TEST REPORT

No. 2013TAR702

for

Sony Mobile Communications AB

GSM/WCDMA/LTE mobile phone

Type: PM-0590-BV

FCC ID: PY7PM-0590

with

Hardware Version: AP1

Software Version: 14.1.F.0.111

Issued Date: Oct. 30th, 2013

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

Test Laboratory:

DAkks accreditation (DIN EN ISO/IEC 17025): No. 12123-01-01

FCC 2.948 Listed: No.733176

IC O.A.T.S listed: No.6629B-1

TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology

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CONTENTS

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1. Test Laboratory

1.1. Testing Location

Location B

Company Name:	TMC Beijing, Telecommunication Metrology Center of MIIT
Address:	Building Shouxiang, No.51, Xueyuan Road, Haidian District, Beijing, China
Postal Code:	100191

Location D

Company Name:	TMC Beijing, Telecommunication Metrology Center of MIIT
Address:	No.18A, Kangding Street, Beijing Economic-Technological Development Area, Beijing, China
Postal Code:	100176

1.2. Testing Environment

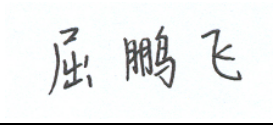
Normal Temperature:	15-35℃
Relative Humidity:	20-75%
Air pressure	980 - 1040 hPa

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

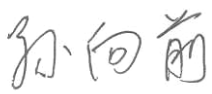
Receipt of Sample	Jul. 26th, 2013
Testing Start Date:	Aug. 08th, 2013
Testing End Date:	Aug. 22nd, 2013

1.4. Signature



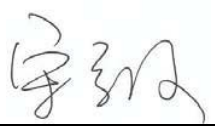
Qu Pengfei

(Prepared this test report)



Sun Xiangqian

(Reviewed this test report)



Song Chongwen

(Approved this test report)

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2. Client Information

2.1. Applicant Information

Company Name:	Sony Mobile Communications AB
Address /Post:	Sony Mobile R&D Center, No. 16, Guangshun South Street, Chaoyang District
City:	Beijing
Postal Code:	100102
Country:	China
Contact Person:	Ma, Gang
Telephone:	+86-10-58656312
Fax:	+86-10-58659049

2.2. Manufacturer Information

Company Name:	Sony Mobile Communications AB
Address /Post:	Sony Mobile R&D Center, No. 16, Guangshun South Street, Chaoyang District
City:	Beijing
Postal Code:	100102
Country:	China
Contact Person:	Ma, Gang
Telephone:	+86-10-58656312
Fax:	+86-10-58659049

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

3.1. About EUT

Description	GSM 850/900/1800/1900 quad bands, GPRS, EDGE, WCDMA FDD bands 1/2/4/5/8, HSDPA, HSUPA, LTE FDD bands 4/17, Bluetooth (EDR and 4.0), ANT+, WLAN (802.11 a/ac/b/g/n), NFC, FM, GPS mobile phone
Type	PM-0590-BV
FCC ID	PY7PM-0590
GSM Frequency Band	GSM 850/900/1800/1900
UMTS Frequency Band	FDD Band 1 / FDD Band 2 / FDD Band 4 / FDD Band 5/ FDD Band 8
LTE Frequency Band	FDD Band 4/ FDD Band 17
Antenna	Internal
Power supply	Battery (charged by travel adapter or vehicle charger)
Extreme vol. Limits	3.6VDC to 4.2VDC (nominal: 3.8VDC)
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 Telecommunication Metrology Center of MIIT of People's Republic of China.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN	IMEI	HW Version	SW Version
EUT6	CB5A1TE7LT	004402451356079	AP1	14.1.F.0.111
EUT10	CB5A1TE7F1	004402451356517	AP1	14.1.F.0.111

*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	SN	Revision
#22972	Travel Charger	8512W19 100198	1C
#23815	USB Cable	123107D30009FA0	1

#22972

Commercial name	EP880
Type	AC-0400-EU
Manufacturer	SALCOMP
Length of cable	98.5 cm (length of USB cable)

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#23815

Commercial name	EC801
Type	AI-0401
Manufacturer	Sony Mobile
Length of cable	98.5 cm

*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 of GSM/WCDMA/LTE mobile phone with integrated antenna and inbuilt battery.

The EUT supports GSM 850/900/1800/1900MHz bands, WCDMA FDD band 1/2/4/5/8 and LTE FDD bands 4/17. It supports GPRS service with multi-slots class 12 and EGPRS service with multi-slots class 12. The HSDPA and HSUPA features are also supported.

It has MP3, camera, USB memory, Mobile High-Definition Link (MHL), FM radio, GPS receiver, NFC, Bluetooth (EDR and Bluetooth 4.0), ANT+, WLAN (802.11 a/ac/b/g/n) and Wi-Fi hotspot functions. For WLAN 802.11n, it supports 20MHz bandwidth on 2.4GHz band and 20MHz/40MHz bandwidths on 5GHz/5.8GHz band. For WLAN 802.11 ac, it supports 20MHz/40MHz/80MHz bandwidths.

It consists of normal options: USB cable and travel charger.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.

3.5. EUT set-ups

EUT Set-up No.	Combination of EUT and AE	Remarks
Set.3	EUT6 + #22972 + #23815	Tests with travel charger
Set.4	EUT6	ERP/EIRP/RSE tests
Set.18	EUT10	Conducted RF tests

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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 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-12 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	2003
KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters	v02r01

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5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-2 (10 meters×6.7meters×6.1meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m distance, from 30 to 1000 MHz
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

Fully-anechoic chamber FAC-3 (9 meters×6.5 meters×4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 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

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

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω

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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 4

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Output Power	27.50(d)(4)	A.1	P	B
2	Emission Limit	27.53(h), 2.1051	A.2	P	B
3	Conducted Emission	15.107/15.207	A.3	P	D
4	Frequency Stability	27.54, 2.1055	A.4	P	B
5	Occupied Bandwidth	2.1049(h)(i)	A.5	P	B
6	Emission Bandwidth	27.53(h)	A.6	P	B
7	Band Edge Compliance	27.53(h)	A.7	P	B
8	Conducted Spurious Emission	27.53(h), 2.1057	A.8	P	B

LTE Band 17

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Output Power	27.50(c)(10)	A.1	P	B
2	Emission Limit	27.53(g), 2.1051	A.2	P	B
3	Conducted Emission	15.107/15.207	A.3	P	D
4	Frequency Stability	27.54, 2.1055	A.4	P	B
5	Occupied Bandwidth	2.1049(h)(i)	A.5	P	B
6	Emission Bandwidth	27.53(g)	A.6	P	B
7	Band Edge Compliance	27.53(g)	A.7	P	B
8	Conducted Spurious Emission	27.53(g), 2.1057	A.8	P	B

6.2. Statements

The test cases listed in section 6.1 of this report for the EUT specified in section 3 were performed by TMC 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.

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7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
1.	Test Receiver	ESCI	100766	R&S	2014-04-08
2.	Spectrum Analyzer	E4440A	MY48250642	Agilent	2014-03-04
3.	LISN	ESH3-Z5	825562/028	R&S	2014-06-12
4.	EMI Antenna	VULB 9163	9163-482	Schwarzbeck	2014-02-17
5.	EMI Antenna	3117	00119024	ETS-Lindgren	2014-02-02
6.	EMI Antenna	3117	00058889	ETS-Lindgren	2014-02-02
7.	EMI Antenna	VUBA 9117	177	Schwarzbeck	2014-06-29
8.	Signal Generator	N5183A	MY49060052	Agilent	2014-03-19
9.	Climatic chamber	SH-241	92003546	ESPEC	2014-05-11
10.	Universal Radio Communication Tester	CMW500	116588	R&S	2013-11-06
11.	Universal Radio Communication Tester	CMW500	127406	R&S	2014-01-27

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ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: CFR 27.50(c)(10), 27.50(d)(4).

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.

The power was measured with spectrum analyzer's RMS detector.

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 4

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1754.3	23.67	22.38
		1732.5	23.72	22.38
		1710.7	23.77	22.43
	1 RB low	1754.3	23.64	22.39
		1732.5	23.66	22.22
		1710.7	23.80	22.34
	50% RB mid	1754.3	23.62	22.75
		1732.5	23.64	22.81
		1710.7	23.75	22.68
	100% RB	1754.3	22.57	21.70
		1732.5	22.56	21.84
		1710.7	22.71	21.59

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(continued)

3MHz	1 RB high	1753.5	23.72	22.48
		1732.5	23.72	22.47
		1711.5	23.73	22.41
	1 RB low	1753.5	23.69	22.44
		1732.5	23.72	22.49
		1711.5	23.70	22.49
	50% RB mid	1753.5	22.62	21.59
		1732.5	22.62	21.64
		1711.5	22.71	21.73
	100% RB	1753.5	22.61	21.66
		1732.5	22.62	21.72
		1711.5	22.65	21.77
5MHz	1 RB high	1752.5	23.66	22.85
		1732.5	23.72	22.83
		1712.5	23.71	22.80
	1 RB low	1752.5	23.56	22.74
		1732.5	23.58	22.61
		1712.5	23.66	22.83
	50% RB mid	1752.5	22.62	21.55
		1732.5	22.64	21.50
		1712.5	22.65	21.55
	100% RB	1752.5	22.54	21.43
		1732.5	22.51	21.42
		1712.5	22.56	21.45
10MHz	1 RB high	1750	23.74	22.49
		1732.5	23.50	22.28
		1715	23.86	22.51
	1 RB low	1750	23.56	22.21
		1732.5	23.56	22.35
		1715	23.72	22.40
	50% RB mid	1750	22.35	21.36
		1732.5	22.49	21.51
		1715	22.58	21.50
	100% RB	1750	22.31	21.21
		1732.5	22.37	21.35
		1715	22.40	21.38

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(continued)

15MHz	1 RB high	1747.5	23.59	22.46
		1732.5	23.46	22.31
		1717.5	23.56	22.31
	1 RB low	1747.5	23.33	22.18
		1732.5	23.44	22.15
		1717.5	23.56	22.39
	50% RB mid	1747.5	22.21	21.63
		1732.5	22.02	21.32
		1717.5	22.10	21.50
	100% RB	1747.5	22.23	21.17
		1732.5	22.19	21.21
		1717.5	22.25	21.26
20MHz	1 RB high	1745	23.59	22.48
		1732.5	23.50	22.39
		1720	23.61	22.41
	1 RB low	1745	23.26	22.16
		1732.5	23.39	22.15
		1720	23.45	22.25
	50% RB mid	1745	22.19	21.12
		1732.5	22.27	21.37
		1720	22.25	21.29
	100% RB	1745	22.21	21.14
		1732.5	22.27	21.32
		1720	22.26	21.26

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LTE band 17

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	706.5	23.31	22.21
		710	23.48	22.37
		713.5	23.68	22.34
	1 RB low	706.5	23.31	22.21
		710	23.48	22.37
		713.5	23.68	22.34
	50% RB mid	706.5	22.34	21.42
		710	22.50	21.55
		713.5	22.58	21.64
	100% RB	706.5	22.33	21.31
		710	22.40	21.30
		713.5	22.41	21.40
10MHz	1 RB high	709	23.32	22.00
		710	23.47	22.12
		711	23.45	22.24
	1 RB low	709	23.51	22.21
		710	23.45	22.15
		711	23.50	22.28
	50% RB mid	709	22.41	21.44
		710	22.31	21.46
		711	22.49	21.55
	100% RB	709	22.17	21.18
		710	22.22	21.29
		711	22.29	21.26

Note: Expanded measurement uncertainty is U = 0.83 dB, k = 2.

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A.1.3 Radiated

A.1.3.1 Description

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

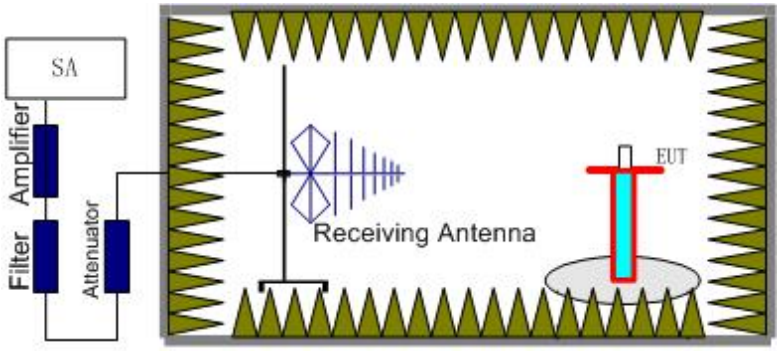
Rule Part 27.50(c) specifies “Portable stations (hand-held devices) are limited to 3 watts ERP”.

Rule Part 27.50(d) specifies “Fixed, mobile, and portable (handheld) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”.

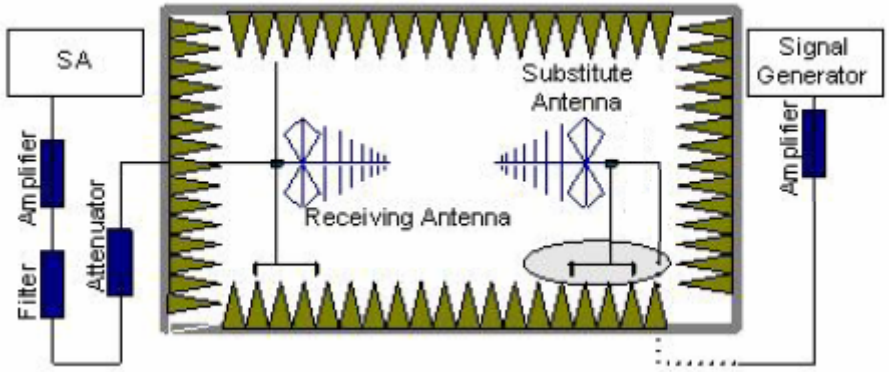
A.1.3.2 Method of Measurement

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

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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.

For test layout photo, please refer to Pic.1 in Annex B.

A.1.3.3 Measurement result

LTE Band 4- EIRP 27.50(d)

Limits: ≤30dBm (1W)

LTE Band 4_1.4MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1710.7	-30.06	2.96	-50.00	-5.17	22.15	Horizontal
1732.5	-28.03	2.99	-50.00	-5.08	24.06	Horizontal
1754.3	-27.23	3.01	-50.00	-4.98	**24.74**	Horizontal

LTE Band 4_3MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1711.5	-30.34	2.96	-50.00	-5.17	21.87	Horizontal
1732.5	-27.93	2.99	-50.00	-5.08	24.16	Horizontal
1753.5	-27.48	3.01	-50.00	-4.98	**24.49**	Horizontal

LTE Band 4_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1712.5	-30.31	2.97	-50.00	-5.17	21.89	Horizontal
1732.5	-28.17	2.99	-50.00	-5.08	23.92	Horizontal
1752.5	-27.31	3.01	-50.00	-4.99	**24.67**	Horizontal

LTE Band 4_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1715	-31.96	2.97	-50.00	-5.15	20.22	Horizontal
1732.5	-30.08	2.99	-50.00	-5.08	22.01	Horizontal
1750	-29.57	3.01	-50.00	-5.00	**22.42**	Horizontal

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LTE Band 4_15MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1717.5	-33.16	2.97	-50.00	-5.14	19.01	Horizontal
1732.5	-31.54	2.99	-50.00	-5.08	**20.55**	Horizontal
1747.5	-31.53	3.00	-50.00	-5.01	20.48	Horizontal

LTE Band 4_20MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1720	-33.82	2.97	-50.00	-5.13	18.34	Horizontal
1732.5	-32.24	2.99	-50.00	-5.08	**19.85**	Horizontal
1745	-32.81	3.00	-50.00	-5.02	19.21	Horizontal

LTE Band 4_1.4MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1710.7	-30.38	2.96	-50.00	-5.17	21.83	Horizontal
1732.5	-28.70	2.99	-50.00	-5.08	23.39	Horizontal
1754.3	-27.30	3.01	-50.00	-4.98	**24.67**	Horizontal

LTE Band 4_3MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1711.5	-30.49	2.96	-50.00	-5.17	21.72	Horizontal
1732.5	-28.35	2.99	-50.00	-5.08	23.74	Horizontal
1753.5	-27.74	3.01	-50.00	-4.98	**24.23**	Horizontal

LTE Band 4_5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1712.5	-30.60	2.97	-50.00	-5.17	21.60	Horizontal
1732.5	-28.08	2.99	-50.00	-5.08	24.01	Horizontal
1752.5	-27.77	3.01	-50.00	-4.99	**24.21**	Horizontal

LTE Band 4_10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1715	-32.84	2.97	-50.00	-5.15	19.34	Horizontal
1732.5	-30.93	2.99	-50.00	-5.08	21.16	Horizontal
1750	-30.54	3.01	-50.00	-5.00	**21.45**	Horizontal

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LTE Band 4_15MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1717.5	-34.03	2.97	-50.00	-5.14	18.14	Horizontal
1732.5	-32.44	2.99	-50.00	-5.08	**19.65**	Horizontal
1747.5	-32.51	3.00	-50.00	-5.01	19.50	Horizontal

LTE Band 4_20MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1720	-34.75	2.97	-50.00	-5.13	17.41	Horizontal
1732.5	-33.16	2.99	-50.00	-5.08	**18.93**	Horizontal
1745	-33.79	3.00	-50.00	-5.02	18.23	Horizontal

Sample calculation: LTE Band 4, 1.4MHz bandwidth, frequency 1754.30 MHz, QPSK
Peak EIRP(dBm) = P_{Mea}(-27.23 dBm) - G_a (-4.98 dBi) - P_{Ag} (-50.00 dB) - P_{cl} (3.01 dB)
= 24.74 dBm

ANALYZER SETTINGS:

RBW = VBW = 8MHz for occupied bandwdiths equal or less than 5MHz.
RBW = VBW = 20MHz for occupied bandwidths equal or greater than 10MHz.

Note: Expanded measurement uncertainty is U = 1.07dB, k = 2.

LTE Band 17- ERP 27.50(c)

Limits: ≤34.77dBm (3W)

LTE Band 17_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
706.5	-32.62	1.91	-53.00	0.30	2.15	16.02	Vertical
710	-32.46	1.92	-53.00	0.32	2.15	**16.15**	Vertical
713.5	-32.78	1.93	-53.00	0.34	2.15	15.80	Vertical

LTE Band 17_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
709	-34.37	1.92	-53.00	0.32	2.15	14.24	Vertical
710	-34.65	1.92	-53.00	0.32	2.15	13.96	Vertical
711	-32.16	1.92	-53.00	0.33	2.15	**16.44**	Vertical

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LTE Band 17_5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
706.5	-33.16	1.91	-53.00	0.30	2.15	15.48	Vertical
710	-32.67	1.92	-53.00	0.32	2.15	**15.94**	Vertical
713.5	-33.15	1.93	-53.00	0.34	2.15	15.43	Vertical

LTE Band 17_10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
709	-35.25	1.92	-53.00	0.32	2.15	13.36	Vertical
710	-35.57	1.92	-53.00	0.32	2.15	13.04	Vertical
711	-33.00	1.92	-53.00	0.33	2.15	**15.60**	Vertical

Sample calculation: LTE Band 17, 10 MHz bandwidth, frequency 711 MHz, QPSK

Peak ERP(dBm) = P_{Mea}(-32.16 dBm) - G_a (0.33 dBi) - P_{Ag} (-53.00 dB) - P_{cl} (1.92 dB) -2.15 dB

= 16.44 dBm

ANALYZER SETTINGS:

RBW = VBW = 8MHz for occupied bandwdiths 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.

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A.2 EMISSION LIMT

Reference

FCC: CFR 2.1051, 27.53(g), 27.53(h).

