Full

TEST REPORT

No. I17D00249-SRD06

For

Client : Shanghai Simcom Ltd.

Production : LTE-FDD/HSPA MODULE

Model Name : SIM7600A-H

FCC ID: UDV-201710

Hardware Version: V1.02

Software Version: B02V01

Issued date: 2017-12-15

Test Laboratory:

ECIT Shanghai, East China Institute of Telecommunications

Add: 7-8F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China

Tel: (+86)-021-63843300, E-Mail: welcome@ecit.org.cn

Revision Version

Report Number	Revision	Date	Memo
I17D00249-SRD06	00	2017-12-11	Initial creation of test report
I17D00249-SRD06	01	2017-12-15	Second creation of test report

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1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301

1.2. Testing Environment

Normal Temperature:	15-35℃
Extreme Temperature:	-10/+55℃
Relative Humidity:	20-75%

1.3. Project data

Project Leader:	Zhou Yan
Testing Start Date:	2016-06-03(For report I16D00113-RFA-01_V1)
Testing End Date:	2016-06-17(For report I16D00113-RFA-01_V1)
Testing Start Date:	2016-06-14(For report I16Z41276-GTE01_part222427_LTE_Rev2)
Testing End Date:	2016-07-27(For report I16Z41276-GTE01_part222427_LTE_Rev2)
Testing Start Date:	2016-09-27(For report BL-SZ1690342-501 V02)
Testing End Date:	2016-10-18 (For report BL-SZ1690342-501 V02)

1.4. Signature

Chen Lei
(Prepared this test report)

Ding Li
(Reviewed this test report)

Zheng Zhongbin
Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Shanghai Simcom Ltd.
Address:	SIM Technology Building.,No.633, Jinzhong Rd,Changning District, Shanghai, P.R.China
Postcode:	/
Telephone:	021-32523134

2.2. Manufacturer Information

Company Name:	Shanghai Simcom Ltd.
Address:	SIM Technology Building.,No.633, Jinzhong Rd,Changning District, Shanghai, P.R.China
Postcode:	/
Telephone:	021-32523134

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

3.1. About EUT

EUT Description	LTE-FDD/HSPA MODULE
Model name	SIM7600A-H
FCC ID	UDV-201710
Frequency	WCDMA BandII/ V LTE FDD2/4/12
Extreme Temperature	-10/+55℃
Nominal Voltage	3.8V
Extreme High Voltage	4.2V
Extreme Low Voltage	3.4V

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

3.2. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	RF cable	---
AE2	Dummy Battery	---

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

3.3. Statements

The SIM7600A-H, supporting WCDMA/HSDPA/HSUPA/DC-HSDPA/LTE, manufactured by Shanghai Simcom Ltd.. which is a variant product for testing. The EIRP please refer to the report I16D00113-RFA-01_V1 and BL-SZ1690342-501 V02 .The rest conducted test cases of Band II/IV please refer to the report I16Z41276-GTE01_part222427_LTE_Rev2. The rest conducted test cases of Band XII please refer to the report BL-SZ1690342-501 V02.

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

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	2014
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	2014
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	2014
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
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	v03

5. SUMMARY OF TEST RESULTS

Note: Output Power and Emission test results are in RXA1711-0374RF02_SIM7600A-H FCC Part24 and report RXA1711-0374RF02_SIM7600A-H FCC Part27.

LTE Band 2

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

LTE Band 4

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

LTE Band 12

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

6. Test Equipment Utilized

Climate chamber

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Climate chamber	SH-641	92012011	ESPEC	2016-01-07	2 Year

Radiated emission test system

The test equipment and ancillaries used are as follows.

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Universal Radio Communication Tester	CMW500	104178	R&S	2017-05-11	1 Year
2	Test Receiver	ESU40	100307	R&S	2017-05-11	1 Year
3	Trilog Antenna	VULB9163	VULB9163-515	Schwarzbeck	2017-10-21	3 Year
4	Double Ridged Guide Antenna	ETS-3117	135890	ETS	2017-01-11	3 Year
5	2-Line V-Network	ENV216	101380	R&S	2017-05-11	1 Year
6	Substitution Antenna	ETS-3117	00135890	ETS	2017-01-11	3 Year
7	RF Signal Generator	SMF100A	102314	R&S	2017-05-11	1 Year
8	Substitution Antenna	VUBA9117	9117-266	Schwarzbeck	2017-10-21	3 Year
9	Amplifier	SCU03	10009	R&S	2017-01-05	1 Year

10	Amplifier	NTWPA-008610F	12023024	Rflight	2017-01-05	1 Year
11	Attenuators	BW-N3W5+	/	MCL	2017-01-05	1 Year

Conducted test system

No.	Name	Type	SN	Manufacture	Calibration date	Cal.interval
1	Vector Signal Analyser	FSQ26	101096	Rohde&Schwarz	2017-05-11	1 Year
2	Wireless communication comprehensive tester	CMW500	148904	Rohde&Schwarz	2017-08-21	1 Year
3	DC Power Supply	ZUP60-14	LOC-220Z006-0007	TDL-Lambda	2017-05-11	1 Year

Software

Name	Version
Eagle FCC LTE auto test system	V3.0
EMC32	V9.15

7. Test Environment

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 20%, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5 Ω

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. =25 %, Max. =75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB,30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

ANNEX A. MEASUREMENT RESULTS

ANNEX A.1. FREQUENCY STABILITY

Reference

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

A.1.1 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 for LTE band 2/4/12, 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 center 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 ℃ decrements 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.1.2 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 4.2VDC, 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. For the purposes of measuring frequency stability these voltage limits are to be used.

A.1.3 Measurement results

Note:

The Frequency Stability test cases of Band II/IV please refer to the report No: I16Z41276-GTE01_part222427_LTE_Rev2. Section A.2.3

The Frequency Stability test cases of Band XII please refer to the report No: BL-SZ1690342-501 V02. Section A.4

LTE Band 2, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.4	-2.05	12.97	0.001	0.007
3.8	0.50	11.87	0.000	0.006
4.2	-4.68	16.25	0.002	0.007

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	-1.23	16.32	0.001	0.009
40°	-2.17	16.12	0.001	0.009
30°	-6.05	14.39	0.003	0.008
20°	-4.95	12.25	0.003	0.007
10°	1.03	16.78	0.001	0.009
0°	-4.89	12.07	0.003	0.006
- 10°	-7.75	13.45	0.004	0.007
- 20°	-3.78	14.26	0.002	0.008
- 30°	-2.13	10.77	0.001	0.006

LTE Band 4, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.4	2.00	19.74	0.001	0.011
3.8	0.11	18.98	0.000	0.011
4.2	5.88	20.43	0.003	0.012

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	-2.86	19.45	0.002	0.011
40°	0.16	19.44	0.000	0.011
30°	1.14	20.00	0.001	0.012
20°	3.28	21.16	0.002	0.012

10°	2.95	17.57	0.002	0.010
0°	-2.43	19.54	0.001	0.011
- 10°	1.49	23.32	0.001	0.013
- 20°	3.08	16.55	0.002	0.010
- 30°	3.45	21.97	0.002	0.013

LTE Band 12, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.4	-9.68	44.47	0.013	0.062
4.2	-9.14	3.73	0.012	0.005

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	21.18	-118.77	0.029	0.167
40°	5.26	15.94	0.007	0.022
30°	20.15	-8.19	0.028	0.011
20°	-21.47	1.35	0.030	0.001
10°	12.93	-26.56	0.018	0.037
0°	1.31	4.36	0.001	0.006
- 10°	-0.75	9.95	0.001	0.014
- 20°	-12.24	-10.77	0.017	0.015
- 30°	0.82	0.59	0.001	0.000

ANNEX A.2. OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049(h)(i)

A.2.1 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.

A.2.2 Measurement results

Note:

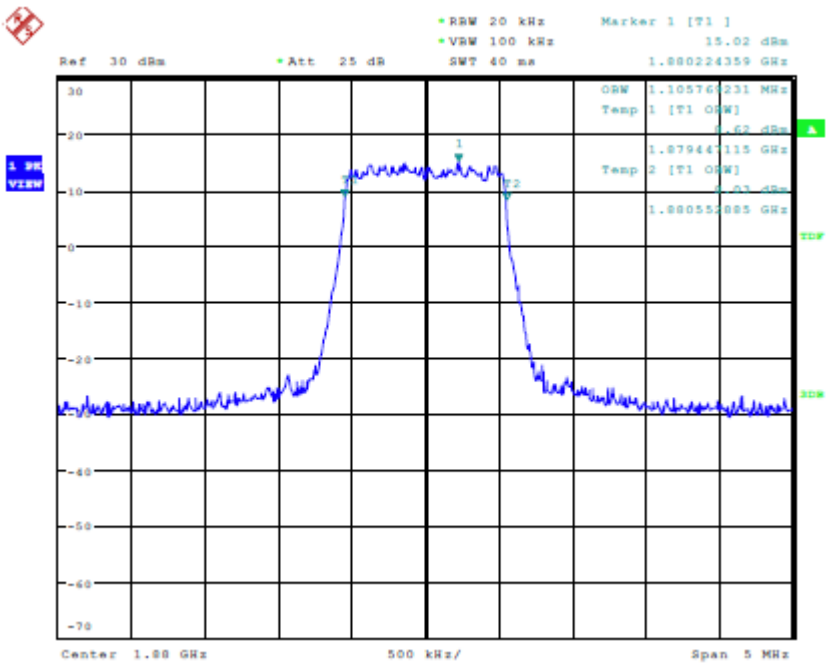
The Occupied Bandwidth test cases of Band II/IV please refer to the report No: I16Z41276-GTE01_part222427_LTE_Rev2. Section A.3.1

The Occupied Bandwidth test cases of Band XII please refer to the report No: BL-SZ1690342-501 V02. Section A.3

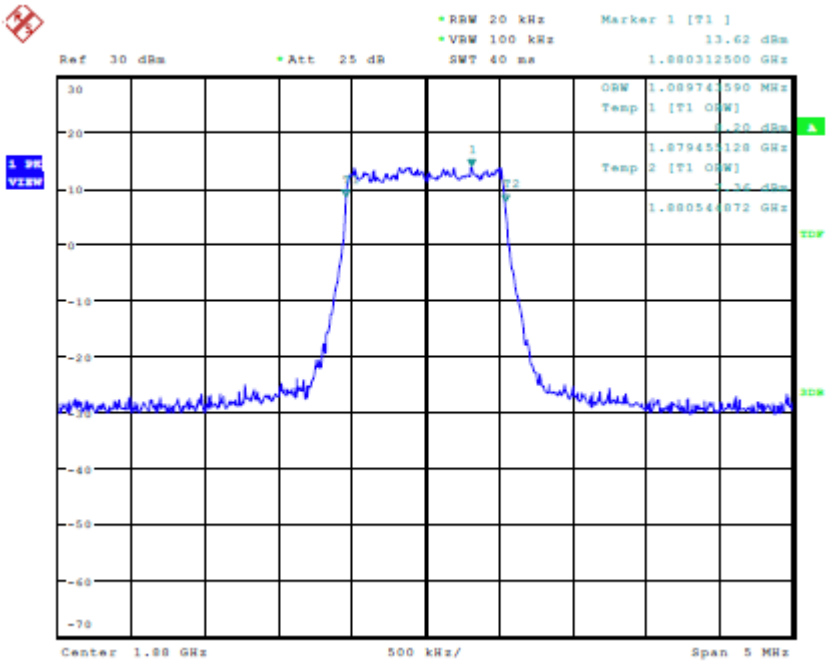
LTE band 2, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
1880.0	QPSK	16QAM
	1105.77	1089.74

LTE band 2, 1.4MHz Bandwidth, QPSK (99% BW)



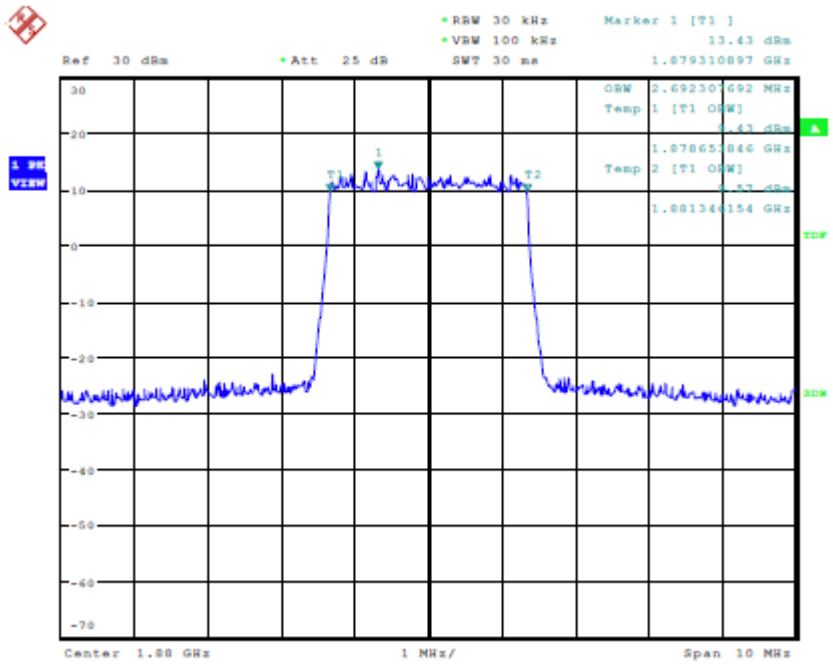
LTE band 2, 1.4MHz Bandwidth, 16QAM (99% BW)



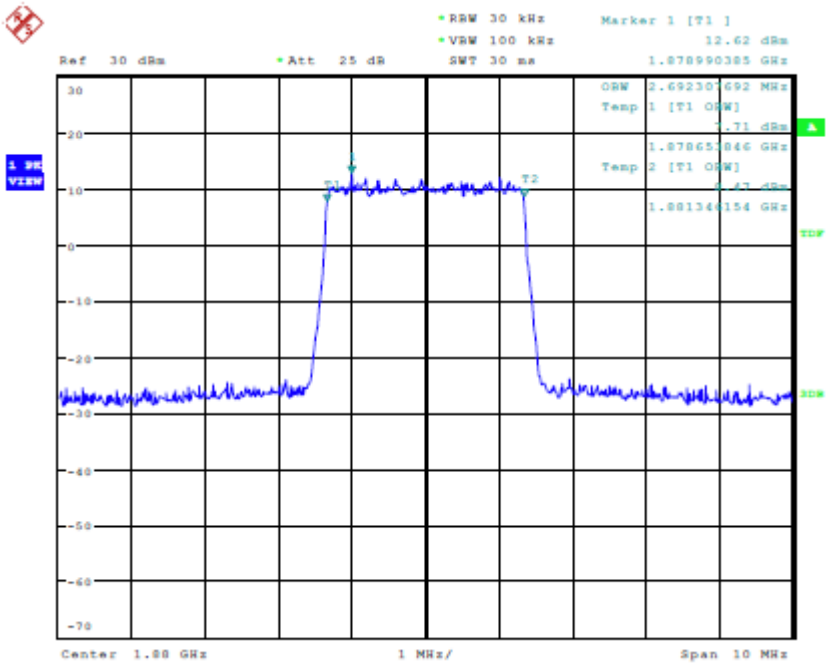
LTE band 2, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
1880.0	QPSK	16QAM
	2692.31	2692.31

LTE band 2, 3MHz Bandwidth, QPSK (99% BW)



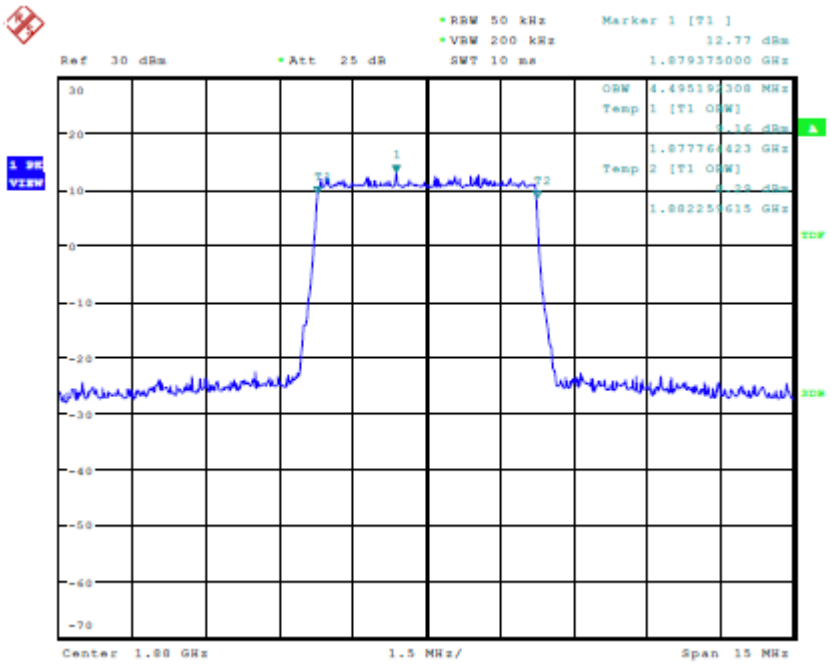
LTE band 2, 3MHz Bandwidth, 16QAM (99% BW)



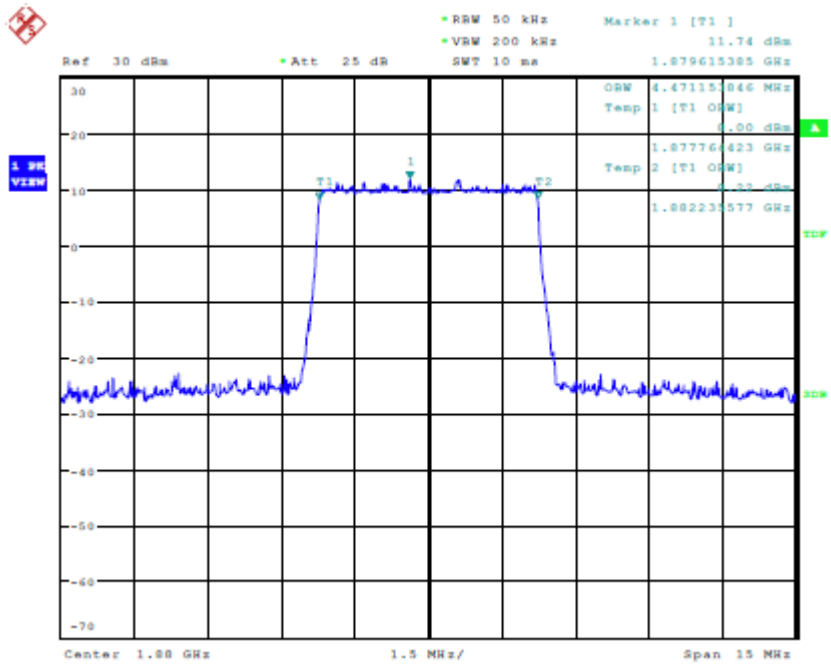
LTE band 2, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
1880.0	QPSK	16QAM
	4495.19	4471.15

