TEST REPORT

No. I14Z45273-GTE03

for

TCT Mobile Limited

HSDPA/HSUPA/HSPA+/UMTS Bi-bands / GSM quad bands/LTE 2 bands mobile phone

Model Name: A995L

Marketing Name: A995L

FCC ID: RAD472

with

Hardware Version: PIO

Software Version: v8F1K

Issued Date: 2014-04-04

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:

FCC 2.948 Listed: No.733176

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

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

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

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CONTENTS

1. Test Laboratory

1.1. Testing Location

Location A

Company Name:	TMC Beijing, Telecommunication Metrology Center of MIIT
Address:	No 52, Huayuan Bei Road, Haidian District, Beijing, P.R. China
Postal Code:	100191

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

1.2. Testing Environment

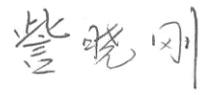
Normal Temperature:	15-35℃
Relative Humidity:	20-75%
Air pressure	980 - 1040 hPa

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

1.3. Project data

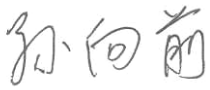
Testing Start Date:	2014-03-21
Testing End Date:	2014-03-27

1.4. Signature



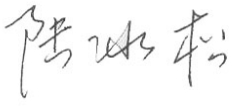
Zi Xiaogang

(Prepared this test report)



Sun Xiangqian

(Reviewed this test report)



Lu Bingsong

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	TCT Mobile Limited
Address /Post:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China.
City:	Shanghai
Postal Code:	201203
Country:	China
Contact Person:	Gong Zhizhou
Contact Email	zhizhou.gong@jrdcom.com
Telephone:	0086-21-61460890
Fax:	0086-21-61460602

2.2. Manufacturer Information

Company Name:	TCT Mobile Limited
Address /Post:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China.
City:	Shanghai
Postal Code:	201203
Country:	China
Contact Person:	Gong Zhizhou
Contact Email	zhizhou.gong@jrdcom.com
Telephone:	0086-21-61460890
Fax:	0086-21-61460602

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

3.1. About EUT

Description	HSDPA/HSUPA/HSPA+/UMTS Bi-bands / GSM quad bands/LTE 2 bands mobile phone
Model Name	A995L
Marketing Name	A995L
FCC ID	RAD472
Antenna	Integrated
Output power	24.28dBm maximum EIRP measured for LTE Band 4
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.9VDC)
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*	IMEI	HW Version	SW Version
UT17a	014057000000111	PIO	v8F1K
UT07a	014057000100093	PIO	v8F1K

*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	Remarks
AE1	Battery	/	Inbuilt
AE2	Travel charger	/	TCT-CHR-1666
AE3	USB cable	/	/
AE4	USB cable	/	/

AE1

Model	CAC3380001C2
Manufacturer	SCUD
Capacitance	3400 mAh
Nominal voltage	3.8 V

AE2

Model	CBA0015AG1C1
Manufacturer	BYD
Length of cable	99 cm (length of USB cable)

AE3

Model	CDA0000024C1
Manufacturer	Shenghua
Length of cable	99 cm

AE4

Model	CDA0000024C2

Manufacturer	Juwei
Length of cable	99 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 HSDPA/HSUPA/HSPA+/UMTS Bi-bands / GSM quad bands/LTE 2 bands mobile phone with integrated antenna. Manual and specifications of the EUT were provided to fulfil the test.

4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-13 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	2009
KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters	v02r01

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 (23 meters×17meters×10meters) 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/10m 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

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	A
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	A
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.

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
1	Test Receiver	ESCI	100344	R&S	2015-03-03
2	Test Receiver	ESU26	100376	R&S	2014-11-05
3	EMI Antenna	VULB 9163	514	Schwarzbeck	2014-11-10
4	EMI Antenna	3117	00139065	ETS-Lindgren	2014-07-31
5	LISN	ESH2-Z5	829991/012	R&S	2014-04-14
6	Universal Radio Communication Tester	CMW500	101675	R&S	2014-07-10
7	Spectrum Analyzer	E4440A	MY48250642	Agilent	2015-02-27
8	EMI Antenna	9117	177	Schwarzbeck	2014-06-29
9	EMI Antenna	VULB 9163	9163 175	Schwarzbeck	2014-07-13
10	EMI Antenna	3117	00119021	ETS-Lindgren	2014-04-19
11	Signal Generator	N5183A	MY49060052	Agilent	2015-03-02
12	Climate chamber	SH-241	92003546	ESPEC	2014-05-11
13	Loop Antenna	HFH2-Z2	829324/007	R&S	2014-12-12
14	Spectrum Analyzer	FSU26	200030	R&S	2014-06-12
15	Vector Signal Analyzer	FSQ40	200089	R&S	2014-07-07

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: 27.50(d)(4), 27.50(h)(2), 27.50(c)(10).

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	23.70	22.97
		1732.5	23.94	23.07
		1710.7	23.84	23.01
	1 RB low	1754.3	23.78	22.91
		1732.5	24.00	23.08
		1710.7	23.84	23.00
	50% RB mid	1754.3	23.79	22.71
		1732.5	23.93	22.90
		1710.7	23.87	22.82
	100% RB	1754.3	22.86	21.82
		1732.5	22.99	22.03
		1710.7	22.87	21.98
3MHz	1 RB high	1753.5	23.66	23.06
		1732.5	23.90	23.31
		1711.5	23.83	23.26
	1 RB low	1753.5	23.71	23.09
		1732.5	23.86	23.17
		1711.5	23.79	23.13

	50% RB mid	1753.5	22.70	21.70
		1732.5	22.96	21.95
		1711.5	22.75	21.79
	100% RB	1753.5	22.78	21.74
		1732.5	22.92	21.93
		1711.5	22.81	21.86
5MHz	1 RB high	1752.5	23.65	22.71
		1732.5	23.93	22.91
		1712.5	23.77	22.76
	1 RB low	1752.5	23.66	22.64
		1732.5	23.87	22.90
		1712.5	23.79	22.75
	50% RB mid	1752.5	22.75	21.70
		1732.5	22.90	21.94
		1712.5	22.74	21.84
	100% RB	1752.5	22.72	21.80
		1732.5	22.96	22.03
		1712.5	22.80	21.85

(continued)

10MHz	1 RB high	1750	23.68	23.05
		1732.5	23.86	23.21
		1715	23.77	23.18
	1 RB low	1750	23.74	23.17
		1732.5	23.85	23.35
		1715	23.65	23.07
	50% RB mid	1750	22.80	21.65
		1732.5	23.01	21.94
		1715	22.79	21.76
	100% RB	1750	22.77	21.76
		1732.5	22.99	21.99
		1715	22.82	21.80
15MHz	1 RB high	1747.5	23.71	23.14
		1732.5	23.89	23.18
		1717.5	23.88	23.25
	1 RB low	1747.5	23.76	23.19
		1732.5	23.82	23.18
		1717.5	23.66	23.12
	50% RB mid	1747.5	22.76	21.86
		1732.5	22.97	22.08
		1717.5	22.81	22.02
	100% RB	1747.5	22.82	21.78
		1732.5	23.01	21.97
		1717.5	22.90	21.87
20MHz	1 RB high	1745	23.83	22.88
		1732.5	24.00	22.99
		1720	24.03	23.03
	1 RB low	1745	23.82	22.84
		1732.5	23.88	22.84
		1720	23.78	22.97
	50% RB mid	1745	22.81	21.77
		1732.5	22.93	21.96
		1720	22.85	21.90
	100% RB	1745	22.77	21.74
		1732.5	22.98	21.98
		1720	22.86	21.92

LTE band 17

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	706.5	23.50	22.53
		710.0	23.56	22.56
		713.5	23.63	22.64
	1 RB low	706.5	23.46	22.49
		710.0	23.55	22.61
		713.5	23.54	22.56
	50% RB mid	706.5	22.52	21.58
		710.0	22.58	21.64
		713.5	22.59	21.62
	100% RB	706.5	22.53	21.62
		710.0	22.57	21.67
		713.5	22.61	21.69
10MHz	1 RB high	709	23.50	22.73
		710	23.50	22.84
		711	23.54	22.89
	1 RB low	709	23.49	22.83
		710	23.39	22.68
		711	23.49	22.79
	50% RB mid	709	22.63	21.49
		710	22.61	21.56
		711	22.59	21.64
	100% RB	709	22.56	21.61
		710	22.56	21.61
		711	22.60	21.56

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

A.1.3 Radiated

A.1.3.1 Description

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

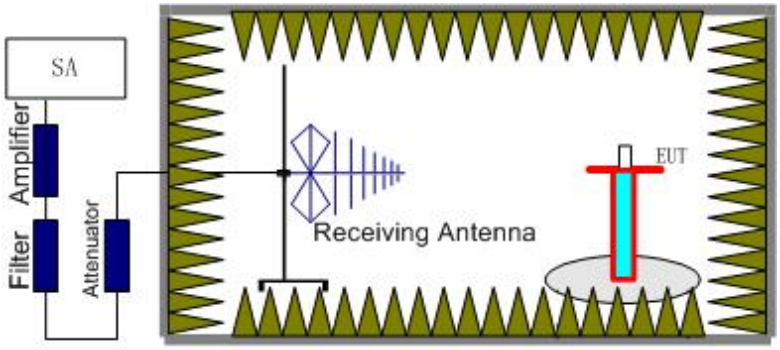
Rule Part 27.50(h)(2) specifies “Mobile stations are limited to 2.0 watts EIRP.”.

Rule Part 27.50(c)(10) specifies “Portable stations (hand-held devices) are limited to 3 watts ERP”.

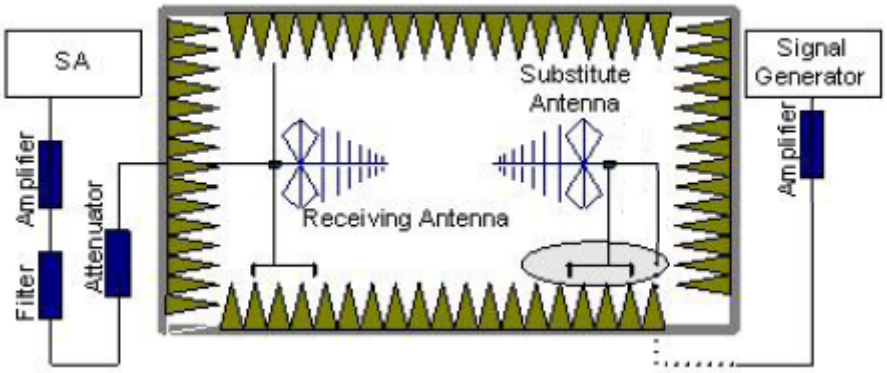
A.1.3.2 Method of Measurement

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

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



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



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

The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

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

A.1.3.3 Measurement result

LTE Band 4- EIRP 27.50(d)

Limits: ≤30dBm (1W)

LTE Band 4_1.4MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1710.70	-29.74	2.96	-50.00	-5.17	22.47	30.00	7.53	H
1732.50	-28.79	2.99	-50.00	-5.08	23.30	30.00	6.70	H
1754.30	-28.37	3.01	-50.00	-4.98	**23.60**	30.00	6.40	H

LTE Band 4_3MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1711.50	-29.64	2.96	-50.00	-5.17	22.57	30.00	7.43	H
1732.50	-28.25	2.99	-50.00	-5.08	23.84	30.00	6.16	H
1753.50	-27.69	3.01	-50.00	-4.98	**24.28**	30.00	5.72	H

LTE Band 4_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1712.50	-29.14	2.97	-50.00	-5.17	23.06	30.00	6.94	H
1732.50	-28.40	2.99	-50.00	-5.08	23.69	30.00	6.31	H
1752.50	-27.81	3.01	-50.00	-4.99	**24.17**	30.00	5.83	H

LTE Band 4_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1715.00	-29.32	2.97	-50.00	-5.15	22.86	30.00	7.14	H
1732.50	-28.34	2.99	-50.00	-5.08	23.75	30.00	6.25	H
1750.00	-28.01	3.00	-50.00	-5.00	**23.99**	30.00	6.01	H

LTE Band 4_15MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1717.50	-29.12	2.97	-50.00	-5.14	23.05	30.00	6.95	H
1732.50	-28.35	2.99	-50.00	-5.08	23.74	30.00	6.26	H
1747.50	-27.86	3.00	-50.00	-5.01	**24.15**	30.00	5.85	H

LTE Band 4_20MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1720.00	-28.98	2.97	-50.00	-5.13	23.18	30.00	6.82	H
1732.50	-28.60	2.99	-50.00	-5.08	23.49	30.00	6.51	H
1745.00	-28.10	3.00	-50.00	-5.02	**23.92**	30.00	6.08	H

LTE Band 4_1.4MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1710.70	-30.82	2.96	-50.00	-5.17	21.39	30.00	8.61	H
1732.50	-29.39	2.99	-50.00	-5.08	22.70	30.00	7.30	H
1754.30	-28.73	3.01	-50.00	-4.98	**23.24**	30.00	6.76	H

LTE Band 4_3MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1711.50	-30.56	2.96	-50.00	-5.17	21.65	30.00	8.35	H
1732.50	-29.10	2.99	-50.00	-5.08	22.99	30.00	7.01	H
1753.50	-28.61	3.01	-50.00	-4.98	**23.36**	30.00	6.64	H

LTE Band 4_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1712.50	-30.09	2.97	-50.00	-5.17	22.11	30.00	7.89	H
1732.50	-29.37	2.99	-50.00	-5.08	22.72	30.00	7.28	H
1752.50	-28.59	3.01	-50.00	-4.99	**23.39**	30.00	6.61	H

LTE Band 4_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1715.00	-30.21	2.97	-50.00	-5.15	21.97	30.00	8.03	H
1732.50	-29.11	2.99	-50.00	-5.08	22.98	30.00	7.02	H
1750.00	-28.86	3.00	-50.00	-5.00	**23.14**	30.00	6.86	H

LTE Band 4_15MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1717.50	-30.08	2.97	-50.00	-5.14	22.09	30.00	7.91	H
1732.50	-29.09	2.99	-50.00	-5.08	**23.00**	30.00	7.00	H
1747.50	-29.11	3.00	-50.00	-5.01	22.90	30.00	7.10	H

LTE Band 4_20MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1720.00	-30.02	2.97	-50.00	-5.13	22.14	30.00	7.86	H
1732.50	-29.33	2.99	-50.00	-5.08	22.76	30.00	7.24	H
1745.00	-28.91	3.00	-50.00	-5.02	**23.11**	30.00	6.89	H

Peak EIRP(dBm) = P_{Mea}(-27.69dBm) - G_a (-4.98dBi) - P_{Ag} (-50.00dB) - P_{cl} (3.01dB) =24.28dBm

LTE Band 17- EIRP 27.50(c)(10)

Limits: ≤34.77dBm (3W)

LTE Band 17_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
706.50	-30.14	1.91	-53.00	0.30	20.65	34.77	14.12	H
710.00	-29.76	1.92	-53.00	0.32	**21.00**	34.77	13.77	H
713.50	-29.86	1.93	-53.00	0.34	20.87	34.77	13.90	H

LTE Band 17_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
709.00	-30.16	1.92	-53.00	0.32	20.60	34.77	14.17	H
710.00	-29.95	1.92	-53.00	0.32	**20.81**	34.77	13.96	H
711.00	-30.02	1.92	-53.00	0.33	20.73	34.77	14.04	H

LTE Band 17_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
706.50	-31.03	1.91	-53.00	0.30	19.76	34.77	15.01	H
710.00	-30.54	1.92	-53.00	0.32	**20.22**	34.77	14.55	H
713.50	-30.67	1.93	-53.00	0.34	20.06	34.77	14.71	H

LTE Band 17_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
709.00	-30.89	1.92	-53.00	0.32	19.87	34.77	14.90	H
710.00	-30.77	1.92	-53.00	0.32	**19.99**	34.77	14.78	H
711.00	-30.82	1.92	-53.00	0.33	19.93	34.77	14.84	H

Peak ERP(dBm)=P_{Mea}(-29.76dBm)-G_a(0.32dBi)-P_{Ag}(-53.00dB)-P_{cl} (1.92dB)-2.15dB = 21.00dBm

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.

A.2 EMISSION LIMIT

Reference

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

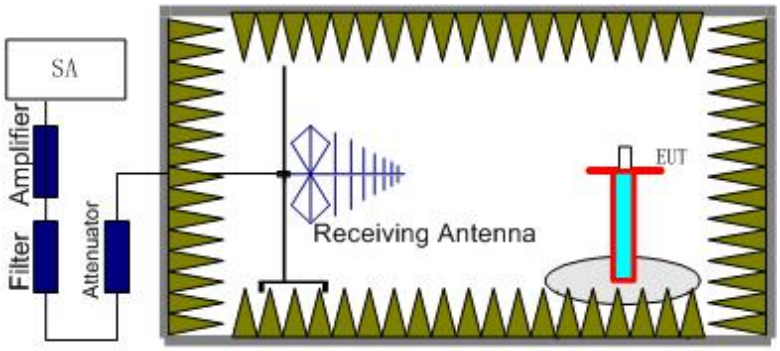
A.2.1 Measurement Method

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

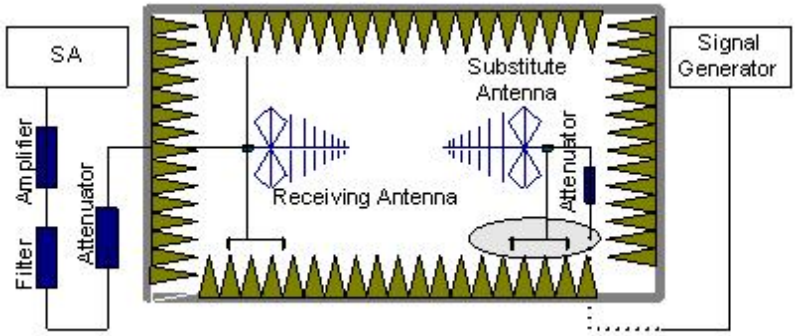
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 27.53(h), Part 27.53(m) and Part 27.53(g). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 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 reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

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

A.2.2 Measurement Limit

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

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands 4 and 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 Bands 4 and 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.