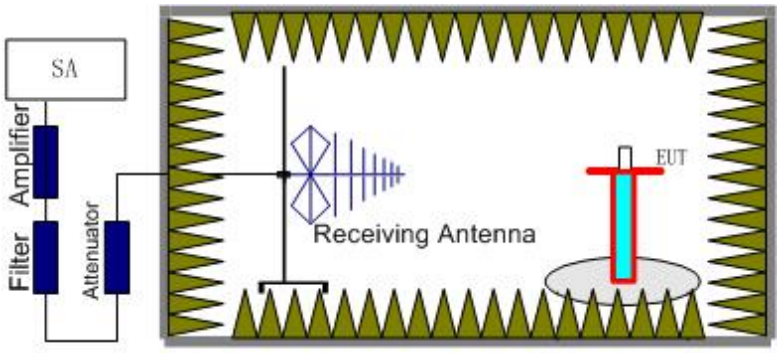
A.2.1 Measurement Method

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

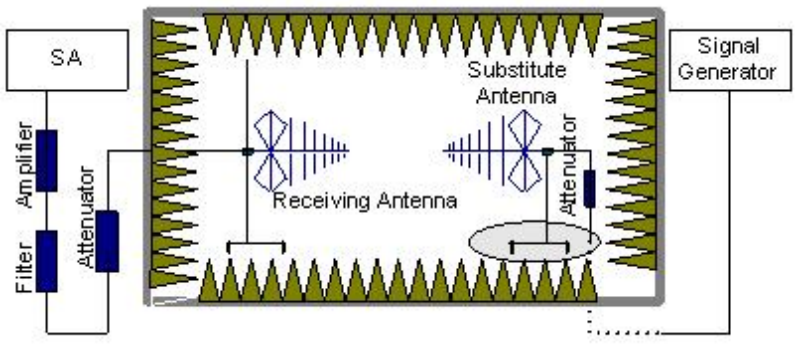
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 27.53(h). The spectrum was scanned with the mobile station transmitting at carrier frequencies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

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

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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 (2.15 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 24.238 specifies 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 Band 4 and Band 17. 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 Band 4 and Band 17 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.

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LTE Band 4, 1.4MHz, QPSK, Channel 19957

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3420.42	-52.44	4.19	-7.71	-48.92	-13.00	Horizontal
5086.36	-64.17	5.20	-9.75	-59.62	-13.00	Horizontal
7260.47	-62.02	6.37	-11.26	-57.13	-13.00	Vertical
8551.04	-60.31	7.28	-12.24	-55.35	-13.00	Horizontal
9042.91	-61.24	7.49	-12.60	-56.13	-13.00	Horizontal
10009.11	-58.87	7.96	-12.40	-54.43	-13.00	Horizontal

LTE Band 4, 1.4MHz, QPSK, Channel 20175

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3288.78	-61.28	4.25	-7.39	-58.14	-13.00	Vertical
4242.41	-63.52	4.75	-8.65	-59.62	-13.00	Vertical
5247.9	-64.48	5.26	-9.85	-59.89	-13.00	Horizontal
6796.54	-60.79	6.17	-10.90	-56.06	-13.00	Horizontal
7802.62	-62.43	6.81	-11.70	-57.54	-13.00	Horizontal
8793.32	-62.52	7.45	-12.43	-57.54	-13.00	Horizontal

LTE Band 4, 1.4MHz, QPSK, Channel 20393

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3504.4	-57.11	4.31	-7.91	-53.51	-13.00	Vertical
5256.31	-53.80	5.28	-9.85	-49.23	-13.00	Horizontal
6181.74	-60.22	5.78	-10.35	-55.65	-13.00	Horizontal
7971.04	-59.44	7.02	-11.87	-54.59	-13.00	Vertical
8914.12	-61.52	7.35	-12.53	-56.34	-13.00	Horizontal
12264.97	-51.12	8.90	-12.61	-47.41	-13.00	Horizontal

LTE Band 4, 1.4MHz, 16QAM, Channel 19957

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3417.18	-51.83	4.19	-7.70	-48.32	-13.00	Horizontal
3757.6	-61.54	4.53	-8.21	-57.86	-13.00	Horizontal
5125.69	-58.97	5.25	-9.78	-54.44	-13.00	Vertical
7659.92	-62.10	6.55	-11.56	-57.09	-13.00	Vertical
8644.54	-62.07	7.46	-12.32	-57.21	-13.00	Horizontal
10332.2	-59.58	7.95	-12.47	-55.06	-13.00	Horizontal

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LTE Band 4, 1.4MHz, 16QAM, Channel 20175

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3460.57	-56.88	4.24	-7.81	-53.31	-13.00	Horizontal
5191.18	-59.23	5.20	-9.81	-54.62	-13.00	Horizontal
6858.09	-61.50	6.12	-10.96	-56.66	-13.00	Horizontal
8631.78	-61.03	7.37	-12.31	-56.09	-13.00	Vertical
9057.9	-60.00	7.52	-12.60	-54.92	-13.00	Vertical
9996.15	-58.98	8.00	-12.40	-54.58	-13.00	Horizontal

LTE Band 4, 1.4MHz, 16QAM, Channel 20393

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3624.98	-61.45	4.38	-8.05	-57.78	-13.00	Horizontal
5256.4	-48.25	5.28	-9.85	-43.68	-13.00	Vertical
6319.63	-62.37	5.88	-10.46	-57.79	-13.00	Horizontal
9061.22	-58.55	7.53	-12.60	-53.48	-13.00	Vertical
10308.89	-58.74	7.73	-12.46	-54.01	-13.00	Horizontal
13669.88	-56.58	8.94	-13.87	-51.65	-13.00	Vertical

LTE Band 17, 5MHz, QPSK, Channel 23755

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Polarization
1508.94	-59.93	2.83	-6.06	2.15	-58.85	-13.00	Horizontal
3507.9	-62.41	4.33	-7.91	2.15	-60.98	-13.00	Horizontal
4302.78	-63.52	4.89	-8.68	2.15	-61.88	-13.00	Vertical
5972.92	-62.70	5.54	-10.19	2.15	-60.20	-13.00	Horizontal
8718.69	-59.58	7.44	-12.37	2.15	-56.80	-13.00	Horizontal
9062.51	-60.98	7.53	-12.60	2.15	-58.06	-13.00	Vertical

LTE Band 17, 5MHz, QPSK, Channel 23790

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Polarization
1415.49	-56.88	2.70	-5.31	2.15	-56.42	-13.00	Horizontal
3277	-63.62	4.19	-7.36	2.15	-62.60	-13.00	Vertical
3888.83	-61.73	4.51	-8.37	2.15	-60.02	-13.00	Horizontal
4479.76	-62.61	4.88	-8.79	2.15	-60.85	-13.00	Horizontal
5102.12	-61.80	5.22	-9.76	2.15	-59.41	-13.00	Vertical
6806.13	-62.49	6.16	-10.91	2.15	-59.89	-13.00	Vertical

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LTE Band 17, 5MHz, QPSK, Channel 23825

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Polarization
2090.66	-56.41	3.28	-4.17	2.15	-57.67	-13.00	Vertical
3230.87	-63.42	4.19	-7.25	2.15	-62.51	-13.00	Horizontal
4950.57	-62.85	5.10	-9.61	2.15	-60.49	-13.00	Vertical
6847.56	-62.04	6.16	-10.95	2.15	-59.40	-13.00	Vertical
8623.41	-62.51	7.40	-12.30	2.15	-59.76	-13.00	Horizontal
9528.27	-60.65	7.72	-12.59	2.15	-57.93	-13.00	Horizontal

LTE Band 17, 5MHz, 16QAM, Channel 23755

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Polarization
3070.59	-62.59	3.97	-6.87	2.15	-61.84	-13.00	Vertical
3604.34	-62.85	4.38	-8.03	2.15	-61.35	-13.00	Vertical
4803.69	-62.66	5.10	-9.35	2.15	-60.56	-13.00	Vertical
5887.07	-63.38	5.59	-10.15	2.15	-60.97	-13.00	Horizontal
6701.95	-62.38	6.09	-10.80	2.15	-59.82	-13.00	Horizontal
9621.83	-59.58	7.89	-12.55	2.15	-57.07	-13.00	Horizontal

LTE Band 17, 5MHz, 16QAM, Channel 23790

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Polarization
1415.73	-56.69	2.70	-5.31	2.15	-56.23	-13.00	Horizontal
3289.11	-62.65	4.25	-7.39	2.15	-61.66	-13.00	Vertical
4027.93	-62.62	4.69	-8.52	2.15	-60.94	-13.00	Vertical
5141.87	-62.47	5.24	-9.79	2.15	-60.07	-13.00	Vertical
5767.14	-62.58	5.69	-10.11	2.15	-60.31	-13.00	Horizontal
7292.7	-60.38	6.53	-11.28	2.15	-57.78	-13.00	Vertical

LTE Band 17, 5MHz, 16QAM, Channel 23825

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Polarization
1422.48	-55.87	2.71	-5.37	2.15	-55.36	-13.00	Horizontal
3233.41	-62.37	4.18	-7.26	2.15	-61.44	-13.00	Vertical
4030.1	-61.64	4.69	-8.52	2.15	-59.96	-13.00	Vertical
5247	-61.75	5.26	-9.85	2.15	-59.31	-13.00	Horizontal
6738.07	-62.02	6.12	-10.84	2.15	-59.45	-13.00	Vertical
8093.03	-62.30	6.96	-11.96	2.15	-59.45	-13.00	Vertical

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

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A.3 CONDUCTED EMISSION

Reference

FCC: CFR Part 15.107/207

The measurement procedure in ANSI C63.4-2003 is used. Conducted emission is measured with travel charger. The EUT is working under LTE FDD band 4/17 traffic mode which is the worst case of conducted emission measurement.

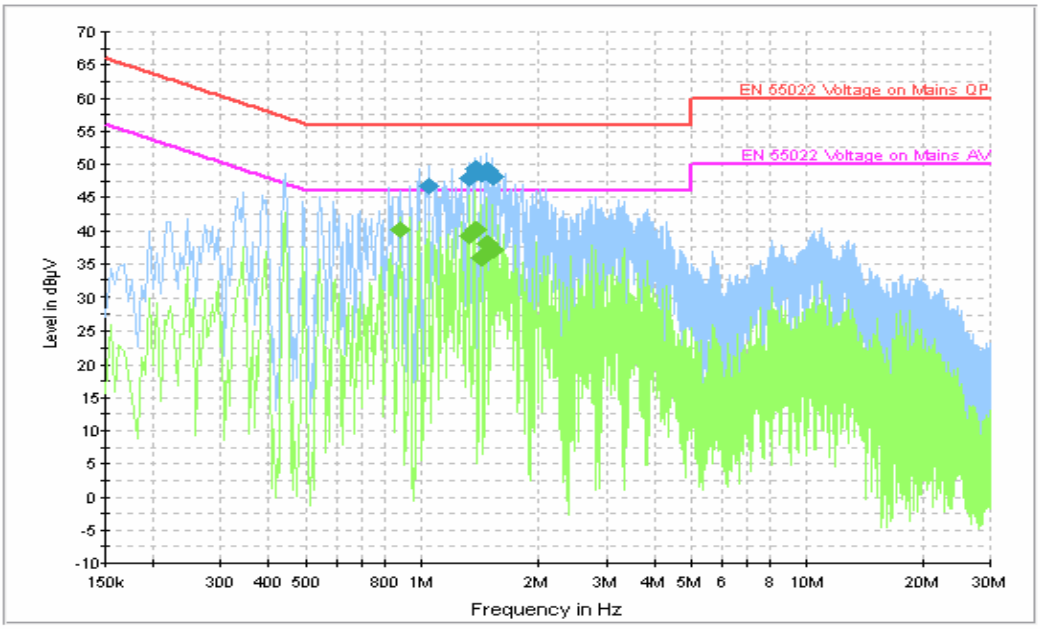
For test layout photo, please refer to Pic.2 in Annex B.

A.3.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi -Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50
* Decreases with logarithm of the frequency		

A.3.2 Measurement result

LTE Band 4, 1.4 MHz bandwidth



IF bandwidth 9 kHz

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

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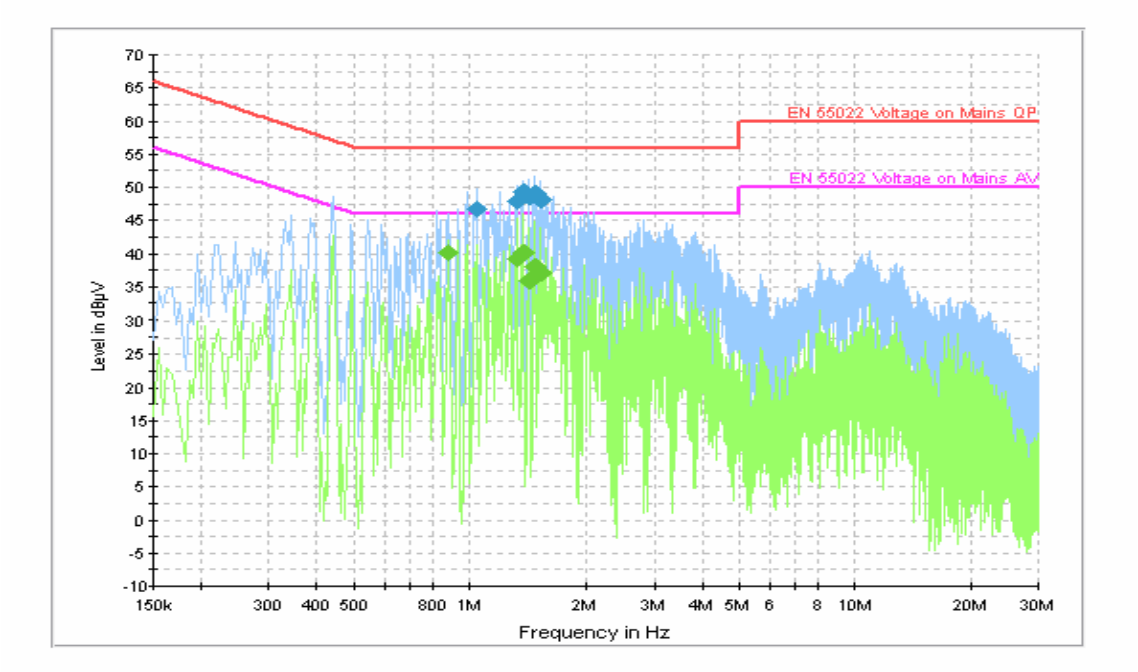
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.041001	46.8	GND	N	9.9	9.2	56.0
1.324501	47.9	GND	N	9.9	8.1	56.0
1.374001	49.3	GND	N	9.9	6.7	56.0
1.432501	48.6	GND	N	9.9	7.4	56.0
1.482001	49.1	GND	N	9.9	6.9	56.0
1.531501	48.1	GND	N	9.9	7.9	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.883501	40.2	GND	N	9.9	5.8	46.0
1.324501	39.2	GND	N	9.9	6.8	46.0
1.374001	40.0	GND	N	9.9	6.0	46.0
1.432501	35.8	GND	N	9.9	10.2	46.0
1.482001	38.1	GND	N	9.9	7.9	46.0
1.531501	37.0	GND	N	9.9	9.0	46.0

LTE Band 17, 5 MHz bandwidth



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Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.329001	47.5	GND	N	9.9	8.5	56.0
1.374001	48.2	GND	N	9.9	7.8	56.0
1.423501	49.2	GND	N	9.9	6.8	56.0
1.468501	46.8	GND	N	9.9	9.2	56.0
1.522501	49.3	GND	N	9.9	6.7	56.0
1.572001	49.0	GND	N	9.9	7.0	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.329001	34.7	GND	N	9.9	11.3	46.0
1.378501	39.1	GND	N	9.9	6.9	46.0
1.423501	40.7	GND	N	9.9	5.3	46.0
1.473001	40.3	GND	N	9.9	5.7	46.0
1.522501	39.9	GND	N	9.9	6.1	46.0
1.572001	39.2	GND	N	9.9	6.8	46.0

Note: The maximum value of expanded measurement uncertainty for this test item is U =2.9 dB, k = 2.

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A.4 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 27.54.

A.4.1 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 4/17, 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 1/2 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.4.2 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. 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 3.6VDC 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. These voltages represent a tolerance of -5.3 % and +10.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

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A.4.3 Measurement results

Room Temperature: 24 ℃

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

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
3.8	-2	7	0.0010	0.0039
4.2	0	11	0.0000	0.0064
3.6	3	9	0.0017	0.0053

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
50	9	7	0.0052	0.0040
40	-2	14	0.0012	0.0082
30	5	5	0.0026	0.0031
20	2	9	0.0014	0.0052
10	1	8	0.0003	0.0048
0	4	6	0.0023	0.0033
-10	6	6	0.0033	0.0036
-20	-1	12	0.0007	0.0067
-30	-4	3	0.0025	0.0015

LTE Band 17, 10MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
3.8	-2	-9	0.0034	0.0128
4.2	-4	-7	0.0050	0.0104
3.6	0	-9	0.0005	0.0128

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
50	-1	-7	0.0016	0.0102
40	-4	-7	0.0053	0.0102
30	0	-4	0.0006	0.0051
20	-1	-9	0.0017	0.0131
10	-4	-5	0.0052	0.0077
0	1	-9	0.0018	0.0133
-10	-4	-10	0.0050	0.0140
-20	-1	-7	0.0011	0.0098
-30	-4	-7	0.0052	0.0101

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

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A.5 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049(h)(i)

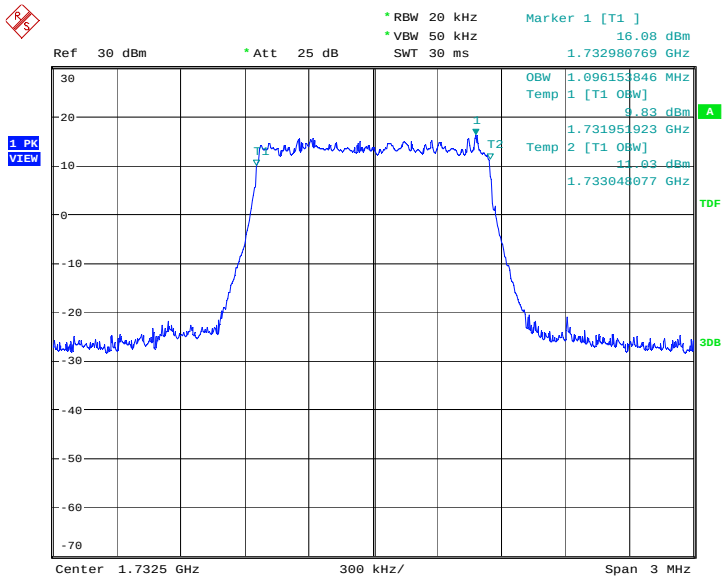
A.5.1 Occupied Bandwidth Measurement Results

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 LTE band 4 and band 17. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

LTE band 4, 1.4MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1732.5	QPSK	16QAM
	1096.154	1091.346

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



Date: 9.AUG.2013 13:16:24

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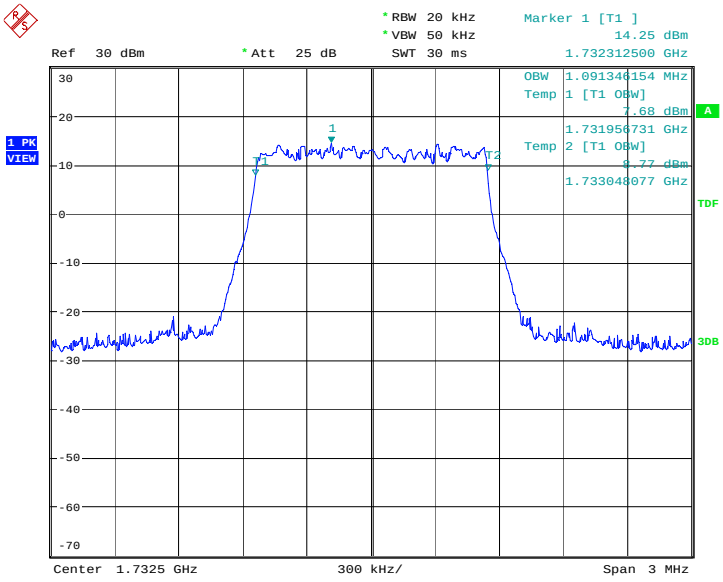
LTE band 4, 1.4MHz Bandwidth, 16QAM (99% BW)

