TEST REPORT

No. I16N01166-LTE

for

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

LTE phone

Model Name: Coolpad E503

FCC ID: R38YLE503

with

Hardware Version: P0

Software Version: 6.0.003.P0.161010.3505I-A00

Issued Date: 2016-11-28

Test Laboratory:

FCC 2.948 Listed: No. 342690

CTTL,Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I16N01166-LTE	Rev.0	1st edition	2016-11-28

CONTENTS

1. Test Laboratory

1.1. Testing Location

Company Name:	CTTL ShenZhen,Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT
Address:	TCL International E city No. 1001 Zhongshanyuan Road, Nanshan District, Shenzhen, Guangdong, China
Postal Code:	518048
Telephone:	+86(755)33322000
Fax:	+86(755)33322000

1.2. Testing Environment

Normal Temperature:	15-35℃
Relative Humidity:	20-75%
Air pressure	980 - 1040 hPa

The climatic requirements above are general exclude the special requirements for dedicated test environments listed in section 5 and some specific test cases in other parts of this report.

1.3. Project data

Testing Start Date:	2016-10-19
Testing End Date:	2016-11-26

1.4. Signature

Lai Minghua

(Prepared this test report)

Shen Shaoming

(Reviewed this test report)

Ma Zhiguo

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address /Post:	Coolpad Information Harbor, High-tech Industrial Park (North), Nanshan District, Shenzhen, P.R.C.
Contact Person:	wangping
Contact Email	wangping1@yulong.com
Telephone:	0755-83301199-83335
Fax:	/

2.2. Manufacturer Information

Company Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address /Post:	Coolpad Information Harbor, High-tech Industrial Park (North), Nanshan District, Shenzhen, P.R.C.
Contact Person:	wangping
Contact Email	wangping1@yulong.com
Telephone:	0755-83301199-83335
Fax:	/

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	LTE phone
Model Name	Coolpad E503
FCC ID	R38YLE503
Antenna	Integrated
Output power	26.99dBm maximum EIRP measured for LTE Band 4
Extreme vol. Limits	3.6VDC to 4.4VDC (nominal: 4.0VDC)
Extreme temp. Tolerance	-30°C to +50°C

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Sample Arrival Date
S01	008600251139837	P0	6.0.003.P0.16101 0.3505I-A00	2016-10-19
S02	008600251139589	P0	6.0.003.P0.16101 0.3505I-A00	2016-10-19

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description
AE1	Battery
AE2	Charger

AE1	
Model	CPLD-414
Manufacturer	ZHUHAI COSLIGHT BATTERY CO., LTD.
Capacitance	2500mAh
AE2	
Model	CA05-050100U
Manufacturer	JIANGSU CHENYANG ELECTRON CO.,LTD

*AE ID: is used to identify the test sample in the lab internally.

3.4. General Description

The Equipment Under Test (EUT) is a model HSDPA/HSUPA/UMTS / GSM / LTE mobile phone with integrated antenna. Manual and specifications of the EUT were provided to fulfil the test.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 22	PUBLIC MOBILE SERVICES	15-10-1 Edition
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	15-10-1 Edition
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	15-10-1 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	15-10-1 Edition
ANSI/TIA-603-C	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2004
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014
KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters	v02r02

5. LABORATORY ENVIRONMENT

Control room / **conducted chamber** did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. =20 %, Max. = 80 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber 2 (8.6 meters×6.1 meters×3.85 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 1 Ω
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 MHz

Semi-anechoic chamber 2 / **Fully-anechoic chamber 3** (10 meters×6.7 meters×6.15 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< ±3.5 dB, 3 m distance
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

6. SUMMARY OF TEST RESULTS

6.1. Summary of test results

Abbreviations used in this clause:		
Verdict Column	P	Pass
	F	Fail
	NA	Not applicable
	NM	Not measured
Location Column	A/B/C/D	The test is performed in test location A, B, C or D which are described in section 1.1 of this report

LTE Band 2

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	24.232(c)	A.1	P
2	Emission Limit	24.238(a), 2.1051	A.2	P
3	Frequency Stability	24.235, 2.1055	A.3	P
4	Occupied Bandwidth	2.1049(h)(i)	A.4	P
5	Emission Bandwidth	24.238(a)	A.5	P
6	Band Edge Compliance	24.238(a)	A.6	P
7	Conducted Spurious Emission	24.238, 2.1057	A.7	P
8	Peak to Average Power Ratio	24.232 (d)	A.8	P

LTE Band 4

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	27.50(d)(4)	A.1	P
2	Emission Limit	27.53(h), 2.1051	A.2	P
3	Frequency Stability	27.54, 2.1055	A.3	P
4	Occupied Bandwidth	2.1049(h)(i)	A.4	P
5	Emission Bandwidth	27.53(h)	A.5	P
6	Band Edge Compliance	27.53(h)	A.6	P
7	Conducted Spurious Emission	27.53(h), 2.1057	A.7	P
8	Peak to Average Power Ratio	27.50(a)	A.8	P

LTE Band 5

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	§2.1046(a), 22.913(a)	A.1	P
2	Emission Limit	22.917, 2.1051	A.2	P
3	Frequency Stability	22.235, 2.1055	A.3	P
4	Occupied Bandwidth	2.1049(h)(i)	A.4	P
5	Emission Bandwidth	22.917(b)	A.5	P
6	Band Edge Compliance	22.917(b)	A.6	P
7	Conducted Spurious Emission	22.917, 2.1057	A.7	P

LTE Band 7

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	27.50(h)(2)	A.1	P
2	Emission Limit	27.53(m), 2.1051	A.2	P
3	Frequency Stability	27.54, 2.1055	A.3	P
4	Occupied Bandwidth	2.1049(h)(i)	A.4	P
5	Emission Bandwidth	27.53(m)	A.5	P
6	Band Edge Compliance	27.53(m)	A.6	P
7	Conducted Spurious Emission	27.53(m), 2.1057	A.7	P
8	Peak to Average Power Ratio	27.50(a)	A.8	P

LTE Band 12

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	27.50(c)(10)	A.1	P
2	Emission Limit	27.53(g), 2.1051	A.2	P
3	Frequency Stability	27.54, 2.1055	A.3	P
4	Occupied Bandwidth	2.1049(h)(i)	A.4	P
5	Emission Bandwidth	27.53(g)	A.5	P
6	Band Edge Compliance	27.53(g)	A.6	P
7	Conducted Spurious Emission	27.53(g), 2.1057	A.7	P
8	Peak to Average Power Ratio	27.50(a)	A.8	P

6.2. Statements

The test cases listed in section 6.1 of this report for the EUT specified in section 3 were performed by CTTL according to the standards or reference documents in section 4.1

The EUT met all applicable requirements of the standards or reference documents in section 4.1.

This report only deals with the LTE functions among the features described in section 3.

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
1	Test Receiver	ESCI	100701	R&S	2017.08.09
2	BiLog Antenna	VULB9163	9163 329	Schwarzbeck	2017.01.20
3	Horn Antenna	3117	00066577	ETS-Lindgren	2017.04.01
4	Universal Radio Communication Tester	CMW500	152499	R&S	2017.07.22
5	Spectrum Analyser	FSP40	100378	R&S	2016.12.18
6	Spectrum Analyzer	FSU	200679	R&S	2017.01.02
7	Temperature Chamber	SH-241	92007516	ESPECs	2016.11.30
8	DC Power Supply	U3606A	MY50450012	Agilent Technologies	2017.11.30

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: 22.913(a), 24.232(c), 27.50(h)(2).

A.1.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation.
This result contains peak output power and ERP/EIRP measurements for the EUT.
In all cases, output power is within the specified limits.

A.1.2 Conducted

A.1.2.1 Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.
These measurements were done at 3 frequencies (bottom, middle and top of operational frequency range) for each bandwidth.

A.1.2.2 Measurement result

LTE band 2

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	1852.5	23.66	22.74
		1880.0	23.54	22.94
		1907.5	23.55	22.56
	1 RB low	1852.5	23.64	22.71
		1880.0	23.56	22.98
		1907.5	23.51	22.58
	50% RB mid	1852.5	23.67	22.73
		1880.0	23.55	23.02
		1907.5	23.57	22.54
	100% RB	1852.5	22.62	21.57
		1880.0	22.56	21.54
		1907.5	22.53	21.55
10MHz	1 RB high	1855.0	23.67	22.80
		1880.0	23.58	23.08
		1905.0	23.65	22.96
	1 RB low	1855.0	23.65	22.76
		1880.0	23.66	23.14
		1905.0	23.63	22.83
	50% RB mid	1855.0	23.68	22.80

		1880.0	23.57	23.10
		1905.0	23.56	22.94
	100% RB	1855.0	22.64	21.63
		1880.0	22.53	21.51
		1905.0	22.55	21.53
20MHz	1 RB high	1860.0	23.66	23.03
		1880.0	23.69	22.95
		1900.0	23.62	22.91
	1 RB low	1860.0	23.72	23.05
		1880.0	23.74	23.01
		1900.0	23.75	23.07
	50% RB mid	1860.0	23.68	22.99
		1880.0	23.67	22.93
		1900.0	23.64	22.91
	100% RB	1860.0	22.65	21.59
		1880.0	22.62	21.62
		1900.0	22.68	21.63

LTE band 4

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	1752.5	23.41	22.37
		1732.5	23.44	22.29
		1712.5	23.46	22.27
	1 RB low	1752.5	23.57	22.39
		1732.5	23.52	22.34
		1712.5	23.51	22.43
	50% RB mid	1752.5	23.48	22.34
		1732.5	23.51	22.32
		1712.5	23.45	22.27
	100% RB	1752.5	22.39	21.45
		1732.5	22.42	21.44
		1712.5	22.52	21.48
10MHz	1 RB high	1750	23.55	22.96
		1732.5	23.46	22.85
		1715	23.49	22.80
	1 RB low	1750	23.51	22.87
		1732.5	23.58	22.93
		1715	23.54	22.88
	50% RB mid	1750	23.61	22.93
		1732.5	23.56	22.91
		1715	23.53	22.89
	100% RB	1750	22.47	21.45
		1732.5	22.43	21.41
		1715	22.53	21.42
20MHz	1 RB high	1745	23.44	22.67
		1732.5	23.55	22.63
		1720	23.51	22.69
	1 RB low	1745	23.59	22.77
		1732.5	23.63	22.74
		1720	23.66	22.72
	50% RB mid	1745	23.56	22.61
		1732.5	23.58	22.64
		1720	23.63	22.68
	100% RB	1745	22.41	21.44
		1732.5	22.45	21.42
		1720	22.49	21.46

LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	846.5	23.57	22.44
		836.5	23.45	22.36
		826.5	23.41	22.39
	1 RB low	846.5	23.63	22.54
		836.5	23.48	22.36
		826.5	23.57	22.49
	50% RB mid	846.5	23.46	22.43
		836.5	23.48	22.38
		826.5	23.53	22.39
	100% RB	846.5	22.48	21.46
		836.5	22.43	21.51
		826.5	22.45	21.55
10MHz	1 RB high	844.0	23.44	22.83
		836.5	23.48	23.01
		829.0	23.56	22.96
	1 RB low	844.0	23.46	22.79
		836.5	23.48	22.93
		829.0	23.51	22.85
	50% RB mid	844.0	23.49	22.96
		836.5	23.47	23.05
		829.0	23.55	22.82
	100% RB	844.0	22.49	21.43
		836.5	22.46	21.50
		829.0	22.51	21.62

LTE band 7

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	2567.5	23.20	22.04
		2535	22.92	22.00
		2502.5	22.96	22.11
	1 RB low	2567.5	23.22	22.06
		2535	22.95	22.03
		2502.5	22.86	22.04
	50% RB mid	2567.5	23.25	22.10
		2535	22.97	22.05
		2502.5	22.86	22.01
	100% RB	2567.5	22.17	21.21
		2535	21.91	20.90
		2502.5	21.76	20.72
10MHz	1 RB high	2565	23.12	22.08
		2535	22.94	22.45
		2505	22.99	22.14
	1 RB low	2565	23.25	22.12
		2535	22.95	22.48
		2505	22.96	22.37
	50% RB mid	2565	23.16	22.45
		2535	22.96	22.49
		2505	22.95	22.46
	100% RB	2565	22.05	21.13
		2535	21.92	20.90
		2505	21.72	20.64
20MHz	1 RB high	2560	22.97	22.04
		2535	23.04	22.34
		2510	22.96	22.44
	1 RB low	2560	23.11	22.43
		2535	22.98	22.32
		2510	23.01	22.49
	50% RB mid	2560	23.24	22.38
		2535	23.04	22.30
		2510	23.14	22.41
	100% RB	2560	22.06	21.11
		2535	21.96	20.95
		2510	21.74	20.81

LTE band 12

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	713.5	23.61	22.49
		707.5	23.54	22.47
		701.5	23.54	22.56
	1 RB low	713.5	23.49	22.43
		707.5	23.63	22.60
		701.5	23.65	22.57
	50% RB mid	713.5	23.53	22.44
		707.5	23.64	22.58
		701.5	23.48	22.71
	100% RB	713.5	22.55	21.69
		707.5	22.68	21.81
		701.5	22.63	21.77
10MHz	1 RB high	711.0	23.68	22.71
		707.5	23.58	22.59
		704.0	23.39	22.45
	1 RB low	711.0	23.59	22.54
		707.5	23.70	22.76
		704.0	23.66	22.76
	50% RB mid	711.0	23.56	22.70
		707.5	23.64	22.71
		704.0	23.47	22.63
	100% RB	711.0	22.66	21.78
		707.5	22.70	21.80
		704.0	22.54	21.67

A.1.3 Radiated

A.1.3.1 Description

This is the test for the maximum radiated power from the EUT.

Rule Part 22.913(a) specifies “Mobile stations are limited to 2.0 watts EIRP.”.

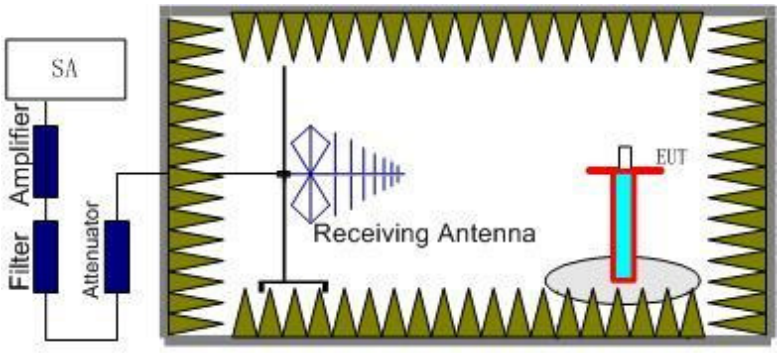
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 27.50(h)(2) specifies “Mobile stations are limited to 2.0 watts EIRP.”.

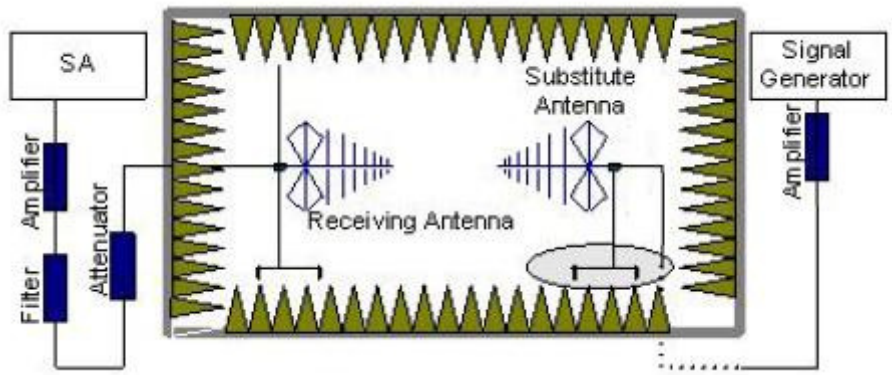
A.1.3.2 Method of Measurement

The measurements procedures in TIA-603C-2004 are used.

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF signal source for the frequency band of interest is

connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna.
   The cable loss (P_{cl}), the substitution antenna Gain (G_a) and the amplifier Gain (P_{Ag}) should be recorded after test.
   The measurement results are obtained as described below:
   Power (EIRP) = P_{Mea} - P_{Ag} - P_{cl} - G_a
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15.

A.1.3.3 Measurement result

LTE Band 2- EIRP 24. 232(b)

Limits: ≤33dBm (2W)

LTE Band 2_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1852.50	-12.27	-29.40	6.86	23.99	33.00	V
1880.00	-12.08	-29.30	6.85	24.07	33.00	V
1907.50	-12.00	-29.30	6.84	24.14	33.00	H

LTE Band 2_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1855.00	-11.05	-29.40	6.86	25.21	33.00	V
1880.00	-10.78	-29.30	6.85	25.37	33.00	V
1905.00	-10.62	-29.30	6.84	25.52	33.00	V

LTE Band 2_20 MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1860.00	-10.26	-29.40	6.86	26.00	33.00	V
1880.00	-10.03	-29.30	6.85	26.12	33.00	V
1900.00	**-9.98**	**-29.30**	**6.84**	**26.16**	**33.00**	**V**

LTE Band 2_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1852.50	-12.16	-29.40	6.86	24.10	33.00	H
1880.00	-11.82	-29.30	6.85	24.33	33.00	V
1907.50	-11.39	-29.30	6.84	24.75	33.00	V

LTE Band 2_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1855.00	-11.86	-29.40	6.86	24.40	33.00	V
1880.00	-11.01	-29.30	6.85	25.14	33.00	V
1905.00	-10.96	-29.30	6.84	25.18	33.00	V

LTE Band 2_20 MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1860.00	-11.96	-29.40	6.86	24.30	33.00	H
1880.00	-11.62	-29.30	6.85	24.53	33.00	H
1900.00	-11.32	-29.30	6.84	24.82	33.00	V

Peak EIRP (dBm)=P_{Mea}(-9.98dBm)-（P_{cl}+P_{Ag}）(-29.30dB)-G_a(-6.84dB) =26.16dBm

LTE Band 4- EIRP 27.50(d)

Limits: ≤30dBm (1W)

LTE Band 4_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1712.50	-12.28	-29.60	6.89	24.21	30.00	V
1732.50	-11.97	-29.60	6.88	24.51	30.00	H
1752.50	-11.07	-29.50	6.87	25.30	30.00	V

LTE Band 4_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1715.00	-11.53	-29.60	6.89	24.96	30.00	V
1732.50	-9.63	-29.60	6.88	26.85	30.00	V
1750.50	**-9.38**	**-29.50**	**6.87**	**26.99**	**30.00**	**V**

LTE Band 4_20MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1720.00	-10.67	-29.60	6.89	25.82	30.00	V
1732.50	-10.42	-29.60	6.88	26.06	30.00	V
1745.00	-10.16	-29.50	6.87	26.21	30.00	H

LTE Band 4_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1712.50	-10.81	-29.60	6.89	25.68	30.00	H
1732.50	-10.63	-29.60	6.88	25.85	30.00	V
1752.50	-9.84	-29.50	6.87	26.53	30.00	V

LTE Band 4_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1715.00	-12.28	-29.60	6.89	24.21	30.00	V
1732.50	-11.56	-29.60	6.88	24.92	30.00	V
1750.50	-10.98	-29.50	6.87	25.39	30.00	V

LTE Band 4_20MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
1720.00	-12.02	-29.60	6.89	24.47	30.00	V
1732.50	-11.43	-29.60	6.88	25.05	30.00	V
1745.00	-11.02	-29.50	6.87	25.35	30.00	V

Peak EIRP (dBm)=P_{Mea}(-9.38dBm)-（P_{cl}+P_{Ag}）(-29.50dB)-G_a(-6.87dB) =26.99dBm

LTE Band 5- ERP 22.913(a)

Limits: ≤38.45dBm (7W)

LTE Band 5_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
826.50	-17.21	-33.60	7.83	2.15	22.07	38.45	V
836.50	-16.29	-33.50	7.88	2.15	22.94	38.45	V
846.50	-15.34	-33.50	7.64	2.15	23.65	38.45	H

LTE Band 5_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
829.00	-17.30	-33.60	7.83	2.15	21.98	38.45	V
836.50	-16.30	-33.50	7.88	2.15	22.93	38.45	V
844.00	-15.40	-33.50	7.70	2.15	23.65	38.45	V

LTE Band 5_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
826.50	-17.31	-33.60	7.83	2.15	21.97	38.45	V
836.50	-16.84	-33.50	7.88	2.15	22.39	38.45	H
846.50	-16.51	-33.50	7.64	2.15	22.48	38.45	V

LTE Band 5_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
829.00	-15.79	-33.60	7.83	2.15	23.49	38.45	V
836.50	-15.63	-33.50	7.88	2.15	23.60	38.45	H
844.00	**-14.93**	**-33.50**	**7.70**	**2.15**	**24.12**	**38.45**	**V**

Peak ERP (dBm)=P_{Mea}(-14.93dBm)-（P_{cl}+P_{Ag}）(-33.50dB)-G_a(-7.70dB) -2.15dB =24.12dBm

LTE Band 7- EIRP 27.50(h)(2)

Limits: ≤33 dBm (2W)

LTE Band 7_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
2502.50	-13.93	-28.70	9.66	24.43	33.00	H
2535.00	-13.79	-28.60	9.68	24.49	33.00	V
2567.50	-13.02	-28.60	9.70	25.28	33.00	V

LTE Band 7_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
2505.00	-14.32	-28.70	9.66	24.04	33.00	V
2535.00	-13.54	-28.60	9.68	24.74	33.00	V
2565.00	-12.69	-28.60	9.70	25.61	33.00	H

LTE Band 7_20MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
2510.00	-12.46	-28.70	9.66	25.90	33.00	V
2535.00	**-12.19**	**-28.60**	**9.68**	**26.09**	**33.00**	**V**
2560.00	-11.82	-28.60	9.70	26.48	33.00	V

LTE Band 7_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
2502.50	-14.28	-28.70	9.66	24.08	33.00	V
2535.00	-13.84	-28.60	9.68	24.44	33.00	V
2567.50	-13.47	-28.60	9.70	24.83	33.00	H

LTE Band 7_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
2505.00	-13.19	-28.70	9.66	25.17	33.00	V
2535.00	-12.85	-28.60	9.68	25.43	33.00	H
2565.00	-12.25	-28.60	9.70	26.05	33.00	V

LTE Band 7_20MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
2510.00	-13.18	-28.70	9.66	25.18	33.00	V
2535.00	-12.78	-28.60	9.68	25.50	33.00	V
2560.00	-11.84	-28.60	9.70	26.46	33.00	V

Peak EIRP (dBm)=P_{Mea}(-12.19dBm)-（P_{cl}+P_{Ag}）(-28.60dB)-G_a(-9.68dB) =26.09dBm

LTE Band 12 - ERP 27.50(c)(10)

Limits: ≤34.77dBm (3W)

LTE Band 12_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
701.50	-22.05	-44.81	-0.74	2.15	19.45	34.77	H
707.50	-22.49	-44.94	-0.62	2.15	19.01	34.77	H
713.50	**-20.78**	**-45.22**	**-0.50**	**2.15**	**20.87**	**34.77**	**H**

LTE Band 12_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
704.00	-21.84	-44.93	-0.70	2.15	19.73	34.77	H
707.50	-22.44	-44.94	-0.62	2.15	19.06	34.77	H
711.00	-21.26	-45.19	-0.53	2.15	20.39	34.77	H

LTE Band 12_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
701.50	-22.89	-44.81	-0.74	2.15	18.61	34.77	H
707.50	-23.20	-44.94	-0.62	2.15	18.30	34.77	H
713.50	-21.64	-45.22	-0.50	2.15	20.01	34.77	H

LTE Band 12_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
704.00	-22.79	-44.93	-0.70	2.15	18.78	34.77	H
707.50	-23.09	-44.94	-0.62	2.15	18.41	34.77	H
711.00	-22.15	-45.19	-0.53	2.15	19.50	34.77	H

Peak ERP (dBm)=P_{Mea}(-20.78dBm)-（P_{cl}+P_{Ag}）(-45.22dB)-G_a(-0.50dB) -2.15dB =20.87dBm

ANALYZER SETTINGS:

RBW = VBW = 8MHz for occupied bandwidths equal to or less than 5MHz.