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



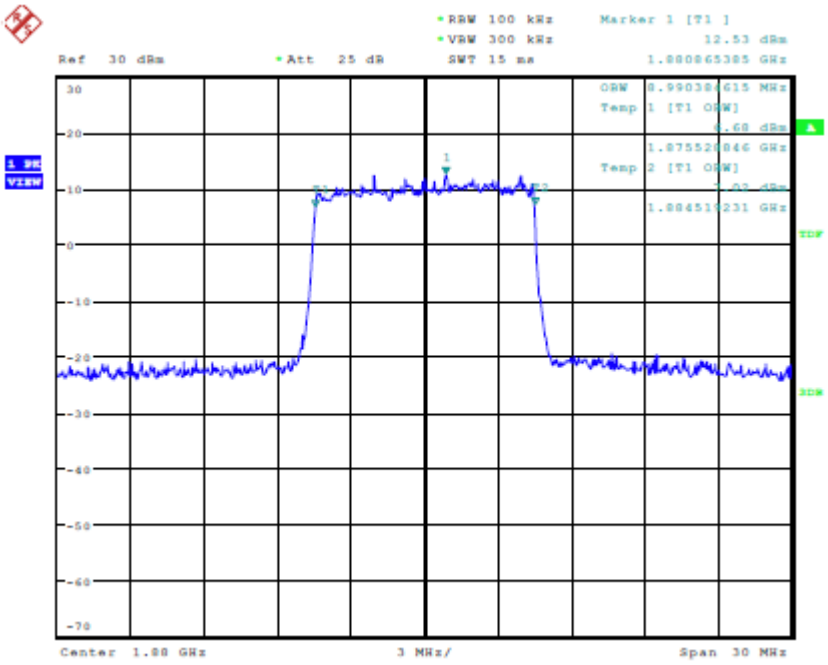
LTE band 2, 5MHz Bandwidth,16QAM (99% BW)



LTE band 2, 10MHz (99%)

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

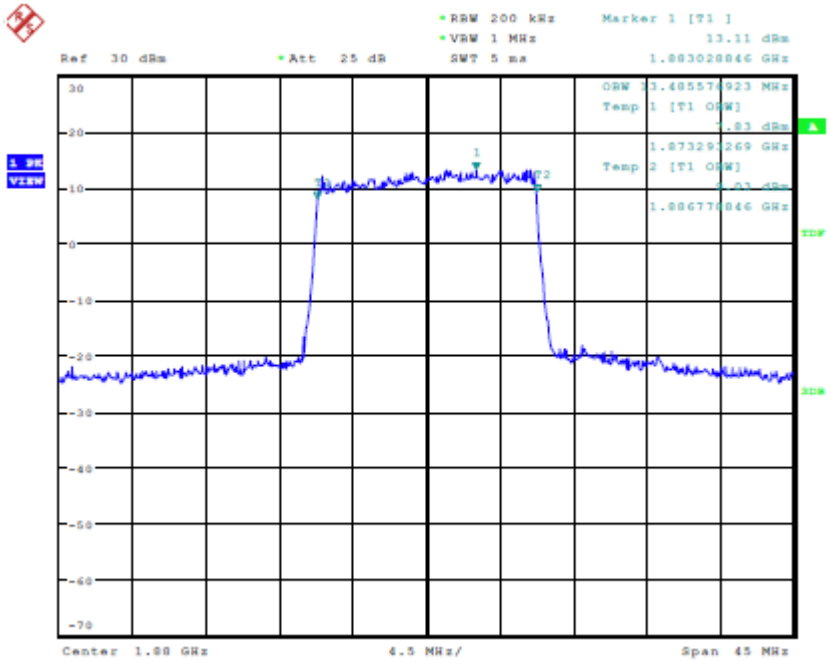
LTE band 2, 10MHz Bandwidth, QPSK (99% BW)



LTE band 2, 15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
1880.0	QPSK	16QAM
	13485.58	/

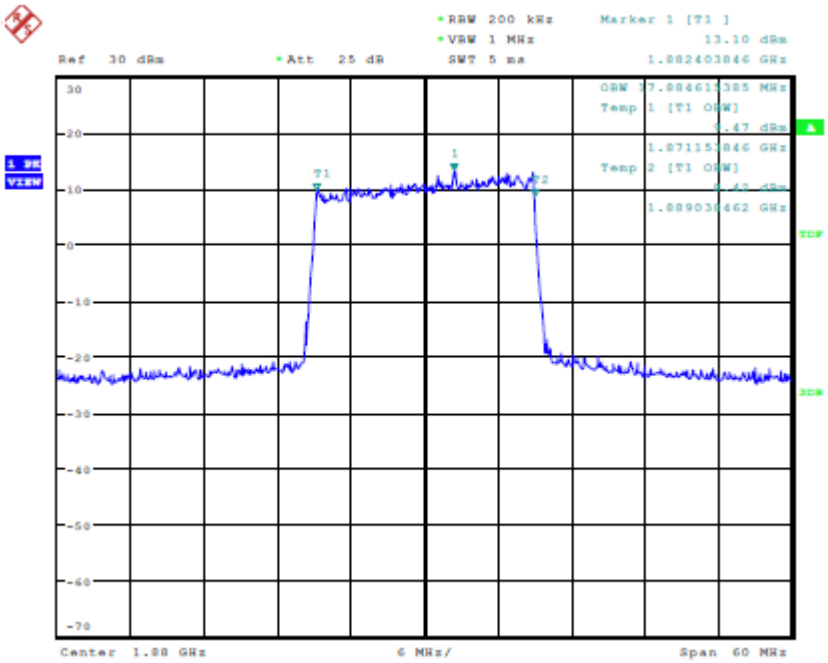
LTE band 2, 15MHz Bandwidth, QPSK (99% BW)



LTE band 2, 20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
1880.0	QPSK	16QAM
	17884.62	/

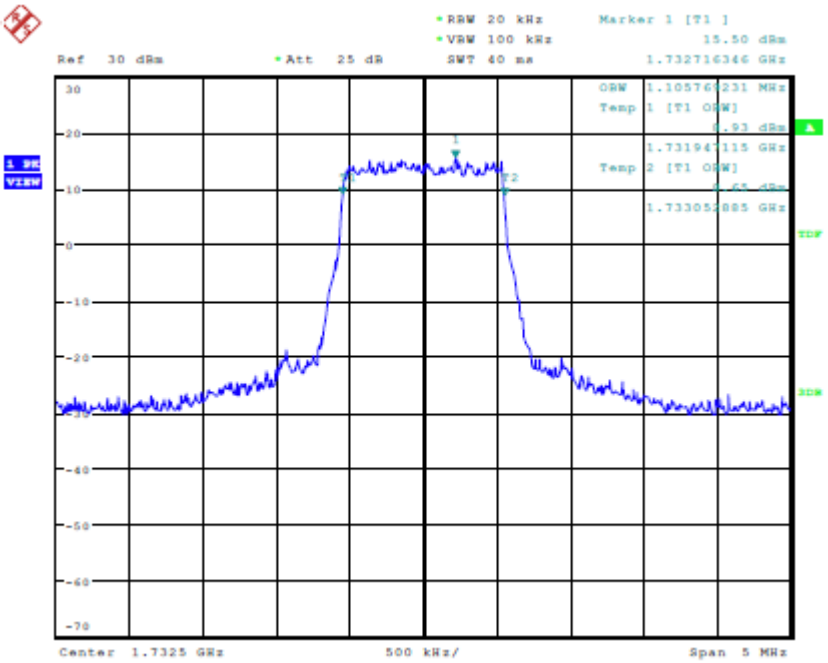
LTE band 2, 20MHz Bandwidth, QPSK (99% BW)



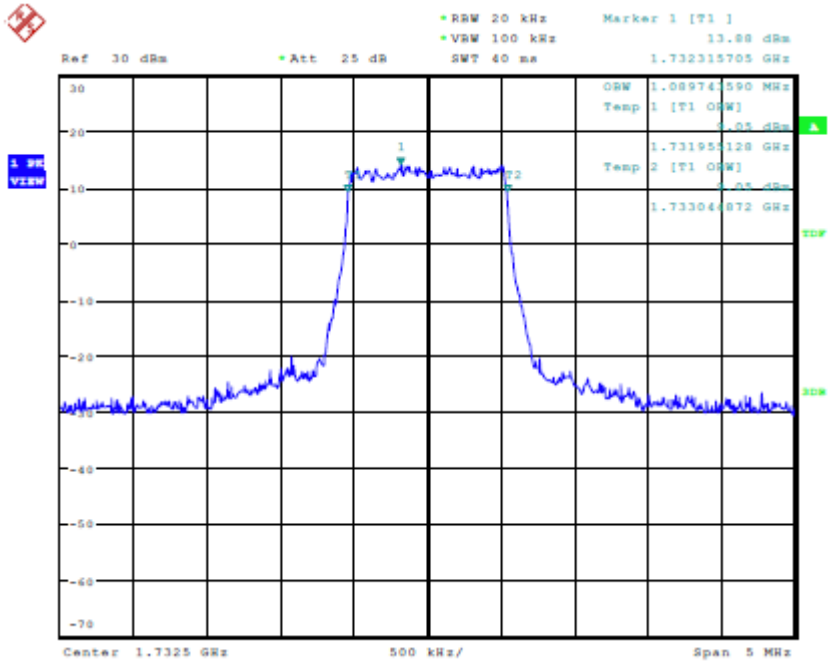
LTE band 4, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
1732.5	QPSK	16QAM
	1105.77	1089.74

LTE band 4, 1.4MHz Bandwidth, QPSK (99% BW)



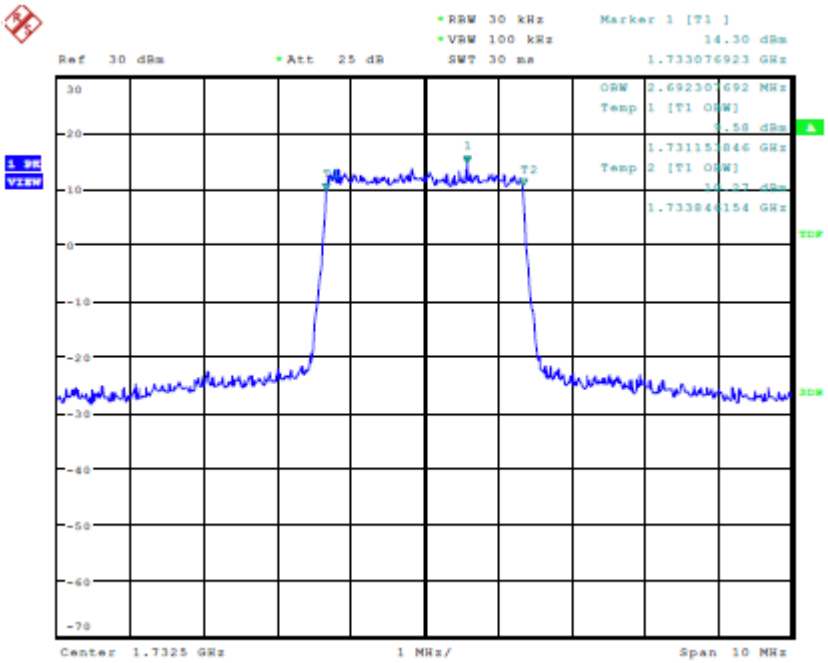
LTE band 4, 1.4MHz Bandwidth, 16QAM (99% BW)



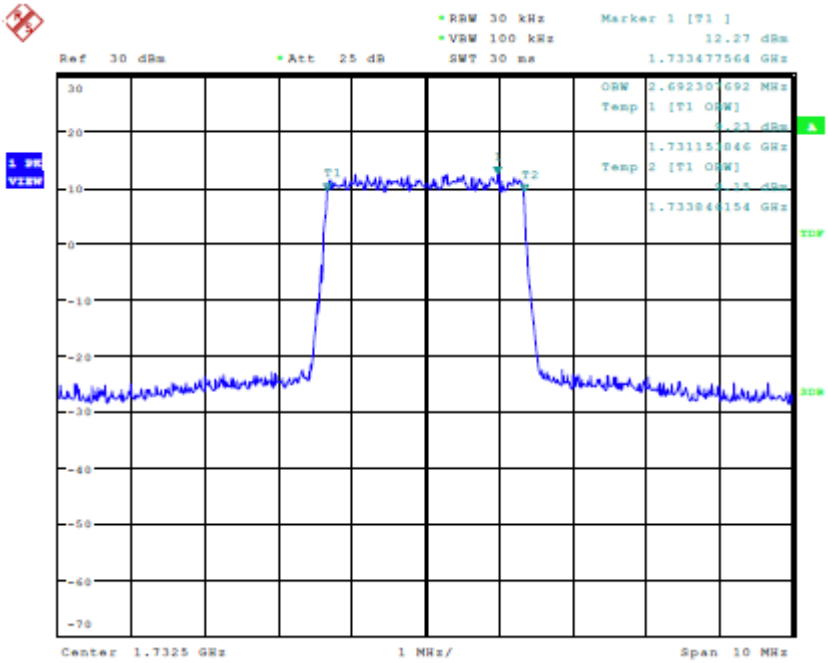
LTE band 4, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
1732.5	QPSK	16QAM
	2692.31	2692.31

LTE band 4, 3MHz Bandwidth, QPSK (99% BW)



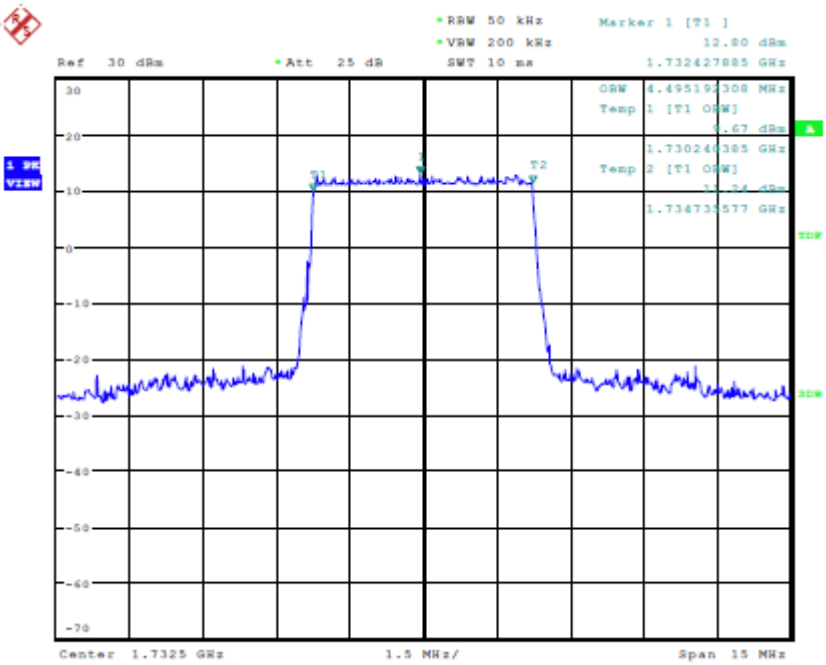
LTE band 4, 3MHz Bandwidth, 16QAM (99% BW)



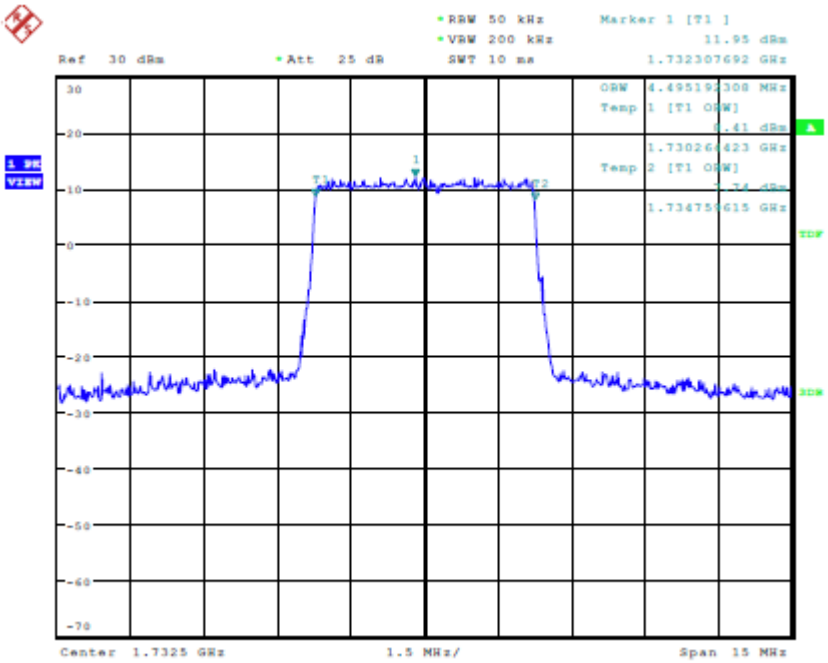
LTE band 4, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
1732.5	QPSK	16QAM
	4495.19	4495.19

