Guangzhou LCS Compliance Testing Laboratory Ltd.
Add: No. 44-1, Qianfeng North Road, Shiji Village, Shiji Town, Panyu District,
Guangzhou City, Guangdong, China
Tel: (86) 020-39166689 Fax: (86) 020-39166619 Internet: Http://www.LCS-cert.com

TEST REPORT

Applicant	:	**Shenzhen Gokodo Technology Co., Ltd**
Address	:	**Central Road B Block 13G, Baoyuan Road, Xixiang Street, Baoan Dist., Shenzhen, Guangdong, China (Mainland)**

Report on the submitted samples said to be:

Sample Name	:	**4G Mobile Router**
Trade Mark	:	**Gokodo/QLink**
Style/ Item No.	:	**M6,M7,M6XX,M7XX**
Manufacturer	:	**Shenzhen Gokodo Technology Co., Ltd**
Address	:	**Central Road B Block 13G, Baoyuan Road, Xixiang Street, Baoan Dist., Shenzhen, Guangdong, China (Mainland)**
Sample Receiving Date	:	**October 11, 2018**
Testing Period	:	**October 11, 2018 ~ October 31, 2018**
Results	:	**Please refer to next page(s).**
Conclusion	:	**The results shown on the report comply with the limit in commission Decision of 21 July 2011 amending Directive 2011/65/EU (RoHS).**

Signed for and on behalf of LCS

Written By: Sallie Li
Sallie Li

Approved by: Edison Xia
Edison Xia

The Test Report is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitations of liability, indemnification and jurisdictional issues defined therein. The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full, without prior written permission of the Company.

1. LISTS

No.	Part Name	Report No.
1	White plastic shell	LCS171212030AR
2	Silvery metal(USB)	LCS171212070AR
3	Silvery metal needle(USB)	LCS171212071AR
4	White plastic(USB)	LCS171212058AR
5	White plastic line	LCS171212042AR
6	Silver metal screw	LCS171212061AR
7	Gray plastic line	LCS171212042AR
8	Rad plastic line	LCS171212041AR
9	Silvery metal line	LCS171212069AR
10	Silver sheet	LCS171212075AR
11	Label	LCS171212038AR
12	Golden metal	LCS171212080AR
13	Black plastic case(C1)	LCS171212037AR
14	Silvery metal case(C1)	LCS171212067AR
15	Black plastic(C1)	LCS171212039AR
16	Electriolsis paper(C1)	LCS171212038AR
17	Silvery metal needle(C1)	LCS171212068AR
18	IC	LCS171212123AR
19	Triode	LCS171212026AR
20	Diode	LCS171212025AR
21	Chips of resistance	LCS171212028AR
22	Chips of capacitance	LCS171212027AR
23	PCB	LCS171212050AR
24	Solder on PCB	LCS171212063AR
25	Black plastic shell(plug)	LCS171212030AR

26	Silver pin(plug)	LCS171212071AR
27	Yellow plastic tape(Transformer)	LCS171212032AR
28	Ceramic(Transformer)	LCS171212022AR
29	Black plastic(Transformer)	LCS171212033AR
30	Copper line(Transformer)	LCS171212064AR
31	Silvery metal needle (Transformer)	LCS171212065AR
32	IC(plug)	LCS171212123AR
33	Triode(plug)	LCS171212026AR
34	Diode(plug)	LCS171212025AR
35	Chips of resistance(plug)	LCS171212028AR
36	Chips of capacitance(plug)	LCS171212027AR
37	PCB(plug)	LCS171212050AR
38	Solder on PCB(plug)	LCS171212063AR

2. TEST DATA SUMMARY

Test items	Lead (Pb)	Cadmium (Cd)	Mercury (Hg)	Hexavalent Chromium Cr(VI)	PBBs	PBDEs
Unit	ppm	ppm	ppm	ppm	ppm	ppm
1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
6	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
7	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
8	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
9	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
10	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
11	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

12	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
13	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
14	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
15	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
16	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
17	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
18	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
19	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
20	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
21	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
22	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
23	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
24	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
25	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
26	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
27	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
28	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
29	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
30	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
31	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
32	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
33	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
34	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
35	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
36	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
37	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
38	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

Note:

(1) N.D. = Not detected (<MDL) (2) ppm = mg/kg (3) N.A. = Not Analyzed

(4) Negative = the concentration of Hexavalent Chromium extracted from 50cm2 sample is less than the detection limit.

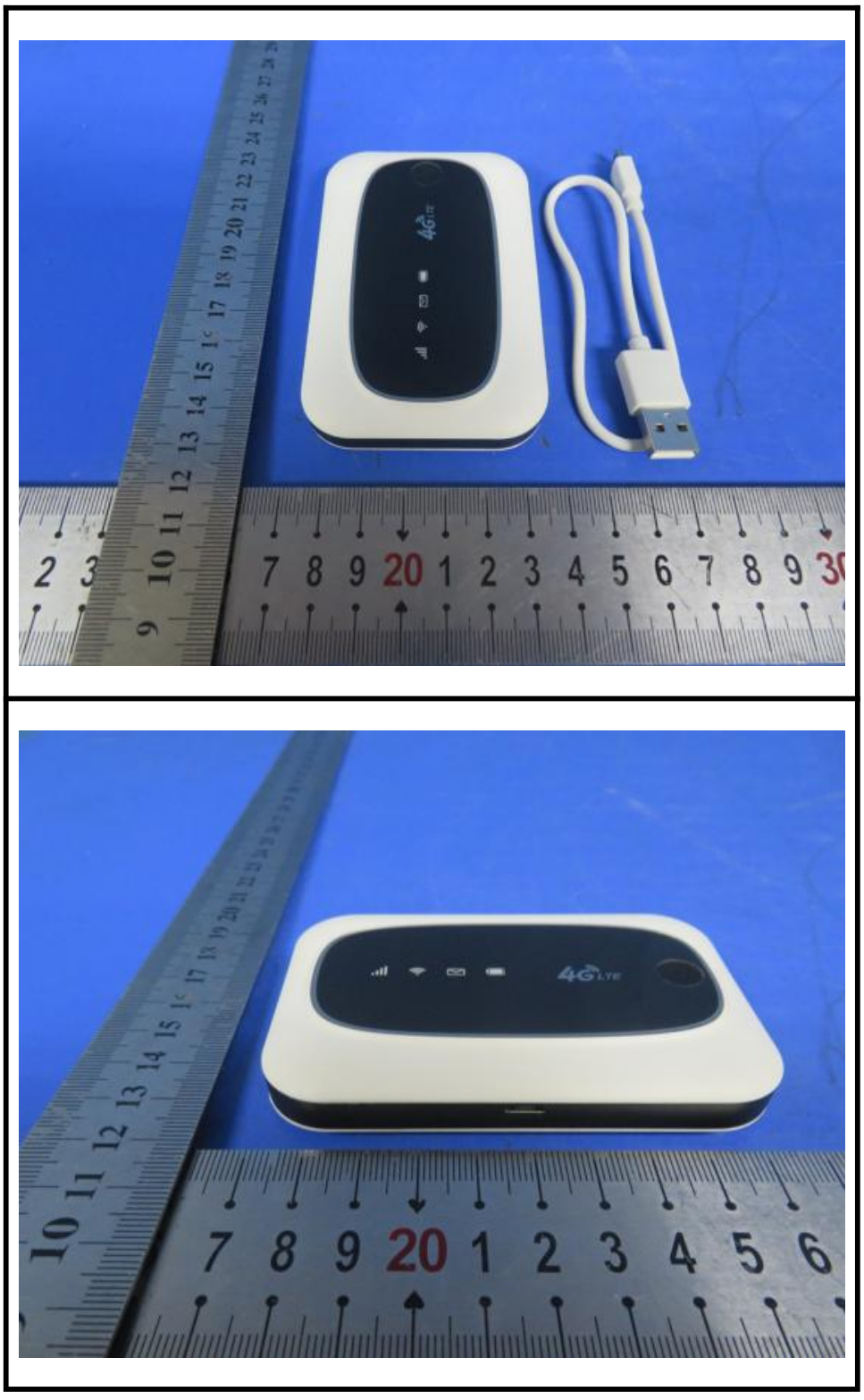
Remark: Lead in electronic components, which are exempted from (RoHS) the requirements.

Disclaimer:

- The integration report is not equivalent to the test report.
- LCS does not shoulder responsibility for the authenticity of all the test data listed in integration report, which are submitted by the applicants.
- The applicants are responsible for all legal obligation caused by the inaccuracy and invalidity of the original report.
- If this disclaimer contradicts any other terms and conditions of LCS, this disclaimer will prevail.

3. PHOTOGRAPHS OF TEST SAMPLE







LCS authenticate the photo on original report only

End of Report

CERTIFICATE
of Conformity

Reference No. : **LCS181011002CR**

Applicant : **Shenzhen Gokodo Technology Co., Ltd**

Address : **Central Road B Block 13G, Baoyuan Road, Xixiang Street, Baoan Dist., Shenzhen, Guangdong, China (Mainland)**

Trademark : **Gokodo/QLink**

Product : **4G Mobile Router**

Model(s) : **M6,M7,M6XX,M7XX**

The submitted products have been tested by us with the listed standards and found in compliance with the following European Directives:

The RoHS Directive 2011/65/EU

IEC 62321-3-1:2013 IEC 62321-5:2013 IEC 62321-4:2013+AMD1:2017 CSV
IEC 62321-6:2015 IEC 62321-7-1:2015 IEC 62321-7-2:2017

The tests were performed in normal operation mode. The test results apply only to the particular sample tested and to the specific tests carried out. This certificate applies specifically to the sample investigated in our test reference number only.

The RoHS markings as shown below can be affixed on the product after preparation of necessary technical documentation.

Other relevant Directives have to be observed.

RoHS

Centre of Testing Service * APPROVED *

Date of issue:October 31, 2018

Manager

Guangzhou LCS Compliance Testing Laboratory Ltd.
No. 44-1, Qianfeng North Road, Shiji Village, Shiji Town, Panyu District,
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EMC TEST REPORT

For

Shenzhen Gokodo Technology Co., Ltd

4G Mobile Router

Test Model: M6

Additional Model No.: M7, M6XX, M7XX

("X" stands for 0-9 and "X" stands for a-z or A-Z)

Prepared for	:	Shenzhen Gokodo Technology Co., Ltd
Address	:	Central Road B Block 13G，Baoyuan Road, Xixiang Street, Baoan Dist., Shenzhen, Guangdong, China (Mainland)
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	October 11, 2018
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	October 11, 2018 ~ October 15, 2018
Date of Report	:	November 23, 2018

CE

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EMC TEST REPORT
EN 55032: 2015
Electromagnetic compatibility of multimedia equipment - Emission requirements
EN 55024: 2010+A1: 2015
Information technology equipment-Immunity characteristics-Limits and methods of measurement

Report Reference No. .....:	**LCS181011004AE**
Date Of Issue.....:	November 23, 2018
Testing Laboratory Name.....:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address.....:	Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure .....:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....:	**Shenzhen Gokodo Technology Co., Ltd**
Address.....:	Central Road B Block 13G, Baoyuan Road, Xixiang Street, Baoan Dist., Shenzhen, Guangdong, China (Mainland)
Test Specification:	
Standard .....:	EN 55032: 2015 EN 55024: 2010+A1: 2015
Test Report Form No.....:	LCSEMC-1.0
TRF Originator.....:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF .....:	Dated 2011-03

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Test Item Description.....:	**4G Mobile Router**
Trade Mark.....:	Gokodo
Test Model.....:	M6
Ratings .....:	DV 5V, 1A
Result .....:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Skyuy Shen	Davey Xu	
Skylly Shen/ File administrators	Davey Xu/ Technique principal	Gavin Liang/ Manager

EMC -- TEST REPORT

Test Report No. : LCS181011004AE	November 23, 2018 Date of issue

Test Model.....	:	M6
EUT.....	:	4G Mobile Router
Applicant.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G，Baoyuan Road, Xixiang Street, Baoan Dist., Shenzhen, Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G，Baoyuan Road, Xixiang Street, Baoan Dist., Shenzhen, Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/
Factory.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G，Baoyuan Road, Xixiang Street, Baoan Dist., Shenzhen, Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/

Test Result according to the standards on page 6: **Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory

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Revision History

Revision	Issue Date	Revisions	Revised By
000	November 23, 2018	Initial Issue	Gavin Liang

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1. SUMMARY OF STANDARDS AND RESULTS

1.1.Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION (EN 55032: 2015)			
Description of Test Item	**Standard**	**Limits**	**Results**
Conducted disturbance at mains terminals	EN 55032: 2015	Class B	N/A
Conducted disturbance at telecommunication port	EN 55032: 2015	Class B	N/A
Radiated disturbance	EN 55032: 2015	Class B	PASS
Harmonic current emissions	EN 61000-3-2: 2014	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3: 2013	--------	N/A

IMMUNITY(EN 55024: 2010+A1: 2015)			
Description of Test Item	**Basic Standard**	**Performance Criteria**	**Results**
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Radio-frequency, Continuous radiated disturbance	EN 61000-4-3: 2006+A2: 2010	A	PASS
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	N/A
Surge (Input a.c. power ports)	EN 61000-4-5:2014+A1:2017	B	N/A
Surge (Telecommunication ports)		B	N/A
Radio-frequency, Continuous conducted disturbance	EN 61000-4-6: 2014	A	N/A
Power frequency magnetic field	EN 61000-4-8: 2010	A	PASS
Voltage dips, >95% reduction	EN 61000-4-11:2004+A1:2017	B	N/A
Voltage dips, 30% reduction		B	N/A
Voltage interruptions		C	N/A
N/A is an abbreviation for Not Applicable.			

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1.2.Description of Performance Criteria

General Performance Criteria

Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

— essential operational modes and states;
— tests of all peripheral access (hard disks, floppy disks, printers, keyboard, mouse, etc.);
— quality of software execution;
— quality of data display and transmission;
— quality of speech transmission.

1.2.1.Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacture when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deliver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.2.Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacture, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operation state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be deliver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.3.Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacture's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be loss.

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2. GENERAL INFORMATION

2.1.Description of Device (EUT)

EUT : 4G Mobile Router

Trade Mark : Gokodo

Test Model : M6

Power Supply : DV 5V, 1A

EUT Clock Frequency : ≤ 108MHz

2.2.Description of Test Facility

Site Description

EMC Lab. : FCC Registration Number. is 254912.

Industry Canada Registration Number. is 9642A-1.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001.

NVLAP Registration Code is 600167-0.

2.3.Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

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2.4.Measurement Uncertainty

Test	Parameters	Expanded uncertainty (U_{lab})	Expanded uncertainty (U_{cispr})
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 2.63 dB ± 2.35 dB	± 3.8 dB ± 3.4 dB
Power disturbance	Level accuracy (30MHz to 300MHz)	± 2.90dB	± 4.5 dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	± 3.60 dB	± 3.3 dB
Radiated Emission	Level accuracy (9kHz to 30MHz)	± 3.68 dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	± 3.48 dB	± 5.3 dB
Radiated Emission	Level accuracy (above 1000MHz)	± 3.90 dB	± 5.2 dB
Mains Harmonic	Voltage	± 0.510%	N/A
Voltage Fluctuations & Flicker	Voltage	± 0.510%	N/A
EMF		± 21.59%	N/A

(1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

(2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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3. MEASURING DEVICE AND TEST EQUIPMENT

3.1.Radiated Disturbance (Electric Field)

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16
2	EMI Test Receiver	ROHDE & SCHWARZ	ESR 7	101181	2018-06-16
3	By-Log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-05-01
4	EMI Test Software	AUDIX	E3	N/A	2018-06-16
5	Positioning Controller	MF	MF-7082	/	2018-06-16

3.2.Electrostatic Discharge

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ESD Simulator	SCHLODER	SESD 230	604035	2018-06-16

3.3.RF Field Strength Susceptibility

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	RF POWER AMPLIFIER	OPHIR	5225R	1052	NCR
2	RF POWER AMPLIFIER	OPHIR	5273F	1019	NCR
3	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	NCR
4	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-484	NCR
5	Signal Generator	Agilent	E4438C	MY42081396	2017-11-17
6	Electric field probe	Narda S.TS./PMM	EP601	611WX80208	2018-03-26
7	Power Meter	Agilent	E4419B	MY45104493	2018-06-16
8	Power Sensor	Agilent	E9301H	MY41495234	2018-06-16
9	Power Sensor	Agilent	E4412A	MY41500229	2018-06-16
Note: NCR means no calibration requirement					

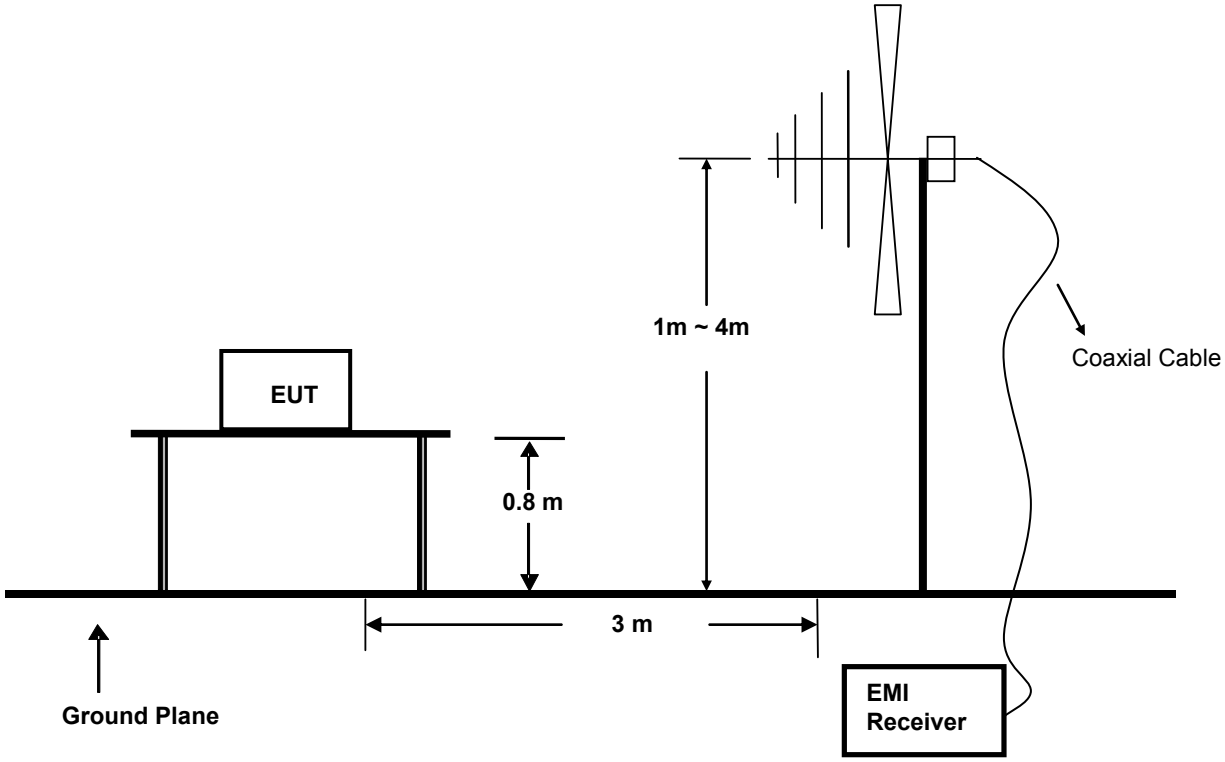
3.4.Power Frequency Magnetic Field Susceptibility

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Power frequency mag-field generator System	EVERFINE	EMS61000-8K	906003	2018-06-16

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4. RADIATED EMISSION MEASUREMENT

4.1.Block Diagram of Test Setup



4.2.Measuring Standard

EN 55032: 2015

4.3.Radiated Emission Limits

EN 55032 Limits:

All emanations from a class B device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dBμV/m)
30 ~ 230	3	40
230 ~ 1000	3	47

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.
(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

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4.4.EUT Configuration on Test

The EN 55032 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.5.Operating Condition of EUT

4.5.1 Turn on the power.

4.5.2 After that, let the EUT work in test mode USB and measure it.

4.6.Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. By-log antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the Receiver is set at 120kHz.

The frequency range from 30MHz to 1000MHz is investigated.

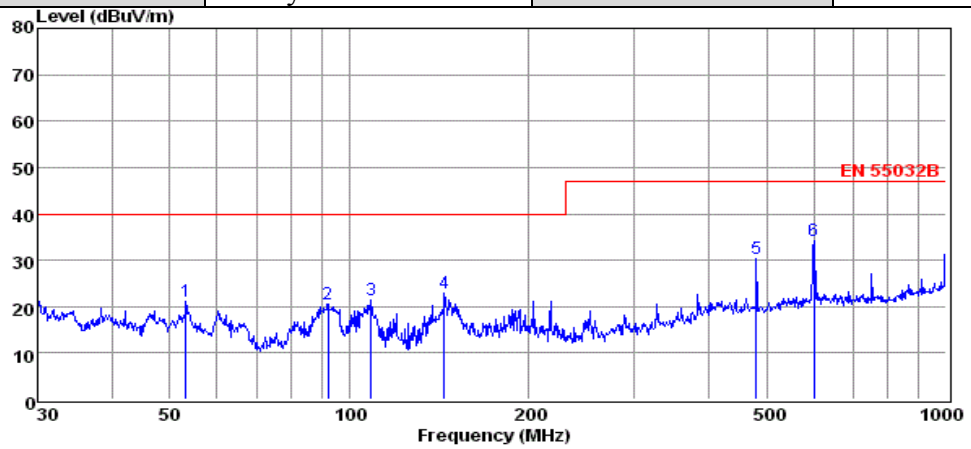
4.7.Test Results

PASS.

The test result please refer to the next page.

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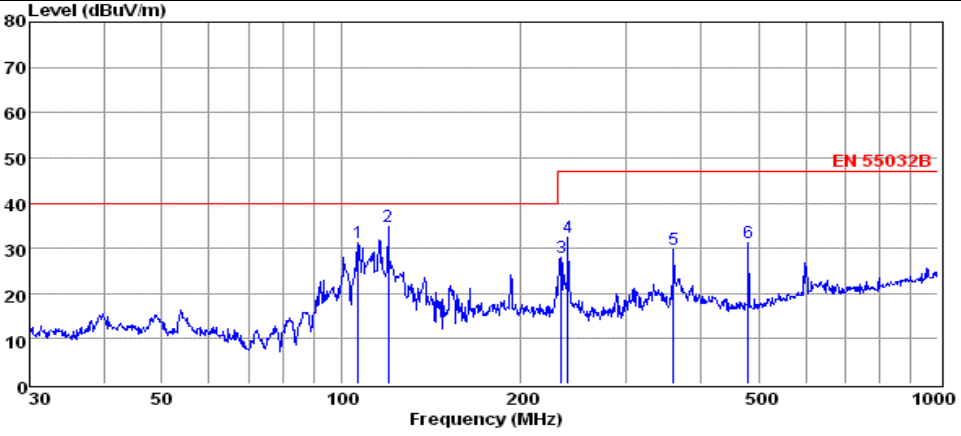
Test Model	M6	Test Mode	USB
Environmental Conditions	23.4℃, 53.8% RH	Detector Function	Quasi-peak
Pol	Vertical	Distance	3m
Test Engineer	Sunny Chen		



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	53.13	7.66	0.46	13.11	21.23	40.00	-18.77	QP
2	92.14	7.77	0.56	12.30	20.63	40.00	-19.37	QP
3	108.65	8.29	0.68	12.37	21.34	40.00	-18.66	QP
4	144.33	13.98	0.71	8.22	22.91	40.00	-17.09	QP
5	480.53	12.99	1.31	16.08	30.38	47.00	-16.62	QP
6	601.43	14.31	1.43	18.46	34.20	47.00	-12.80	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Test Model	M6	Test Mode	USB
Environmental Conditions	23.4℃, 53.8% RH	Detector Function	Quasi-peak
Pol	Horizontal	Distance	3m
Test Engineer	Sunny Chen		



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	106.76	18.08	0.68	12.54	31.30	40.00	-8.70	QP
2	119.86	23.69	0.64	10.51	34.84	40.00	-5.16	QP
3	233.35	15.15	0.98	11.79	27.92	47.00	-19.08	QP
4	239.99	19.23	1.01	12.09	32.33	47.00	-14.67	QP
5	360.45	14.18	1.18	14.43	29.79	47.00	-17.21	QP
6	480.53	13.85	1.31	16.08	31.24	47.00	-15.76	QP

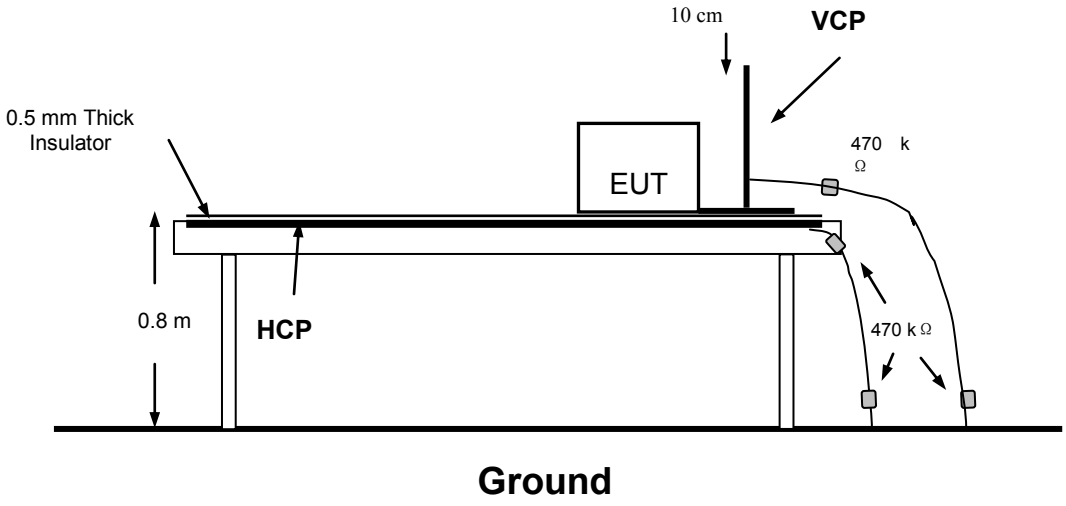
Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Note: Pre-Scan all mode, Thus record worse case mode result in this report.

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5. ELECTROSTATIC DISCHARGE IMMUNITY TEST

5.1.Block Diagram of Test Setup



5.2.Test Standard

EN 55024: 2010+A1: 2015,

Severity Level: 3 / Air Discharge: ±8KV, Level: 2 / Contact Discharge: ±4KV)

5.3.Severity Levels and Performance Criterion

5.3.1.Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	±2	±2
2.	±4	±4
3.	±6	±8
4.	±8	±15
X	Special	Special

5.3.2.Performance Criterion: **B**

5.4.EUT Configuration on Test

The configuration of EUT is listed in Section 2.1.

5.5.Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.5. Except the test set up replaced by Section 5.1.

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5.6.Test Procedure

5.6.1.Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT.
After each discharge, the discharge electrode shall be removed from the EUT.
The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

5.6.2.Contact Discharge

All the procedure shall be same as Section 5.6.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

5.6.3.Indirect Discharge For Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

5.6.4.Indirect Discharge For Vertical Coupling Plane

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

5.7.Test Results

PASS.

Please refer to the following pages

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Electrostatic Discharge Test Results

Standard	☐ IEC 61000-4-2 ☑ EN 61000-4-2		
Applicant	Shenzhen Gokodo Technology Co., Ltd		
EUT	4G Mobile Router	**Temperature**	23.8℃
M/N	M6	**Humidity**	53.1％
Criterion	B	**Pressure**	1021mbar
Test Mode	USB	**Test Engineer**	Sunny Chen

Air Discharge

Test Points	Test Levels			Results		
	± 2kV	± 4kV	± 8kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☒	☐	☐A ☒B
Top	☒	☒	☒	☒	☐	☐A ☒B
Bottom	☒	☒	☒	☒	☐	☐A ☒B

Contact Discharge

Test Points	Test Levels		Results		
	± 2 kV	±4 kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B
Top	☒	☒	☒	☐	☐A ☒B
Bottom	☒	☒	☒	☐	☐A ☒B

Discharge To Horizontal Coupling Plane

Side of EUT	Test Levels		Results		
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B

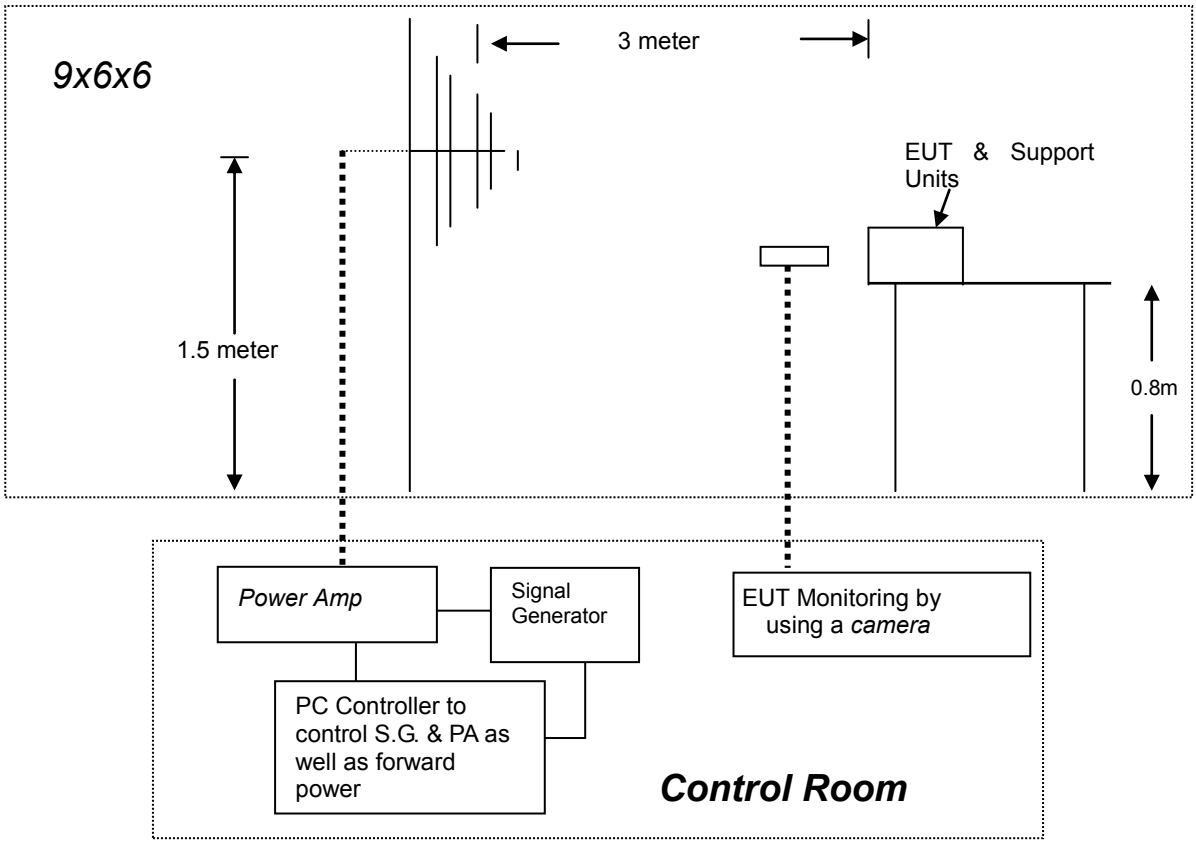
Discharge To Vertical Coupling Plane

Side of EUT	Test Levels		Results		
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B

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6. RF FIELD STRENGTH SUSCEPTIBILITY TEST

6.1.Block Diagram of Test



6.2.Test Standard

EN 55024: 2010+A1: 2015,

(EN 61000-4-3: 2006+A2: 2010, Severity Level: 2, 3V / m)

6.3.Severity Levels and Performance Criterion

6.3.1.Severity Levels

Level	Field Strength (V/m)
1.	1
2.	3
3.	10
X.	Special

6.3.2.Performance Criterion: **A**

6.4.EUT Configuration on Test

The configuration of the EUT is same as Section 2.1.

6.5.Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 4.5, except the test setup replaced as Section 6.1.

6.6.Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.
In order to judge the EUT performance, a CCD Recording is used to monitor its screen.
All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	3V/m (Severity Level 2)
2. Radiated Signal	Unmodulated
3. Scanning Frequency	80-6000MHz
4. Sweep time of radiated	0.0015 Decade/s
5. Dwell Time	3 Sec.

6.7.Test Results

PASS.

Please refer to the following page.

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RF Field Strength Susceptibility Test Results

Standard	☐ IEC 61000-4-3 ☑ EN 61000-4-3		
Applicant	Shenzhen Gokodo Technology Co., Ltd		
EUT	4G Mobile Router	**Temperature**	24.3℃
M/N	M6	**Humidity**	53.1%
Field Strength	3 V/m	**Criterion**	A
Test Mode	USB	**Test Engineer**	Sunny Chen
Frequency Range	80 MHz to 6000MHz		
Modulation	☐None ☐ Pulse ☑AM 1KHz 80%		
Steps	1%		

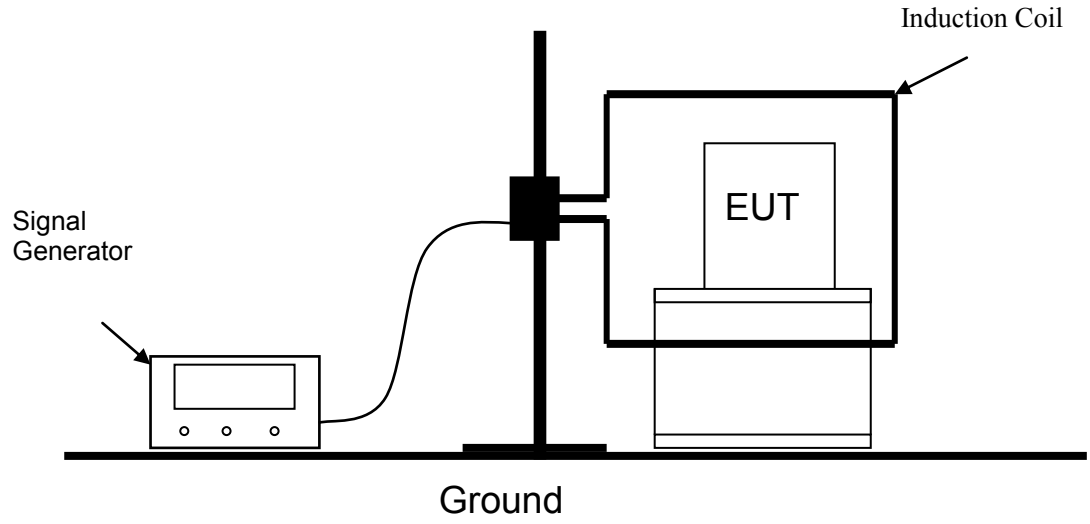
	Horizontal	**Vertical**
Front	PASS	PASS
Right	PASS	PASS
Rear	PASS	PASS
Left	PASS	PASS

Note:

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7. MAGNETIC FIELD SUSCEPTIBILITY TEST

7.1.Block Diagram of Test Setup



7.2.Test Standard

EN 55024: 2010+A1: 2015,

(EN 61000-4-8: 2010, Severity Level: Level 1, 1A / m)

7.3.Severity Levels and Performance Criterion

7.3.1.Severity Levels

Level	Field Strength (A/m)
1	1
2	3
3	10
4	30
5	100
X	Special

7.3.2.Performance Criterion: **A**

7.4.EUT Configuration on Test

The configuration of the EUT is same as Section 2.1.

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7.5. Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. Both horizontal and vertical polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

7.6. Test Results

PASS.

Please refer to the following page.

Magnetic Field Immunity Test Result

Standard	☐ IEC 61000-4-8 ☑ EN 61000-4-8		
Applicant	Shenzhen Gokodo Technology Co., Ltd		
EUT	4G Mobile Router	**Temperature**	23.5℃
M/N	M6	**Humidity**	53.2%
Test Mode	USB	**Criterion**	A
Test Engineer	Sunny Chen		

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result
1	5 mins	X	A	PASS
1	5 mins	Y	A	PASS
1	5 mins	Z	A	PASS

Note:

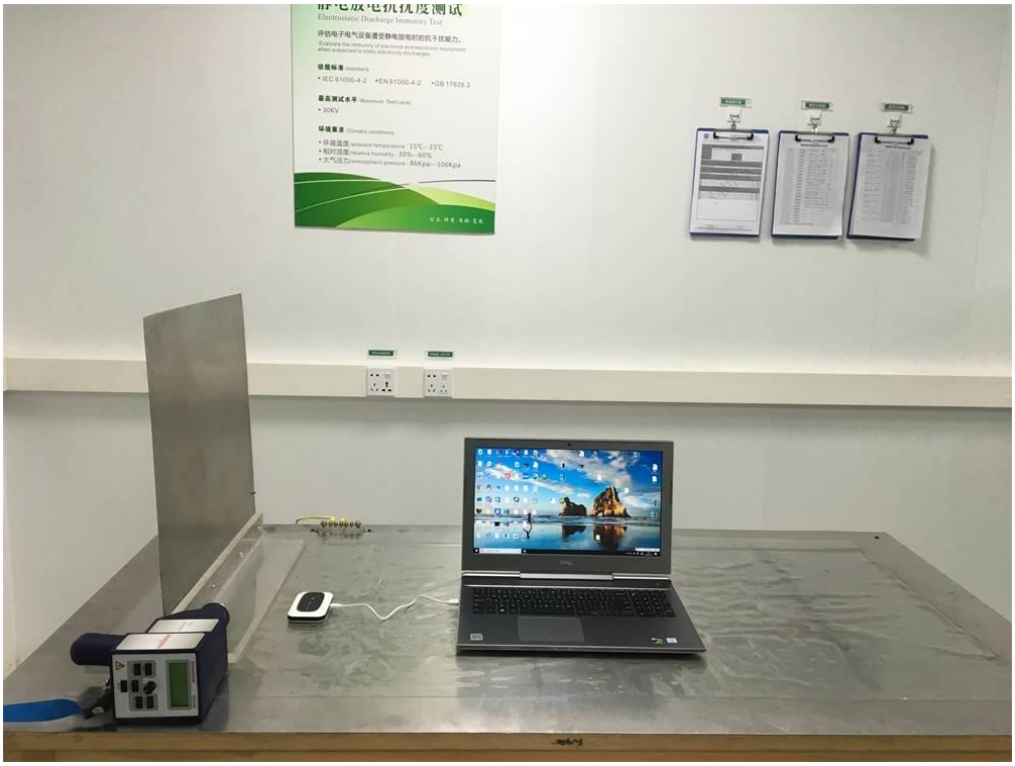
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9. PHOTOGRAPH

9.1.Photo of Radiated Measurement



9.2.Photo of Electrostatic Discharge Test



9.3.Photo of Radio-frequency, Continuous radiated disturbance



9.4.Photo of Magnetic Field Immunity Test



10. EXTERNAL AND INTERNAL PHOTOS OF THE EUT



Fig. 1



Fig. 2

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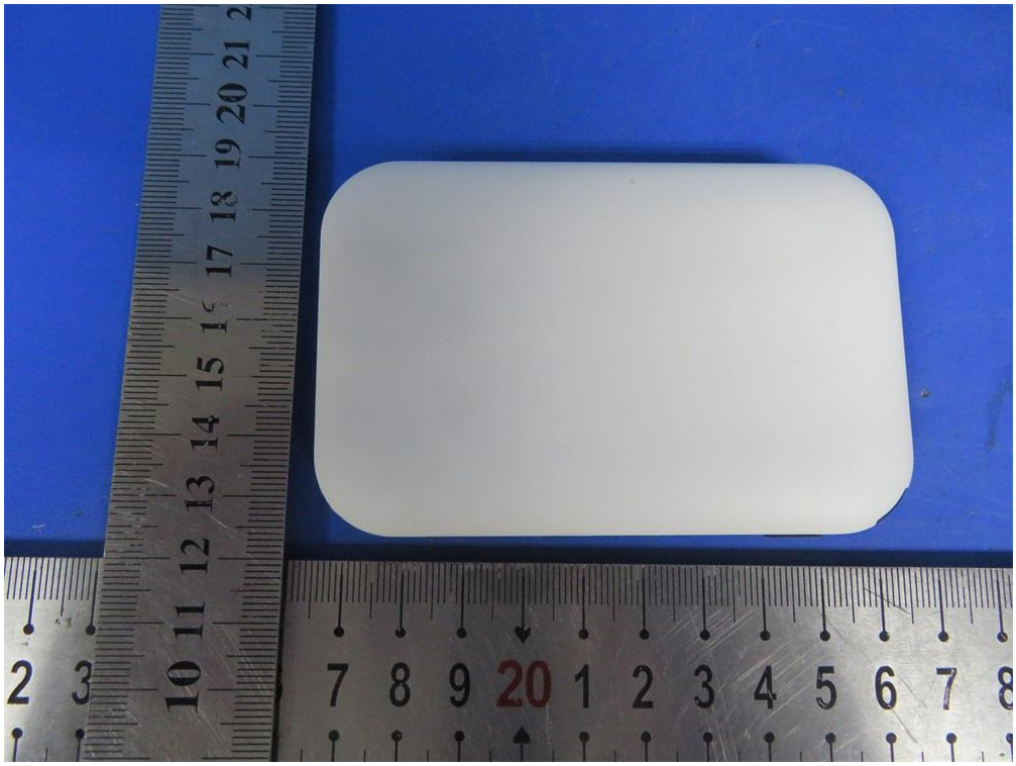


Fig. 3


BATTERY LITHIUM-ION 2000mAh (7.4Wh)
NOMINAL VOLTAGE: 3. 7V
LIMITED CHARGE VOLTAGE:4.2V
STANDARD:GB/T 18287-2000
Use only original batteries and chargers
Do not disassemble or circuit the battery
Must be recycled or disposed of properly
May explode if damaged or disposed of in fire
GKD 20171105-02000
2G/3G/4G WIRELESS ROUTER
TDD-LTE/FDD-LTE/WCDMA/HSPA+/GSM NETWORK
WIFI SSID:M6XX_XXXX/M7XX_XXXX
WIFI KEY:1234567890
IMEI:865298030737534
MODEL:M6/M7
MADE IN CHINA

Fig. 4

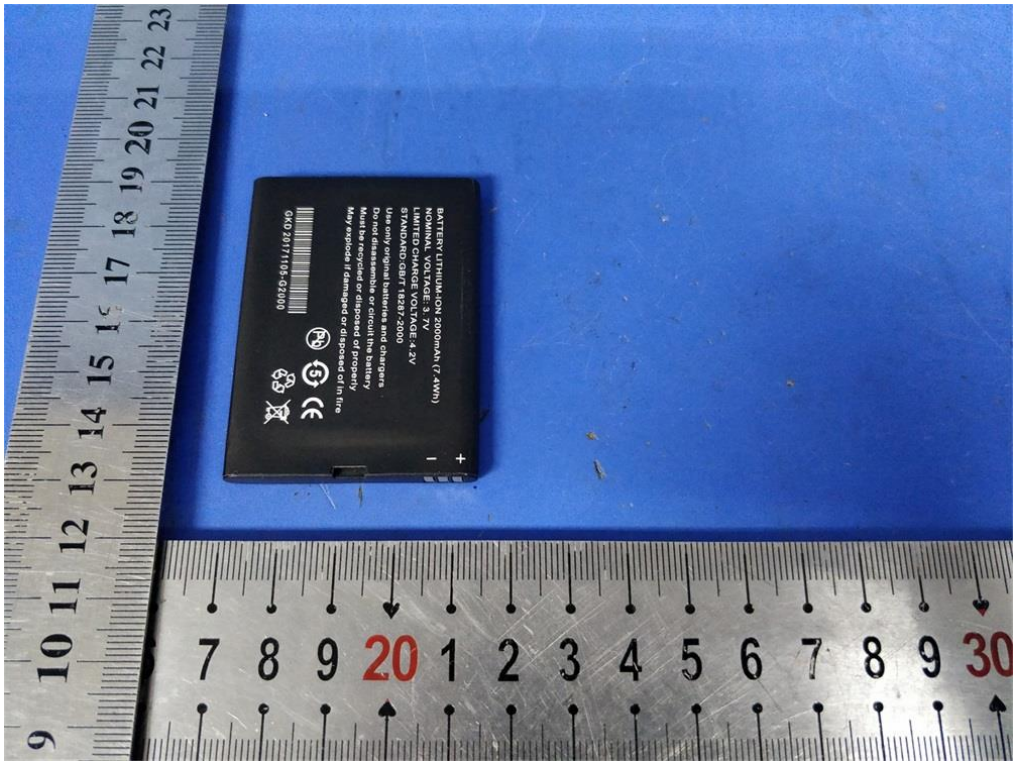

BATTERY LITHIUM-ION 2000mAh (7.4Wh)
NOMINAL VOLTAGE 3.7V
LIMITED CHARGE VOLTAGE 4.2V
STANDARD GB/T 18287-2000
Use only original batteries and chargers
Do not disassemble or circuit the battery
Must be recycled or disposed of properly
May explode if damaged or disposed of in fire
0K0 201711 05-02000

Fig. 5

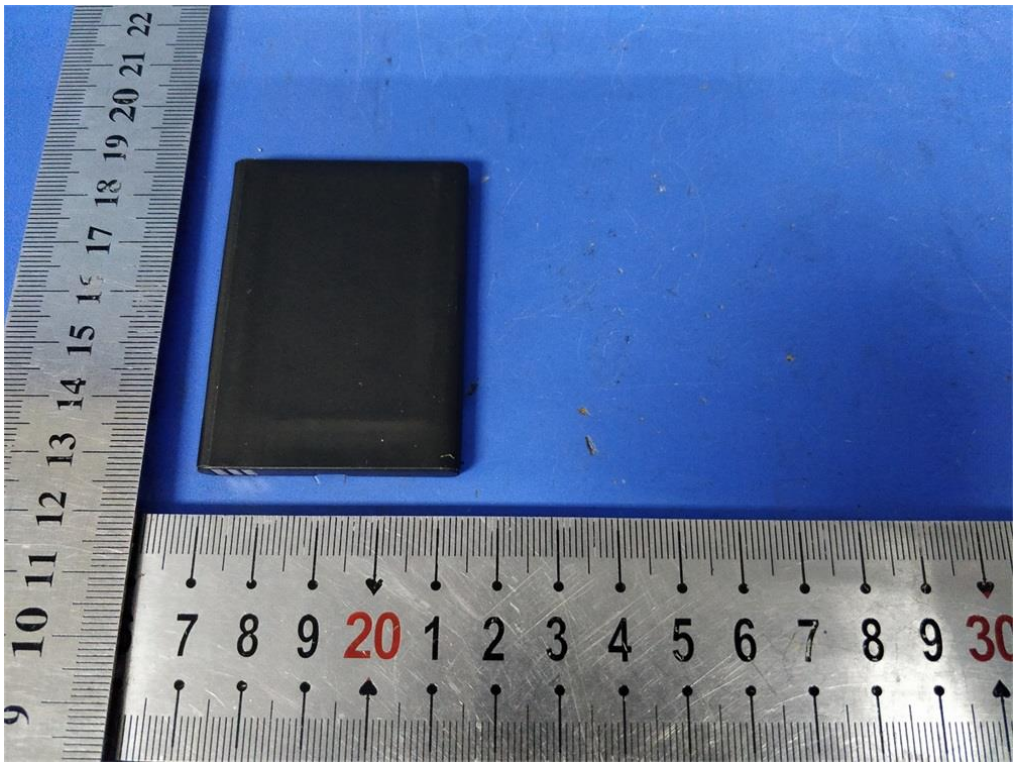


Fig. 6

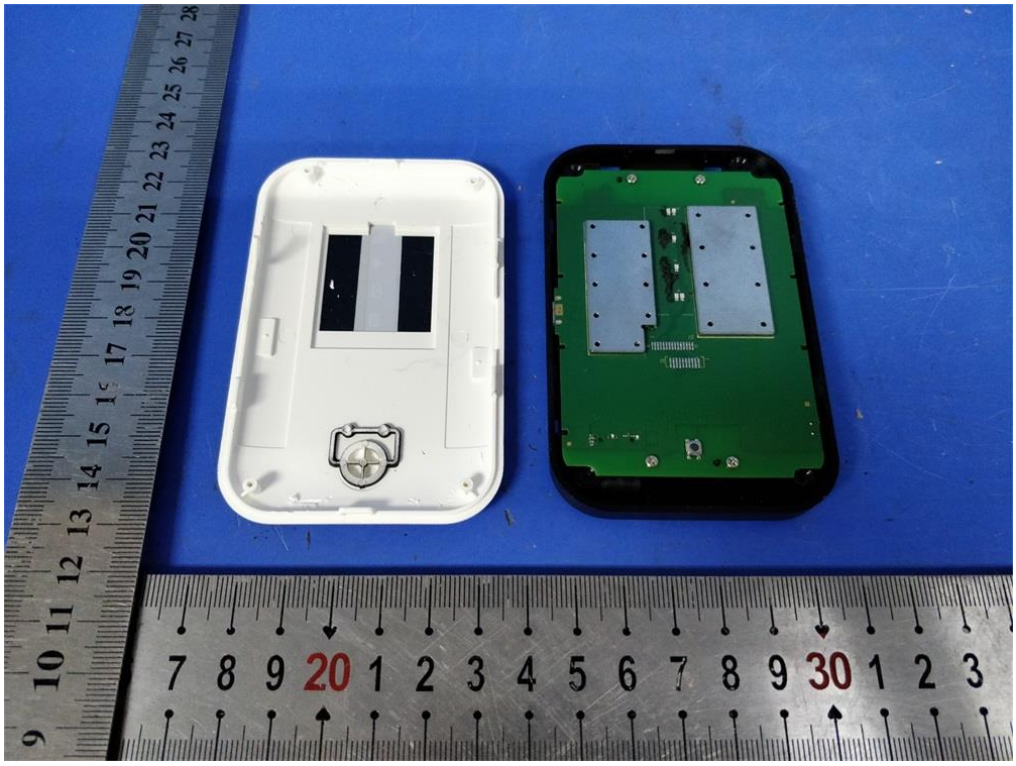


Fig. 7



Fig. 8

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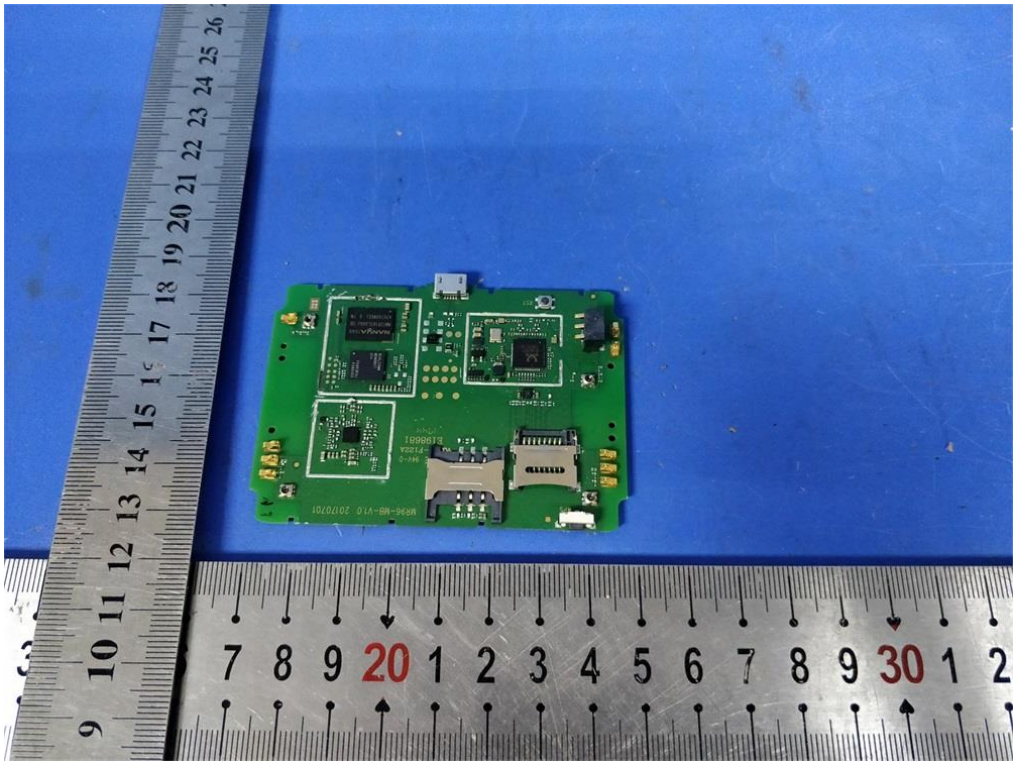


Fig. 9

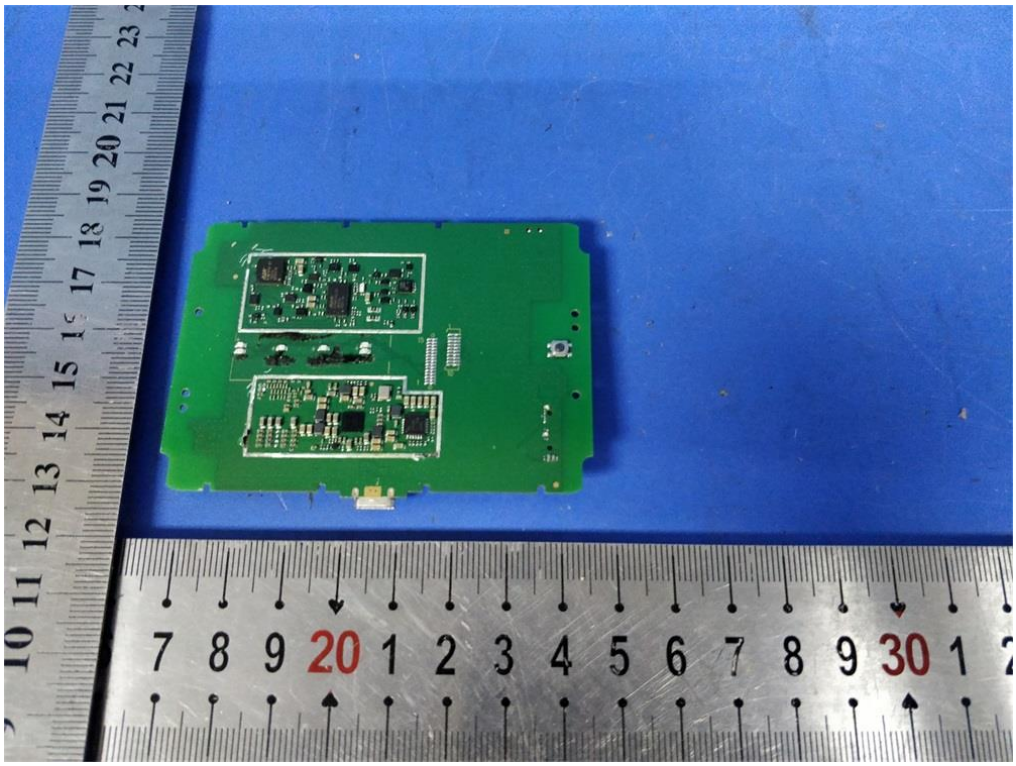


Fig. 10

----------THE END OF TEST REPORT----------

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CERTIFICATE
of Conformity

Reference No.	:	**LCS181011004AE**
Applicant	:	**Shenzhen Gokodo Technology Co., Ltd**
Address	:	**Central Road B Block 13G, Baoyuan Road, Xixiang Street, Baoan Dist., Shenzhen, Guangdong, China (Mainland)**
Trade Mark	:	**Gokodo/QLink**
Product	:	**4G Mobile Router**
Model(s)	:	**M6, M7, M6XX, M7XX("X" stands for 0-9 and "X" stands for a-z or A-Z)**

The submitted products have been tested by us with the listed standards and found in compliance with the following European Directives:

The EMC Directive 2014/30/EU

EN 55032: 2015, EN 55024: 2010+A1: 2015

The tests were performed in normal operation mode. The test results apply only to the particular sample tested and to the specific tests carried out. This certificate applies specifically to the sample investigated in our test reference number only.

The CE markings as shown below can be affixed on the product after preparation of necessary technical documentation.

Other relevant Directives have to be observed.

CE

Centre of Testing Service * APPROVED *

Date of issue: November 23, 2018

Manager

Shenzhen LCS Compliance Testing Laboratory Ltd.
Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel: (86)755-82591330 Fax: (86)755-82591332
Http://www.lcs-cert.com Email: webmaster@lcs-cert.com

TEST REPORT

IEC 60950-1
Information technology equipment – Safety – Part 1: General requirements

Report Number. ..... :	LCS181011005AS
Date of issue ..... :	2018-11-09
Total number of pages ..... :	58
Applicant's name ..... :	Shenzhen Gokodo Technology Co., Ltd
Address ..... :	Central Road B Block 13G, Baoyuan Road, Xixiang Street, Baoan Dist., Shenzhen, Guangdong, China (Mainland)
Test specification:	
Standard ..... :	IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013
Test procedure ..... :	Type test
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC60950_1F
Test Report Form(s) Originator .... :	SGS Fimko Ltd
Master TRF ..... :	Dated 2014-02

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This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel: +(86) 0755-8259 1330 | Fax: +(86) 0755-8259 1332 | E-mail: webmaster@lcs-cert.com | http:// www.lcs-cert.com

Test item description ..... :	4G Mobile Router
Trade Mark ..... :	Gokodo, QLink
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	M6, M7, M6XX, M7XX
Ratings ..... :	Input: 5V⎓, 1A Battery: 3.7V⎓, 2000mAh

Testing procedure and testing location:			
☒	**Testing Laboratory:**	Shenzhen LCS Compliance Testing Laboratory Ltd.	
Testing location/ address ..... :		Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China	
☐	**Associated Testing Laboratory:**	N/A	
Testing location/ address ..... :		N/A	
Tested by ..... :		Simple Zhang / Test Engineer	
Checked by ..... :		Eli.Zhang/ Project Engineer	
Approved by ..... :		Peter Chen / Project Manager	

Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel: +(86) 0755-8259 1330 | Fax: +(86) 0755-8259 1332 | E-mail: webmaster@lcs-cert.com | http:// www.lcs-cert.com

List of Attachments (including a total number of pages in each attachment):

Attachment No. 1: EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES (18 pages)

Attachment No. 2: Photo documentation. (4 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
The submitted samples were found to comply with the requirements of: Electrical safety ➢ IEC 60950-1:2005 ➢ IEC 60950-1:2005/AMD1:2009 ➢ IEC 60950-1:2005/AMD2:2013 ➢ EN 60950-1:2006+A11:2009+A1:2010+ A12:2011+A2:2013	Shenzhen LCS Compliance Testing Laboratory Ltd. Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China

Summary of compliance with National Differences:

List of countries addressed: National Differences and Group Differences, Refer Attachment No. 1 for details

☒ The product fulfils the requirements of EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013.

Copy of marking plate:

The artwork below may be only a draft.

Gokodo
4G Mobile Router
Model: M6
Input: 5V⎓, 1A
Battery: 3.7V⎓, 2000mAh
Importer: XXXX
Address: XXXX

Shenzhen Gokodo Technology Co., Ltd
Made in China

Remark:

1. The 4G Mobile Router has two trademarks, including Gokodo, QLink . Gokodo is a trademark representative.
2. The height dimension of CE mark should not less than 5mm, the height dimension of WEEE symbol should not less than 7mm.

Test item particulars..... :	
Equipment mobility.....:	[X] movable [] hand-held [X] transportable [] stationary [] for building-in [] direct plug-in
Connection to the mains.....:	[] pluggable equipment [] type A [] type B [] permanent connection [] detachable power supply cord [] non-detachable power supply cord [X] not directly connected to the mains
Operating condition.....:	[X] continuous [] rated operating / resting time:
Access location .....:	[X] operator accessible [] restricted access location
Over voltage category (OVC) .....:	[] OVC I [] OVC II [] OVC III [] OVC IV [X] other: not directly connected to the mains
Mains supply tolerance (%) or absolute mains supply values .....:	Not directly connected to the mains
Tested for IT power systems .....:	[] Yes [X] No
IT testing, phase-phase voltage (V) .....:	N/A
Class of equipment .....:	[] Class I [] Class II [X] Class III [] Not classified
Considered current rating of protective device as part of the building installation (A) .....:	N/A
Pollution degree (PD) .....:	[] PD 1 [X] PD 2 [] PD 3
IP protection class .....:	IP20
Altitude during operation (m) .....:	≤ 2000
Altitude of test laboratory (m) .....:	≤ 500
Mass of equipment (kg) .....:	approx. 0.186
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	2018-10-11
Date (s) of performance of tests .....:	From 2018-10-11 to 2018-11-09

Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
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General remarks:
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.** According to the EU directives which have been aligned with EU NLF (new legislative framework), both of manufacturer and importer's name and address shall be affixed on the product or, where that is not possible, on its packaging or in a document accompanying the product before the product is placed on the EU market. The manufacturer/ Importer has to ensure the appliance placing on the EU market conforms to the applicable EU directives which provide the affixing of the CE marking, such as LVD, EMC, RoHS, ErP, and so on.
When differences exist; they shall be identified in the General product information section.
Name and address of factory (ies) ..... : Same as manufacturer
General product information: 1. The product was submitted and tested for use at the manufacturer's recommended ambient temperature (Tma) of 45°C. 2. Instructions and equipment marking related to safety is applied in the language that is acceptable in the country in which the equipment is to be sold. 3. All electronic components were mounted on PCB and housed with plastic enclosure. 4. Battery pack was also evaluated according to standard IEC/EN 62133. 5. All models are identical to each other except for model name, all test were performed on model M6.

Abbreviations used in the report:

- normal conditions	**N.C**.	- single fault conditions	**S.F.C**
- functional insulation	**OP**	- basic insulation	**BI**
- double insulation	**DI**	- supplementary insulation	**SI**
- between parts of opposite polarity	**BOP**	- reinforced insulation	**RI**

Indicate used abbreviations (if any)

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1	**GENERAL**		P
1.5	**Components**		P
1.5.1	General		P
	Comply with IEC 60950-1 or relevant component standard	(see appended tables 1.5.1)	P
1.5.2	Evaluation and testing of components	Components which are certified to IEC and/or national standards are used correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment.	P
1.5.3	Thermal controls	No thermal controls.	N/A
1.5.4	Transformers	No Transformers	N/A
1.5.5	Interconnecting cables		N/A
1.5.6	Capacitors bridging insulation		N/A
1.5.7	Resistors bridging insulation		N/A
1.5.7.1	Resistors bridging functional, basic or supplementary insulation		N/A
1.5.7.2	Resistors bridging double or reinforced insulation between a.c. mains and other circuits		N/A
1.5.7.3	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable		N/A
1.5.8	Components in equipment for IT power systems		N/A
1.5.9	Surge suppressors		N/A
1.5.9.1	General		N/A
1.5.9.2	Protection of VDRs		N/A
1.5.9.3	Bridging of functional insulation by a VDR		N/A
1.5.9.4	Bridging of basic insulation by a VDR		N/A
1.5.9.5	Bridging of supplementary, double or reinforced insulation by a VDR		N/A
1.6	**Power interface**		P
1.6.1	AC power distribution systems	Not directly connected to mains	N/A
1.6.2	Input current	(see appended table 1.6.2)	P
1.6.3	Voltage limit of hand-held equipment		N/A
1.6.4	Neutral conductor		N/A
1.7	**Marking and instructions**		P

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.1	Power rating and identification markings		P
1.7.1.1	Power rating marking		P
	Multiple mains supply connections.....:		N/A
	Rated voltage(s) or voltage range(s) (V) ..... :	5V	P
	Symbol for nature of supply, for d.c. only ..... :	⎓	P
	Rated frequency or rated frequency range (Hz) ... :		N/A
	Rated current (mA or A) ..... :	1A	P
1.7.1.2	Identification markings		P
	Manufacturer's name or trade-mark or identification mark ..... :	(see copy of marking plate)	P
	Model identification or type reference .....:	(see copy of marking plate)	P
	Symbol for Class II equipment only ..... :		N/A
	Other markings and symbols ..... :	(see copy of marking plate)	P
1.7.1.3	Use of graphical symbols		N/A
1.7.2	Safety instructions and marking	Provided	P
1.7.2.1	General		P
1.7.2.2	Disconnect devices		N/A
1.7.2.3	Overcurrent protective device		N/A
1.7.2.4	IT power distribution systems		N/A
1.7.2.5	Operator access with a tool		N/A
1.7.2.6	Ozone		N/A
1.7.3	Short duty cycles	Continuous operation	N/A
1.7.4	Supply voltage adjustment ..... :	No supply voltage adjustment	N/A
	Methods and means of adjustment; reference to installation instructions ..... :		N/A
1.7.5	Power outlets on the equipment ..... :	No standard power outlets.	N/A
1.7.6	Fuse identification (marking, special fusing characteristics, cross-reference) .....:		N/A
1.7.7	Wiring terminals		N/A
1.7.7.1	Protective earthing and bonding terminals .....:		N/A
1.7.7.2	Terminals for a.c. mains supply conductors		N/A
1.7.7.3	Terminals for d.c. mains supply conductors		N/A
1.7.8	Controls and indicators		N/A
1.7.8.1	Identification, location and marking .....:		N/A
1.7.8.2	Colours .....:		N/A
1.7.8.3	Symbols according to IEC 60417.....:		N/A

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.8.4	Markings using figures .....:		N/A
1.7.9	Isolation of multiple power sources .....:		N/A
1.7.10	Thermostats and other regulating devices .....:	No such regulating devices	N/A
1.7.11	Durability	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15 sec. And then again for 15 sec. With the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking on the label did not fade. There was no curling and lifting of the label edge.	P
1.7.12	Removable parts		N/A
1.7.13	Replaceable batteries ..... :		N/A
	Language(s) .....:		—
1.7.14	Equipment for restricted access locations ..... :		N/A

2	**PROTECTION FROM HAZARDS**		P
2.1	**Protection from electric shock and energy hazards**		P
2.1.1	Protection in operator access areas	Supplied by SELV	P
2.1.1.1	Access to energized parts		N/A
	Test by inspection .....:		N/A
	Test with test finger (Figure 2A) .....:		N/A
	Test with test pin (Figure 2B) .....:		N/A
	Test with test probe (Figure 2C) .....:		N/A
2.1.1.2	Battery compartments		N/A
2.1.1.3	Access to ELV wiring	No ELV wiring in operator accessible area.	N/A
	Working voltage (Vpeak or Vrms); minimum distance through insulation (mm)		—
2.1.1.4	Access to hazardous voltage circuit wiring		N/A
2.1.1.5	Energy hazards .....:		N/A
2.1.1.6	Manual controls		N/A
2.1.1.7	Discharge of capacitors in equipment		N/A
	Measured voltage (V); time-constant (s).....:		—
2.1.1.8	Energy hazards – d.c. mains supply		N/A
	a) Capacitor connected to the d.c. mains supply ..:		N/A

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
	b) Internal battery connected to the d.c. mains supply :		N/A
2.1.1.9	Audio amplifiers .....:		N/A
2.1.2	Protection in service access areas	No operator accessible area that needs to be accessed by the use of a tool.	N/A
2.1.3	Protection in restricted access locations	Not intended for use in restricted access locations.	N/A
2.2	**SELV circuits**		P
2.2.1	General requirements		P
2.2.2	Voltages under normal conditions (V) .....:		P
2.2.3	Voltages under fault conditions (V) .....:		P
2.2.4	Connection of SELV circuits to other circuits .....:	Connect to SELV circuits only	P
2.3	**TNV circuits**		N/A
2.3.1	Limits	No TNV circuits	N/A
	Type of TNV circuits .....:		—
2.3.2	Separation from other circuits and from accessible parts		N/A
2.3.2.1	General requirements		N/A
2.3.2.2	Protection by basic insulation		N/A
2.3.2.3	Protection by earthing		N/A
2.3.2.4	Protection by other constructions .....:		N/A
2.3.3	Separation from hazardous voltages		N/A
	Insulation employed .....:		—
2.3.4	Connection of TNV circuits to other circuits		N/A
	Insulation employed .....:		—
2.3.5	Test for operating voltages generated externally		N/A
2.4	**Limited current circuits**		N/A
2.4.1	General requirements		N/A
2.4.2	Limit values		N/A
	Frequency (Hz).....:		—
	Measured current (mA) .....:		—
	Measured voltage (V) .....:		—
	Measured circuit capacitance (nF or µF).....:		—

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.4.3	Connection of limited current circuits to other circuits		N/A
2.5	**Limited power sources**		P
	a) Inherently limited output		N/A
	b) Impedance limited output		N/A
	c) Regulating network or IC current limiter, limits output under normal operating and single fault condition		P
	Use of integrated circuit (IC) current limiters		N/A
	d) Overcurrent protective device limited output		N/A
	Max. output voltage (V), max. output current (A), max. apparent power (VA) .....:	(see appended table 2.5)	—
	Current rating of overcurrent protective device (A) .:		—
2.6	**Provisions for earthing and bonding**		N/A
2.6.1	Protective earthing	Class III equipment	N/A
2.6.2	Functional earthing		N/A
	Use of symbol for functional earthing .....:		N/A
2.6.3	Protective earthing and protective bonding conductors		N/A
2.6.3.1	General		N/A
2.6.3.2	Size of protective earthing conductors		N/A
	Rated current (A), cross-sectional area (mm^2), AWG .....:		—
2.6.3.3	Size of protective bonding conductors		N/A
	Rated current (A), cross-sectional area (mm^2), AWG .....:		—
	Protective current rating (A), cross-sectional area (mm^2), AWG .....:		—
2.6.3.4	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min) .....:		N/A
2.6.3.5	Colour of insulation.....:		N/A
2.6.4	Terminals		N/A
2.6.4.1	General		N/A
2.6.4.2	Protective earthing and bonding terminals		N/A
	Rated current (A), type, nominal thread diameter (mm) .....:		—

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.6.4.3	Separation of the protective earthing conductor from protective bonding conductors		N/A
2.6.5	Integrity of protective earthing		N/A
2.6.5.1	Interconnection of equipment		N/A
2.6.5.2	Components in protective earthing conductors and protective bonding conductors		N/A
2.6.5.3	Disconnection of protective earth		N/A
2.6.5.4	Parts that can be removed by an operator		N/A
2.6.5.5	Parts removed during servicing		N/A
2.6.5.6	Corrosion resistance		N/A
2.6.5.7	Screws for protective bonding		N/A
2.6.5.8	Reliance on telecommunication network or cable distribution system		N/A
2.7	**Overcurrent and earth fault protection in primary circuits**		N/A
2.7.1	Basic requirements	No primary circuits	N/A
	Instructions when protection relies on building installation		N/A
2.7.2	Faults not simulated in 5.3.7		N/A
2.7.3	Short-circuit backup protection		N/A
2.7.4	Number and location of protective devices .....:		N/A
2.7.5	Protection by several devices		N/A
2.7.6	Warning to service personnel.....:		N/A
2.8	**Safety interlocks**		N/A
2.8.1	General principles	No safety interlocks	N/A
2.8.2	Protection requirements		N/A
2.8.3	Inadvertent reactivation		N/A
2.8.4	Fail-safe operation		N/A
	Protection against extreme hazard		N/A
2.8.5	Moving parts		N/A
2.8.6	Overriding		N/A
2.8.7	Switches, relays and their related circuits		N/A
2.8.7.1	Separation distances for contact gaps and their related circuits (mm) .....:		N/A
2.8.7.2	Overload test		N/A
2.8.7.3	Endurance test		N/A
2.8.7.4	Electric strength test		N/A

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.8.8	Mechanical actuators		N/A
2.9	**Electrical insulation**		P
2.9.1	Properties of insulating materials		P
2.9.2	Humidity conditioning		N/A
	Relative humidity (%), temperature (°C) .....:		—
2.9.3	Grade of insulation	Functional insulation only	P
2.9.4	Separation from hazardous voltages		N/A
	Method(s) used .....:		—
2.10	**Clearances, creepage distances and distances through insulation**		N/A
2.10.1	General	Class III equipment	N/A
2.10.1.1	Frequency .....:		N/A
2.10.1.2	Pollution degrees .....:		N/A
2.10.1.3	Reduced values for functional insulation		N/A
2.10.1.4	Intervening unconnected conductive parts		N/A
2.10.1.5	Insulation with varying dimensions		N/A
2.10.1.6	Special separation requirements		N/A
2.10.1.7	Insulation in circuits generating starting pulses		N/A
2.10.2	Determination of working voltage		N/A
2.10.2.1	General		N/A
2.10.2.2	RMS working voltage		N/A
2.10.2.3	Peak working voltage		N/A
2.10.3	Clearances		N/A
2.10.3.1	General		N/A
2.10.3.2	Mains transient voltages		N/A
	a) AC mains supply .....:		N/A
	b) Earthed d.c. mains supplies .....:		N/A
	c) Unearthed d.c. mains supplies .....:		N/A
	d) Battery operation .....:		N/A
2.10.3.3	Clearances in primary circuits		N/A
2.10.3.4	Clearances in secondary circuits		N/A
2.10.3.5	Clearances in circuits having starting pulses		N/A
2.10.3.6	Transients from a.c. mains supply .....:		N/A
2.10.3.7	Transients from d.c. mains supply .....:		N/A
2.10.3.8	Transients from telecommunication networks and cable distribution systems .....:		N/A

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.10.3.9	Measurement of transient voltage levels		N/A
	a) Transients from a mains supply		N/A
	For an a.c. mains supply .....:		N/A
	For a d.c. mains supply .....:		N/A
	b) Transients from a telecommunication network :		N/A
2.10.4	Creepage distances		N/A
2.10.4.1	General		N/A
2.10.4.2	Material group and comparative tracking index		N/A
	CTI tests .....:		—
2.10.4.3	Minimum creepage distances		N/A
2.10.5	Solid insulation		N/A
2.10.5.1	General		N/A
2.10.5.2	Distances through insulation		N/A
2.10.5.3	Insulating compound as solid insulation		N/A
2.10.5.4	Semiconductor devices		N/A
2.10.5.5.	Cemented joints		N/A
2.10.5.6	Thin sheet material – General		N/A
2.10.5.7	Separable thin sheet material		N/A
	Number of layers (pcs).....:		—
2.10.5.8	Non-separable thin sheet material		N/A
2.10.5.9	Thin sheet material – standard test procedure		N/A
	Electric strength test		—
2.10.5.10	Thin sheet material – alternative test procedure		N/A
	Electric strength test		—
2.10.5.11	Insulation in wound components		N/A
2.10.5.12	Wire in wound components		N/A
	Working voltage .....:		N/A
	a) Basic insulation not under stress .....:		N/A
	b) Basic, supplementary, reinforced insulation .....:		N/A
	c) Compliance with Annex U .....:		N/A
	Two wires in contact inside wound component; angle between 45° and 90° .....:		N/A
2.10.5.13	Wire with solvent-based enamel in wound components		N/A
	Electric strength test		—
	Routine test		N/A

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.10.5.14	Additional insulation in wound components		N/A
	Working voltage .....:		N/A
	- Basic insulation not under stress .....:		N/A
	- Supplementary, reinforced insulation .....:		N/A
2.10.6	Construction of printed boards		N/A
2.10.6.1	Uncoated printed boards		N/A
2.10.6.2	Coated printed boards		N/A
2.10.6.3	Insulation between conductors on the same inner surface of a printed board		N/A
2.10.6.4	Insulation between conductors on different layers of a printed board		N/A
	Distance through insulation		N/A
	Number of insulation layers (pcs).....:		N/A
2.10.7	Component external terminations		N/A
2.10.8	Tests on coated printed boards and coated components		N/A
2.10.8.1	Sample preparation and preliminary inspection		N/A
2.10.8.2	Thermal conditioning		N/A
2.10.8.3	Electric strength test		N/A
2.10.8.4	Abrasion resistance test		N/A
2.10.9	Thermal cycling		N/A
2.10.10	Test for Pollution Degree 1 environment and insulating compound		N/A
2.10.11	Tests for semiconductor devices and cemented joints		N/A
2.10.12	Enclosed and sealed parts		N/A

3	**WIRING, CONNECTIONS AND SUPPLY**		P
3.1	**General**		P
3.1.1	Current rating and overcurrent protection		P
3.1.2	Protection against mechanical damage		P
3.1.3	Securing of internal wiring		P
3.1.4	Insulation of conductors		N/A
3.1.5	Beads and ceramic insulators		N/A
3.1.6	Screws for electrical contact pressure		N/A
3.1.7	Insulating materials in electrical connections		N/A
3.1.8	Self-tapping and spaced thread screws		N/A
3.1.9	Termination of conductors		N/A

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
	10 N pull test		N/A
3.1.10	Sleeving on wiring		N/A
3.2	**Connection to a mains supply**		N/A
3.2.1	Means of connection	Not directly connected to mains supply	N/A
3.2.1.1	Connection to an a.c. mains supply		N/A
3.2.1.2	Connection to a d.c. mains supply		N/A
3.2.2	Multiple supply connections		N/A
3.2.3	Permanently connected equipment		N/A
	Number of conductors, diameter of cable and conduits (mm) .....:		—
3.2.4	Appliance inlets		N/A
3.2.5	Power supply cords		N/A
3.2.5.1	AC power supply cords		N/A
	Type .....:		—
	Rated current (A), cross-sectional area (mm^2), AWG .....:		—
3.2.5.2	DC power supply cords		N/A
3.2.6	Cord anchorages and strain relief		N/A
	Mass of equipment (kg), pull (N) .....:		—
	Longitudinal displacement (mm) .....:		—
3.2.7	Protection against mechanical damage		N/A
3.2.8	Cord guards		N/A
	Diameter or minor dimension D (mm); test mass (g) .....:		—
	Radius of curvature of cord (mm) .....:		—
3.2.9	Supply wiring space		N/A
3.3	**Wiring terminals for connection of external conductors**		N/A
3.3.1	Wiring terminals		N/A
3.3.2	Connection of non-detachable power supply cords		N/A
3.3.3	Screw terminals		N/A
3.3.4	Conductor sizes to be connected		N/A
	Rated current (A), cord/cable type, cross-sectional area (mm^2) .....:		—
3.3.5	Wiring terminal sizes		N/A

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Rated current (A), type, nominal thread diameter (mm) ..... :		—
3.3.6	Wiring terminal design		N/A
3.3.7	Grouping of wiring terminals		N/A
3.3.8	Stranded wire		N/A
3.4	**Disconnection from the mains supply**		N/A
3.4.1	General requirement	Not directly connected to mains supply	N/A
3.4.2	Disconnect devices		N/A
3.4.3	Permanently connected equipment		N/A
3.4.4	Parts which remain energized		N/A
3.4.5	Switches in flexible cords		N/A
3.4.6	Number of poles – single-phase and d.c. equipment		N/A
3.4.7	Number of poles – three-phase equipment		N/A
3.4.8	Switches as disconnect devices		N/A
3.4.9	Plugs as disconnect devices		N/A
3.4.10	Interconnected equipment		N/A
3.4.11	Multiple power sources		N/A
3.5	**Interconnection of equipment**		P
3.5.1	General requirements		P
3.5.2	Types of interconnection circuits ..... :	SELV circuit only	P
3.5.3	ELV circuits as interconnection circuits	No ELV circuits	N/A
3.5.4	Data ports for additional equipment		N/A
4	**PHYSICAL REQUIREMENTS**		P
4.1	**Stability**		N/A
	Angle of 10°	< 7kg	N/A
	Test force (N) ..... :		N/A
4.2	**Mechanical strength**		P
4.2.1	General	See below. Tested with each source of plastic materials used for enclosure. After tests, unit complies with the requirements of sub-clauses 2.1.1 and 2.10.	P
	Rack-mounted equipment.		N/A

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.2.2	Steady force test, 10 N		N/A
4.2.3	Steady force test, 30 N	No internal enclosure.	N/A
4.2.4	Steady force test, 250 N		P
4.2.5	Impact test		N/A
	Fall test		N/A
	Swing test		N/A
4.2.6	Drop test; height (mm) ..... :	1000mm, no hazards, no damage	P
4.2.7	Stress relief test	70°C, 7h, no hazards, no damage	P
4.2.8	Cathode ray tubes		N/A
	Picture tube separately certified ..... :		N/A
4.2.9	High pressure lamps		N/A
4.2.10	Wall or ceiling mounted equipment; force (N) ..... :		N/A
4.3	**Design and construction**		P
4.3.1	Edges and corners	No sharp edges or corners	P
4.3.2	Handles and manual controls; force (N) .....:		N/A
4.3.3	Adjustable controls		N/A
4.3.4	Securing of parts		N/A
4.3.5	Connection by plugs and sockets	No misconnection	N/A
4.3.6	Direct plug-in equipment		N/A
	Torque ..... :		—
	Compliance with the relevant mains plug standard ..... :		N/A
4.3.7	Heating elements in earthed equipment		N/A
4.3.8	Batteries	With internal rechargeable battery	P
	- Overcharging of a rechargeable battery	(see appended table 4.3.8)	P
	- Unintentional charging of a non-rechargeable battery		N/A
	- Reverse charging of a rechargeable battery	(see appended table 4.3.8)	P
	- Excessive discharging rate for any battery	(see appended table 4.3.8)	P
4.3.9	Oil and grease		N/A
4.3.10	Dust, powders, liquids and gases	No dust, powders, liquids and gases.	N/A
4.3.11	Containers for liquids or gases	No containers for liquid and gases.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.12	Flammable liquids ..... :	No flammable liquid.	N/A
	Quantity of liquid (l) ..... :		N/A
	Flash point (°C) ..... :		N/A
4.3.13	Radiation		P
4.3.13.1	General		P
4.3.13.2	Ionizing radiation		N/A
	Measured radiation (pA/kg) ..... :		—
	Measured high-voltage (kV) ..... :		—
	Measured focus voltage (kV) ..... :		—
	CRT markings ..... :		—
4.3.13.3	Effect of ultraviolet (UV) radiation on materials		N/A
	Part, property, retention after test, flammability classification ..... :		N/A
4.3.13.4	Human exposure to ultraviolet (UV) radiation ..... :		N/A
4.3.13.5	Lasers (including laser diodes) and LEDs		P
4.3.13.5.1	Lasers (including laser diodes)		N/A
	Laser class ..... :		—
4.3.13.5.2	Light emitting diodes (LEDs)	LED is indicator only	P
4.3.13.6	Other types ..... :		N/A

4.4	**Protection against hazardous moving parts**		N/A
4.4.1	General	No moving parts	N/A
4.4.2	Protection in operator access areas ..... :		N/A
	Household and home/office document/media shredders		N/A
4.4.3	Protection in restricted access locations ..... :		N/A
4.4.4	Protection in service access areas		N/A
4.4.5	Protection against moving fan blades		N/A
4.4.5.1	General		N/A
	Not considered to cause pain or injury. A)……:		N/A
	Is considered to cause pain, not injury. B) ……..:		N/A
	Considered to cause injury. C) ……:		N/A
4.4.5.2	Protection for users		N/A
	Use of symbol or warning ……..:		N/A
4.4.5.3	Protection for service persons		N/A
	Use of symbol or warning ……..:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.5	**Thermal requirements**		P
4.5.1	General		P
4.5.2	Temperature tests		P
	Normal load condition per Annex L ..... :	(see appended table 4.5)	—
4.5.3	Temperature limits for materials	(see appended table 4.5)	P
4.5.4	Touch temperature limits	(see appended table 4.5)	P
4.5.5	Resistance to abnormal heat ..... :		N/A
4.6	**Openings in enclosures**		N/A
4.6.1	Top and side openings	No openings	N/A
	Dimensions (mm) ..... :		—
4.6.2	Bottoms of fire enclosures		N/A
	Construction of the bottom, dimensions (mm) ..... :		—
4.6.3	Doors or covers in fire enclosures		N/A
4.6.4	Openings in transportable equipment		N/A
4.6.4.1	Constructional design measures		N/A
	Dimensions (mm) ..... :		—
4.6.4.2	Evaluation measures for larger openings		N/A
4.6.4.3	Use of metallized parts		N/A
4.6.5	Adhesives for constructional purposes		N/A
	Conditioning temperature (°C), time (weeks) ..... :		—
4.7	**Resistance to fire**		P
4.7.1	Reducing the risk of ignition and spread of flame	See below	P
	Method 1, selection and application of components wiring and materials	Method 1 used. (see appended table 4.7)	P
	Method 2, application of all of simulated fault condition tests		N/A
4.7.2	Conditions for a fire enclosure		P
4.7.2.1	Parts requiring a fire enclosure		P
4.7.2.2	Parts not requiring a fire enclosure		N/A
4.7.3	Materials		P
4.7.3.1	General	(see appended table 1.5.1)	P
4.7.3.2	Materials for fire enclosures	(see appended table 1.5.1)	P
4.7.3.3	Materials for components and other parts outside fire enclosures		N/A
4.7.3.4	Materials for components and other parts inside fire enclosures	(see appended table 1.5.1)	P

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Clause	Requirement + Test	Result - Remark	Verdict
4.7.3.5	Materials for air filter assemblies		N/A
4.7.3.6	Materials used in high-voltage components		N/A
5	**ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS**		P
5.1	**Touch current and protective conductor current**		N/A
5.1.1	General		N/A
5.1.2	Configuration of equipment under test (EUT)		N/A
5.1.2.1	Single connection to an a.c. mains supply		N/A
5.1.2.2	Redundant multiple connections to an a.c. mains supply		N/A
5.1.2.3	Simultaneous multiple connections to an a.c. mains supply		N/A
5.1.3	Test circuit		N/A
5.1.4	Application of measuring instrument		N/A
5.1.5	Test procedure		N/A
5.1.6	Test measurements		N/A
	Supply voltage (V) ..... :		—
	Measured touch current (mA) ..... :		—
	Max. allowed touch current (mA) ..... :		—
	Measured protective conductor current (mA) ..... :		—
	Max. allowed protective conductor current (mA) .. :		—
5.1.7	Equipment with touch current exceeding 3,5 mA		N/A
5.1.7.1	General ..... :		N/A
5.1.7.2	Simultaneous multiple connections to the supply		N/A
5.1.8	Touch currents to telecommunication networks and cable distribution systems and from telecommunication networks		N/A
5.1.8.1	Limitation of the touch current to a telecommunication network or to a cable distribution system		N/A
	Supply voltage (V) ..... :		—
	Measured touch current (mA) ..... :		—
	Max. allowed touch current (mA) ..... :		—
5.1.8.2	Summation of touch currents from telecommunication networks		N/A
	a) EUT with earthed telecommunication ports ..... :		N/A
	b) EUT whose telecommunication ports have no reference to protective earth		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.2	**Electric strength**		N/A
5.2.1	General		N/A
5.2.2	Test procedure		N/A
5.3	**Abnormal operating and fault conditions**		P
5.3.1	Protection against overload and abnormal operation	(see appended table 5.3)	P
5.3.2	Motors		N/A
5.3.3	Transformers		N/A
5.3.4	Functional insulation ..... :	By short circuit	P
5.3.5	Electromechanical components		N/A
5.3.6	Audio amplifiers in ITE ..... :		N/A
5.3.7	Simulation of faults	(see appended table 5.3)	P
5.3.8	Unattended equipment		N/A
5.3.9	Compliance criteria for abnormal operating and fault conditions		P
5.3.9.1	During the tests		P
5.3.9.2	After the tests		N/A
6	**CONNECTION TO TELECOMMUNICATION NETWORKS**		N/A
6.1	**Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment**		N/A
6.1.1	Protection from hazardous voltages		N/A
6.1.2	Separation of the telecommunication network from earth		N/A
6.1.2.1	Requirements		N/A
	Supply voltage (V) ..... :		—
	Current in the test circuit (mA) ..... :		—
6.1.2.2	Exclusions ..... :		N/A
6.2	**Protection of equipment users from overvoltages on telecommunication networks**		N/A
6.2.1	Separation requirements		N/A
6.2.2	Electric strength test procedure		N/A
6.2.2.1	Impulse test		N/A
6.2.2.2	Steady-state test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.2.2.3	Compliance criteria		N/A
6.3	**Protection of the telecommunication wiring system from overheating**		N/A
	Max. output current (A) ..... :		—
	Current limiting method ..... :		—
7	**CONNECTION TO CABLE DISTRIBUTION SYSTEMS**		N/A
7.1	**General**		N/A
7.2	Protection of cable distribution system service persons, and users of other equipment connected to the system, from hazardous voltages in the equipment		N/A
7.3	Protection of equipment users from overvoltages on the cable distribution system		N/A
7.4	Insulation between primary circuits and cable distribution systems		N/A
7.4.1	General		N/A
7.4.2	Voltage surge test		N/A
7.4.3	Impulse test		N/A
A	**ANNEX A, TESTS FOR RESISTANCE TO HEAT AND FIRE**		N/A
A.1	**Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2)**		N/A
A.1.1	Samples ..... :		—
	Wall thickness (mm)..... :		—
A.1.2	Conditioning of samples; temperature (°C) ..... :		N/A
A.1.3	Mounting of samples ..... :		N/A
A.1.4	Test flame (see IEC 60695-11-3)		N/A
	Flame A, B, C or D ..... :		—
A.1.5	Test procedure		N/A
A.1.6	Compliance criteria		N/A
	Sample 1 burning time (s)..... :		—
	Sample 2 burning time (s)..... :		—
	Sample 3 burning time (s)..... :		—

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
A.2	**Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2 and 4.7.3.4)** UL recognized material V-0 enclosure used.		N/A
A.2.1	Samples, material .....:		—
	Wall thickness (mm).....:		—
A.2.2	Conditioning of samples; temperature (°C) .....:		N/A
A.2.3	Mounting of samples .....:		N/A
A.2.4	Test flame (see IEC 60695-11-4)		N/A
	Flame A, B or C .....:		—
A.2.5	Test procedure		N/A
A.2.6	Compliance criteria		N/A
	Sample 1 burning time (s).....:		—
	Sample 2 burning time (s).....:		—
	Sample 3 burning time (s).....:		—
A.2.7	Alternative test acc. To IEC 60695-11-5, cl. 5 and 9		N/A
	Sample 1 burning time (s).....:		—
	Sample 2 burning time (s).....:		—
	Sample 3 burning time (s).....:		—
A.3	**Hot flaming oil test (see 4.6.2)**		N/A
A.3.1	Mounting of samples		N/A
A.3.2	Test procedure		N/A
A.3.3	Compliance criterion		N/A

B	**ANNEX B, MOTOR TESTS UNDER ABNORMAL CONDITIONS (see 4.7.2.2 and 5.3.2)**		N/A
B.1	**General requirements**		N/A
	Position .....:		—
	Manufacturer .....:		—
	Type .....:		—
	Rated values .....:		—
B.2	**Test conditions**		N/A
B.3	**Maximum temperatures**		N/A
B.4	**Running overload test**		N/A
B.5	**Locked-rotor overload test**		N/A
	Test duration (days) .....:		—
	Electric strength test: test voltage (V) .....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
B.6	**Running overload test for d.c. motors in secondary circuits**		N/A
B.6.1	General		N/A
B.6.2	Test procedure		N/A
B.6.3	Alternative test procedure		N/A
B.6.4	Electric strength test; test voltage (V) .....:		N/A
B.7	**Locked-rotor overload test for d.c. motors in secondary circuits**		N/A
B.7.1	General		N/A
B.7.2	Test procedure		N/A
B.7.3	Alternative test procedure		N/A
B.7.4	Electric strength test; test voltage (V) .....:		N/A
B.8	**Test for motors with capacitors**		N/A
B.9	**Test for three-phase motors**		N/A
B.10	**Test for series motors**		N/A
	Operating voltage (V) .....:		—
C	**ANNEX C, TRANSFORMERS (see 1.5.4 and 5.3.3)**		N/A
	Position .....:		—
	Manufacturer .....:		—
	Type .....:		—
	Rated values .....:		—
	Method of protection .....:		—
C.1	**Overload test**		N/A
C.2	**Insulation**		N/A
	Protection from displacement of windings .....:		N/A
D	**ANNEX D, MEASURING INSTRUMENTS FOR TOUCH-CURRENT TESTS (see 5.1.4)**		N/A
D.1	**Measuring instrument**		N/A
D.2	**Alternative measuring instrument**		N/A
E	**ANNEX E, TEMPERATURE RISE OF A WINDING (see 1.4.13)**		N/A
F	**ANNEX F, MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES (see 2.10 and Annex G)**		N/A
G	**ANNEX G, ALTERNATIVE METHOD FOR DETERMINING MINIMUM CLEARANCES**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.1	**Clearances**		N/A
G.1.1	General		N/A
G.1.2	Summary of the procedure for determining minimum clearances		N/A
G.2	**Determination of mains transient voltage (V)**		N/A
G.2.1	AC mains supply .....:		N/A
G.2.2	Earthed d.c. mains supplies .....:		N/A
G.2.3	Unearthed d.c. mains supplies .....:		N/A
G.2.4	Battery operation .....:		N/A
G.3	**Determination of telecommunication network transient voltage (V) .....:**		N/A
G.4	**Determination of required withstand voltage (V)**		N/A
G.4.1	Mains transients and internal repetitive peaks .....:		N/A
G.4.2	Transients from telecommunication networks .....:		N/A
G.4.3	Combination of transients		N/A
G.4.4	Transients from cable distribution systems		N/A
G.5	**Measurement of transient voltages (V)**		N/A
	a) Transients from a mains supply		N/A
	For an a.c. mains supply		N/A
	For a d.c. mains supply		N/A
	b) Transients from a telecommunication network		N/A
G.6	**Determination of minimum clearances .....:**		N/A

H	**ANNEX H, IONIZING RADIATION (see 4.3.13)**		N/A

J	**ANNEX J, TABLE OF ELECTROCHEMICAL POTENTIALS (see 2.6.5.6)**		N/A
	Metal(s) used .....:		—

K	**ANNEX K, THERMAL CONTROLS (see 1.5.3 and 5.3.8)**		N/A
K.1	Making and breaking capacity		N/A
K.2	Thermostat reliability; operating voltage (V) .....:		N/A
K.3	Thermostat endurance test; operating voltage (V) .....:		N/A
K.4	Temperature limiter endurance; operating voltage (V) .....:		N/A
K.5	Thermal cut-out reliability		N/A
K.6	Stability of operation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
L	**ANNEX L, NORMAL LOAD CONDITIONS FOR SOME TYPES OF ELECTRICAL BUSINESS EQUIPMENT (see 1.2.2.1 and 4.5.2)**		P
L.1	Typewriters		N/A
L.2	Adding machines and cash registers		N/A
L.3	Erasers		N/A
L.4	Pencil sharpeners		N/A
L.5	Duplicators and copy machines		N/A
L.6	Motor-operated files		N/A
L.7	Other business equipment		P
M	**ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1)**		N/A
M.1	Introduction		N/A
M.2	Method A		N/A
M.3	Method B		N/A
M.3.1	Ringing signal		N/A
M.3.1.1	Frequency (Hz) .....:		—
M.3.1.2	Voltage (V) .....:		—
M.3.1.3	Cadence; time (s), voltage (V) .....:		—
M.3.1.4	Single fault current (mA) .....:		—
M.3.2	Tripping device and monitoring voltage .....:		N/A
M.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N/A
M.3.2.2	Tripping device		N/A
M.3.2.3	Monitoring voltage (V) .....:		N/A
N	**ANNEX N, IMPULSE TEST GENERATORS (see 1.5.7.2, 1.5.7.3, 2.10.3.9, 6.2.2.1, 7.3.2, 7.4.3 and Clause G.5)**		N/A
N.1	ITU-T impulse test generators		N/A
N.2	IEC 60065 impulse test generator		N/A
P	**ANNEX P, NORMATIVE REFERENCES**		—
Q	**ANNEX Q, Voltage dependent resistors (VDRs) (see 1.5.9.1)**		N/A
	- Preferred climatic categories .....:		N/A
	- Maximum continuous voltage .....:		N/A
	- Combination pulse current .....:		N/A
	Body of the VDR Test according to IEC60695-11-5.....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Body of the VDR. Flammability class of material (min V-1).....:		N/A
R	**ANNEX R, EXAMPLES OF REQUIREMENTS FOR QUALITY CONTROL PROGRAMMES**		N/A
R.1	Minimum separation distances for unpopulated coated printed boards (see 2.10.6.2)		N/A
R.2	Reduced clearances (see 2.10.3)		N/A
S	**ANNEX S, PROCEDURE FOR IMPULSE TESTING (see 6.2.2.3)**		N/A
S.1	Test equipment		N/A
S.2	Test procedure		N/A
S.3	Examples of waveforms during impulse testing		N/A
T	**ANNEX T, GUIDANCE ON PROTECTION AGAINST INGRESS OF WATER (see 1.1.2)**		N/A
			—
U	**ANNEX U, INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION (see 2.10.5.4)**		N/A
			—
V	**ANNEX V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1)**		N/A
V.1	Introduction		N/A
V.2	TN power distribution systems		N/A
W	**ANNEX W, SUMMATION OF TOUCH CURRENTS**		N/A
W.1	Touch current from electronic circuits		N/A
W.1.1	Floating circuits		N/A
W.1.2	Earthed circuits		N/A
W.2	Interconnection of several equipments		N/A
W.2.1	Isolation		N/A
W.2.2	Common return, isolated from earth		N/A
W.2.3	Common return, connected to protective earth		N/A
X	**ANNEX X, MAXIMUM HEATING EFFECT IN TRANSFORMER TESTS (see clause C.1)**		N/A
X.1	Determination of maximum input current		N/A
X.2	Overload test procedure		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Y	**ANNEX Y, ULTRAVIOLET LIGHT CONDITIONING TEST (see 4.3.13.3)**		N/A
Y.1	Test apparatus .....:		N/A
Y.2	Mounting of test samples .....:		N/A
Y.3	Carbon-arc light-exposure apparatus .....:		N/A
Y.4	Xenon-arc light exposure apparatus .....:		N/A
Z	**ANNEX Z, OVERVOLTAGE CATEGORIES (see 2.10.3.2 and Clause G.2)**		N/A
AA	**ANNEX AA, MANDREL TEST (see 2.10.5.8)**		N/A
BB	**ANNEX BB, CHANGES IN THE SECOND EDITION**		—
CC	**ANNEX CC, Evaluation of integrated circuit (IC) current limiters**		N/A
CC.1	General		N/A
CC.2	Test program 1……:		N/A
CC.3	Test program 2……:		N/A
CC.4	Test program 3.....:		N/A
CC.5	Compliance.....:		N/A
DD	**ANNEX DD, Requirements for the mounting means of rack-mounted equipment**		N/A
DD.1	General		N/A
DD.2	Mechanical strength test, variable N……..:		N/A
DD.3	Mechanical strength test, 250N, including end stops……:		N/A
DD.4	Compliance……..:		N/A
EE	**ANNEX EE, Household and home/office document/media shredders**		N/A
EE.1	General		N/A
EE.2	Markings and instructions		N/A
	Use of markings or symbols……:		N/A
	Information of user instructions, maintenance and/or servicing instructions……:		N/A
EE.3	Inadvertent reactivation test……:		N/A
EE.4	Disconnection of power to hazardous moving parts:		N/A
	Use of markings or symbols……:		N/A
EE.5	Protection against hazardous moving parts		N/A
	Test with test finger (Figure 2A) ……:		N/A
	Test with wedge probe (Figure EE1 and EE2) ……:		N/A

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1.5.1	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity[1])
Plastic enclosure	FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV	AC310(+)	V-0, 85°C, min. thickness: 1.5mm	UL 94, UL 746C	UL
PCB	KINGBOARD LAMINATES HOLDINGS LTD	KB-6150C	V-0, 130°C	UL 94, UL 796	UL
Rechargeable Li-ion Battery	Shenzhen BaiYiShun Science&Technology Co.,Ltd	481120	3.7Vdc, 2000mAh	IEC/EN 62133	CE
Supplementary information: [1)] Provided evidence ensures the agreed level of compliance.					

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1.6.2	TABLE: Electrical data (in normal conditions)					P
U (Vd.c.)	I (A)	Irated (A)	P (W)	Fuse #	Ifuse (A)	Condition/status
5.0	0.85	1	4.25	--	--	Empty battery charging and EUT working normally
3.7	0.43	--	1.59	--	--	Battery discharging and EUT working normally
Supplementary information:						

2.1.1.5 c) 1)	TABLE: max. V, A, VA test	N/A

Voltage (rated) (V)	Current (rated) (A)	Voltage (max.) (V)	Current (max.) (A)	VA (max.) (VA)
--	--	--	--	--
Supplementary information:				

2.1.1.5 c) 2)	TABLE: stored energy	N/A

Capacitance C (µF)	Voltage U (V)	Energy E (J)
--	--	--
supplementary information:		

2.2	TABLE: evaluation of voltage limiting components in SELV circuits		N/A
Component (measured between)	max. voltage (V) (normal operation)		Voltage Limiting Components
	V peak	V d.c.	
--	--	--	--
Fault test performed on voltage limiting components	Voltage measured (V) in SELV circuits (V peak or V d.c.)		
--	--		
supplementary information:			

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IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict

2.5	TABLE: Limited power sources	P

Circuit output tested:

Note: Measured Uoc (V) with all load circuits disconnected:

Components	Sample No.	Uoc (V)	I_{sc} (A)		VA	
			Meas.	Limit	Meas.	Limit
Battery	Normal	4.20	1.68	8.0	6.93	100
Battery	B+~B- SC	0	0	8.0	0	100

supplementary information:
Under normal and fault conditions, the worst case was recorded.

SC=short-circuit

2.10.2	Table: working voltage measurement	N/A

Location	RMS voltage (V)	Peak voltage (V)	Comments
--	--	--	--

supplementary information:

2.10.3 and 2.10.4	TABLE: Clearance and creepage distance measurements	N/A

Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
Functional:						
--	--	--	--	--	--	--
Basic/supplementary:						
--	--	--	--	--	--	--
Reinforced:						
--	--	--	--	--	--	--
Supplementary information:						

2.10.5	TABLE: Distance through insulation measurements	N/A

Distance through insulation (DTI) at/of:	U peak (V)	U rms (V)	Test voltage (Vac)	Required DTI (mm)	DTI (mm)
--	--	--	--	--	--
Remark:					

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Clause	Requirement + Test	Result - Remark	Verdict

4.3.8	TABLE: Batteries (see appended table 5.3)									P
The tests of 4.3.8 are applicable only when appropriate battery data is not available										P
Is it possible to install the battery in a reverse polarity position?						No possible				N/A
	Non-rechargeable batteries			Rechargeable batteries						
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging		
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	
Max. current during normal condition	--	--	--	850mA	2000mA	930mA	2000mA	--	--	
Max. current during fault condition	--	--	--	860mA (Battery B-~P-SC)	2000mA	935mA (Battery B-~P-SC)	2000mA	--	--	
Test results:										Verdict
- Chemical leaks						No hazard				P
- Explosion of the battery						No hazard				P
- Emission of flame or expulsion of molten metal						No hazard				P
- Electric strength tests of equipment after completion of tests										N/A
Supplementary information:										

4.3.8	TABLE: Batteries	P
Battery category.....:	Rechargeable Li-ion Battery	
Manufacturer.....:	see appended table 1.5.1 for details	
Type / model.....:	see appended table 1.5.1 for details	
Voltage.....:	see appended table 1.5.1 for details	
Capacity.....:	see appended table 1.5.1 for details	
Tested and Certified by (incl. Ref. No.) .....:	see appended table 1.5.1 for details	
Circuit protection diagram:	--	

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Clause	Requirement + Test	Result - Remark	Verdict

MARKINGS AND INSTRUCTIONS (1.7.13)	
Location of replaceable battery	--
Language(s) ……:	--
Close to the battery ……:	--
In the servicing instructions ……:	--
In the operating instructions ……:	--

4.5	TABLE: Thermal requirements					P
	Supply voltage (V) ……:	5.0Vdc (Battery charging)		3.7Vdc (EUT discharging)		—
	Ambient T_{min} (°C) ……:	--	--	--	--	—
	Ambient T_{max} (°C) ……:	--	--	--	--	—
Maximum measured temperature T of part/at……:		T (°C)				Allowed T_{max} (°C)
PCB near IC1		37.7	57.5	41.9	61.2	130
PCB near IC2		40.0	59.8	44.6	63.9	130
PCB near IC3		38.4	58.2	42.4	61.7	130
Battery surface		31.6	51.4	32.9	52.2	60
Plastic enclosure inside near battery		30.9	50.7	33.6	52.9	Ref.
Plastic enclosure outside near battery		30.0	49.8	32.0	51.3	85
Ambient		25.2	45.0	25.7	45.0	--
Supplementary information: The maximum operating temperature is 45ºC. Temperature measurement was carried out on the most unfavourable test condition.						

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class
--	--	--	--	--	--	--	--
Supplementary information:							

4.5.5	TABLE: Ball pressure test of thermoplastic parts		N/A
	Allowed impression diameter (mm) ……:	≤ 2 mm	—
Part		Test temperature (°C)	Impression diameter (mm)
--		--	--
Supplementary information:			

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4.7	TABLE: Resistance to fire				P
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	Evidence
Plastic enclosure	--	--	--	--	--
PCB	--	--	--	--	--
supplementary information: see appended table 1.5.1 for details.					

5.1	TABLE: touch current measurement			N/A
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions	
--	--	--	--	
supplementary information:				

5.2	TABLE: Electric strength tests, impulse tests and voltage surge tests			N/A
Test voltage applied between:	Voltage shape (AC, DC, impulse, surge)	Test voltage (V)	Breakdown Yes / No	
Functional:				
--	--	--	--	
Basic/supplementary:				
--	--	--	--	
Reinforced:				
--	--	--	--	
Supplementary information:				

5.3	TABLE: Fault condition tests		P
	Ambient temperature (°C) .....:	25.0°C, unless otherwise specified	—
	Power source for EUT: Manufacturer, model/type, output rating .....:	--	—

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Component No.	Fault	Supply voltage (V)	Test time	Fuse	Fuse current (A)	Observation
Test condition: empty battery charging and EUT working normally						
R1	SC	5.0Vdc	10mins	--	--	Input current: 0.02A. Unit shut down, recoverable. After test, no damaged, no hazard.
Battery (B-~P-)	Overcharging	5.0Vdc	7hrs10mins	--	--	Max continuous charging current was 0.86A. The product worked as normal. No chemicals leak, explosion, molten metal emission or expulsion observed.
D1	SC	5.0Vdc	10mins	--	--	Input current: 0.02A. Unit shut down, recoverable. After test, no damaged, no hazard.
Test condition: battery discharging and EUT working normally						
Battery (B-~P-)	Excessive discharging	3.7Vdc	7hrs10mins	--	--	Max continuous charging current was 0.935A. The product worked as normal. No chemicals leak, explosion, molten metal emission or expulsion observed.
Battery B+~B-	SC	3.7Vdc	7hrs10mins	--	--	Unit was protected. After test, no damaged, no hazard.
C3	SC	3.7Vdc	10mins	--	--	Unit shut down, recoverable. After test, no damaged, no hazard.

1. Supplementary information: SC: short-circuit; OC: Over charge; ED: Excessive discharge ;
2. The voltage of SELV circuit did not exceed 42.4 Vpeak or 60 Vdc and did not exceed the limit of 71 Vpeak or 120 Vdc within 0.2 second after abnormal conditions were applied.

C.2	TABLE: transformers	N/A

Loc.	Tested insulation	Working voltage peak / V (2.10.2)	Working voltage rms / V (2.10.2)	Required electric strength (5.2)	Required clearance / mm (2.10.3)	Required creepage distance / mm (2.10.4)	Required distance thr. insul. (2.10.5)
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
Loc.	Tested insulation			Test voltage/ V	Measured clearance / mm	Measured creepage dist./ mm	Measured distance thr. insul. / mm; number of layers
--	--			--	--	--	--
--	--			--	--	--	--

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supplementary information:

C.2	TABLE: transformers	N/A
Transformer		

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Attachment No. 1

ATTACHMENT TO TEST REPORT IEC 60950-1
EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

Information technology equipment – Safety –

Part 1: General requirements

Differences according to.....:	EN 60950-1:2006/A11:2009/A1:2010/A12:2011/A2:2013
Attachment Form No. .....:	EU_GD_IEC60950_1F
Attachment Originator .....:	SGS Fimko Ltd
Master Attachment .....:	Date 2014-02

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EN 60950-1:2006/A11:2009/A1**:2010/A12:2011/A2:2013 – CENELEC COMMON MODIFICATIONS**

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)

Clause	Requirement + Test	Result - Remark	Verdict
	Clauses, subclauses, notes, tables and figures which are additional to those in IEC60950-1 and it´s amendmets are prefixed “Z”		--
Contents (A2:2013)	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZD (informative) IEC and CENELEC code designations for flexible cords		P
General	Delete all the “country” notes in the reference document (IEC 60950-1:2005) according to the following list: 1.4.8 Note 2 1.5.1 Note 2 & 3 1.5.7.1 Note 1.5.8 Note 2 1.5.9.4 Note 1.7.2.1 Note 4, 5 & 6 2.2.3 Note 2.2.4 Note 2.3.2 Note 2.3.2.1 Note 2 2.3.4 Note 2 2.6.3.3 Note 2 & 3 2.7.1 Note 2.10.3.2 Note 2 2.10.5.13 Note 3 3.2.1.1 Note 3.2.4 Note 3. 2.5.1 Note 2 4.3.6 Note 1 & 2 4.7 Note 4 4.7.2.2 Note 4.7.3.1 Note 2 5.1.7.1 Note 3 & 4 5.3.7 Note 1 6 Note 2 & 5 6.1.2.1 Note 2 6.1.2.2 Note 6.2.2 Note 6.2.2.1 Note 2 6.2.2.2 Note 7.1 Note 3 7.2 Note 7.3 Note 1 & 2 G.2.1 Note 2 Annex H Note 2		P
General (A1:2010)	Delete all the “country” notes in the reference document (IEC 60950-1:2005/A1:2010) according to the following list: 1.5.7.1 Note 6.1.2.1 Note 2 6.2.2.1 Note 2 EE.3 Note		P

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Clause	Requirement + Test	Result - Remark	Verdict
General (A2:2013)	Delete all the "country" notes in the reference document (IEC 60950-1:2005/A2:2013) according to the following list: 2.7.1 Note * 2.10.3.1 Note 2 6.2.2. Note * Note of secretary: Text of Common Modification remains unchanged.		P
1.1.1 (A1:2010)	**Replace** the text of NOTE 3 by the following. NOTE 3 The requirements of EN 60065 may also be used to meet safety requirements for multimedia equipment. See IEC Guide 112, Guide on the safety of multimedia equipment. For television sets EN 60065 applies.		N/A
1.3.Z1	Add the following subclause: 1.3.Z1 Exposure to excessive sound pressure The apparatus shall be so designed and constructed as to present no danger when used for its intended purpose, either in normal operating conditions or under fault conditions, particularly providing protection against exposure to excessive sound pressures from headphones or earphones. NOTE Z1 A new method of measurement is described in EN 50332-1, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 1: General method for "one package equipment", and in EN 50332-2, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 2: Guidelines to associate sets with headphones coming from different manufacturers.		N/A
(A12:2011)	In EN 60950-1:2006/A12:2011 Delete the addition of 1.3.Z1 / EN 60950-1:2006 Delete the definition 1.2.3.Z1 / EN 60950-1:2006 /A1:2010		N/A
1.5.1 (Added info*)	Add the following NOTE: NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2002/95/EC. New Directive 2011/65/11 *		N/A
1.7.2.1 (A1:2010)	In addition, for a PORTABLE SOUND SYSTEM, the instructions shall include a warning that excessive sound pressure from earphones and headphones can cause hearing loss.		N/A
1.7.2.1 (A12.2011)	In EN 60950-1:2006/A12:2011 Delete NOTE Z1 and the addition for Portable Sound System. Add the following clause and annex to the existing standard and amendments.		P
	Zx Protection against excessive sound pressure from personal music players		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Zx.1 General This sub-clause specifies requirements for protection against excessive sound pressure from personal music players that are closely coupled to the ear. It also specifies requirements for earphones and headphones intended for use with personal music players. A personal music player is a portable equipment for personal use, that: is designed to allow the user to listen to recorded or broadcast sound or video; and primarily uses headphones or earphones that can be worn in or on or around the ears; and allows the user to walk around while in use. NOTE 1 Examples are hand-held or body-worn portable CD players, MP3 audio players, mobile phones with MP3 type features, PDA's or similar equipment. A personal music player and earphones or headphones intended to be used with personal music players shall comply with the requirements of this sub-clause. The requirements in this sub-clause are valid for music or video mode only. The requirements do not apply: while the personal music player is connected to an external amplifier; or while the headphones or earphones are not used. NOTE 2 An external amplifier is an amplifier which is not part of the personal music player or the listening device, but which is intended to play the music as a standalone music player. The requirements do not apply to: hearing aid equipment and professional equipment; NOTE 3 Professional equipment is equipment sold through special sales channels. All products sold through normal electronics stores are considered not to be professional equipment.		N/A
	analogue personal music players (personal music players without any kind of digital processing of the sound signal) that are brought to the market before the end of 2015. NOTE 4 This exemption has been allowed because this technology is falling out of use and it is expected that within a few years it will no longer exist. This exemption will not be extended to other technologies. For equipment which is clearly designed or intended for use by young children, the limits of EN 71-1 apply.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Zx.2 Equipment requirements No safety provision is required for equipment that complies with the following: equipment provided as a package (personal music player with its listening device), where the acoustic output $L_{Aeq,T}$ is ≤ 85 dBA measured while playing the fixed "programme simulation noise" as described in EN 50332-1; and a personal music player provided with an analogue electrical output socket for a listening device, where the electrical output is ≤ 27 mV measured as described in EN 50332-2, while playing the fixed "programme simulation noise" as described in EN 50332-1. NOTE 1 Wherever the term acoustic output is used in this clause, the 30 s A-weighted equivalent sound pressure level $L_{Aeq,T}$ is meant. See also Zx.5 and Annex Zx. All other equipment shall: a) protect the user from unintentional acoustic outputs exceeding those mentioned above; and b) have a standard acoustic output level not exceeding those mentioned above, and automatically return to an output level not exceeding those mentioned above when the power is switched off; and		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) provide a means to actively inform the user of the increased sound pressure when the equipment is operated with an acoustic output exceeding those mentioned above. Any means used shall be acknowledged by the user before activating a mode of operation which allows for an acoustic output exceeding those mentioned above. The acknowledgement does not need to be repeated more than once every 20 h of cumulative listening time; and NOTE 2 Examples of means include visual or audible signals. Action from the user is always required. NOTE 3 The 20 h listening time is the accumulative listening time, independent how often and how long the personal music player has been switched off. d) have a warning as specified in Zx.3; and e) not exceed the following: 1) equipment provided as a package (player with Its listening device), the acoustic output shall be ≤ 100 dBA measured while playing the fixed “programme simulation noise” described in EN 50332-1; and 2) a personal music player provided with an analogue electrical output socket for a listening device, the electrical output shall be ≤ 150 mV measured as described in EN 50332-2, while playing the fixed “programme simulation noise” described in EN 50332-1. For music where the average sound pressure (long term $L_{Aeq,T}$) measured over the duration of the song is lower than the average produced by the programme simulation noise, the warning does not need to be given as long as the average sound pressure of the song is below the basic limit of 85 dBA. In this case T becomes the duration of the song. NOTE 4 Classical music typically has an average sound pressure (long term $L_{Aeq,T}$) which is much lower than the average programme simulation noise. Therefore, if the player is capable to analyse the song and compare it with the programme simulation noise, the warning does not need to be given as long as the average sound pressure of the song is below the basic limit of 85 dBA. For example, if the player is set with the programme simulation noise to 85 dBA, but the average music level of the song is only 65 dBA, there is no need to give a warning or ask an acknowledgement as long as the average sound level of the song is not above the basic limit of 85 dBA.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Zx.3 Warning The warning shall be placed on the equipment, or on the packaging, or in the instruction manual and shall consist of the following: the symbol of Figure 1 with a minimum height of 5 mm; and the following wording, or similar: "To prevent possible hearing damage, do not listen at high volume levels for long periods."  **Figure 1 – Warning label (IEC 60417-6044)** Alternatively, the entire warning may be given through the equipment display during use, when the user is asked to acknowledge activation of the higher level.		N/A
	Zx.4 Requirements for listening devices (headphones and earphones)		
	Zx.4.1 Wired listening devices with analogue input With 94 dBA sound pressure output $L_{Aeq,T}$, the input voltage of the fixed "programme simulation noise" described in EN 50332-2 shall be ≥ 75 mV. This requirement is applicable in any mode where the headphones can operate (active or passive), including any available setting (for example built-in volume level control). NOTE The values of 94 dBA – 75 mV correspond with 85dBA – 27 mV and 100 dBA – 150 mV.		N/A
	Zx.4.2 Wired listening devices with digital input With any playing device playing the fixed "programme simulation noise" described in EN 50332-1 (and respecting the digital interface standards, where a digital interface standard exists that specifies the equivalent acoustic level), the acoustic output $L_{Aeq,T}$ of the listening device shall be ≤ 100 dBA. This requirement is applicable in any mode where the headphones can operate, including any available setting (for example built-in volume level control, additional sound feature like equalization, etc.). NOTE An example of a wired listening device with digital input is a USB headphone.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Zx.4.3 Wireless listening devices In wireless mode: with any playing and transmitting device playing the fixed programme simulation noise described in EN 50332-1; and respecting the wireless transmission standards, where an air interface standard exists that specifies the equivalent acoustic level; and with volume and sound settings in the listening device (for example built-in volume level control, additional sound feature like equalization, etc.) set to the combination of positions that maximize the measured acoustic output for the abovementioned programme simulation noise, the acoustic output $L_{Aeq,T}$ of the listening device shall be ≤ 100 dBA. NOTE An example of a wireless listening device is a Bluetooth headphone.		N/A
	Zx.5 Measurement methods Measurements shall be made in accordance with EN 50332-1 or EN 50332-2 as applicable. Unless stated otherwise, the time interval T shall be 30 s. NOTE Test method for wireless equipment provided without listening device should be defined.		N/A
2.7.1	Replace the subclause as follows: Basic requirements To protect against excessive current, short-circuits and earth faults in PRIMARY CIRCUITS, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of 5.3 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation;		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) it is permitted for PLUGGABLE EQUIPMENT TYPE B or PERMANENTLY CONNECTED EQUIPMENT, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for PLUGGABLE EQUIPMENT TYPE A the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.		N/A
2.7.2	This subclause has been declared 'void'.		N/A
3.2.3	Delete the NOTE in Table 3A, and delete also in this table the conduit sizes in parentheses.		N/A
3.2.5.1	Replace "60245 IEC 53" by "H05 RR-F"; "60227 IEC 52" by "H03 VV-F or H03 VVH2-F"; "60227 IEC 53" by "H05 VV-F or H05 VVH2-F". In Table 3B, replace the first four lines by the following: Up to and including 6 | 0,75 [a)] | Over 6 up to and including 10| (0,75) [b)] 1,0 | Over 10 up to and including 16| (1,0) [c)] 1,5 | In the conditions applicable to Table 3B delete the words "in some countries" in condition [a)]. In NOTE 1, applicable to Table 3B, delete the second sentence.		N/A
3.2.5.1 (A2:2013)	NOTE Z1 The harmonised code designations corresponding to the IEC cord types are given in Annex ZD		N/A
3.3.4	In Table 3D, delete the fourth line: conductor sizes for 10 to 13 A, and replace with the following: Over 10 up to and including 16 | 1,5 to 2,5 | 1,5 to 4 | Delete the fifth line: conductor sizes for 13 to 16 A		N/A
4.3.13.6 (A1:2010)	Replace the existing NOTE by the following: NOTE Z1 Attention is drawn to: 1999/519/EC: Council Recommendation on the limitation of exposure of the general public to electromagnetic fields 0 Hz to 300 GHz, and 2006/25/EC: Directive on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (artifical optical radiation).		N/A
	Standards taking into account mentioned Recommendation and Directive which demonstrate compliance with the applicable EU Directive are indicated in the OJEC.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex H	Replace the last paragraph of this annex by: At any point 10 cm from the surface of the OPERATOR ACCESS AREA, the dose rate shall not exceed 1 µSv/h (0,1 mR/h) (see NOTE). Account is taken of the background level. Replace the notes as follows: NOTE These values appear in Directive 96/29/Euratom. Delete NOTE 2.		N/A
Bibliography	Additional EN standards.		—

ZA	**NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS**	—

ZB ANNEX (normative) **SPECIAL NATIONAL CONDITIONS (EN)**			
Clause	Requirement + Test	Result - Remark	Verdict
1.2.4.1	In **Denmark**, certain types of Class I appliances (see 3.2.1.1) may be provided with a plug not establishing earthing conditions when inserted into Danish socket-outlets.		N/A
1.2.13.14 (A11:2009)	In **Norway** and **Sweden**, for requirements see 1.7.2.1 and 7.3 of this annex.		N/A
1.5.7.1 (A11:2009)	In **Finland, Norway** and **Sweden**, resistors bridging BASIC INSULATION in CLASS I PLUGGABLE EQUIPMENT TYPE A must comply with the requirements in 1.5.7.1. In addition when a single resistor is used, the resistor must withstand the resistor test in 1.5.7.2.		N/A
1.5.8	In **Norway**, due to the IT power system used (see annex V, Figure V.7), capacitors are required to be rated for the applicable line-to-line voltage (230 V).		N/A
1.5.9.4	In **Finland**, **Norway** and **Sweden**, the third dashed sentence is applicable only to equipment as defined in 6.1.2.2 of this annex.		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.2.1	In **Finland**, **Norway** and **Sweden**, CLASS I PLUGGABLE EQUIPMENT TYPE A intended for connection to other equipment or a network shall, if safety relies on connection to protective earth or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment must be connected to an earthed mains socket-outlet. The marking text in the applicable countries shall be as follows: In **Finland**: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In **Norway**: “Apparatet må tilkoples jordet stikkontakt” In **Sweden**: “Apparaten skall anslutas till jordat uttag”		N/A
1.7.2.1 (A11:2009)	In **Norway** and **Sweden**, the screen of the cable distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation need to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by e.g. a retailer. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Equipment connected to the protective earthing of the building installation through the mains connection or through other equipment with a connection to protective earthing – and to a cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system has therefore to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11).”		

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	NOTE In Norway, due to regulation for installations of cable distribution systems, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): “Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel- TV nettet.” Translation to Swedish: ”Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet.”		N/A
1.7.2.1 (A2:2013)	In **Denmark**, CLASS I PLUGGABLE EQUIPMENT TYPE A intended for connection to other equipment or a network shall, if safety relies on connection to protective earth or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment must be connected to an earthed mains socket-outlet. The marking text in **Denmark** shall be as follows: In **Denmark**: “Apparatets stikprop skal tilsluttes en stikkontakt med jord, som giver forbindelse til stikproppens jord.”		N/A
1.7.5 1.7.5 (A11:2009)	In **Denmark**, socket-outlets for providing power to other equipment shall be in accordance with the Heavy Current Regulations, Section 107-2-D1, Standard Sheet DK 1-3a, DK 1-5a or DK 1-7a, when used on Class I equipment. For STATIONARY EQUIPMENT the socket-outlet shall be in accordance with Standard Sheet DK 1-1b or DK 1-5a. For **CLASS II EQUIPMENT** the socket outlet shall be in accordance with Standard Sheet DKA 1-4a.		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.5 (A2:2013)	In **Denmark**, socket-outlets for providing power to other equipment shall be in accordance with the DS 60884-2-D1:2011. For class I equipment the following Standard Sheets are applicable: DK 1-3a, DK 1-1c, DK 1-1d, DK 1-5a or DK 1-7a, with the exception for STATIONARY EQUIPMENT where the socket-outlets shall be in accordance with Standard Sheet DK 1-1b, DK 1-1c, DK 1-1d or DK 1-5a. Socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance with DS 60884-2-D1 standard sheet DKA 1-4a. Other current rating socket outlets shall be in compliance with by DS 60884-2-D1 Standard Sheet DKA 1-3a or DKA 1-3b. Justification the Heavy Current Regulations, 6c		N/A
2.2.4	In **Norway**, for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.		N/A
2.3.2	In **Finland**, **Norway** and **Sweden** there are additional requirements for the insulation. See 6.1.2.1 and 6.1.2.2 of this annex.		N/A
2.3.4	In **Norway**, for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.		N/A
2.6.3.3	In the **United Kingdom**, the current rating of the circuit shall be taken as 13 A, not 16 A.		N/A
2.7.1	In the **United Kingdom**, to protect against excessive currents and short-circuits in the PRIMARY CIRCUIT of DIRECT PLUG-IN EQUIPMENT, tests according to 5.3 shall be conducted, using an external protective device rated 30 A or 32 A. If these tests fail, suitable protective devices shall be included as integral parts of the DIRECT PLUG-IN EQUIPMENT, so that the requirements of 5.3 are met.		N/A
2.10.5.13	In **Finland**, **Norway** and **Sweden**, there are additional requirements for the insulation, see 6.1.2.1 and 6.1.2.2 of this annex.		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.1	In **Switzerland**, supply cords of equipment having a RATED CURRENT not exceeding 10 A shall be provided with a plug complying with SEV 1011 or IEC 60884-1 and one of the following dimension sheets: SEV 6532-2.1991 Plug Type 15 3P+N+PE 250/400 V, 10 A SEV 6533-2.1991 Plug Type 11 L+N 250 V, 10 A SEV 6534-2.1991 Plug Type 12 L+N+PE 250 V, 10 A In general, EN 60309 applies for plugs for currents exceeding 10 A. However, a 16 A plug and socket-outlet system is being introduced in Switzerland, the plugs of which are according to the following dimension sheets, published in February 1998: SEV 5932-2.1998: Plug Type 25 , 3L+N+PE 230/400 V, 16 A SEV 5933-2.1998:Plug Type 21, L+N, 250 V, 16A SEV 5934-2.1998: Plug Type 23, L+N+PE 250 V, 16 A		N/A
3.2.1.1	In **Denmark**, supply cords of single-phase equipment having a rated current not exceeding13 A shall be provided with a plug according to the Heavy Current Regulations, Section 107-2-D1. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If poly-phase equipment and single-phase equipment having a RATED CURRENT exceeding 13 A is provided with a supply cord with a plug, this plug shall be in accordance with the Heavy Current Regulations, Section 107-2-D1 or EN 60309-2.		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.1 (A2:2013)	In **Denmark**, supply cords of single-phase equipment having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2. Justification the Heavy Current Regulations, 6c		N/A
3.2.1.1	In **Spain**, supply cords of single-phase equipment having a rated current not exceeding 10 A shall be provided with a plug according to UNE 20315:1994. Supply cords of single-phase equipment having a rated current not exceeding 2,5 A shall be provided with a plug according to UNE-EN 50075:1993. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules, shall be provided with a plug in accordance with standard UNE 20315:1994. If poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with UNE-EN 60309-2.		N/A
3.2.1.1	In the **United Kingdom**, apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord and plug, shall be fitted with a 'standard plug' in accordance with Statutory Instrument 1768:1994 - The Plugs and Sockets etc. (Safety) Regulations 1994, unless exempted by those regulations. NOTE 'Standard plug' is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.1	In **Ireland**, apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to I.S. 411 by means of that flexible cable or cord and plug, shall be fitted with a 13 A plug in accordance with Statutory Instrument 525:1997 - National Standards Authority of Ireland (section 28) (13 A Plugs and Conversion Adaptors for Domestic Use) Regulations 1997.		N/A
3.2.4	In **Switzerland**, for requirements see 3.2.1.1 of this annex.		N/A
3.2.5.1	In the **United Kingdom**, a power supply cord with conductor of 1,25 mm2 is allowed for equipment with a rated current over 10 A and up to and including 13 A.		N/A
3.3.4	In the **United Kingdom**, the range of conductor sizes of flexible cords to be accepted by terminals for equipment with a RATED CURRENT of over 10 A up to and including 13 A is: • 1,25 mm^2 to 1,5 mm^2 nominal cross-sectional area.		N/A
4.3.6	In the **United Kingdom**, the torque test is performed using a socket outlet complying with BS 1363 part 1:1995, including Amendment 1:1997 and Amendment 2:2003 and the plug part of DIRECT PLUG-IN EQUIPMENT shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16 and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.		N/A
4.3.6	In **Ireland**, DIRECT PLUG-IN EQUIPMENT is known as plug similar devices. Such devices shall comply with Statutory Instrument 526:1997 - National Standards Authority of Ireland (Section 28) (Electrical plugs, plug similar devices and sockets for domestic use) Regulations, 1997.		N/A

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ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.7.1	In **Finland**, **Norway** and **Sweden** TOUCH CURRENT measurement results exceeding 3,5 mA r.m.s. are permitted only for the following equipment: • STATIONARY PLUGGABLE EQUIPMENT TYPE A that is intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, for example, in a telecommunication centre; and has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR; and is provided with instructions for the installation of that conductor by a SERVICE PERSON; • STATIONARY PLUGGABLE EQUIPMENT TYPE B; • STATIONARY PERMANENTLY CONNECTED EQUIPMENT.		N/A
6.1.2.1 (A1:2010)	In **Finland**, **Norway** and **Sweden**, add the following text between the first and second paragraph of the compliance clause: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either - two layers of thin sheet material, each of which shall pass the electric strength test below, or - one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. Alternatively for components, there is no distance through insulation requirements for the insulation consisting of an insulating compound completely filling the casing, so that CLEARANCES and CREEPAGE DISTANCES do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition - passes the tests and inspection criteria of 2.10.11 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 2.10.10 shall be performed using 1,5 kV), and - is subject to ROUTINE TESTING for electric strength during manufacturing, using a test voltage of 1,5 kV.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	It is permitted to bridge this insulation with an optocoupler complying with 2.10.5.4 b). It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2. A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: - the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in EN 60950-1:2006, 6.2.2.1; - the additional testing shall be performed on all the test specimens as described in EN 60384-14: - the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.		N/A
6.1.2.2	In **Finland**, **Norway** and **Sweden**, the exclusions are applicable for PERMANENTLY CONNECTED EQUIPMENT, PLUGGABLE EQUIPMENT TYPE B and equipment intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, e.g. in a telecommunication centre, and which has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR and is provided with instructions for the installation of that conductor by a SERVICE PERSON.		N/A
7.2	In **Finland**, **Norway** and **Sweden**, for requirements see 6.1.2.1 and 6.1.2.2 of this annex. The term TELECOMMUNICATION NETWORK in 6.1.2 being replaced by the term CABLE DISTRIBUTION SYSTEM.		N/A
7.3 (A11:2009)	In **Norway** and **Sweden**, for requirements see 1.2.13.14 and 1.7.2.1 of this annex.		N/A

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Annex ZD
(informative)

IEC and CENELEC code designations for flexible cords

Type of flexible cord	Code designations	
	IEC	CENELEC
PVC insulated cords		
Flat twin tinsel cord	60227 IEC 41	H03VH-Y
Light polyvinyl chloride sheathed flexible cord	60227 IEC 52	H03VV-F H03VVH2-F
Ordinary polyvinyl chloride sheathed flexible cord	60277 IEC 53	H05VV-F H05VVH2-F
Rubber insulated cords		
Braided cord	60245 IEC 51	H03RT-F
Ordinary tough rubber sheathed flexible cord	60245 IEC 53	H05RR-F
Ordinary polychloroprene sheathed flexible cord	60245 IEC 57	H05RN-F
Heavy polychloroprene sheathed flexible cord	60245 IEC 66	H07RN-F
Cords having high flexibility		
Rubber insulated and sheathed cord	60245 IEC 86	H03RR-H
Rubber insulated, crosslinked PVC sheathed cord	60245 IEC 87	H03RV4-H
Crosslinked PVC insulated and sheathed cord	60245 IEC 88	H03V4V4-H

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Details of: External View-1



Details of: External View-2



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Details of: External View-3



Details of: Internal View-1

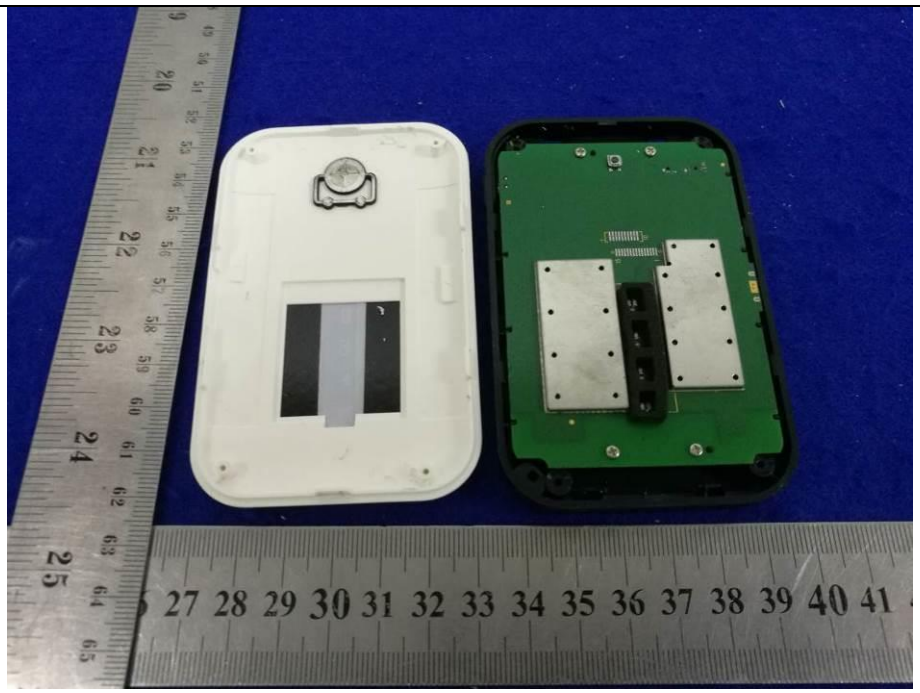


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Tel: +(86) 0755-8259 1330 | Fax: +(86) 0755-8259 1332 | E-mail: webmaster@lcs-cert.com | http:// www.lcs-cert.com

Details of: Internal View-2

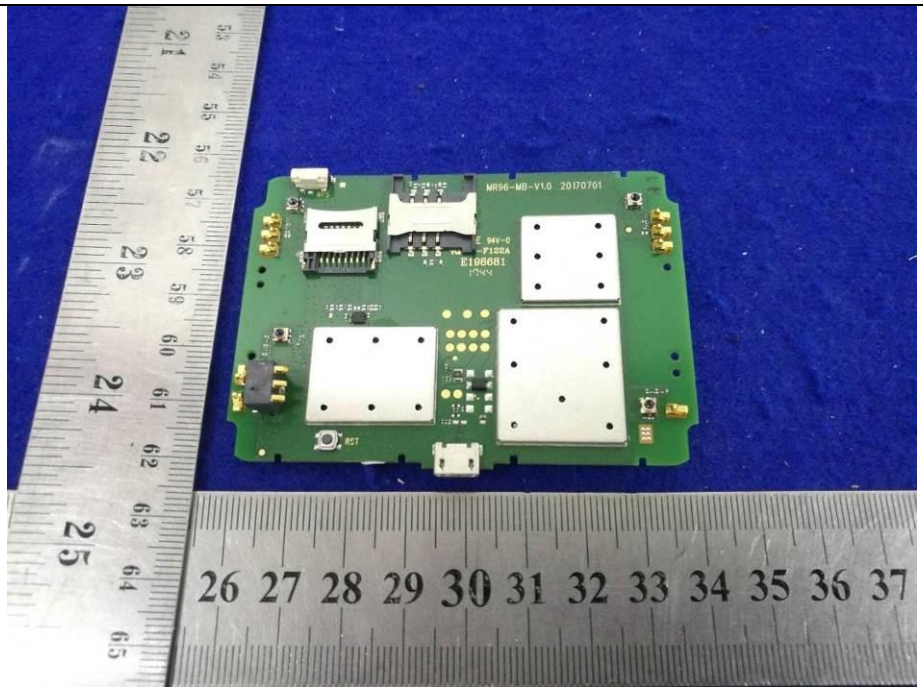


Details of: Internal View-3

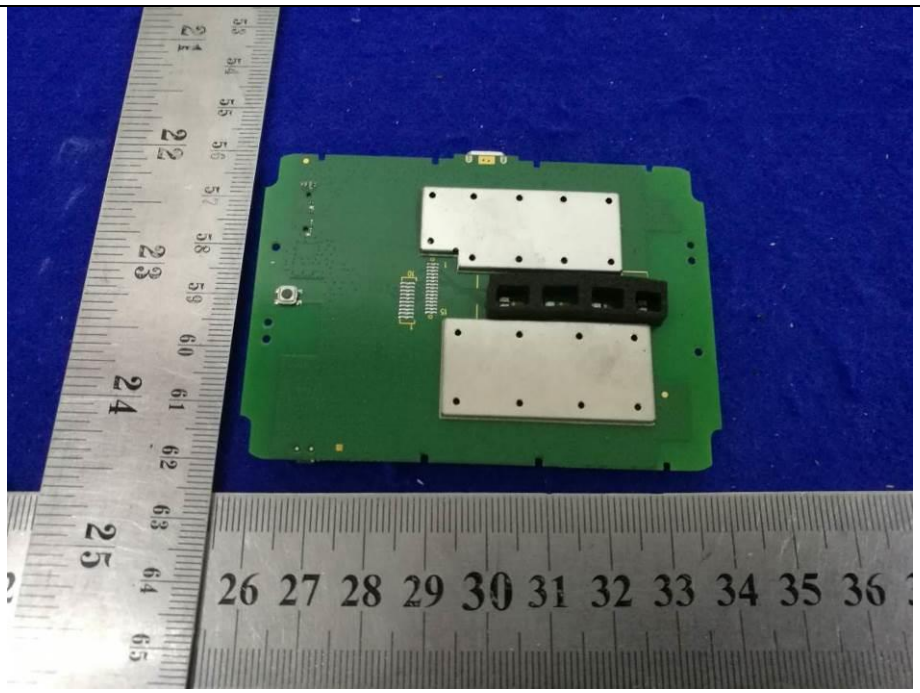


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Details of: PCB board view-1



Details of: PCB board view-2



--------- END OF TEST REPORT ---------

Shenzhen LCS Compliance Testing Laboratory Ltd.
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CERTIFICATE
of Conformity

Reference No. : **LCS181011006AE**

Applicant : **Shenzhen Gokodo Technology Co., Ltd**

Address : **Central Road B Block 13G,Baoyuan Road,Xixiang Street, Baoan Dist.,Shenzhen,Guangdong, China (Mainland)**

Trade Mark : **Gokodo/QLink**

Product : **4G Mobile Router**

Model(s) : **M6,M7,M6XX,M7XX**

Opinion on the Essential Requirements

Article 3.1a): Health and Safety	**Conform**
Article 3.1b): Electromagnetic Compatibility	**Conform**
Article 3.2: Effective Use of the Radio Spectrum	**Conform**

CE-marking

Marking Example (Class 1)

CE

This certificate is issued in accordance with The RED2014/53/EUof the European Parliament and the Council and the mutual recognition of their conformity.

Centre of Testing Service * APPROVED *

November 13, 2018
Date of issue

Manager

Shenzhen LCS Compliance Testing Laboratory Ltd.
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Shenzhen, Guangdong, China
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Annex

Applied Standards and Test Reports

Standard	Laboratory	Test Report Number
ETSI EN 301 489-1 V2.1.1 (2017-02) ETSI EN 301 489-17 V3.1.1(2017-02) Draft ETSI EN 301 489-52 V1.1.0 (2016-11) EN 55032:2015 EN 55035:2017	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS181011006AEA
ETSI EN 300 328 V2.1.1 (2016-11)	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS181011006AEC
ETSI EN 301 511 V12.5.1 (2017-03)	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS181011006AED
ETSI EN 301 908-1 V11.1.1 (2016-07) ETSI EN 301 908-2 V11.1.2 (2017-08)	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS181011006AEE
ETSI EN 301 908-1 V11.1.1 (2016-07) ETSI EN 301 908-13 V11.1.1 (2016-07)	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS181011006AEE
EN50663:2017 EN50566:2017 EN62209-2:2010	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS181011006AEB
EN 60950-1: 2006+A11: 2009+A1:2010+A12:2011+A2: 2013	Shenzhen LCS Compliance Testing Laboratory Ltd.	LCS181011005AS

General Remarks:

- This conformity assessment is limited to the essential requirements of the RED Directive. Only products fulfilling all essential requirements of all applicable new approach directives may be placed on the market and put into service.
  Products in compliance with all provisions of the applicable directives providing for the CE marking must bear this marking.
- This device also contains frequency bands that are not operational in EU member states. Only the frequency bands used in European Union have been assessed for this Certificate.

Shenzhen LCS Compliance Testing Laboratory Ltd.
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Http://www.LCS-cert.com Email: webmaster@LCS-cert.com

EMC TEST REPORT

For

Shenzhen Gokodo Technology Co., Ltd

4G Mobile Router

Test Model: M6

Additional Model No.: M7,M6XX,M7XX

Prepared for	:	Shenzhen Gokodo Technology Co., Ltd
Address	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street, Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	October 11, 2018
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	October 11, 2018~ November 08, 2018
Date of Report	:	November 13, 2018

CE

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EMC TEST REPORT

ETSI EN 301 489-17 V3.1.1(2017-02) & Draft ETSI EN 301 489-52 V1.1.0 (2016-11) & EN55032 :2015 & EN 55035:2017

Electromagnetic compatibility and Radio spectrum Matters (ERM);Electromagnetic Compatibility (EMC)standard for radio equipment and services

Report Reference No.	:	**LCS181011006AEA**
Date Of Issue	:	November 13, 2018
Testing Laboratory Name	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	:	**Shenzhen Gokodo Technology Co., Ltd**
Address	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Test Specification		
Standard	:	ETSI EN 301 489-1 V2.1.1 (2017-02) ETSI EN 301 489-17 V3.1.1(2017-02) Draft ETSI EN 301 489-52 V1.1.0 (2016-11) EN 55032:2015 EN 55035:2017
Test Report Form No.	:	LCSEMC-1.0
TRF Originator	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2017-06

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Test Item Description.	:	4G Mobile Router
Trade Mark	:	Gokodo/QLink
Test Model	:	M6
Ratings	:	DC 3.7V by Li-ion battery(2000mAh) Recharged by DC 5V/1A by adapter
Result	:	**Positive**

Compiled by:	Supervised by:	Approved by:
Peter Xiao	Calvin Weng	Gavin Liang
Peter Xiao / Administrators	Calvin Weng / Technique principal	Gavin Liang/ Manager

EMC -- TEST REPORT

Test Report No. : LCS181011006AEA	November 13, 2018 Date of issue

Test Model.....	: M6
EUT.....	: 4G Mobile Router
Applicant.....	**: Shenzhen Gokodo Technology Co., Ltd**
Address.....	: Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Shenzhen Gokodo Technology Co., Ltd**
Address.....	: Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	: /
Fax.....	: /
Factory.....	**: Shenzhen Gokodo Technology Co., Ltd**
Address.....	: Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	: /
Fax.....	: /

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	November 13, 2018	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	4G Mobile Router
Test Model	:	M6
Additional Model No.	:	M7,M6XX,M7XX
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Power Supply	:	DC 3.7V by Li-ion battery(2000mAh) Recharged by DC 5V/1A by adapter
Hardware Version	:	M6_V1.1
Software Version	:	M6VD_V1.1
2G	:	
Support Band	:	☒GSM 900 (EU-Band) ☒DCS 1800 (EU-Band) ☒GSM 850 (U.S.-Band) ☒PCS 1900 (U.S.-Band)
Release Version	:	R99
GPRS Class	:	Class 12
EGPRS Class	:	Class 12
Uplink	:	GSM 900: 880MHz ~ 915MHz DCS 1800: 1710MHz ~ 1785MHz
Downlink	:	GSM 900: 925MHz ~ 960MHz DCS 1800: 1805MHz ~ 1880MHz
Type Of Modulation	:	GMSK for GPRS, GMSK/8PSK for EGPRS
Antenna Description	:	PIFA Antenna; 900MHz:-0.72dBi(Max.) , 900MHz :-1.23dBi(Max.)
Power Class	:	GSM 900: Class 4, DCS 1800: Class 1
3G	:	
Support Band	:	☐WCDMA Band II (U.S.-Band) ☐WCDMA Band V (U.S.-Band) ☒WCDMA Band I (EU-Band) ☒WCDMA Band VIII (EU-Band)
Release Version	:	R99
Uplink	:	WCDMA Band I: 1920MHz ~ 1980MHz WCDMA Band VIII: 880MHz~915MHz
Downlink	:	WCDMA Band I: 2110MHz ~ 2170MHz WCDMA Band VIII: 925MHz~960MHz
Type Of Modulation	:	WCDMA: QPSK; HSDPA/HSUPA: QPSK
Antenna Description	:	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 8:-0.72dBi(Max.)
Power Class	:	Class 3

LTE	:	
Support Band	:	☒E-UTRA Band 1(EU-Band) ☒E-UTRA Band 3(EU-Band) ☒E-UTRA Band 7(EU-Band) ☒E-UTRA Band 8(EU-Band) ☒E-UTRA Band 20(EU-Band) ☒E-UTRA Band 38(EU-Band) ☒E-UTRA Band 40(EU-Band)
LTE Release Version	:	R4
Uplink	:	E-UTRA Band 1: 1920MHz ~ 1980MHz E-UTRA Band 3: 1710MHz~1785MHz E-UTRA Band 7: 2500MHz ~ 2570MHz E-UTRA Band 8: 880MHz~915MHz E-UTRA Band 20: 832MHz ~ 862MHz E-UTRA Band 38: 2570MHz ~ 2620MHz E-UTRA Band 40: 2300MHz~2400MHz
Downlink	:	E-UTRA Band 1: 2110MHz ~ 2170MHz E-UTRA Band 3: 1805MHz~1880MHz E-UTRA Band 7: 2620MHz~2690MHz E-UTRA Band 8: 926MHz~960MHz E-UTRA Band 20: 791MHz~821MHz E-UTRA Band 38: 2570MHz ~ 2620MHz E-UTRA Band 40: 2300MHz~2400MHz
Type Of Modulation	:	QPSK/16-QAM
Antenna Description	:	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 3:-1.37dBi(Max.), Band 7:-0.27dBi(Max.),Band 8:-0.72dBi(Max.) , Band 20:-0.67dBi(Max.) ,Band 38:-0.22dBi(Max.) , Band 40:-0.25dBi(Max.)
Power Class	:	Class 3
WIFI(2.4G Band)	:	
Frequency Range	:	2412-2472MHz
Channel Spacing	:	5MHz
Channel Number	:	13 Channel for 20MHz bandwidth(2412~2472MHz) 9 channels for 40MHz bandwidth(2422~2462MHz)
Modulation Type	:	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	:	Two same PIFA Antenna; ANT1 used for WIFI, -0.52dBi(Max.); ANT2 used for WIFI, -0.52dBi(Max.);

1.2. Objective

ETSI EN 301 489-1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
ETSI EN 301 489-17	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment Part 17: Specific conditions for Broadband Data Transmission Systems
Draft ETSI EN 301 489-52 V1.1.0 (2016-11)	Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment;
EN55032:2015	Electromagnetic compatibility of multimedia equipment — Emission Requirements
EN 55035	Electromagnetic compatibility of multimedia equipment – Immunity requirements

The objective is to determine compliance with ETSI EN 301 489-1 V2.1.1 (2017-02), ETSI EN 301 489-17 V3.1.1(2017-02) and Draft ETSI EN 301 489-52 V1.1.0 (2016-11) & EN55032:2015, EN 55035:2017.

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1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 489-1 V2.1.1 (2017-02),ETSI EN 301 489-17 V2.2.1 (2012-09) and Draft ETSI EN 301 489-52 V1.1.0 (2016-11) & EN55032:2015, EN 55035:2017.

1.5. Description of Test Facility

FCC Registration Number. is 254912.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001
NVLAP Registration Code is 600167-0

1.6. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
Shenzhen Gokodo Technology Co., Ltd	Adapter	KS15004R	---	CE

Products are sold without adapters

1.7. External I/O

I/O Port Description	Quantity	Cable
Charging port	1	0.2 m, unshielded cable

1.8. List Of Measuring Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	X-series USB Peak and Average Power Sensor Aglient	Agilent	U2021XA	MY54080022	2018-10-25	2019-10-24
2	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2018-10-25	2019-10-24
3	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
4	RF Control Unit	Ascentest	AT890-RFB	N/A	2018-06-16	2019-06-15
5	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2017-11-17	2018-11-16
6	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2018-06-16	2019-06-15
7	SPECTRUM ANALYZER	R&S	FSP	100503	2018-06-16	2019-06-15
8	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2017-11-17	2018-11-16
9	ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY42081396	2017-11-17	2018-11-16
10	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2017-11-17	2018-11-16
11	Universal Radio Communication Tester	R&S	CMU 200	105788	2018-06-16	2019-06-15
12	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2018-06-16	2019-06-15
13	RF Control Unit	Tonscend	JS0806-1	N/A	2018-06-16	2019-06-15
14	DC Power Supply	Agilent	E3642A	N/A	2017-11-17	2018-11-16
15	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
16	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2018-10-10	2019-10-09
17	DC Source	CHROMA	62012P-80-60	34782951	2018-10-10	2019-10-09
18	RF Filter	Micro-Tronics	BRC50718	S/N-017	2018-06-16	2019-06-15
19	RF Filter	Micro-Tronics	BRC50719	S/N-011	2018-06-16	2019-06-15
20	RF Filter	Micro-Tronics	BRC50720	S/N-011	2018-06-16	2019-06-15
21	RF Filter	Micro-Tronics	BRC50721	S/N-013	2018-06-16	2019-06-15
22	RF Filter	Micro-Tronics	BRM50702	S/N-195	2018-06-16	2019-06-15
23	Splitter/Combiner	Micro-Tronics	PS2-15	CB11-20	2018-06-16	2019-06-15
24	Splitter/Combiner	Micro-Tronics	CB11-20	N/A	2018-06-16	2019-06-15
25	Attenuator	Micro-Tronics	PAS-8-10	S/N23466	2018-06-16	2019-06-15
26	Exposure Level Tester	Narda	ELT-400	N-0713	2018-04-02	2019-04-01
27	B-Field Probe	Narda	ELT-400	M-1154	2018-04-10	2019-04-09
28	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
29	Positioning Controller	MF	MF-7082	/	2018-06-16	2019-06-15
30	EMI Test Software	AUDIX	E3	N/A	2018-06-16	2019-06-15
31	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
32	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2017-11-17	2018-11-16
33	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-06-22	2019-06-21
34	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-05-01	2019-04-30
35	Horn Antenna	EMCO	3115	6741	2018-06-22	2019-06-21
36	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
37	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
38	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
39	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15
40	TEST RECEIVER	R&S	ESCI	101142	2018-06-16	2019-06-15

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41	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	2018-06-16	2019-06-15
42	10dB Attenuator	SCHWARZBECK	MTS-IMP136	261115-001-0032	2018-06-16	2019-06-15
43	Artificial Mains	R&S	ENV216	101288	2018-06-16	2019-06-15
44	Power Analyzer Test System	Voltech	PM6000	20000670053	2018-06-16	2019-06-15
45	ESD Simulator	SCHLODER	SESD 230	604035	2018-06-16	2019-06-15
46	RF POWER AMPLIFIER	OPHIR	5225R	1052	2018-03-21	2019-03-20
47	RF POWER AMPLIFIER	OPHIR	5273F	1019	2018-03-23	2019-03-25
48	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2018-04-27	2019-04-26
49	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-482	2018-04-27	2019-04-26
50	Electric field probe	Narda S.TS./PMM	EP601	611WX80208	2018-03-26	2019-03-25
51	Power Meter	Agilent	E4419B	MY45104493	2018-06-16	2019-06-15
52	Power Sensor	Agilent	E9301H	MY41495234	2018-06-16	2019-06-15
53	Power Sensor	Agilent	E4412A	MY41500229	2018-06-16	2019-06-15
54	Sound Level meter	BK Precision	735	73500873100 10020	2018-06-16	2019-06-15
55	Audio Analyzer	R&S	UPV	1146.2003K0 2-101782-XP	2018-06-16	2019-06-15
56	Mouse Simulation	Bruel & Kjaer	4227	A0304216	2018-06-16	2019-06-15
57	Ear Simulation and supply	Bruel & Kjaer	2669.4182.5935	A0305284	2018-06-16	2019-06-15
58	Acoustical Calibrators	Bruel & Kjaer	4231	A0304215	2018-06-16	2019-06-15
59	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2017-11-17	2018-11-16
60	Simulator	FRANKONIA	CIT-10	A126A1195	2018-06-16	2019-06-15
61	CDN	FRANKONIA	CDN-M2	5100100100	2018-06-16	2019-06-15
62	CDN	FRANKONIA	CDN-M3	0900-11	2018-06-16	2019-06-15
63	Attenuator	FRANKONIA	ATT6	0010222A	2018-06-16	2019-06-15
64	Infuse tongs	EM TEST	EM-Clamp	0513A031201	2018-06-16	2019-06-15
65	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2018-06-16	2019-06-15
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

1.9. Measurement Uncertainty

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.42dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.54dB	Polarize: V
	4.1dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	2.08dB	Polarize: H
	2.56dB	Polarize: V
Uncertainty for radio frequency	0.01ppm	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2℃	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

1.10. Description Of Test Modes

There was 20 test Modes. TM1 to TM20 were shown below:

TM1: Operate in traffic mode GPRS 900;
TM2: Operate in traffic mode EGPRS 900;
TM3: Operate in traffic mode GPRS 1800;
TM4: Operate in traffic mode EGPRS 1800;
TM5: Operate in traffic mode WCDMA For band I;
TM6: Operate in traffic mode HSUPA For band I;
TM7: Operate in traffic mode HSDPA For band I;
TM8: Operate in traffic mode WCDMA For band VIII;
TM9: Operate in traffic mode HSUPA For band VIII;
TM10: Operate in traffic mode HSDPA For band VIII;
TM11: Operate in traffic mode For E-UTRA Band 1;
TM12: Operate in traffic mode For E-UTRA Band 3;
TM13: Operate in traffic mode For E-UTRA Band 7;
TM14: Operate in traffic mode For E-UTRA Band 8;
TM15: Operate in traffic mode For E-UTRA Band 20;
TM16: Operate in traffic mode For E-UTRA Band 38;
TM17: Operate in traffic mode For E-UTRA Band 40;
TM18: Operate in 2.4GWIFI Link mode;
TM19: Charging mode;
TM20: Idle mode

***Note:
1. All test modes were tested, but we only recorded the worst case in this report.

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2. SUMMARY OF TEST RESULTS

Rule	Description of Test Items	Result
§7.1	Reference to clauses EN 301 489-1 §8.4 AC mains power input/output ports	Compliant
§7.1	Reference to clauses EN 301 489-1§8.3 DC power input/output ports	N/A*
§7.1	Reference to clauses EN 301 489-1 §8.2 Enclosure of ancillary equipment measured on a stand alone basis	Compliant
§7.1	Reference to clauses EN 301 489-1 §8.5 Harmonic current emissions (AC mains input port)	Compliant
§7.1	Reference to clauses EN 301 489-1 §8.6 Voltage fluctuations and flicker (AC mains input port)	Compliant
§7.1	Reference to clauses EN 301 489-1§8.7 Telecommunication ports	N/A*
§7.2	Reference to clauses EN 301 489-1 §9.3 Electrostatic discharge (EN 61000-4-2)	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.2 Radio frequency electromagnetic field (80 MHz to 6000 MHz)(EN 61000-4-3)	Compliant
§7.2	Reference to clauses EN 301 489-1§9.4 Fast transients, common mode (EN 61000-4-4)	Compliant
§7.2	Reference to clauses EN 301 489-1§9.8 Surges (EN 61000-4-5)	Compliant
§7.2	Reference to clauses EN 301 489-1§9.5 Radio frequency, common mode (EN 61000-4-6)	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.6 Transients and surges in the vehicular environment (ISO 7637-2)	N/A*
§7.2	Reference to clauses EN 301 489-1§9.7 Voltage dips and interruptions (EN 61000-4-11)	Compliant

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3. LINE CONDUCTED EMISSION

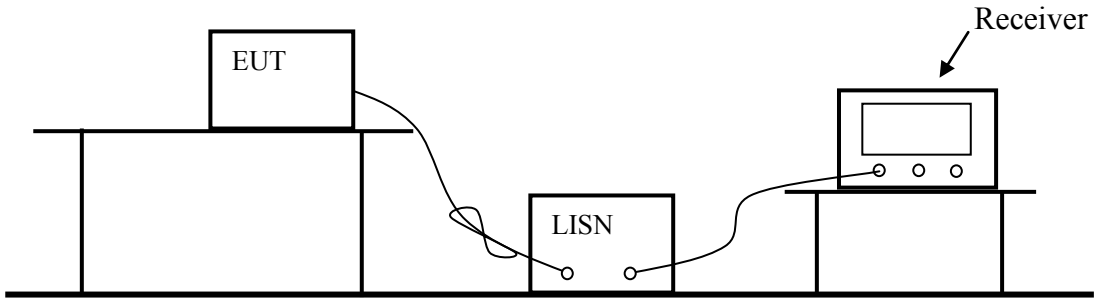
3.1. Conducted Emission Limit

ETSI EN 301 489-1 V2.1.1 (2017-02)/EN 55032 Class B

Limits for Line Conducted Emission

Frequency (MHz)	Limit (dBμV)	
	Quasi-peak Level	Average Level
0.15~0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50~5.00	56.0	46.0
5.00~30.00	60.0	50.0
NOTE1-The lower limit shall apply at the transition frequencies. NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

3.2. Test Configuration



The setup of EUT is according with per ETSI EN 301 489-1 measurement procedure. The specification used was with the ETSI EN 301 489-1 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.

The EUT received DC 5V charging power from the Adapter which received power through a LISN supplying power of AC 230V/50Hz.

3.3. EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IFBW
150 kHz – 30 MHz	9 kHz

3.4. Test Procedure

Power on the EUT, the EUT begins to work. Make sure the EUT operates normally during the test.

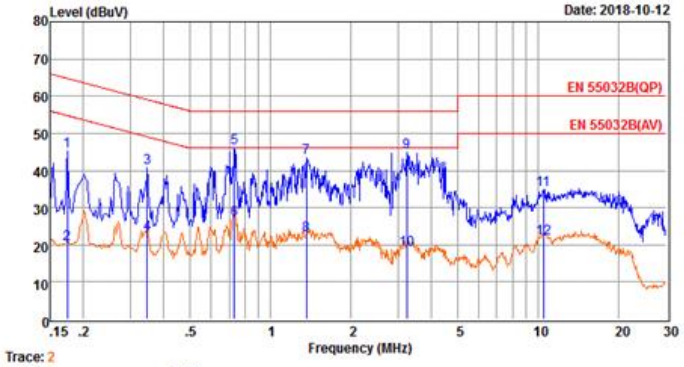
Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

3.5. Test Data

For pre-scan, the worst test case is TM1, and the test data was show as follow:

Model No.	M6	Test Mode	TM1
Environmental Conditions	20.6℃, 51.2% RH	Test Engineer	Mina Xu
Pol	Line		

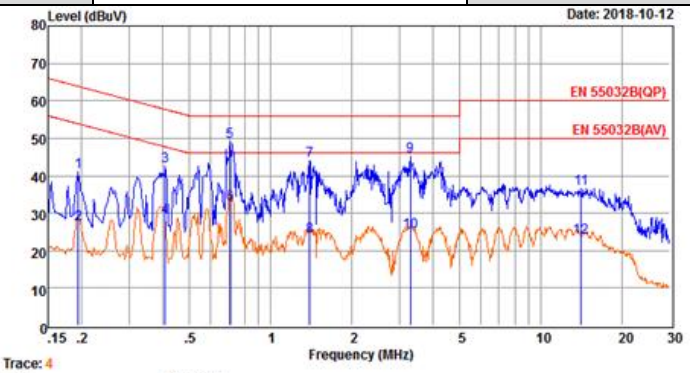


Trace: 2
Pol: LINE

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.17	25.57	9.60	0.02	10.00	45.19	64.77	-19.58	QP
2	0.17	0.49	9.60	0.02	10.00	20.11	54.76	-34.65	Average
3	0.35	21.16	9.62	0.03	10.00	40.81	59.05	-18.24	QP
4	0.35	3.24	9.62	0.03	10.00	22.89	49.04	-26.15	Average
5	0.73	26.49	9.64	0.04	10.00	46.17	56.00	-9.83	QP
6	0.73	7.12	9.64	0.04	10.00	26.80	46.00	-19.20	Average
7	1.36	23.59	9.63	0.05	10.00	43.27	56.00	-12.73	QP
8	1.36	2.99	9.63	0.05	10.00	22.67	46.00	-23.33	Average
9	3.22	25.08	9.65	0.06	10.00	44.79	56.00	-11.21	QP
10	3.22	-0.88	9.65	0.06	10.00	18.83	46.00	-27.17	Average
11	10.45	14.94	9.69	0.08	10.00	34.71	60.00	-25.29	QP
12	10.45	1.97	9.69	0.08	10.00	21.74	50.00	-28.26	Average

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

Model No.	M6	Test Mode	TM1
Environmental Conditions	20.6℃, 51.2% RH	Test Engineer	Mina Xu
Pol	Neutral		



Trace: 4
Pol: NEUTRAL

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.19	21.31	9.60	0.02	10.00	40.93	63.84	-22.91	QP
2	0.19	7.42	9.60	0.02	10.00	27.04	53.84	-26.80	Average
3	0.41	22.73	9.61	0.04	10.00	42.38	57.73	-15.35	QP
4	0.41	9.12	9.61	0.04	10.00	28.77	47.72	-18.95	Average
5	0.71	29.47	9.63	0.04	10.00	49.14	56.00	-6.86	QP
6	0.71	12.70	9.63	0.04	10.00	32.37	46.00	-13.63	Average
7	1.40	24.45	9.63	0.05	10.00	44.13	56.00	-11.87	QP
8	1.40	4.16	9.63	0.05	10.00	23.84	46.00	-22.16	Average
9	3.29	25.55	9.65	0.06	10.00	45.26	56.00	-10.74	QP
10	3.29	5.34	9.65	0.06	10.00	25.05	46.00	-20.95	Average
11	14.06	16.85	9.74	0.10	10.00	36.69	60.00	-23.31	QP
12	14.06	3.59	9.74	0.10	10.00	23.43	50.00	-26.57	Average

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

4. RADIATED DISTURBANCE

4.1. Radiated Emission Limit

ETSI EN 301 489-1 V2.1.1 (2017-02)/EN 55032 Class B

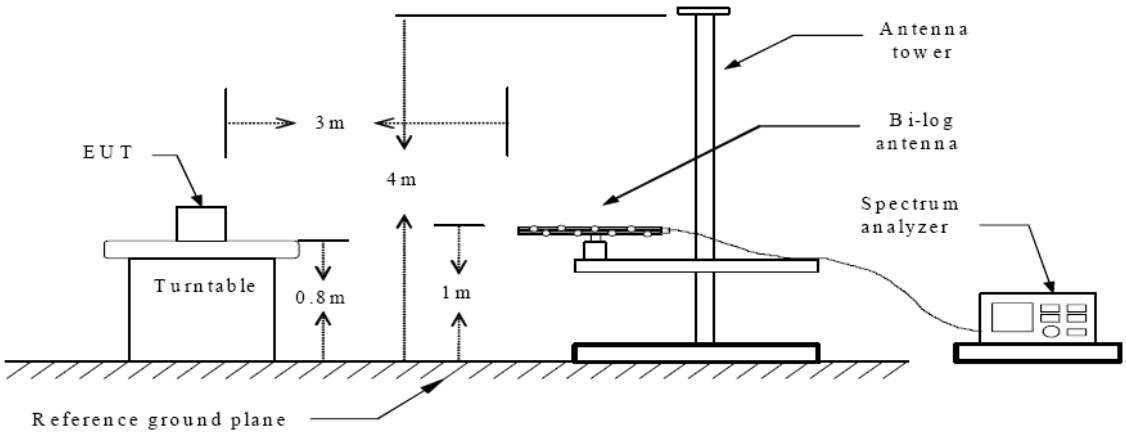
Limits for radiated disturbance below 1GHz

Frequency (MHz)	Distance (Meters)	Field Strengths Limit (dBμV/m)
30 ~ 230	3	40
230 ~ 1000	3	47
Note: (1) The smaller limit shall apply at the combination point between two frequency bands. (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.		

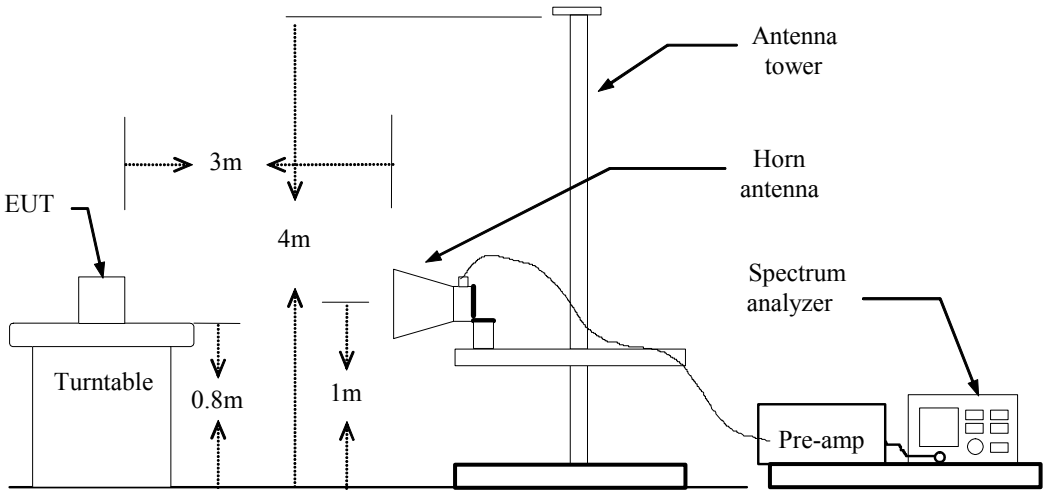
Limits for radiated disturbance Above 1GHz

Frequency (MHz)	Distance (Meters)	Average Limit (dBμV/m)	Peak Limit (dBμV/m)
1000-3000	3	50	70
3000-6000	3	54	74
Note: The lower limit applies at the transition frequency.			

4.2. Test Configuration



Below 1000MHz



Above 1000MHz

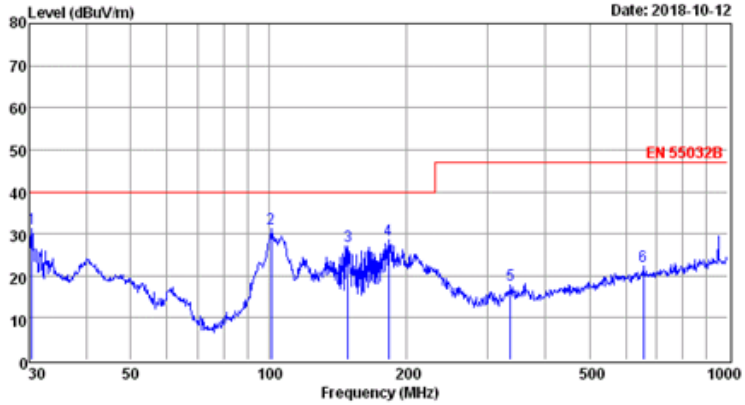
4.3. Test Procedure

Please refer to ETSI EN 301 489-1 Clause 8.2.3 and EN 55032 Clause annex A.2 for the measurement methods.

4.4. Test Data

The worst test mode of the EUT was TM1, and its test data was showed as the follow:

Model No.	M6	Test Mode	TM1
Environmental Conditions	23.1℃, 51.3% RH	Detector Function	Quasi-peak
Pol	Vertical	Distance	3m
Test Engineer	Mina Xu		

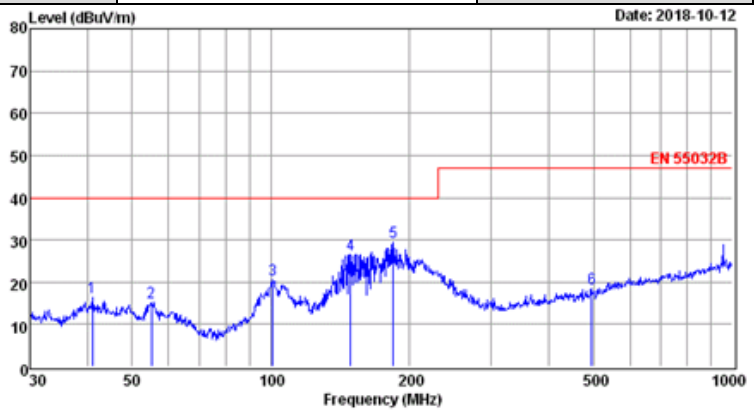


pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	30.42	18.51	0.39	12.33	31.23	40.00	-8.77	QP
2	101.29	17.44	0.60	13.04	31.08	40.00	-8.92	QP
3	148.96	17.96	0.86	8.25	27.07	40.00	-12.93	QP
4	182.56	17.82	0.89	9.91	28.62	40.00	-11.38	QP
5	336.04	2.68	1.09	13.96	17.73	47.00	-29.27	QP
6	656.53	2.03	1.50	18.65	22.18	47.00	-24.82	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Model No.	M6	Test Mode	TM1
Environmental Conditions	23.1℃, 51.3% RH	Detector Function	Quasi-peak
Pol	Horizontal	Distance	3m
Test Engineer	Mina Xu		



pol: HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	40.99	2.21	0.50	13.57	16.28	40.00	-23.72	QP
2	55.03	1.68	0.46	13.02	15.16	40.00	-24.84	QP
3	100.93	6.78	0.60	13.08	20.46	40.00	-19.54	QP
4	148.96	17.45	0.86	8.25	26.56	40.00	-13.44	QP
5	183.84	18.60	0.70	10.02	29.32	40.00	-10.68	QP
6	495.93	0.59	1.34	16.48	18.41	47.00	-28.59	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

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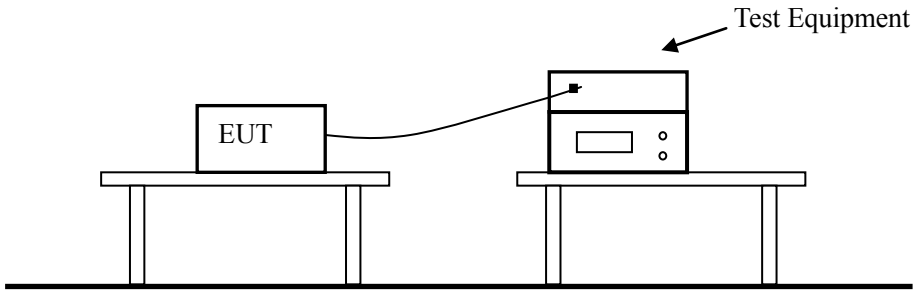
Test Mode: TM1(above 1GHz)	**Tested by:** Mina Xu
Test voltage: AC 230V/50Hz	**Test Distance:** 3m
Detector Function: Peak+AV	**Test Results:** Passed

Polarization	Frequency MHz	Emission Level dBμV/m		Limits dBμV/m		Margin dBμV/m	
Horizontal	1350.43	52.34	35.84	70.00	50.00	-17.66	-14.16
	1922.29	50.90	37.59	70.00	50.00	-19.10	-12.41
	2275.51	52.24	38.51	70.00	50.00	-17.76	-11.49
	3386.34	52.65	38.58	74.00	54.00	-21.35	-15.42
	4316.49	55.78	34.99	74.00	54.00	-18.22	-19.01
	5882.87	57.11	34.27	74.00	54.00	-16.89	-19.73
Vertical	1350.92	53.31	35.39	70.00	50.00	-16.69	-14.61
	1921.89	50.77	36.68	70.00	50.00	-19.23	-13.32
	2275.38	52.65	38.89	70.00	50.00	-17.35	-11.11
	3385.66	52.28	39.13	74.00	54.00	-21.72	-14.87
	4316.03	56.07	35.16	74.00	54.00	-17.93	-18.84
	5883.50	56.48	34.96	74.00	54.00	-17.52	-19.04

1. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
2. Measurements above show only up to 6 maximum emissions noted.
3. Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. HARMONIC CURRENT EMISSIONS

5.1. Test Configuration



5.2. Test Standard

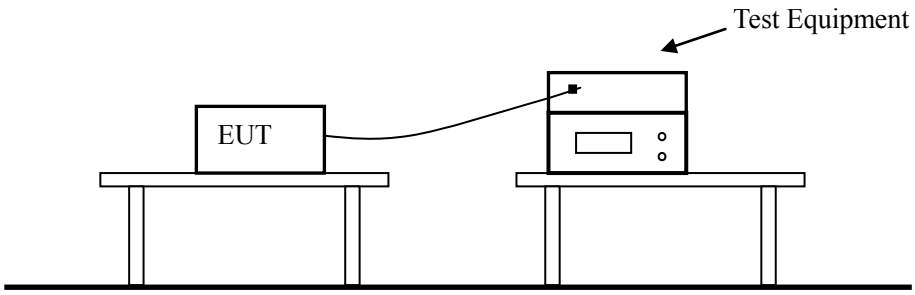
According to ETSI EN 301 489-1 V2.1.1 (2017-02) & EN 61000-3-2: 2014

5.3. Test Data

Because power of EUT is less than 75W, according standard EN 61000-3-2, Harmonic current is unnecessary to test.

6. VOLTAGE FLUCTUATION AND FLICKER

6.1. Test Configuration



6.2. Test Standard

According to ETSI EN 301 489-1 V2.1.1 (2017-02) & EN 61000-3-3: 2013

6.3. Test Data

Voltech IEC61000-3 Windows Software 1.14.06RC1		Test Date:	2018 Oct 12 15:05
Type of Test:	Flickermeter Test - Table		
Power Analyzer:	Voltech PM6000 SN: 200006700523 Firmware Version: v1.21.07RC2 Channel(s): 1. SN: 090015502053, 28 Adjusted Date: 22 JUN 2011. 2. SN:None Adjusted Date:None 3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None Shunt(s): 1. SN: 091024301916, 4 Adjusted Date: 23 JUN 2011. 2. SN:None Adjusted Date:None 3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None		
AC Source:	Mains / Manual Source		
Overall Result: **PASS**	Notes: Measurement method - Voltage		

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.089	0.006	0.198	0

7. GENERAL PERFORMANCE CRITERIA FOR IMMUNITY TEST

7.1. Performance criteria for Continuous phenomena applied to Transmitter (CT)

For equipment of type II or type III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence.
Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

7.2. Performance criteria for Transient phenomena applied to Transmitter (TT)

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

7.3. Performance criteria for Continuous phenomena applied to Receiver (CR)

For equipment of type II or III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

7.4. Performance criteria for Transient phenomena applied to Receiver (TR)

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

Performance criteria for ETSI EN 301 489-17 V3.1.1(2017-02)

Criteria	During test	After test
A	Shall operate as intended. May show degradation of performance (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).
NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended. NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In		

some cases the specified minimum performance level may be replaced by a permissible degradation of performance.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Performance criteria for Draft ETSI EN 301 489-52 V1.1.0 (2016-11)

1) Performance criteria for Continuous phenomena applied to Transmitters (CT)

A communication link shall be established at the start of the test, and maintained during the test.
During the test, the uplink speech output level shall be at least 35 dB less than the previously recorded reference levels, when measured through an audio band pass filter of width 200 Hz, centred on 1 kHz (audio breakthrough check).
At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained. In addition to confirming the above performance during a call, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.

2) Performance criteria for Transient phenomena applied to Transmitters (TT)

A communications link shall be established at the start of the test.
At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link.
At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained.
In addition to confirming the above performance during a call, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.

3) Performance criteria for Continuous phenomena applied to Receivers (CR)

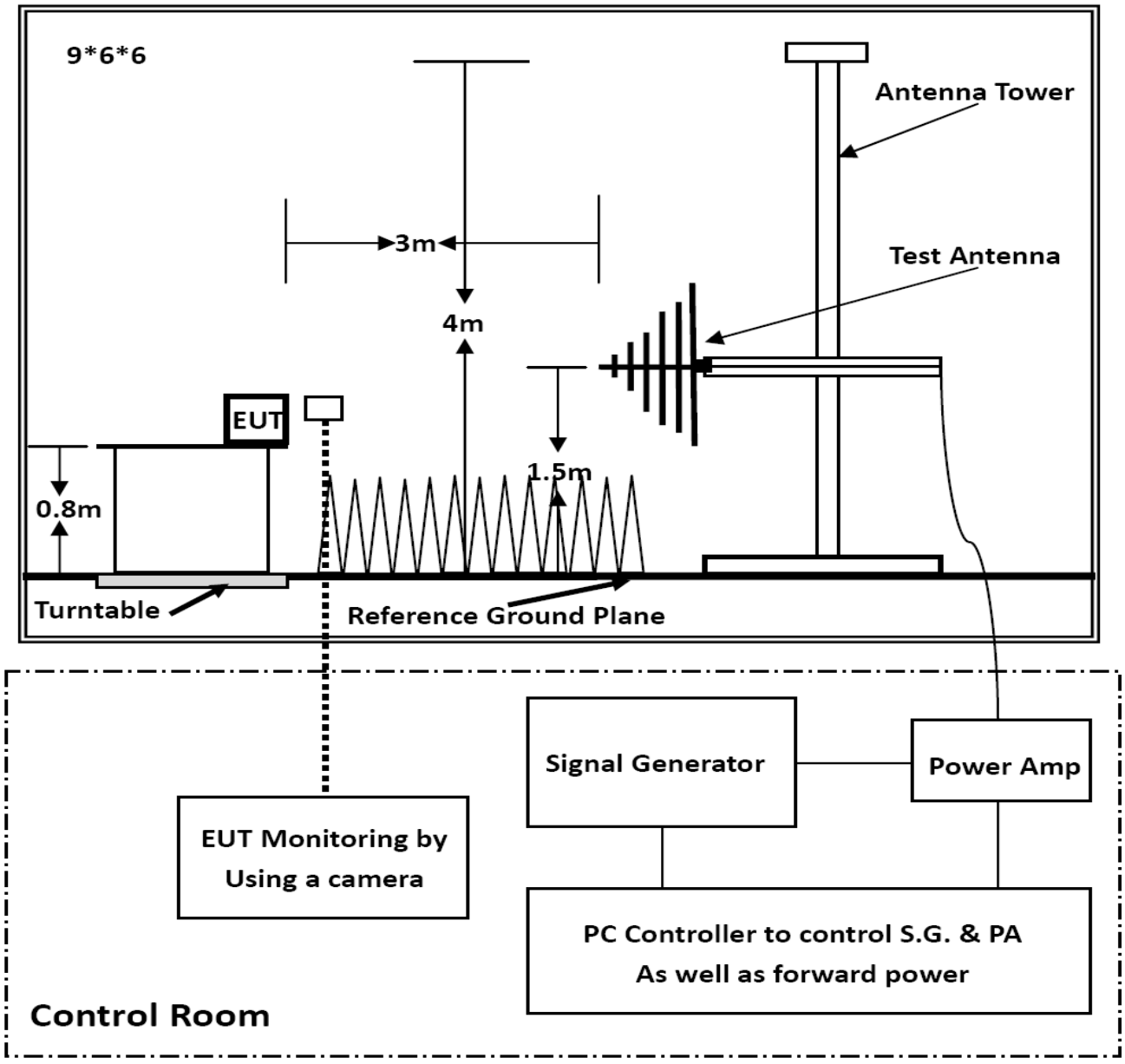
A communications link shall be established at the start of the test.
During the test, the RXQUAL of the downlink shall not exceed the value of three, measured during each individual exposure in the test sequence.
During the test, the downlink speech output level shall be at least 35 dB less than the previously recorded reference levels, when measured through an audio band pass filter of width 200 Hz, centred on 1 kHz (audio breakthrough check).
At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained.

3) Performance criteria for Transient phenomena applied to Receivers(TR)

A communications link shall be established at the start of the test.
At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link.
At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained.

8. RF ELECTROMAGNETIC FIELD (80 MHZ -6000 MHZ)

8.1. Test Configuration



8.2. Test Standard

ETSI 301 489-1, EN 301 489-17& EN 301 489-52
/(EN 61000-4-3: 2006+A2: 2010)

Test level 2 at 3V / m.

8.3. Severity Level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

Performance criterion: **A**

8.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor EUT screen. All the scanning conditions are as follows:

Condition of Test	Remarks
1. Fielded Strength	3 V/m (Severity Level 2)
2. Radiated Signal	Unmodulated
3. Scanning Frequency	80 - 6000 MHz
4. Dwell time of radiated	0.0015 decade/s
5. Waiting Time	3 Sec.

8.5. Test Result

MS Test Result:

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Position	Conclusion
GPRS/ EGPRS 900 MHz, Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
GPRS/ EGPRS 900 MHz, Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass
GPRS/ EGPRS 1800 MHz, Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
GPRS/ EGPRS 1800 MHz, Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass
WCDMA/ HSDPA/HSUPA Band I 2100MHz Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
WCDMA HSDPA/HSUPA Band I 2100MHz Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass
WCDMA/ HSDPA/HSUPA Band VIII 900MHz Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
WCDMA HSDPA/HSUPA Band VIII 900MHz Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass
E-UTRA Band 1 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
E-UTRA Band 1 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass
E-UTRA Band 3 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
E-UTRA Band 3 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass

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E-UTRA Band 7 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
E-UTRA Band 7 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass
E-UTRA Band 8 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
E-UTRA Band 8 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass
E-UTRA Band 20 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
E-UTRA Band 20 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass
E-UTRA Band 38 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
E-UTRA Band 38 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass
E-UTRA Band 40 Traffic	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
E-UTRA Band 40 Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass

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WIFI Test Result:

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Position	Conclusion
Operating Mode	Vertical	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT,CR	Front, Right, Left, Back	Pass
Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass

TM19-TM20 Test Result:

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Position	Conclusion
Operating Mode	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass
Idle	Vertical	80-6000	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	See Note	Front, Right, Left, Back	Pass

***Note: Unintentional transmission is not founded from the EUT.

Special conditions for EMC immunity tests

EUT operating Mode		Polarity	Conclusion
GPRS/ EGPRS 900	bit error ratio	H	Pass
		V	Pass
	block error ratio	H	Pass
		V	Pass
GPRS/ EGPRS 1800 MHz	bit error ratio	H	Pass
		V	Pass
	block error ratio	H	Pass
		V	Pass

EUT operating Mode		Polarity	Conclusion
WCDMA HSDPA/HSUPA Band I 2100MHz	bit error ratio	H	Pass
		V	Pass
	block error ratio	H	Pass
		V	Pass
WCDMA HSDPA/HSUPA Band VIII 900MHz	bit error ratio	H	Pass
		V	Pass
	block error ratio	H	Pass
		V	Pass

EUT operating Mode		Polarity	Conclusion
LTE Band 1	bit error ratio	H	Pass
		V	Pass
	block error ratio	H	Pass
		V	Pass
LTE Band 3	bit error ratio	H	Pass
		V	Pass
	block error ratio	H	Pass
		V	Pass

EUT operating Mode		Polarity	Conclusion
LTE Band 7	bit error ratio	H	Pass
		V	Pass
	block error ratio	H	Pass
		V	Pass
LTE Band 8	bit error ratio	H	Pass
		V	Pass
	block error ratio	H	Pass
		V	Pass

EUT operating Mode		Polarity	Conclusion
LTE Band 20	bit error ratio	H	Pass
		V	Pass
	block error ratio	H	Pass
		V	Pass
LTE Band 38	bit error ratio	H	Pass
		V	Pass
	block error ratio	H	Pass
		V	Pass

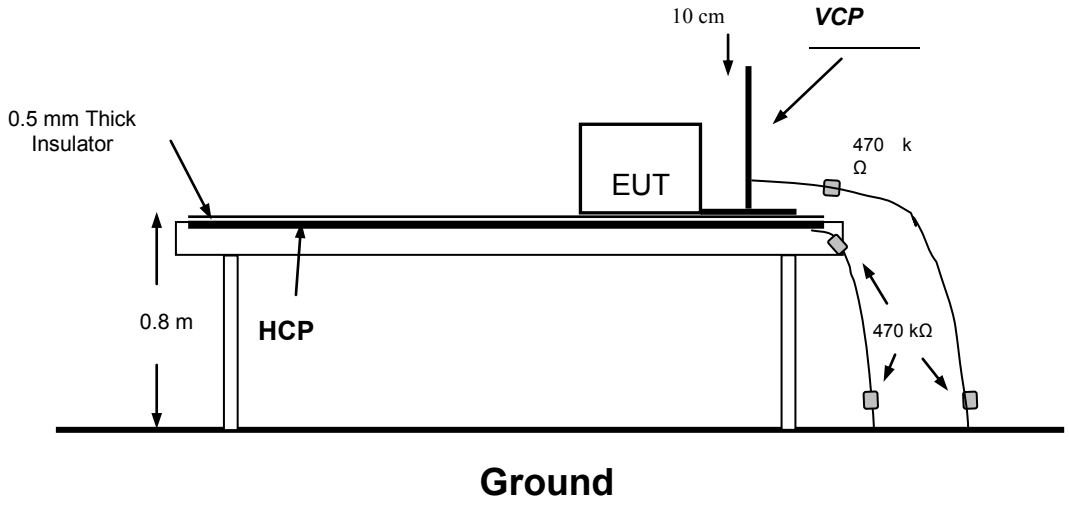
EUT operating Mode		Polarity	Conclusion
LTE Band 40	bit error ratio	H	Pass
		V	Pass
	block error ratio	H	Pass
		V	Pass
		V	Pass

Note:
During the test, the Maximum Bit Error Ratio was less than 0.001
During the test, the Maximum Block Error Ratio was less than 0.001

9. ELECTROSTATIC DISCHARGE

Please refer to ETSI EN 301 489-1 and EN 61000-4-2.

9.1. Test Configuration



EN 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.5 by 1.0-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by 0.5-millimeter thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

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9.2. Test Procedure

ETSI EN 301 489-1 V2.1.1 (2017-02)/ EN 61000-4-2: 2009
Test level 3 for Air Discharge at ±8 kV
Test level 2 for Contact Discharge at ±4 kV

9.2.1. Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

9.2.2. Contact Discharge

All the procedure shall be same as Section 9.2.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

9.2.3. Indirect Discharge For Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

9.2.4. Indirect Discharge For Vertical Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

9.3. Test Data

PASS.

Electrostatic Discharge Test Results

Standard	☐ IEC 61000-4-2 ☑ EN 61000-4-2		
Applicant	Shenzhen Gokodo Technology Co., Ltd		
EUT	4G Mobile Router	**Temperature**	24.1℃
M/N	M6	**Humidity**	52.7%
Criterion	B	**Pressure**	1021mbar
Test Mode	TM1-TM20	**Test Engineer**	Mina Xu

TEST RESULT OF MS & WIFI

Test Voltage	Coupling	Observation	Result (Pass/Fail)
±2KV, ±4kV	Contact Discharge	TT, TR	Pass
±2KV, ±4kV, ±8kV	Air Discharge	TT, TR	Pass
±2KV, ±4kV	Indirect Discharge HCP	TT, TR	Pass
±2KV, ±4kV	Indirect Discharge VCP	TT, TR	Pass

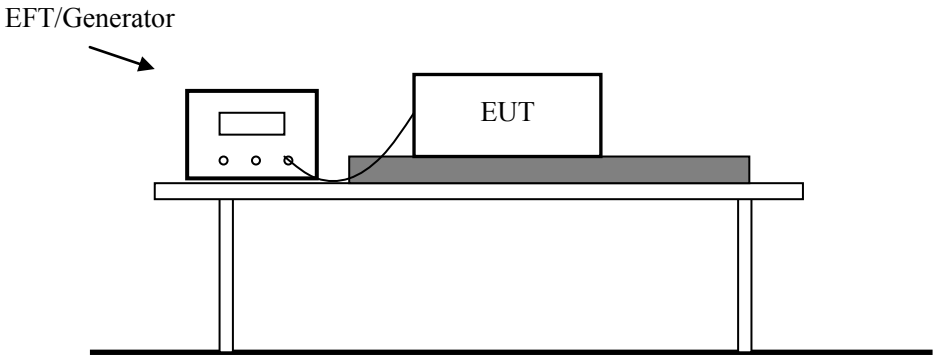
TEST RESULT OF TM19-TM20

Test Voltage	Coupling	Result (Pass/Fail)
±2KV, ±4kV	Contact Discharge	Pass
±2KV, ±4kV, ±8kV	Air Discharge	Pass
±2KV, ±4kV	Indirect Discharge HCP	Pass
±2KV, ±4kV	Indirect Discharge VCP	Pass

Note: The EUT performance complied with performance criteria for CT&CR to MS Function and there is no any degradation of performance and function.

10. ELECTRICAL FAST TRANSIENT IMMUNITY

10.1. Test Configuration



10.2. Test Standard

EN 301 489-1 V2.1.1/ EN61000-4-4: 2012
Test level 2 at 1 kV

Test level

Open Circuit Output Test Voltage ±10%		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

Performance criterion: B

10.3. Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

10.4.1.For input and output AC power ports:
The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minutes.

10.4.2.For signal lines and control lines ports: No I/O ports. It's unnecessary to test.

10.4.3.For DC output line ports: It's unnecessary to test.

10.4. Test Data

PASS.

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

Standard	☐ IEC 61000-4-4 ☑ EN 61000-4-4		
Applicant	Shenzhen Gokodo Technology Co., Ltd		
EUT	4G Mobile Router	**Temperature**	24.1℃
M/N	M6	**Humidity**	53.2%
Test Mode	TM1-TM20	**Criterion**	B
Test Engineer	Mina Xu		

TEST RESULT OF MS &WIFI

Line	Test Voltage	Polarity	Observation	Result (Pass/Fail)
L	1KV	+/-	TT, TR	Pass
N	1KV	+/-	TT, TR	Pass
L-N	1KV	+/-	TT, TR	Pass

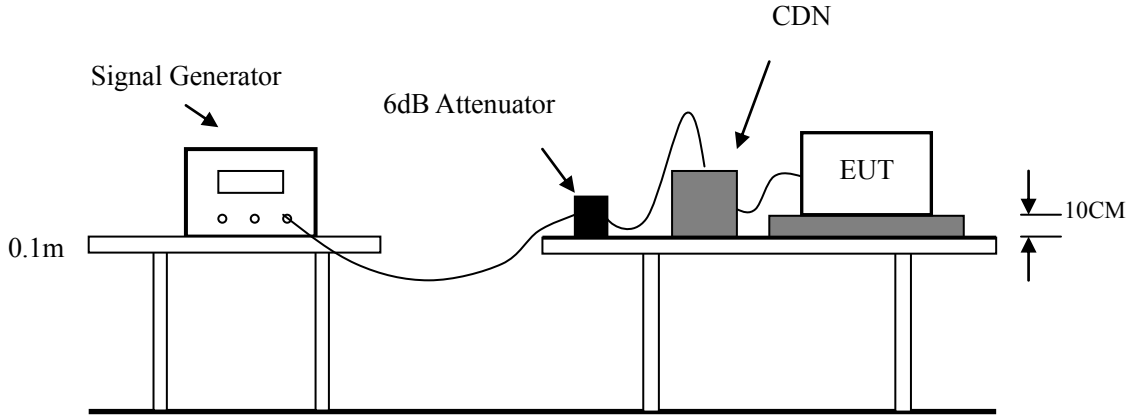
TEST RESULT OF TM19-TM20

Line	Test Voltage	Polarity	Result (Pass/Fail)
L	1KV	+/-	Pass
N	1KV	+/-	Pass
L-N	1KV	+/-	Pass

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11. RF COMMON MODE

11.1. Test Configuration



11.2. Test Standard

EN 301 489-1 V2.1.1/ EN 61000-4-6: 2014
Test level 2 at 3 V (r.m.s.), 0.15 MHz ~ 80 MHz,
Modulation type: AM
Modulation depth: 80%
Modulation signal: 1 kHz

Test level

Level	Voltage Level (r.m.s..) (V)
1	1
2	3
3	10
X	Special

Performance criterion: A

11.3. Test Procedure

11.3.1. Let the EUT work in test mode and test it.

11.3.2. The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3 m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

11.3.3. The disturbance signal described below is injected to EUT through CDN.

11.3.4. The EUT operates within its operational mode(s) under intended climatic conditions after power on.

11.3.5. The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

11.3.6. The rate of sweep shall not exceed 1.5*10-3 decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

11.3.7. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

11.4. Test Data

PASS.

Please refer to the following page.