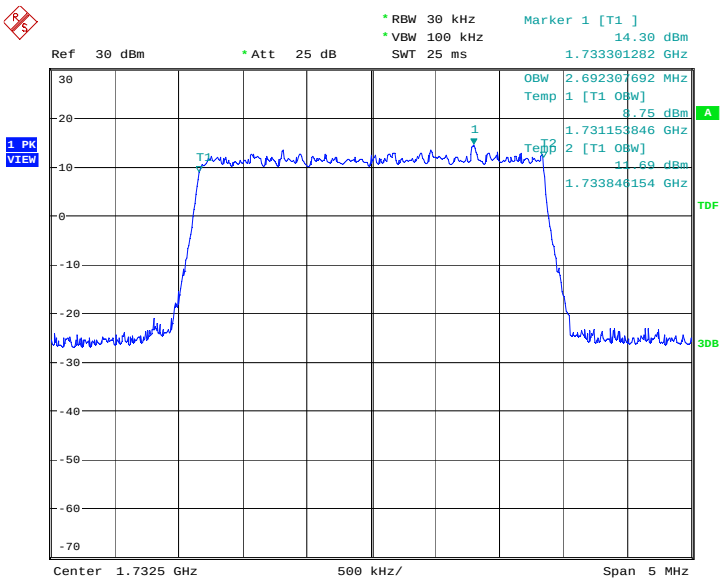


Date: 9.AUG.2013 13:16:38

LTE band 4, 3MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1732.5	QPSK	16QAM
	2692.308	2692.308

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



Date: 9.AUG.2013 13:17:29

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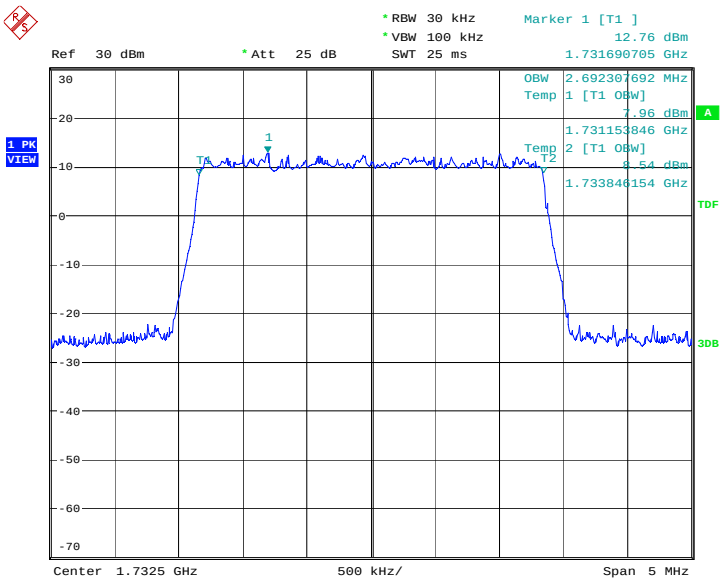
LTE band 4, 3MHz Bandwidth, 16QAM (99% BW)

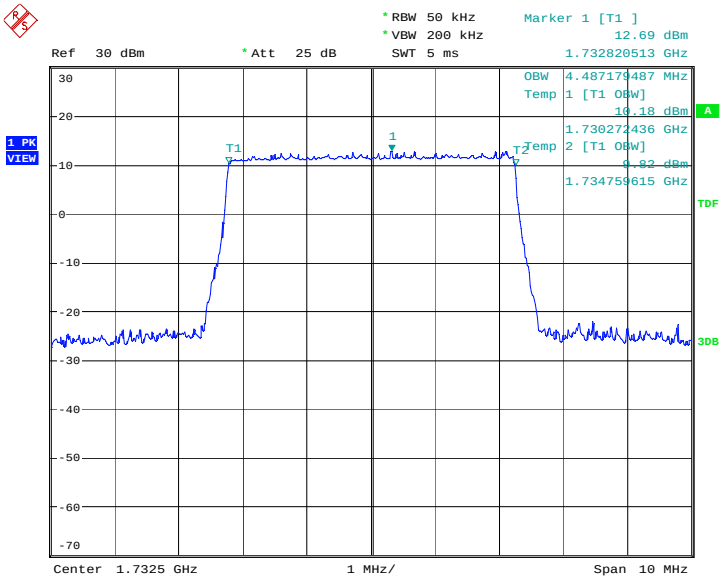


Date: 9.AUG.2013 13:17:43

LTE band 4, 5MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1732.5	QPSK	16QAM
	4487.179	4503.205

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



Date: 9.AUG.2013 13:19:04

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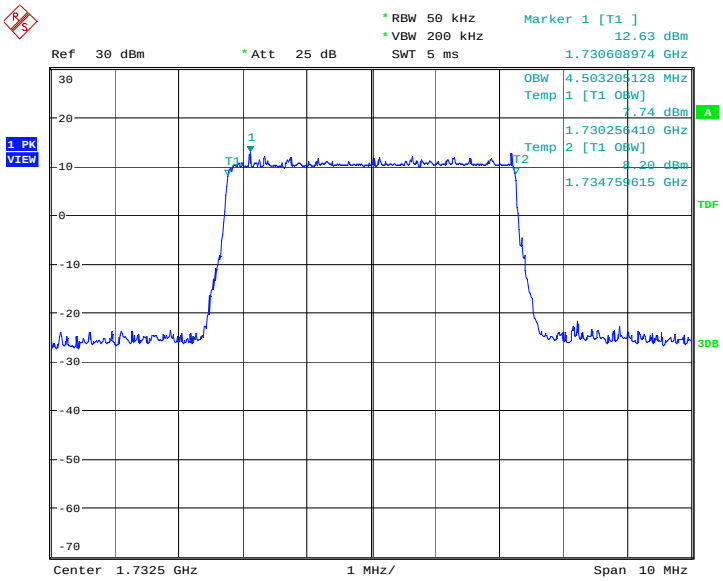
LTE band 4, 5MHz Bandwidth,16QAM (99% BW)

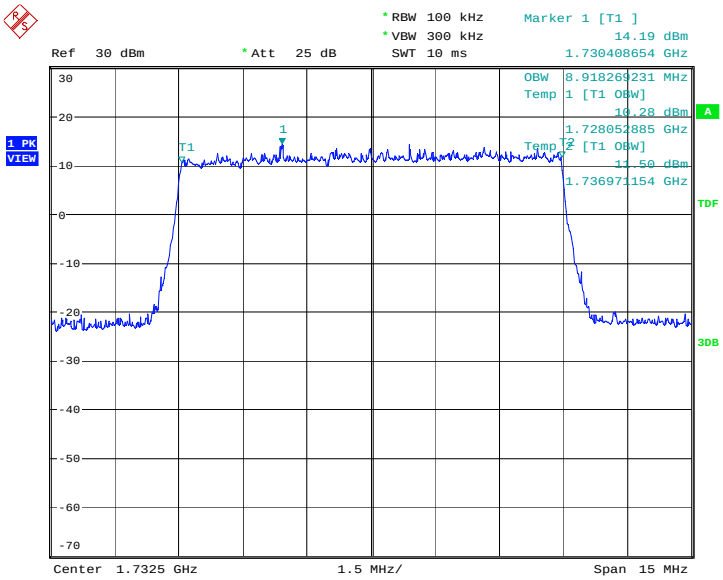


Date: 9.AUG.2013 13:19:18

LTE band 4, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1732.5	QPSK	16QAM
	8918.269	8942.308

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



Date: 9.AUG.2013 13:20:09

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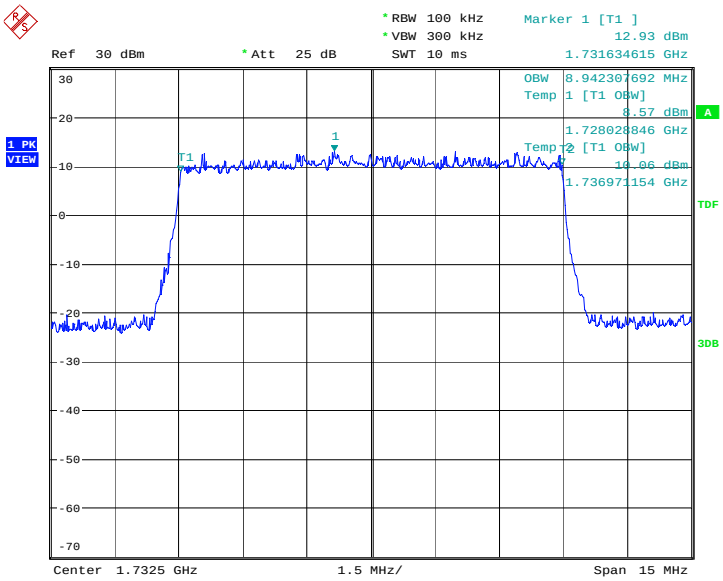
LTE band 4, 10MHz Bandwidth, 16QAM (99% BW)

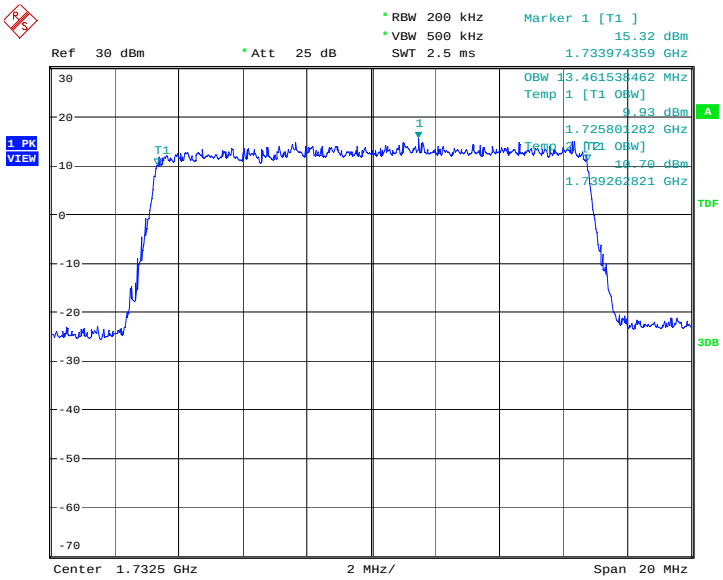


Date: 9.AUG.2013 13:20:23

LTE band 4, 15MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1732.5	QPSK	16QAM
	13461.538	13429.487

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



Date: 9.AUG.2013 13:21:14

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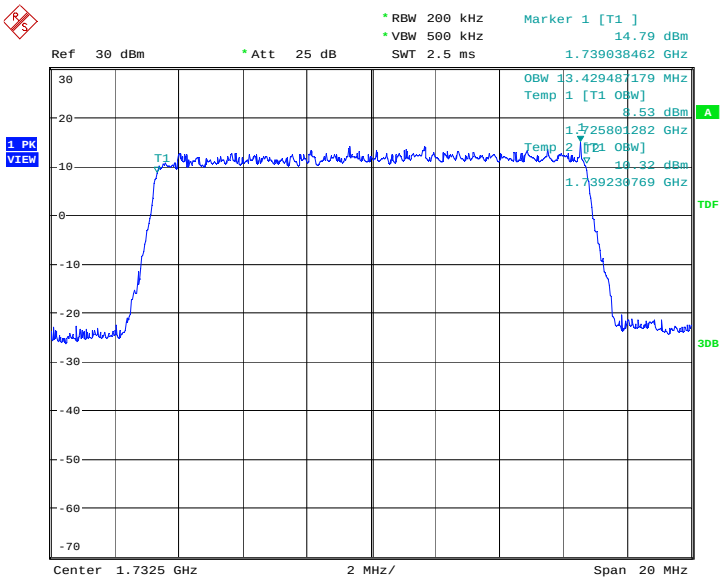
LTE band 4, 15MHz Bandwidth, 16QAM (99% BW)

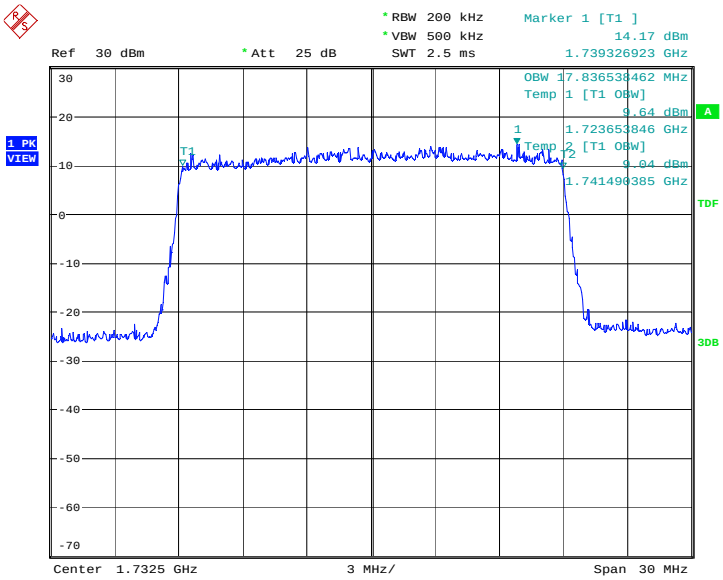


Date: 9.AUG.2013 13:21:28

LTE band 4, 20MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1732.5	QPSK	16QAM
	17836.538	17884.615

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



Date: 9.AUG.2013 13:22:19

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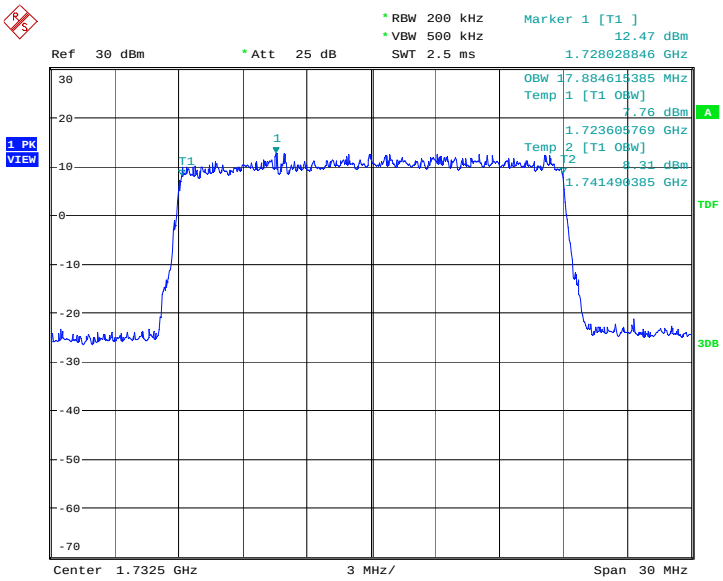
LTE band 4, 20MHz Bandwidth, 16QAM (99% BW)

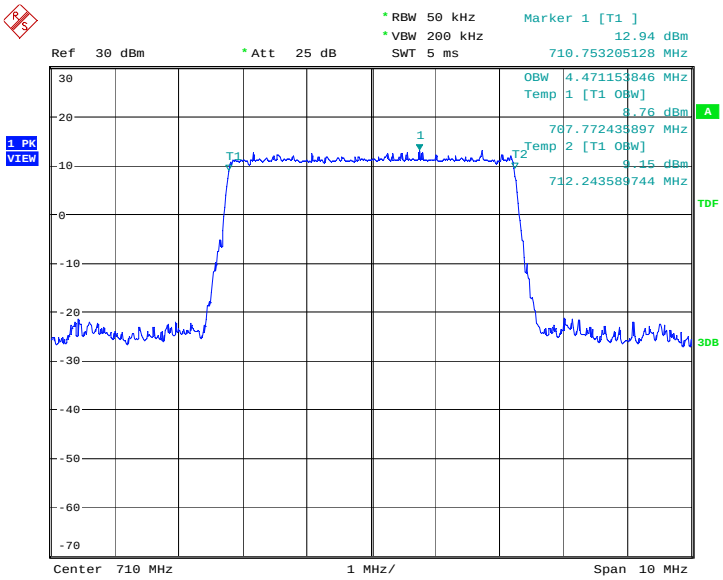


Date: 9.AUG.2013 13:22:33

LTE band 17, 5MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
710.0	QPSK	16QAM
	4471.154	4503.205

LTE band 17, 5MHz Bandwidth, QPSK (99% BW)



Date: 9.AUG.2013 13:23:26

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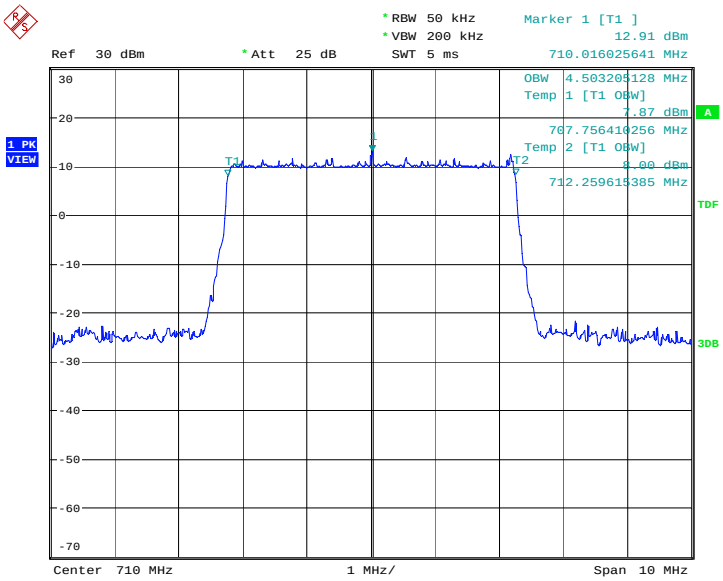
LTE band 17, 5MHz Bandwidth,16QAM (99% BW)

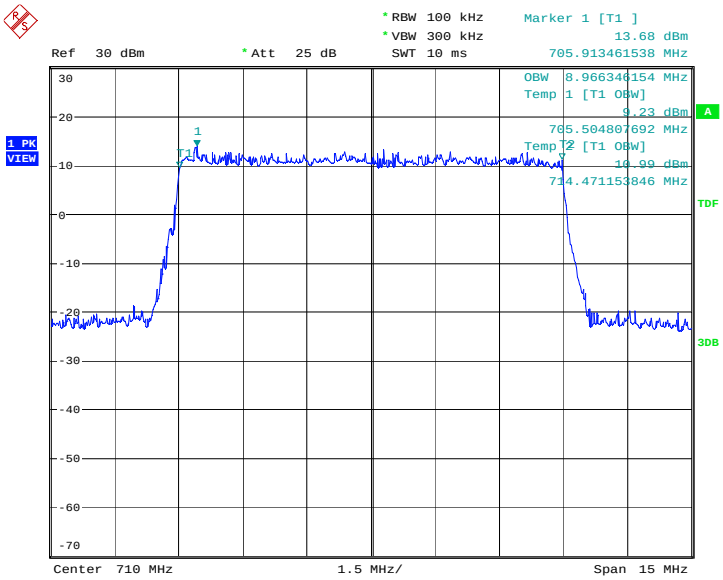


Date: 9.AUG.2013 13:23:40

LTE band 17, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
710.0	QPSK	16QAM
	8966.346	8990.385

LTE band 17, 10MHz Bandwidth, QPSK (99% BW)