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



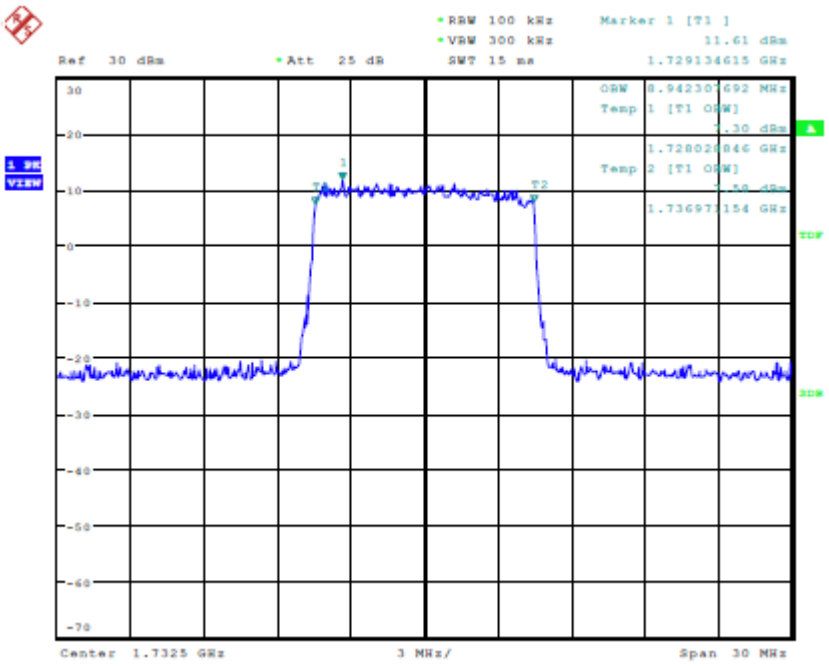
LTE band 4, 5MHz Bandwidth,16QAM (99% BW)



LTE band 4, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
1732.5	QPSK	16QAM
	8942.31	/

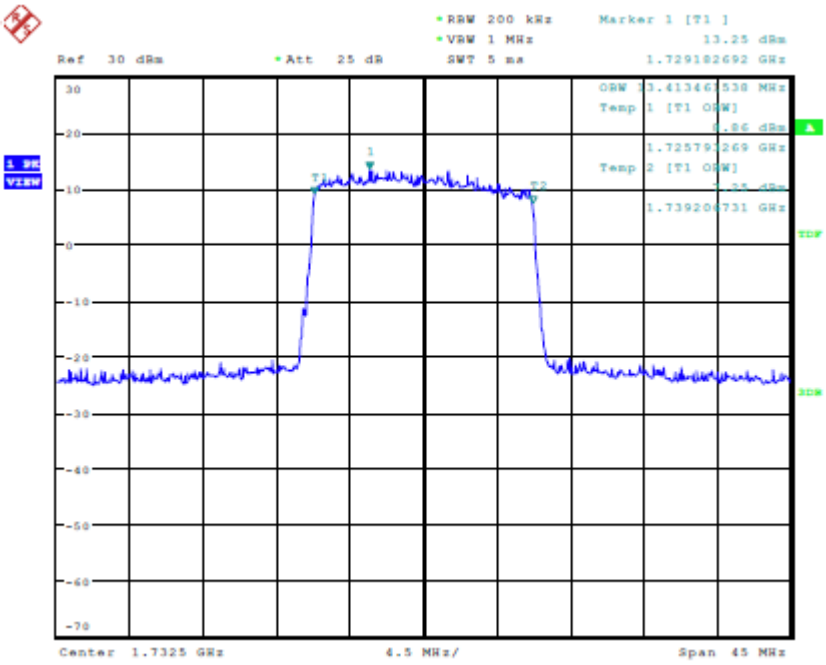
LTE band 4, 10MHz Bandwidth, QPSK (99% BW)



LTE band 4, 15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
1732.5	QPSK	16QAM
	13413.46	/

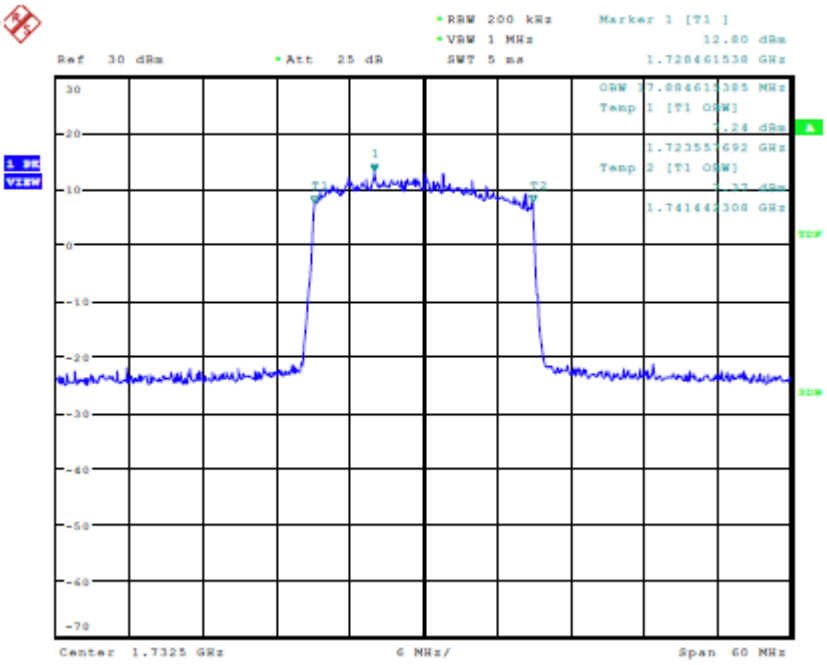
LTE band 4, 15MHz Bandwidth, QPSK (99% BW)



LTE band 4, 20MHz (99%)

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

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

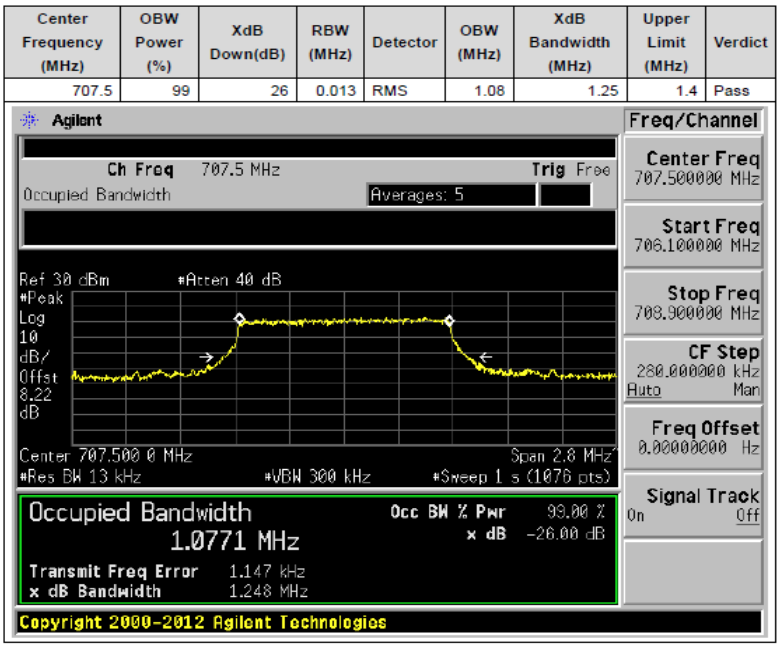


LTE band 12, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
707.5	QPSK	16QAM
	1077.1	1076.8

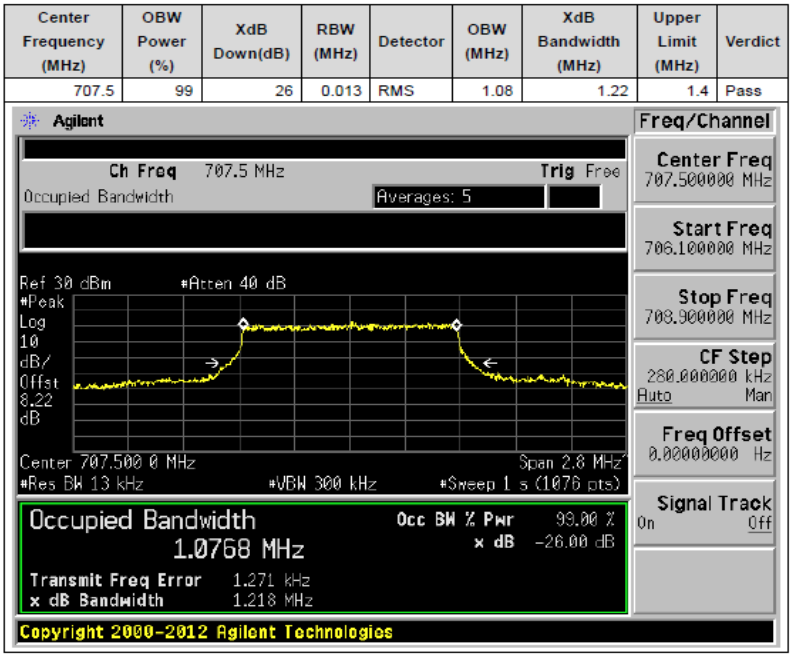
LTE band 12, 1.4MHz Bandwidth, QPSK (99% BW)

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.013	RMS	1.08	1.25	1.4	Pass



LTE band 12, 1.4MHz Bandwidth, 16QAM (99% BW)

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.013	RMS	1.08	1.22	1.4	Pass

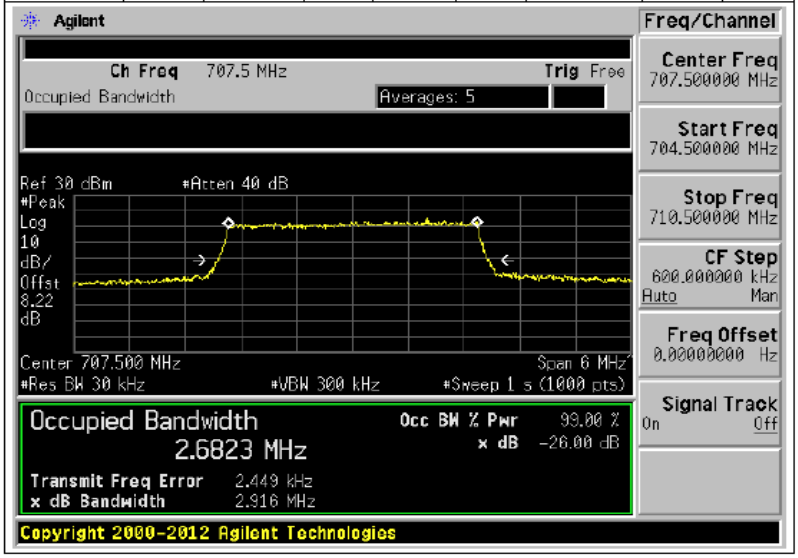


LTE band 12, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
707.5	QPSK	16QAM
	2682.3	2681.9

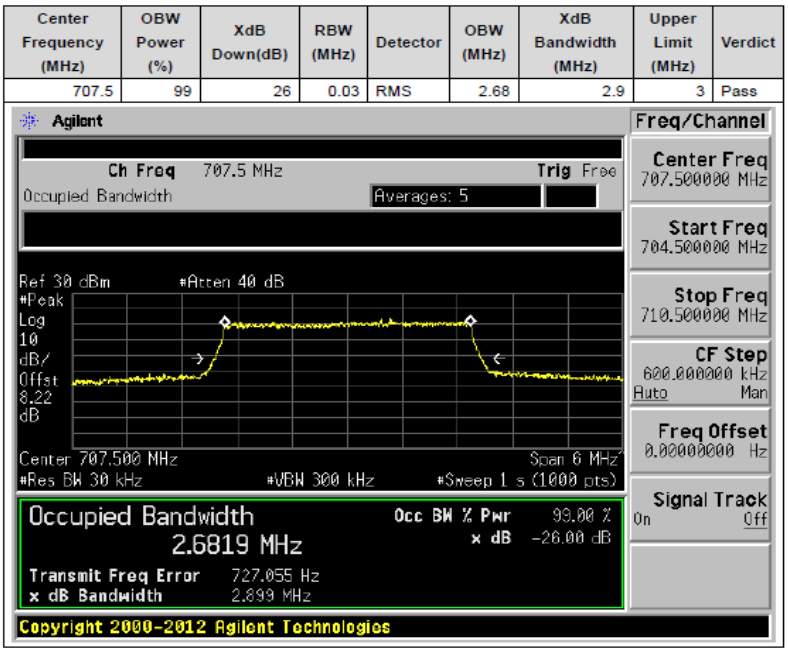
LTE band 12, 3MHz Bandwidth, QPSK (99% BW)

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.03	RMS	2.68	2.92	3	Pass



LTE band 12, 3MHz Bandwidth, 16QAM (99% BW)

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.03	RMS	2.68	2.9	3	Pass

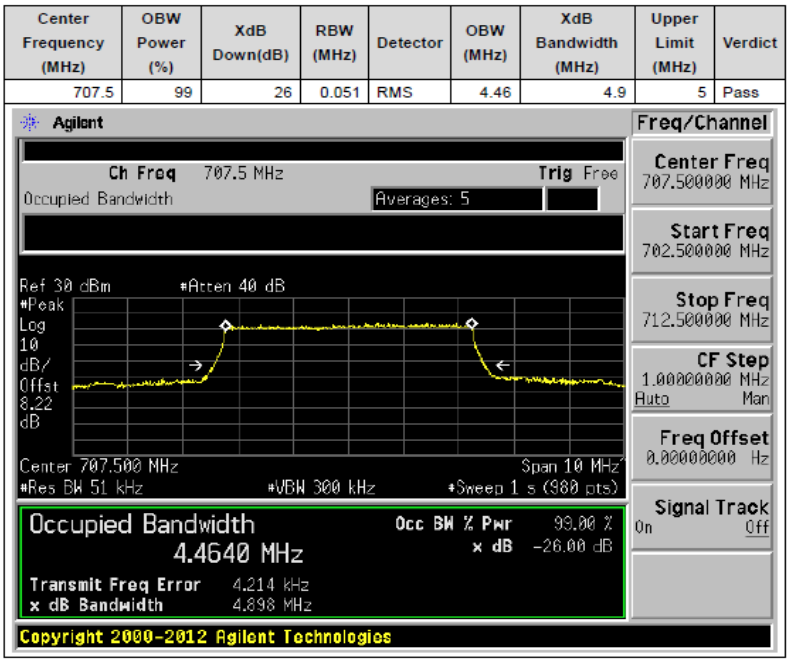


LTE band 12, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
707.5	QPSK	16QAM
	4464.0	4475.7

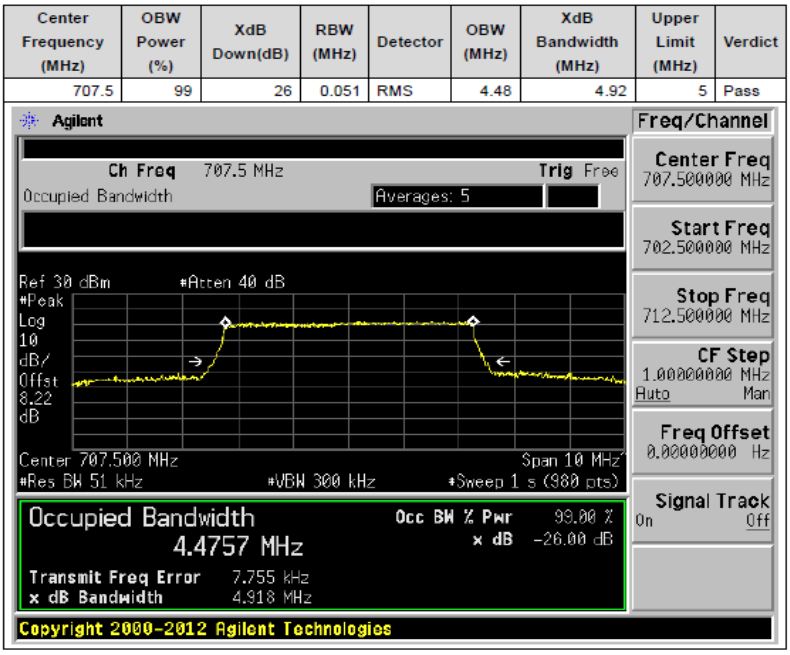
LTE band 12, 5MHz Bandwidth, QPSK (99% BW)

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.051	RMS	4.46	4.9	5	Pass



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

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.051	RMS	4.48	4.92	5	Pass

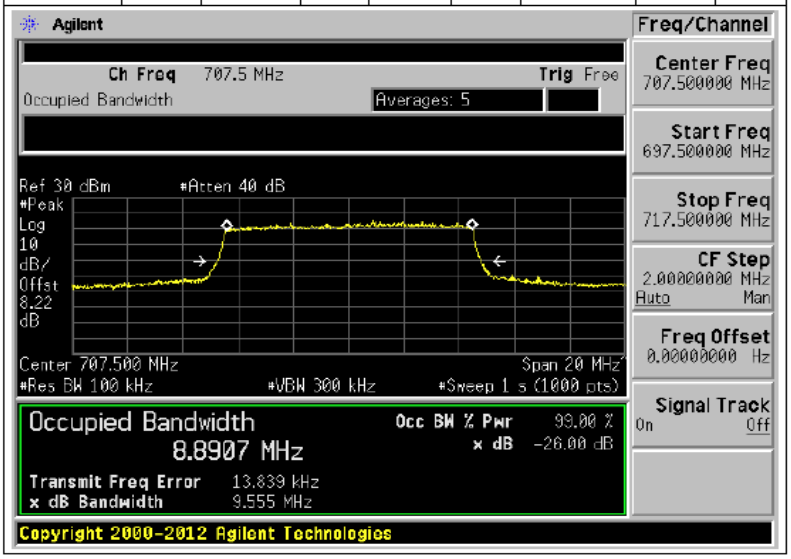


LTE band 12, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(KHz)	
707.5	QPSK	16QAM
	8890.7	/

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

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.1	RMS	8.89	9.55	10	Pass



ANNEX A.3. EMISSION BANDWIDTH

Reference

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

A.3.1Emission 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.