RBW = VBW = 20MHz for occupied bandwidths equal to or greater than 10MHz.

Note: Expanded measurement uncertainty is U = 0.96 dB, k = 2.

A.2 EMISSION LIMIT

Reference

FCC: CFR 2.1051, 22.917, 24.238(a), 27.53(m).

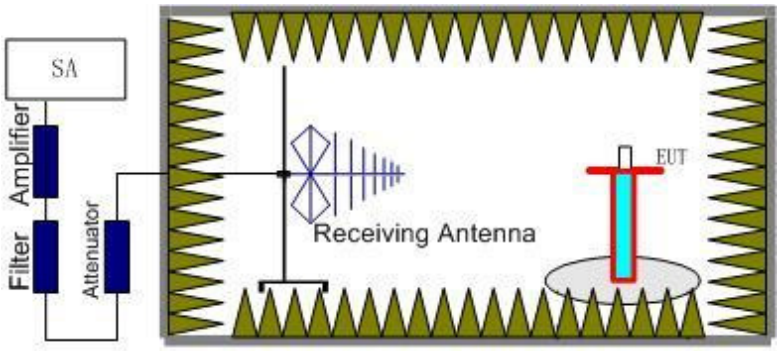
A.2.1 Measurement Method

The measurements procedures in TIA-603C-2004 are used. This measurement is carried out in fully-anechoic chamber FAC-3.

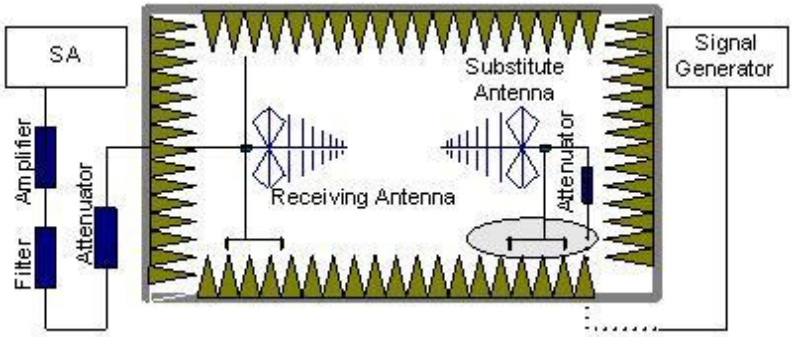
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 22.917, 24.238(a), Part 27.53(m). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 2, 4, 5, 7,12,17,30.

The procedure of radiated spurious emissions is as follows:

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.
   An amplifier should be connected in for the test.
   The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.
   The measurement results are obtained as described below:
   Power (EIRP)=P_{Mea}+ P_{pl} + G_a
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dB.

A.2.2 Measurement Limit

Part 22.917, 24.238(a), 27.53(m) all specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands2, 4, 5, 7,12,17,30. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE Bands 2, 4, 5, 7,12,17,30 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

LTE Band 2, 5MHz, QPSK, Channel 18607

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2400	-58.61	0.90	5.97	-53.54	-13.00	H
3701	-68.89	1.10	8.19	-61.80	-13.00	H
4159	-70.66	1.20	8.85	-63.01	-13.00	H
5547	-71.09	1.20	10.32	-61.97	-13.00	V
6860	-71.03	1.80	11.41	-61.42	-13.00	V
8436	-71.95	1.90	12.7	-61.15	-13.00	V

LTE Band 2, 5MHz, QPSK, Channel 18900

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2199	-65.80	0.90	4.53	-62.17	-13.00	H
3763	-72.17	1.10	8.19	-65.08	-13.00	H
5638	-73.36	1.20	10.32	-64.24	-13.00	H
7520	-65.57	1.80	11.91	-55.46	-13.00	H
9399	-72.59	2.00	12.89	-61.7	-13.00	V
11280	-71.60	2.10	13.14	-60.56	-13.00	V

LTE Band 2, 5MHz, QPSK, Channel 19193

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2396	-57.07	0.90	4.53	-53.44	-13.00	H
5728	-68.02	1.20	10.32	-58.9	-13.00	V
7637	-70.02	1.80	11.91	-59.91	-13.00	H
8620	-71.66	1.90	12.7	-60.86	-13.00	V
9685	-70.67	2.10	12.96	-59.81	-13.00	V
11595	-69.53	2.10	13.14	-58.49	-13.00	V

LTE Band 2, 5MHz, 16QAM, Channel 18607

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2399	-57.06	0.90	4.53	-53.43	-13.00	H
8447	-73.06	1.90	12.7	-62.26	-13.00	V
9892	-72.37	2.10	13.11	-61.36	-13.00	H
11163	-71.12	2.10	13.14	-60.08	-13.00	V
12347	-70.42	2.20	12.99	-59.63	-13.00	H
13720	-70.91	2.20	13.49	-59.62	-13.00	V

LTE Band 2, 5MHz, 16QAM, Channel 18900

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2393	-57.04	0.90	4.53	-53.41	-13.00	V
3760	-68.35	1.10	8.19	-61.26	-13.00	H
5640	-71.41	1.20	10.32	-62.29	-13.00	H
7520	-68.70	1.80	11.91	-58.59	-13.00	H
9400	-71.17	2.10	12.96	-60.31	-13.00	H
16625	-64.61	2.60	13.16	-54.05	-13.00	H

LTE Band 2, 5MHz, 16QAM, Channel 19193

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2391	-57.04	0.90	4.53	-53.41	-13.00	V
9811	-73.10	2.10	12.96	-62.24	-13.00	V
11238	-71.86	2.10	13.14	-60.82	-13.00	V
12791	-68.15	2.20	13.25	-57.1	-13.00	H
13583	-70.88	2.20	14.02	-59.06	-13.00	V
14884	-69.45	2.30	13.53	-58.22	-13.00	V

LTE Band 4, 5MHz QPSK, Channel 19957

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2395	-57.00	0.90	4.53	-53.37	-13.00	H
4367	-71.45	1.20	8.85	-63.8	-13.00	V
5700	-72.25	1.20	10.32	-63.13	-13.00	H
6843	-69.09	1.80	11.41	-59.48	-13.00	H
9818	-71.79	2.10	13.11	-60.78	-13.00	H
12238	-70.39	2.20	12.99	-59.6	-13.00	V

LTE Band 4, 5MHz, QPSK, Channel 20175

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2396	-57.02	0.90	4.53	-53.39	-13.00	H
2625	-66.99	1.00	5.97	-62.02	-13.00	V
6931	-72.01	1.80	11.41	-62.4	-13.00	V
8662	-73.94	1.90	12.7	-63.14	-13.00	H
16918	-65.05	2.60	13.52	-54.13	-13.00	H
17187	-65.03	2.90	13.52	-54.41	-13.00	V

LTE Band 4, 5MHz, QPSK, Channel 20393

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2405	-58.47	0.90	5.97	-53.4	-13.00	V
3754	-72.33	1.10	8.19	-65.24	-13.00	H
4823	-74.09	1.20	9.99	-65.3	-13.00	V
6825	-72.14	1.80	11.41	-62.53	-13.00	V
8490	-73.52	1.90	12.7	-62.72	-13.00	V
10580	-70.45	2.10	13.11	-59.44	-13.00	H

LTE Band 4, 5MHz, 16QAM, Channel 19957

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2401	-58.46	0.90	5.97	-53.39	-13.00	V
6331	-73.34	1.80	10.57	-64.57	-13.00	V
7553	-73.19	1.80	11.91	-63.08	-13.00	V
9075	-73.05	2.00	12.89	-62.16	-13.00	V
10201	-71.80	2.10	13.11	-60.79	-13.00	H
12166	-69.54	2.20	12.99	-58.75	-13.00	V

LTE Band 4, 5MHz, 16QAM, Channel 20175

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2395	-57.00	0.90	4.53	-53.37	-13.00	H
3463	-72.03	1.10	8.19	-64.94	-13.00	V
6930	-71.29	1.80	11.41	-61.68	-13.00	H
12122	-69.75	2.20	12.99	-58.96	-13.00	V
16817	-64.61	2.60	13.52	-53.69	-13.00	V
17001	-64.29	2.90	13.52	-53.67	-13.00	H

LTE Band 4, 5MHz, 16QAM, Channel 20393

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
2394	-56.89	0.90	4.53	-53.26	-13.00	H
5899	-73.78	1.20	10.57	-64.41	-13.00	V
7076	-74.01	1.80	11.41	-64.4	-13.00	V
11286	-69.72	2.10	13.14	-58.68	-13.00	V
13345	-69.67	2.20	13.49	-58.38	-13.00	H
14477	-70.44	2.30	13.84	-58.9	-13.00	V

LTE Band 5, 5MHz, QPSK, Channel 20407

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2239	-60.79	0.90	4.53	-59.31	-13.00	H
2365	-58.79	0.90	4.53	-57.31	-13.00	H
2407	-54.07	0.90	5.97	-51.15	-13.00	H
2481	-59.71	0.90	5.97	-56.79	-13.00	H
2645	-63.69	1.00	5.97	-60.87	-13.00	H
7725	-73.67	1.80	11.91	-65.71	-13.00	V

LTE Band 5, 5MHz, QPSK, Channel 20525

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2249	-61.43	0.90	4.53	-59.95	-13.00	H
2369	-58.01	0.90	4.53	-56.53	-13.00	H
2400	-53.28	0.90	5.97	-50.36	-13.00	H
2453	-58.39	0.90	5.97	-55.47	-13.00	H
2625	-63.16	1.00	5.97	-60.34	-13.00	H
5017	-75.00	1.20	9.99	-68.36	-13.00	V

LTE Band 5, 5MHz, QPSK, Channel 20643

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2239	-60.80	0.90	4.53	-59.32	-13.00	H
2360	-59.61	0.90	4.53	-58.13	-13.00	H
2400	-53.28	0.90	5.97	-50.36	-13.00	H
2471	-58.61	0.90	5.97	-55.69	-13.00	H
2615	-63.29	1.00	5.97	-60.47	-13.00	H
6787	-69.23	1.80	10.87	-62.31	-13.00	H

LTE Band 5, 5MHz, 16QAM, Channel 20407

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2201	-68.54	0.90	4.53	-67.06	-13.00	V
2343	-66.57	0.90	4.53	-65.09	-13.00	V
2398	-60.39	0.90	4.53	-58.91	-13.00	V
2499	-67.59	0.90	5.97	-64.67	-13.00	V
2633	-70.30	1.00	5.97	-67.48	-13.00	V
7386	-71.38	1.80	11.41	-63.92	-13.00	H

LTE Band 5, 5MHz, 16QAM, Channel 20525

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2239	-60.76	0.90	4.53	-59.28	-13.00	H
2400	-53.25	0.90	5.97	-50.33	-13.00	H
2443	-58.03	0.90	5.97	-55.11	-13.00	H
2490	-60.72	0.90	5.97	-57.8	-13.00	H
2655	-64.05	1.00	5.97	-61.23	-13.00	H
6692	-71.25	1.80	10.87	-64.33	-13.00	H

LTE Band 5, 5MHz, 16QAM, Channel 20643

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2233	-61.12	0.90	4.53	-59.64	-13.00	H
2375	-56.80	0.90	4.53	-55.32	-13.00	H
2400	-53.28	0.90	5.97	-50.36	-13.00	H
2471	-58.70	0.90	5.97	-55.78	-13.00	H
2537	-63.28	1.00	5.97	-60.46	-13.00	H
4581	-73.21	1.20	9.37	-67.19	-13.00	V

LTE Band 7, 5 MHz, QPSK, Channel 20775

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2376	-57.06	0.90	4.53	-53.43	-13.00	V
6851	-70.43	1.80	10.87	-61.36	-13.00	H
8547	-72.61	1.90	12.7	-61.81	-13.00	V
10002	-64.89	2.10	13.11	-53.88	-13.00	V
11421	-69.48	2.10	13.14	-58.44	-13.00	V
12817	-70.92	2.20	13.49	-59.63	-13.00	V

LTE Band 7, 5 MHz, QPSK, Channel 21100

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2401	-58.59	0.90	5.97	-53.52	-13.00	V
5070	-75.23	1.20	9.99	-66.44	-13.00	H
7605	-73.71	1.80	11.91	-63.60	-13.00	H
10140	-68.15	2.10	13.11	-57.14	-13.00	V
12677	-70.16	2.20	13.25	-59.11	-13.00	V
17009	-64.59	2.90	13.52	-53.97	-13.00	V

LTE Band 7, 5 MHz, QPSK, Channel 21425

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2400	-58.62	0.90	5.97	-53.55	-13.00	V
9279	-72.96	2.00	12.89	-62.07	-13.00	V
10270	-66.20	2.10	13.11	-55.19	-13.00	V
11284	-71.03	2.10	13.14	-59.99	-13.00	V
12688	-69.01	2.20	13.25	-57.96	-13.00	V
14281	-68.95	2.30	13.84	-57.41	-13.00	V

LTE Band 7, 5 MHz, 16QAM, Channel 20775

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2620	-61.88	1.00	5.97	-56.91	-13.00	V
5241	-71.24	1.20	9.99	-62.45	-13.00	V
6385	-71.08	1.80	10.57	-62.31	-13.00	V
7505	-73.70	1.80	11.91	-63.59	-13.00	H
8530	-72.64	1.90	12.7	-61.84	-13.00	V
10005	-70.19	2.10	13.11	-59.18	-13.00	V

LTE Band 7, 5 MHz, 16QAM, Channel 21100

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2395	-57.04	0.90	4.53	-53.41	-13.00	V
5069	-73.78	1.20	10.32	-64.66	-13.00	H
7607	-72.82	1.80	11.91	-62.71	-13.00	H
10142	-71.83	2.10	13.11	-60.82	-13.00	V
15211	-67.97	2.50	13.53	-56.94	-13.00	H
16786	-63.72	2.60	13.16	-53.16	-13.00	V

LTE Band 7, 5 MHz, 16QAM, Channel 21425

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2401	-58.73	0.90	5.97	-53.66	-13.00	H
5209	-70.60	1.20	9.99	-61.81	-13.00	V
6739	-71.40	1.80	10.87	-62.33	-13.00	H
8388	-72.10	1.90	12.17	-61.83	-13.00	V
11367	-69.75	2.10	13.14	-58.71	-13.00	V
12204	-69.00	2.20	12.99	-58.21	-13.00	H

LTE Band 12, 5MHz, QPSK, Channel 23035

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
1398.7	-27.03	3.55	-4.97	-27.76	-13.00	H
2098.06	-41	4.4	-4.89	-42.66	-13.00	V
2797.14	-53.19	5.04	-6.63	-53.75	-13.00	V
3496.68	-49.55	5.69	-8.19	-49.20	-13.00	V
4196.27	-56.41	6.22	-9.1	-55.68	-13.00	V
4895.38	-44.72	6.72	-9.8	-43.79	-13.00	H

LTE Band 12, 5MHz, QPSK, Channel 23095

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2123.02	-49.01	4.41	-4.97	-50.60	-13.00	V
2831.07	-58.9	5.07	-6.7	-59.42	-13.00	V
3538.3	-53.33	5.75	-8.25	-52.98	-13.00	V
4246.11	-54.21	6.25	-9.15	-53.46	-13.00	V
4953.59	-42.93	6.73	-9.85	-41.96	-13.00	H
5609.22	-66.5	7.18	-10.58	-65.25	-13.00	H

LTE Band 12, 5MHz, QPSK, Channel 23155

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
1427.48	-50.17	3.59	-5.12	-50.79	-13.00	V
2140.96	-49.9	4.41	-5.02	-51.44	-13.00	V
2854.68	-48.25	5.11	-6.74	-48.77	-13.00	V
3568.34	-45.13	5.69	-8.3	-44.67	-13.00	H
4281.85	-46.89	6.29	-9.18	-46.15	-13.00	V
4995.99	-44.97	6.79	-9.9	-44.01	-13.00	H

LTE Band 12, 5MHz, 16QAM, Channel 23035

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
1398.69	-51.01	3.55	-4.97	-51.74	-13.00	V
2098.07	-41.86	4.4	-4.89	-43.52	-13.00	V
2798.66	-56.72	5.04	-6.64	-57.27	-13.00	H
3496.91	-50.13	5.69	-8.19	-49.78	-13.00	V
4196.03	-55.53	6.22	-9.1	-54.80	-13.00	V
4895.46	-44.71	6.72	-9.8	-43.78	-13.00	H

LTE Band 12, 5MHz 16QAM, Channel 23095

Frequency(MHz)	PMea(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2123	-48.25	4.41	-4.97	-49.84	-13.00	V
2830.69	-58.9	5.07	-6.7	-59.42	-13.00	V
3538.31	-54.08	5.75	-8.25	-53.73	-13.00	V
4245.9	-56.99	6.25	-9.15	-56.24	-13.00	V
4953.86	-43.02	6.73	-9.85	-42.05	-13.00	H
5654.12	-64.48	7.2	-10.57	-63.26	-13.00	V

LTE Band 12, 5MHz, 16QAM, Channel 23155

Frequency(MHz)	PMea(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
1427.44	-51.06	3.59	-5.12	-51.68	-13.00	V
2141.02	-49.3	4.41	-5.02	-50.84	-13.00	V
2854.72	-51.03	5.11	-6.74	-51.55	-13.00	V
3568.55	-45.46	5.69	-8.3	-45.00	-13.00	H
4281.9	-49.84	6.29	-9.18	-49.10	-13.00	V
4995.71	-44.73	6.78	-9.9	-43.76	-13.00	H

Note: The maximum value of expanded measurement uncertainty for this test item is $U = 4.2$ dB, $k = 2$.

A.3 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.235, 24.235, 27.54.

A.3.1 Method of Measurement

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 ℃ increments from +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

A.3.2 Measurement Limit

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d) (2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.4VDC and 4.32VDC, with a nominal voltage of 3.8VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance from -5.4% to 10.8%. For the purposes of measuring frequency stability these voltage limits are to be used.