LTE Band 4, 1.4MHz, QPSK, Channel 19957

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
5130.80	-37.43	5.25	-9.78	-32.90	-13.00	19.90	H
6808.97	-60.29	6.15	-10.91	-55.53	-13.00	42.53	H
8547.00	-59.29	7.26	-12.24	-54.31	-13.00	41.31	H
10244.02	-57.70	7.50	-12.45	-52.75	-13.00	39.75	H
11997.03	-56.66	8.71	-12.50	-52.87	-13.00	39.87	H
13518.72	-52.76	9.33	-13.81	-48.28	-13.00	35.28	H

LTE Band 4, 1.4MHz, QPSK, Channel 20175

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
5197.73	-37.34	5.23	-9.82	-32.75	-13.00	19.75	V
6873.87	-57.47	6.07	-10.97	-52.57	-13.00	39.57	H
8563.35	-61.69	7.18	-12.25	-56.62	-13.00	43.62	H
10107.43	-56.67	8.18	-12.42	-52.43	-13.00	39.43	V
13312.18	-54.14	9.09	-13.61	-49.62	-13.00	36.62	V
15053.13	-50.89	9.64	-13.49	-47.04	-13.00	34.04	V

LTE Band 4, 1.4MHz, QPSK, Channel 20393

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3508.28	-61.54	4.33	-7.91	-57.96	-13.00	44.96	V
5261.57	-37.91	5.30	-9.86	-33.35	-13.00	20.35	V
6984.83	-56.09	6.23	-11.08	-51.24	-13.00	38.24	V
8771.44	-60.17	7.37	-12.42	-55.12	-13.00	42.12	V
10575.99	-56.44	8.13	-12.48	-52.09	-13.00	39.09	V
13978.01	-51.50	9.26	-13.99	-46.77	-13.00	33.77	H

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
5130.67	-38.67	5.25	-9.78	-34.14	-13.00	21.14	H
6845.44	-57.65	6.16	-10.95	-52.86	-13.00	39.86	H
8525.13	-59.78	7.10	-12.22	-54.66	-13.00	41.66	H
10222.95	-58.92	7.54	-12.44	-54.02	-13.00	41.02	H
12036.44	-57.62	8.90	-12.51	-54.01	-13.00	41.01	H
13730.80	-53.39	8.98	-13.89	-48.48	-13.00	35.48	V

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
5198.00	-46.37	5.23	-9.82	-41.78	-13.00	28.78	H
6912.79	-59.56	6.10	-11.01	-54.65	-13.00	41.65	H
8632.35	-59.76	7.37	-12.31	-54.82	-13.00	41.82	H
10187.00	-59.86	7.71	-12.44	-55.13	-13.00	42.13	V
12087.85	-53.67	8.94	-12.54	-50.07	-13.00	37.07	H
13889.00	-60.52	9.16	-13.96	-55.72	-13.00	42.72	V

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
5261.54	-37.30	5.30	-9.86	-32.74	-13.00	19.74	V
7189.27	-59.70	6.42	-11.21	-54.91	-13.00	41.91	H
8959.55	-58.05	7.31	-12.57	-52.79	-13.00	39.79	H
10632.75	-57.73	8.09	-12.47	-53.35	-13.00	40.35	V
12667.44	-54.56	8.90	-12.90	-50.56	-13.00	37.56	V
15957.24	-50.36	10.25	-13.03	-47.58	-13.00	34.58	V

LTE Band 17, 5MHz, QPSK, Channel 23755

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3533.43	-47.14	4.32	-7.94	2.15	-45.67	-13.00	32.67	H
4201.85	-60.04	4.72	-8.62	2.15	-58.29	-13.00	45.29	V
4946.78	-47.77	5.11	-9.60	2.15	-45.43	-13.00	32.43	H
5614.65	-60.15	5.46	-10.05	2.15	-57.71	-13.00	44.71	H
6312.67	-60.38	5.90	-10.45	2.15	-57.98	-13.00	44.98	V
7019.44	-59.46	6.36	-11.11	2.15	-56.86	-13.00	43.86	V

LTE Band 17, 5MHz, QPSK, Channel 23790

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3551.02	-48.62	4.31	-7.96	2.15	-47.12	-13.00	34.12	V
4261.40	-56.56	4.79	-8.66	2.15	-54.84	-13.00	41.84	H
4971.30	-50.09	5.11	-9.65	2.15	-47.70	-13.00	34.70	H
5681.51	-59.43	5.50	-10.07	2.15	-57.01	-13.00	44.01	V
6752.86	-60.54	6.14	-10.85	2.15	-57.98	-13.00	44.98	V
7370.75	-60.43	6.42	-11.32	2.15	-57.68	-13.00	44.68	V

LTE Band 17, 5MHz, QPSK, Channel 23825

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3568.50	-46.95	4.34	-7.98	2.15	-45.46	-13.00	32.46	V
4304.00	-61.49	4.90	-8.68	2.15	-59.86	-13.00	46.86	H
4995.78	-51.74	5.17	-9.69	2.15	-49.37	-13.00	36.37	H
5771.39	-60.08	5.68	-10.11	2.15	-57.80	-13.00	44.80	H
6340.23	-60.68	5.84	-10.47	2.15	-58.20	-13.00	45.20	H
7125.77	-61.29	6.42	-11.18	2.15	-58.68	-13.00	45.68	H

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3533.23	-47.03	4.32	-7.94	2.15	-45.56	-13.00	32.56	H
4280.55	-60.81	4.79	-8.67	2.15	-59.08	-13.00	46.08	V
4946.77	-48.14	5.11	-9.60	2.15	-45.80	-13.00	32.80	H
5706.59	-58.44	5.51	-10.08	2.15	-56.02	-13.00	43.02	V
6436.37	-58.35	5.84	-10.55	2.15	-55.79	-13.00	42.79	H
7329.41	-59.72	6.44	-11.30	2.15	-57.01	-13.00	44.01	V

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3550.88	-50.16	4.31	-7.96	2.15	-48.66	-13.00	35.66	H
4261.57	-58.20	4.79	-8.66	2.15	-56.48	-13.00	43.48	H
4971.42	-50.69	5.11	-9.65	2.15	-48.30	-13.00	35.30	H
5675.30	-59.75	5.48	-10.07	2.15	-57.31	-13.00	44.31	V
6383.90	-60.60	5.82	-10.51	2.15	-58.06	-13.00	45.06	H
7011.59	-59.93	6.32	-11.11	2.15	-57.29	-13.00	44.29	V

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3568.33	-46.87	4.34	-7.98	2.15	-45.38	-13.00	32.38	V
4282.17	-59.03	4.79	-8.67	2.15	-57.30	-13.00	44.30	H
4995.97	-51.91	5.17	-9.69	2.15	-49.54	-13.00	36.54	H
5738.61	-59.08	5.61	-10.10	2.15	-56.74	-13.00	43.74	V
6462.16	-60.91	5.89	-10.57	2.15	-58.38	-13.00	45.38	H
7163.77	-59.46	6.35	-11.20	2.15	-56.76	-13.00	43.76	H

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

A.3 CONDUCTED EMISSION

Reference

FCC: CFR Part 15.107/207

The measurement procedure in ANSI C63.4-2009 is used. Conducted emission is measured with travel charger. The EUT is working under LTE FDD bands 4/17 traffic mode which is the worst case of conducted emission measurement.

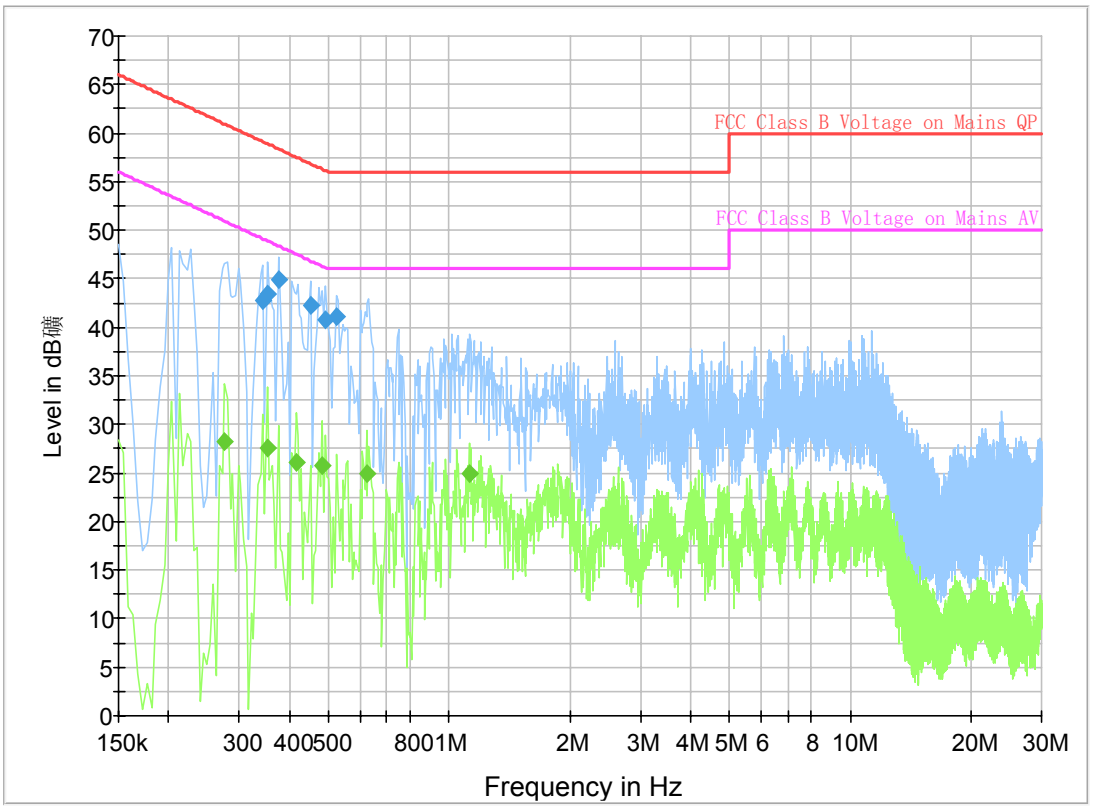
For test layout photo, please refer to Pic.2 in Annex B.

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



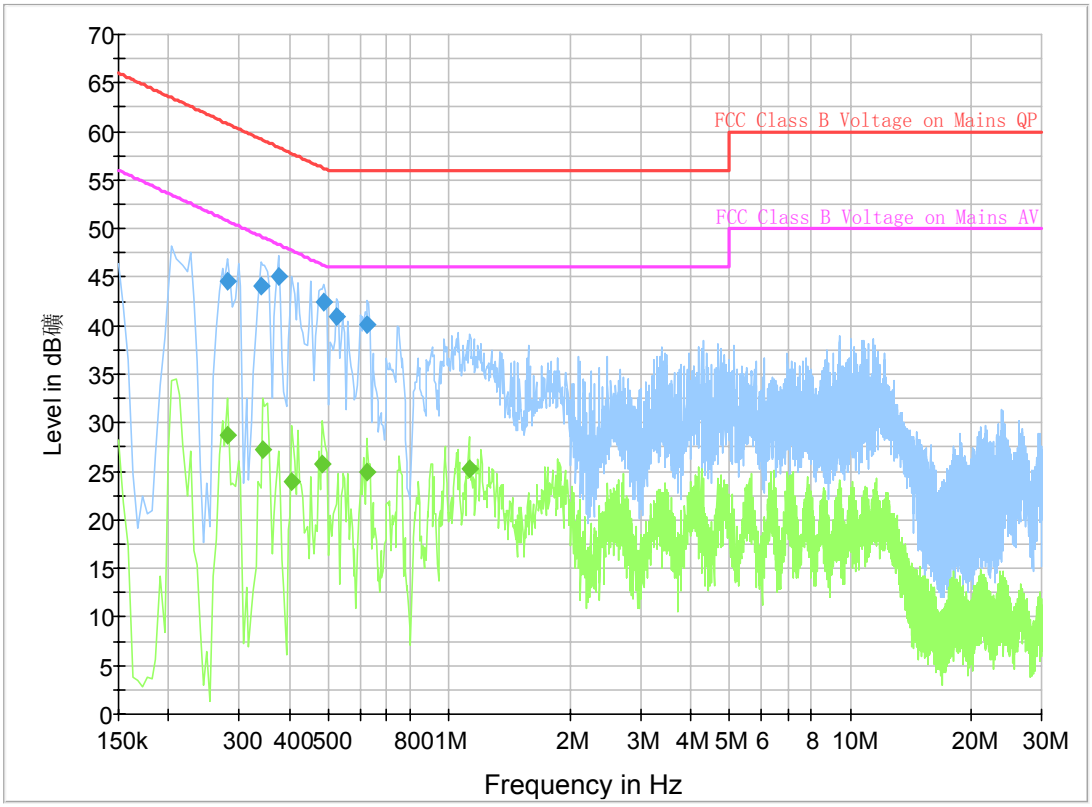
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.343500	42.7	GND	L1	9.8	16.4	59.1
0.352500	43.5	GND	N	9.8	15.4	58.9
0.375000	45.0	GND	L1	9.8	13.4	58.4
0.451500	42.2	GND	L1	9.8	14.6	56.8
0.492000	40.8	GND	N	9.8	15.3	56.1
0.523500	41.2	GND	N	9.8	14.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.276000	28.2	GND	N	9.8	22.7	50.9
0.352500	27.5	GND	N	9.8	21.4	48.9
0.415500	26.1	GND	N	9.8	21.4	47.5
0.483000	25.8	GND	L1	9.8	20.5	46.3
0.622500	24.9	GND	L1	9.8	21.1	46.0
1.122000	24.9	GND	L1	9.7	21.1	46.0

LTE Band 17, 5 MHz bandwidth



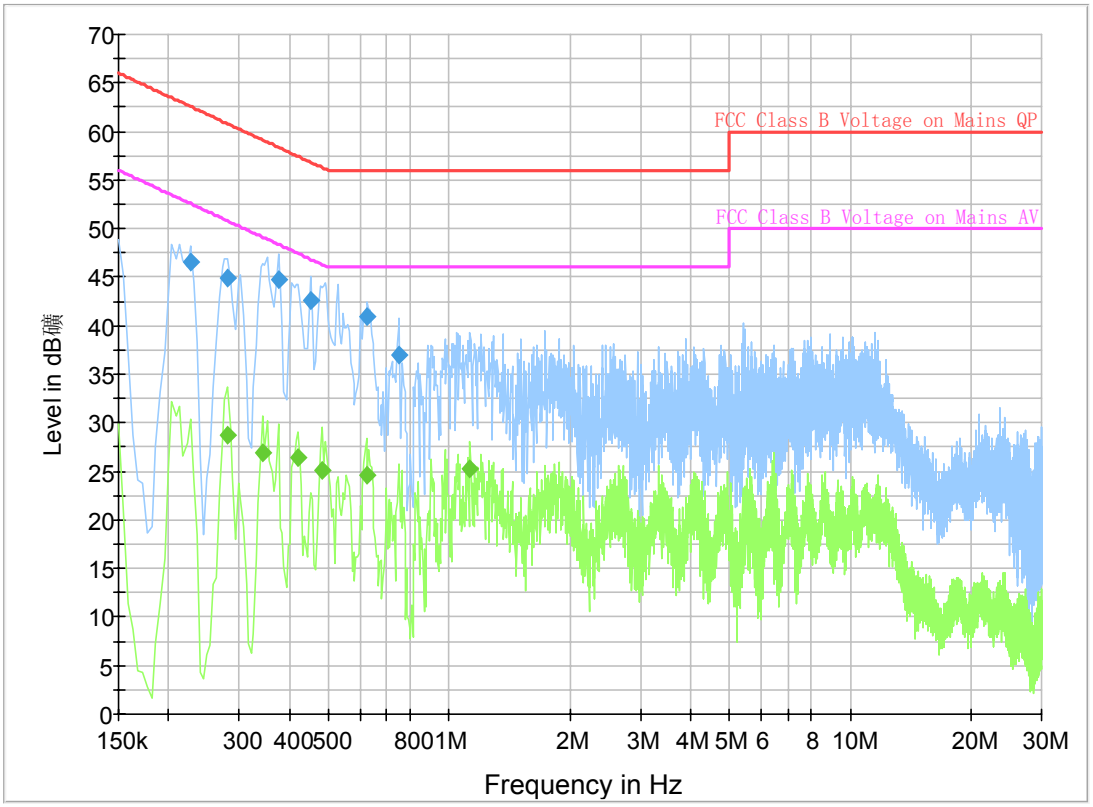
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.280500	44.5	GND	N	9.8	16.3	60.8
0.339000	44.2	GND	L1	9.8	15.1	59.2
0.375000	45.1	GND	N	9.8	13.3	58.4
0.487500	42.5	GND	L1	9.8	13.8	56.2
0.523500	41.0	GND	N	9.8	15.0	56.0
0.627000	40.2	GND	L1	9.8	15.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.280500	28.7	GND	N	9.8	22.1	50.8
0.343500	27.2	GND	N	9.8	21.9	49.1
0.406500	24.0	GND	N	9.8	23.7	47.7
0.483000	25.8	GND	N	9.8	20.5	46.3
0.622500	24.9	GND	N	9.8	21.1	46.0
1.122000	25.2	GND	N	9.7	20.8	46.0

MP3



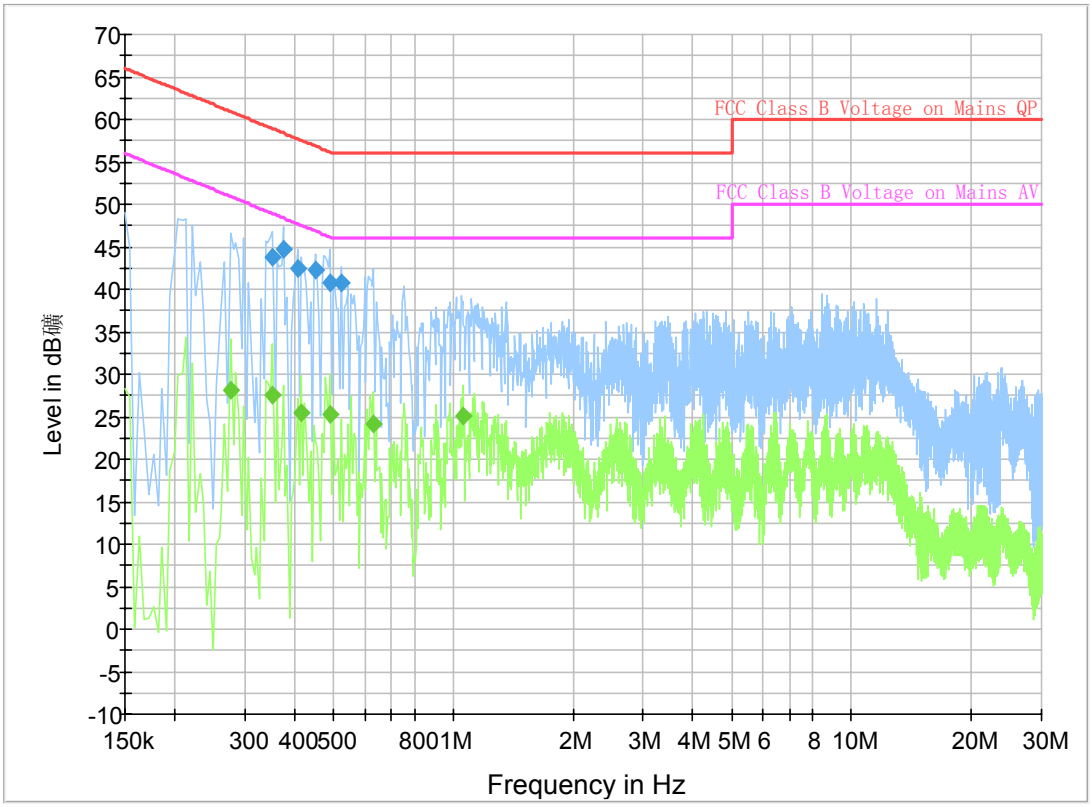
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.226500	46.6	GND	N	9.8	16.0	62.6
0.280500	45.0	GND	N	9.8	15.9	60.8
0.375000	44.8	GND	N	9.8	13.6	58.4
0.451500	42.6	GND	N	9.8	14.3	56.8
0.627000	41.0	GND	N	9.8	15.0	56.0
0.753000	36.9	GND	N	9.8	19.1	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.280500	28.7	GND	N	9.8	22.1	50.8
0.343500	26.9	GND	N	9.8	22.2	49.1
0.420000	26.4	GND	N	9.8	21.1	47.4
0.483000	25.1	GND	N	9.8	21.2	46.3
0.622500	24.6	GND	N	9.8	21.4	46.0
1.126500	25.2	GND	N	9.7	20.8	46.0

CAMERA



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.352500	43.7	GND	L1	9.8	15.2	58.9
0.375000	44.7	GND	N	9.8	13.7	58.4
0.406500	42.4	GND	N	9.8	15.3	57.7
0.451500	42.2	GND	L1	9.8	14.6	56.8
0.492000	40.8	GND	L1	9.8	15.3	56.1
0.523500	40.7	GND	L1	9.8	15.3	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.276000	28.1	GND	L1	9.8	22.8	50.9
0.352500	27.5	GND	L1	9.8	21.4	48.9
0.415500	25.4	GND	L1	9.8	22.1	47.5
0.492000	25.2	GND	L1	9.8	20.9	46.1
0.631500	24.2	GND	L1	9.8	21.8	46.0
1.054500	25.2	GND	L1	9.7	20.8	46.0

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

A.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 3.5VDC and 4.2VDC, with a nominal voltage of 3.9VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance from -5.4% to 10.8%. For the purposes of measuring frequency stability these voltage limits are to be used.