Date: 9.AUG.2013 13:24:31

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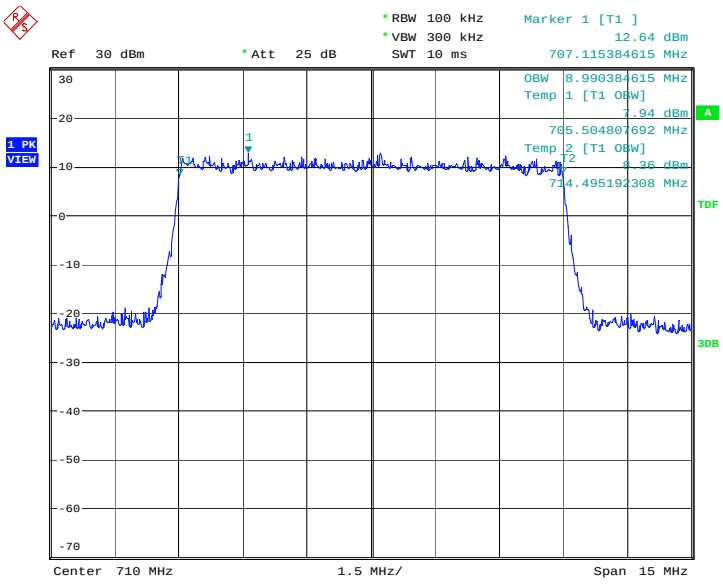
LTE band 17, 10MHz Bandwidth, 16QAM (99% BW)



Date: 9.AUG.2013 13:24:45

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A.6 EMISSION BANDWIDTH

Reference

FCC: CFR Part 27.53(g), 27.53(h)

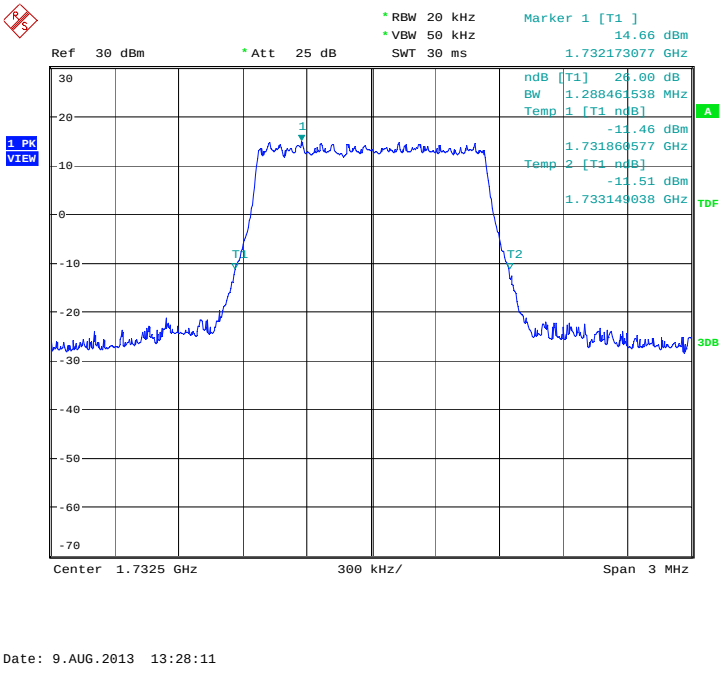
A.6.1Emission Bandwidth Measurement Results

Emission 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 LTE band 4 and band 17. Table below lists the measured 100% BW. Spectrum analyzer plots are included on the following pages.

LTE band 4, 1.4MHz (100% BW)

Frequency(MHz)	Occupied Bandwidth (100% BW)(kHz)	
1732.5	QPSK	16QAM
	1288.462	1288.462

LTE band 4, 1.4MHz Bandwidth, QPSK (100% BW)



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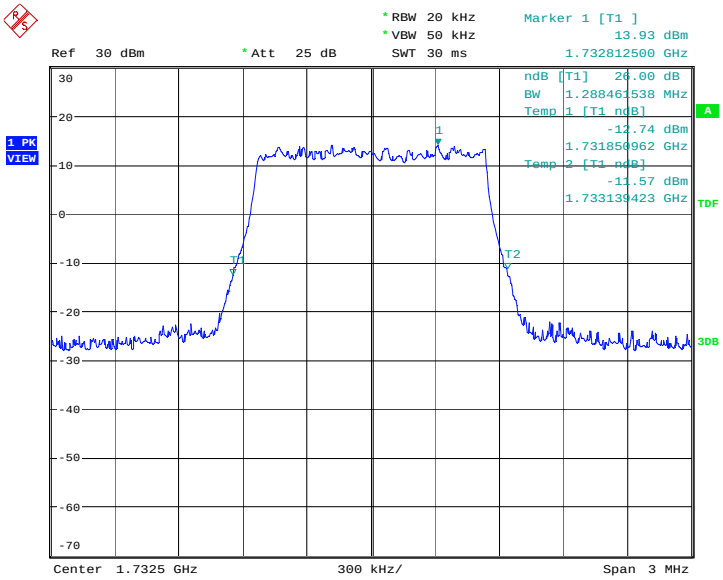
LTE band 4, 1.4MHz Bandwidth, 16QAM (100% BW)

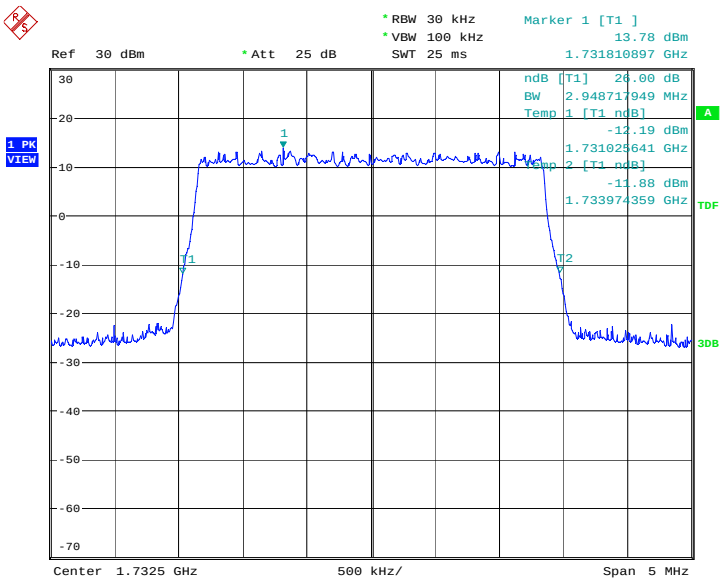


Date: 9.AUG.2013 13:28:27

LTE band 4, 3MHz (100% BW)

Frequency(MHz)	Occupied Bandwidth (100% BW)(kHz)	
	QPSK	16QAM
1732.5	2948.718	2956.731

LTE band 4, 3MHz Bandwidth, QPSK (100% BW)



Date: 9.AUG.2013 13:34:12

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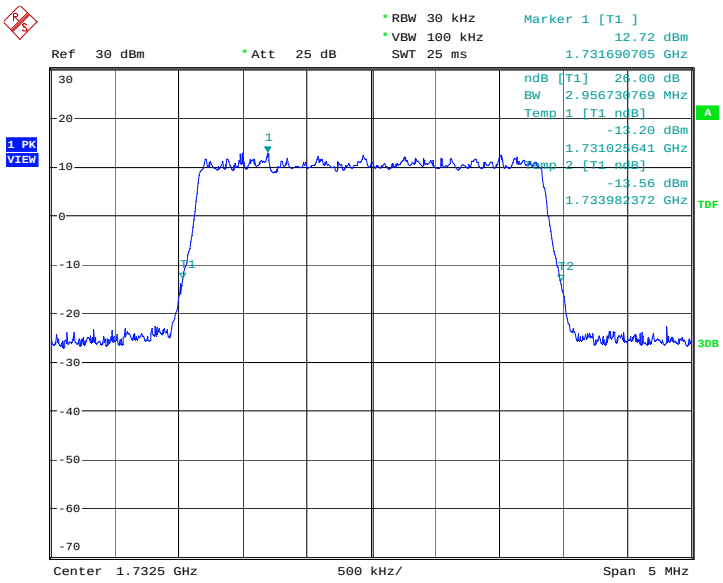
LTE band 4, 3MHz Bandwidth, 16QAM (100% BW)

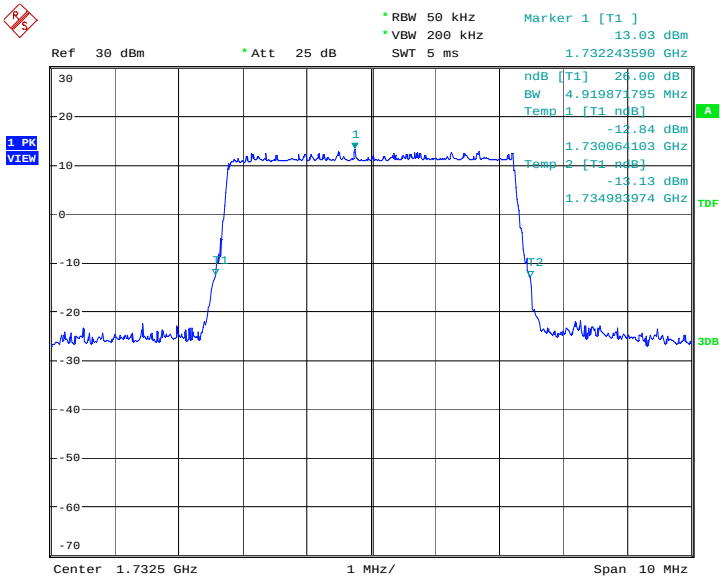


Date: 9.AUG.2013 13:34:27

LTE band 4, 5MHz (100% BW)

Frequency(MHz)	Occupied Bandwidth (100% BW)(kHz)	
1732.5	QPSK	16QAM
	4919.872	4919.872

LTE band 4, 5MHz Bandwidth, QPSK (100% BW)



Date: 9.AUG.2013 13:39:42

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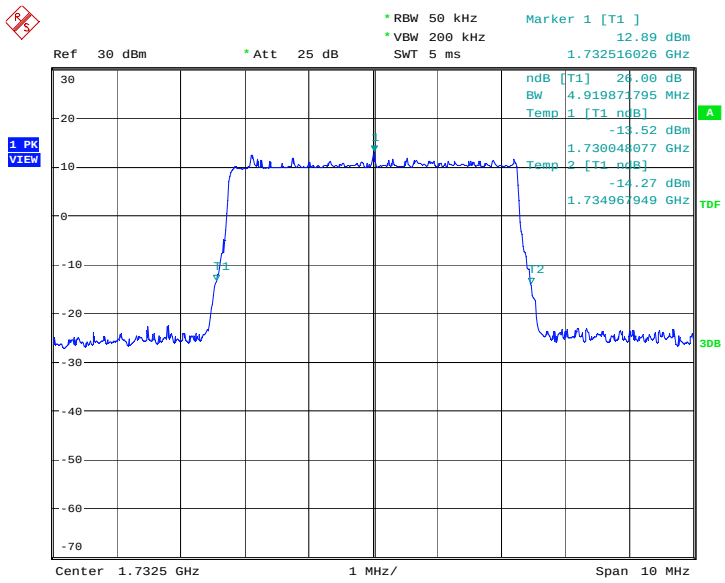
LTE band 4, 5MHz Bandwidth,16QAM (100% BW)

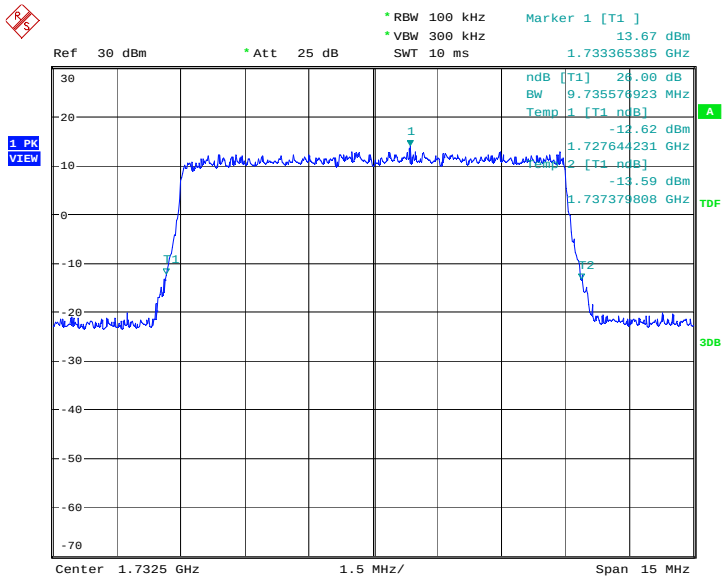


Date: 9.AUG.2013 13:39:58

LTE band 4, 10MHz (100% BW)

Frequency(MHz)	Occupied Bandwidth (100% BW)(kHz)	
	QPSK	16QAM
1732.5	9735.577	9711.538

LTE band 4, 10MHz Bandwidth, QPSK (100% BW)



Date: 9.AUG.2013 13:45:13

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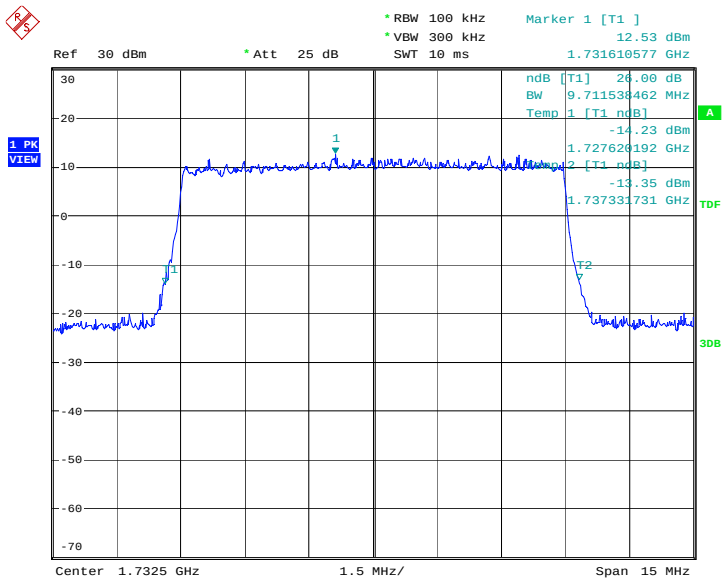
LTE band 4, 10MHz Bandwidth, 16QAM (100% BW)

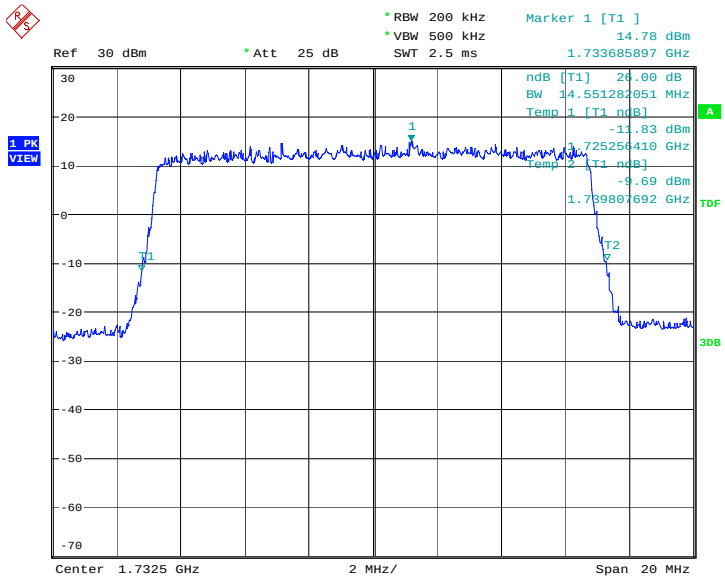


Date: 9.AUG.2013 13:45:29

LTE band 4, 15MHz (100% BW)

Frequency(MHz)	Occupied Bandwidth (100% BW)(kHz)	
1732.5	QPSK	16QAM
	14551.282	14615.385

LTE band 4, 15MHz Bandwidth, QPSK (100% BW)



Date: 9.AUG.2013 13:50:44

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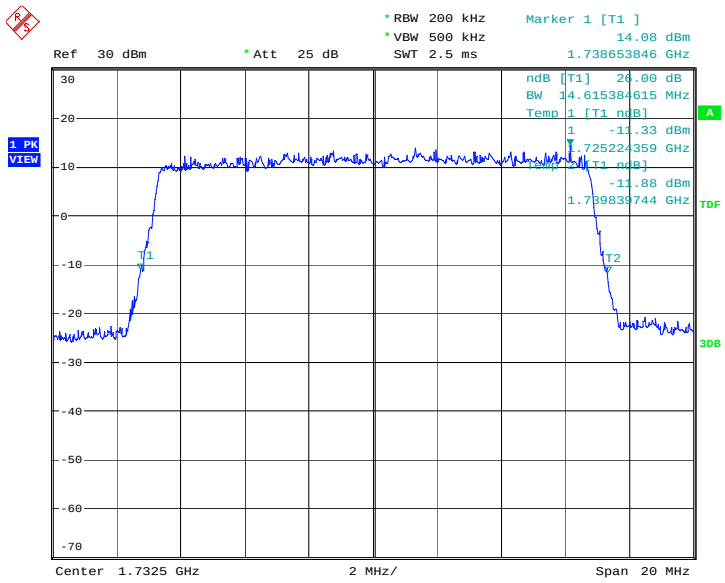
LTE band 4, 15MHz Bandwidth, 16QAM (100% BW)

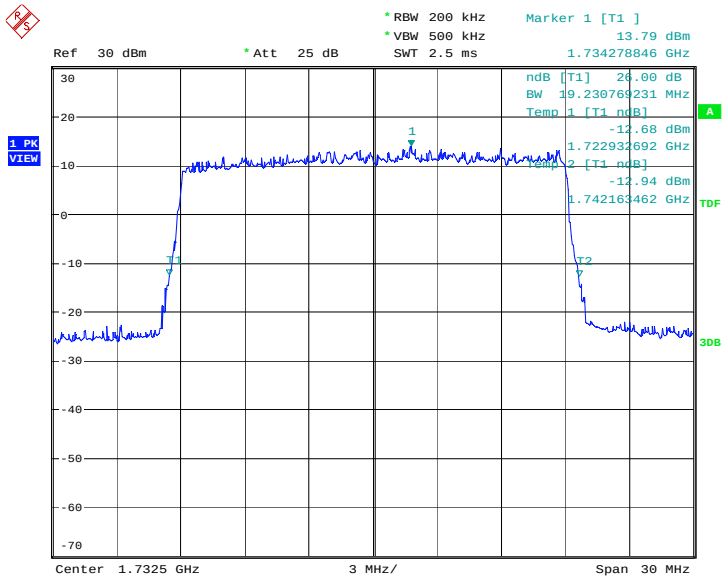


Date: 9.AUG.2013 13:51:00

LTE band 4, 20MHz (100% BW)

Frequency(MHz)	Occupied Bandwidth (100% BW)(kHz)	
	QPSK	16QAM
1732.5	19230.769	19134.615

LTE band 4, 20MHz Bandwidth, QPSK (100% BW)



Date: 9.AUG.2013 13:56:15

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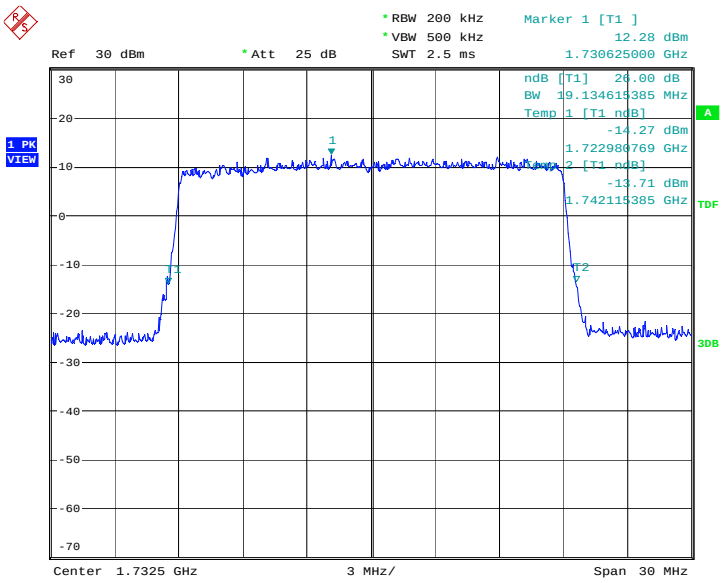
LTE band 4, 20MHz Bandwidth, 16QAM (100% BW)

