TEST REPORT
No. 2013TAR730

for

TCT Mobile Limited

HSDPA/HSUPA/UMTS Tri bands / GSM quad bands/LTE Bi bands

mobile phone

Model Name: A851L

Marketing Name: A851L

FCC ID: RAD361

with

Hardware Version: 05

Software Version: VAC6

Issued Date: 2013-11-27

Test Laboratory:
DAR accreditation (DIN EN ISO/IEC 17025): No. D-PL-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
3/F Shou Xiang Technology Building, No.51 Xueyuan Road, Hai Dian District, Beijing, P. R. China,100191.
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CONTENTS

1. Test Laboratory

1.1. Testing Location

Company Name:	TMC Beijing, Telecommunication Metrology Center of MIIT
Address:	3/F Shou Xiang Technology Building, No.51 Xueyuan Road, Hai Dian District, Beijing, P. R. China
Postal Code:	100191
Telephone:	00861062304633
Fax:	00861062304633

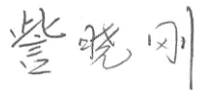
1.2. Testing Environment

Normal Temperature:	15-35℃
Relative Humidity:	20-75%

1.3. Project data

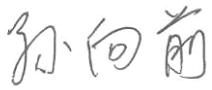
Testing Start Date:	2013-10-25
Testing End Date:	2013-11-26

1.4. Signature



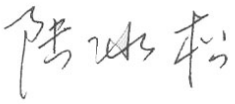
Zi Xiaogang

(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. 201203
Contact:	Gong Zhizhou
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. 201203
Contact:	Gong Zhizhou
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/UMTS Tri bands / GSM quad bands/LTE Bi bands mobile phone
Model name	A851L
Marketing Name	A851L
FCC ID	RAD361
Frequency	GSM850; PCS1900; WCDMA Band II; WCDMA Band V; LTE Band 4; LTE Band 17
Antenna	Integrated
Output power	Maximum EIRP measured 22.62dBm 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*	SN or IMEI	HW Version	SW Version
N06	013639000216259	05	VAC6
N14	013639000004101	05	VAC6

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

3.3. Internal Identification of AE used during the test

AE ID*	Description
AE1	Battery
AE2	Battery
AE3	Battery
AE4	Battery
AE5	Battery
AE6	Travel charger
AE7	Travel charger

AE1, AE2, AE3, AE4, AE5

Model	TLi022A2
Manufacturer	SCUD
Capacitance	2200 mAh
Nominal voltage	3.8V

AE6, AE7

Model	CBA3000AG0C1

Manufacturer	Tenpao
Length of cable	/

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

3.4. Normal Accessory setting

Fully charged battery was used during the test.

3.5. General Description

The Equipment Under Test (EUT) is a model of HSDPA/HSUPA/UMTS Tri bands / GSM quad bands/LTE Bi bands mobile phone with integrated antenna. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the Client.

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 24	PERSONAL COMMUNICATIONS SERVICES	10-1-12 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-12 Edition
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

5. LABORATORY ENVIRONMENT

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

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

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

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

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

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

6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:

P	Pass
NA	Not applicable
F	Fail

LTE Band 4

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

LTE Band 17

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

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
1	Test Receiver	ESCI	100344	R&S	2014-03-27
2	Test Receiver	ESU26	100235	R&S	2014-01-05
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	Spectrum Analyzer	E4440A	MY48250642	Agilent	2014-03-04
7	EMI Antenna	9117	177	Schwarzbeck	2014-06-29
8	EMI Antenna	VULB 9163	482	Schwarzbeck	2014-02-17
9	EMI Antenna	3117	00119024	ETS-Lindgren	2014-02-02
10	EMI Antenna	3117	00058889	ETS-Lindgren	2014-02-02
11	Signal Generator	N5183A	MY49060052	Agilent	2014-03-19
12	Climate chamber	SH-241	92003546	ESPEC	2014-05-11
13	Universal Radio Communication Tester	CMW500	101675	R&S	2014-07-10
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: CFR Part 22.913(a), 24.232(b), 27.50(d)(2).

A.1.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation.

This result contains peak output power and ERP/EIRP measurements for the EUT.

In all cases, output power is within the specified limits.

A.1.2 Conducted

A.1.2.1 Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.

The power was measured with Rhode & Schwarz Digital Radio Communication tester (CMW500).

These measurements were done at 3 frequencies (bottom, middle and top of operational frequency range) for each bandwidth.

LTE band 4

Measurement result

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1754.3	22.64	21.54
		1732.5	22.46	21.30
		1710.7	22.30	21.26
	1 RB low	1754.3	22.63	21.52
		1732.5	22.37	21.20
		1710.7	22.27	21.29
	50% RB mid	1754.3	22.62	21.47
		1732.5	22.33	21.28
		1710.7	22.21	21.17
	100% RB	1754.3	21.63	20.44
		1732.5	21.38	20.18
		1710.7	21.27	20.10
3MHz	1 RB high	1753.5	22.57	21.49
		1732.5	22.49	21.35
		1711.5	22.39	21.34
	1 RB low	1753.5	22.53	21.60
		1732.5	22.44	21.35
		1711.5	22.33	21.24
	50% RB mid	1753.5	21.53	20.49

		1732.5	21.36	20.36
		1711.5	21.33	20.18
	100% RB	1753.5	21.53	20.57
		1732.5	21.37	20.40
		1711.5	21.30	20.32
5MHz	1 RB high	1752.5	22.61	22.02
		1732.5	22.45	21.91
		1712.5	22.41	21.55
	1 RB low	1752.5	22.47	21.95
		1732.5	22.35	21.96
		1712.5	22.23	21.36
	50% RB mid	1752.5	21.59	20.60
		1732.5	21.40	20.47
		1712.5	21.39	20.49
	100% RB	1752.5	21.55	20.57
		1732.5	21.37	20.47
		1712.5	21.33	20.37
10MHz	1 RB high	1750.0	22.64	21.37
		1732.5	22.41	21.14
		1715.0	22.42	21.36
	1 RB low	1750.0	22.53	21.27
		1732.5	22.24	20.96
		1715.0	22.15	21.21
	50% RB mid	1750.0	21.51	20.51
		1732.5	21.35	20.47
		1715.0	21.45	20.46
	100% RB	1750.0	21.49	20.47
		1732.5	21.35	20.40
		1715.0	21.33	20.46
15MHz	1 RB high	1747.5	22.67	21.32
		1732.5	22.56	21.27
		1717.5	22.30	21.29
	1 RB low	1747.5	22.32	21.03
		1732.5	22.24	20.95
		1717.5	22.27	21.17
	50% RB mid	1747.5	21.42	20.66
		1732.5	21.39	20.67
		1717.5	21.29	20.62
	100% RB	1747.5	21.48	20.50
		1732.5	21.36	20.38

		1717.5	21.25	20.26
20MHz	1 RB high	1745.0	22.60	21.56
		1732.5	22.40	21.45
		1720.0	22.46	21.23
	1 RB low	1745.0	22.26	21.27
		1732.5	22.22	21.17
		1720.0	22.12	20.85
	50% RB mid	1745.0	21.58	20.50
		1732.5	21.47	20.48
		1720.0	21.32	20.35
	100% RB	1745.0	21.55	20.46
		1732.5	21.43	20.46
		1720.0	21.24	20.19

LTE band 17

Measurement result

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	713.5	22.92	21.89
		710.0	23.49	22.62
		706.5	23.50	22.62
	1 RB low	713.5	23.03	21.99
		710.0	23.28	22.40
		706.5	23.34	22.46
	50% RB mid	713.5	22.16	21.24
		710.0	22.20	21.24
		706.5	22.17	21.23
	100% RB	713.5	22.21	21.27
		710.0	22.18	21.32
		706.5	22.18	21.28
10MHz	1 RB high	711.0	22.98	21.67
		710.0	23.26	21.99
		709.0	23.23	22.02
	1 RB low	711.0	22.99	21.59
		710.0	22.95	21.63
		709.0	23.13	21.85
	50% RB mid	711.0	22.31	21.31
		710.0	22.12	21.27
		709.0	22.21	21.22
	100% RB	711.0	22.04	21.18
		710.0	22.18	21.30
		709.0	22.12	21.11

A.1.3 Radiated

A.1.3.1 Description

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

Rule Part 22.913(a) specifies ”Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.”

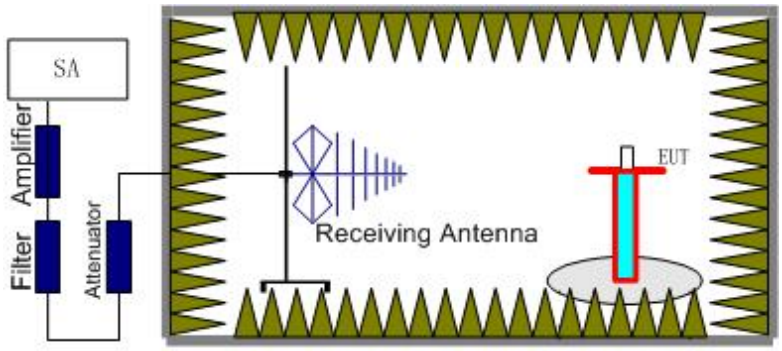
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

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

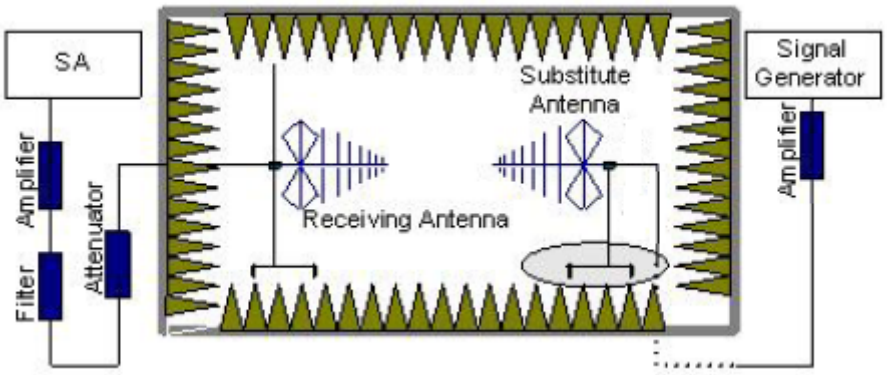
A.1.3.2 Method of Measurement

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 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 (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15.

LTE Band 4- EIRP 27.50(d)

Test Condition:

RBW	VBW
20MHz	30MHz

Limits: ≤30dBm (1W)

Measurement result

LTE Band 4_1.4MHz-QPSK

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.70	-28.42	2.96	-50.00	-5.17	2.15	21.64	30.00	8.36	H
1732.50	-27.57	2.99	-50.00	-5.08	2.15	22.37	30.00	7.63	H
1754.30	-28.02	3.01	-50.00	-4.98	2.15	21.80	30.00	8.20	H

LTE Band 4_1.4MHz-16QAM

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.70	-28.53	2.96	-50.00	-5.17	2.15	21.53	30.00	8.47	H
1732.50	-27.74	2.99	-50.00	-5.08	2.15	22.20	30.00	7.80	H
1754.30	-28.03	3.01	-50.00	-4.98	2.15	21.79	30.00	8.21	H

LTE Band 4_3MHz-QPSK

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization

1711.50	-28.57	2.96	-50.00	-5.17	2.15	21.49	30.00	8.51	H
1732.50	-27.41	2.99	-50.00	-5.08	2.15	22.53	30.00	7.47	H
1753.50	-27.84	3.01	-50.00	-4.98	2.15	21.98	30.00	8.02	H

LTE Band 4_3MHz-16QAM

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1711.50	-28.79	2.96	-50.00	-5.17	2.15	21.27	30.00	8.73	H
1732.50	-27.53	2.99	-50.00	-5.08	2.15	22.41	30.00	7.59	H
1753.50	-27.98	3.01	-50.00	-4.98	2.15	21.84	30.00	8.16	H

LTE Band 4_5MHz-QPSK

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.50	-28.92	2.97	-50.00	-5.17	2.15	21.13	30.00	8.87	H
1732.50	-27.62	2.99	-50.00	-5.08	2.15	22.32	30.00	7.68	H
1752.50	-27.95	3.01	-50.00	-4.99	2.15	21.88	30.00	8.12	H

LTE Band 4_5MHz-16QAM

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.50	-28.68	2.97	-50.00	-5.17	2.15	21.37	30.00	8.63	H
1732.50	-27.32	2.99	-50.00	-5.08	2.15	22.62	30.00	7.38	H
1752.50	-27.74	3.01	-50.00	-4.99	2.15	22.09	30.00	7.91	H

LTE Band 4_10MHz-QPSK

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.00	-29.66	2.97	-50.00	-5.15	2.15	20.37	30.00	9.63	H
1732.50	-28.01	2.99	-50.00	-5.08	2.15	21.93	30.00	8.07	H
1750.00	-28.36	3.00	-50.00	-5.00	2.15	21.49	30.00	8.51	H

LTE Band 4_10MHz-16QAM

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.00	-29.52	2.97	-50.00	-5.15	2.15	20.51	30.00	9.49	H
1732.50	-28.21	2.99	-50.00	-5.08	2.15	21.73	30.00	8.27	H
1750.00	-28.70	3.00	-50.00	-5.00	2.15	21.15	30.00	8.85	H

LTE Band 4_15MHz-QPSK

Frequency	Pmea	Cable	PAg	Antenna	Correction	RMS	Limit	Margin	Polarizati

(MHz)	(dBm)	Loss(dB)	(dB)	Gain (dBi)	(dB)	ERP (dBm)	(dBm)	(dB)	on
1717.50	-29.51	2.97	-50.00	-5.14	2.15	20.51	30.00	9.49	H
1732.50	-28.85	2.99	-50.00	-5.08	2.15	21.09	30.00	8.91	H
1747.50	-29.46	3.00	-50.00	-5.01	2.15	20.40	30.00	9.60	H

LTE Band 4_15MHz-16QAM

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1717.50	-29.90	2.97	-50.00	-5.14	2.15	20.12	30.00	9.88	H
1732.50	-29.06	2.99	-50.00	-5.08	2.15	20.88	30.00	9.12	H
1747.50	-29.89	3.00	-50.00	-5.01	2.15	19.97	30.00	10.03	H

LTE Band 4_20MHz-QPSK

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.00	-31.18	2.97	-50.00	-5.13	2.15	18.83	30.00	11.17	H
1732.50	-30.21	2.99	-50.00	-5.08	2.15	19.73	30.00	10.27	H
1745.00	-31.03	3.00	-50.00	-5.02	2.15	18.84	30.00	11.16	H

LTE Band 4_20MHz-16QAM

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.00	-31.59	2.97	-50.00	-5.13	2.15	18.42	30.00	11.58	H
1732.50	-30.60	2.99	-50.00	-5.08	2.15	19.34	30.00	10.66	H
1745.00	-31.53	3.00	-50.00	-5.02	2.15	18.34	30.00	11.66	H

Frequency: 1732.50MHz

Peak EIRP(dBm)=P_{Mea}(-27.32dBm) - P_{cl}(2.99dB) - P_{Ag}(-50.00dB) - G_a (-5.08dB)-2.15dB

=22.62dBm

LTE Band 17- ERP 27.50(d)

Test Condition:

RBW	VBW
20MHz	30MHz

Limits: ≤30dBm (1W)

Measurement result

LTE Band 17_5MHz-QPSK

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
706.50	-30.54	1.91	-53.00	0.30	2.15	18.10	30.00	11.90	V
710.00	-30.06	1.92	-53.00	0.32	2.15	18.55	30.00	11.45	V
713.50	-31.33	1.93	-53.00	0.34	2.15	17.25	30.00	12.75	V

LTE Band 17_5MHz-16QAM

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
706.50	-30.87	1.91	-53.00	0.30	2.15	17.77	30.00	12.23	V
710.00	-29.77	1.92	-53.00	0.32	2.15	18.84	30.00	11.16	V
713.50	-31.41	1.93	-53.00	0.34	2.15	17.17	30.00	12.83	V

LTE Band 17_10MHz-QPSK

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
709.00	-30.53	1.92	-53.00	0.32	2.15	18.08	30.00	11.92	V
710.00	-30.19	1.92	-53.00	0.32	2.15	18.42	30.00	11.58	V
711.00	-30.22	1.92	-53.00	0.33	2.15	18.38	30.00	11.62	V

LTE Band 17_10MHz-16QAM

Frequency (MHz)	Pmea (dBm)	Cable Loss(dB)	PAg (dB)	Antenna Gain (dBi)	Correction (dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
709.00	-31.05	1.92	-53.00	0.32	2.15	17.56	30.00	12.44	V
710.00	-30.67	1.92	-53.00	0.32	2.15	17.94	30.00	12.06	V
711.00	-30.08	1.92	-53.00	0.33	2.15	18.52	30.00	11.48	V

Frequency: 710.00MHz

Peak EIRP(dBm)=P_{Mea}(-29.77dBm) - P_{cl}(1.92dB) - P_{Ag}(-53.00dB) - G_a (0.32dB)-2.15dB

=18.84dBm

A.2 EMISSION LIMIT

Reference

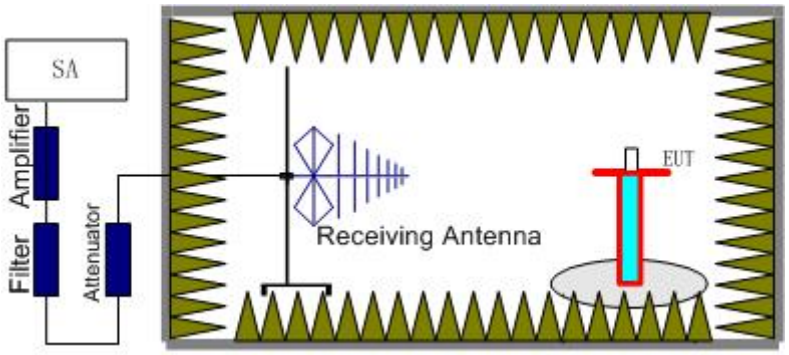
FCC: CFR 2.1051, Part 22.917(a), 24.238(a), 27.53(h).

A.2.1 Measurement Method

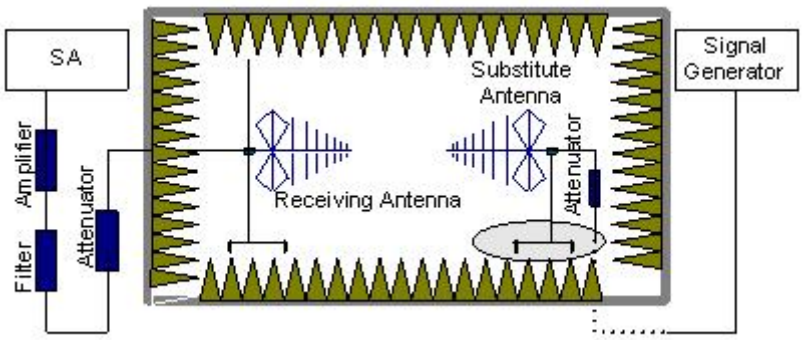
The measurements procedures in TIA-603C-2004 are used. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of LTE Band 4 and Band 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, and adjust the level of the signal generator output until the value of the receiver reach 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.
   A 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 -2.15dBi.