A.4.3 Measurement results

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
3.5	6	19	0.004	0.011
3.9	1	18	0.000	0.010
4.2	-1	16	0.000	0.009

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	5	21	0.003	0.012
40°	-2	22	0.001	0.013
30°	0	18	0.000	0.010
20°	1	16	0.001	0.010
10°	4	19	0.003	0.011
0°	5	16	0.003	0.009
- 10°	2	18	0.001	0.010
- 20°	0	21	0.000	0.012
- 30°	2	24	0.001	0.014

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

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.5	0	-6	0.001	0.009
3.9	2	-5	0.003	0.007
4.2	2	-4	0.002	0.006

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	0	-2	0.001	0.003
40°	-3	-3	0.004	0.004
30°	-2	-5	0.003	0.007
20°	0	-6	0.000	0.008
10°	3	-4	0.004	0.005
0°	0	-4	0.000	0.006
- 10°	1	-4	0.002	0.006
- 20°	-1	-2	0.001	0.003
- 30°	-1	-4	0.001	0.005

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

A.5 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049(h)(i)

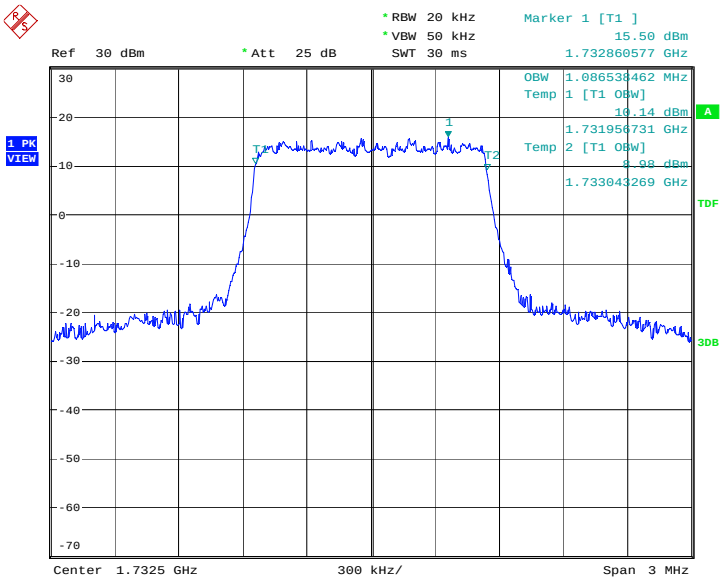
A.5.1 Occupied Bandwidth Results

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.

LTE band 4, 1.4MHz (99%)

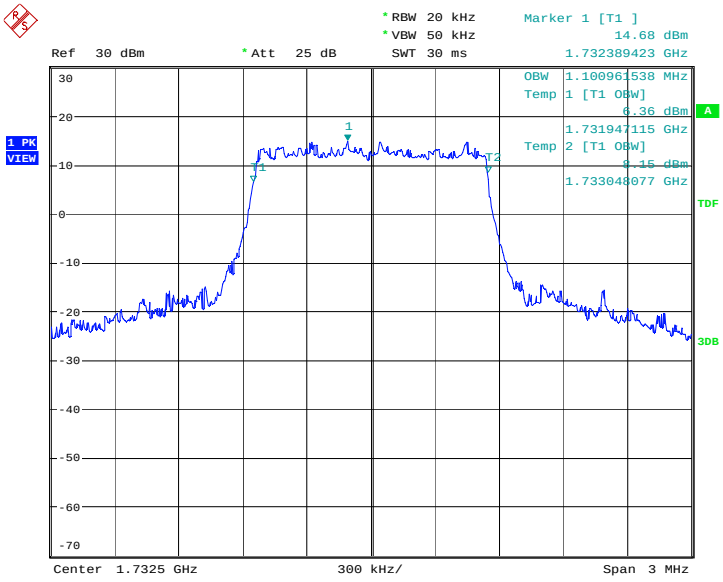
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	1086.538	1100.962

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



Date: 25.MAR.2014 14:25:14

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

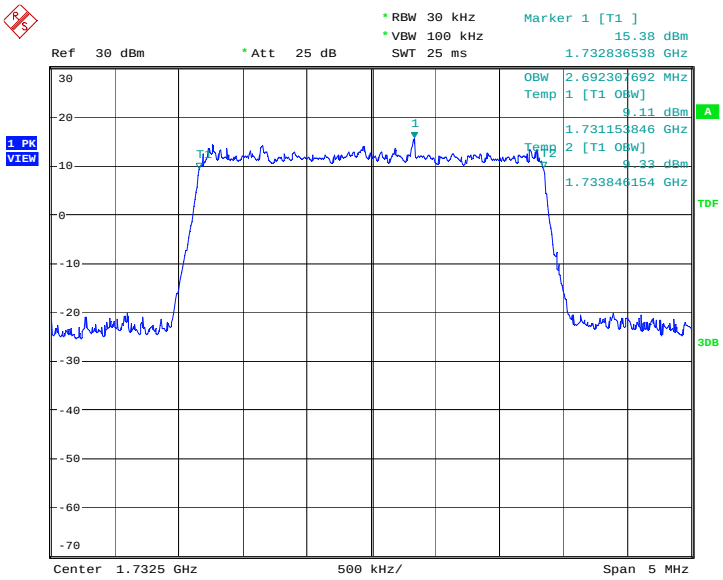


Date: 25.MAR.2014 14:25:28

LTE band 4, 3MHz (99%)

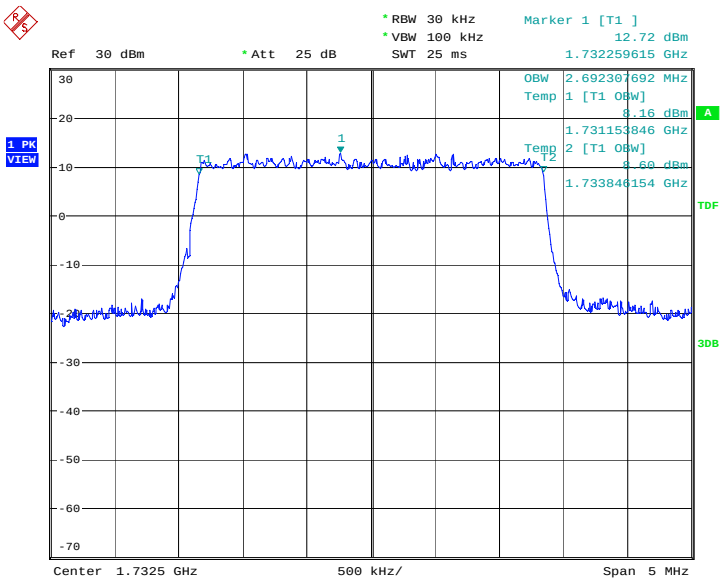
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	2692.308	2692.308

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



Date: 25.MAR.2014 14:41:22

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

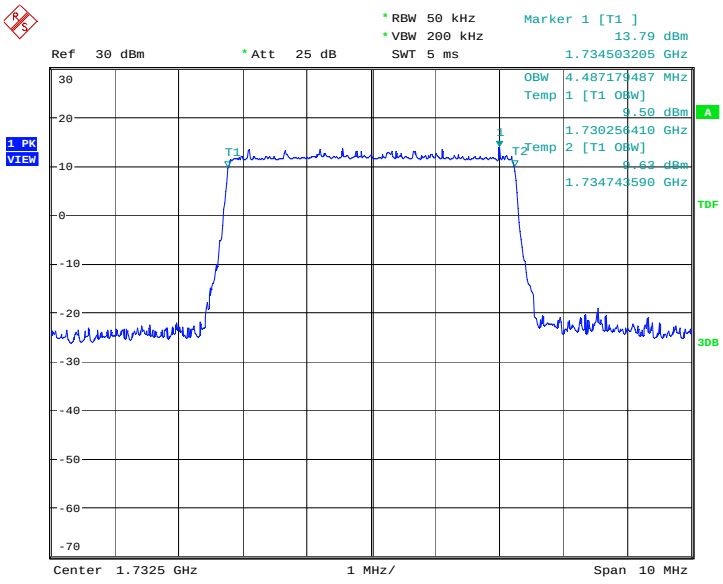


Date: 25.MAR.2014 14:41:35

LTE band 4, 5MHz (99%)

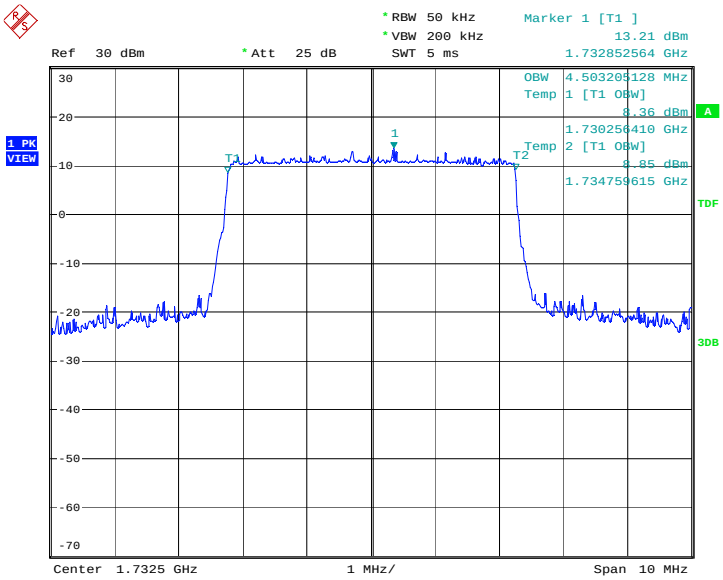
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	4487.179	4503.205

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



Date: 25.MAR.2014 14:43:38

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

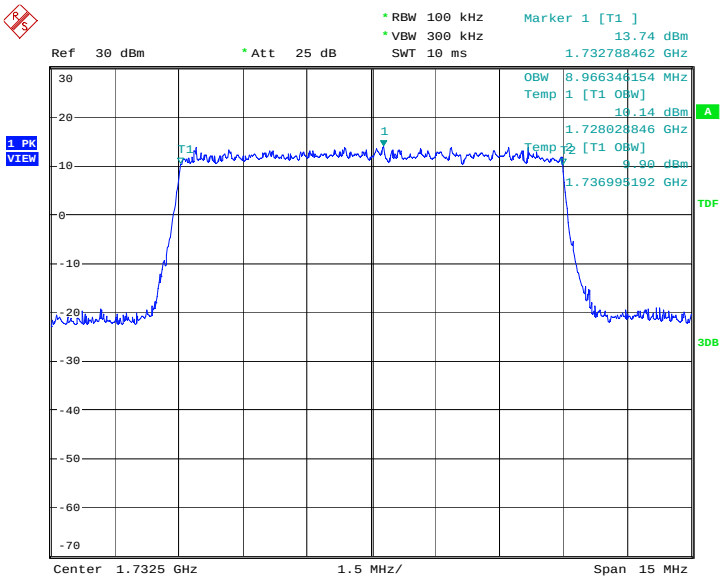


Date: 25.MAR.2014 14:43:51

LTE band 4, 10MHz (99%)

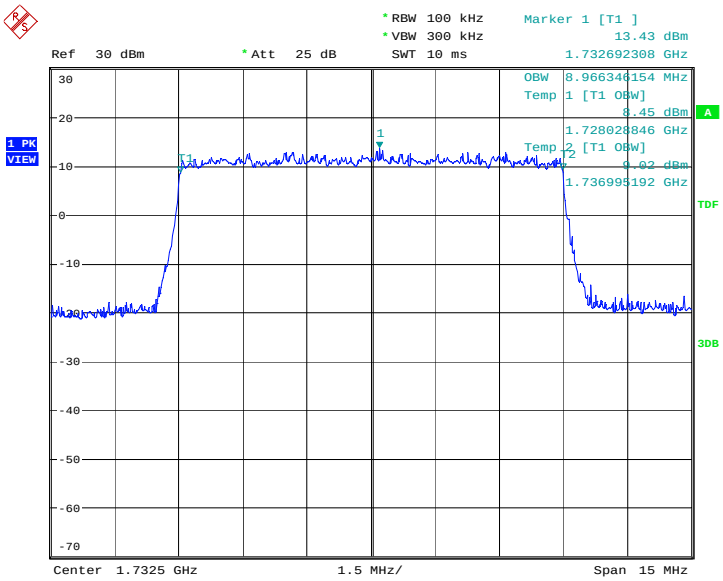
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	8966.346	8966.346

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



Date: 25.MAR.2014 14:45:50

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

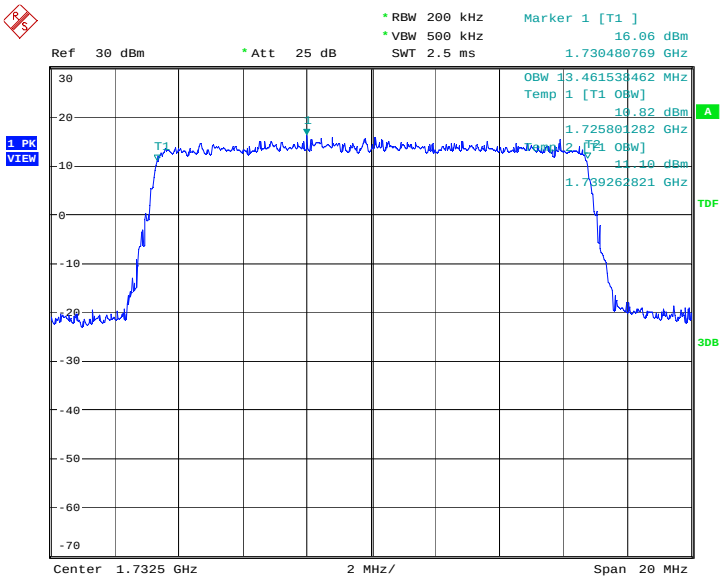


Date: 25.MAR.2014 14:46:03

LTE band 4, 15MHz (99%)

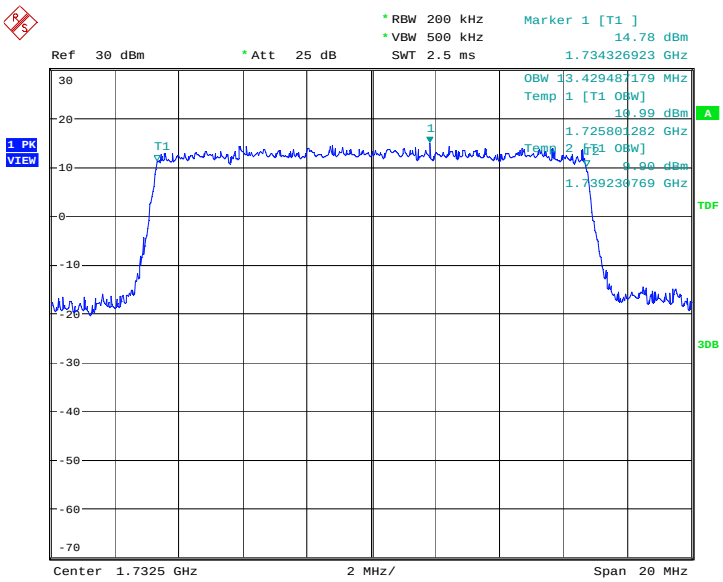
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	13461.54	13429.49

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



Date: 25.MAR.2014 14:48:02

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

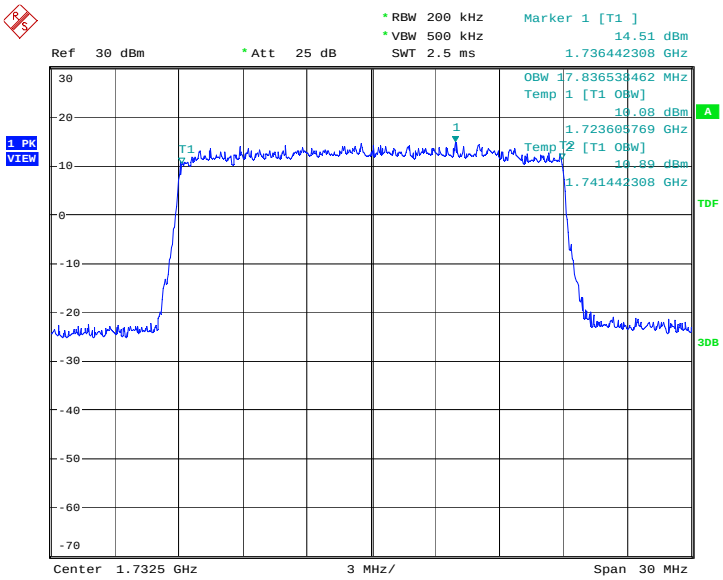


Date: 25.MAR.2014 14:48:15

LTE band 4, 20MHz (99%)

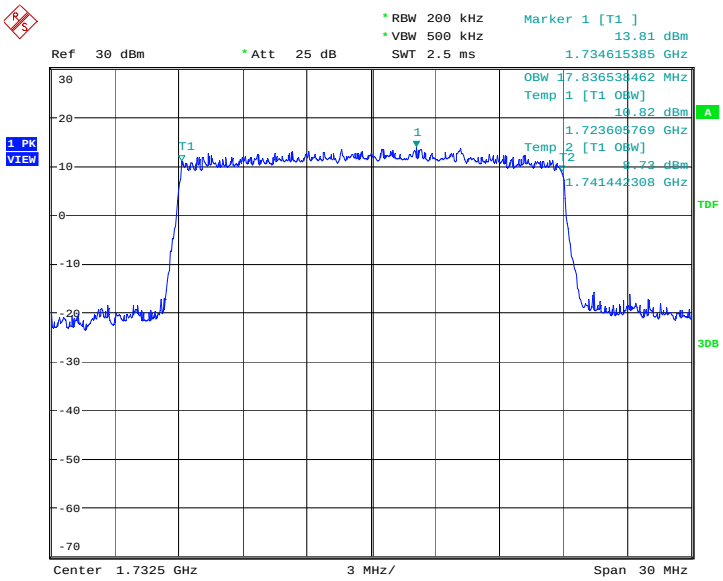
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	17836.54	17836.54

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



Date: 25.MAR.2014 14:51:46

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

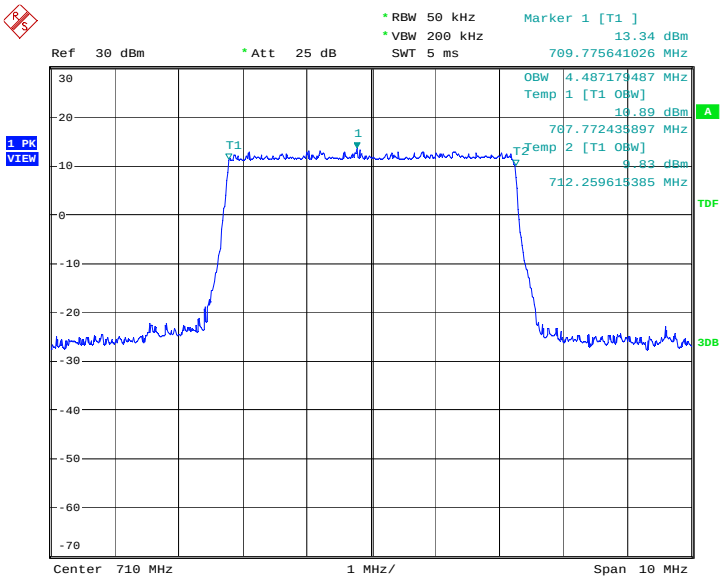


Date: 25.MAR.2014 14:52:00

LTE band 17, 5MHz (99%)