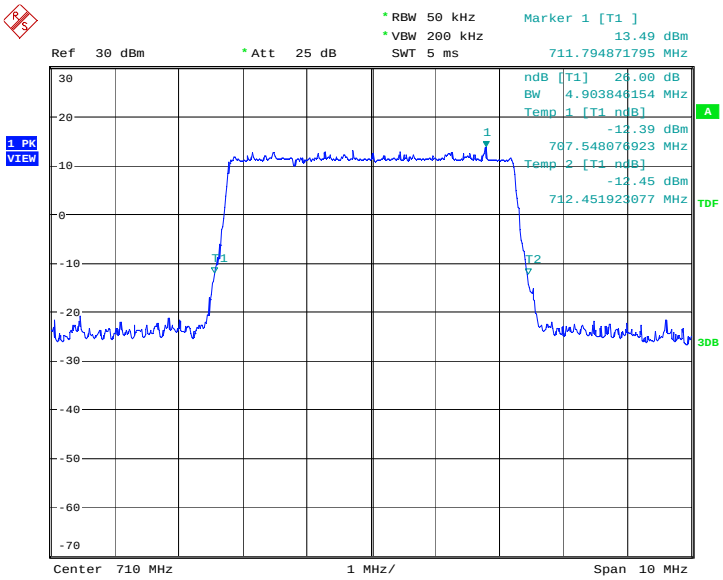


Date: 9.AUG.2013 13:56:31

LTE band 17, 5MHz (100% BW)

Frequency(MHz)	Occupied Bandwidth (100% BW)(kHz)	
710.0	QPSK	16QAM
	4903.846	4871.795

LTE band 17, 5MHz Bandwidth, QPSK (100% BW)



Date: 9.AUG.2013 14:02:48

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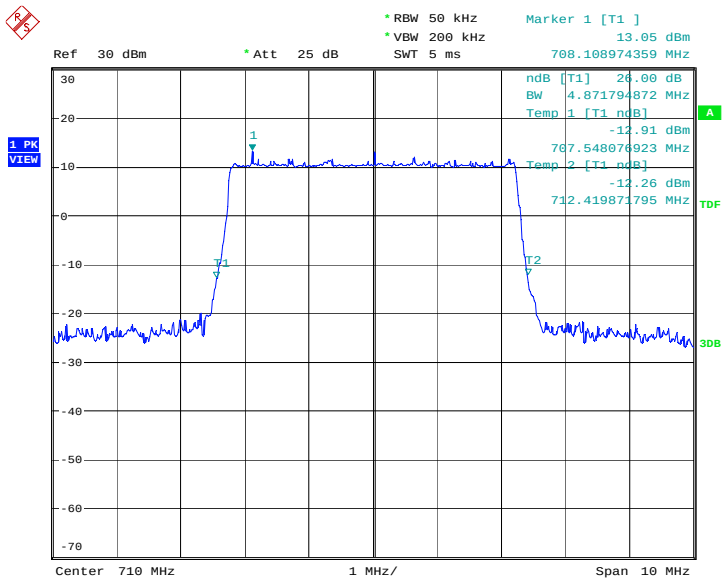
LTE band 17, 5MHz Bandwidth,16QAM (100% BW)

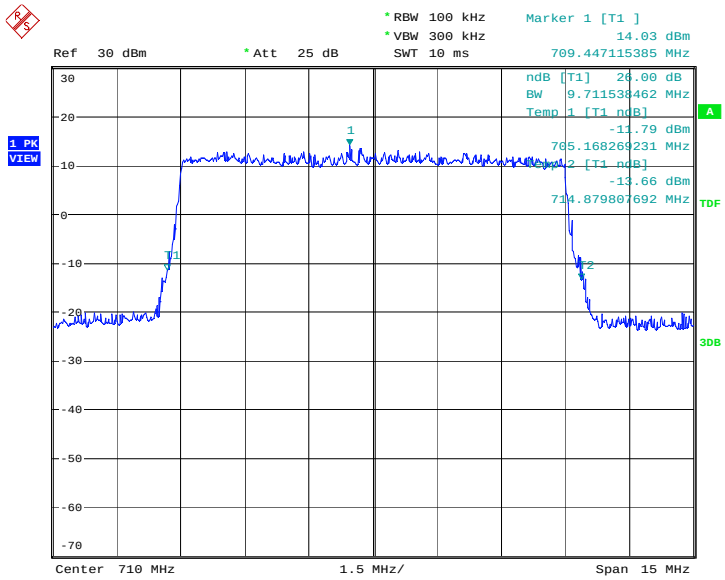


Date: 9.AUG.2013 14:03:04

LTE band 17, 10MHz (100% BW)

Frequency(MHz)	Occupied Bandwidth (100% BW)(kHz)	
710.0	QPSK	16QAM
	9711.538	9735.577

LTE band 17, 10MHz Bandwidth, QPSK (100% BW)



Date: 9.AUG.2013 14:08:49

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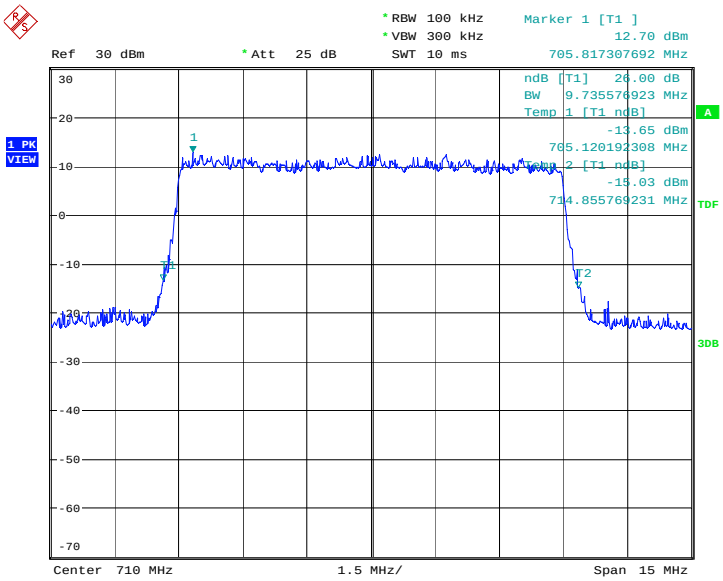
LTE band 17, 10MHz Bandwidth, 16QAM (100% BW)



Date: 9.AUG.2013 14:09:04

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A.7 BAND EDGE COMPLIANCE

Reference

FCC: CFR Part 27.53(g), 27.53(h).

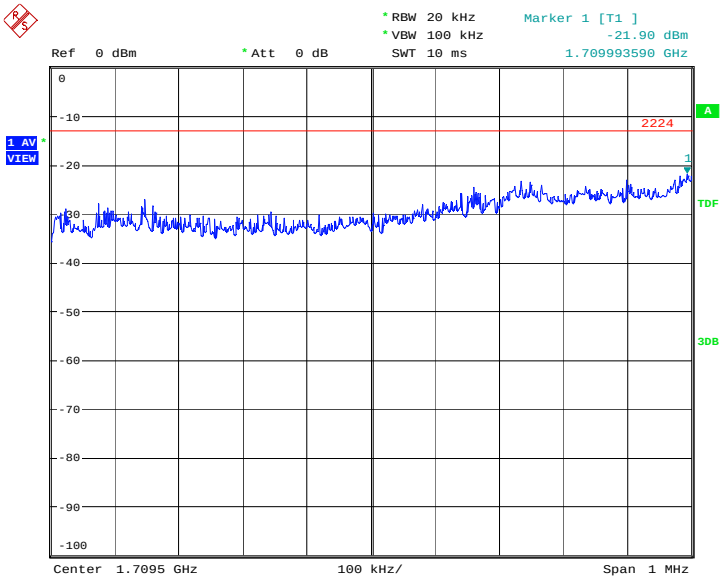
A.7.1 Measurement limit

On any frequency outside frequency band of the LTE FDD band 4 and band 17 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.

A.7.2 Measurement result

LTE band 4, 1.4MHz

LOW BAND EDGE BLOCK-QPSK



Date: 9.AUG.2013 13:27:05

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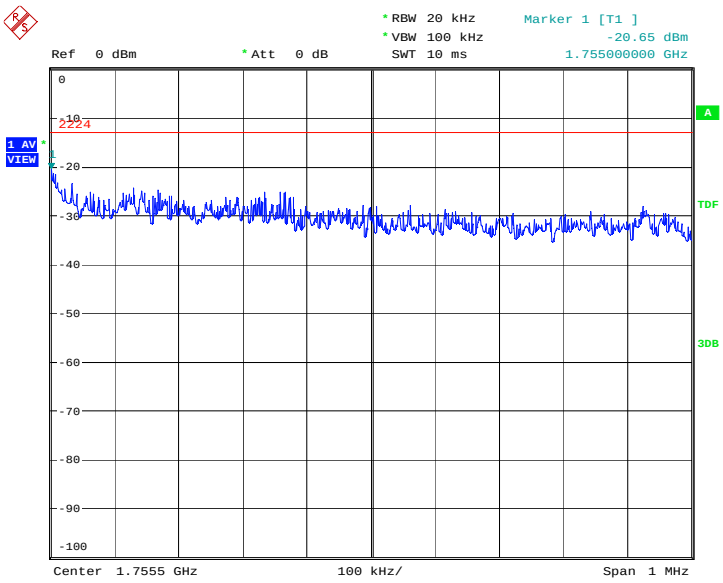
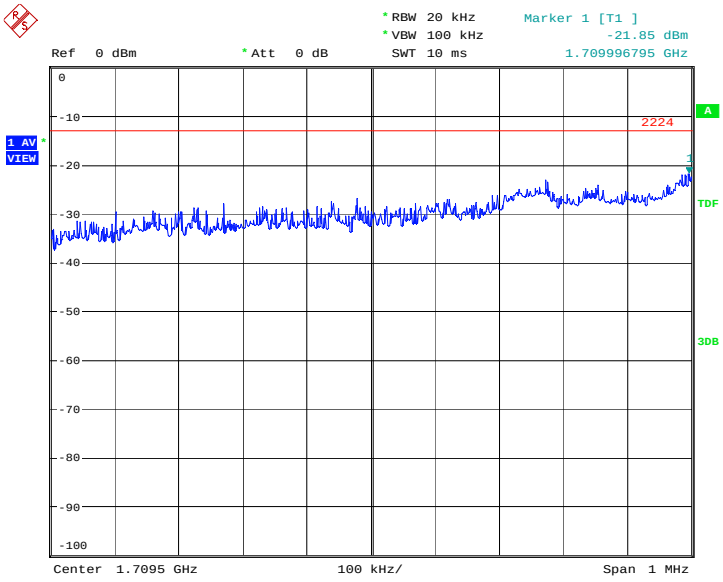
HIGH BAND EDGE BLOCK-QPSK



Date: 9.AUG.2013 13:30:26

LOW BAND EDGE BLOCK-16QAM



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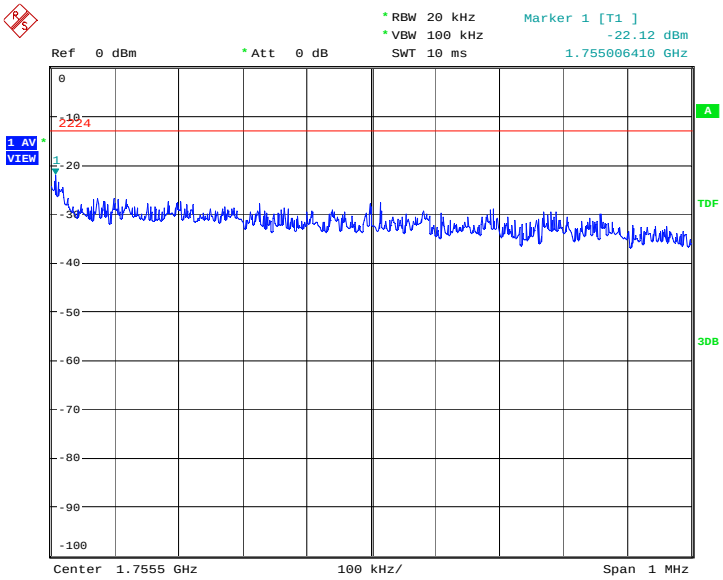
HIGH BAND EDGE BLOCK-16QAM



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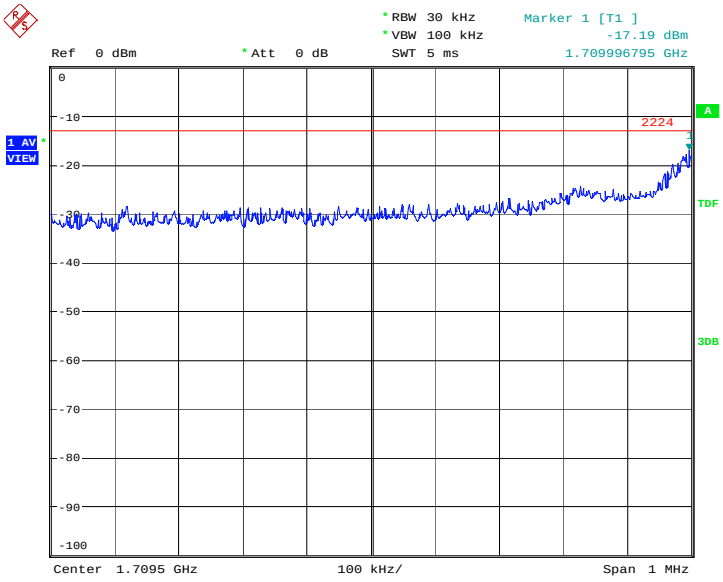
LTE band 4, 3MHz

LOW BAND EDGE BLOCK-QPSK



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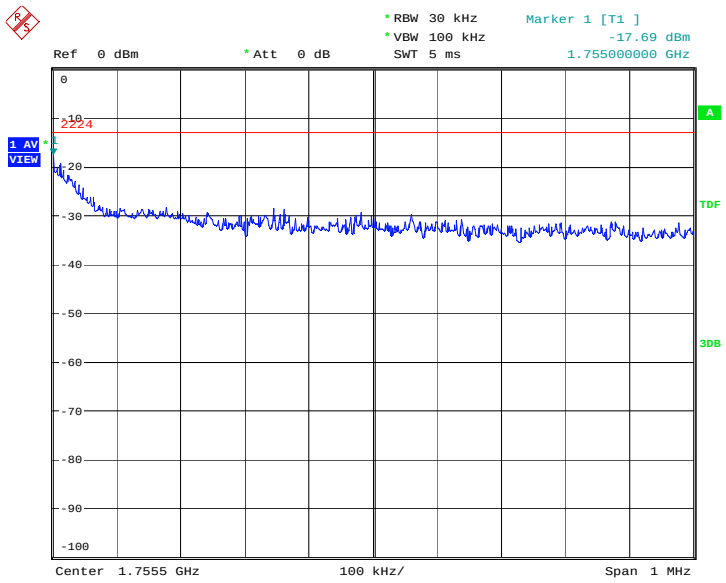
HIGH BAND EDGE BLOCK-QPSK



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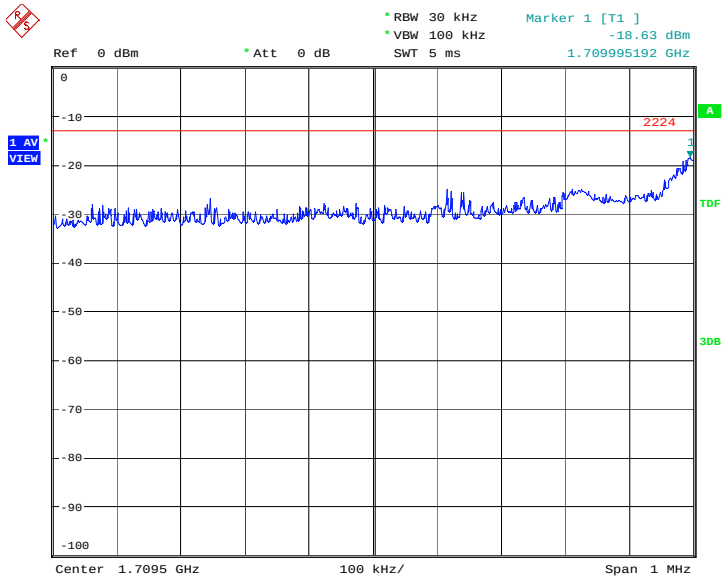

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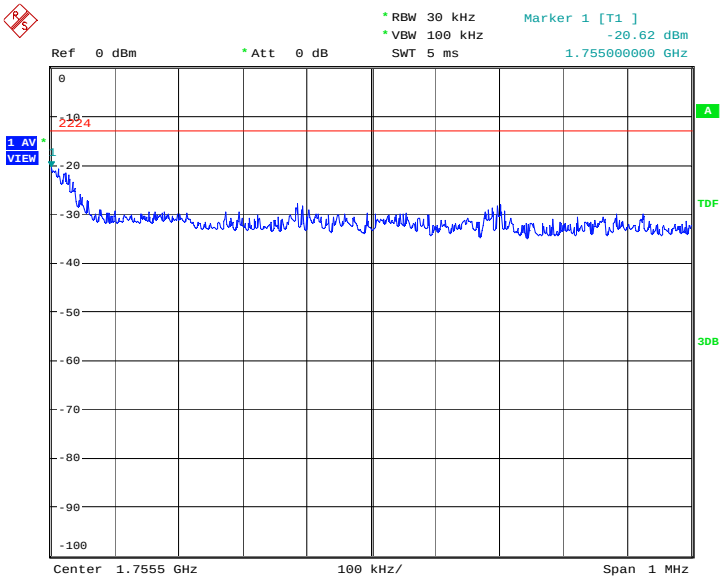
HIGH BAND EDGE BLOCK-16QAM



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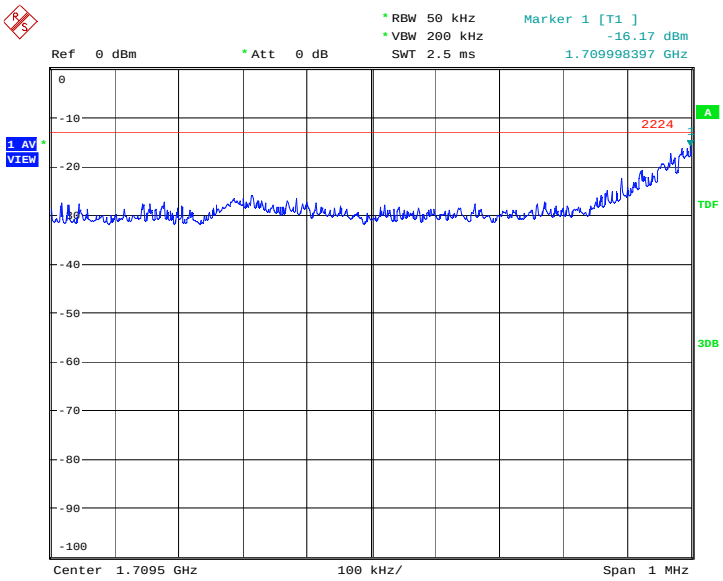
LTE band 4, 5MHz
LOW BAND EDGE BLOCK-QPSK