Injected Currents Susceptibility Test Results

Standard	☐ IEC 61000-4-6 ☑ EN 61000-4-6		
Applicant	Shenzhen Gokodo Technology Co., Ltd		
EUT	4G Mobile Router	**Temperature**	23.4℃
M/N	M6	**Humidity**	52.7%
Test Mode	TM1-TM20	**Criterion**	A
Test Engineer	Mina Xu		

TEST RESULT OF MS (GSM & WCDMA&LTE)

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Observation	Result (Pass/Fail)
0.15 ~ 80	AC Mains	3V	CT, CR	Pass

TEST RESULT OF WIFI

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Observation	Result (Pass/Fail)
0.15 ~ 80	AC Mains	3V	CT, CR	Pass

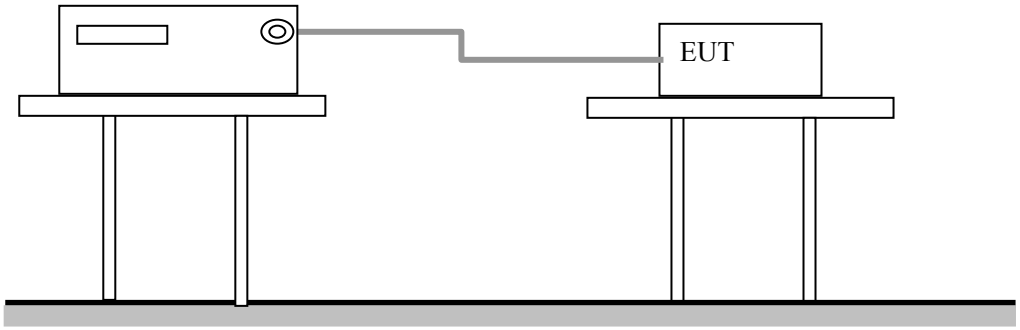
TEST RESULT OF TM19-TM20

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Result (Pass/Fail)
0.15 ~ 80	AC Mains	3V	Pass

Remark:
1. Modulation Signal:1kHz 80% AM
2. Measurement Equipment :
Simulator: CIT-10 (FRANKONIA)
CDN : ☑CDN-M2 (FRANKONIA)
☐CDN-M3 (FRANKONIA)

12. SURGES, LINE TO LINE AND LINE TO GROUND

12.1. Test Configuration



Ground Plane

12.2. Test Standard

ETSI EN 301 489-1 V2.1.1 / EN 61000-4-5: 2014
L-N: Test level 2 at 1 kV
L-PE, N-PE Test Level 3 at 2kV

Test Level

Open Circuit Output Test Voltage ±10%		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

Performance criterion: B

12.3. Test Procedure

12.3.1. For line to line coupling mode, provide a 0.5 kV 1.2/50us voltage surge (at open-circuit condition).
12.3.2. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
12.3.3. Different phase angles are done individually.
12.3.4. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

12.4. Test Data

Surge Immunity Test Result			
Standard	☐ IEC 61000-4-5 ☑ EN 61000-4-5		
Applicant	Shenzhen Gokodo Technology Co., Ltd		
EUT	4G Mobile Router	**Temperature**	24.1℃
M/N	M6	**Humidity**	53.2%
Test Mode	TM1-TM20	**Criterion**	A
Test Engineer	Mina Xu		

TEST RESULT OF MS & WIFI

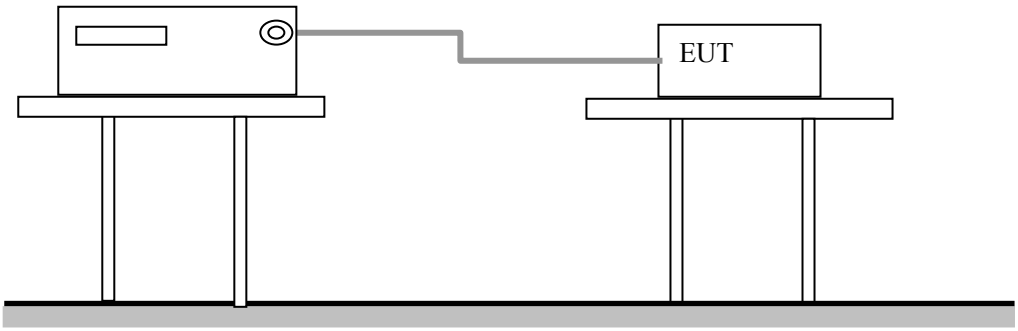
Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Observation	Result (Pass/Fail)
L-N	+	0^o, 90^o, 180^o, 270^o	5	1.0	TT, TR	Pass
	-	0^o, 90^o, 180^o, 270^o	5	1.0	TT, TR	Pass

TEST RESULT OF TM19-TM20

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Result (Pass/Fail)
L-N	+	0^o, 90^o, 180^o, 270^o	5	1.0	Pass
	-	0^o, 90^o, 180^o, 270^o	5	1.0	Pass

13. VOLTAGE DIPS/INTERRUPTIONS IMMUNITY TEST

13.1. Test Configuration



Ground Plane

13.2. Test Standard

ETSI EN 301 489-1 V2.1.1/ EN 61000-4-11: 2004
Test levels and Performance Criterion

Test Level

Voltage Reduction %UT	Voltage dips %UT	Duration (in period)
100	0	0.5
100	0	1
30	70	5
Voltage Reduction %UT	Voltage Interruptions %UT	Duration (in period)
100	0	250

Performance criterion: B&C

13.3. Test Procedure

13.3.1. The interruption is introduced at selected phase angles with specified duration.

13.3.2. Record any degradation of performance.

13.4. Test Data

Voltage Dips And Interruptions Test Results			
Standard	☐ IEC 61000-4-11 ☑ EN 61000-4-11		
Applicant	Shenzhen Gokodo Technology Co., Ltd		
EUT	4G Mobile Router	**Temperature**	24.1℃
M/N	M6	**Humidity**	53.2%
Test Mode	TM1-TM20	**Criterion**	A
Test Engineer	Mina Xu		

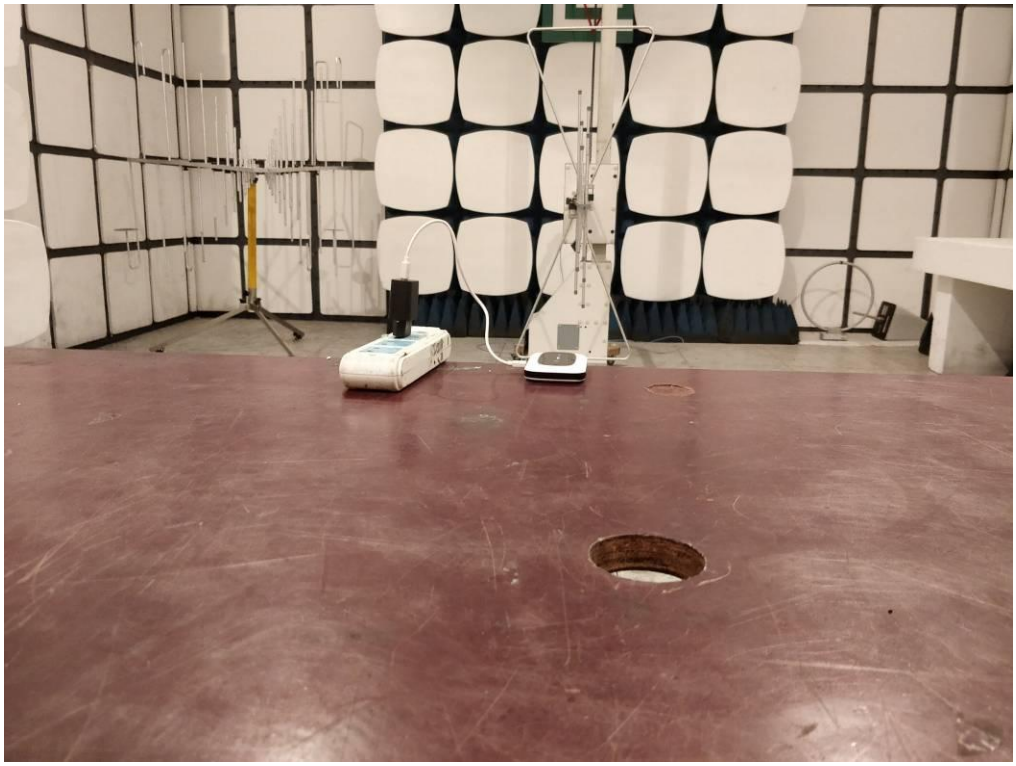
TEST RESULT OF MS & WIFI				
Test Level % U_T	**Voltage Dips & Short Interruptions % U_T**	**Duration (in periods)**	**Observation**	**Result (Pass/Fail)**
0	100	0.5P	TT, TR	Pass
0	100	1P	TT, TR	Pass
70	30	25P	TT, TR	Pass
0	100	250P	TT, TR	Pass

TEST RESULT OF TM19-TM20			
Test Level % U_T	**Voltage Dips & Short Interruptions % U_T**	**Duration (in periods)**	**Result (Pass/Fail)**
0	100	0.5P	Pass
0	100	1P	Pass
70	30	25P	Pass
0	100	250P	Pass

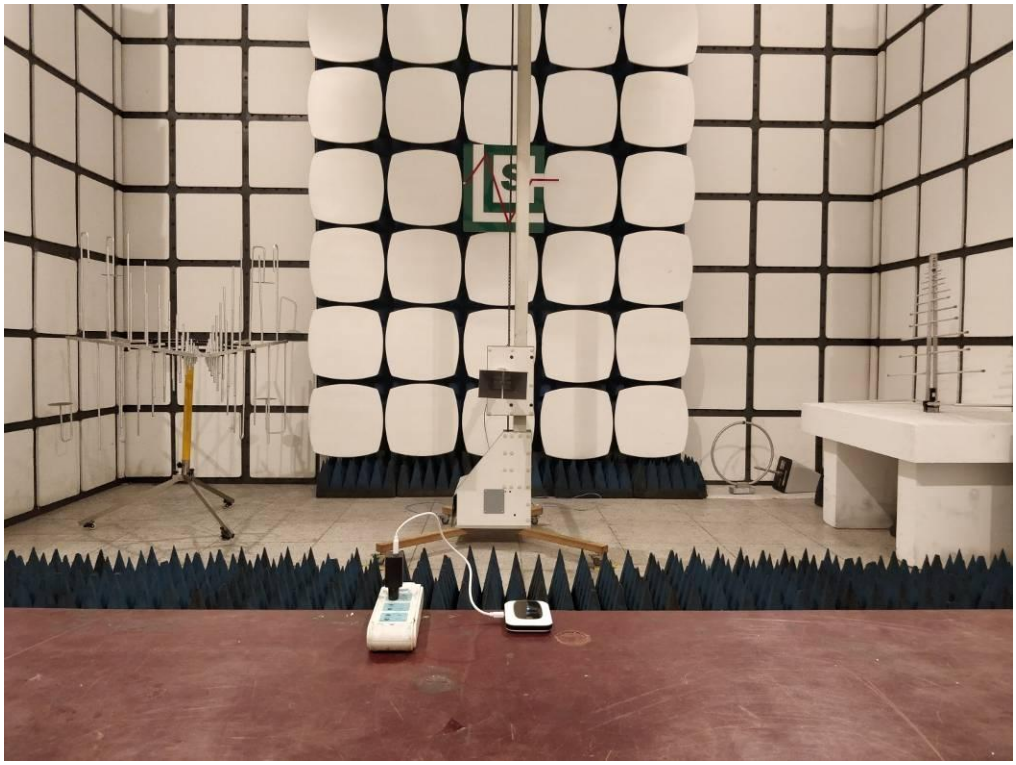
14. PHOTOGRAPHS OF TEST SETUP



Conducted Emission



RE below 1GHz



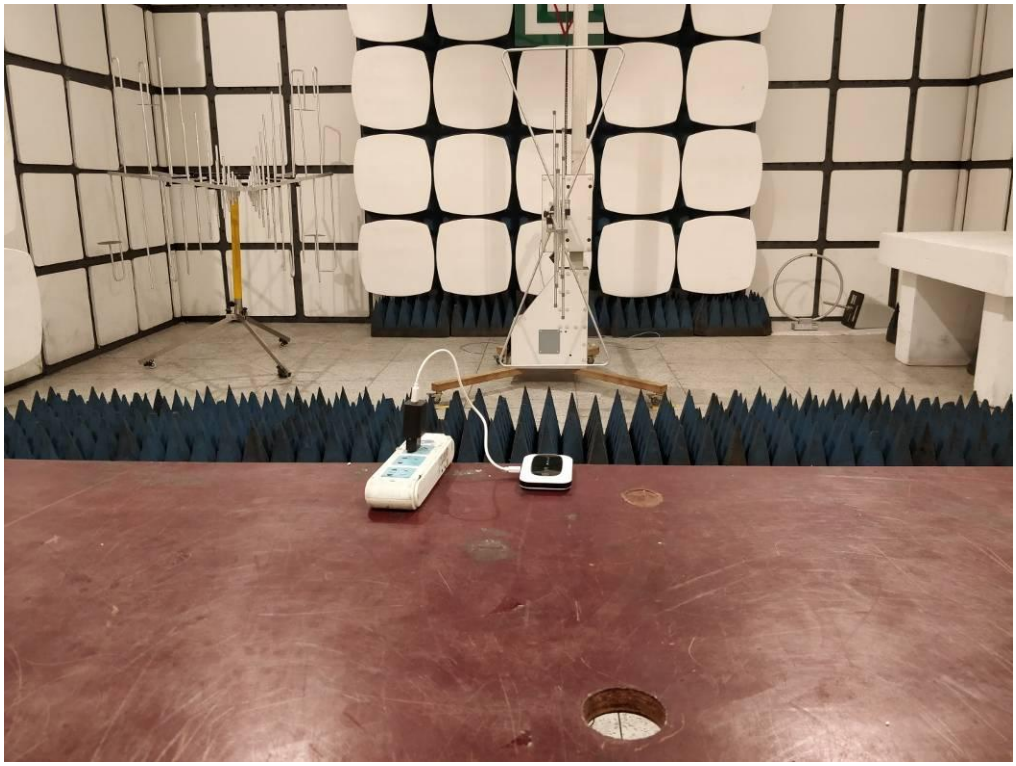
RE above 1GHz



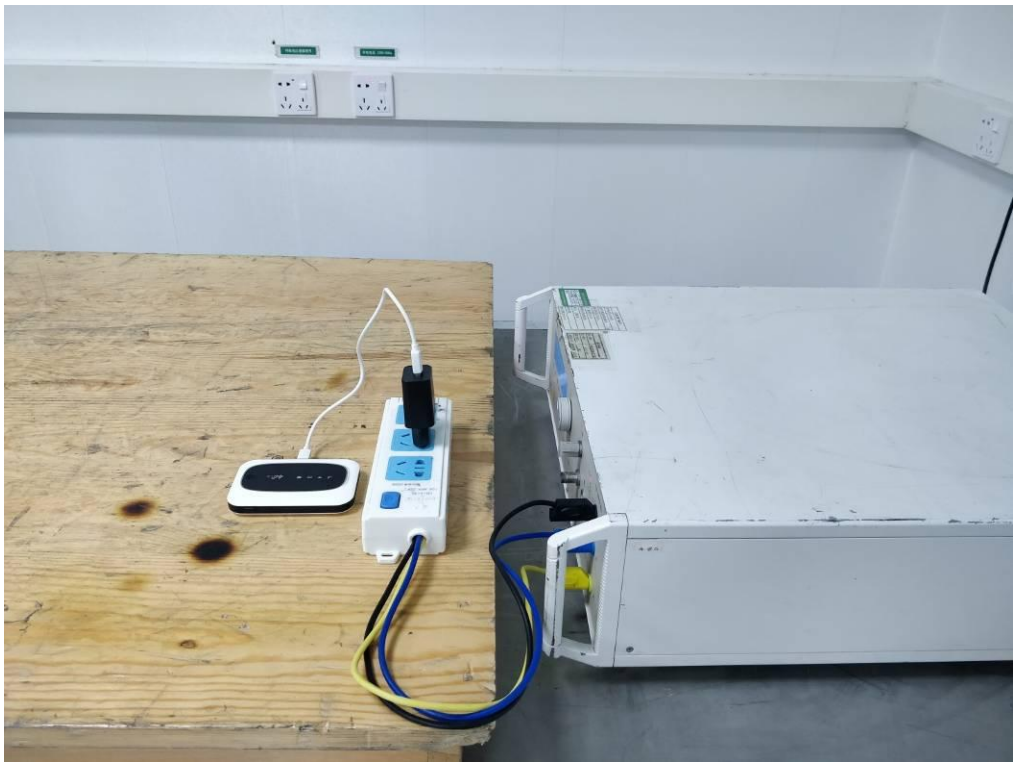
Flicker


环境要求/Climate conditions
• 环境温度/ambient temperature: 15℃--35℃
• 相对湿度/relative humidity: 30%--60%
• 大气压力/atmospheric pressure: 86Kpa—106Kpa

ESD



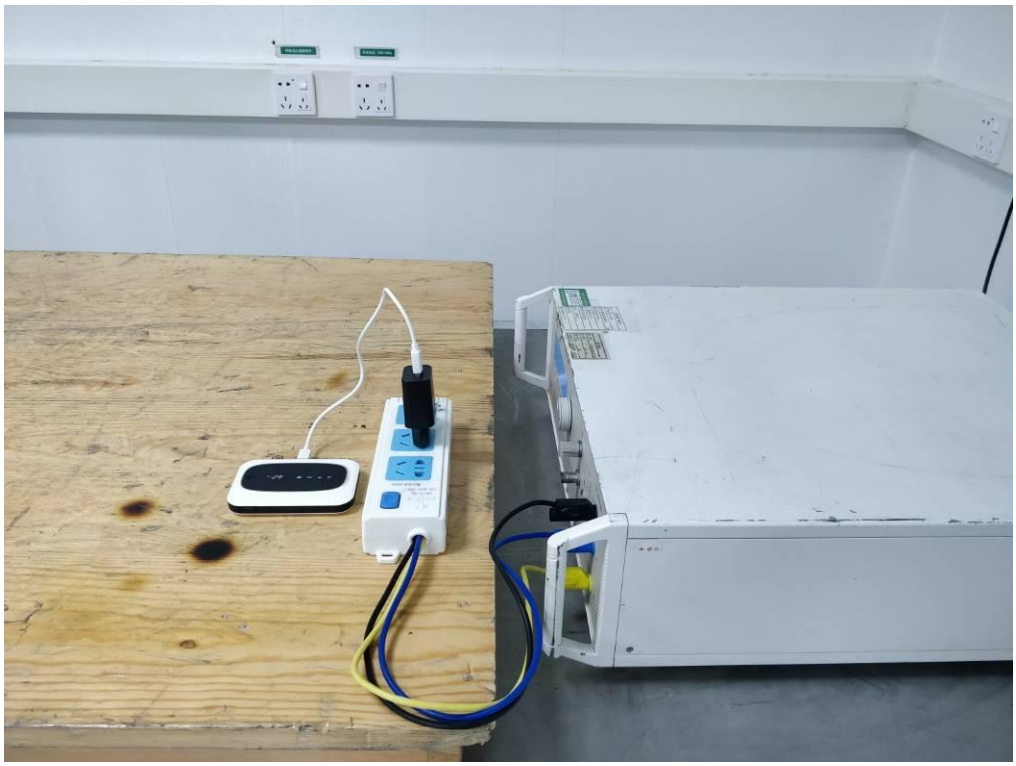
RS



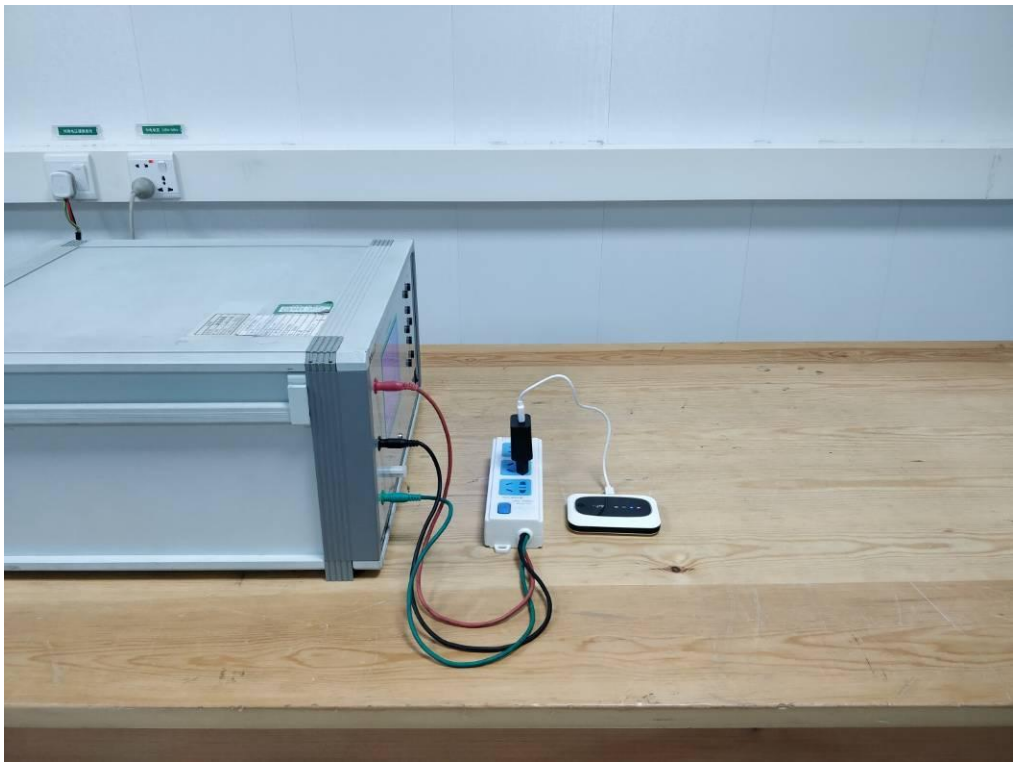
EFT



CS



Surge



Dips

15. PHOTOGRAPHS OF EUT



Fig.1



Fig.2



Fig.3



Fig.4



Fig.5

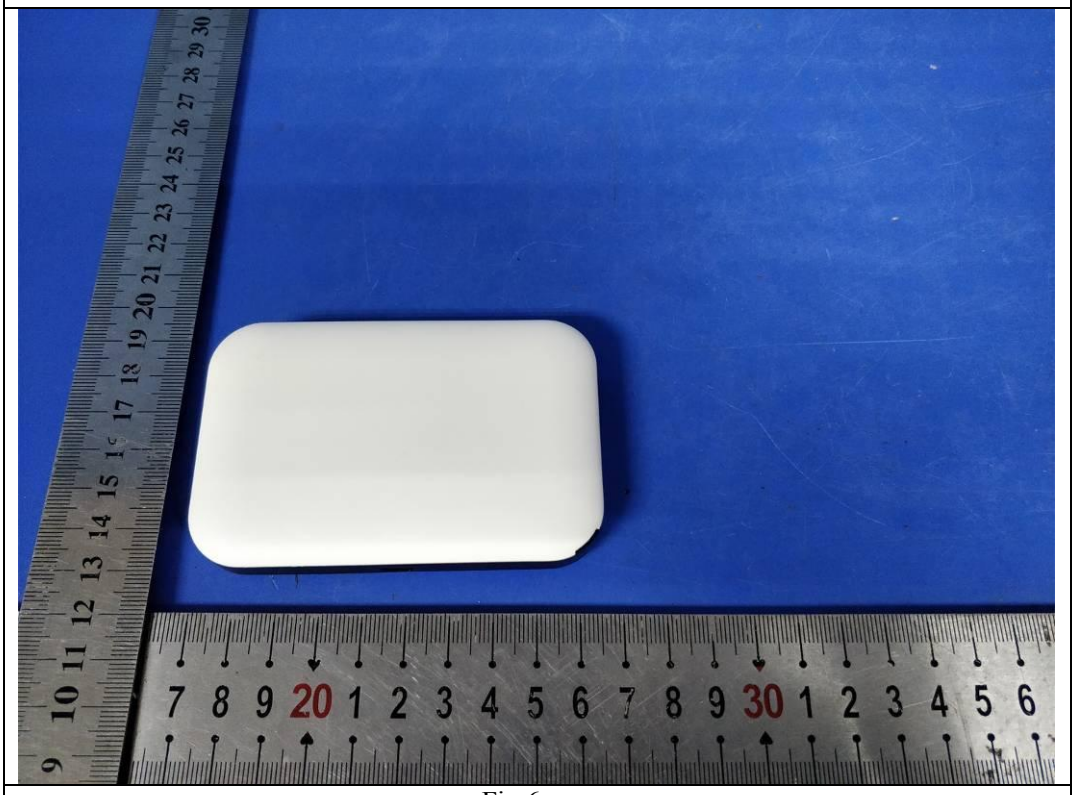


Fig.6



Fig.7

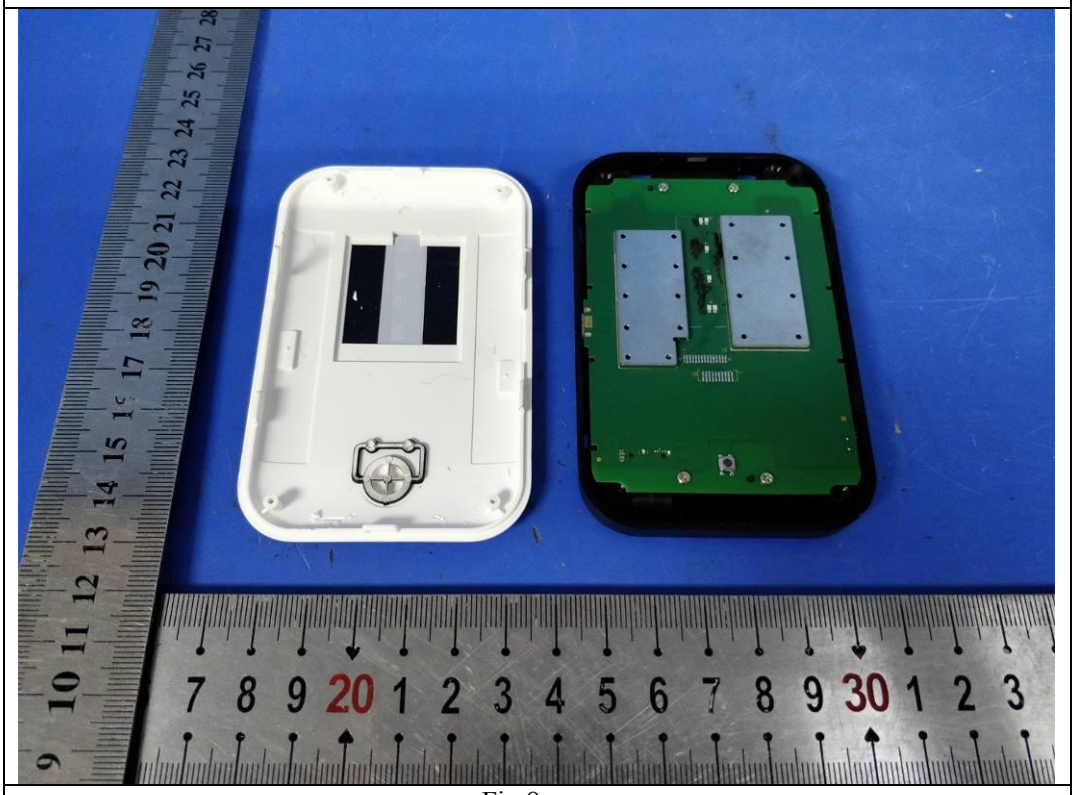


Fig.8

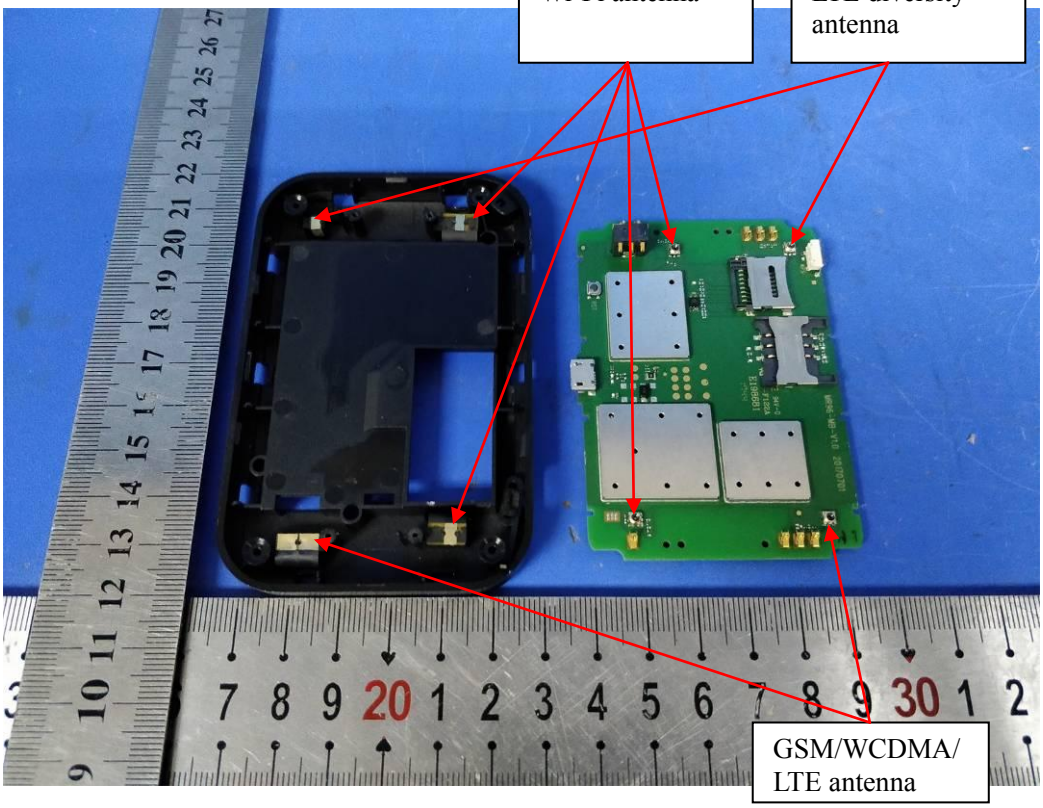


Fig.9

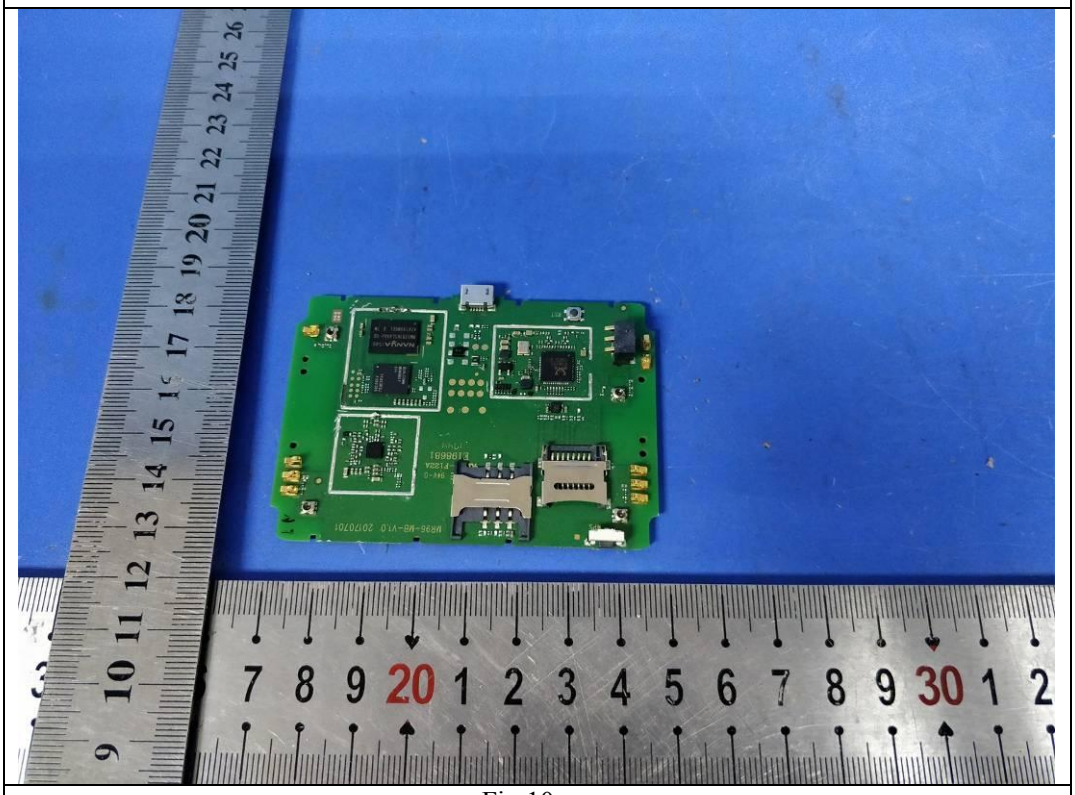


Fig.10

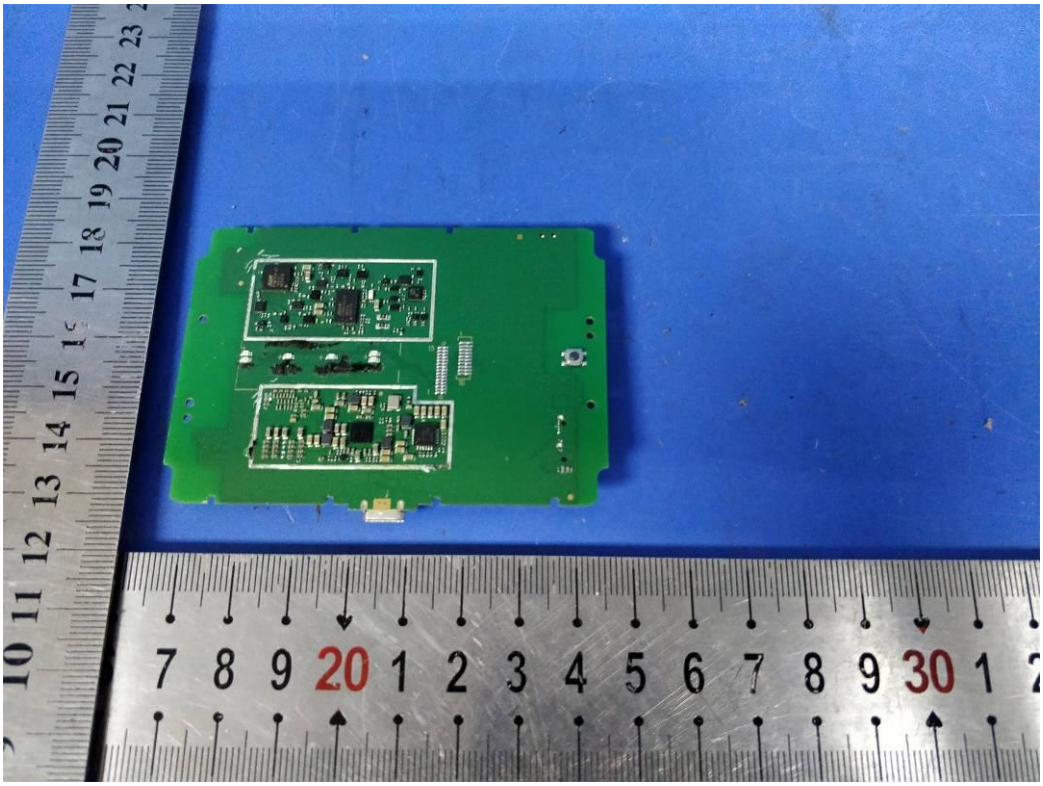


Fig.11

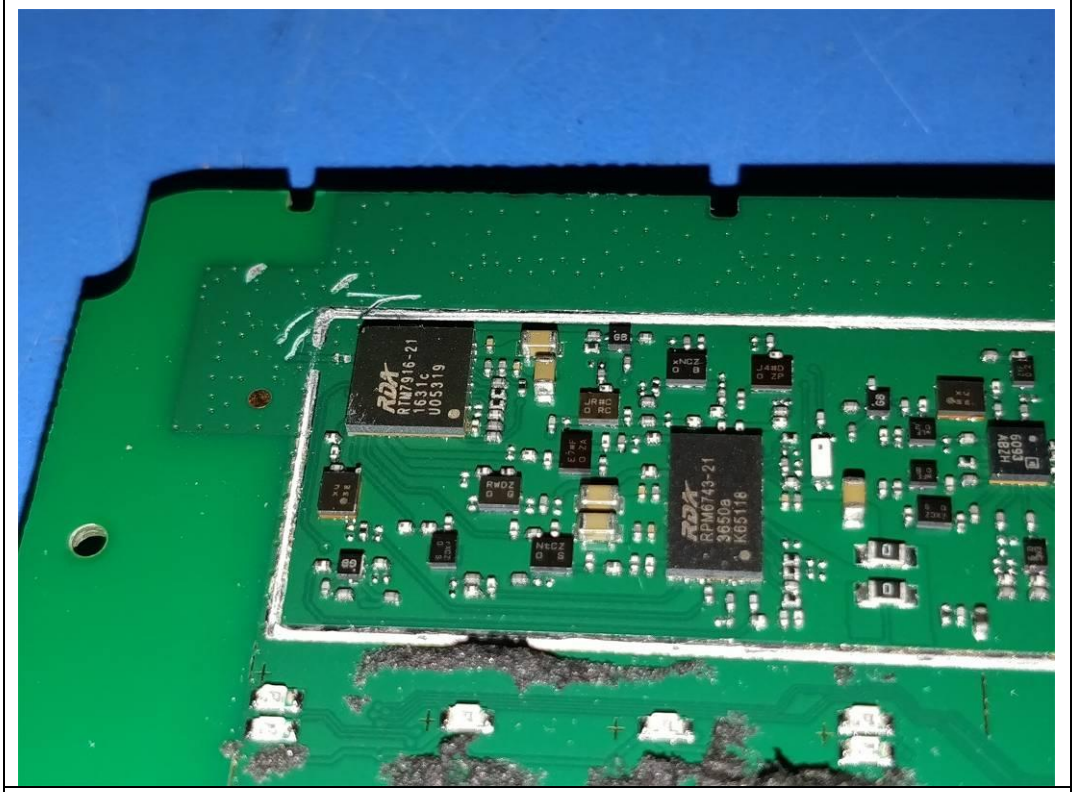


Fig.12

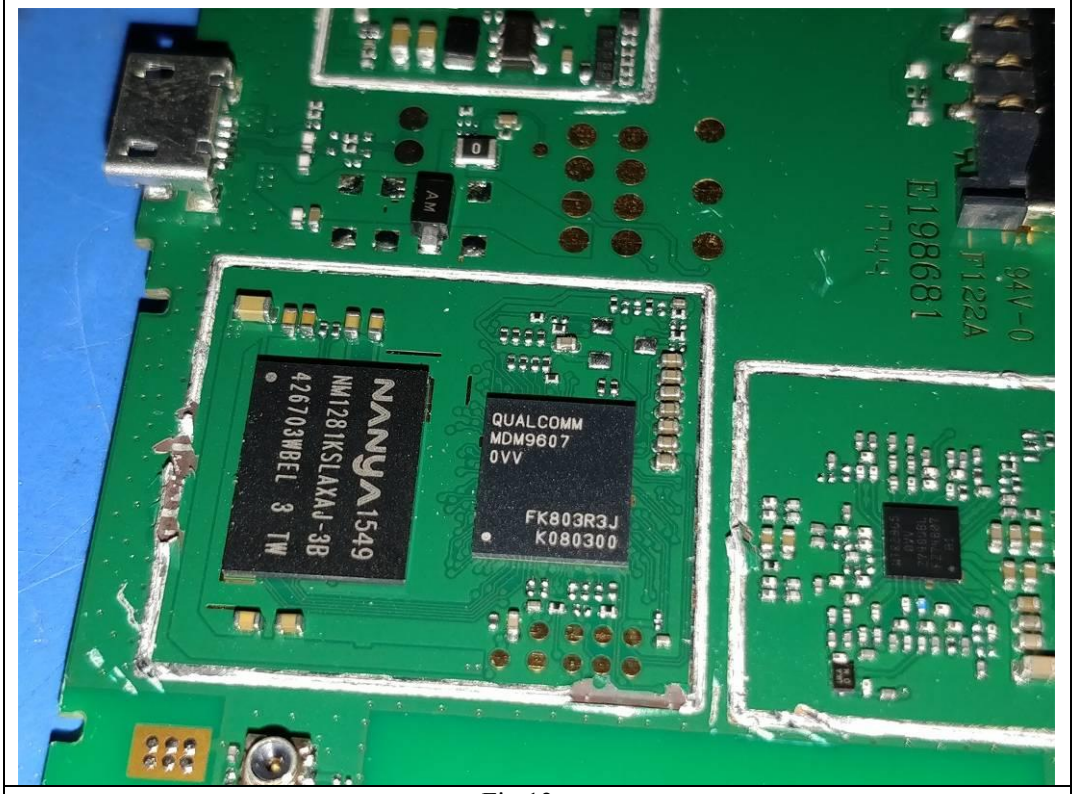

NANYA1549
NM1281KSLAXAJ-3B
426703WBEL 3 TW
QUALCOMM
MDM9607
0VV
FK803R3J
K080300
E198681
94V-0

Fig.13

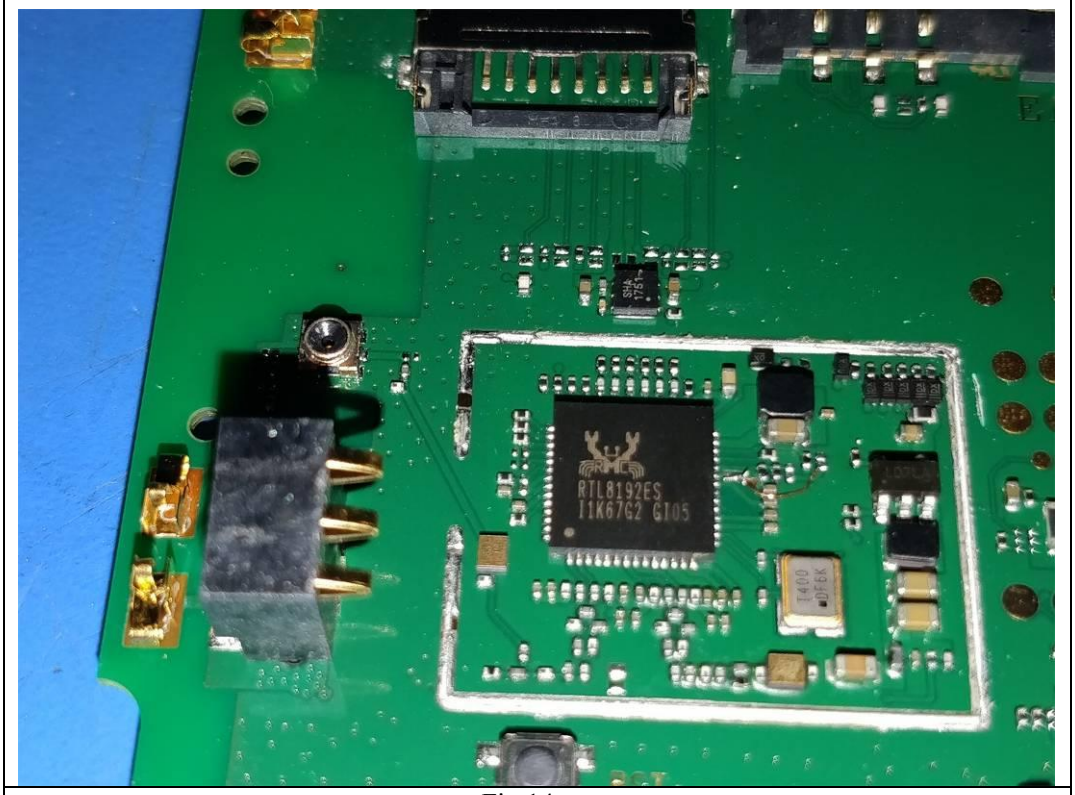

RTL8192ES
11K67G2 GI05

Fig.14

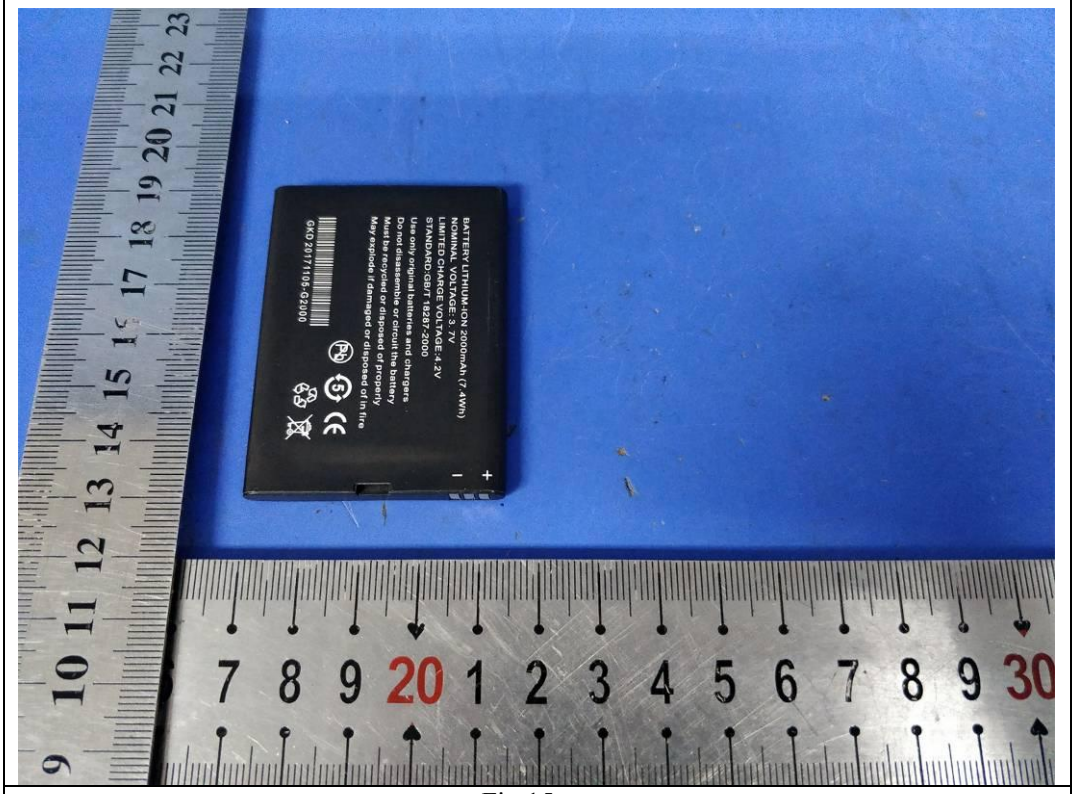


Fig.15



Fig.16

----------THE END OF REPORT----------

SAR TEST REPORT

For

Shenzhen Gokodo Technology Co., Ltd

4G Mobile Router

Model No.:M6

Additional Model No.: M7,M6XX,M7XX

Prepared for	:	Shenzhen Gokodo Technology Co., Ltd
Address	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street, Baoan Dist.,Shenzhen,Guangdong, China (Mainland)

Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(86)755-82591330
Fax	:	(86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com

Date of receipt of test sample	:	October 11, 2018
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	October 11, 2018~ October 30, 2018
Date of Report	:	November 23, 2018

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SAR TEST REPORT

Report Reference No.....:	**LCS181011006AEB**
Date Of Issue.....:	November 23, 2018
Testing Laboratory Name .....:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address.....:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure .....:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....:	**Shenzhen Gokodo Technology Co., Ltd**
Address.....:	Central Road B Block 13G,Baoyuan Road,Xixiang Street, Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Test Specification:	
SAR Max. Values is.....:	1.600W/Kg (10g) for Body.
Standard.....:	EN 62209-2:2010&EN 50566:2017& EN 50663:2017
Test Report Form No.....:	LCSEMC-1.0
TRF Originator.....:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF .....:	Dated 2017-12

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Test Item Description.....:	**4G Mobile Router**
Trade Mark.....:	Gokodo/QLink
Model/Type Reference.....:	M6
Ratings.....:	DC 3.7V by Li-ion Battery(2000mAh) Recharged by DC 5V/1A by adapter
Result .....:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Vera Deng	Calvin Weng	Gavin Liang
Vera Deng/ File administrators	Calvin Weng/ Technique principal	Gavin Liang/ Manager

SAR -- TEST REPORT

Test Report No. : LCS181011006AEB	November 23, 2018 Date of issue

Type / Model.....	:	M6
EUT.....	:	4G Mobile Router
Applicant.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street, Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	
Fax.....	:	
Manufacturer.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	
Fax.....	:	
Factory.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	
Fax.....	:	

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revison History

Revision	Issue Date	Revisions	Revised By
000	November 23, 2018	Initial Issue	Gavin Liang

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1.TEST STANDARDS AND TEST DESCRIPTION

1.1. Test Standards

The tests were performed according to following standards:

EN 62209-2:2010: Human exposure to radio frequency fields from hand-held and bodymounted wireless communication devices.Human models,instrumentation, and procedures.Part 2: Procedure to determine thespecific absorption rate (SAR) forwireless communication devices usedin close proximity to the human body(frequency range of 30 MHz to 6 GHz)
EN 50663:2017:Generic standard for assessment of low power electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (10 MHz - 300 GHz)
EN 50566-2017:Product standard to demonstrate the compliance of wireless communication devices with thebasic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 30 MHz to 6 GHz: hand-held and body mounted devices in close proximity to the human body

1.2. Test Description

The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power

1.3. Product Description

Product Name:	4G Mobile Router
Model/Type reference:	M6
Additional Model	M7,M6XX,M7XX
Model Declaration:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Hardware Version	M6_V1.1
Software Version:	M6VD_V1.1
Power supply:	DC 3.7V by Li-ion battery(2000mAh) Recharged by DC 5V/1A by adapter
2G	
Operation Band:	GSM850,GSM900, DCS1800, PCS1800
Supported type:	GSM/GPRS/EGPRS
Power Class:	GSM900:Power Class 4 DCS1800:Power Class 1
Modulation Type:	GMSK for GSM/GPRS; GMSK/8PSK For EGPRS
GSM Release Version:	R99
GPRS Multislot Class:	12
EGPRS Multislot Class:	12
Antenna Description:	PIFA Antenna; 900MHz:-0.72dBi(Max.) , 1800MHz :-1.23dBi(Max.)
WCDMA	
Operation Band:	FDD Band I&FDD Band VIII
Power Class:	Class 3
Modulation Type:	WCDMA: QPSK; HSDPA/HSUPA: QPSK
WCDMA Release Version:	R99
DC-HSUPA Release Version:	Not Supported
Antenna Description	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 8:-0.72dBi(Max.)
LTE	
Operation Band:	E-UTRA Band 1& Band 3& Band 7& Band 8& Band 20 & Band38& Band 40
Power Class:	Class 3
Modulation Type:	QPSK/16-QAM
LTE Release Version:	R4
Antenna Description:	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 3:-1.37dBi(Max.), Band 7:-0.27dBi(Max.),Band 8:-0.72dBi(Max.) , Band 20:-0.67dBi(Max.) ,Band 38:-0.22dBi(Max.) , Band 40:-0.25dBi(Max.)
WIFI (2.4G Band)	
Supported type:	802.11b/802.11g/802.11n(HT20&HT40)
Modulation:	802.11b: DSSS 802.11g/802.11n:OFDM
Operation frequency:	802.11b/802.11g/802.11n(HT20): 2412MHz~2472MHz; 802.11n(HT40): 2422MHz~2462MHz

Channel number:	802.11b/802.11g/802.11n(HT20): 13; 802.11n(HT40): 9
Channel separation:	5MHz
Antenna Description	Two same PIFA Antenna; ANT1 used for WIFI, -0.52dBi(Max.); ANT2 used for WIFI, -0.52dBi(Max.);

1.4. Summary SAR Results

Table 1:Max. SAR Measured(10g)

Exposure Configuration	Technolohy Band	Highest Measured SAR 10g(W/kg)
Body-worn	GSM900	1.129
	DCS1800	1.414
	WCDMA Band VIII	0.619
	WCDMA Band I	1.366
	WLAN2450	0.119
	E-UTRA Band 1	**1.600**
	E-UTRA Band 3	1.280
	E-UTRA Band 7	0.885
	E-UTRA Band 8	0.389
	E-UTRA Band 20	0.894
	E-UTRA Band 38	0.571
	E-UTRA Band 40	1.269

The SAR values found for the EUT below the maximum recommended levels of 2.0W/kg as averaged over for 10g tissue according to IEC62209.
The maximum SAR value is obtained at the case of (Table 1), and the maximum value is: 1.600W/kg(10g) for Body.
This EUT owns one SIM cards, so its result is recorded in this report.

1.5. EUT operation mode

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

1.6. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer
○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
○	Multimeter	Manufacturer :	/
		Model No. :	/

2.TEST ENVIRONMENT

2.1. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

Site Description

EMC Lab. : FCC Registration Number. is 254912.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001
NVLAP Registration Code is 600167-0

2.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	18-25 ° C
Humidity:	40-65 %
Atmospheric pressure:	950-1050mbar

2.3. SAR Limits

CE Limit (10g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average(averaged over the whole body)	0.08	0.4
Spatial Peak(averaged over any 1 g of tissue)	2.0	10
Spatial Peak(hands/wrists/ feet/anklesaveraged over 10 g)	4.0	20.0

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.
Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

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2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Type/Model	Serial Number	Calibration	
				Calibration Date	Calibration Due
PC	Lenovo	G5005	MY42081102	N/A	N/A
SAR Measurement system	SATIMO	4014_01	SAR_4014_01	N/A	N/A
Signal Generator	Angilent	E4438C	MY42081396	06/16/2018	06/15/2019
Multimeter	Keithley	MiltiMeter 2000	4059164	11/16/2017	11/15/2018
S-parameter Network Analyzer	Agilent	8753ES	US38432944	11/16/2017	11/15/2018
Wideband Radia Communication Tester	R&S	CMW500	1201.0002K50	11/16/2017	11/15/2018
E-Field PROBE	SATIMO	SSE2	SN 31/17 EPGO324	10/08/2018	10/07/2019
DIPOLE 900	SATIMO	SID 900	SN 07/14 DIP 0G900-300	10/01/2018	09/30/2021
DIPOLE 1800	SATIMO	SID 1800	SN 07/14 DIP 1G800-301	10/01/2018	09/30/2021
DIPOLE 2000	SATIMO	SID 2000	SN 30/14 DIP 2G000-305	10/01/2018	09/30/2021
DIPOLE 2450	SATIMO	SID 2450	SN 07/14 DIP 2G450-306	10/01/2018	09/30/2021
DIPOLE 2600	SATIMO	SID2600	SN 30/14 DIP 2G600-336	09/01/2018	08/30/2021
Power meter	Agilent	E4419B	MY45104493	06/16/2018	06/15/2019
Power meter	Agilent	E4418B	GB4331256	06/16/2018	06/15/2019
Power sensor	Agilent	E9301H	MY41497725	06/16/2018	06/15/2019
Power sensor	Agilent	E9301H	MY41495234	06/16/2018	06/15/2019
Directional Coupler	MCLI/USA	4426-20	0D2L51502	06/16/2018	06/15/2019
COMOSAR OPEN Coaxial Probe	SATIMO	OCPG 68	SN 40/14 OCPG68	N/A	N/A
Mobile Phone POSITIONING DEVICE	SATIMO	MSH98	SN 40/14 MSH98	N/A	N/A
SAM PHANTOM	SATIMO	SAM117	SN 40/14 SAM117	N/A	N/A
Liquid measurement Kit	HP	85033D	3423A03482	N/A	N/A

3.SAR MEASUREMENTS SYSTEM CONFIGURATION

3.1. SAR Measurement Set-up

The OPENSAR system for performing compliance tests consist of the following items:

A standard high precision 6-axis robot (KUKA) with controller and software.

KUKA Control Panel (KCP)

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with a Video Positioning System(VPS).

The stress sensor is composed with mechanical and electronic when the electronic part detects a change on the electro-mechanical switch,It sends an “Emergency signal” to the robot controller that to stop robot’s moves

A computer operating Windows XP.

OPENSAR software

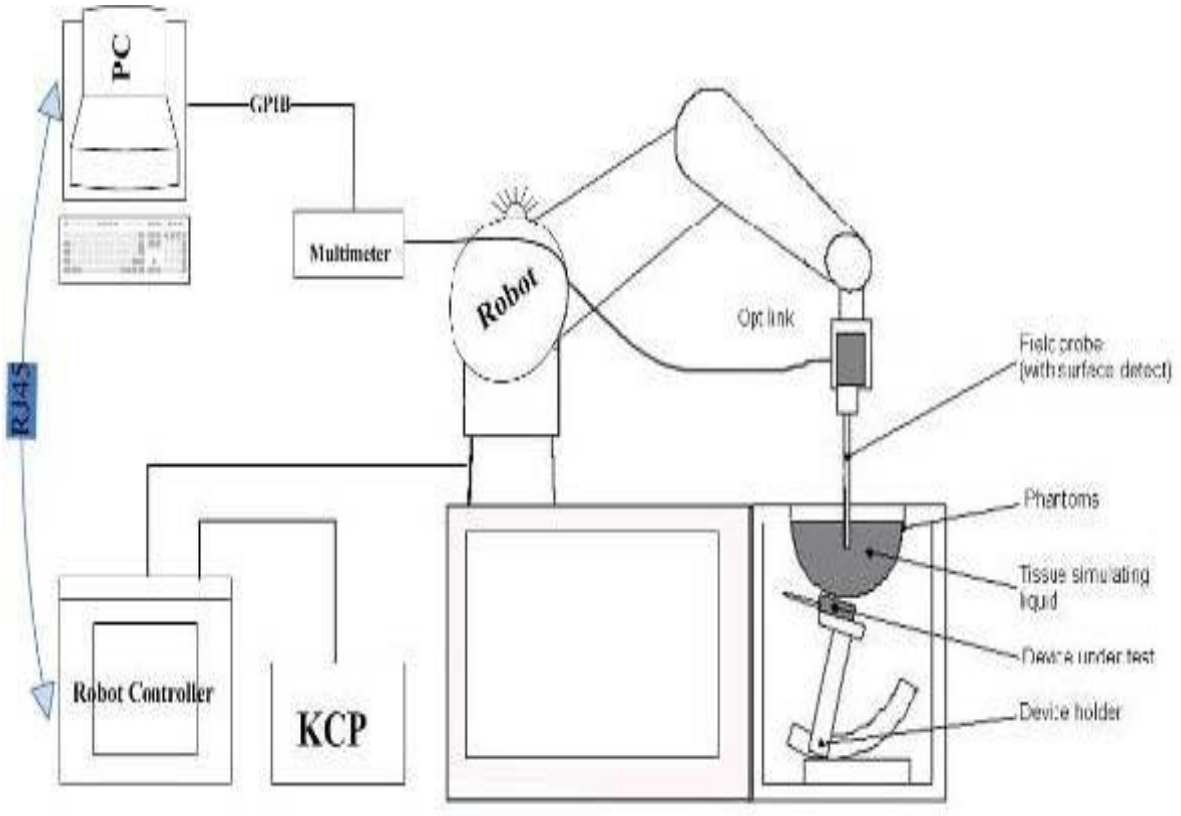
Remote control with teaches pendant and additional circuitry for robot safety such as warning lamps, etc.

The SAM phantom enabling testing left-hand right-hand and body usage.

The Position device for handheld EUT

Tissue simulating liquid mixed according to the given recipes .

System validation dipoles to validate the proper functioning of the system.



3.2. OPENSAR E-field Probe System

The SAR measurements were conducted with the dosimetric probe EPGO324(manufactured by SATIMO), designed in the classical triangular configuration and optimized for dosimetric evaluation.

Probe Specification

ConstructionSymmetrical design with triangular core
Interleaved sensors
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

CalibrationISO/IEC 17025 calibration service available.

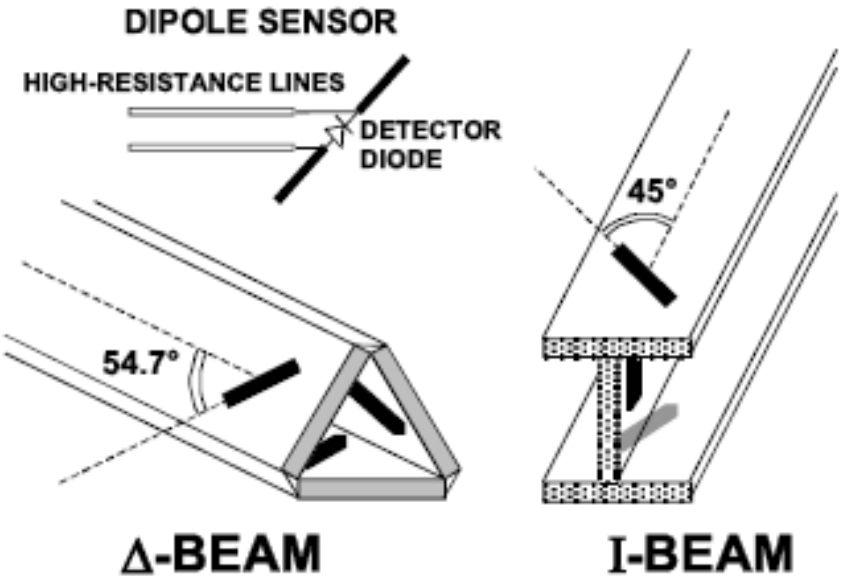
Frequency	450 MHz to 6 GHz; Linearity:0.25dB(450 MHz to 6GHz)
Directivity	0.25 dB in HSL (rotation around probe axis) 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	0.01W/kg to > 100 W/kg; Linearity: 0.25 dB
Dimensions	Overall length: 330 mm (Tip: 16mm) Tip diameter: 5 mm (Body: 8 mm) Distance from probe tip to sensor centers: 2.5 mm
Application	General dosimetry up to 6 GHz Dosimetry in strong gradient fields Compliance tests of Mobile Phones



Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

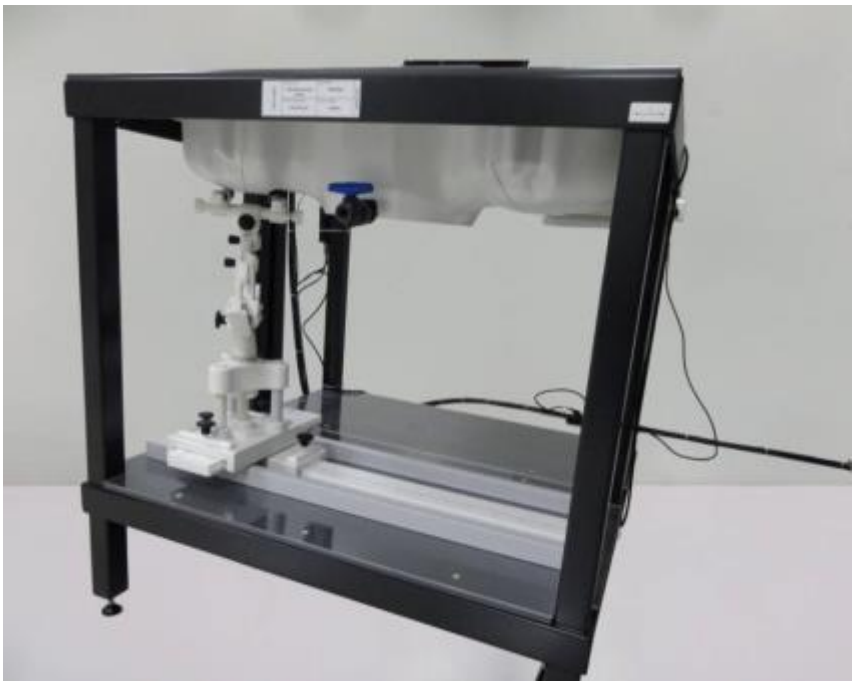
The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



3.3. Phantoms

The SAM Phantom SAM117 is constructed of a fiberglass shell ntegrated in a wooden table. The shape of the shell is in compliance with the specification set in IEEE P1528 and CENELEC IEC62209-1 , IEC 62209-2:2010.The phantom enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of allpredefined phantom positions and measurement grids by manually teaching three points in the robo

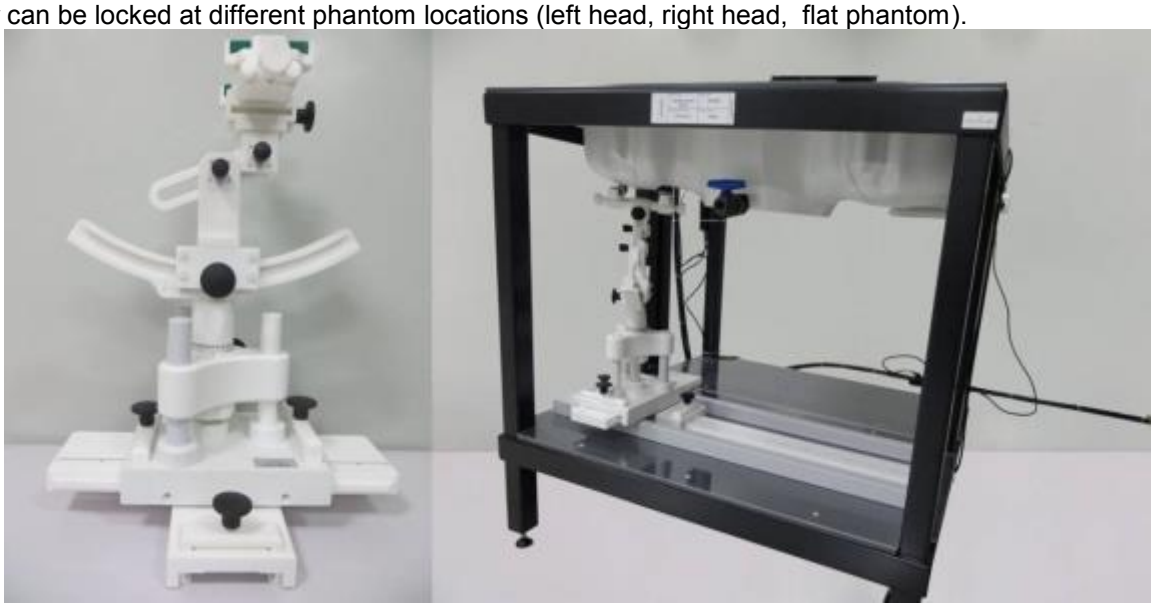
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.



SAM Twin Phantom

3.4. Device Holder

In combination with the Generic Twin PhantomSAM117, the Mounting Device enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatedly positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).



Device holder supplied by SATIMO

3.5. Scanning Procedure

The procedure for assessing the peak spatial-average SAR value consists of the following steps

Power Reference Measurement
The referenceand drift jobs are useful jobs for monitoring the power drift of the device under test in the batch process. Both jobs measure the field at a specified reference position, at a selectable distance from the phantom surface. The reference position can be either the selected section's grid reference point or a user point in this section. The reference job projects the selected point onto the phantom surface, orients the probe perpendicularly to the surface, and approaches the surface using the selected detection method.

Area Scan
The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot.Thesophisticated interpolation routines implemented in OPENSAR software can find the maximum locations even in relatively coarse grids. The scan area is defined by an editable grid. This grid is anchored at the grid reference point of the selected section in the phantom. When the area scan's property sheet is brought-up, grid was at to 15 mm by 15 mm and can be edited by a user.

Zoom Scan
Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default zoom scan measures 5 x 5 x 4 points within a cube whose base faces are centered around the maximum found in a preceding area scan job within the same procedure. If the preceding Area Scan job indicates more then one maximum, the number of Zoom Scans has to be enlarged accordingly (The default number inserted is 1).

Power Drift measurement
The drift job measures the field at the same location as the most recent reference job within the same procedure, and with the same settings. The drift measurement gives the field difference in dB from the reading conducted within the last reference measurement. Several drift measurements are possible for one reference measurement. This allows a user to monitor the power drift of the device under test within a batch process. In the properties of the Drift job, the user can specify a limit for the drift and have OPENSAR software stop the measurements if this limit is exceeded.

3.6. Data Storage and Evaluation

Data Storage
The OPENSAR software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files . The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

Data Evaluation
The OPENSAR software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	Normi, ai0, ai1, ai2
	- Conversion factor	ConvFi
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

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These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the OPENSAR components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

With Vi = compensated signal of channel i (i = x, y, z)
Ui = input signal of channel i (i = x, y, z)
cf = crest factor of exciting field
dcpi = diode compression point

From the compensated input signals the primary field data for each channel can be evaluated:

$$\mathrm{E-fieldprobes}: \qquad E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

$$\mathrm{H-fieldprobes}: \qquad H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$$

With Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel i (i = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel i in V/m
Hi = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

with SAR = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

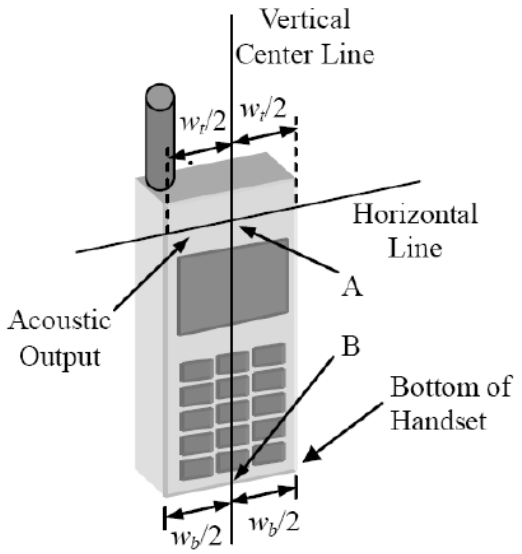
3.7. Position of the wireless device in relation to the phantom

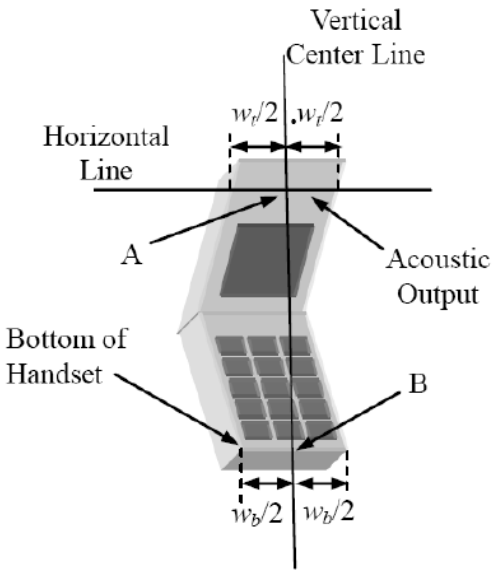
General considerations
This standard specifies two handset test positions against the head phantom – the “cheek” position and the “tilt” position.

The power flow density is calculated assuming the excitation field as a free space field

$$P_{(\mathrm{pwe})} = \frac{E_{tot}^2}{3770} \text{ or } P_{(\mathrm{pwe})} = H_{tot}^2 \cdot 37.7$$

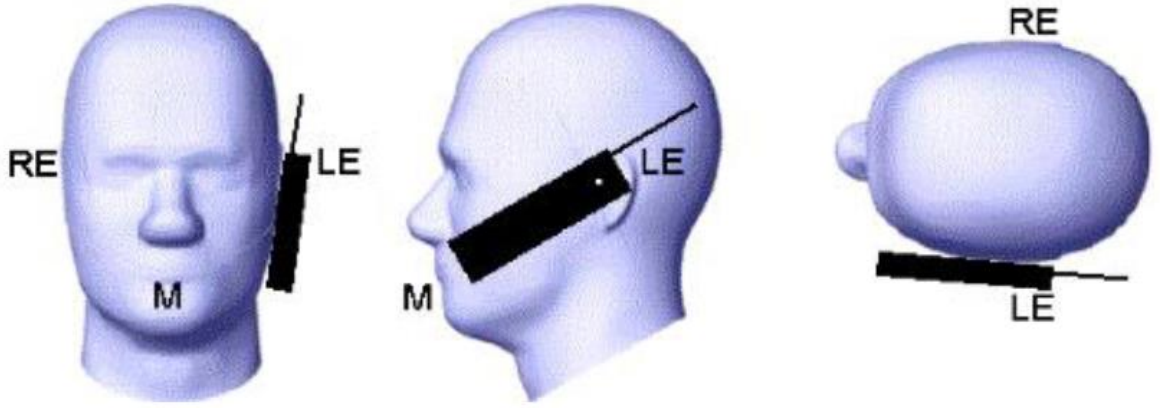
Where P_{pwe}=Equivalent power density of a plane wave in mW/cm2
E_{tot}=total electric field strength in V/m
H_{tot}=total magnetic field strength in A/m



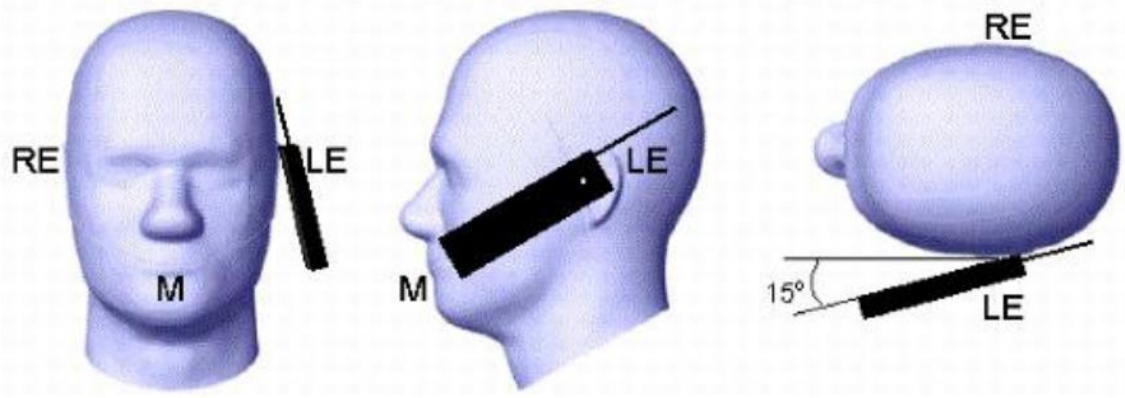


W_t Width of the handset at the level of the acoustic
W_b Width of the bottom of the handset
A Midpoint of the width w_t of the handset at the level of the acoustic output
B Midpoint of the width w_b of the bottom of the handset

Picture 1-a Typical "fixed" case handset Picture 1-b Typical "clam-shell" case handset



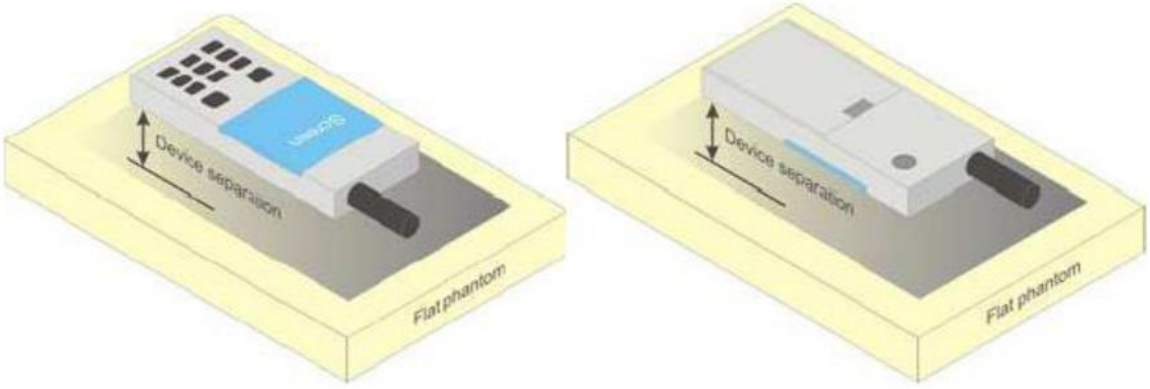
Picture 2 Cheek position of the wireless device on the left side of SAM



Picture 3 Tilt position of the wireless device on the left side of SAM

Body-worn device

A typical example of a body-worn device is a mobile phone, wireless enabled PDA or other battery operated wireless device with the ability to transmit while mounted on a person's body using a carry accessory approved by the wireless device manufacturer.



Picture 4 Test positions for body-worn devices

Devices with hinged or swivel antenna(s)

For devices that employ one or more external antennas with variable positions (e.g. antenna extended, retracted, rotated), these shall be positioned in accordance with the user instructions provided by the manufacturer. For a device with only one antenna, if no intended antenna position is specified, tests shall be performed if applicable in both the horizontal and vertical positions relative to the phantom, and with the antenna oriented away from the body of the DUT (Figure 5) and/or with the antenna extended and retracted such as to obtain the highest exposure condition. For antennas that may be rotated through one or two planes, an evaluation should be made and documented in the measurement report to the highest exposure scenario and only that position(s) need(s) to be tested. For devices with multiple detachable antennas see provisions of 6.2.2.

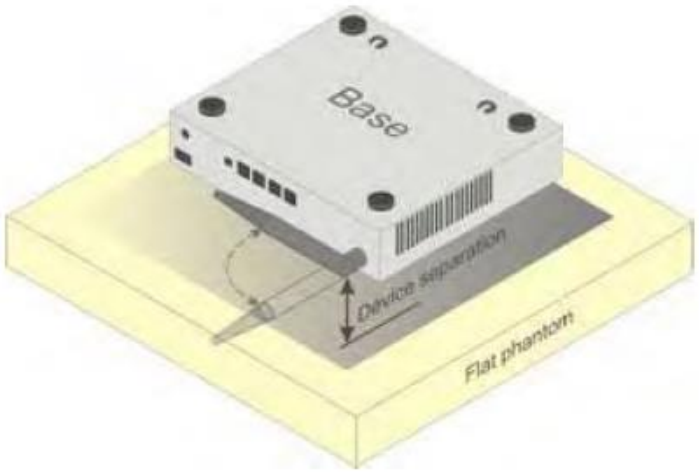


Figure 5– Device with swivel antenna (example of desktop device)

Body-supported device

A typical example of a body supported device is a wireless enabled laptop device that among other orientations may be supported on the thighs of a sitting user. To represent this orientation, the device shall be positioned with its base against the flat phantom. Other orientations may be specified by the manufacturer in the user instructions. If the intended use is not specified, the device shall be tested directly against the flat phantom in all usable orientations.

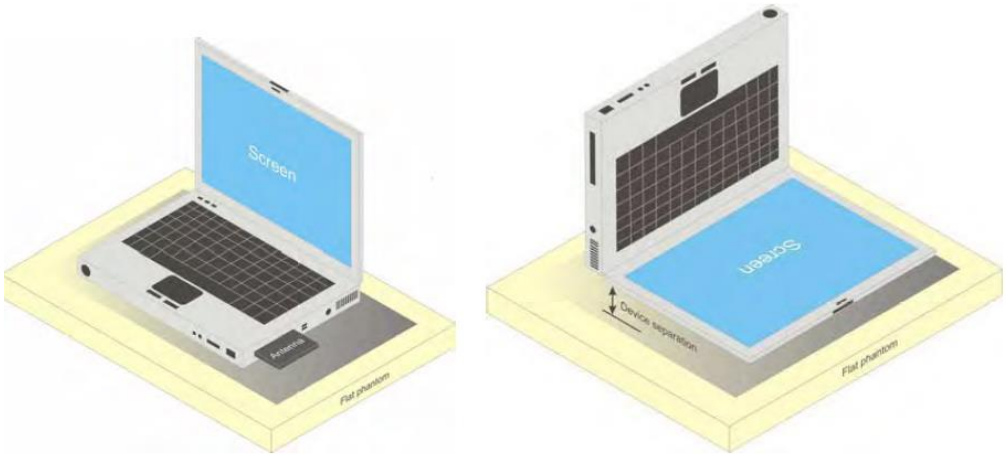
The screen portion of the device shall be in an open position at a 90° angle as seen in Figure 6a (left side), or at an operating angle specified for intended use by the manufacturer in the operating instructions. Where a body supported device has an integral screen required for normal operation, then the screen-side will not need to be tested if the antenna(s) integrated in it ordinarily remain(s) 200 mm from the body. Where a screen mounted antenna is present, the measurement shall be performed with the screen against the flat phantom as shown in Figure 6a) (right side), if operating the screen against the body is consistent with the intended use.

Other devices that fall into this category include tablet type portable computers and credit card transaction authorisation terminals, point-of-sale and/or inventory terminals. Where these devices may be torso or limb-supported, the same principles for body-supported devices are applied.

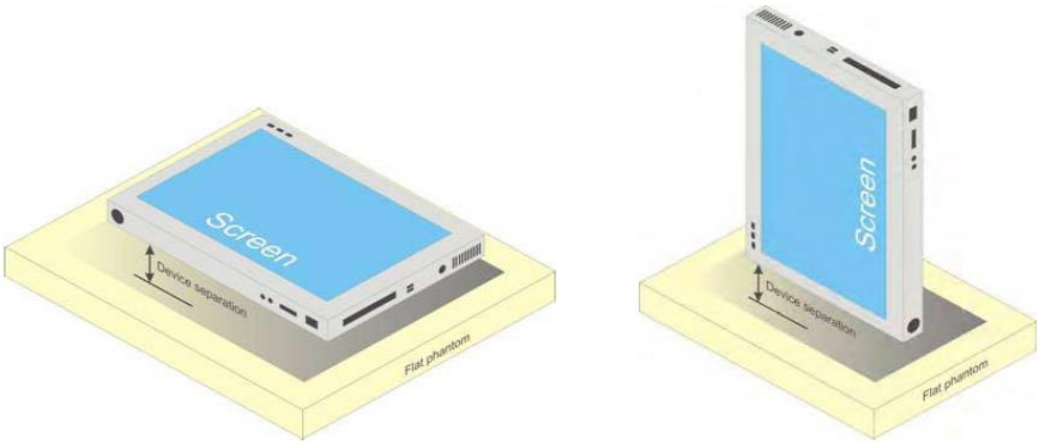
The example in Figure 6b) shows a tablet form factor portable computer for which SAR should be separately assessed with

c). each surface and

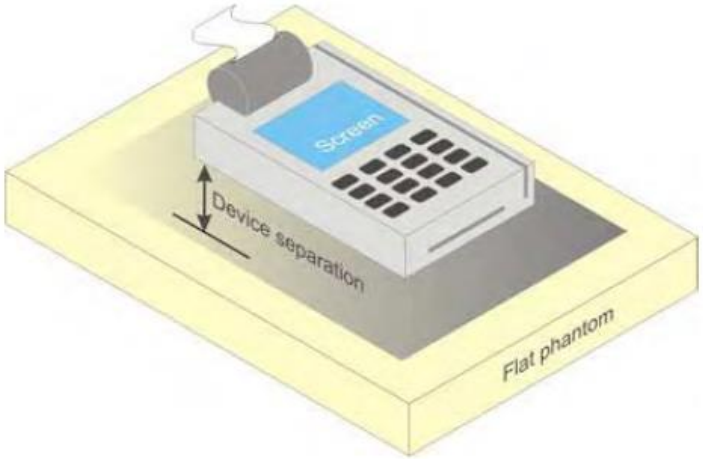
d). the separation distances
positioned against the flat phantom that correspond to the intended use as specified by the manufacturer. If the intended use is not specified in the user instructions, the device shall be tested directly against the flat phantom in all usable orientations.
Some body-supported devices may allow testing with an external power supply (e.g. a.c. adapter) supplemental to the battery, but it shall be verified and documented in the measurement report that SAR is still conservative.
For devices that employ an external antenna with variable positions (e.g. swivel antenna), see 6.1.4.5 and Figure 5.



a) Portable computer with external antenna plug-in-radio-card (left side) or with internal antenna located in screen section (right side)



b) Tablet form factor portable computer



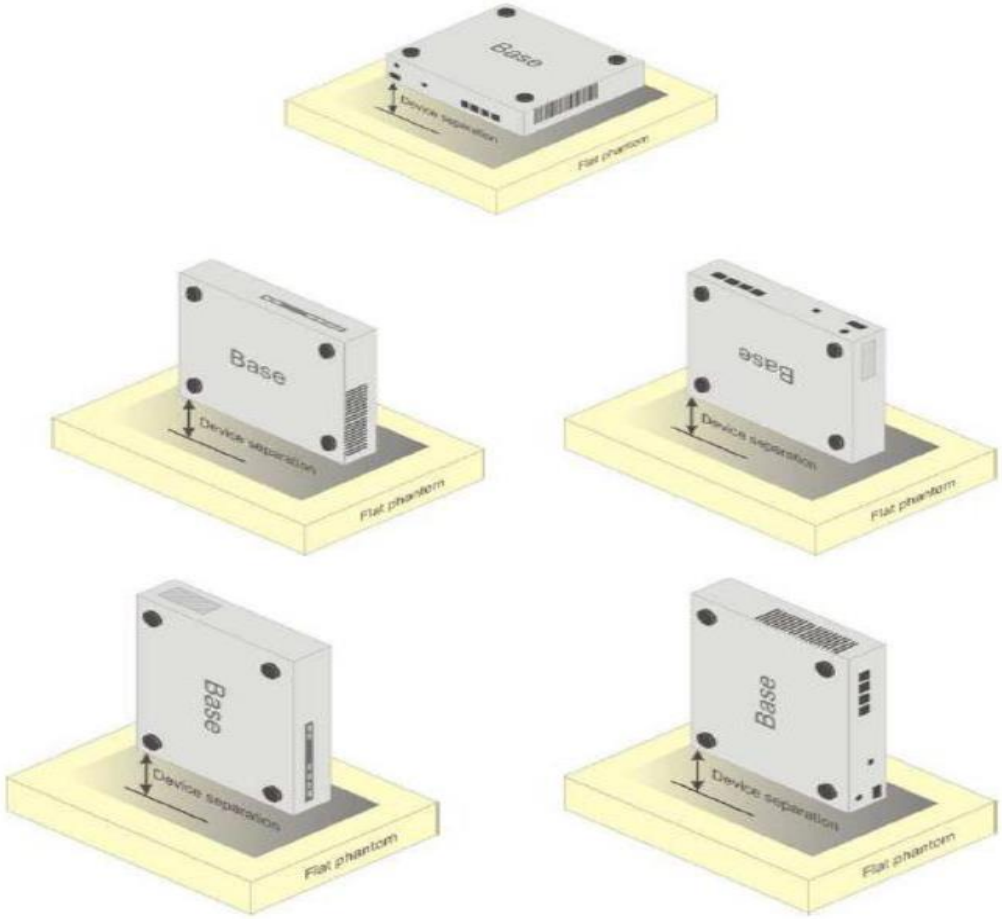
c) Wireless credit card transaction authorisation terminal

Figure 6 – Test positions for body supported devices

Desktop device

A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.

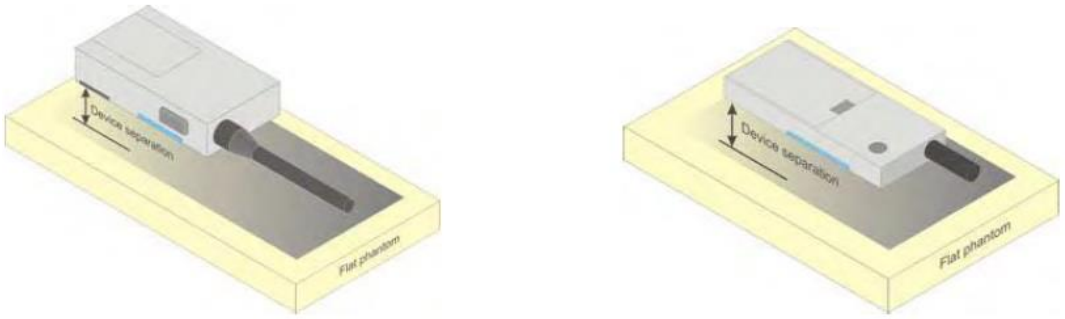
The DUT shall be positioned at the distance and in the orientation to the phantom that corresponds to the intended use as specified by the manufacturer in the user instructions. For devices that employ an external antenna with variable positions, tests shall be performed for all antenna positions specified. Picture 14 shows positions for desktop device SAR tests. If the intended use is not specified, the device shall be tested directly against the flat phantom.



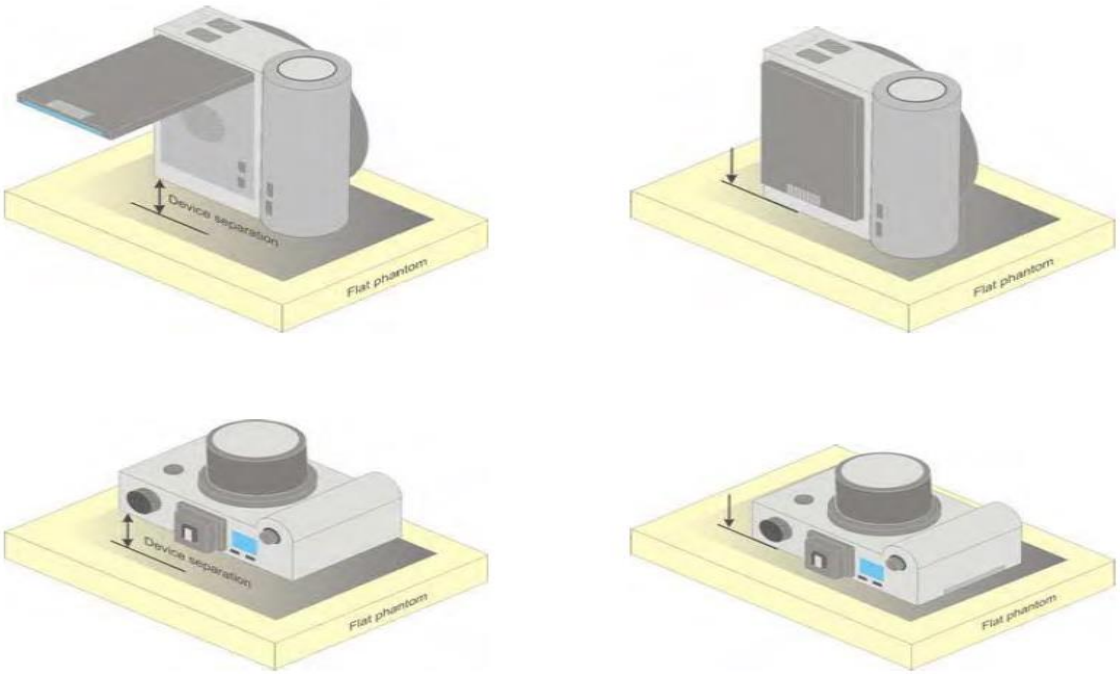
Picture 7 Test positions for desktop devices

Front-of-face device

A typical example of a front-of-face device is a two-way radio that is held at a distance from the face of the user when transmitting. In these cases the device under test shall be positioned at the distance to the phantom surface that corresponds to the intended use as specified by the manufacturer in the user instructions (Figure 8a). If the intended use is not specified, a separation distance of 25 mm between the phantom surface and the device shall be used.



a) Two-way radios



b) Still cameras and video cameras

Figure 8 – Test positions for front-of-face devices

Other devices that fall into this category include wireless-enabled still cameras and video cameras that can send data to a network or other device (Figure 8b). In the case of a devicewhose intended use requires a separation distance from the user (e.g., device with a viewing screen), this shall be positioned at the distance to the phantom surface that corresponds to the intended use as specified by the manufacturer in the user instructions (Figure 8b, left side). If the intended use is not specified, a separation distance of 25 mm between the phantom surface and the device shall be used.
For a device whose intended use requires the user's face to be in contact with the device (e.g., device with an optical viewfinder), this shall be placed directly against the phantom (Figure 8b, right side).

Hand-held usage of the device, not at the head or torso
Additional studies remain needed for devising a representative method for evaluating SAR in the hand of hand-held devices. Future versions of this standard are intended to contain a test method based on scientific data and rationale. Annex J presents the currently available test procedure.

Limb-worn device
A limb-worn device is a unit whose intended use includes being strapped to the arm or leg of the user while transmitting (except in idle mode). It is similar to a body-worn device. Therefore, the test positions of 6.1.4.4 also apply. The strap shall be opened so that it is divided into two parts as shown in Figure 9. The device shall be positioned directly against the phantom surface with the strap straightened as much as possible and the back of the device towards the phantom.
If the strap cannot normally be opened to allow placing in direct contact with the phantom surface, it may be necessary to break the strap of the device but ensuring to not damage the antenna.

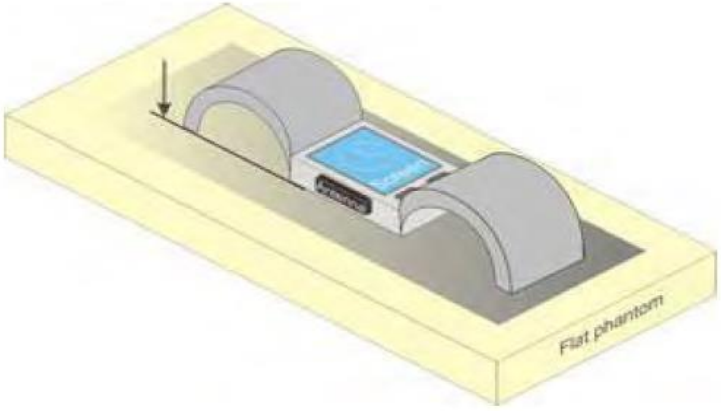


Figure 9 – Test position for limb-worn devices

Clothing-integrated device

A typical example of a clothing-integrated device is a wireless device (mobile phone) integrated into a jacket to provide voice communications through an embedded speaker and microphone. This category also includes headgear with integrated wireless devices.

All wireless or RF transmitting components shall be placed in the orientation and at the separation distance to the phantom surface that correspond to intended use of the device when it is integrated into the clothing (Figure 10).

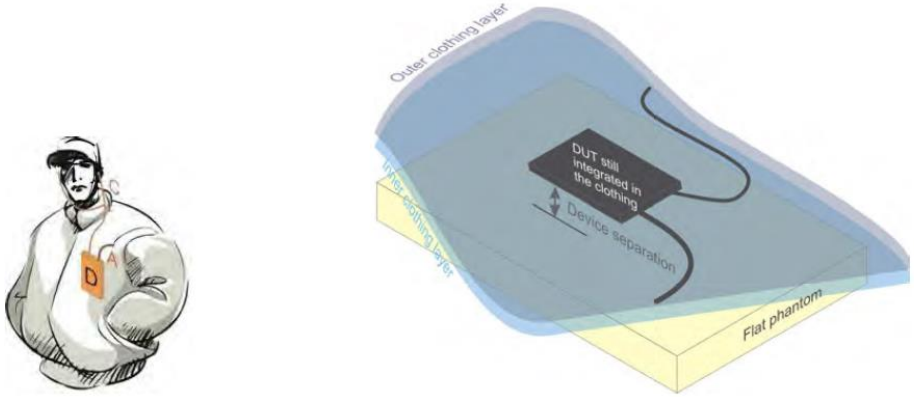


Figure 10– Test position for clothing-integrated wireless devices

3.8. Tissue Dielectric Parameters for Head and Body Phantoms

The liquid used for the frequency range of 700-3000 MHz consisted of water, sugar, salt and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table 3 and 4 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.

Table 2. Composition of the Head Tissue Equivalent Matter

Ingredients (% by weight)	Frequency (MHz)				
	835	900	1800	2000	2450
Water	41.45	40.92	16.33	54.89	46.70
Sugar	56.0	56.5	/	/	/
Salt	4.45	1.48	0.41	0.18	/
Preventol	0.19	0.1	/	/	/
Cellulose	0.1	0.4	/	/	/
Clycol Monobutyl	/	/	65.3	44.93	53.3
Dielectric ParametersTarget Value	f=835MHz ε =41.5 σ =0.90	f=900MHz ε =41.5 σ =0.97	f=1800MHz ε =40.0 σ =1.40	f=1950 MHz ε =40.0 σ =1.40	f=2450 MHz ε =39.2 σ =1.80

Table 3. Targets for tissue simulating liquid

Frequency (MHz)	Liquid Type	Liquid Type (σ)	± 5% Range	Permittivity (ε)	± 5% Range
300	Head	0.87	0.83～0.91	45.30	43.04～47.57
450	Head	0.87	0.83～0.91	43.50	41.33～45.68
835	Head	0.90	0.86～0.95	41.50	39.43～43.58
900	Head	0.97	0.92～1.02	41.50	39.43～43.58
1450	Head	1.20	1.14～1.26	40.50	38.48～42.53
1800	Head	1.40	1.33～1.47	40.00	38.00～42.00
1900	Head	1.40	1.33～1.47	40.00	38.00～42.00
1950	Head	1.40	1.33～1.47	40.00	38.00～42.00
2000	Head	1.40	1.33～1.47	40.00	38.00～42.00
2450	Head	1.80	1.71～1.89	39.20	37.24～41.16
3000	Head	2.40	2.28～2.52	38.50	36.58～40.43
300	Body	0.87	0.83～0.91	45.30	43.04～47.57
450	Body	0.87	0.83～0.91	43.50	41.33～45.68
835	Body	0.90	0.86～0.95	41.50	39.43～43.58
900	Body	0.97	0.92～1.02	41.50	39.43～43.58
1450	Body	1.20	1.14～1.26	40.50	38.48～42.53
1800	Body	1.40	1.33～1.47	40.00	38.00～42.00
1900	Body	1.40	1.33～1.47	40.00	38.00～42.00
1950	Body	1.40	1.33～1.47	40.00	38.00～42.00
2000	Body	1.40	1.33～1.47	40.00	38.00～42.00
2100	Body	1.49	1.42～1.56	39.80	37.81～41.79
2450	Body	1.80	1.71～1.89	39.20	37.24～41.16
2600	Body	1.96	1.86～2.06	39.00	37.05～40.95
3000	Body	2.40	2.28～2.52	38.50	36.58～40.43
3500	Body	2.91	2.77～3.06	37.90	36.01～39.80
4000	Body	3.43	3.26～3.61	37.40	35.53～39.27
4500	Body	3.94	3.74～4.14	36.80	34.96～38.64
5000	Body	4.45	4.23～4.67	36.20	34.39～38.01
5200	Body	4.66	4.43～4.89	36.00	34.20～37.80
5400	Body	4.86	4.62～5.10	35.80	34.01～37.59
5600	Body	5.07	4.82～5.32	35.50	33.73～37.28
5800	Body	5.27	5.01～5.53	35.30	33.54～37.07
6000	Body	5.48	5.21～5.75	35.10	33.35～36.86

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3.9. Dielectric Performance

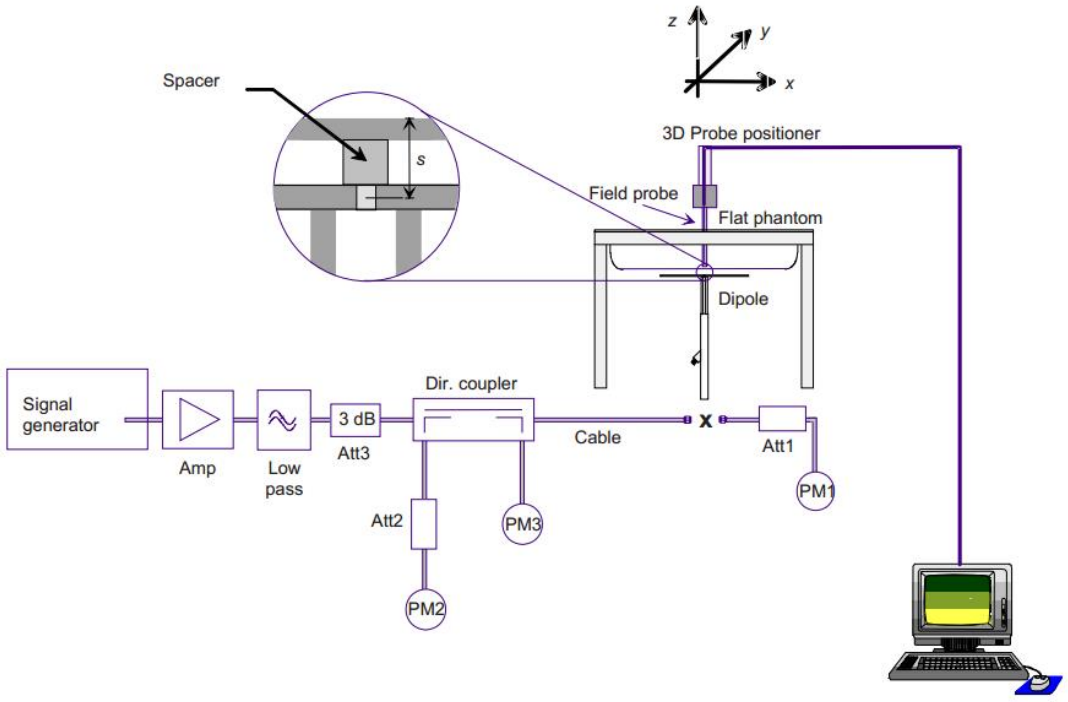
Test Condition and Test Date

Test Enigneer: Handy Lu			
Liquid Frequency	Measurement temperature	Measurement humidity	Measurement Date
900 MHz	24.1℃	52.3%	October 11, 2018
1800 MHz	23.1℃	53.1%	October 15, 2018
2000 MHz	23.6℃	52.7%	October 16, 2018
2450 MHz	23.5℃	54.3%	October 25, 2018
2600 MHz	23.7℃	53.1%	October 30, 2018

Dielectric Performance of Head Tissue Simulating Liquid

Measured Frequency (MHz)	Target Tissue		Measured Tissue			
	σ	ε_r	σ	Dev.	ε_r	Dev.
900	0.97	41.5	0.94	-3.09%	42.58	2.60%
1800	1.40	40.0	1.43	2.14%	40.64	1.60%
2000	1.40	40.0	1.42	1.43%	39.17	-2.08%
2450	1.80	39.2	1.78	-1.11%	38.35	-2.17%
2600	1.96	39.0	1.90	-3.06%	40.35	3.46%

3.10. System Check



Test set-up for the system check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch

the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:

1 Signal Generator
2 Amplifier
3 Directional Coupler
4 Power Meter
5 Calibrated Dipole

The output power on dipole port must be calibrated to 20 dBm (100 mW) before dipole is connected.



Photo of Dipole Setup

System Validation of Head

Verification results	Frequency (MHz)	Target value (W/kg)		Measured value (W/kg)		Deviation	
		1 g Average	10 g Average	1 g Average	10 g Average	1 g Average	10 g Average
	900	10.9	6.99	11.1	7.05	1.83%	0.86%
	1800	38.4	20.1	40.0	19.5	4.17%	-2.99%
	2000	41.1	21.1	40.8	19.6	-0.73%	-7.11%
	2450	52.4	24.0	49.3	23.7	-5.92%	-1.25%
	2600	55.3	24.6	56.0	24.4	1.27%	-0.81%

3.11. Measurement Procedures

Tests to be performed

In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in Picture 11

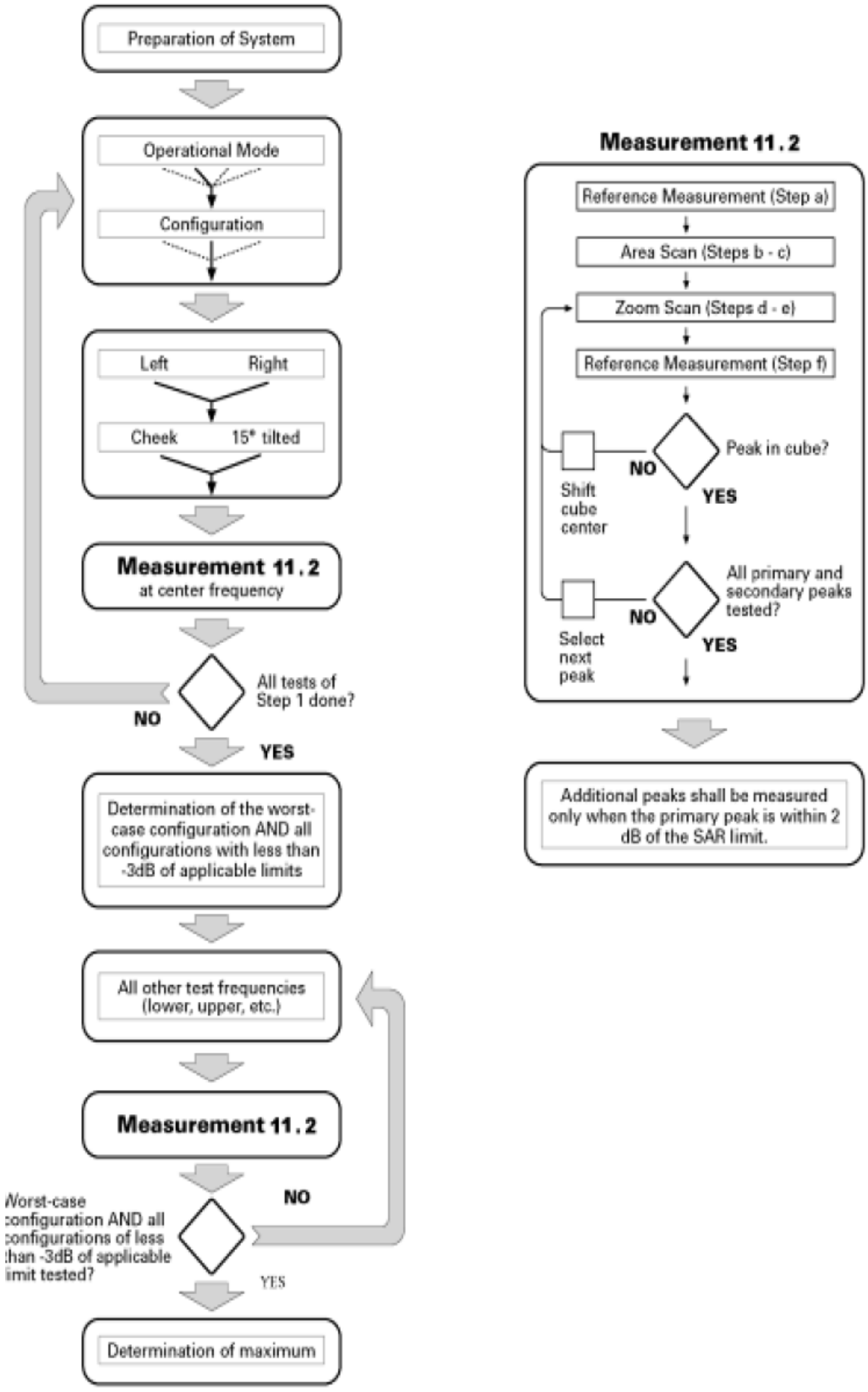
Step 1: The tests described in 11.2 shall be performed at the channel that is closest to the centre of the transmit frequency band (f_c) for:

a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in Chapter 8),
b) all configurations for each device position in a), e.g., antenna extended and retracted, and
c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.
d) If more than three frequencies need to be tested according to 11.1 (i.e., N_c> 3), then allfrequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1, perform all tests described in 11.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value

determined in Step 1 is within 3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture 11 Block diagram of the tests to be performed

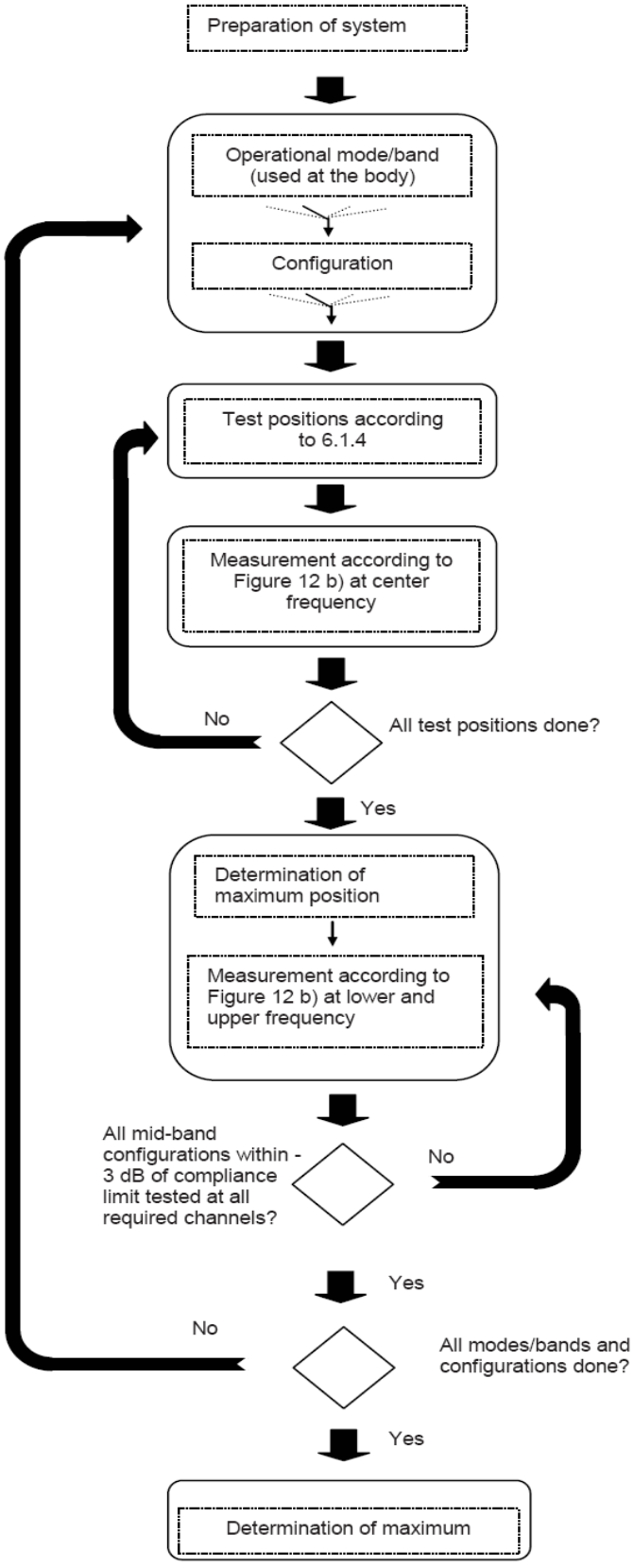


Figure 12a – Tests to be performed

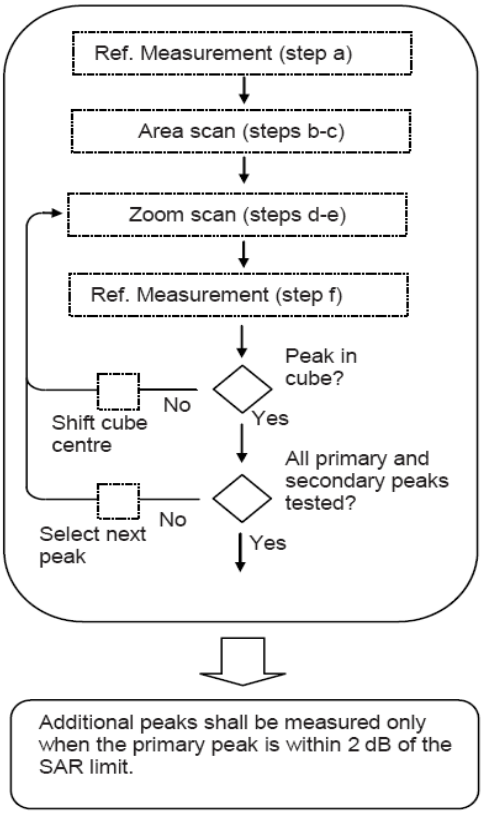


Figure 12b – General procedure

Picture 12 Block diagram of the tests to be performed

Measurement procedure

The following procedure shall be performed for each of the test conditions (see Picture 11) described in 11.1:

a) Measure the local SAR at a test point within 4 mm or less in the normal direction from the inner surface of the phantom.

b) Measure the two-dimensional SAR distribution within the phantom (area scan procedure). The boundary of the measurement area shall not be closer than 20 mm from the phantom side walls. The distance between the measurement points should enable the detection of the location of localmaximum with an accuracy of better than half the linear dimension of the tissue cube after interpolation. A maximum grip spacing of 20 mm for frequencies below 3 GHz and (60/f [GHz]) mm for frequencies of 3GHz and greater is recommended. The maximum distance between the geometrical centre of the probe detectors and the inner surface of the phantom shall be 5 mm for frequencies below 3 GHz andδIn(2)/2 mm for frequencies of 3 GHz and greater, whereδis theplane wave skin depth and In(x) is the natural logarithm. The maximum variation of thesensor-phantom surface shall be ±1 mm for frequencies below 3 GHz and ±0.5 mm forfrequencies of 3 GHz and greater. At all measurement points the angle of the probe with respect tothe line normal to the surface should be less than 5°. If this cannot be achieved for ameasurement distance to the phantom inner surface shorter than the probe diameter, additionalmeasurement distance to the phantom inner surface shorter than the probe diameter, additional

c) From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that are not within the zoom-scan volume; additional peaks shall be measured only when the primary peak is within 2 dB of the SAR limit. This is consistent with the 2 dB threshold already stated;

d) Measure the three-dimensional SAR distribution at the local maxima locations identified in step

e) The horizontal grid step shall be (24 / f[GHz]) mm or less but not more than 8 mm. The minimum zoom size of 30 mm by 30 mm and 30 mm for frequencies below 3 GHz. For higher frequencies, the minimum zoom size of 22 mm by 22 mm and 22 mm. The grip step in the vertical direction shall be (8-f[GHz]) mm or less but not more than 5 mm, if uniform spacing is used. If variable spacing is used in the vertical direction, the maximum spacing between the two closest measured points to the phantom shell shall be (12 / f[GHz]) mm or less but not more than 4 mm, and the spacing between father points shall increase by an incremental factor not exceeding 1.5. When variable spacing is used, extrapolation routines shall be tested with the same spacing as used in measurements. The maximum distance between the geometrical centre of the probe detectors and the inner surface of the phantom shall be 5 mm for frequencies below 3 GHz andδIn(2)/2 mm for frequencies of 3 GHz and greater, where δis the plane wave skin depth and In(x)is the natural logarithm. Separate grids shall be centered on each of the local SAR maxima foundin step c). Uncertainties due to field distortion between the media boundary and the dielectricenclosure of the probe should also be minimized, which is achieved is the distance between thephantom surface and physical tip of the probe is larger than probe tip diameter. Other methodsmay utilize correction procedures for these boundary effects that enable high precisionmeasurements closer than half the probe diameter. For all measurement points, the angle of theprobe with respect to the flat phantom surface shall be less than 5. If this cannot be achievedan additional uncertainty evaluation is needed.

f) Use post processing(e.g. interpolation and extrapolation) procedures to determine the localSAR values at the spatial resolution needed for mass averaging.

WCDMA Measurement Procedures for SAR

The following procedures are applicable to WCDMA handsets operating under 3GPP Release99,Release 5 and Release 6. The default test configuration is to measure SAR with an establishedradio link between the DUT and a communication test set using a 12.2kbps RMC (referencemeasurement channel) configured in Test Loop Mode 1. SAR is selectively confirmed for otherphysical channel configurations (DPCCH & DPDCH), HSDPA and HSPA (HSUPA/HSDPA)modes according to output power, exposure conditions and device operating capabilities. Bothuplink and downlink should be configured with the same RMC or AMR, when required. SAR forRelease 5 HSDPA and Release 6 HSPA are measured using the applicable FRC (fixed referencechannel) and E-DCH reference channel configurations. Maximum output power is verified
according to applicable versions of 3GPP TS 34.121 and SAR must be measured according tothesemaximum output conditions. When Maximum Power Reduction (MPR) is not implementedaccording to Cubic Metric (CM) requirements for Release 6 HSPA, the following procedures do notapply.

For Release 5 HSDPA Data Devices:

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs}	CM/dB
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15	15/15	64	12/15	24/25	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

For Release 6 HSUPA Data Devices

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (dB)	MPR (dB)	AG Index	E-TFCI
1	11/15	15/15	64	11/15	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	12/15	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	βed1:47/15 βed2 :47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	3.0	2.0	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	1.0	0.0	21	81

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4.TEST CONDITIONS AND RESULTS

4.1. Conducted Power Results

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMW500) to ensure the maximum power transmission and proper modulation. This result contains conducted output power for the EUT. In all cases, the measured peak output power should be greater and within 5% than EMI measurement.

The conducted power measurement results for GSM900/DCS1800

GSM900	Conducted Power (dBm)		
	Channel 124 (914.80MHz)	Channel 37 (987.40MHz)	Channel 975 (880.20MHz)
	32.28	32.27	32.25
DCS1800	**Conducted Power (dBm)**		
	Channel 885 (1784.80MHz)	**Channel 698 (1747.40MHz)**	**Channel 512 (1710.20MHz)**
	29.09	29.09	29.06

The conducted power measurement results for GPRS

GPRS 900 (GMSK)	Measured Power (dBm)			Calculation (dB)	Averaged Power (dBm)		
	880.2 MHz	897.4 MHz	914.8 MHz		880.2 MHz	897.4 MHz	914.8 MHz
1 Txslot	30.39	30.40	30.38	-9.03	21.36	21.37	21.35
2 Txslot	**28.21**	**28.28**	**28.27**	**-6.02**	**22.19**	**22.26**	**22.25**
3 Txslot	26.38	26.34	26.36	-4.26	22.12	22.08	22.10
4 Txslot	24.90	24.87	24.87	-3.01	21.89	21.86	21.86
GPRS 1800 (GMSK)	**Measured Power (dBm)**			**Calculation (dB)**	**Averaged Power (dBm)**		
	1710.2 MHz	**1747.4 MHz**	**1784.8 MHz**		**1710.2 MHz**	**1747.4 MHz**	**1784.8 MHz**
1 Txslot	27.09	27.07	27.05	-9.03	18.06	18.04	18.02
2 Txslot	**25.56**	**25.56**	**25.56**	**-6.02**	**19.54**	**19.54**	**19.54**
3 Txslot	23.46	23.43	23.50	-4.26	19.20	19.17	19.24
4 Txslot	21.67	21.67	21.64	-3.01	18.66	18.66	18.63

The conducted power measurement results for EGPRS

EGPRS 900 (8-PSK)	Measured Power (dBm)			Calculation (dB)	Averaged Power (dBm)		
	880.2 MHz	897.4 MHz	914.8 MHz		880.2 MHz	897.4 MHz	914.8 MHz
1 Txslot	24.89	24.89	24.79	-9.03	15.86	15.86	15.76
2 Txslot	22.19	22.09	22.11	-6.02	16.17	16.07	16.09
3 Txslot	**20.58**	**20.60**	**20.50**	**-4.26**	**16.32**	**16.34**	**16.24**
4 Txslot	19.03	19.09	19.06	-3.01	16.02	16.08	16.05
EGPRS 1800 (8-PSK)	**Measured Power (dBm)**			**Calculation (dB)**	**Averaged Power (dBm)**		
	1710.2 MHz	**1747.4 MHz**	**1784.8 MHz**		**1710.2 MHz**	**1747.4 MHz**	**1784.8 MHz**
1 Txslot	23.44	23.49	23.48	-9.03	14.41	14.46	14.45
2 Txslot	**21.67**	**21.68**	**21.65**	**-6.02**	**15.65**	**15.66**	**15.63**
3 Txslot	19.39	19.26	19.38	-4.26	15.13	15.00	15.12
4 Txslot	17.48	17.43	17.49	-3.01	14.47	14.42	14.48

Note:

1. Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

2.According to the conducted power as above, the body measurements are performed with 2Txslots for 900MHz and 2Txslots for 1800MHz for GPRS.

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The conducted power measurement results for WCDMA

Item	band	FDD Band VIII result (dBm)			FDD Band I result (dBm)		
		Test Channel			Test Channel		
	sub-test	2713	2788	2862	9612	9750	9888
WCDMA	\	23.16	23.13	23.13	23.14	23.13	23.16
HSDPA	1	23.15	23.15	23.07	22.63	22.63	22.62
	2	22.79	23.10	22.90	22.50	22.39	22.35
	3	22.69	23.10	22.57	22.17	22.36	22.16
	4	22.35	22.72	22.43	21.91	22.19	21.97
HSUPA	1	22.63	22.61	22.62	23.12	23.11	23.15
	2	22.69	22.37	22.36	23.17	22.82	23.07
	3	22.42	22.21	22.37	23.22	22.89	22.82
	4	22.50	22.24	22.36	23.28	22.97	22.74
	5	22.50	22.18	22.32	23.17	22.85	22.49

The conducted power measurement results for WLAN

Mode	Channel	Frequency (MHz)	Conducted Output Power(dBm)			Test Rate Data
			ANT1	ANT2	SUM	
802.11b	1	2412	15.35	15.38	/	1 Mbps
	7	2442	15.75	15.68	/	1 Mbps
	13	2472	15.99	16.09	/	1 Mbps
802.11g	1	2412	14.20	14.36	/	6 Mbps
	7	2442	14.50	14.58	/	6 Mbps
	13	2472	14.99	15.06	/	6 Mbps
802.11n(20MHz)	1	2412	13.38	13.40	16.39	6.5 Mbps
	7	2442	13.44	13.60	16.53	6.5 Mbps
	13	2472	13.69	13.80	16.76	6.5 Mbps
802.11n(40MHz)	1	2412	12.42	12.67	15.36	13 Mbps
	7	2442	12.86	12.68	15.78	13 Mbps
	13	2472	12.72	13.00	15.87	13 Mbps

Note: 1.The output power was test all data rate and recorded worst case at recorded data rate.

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The conducted power measurement results for LTE

LTE-BAND1

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
5 MHz	Low range	1	0	22.80	21.90
			max	22.81	21.99
		Partial	0	22.93	22.03
			max	22.88	21.90
	Mid range	1	0	22.80	21.84
			max	22.91	21.93
		Partial	0	22.97	22.01
			max	22.84	21.92
	High range	1	0	22.89	21.99
			max	22.90	22.01
		Partial	0	22.89	22.04
			max	22.74	21.81
20MHz	Low range	1	0	22.78	21.87
			max	22.77	21.92
		Partial	0	22.86	21.97
			max	22.82	21.83
	Mid range	1	0	22.66	21.73
			max	22.63	21.59
		Partial	0	22.76	21.80
			max	22.69	21.62
	High range	1	0	22.70	21.66
			max	22.78	21.72
		Partial	0	22.60	21.69
			max	22.73	21.80

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LTE-BAND3

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
1.4MHz	Low range	1	0	22.45	21.58
			max	22.50	21.67
		Partial	0	22.45	21.57
			max	22.31	21.49
	Mid range	1	0	22.46	21.62
			max	22.37	21.49
		Partial	0	22.36	21.48
			max	22.43	21.55
	High range	1	0	22.21	21.39
			max	22.26	21.36
		Partial	0	22.27	21.34
			max	22.35	21.50
5 MHz	Low range	1	0	22.33	21.43
			max	22.22	21.38
		Partial	0	22.32	21.35
			max	22.38	21.43
	Mid range	1	0	22.25	21.27
			max	22.22	21.17
		Partial	0	22.20	21.25
			max	22.19	21.15
	High range	1	0	22.29	21.34
			max	22.27	21.31
		Partial	0	22.23	21.23
			max	22.15	21.16
20MHz	Low range	1	0	22.40	21.54
			max	22.38	21.42
		Partial	0	22.44	21.51
			max	22.45	21.62
	Mid range	1	0	22.49	21.53
			max	22.42	21.53
		Partial	0	22.36	21.50
			max	22.49	21.55
	High range	1	0	22.30	21.37
			max	22.23	21.23
		Partial	0	22.23	21.41
			max	22.30	21.40

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LTE-BAND7

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
5 MHz	Low range	1	0	22.69	21.88
			max	22.74	21.79
		Partial	0	22.71	21.75
			max	22.69	21.75
	Mid range	1	0	22.73	21.74
			max	22.75	21.90
		Partial	0	22.61	21.63
			max	22.63	21.80
	High range	1	0	22.60	21.66
			max	22.54	21.71
		Partial	0	22.56	21.64
			max	22.61	21.63
20MHz	Low range	1	0	22.65	21.84
			max	22.53	21.68
		Partial	0	22.56	21.71
			max	22.64	21.70
	Mid range	1	0	22.60	21.53
			max	22.55	21.47
		Partial	0	22.46	21.46
			max	22.57	21.54
	High range	1	0	22.58	21.63
			max	22.60	21.58
		Partial	0	22.50	21.43
			max	22.50	21.45

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LTE-BAND8

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
1.4 MHz	Low range	1	0	22.40	21.48
			max	22.49	21.50
		Partial	0	22.39	21.43
			max	22.46	21.54
	Mid range	1	0	22.31	21.37
			max	22.48	21.65
		Partial	0	22.38	21.40
			max	22.38	21.42
	High range	1	0	22.38	21.39
			max	22.37	21.52
		Partial	0	22.32	21.52
			max	22.29	21.32
5 MHz	Low range	1	0	22.24	21.32
			max	22.34	21.46
		Partial	0	22.21	21.33
			max	22.34	21.47
	Mid range	1	0	22.19	21.23
			max	22.26	21.17
		Partial	0	22.18	21.25
			max	22.12	21.21
	High range	1	0	22.21	21.12
			max	22.25	21.28
		Partial	0	22.15	21.21
			max	22.10	21.00
10MHz	Low range	1	0	22.43	21.46
			max	22.35	21.52
		Partial	0	22.41	21.42
			max	22.39	21.44
	Mid range	1	0	22.46	21.61
			max	22.38	21.55
		Partial	0	22.45	21.63
			max	22.49	21.62
	High range	1	0	22.30	21.30
			max	22.30	21.46
		Partial	0	22.22	21.34
			max	22.25	21.35

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LTE-BAND20

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
5 MHz	Low range	1	0	22.70	21.85
			max	22.63	21.66
		Partial	0	22.67	21.70
			max	22.71	21.72
	Mid range	1	0	22.72	21.74
			max	22.78	21.86
		Partial	0	22.66	21.86
			max	22.73	21.82
	High range	1	0	22.53	21.70
			max	22.52	21.65
		Partial	0	22.63	21.67
			max	22.56	21.69
20MHz	Low range	1	0	22.62	21.73
			max	22.57	21.63
		Partial	0	22.50	21.61
			max	22.64	21.79
	Mid range	1	0	22.58	21.62
			max	22.56	21.53
		Partial	0	22.47	21.51
			max	22.48	21.54
	High range	1	0	22.47	21.49
			max	22.51	21.56
		Partial	0	22.60	21.61
			max	22.41	21.44

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LTE-BAND38

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
5 MHz	Low range	1	0	23.40	22.49
			max	23.42	22.47
		Partial	0	23.48	22.65
			max	23.45	22.51
	Mid range	1	0	23.32	22.51
			max	23.49	22.59
		Partial	0	23.45	22.64
			max	23.49	22.69
	High range	1	0	23.26	22.32
			max	23.22	22.41
		Partial	0	23.25	22.39
			max	23.39	22.52
20MHz	Low range	1	0	23.29	22.35
			max	23.28	22.41
		Partial	0	23.26	22.41
			max	23.23	22.41
	Mid range	1	0	23.16	22.21
			max	23.23	22.32
		Partial	0	23.18	22.21
			max	23.13	22.03
	High range	1	0	23.22	22.21
			max	23.27	22.19
		Partial	0	23.30	22.31
			max	23.13	22.05

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LTE-BAND40

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
5 MHz	Low range	1	0	23.45	22.51
			max	23.32	22.47
		Partial	0	23.41	22.54
			max	23.36	22.48
	Mid range	1	0	23.42	22.43
			max	23.40	22.53
		Partial	0	23.45	22.59
			max	23.33	22.39
	High range	1	0	23.13	22.10
			max	23.30	22.12
		Partial	0	23.27	22.23
			max	23.21	22.14
20MHz	Low range	1	0	23.16	22.02
			max	23.12	21.99
		Partial	0	23.13	22.01
			max	23.12	21.99
	Mid range	1	0	23.24	22.10
			max	23.30	22.29
		Partial	0	23.20	22.04
			max	23.24	22.23
	High range	1	0	23.23	22.05
			max	23.24	22.15
		Partial	0	23.28	22.17
			max	23.21	22.15

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4.2. Test reduction procedure

Maximum power level

The maximum power level, $P_{max,m}$, that can be transmitted by a device before the SAR averaged over a mass, m, exceeds a given limit, SAR_{lim}, can be defined. Any device transmitting at power levels below $P_{max,m}$ can then be excluded from SAR testing. The lowest possible value for $_{Pmax,m}$ is: $P_{max,m} = SAR_{lim}$* m.

When working alone, the averages transmit power ofBT module should be less than 20mW. According tothe test results, when working alone, the testing ofBT module is not necessary.

Simultaneous Multi-band Transmission SAR Analysis List of Mode for Simultaneous Multi-band

Transmission

No.	Configurations	Body SAR
1	GSM + WLAN	Yes
2	WCDMA + WLAN	Yes
3	LTE + WLAN	Yes

Remark:

One way of determining the threshold power level available to the secondary transmitter ($P_{available}$) is to calculate it from the measured peak spatial-average SAR of the primary transmitter (SAR_1) according to the equation:

$$P_{available} = P_{th,m} \times (SAR_{lim} - SAR_1) / SAR_{lim}$$

Maximum SAR value and the sum of the 10-g SAR for WWAN &WLAN - Body

WWAN Band	WWAN Max SAR (W/kg)	2.4GWLAN Max SAR (W/kg)	Max SAR Sum (W/kg)	Limit (W/kg)
GSM900(L)	1.058	0.119	1.177	2.0
GSM900	1.129	0.119	1.248	
GSM900(H)	0.904	0.119	1.023	
DCS1800(L)	1.236	0.119	1.355	
DCS1800	1.414	0.119	1.533	
DCS1800(H)	1.159	0.119	1.278	
WCDMA900	0.619	0.119	0.738	
WCDMA2100(L)	1.164	0.119	1.283	
WCDMA2100	1.366	0.119	1.485	
WCDMA2100(H)	1.085	0.119	1.204	
LTE Band 1(L)	1.431	0.119	1.550	
LTE Band 1	1.600	0.119	**1.719**	
LTE Band 1(H)	1.363	0.119	1.482	
LTE Band 3(L)	1.092	0.119	1.211	
LTE Band 3	1.280	0.119	1.399	
LTE Band 3(H)	1.011	0.119	1.130	
LTE Band 7	0.885	0.119	1.004	
LTE Band 8	0.389	0.119	0.508	
LTE Band 20	0.894	0.119	1.013	
LTE Band 38	0.571	0.119	0.690	
LTE Band 40(L)	1.096	0.119	1.215	
LTE Band 40	1.296	0.119	1.415	
LTE Band 40(H)	0.937	0.119	1.056	

Remark:

1 WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2 LTE, GSM and WCDMA share the same antenna, and cannot transmit simultaneously.
3 The maximum SAR summation is calculated based on the same configuration and test position.
If 10g-SAR summation < 2.0W/kg , simultaneous SAR measurement is not necessary.
4 When the maximum SAR summation ⩾1.0W/kg on Body, WWAN and WLAN for low and high Channels are necessary to be tested and the test results please refer to the SAR Measurement Results.

Test Location

Antenna	Edge	SAR Conclusion
WWAN	Front Side	Tested
WWAN	Back Side	Tested
WWAN	Right	No
WWAN	Left	Tested
WWAN	Bottom	No
WWAN	Top	Tested
WLAN	Front Side	Tested
WLAN	Back Side	Tested
WLAN	Right	Tested
WLAN	Left	Tested
WLAN	Bottom	Tested
WLAN	Top	No

1. SAR is required only for both back and edge with the most conservation exposure condition
2. For Body mode,SAR is not required when the main antenna to edge is >2.5cm (refer to EUT photographs)

4.3. SAR Measurement Results

SAR Values for GSM900 Band-Body

Frequency		Service/Headset	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
897.4	37	GPRS 2TS	Front	0	0.824	-2.01	--
897.4	37	GPRS 2TS	Rear	0	**1.129**	0.91	1
880.2	975	GPRS 2TS	Rear	0	1.058	-1.04	--
914.8	124	GPRS 2TS	Rear	0	0.904	2.91	--
897.4	37	GPRS 2TS	Left	0	0.493	2.94	--
897.4	37	GPRS 2TS	Top	0	0.357	3.64	--

Note:

1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.

2.The EUT is a Class B mobile phone which can be attached to both GPRS and GSM services,using one service at a time

3.The Multi-slot Classes of EUT is Class12 which has maximum 4 Downlink slots and 2 Uplink slots, the maximum active slots is 6, when perform the multiple slots scan, 4DL+2UL is the worse case.

SAR Values for DCS1800 Band-Body

Frequency		Service/Headset	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
1747.4	698	GPRS 2TS	Front	0	0.593	-1.20	--
1747.4	698	GPRS 2TS	Rear	0	**1.414**	-0.28	2
1710.2	512	GPRS 2TS	Rear	0	1.236	1.02	--
1784.8	885	GPRS 2TS	Rear	0	1.159	-3.91	--
1747.4	698	GPRS 2TS	Left	0	0.504	1.66	--
1747.4	698	GPRS 2TS	Top	0	0.427	-0.01	--

Note:

1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.

2.The EUT is a Class B mobile phone which can be attached to both GPRS and GSM services,using one service at a time

3.The Multi-slot Classes of EUT is Class12 which has maximum 4 Downlink slots and 2 Uplink slots, the maximum active slots is 6, when perform the multiple slots scan, 4DL+2UL is the worse case.

SAR Values forWCDMA Band VIII-Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
897.4	2788	RMC	Front	0	**0.619**	-0.27	3
897.4	2788	RMC	Rear	0	0.310	1.51	--
897.4	2788	RMC	Left	0	0.260	2.67	--
897.4	2788	RMC	Top	0	0.204	-3.55	--

Note:

1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.

2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

SAR Values forWCDMA Band I-Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
1950.0	9750	RMC	Front	0	**1.366**	1.21	4
1922.4	9612	RMC	Front	0	1.164	-3.01	--
1977.6	9888	RMC	Front	0	1.085	2.94	--
1950.0	9750	RMC	Rear	0	0.834	0.59	--
1950.0	9750	RMC	Left	0	0.437	-3.54	--
1950.0	9750	RMC	Top	0	0.398	2.87	--

Note:

1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.

2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

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SAR Values for WLAN2450 Band -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
2442.0	7	802.11b	Front	0	**0.119**	-0.28	5
2442.0	7	802.11b	Rear	0	0.107	-0.05	--
2442.0	7	802.11b	Left	0	0.051	1.57	--
2442.0	7	802.11b	Right	0	0.041	3.64	--
2442.0	7	802.11b	Bottom	0	0.036	2.10	--

Note:
1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.
2. The result was tested under the lowest data rate 1Mbps for 802.11b.

SAR Values for E-UTRA Band1 -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
1950.0	18300	RMC	Front	0	1.600	0.73	6
1930.0	18100	RMC	Front	0	1.431	-2.67	--
1870.0	18500	RMC	Front	0	1.363	1.15	--
1950.0	18300	RMC	Rear	0	0.854	1.54	--
1950.0	18300	RMC	Left	0	0.534	-2.57	--
1950.0	18300	RMC	Top	0	0.671	3.58	--

Note:
1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.
2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

SAR Values for E-UTRA Band3 -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
1747.5	19575	RMC	Front	0	0.631	-0.84	--
1747.5	19575	RMC	Rear	0	**1.280**	-1.91	7
1720.0	19300	RMC	Rear	0	1.092	-3.21	--
1775.0	19850	RMC	Rear	0	1.011	0.84	--
1747.5	19575	RMC	Left	0	0.431	1.94	--
1747.5	19575	RMC	Top	0	0.505	-2.28	--

Note:
1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.
2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

SAR Values for E-UTRA Band 7 -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
2535.0	21100	RMC	Front	0	0.590	0.90	--
2535.0	21100	RMC	Rear	0	**0.865**	1.21	8
2535.0	21100	RMC	Left	0	0.317	0.84	--
2535.0	21100	RMC	Top	0	0.289	-3.74	--

Note:
1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.
2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

SAR Values for E-UTRA Band 8 -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
897.5	21625	RMC	Front	0	**0.389**	-1.23	9
897.5	21625	RMC	Rear	0	0.281	-0.77	--
897.5	21625	RMC	Left	0	0.102	0.65	--
897.5	21625	RMC	Top	0	0.093	3.97	--

Note:
1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.
2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

SAR Values for E-UTRA Band 20 -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
847.0	24300	RMC	Front	0	**0.894**	-0.44	10
847.0	24300	RMC	Rear	0	0.494	-0.28	--
847.0	24300	RMC	Left	0	0.282	2.94	--
847.0	24300	RMC	Top	0	0.216	3.25	--

Note:

1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.

2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

SAR Values for E-UTRA Band38 -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
2595.0	38000	RMC	Front	0	0.344	-2.17	--
2595.0	38000	RMC	Rear	0	**0.571**	0.23	11
2595.0	38000	RMC	Left	0	0.217	-0.57	--
2595.0	38000	RMC	Top	0	0.186	1.94	--

Note:

1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.

2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

SAR Values for E-UTRA Band40 -Body

Frequency		Mode/Band	Test Position	Spacing(mm)	SAR(10g) (W/kg)	Power Drift(%)	Ref.Plot #
MHz	Channel						
2350.0	39150	RMC	Front	0	0.564	-1.42	--
2350.0	39150	RMC	Rear	0	**1.269**	0.96	12
2310.0	38750	RMC	Rear	0	**1.096**	1.54	--
2390.0	39550	RMC	Rear	0	**0.937**	0.97	--
2350.0	39150	RMC	Left	0	0.482	-1.67	--
2350.0	39150	RMC	Top	0	0.407	2.97	--

Note:

1.When the 10-g SAR is ≤ 1.0W/kg, testing for low and high channel is optional.

2.The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2kbps RMC(reference measurement channel) configuration in test loop mode.

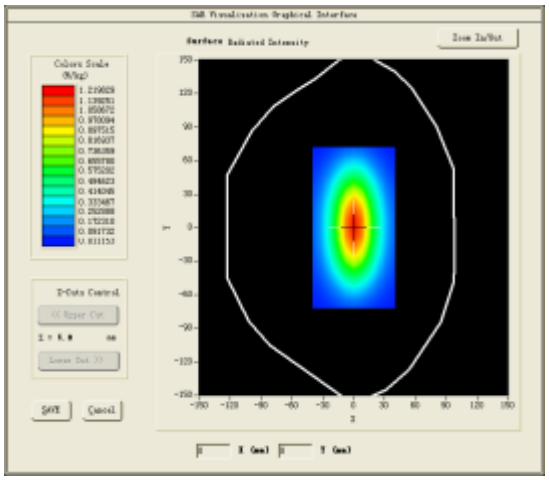
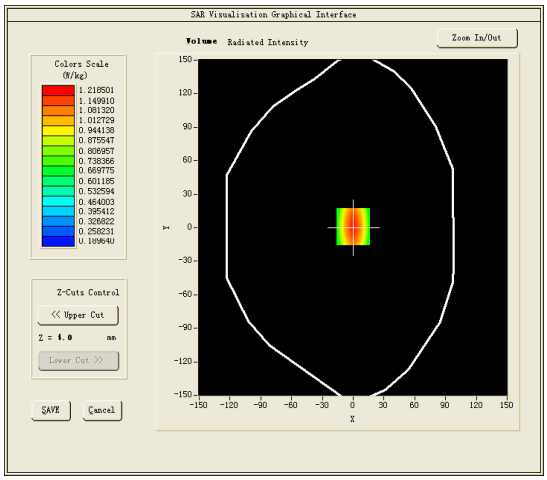
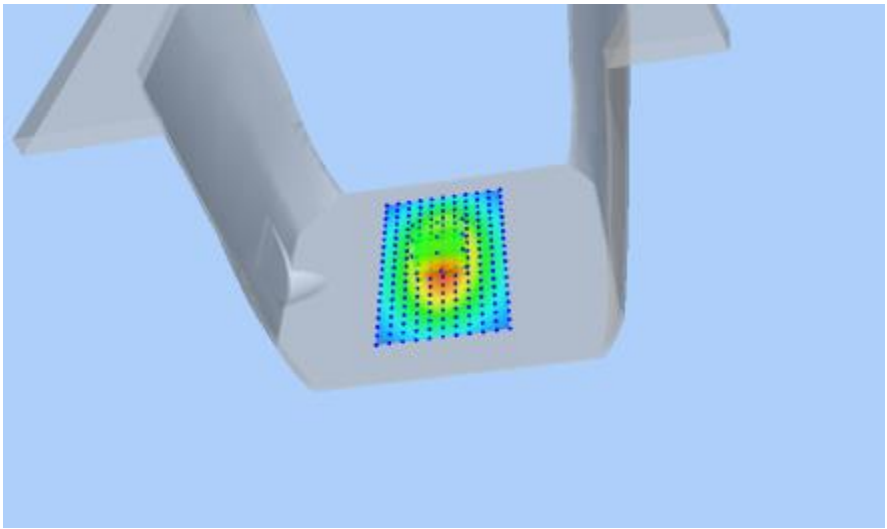
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4.4. Measurement Uncertainty (450MHz-6GHz)

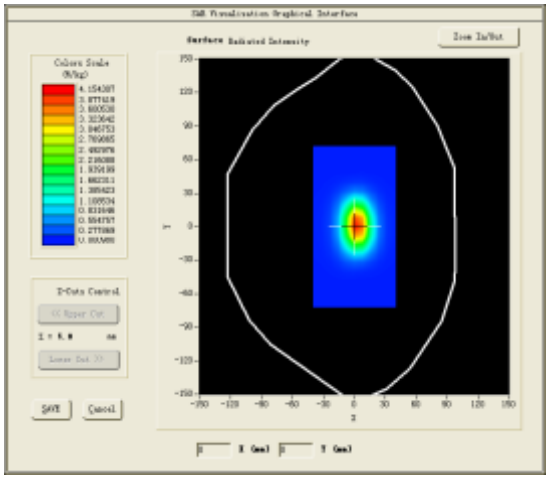
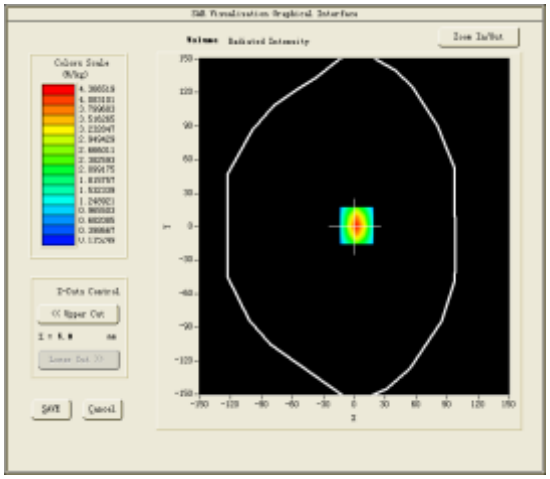
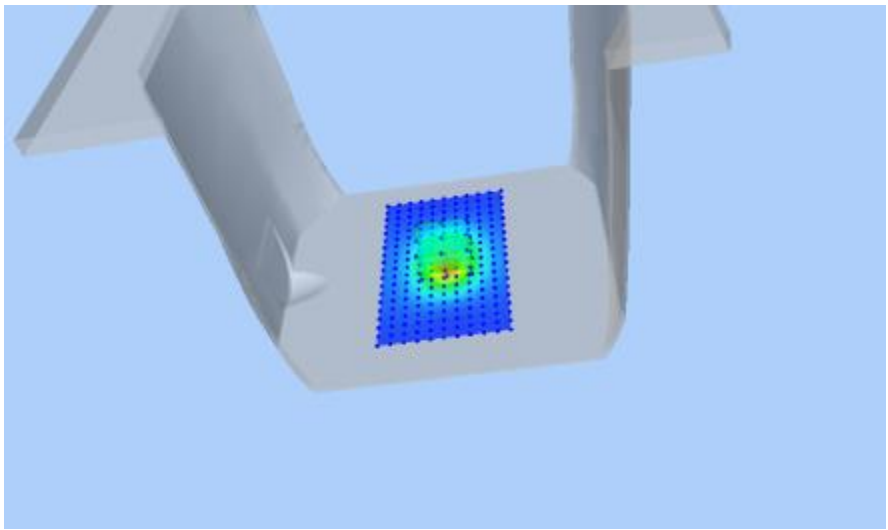
Uncertainty Component	Sec.	Tol (+-%)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System									
Probe calibration	7.2.1	5.8	N		1	1	5.80	5.80	∞
Axial Isotropy	7.2.1.1	3.5	R	√3	(1-Cp)^1/2	(1-Cp)^1/2	1.43	1.43	∞
Hemispherical Isotropy	7.2.1.1	5.9	R	√3	(Cp)^1/2	(Cp)^1/2	2.41	2.41	∞
Boundary effect	7.2.1.4	1.0	R	√3	1	1	0.58	0.58	∞
Linearity	7.2.1.2	4.7	R	√3	1	1	2.71	2.71	∞
System detection limits	7.2.1.2	1.0	R	√3	1	1	0.58	0.58	∞
Modulation response	7.2.1.3	3.00	N		1	1	3.00	3.00	∞
Readout Electronics	7.2.1.5	0.50	N		1	1	0.50	0.50	∞
Reponse Time	7.2.1.6	0.0	R	√3	1	1	0.00	0.00	∞
Integration Time	7.2.1.7	1.4	R	√3	1	1	0.81	0.81	∞
RF ambient Conditions - Noise	7.2.3.7	3.0	R	√3	1	1	1.73	1.73	∞
RF ambient Conditions - Reflections	7.2.3.7	3.0	R	√3	1	1	1.73	1.73	∞
Probe positioner Mechanical Tolerance	7.2.2.1	1.4	R	√3	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	7.2.2.3	1.40	R	√3	1	1	0.81	0.81	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	7.2.4	2.3	R	√3	1	1	1.33	1.33	∞
Test sample Related									
Test sample positioning	7.2.2.4.4	2.60	N		1	1	2.60	2.60	
Device Holder Uncertainty	7.2.2.4.2 7.2.2.4.3	3.00	N		1	1	3.00	3.00	
Output power Variation - SAR drift measurement	7.2.3.6	5.00	R	√3	1	1	2.89	2.89	∞
SAR scaling	7.2.5	2.00	R	√3	1	1	1.15	1.15	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	7.2.2.2	4.00	R	√3	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation (in permittivity and conductivity)	7.2.6	2.00	N		1	0.84	2.00	1.68	∞
Liquid conductivity (temperature uncertainty)	7.2.3.5	2.50	N		0.78	0.71	1.95	1.78	
Liquid conductivity - measurement uncertainty	7.2.3.3	4.00	N		0.23	0.26	0.92	1.04	
Liquid permittivity (temperature uncertainty)	7.2.3.5	2.50	N		0.78	0.71	1.95	1.78	∞
Liquid permittivity - measurement uncertainty	7.2.3.4	5.00	N		0.23	0.26	1.15	1.30	∞
Combined Standard Uncertainty			RSS				10.63	10.54	
Expanded Uncertainty (95% Confidence interval)			k				21.26	21.08	

4.5. System Check Results

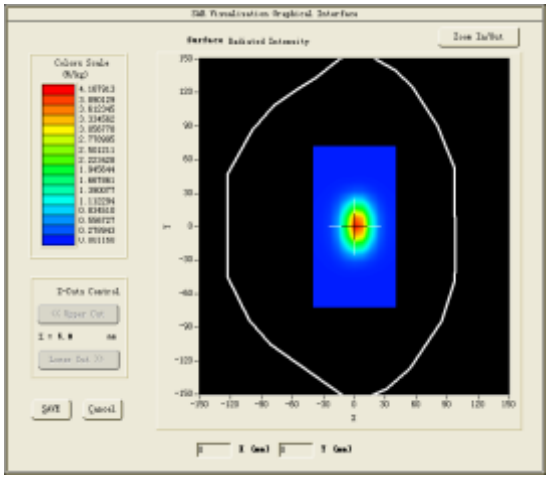
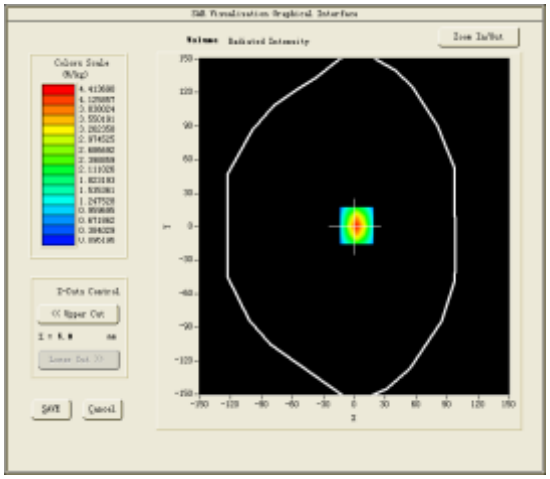
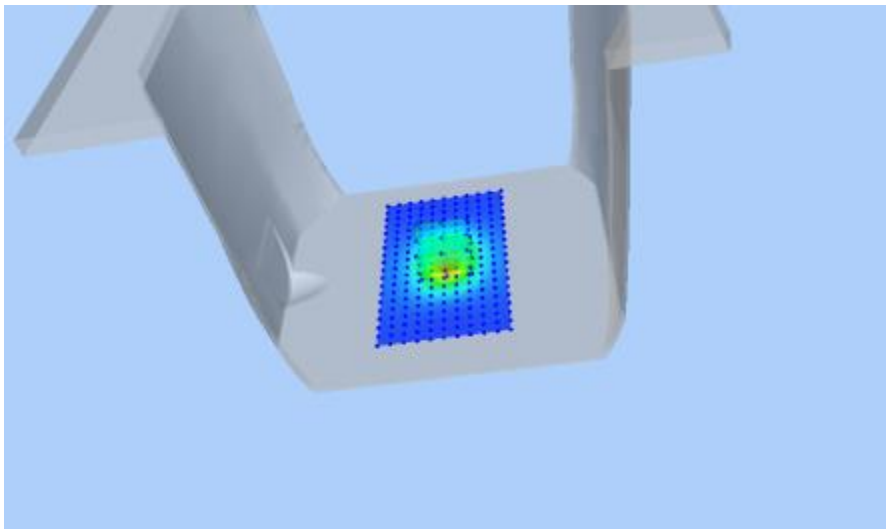
Test mode:900MHz
Product Description:Validation
Model:Dipole SID900
E-Field Probe: SSE2(SN 31/17 EPGO324)
Test Date: October 11, 2018

Medium(liquid type)	HSL_900
Frequency (MHz)	900.0000
Relative permittivity (real part)	42.58
Conductivity (S/m)	0.94
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.54
Variation (%)	0.440000
SAR 10g (W/Kg)	0.741279
SAR 1g (W/Kg)	1.154756
SURFACE SAR	**VOLUME SAR**
	
	

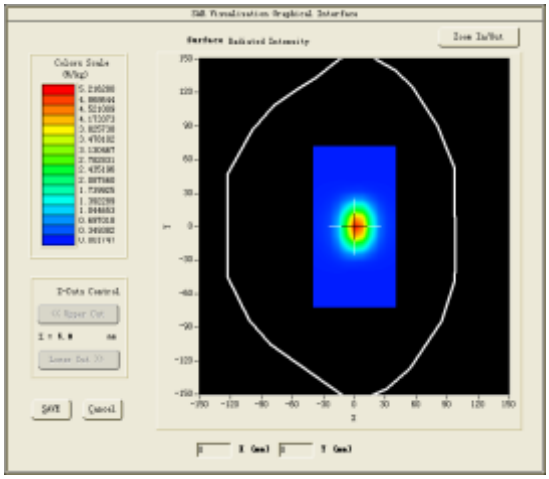
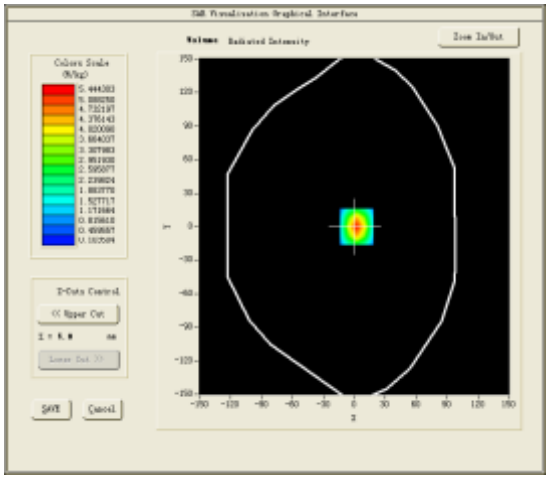
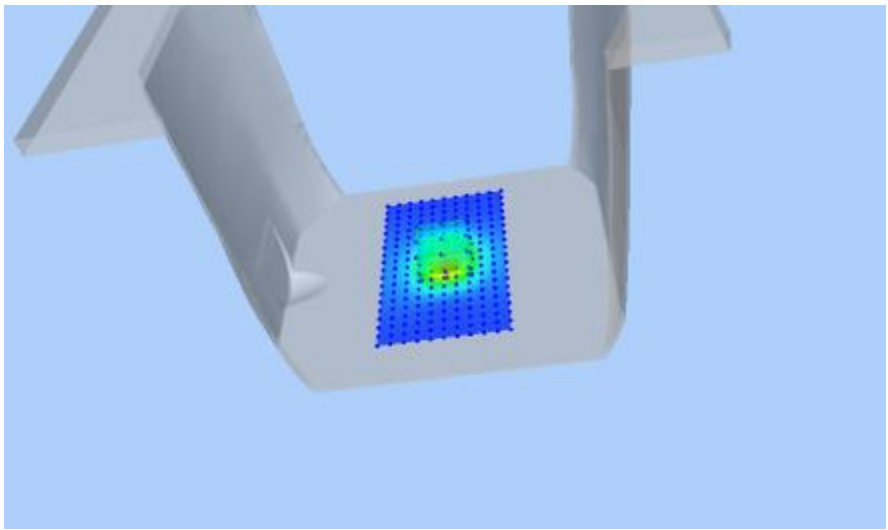
Test mode:1800MHz
Product Description:Validation
Model:Dipole SID1800
E-Field Probe: SSE2(SN 31/17 EPGO324)
Test Date: October 15, 2018

Medium(liquid type)	HSL_1800
Frequency (MHz)	1800.0000
Relative permittivity (real part)	40.64
Conductivity (S/m)	1.43
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.65
Variation (%)	-0.750000
SAR 10g (W/Kg)	1.859567
SAR 1g (W/Kg)	4.016495
SURFACE SAR	**VOLUME SAR**
	
	

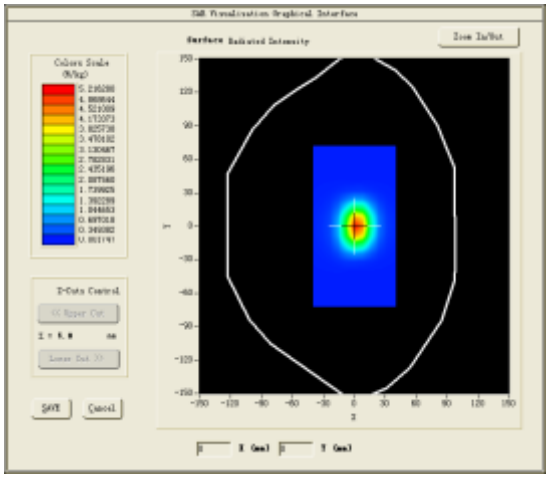
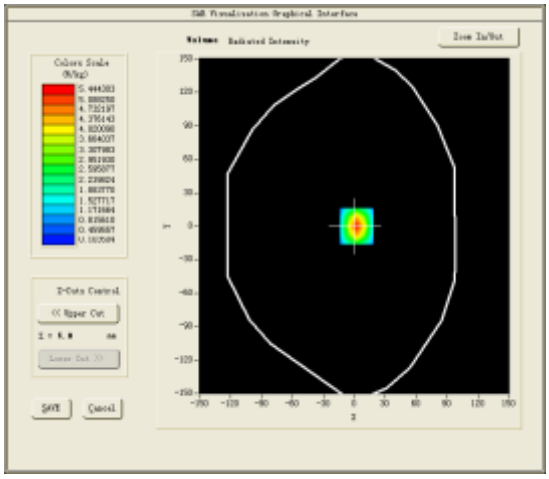
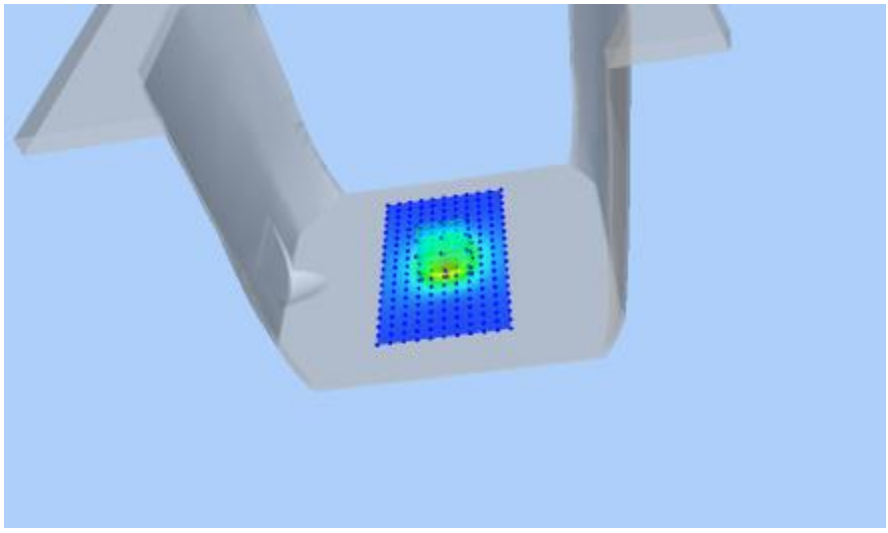
Test mode:2000MHz
Product Description:Validation
Model:Dipole SID2000
E-Field Probe: SSE2(SN 31/17 EPGO324)
Test Date: October 16, 2018

Medium(liquid type)	HSL_2000
Frequency (MHz)	2000.0000
Relative permittivity (real part)	39.17
Conductivity (S/m)	1.42
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.83
Variation (%)	-0.220000
SAR 10g (W/Kg)	1.931762
SAR 1g (W/Kg)	4.032543
SURFACE SAR	**VOLUME SAR**
	
	

Test mode:2450MHz
Product Description:Validation
Model:Dipole SID2450
E-Field Probe:SSE2(SN 31/17 EPGO324)
Test Date: October 25, 2018

Medium(liquid type)	HSL_2450
Frequency (MHz)	2450.0000
Relative permittivity (real part)	39.17
Conductivity (S/m)	1.78
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.91
Variation (%)	-0.160000
SAR 10g (W/Kg)	2.308919
SAR 1g (W/Kg)	4.946164
SURFACE SAR	**VOLUME SAR**
	
	

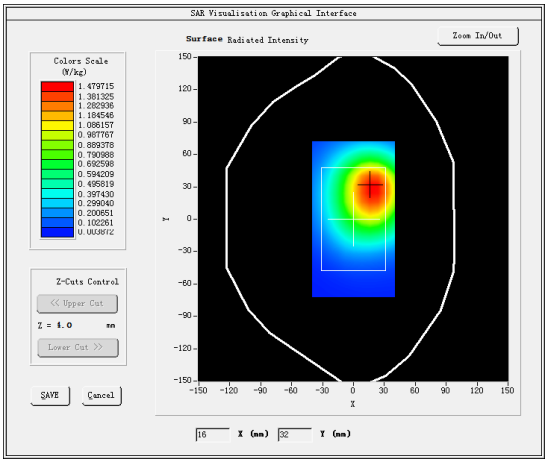
Test mode:2600MHz
Product Description:Validation
Model:Dipole SID2600
E-Field Probe:SSE2(SN 31/17 EPGO324)
Test Date: October 30, 2018

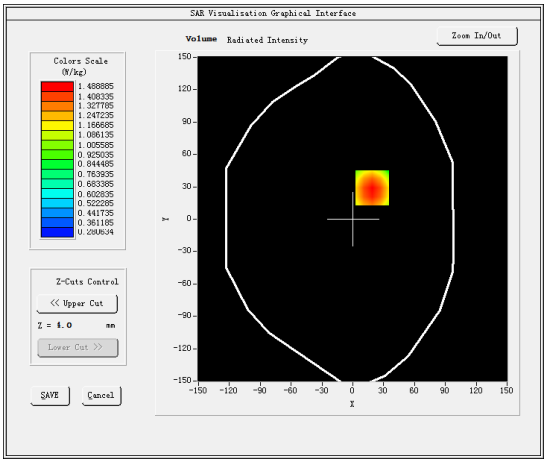
Medium(liquid type)	HSL_2600
Frequency (MHz)	2600.0000
Relative permittivity (real part)	38.35
Conductivity (S/m)	1.90
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.89
Variation (%)	3.570000
SAR 10g (W/Kg)	2.408561
SAR 1g (W/Kg)	5.619142
SURFACE SAR	**VOLUME SAR**
	
	

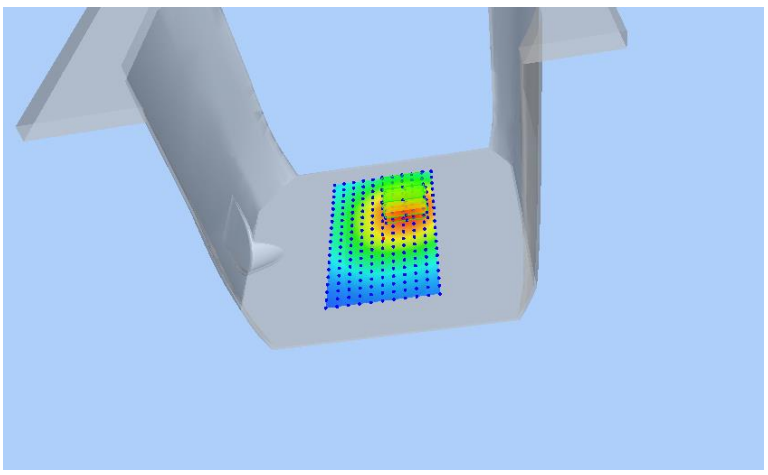
4.6. SAR Test Graph Results

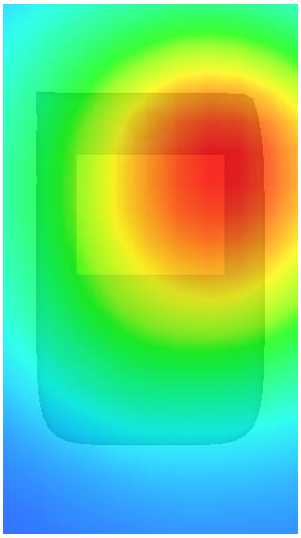
1 Test Mode:GPRS900MHz,Mid channel(Body-LCD Down)
Product Description:4G Mobile Router
Model:M6
Test Date: October 11, 2018

Medium(liquid type)	HSL_900
Frequency (MHz)	897.4000
Relative permittivity (real part)	42.58
Conductivity (S/m)	0.94
E-Field Probe	SN 31/17 EPGO324
Crest Factor	4.0
Conversion Factor	1.54
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.910000
SAR 10g (W/Kg)	1.128576
SAR 1g (W/Kg)	1.595303
SURFACE SAR	**VOLUME SAR**



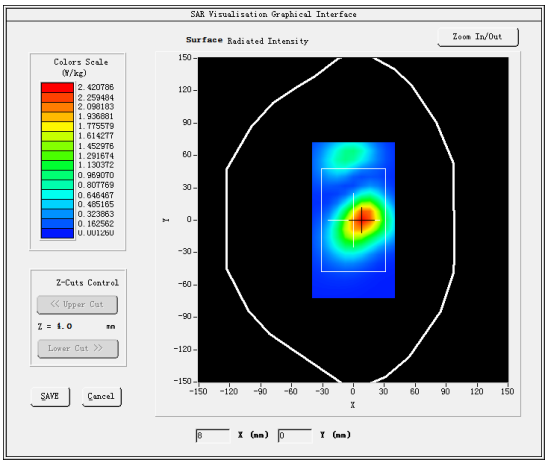


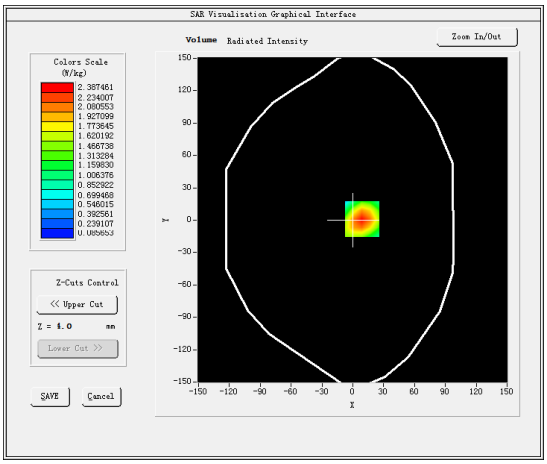


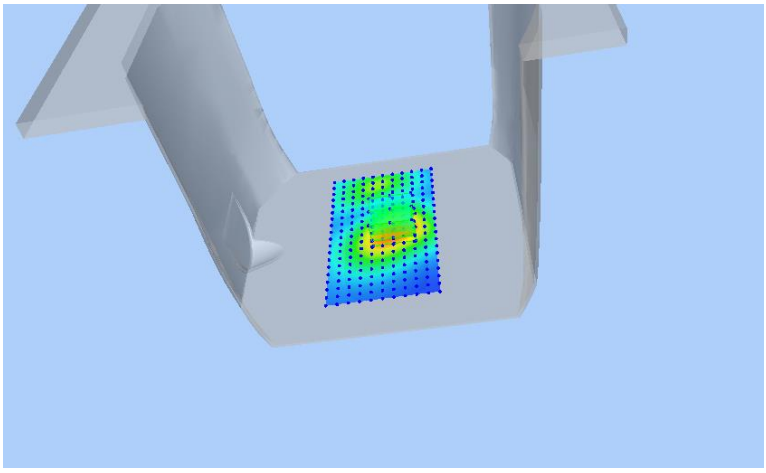


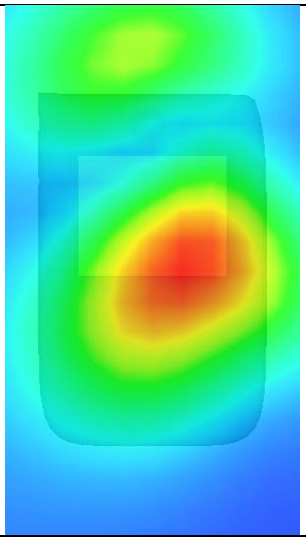
2 Test Mode:GPRS1800MHz,Mid channel(Body-LCD Down)
Product Description: 4G Mobile Router
Model:M6
Test Date: October 15, 2018

Medium(liquid type)	HSL_1800
Frequency (MHz)	1747.4000
Relative permittivity (real part)	40.64
Conductivity (S/m)	1.43
E-Field Probe	SN 31/17 EPGO324
Crest Factor	4.0
Conversion Factor	1.65
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.280000
SAR 10g (W/Kg)	1.413825
SAR 1g (W/Kg)	2.514225
SURFACE SAR	**VOLUME SAR**



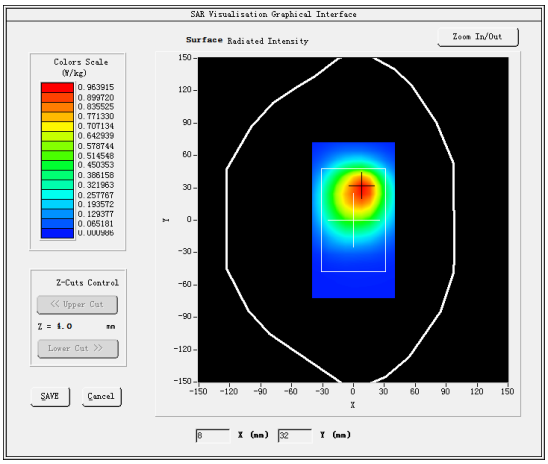


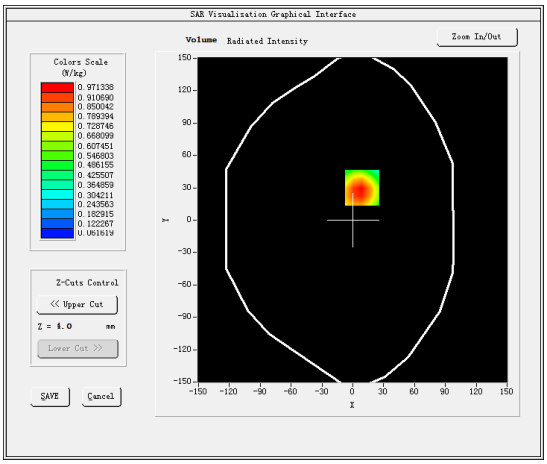


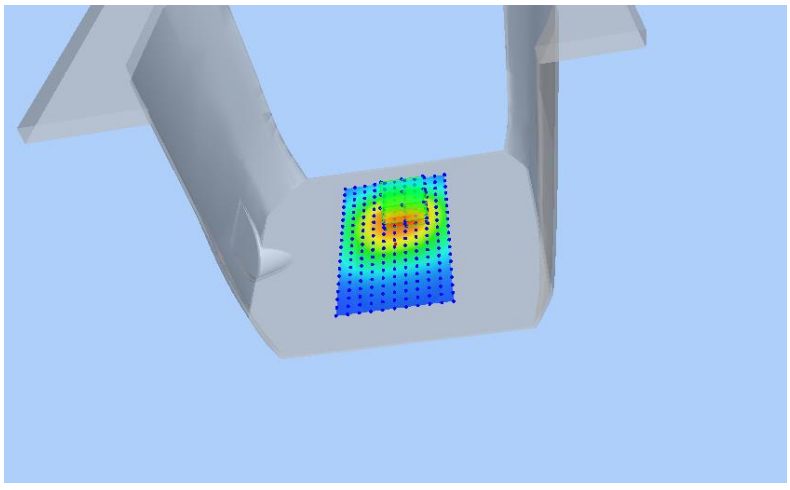


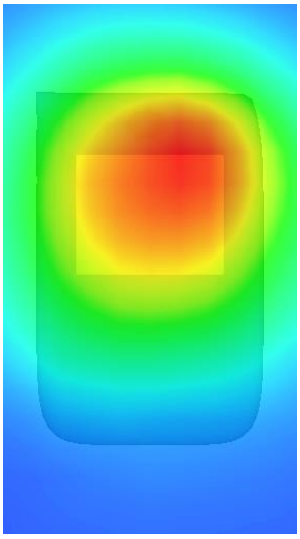
3 Test Mode:WCDMA900MHz,Mid channel(Body-LCD Up)
Product Description: 4G Mobile Router
Model: M6
Test Date: October 11, 2018

Medium(liquid type)	HSL_900
Frequency (MHz)	897.40000
Relative permittivity (real part)	42.58
Conductivity (S/m)	0.94
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.54
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.270000
SAR 10g (W/Kg)	0.618753
SAR 1g (W/Kg)	0.997923
SURFACE SAR	**VOLUME SAR**



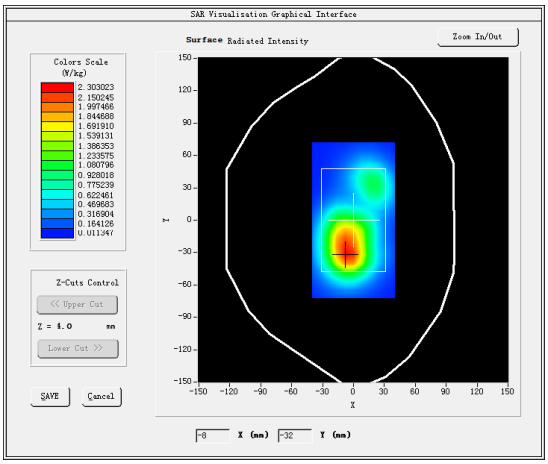


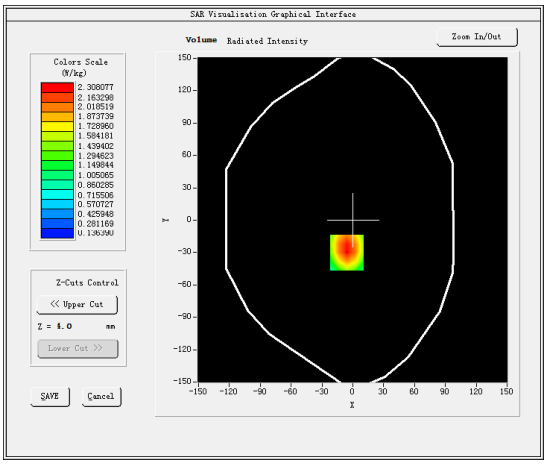


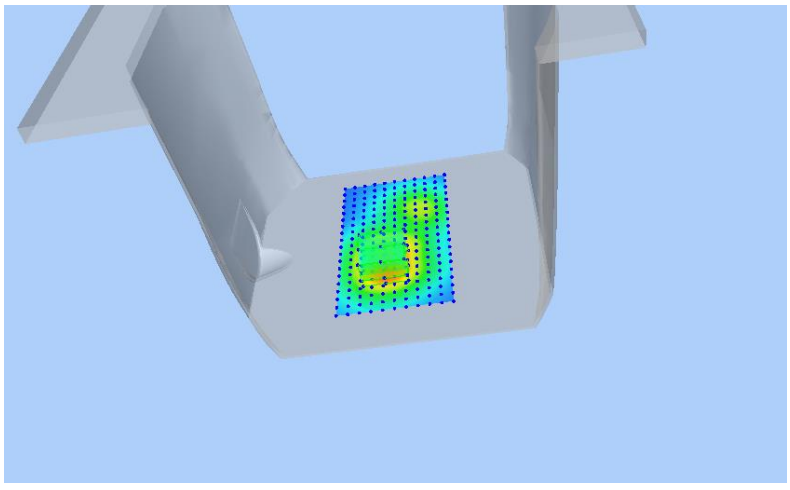


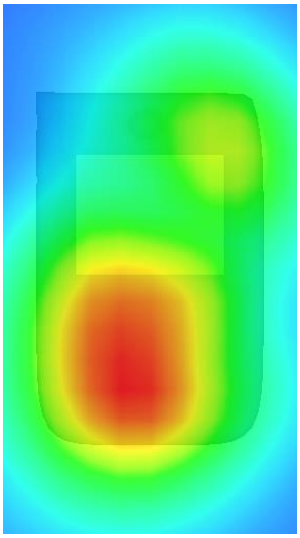
4 Test Mode:WCDMA2100MHz,Mid channel(Body-LCD Up)
Product Description: 4G Mobile Router
Model: M6
Test Date: October 16, 2018

Medium(liquid type)	BSL_2000
Frequency (MHz)	1950.0000
Relative permittivity (real part)	39.17
Conductivity (S/m)	1.42
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.83
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	1.210000
SAR 10g (W/Kg)	1.365650
SAR 1g (W/Kg)	2.393486
SURFACE SAR	**VOLUME SAR**



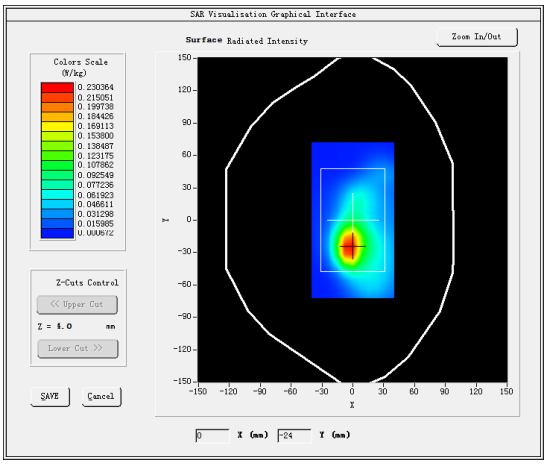


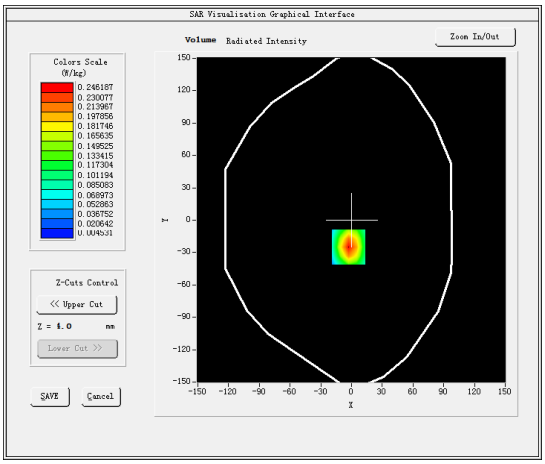


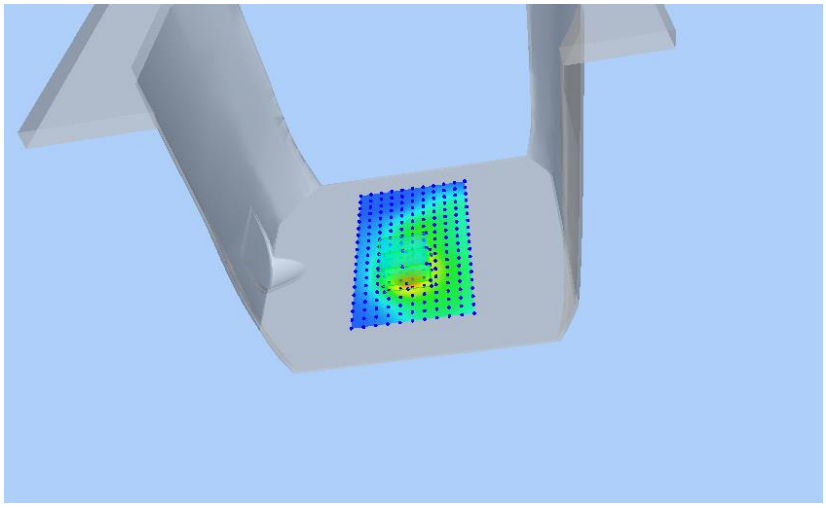


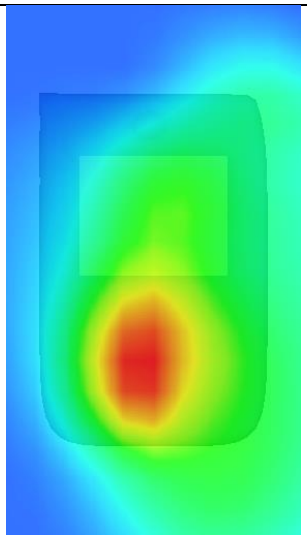
5 Test Mode:802.11B,Mid channel(Body-LCD Up)
Product Description:4G Mobile Router
Model:M6
Test Date: October 25, 2018

Medium(liquid type)	HSL_2450
Frequency (MHz)	2442.0000
Relative permittivity (real part)	38.35
Conductivity (S/m)	1.78
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.91
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.280000
SAR 10g (W/Kg)	0.119063
SAR 1g (W/Kg)	0.247681
SURFACE SAR	**VOLUME SAR**



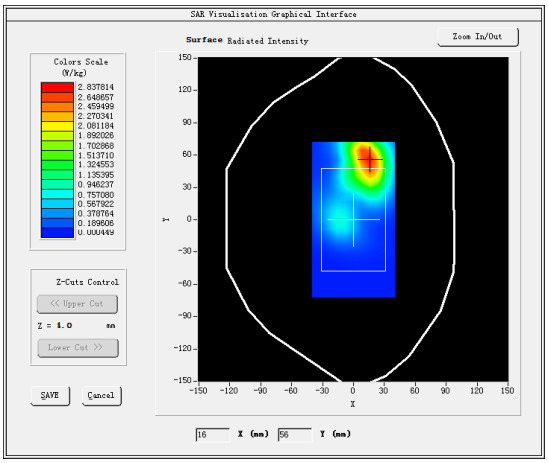


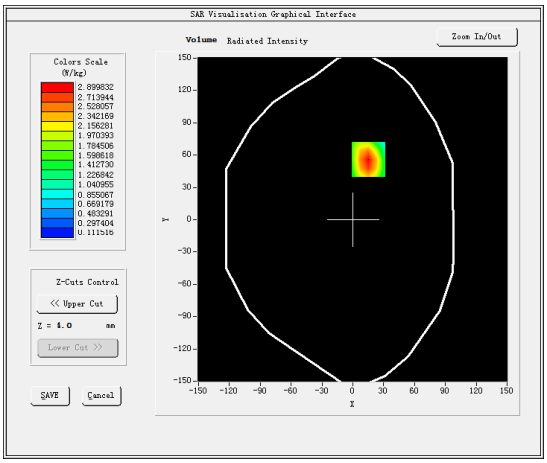


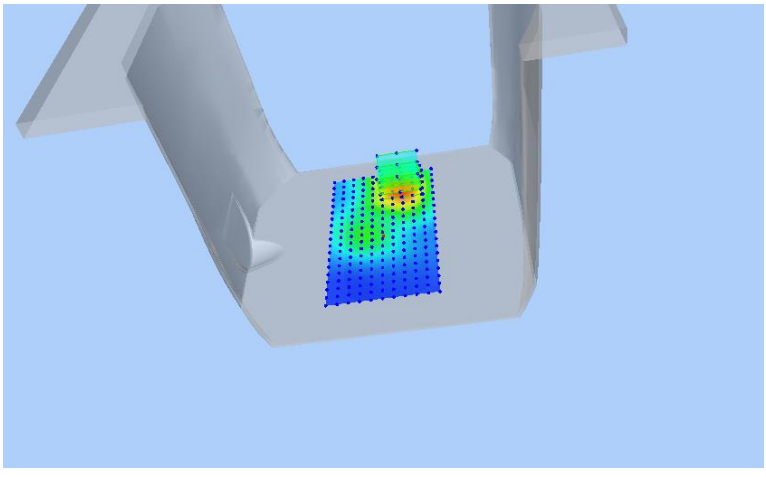


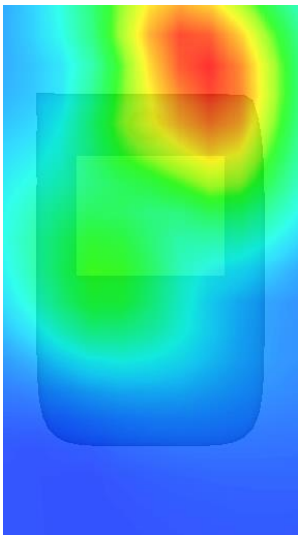
6 Test Mode:E-UTRA Band1,Mid channel(Body-LCD Up）
Product Description: 4G Mobile Router
Model:M6
Test Date: October 16, 2018

Medium(liquid type)	HSL_2000
Frequency (MHz)	1950.0000
Relative permittivity (real part)	39.17
Conductivity (S/m)	1.42
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.83
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.730000
SAR 10g (W/Kg)	1.599955
SAR 1g (W/Kg)	2.968364
SURFACE SAR	**VOLUME SAR**



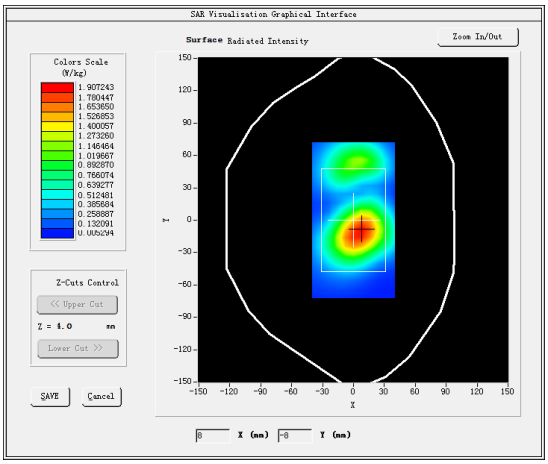


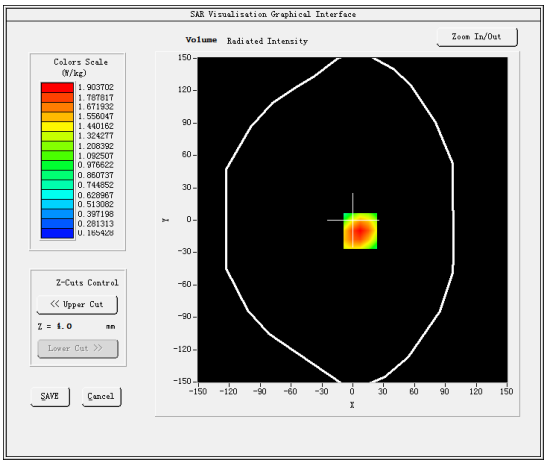


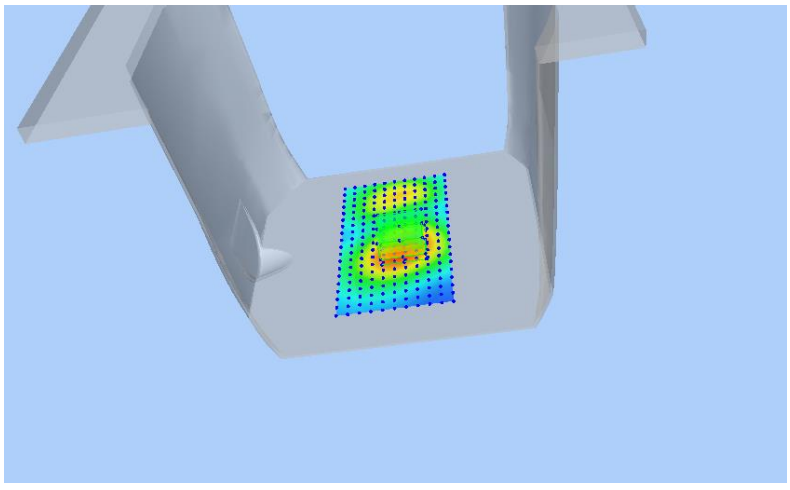


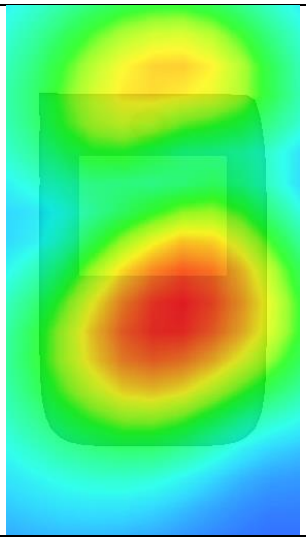
7 Test Mode: E-UTRA3,Mid channel(Body-LCD Down)
Product Description: 4G Mobile Router
Model:M6
Test Date: October 15, 2018

Medium(liquid type)	HSL_1800
Frequency (MHz)	1747.5000
Relative permittivity (real part)	40.64
Conductivity (S/m)	1.43
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.65
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.910000
SAR 10g (W/Kg)	1.280145
SAR 1g (W/Kg)	1.966291
SURFACE SAR	**VOLUME SAR**





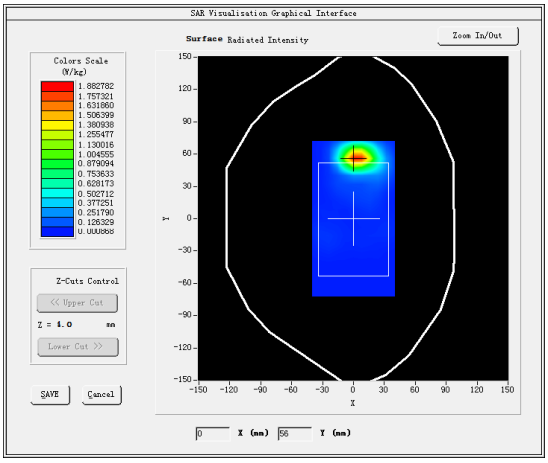


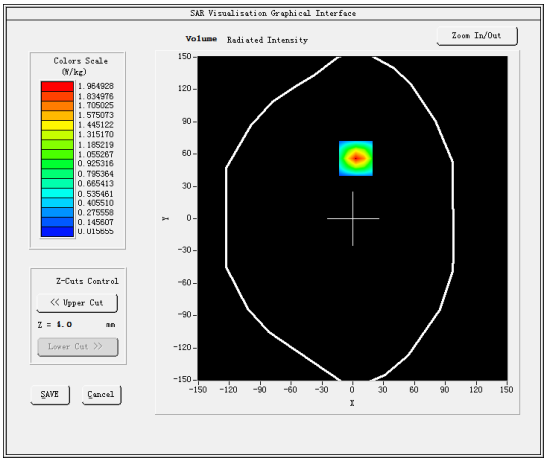


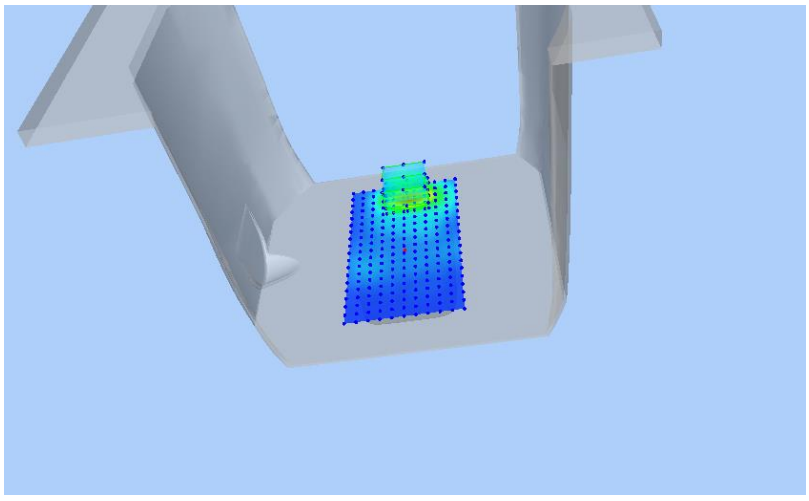
8 Test Mode: E-UTRA7,Middle channel(Body-LCD Down)
Product Description: 4G Mobile Router

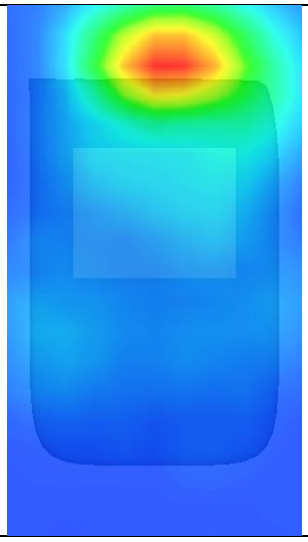
Model:M6
Test Date: October 30, 2018

Medium(liquid type)	HSL_2600
Frequency (MHz)	2535.0000
Relative permittivity (real part)	40.35
Conductivity (S/m)	1.90
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.89
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	1.210000
SAR 10g (W/Kg)	0.885338
SAR 1g (W/Kg)	1.919554
SURFACE SAR	**VOLUME SAR**



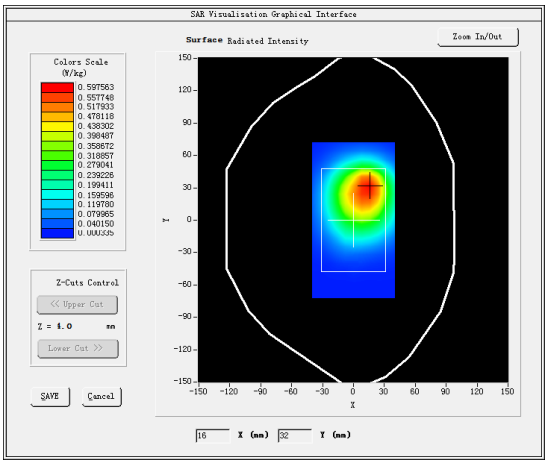


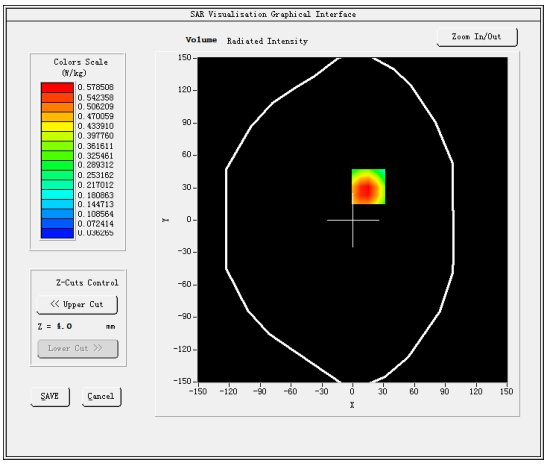


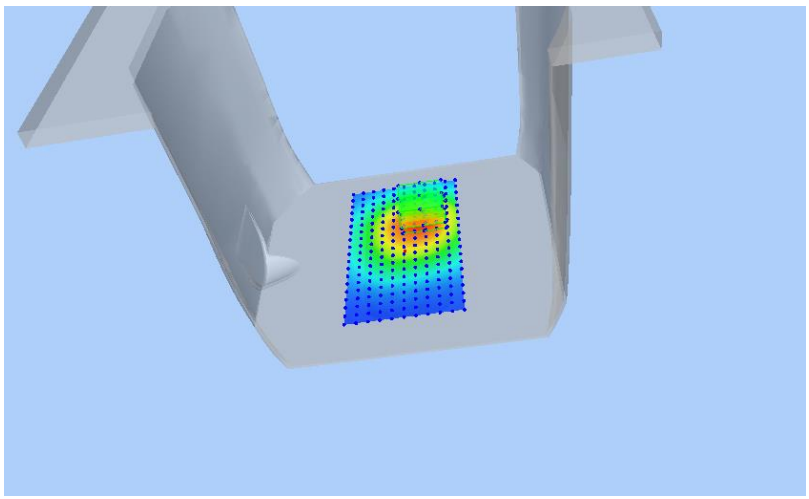


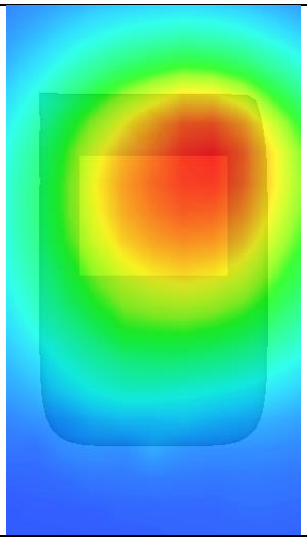
9 Test Mode: E-UTRA8,Middle channel(Body-LCD Up)
Product Description: 4G Mobile Router
Model: M6
Test Date: October 11, 2018

Medium(liquid type)	HSL_900
Frequency (MHz)	897.5000
Relative permittivity (real part)	42.58
Conductivity (S/m)	0.94
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.54
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.230000
SAR 10g (W/Kg)	0.388976
SAR 1g (W/Kg)	0.623107
SURFACE SAR	**VOLUME SAR**



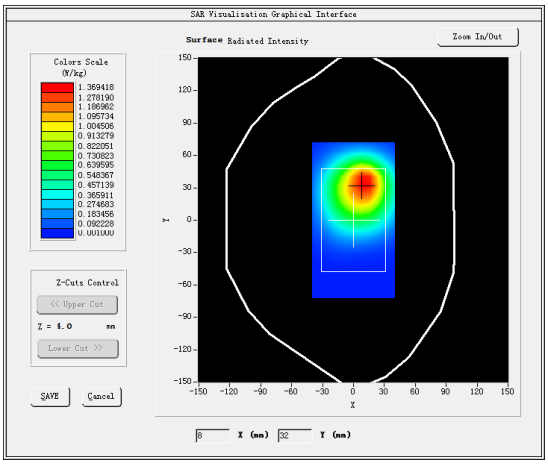


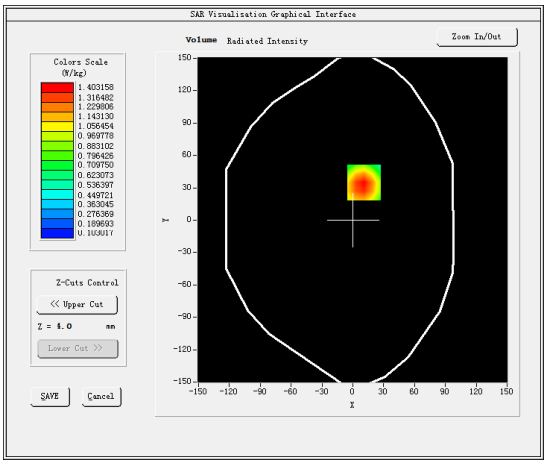


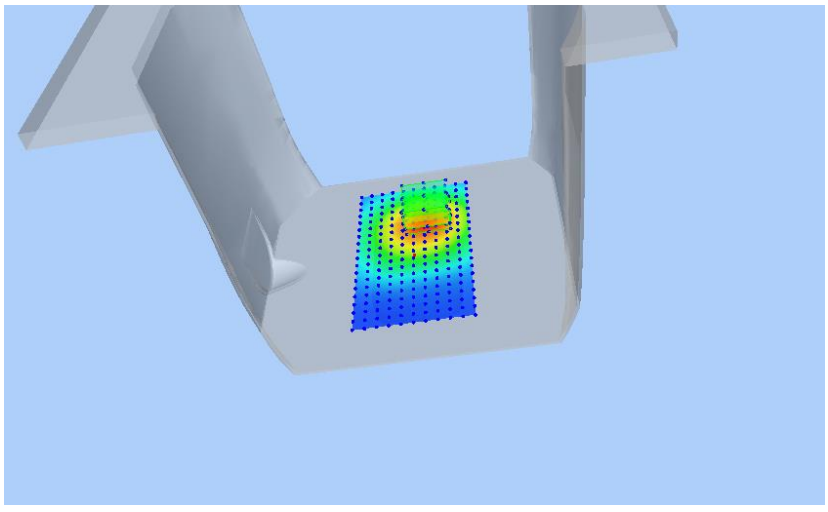


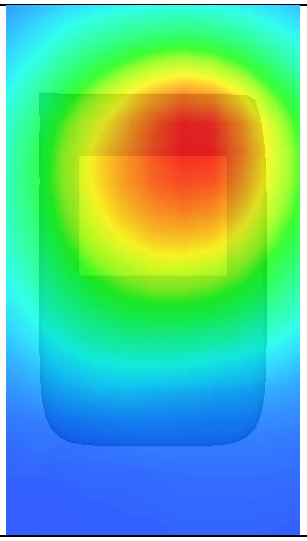
#10 Test Mode: E-UTRA20,Middle channel(Body-LCD Up)
Product Description: 4G Mobile Router
Model: M6
Test Date: October 11, 2018

Medium(liquid type)	HSL_900
Frequency (MHz)	847.0000
Relative permittivity (real part)	42.58
Conductivity (S/m)	0.94
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.54
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.440000
SAR 10g (W/Kg)	0.893668
SAR 1g (W/Kg)	1.428758
SURFACE SAR	**VOLUME SAR**



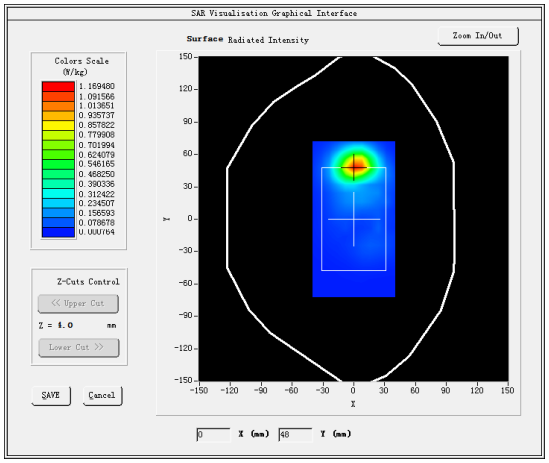


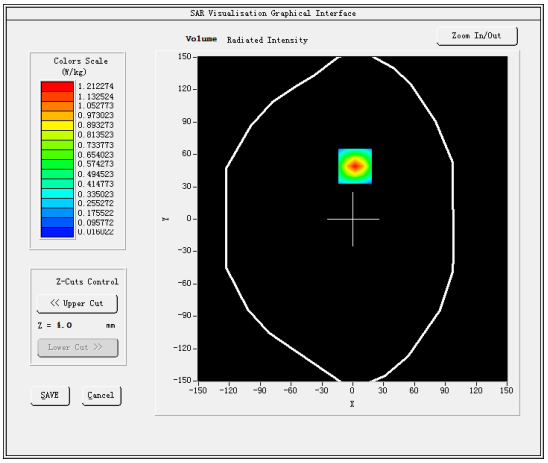


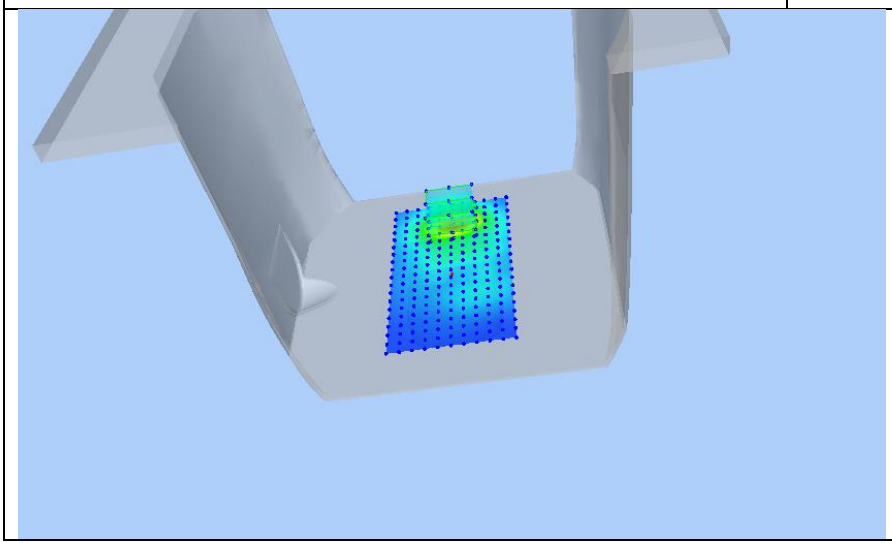


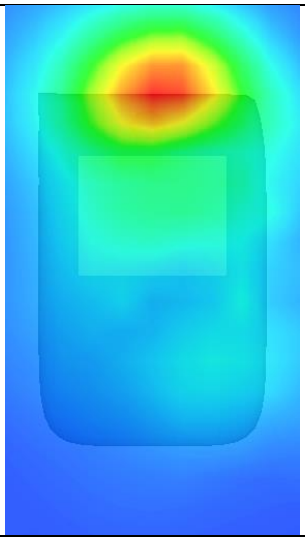
11 Test Mode: E-UTRA38, Mid channel(Body-LCD Down)
Product Description: 4G Mobile Router
Model:M6
Test Date: October 30, 2018

Medium(liquid type)	HSL_2600
Frequency (MHz)	2595.0000
Relative permittivity (real part)	40.35
Conductivity (S/m)	1.90
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.89
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.230000
SAR 10g (W/Kg)	0.570820
SAR 1g (W/Kg)	1.207398
SURFACE SAR	**VOLUME SAR**



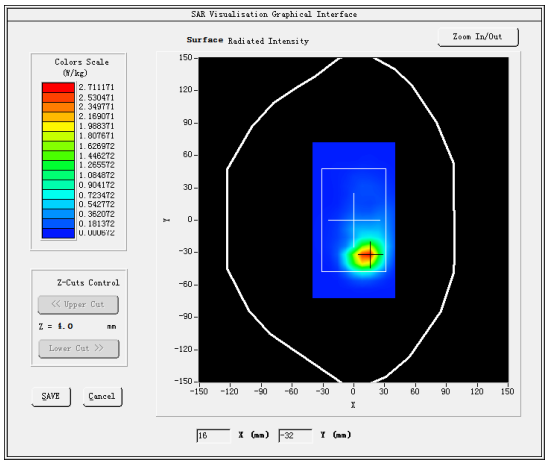


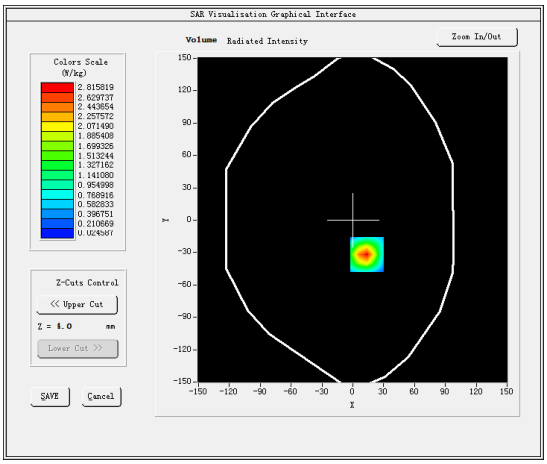


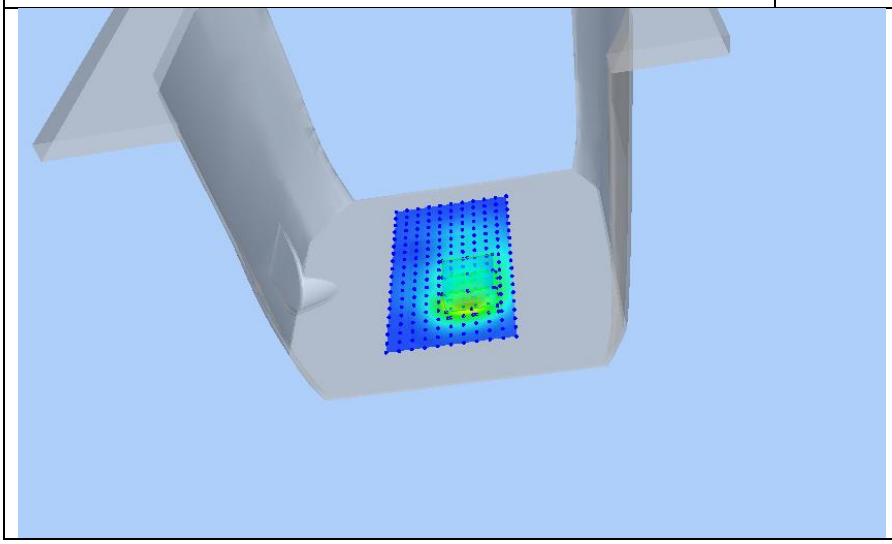


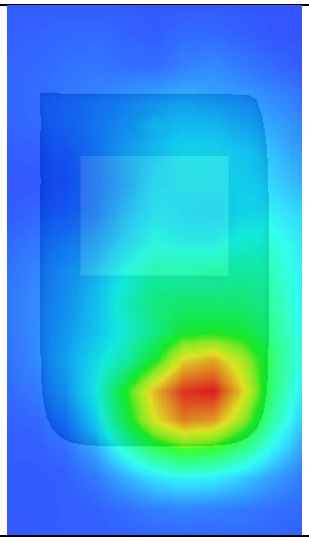
12 Test Mode: E-UTRA40,Mid channel(Body-LCD Down)
Product Description: 4G Mobile Router
Model:M6
Test Date: October 25, 2018

Medium(liquid type)	HSL_2450
Frequency (MHz)	2350.0000
Relative permittivity (real part)	38.85
Conductivity (S/m)	1.90
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.91
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.920000
SAR 10g (W/Kg)	1.269347
SAR 1g (W/Kg)	2.788211
SURFACE SAR	**VOLUME SAR**









5.CALIBRATION CERTIFICATE

SARTIMO Calibration Certificate-Extended Dipole Calibrations

According to KDB 450824 D02, Dipoles must be recalibrated at least once every three years; however, immediate re-calibration is required for following conditions. The test laboratory must ensure that the required supporting information and documentation have been included in the SAR report to qualify for extended 3-year calibration interval.