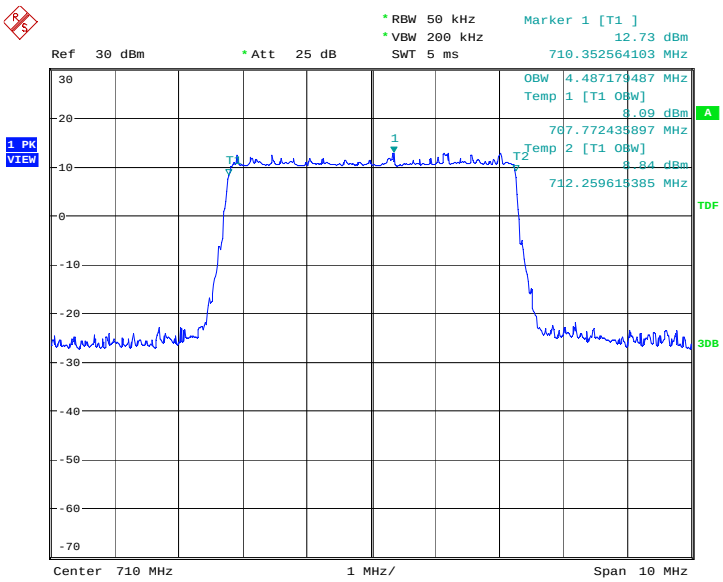
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
710.0	QPSK	16QAM
	4487.179	4487.179

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



Date: 25.MAR.2014 14:54:02

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

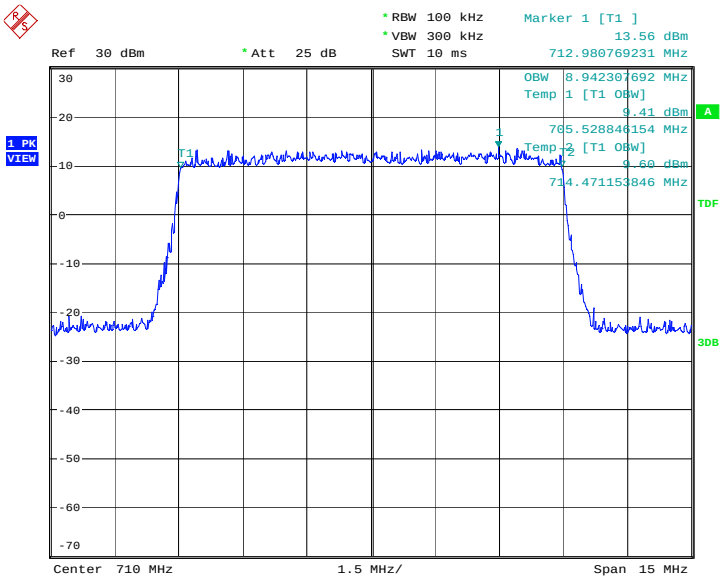


Date: 25.MAR.2014 14:54:15

LTE band 17, 10MHz (99%)

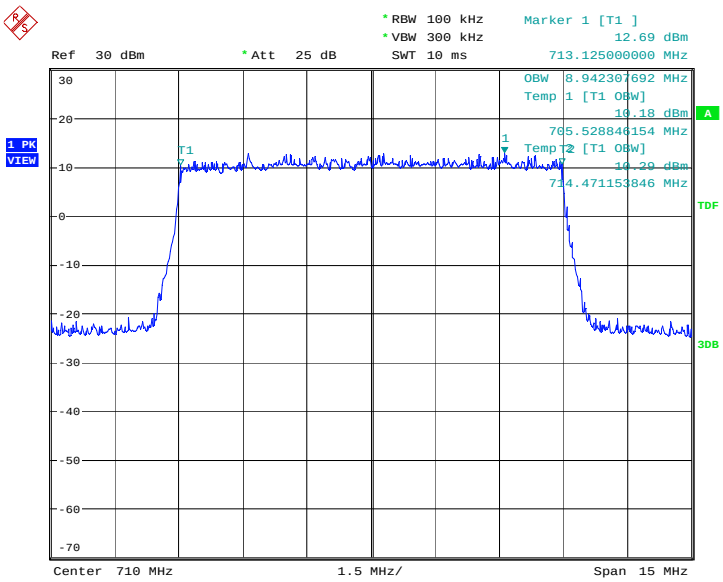
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
710.0	QPSK	16QAM
	8942.308	8942.308

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



Date: 25.MAR.2014 14:57:46

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



Date: 25.MAR.2014 14:57:59

A.6 EMISSION BANDWIDTH

Reference

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

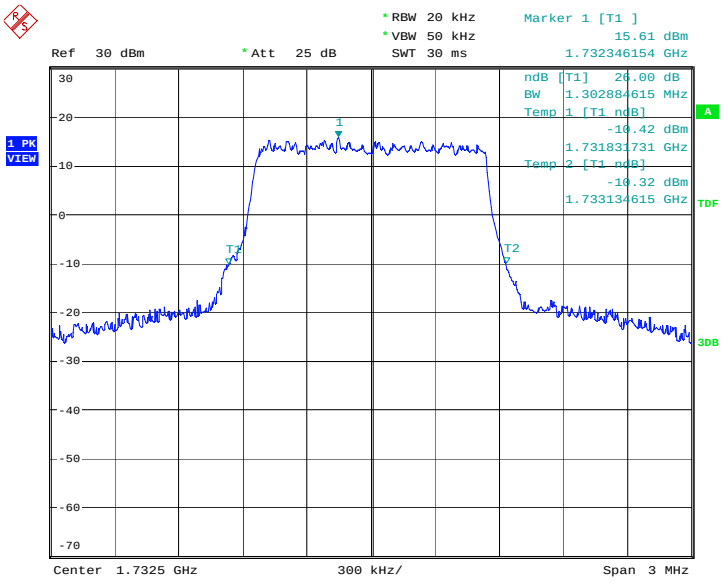
A.6.1Emission Bandwidth Results

Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

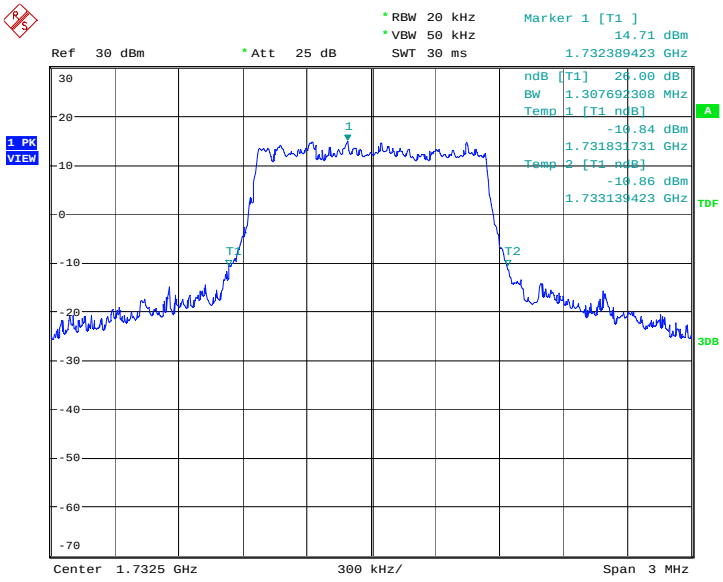
LTE band 4, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	1302.885	1307.692

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



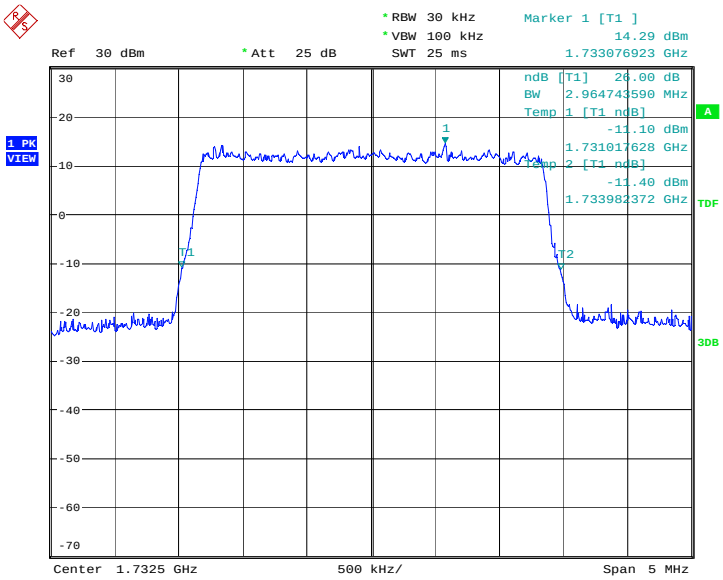
LTE band 4, 1.4MHz Bandwidth, 16QAM (-26dBc BW)



LTE band 4, 3MHz (-26dBc)

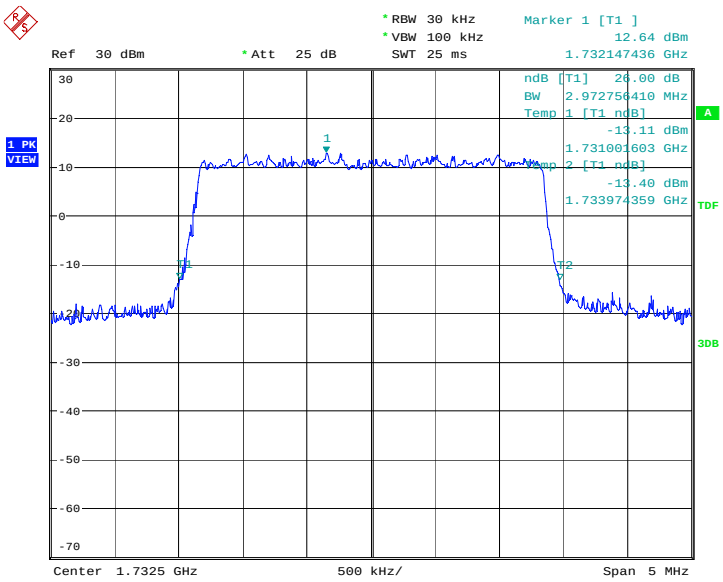
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	2964.744	2972.756

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



Date: 25.MAR.2014 14:42:28

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

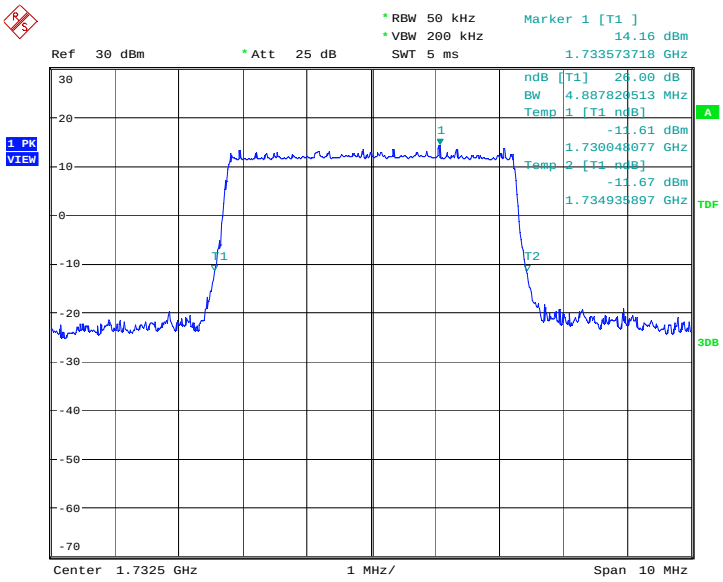


Date: 25.MAR.2014 14:42:44

LTE band 4, 5MHz (-26dBc)

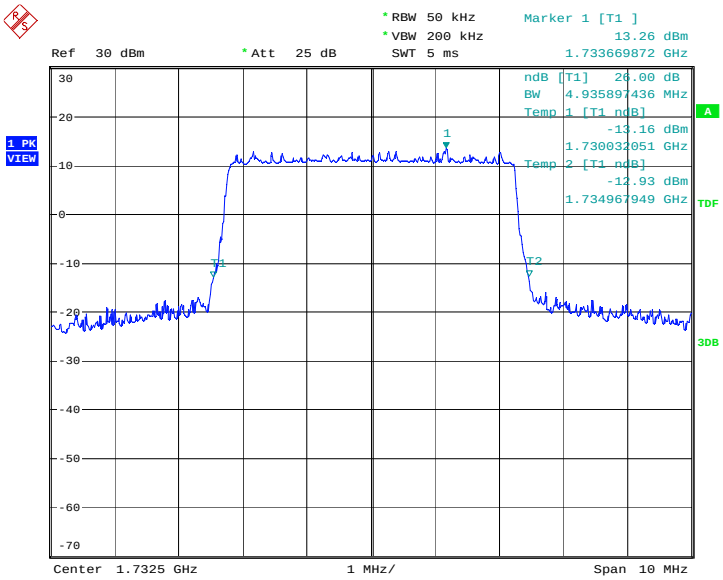
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	4887.821	4935.897

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



Date: 25.MAR.2014 14:44:43

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

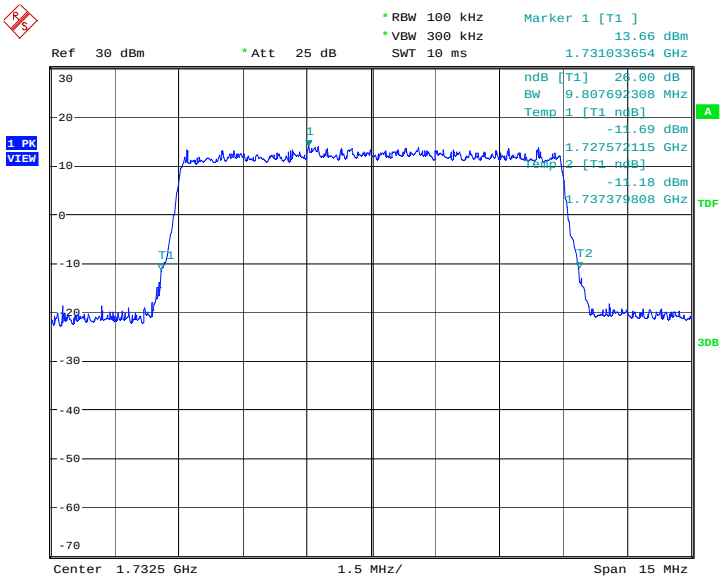


Date: 25.MAR.2014 14:44:58

LTE band 4, 10MHz (-26dBc)

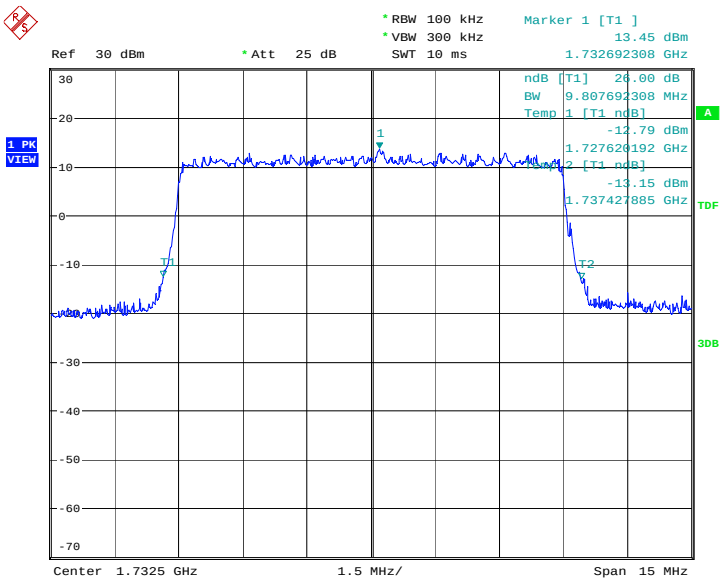
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	9807.692	9807.692

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



Date: 25.MAR.2014 14:46:55

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

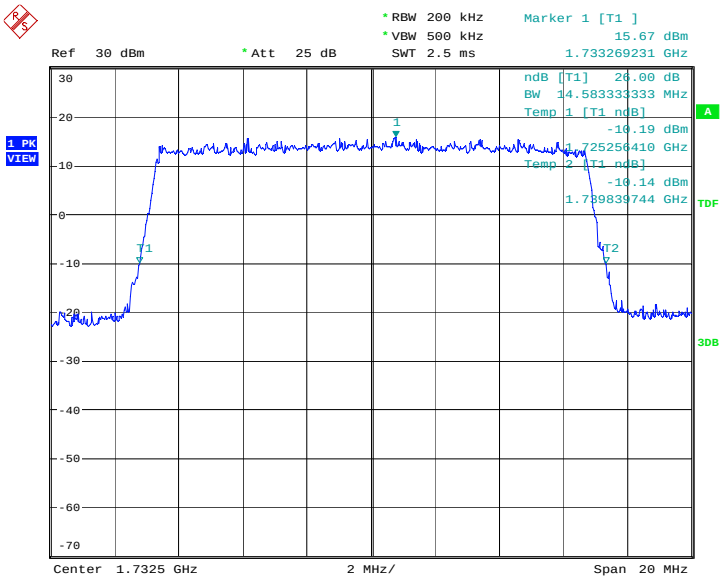


Date: 25.MAR.2014 14:47:10

LTE band 4, 15MHz (-26dBc)

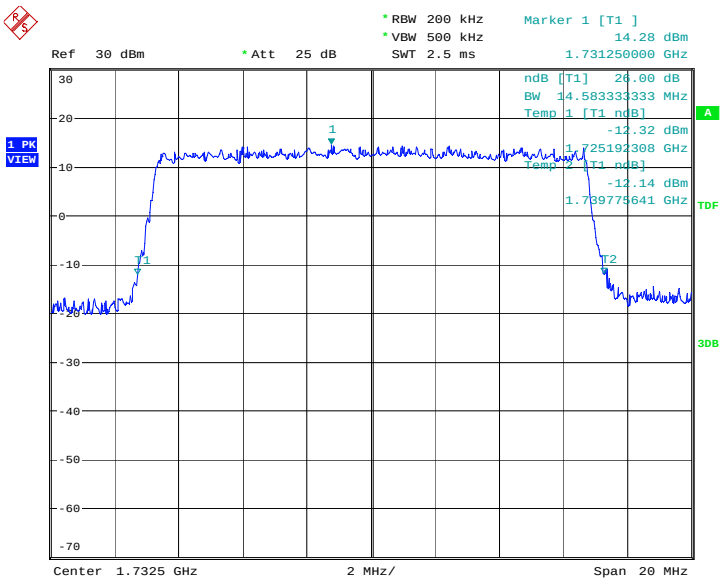
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	14583.33	14583.33

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



Date: 25.MAR.2014 14:50:39

LTE band 4, 15MHz Bandwidth, 16QAM (-26dBc BW)

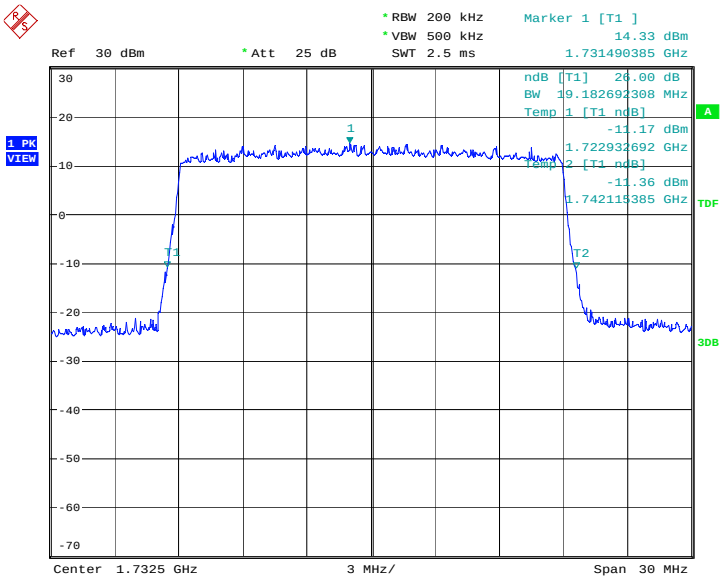


Date: 25.MAR.2014 14:50:55

LTE band 4, 20MHz (-26dBc)