A.3.3 Measurement results

LTE Band 2, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.6	9	22	0.005	0.012
4.0	11	11	0.006	0.006
4.4	24	9	0.013	0.005

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30°	16	23	0.009	0.012
-20°	23	6	0.012	0.003
-10°	5	14	0.003	0.007
0°	11	13	0.006	0.007
10°	9	8	0.005	0.004
20°	23	23	0.012	0.012
30°	26	14	0.014	0.007
40°	18	6	0.010	0.003
50°	36	27	0.019	0.014

LTE Band 4, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.6	34	8	0.020	0.005
4.0	13	22	0.008	0.013
4.4	22	14	0.013	0.008

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30°	36	24	0.021	0.014
-20°	33	6	0.019	0.003
-10°	29	12	0.017	0.007
0°	7	19	0.004	0.011
10°	12	34	0.007	0.020
20°	29	8	0.017	0.005
30°	33	13	0.019	0.008
40°	12	27	0.007	0.016
50°	5	22	0.003	0.013

LTE Band 5, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.6	15	13	0.018	0.016
4.0	7	1	0.008	0.001
4.4	22	6	0.026	0.007

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30°	13	23	0.016	0.027
-20°	23	2	0.027	0.002
-10°	11	17	0.013	0.020
0°	6	13	0.007	0.016
10°	9	9	0.011	0.011
20°	3	6	0.004	0.007
30°	8	11	0.010	0.013
40°	11	9	0.013	0.011
50°	16	17	0.019	0.020

LTE Band 7, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.6	13	10	0.005	0.004
4.0	3	4	0.001	0.002
4.4	22	13	0.009	0.005

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30°	14	6	0.006	0.002
-20°	16	14	0.006	0.006
-10°	9	8	0.004	0.003
0°	18	5	0.007	0.002
10°	13	11	0.005	0.004
20°	9	2	0.004	0.001
30°	12	5	0.005	0.002
40°	8	7	0.003	0.003
50°	18	14	0.007	0.006

LTE Band 12, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.6	11	8	0.016	0.011
4.0	7	1	0.010	0.001
4.4	22	5	0.031	0.007

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30°	9	5	0.013	0.007
-20°	16	11	0.023	0.016
-10°	4	7	0.006	0.010
0°	11	9	0.016	0.013
10°	8	6	0.011	0.008
20°	3	3	0.004	0.004
30°	4	4	0.006	0.006
40°	13	8	0.018	0.011
50°	23	10	0.033	0.014

Expanded measurement uncertainty for this test item is 10 Hz, $k = 2$.

A.4 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049(h)(i)

A.4.1 Occupied Bandwidth Results

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the US Cellular/PCS frequency bands. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

The measurement method is from KDB 971168 4.2:

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

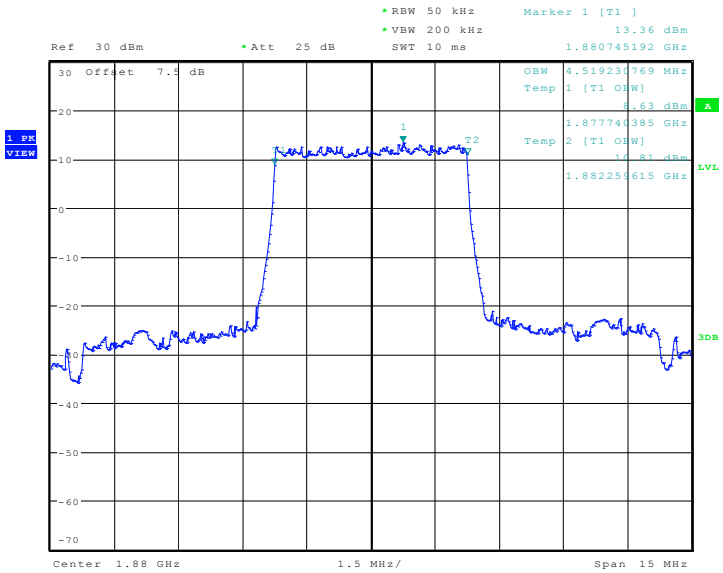
d) Set the detection mode to peak, and the trace mode to max hold.

e) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

LTE band 2, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	4519.23	4495.19

LTE band 2, 5MHz Bandwidth, QPSK (99% BW)



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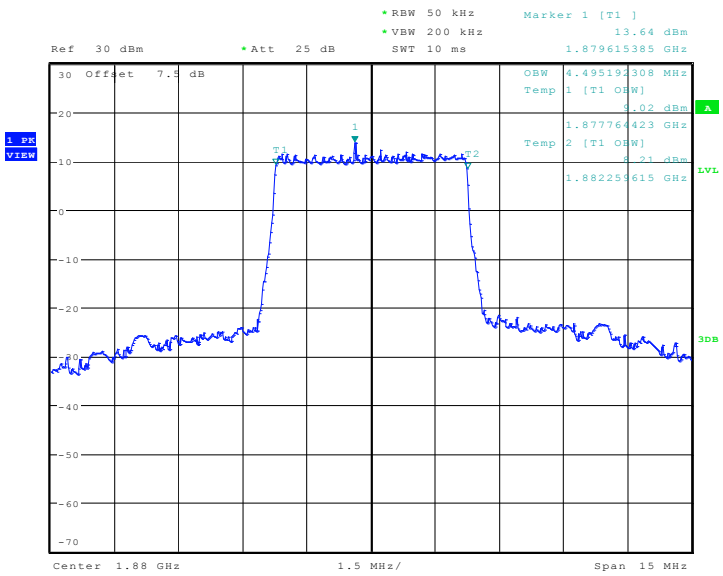
LTE band 2, 5MHz Bandwidth,16QAM (99% BW)



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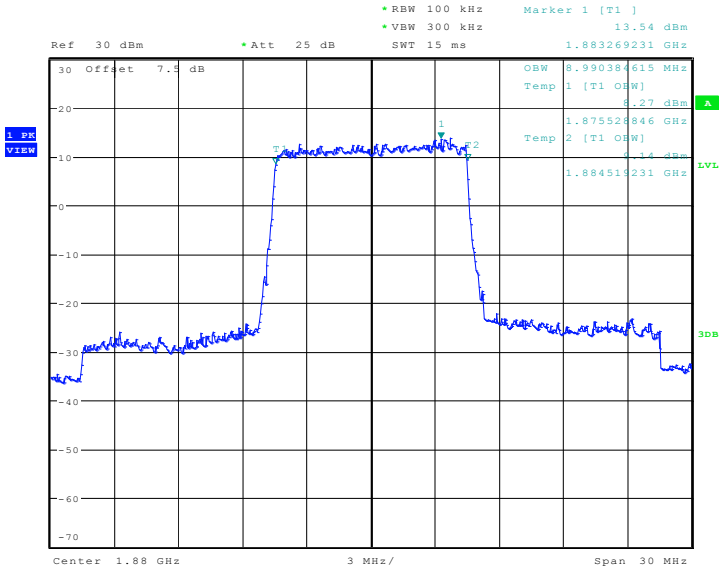
LTE band 2, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	8990.38	8990.38

LTE band 2, 10MHz Bandwidth, QPSK (99% BW)



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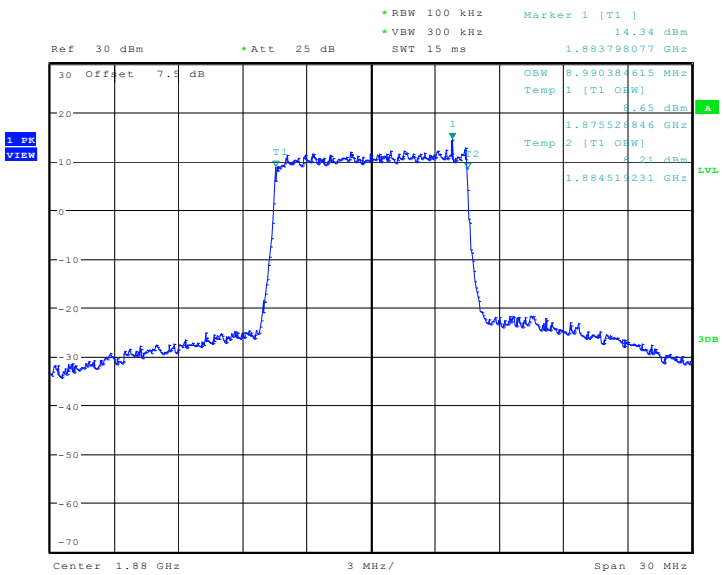
LTE band 2, 10MHz Bandwidth, 16QAM (99% BW)



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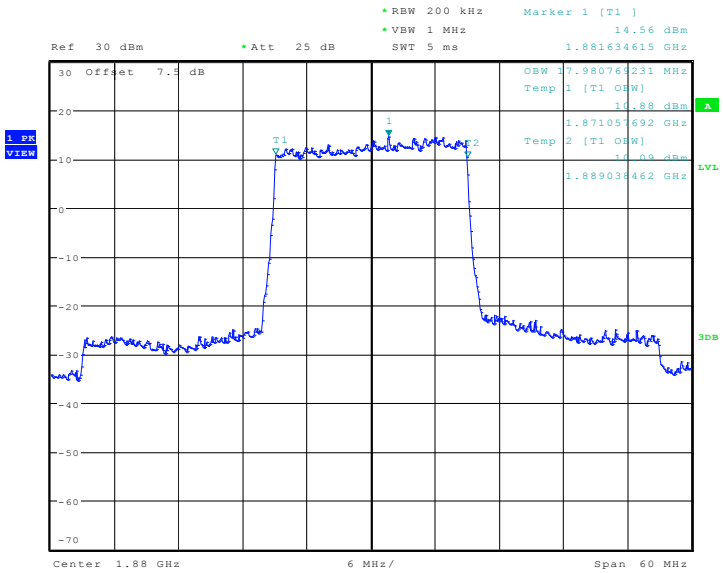
LTE band 2, 20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	17980.77	17980.77

LTE band 2, 20MHz Bandwidth, QPSK (99% BW)



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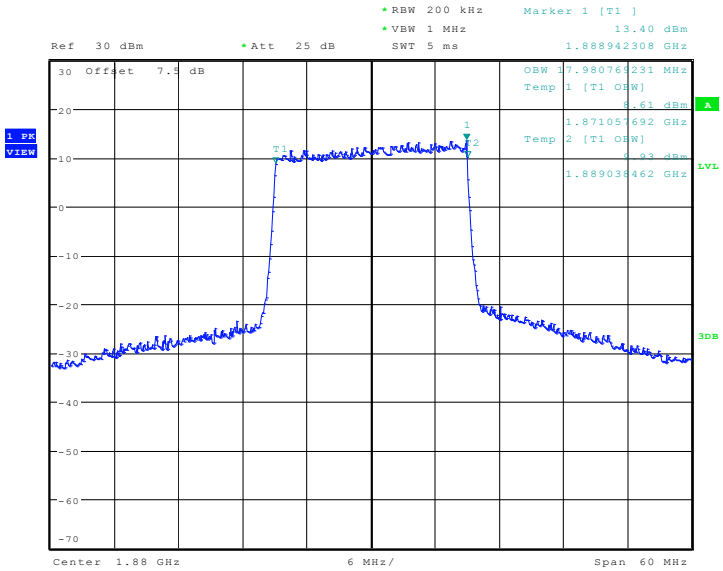
LTE band 2, 20MHz Bandwidth, 16QAM (99% BW)



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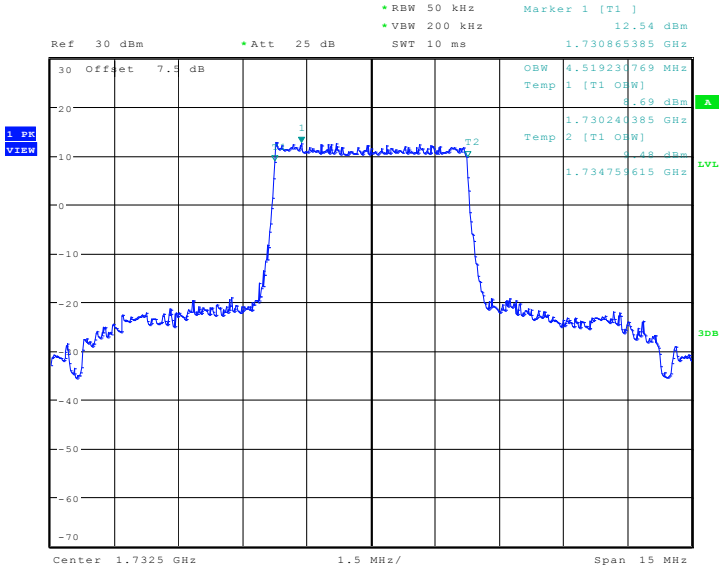
LTE band 4, 5MHz (99%)

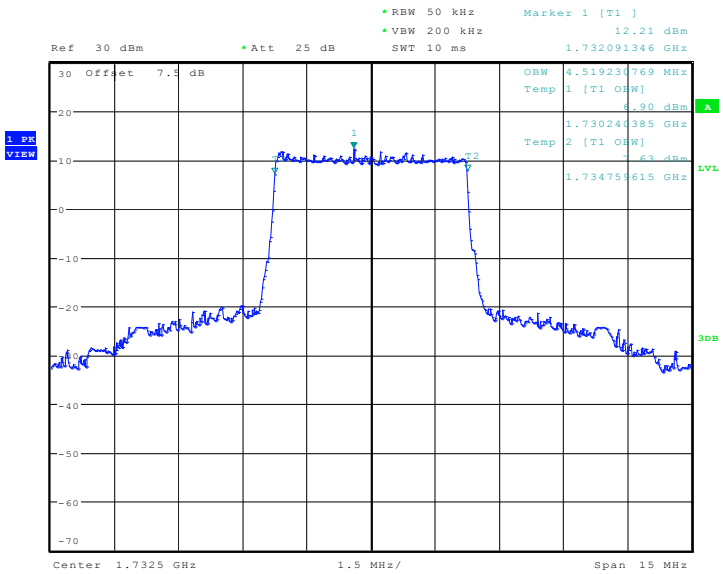
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	4519.23	4519.23

LTE band 4, 5MHz Bandwidth, QPSK (99% BW)



Date: 31.OCT.2016 19:40:03

LTE band 4, 5MHz Bandwidth,16QAM (99% BW)

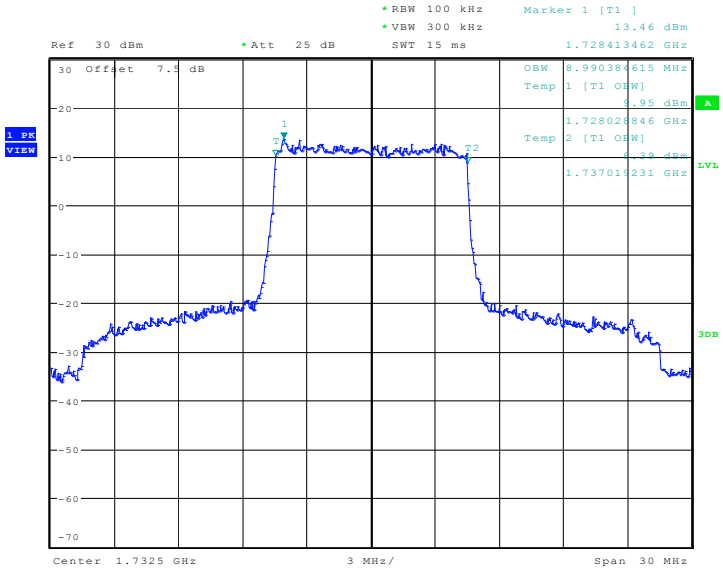


Date: 31.OCT.2016 19:39:37

LTE band 4, 10MHz (99%)

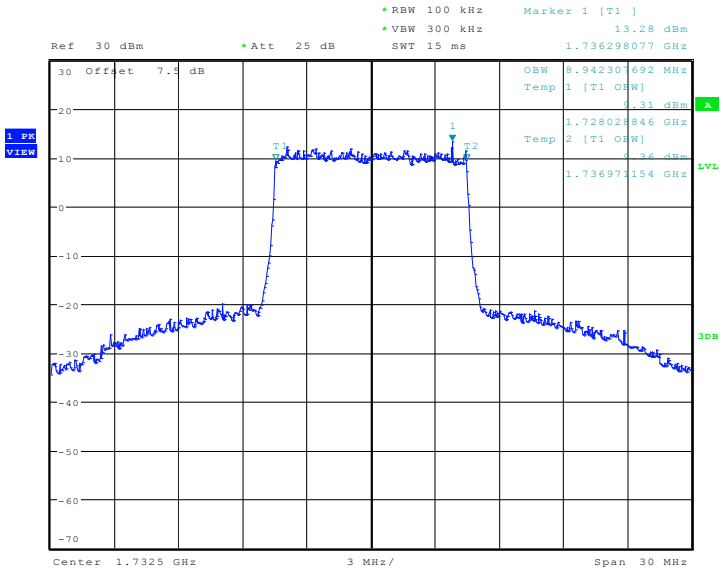
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	8990.38	8942.31

LTE band 4, 10MHz Bandwidth, QPSK (99% BW)



Date: 31.OCT.2016 19:34:27

LTE band 4, 10MHz Bandwidth, 16QAM (99% BW)

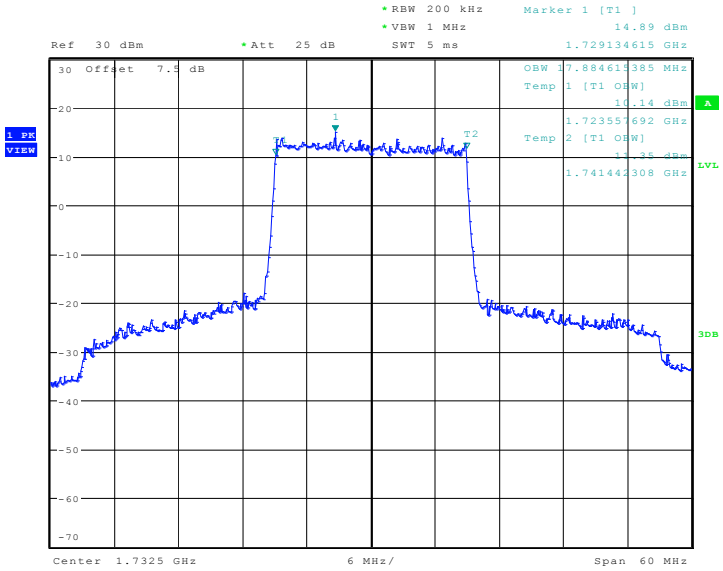


Date: 31.OCT.2016 19:34:55

LTE band 4, 20MHz (99%)

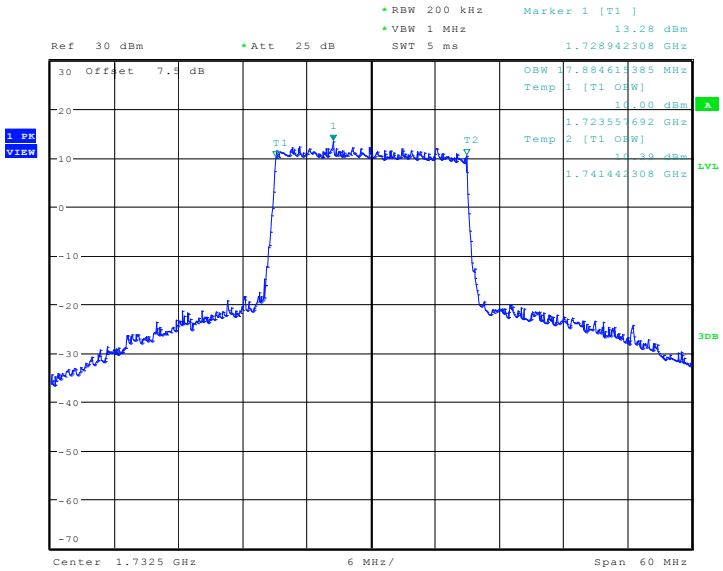
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	17884.62	17884.62

LTE band 4, 20MHz Bandwidth, QPSK (99% BW)



Date: 31.OCT.2016 19:33:21

LTE band 4, 20MHz Bandwidth, 16QAM (99% BW)

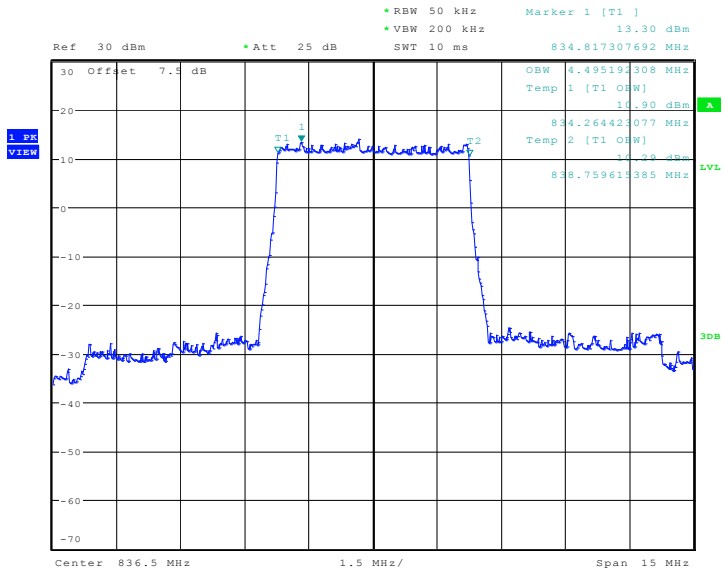


Date: 31.OCT.2016 19:32:50

LTE band 5, 5MHz (99%)

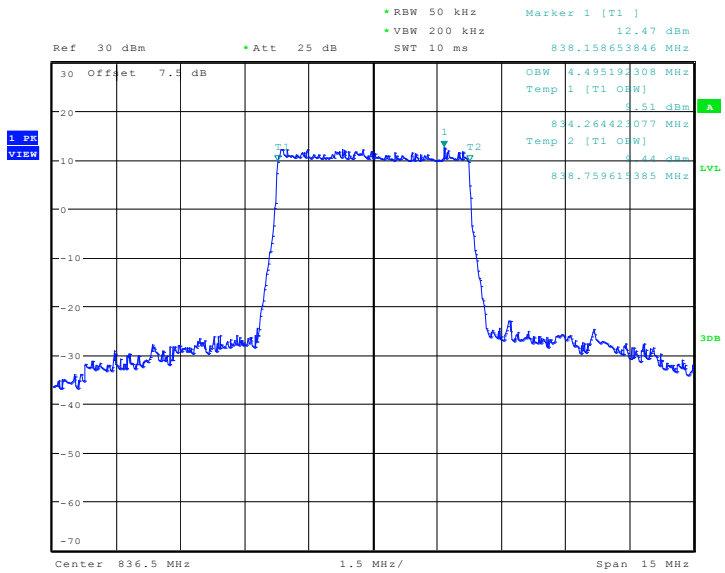
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	4495.19	4495.19