1) When the most recent return-loss, measured at least annually, deviates by more than 20% from theprevious measurement (i.e. 0.2 of the dB value) or not meeting the required -20 dB return-loss specification
2) When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, deviates by more than 5Ω from the previous measurement

Summary Result:

SID900			
Frquency	Return Loss(dB)	Requirement(dB)	Impedence
900	-23.55	-20	52.8Ω-5.4jΩ

SID1800			
Frquency	Return Loss(dB)	Requirement(dB)	Impedence
1800	-20.26	-20	43.1Ω+6.9jΩ

SID 2000			
Frquency	Return Loss(dB)	Requirement(dB)	Impedence
2000	-23.67	-20	50.8Ω-6.2jΩ

SID 2450			
Frquency	Return Loss(dB)	Requirement(dB)	Impedence
2450	-25.59	-20	44.7Ω-1.1jΩ

SID 2600			
Frquency	Return Loss(dB)	Requirement(dB)	Impedence
2600	-34.43	-20	50.5Ω+1.7jΩ

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5.1 Probe-EPGO324 Calibration Certificate

COMOSAR E-Field Probe Calibration Report

Ref : ACR.281.2.18.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: SN 31/17 EPGO324

Calibrated at MVG US

2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED Calibration CERT #2246-02

Calibration Date: 10/08/2018

Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed in MVG USA using the CALISAR / CALIBAIR test bench, for use with a COMOSAR system only. All calibration results are traceable to national metrology institutions.

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COMOSAR E-FIELD PROBE CALIBRATION REPORT Ref: ACR.281.2.18.SATU.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme LUC	Product Manager	10/8/2018	
Checked by :	Jérôme LUC	Product Manager	10/8/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/8/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	*Date*	*Modifications*
A	10/8/2018	Initial release

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1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	SN 31/17 EPGO324
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.189 MΩ Dipole 2: R2=0.203 MΩ Dipole 3: R3=0.218 MΩ

A yearly calibration interval is recommended.

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

MVG's COMOSAR E field Probes are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards.



Figure 1 – *MVG COMOSAR Dosimetric E field Dipole*

Probe Length	330 mm
Length of Individual Dipoles	2 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.5 mm
Distance between dipoles / probe extremity	1 mm

3 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their affect. All calibrations / measurements performed meet the fore mentioned standards.

3.1 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01W/kg to 100W/kg.

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3.2 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards.

3.3 LOWER DETECTION LIMIT

The lower detection limit was assessed using the same measurement set up as used for the linearity measurement. The required lower detection limit is 10 mW/kg.

3.4 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 - 360 degrees in 15 degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

3.5 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty associated with an E-field probe calibration using the waveguide technique. All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

Uncertainty analysis of the probe calibration in waveguide					
ERROR SOURCES	**Uncertainty value (%)**	**Probability Distribution**	**Divisor**	**ci**	**Standard Uncertainty (%)**
Incident or forward power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Reflected power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Liquid conductivity	5.00%	Rectangular	$\sqrt{3}$	1	2.887%
Liquid permittivity	4.00%	Rectangular	$\sqrt{3}$	1	2.309%
Field homogeneity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Field probe positioning	5.00%	Rectangular	$\sqrt{3}$	1	2.887%

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Field probe linearity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Combined standard uncertainty					5.831%
Expanded uncertainty 95 % confidence level k = 2					12.0%

5 CALIBRATION MEASUREMENT RESULTS

Calibration Parameters	
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

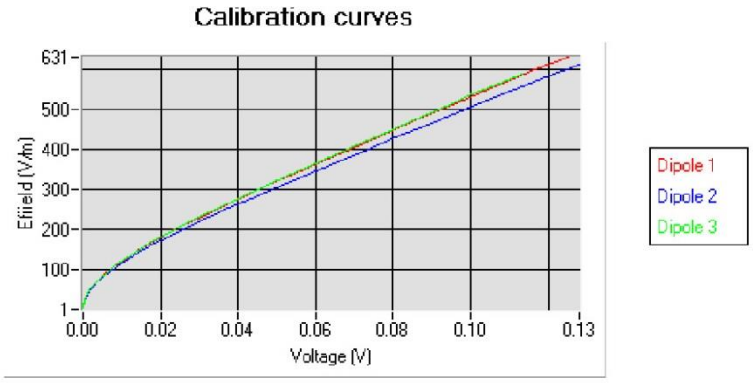
5.1 SENSITIVITY IN AIR

Normx dipole 1 (μV/(V/m)²)	Normy dipole 2 (μV/(V/m)²)	Normz dipole 3 (μV/(V/m)²)
0.80	0.83	0.68

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
95	90	93

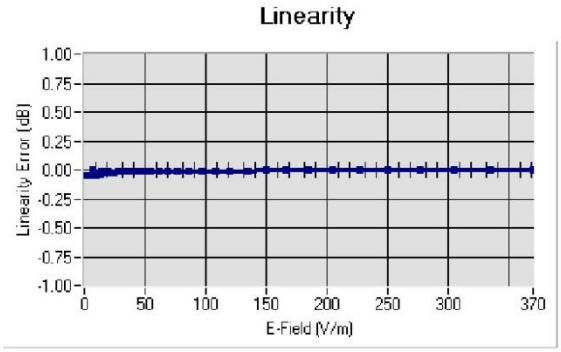
Calibration curves ei=f(V) (i=1,2,3) allow to obtain H-field value using the formula:

$$E = \sqrt{E_1^{\,2} + E_2^{\,2} + E_3^{\,2}}$$



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5.2 LINEARITY



Linearity:±1.13% (+/-0.05dB)

5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL450	450	42.17	0.86	1.56
BL450	450	57.65	0.95	1.60
HL750	750	40.03	0.93	1.45
BL750	750	56.83	1.00	1.50
HL850	835	42.19	0.90	1.55
BL850	835	54.67	1.01	1.59
HL900	900	42.08	1.01	1.54
BL900	900	55.25	1.08	1.60
HL1800	1800	41.68	1.46	1.65
BL1800	1800	53.86	1.46	1.68
HL1900	1900	38.45	1.45	1.86
BL1900	1900	53.32	1.56	1.93
HL2000	2000	38.26	1.38	1.83
BL2000	2000	52.70	1.51	1.89
HL2300	2300	39.44	1.62	1.95
BL2300	2300	54.52	1.77	2.01
HL2450	2450	37.50	1.80	1.91
BL2450	2450	53.22	1.89	1.95
HL2600	2600	39.80	1.99	1.89
BL2600	2600	52.52	2.23	1.94
HL5200	5200	35.64	4.67	1.50
BL5200	5200	48.64	5.51	1.56
HL5400	5400	36.44	4.87	1.44
BL5400	5400	46.52	5.77	1.47
HL5600	5600	36.66	5.17	1.48
BL5600	5600	46.79	5.77	1.53
HL5800	5800	35.31	5.31	1.50
BL5800	5800	47.04	6.10	1.55

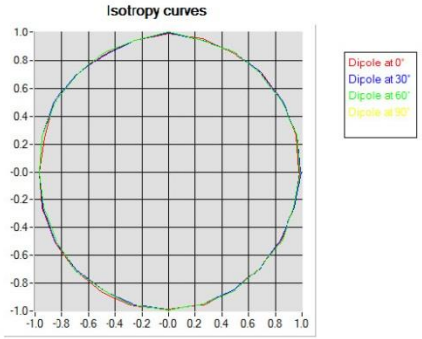
LOWER DETECTION LIMIT: 9mW/kg

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5.4 ISOTROPY

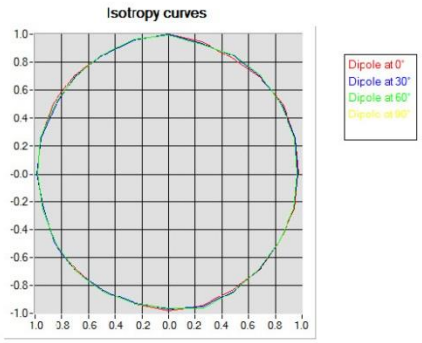
HL900 MHz

- Axial isotropy: 0.05 dB
- Hemispherical isotropy: 0.07 dB



HL1800 MHz

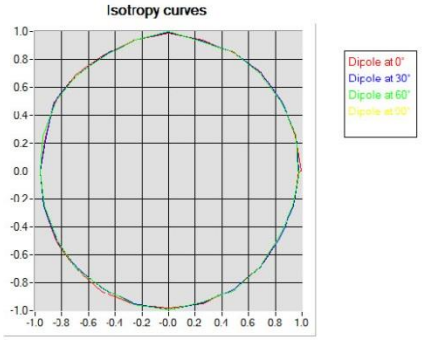
- Axial isotropy: 0.06 dB
- Hemispherical isotropy: 0.07 dB



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HL5600 MHz

- Axial isotropy: 0.06 dB
- Hemispherical isotropy: 0.10 dB



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6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
Flat Phantom	MVG	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Reference Probe	MVG	EP 94 SN 37/08	10/2017	10/2019
Multimeter	Keithley 2000	1188656	01/2017	01/2020
Signal Generator	Agilent E4438C	MY49070581	01/2017	01/2020
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	01/2017	01/2020
Power Sensor	HP ECP-E26A	US37181460	01/2017	01/2020
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Waveguide	Mega Industries	069Y7-158-13-712	Validated. No cal required.	Validated. No cal required.
Waveguide Transition	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Waveguide Termination	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Control Company	150798832	11/2017	11/2020

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5.2 SID900 Dipole Calibration Ceriticate

SAR Reference Dipole Calibration Report

Ref : ACR.287.5.14.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 900 MHZ

SERIAL NO.: SN 07/14 DIP 0G900-300

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

10/01/2018

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/14/2018	
Checked by :	Jérôme LUC	Product Manager	10/14/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/14/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	10/14/2018	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 900 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID900
Serial Number	SN 07/14 DIP 0G900-300
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *Satimo COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constucted as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

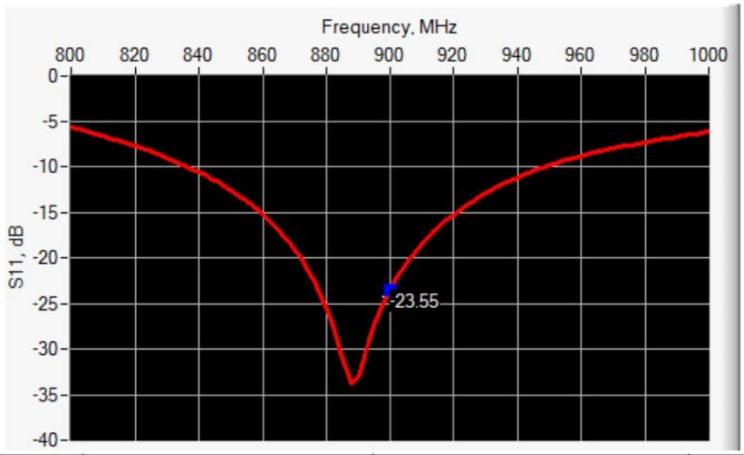
The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
900	-23.55	-20	52.8 Ω - 5.4 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.	PASS	83.3 ±1 %.	PASS	3.6 ±1 %.	PASS
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %	PASS	0.97 ±5 %	PASS
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	
1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 42.5 sigma : 0.96
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm

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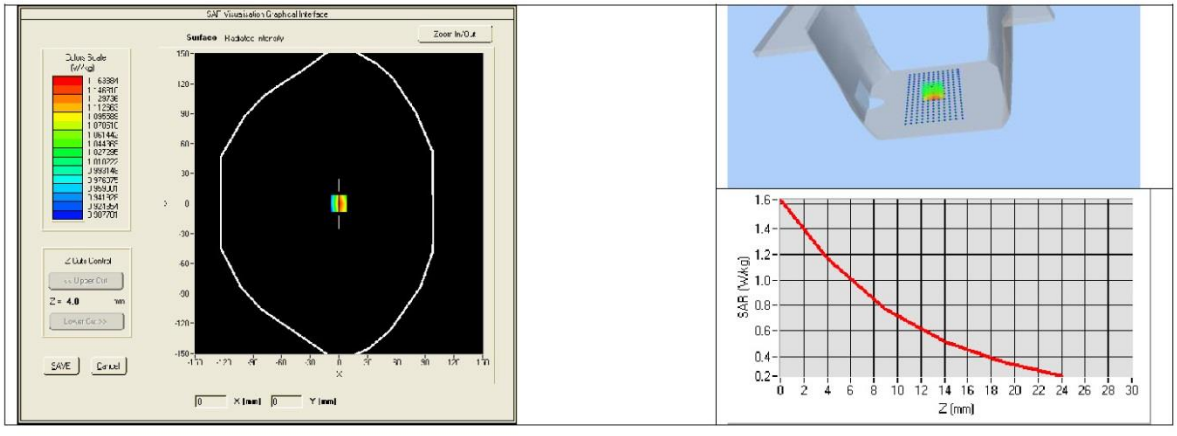
SATIMO

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.5.14.SATU.A

Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	900 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9	11.12 (1.11)	6.99	7.01 (0.70)
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %	PASS	1.05 ±5 %	PASS
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %		1.52 ±5 %	
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %		1.52 ±5 %	
2100	53.2 ±5 %		1.62 ±5 %	
2450	52.7 ±5 %		1.95 ±5 %	
2600	52.5 ±5 %		2.16 ±5 %	
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

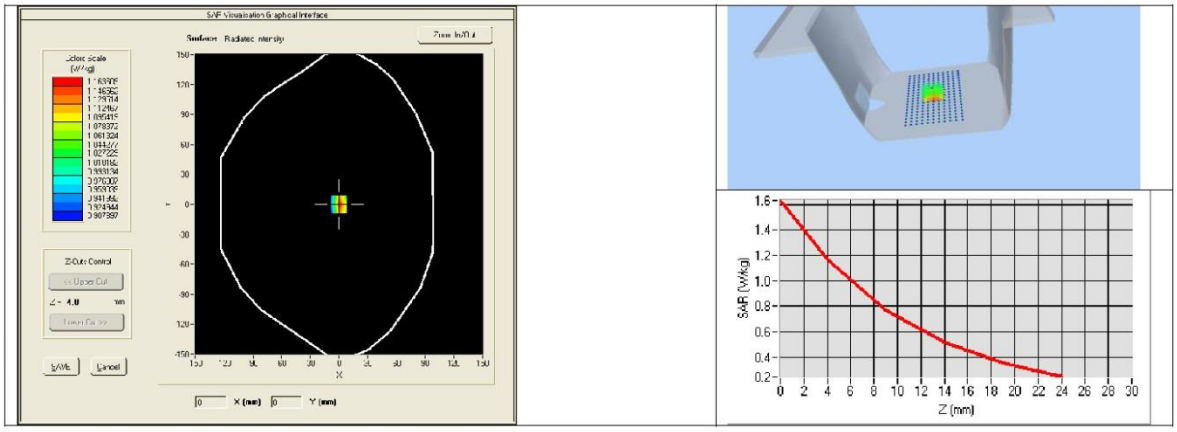
Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 56.7 sigma : 1.08
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	900 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.5.14.SATU.A

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
900	11.34 (1.13)	7.15 (0.72)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	Satimo	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Calipers	Carrera	CALIPER-01	12/2016	12/2019
Reference Probe	Satimo	EPG122 SN 18/11	10/2018	10/2019
Multimeter	Keithley 2000	1188656	12/2016	12/2019
Signal Generator	Agilent E4438C	MY49070581	12/2016	12/2019
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2016	12/2019
Power Sensor	HP ECP-E26A	US37181460	12/2016	12/2019
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	8/2016	8/2019

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5.3 SID1800 Dipole Calibration Certificate

SAR Reference Dipole Calibration Report

Ref : ACR.287.6.14.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 1800 MHZ

SERIAL NO.: SN 07/14 DIP 1G800-301

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

10/01/2018

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

SATIMO

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.6.14.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/14/2018	
Checked by :	Jérôme LUC	Product Manager	10/14/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/14/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	10/14/2018	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 1800 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID1800
Serial Number	SN 07/14 DIP 1G800-301
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *Satimo COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constucted as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

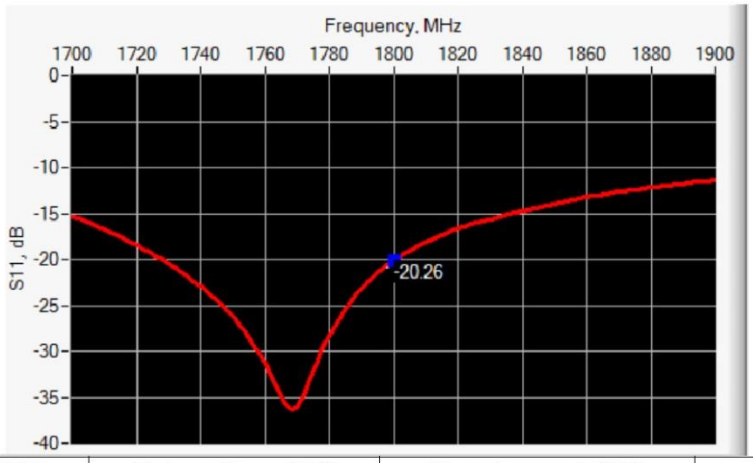
The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1800	-20.26	-20	43.1 Ω + 6.9 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.	PASS	41.7 ±1 %.	PASS	3.6 ±1 %.	PASS
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	
1800	40.0 ±5 %	PASS	1.40 ±5 %	PASS
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 41.3 sigma : 1.38
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm

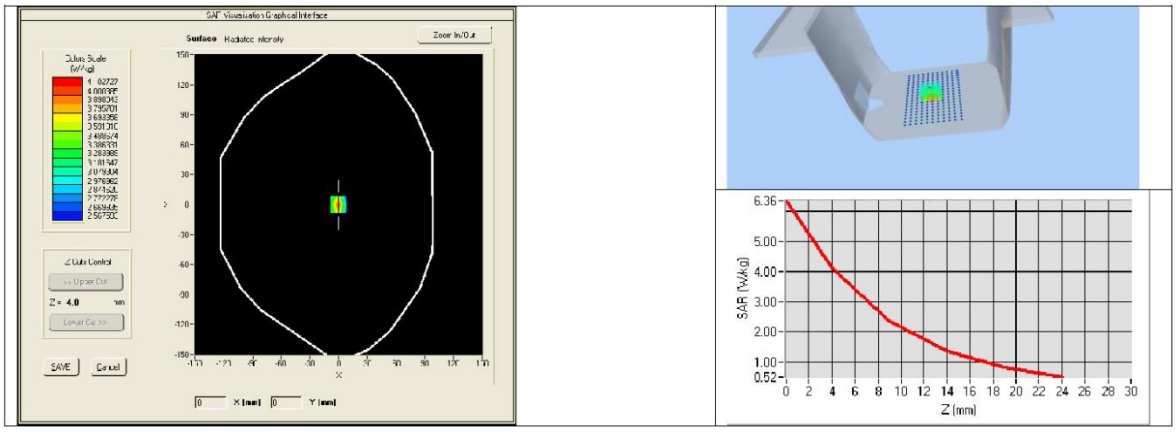
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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.6.14.SATU.A

Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	1800 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4	38.13 (3.81)	20.1	20.20 (2.02)
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %	PASS	1.52 ±5 %	PASS
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %		1.52 ±5 %	
2100	53.2 ±5 %		1.62 ±5 %	
2450	52.7 ±5 %		1.95 ±5 %	
2600	52.5 ±5 %		2.16 ±5 %	
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

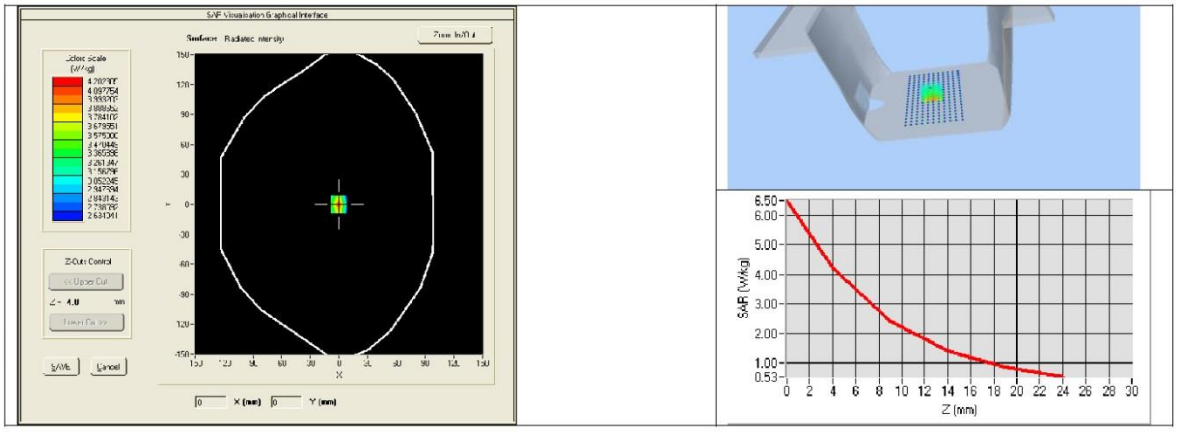
Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 53.3 sigma : 1.51
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	1800 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.6.14.SATU.A

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
1800	39.03 (3.90)	20.65 (2.07)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	Satimo	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Calipers	Carrera	CALIPER-01	12/2016	12/2019
Reference Probe	Satimo	EPG122 SN 18/11	10/2018	10/2019
Multimeter	Keithley 2000	1188656	12/2016	12/2019
Signal Generator	Agilent E4438C	MY49070581	12/2016	12/2019
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2016	12/2019
Power Sensor	HP ECP-E26A	US37181460	12/2016	12/2019
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	8/2016	8/2019

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5.4 SID2000 Dipole Calibration Ceriticate

SAR Reference Dipole Calibration Report

Ref : ACR.287.7.14.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 2000 MHZ

SERIAL NO.: SN 07/14 DIP 2G000-305

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED Calibration CERT #2246-02

10/01/2018

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

SATIMO

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.7.14.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/14/2018	
Checked by :	Jérôme LUC	Product Manager	10/14/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/14/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	10/14/2018	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2000 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID2000
Serial Number	SN 07/14 DIP 2G000-305
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *Satimo COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constucted as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

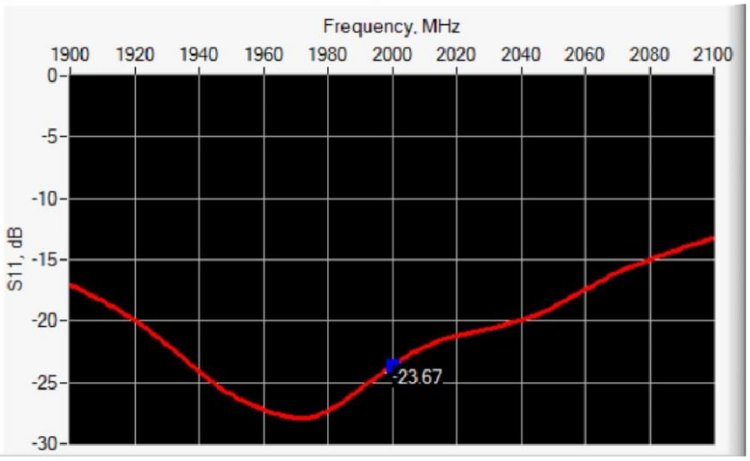
The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2000	-23.67	-20	50.8 Ω - 6.2 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.	PASS	37.5 ±1 %.	PASS	3.6 ±1 %.	PASS
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	
1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %	PASS	1.40 ±5 %	PASS
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

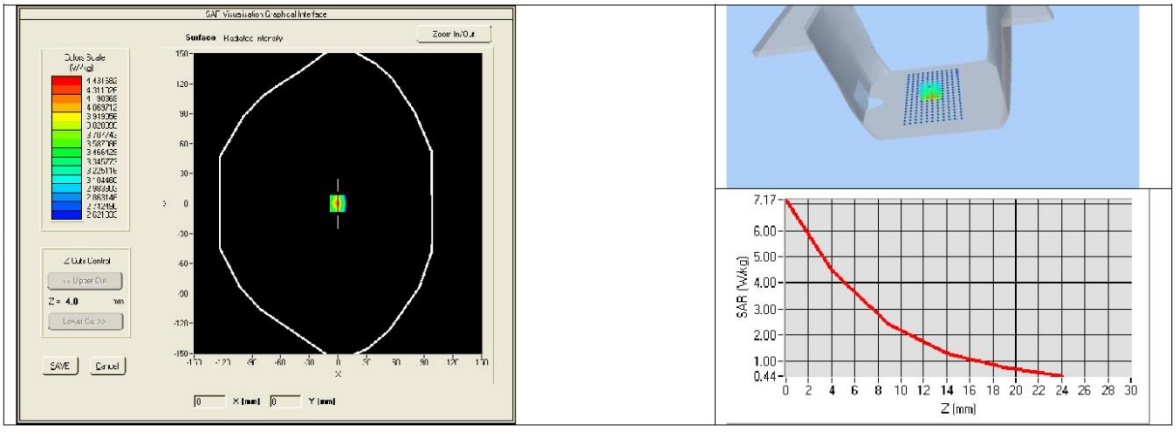
Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 39.7 sigma : 1.43
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm

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SAR REFERENCE DIPOLE CALIBRATION REPORT Ref: ACR.287.7.14.SATU.A

Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	2000 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1	43.00 (4.30)	21.1	21.20 (2.12)
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %		1.52 ±5 %	
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %	PASS	1.52 ±5 %	PASS
2100	53.2 ±5 %		1.62 ±5 %	
2450	52.7 ±5 %		1.95 ±5 %	
2600	52.5 ±5 %		2.16 ±5 %	
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

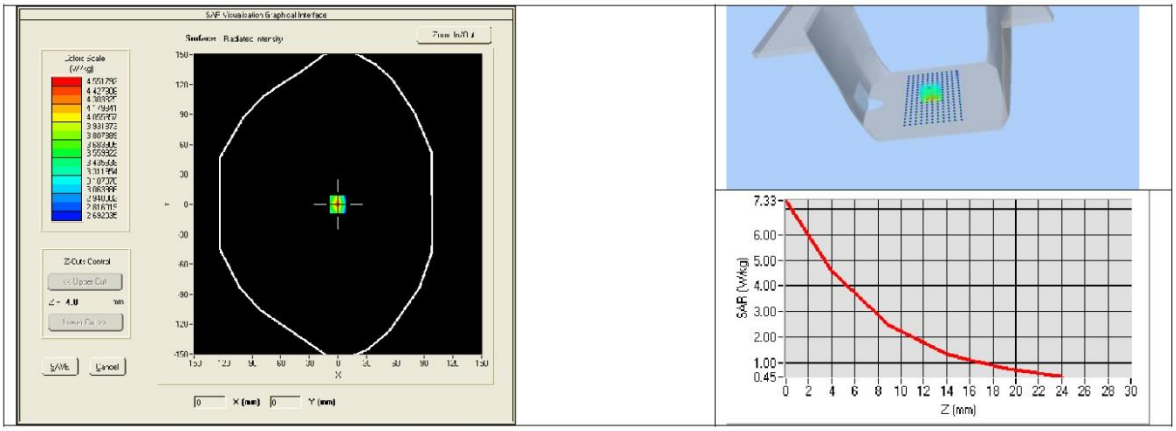
Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 53.9 sigma : 1.53
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	2000 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.7.14.SATU.A

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
2000	45.84 (4.58)	22.30 (2.23)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	Satimo	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Calipers	Carrera	CALIPER-01	12/2016	12/2019
Reference Probe	Satimo	EPG122 SN 18/11	10/2018	10/2019
Multimeter	Keithley 2000	1188656	12/2016	12/2019
Signal Generator	Agilent E4438C	MY49070581	12/2016	12/2019
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2016	12/2019
Power Sensor	HP ECP-E26A	US37181460	12/2016	12/2019
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	8/2016	8/2019

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5.5 SID2450 Dipole Calibration Ceriticate

SAR Reference Dipole Calibration Report

Ref : ACR.287.8.14.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 2450 MHZ

SERIAL NO.: SN 07/14 DIP 2G450-306

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED Calibration CERT #2246-02

10/01/2018

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

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SATIMO

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.8.14.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/14/2018	
Checked by :	Jérôme LUC	Product Manager	10/14/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/14/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	10/14/2018	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2450 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID2450
Serial Number	SN 07/14 DIP 2G450-306
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *Satimo COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constucted as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

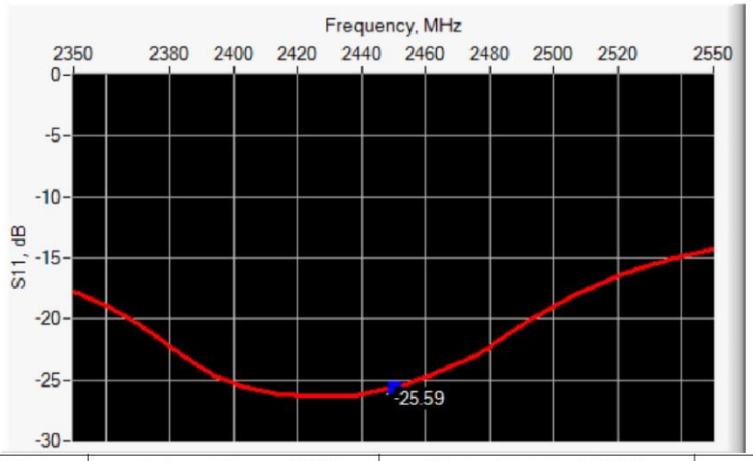
The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-25.59	-20	44.7 Ω - 1.1 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.	PASS	30.4 ±1 %.	PASS	3.6 ±1 %.	PASS
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	
1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %	PASS	1.80 ±5 %	PASS
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 39.0 sigma : 1.77
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm

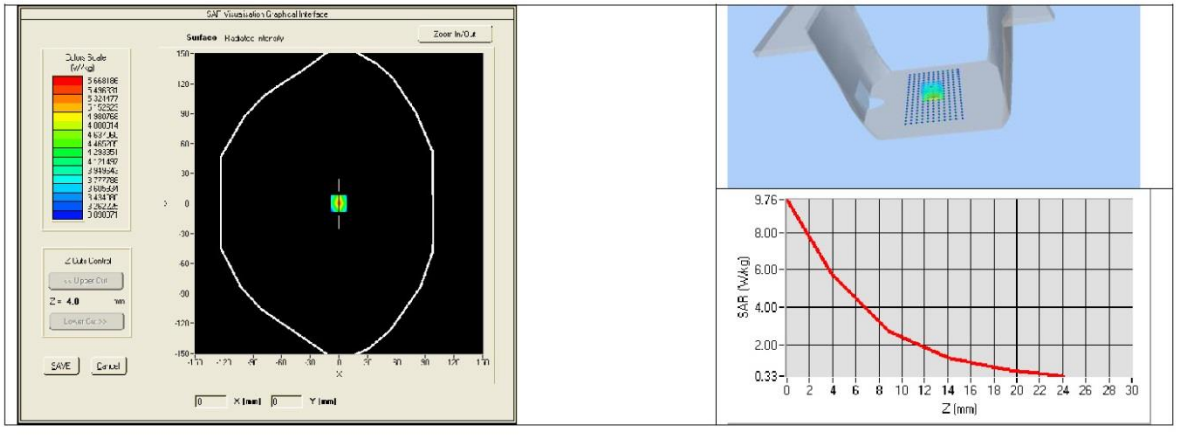
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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.8.14.SATU.A

Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	2450 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4	53.89 (5.39)	24	24.15 (2.42)
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %		1.52 ±5 %	
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %		1.52 ±5 %	
2100	53.2 ±5 %		1.62 ±5 %	
2450	52.7 ±5 %	PASS	1.95 ±5 %	PASS
2600	52.5 ±5 %		2.16 ±5 %	
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

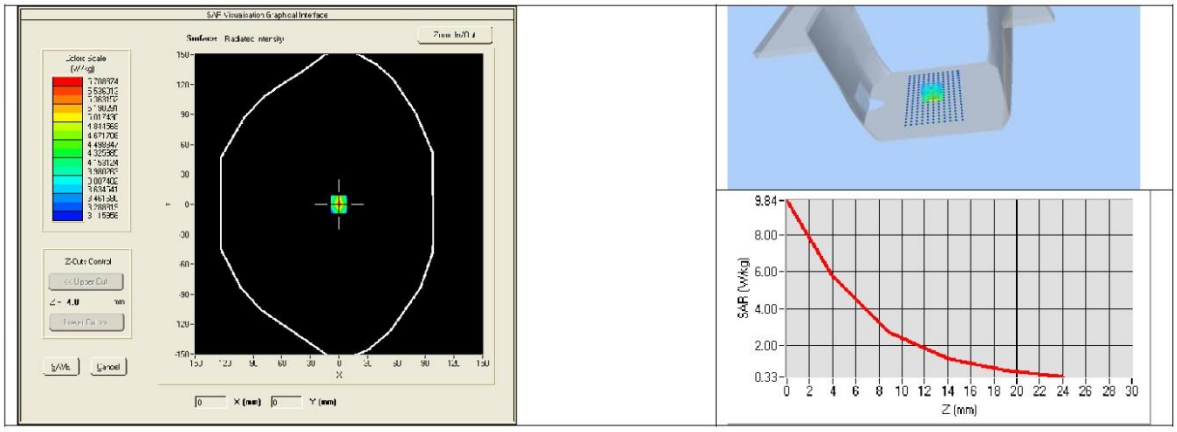
Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 53.0 sigma : 1.93
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	2450 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.8.14.SATU.A

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
2450	54.65 (5.46)	24.58 (2.46)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	Satimo	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Calipers	Carrera	CALIPER-01	12/2016	12/2019
Reference Probe	Satimo	EPG122 SN 18/11	10/2018	10/2019
Multimeter	Keithley 2000	1188656	12/2016	12/2019
Signal Generator	Agilent E4438C	MY49070581	12/2016	12/2019
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2016	12/2019
Power Sensor	HP ECP-E26A	US37181460	12/2016	12/2019
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	8/2016	8/2019

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5.6 SID2600 Dipole Calibration Ceriticate

SAR Reference Dipole Calibration Report

Ref : ACR.262.11.14.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.
1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD, BAO'AN BLVD
BAO'AN DISTRAICT, SHENZHEN, GUANGDONG, CHINA
SATIMO COMOSAR REFERENCE DIPOLE
FREQUENCY: 2600 MHZ
SERIAL NO.: SN 30/14 DIP2G600-336

Calibrated at SATIMO US
2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED
Calibration CERT #2246-02

09/01/2018

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

SATIMO

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.262.11.14.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	9/19/2018	
Checked by :	Jérôme LUC	Product Manager	9/19/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	9/19/2018	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	9/19/2018	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2600 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID2600
Serial Number	SN 30/14 DIP2G600-336
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *Satimo COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constucted as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

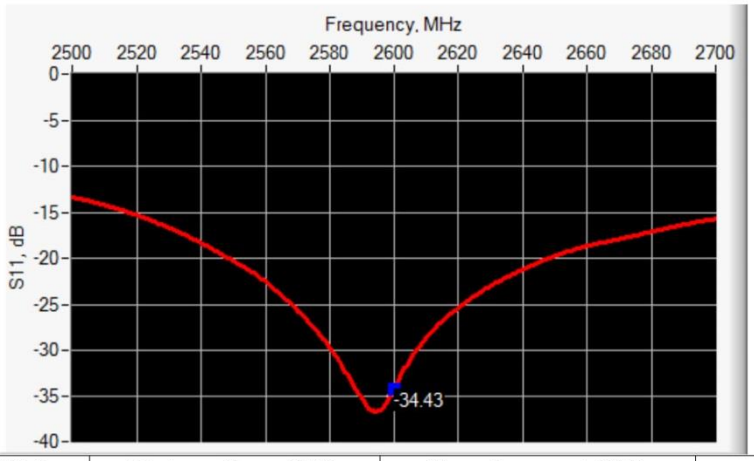
The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

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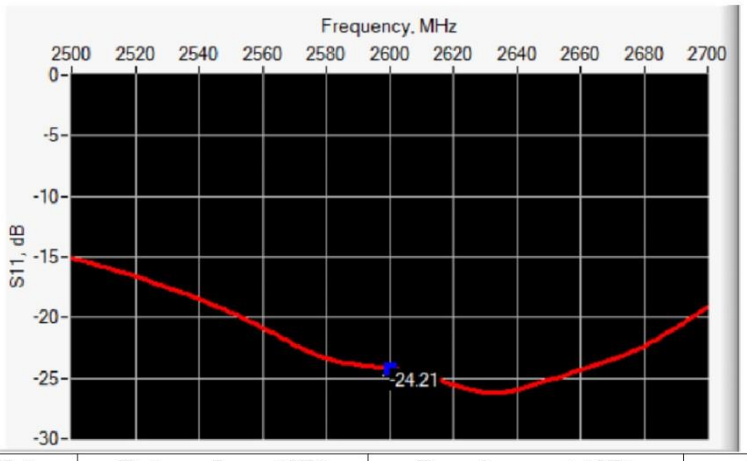
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2600	-34.43	-20	50.5 Ω + 1.7 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2600	-24.21	-20	45.8 Ω - 4.6 jΩ

6.3 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	

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900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.	PASS	28.8 ±1 %.	PASS	3.6 ±1 %.	PASS
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	
1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	

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2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %	PASS	1.96 ±5 %	PASS
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

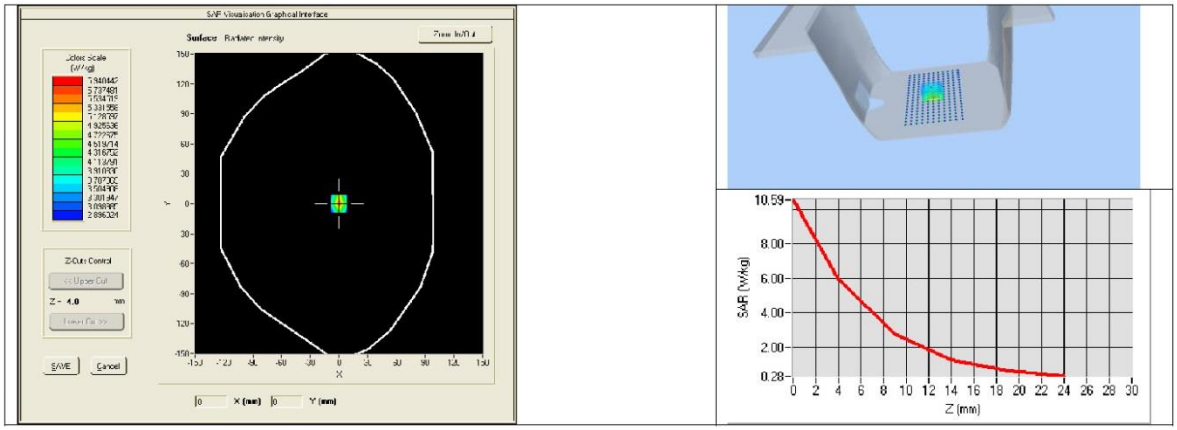
The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 38.3 sigma : 1.92
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	2600 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	

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2450	52.4		24	
2600	55.3	56.19 (5.62)	24.6	24.08 (2.41)
3000	63.8		25.7	
3500	67.1		25	



7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %		1.52 ±5 %	
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %		1.52 ±5 %	
2100	53.2 ±5 %		1.62 ±5 %	
2450	52.7 ±5 %		1.95 ±5 %	
2600	52.5 ±5 %	PASS	2.16 ±5 %	PASS
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	

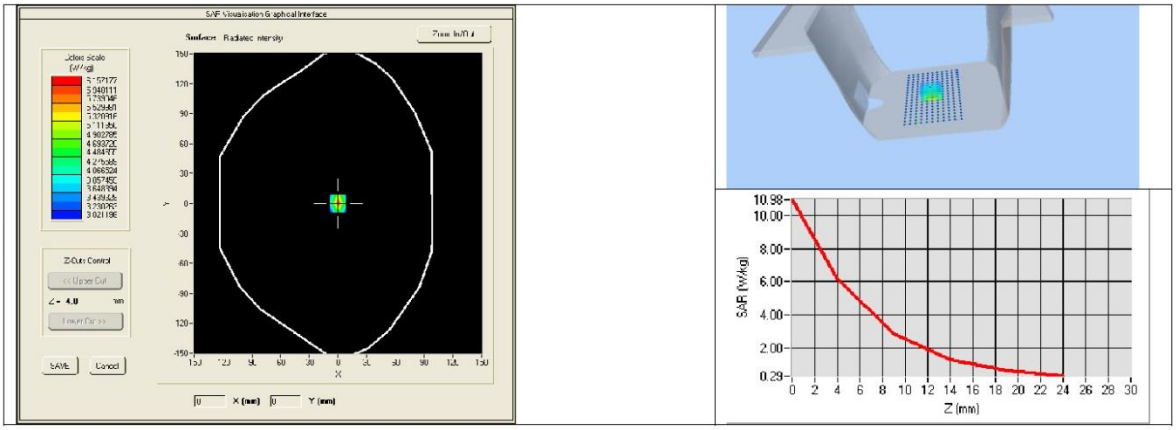
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5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 51.8 sigma : 2.19
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	2600 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
2600	57.49 (5.75)	24.88 (2.49)



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8 LIST OF EQUIPMENT

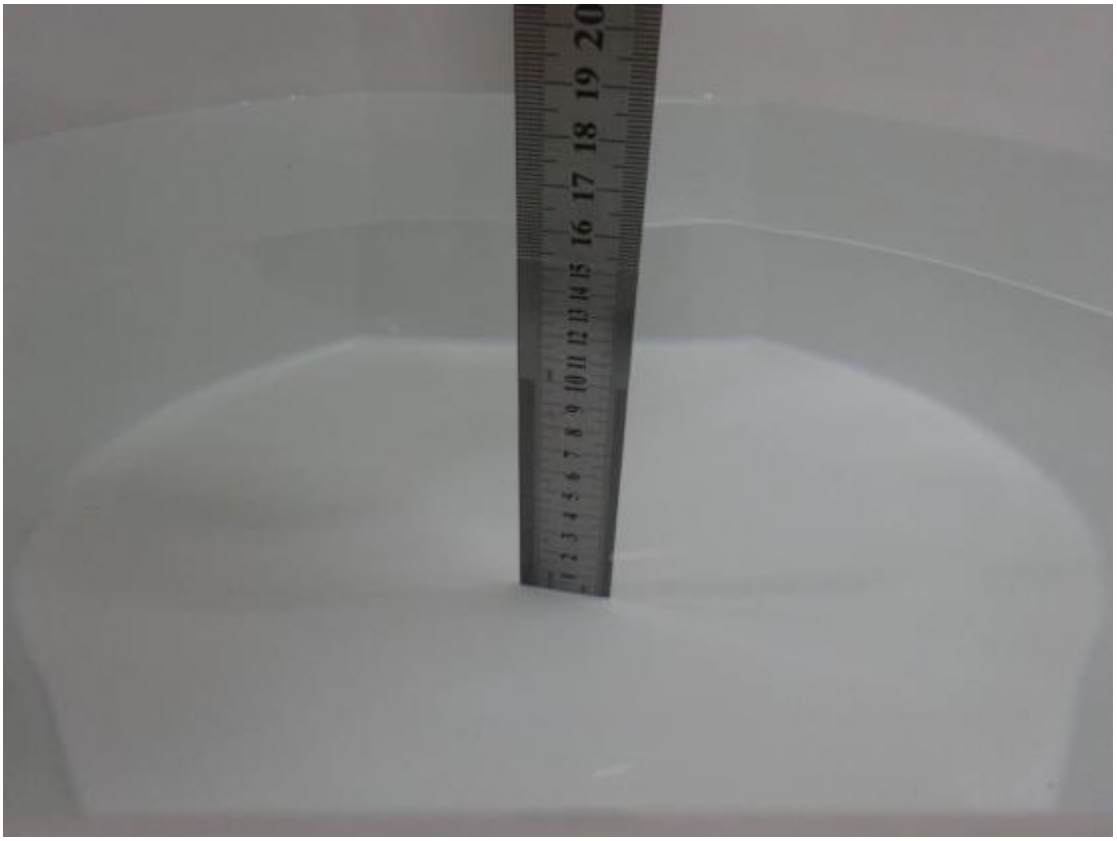
Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	Satimo	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2016	02/2019
Calipers	Carrera	CALIPER-01	12/2016	12/2019
Reference Probe	Satimo	EPG122 SN 18/11	10/2018	10/2019
Multimeter	Keithley 2000	1188656	12/2016	12/2019
Signal Generator	Agilent E4438C	MY49070581	12/2016	12/2019
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2016	12/2019
Power Sensor	HP ECP-E26A	US37181460	12/2016	12/2019
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	8/2016	8/2019

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6.SAR System PHOTOGRAPHS

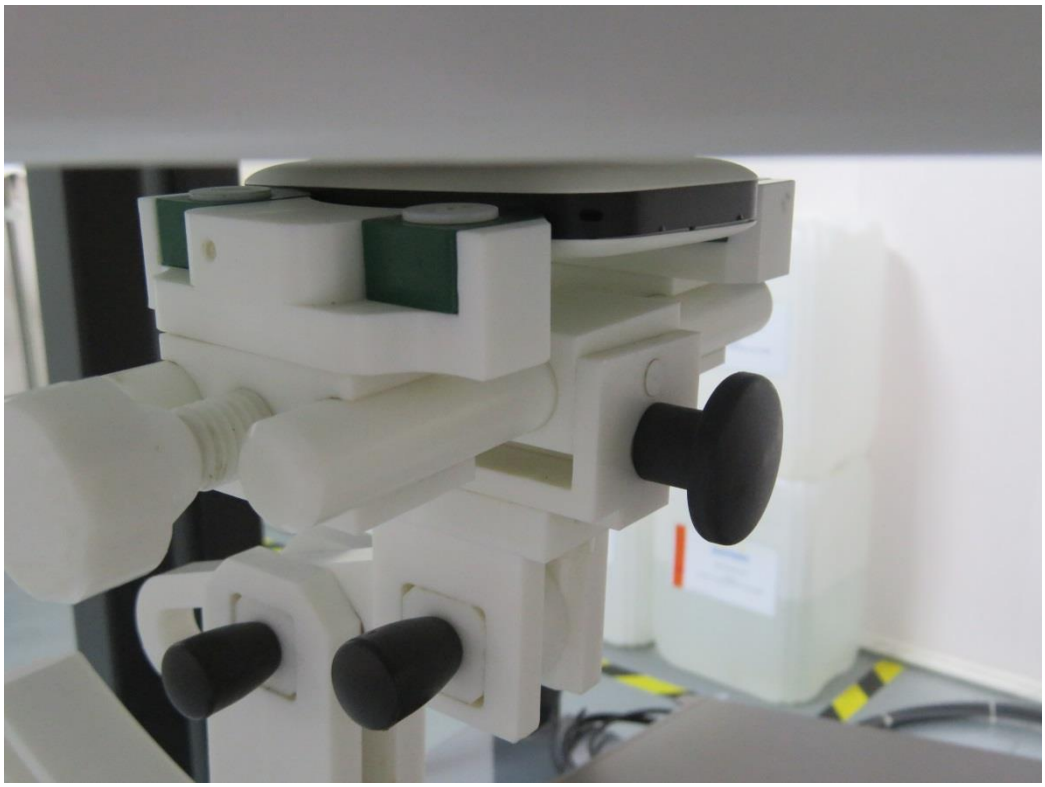


Liquid depth≧15cm

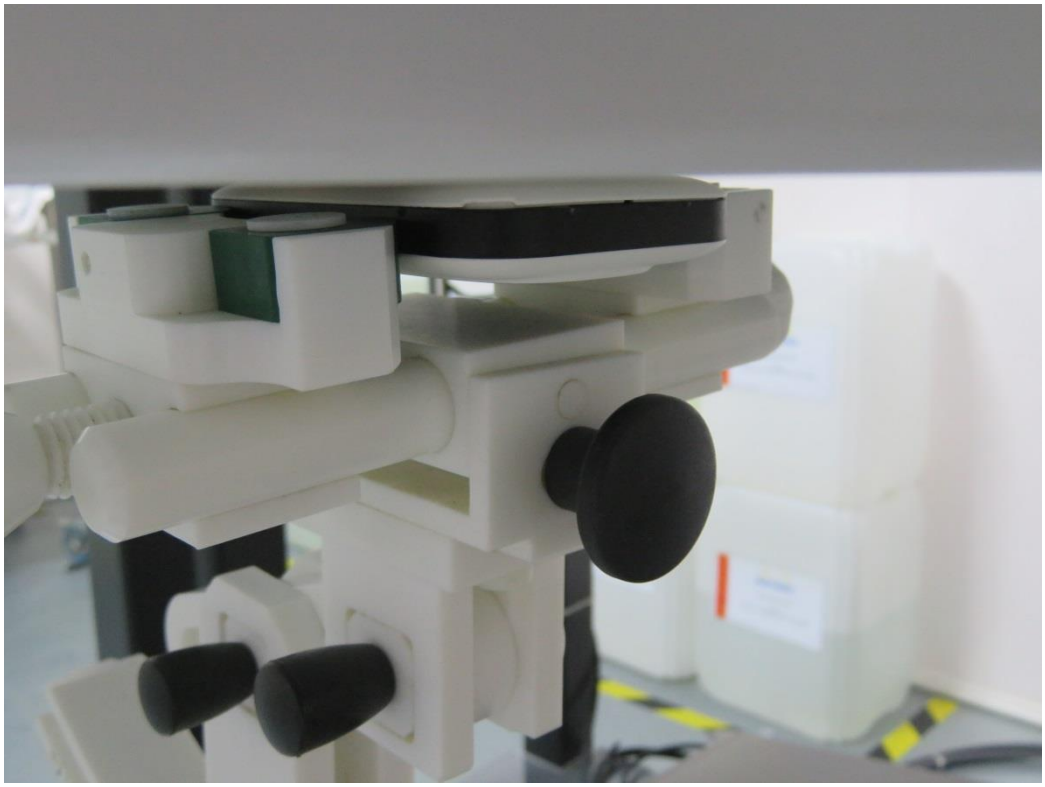


7.SETUP PHOTOGRAPHS

Body Setup photo(Back 0mm)



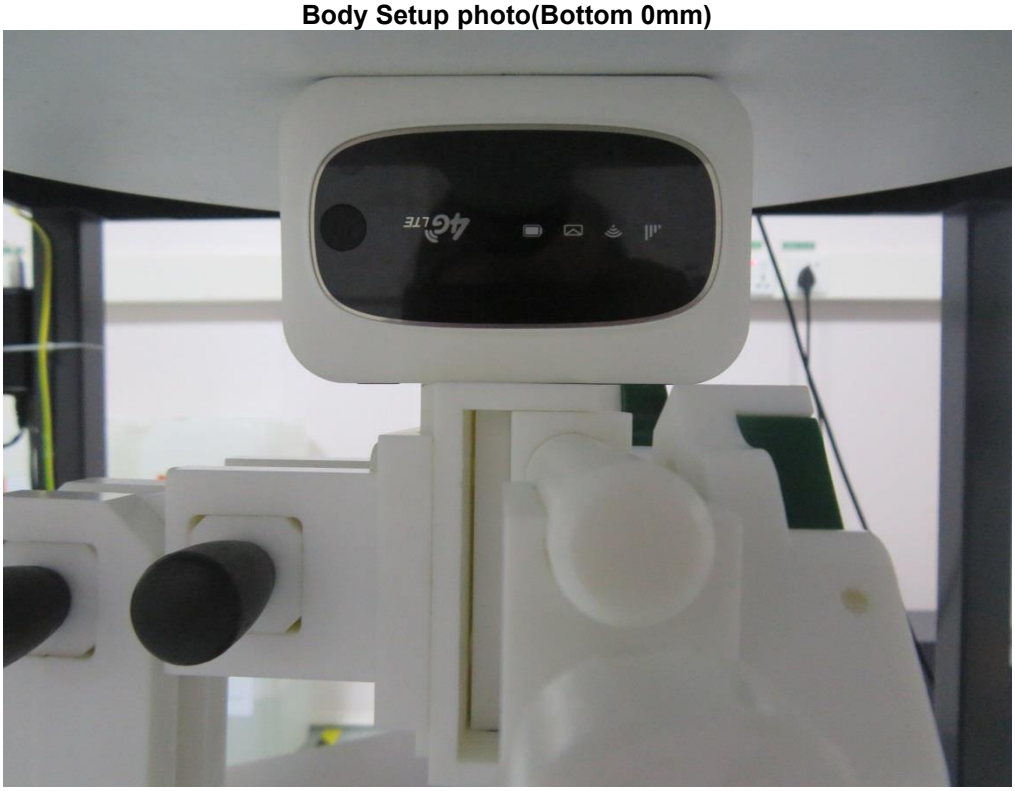
Body Setup photo(Front 0mm)



Body Setup photo(Top 0mm)



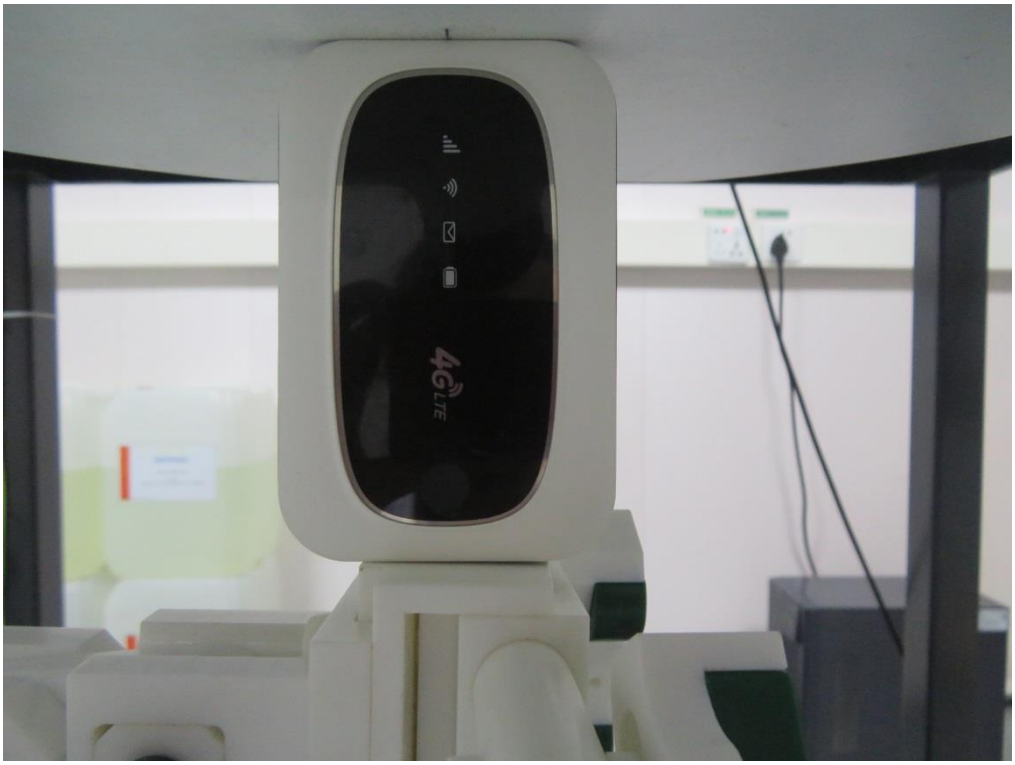
Body Setup photo(Bottom 0mm)



Body Setup photo(Right 0mm)

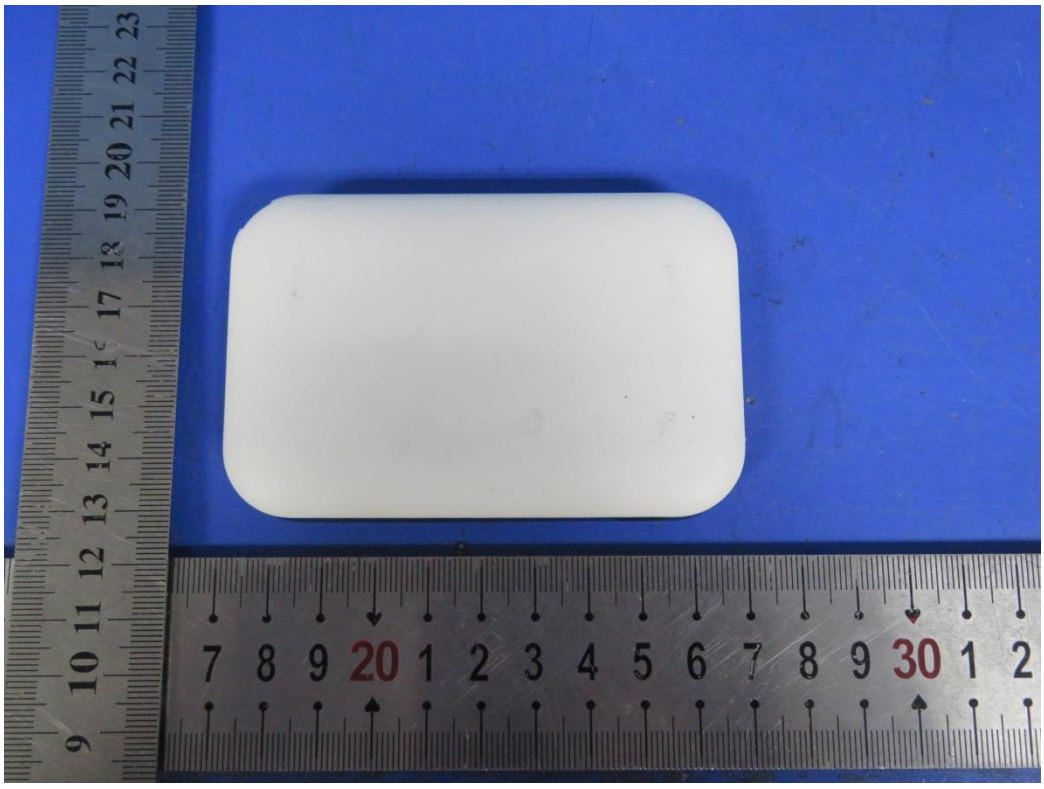


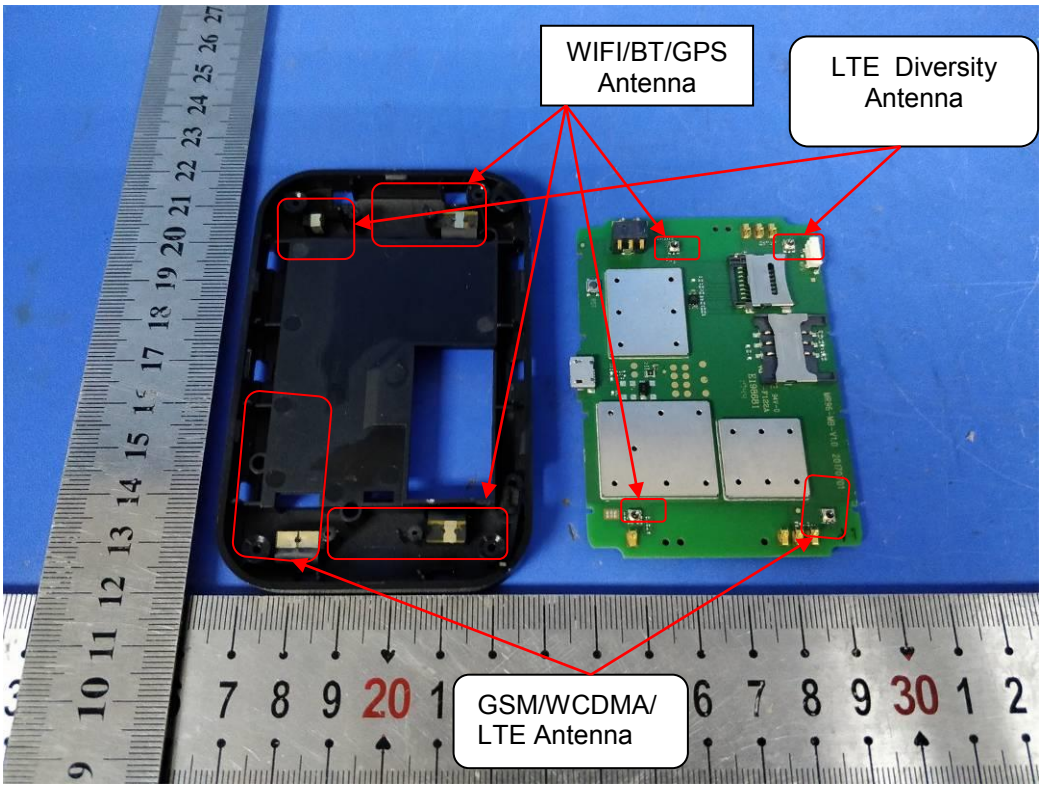
Body Setup photo(Left 0mm)



8.EUT PHOTOGRAPHS







.....The End of Test Report.....

RADIO TEST REPORT

For

Shenzhen Gokodo Technology Co., Ltd

4G Mobile Router

Test Model: M6

Additional Model No.: M7,M6XX,M7XX

Prepared for	:	Shenzhen Gokodo Technology Co., Ltd
Address	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street, Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	October 11, 2018
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	October 11, 2018~ November 08, 2018
Date of Report	:	November 13, 2018

CE

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RADIO TEST REPORT
ETSI EN 300 328 V2.1.1 (2016-11)
Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Report Reference No.	:	**LCS181011006AEC**
Date of Issue	:	November 13, 2018
Testing Laboratory Name	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards ☐ Other standard testing method ☐
Applicant's Name.....	:	**Shenzhen Gokodo Technology Co., Ltd**
Address	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street, Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Test Specification		
Standard	:	ETSI EN 300 328 V2.1.1 (2016-11)
Test Report Form No.	:	LCSEMC-1.0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2017-06

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Test Item Description.	:	4G Mobile Router
Trade Mark.....	:	Gokodo/QLink
Test Model	:	M6
Ratings	:	DC 3.7V by Li-ion battery(2000mAh) Recharged by DC 5V/1A by adapter
Result	:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Peter Xiao	Calvin Weng	
Peter Xiao / Administrators	Calvin Weng / Technique principal	Gavin Liang / Manager

RADIO -- TEST REPORT

Test Report No. : LCS181011006AEC	November 13, 2018 Date of issue

Test Model.....	:	M6
EUT.....	:	4G Mobile Router
Applicant.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/
Factory.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/

Test Result	Positive

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	November 13, 2018	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	4G Mobile Router
Test Model	:	M6
Additional Model No.	:	M7,M6XX,M7XX
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Power Supply	:	DC 3.7V by Li-ion battery(2000mAh) Recharged by DC 5V/1A by adapter
Hardware Version	:	M6_V1.1
Software Version	:	M6VD_V1.1
2G	:	
Support Band	:	☒GSM 900 (EU-Band) ☒DCS 1800 (EU-Band) ☒GSM 850 (U.S.-Band) ☒PCS 1900 (U.S.-Band)
Release Version	:	R99
GPRS Class	:	Class 12
EGPRS Class	:	Class 12
Uplink	:	GSM 900: 880MHz ~ 915MHz DCS 1800: 1710MHz ~ 1785MHz
Downlink	:	GSM 900: 925MHz ~ 960MHz DCS 1800: 1805MHz ~ 1880MHz
Type Of Modulation	:	GMSK for GPRS, GMSK/8PSK for EGPRS
Antenna Description	:	PIFA Antenna; 900MHz:-0.72dBi(Max.) , 900MHz :-1.23dBi(Max.)
Power Class	:	GSM 900: Class 4, DCS 1800: Class 1
3G	:	
Support Band	:	☐WCDMA Band II (U.S.-Band) ☐WCDMA Band V (U.S.-Band) ☒WCDMA Band I (EU-Band) ☒WCDMA Band VIII (EU-Band)
Release Version	:	R99
Uplink	:	WCDMA Band I: 1920MHz ~ 1980MHz WCDMA Band VIII: 880MHz~915MHz
Downlink	:	WCDMA Band I: 2110MHz ~ 2170MHz WCDMA Band VIII: 925MHz~960MHz
Type Of Modulation	:	WCDMA: QPSK; HSDPA/HSUPA: QPSK
Antenna Description	:	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 8:-0.72dBi(Max.)
Power Class	:	Class 3
LTE	:	
Support Band	:	☒E-UTRA Band 1(EU-Band) ☒E-UTRA Band 3(EU-Band)

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		☒E-UTRA Band 7(EU-Band) ☒E-UTRA Band 8(EU-Band) ☒E-UTRA Band 20(EU-Band) ☒E-UTRA Band 38(EU-Band) ☒E-UTRA Band 40(EU-Band)
LTE Release Version	:	R4
Uplink	:	E-UTRA Band 1: 1920MHz ~ 1980MHz E-UTRA Band 3: 1710MHz~1785MHz E-UTRA Band 7: 2500MHz ~ 2570MHz E-UTRA Band 8: 880MHz~915MHz E-UTRA Band 20: 832MHz ~ 862MHz E-UTRA Band 38: 2570MHz ~ 2620MHz E-UTRA Band 40: 2300MHz~2400MHz
Downlink	:	E-UTRA Band 1: 2110MHz ~ 2170MHz E-UTRA Band 3: 1805MHz~1880MHz E-UTRA Band 7: 2620MHz~2690MHz E-UTRA Band 8: 926MHz~960MHz E-UTRA Band 20: 791MHz~821MHz E-UTRA Band 38: 2570MHz ~ 2620MHz E-UTRA Band 40: 2300MHz~2400MHz
Type Of Modulation	:	QPSK/16-QAM
Antenna Description	:	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 3:-1.37dBi(Max.), Band 7:-0.27dBi(Max.),Band 8:-0.72dBi(Max.) , Band 20:-0.67dBi(Max.) ,Band 38:-0.22dBi(Max.) , Band 40:-0.25dBi(Max.)
Power Class	:	Class 3
WIFI(2.4G Band)	:	
Frequency Range	:	2412-2472MHz
Channel Spacing	:	5MHz
Channel Number	:	13 Channel for 20MHz bandwidth(2412~2472MHz) 9 channels for 40MHz bandwidth(2422~2462MHz)
Modulation Type	:	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	:	Two same PIFA Antenna; ANT1 used for WIFI, -0.52dBi(Max.); ANT2 used for WIFI, -0.52dBi(Max.);

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Product Information

a) The type of modulation used by the equipment:

☐FHSS

☒other forms of modulation

b) In case of FHSS modulation:

•In case of non-Adaptive Frequency Hopping equipment:

The number of Hopping Frequencies: .....

•In case of Adaptive Frequency Hopping Equipment:

The maximum number of Hopping Frequencies: .....

The minimum number of Hopping Frequencies: .....

The Dwell Time: .....

The Minimum Channel Occupation Time: .....

c) Adaptive / non-adaptive equipment:

☐non-adaptive Equipment

☒adaptive Equipment without the possibility to switch to a non-adaptive mode

☐adaptive Equipment which can also operate in a non-adaptive mode

d) In case of adaptive equipment:

The Channel Occupancy Time implemented by the equipment:

☒The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

☐The equipment is Frame Based equipment

☒The equipment is Load Based equipment

☐The equipment can switch dynamically between Frame Based and Load Based equipment

The CCA time implemented by the equipment: 20μs

The value q as referred to in clause 4.3.2.5.2.2.2 .....

☐The equipment has implemented an non-LBT based DAA mechanism

☐The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

The maximum RF Output Power (e.i.r.p.): ..... dBm

The maximum (corresponding) Duty Cycle: 100 %

Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):

f) The worst case operational mode for each of the following tests:

- RF Output Power

DSSS, OFDM

- Power Spectral Density

DSSS, OFDM

- Duty cycle, Tx-Sequence, Tx-gap

.....

- Dwell time, Minimum Frequency Occupation & Hopping Sequence (only for FHSS equipment)

.....

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- Hopping Frequency Separation (only for FHSS equipment)

.....

- Medium Utilisation

.....

- Adaptivity & Receiver Blocking

DSSS, OFDM

- Occupied Channel Bandwidth

DSSS, OFDM

- Transmitter unwanted emissions in the OOB domain

DSSS, OFDM

- Transmitter unwanted emissions in the spurious domain

DSSS, OFDM

- Receiver spurious emissions

DSSS, OFDM

g) The different transmit operating modes (tick all that apply):

☐Operating mode 1: Single Antenna Equipment

☐Equipment with only 1 antenna

☐Equipment with 2 diversity antennas but only 1 antenna active at any moment in time

☐Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)

☒Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming

☐Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

☐Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming

☐Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

h) In case of Smart Antenna Systems:

- The number of Receive chains: .....
- The number of Transmit chains: .....

☐symmetrical power distribution

☐asymmetrical power distribution

In case of beam forming, the maximum beam forming gain: .....

NOTE: Beam forming gain does not include the basic gain of a single antenna.

i) Operating Frequency Range(s) of the equipment:

- Operating Frequency Range 1: 2412MHz to 2472MHz
- Operating Frequency Range 2: 2422MHz to 2462MHz

NOTE: Add more lines if more Frequency Ranges are supported.

j) Occupied Channel Bandwidth(s):

- Occupied Channel Bandwidth: 18.59MHz
- Occupied Channel Bandwidth 2: 36.61MHz

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NOTE: Add more lines if more channel bandwidths are supported.

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):

☒Stand-alone

☐Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)

☐Plug-in radio device (Equipment intended for a variety of host systems)

Other .....

l) The extreme operating conditions that apply to the equipment:

Operating temperature range:-20° C to 45° C

Details provided are for the: ■stand-alone equipment

☐combined (or host) equipment

☐test jig

m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:

• Antenna Type

☒ PIFA Antenna

Antenna 1 Gain:-0.52dBi

Antenna 2 Gain: -0.52dBi

If applicable, additional beamforming gain (excluding basic antenna gain): ..... dB

☐Temporary RF connector provided

☐No temporary RF connector provided

☐Dedicated Antennas (equipment with antenna connector)

☐Single power level with corresponding antenna(s)

☐Multiple power settings and corresponding antenna(s)

Number of different Power Levels: .....

Power Level 1: ……..dBm

Power Level 2: ..... dBm

Power Level 3: ..... dBm

NOTE 1: Add more lines in case the equipment has more power levels.

NOTE 2: These power levels are conducted power levels (at antenna connector).

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the: ☒stand-alone equipment

☐combined (or host) equipment

☐test jig

Supply Voltage ☐AC mains State AC voltage

☒ DC State DC voltage : 3.7V

In case of DC, indicate the type of power source

☐Internal Power Supply

☐External Power Supply or AC/DC adapter: AC 230V

☒Battery: 3.7V

☐Other: .....

o) Describe the test modes available which can facilitate testing:
The EUT can transmit in engineering mode.

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):
IEEE 802.11™

1.2. Objective

This Type approval report is prepared on behalf of **Shenzhen Gokodo Technology Co., Ltd** in accordance with ETSI EN 300 328 V2.1.1 (2016-11), Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The objective is to determine compliance with ETSI EN 300 328 V2.1.1 (2016-11).

1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 328 V2.1.1 (2016-11).

1.5. Description of Test Facility

FCC Registration Number. is 254912.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001
NVLAP Registration Code is 600167-0

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1.6. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
Shenzhen Gokodo Technology Co., Ltd	Adapter	KS15004R	---	CE

Products are sold without adapters

1.7. External I/O

I/O Port Description	Quantity	Cable
Charging port	1	0.2 m, unshielded cable

1.8. List Of Measuring Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	X-series USB Peak and Average Power Sensor Aglient	Agilent	U2021XA	MY54080022	2018-10-25	2019-10-24
2	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2018-10-25	2019-10-24
3	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
4	RF Control Unit	Ascentest	AT890-RFB	N/A	2018-06-16	2019-06-15
5	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2017-11-17	2018-11-16
6	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2018-06-16	2019-06-15
7	SPECTRUM ANALYZER	R&S	FSP	100503	2018-06-16	2019-06-15
8	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2017-11-17	2018-11-16
9	ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY42081396	2017-11-17	2018-11-16
10	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2017-11-17	2018-11-16
11	Universal Radio Communication Tester	R&S	CMU 200	105788	2018-06-16	2019-06-15
12	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2018-06-16	2019-06-15
13	RF Control Unit	Tonscend	JS0806-1	N/A	2018-06-16	2019-06-15
14	DC Power Supply	Agilent	E3642A	N/A	2017-11-17	2018-11-16
15	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
16	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2018-10-10	2019-10-09
17	DC Source	CHROMA	62012P-80-60	34782951	2018-10-10	2019-10-09
18	RF Filter	Micro-Tronics	BRC50718	S/N-017	2018-06-16	2019-06-15
19	RF Filter	Micro-Tronics	BRC50719	S/N-011	2018-06-16	2019-06-15
20	RF Filter	Micro-Tronics	BRC50720	S/N-011	2018-06-16	2019-06-15
21	RF Filter	Micro-Tronics	BRC50721	S/N-013	2018-06-16	2019-06-15
22	RF Filter	Micro-Tronics	BRM50702	S/N-195	2018-06-16	2019-06-15
23	Splitter/Combiner	Micro-Tronics	PS2-15	CB11-20	2018-06-16	2019-06-15
24	Splitter/Combiner	Micro-Tronics	CB11-20	N/A	2018-06-16	2019-06-15
25	Attenuator	Micro-Tronics	PAS-8-10	S/N23466	2018-06-16	2019-06-15
26	Exposure Level Tester	Narda	ELT-400	N-0713	2018-04-02	2019-04-01
27	B-Field Probe	Narda	ELT-400	M-1154	2018-04-10	2019-04-09
28	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
29	Positioning Controller	MF	MF-7082	/	2018-06-16	2019-06-15
30	EMI Test Software	AUDIX	E3	N/A	2018-06-16	2019-06-15
31	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
32	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2017-11-17	2018-11-16
33	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-06-22	2019-06-21
34	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-05-01	2019-04-30
35	Horn Antenna	EMCO	3115	6741	2018-06-22	2019-06-21
36	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
37	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
38	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
39	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15
40	TEST RECEIVER	R&S	ESCI	101142	2018-06-16	2019-06-15
41	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	2018-06-16	2019-06-15
42	10dB Attenuator	SCHWARZBECK	MTS-IMP136	261115-001-0032	2018-06-16	2019-06-15
43	Artificial Mains	R&S	ENV216	101288	2018-06-16	2019-06-15

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44	Power Analyzer Test System	Voltech	PM6000	20000670053	2018-06-16	2019-06-15
45	ESD Simulator	SCHLODER	SESD 230	604035	2018-06-16	2019-06-15
46	RF POWER AMPLIFIER	OPHIR	5225R	1052	2018-03-21	2019-03-20
47	RF POWER AMPLIFIER	OPHIR	5273F	1019	2018-03-23	2019-03-25
48	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2018-04-27	2019-04-26
49	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-482	2018-04-27	2019-04-26
50	Electric field probe	Narda S.TS./PMM	EP601	611WX80208	2018-03-26	2019-03-25
51	Power Meter	Agilent	E4419B	MY45104493	2018-06-16	2019-06-15
52	Power Sensor	Agilent	E9301H	MY41495234	2018-06-16	2019-06-15
53	Power Sensor	Agilent	E4412A	MY41500229	2018-06-16	2019-06-15
54	Sound Level meter	BK Precision	735	73500873100	2018-06-16	2019-06-15
55	Audio Analyzer	R&S	UPV	1146.2003K0	2018-06-16	2019-06-15
56	Mouse Simulation	Bruel & Kjaer	4227	A0304216	2018-06-16	2019-06-15
57	Ear Simulation and supply	Bruel & Kjaer	2669.4182.5935	A0305284	2018-06-16	2019-06-15
58	Acoustical Calibrators	Bruel & Kjaer	4231	A0304215	2018-06-16	2019-06-15
59	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2017-11-17	2018-11-16
60	Simulator	FRANKONIA	CIT-10	A126A1195	2018-06-16	2019-06-15
61	CDN	FRANKONIA	CDN-M2	5100100100	2018-06-16	2019-06-15
62	CDN	FRANKONIA	CDN-M3	0900-11	2018-06-16	2019-06-15
63	Attenuator	FRANKONIA	ATT6	0010222A	2018-06-16	2019-06-15
64	Infuse tongs	EM TEST	EM-Clamp	0513A031201	2018-06-16	2019-06-15
65	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2018-06-16	2019-06-15
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

1.9. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Occupied Channel Bandwidth	5 %
RF output power, conducted	1,5 dB
Power Spectral Density, conducted	3 dB
Unwanted Emissions, conducted	3 dB
All emissions, radiated	6 dB
Temperature	1 °C
Humidity	5 %
DC and low frequency voltages	3 %
Time	5 %
Duty Cycle	5 %

1.10. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	23.5
Humidity (%RH)	25-75	52.6
Barometric pressure (mbar)	860-1060	950-1000

Test Engineer	Mina Xu

1.11. Description Of Test Modes

LCS has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmit by 802.11b
Mode 2: Transmit by 802.11g
Mode 3: Transmit by 802.11n(20MHz)
Mode 4: Transmit by 802.11n(40MHz)
Mode 5: Receive by 802.11b
Mode 6: Receive by 802.11g
Mode 7: Receive by 802.11n(20MHz)
Mode 8: Receive by 802.11n(40MHz)

Note:

(1) For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case on this report.

(2) Regard to the frequency band operation for systems using Wide Band modulation: the lowest, middle, highest frequency channel for conducted test, and the lowest, highest frequency channel for radiation spurious test.

(3) The extreme test condition for voltage and temperature were declared by the manufacturer.

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2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in engineering mode.

2.2. EUT Exercise Software

N/A.

2.3. Special Accessories

N/A.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Configuration of Test Setup

Please refer to the test setup photo.

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3. SUMMARY OF TEST RESULT

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

Technical requirements for the equipment using wide band modulations other than FHSS:

Performed Test Item	Normative References	Test Performed	Deviation
RF Output Power & Receiver Category	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Power Spectral Density	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Duty cycle, Tx-Sequence, Tx-gap	ETSI EN 300 328 V2.1.1 (2016-11)	N/A	N/A
Medium Utilisation (MU) factor	ETSI EN 300 328 V2.1.1 (2016-11)	N/A	N/A
Adaptivity	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Occupied Channel Bandwidth	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Transmitter unwanted emissions in the out-of-band domain	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Transmitter unwanted emissions in the spurious domain	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Receiver Spurious Emissions	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No
Receiver Blocking	ETSI EN 300 328 V2.1.1 (2016-11)	Yes	No

Note:
1. The EUT can operate in an adaptive mode, and can't operate in a non-adaptive mode which is stated by the supplier.
2. The EUT is equipment which using wide band modulations other than FHSS. It is an adaptive equipment which can't operate in non-adaptive mode.

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4. RF OUTPUT POWER

4.1. Limit

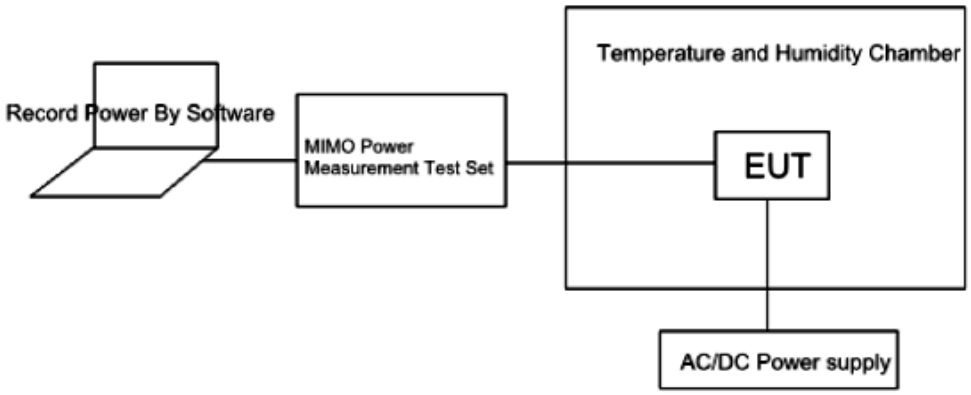
For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.

The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

This limit shall apply for any combination of power level and intended antenna assembly.

4.2. Test Setup

For Conducted Measurement



4.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

Step 1:

• The fast power sensor use the following setting: Sample speed 1 MS/s.

Step 2:

• Connect the power sensor to the transmit port, sample the transmit signal and store the raw data.Use these stored samples in all following steps.

Step 3:

• Find the start and stop times of each burst in the stored measurement samples.

Step 4:

• Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these Pburst values, as well as the start and stop times for each burst.

Step 5:

• The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.

Step 6:

• Add the (stated) antenna assembly gain "G" in dBi of the individual antenna.

• If applicable, add the additional beamforming gain "Y" in dB.

The RF Output Power (P) shall be calculated using the formula below:
P = A + G + Y

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4.4. Test Result

Pass

***Note: 20 bursts had been captured for power measurement.

Product	:	4G Mobile Router
Test Item	:	RF Output Power
Test Mode	:	Mode 1: Transmit by 802.11b

Test Conditions		Frequency (MHz)	RF Output Power EIRP (dBm)		Limit (dBm)
			ANT1	ANT2	
Tnom (25℃)	Vnom (DC 3.7V)	2412	15.35	15.24	20
		2442	15.63	15.41	
		2472	15.99	15.94	
Tmax (45℃)	Vnom (DC 3.7V)	2412	15.27	15.37	20
		2442	15.51	15.65	
		2472	15.78	16.09	
Tmin (-20℃)	Vnom (DC 3.7V)	2412	15.24	15.38	20
		2442	15.75	15.68	
		2472	15.72	15.88	

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Product	:	4G Mobile Router
Test Item	:	RF Output Power
Test Mode	:	Mode 2: Transmit by 802.11g

Test Conditions		Frequency (MHz)	RF Output Power EIRP (dBm)		Limit (dBm)
			ANT1	ANT2	
Tnom (25℃)	Vnom (DC 3.7V)	2412	14.20	14.36	20
		2442	14.50	14.54	
		2472	14.97	15.05	
Tmax (45℃)	Vnom (DC 3.7V)	2412	14.20	14.32	20
		2442	14.41	14.49	
		2472	14.99	15.06	
Tmin (-20℃)	Vnom (DC 3.7V)	2412	14.17	14.28	20
		2442	14.48	14.58	
		2472	14.99	14.97	

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Product	:	4G Mobile Router
Test Item	:	RF Output Power
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz)

Test Conditions		Frequency (MHz)	RF Output Power EIRP (dBm)			Limit (dBm)
			ANT1	ANT2	ANT1+ANT2	
Tnom (25℃)	Vnom (DC 3.7V)	2412	13.29	13.40	16.36	20
		2442	13.41	13.54	16.49	
		2472	13.65	13.75	16.71	
Tmax (45℃)	Vnom (DC 3.7V)	2412	13.38	13.37	16.39	20
		2442	13.44	13.60	16.53	
		2472	13.69	13.80	**16.76**	
Tmin (-20℃)	Vnom (DC 3.7V)	2412	13.32	13.37	16.36	20
		2442	13.38	13.60	16.50	
		2472	13.60	13.77	16.70	

Product	:	4G Mobile Router
Test Item	:	RF Output Power
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz)

Test Conditions		Frequency (MHz)	RF Output Power EIRP (dBm)			Limit (dBm)
			ANT1	ANT2	ANT1+ANT2	
Tnom (25℃)	Vnom (DC 3.7V)	2422	12.36	12.29	15.34	20
		2442	12.77	12.65	15.72	
		2462	12.64	12.91	15.79	
Tmax (45℃)	Vnom (DC 3.7V)	2422	12.42	12.27	15.36	20
		2442	12.86	12.67	15.78	
		2462	12.72	13.00	15.87	
Tmin (-20℃)	Vnom (DC 3.7V)	2422	12.31	12.35	15.34	20
		2442	12.80	12.68	15.75	
		2462	12.60	12.88	15.75	

4.5. Receiver Category

Receiver Category 1: Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment.

Receiver Category 2:Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment.

Receiver Category 3: Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment.

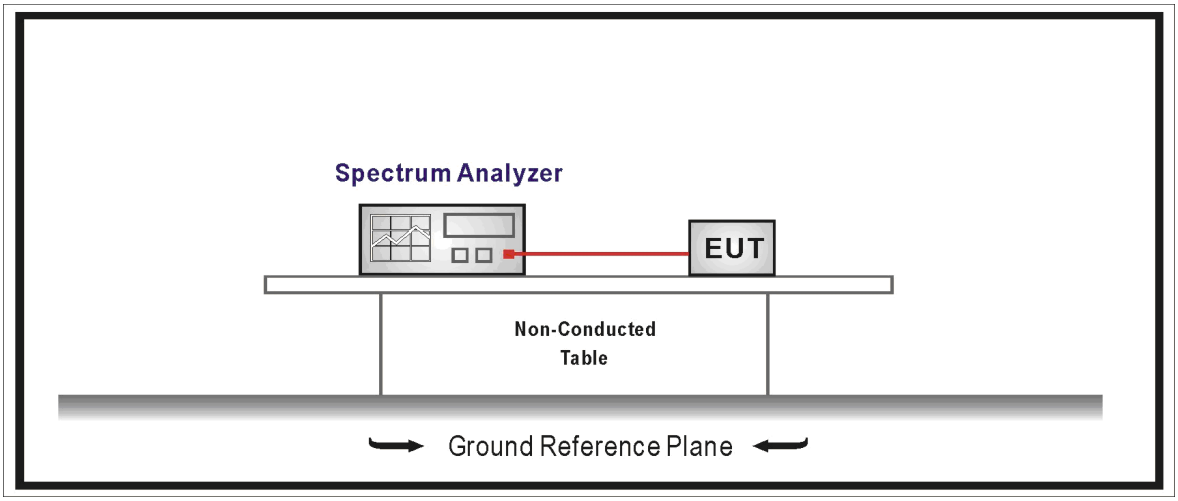
As this an adaptivity device with a maximum power of 16.76m, **it belongs to recevier category 1**.

5. POWER SPECTRAL DENSITY

5.1. Limit

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10dBm per MHz.

5.2. Test Setup



5.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.3

Step 1:

Connect the UUT to the spectrum analyzer and use the following settings:

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- Resolution BW: 10 kHz
- Video BW: 30 kHz
- Sweep Points: > 8 350
- Detector: RMS
- Trace Mode: Max Hold
- Sweep time: Auto

For non-continuous signals, wait for the trace to be completed. Save the (trace) data set to a file.

Step 2:

For each frequency point, add up the amplitude (power) values for the different transmit chains and use this as the new data set.

Step 3:

Add up the values for amplitude (power) for all the samples in the file.

Step 4:

Normalize the individual values for amplitude so that the sum is equal to the RF Output Power (e.i.r.p.).

Step 5:

Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 6:

Shift the start point of the samples added up in step 5 by 1 sample and repeat the procedure in step 5 (i.e. sample #2 to #101).

Step 7:

Repeat step 6 until the end of the data set and record the radiated Power Spectral Density values for each of the 1 MHz segments. From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT.

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5.4. Test Result

Product	:	4G Mobile Router
Test Item	:	Maximum Spectral Power Density
Test Mode	:	Mode 1: Transmit by 802.11b

Frequency (MHz)	Total Power Density (dBm/MHz)		Limit (dBm/MHz)
	ANT1	ANT2	
2412	4.25	4.28	10.00
2442	4.54	4.65	10.00
2472	4.65	5.20	10.00

Product	:	4G Mobile Router
Test Item	:	Maximum Spectral Power Density
Test Mode	:	Mode 2: Transmit by 802.11g

Frequency (MHz)	Total Power Density (dBm/MHz)		Limit (dBm/MHz)
	ANT1	ANT2	
2412	0.32	0.25	10.00
2442	0.50	0.63	10.00
2472	1.06	0.63	10.00

Product	:	4G Mobile Router
Test Item	:	Maximum Spectral Power Density
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz)

Frequency (MHz)	Total Power Density (dBm/MHz)			Limit (dBm/MHz)
	ANT1	ANT2	ANT1+ANT2	
2412	-1.62	-1.68	1.36	10.00
2442	-1.31	-1.37	1.67	10.00
2472	-1.38	-1.36	1.64	10.00

Product	:	4G Mobile Router
Test Item	:	Maximum Spectral Power Density
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz)

Frequency (MHz)	Total Power Density (dBm/MHz)			Limit (dBm/MHz)
	ANT1	ANT2	ANT1+ANT2	
2422	-2.78	-2.77	0.24	10.00
2442	-2.23	-2.55	0.62	10.00
2462	-2.09	-1.85	1.04	10.00

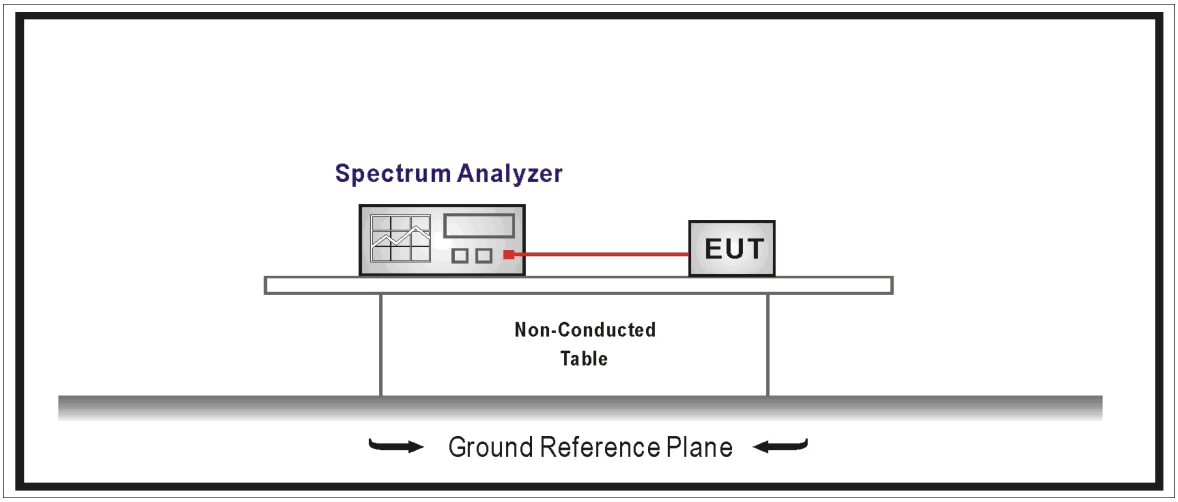
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6. DUTY CYCLE, TX-SEQUENCE, TX-GAP

6.1. Limit

The Duty Cycle shall be equal to or less than the maximum value declared by the supplier.
The maximum Tx-sequence Time and the minimum Tx-gap Time shall be according to the formula below: Maximum Tx-Sequence Time = Minimum Tx-gap Time = M
where M is in the range of 3,5 ms to 10 ms.

6.2. Test Setup



6.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

6.4. Test Result

These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode.
These requirements do not apply for equipment with a maximum declared RF Output power of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.
No applicable.

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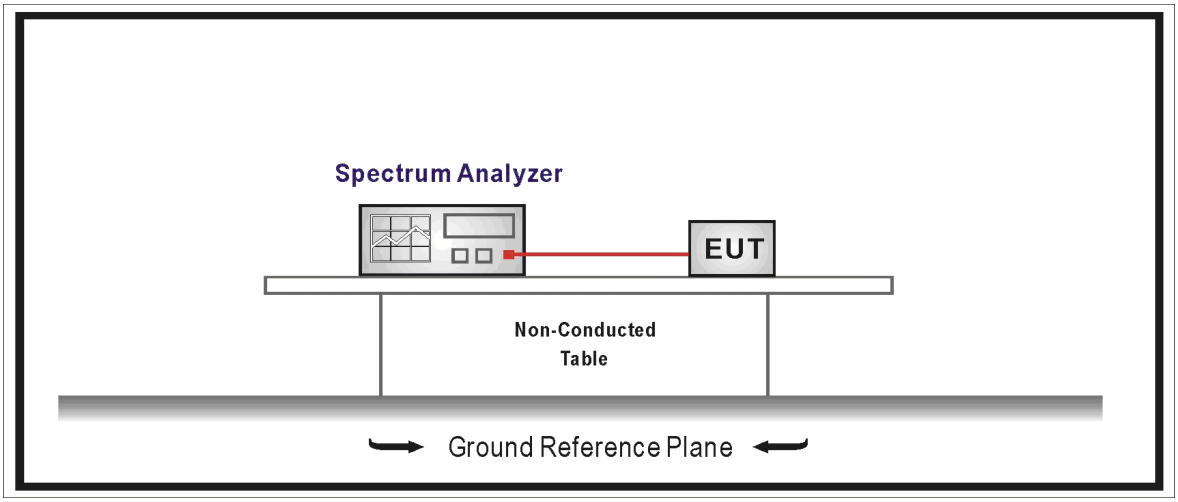
7. MEDIUM UTILISATION (MU) FACTOR

7.1. Limit

For non-adaptive equipment

The maximum Medium Utilisation factor for non-adaptive Frequency Hopping equipment shall be 10 %.

7.2. Test Setup



7.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2

7.4. Test Result

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.
In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.
No applicable.

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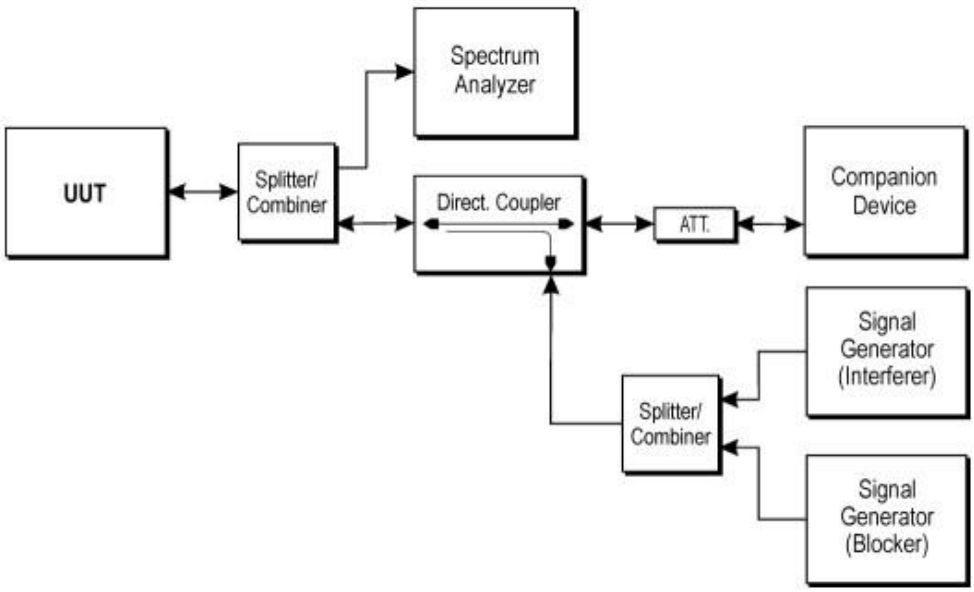
8. ADAPTIVITY AND RECEIVER BLOCKING

8.1. Limit

Adaptivity Limit
☐ Non-LBT based Detect and Avoid --- The channel shall remain unavailable for a minimum time equal to 1 s after which the channel may be considered again as an 'available' channel; --- COT ≤ 40 ms; --- COT ≤ 60 ms; --- Idle Period shall be minimum 5% of COT with a minimum of 100us; --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☐ LBT based Detect and Avoid(Frame Based Equipment) --- The CCA observation time shall be not less than 20 us; --- The CCA time used by the equipment shall be declared by the supplier; --- COT = 1-10 ms; --- Idle Period = 5% of COT; --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☒ LBT based Detect and Avoid(Load Based Equipment) --- The CCA observation time shall be not less than 20 us; --- The CCA time used by the equipment shall be declared by the supplier; --- COT ≤ (13 / 32) * q ms; q = [4~32]; 1.625ms~13ms; --- R = number of clear idle slots are randomly [1~q]. Every time an Extended CCA is required and the 'R' value stored in a counter. --- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
☐ Short Control Signalling Transmissions: --- Short Control Signalling Transmissions shall have a maximum duty cycle of 10% within an observation period of 50ms.

8.2. Test Setup

Conducted measurements



8.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.7

1) The EUT connect to a companion device during the test. Adjust the received signal level at the EUT to the value defined in table 6 of ETSI EN 300 328 V2.1.1 Clause 4.3.2.10.2
2) the analyzer shall be set as below: RBW=8MHz and VBW=28MHz.
3) Configure the EUT for normal transmission with a sufficiently high payload to allow demonstration of compliance of the adaptive mechanism on the channel being tested.
4) Adding the interference signal and blocking signal.
5) Record the data.

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8.4. Test Result

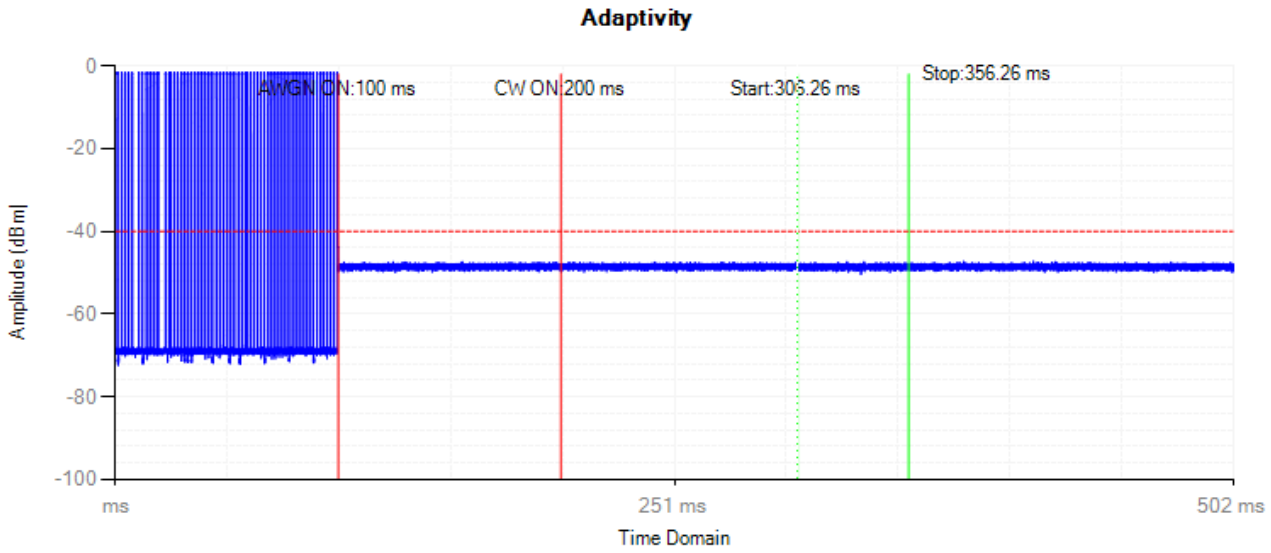
Product	:	4G Mobile Router
Test Item	:	Adaptivity and Receiver Blocking
Test Result	:	Pass

Summary Of Test Result		
Test Mode	Channel	Conclusion
802.11b	Low	Pass
	High	Pass
802.11g	Low	Pass
	High	Pass
802.11n20	Low	Pass
	High	Pass
802.11n40	Low	Pass
	High	Pass
Note: All modulation of EUT which maximum output power is more than 10dbm have been tested.		

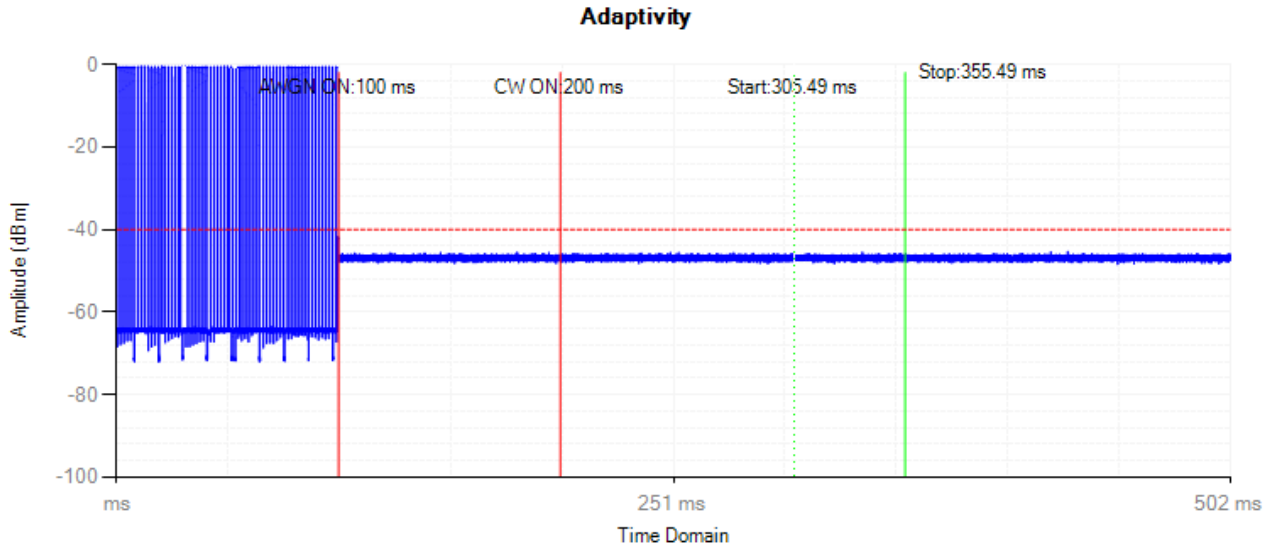
The Worst Test Mode (ANT1)	802.11b: Low Channel
AWGN Interference Level (dBm)	-63.52
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max. COT (ms)	3.31
Pulse width (ms)	0
Duty Cycle (%)	0
The Worst Test Mode (ANT1)	802.11b: High Channel
AWGN Interference Level (dBm)	-64.17
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	2.63
Pulse width (ms)	0
Duty Cycle (%)	0

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Test plot (802.11b-Low channel, ANT1):



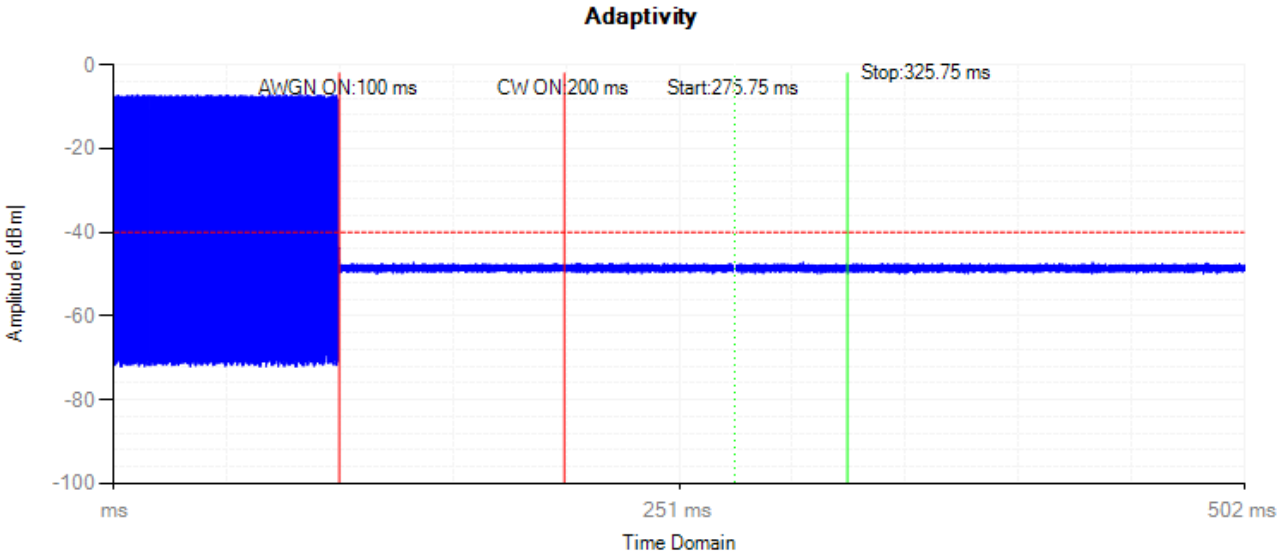
Test plot (802.11b-High channel, ANT1):



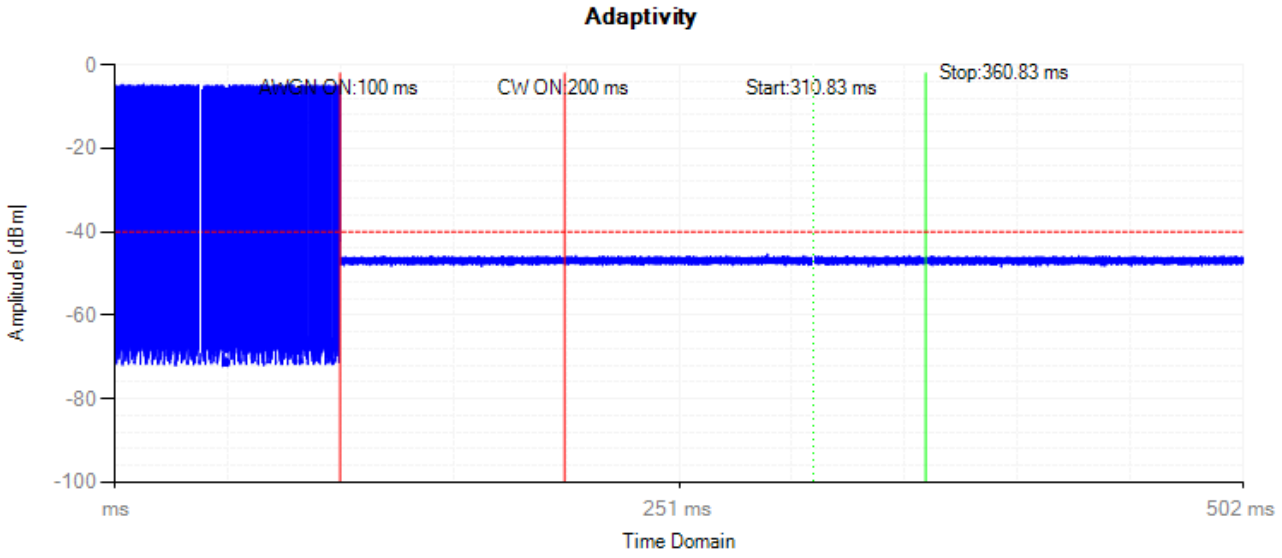
The Worst Test Mode (ANT1)	802.11g: Low Channel
AWGN Interference Level (dBm)	-64.78
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	2.70
Pulse width (ms)	0
Duty Cycle (%)	0
The Worst Test Mode (ANT1)	802.11g: High Channel
AWGN Interference Level (dBm)	-65.08
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	2.53
Pulse width (ms)	0
Duty Cycle (%)	0

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Test plot (802.11g-Low channel, ANT1):



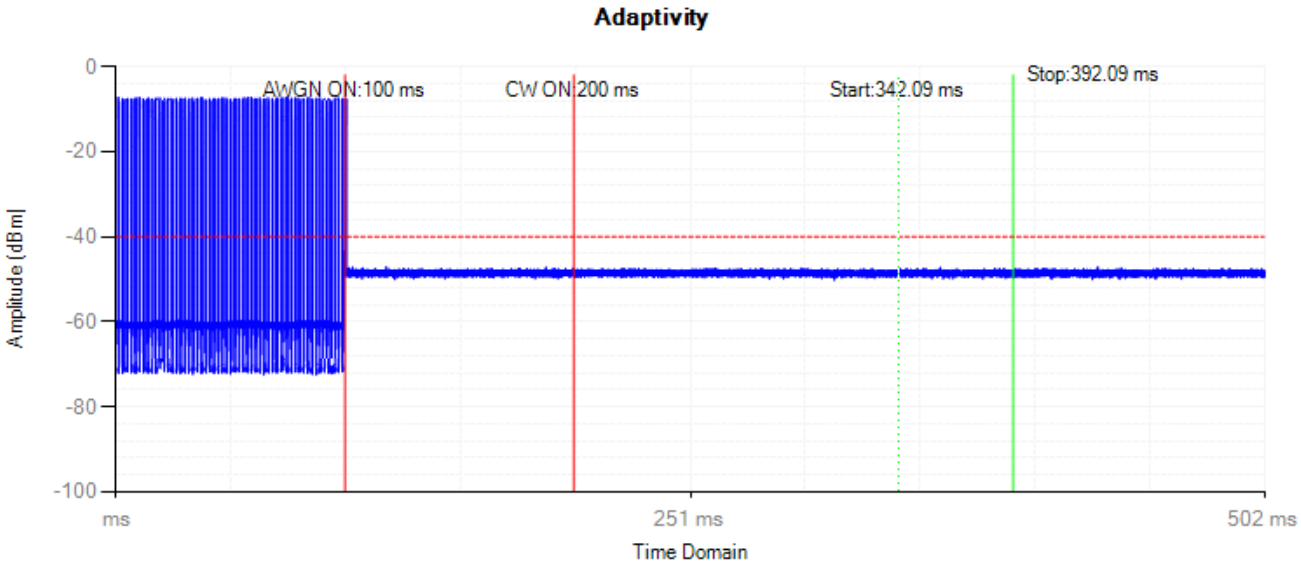
Test plot (802.11g-High channel, ANT1):



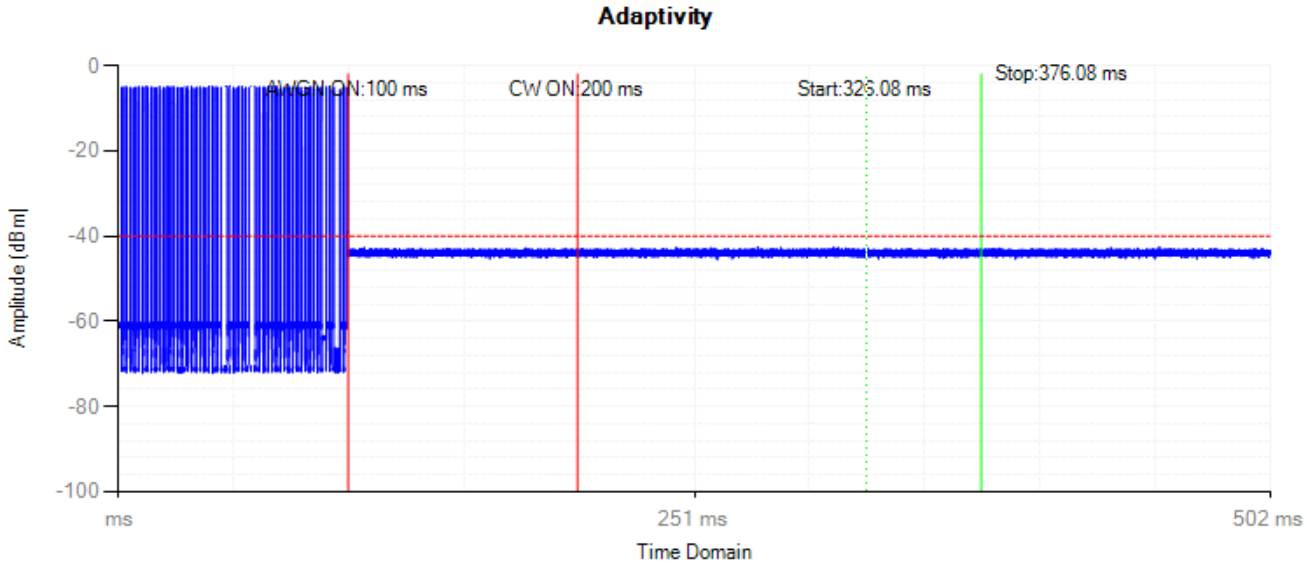
The Worst Test Mode (ANT1)	802.11n20: Low Channel
AWGN Interference Level (dBm)	-64.96
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max. COT (ms)	2.61
Pulse width (ms)	0
Duty Cycle (%)	0
The Worst Test Mode (ANT1)	802.11n20: High Channel
AWGN Interference Level (dBm)	-64.27
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	2.57
Pulse width (ms)	0
Duty Cycle (%)	0

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Test plot (802.11n20-Low channel, ANT1):



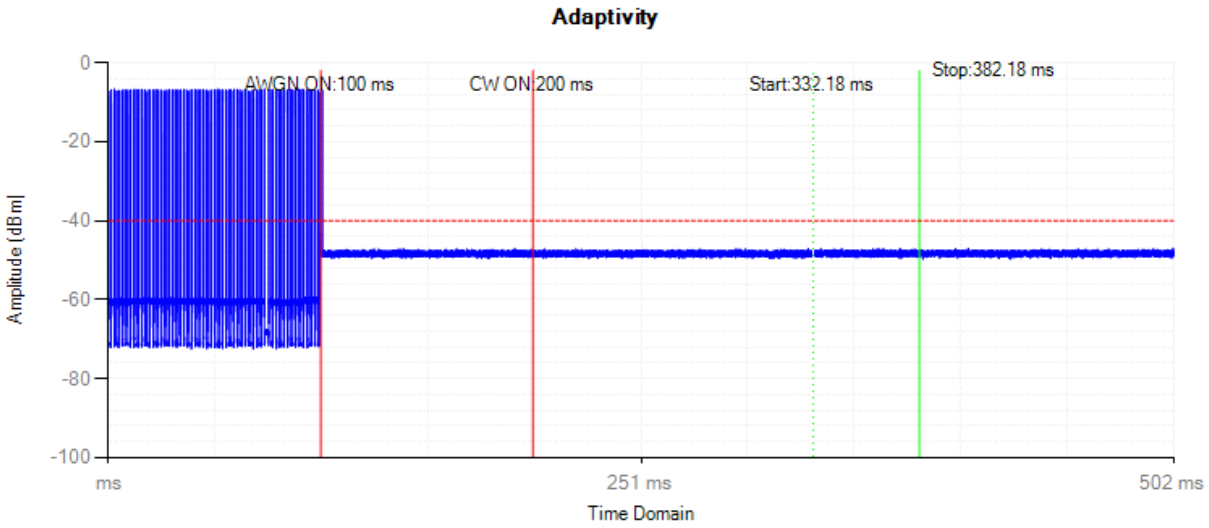
Test plot (802.11n20-High channel, ANT1):



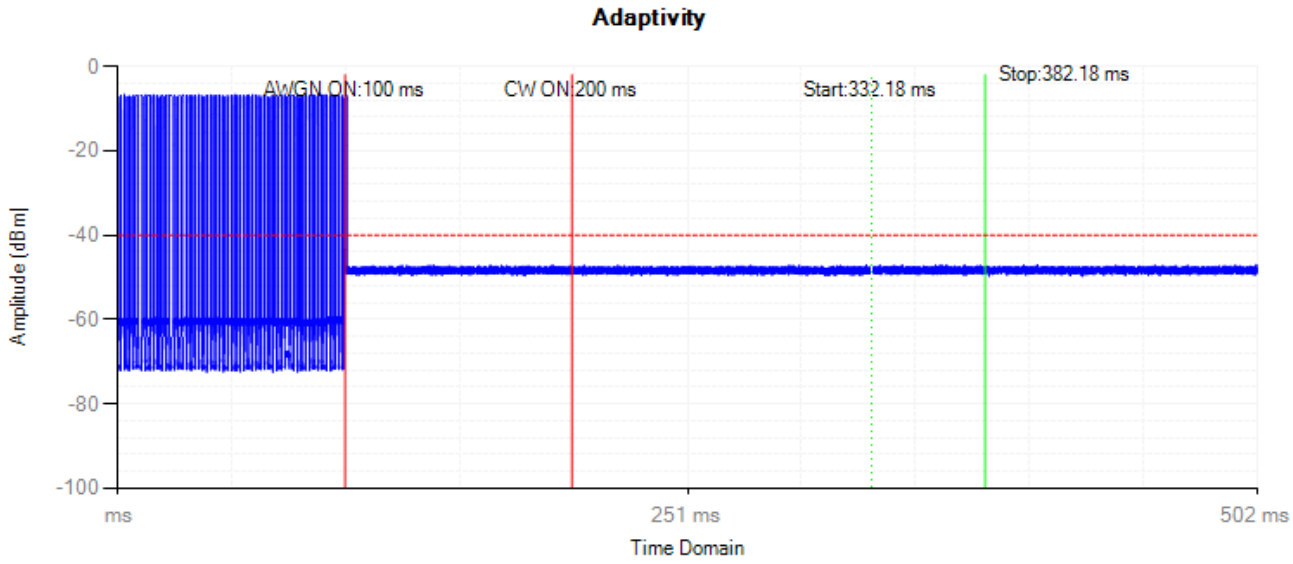
The Worst Test Mode (ANT1)	802.11n40: Low Channel
AWGN Interference Level (dBm)	-65.17
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max. COT (ms)	2.61
Pulse width (ms)	0
Duty Cycle (%)	0
The Worst Test Mode (ANT1)	802.11n40: High Channel
AWGN Interference Level (dBm)	-64.63
Blocking Interference Level (dBm)	-35
Interference Start Time (ms)	100
Stop time after interfering signal(ms)	100
Blocking ON Time (ms)	200
Suggest q Level	4
Max COT (ms)	3.22
Pulse width (ms)	0
Duty Cycle (%)	0

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Test plot (802.11n40-Low channel, ANT1):



Test plot (802.11n40-High channel, ANT1):



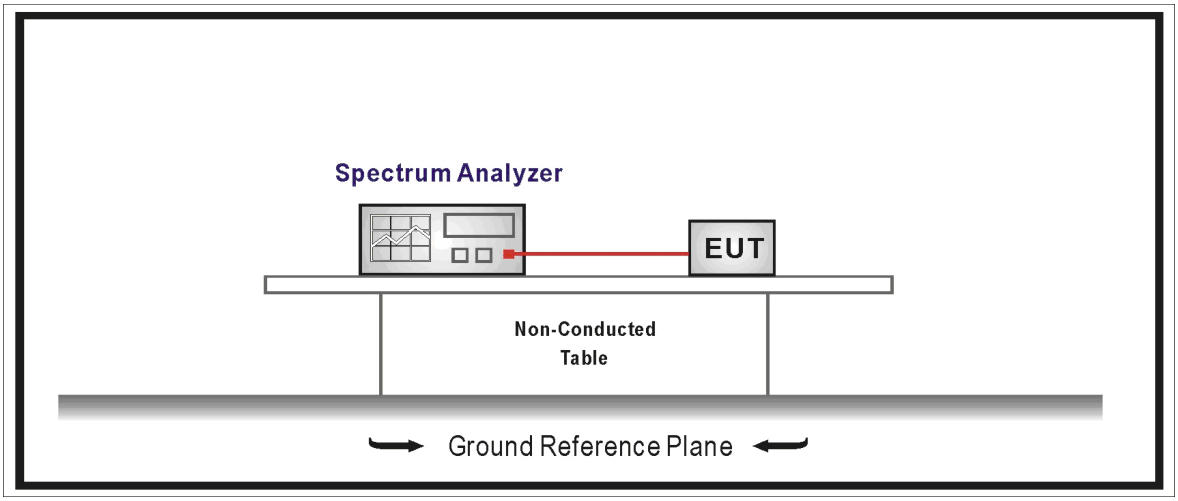
9. OCCUPIED CHANNEL BANDWIDTH

9.1. Limit

The Occupied Channel Bandwidth shall fall completely within the band given in 2.4GHz to 2.4835GHz.

In addition, for non-adaptive systems using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

9.2. Test Setup



9.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.8

Step 1:

Connect the UUT to the spectrum analyzer and use the following settings:

• Centre Frequency: The centre frequency of the channel under test

• Resolution BW: ~ 1 % of the span without going below 1 %

(we set RBW=400KHz for 802.11b/g/n20 and 820KHz for 802.11n40)

• Video BW: 3 × RBW (we set VBW=1.2MHz for 802.11b/g/n20 and 2.4MHz for 802.11n40)

• Frequency Span: 2 × Occupied Channel Bandwidth

(we set Span=40MHz(for 802.11b/g/n20) & 80MHz(for 802.11n40))

• Detector Mode: RMS

• Trace Mode: Max Hold

Step 2:

Wait until the trace is completed. Find the peak value of the trace and place the analyzer marker on this peak.

Step 3:

Use the 99 % bandwidth function of the spectrum analyzer to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

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9.4. Test Result

Product	:	4G Mobile Router
Test Item	:	Occupied Channel Bandwidth
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	99% Bandwidth (MHz)		Limit
		ANT1	ANT2	
01	2412	12.90	12.38	Within the band 2400.0MHz~2483.5MHz
13	2472	13.47	12.36	

Product	:	4G Mobile Router
Test Item	:	Occupied Channel Bandwidth
Test Mode	:	Mode 2: Transmit by 802.11g

Channel No.	Frequency (MHz)	99% Bandwidth (MHz)		Limit
		ANT1	ANT2	
01	2412	17.32	17.12	Within the band 2400.0MHz~2483.5MHz
13	2472	18.27	17.31	

Product	:	4G Mobile Router
Test Item	:	Occupied Channel Bandwidth
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz)

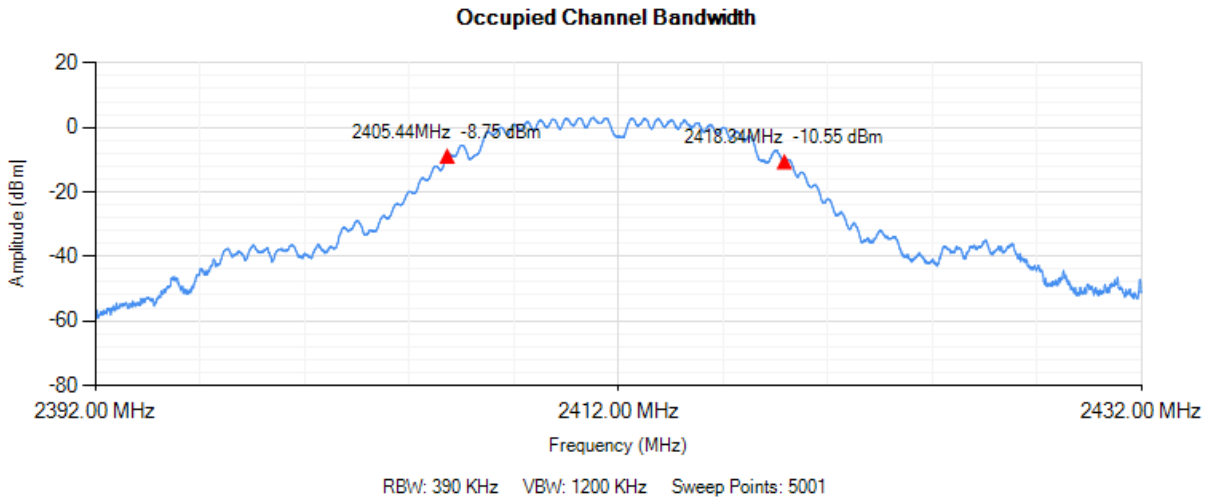
Channel No.	Frequency (MHz)	99% Bandwidth (MHz)		Limit
		ANT1	ANT2	
01	2412	18.08	17.87	Within the band 2400.0MHz~2483.5MHz
13	2472	18.59	17.86	

Product	:	4G Mobile Router
Test Item	:	Occupied Channel Bandwidth
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz)

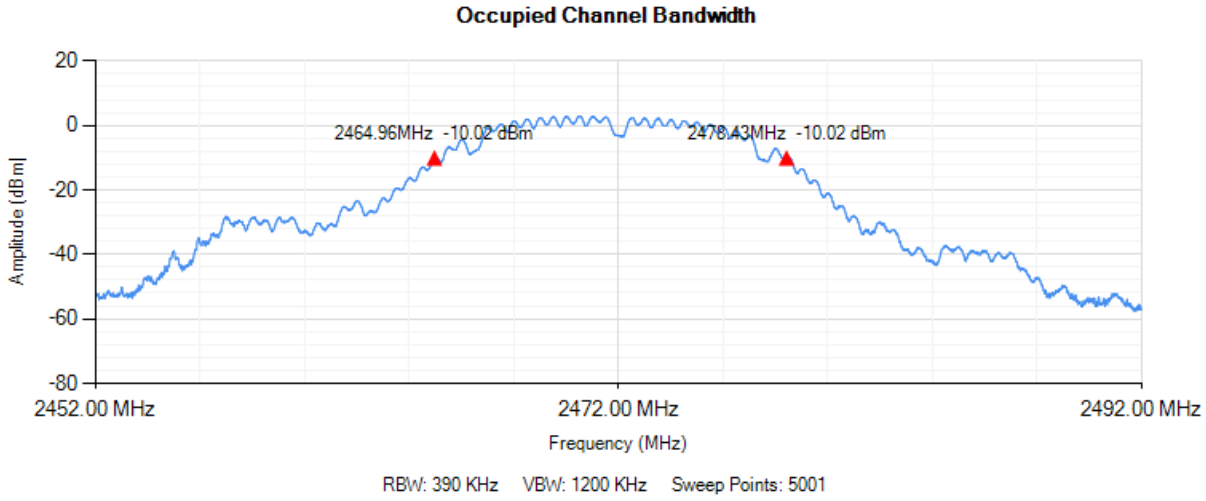
Channel No.	Frequency (MHz)	99% Bandwidth (MHz)		Limit
		ANT1	ANT2	
03	2422	35.45	36.32	Within the band 2400.0MHz~2483.5MHz
11	2462	36.61	36.37	

Test Result	:	Pass

802.11b-Low channel (The Worst Case: ANT1)

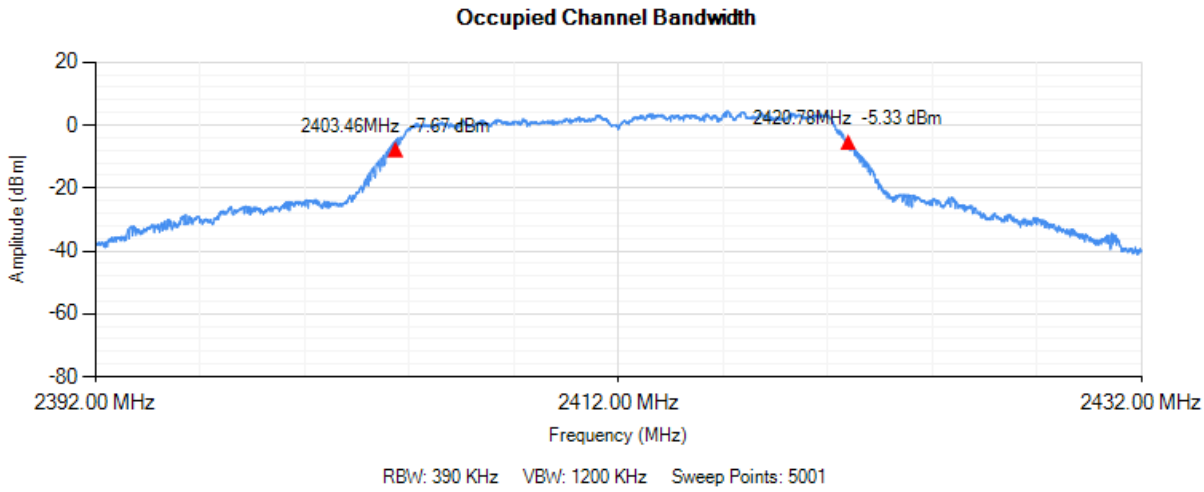


802.11b-High channel (The Worst Case: ANT1)

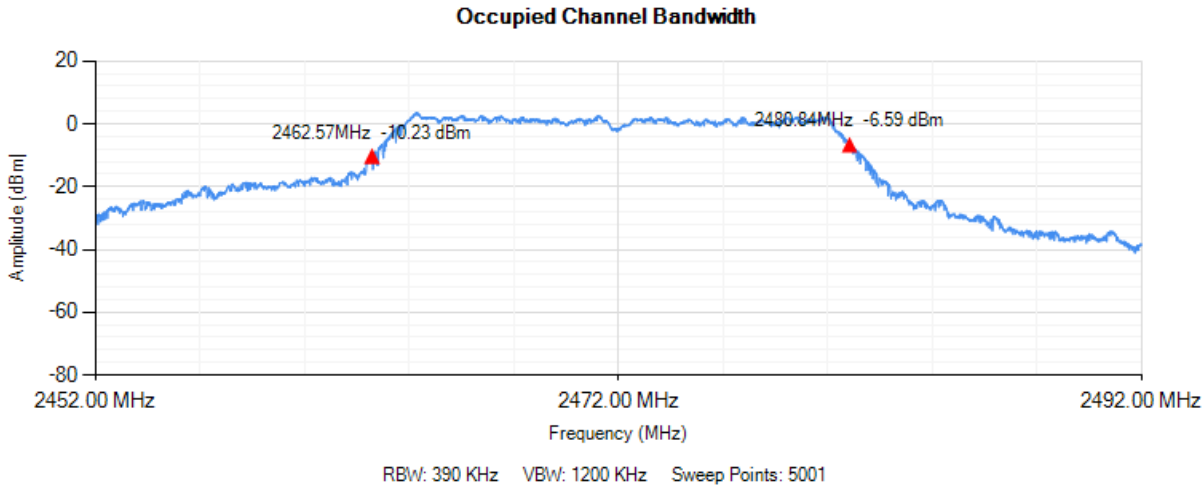


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802.11g-Low channel (The Worst Case: ANT1)

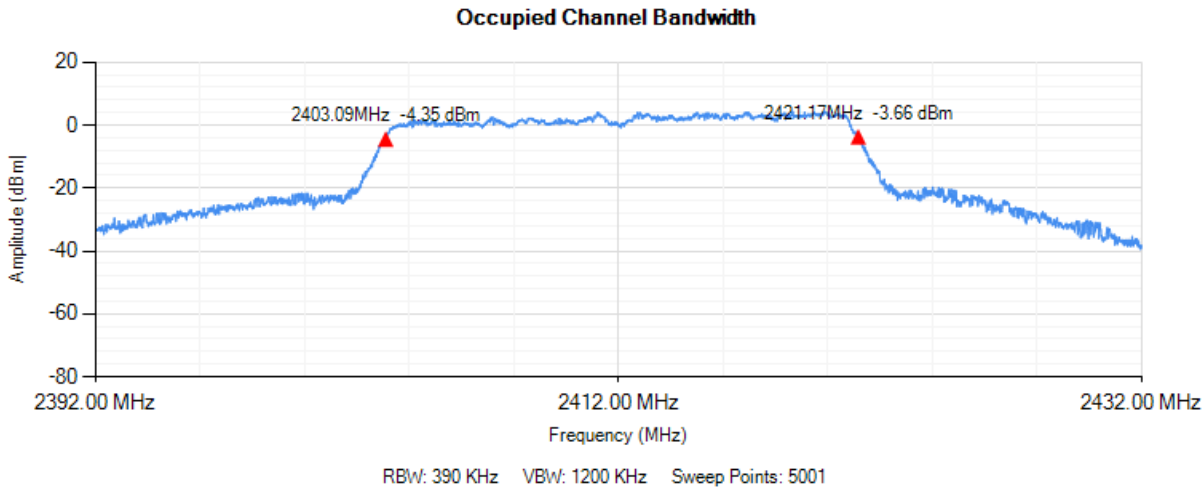


802.11g-High channel (The Worst Case: ANT1)

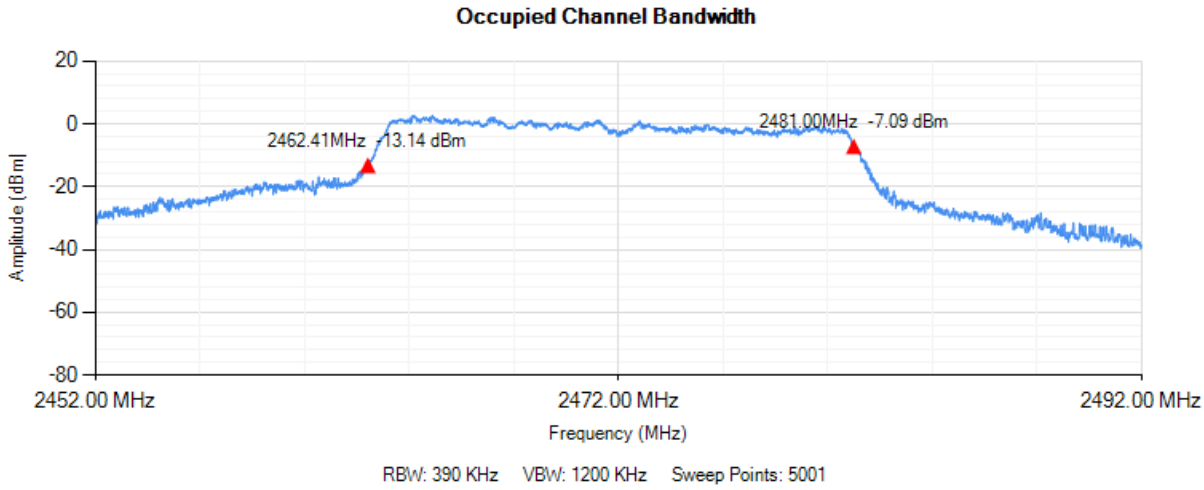


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802.11n-HT20-Low channel (The Worst Case: ANT1)

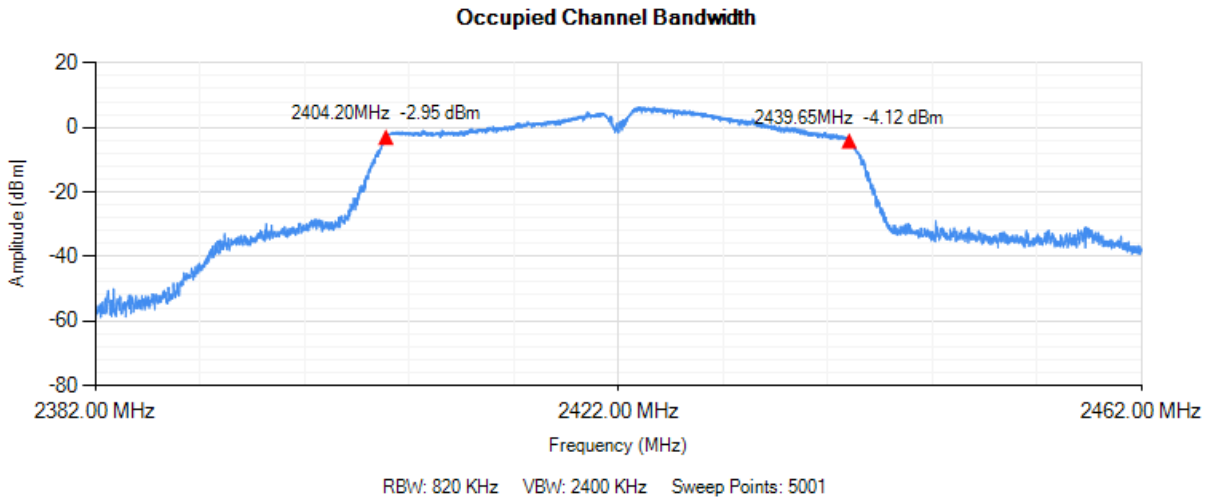


802.11n-HT20-High channel (The Worst Case: ANT1)

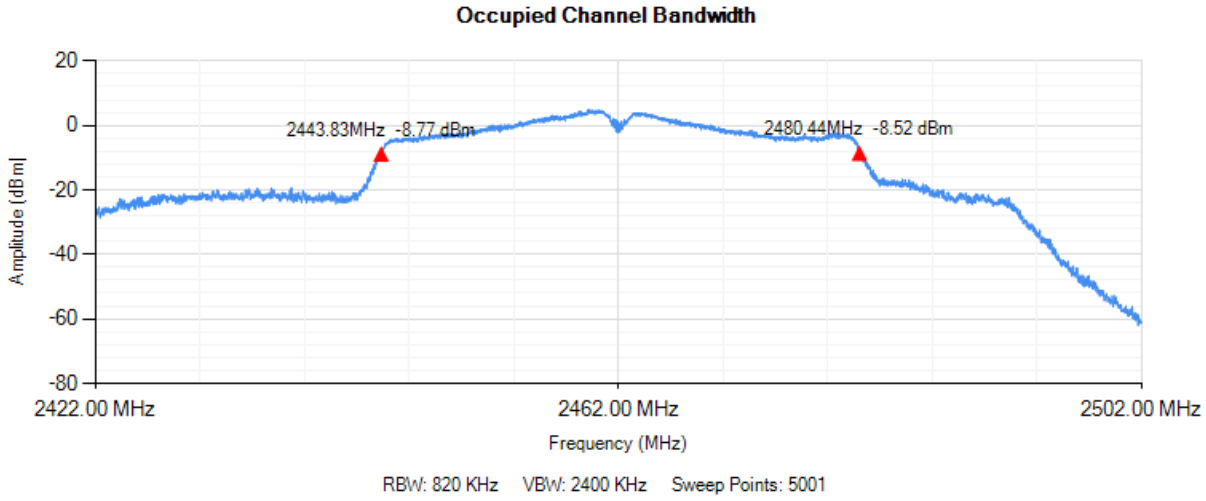


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802.11n-HT40-Low channel (The Worst Case: ANT1)



802.11n-HT40-High channel (The Worst Case: ANT1)



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10. TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

10.1. Limit

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.

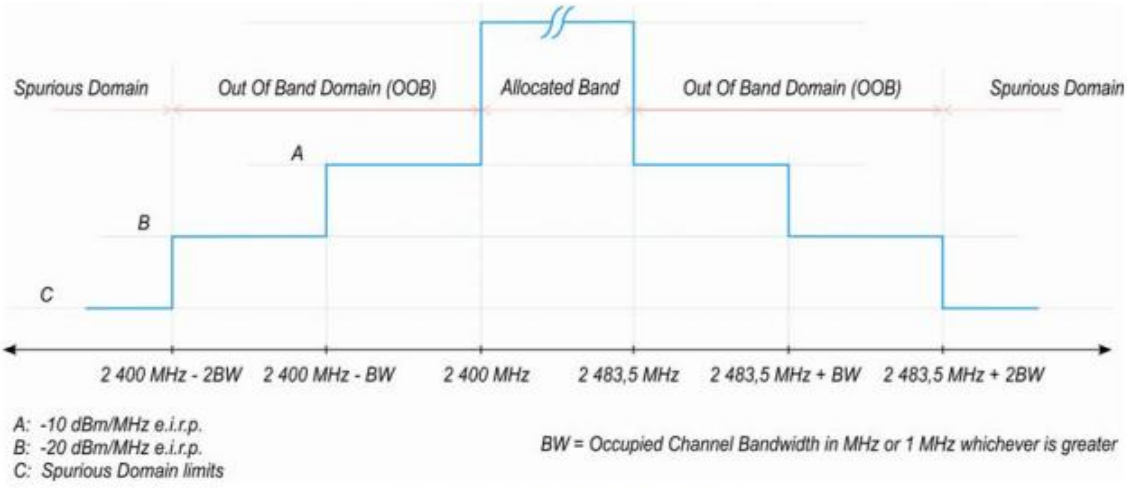
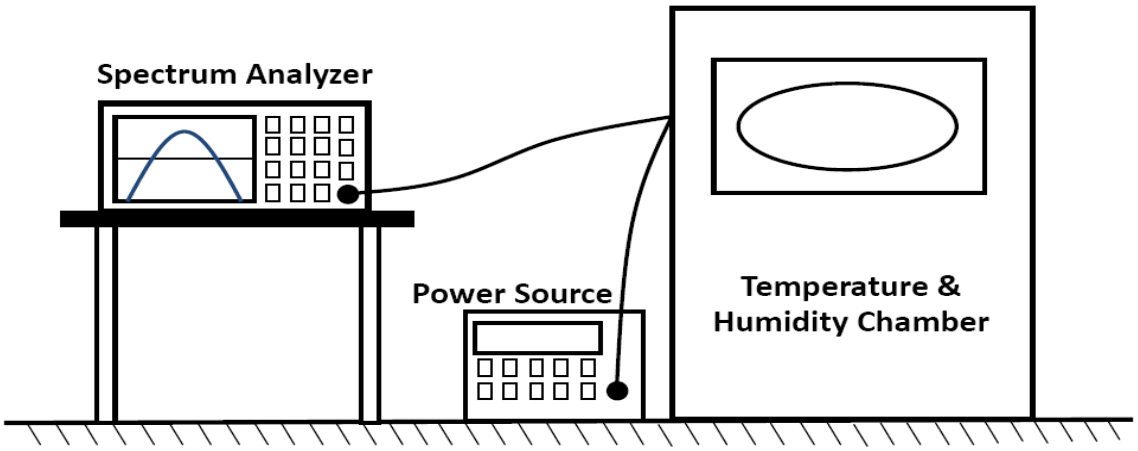


Figure 3: Transmit mask

10.2. Test Setup

For Conducted Measurement



10.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.9

Step 1:

• Connect the UUT to the spectrum analyzer and use the following settings:
- Centre Frequency: 2 484 MHz
- Span: 0 Hz
- Resolution BW: 1 MHz
- Filter mode: Channel filter
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Clear / Write
- Sweep Mode: Continuous
- Sweep Points: 5 000
- Trigger Mode: Video trigger

NOTE 1: In case video triggering is not possible, an external trigger source may be used.

- Sweep Time: Suitable to capture one transmission burst

Step 2: (segment 2 483,5 MHz to 2 483,5 MHz + BW)

• Adjust the trigger level to select the transmissions with the highest power level.

• For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.

• Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.

• Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.

• Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3: (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW)

• Change the centre frequency of the analyzer to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz.

Step 4: (segment 2 400 MHz - BW to 2 400 MHz)

• Change the centre frequency of the analyzer to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

Step 5: (segment 2 400 MHz - 2BW to 2 400 MHz - BW)

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• Change the centre frequency of the analyzer to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

Step 6:

• In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figures 1 or 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.

• In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figures 1 or 3.
- Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by 10 x log10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE 2: Ach refers to the number of active transmit chains.

It shall be recorded whether the equipment complies with the mask provided in figures 1 or 3.

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10.4. Test Result

Product	:	4G Mobile Router
Test Item	:	Transmitter unwanted emissions in the out-of-band domain
Test Mode	:	Mode 1: Transmit by 802.11b (The Worst Case: ANT1)

Frequency (MHz)	Test Conditions (℃)	Max measured Values (dBm/MHz)	Limit (dBm/MHz)
2400–2BW~ 2400-BW	25	-53.20	-20
2400–BW~2400	25	-25.29	-10
2483.5~ 2483.5+BW	25	-38.34	-10
2483.5+BW~ 2483.5+2BW	25	-64.63	-20

Product	:	4G Mobile Router
Test Item	:	Transmitter unwanted emissions in the out-of-band domain
Test Mode	:	Mode 2: Transmit by 802.11g (The Worst Case: ANT1)

Frequency (MHz)	Test Conditions (℃)	Max measured Values (dBm/MHz)	Limit (dBm/MHz)
2400–2BW~ 2400-BW	25	-54.02	-20
2400–BW~2400	25	-14.70	-10
2483.5~ 2483.5+BW	25	-26.69	-10
2483.5+BW~ 2483.5+2BW	25	-65.58	-20

Product	:	4G Mobile Router
Test Item	:	Transmitter unwanted emissions in the out-of-band domain
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz) (The Worst Case: ANT1)

Frequency (MHz)	Test Conditions (℃)	Max measured Values (dBm/MHz)	Limit (dBm/MHz)
2400–2BW~ 2400-BW	25	-54.28	-20
2400–BW~2400	25	-13.26	-10
2483.5~ 2483.5+BW	25	-27.53	-10
2483.5+BW~ 2483.5+2BW	25	-65.75	-20

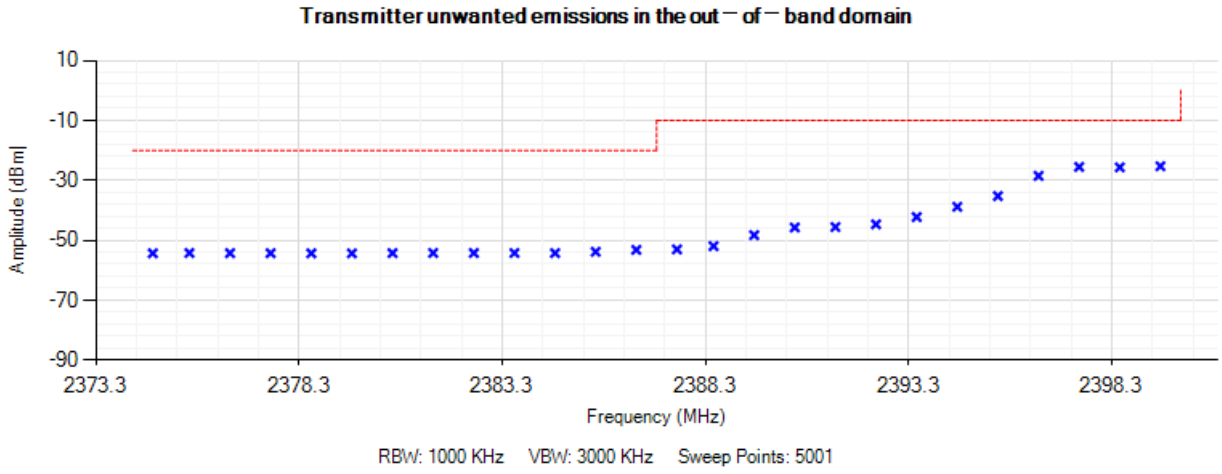
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Product	:	4G Mobile Router
Test Item	:	Transmitter unwanted emissions in the out-of-band domain
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz) (The Worst Case: ANT1)

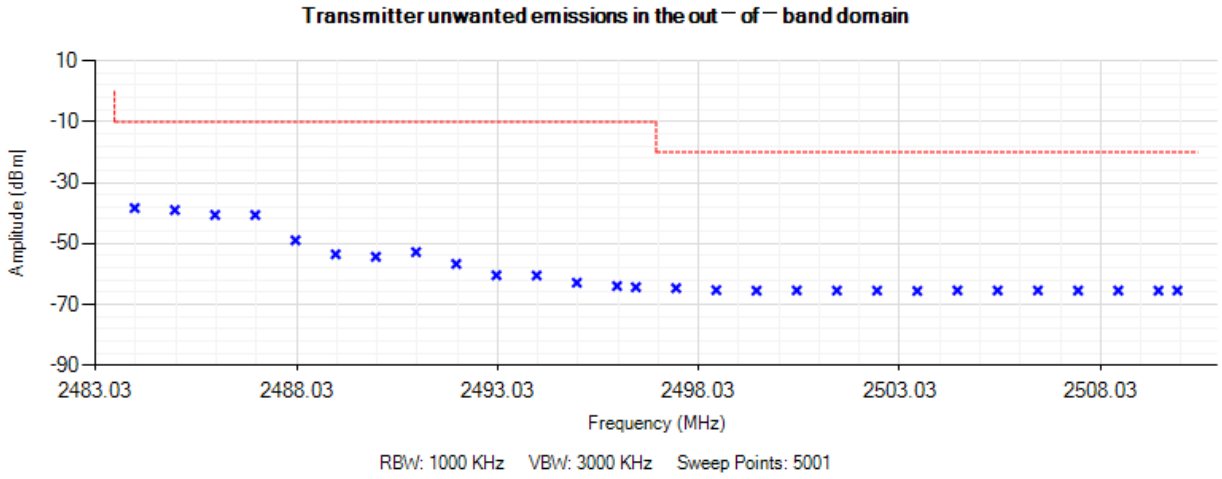
Frequency (MHz)	Test Conditions (℃)	Max measured Values (dBm/MHz)	Limit (dBm/MHz)
2400–2BW~ 2400-BW	25	-54.38	-20
2400–BW~2400	25	-24.64	-10
2483.5~ 2483.5+BW	25	-21.07	-10
2483.5+BW~ 2483.5+2BW	25	-65.55	-20

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802.11b- Low channel (The Worst Case: ANT1)

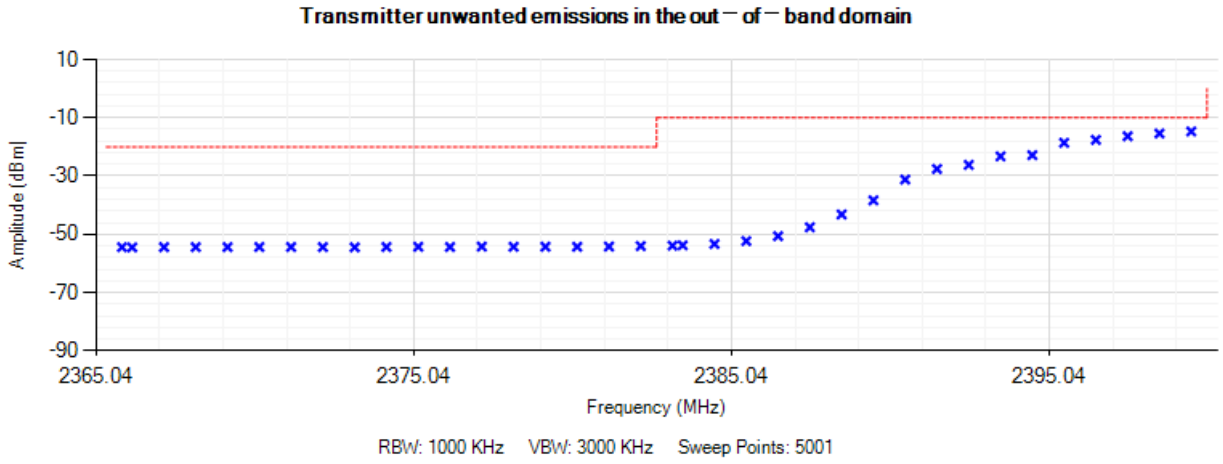


802.11b- High channel (The Worst Case: ANT1)

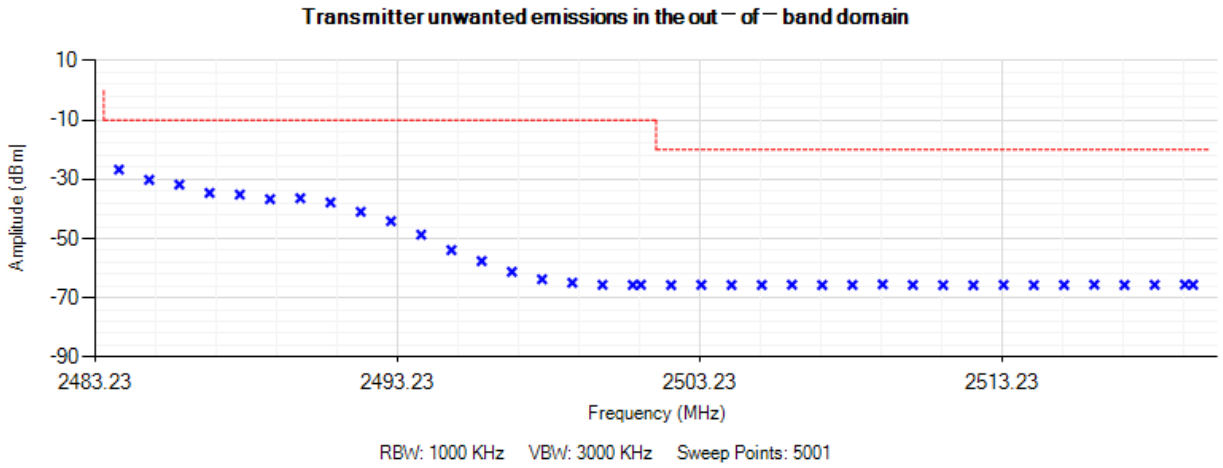


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802.11g- Low channel (The Worst Case: ANT1)

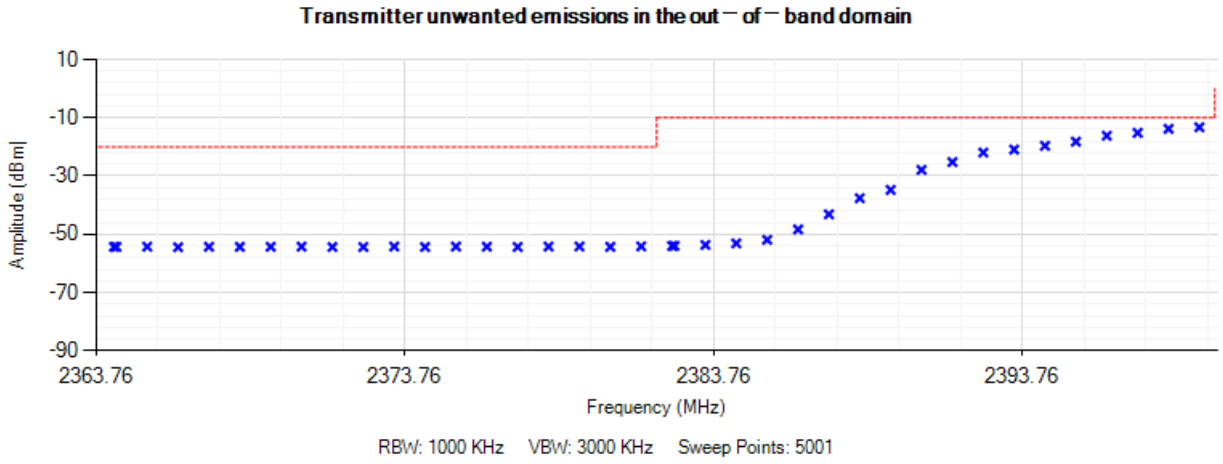


802.11g- High channel (The Worst Case: ANT1)

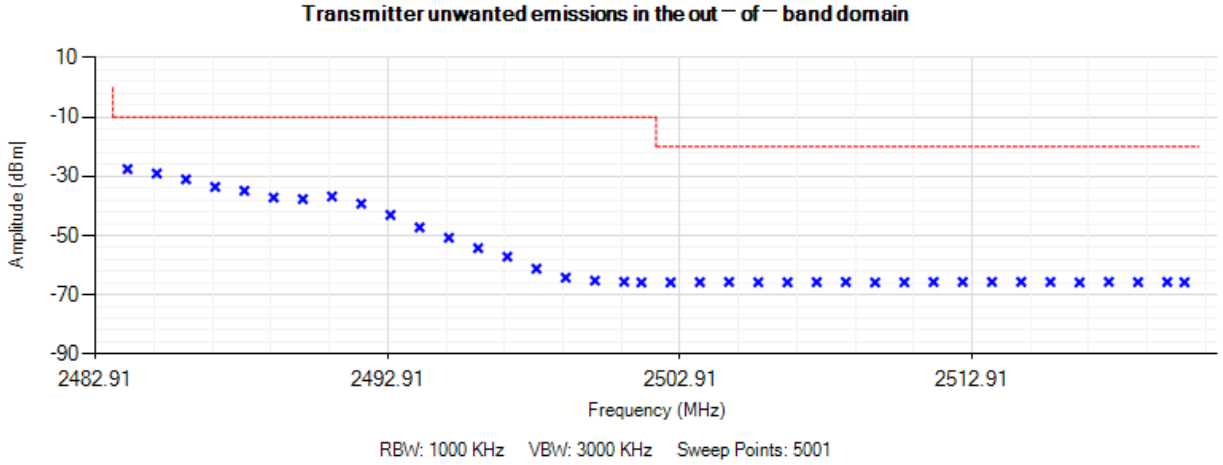


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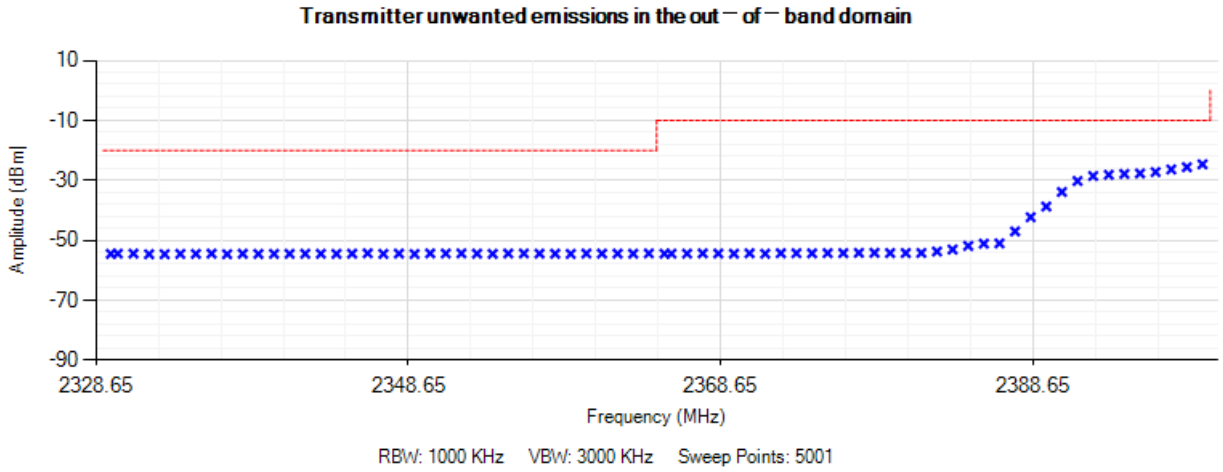
802.11n(HT20)- Low channel (The Worst Case: ANT1)



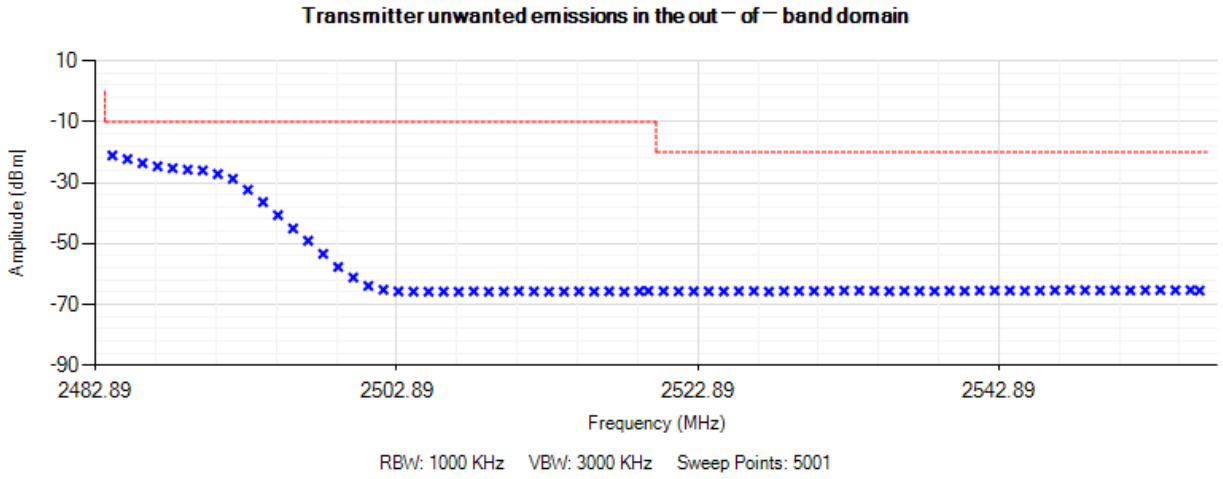
802.11n(HT20)- High channel (The Worst Case: ANT1)



802.11n(HT40)- Low channel (The Worst Case: ANT1)



802.11n(HT40)- High channel (The Worst Case: ANT1)



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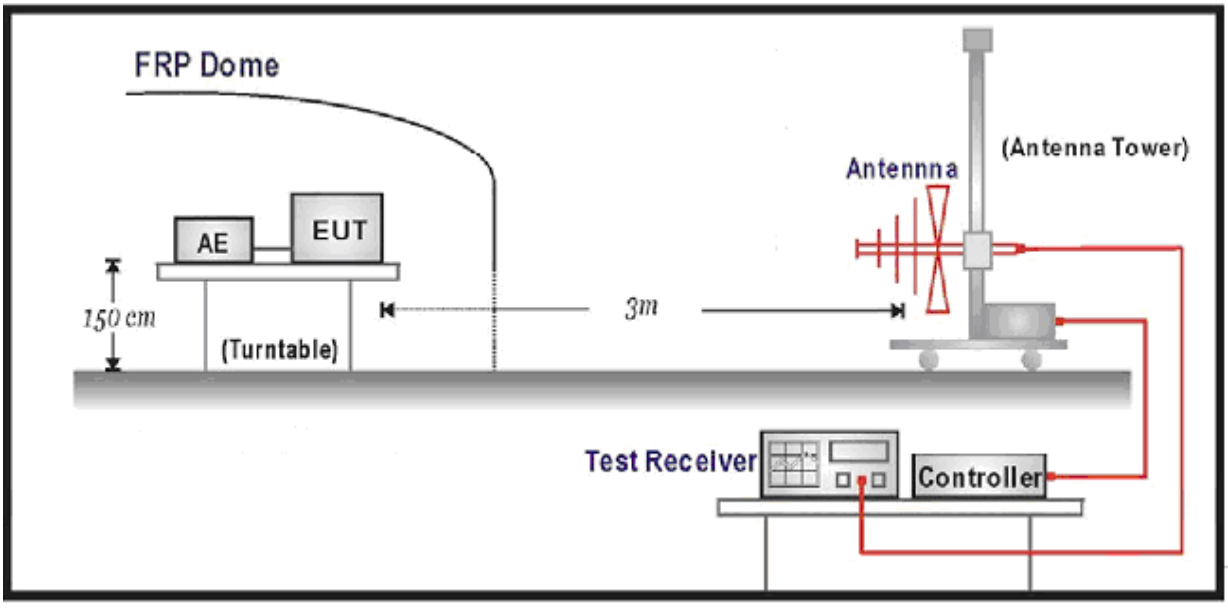
11. TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

11.1. Limit

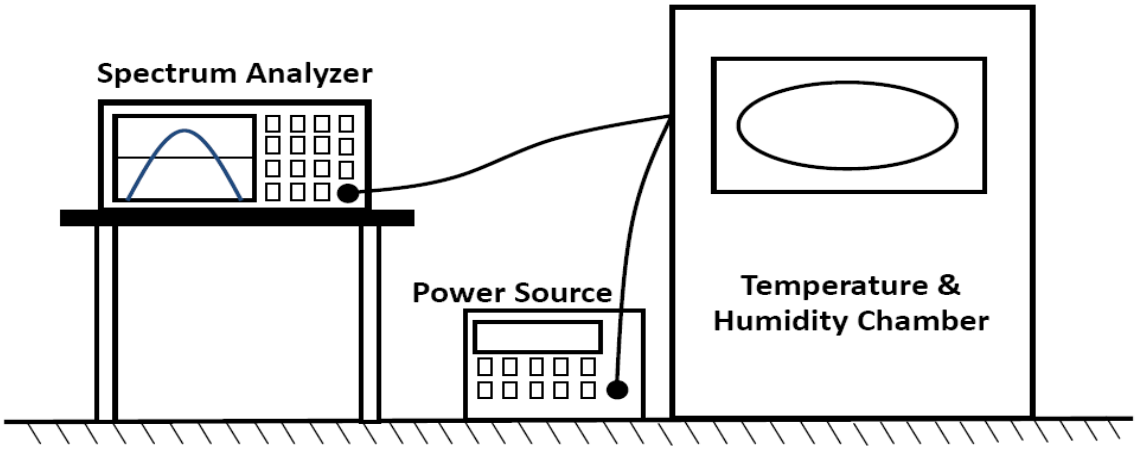
Transmitter Limits for Spurious Emissions		
Frequency Range	Maximum power E.R.P. (≤ 1GHz) E.I.R.P. (> 1GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

11.2. Test Setup

For Radiated Measurement



For Conducted Measurement



11.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.10

Step 1:

The sensitivity of the spectrum analyzer should be such that the noise floor is at least 12 dB below the limits given in tables 1 or 4.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyzer settings:

• Resolution bandwidth: 100 kHz

• Video bandwidth: 300 kHz

• Detector mode: Peak

• Trace Mode: Max Hold

• Sweep Points: ≥ 9 970

NOTE 1: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.

• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT. For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on the same hopping frequency in different hopping sequences. Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.10.2.1.2 and compared to the limits given in tables 1 or 4.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyzer settings:

• Resolution bandwidth: 1 MHz

• Video bandwidth: 3 MHz

• Detector mode: Peak

• Trace Mode: Max Hold

• Sweep Points: ≥ 11 750

NOTE 2: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.

• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.

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11.4. Test Result

Product	:	4G Mobile Router
Test Item	:	Transmitter spurious emissions (Radiated Measurement)
Test Mode	:	Mode 1: Transmit by 802.11b (The Worst Case: ANT1)

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)					
295.39	H	-47.61	-36.00	-11.61	PK
121.58	V	-49.00	-36.00	-13.00	PK
821.52	H	-68.48	-54.00	-14.48	PK
810.28	V	-66.30	-54.00	-12.30	PK
4823.99	H	-40.60	-30.00	-10.60	PK
4823.97	V	-44.80	-30.00	-14.80	PK
7235.98	H	-41.50	-30.00	-11.50	PK
7235.97	V	-44.21	-30.00	-14.21	PK
Channel 13 (2472MHz)					
265.84	H	-46.37	-36.00	-10.37	PK
239.53	V	-49.08	-36.00	-13.08	PK
855.55	H	-68.26	-54.00	-14.26	PK
824.02	V	-68.12	-54.00	-14.12	PK
4944.01	H	-44.51	-30.00	-14.51	PK
4943.98	V	-43.29	-30.00	-13.29	PK
7416.03	H	-44.99	-30.00	-14.99	PK
7415.99	V	-43.11	-30.00	-13.11	PK

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Product	:	4G Mobile Router
Test Item	:	Transmitter spurious emissions (Radiated Measurement)
Test Mode	:	Mode 2: Transmit by 802.11g (The Worst Case: ANT1)

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)					
298.99	H	-48.22	-36.00	-12.22	PK
195.17	V	-66.39	-54.00	-12.39	PK
985.46	H	-48.79	-36.00	-12.79	PK
994.10	V	-49.90	-36.00	-13.90	PK
4823.99	H	-42.95	-30.00	-12.95	PK
4823.99	V	-41.35	-30.00	-11.35	PK
7236.00	H	-41.59	-30.00	-11.59	PK
7235.97	V	-41.59	-30.00	-11.59	PK
Channel 13 (2472MHz)					
281.94	H	-47.82	-36.00	-11.82	PK
241.67	V	-47.51	-36.00	-11.51	PK
830.15	H	-65.07	-54.00	-11.07	PK
994.29	V	-49.31	-36.00	-13.31	PK
4943.96	H	-42.41	-30.00	-12.41	PK
4944.00	V	-40.99	-30.00	-10.99	PK
7415.97	H	-40.25	-30.00	-10.25	PK
7416.00	V	-41.24	-30.00	-11.24	PK

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Product	:	4G Mobile Router
Test Item	:	Transmitter spurious emissions (Radiated Measurement)
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz) (The Worst Case: ANT1+ANT2)

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)					
218.07	H	-68.60	-54.00	-14.60	PK
261.38	V	-46.76	-36.00	-10.76	PK
944.55	H	-48.49	-36.00	-12.49	PK
935.59	V	-47.97	-36.00	-11.97	PK
4823.98	H	-42.13	-30.00	-12.13	PK
4824.00	V	-42.16	-30.00	-12.16	PK
7236.02	H	-43.64	-30.00	-13.64	PK
7235.97	V	-42.26	-30.00	-12.26	PK
Channel 13 (2472MHz)					
145.43	H	-48.58	-36.00	-12.58	PK
235.46	V	-46.61	-36.00	-10.61	PK
846.97	H	-66.31	-54.00	-12.31	PK
907.41	V	-47.44	-36.00	-11.44	PK
4944.03	H	-42.94	-30.00	-12.94	PK
4943.98	V	-41.12	-30.00	-11.12	PK
7416.02	H	-40.75	-30.00	-10.75	PK
7415.98	V	-40.63	-30.00	-10.63	PK

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Product	:	4G Mobile Router
Test Item	:	Transmitter spurious emissions (Radiated Measurement)
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz) (The Worst Case: ANT1+ANT2)

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 03 (2422MHz)					
159.48	H	-50.70	-36.00	-14.70	PK
100.68	V	-64.46	-54.00	-10.46	PK
869.18	H	-49.95	-36.00	-13.95	PK
998.66	V	-50.94	-36.00	-14.94	PK
4824.04	H	-40.09	-30.00	-10.09	PK
4824.02	V	-43.30	-30.00	-13.30	PK
7236.03	H	-44.96	-30.00	-14.96	PK
7235.97	V	-40.29	-30.00	-10.29	PK
Channel 11 (2462MHz)					
195.92	H	-67.24	-54.00	-13.24	PK
195.71	V	-65.48	-54.00	-11.48	PK
916.89	H	-47.07	-36.00	-11.07	PK
827.13	V	-64.83	-54.00	-10.83	PK
4944.01	H	-40.28	-30.00	-10.28	PK
4944.01	V	-43.08	-30.00	-13.08	PK
7415.99	H	-42.96	-30.00	-12.96	PK
7416.02	V	-43.66	-30.00	-13.66	PK

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Product	:	4G Mobile Router
Test Item	:	Transmitter spurious emissions (Conducted Measurement)
Test Mode	:	Mode 1: Transmit by 802.11b (The Worst Case: ANT1)

Frequency (MHz)	Measure Level(dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)				
281.45	-47.68	-36.00	-11.68	PK
863.57	-48.05	-36.00	-12.05	PK
4824.00	-40.95	-30.00	-10.95	PK
7236.03	-41.34	-30.00	-11.34	PK
Channel 13 (2472MHz)				
263.54	-50.44	-36.00	-14.44	PK
963.68	-47.35	-36.00	-11.35	PK
4944.04	-44.66	-30.00	-14.66	PK
7416.03	-40.59	-30.00	-10.59	PK

Product	:	4G Mobile Router
Test Item	:	Transmitter spurious emissions (Conducted Measurement)
Test Mode	:	Mode 2: Transmit by 802.11g (The Worst Case: ANT1)

Frequency (MHz)	Measure Level(dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)				
281.63	-49.48	-36.00	-13.48	PK
842.80	-66.55	-54.00	-12.55	PK
4824.03	-42.45	-30.00	-12.45	PK
7236.01	-43.08	-30.00	-13.08	PK
Channel 13 (2472MHz)				
234.17	-50.40	-36.00	-14.40	PK
999.73	-50.64	-36.00	-14.64	PK
4944.04	-44.99	-30.00	-14.99	PK
7416.02	-42.10	-30.00	-12.10	PK

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Product	:	4G Mobile Router
Test Item	:	Transmitter spurious emissions (Conducted Measurement)
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz) (The Worst Case: ANT1)

Frequency (MHz)	Measure Level(dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)				
160.91	-48.82	-36.00	-12.82	PK
855.13	-67.04	-54.00	-13.04	PK
4824.04	-41.55	-30.00	-11.55	PK
7235.98	-43.20	-30.00	-13.20	PK
Channel 13 (2472MHz)				
248.33	-49.35	-36.00	-13.35	PK
811.30	-66.94	-54.00	-12.94	PK
4944.01	-44.08	-30.00	-14.08	PK
7416.03	-40.59	-30.00	-10.59	PK

Product	:	4G Mobile Router
Test Item	:	Transmitter spurious emissions (Conducted Measurement)
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz) (The Worst Case: ANT1)

Frequency (MHz)	Measure Level(dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 03 (2422MHz)				
169.54	-46.78	-36.00	-10.78	PK
834.59	-67.29	-54.00	-13.29	PK
4823.98	-40.96	-30.00	-10.96	PK
7235.97	-40.85	-30.00	-10.85	PK
Channel 11 (2462MHz)				
264.89	-48.44	-36.00	-12.44	PK
940.67	-48.58	-36.00	-12.58	PK
4943.96	-44.75	-30.00	-14.75	PK
7415.98	-44.09	-30.00	-14.09	PK

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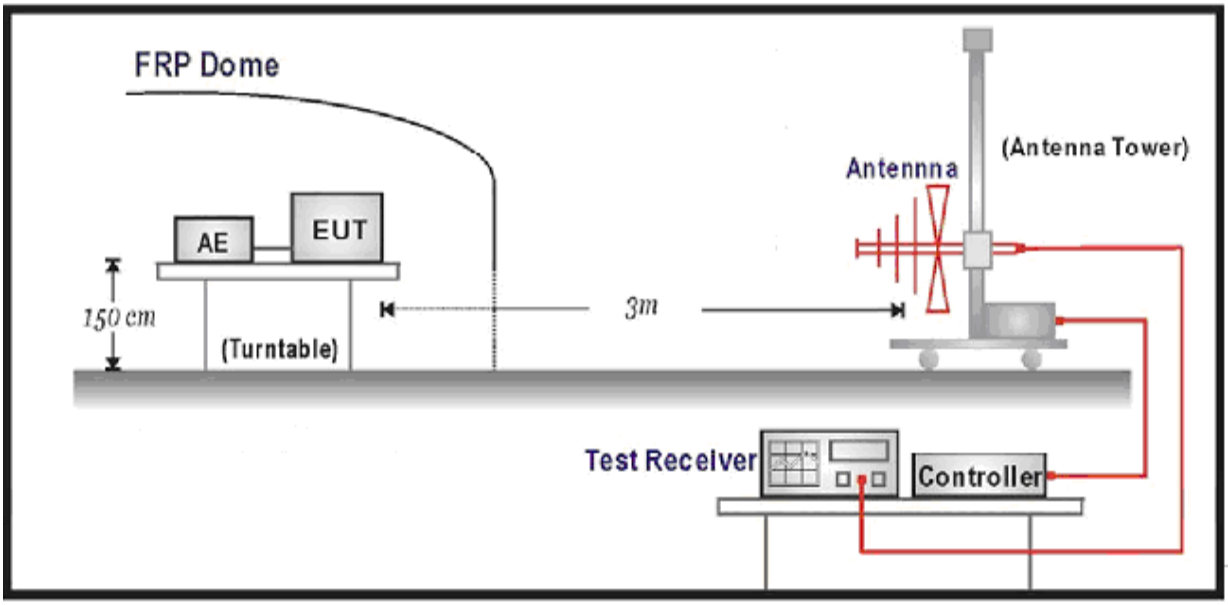
12. RECEIVER SPURIOUS EMISSIONS

12.1. Limit

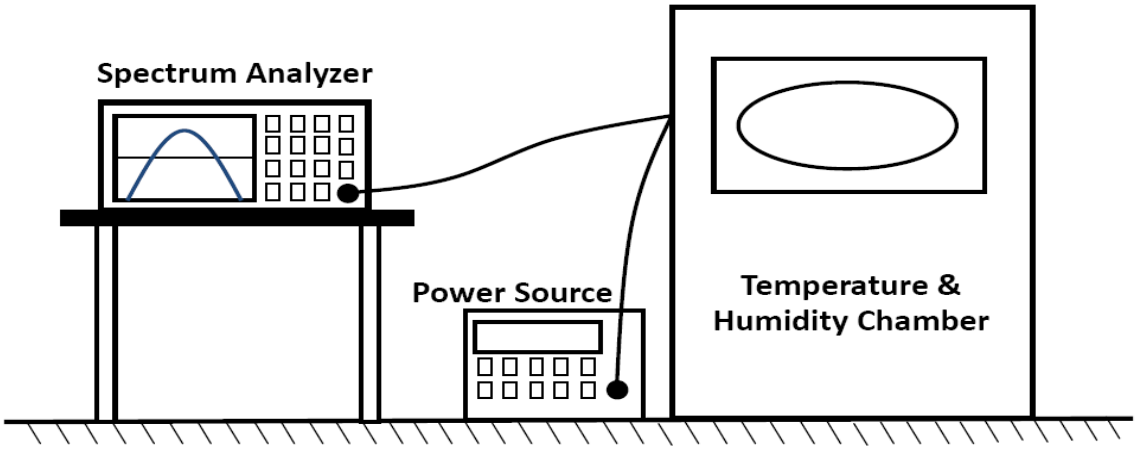
Spurious emissions limits for receivers		
Frequency Range	Maximum power E.R.P. (≤ 1GHz) E.I.R.P. (> 1GHz)	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

12.2. Test Setup

For Radiated Measurement



For Conducted Measurement



12.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.11

Step 1:

The sensitivity of the spectrum analyzer should be such that the noise floor is at least 12 dB below the limits given in tables 2 or 5.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyzer settings:

• Resolution bandwidth: 100 kHz
• Video bandwidth: 300 kHz
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 9 970
• Sweep time: Auto

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.11.2.1.2 and compared to the limits given in tables 2 or 5.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyzer settings:

• Resolution bandwidth: 1 MHz
• Video bandwidth: 3 MHz
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 11 750
• Sweep time: Auto

Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.11.2.1.2 and compared to the limits given in tables 2 or 5. Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.3.11.2.1.2.

Step 4:

• In case of conducted measurements on smart antenna systems (equipment with multiple receive chains), the steps 2 and 3 need to be repeated for each of the active receive chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active receive chains).

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12.4. Test Result

Product	:	4G Mobile Router
Test Item	:	Receiver spurious emissions(Radiated Measurement)
Test Mode	:	Mode 5: Receive by 802.11b (The Worst Case: ANT1)

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)					
255.22	H	-71.69	-57.00	-14.69	PK
280.12	V	-68.50	-57.00	-11.50	PK
900.46	H	-71.67	-57.00	-14.67	PK
924.59	V	-70.39	-57.00	-13.39	PK
1403.10	H	-57.25	-47.00	-10.25	PK
1396.56	V	-60.02	-47.00	-13.02	PK
2355.21	H	-58.18	-47.00	-11.18	PK
2792.49	V	-61.94	-47.00	-14.94	PK
Channel 13 (2472MHz)					
278.73	H	-70.50	-57.00	-13.50	PK
203.37	V	-69.77	-57.00	-12.77	PK
958.05	H	-68.91	-57.00	-11.91	PK
952.19	V	-67.52	-57.00	-10.52	PK
1404.31	H	-60.24	-47.00	-13.24	PK
1593.41	V	-60.46	-47.00	-13.46	PK
2620.79	H	-60.20	-47.00	-13.20	PK
2411.03	V	-60.07	-47.00	-13.07	PK

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Product	:	4G Mobile Router
Test Item	:	Receiver spurious emissions(Radiated Measurement)
Test Mode	:	Mode 6: Receive by 802.11g (The Worst Case: ANT1)

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)					
263.46	H	-69.38	-57.00	-12.38	PK
269.66	V	-68.68	-57.00	-11.68	PK
888.94	H	-70.03	-57.00	-13.03	PK
884.09	V	-71.63	-57.00	-14.63	PK
1662.68	H	-61.74	-47.00	-14.74	PK
1753.27	V	-60.13	-47.00	-13.13	PK
2608.64	H	-57.60	-47.00	-10.60	PK
2636.23	V	-60.24	-47.00	-13.24	PK
Channel 13 (2472MHz)					
110.50	H	-70.58	-57.00	-13.58	PK
195.00	V	-70.17	-57.00	-13.17	PK
994.93	H	-69.98	-57.00	-12.98	PK
801.47	V	-68.05	-57.00	-11.05	PK
1726.60	H	-59.23	-47.00	-12.23	PK
1627.32	V	-59.85	-47.00	-12.85	PK
2745.61	H	-59.13	-47.00	-12.13	PK
2867.92	V	-59.82	-47.00	-12.82	PK

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Product	:	4G Mobile Router
Test Item	:	Receiver spurious emissions(Radiated Measurement)
Test Mode	:	Mode 7: Receive by 802.11n(20MHz) (The Worst Case: ANT1+ANT2)

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)					
251.90	H	-67.50	-57.00	-10.50	PK
277.88	V	-71.03	-57.00	-14.03	PK
940.78	H	-67.11	-57.00	-10.11	PK
857.48	V	-68.48	-57.00	-11.48	PK
1579.79	H	-58.23	-47.00	-11.23	PK
1388.52	V	-60.82	-47.00	-13.82	PK
2811.76	H	-61.72	-47.00	-14.72	PK
2638.46	V	-58.80	-47.00	-11.80	PK
Channel 13 (2472MHz)					
208.27	H	-69.14	-57.00	-12.14	PK
218.10	V	-71.94	-57.00	-14.94	PK
917.84	H	-70.36	-57.00	-13.36	PK
803.39	V	-70.02	-57.00	-13.02	PK
1550.85	H	-61.21	-47.00	-14.21	PK
1783.26	V	-61.23	-47.00	-14.23	PK
2306.97	H	-61.78	-47.00	-14.78	PK
2662.06	V	-61.20	-47.00	-14.20	PK

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Product	:	4G Mobile Router
Test Item	:	Receiver spurious emissions(Radiated Measurement)
Test Mode	:	Mode 8: Receive by 802.11n(40MHz) (The Worst Case: ANT1+ANT2)

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 03 (2422MHz)					
105.02	H	-71.36	-57.00	-14.36	PK
241.87	V	-69.97	-57.00	-12.97	PK
967.65	H	-69.10	-57.00	-12.10	PK
838.08	V	-68.12	-57.00	-11.12	PK
1881.79	H	-61.36	-47.00	-14.36	PK
1423.99	V	-57.00	-47.00	-10.00	PK
2745.36	H	-61.11	-47.00	-14.11	PK
2771.27	V	-57.94	-47.00	-10.94	PK
Channel 11 (2462MHz)					
132.74	H	-71.18	-57.00	-14.18	PK
204.36	V	-69.25	-57.00	-12.25	PK
992.02	H	-71.62	-57.00	-14.62	PK
910.04	V	-68.30	-57.00	-11.30	PK
1401.23	H	-60.28	-47.00	-13.28	PK
1615.68	V	-58.97	-47.00	-11.97	PK
2460.85	H	-60.76	-47.00	-13.76	PK
2695.44	V	-61.10	-47.00	-14.10	PK

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Product	:	4G Mobile Router
Test Item	:	Receiver spurious emissions (Conducted Measurement)
Test Mode	:	Mode 5: Receive by 802.11b (The Worst Case: ANT1)

Frequency (MHz)	Measure Level(dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)				
179.57	-67.40	-57.00	-10.40	PK
857.00	-67.80	-57.00	-10.80	PK
1787.96	-58.87	-47.00	-11.87	PK
2476.46	-61.03	-47.00	-14.03	PK
Channel 13 (2472MHz)				
291.02	-71.72	-57.00	-14.72	PK
963.57	-67.68	-57.00	-10.68	PK
1842.61	-61.71	-47.00	-14.71	PK
2816.62	-61.62	-47.00	-14.62	PK

Product	:	4G Mobile Router
Test Item	:	Receiver spurious emissions (Conducted Measurement)
Test Mode	:	Mode 6: Receive by 802.11g (The Worst Case: ANT1)

Frequency (MHz)	Measure Level(dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)				
233.67	-70.49	-57.00	-13.49	PK
978.32	-70.25	-57.00	-13.25	PK
1852.97	-57.78	-47.00	-10.78	PK
2305.64	-60.99	-47.00	-13.99	PK
Channel 13 (2472MHz)				
249.73	-69.39	-57.00	-12.39	PK
853.36	-70.38	-57.00	-13.38	PK
1343.43	-61.01	-47.00	-14.01	PK
2389.36	-61.61	-47.00	-14.61	PK

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Product	:	4G Mobile Router
Test Item	:	Receiver spurious emissions (Conducted Measurement)
Test Mode	:	Mode 7: Receive by 802.11n(20MHz) (The Worst Case: ANT1)

Frequency (MHz)	Measure Level(dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 01 (2412MHz)				
137.11	-69.08	-57.00	-12.08	PK
996.62	-68.29	-57.00	-11.29	PK
1464.18	-61.53	-47.00	-14.53	PK
2346.53	-58.11	-47.00	-11.11	PK
Channel 13 (2472MHz)				
209.65	-71.65	-57.00	-14.65	PK
949.09	-68.39	-57.00	-11.39	PK
1780.85	-60.86	-47.00	-13.86	PK
2488.15	-58.41	-47.00	-11.41	PK

Product	:	4G Mobile Router
Test Item	:	Receiver spurious emissions (Conducted Measurement)
Test Mode	:	Mode 8: Receive by 802.11n(40MHz) (The Worst Case: ANT1)

Frequency (MHz)	Measure Level(dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 03 (2422MHz)				
150.31	-68.89	-57.00	-11.89	PK
959.53	-69.76	-57.00	-12.76	PK
1577.67	-61.13	-47.00	-14.13	PK
2717.11	-59.28	-47.00	-12.28	PK
Channel 11 (2462MHz)				
282.16	-70.98	-57.00	-13.98	PK
853.53	-68.45	-57.00	-11.45	PK
1535.64	-57.31	-47.00	-10.31	PK
2882.72	-58.16	-47.00	-11.16	PK

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13. RECEIVER BLOCKING

13.1. Limit

Adaptive Frequency Hopping equipment shall comply with the requirements defined in clause 4.3.1.12.4

Table 6: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-53	CW
P_{min} + 6 dB	2 300 2 330 2 360	-47	CW
P_{min} + 6 dB	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW
NOTE 1: P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

Table 7: Receiver Blocking parameters receiver category 2 equipment

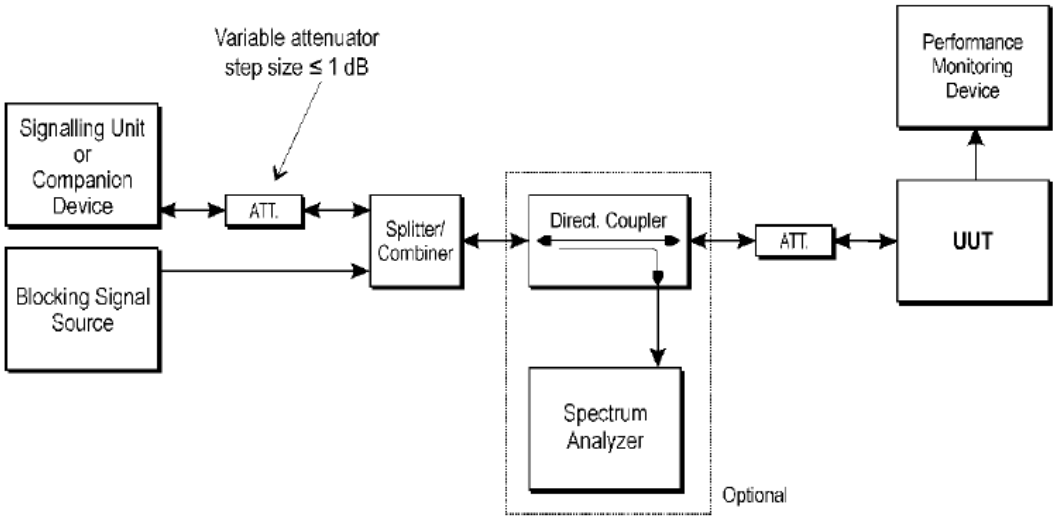
Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-57	CW
P_{min} + 6 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

Table 8: Receiver Blocking parameters receiver category 3 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 12 dB	2 380 2 503,5	-57	CW
P_{min} + 12 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

13.2. Test Setup

Conducted measurements



13.3. Test Procedure

Step 1:

• For non-frequency hopping equipment, the UUT shall be set to the lowest operating channel.

Step 2:

• The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

• With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is Pmin.

• This signal level (Pmin) is increased by the value provided in the table corresponding to the receiver category and type of equipment.

Step 4:

• The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver

category and type of equipment. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met.

Step 5:

• Repeat step 4 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 6:

• For non-frequency hopping equipment, repeat step 2 to step 5 with the UUT operating at the highest operating channel.