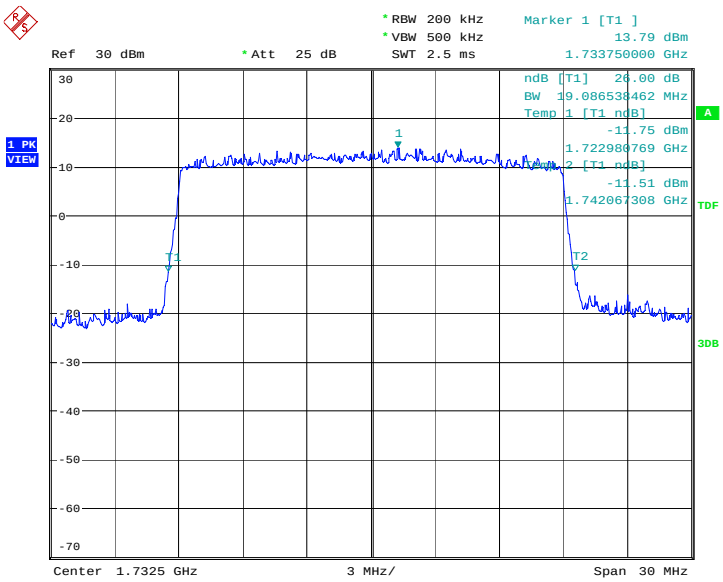
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	19182.69	19086.54

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



Date: 25.MAR.2014 14:52:51

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

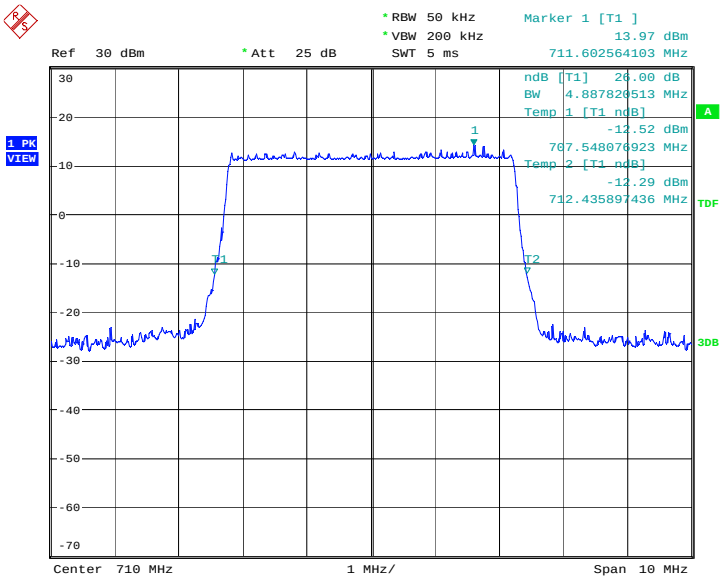


Date: 25.MAR.2014 14:53:07

LTE band 17, 5MHz (-26dBc)

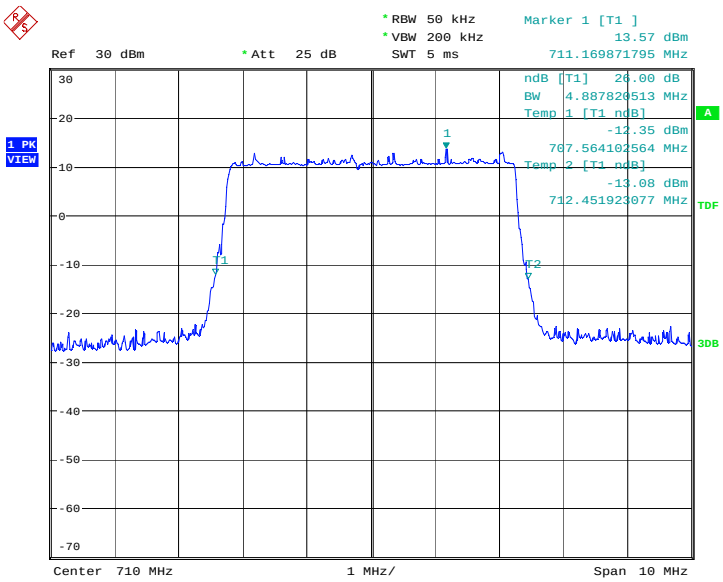
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
710.0	QPSK	16QAM
	4887.821	4887.821

LTE band 17, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 25.MAR.2014 14:55:07

LTE band 17, 5MHz Bandwidth,16QAM (-26dBc BW)

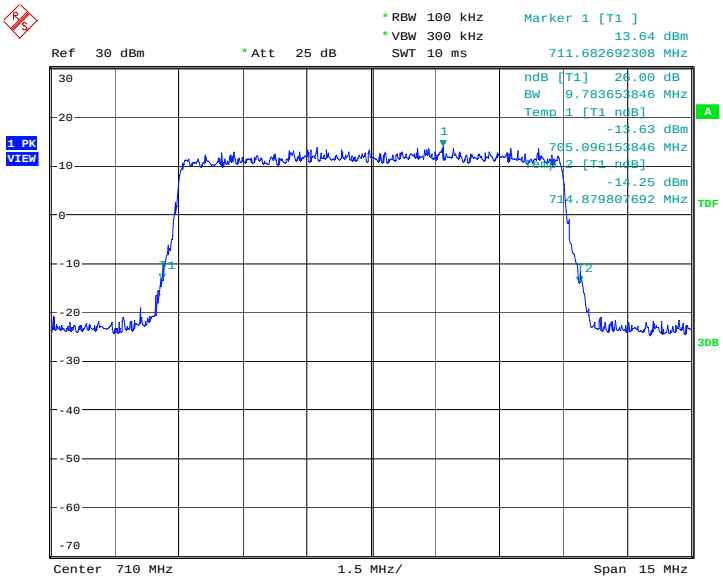


Date: 25.MAR.2014 14:55:22

LTE band 17, 10MHz (-26dBc)

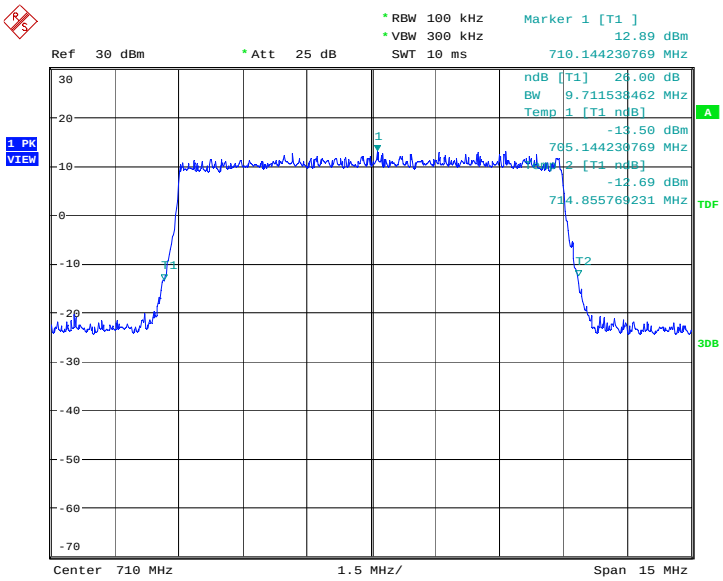
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
710.0	QPSK	16QAM
	9783.654	9711.538

LTE band 17, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 25.MAR.2014 15:00:53

LTE band 17, 10MHz Bandwidth, 16QAM (-26dBc BW)



Date: 25.MAR.2014 15:01:08

A.7 BAND EDGE COMPLIANCE

Reference

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

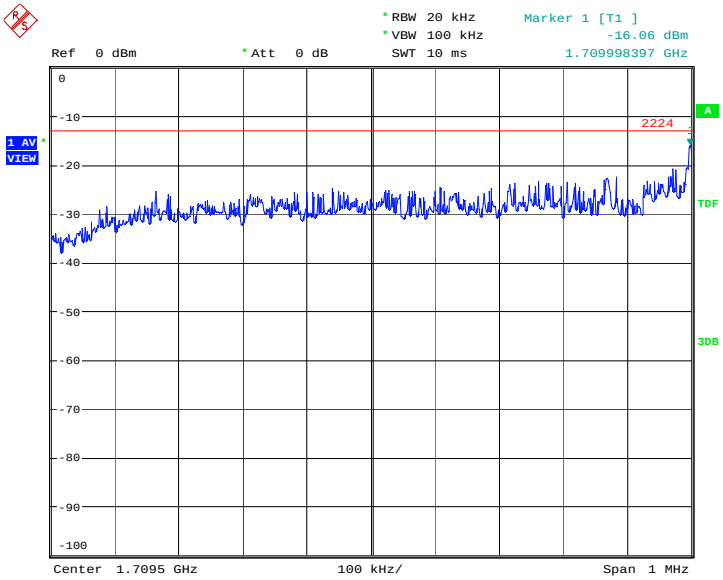
A.7.1 Measurement limit

On any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

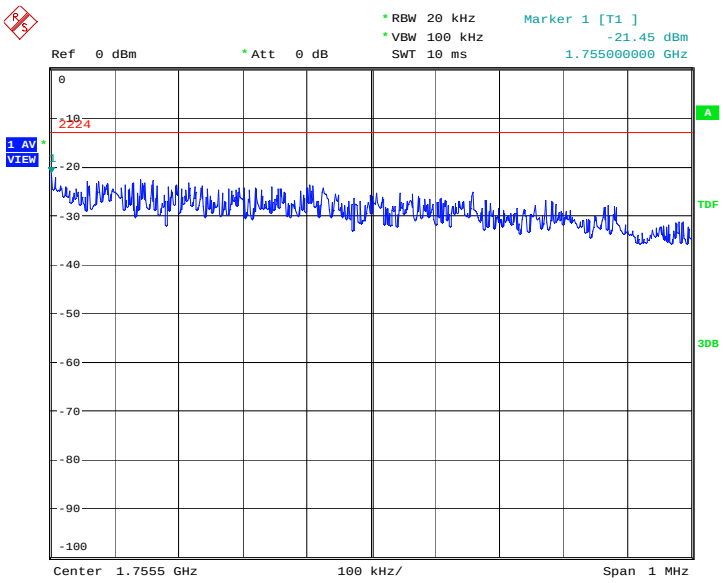
A.7.2 Measurement result

LTE band 4, 1.4MHz

LOW BAND EDGE BLOCK-QPSK

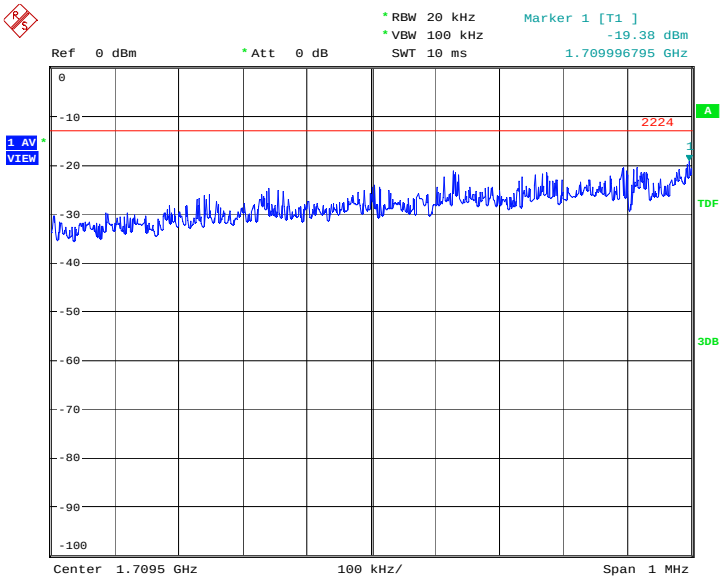


HIGH BAND EDGE BLOCK-QPSK



Date: 25.MAR.2014 16:36:11

LOW BAND EDGE BLOCK-16QAM



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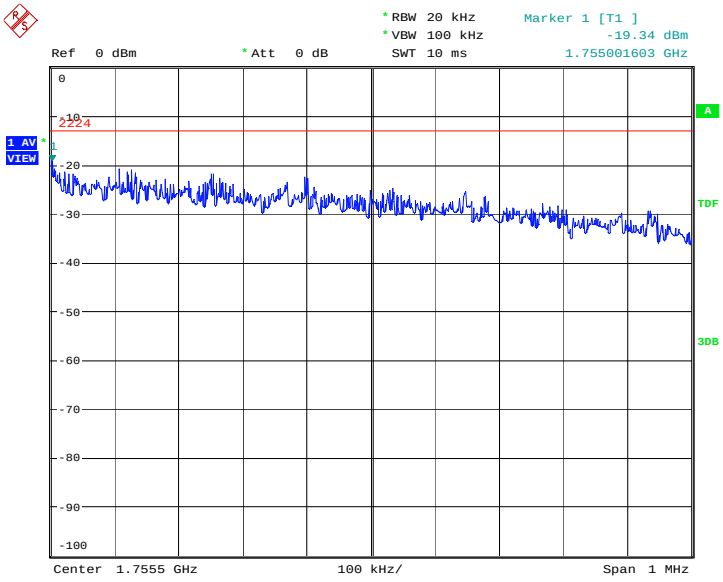
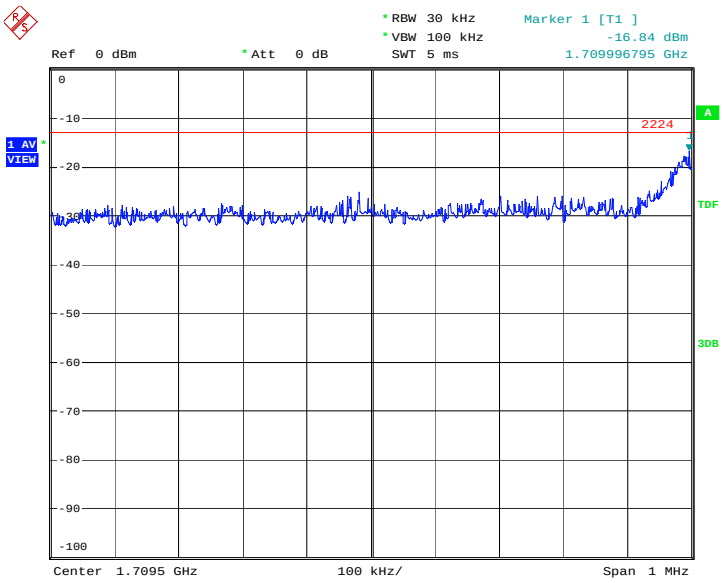
HIGH BAND EDGE BLOCK-16QAM



Date: 25.MAR.2014 16:36:21

LTE band 4, 3MHz

LOW BAND EDGE BLOCK-QPSK



Date: 25.MAR.2014 16:39:23

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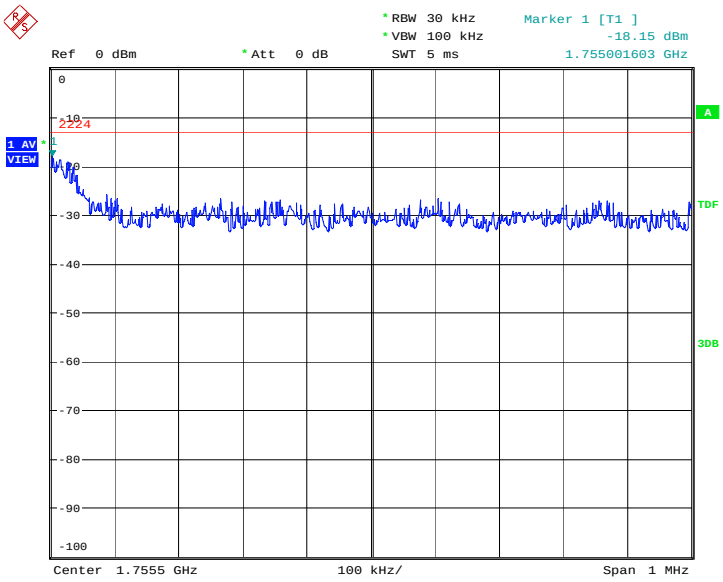
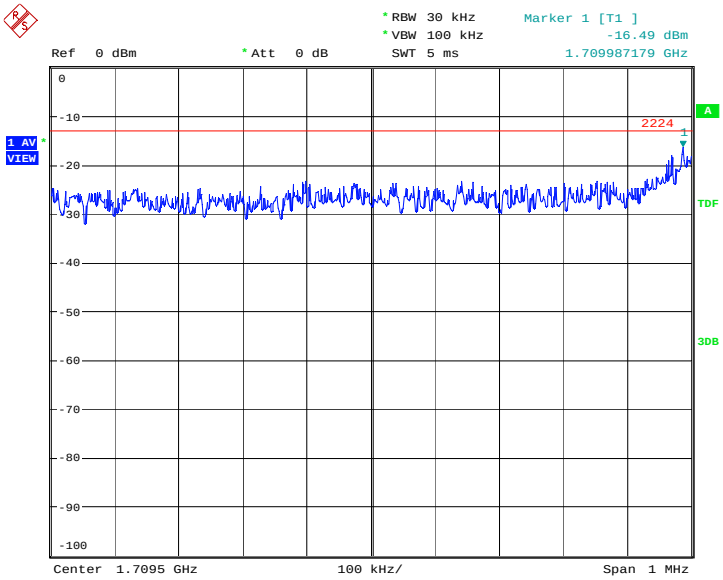


Date: 25.MAR.2014 16:46:36

LOW BAND EDGE BLOCK-16QAM



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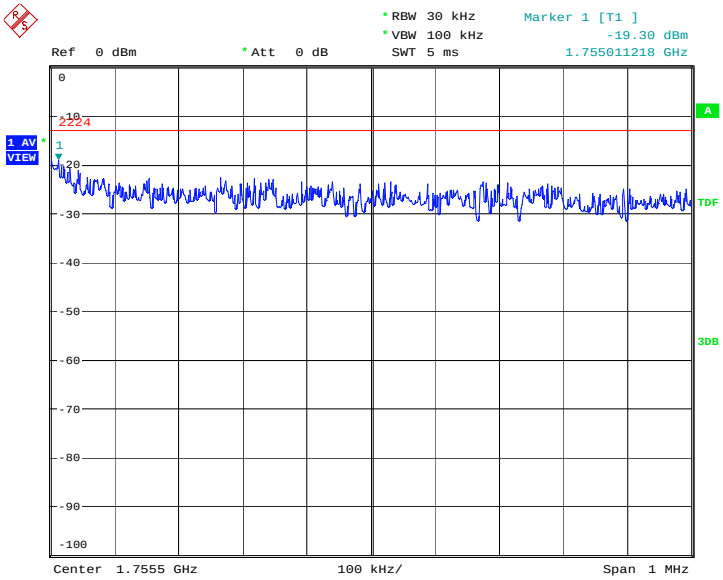
HIGH BAND EDGE BLOCK-16QAM



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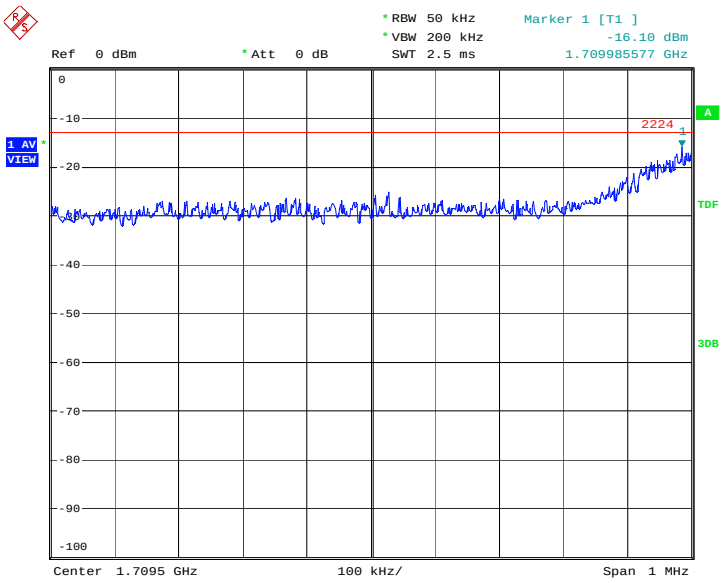
LTE band 4, 5MHz