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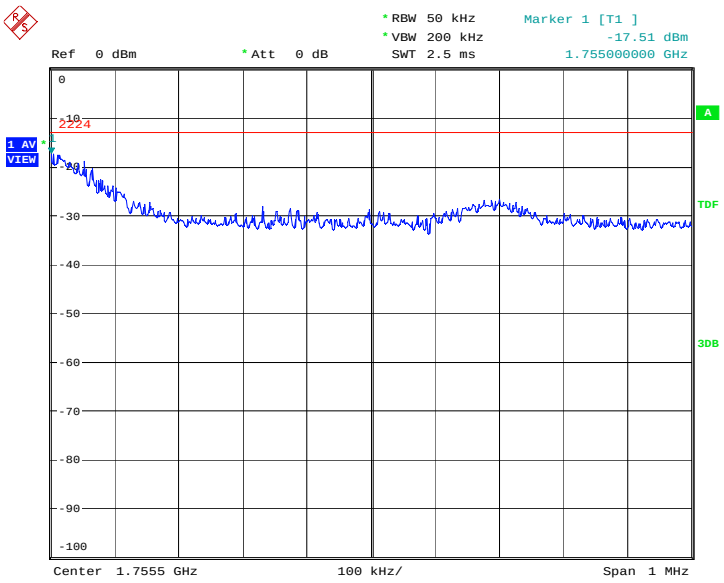

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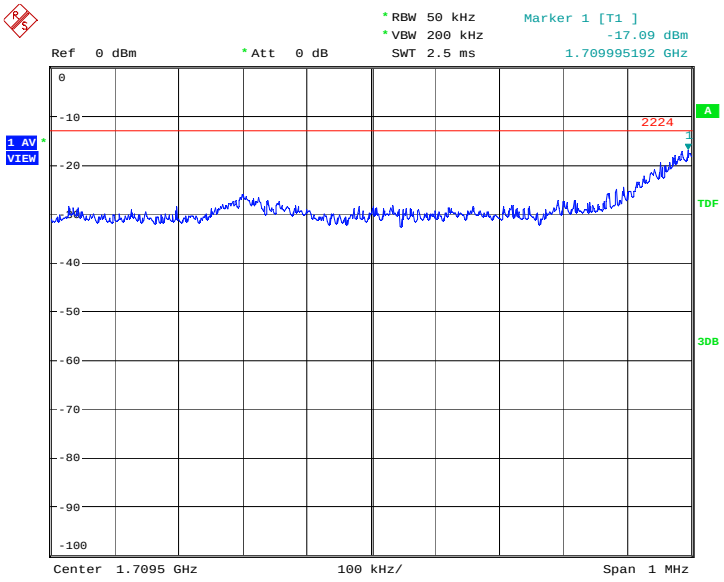

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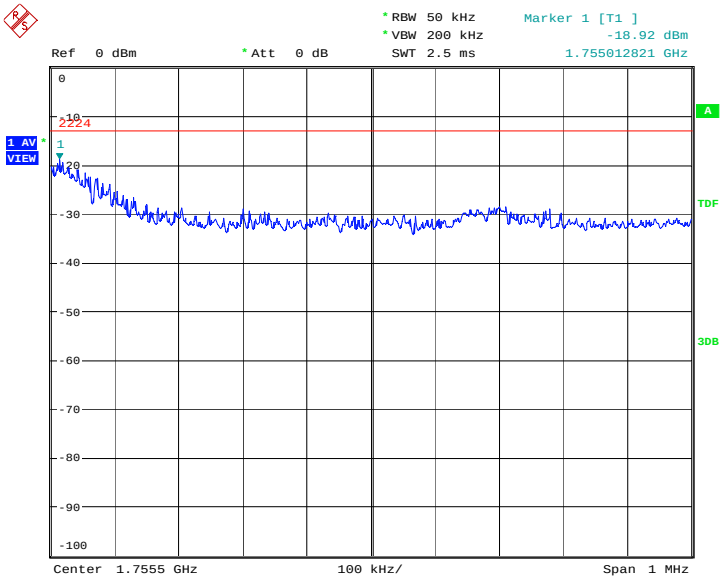
HIGH BAND EDGE BLOCK-16QAM



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LTE band 4, 10MHz

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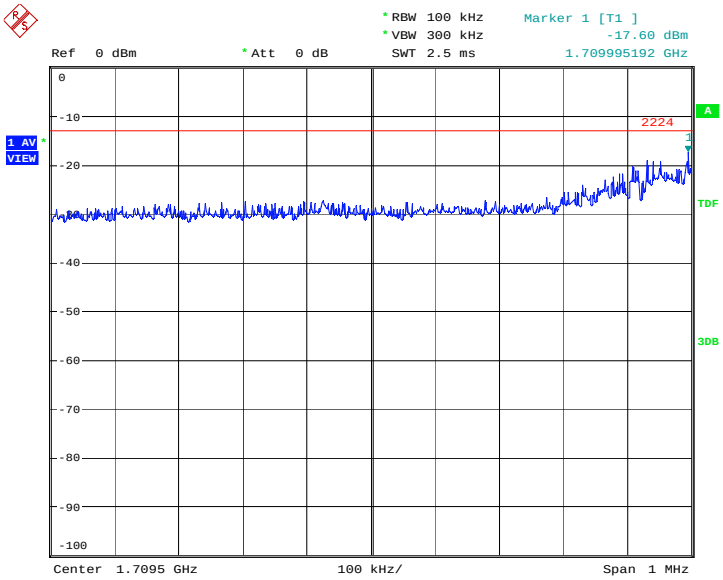

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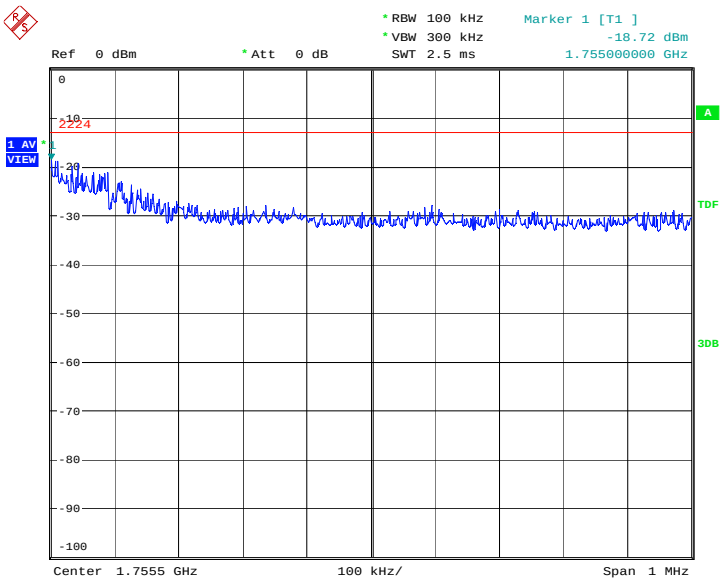
HIGH BAND EDGE BLOCK-QPSK



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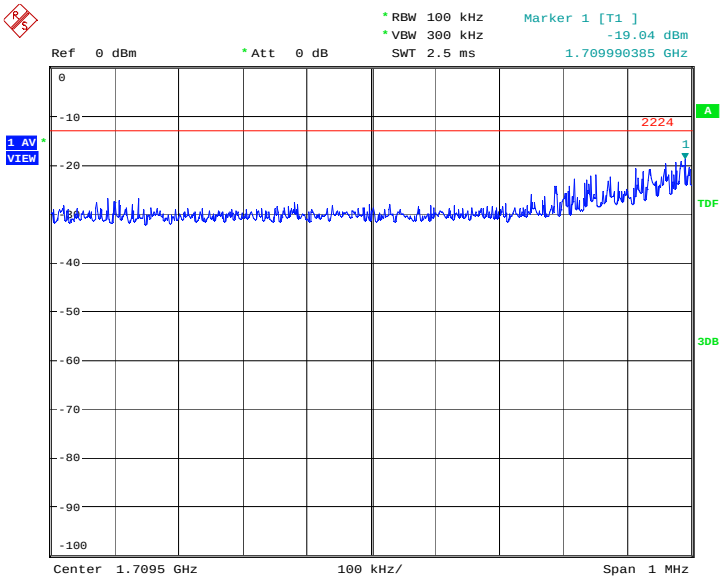

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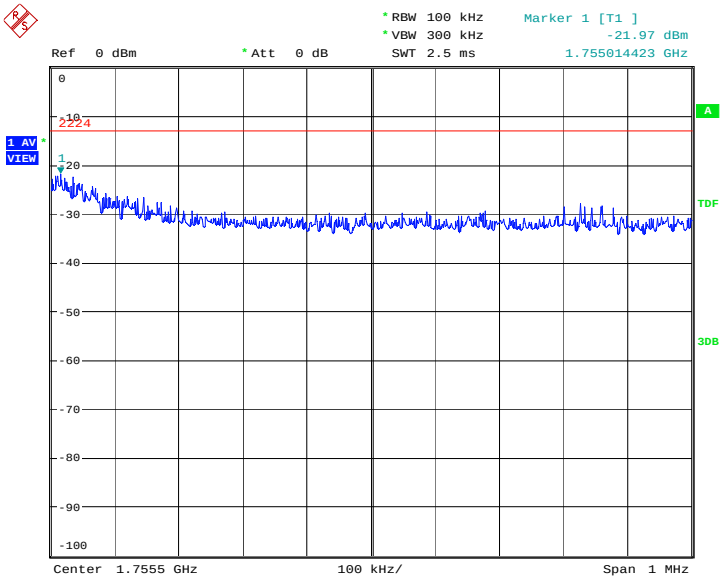

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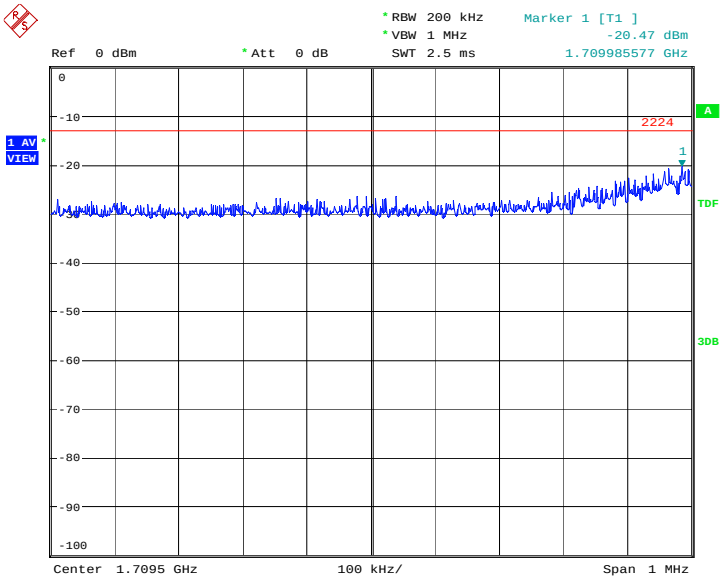
LTE band 4, 15MHz

LOW BAND EDGE BLOCK-QPSK



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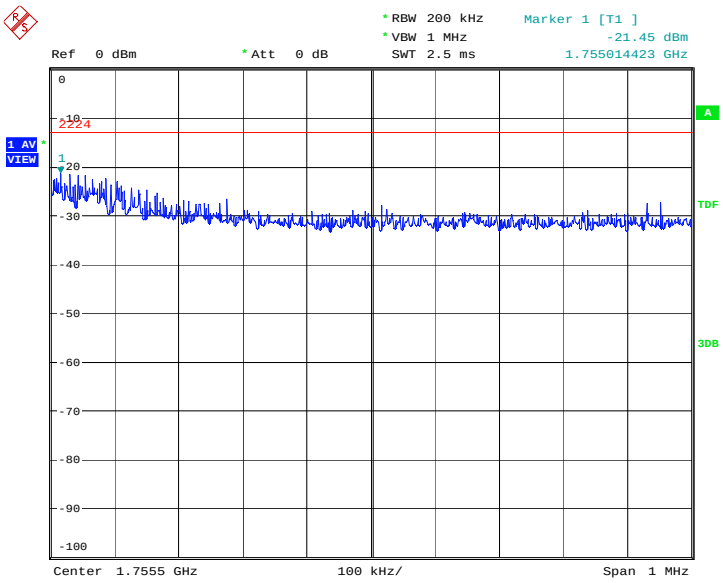
HIGH BAND EDGE BLOCK-QPSK



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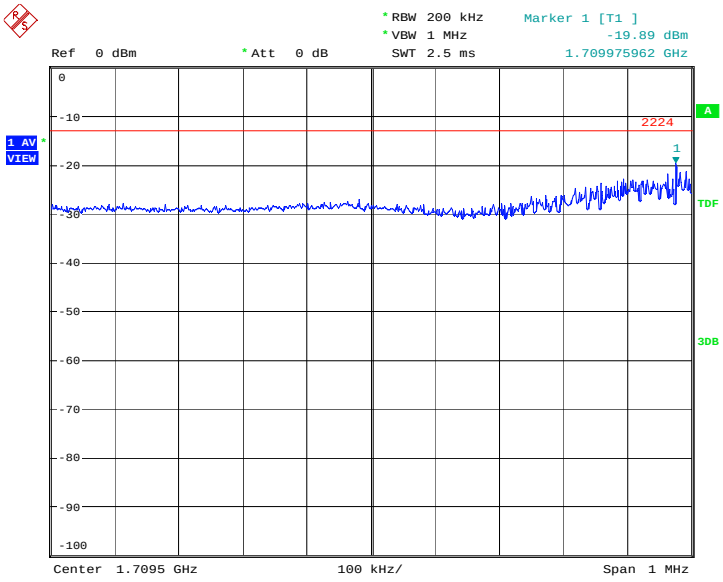

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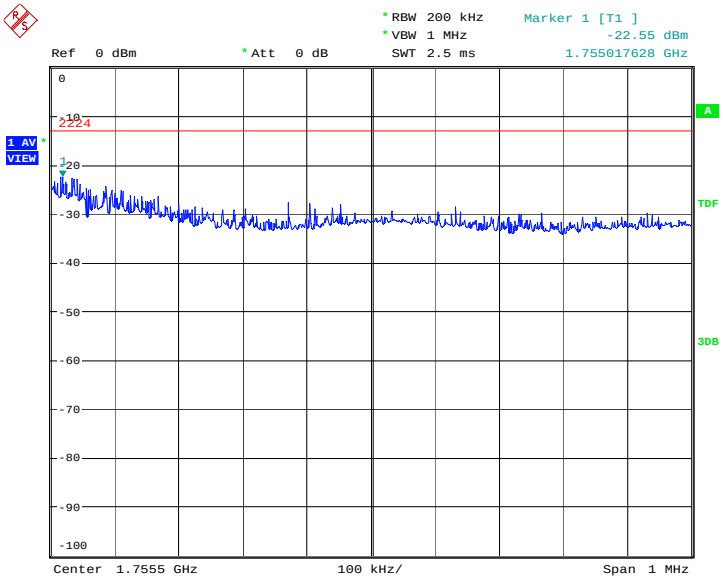
HIGH BAND EDGE BLOCK-16QAM



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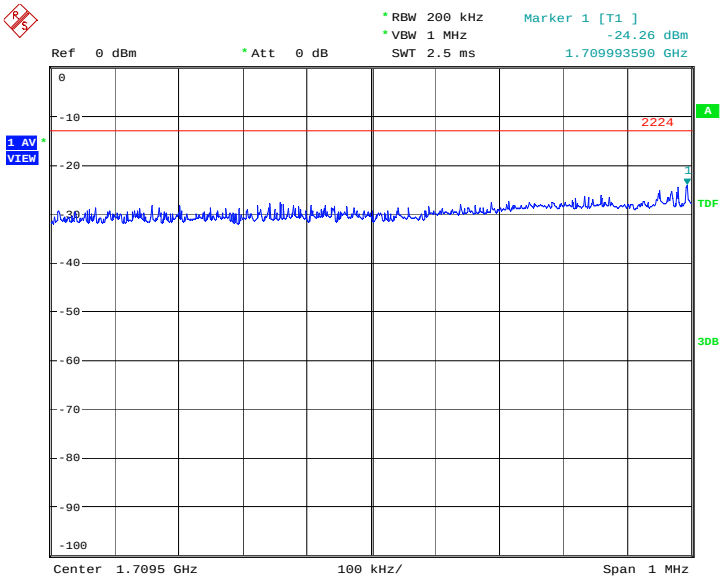
LTE band 4, 20MHz

LOW BAND EDGE BLOCK-QPSK



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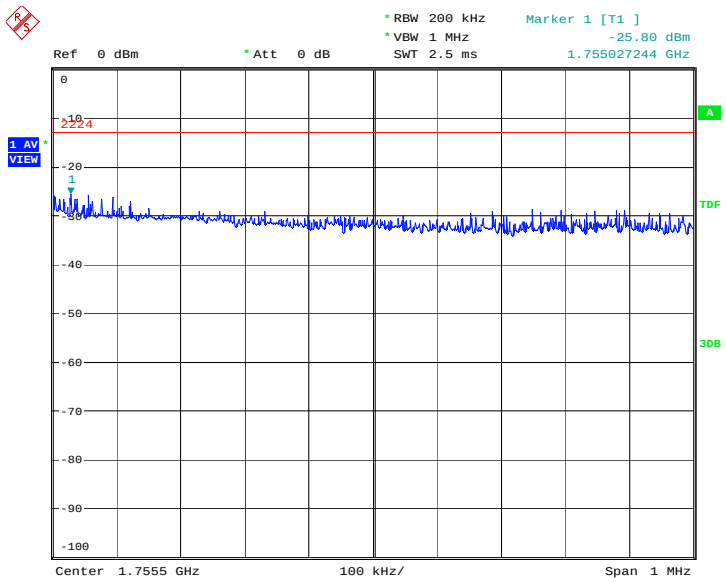
HIGH BAND EDGE BLOCK-QPSK



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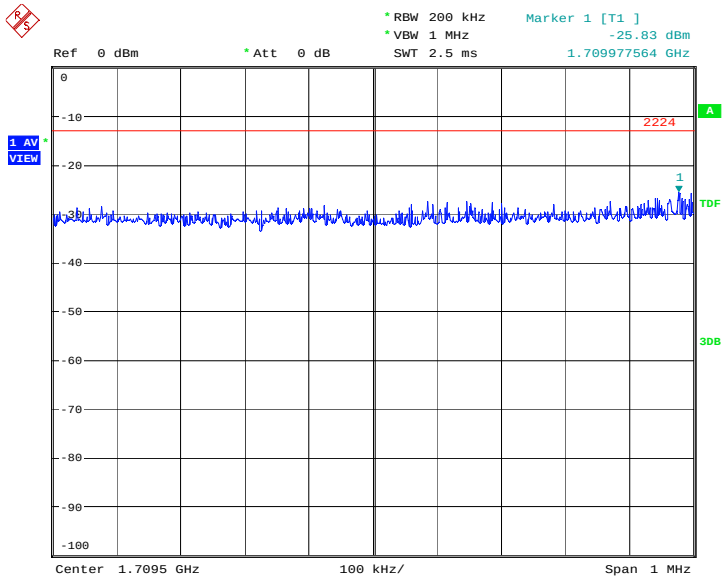
LOW BAND EDGE BLOCK-16QAM



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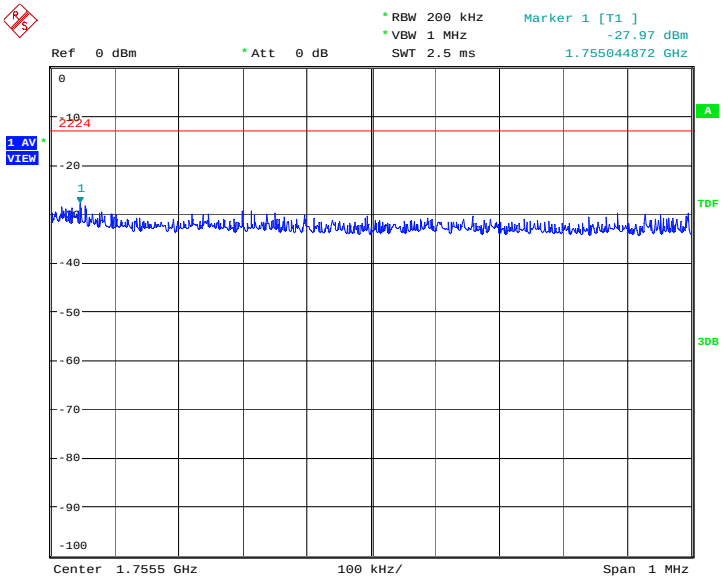
HIGH BAND EDGE BLOCK-16QAM