LTE band 5, 5MHz Bandwidth, QPSK (99% BW)



Date: 31.OCT.2016 19:41:49

LTE band 5, 5MHz Bandwidth,16QAM (99% BW)

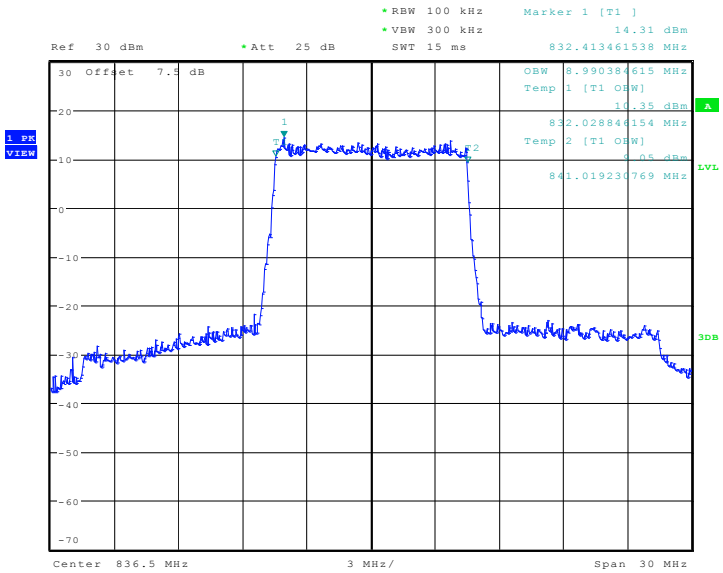


Date: 31.OCT.2016 19:42:27

LTE band 5, 10MHz (99%)

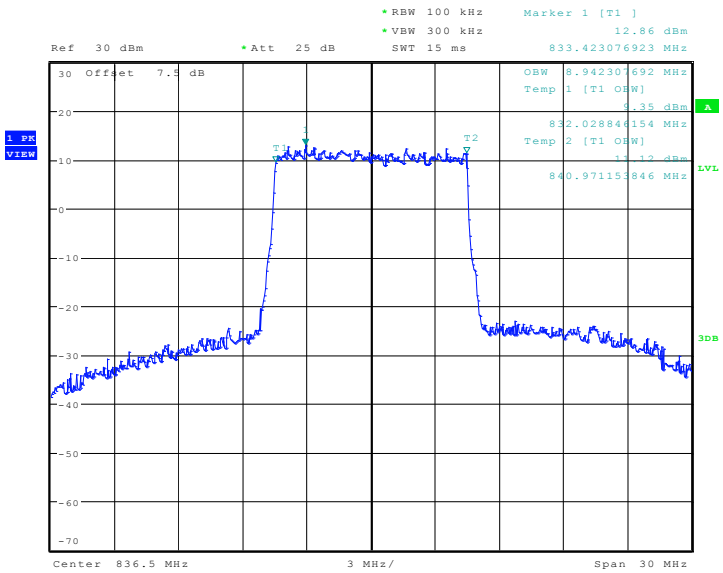
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	8990.38	8942.31

LTE band 5, 10MHz Bandwidth, QPSK (99% BW)



Date: 31.OCT.2016 19:47:05

LTE band 5, 10MHz Bandwidth, 16QAM (99% BW)

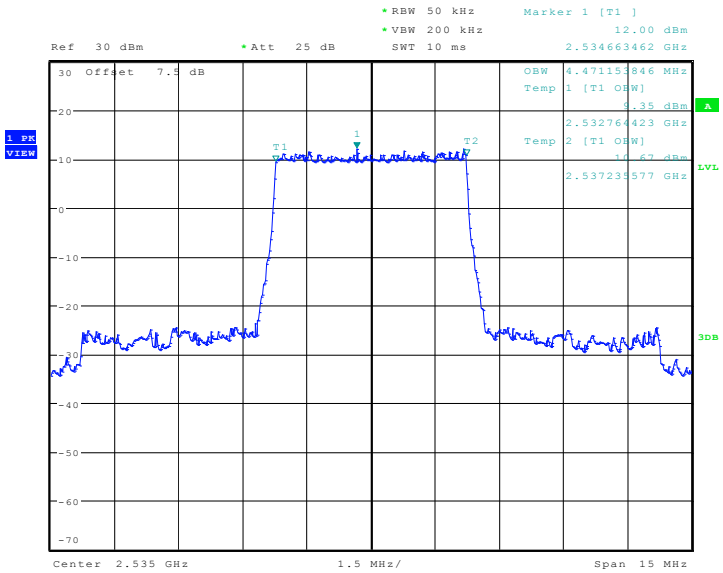


Date: 31.OCT.2016 19:46:25

LTE band 7, 5MHz (99%)

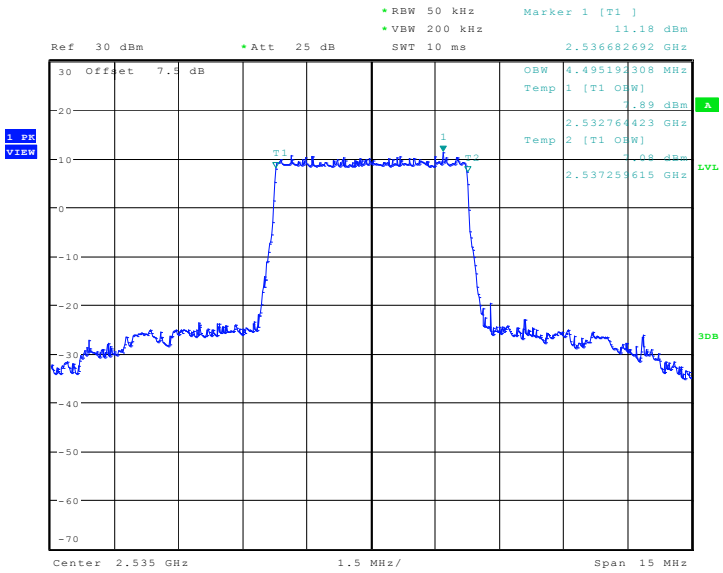
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	4471.15	4495.19

LTE band 7, 5MHz Bandwidth, QPSK (99% BW)



Date: 31.OCT.2016 19:49:06

LTE band 7, 5MHz Bandwidth,16QAM (99% BW)

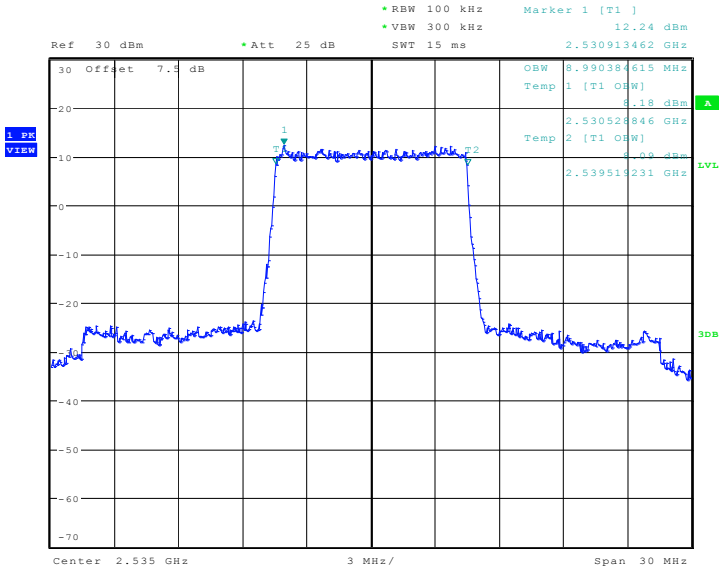


Date: 31.OCT.2016 19:49:34

LTE band 7, 10MHz (99%)

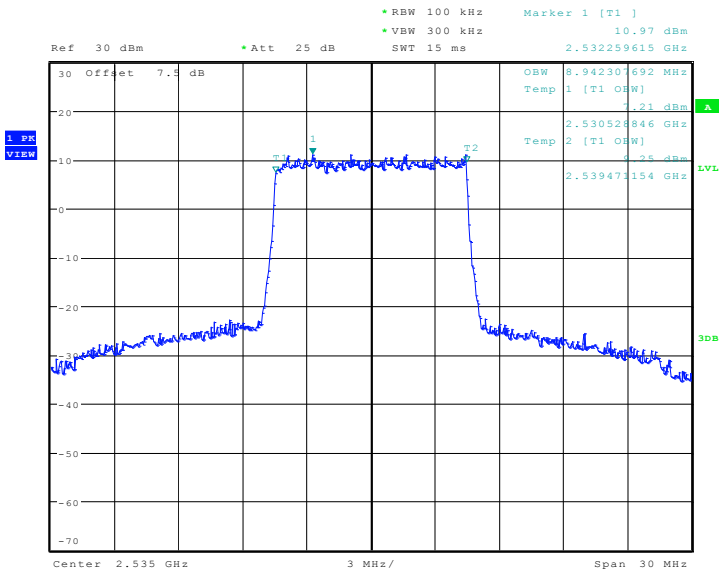
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	8990.38	8942.31

LTE band 7, 10MHz Bandwidth, QPSK (99% BW)



Date: 31.OCT.2016 19:54:08

LTE band 7, 10MHz Bandwidth, 16QAM (99% BW)

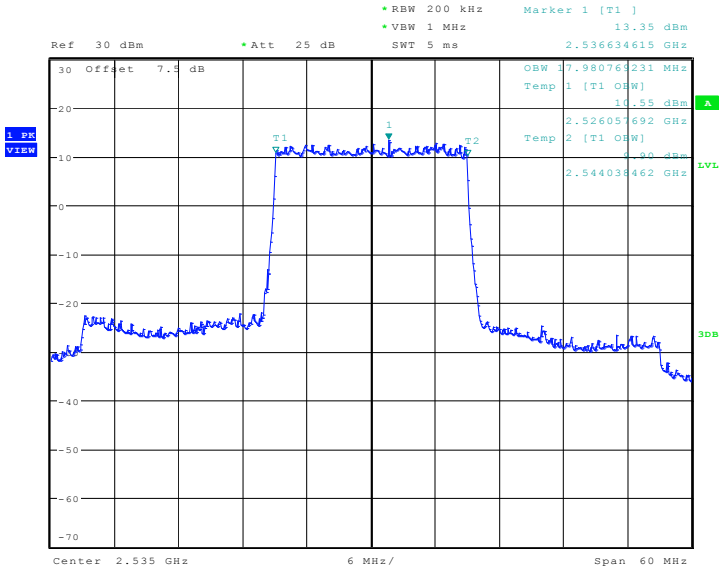


Date: 31.OCT.2016 19:53:26

LTE band 7, 20MHz (99%)

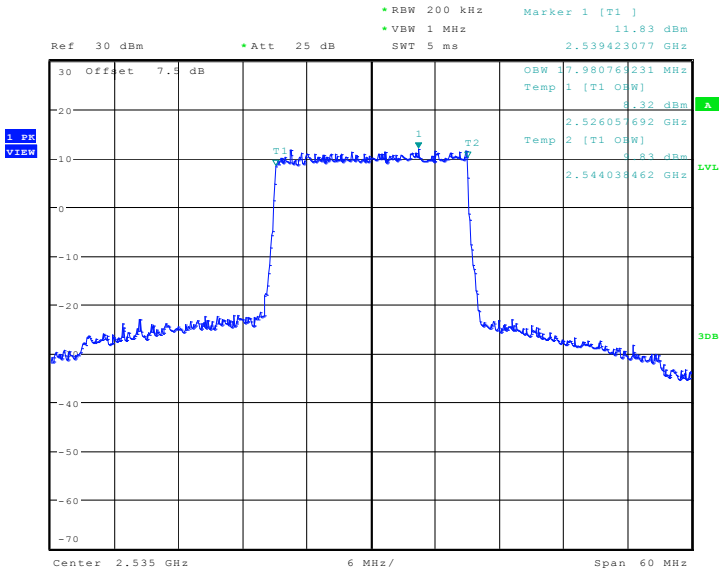
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	17980.77	17980.77

LTE band 7, 20MHz Bandwidth, QPSK (99% BW)



Date: 31.OCT.2016 19:56:04

LTE band 7, 20MHz Bandwidth, 16QAM (99% BW)

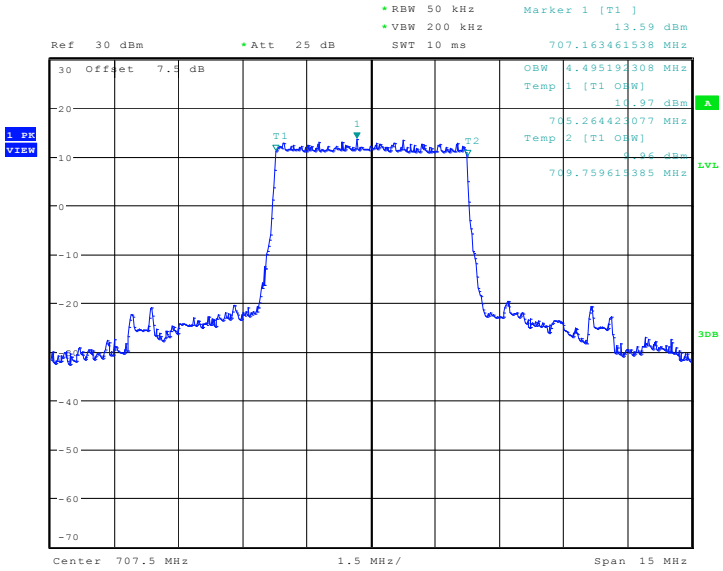


Date: 31.OCT.2016 19:56:33

LTE band 12, 5MHz (99%)

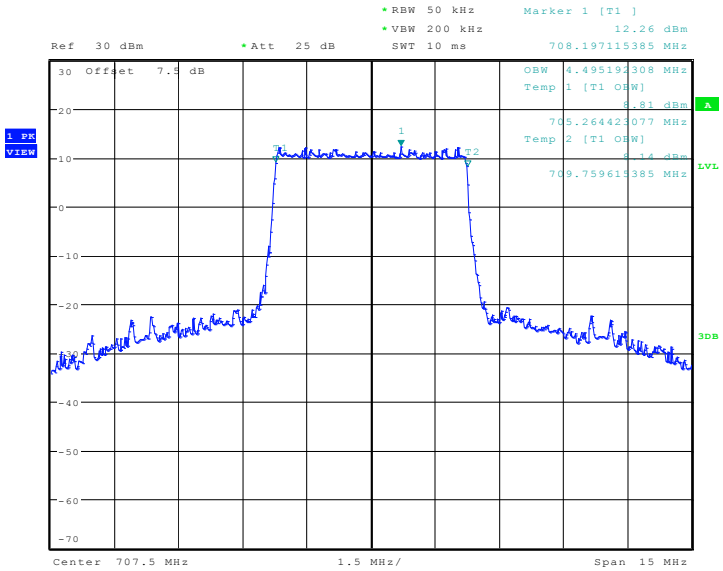
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
707.5	4495.19	4495.19

LTE band 12, 5MHz Bandwidth, QPSK (99% BW)



Date: 31.OCT.2016 20:01:41

LTE band 12, 5MHz Bandwidth,16QAM (99% BW)

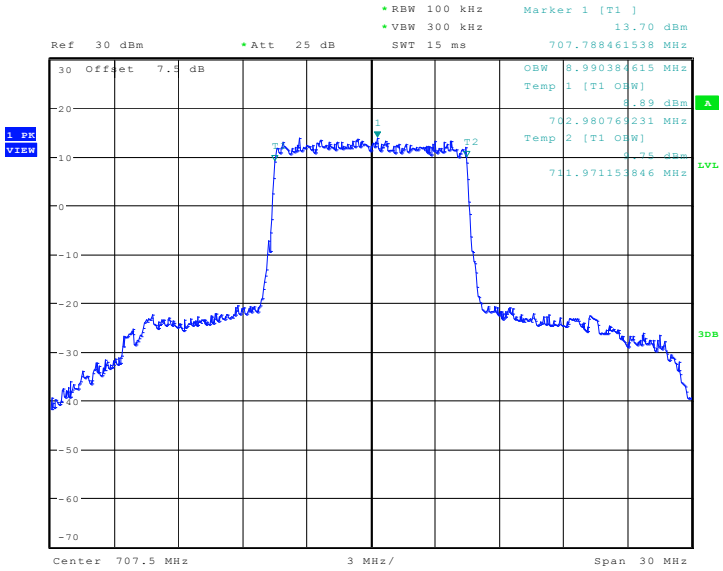


Date: 31.OCT.2016 20:01:16

LTE band 12, 10MHz (99%)

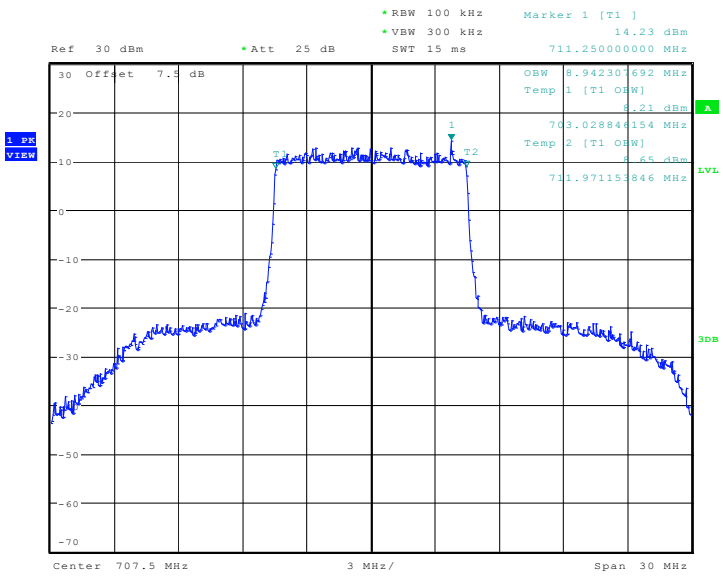
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	8990.38	8942.31

LTE band 12, 10MHz Bandwidth, QPSK (99% BW)



Date: 31.OCT.2016 20:02:31

LTE band 12, 10MHz Bandwidth, 16QAM (99% BW)



Date: 31.OCT.2016 20:02:51

A.5 EMISSION BANDWIDTH

Reference

FCC: CFR Part 22.917(b), 24.238(a), 27.53(h)

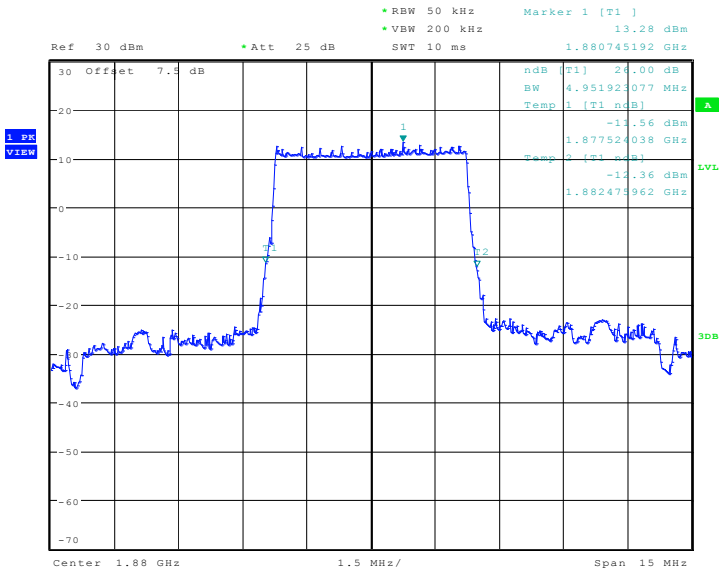
A.5.1Emission Bandwidth Results

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

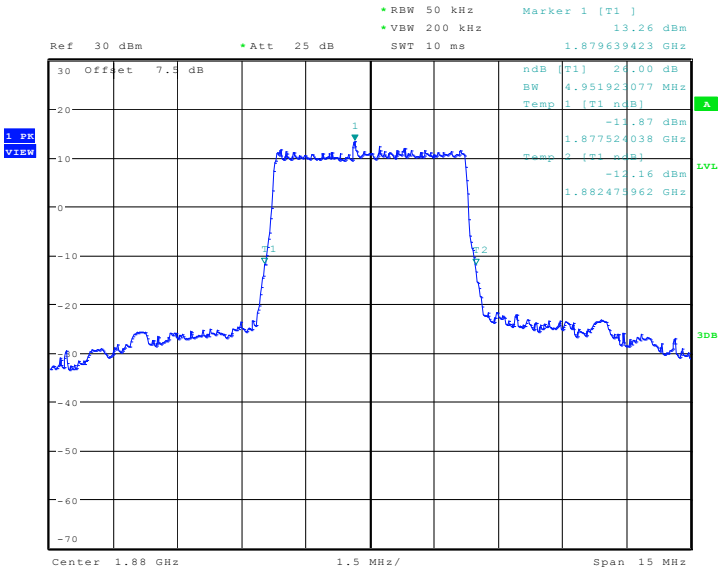
LTE band 2, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	4951.92	4951.92

LTE band 2, 5MHz Bandwidth, QPSK (-26dBc BW)



LTE band 2, 5MHz Bandwidth,16QAM (-26dBc BW)