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13.4. Test Result

Product	:	4G Mobile Router
Test Item	:	Receiver spurious emissions(conducted)
Test Mode	:	Receiving

Wanted Signal Mean Power from Companion Device (dBm)	Test Mode	Test Channel (MHz)	Blocking Signal Frequency (MHz)	Pmin	Blocking Signal Power (dBm)		Type of Blocking Signal	PER(%		Test Result
					Test Value	Limit		Test Value	Limit	
Pmin + 6 dB	802.11b (The Worst Case: ANT1)	2412	2380	-88	-30	⩾-53	CW	3.19	10	Pass
			2503.5	-90	-31	⩾-53	CW	3.57	10	Pass
			2300	-87	-16	⩾-47	CW	3.57	10	Pass
			2330	-92	-14	⩾-47	CW	4.40	10	Pass
			2360	-87	-19	⩾-47	CW	3.20	10	Pass
			2523.5	-89	-29	⩾-47	CW	4.38	10	Pass
			2553.5	-88	-20	⩾-47	CW	4.86	10	Pass
			2583.5	-87	-17	⩾-47	CW	4.15	10	Pass
			2613.5	-87	-27	⩾-47	CW	3.65	10	Pass
			2643.5	-89	-11	⩾-47	CW	4.64	10	Pass
			2673.5	-88	-19	⩾-47	CW	4.93	10	Pass
		2472	2380	-89	-30	⩾-53	CW	3.71	10	Pass
			2503.5	-89	-34	⩾-53	CW	3.33	10	Pass
			2300	-87	-20	⩾-47	CW	3.42	10	Pass
			2330	-93	-25	⩾-47	CW	4.10	10	Pass
			2360	-91	-22	⩾-47	CW	4.21	10	Pass
			2523.5	-91	-30	⩾-47	CW	3.63	10	Pass
			2553.5	-90	-19	⩾-47	CW	4.26	10	Pass
			2583.5	-88	-24	⩾-47	CW	4.57	10	Pass
			2613.5	-92	-18	⩾-47	CW	4.01	10	Pass
			2643.5	-89	-11	⩾-47	CW	4.40	10	Pass
			2673.5	-91	-12	⩾-47	CW	3.98	10	Pass

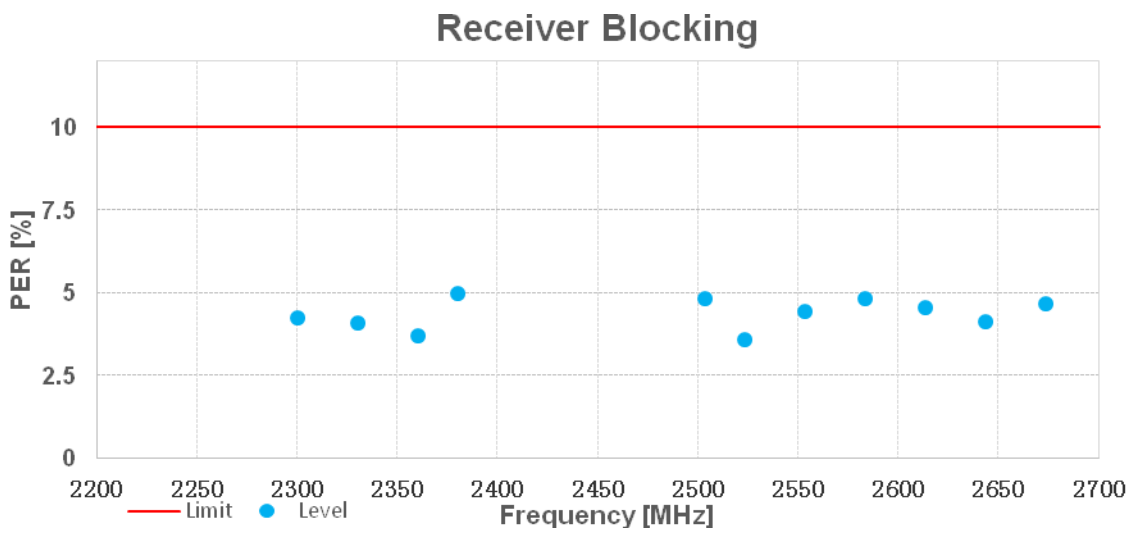
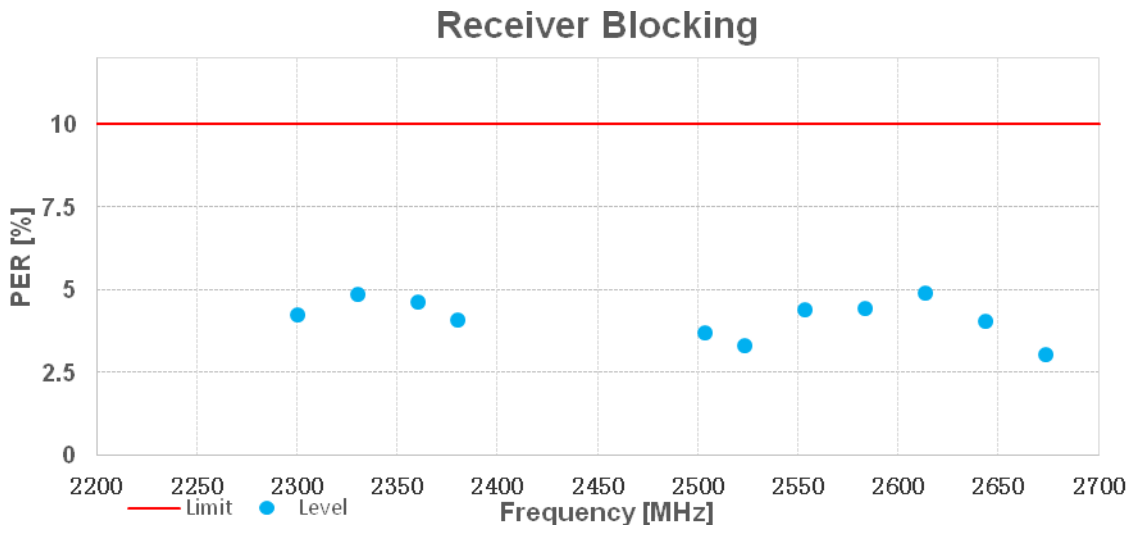
Wanted Signal Mean Power from Companion Device (dBm)	Test Mode	Test Channel (MHz)	Blocking Signal Frequency (MHz)	Pmin	Blocking Signal Power (dBm)		Type of Blocking Signal	PER(%		Test Result
					Test Value	Limit		Test Value	Limit	
Pmin + 6 dB	802.11g (The Worst Case: ANT1)	2412	2380	-88	-35	⩾-53	CW	3.94	10	Pass
			2503.5	-86	-36	⩾-53	CW	4.10	10	Pass
			2300	-84	-22	⩾-47	CW	3.80	10	Pass
			2330	-86	-21	⩾-47	CW	3.07	10	Pass
			2360	-89	-22	⩾-47	CW	3.99	10	Pass
			2523.5	-87	-25	⩾-47	CW	4.15	10	Pass
			2553.5	-88	-26	⩾-47	CW	4.62	10	Pass
			2583.5	-87	-18	⩾-47	CW	4.16	10	Pass
			2613.5	-85	-12	⩾-47	CW	3.33	10	Pass
			2643.5	-89	-18	⩾-47	CW	4.37	10	Pass
			2673.5	-85	-11	⩾-47	CW	3.11	10	Pass
		2472	2380	-88	-26	⩾-53	CW	4.59	10	Pass
			2503.5	-89	-31	⩾-53	CW	4.53	10	Pass
			2300	-89	-23	⩾-47	CW	3.25	10	Pass
			2330	-90	-26	⩾-47	CW	4.40	10	Pass
			2360	-91	-25	⩾-47	CW	3.10	10	Pass
			2523.5	-88	-25	⩾-47	CW	4.29	10	Pass
			2553.5	-87	-27	⩾-47	CW	3.08	10	Pass
			2583.5	-90	-16	⩾-47	CW	3.57	10	Pass
			2613.5	-90	-18	⩾-47	CW	4.99	10	Pass
			2643.5	-89	-21	⩾-47	CW	4.54	10	Pass
			2673.5	-89	-17	⩾-47	CW	3.70	10	Pass

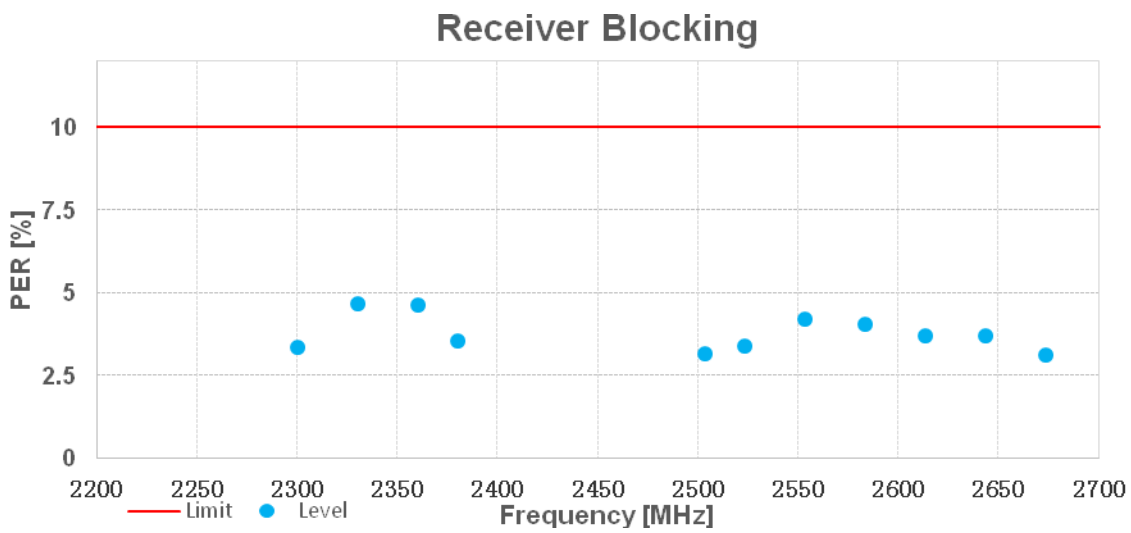
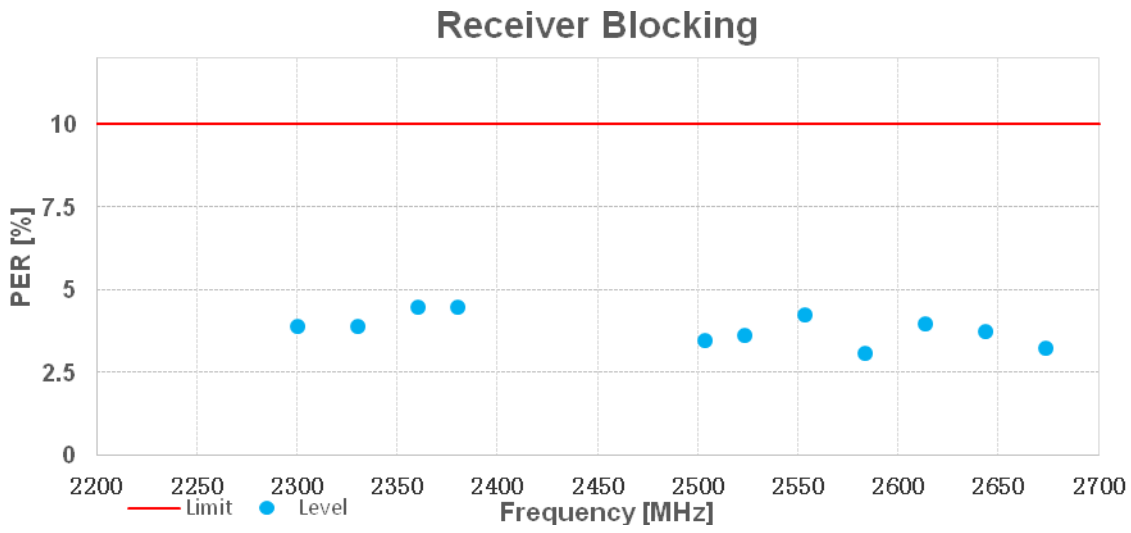
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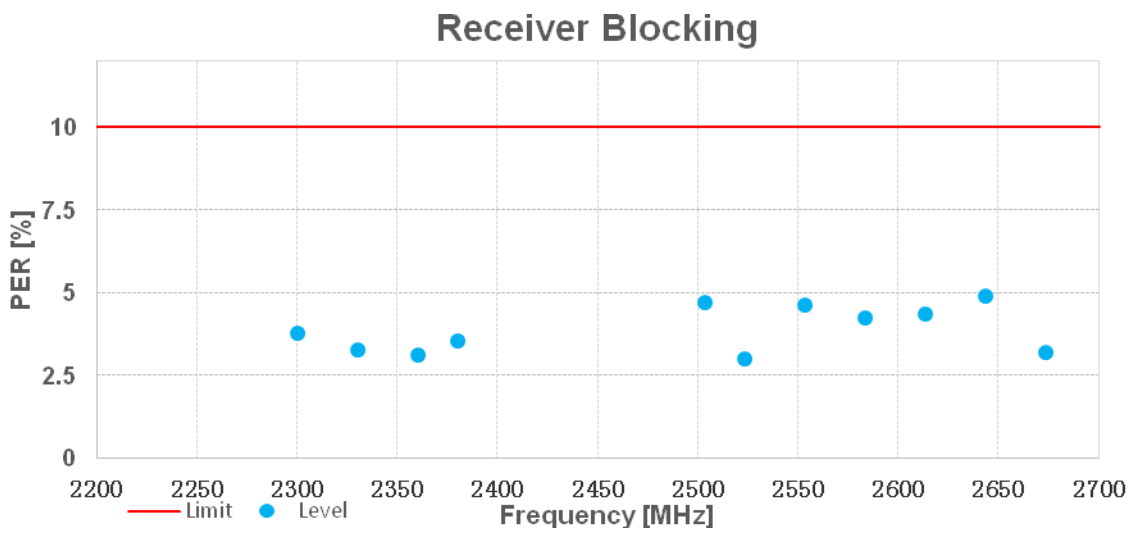
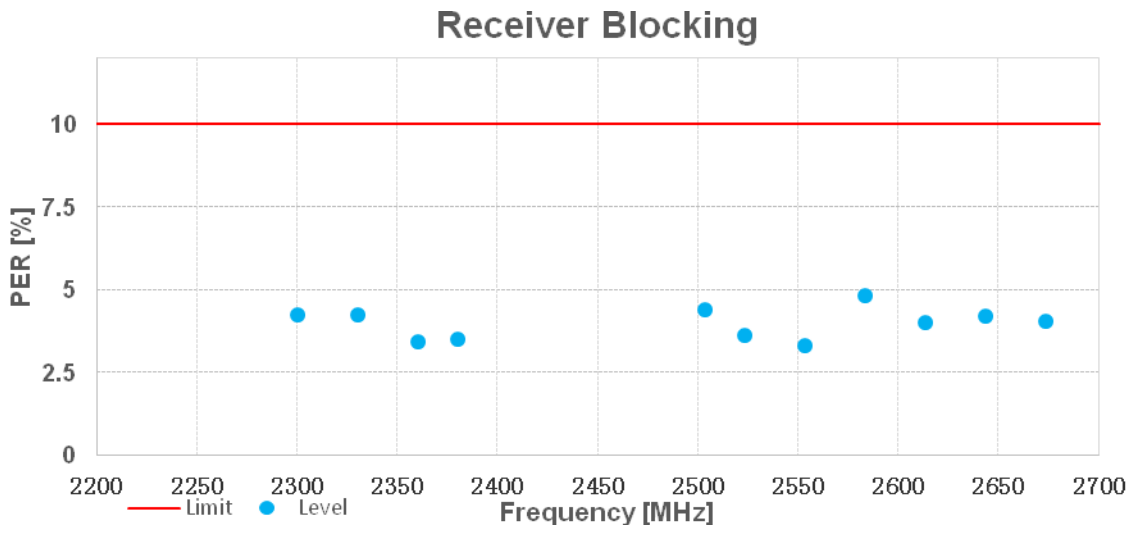
Wanted Signal Mean Power from Companion Device (dBm)	Test Mode	Test Channel (MHz)	Blocking Signal Frequency (MHz)	Pmin	Blocking Signal Power (dBm)		Type of Blocking Signal	PER(%		Test Result
					Test Value	Limit		Test Value	Limit	
Pmin + 6 dB	802.11n20 (The Worst Case: ANT1)	2412	2380	-86	-35	⩾-53	CW	4.40	10	Pass
			2503.5	-90	-37	⩾-53	CW	4.04	10	Pass
			2300	-90	-18	⩾-47	CW	3.34	10	Pass
			2330	-88	-22	⩾-47	CW	3.10	10	Pass
			2360	-89	-18	⩾-47	CW	3.31	10	Pass
			2523.5	-90	-29	⩾-47	CW	3.97	10	Pass
			2553.5	-86	-23	⩾-47	CW	4.08	10	Pass
			2583.5	-87	-21	⩾-47	CW	4.28	10	Pass
			2613.5	-88	-15	⩾-47	CW	3.34	10	Pass
			2643.5	-89	-18	⩾-47	CW	4.11	10	Pass
			2673.5	-88	-11	⩾-47	CW	4.27	10	Pass
		2472	2380	-89	-23	⩾-53	CW	4.40	10	Pass
			2503.5	-93	-29	⩾-53	CW	3.74	10	Pass
			2300	-91	-24	⩾-47	CW	3.70	10	Pass
			2330	-89	-32	⩾-47	CW	3.98	10	Pass
			2360	-93	-27	⩾-47	CW	3.59	10	Pass
			2523.5	-90	-24	⩾-47	CW	3.24	10	Pass
			2553.5	-87	-26	⩾-47	CW	4.52	10	Pass
			2583.5	-92	-11	⩾-47	CW	4.38	10	Pass
			2613.5	-91	-20	⩾-47	CW	4.61	10	Pass
			2643.5	-88	-18	⩾-47	CW	4.05	10	Pass
			2673.5	-92	-20	⩾-47	CW	4.97	10	Pass

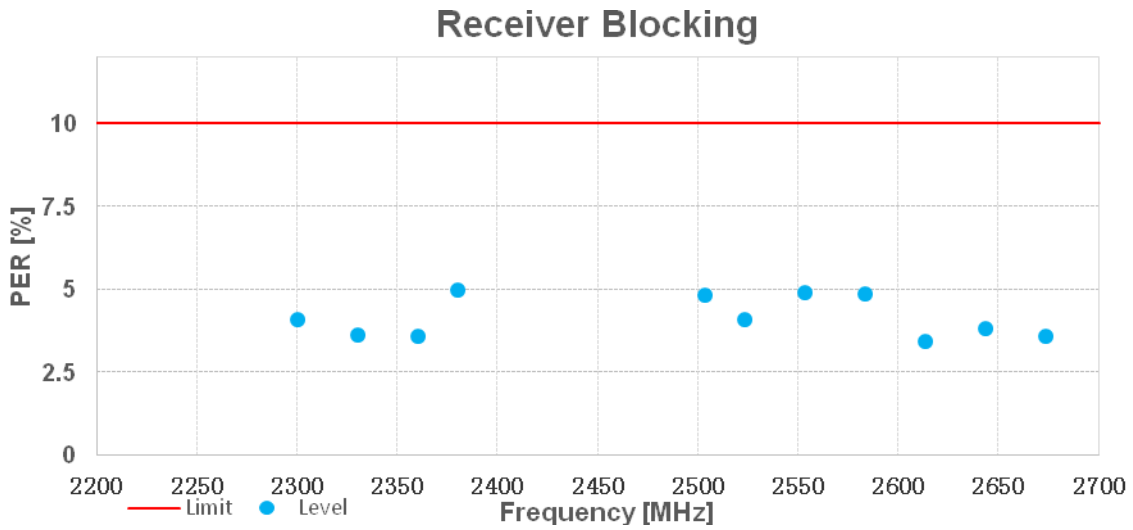
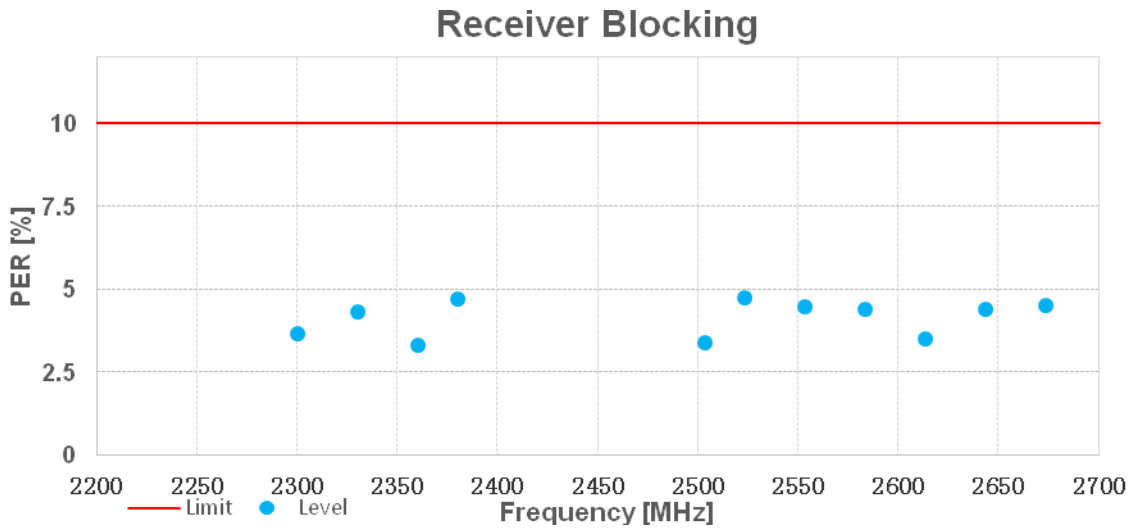
Wanted Signal Mean Power from Companion Device (dBm)	Test Mode	Test Channel (MHz)	Blocking Signal Frequency (MHz)	Pmin	Blocking Signal Power (dBm)		Type of Blocking Signal	PER(%		Test Result
					Test Value	Limit		Test Value	Limit	
Pmin + 6 dB	802.11n40 (The Worst Case: ANT1)	2422	2380	-90	-19	⩾-53	CW	4.73	10	Pass
			2503.5	-92	-34	⩾-53	CW	4.87	10	Pass
			2300	-88	-19	⩾-47	CW	4.92	10	Pass
			2330	-91	-16	⩾-47	CW	3.78	10	Pass
			2360	-90	-26	⩾-47	CW	3.77	10	Pass
			2523.5	-91	-24	⩾-47	CW	4.07	10	Pass
			2553.5	-89	-28	⩾-47	CW	4.46	10	Pass
			2583.5	-94	-25	⩾-47	CW	3.38	10	Pass
			2613.5	-90	-18	⩾-47	CW	3.28	10	Pass
			2643.5	-89	-13	⩾-47	CW	4.66	10	Pass
			2673.5	-88	-16	⩾-47	CW	4.62	10	Pass
		2462	2380	-92	-27	⩾-53	CW	5.00	10	Pass
			2503.5	-91	-29	⩾-53	CW	4.84	10	Pass
			2300	-89	-24	⩾-47	CW	4.26	10	Pass
			2330	-92	-23	⩾-47	CW	4.09	10	Pass
			2360	-90	-21	⩾-47	CW	3.71	10	Pass
			2523.5	-88	-27	⩾-47	CW	3.60	10	Pass
			2553.5	-94	-25	⩾-47	CW	4.43	10	Pass
			2583.5	-89	-23	⩾-47	CW	4.83	10	Pass
			2613.5	-92	-15	⩾-47	CW	4.55	10	Pass
			2643.5	-88	-25	⩾-47	CW	4.14	10	Pass
			2673.5	-92	-20	⩾-47	CW	4.67	10	Pass

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Test Plots for Receiver Blocking (The Worst Case: ANT1)

802.11b_2412

802.11b_2472

Test Plots for Receiver Blocking (The Worst Case: ANT1)

802.11g_2412

802.11g_2472

Test Plots for Receiver Blocking (The Worst Case: ANT1)

802.11n20_2412

802.11n20_2472

Test Plots for Receiver Blocking (The Worst Case: ANT1)

802.11n40_2422

802.11n40_2462

14. PHOTOGRAPHS OF TEST SETUP



Spurious Emission below 1GHz



Spurious Emission above 1GHz

----------THE END OF REPORT----------

RADIO TEST REPORT

For

Shenzhen Gokodo Technology Co., Ltd

4G Mobile Router

Test Model:M6

List Model No.: M7,M6XX,M7XX

Prepared for	:	Shenzhen Gokodo Technology Co., Ltd
Address	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street, Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	October 11, 2018
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	October 11, 2018~ November 08, 2018
Date of Report	:	November 13, 2018

CE

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RADIO TEST REPORT

ETSI EN 301 908-2 V11.1.2 (2017-08)

IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE)

Report Reference No.	:	**LCS181011006AEE**
Date of Issue	:	November 13, 2018
Testing Laboratory Name	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards ☐ Other standard testing method ☐
Applicant's Name.....	:	**Shenzhen Gokodo Technology Co., Ltd**
Address	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Test Specification		
Standard	:	ETSI EN 301 908-1 V11.1.1 (2016-07) ETSI EN 301 908-2 V11.1.2 (2017-08)
Test Report Form No.	:	LCSEMC-1.0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2017-06

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Test Item Description.	:	4G Mobile Router
Trade Mark.....	:	Gokodo/QLink
Test Model	:	M6
Ratings	:	DC 3.7V by Li-ion battery(2000mAh) Recharged by DC 5V/1A by adapter
Result	:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Peter Xiao	Calvin Weng	
Peter Xiao / Administrators	Calvin Weng/Technique principal	Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCS181011006AEE	November 13, 2018 Date of issue

Test Model.....	:	iQA27X
EUT.....	:	4G Mobile Router
Applicant.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/
Factory.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/

Test Result	Positive

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	November 13, 2018	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	4G Mobile Router
Test Model	:	M6
Additional Model No.	:	M7,M6XX,M7XX
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Power Supply	:	DC 3.7V by Li-ion battery(2000mAh) Recharged by DC 5V/1A by adapter
Hardware Version	:	M6_V1.1
Software Version	:	M6VD_V1.1
2G	:	
Support Band	:	☒GSM 900 (EU-Band) ☒DCS 1800 (EU-Band) ☒GSM 850 (U.S.-Band) ☒PCS 1900 (U.S.-Band)
Release Version	:	R99
GPRS Class	:	Class 12
EGPRS Class	:	Class 12
Uplink	:	GSM 900: 880MHz ~ 915MHz DCS 1800: 1710MHz ~ 1785MHz
Downlink	:	GSM 900: 925MHz ~ 960MHz DCS 1800: 1805MHz ~ 1880MHz
Type Of Modulation	:	GMSK for GPRS, GMSK/8PSK for EGPRS
Antenna Description	:	PIFA Antenna; 900MHz:-0.72dBi(Max.) , 900MHz :-1.23dBi(Max.)
Power Class	:	GSM 900: Class 4, DCS 1800: Class 1
3G	:	
Support Band	:	☐WCDMA Band II (U.S.-Band) ☐WCDMA Band V (U.S.-Band) ☒WCDMA Band I (EU-Band) ☒WCDMA Band VIII (EU-Band)
Release Version	:	R99
Uplink	:	WCDMA Band I: 1920MHz ~ 1980MHz WCDMA Band VIII: 880MHz~915MHz
Downlink	:	WCDMA Band I: 2110MHz ~ 2170MHz WCDMA Band VIII: 925MHz~960MHz
Type Of Modulation	:	WCDMA: QPSK; HSDPA/HSUPA: QPSK
Antenna Description	:	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 8:-0.72dBi(Max.)
Power Class	:	Class 3
LTE	:	
Support Band	:	☒E-UTRA Band 1(EU-Band) ☒E-UTRA Band 3(EU-Band) ☒E-UTRA Band 7(EU-Band) ☒E-UTRA Band 8(EU-Band)

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		☒E-UTRA Band 20(EU-Band) ☒E-UTRA Band 38(EU-Band) ☒E-UTRA Band 40(EU-Band)
LTE Release Version	:	R4
Uplink	:	E-UTRA Band 1: 1920MHz ~ 1980MHz E-UTRA Band 3: 1710MHz~1785MHz E-UTRA Band 7: 2500MHz ~ 2570MHz E-UTRA Band 8: 880MHz~915MHz E-UTRA Band 20: 832MHz ~ 862MHz E-UTRA Band 38: 2570MHz ~ 2620MHz E-UTRA Band 40: 2300MHz~2400MHz
Downlink	:	E-UTRA Band 1: 2110MHz ~ 2170MHz E-UTRA Band 3: 1805MHz~1880MHz E-UTRA Band 7: 2620MHz~2690MHz E-UTRA Band 8: 926MHz~960MHz E-UTRA Band 20: 791MHz~821MHz E-UTRA Band 38: 2570MHz ~ 2620MHz E-UTRA Band 40: 2300MHz~2400MHz
Type Of Modulation	:	QPSK/16-QAM
Antenna Description	:	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 3:-1.37dBi(Max.), Band 7:-0.27dBi(Max.),Band 8:-0.72dBi(Max.) , Band 20:-0.67dBi(Max.) ,Band 38:-0.22dBi(Max.) , Band 40:-0.25dBi(Max.)
Power Class	:	Class 3
WIFI(2.4G Band)	:	
Frequency Range	:	2412-2472MHz
Channel Spacing	:	5MHz
Channel Number	:	13 Channel for 20MHz bandwidth(2412~2472MHz) 9 channels for 40MHz bandwidth(2422~2462MHz)
Modulation Type	:	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	:	Two same PIFA Antenna; ANT1 used for WIFI, -0.52dBi(Max.); ANT2 used for WIFI, -0.52dBi(Max.);

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1.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
Shenzhen Gokodo Technology Co., Ltd	Adapter	KS15004R	---	CE

Products are sold without adapters

1.3. External I/O

I/O Port Description	Quantity	Cable
Charging port	1	0.2 m, unshielded cable

1.4. Objective

Standard Referenced	Standard Title	Standard Version
ETSI EN 301 908-1	IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Introduction and common requirements	V11.1.1 (2016-07)
ETSI EN 301 908-2	IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE)	V11.1.2 (2017-08)

The objective is to determine compliance with ETSI EN 301 908-1 V11.1.1 (2016-07) & ETSI EN 301 908-2 V11.1.2 (2017-08).

1.5. Test Conditions

Conditions	Temperature	Voltage
Normal	21-25℃	DC 3.70V
Low extreme Temperature/Low extreme Voltage (TL/VL);	-20℃	DC 3.30V
Low extreme Temperature/High extreme Voltage (TL/VH);	-20℃	DC 4.20V
High extreme Temperature/Low extreme Voltage (TH/VL);	+55℃	DC 3.30V
High extreme Temperature/High extreme Voltage (TH/VH).	+55℃	DC 4.20V
Note1: For all conditions, the humidity range is:40-75%, the pressure range is 86-106kPa. The High Voltage DC 4.20V and Low Voltage DC 3.30V was declared by manufacturer		

1.6. Description Of Test Mode

1. WCDMA Band I
1). Low Channel Operation(9612Channel)
2). Middle Channel Operation(9750Channel)
3). High Channel Operation(9888Channel)

2. WCDMA Band VIII
1). Low Channel Operation(2713Channel)
2). Middle Channel Operation(2788Channel)
3). High Channel Operation(2862Channel)

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1.7. List Of Measuring Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	X-series USB Peak and Average Power Sensor Aglient	Agilent	U2021XA	MY54080022	2018-10-25	2019-10-24
2	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2018-10-25	2019-10-24
3	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
4	RF Control Unit	Ascentest	AT890-RFB	N/A	2018-06-16	2019-06-15
5	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2017-11-17	2018-11-16
6	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2018-06-16	2019-06-15
7	SPECTRUM ANALYZER	R&S	FSP	100503	2018-06-16	2019-06-15
8	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2017-11-17	2018-11-16
9	ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY42081396	2017-11-17	2018-11-16
10	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2017-11-17	2018-11-16
11	Universal Radio Communication Tester	R&S	CMU 200	105788	2018-06-16	2019-06-15
12	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2018-06-16	2019-06-15
13	RF Control Unit	Tonscend	JS0806-1	N/A	2018-06-16	2019-06-15
14	DC Power Supply	Agilent	E3642A	N/A	2017-11-17	2018-11-16
15	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
16	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2018-10-10	2019-10-09
17	DC Source	CHROMA	62012P-80-60	34782951	2018-10-10	2019-10-09
18	RF Filter	Micro-Tronics	BRC50718	S/N-017	2018-06-16	2019-06-15
19	RF Filter	Micro-Tronics	BRC50719	S/N-011	2018-06-16	2019-06-15
20	RF Filter	Micro-Tronics	BRC50720	S/N-011	2018-06-16	2019-06-15
21	RF Filter	Micro-Tronics	BRC50721	S/N-013	2018-06-16	2019-06-15
22	RF Filter	Micro-Tronics	BRM50702	S/N-195	2018-06-16	2019-06-15
23	Splitter/Combiner	Micro-Tronics	PS2-15	CB11-20	2018-06-16	2019-06-15
24	Splitter/Combiner	Micro-Tronics	CB11-20	N/A	2018-06-16	2019-06-15
25	Attenuator	Micro-Tronics	PAS-8-10	S/N23466	2018-06-16	2019-06-15
26	Exposure Level Tester	Narda	ELT-400	N-0713	2018-04-02	2019-04-01
27	B-Field Probe	Narda	ELT-400	M-1154	2018-04-10	2019-04-09
28	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
29	Positioning Controller	MF	MF-7082	/	2018-06-16	2019-06-15
30	EMI Test Software	AUDIX	E3	N/A	2018-06-16	2019-06-15
31	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
32	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2017-11-17	2018-11-16
33	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-06-22	2019-06-21
34	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-05-01	2019-04-30
35	Horn Antenna	EMCO	3115	6741	2018-06-22	2019-06-21
36	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
37	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
38	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
39	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15
40	TEST RECEIVER	R&S	ESCI	101142	2018-06-16	2019-06-15
41	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	2018-06-16	2019-06-15
42	10dB Attenuator	SCHWARZBECK	MTS-IMP136	261115-001-0032	2018-06-16	2019-06-15
43	Artificial Mains	R&S	ENV216	101288	2018-06-16	2019-06-15
44	Power Analyzer Test System	Voltech	PM6000	20000670053	2018-06-16	2019-06-15

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45	ESD Simulator	SCHLODER	SESD 230	604035	2018-06-16	2019-06-15
46	RF POWER AMPLIFIER	OPHIR	5225R	1052	2018-03-21	2019-03-20
47	RF POWER AMPLIFIER	OPHIR	5273F	1019	2018-03-23	2019-03-25
48	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2018-04-27	2019-04-26
49	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-482	2018-04-27	2019-04-26
50	Electric field probe	Narda S.TS./PMM	EP601	611WX80208	2018-03-26	2019-03-25
51	Power Meter	Agilent	E4419B	MY45104493	2018-06-16	2019-06-15
52	Power Sensor	Agilent	E9301H	MY41495234	2018-06-16	2019-06-15
53	Power Sensor	Agilent	E4412A	MY41500229	2018-06-16	2019-06-15
54	Sound Level meter	BK Precision	735	73500873100	2018-06-16	2019-06-15
55	Audio Analyzer	R&S	UPV	1146.2003K0	2018-06-16	2019-06-15
56	Mouse Simulation	Bruel & Kjaer	4227	A0304216	2018-06-16	2019-06-15
57	Ear Simulation and supply	Bruel & Kjaer	2669.4182.5935	A0305284	2018-06-16	2019-06-15
58	Acoustical Calibrators	Bruel & Kjaer	4231	A0304215	2018-06-16	2019-06-15
59	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2017-11-17	2018-11-16
60	Simulator	FRANKONIA	CIT-10	A126A1195	2018-06-16	2019-06-15
61	CDN	FRANKONIA	CDN-M2	5100100100	2018-06-16	2019-06-15
62	CDN	FRANKONIA	CDN-M3	0900-11	2018-06-16	2019-06-15
63	Attenuator	FRANKONIA	ATT6	0010222A	2018-06-16	2019-06-15
64	Infuse tongs	EM TEST	EM-Clamp	0513A031201	2018-06-16	2019-06-15
65	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2018-06-16	2019-06-15
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

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1.8. Measurement Uncertainty (95% confidence levels, k=2)

Test Item		Uncertainty
Radio Frequency	:	0.9×10^{-4}
Total RF Power, Conducted	:	1.0 dB
RF Power Density, Conducted	:	1.8 dB
Spurious Emissions, Conducted	:	1.8 dB
All Emissions, Radiated	:	3.1 dB
Temperature	:	0.5°C
Humidity	:	1 %
DC And Low Frequency Voltages	:	1 %

1.9. Description of Test Facility

FCC Registration Number. is 254912.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001
NVLAP Registration Code is 600167-0

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2. SYSTEM TEST CONFIGURATION

2.1. Justification

N/A

2.2. EUT Exercise Software

N/A

2.3. Special Accessories

The special accessories were supplied by Shenzhen LCS Compliance Testing Laboratory Ltd.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Test Setup

Please refer to the test setup photo.

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3. TEST RESULTS

Reference Clause No. (ETSI EN 301 908-2)	Description of Test Items	WCDMA Band VIII	WCDMA Band I
		Result	Result
4.2.2	Transmitter maximum output power		
	Normal	Pass	Pass
	TL/VL	Pass	Pass
	TL/VH	Pass	Pass
	TH/VL	Pass	Pass
	TH/VH	Pass	Pass
	Transmitter maximum output power for HSDPA & HSUPA		
	Normal	Pass	Pass
	TL/VL	Pass	Pass
	TL/VH	Pass	Pass
	TH/VL	Pass	Pass
	TH/VH	Pass	Pass
4.2.3	Transmitter spectrum emission mask		
	Normal	Pass	Pass
	Transmitter spectrum emission mask for HSDPA & HSUPA		
	Normal	Pass	Pass
4.2.4	Transmitter spurious emissions		
	Normal	Pass	Pass
	Transmitter spurious emission for HSDPA & HSUPA		
	Normal	Pass	Pass
4.2.5	Transmitter minimum output power		
	Normal	Pass	Pass
	TL/VL	Pass	Pass
	TL/VH	Pass	Pass
	TH/VL	Pass	Pass
	TH/VH	Pass	Pass
4.2.6	Receiver Adjacent Channel Selectivity (ACS)		
	NT / NV	Pass	Pass
	Receiver Adjacent Channel Selectivity for HSDPA & HSUPA		
	NT / NV	Pass	Pass
4.2.7	Receiver blocking characteristics		
	Normal	Pass	Pass
4.2.8	Receiver spurious response		
	Normal	Pass	Pass
4.2.9	Receiver intermodulation characteristics		
	Normal	Pass	Pass
4.2.10	Receiver spurious emissions		
	Normal	Pass	Pass
4.2.11	Out-of-synchronization handling of output power		

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	Normal	Pass	Pass
4.2.12	Transmitter Adjacent Channel Leakage power Ratio (ACLR)		
	Normal	Pass	Pass
	TL/VL	Pass	Pass
	TL/VH	Pass	Pass
	TH/VL	Pass	Pass
	TH/VH	Pass	Pass
	Transmitter Adjacent Channel Leakage power Ratio (ACLR) for HSDPA & HSUPA		
	Normal	Pass	Pass
	TL/VL	Pass	Pass
	TL/VH	Pass	Pass
	TH/VL	Pass	Pass
	TH/VH	Pass	Pass
4.2.13	Receiver Reference Sensitivity level		
	Normal	Pass	Pass
	TL/VL	Pass	Pass
	TL/VH	Pass	Pass
	TH/VL	Pass	Pass
	TH/VH	Pass	Pass
	Receiver Reference Sensitivity level for HSDPA & HSUPA		
	Normal	Pass	Pass
	TL/VL	Pass	Pass
	TL/VH	Pass	Pass
	TH/VL	Pass	Pass
	TH/VH	Pass	Pass

Reference Clause No. (ETSI EN 301 908-1)	**Description of Test Items**	**WCDMA Band VIII**	**WCDMA Band I**
		Result	**Result**
4.2.2	Radiated emissions (UE)		
	Normal	Pass	Pass
4.2.4	Control and monitoring functions (UE)		
	Normal	Pass	Pass

***Note:

Result: Describes test result of Test Case.

Pass: Test Case passed on specified conformance test platform.

Normal(TN/VN): Normal temperature – 25℃; Normal voltage. – DC 3.70V

TH: High extreme Temperature – +55℃

VH: High extreme Voltage – DC 4.20V

TL: Low extreme Temperature –20℃

VL: Low extreme Voltage – DC 3.30V

N/A: Not applicable.

—: Not test.

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4. PHOTOGRAPHS OF TEST SETUP



Spurious Emission below 1GHz



Spurious Emission above 1GHz

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Annex A

Transmitter maximum output power

The worst test result of maximum output power for WCDMA Band I

Test Condition		Measure Result (dBm)			Nominal Output Power (dBm)	Conclusion
Temperature (℃)	Voltage (Vdc)	Low Channel 9612	Middle Channel 9750	High Channel 9888		
-20	DC 3.30V	23.06	23.03	23.07	24	Pass
	DC 3.70V	23.09	23.12	23.02		Pass
	DC 4.20V	22.97	23.03	23.16		Pass
25	DC 3.30V	23.03	23.13	23.14		Pass
	DC 3.70V	23.14	23.00	23.05		Pass
	DC 4.20V	23.14	23.11	23.06		Pass
55	DC 3.30V	22.98	23.10	23.08		Pass
	DC 3.70V	23.00	23.04	23.03		Pass
	DC 4.20V	23.06	23.09	23.04		Pass

The worst test result of maximum output power for WCDMA Band I (HSUPA)

Test Condition		Measure Result (dBm)			Nominal Output Power (dBm)	Conclusion
Temperature (℃)	Voltage (Vdc)	Low Channel 9612	Middle Channel 9750	High Channel 9888		
-20	DC 3.30V	22.99	23.09	23.03	24	Pass
	DC 3.70V	23.10	23.05	23.15		Pass
	DC 4.20V	22.99	23.02	23.11		Pass
25	DC 3.30V	22.98	22.97	23.06		Pass
	DC 3.70V	23.01	23.03	23.02		Pass
	DC 4.20V	23.12	23.12	23.15		Pass
55	DC 3.30V	23.13	23.09	23.06		Pass
	DC 3.70V	22.98	23.11	23.09		Pass
	DC 4.20V	23.04	23.08	23.03		Pass

The worst test result of maximum output power for WCDMA Band I (HSDPA)

Test Condition		Measure Result (dBm)			Nominal Output Power (dBm)	Conclusion
Temperature (℃)	Voltage (Vdc)	Low Channel 9612	Middle Channel 9750	High Channel 9888		
-20	DC 3.30V	22.60	22.61	22.62	24	Pass
	DC 3.70V	22.60	22.58	22.62		Pass
	DC 4.20V	22.62	22.57	22.58		Pass
25	DC 3.30V	22.61	22.63	22.61		Pass
	DC 3.70V	22.61	22.58	22.60		Pass
	DC 4.20V	22.63	22.63	22.60		Pass
55	DC 3.30V	22.62	22.58	22.62		Pass
	DC 3.70V	22.60	22.58	22.61		Pass
	DC 4.20V	22.63	22.60	22.59		Pass

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The worst test result of maximum output power for WCDMA Band VIII

Test Condition		Measure Result (dBm)			Nominal Output Power (dBm)	Conclusion
Temperature (℃)	Voltage (Vdc)	Low Channel 2713	Middle Channel 2788	High Channel 2862		
-20	DC 3.30V	23.16	23.06	23.08	24	Pass
	DC 3.70V	22.99	23.05	23.10		Pass
	DC 4.20V	23.13	23.03	23.02		Pass
25	DC 3.30V	23.05	23.05	23.12		Pass
	DC 3.70V	23.00	23.09	23.03		Pass
	DC 4.20V	23.02	23.13	23.07		Pass
55	DC 3.30V	22.97	23.08	23.13		Pass
	DC 3.70V	23.10	23.13	23.11		Pass
	DC 4.20V	23.03	23.12	23.04		Pass

The worst test result of maximum output power for WCDMA Band VIII (HSUPA)

Test Condition		Measure Result (dBm)			Nominal Output Power (dBm)	Conclusion
Temperature (℃)	Voltage (Vdc)	Low Channel 2713	Middle Channel 2788	High Channel 2862		
-20	DC 3.30V	22.62	22.61	22.62	24	Pass
	DC 3.70V	22.61	22.61	22.61		Pass
	DC 4.20V	22.58	22.60	22.59		Pass
25	DC 3.30V	22.63	22.60	22.58		Pass
	DC 3.70V	22.61	22.59	22.61		Pass
	DC 4.20V	22.61	22.59	22.60		Pass
55	DC 3.30V	22.59	22.61	22.58		Pass
	DC 3.70V	22.59	22.59	22.57		Pass
	DC 4.20V	22.59	22.57	22.57		Pass

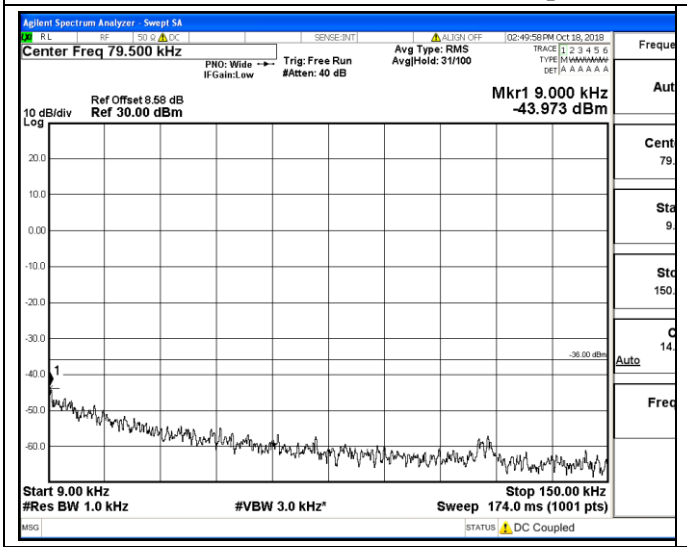
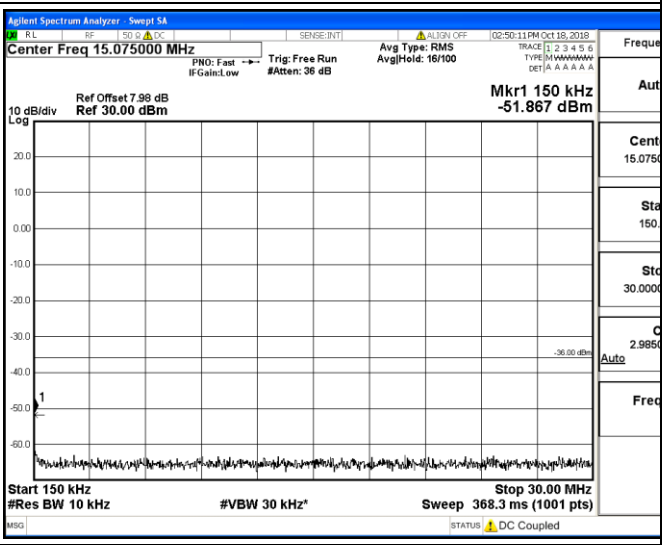
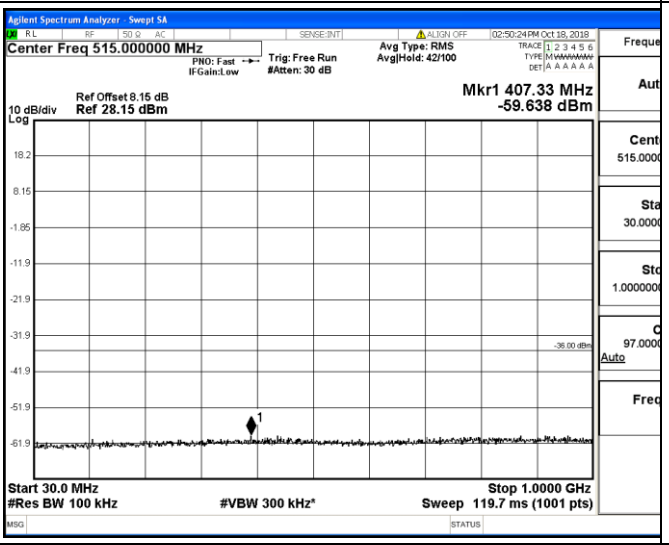
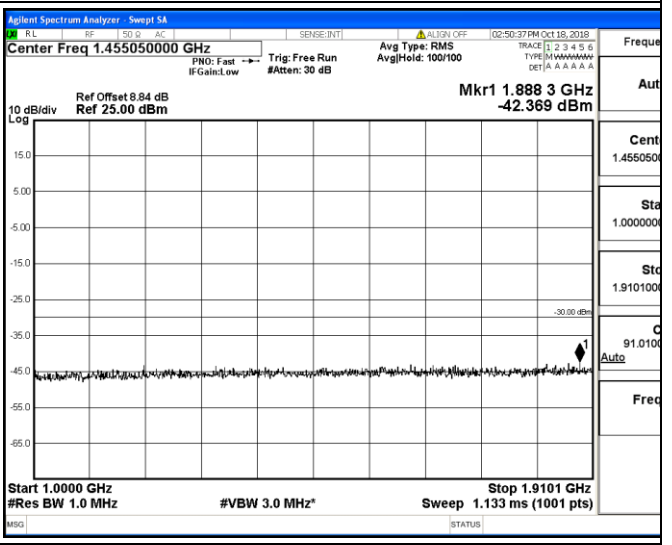
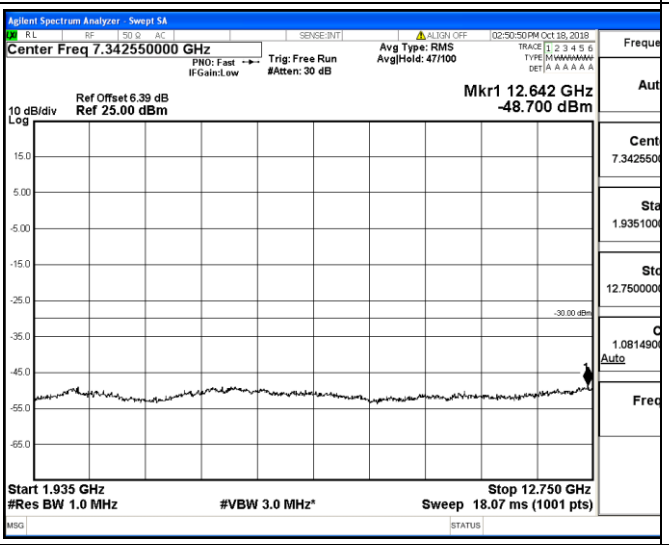
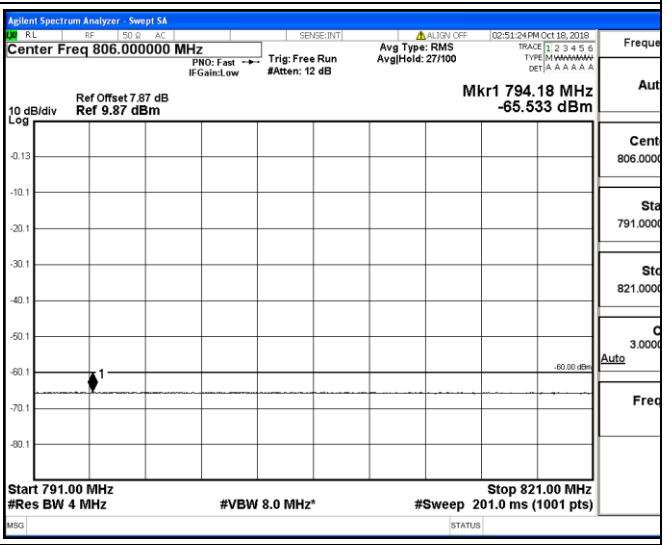
The worst test result of maximum output power for WCDMA Band VIII (HSDPA)

Test Condition		Measure Result (dBm)			Nominal Output Power (dBm)	Conclusion
Temperature (℃)	Voltage (Vdc)	Low Channel 2713	Middle Channel 2788	High Channel 2862		
-20	DC 3.30V	23.09	23.06	23.05	24	Pass
	DC 3.70V	23.15	23.13	23.03		Pass
	DC 4.20V	23.00	23.10	23.07		Pass
25	DC 3.30V	23.02	23.11	23.07		Pass
	DC 3.70V	23.14	23.15	23.04		Pass
	DC 4.20V	23.02	23.06	23.03		Pass
55	DC 3.30V	22.99	23.06	23.02		Pass
	DC 3.70V	23.00	23.04	23.02		Pass
	DC 4.20V	23.06	23.12	22.99		Pass

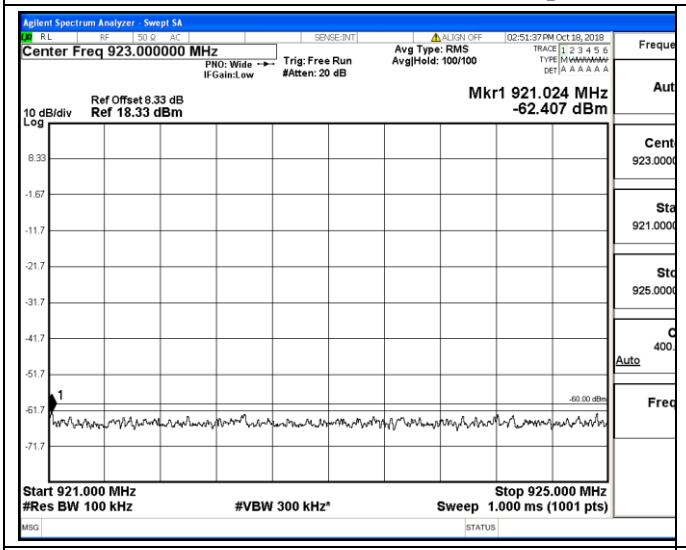
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Transmitter spurious emissions

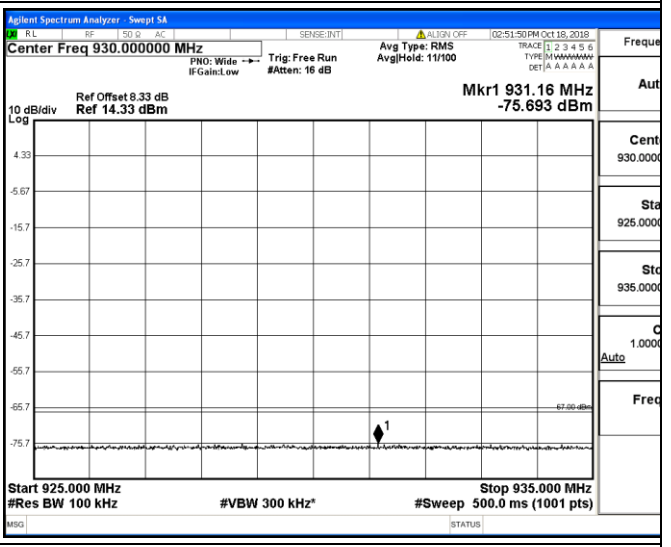
Only Report The Worst Test Result

The Worst Test Result of Spurious Emissions for Band I (Middle Channel)	
	
9KHz~150KHz	150KHz~30MHz
	
30MHz~1GHz	1GHz~1.9101GHz
	
1.935GHz~12.75GHz	791MHz~821MHz

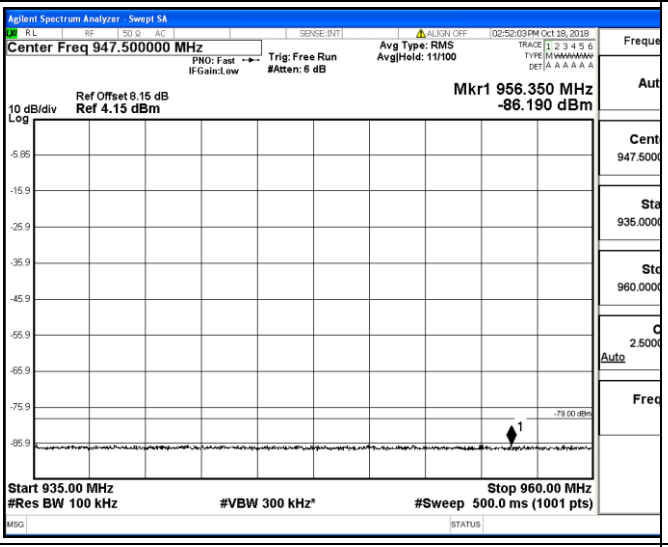
The Worst Test Result of Spurious Emissions for Band I (Middle Channel)



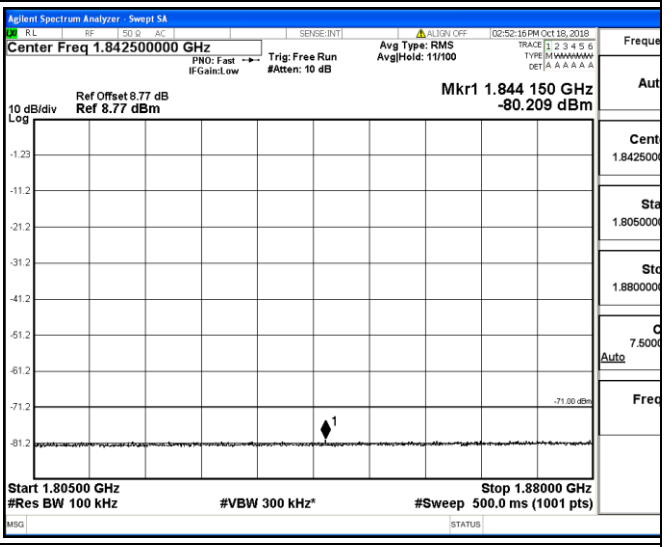
921MHz~925MHz



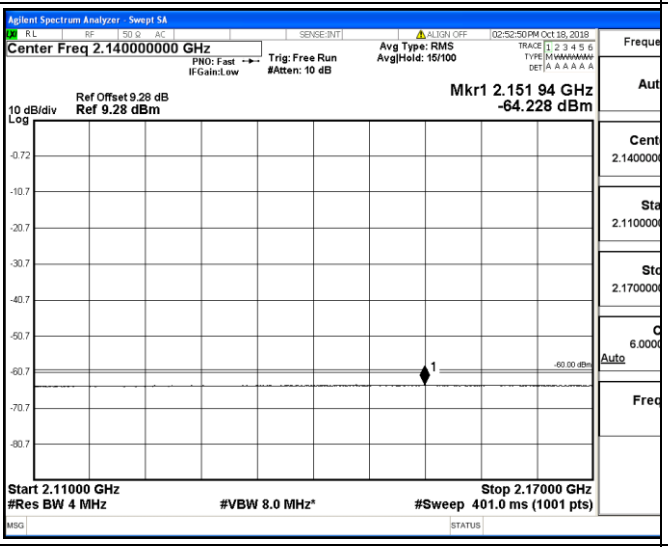
925MHz~935MHz



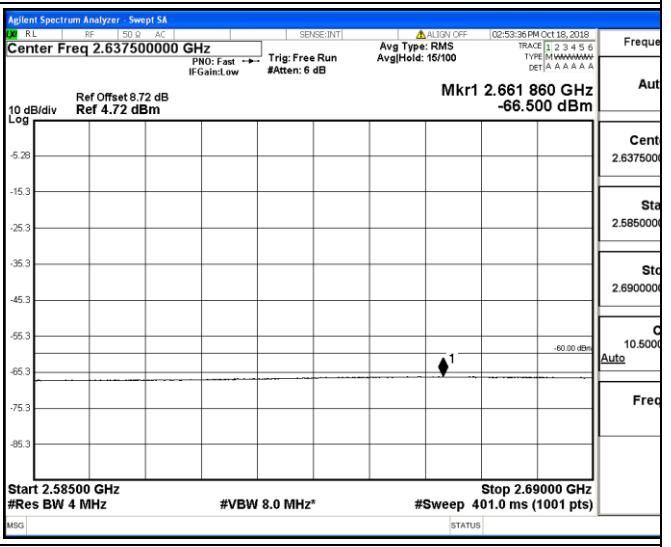
935MHz~960MHz



1805MHz~1880MHz



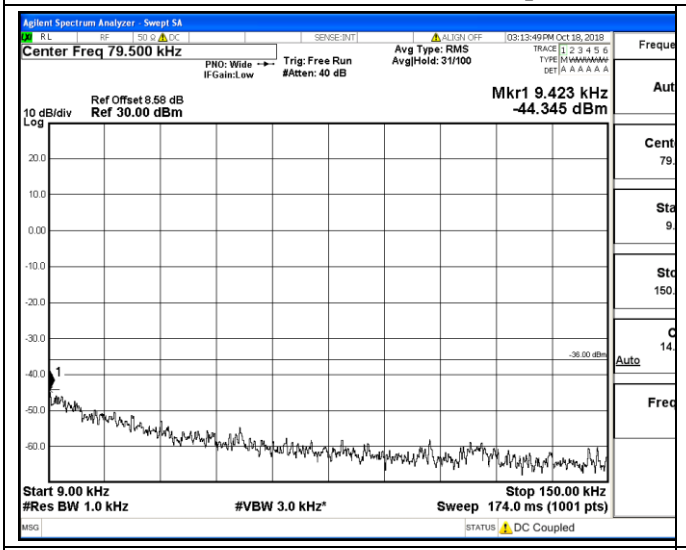
2110MHz~2170MHz



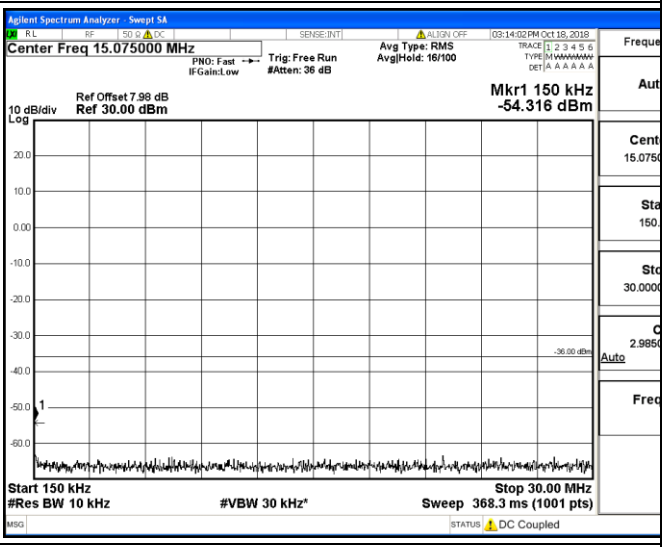
2585MHz~2690MHz

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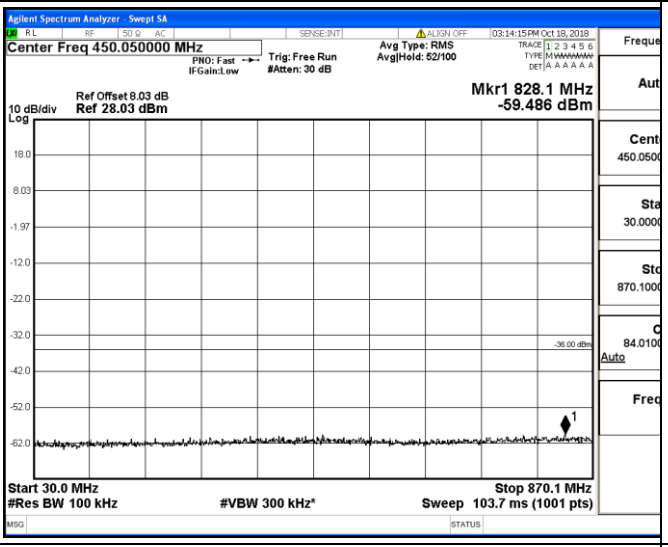
The Worst Test Result of Spurious Emissions for Band VIII (Middle Channel)



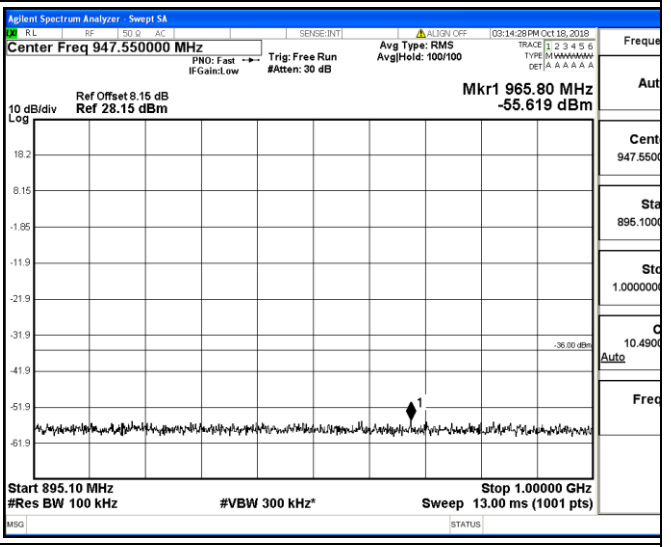
9KHz~150KHz



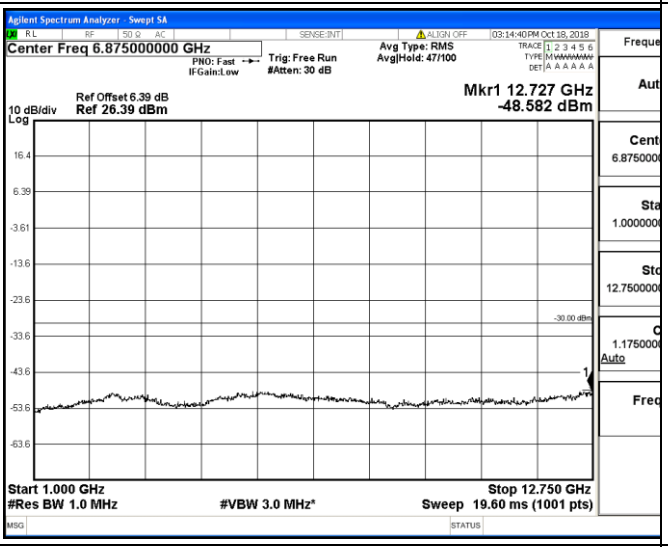
150KHz~30MHz



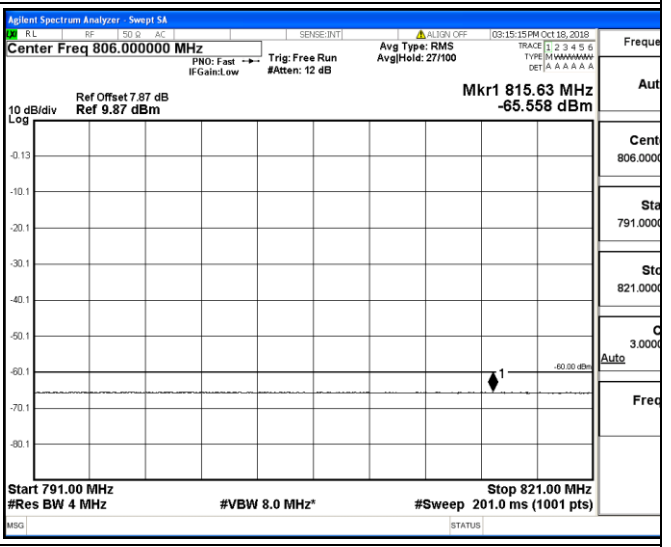
30MHz~870.1MHz



895.1MHz~1GHz

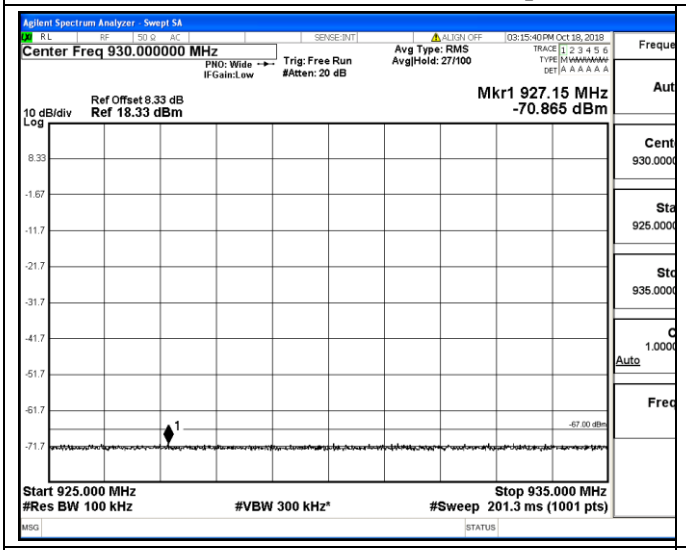


1GHz~12.75GHz

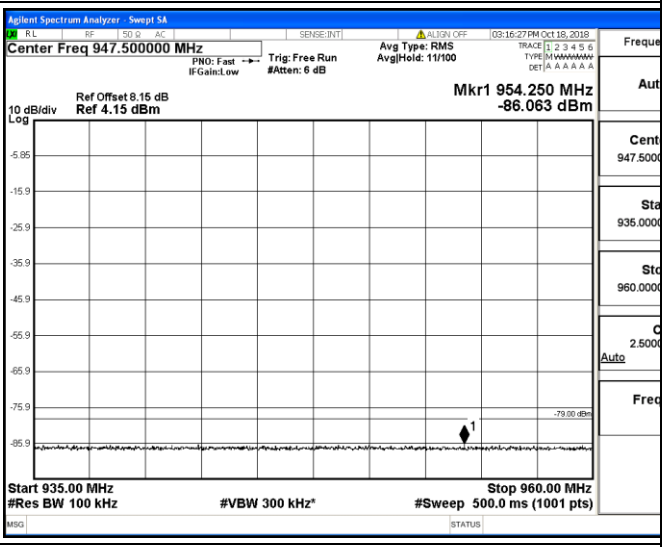


791MHz~821MHz

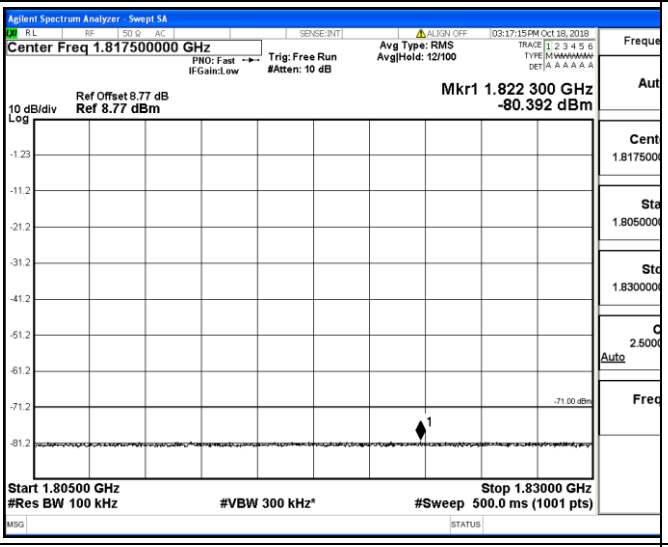
The Worst Test Result of Spurious Emissions for Band VIII (Middle Channel)



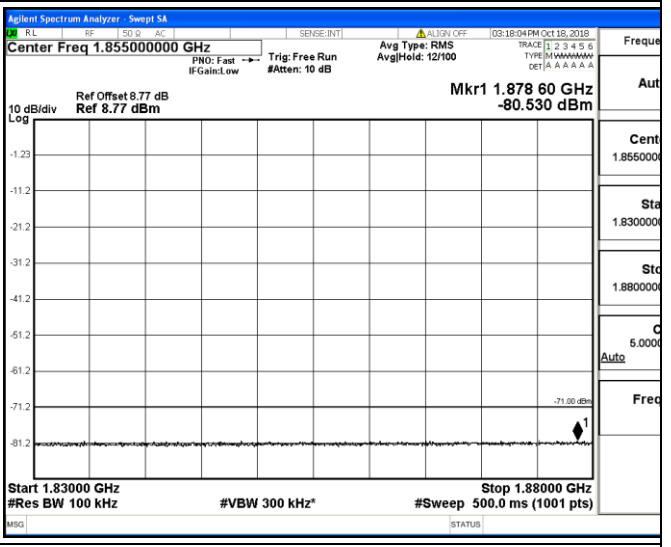
925MHz~935MHz



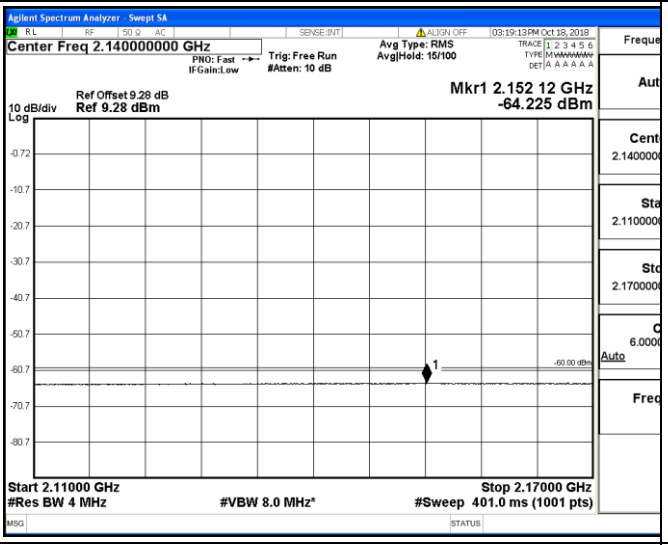
935MHz~960MHz



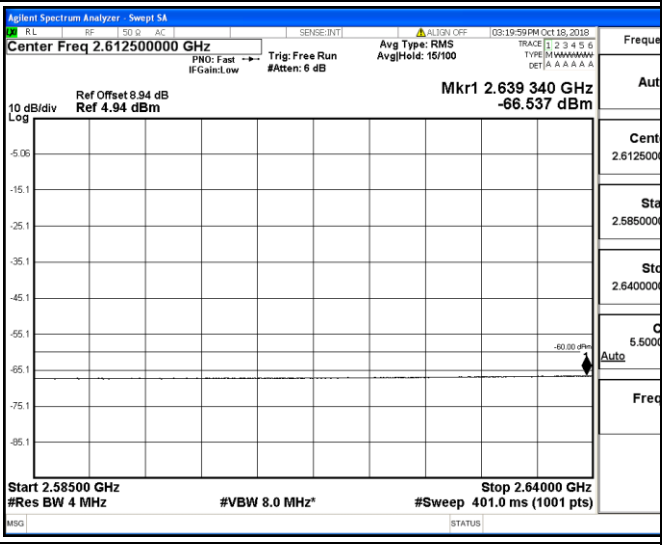
1805MHz~1830MHz



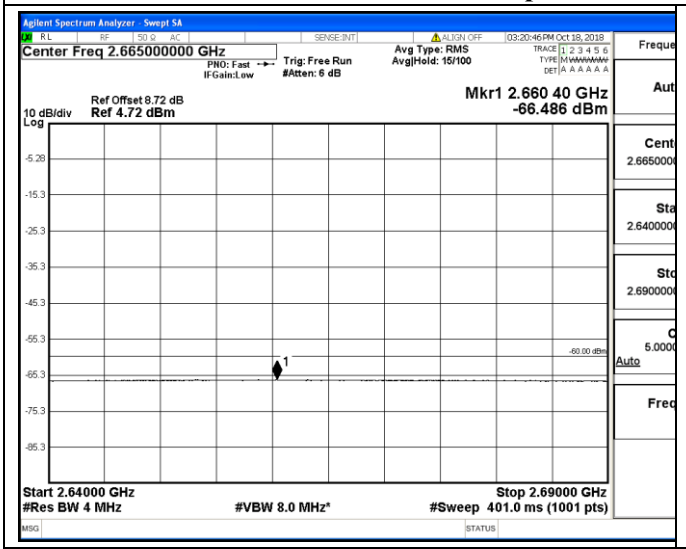
1830MHz~1880MHz



2110MHz~2170MHz



2585MHz~2640MHz

The Worst Test Result of Spurious Emissions for Band VIII (Middle Channel)	
	
2640MHz~2690MHz	

Transmitter spurious emissions

Radiated spurious emissions - MS allocated a channel(Worst Case)

WCDMA Band I: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
245.71	Horizontal	-50.00	-36.00	Pass
551.77	H	-51.01	-36.00	
1794.88	H	-44.78	-30.00	
2692.24	H	-41.23	-30.00	
3589.65	H	-49.43	-30.00	
WCDMA Band I: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
204.43	Vertical	-55.26	-36.00	Pass
451.02	V	-48.03	-36.00	
1794.72	V	-49.00	-30.00	
2692.25	V	-47.71	-30.00	
3589.58	V	-44.78	-30.00	

WCDMA Band VIII: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
325.69	Horizontal	-53.70	-36.00	Pass
414.23	H	-53.67	-36.00	
1794.86	H	-44.81	-30.00	
2692.24	H	-47.34	-30.00	
3589.61	H	-44.04	-30.00	
WCDMA Band VIII: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
254.21	Vertical	-55.96	-36.00	Pass
429.80	V	-46.36	-36.00	
1794.73	V	-47.81	-30.00	
2692.28	V	-47.78	-30.00	
3589.62	V	-42.42	-30.00	

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Radiated spurious emissions - MS in Idle Mode(Worst Case)

WCDMA Band I: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
241.55	Horizontal	-71.56	-57.00	Pass
509.80	H	-70.14	-57.00	
1621.05	H	-58.86	-47.00	
2248.34	H	-62.42	-47.00	
3648.34	H	-63.88	-47.00	
WCDMA Band I: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
62.79	Vertical	-74.21	-57.00	Pass
919.50	V	-71.31	-57.00	
1510.65	V	-59.36	-47.00	
2148.47	V	-58.02	-47.00	
3332.97	V	-63.46	-47.00	

WCDMA Band VIII: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
367.85	Horizontal	-76.56	-57.00	Pass
418.28	H	-68.95	-57.00	
1582.49	H	-58.50	-47.00	
2251.39	H	-64.89	-47.00	
3426.67	H	-61.35	-47.00	
WCDMA Band VIII: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
62.79	Vertical	-72.70	-57.00	Pass
919.50	V	-73.47	-57.00	
1568.87	V	-61.38	-47.00	
2161.99	V	-59.64	-47.00	
3658.22	V	-64.31	-47.00	

----------THE END OF REPORT----------

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RADIO TEST REPORT

For

Shenzhen Gokodo Technology Co., Ltd

4G Mobile Router

Test Model: M6

Additional Model No.: M7,M6XX,M7XX

Prepared for	:	Shenzhen Gokodo Technology Co., Ltd
Address	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street, Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	October 11, 2018
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	October 11, 2018~ November 08, 2018
Date of Report	:	November 13, 2018

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RADIO TEST REPORT

ETSI EN 301 908-13 V11.1.1 (2016-07)

IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)

Report Reference No.	:	**LCS181011006AEF**
Date of Issue	:	November 13, 2018
Testing Laboratory Name	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards ☐ Other standard testing method ☐
Applicant's Name.....	:	**Shenzhen Gokodo Technology Co., Ltd**
Address	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Test Specification		
Standard	:	ETSI EN 301 908-1 V11.1.1 (2016-07) ETSI EN 301 908-13 V11.1.1 (2016-07)
Test Report Form No.	:	LCSEMC-1.0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2017-06

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Test Item Description.	:	4G Mobile Router
Trade Mark.....	:	Gokodo/QLink
Test Model	:	M6
Ratings	:	DC 3.7V by Li-ion battery(2000mAh) Recharged by DC 5V/1A by adapter
Result	:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Peter Xiao	Calvin Weng	
Peter Xiao / Administrators	Calvin Weng/Technique principal	Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCS181011006AEF	November 13, 2018 Date of issue

Test Model.....	:	M6
EUT.....	:	4G Mobile Router
Applicant.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/
Factory.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/

Test Result	Positive

The test report merely corresponds to the test sample.
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Revision History

Revision	Issue Date	Revisions	Revised By
000	November 13, 2018	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	4G Mobile Router
Test Model	:	M6
Additional Model No.	:	M7,M6XX,M7XX
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Power Supply	:	DC 3.7V by Li-ion battery(2000mAh) Recharged by DC 5V/1A by adapter
Hardware Version	:	M6_V1.1
Software Version	:	M6VD_V1.1
2G	:	
Support Band	:	☒GSM 900 (EU-Band) ☒DCS 1800 (EU-Band) ☒GSM 850 (U.S.-Band) ☒PCS 1900 (U.S.-Band)
Release Version	:	R99
GPRS Class	:	Class 12
EGPRS Class	:	Class 12
Uplink	:	GSM 900: 880MHz ~ 915MHz DCS 1800: 1710MHz ~ 1785MHz
Downlink	:	GSM 900: 925MHz ~ 960MHz DCS 1800: 1805MHz ~ 1880MHz
Type Of Modulation	:	GMSK for GPRS, GMSK/8PSK for EGPRS
Antenna Description	:	PIFA Antenna; 900MHz:-0.72dBi(Max.) , 900MHz :-1.23dBi(Max.)
Power Class	:	GSM 900: Class 4, DCS 1800: Class 1
3G	:	
Support Band	:	☐WCDMA Band II (U.S.-Band) ☐WCDMA Band V (U.S.-Band) ☒WCDMA Band I (EU-Band) ☒WCDMA Band VIII (EU-Band)
Release Version	:	R99
Uplink	:	WCDMA Band I: 1920MHz ~ 1980MHz WCDMA Band VIII: 880MHz~915MHz
Downlink	:	WCDMA Band I: 2110MHz ~ 2170MHz WCDMA Band VIII: 925MHz~960MHz
Type Of Modulation	:	WCDMA: QPSK; HSDPA/HSUPA: QPSK
Antenna Description	:	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 8:-0.72dBi(Max.)
Power Class	:	Class 3
LTE	:	
Support Band	:	☒E-UTRA Band 1(EU-Band) ☒E-UTRA Band 3(EU-Band)

		☒E-UTRA Band 7(EU-Band) ☒E-UTRA Band 8(EU-Band) ☒E-UTRA Band 20(EU-Band) ☒E-UTRA Band 38(EU-Band) ☒E-UTRA Band 40(EU-Band)
LTE Release Version	:	R4
Uplink	:	E-UTRA Band 1: 1920MHz ~ 1980MHz E-UTRA Band 3: 1710MHz~1785MHz E-UTRA Band 7: 2500MHz ~ 2570MHz E-UTRA Band 8: 880MHz~915MHz E-UTRA Band 20: 832MHz ~ 862MHz E-UTRA Band 38: 2570MHz ~ 2620MHz E-UTRA Band 40: 2300MHz~2400MHz
Downlink	:	E-UTRA Band 1: 2110MHz ~ 2170MHz E-UTRA Band 3: 1805MHz~1880MHz E-UTRA Band 7: 2620MHz~2690MHz E-UTRA Band 8: 926MHz~960MHz E-UTRA Band 20: 791MHz~821MHz E-UTRA Band 38: 2570MHz ~ 2620MHz E-UTRA Band 40: 2300MHz~2400MHz
Type Of Modulation	:	QPSK/16-QAM
Antenna Description	:	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 3:-1.37dBi(Max.), Band 7:-0.27dBi(Max.),Band 8:-0.72dBi(Max.) , Band 20:-0.67dBi(Max.) ,Band 38:-0.22dBi(Max.) , Band 40:-0.25dBi(Max.)
Power Class	:	Class 3
WIFI(2.4G Band)	:	
Frequency Range	:	2412-2472MHz
Channel Spacing	:	5MHz
Channel Number	:	13 Channel for 20MHz bandwidth(2412~2472MHz) 9 channels for 40MHz bandwidth(2422~2462MHz)
Modulation Type	:	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	:	Two same PIFA Antenna; ANT1 used for WIFI, -0.52dBi(Max.); ANT2 used for WIFI, -0.52dBi(Max.);

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1.2. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
Shenzhen Gokodo Technology Co., Ltd	Adapter	KS15004R	---	CE

Products are sold without adapters

1.3. External I/O

I/O Port Description	Quantity	Cable
Charging port	1	0.2 m, unshielded cable

1.4. Objective

Standard Referenced	Standard Title	Standard Version
ETSI EN 301 908-1	IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Introduction and common requirements	V11.1.1 (2016-07)
ETSI EN 301 908-13	IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)	V11.1.1 (2016-07)
ETSI TS 136 521-1	LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing (3GPP TS 36.521-1 version 12.8.0 Release 12)	V12.8.0 (2016-05)

The objective is to determine compliance with ETSI EN 301 908-1 V11.1.1 (2016-07) & ETSI EN 301 908-13 V11.1.1 (2016-07).

1.5. Test Conditions

Conditions	Temperature	Voltage
Normal	21-25℃	DC 3.70V
Low extreme temperature/low extreme voltage (LT/LV);	-20℃	DC 3.30V
Low extreme temperature/high extreme voltage (LT/HV);	-20℃	DC 4.20V
High extreme temperature/low extreme voltage (HT/LV);	+55℃	DC 3.30V
High extreme temperature/high extreme voltage (HT/HV).	+55℃	DC 4.20V
Note1: For all conditions, the humidity range is:40-75%, the pressure range is 86-106kPa. The High Voltage DC 4.2V and Low Voltage DC 3.3V was declared by manufacturer		

1.6. Description Of Test Mode

The following operating modes were applied for the related test items. For radiated measurement, the test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position. All test modes were tested, only the result of the worst case was recorded in the report.

Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
	1.4	3	5	10	15	20	QPSK	16-QAM	1	Part	Full	L	M	H
1	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
3	Y	/	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
7	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
8	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
20	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
38	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y
40	N/A	N/A	Y	/	/	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note:
1)The mark "**Y**" means that this configuration is chosen for testing.
2)The mark "/" means that this bandwidth is supported but is not chosen for testing.
3)The mark "**N/A**" means that this bandwidth is not supported.

1.7. Measurement Uncertainty (95% confidence levels, k=2)

Test Item		Uncertainty
Radio Frequency	:	0.9×10^{-4}
Total RF Power, Conducted	:	1.0 dB
RF Power Density, Conducted	:	1.8 dB
Spurious Emissions, Conducted	:	1.8 dB
All Emissions, Radiated	:	3.1 dB
Temperature	:	0.5°C
Humidity	:	1 %
DC And Low Frequency Voltages	:	1 %

1.8. Description of Test Facility

FCC Registration Number. is 254912.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001
NVLAP Registration Code is 600167-0

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2. SYSTEM TEST CONFIGURATION

2.1. Justification

N/A

2.2. EUT Exercise Software

N/A

2.3. Special Accessories

The special accessories were supplied by Shenzhen LCS Compliance Testing Laboratory Ltd.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Test Setup

Please refer to the test setup photo.

3. TEST RESULTS

Reference Clause No. (ETSI EN 301 908-13)	Description of Test Items	Result						
		E-UTRA Band						
		Band 1	Band 3	Band 7	Band 8	Band 20	Band 38	Band 40
4.2.2	Transmitter Maximum Output Power							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	LT / LV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	LT / HV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	HT / LV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	HT / HV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
4.2.5	Transmitter Minimum Output Power							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	LT / LV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	LT / HV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	HT / LV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	HT / HV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
4.2.3	Transmitter Spectrum Emission Mask							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
4.2.11	Transmitter Adjacent Channel Leakage Power Ratio							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	LT / LV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	LT / HV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	HT / LV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	HT / HV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
4.2.4	Transmitter Spurious Emissions							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
4.2.10	Receiver Spurious Emissions							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
4.2.6	Receiver Adjacent Channel Selectivity (ACS)							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
4.2.7	Receiver Blocking Characteristics							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
4.2.8	Receiver Spurious Response							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
4.2.9	Receiver Inter modulation Characteristics							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass

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Reference Clause No. (ETSI EN 301 908-1)	Description of Test Items	Result						
		E-UTRA Band						
		Band 1	Band 3	Band 7	Band 8	Band 20	Band 38	Band 40
4.2.2	Radiated emissions (UE)							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass
4.2.4	Control and monitoring functions (UE)							
	NT / NV	Pass	Pass	Pass	Pass	Pass	Pass	Pass

***Note:

Result: Describes test result of Test Case.

Pass: Test Case passed on specified conformance test platform.

NT: Normal temperature – 25℃

NV: Normal voltage. – DC 3.7V

HT: High temperature – +55℃

HV: High voltage – DC 4.2V

LT: Low temperature – -20℃

LV: Low voltage – DC 3.3V

Vibration X-axis/ Y-axis/ Z-axis: Vibration test condition for X/Y/Z axis.

N/A: Not applicable.

—: Not test.

3.1. List Of Measuring Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	X-series USB Peak and Average Power Sensor Aglient	Agilent	U2021XA	MY54080022	2018-10-25	2019-10-24
2	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2018-10-25	2019-10-24
3	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
4	RF Control Unit	Ascentest	AT890-RFB	N/A	2018-06-16	2019-06-15
5	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2017-11-17	2018-11-16
6	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2018-06-16	2019-06-15
7	SPECTRUM ANALYZER	R&S	FSP	100503	2018-06-16	2019-06-15
8	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2017-11-17	2018-11-16
9	ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY42081396	2017-11-17	2018-11-16
10	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2017-11-17	2018-11-16
11	Universal Radio Communication Tester	R&S	CMU 200	105788	2018-06-16	2019-06-15
12	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2018-06-16	2019-06-15
13	RF Control Unit	Tonscend	JS0806-1	N/A	2018-06-16	2019-06-15
14	DC Power Supply	Agilent	E3642A	N/A	2017-11-17	2018-11-16
15	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
16	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2018-10-10	2019-10-09
17	DC Source	CHROMA	62012P-80-60	34782951	2018-10-10	2019-10-09
18	RF Filter	Micro-Tronics	BRC50718	S/N-017	2018-06-16	2019-06-15
19	RF Filter	Micro-Tronics	BRC50719	S/N-011	2018-06-16	2019-06-15
20	RF Filter	Micro-Tronics	BRC50720	S/N-011	2018-06-16	2019-06-15
21	RF Filter	Micro-Tronics	BRC50721	S/N-013	2018-06-16	2019-06-15
22	RF Filter	Micro-Tronics	BRM50702	S/N-195	2018-06-16	2019-06-15
23	Splitter/Combiner	Micro-Tronics	PS2-15	CB11-20	2018-06-16	2019-06-15
24	Splitter/Combiner	Micro-Tronics	CB11-20	N/A	2018-06-16	2019-06-15
25	Attenuator	Micro-Tronics	PAS-8-10	S/N23466	2018-06-16	2019-06-15
26	Exposure Level Tester	Narda	ELT-400	N-0713	2018-04-02	2019-04-01
27	B-Field Probe	Narda	ELT-400	M-1154	2018-04-10	2019-04-09
28	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
29	Positioning Controller	MF	MF-7082	/	2018-06-16	2019-06-15
30	EMI Test Software	AUDIX	E3	N/A	2018-06-16	2019-06-15
31	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
32	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2017-11-17	2018-11-16
33	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-06-22	2019-06-21
34	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-05-01	2019-04-30
35	Horn Antenna	EMCO	3115	6741	2018-06-22	2019-06-21
36	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
37	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
38	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
39	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15
40	TEST RECEIVER	R&S	ESCI	101142	2018-06-16	2019-06-15
41	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	2018-06-16	2019-06-15
42	10dB Attenuator	SCHWARZBECK	MTS-IMP136	261115-001-0032	2018-06-16	2019-06-15

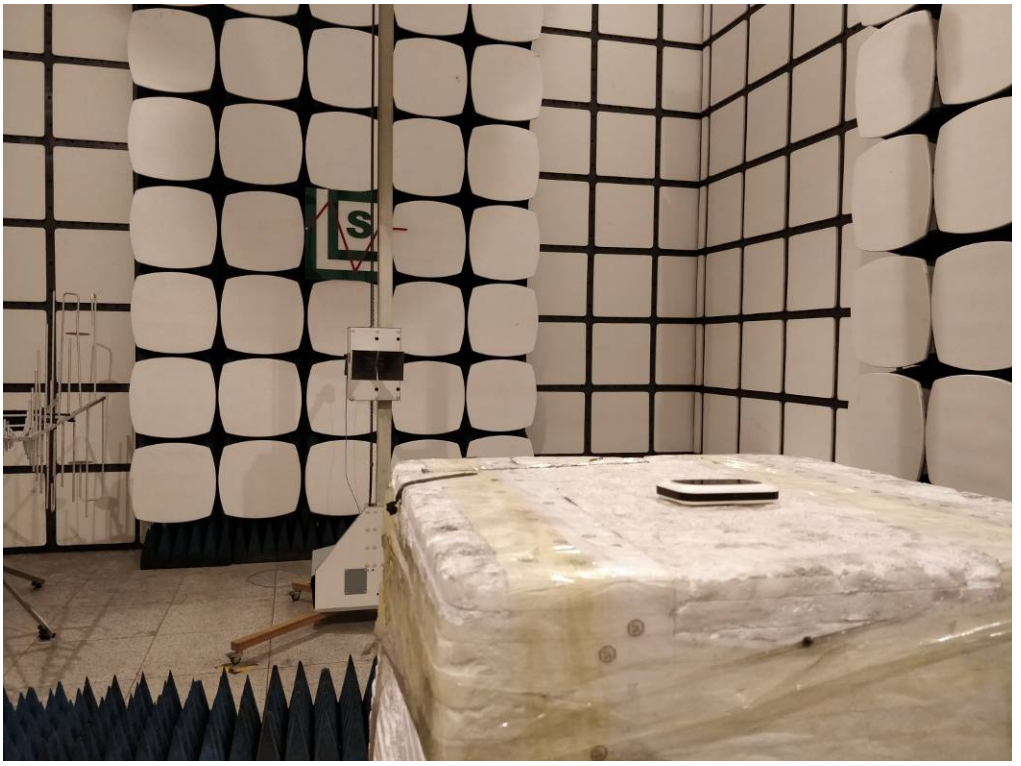
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43	Artificial Mains	R&S	ENV216	101288	2018-06-16	2019-06-15
44	Power Analyzer Test System	Voltech	PM6000	20000670053	2018-06-16	2019-06-15
45	ESD Simulator	SCHLODER	SESD 230	604035	2018-06-16	2019-06-15
46	RF POWER AMPLIFIER	OPHIR	5225R	1052	2018-03-21	2019-03-20
47	RF POWER AMPLIFIER	OPHIR	5273F	1019	2018-03-23	2019-03-25
48	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2018-04-27	2019-04-26
49	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-482	2018-04-27	2019-04-26
50	Electric field probe	Narda S.TS./PMM	EP601	611WX80208	2018-03-26	2019-03-25
51	Power Meter	Agilent	E4419B	MY45104493	2018-06-16	2019-06-15
52	Power Sensor	Agilent	E9301H	MY41495234	2018-06-16	2019-06-15
53	Power Sensor	Agilent	E4412A	MY41500229	2018-06-16	2019-06-15
54	Sound Level meter	BK Precision	735	73500873100	2018-06-16	2019-06-15
55	Audio Analyzer	R&S	UPV	1146.2003K0	2018-06-16	2019-06-15
56	Mouse Simulation	Bruel & Kjaer	4227	A0304216	2018-06-16	2019-06-15
57	Ear Simulation and supply	Bruel & Kjaer	2669.4182.5935	A0305284	2018-06-16	2019-06-15
58	Acoustical Calibrators	Bruel & Kjaer	4231	A0304215	2018-06-16	2019-06-15
59	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2017-11-17	2018-11-16
60	Simulator	FRANKONIA	CIT-10	A126A1195	2018-06-16	2019-06-15
61	CDN	FRANKONIA	CDN-M2	5100100100	2018-06-16	2019-06-15
62	CDN	FRANKONIA	CDN-M3	0900-11	2018-06-16	2019-06-15
63	Attenuator	FRANKONIA	ATT6	0010222A	2018-06-16	2019-06-15
64	Infuse tongs	EM TEST	EM-Clamp	0513A031201	2018-06-16	2019-06-15
65	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2018-06-16	2019-06-15
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

4. PHOTOGRAPHS OF TEST SETUP



Spurious Emission below 1GHz



Spurious Emission above 1GHz

The conducted power measurement results for LTE

LTE-BAND1

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
5 MHz	Low range	1	0	22.80	21.90
			max	22.81	21.99
		Partial	0	22.93	22.03
			max	22.88	21.90
	Mid range	1	0	22.80	21.84
			max	22.91	21.93
		Partial	0	22.97	22.01
			max	22.84	21.92
	High range	1	0	22.89	21.99
			max	22.90	22.01
		Partial	0	22.89	22.04
			max	22.74	21.81
20MHz	Low range	1	0	22.78	21.87
			max	22.77	21.92
		Partial	0	22.86	21.97
			max	22.82	21.83
	Mid range	1	0	22.66	21.73
			max	22.63	21.59
		Partial	0	22.76	21.80
			max	22.69	21.62
	High range	1	0	22.70	21.66
			max	22.78	21.72
		Partial	0	22.60	21.69
			max	22.73	21.80

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LTE-BAND3

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
1.4MHz	Low range	1	0	22.45	21.58
			max	22.50	21.67
		Partial	0	22.45	21.57
			max	22.31	21.49
	Mid range	1	0	22.46	21.62
			max	22.37	21.49
		Partial	0	22.36	21.48
			max	22.43	21.55
	High range	1	0	22.21	21.39
			max	22.26	21.36
		Partial	0	22.27	21.34
			max	22.35	21.50
5 MHz	Low range	1	0	22.33	21.43
			max	22.22	21.38
		Partial	0	22.32	21.35
			max	22.38	21.43
	Mid range	1	0	22.25	21.27
			max	22.22	21.17
		Partial	0	22.20	21.25
			max	22.19	21.15
	High range	1	0	22.29	21.34
			max	22.27	21.31
		Partial	0	22.23	21.23
			max	22.15	21.16
20MHz	Low range	1	0	22.40	21.54
			max	22.38	21.42
		Partial	0	22.44	21.51
			max	22.45	21.62
	Mid range	1	0	22.49	21.53
			max	22.42	21.53
		Partial	0	22.36	21.50
			max	22.49	21.55
	High range	1	0	22.30	21.37
			max	22.23	21.23
		Partial	0	22.23	21.41
			max	22.30	21.40

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LTE-BAND7

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
5 MHz	Low range	1	0	22.69	21.88
			max	22.74	21.79
		Partial	0	22.71	21.75
			max	22.69	21.75
	Mid range	1	0	22.73	21.74
			max	22.75	21.90
		Partial	0	22.61	21.63
			max	22.63	21.80
	High range	1	0	22.60	21.66
			max	22.54	21.71
		Partial	0	22.56	21.64
			max	22.61	21.63
20MHz	Low range	1	0	22.65	21.84
			max	22.53	21.68
		Partial	0	22.56	21.71
			max	22.64	21.70
	Mid range	1	0	22.60	21.53
			max	22.55	21.47
		Partial	0	22.46	21.46
			max	22.57	21.54
	High range	1	0	22.58	21.63
			max	22.60	21.58
		Partial	0	22.50	21.43
			max	22.50	21.45

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LTE-BAND8

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
1.4 MHz	Low range	1	0	22.40	21.48
			max	22.49	21.50
		Partial	0	22.39	21.43
			max	22.46	21.54
	Mid range	1	0	22.31	21.37
			max	22.48	21.65
		Partial	0	22.38	21.40
			max	22.38	21.42
	High range	1	0	22.38	21.39
			max	22.37	21.52
		Partial	0	22.32	21.52
			max	22.29	21.32
5 MHz	Low range	1	0	22.24	21.32
			max	22.34	21.46
		Partial	0	22.21	21.33
			max	22.34	21.47
	Mid range	1	0	22.19	21.23
			max	22.26	21.17
		Partial	0	22.18	21.25
			max	22.12	21.21
	High range	1	0	22.21	21.12
			max	22.25	21.28
		Partial	0	22.15	21.21
			max	22.10	21.00
10MHz	Low range	1	0	22.43	21.46
			max	22.35	21.52
		Partial	0	22.41	21.42
			max	22.39	21.44
	Mid range	1	0	22.46	21.61
			max	22.38	21.55
		Partial	0	22.45	21.63
			max	22.49	21.62
	High range	1	0	22.30	21.30
			max	22.30	21.46
		Partial	0	22.22	21.34
			max	22.25	21.35

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LTE-BAND20

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
5 MHz	Low range	1	0	22.70	21.85
			max	22.63	21.66
		Partial	0	22.67	21.70
			max	22.71	21.72
	Mid range	1	0	22.72	21.74
			max	22.78	21.86
		Partial	0	22.66	21.86
			max	22.73	21.82
	High range	1	0	22.53	21.70
			max	22.52	21.65
		Partial	0	22.63	21.67
			max	22.56	21.69
20MHz	Low range	1	0	22.62	21.73
			max	22.57	21.63
		Partial	0	22.50	21.61
			max	22.64	21.79
	Mid range	1	0	22.58	21.62
			max	22.56	21.53
		Partial	0	22.47	21.51
			max	22.48	21.54
	High range	1	0	22.47	21.49
			max	22.51	21.56
		Partial	0	22.60	21.61
			max	22.41	21.44

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LTE-BAND38

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
5 MHz	Low range	1	0	23.40	22.49
			max	23.42	22.47
		Partial	0	23.48	22.65
			max	23.45	22.51
	Mid range	1	0	23.32	22.51
			max	23.49	22.59
		Partial	0	23.45	22.64
			max	23.49	22.69
	High range	1	0	23.26	22.32
			max	23.22	22.41
		Partial	0	23.25	22.39
			max	23.39	22.52
20MHz	Low range	1	0	23.29	22.35
			max	23.28	22.41
		Partial	0	23.26	22.41
			max	23.23	22.41
	Mid range	1	0	23.16	22.21
			max	23.23	22.32
		Partial	0	23.18	22.21
			max	23.13	22.03
	High range	1	0	23.22	22.21
			max	23.27	22.19
		Partial	0	23.30	22.31
			max	23.13	22.05

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LTE-BAND40

Channel Bandwidth	Channel	RB allocation		Average Power (dBm) QPSK	Average Power (dBm) 16-QAM
		RB Size	RB Offset		
5 MHz	Low range	1	0	23.45	22.51
			max	23.32	22.47
		Partial	0	23.41	22.54
			max	23.36	22.48
	Mid range	1	0	23.42	22.43
			max	23.40	22.53
		Partial	0	23.45	22.59
			max	23.33	22.39
	High range	1	0	23.13	22.10
			max	23.30	22.12
		Partial	0	23.27	22.23
			max	23.21	22.14
20MHz	Low range	1	0	23.16	22.02
			max	23.12	21.99
		Partial	0	23.13	22.01
			max	23.12	21.99
	Mid range	1	0	23.24	22.10
			max	23.30	22.29
		Partial	0	23.20	22.04
			max	23.24	22.23
	High range	1	0	23.23	22.05
			max	23.24	22.15
		Partial	0	23.28	22.17
			max	23.21	22.15

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Annex of Radiated spurious emission

Radiated spurious emissions - MS allocated a channel(Worst Case)

LTE Band 1(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
210.68	Horizontal	-50.86	-36.00	Pass
451.74	H	-53.03	-36.00	
1794.72	H	-43.40	-30.00	
2692.26	H	-47.23	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
388.13	Vertical	-52.09	-36.00	Pass
497.38	V	-51.98	-36.00	
1794.86	V	-45.15	-30.00	
2692.29	V	-48.40	-30.00	

LTE Band 1(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
211.96	Horizontal	-55.97	-36.00	Pass
525.73	H	-55.62	-36.00	
1794.84	H	-40.63	-30.00	
2692.24	H	-47.29	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
230.34	Vertical	-47.76	-36.00	Pass
408.10	V	-47.72	-36.00	
1794.72	V	-41.84	-30.00	
2692.26	V	-49.26	-30.00	

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LTE Band 1(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
210.15	Horizontal	-52.43	-36.00	Pass
420.88	H	-49.72	-36.00	
1794.71	H	-48.42	-30.00	
2692.10	H	-43.48	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
358.68	Vertical	-53.84	-36.00	Pass
405.30	V	-50.80	-36.00	
1794.71	V	-44.99	-30.00	
2692.24	V	-43.19	-30.00	

LTE Band 1(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
311.51	Horizontal	-46.34	-36.00	Pass
523.15	H	-49.99	-36.00	
1794.85	H	-40.10	-30.00	
2692.22	H	-49.81	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
393.31	Vertical	-48.59	-36.00	Pass
463.14	V	-48.99	-36.00	
1794.80	V	-44.41	-30.00	
2692.17	V	-45.43	-30.00	

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LTE Band 3(1.4MHz, RB allocation=6): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
215.55	Horizontal	-54.62	-36.00	Pass
487.99	H	-54.45	-36.00	
1794.70	H	-41.98	-30.00	
2692.23	H	-49.22	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
306.88	Vertical	-46.70	-36.00	Pass
579.95	V	-49.72	-36.00	
1794.72	V	-47.65	-30.00	
2692.28	V	-45.54	-30.00	

LTE Band 3(1.4MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
222.16	Horizontal	-48.45	-36.00	Pass
470.27	H	-50.96	-36.00	
1794.89	H	-44.27	-30.00	
2692.26	H	-45.39	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
313.46	Vertical	-46.62	-36.00	Pass
478.25	V	-52.60	-36.00	
1794.74	V	-40.47	-30.00	
2692.14	V	-47.25	-30.00	

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LTE Band 3(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
215.04	Horizontal	-49.87	-36.00	Pass
464.41	H	-54.38	-36.00	
1794.78	H	-45.57	-30.00	
2692.27	H	-42.60	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
216.76	Vertical	-51.31	-36.00	Pass
406.97	V	-49.68	-36.00	
1794.77	V	-40.09	-30.00	
2692.25	V	-46.60	-30.00	

LTE Band 3(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
204.95	Horizontal	-47.42	-36.00	Pass
507.58	H	-50.62	-36.00	
1794.85	H	-47.14	-30.00	
2692.23	H	-41.81	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
204.06	Vertical	-48.59	-36.00	Pass
599.30	V	-47.10	-36.00	
1794.83	V	-40.99	-30.00	
2692.24	V	-40.95	-30.00	

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LTE Band 3(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
251.16	Horizontal	-53.25	-36.00	Pass
559.39	H	-46.91	-36.00	
1794.82	H	-42.50	-30.00	
2692.14	H	-49.94	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
373.50	Vertical	-52.06	-36.00	Pass
560.45	V	-51.35	-36.00	
1794.75	V	-46.49	-30.00	
2692.10	V	-47.95	-30.00	

LTE Band 3(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
250.28	Horizontal	-51.69	-36.00	Pass
580.74	H	-55.84	-36.00	
1794.79	H	-42.96	-30.00	
2692.15	H	-48.92	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
261.29	Vertical	-48.24	-36.00	Pass
561.97	V	-46.04	-36.00	
1794.78	V	-44.46	-30.00	
2692.21	V	-45.15	-30.00	

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LTE Band 7(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
385.49	Horizontal	-48.62	-36.00	Pass
444.47	H	-55.70	-36.00	
1794.85	H	-49.58	-30.00	
2692.11	H	-41.29	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
346.52	Vertical	-49.69	-36.00	Pass
549.21	V	-55.94	-36.00	
1794.85	V	-46.51	-30.00	
2692.11	V	-42.36	-30.00	

LTE Band 7(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
383.99	Horizontal	-48.44	-36.00	Pass
403.15	H	-49.75	-36.00	
1794.79	H	-41.08	-30.00	
2692.15	H	-44.00	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
355.39	Vertical	-54.37	-36.00	Pass
410.08	V	-53.35	-36.00	
1794.73	V	-49.38	-30.00	
2692.27	V	-45.97	-30.00	

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LTE Band 7(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
211.45	Horizontal	-54.20	-36.00	Pass
526.88	H	-49.96	-36.00	
1794.77	H	-49.14	-30.00	
2692.10	H	-42.83	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
392.78	Vertical	-54.45	-36.00	Pass
453.98	V	-54.73	-36.00	
1794.87	V	-43.97	-30.00	
2692.23	V	-49.88	-30.00	

LTE Band 7(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
264.97	Horizontal	-51.48	-36.00	Pass
548.05	H	-51.79	-36.00	
1794.83	H	-41.21	-30.00	
2692.22	H	-44.10	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
228.81	Vertical	-52.77	-36.00	Pass
567.67	V	-52.18	-36.00	
1794.85	V	-46.22	-30.00	
2692.20	V	-47.45	-30.00	

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LTE Band 8(1.4MHz, RB allocation=6): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
349.75	Horizontal	-54.00	-36.00	Pass
549.69	H	-52.45	-36.00	
1794.73	H	-49.35	-30.00	
2692.21	H	-48.54	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
285.74	Vertical	-49.46	-36.00	Pass
523.13	V	-50.67	-36.00	
1794.81	V	-44.71	-30.00	
2692.26	V	-47.30	-30.00	

LTE Band 8(1.4MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
280.50	Horizontal	-54.19	-36.00	Pass
580.13	H	-55.05	-36.00	
1794.73	H	-43.69	-30.00	
2692.24	H	-40.35	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
375.33	Vertical	-46.08	-36.00	Pass
438.02	V	-55.15	-36.00	
1794.74	V	-46.87	-30.00	
2692.27	V	-40.65	-30.00	

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LTE Band 8(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
239.70	Horizontal	-53.15	-36.00	Pass
461.82	H	-55.28	-36.00	
1794.84	H	-46.45	-30.00	
2692.14	H	-44.15	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
390.42	Vertical	-52.57	-36.00	Pass
510.37	V	-50.51	-36.00	
1794.90	V	-49.37	-30.00	
2692.16	V	-48.43	-30.00	

LTE Band 8(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
367.42	Horizontal	-55.41	-36.00	Pass
439.42	H	-52.15	-36.00	
1794.85	H	-43.47	-30.00	
2692.28	H	-44.04	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
338.33	Vertical	-54.29	-36.00	Pass
522.64	V	-49.35	-36.00	
1794.73	V	-43.97	-30.00	
2692.18	V	-42.48	-30.00	

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LTE Band 8(10MHz, RB allocation=50): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
335.40	Horizontal	-52.17	-36.00	Pass
407.83	H	-50.59	-36.00	
1794.78	H	-40.39	-30.00	
2692.25	H	-40.77	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
276.37	Vertical	-52.74	-36.00	Pass
547.25	V	-51.98	-36.00	
1794.80	V	-47.78	-30.00	
2692.14	V	-40.11	-30.00	

LTE Band 8(10MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
289.08	Horizontal	-55.53	-36.00	Pass
540.57	H	-52.28	-36.00	
1794.72	H	-40.75	-30.00	
2692.22	H	-43.07	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
209.33	Vertical	-55.37	-36.00	Pass
484.07	V	-53.96	-36.00	
1794.77	V	-43.74	-30.00	
2692.14	V	-40.87	-30.00	

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LTE Band 20(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
312.58	Horizontal	-55.95	-36.00	Pass
457.58	H	-48.82	-36.00	
1794.86	H	-43.20	-30.00	
2692.19	H	-46.10	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
259.65	Vertical	-51.67	-36.00	Pass
579.93	V	-55.02	-36.00	
1794.76	V	-46.22	-30.00	
2692.13	V	-48.54	-30.00	

LTE Band 20(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
318.62	Horizontal	-54.70	-36.00	Pass
452.31	H	-55.09	-36.00	
1794.81	H	-44.81	-30.00	
2692.15	H	-43.39	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
279.78	Vertical	-48.83	-36.00	Pass
492.79	V	-53.76	-36.00	
1794.73	V	-46.25	-30.00	
2692.22	V	-44.82	-30.00	

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LTE Band 20(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
328.26	Horizontal	-46.93	-36.00	Pass
418.02	H	-49.20	-36.00	
1794.86	H	-44.01	-30.00	
2692.27	H	-46.86	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
376.63	Vertical	-54.58	-36.00	Pass
447.23	V	-51.86	-36.00	
1794.74	V	-45.26	-30.00	
2692.28	V	-44.07	-30.00	

LTE Band 20(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
321.04	Horizontal	-55.38	-36.00	Pass
432.02	H	-51.50	-36.00	
1794.79	H	-45.19	-30.00	
2692.26	H	-47.37	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
365.22	Vertical	-49.60	-36.00	Pass
504.30	V	-48.09	-36.00	
1794.89	V	-48.76	-30.00	
2692.13	V	-49.38	-30.00	

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LTE Band 38(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
250.66	Horizontal	-50.93	-36.00	Pass
435.78	H	-51.94	-36.00	
1794.76	H	-42.02	-30.00	
2692.17	H	-46.06	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
372.29	Vertical	-48.26	-36.00	Pass
509.61	V	-54.16	-36.00	
1794.82	V	-45.80	-30.00	
2692.14	V	-41.30	-30.00	

LTE Band 38(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
367.38	Horizontal	-50.94	-36.00	Pass
477.44	H	-48.36	-36.00	
1794.81	H	-41.46	-30.00	
2692.22	H	-46.39	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
240.32	Vertical	-46.12	-36.00	Pass
516.70	V	-47.62	-36.00	
1794.83	V	-46.36	-30.00	
2692.26	V	-44.83	-30.00	

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LTE Band 38(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
233.69	Horizontal	-51.89	-36.00	Pass
415.85	H	-51.00	-36.00	
1794.87	H	-47.14	-30.00	
2692.11	H	-43.56	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
291.50	Vertical	-55.38	-36.00	Pass
493.30	V	-49.82	-36.00	
1794.88	V	-47.51	-30.00	
2692.24	V	-41.23	-30.00	

LTE Band 38(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
389.72	Horizontal	-50.82	-36.00	Pass
504.61	H	-55.91	-36.00	
1794.82	H	-46.28	-30.00	
2692.21	H	-49.40	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
316.61	Vertical	-52.45	-36.00	Pass
536.96	V	-54.01	-36.00	
1794.76	V	-46.27	-30.00	
2692.13	V	-49.02	-30.00	

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LTE Band 40(5MHz, RB allocation=25): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
205.02	Horizontal	-48.10	-36.00	Pass
499.35	H	-55.38	-36.00	
1794.79	H	-43.40	-30.00	
2692.12	H	-49.11	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
294.16	Vertical	-48.07	-36.00	Pass
409.45	V	-46.92	-36.00	
1794.74	V	-44.14	-30.00	
2692.15	V	-44.99	-30.00	

LTE Band 40(5MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
238.72	Horizontal	-55.99	-36.00	Pass
519.56	H	-46.55	-36.00	
1794.84	H	-46.49	-30.00	
2692.11	H	-44.50	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
318.15	Vertical	-48.59	-36.00	Pass
560.81	V	-53.61	-36.00	
1794.87	V	-46.55	-30.00	
2692.20	V	-49.51	-30.00	

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LTE Band 40(20MHz, RB allocation=100): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
398.58	Horizontal	-55.83	-36.00	Pass
561.42	H	-49.12	-36.00	
1794.73	H	-47.88	-30.00	
2692.21	H	-46.79	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
308.67	Vertical	-52.97	-36.00	Pass
455.71	V	-47.23	-36.00	
1794.77	V	-40.14	-30.00	
2692.18	V	-48.05	-30.00	

LTE Band 40(20MHz, RB allocation=1): Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
292.99	Horizontal	-51.54	-36.00	Pass
434.23	H	-50.18	-36.00	
1794.84	H	-44.18	-30.00	
2692.26	H	-47.46	-30.00	
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
248.54	Vertical	-51.40	-36.00	Pass
596.17	V	-52.35	-36.00	
1794.77	V	-43.12	-30.00	
2692.22	V	-44.37	-30.00	

----------THE END OF REPORT----------

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TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.247

TEST REPORT

For

Shenzhen Lilian Communication Technology Co., Ltd.

Room1207BiwanbuildingXixiangSubdistrictBaoanShenzhenChina

FCC ID:2AV8R-67

Report Type:	**Product Name:**
Original Report	4G LTE Mobile WIFI

Report Number:	RDG200421001-00A
Report Date:	2020-05-18
Reviewed By:	Ivan Cao Assistant manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	4G LTE Mobile WIFI
EUT Model:	M7
Multiple Models:	M7XX,M6,M6XX.("X" stands for 0-9 and "X" stands for a-z or A-Z)
Operation Frequency:	2412-2462 MHz(802.11b/g/n ht20) 2422-2452 MHz(802.11n ht40)
Maximum Peak Output Power (Conducted):	21.47 dBm
Modulation Type:	DSSS, OFDM
Rated Input Voltage:	DC 3.7V from battery or DC5V from USB port
Serial Number:	RDG200421001-RF-S1
EUT Received Date:	2020.04.25
EUT Received Status:	Good

Note 1: *Model M7 was selected for fully testing, the detailed information about the difference among M7 and model M7XX,M6,M6XX can be referred to the declaration letter which was stated and guaranteed by the manufacturer.*

Note 2: *Per FCC part 15B test, the model M7was the worst case, so this report test this model only.*

Objective

This report is prepared on behalf of *Shenzhen Lilian Communication Technology Co., Ltd.* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the compliance of the EUT with FCC Rules Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part Part 22H,24E, 27 PCB submissions with FCC ID: 2AV8R-67.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed 4G LTE Mobile WIFIs. And 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	30M~200MHz: 4.55 dB,200M~1GHz: 5.92 dB,1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier : CN0022.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "△ ". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk "★".

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.
For 2.4GHz band, total 11 channels are provided:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	/

For 802.11b, 802.11g, and 802.11n ht20 modes were test with channel 1,6,11. For 802.11n ht40 mode was tested with channel 3, 6, 9.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations. The device supports SISO in all modes, and MIMO in 802.11n modes, per pretest, MIMO mode was the worst mode and reported for 802.11n modes.

EUT Exercise Software

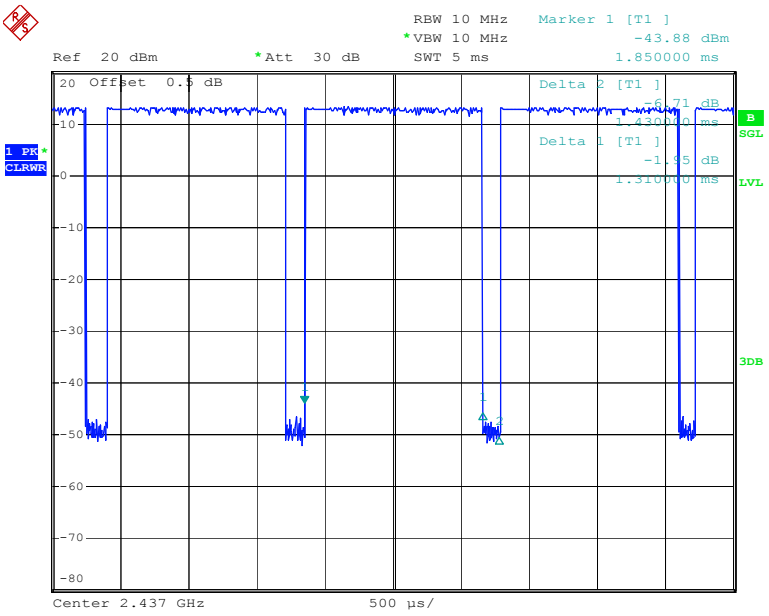
The software “abd.exe” was used for testing, which was provided by manufacturer. The maximum power was configured as below table, that provided by the manufacturer:

Mode	Channel	Frequency (MHz)	Data rate	Power level Setting	
				Chain 0	Chain 1
802.11 b	Low	2412	1Mbps	42	50
	Middle	2437	1Mbps	42	50
	High	2462	1Mbps	42	53
802.11 g	Low	2412	6Mbps	50	50
	Middle	2437	6Mbps	46	50
	High	2462	6Mbps	46	53
802.11n ht20	Low	2412	MCS8	46	50
	Middle	2437	MCS8	44	50
	High	2462	MCS8	42	53
802.11n ht40	Low	2422	MCS8	42	50
	Middle	2437	MCS8	40	50
	High	2452	MCS8	40	52

The maximum duty cycle as following table:

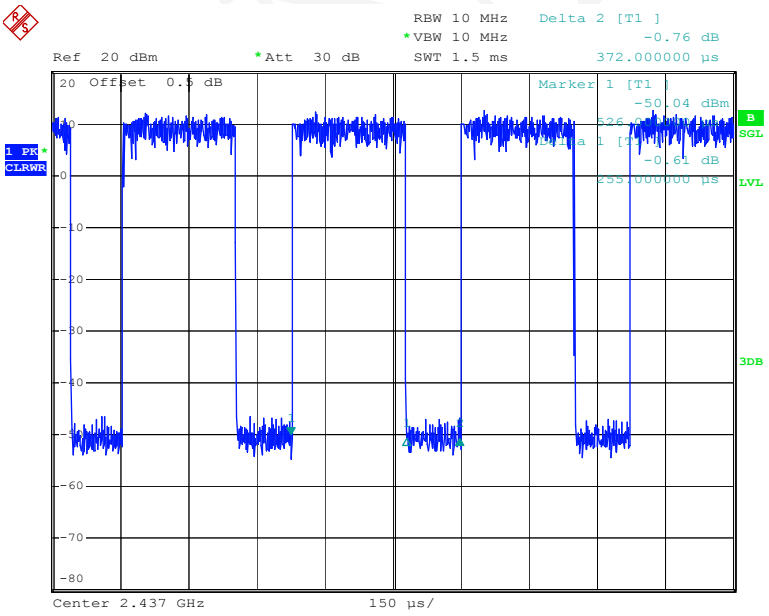
Test mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)
802.11b	1.31	1.43	91.61
802.11g	0.255	0.372	68.55
802.11n ht20	0.237	0.345	68.70
802.11n ht40	0.133	0.261	50.96

802.11b



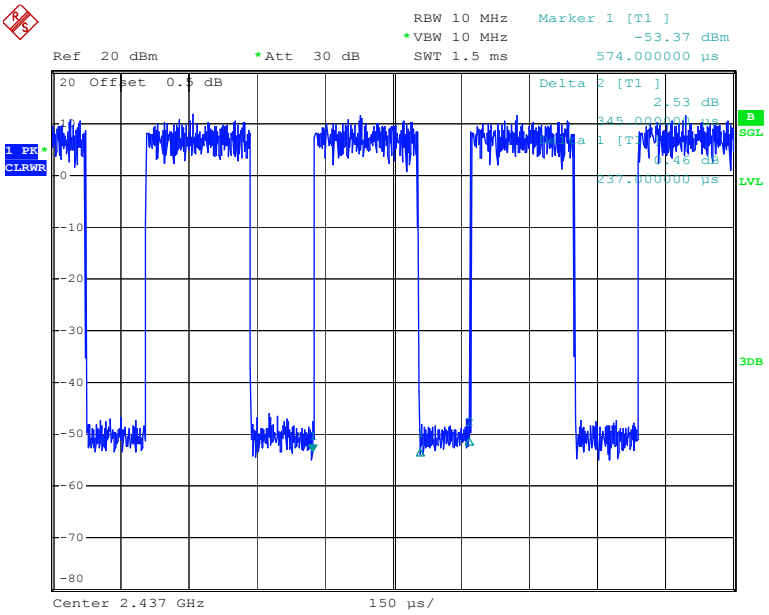
Date: 18.MAY.2020 20:02:24

802.11g



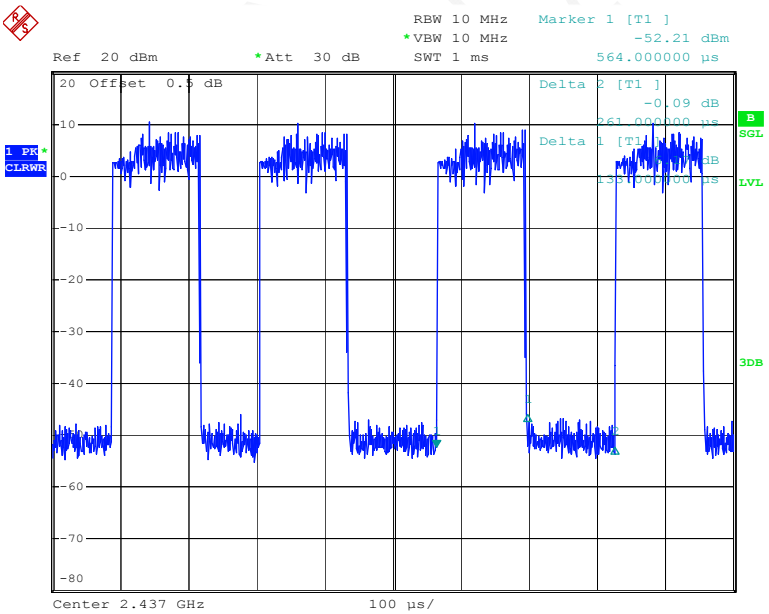
Date: 18.MAY.2020 20:04:53

802.11n ht20



Date: 18.MAY.2020 20:15:23

802.11n ht40



Date: 18.MAY.2020 20:37:41

Equipment Modifications

No modification was made to the EUT.

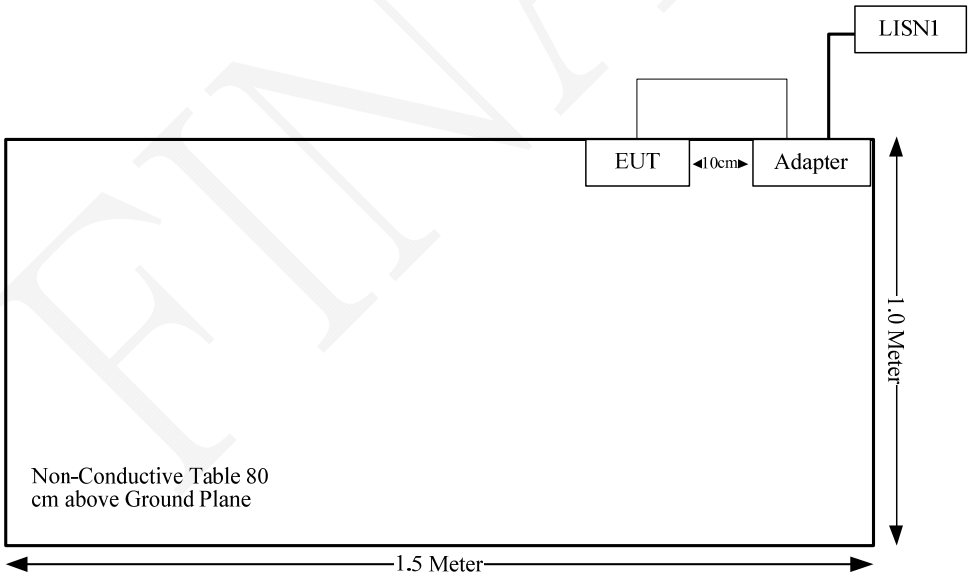
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
HUAWEI	Adapter	HW-050200C01	P78518G9V49032

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From	To
USB Cable	Yes	No	1	EUT	Adapter

Configuration of Test Setup



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SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Bandwidth	Compliance
§15.247(b)(3)	Maximum Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

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FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

According to§15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Measurement Result

Please refer to the SAR report:RDG200421001-SAR.

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FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT has 2 antenna permanently attached to the unit. Please refer to the EUT photos and below information:

Antenna	Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range
2.4G Chain 0	FPC	50	1 dBi/2.4-2.5GHz
2.4G Chain 1	FPC	50	1 dBi/2.4-2.5GHz

Result: Compliance.

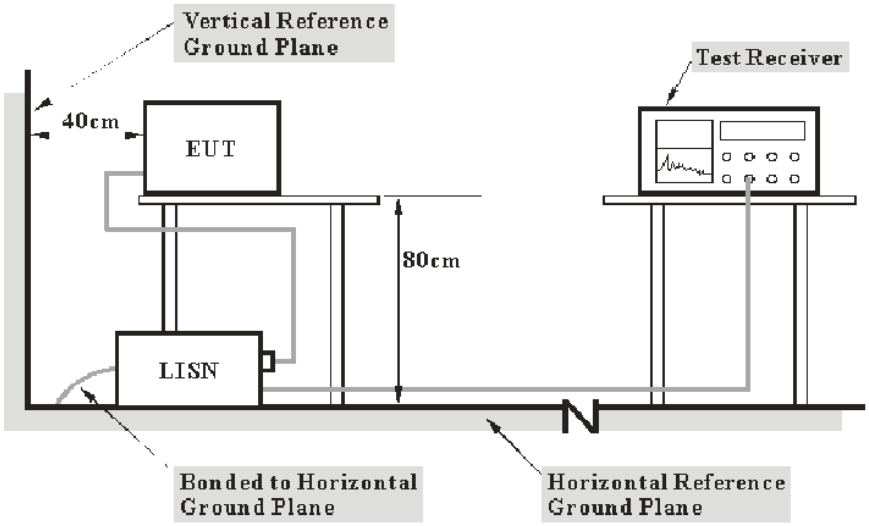
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FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main lisn with a 120 V/60 Hz AC power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2019-09-05	2020-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2019-12-10	2020-12-10
R&S	EMI Test Receiver	ESPI	100120	2019-05-09	2020-05-09
R&S	L.I.S.N	ESH2-Z5	892107/021	2019-09-19	2020-09-19

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

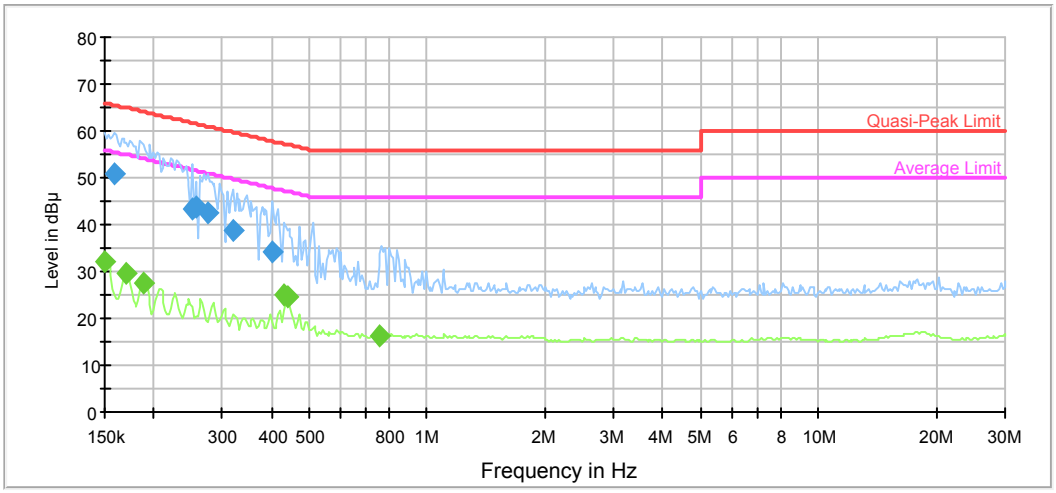
Test Data

Environmental Conditions

Temperature:	24.6 °C
Relative Humidity:	63%
ATM Pressure:	101.8 kPa
Tester:	Hayley Lao
Test Date:	2020.04.27

Test Mode: Transmitting (Wi-Fi mode 802.11b middle channel chain 0 was the worst)

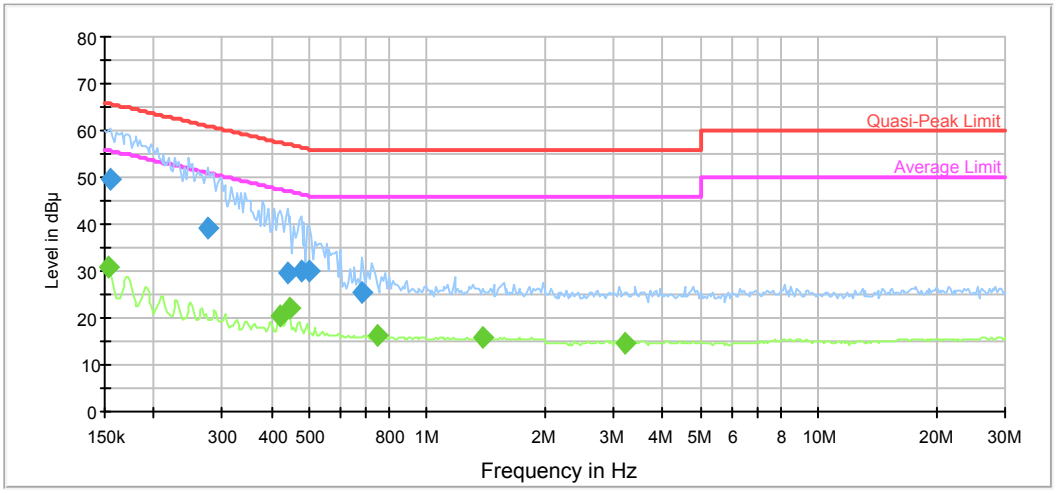
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159228	50.9	9.000	L1	9.7	14.6	65.5
0.251654	43.2	9.000	L1	9.7	18.5	61.7
0.256712	43.7	9.000	L1	9.7	17.8	61.5
0.275230	42.7	9.000	L1	9.7	18.3	61.0
0.319533	38.8	9.000	L1	9.7	20.9	59.7
0.401705	34.0	9.000	L1	9.7	23.8	57.8

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	32.0	9.000	L1	9.7	24.0	56.0
0.170714	29.6	9.000	L1	9.7	25.3	54.9
0.188575	27.7	9.000	L1	9.7	26.4	54.1
0.430682	24.8	9.000	L1	9.7	22.4	47.2
0.439339	24.4	9.000	L1	9.7	22.7	47.1
0.759409	16.4	9.000	L1	9.7	29.6	46.0

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.156091	49.6	9.000	N	9.7	16.1	65.7
0.275230	39.1	9.000	N	9.7	21.9	61.0
0.439339	29.5	9.000	N	9.6	27.6	57.1
0.475741	30.1	9.000	N	9.6	26.3	56.4
0.500009	30.1	9.000	N	9.6	25.9	56.0
0.680676	25.6	9.000	N	9.6	30.4	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.153015	30.8	9.000	N	9.7	25.0	55.8
0.422196	20.5	9.000	N	9.6	26.9	47.4
0.443733	22.0	9.000	N	9.6	25.0	47.0
0.744445	16.3	9.000	N	9.6	29.7	46.0
1.393411	15.7	9.000	N	9.6	30.3	46.0
3.214213	14.8	9.000	N	9.6	31.2	46.0

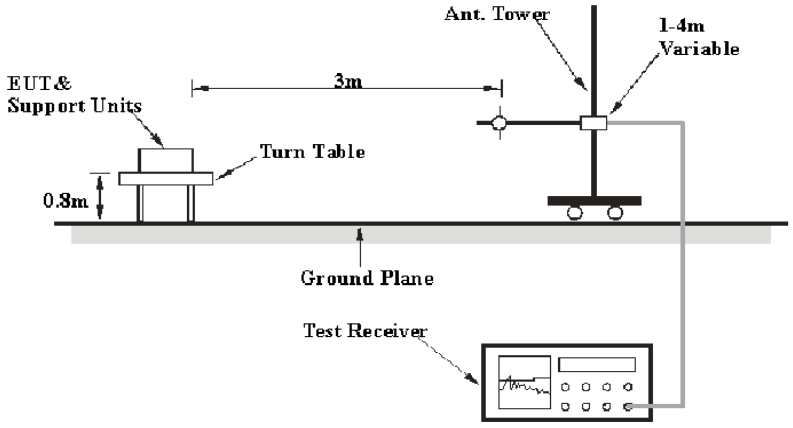
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

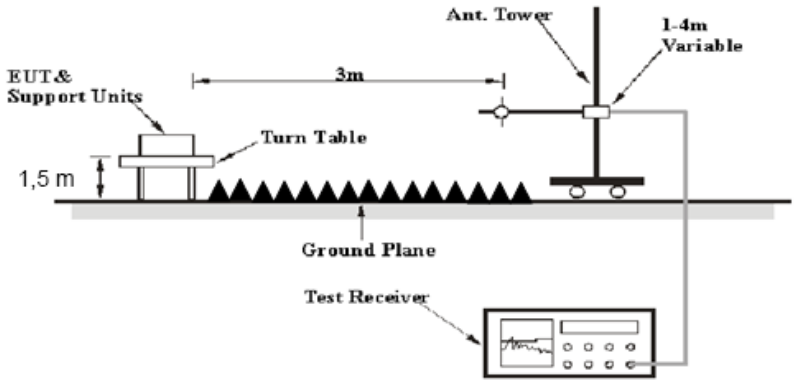
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission Below 1GHz tests were performed in the 3 meters chamber test site A, above 1GHz tests were performed in the 3 meters chamber test site B, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

30MHz-1000MHz:

Measurement	RBW	Video B/W	IF B/W
QP	120 kHz	300 kHz	120kHz

1GHz- 25GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
AV	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

Note: T is minimum transmission duration

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiation Below 1GHz					
R&S	EMI Test Receiver	ESR3	102453	2019-09-12	2020-09-12
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2020-05-06	2021-05-06
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05
Radiation Above 1GHz					
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-05-09	2020-05-09
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2019-11-18	2022-11-18
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
Mini-Circuit	Amplifier	ZVA-213-S+	54201245	2019-09-05	2020-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2019-06-27	2020-06-27
E-Microwave	Band-stop Filters	OBSF-2400-2483.5-S	OE01601525	2019-06-16	2020-06-16
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	2019-06-16	2020-06-16

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

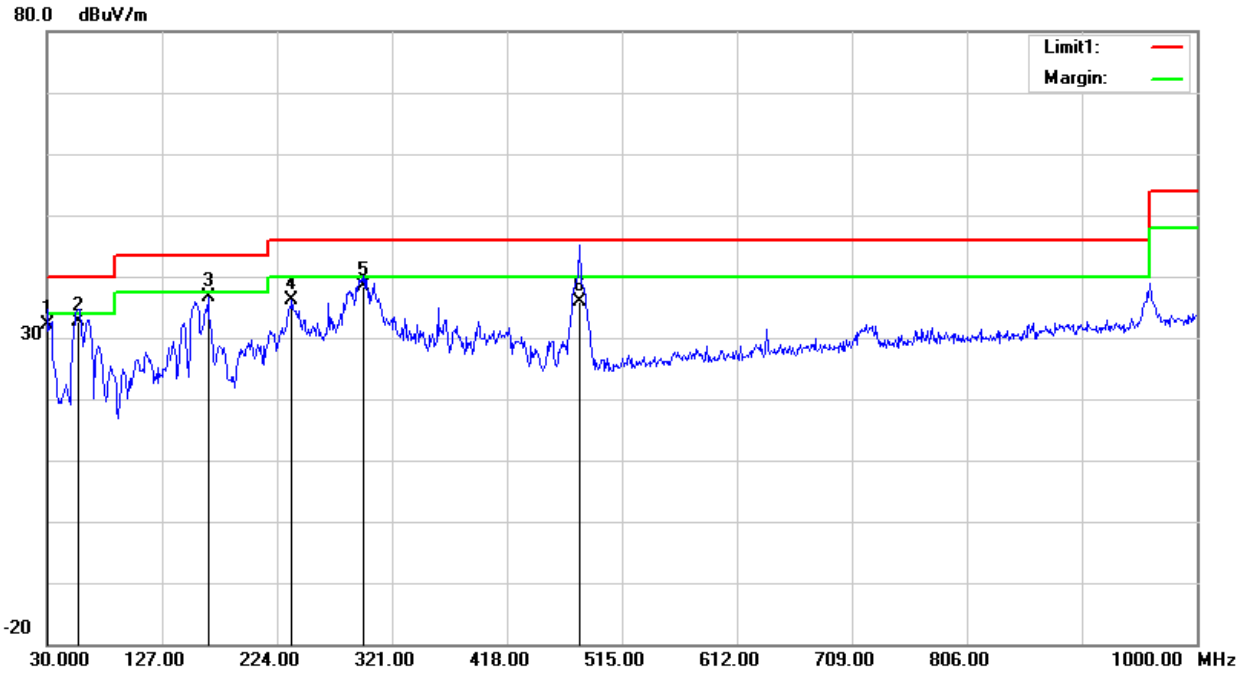
Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	25.2 °C	25.2 °C
Relative Humidity:	53%	53%
ATM Pressure:	100.5 kPa	100.5 kPa
Tester:	Davy Wang	Jalon Liu
Test Date:	2020-05-14	2020-05-08

Test Result: Compliance, please Refer to the following data

Test Mode: Transmitting

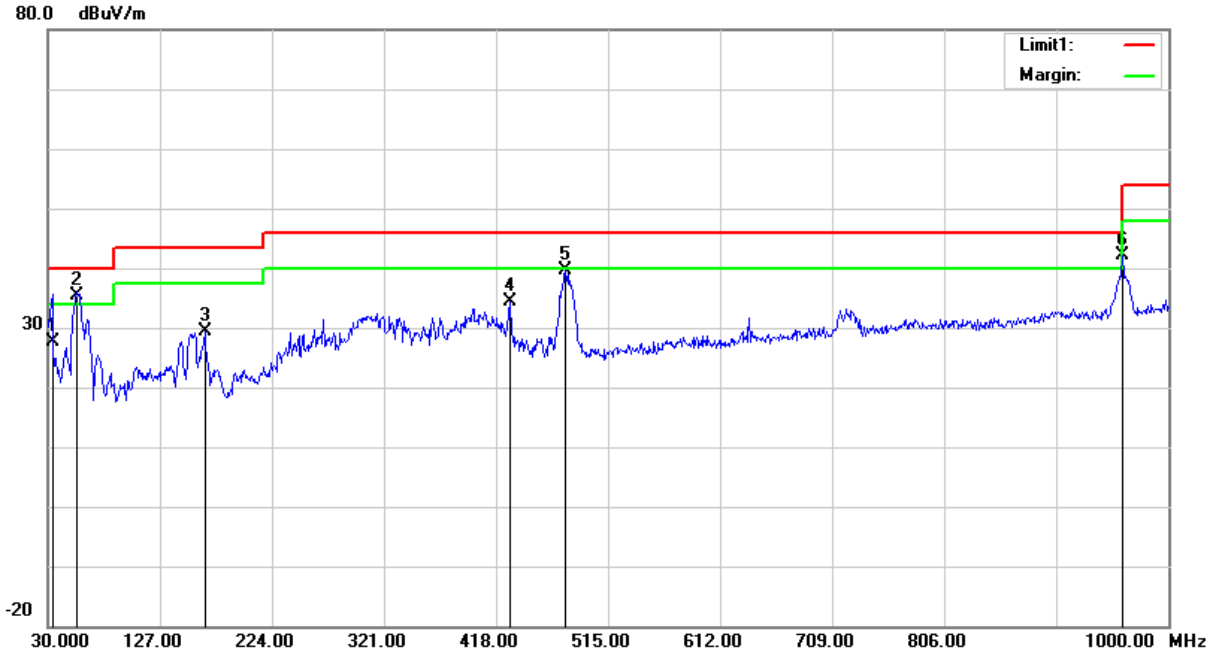
1) 30MHz-1GHz(802.11b,Chain 0 Low channel was the worst)

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.0000	30.50	QP	1.72	32.22	40.00	7.78
56.1900	44.67	QP	-12.14	32.53	40.00	7.47
165.8000	42.88	peak	-6.21	36.67	43.50	6.83
236.6100	42.25	peak	-6.15	36.10	46.00	9.90
296.7500	42.28	QP	-3.90	38.38	46.00	7.62
479.1100	36.20	QP	-0.29	35.91	46.00	10.09

Vertical:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
33.8800	28.90	QP	-1.29	27.61	40.00	12.39
55.2200	47.40	QP	-12.10	35.30	40.00	4.70
165.8000	35.54	peak	-6.21	29.33	43.50	14.17
429.6400	35.66	peak	-1.29	34.37	46.00	11.63
478.1400	39.92	peak	-0.32	39.60	46.00	6.40
960.2300	40.96	peak	1.09	42.05	54.00	11.95

2) 1-25GHz:
802.11b Mode, Chain 0

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2390.00	26.34	PK	H	28.08	1.80	0.00	56.22	74.00	17.78
2390.00	16.89	AV	H	28.08	1.80	0.00	46.77	54.00	7.23
4824.00	39.05	PK	H	32.95	3.19	25.62	49.57	74.00	24.43
4824.00	33.02	AV	H	32.95	3.19	25.62	43.54	54.00	10.46
7236.00	36.01	PK	H	35.81	4.77	25.64	50.95	74.00	23.05
7236.00	23.68	AV	H	35.81	4.77	25.64	38.62	54.00	15.38
Middle Channel: 2437 MHz									
4874.00	40.02	PK	H	33.05	3.26	25.65	50.68	74.00	23.32
4874.00	33.79	AV	H	33.05	3.26	25.65	44.45	54.00	9.55
7311.00	36.08	PK	H	36.01	4.64	25.71	51.02	74.00	22.98
7311.00	23.79	AV	H	36.01	4.64	25.71	38.73	54.00	15.27
High Channel: 2462 MHz									
2483.50	28.21	PK	H	28.27	1.84	0.00	58.32	74.00	15.68
2483.50	15.25	AV	H	28.27	1.84	0.00	45.36	54.00	8.64
4924.00	42.32	PK	H	33.15	3.27	25.65	53.09	74.00	20.91
4924.00	37.43	AV	H	33.15	3.27	25.65	48.20	54.00	5.80
7386.00	35.88	PK	H	36.20	4.51	25.79	50.80	74.00	23.20
7386.00	23.54	AV	H	36.20	4.51	25.79	38.46	54.00	15.54

802.11b Mode, Chain 1:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2390.00	26.02	PK	H	28.08	1.80	0.00	55.90	74.00	18.10
2390.00	15.89	AV	H	28.08	1.80	0.00	45.77	54.00	8.23
4824.00	36.44	PK	H	32.95	3.19	25.62	46.96	74.00	27.04
4824.00	23.91	AV	H	32.95	3.19	25.62	34.43	54.00	19.57
7236.00	36.05	PK	H	35.81	4.77	25.64	50.99	74.00	23.01
7236.00	23.74	AV	H	35.81	4.77	25.64	38.68	54.00	15.32
Middle Channel: 2437 MHz									
4874.00	36.78	PK	H	33.05	3.26	25.65	47.44	74.00	26.56
4874.00	24.58	AV	H	33.05	3.26	25.65	35.24	54.00	18.76
7311.00	36.21	PK	H	36.01	4.64	25.71	51.15	74.00	22.85
7311.00	24.12	AV	H	36.01	4.64	25.71	39.06	54.00	14.94
High Channel: 2462 MHz									
2483.50	28.32	PK	H	28.27	1.84	0.00	58.43	74.00	15.57
2483.50	15.19	AV	H	28.27	1.84	0.00	45.30	54.00	8.70
4924.00	37.58	PK	H	33.15	3.27	25.65	48.35	74.00	25.65
4924.00	25.12	AV	H	33.15	3.27	25.65	35.89	54.00	18.11
7386.00	36.33	PK	H	36.20	4.51	25.79	51.25	74.00	22.75
7386.00	24.10	AV	H	36.20	4.51	25.79	39.02	54.00	14.98

802.11g Mode, Chain 0:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2390.00	36.31	PK	H	28.08	1.80	0.00	66.19	74.00	7.81
2390.00	22.56	AV	H	28.08	1.80	0.00	52.44	54.00	1.56
4824.00	36.01	PK	H	32.95	3.19	25.62	46.53	74.00	27.47
4824.00	27.35	AV	H	32.95	3.19	25.62	37.87	54.00	16.13
7236.00	35.95	PK	H	35.81	4.77	25.64	50.89	74.00	23.11
7236.00	24.89	AV	H	35.81	4.77	25.64	39.83	54.00	14.17
Middle Channel: 2437 MHz									
4874.00	36.05	PK	H	33.05	3.26	25.65	46.71	74.00	27.29
4874.00	27.33	AV	H	33.05	3.26	25.65	37.99	54.00	16.01
7311.00	35.67	PK	H	36.01	4.64	25.71	50.61	74.00	23.39
7311.00	24.30	AV	H	36.01	4.64	25.71	39.24	54.00	14.76
High Channel: 2462 MHz									
2483.50	38.52	PK	H	28.27	1.84	0.00	68.63	74.00	5.37
2483.50	22.06	AV	H	28.27	1.84	0.00	52.17	54.00	1.83
4924.00	40.94	PK	H	33.15	3.27	25.65	51.71	74.00	22.29
4924.00	28.81	AV	H	33.15	3.27	25.65	39.58	54.00	14.42
7386.00	35.66	PK	H	36.20	4.51	25.79	50.58	74.00	23.42
7386.00	24.22	AV	H	36.20	4.51	25.79	39.14	54.00	14.86

802.11g Mode, Chain 1

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2390.00	30.56	PK	H	28.08	1.80	0.00	60.44	74.00	13.56
2390.00	18.45	AV	H	28.08	1.80	0.00	48.33	54.00	5.67
4824.00	36.12	PK	H	32.95	3.19	25.62	46.64	74.00	27.36
4824.00	25.35	AV	H	32.95	3.19	25.62	35.87	54.00	18.13
7236.00	35.45	PK	H	35.81	4.77	25.64	50.39	74.00	23.61
7236.00	24.21	AV	H	35.81	4.77	25.64	39.15	54.00	14.85
Middle Channel: 2437 MHz									
4874.00	31.21	PK	H	33.05	3.26	25.65	41.87	74.00	32.13
4874.00	19.12	AV	H	33.05	3.26	25.65	29.78	54.00	24.22
7311.00	35.87	PK	H	36.01	4.64	25.71	50.81	74.00	23.19
7311.00	24.39	AV	H	36.01	4.64	25.71	39.33	54.00	14.67
High Channel: 2462 MHz									
2483.50	36.82	PK	H	28.27	1.84	0.00	66.93	74.00	7.07
2483.50	20.10	AV	H	28.27	1.84	0.00	50.21	54.00	3.79
4924.00	38.12	PK	H	33.15	3.27	25.65	48.89	74.00	25.11
4924.00	26.10	AV	H	33.15	3.27	25.65	36.87	54.00	17.13
7386.00	36.02	PK	H	36.20	4.51	25.79	50.94	74.00	23.06
7386.00	24.09	AV	H	36.20	4.51	25.79	39.01	54.00	14.99

802.11n ht20 Mode(MIMO was the worst):

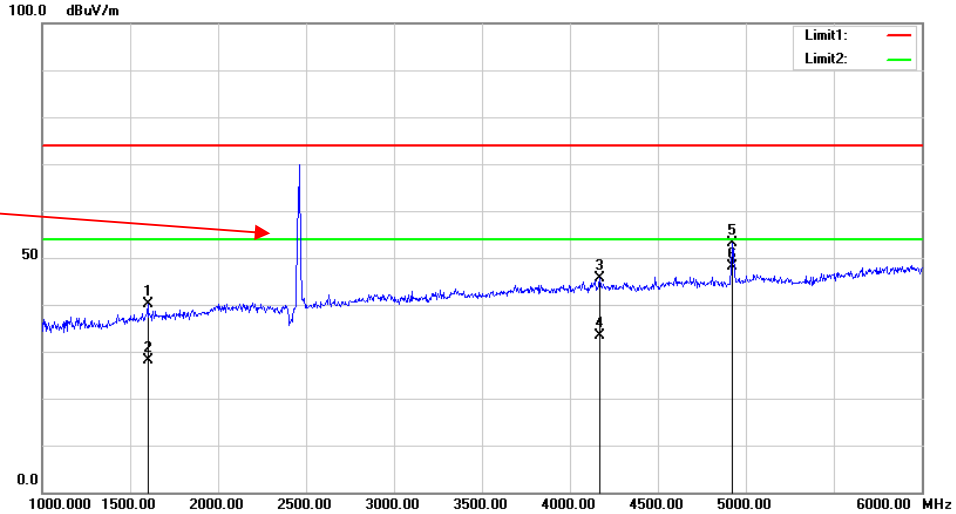
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2412 MHz									
2390.00	32.49	PK	H	28.08	1.80	0.00	62.37	74.00	11.63
2390.00	20.69	AV	H	28.08	1.80	0.00	50.57	54.00	3.43
4824.00	36.84	PK	H	32.95	3.19	25.62	47.36	74.00	26.64
4824.00	25.79	AV	H	32.95	3.19	25.62	36.31	54.00	17.69
7236.00	35.85	PK	H	35.81	4.77	25.64	50.79	74.00	23.21
7236.00	24.54	AV	H	35.81	4.77	25.64	39.48	54.00	14.52
Middle Channel: 2437 MHz									
4874.00	36.72	PK	H	33.05	3.26	25.65	47.38	74.00	26.62
4874.00	25.63	AV	H	33.05	3.26	25.65	36.29	54.00	17.71
7311.00	35.60	PK	H	36.01	4.64	25.71	50.54	74.00	23.46
7311.00	24.39	AV	H	36.01	4.64	25.71	39.33	54.00	14.67
High Channel: 2462 MHz									
2483.50	32.43	PK	H	28.27	1.84	0.00	62.54	74.00	11.46
2483.50	20.02	AV	H	28.27	1.84	0.00	50.13	54.00	3.87
4924.00	36.55	PK	H	33.15	3.27	25.65	47.32	74.00	26.68
4924.00	25.43	AV	H	33.15	3.27	25.65	36.20	54.00	17.80
7386.00	35.41	PK	H	36.20	4.51	25.79	50.33	74.00	23.67
7386.00	24.16	AV	H	36.20	4.51	25.79	39.08	54.00	14.92

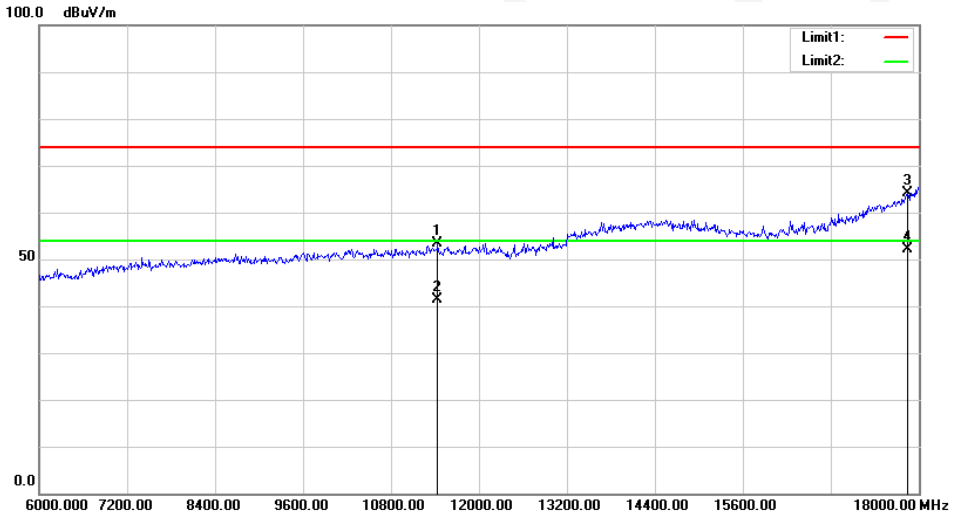
802.11n ht40 Mode(MIMO was the worst):

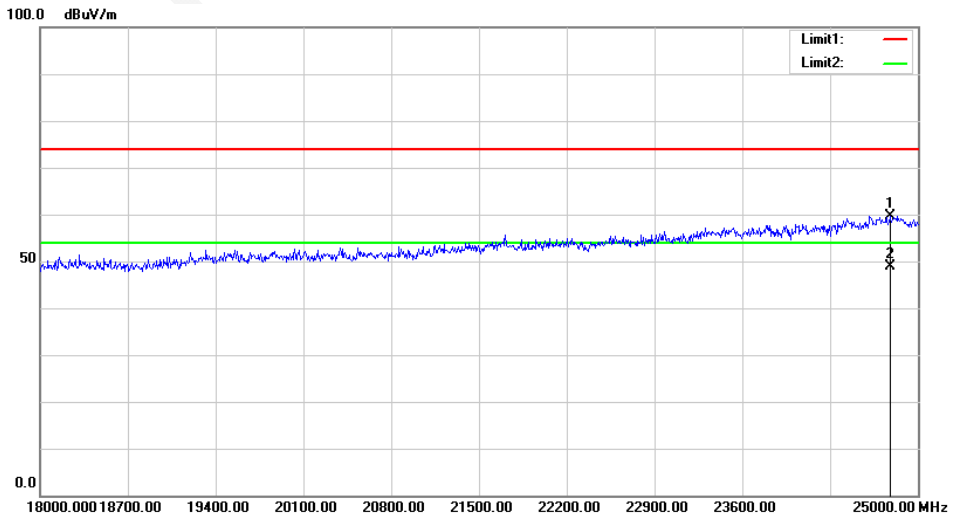
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2422 MHz									
2390.00	30.15	PK	H	28.08	1.80	0.00	60.03	74.00	13.97
2390.00	20.06	AV	H	28.08	1.80	0.00	49.94	54.00	4.06
4844.00	36.39	PK	H	32.99	3.22	25.63	46.97	74.00	27.03
4844.00	25.61	AV	H	32.99	3.22	25.63	36.19	54.00	17.81
7266.00	35.24	PK	H	35.89	4.72	25.67	50.18	74.00	23.82
7266.00	25.34	AV	H	35.89	4.72	25.67	40.28	54.00	13.72
Middle Channel: 2437 MHz									
4874.00	36.32	PK	H	33.05	3.26	25.65	46.98	74.00	27.02
4874.00	25.54	AV	H	33.05	3.26	25.65	36.20	54.00	17.80
7311.00	35.18	PK	H	36.01	4.64	25.71	50.12	74.00	23.88
7311.00	25.25	AV	H	36.01	4.64	25.71	40.19	54.00	13.81
High Channel: 2452 MHz									
2483.50	29.28	PK	H	28.27	1.84	0.00	59.39	74.00	14.61
2483.50	19.90	AV	H	28.27	1.84	0.00	50.01	54.00	3.99
4904.00	36.27	PK	H	33.11	3.30	25.67	47.01	74.00	26.99
4904.00	25.38	AV	H	33.11	3.30	25.67	36.12	54.00	17.88
7356.00	35.20	PK	H	36.13	4.56	25.76	50.13	74.00	23.87
7356.00	25.29	AV	H	36.13	4.56	25.76	40.22	54.00	13.78

Test plots(802.11b mode Chain 0 High channel was the worst)
Horizontal:

Fundamental Test with Band Rejection Filter

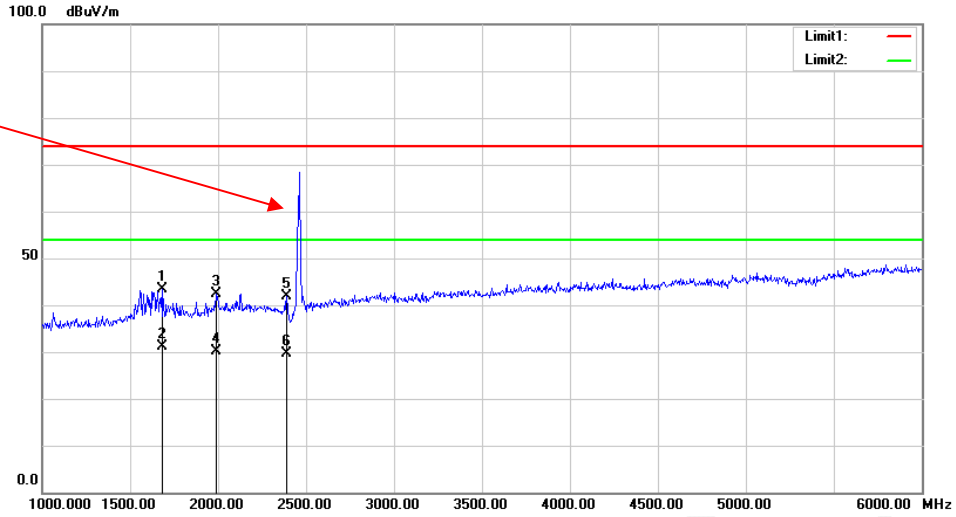


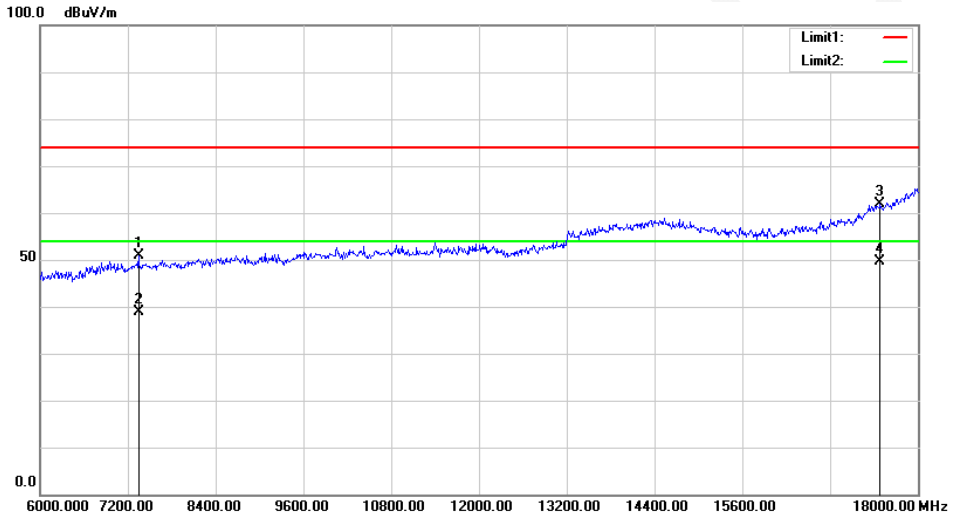


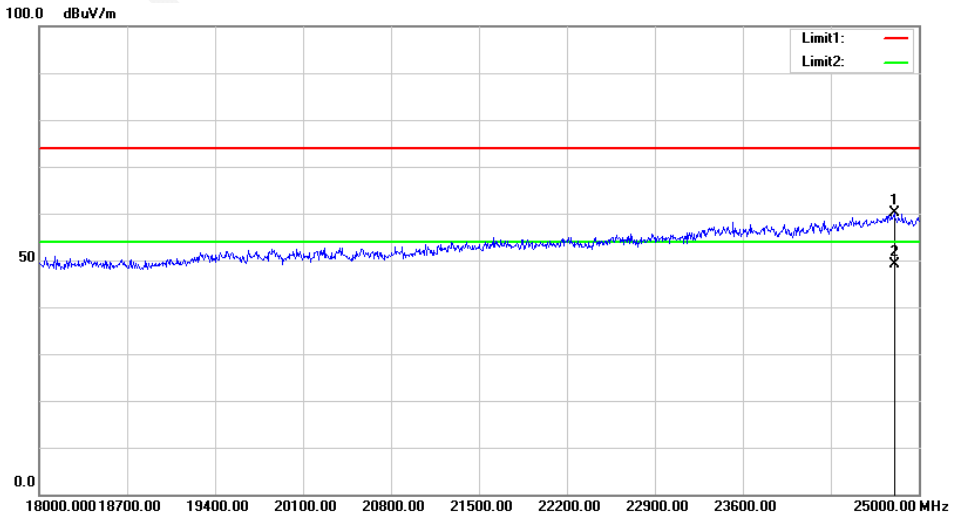


Vertical:

Fundamental Test with Band Rejection Filter







FCC §15.247(a) (2)–6 dB EMISSION BANDWIDTH

Applicable Standard

According to FCC §15.247(a) (2)

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2020-01-04	2021-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	27.5°C
Relative Humidity:	52 %
ATM Pressure:	100.5kPa
Test by:	Lucy Lu
Test Date:	2020-05-08

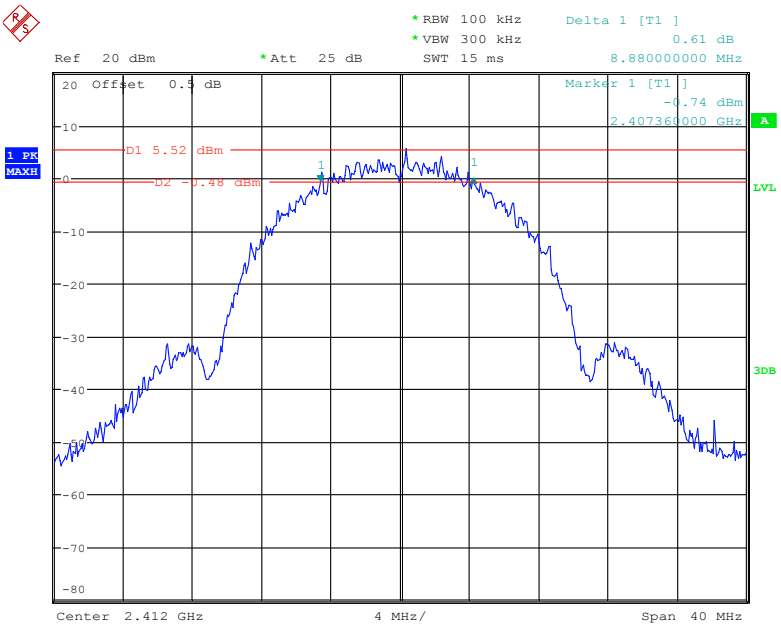
Test Mode: Transmitting(test only performed at chain 0)

Test Result: Compliant. please refer to the following table and plots.

Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	8.880	≥0.5
	Middle	2437	8.960	≥0.5
	High	2462	9.040	≥0.5
802.11g	Low	2412	16.560	≥0.5
	Middle	2437	16.480	≥0.5
	High	2462	16.480	≥0.5
802.11n ht20	Low	2412	17.760	≥0.5
	Middle	2437	17.760	≥0.5
	High	2462	17.680	≥0.5
802.11n ht40	Low	2422	36.160	≥0.5
	Middle	2437	35.200	≥0.5
	High	2452	35.840	≥0.5

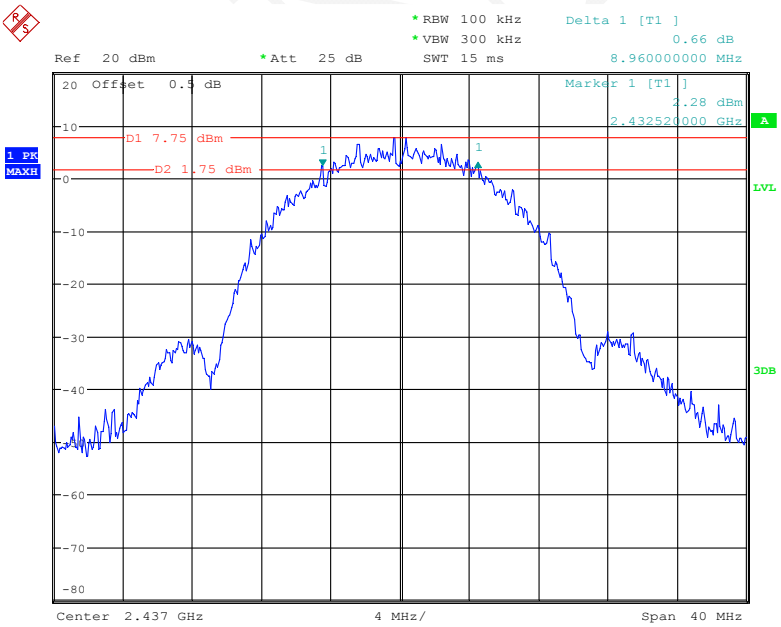
FINAL

802.11b Low Channel



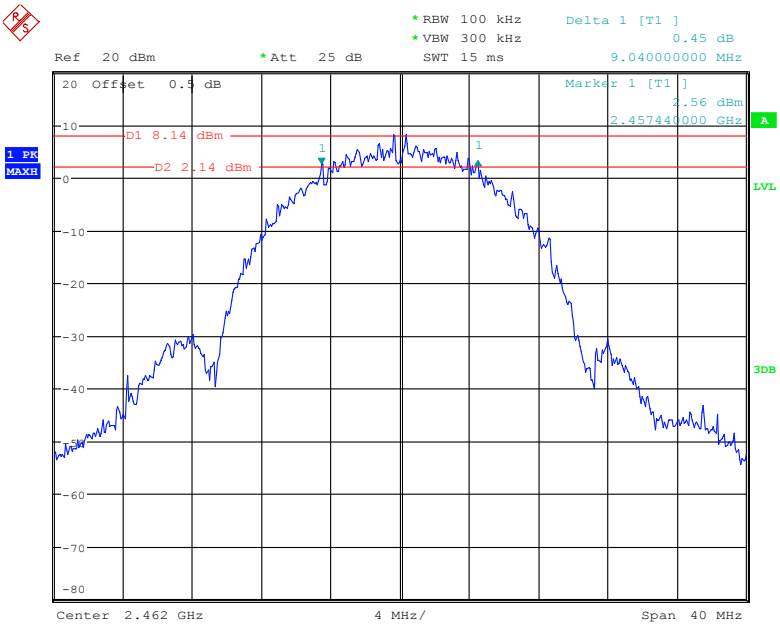
Date: 8.MAY.2020 16:46:37

802.11b Middle Channel



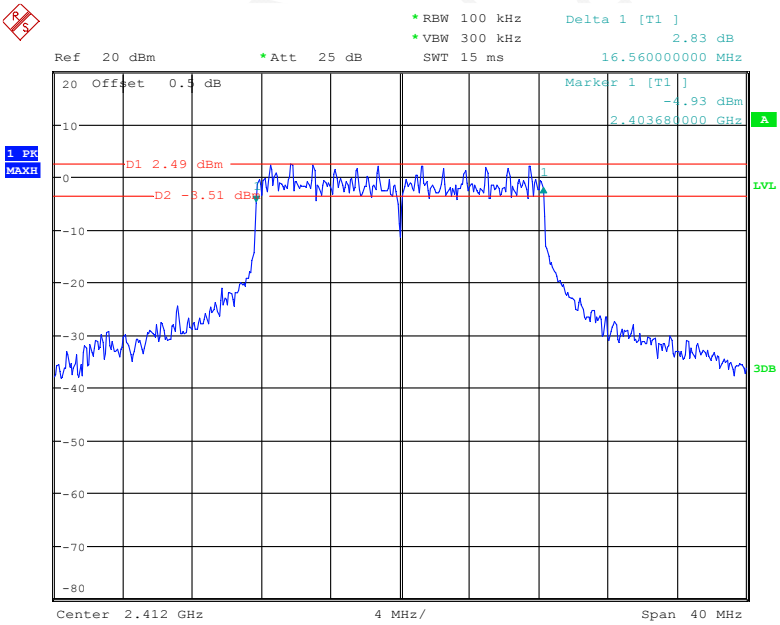
Date: 8.MAY.2020 16:48:02

802.11b High Channel



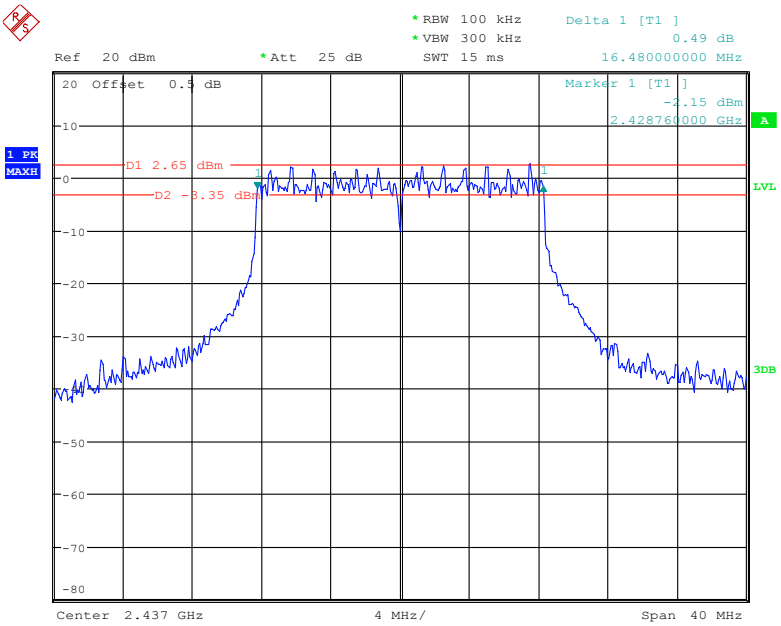
Date: 8.MAY.2020 16:49:03

802.11g Low Channel



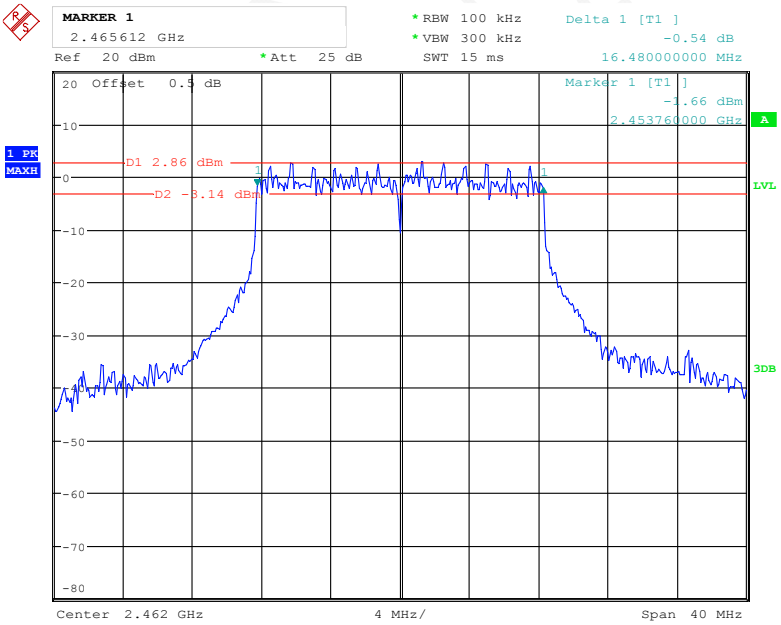
Date: 8.MAY.2020 16:44:44

802.11g Middle Channel



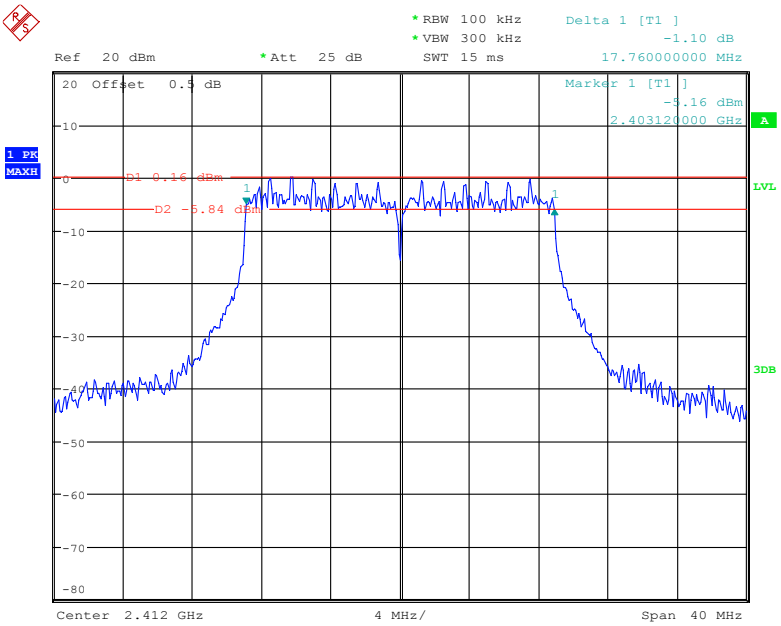
Date: 8.MAY.2020 16:42:57

802.11g High Channel

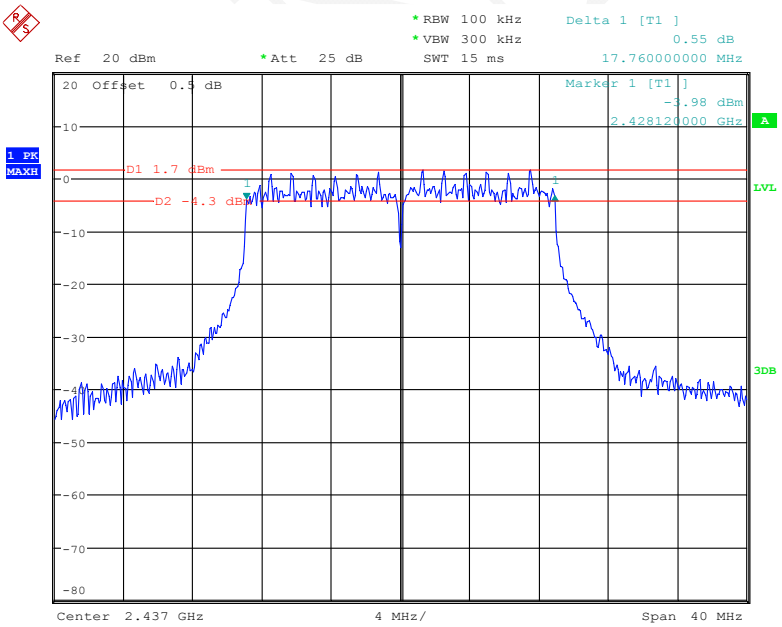


Date: 8.MAY.2020 16:41:32

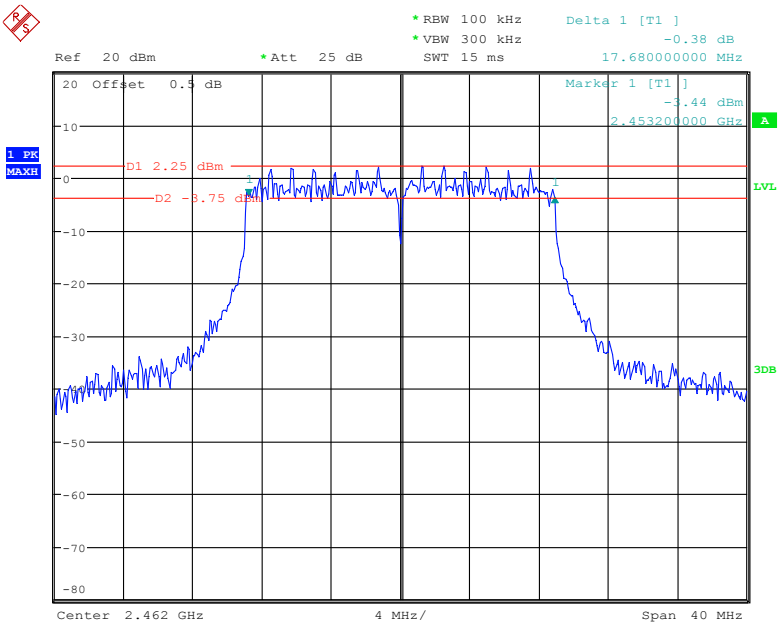
802.11n ht20 Low Channel



802.11n ht20 Middle Channel

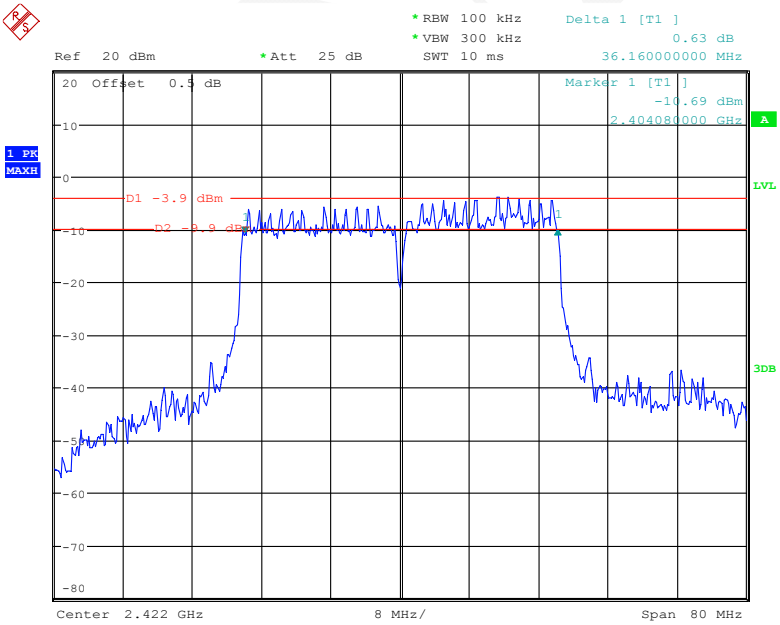


802.11n ht20 High Channel



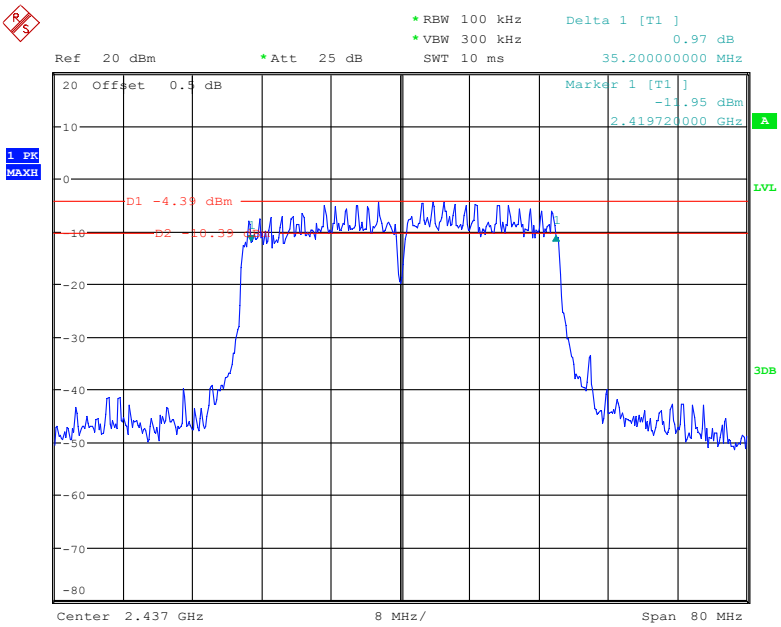
Date: 8.MAY.2020 16:38:34

802.11n ht40 Low Channel



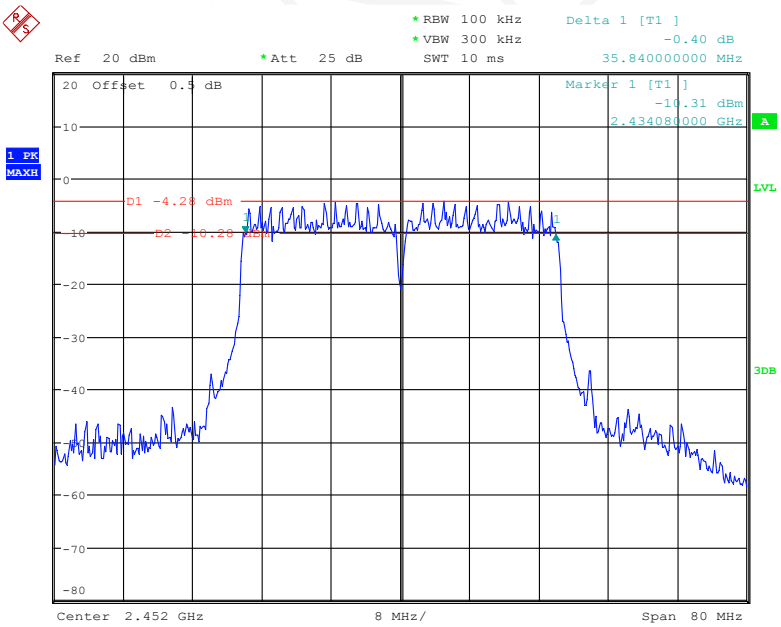
Date: 8.MAY.2020 16:12:54

802.11n ht40 Middle Channel



Date: 8.MAY.2020 16:10:58

802.11n ht40 High Channel



Date: 8.MAY.2020 16:06:50

FCC §15.247(b) (3) - MAXIMUM PEAK CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.
3. Add a correction factor to the display.
4. Set the power Meter to test Peak output power, record the result as peak power.
5. Set the power meter to test average output power, record the result as average power.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2019-09-23	2020-09-23
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	27.5°C
Relative Humidity:	52 %
ATM Pressure:	100.5kPa
Test by:	Lucy Lu
Test Date:	2020-05-08

Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table.