A.3.2 Measurement results

Note:

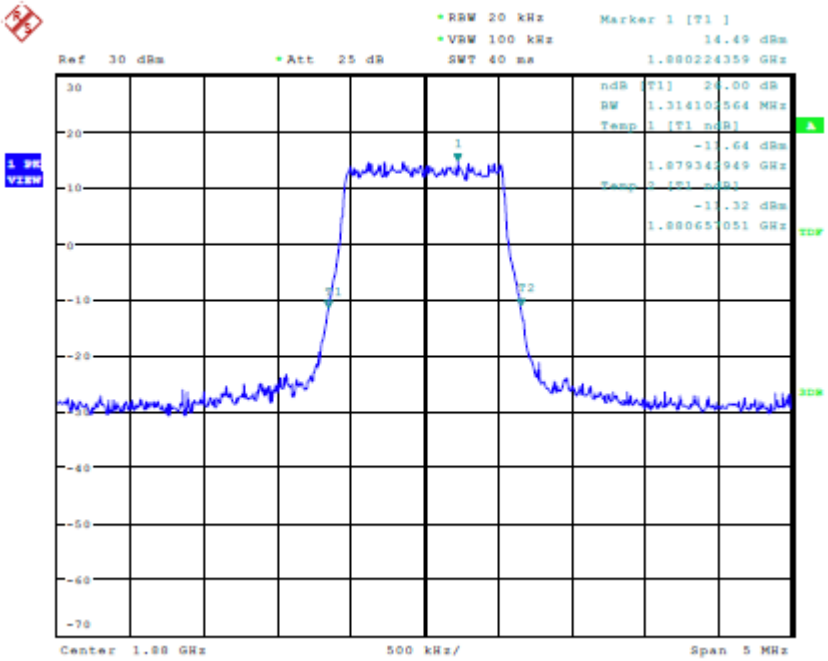
The Emission Bandwidth test cases of Band II/IV please refer to the report No: I16Z41276-GTE01_part222427_LTE_Rev2. Section A.4

The Emission Bandwidth test cases of Band XII please refer to the report No: BL-SZ1690342-501 V02. Section A.3

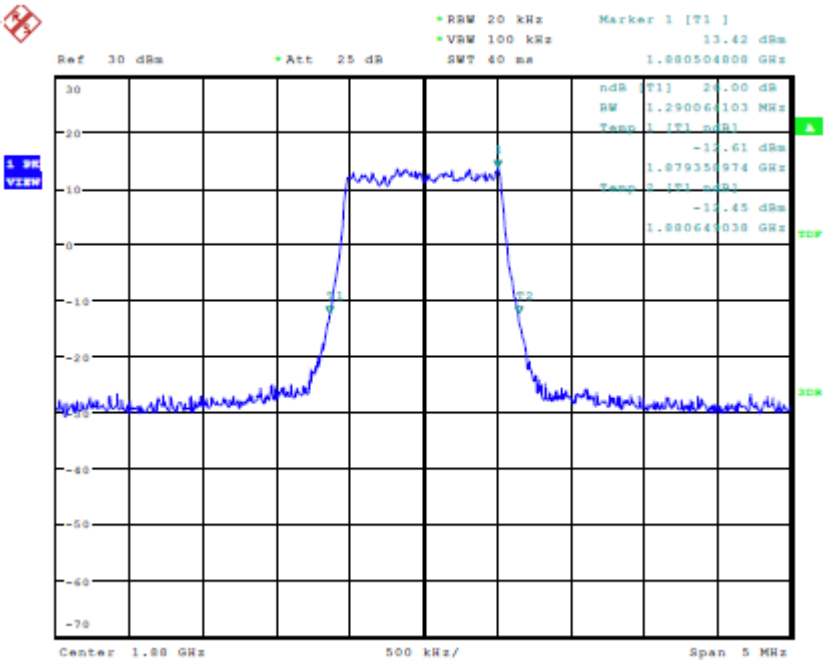
LTE band 2, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	1314.10	1290.06

LTE band 2, 1.4MHz Bandwidth, QPSK (-26dBc BW)



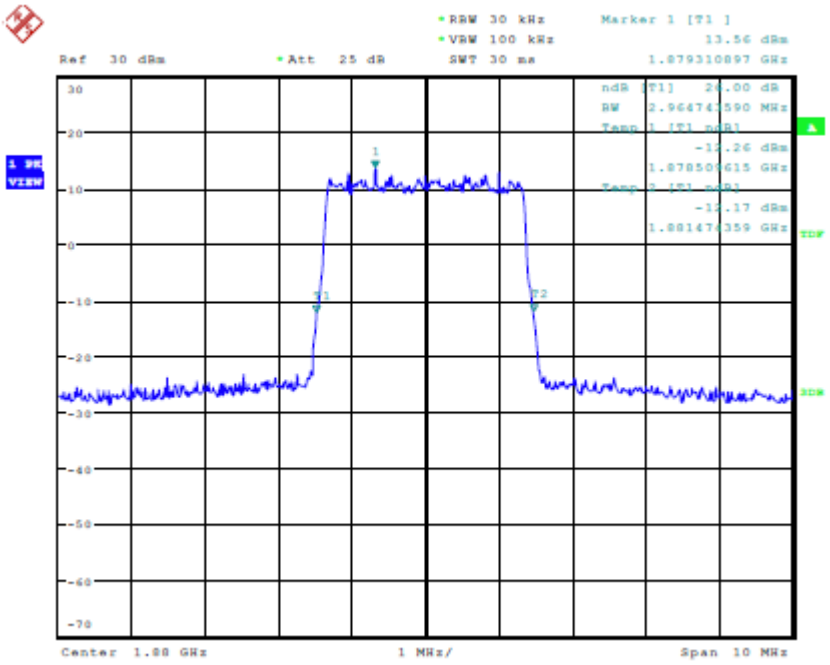
LTE band 2, 1.4MHz Bandwidth, 16QAM (-26dBc BW)



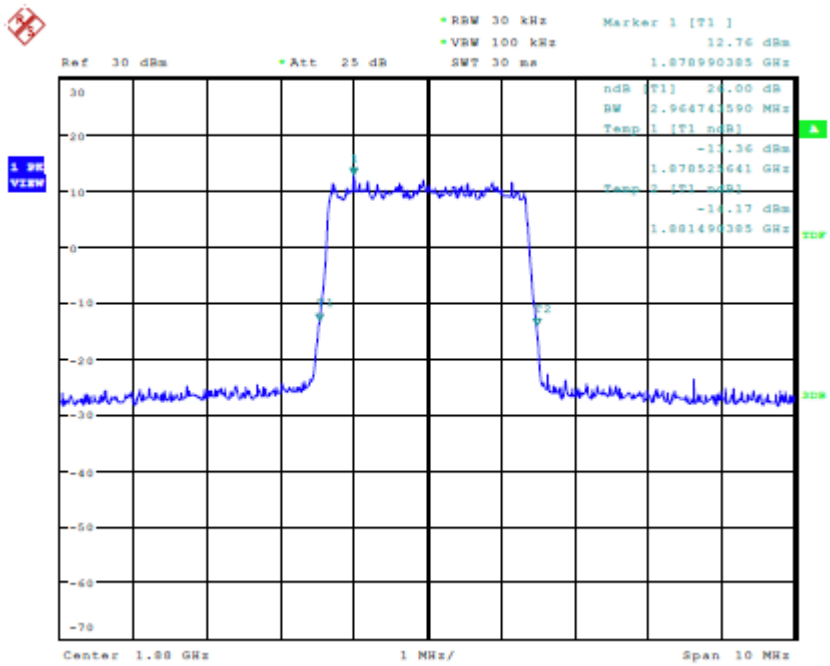
LTE band 2, 3MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	2964.74	2964.74

LTE band 2, 3MHz Bandwidth, QPSK (-26dBc BW)



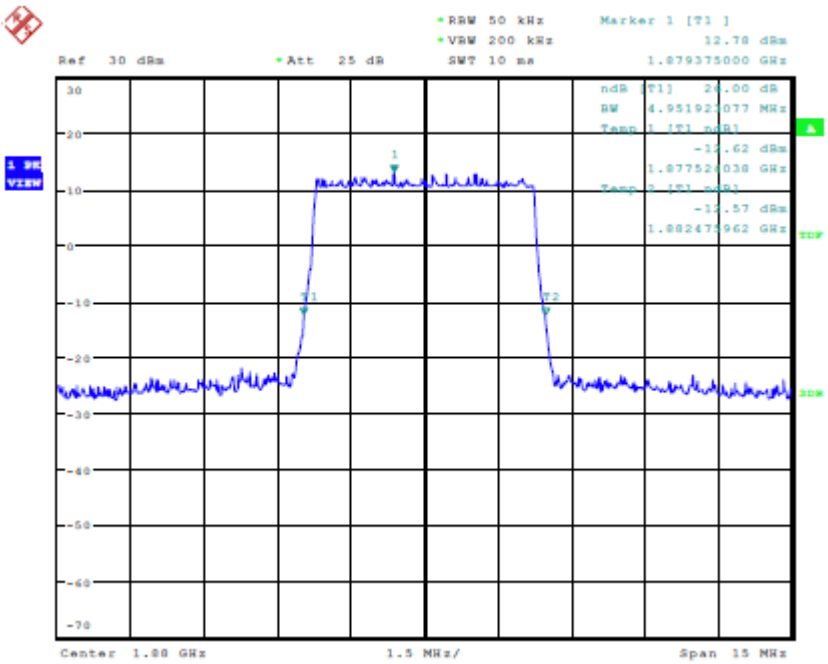
LTE band 2, 3MHz Bandwidth, 16QAM (-26dBc BW)



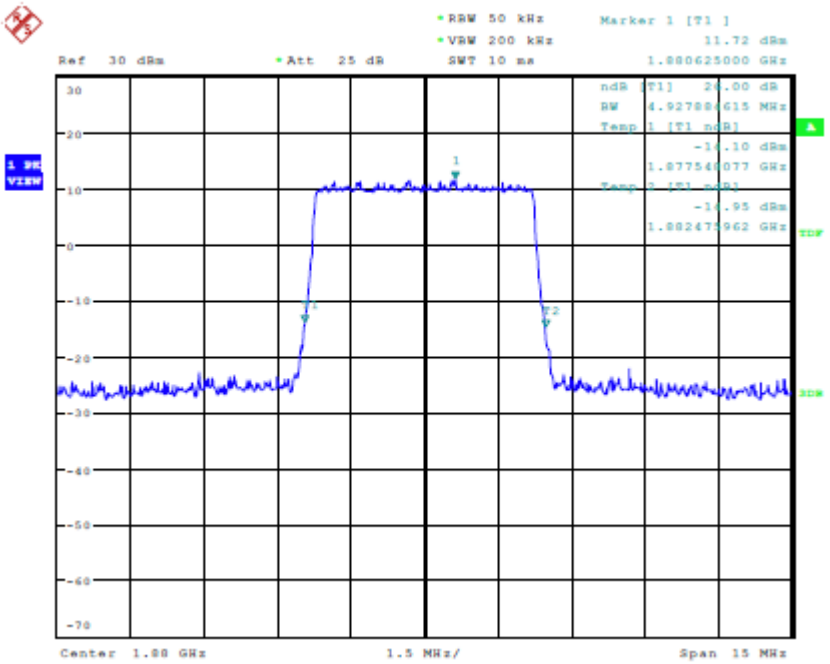
LTE band 2, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	4951.92	4927.88

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



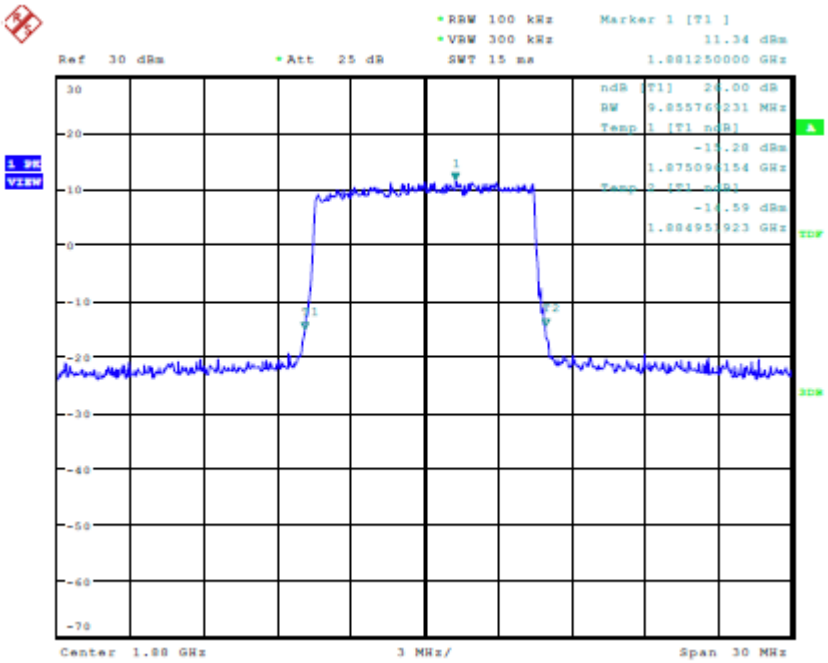
LTE band 2, 5MHz Bandwidth,16QAM (-26dBc BW)



LTE band 2, 10MHz (-26dBc)

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

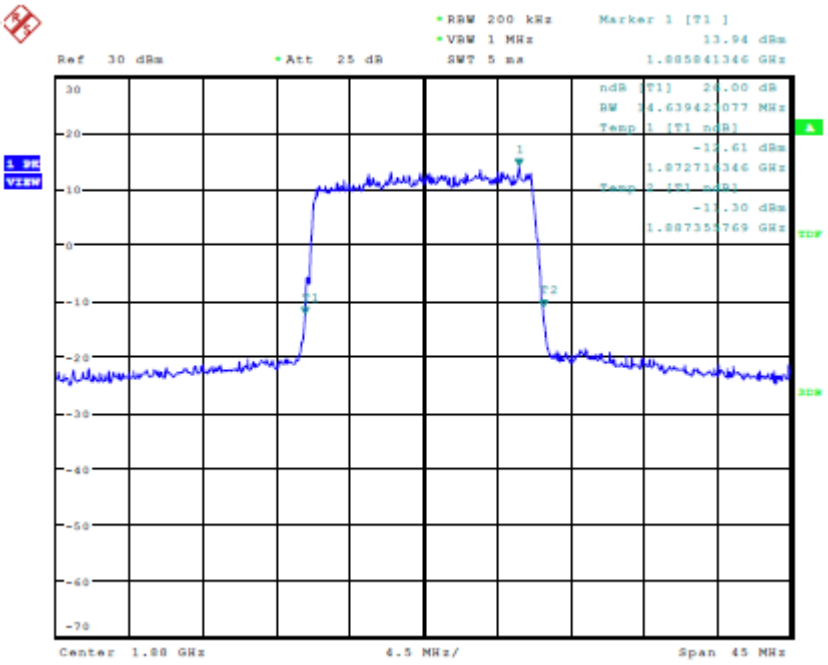
LTE band 2, 10MHz Bandwidth, QPSK (-26dBc BW)



LTE band 2, 15MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	14639.42	/

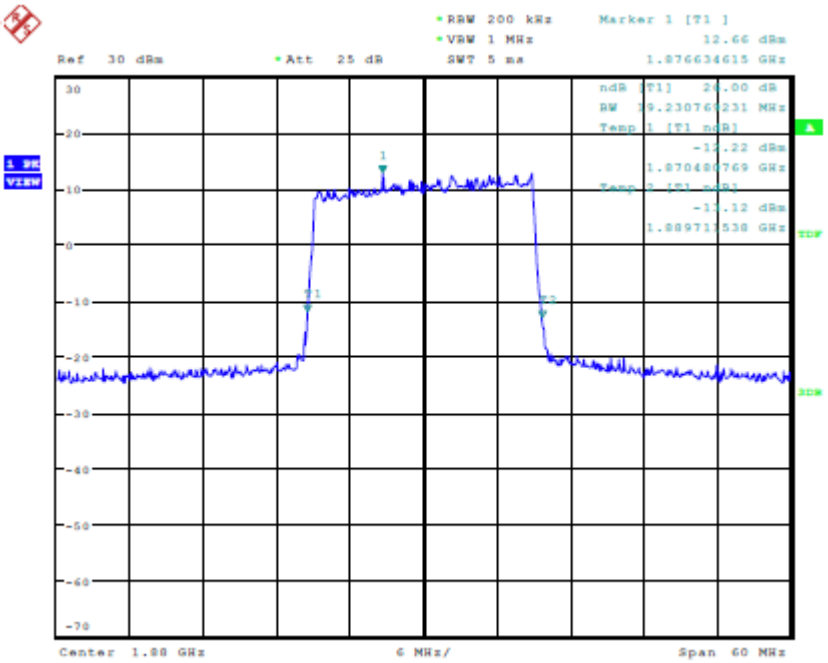
LTE band 2, 15MHz Bandwidth, QPSK (-26dBc BW)



LTE band 2, 20MHz (-26dBc)

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

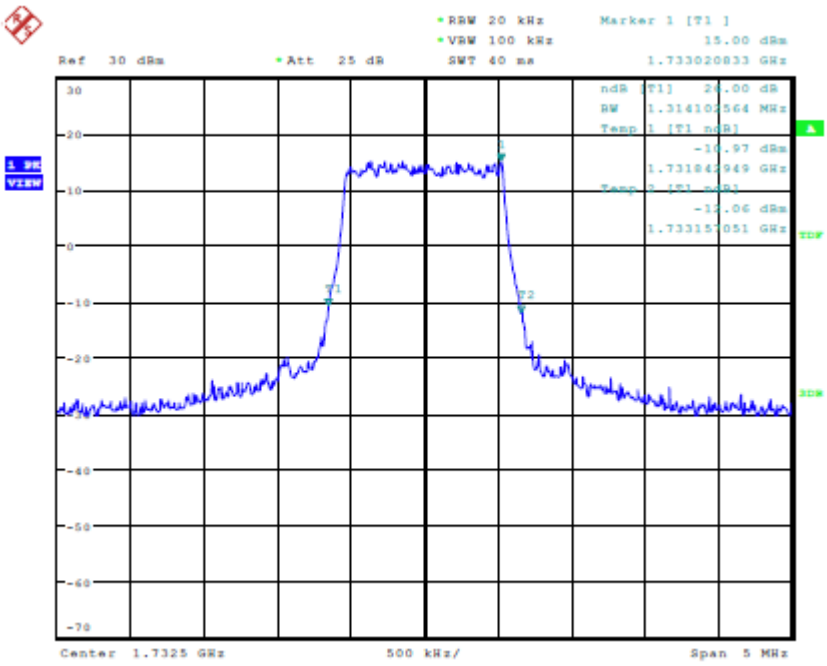
LTE band 2, 20MHz Bandwidth, QPSK (-26dBc BW)