LOW BAND EDGE BLOCK-QPSK



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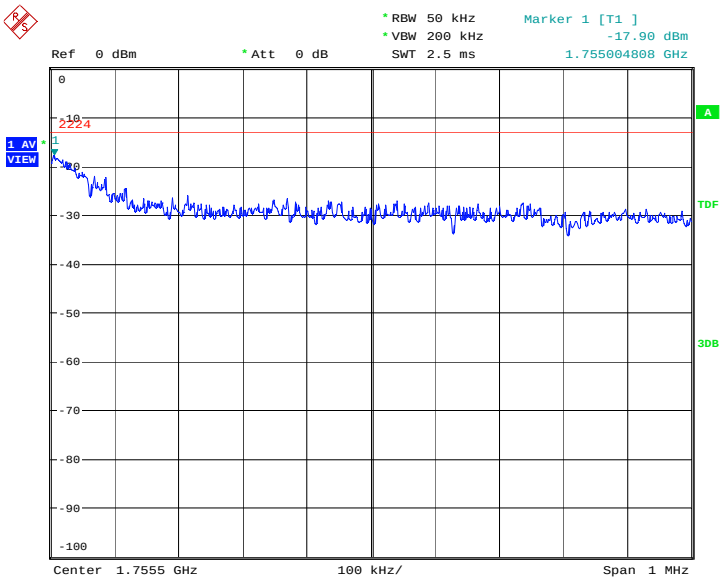
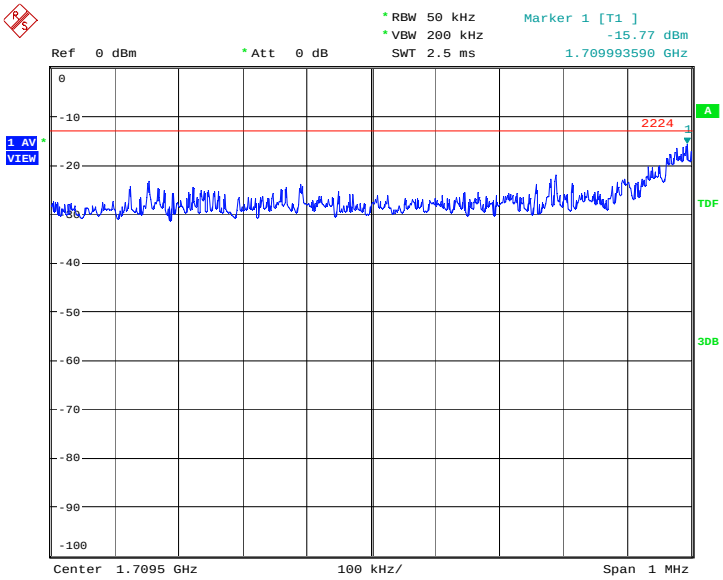
HIGH BAND EDGE BLOCK-QPSK

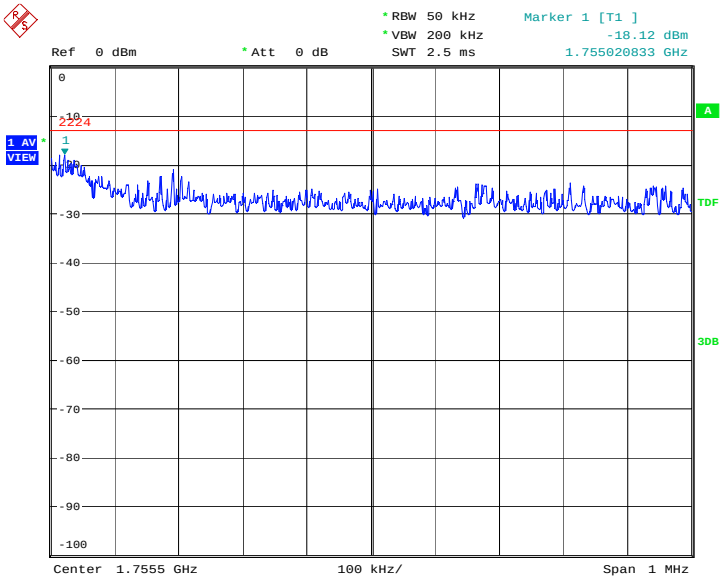


Date: 25.MAR.2014 16:54:58

LOW BAND EDGE BLOCK-16QAM

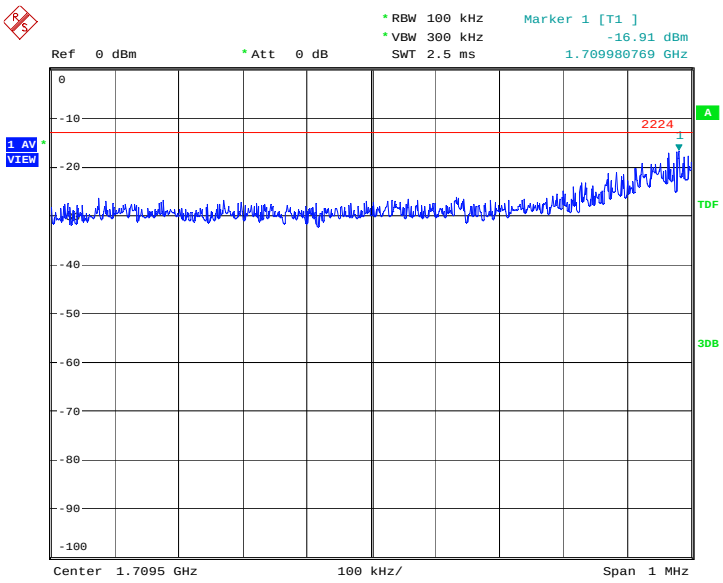


HIGH BAND EDGE BLOCK-16QAM



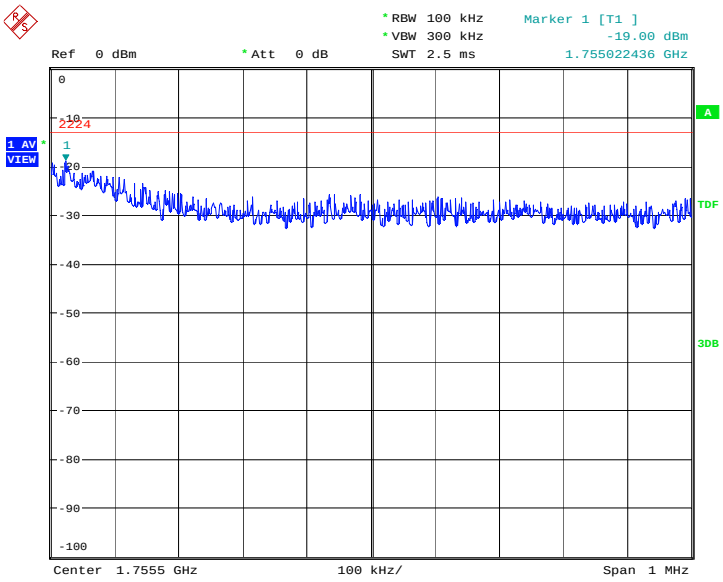
LTE band 4, 10MHz

LOW BAND EDGE BLOCK-QPSK



Date: 25.MAR.2014 16:59:41

HIGH BAND EDGE BLOCK-QPSK



Date: 25.MAR.2014 17:08:00

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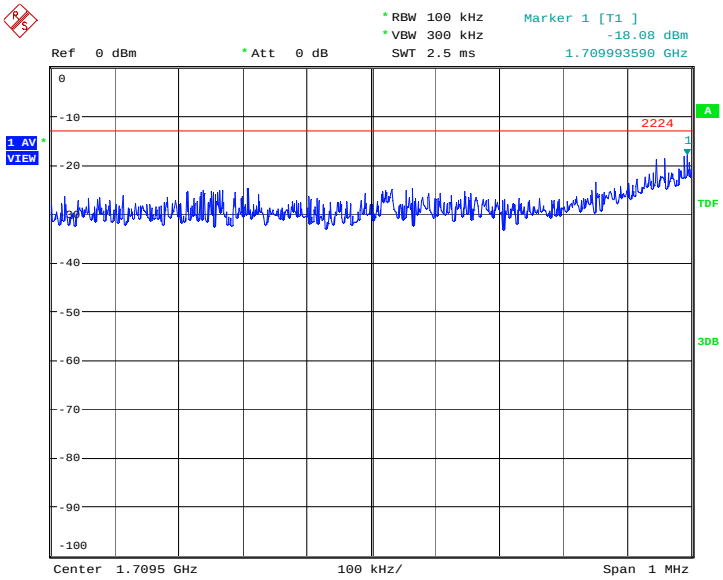

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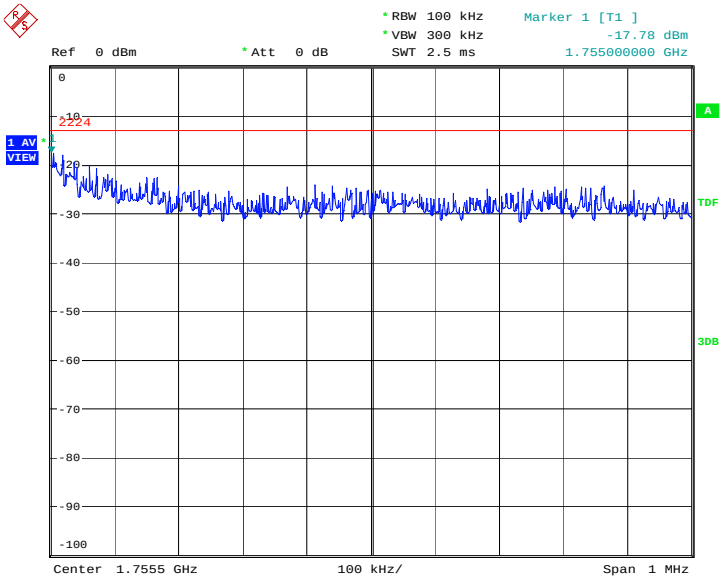
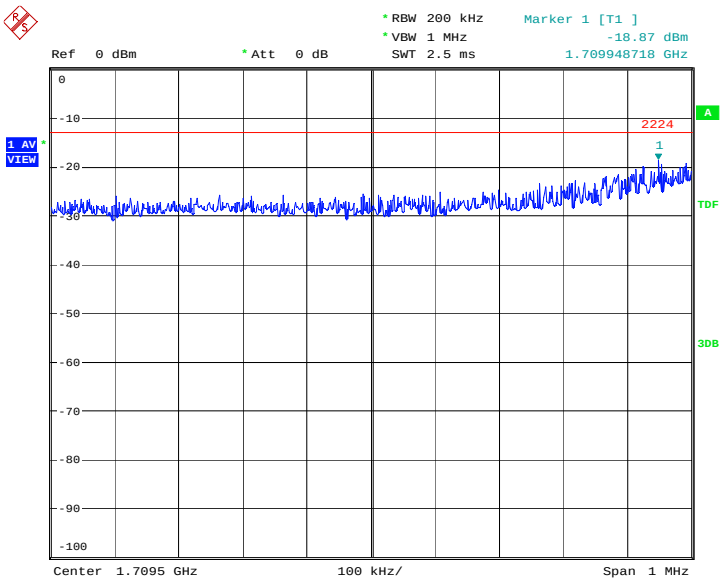


Date: 25.MAR.2014 17:08:11

LTE band 4, 15MHz

LOW BAND EDGE BLOCK-QPSK



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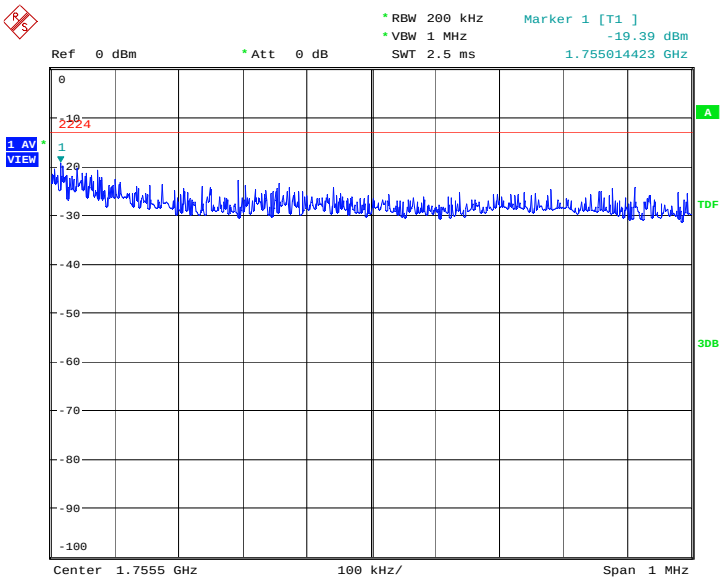

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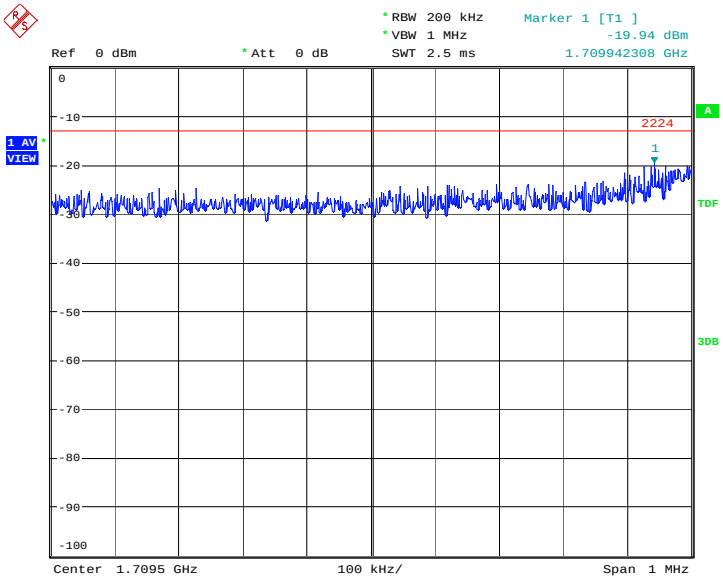

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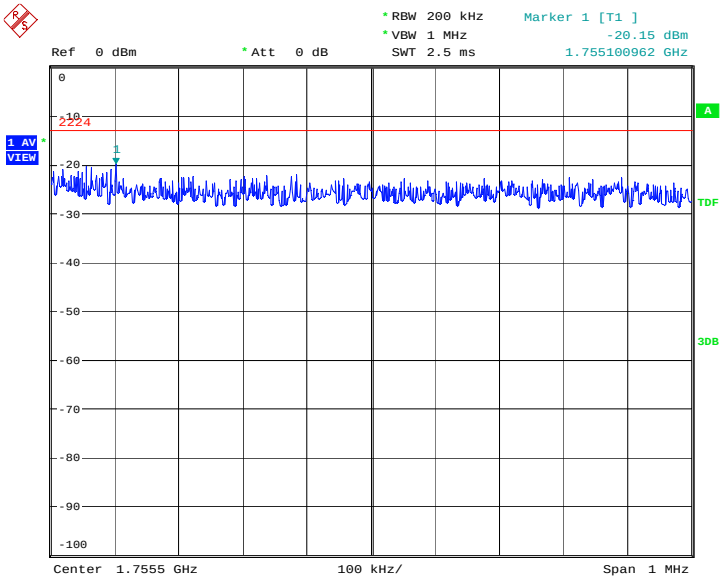
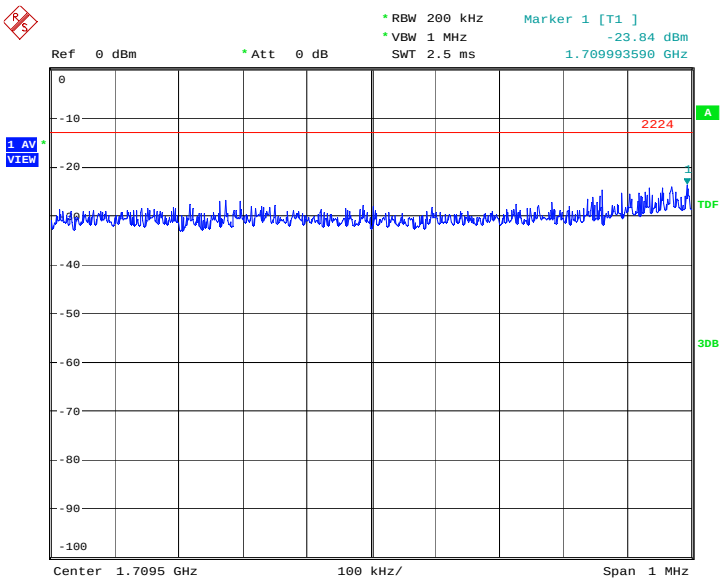


Date: 25.MAR.2014 17:17:33

LTE band 4, 20MHz

LOW BAND EDGE BLOCK-QPSK



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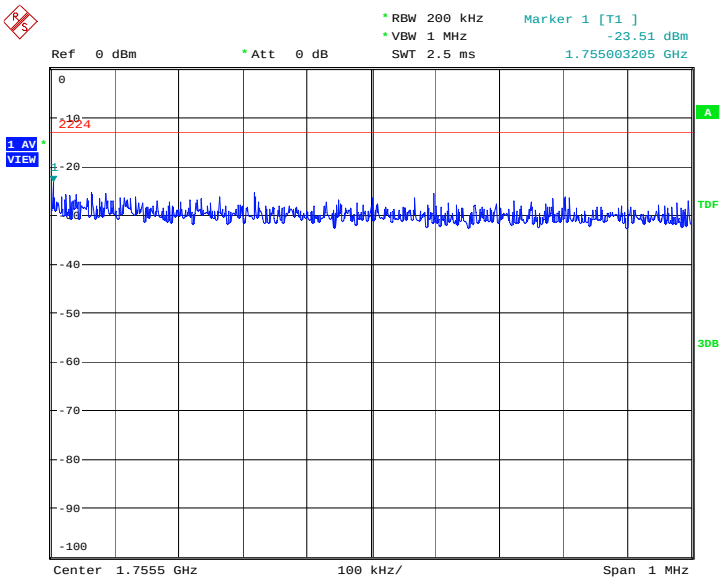

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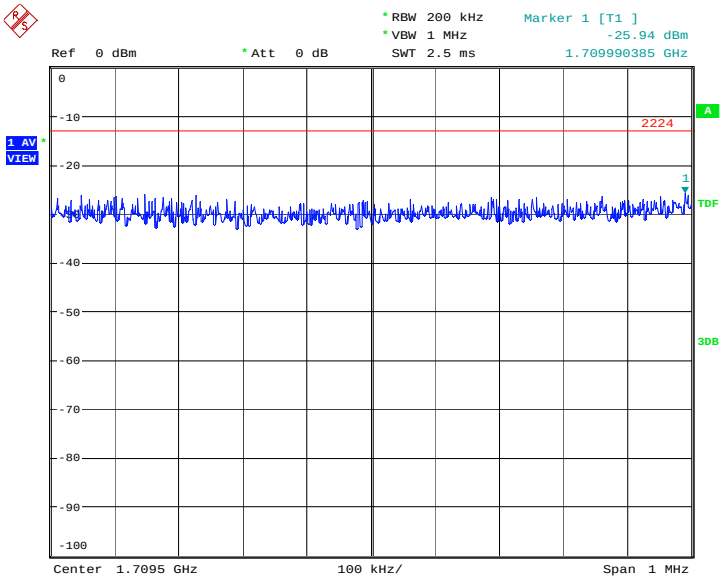
LOW BAND EDGE BLOCK-16QAM