Test mode	Channel	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
802.11b	Low	2412	18.13	13.71	/	30
	Middle	2437	18.25	13.88	/	30
	High	2462	18.27	11.43	/	30
802.11g	Low	2412	20.71	13.64	/	30
	Middle	2437	22.20	13.73	/	30
	High	2462	22.27	11.05	/	30
802.11n ht20	Low	2412	19.77	13.46	20.68	30
	Middle	2437	20.62	13.97	21.47	30
	High	2462	20.92	11.59	21.4	30
802.11n ht40	Low	2422	19.13	13.76	20.24	30
	Middle	2437	19.08	13.99	20.25	30
	High	2452	19.26	13.15	20.21	30

Test mode	Channel	Frequency (MHz)	Maximum Average Conducted Output Power (dBm)			Limit (dBm)
			Chain 0	Chain 1	Total	
802.11b	Low	2412	15.87	7.56	/	30
	Middle	2437	15.89	8.18	/	30
	High	2462	16.18	6.15	/	30
802.11g	Low	2412	13.12	6.97	/	30
	Middle	2437	13.69	7.64	/	30
	High	2462	13.83	5.62	/	30
802.11n ht20	Low	2412	11.59	7.19	12.94	30
	Middle	2437	12.39	7.51	13.61	30
	High	2462	12.52	5.73	13.35	30
802.11n ht40	Low	2422	9.30	6.63	11.18	30
	Middle	2437	8.92	7.74	11.38	30
	High	2452	9.51	5.91	11.08	30

Note: the antenna gain is 1dBi

FCC §15.247(d)– 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

According to FCC§15.247(d):In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2020-01-04	2021-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

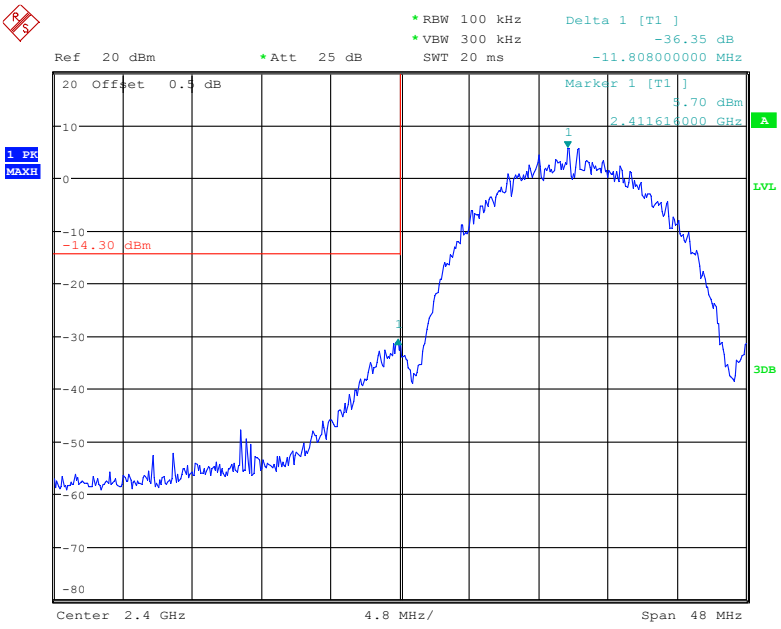
Test Data

Environmental Conditions

Temperature:	26~27.5°C
Relative Humidity:	52~72%
ATM Pressure:	99.3~100.9kPa
Test by:	Lucy Lu
Test Date:	2020-05-08~2020-05-18

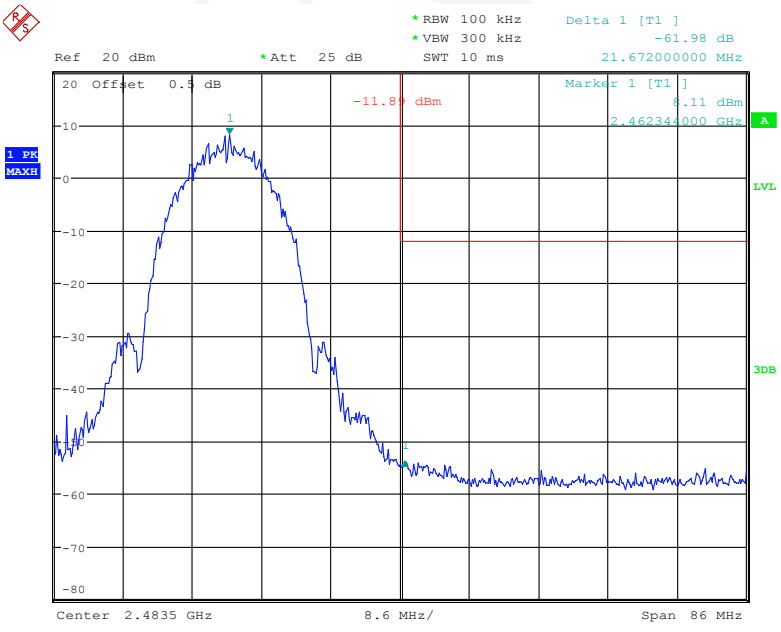
Test mode: Transmitting
Test Result: Compliant. Please refer to following plots.
Chain 0

802.11b: Band Edge, Left Side



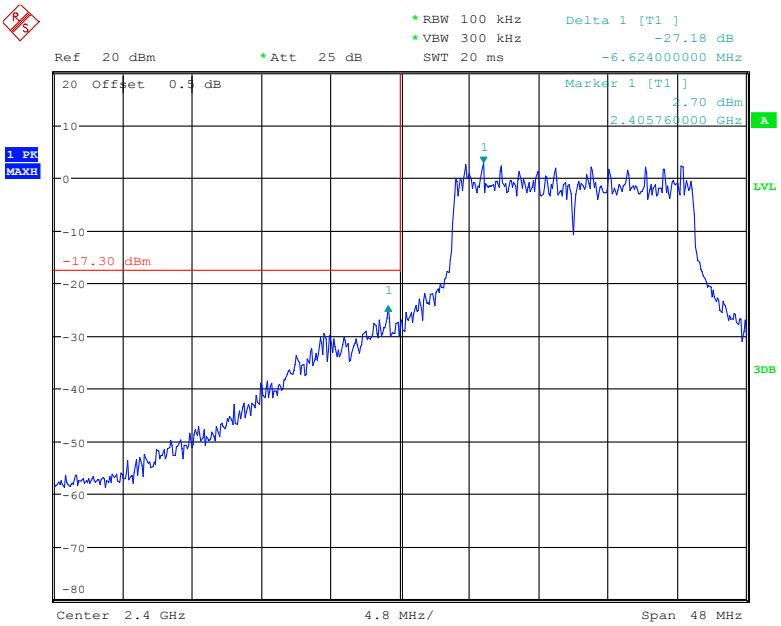
Date: 8.MAY.2020 16:47:18

802.11b: Band Edge, Right Side



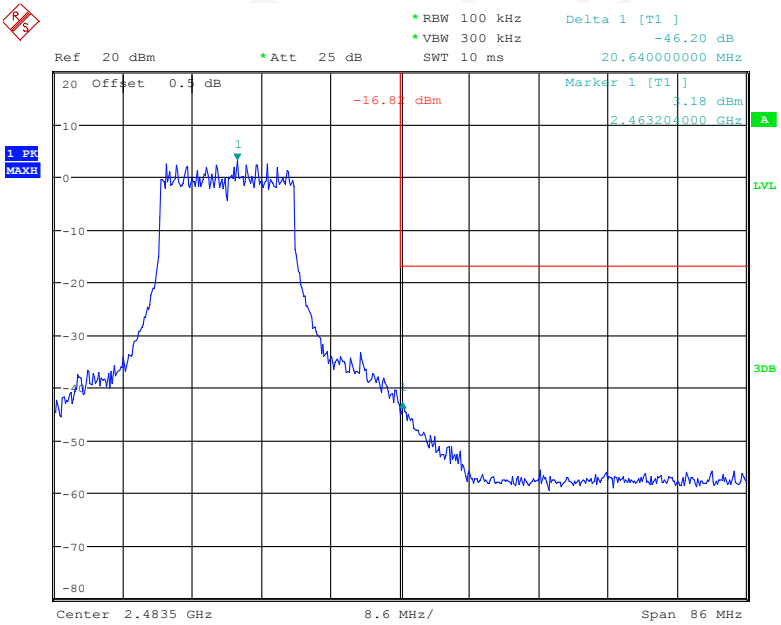
Date: 8.MAY.2020 16:49:48

802.11g: Band Edge, Left Side



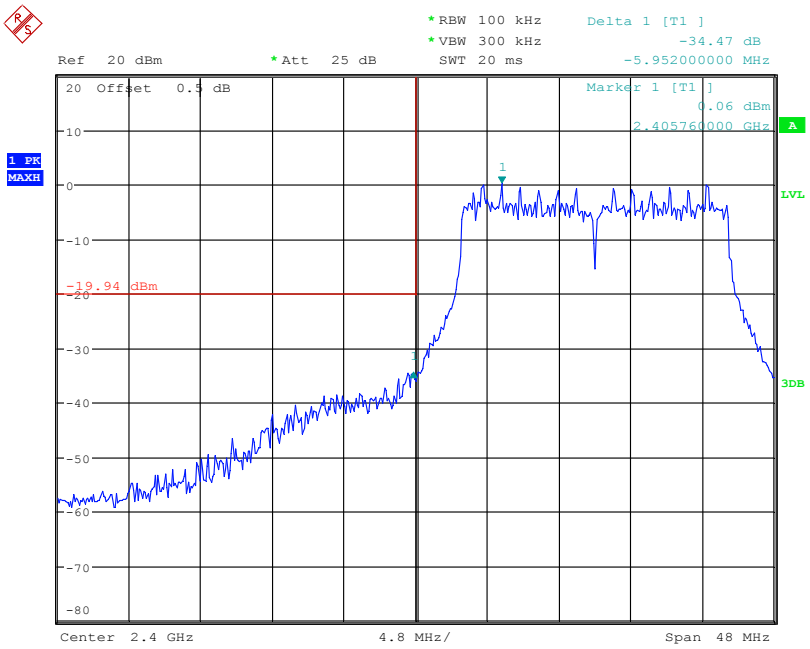
Date: 8.MAY.2020 16:45:34

802.11g: Band Edge, Right Side



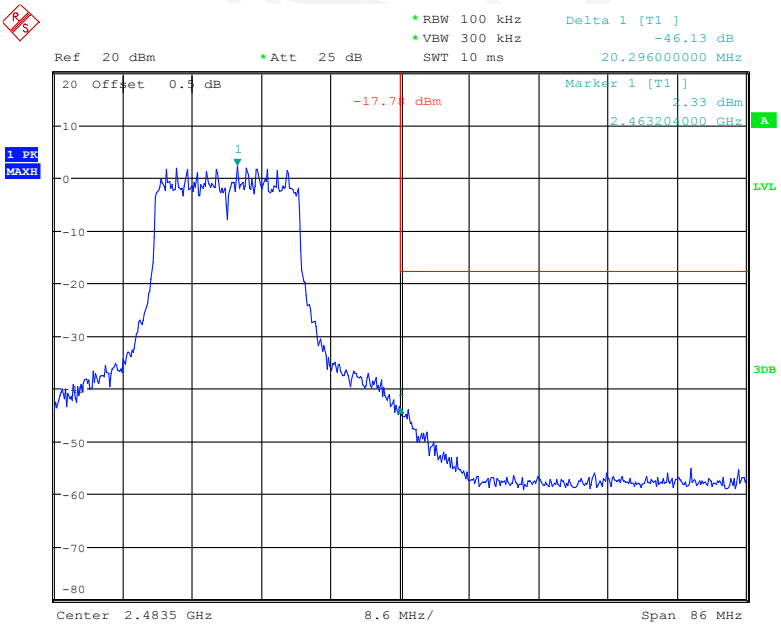
Date: 8.MAY.2020 16:42:22

802.11n ht20 Band Edge, Left Side



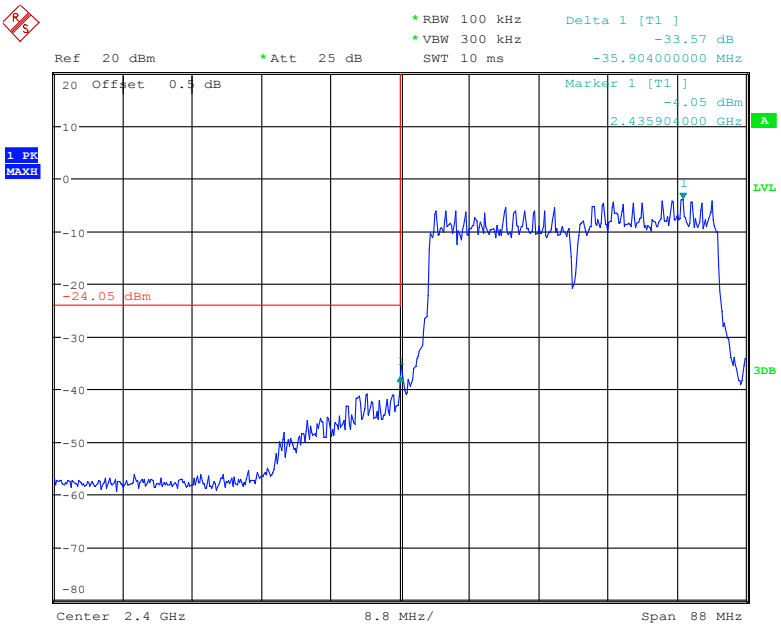
Date: 8.MAY.2020 16:30:08

802.11n ht20 Band Edge, Right Side



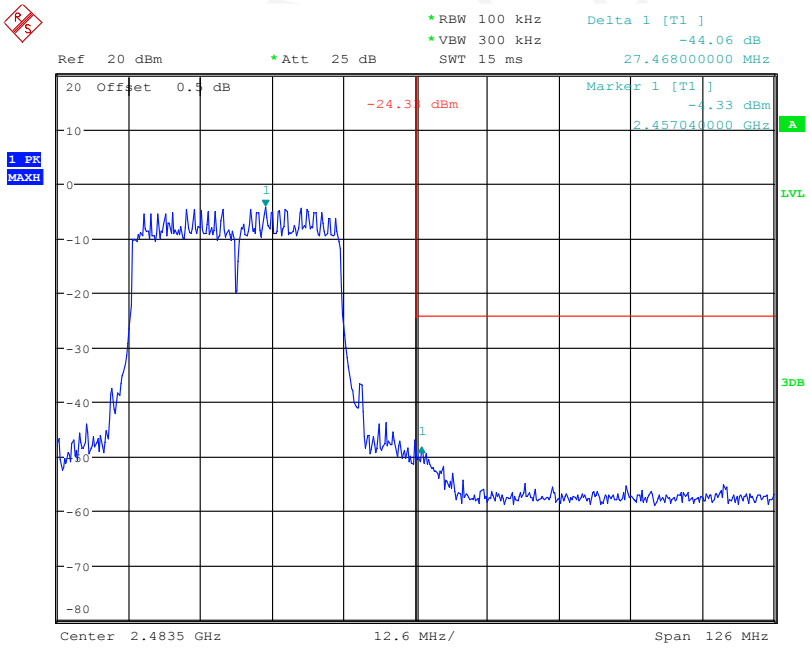
Date: 8.MAY.2020 16:39:25

802.11n ht40: Band Edge, Left Side



Date: 8.MAY.2020 16:14:26

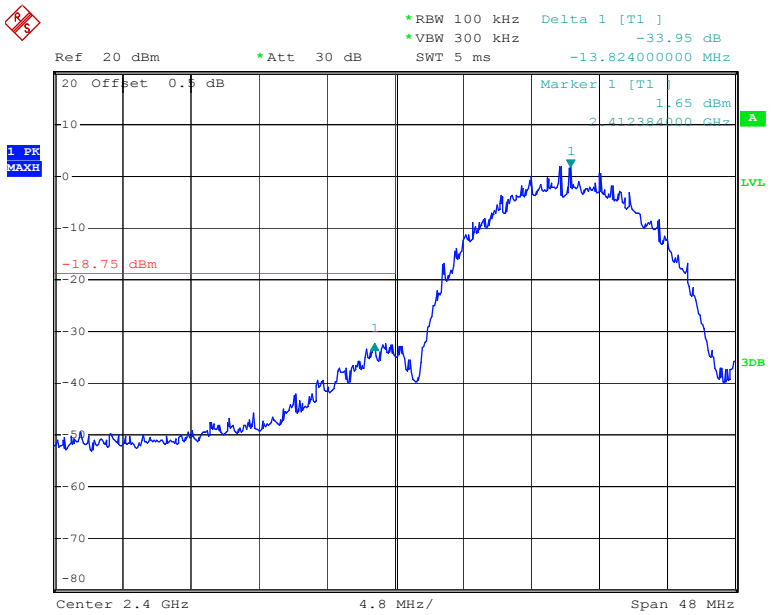
802.11n ht40 Band Edge, Right Side



Date: 8.MAY.2020 16:08:21

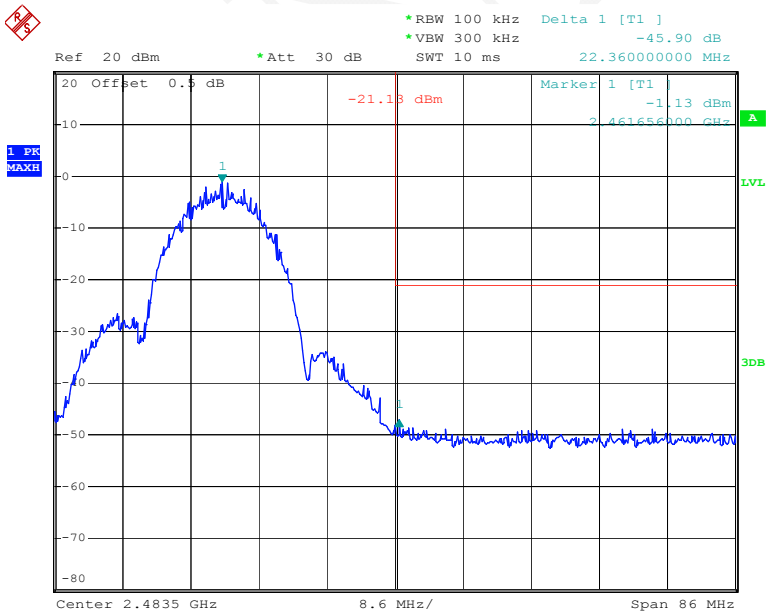
Chain 1

802.11b: Band Edge, Left Side



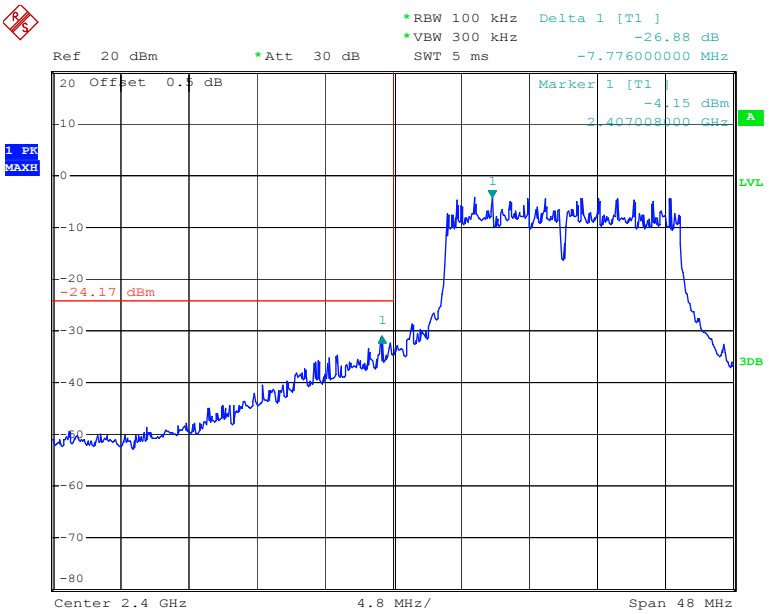
Date: 18.MAY.2020 19:03:51

802.11b: Band Edge, Right Side



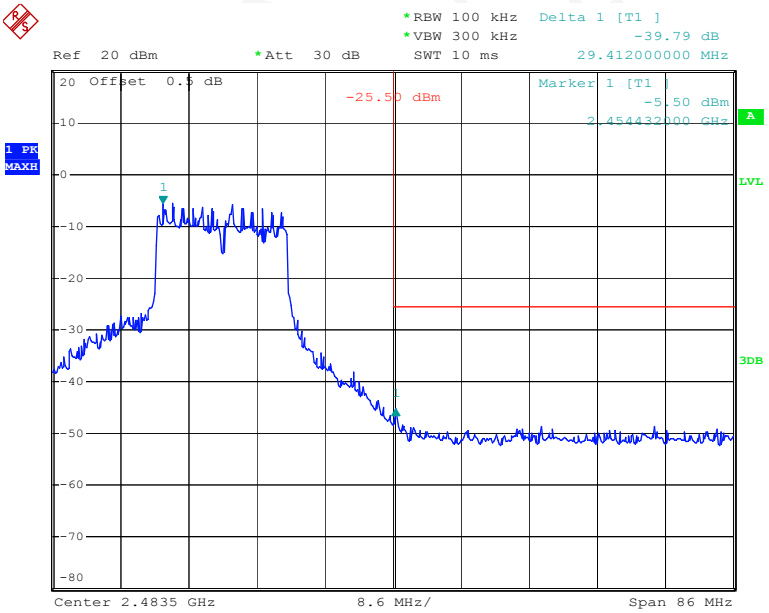
Date: 18.MAY.2020 19:52:08

802.11g: Band Edge, Left Side



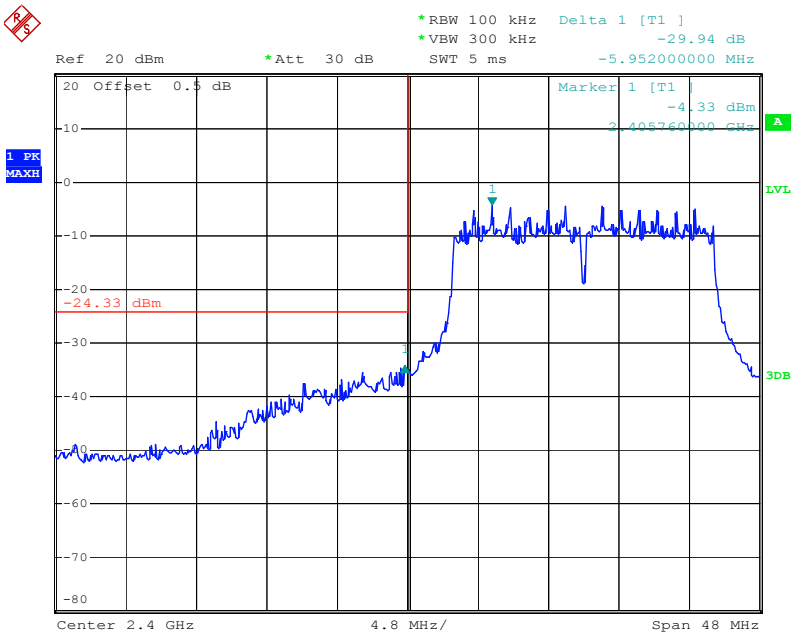
Date: 18.MAY.2020 20:11:02

802.11g: Band Edge, Right Side



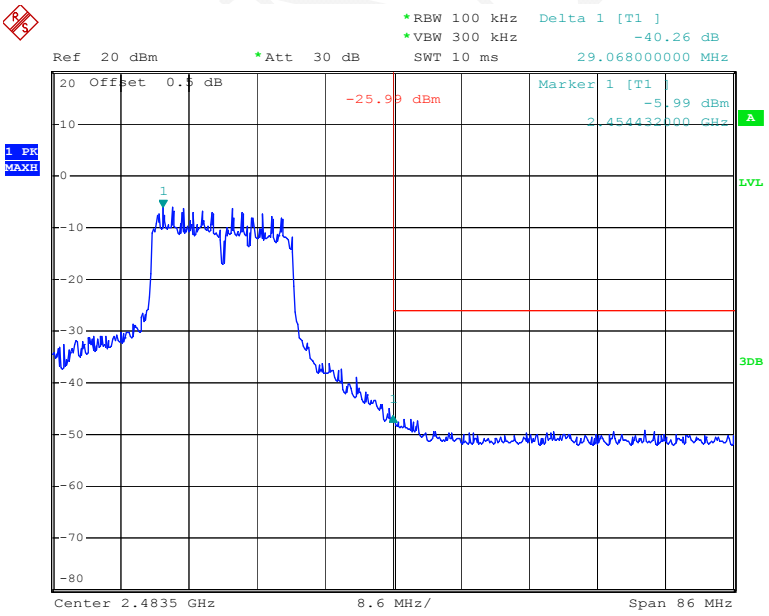
Date: 18.MAY.2020 20:09:01

802.11n ht20 Band Edge, Left Side



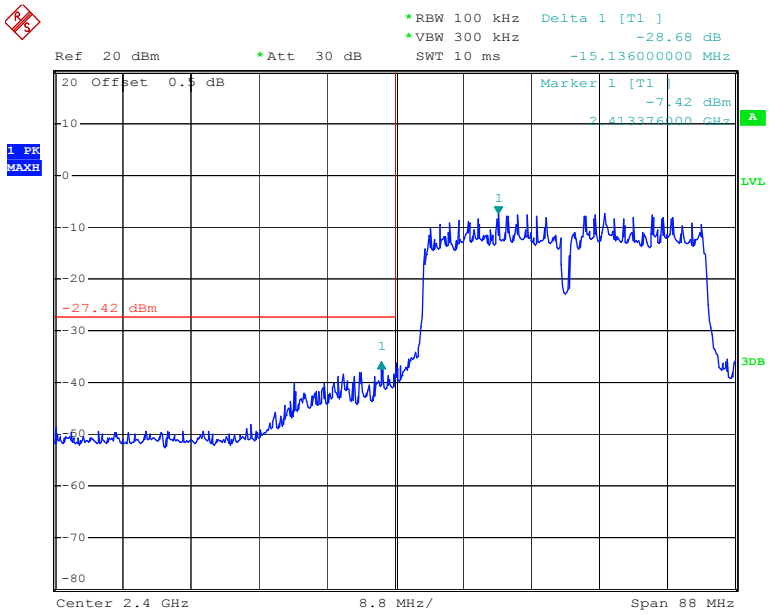
Date: 18.MAY.2020 20:17:40

802.11n ht20 Band Edge, Right Side



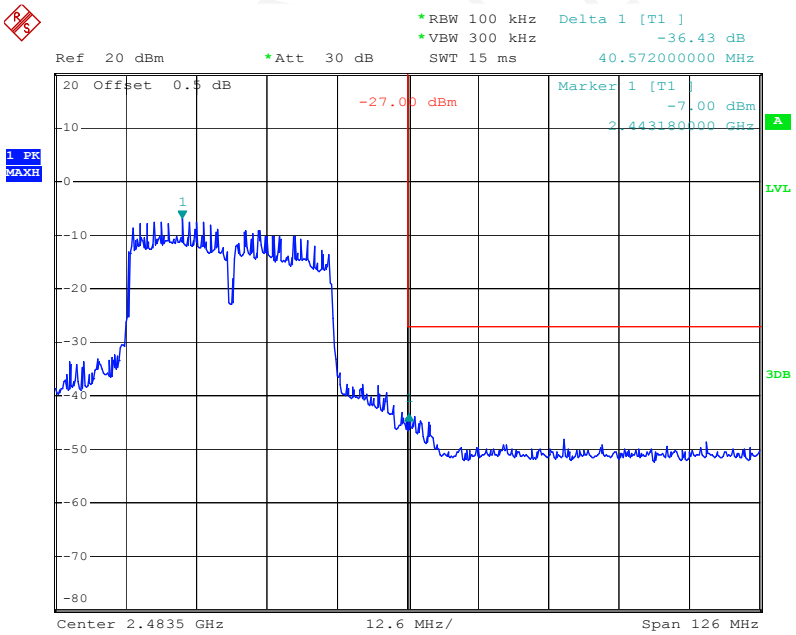
Date: 18.MAY.2020 20:18:58

802.11n ht40: Band Edge, Left Side



Date: 18.MAY.2020 20:26:24

802.11n ht40 Band Edge, Right Side



Date: 18.MAY.2020 20:34:35

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the RBW = 3 kHz, VBW = 10 kHz, Set the span to 1.5 times the DTS bandwidth.
4. Use the peak marker function to determine the maximum amplitude level.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2020-01-04	2021-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	26~27.5°C
Relative Humidity:	52~72%
ATM Pressure:	99.3~100.9kPa
Test by:	Lucy Lu
Test Date:	2020-05-08~2020-05-18

Test Result: Compliance

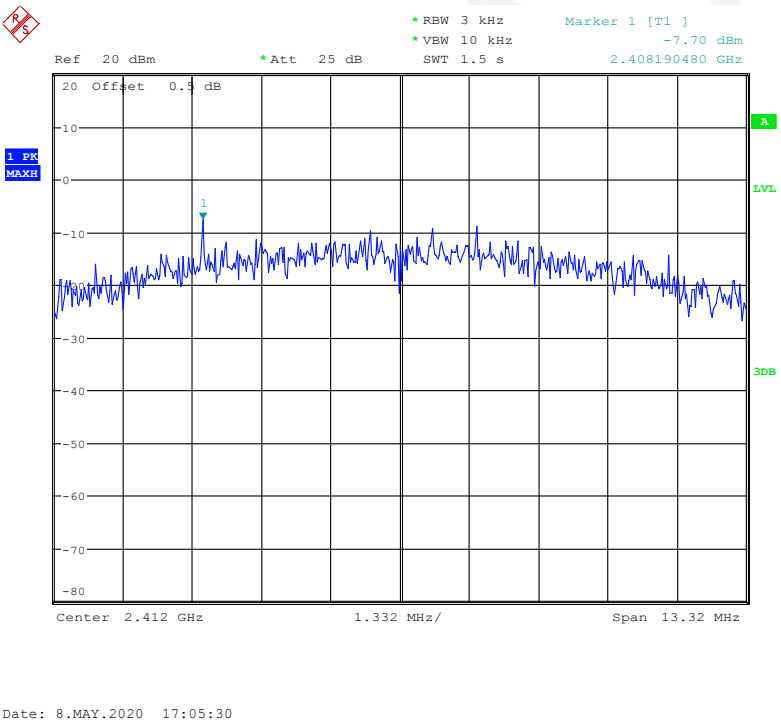
Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table and plots

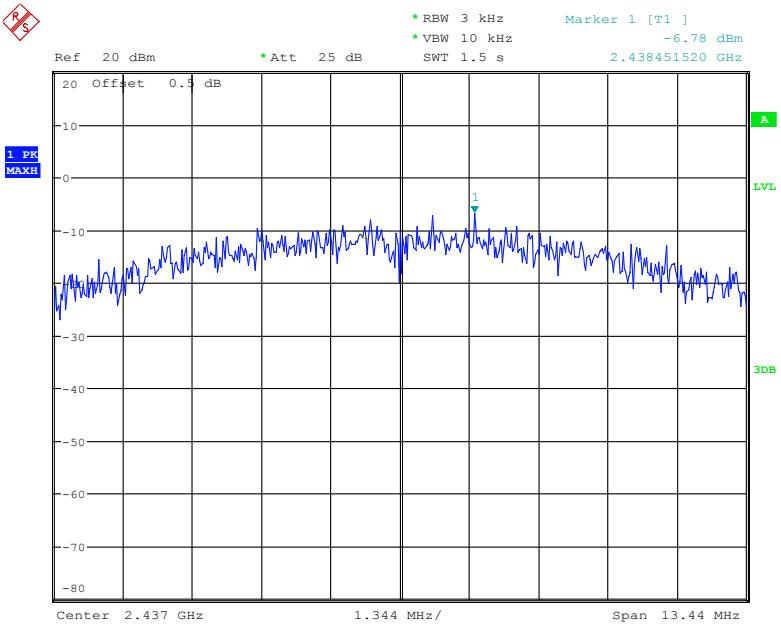
Test mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)			Limit (dBm/3kHz)
			Chain 0	Chain 1	Total	
802.11b	Low	2412	-7.70	-13.30	/	≤8
	Middle	2437	-6.78	-13.22	/	≤8
	High	2462	-6.53	-15.56	/	≤8
802.11g	Low	2412	-14.18	-20.31	/	≤8
	Middle	2437	-14.12	-20.23	/	≤8
	High	2462	-13.60	-22.13	/	≤8
802.11n ht20	Low	2412	-15.59	-20.33	-14.33	≤8
	Middle	2437	-13.40	-20.13	-12.56	≤8
	High	2462	-13.69	-22.10	-13.1	≤8
802.11n ht40	Low	2422	-18.69	-23.20	-17.37	≤8
	Middle	2437	-20.35	-22.70	-18.36	≤8
	High	2452	-19.59	-22.72	-17.87	≤8

Chain 0

Power Spectral Density, 802.11b Low Channel

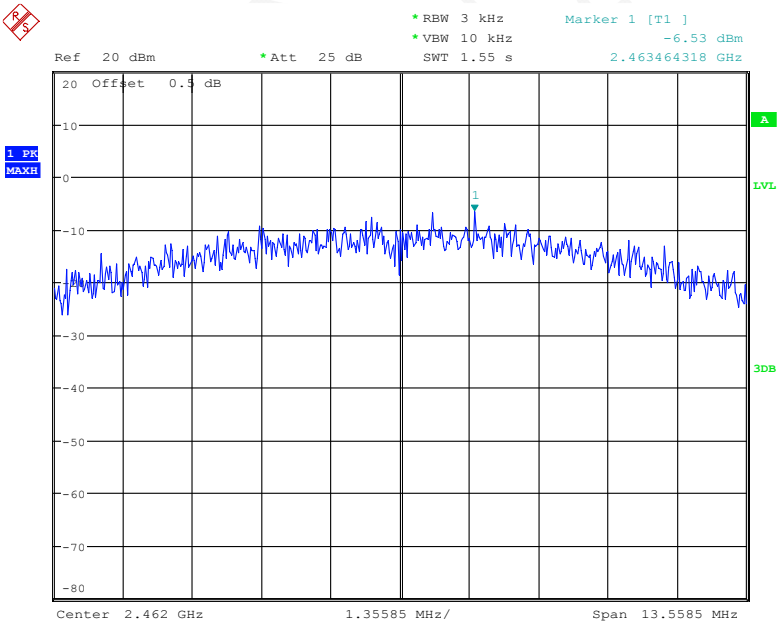


Power Spectral Density, 802.11b Middle Channel



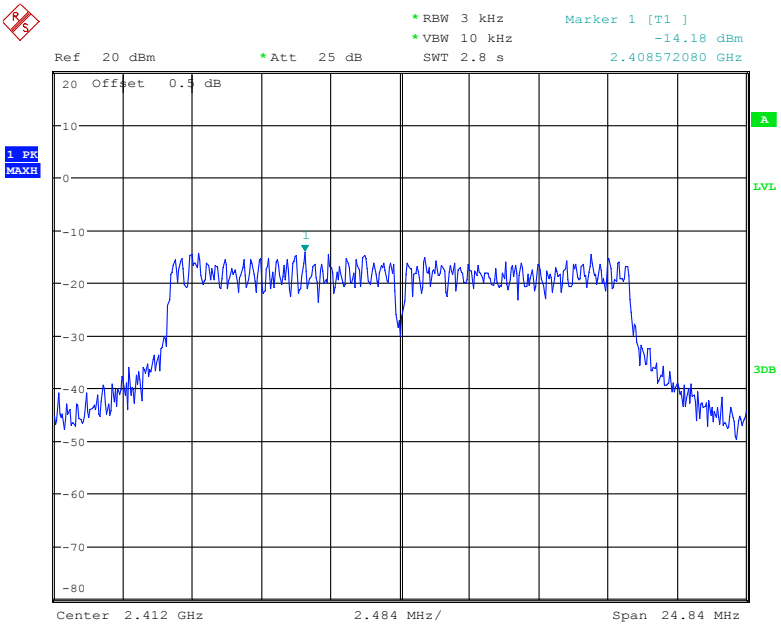
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Power Spectral Density, 802.11b High Channel



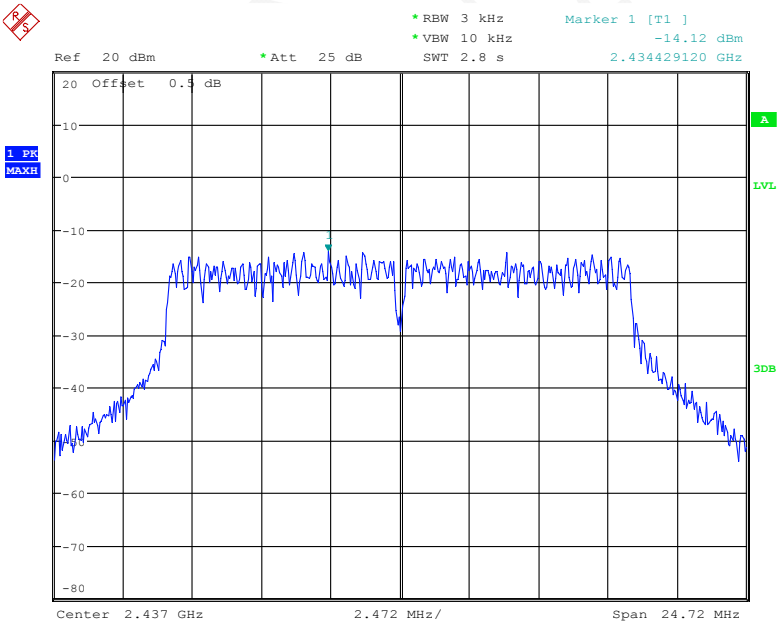
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Power Spectral Density, 802.11g Low Channel



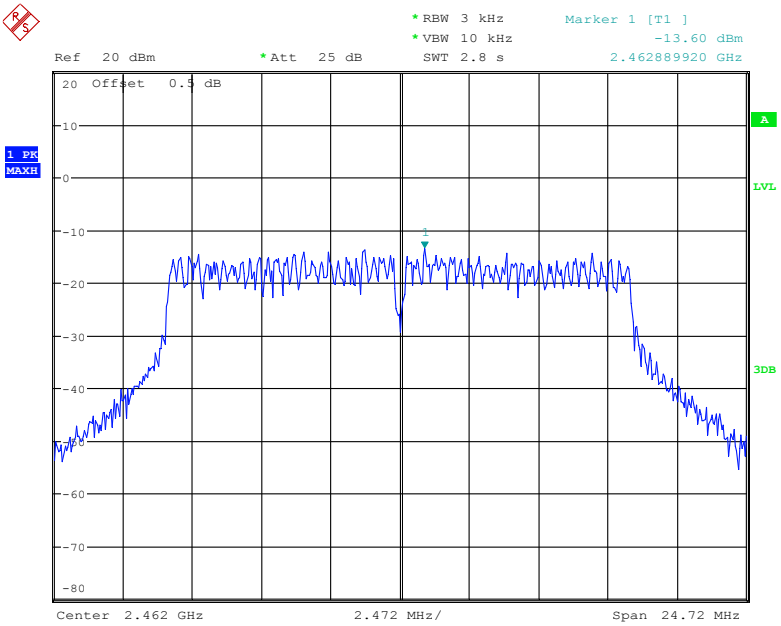
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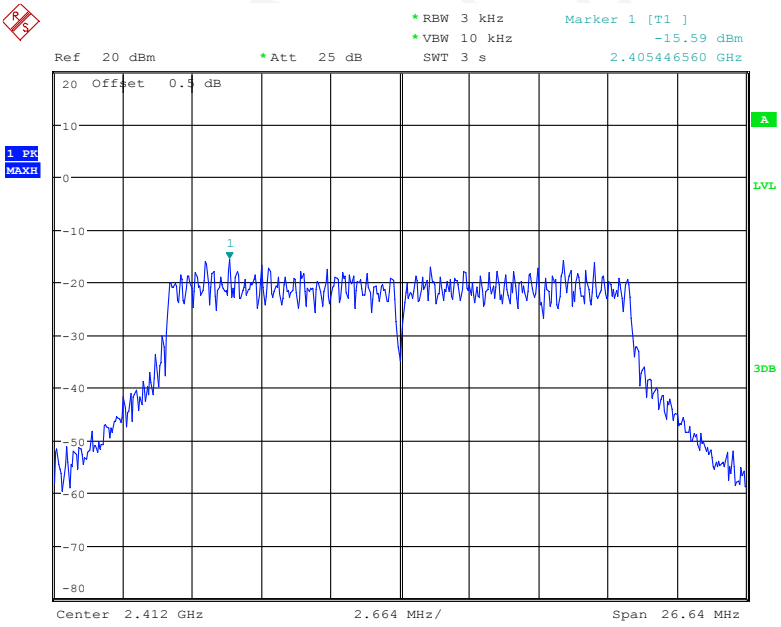
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Power Spectral Density, 802.11g High Channel



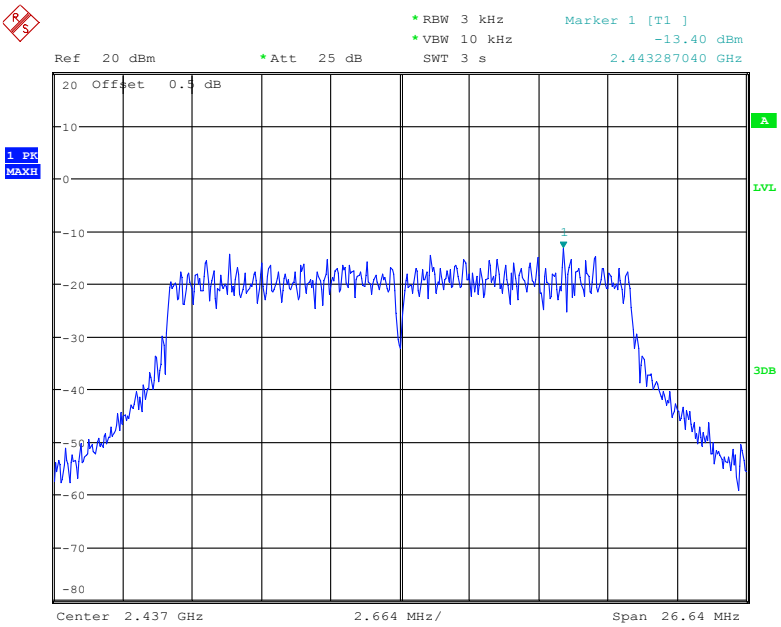
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Power Spectral Density, 802.11n ht20 Low Channel



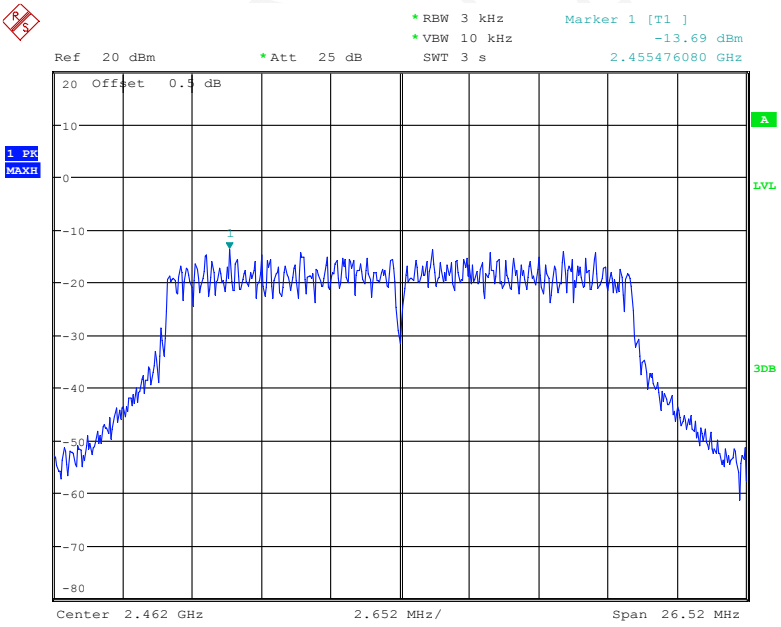
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Power Spectral Density, 802.11n ht20 Middle Channel



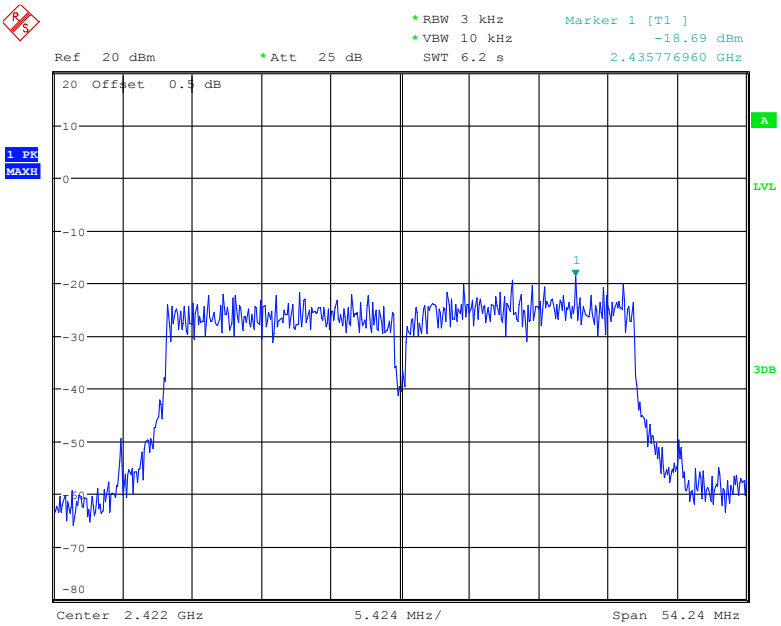
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Power Spectral Density, 802.11n ht20 High Channel



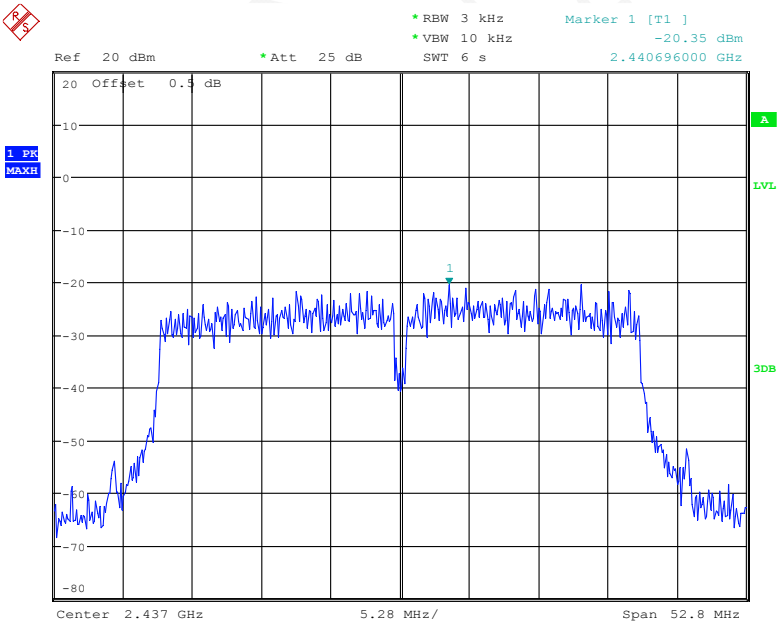
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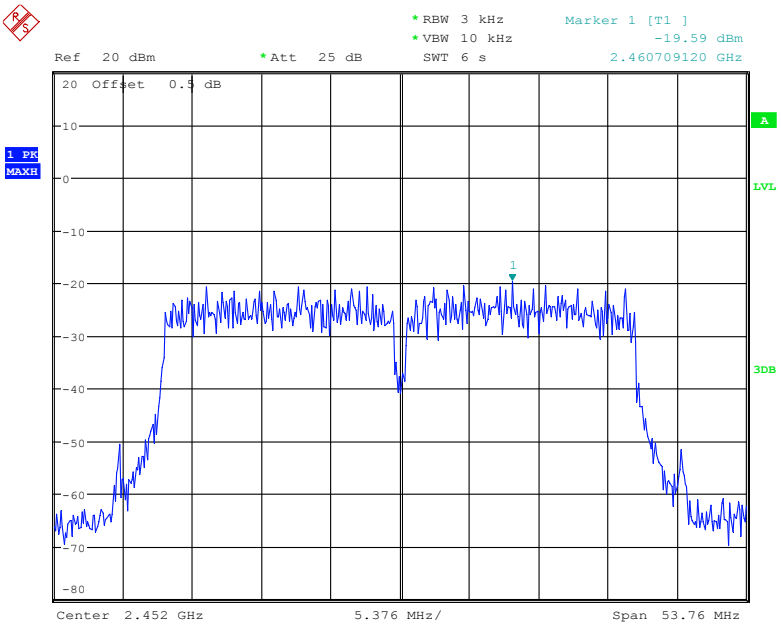
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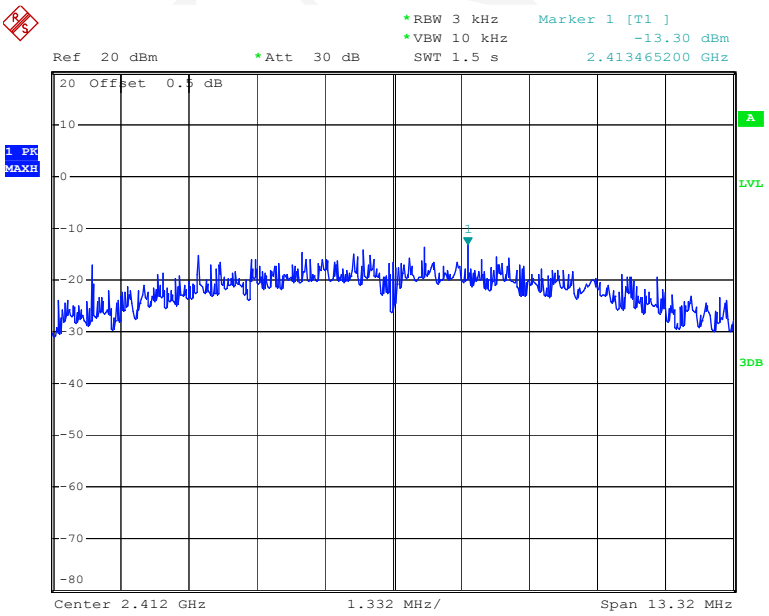
Power Spectral Density, 802.11n ht40 High Channel



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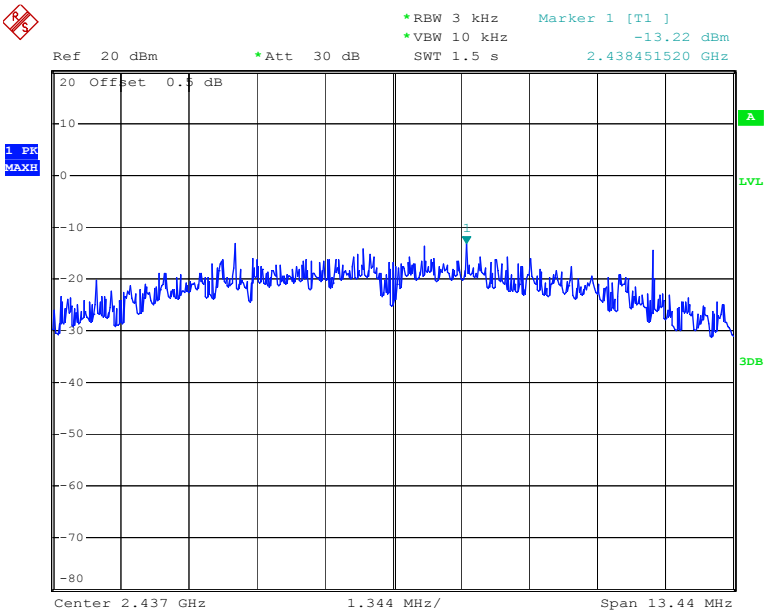
Chain 1

Power Spectral Density, 802.11b Low Channel



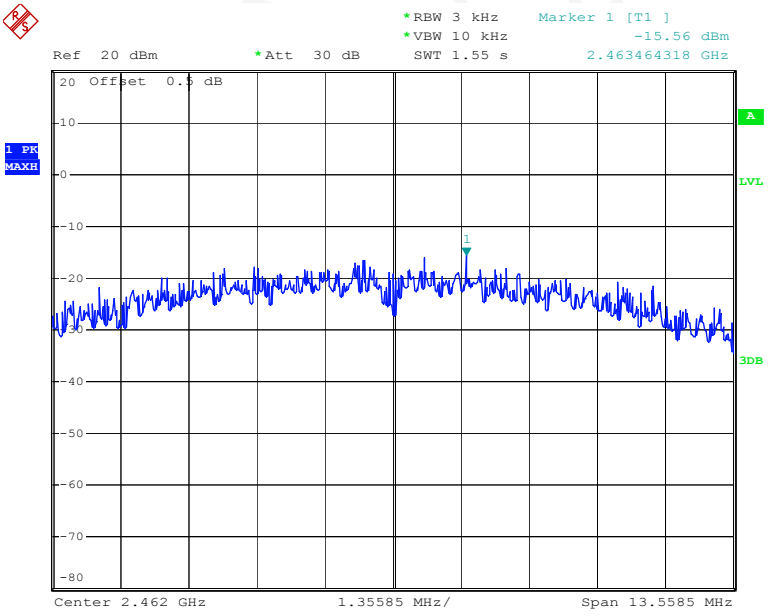
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Power Spectral Density, 802.11b Middle Channel



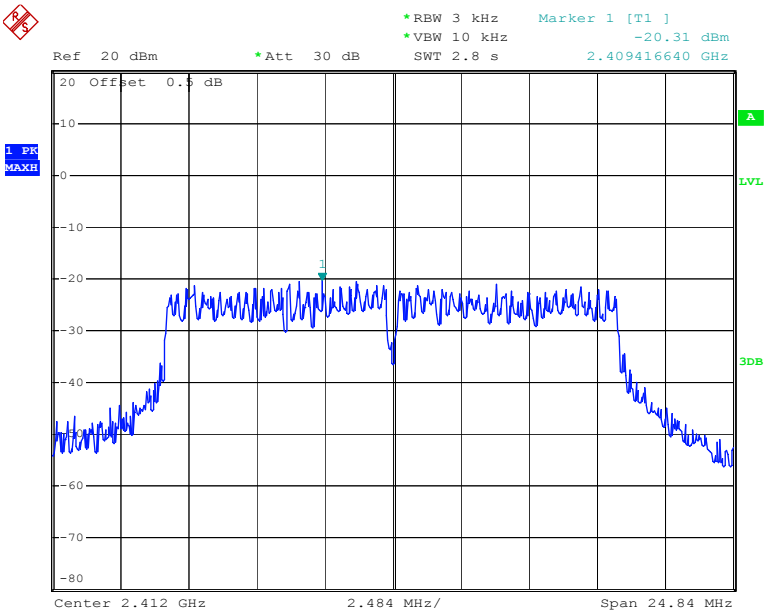
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Power Spectral Density, 802.11b High Channel



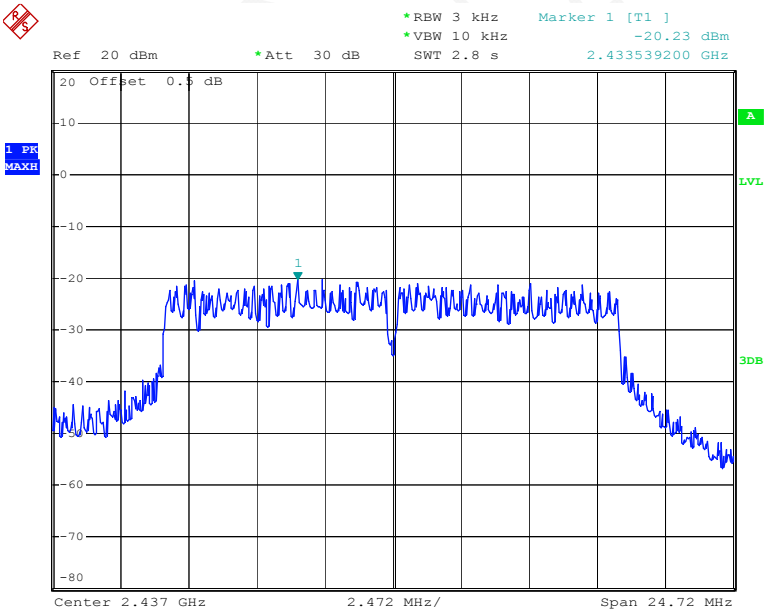
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Power Spectral Density, 802.11g Low Channel



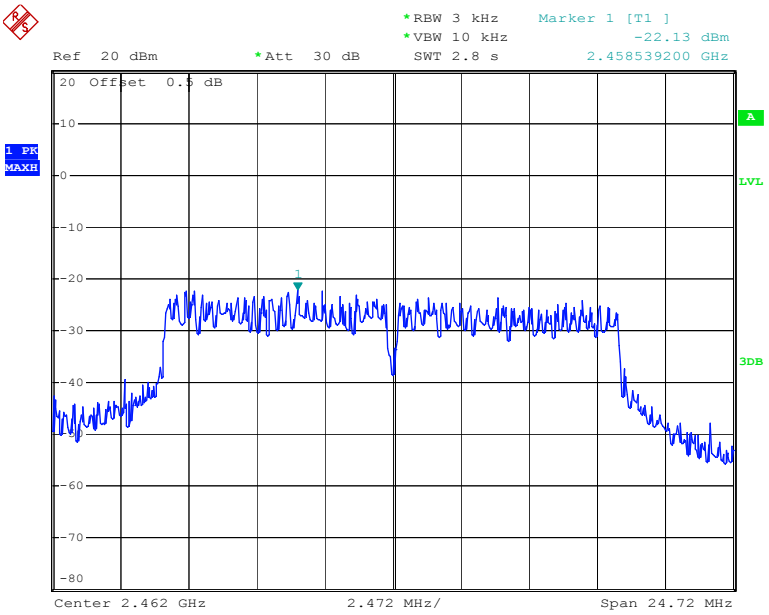
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Power Spectral Density, 802.11g Middle Channel



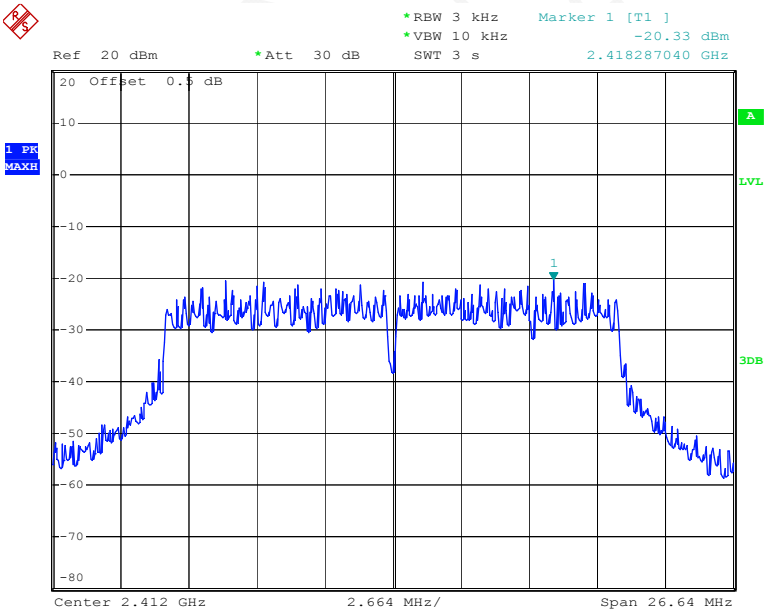
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Power Spectral Density, 802.11g High Channel



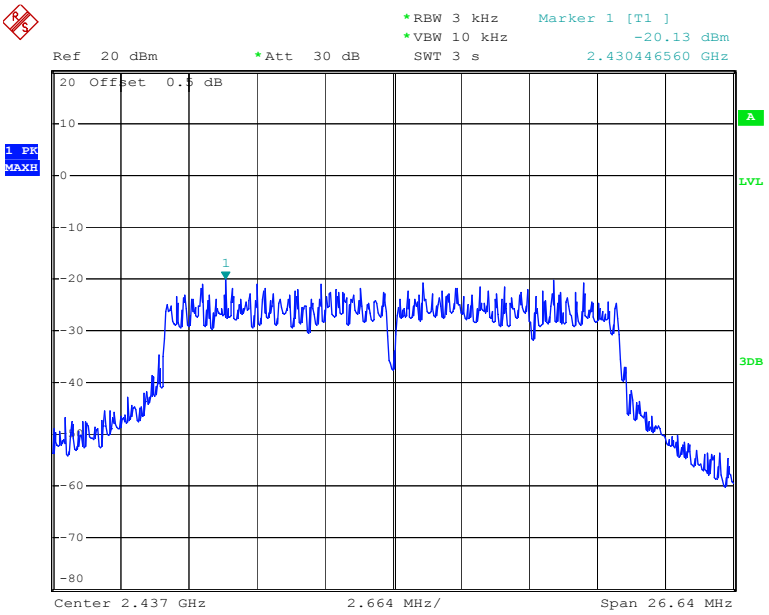
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Power Spectral Density, 802.11n ht20 Low Channel



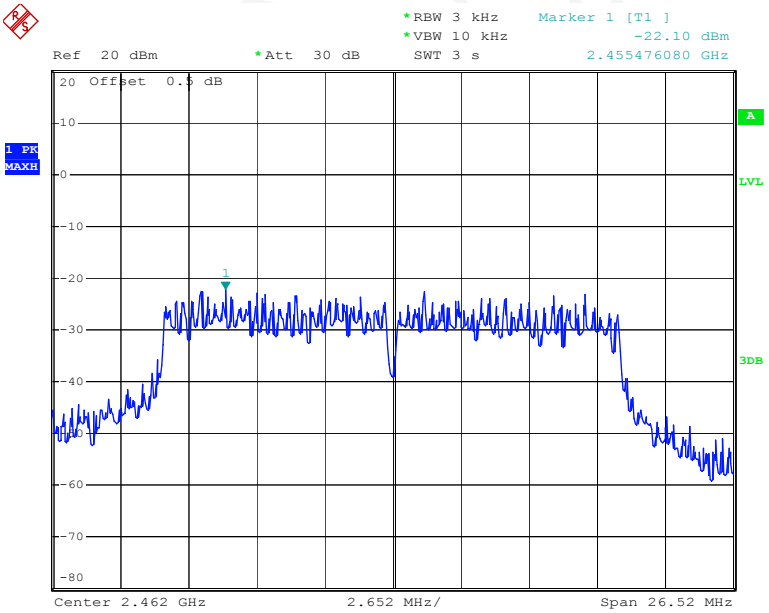
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Power Spectral Density, 802.11n ht20 Middle Channel



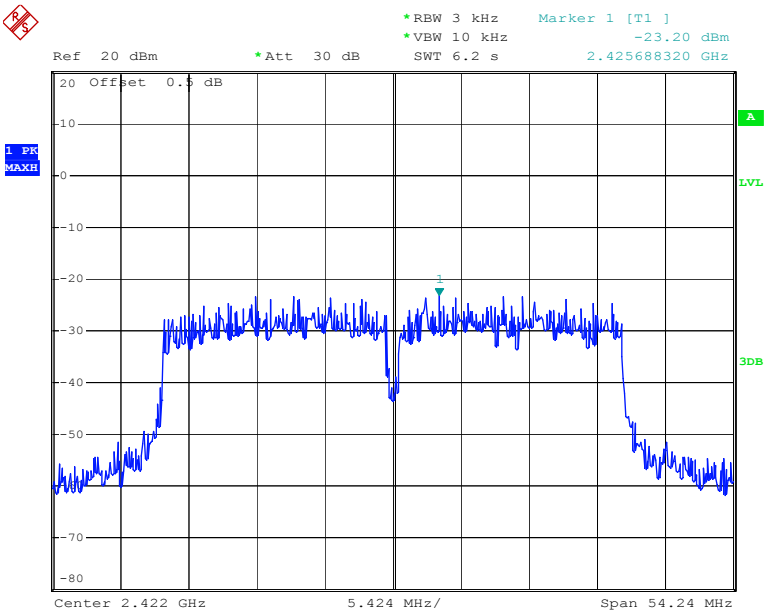
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Power Spectral Density, 802.11n ht20 High Channel



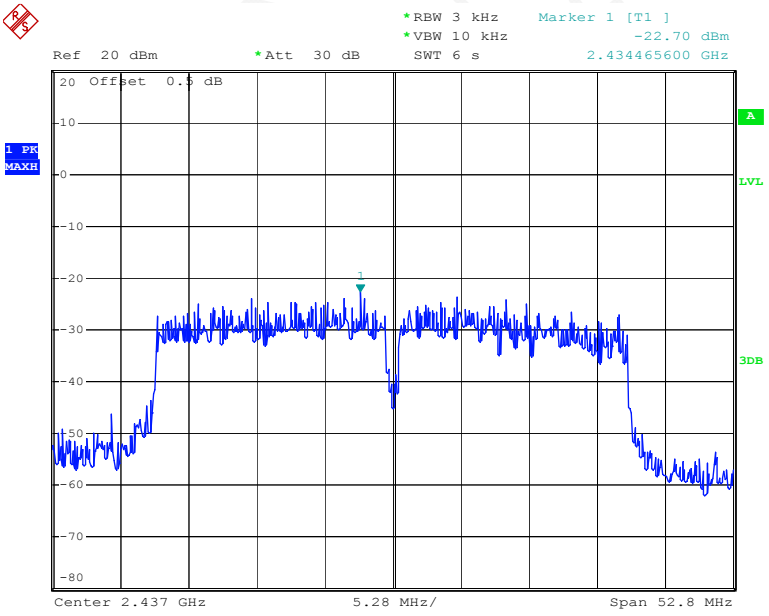
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Power Spectral Density, 802.11n ht40 Low Channel



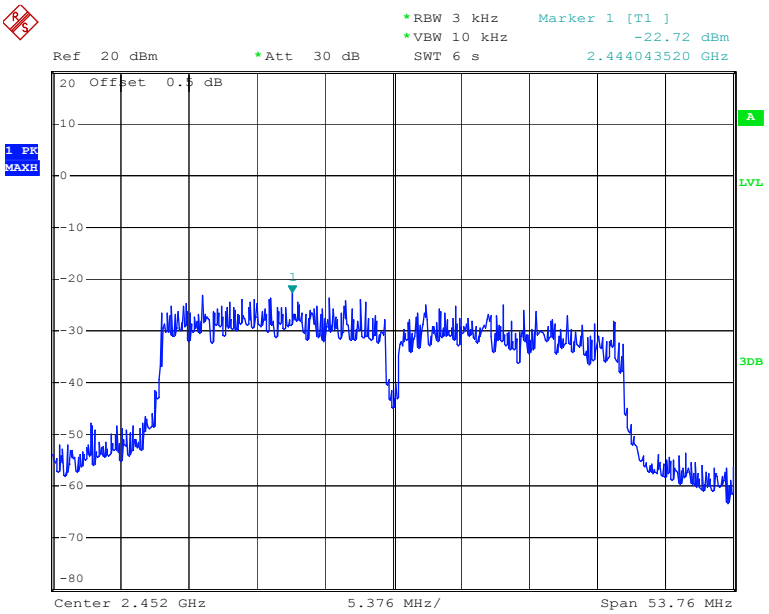
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Power Spectral Density, 802.11n ht40 Middle Channel



Date: 18.MAY.2020 20:28:18

Power Spectral Density, 802.11n ht40 High Channel



Date: 18.MAY.2020 20:34:23

******* END OF REPORT *******

TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 22H, PART 24E,PART 27
MEASUREMENT AND TEST REPORT

For

Shenzhen Lilian Communication Technology Co., Ltd.

Room1207BiwanbuildingXixiangSubdistrictBaoanShenzhenChina

FCC ID:2AV8R-67

Report Type:	**Product Type:**
Original Report	4G LTE Mobile WIFI

Report Number:	RDG200421001-00B
Report Date:	2020-05-20
Reviewed By:	Ivan Cao Assistant manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	4G LTE Mobile WIFI
EUT Model:	M7
Multiple Models:	M7XX,M6,M6XX.("X" stands for 0-9 and "X" stands for a-z or A-Z)
Operation modes:	FDD-LTE,TDD-LTE
Modulation Type:	QPSK, 16QAM
Rated Input Voltage:	DC 3.7V from battery or DC5V from USB port
Serial Number:	RBJ190927050-RF-S1
EUT Received Date:	2019/10/9
EUT Received Status:	Good

Notes: *Model M7 was selected for fully testing, the detailed information about the difference among M7 and model M7XX,M6,M6XX can be referred to the declaration letter which was stated and guaranteed by the manufacturer.*

Objective

This report is prepared on behalf of ***Shenzhen Lilian Communication Technology Co., Ltd.*** in accordance with: Part 2-Subpart J, Part 22-Subpart H, Part 24-Subpart E, Part 27, Part 90 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AV8R-67.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services
Part 27 - Miscellaneous wireless communications services

TIA/EIA 603-D-2010.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp.(Dongguan).

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Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Unwanted Emissions, radiated	30MHz ~ 1GHz:5.85 dB 1G~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier : CN0022.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "△ ". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-603-D 2010.

The test items were performed with the EUT operating at testing mode. The device operates on LTE band 2/4/5/7/12/13/25/40, test was performed with channels as below table:

Frequency Bands	Bandwidth (MHz)	Test Frequency(MHz)		
		Low	Middle	High
LTE Band 2	1.4	1850.7	1880	1909.3
	3	1851.5	1880	1908.5
	5	1852.5	1880	1907.5
	10	1855	1880	1905
	15	1857.5	1880	1902.5
	20	1860	1880	1900
LTE Band 4	1.4	1710.7	1732.5	1754.3
	3	1711.5	1732.5	1753.5
	5	1712.5	1732.5	1752.5
	10	1715	1732.5	1750
	15	1717.5	1732.5	1747.5
	20	1720	1732.5	1745
LTE Band 5	1.4	824.7	836.5	848.3
	3	825.5	836.5	847.5
	5	826.5	836.5	846.5
	10	829	836.5	844
LTE Band 7	5	2502.5	2535	2567.5
	10	2505	2535	2565
	15	2507.5	2535	2562.5
	20	2510	2535	2560
LTE Band 12	1.4	699.7	707.5	715.3
	3	700.5	707.5	714.5
	5	701.5	707.5	713.5
	10	704	707.5	711
LTE Band 13	5	779.5	782	784.5
	10	/	782	/
LTE Band 25	1.4	1850.7	1882.5	1914.3
	3	1851.5	1882.5	1913.5
	5	1852.5	1882.5	1912.5
	10	1855	1882.5	1910
	15	1857.5	1882.5	1907.5
	20	1860	1882.5	1905
LTE Band 40 Lower 2305-2315MHz	5	2307.5	2310	2312.5
	10	/	2310	/
LTE Band 40 Upper 2350-2360MHz	5	2352.5	2355	2357.5
	10	/	2355	/

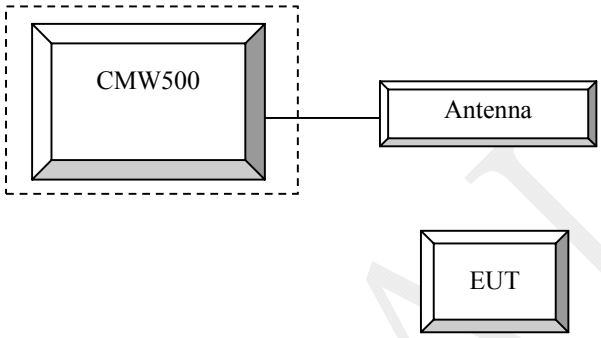
Equipment Modifications

No modification was made to the EUT.

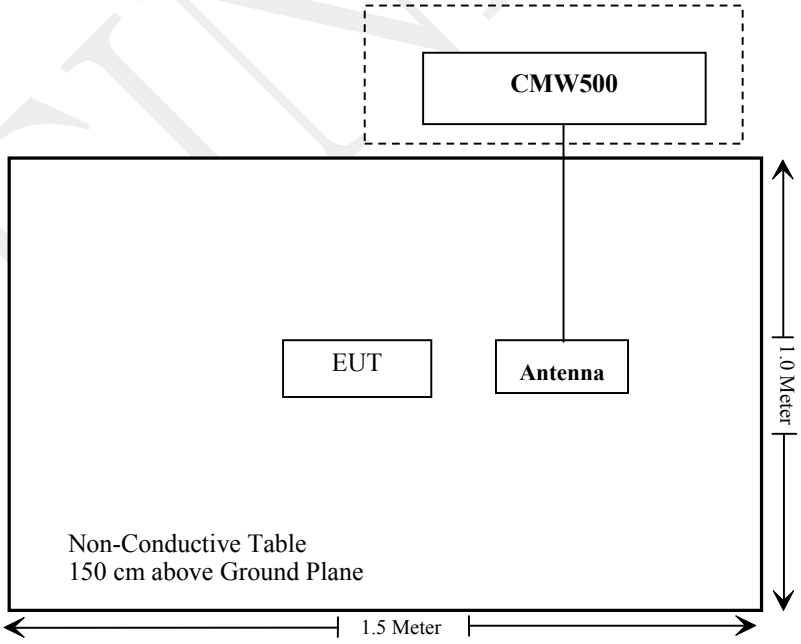
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Wideband Radio Communication Tester	CMW500	147473
Unknown	ANTENNA	Unknown	/

Configuration of Test Setup



Block Diagram of Test Setup



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SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC§1.1310, §2.1093	RF Exposure	Compliance
FCC§2.1046; § 22.913 (a); § 24.232 (c); §27.50	RF Output Power	Compliance
FCC§ 2.1047	Modulation Characteristics	Not Applicable
FCC§ 2.1049; § 22.905 § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliance
FCC§ 2.1051, § 22.917 (a); § 24.238 (a); §27.53	Spurious Emissions at Antenna Terminal	Compliance
FCC§ 2.1053 § 22.917 (a); § 24.238 (a); §27.53	Field Strength of Spurious Radiation	Compliance
FCC§ 22.917 (a); § 24.238 (a); §27.53	Out of band emission, Band Edge	Compliance
FCC§ 2.1055 § 22.355; § 24.235; §27.54	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

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FCC §1.1310 , §2.1093 - RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliant, please refer to the SAR report: RDG200421001-20.

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FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H & 24E, Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

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FCC § 2.1046, § 22.913 (a) & § 24.232 (c) & § 27.50 - RF OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §24.232 (d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

According to FCC §2.1046 and §27.50 (d), (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

According to §27.50

(b)(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

(c) (10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

(d), (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(h),(2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

Test Procedure

LTE (FDD):

The following tests were conducted according to the test requirements in 3GPP TS36.101

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

LTE(TDD):

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Calculated Duty Cycle

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

Calculated Duty Cycle = Extended cyclic prefix in uplink x (T_s) x # of S + # of U

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:
Calculated Duty Cycle = 5120 x [1/(15000 x 2048)] x 2 + 6 ms = 63.33%
where
T_s = 1/(15000 x 2048) seconds

Radiated method:

ANSI/TIA-603-D section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESR3	102453	2019-06-26	2020-06-26
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-05-09	2020-05-09
TDK RF	Horn Antenna	HRN-0118	130 084	2018-10-12	2021-10-12
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2019-09-05	2020-09-05
Agilent	Signal Generator	E8247C	MY43321350	2019-12-10	2020-12-10
R&S	Wideband Radio Communication Tester	CMW500	147473	2019-08-03	2020-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Test Items:	Radiation Below 1GHz	Radiation Above 1GHz	Conducted Output Power
Temperature:	24.8°C	24.1°C	23.9 °C
Relative Humidity:	53 %	53%	58 %
ATM Pressure:	101.4 kPa	101.4 kPa	101.8 kPa
Tester:	Vern Shen	FelixWang	Chris Mo
Test Date:	2020-04-29	2020-04-29	2020-04-27

Conducted Output Power

LTE Band 2

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	22.56	22.64	22.73
		RB1#3	22.63	22.67	22.93
		RB1#5	22.57	22.62	22.79
		RB3#0	22.39	22.43	22.78
		RB3#3	22.44	22.31	22.76
		RB6#0	21.43	21.48	21.88
	16QAM	RB1#0	21.61	21.66	22.08
		RB1#3	21.69	21.61	22.62
		RB1#5	21.58	21.59	22.58
		RB3#0	21.62	21.67	21.86
		RB3#3	21.56	21.69	21.78
		RB6#0	20.26	20.41	20.83
3MHz	QPSK	RB1#0	22.54	22.86	22.84
		RB1#8	22.66	22.74	22.86
		RB1#14	22.43	22.67	23.08
		RB6#0	21.91	21.75	21.93
		RB6#9	21.70	21.66	22.08
		RB15#0	22.01	21.66	21.89
	16QAM	RB1#0	22.04	22.09	21.89
		RB1#8	21.98	21.90	21.52
		RB1#14	21.92	21.87	21.53
		RB6#0	20.74	20.99	20.88
		RB6#9	20.71	20.95	20.58
		RB15#0	20.79	20.93	20.90
5MHz	QPSK	RB1#0	22.56	22.51	22.67
		RB1#13	22.53	22.43	22.87
		RB1#24	22.60	22.63	22.90
		RB15#0	21.98	21.79	22.00
		RB15#10	21.99	21.76	21.85
		RB25#0	21.74	21.69	21.92
	16QAM	RB1#0	21.14	21.92	21.57
		RB1#13	21.08	21.88	21.73
		RB1#24	21.14	21.78	21.57
		RB15#0	20.70	20.81	21.09
		RB15#10	20.58	20.64	20.75
		RB25#0	20.76	20.76	20.97

10MHz	QPSK	RB1#0	22.58	22.88	22.69
		RB1#25	22.57	23.05	23.19
		RB1#49	22.91	22.82	22.93
		RB25#0	21.93	21.89	21.94
		RB25#25	21.81	21.72	21.99
		RB50#0	21.90	21.77	22.02
	16QAM	RB1#0	22.10	22.32	21.69
		RB1#25	21.89	22.79	21.73
		RB1#49	22.20	22.42	21.51
		RB25#0	21.04	20.78	20.94
		RB25#25	20.69	20.71	20.91
		RB50#0	20.97	20.85	21.01
15MHz	QPSK	RB1#0	23.00	22.68	22.94
		RB1#38	22.79	22.54	22.78
		RB1#74	22.97	22.55	22.51
		RB36#0	21.92	21.92	21.99
		RB36#39	21.82	21.74	22.00
		RB75#0	21.79	21.85	22.02
	16QAM	RB1#0	22.01	22.48	21.67
		RB1#38	22.16	22.15	21.93
		RB1#74	22.05	22.14	21.60
		RB36#0	20.82	21.17	20.98
		RB36#39	20.89	20.72	20.92
		RB75#0	20.88	20.96	21.12
20MHz	QPSK	RB1#0	22.91	22.59	22.71
		RB1#50	22.93	23.03	23.21
		RB1#99	22.42	22.74	23.16
		RB50#0	21.70	21.90	21.89
		RB50#50	21.72	21.66	21.96
		RB100#0	21.74	21.79	22.03
	16QAM	RB1#0	22.59	22.49	22.00
		RB1#50	22.66	22.52	21.73
		RB1#99	22.69	21.95	21.30
		RB50#0	20.92	21.07	20.95
		RB50#50	20.79	20.90	20.97
		RB100#0	20.76	20.97	20.89

FINAL

LTE Band 4

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	23.01	22.48	22.84
		RB1#3	23.00	22.75	22.87
		RB1#5	23.00	22.61	22.79
		RB3#0	22.87	22.60	22.72
		RB3#3	22.64	22.72	22.73
		RB6#0	21.71	21.76	21.71
	16QAM	RB1#0	21.88	21.98	21.83
		RB1#3	22.09	22.18	21.60
		RB1#5	21.87	22.10	21.49
		RB3#0	21.62	22.07	21.72
		RB3#3	21.73	22.06	21.70
		RB6#0	20.80	21.01	20.74
3MHz	QPSK	RB1#0	22.60	22.72	22.41
		RB1#8	22.49	22.86	22.55
		RB1#14	22.51	22.95	22.53
		RB6#0	21.64	21.73	21.55
		RB6#9	21.63	21.73	21.55
		RB15#0	21.65	21.72	21.66
	16QAM	RB1#0	21.84	21.93	21.84
		RB1#8	21.77	22.21	21.78
		RB1#14	21.82	22.36	21.79
		RB6#0	20.55	21.03	20.75
		RB6#9	20.51	21.18	20.57
		RB15#0	20.54	20.82	20.77
5MHz	QPSK	RB1#0	22.35	22.56	22.42
		RB1#13	22.40	22.84	22.65
		RB1#24	22.50	22.82	22.75
		RB15#0	21.61	21.67	21.75
		RB15#10	21.58	21.70	21.78
		RB25#0	21.47	21.64	21.75
	16QAM	RB1#0	20.76	21.88	21.22
		RB1#13	20.87	22.03	21.31
		RB1#24	20.85	21.99	21.37
		RB15#0	20.87	20.62	20.71
		RB15#10	20.86	20.95	20.76
		RB25#0	20.78	20.70	20.73

10MHz	QPSK	RB1#0	22.72	22.62	22.51
		RB1#25	22.97	22.98	22.65
		RB1#49	22.58	22.53	22.59
		RB25#0	21.59	21.66	21.45
		RB25#25	21.64	21.61	21.47
		RB50#0	21.70	21.70	21.49
	16QAM	RB1#0	21.89	22.40	22.21
		RB1#25	22.18	22.37	22.38
		RB1#49	21.59	22.24	22.22
		RB25#0	20.75	20.33	20.53
		RB25#25	20.60	20.55	20.44
		RB50#0	20.73	20.42	20.66
15MHz	QPSK	RB1#0	22.41	22.92	22.75
		RB1#38	22.48	22.68	22.50
		RB1#74	22.78	22.50	22.71
		RB36#0	21.60	21.65	21.82
		RB36#39	21.69	21.69	21.78
		RB75#0	21.62	21.63	21.70
	16QAM	RB1#0	21.88	22.28	21.63
		RB1#38	22.00	22.71	21.62
		RB1#74	21.64	22.22	21.27
		RB36#0	20.63	20.52	20.84
		RB36#39	20.65	20.74	20.59
		RB75#0	20.65	20.58	20.83
20MHz	QPSK	RB1#0	22.53	22.82	22.96
		RB1#50	22.87	23.04	22.93
		RB1#99	22.77	21.42	22.55
		RB50#0	21.77	21.45	21.48
		RB50#50	21.87	21.45	21.41
		RB100#0	21.84	21.41	21.54
	16QAM	RB1#0	21.84	22.32	21.50
		RB1#50	22.32	22.23	21.64
		RB1#99	21.80	21.88	21.04
		RB50#0	20.88	20.53	20.70
		RB50#50	20.71	20.55	20.62
		RB100#0	20.91	20.58	20.56

LTE Band 5

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	21.84	20.75	22.56
		RB1#3	22.00	20.65	22.28
		RB1#5	22.06	20.54	22.06
		RB3#0	21.79	20.80	22.39
		RB3#3	21.95	20.66	22.10
		RB6#0	21.84	20.62	22.14
	16QAM	RB1#0	20.75	20.35	21.81
		RB1#3	20.99	20.20	21.65
		RB1#5	21.08	21.50	21.50
		RB3#0	20.94	21.70	21.88
		RB3#3	21.18	20.84	21.72
		RB6#0	20.90	20.78	21.15
3MHz	QPSK	RB1#0	21.57	21.58	22.27
		RB1#8	22.20	21.23	22.45
		RB1#14	22.60	20.96	21.89
		RB6#0	21.69	21.50	22.39
		RB6#9	22.44	21.10	22.03
		RB15#0	22.07	21.36	22.29
	16QAM	RB1#0	21.03	21.18	21.21
		RB1#8	21.74	20.76	21.77
		RB1#14	22.16	20.44	21.34
		RB6#0	20.84	20.95	21.47
		RB6#9	21.59	20.50	21.50
		RB15#0	21.20	20.72	21.65
5MHz	QPSK	RB1#0	22.04	22.08	21.33
		RB1#13	22.96	21.48	22.71
		RB1#24	22.67	20.98	22.11
		RB15#0	21.93	21.88	22.05
		RB15#10	21.92	21.43	22.22
		RB25#0	21.99	21.60	22.27
	16QAM	RB1#0	20.91	21.46	20.50
		RB1#13	21.96	20.82	22.00
		RB1#24	21.64	20.20	21.69
		RB15#0	20.91	21.26	21.00
		RB15#10	20.93	20.73	21.04
		RB25#0	20.99	21.00	21.32
10MHz	QPSK	RB1#0	21.14	22.37	20.95
		RB1#25	23.39	21.21	21.79
		RB1#49	21.94	20.21	22.47
		RB25#0	22.38	21.92	21.21
		RB25#25	22.37	20.93	22.36
		RB50#0	22.27	21.47	21.72
	16QAM	RB1#0	20.66	21.91	19.88
		RB1#25	22.87	20.71	20.70
		RB1#49	21.56	19.53	21.65
		RB25#0	21.10	21.32	20.28
		RB25#25	21.41	20.77	21.46
		RB50#0	21.38	20.53	20.77

LTE Band 7

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	21.52	21.49	21.51
		RB1#13	21.71	21.70	21.88
		RB1#24	21.57	21.63	21.78
		RB15#0	20.73	20.83	20.72
		RB15#10	20.68	20.75	20.88
		RB25#0	20.67	20.73	20.75
	16QAM	RB1#0	20.27	20.27	21.01
		RB1#13	20.83	20.48	21.37
		RB1#24	20.61	20.28	21.29
		RB15#0	19.64	19.85	19.38
		RB15#10	19.66	19.78	19.46
		RB25#0	19.65	19.77	19.48
10MHz	QPSK	RB1#0	21.49	21.62	22.27
		RB1#25	21.71	22.07	22.23
		RB1#49	21.59	21.89	21.95
		RB25#0	20.78	20.76	20.89
		RB25#25	20.70	20.88	20.97
		RB50#0	20.74	20.85	20.91
	16QAM	RB1#0	20.60	21.26	21.23
		RB1#25	21.18	21.66	20.76
		RB1#49	20.52	21.45	20.58
		RB25#0	19.71	19.72	19.94
		RB25#25	19.69	19.87	20.07
		RB50#0	19.58	19.67	19.75
15MHz	QPSK	RB1#0	21.50	21.62	21.79
		RB1#38	21.56	21.86	21.72
		RB1#74	21.57	21.80	21.68
		RB36#0	20.78	20.69	20.94
		RB36#39	20.56	20.77	20.94
		RB75#0	20.71	20.71	20.85
	16QAM	RB1#0	21.02	21.26	20.98
		RB1#38	21.12	21.71	20.92
		RB1#74	20.27	21.45	20.88
		RB36#0	19.67	19.95	19.75
		RB36#39	19.50	20.02	19.78
		RB75#0	19.70	19.60	19.68
20MHz	QPSK	RB1#0	21.31	21.65	21.67
		RB1#50	21.92	22.15	22.05
		RB1#99	21.47	21.85	21.87
		RB50#0	20.72	20.76	20.98
		RB50#50	20.68	20.86	20.99
		RB100#0	20.71	20.80	20.91
	16QAM	RB1#0	21.03	20.77	21.67
		RB1#50	21.29	21.01	21.70
		RB1#99	20.55	20.36	21.49
		RB50#0	19.84	19.80	19.81
		RB50#50	19.66	19.94	19.79
		RB100#0	19.76	19.77	19.84

LTE Band 12

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	23.75	23.82	23.25
		RB1#3	23.75	23.86	23.17
		RB1#5	23.91	23.87	23.41
		RB3#0	23.71	23.55	23.61
		RB3#3	23.82	23.43	23.42
		RB6#0	22.77	22.61	22.50
	16QAM	RB1#0	22.47	22.84	22.75
		RB1#3	22.63	23.07	22.81
		RB1#5	23.02	22.58	22.80
		RB3#0	22.86	22.56	22.87
		RB3#3	22.97	22.60	22.62
		RB6#0	21.80	21.65	21.65
3MHz	QPSK	RB1#0	23.70	23.54	16.59
		RB1#8	23.76	23.70	23.96
		RB1#14	23.60	23.52	24.31
		RB6#0	22.76	22.59	23.42
		RB6#9	22.75	22.91	23.35
		RB15#0	22.81	21.51	23.51
	16QAM	RB1#0	23.04	21.65	24.05
		RB1#8	23.57	21.08	23.90
		RB1#14	22.98	21.10	23.70
		RB6#0	21.65	19.97	22.54
		RB6#9	21.65	19.96	22.08
		RB15#0	21.78	21.55	22.50
5MHz	QPSK	RB1#0	24.40	24.20	24.27
		RB1#13	24.52	24.32	24.12
		RB1#24	24.35	24.27	24.03
		RB15#0	23.60	23.51	23.44
		RB15#10	23.37	23.45	23.34
		RB25#0	23.45	23.33	23.42
	16QAM	RB1#0	23.38	22.96	23.60
		RB1#13	23.01	22.95	23.07
		RB1#24	23.07	22.56	23.39
		RB15#0	22.63	22.22	22.35
		RB15#10	22.41	22.58	22.03
		RB25#0	22.39	22.34	22.33
10MHz	QPSK	RB1#0	24.20	24.26	24.51
		RB1#25	24.37	24.43	24.71
		RB1#49	24.40	24.55	24.29
		RB25#0	23.44	23.41	23.41
		RB25#25	23.38	23.43	23.50
		RB50#0	23.58	23.41	23.36
	16QAM	RB1#0	23.74	23.95	23.18
		RB1#25	23.43	23.93	24.08
		RB1#49	23.30	24.53	22.76
		RB25#0	22.45	22.26	22.32
		RB25#25	22.41	22.45	22.61
		RB50#0	22.60	22.32	22.34

LTE Band 13

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	19.87	20.05	20.61
		RB1#13	20.45	21.25	20.49
		RB1#24	20.66	20.39	20.01
		RB15#0	19.54	19.78	19.52
		RB15#10	19.78	20.04	19.48
		RB25#0	19.69	19.86	19.56
	16QAM	RB1#0	18.75	19.34	19.11
		RB1#13	19.26	19.89	19.24
		RB1#24	19.49	20.00	18.92
		RB15#0	18.54	18.16	18.50
		RB15#10	18.52	18.82	18.56
		RB25#0	18.74	18.27	18.46
10MHz	QPSK	RB1#0	/	19.76	/
		RB1#25	/	20.65	/
		RB1#49	/	19.96	/
		RB25#0	/	19.18	/
		RB25#25	/	19.74	/
		RB50#0	/	19.30	/
	16QAM	RB1#0	/	18.96	/
		RB1#25	/	20.50	/
		RB1#49	/	19.47	/
		RB25#0	/	18.43	/
		RB25#25	/	18.54	/
		RB50#0	/	18.29	/

FINAL

LTE Band 25

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	23.55	23.93	23.53
		RB1#3	24.01	24.05	23.70
		RB1#5	24.01	24.01	23.74
		RB3#0	24.08	23.86	23.95
		RB3#3	23.82	23.84	23.79
		RB6#0	22.77	22.85	22.90
	16QAM	RB1#0	22.63	22.92	23.04
		RB1#3	22.82	23.05	23.20
		RB1#5	22.80	23.02	23.06
		RB3#0	22.90	22.81	22.72
		RB3#3	23.05	22.84	22.64
		RB6#0	21.88	21.94	21.84
3MHz	QPSK	RB1#0	23.71	23.70	23.76
		RB1#8	23.90	23.74	23.81
		RB1#14	23.94	23.71	23.86
		RB6#0	22.82	22.76	22.88
		RB6#9	22.86	22.70	23.00
		RB15#0	22.82	22.76	22.95
	16QAM	RB1#0	23.08	23.45	22.86
		RB1#8	23.06	23.00	22.85
		RB1#14	23.01	22.89	22.61
		RB6#0	21.67	21.84	21.88
		RB6#9	21.80	21.71	21.98
		RB15#0	21.85	21.56	21.88
5MHz	QPSK	RB1#0	23.52	23.58	23.95
		RB1#13	23.70	23.64	23.95
		RB1#24	23.83	23.73	23.73
		RB15#0	22.79	22.76	23.00
		RB15#10	22.87	22.81	22.87
		RB25#0	22.84	22.85	22.92
	16QAM	RB1#0	22.41	23.01	22.81
		RB1#13	22.44	23.14	22.52
		RB1#24	22.04	23.04	22.62
		RB15#0	21.76	21.60	21.67
		RB15#10	21.83	21.73	21.65
		RB25#0	21.86	21.66	21.96
10MHz	QPSK	RB1#0	23.62	23.78	23.77
		RB1#25	24.03	24.11	24.00
		RB1#49	24.17	23.97	23.94
		RB25#0	22.82	22.86	22.96
		RB25#25	22.89	22.73	22.87
		RB50#0	22.90	22.90	22.94
	16QAM	RB1#0	23.10	23.41	22.63
		RB1#25	23.61	23.75	22.81
		RB1#49	23.84	23.39	22.59
		RB25#0	21.71	21.72	22.05
		RB25#25	21.89	21.87	22.06
		RB50#0	21.66	21.73	21.88

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15MHz	QPSK	RB1#0	23.68	23.76	23.47
		RB1#38	23.95	23.84	23.50
		RB1#74	24.10	23.66	23.70
		RB36#0	22.72	22.87	23.05
		RB36#39	22.86	22.74	22.93
		RB75#0	22.80	22.81	22.93
	16QAM	RB1#0	23.12	23.33	23.09
		RB1#38	23.18	23.87	22.88
		RB1#74	23.13	23.29	22.10
		RB36#0	21.72	22.00	21.81
		RB36#39	21.71	21.88	21.69
		RB75#0	21.60	21.79	21.85
20MHz	QPSK	RB1#0	23.78	23.66	23.84
		RB1#50	24.13	24.15	24.09
		RB1#99	23.62	23.79	24.38
		RB50#0	22.73	22.88	23.02
		RB50#50	22.92	22.84	22.94
		RB100#0	22.79	22.94	22.99
	16QAM	RB1#0	22.98	22.85	23.52
		RB1#50	23.66	22.97	23.95
		RB1#99	22.68	22.24	24.03
		RB50#0	21.75	21.90	21.85
		RB50#50	21.89	21.75	21.54
		RB100#0	21.62	21.64	21.85

FINAL

LTE Band 40 Lower Band

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	20.62	19.80	20.35
		RB1#13	20.66	19.92	20.39
		RB1#24	20.40	20.04	20.51
		RB15#0	19.81	19.28	19.21
		RB15#10	19.69	19.28	19.32
		RB25#0	19.73	19.22	19.20
	16QAM	RB1#0	19.33	19.53	19.46
		RB1#13	19.26	19.64	19.52
		RB1#24	18.91	19.51	19.37
		RB15#0	18.49	18.18	18.36
		RB15#10	18.58	18.18	18.20
		RB25#0	18.60	18.28	18.11
10MHz	QPSK	RB1#0	\	20.10	\
		RB1#25	\	20.05	\
		RB1#49	\	20.06	\
		RB25#0	\	19.28	\
		RB25#25	\	19.35	\
		RB50#0	\	19.25	\
	16QAM	RB1#0	\	19.12	\
		RB1#25	\	19.85	\
		RB1#49	\	19.63	\
		RB25#0	\	18.33	\
		RB25#25	\	18.33	\
		RB50#0	\	18.34	\

Note: the device is a mobile station. For 5MHz mode, the channel power is equal to the test result in dBm/5MHz. For 10MHz mode, the PSD as below:

Channel Bandwidth	Modulation	Resource Block & RB offset	Middle Channel (dBm/5MHz)
10MHz	QPSK	RB1#0	17.54
		RB1#25	17.65
		RB1#49	17.51
		RB25#0	17.25
		RB25#25	17.23
		RB50#0	17.15
	16QAM	RB1#0	17.02
		RB1#25	16.98
		RB1#49	16.99
		RB25#0	16.52
		RB25#25	16.55
		RB50#0	16.75

LTE Band 40 Upper Band

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	21.19	20.29	20.55
		RB1#13	20.94	20.39	20.40
		RB1#24	20.76	20.62	20.69
		RB15#0	19.89	19.35	19.54
		RB15#10	19.80	19.41	19.56
		RB25#0	19.92	19.29	19.66
	16QAM	RB1#0	19.72	19.90	19.58
		RB1#13	19.42	19.87	19.36
		RB1#24	19.50	19.88	19.39
		RB15#0	18.70	18.39	18.56
		RB15#10	18.70	18.36	18.48
		RB25#0	18.86	18.28	18.53
10MHz	QPSK	RB1#0	\	20.25	\
		RB1#25	\	20.60	\
		RB1#49	\	20.48	\
		RB25#0	\	19.28	\
		RB25#25	\	19.49	\
		RB50#0	\	19.33	\
	16QAM	RB1#0	\	19.28	\
		RB1#25	\	18.97	\
		RB1#49	\	19.03	\
		RB25#0	\	18.41	\
		RB25#25	\	18.40	\
		RB50#0	\	18.23	\

Note: the device is a mobile station. For 5MHz mode, the channel power is equal to the test result in dBm/5MHz. For 10MHz mode, the PSD as below:

Channel Bandwidth	Modulation	Resource Block & RB offset	Middle Channel (dBm/5MHz)
10MHz	QPSK	RB1#0	17.85
		RB1#25	17.54
		RB1#49	17.25
		RB25#0	17.00
		RB25#25	6.78
		RB50#0	16.52
	16QAM	RB1#0	16.65
		RB1#25	16.25
		RB1#49	16.14
		RB25#0	16.41
		RB25#25	16.32
		RB50#0	16.55

PAR, Band 2

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.04	3.96	3.96	13
	100 RB		5.20	5.16	5.12	13
16QAM	1 RB	20 MHz	5.00	4.92	4.64	13
	100 RB		6.16	6.12	6.04	13

PAR, Band 4

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.56	3.68	4.60	13
	100 RB		5.28	5.20	5.28	13
16QAM	1 RB	20 MHz	5.52	4.60	5.56	13
	100 RB		6.20	6.16	6.24	13

PAR, Band 5

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	4.16	1.80	2.28	13
	50 RB		4.64	4.16	5.12	13
16QAM	1 RB	10 MHz	5.08	2.40	3.00	13
	50 RB		5.60	4.68	6.04	13

PAR, Band 7

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.13	3.40	4.87	13
	100 RB		5.22	4.78	5.29	13
16QAM	1 RB	20 MHz	4.94	5.67	5.51	13
	100 RB		6.19	5.67	6.15	13

PAR, LTE Band 12

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	4.01	5.06	4.97	13
	50 RB		5.83	5.71	4.55	13
16QAM	1 RB	10 MHz	4.84	5.74	5.99	13
	50 RB		6.51	6.76	5.83	13

PAR, LTE Band 13

Test Modulation		Channel Bandwidth	Middle Channel (dB)	Limit (dB)
QPSK	1 RB	10 MHz	3.52	13
	50 RB		4.52	13
16QAM	1 RB	10 MHz	4.24	13
	50 RB		5.56	13

PAR, LTE Band 25

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	3.32	3.84	3.80	13
	100 RB		5.12	5.08	5.16	13
16QAM	1 RB	20 MHz	4.08	4.64	4.84	13
	100RB		6.08	6.12	6.08	13

Note: peak-to-average ratio (PAR) <13 dB.

Band 40 Duty cycle:
2305-2315MHz

Test Modulation	Test Bandwidth	Ton (ms)	Total (ms)	Duty Cycle (%)	Limit (%)
QPSK	5M	3.269	10.032	32.59	38
	10M	3.205	10.032	31.95	
16-QAM	5M	3.205	10.032	31.95	
	10M	3.205	10.032	31.95	

2350-2360MHz

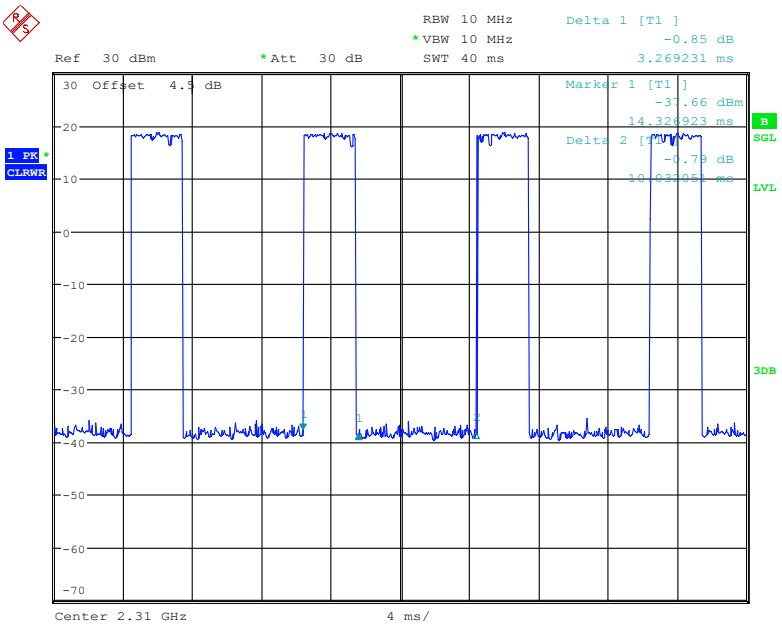
Test Modulation	Test Bandwidth	Ton (ms)	Total (ms)	Duty Cycle (%)	Limit (%)
QPSK	5M	3.205	10.032	31.95	38
	10M	3.141	10.032	31.31	
16-QAM	5M	3.205	10.032	31.95	
	10M	3.205	10.032	31.95	

Note: EUT setup is as following:

Uplink Downlink configuration	Subframe number									
	0	1	2	3	4	5	6	7	8	9
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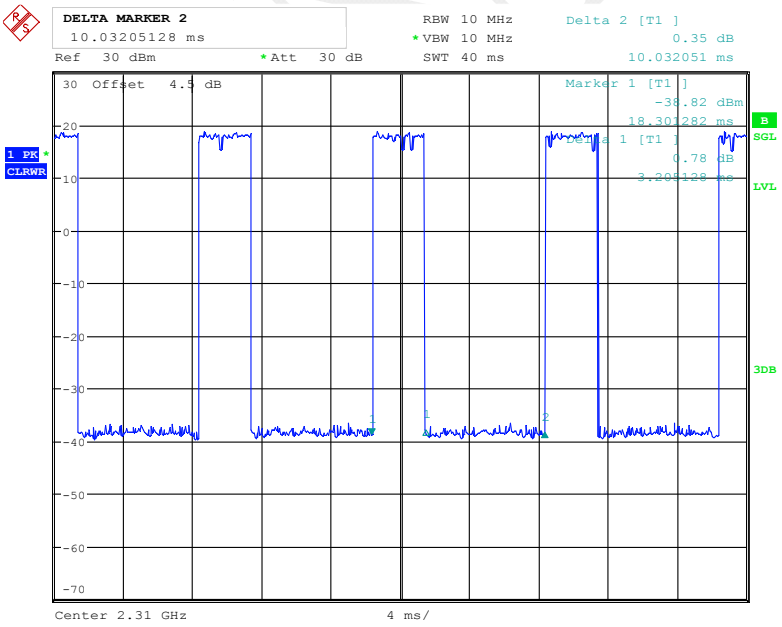
Band 40(2305-2315MHz)

QPSK, 5MHz



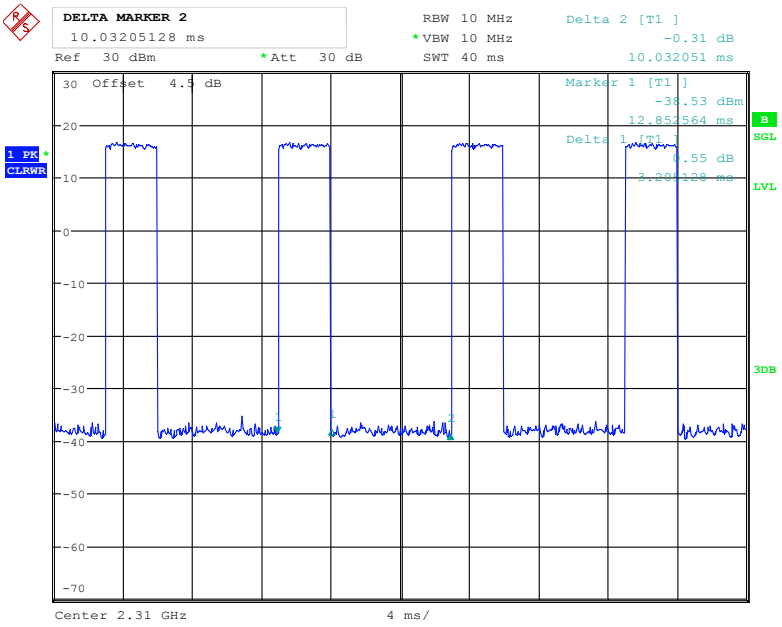
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QPSK, 10MHz



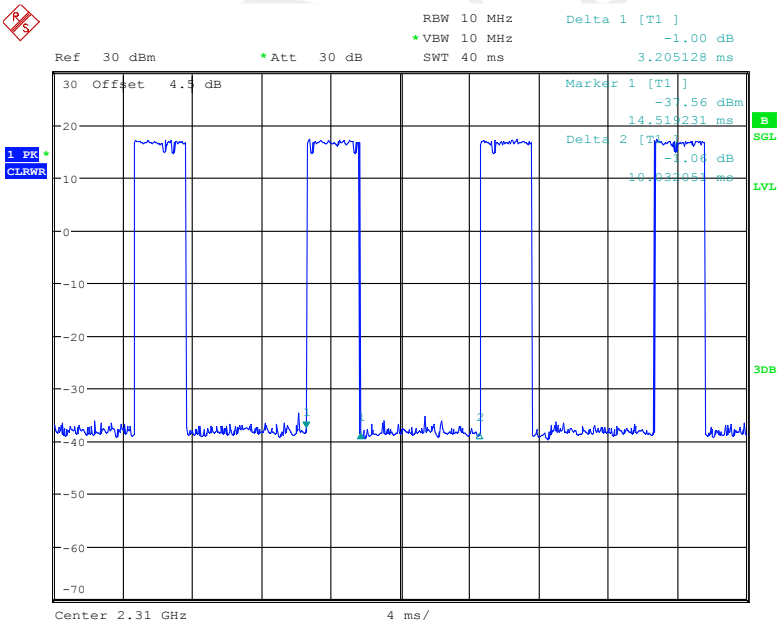
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16-QAM, 5MHz



Date: 15.MAY.2020 12:23:47

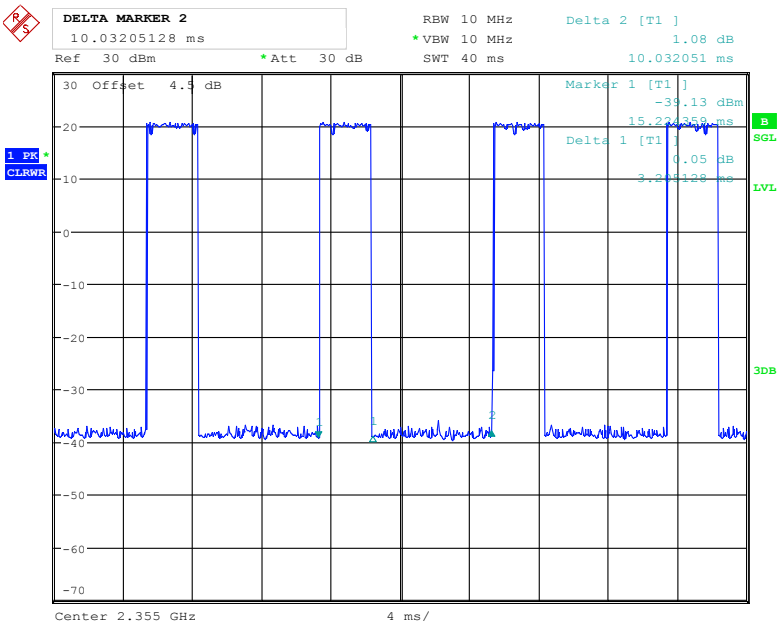
16-QAM, 10MHz



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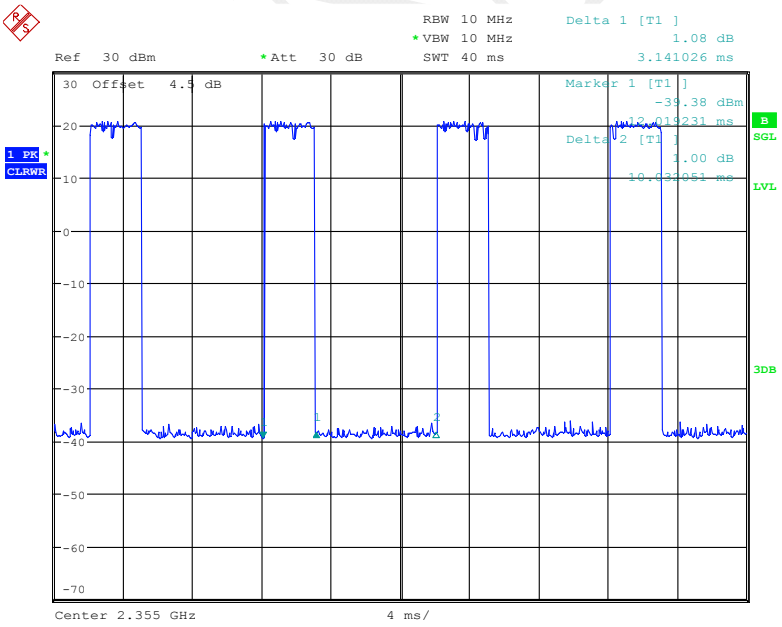
Band 40(2350-2360MHz)

QPSK, 5MHz



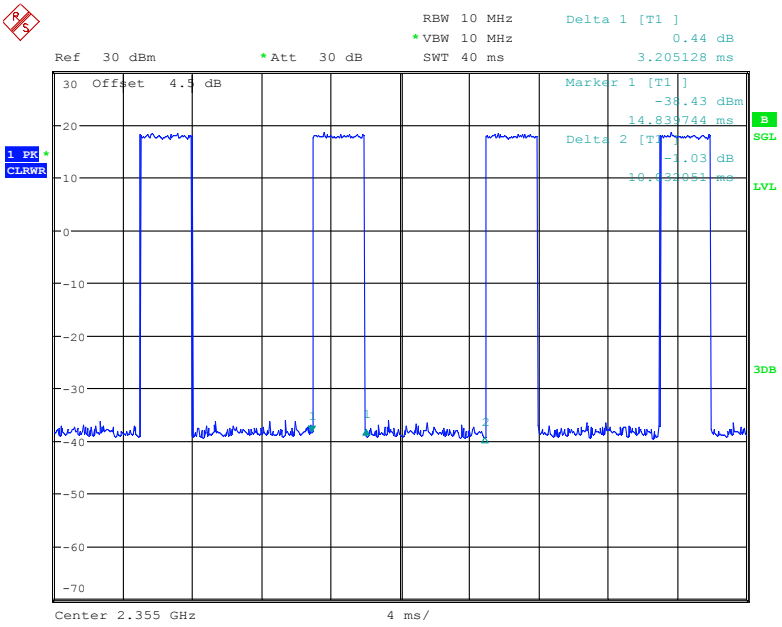
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QPSK, 10MHz



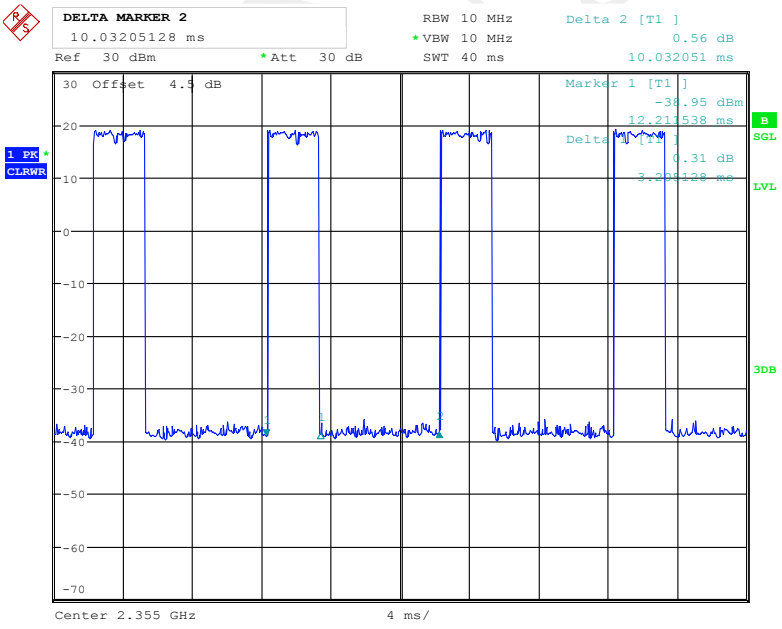
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16-QAM, 5MHz



Date: 15.MAY.2020 12:14:27

16-QAM, 10MHz



Date: 15.MAY.2020 12:15:35

ERP & EIRP:

LTE Band 2

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1880.00	1.40	QPSK	H	87.53	14.92	11.66	2.66	23.92	33.00	9.08
1880.00			V	88.98	16.51	11.66	2.66	25.51	33.00	7.49
1880.00	3.00		H	87.57	14.96	11.66	2.66	23.96	33.00	9.04
1880.00			V	88.77	16.30	11.66	2.66	25.30	33.00	7.70
1880.00	5.00		H	87.32	14.71	11.66	2.66	23.71	33.00	9.29
1880.00			V	88.40	15.93	11.66	2.66	24.93	33.00	8.07
1880.00	10.00		H	87.34	14.73	11.66	2.66	23.73	33.00	9.27
1880.00			V	88.41	15.94	11.66	2.66	24.94	33.00	8.06
1880.00	15.00		H	87.50	14.89	11.66	2.66	23.89	33.00	9.11
1880.00			V	88.67	16.20	11.66	2.66	25.20	33.00	7.80
1880.00	20.00		H	87.73	15.12	11.66	2.66	24.12	33.00	8.88
1880.00			V	88.83	16.36	11.66	2.66	25.36	33.00	7.64
1880.00	1.40	16QAM	H	86.69	14.08	11.66	2.66	23.08	33.00	9.92
1880.00			V	87.72	15.25	11.66	2.66	24.25	33.00	8.75
1880.00	3.00		H	86.30	13.69	11.66	2.66	22.69	33.00	10.31
1880.00			V	87.45	14.98	11.66	2.66	23.98	33.00	9.02
1880.00	5.00		H	86.31	13.70	11.66	2.66	22.70	33.00	10.30
1880.00			V	87.23	14.76	11.66	2.66	23.76	33.00	9.24
1880.00	10.00		H	86.10	13.49	11.66	2.66	22.49	33.00	10.51
1880.00			V	87.31	14.84	11.66	2.66	23.84	33.00	9.16
1880.00	15.00		H	86.38	13.77	11.66	2.66	22.77	33.00	10.23
1880.00			V	87.56	15.09	11.66	2.66	24.09	33.00	8.91
1880.00	20.00		H	86.61	14.00	11.66	2.66	23.00	33.00	10.00
1880.00			V	87.99	15.52	11.66	2.66	24.52	33.00	8.48

REPORT

LTE Band 4

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1732.50	1.40	QPSK	H	85.53	12.92	11.66	2.66	21.92	33.00	11.08
1732.50			V	86.98	14.51	11.66	2.66	23.51	33.00	9.49
1732.50	3.00		H	85.57	12.96	11.66	2.66	21.96	33.00	11.04
1732.50			V	86.77	14.30	11.66	2.66	23.30	33.00	9.70
1732.50	5.00		H	85.32	12.71	11.66	2.66	21.71	33.00	11.29
1732.50			V	86.40	13.93	11.66	2.66	22.93	33.00	10.07
1732.50	10.00		H	85.34	12.73	11.66	2.66	21.73	33.00	11.27
1732.50			V	86.41	13.94	11.66	2.66	22.94	33.00	10.06
1732.50	15.00		H	85.50	12.89	11.66	2.66	21.89	33.00	11.11
1732.50			V	86.67	14.20	11.66	2.66	23.20	33.00	9.80
1732.50	20.00		H	85.73	13.12	11.66	2.66	22.12	33.00	10.88
1732.50			V	86.83	14.36	11.66	2.66	23.36	33.00	9.64
1732.50	1.40	16QAM	H	84.69	12.08	11.66	2.66	21.08	33.00	11.92
1732.50			V	85.72	13.25	11.66	2.66	22.25	33.00	10.75
1732.50	3.00		H	84.30	11.69	11.66	2.66	20.69	33.00	12.31
1732.50			V	85.45	12.98	11.66	2.66	21.98	33.00	11.02
1732.50	5.00		H	84.31	11.70	11.66	2.66	20.70	33.00	12.30
1732.50			V	85.23	12.76	11.66	2.66	21.76	33.00	11.24
1732.50	10.00		H	84.10	11.49	11.66	2.66	20.49	33.00	12.51
1732.50			V	85.31	12.84	11.66	2.66	21.84	33.00	11.16
1732.50	15.00		H	84.38	11.77	11.66	2.66	20.77	33.00	12.23
1732.50			V	85.56	13.09	11.66	2.66	22.09	33.00	10.91
1732.50	20.00		H	84.61	12.00	11.66	2.66	21.00	33.00	12.00
1732.50			V	85.99	13.52	11.66	2.66	22.52	33.00	10.48

FINAL

LTE Band 5

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
836.50	1.40	QPSK	H	86.62	11.69	0.00	0.97	10.72	38.45	27.73
836.50			V	96.32	24.53	0.00	0.97	23.56	38.45	14.89
836.50	3.00		H	85.81	10.88	0.00	0.97	9.91	38.45	28.54
836.50			V	95.52	23.73	0.00	0.97	22.76	38.45	15.69
836.50	5.00		H	85.37	10.44	0.00	0.97	9.47	38.45	28.98
836.50			V	95.06	23.27	0.00	0.97	22.30	38.45	16.15
836.50	10.00		H	84.84	9.91	0.00	0.97	8.94	38.45	29.51
836.50			V	94.55	22.76	0.00	0.97	21.79	38.45	16.66
836.50	1.40	16QAM	H	85.98	11.05	0.00	0.97	10.08	38.45	28.37
836.50			V	95.46	23.67	0.00	0.97	22.70	38.45	15.75
836.50	3.00		H	85.45	10.52	0.00	0.97	9.55	38.45	28.90
836.50			V	94.93	23.14	0.00	0.97	22.17	38.45	16.28
836.50	5.00		H	85.19	10.26	0.00	0.97	9.29	38.45	29.16
836.50			V	94.67	22.88	0.00	0.97	21.91	38.45	16.54
836.50	10.00		H	83.94	9.01	0.00	0.97	8.04	38.45	30.41
836.50			V	93.42	21.63	0.00	0.97	20.66	38.45	17.79

LTE Band 7

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
2535.00	5.00	QPSK	H	86.16	13.55	13.14	3.10	23.59	33.00	9.41
2535.00			V	84.42	13.27	13.14	3.10	23.31	33.00	9.69
2535.00	10.00		H	85.90	13.29	13.14	3.10	23.33	33.00	9.67
2535.00			V	84.31	13.16	13.14	3.10	23.20	33.00	9.80
2535.00	15.00		H	86.17	13.56	13.14	3.10	23.60	33.00	9.40
2535.00			V	84.48	13.33	13.14	3.10	23.37	33.00	9.63
2535.00	20.00		H	86.11	13.50	13.14	3.10	23.54	33.00	9.46
2535.00			V	84.72	13.57	13.14	3.10	23.61	33.00	9.39
2535.00	5.00	16QAM	H	85.03	12.42	13.14	3.10	22.46	33.00	10.54
2535.00			V	83.17	12.02	13.14	3.10	22.06	33.00	10.94
2535.00	10.00		H	84.90	12.29	13.14	3.10	22.33	33.00	10.67
2535.00			V	83.15	12.00	13.14	3.10	22.04	33.00	10.96
2535.00	15.00		H	85.16	12.55	13.14	3.10	22.59	33.00	10.41
2535.00			V	83.63	12.48	13.14	3.10	22.52	33.00	10.48
2535.00	20.00		H	85.36	12.75	13.14	3.10	22.79	33.00	10.21
2535.00			V	83.74	12.59	13.14	3.10	22.63	33.00	10.37

LTE Band 12

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
707.50	1.40	QPSK	H	83.83	6.97	0.00	0.94	6.03	34.77	28.74
707.50			V	91.86	17.44	0.00	0.94	16.50	34.77	18.27
707.50	3.00		H	82.53	5.67	0.00	0.94	4.73	34.77	30.04
707.50			V	90.56	16.14	0.00	0.94	15.20	34.77	19.57
707.50	5.00		H	82.74	5.88	0.00	0.94	4.94	34.77	29.83
707.50			V	90.77	16.35	0.00	0.94	15.41	34.77	19.36
707.50	10.00		H	81.18	4.32	0.00	0.94	3.38	34.77	31.39
707.50			V	89.21	14.79	0.00	0.94	13.85	34.77	20.92
707.50	1.40	16QAM	H	84.43	7.57	0.00	0.94	6.63	34.77	28.14
707.50			V	92.46	18.04	0.00	0.94	17.10	34.77	17.67
707.50	3.00		H	84.05	7.19	0.00	0.94	6.25	34.77	28.52
707.50			V	92.08	17.66	0.00	0.94	16.72	34.77	18.05
707.50	5.00		H	83.44	6.58	0.00	0.94	5.64	34.77	29.13
707.50			V	91.47	17.05	0.00	0.94	16.11	34.77	18.66
707.50	10.00		H	82.67	5.81	0.00	0.94	4.87	34.77	29.90
707.50			V	90.70	16.28	0.00	0.94	15.34	34.77	19.43

LTE Band 13

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
782.00	5.00	QPSK	H	82.96	7.43	0.00	0.93	6.50	34.77	28.27
782.00			V	90.28	17.67	0.00	0.93	16.74	34.77	18.03
782.00	10.00		H	82.10	6.57	0.00	0.93	5.64	34.77	29.13
782.00			V	89.42	16.81	0.00	0.93	15.88	34.77	18.89
782.00	5.00	16QAM	H	82.94	7.41	0.00	0.93	6.48	34.77	28.29
782.00			V	90.26	17.65	0.00	0.93	16.72	34.77	18.05
782.00	10.00		H	81.79	6.26	0.00	0.93	5.33	34.77	29.44
782.00			V	89.11	16.50	0.00	0.93	15.57	34.77	19.20

LTE Band 25

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1882.5	1.40	QPSK	H	86.69	14.11	11.68	2.66	23.13	33.00	9.87
1882.5			V	86.82	14.40	11.68	2.66	23.42	33.00	9.58
1882.5	3.00		H	86.43	13.85	11.68	2.66	22.87	33.00	10.13
1882.5			V	86.59	14.17	11.68	2.66	23.19	33.00	9.81
1882.5	5.00		H	86.38	13.80	11.68	2.66	22.82	33.00	10.18
1882.5			V	86.46	14.04	11.68	2.66	23.06	33.00	9.94
1882.5	10.00		H	86.34	13.76	11.68	2.66	22.78	33.00	10.22
1882.5			V	85.47	13.05	11.68	2.66	22.07	33.00	10.93
1882.5	15.00		H	86.78	14.20	11.68	2.66	23.22	33.00	9.78
1882.5			V	86.76	14.34	11.68	2.66	23.36	33.00	9.64
1882.5	20.00		H	86.85	14.27	11.68	2.66	23.29	33.00	9.71
1882.5			V	86.97	14.55	11.68	2.66	23.57	33.00	9.43
1882.5	1.40	16QAM	H	85.52	12.94	11.68	2.66	21.96	33.00	11.04
1882.5			V	85.78	13.36	11.68	2.66	22.38	33.00	10.62
1882.5	3.00		H	85.64	13.06	11.68	2.66	22.08	33.00	10.92
1882.5			V	85.39	12.97	11.68	2.66	21.99	33.00	11.01
1882.5	5.00		H	85.11	12.53	11.68	2.66	21.55	33.00	11.45
1882.5			V	85.21	12.79	11.68	2.66	21.81	33.00	11.19
1882.5	10.00		H	85.28	12.70	11.68	2.66	21.72	33.00	11.28
1882.5			V	85.29	12.87	11.68	2.66	21.89	33.00	11.11
1882.5	15.00		H	85.69	13.11	11.68	2.66	22.13	33.00	10.87
1882.5			V	85.59	13.17	11.68	2.66	22.19	33.00	10.81
1882.5	20.00		H	85.86	13.28	11.68	2.66	22.30	33.00	10.70
1882.5			V	86.04	13.62	11.68	2.66	22.64	33.00	10.36

FINAL

LTE Band 40

Lower:

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
2310.00	5.00	QPSK	H	79.72	8.98	11.75	3.04	17.69	24.00	6.31
2310.00			V	82.19	12.20	11.75	3.04	20.91	24.00	3.09
2310.00	10.00		H	79.96	9.22	11.75	3.04	17.93	24.00	6.07
2310.00			V	82.07	12.08	11.75	3.04	20.79	24.00	3.21
2310.00	5.00	16QAM	H	79.76	9.02	11.75	3.04	17.73	24.00	6.27
2310.00			V	82.55	12.56	11.75	3.04	21.27	24.00	2.73
2310.00	10.00		H	79.70	8.96	11.75	3.04	17.67	24.00	6.33
2310.00			V	82.21	12.22	11.75	3.04	20.93	24.00	3.07

Upper:

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
2355.00	5.00	QPSK	H	78.75	8.01	11.75	3.04	16.72	24.00	7.28
2355.00			V	80.95	10.96	11.75	3.04	19.67	24.00	4.33
2355.00	10.00		H	78.40	7.66	11.75	3.04	16.37	24.00	7.63
2355.00			V	80.61	10.62	11.75	3.04	19.33	24.00	4.67
2355.00	5.00	16QAM	H	78.52	7.78	11.75	3.04	16.49	24.00	7.51
2355.00			V	80.76	10.77	11.75	3.04	19.48	24.00	4.52
2355.00	10.00		H	78.59	7.85	11.75	3.04	16.56	24.00	7.44
2355.00			V	80.84	10.85	11.75	3.04	19.56	24.00	4.44

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53- OCCUPIED BANDWIDTH

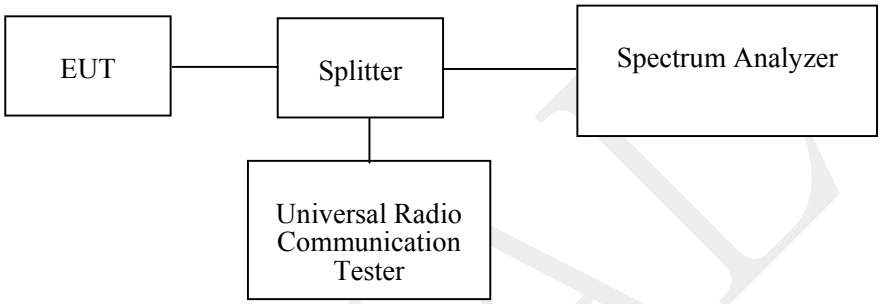
Applicable Standard

FCC §2.1049, §22.917, §22.905, §24.238, §27.53.

Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The 26 dB & 99% bandwidth was recorded.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2020-01-04	2021-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005011	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/04	Each Time	/
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	26~27.5°C
Relative Humidity:	52~72 %
ATM Pressure:	100.2~100.9 kPa
Tester:	Chris Mo
Test Date:	2020-05-07~2020-05-15

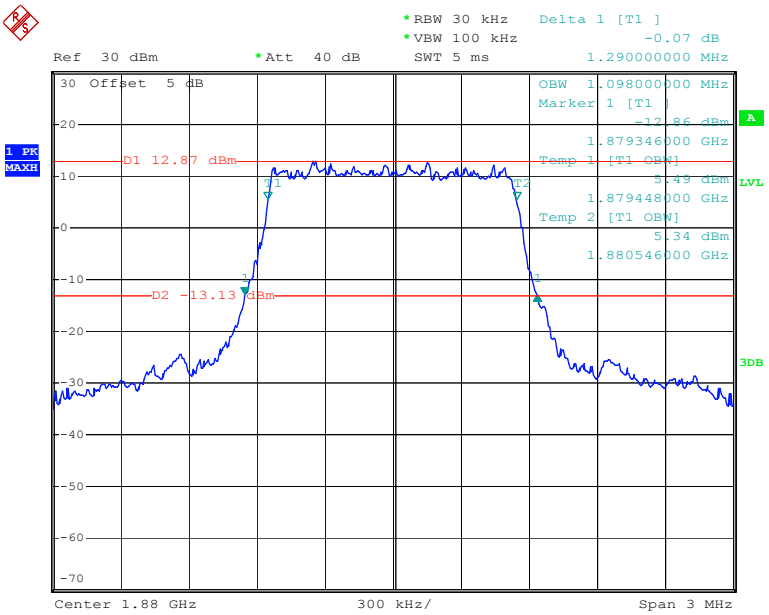
Test Mode: Transmitting
Test Result: Compliant. Please refer to the following table and plots.

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 2	1.4 MHz	QPSK	1.098	1.290
		16QAM	1.104	1.314
	3 MHz	QPSK	2.688	2.928
		16QAM	2.688	2.976
	5 MHz	QPSK	4.540	4.980
		16QAM	4.520	5.020
	10 MHz	QPSK	8.960	9.800
		16QAM	8.960	9.720
	15 MHz	QPSK	13.500	14.880
		16QAM	13.500	14.880
	20 MHz	QPSK	18.000	19.440
		16QAM	18.000	19.600
LTE Band 4	1.4 MHz	QPSK	1.098	1.296
		16QAM	1.098	1.308
	3 MHz	QPSK	2.688	2.928
		16QAM	2.700	2.964
	5 MHz	QPSK	4.540	5.060
		16QAM	4.520	5.020
	10 MHz	QPSK	8.960	9.720
		16QAM	8.960	9.640
	15 MHz	QPSK	13.500	14.820
		16QAM	13.500	14.820
	20 MHz	QPSK	18.000	19.520
		16QAM	17.920	19.440
LTE Band 5	1.4 MHz	QPSK	1.596	2.430
		16QAM	1.488	2.418
	3 MHz	QPSK	3.012	4.812
		16QAM	3.084	4.788
	5 MHz	QPSK	5.340	8.020
		16QAM	5.420	8.039
	10 MHz	QPSK	8.920	9.720
		16QAM	8.880	9.680

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 7	5 MHz	QPSK	4.540	5.020
		16QAM	4.520	5.000
	10 MHz	QPSK	8.960	9.840
		16QAM	8.960	9.720
	15 MHz	QPSK	13.500	14.940
		16QAM	13.500	14.820
	20 MHz	QPSK	18.000	19.440
		16QAM	17.920	19.440
LTE Band 12	1.4 MHz	QPSK	1.110	1.290
		16QAM	1.098	1.314
	3 MHz	QPSK	2.700	2.940
		16QAM	2.688	2.964
	5 MHz	QPSK	4.540	4.960
		16QAM	4.520	4.960
	10 MHz	QPSK	8.880	9.480
		16QAM	8.840	9.440
LTE Band 13	5 MHz	QPSK	4.500	5.020
		16QAM	4.540	5.040
	10 MHz	QPSK	8.960	10.200
		16QAM	8.960	9.600
LTE Band 25	1.4 MHz	QPSK	1.110	1.284
		16QAM	1.104	1.302
	3 MHz	QPSK	2.700	2.952
		16QAM	2.700	2.940
	5 MHz	QPSK	4.560	5.000
		16QAM	4.520	5.060
	10 MHz	QPSK	8.960	9.800
		16QAM	8.960	9.720
	15 MHz	QPSK	13.500	15.000
		16QAM	13.500	14.820
	20 MHz	QPSK	18.000	19.440
		16QAM	18.000	19.440
LTE Band 40 Lower	5 MHz	QPSK	4.52	4.984
		16QAM	4.52	5.026
	10 MHz	QPSK	8.96	9.715
		16QAM	8.92	9.571
LTE Band 40 Upper	5 MHz	QPSK	4.52	5.07
		16QAM	4.52	5.005
	10 MHz	QPSK	8.96	9.764
		16QAM	8.96	9.677

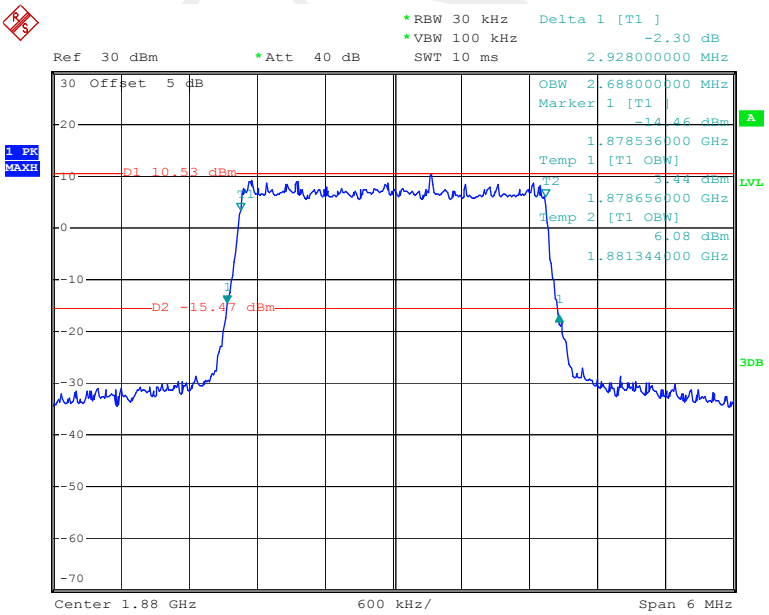
LTE Band 2

QPSK_1.4 MHz



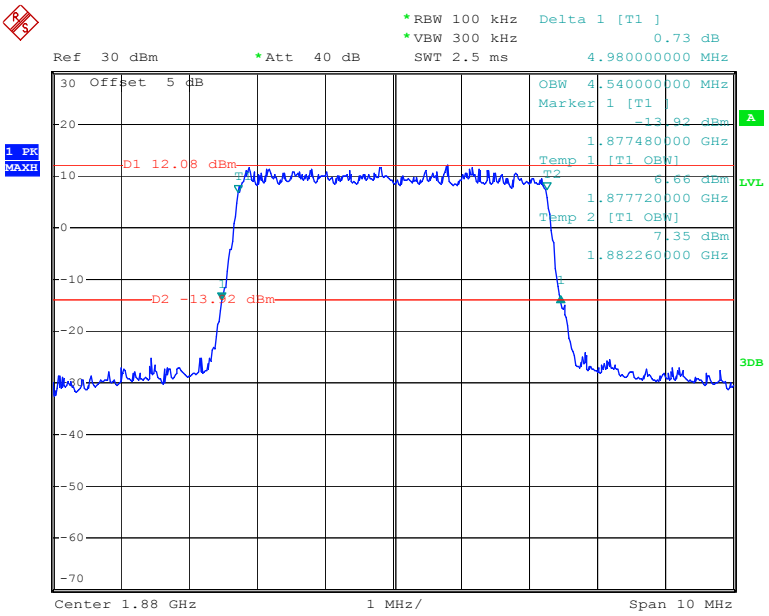
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QPSK_3 MHz



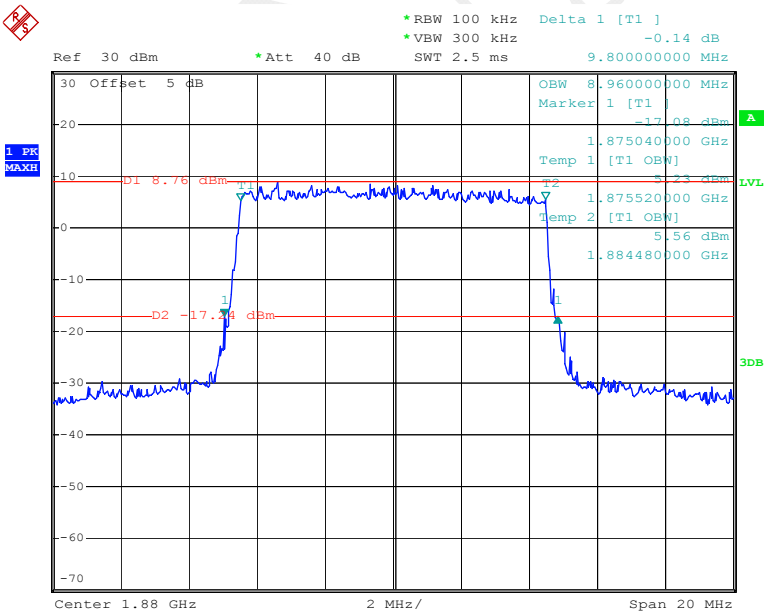
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QPSK_5 MHz



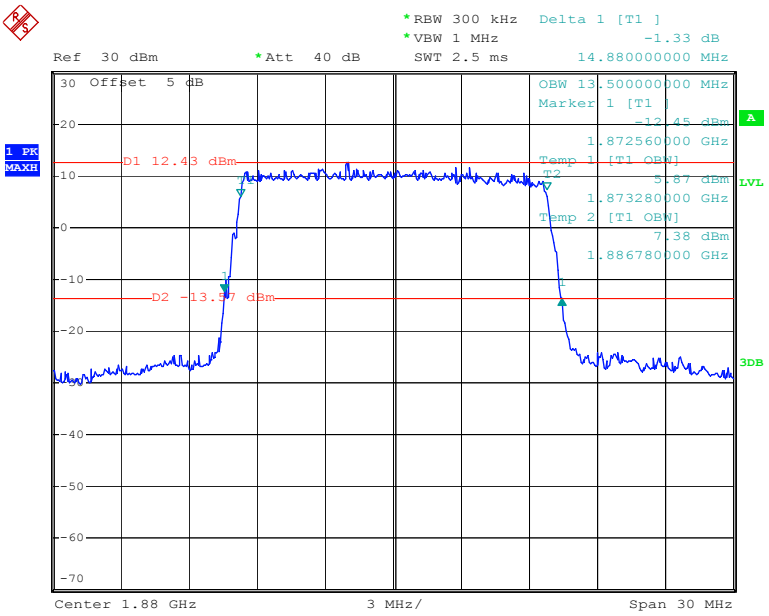
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QPSK_10 MHz



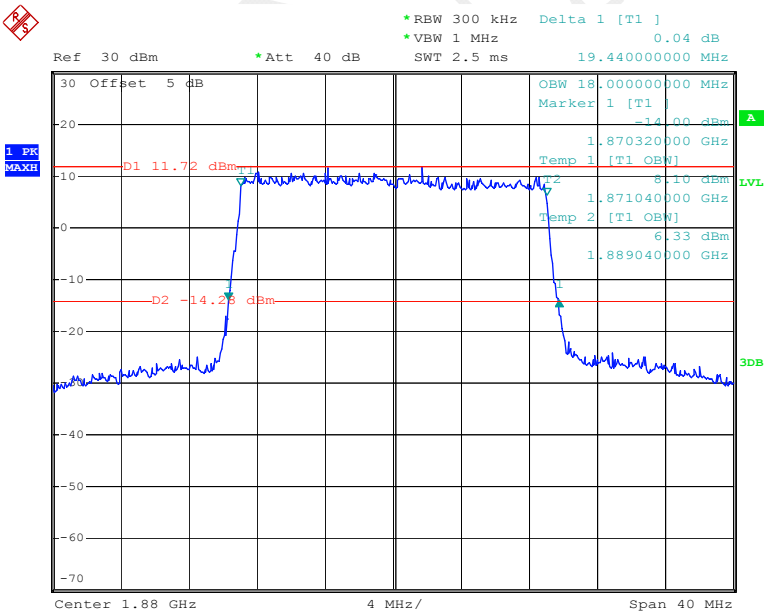
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QPSK_15 MHz



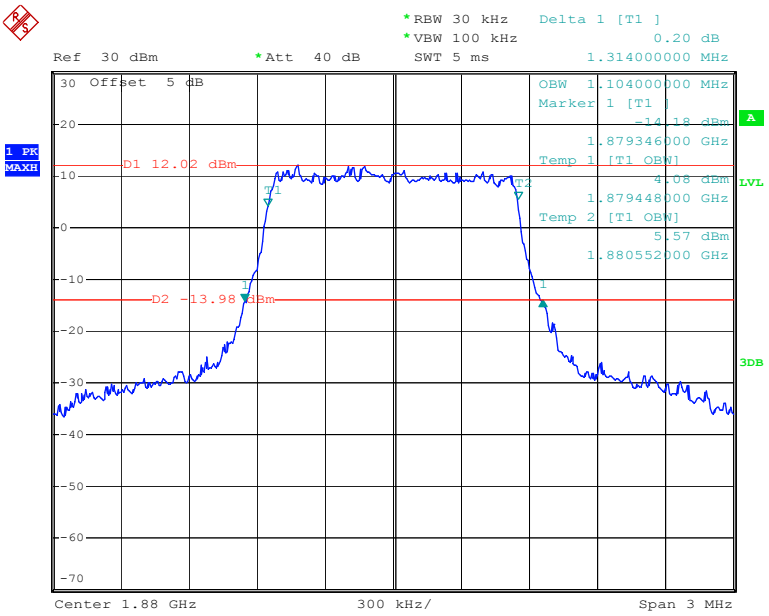
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QPSK_20 MHz



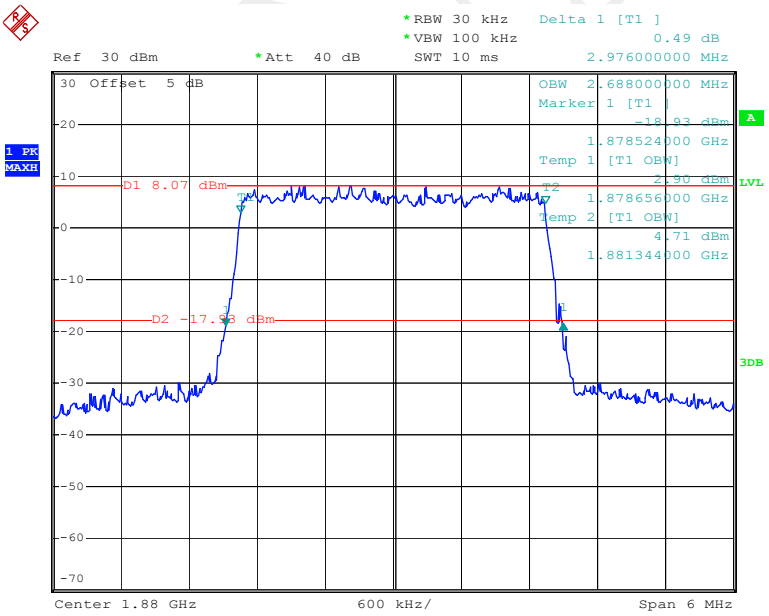
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16QAM_1.4 MHz



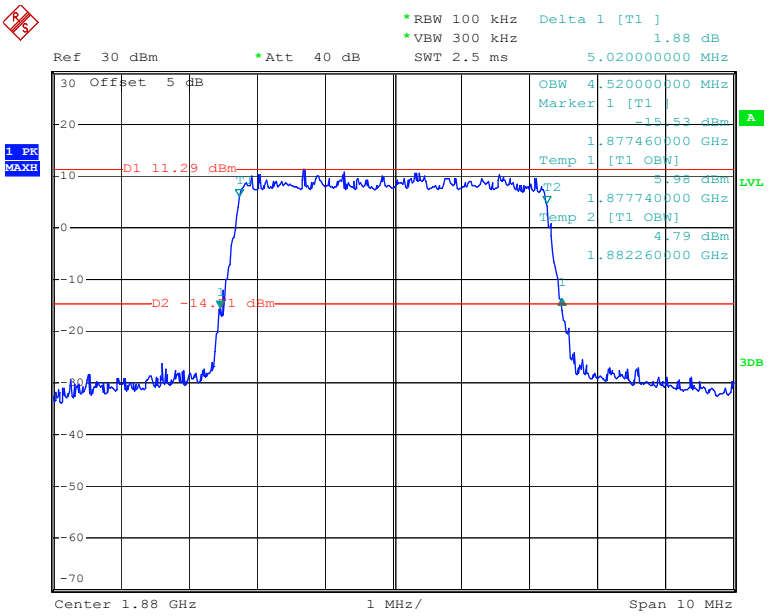
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16QAM_3 MHz



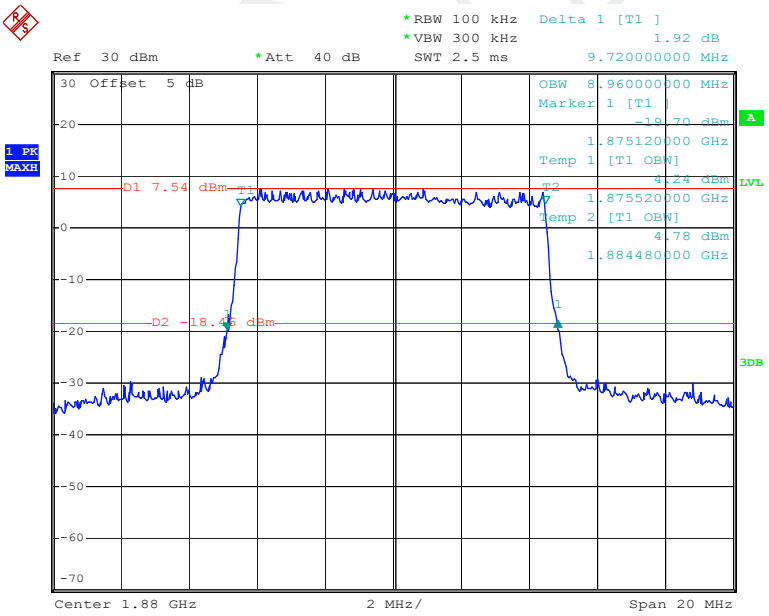
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16QAM_5 MHz



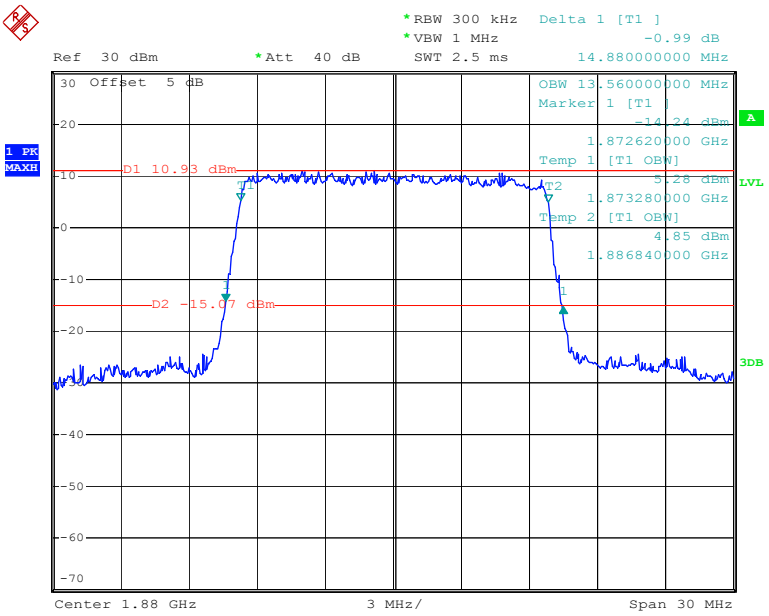
Date: 7.MAY.2020 12:25:40

16QAM_10 MHz



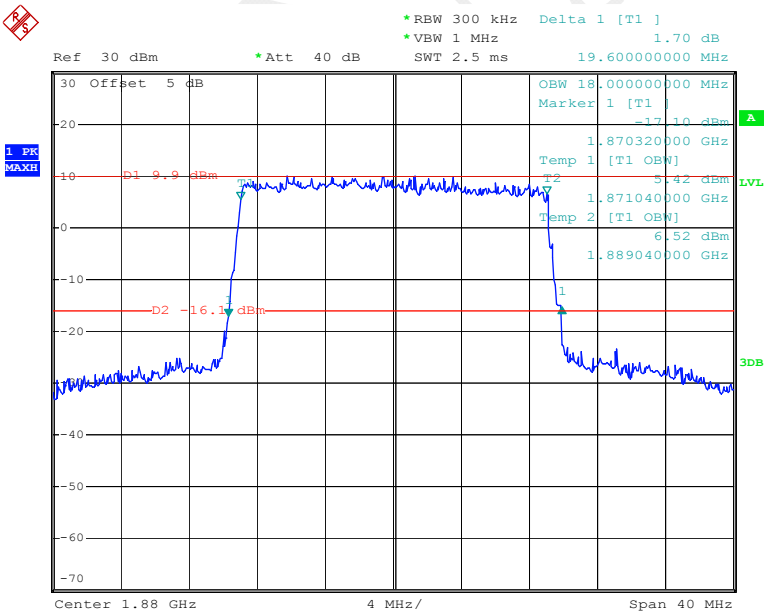
Date: 7.MAY.2020 12:26:24

16QAM_15 MHz



Date: 7.MAY.2020 12:27:14

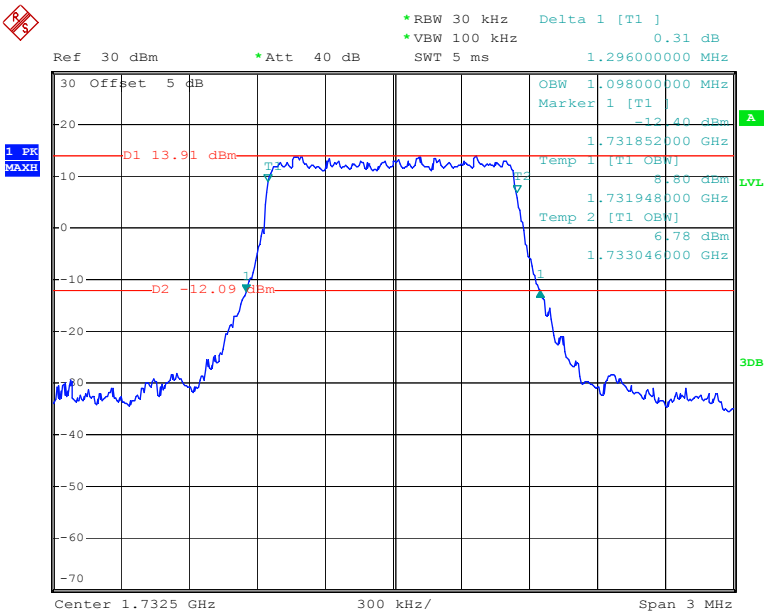
16QAM_20 MHz



Date: 7.MAY.2020 12:28:05

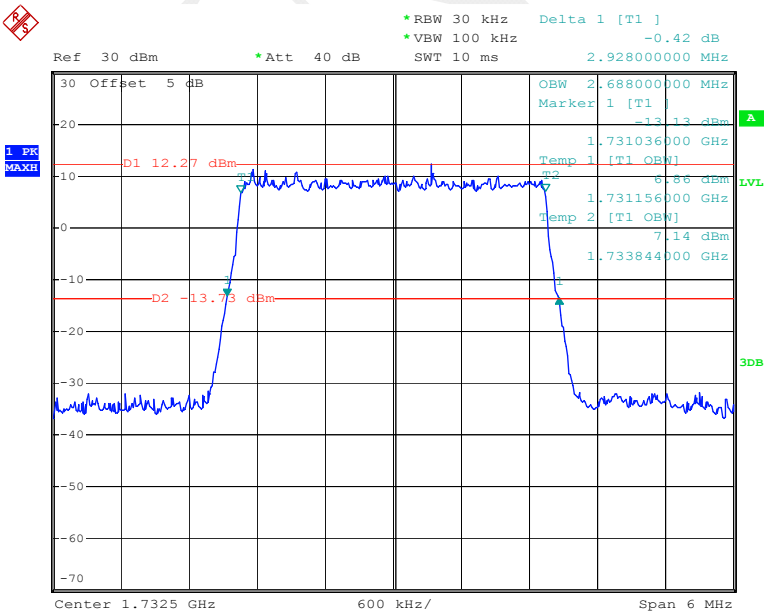
LTE Band 4

QPSK_1.4 MHz



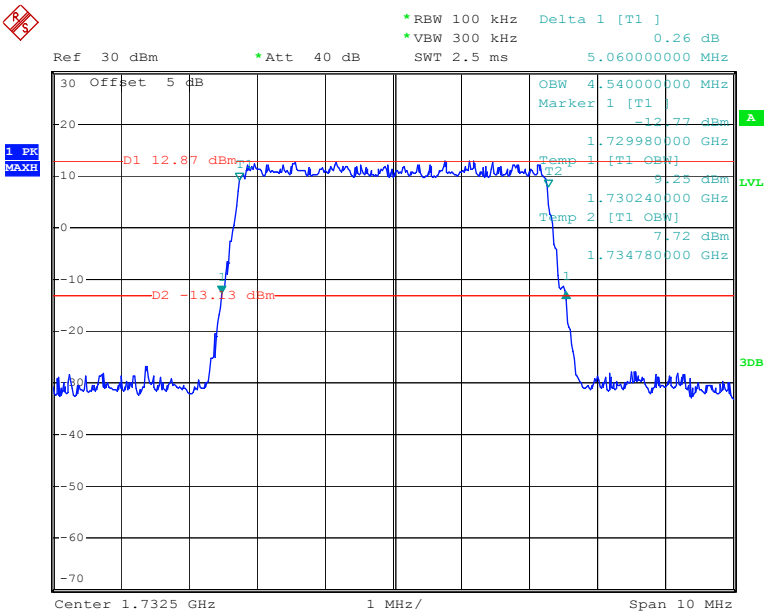
Date: 7.MAY.2020 12:28:31

QPSK_3 MHz



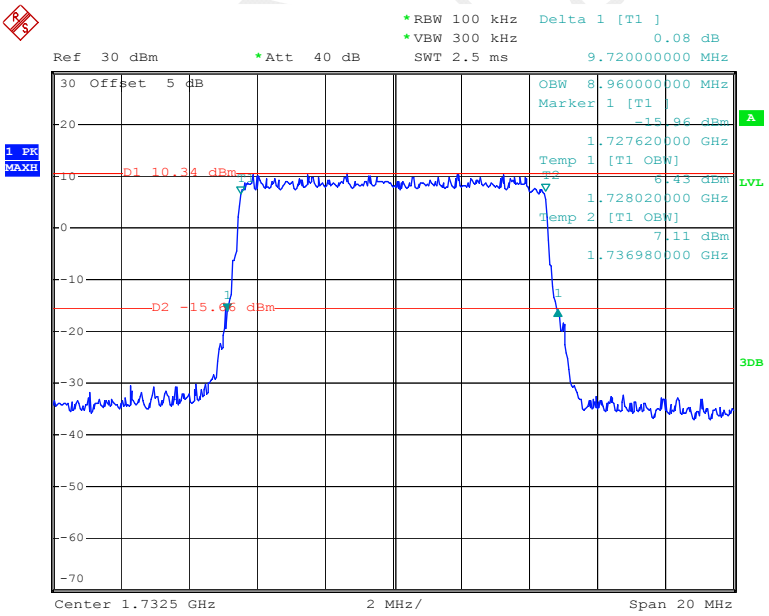
Date: 7.MAY.2020 12:29:13

QPSK_5 MHz



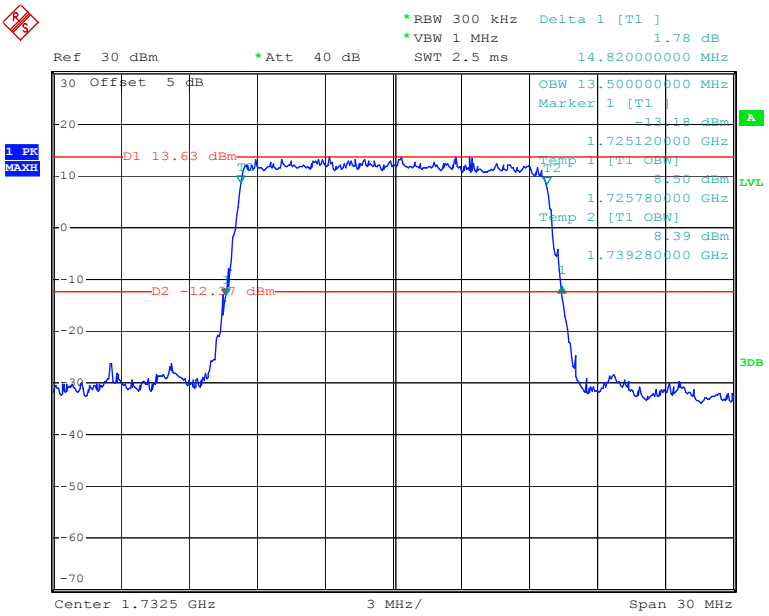
Date: 7.MAY.2020 12:29:56

QPSK_10 MHz



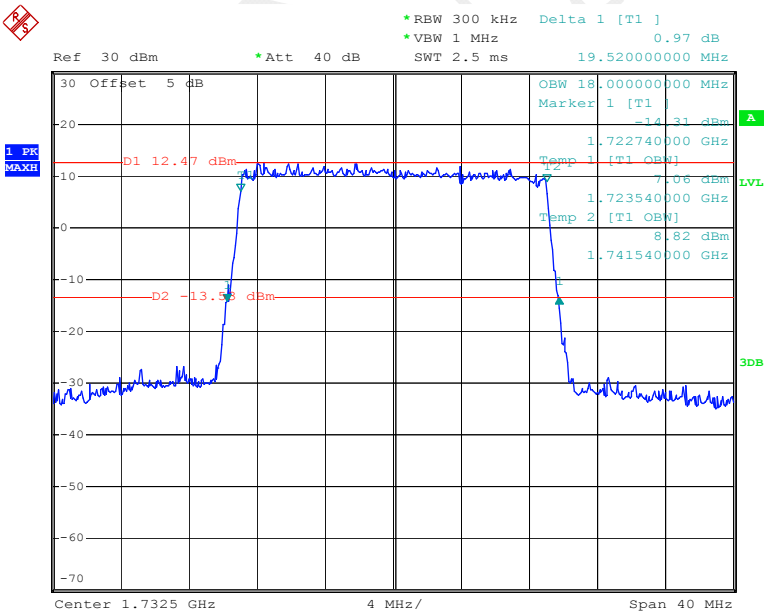
Date: 7.MAY.2020 12:30:46

QPSK_15 MHz



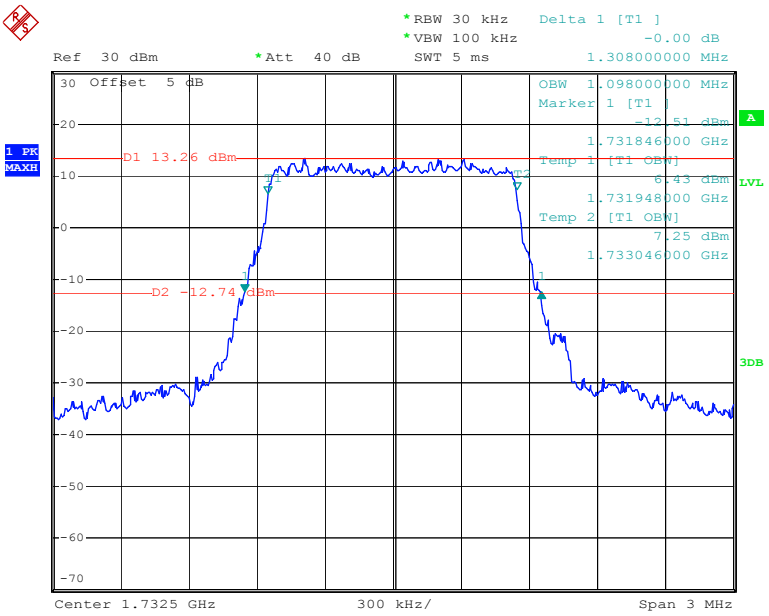
Date: 7.MAY.2020 12:31:37

QPSK_20 MHz



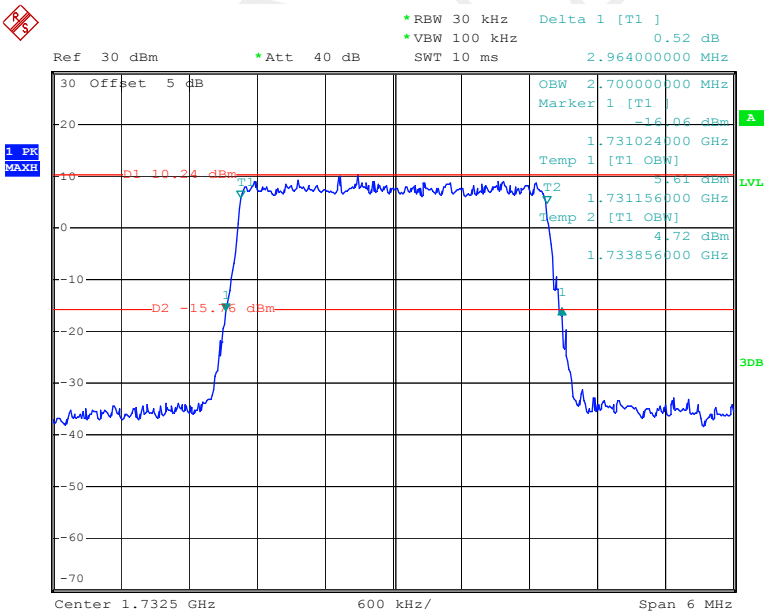
Date: 7.MAY.2020 12:32:28

16QAM_1.4 MHz



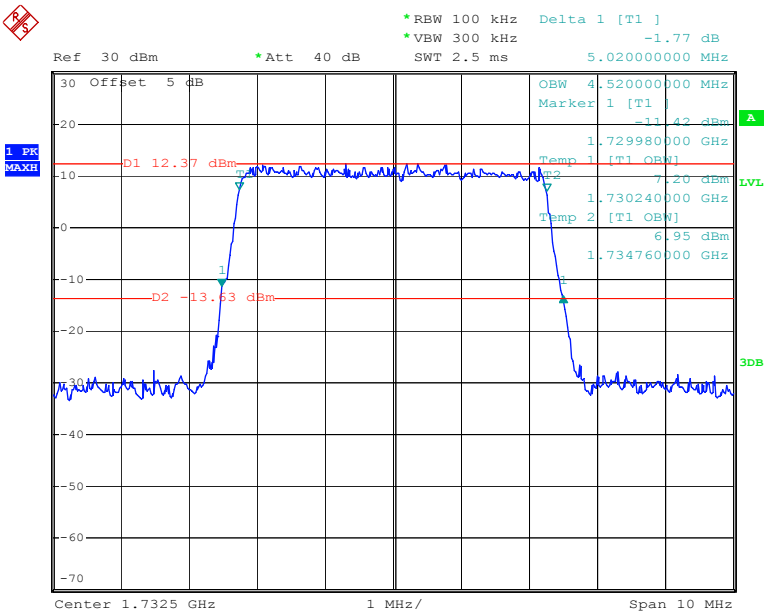
Date: 7.MAY.2020 12:28:49

16QAM_3 MHz



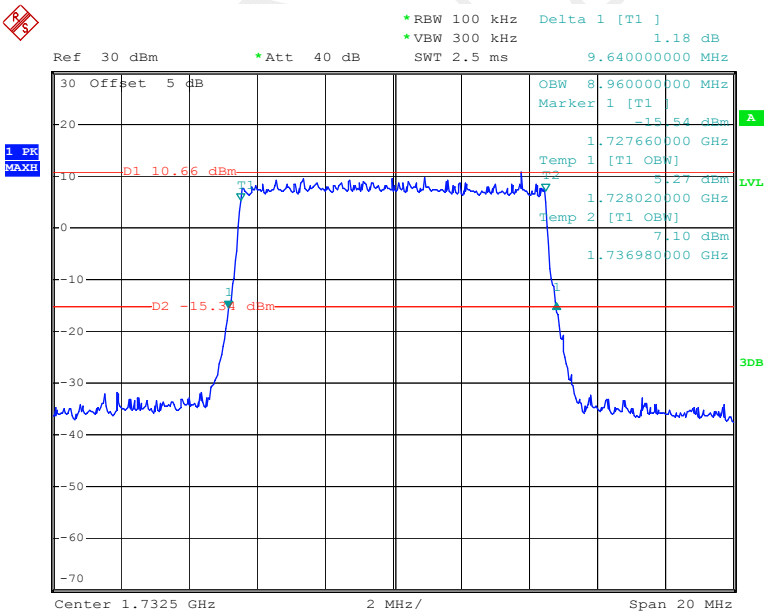
Date: 7.MAY.2020 12:29:34

16QAM_5 MHz



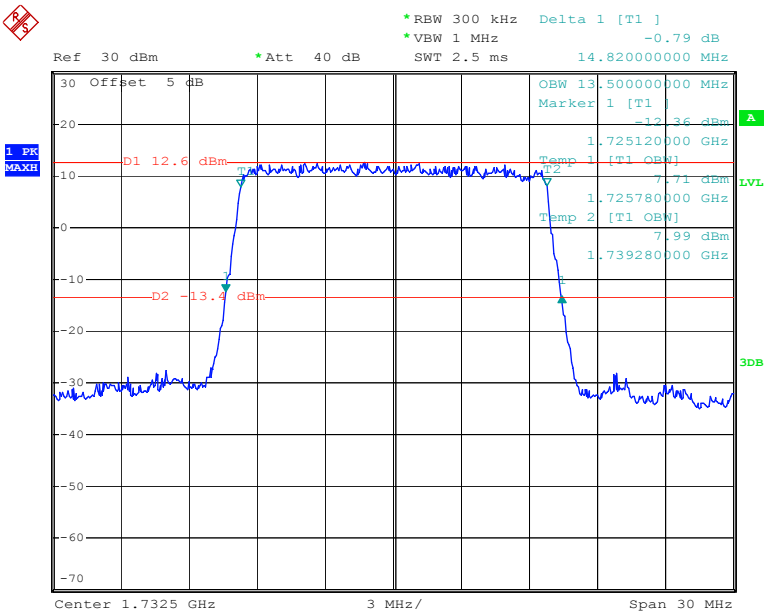
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16QAM_10 MHz



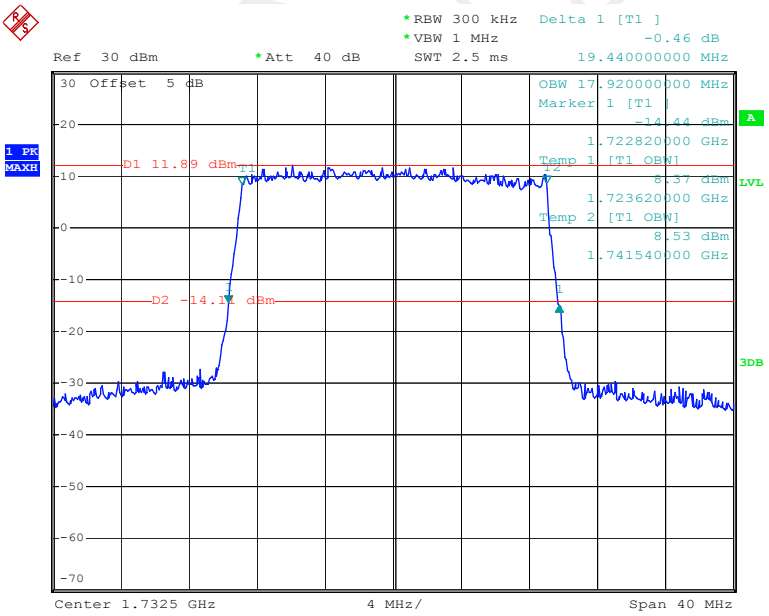
Date: 7.MAY.2020 12:31:09

16QAM_15 MHz



Date: 7.MAY.2020 12:32:02

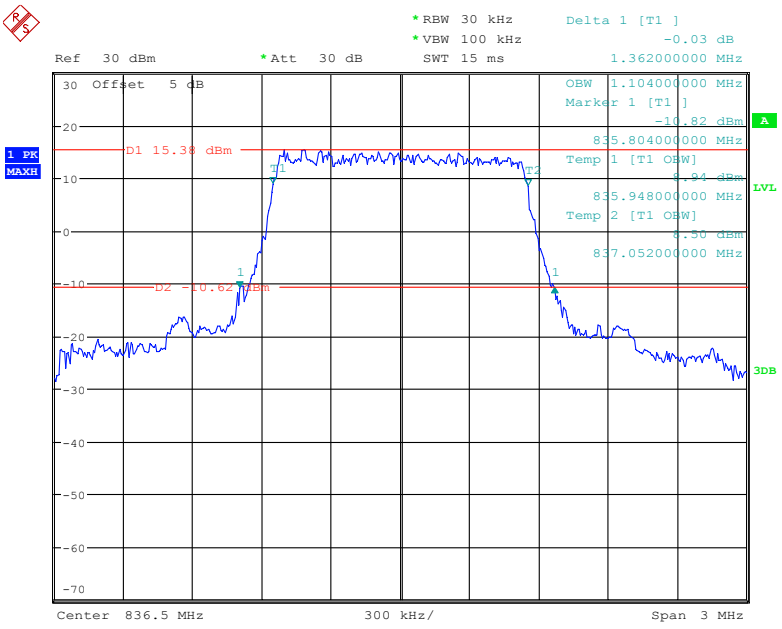
16QAM_20 MHz



Date: 7.MAY.2020 12:32:53

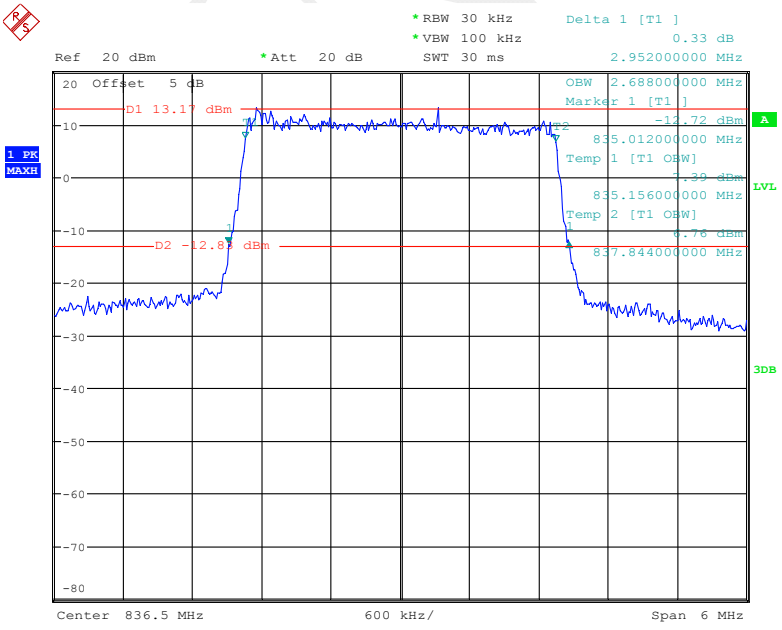
LTE Band 5:

QPSK_1.4 MHz



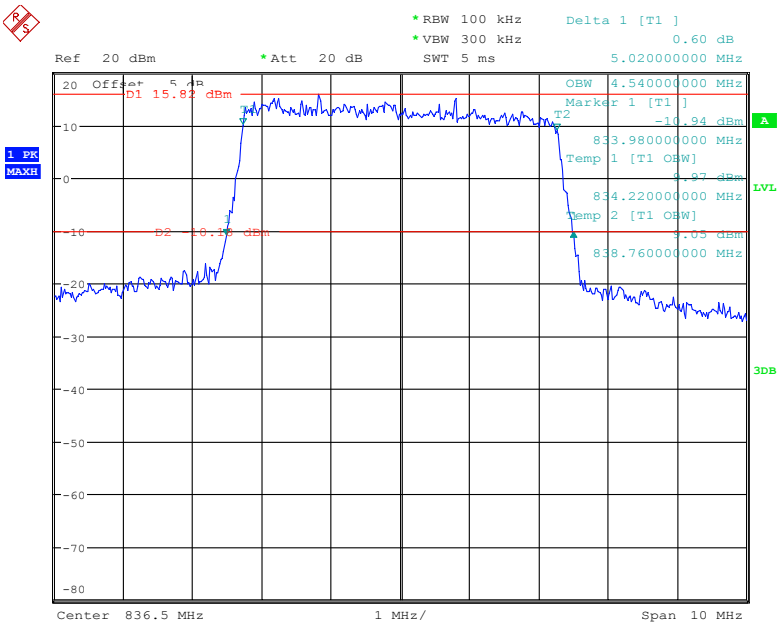
Date: 15.MAY.2020 09:49:37

QPSK_3 MHz



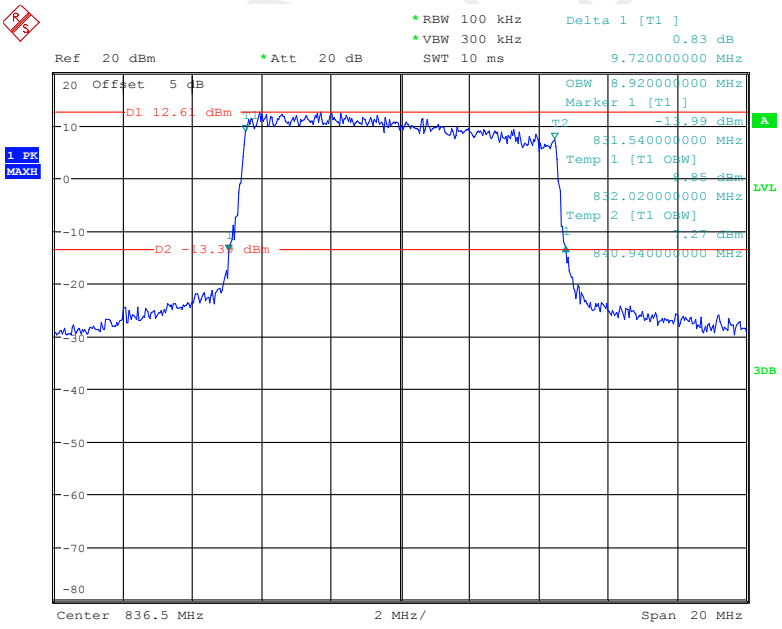
Date: 15.MAY.2020 09:50:16

QPSK_5 MHz



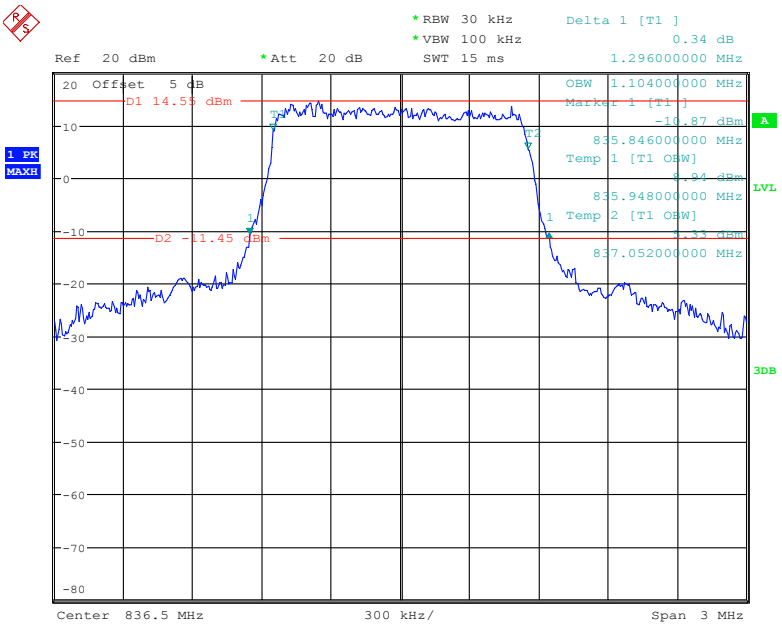
Date: 15.MAY.2020 09:50:57

QPSK_10 MHz



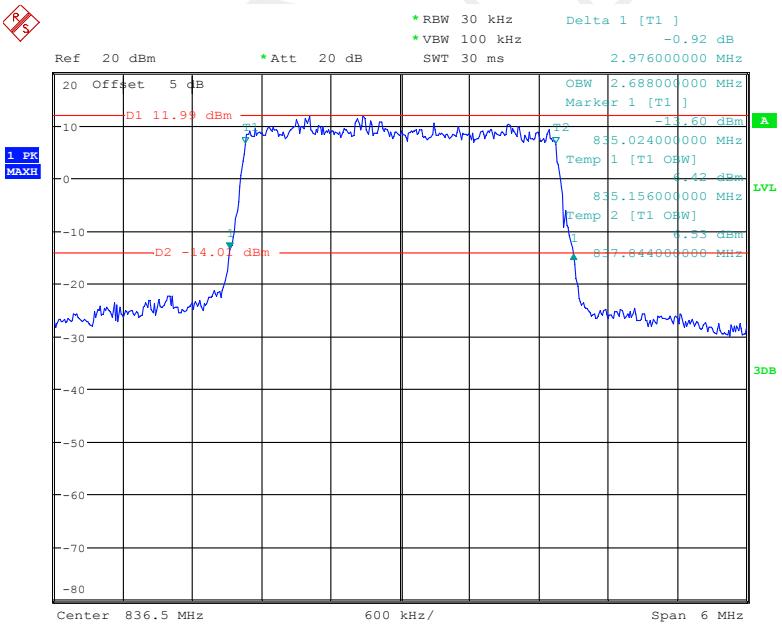
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16QAM_1.4 MHz



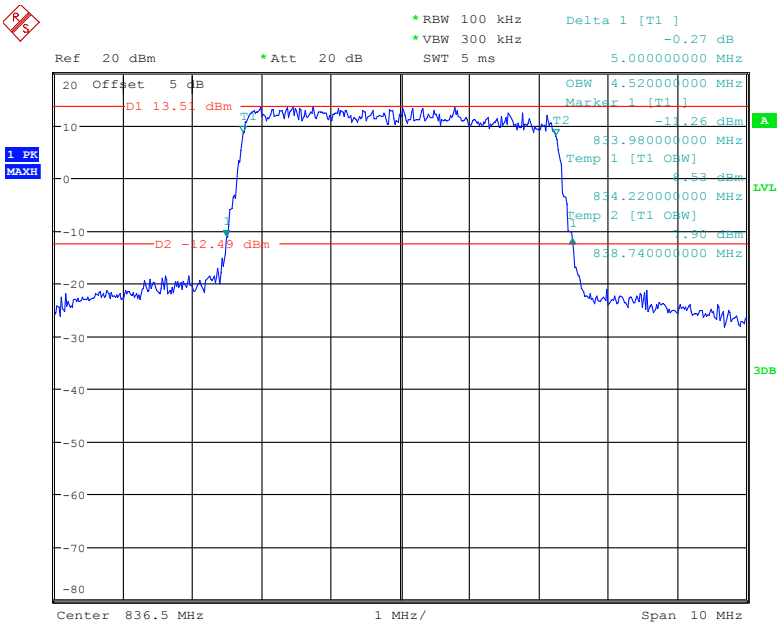
Date: 15.MAY.2020 09:49:56

16QAM_3 MHz



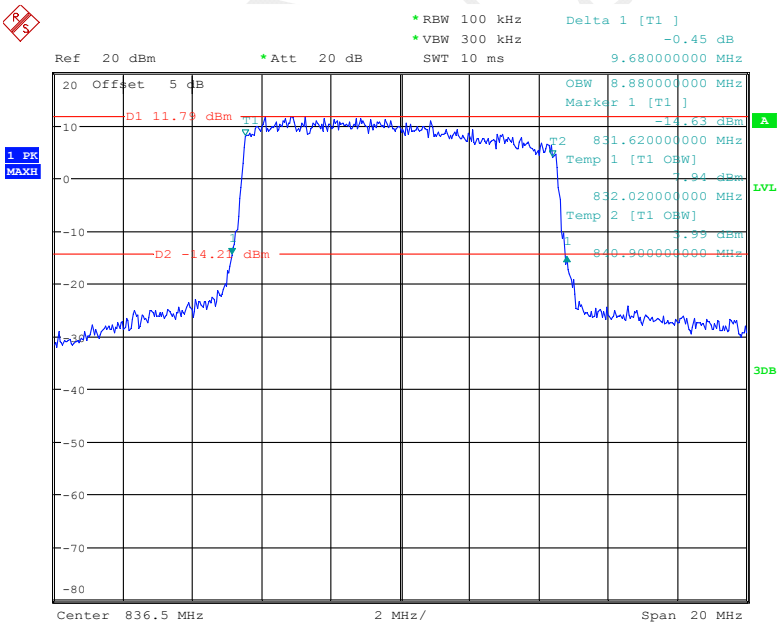
Date: 15.MAY.2020 09:50:34

16QAM_5 MHz



Date: 15.MAY.2020 09:51:18

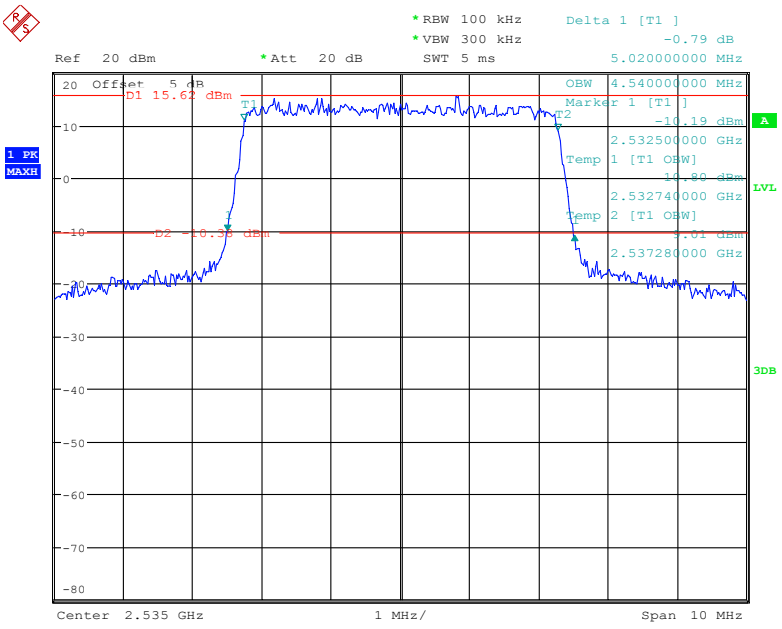
16QAM_10 MHz



Date: 15.MAY.2020 09:52:04

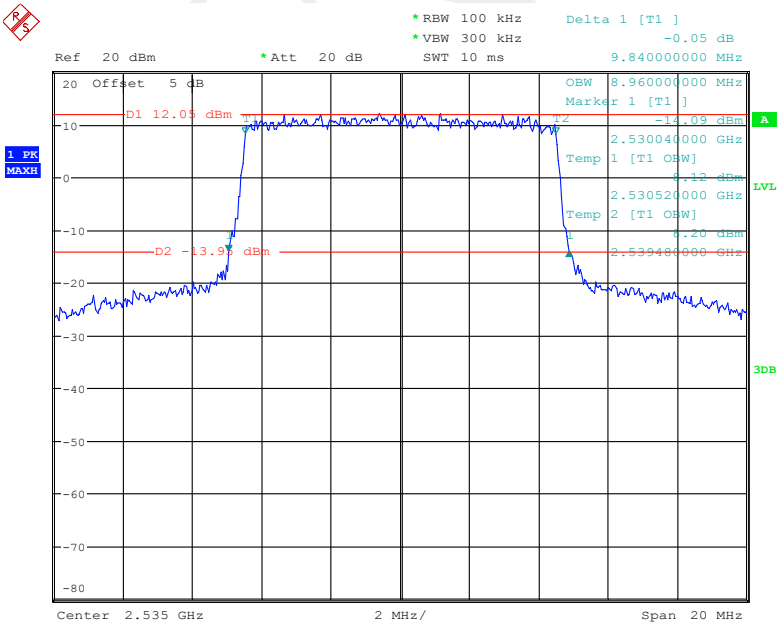
LTE Band 7:

QPSK_5 MHz



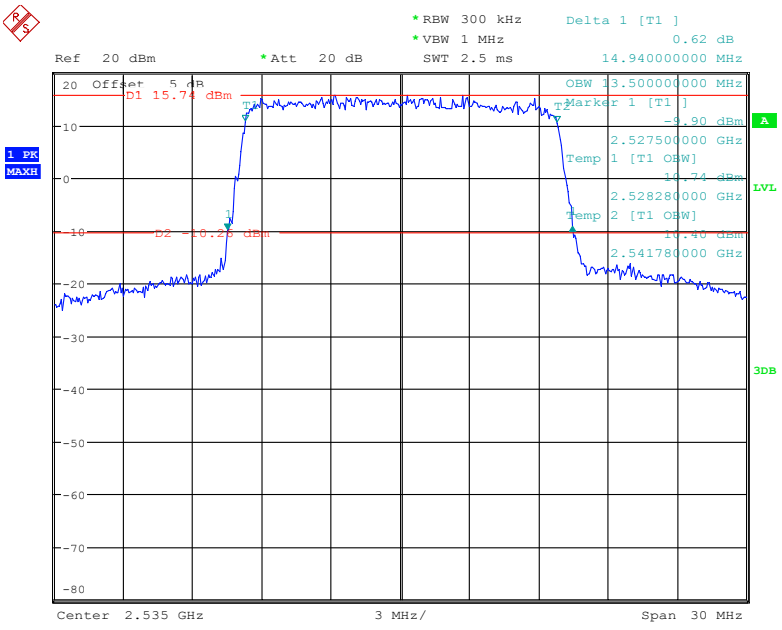
Date: 15.MAY.2020 09:56:47

QPSK_10 MHz



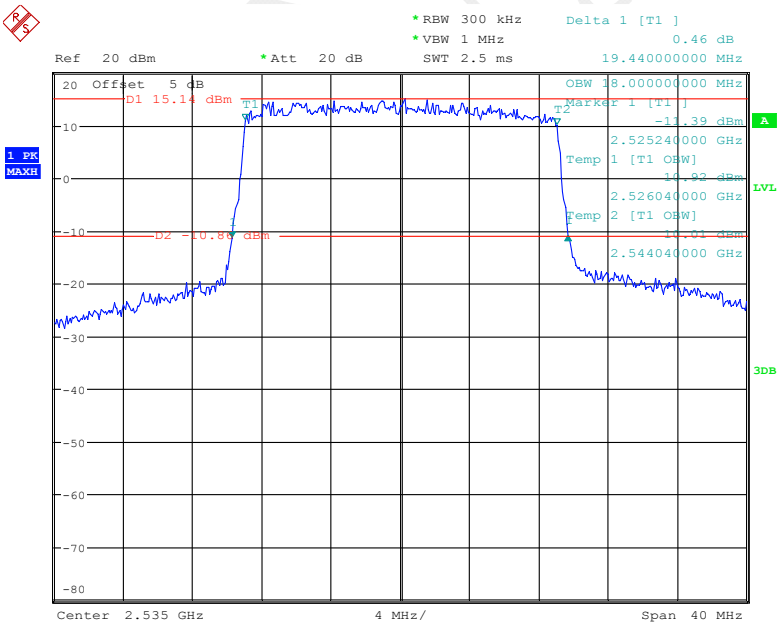
Date: 15.MAY.2020 09:57:33

QPSK_15 MHz



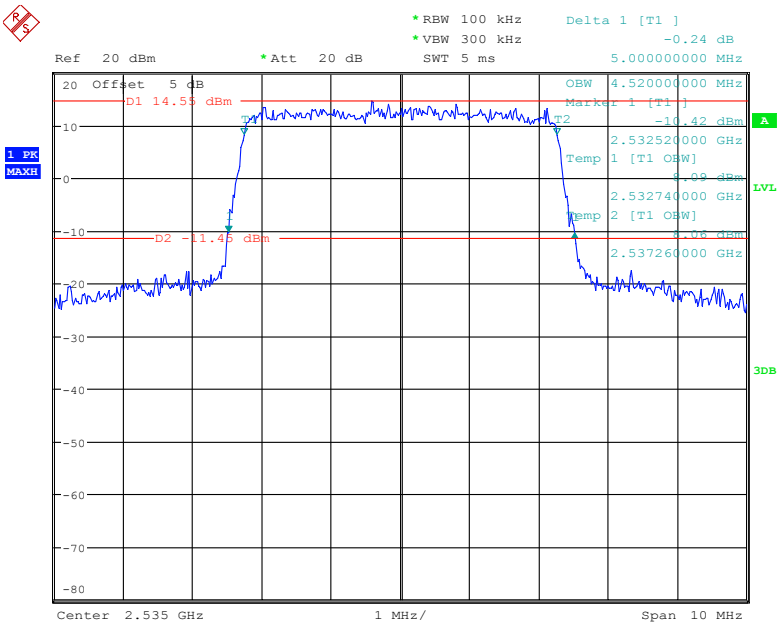
Date: 15.MAY.2020 09:58:21

QPSK_20 MHz



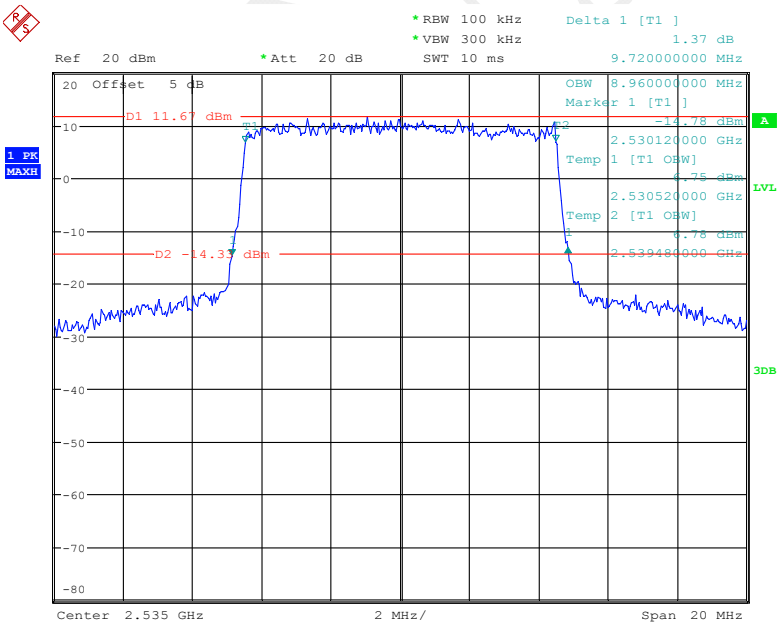
Date: 15.MAY.2020 09:59:13

16QAM_5 MHz



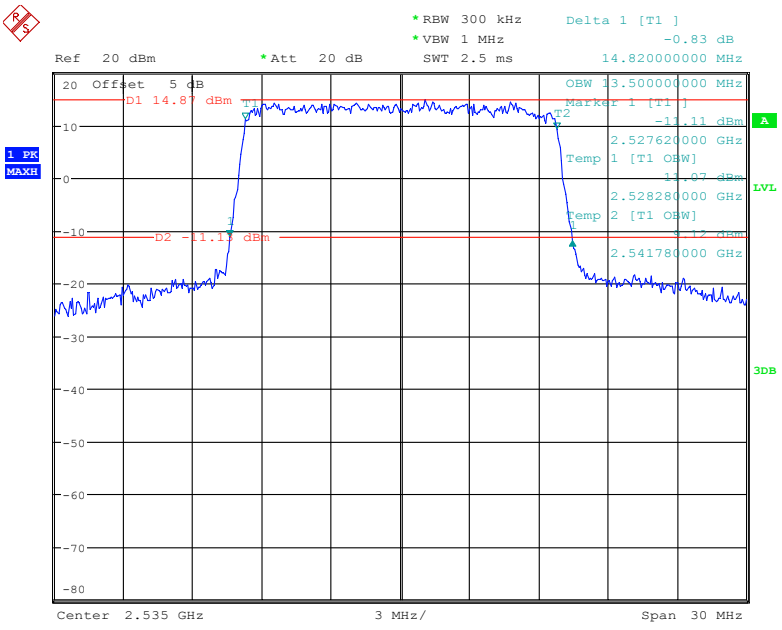
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16QAM_10 MHz



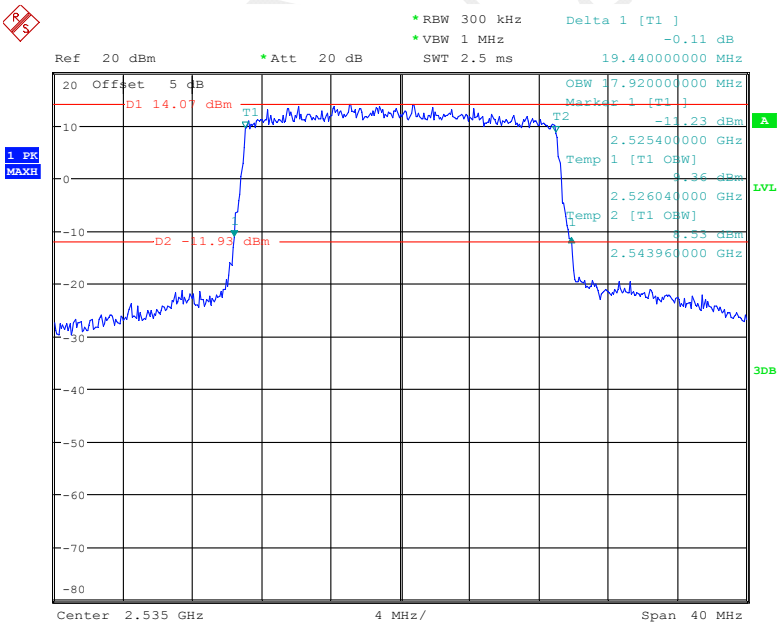
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16QAM_15 MHz



Date: 15.MAY.2020 09:58:46

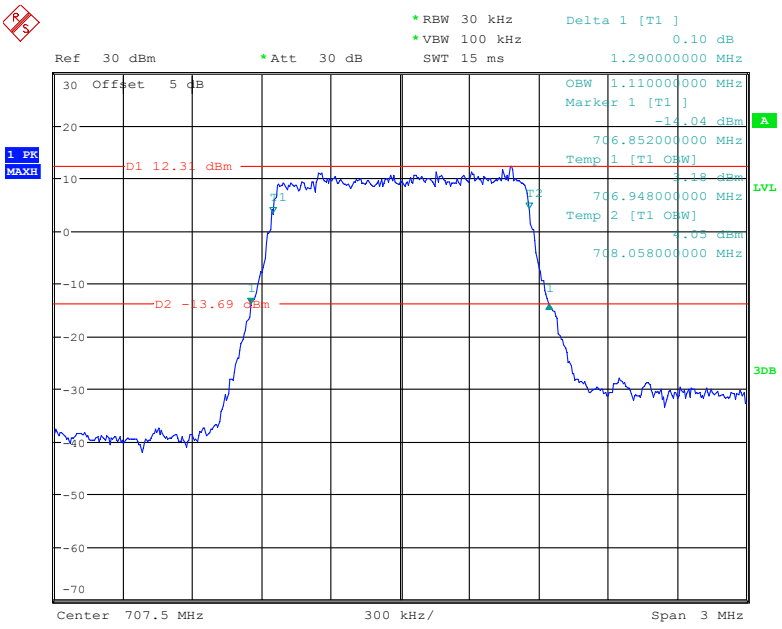
16QAM_20 MHz



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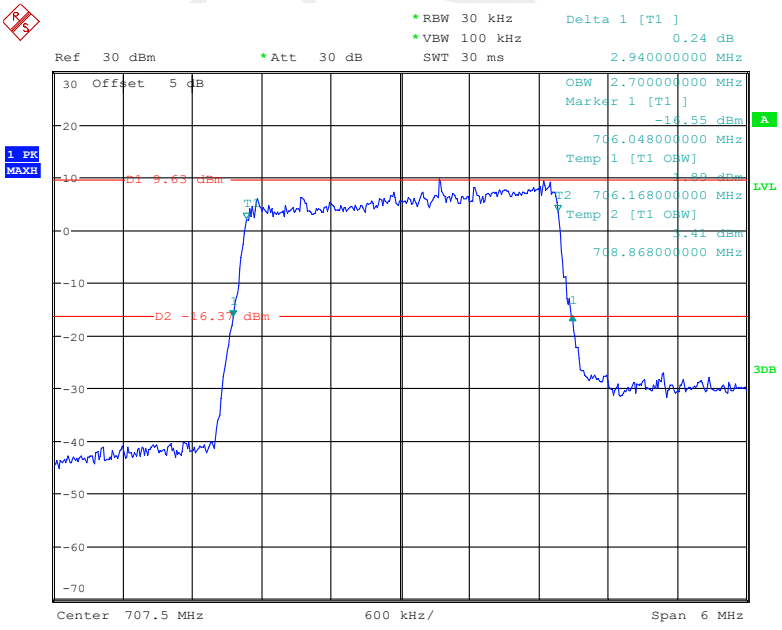
LTE Band 12:

QPSK_1.4 MHz



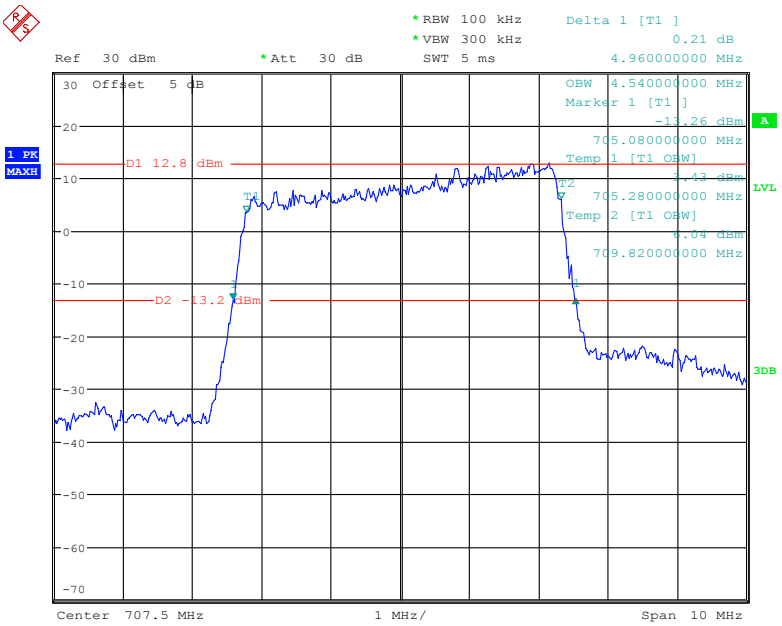
Date: 15.MAY.2020 18:03:01

QPSK_3 MHz



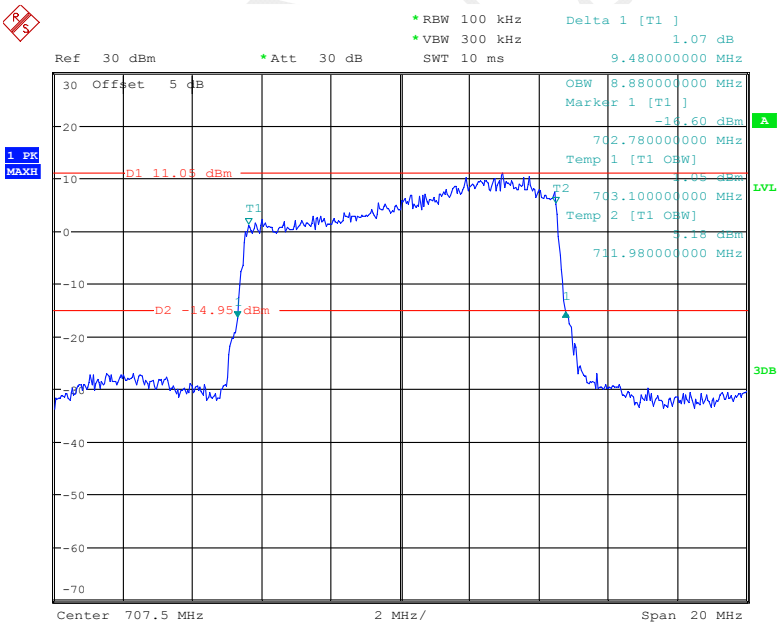
Date: 15.MAY.2020 18:03:49

QPSK_5 MHz



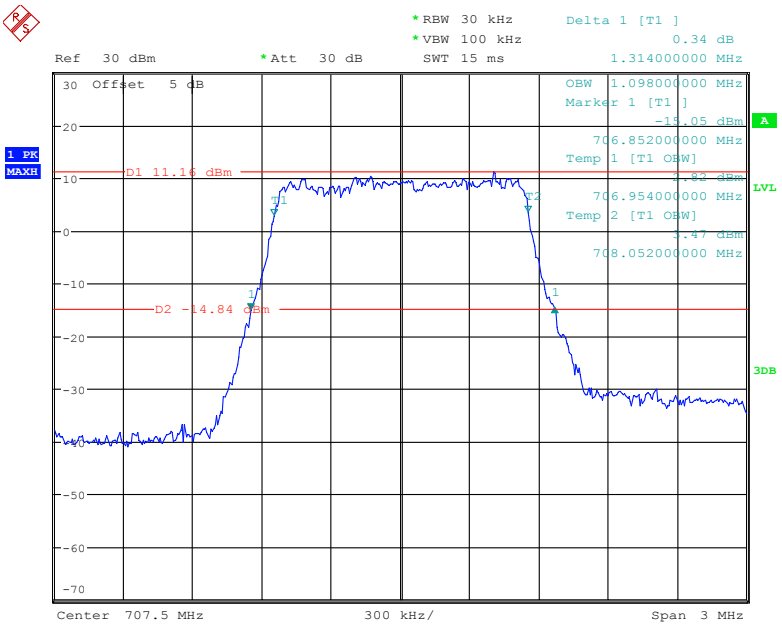
Date: 15.MAY.2020 18:04:30

QPSK_10 MHz



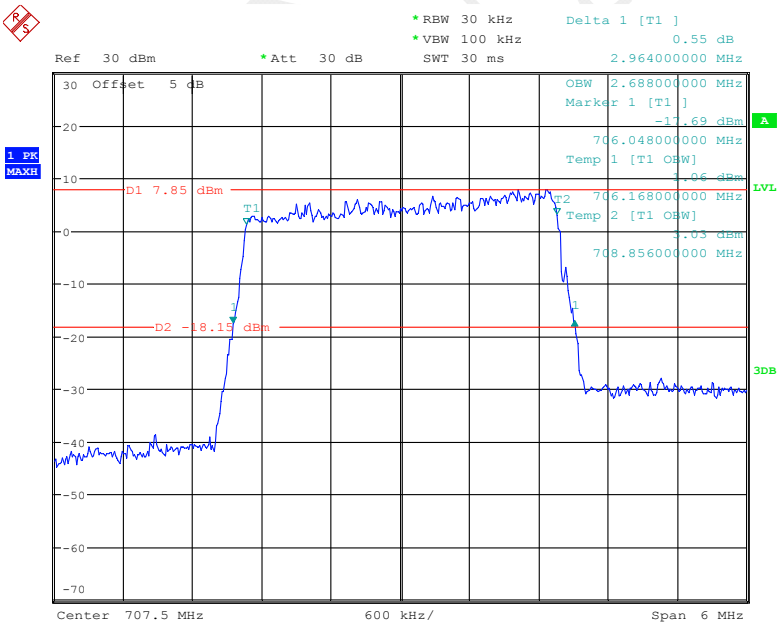
Date: 15.MAY.2020 18:05:16

16QAM_1.4 MHz



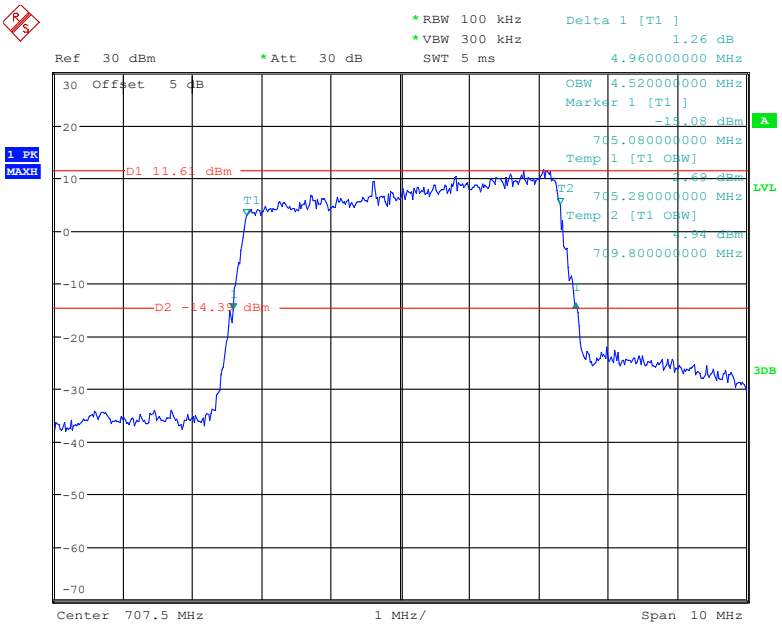
Date: 15.MAY.2020 18:03:25

16QAM_3 MHz



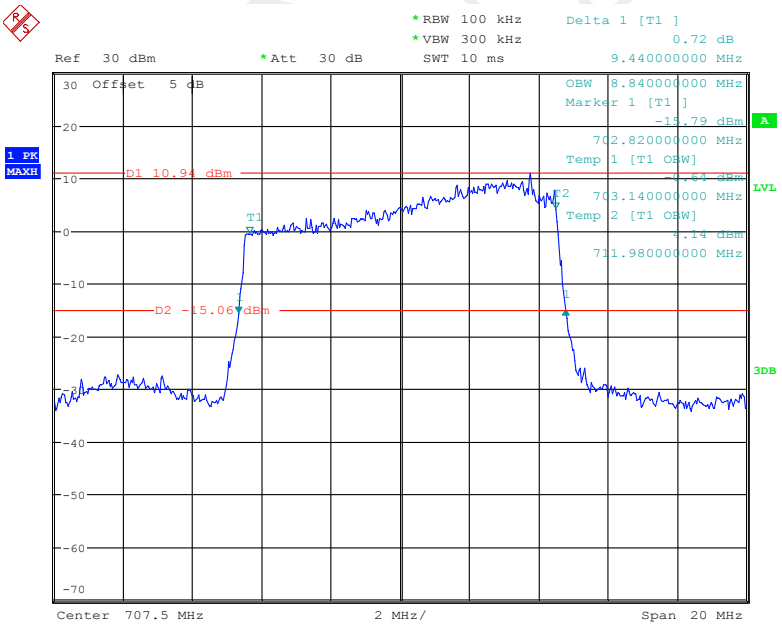
Date: 15.MAY.2020 18:04:07

16QAM_5 MHz



Date: 15.MAY.2020 18:04:51

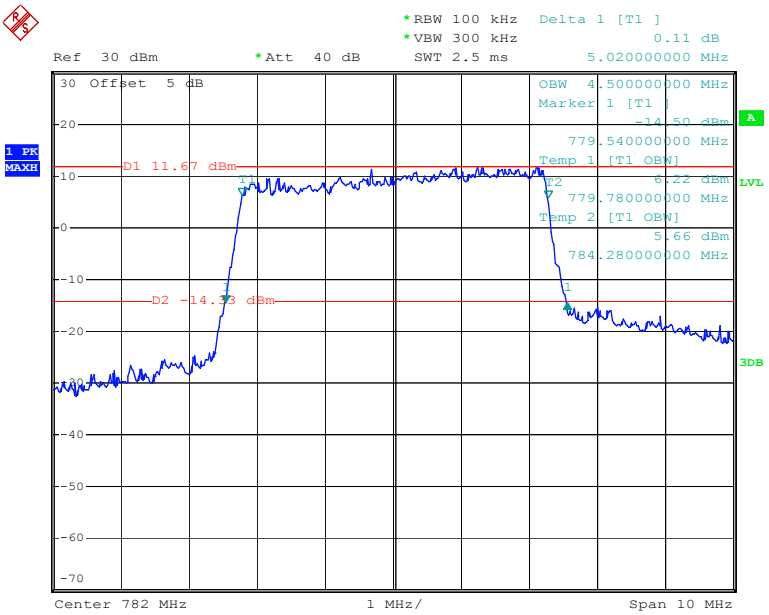
16QAM_10 MHz



Date: 15.MAY.2020 18:05:41

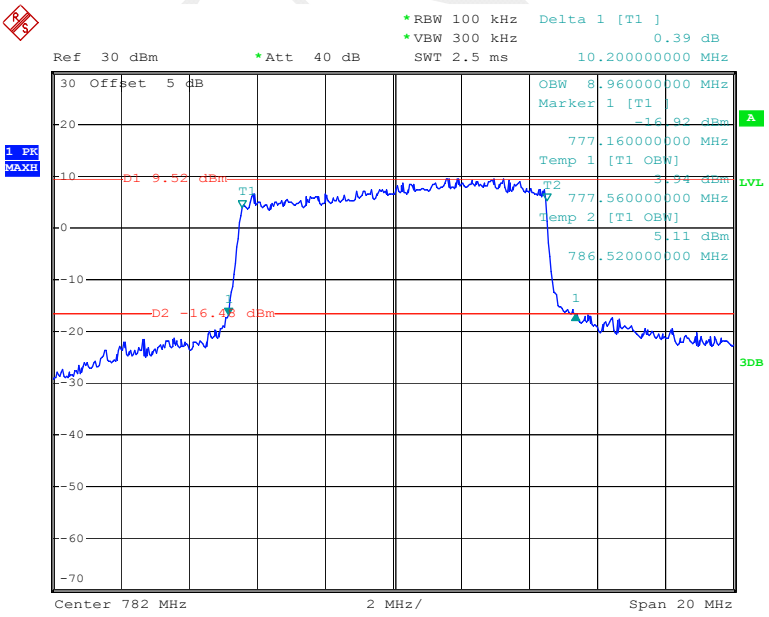
LTE Band 13:

QPSK_5 MHz



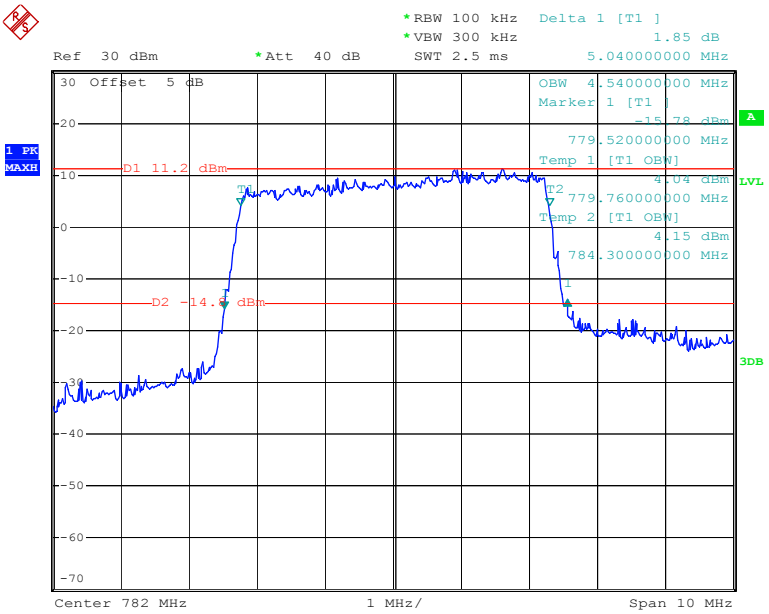
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QPSK_10 MHz



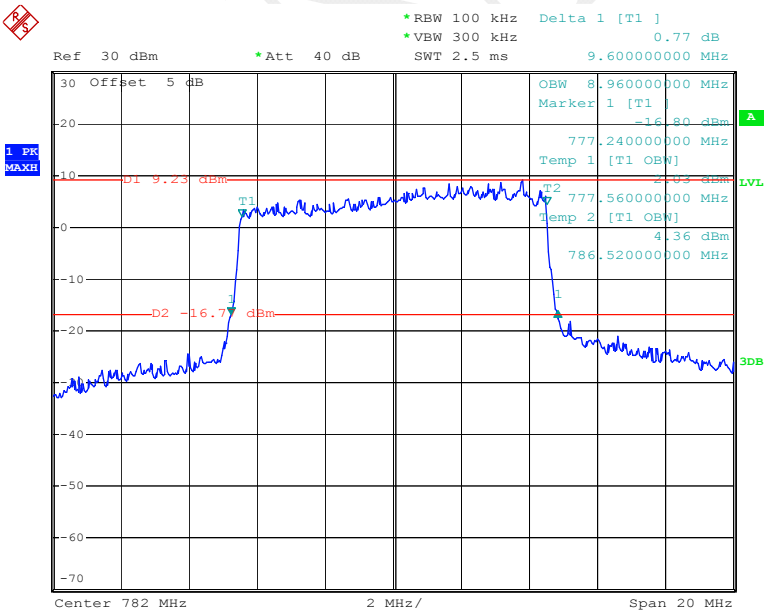
Date: 7.MAY.2020 14:04:41

16QAM_5 MHz



Date: 7.MAY.2020 12:56:30

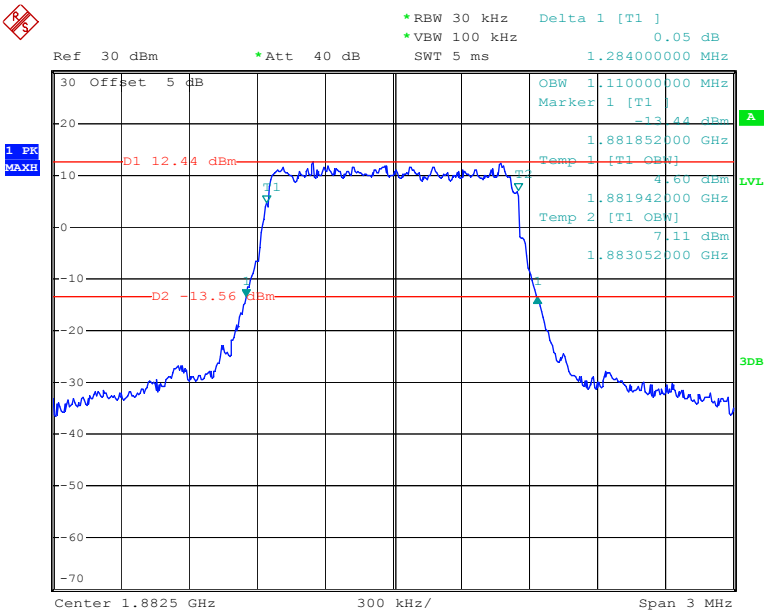
16QAM_10MHz



Date: 7.MAY.2020 14:05:03

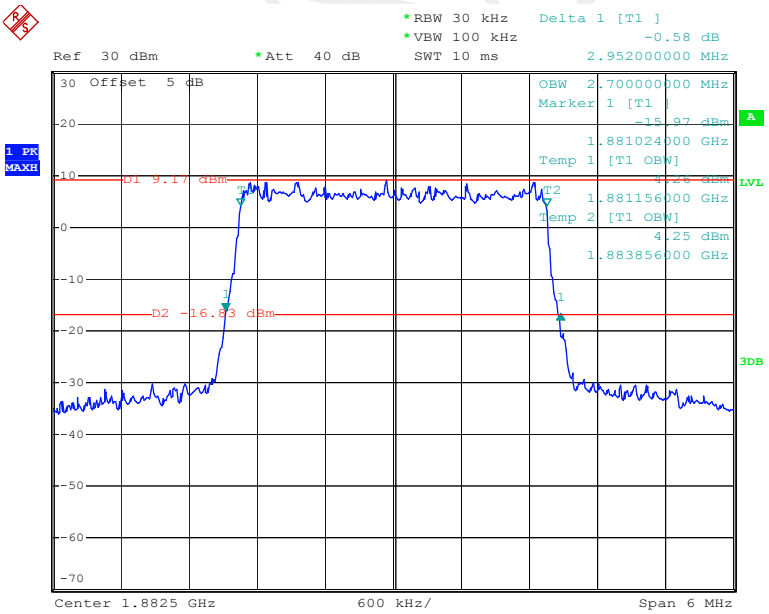
LTE Band 25:

QPSK_1.4 MHz



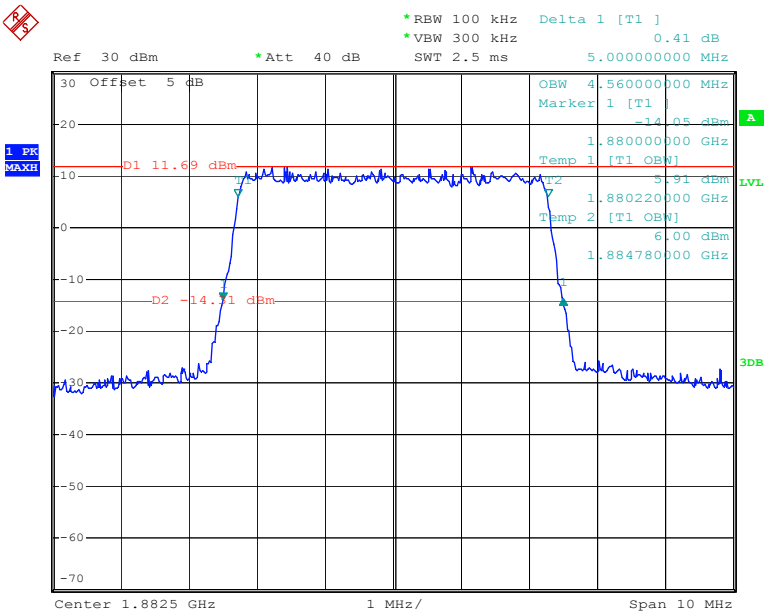
Date: 7.MAY.2020 14:05:42

QPSK_3 MHz



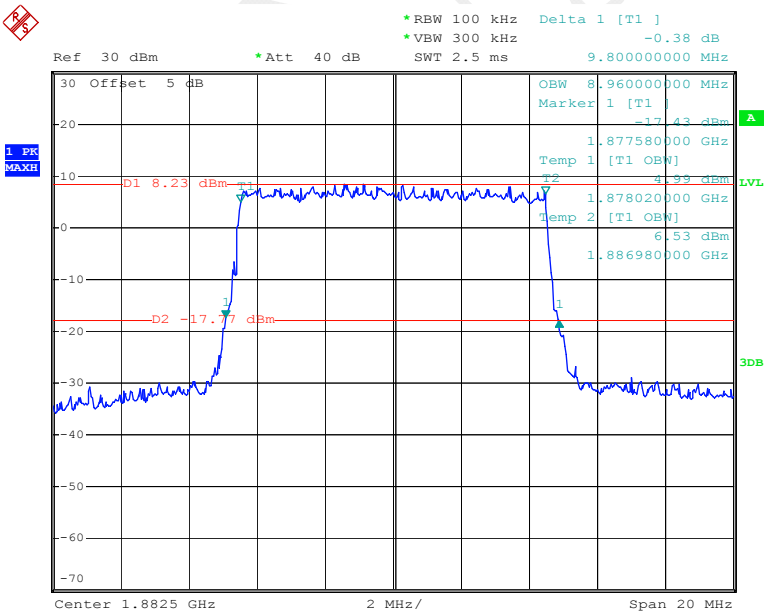
Date: 7.MAY.2020 14:06:23

QPSK_5 MHz



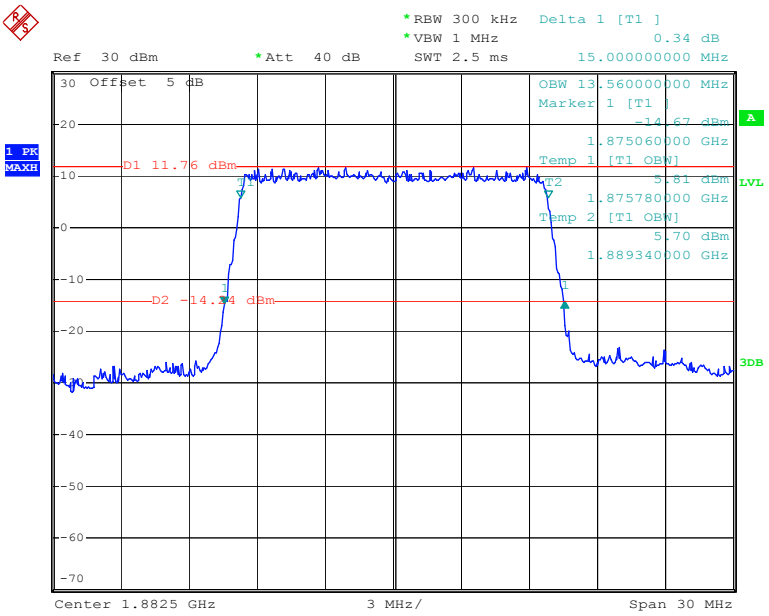
Date: 7.MAY.2020 14:07:12

QPSK_10 MHz



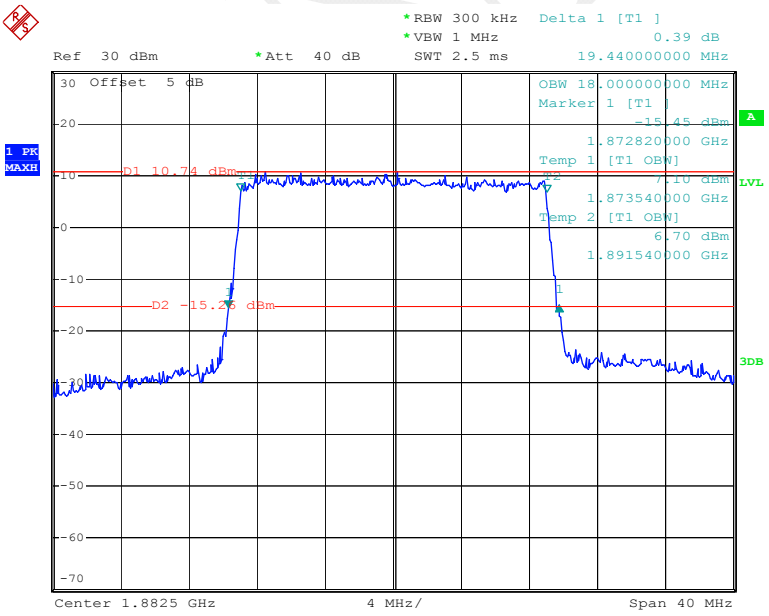
Date: 7.MAY.2020 14:07:59

QPSK_15 MHz



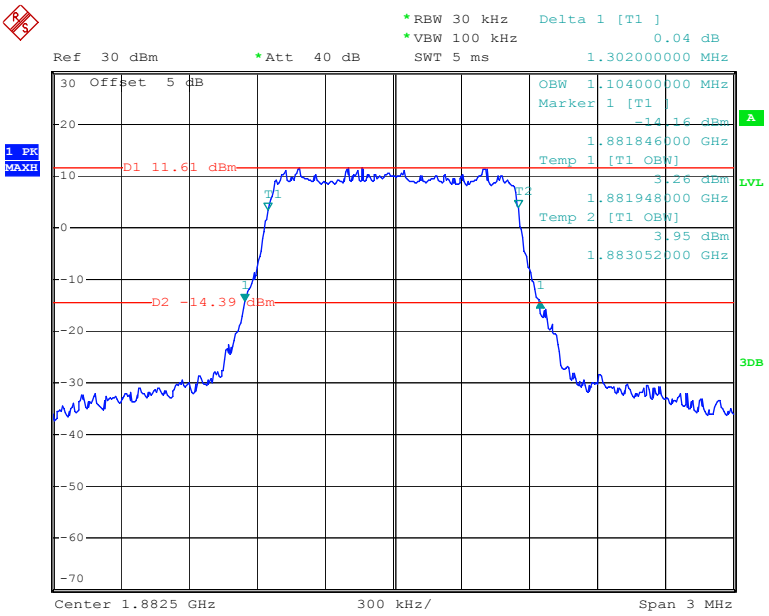
Date: 7.MAY.2020 14:08:44

QPSK_20MHz



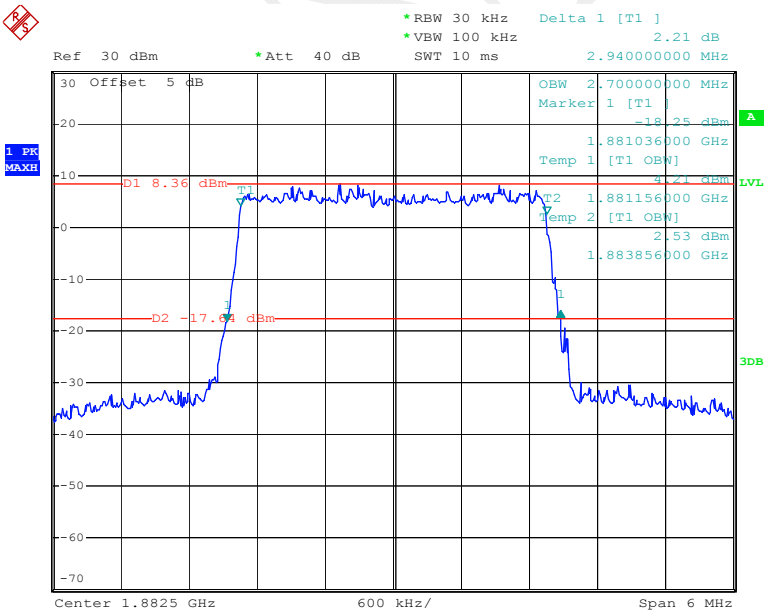
Date: 7.MAY.2020 14:09:35

16QAM_1.4 MHz



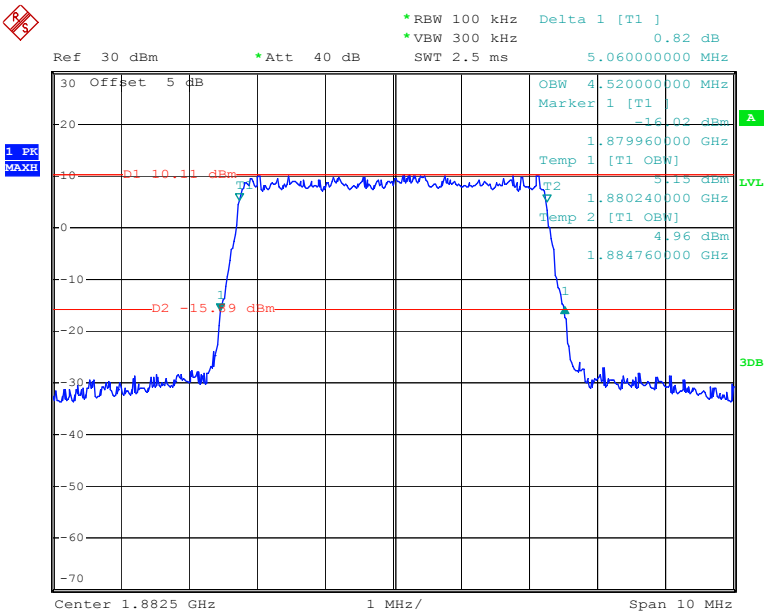
Date: 7.MAY.2020 14:06:03

16QAM_3 MHz



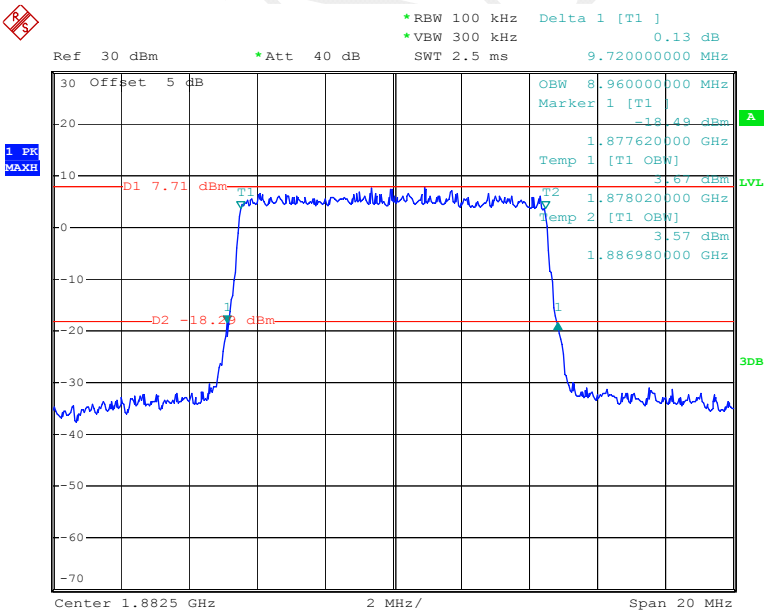
Date: 7.MAY.2020 14:06:44

16QAM_5 MHz



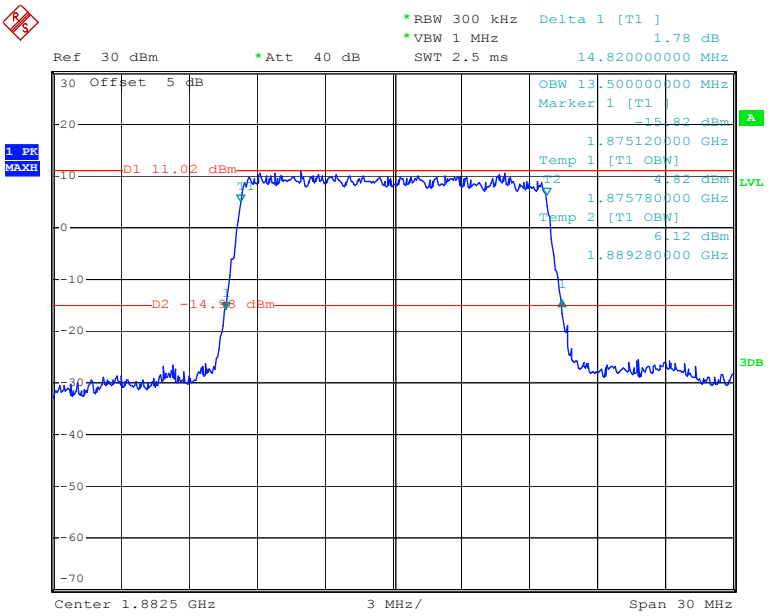
Date: 7.MAY.2020 14:07:34

16QAM_10 MHz



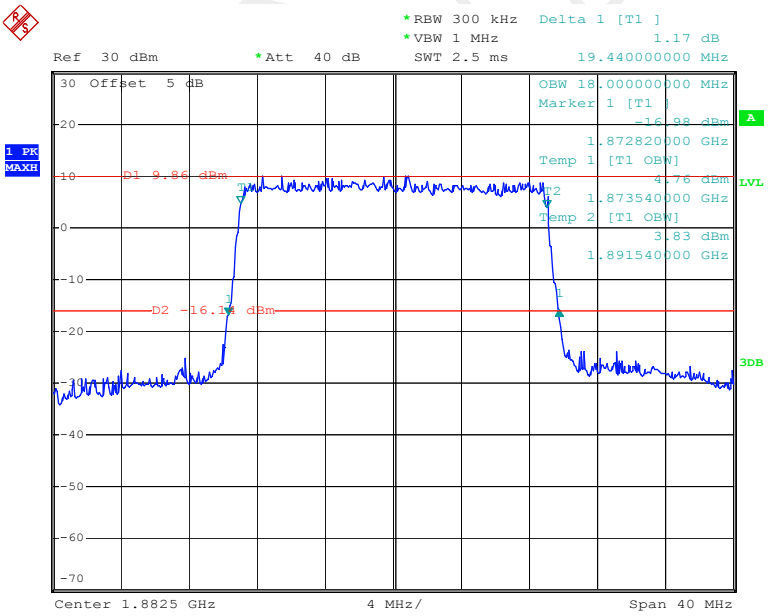
Date: 7.MAY.2020 14:08:19

16QAM_15 MHz



Date: 7.MAY.2020 14:09:09

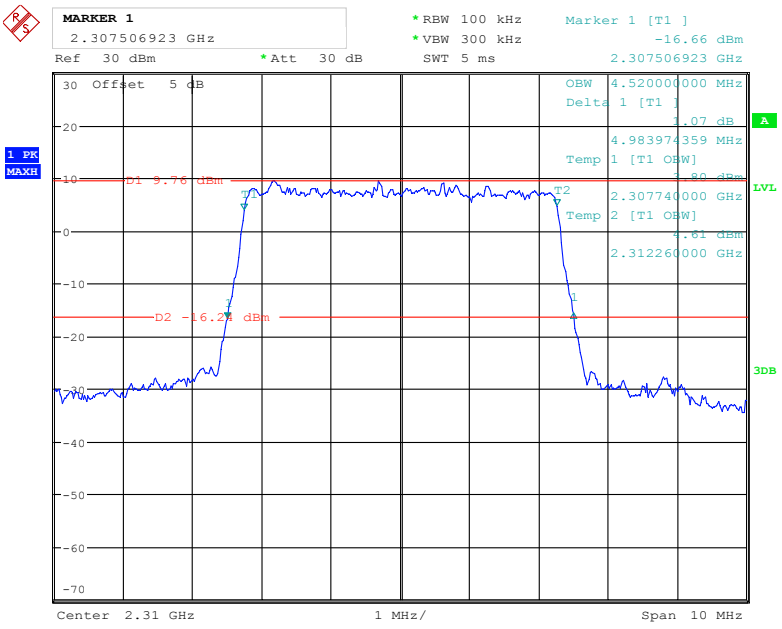
16QAM_20 MHz



Date: 7.MAY.2020 14:09:57

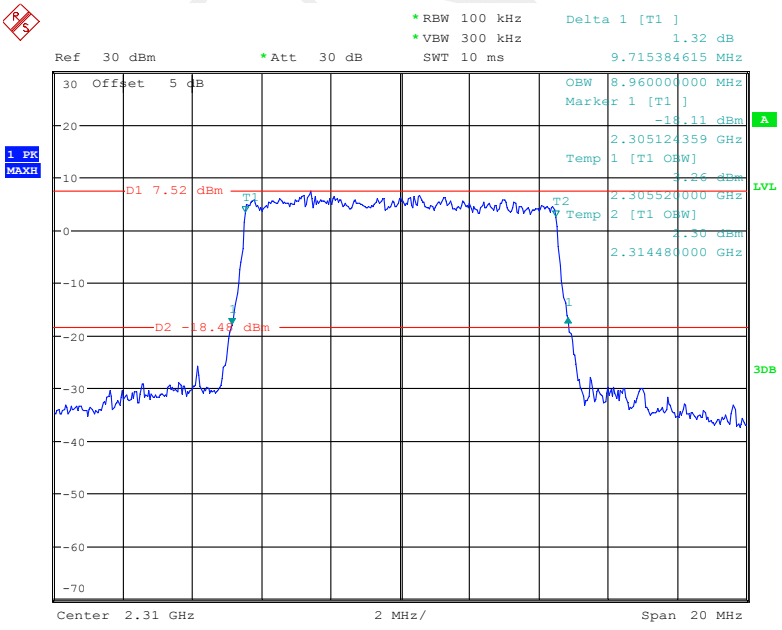
LTE Band 40
Lower:

QPSK_5 MHz



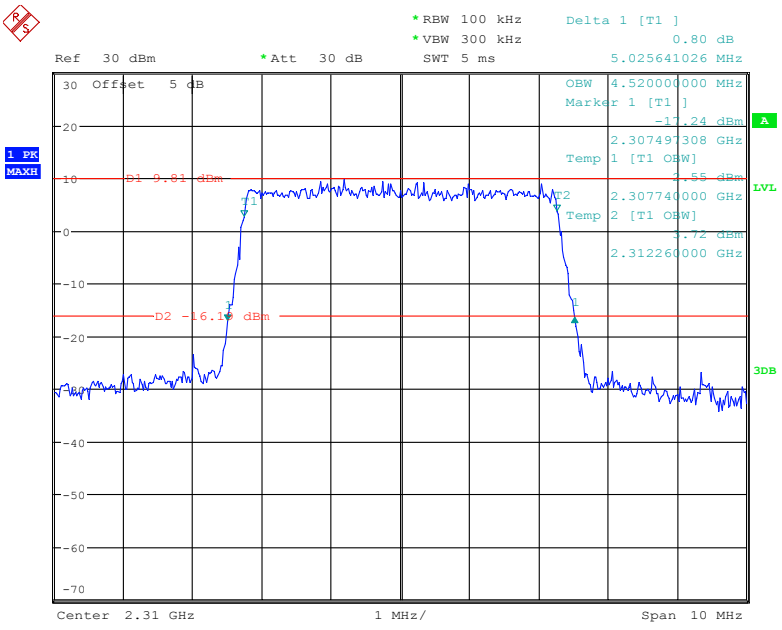
Date: 15.MAY.2020 14:23:14

QPSK_10 MHz



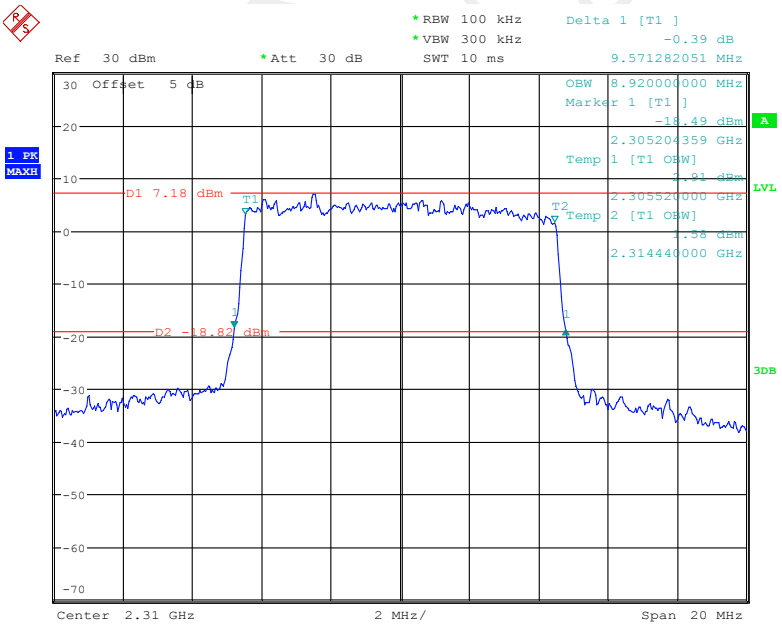
Date: 15.MAY.2020 14:38:16

16QAM_5 MHz



Date: 15.MAY.2020 14:24:36

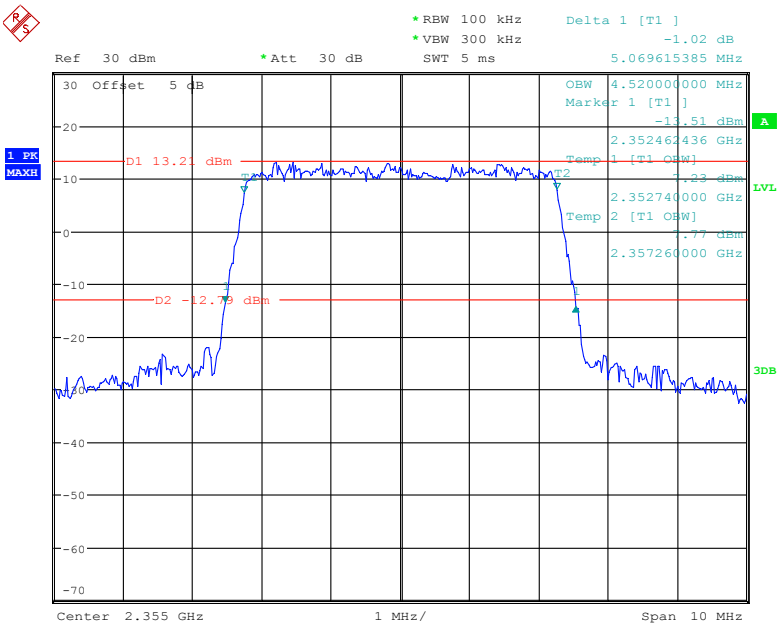
16QAM_10 MHz



Date: 15.MAY.2020 14:36:32

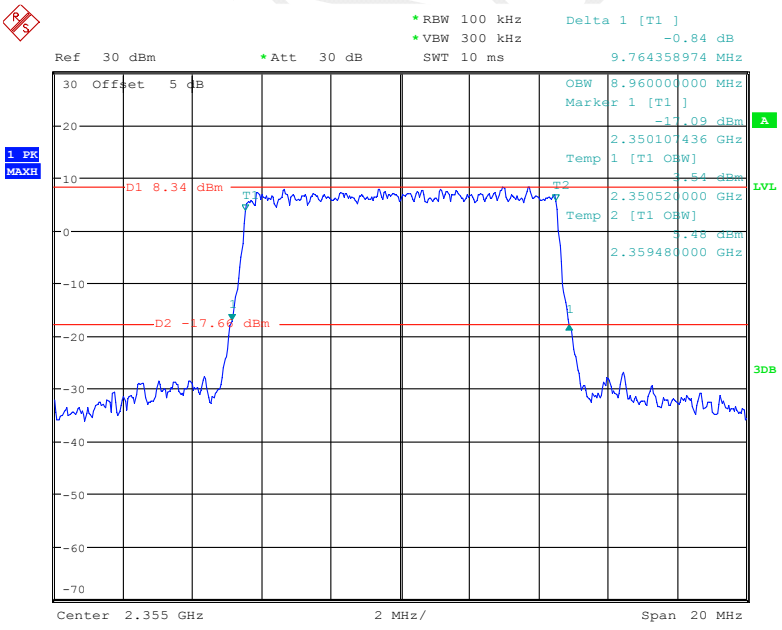
Upper:

QPSK_5 MHz



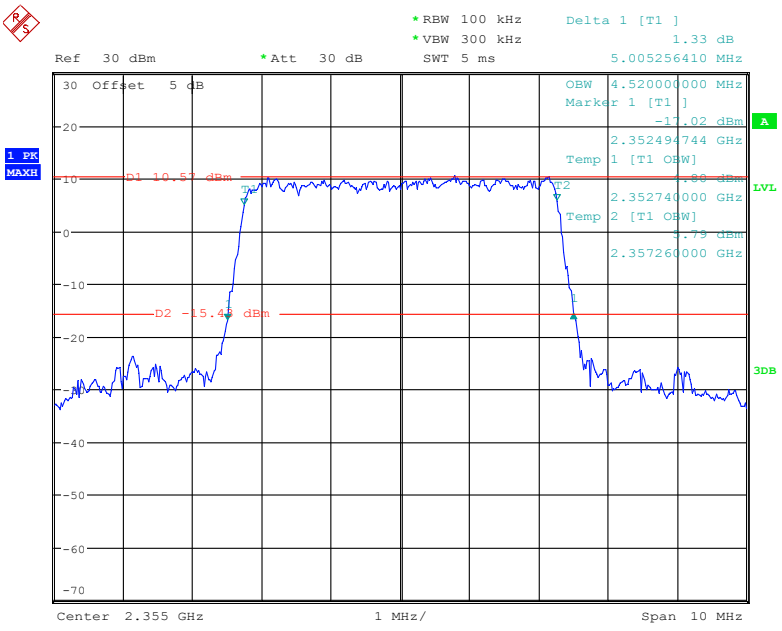
Date: 15.MAY.2020 14:28:18

QPSK_10 MHz



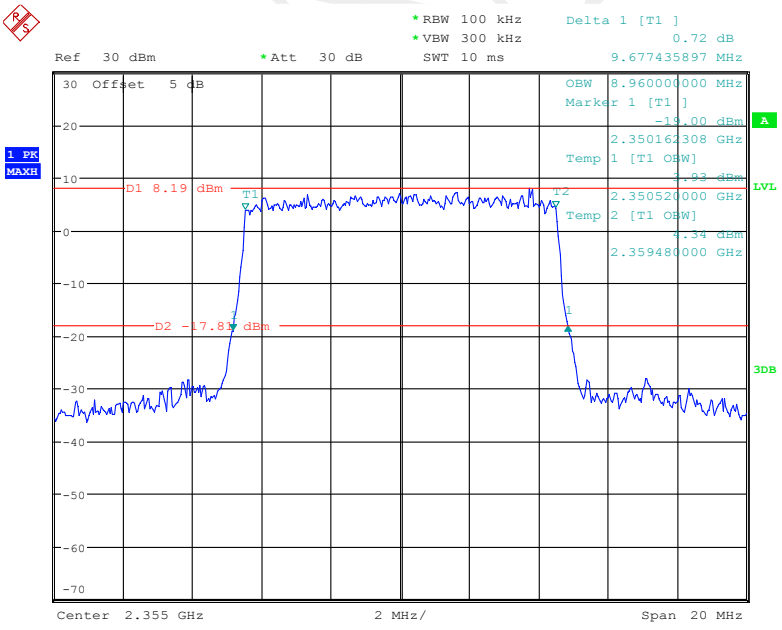
Date: 15.MAY.2020 14:32:51

16QAM_5 MHz



Date: 15.MAY.2020 14:26:02

16QAM_10 MHz



Date: 15.MAY.2020 14:34:00

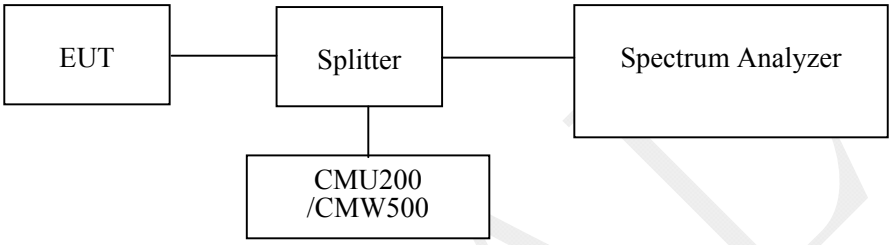
FCC §2.1051, §22.917(a) & §24.238(a) & §27.53- SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

FCC § 2.1053, §22.917, § 24.238 ,§ 27.53.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2020-01-04	2021-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005011	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/04	Each Time	/
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

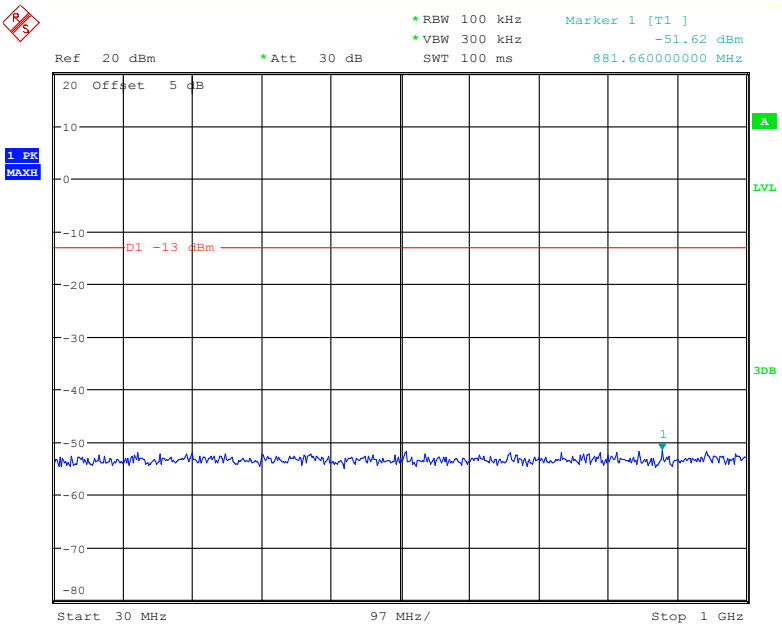
Environmental Conditions

Temperature:	26~27.5°C
Relative Humidity:	52~72 %
ATM Pressure:	100.2~100.9 kPa
Tester:	Chris Mo
Test Date:	2020-05-08~2020-05-19

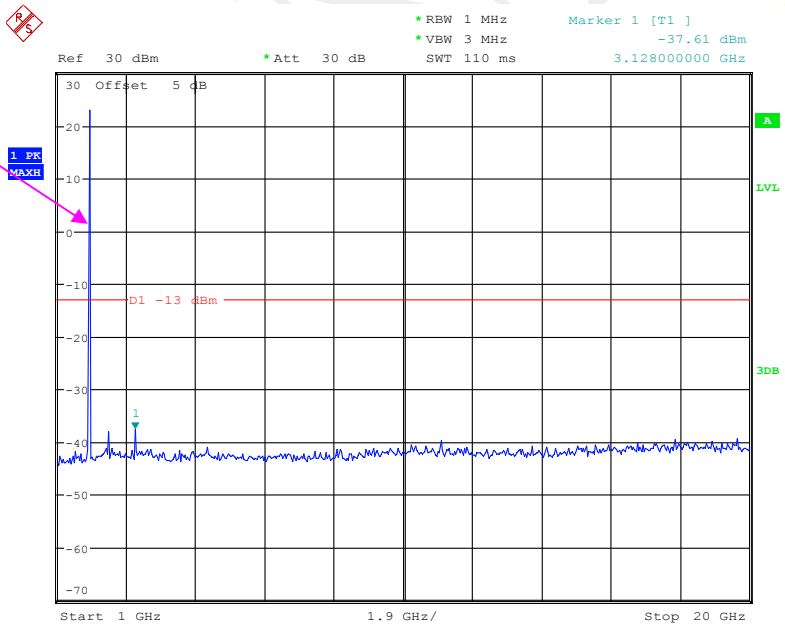
Please refer to the following plots.