A.2.2 Measurement Limit

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

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
3420.50	-45.75	4.19	-7.71	-42.23	-13.00	H
5268.18	-63.86	5.32	-9.86	-59.32	-13.00	V
7340.97	-61.48	6.47	-11.30	-56.65	-13.00	V
10207.09	-57.74	7.64	-12.44	-52.94	-13.00	H
13327.41	-57.29	8.97	-13.63	-52.63	-13.00	V
14987.02	-56.34	9.56	-13.50	-52.40	-13.00	V

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
3463.97	-50.51	4.24	-7.81	-46.94	-13.00	H
5132.20	-61.89	5.25	-9.78	-57.36	-13.00	V
6806.51	-63.47	6.16	-10.91	-58.72	-13.00	H
8496.75	-63.70	7.02	-12.20	-58.52	-13.00	H
10170.24	-60.87	7.79	-12.43	-56.23	-13.00	V
12094.57	-57.87	8.91	-12.54	-54.24	-13.00	H

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
3507.85	-44.34	4.33	-7.91	-40.76	-13.00	H
5130.16	-61.78	5.25	-9.78	-57.25	-13.00	V
7262.82	-61.52	6.36	-11.26	-56.62	-13.00	V
10214.45	-59.78	7.60	-12.44	-54.94	-13.00	V
12125.90	-58.58	8.81	-12.55	-54.84	-13.00	H
16387.85	-54.28	10.63	-12.53	-52.38	-13.00	H

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
3532.93	-66.34	4.32	-7.94	2.15	-64.87	-13.00		H
3879.45	-66.37	4.52	-8.36	2.15	-64.68	-13.00		H
4296.03	-68.83	4.84	-8.68	2.15	-67.14	-13.00		V
5019.48	-67.96	5.16	-9.71	2.15	-65.56	-13.00		H
5568.46	-66.37	5.42	-10.03	2.15	-63.91	-13.00		H
6250.07	-63.24	5.82	-10.40	2.15	-60.81	-13.00		H

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
3741.64	-58.70	4.50	-8.19	2.15	-57.16	-13.00		H
4159.53	-54.16	4.68	-8.60	2.15	-52.39	-13.00		H
4604.11	-67.19	4.98	-8.99	2.15	-65.33	-13.00		H
5288.27	-64.81	5.36	-9.87	2.15	-62.45	-13.00		H
6468.23	-66.39	5.91	-10.57	2.15	-63.88	-13.00		V
8073.23	-63.95	6.92	-11.94	2.15	-61.08	-13.00		V

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
3187.65	-67.74	4.09	-7.15	2.15	-66.83	-13.00		V
3821.38	-67.94	4.50	-8.29	2.15	-66.30	-13.00		V
4397.23	-65.81	4.82	-8.74	2.15	-64.04	-13.00		V
4718.77	-66.16	4.97	-9.19	2.15	-64.09	-13.00		H
5286.20	-66.25	5.35	-9.87	2.15	-63.88	-13.00		V
6248.41	-65.18	5.82	-10.40	2.15	-62.75	-13.00		H

A.3 CONDUCTED EMISSION

Reference

FCC: CFR Part 15.107/207

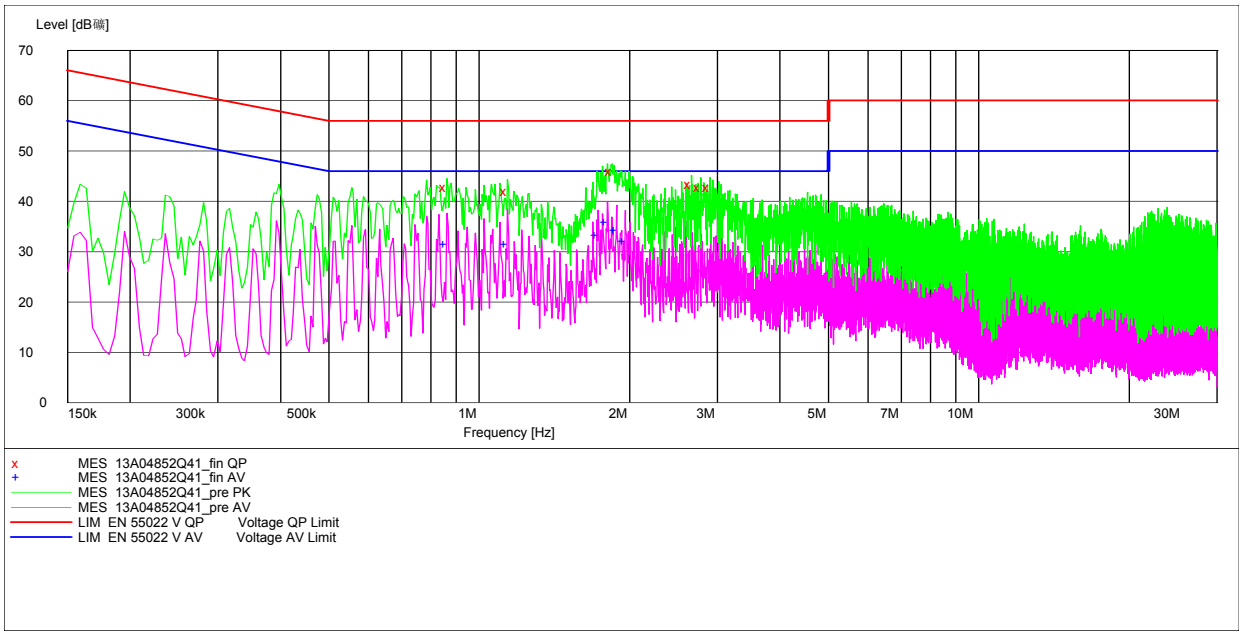
The measurement procedure in ANSI C63.4-2003 is used. Conducted Emission is measured with travel charger.

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

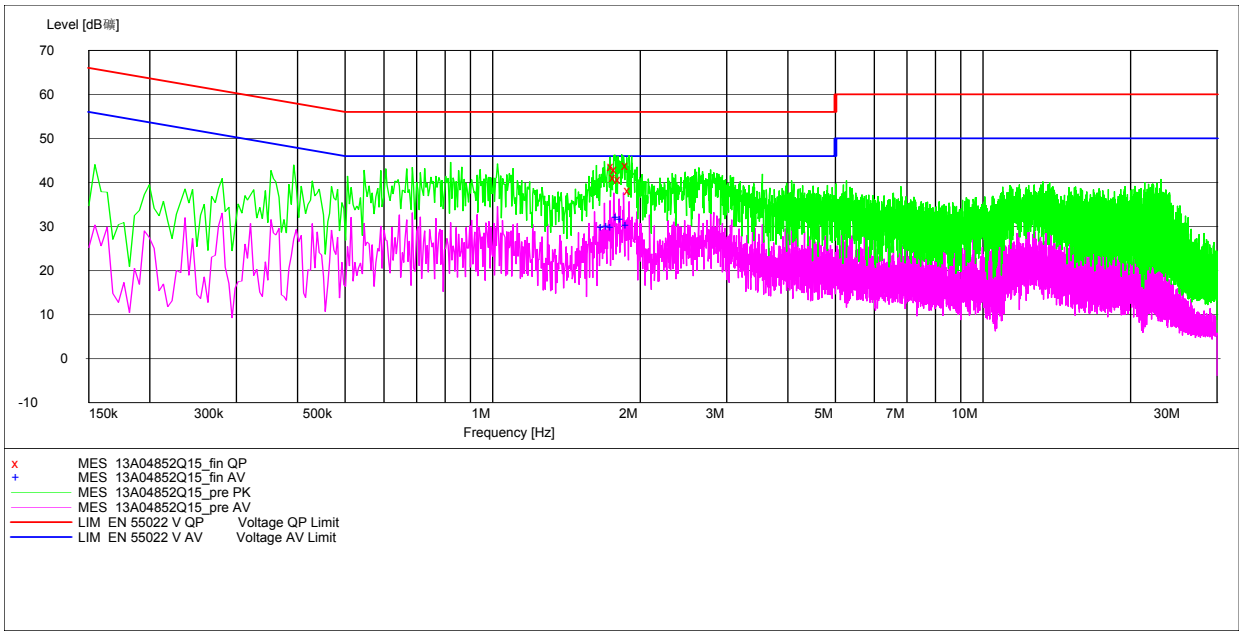
LTE Band 4, 1.4MHz



Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.861000	42.80	9.8	56	13.2	L1	GND
1.140000	41.90	9.7	56	14.1	L1	GND
1.846500	45.90	9.7	56	10.1	L1	GND
2.661500	43.40	9.7	56	12.6	L1	GND
2.778500	42.70	9.7	56	13.3	L1	GND
2.895500	42.70	9.7	56	13.3	L1	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.861000	31.40	9.8	46	14.6	L1	GND
1.140000	31.40	9.7	46	14.6	L1	GND
1.729500	33.20	9.7	46	12.8	L1	GND
1.806000	35.90	9.7	46	10.1	L1	GND
1.882500	34.20	9.7	46	11.8	L1	GND
1.959000	32.00	9.7	46	14.0	L1	GND

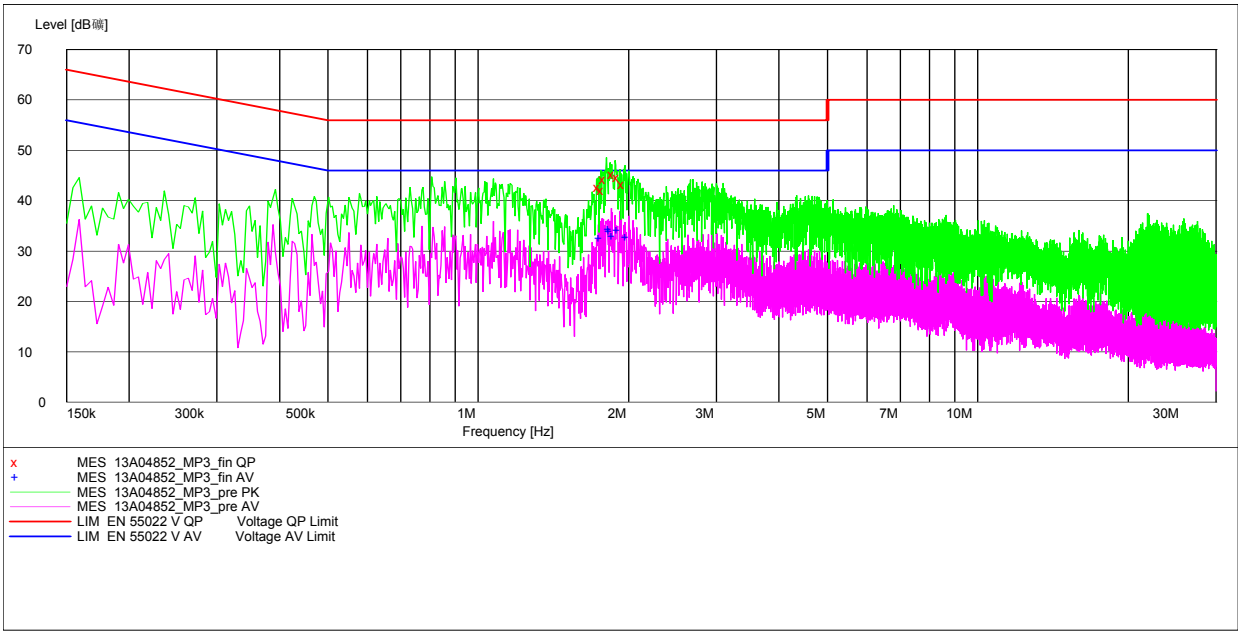
LTE Band 17, 5MHz



Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
1.774500	43.70	9.7	56	12.3	L1	GND
1.788000	41.10	9.7	56	14.9	N	GND
1.801500	42.90	9.7	56	13.1	L1	GND
1.833000	40.60	9.7	56	15.4	L1	GND
1.896000	44.00	9.7	56	12.0	L1	GND
1.918500	38.20	9.7	56	17.8	N	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
1.689000	29.70	9.7	46	16.3	L1	GND
1.734000	30.00	9.7	46	16.0	L1	GND
1.765500	29.90	9.7	46	16.1	L1	GND
1.810500	32.10	9.7	46	13.9	L1	GND
1.851000	31.70	9.7	46	14.3	L1	GND
1.896000	30.30	9.7	46	15.7	L1	GND

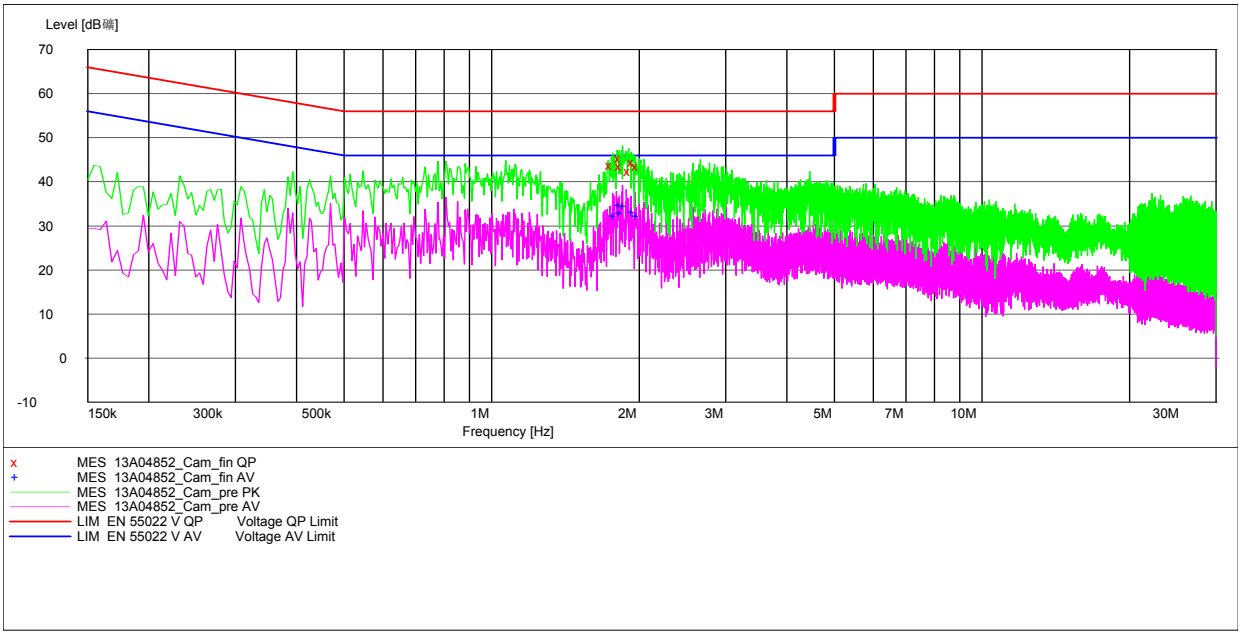
MP3



Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
1.761000	42.60	9.7	56	13.4	L1	GND
1.792500	42.00	9.7	56	14.0	L1	GND
1.806000	44.30	9.7	56	11.7	L1	GND
1.878000	45.30	9.7	56	10.7	L1	GND
1.923000	44.60	9.7	56	11.4	L1	GND
1.968000	43.20	9.7	56	12.8	L1	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
1.770000	32.50	9.7	46	13.5	L1	GND
1.846500	34.30	9.7	46	11.7	L1	GND
1.855500	33.90	9.7	46	12.1	N	GND
1.878000	32.90	9.7	46	13.1	L1	GND
1.923000	34.10	9.7	46	11.9	L1	GND
1.999500	32.80	9.7	46	13.2	L1	GND

Camera



Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
1.765500	43.80	9.7	56	12.2	L1	GND
1.842000	45.40	9.7	56	10.6	L1	GND
1.851000	43.60	9.7	56	12.4	N	GND
1.927500	42.30	9.7	56	13.7	L1	GND
1.959000	44.30	9.7	56	11.7	L1	GND
2.000000	43.40	9.7	56	12.6	L1	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
1.797000	32.20	9.7	46	13.8	L1	GND
1.842000	34.70	9.7	46	11.3	L1	GND
1.851000	32.90	9.7	46	13.1	L1	GND
1.882500	34.40	9.7	46	11.6	L1	GND
1.959000	33.00	9.7	46	13.0	L1	GND
2.000000	32.20	9.7	46	13.8	L1	GND

A.4 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.235, 24.235, 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 channel 661 for LTE band 4 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 1/2 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 1/2 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

A.4.2.1 For Hand carried battery powered equipment

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.5VDC and 4.1VDC, with a nominal voltage of 3.7VDC. 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 -5.4 % and +10.8 %. For the purposes of measuring frequency stability these voltage limits are to be used.