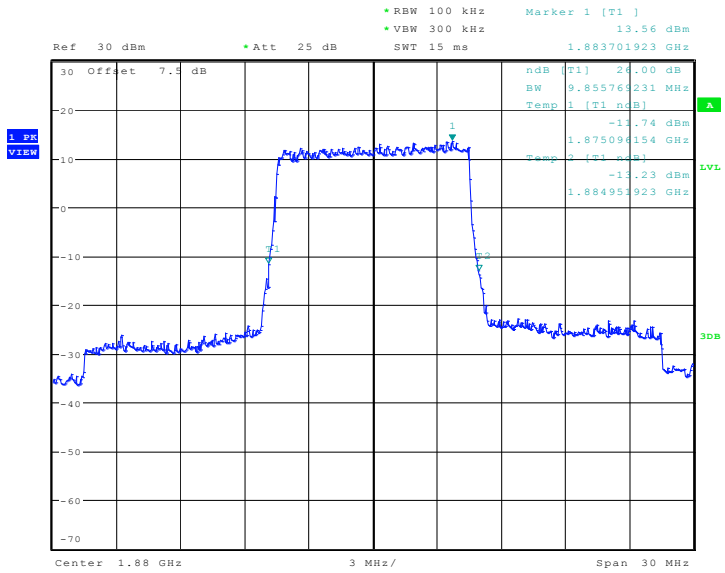


Date: 31.OCT.2016 19:19:53

LTE band 2, 10MHz (-26dBc)

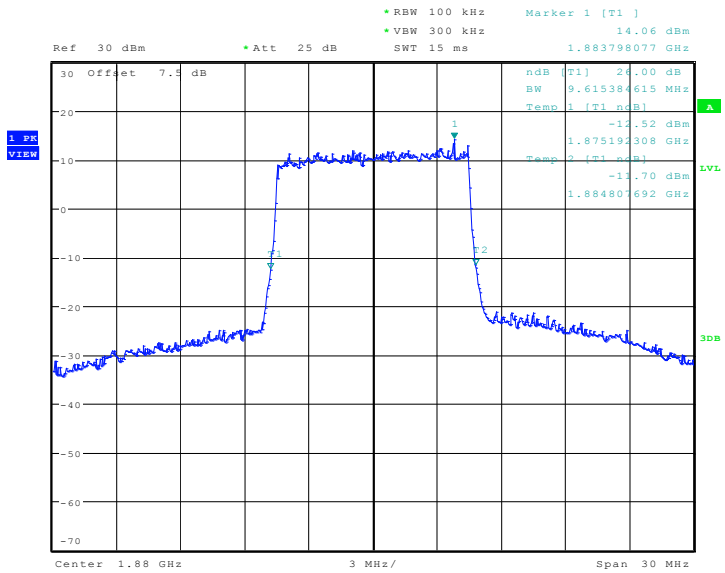
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	9855.77	9615.38

LTE band 2, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 19:22:24

LTE band 2, 10MHz Bandwidth, 16QAM (-26dBc BW)

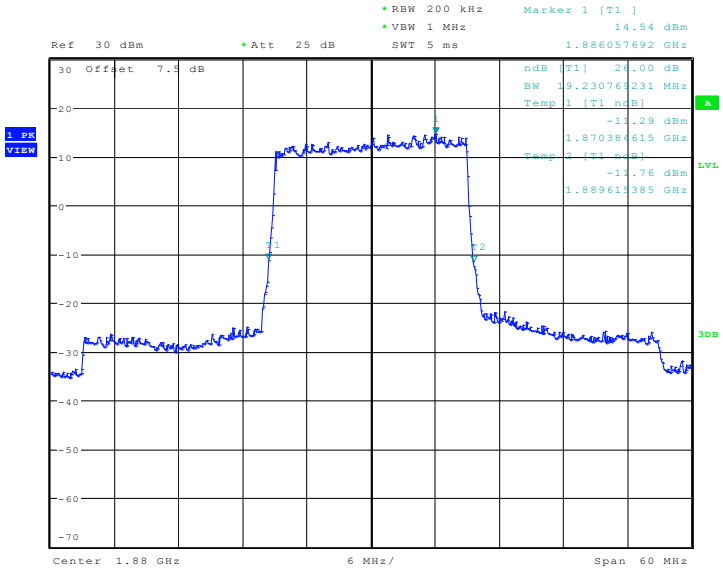


Date: 31.OCT.2016 19:22:52

LTE band 2, 20MHz (-26dBc)

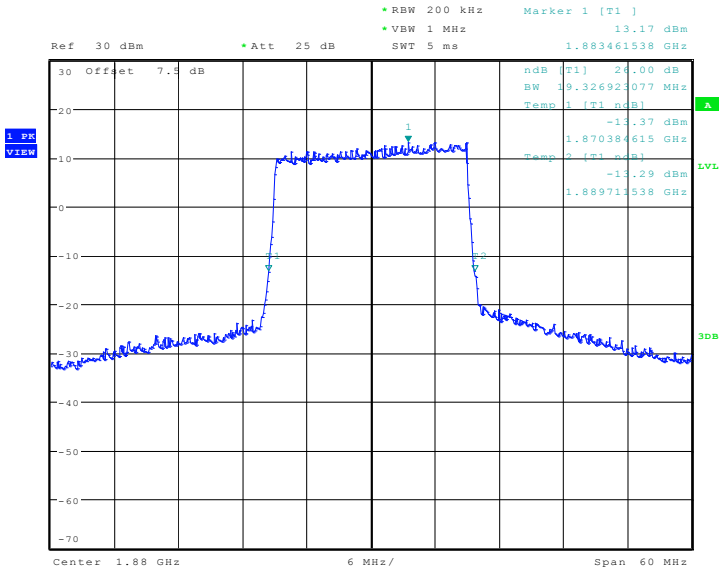
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	19230.77	19326.92

LTE band 2, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 19:27:14

LTE band 2, 20MHz Bandwidth, 16QAM (-26dBc BW)

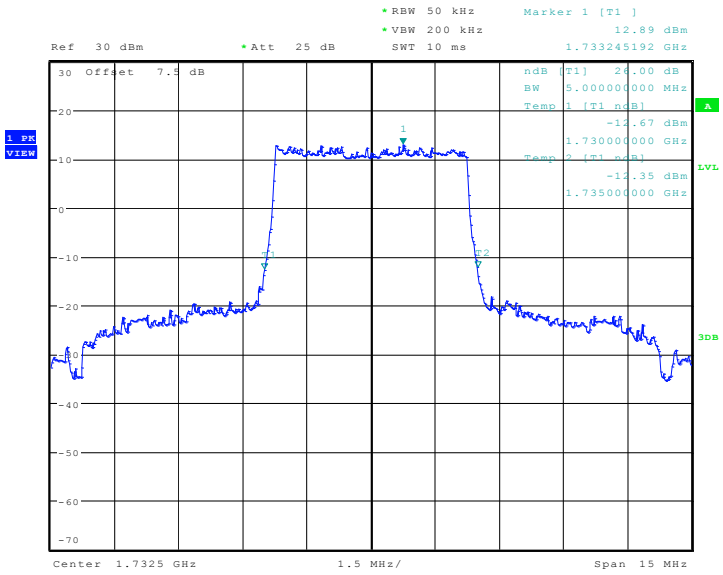


Date: 31.OCT.2016 19:26:32

LTE band 4, 5MHz (-26dBc)

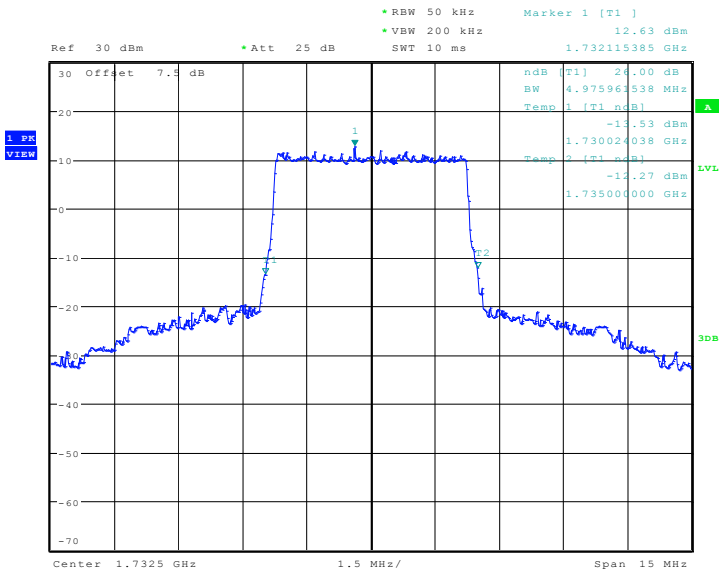
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	5000.00	4975.96

LTE band 4, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 19:38:33

LTE band 4, 5MHz Bandwidth,16QAM (-26dBc BW)

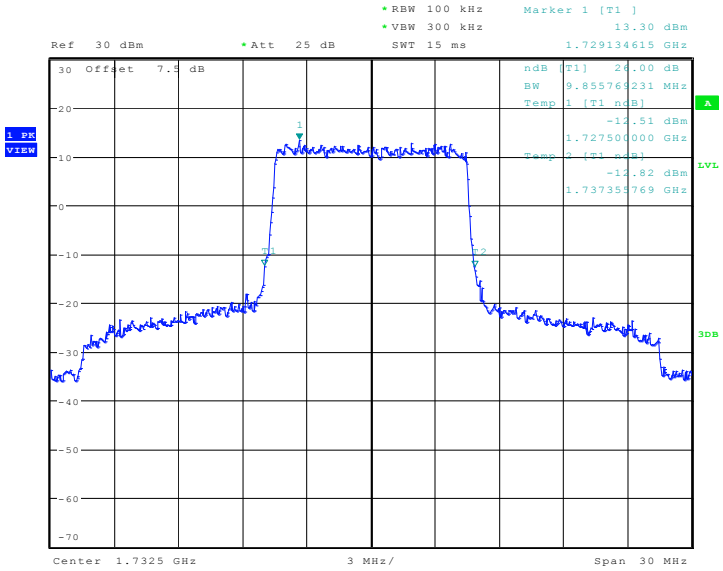


Date: 31.OCT.2016 19:39:09

LTE band 4, 10MHz (-26dBc)

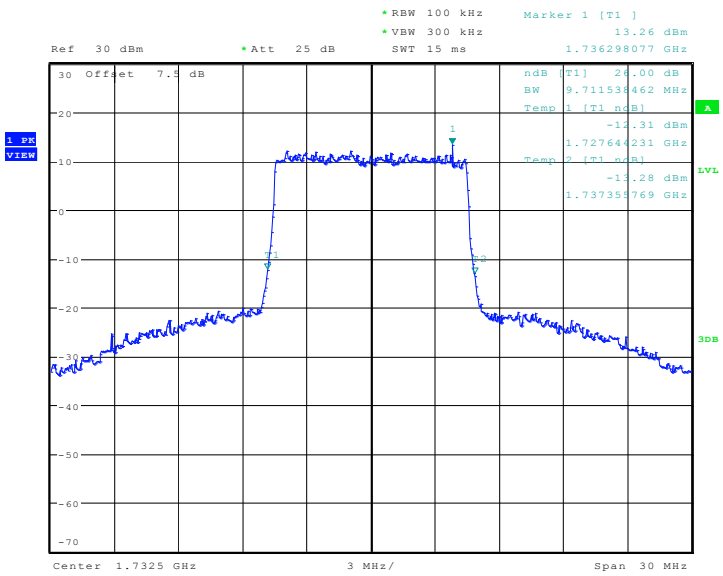
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	9855.77	9711.54

LTE band 4, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 19:36:51

LTE band 4, 10MHz Bandwidth, 16QAM (-26dBc BW)

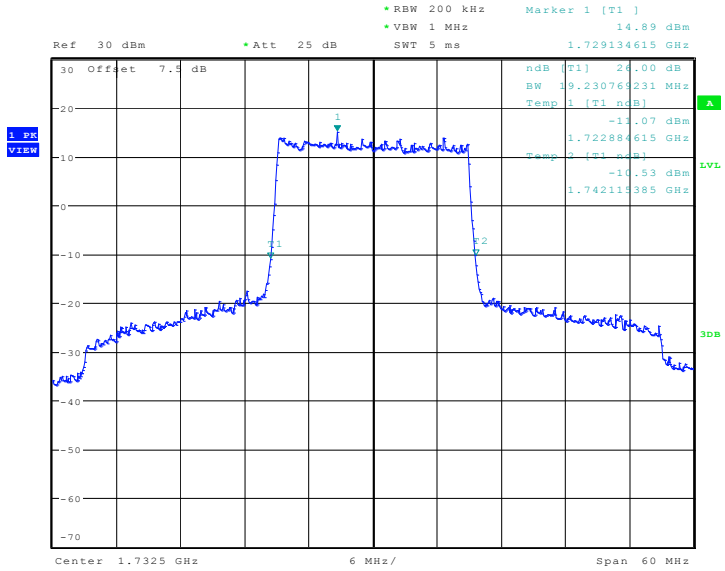


Date: 31.OCT.2016 19:35:29

LTE band 4, 20MHz (-26dBc)

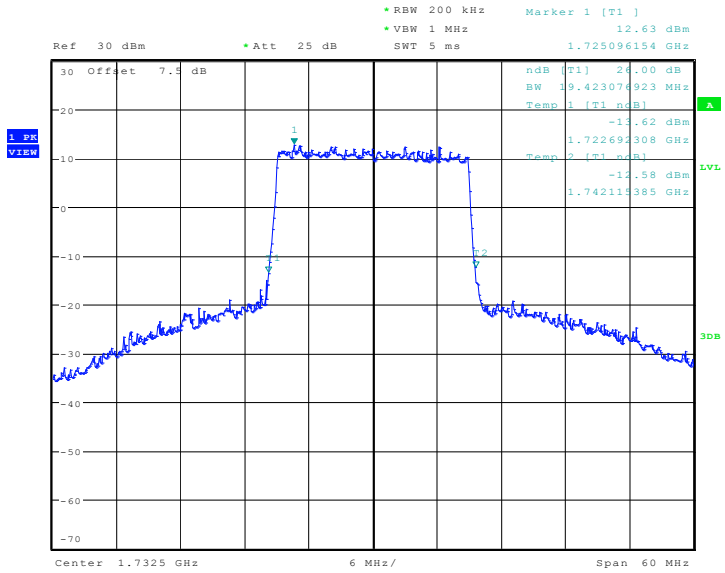
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	19230.77	19423.08

LTE band 4, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 19:31:47

LTE band 4, 20MHz Bandwidth, 16QAM (-26dBc BW)

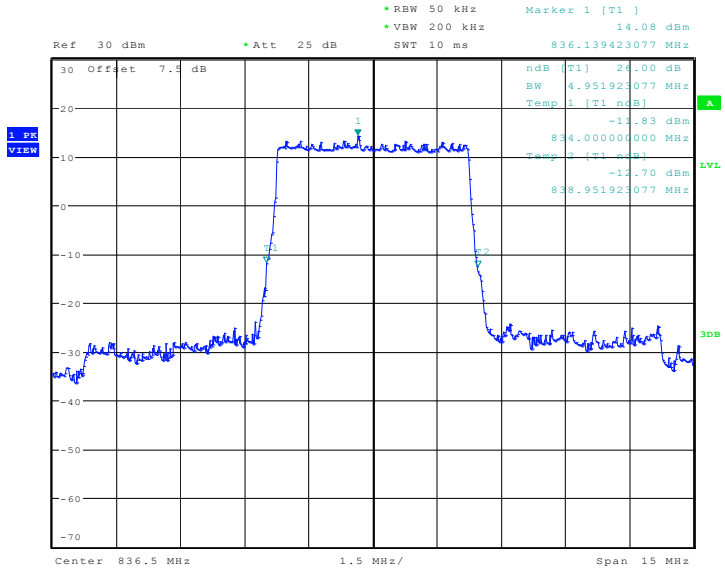


Date: 31.OCT.2016 19:32:20

LTE band 5, 5MHz (-26dBc)

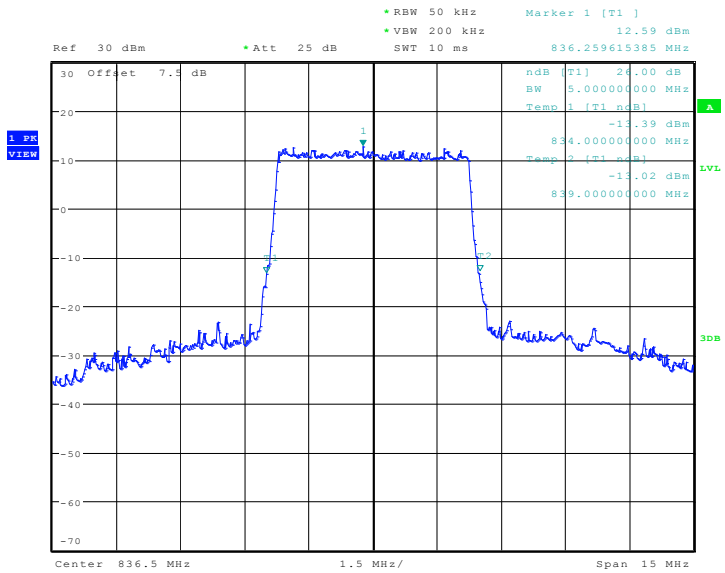
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	4951.92	5000.00

LTE band 5, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 19:44:08

LTE band 5, 5MHz Bandwidth,16QAM (-26dBc BW)

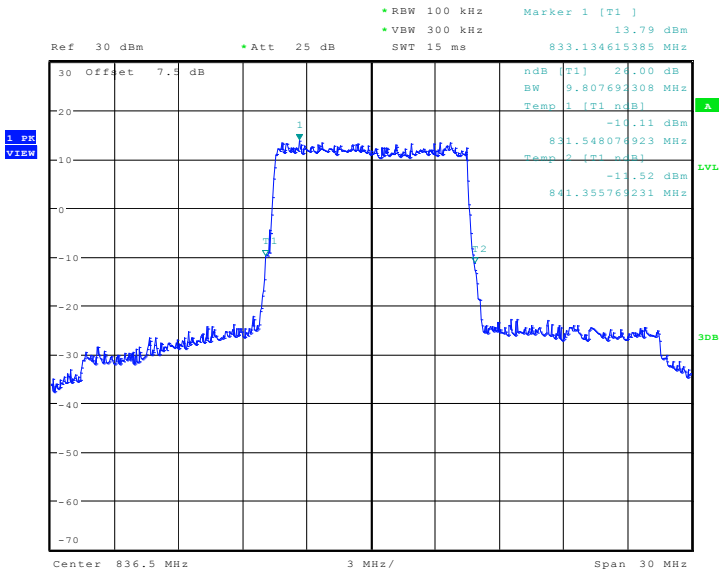


Date: 31.OCT.2016 19:43:29

LTE band 5, 10MHz (-26dBc)

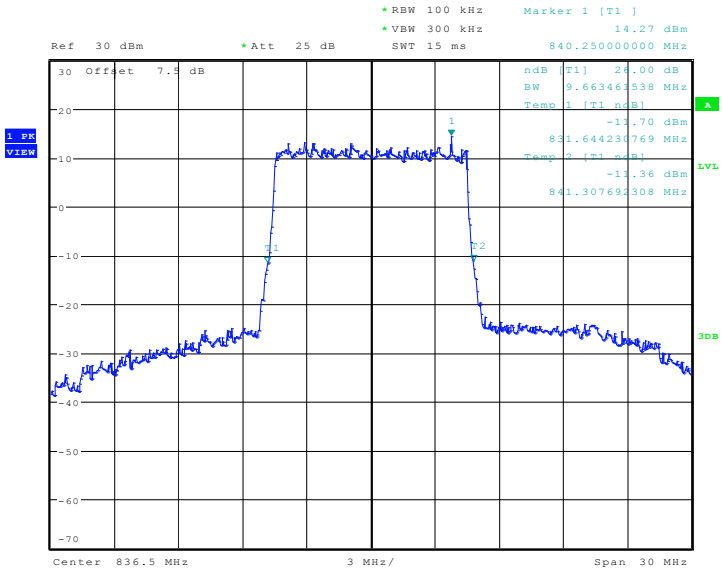
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	9807.69	9663.46

LTE band 5, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 19:45:18

LTE band 5, 10MHz Bandwidth, 16QAM (-26dBc BW)

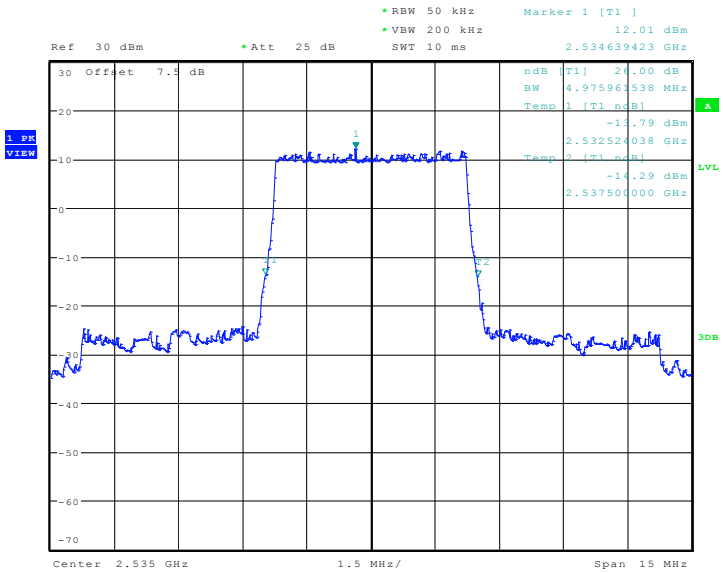


Date: 31.OCT.2016 19:45:54

LTE band 7, 5MHz (-26dBc)