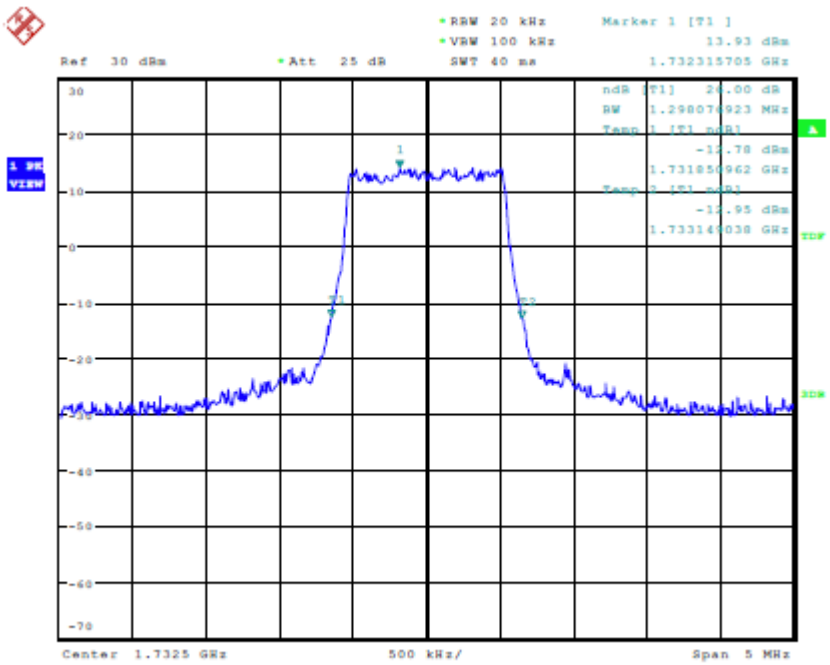
LTE band 4, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	1314.10	1298.08

LTE band 4, 1.4MHz Bandwidth, QPSK (-26dBc BW)



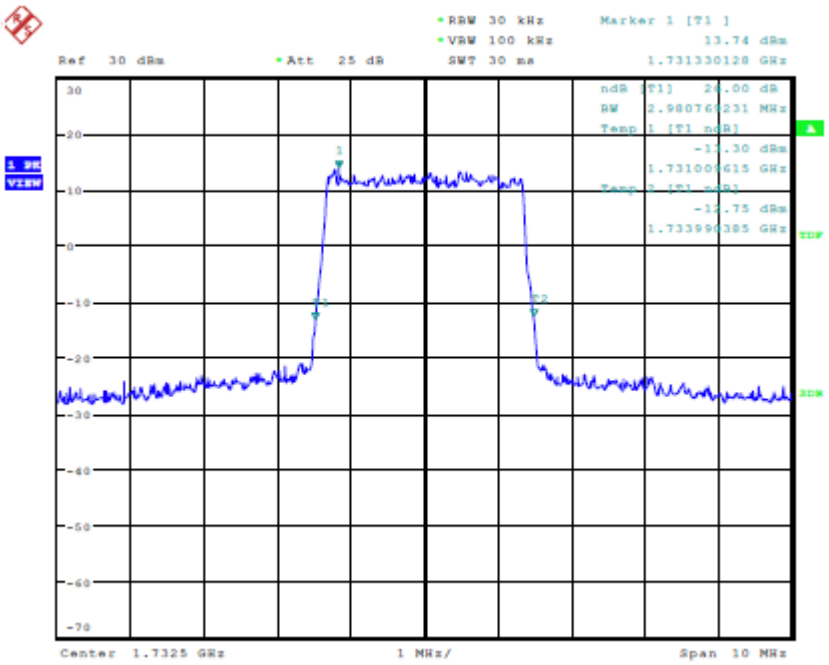
LTE band 4, 1.4MHz Bandwidth, 16QAM (-26dBc BW)



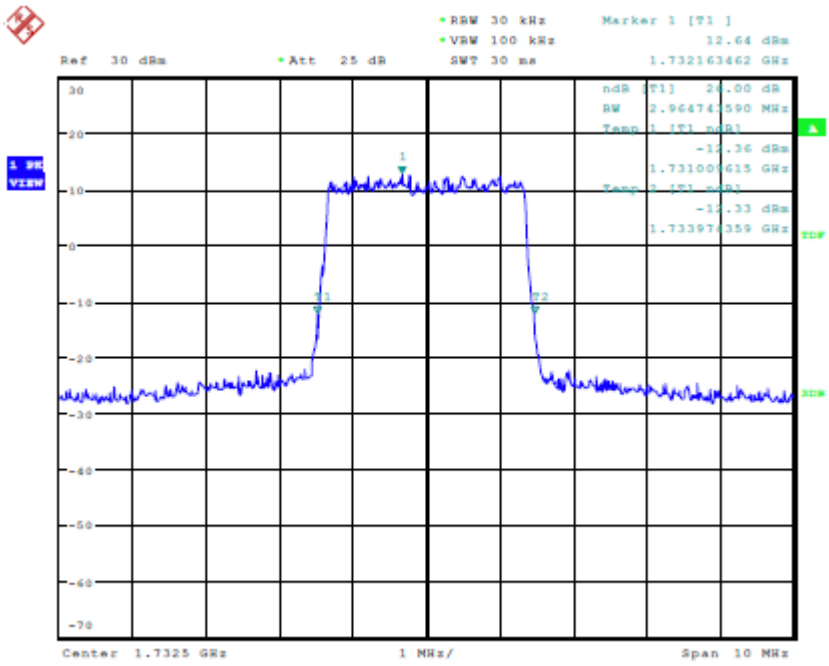
LTE band 4, 3MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	298.77	2964.74

LTE band 4, 3MHz Bandwidth, QPSK (-26dBc BW)



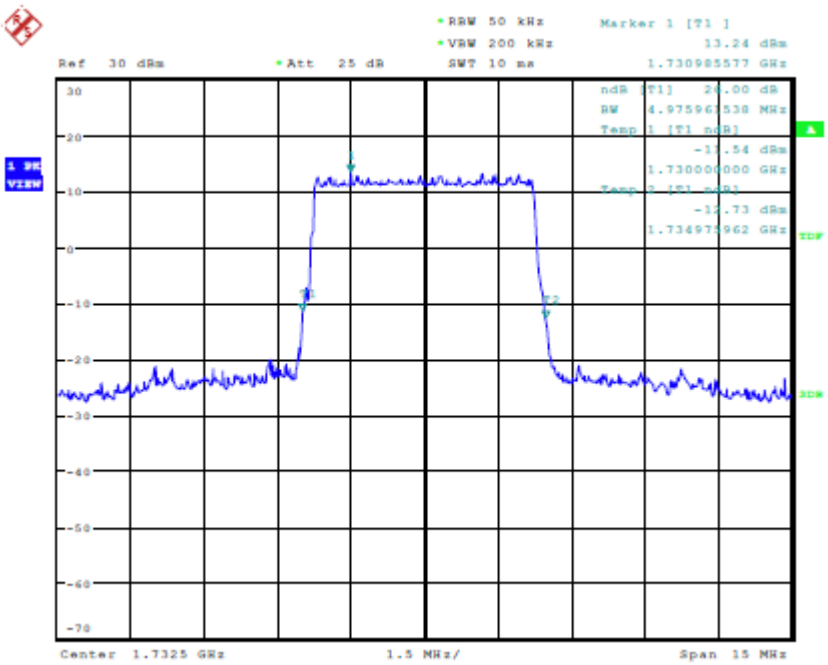
LTE band 4, 3MHz Bandwidth, 16QAM (-26dBc BW)



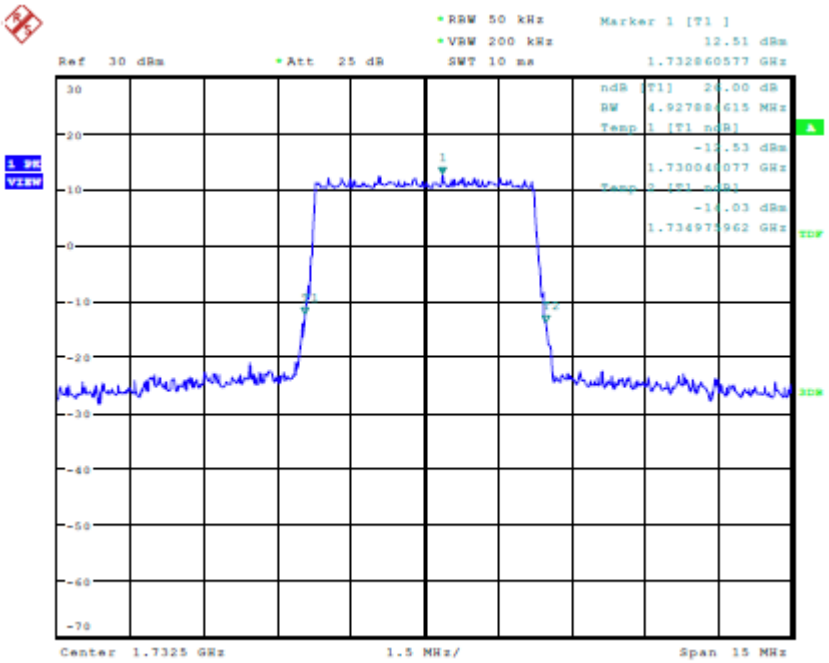
LTE band 4, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	4975.96	4927.88

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



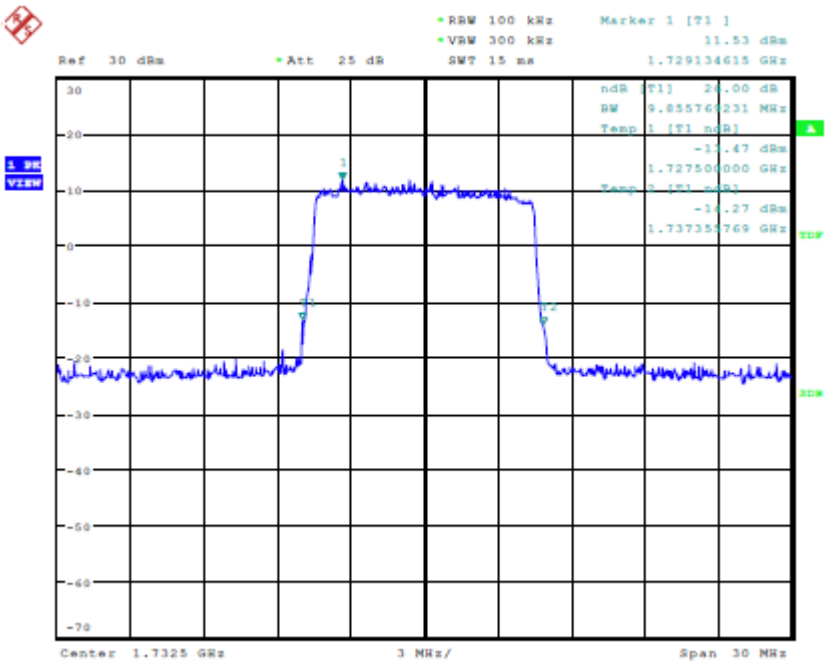
LTE band 4, 5MHz Bandwidth,16QAM (-26dBc BW)



LTE band 4, 10MHz (-26dBc)

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

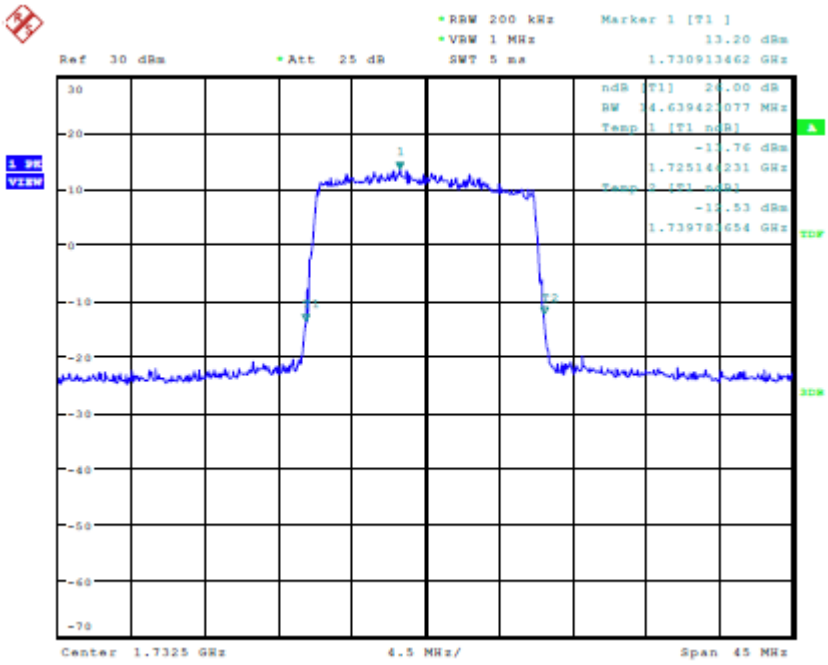
LTE band 4, 10MHz Bandwidth, QPSK (-26dBc BW)



LTE band 4, 15MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	14639.42	/

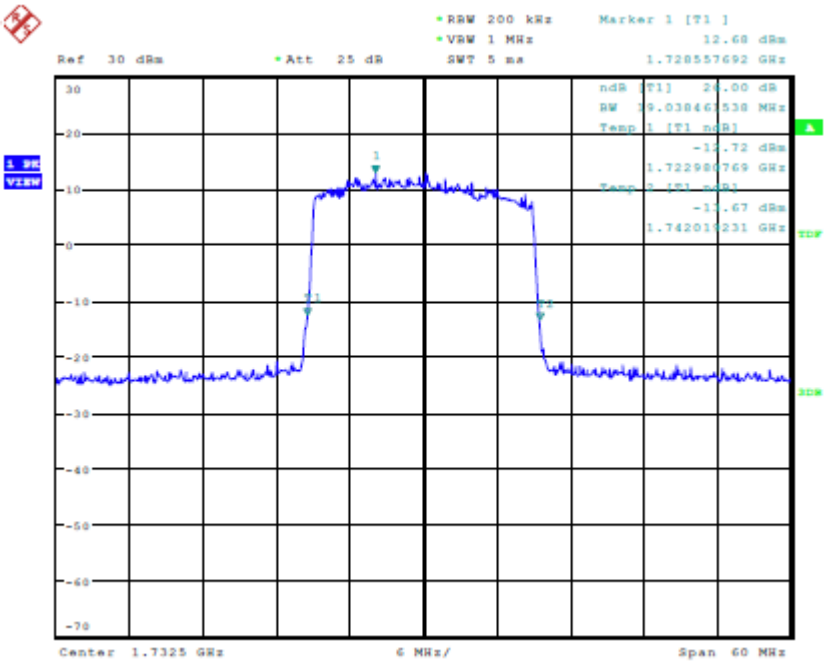
LTE band 4, 15MHz Bandwidth, QPSK (-26dBc BW)



LTE band 4, 20MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	19038.46	/

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

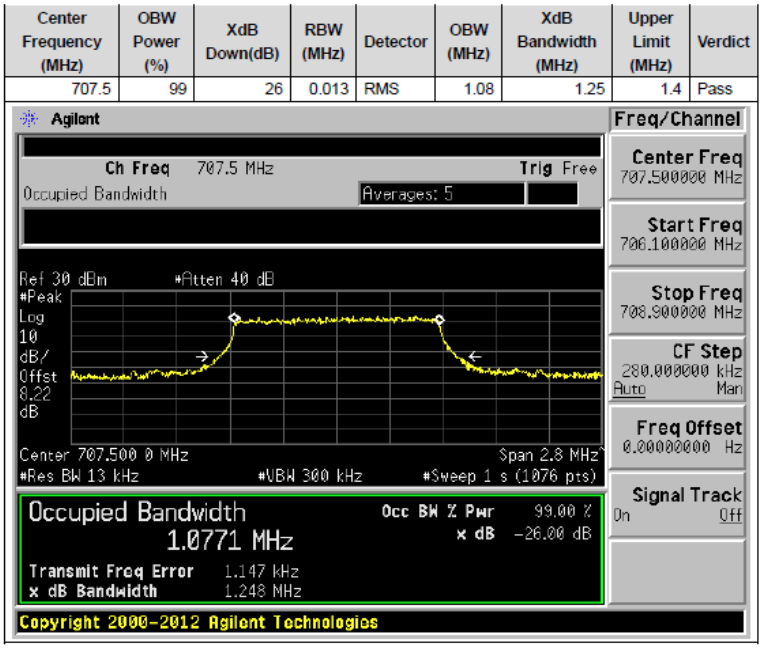


LTE band 12, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	1077.1	1076.8

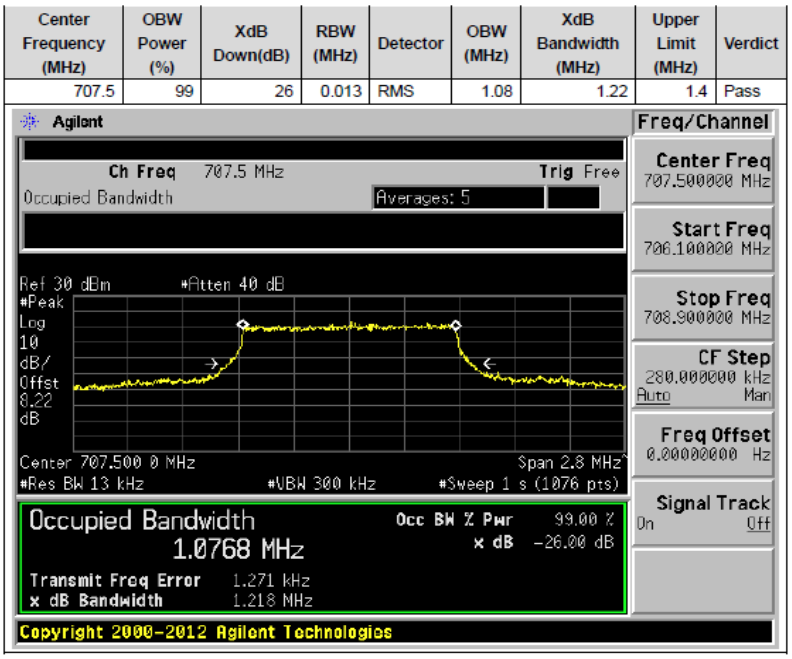
LTE band 12, 1.4MHz Bandwidth, QPSK (-26dBc BW)