LTE Band 4, 1.4MHz

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
3.5	-1	0.000	1	0.001
3.9	-2	0.001	8	0.005
4.2	-3	0.002	8	0.005

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
-30	6	0.004	2	0.001
-20	1	0.001	4	0.002
-10	-1	0.001	5	0.003
0	6	0.003	7	0.004
10	3	0.002	5	0.003
20	-7	0.004	7	0.004
30	0	0.000	3	0.002
40	-1	0.000	7	0.004
50	-1	0.000	8	0.004

LTE Band 4, 3MHz

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
3.5	-5	0.003	3	0.002
3.9	1	0.001	0	0.000
4.2	-1	0.000	3	0.002

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
-30	-1	0.000	-3	0.002
-20	0	0.000	-4	0.002
-10	-1	0.001	-8	0.005
0	0	0.000	-1	0.001
10	-5	0.003	-2	0.001
20	2	0.001	-3	0.002
30	-5	0.003	1	0.001
40	-17	0.010	-4	0.003
50	-1	0.001	-7	0.004

LTE Band 4, 5MHz

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
3.5	6	0.003	0	0.000
3.9	2	0.001	-1	0.000
4.2	3	0.002	-6	0.003

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
-30	3	0.002	-4	0.002
-20	-1	0.001	-4	0.002
-10	0	0.000	0	0.000
0	1	0.001	-1	0.000
10	5	0.003	-5	0.003
20	5	0.003	-3	0.002
30	4	0.003	0	0.000
40	1	0.001	0	0.000
50	-3	0.002	-2	0.001

LTE Band 4, 10MHz

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
3.5	-1	0.001	-1	0.000
3.9	1	0.001	-8	0.005
4.2	3	0.002	1	0.000

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
-30	-8	0.005	-8	0.005
-20	2	0.001	-5	0.003
-10	-1	0.000	-4	0.002
0	1	0.001	-6	0.004
10	0	0.000	-7	0.004
20	-2	0.001	-8	0.005
30	2	0.001	-6	0.003
40	-2	0.001	-4	0.002
50	-1	0.000	-3	0.002

LTE Band 4, 15MHz

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
3.5	6	0.004	-6	0.003
3.9	2	0.001	-7	0.004
4.2	2	0.001	-5	0.003

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
-30	8	0.005	-6	0.004
-20	2	0.001	-3	0.002
-10	4	0.002	-7	0.004
0	3	0.002	-8	0.005
10	-2	0.001	-13	0.008
20	-3	0.002	-2	0.001
30	2	0.001	-3	0.002
40	3	0.002	-5	0.003
50	-2	0.001	-8	0.004

LTE Band 4, 20MHz

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
3.5	-2	0.001	0	0.000
3.9	8	0.005	-2	0.001
4.2	-3	0.002	3	0.002

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
-30	-1	0.000	4	0.002
-20	-2	0.001	-3	0.001
-10	1	0.001	-2	0.001
0	-5	0.003	-3	0.002
10	2	0.001	0	0.000
20	5	0.003	0	0.000
30	2	0.001	0	0.000
40	-1	0.000	3	0.002
50	-2	0.001	-3	0.002

LTE Band 17, 5MHz

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
3.5	6	0.008	0	0.001
3.9	2	0.002	-1	0.001
4.2	3	0.004	-6	0.008

Frequency Error vs Temperature

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

LTE Band 17, 10MHz

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
3.5	-1	0.002	-1	0.001
3.9	1	0.002	-8	0.012
4.2	3	0.004	1	0.001

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)		Frequency error(ppm)	
Modulation	QPSK	16QAM	QPSK	16QAM
-30	-8	0.011	-8	0.011
-20	2	0.003	-5	0.007
-10	-1	0.001	-4	0.006
0	1	0.002	-6	0.009
10	0	0.001	-7	0.010
20	-2	0.003	-8	0.012
30	2	0.004	-6	0.008
40	-2	0.003	-4	0.006
50	-1	0.001	-3	0.005

A.5 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049(h)(i)

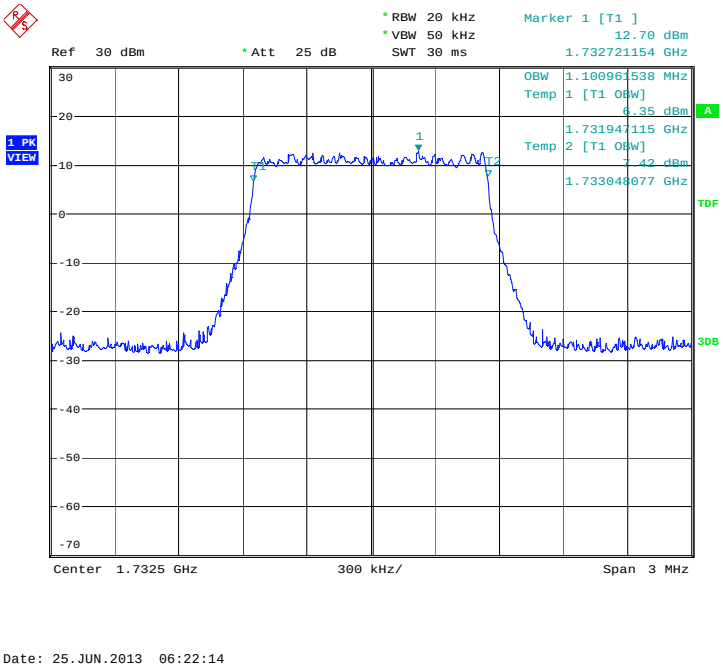
A.5.1 Occupied Bandwidth Results

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.

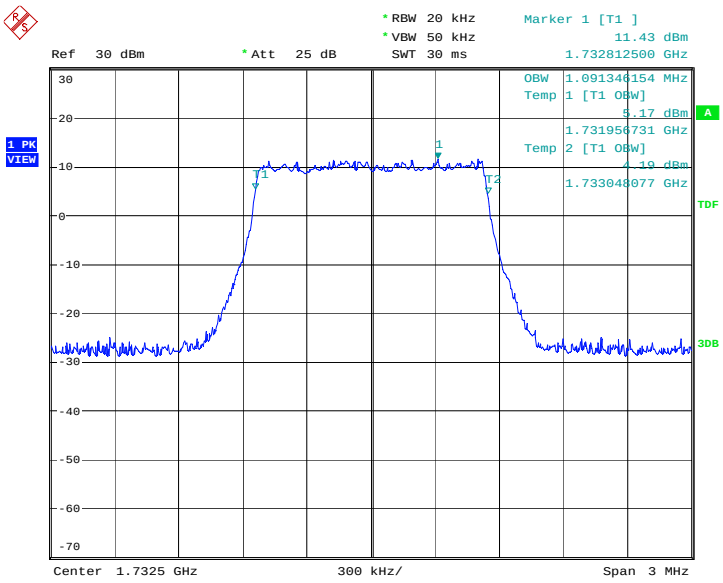
LTE band 4, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	1100.96	1091.35

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



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

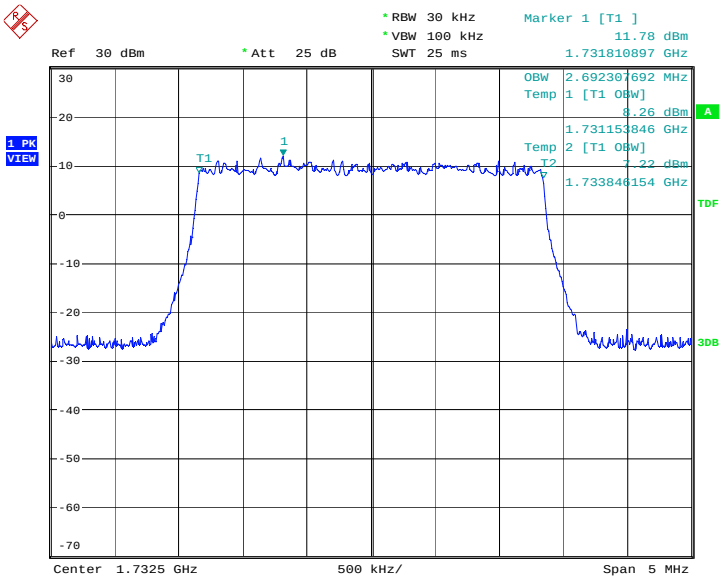


Date: 25.JUN.2013 06:22:27

LTE band 4, 3MHz (99%)

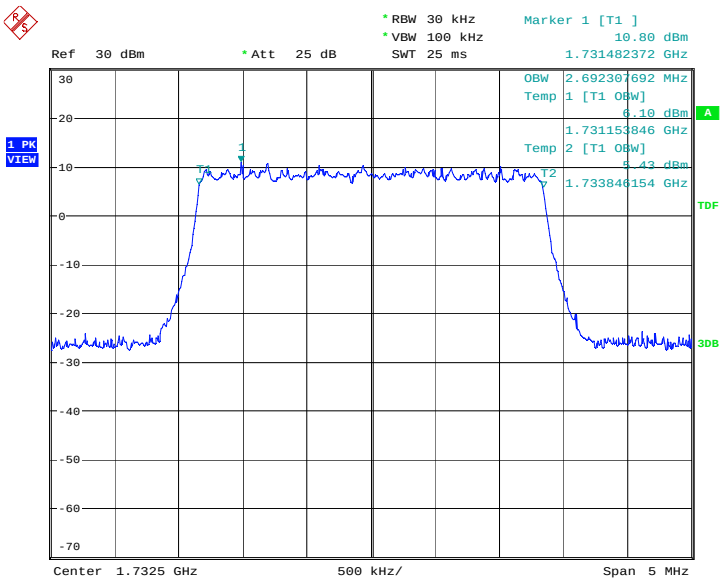
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	2692.31	2692.31

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



Date: 25.JUN.2013 06:26:53

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

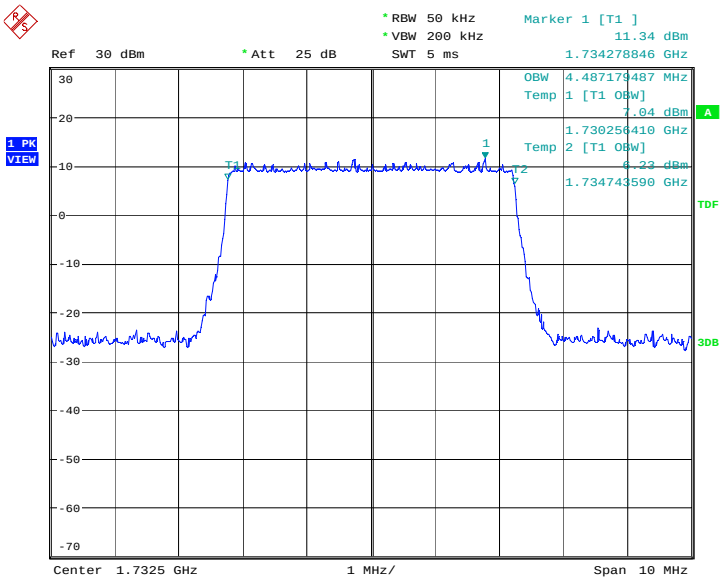


Date: 25.JUN.2013 06:27:06

LTE band 4, 5MHz (99%)

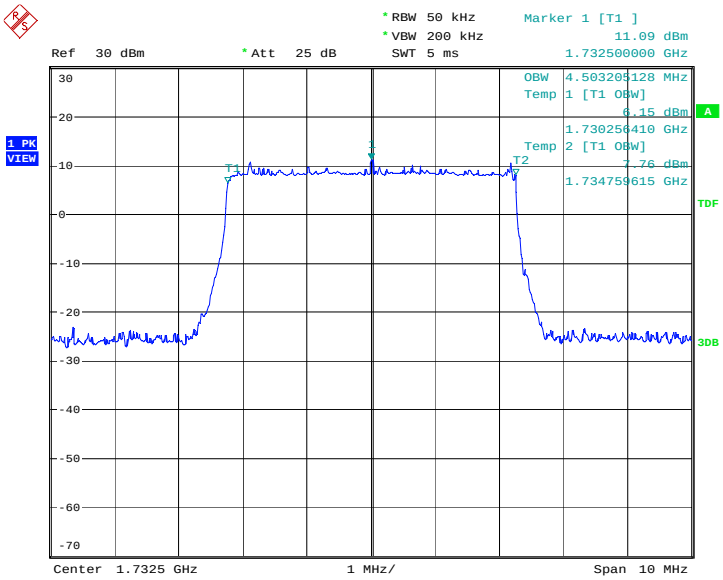
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	4487.18	4503.21

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



Date: 25.JUN.2013 06:32:34

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

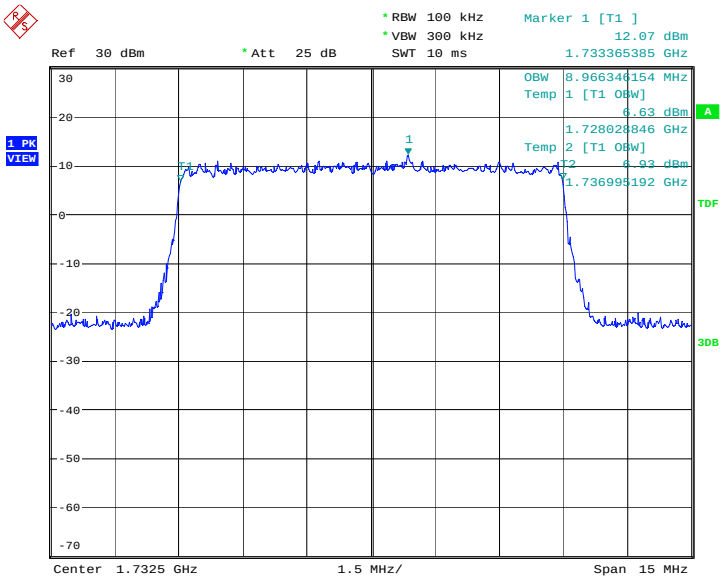


Date: 25.JUN.2013 06:32:47

LTE band 4, 10MHz (99%)

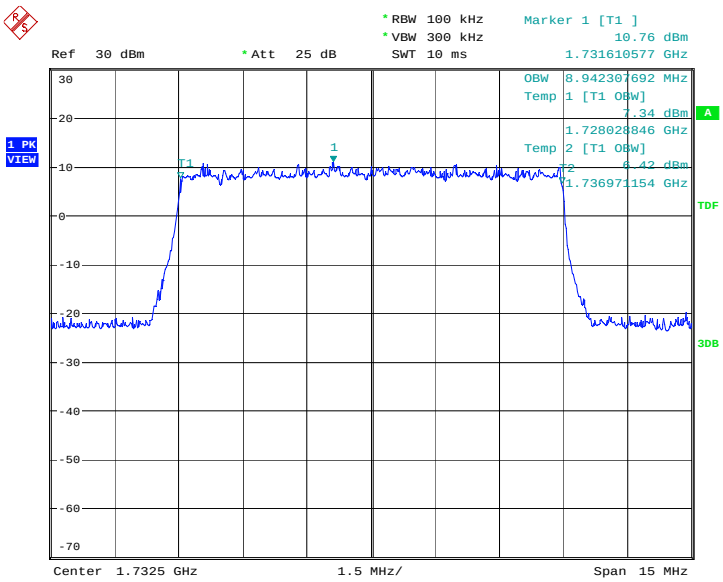
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	8966.35	8942.31

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



Date: 25.JUN.2013 06:38:43

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

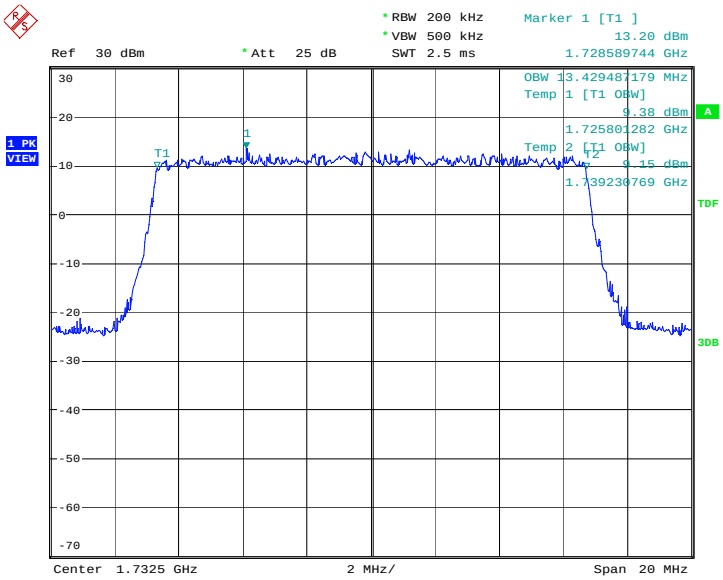


Date: 25.JUN.2013 06:38:56

LTE band 4, 15MHz (99%)

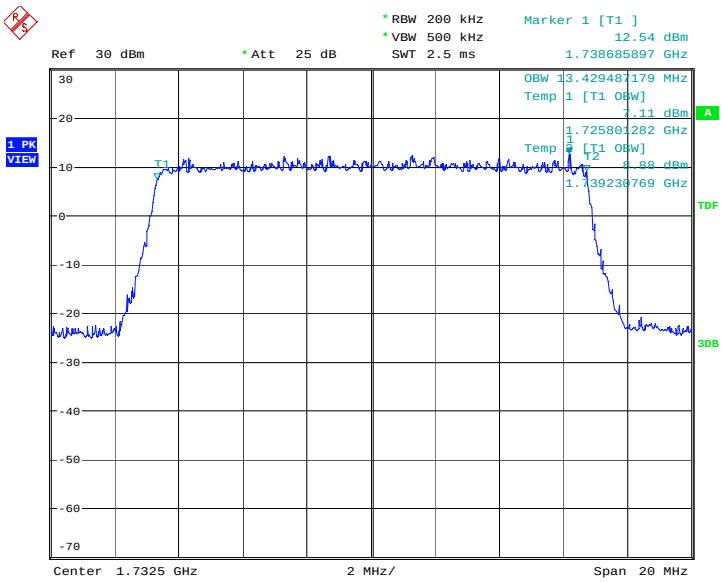
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	13429.49	13429.49

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



Date: 25.JUN.2013 06:45:23

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

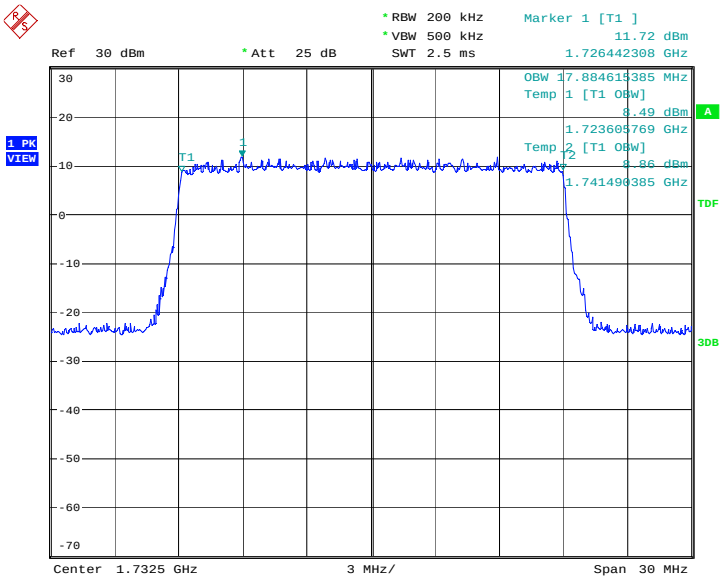


Date: 25.JUN.2013 06:45:36

LTE band 4, 20MHz (99%)

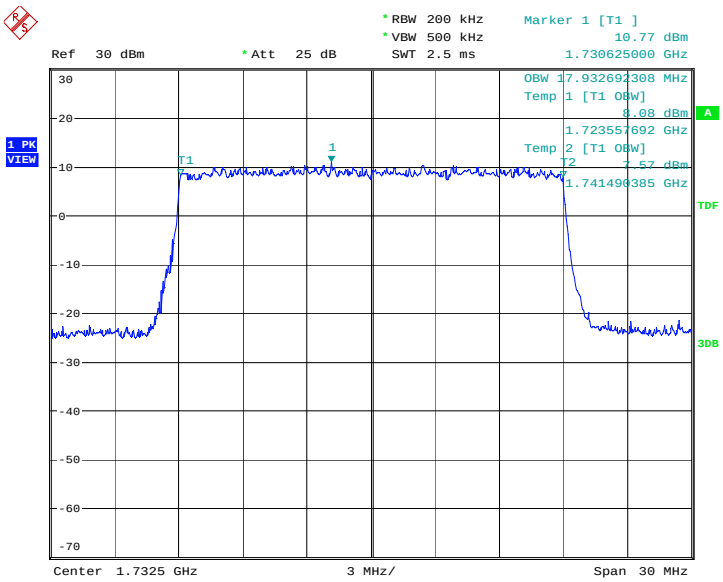
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	17884.62	17932.69