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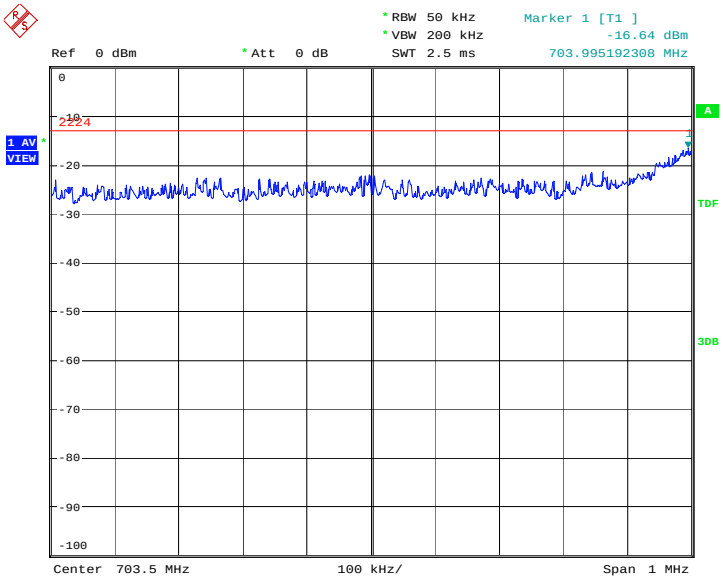
LTE band 17, 5MHz

LOW BAND EDGE BLOCK-QPSK



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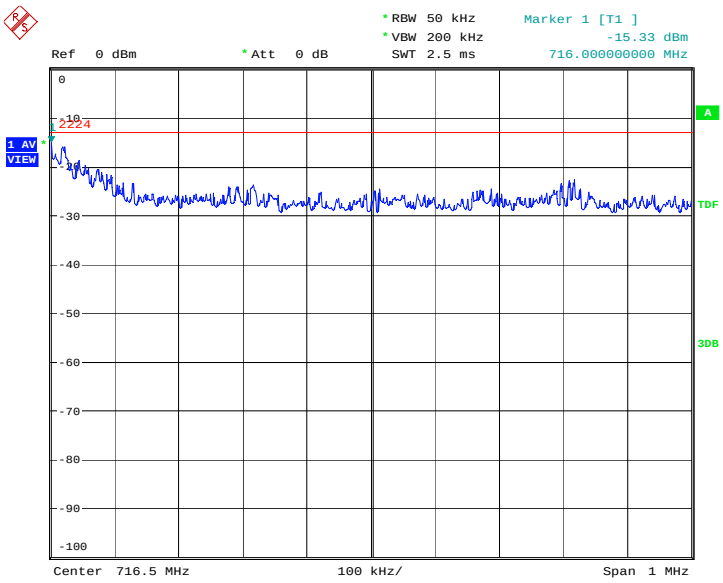
HIGH BAND EDGE BLOCK-QPSK



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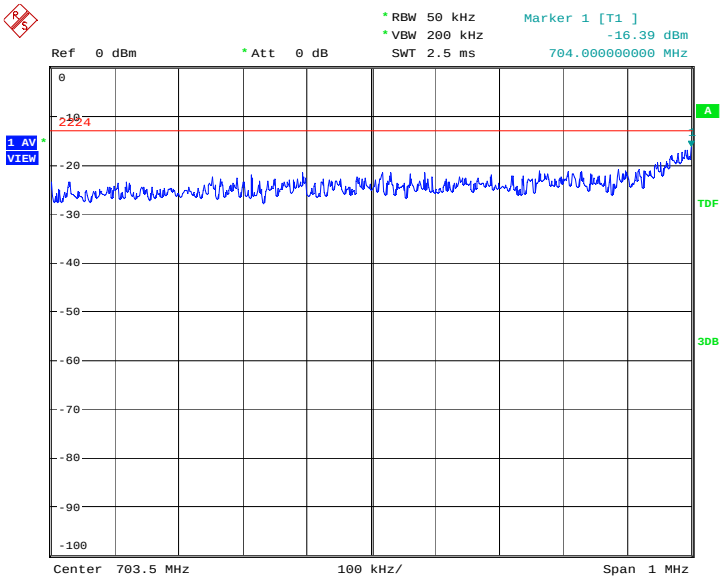

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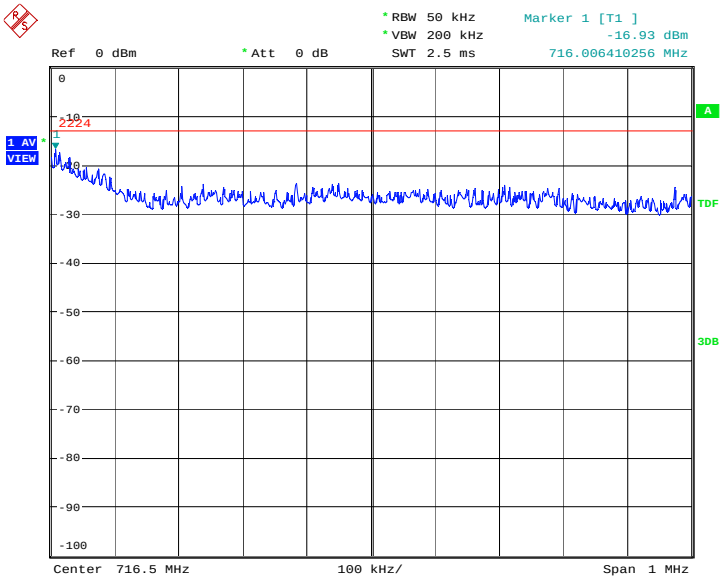
HIGH BAND EDGE BLOCK-16QAM



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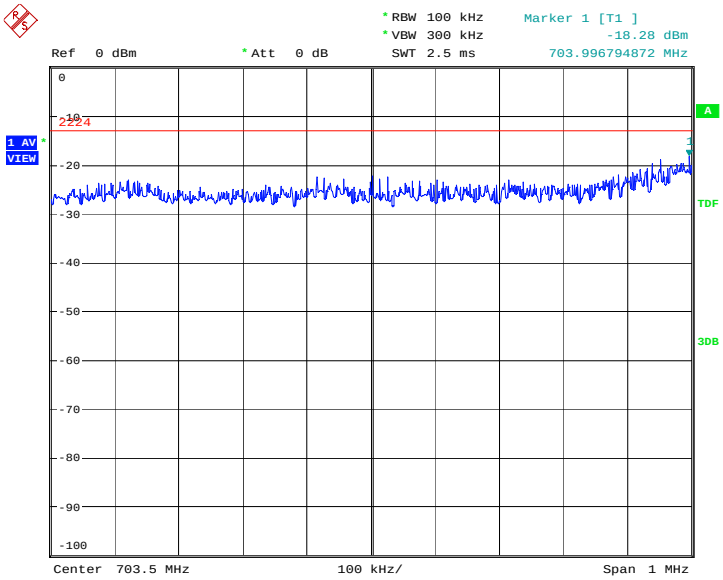
LTE band 17, 10MHz

LOW BAND EDGE BLOCK-QPSK



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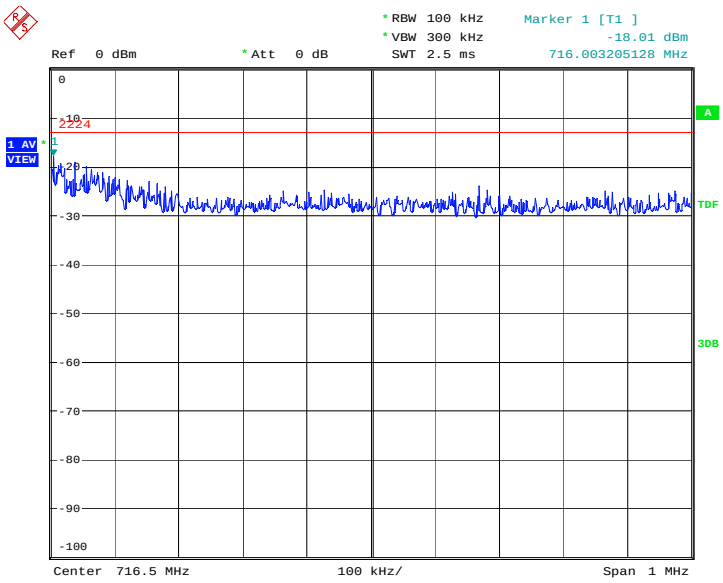
HIGH BAND EDGE BLOCK-QPSK



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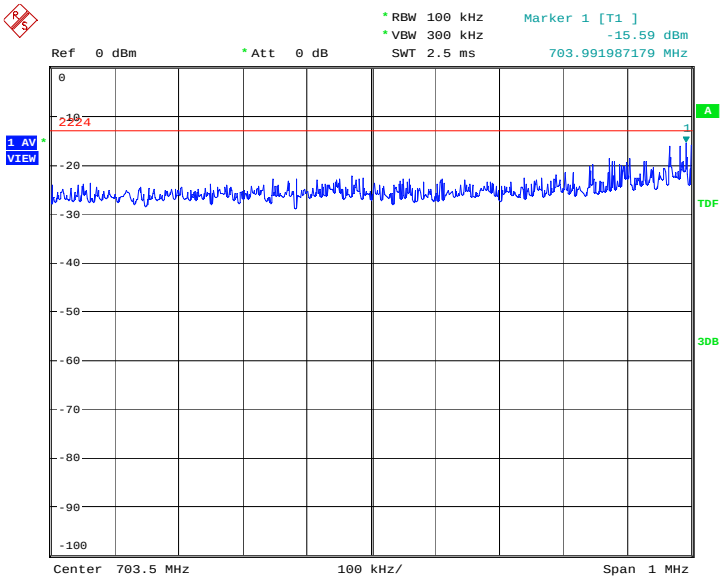
LOW BAND EDGE BLOCK-16QAM



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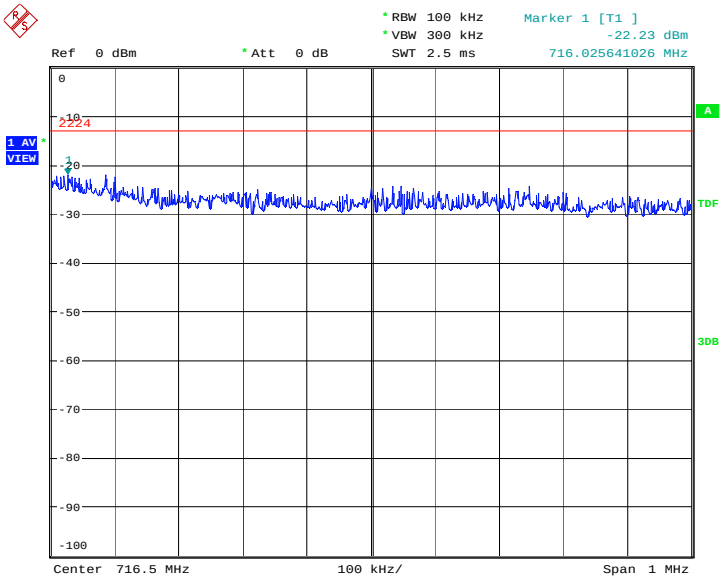
HIGH BAND EDGE BLOCK-16QAM



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A.8 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1057, 27.53(g), 27.53(h).

A.8.1 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.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

A. 8.2 Measurement Limit

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. 8.3 Measurement result

Measurement Uncertainty: 0.3dB

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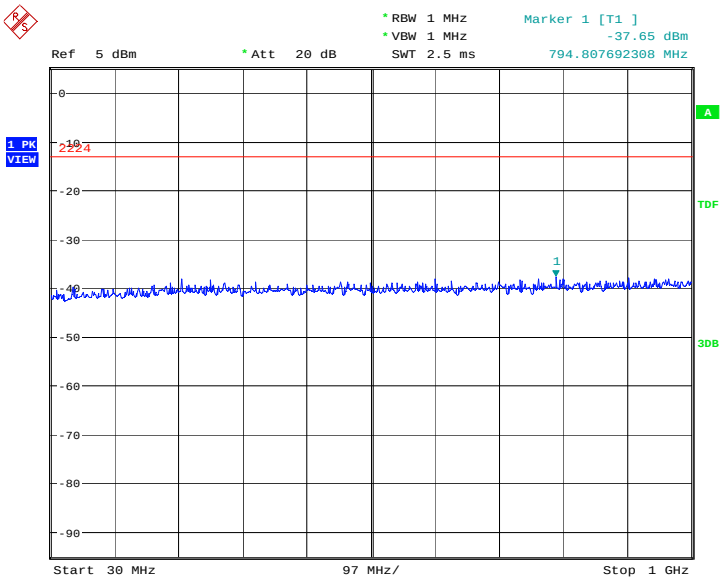
LTE band 4, 1.4MHz bandwidth

QPSK: 30MHz – 1GHz

Spurious emission limit –13dBm.



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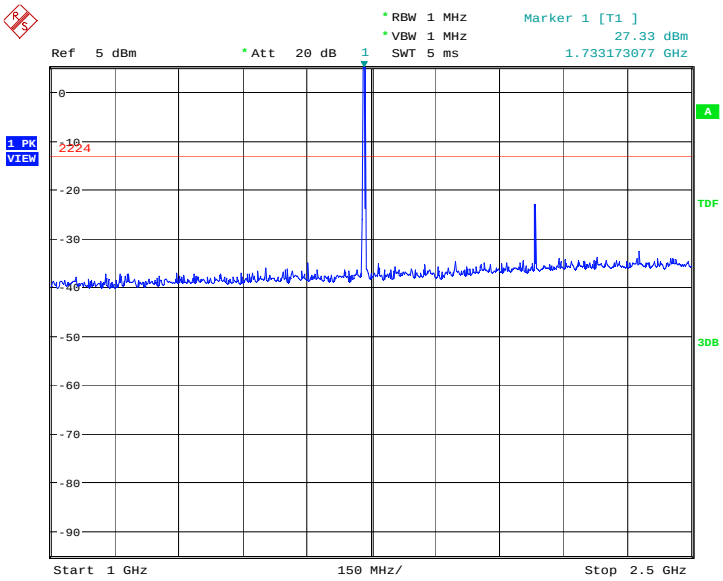
QPSK: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



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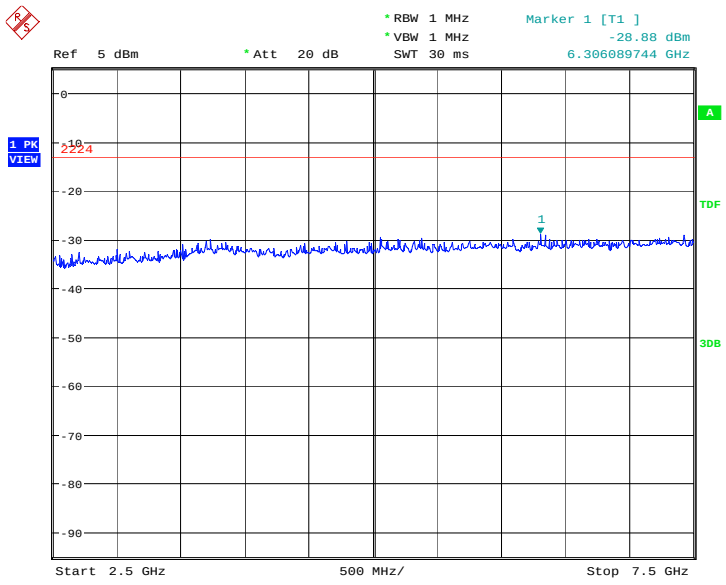
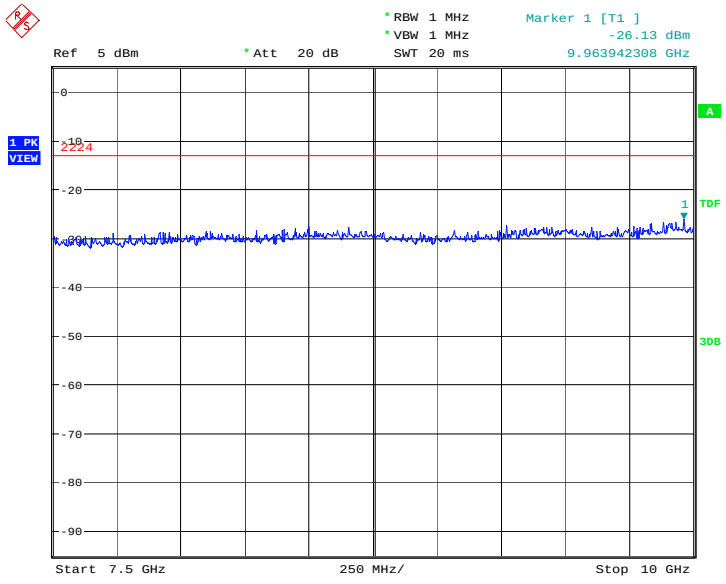
QPSK: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.



QPSK: 7.5GHz –10GHz

Spurious emission limit –13dBm.



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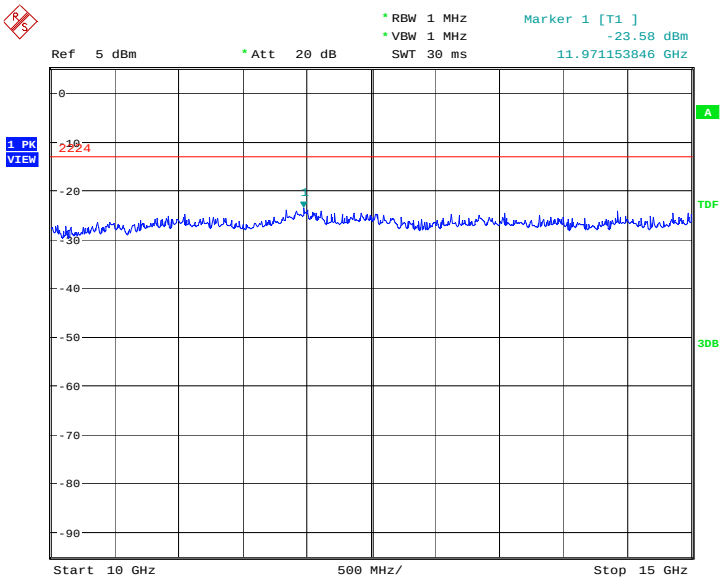
QPSK: 10GHz –15GHz

Spurious emission limit –13dBm.



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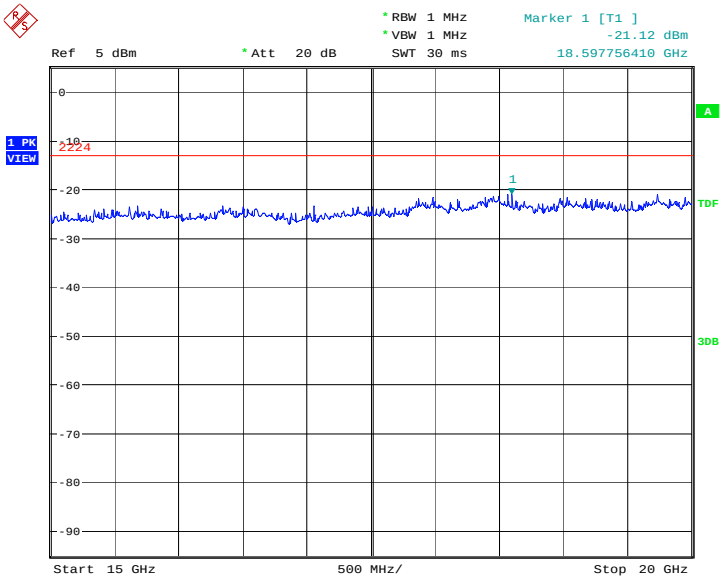
QPSK: 15GHz –20GHz

Spurious emission limit –13dBm.