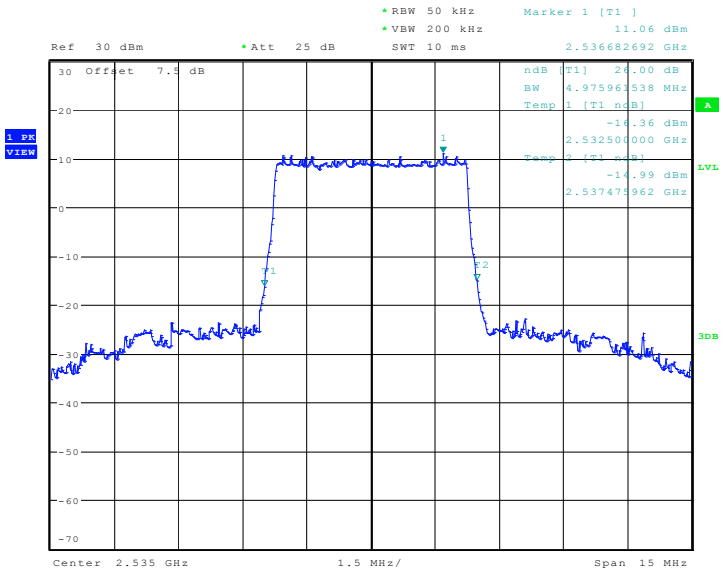
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	4975.96	4975.96

LTE band 7, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 19:50:34

LTE band 7, 5MHz Bandwidth,16QAM (-26dBc BW)

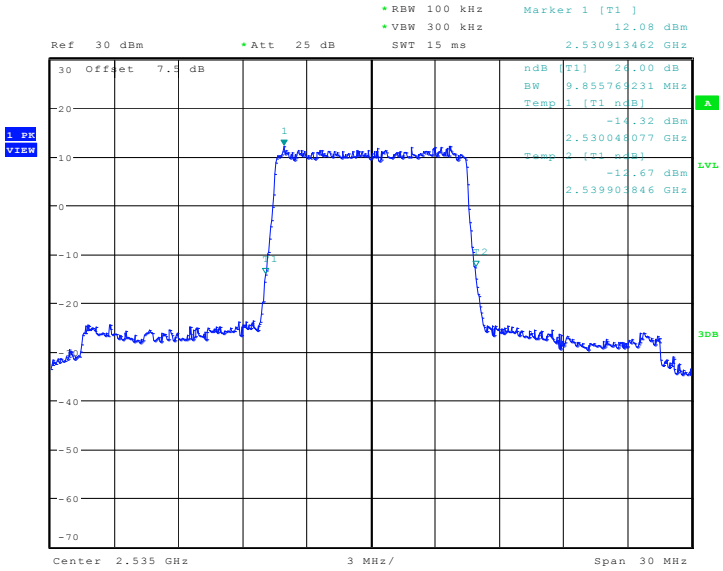


Date: 31.OCT.2016 19:50:04

LTE band 7, 10MHz (-26dBc)

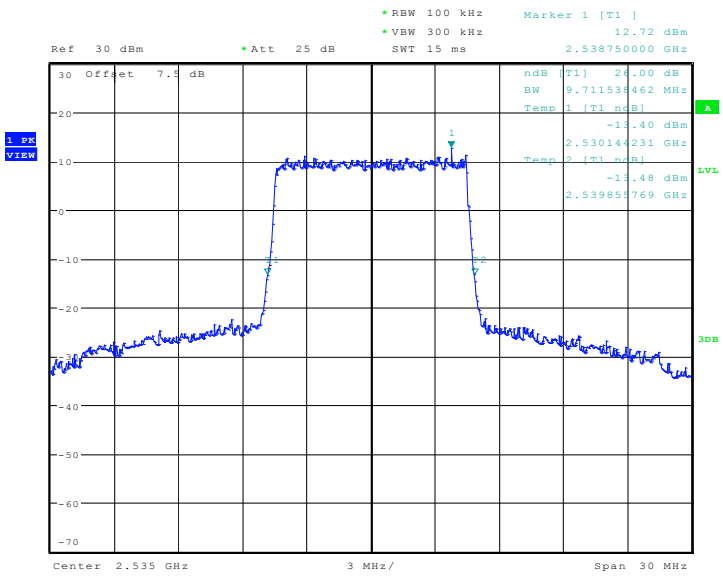
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	9855.77	9711.54

LTE band 7, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 19:51:43

LTE band 7, 10MHz Bandwidth, 16QAM (-26dBc BW)

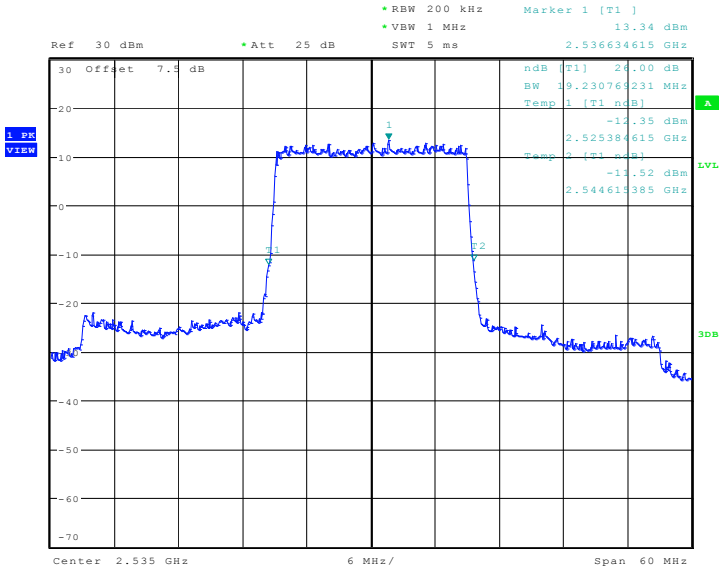


Date: 31.OCT.2016 19:52:30

LTE band 7, 20MHz (-26dBc)

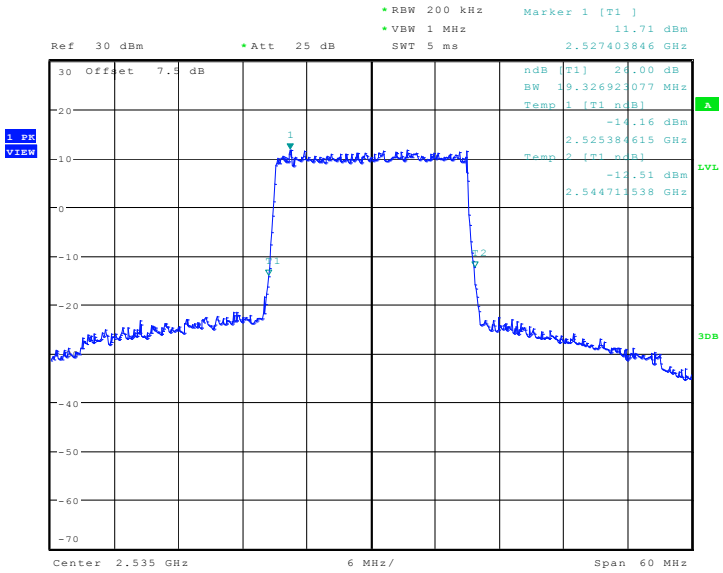
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	19230.77	19326.92

LTE band 7, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 19:57:46

LTE band 7, 20MHz Bandwidth, 16QAM (-26dBc BW)

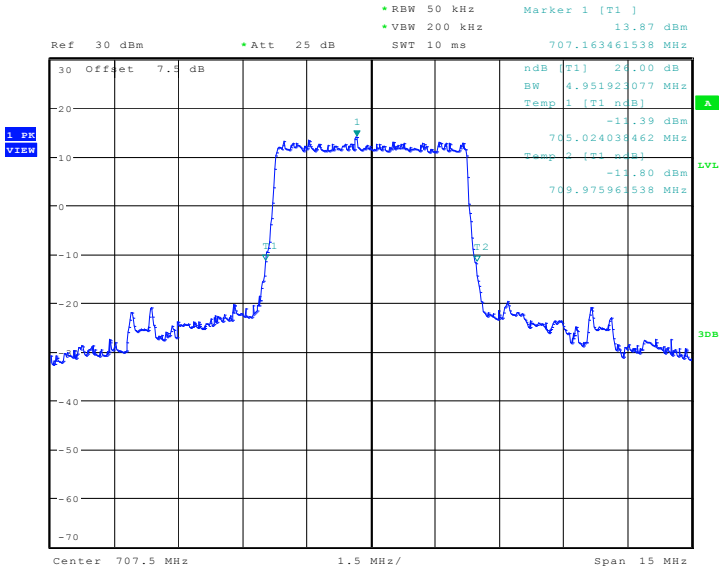


Date: 31.OCT.2016 19:57:04

LTE band 12, 5MHz (-26dBc)

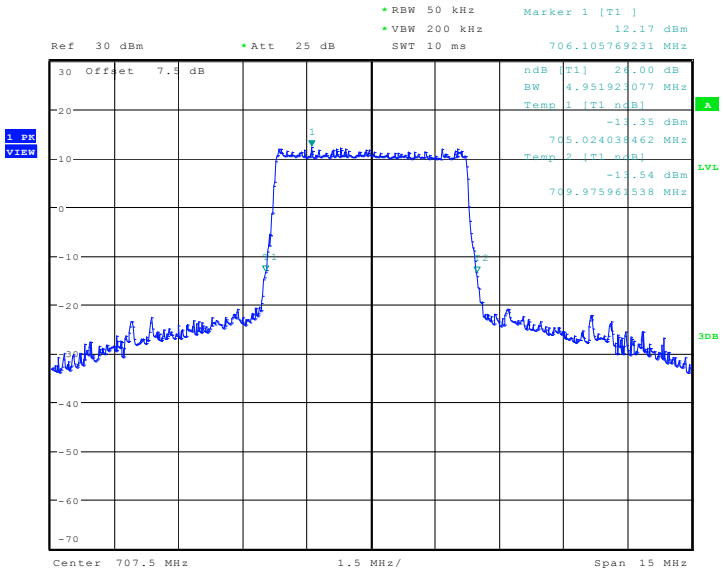
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	4951.92	4951.92

LTE band 12, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 20:00:06

LTE band 12, 5MHz Bandwidth,16QAM (-26dBc BW)

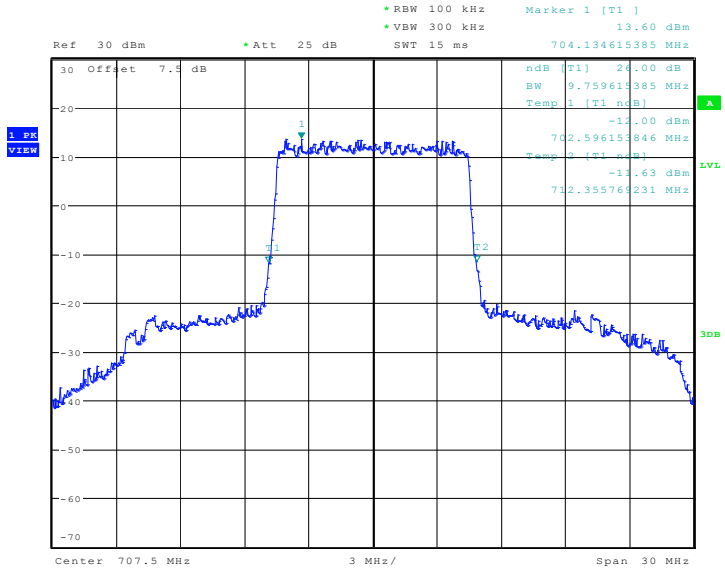


Date: 31.OCT.2016 20:00:46

LTE band 12, 10MHz (-26dBc)

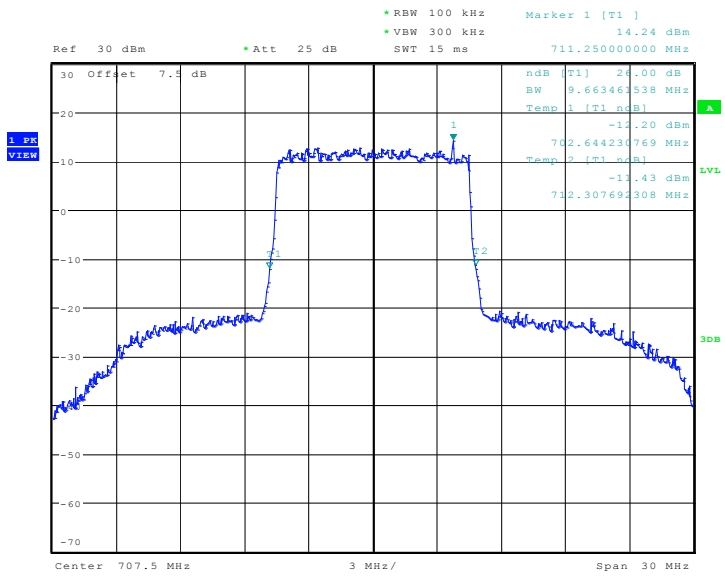
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	9759.62	9663.46

LTE band 12, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 31.OCT.2016 20:03:58

LTE band 12, 10MHz Bandwidth, 16QAM (-26dBc BW)



Date: 31.OCT.2016 20:03:29

A.6 BAND EDGE COMPLIANCE

Reference

FCC: CFR Part 22.917(b), 24.238(a), 27.53(h).

A.6.1 Measurement limit

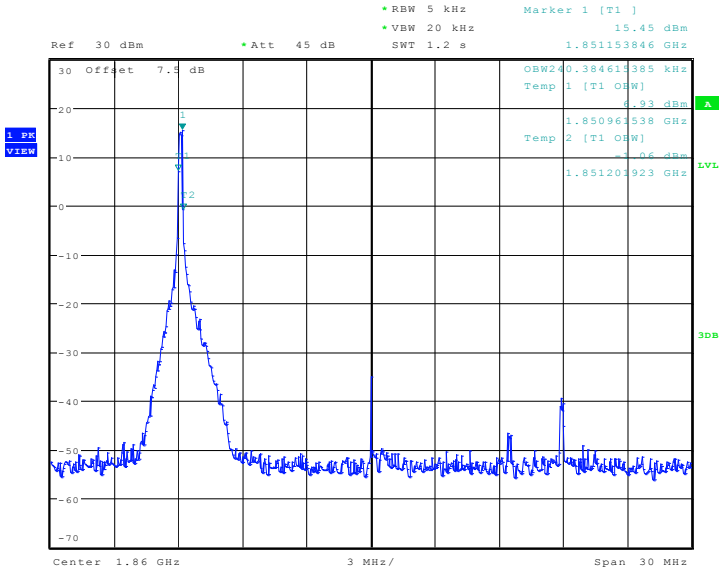
On any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm. According to KDB 971168 6.0, a relaxation of the reference bandwidth is often provided for measurements within a specified frequency range at the edge of the authorized frequency block/band. This is often implemented by permitting the use of a narrower RBW (typically limited to a minimum RBW of 1% of the OBW) for measuring the out-of-band emissions without a requirement to integrate the result over the full reference bandwidth.

A.6.2 Measurement result

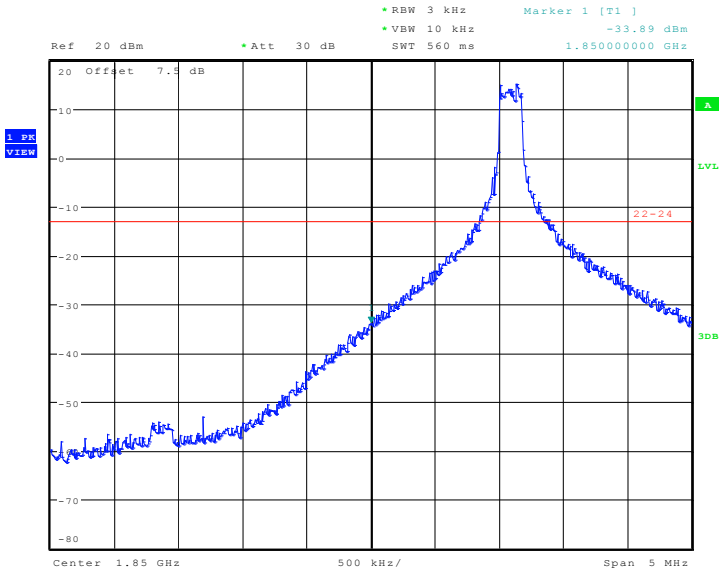
Only worst case result is given below

LTE band 2

OBW: 1RB-low_offset

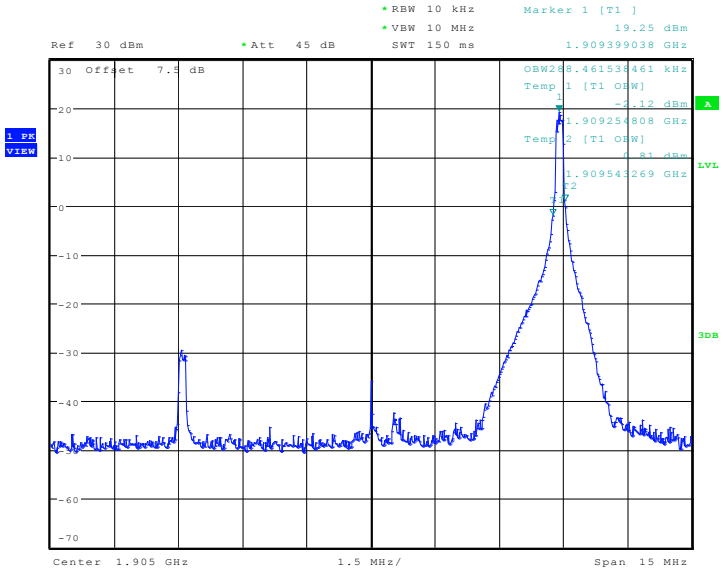


LOW BAND EDGE BLOCK-1RB-low_offset



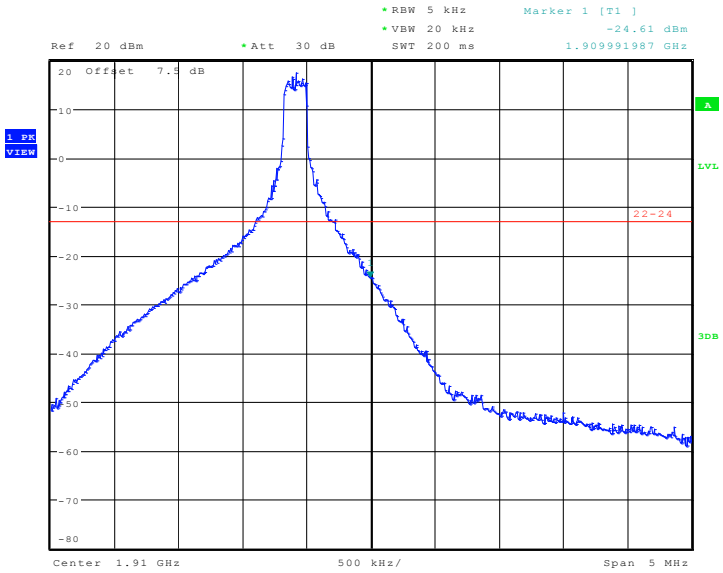
Date: 31.OCT.2016 21:43:53

OBW: 1RB-high_offset



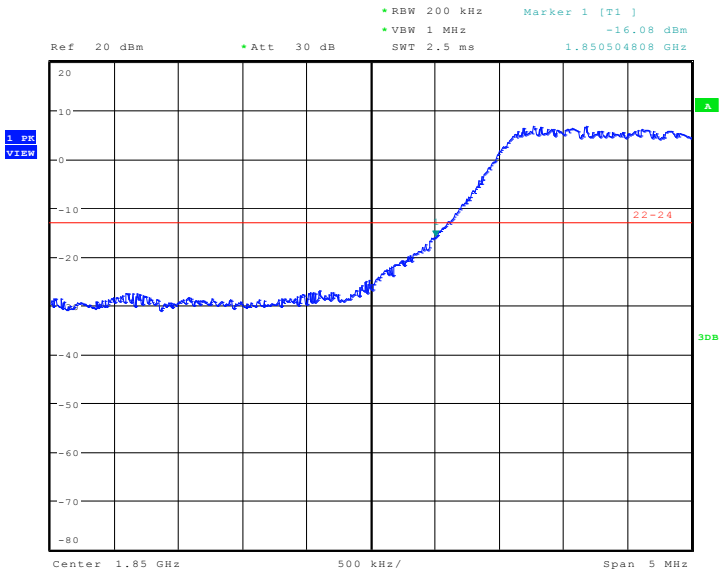
Date: 31.OCT.2016 21:49:36

HIGH BAND EDGE BLOCK-1RB-high_offset



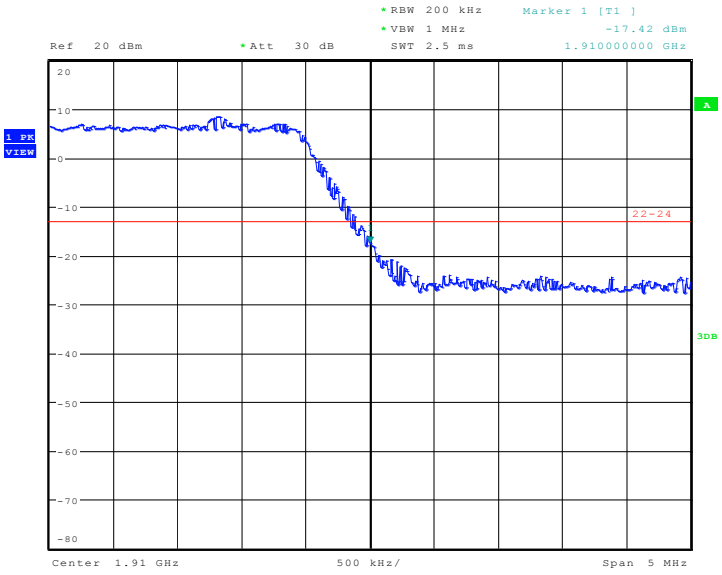
Date: 31.OCT.2016 21:51:15

LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 31.OCT.2016 22:03:31

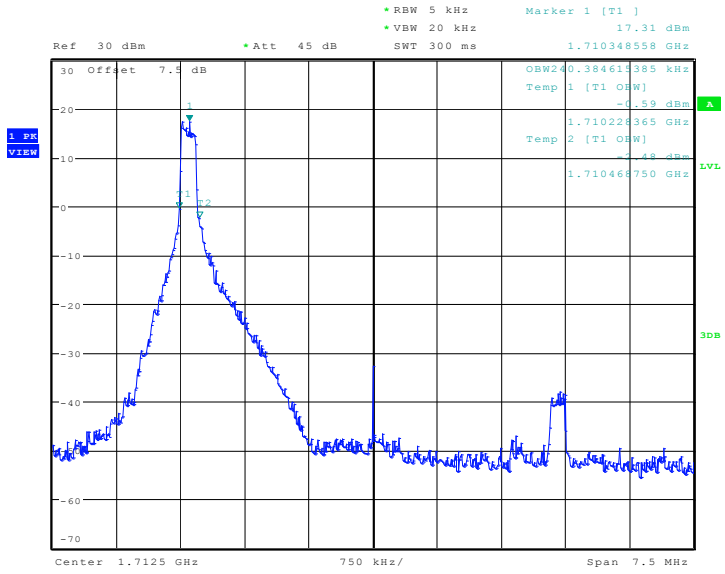
HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 31.OCT.2016 22:01:35