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



Date: 25.JUN.2013 06:50:32

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

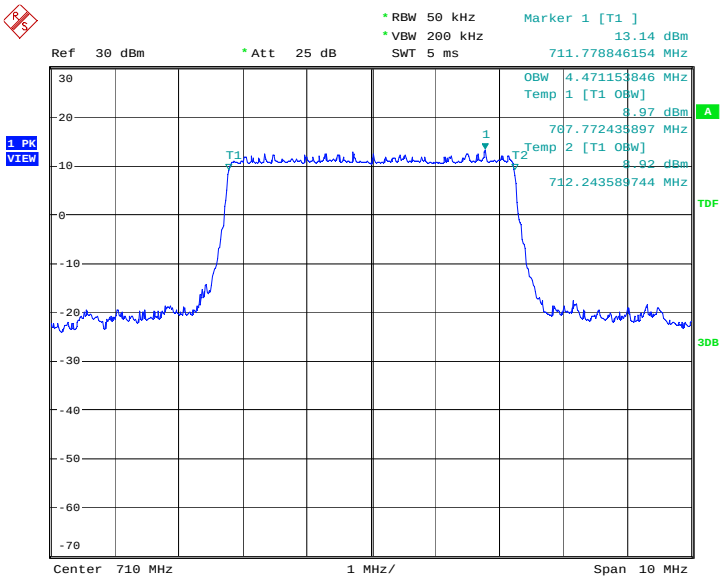


Date: 25.JUN.2013 06:50:45

LTE band 17, 5MHz (99%)

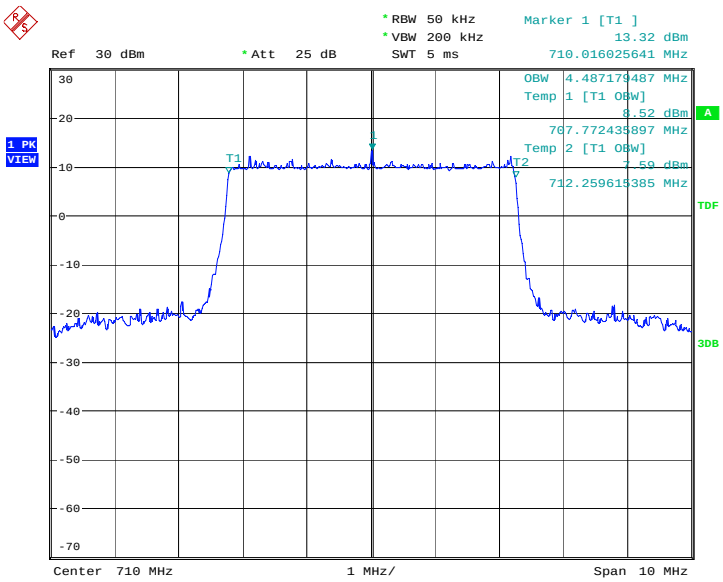
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
710.0	QPSK	16QAM
	4471.15	4487.18

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



Date: 25.JUN.2013 06:54:14

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

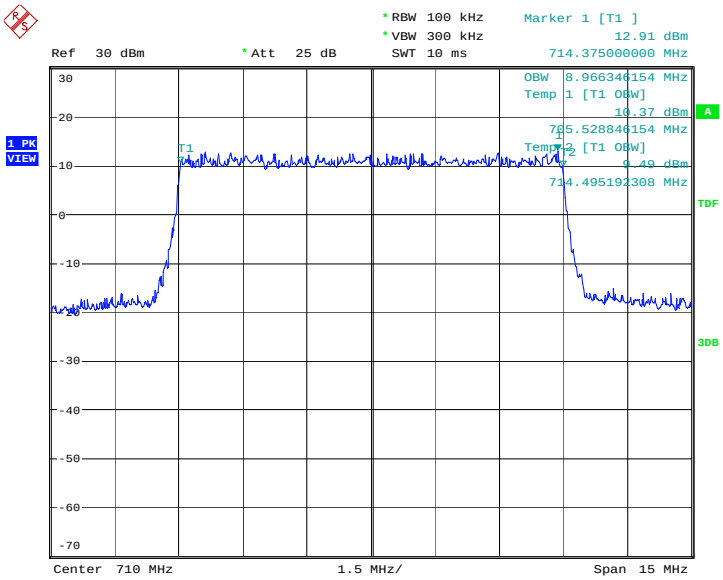


Date: 25.JUN.2013 06:54:27

LTE band 17, 10MHz (99%)

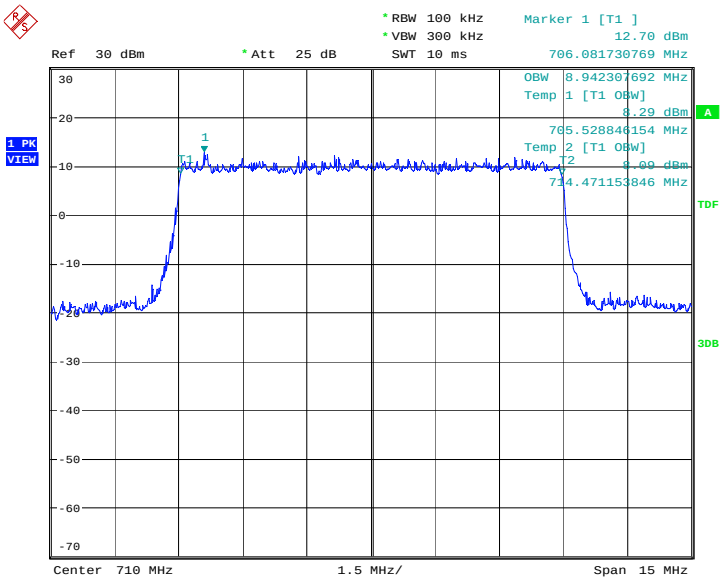
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
710.0	QPSK	16QAM
	8966.35	8942.31

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



Date: 25.JUN.2013 06:58:23

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



Date: 25.JUN.2013 06:58:37

A.6 EMISSION BANDWIDTH

Reference

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

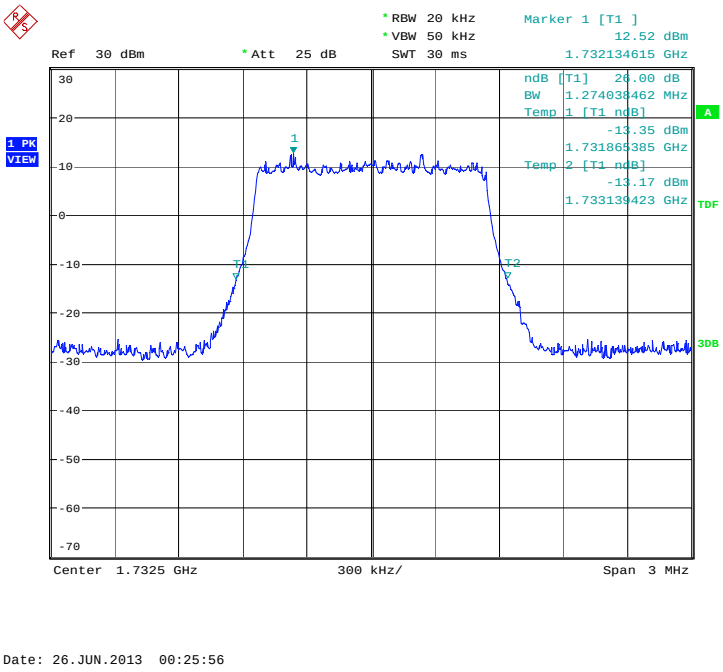
A.6.1Emission Bandwidth Results

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

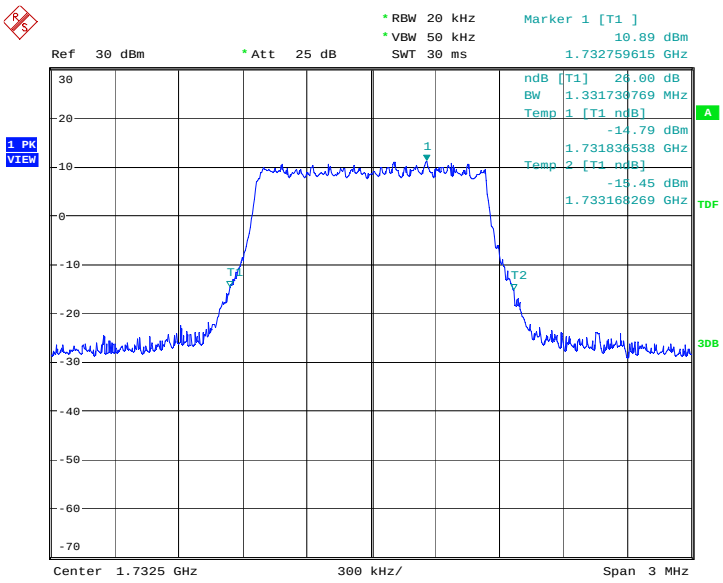
LTE band 4, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	1274.04	1331.73

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



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

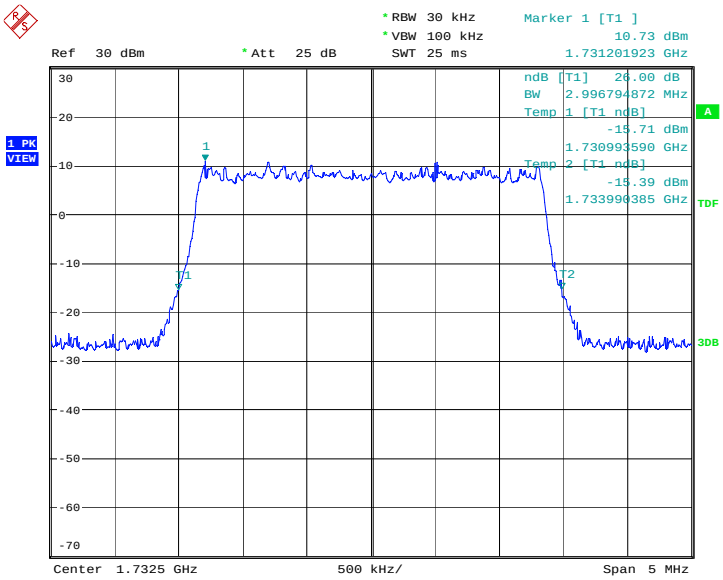


Date: 26.JUN.2013 00:26:12

LTE band 4, 3MHz (-26dBc)

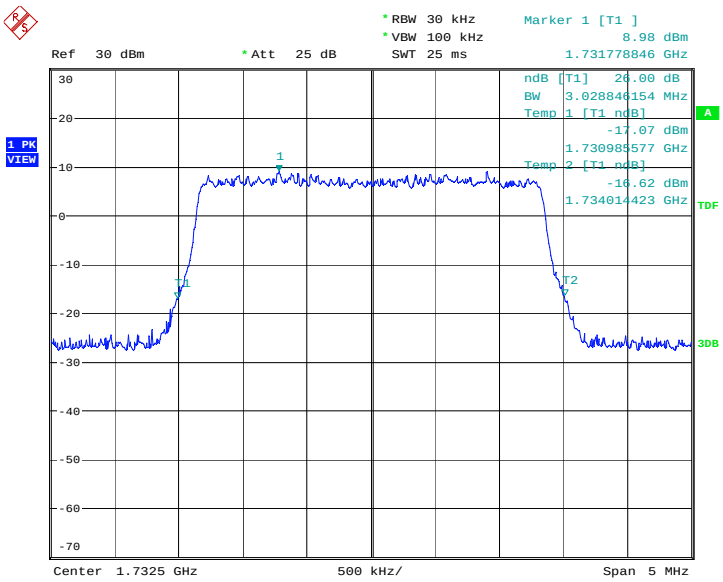
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	2996.79	3028.85

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



Date: 26.JUN.2013 00:34:31

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

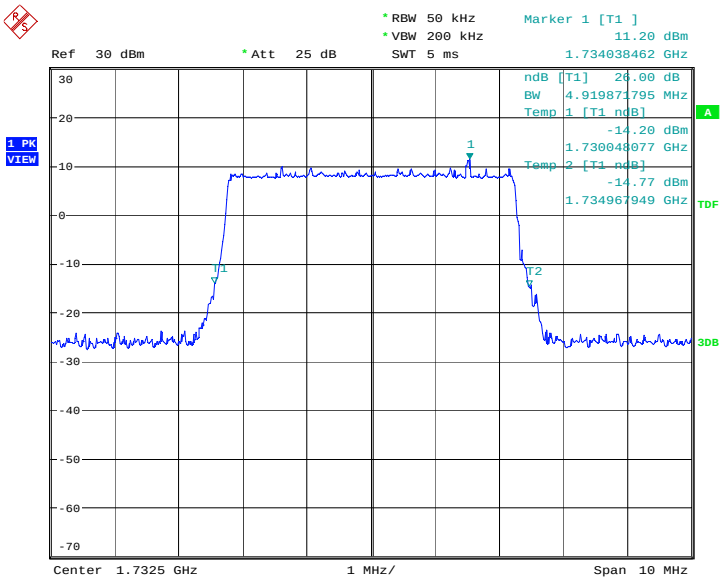


Date: 26.JUN.2013 00:34:46

LTE band 4, 5MHz (-26dBc)

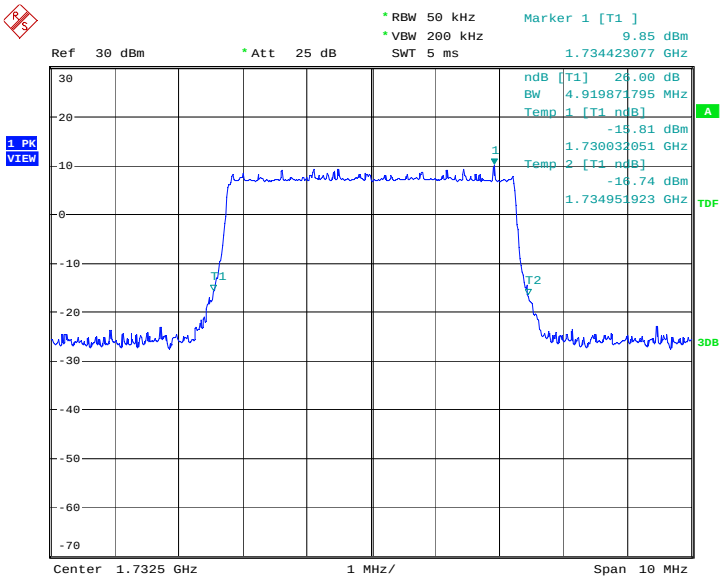
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	4919.87	4919.87

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



Date: 26.JUN.2013 00:40:04

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

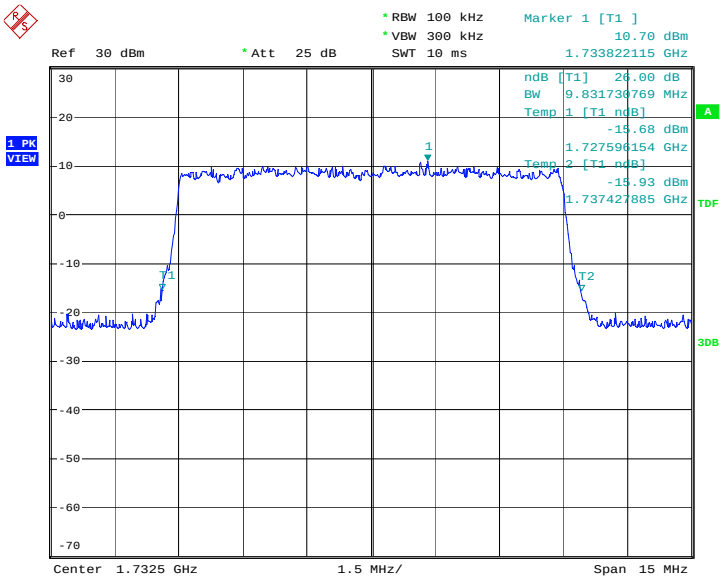


Date: 26.JUN.2013 00:40:20

LTE band 4, 10MHz (-26dBc)

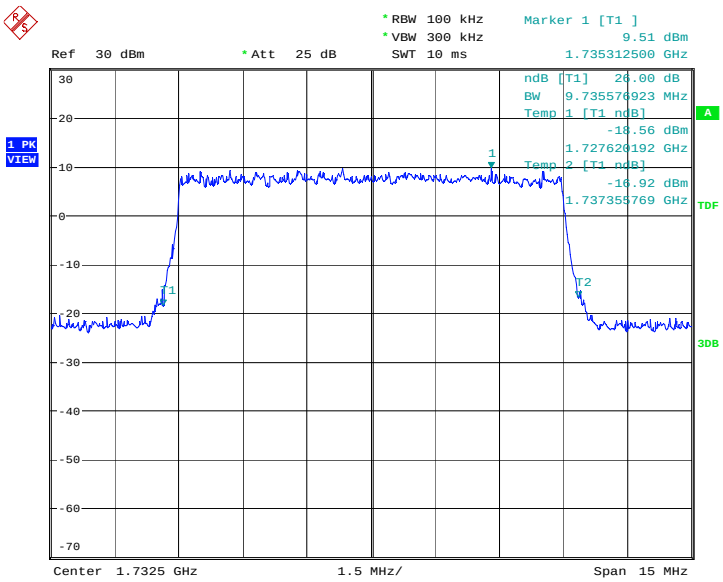
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	9831.73	9735.58

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



Date: 26.JUN.2013 00:45:37

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

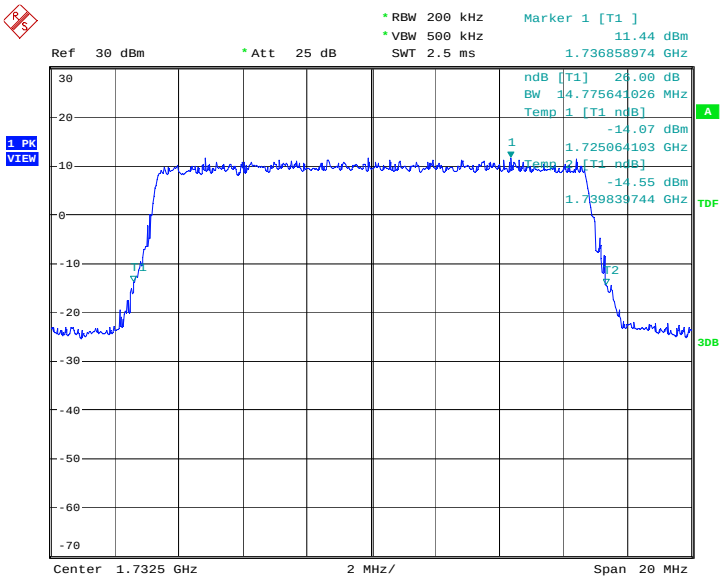


Date: 26.JUN.2013 00:45:53

LTE band 4, 15MHz (-26dBc)

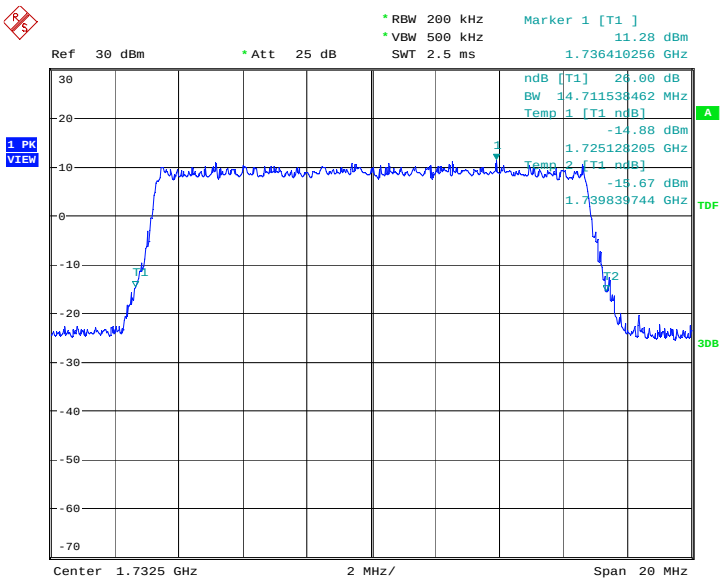
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	14775.64	14711.54