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.013	RMS	1.08	1.25	1.4	Pass



LTE band 12, 1.4MHz Bandwidth, 16QAM (-26dBc BW)

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.013	RMS	1.08	1.22	1.4	Pass

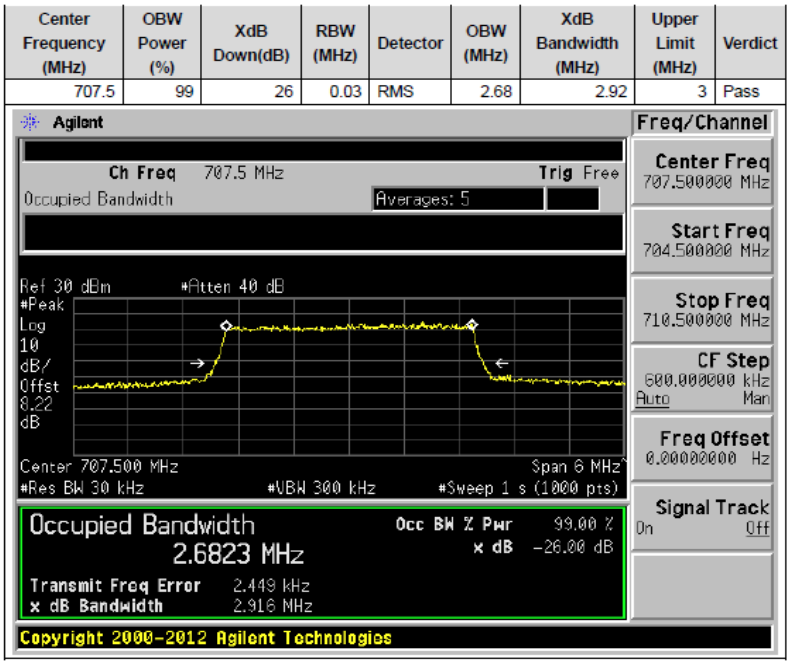


LTE band 12, 3MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	2682.3	2681.9

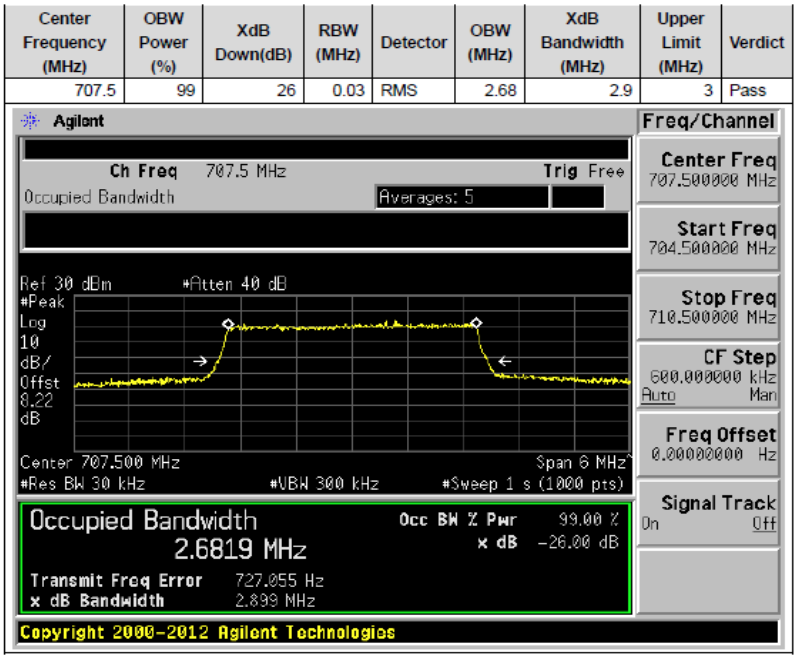
LTE band 12, 3MHz Bandwidth, QPSK (-26dBc BW)

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.03	RMS	2.68	2.92	3	Pass



LTE band 12, 3MHz Bandwidth, 16QAM (-26dBc BW)

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.03	RMS	2.68	2.9	3	Pass

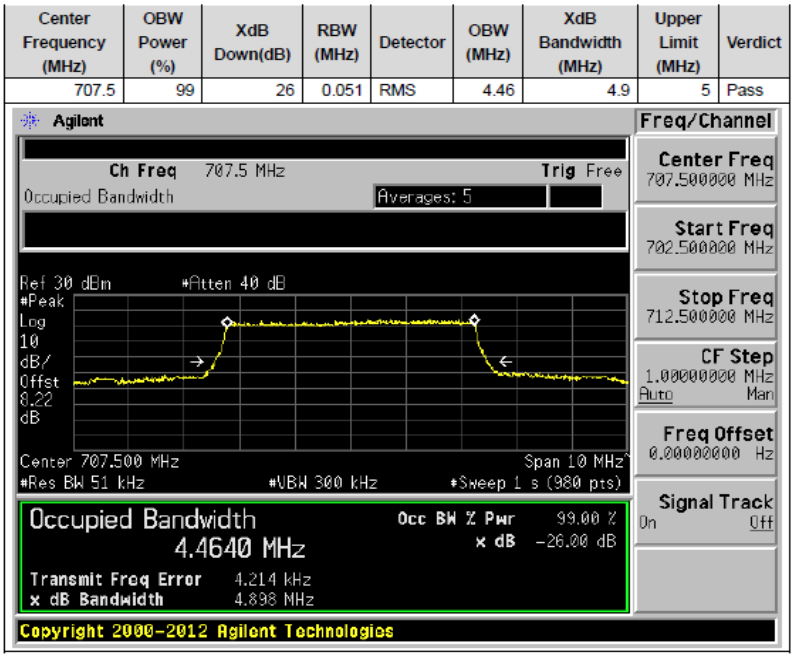


LTE band 12, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	4464.0	4475.7

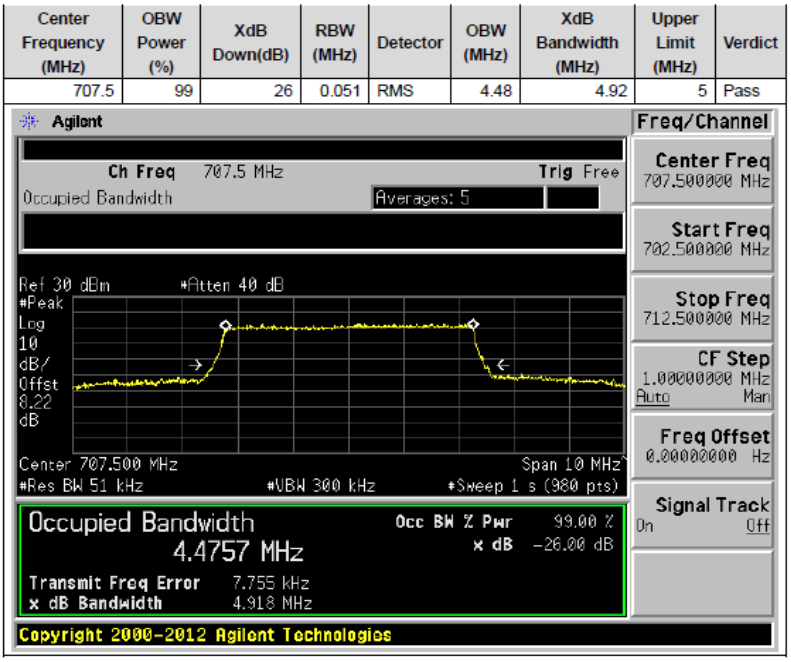
LTE band 12, 5MHz Bandwidth, QPSK (-26dBc BW)

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.051	RMS	4.46	4.9	5	Pass



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

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.051	RMS	4.48	4.92	5	Pass

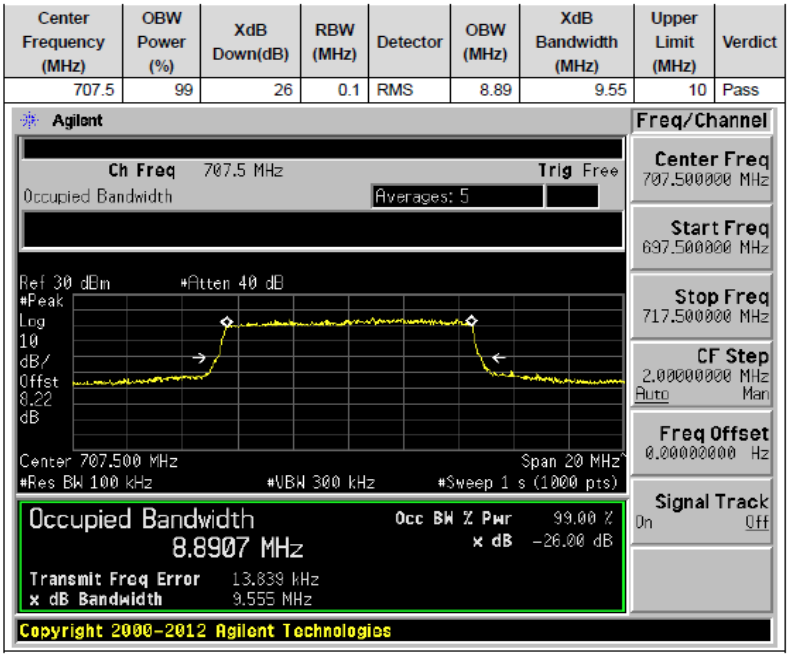


LTE band 12, 10MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	8890.7	/

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

Center Frequency (MHz)	OBW Power (%)	XdB Down(dB)	RBW (MHz)	Detector	OBW (MHz)	XdB Bandwidth (MHz)	Upper Limit (MHz)	Verdict
707.5	99	26	0.1	RMS	8.89	9.55	10	Pass



ANNEX A.4. BAND EDGE COMPLIANCE

Reference

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

A.4.1 Measurement limit

Part 22.917(b),24.238(a), 27.53(g),27.53(h), 27.53(m) state that 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.

Part 27.53(m) states that for mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

A.4.2 Measurement result

Note:

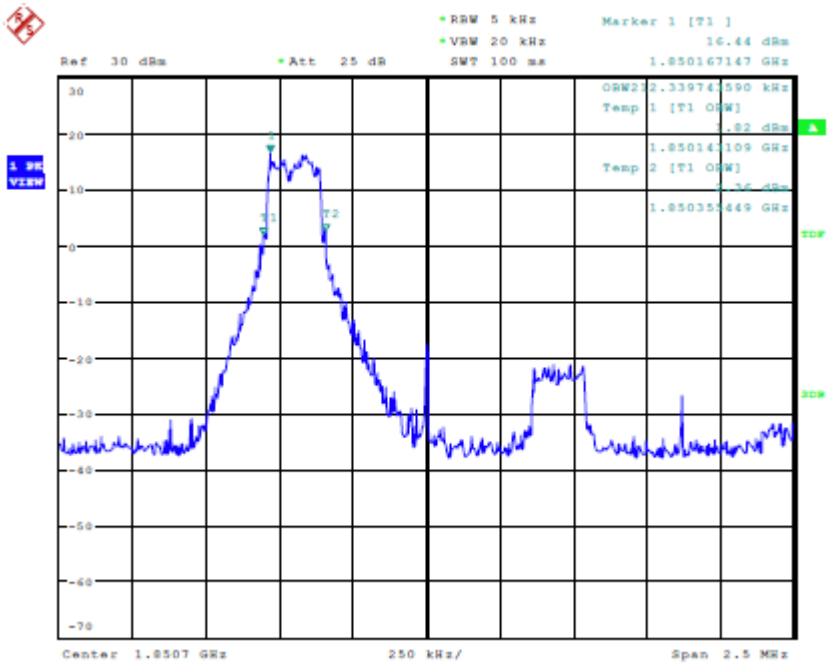
The Band Edge Compliance test cases of Band II/IV please refer to the report No: I16Z41276-GTE01_part222427_LTE_Rev2. Section A.5.2

The Band Edge Compliance test cases of Band XII please refer to the report No: BL-SZ1690342-501 V02. Section A.6