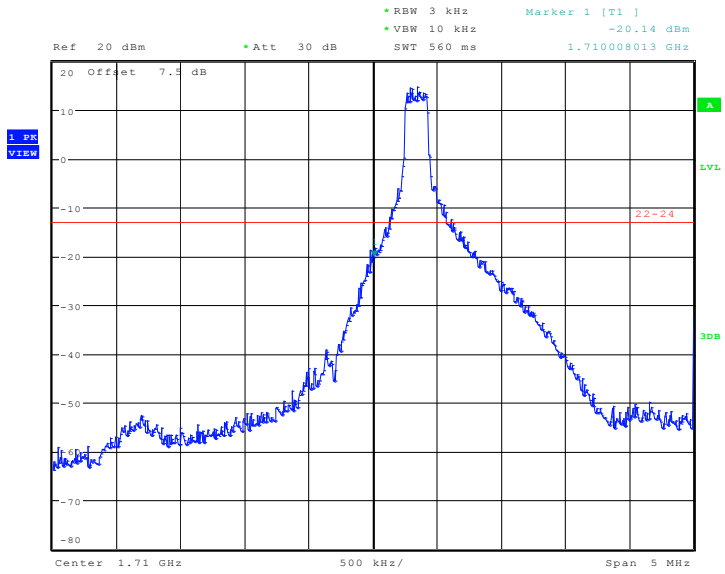
LTE band 4

OBW: 1RB-low_offset



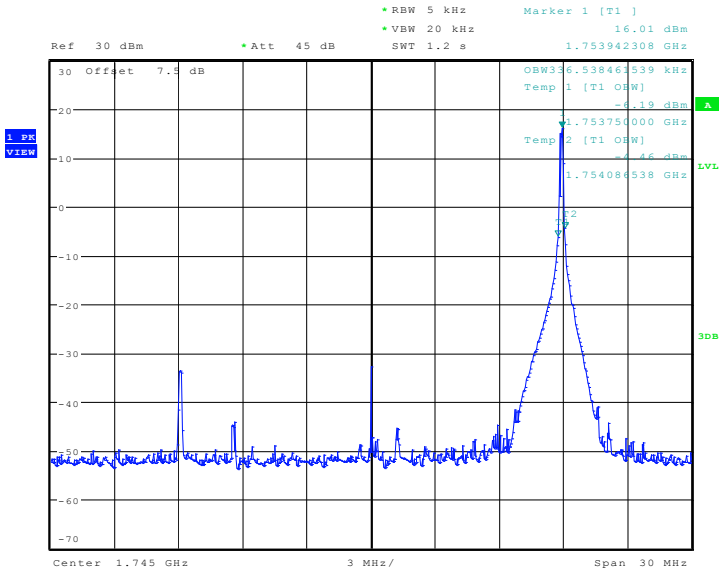
Date: 31.OCT.2016 22:12:30

LOW BAND EDGE BLOCK-1RB-low_offset



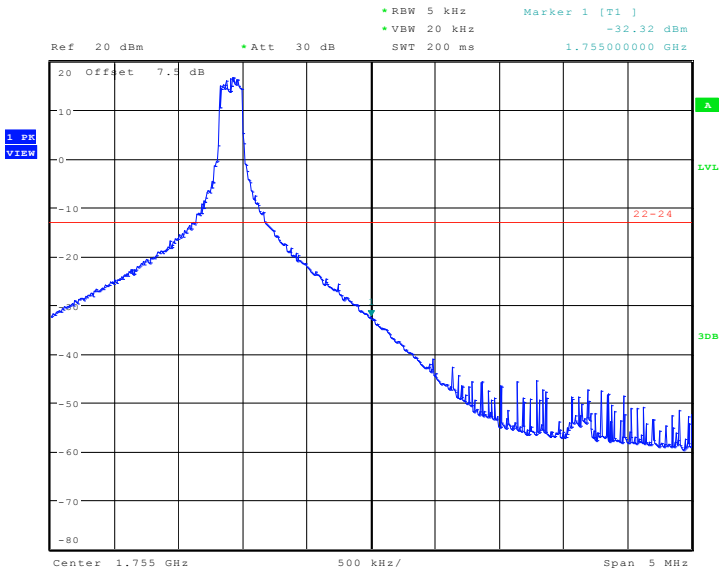
Date: 31.OCT.2016 22:14:07

OBW: 1RB-high_offset



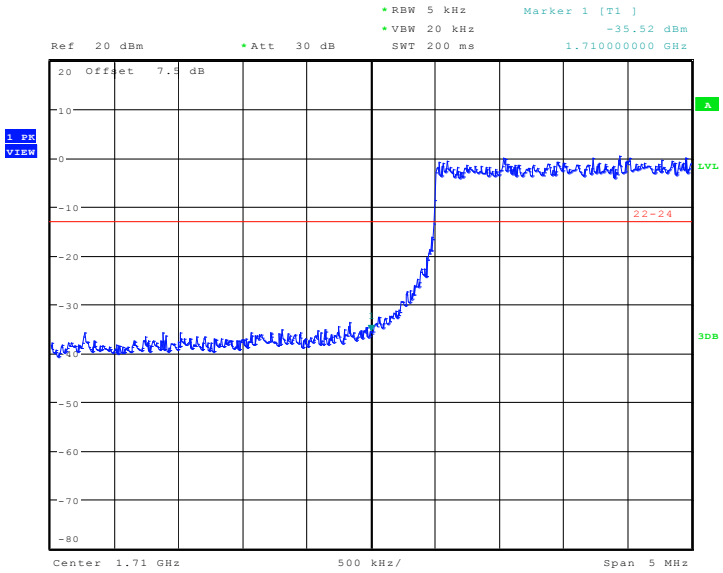
Date: 31.OCT.2016 22:16:34

HIGH BAND EDGE BLOCK-1RB-high_offset



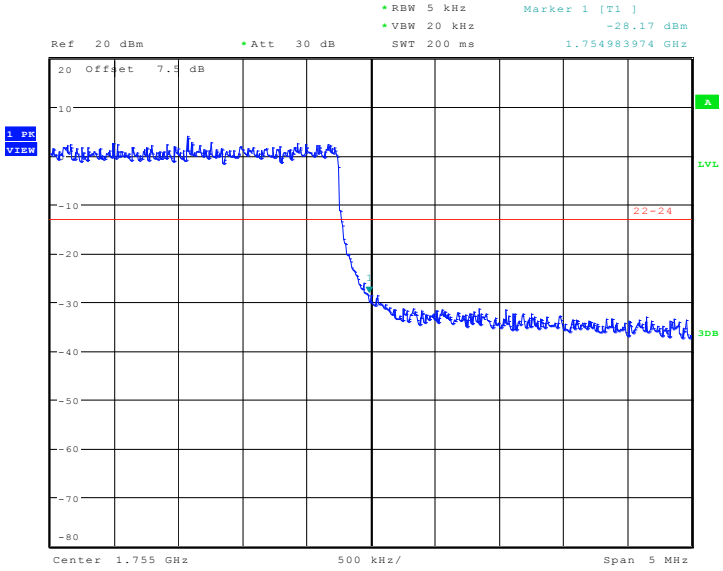
Date: 31.OCT.2016 22:17:55

LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 31.OCT.2016 22:25:09

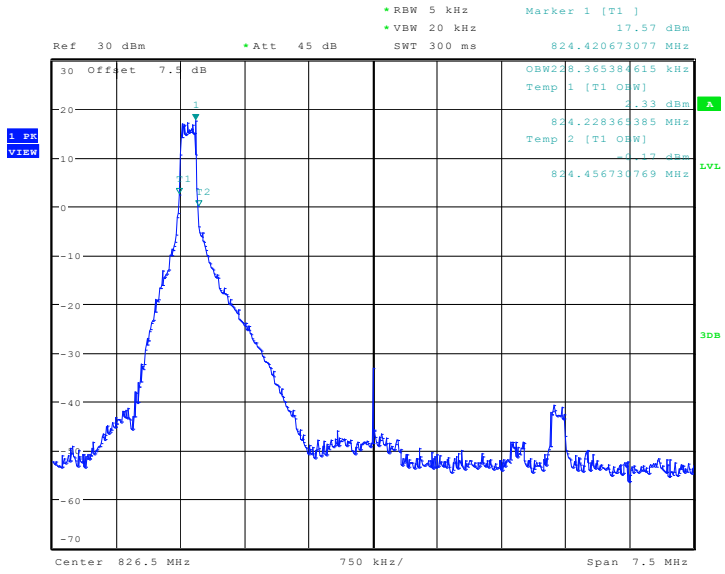
HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 31.OCT.2016 22:21:55

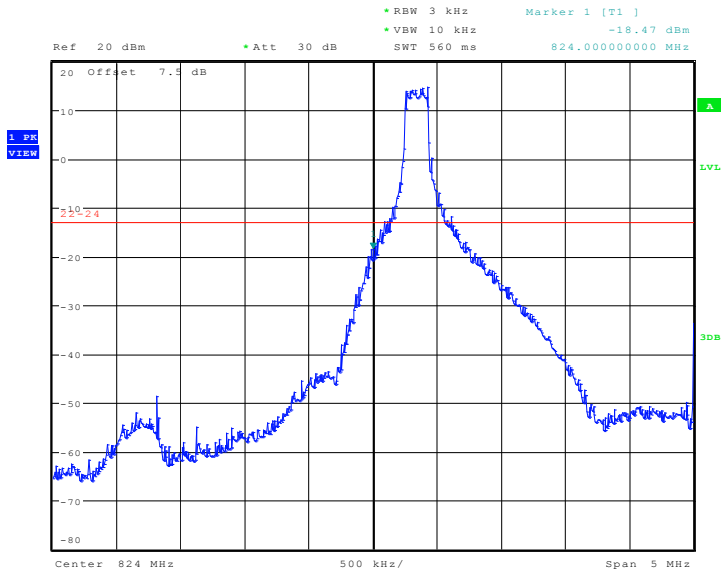
LTE band 5

OBW: 1RB-low_offset



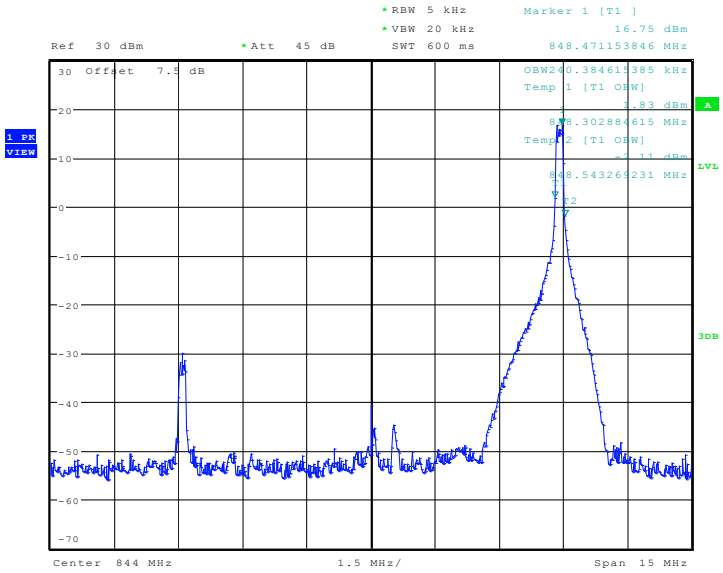
Date: 31.OCT.2016 22:27:22

LOW BAND EDGE BLOCK-1RB-low_offset



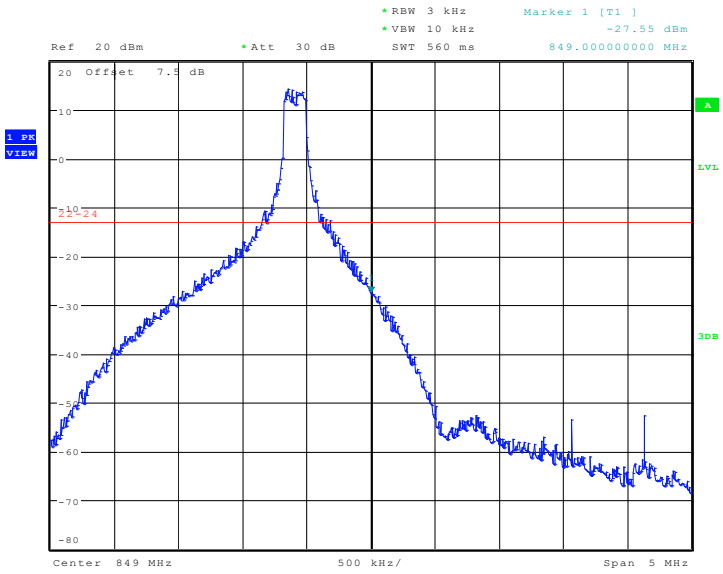
Date: 31.OCT.2016 22:28:28

OBW: 1RB-high_offset



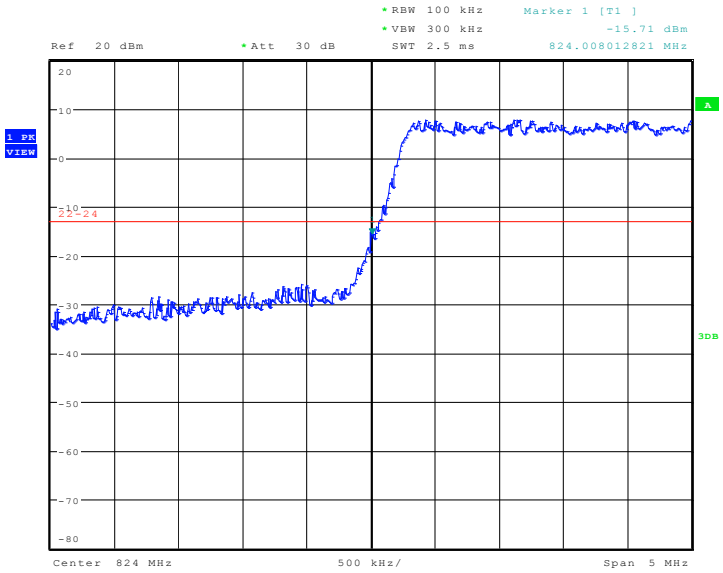
Date: 31.OCT.2016 22:30:35

HIGH BAND EDGE BLOCK-1RB-high_offset



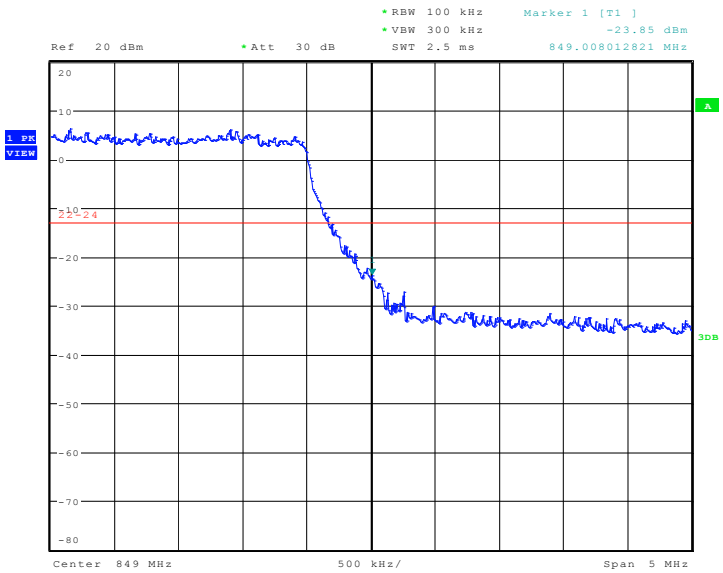
Date: 31.OCT.2016 22:31:30

LOW BAND EDGE BLOCK-10MHz-100%RB



Date: 31.OCT.2016 22:36:05

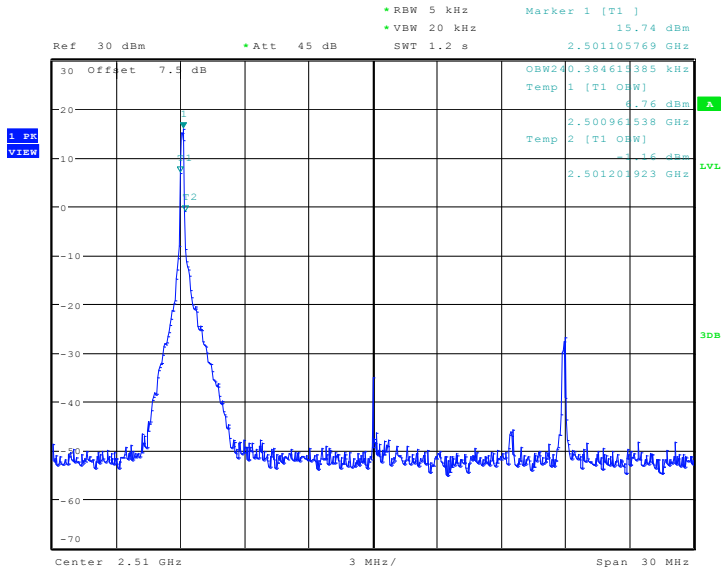
HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 31.OCT.2016 22:35:14