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



Date: 26.JUN.2013 00:51:11

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

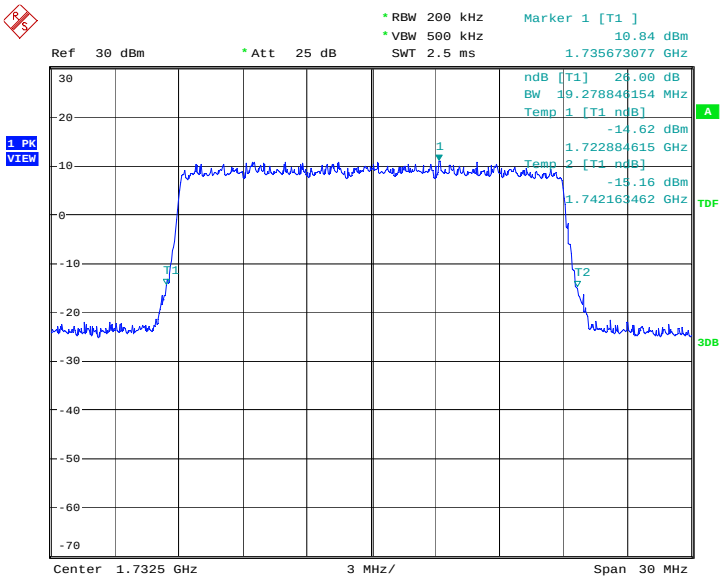


Date: 26.JUN.2013 00:51:27

LTE band 4, 20MHz (-26dBc)

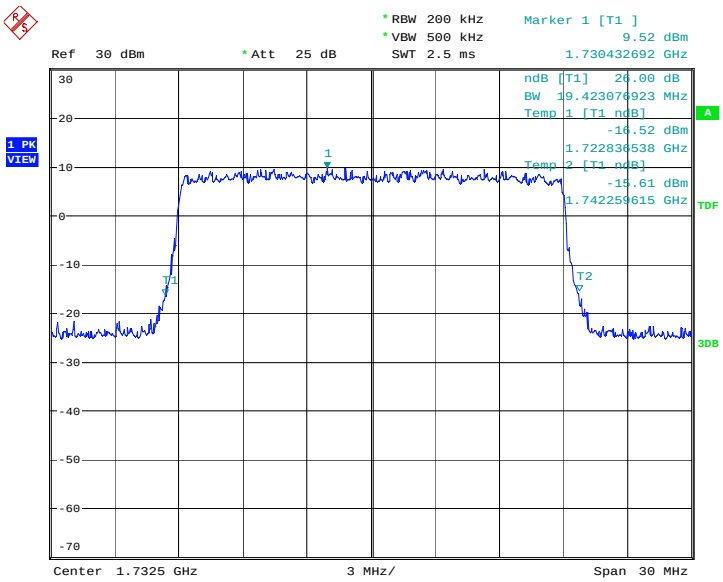
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	19278.85	19423.08

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



Date: 26.JUN.2013 00:57:15

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

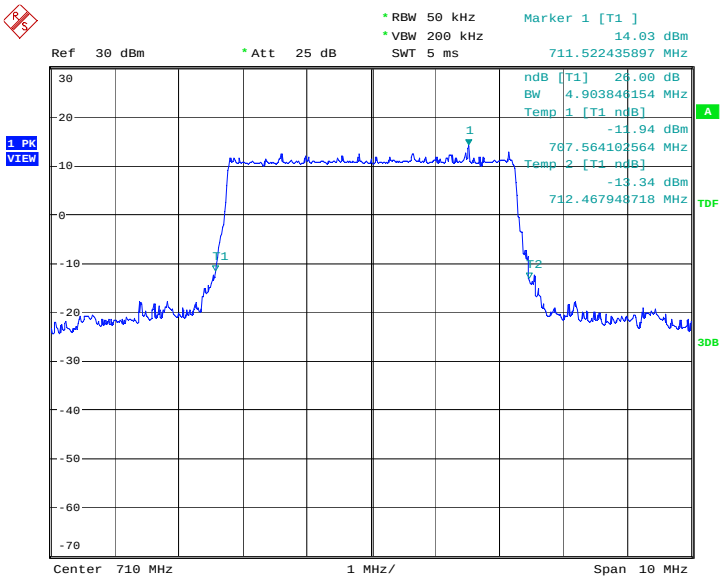


Date: 26.JUN.2013 00:57:31

LTE band 17, 5MHz (-26dBc)

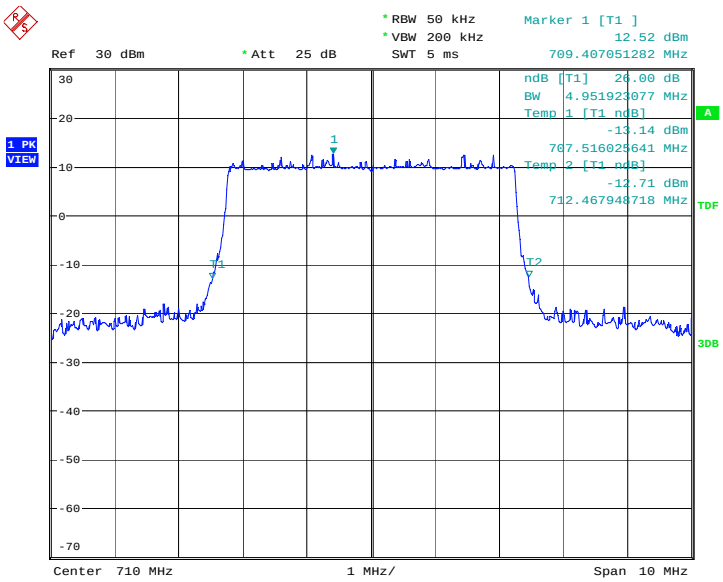
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
710.0	QPSK	16QAM
	4903.85	4951.92

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



Date: 26.JUN.2013 01:03:20

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

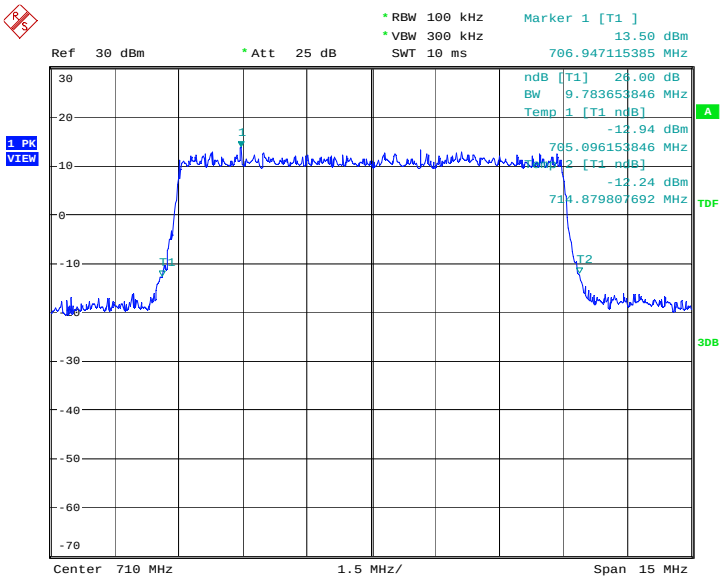


Date: 26.JUN.2013 01:03:36

LTE band 17, 10MHz (-26dBc)

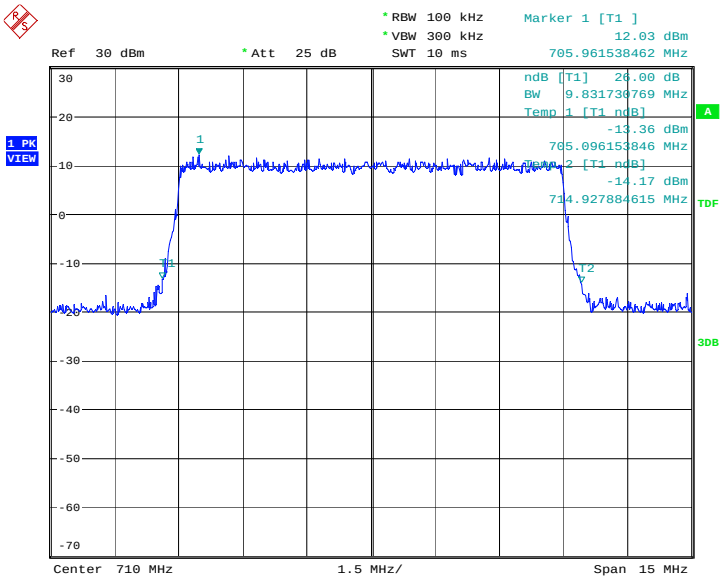
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
710.0	QPSK	16QAM
	9783.65	9831.73

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



Date: 26.JUN.2013 01:09:24

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



Date: 26.JUN.2013 01:09:39

A.7 BAND EDGE COMPLIANCE

Reference

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

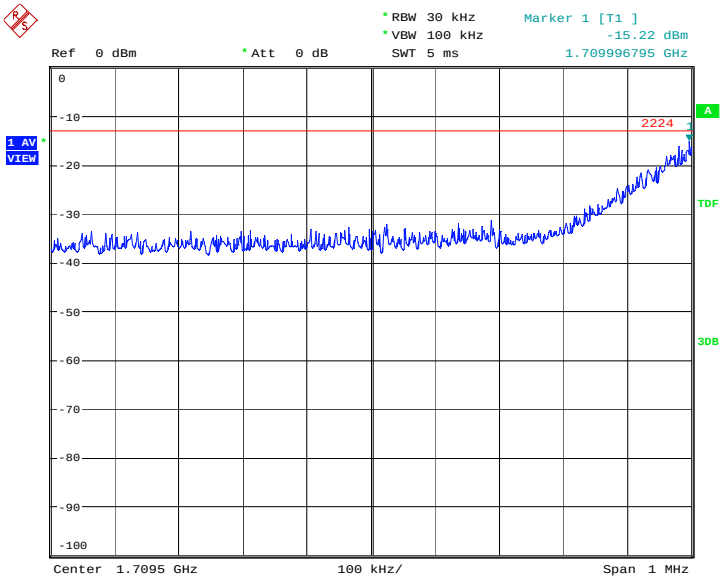
A.7.1 Measurement limit

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

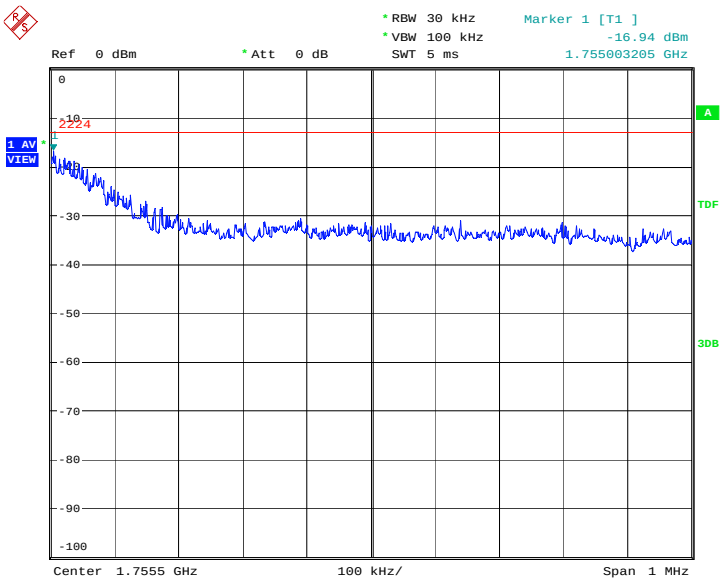
LTE band 4, 3MHz

LOW BAND EDGE BLOCK-QPSK



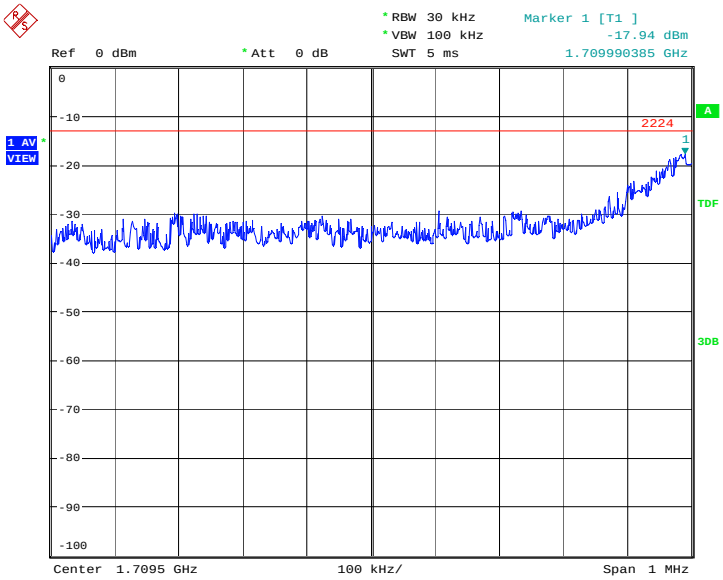
Date: 26.JUN.2013 00:33:24

HIGH BAND EDGE BLOCK-QPSK



Date: 26.JUN.2013 00:36:47

LOW BAND EDGE BLOCK-16QAM



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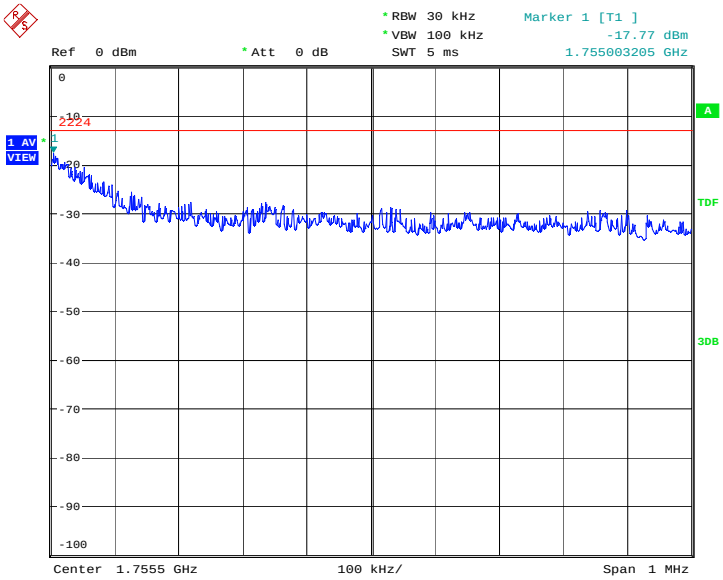
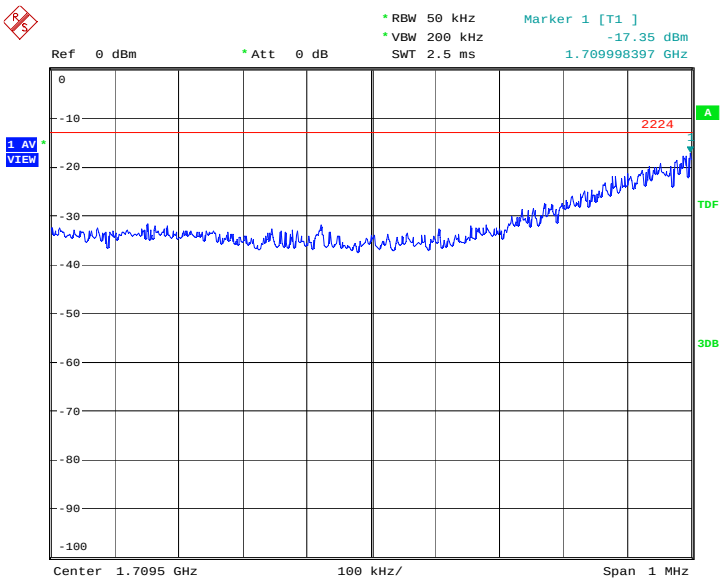
HIGH BAND EDGE BLOCK-16QAM



Date: 26.JUN.2013 00:36:58

LTE band 4, 5MHz

LOW BAND EDGE BLOCK-QPSK



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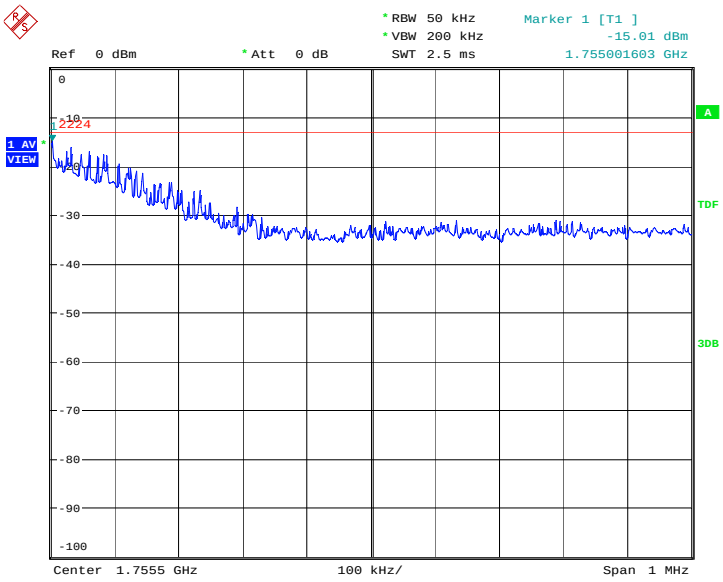
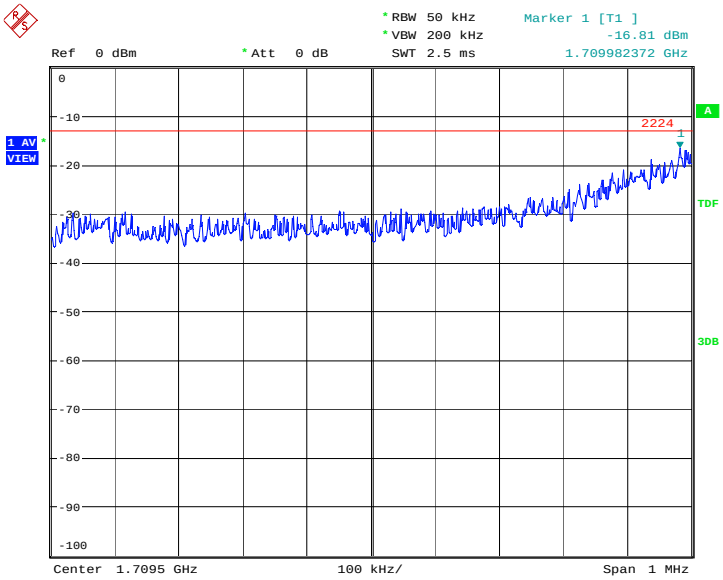
HIGH BAND EDGE BLOCK-QPSK