LTE Band 2 (Middle Channel)

QPSK_1.4 MHz



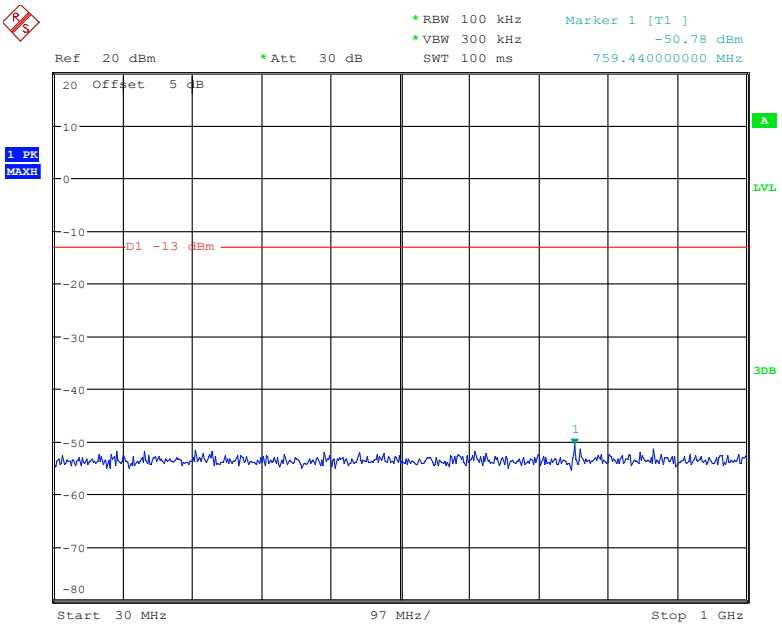
Date: 8.MAY.2020 10:14:08



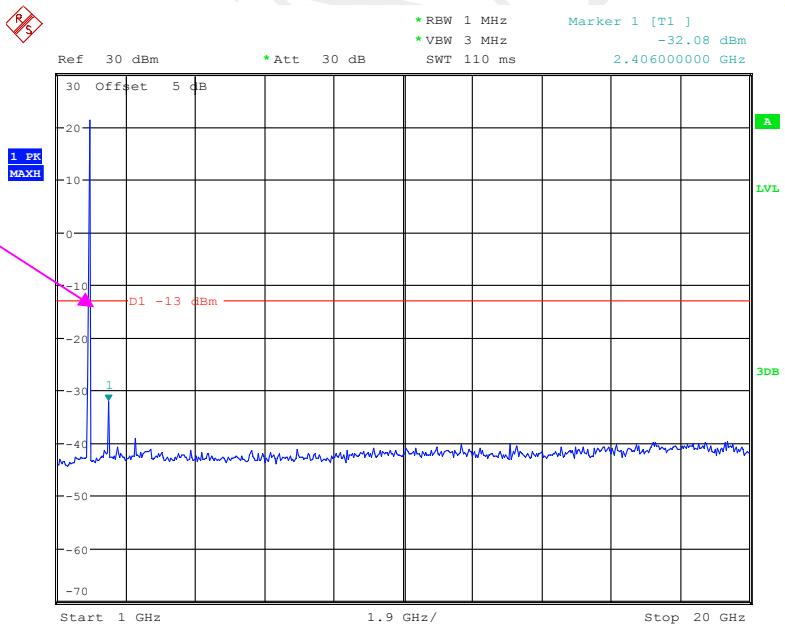
Fundamental

Date: 8.MAY.2020 10:14:20

QPSK_3 MHz



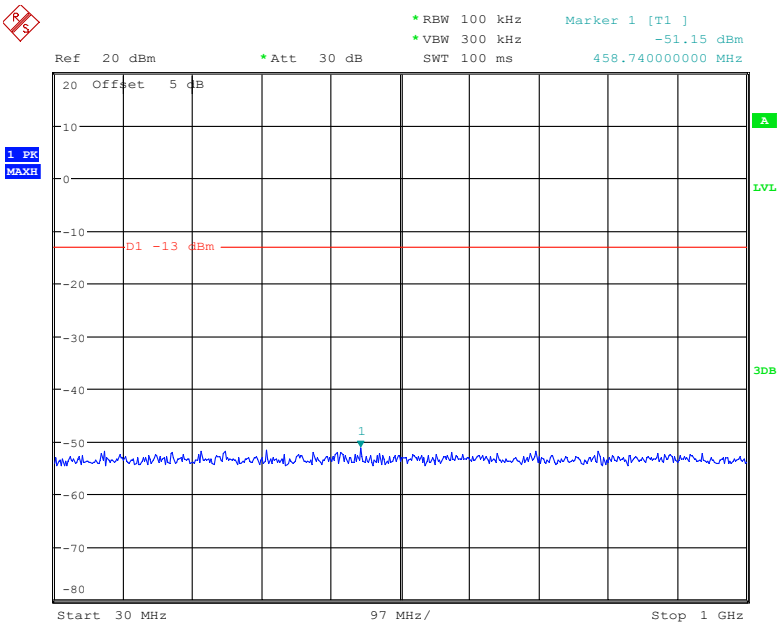
Date: 8.MAY.2020 10:14:39



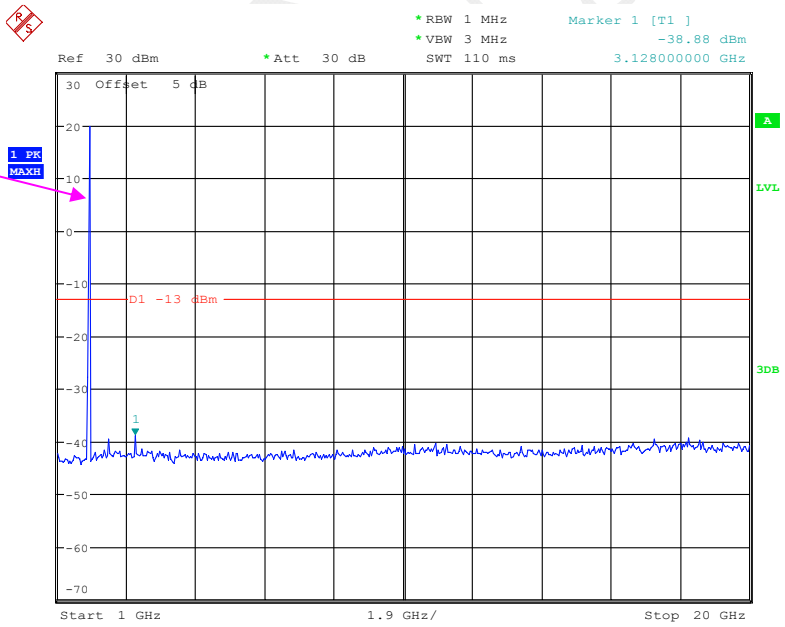
Fundamental

Date: 8.MAY.2020 10:14:51

QPSK_5 MHz



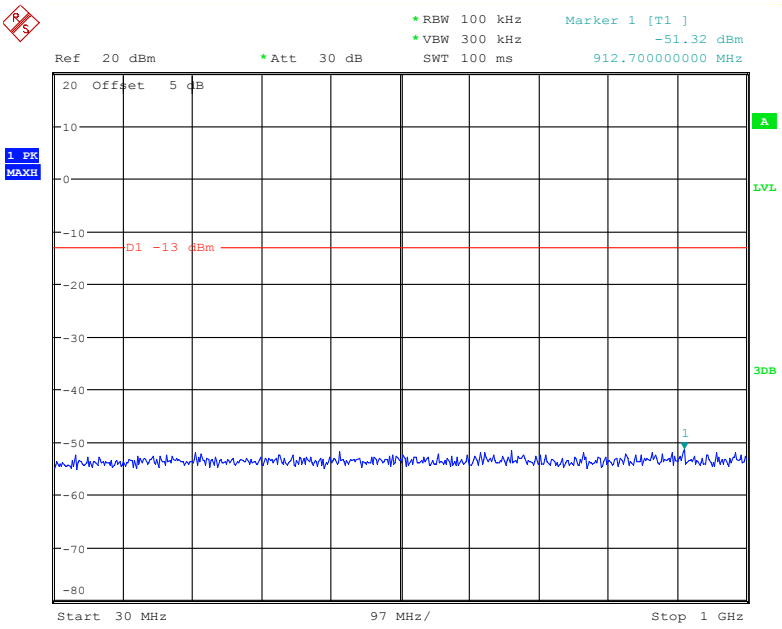
Date: 8.MAY.2020 10:15:13



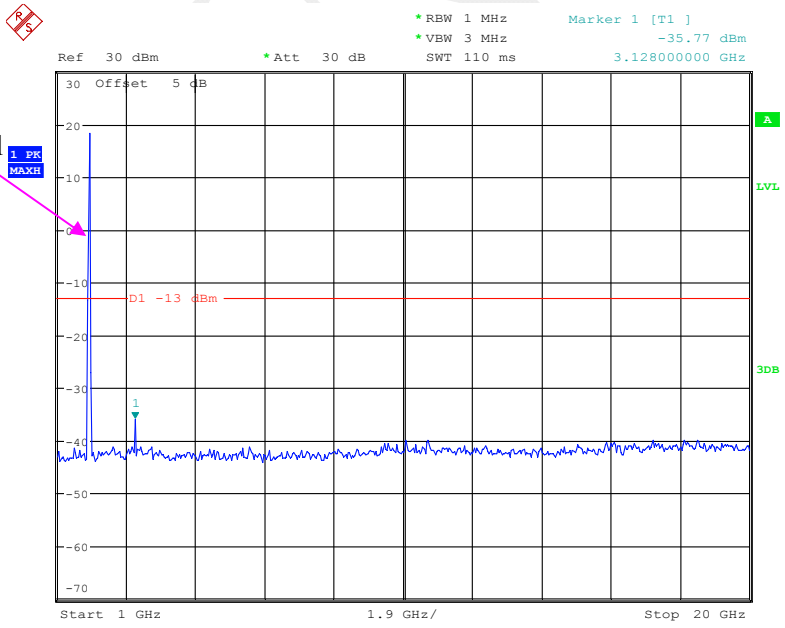
Fundamental

Date: 8.MAY.2020 10:15:25

QPSK_10 MHz

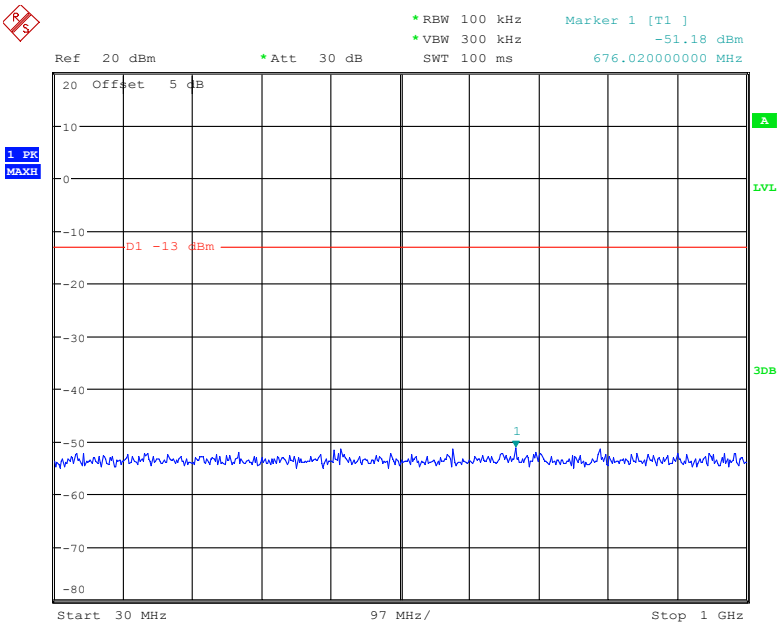


Date: 8.MAY.2020 10:15:45

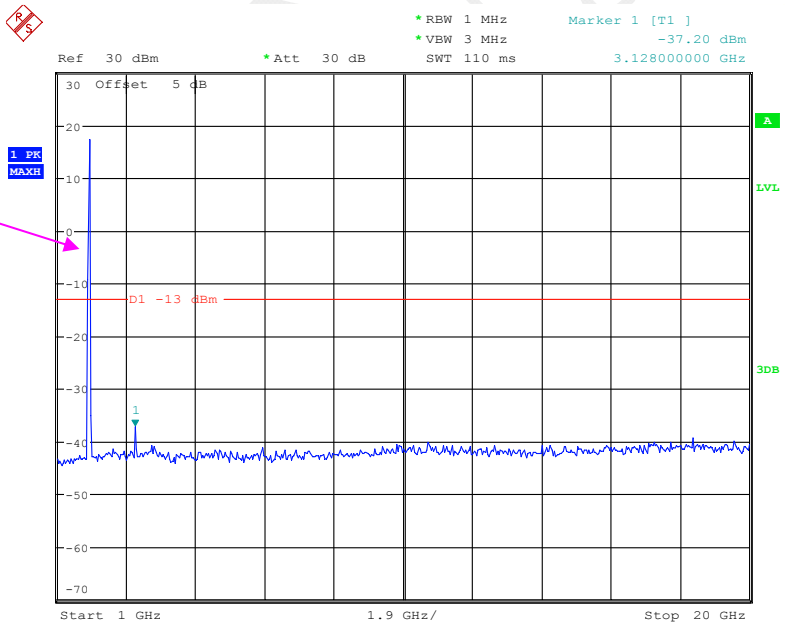


Date: 8.MAY.2020 10:15:57

QPSK_15 MHz



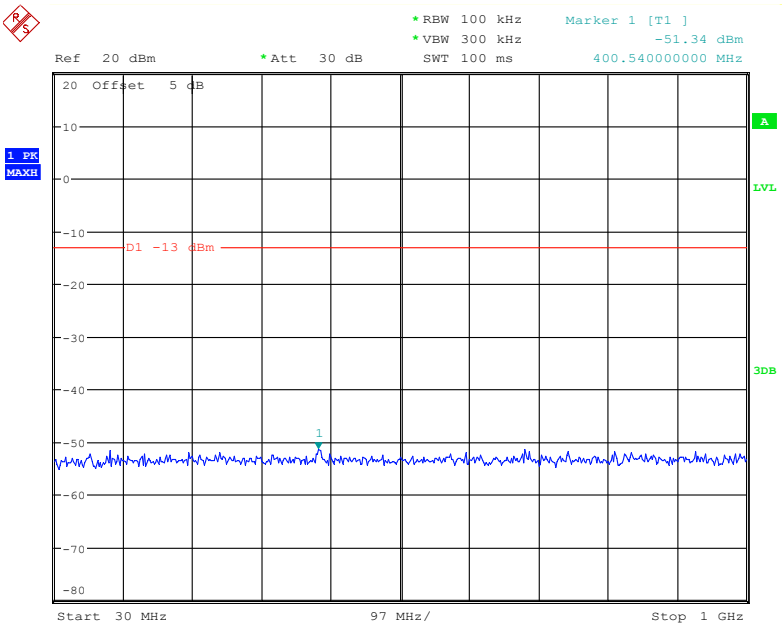
Date: 8.MAY.2020 10:16:19



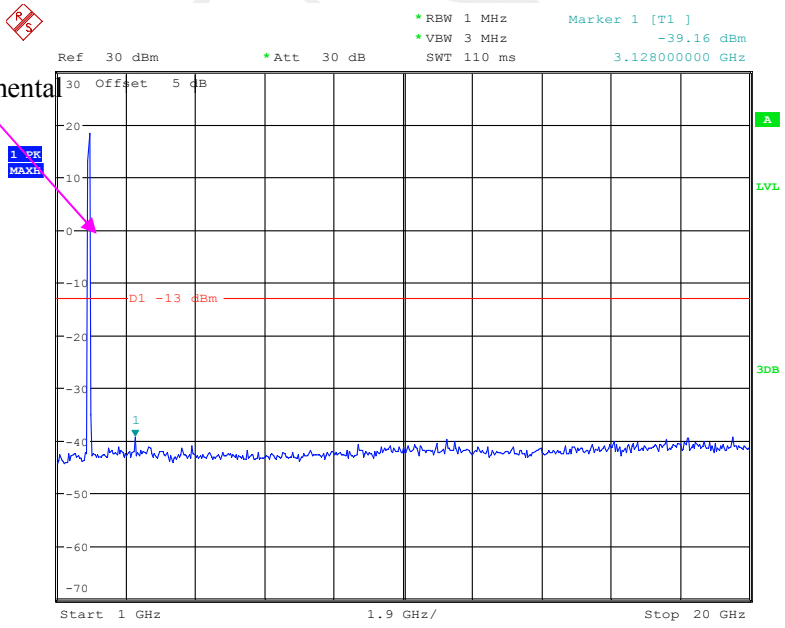
Fundamental

Date: 8.MAY.2020 10:16:31

QPSK_20 MHz



Date: 8.MAY.2020 10:16:56

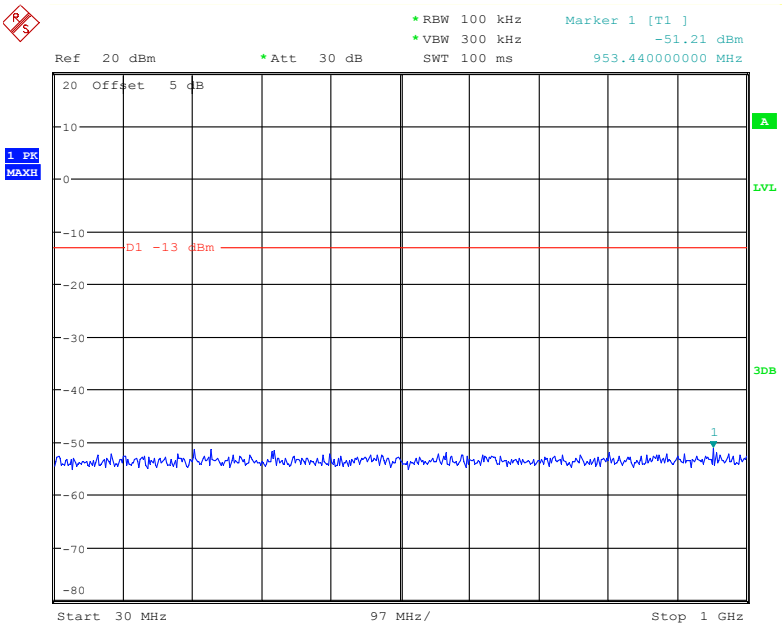


Fundamental

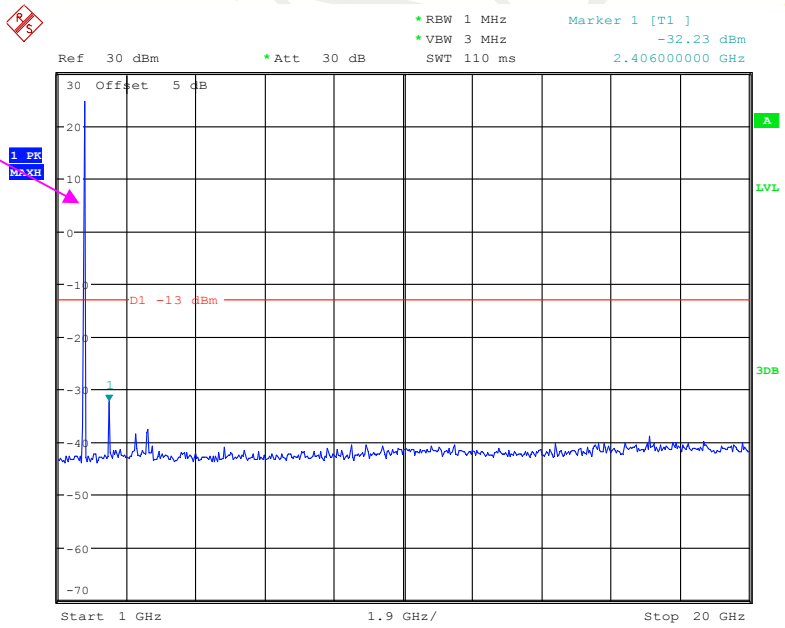
Date: 8.MAY.2020 10:17:08

LTE Band 4 (Middle Channel)

QPSK_1.4 MHz



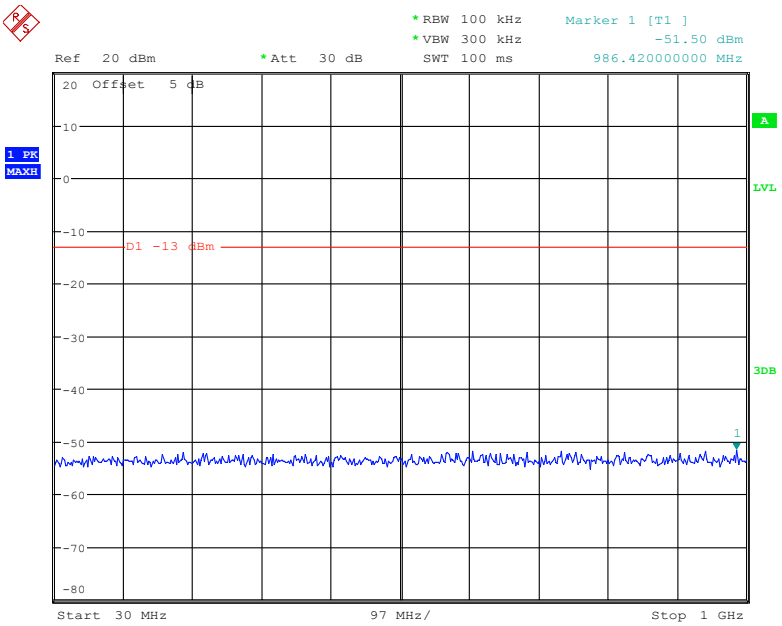
Date: 8.MAY.2020 10:17:33



Fundamental

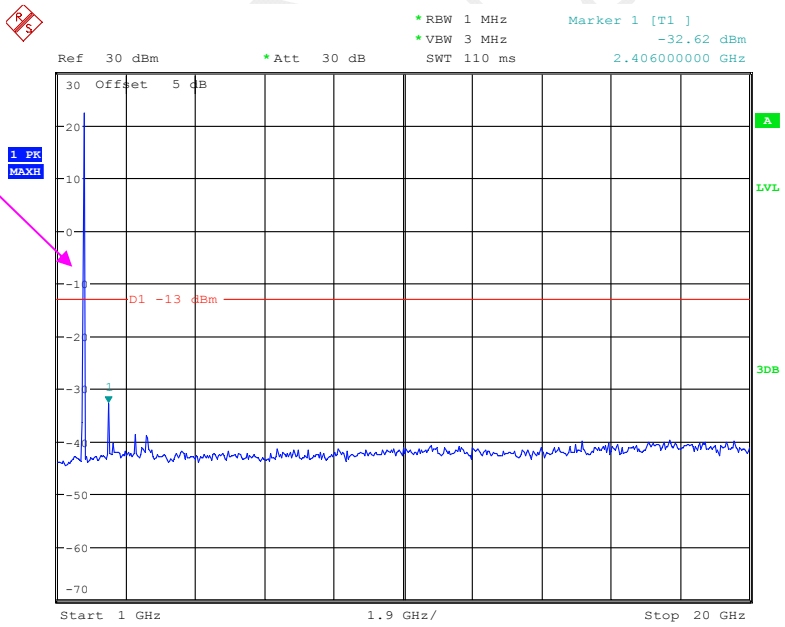
Date: 8.MAY.2020 10:17:45

QPSK_3 MHz



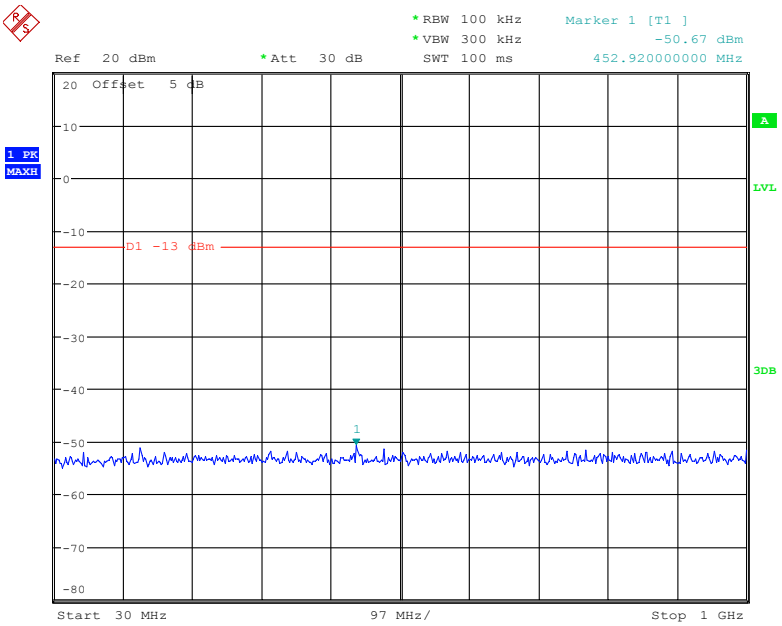
Date: 8.MAY.2020 10:18:03

Fundamental

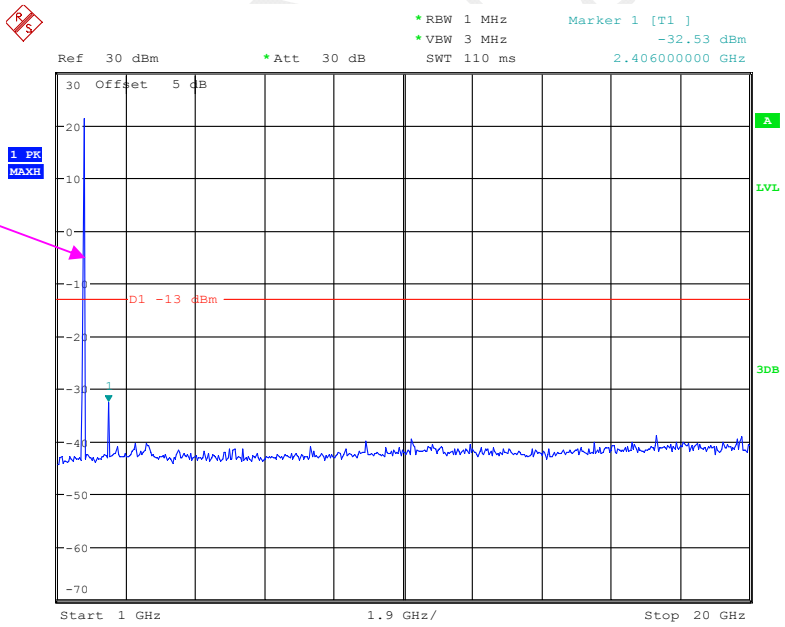


Date: 8.MAY.2020 10:18:15

QPSK_5 MHz



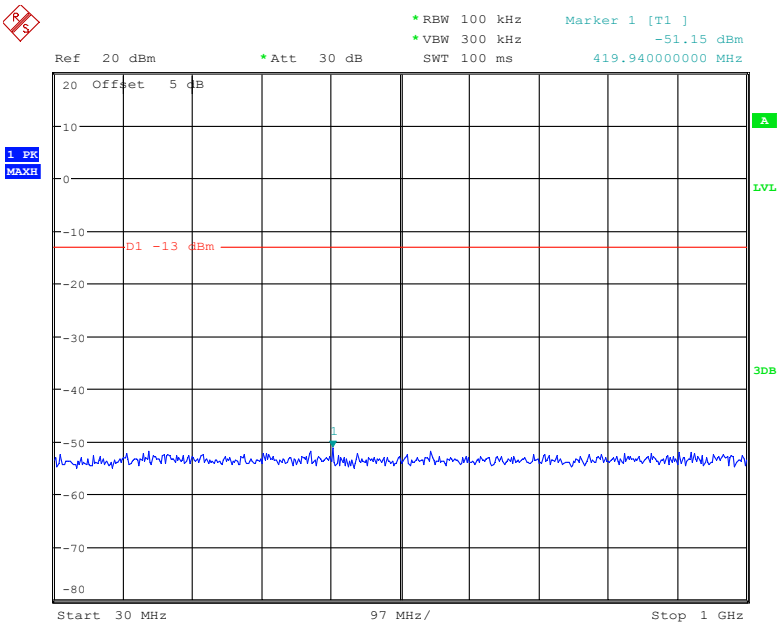
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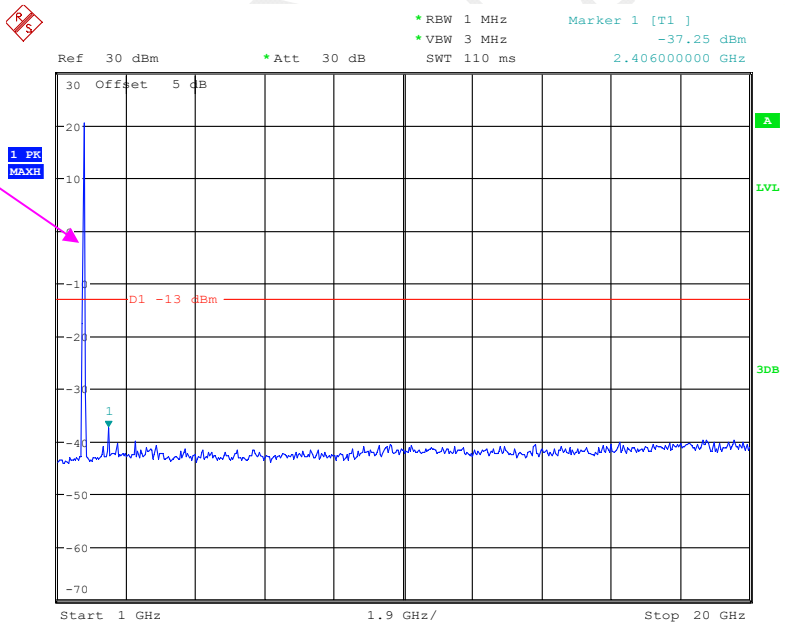
Fundamental

Date: 8.MAY.2020 10:18:49

QPSK_10 MHz



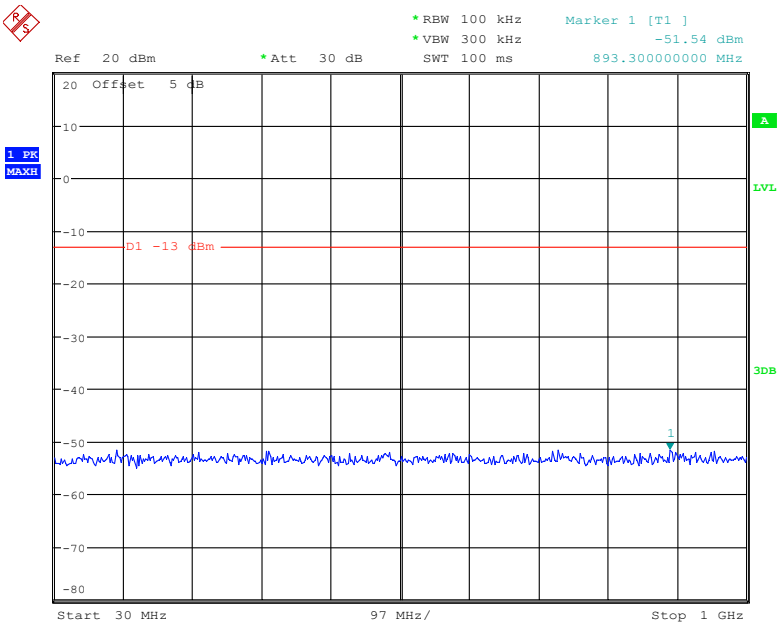
Date: 8.MAY.2020 10:19:09



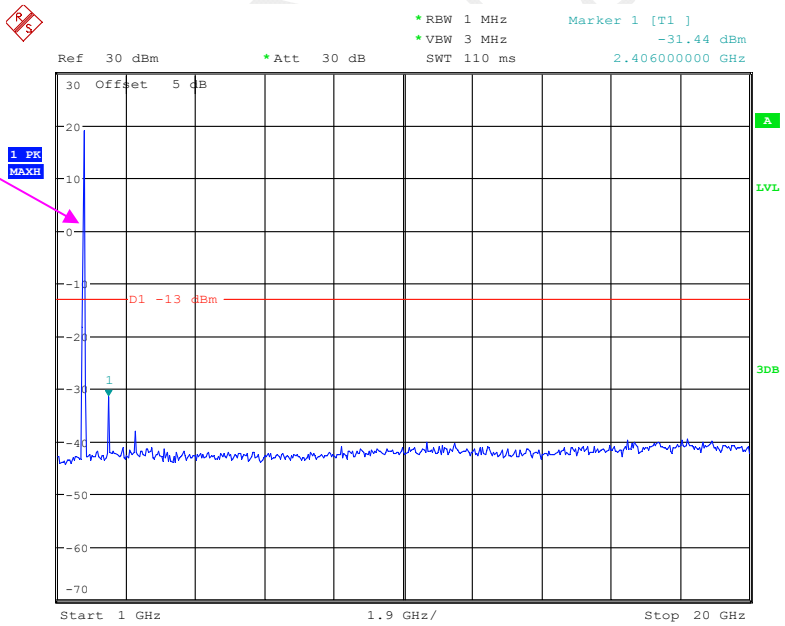
Fundamental

Date: 8.MAY.2020 10:19:21

QPSK_15 MHz



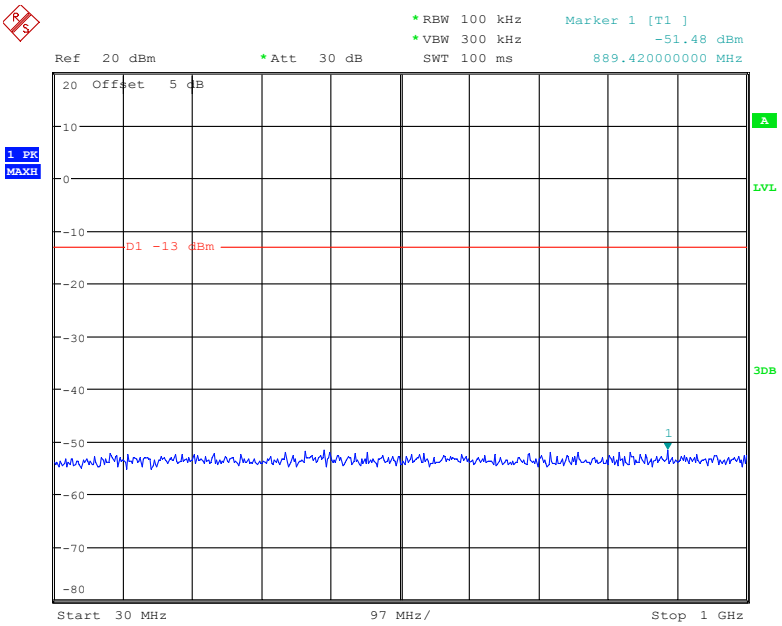
Date: 8.MAY.2020 10:19:47



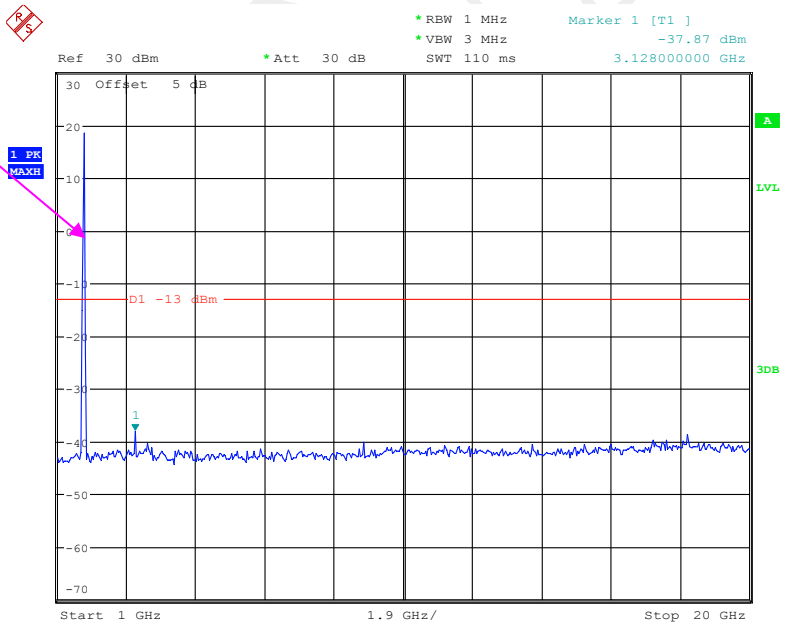
Fundamental

Date: 8.MAY.2020 10:19:58

QPSK_20 MHz



Date: 8.MAY.2020 10:20:21

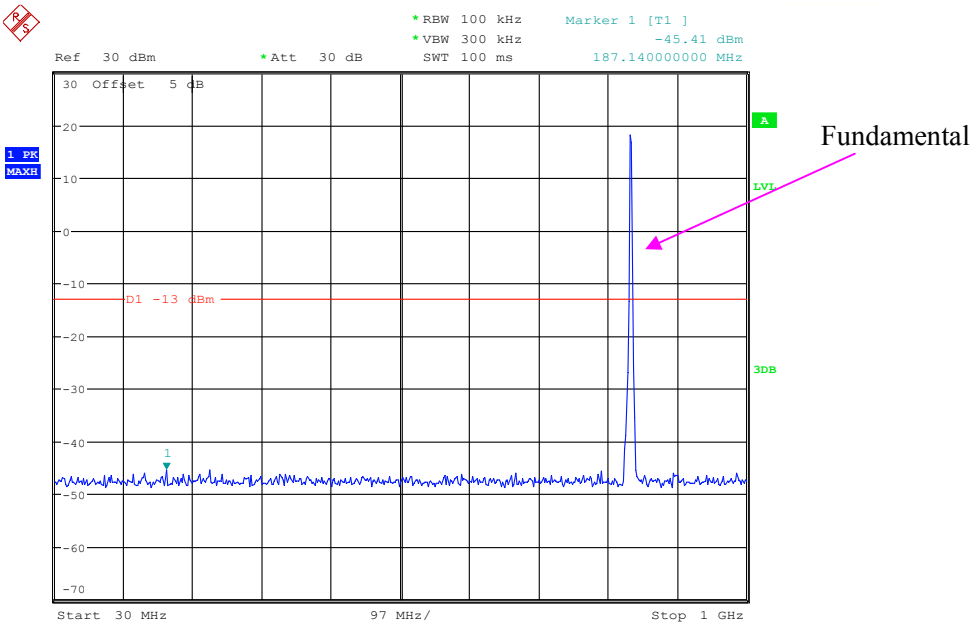


Fundamental

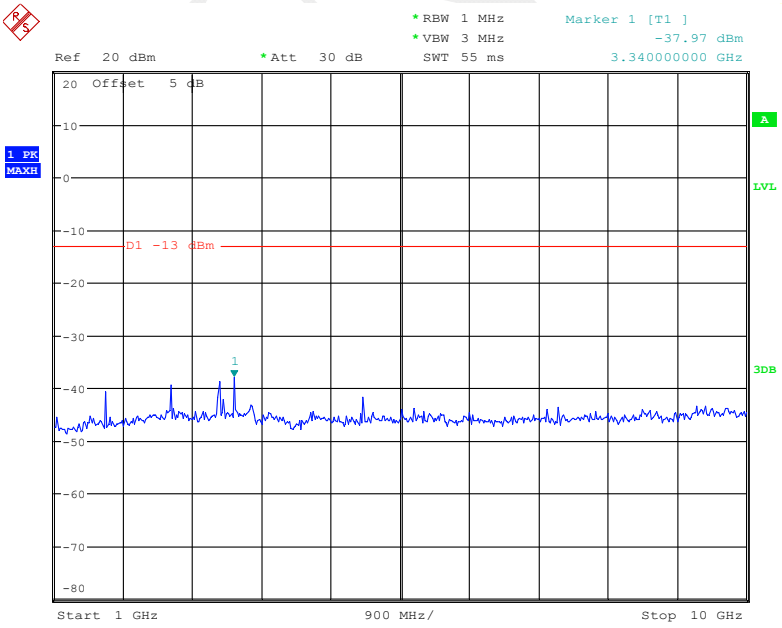
Date: 8.MAY.2020 10:20:33

LTE Band 5 (Middle Channel)

QPSK_1.4 MHz

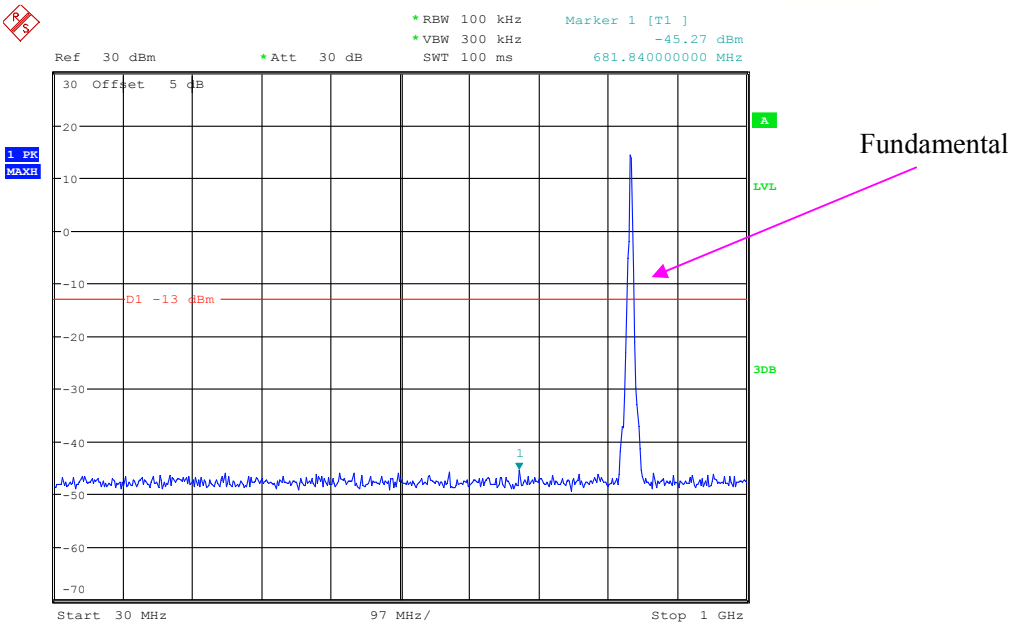


Date: 8.MAY.2020 10:21:03

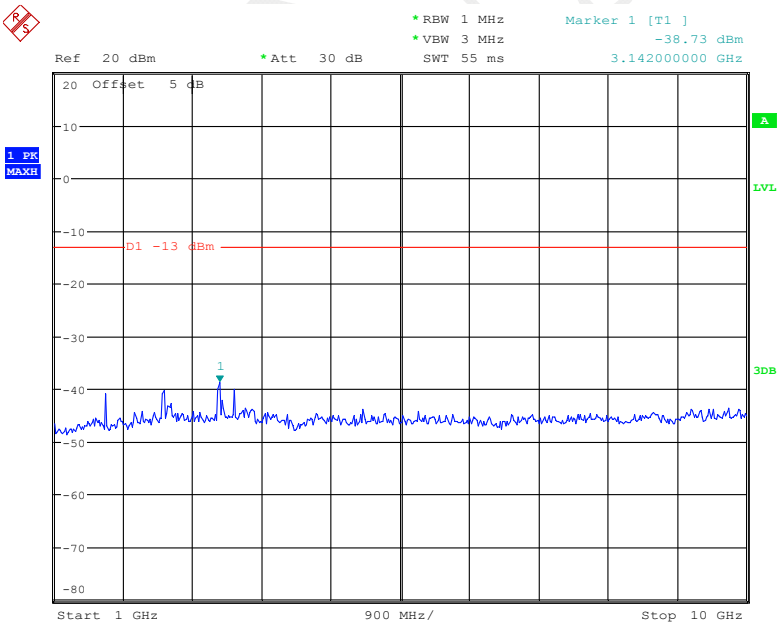


Date: 8.MAY.2020 10:21:14

QPSK_3 MHz

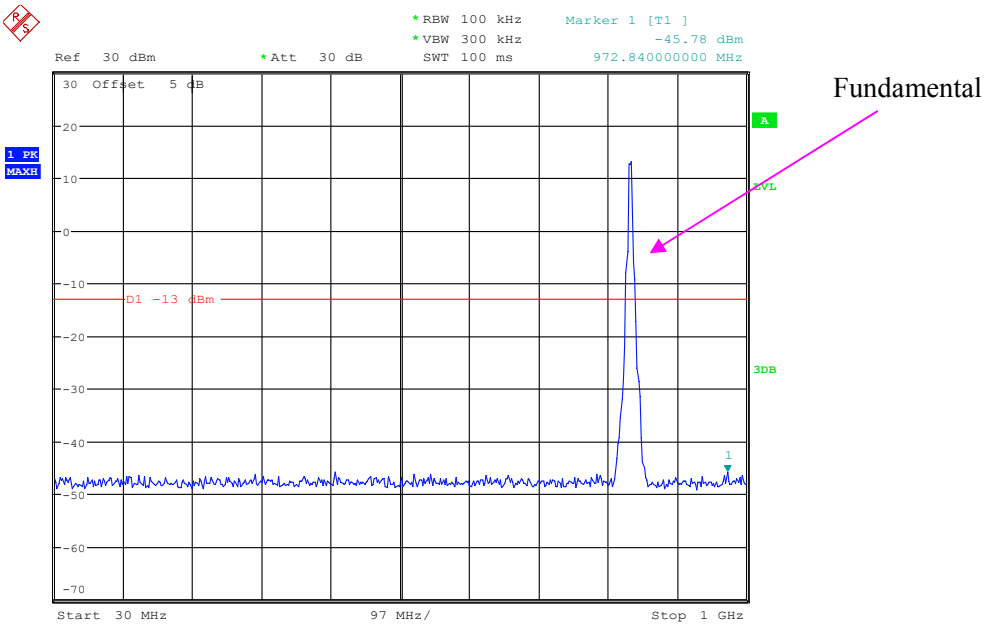


Date: 8.MAY.2020 10:21:33

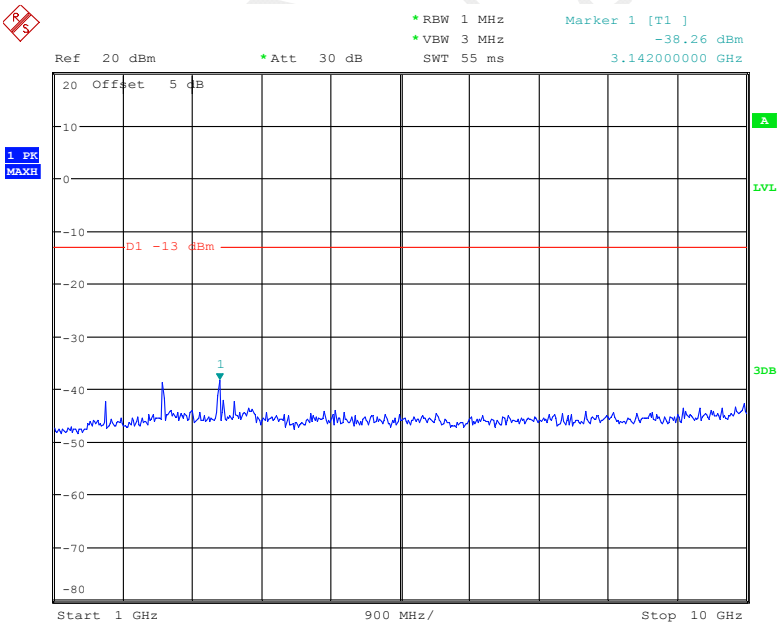


Date: 8.MAY.2020 10:21:45

QPSK_5 MHz

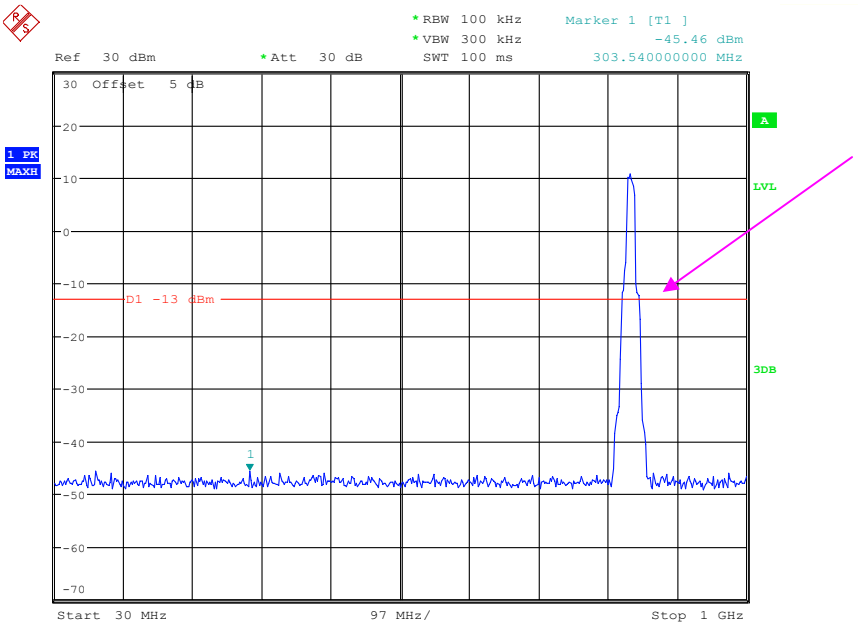


Date: 8.MAY.2020 10:22:04



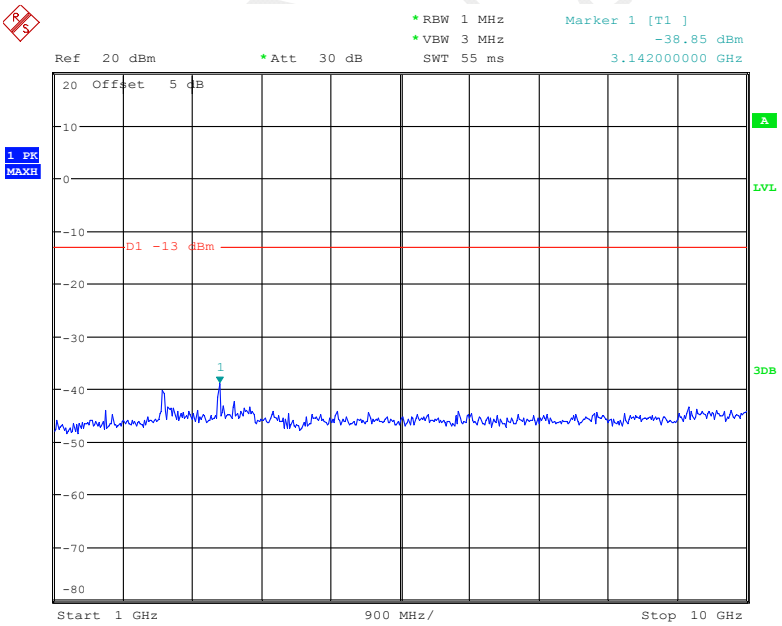
Date: 8.MAY.2020 10:22:16

QPSK_10 MHz



Fundamental

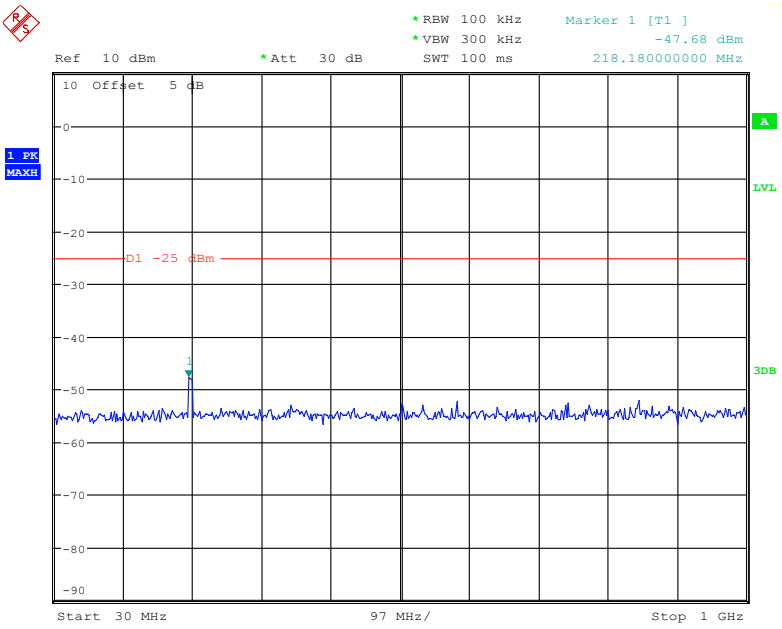
Date: 8.MAY.2020 10:22:36



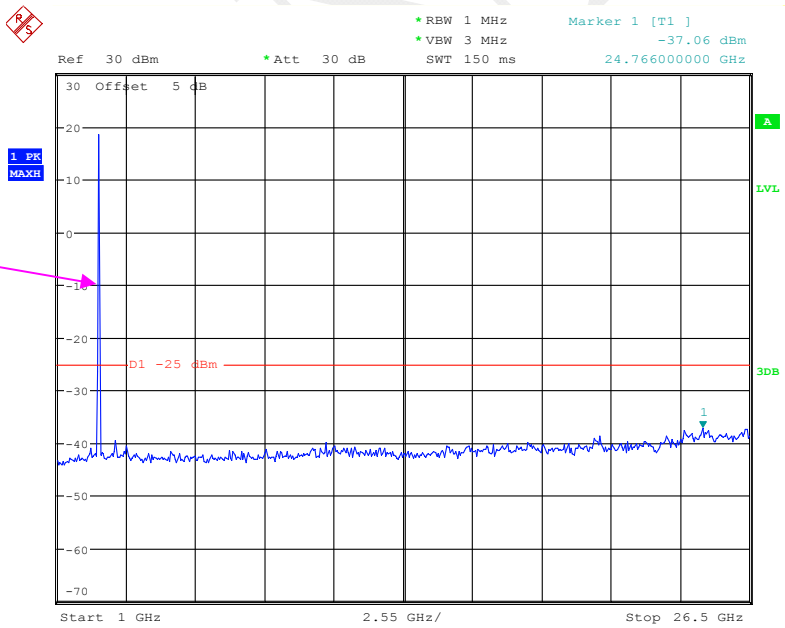
Date: 8.MAY.2020 10:22:48

LTE Band 7 (Middle Channel)

QPSK_5 MHz



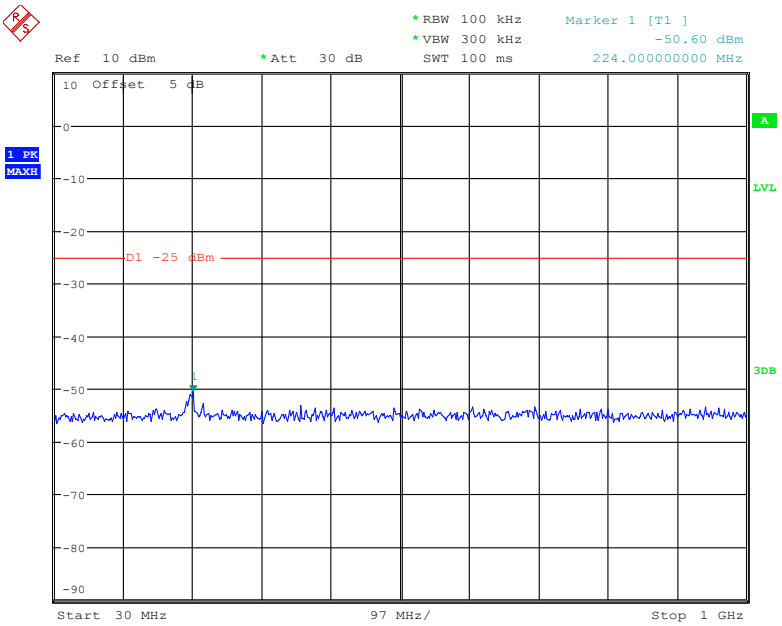
Date: 15.MAY.2020 11:00:21



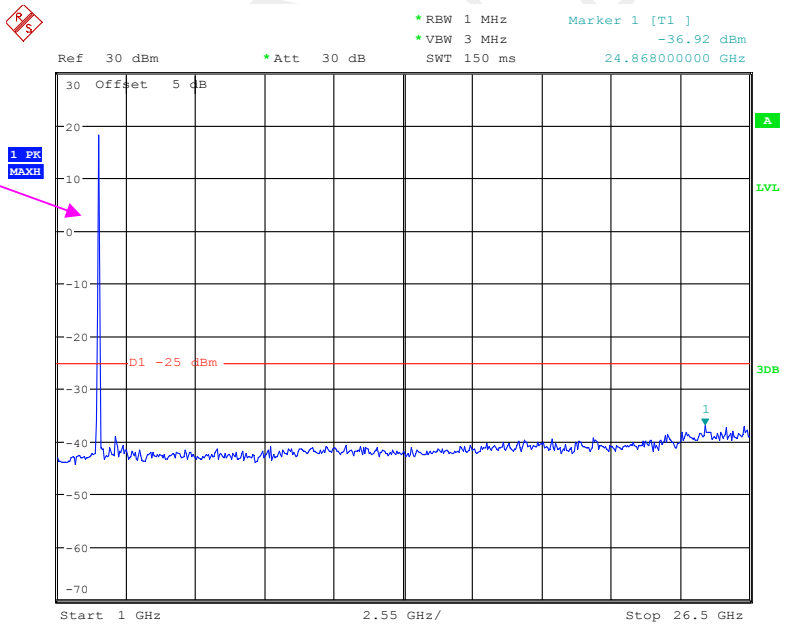
Fundamental

Date: 15.MAY.2020 11:00:33

QPSK_10 MHz



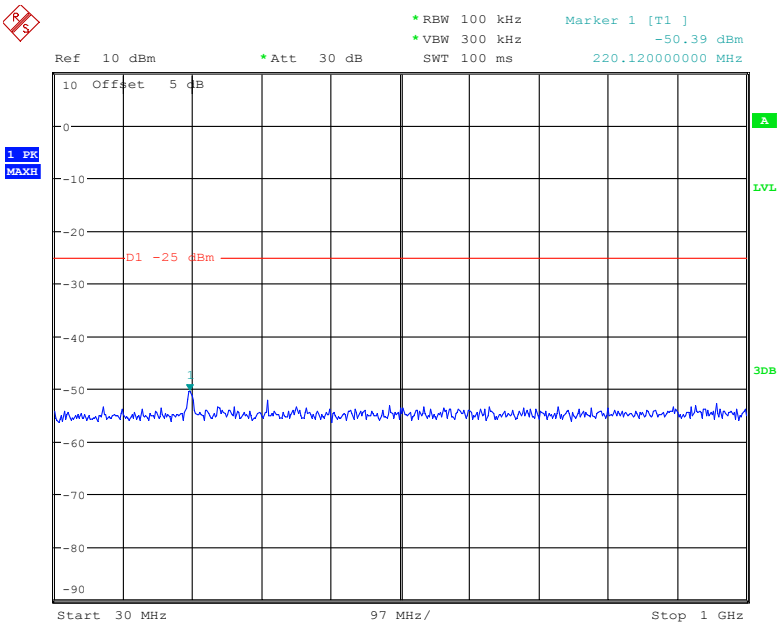
Date: 15.MAY.2020 11:01:18



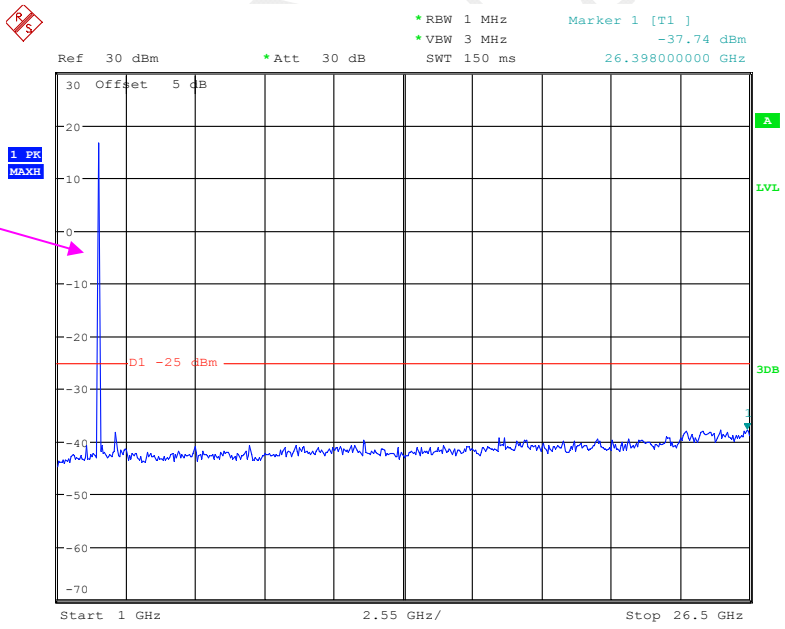
Fundamental

Date: 15.MAY.2020 11:01:30

QPSK_15 MHz



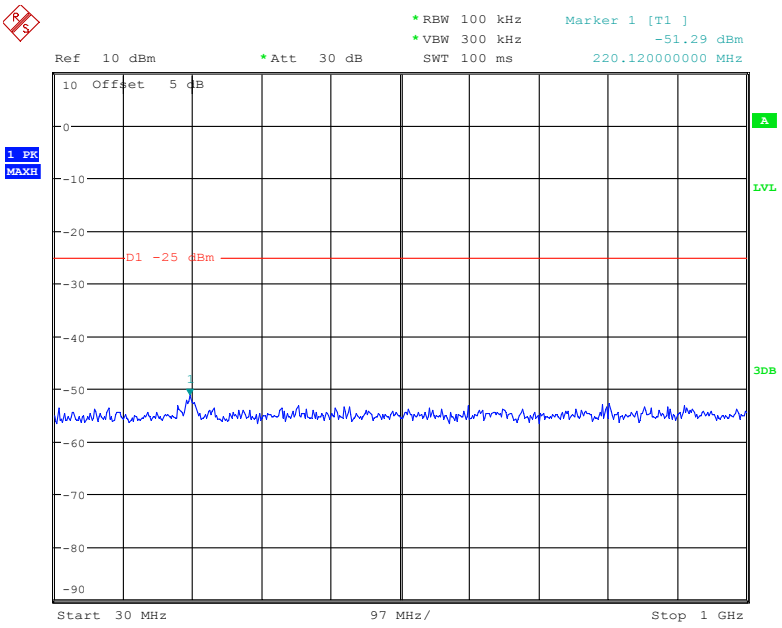
Date: 15.MAY.2020 11:01:55



Fundamental

Date: 15.MAY.2020 11:02:07

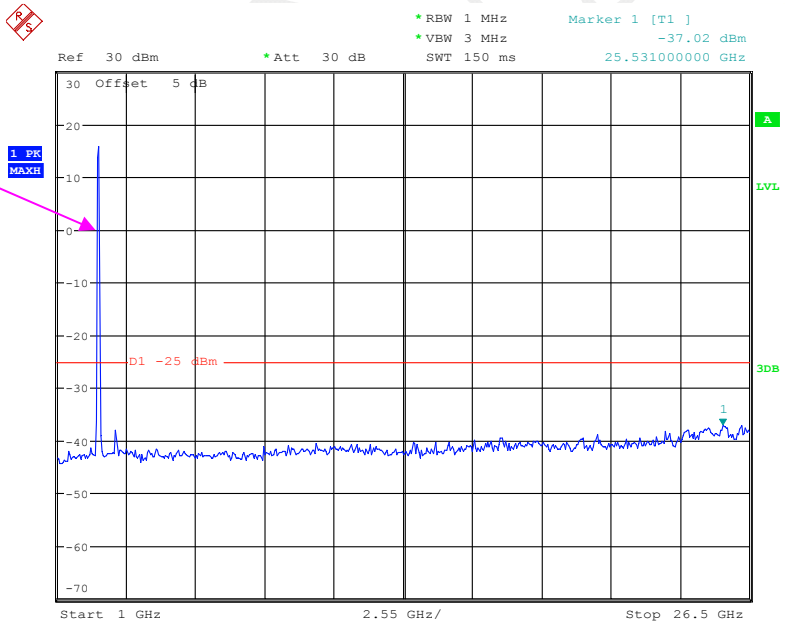
QPSK_20 MHz



Date: 15.MAY.2020 11:02:30

QPSK_20 MHz

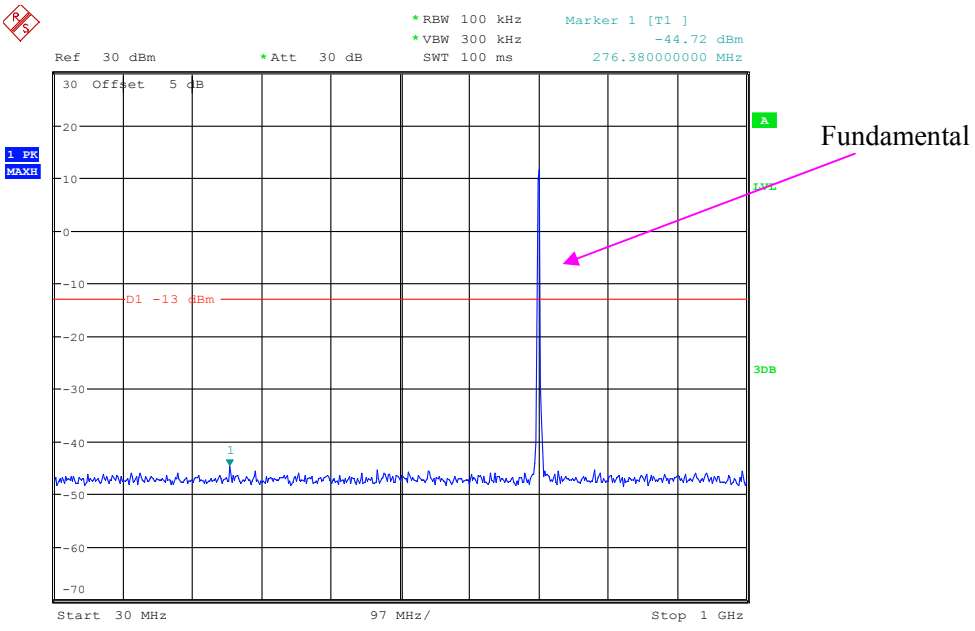
Fundamental



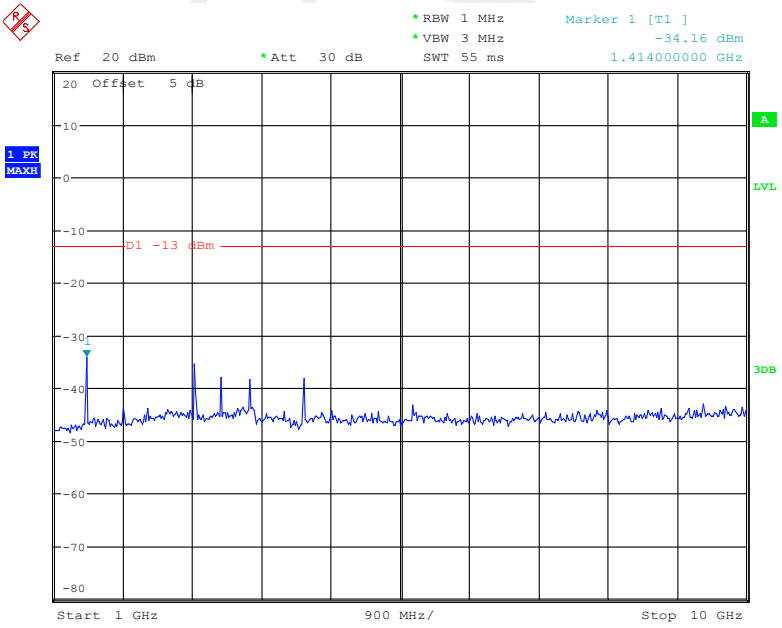
Date: 15.MAY.2020 11:02:42

LTE Band 12 (Middle Channel)

QPSK_1.4 MHz

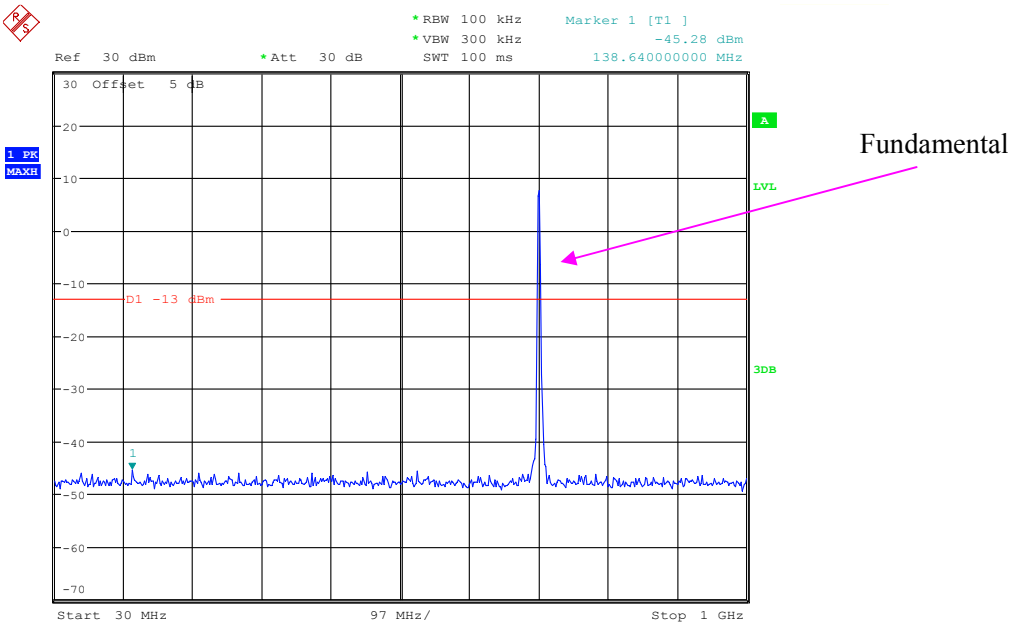


Date: 15.MAY.2020 17:22:33

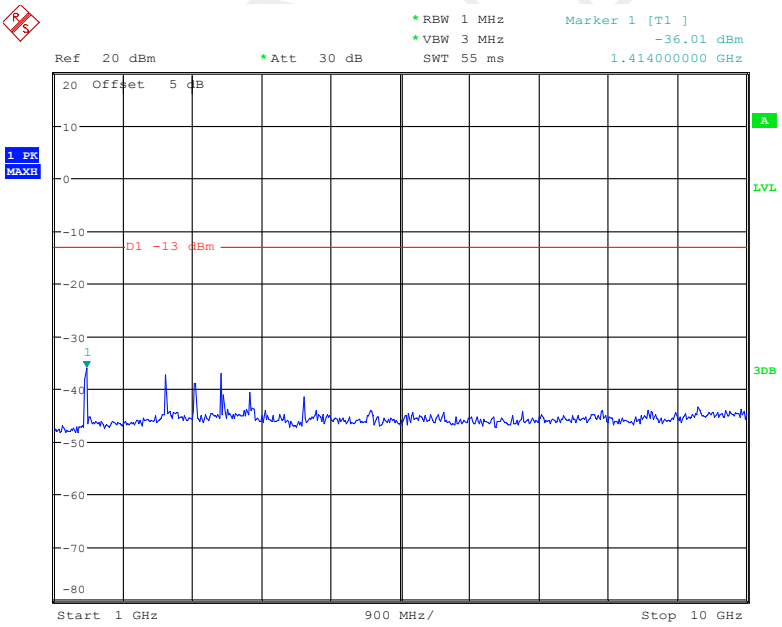


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QPSK_3 MHz

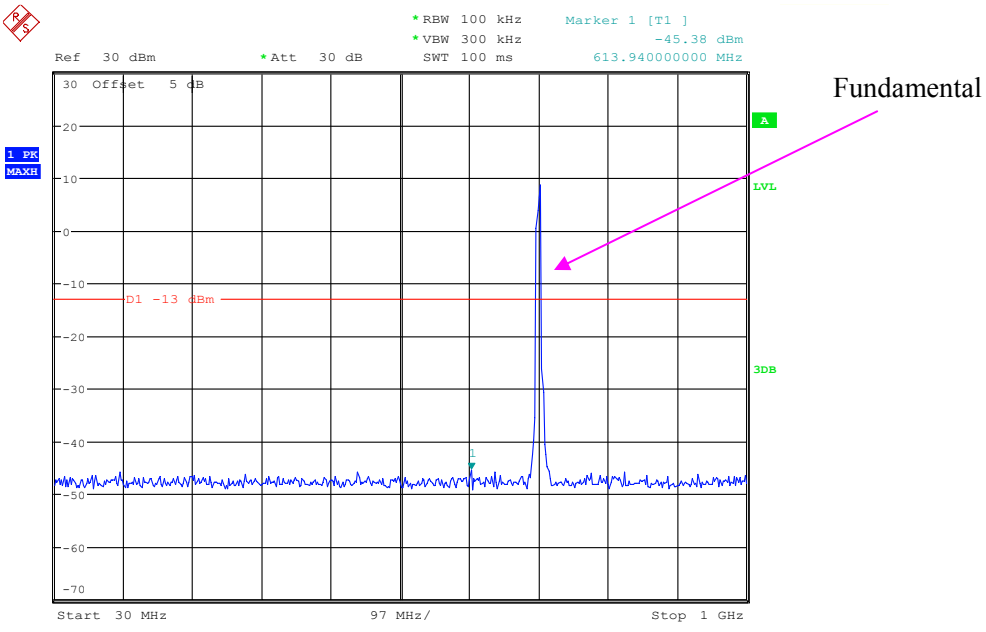


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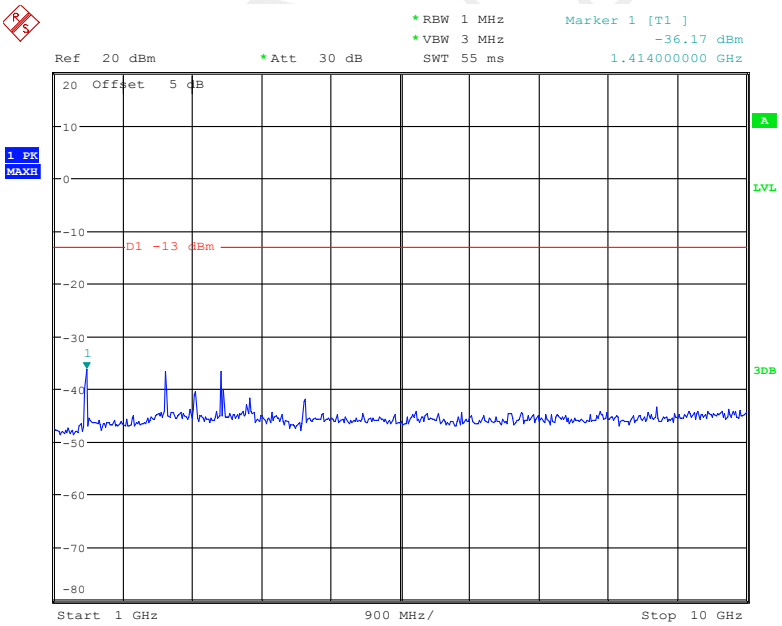


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QPSK_5 MHz

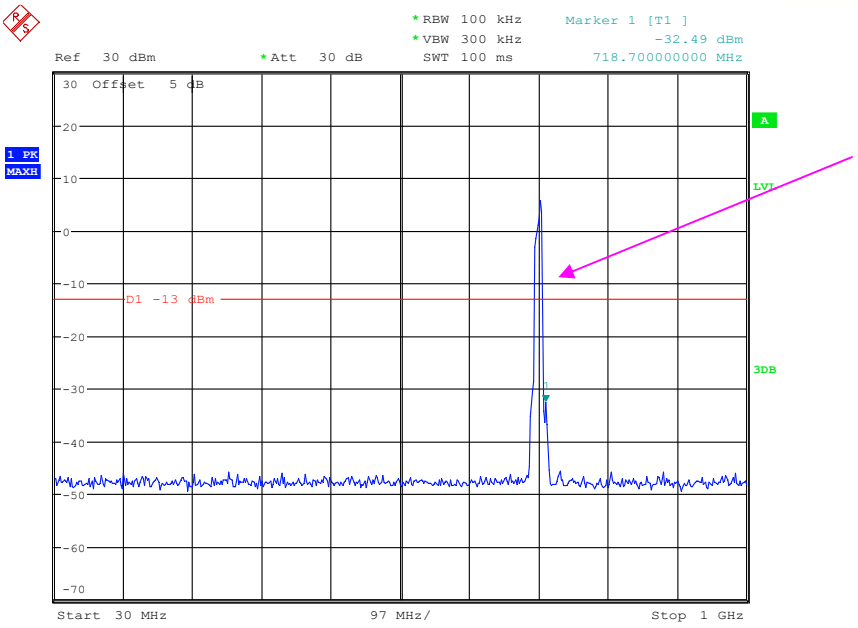


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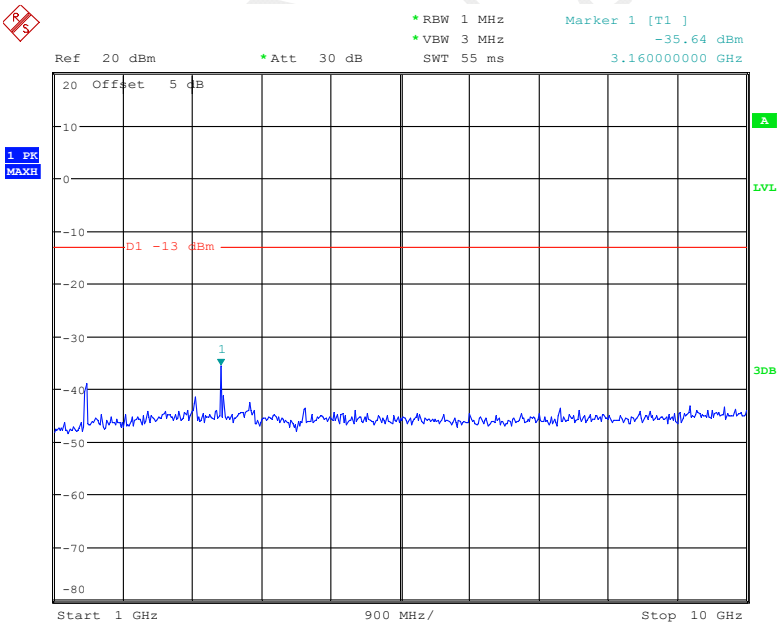
Date: 15.MAY.2020 17:23:46

QPSK_10 MHz



Fundamental

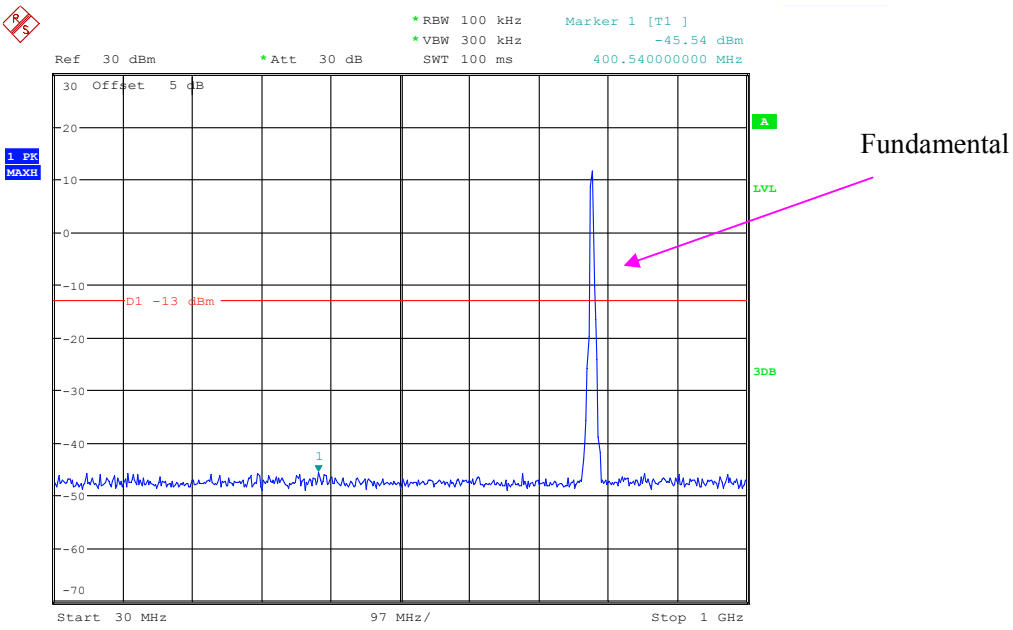
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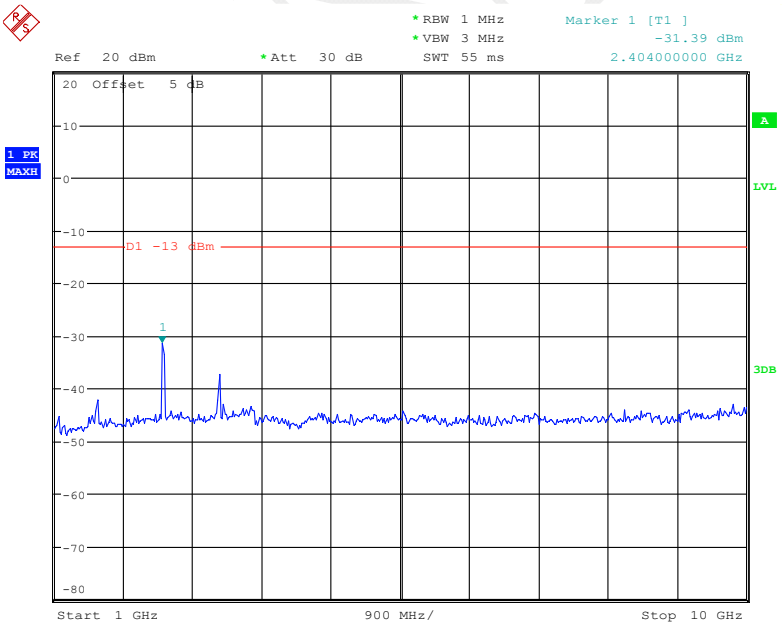
Date: 15.MAY.2020 17:24:18

LTE Band 13 (Middle Channel)

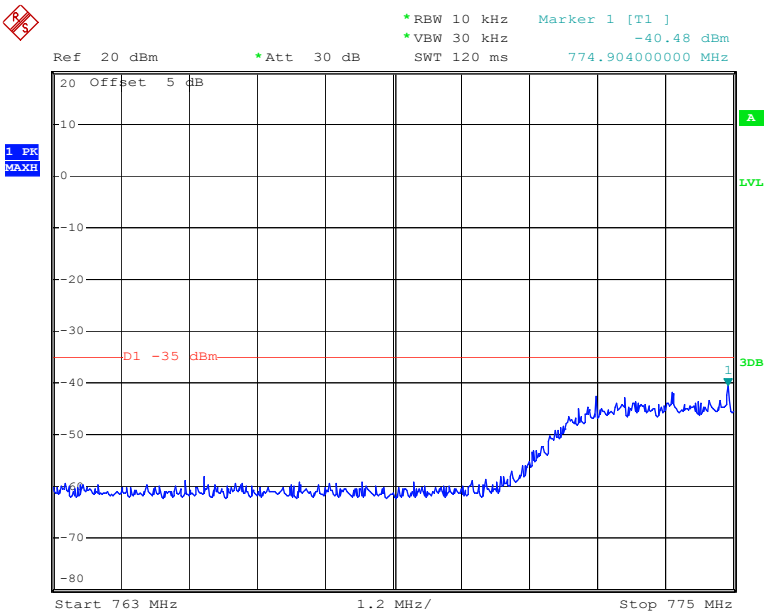
QPSK_5 MHz



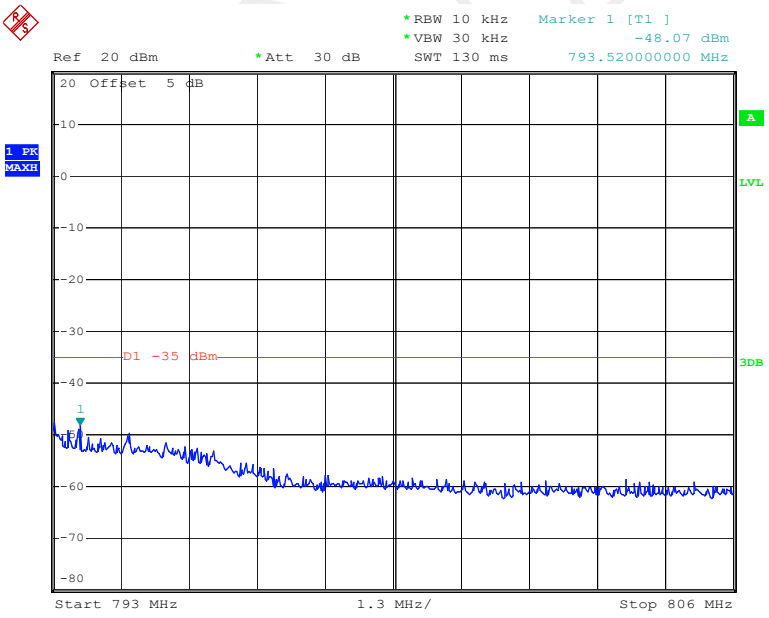
Date: 8.MAY.2020 10:28:53



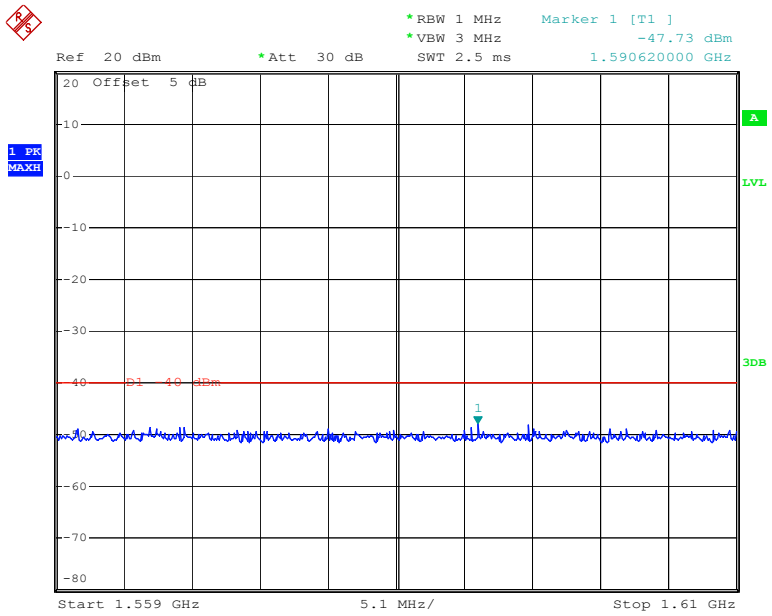
Date: 8.MAY.2020 10:29:05



Date: 19.MAY.2020 20:19:08

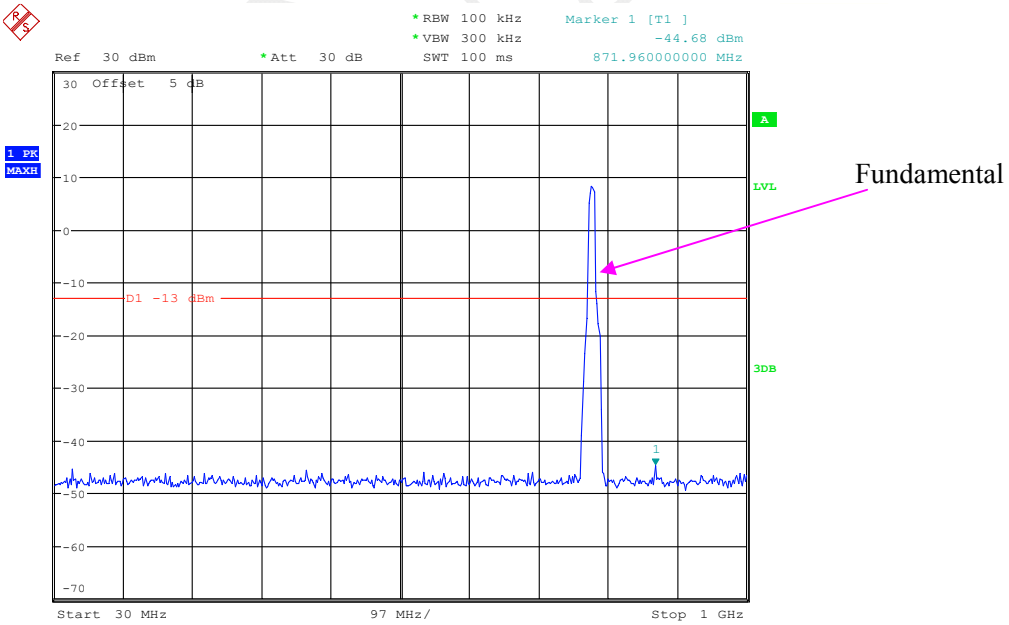


Date: 19.MAY.2020 20:20:20

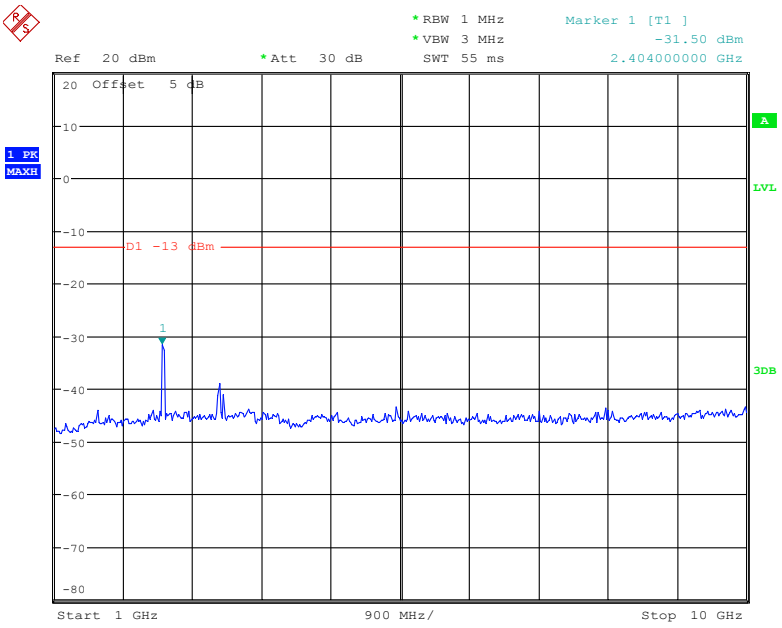


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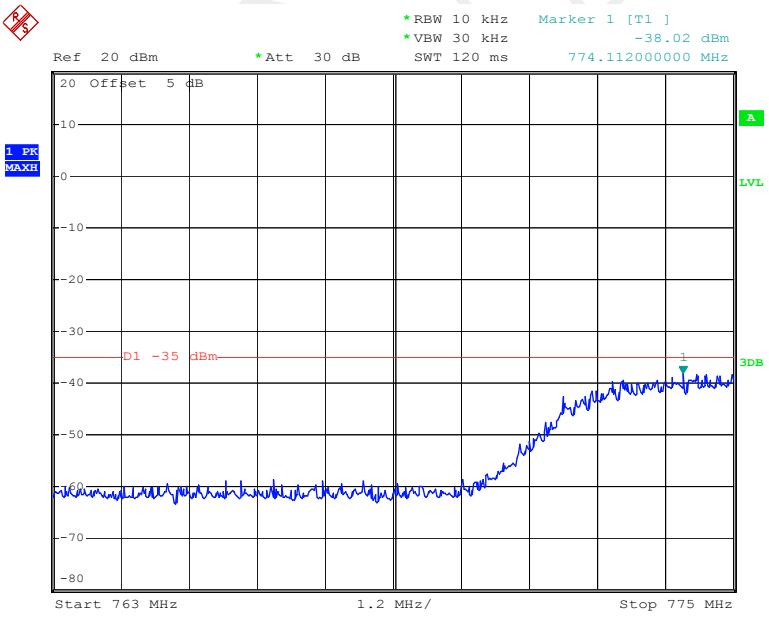
QPSK_10 MHz



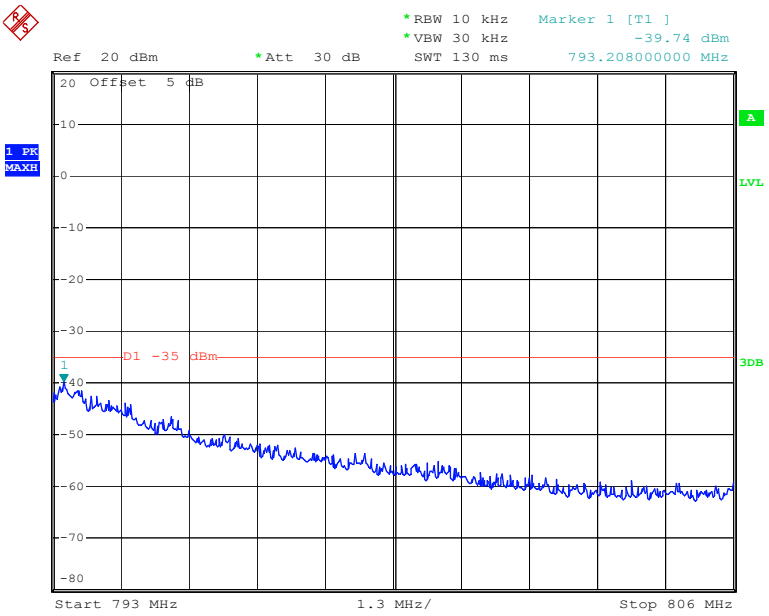
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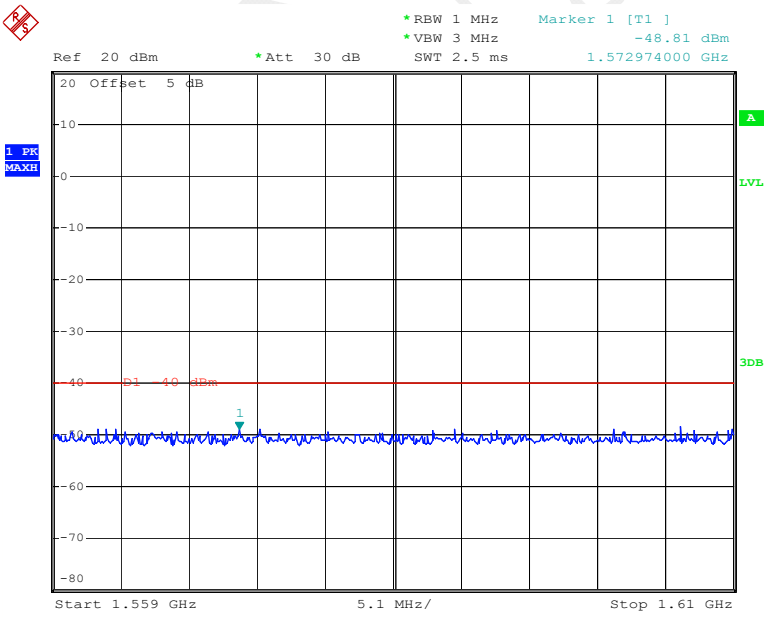
Date: 8.MAY.2020 10:29:40



Date: 19.MAY.2020 20:32:24



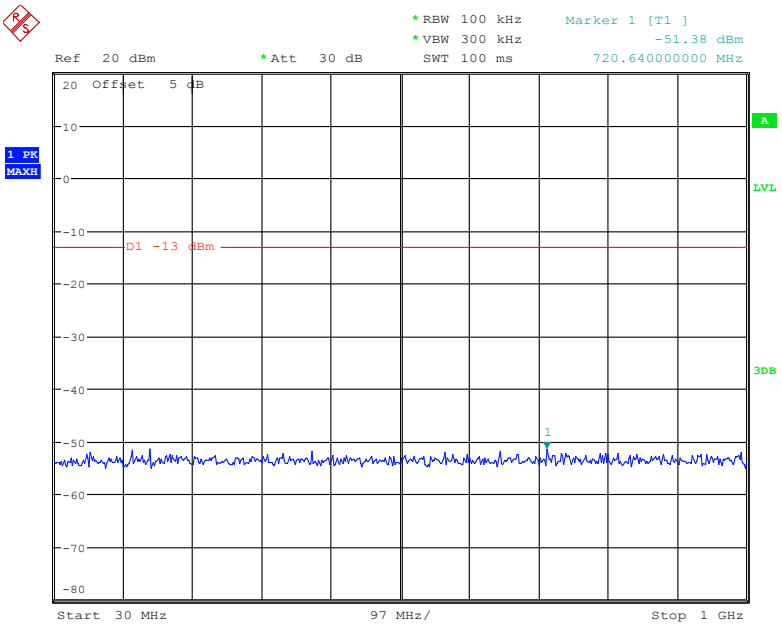
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Date: 19.MAY.2020 20:27:00

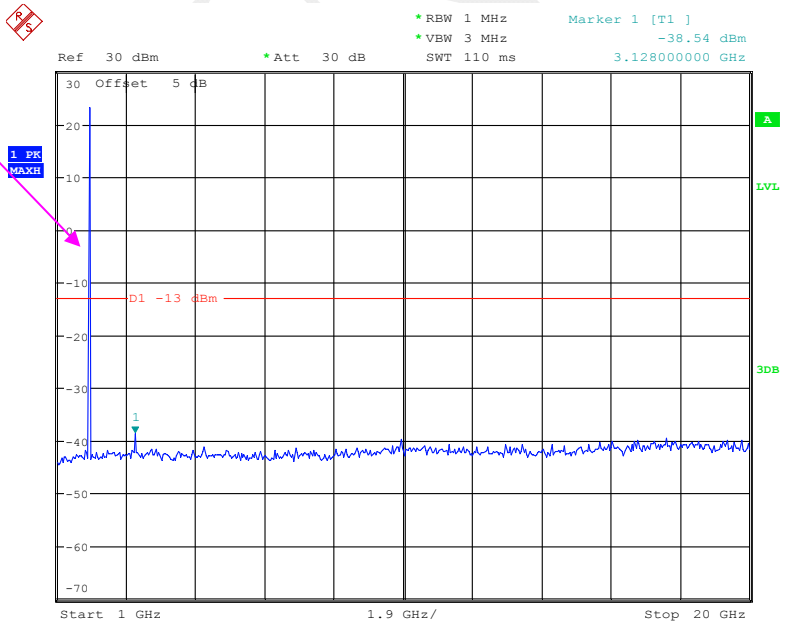
LTE Band 25 (Middle Channel)

QPSK_1.4 MHz



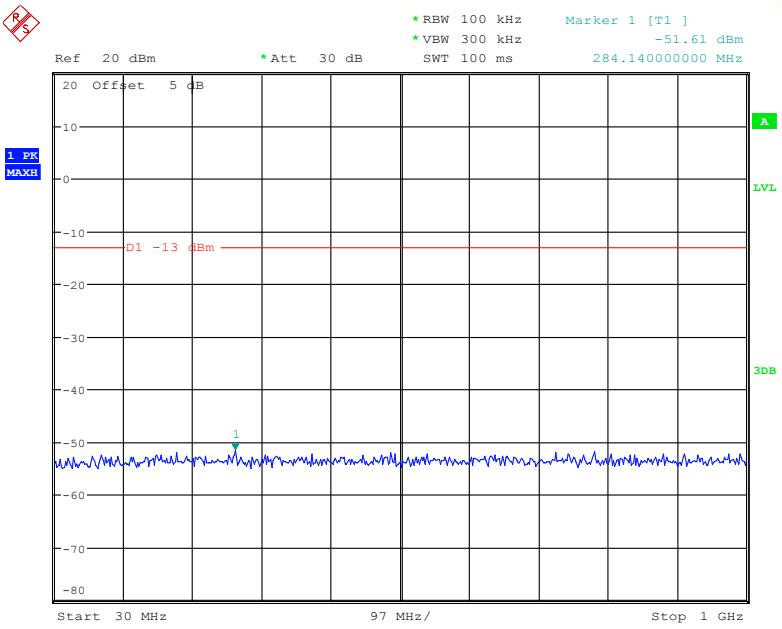
Date: 8.MAY.2020 10:30:17

Fundamental



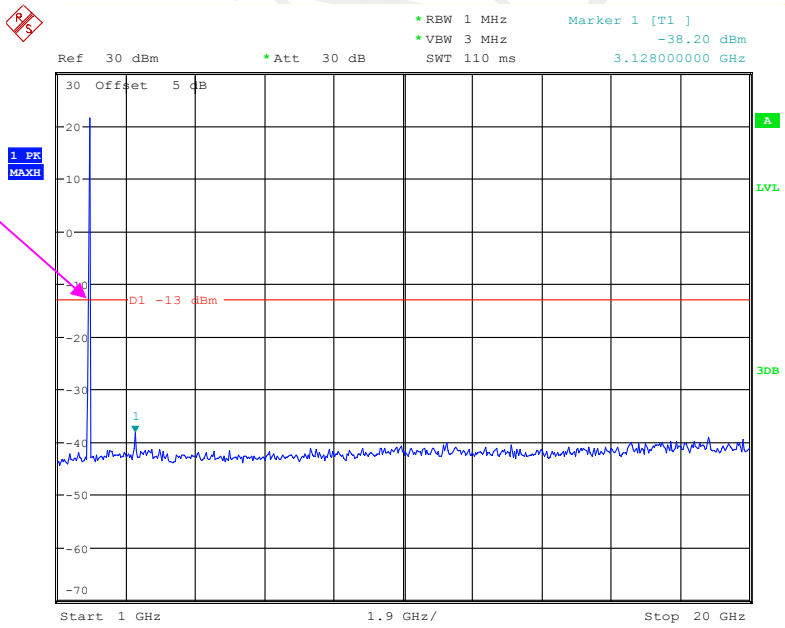
Date: 8.MAY.2020 10:30:29

QPSK_3 MHz



Date: 8.MAY.2020 10:30:48

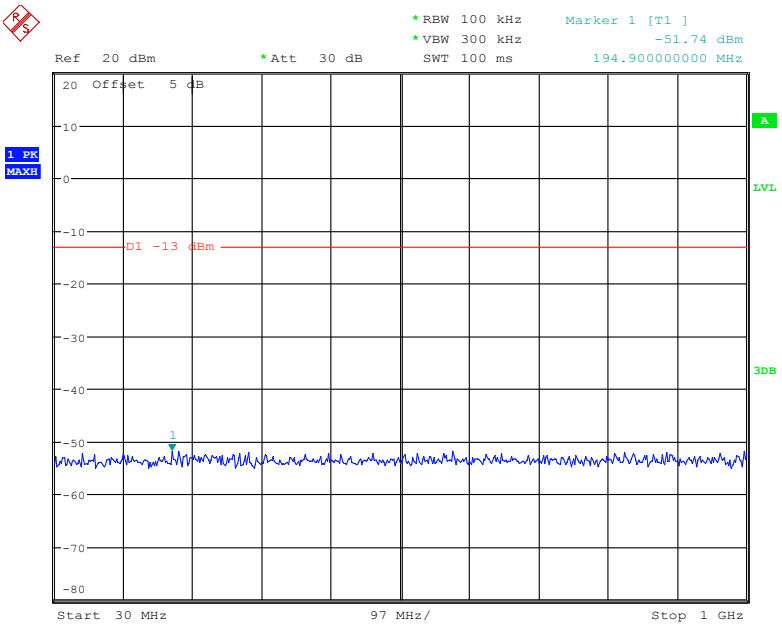
QPSK_3 MHz



Fundamental

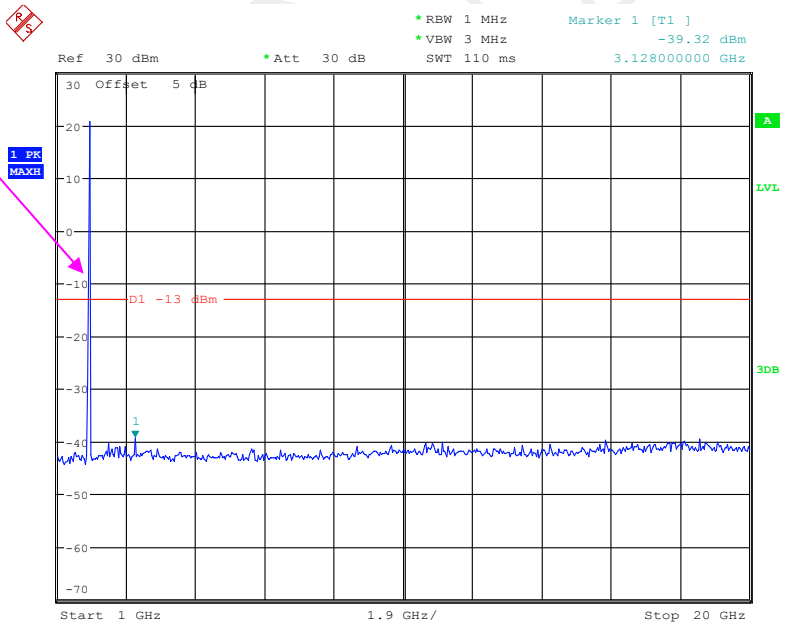
Date: 8.MAY.2020 10:31:00

QPSK_5 MHz



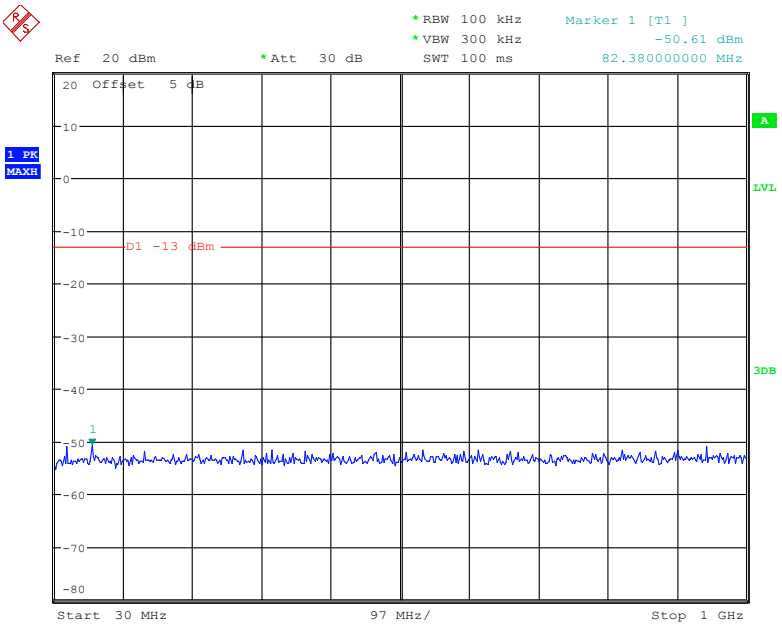
Date: 8.MAY.2020 10:31:19

Fundamental

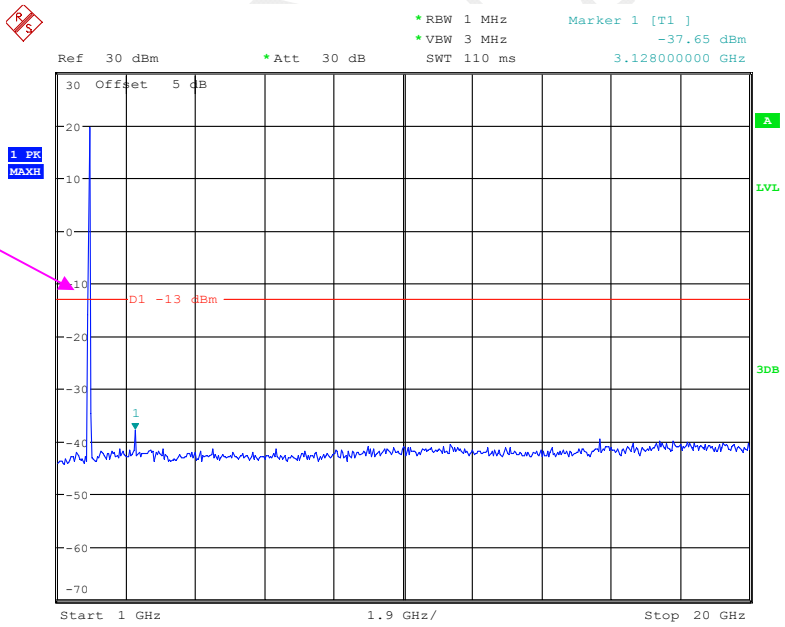


Date: 8.MAY.2020 10:31:30

QPSK_10 MHz



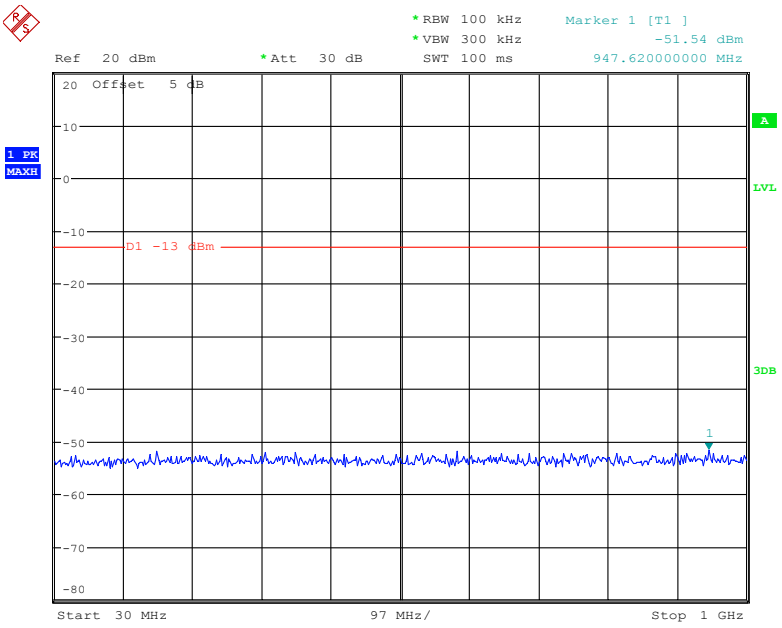
Date: 8.MAY.2020 10:31:54



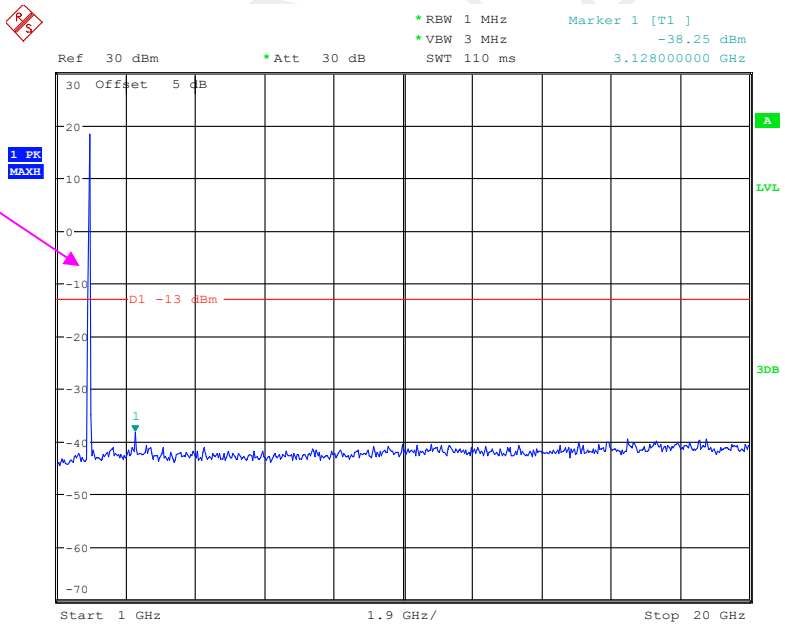
Fundamental

Date: 8.MAY.2020 10:32:05

QPSK_15 MHz



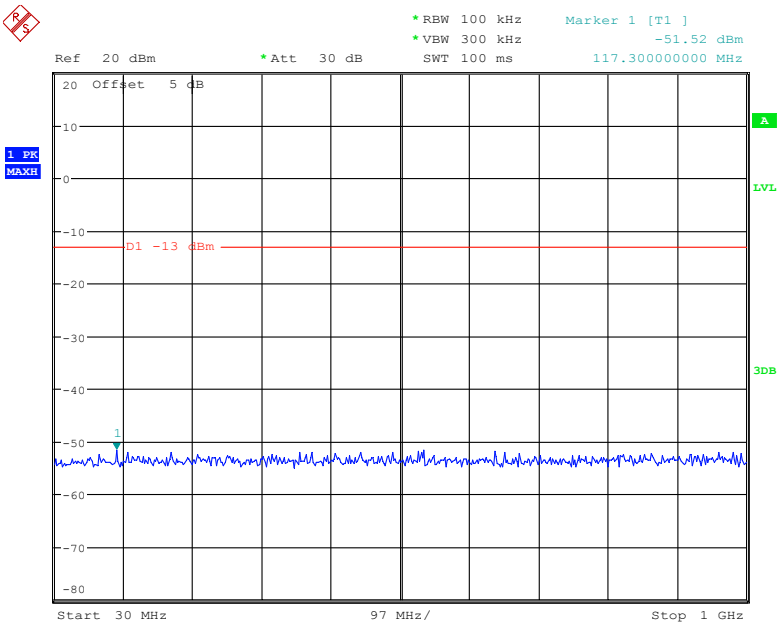
Date: 8.MAY.2020 10:32:28



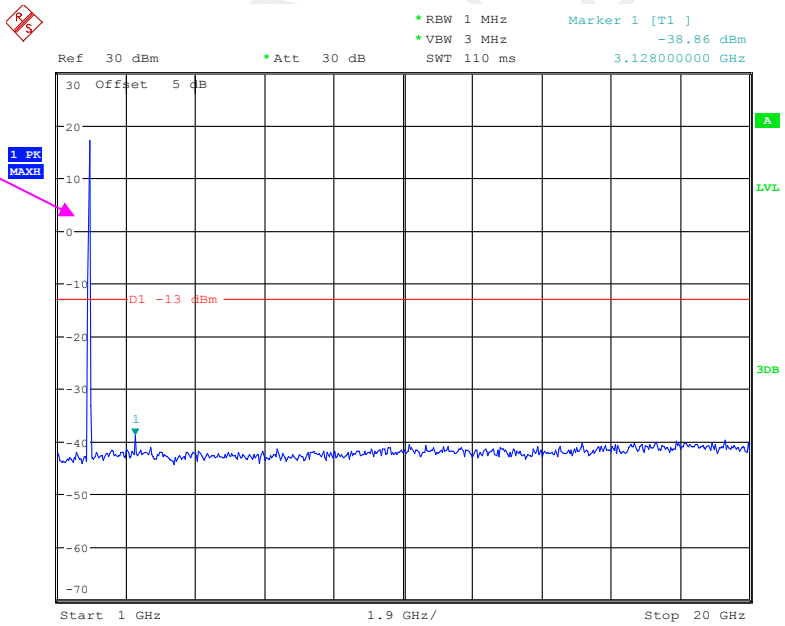
Fundamental

Date: 8.MAY.2020 10:32:40

QPSK_20 MHz



Date: 8.MAY.2020 10:33:02

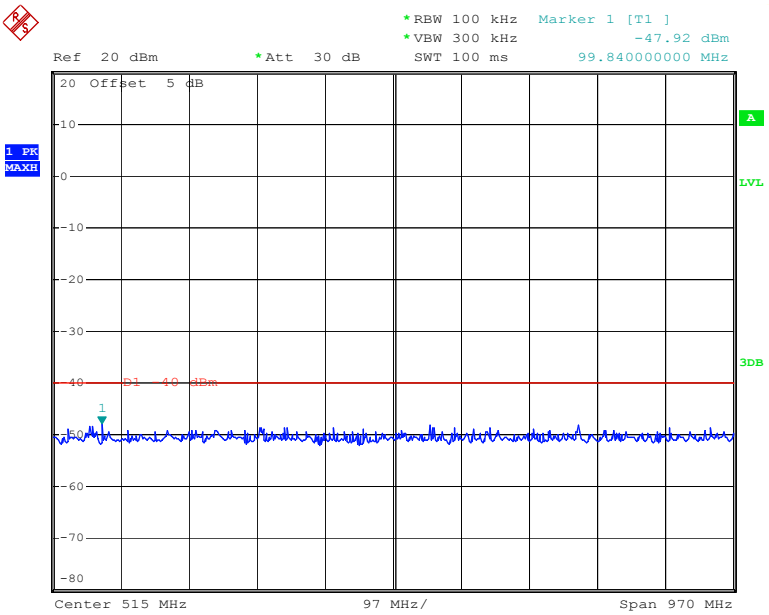


Fundamental

Date: 8.MAY.2020 10:33:14

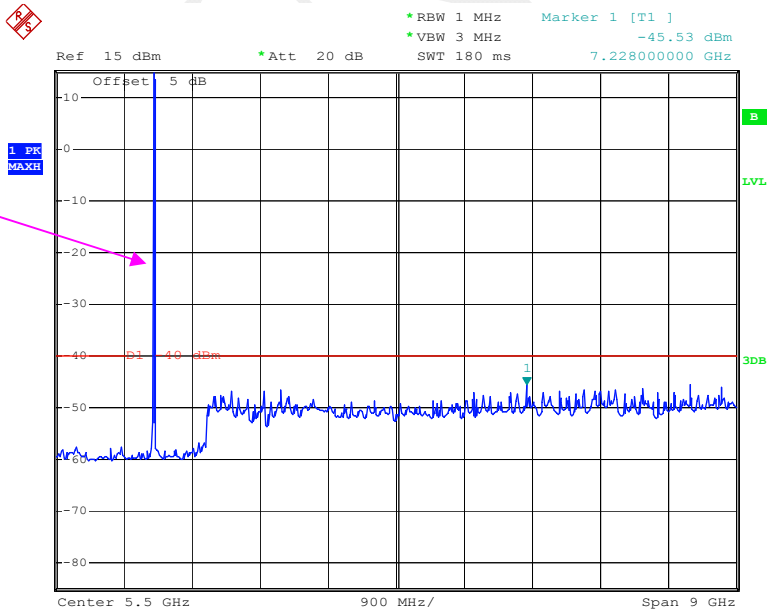
LTE Band 40 Lower:

QPSK_5 MHz

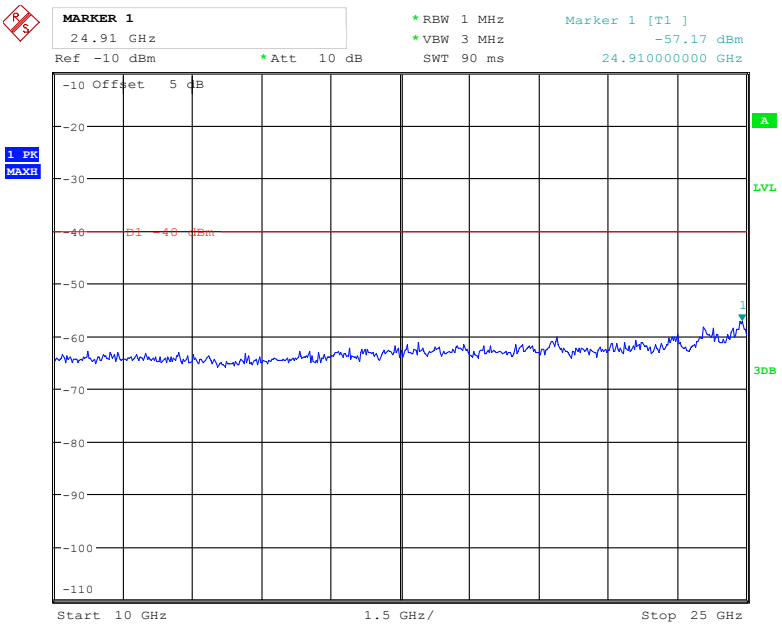


Date: 15.MAY.2020 12:49:28

Fundamental

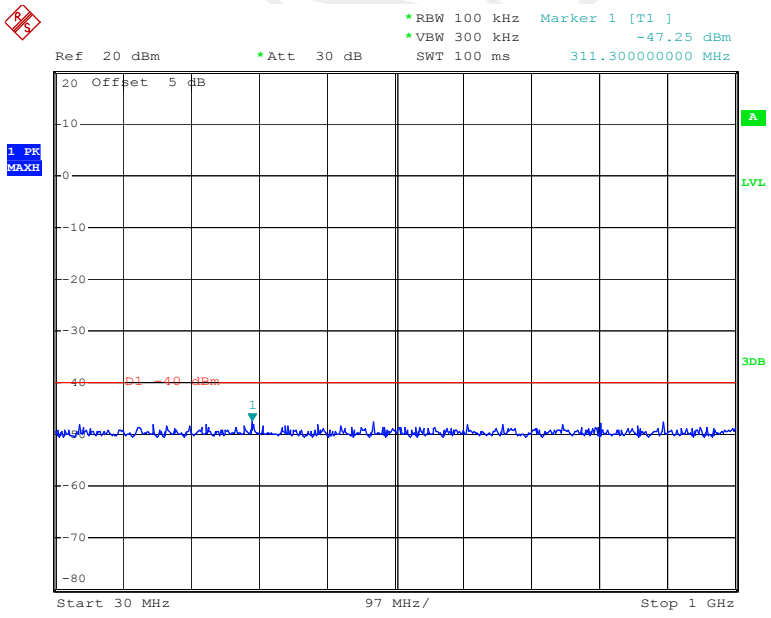


Date: 15.MAY.2020 12:49:15

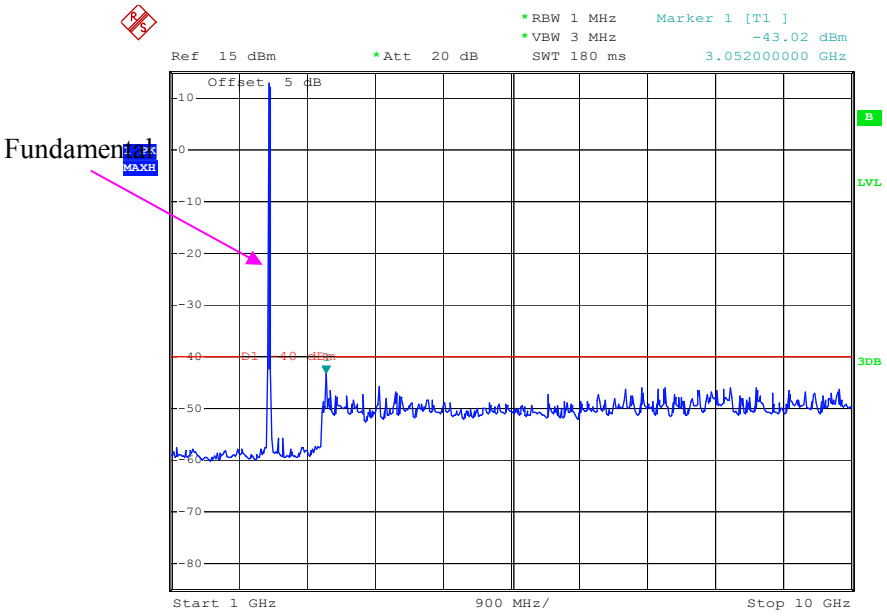


Date: 15.MAY.2020 14:51:16

QPSK_10 MHz

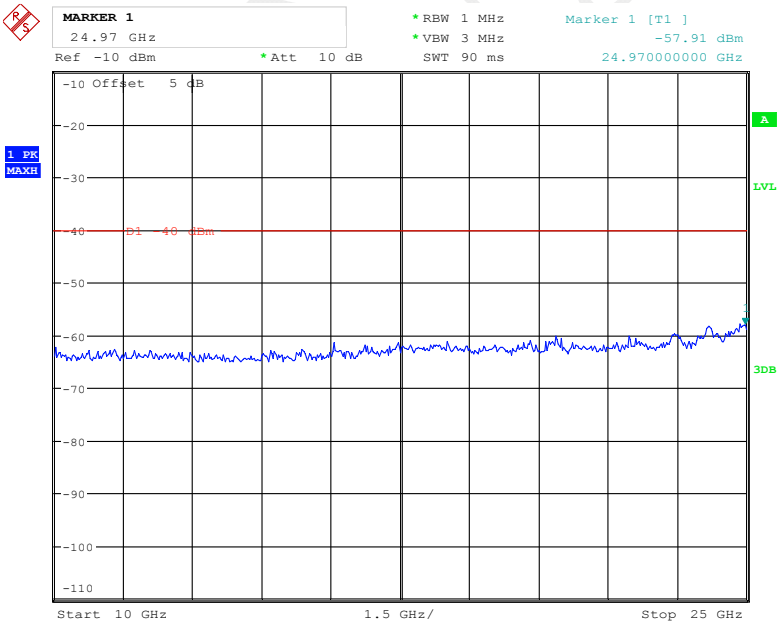


Date: 15.MAY.2020 12:43:47



Fundamental

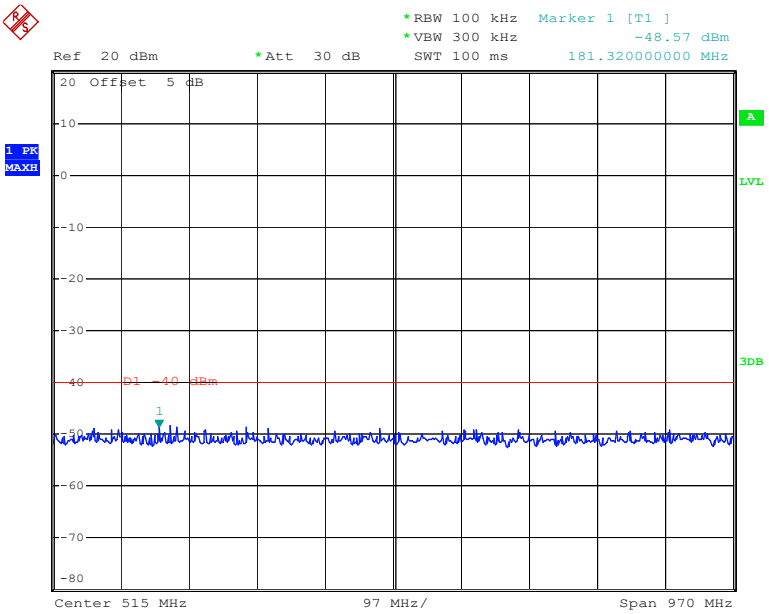
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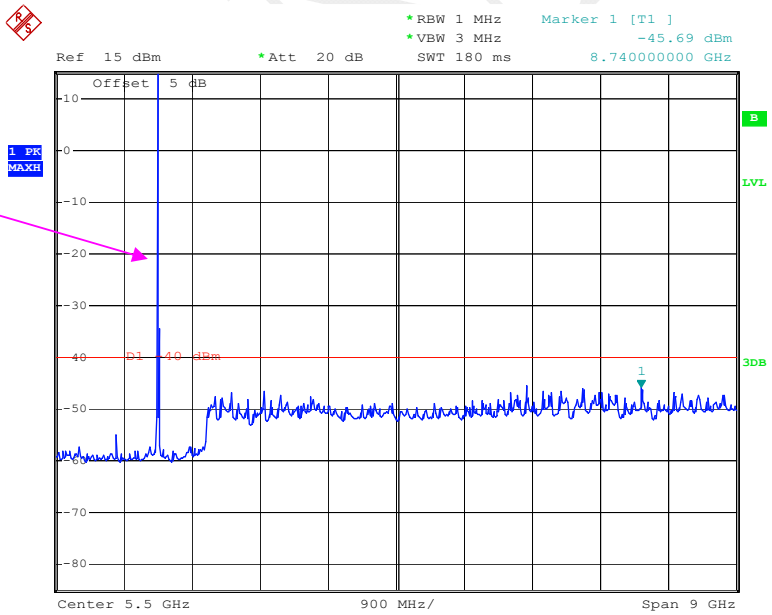
Date: 15.MAY.2020 14:52:41

LTE Band 40 Upper:

QPSK_5 MHz

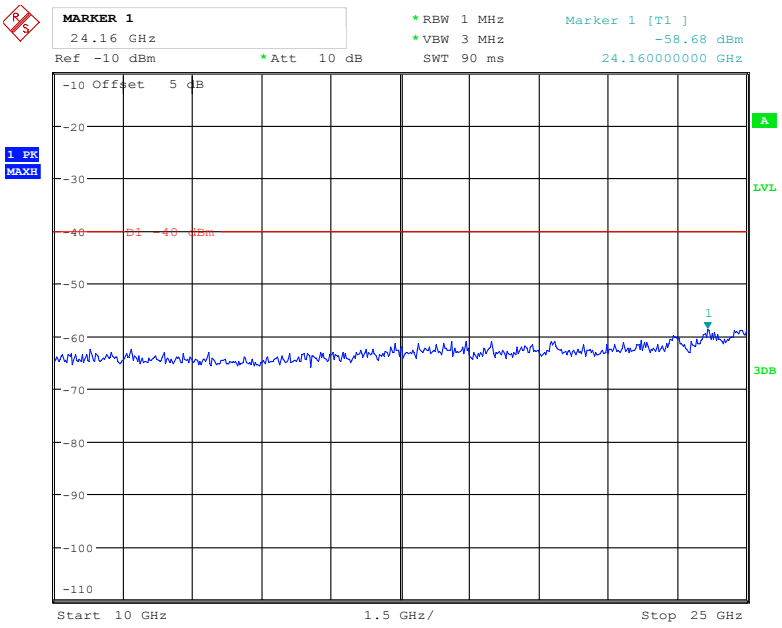


Date: 15.MAY.2020 12:48:38



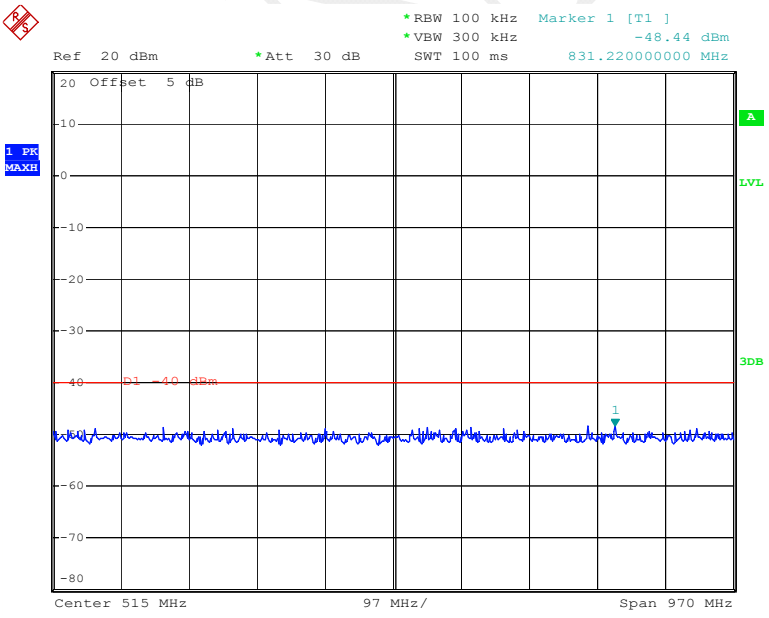
Fundamental

Date: 15.MAY.2020 12:48:50

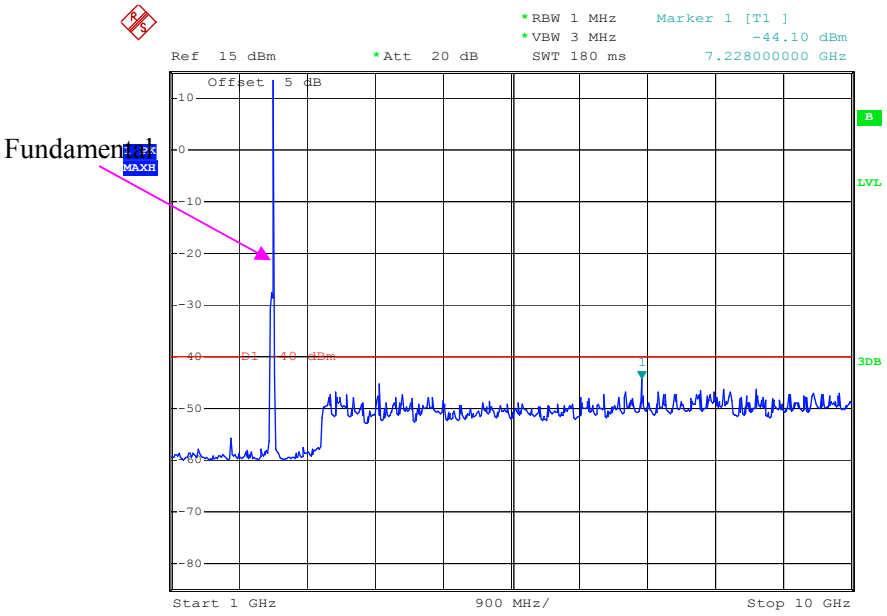


Date: 15.MAY.2020 14:52:02

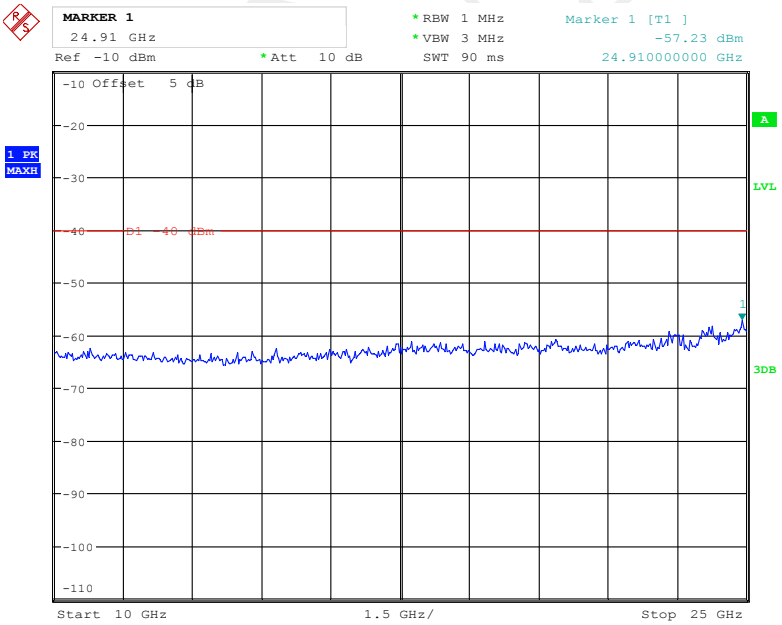
QPSK_10 MHz



Date: 15.MAY.2020 12:47:52



Date: 15.MAY.2020 12:47:39



Date: 15.MAY.2020 14:53:11

FCC §2.1053, §22.917 & §24.238 & §27.53& §90.691- SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 27.53 &§90.691.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

FINAL

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESR3	102453	2019-06-26	2020-06-26
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2019-09-05	2020-09-05
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-05-09	2020-05-09
TDK RF	Horn Antenna	HRN-0118	130 084	2018-10-12	2021-10-12
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2019-09-05	2020-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2019-09-05	2020-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2019-06-27	2020-06-27
Agilent	Signal Generator	E8247C	MY43321350	2019-12-10	2020-12-10
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2019-11-18	2022-11-18
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2019-11-18	2022-11-18
Sinoscite	Band-stop filter	BSF1710-1785MN-0383-003	0383003	2019-06-16	2020-06-16
Sinoscite	Band-stop filter	BSF824-862MS-1438-001	1438001	2019-06-16	2020-06-16
Sinoscite	Band-stop filter	BSF2300-2400MS-0777-003	0777003	2019-06-16	2020-06-16
Sinoscite	Band-stop filter	BSF1850-1910MS-0935V2	0935V2	2019-06-16	2020-06-16
Sinoscite	Band-stop filter	BSF2500-2750MS-1439-001	1437001	2019-06-16	2020-06-16

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	24.1~24.8°C
Relative Humidity:	53 %
ATM Pressure:	101.4 kPa
Tester:	Vern Shen, Felix Wang
Test Date:	2020-04-29

EUT Operation Mode: Transmitting

LTE Band 2 (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:1880.000 MHz								
3760.00	H	38.85	-58.79	13.76	1.63	-46.66	-13.00	33.66
3760.00	V	38.42	-59.08	13.76	1.63	-46.95	-13.00	33.95
5640.00	H	34.87	-58.72	14.02	1.31	-46.01	-13.00	33.01
5640.00	V	35.69	-57.79	14.02	1.31	-45.08	-13.00	32.08
399.69	H	40.14	-64.68	0.00	0.61	-65.29	-13.00	52.29
399.90	V	40.68	-67.49	0.00	0.61	-68.10	-13.00	55.10

LTE Band 4 (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:1732.500 MHz								
3465.00	H	44.30	-54.89	13.91	1.62	-42.60	-13.00	29.60
3465.00	V	43.06	-56.16	13.91	1.62	-43.87	-13.00	30.87
5197.50	H	35.27	-59.42	14.00	1.52	-46.94	-13.00	33.94
5197.50	V	36.43	-58.33	14.00	1.52	-45.85	-13.00	32.85
399.90	H	39.29	-65.52	0.00	0.61	-66.13	-13.00	53.13
399.90	V	38.76	-69.41	0.00	0.61	-70.02	-13.00	57.02

LTE Band 5 (30MHz-10GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:836.500 MHz								
1673.00	H	43.70	-60.24	10.61	0.73	-50.36	-13.00	37.36
1673.00	V	47.52	-57.02	10.61	0.73	-47.14	-13.00	34.14
2509.50	H	40.25	-62.66	13.11	1.25	-50.80	-13.00	37.80
2509.50	V	41.52	-61.42	13.11	1.25	-49.56	-13.00	36.56
3346.00	H	43.66	-56.02	13.83	1.61	-43.80	-13.00	30.80
3346.00	V	41.94	-57.78	13.83	1.61	-45.56	-13.00	32.56
399.69	H	40.18	-64.64	0.00	0.61	-65.25	-13.00	52.25
399.52	V	39.57	-68.61	0.00	0.61	-69.22	-13.00	56.22

LTE Band 7 (30MHz-26.5GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 2535.000 MHz								
5070.00	H	45.42	-49.69	13.93	1.34	-37.10	-25.00	12.10
5070.00	V	42.26	-52.66	13.93	1.34	-40.07	-25.00	15.07
7605.00	H	36.34	-52.54	13.21	1.40	-40.73	-25.00	15.73
7605.00	V	35.69	-53.59	13.21	1.40	-41.78	-25.00	16.78
399.90	H	38.98	-65.83	0.00	0.61	-66.44	-25.00	41.44
399.90	V	39.04	-69.13	0.00	0.61	-69.74	-25.00	44.74

LTE Band 12 (30MHz-10 GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 707.500 MHz								
1415.00	H	46.22	-57.39	9.08	1.22	-49.53	-13.00	36.53
1415.00	V	46.97	-57.16	9.08	1.22	-49.30	-13.00	36.30
2122.50	H	38.02	-63.99	11.27	1.11	-53.83	-13.00	40.83
2122.50	V	37.66	-64.33	11.27	1.11	-54.17	-13.00	41.17
2830.00	H	44.45	-56.97	13.34	1.36	-44.99	-13.00	31.99
2830.00	V	42.38	-59.27	13.34	1.36	-47.29	-13.00	34.29
399.90	H	40.57	-64.24	0.00	0.61	-64.85	-13.00	51.85
399.90	V	38.24	-69.93	0.00	0.61	-70.54	-13.00	57.54

LTE Band 13 (30MHz-10 GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 782.000 MHz								
1564.00	H	38.07	-66.65	9.88	0.92	-57.69	-40.00	17.69
1564.00	V	42.32	-62.82	9.88	0.92	-53.86	-40.00	13.86
2346.00	H	39.92	-62.37	11.71	1.26	-51.92	-13.00	38.92
2346.00	V	40.66	-61.67	11.71	1.26	-51.22	-13.00	38.22
3128.00	H	36.58	-63.00	13.31	1.76	-51.45	-13.00	38.45
3128.00	V	36.72	-62.87	13.31	1.76	-51.32	-13.00	38.32
399.69	H	40.24	-64.58	0.00	0.61	-65.19	-13.00	52.19
399.90	V	39.02	-69.15	0.00	0.61	-69.76	-13.00	56.76

LTE Band 25 (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:1882.500 MHz								
3765.00	H	39.14	-58.47	13.74	1.62	-46.35	-13.00	33.35
3765.00	V	38.37	-59.09	13.74	1.62	-46.97	-13.00	33.97
5647.50	H	34.72	-58.92	14.01	1.31	-46.22	-13.00	33.22
5647.50	V	35.27	-58.25	14.01	1.31	-45.55	-13.00	32.55
399.90	H	39.68	-65.13	0.00	0.61	-65.74	-13.00	52.74
399.90	V	38.27	-69.90	0.00	0.61	-70.51	-13.00	57.51

LTE Band 40 Lower(30MHz-25GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:2310.000 MHz								
4620.00	H	41.88	-55.35	14.40	1.67	-42.62	-40.00	2.62
4620.00	V	41.98	-55.34	14.40	1.67	-42.61	-40.00	17.61
6930.00	H	35.64	-54.65	13.35	1.78	-43.08	-40.00	18.08
6930.00	V	35.68	-54.51	13.35	1.78	-42.94	-40.00	17.94
399.90	H	39.87	-64.94	0.00	0.61	-65.55	-40.00	40.55
399.90	V	37.06	-71.11	0.00	0.61	-71.72	-40.00	46.72

LTE Band 40 Upper(30MHz-25GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:2355.000 MHz								
4710.00	H	42.38	-55.00	13.23	1.50	-43.27	-40.00	3.27
4710.00	V	42.25	-55.20	13.23	1.50	-43.47	-40.00	3.47
7065.00	H	34.65	-57.09	13.32	1.76	-45.53	-40.00	5.53
7065.00	V	35.76	-56.25	13.32	1.76	-44.69	-40.00	4.69
399.90	H	39.55	-65.26	0.00	0.61	-65.87	-40.00	25.87
399.90	V	37.44	-70.73	0.00	0.61	-71.34	-40.00	31.34

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

FCC §22.917(a) & §24.238(a) & §27.53- BAND EDGES

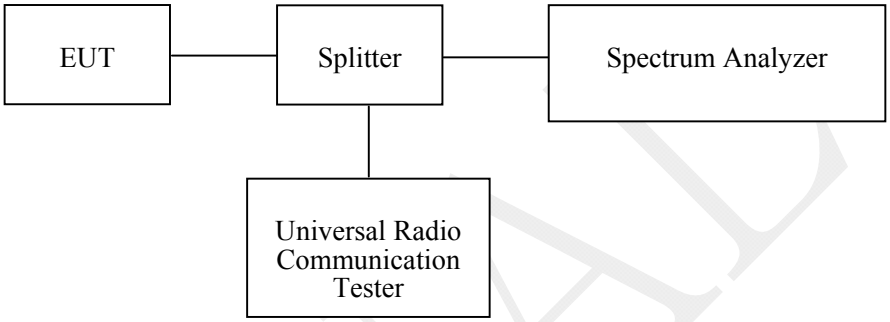
Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 27.53 & §90.691.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2020-01-04	2021-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005011	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/04	Each Time	/
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

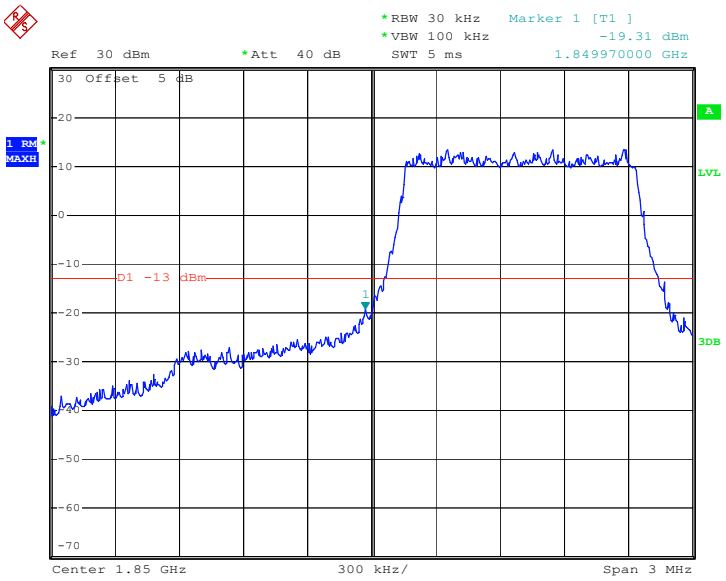
Environmental Conditions

Temperature:	26~27.5°C
Relative Humidity:	52~72 %
ATM Pressure:	100.2~100.9 kPa
Tester:	Chris Mo
Test Date:	2020-05-07~2020-05-20

Test Mode: Transmitting
Test Result: Compliant. Please refer to the following plots.