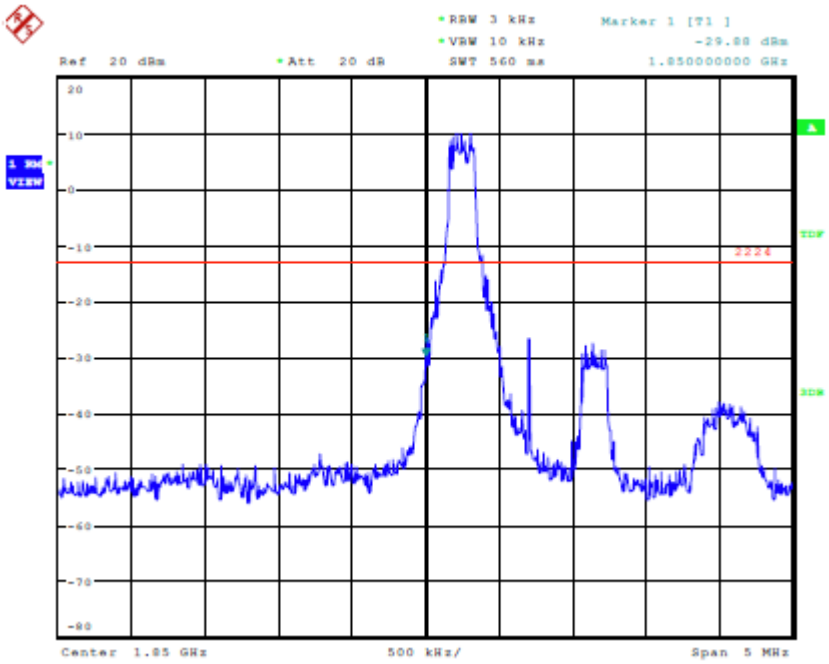
Only worst case result is given below

LTE band 2

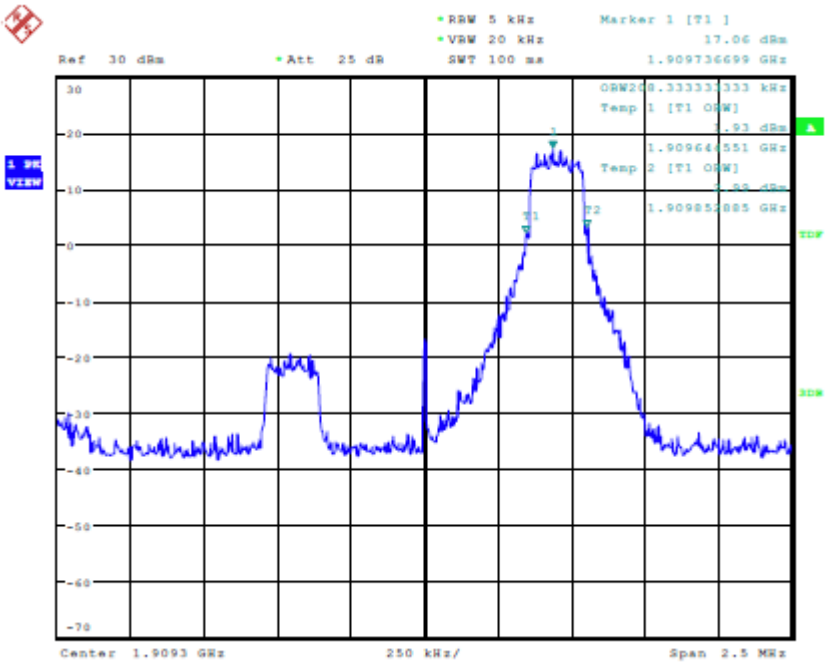
OBW: 1RB-low_offset



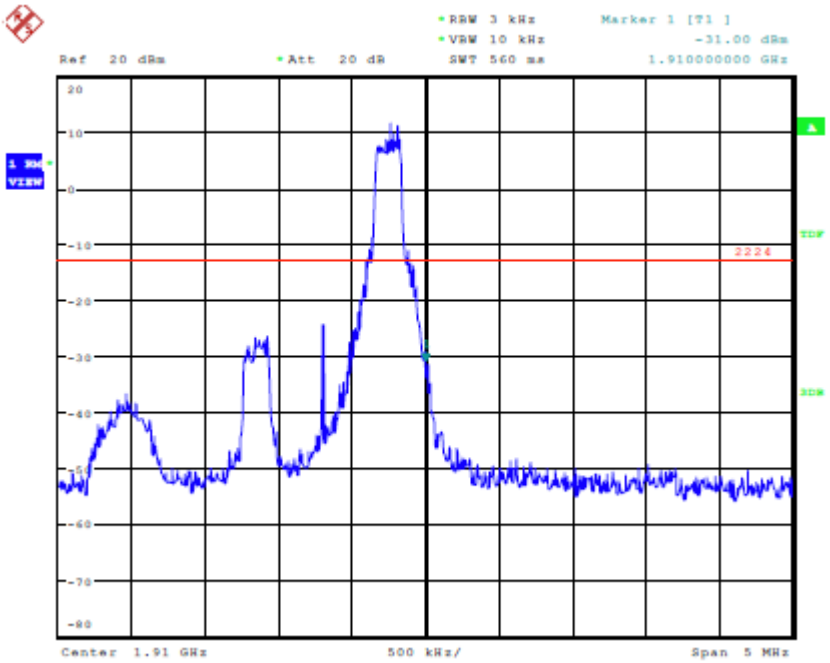
LOW BAND EDGE BLOCK-1RB-low_offset



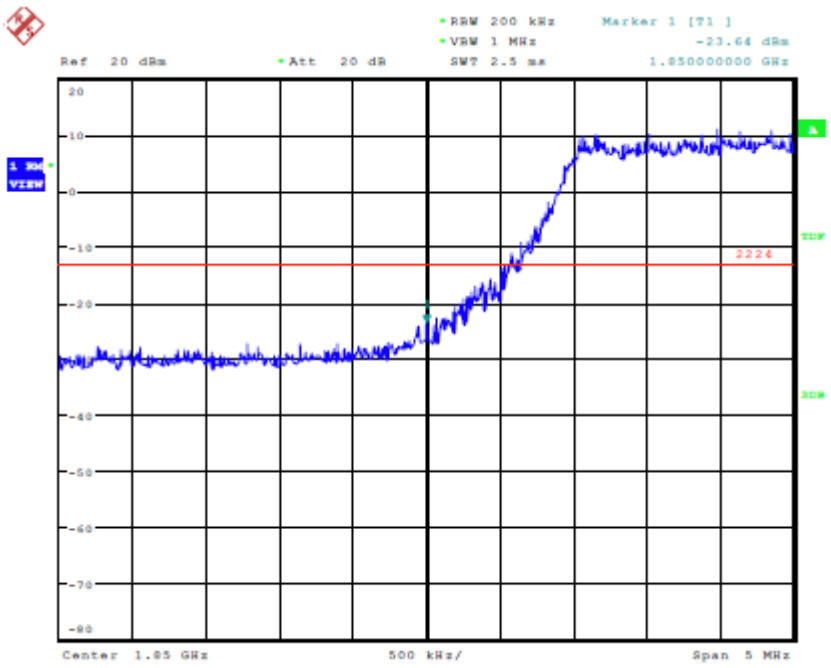
OBW: 1RB-high_offset



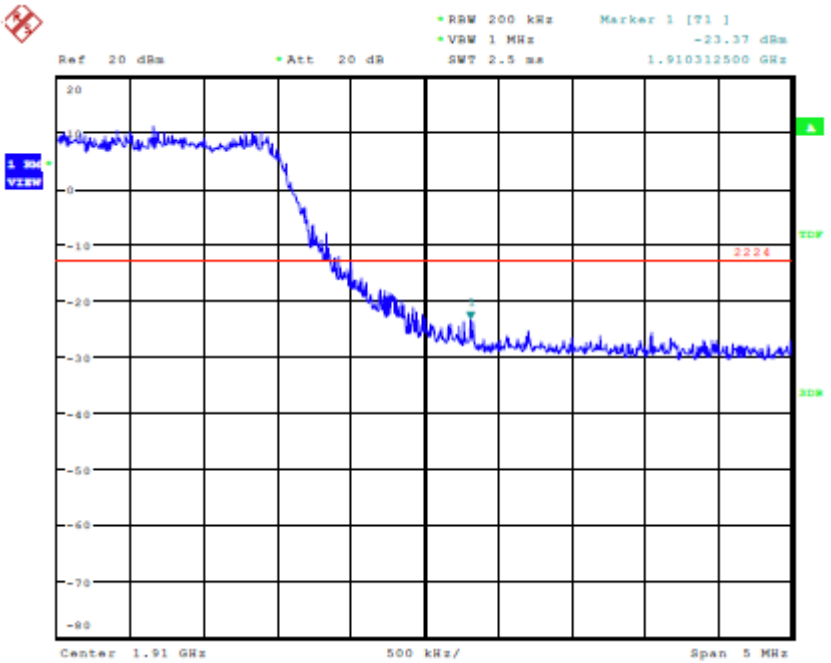
HIGH BAND EDGE BLOCK-1RB-high_offset



LOW BAND EDGE BLOCK-20MHz-100%RB

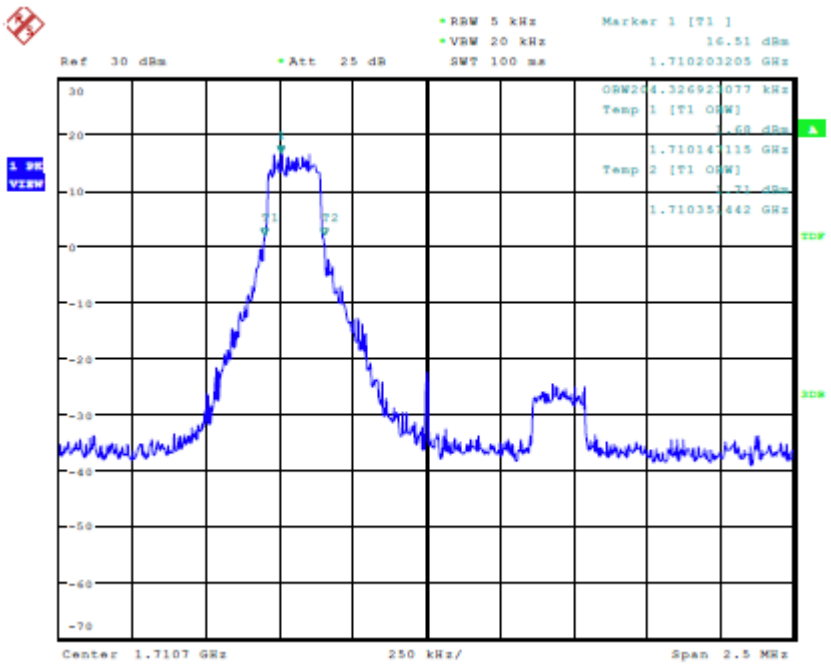


HIGH BAND EDGE BLOCK-20MHz-100%RB

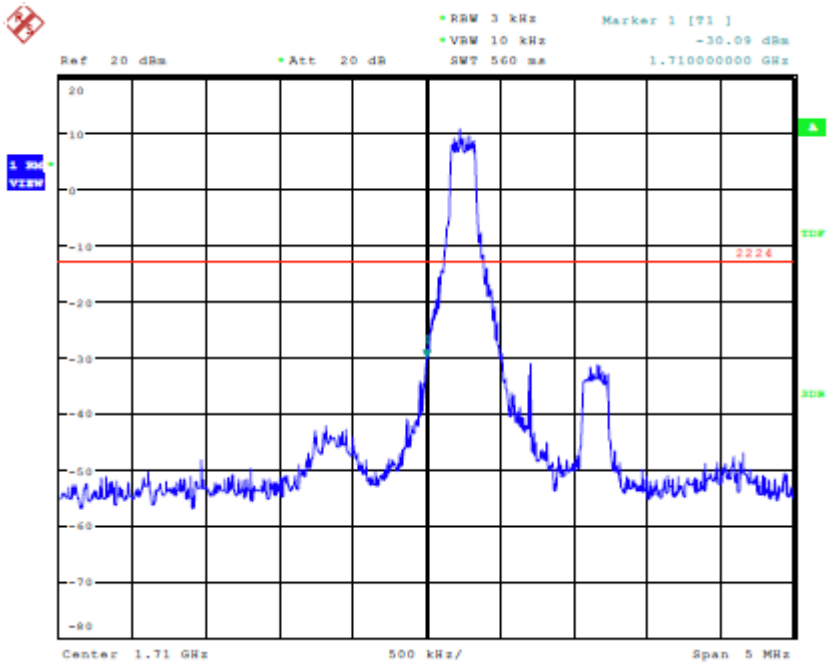


LTE band 4

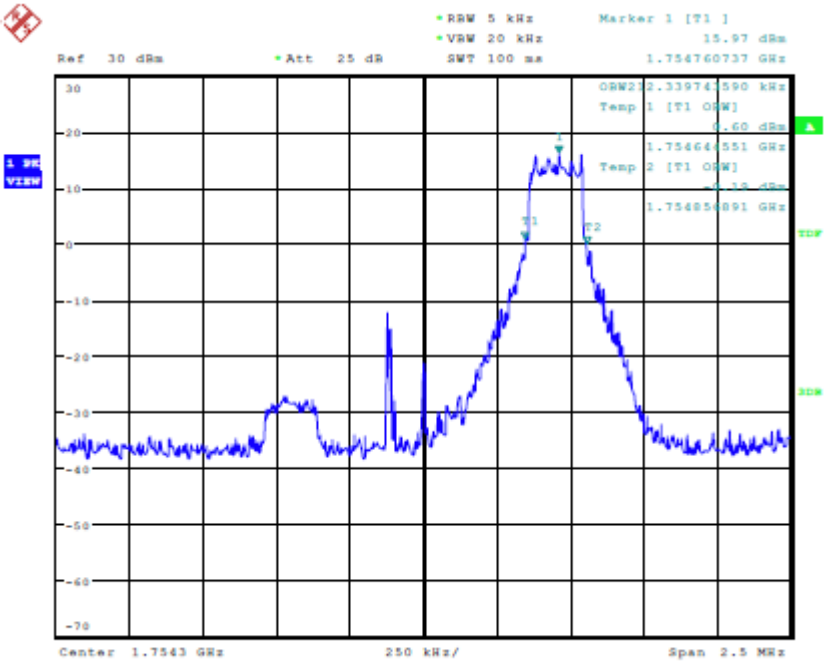
OBW: 1RB-low_offset



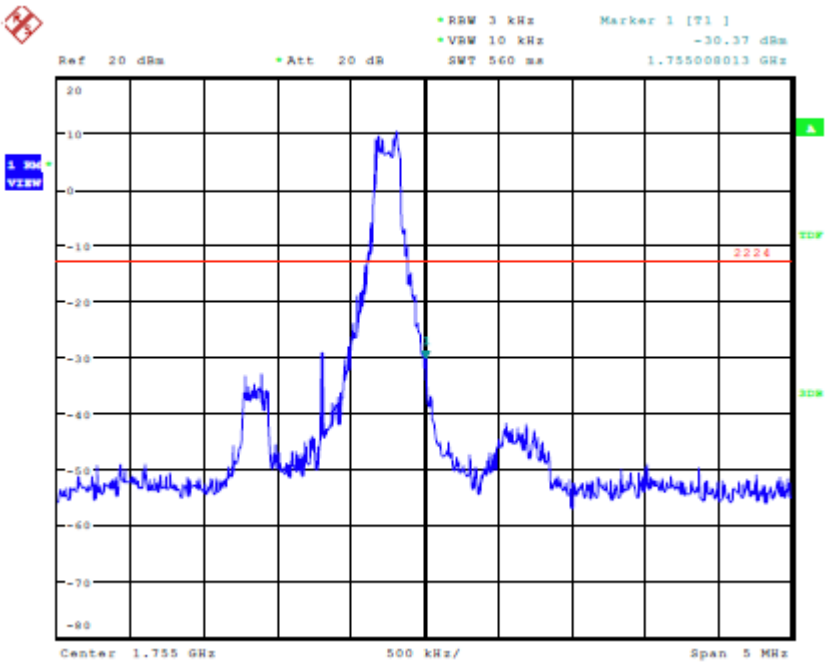
LOW BAND EDGE BLOCK-1RB-low_offset



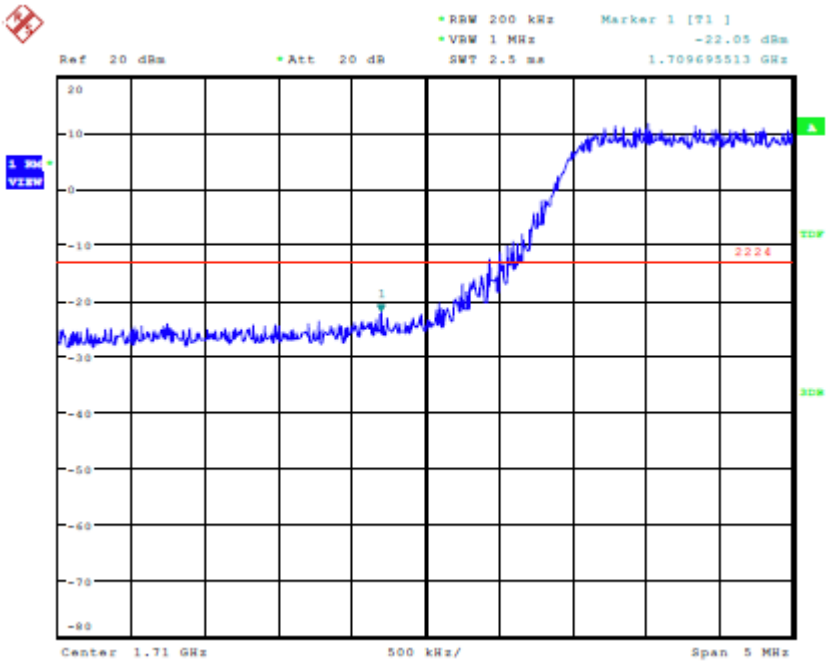
OBW: 1RB-high_offset



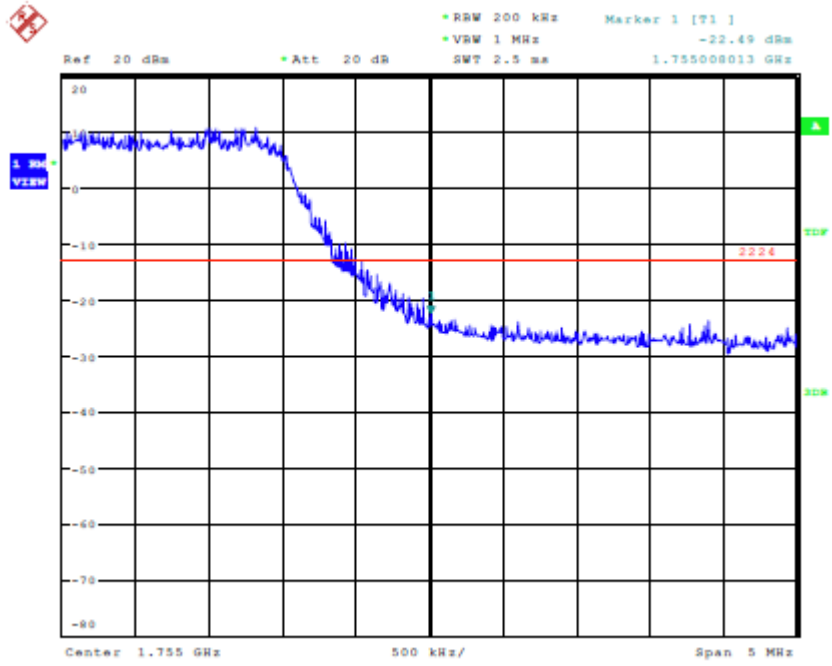
HIGH BAND EDGE BLOCK-1RB-high_offset



LOW BAND EDGE BLOCK-20MHz-100%RB



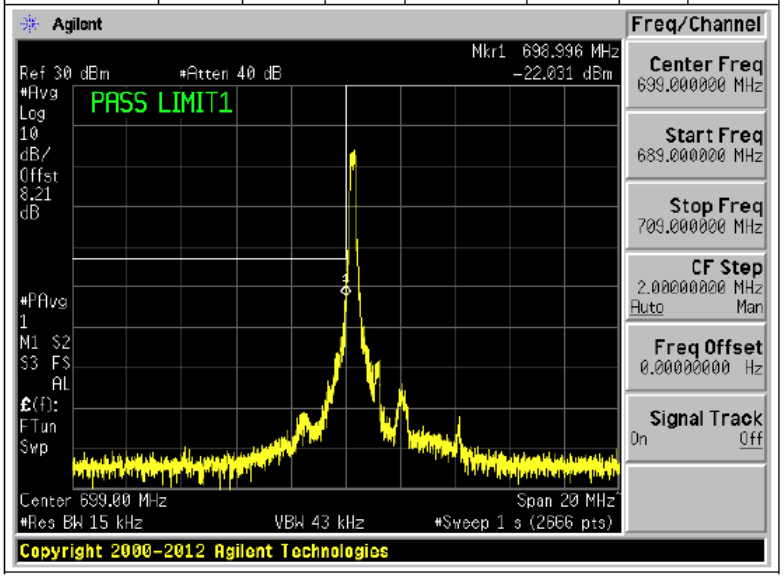
HIGH BAND EDGE BLOCK-20MHz-100%RB



LTE band 12

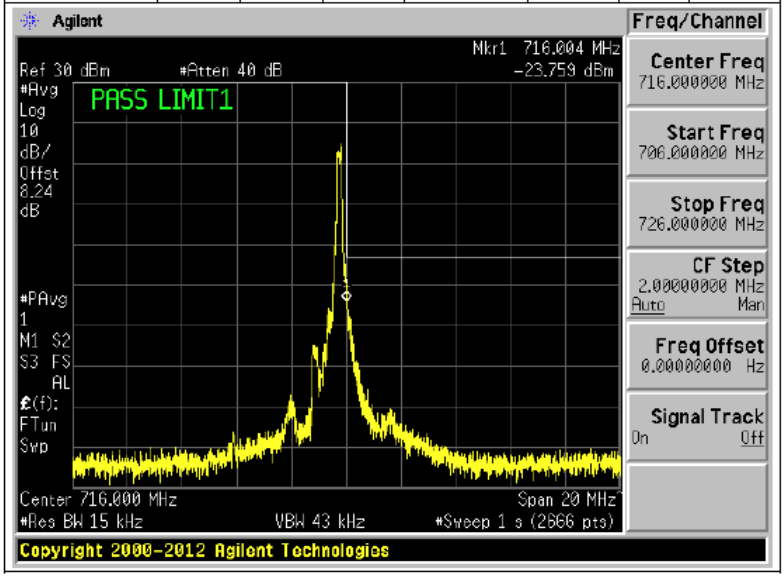
LOW BAND EDGE BLOCK-1RB-low_offset

Center Frequency (MHz)	Span (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Verdict	Sweep Point
699	20	0.015	RMS	698.996	-22.03	Pass	2666