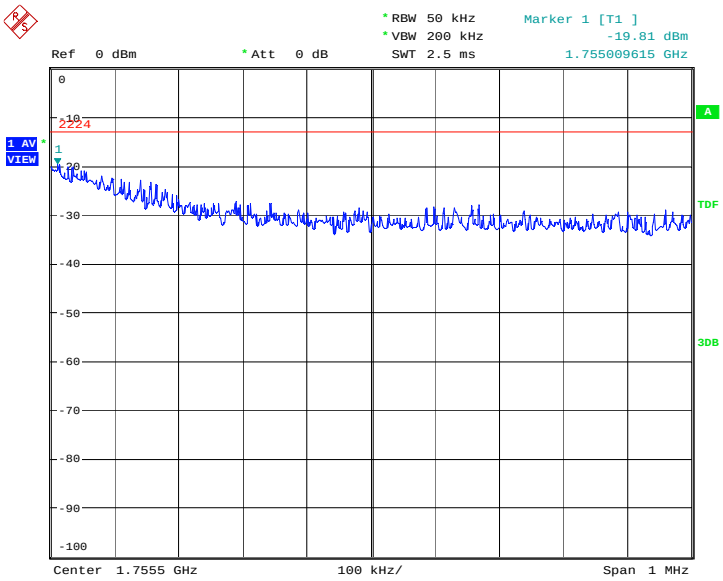
Date: 26.JUN.2013 00:42:21

LOW BAND EDGE BLOCK-16QAM



Date: 26.JUN.2013 00:39:09

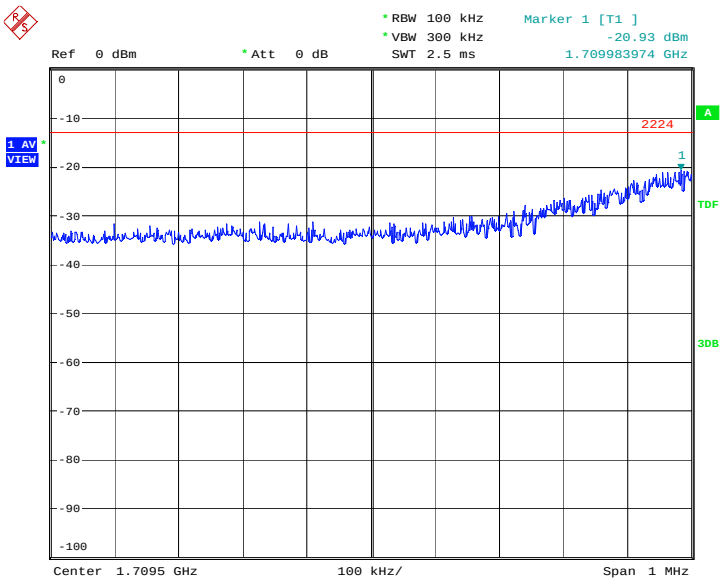
HIGH BAND EDGE BLOCK-16QAM



Date: 26.JUN.2013 00:42:31

LTE band 4, 10MHz

LOW BAND EDGE BLOCK-QPSK



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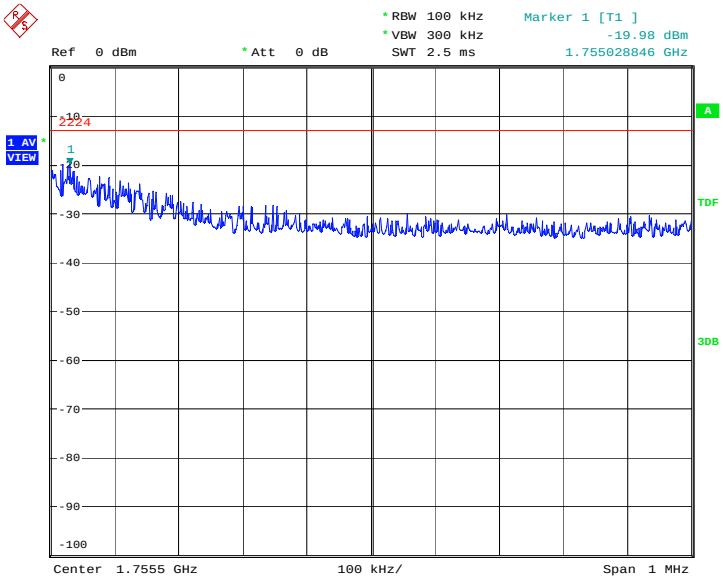
HIGH BAND EDGE BLOCK-QPSK



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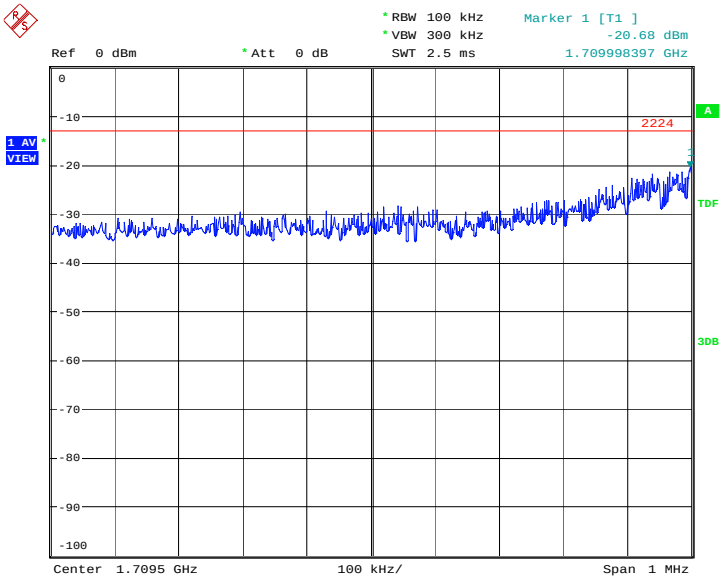
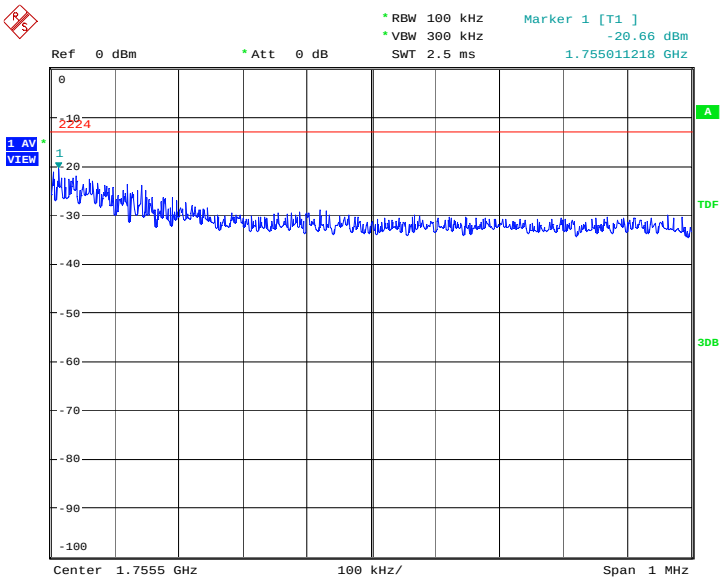
LOW BAND EDGE BLOCK-16QAM



Date: 26.JUN.2013 00:44:42

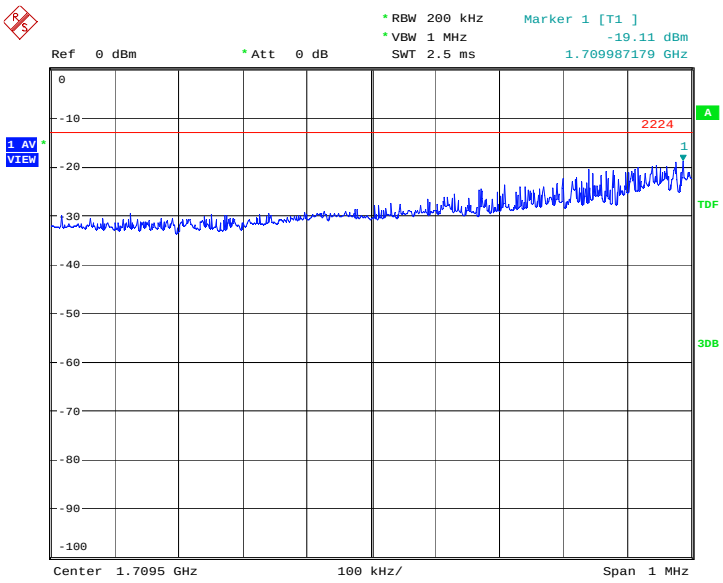
HIGH BAND EDGE BLOCK-16QAM



Date: 26.JUN.2013 00:48:04

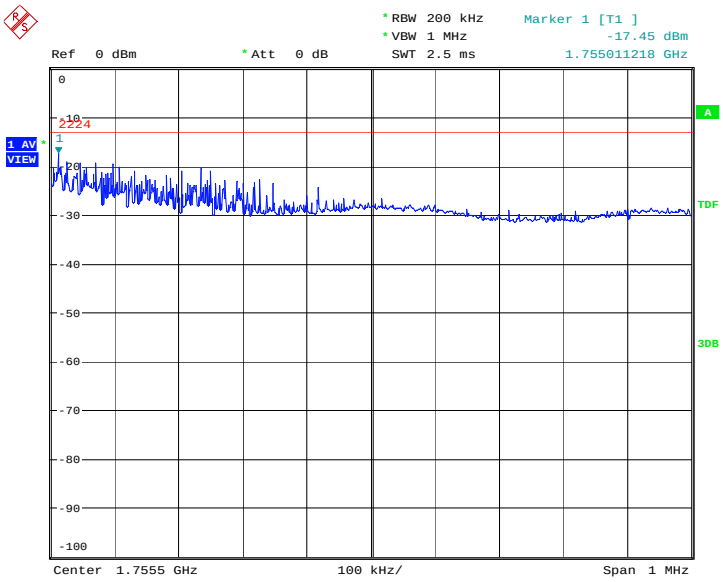
LTE band 4, 15MHz

LOW BAND EDGE BLOCK-QPSK



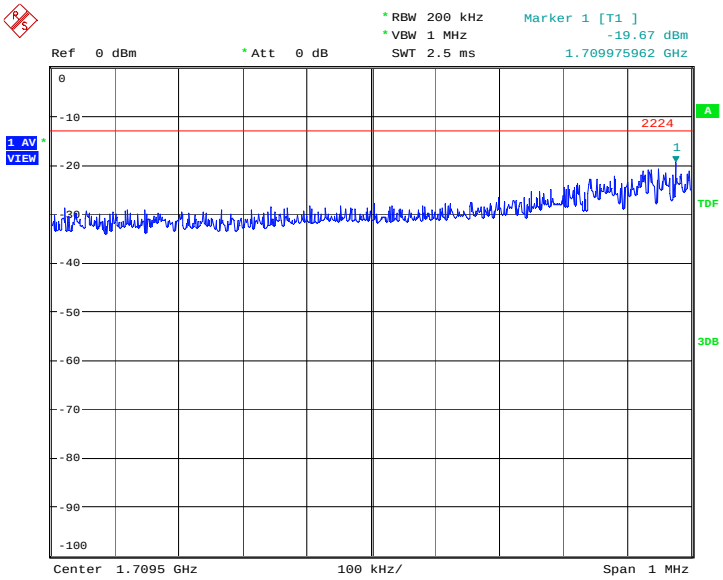
Date: 26.JUN.2013 00:50:05

HIGH BAND EDGE BLOCK-QPSK



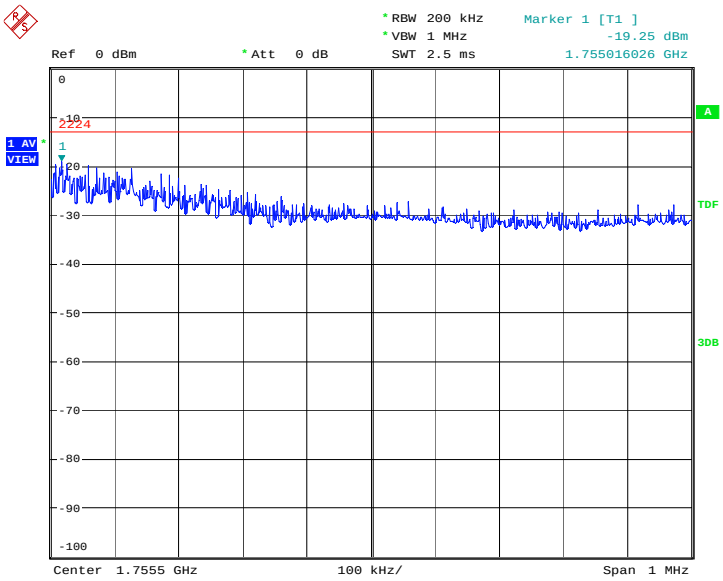
Date: 26.JUN.2013 00:53:28

LOW BAND EDGE BLOCK-16QAM



Date: 26.JUN.2013 00:50:16

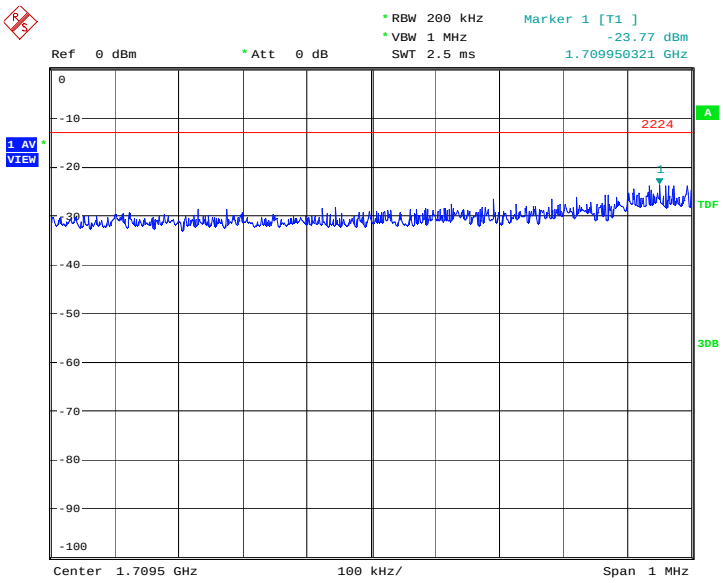
HIGH BAND EDGE BLOCK-16QAM



Date: 26.JUN.2013 00:53:38

LTE band 4, 20MHz

LOW BAND EDGE BLOCK-QPSK



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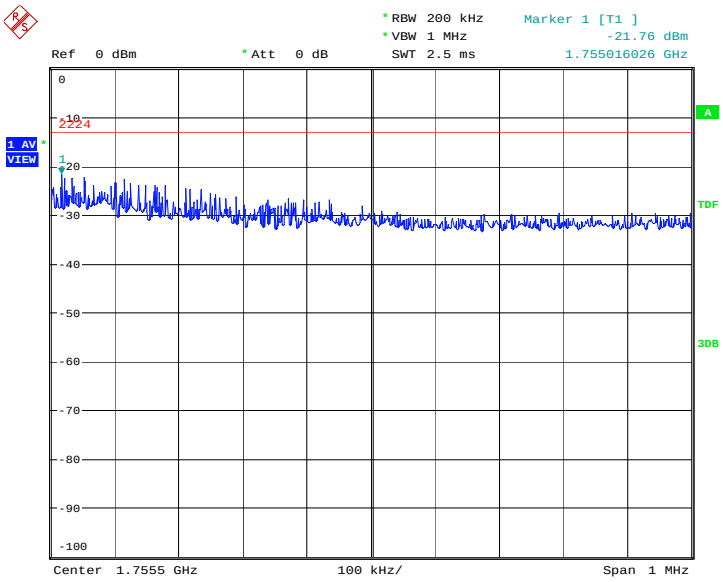
HIGH BAND EDGE BLOCK-QPSK



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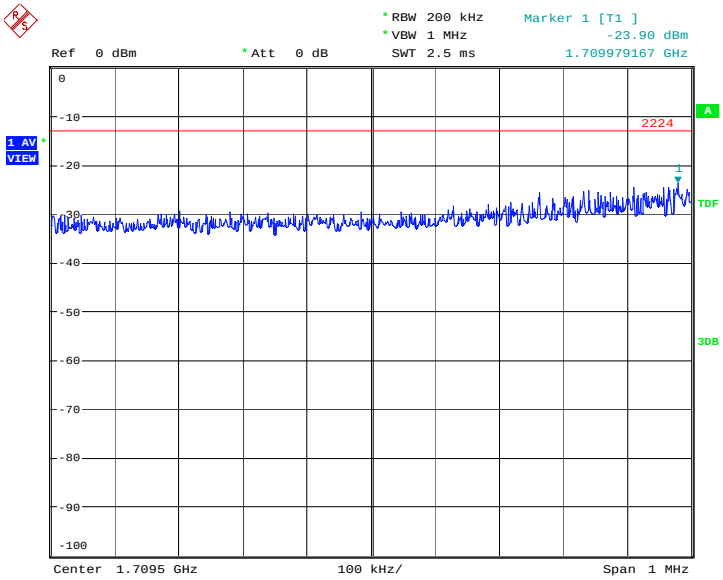
LOW BAND EDGE BLOCK-16QAM



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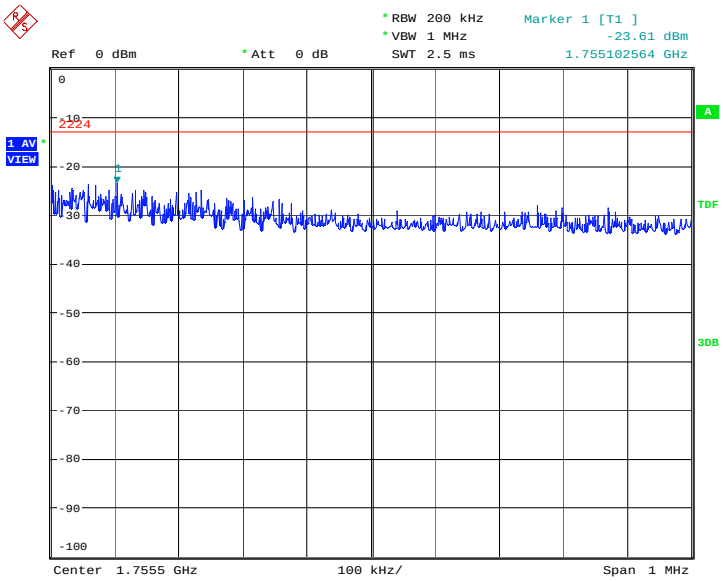
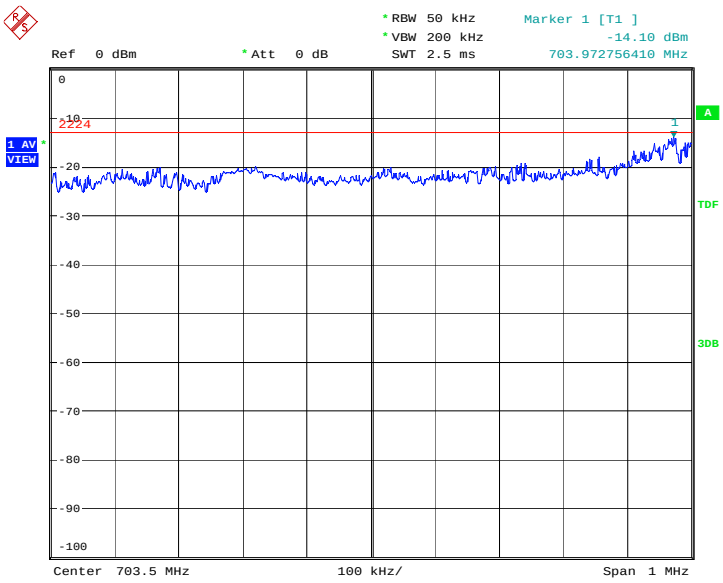
HIGH BAND EDGE BLOCK-16QAM