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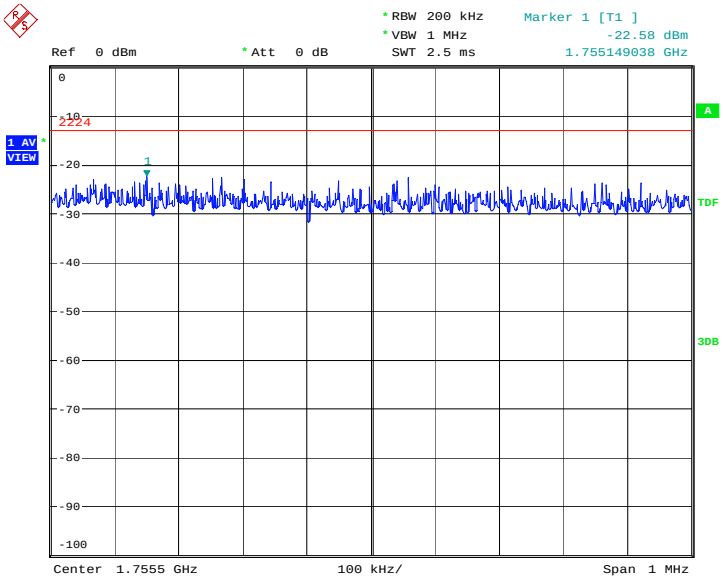
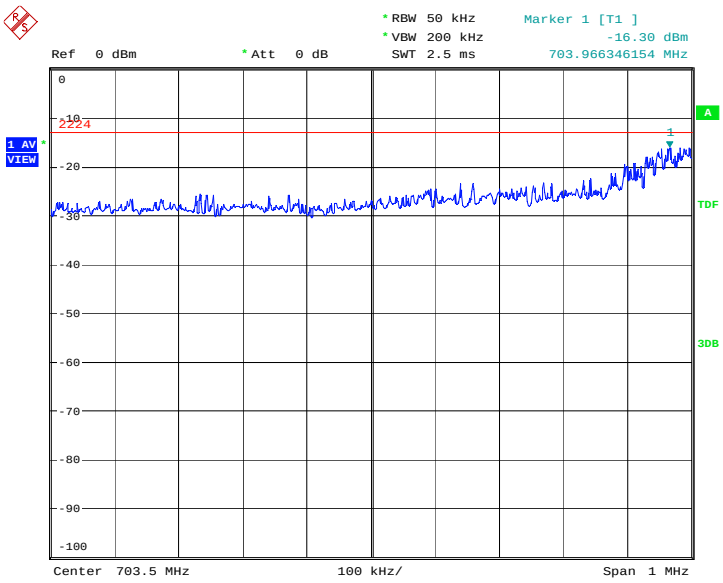


Date: 25.MAR.2014 17:27:27

LTE band 17, 5MHz

LOW BAND EDGE BLOCK-QPSK



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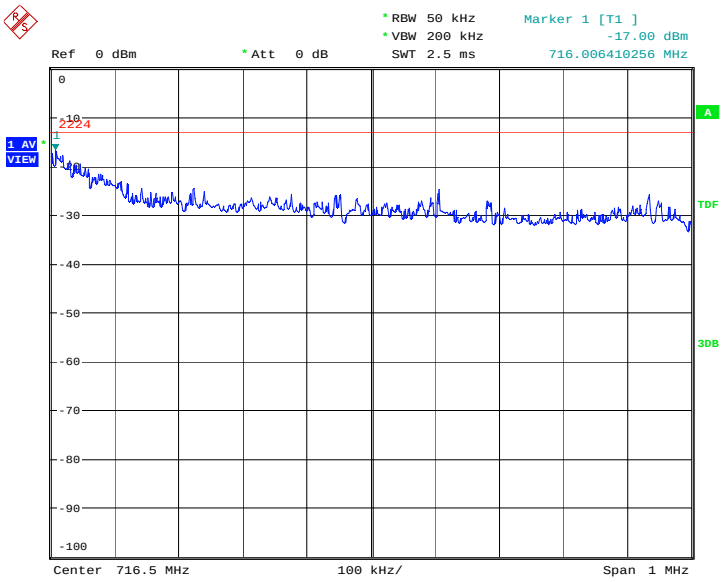

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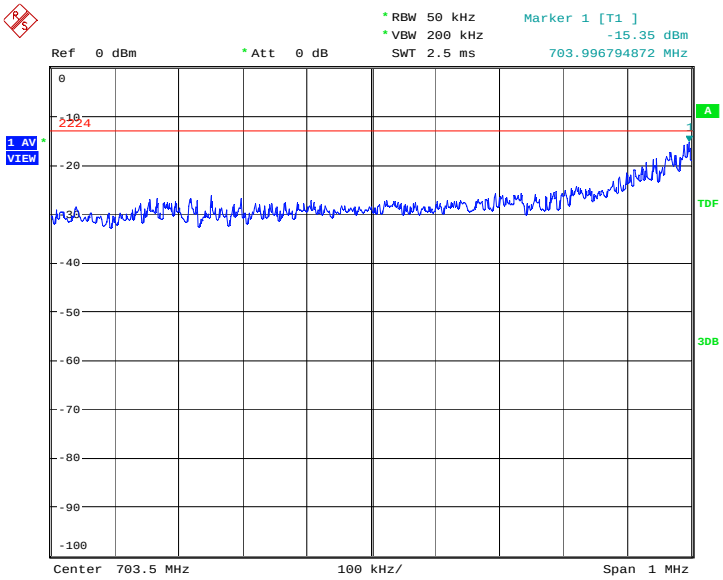
LOW BAND EDGE BLOCK-16QAM



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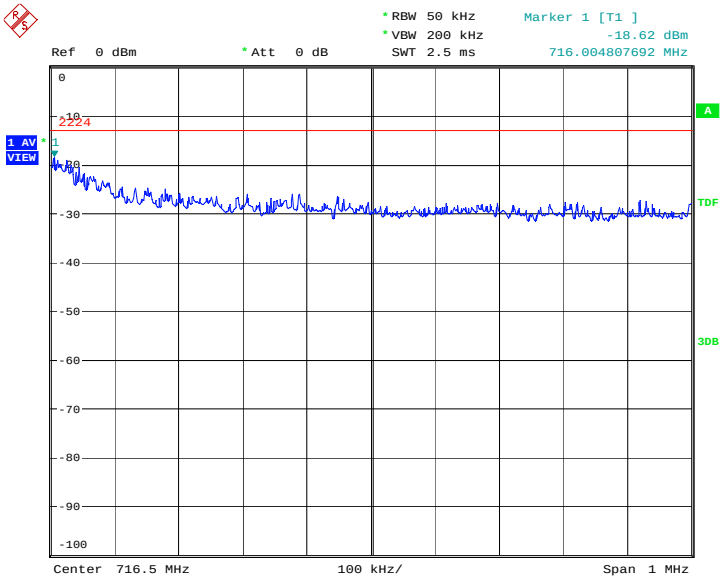
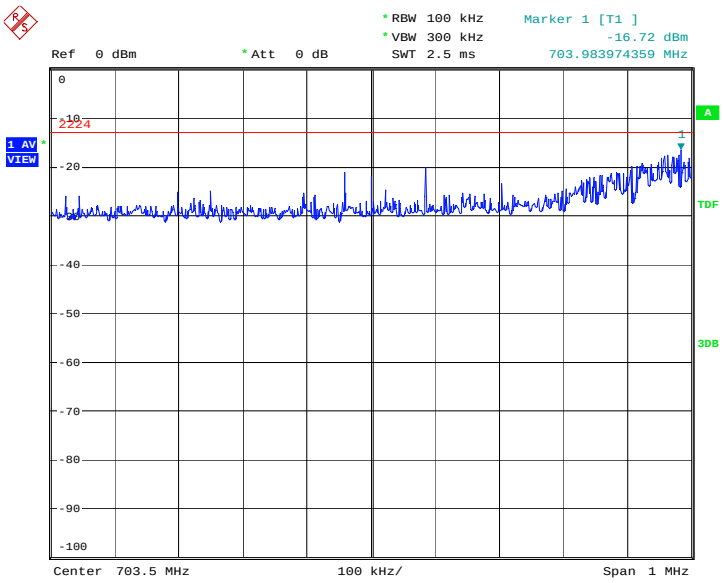
HIGH BAND EDGE BLOCK-16QAM



Date: 25.MAR.2014 17:38:59

LTE band 17, 10MHz

LOW BAND EDGE BLOCK-QPSK



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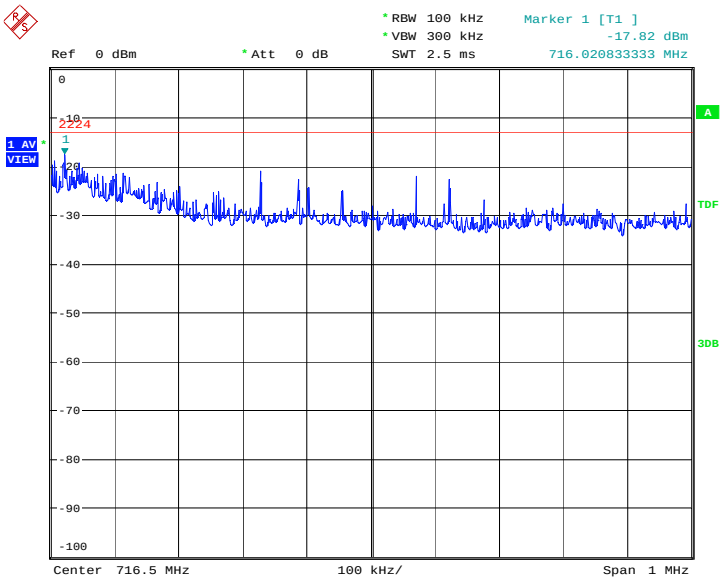
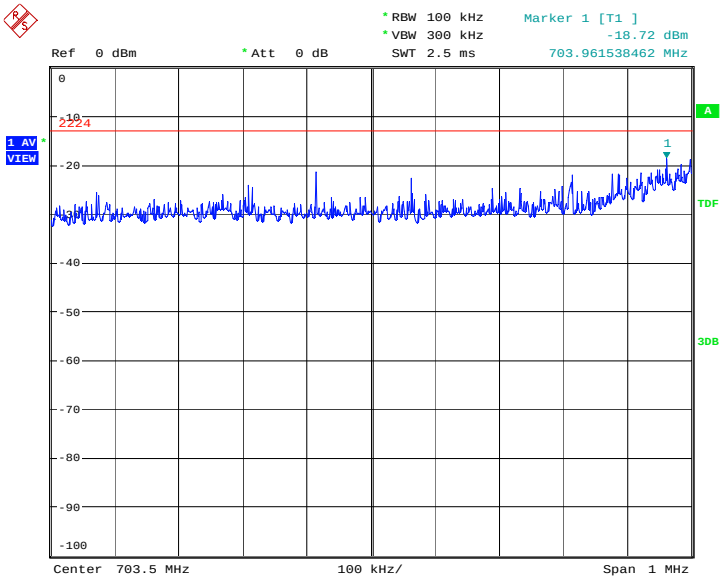
HIGH BAND EDGE BLOCK-QPSK



Date: 25.MAR.2014 17:45:09

LOW BAND EDGE BLOCK-16QAM



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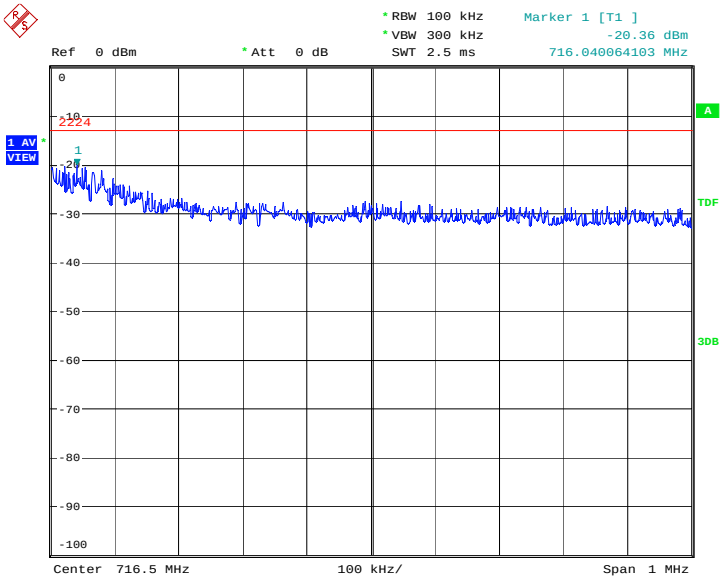


Date: 25.MAR.2014 17:45:19

A.8 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1057, 22.917, 24.238, 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. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

A. 8.2 Measurement Limit

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

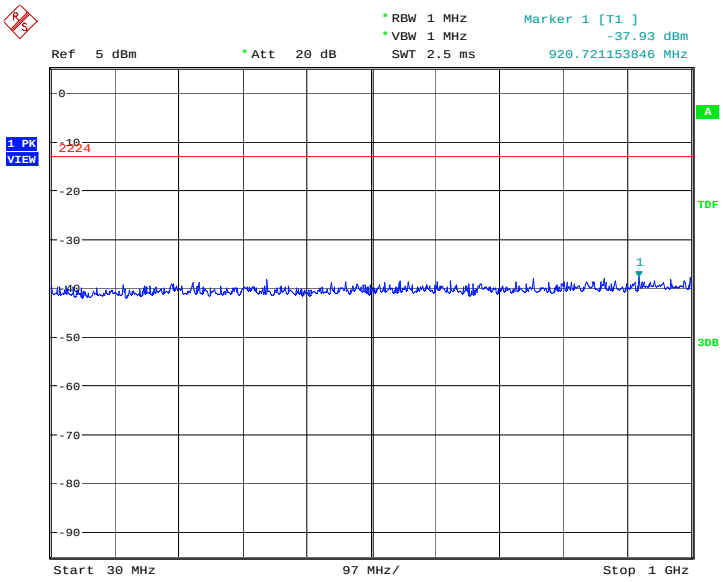
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm.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

A. 8.3 Measurement result

LTE band 4, 1.4MHz bandwidth

QPSK: 30MHz – 1GHz

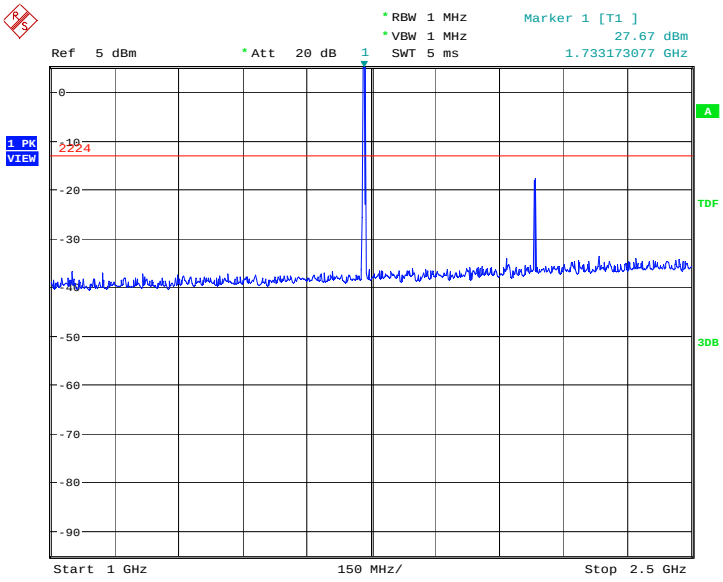
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:47:03

QPSK: 1GHz – 2.5GHz

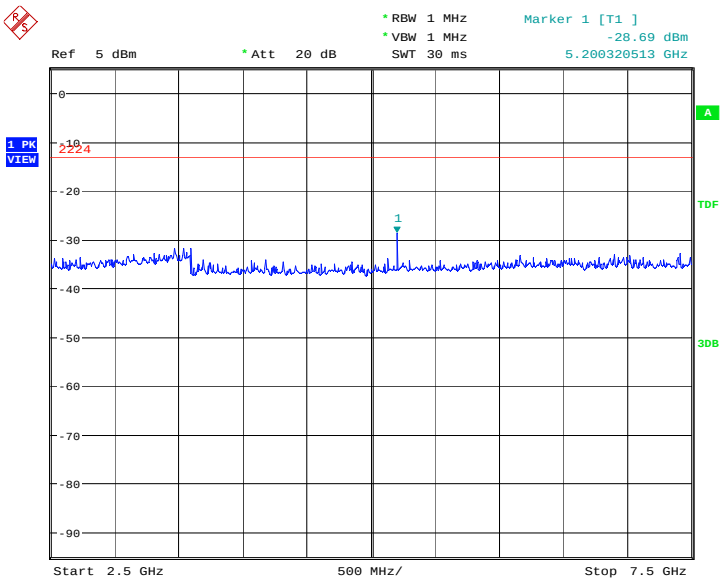
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:47:11

QPSK: 2.5GHz – 7.5GHz

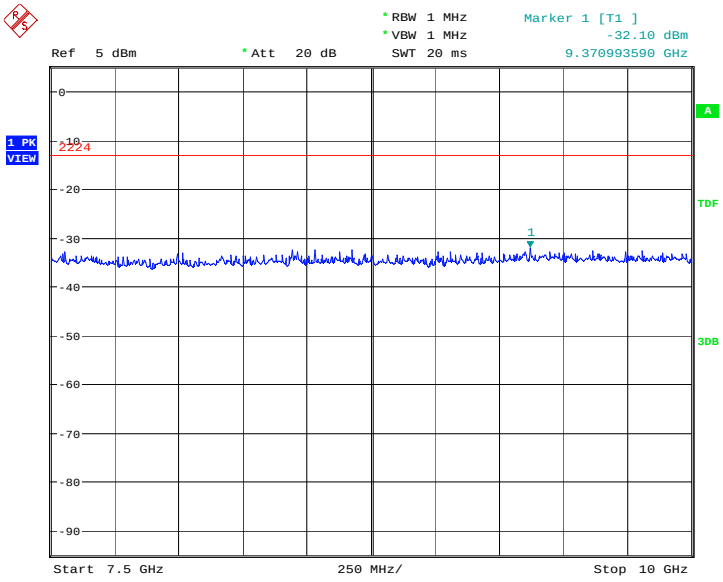
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:47:19

QPSK: 7.5GHz –10GHz

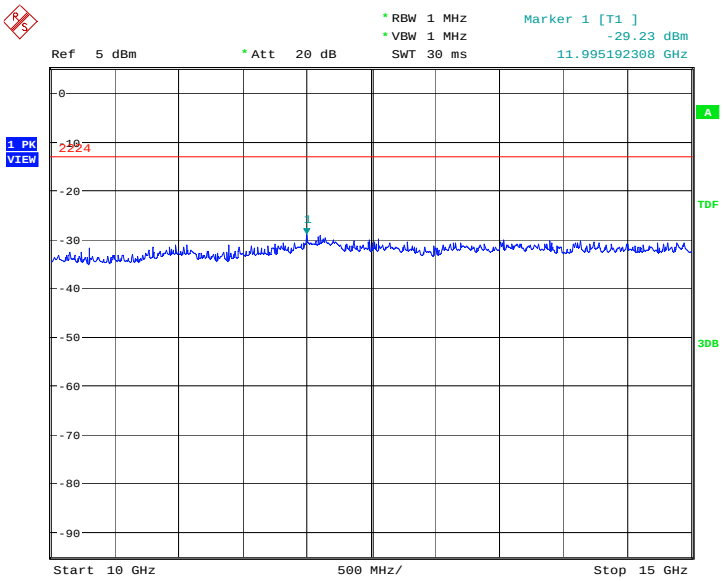
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:47:27

QPSK: 10GHz –15GHz

Spurious emission limit –13dBm.