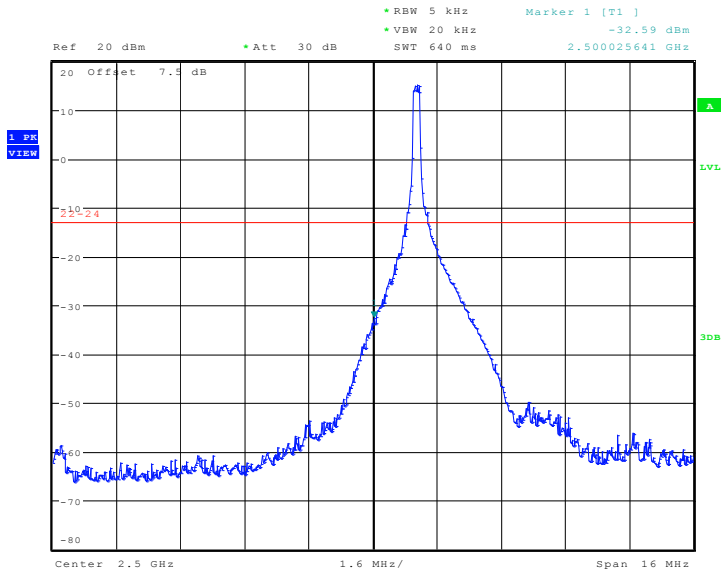
LTE band 7

OBW: 1RB-low_offset



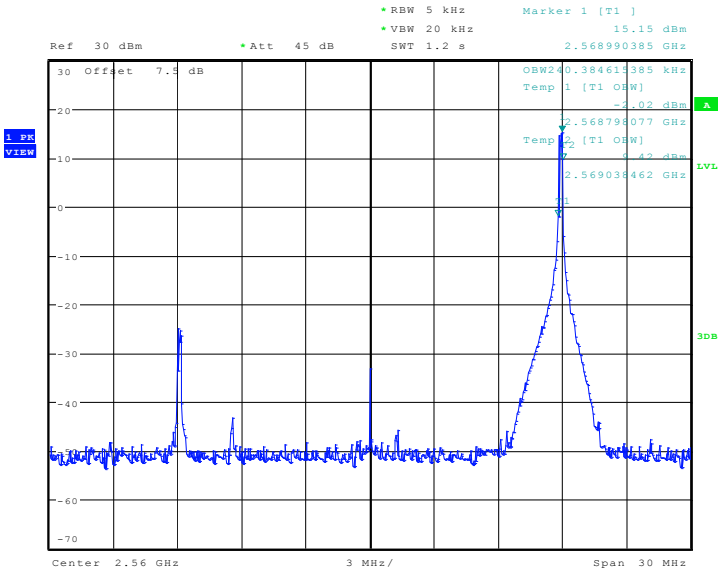
Date: 31.OCT.2016 22:38:03

LOW BAND EDGE BLOCK-1RB-low_offset



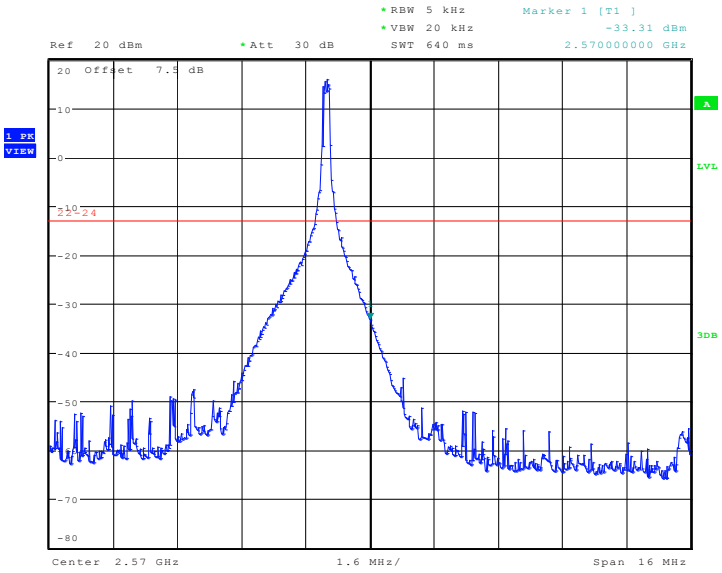
Date: 31.OCT.2016 22:39:03

OBW: 1RB-high_offset



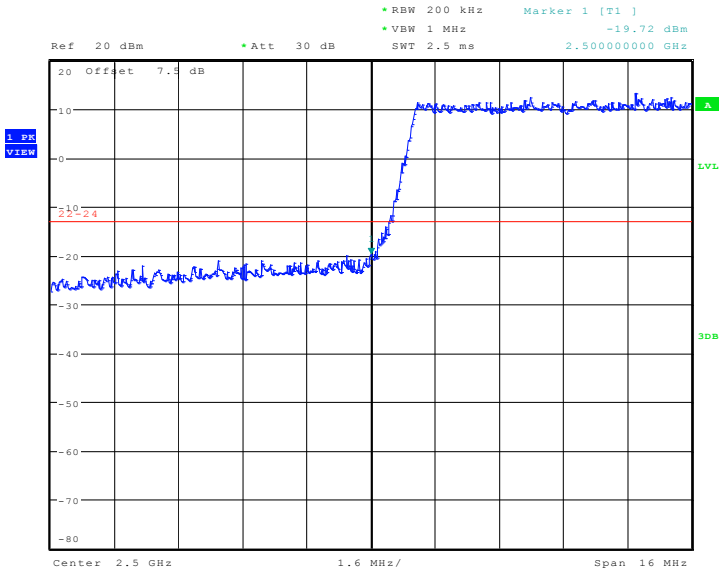
Date: 31.OCT.2016 22:42:24

HIGH BAND EDGE BLOCK-1RB-high_offset



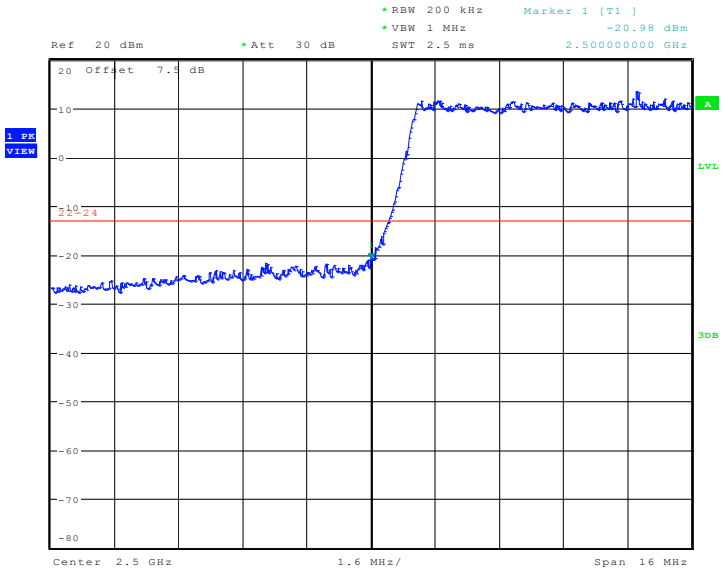
Date: 31.OCT.2016 23:12:17

LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 31.OCT.2016 22:44:56

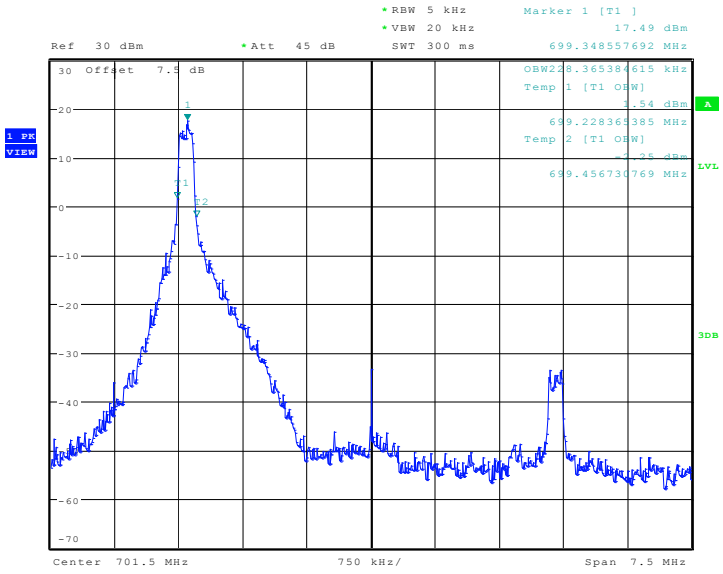
HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 31.OCT.2016 22:40:03

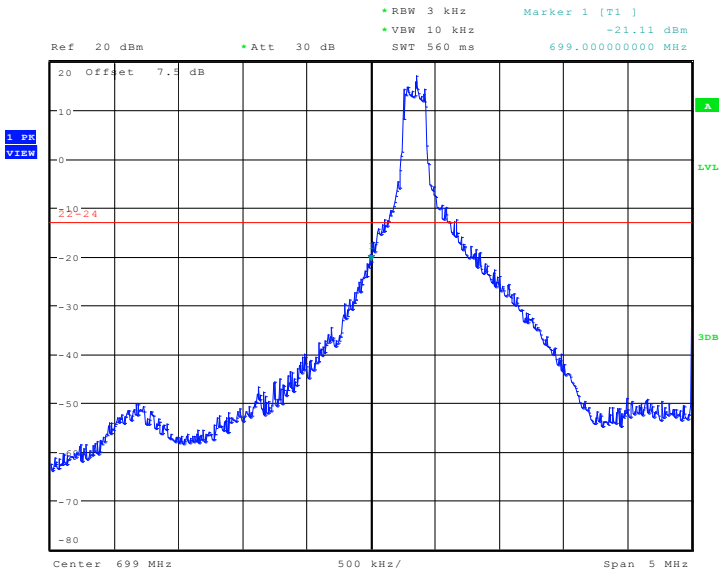
LTE band 12

OBW: 1RB-low_offset



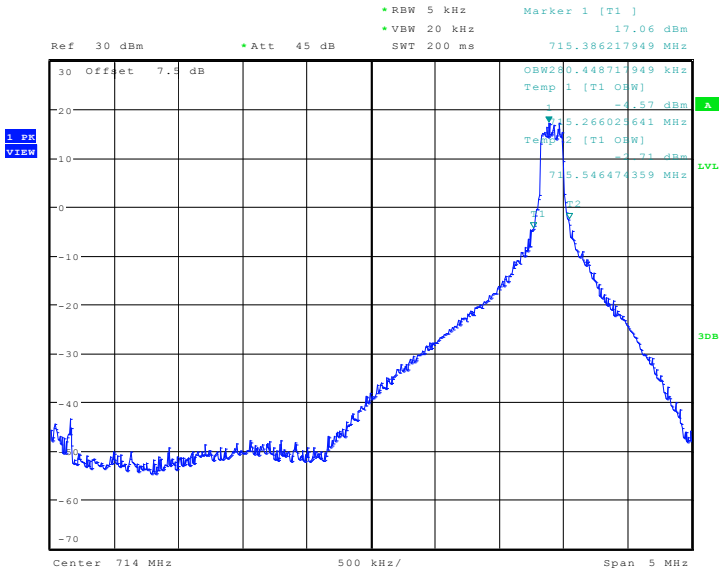
Date: 31.OCT.2016 22:47:07

LOW BAND EDGE BLOCK-1RB-low_offset



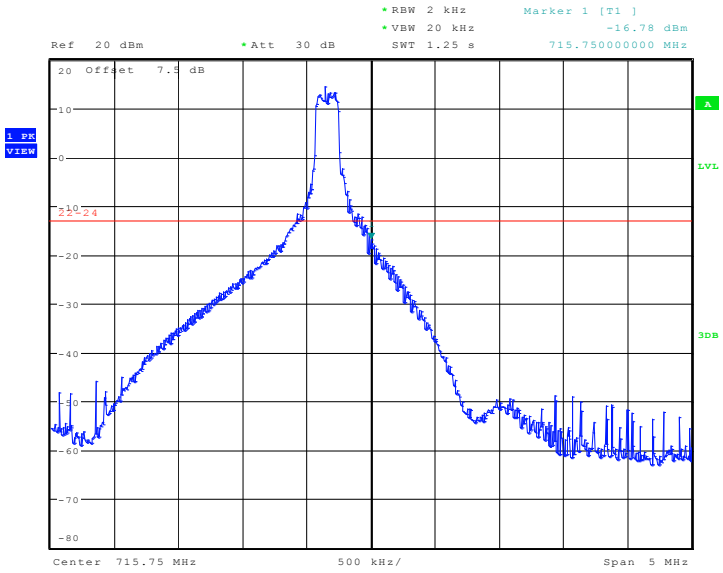
Date: 31.OCT.2016 23:16:25

OBW: 1RB-high_offset



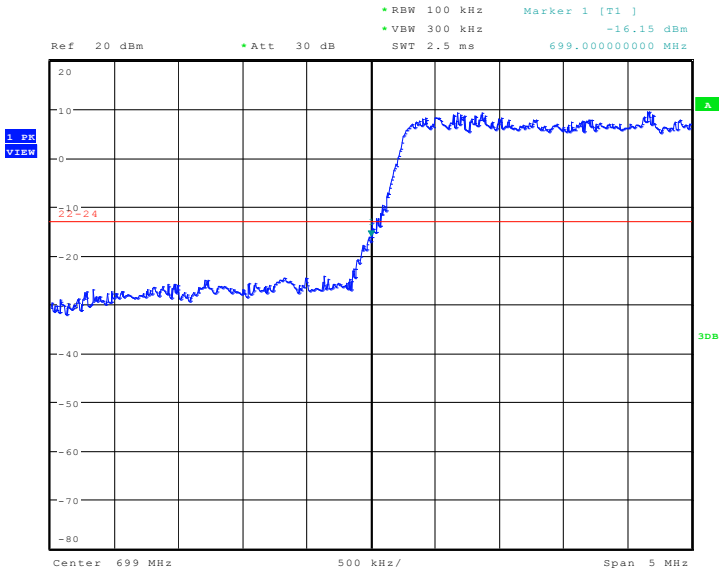
Date: 31.OCT.2016 22:57:58

HIGH BAND EDGE BLOCK-1RB-high_offset



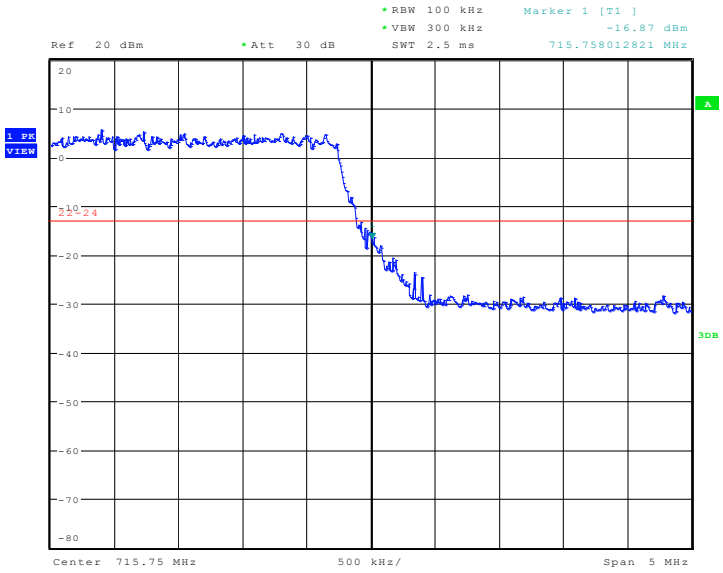
Date: 31.OCT.2016 23:02:48

LOW BAND EDGE BLOCK-10MHz-100%RB



Date: 31.OCT.2016 22:52:06

HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 31.OCT.2016 23:05:44

A.7 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1057, 22.917, 24.238, 27.53(h).

A.7.1 Measurement Method

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

A. 7.2 Measurement Limit

Part 22.917, Part 24.238 and Part 27.53 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

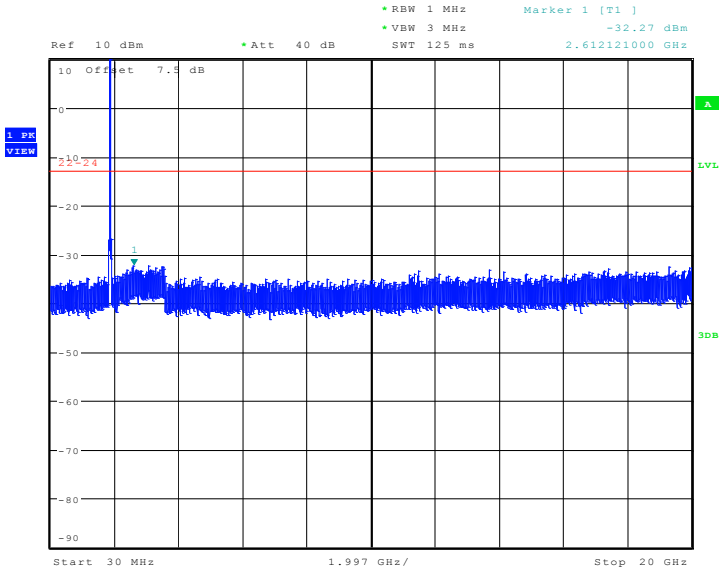
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A. 7.3 Measurement result

Only worst case result is given below

LTE band 2: 30MHz – 20GHz

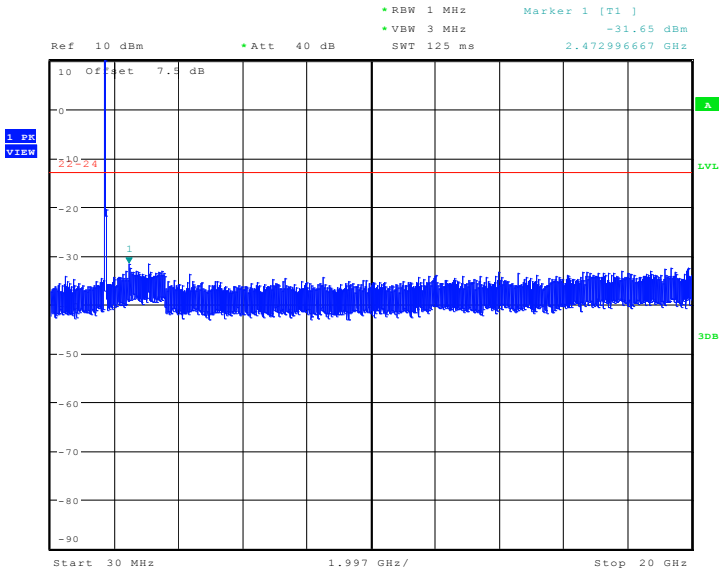
Spurious emission limit –13dBm.



Date: 31.OCT.2016 20:56:01

LTE band 4: 30MHz – 20GHz

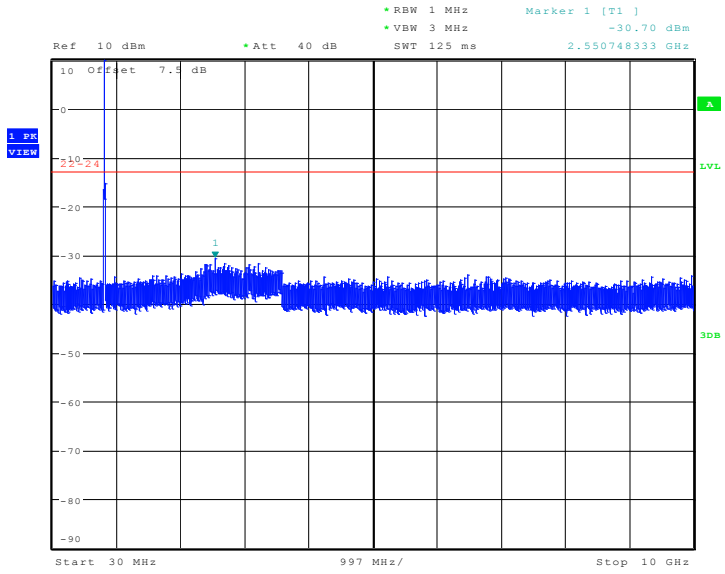
Spurious emission limit –13dBm.



Date: 31.OCT.2016 20:55:16

LTE band 5: 30MHz – 10GHz

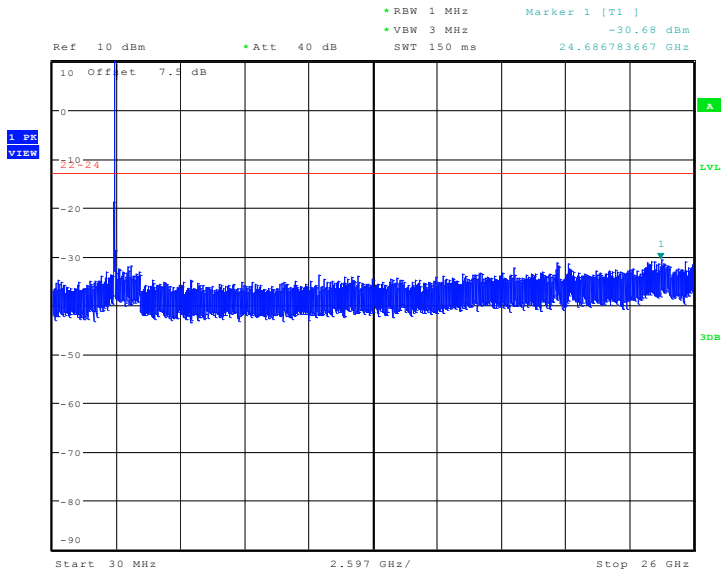
Spurious emission limit –13dBm.



Date: 31.OCT.2016 20:57:06

LTE band 7: 30MHz – 26GHz

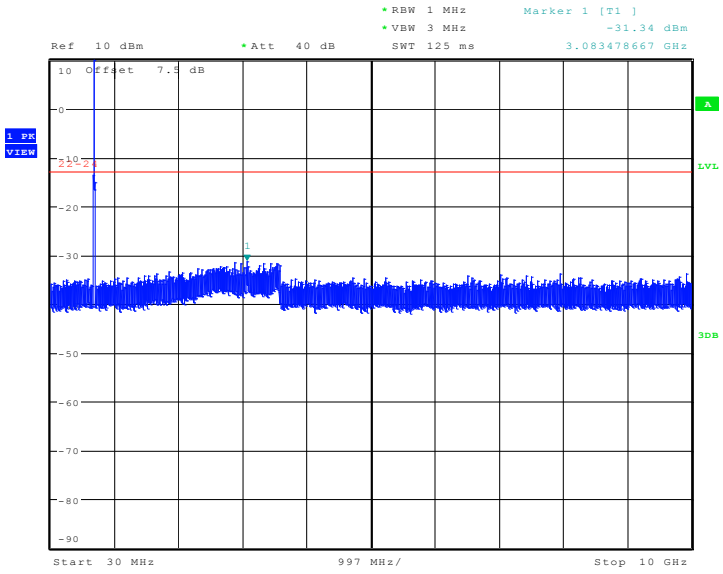
Spurious emission limit –13dBm.



Date: 31.OCT.2016 20:53:41

LTE band 12: 30MHz – 10GHz

Spurious emission limit –13dBm.



Date: 31.OCT.2016 20:19:32

A.8 PEAK-TO-AVERAGE POWER RATIO

Reference

FCC: CFR Part 24.232 (d), 27.50(a)

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

According to KDB 971168 5.7.1:

a)Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;

b) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;

c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Set the measurement interval to 1 ms

e)Record the maximum PAPR level associated with a probability of 0.1%

A.8.1 Measurement limit

not exceed 13 dB

A.8.2 Measurement results

LTE band 2, 20MHz

Frequency(MHz)	PAPR(dB)	
1880.0	QPSK	16QAM
	6.64	7.41

LTE band 4, 20MHz

Frequency(MHz)	PAPR(dB)	
1732.5	QPSK	16QAM
	6.81	7.54

LTE band 7, 20MHz

Frequency(MHz)	PAPR(dB)	
2510.0	QPSK	16QAM
	6.57	7.45

LTE band 12,10MHz

Frequency(MHz)	PAPR(dB)	
707.5	QPSK	16QAM
	6.23	7.24

*****END OF REPORT*****