Date: 26.JUN.2013 00:59:42

LTE band 17, 5MHz

LOW BAND EDGE BLOCK-QPSK



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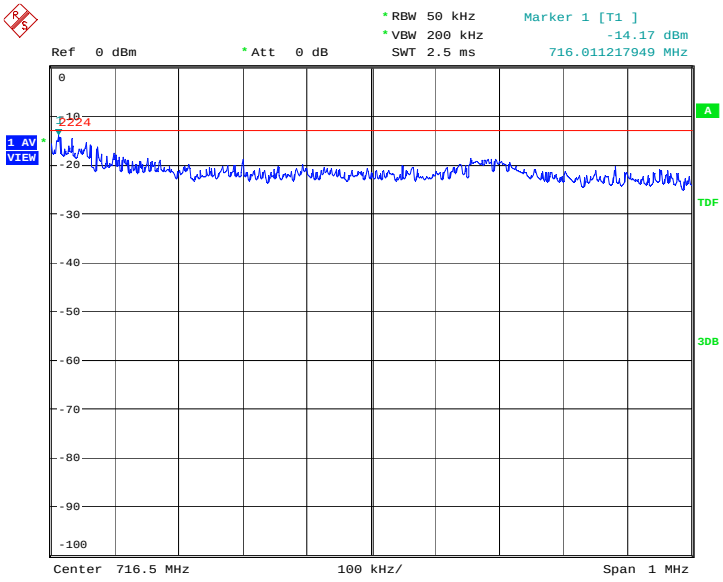
HIGH BAND EDGE BLOCK-QPSK



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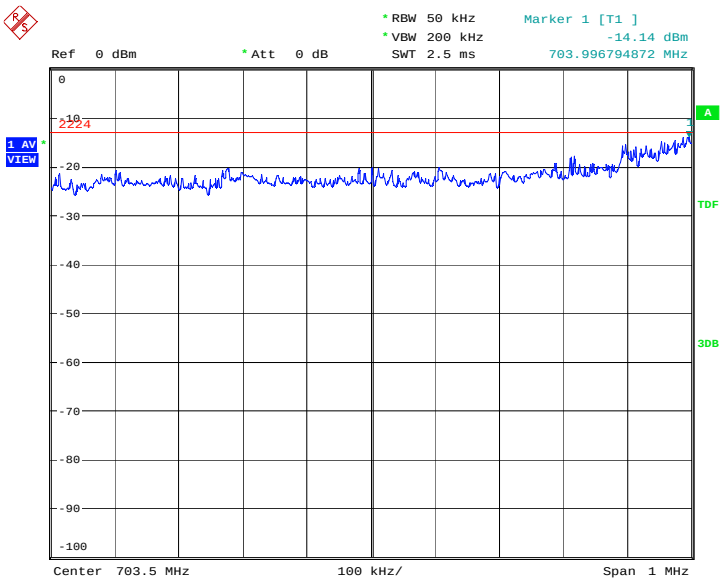
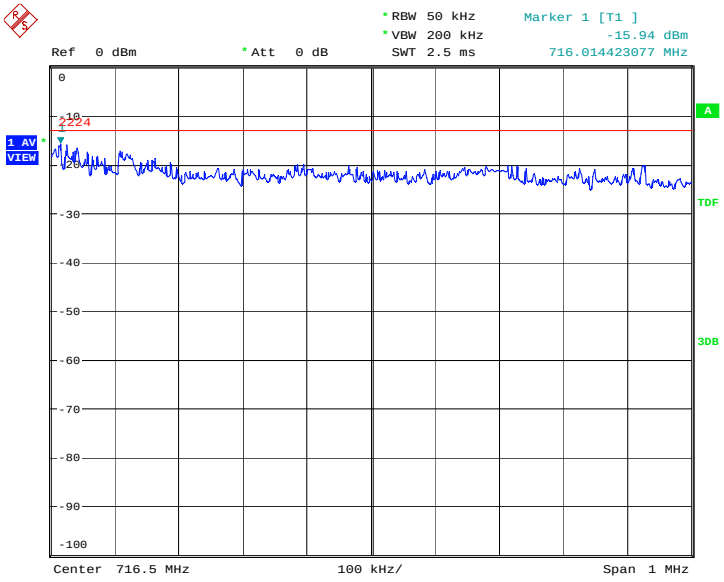


Date: 26.JUN.2013 01:02:25

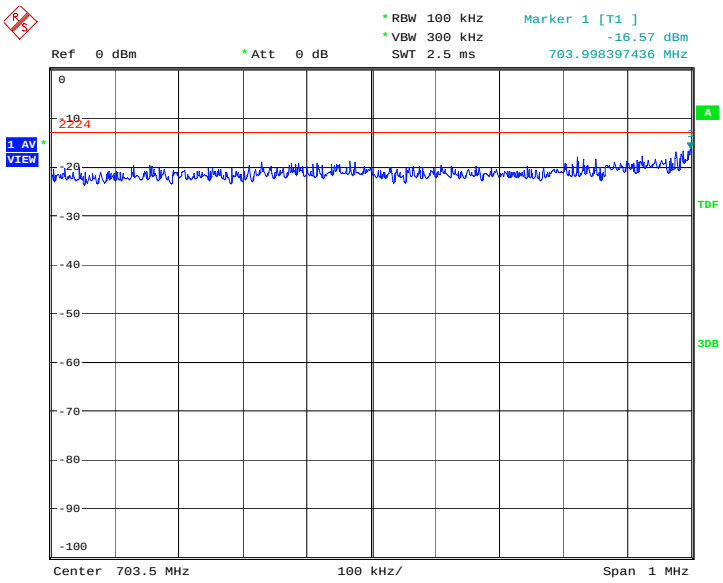
HIGH BAND EDGE BLOCK-16QAM



Date: 26.JUN.2013 01:05:47

LTE band 17, 10MHz

LOW BAND EDGE BLOCK-QPSK



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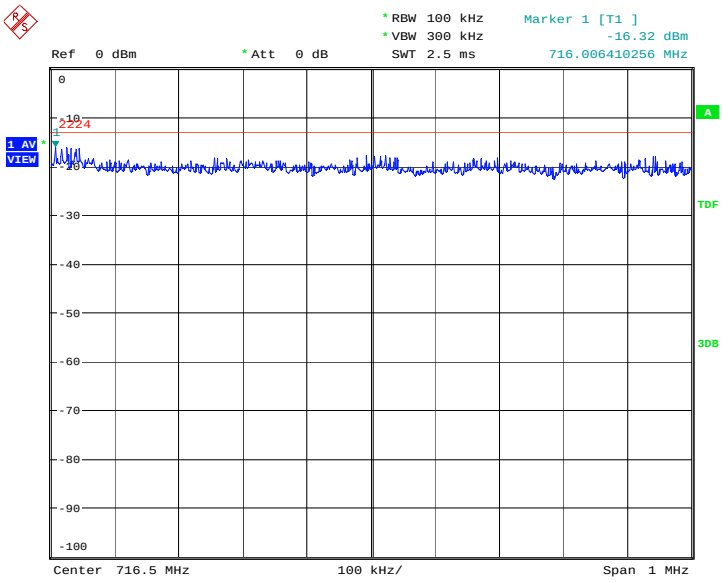
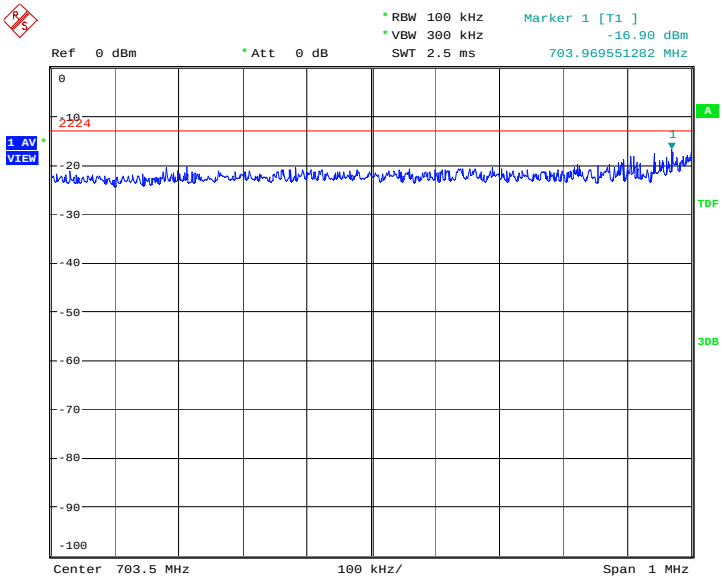
HIGH BAND EDGE BLOCK-QPSK



Date: 26.JUN.2013 01:11:40

LOW BAND EDGE BLOCK-16QAM



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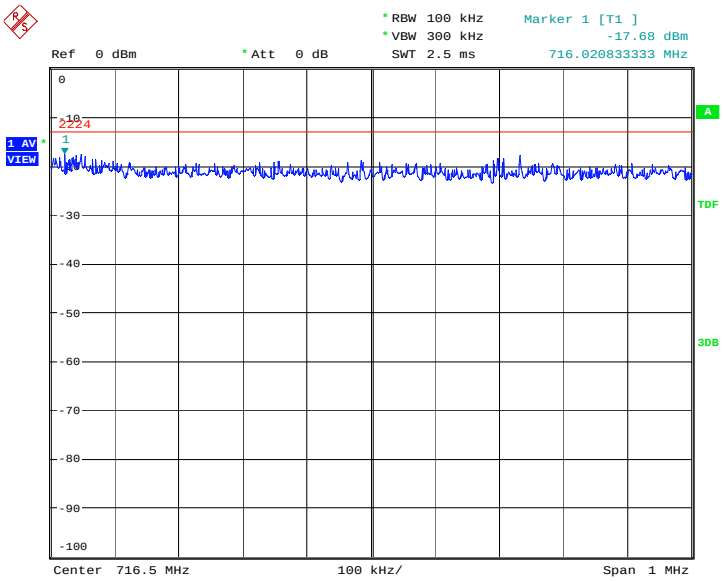
HIGH BAND EDGE BLOCK-16QAM



Date: 26.JUN.2013 01:11:50

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.

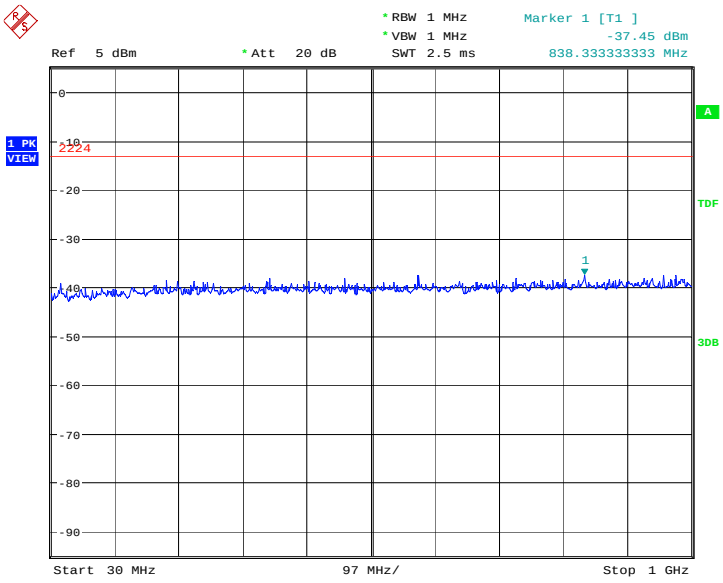
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. 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

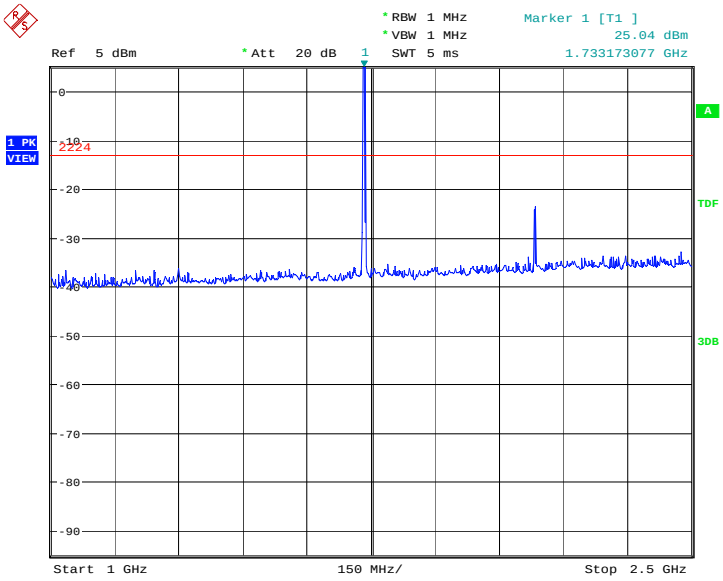
Spurious emission limit –13dBm.



Date: 26.JUN.2013 01:17:11

QPSK: 1GHz – 2.5GHz

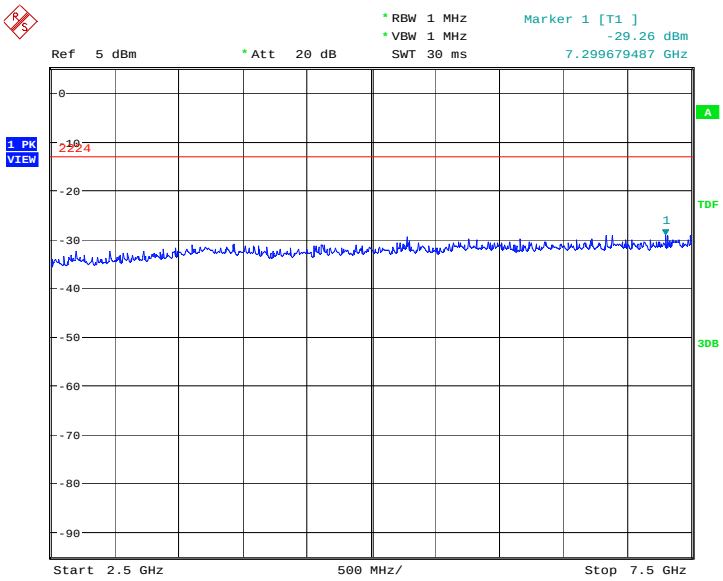
Spurious emission limit –13dBm.



Date: 26.JUN.2013 01:17:19

QPSK: 2.5GHz – 7.5GHz

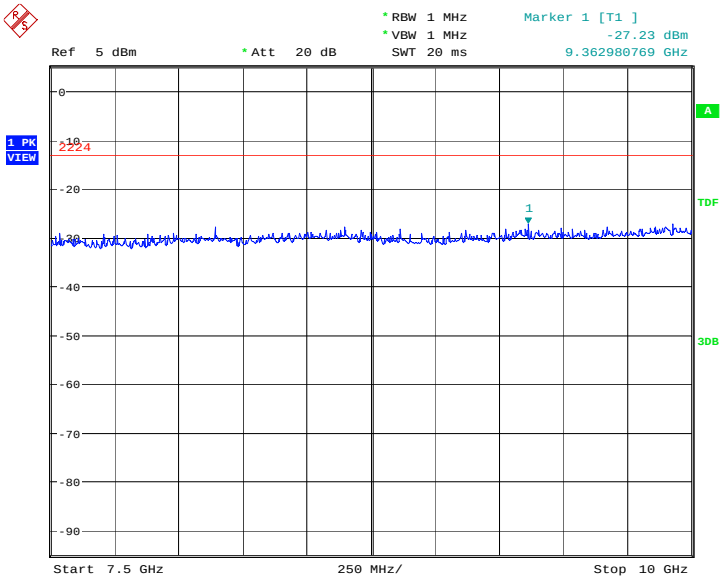
Spurious emission limit –13dBm.



Date: 26.JUN.2013 01:17:27

QPSK: 7.5GHz –10GHz

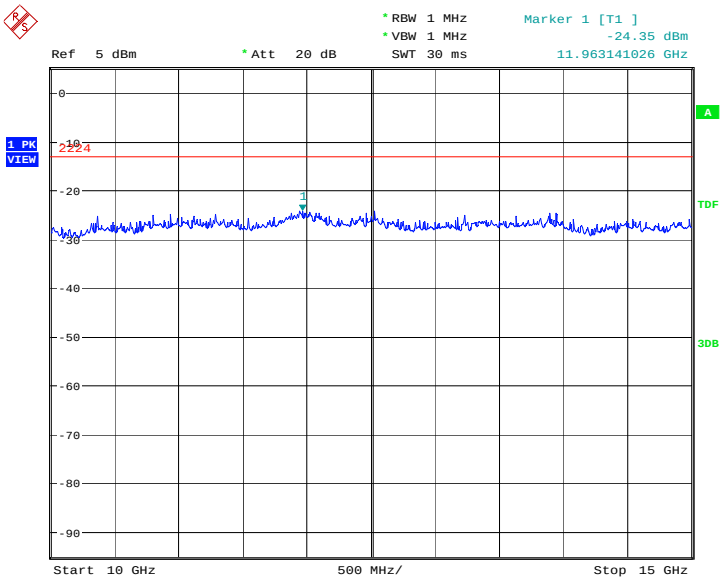
Spurious emission limit –13dBm.



Date: 26.JUN.2013 01:17:35

QPSK: 10GHz –15GHz

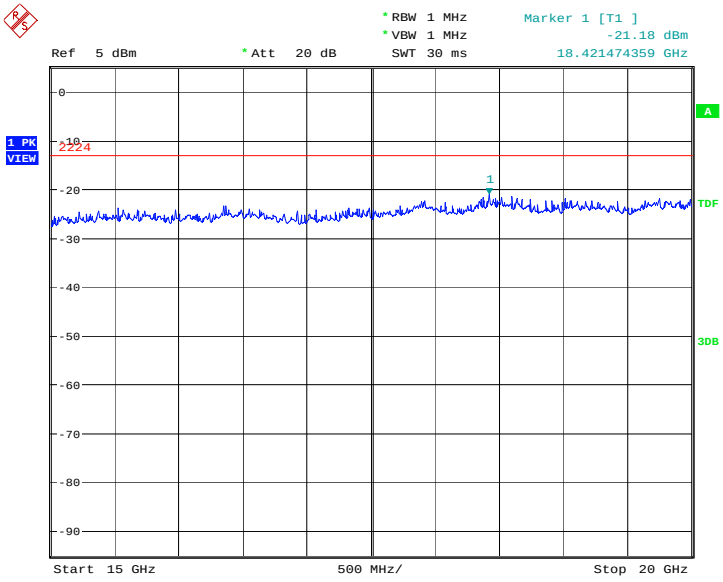
Spurious emission limit –13dBm.