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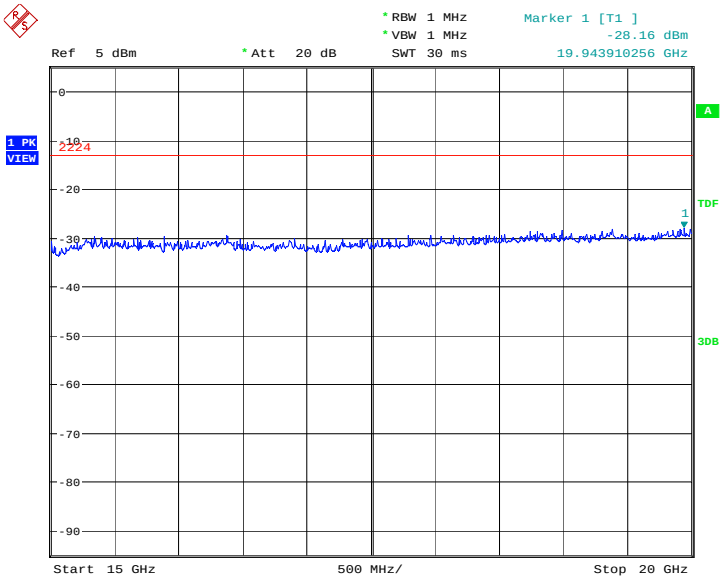
QPSK: 15GHz –20GHz

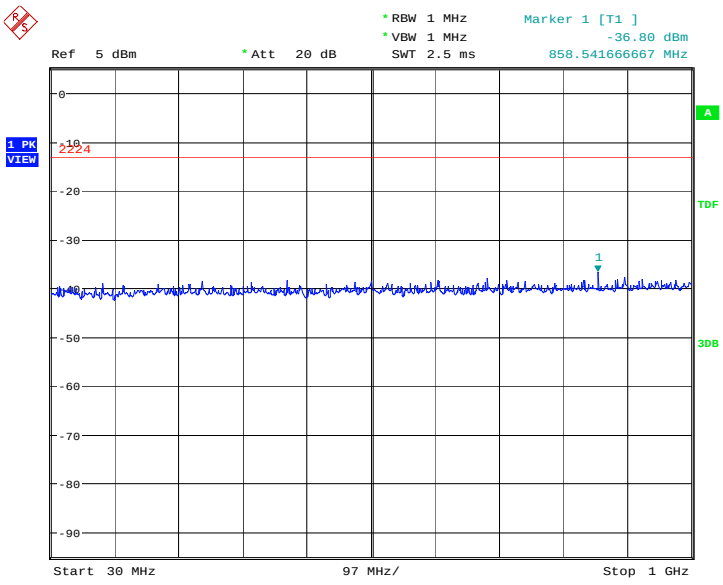
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:47:44

16QAM: 30MHz – 1GHz

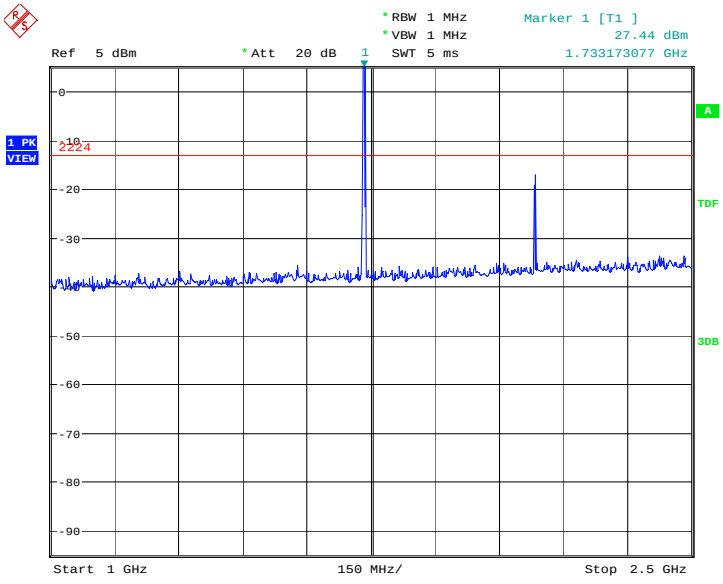
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:47:54

16QAM: 1GHz – 2.5GHz

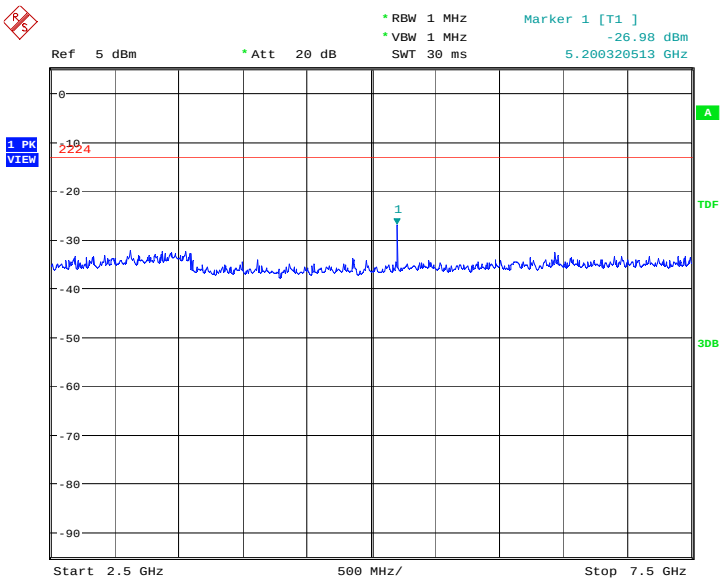
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:48:02

16QAM: 2.5GHz – 7.5GHz

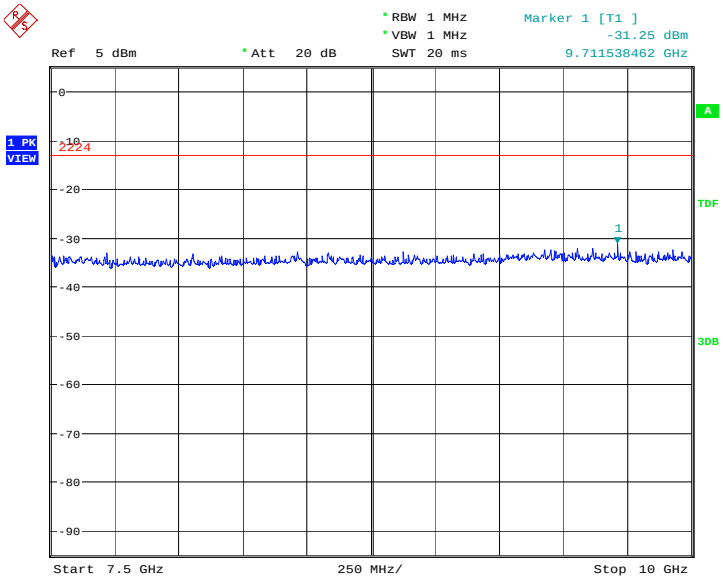
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:48:11

16QAM: 7.5GHz –10GHz

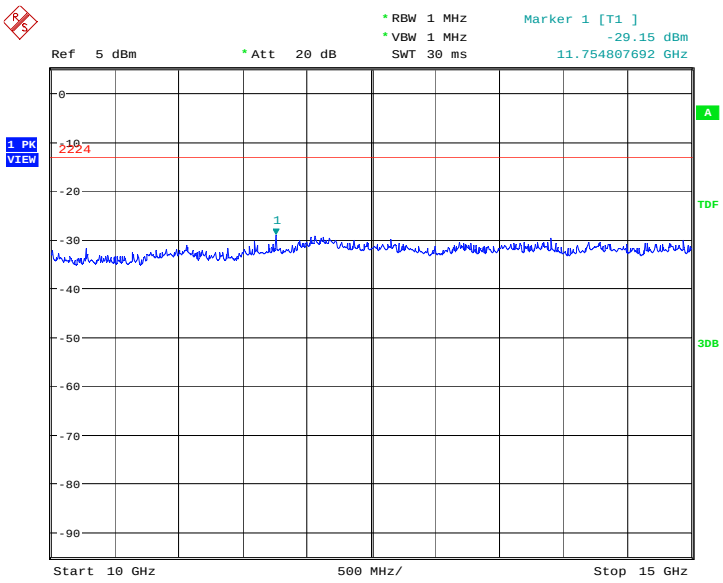
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:48:19

16QAM: 10GHz –15GHz

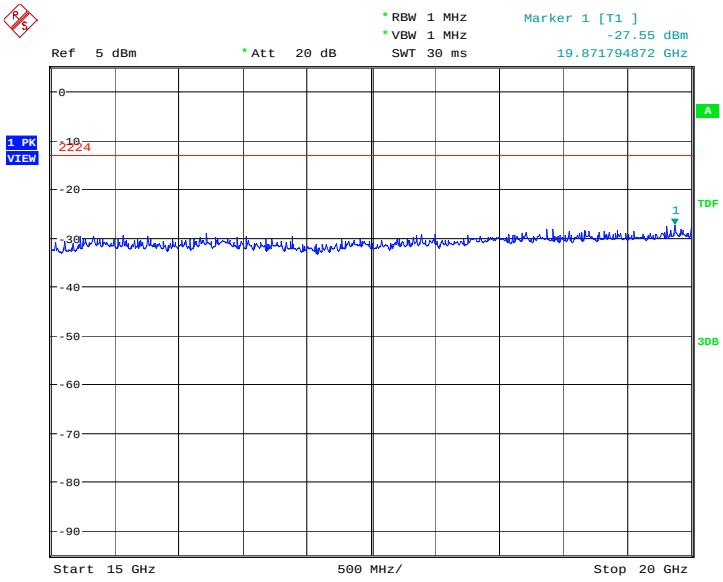
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:48:27

16QAM: 15GHz –20GHz

Spurious emission limit –13dBm.

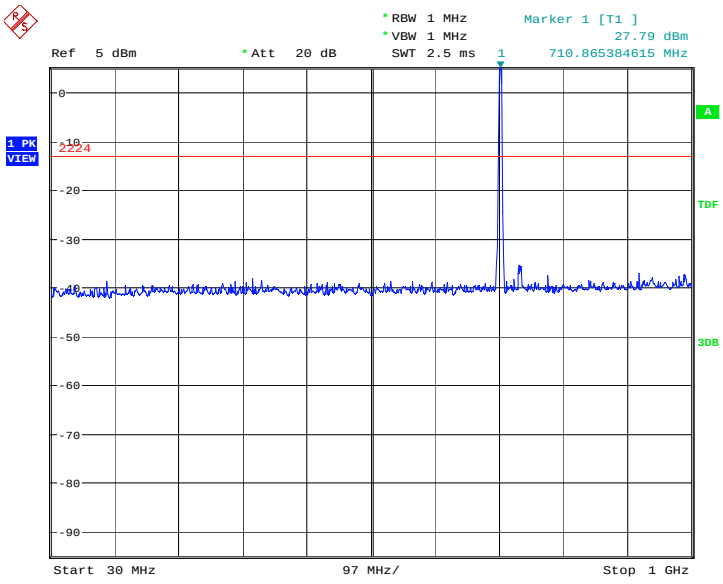


Date: 26.MAR.2014 08:48:35

LTE band 17, 5MHz bandwidth

QPSK: 30MHz – 1GHz

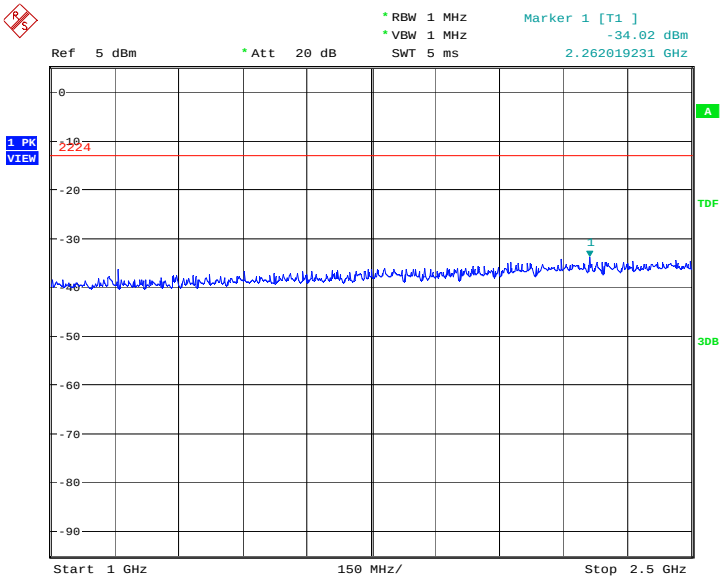
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:49:55

QPSK: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



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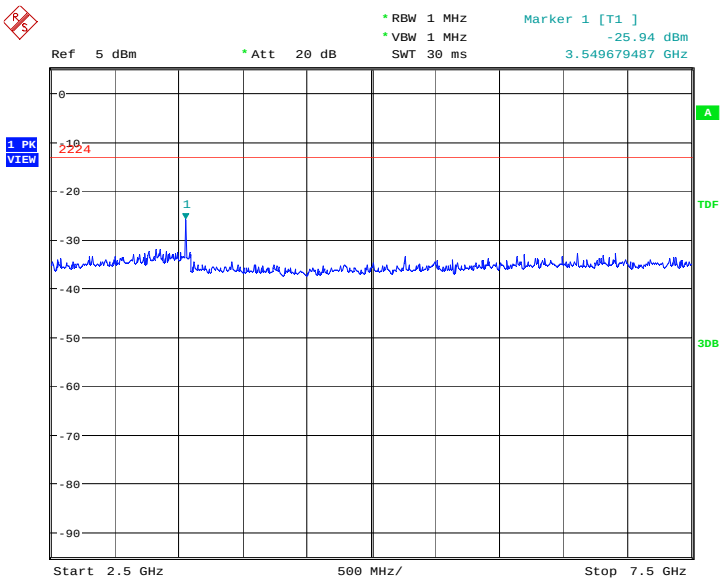
QPSK: 2.5GHz – 7.5GHz

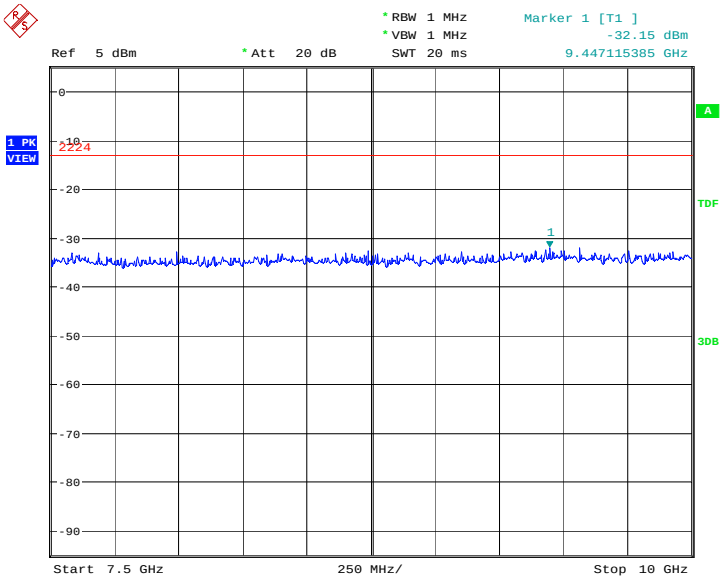
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:50:11

QPSK: 7.5GHz –10GHz

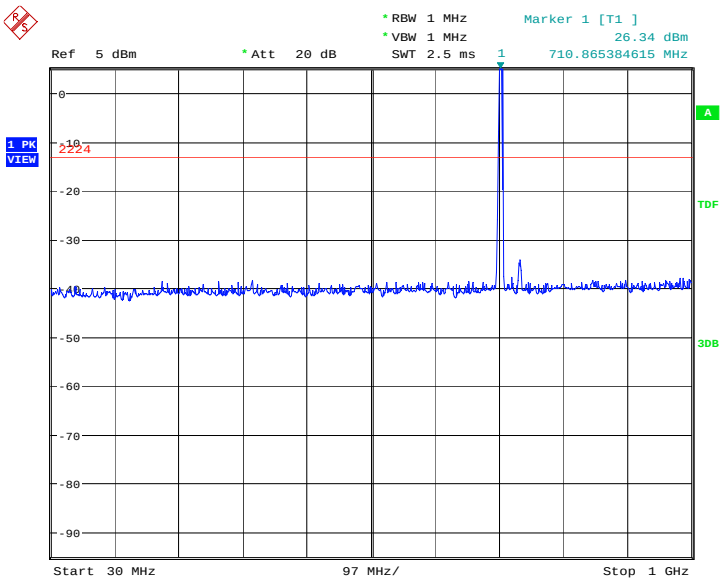
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:50:19

16QAM: 30MHz – 1GHz

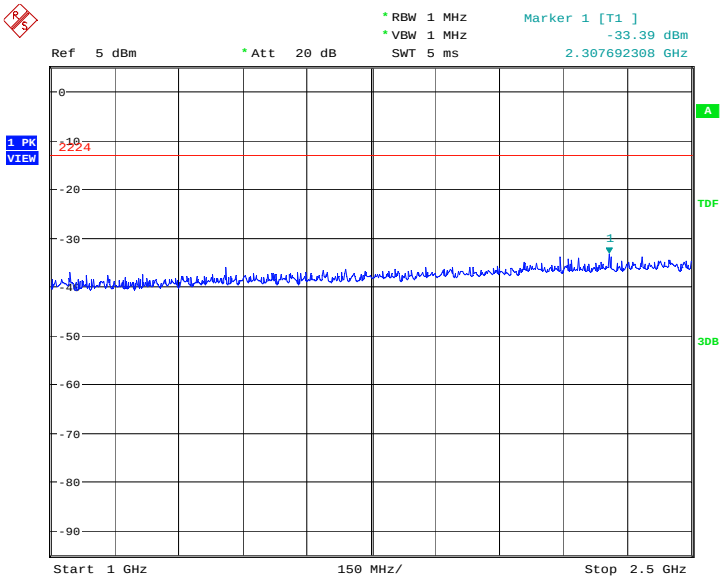
Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:50:29

16QAM: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



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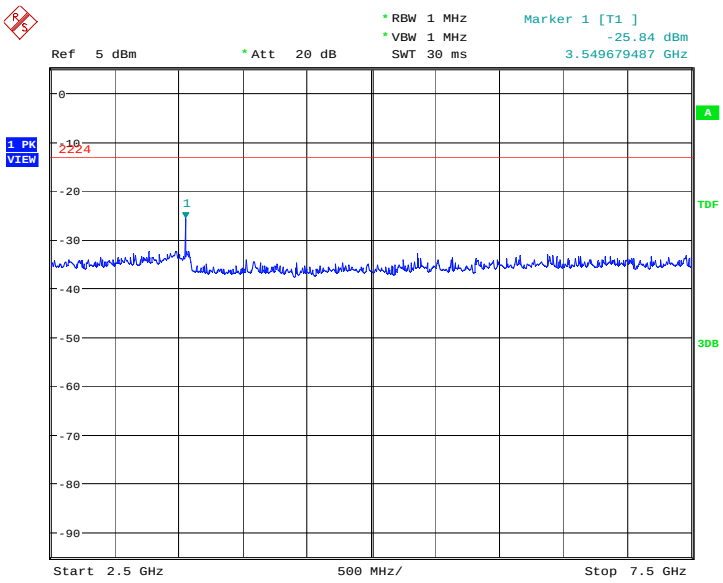
16QAM: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.



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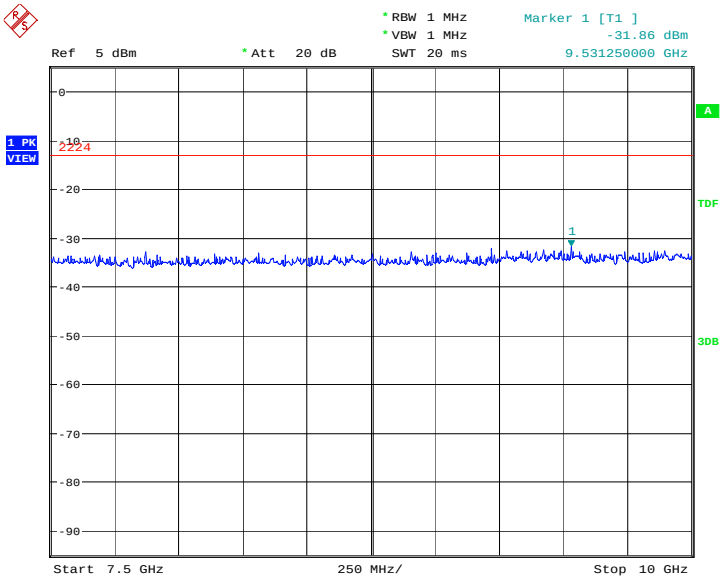
16QAM: 7.5GHz –10GHz

Spurious emission limit –13dBm.



Date: 26.MAR.2014 08:50:53

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