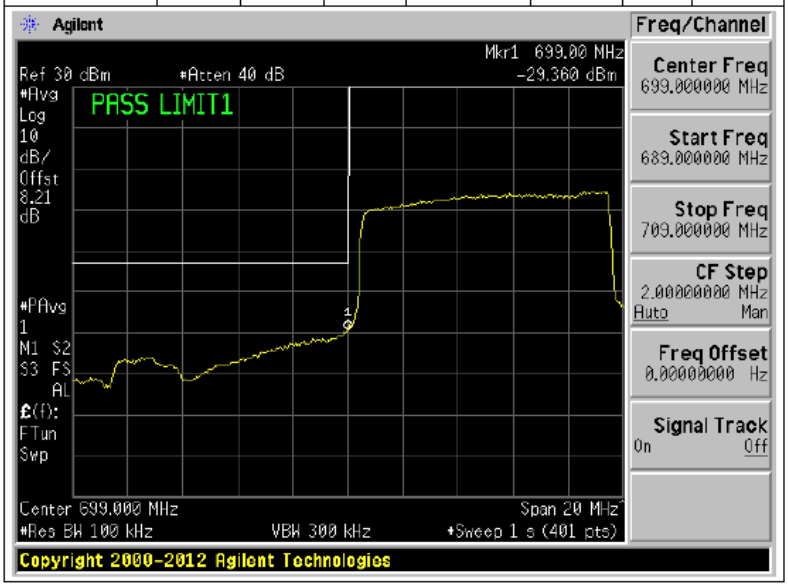
HIGH BAND EDGE BLOCK-1RB-high_offset

Center Frequency (MHz)	Span (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Verdict	Sweep Point
716	20	0.015	RMS	716.004	-23.76	Pass	2666



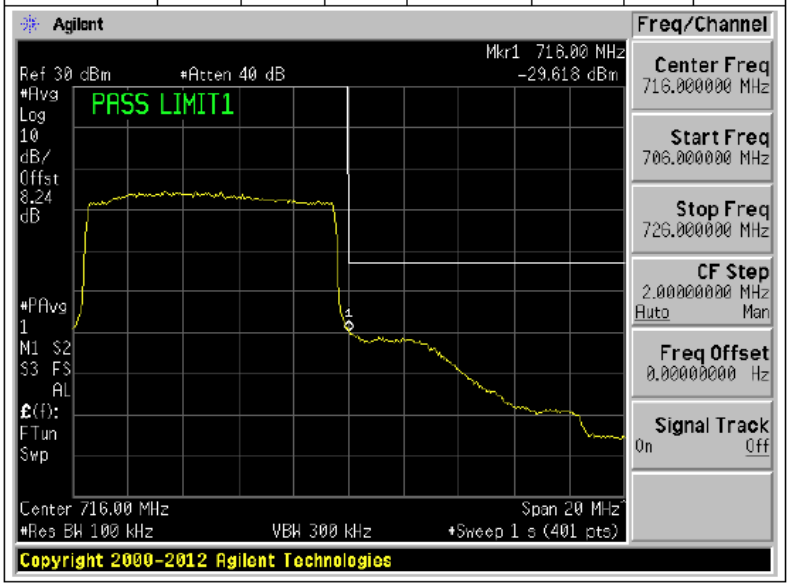
LOW BAND EDGE BLOCK-10MHz-100%RB

Center Frequency (MHz)	Span (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Verdict	Sweep Point
699	20	0.1	RMS	699	-29.36	Pass	401



HIGH BAND EDGE BLOCK-10MHz-100%RB

Center Frequency (MHz)	Span (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Verdict	Sweep Point
716	20	0.1	RMS	716	-29.62	Pass	401



ANNEX A.5. CONDUCTED SPURIOUS EMISSION

Reference

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

A.5.1 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.
3. The number of sweep points of spectrum analyzer is set to 30001 which is greater than span/RBW.

A. 5.2 Measurement Limit

Part 22.917(b),24.238(a), 27.53(g),27.53(h), 27.53(m) 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.

Part 27.53(m)(4) specifies for mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

A. 5.3 Measurement result

Note:

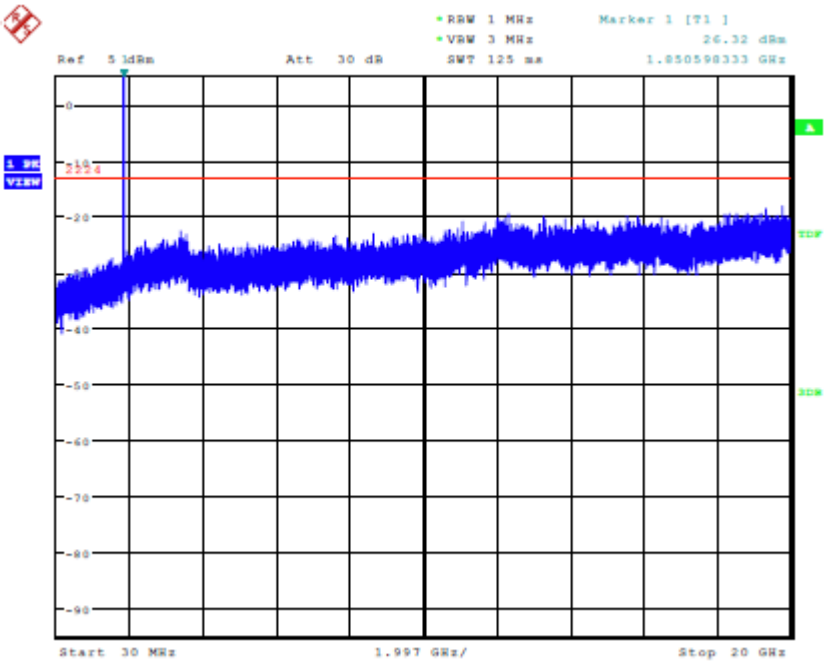
The Conducted Spurious Emission test cases of Band II/IV please refer to the report No: I16Z41276-GTE01_part222427_LTE_Rev2. Section A.6.3

The Conducted Spurious Emission test cases of Band XII please refer to the report No: BL-SZ1690342-501 V02. Section A.5

Only worst case result is given below

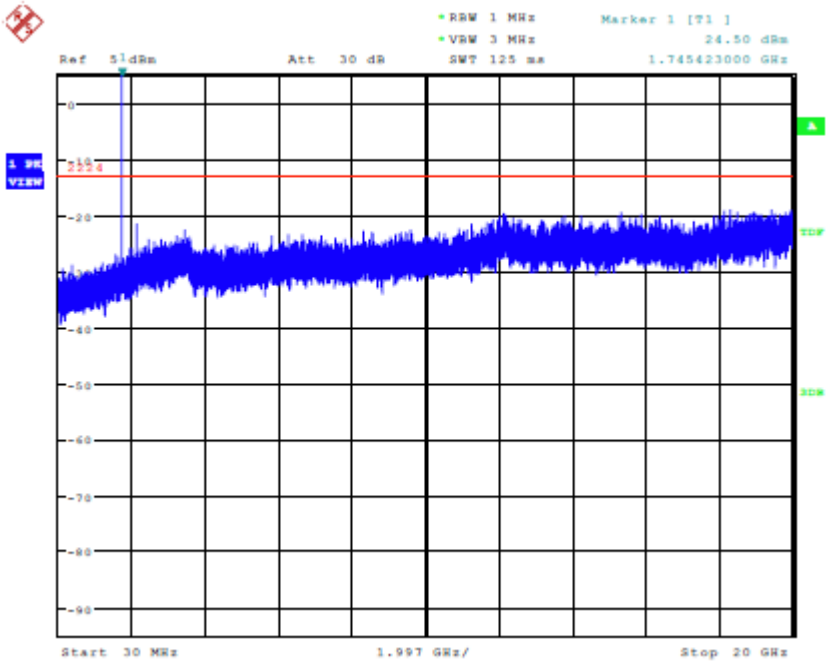
LTE band 2: 30MHz – 20GHz

Spurious emission limit –13dBm.



LTE band 4: 30MHz – 20GHz

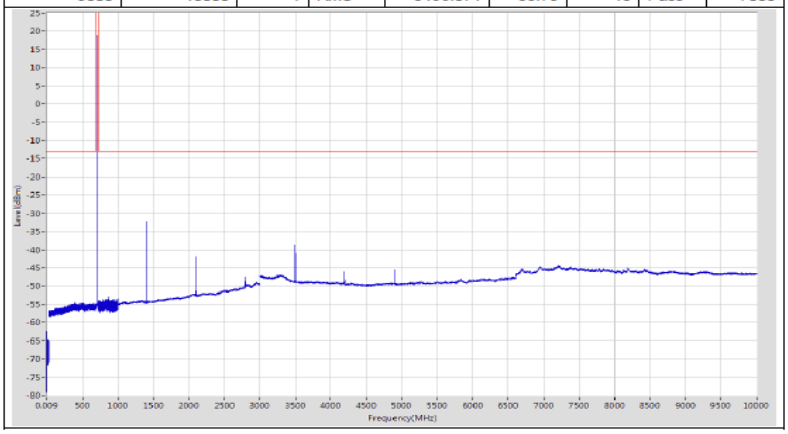
Spurious emission limit –13dBm.



LTE band 12: 30MHz – 10GHz

Spurious emission limit –13dBm.

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
0.009	0.15	0.001	RMS	0.009	-62.96	-13	Pass	401
0.15	30	0.01	RMS	0.25	-62.35	-13	Pass	2985
30	689	0.1	RMS	382.453	-54.44	-13	Pass	6590
689	725	0.1	RMS	699.26	18.93	60	Pass	401
725	1000	0.1	RMS	876.655	-52.98	-13	Pass	2750
1000	3000	1	RMS	1398.199	-32.39	-13	Pass	2000
3000	10000	1	RMS	3496.071	-38.75	-13	Pass	7000



ANNEX A.6. 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 v03 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.6.1 Measurement limit

not exceed 13 dB

A.6.2 Measurement results

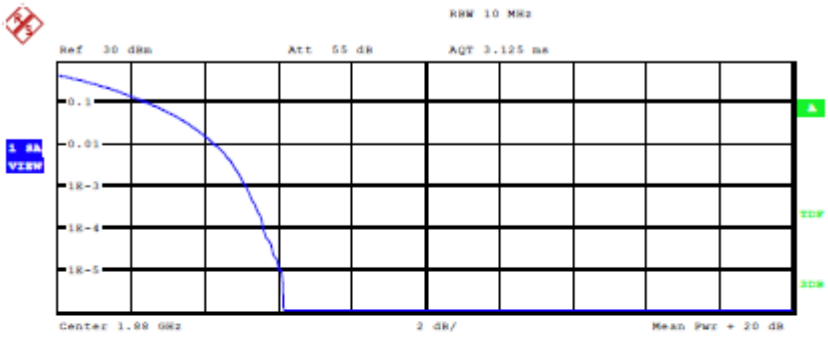
Note:

The Peak-To-Average Power Ratio test cases of Band II/IV please refer to the report No: I16Z41276-GTE01_part222427_LTE_Rev2. Section A.7.2

The Peak-To-Average Power Ratio test cases of Band XII please refer to the report No: BL-SZ1690342-501 V02. Section A.2

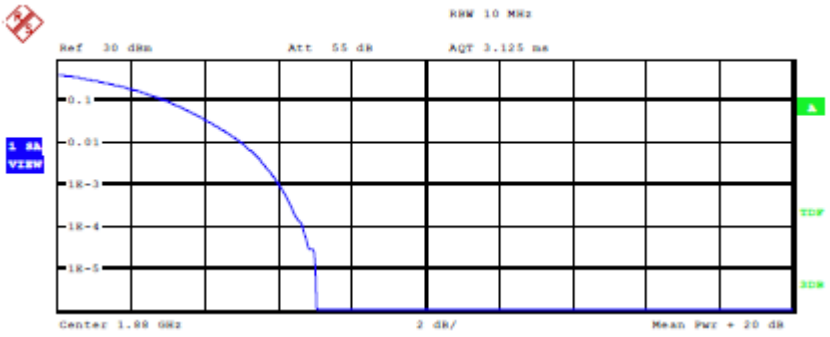
LTE band 2, 20MHz

Frequency(MHz)	PAPR(dB)	
1860.0	QPSK	16QAM
	5.10	6.03



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	21.64 dBm
Peak	27.79 dBm
Crest	6.15 dB
10 %	2.44 dB
1 %	4.26 dB
.1 %	5.10 dB
.01 %	5.58 dB

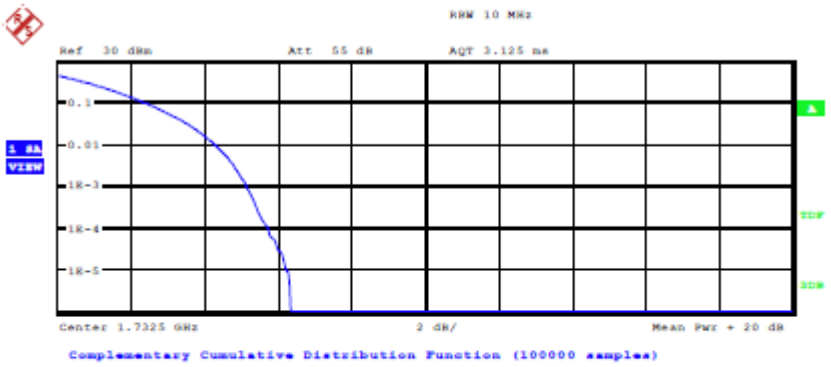


Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	20.69 dBm
Peak	27.72 dBm
Crest	7.03 dB
10 %	2.98 dB
1 %	5.00 dB
.1 %	6.03 dB
.01 %	6.67 dB

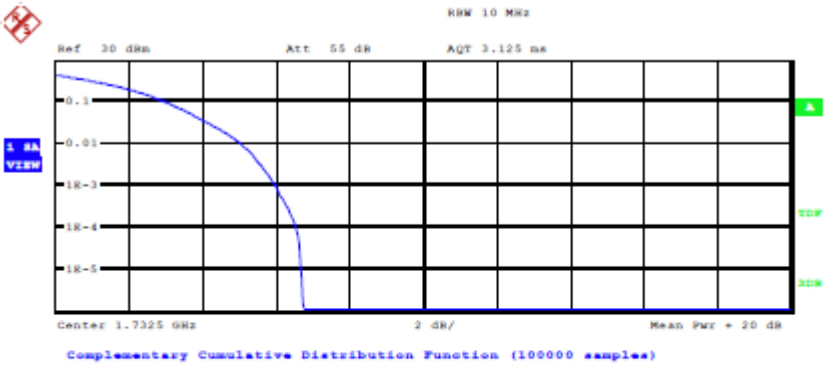
LTE band 4, 20MHz

Frequency(MHz)	PAPR(dB)	
1745.0	QPSK	16QAM
	5.13	5.96



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	22.13 dBm
Peak	28.46 dBm
Crest	6.34 dB
10 %	2.44 dB
1 %	4.29 dB
.1 %	5.13 dB
.01 %	5.74 dB



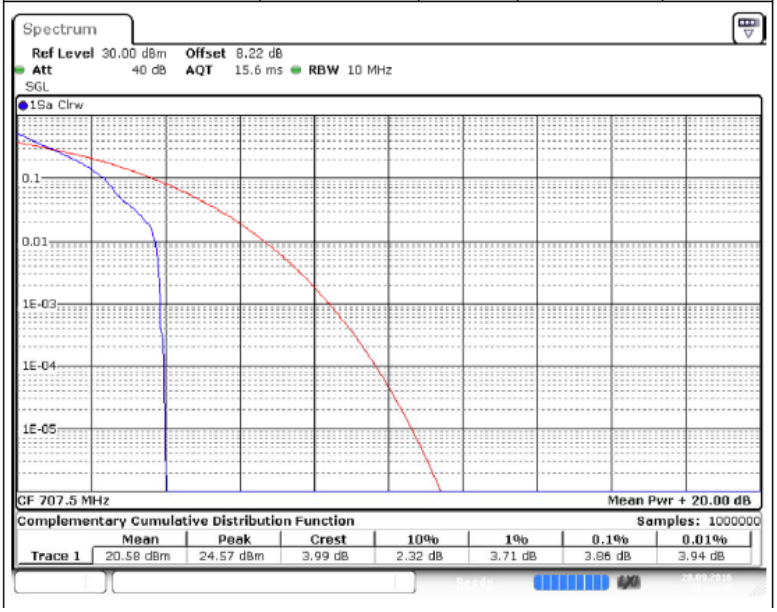
Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	21.31 dBm
Peak	28.04 dBm
Crest	6.73 dB
10 %	2.98 dB
1 %	5.03 dB
.1 %	5.96 dB
.01 %	6.54 dB

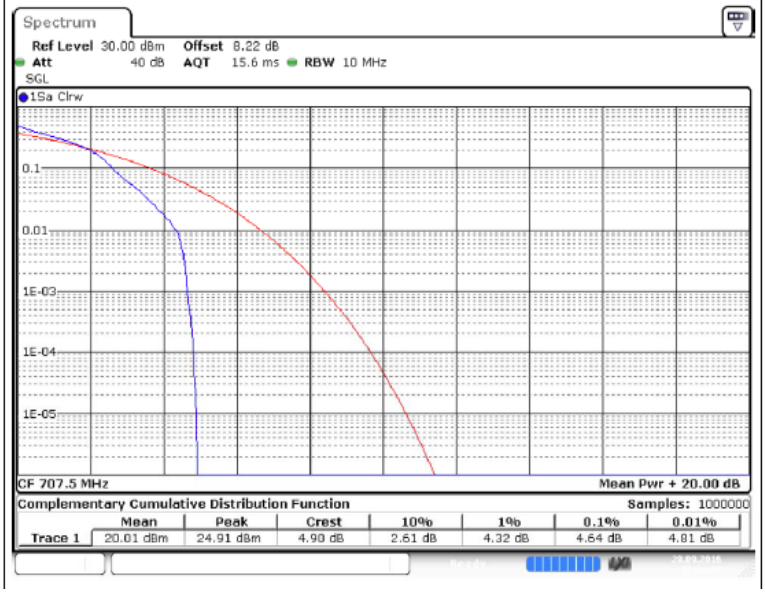
LTE band 12,10MHz

Frequency(MHz)	PAPR(dB)	
707.5	QPSK	16QAM
	3.86	4.64

Center Frequency(MHz)	PAR Percent (%)	PAR (dB)	Upper Limit (dB)	Verdict
707.5	0.1	3.86	13	Pass



Center Frequency(MHz)	PAR Percent (%)	PAR (dB)	Upper Limit (dB)	Verdict
707.5	0.1	4.64	13	Pass



ANNEX B. Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

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