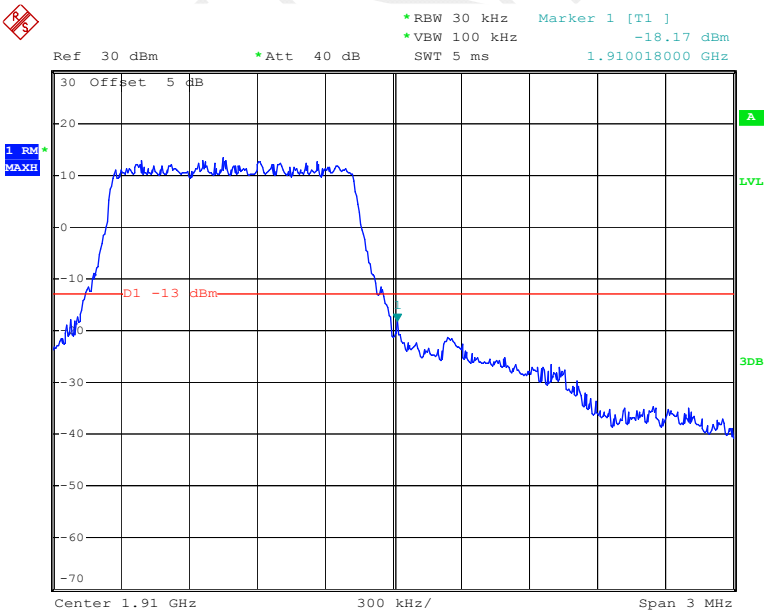
LTE Band 2

QPSK_1.4MHz_ 6 RB_ Left



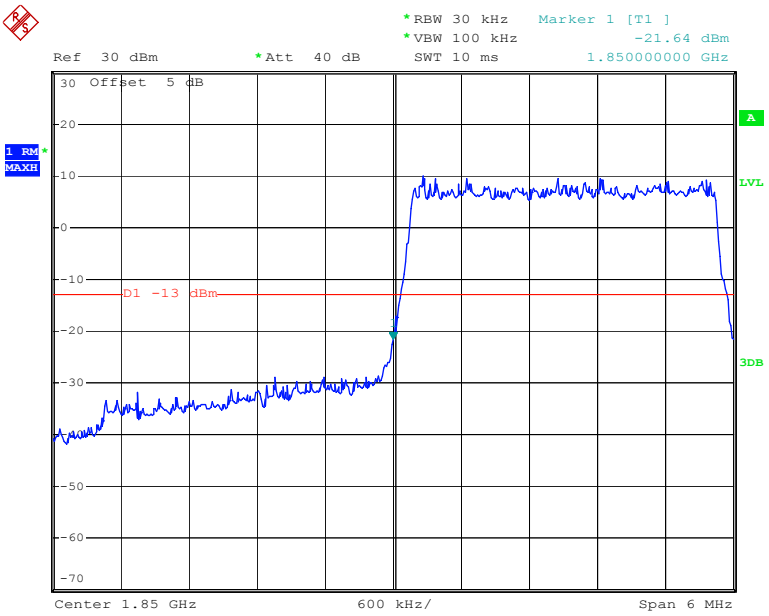
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QPSK_1.4MHz_ 6 RB_ Right



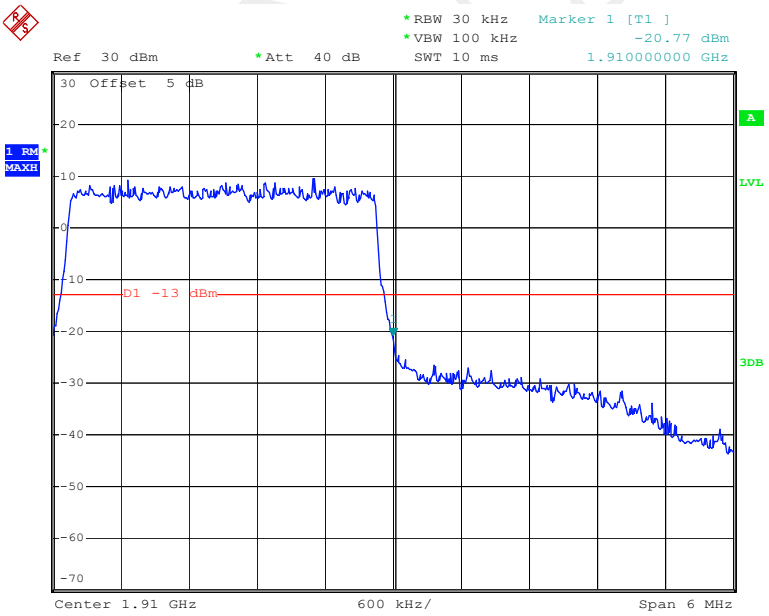
Date: 7.MAY.2020 15:47:06

QPSK_3MHz_ 15 RB_ Left



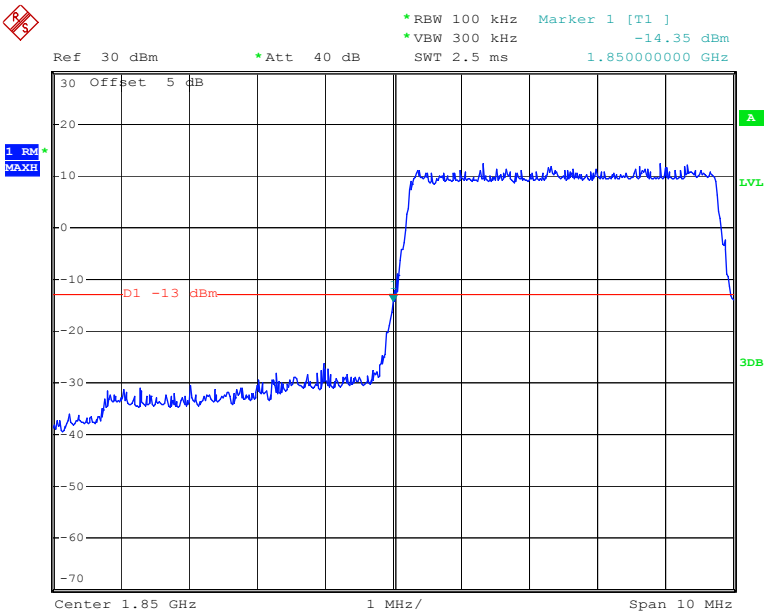
Date: 7.MAY.2020 15:47:49

QPSK_3MHz_ 15 RB_ Right



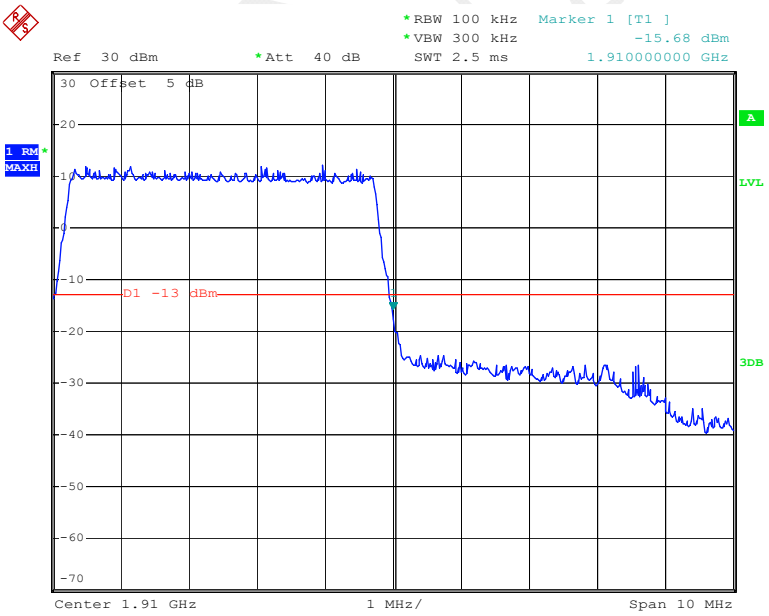
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QPSK_5MHz_ 25 RB_ Left



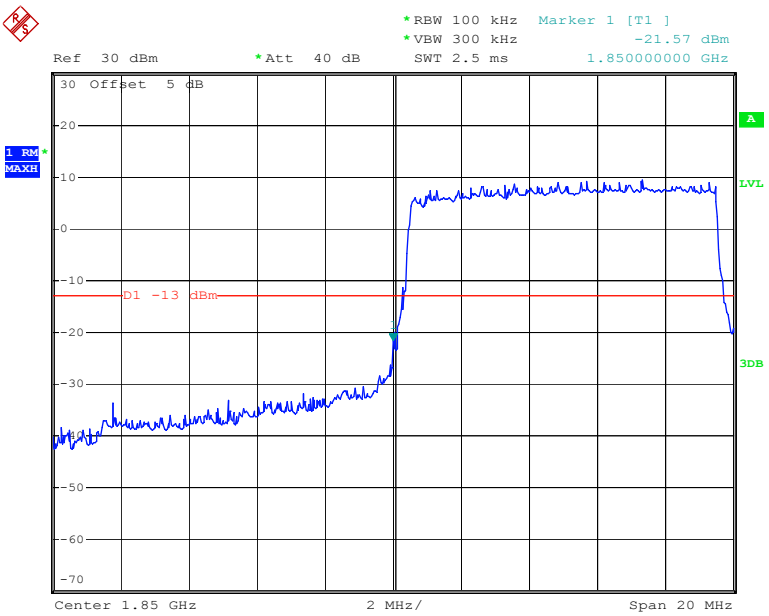
Date: 7.MAY.2020 15:49:15

QPSK_5MHz_ 25 RB_ Right



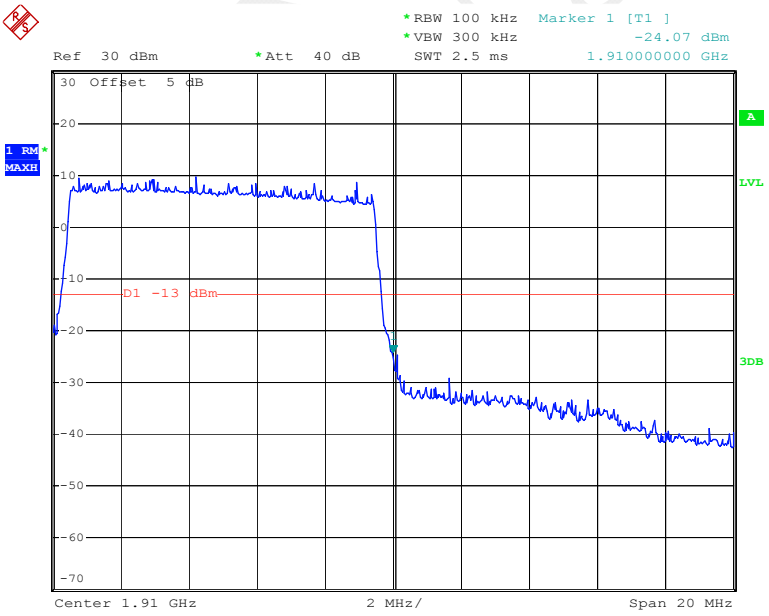
Date: 7.MAY.2020 15:49:54

QPSK_10MHz_ 50 RB_ Left



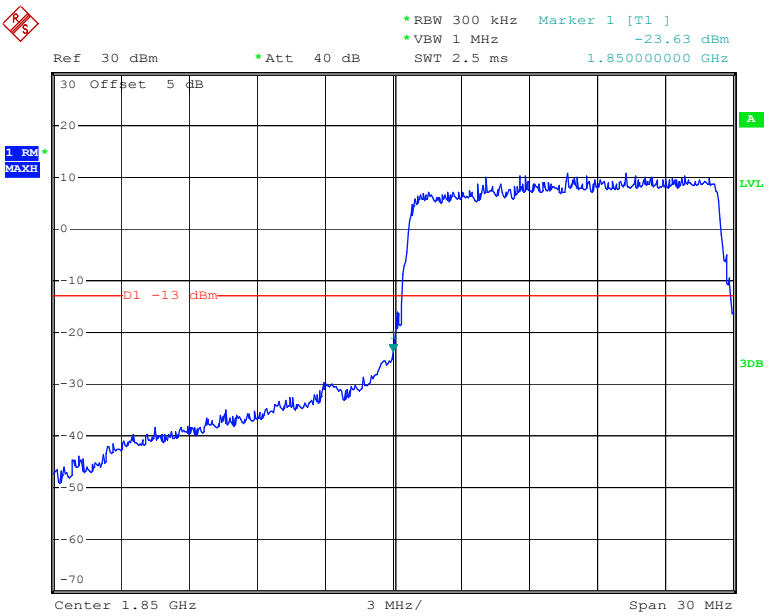
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QPSK_10MHz_ 50 RB_ Right



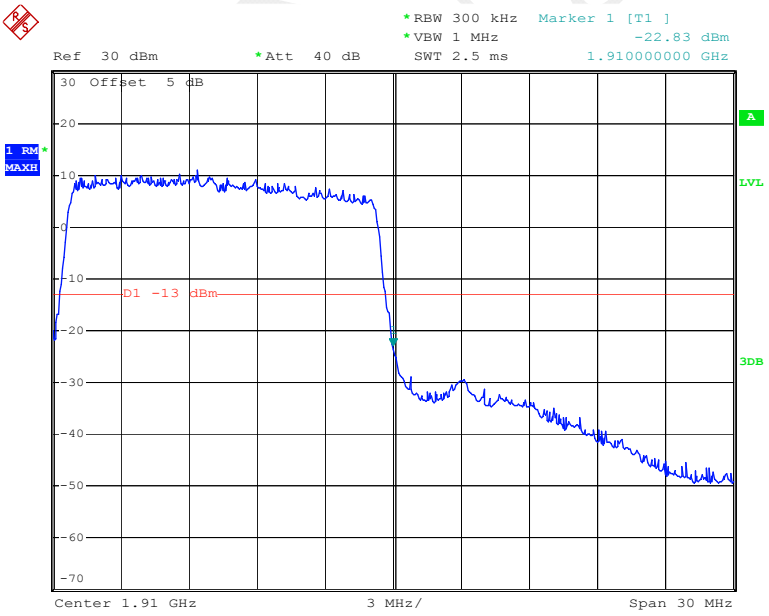
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QPSK_15MHz_ 75 RB_ Left



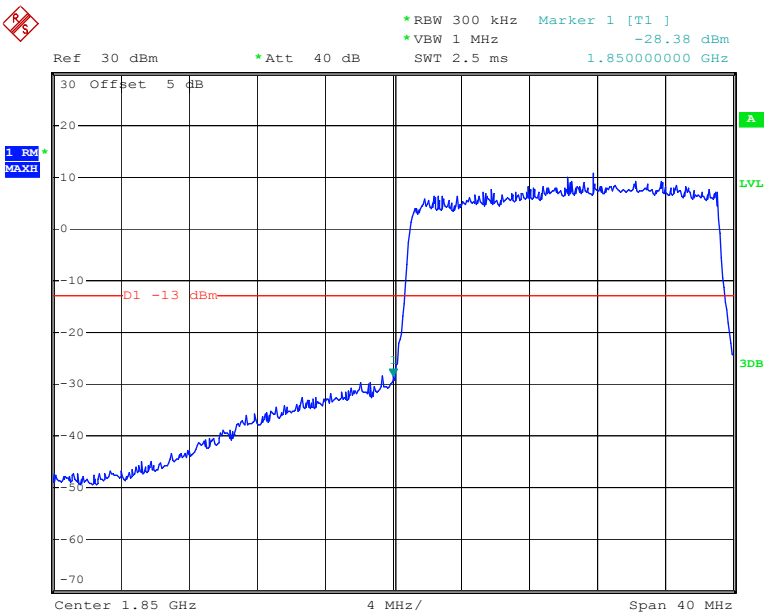
Date: 7.MAY.2020 15:52:04

QPSK_15MHz_ 75 RB_ Right



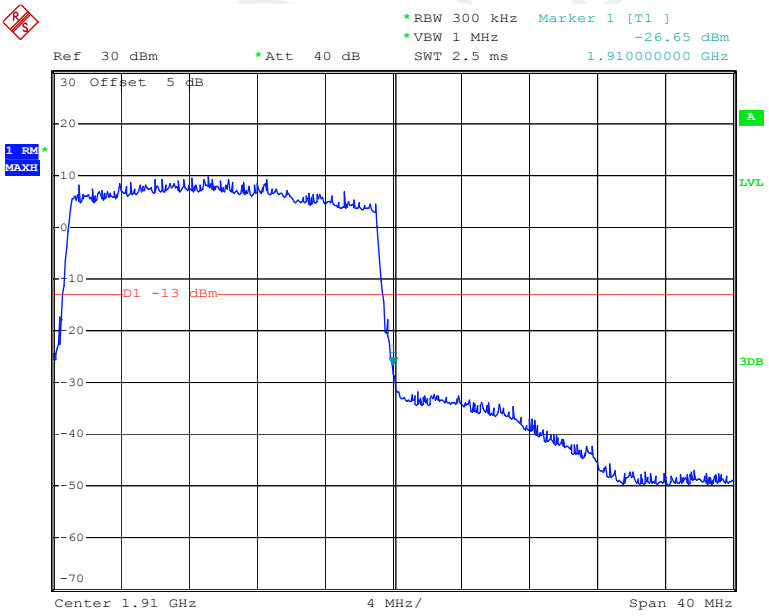
Date: 7.MAY.2020 15:52:46

QPSK_20MHz_ FULL RB_ Left



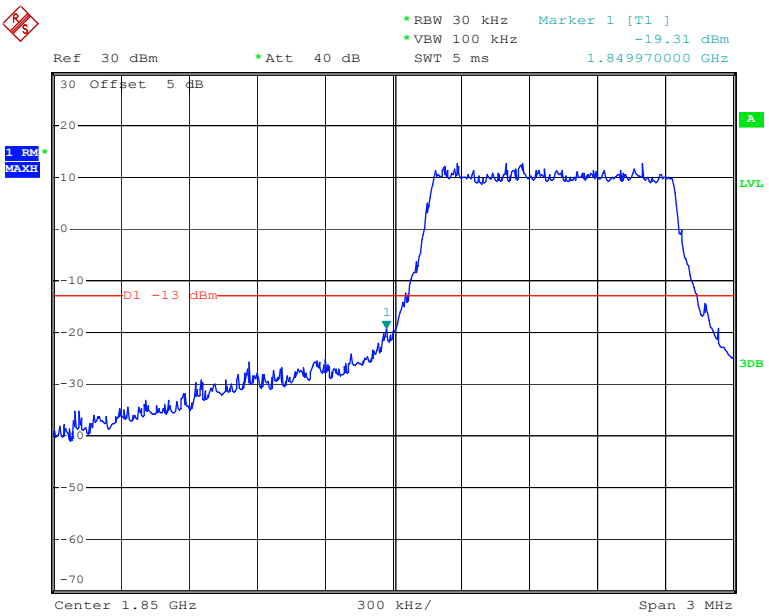
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QPSK_20MHz_ FULL RB_ Right



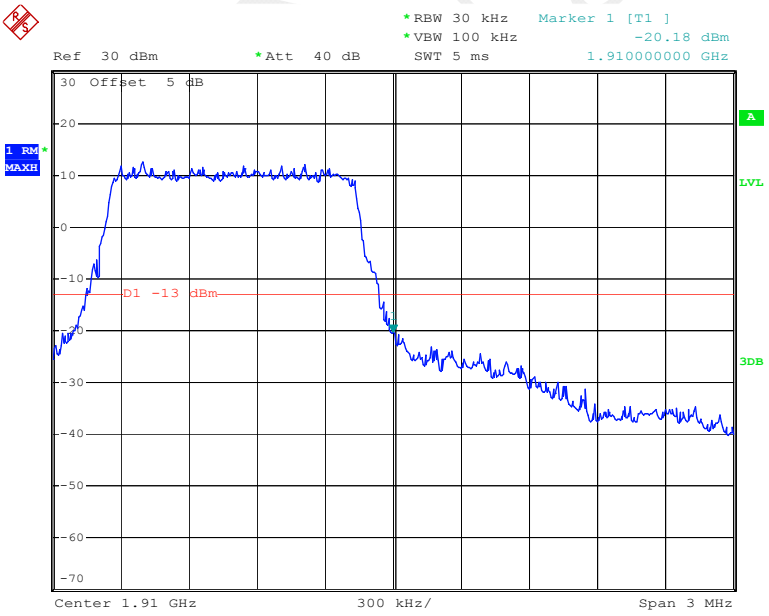
Date: 7.MAY.2020 15:54:15

16QAM_1.4MHz_ 6 RB_ Left



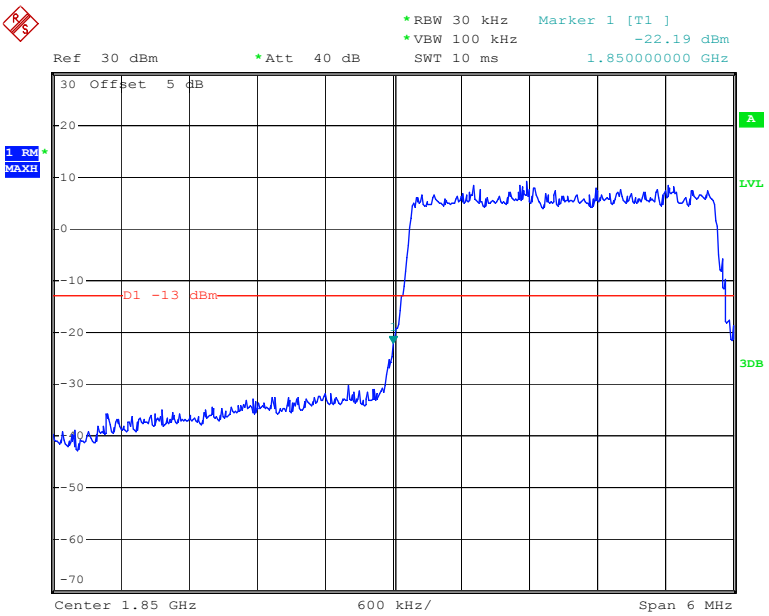
Date: 7.MAY.2020 15:46:48

16QAM_1.4MHz_ 6 RB_ Right



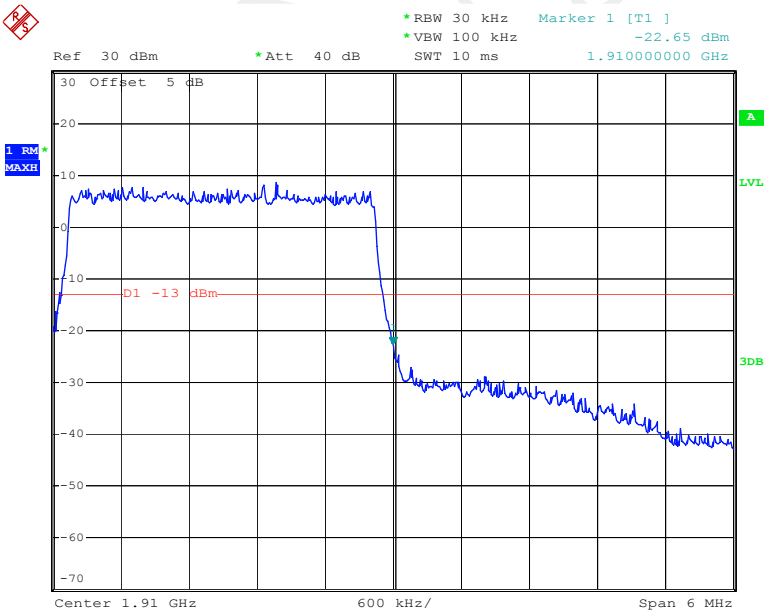
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16QAM_3MHz_ 15 RB_ Left



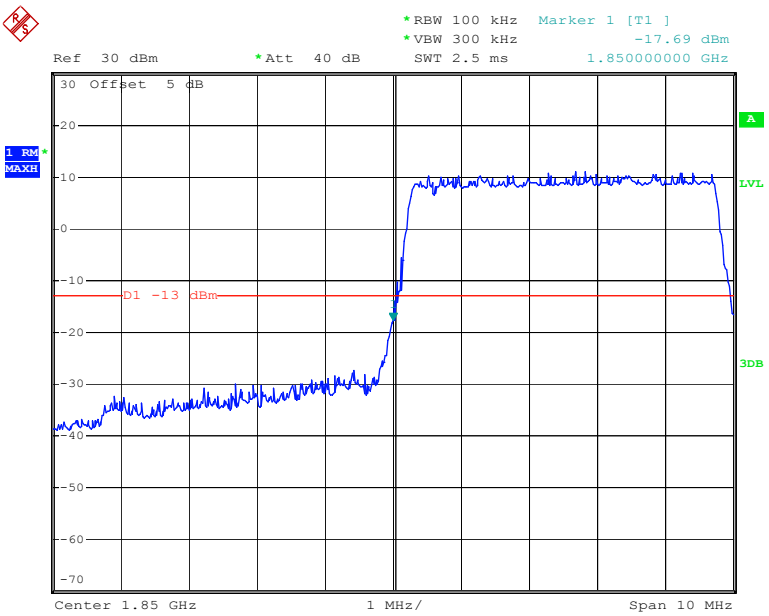
Date: 7.MAY.2020 15:48:06

16QAM_3MHz_ 15 RB_ Right



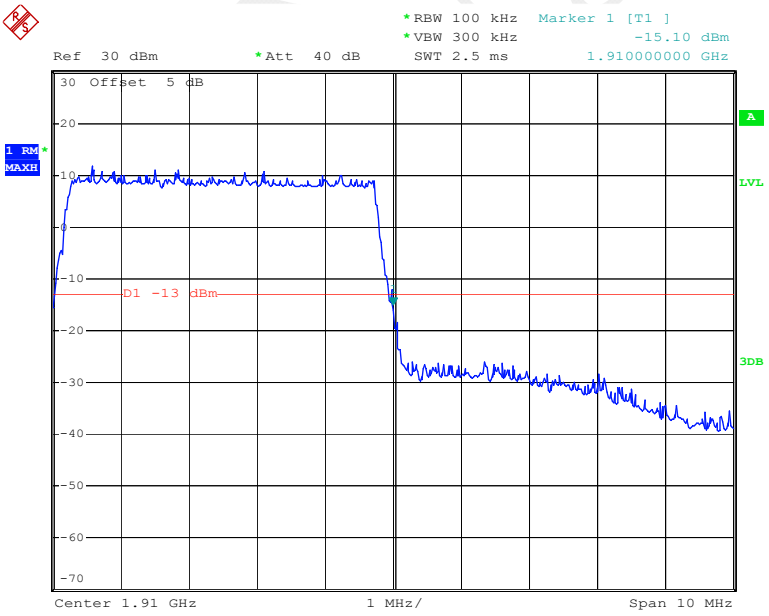
Date: 7.MAY.2020 15:48:48

16QAM_5MHz_ 25 RB_ Left



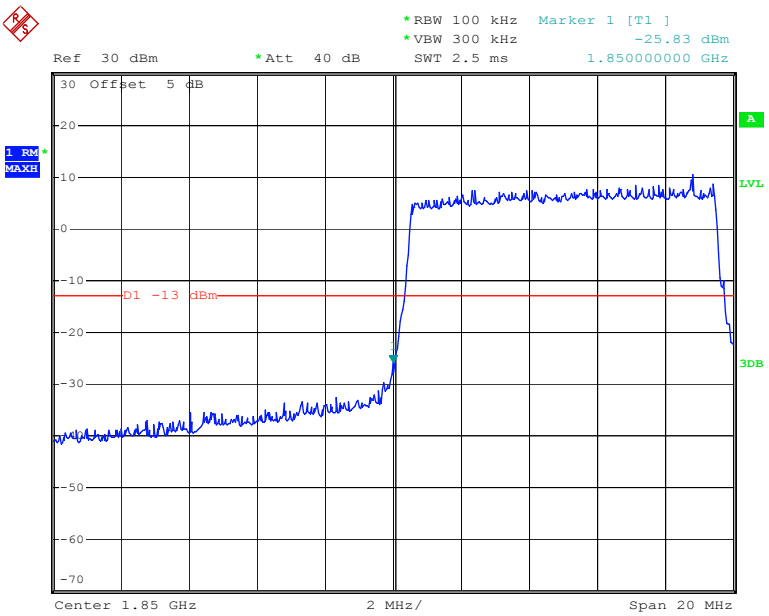
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16QAM_5MHz_ 25 RB_ Right



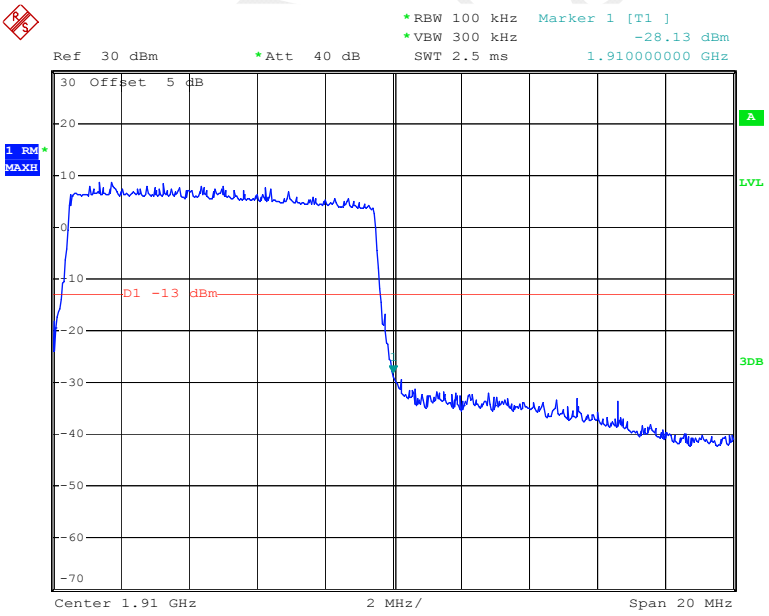
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16QAM_10MHz_ 50 RB_ Left



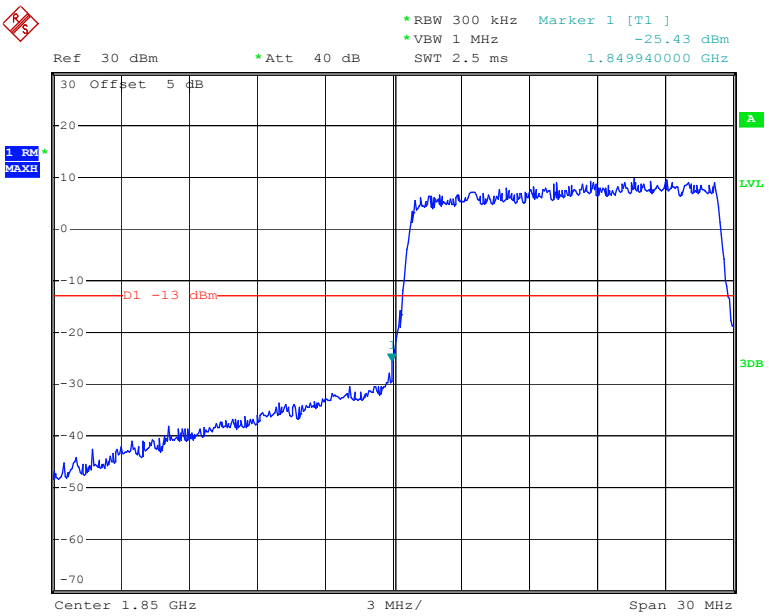
Date: 7.MAY.2020 15:50:56

16QAM_10MHz_ 50 RB_ Right



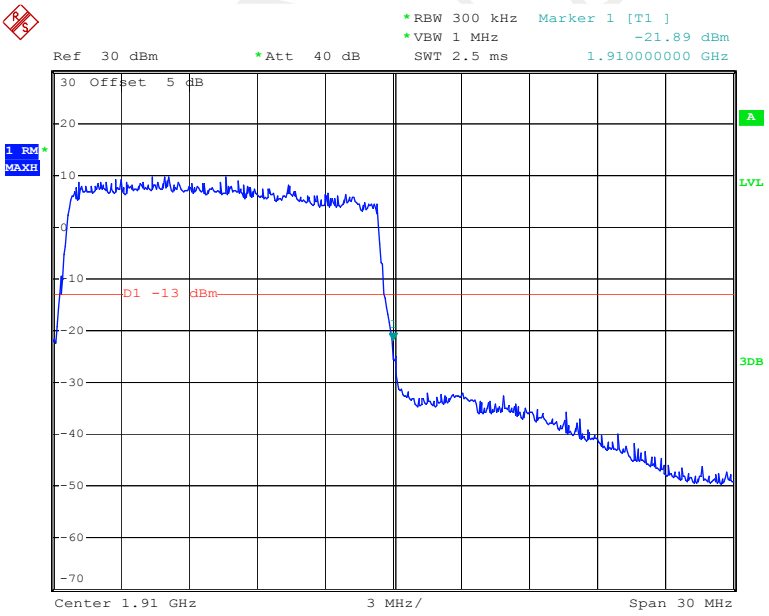
Date: 7.MAY.2020 15:51:37

16QAM_15MHz_ 75 RB_ Left



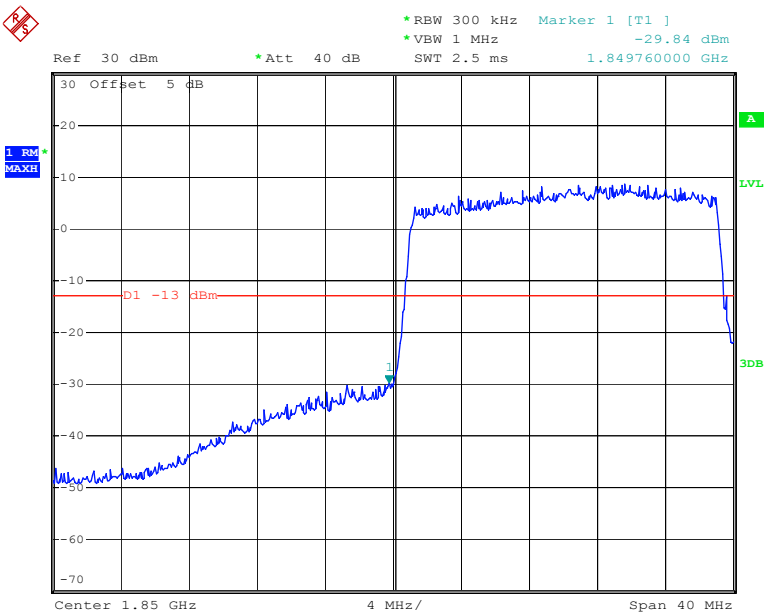
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16QAM_15MHz_ 75 RB_ Right



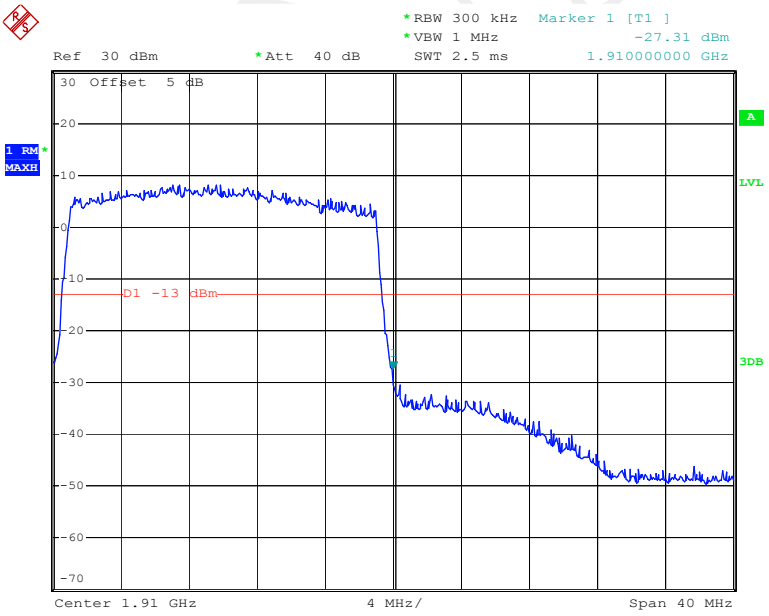
Date: 7.MAY.2020 15:53:06

16QAM_20MHz_ FULL RB_ Left



Date: 7.MAY.2020 15:53:53

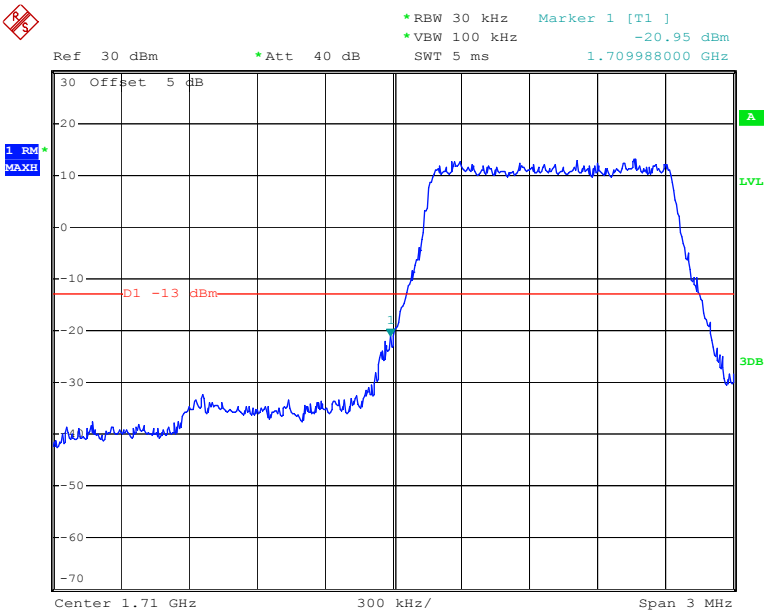
16QAM_20MHz_ FULL RB_ Right



Date: 7.MAY.2020 15:54:38

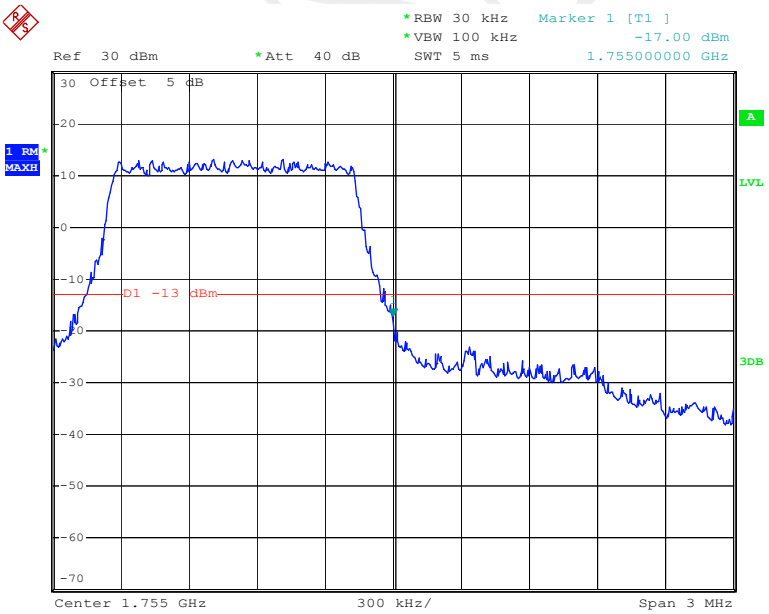
LTE Band 4

QPSK_1.4MHz_ 6 RB_ Left



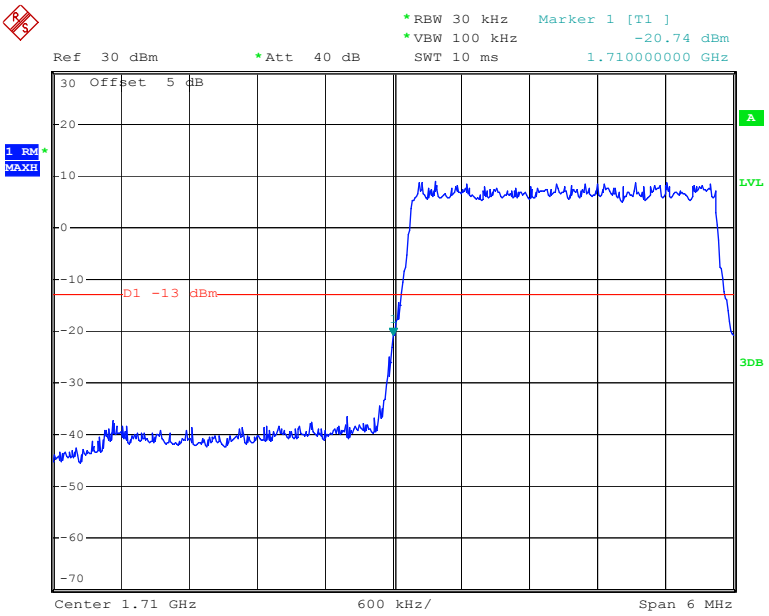
Date: 7.MAY.2020 15:55:05

QPSK_1.4MHz_ 6 RB_ Right



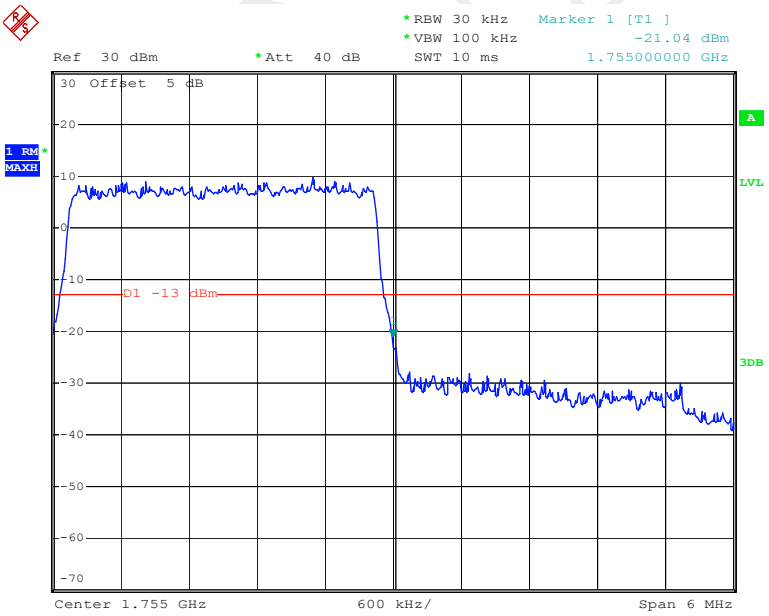
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QPSK_3MHz_ 15 RB_ Left



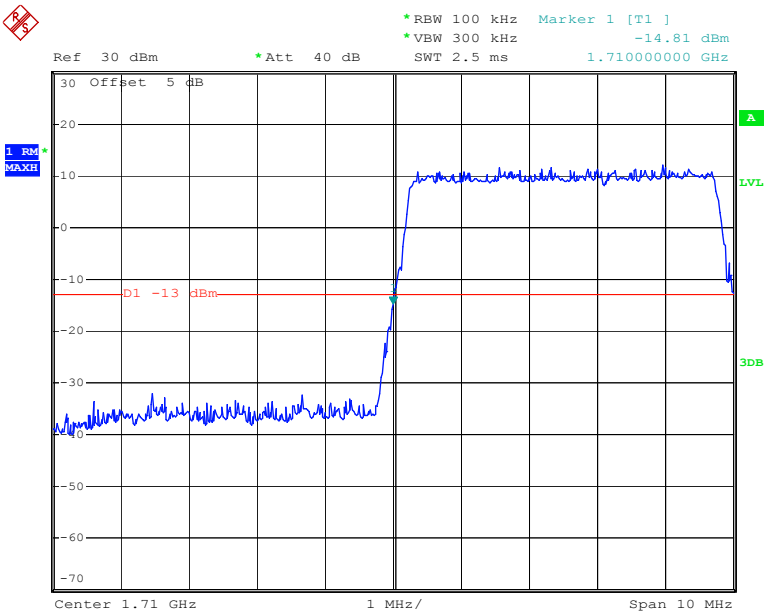
Date: 7.MAY.2020 15:56:30

QPSK_3MHz_ 15 RB_ Right



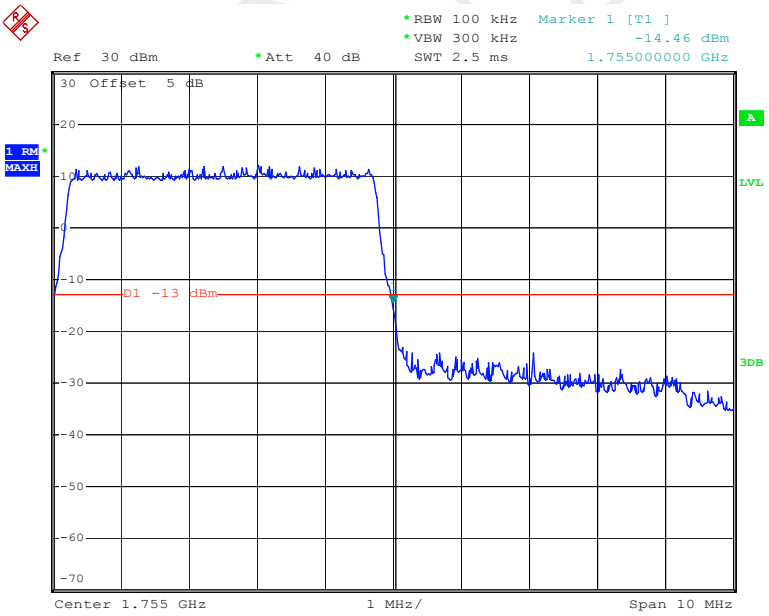
Date: 7.MAY.2020 15:57:12

QPSK_5MHz_ 25 RB_ Left



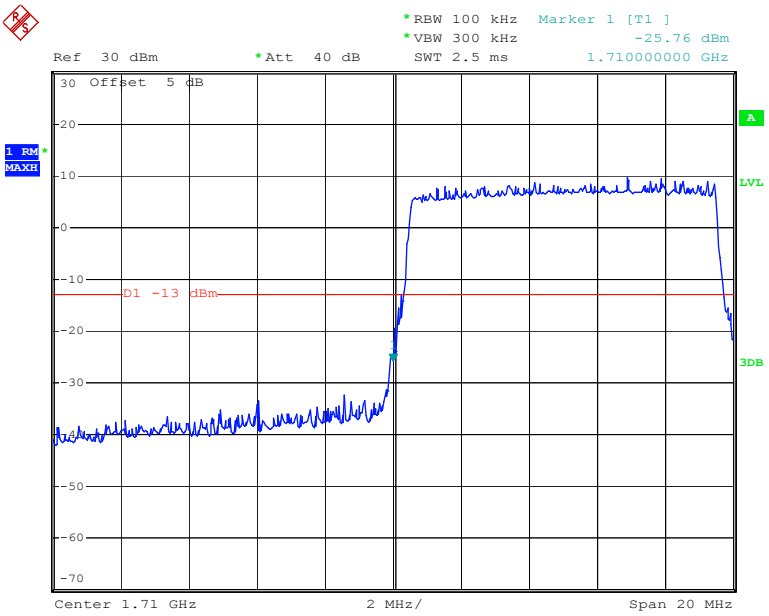
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QPSK_5MHz_ 25 RB_ Right



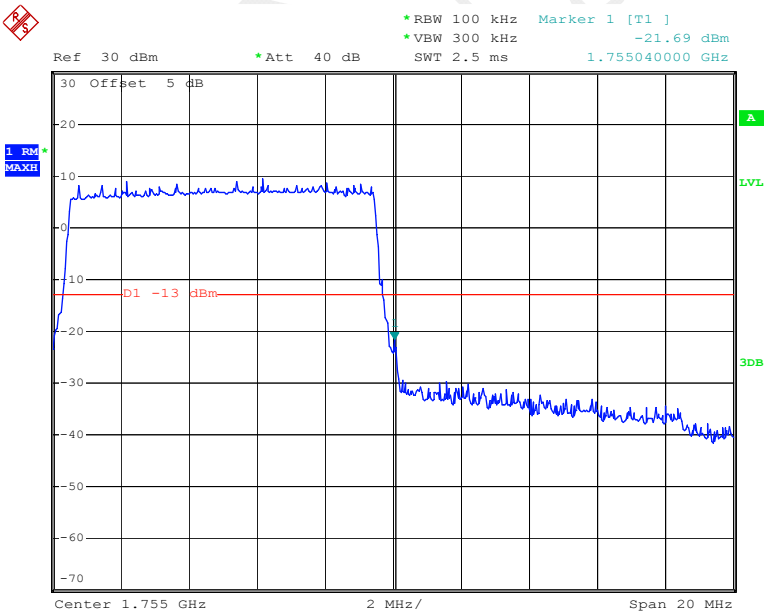
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QPSK_10MHz_ 50 RB_ Left



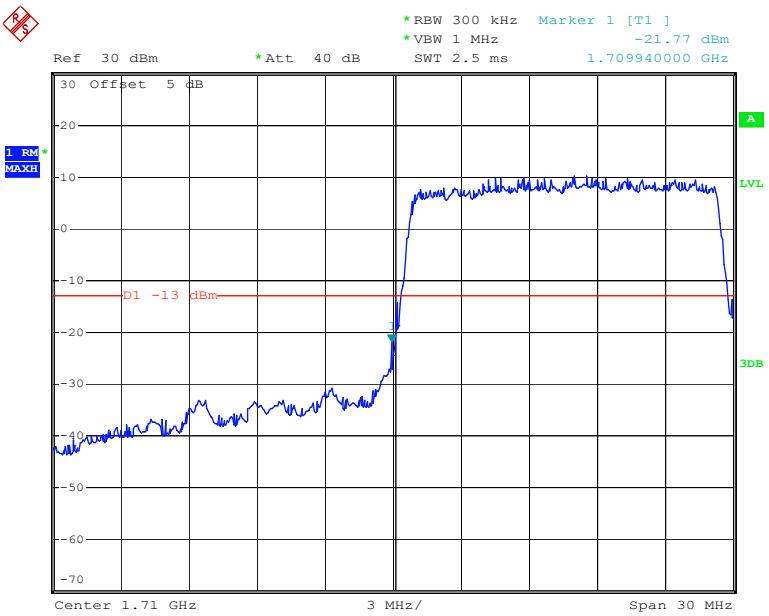
Date: 7.MAY.2020 15:59:19

QPSK_10MHz_ 50 RB_ Right



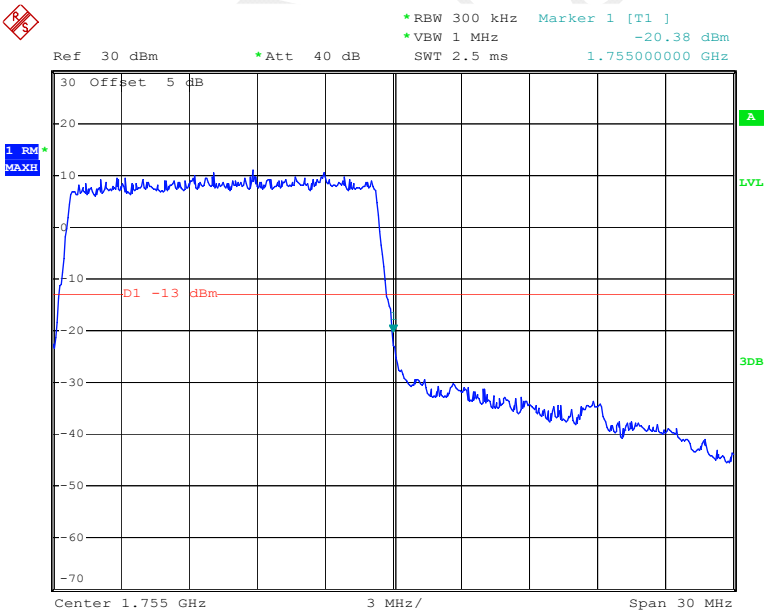
Date: 7.MAY.2020 16:00:00

QPSK_15MHz_ 75 RB_ Left



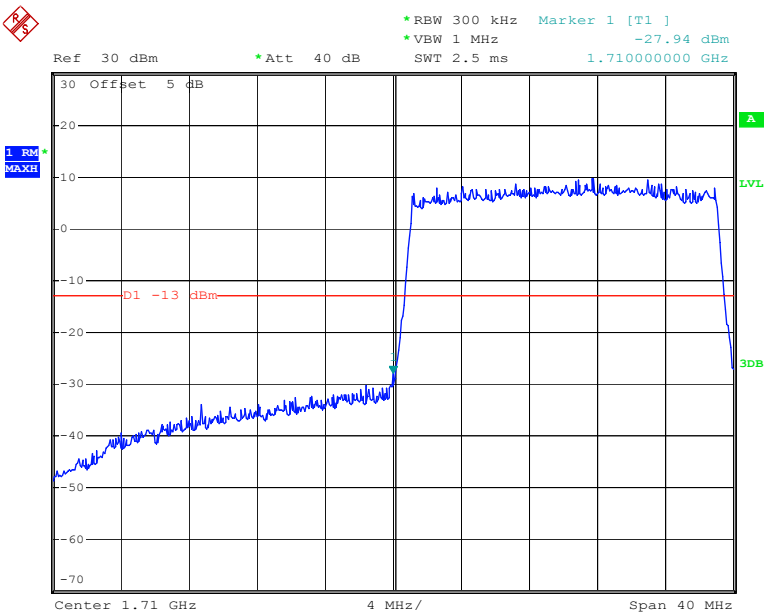
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QPSK_15MHz_ 75 RB_ Right



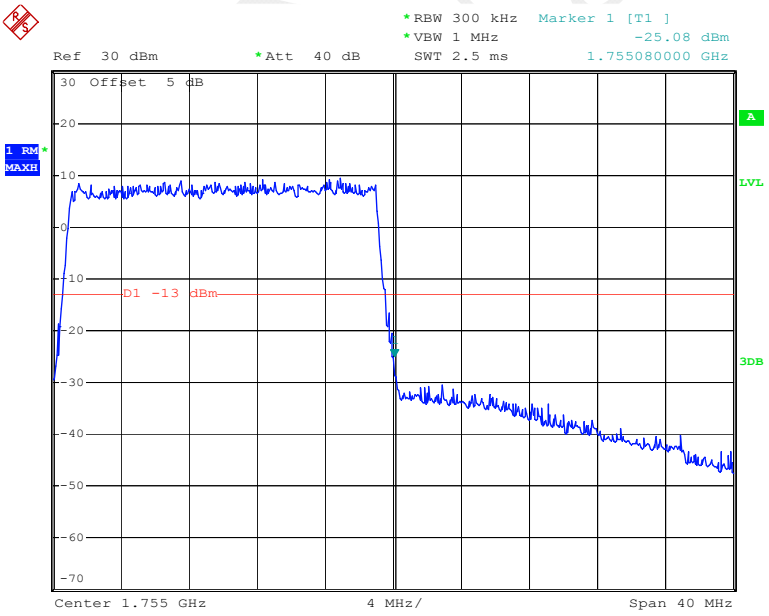
Date: 7.MAY.2020 16:01:27

QPSK_20MHz_ FULL RB_ Left



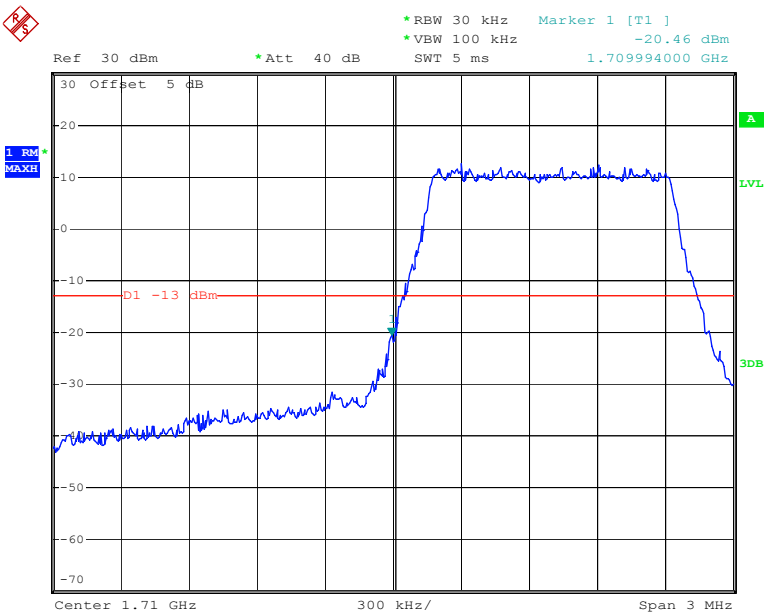
Date: 7.MAY.2020 16:02:10

QPSK_20MHz_ FULL RB_ Right



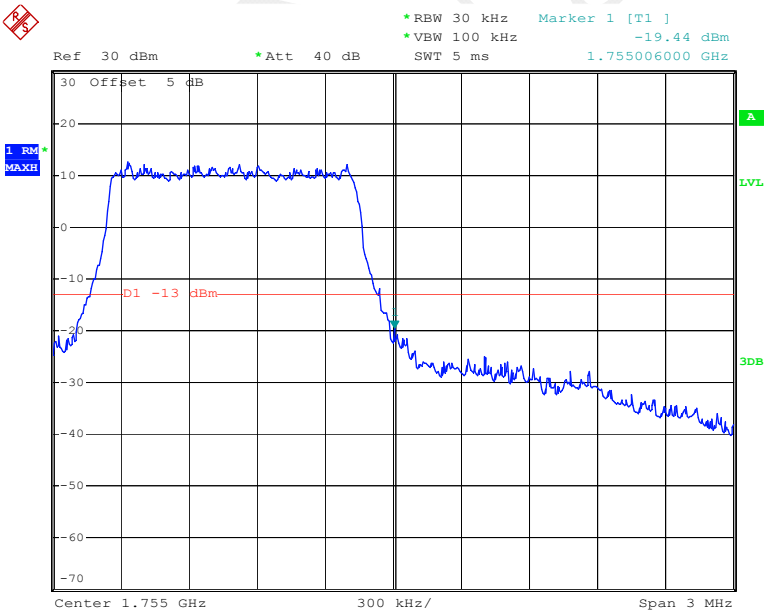
Date: 7.MAY.2020 16:02:55

16QAM_1.4MHz_ 6 RB_ Left



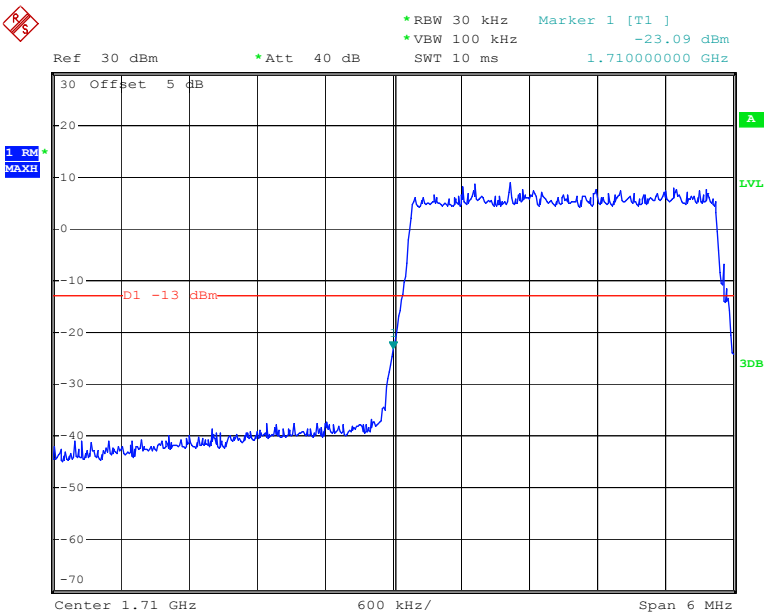
Date: 7.MAY.2020 15:55:25

16QAM_1.4MHz_ 6 RB_ Right



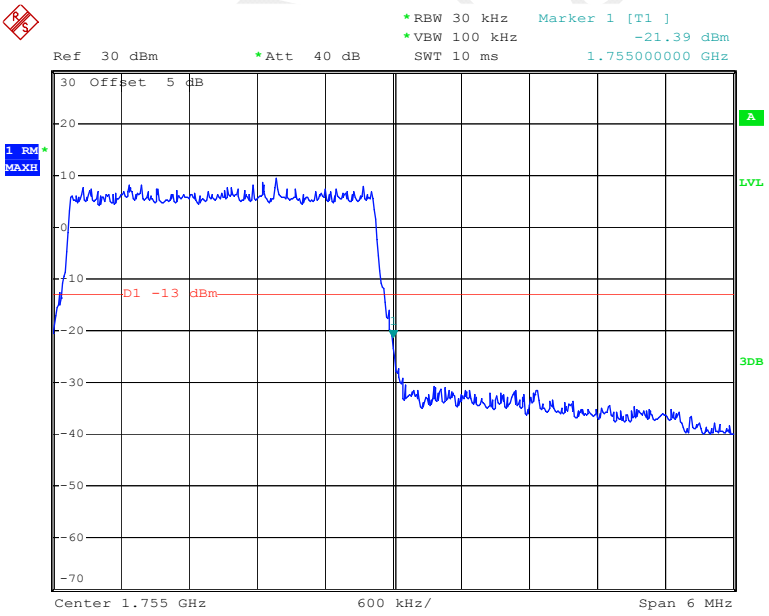
Date: 7.MAY.2020 15:56:03

16QAM_3MHz_ 15 RB_ Left



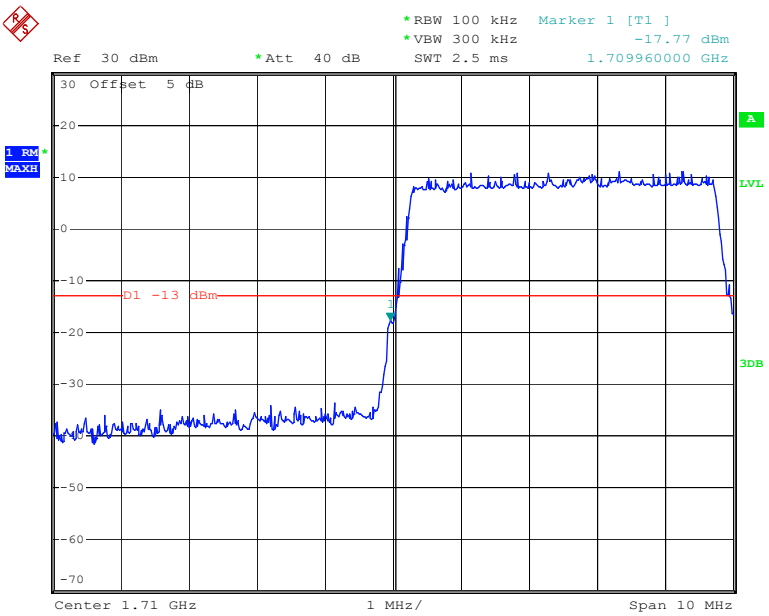
Date: 7.MAY.2020 15:56:51

16QAM_3MHz_ 15 RB_ Right



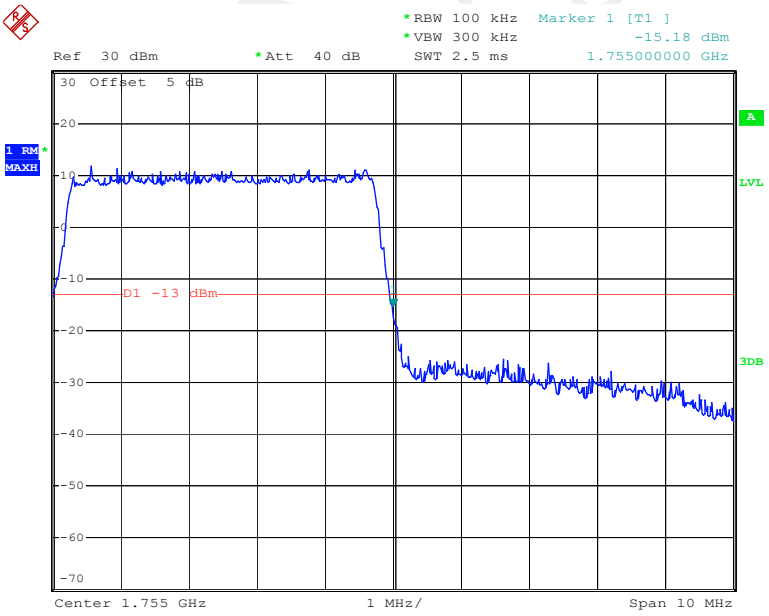
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16QAM_5MHz_ 25 RB_ Left



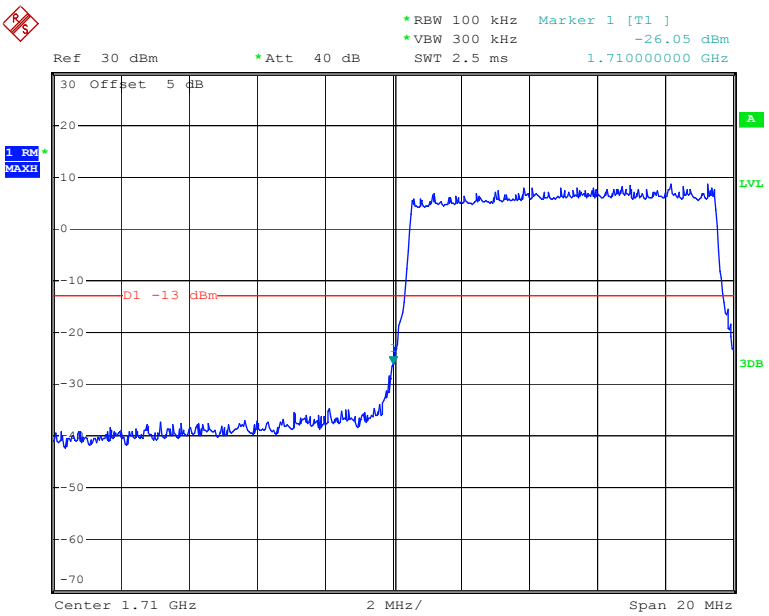
Date: 7.MAY.2020 15:58:14

16QAM_5MHz_ 25 RB_ Right



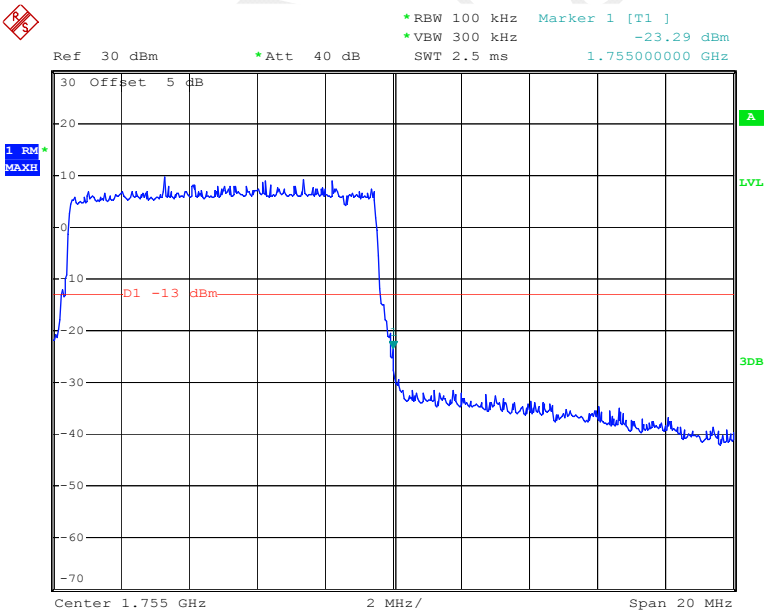
Date: 7.MAY.2020 15:58:56

16QAM_10MHz_ 50 RB_ Left



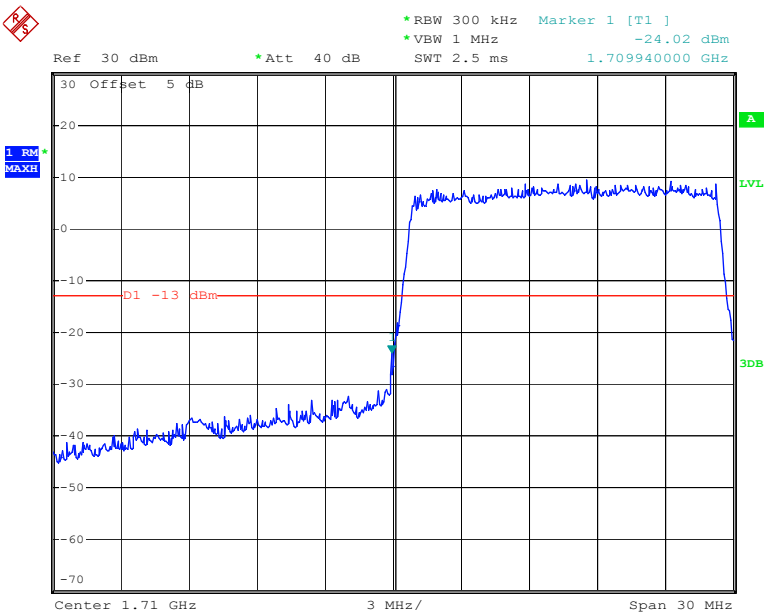
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16QAM_10MHz_ 50 RB_ Right



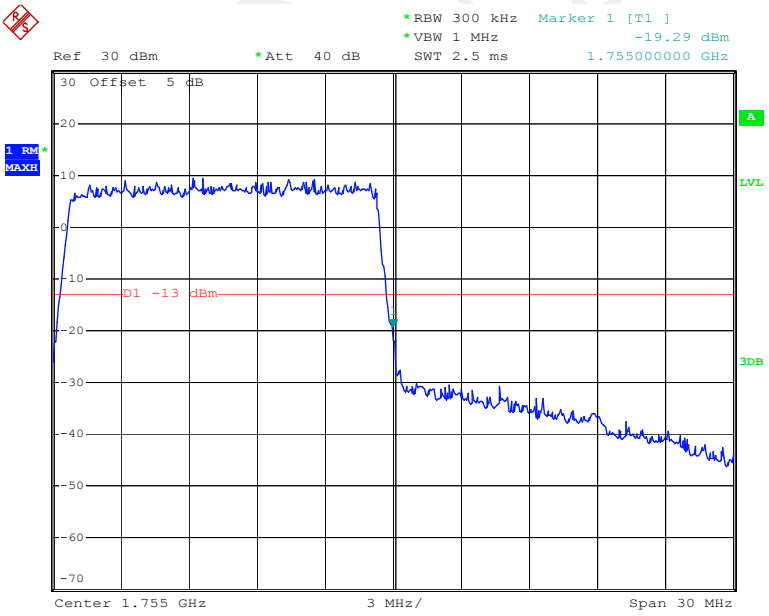
Date: 7.MAY.2020 16:00:18

16QAM_15MHz_ 75 RB_ Left



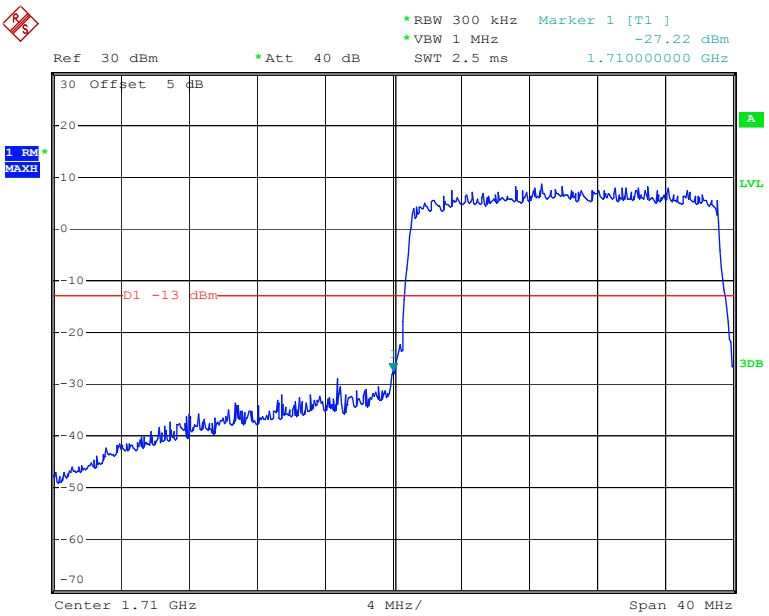
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16QAM_15MHz_ 75 RB_ Right



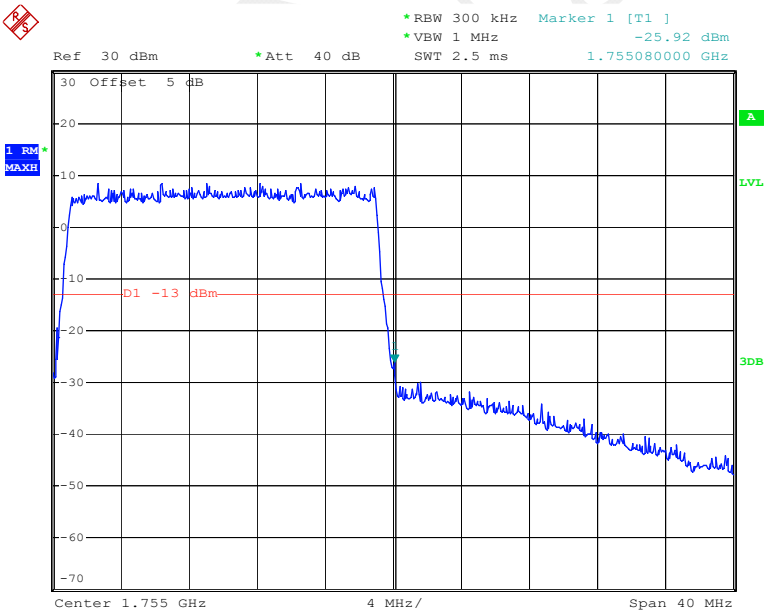
Date: 7.MAY.2020 16:01:47

16QAM_20MHz_ FULL RB_ Left



Date: 7.MAY.2020 16:02:30

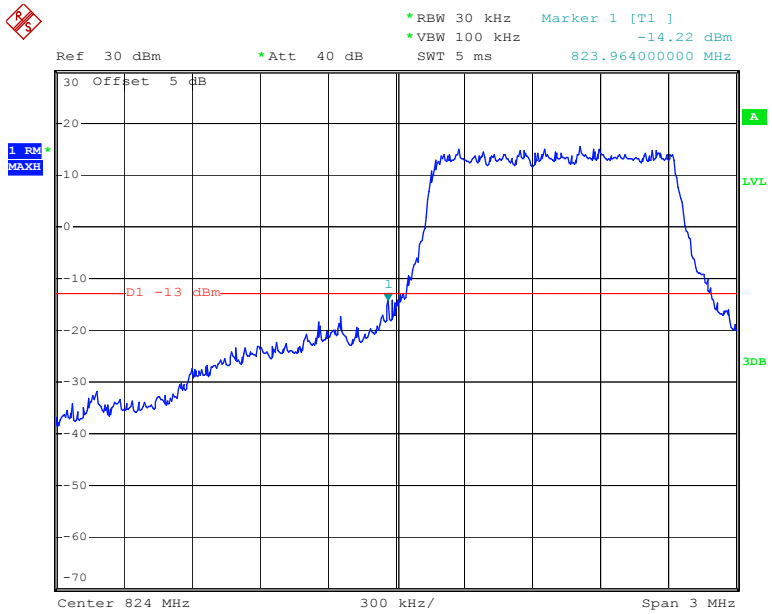
16QAM_20MHz_ FULL RB_ Right



Date: 7.MAY.2020 16:03:18

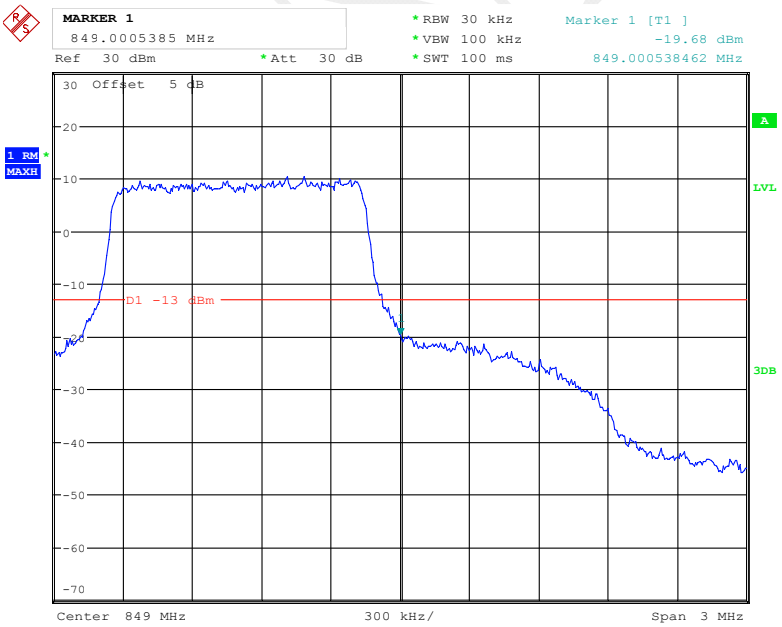
LTE Band 5

QPSK_1.4MHz_ 6 RB_ Left



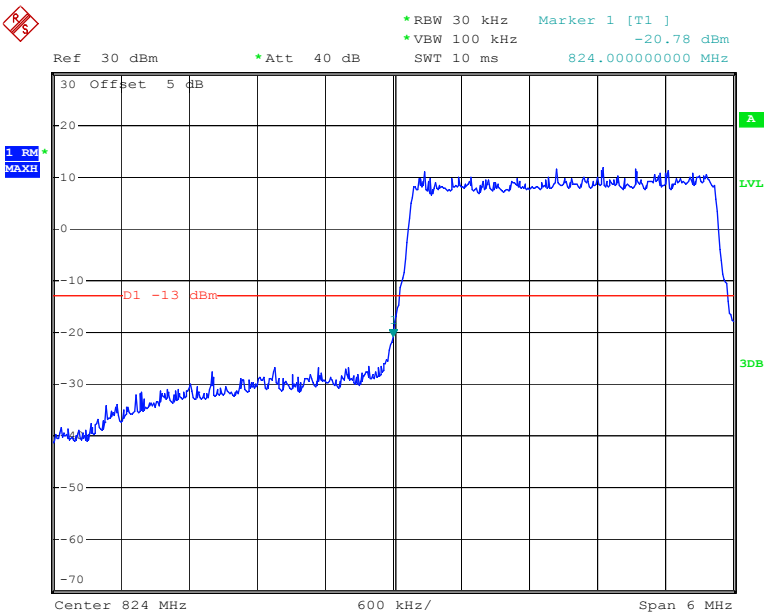
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QPSK_1.4MHz_ 6 RB_ Right



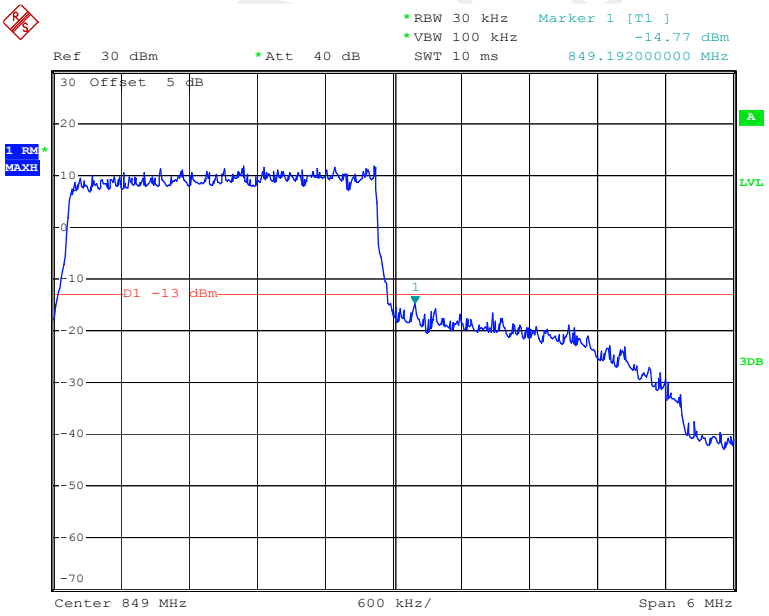
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QPSK_3MHz_ 15 RB_ Left



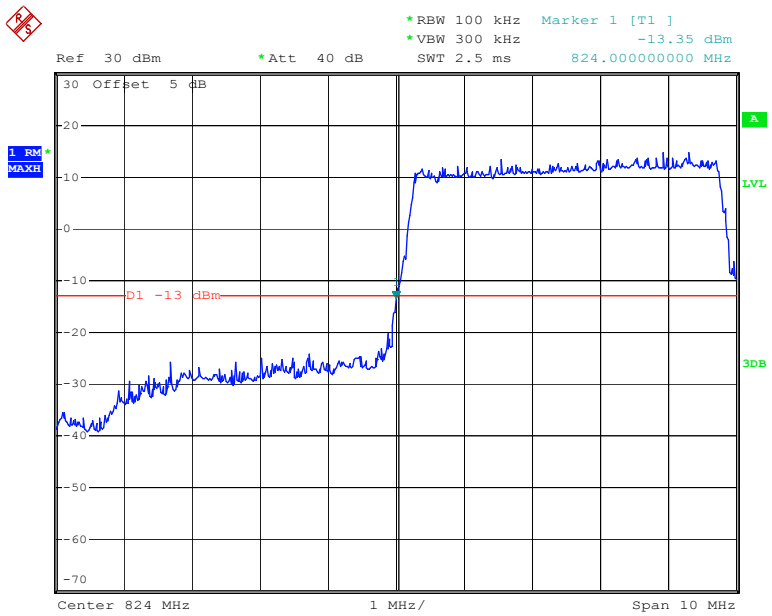
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QPSK_3MHz_ 15 RB_ Right



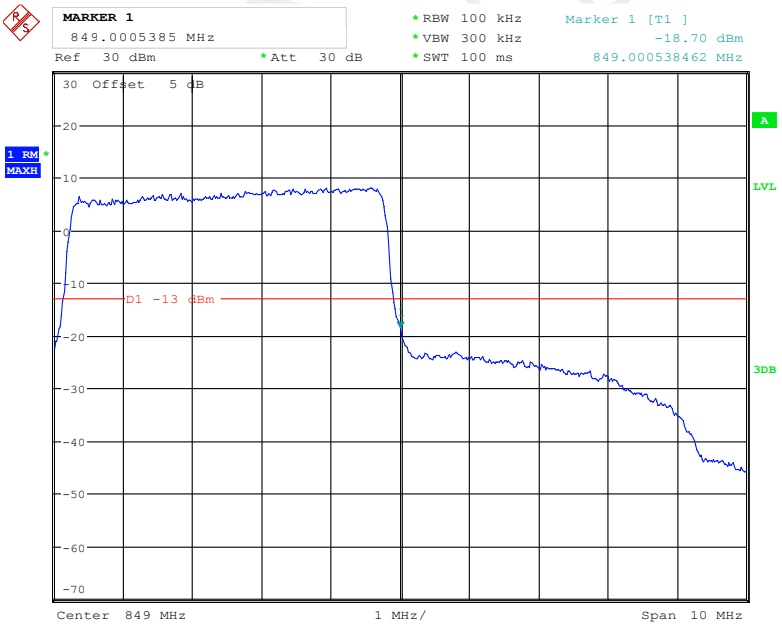
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QPSK_5MHz_ 25 RB_ Left



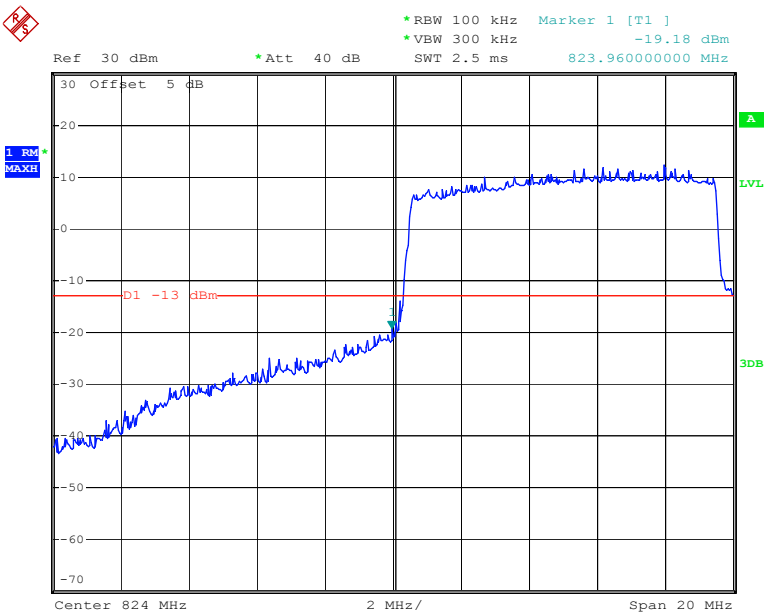
Date: 7.MAY.2020 16:06:31

QPSK_5MHz_ 25 RB_ Right



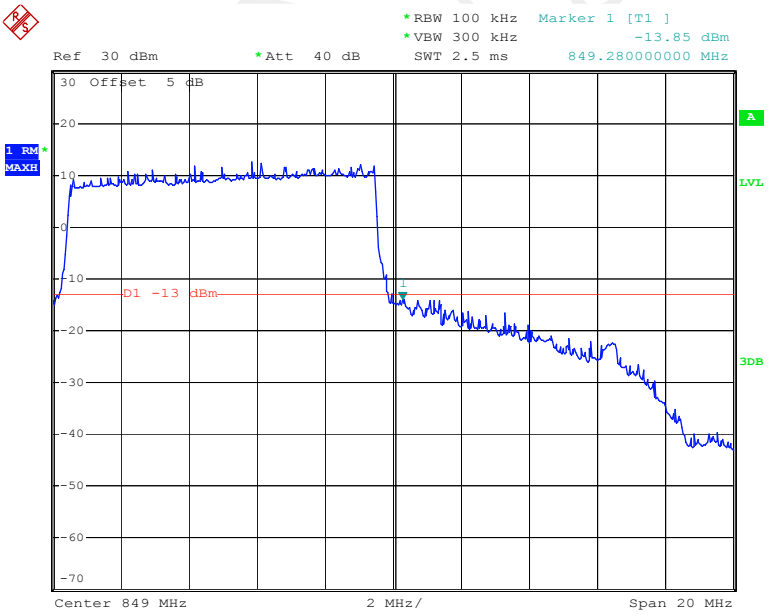
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QPSK_10MHz_ 50 RB_ Left



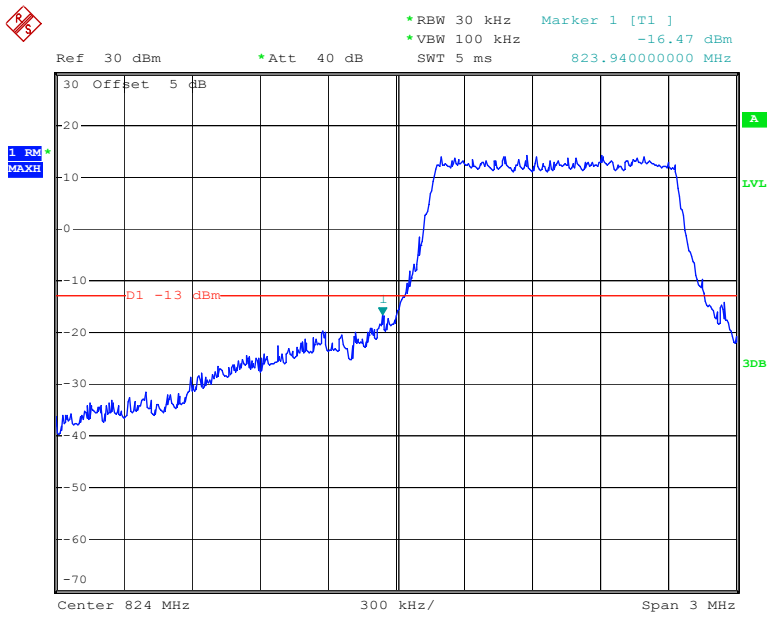
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QPSK_10MHz_ 50 RB_ Right



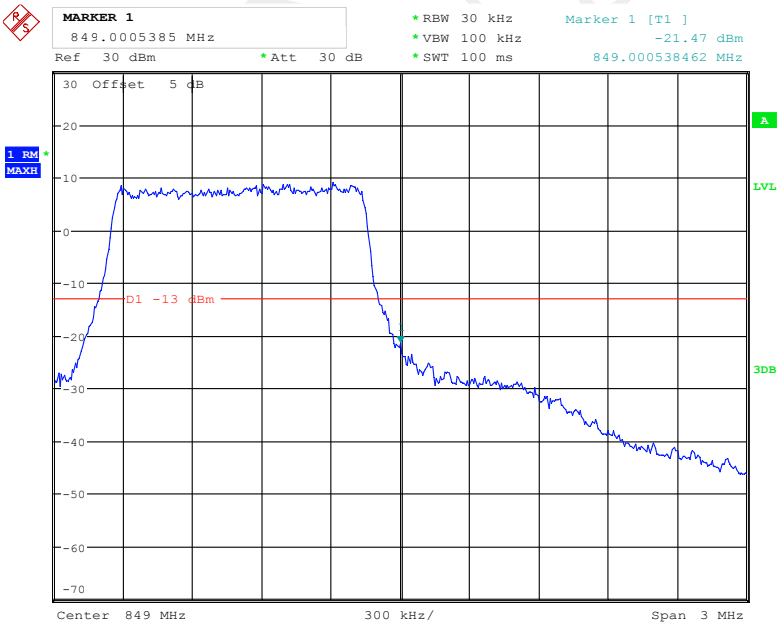
Date: 7.MAY.2020 16:08:32

16QAM_1.4MHz_ 6 RB_ Left



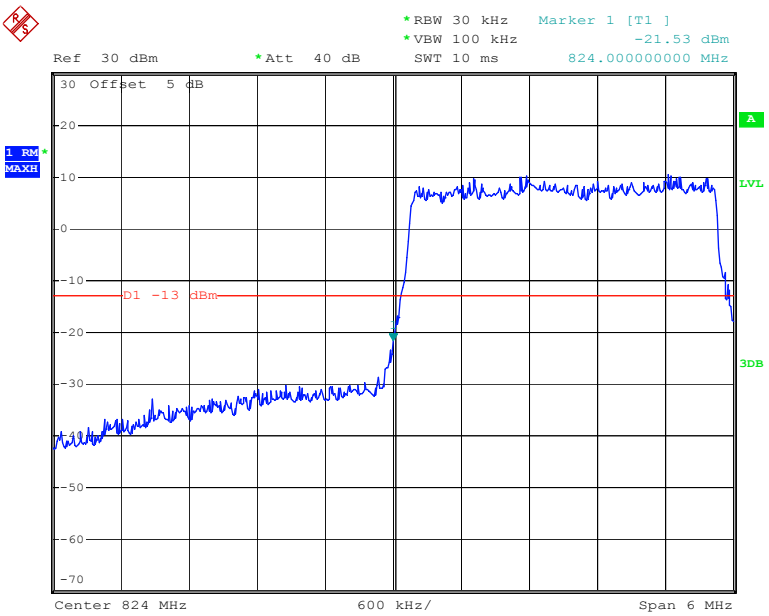
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16QAM_1.4MHz_ 6 RB_ Right



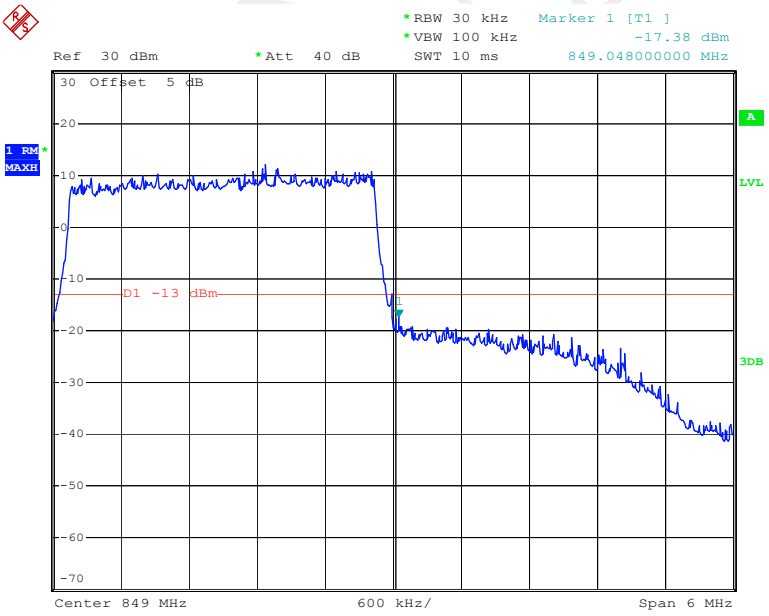
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16QAM_3MHz_ 15 RB_ Left



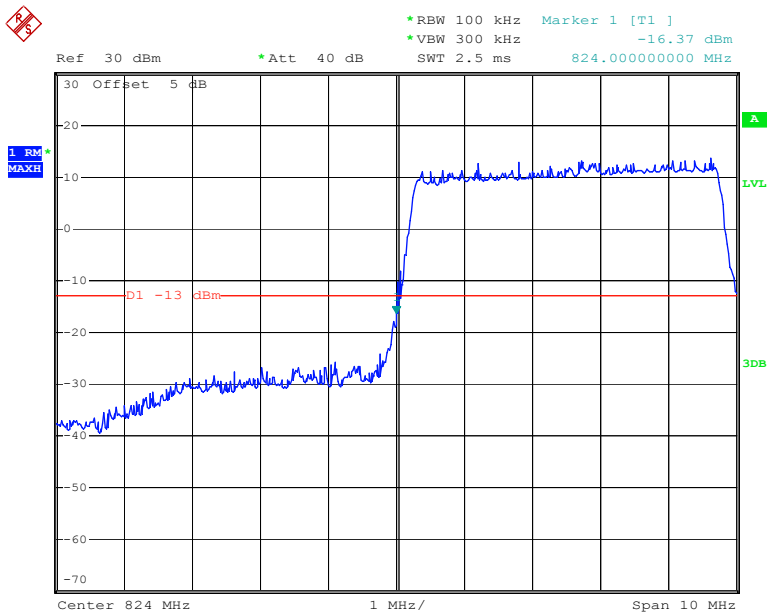
Date: 7.MAY.2020 16:05:28

16QAM_3MHz_ 15 RB_ Right



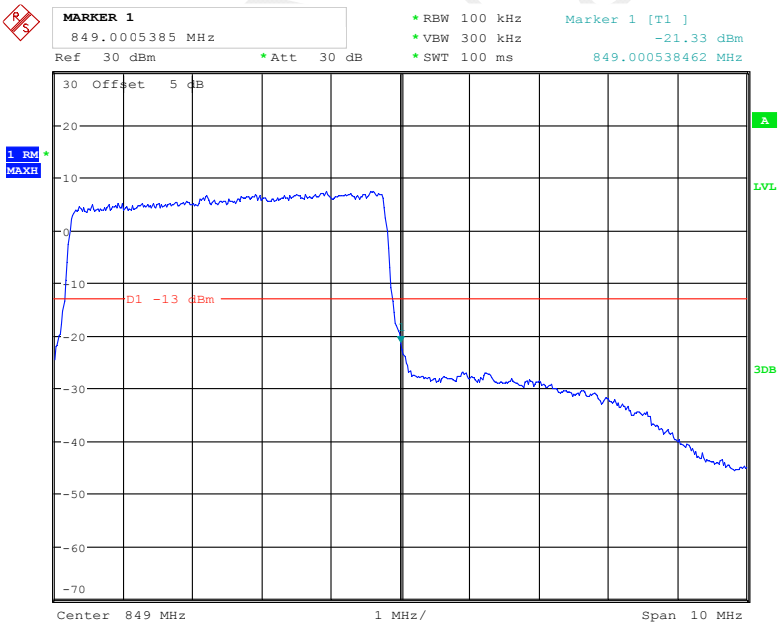
Date: 7.MAY.2020 16:06:07

16QAM_5MHz_ 25 RB_ Left



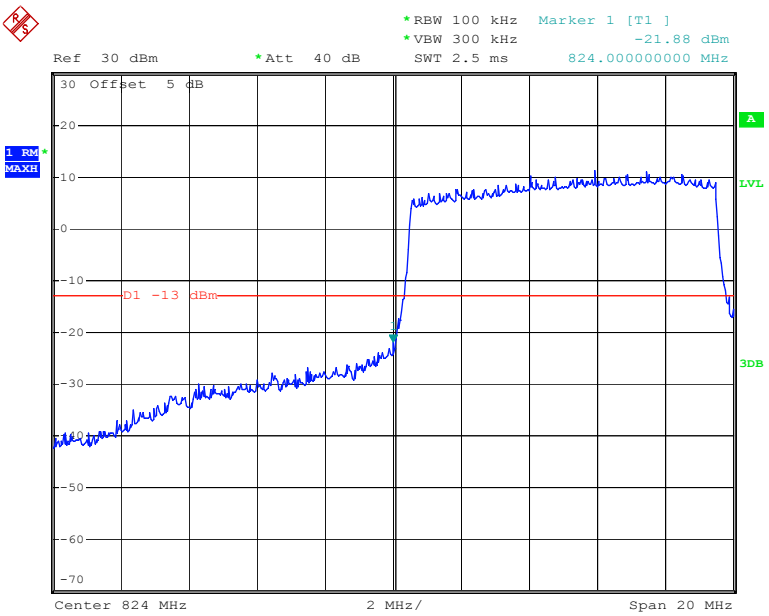
Date: 7.MAY.2020 16:06:51

16QAM_5MHz_ 25 RB_ Right



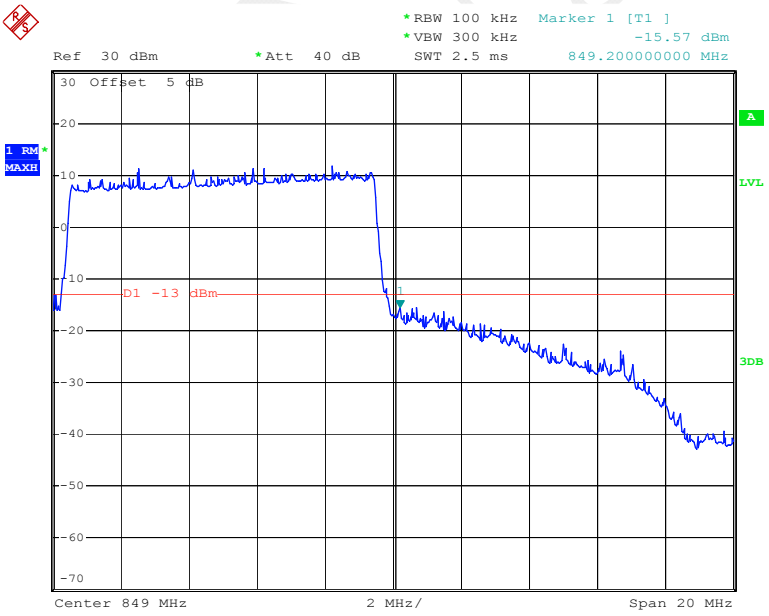
Date: 8.MAY.2020 12:13:30

16QAM_10MHz_ 50 RB_ Left



Date: 7.MAY.2020 16:08:13

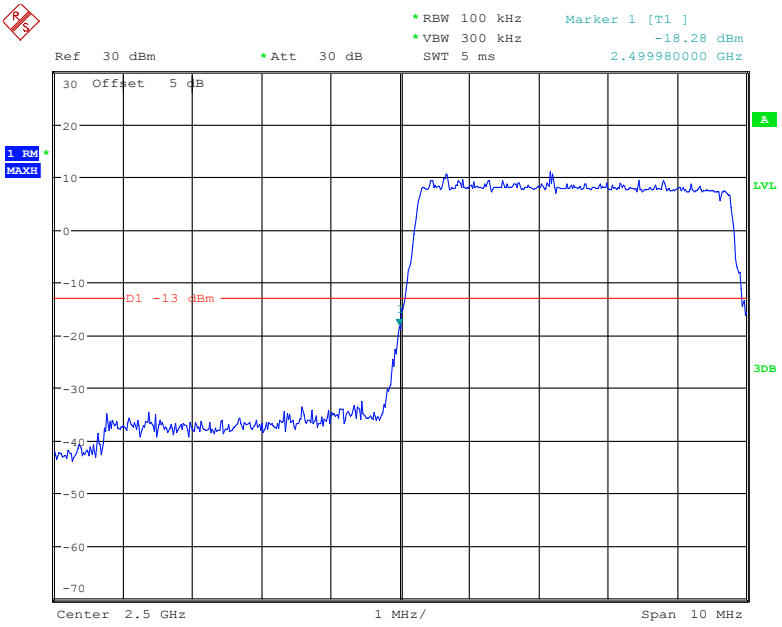
16QAM_10MHz_ 50 RB_ Right



Date: 7.MAY.2020 16:08:50

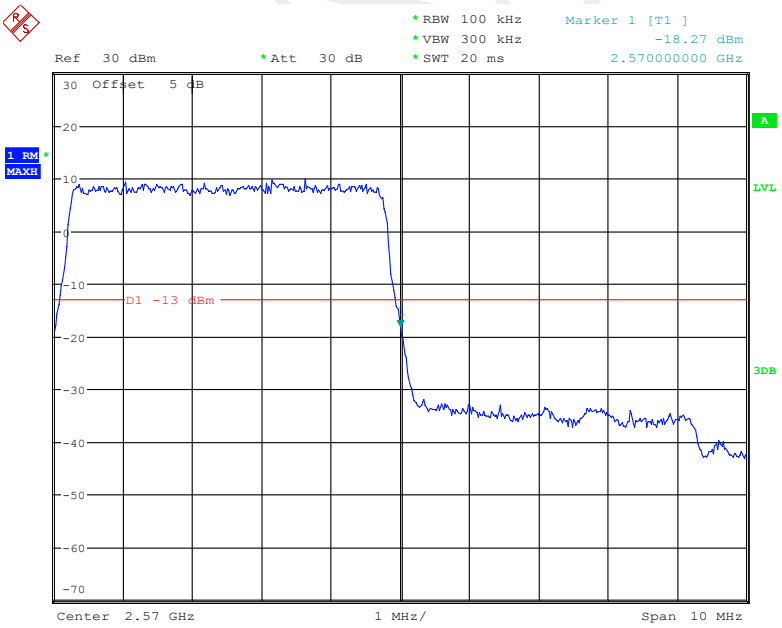
LTE Band 7

QPSK_5MHz_ 25 RB_ Left



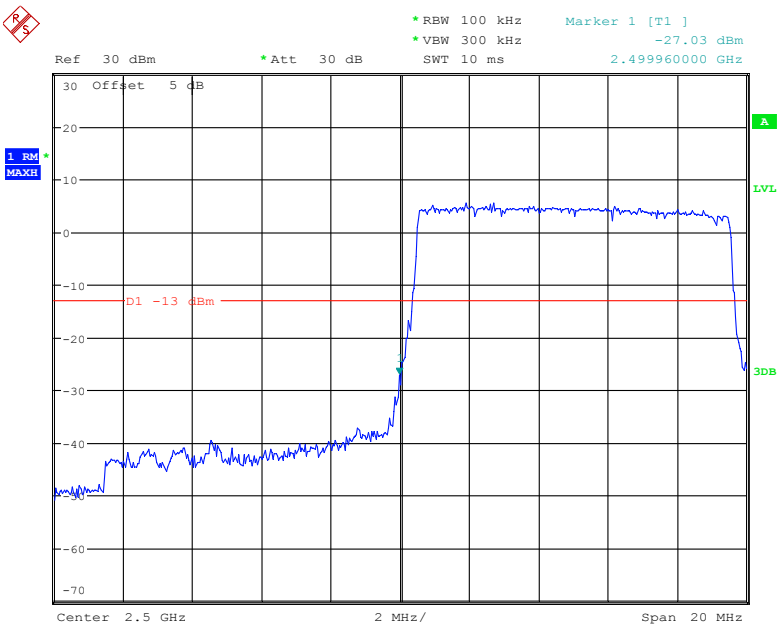
Date: 15.MAY.2020 10:29:27

QPSK_5MHz_ 25 RB_ Right



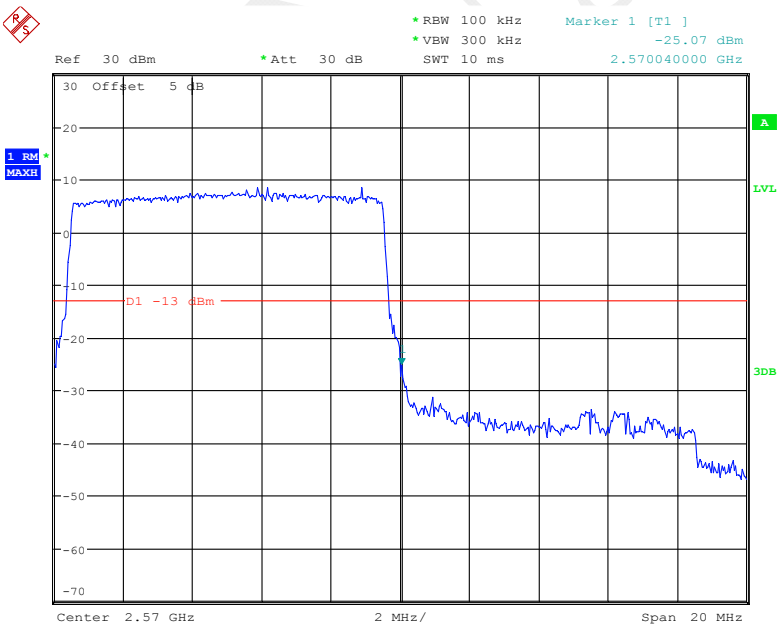
Date: 15.MAY.2020 10:30:24

QPSK_10MHz_ 50 RB_ Left



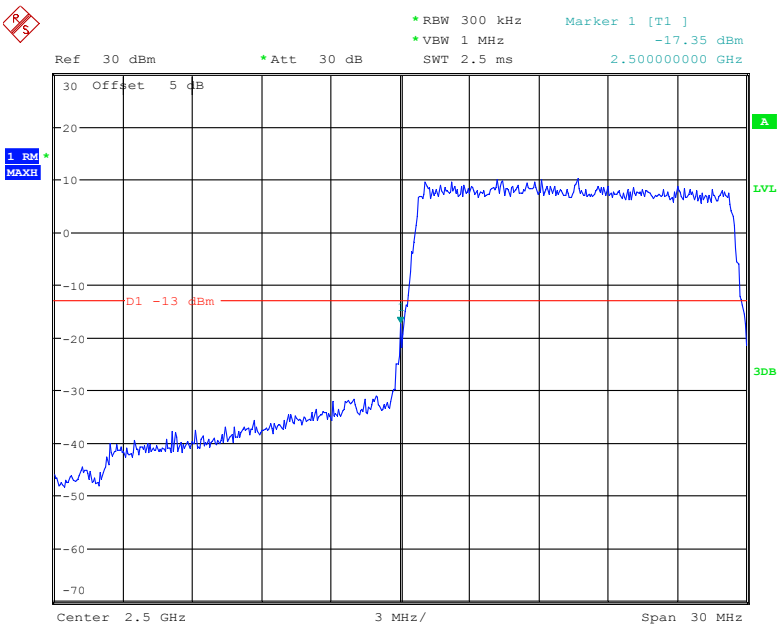
Date: 15.MAY.2020 10:31:07

QPSK_10MHz_ 50 RB_ Right



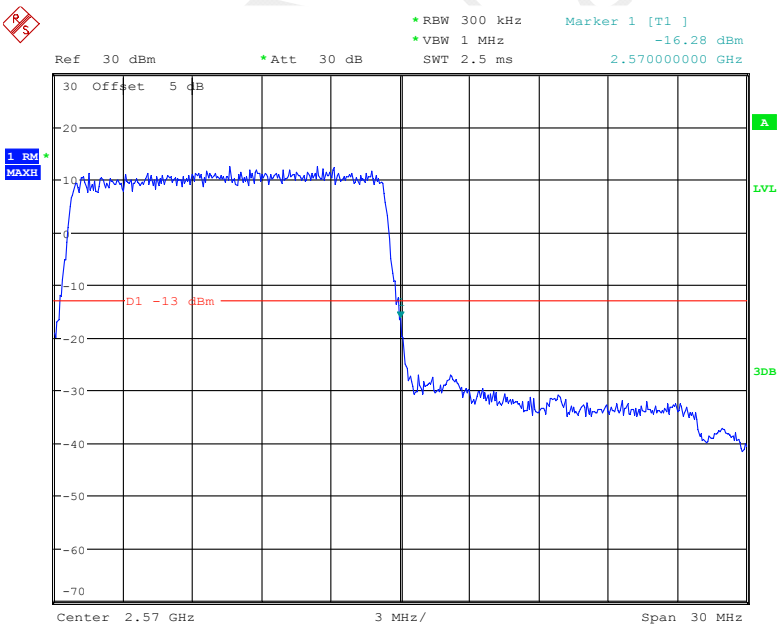
Date: 15.MAY.2020 10:31:44

QPSK_15MHz_ 75 RB_ Left



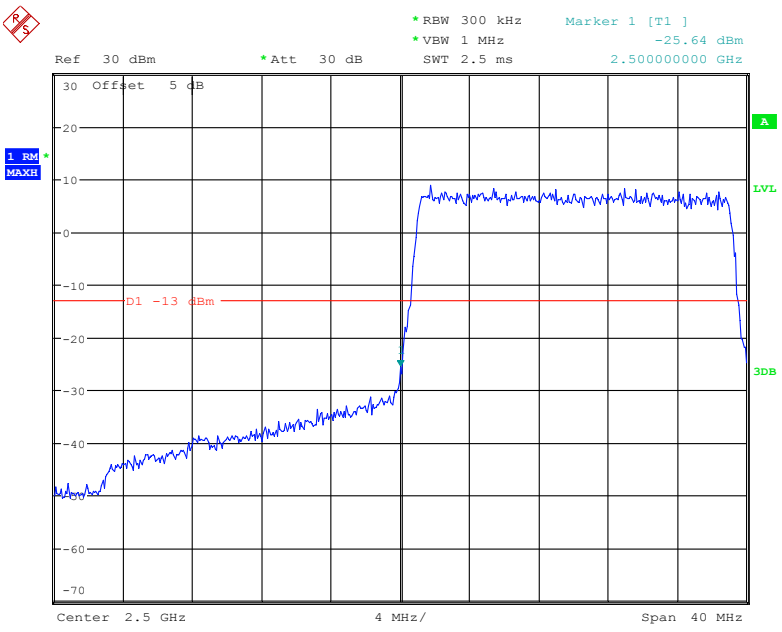
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QPSK_15MHz_ 75 RB_ Right



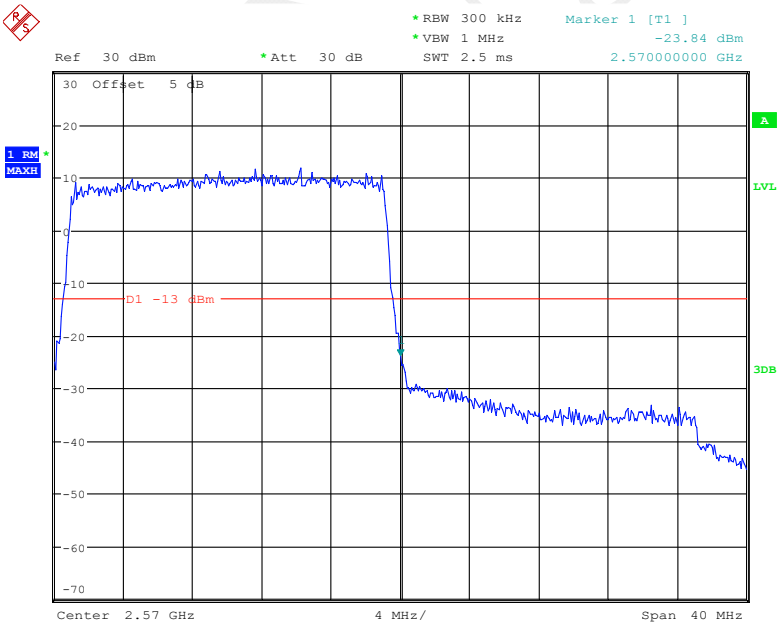
Date: 15.MAY.2020 10:33:10

QPSK_20MHz_ FULL RB_ Left



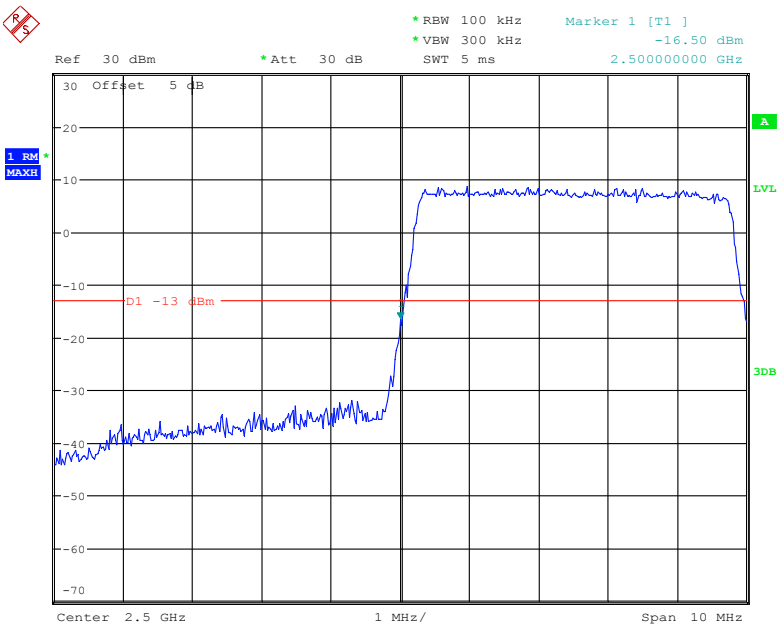
Date: 15.MAY.2020 10:36:00

QPSK_20MHz_ FULL RB_ Right



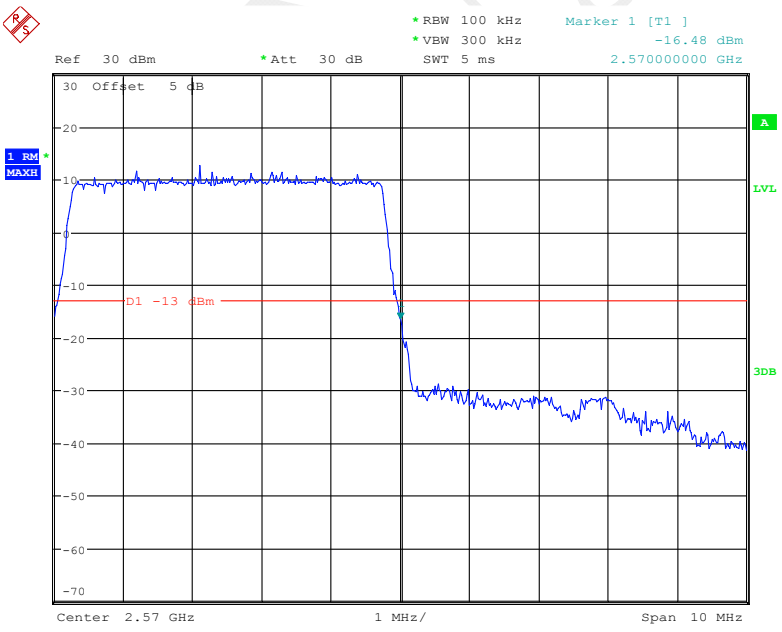
Date: 15.MAY.2020 10:36:41

16QAM_5MHz_ 25 RB_ Left



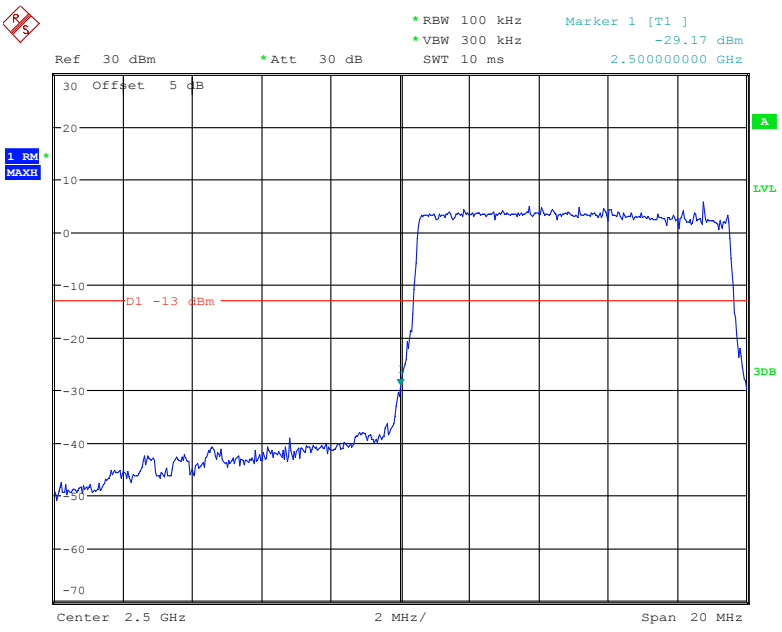
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16QAM_5MHz_ 25 RB_ Right



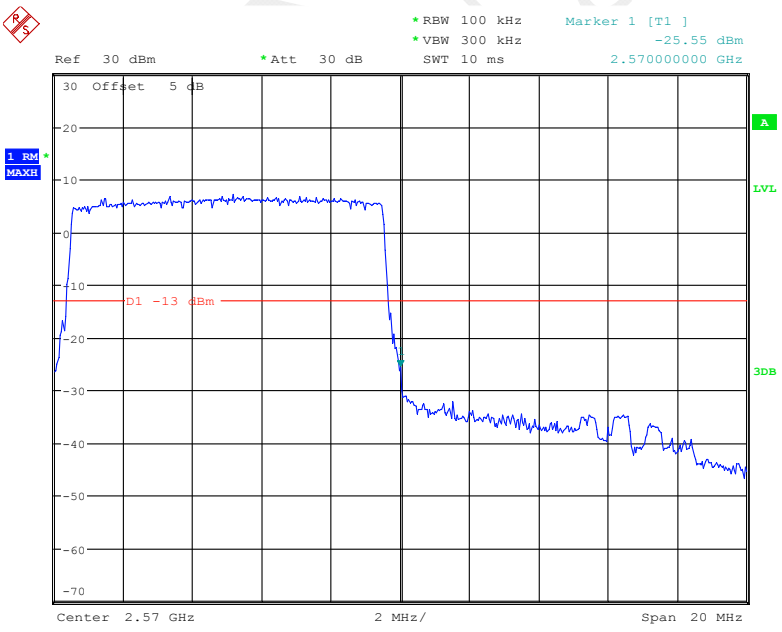
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16QAM_10MHz_ 50 RB_ Left



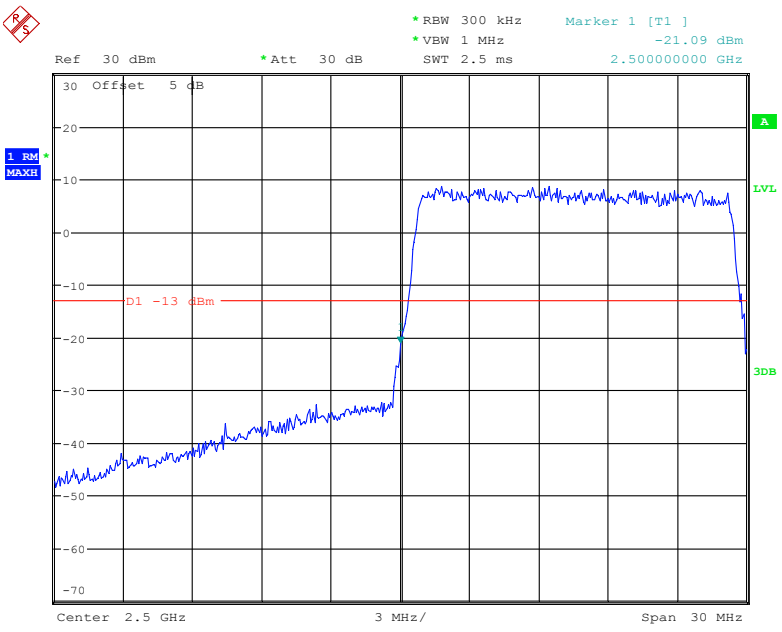
Date: 15.MAY.2020 10:31:25

16QAM_10MHz_ 50 RB_ Right



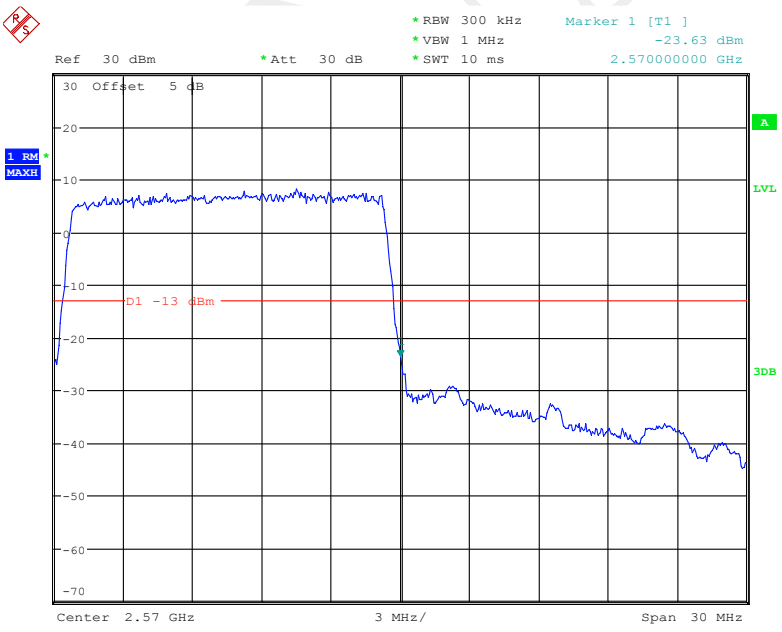
Date: 15.MAY.2020 10:32:02

16QAM_15MHz_ 75 RB_ Left



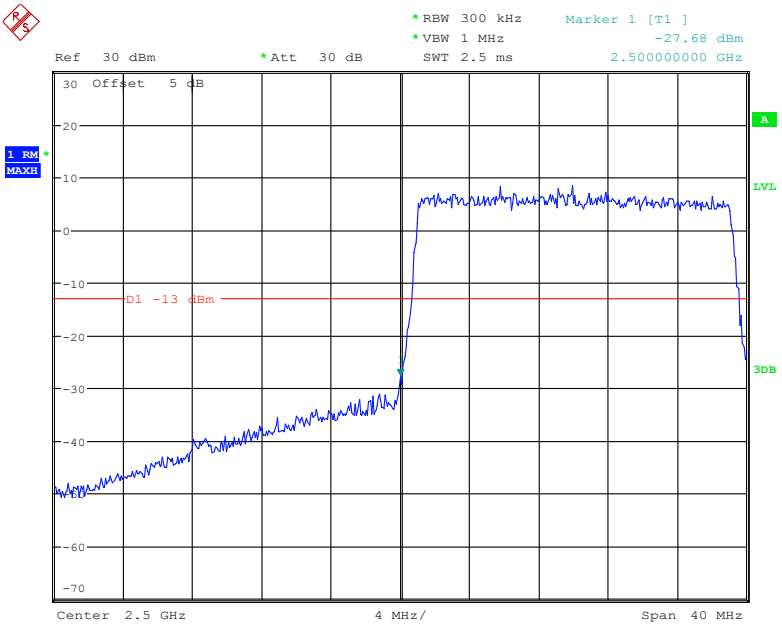
Date: 15.MAY.2020 10:32:49

16QAM_15MHz_ 75 RB_ Right



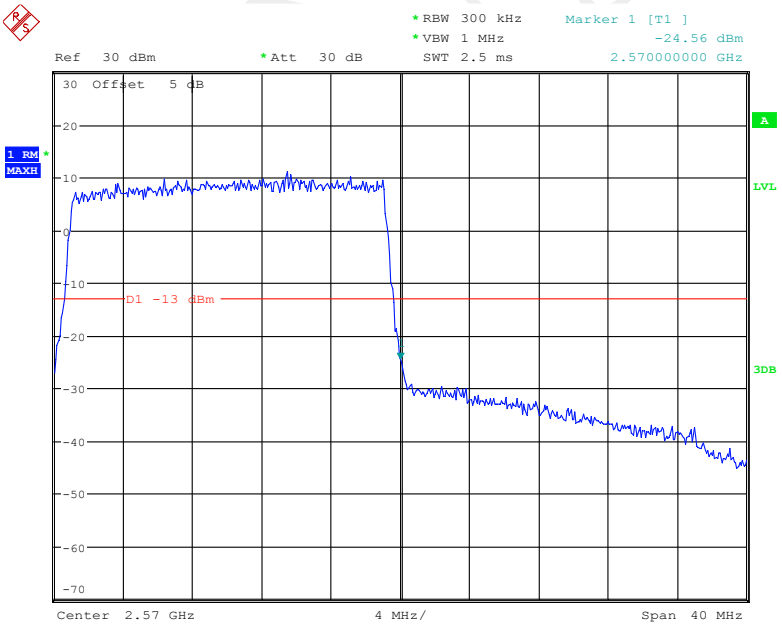
Date: 15.MAY.2020 10:34:12

16QAM_20MHz_ FULL RB_ Left



Date: 15.MAY.2020 10:36:20

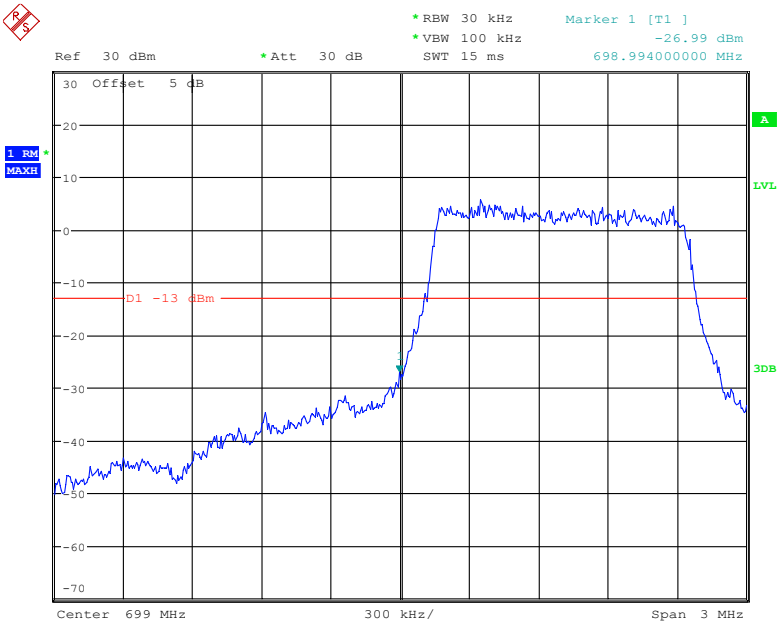
16QAM_20MHz_ FULL RB_ Right



Date: 15.MAY.2020 10:37:04

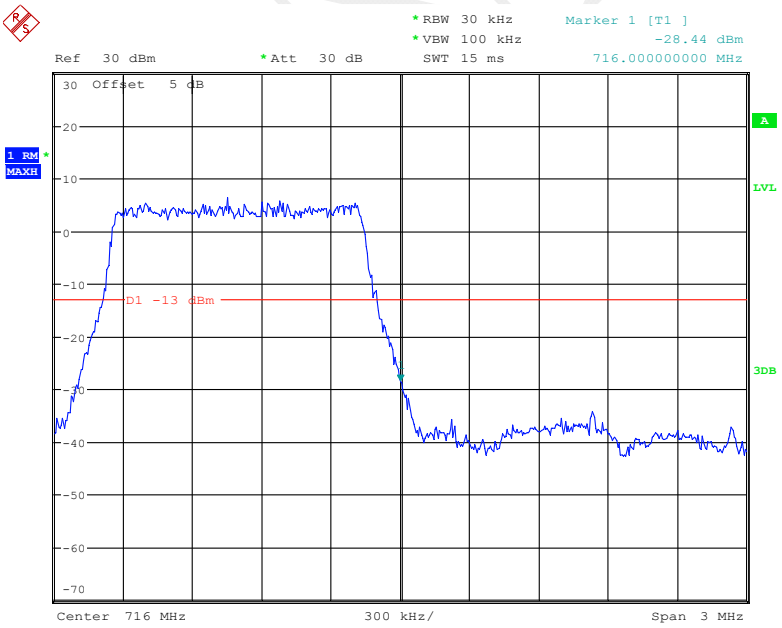
LTE Band 12

QPSK_1.4MHz_ 6 RB_ Left



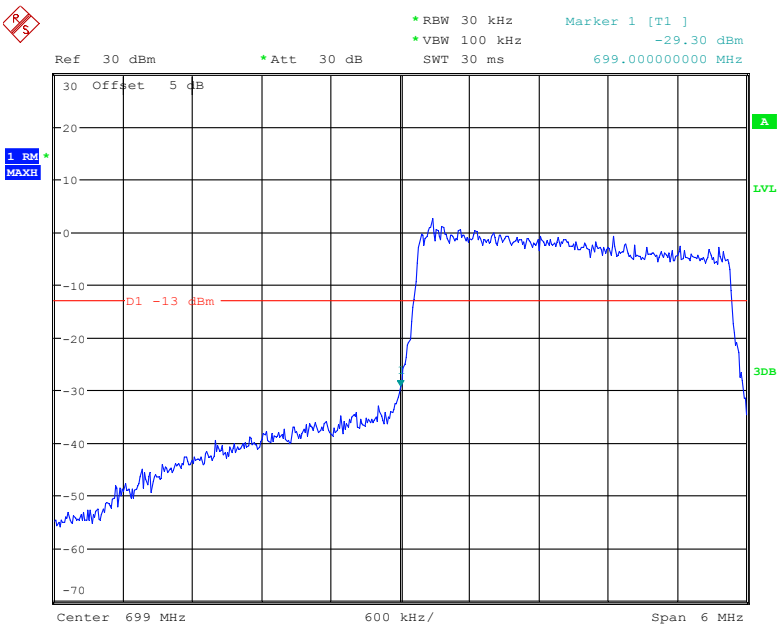
Date: 15.MAY.2020 17:27:28

QPSK_1.4MHz_ 6 RB_ Right



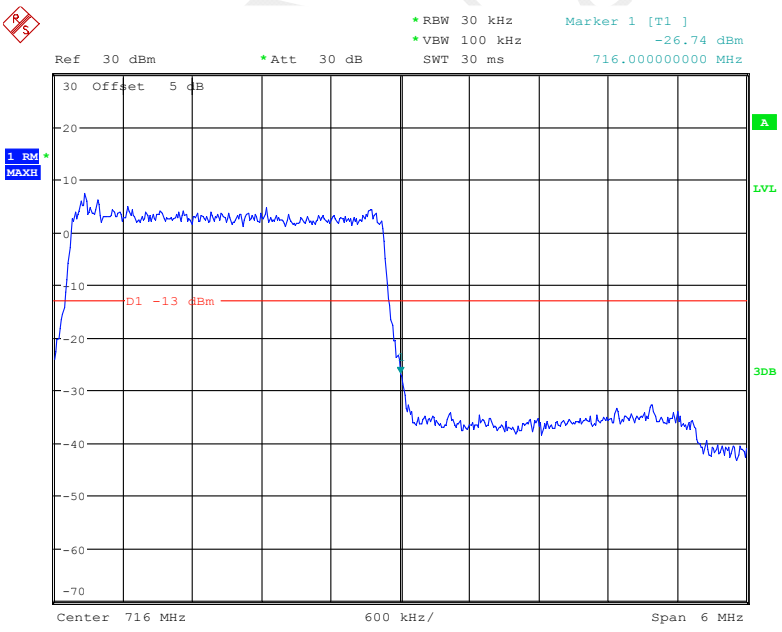
Date: 15.MAY.2020 17:38:04

QPSK_3MHz_ 15 RB_ Left



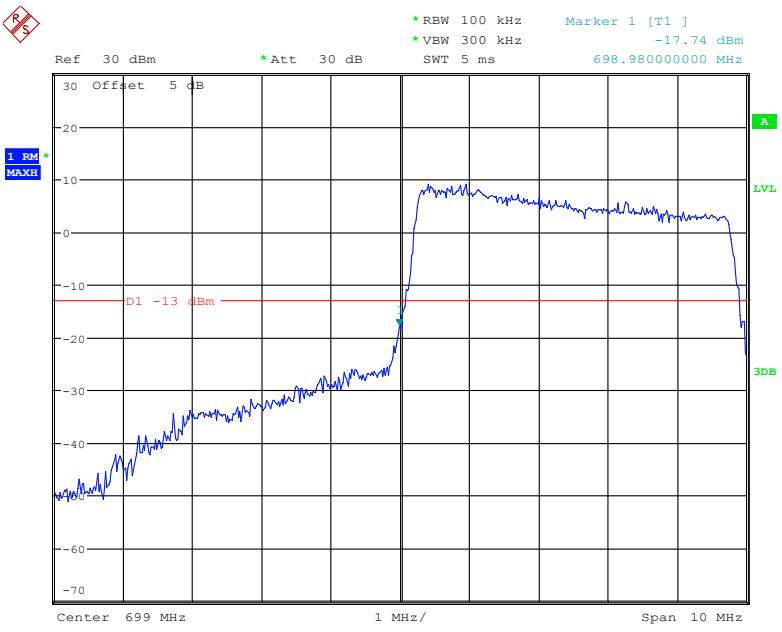
Date: 15.MAY.2020 17:38:44

QPSK_3MHz_ 15 RB_ Right



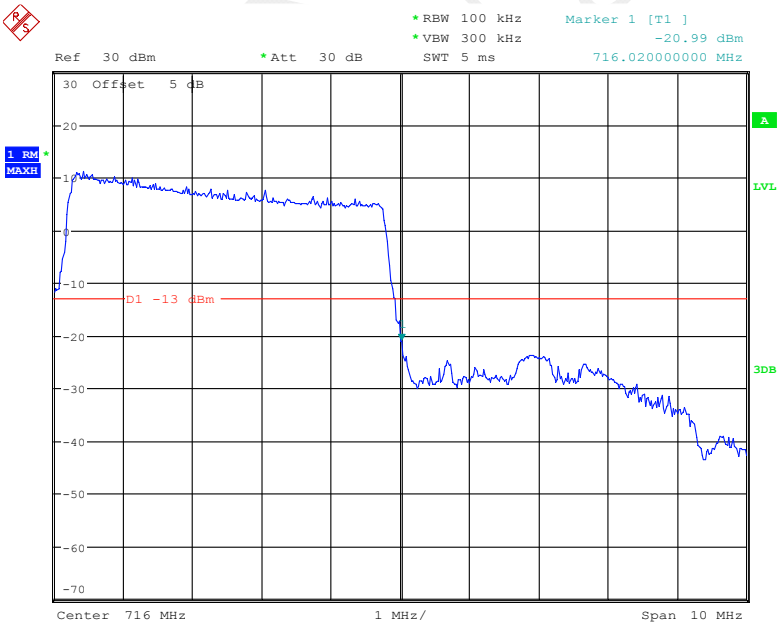
Date: 15.MAY.2020 17:41:18

QPSK_5MHz_ 25 RB_ Left



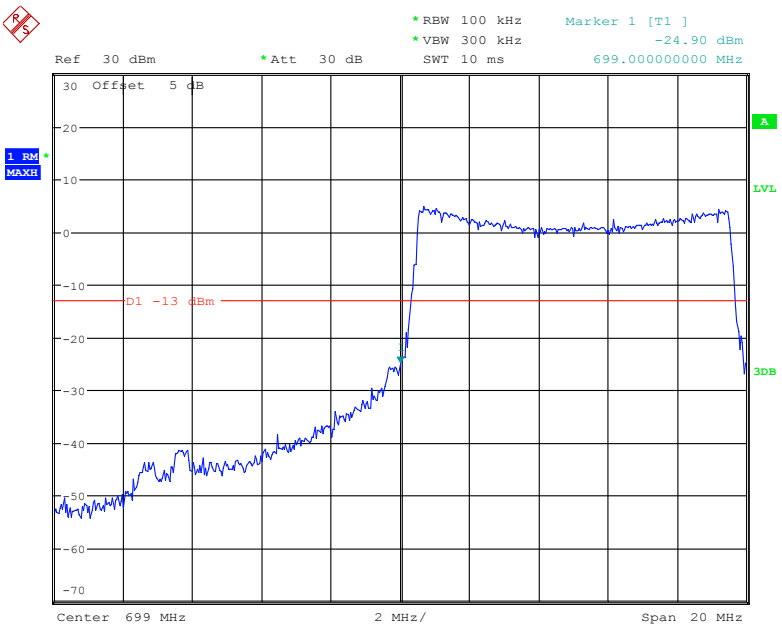
Date: 15.MAY.2020 17:41:58

QPSK_5MHz_ 25 RB_ Right



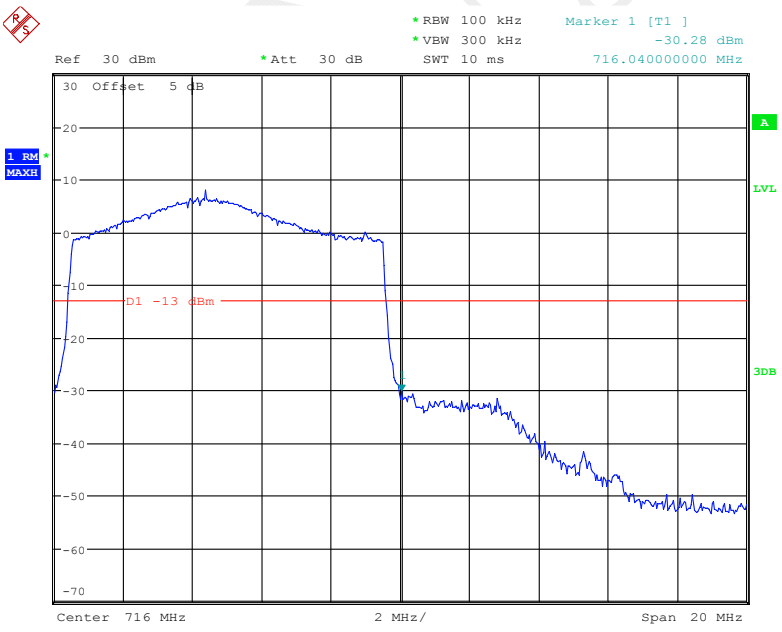
Date: 15.MAY.2020 17:42:35

QPSK_10MHz_ 50 RB_ Left



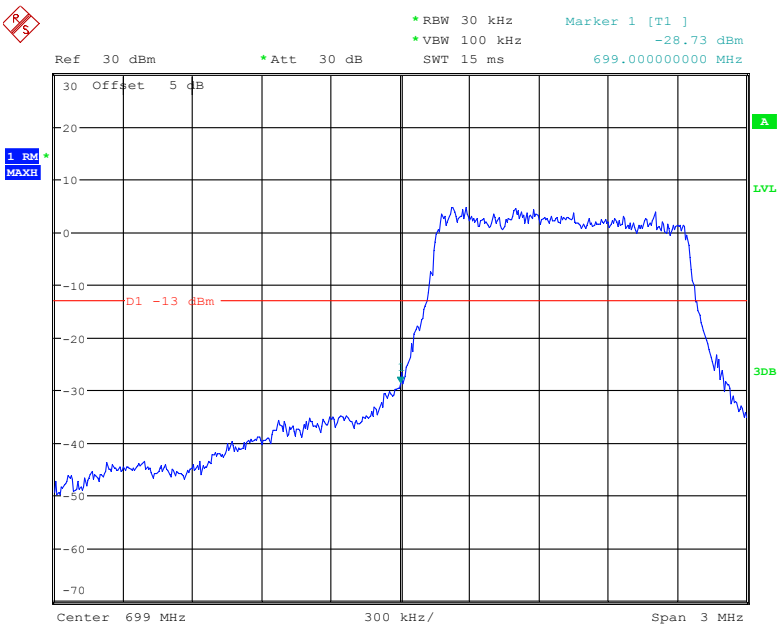
Date: 15.MAY.2020 17:43:16

QPSK_10MHz_ 50 RB_ Right



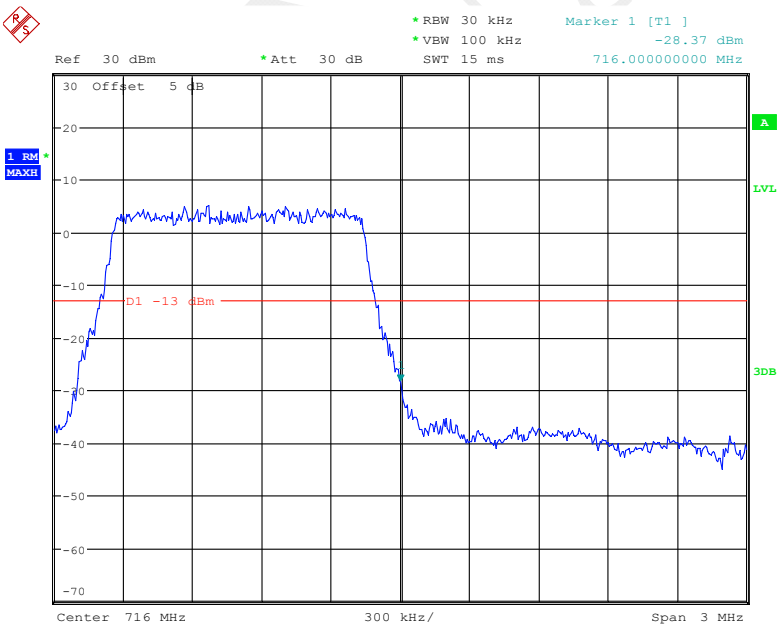
Date: 15.MAY.2020 17:43:52

16QAM_1.4MHz_ 6 RB_ Left



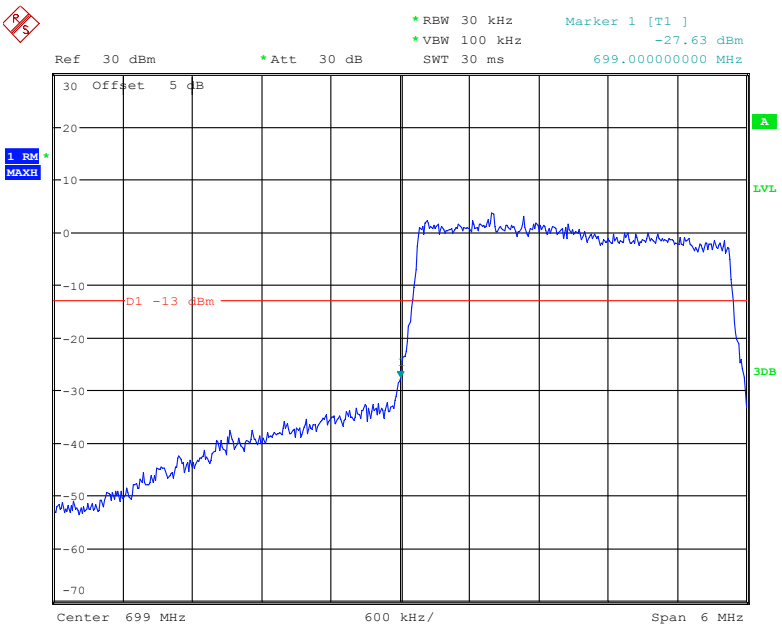
Date: 15.MAY.2020 17:27:51

16QAM_1.4MHz_ 6 RB_ Right



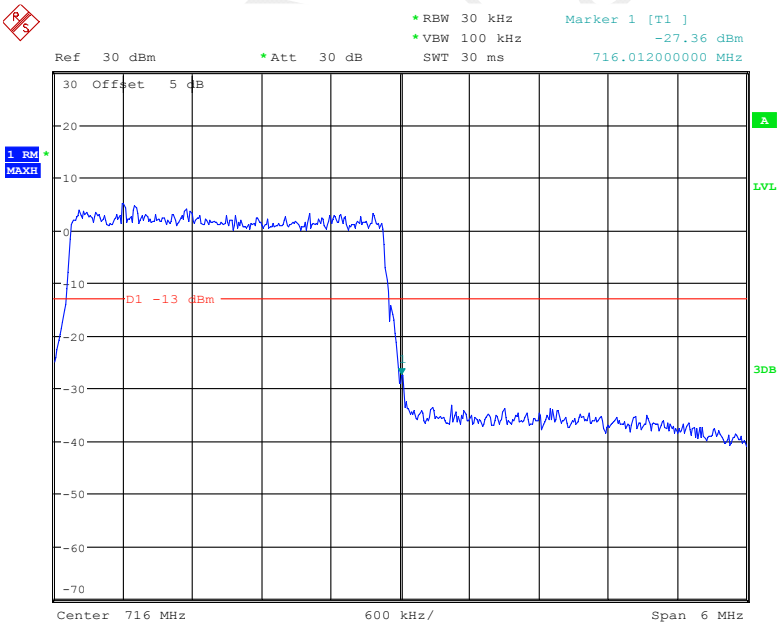
Date: 15.MAY.2020 17:38:21

16QAM_3MHz_ 15 RB_ Left



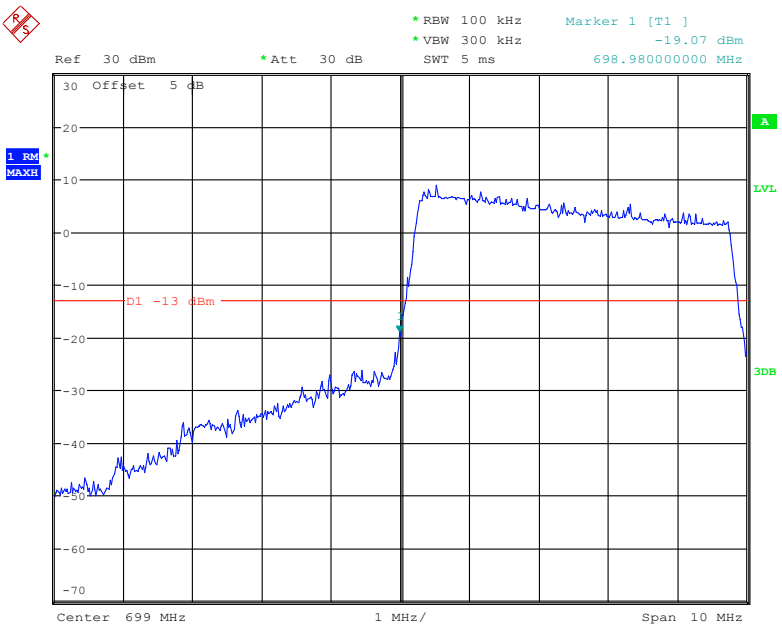
Date: 15.MAY.2020 17:41:01

16QAM_3MHz_ 15 RB_ Right



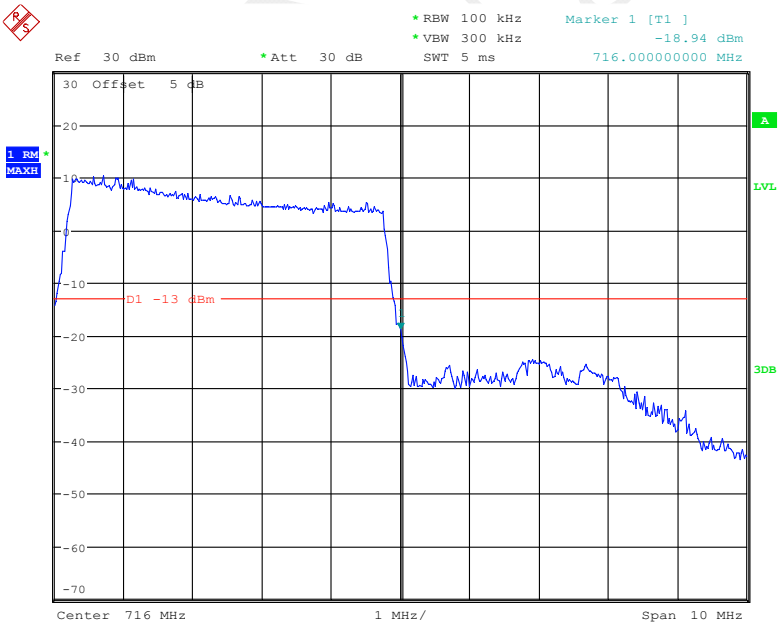
Date: 15.MAY.2020 17:41:35

16QAM_5MHz_ 25 RB_ Left



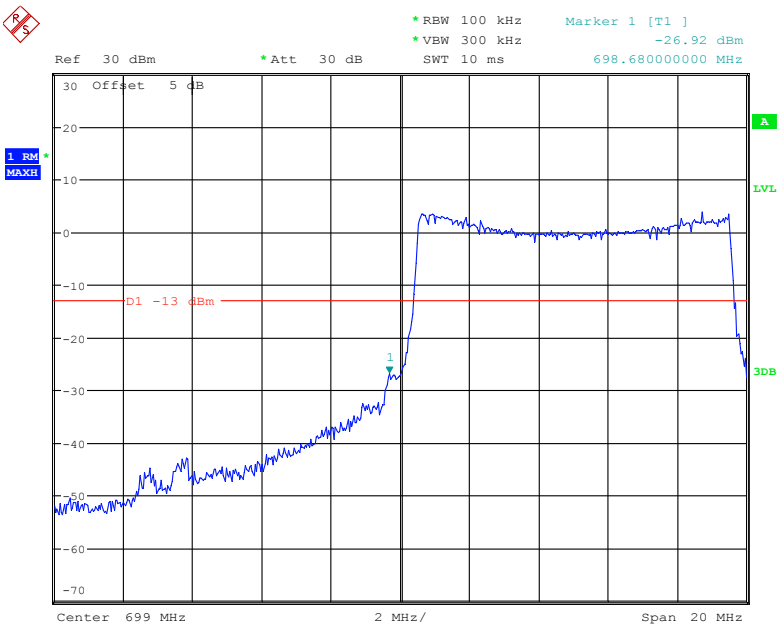
Date: 15.MAY.2020 17:42:18

16QAM_5MHz_ 25 RB_ Right



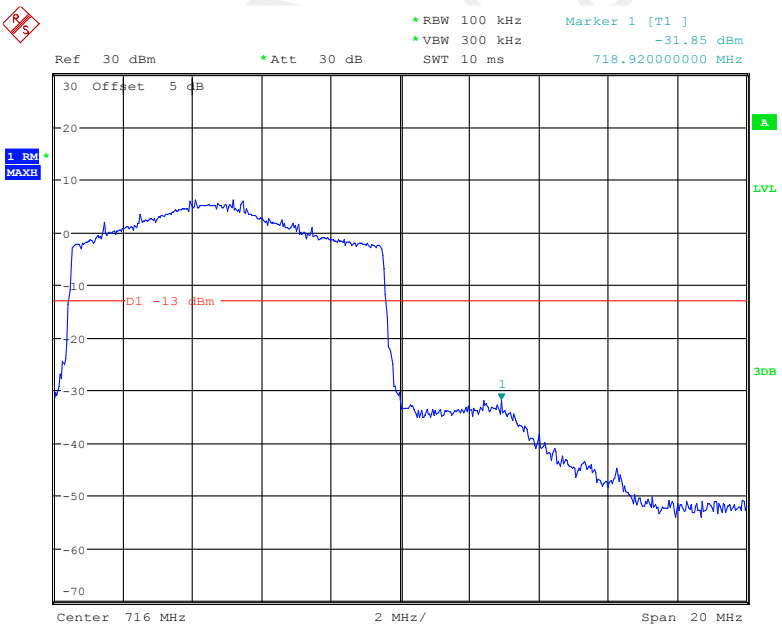
Date: 15.MAY.2020 17:42:52

16QAM_10MHz_ 50 RB_ Left



Date: 15.MAY.2020 17:43:34

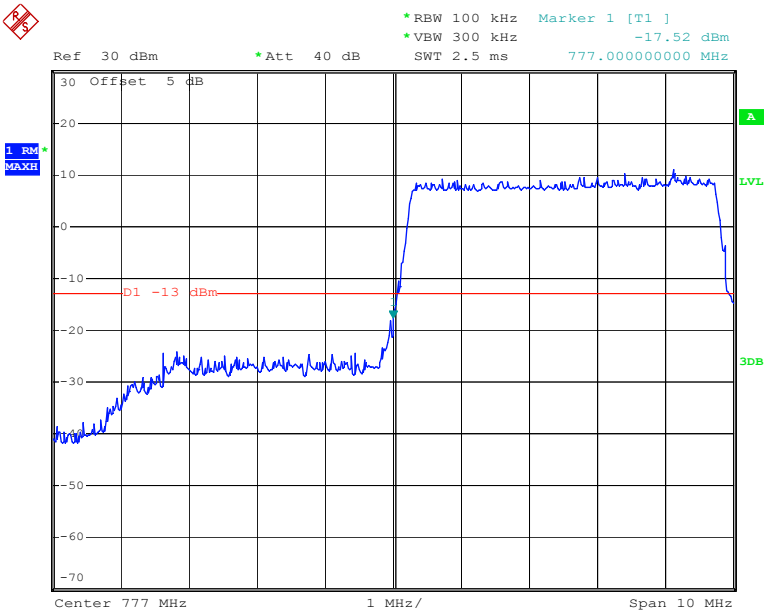
16QAM_10MHz_ 50 RB_ Right



Date: 15.MAY.2020 17:44:10

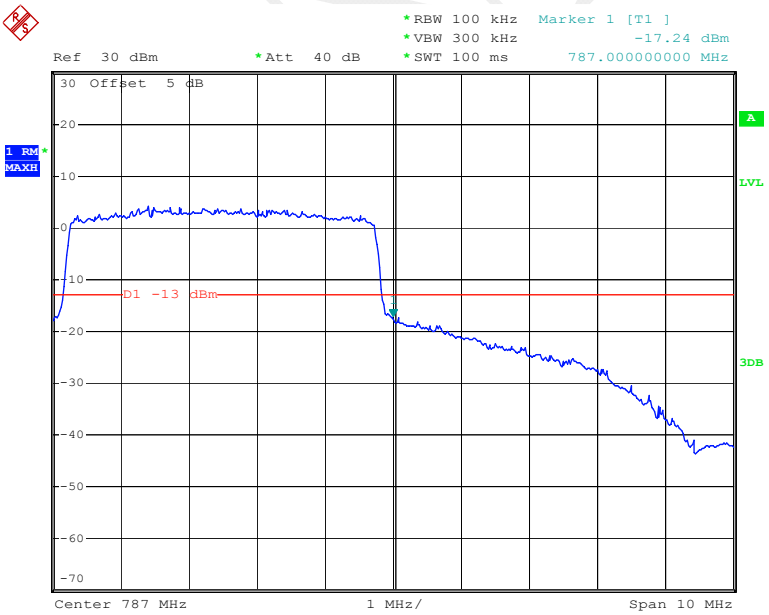
LTE Band 13

QPSK_5MHz_ 25 RB_ Left



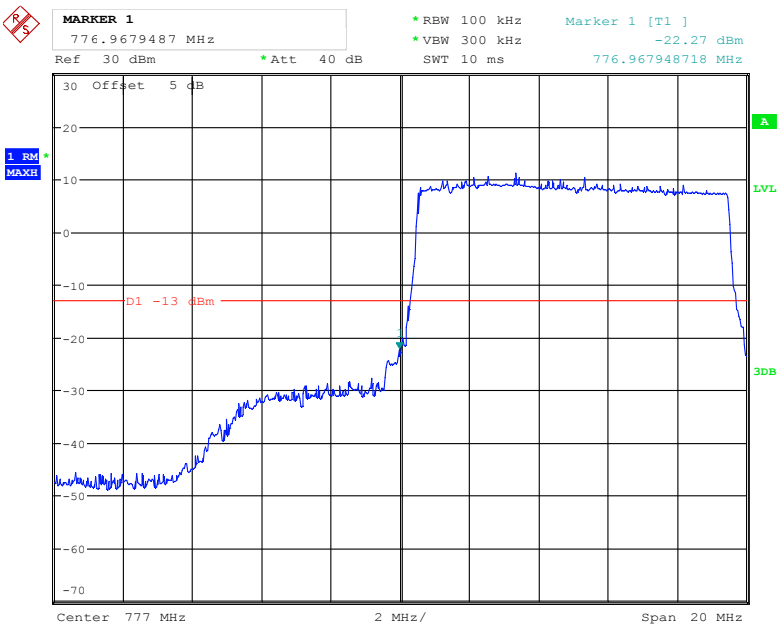
Date: 7.MAY.2020 16:33:12

QPSK_5MHz_ 25 RB_ Right



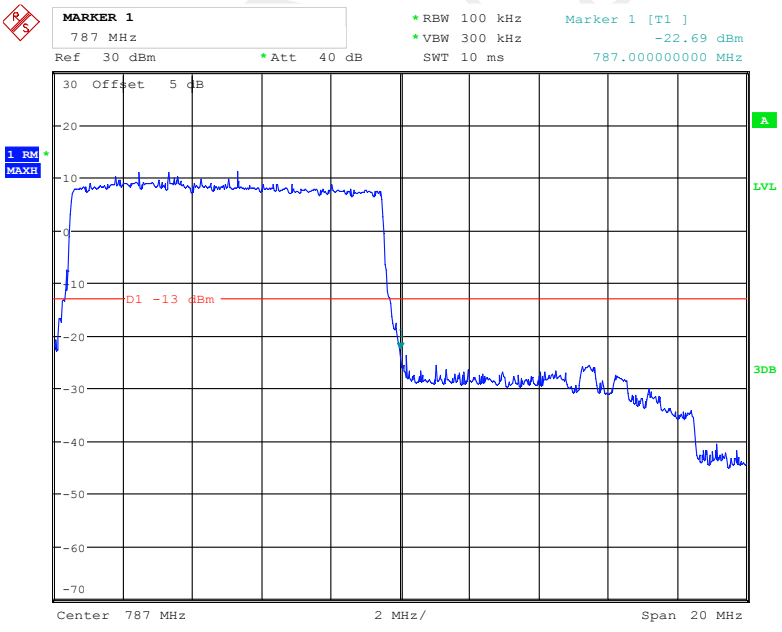
Date: 7.MAY.2020 16:34:05

QPSK_10MHz_ 50 RB_ Left



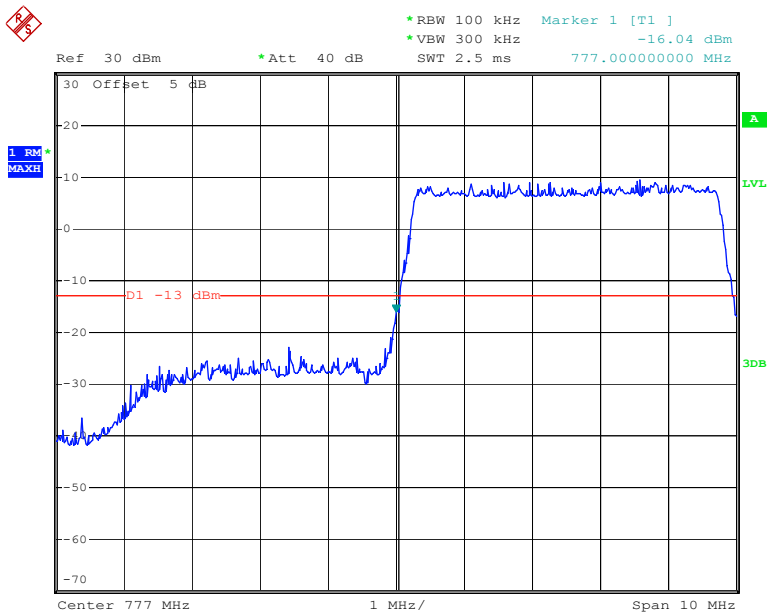
Date: 20.MAY.2020 10:12:06

QPSK_10MHz_ 50 RB_ Right



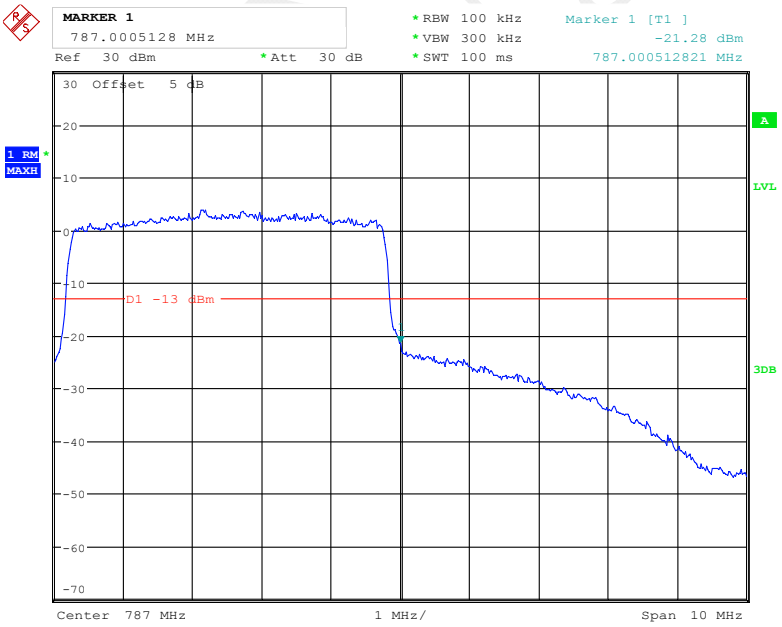
Date: 20.MAY.2020 10:12:41

16QAM_5MHz_ 25 RB_ Left



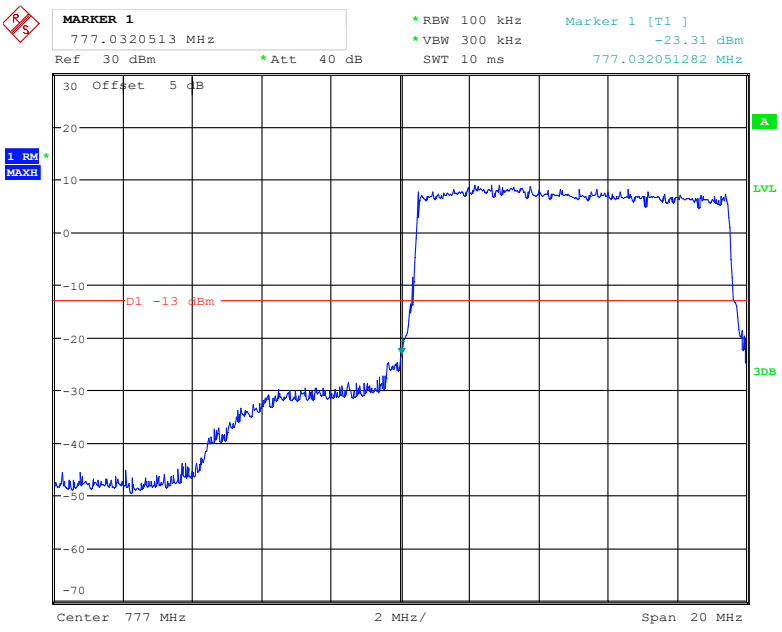
Date: 7.MAY.2020 16:33:32

16QAM_5MHz_ 25 RB_ Right



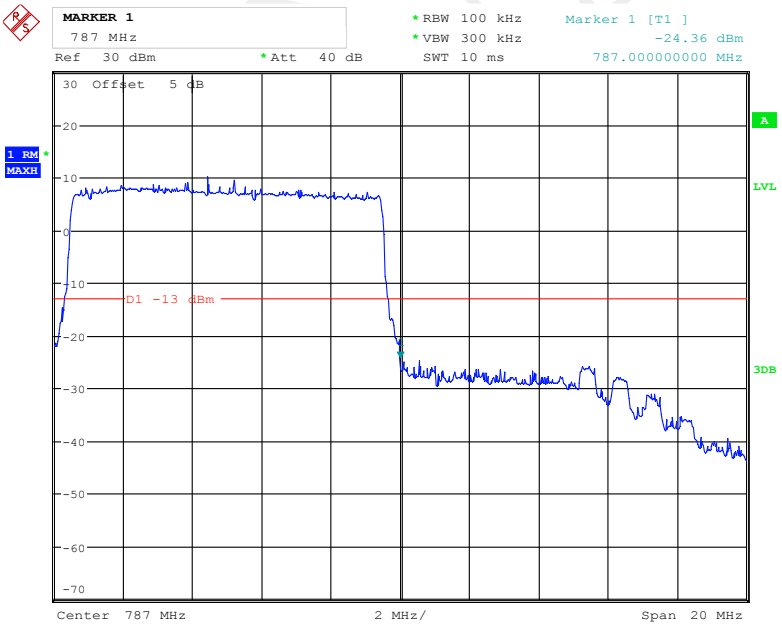
Date: 8.MAY.2020 12:17:30

16QAM_5MHz_ 50 RB_ Left



Date: 20.MAY.2020 10:14:12

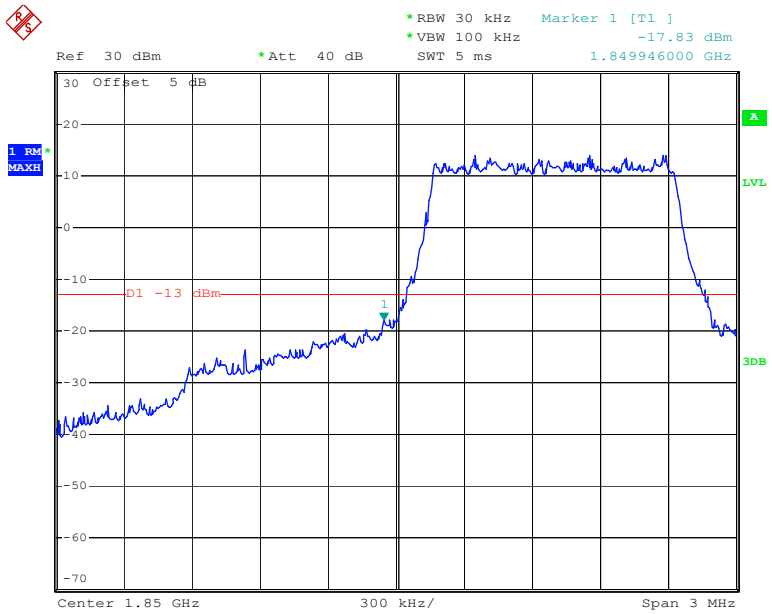
16QAM_5MHz_50 RB_ Right



Date: 20.MAY.2020 10:13:53

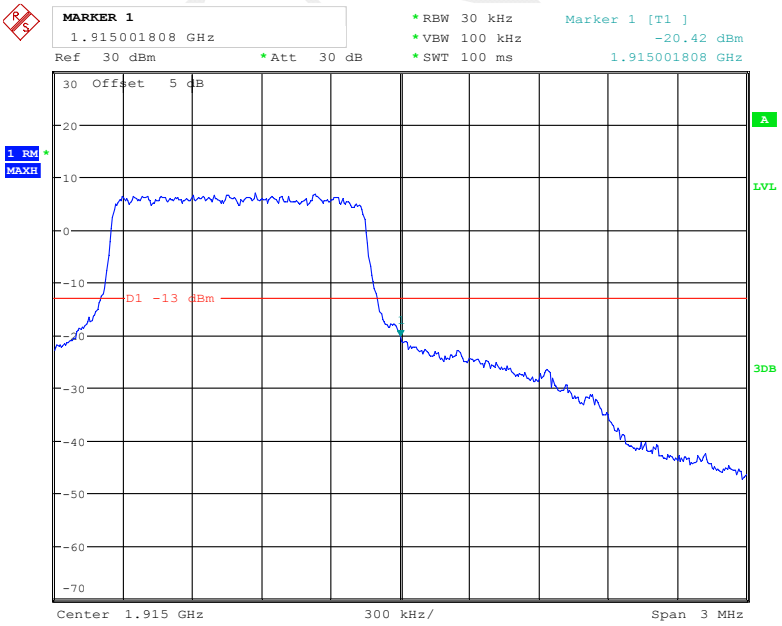
LTE Band 25

QPSK_1.4MHz_ 6 RB_ Left



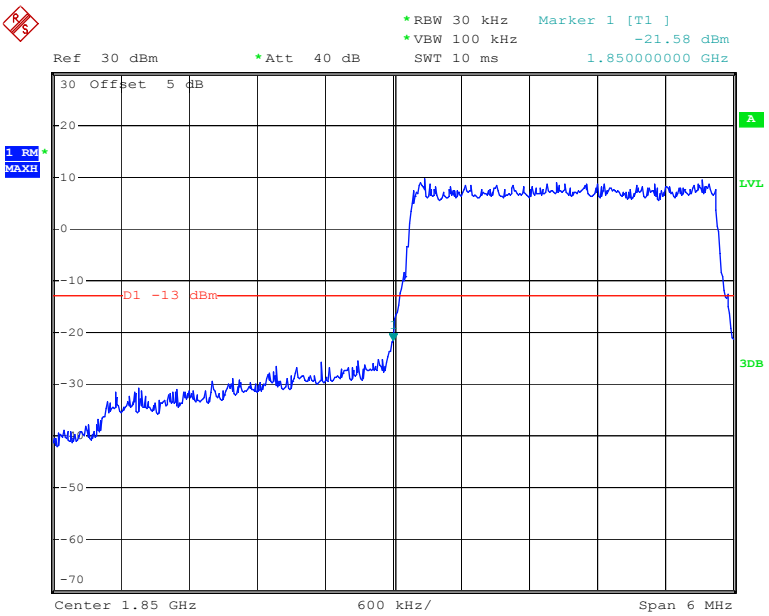
Date: 7.MAY.2020 17:43:29

QPSK_1.4MHz_ 6 RB_ Right



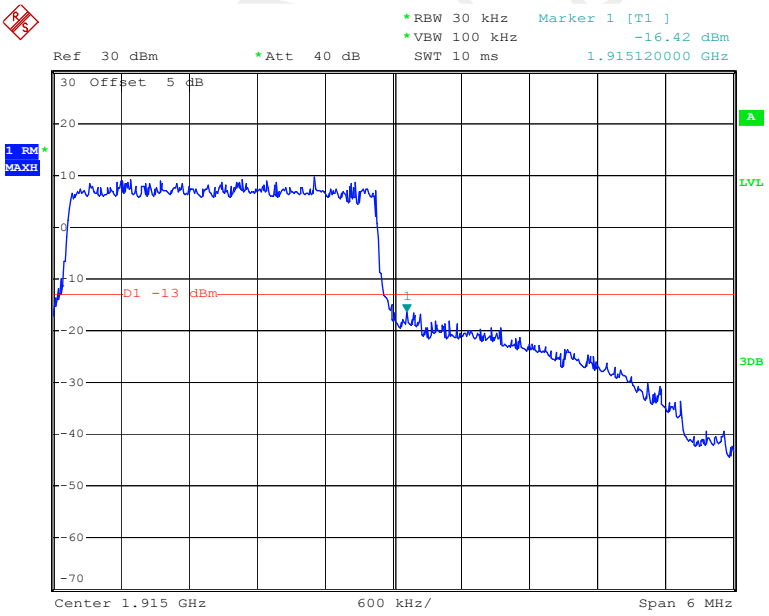
Date: 8.MAY.2020 12:20:04

QPSK_3MHz_ 15 RB_ Left



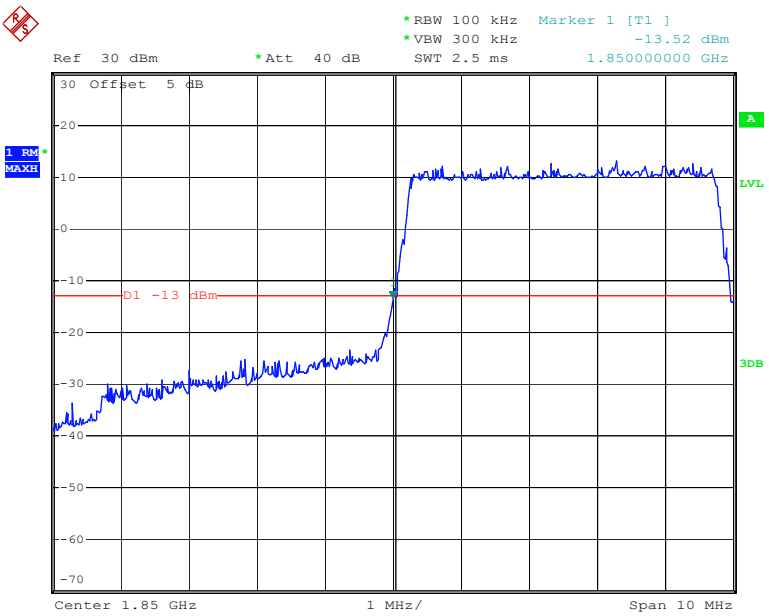
Date: 7.MAY.2020 17:44:53

QPSK_3MHz_ 15 RB_ Right



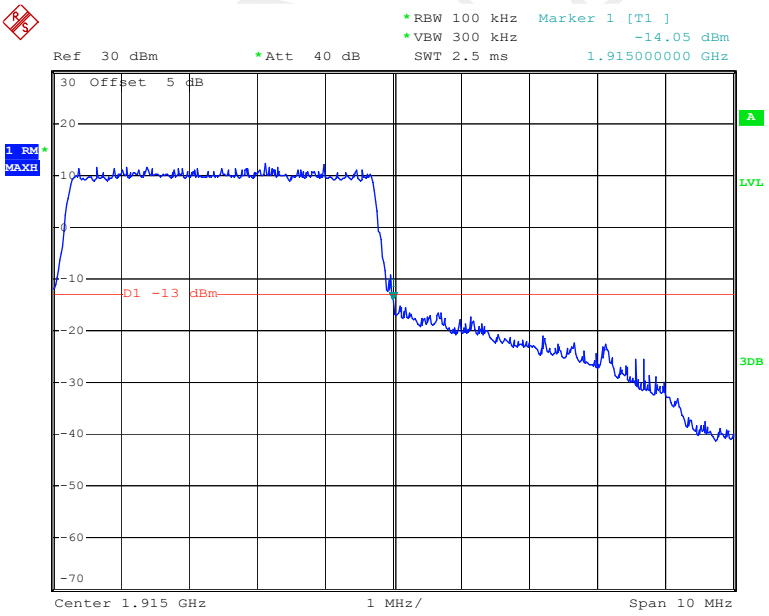
Date: 7.MAY.2020 17:45:32

QPSK_5MHz_ 25 RB_ Left



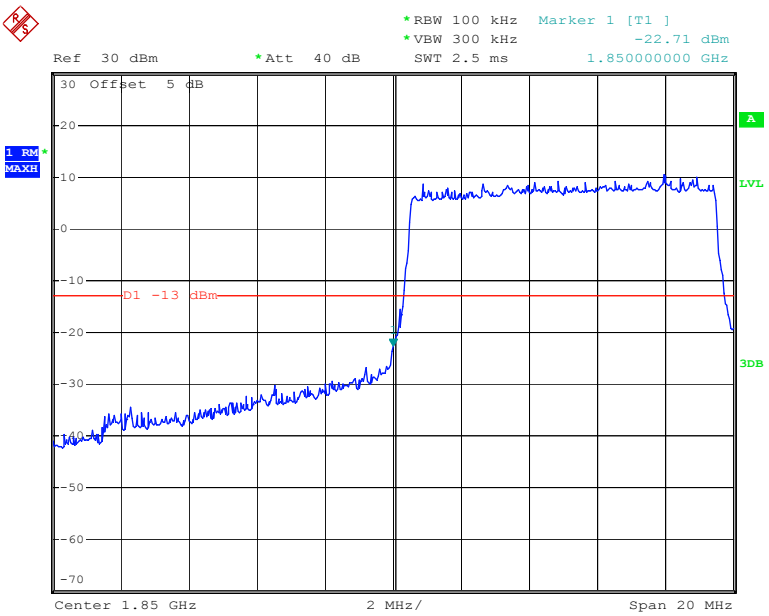
Date: 7.MAY.2020 17:46:22

QPSK_5MHz_ 25 RB_ Right



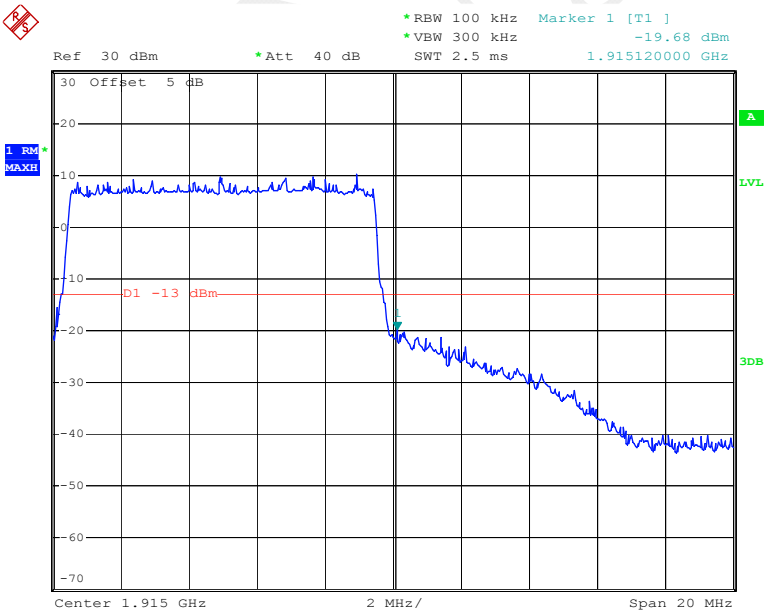
Date: 7.MAY.2020 17:46:57

QPSK_10MHz_ 50 RB_ Left



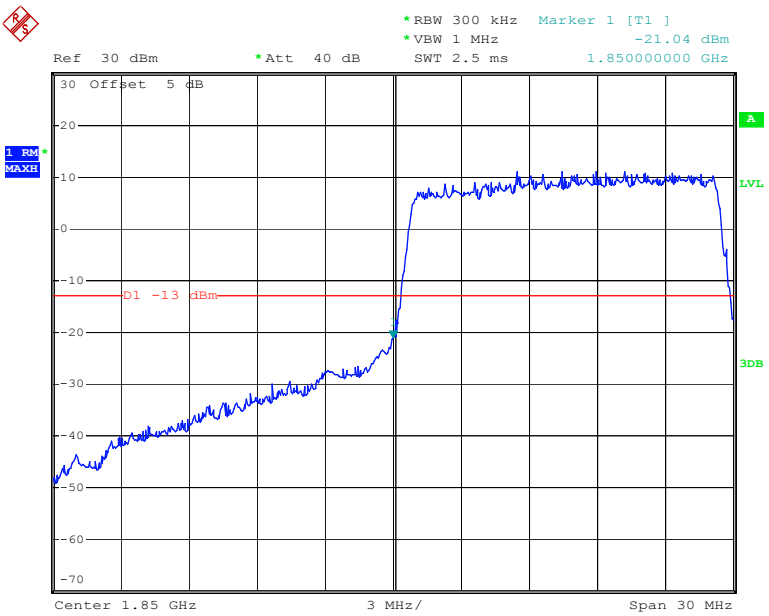
Date: 7.MAY.2020 17:47:39

QPSK_10MHz_ 50 RB_ Right



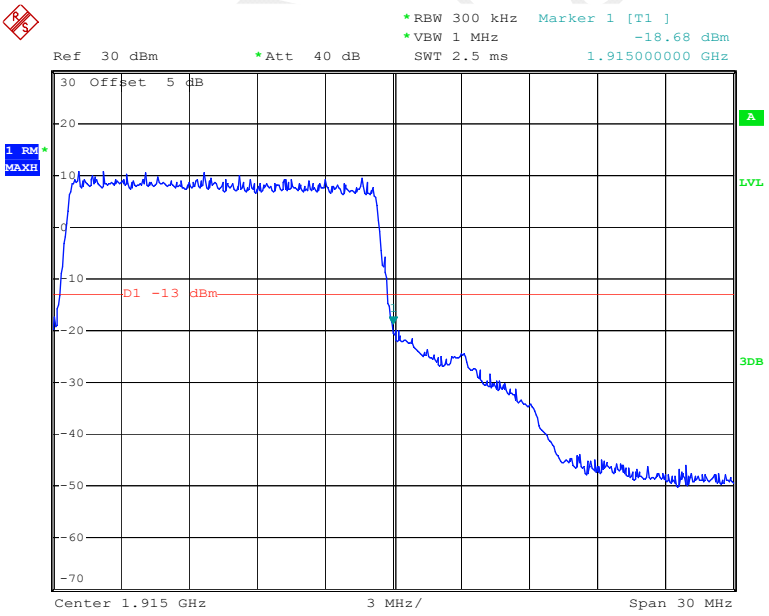
Date: 7.MAY.2020 17:48:20

QPSK_15MHz_ 75 RB_ Left



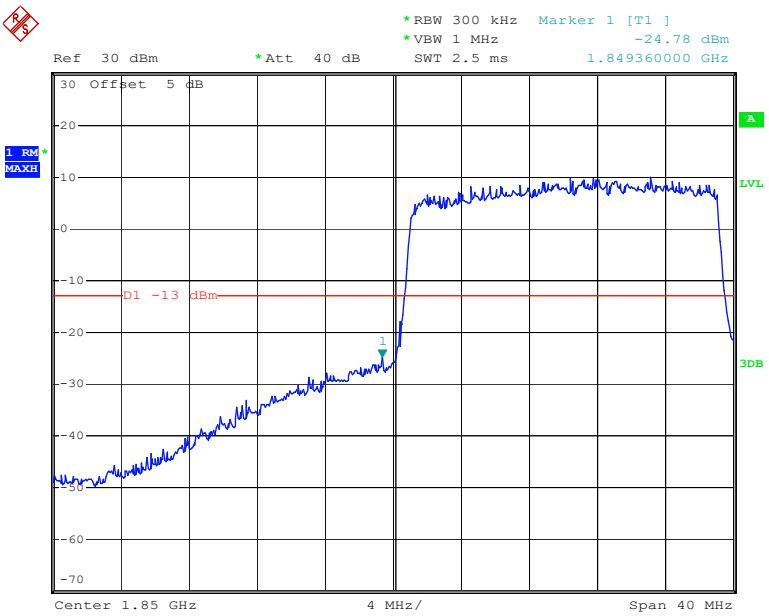
Date: 7.MAY.2020 17:49:09

QPSK_15MHz_ 75 RB_ Right



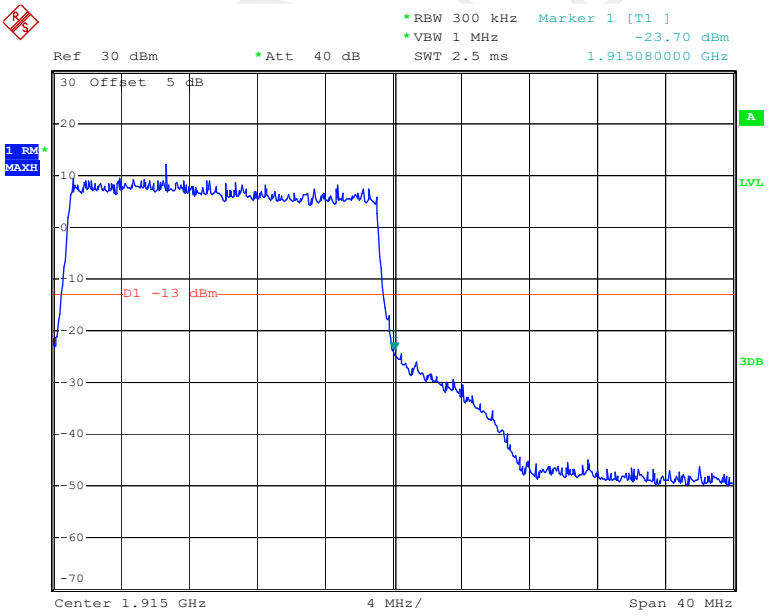
Date: 7.MAY.2020 17:49:51

QPSK_20MHz_ 100 RB_ Left



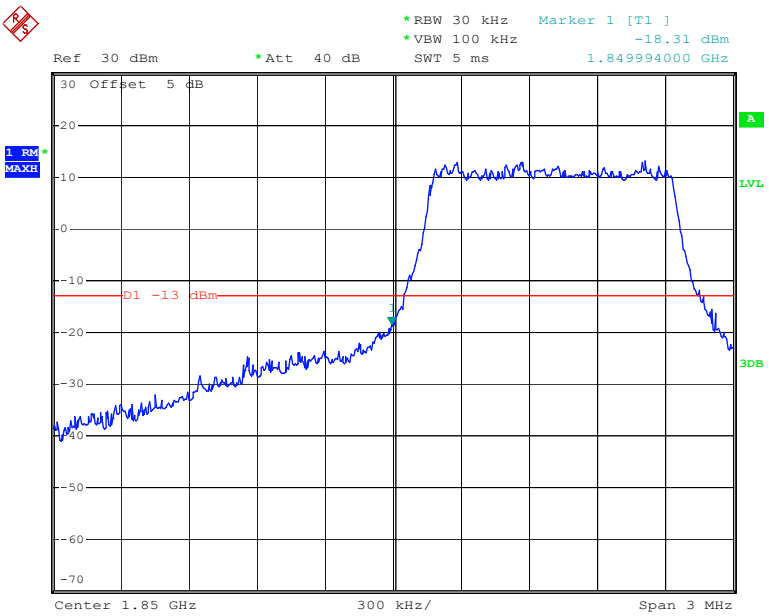
Date: 7.MAY.2020 17:50:39

QPSK_20MHz_100 RB_ Right



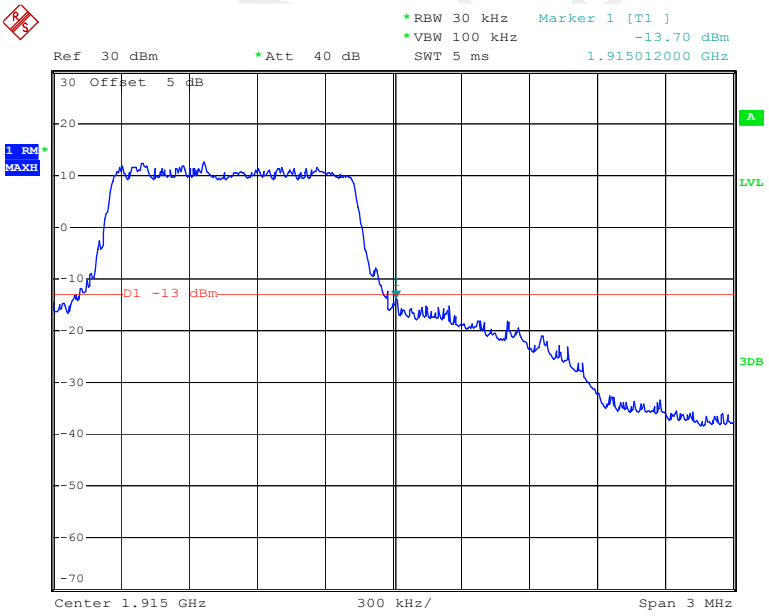
Date: 7.MAY.2020 17:51:21

16QAM_1.4MHz_ 6 RB_ Left



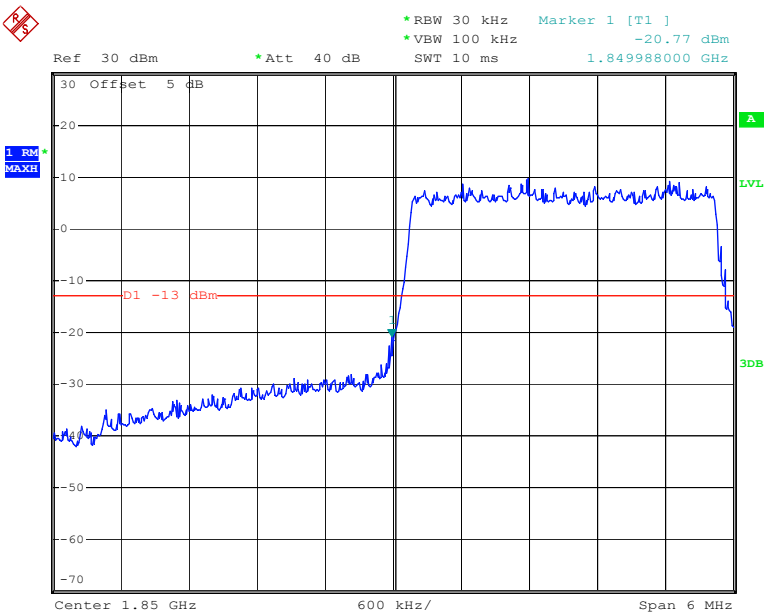
Date: 7.MAY.2020 17:43:50

16QAM_1.4MHz_ 6 RB_ Right



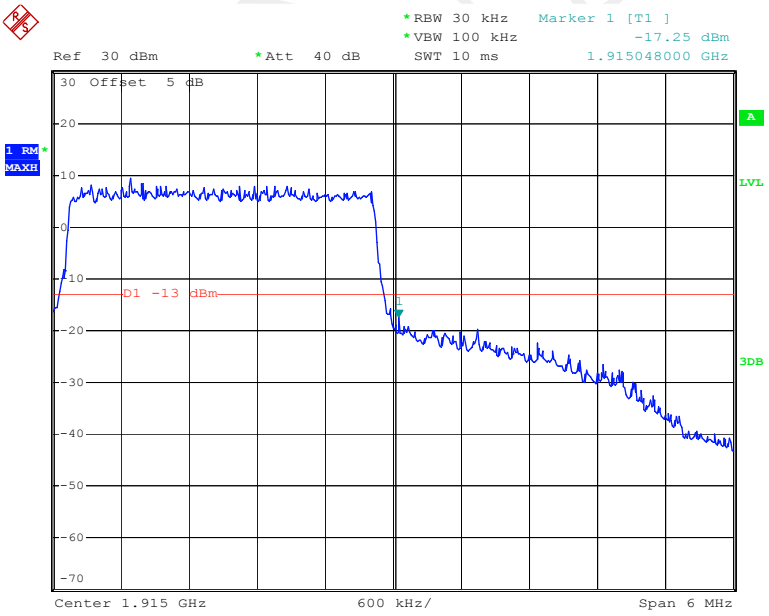
Date: 7.MAY.2020 17:44:28

16QAM_3MHz_ 15 RB_ Left



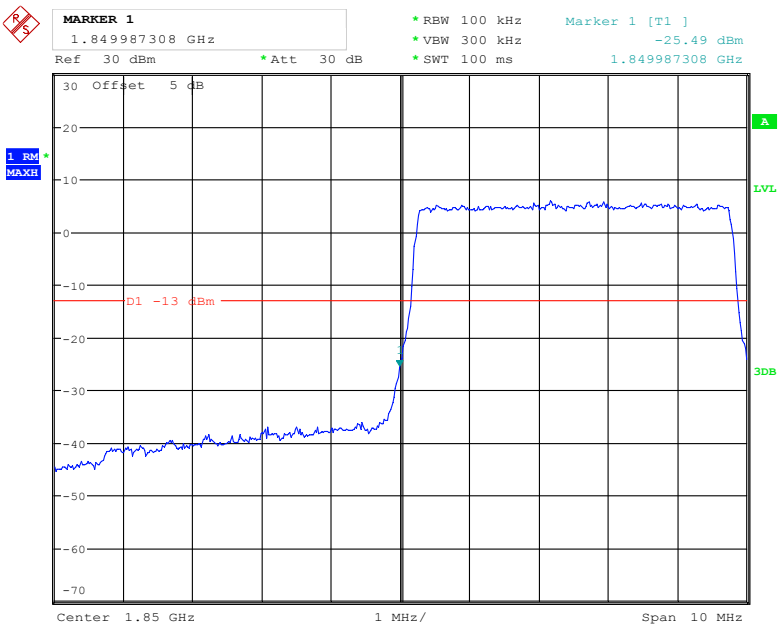
Date: 7.MAY.2020 17:45:14

16QAM_3MHz_ 15 RB_ Right



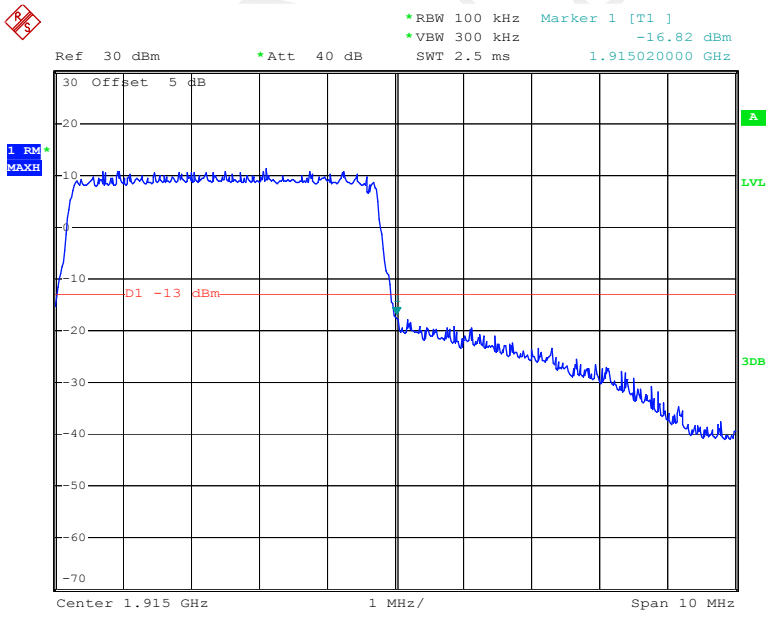
Date: 7.MAY.2020 17:45:55

16QAM_5MHz_ 25 RB_ Left



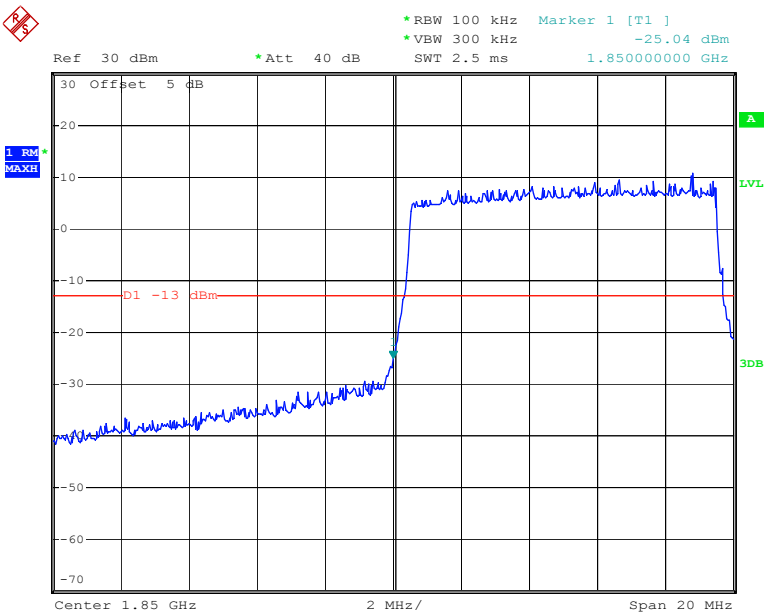
Date: 8.MAY.2020 12:22:04

16QAM_5MHz_ 25 RB_ Right



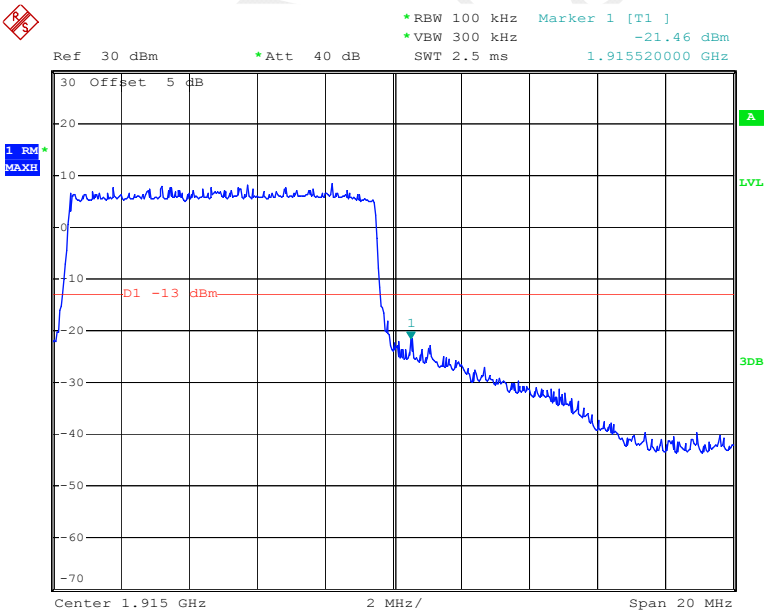
Date: 7.MAY.2020 17:47:14

16QAM_10MHz_ 50 RB_ Left



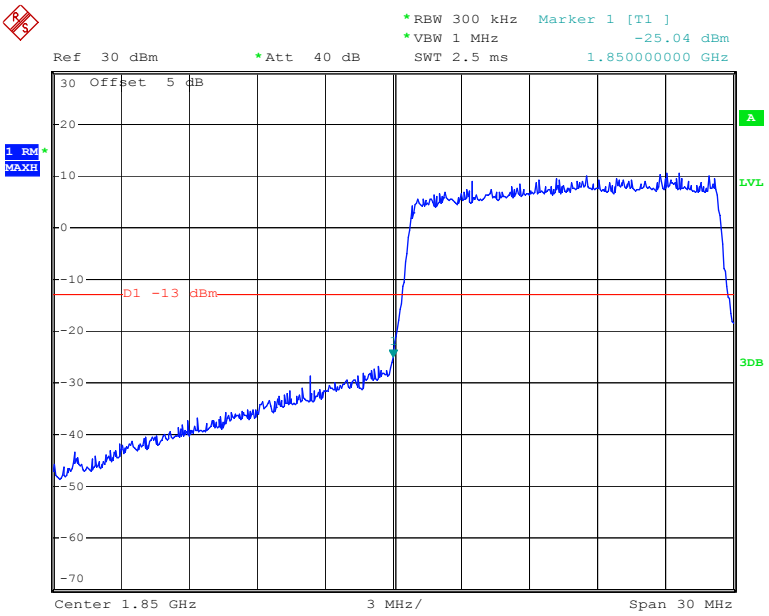
Date: 7.MAY.2020 17:48:01

16QAM_10MHz_ 50 RB_ Right



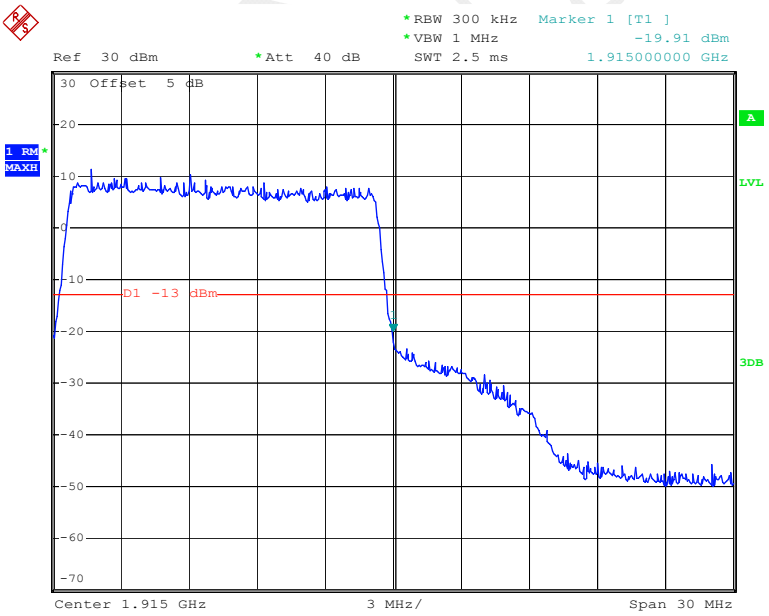
Date: 7.MAY.2020 17:48:38

16QAM_15MHz_ 75 RB_ Left



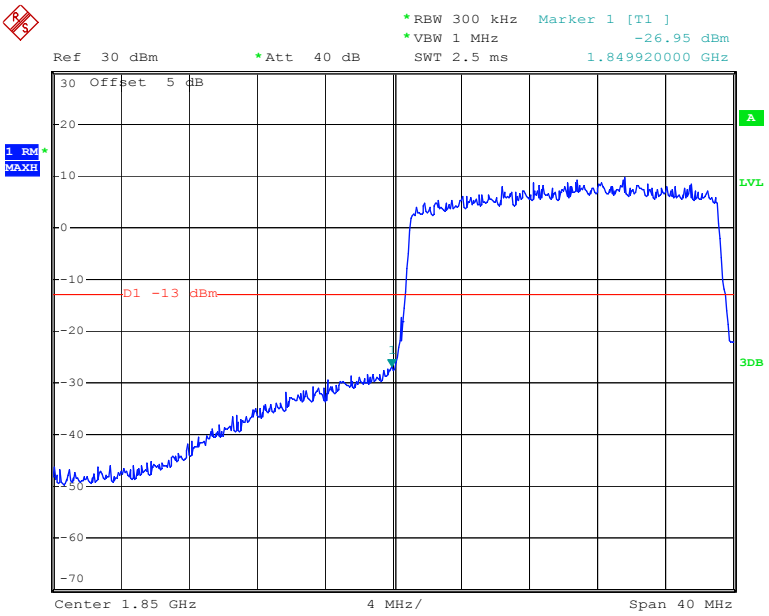
Date: 7.MAY.2020 17:49:29

16QAM_15MHz_ 75 RB_ Right



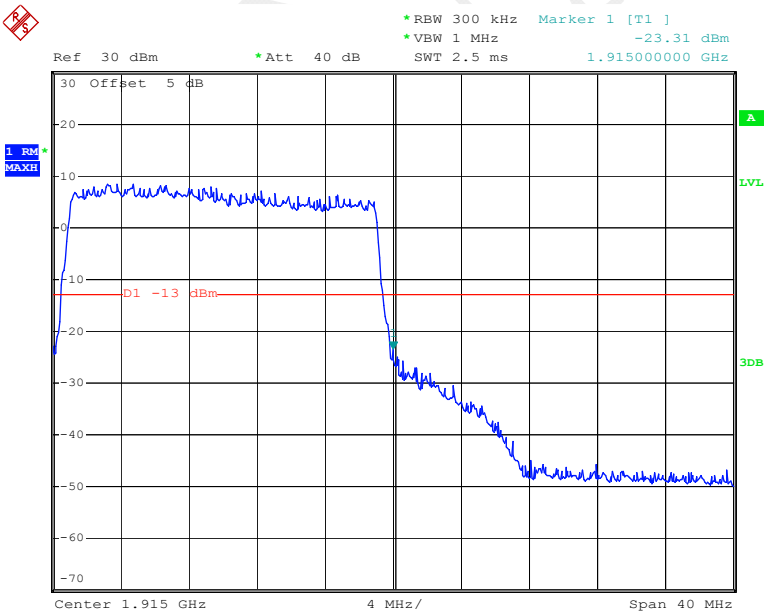
Date: 7.MAY.2020 17:50:11

16QAM_20MHz_ 100 RB_ Left



Date: 7.MAY.2020 17:51:00

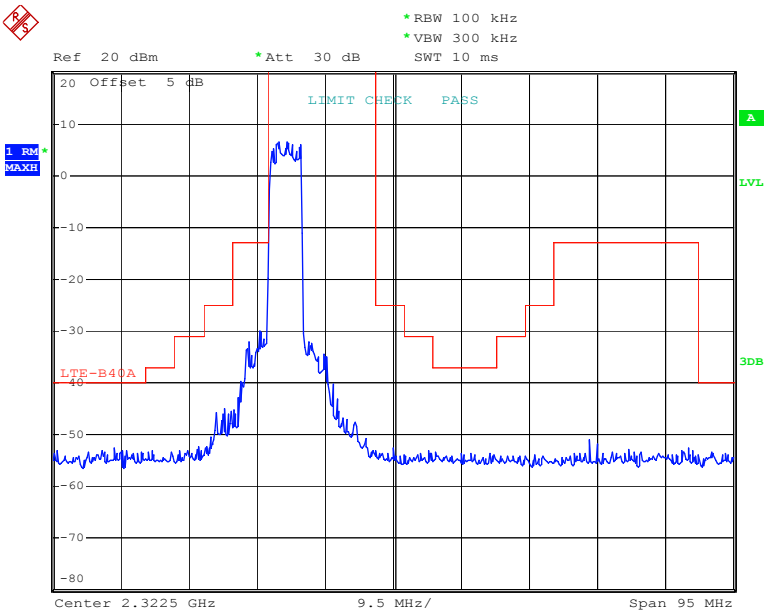
16QAM_20MHz_100 RB_ Right



Date: 7.MAY.2020 17:51:41

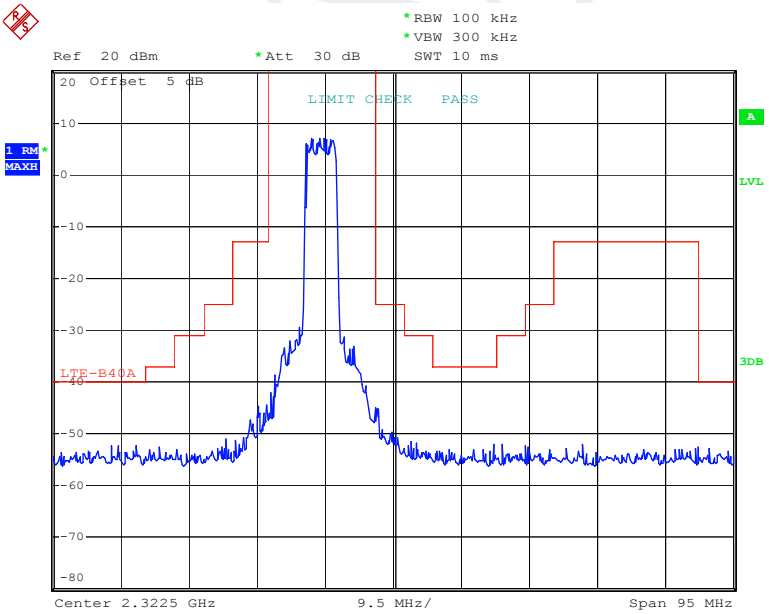
LTE Band 40,Lower:

QPSK_5MHz_ 25 RB_ Left



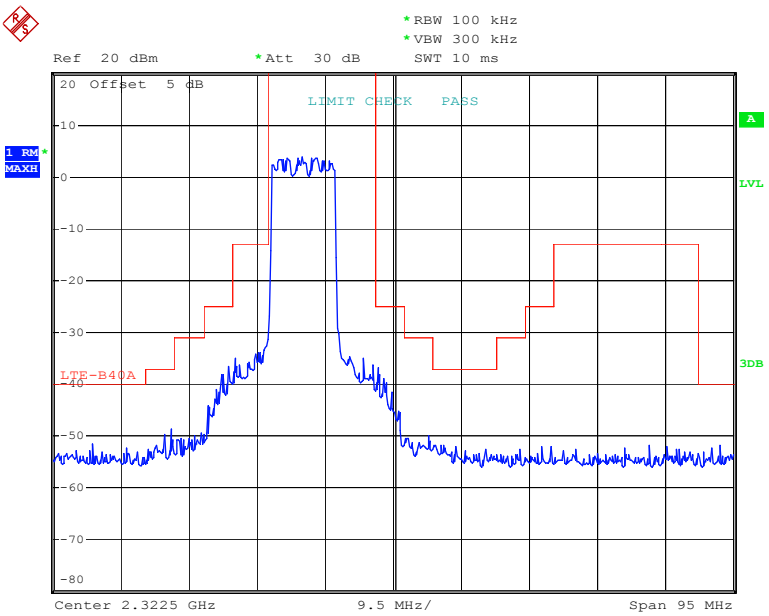
Date: 15.MAY.2020 14:04:01

QPSK_5MHz_ 25 RB_ Right



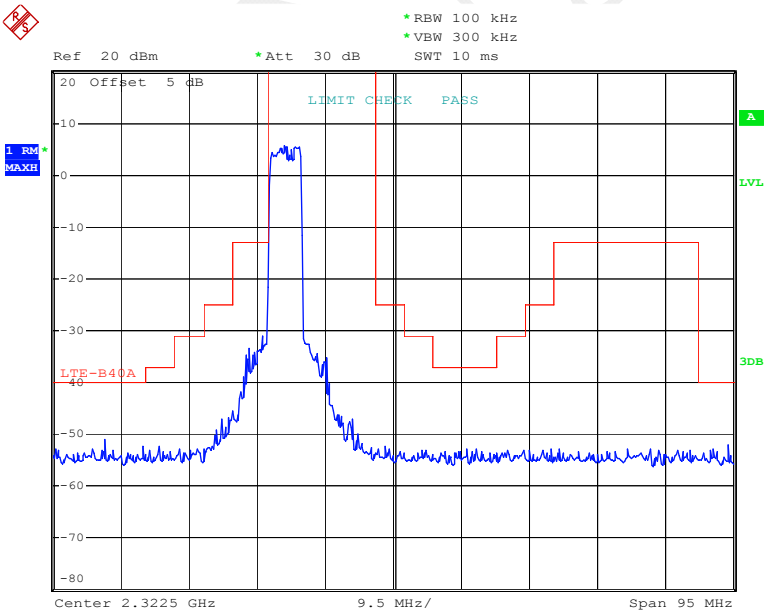
Date: 15.MAY.2020 14:05:33

QPSK_10MHz_ 50 RB



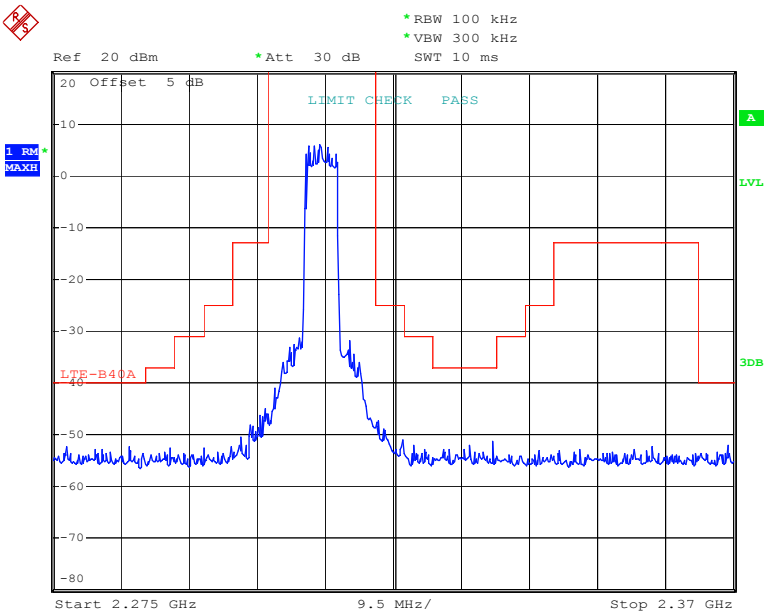
Date: 15.MAY.2020 14:06:36

16QAM_5MHz_ 25 RB_ Left



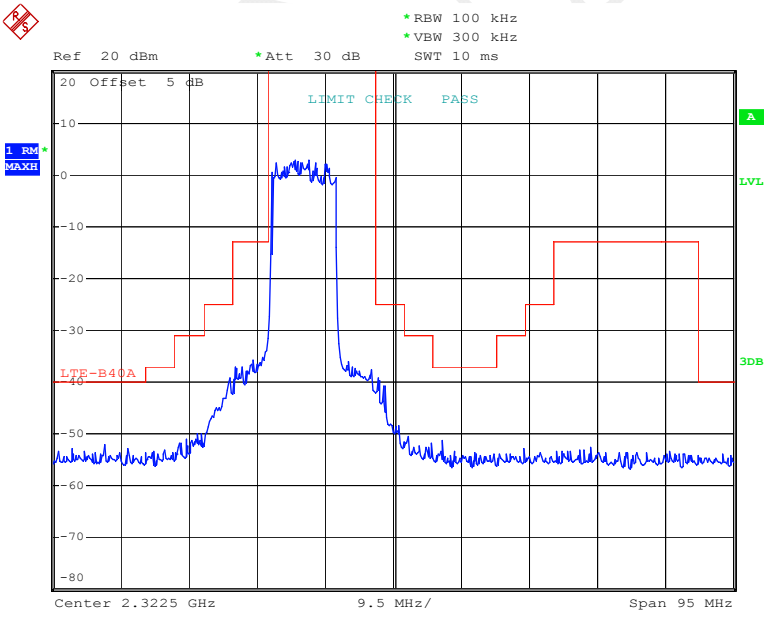
Date: 15.MAY.2020 14:04:37

16QAM_5MHz_ 25 RB_ Right



Date: 15.MAY.2020 14:05:14

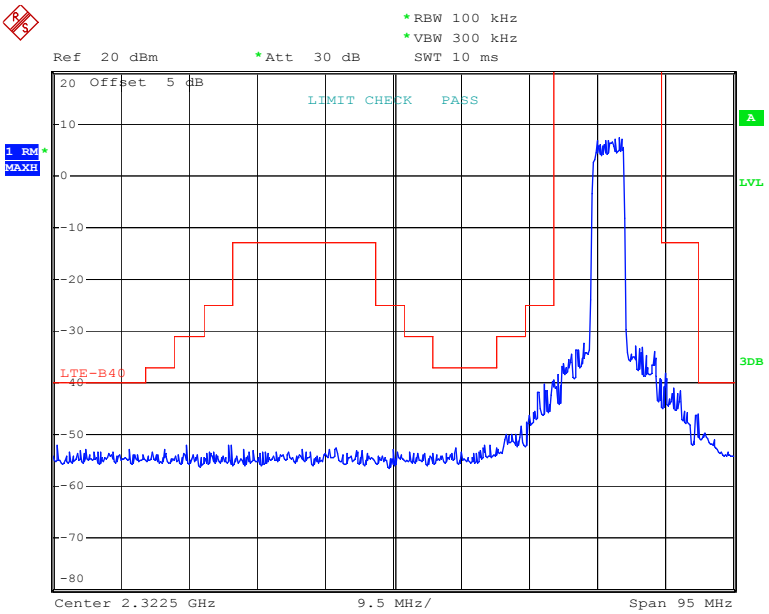
16QAM_10MHz_ 50 RB



Date: 15.MAY.2020 14:07:00

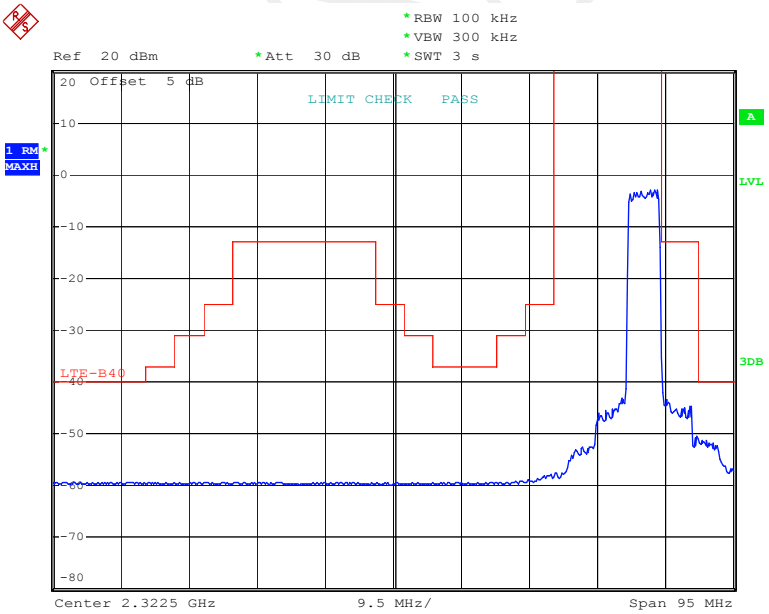
LTE Band 40-High

QPSK_5MHz_ 25 RB_ Left



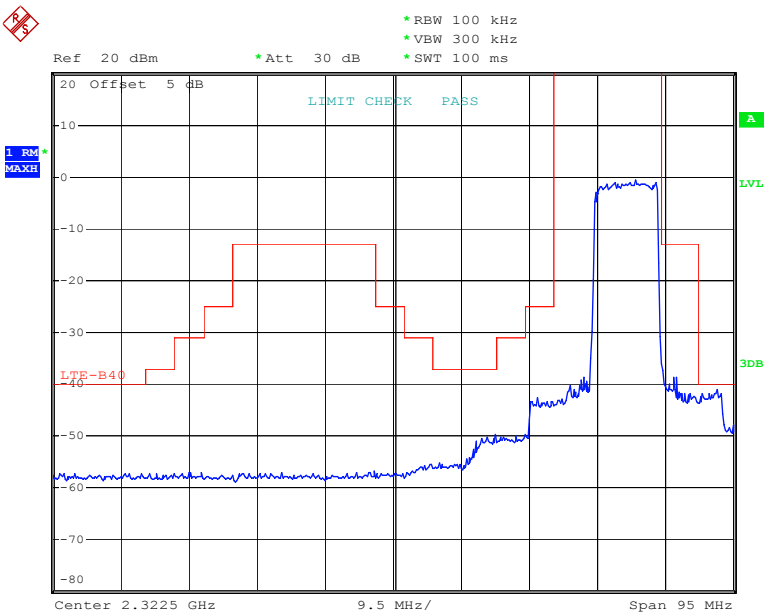
Date: 15.MAY.2020 14:10:04

QPSK_5MHz_ 25 RB_ Right



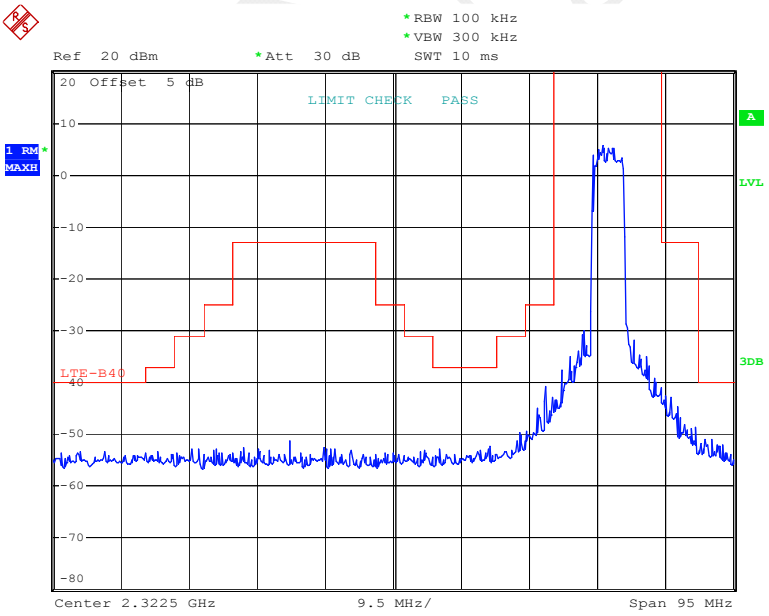
Date: 15.MAY.2020 14:13:04

QPSK_10MHz_ 50 RB



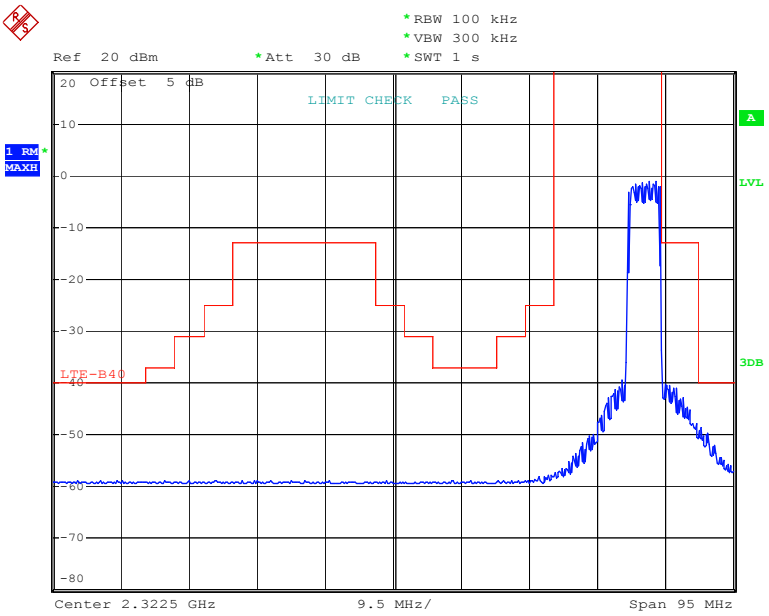
Date: 15.MAY.2020 14:08:54

16QAM_5MHz_ 25 RB_ Left



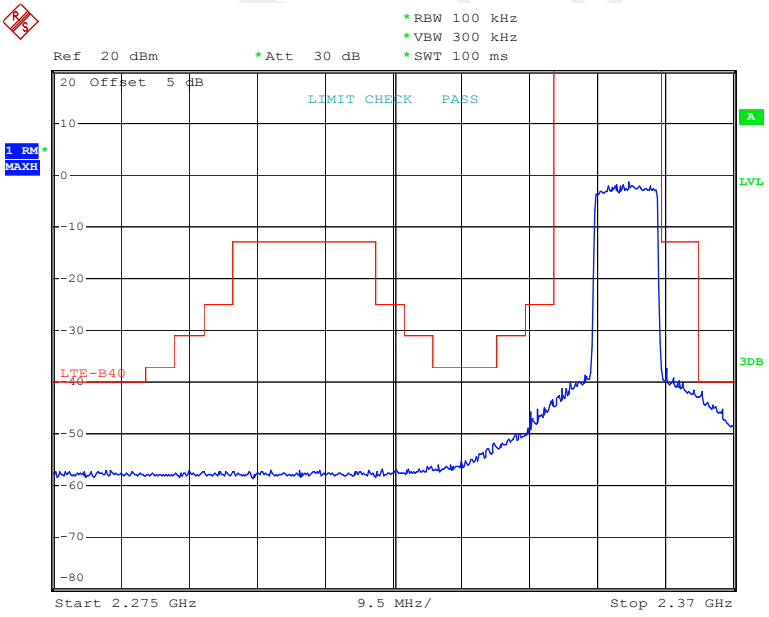
Date: 15.MAY.2020 14:10:19

16QAM_5MHz_ 25 RB_ Right



Date: 15.MAY.2020 14:11:33

16QAM_10MHz_ 50 RB



Date: 15.MAY.2020 14:08:21

FCC §2.1055, §22.355 & §24.235 & §27.54& §90.213 - FREQUENCY STABILITY

Applicable Standard

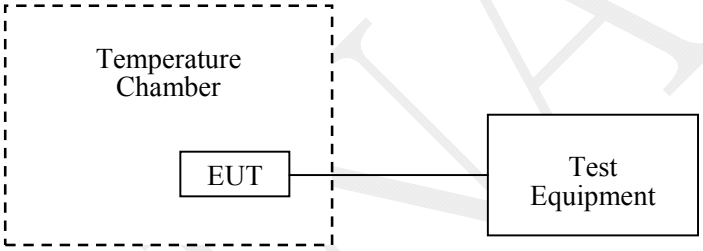
FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235，§27.54, §90.213.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The AC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: An external variable AC power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



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Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2020-01-04	2021-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005011	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Blocking Control	EMDCB-00036	0E01201047	Each time	N/A
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	147473	2019-08-03	2020-08-03
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2020-03-26	2021-03-26
UNI-T	Multimeter	UT39A	M130199938	2019-07-23	2020-07-23
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	26~27.5°C
Relative Humidity:	52~72 %
ATM Pressure:	100.2~100.9 kPa
Tester:	Chris Mo
Test Date:	2020-05-07~2020-05-15

LTE Band 2:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	-4.62	-0.0025	Pass
-20		7.97	0.0042	
-10		-1.11	-0.0006	
0		-1.86	-0.0010	
10		7.90	0.0042	
20		6.76	0.0036	
30		-6.17	-0.0033	
40		1.94	0.0010	
50		10.89	0.0058	
20	3.5	-4.61	-0.0025	
20	4.2	-6.47	-0.0034	

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	-2.60	-0.0014	Pass
-20		4.76	0.0025	
-10		7.79	0.0041	
0		-4.50	-0.0024	
10		-2.83	-0.0015	
20		-6.61	-0.0035	
30		7.16	0.0038	
40		7.42	0.0039	
50		0.49	0.0003	
20	3.5	-0.74	-0.0004	
20	4.2	-7.43	-0.0040	

LTE Band 4:

QPSK, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.7	1710.544772	1754.453421	1710	1755
-20		1710.544972	1754.452421	1710	1755
-10		1710.544272	1754.451821	1710	1755
0		1710.543872	1754.452121	1710	1755
10		1710.543272	1754.453121	1710	1755
20		1710.544872	1754.455128	1710	1755
30		1710.548072	1754.453321	1710	1755
40		1710.548672	1754.453421	1710	1755
50		1710.547972	1754.453521	1710	1755
20	3.5	1710.548272	1754.454021	1710	1755
20	4.2	1710.547772	1754.453321	1710	1755

16QAM, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.7	1710.545172	1754.452621	1710	1755
-20		1710.544572	1754.452021	1710	1755
-10		1710.545072	1754.451021	1710	1755
0		1710.544572	1754.450821	1710	1755
10		1710.543872	1754.450221	1710	1755
20		1710.544872	1754.452821	1710	1755
30		1710.546672	1754.450721	1710	1755
40		1710.546672	1754.451621	1710	1755
50		1710.546272	1754.451121	1710	1755
20	3.5	1710.546272	1754.450121	1710	1755
20	4.2	1710.546772	1754.449321	1710	1755

LTE Band 5:

Middle Channel, f_c = 836.5 MHz, Channel Bandwidth:10MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.7	-1.29	-0.0015	2.5
-20		1.31	0.0016	
-10		-1.73	-0.0021	
0		1.79	0.0021	
10		-4.47	-0.0053	
20		2.00	0.0024	
30		10.98	0.0131	
40		-7.49	-0.0090	
50		1.71	0.0020	
20	3.5	8.84	0.0106	
20	4.2	10.47	0.0125	

Middle Channel, f_c = 836.5 MHz, Channel Bandwidth:10MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.7	-1.54	-0.0018	2.5
-20		-5.81	-0.0069	
-10		-2.10	-0.0025	
0		-8.70	-0.0104	
10		5.23	0.0063	
20		9.64	0.0115	
30		1.89	0.0023	
40		7.61	0.0091	
50		10.75	0.0129	
20	3.5	-1.92	-0.0023	
20	4.2	-8.76	-0.0105	

LTE Band 7:

QPSK, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.7	2500.520700	2569.480100	2500	2570
-20		2500.520000	2569.480000	2500	2570
-10		2500.519000	2569.479000	2500	2570
0		2500.519900	2569.478800	2500	2570
10		2500.520500	2569.479800	2500	2570
20		2500.520000	2569.480000	2500	2570
30		2500.518400	2569.478900	2500	2570
40		2500.517400	2569.478000	2500	2570
50		2500.517900	2569.477000	2500	2570
20	3.5	2500.517700	2569.477200	2500	2570
20	4.2	2500.517500	2569.476400	2500	2570

16QAM, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.7	2500.520400	2569.480000	2500	2570
-20		2500.520900	2569.480500	2500	2570
-10		2500.520200	2569.480700	2500	2570
0		2500.519400	2569.481600	2500	2570
10		2500.521200	2569.481400	2500	2570
20		2500.520000	2569.480000	2500	2570
30		2500.521000	2569.480200	2500	2570
40		2500.521900	2569.480100	2500	2570
50		2500.522500	2569.480800	2500	2570
20	3.5	2500.522400	2569.480600	2500	2570
20	4.2	2500.522200	2569.480800	2500	2570

LTE Band 12:

QPSK, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	**V_{DC}**	**F_L**	**F_H**	**F_L**	**F_H**
-30	3.7	699.479000	715.398700	699	716
-20		699.479900	715.398500	699	716
-10		699.480200	715.398000	699	716
0		699.479300	715.398800	699	716
10		699.479400	715.397700	699	716
20		699.480000	715.410000	699	716
30		699.480200	715.397500	699	716
40		699.480200	715.398700	699	716
50		699.479800	715.397500	699	716
20	3.5	699.480800	715.396000	699	716
20	4.2	699.481700	715.397000	699	716

16QAM, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	**V_{DC}**	**F_L**	**F_H**	**F_L**	**F_H**
-30	3.7	699.480300	715.399000	699	716
-20		699.480700	715.398000	699	716
-10		699.479700	715.398500	699	716
0		699.480100	715.398400	699	716
10		699.479100	715.398700	699	716
20		699.480000	715.400000	699	716
30		699.481800	715.398500	699	716
40		699.481000	715.397700	699	716
50		699.481300	715.398500	699	716
20	3.5	699.482200	715.398900	699	716
20	4.2	699.483200	715.399300	699	716

FCC

LTE Band 13:

QPSK, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.7	777.559700	786.480800	777	787
-20		777.558900	786.479800	777	787
-10		777.558600	786.479500	777	787
0		777.558300	786.478900	777	787
10		777.558300	786.478400	777	787
20		777.560000	786.480000	777	787
30		777.558300	786.480200	777	787
40		777.557400	786.479900	777	787
50		777.557000	786.479600	777	787
20	3.5	777.556200	786.479900	777	787
20	4.2	777.555800	786.480600	777	787

16QAM, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.7	777.559300	786.520900	777	787
-20		777.558300	786.521800	777	787
-10		777.558000	786.522000	777	787
0		777.557900	786.521800	777	787
10		777.560200	786.522100	777	787
20		777.560000	786.520000	777	787
30		777.561400	786.521500	777	787
40		777.560500	786.521100	777	787
50		777.560200	786.521000	777	787
20	3.5	777.560900	786.520600	777	787
20	4.2	777.561800	786.520600	777	787

LTE Band 25:

Middle Channel, f_c = 1882.5 MHz, Channel Bandwidth:10MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	1.19	0.0006	Pass
-20		4.07	0.0022	
-10		-6.06	-0.0032	
0		-1.25	-0.0007	
10		-7.32	-0.0039	
20		1.34	0.0007	
30		-3.96	-0.0021	
40		6.21	0.0033	
50		6.07	0.0032	
20	3.5	2.32	0.0012	
20	4.2	10.53	0.0056	

Middle Channel, f_c = 1882.5 MHz, Channel Bandwidth:10MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	0.43	0.0002	Pass
-20		-7.26	-0.0039	
-10		-6.50	-0.0035	
0		1.59	0.0008	
10		5.47	0.0029	
20		8.95	0.0048	
30		-3.18	-0.0017	
40		-0.88	-0.0005	
50		3.33	0.0018	
20	3.5	2.10	0.0011	
20	4.2	1.46	0.0008	

LTE Band 40:
Lower:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.63	2305.5317	2314.5095	2305	2315
-20		2305.5318	2314.5090	2305	2315
-10		2305.5307	2314.5097	2305	2315
0		2305.5311	2314.5038	2305	2315
10		2305.5301	2314.5086	2305	2315
20		2305.5310	2314.5020	2305	2315
30		2305.5300	2314.5094	2305	2315
40		2305.5310	2314.5087	2305	2315
50		2305.5306	2314.5096	2305	2315
20	4.2	2305.5314	2314.5040	2305	2315
20	3.5	2305.5312	2314.5096	2305	2315

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.63	2305.5317	2314.4696	2305	2315
-20		2305.5314	2314.4688	2305	2315
-10		2305.5313	2314.4686	2305	2315
0		2305.5306	2314.4692	2305	2315
10		2305.5307	2314.4693	2305	2315
20		2305.5310	2314.4680	2305	2315
30		2305.5310	2314.4683	2305	2315
40		2305.5311	2314.4691	2305	2315
50		2305.5311	2314.4695	2305	2315
20	4.2	2305.5308	2314.4698	2305	2315
20	3.5	2305.5312	2314.4688	2305	2315

Upper:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.63	2350.5314	2359.4690	2350	2360
-20		2350.5312	2359.4690	2350	2360
-10		2350.5312	2359.4692	2350	2360
0		2350.5314	2359.4685	2350	2360
10		2350.5306	2359.4687	2350	2360
20		2350.5310	2359.4689	2350	2360
30		2350.5308	2359.4685	2350	2360
40		2350.5311	2359.4692	2350	2360
50		2350.5309	2359.4693	2350	2360
20	4.2	2350.5312	2359.4693	2350	2360
20	3.5	2350.5306	2359.4686	2350	2360

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.63	2350.5311	2359.4691	2350	2360
-20		2350.5306	2359.4690	2350	2360
-10		2350.5314	2359.4688	2350	2360
0		2350.5305	2359.4692	2350	2360
10		2350.5311	2359.4684	2350	2360
20		2350.5310	2359.4680	2350	2360
30		2350.5304	2359.4687	2350	2360
40		2350.5309	2359.4688	2350	2360
50		2350.5317	2359.4690	2350	2360
20	4.2	2350.5305	2359.4687	2350	2360
20	3.5	2350.5307	2359.4697	2350	2360

Note: The fundamental emissions stay within the authorized bands of operation based on the frequency deviation measured is small, the extreme voltage was declared by applicant.