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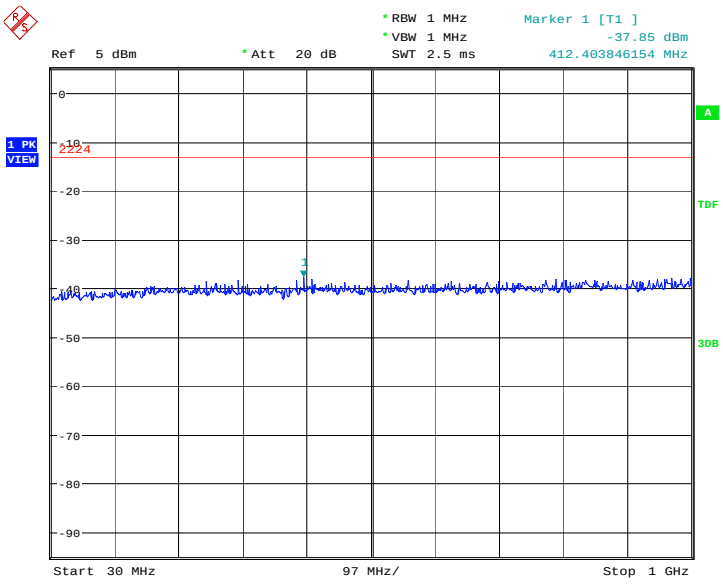
16QAM: 30MHz – 1GHz

Spurious emission limit –13dBm.



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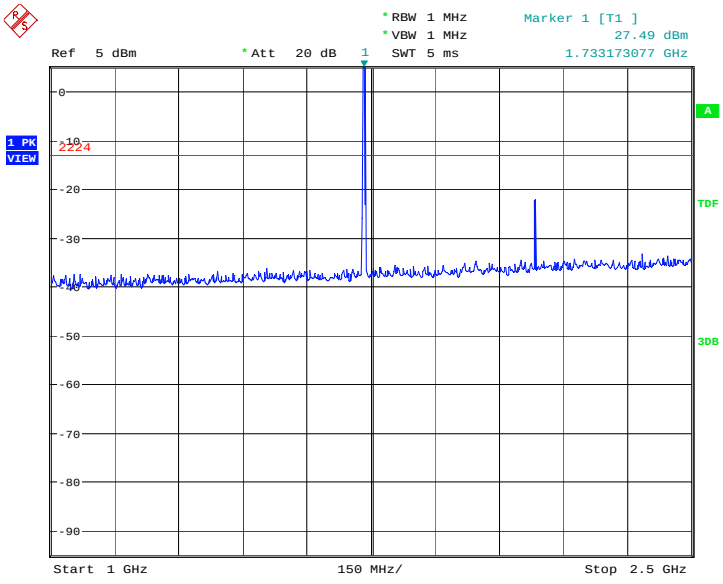
16QAM: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



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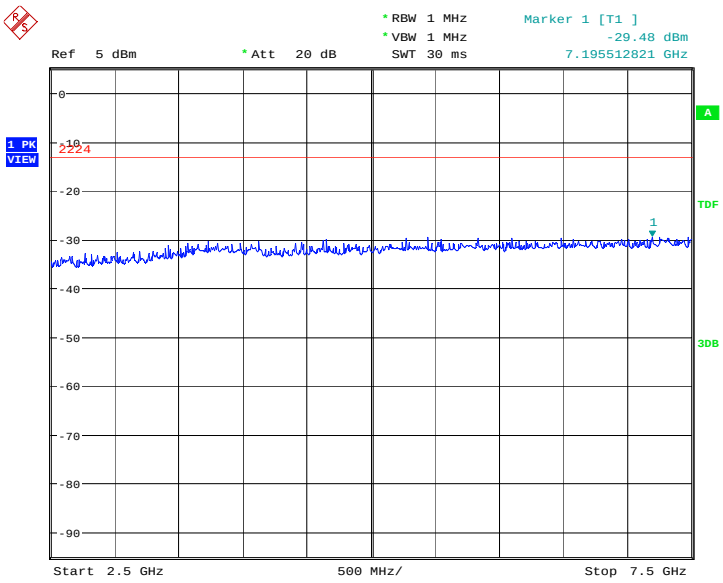
16QAM: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.



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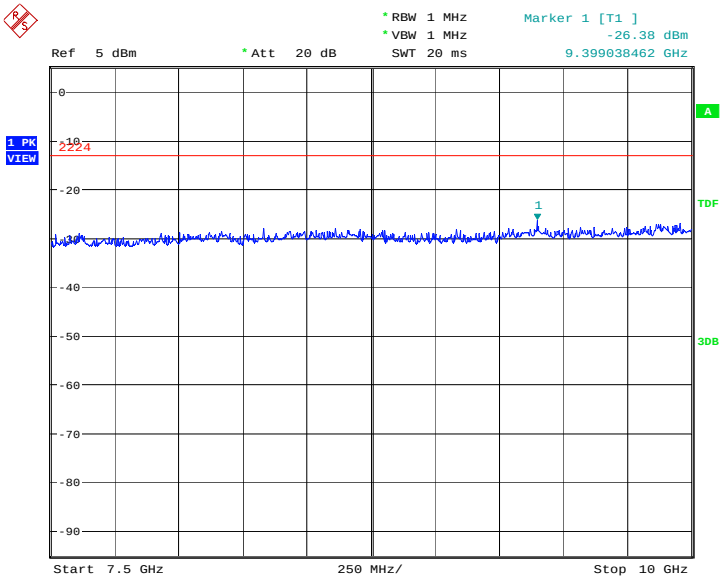
16QAM: 7.5GHz –10GHz

Spurious emission limit –13dBm.



Date: 9.AUG.2013 14:15:27

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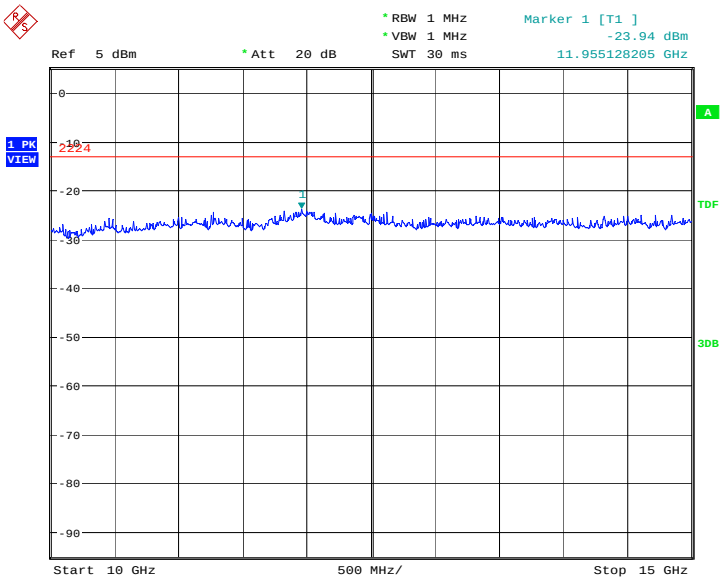
16QAM: 10GHz –15GHz

Spurious emission limit –13dBm.



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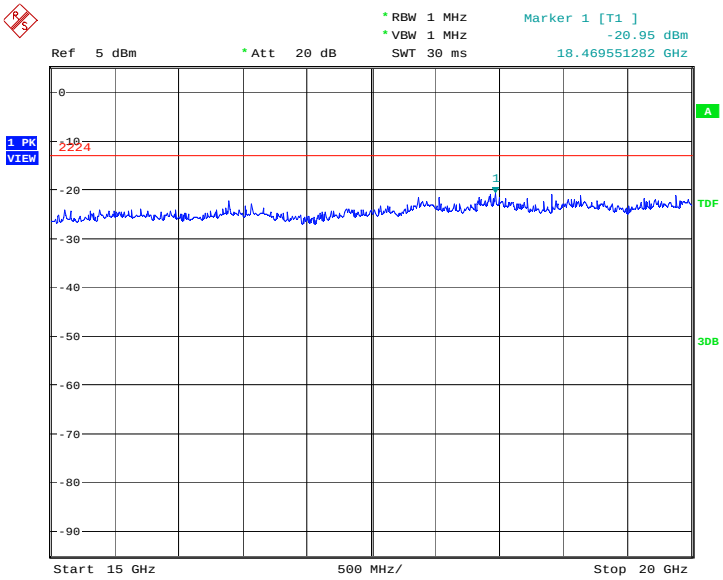
16QAM: 15GHz –20GHz

Spurious emission limit –13dBm.



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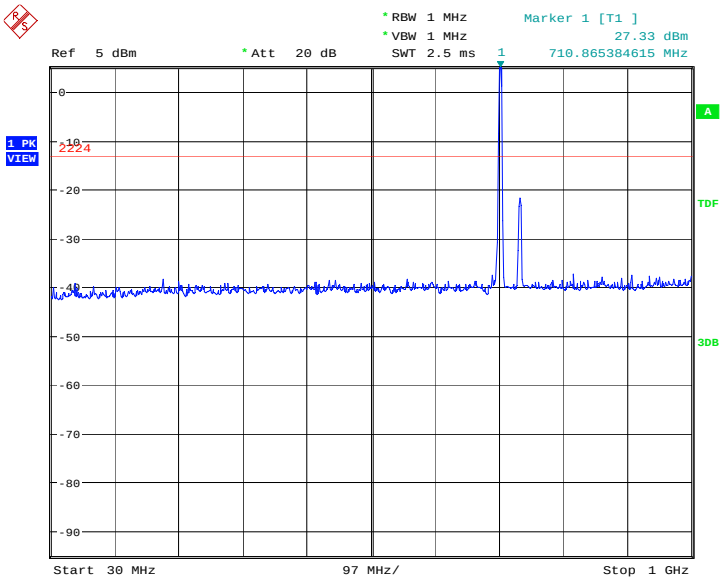
LTE band 17, 5MHz bandwidth

QPSK: 30MHz – 1GHz

Spurious emission limit –13dBm.



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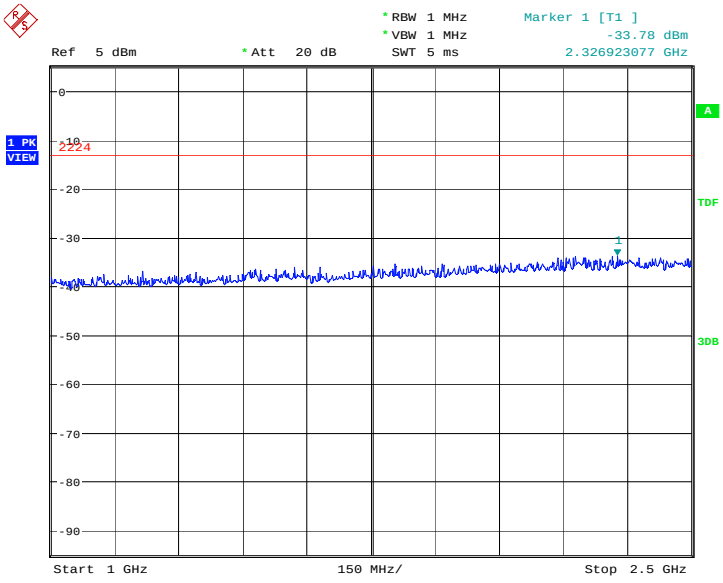
QPSK: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



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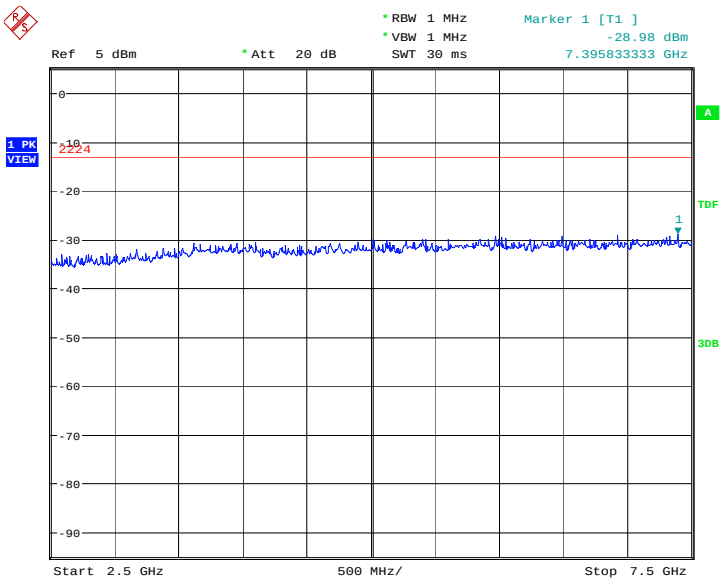
QPSK: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.



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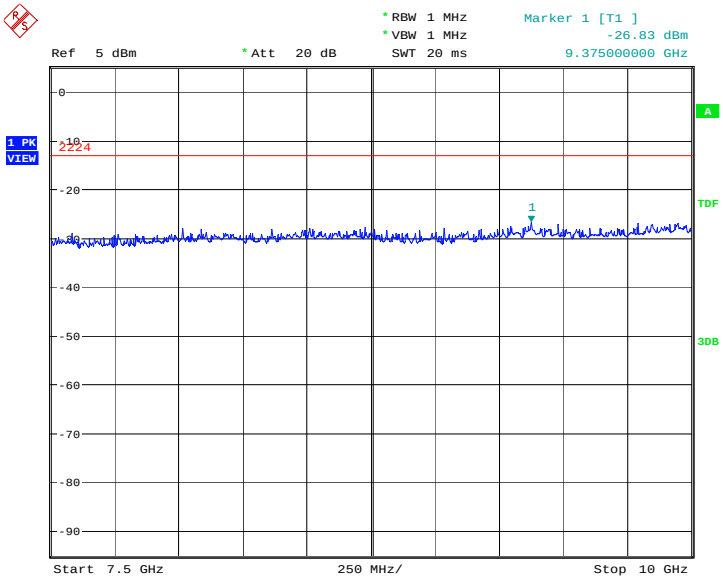
QPSK: 7.5GHz –10GHz

Spurious emission limit –13dBm.



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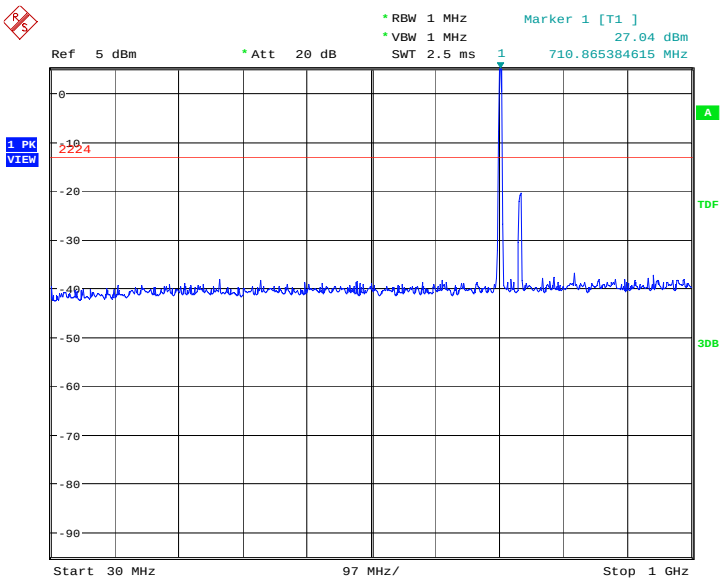
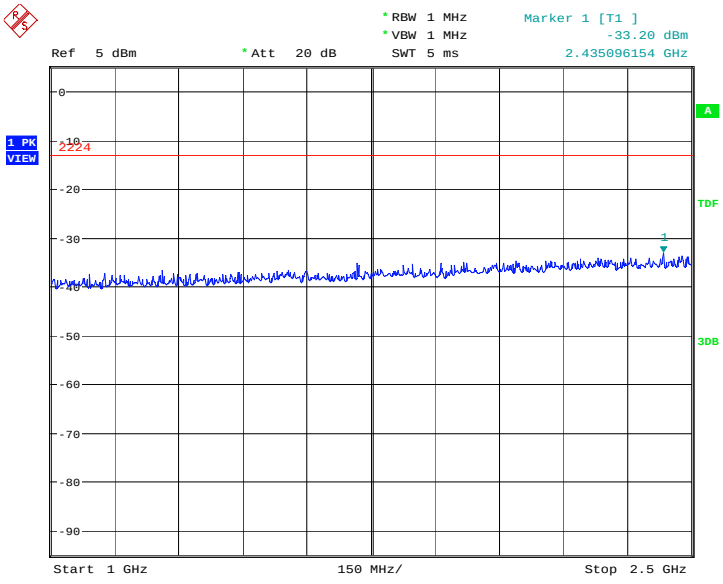
16QAM: 30MHz – 1GHz

Spurious emission limit –13dBm.



16QAM: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



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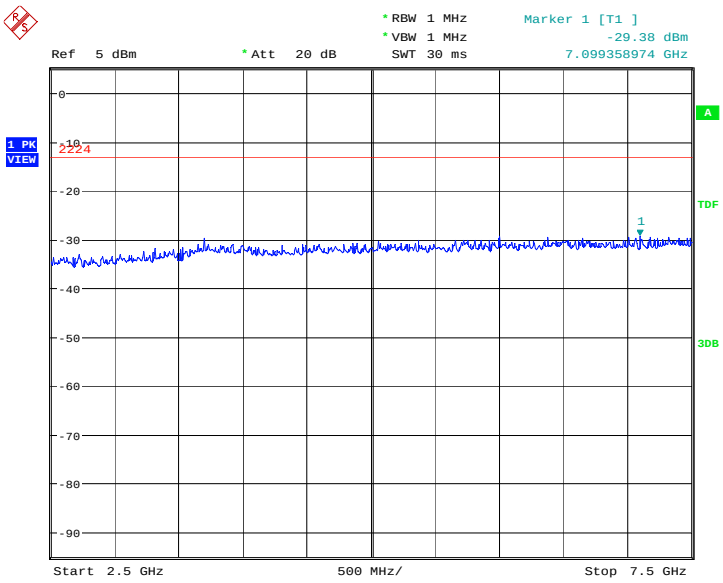
16QAM: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.



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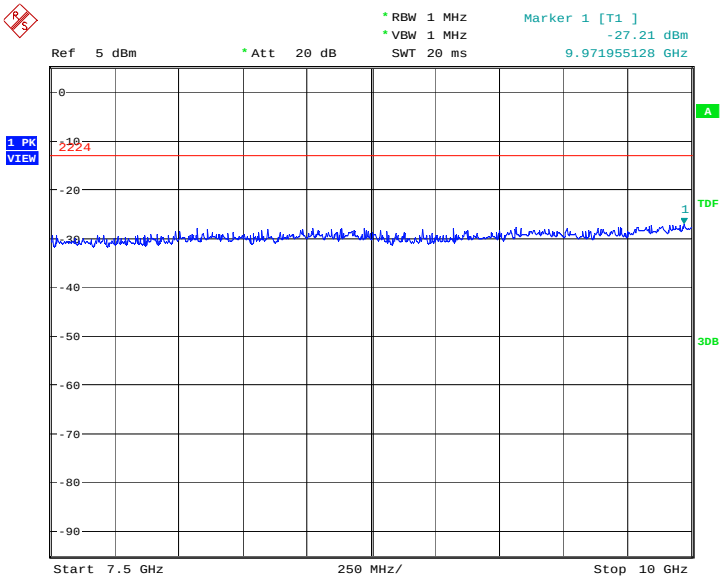
16QAM: 7.5GHz –10GHz

Spurious emission limit –13dBm.



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