******* END OF REPORT *******

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TESTING LABORATORY
CERTIFICATE #4820.01

SAR EVALUATION REPORT

For

Shenzhen Lilian Communication Technology Co., Ltd.

Room1207BiwanbuildingXixiangSubdistrictBaoanShenzhenChina

FCC ID:2AV8R-67

Report Type:	**Product Type:**
Original Report	4G LTE Mobile WIFI

Report Number:	RDG200421001-20
Report Date:	2020-05-19
Reviewed By:	Rocky Xiao RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan). This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government. * This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*".

Attestation of Test Results			
EUT Information	**EUT Description**	4G LTE Mobile WIFI	
	Tested Model	M7, M7P	
	Multiple Models	M7XX,M6,M6XX.("X" stands for 0-9 and "X" stands for a-z or A-Z)	
	FCC ID	2AV8R-67	
	Serial Number	RDG200421001-SA-S1 (M7) RDG200421001-SA-S2(M7P)	
	Test Date	2020-04-23~ 2020-04-25	
MODE		**Max. SAR Level(s) Reported(W/kg)**	**Limit (W/kg)**
LTE Band 2	1g Body SAR	0.41	**1.6**
LTE Band 4	1g Body SAR	0.51	
LTE Band 5	1g Body SAR	1.01	
LTE Band 7	1g Body SAR	0.66	
LTE Band 12	1g Body SAR	**1.14**	
LTE Band 13	1g Body SAR	0.84	
LTE Band 25	1g Body SAR	0.36	
LTE Band 40	1g Body SAR	0.69	
WLAN 2.4G	1g Body SAR	0.29	
Simultaneous	1g Body SAR	**1.54**	
	1g Body SAR	**1.54** (Hotspot)	
Applicable Standards	**FCC 47 CFR part 2.1093** Radiofrequency radiation exposure evaluation: portable devices		
	RF Exposure Procedures: TCB Workshop April 2019		
	IEEE1528:2013 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques		
	IEC 62209-2:2010 Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices-Human models, instrumentation, and procedures-Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)		
	KDB procedures KDB 447498 D01 General RF Exposure Guidance v06 KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04 KDB 865664 D02 RF Exposure Reporting v01r02 KDB 941225 D01 3G SAR Procedures v03r01 KDB 941225 D05 SAR for LTE Devices v02r05 KDB 941225 D06 Hotspot Mode v02r01 KDB 248227 D01 802 11 Wi-Fi SAR v02r02		
Note: This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in **FCC 47 CFR part 2.1093** and has been tested in accordance with the measurement procedures specified in IEEE 1528-2013 and RF exposure KDB procedures. **The results and statements contained in this report pertain only to the device(s) evaluated.**			

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	RDG200421001-20	Original Report	2020-05-19

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EUT DESCRIPTION

This report has been prepared on behalf of ***Shenzhen Lilian Communication Technology Co., Ltd.*** and their product ***4G LTE Mobile WIFI***, Model: ***M7***, ***M7P***, FCC ID: ***2AV8R-67*** or the EUT (Equipment under Test) as referred to in the rest of this report.

Notes: *Model M7 and M7XX,M6,M6XX.("X" stands for 0-9 and "X" stands for a-z or A-Z) are identical, M7 was selected for fully testing, M7P was tested the worst case, the detailed information about the difference can be referred to the declaration letter which was stated and guaranteed by the manufacturer.*

**All measurement and test data in this report was gathered from production sample serial number: RDG200421001-SA-S1 (M7)*
RDG200421001-SA-S2 (M7P) (Assigned by BACL).The EUT supplied by the applicant was received on 2020-04-21.

Technical Specification

Device Type:	Portable
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
DTM Type:	Class B
Body-Worn Accessories:	None
Face-Head Accessories:	None
Operation Mode:	FDD-LTE, TDD-LTE and WLAN
Frequency Band:	LTE Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) LTE Band 4: 1710-1755 MHz(TX) ; 2110-2155 MHz(RX) LTE Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 7: 2500-2570 MHz(TX); 2620-2690 MHz(RX) LTE Band 12: 699-716 MHz(TX); 729-746 MHz(RX) LTE Band 13: 777-787 MHz(TX); 746-756 MHz(RX) LTE Band 25: 1850-1915 MHz(TX); 1930-1995 MHz(RX) LTE Band 40: 2305-2315 MHz(TX); 2305-2315 MHz(RX) 2350-2360 MHz(TX); 2350-2360 MHz(RX) WLAN 2.4G: 2412 -2462 MHz/2422 -2452 MHz
Conducted RF Power:	**Model: M7** LTE Band 2: 23.19 dBm; LTE Band 4: 23.05 dBm LTE Band 5: 23.42 dBm; LTE Band 7: 22.30 dBm LTE Band 12: 24.70 dBm; LTE Band 13: 21.32 dBm LTE Band 25: 24.43 dBm; LTE Band 40: 21.27 dBm WLAN 2.4G: 16.22 dBm **Model: M7P** LTE Band 12: 24.31 dBm
Power Source:	3.7 VDC From Rechargeable Battery
Normal Operation:	Body-worn(Hotspot)

Note: The different between model M7and M7P is the hardware with display, M7 was selected for fully testing, M7P was tested the worst case(body back of LTE Band 12).

REFERENCE, STANDARDS, AND GUIDELINES

FCC:

The Report and Order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g as recommended by the ANSI/IEEE standard C95.1-1992 [6] for an uncontrolled environment (Paragraph 65). According to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in North America is 1.6 mW/g average over 1 gram of tissue mass.

CE:

The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 2 mW/g as recommended by EN62209-1 for an uncontrolled environment. According to the Standard, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in Europe is 2 mW/g average over 10 gram of tissue mass.

The test configurations were laid out on a specially designed test fixture to ensure the reproducibility of measurements. Each configuration was scanned for SAR. Analysis of each scan was carried out to characterize the above effects in the device.

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SAR Limits

FCC Limit

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	**1.60**	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

CE Limit

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 10 g of tissue)	2.0	10
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.

Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

General Population/Uncontrolled environments Spatial Peak limit 1.6W/kg (FCC) & 2 W/kg (CE) applied to the EUT.

FACILITIES

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier : CN0022.

The test sites and measurement facilities used to collect data are located at:

☐ SAR Lab 1	☒ SAR Lab 2

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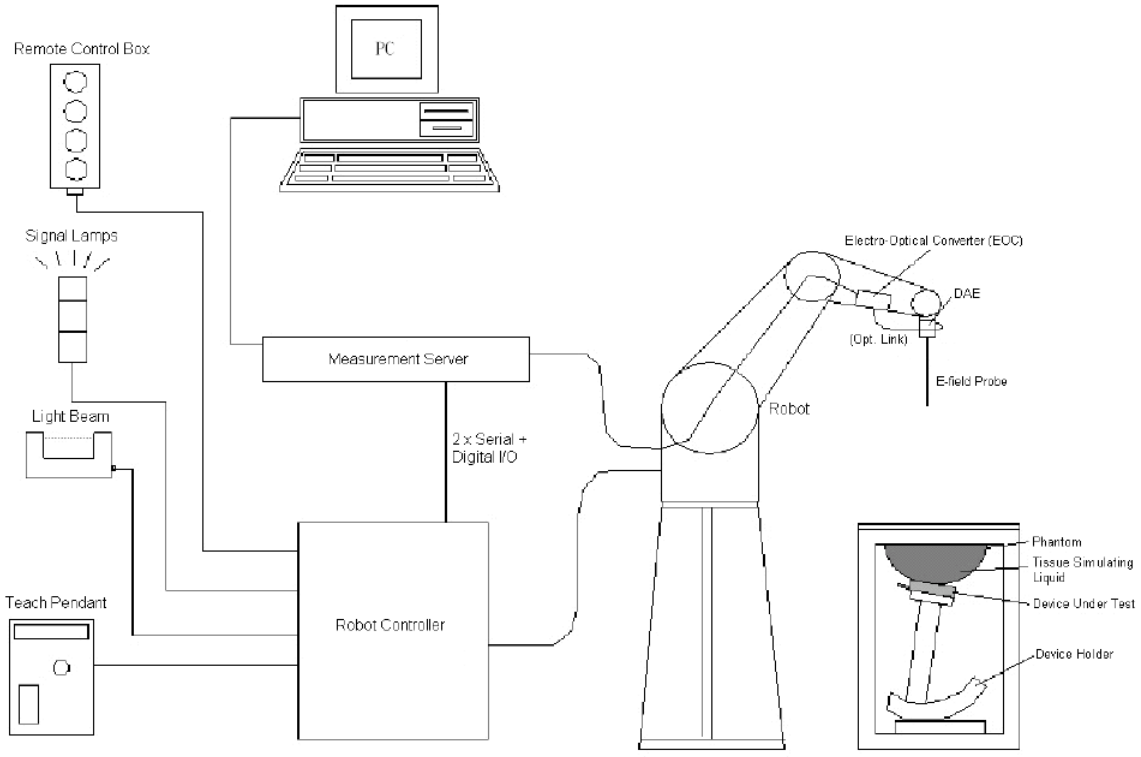
DESCRIPTION OF TEST SYSTEM

These measurements were performed with the automated near-field scanning system DASY5 from Schmid & Partner Engineering AG (SPEAG) which is the Fifth generation of the system shown in the figure hereinafter:



DASY5 System Description

The DASY5 system for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal application, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 professional operating system and the DASY52 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

DASY5 Measurement Server



The DASY5 measurement server is based on a PC/104 CPU board with a 400MHz Intel ULV Celeron, 128MB chip-disk and 128MB RAM. The necessary circuits for communication with the DAE4 (or DAE3) electronics box, as well as the 16 bit AD-converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized point out, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.

Data Acquisition Electronics

The data acquisition electronics (DAE4) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of both the DAE4 as well as of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

EX3DV4 E-Field Probes

Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

Calibration Frequency Points for EX3DV4 E-Field Probes SN: 7329 Calibrated: 2019/10/22

Calibration Frequency Point(MHz)	Frequency Range(MHz)		Conversion Factor		
	From	To	X	Y	Z
750 Head	650	850	9.97	9.97	9.97
750 Body	650	850	10.14	10.14	10.14
900 Head	850	1000	9.68	9.68	9.68
1450 Head	1350	1550	8.68	8.68	8.68
1750 Head	1650	1850	8.39	8.39	8.39
1900 Head	1850	2000	8.29	8.29	8.29
2300 Head	2200	2400	7.90	7.90	7.90
2450 Head	2400	2550	7.60	7.60	7.60
2600 Head	2550	2700	7.42	7.42	7.42
5200 Head	5090	5250	5.57	5.57	5.57
5300 Head	5250	5410	5.30	5.30	5.30
5600 Head	5490	5700	4.72	4.72	4.72
5800 Head	5700	5910	4.67	4.67	4.67

SAM Twin Phantom



The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness
increases to 6 mm). The phantom has three measurement areas:
_ Left Head
_ Right Head
_ Flat phantom

The phantom table for the DASY systems based on the robots have the size of 100 x 50 x 85 cm (L x W x H).
For easy dislocation these tables have fork lift cut outs at the bottom.
The bottom plate contains three pairs of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. Only one device holder is necessary if two phantoms are used (e.g., for different liquids)

A white cover is provided to cover the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. Free space scans of devices on top of this phantom cover are possible. Three reference marks are provided on the phantom counter. These reference marks are used to teach the absolute phantom position relative to the robot.

Robots

The DASY5 system uses the high precision industrial robot. The robot offers the same features important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchrony motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)

The above mentioned robots are controlled by the Staubli CS8c robot controllers. All information regarding the use and maintenance of the robot arm and the robot controller is contained on the CDs delivered along with the robot. Paper manuals are available upon request direct from Staubli.

Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 15mm 2 step integral, with 1.5mm interpolation used to locate the peak SAR area used for zoom scan assessments.

Where the system identifies multiple SAR peaks (which are within 25% of peak value) the system will provide the user with the option of assessing each peak location individually for zoom scan averaging.

Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the DASY5 software is in the shape of a cube and the side dimension of a 1 g or 10 g mass is dependent on the density of the liquid representing the simulated tissue. A density of 1000 kg/m^3 is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1g cube is 10mm,with the side length of the 10g cube is 21.5mm.

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When the cube intersects with the surface of the phantom, it is oriented so that 3 vertices touch the surface of the shell or the center of a face is tangent to the surface. The face of the cube closest to the surface is modified in order to conform to the tangent surface.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 7 x7 x 7 (5mmx5mmx5mm) providing a volume of 30 mm in the X & Y & Z axis.

Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEC 62209-1:2016

Recommended Tissue Dielectric Parameters for Head liquid

Table A.3 – Dielectric properties of the head tissue-equivalent liquid

Frequency MHz	Relative permittivity ε_r	Conductivity (σ) S/m
300	45,3	0,87
450	43,5	0,87
750	*41,9*	*0,89*
835	41,5	0,90
900	41,5	0,97
1 450	40,5	1,20
1 500	*40,4*	*1,23*
1 640	*40,2*	*1,31*
1 750	*40,1*	*1,37*
1 800	40,0	1,40
1 900	40,0	1,40
2 000	40,0	1,40
2 100	*39,8*	*1,49*
2 300	*39,5*	*1,67*
2 450	39,2	1,80
2 600	*39,0*	*1,96*
3 000	38,5	2,40
3 500	*37,9*	*2,91*
4 000	*37,4*	*3,43*
4 500	*36,8*	*3,94*
5 000	*36,2*	*4,45*
5 200	*36,0*	*4,66*
5 400	*35,8*	*4,86*
5 600	*35,5*	*5,07*
5 800	*35,3*	*5,27*
6 000	*35,1*	*5,48*

NOTE For convenience, permittivity and conductivity values at those frequencies which are not part of the original data provided by Drossos et al. [33] or the extension to 5 800 MHz are provided (i.e. the values shown *in italics*). These values were linearly interpolated between the values in this table that are immediately above and below these values, except the values at 6 000 MHz that were linearly extrapolated from the values at 3 000 MHz and 5 800 MHz.

Note:

1, Effective February 19, 2019, FCC has permitted the use of single head-tissue simulating liquid specified in IEC 62209-1 for all SAR tests.
2, Mix and Match of traditional FCC SAR TSLs and IEC 62209-1 TSL in a single application is not permitted TSL can be changed in a Permissive Change.
3, If SAR increases and original SAR > 1.2 W/kg, additional SAR measurements will be required IEC 62209-1 TSL is an alternative, not mandatory at this time.
4, If FCC parameters are used, ±5% tolerance. If IEC parameters, ±10%.
5, In this case, IEC parameters applied

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EQUIPMENT LIST AND CALIBRATION

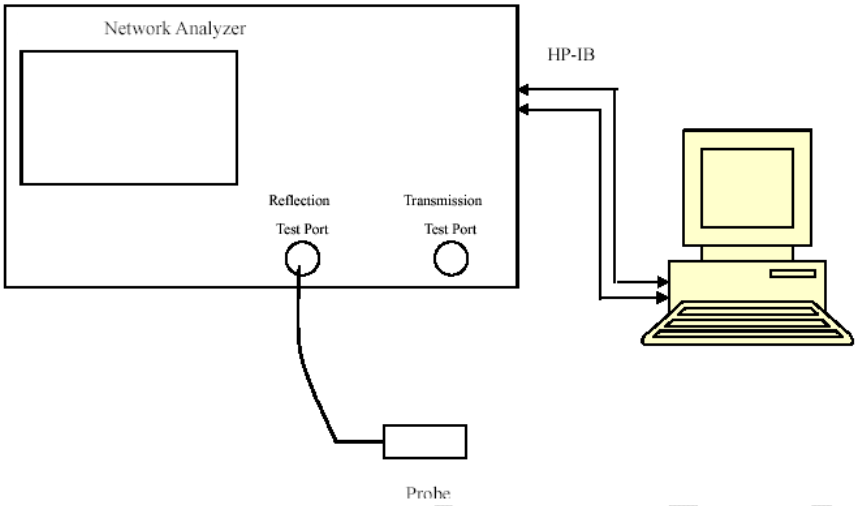
Equipments List & Calibration Information

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52.10	N/A	NCR	NCR
DASY5 Measurement Server	DASY5 4.5.12	1567	NCR	NCR
Data Acquisition Electronics	DAE4	772	2019/10/6	2020/10/5
E-Field Probe	EX3DV4	7329	2019/10/22	2020/10/21
Mounting Device	MD4HHTV5	BJPCTC0152	NCR	NCR
Twin SAM	Twin SAM V5.0	1412	NCR	NCR
Dipole, 750 MHz	D750V3	1167	2019/11/20	2022/11/19
Dipole, 1750 MHz	D1750V2	1141	2018/6/25	2021/6/24
Dipole, 1900 MHz	D1900V2	543	2019/10/15	2022/10/14
Dipole, 2300 MHz	D2300V2	1085	2018/5/9	2021/5/9
Dipole, 2450 MHz	D2450V2	971	2018/6/26	2021/6/25
Simulated Tissue 750 MHz	TS-750	1709075001	Each Time	/
Simulated Tissue 1750 MHz	TS-1750	1703175001	Each Time	/
Simulated Tissue 1900 MHz	TS-1900	1703190001	Each Time	/
Simulated Tissue 2300 MHz	TS-2300	1709230001	Each Time	/
Simulated Tissue 2450 MHz	TS-2450	1703245001	Each Time	/
Network Analyzer	8753C	3033A02857	2019/9/12	2020/9/11
Dielectric assessment kit	1253	SM DAK 040 CA	NCR	NCR
synthesized signal generator	8665B	3438a00584	2019/9/12	2020/9/11
EPM Series Power Meter	E4419B	MY45103907	2019/5/9	2020/5/8
Power Amplifier	ZVA-183-S+	5969001149	NCR	NCR
Directional Coupler	441493	520Z	NCR	NCR
Attenuator	20dB, 100W	LN749	NCR	NCR
Attenuator	6dB, 150W	2754	NCR	NCR
Wireless communication tester	E5515C	MY48367501	2019/9/12	2020/9/11
R&S, universal Radio Communication Tester	CMU200	106891	2019/9/12	2020/9/11
Wideband Radio Communication Tester	CMW500	110479	2019/9/12	2020/9/11

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SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	$\Delta\sigma$ (S/m)	
704	Simulated Tissue 750 MHz	43.054	0.875	42.15	0.89	2.14	-1.69	±10
707.5	Simulated Tissue 750 MHz	42.994	0.878	42.13	0.89	2.05	-1.35	±10
711	Simulated Tissue 750 MHz	42.92	0.88	42.11	0.89	1.92	-1.12	±10
750	Simulated Tissue 750 MHz	41.447	0.881	41.9	0.89	-1.08	-1.01	±10
782	Simulated Tissue 750 MHz	40.92	0.883	41.75	0.89	-1.99	-0.79	±10
829	Simulated Tissue 750 MHz	40.881	0.886	41.53	0.9	-1.56	-1.56	±10
836.5	Simulated Tissue 750 MHz	40.697	0.889	41.5	0.9	-1.93	-1.22	±10
844	Simulated Tissue 750 MHz	40.3	0.905	41.5	0.91	-2.89	-0.55	±10

**Liquid Verification above was performed on 2020/04/24.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	$\Delta\sigma$ (S/m)	
1720	Simulated Tissue 1750 MHz	41.214	1.335	40.13	1.35	2.7	-1.11	±10
1732.5	Simulated Tissue 1750 MHz	41.195	1.343	40.12	1.36	2.68	-1.25	±10
1745	Simulated Tissue 1750 MHz	41.125	1.354	40.1	1.37	2.56	-1.17	±10
1750	Simulated Tissue 1750 MHz	41.088	1.362	40.1	1.37	2.46	-0.58	±10

**Liquid Verification above was performed on 2020/04/23.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	$\Delta\sigma$ (S/m)	
1860	Simulated Tissue 1900 MHz	39.164	1.375	40	1.4	-2.09	-1.79	±10
1880	Simulated Tissue 1900 MHz	39.118	1.383	40	1.4	-2.2	-1.21	±10
1882.5	Simulated Tissue 1900 MHz	39.084	1.389	40	1.4	-2.29	-0.79	±10
1900	Simulated Tissue 1900 MHz	39.042	1.416	40	1.4	-2.4	1.14	±10
1905	Simulated Tissue 1900 MHz	38.981	1.421	40	1.4	-2.55	1.5	±10

**Liquid Verification above was performed on 2020/04/25.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	$\Delta\sigma$ (S/m)	
2300	Simulated Tissue 2300 MHz	39.047	1.605	39.5	1.67	-1.15	-3.89	±10
2310	Simulated Tissue 2300 MHz	39.015	1.617	39.48	1.68	-1.18	-3.75	±10
2355	Simulated Tissue 2300 MHz	38.951	1.654	39.39	1.72	-1.11	-3.84	±10

**Liquid Verification above was performed on 2020/04/23.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	$\Delta\sigma$ (S/m)	
2412	Simulated Tissue 2450 MHz	40.288	1.734	39.28	1.77	2.57	-2.03	±10
2437	Simulated Tissue 2450 MHz	40.086	1.764	39.23	1.79	2.18	-1.45	±10
2450	Simulated Tissue 2450 MHz	39.917	1.771	39.2	1.8	1.83	-1.61	±10
2462	Simulated Tissue 2450 MHz	39.868	1.778	39.18	1.81	1.76	-1.77	±10
2510	Simulated Tissue 2450 MHz	39.778	1.826	39.12	1.86	1.68	-1.83	±10
2535	Simulated Tissue 2450 MHz	39.763	1.833	39.09	1.89	1.72	-3.02	±10

**Liquid Verification above was performed on 2020/04/25.*

REPORT

System Accuracy Verification

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

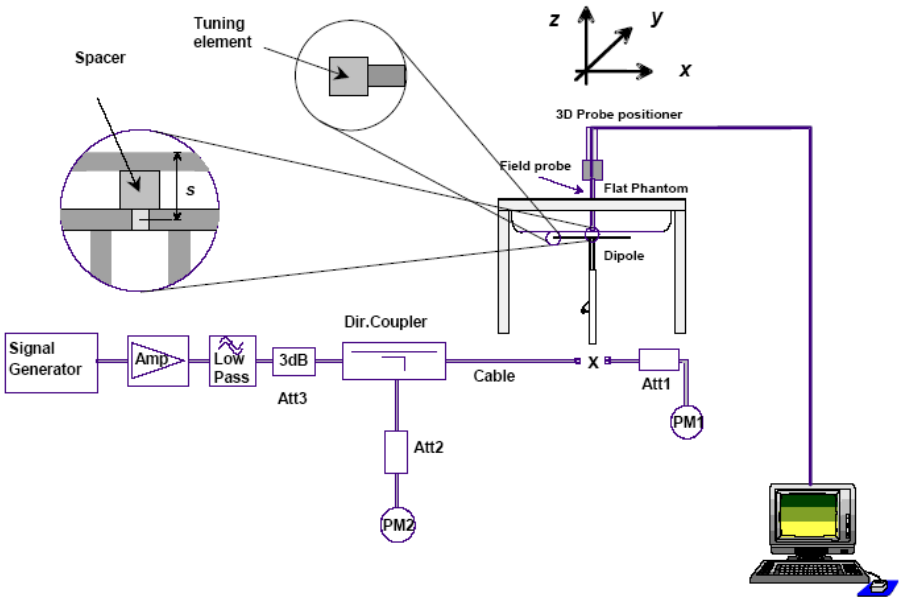
The spacing distance*s* in the **System Verification Setup Block Diagram** is given by the following:

a) s = 15 mm ± 0,2 mm for 300 MHz ≤ f ≤ 1 000 MHz;

b) s = 10 mm ± 0,2 mm for 1 000 MHz < f ≤ 3 000 MHz;

c) s = 10 mm ± 0,2 mm for 3 000 MHz < f ≤ 6 000 MHz.

System Verification Setup Block Diagram



System Accuracy Check Results

Date	Frequency Band	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/kg)	Delta (%)	Tolerance (%)
2020/04/24	750 MHz	Simulated Tissue 750 MHz	100	1g	0.806	8.06	8.38	-3.82	±10
2020/04/23	1750 MHz	Simulated Tissue 1750 MHz	100	1g	3.51	35.1	36.8	-4.62	±10
2020/04/25	1900 MHz	Simulated Tissue 1900 MHz	100	1g	3.89	38.9	40.2	-3.23	±10
2020/04/23	2300 MHz	Simulated Tissue 2300 MHz	100	1g	5.18	51.8	49.4	4.86	±10
2020/04/25	2450 MHz	Simulated Tissue 2450 MHz	100	1g	5.62	56.2	53.3	5.44	±10

*The SAR values above are normalized to 1 Watt forward power.

SAR SYSTEM VALIDATION DATA

System Performance 750 MHz

DUT: D750V3; Type: 750 MHz; Serial: 1167

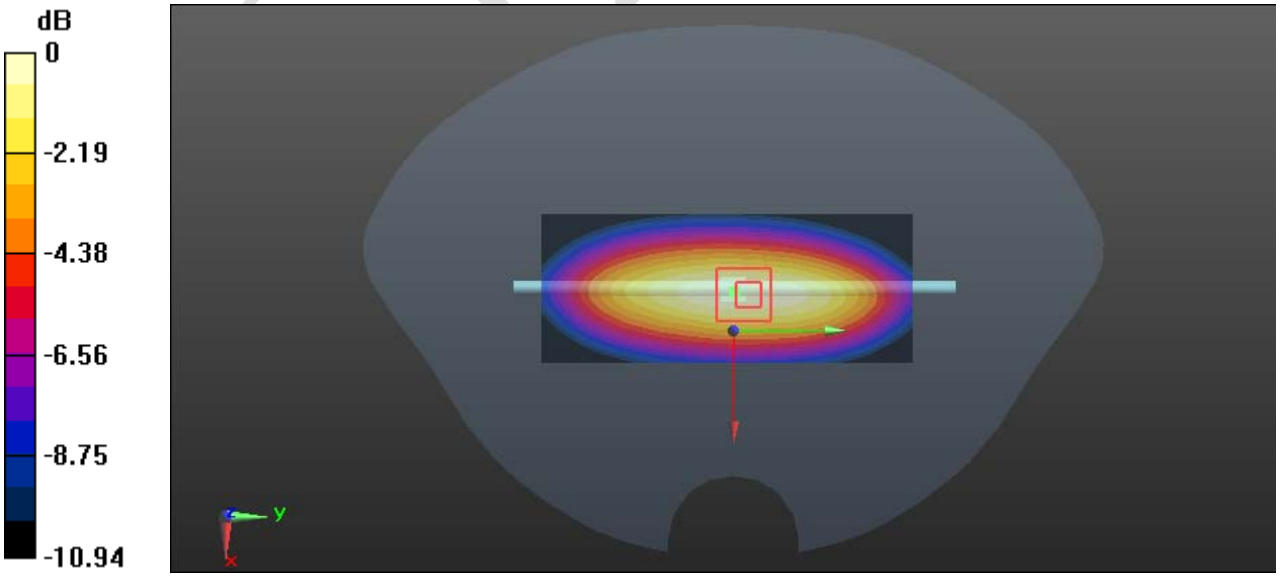
Communication System:CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; σ = 0.881 S/m; ε_r = 41.447; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(9.97, 9.97, 9.97) @ 750 MHz; Calibrated: 2019/10/22
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn772; Calibrated: 2019/10/6
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (41x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.09 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.75 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.806 W/kg; SAR(10 g) = 0.525 W/kg
Maximum value of SAR (measured) = 1.05 W/kg



0 dB = 1.05 W/kg = 0.21 dBW/kg

System Performance 1750 MHz

DUT: D1750V2; Type: 1750 MHz; Serial: 1141

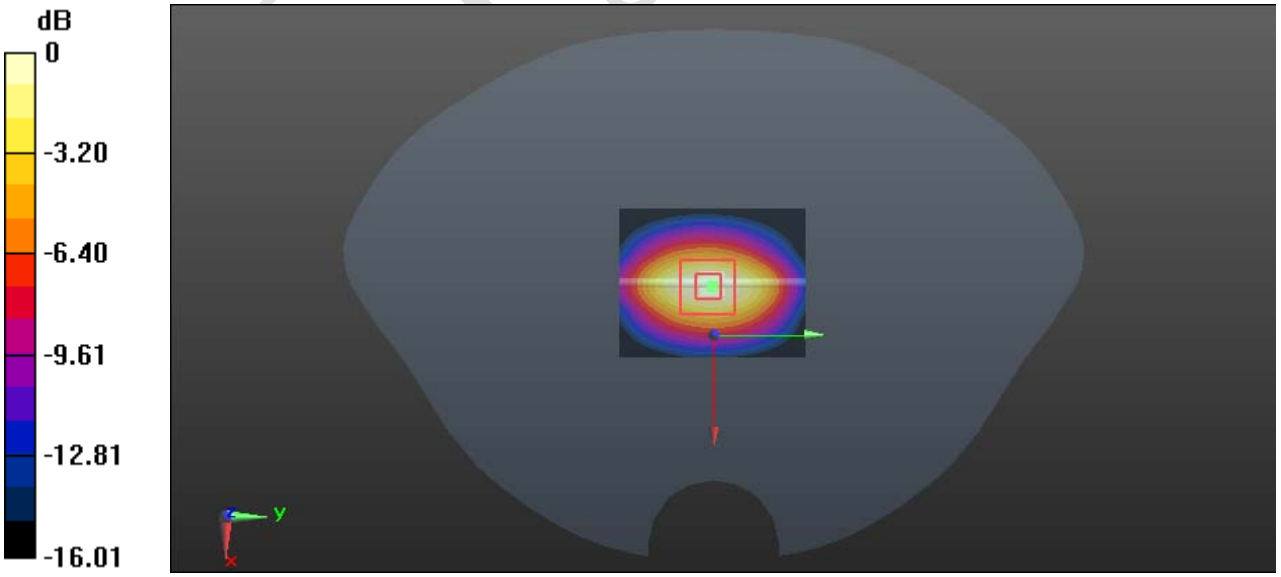
Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.362 S/m; ε_r = 41.088; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(8.39, 8.39, 8.39) @ 1750 MHz; Calibrated: 2019/10/22
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn772; Calibrated: 2019/10/6
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (41x51x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 5.81 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.23 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 6.54 W/kg
SAR(1 g) = 3.51 W/kg; SAR(10 g) = 1.88 W/kg
Maximum value of SAR (measured) = 5.49 W/kg



0 dB = 5.49 W/kg = 7.40 dBW/kg

System Performance 1900MHz

DUT: D1900V2; Type: 1900 MHz; Serial: 543

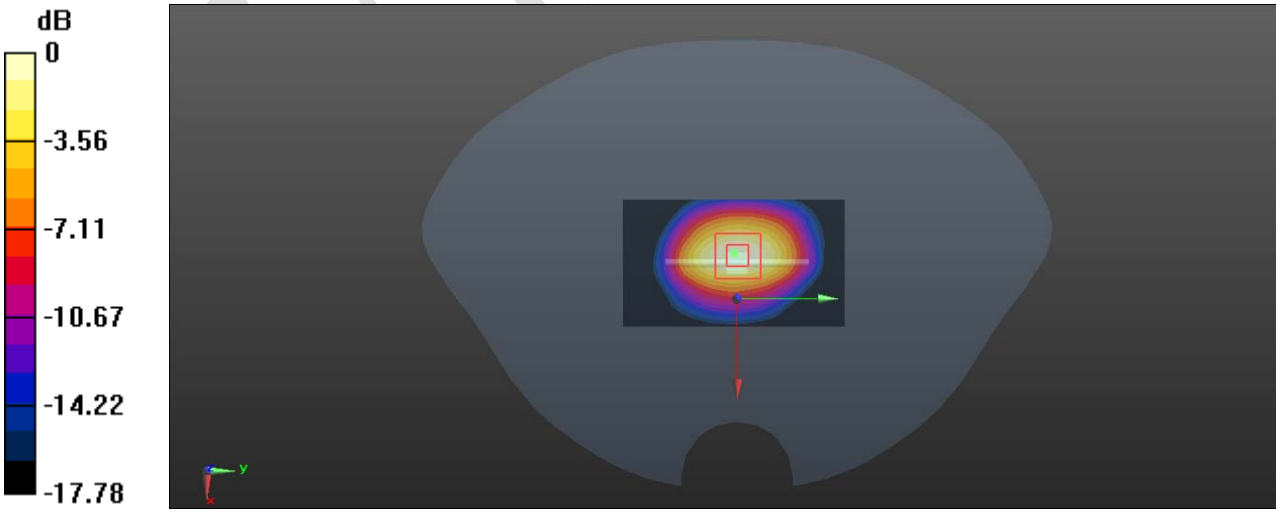
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.416 S/m; ε_r = 39.042;ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(8.29, 8.29, 8.29) @ 1900 MHz; Calibrated: 2019/10/22
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn772; Calibrated: 2019/10/6
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 4.58 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.62 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 6.91 W/kg
SAR(1 g) = 3.89 W/kg; SAR(10 g) = 2.03 W/kg
Maximum value of SAR (measured) = 4.23 W/kg



0 dB = 4.23 W/kg = 6.26 dBW/kg

System Performance 2300MHz

DUT: D2300V2; Type: 2300 MHz; Serial: 1085

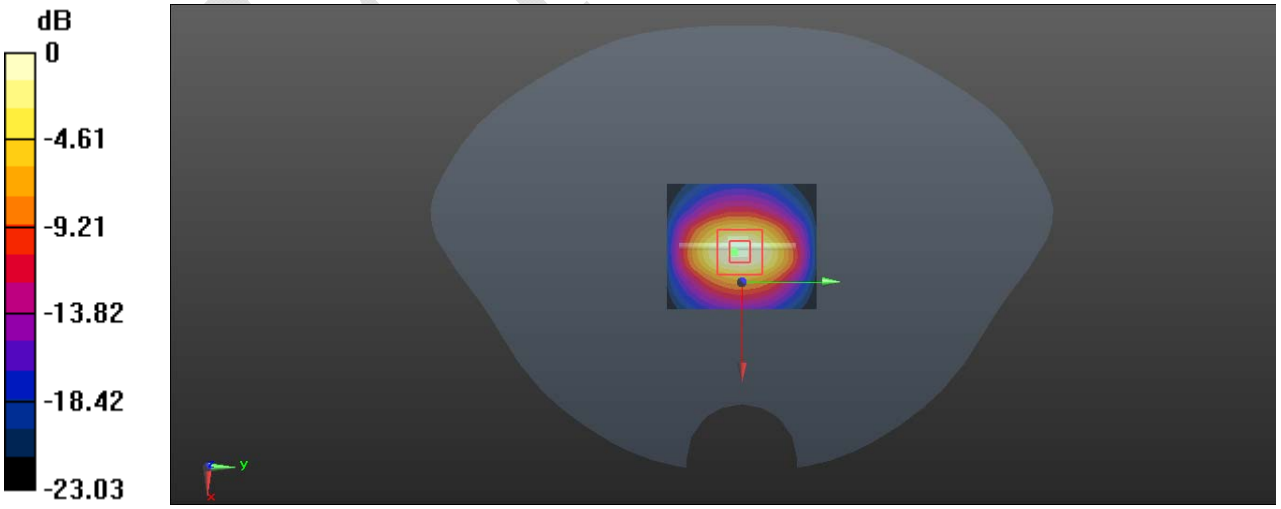
Communication System: CW; Frequency: 2300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2300 MHz; σ = 1.605 S/m; ε_r = 39.047; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- EX3DV4 - SN7329; ConvF(7.9, 7.9, 7.9) @ 2300 MHz; Calibrated: 2019/10/22
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn772; Calibrated: 2019/10/6
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (51x61x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 9.88 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.74 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 11.9 W/kg
SAR(1 g) = 5.18 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (measured) = 8.96 W/kg



0 dB = 8.96 W/kg = 9.52 dBW/kg

System Performance 2450MHz

DUT: D2450V2; Type: 2450 MHz; Serial: 971

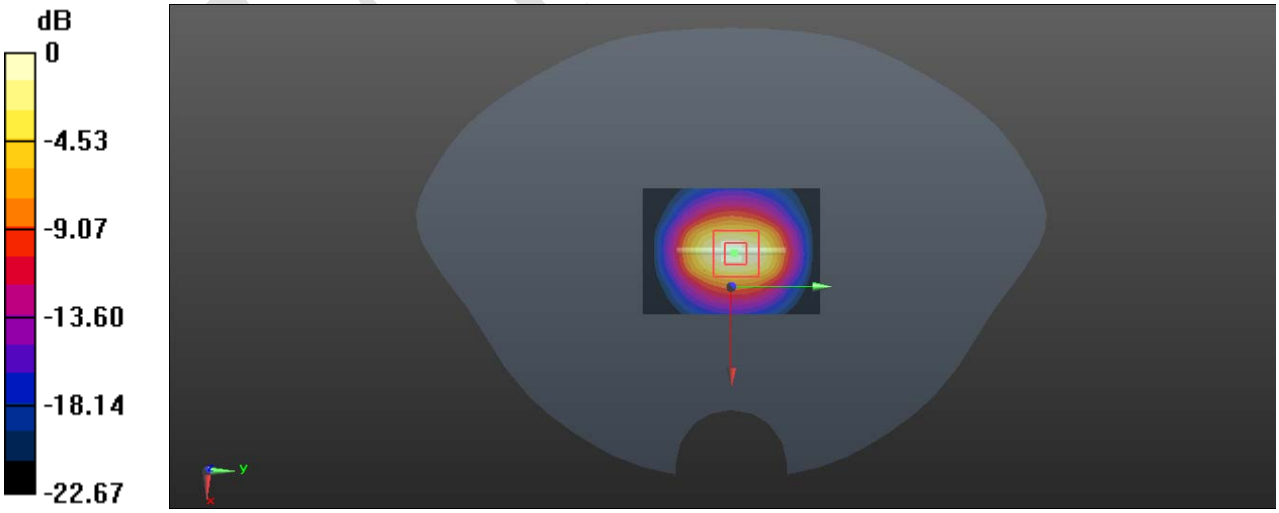
Communication System:CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.771 S/m; ε_r = 39.917; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7329; ConvF(7.6, 7.6, 7.6) @ 2450 MHz; Calibrated: 2019/10/22
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn772; Calibrated: 2019/10/6
- Phantom: Twin SAM; Type: Twin SAM V5.0; Serial: TP:1412
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Area Scan (71x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 10.1 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 74.31 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 11.2 W/kg
SAR(1 g) = 5.62 W/kg; SAR(10 g) = 2.55 W/kg
Maximum value of SAR (measured) = 9.26 W/kg



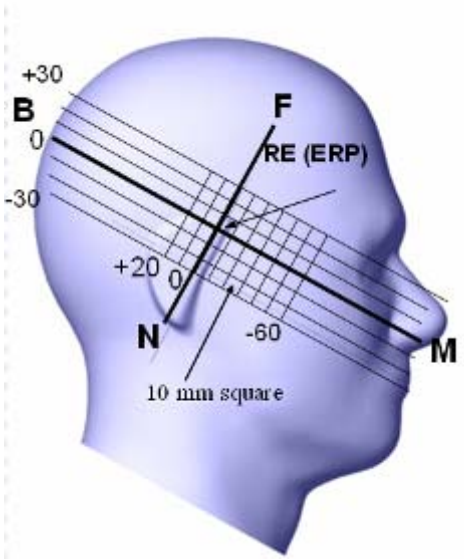
0 dB = 9.26 W/kg = 9.67 dBW/kg

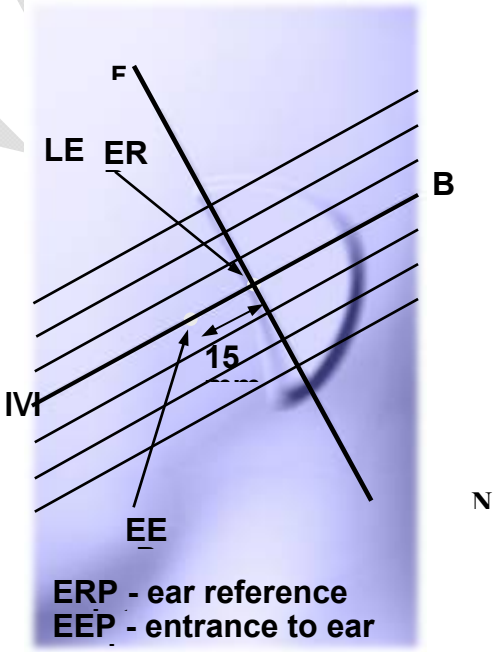
EUT TEST STRATEGY AND METHODOLOGY

Test Positions for Device Operating Next to a Person's Ear

This category includes most wireless handsets with fixed, retractable or internal antennas located toward the top half of the device, with or without a foldout, sliding or similar keypad cover. The handset should have its earpiece located within the upper ¼ of the device, either along the centerline or off-centered, as perceived by its users. This type of handset should be positioned in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point". The "test device reference point" should be located at the same level as the center of the earpiece region. The "vertical centerline" should bisect the front surface of the handset at its top and bottom edges. A "ear reference point" is located on the outer surface of the head phantom on each ear spacer. It is located 1.5 cm above the center of the ear canal entrance in the "phantom reference plane" defined by the three lines joining the center of each "ear reference point" (left and right) and the tip of the mouth.

A handset should be initially positioned with the earpiece region pressed against the ear spacer of a head phantom. For the SCC-34/SC-2 head phantom, the device should be positioned parallel to the "N-F" line defined along the base of the ear spacer that contains the "ear reference point". For interim head phantoms, the device should be positioned parallel to the cheek for maximum RF energy coupling. The "test device reference point" is aligned to the "ear reference point" on the head phantom and the "vertical centerline" is aligned to the "phantom reference plane". This is called the "initial ear position". While maintaining these three alignments, the body of the handset is gradually adjusted to each of the following positions for evaluating SAR:





Cheek/Touch Position

The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

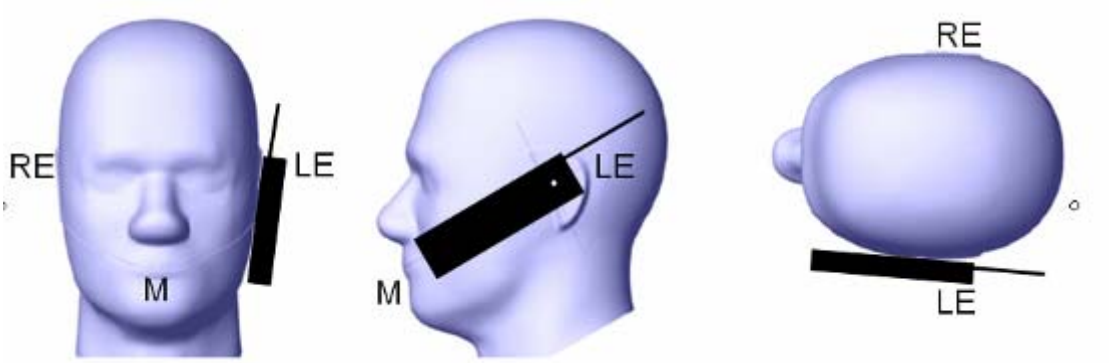
This test position is established:

When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.

(or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms – when the handset loses contact with the phantom at the pivoting point, rotation should continue until the device touches the cheek of the phantom or breaks its last contact from the ear spacer.

Cheek /Touch Position



Ear/Tilt Position

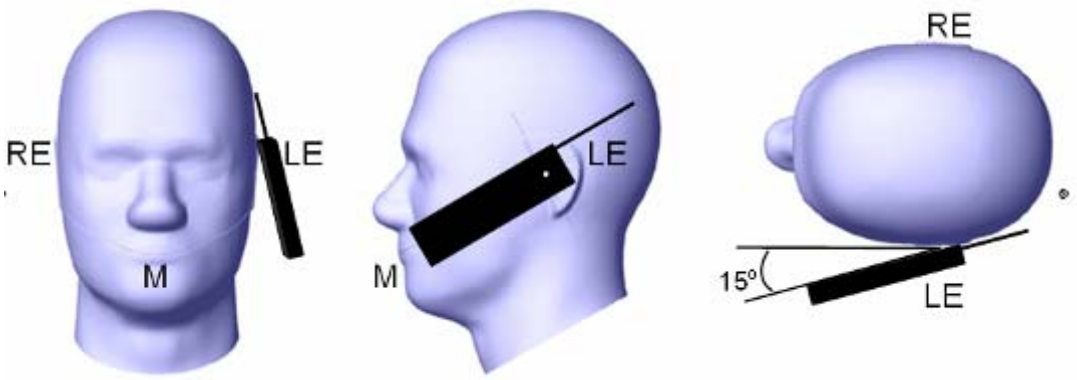
With the handset aligned in the "Cheek/Touch Position":

1) If the earpiece of the handset is not in full contact with the phantom's ear spacer (in the "Cheek/Touch position") and the peak SAR location for the "Cheek/Touch" position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the "initial ear position" by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.

2) (otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both "ear reference points" (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the device handset is tilted away from the mouth with respect to the "test device reference point" until the inside angle between the vertical centerline on the front surface of the phone and the horizontal line passing through the ear reference point is by 15 80°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

If a device is also designed to transmit with its keypad cover closed for operating in the head position, such positions should also be considered in the SAR evaluation. The device should be tested on the left and right side of the head phantom in the "Cheek/Touch" and "Ear/Tilt" positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tilt/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s). If the transmission band of the test device is less than 10 MHz, testing at the high and low frequency channels is optional.

Ear /Tilt 15° Position



Test positions for body-worn and other configurations

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., the same metallic belt-clip used with different holsters with no other metallic components), only the accessory that dictates the closest spacing to the body must be tested.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.

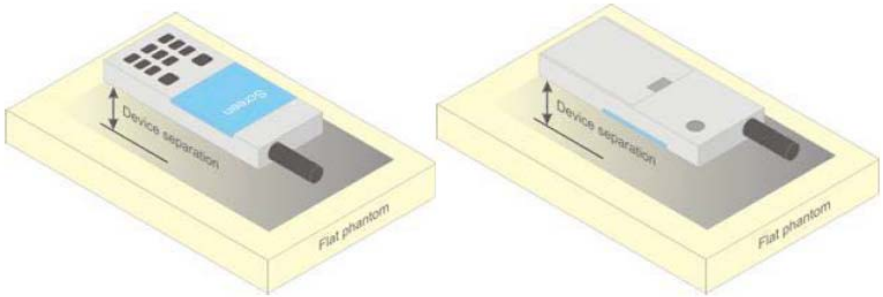


Figure 5 – Test positions for body-worn devices

Test Distance for SAR Evaluation

In this case the EUT(Equipment Under Test) is set 10mm away from the phantom, the test distance is 10mm.

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the ear point or central position was used as a reference value for assessing the power drop. The SAR at this point is measured at the start of the test and then again at the end of the testing.

Step 2: The SAR distribution at the exposed side of the head was measured at a distance of 4 mm from the inner surface of the shell. The area covered the entire dimension of the head or radiating structures of the EUT, the horizontal grid spacing was 15 mm x 15 mm, and the SAR distribution was determined by integrated grid of 1.5mm x 1.5mm. Based on these data, the area of the maximum absorption was determined by spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7x 7 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

1) The data at the surface were extrapolated, since the center of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

2) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one dimensional splines with the “Not a knot"-condition (in x, y and z-directions). The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the averages.

All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement of the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

FINAL

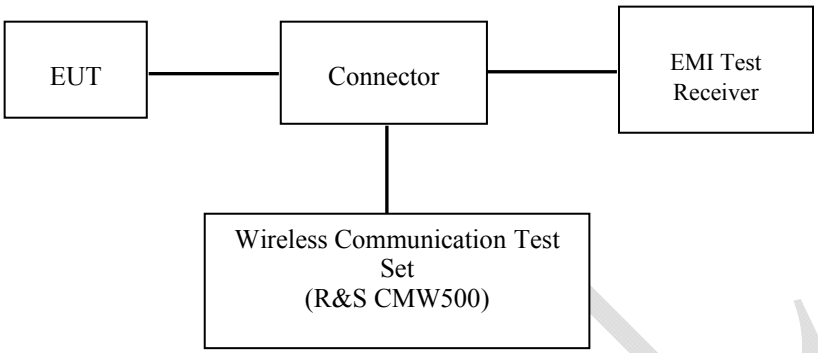
CONDUCTED OUTPUT POWER MEASUREMENT

Provision Applicable

The measured peak output power should be greater and within 5% than EMI measurement.

Test Procedure

The RF output of the transmitter was connected to the input of the EMI Test Receiver through Connector.



LTE

Radio Configuration

The power measurement was configured by the Wireless Communication Test Set.

FINAL

FDD-LTE

For UE Power Class 1 and 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2-1due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

For UE Power Class 1 and 3 the specific requirements and identified sub clauses are specified in Table 6.2.4-1 along with the allowed A-MPR values that may be used to meet these requirements. The allowed A-MPR values specified below in Table 6.2.4.-1 to 6.2.4-15 are in addition to the allowed MPR requirements specified in sub clause 6.2.3.

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	N/A
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	
NS_11	6.6.2.2.1	23	1.4, 3, 5, 10, 15, 20	Table 6.2.4-5	
NS_12	6.6.3.3.5	26	1.4, 3, 5	Table 6.2.4-6	
NS_13	6.6.3.3.6	26	5	Table 6.2.4-7	
NS_14	6.6.3.3.7	26	10, 15	Table 6.2.4-8	
NS_15	6.6.3.3.8	26	1.4, 3, 5, 10, 15	Table 6.2.4-9 Table 6.2.4-10	
NS_16	6.6.3.3.9	27	3, 5, 10	Table 6.2.4-11, Table 6.2.4-12, Table 6.2.4-13	
NS_17	6.6.3.3.10	28	5, 10	Table 5.6-1	N/A
NS_18	6.6.3.3.11	28	5	≥ 2	≤ 1
			10, 15, 20	≥ 1	≤ 4
NS_19	6.6.3.3.12	44	10, 15, 20	Table 6.2.4-14	
NS_20	6.2.2 6.6.2.2.1 6.6.3.2	23	5, 10, 15, 20	Table 6.2.4-15	
...					
NS_32	-	-	-	-	-

TDD-LTE

3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Calculated Duty Cycle

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

Calculated Duty Cycle = Extended cyclic prefix in uplink x (T_s) x # of S + # of U

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:
Calculated Duty Cycle = 5120 x [1/(15000 x 2048)] x 2 + 6 ms = 63.33%
where
T_s = 1/(15000 x 2048) seconds

Maximum Target Output Power

Max Target Power(dBm)			
Mode/Band	Channel		
	Low	Middle	High
LTE Band 2	23.3	23.3	23.3
LTE Band 4	23.2	23.2	23.2
LTE Band 5	23.5	23.5	23.5
LTE Band 7	22.4	22.4	22.4
LTE Band 12	24.8	24.8	24.8
LTE Band 13	21.4	21.4	21.4
LTE Band 25	24.5	24.5	24.5
LTE Band 40	21.4	21.4	21.4
WLAN 2.4G Chain 0(802.11b)	16.3	16.3	16.3
WLAN 2.4G Chain 0(802.11g)	14	14	14
WLAN 2.4G Chain 0(802.11n ht20)	12.7	12.7	12.7
WLAN 2.4G Chain 0(802.11n ht40)	9.7	9.7	9.7
WLAN 2.4G Chain 1(802.11b)	8.3	8.3	8.3
WLAN 2.4G Chain 1(802.11g)	7.8	7.8	7.8
WLAN 2.4G Chain 1(802.11n ht20)	7.7	7.7	7.7
WLAN 2.4G Chain 1(802.11n ht40)	8	8	8

FINAL

Test Results:

LTE Band 2:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	22.64	22.75	22.76
		RB1#3	0	0	22.77	22.76	22.92
		RB1#5	0	0	22.55	22.71	22.81
		RB3#0	1	1	22.44	22.46	22.91
		RB3#3	1	1	22.54	22.31	22.77
		RB6#0	1	1	21.46	21.45	21.87
	16-QAM	RB1#0	1	1	21.70	21.61	22.07
		RB1#3	1	1	21.71	21.75	22.71
		RB1#5	2	2	21.67	21.72	22.60
		RB3#0	2	2	21.74	21.76	21.95
		RB3#3	2	2	21.55	21.75	21.92
		RB6#0	2	2	20.39	20.51	20.85
3M	QPSK	RB1#0	0	0	22.51	22.88	22.97
		RB1#8	0	0	22.62	22.85	22.91
		RB1#14	0	0	22.53	22.80	23.09
		RB6#0	1	1	21.99	21.81	21.95
		RB6#9	1	1	21.73	21.78	22.05
		RB15#0	1	1	22.11	21.72	22.00
	16-QAM	RB1#0	1	1	22.13	22.12	21.98
		RB1#8	1	1	22.06	21.94	21.51
		RB1#14	1	1	21.97	21.89	21.62
		RB6#0	2	2	20.74	21.01	20.97
		RB6#9	2	2	20.70	20.96	20.65
		RB15#0	2	2	20.75	21.00	21.00
5M	QPSK	RB1#0	0	0	22.55	22.55	22.69
		RB1#13	0	0	22.67	22.47	22.98
		RB1#24	0	0	22.70	22.78	23.05
		RB15#0	1	1	22.03	21.86	21.98
		RB15#10	1	1	21.98	21.78	21.98
		RB25#0	1	1	21.88	21.69	21.94
	16-QAM	RB1#0	1	1	21.20	22.00	21.70
		RB1#13	1	1	21.22	21.92	21.84
		RB1#24	1	1	21.11	21.80	21.57
		RB15#0	2	2	20.82	20.83	21.15
		RB15#10	2	2	20.56	20.63	20.85
		RB25#0	2	2	20.75	20.77	20.92

FINAL

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	22.54	22.88	22.75
		RB1#25	0	0	22.56	23.08	23.05
		RB1#49	1	1	23.01	22.92	23.07
		RB25#0	1	1	21.91	21.94	21.90
		RB25#25	1	1	21.79	21.84	22.06
		RB50#0	1	1	21.95	21.85	22.15
	16-QAM	RB1#0	1	1	22.16	22.33	21.73
		RB1#25	1	1	22.03	22.88	21.77
		RB1#49	1	1	22.32	22.38	21.65
		RB25#0	2	2	21.06	20.73	21.04
		RB25#25	2	2	20.78	20.68	20.91
		RB50#0	2	2	20.97	20.82	21.10
15M	QPSK	RB1#0	0	0	23.02	22.74	22.91
		RB1#38	0	0	22.81	22.63	22.75
		RB1#74	1	1	22.95	22.52	22.61
		RB36#0	1	1	21.93	21.95	21.96
		RB36#39	1	1	21.82	21.80	22.13
		RB75#0	1	1	21.86	21.85	22.07
	16-QAM	RB1#0	1	1	22.14	22.49	21.81
		RB1#38	1	1	22.16	22.14	21.96
		RB1#74	2	2	22.13	22.14	21.63
		RB36#0	2	2	20.77	21.32	20.96
		RB36#39	2	2	20.96	20.73	20.88
		RB75#0	2	2	20.84	20.95	21.26
20M	QPSK	RB1#0	0	0	22.90	22.74	22.67
		RB1#50	0	0	22.93	23.17	**23.19**
		RB1#99	0	0	22.39	22.73	23.16
		RB50#0	1	1	22.46	22.69	22.82
		RB50#50	1	1	22.65	22.45	22.73
		RB100#0	1	1	21.85	21.94	22.05
	16-QAM	RB1#0	1	1	22.65	22.50	22.15
		RB1#50	1	1	22.70	22.56	21.70
		RB1#99	2	2	22.74	22.09	21.34
		RB50#0	2	2	20.91	21.06	20.91
		RB50#50	2	2	20.87	21.01	21.12
		RB100#0	2	2	20.72	20.99	20.90

FINAL

LTE Band 4:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	23.01	22.55	22.79
		RB1#3	0	0	23.03	22.73	22.87
		RB1#5	0	0	23.01	22.57	22.93
		RB3#0	1	1	22.91	22.65	22.81
		RB3#3	1	1	22.75	22.84	22.69
		RB6#0	1	1	21.68	21.89	21.84
	16-QAM	RB1#0	1	1	21.95	22.05	21.93
		RB1#3	1	1	22.15	22.18	21.56
		RB1#5	1	1	21.91	22.20	21.63
		RB3#0	2	2	21.69	22.20	21.85
		RB3#3	2	2	21.86	22.05	21.71
		RB6#0	2	2	20.95	20.98	20.77
3M	QPSK	RB1#0	0	0	22.65	22.79	22.49
		RB1#8	0	0	22.62	22.87	22.52
		RB1#14	1	1	22.51	22.92	22.49
		RB6#0	1	1	21.64	21.68	21.63
		RB6#9	1	1	21.78	21.88	21.61
		RB15#0	1	1	21.79	21.76	21.78
	16-QAM	RB1#0	1	1	21.86	21.96	21.95
		RB1#8	1	1	21.82	22.32	21.75
		RB1#14	2	2	21.94	22.36	21.90
		RB6#0	2	2	20.69	21.07	20.81
		RB6#9	2	2	20.54	21.14	20.59
		RB15#0	2	2	20.49	20.80	20.80
5M	QPSK	RB1#0	0	0	22.43	22.58	22.44
		RB1#13	0	0	22.45	22.92	22.69
		RB1#24	1	1	22.59	22.92	22.85
		RB15#0	1	1	21.69	21.72	21.82
		RB15#10	1	1	21.54	21.70	21.77
		RB25#0	1	1	21.49	21.64	21.82
	16-QAM	RB1#0	1	1	20.81	21.98	21.26
		RB1#13	1	1	20.89	22.13	21.31
		RB1#24	1	1	20.98	22.04	21.45
		RB15#0	2	2	20.87	20.68	20.79
		RB15#10	2	2	20.94	21.01	20.80
		RB25#0	2	2	20.82	20.68	20.74

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Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	22.73	22.59	22.60
		RB1#25	0	0	23.03	22.93	22.75
		RB1#49	0	0	22.60	22.53	22.58
		RB25#0	1	1	21.58	21.61	21.42
		RB25#25	1	1	21.66	21.71	21.57
		RB50#0	1	1	21.72	21.66	21.53
	16-QAM	RB1#0	1	1	21.89	22.41	22.28
		RB1#25	1	1	22.16	22.36	22.47
		RB1#49	2	2	21.54	22.34	22.24
		RB25#0	2	2	20.78	20.39	20.63
		RB25#25	2	2	20.71	20.60	20.51
		RB50#0	2	2	20.81	20.49	20.63
15M	QPSK	RB1#0	0	0	22.43	23.04	22.88
		RB1#38	0	0	22.59	22.79	22.59
		RB1#74	1	1	22.75	22.61	22.66
		RB36#0	1	1	21.70	21.75	21.90
		RB36#39	1	1	21.83	21.77	21.75
		RB75#0	1	1	21.75	21.61	21.74
	16-QAM	RB1#0	1	1	21.83	22.37	21.59
		RB1#38	1	1	22.03	22.78	21.57
		RB1#74	2	2	21.62	22.33	21.23
		RB36#0	2	2	20.65	20.66	20.98
		RB36#39	2	2	20.79	20.74	20.56
		RB75#0	2	2	20.62	20.60	20.79
20M	QPSK	RB1#0	0	0	22.89	22.96	**23.05**
		RB1#50	0	0	22.84	23.00	22.95
		RB1#99	1	1	22.88	22.39	22.63
		RB50#0	1	1	22.69	22.37	22.43
		RB50#50	1	1	22.81	22.29	22.31
		RB100#0	1	1	21.95	21.54	21.67
	16-QAM	RB1#0	1	1	21.79	22.47	21.61
		RB1#50	1	1	22.34	22.19	21.63
		RB1#99	2	2	21.81	21.93	21.05
		RB50#0	2	2	20.88	20.56	20.71
		RB50#50	2	2	20.71	20.70	20.76
		RB100#0	2	2	21.03	20.66	20.51

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LTE Band 5:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	21.95	20.77	22.59
		RB1#3	0	0	22.13	20.63	22.33
		RB1#5	0	0	22.01	20.58	22.13
		RB3#0	1	1	21.91	20.78	22.44
		RB3#3	1	1	21.98	20.63	22.24
		RB6#0	1	1	21.95	20.58	22.26
	16-QAM	RB1#0	1	1	20.71	20.63	21.87
		RB1#3	1	1	21.14	20.64	21.67
		RB1#5	2	2	21.1	21.56	21.51
		RB3#0	2	2	21.08	21.78	22
		RB3#3	2	2	21.27	20.98	21.79
		RB6#0	2	2	20.92	20.77	21.28
3M	QPSK	RB1#0	0	0	21.55	21.66	22.3
		RB1#8	0	0	22.24	21.36	22.58
		RB1#14	1	1	22.57	20.95	21.91
		RB6#0	1	1	21.66	21.58	22.38
		RB6#9	1	1	22.49	21.07	22.02
		RB15#0	1	1	22.05	21.35	22.42
	16-QAM	RB1#0	1	1	20.99	21.27	21.24
		RB1#8	1	1	21.77	20.76	21.78
		RB1#14	2	2	22.27	20.49	21.48
		RB6#0	2	2	20.83	20.93	21.47
		RB6#9	2	2	21.6	20.53	21.64
		RB15#0	2	2	21.3	20.79	21.65
5M	QPSK	RB1#0	0	0	22.09	22.17	21.48
		RB1#13	0	0	23.03	21.54	22.8
		RB1#24	0	0	22.7	21	22.11
		RB15#0	1	1	21.93	21.89	22.1
		RB15#10	1	1	21.92	21.52	22.25
		RB25#0	1	1	21.95	21.72	22.37
	16-QAM	RB1#0	1	1	20.97	21.5	20.53
		RB1#13	1	1	22.08	20.82	22.11
		RB1#24	1	1	21.74	20.65	21.72
		RB15#0	2	2	21.01	21.39	21.09
		RB15#10	2	2	21.07	20.81	21.05
		RB25#0	2	2	21.05	21.04	21.33

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	23.14	22.91	22.96
		RB1#25	0	0	**23.42**	23.3	23.23
		RB1#49	1	1	22.96	22.77	22.61
		RB25#0	1	1	22.72	22.85	22.16
		RB25#25	1	1	22.59	22.72	22.25
		RB50#0	1	1	22.38	21.5	21.7
	16-QAM	RB1#0	1	1	20.69	21.98	20.62
		RB1#25	1	1	22.88	20.77	20.77
		RB1#49	2	2	21.59	20.5	21.66
		RB25#0	2	2	21.23	21.45	20.92
		RB25#25	2	2	21.42	20.77	21.51
		RB50#0	2	2	21.41	20.63	20.88

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LTE Band 7:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	RB1#0	0	0	21.63	21.61	21.64
		RB1#13	0	0	21.82	21.78	22.00
		RB1#24	0	0	21.65	21.66	21.89
		RB15#0	1	1	20.79	20.92	20.75
		RB15#10	1	1	20.65	20.71	20.90
		RB25#0	1	1	20.62	20.82	20.86
	16-QAM	RB1#0	1	1	20.26	20.42	21.02
		RB1#13	1	1	20.79	20.60	21.51
		RB1#24	2	2	20.74	20.26	21.37
		RB15#0	2	2	19.75	19.81	19.47
		RB15#10	2	2	19.70	19.92	19.54
		RB25#0	2	2	19.63	19.82	19.49
10M	QPSK	RB1#0	0	0	21.63	21.57	**22.30**
		RB1#25	0	0	21.80	22.02	22.24
		RB1#49	1	1	21.64	21.89	22.05
		RB25#0	1	1	20.78	20.85	20.95
		RB25#25	1	1	20.70	21.00	21.00
		RB50#0	1	1	20.82	21.00	20.93
	16-QAM	RB1#0	1	1	20.64	21.23	21.26
		RB1#25	1	1	21.24	21.80	20.78
		RB1#49	1	1	20.57	21.46	20.70
		RB25#0	2	2	19.85	19.72	20.03
		RB25#25	2	2	19.70	19.99	20.08
		RB50#0	2	2	19.61	19.72	19.87
15M	QPSK	RB1#0	0	0	21.48	21.64	21.81
		RB1#38	0	0	21.69	21.84	21.86
		RB1#74	0	0	21.70	21.90	21.74
		RB36#0	1	1	20.93	20.82	20.91
		RB36#39	1	1	20.57	20.78	21.06
		RB75#0	1	1	20.71	20.66	21.00
	16-QAM	RB1#0	1	1	21.15	21.30	21.09
		RB1#38	1	1	21.09	21.75	20.91
		RB1#74	1	1	20.36	21.46	20.87
		RB36#0	2	2	19.65	19.91	19.85
		RB36#39	2	2	19.56	20.10	19.77
		RB75#0	2	2	19.67	19.68	19.77

PINAL

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
20M	QPSK	RB1#0	0	0	21.36	21.62	21.68
		RB1#50	0	0	22.02	22.24	22.04
		RB1#99	1	1	21.54	21.91	21.84
		RB50#0	1	1	21.74	21.85	21.97
		RB50#50	1	1	21.56	21.80	21.96
		RB100#0	1	1	20.76	20.90	21.06
	16-QAM	RB1#0	1	1	21.01	20.83	21.78
		RB1#50	1	1	21.35	20.97	21.70
		RB1#99	2	2	20.59	20.42	21.53
		RB50#0	2	2	19.94	19.83	19.85
		RB50#50	2	2	19.62	19.91	19.92
		RB100#0	2	2	19.74	19.89	19.85

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LTE Band 12 (Model: M7):

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	23.85	23.78	23.37
		RB1#3	0	0	23.71	23.82	23.14
		RB1#5	0	0	23.94	23.88	23.42
		RB3#0	1	1	23.74	23.65	23.72
		RB3#3	1	1	23.79	23.45	23.45
		RB6#0	1	1	22.82	22.7	22.55
	16-QAM	RB1#0	1	1	22.45	22.91	22.76
		RB1#3	1	1	22.71	23.19	22.81
		RB1#5	2	2	23	22.6	22.8
		RB3#0	2	2	22.9	22.62	22.93
		RB3#3	2	2	22.99	22.55	22.63
		RB6#0	2	2	21.76	21.74	21.79
3M	QPSK	RB1#0	0	0	23.66	23.49	23.36
		RB1#8	0	0	23.9	23.67	24.07
		RB1#14	0	0	23.57	23.5	24.31
		RB6#0	1	1	22.9	22.66	23.49
		RB6#9	1	1	22.89	22.89	23.37
		RB15#0	1	1	22.83	21.89	23.51
	16-QAM	RB1#0	1	1	23.06	21.72	24.04
		RB1#8	1	1	23.53	23.08	23.89
		RB1#14	1	1	23.12	23.15	23.75
		RB6#0	2	2	21.75	22.09	22.59
		RB6#9	2	2	21.79	21.93	22.09
		RB15#0	2	2	21.73	21.77	22.53
5M	QPSK	RB1#0	0	0	24.39	24.16	24.31
		RB1#13	0	0	24.6	24.46	24.18
		RB1#24	0	0	24.31	24.41	24.14
		RB15#0	1	1	23.66	23.51	23.43
		RB15#10	1	1	23.37	23.51	23.31
		RB25#0	1	1	23.59	23.33	23.42
	16-QAM	RB1#0	1	1	23.49	22.94	23.58
		RB1#13	1	1	23.02	23.02	23.22
		RB1#24	1	1	23.09	22.71	23.35
		RB15#0	2	2	22.74	22.26	22.34
		RB15#10	2	2	22.4	22.68	22
		RB25#0	2	2	22.45	22.46	22.38

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Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	24.2	24.29	24.62
		RB1#25	0	0	24.56	24.64	**24.7**
		RB1#49	1	1	24.47	24.57	24.35
		RB25#0	1	1	24.16	24.11	24.14
		RB25#25	1	1	24.21	24.23	24.22
		RB50#0	1	1	23.54	23.38	23.42
	16-QAM	RB1#0	1	1	23.75	23.99	23.31
		RB1#25	1	1	23.58	23.95	24.08
		RB1#49	1	1	23.41	24.5	22.88
		RB25#0	2	2	22.57	22.22	22.27
		RB25#25	2	2	22.43	22.58	22.72
		RB50#0	2	2	22.61	22.3	22.44

FINAL

LTE Band 12 (Model: M7P):

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	23.43	23.43	22.86
		RB1#3	0	0	23.36	23.27	22.69
		RB1#5	0	0	23.53	23.4	22.99
		RB3#0	1	1	23.26	23.2	23.31
		RB3#3	1	1	23.4	22.94	23.03
		RB6#0	1	1	22.37	22.27	22.12
	16-QAM	RB1#0	1	1	22.07	22.44	22.27
		RB1#3	1	1	22.33	22.75	22.39
		RB1#5	2	2	22.47	22.05	22.42
		RB3#0	2	2	22.55	22.09	22.51
		RB3#3	2	2	22.59	22.19	22.1
		RB6#0	2	2	21.38	21.35	21.35
3M	QPSK	RB1#0	0	0	23.25	23.09	22.99
		RB1#8	0	0	23.54	23.16	23.56
		RB1#14	0	0	23.11	23.04	23.77
		RB6#0	1	1	22.49	22.23	23.04
		RB6#9	1	1	22.5	22.52	22.97
		RB15#0	1	1	22.38	21.54	23.02
	16-QAM	RB1#0	1	1	22.6	21.36	23.54
		RB1#8	1	1	22.99	22.63	23.42
		RB1#14	1	1	22.72	22.79	23.22
		RB6#0	2	2	21.34	21.61	22.08
		RB6#9	2	2	21.37	21.45	21.66
		RB15#0	2	2	21.42	21.53	21.98
5M	QPSK	RB1#0	0	0	24.04	23.68	23.93
		RB1#13	0	0	24.25	24.02	23.67
		RB1#24	0	0	23.89	23.97	23.78
		RB15#0	1	1	23.13	23.1	22.9
		RB15#10	1	1	22.92	23.04	22.84
		RB25#0	1	1	23.04	22.8	22.93
	16-QAM	RB1#0	1	1	23.01	22.58	23.04
		RB1#13	1	1	22.67	22.63	22.71
		RB1#24	1	1	22.63	22.3	22.9
		RB15#0	2	2	22.26	21.76	21.94
		RB15#10	2	2	22.04	22.23	21.48
		RB25#0	2	2	22.06	22.04	21.96

PENDING

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	23.7	23.9	24.1
		RB1#25	0	0	24.27	24.23	**24.31**
		RB1#49	1	1	24.1	24.19	23.96
		RB25#0	1	1	23.7	23.58	23.62
		RB25#25	1	1	23.83	23.83	23.86
		RB50#0	1	1	23.11	22.84	23.03
	16-QAM	RB1#0	1	1	23.25	23.61	22.82
		RB1#25	1	1	23.13	23.5	23.71
		RB1#49	1	1	22.96	24.07	22.37
		RB25#0	2	2	22.14	21.84	21.85
		RB25#25	2	2	21.94	22.22	22.23
		RB50#0	2	2	22.13	21.85	22.05

LTE Band 13:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	RB1#0	0	0	19.98	20.15	20.69
		RB1#13	0	0	20.59	**21.32**	20.57
		RB1#24	0	0	20.66	20.43	20.10
		RB15#0	1	1	19.68	19.90	19.53
		RB15#10	1	1	19.88	20.09	19.62
		RB25#0	1	1	19.74	19.96	19.68
	16-QAM	RB1#0	1	1	18.73	19.34	19.26
		RB1#13	1	1	19.21	19.95	19.29
		RB1#24	1	1	19.63	19.97	19.03
		RB15#0	2	2	18.49	18.56	18.56
		RB15#10	2	2	18.64	18.89	18.66
		RB25#0	2	2	18.87	18.65	18.59
10M	QPSK	RB1#0	0	0	/	20.81	/
		RB1#25	0	0	/	21.18	/
		RB1#49	1	1	/	20.93	/
		RB25#0	1	1	/	20.21	/
		RB25#25	1	1	/	20.89	/
		RB50#0	1	1	/	19.34	/
	16-QAM	RB1#0	1	1	/	18.93	/
		RB1#25	1	1	/	20.64	/
		RB1#49	1	1	/	19.44	/
		RB25#0	2	2	/	18.53	/
		RB25#25	2	2	/	18.58	/
		RB50#0	2	2	/	18.37	/

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LTE Band 25:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	23.67	24.02	23.52
		RB1#3	0	0	24.02	24.10	23.84
		RB1#5	0	0	24.13	24.03	23.79
		RB3#0	1	1	24.08	23.90	23.95
		RB3#3	1	1	23.82	23.95	23.87
		RB6#0	1	1	22.82	22.88	22.86
	16-QAM	RB1#0	1	1	22.73	22.98	23.03
		RB1#3	1	1	22.84	23.15	23.19
		RB1#5	1	1	22.82	23.03	23.06
		RB3#0	2	2	23.02	22.91	22.84
		RB3#3	2	2	23.08	22.86	22.78
		RB6#0	2	2	22.00	21.97	21.93
3M	QPSK	RB1#0	0	0	23.71	23.74	23.84
		RB1#8	0	0	23.94	23.83	23.78
		RB1#14	1	1	24.07	23.77	24.01
		RB6#0	1	1	22.78	22.89	22.84
		RB6#9	1	1	22.85	22.67	23.06
		RB15#0	1	1	22.95	22.85	22.92
	16-QAM	RB1#0	1	1	23.14	23.48	22.93
		RB1#8	1	1	23.17	23.12	22.91
		RB1#14	2	2	23.06	23.02	22.62
		RB6#0	2	2	21.63	21.86	21.97
		RB6#9	2	2	21.78	21.72	22.05
		RB15#0	2	2	21.83	21.62	22.00
5M	QPSK	RB1#0	0	0	23.54	23.55	24.06
		RB1#13	0	0	23.72	23.76	23.92
		RB1#24	1	1	23.92	23.71	23.69
		RB15#0	1	1	22.92	22.81	23.11
		RB15#10	1	1	23.01	22.88	22.86
		RB25#0	1	1	22.80	22.96	23.07
	16-QAM	RB1#0	1	1	22.50	23.15	22.86
		RB1#13	1	1	22.40	23.18	22.49
		RB1#24	1	1	22.17	23.11	22.73
		RB15#0	2	2	21.79	21.63	21.64
		RB15#10	2	2	21.95	21.78	21.66
		RB25#0	2	2	21.87	21.79	21.98

PENDING

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	23.66	23.77	23.81
		RB1#25	0	0	24.02	24.22	23.99
		RB1#49	0	0	24.16	24.07	24.08
		RB25#0	1	1	22.97	22.98	22.99
		RB25#25	1	1	23.03	22.85	23.01
		RB50#0	1	1	23.05	23.01	23.06
	16-QAM	RB1#0	1	1	23.17	23.36	22.60
		RB1#25	1	1	23.75	23.75	22.92
		RB1#49	2	2	23.80	23.45	22.59
		RB25#0	2	2	21.78	21.87	22.17
		RB25#25	2	2	21.93	21.83	22.10
		RB50#0	2	2	21.70	21.86	21.88
15M	QPSK	RB1#0	0	0	23.64	23.78	23.61
		RB1#38	0	0	24.09	23.86	23.50
		RB1#74	1	1	24.19	23.61	23.65
		RB36#0	1	1	22.77	23.00	23.07
		RB36#39	1	1	22.89	22.75	22.98
		RB75#0	1	1	22.86	22.81	22.89
	16-QAM	RB1#0	1	1	23.23	23.37	23.23
		RB1#38	1	1	23.27	23.94	22.97
		RB1#74	2	2	23.10	23.25	22.18
		RB36#0	2	2	21.70	22.08	21.79
		RB36#39	2	2	21.79	21.93	21.76
		RB75#0	2	2	21.64	21.75	21.80
20M	QPSK	RB1#0	0	0	23.76	23.78	23.80
		RB1#50	0	0	24.17	24.14	24.10
		RB1#99	1	1	24.21	24.33	**24.43**
		RB50#0	1	1	23.53	23.74	23.83
		RB50#50	1	1	23.80	23.62	23.82
		RB100#0	1	1	22.91	23.06	23.09
	16-QAM	RB1#0	1	1	23.07	22.88	23.64
		RB1#50	1	1	23.72	22.96	23.95
		RB1#99	2	2	22.82	22.32	24.14
		RB50#0	2	2	21.76	22.00	21.95
		RB50#50	2	2	21.89	21.78	21.62
		RB100#0	2	2	21.67	21.70	21.81

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LTE Band 40: (2305-2315MHz):

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	RB1#0	0	0	20.61	19.89	20.42
		RB1#13	0	0	**20.63**	19.87	20.49
		RB1#24	0	0	20.47	20.02	20.60
		RB15#0	1	1	19.79	19.27	19.30
		RB15#10	1	1	19.77	19.25	19.28
		RB25#0	1	1	19.82	19.31	19.25
	16-QAM	RB1#0	1	1	19.46	19.55	19.61
		RB1#13	1	1	19.32	19.76	19.61
		RB1#24	1	1	19.00	19.49	19.44
		RB15#0	2	2	18.51	18.27	18.41
		RB15#10	2	2	18.72	18.19	18.21
		RB25#0	2	2	18.62	18.26	18.08
10M	QPSK	RB1#0	0	0	/	20.28	/
		RB1#25	0	0	/	20.45	/
		RB1#49	1	1	/	20.30	/
		RB25#0	1	1	/	19.91	/
		RB25#25	1	1	/	20.04	/
		RB50#0	1	1	/	19.33	/
	16-QAM	RB1#0	1	1	/	19.26	/
		RB1#25	1	1	/	19.95	/
		RB1#49	1	1	/	19.74	/
		RB25#0	2	2	/	18.39	/
		RB25#25	2	2	/	18.33	/
		RB50#0	2	2	/	18.39	/

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LTE Band 40(2350-2360MHz):

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	RB1#0	0	0	**21.27**	20.35	20.64
		RB1#13	0	0	20.98	20.52	20.49
		RB1#24	0	0	20.73	20.72	20.81
		RB15#0	1	1	19.89	19.34	19.62
		RB15#10	1	1	19.95	19.55	19.63
		RB25#0	1	1	19.89	19.27	19.65
	16-QAM	RB1#0	1	1	19.86	19.94	19.73
		RB1#13	1	1	19.49	19.98	19.32
		RB1#24	1	1	19.54	20.00	19.47
		RB15#0	2	2	18.70	18.42	18.56
		RB15#10	2	2	18.69	18.34	18.45
		RB25#0	2	2	18.92	18.33	18.64
10M	QPSK	RB1#0	0	0	/	20.74	/
		RB1#25	0	0	/	21.08	/
		RB1#49	1	1	/	21.15	/
		RB25#0	1	1	/	20.51	/
		RB25#25	1	1	/	20.73	/
		RB50#0	1	1	/	19.38	/
	16-QAM	RB1#0	1	1	/	19.41	/
		RB1#25	1	1	/	19.01	/
		RB1#49	1	1	/	19.03	/
		RB25#0	2	2	/	18.39	/
		RB25#25	2	2	/	18.54	/
		RB50#0	2	2	/	18.47	/

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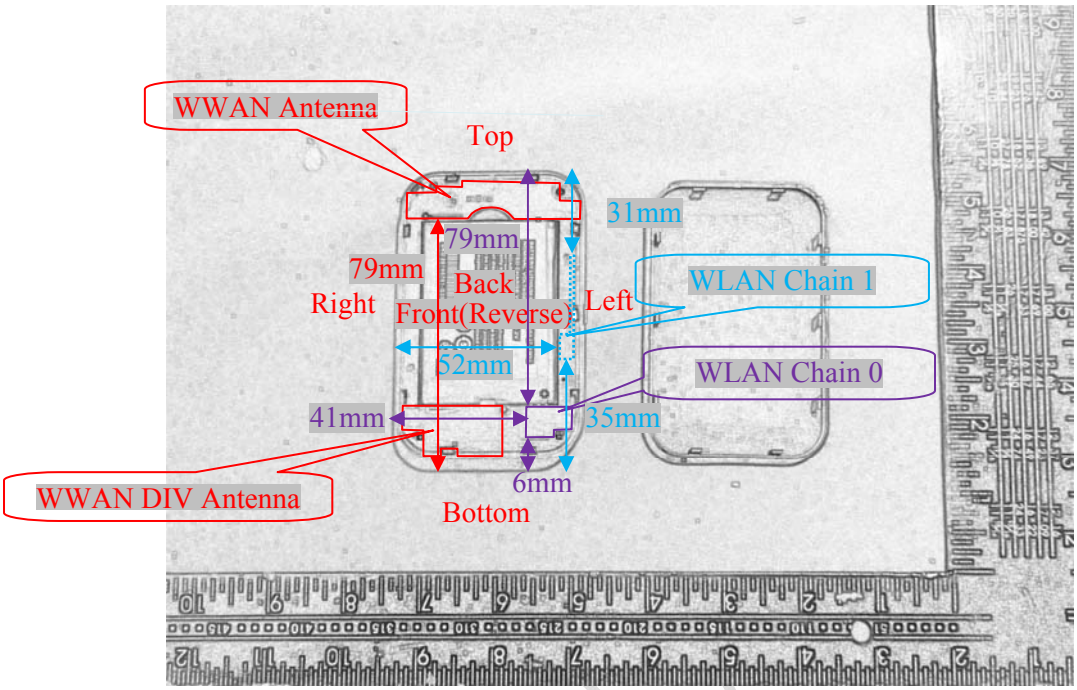
WLAN 2.4G:

Mode	Channel frequency (MHz)	Data Rate	Conducted Average Output Power(dBm)		
			Chain 0	Chain 1	Total
802.11b	2412	1Mbps	15.95	7.83	/
	2437		16.04	**8.24**	/
	2462		**16.22**	6.54	/
802.11g	2412	6Mbps	13.32	6.86	/
	2437		13.76	7.72	/
	2462		13.89	5.51	/
802.11n HT20	2412	MCS0	11.69	7.33	13.05
	2437		12.50	7.60	13.72
	2462		12.61	5.78	13.43
802.11n HT40	2422	MCS0	9.34	6.72	11.23
	2437		9.04	7.83	11.49
	2452		9.55	5.85	11.09

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Standalone SAR test exclusion considerations

Antenna Location



Antenna Distance To Edge

Antenna Distance To Edge(mm)						
Antenna	**Back**	**Front**	**Left**	**Right**	**Top**	**Bottom**
WWAN Antenna(LTE)	< 5	< 5	< 5	< 5	< 5	79
WLAN Chain 0	< 5	< 5	< 5	41	79	6
WLAN Chain 1	< 5	< 5	< 5	52	31	35

Standalone SAR test exclusion considerations

Mode	Frequency (MHz)	Pavg (dBm)	Pavg (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
WLAN 2.4G Chain 0	2462	16.3	42.66	10	6.69	3	NO
WLAN 2.4G Chain 1	2462	8.3	6.76	10	1.06	3	YES

In order to make the test results more strict, we chose to test wlan chain 1.

NOTE:
The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR, where
1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

SAR test exclusion for the EUT edge considerations Result

Mode	Back Edge	Front Edge	Left Edge	Right Edge	Top Edge	Bottom Edge
LTE Band 2	**Required**	**Required**	**Required**	**Required**	**Required**	Exclusion
LTE Band 4	**Required**	**Required**	**Required**	**Required**	**Required**	Exclusion
LTE Band 5	**Required**	**Required**	**Required**	**Required**	**Required**	Exclusion
LTE Band 7	**Required**	**Required**	**Required**	**Required**	**Required**	Exclusion
LTE Band 12	**Required**	**Required**	**Required**	**Required**	**Required**	Exclusion
LTE Band 13	**Required**	**Required**	**Required**	**Required**	**Required**	Exclusion
LTE Band 25	**Required**	**Required**	**Required**	**Required**	**Required**	Exclusion
LTE Band 40	**Required**	**Required**	**Required**	**Required**	**Required**	Exclusion
WLAN 2.4G Chain 0	**Required**	**Required**	**Required**	Exclusion	Exclusion	**Required**
WLAN 2.4G Chain 1	**Required**	**Required**	**Required**	Exclusion	Exclusion	Exclusion

Note:

Required: The distance to Edge is less than 25mm, testing is required.
Exclusion: The distance to Edge is more than 25 mm, testing is not required.

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SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	22.2-23.4 ℃	21.5-22.9 ℃	22.1-23.2 ℃
Relative Humidity:	38 %	44 %	41 %
ATM Pressure:	101.1 kPa	101.1 kPa	101.2 kPa
Test Date:	2020/04/23	2020/04/24	2020/04/25

Testing was performed by Gaochao Gong, Sam Liang, William Ye.

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LTE Band 2：

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max Power (dBm)		Scaled Factor	1g SAR (W/kg)		Plot
				Meas.	Rated		Meas.	Rated	
Body Back (10mm)	1860	20	1RB	/	/	/	/	/	/
	1880	20	1RB	23.17	23.3	1.030	0.396	**0.41**	**1#**
	1900	20	1RB	/	/	/	/	/	/
	1880	20	50%RB	22.69	23.3	1.151	0.279	0.32	2#
Body Front (10mm)	1860	20	1RB	/	/	/	/	/	/
	1880	20	1RB	23.17	23.3	1.030	0.184	0.19	3#
	1900	20	1RB	/	/	/	/	/	/
	1880	20	50%RB	22.69	23.3	1.151	0.139	0.16	4#
Body Left (10mm)	1860	20	1RB	/	/	/	/	/	/
	1880	20	1RB	23.17	23.3	1.030	0.050	0.05	5#
	1900	20	1RB	/	/	/	/	/	/
	1880	20	50%RB	22.69	23.3	1.151	0.037	0.04	6#
Body Right (10mm)	1860	20	1RB	/	/	/	/	/	/
	1880	20	1RB	23.17	23.3	1.030	0.133	0.14	7#
	1900	20	1RB	/	/	/	/	/	/
	1880	20	50%RB	22.69	23.3	1.151	0.097	0.11	8#
Body Top (10mm)	1860	20	1RB	/	/	/	/	/	/
	1880	20	1RB	23.17	23.3	1.030	0.143	0.15	9#
	1900	20	1RB	/	/	/	/	/	/
	1880	20	50%RB	22.69	23.3	1.151	0.118	0.14	10#

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LTE Band 4：

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max Power (dBm)		Scaled Factor	1g SAR (W/kg)		Plot
				Meas.	Rated		Meas.	Rated	
Body Back (10mm)	1720	20	1RB	/	/	/	/	/	/
	1732.5	20	1RB	22.96	23.2	1.057	0.480	**0.51**	**11#**
	1745	20	1RB	/	/	/	/	/	/
	1732.5	20	50%RB	22.37	23.2	1.211	0.308	0.37	12#
Body Front (10mm)	1720	20	1RB	/	/	/	/	/	/
	1732.5	20	1RB	22.96	23.2	1.057	0.076	0.08	13#
	1745	20	1RB	/	/	/	/	/	/
	1732.5	20	50%RB	22.37	23.2	1.211	0.053	0.06	14#
Body Left (10mm)	1720	20	1RB	/	/	/	/	/	/
	1732.5	20	1RB	22.96	23.2	1.057	0.067	0.07	15#
	1745	20	1RB	/	/	/	/	/	/
	1732.5	20	50%RB	22.37	23.2	1.211	0.052	0.06	16#
Body Right (10mm)	1720	20	1RB	/	/	/	/	/	/
	1732.5	20	1RB	22.96	23.2	1.057	0.104	0.11	17#
	1745	20	1RB	/	/	/	/	/	/
	1732.5	20	50%RB	22.37	23.2	1.211	0.098	0.12	18#
Body Top (10mm)	1720	20	1RB	/	/	/	/	/	/
	1732.5	20	1RB	22.96	23.2	1.057	0.217	0.23	19#
	1745	20	1RB	/	/	/	/	/	/
	1732.5	20	50%RB	22.37	23.2	1.211	0.151	0.18	20#

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LTE Band 5：

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max Power (dBm)		Scaled Factor	1g SAR (W/kg)		Plot
				Meas.	Rated		Meas.	Rated	
Body Back (10mm)	829	10	1RB	23.42	23.5	1.019	0.940	0.96	21#
	836.5	10	1RB	23.3	23.5	1.047	0.911	0.95	22#
	844	10	1RB	23.23	23.5	1.064	0.953	**1.01**	**23#**
	836.5	10	50%RB	22.85	23.5	1.161	0.665	0.77	24#
Body Front (10mm)	829	10	1RB	/	/	/	/	/	/
	836.5	10	1RB	23.3	23.5	1.047	0.517	0.54	25#
	844	10	1RB	/	/	/	/	/	/
	836.5	10	50%RB	22.85	23.5	1.161	0.443	0.51	26#
Body Left (10mm)	829	10	1RB	/	/	/	/	/	/
	836.5	10	1RB	23.3	23.5	1.047	0.290	0.30	27#
	844	10	1RB	/	/	/	/	/	/
	836.5	10	50%RB	22.85	23.5	1.161	0.251	0.29	28#
Body Right (10mm)	829	10	1RB	/	/	/	/	/	/
	836.5	10	1RB	23.3	23.5	1.047	0.282	0.30	29#
	844	10	1RB	/	/	/	/	/	/
	836.5	10	50%RB	22.85	23.5	1.161	0.226	0.26	30#
Body Top (10mm)	829	10	1RB	/	/	/	/	/	/
	836.5	10	1RB	23.3	23.5	1.047	0.155	0.16	31#
	844	10	1RB	/	/	/	/	/	/
	836.5	10	50%RB	22.85	23.5	1.161	0.128	0.15	32#

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LTE Band 7：

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max Power (dBm)		Scaled Factor	1g SAR (W/kg)		Plot
				Meas.	Rated		Meas.	Rated	
Body Back (10mm)	2510	20	1RB	/	/	/	/	/	/
	2535	20	1RB	22.24	22.4	1.038	0.632	**0.66**	**33#**
	2560	20	1RB	/	/	/	/	/	/
	2535	20	50%RB	21.85	22.4	1.135	0.453	0.51	34#
Body Front (10mm)	2510	20	1RB	/	/	/	/	/	/
	2535	20	1RB	22.24	22.4	1.038	0.095	0.10	35#
	2560	20	1RB	/	/	/	/	/	/
	2535	20	50%RB	21.85	22.4	1.135	0.063	0.07	36#
Body Left (10mm)	2510	20	1RB	/	/	/	/	/	/
	2535	20	1RB	22.24	22.4	1.038	0.047	0.05	37#
	2560	20	1RB	/	/	/	/	/	/
	2535	20	50%RB	21.85	22.4	1.135	0.024	0.03	38#
Body Right (10mm)	2510	20	1RB	/	/	/	/	/	/
	2535	20	1RB	22.24	22.4	1.038	0.096	0.10	39#
	2560	20	1RB	/	/	/	/	/	/
	2535	20	50%RB	21.85	22.4	1.135	0.068	0.08	40#
Body Top (10mm)	2510	20	1RB	/	/	/	/	/	/
	2535	20	1RB	22.24	22.4	1.038	0.154	0.16	41#
	2560	20	1RB	/	/	/	/	/	/
	2535	20	50%RB	21.85	22.4	1.135	0.113	0.13	42#

FINAL

LTE Band 12：

EUT Position	Model	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max Power (dBm)		Scaled Factor	1g SAR (W/kg)		Plot
					Meas.	Rated		Meas.	Rated	
Body Back (10mm)	M7	704	10	1RB	24.56	24.8	1.057	0.766	0.81	43#
		707.5	10	1RB	24.64	24.8	1.038	0.790	0.82	44#
		711	10	1RB	24.7	24.8	1.023	1.11	**1.14**	**45#**
		707.5	10	50%RB	24.23	24.8	1.140	0.671	0.76	46#
	M7P	711	10	1RB	24.31	24.8	1.119	0.937	1.05	47#
Body Front (10mm)	M7	704	10	1RB	/	/	/	/	/	/
		707.5	10	1RB	24.64	24.8	1.038	0.372	0.39	48#
		711	10	1RB	/	/	/	/	/	/
		707.5	10	50%RB	24.23	24.8	1.140	0.283	0.32	49#
Body Left (10mm)		704	10	1RB	/	/	/	/	/	/
		707.5	10	1RB	24.64	24.8	1.038	0.290	0.30	50#
		711	10	1RB	/	/	/	/	/	/
		707.5	10	50%RB	24.23	24.8	1.140	0.215	0.25	51#
Body Right (10mm)		704	10	1RB	/	/	/	/	/	/
		707.5	10	1RB	24.64	24.8	1.038	0.237	0.25	52#
		711	10	1RB	/	/	/	/	/	/
		707.5	10	50%RB	24.23	24.8	1.140	0.179	0.20	53#
Body Top (10mm)		704	10	1RB	/	/	/	/	/	/
		707.5	10	1RB	24.64	24.8	1.038	0.126	0.13	54#
		711	10	1RB	/	/	/	/	/	/
		707.5	10	50%RB	24.23	24.8	1.140	0.103	0.12	55#

Note: As the body back of LTE Band 12 was the worst case amang test model M7, we choose the multiple model: M7P to test the LTE Bnad 12 body back to demonstrate compliance.

FINAL

LTE Band 13：

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max Power (dBm)		Scaled Factor	1g SAR (W/kg)		Plot
				Meas.	Rated		Meas.	Rated	
Body Back (10mm)	782	10	1RB	21.18	21.4	1.052	0.801	**0.84**	**56#**
	782	10	50%RB	20.89	21.4	1.125	0.692	0.78	57#
Body Front (10mm)	782	10	1RB	21.18	21.4	1.052	0.405	0.43	58#
	782	10	50%RB	20.89	21.4	1.125	0.322	0.36	59#
Body Left (10mm)	782	10	1RB	21.18	21.4	1.052	0.341	0.36	60#
	782	10	50%RB	20.89	21.4	1.125	0.254	0.29	61#
Body Right (10mm)	782	10	1RB	21.18	21.4	1.052	0.207	0.22	62#
	782	10	50%RB	20.89	21.4	1.125	0.159	0.18	63#
Body Top (10mm)	782	10	1RB	21.18	21.4	1.052	0.136	0.14	64#
	782	10	50%RB	20.89	21.4	1.125	0.105	0.12	65#

FINAL

LTE Band 25：

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max Power (dBm)		Scaled Factor	1g SAR (W/kg)		Plot
				Meas.	Rated		Meas.	Rated	
Body Back (10mm)	1860	20	1RB	/	/	/	/	/	/
	1882.5	20	1RB	24.33	24.5	1.040	0.344	**0.36**	**66#**
	1905	20	1RB	/	/	/	/	/	/
	1882.5	20	50%RB	23.74	24.5	1.191	0.248	0.30	67#
Body Front (10mm)	1860	20	1RB	/	/	/	/	/	/
	1882.5	20	1RB	24.33	24.5	1.040	0.152	0.16	68#
	1905	20	1RB	/	/	/	/	/	/
	1882.5	20	50%RB	23.74	24.5	1.191	0.114	0.14	69#
Body Left (10mm)	1860	20	1RB	/	/	/	/	/	/
	1882.5	20	1RB	24.33	24.5	1.040	0.052	0.05	70#
	1905	20	1RB	/	/	/	/	/	/
	1882.5	20	50%RB	23.74	24.5	1.191	0.041	0.05	71#
Body Right (10mm)	1860	20	1RB	/	/	/	/	/	/
	1882.5	20	1RB	24.33	24.5	1.040	0.147	0.15	72#
	1905	20	1RB	/	/	/	/	/	/
	1882.5	20	50%RB	23.74	24.5	1.191	0.121	0.14	73#
Body Top (10mm)	1860	20	1RB	/	/	/	/	/	/
	1882.5	20	1RB	24.33	24.5	1.040	0.132	0.14	74#
	1905	20	1RB	/	/	/	/	/	/
	1882.5	20	50%RB	23.74	24.5	1.191	0.112	0.13	75#

LTE Band 40(2305-2315MHz):

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max Power (dBm)		Scaled Factor	1g SAR (W/kg)		Plot
				Meas.	Rated		Meas.	Rated	
Body Back (10mm)	2310	10	1RB	20.45	21.4	1.245	0.553	**0.69**	**76#**
	2310	10	50%RB	20.04	21.4	1.368	0.361	0.49	77#
Body Front (10mm)	2310	10	1RB	20.45	21.4	1.245	0.099	0.12	78#
	2310	10	50%RB	20.04	21.4	1.368	0.080	0.11	79#
Body Left (10mm)	2310	10	1RB	20.45	21.4	1.245	0.117	0.15	80#
	2310	10	50%RB	20.04	21.4	1.368	0.078	0.11	81#
Body Right (10mm)	2310	10	1RB	20.45	21.4	1.245	0.084	0.10	82#
	2310	10	50%RB	20.04	21.4	1.368	0.083	0.11	83#
Body Top (10mm)	2310	10	1RB	20.45	21.4	1.245	0.215	0.27	84#
	2310	10	50%RB	20.04	21.4	1.368	0.169	0.23	85#

LTE Band 40(2350-2360MHz):

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max Power (dBm)		Scaled Factor	1g SAR (W/kg)		Plot
				Meas.	Rated		Meas.	Rated	
Body Back (10mm)	2355	10	1RB	21.15	21.4	1.059	0.302	**0.32**	**86#**
	2355	10	50%RB	20.73	21.4	1.167	0.250	0.29	87#
Body Front (10mm)	2355	10	1RB	21.15	21.4	1.059	0.086	0.09	88#
	2355	10	50%RB	20.73	21.4	1.167	0.045	0.05	89#
Body Left (10mm)	2355	10	1RB	21.15	21.4	1.059	0.070	0.07	90#
	2355	10	50%RB	20.73	21.4	1.167	0.051	0.06	91#
Body Right (10mm)	2355	10	1RB	21.15	21.4	1.059	0.071	0.08	92#
	2355	10	50%RB	20.73	21.4	1.167	0.051	0.06	93#
Body Top (10mm)	2355	10	1RB	21.15	21.4	1.059	0.185	0.20	94#
	2355	10	50%RB	20.73	21.4	1.167	0.133	0.16	95#

Note:

1. When the 1-g SAR is ≤ 0.8W/Kg, testing for other channels are optional.
2. SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02.
3. KDB941225D05-SAR for higher order modulation is required only when the highest maximum output power for the configuration in the higher order modulation is > 0.5 dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg
4. KDB941225D05-For QPSK with 100% RB allocation, when the reported SAR measured for the Highest output power channel is <1.45 W/kg, tests for the remaining required test channels are optional.
5.KDB941225D05- For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg.
6. KDB941225D05- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offset the upper edge, middle and lower edge of each required test channel.
7. KDB941225D05- other channel bandwidths SAR test is required when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > 0.5 dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.
8. Worst case SAR for 50% RB allocation is selected to be tested.

REPORT

WLAN 2.4G Chain 0:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg)			
					Scaled Factor	Meas. SAR	Scaled SAR	Plot
Body Back (10mm)	2412	802.11b	/	/	/	/	/	/
	2437	802.11b	16.04	16.3	1.062	0.275	**0.29**	**96#**
	2462	802.11b	/	/	/	/	/	/
Body Front (10mm)	2412	802.11b	/	/	/	/	/	/
	2437	802.11b	16.04	16.3	1.062	0.237	0.25	97#
	2462	802.11b	/	/	/	/	/	/
Body Left (10mm)	2412	802.11b	/	/	/	/	/	/
	2437	802.11b	16.04	16.3	1.062	0.266	0.28	98#
	2462	802.11b	/	/	/	/	/	/
Body Bottom (10mm)	2412	802.11b	/	/	/	/	/	/
	2437	802.11b	16.04	16.3	1.062	0.055	0.06	99#
	2462	802.11b	/	/	/	/	/	/

WLAN 2.4G Chain 1:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg)			
					Scaled Factor	Meas. SAR	Scaled SAR	Plot
Body Back (10mm)	2412	802.11b	/	/	/	/	/	/
	2437	802.11b	8.24	8.3	1.014	0.111	0.11	100#
	2462	802.11b	/	/	/	/	/	/
Body Front (10mm)	2412	802.11b	/	/	/	/	/	/
	2437	802.11b	8.24	8.3	1.014	0.133	0.13	101#
	2462	802.11b	/	/	/	/	/	/
Body Left (10mm)	2412	802.11b	/	/	/	/	/	/
	2437	802.11b	8.24	8.3	1.014	0.070	0.07	102#
	2462	802.11b	/	/	/	/	/	/

Note:

1. When the 1-g SAR is≤ 0.8W/kg, testing for other channels are optional.
2. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.
3. KDB 248227 D01-SAR measurement is not required for 2.4 GHz OFDM(801.11g/n) when the highest reported SAR for DSSS(802.11b) is ≤ 1.2 W/kg, and the output power for DSSS is not less than that for OFDM.

FINAL

SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Note: The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

The Highest Measured SAR Configuration in Each Frequency Band

Body

SAR probe calibration point	Frequency Band	Freq.(MHz)	EUT Position	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio
				Original	Repeated	
750MHz (650~850MHz)	LTE Band 12 (Model: M7)	711	Body Back	1.11	1.08	**1.03**
750MHz (650~850MHz)	LTE Band 12 (Model: M7P)	711	Body Back	0.937	0.929	1.01

Note:

1. Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.
2. The measured SAR results **do not** have to be scaled to the maximum tune-up tolerance to determine if repeated measurements are required.
3. SAR measurement variability must be assessed for each frequency band, which is determined by the **SAR probe calibration point and tissue-equivalent medium** used for the device measurements..

FINAL

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

Simultaneous Transmission:

Description of Simultaneous Transmit Capabilities		
Transmitter Combination	**Simultaneous?**	**Hotspot?**
WLAN 2.4G Chain 0+WLAN 2.4G Chain 1	√	×
WWAN(LTE)+WLAN 2.4G Chain 0	√	√
WWAN(LTE)+WLAN 2.4G Chain 1	√	√
WWAN(LTE)+WLAN 2.4G Chain 0+WLAN 2.4G Chain 1	√	√

Simultaneous and Hotspot SAR test exclusion considerations:

Worst case:

Mode(SAR1+SAR2+SAR3)	Position	Reported SAR(W/kg)			ΣSAR ≤ 1.6W/kg
		SAR1	SAR2	SAR3	
LTE Band 2+ WLAN 2.4G Chain 0+ WLAN 2.4G Chain 1 (Hotspot)	Body Back	0.41	0.29	0.11	0.81
	Body Front	0.19	0.25	0.13	0.57
	Body Left	0.05	0.28	0.07	0.4
	Body Right	0.14	NA	NA	NA
	Body Top	0.15	NA	NA	NA
	Body Bottom	NA	0.06	NA	NA
LTE Band 4+ WLAN 2.4G Chain 0+ WLAN 2.4G Chain 1 (Hotspot)	Body Back	0.51	0.29	0.11	0.91
	Body Front	0.08	0.25	0.13	0.46
	Body Left	0.07	0.28	0.07	0.42
	Body Right	0.12	NA	NA	NA
	Body Top	0.23	NA	NA	NA
	Body Bottom	NA	0.06	NA	NA
LTE Band 5+ WLAN 2.4G Chain 0+ WLAN 2.4G Chain 1 (Hotspot)	Body Back	1.01	0.29	0.11	1.41
	Body Front	0.54	0.25	0.13	0.92
	Body Left	0.30	0.28	0.07	0.65
	Body Right	0.30	NA	NA	NA
	Body Top	0.16	NA	NA	NA
	Body Bottom	NA	0.06	NA	NA
LTE Band 7+ WLAN 2.4G Chain 0+ WLAN 2.4G Chain 1 (Hotspot)	Body Back	0.66	0.29	0.11	1.06
	Body Front	0.10	0.25	0.13	0.48
	Body Left	0.05	0.28	0.07	0.40
	Body Right	0.10	NA	NA	NA
	Body Top	0.16	NA	NA	NA
	Body Bottom	NA	0.06	NA	NA
LTE Band 12+ WLAN 2.4G Chain 0+ WLAN 2.4G Chain 1 (Hotspot)	Body Back	1.14	0.29	0.11	**1.54**
	Body Front	0.39	0.25	0.13	0.77
	Body Left	0.30	0.28	0.07	0.65
	Body Right	0.25	NA	NA	NA
	Body Top	0.13	NA	NA	NA
	Body Bottom	NA	0.06	NA	NA

FCC

Mode(SAR1+SAR2+SAR3)	Position	Reported SAR(W/kg)			ΣSAR ≤ 1.6W/kg
		SAR1	SAR2	SAR3	
LTE Band 13+ WLAN 2.4G Chain 0+ WLAN 2.4G Chain 1 (Hotspot)	Body Back	0.84	0.29	0.11	1.24
	Body Front	0.43	0.25	0.13	0.81
	Body Left	0.36	0.28	0.07	0.71
	Body Right	0.22	NA	NA	NA
	Body Top	0.14	NA	NA	NA
	Body Bottom	NA	0.06	NA	NA
LTE Band 25+ WLAN 2.4G Chain 0+ WLAN 2.4G Chain 1 (Hotspot)	Body Back	0.36	0.29	0.11	0.76
	Body Front	0.16	0.25	0.13	0.54
	Body Left	0.05	0.28	0.07	0.4
	Body Right	0.15	NA	NA	NA
	Body Top	0.14	NA	NA	NA
	Body Bottom	NA	0.06	NA	NA
LTE Band 40+ WLAN 2.4G Chain 0+ WLAN 2.4G Chain 1 (Hotspot)	Body Back	0.69	0.29	0.11	1.09
	Body Front	0.12	0.25	0.13	0.5
	Body Left	0.15	0.28	0.07	0.5
	Body Right	0.11	NA	NA	NA
	Body Top	0.27	NA	NA	NA
	Body Bottom	NA	0.06	NA	NA

Note:

1. Hotspot mode SAR is measured for all edges and surfaces of the device with a transmitting antenna located within 25 mm from that surface or edge; for the data modes, wireless technologies and frequency bands supporting hotspot mode.

Conclusion:

Sum of SAR: **ΣSAR ≤ 1.6 W/kg** therefore simultaneous transmission SAR with Volume Scans is **not required**.

FINAL

SAR Plots

Please Refer to the Attachment.

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APPENDIX A MEASUREMENT UNCERTAINTY

The uncertainty budget has been determined for the measurement system and is given in the following Table.

Measurement uncertainty evaluation for IEEE1528-2013 SAR test

Source of uncertainty	Tolerance/ uncertainty ± %	Probability distribution	Divisor	ci (1 g)	ci (10 g)	Standard uncertainty ± %, (1 g)	Standard uncertainty ± %, (10 g)
Measurement system							
Probe calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7
Hemispherical Isotropy	9.6	R	√3	0	0	0.0	0.0
Boundary effect	1.0	R	√3	1	1	0.6	0.6
Linearity	4.7	R	√3	1	1	2.7	2.7
Detection limits	1.0	R	√3	1	1	0.6	0.6
Readout electronics	0.3	N	1	1	1	0.3	0.3
Response time	0.0	R	√3	1	1	0.0	0.0
Integration time	0.0	R	√3	1	1	0.0	0.0
RF ambient conditions – noise	1.0	R	√3	1	1	0.6	0.6
RF ambient conditions–reflections	1.0	R	√3	1	1	0.6	0.6
Probe positioner mech. Restrictions	0.8	R	√3	1	1	0.5	0.5
Probe positioning with respect to phantom shell	6.7	R	√3	1	1	3.9	3.9
Post-processing	2.0	R	√3	1	1	1.2	1.2
Test sample related							
Test sample positioning	2.8	N	1	1	1	2.8	2.8
Device holder uncertainty	6.3	N	1	1	1	6.3	6.3
Drift of output power	5.0	R	√3	1	1	2.9	2.9
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	4.0	R	√3	1	1	2.3	2.3
Liquid conductivity target)	5.0	R	√3	0.64	0.43	1.8	1.2
Liquid conductivity meas.)	2.5	N	1	0.64	0.43	1.6	1.1
Liquid permittivity target)	5.0	R	√3	0.6	0.49	1.7	1.4
Liquid permittivity meas.)	2.5	N	1	0.6	0.49	1.5	1.2
Combined standard uncertainty		RSS				12.2	12.0
Expanded uncertainty 95 % confidence interval)						24.3	23.9

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Measurement uncertainty evaluation for IEC62209-2 SAR test

Source of uncertainty	Tolerance/ uncertainty ± %	Probability distribution	Divisor	ci (1 g)	ci (10 g)	Standard uncertainty ± %, (1 g)	Standard uncertainty ± %, (10 g)
Measurement system							
Probe calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7
Hemispherical Isotropy	9.6	R	√3	0	0	0.0	0.0
Linearity	4.7	R	√3	1	1	2.7	2.7
Modulation Response	0.0	R	√3	1	1	0.0	0.0
Detection limits	1.0	R	√3	1	1	0.6	0.6
Boundary effect	1.0	R	√3	1	1	0.6	0.6
Readout electronics	0.3	N	1	1	1	0.3	0.3
Response time	0.0	R	√3	1	1	0.0	0.0
Integration time	0.0	R	√3	1	1	0.0	0.0
RF ambient conditions – noise	1.0	R	√3	1	1	0.6	0.6
RF ambient conditions–reflections	1.0	R	√3	1	1	0.6	0.6
Probe positioner mech. Restrictions	0.8	R	√3	1	1	0.5	0.5
Probe positioning with respect to phantom shell	6.7	R	√3	1	1	3.9	3.9
Post-processing	2.0	R	√3	1	1	1.2	1.2
Test sample related							
Device holder Uncertainty	6.3	N	1	1	1	6.3	6.3
Test sample positioning	2.8	N	1	1	1	2.8	2.8
Power scaling	4.5	R	√3	1	1	2.6	2.6
Drift of output power	5.0	R	√3	1	1	2.9	2.9
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	4.0	R	√3	1	1	2.3	2.3
Algorithm for correcting SAR for deviations in permittivity and conductivity	1.9	N	1	1	0.84	1.1	0.9
Liquid conductivity (meas.)	2.5	N	1	0.64	0.43	1.6	1.1
Liquid permittivity (meas.)	2.5	N	1	0.6	0.49	1.5	1.2
Temp. unc. - Conductivity	1.7	R	√3	0.78	0.71	0.8	0.7
Temp. unc. - Permittivity	0.3	R	√3	0.23	0.26	0.0	0.0
Combined standard uncertainty		RSS				12.2	12.1
Expanded uncertainty 95 % confidence interval)						24.5	24.2

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APPENDIX B EUT TEST POSITION PHOTOS

Please Refer to the Attachment.

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APPENDIX C CALIBRATION CERTIFICATES

Please Refer to the Attachment.

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Declarations

1. BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "△". Customer model name, addresses, names, trademarks etc. are not considered data.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of the Company.
6. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.
7. This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA, or any agency of the U.S. Government.
8. This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk "★".

******* END OF REPORT *******

FINAL

TCB

GRANT OF EQUIPMENT AUTHORIZATION

TCB

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

Bay Area Compliance Laboratory Corp.
1274 Anvilwood Avenue
Sunnyvale, CA 94089

Date of Grant: 05/31/2020

Application Dated: 05/31/2020

Shenzhen Lilian Communication Technology Co., Ltd.

Room1207BiwanbuildingXixiangSubdistrictBaoan

Shenzhen,
China

Attention: xianghui zhou

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: 2AV8R-67
Name of Grantee: Shenzhen Lilian Communication Technology Co., Ltd.
Equipment Class: **Digital Transmission System**
Notes: **4G LTE Mobile Wi-Fi**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
MO	15C	2412.0 - 2462.0	0.14		

Output power listed is conducted. SAR compliance for body-worn operating conditions is restricted to belt clips, holsters or similar accessories that have no metallic component in the assembly and must provide a minimum separation distance of 10 mm between the device and the body. End-users must be informed of the body-worn operating requirements for satisfying RF exposure compliance. The highest reported SAR for body-worn accessory, and simultaneous transmission exposure conditions are 0.29 W/kg, and 1.54 W/kg respectively. This device supports 20 MHz and 40 MHz bandwidth modes.

MO: This Multiple Input Multiple Output (MIMO) device was evaluated for multiple transmitted signals as indicated in the filing.

TCB

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China

Attention: xianghui zhou

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: 2AV8R-67
Name of Grantee: Shenzhen Lilian Communication Technology Co., Ltd.
Equipment Class: PCS Licensed Transmitter
Notes: 4G LTE Mobile Wi-Fi

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	24E	1850.7 - 1909.3	0.356	2.5 PM	1M10G7D
	24E	1850.7 - 1909.3	0.266	2.5 PM	1M10D7W
	24E	1860.0 - 1900.0	0.344	2.5 PM	18M0G7D
	24E	1860.0 - 1900.0	0.283	2.5 PM	18M0D7W
	27	1710.7 - 1754.3	0.224	2.5 PM	1M10G7D
	27	1710.7 - 1754.3	0.168	2.5 PM	1M10D7W
	27	1720.0 - 1745.0	0.217	2.5 PM	18M0G7D
	27	1720.0 - 1745.0	0.179	2.5 PM	17M9D7W
	22H	824.7 - 848.3	0.227	2.5 PM	1M60G7D
	22H	824.7 - 848.3	0.186	2.5 PM	1M49D7W
	22H	829.0 - 844.0	0.151	2.5 PM	8M92G7D
	22H	829.0 - 844.0	0.116	2.5 PM	8M88D7W
	27	2510.0 - 2560.0	0.23	2.5 PM	18M0G7D
	27	2510.0 - 2560.0	0.19	2.5 PM	17M9D7W
	27	699.7 - 715.3	0.045	2.5 PM	1M11G7D

27	699.7 - 715.3	0.051	2.5	PM	1M10D7W
27	704.0 - 711.0	0.024	2.5	PM	8M88G7D
27	704.0 - 711.0	0.034	2.5	PM	8M84D7W
27	779.5 - 784.5	0.047	2.5	PM	4M50G7D
27	779.5 - 784.5	0.047	2.5	PM	4M54D7W
27	782.0 - 782.0	0.039	2.5	PM	8M96G7D
27	782.0 - 782.0	0.036	2.5	PM	8M96D7W
24E	1860.0 - 1905.0	0.228	2.5	PM	18M0G7D
24E	1860.0 - 1905.0	0.184	2.5	PM	18M0D7W
27	2307.5 - 2312.5	0.123	2.5	PM	4M52G7D
27	2307.5 - 2312.5	0.134	2.5	PM	4M52D7W
27	2310.0 - 2310.0	0.12	2.5	PM	8M96G7D
27	2310.0 - 2310.0	0.124	2.5	PM	8M92D7W
27	2352.5 - 2357.5	0.093	2.5	PM	4M52G7D
27	2352.5 - 2357.5	0.089	2.5	PM	4M52D7W
27	2355.0 - 2355.0	0.086	2.5	PM	8M96G7D
27	2355.0 - 2355.0	0.09	2.5	PM	8M96D7W

Output power listed is ERP for operation below 1 GHz and EIRP for operation above 1 GHz. LTE supports 1.4/3/5/10/15/20 MHz BW modes in Band 2/4/25, 5/10/15/20 MHz BW modes in Band 7, 5/10 MHz BW modes in Band 13/40, and 1.4/3/5/10 MHz BW modes in Band 5/12. The antenna(s) used for this transmitter must not be co-located with any other transmitters, except in accordance with FCC multi-transmitter product procedures. SAR compliance for body-worn operating conditions is restricted to belt clips, holsters or similar accessories that have no metallic component in the assembly and must provide a minimum separation distance of 10 mm between the device and the body. End-users must be informed of the body-worn operating requirements for satisfying RF exposure compliance. The highest reported SAR for body-worn accessory, product specific, and simultaneous transmission exposure conditions are 1.14 W/kg, 1.54 W/kg, and 1.54 W/kg, respectively.

This device contains functions that are not operational in U.S Territories. This filing is only applicable for US operations.



RADIO TEST REPORT

For

Shenzhen Gokodo Technology Co., Ltd

4G Mobile Router

Test Model: M6

List Model No.: M7,M6XX,M7XX

Prepared for	:	Shenzhen Gokodo Technology Co., Ltd
Address	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street, Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	October 11, 2018
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	October 11, 2018~ November 08, 2018
Date of Report	:	November 13, 2018

CE

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RADIO TEST REPORT
ETSI EN 301 511 V12.5.1 (2017-03)

Global System for Mobile communications (GSM); Mobile Stations (MS) equipment; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Report Reference No.	:	**LCS181011006AED**
Date of Issue	:	November 13, 2018
Testing Laboratory Name	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	:	**Shenzhen Gokodo Technology Co., Ltd**
Address	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street, Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Test Specification		
Standard	:	ETSI EN 301 511 V12.5.1 (2017-03)
Test Report Form No	:	LCSEMC-1.0
TRF Originator	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2017-06

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Test Item Description	:	4G Mobile Router
Trade Mark	:	Gokodo/QLink
Test Model	:	M6
Ratings	:	DC 3.7V by Li-ion battery(2000mAh) Recharged by DC 5V/1A by adapter
Result	:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Peter Xiao	Calvin Weng	
Peter Xiao / Administrators	Calvin Weng/Technique principal	Gavin Liang / Manager

RADIO -- TEST REPORT

Test Report No. : LCS181011006AED	November 13, 2018 Date of issue

Test Model.....	:	M6
EUT.....	:	4G Mobile Router
Applicant.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/
Factory.....	**:**	**Shenzhen Gokodo Technology Co., Ltd**
Address.....	:	Central Road B Block 13G,Baoyuan Road,Xixiang Street,Baoan Dist.,Shenzhen,Guangdong, China (Mainland)
Telephone.....	:	/
Fax.....	:	/

Test Result	Positive

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	November 13, 2018	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	4G Mobile Router
Test Model	:	M6
Additional Model No.	:	M7,M6XX,M7XX
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Power Supply	:	DC 3.7V by Li-ion battery(2000mAh) Recharged by DC 5V/1A by adapter
Hardware Version	:	M6_V1.1
Software Version	:	M6VD_V1.1
2G	:	
Support Band	:	☒GSM 900 (EU-Band) ☒DCS 1800 (EU-Band) ☒GSM 850 (U.S.-Band) ☒PCS 1900 (U.S.-Band)
Release Version	:	R99
GPRS Class	:	Class 12
EGPRS Class	:	Class 12
Uplink	:	GSM 900: 880MHz ~ 915MHz DCS 1800: 1710MHz ~ 1785MHz
Downlink	:	GSM 900: 925MHz ~ 960MHz DCS 1800: 1805MHz ~ 1880MHz
Type Of Modulation	:	GMSK for GPRS, GMSK/8PSK for EGPRS
Antenna Description	:	PIFA Antenna; 900MHz:-0.72dBi(Max.) , 900MHz :-1.23dBi(Max.)
Power Class	:	GSM 900: Class 4, DCS 1800: Class 1
3G	:	
Support Band	:	☐WCDMA Band II (U.S.-Band) ☐WCDMA Band V (U.S.-Band) ☒WCDMA Band I (EU-Band) ☒WCDMA Band VIII (EU-Band)
Release Version	:	R99
Uplink	:	WCDMA Band I: 1920MHz ~ 1980MHz WCDMA Band VIII: 880MHz~915MHz
Downlink	:	WCDMA Band I: 2110MHz ~ 2170MHz WCDMA Band VIII: 925MHz~960MHz
Type Of Modulation	:	WCDMA: QPSK; HSDPA/HSUPA: QPSK
Antenna Description	:	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 8:-0.72dBi(Max.)
Power Class	:	Class 3
LTE	:	
Support Band	:	☒E-UTRA Band 1(EU-Band) ☒E-UTRA Band 3(EU-Band) ☒E-UTRA Band 7(EU-Band) ☒E-UTRA Band 8(EU-Band)

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		☒E-UTRA Band 20(EU-Band) ☒E-UTRA Band 38(EU-Band) ☒E-UTRA Band 40(EU-Band)
LTE Release Version	:	R4
Uplink	:	E-UTRA Band 1: 1920MHz ~ 1980MHz E-UTRA Band 3: 1710MHz~1785MHz E-UTRA Band 7: 2500MHz ~ 2570MHz E-UTRA Band 8: 880MHz~915MHz E-UTRA Band 20: 832MHz ~ 862MHz E-UTRA Band 38: 2570MHz ~ 2620MHz E-UTRA Band 40: 2300MHz~2400MHz
Downlink	:	E-UTRA Band 1: 2110MHz ~ 2170MHz E-UTRA Band 3: 1805MHz~1880MHz E-UTRA Band 7: 2620MHz~2690MHz E-UTRA Band 8: 926MHz~960MHz E-UTRA Band 20: 791MHz~821MHz E-UTRA Band 38: 2570MHz ~ 2620MHz E-UTRA Band 40: 2300MHz~2400MHz
Type Of Modulation	:	QPSK/16-QAM
Antenna Description	:	PIFA Antenna; Band 1:-0.78dBi(Max.),Band 3:-1.37dBi(Max.), Band 7:-0.27dBi(Max.),Band 8:-0.72dBi(Max.) , Band 20:-0.67dBi(Max.) ,Band 38:-0.22dBi(Max.) , Band 40:-0.25dBi(Max.)
Power Class	:	Class 3
WIFI(2.4G Band)	:	
Frequency Range	:	2412-2472MHz
Channel Spacing	:	5MHz
Channel Number	:	13 Channel for 20MHz bandwidth(2412~2472MHz) 9 channels for 40MHz bandwidth(2422~2462MHz)
Modulation Type	:	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	:	Two same PIFA Antenna; ANT1 used for WIFI, -0.52dBi(Max.); ANT2 used for WIFI, -0.52dBi(Max.);

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1.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
Shenzhen Gokodo Technology Co., Ltd	Adapter	KS15004R	---	CE

Products are sold without adapters

1.3. External I/O

I/O Port Description	Quantity	Cable
Charging port	1	0.2 m, unshielded cable

1.4. Objective

Standard Referenced	Standard Title	Standard Version
ETSI EN 301 511	Global System for Mobile communications (GSM); Mobile Stations (MS) equipment; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU	V12.5.1 (2017-03)
ETSI TS 151 010-1	Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (3GPP TS 51.010-1 version 12.8.0 Release 12)	V12.8.0 (2016-05)

The objective is to determine compliance with ETSI EN 301 511 V12.5.1 (2017-03).

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1.5. Test Conditions

Conditions	Temperature	Voltage
Normal	21-25℃	DC 3.70V
Low extreme Temperature/Low extreme Voltage (TL/VL);	-20℃	DC 3.30V
Low extreme Temperature/High extreme Voltage (TL/VH);	-20℃	DC 4.20V
High extreme Temperature/Low extreme Voltage (TH/VL);	+55℃	DC 3.30V
High extreme Temperature/High extreme Voltage (TH/VH).	+55℃	DC 4.20V
Note1: For all conditions, the humidity range is:40-75%, the pressure range is 86-106kPa. The High Voltage DC 4.20V and Low Voltage DC 3.30V was declared by manufacturer		

1.6. Description Of Test Mode

During all testing, EUT is in link mode with base station emulator at maximum power level in each test mode and channel as below:

Mode	Channel	Frequency(MHz)
GSM 900	975	880.2
	37	897.4
	124	914.8

Mode	Channel	Frequency(MHz)
DCS 1800	512	1710.2
	698	1747.4
	885	1784.8

Operating modes of EUT during test	
Traffic Mode	A communication link is set up with a System Simulator (ss). The Absolute Radio Frequency Channel Number is allocated to the lowest, middle and highest channel during the test for all working frequency bands. The EUT is commanded to operate at maximum transmitting power. A call has been established.
Idle Mode	The EUT is synchronized to SS, and able to respond to paging messages and incoming call. An established call has been released.

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1.7. List Of Measuring Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	X-series USB Peak and Average Power Sensor Aglient	Agilent	U2021XA	MY54080022	2018-10-25	2019-10-24
2	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2018-10-25	2019-10-24
3	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
4	RF Control Unit	Ascentest	AT890-RFB	N/A	2018-06-16	2019-06-15
5	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2017-11-17	2018-11-16
6	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2018-06-16	2019-06-15
7	SPECTRUM ANALYZER	R&S	FSP	100503	2018-06-16	2019-06-15
8	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2017-11-17	2018-11-16
9	ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY42081396	2017-11-17	2018-11-16
10	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2017-11-17	2018-11-16
11	Universal Radio Communication Tester	R&S	CMU 200	105788	2018-06-16	2019-06-15
12	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2018-06-16	2019-06-15
13	RF Control Unit	Tonscend	JS0806-1	N/A	2018-06-16	2019-06-15
14	DC Power Supply	Agilent	E3642A	N/A	2017-11-17	2018-11-16
15	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
16	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2018-10-10	2019-10-09
17	DC Source	CHROMA	62012P-80-60	34782951	2018-10-10	2019-10-09
18	RF Filter	Micro-Tronics	BRC50718	S/N-017	2018-06-16	2019-06-15
19	RF Filter	Micro-Tronics	BRC50719	S/N-011	2018-06-16	2019-06-15
20	RF Filter	Micro-Tronics	BRC50720	S/N-011	2018-06-16	2019-06-15
21	RF Filter	Micro-Tronics	BRC50721	S/N-013	2018-06-16	2019-06-15
22	RF Filter	Micro-Tronics	BRM50702	S/N-195	2018-06-16	2019-06-15
23	Splitter/Combiner	Micro-Tronics	PS2-15	CB11-20	2018-06-16	2019-06-15
24	Splitter/Combiner	Micro-Tronics	CB11-20	N/A	2018-06-16	2019-06-15
25	Attenuator	Micro-Tronics	PAS-8-10	S/N23466	2018-06-16	2019-06-15
26	Exposure Level Tester	Narda	ELT-400	N-0713	2018-04-02	2019-04-01
27	B-Field Probe	Narda	ELT-400	M-1154	2018-04-10	2019-04-09
28	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
29	Positioning Controller	MF	MF-7082	/	2018-06-16	2019-06-15
30	EMI Test Software	AUDIX	E3	N/A	2018-06-16	2019-06-15
31	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
32	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2017-11-17	2018-11-16
33	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-06-22	2019-06-21
34	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-05-01	2019-04-30
35	Horn Antenna	EMCO	3115	6741	2018-06-22	2019-06-21
36	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
37	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
38	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
39	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15
40	TEST RECEIVER	R&S	ESCI	101142	2018-06-16	2019-06-15
41	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	2018-06-16	2019-06-15
42	10dB Attenuator	SCHWARZBECK	MTS-IMP136	261115-001-0032	2018-06-16	2019-06-15
43	Artificial Mains	R&S	ENV216	101288	2018-06-16	2019-06-15
44	Power Analyzer Test System	Voltech	PM6000	20000670053	2018-06-16	2019-06-15

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45	ESD Simulator	SCHLODER	SESD 230	604035	2018-06-16	2019-06-15
46	RF POWER AMPLIFIER	OPHIR	5225R	1052	2018-03-21	2019-03-20
47	RF POWER AMPLIFIER	OPHIR	5273F	1019	2018-03-23	2019-03-25
48	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2018-04-27	2019-04-26
49	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-482	2018-04-27	2019-04-26
50	Electric field probe	Narda S.TS./PMM	EP601	611WX80208	2018-03-26	2019-03-25
51	Power Meter	Agilent	E4419B	MY45104493	2018-06-16	2019-06-15
52	Power Sensor	Agilent	E9301H	MY41495234	2018-06-16	2019-06-15
53	Power Sensor	Agilent	E4412A	MY41500229	2018-06-16	2019-06-15
54	Sound Level meter	BK Precision	735	73500873100	2018-06-16	2019-06-15
55	Audio Analyzer	R&S	UPV	1146.2003K0	2018-06-16	2019-06-15
56	Mouse Simulation	Bruel & Kjaer	4227	A0304216	2018-06-16	2019-06-15
57	Ear Simulation and supply	Bruel & Kjaer	2669.4182.5935	A0305284	2018-06-16	2019-06-15
58	Acoustical Calibrators	Bruel & Kjaer	4231	A0304215	2018-06-16	2019-06-15
59	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2017-11-17	2018-11-16
60	Simulator	FRANKONIA	CIT-10	A126A1195	2018-06-16	2019-06-15
61	CDN	FRANKONIA	CDN-M2	5100100100	2018-06-16	2019-06-15
62	CDN	FRANKONIA	CDN-M3	0900-11	2018-06-16	2019-06-15
63	Attenuator	FRANKONIA	ATT6	0010222A	2018-06-16	2019-06-15
64	Infuse tongs	EM TEST	EM-Clamp	0513A031201	2018-06-16	2019-06-15
65	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2018-06-16	2019-06-15
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

1.8. Measurement Uncertainty (95% confidence levels, k=2)

Test Item		Uncertainty
Radio Frequency	:	0.9×10^{-4}
Total RF Power, Conducted	:	1.0 dB
RF Power Density, Conducted	:	1.8 dB
Spurious Emissions, Conducted	:	1.8 dB
All Emissions, Radiated	:	3.1 dB
Temperature	:	0.5°C
Humidity	:	1 %
DC And Low Frequency Voltages	:	1 %

1.9. Description of Test Facility

FCC Registration Number. is 254912.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001
NVLAP Registration Code is 600167-0

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2. SYSTEM TEST CONFIGURATION

2.1. Justification

N/A

2.2. EUT Exercise Software

N/A

2.3. Special Accessories

The special accessories were supplied by Shenzhen LCS Compliance Testing Laboratory Ltd.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Test Setup

Please refer to the test setup photo.

3. SUMMARY OF TEST RESULTS

Reference Clause No. (ETSI TS 151 010-1)	Reference Clause No. (ETSI EN 301 511)	Description of Test Items	GSM 900	DCS 1800
			Result	Result
13.1	4.2.1	Transmitter - Frequency error and phase error		
		Normal	Pass	Pass
		TL/VL	Pass	Pass
		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass
		Vibration X-axis	Pass	Pass
		Vibration Y-axis	Pass	Pass
		Vibration Z-axis	Pass	Pass
13.2	4.2.2	Transmitter - Frequency error under multipath and interference conditions		
		Normal	Pass	Pass
		TL/VL	Pass	Pass
		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass
13.16.1	4.2.4	Frequency error and phase error in GPRS multislot configuration		
		Normal	Pass	Pass
		TL/VL	Pass	Pass
		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass
		Vibration X-axis	Pass	Pass
		Vibration Y-axis	Pass	Pass
		Vibration Z-axis	Pass	Pass
13.3	4.2.5	Transmitter output power and burst timing		
		Normal	Pass	Pass
		TL/VL	Pass	Pass
		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass
13.4	4.2.6	Transmitter - Output RF spectrum		
		Normal	Pass	Pass
		TL/VL	Pass	Pass
		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass
13.16.2	4.2.10	Transmitter output power in GPRS multislot configuration		
		Normal	Pass	Pass
		TL/VL	Pass	Pass
		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass

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13.16.3	4.2.11	Output RF spectrum in GPRS multislot configuration		
		Normal	Pass	Pass
		TL/VL	Pass	Pass
		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass
12.1.1	4.2.12	Conducted spurious emissions - MS allocated a channel		
		Normal	Pass	Pass
		TN/VL	Pass	Pass
		TN/VH	Pass	Pass
12.1.2	4.2.13	Conducted spurious emissions - MS in idle mode		
		Normal	Pass	Pass
		TN/VL	Pass	Pass
		TN/VH	Pass	Pass
12.2.1	4.2.16	Radiated spurious emissions - MS allocated a channel		
		Normal	Pass	Pass
		TN/VL	Pass	Pass
		TN/VH	Pass	Pass
12.2.2	4.2.17	Radiated spurious emissions - MS in idle mode		
		Normal	Pass	Pass
		TN/VL	Pass	Pass
		TN/VH	Pass	Pass
14.7.1	4.2.20	Receiver Blocking and spurious response - speech channels		
		Normal	Pass	Pass
13.17.1	4.2.26	Frequency error and Modulation accuracy in EGPRS Configuration		
		Normal	Pass	Pass
		TL/VL	Pass	Pass
		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass
13.17.2	4.2.27	Frequency error under multipath and interference conditions in EGPRS Configuration		
		Normal	Pass	Pass
		TL/VL	Pass	Pass
		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass
13.17.3	4.2.28	EGPRS Transmitter output power		
		Normal	Pass	Pass
		TL/VL	Pass	Pass
		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass
13.17.4	4.2.29	Output RF spectrum in EGPRS configuration		
		Normal	Pass	Pass
		TL/VL	Pass	Pass

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		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass
14.18.5	4.2.30	Blocking and spurious response in EGPRS configuration		
		Normal	Pass	Pass
14.6.1	4.2.32	Intermodulation rejection - speech channels		
		Normal	Pass	Pass
14.6.2	4.2.33	Intermodulation rejection - control channels		
		Normal	N/A	N/A
14.18.4	4.2.34	Intermodulation rejection - EGPRS		
		Normal	Pass	Pass
14.8.1	4.2.35	AM suppression - speech channels		
		Normal	Pass	Pass
14.8.1	4.2.36	AM suppression - control channels		
		Normal	N/A	N/A
14.8.3	4.2.37	AM suppression - packet channels		
		Normal	Pass	Pass
14.5.1.1	4.2.38	Adjacent channel rejection - speech channels (TCH/FS)		
		Normal	Pass	Pass
14.5.2	4.2.39	Adjacent channel rejection - control channels		
		Normal	N/A	N/A
14.18.3	4.2.40	Adjacent channel rejection - EGPRS		
		Normal	Pass	Pass
14.2.1	4.2.42	Reference sensitivity - TCH/FS		
		Normal	Pass	Pass
14.2.3	4.2.43	Reference sensitivity - FACCH/F		
		Normal	Pass	Pass
14.16.1	4.2.44	Minimum Input level for Reference Performance - GPRS		
		Normal	Pass	Pass
		TL/VL	Pass	Pass
		TL/VH	Pass	Pass
		TH/VL	Pass	Pass
		TH/VH	Pass	Pass
14.18.1	4.2.45	Minimum Input level for Reference Performance - EGPRS		
		Normal	Pass	Pass
		TL/VL (for MCS 4 only)	Pass	Pass
		TL/VH (for MCS 4 only)	Pass	Pass
		H/VL (for MCS 4 only)	Pass	Pass
		TH/VH (for MCS 4 only)	Pass	Pass

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***Note:

Result: Describes test result of Test Case.

Pass: Test Case passed on specified conformance test platform.

Normal(TN/VN): Normal temperature – 25℃; Normal voltage. – DC 3.70V

TH: High extreme Temperature – +55℃

VH: High extreme Voltage – DC 4.20V

TL: Low extreme Temperature – -20℃

VL: Low extreme Voltage – DC 3.30V

Vibration X-axis/ Y-axis/ Z-axis: Vibration test condition for X/Y/Z axis.

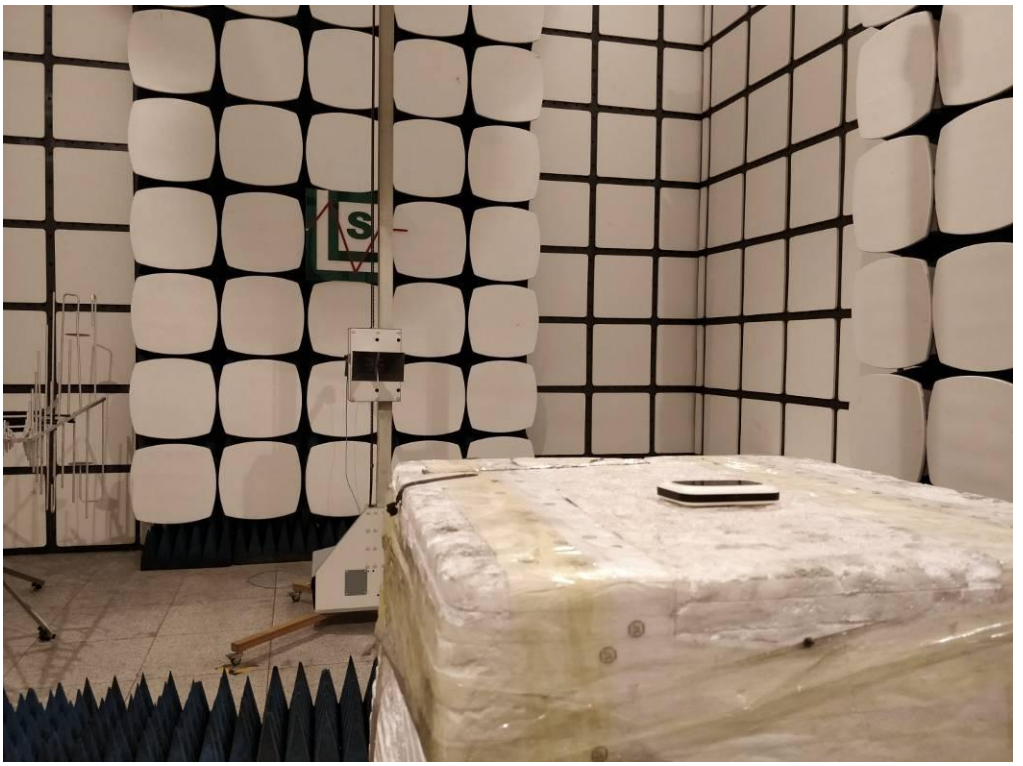
N/A: Not applicable.

—: Not test.

4. PHOTOGRAPHS OF TEST SETUP



Spurious Emission below 1GHz



Spurious Emission above 1GHz

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Annex A

Transmitter output power and burst timing(Worst Case)

Mode: GPRS 900 , Low channel CH 975:880.2MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
5	32.19	32.25	32.17	32.22	32.16	PASS
6	30.32	30.36	30.39	30.22	30.33	PASS
7	28.15	28.13	28.13	28.16	28.21	PASS
8	26.23	26.35	26.26	26.31	26.38	PASS
9	24.71	24.81	24.90	24.83	24.79	PASS
10	22.12	22.17	22.03	22.14	22.19	PASS
11	20.45	20.44	20.54	20.49	20.42	PASS
12	18.99	19.05	19.06	19.01	18.97	PASS
13	17.04	16.98	16.94	17.04	17.06	PASS
14	15.06	15.03	14.99	15.05	15.00	PASS
15	13.06	12.98	12.92	13.05	13.09	PASS
16	11.10	11.09	11.02	11.06	11.08	PASS
17	8.09	7.96	8.00	7.99	7.98	PASS
18	5.93	6.05	5.96	5.95	6.07	PASS
19	4.05	3.91	3.96	4.09	4.01	PASS

Mode: GPRS 900 , middle channel CH 37:897.4MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
5	32.14	32.19	32.27	32.25	32.13	PASS
6	30.36	30.25	30.37	30.37	30.40	PASS
7	28.28	28.26	28.20	28.22	28.12	PASS
8	26.21	26.34	26.26	26.30	26.29	PASS
9	24.87	24.73	24.78	24.70	24.83	PASS
10	22.06	22.03	22.01	22.09	22.17	PASS
11	20.46	20.41	20.47	20.49	20.48	PASS
12	18.92	18.97	19.03	18.96	18.96	PASS
13	17.07	17.07	16.96	16.93	17.03	PASS
14	14.97	14.97	15.04	15.07	15.00	PASS
15	12.93	12.99	13.07	12.91	13.08	PASS
16	10.98	10.96	10.91	11.00	11.03	PASS
17	7.94	7.98	7.94	8.09	7.97	PASS
18	5.94	5.98	6.00	5.94	5.96	PASS
19	4.03	4.05	3.92	3.96	4.05	PASS

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Mode: GPRS 900 , High channel CH 124:914.8MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
5	32.27	32.28	32.26	32.10	32.23	PASS
6	30.34	30.23	30.30	30.35	30.38	PASS
7	28.26	28.23	28.19	28.27	28.18	PASS
8	26.27	26.30	26.24	26.36	26.23	PASS
9	24.73	24.81	24.78	24.87	24.77	PASS
10	22.15	22.05	22.06	22.13	22.17	PASS
11	20.48	20.41	20.52	20.56	20.54	PASS
12	19.06	18.97	19.09	19.02	18.95	PASS
13	17.03	17.06	16.91	17.05	16.99	PASS
14	15.09	14.93	15.00	14.97	15.01	PASS
15	12.97	13.00	13.05	13.06	12.95	PASS
16	11.07	11.04	11.07	11.05	11.10	PASS
17	8.03	8.06	8.05	8.00	8.02	PASS
18	6.05	5.92	6.04	6.06	5.94	PASS
19	3.95	3.96	4.02	3.92	3.95	PASS

Mode: GPRS 1800, Low channel CH 512:1710.2MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
0	28.97	29.00	28.99	29.06	28.91	PASS
1	26.98	26.91	27.09	27.09	27.03	PASS
2	25.49	25.56	25.56	25.42	25.49	PASS
3	23.44	23.46	23.45	23.31	23.42	PASS
4	21.67	21.57	21.56	21.64	21.52	PASS
5	19.34	19.21	19.24	19.35	19.39	PASS
6	17.32	17.36	17.41	17.44	17.39	PASS
7	15.42	15.42	15.40	15.52	15.46	PASS
8	13.39	13.36	13.32	13.39	13.30	PASS
9	11.59	11.54	11.53	11.59	11.59	PASS
10	9.44	9.53	9.52	9.54	9.40	PASS
11	7.34	7.44	7.41	7.36	7.31	PASS
12	5.23	5.15	5.14	5.24	5.23	PASS
13	3.27	3.31	3.25	3.38	3.23	PASS
14	1.26	1.29	1.38	1.40	1.27	PASS
15	-0.89	-0.74	-0.90	-0.90	-0.73	PASS

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Mode: GPRS 1800, middle channel CH 698:1747.4MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
0	28.97	29.06	29.02	29.09	29.03	PASS
1	26.97	26.92	26.91	27.07	27.03	PASS
2	25.46	25.40	25.50	25.55	25.56	PASS
3	23.34	23.35	23.31	23.41	23.43	PASS
4	21.67	21.62	21.63	21.57	21.60	PASS
5	19.35	19.38	19.29	19.40	19.26	PASS
6	17.38	17.47	17.37	17.30	17.45	PASS
7	15.55	15.46	15.49	15.42	15.59	PASS
8	13.30	13.38	13.34	13.34	13.41	PASS
9	11.49	11.46	11.47	11.41	11.45	PASS
10	9.49	9.47	9.44	9.48	9.44	PASS
11	7.47	7.43	7.48	7.33	7.44	PASS
12	5.27	5.12	5.28	5.16	5.27	PASS
13	3.31	3.31	3.26	3.29	3.23	PASS
14	1.33	1.34	1.31	1.40	1.26	PASS
15	-0.79	-0.78	-0.72	-0.83	-0.83	PASS

Mode: GPRS 1800, high channel CH 885:1784.8MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
0	29.04	29.01	28.91	28.93	29.09	PASS
1	27.04	27.05	26.97	26.95	26.99	PASS
2	25.42	25.53	25.56	25.54	25.47	PASS
3	23.50	23.36	23.35	23.44	23.49	PASS
4	21.53	21.54	21.62	21.57	21.64	PASS
5	19.21	19.26	19.30	19.20	19.24	PASS
6	17.36	17.41	17.36	17.49	17.36	PASS
7	15.49	15.53	15.46	15.50	15.56	PASS
8	13.48	13.49	13.49	13.50	13.40	PASS
9	11.51	11.59	11.49	11.49	11.55	PASS
10	9.42	9.45	9.52	9.45	9.43	PASS
11	7.41	7.31	7.45	7.31	7.32	PASS
12	5.12	5.14	5.25	5.17	5.27	PASS
13	3.39	3.39	3.39	3.29	3.24	PASS
14	1.30	1.31	1.27	1.29	1.37	PASS
15	-0.76	-0.71	-0.90	-0.71	-0.79	PASS

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Mode: EGPRS 900 , Low channel CH 975:880.2MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
8	26.32	26.36	26.38	26.28	26.24	PASS
9	24.85	24.77	24.81	24.89	24.70	PASS
10	22.12	22.13	22.11	22.13	22.19	PASS
11	20.55	20.43	20.58	20.54	20.50	PASS
12	18.99	18.97	18.93	19.03	19.00	PASS
13	17.03	17.04	16.93	16.92	17.02	PASS
14	15.03	15.09	14.92	14.96	15.08	PASS
15	13.07	12.91	12.92	12.97	12.91	PASS
16	11.06	11.08	10.96	10.90	10.97	PASS
17	7.91	7.96	7.92	7.92	7.99	PASS
18	6.06	5.95	5.98	6.05	5.93	PASS
19	3.95	4.01	4.06	4.02	3.96	PASS

Mode: EGPRS 900 , middle channel CH 37:897.4MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
8	26.39	26.31	26.28	26.37	26.30	PASS
9	24.74	24.89	24.81	24.75	24.81	PASS
10	22.06	22.01	22.03	22.09	22.03	PASS
11	20.54	20.60	20.51	20.54	20.50	PASS
12	18.98	18.90	19.10	19.09	18.94	PASS
13	16.91	17.02	17.07	17.10	17.03	PASS
14	15.01	15.04	15.06	15.08	15.01	PASS
15	13.04	12.92	13.10	13.05	12.95	PASS
16	11.08	11.06	10.98	10.94	10.93	PASS
17	7.94	8.09	7.93	8.03	8.01	PASS
18	5.94	5.93	5.92	5.95	5.97	PASS
19	4.02	3.95	4.07	3.93	4.01	PASS

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Mode: EGPRS 900 , High channel CH 124:914.8MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
8	26.26	26.23	26.36	26.30	26.31	PASS
9	24.77	24.76	24.79	24.74	24.74	PASS
10	22.03	22.03	22.09	22.11	22.00	PASS
11	20.49	20.41	20.48	20.50	20.48	PASS
12	18.98	18.97	18.92	19.03	19.06	PASS
13	16.94	17.10	17.05	16.90	16.97	PASS
14	14.90	15.00	15.07	15.03	14.93	PASS
15	13.03	13.01	13.03	13.08	13.06	PASS
16	10.97	11.07	11.06	10.98	10.91	PASS
17	8.08	7.97	7.98	7.93	7.91	PASS
18	6.03	6.09	6.00	6.07	6.08	PASS
19	3.93	3.97	3.93	4.01	4.00	PASS

Mode: EGPRS 1800, Low channel CH 512:1710.2MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
2	25.48	25.48	25.56	25.42	25.45	PASS
3	23.44	23.40	23.43	23.43	23.34	PASS
4	21.67	21.67	21.57	21.59	21.67	PASS
5	19.31	19.32	19.39	19.33	19.29	PASS
6	17.44	17.44	17.30	17.48	17.39	PASS
7	15.45	15.59	15.55	15.58	15.50	PASS
8	13.38	13.41	13.46	13.40	13.45	PASS
9	11.44	11.52	11.48	11.54	11.40	PASS
10	9.49	9.46	9.46	9.51	9.55	PASS
11	7.37	7.40	7.42	7.48	7.39	PASS
12	5.13	5.22	5.22	5.16	5.23	PASS
13	3.30	3.36	3.28	3.25	3.28	PASS
14	1.39	1.33	1.37	1.39	1.20	PASS
15	-0.87	-0.77	-0.74	-0.77	-0.82	PASS

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Mode: EGPRS 1800, middle channel CH 698:1747.4MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
2	25.47	25.54	25.51	25.57	25.45	PASS
3	23.42	23.39	23.30	23.40	23.49	PASS
4	21.59	21.66	21.65	21.68	21.65	PASS
5	19.24	19.21	19.22	19.26	19.22	PASS
6	17.41	17.31	17.34	17.43	17.42	PASS
7	15.54	15.48	15.40	15.50	15.45	PASS
8	13.32	13.38	13.41	13.37	13.40	PASS
9	11.56	11.51	11.59	11.57	11.48	PASS
10	9.55	9.53	9.43	9.45	9.46	PASS
11	7.41	7.44	7.47	7.47	7.49	PASS
12	5.10	5.16	5.14	5.16	5.13	PASS
13	3.40	3.23	3.26	3.34	3.26	PASS
14	1.31	1.24	1.29	1.31	1.22	PASS
15	-0.82	-0.79	-0.85	-0.78	-0.83	PASS

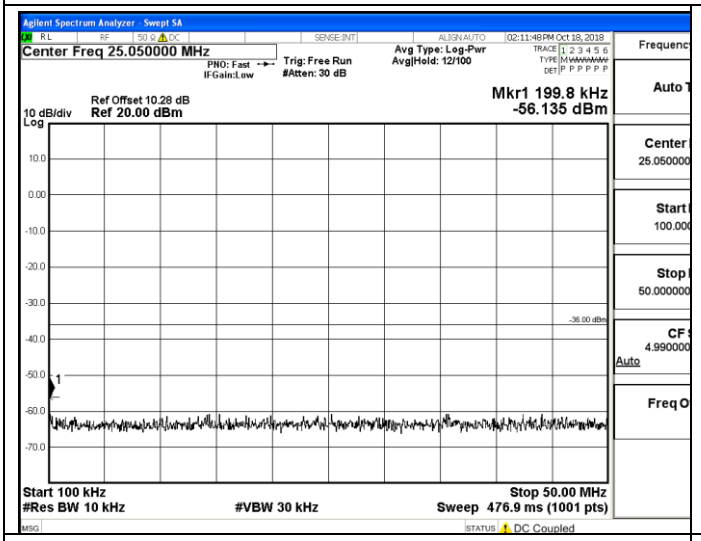
Mode: EGPRS 1800, high channel CH 885:1784.8MHz						
Power Control level	Output power(dBm)					Conclusion
	Normal	TL/VL	TH/VL	TL/VH	TH/VH	
2	25.53	25.55	25.40	25.55	25.44	PASS
3	23.31	23.33	23.41	23.48	23.36	PASS
4	21.58	21.65	21.62	21.61	21.62	PASS
5	19.30	19.38	19.24	19.30	19.32	PASS
6	17.49	17.33	17.35	17.47	17.31	PASS
7	15.51	15.52	15.51	15.59	15.46	PASS
8	13.48	13.36	13.40	13.34	13.36	PASS
9	11.53	11.52	11.43	11.53	11.43	PASS
10	9.40	9.53	9.45	9.60	9.41	PASS
11	7.43	7.31	7.39	7.39	7.31	PASS
12	5.17	5.16	5.20	5.28	5.19	PASS
13	3.40	3.21	3.28	3.23	3.37	PASS
14	1.28	1.35	1.27	1.22	1.26	PASS
15	-0.83	-0.80	-0.85	-0.76	-0.70	PASS

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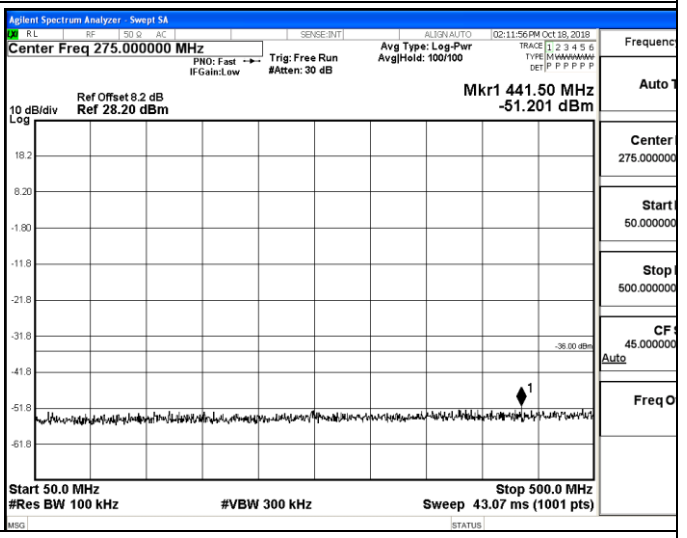
Transmitter spurious emissions

Conducted spurious emissions - MS allocated a channel(Worst Case)

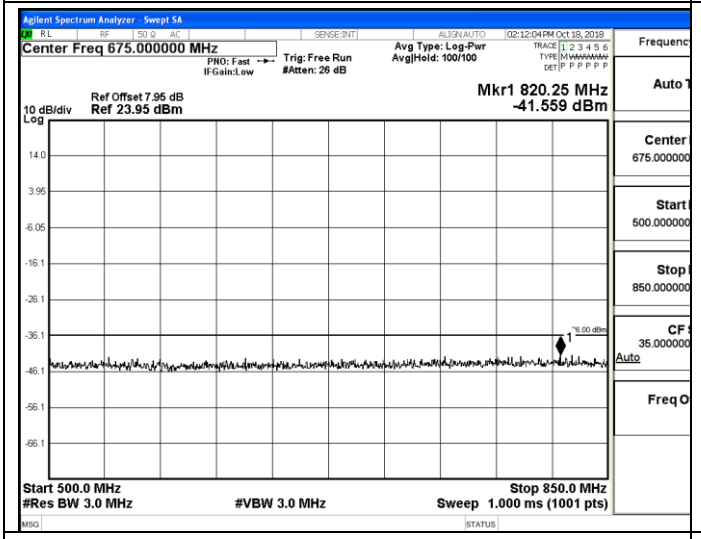
GPRS 900



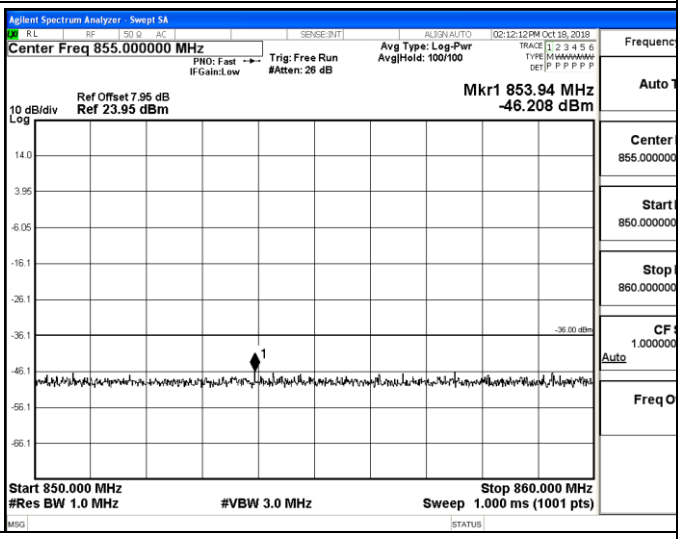
0.1-50 10K/30K -36dBm



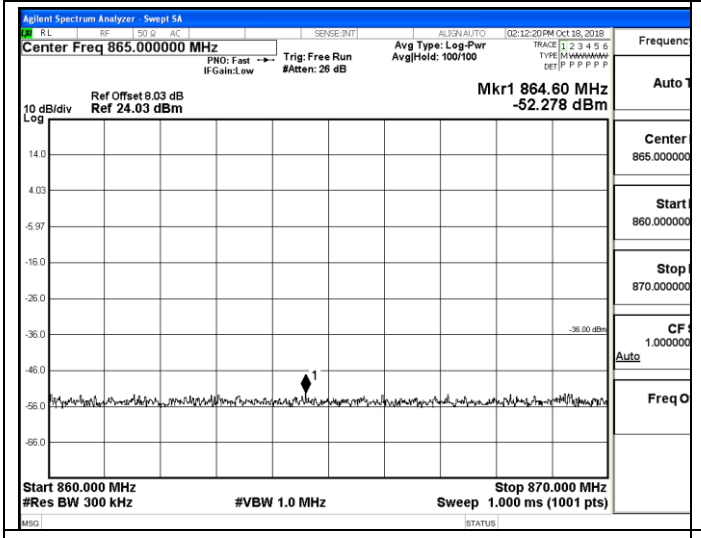
50-500 100K/300K -36dBm



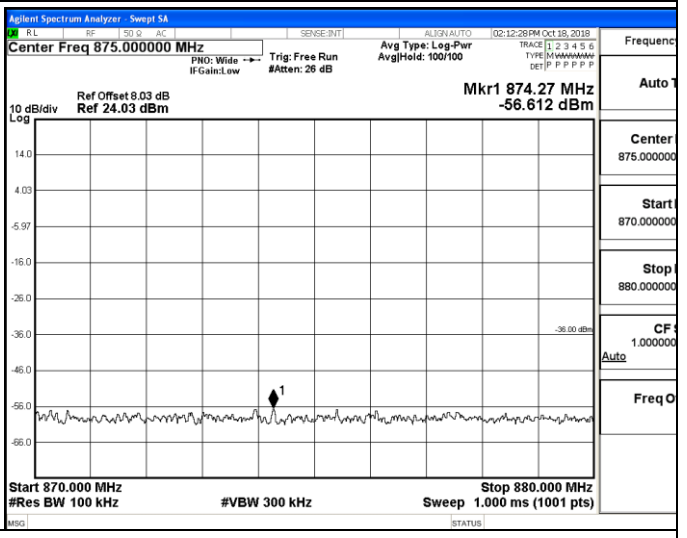
500-850 3M/3M -36dBm



850-860 1M/3M -36dBm

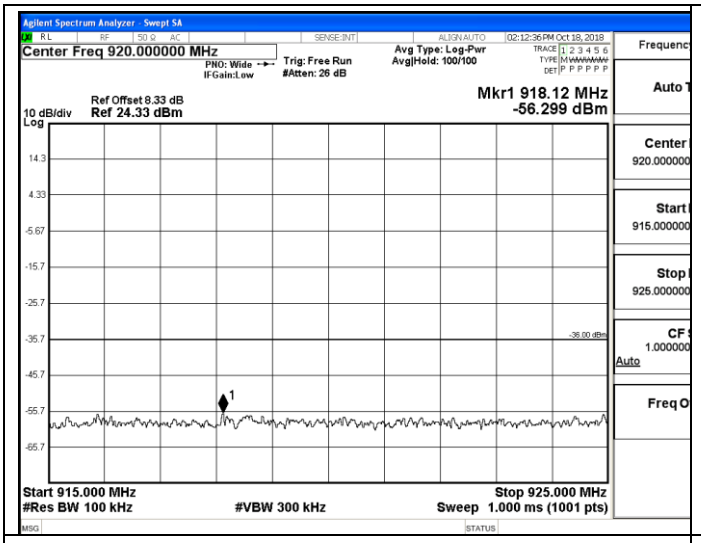


860-870 300K/1M -36dBm

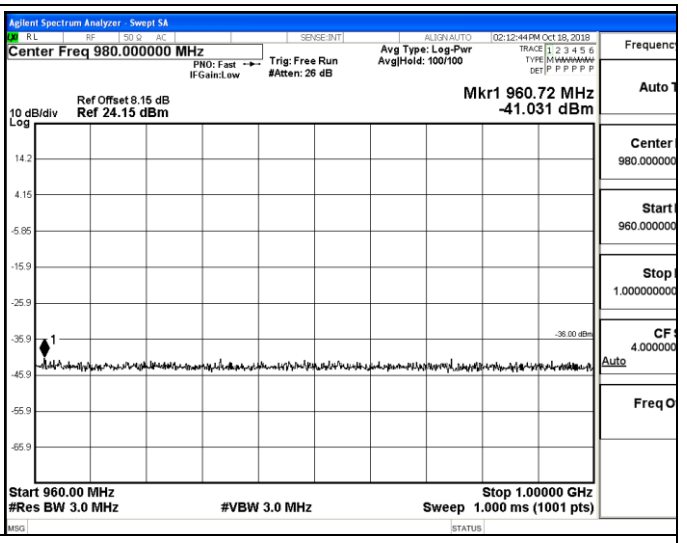


870-880 100K/300K -36dBm

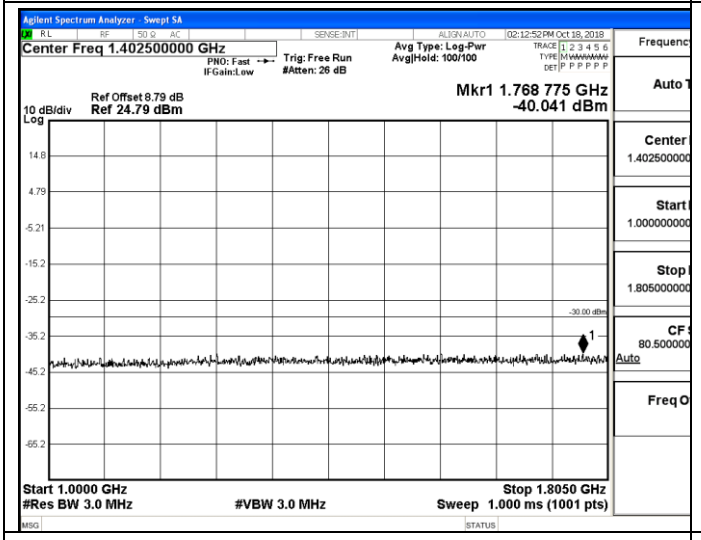
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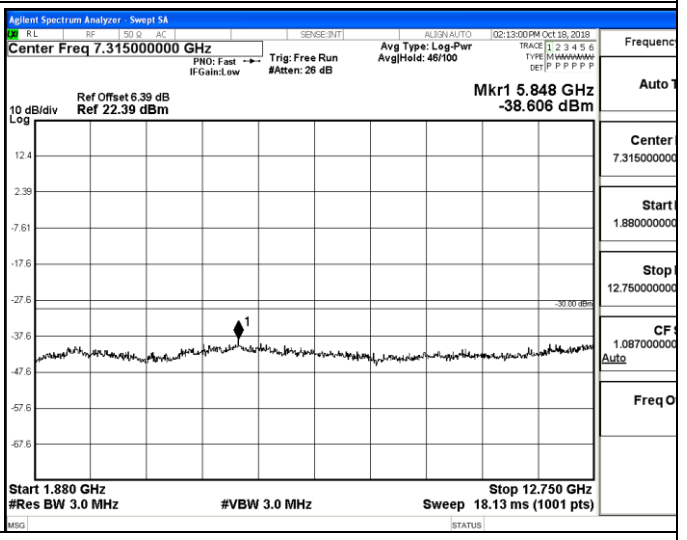
915-925 100K/300K -36dBm



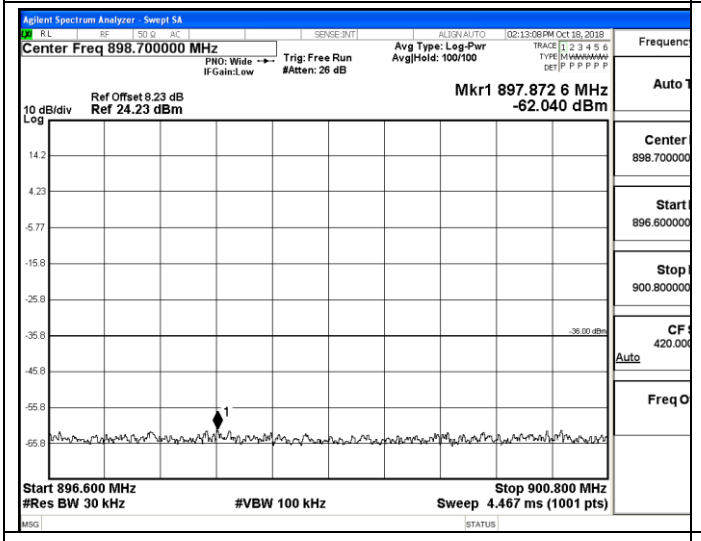
960-1000 3M/3M -36dBm



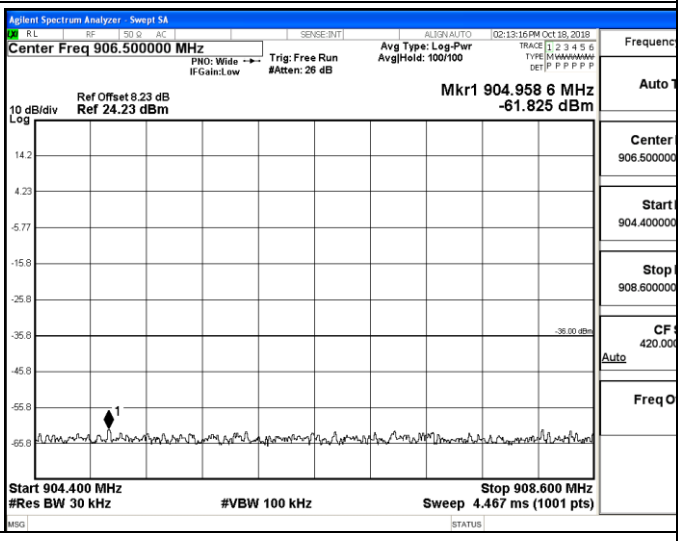
1000-1805 3M/3M -30dBm



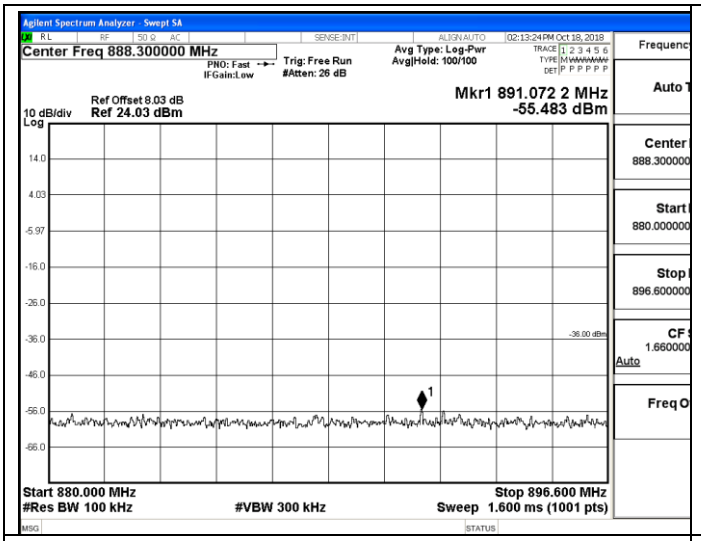
1880MHz-12.75 3M/3M -30dBm



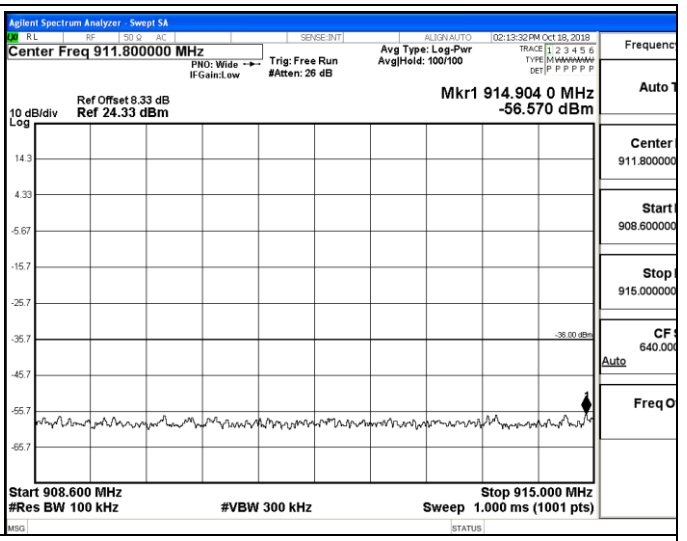
896.6-900.8 30K/100K -36dBm



904.4-908.6 30K/100K -36dBm

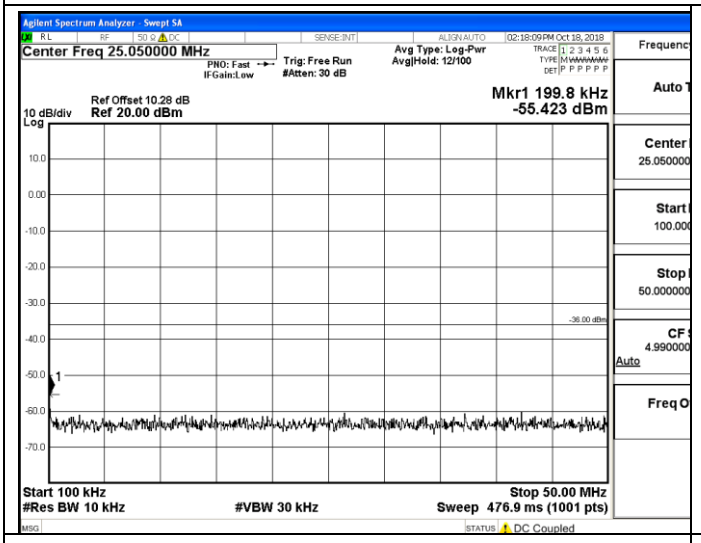
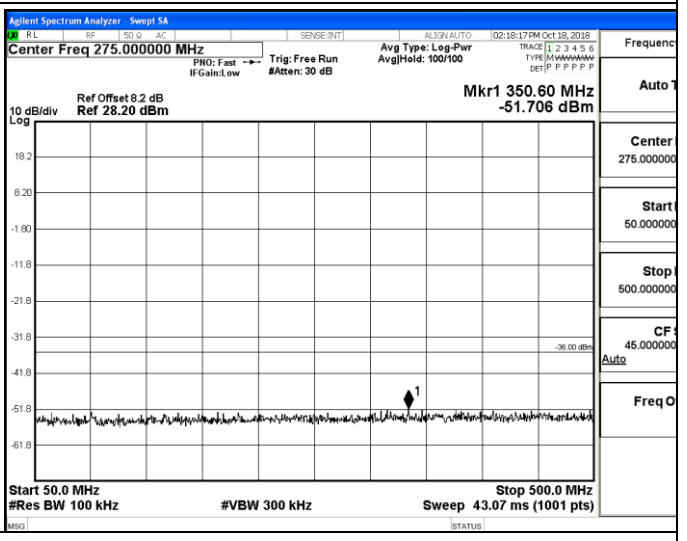
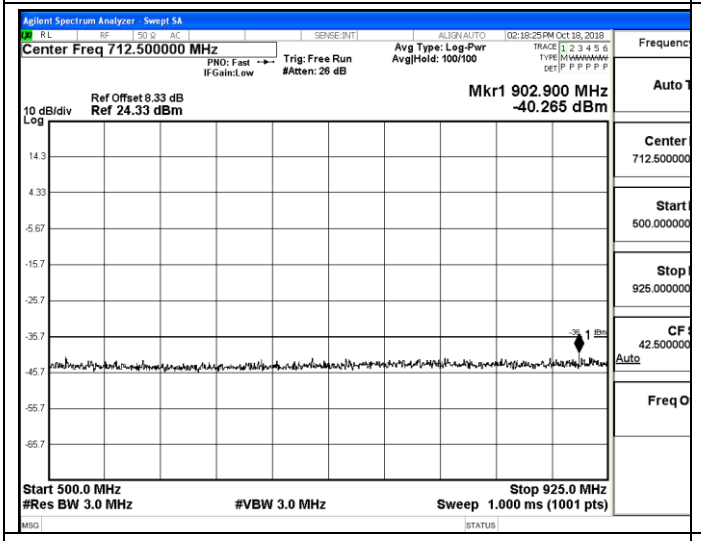
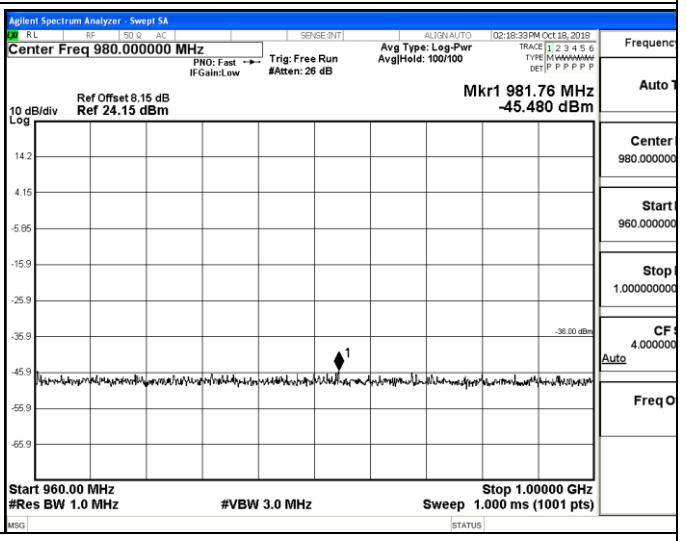
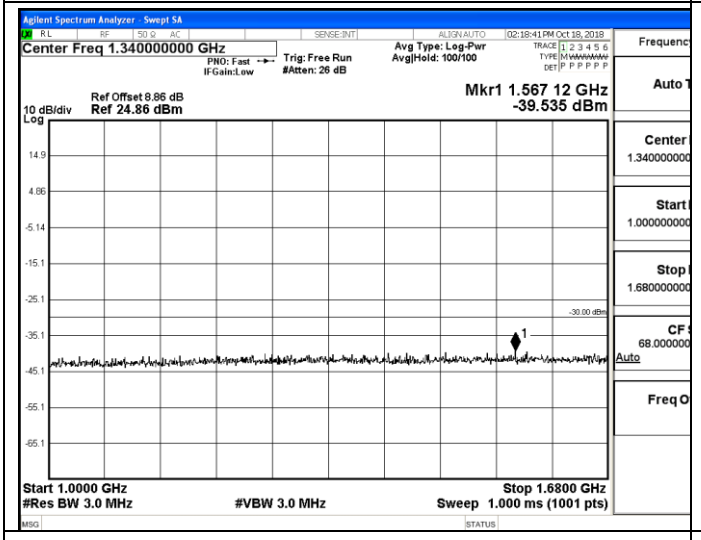
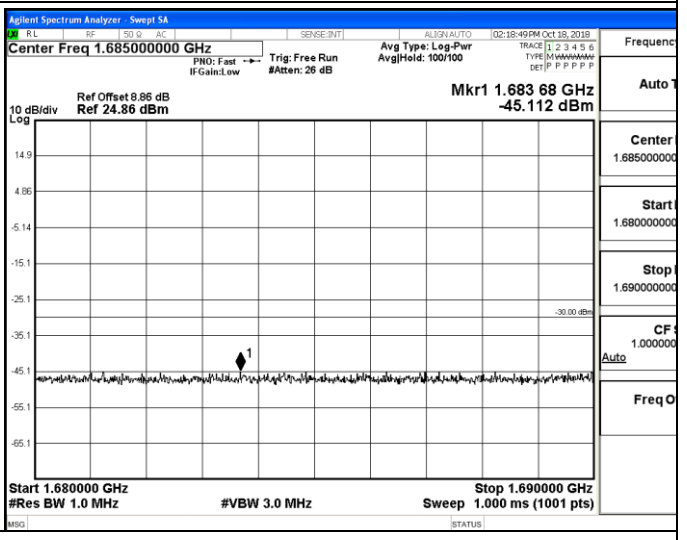


880-896.6 100K/300K -36dBm

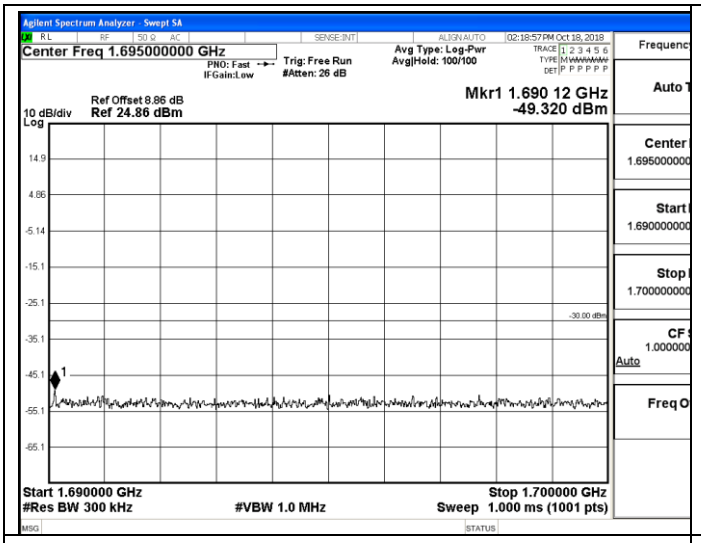


908.6-915 100K/300K -36dBm

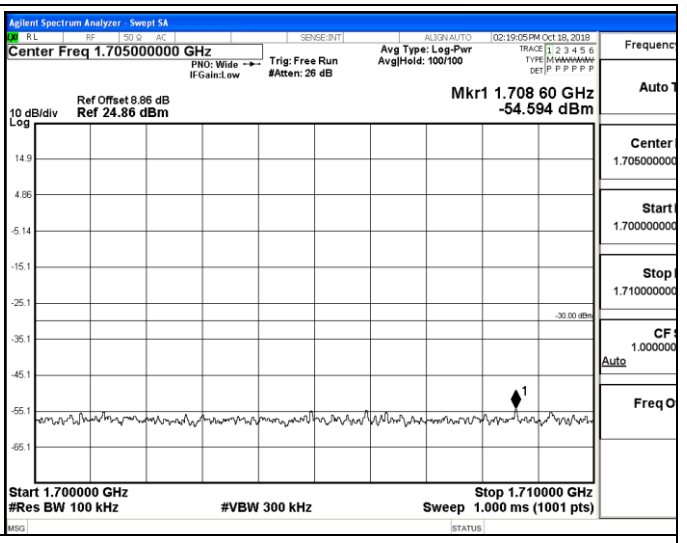
GSM 1800 Normal condition Middle channel original test data

GPRS 1800	
	
0.1-50 10K/30K -36dBm	50-500 100K/300K -36dBm
	
500-925 3M/3M -36dBm	960-1000 1M/3M -36dBm
	
1000-1680 3M/3M -30dBm	1680-1690 3M/3M -30dBm

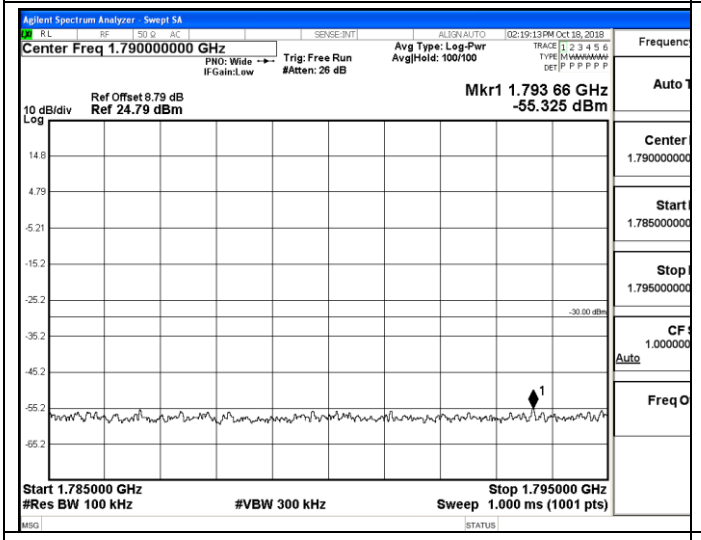
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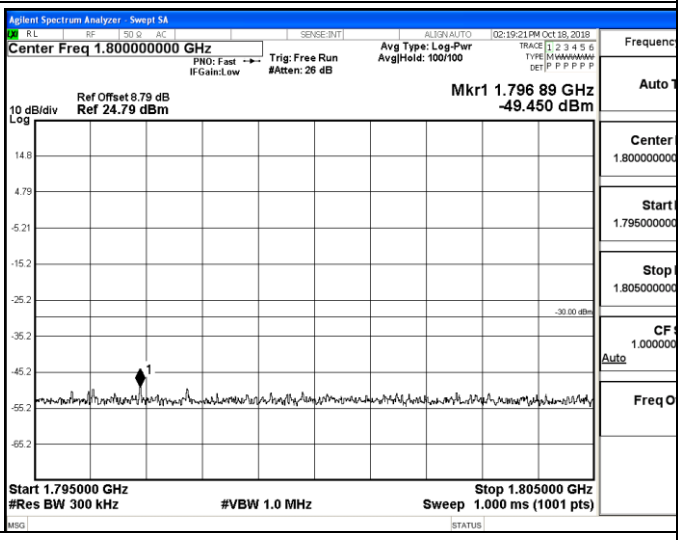
1690-1700 300K/1M -30dBm



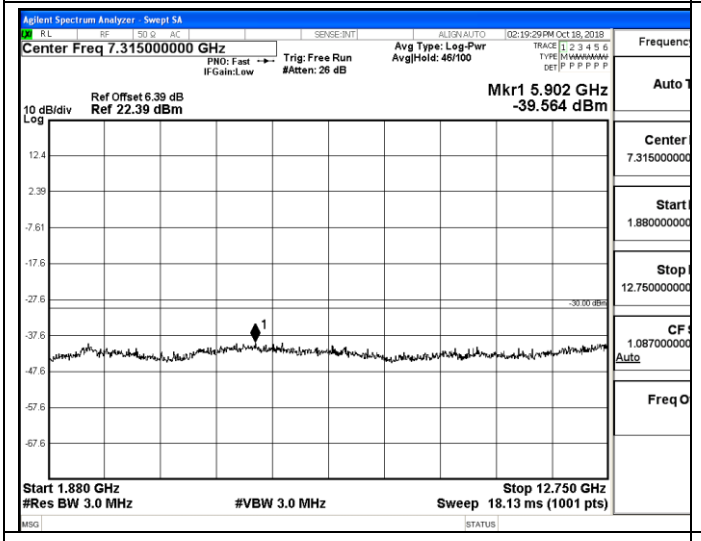
1700-1710 100K/300K -30dBm



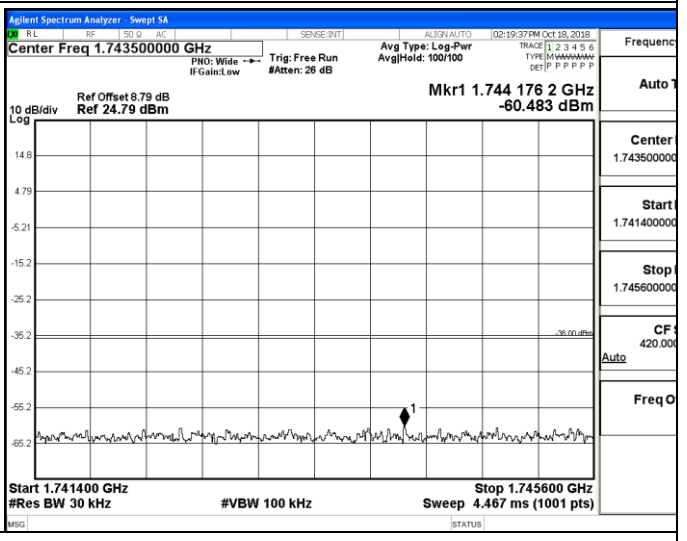
1785-1795 100K/300K -30dBm



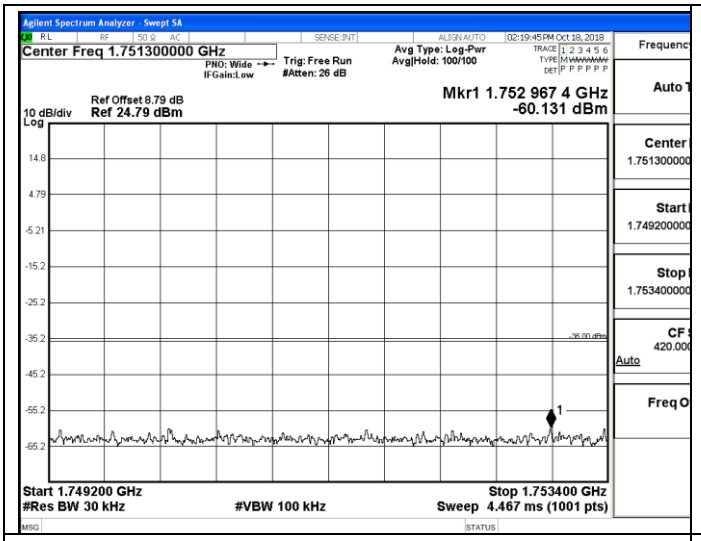
1795-1805 300K/1M -30dBm



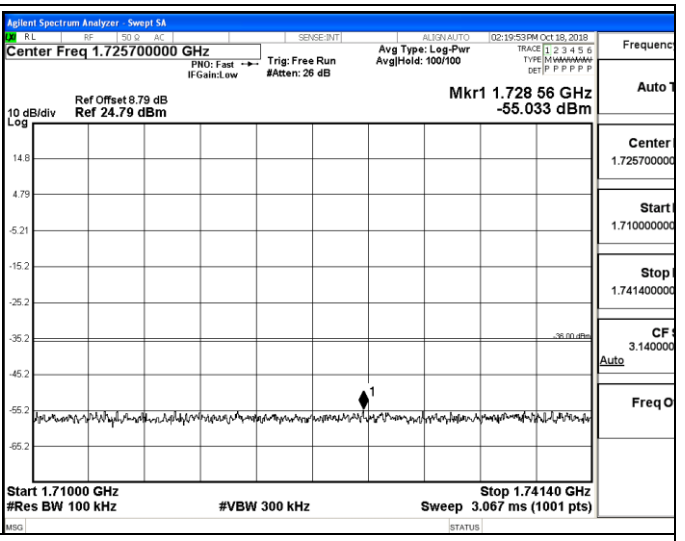
1880-12.75 3M/3M -30dBm



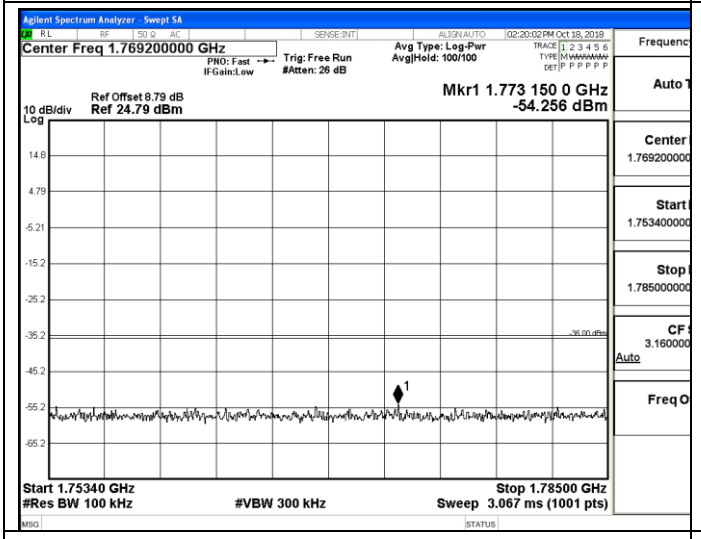
1741.4-1745.6 30K/100K -36dBm



1749.2-1753.4 30K/100K -36dBm



1710-1741.4 100K/300K -36dBm



1753.4-1785 100K/300K -36dBm

Transmitter spurious emissions

Radiated spurious emissions - MS allocated a channel(Worst Case)

GPRS 900 Band: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
279.06	Horizontal	-49.59	-36.00	Pass
493.03	H	-53.55	-36.00	
1794.82	H	-43.85	-30.00	
2692.12	H	-41.99	-30.00	
3589.65	H	-47.63	-30.00	
GPRS 900 Band: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
321.31	Vertical	-54.03	-36.00	Pass
501.92	V	-46.56	-36.00	
1794.75	V	-40.47	-30.00	
2692.19	V	-40.96	-30.00	
3589.56	V	-41.44	-30.00	

Transmitter spurious emissions

Radiated spurious emissions - MS allocated a channel(Worst Case)

GPRS 1800 Band: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
212.96	Horizontal	-53.77	-36.00	Pass
432.95	H	-50.64	-36.00	
1794.80	H	-42.11	-30.00	
2692.21	H	-41.05	-30.00	
3589.68	H	-46.60	-30.00	
GPRS 1800 Band: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
263.81	Vertical	-53.06	-36.00	Pass
409.47	V	-55.17	-36.00	
1794.88	V	-44.86	-30.00	
2692.14	V	-48.29	-30.00	
3589.50	V	-45.07	-30.00	

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Radiated spurious emissions - MS in Idle Mode(Worst Case)

GPRS 900 Band: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
274.13	Horizontal	-70.58	-57.00	Pass
504.46	H	-76.22	-57.00	
1409.95	H	-61.84	-47.00	
2036.70	H	-64.21	-47.00	
3608.42	H	-59.96	-47.00	
GPRS 900 Band: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
62.79	Vertical	-70.88	-57.00	Pass
919.50	V	-76.90	-57.00	
1558.70	V	-65.27	-47.00	
2264.39	V	-60.64	-47.00	
3478.64	V	-65.96	-47.00	

GPRS 1800 Band: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
364.77	Horizontal	-76.02	-57.00	Pass
579.06	H	-74.94	-57.00	
1599.30	H	-61.97	-47.00	
2248.87	H	-65.48	-47.00	
3680.98	H	-58.75	-47.00	
GPRS 1800 Band: Middle Channel, Normal condition				
Frequency (MHz)	Radiated Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
62.79	Vertical	-67.23	-57.00	Pass
919.50	V	-69.83	-57.00	
1465.22	V	-58.72	-47.00	
2140.34	V	-59.21	-47.00	
3400.69	V	-57.37	-47.00	

----------THE END OF REPORT----------

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