Date: 26.JUN.2013 01:17:43

QPSK: 15GHz –20GHz

Spurious emission limit –13dBm.



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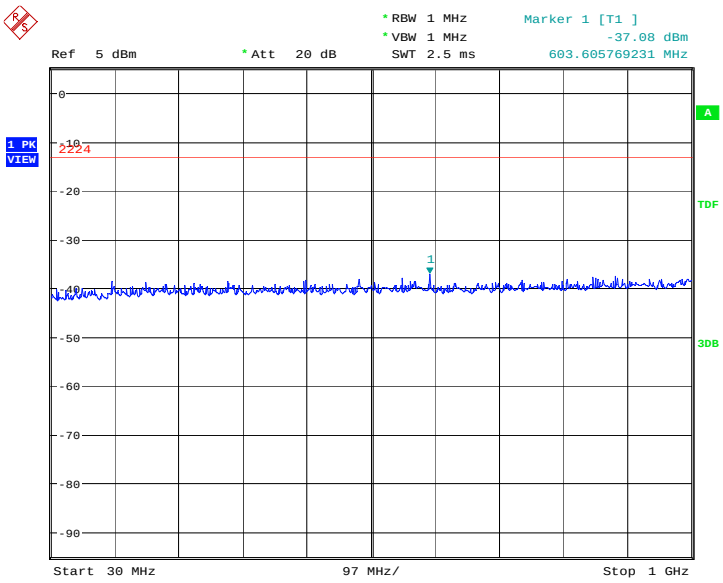
16QAM: 30MHz – 1GHz

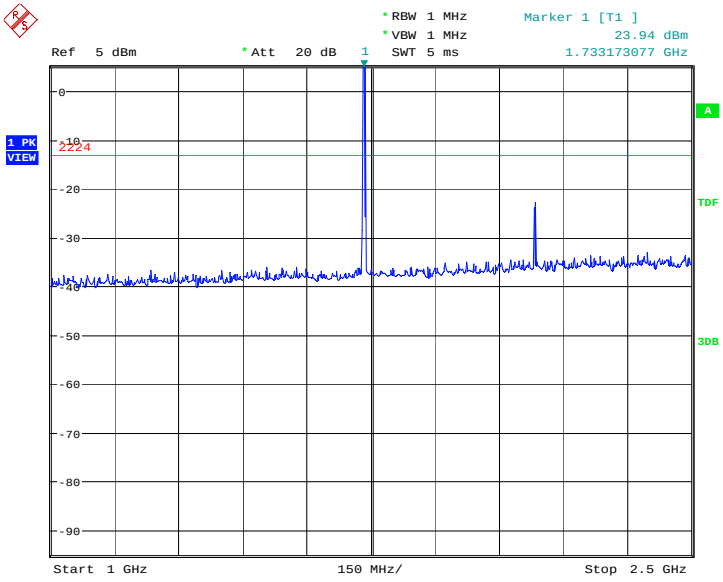
Spurious emission limit –13dBm.



Date: 26.JUN.2013 01:18:01

16QAM: 1GHz – 2.5GHz

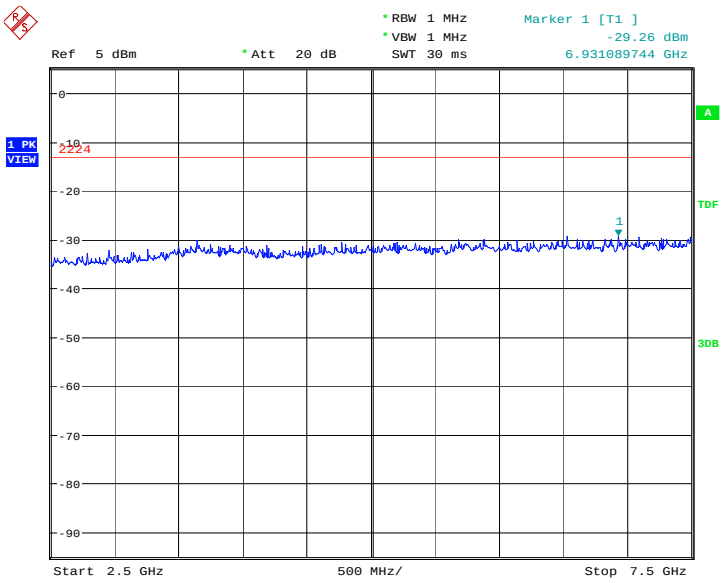
Spurious emission limit –13dBm.



Date: 26.JUN.2013 01:18:09

16QAM: 2.5GHz – 7.5GHz

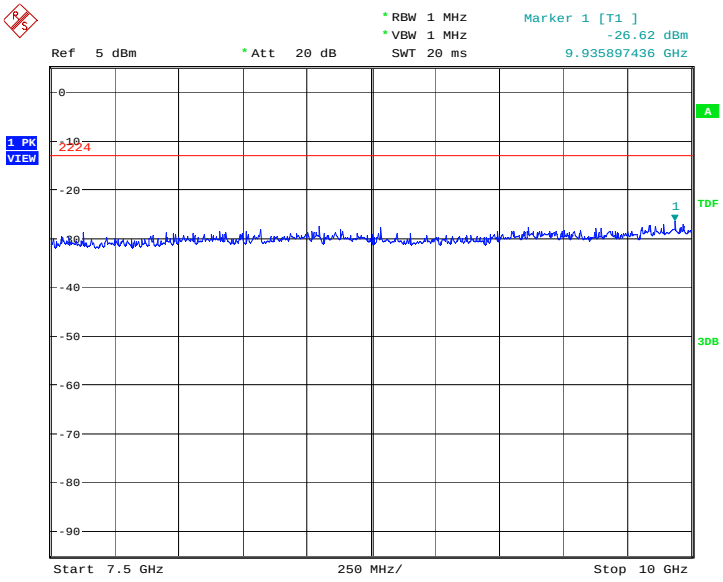
Spurious emission limit –13dBm.



Date: 26.JUN.2013 01:18:17

16QAM: 7.5GHz –10GHz

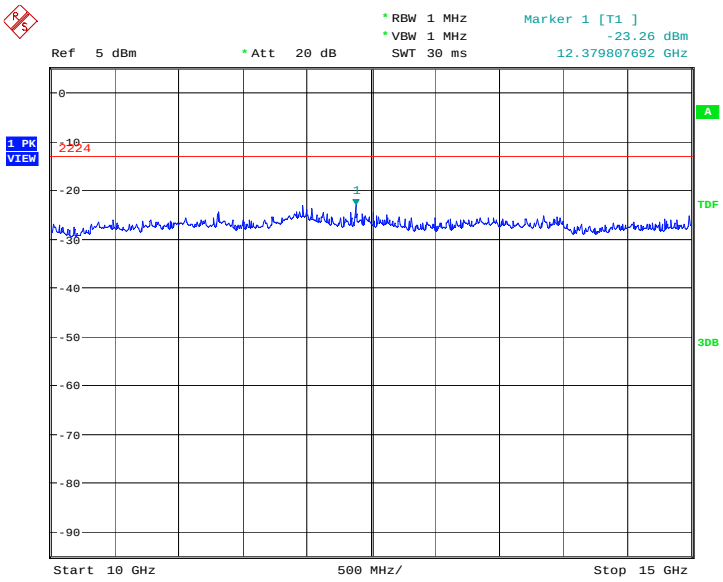
Spurious emission limit –13dBm.



Date: 26.JUN.2013 01:18:25

16QAM: 10GHz –15GHz

Spurious emission limit –13dBm.



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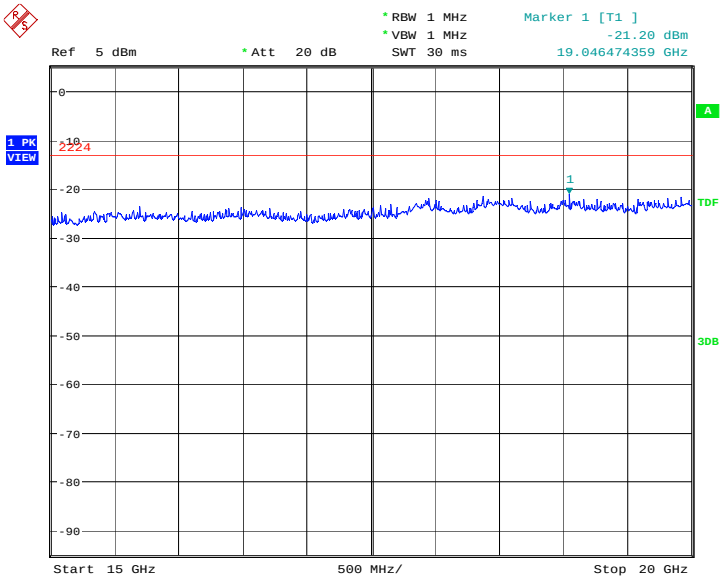
16QAM: 15GHz –20GHz

Spurious emission limit –13dBm.

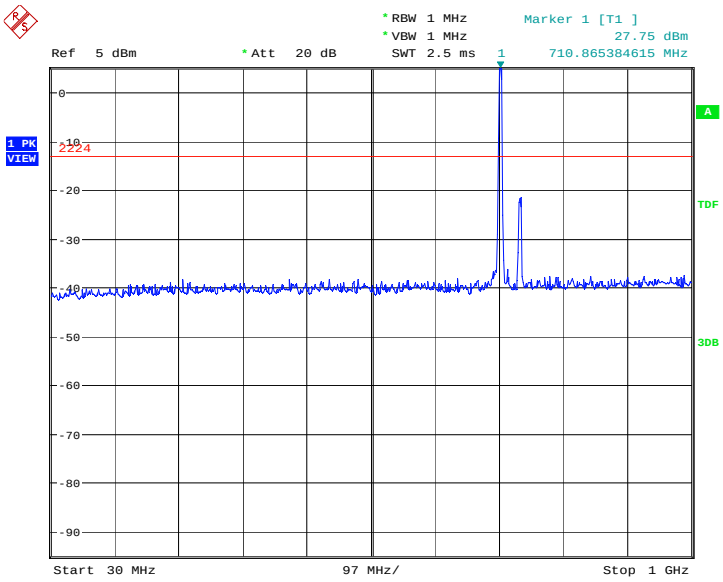


Date: 26.JUN.2013 01:18:41

LTE band 17, 5MHz bandwidth

QPSK: 30MHz – 1GHz

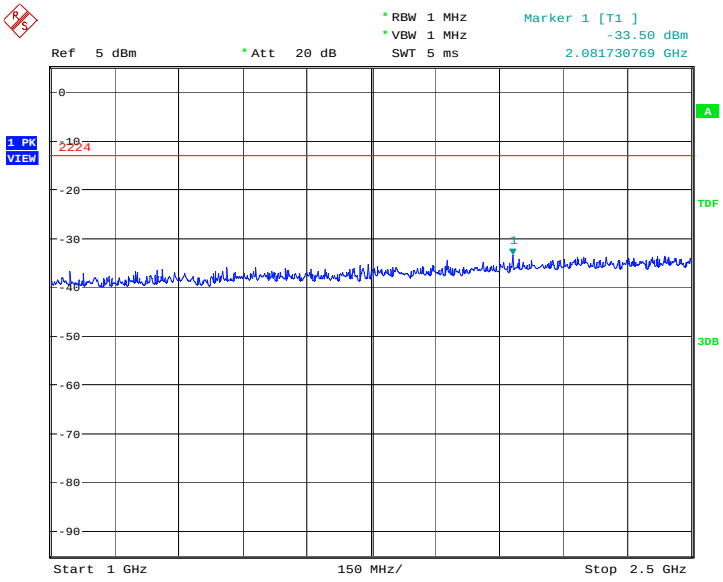
Spurious emission limit –13dBm.



Date: 26.JUN.2013 02:02:42

QPSK: 1GHz – 2.5GHz

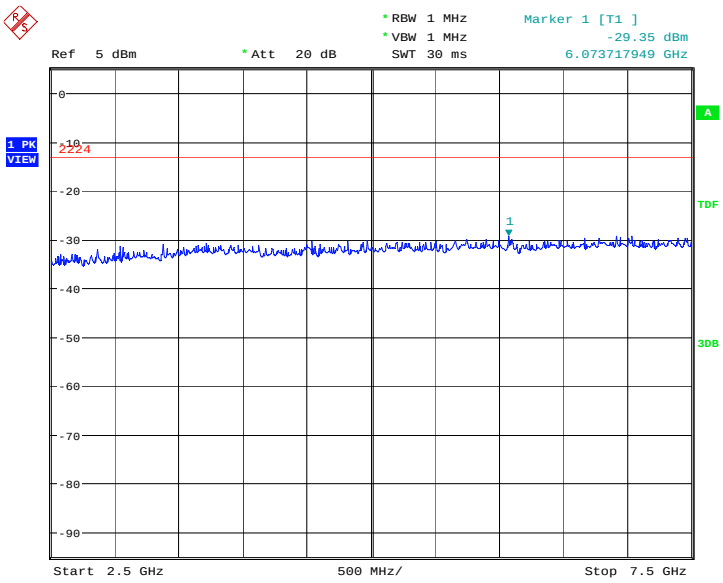
Spurious emission limit –13dBm.



Date: 26.JUN.2013 02:02:50

QPSK: 2.5GHz – 7.5GHz

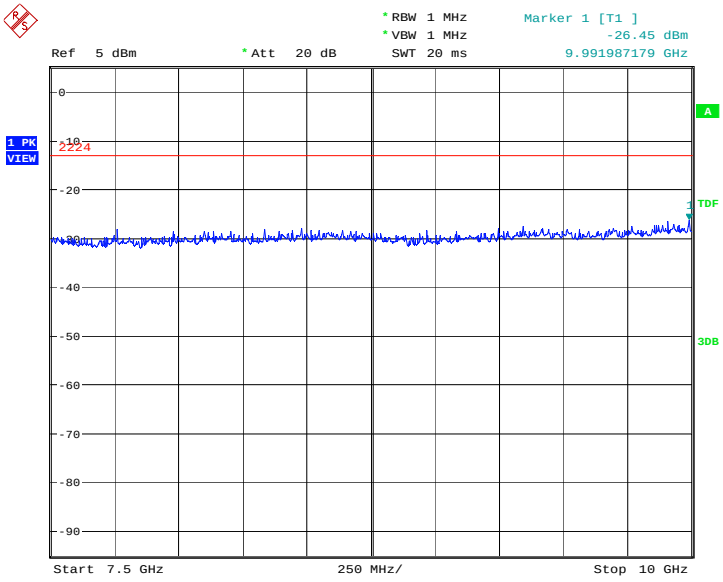
Spurious emission limit –13dBm.



Date: 26.JUN.2013 02:02:58

QPSK: 7.5GHz –10GHz

Spurious emission limit –13dBm.



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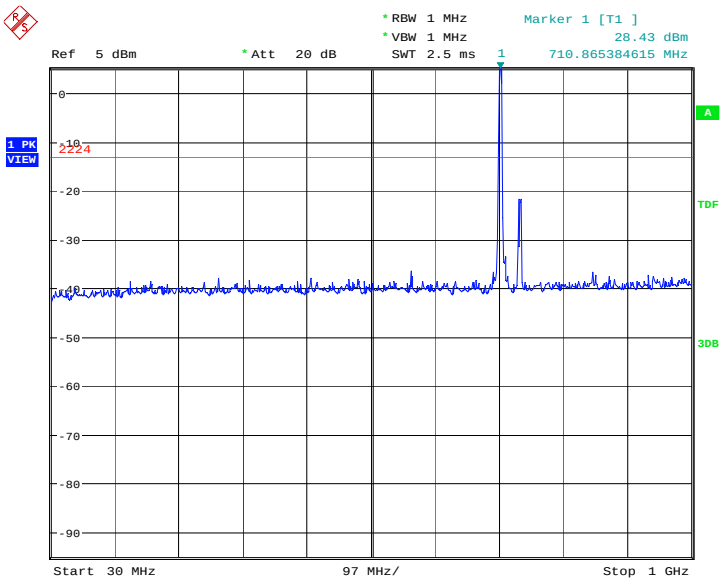
16QAM: 30MHz – 1GHz

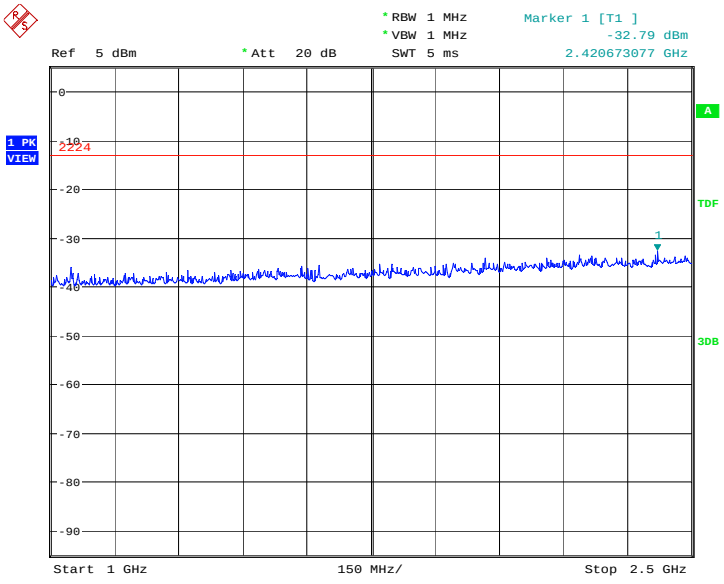
Spurious emission limit –13dBm.



Date: 26.JUN.2013 02:03:16

16QAM: 1GHz – 2.5GHz

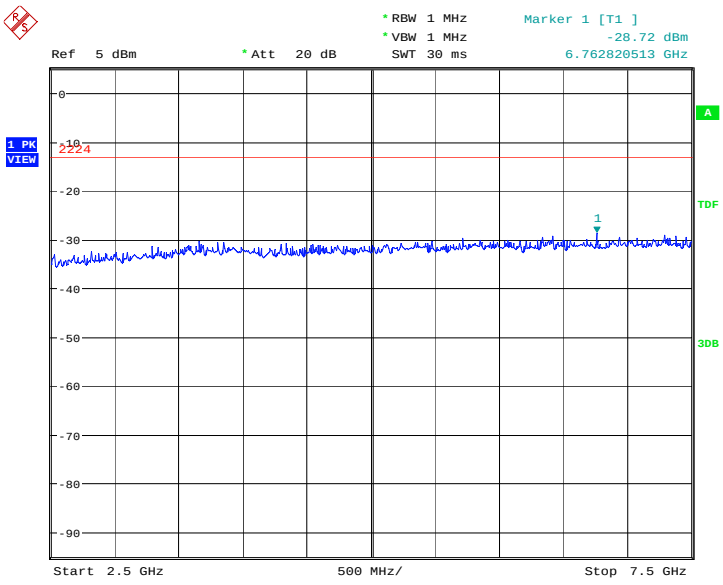
Spurious emission limit –13dBm.



Date: 26.JUN.2013 02:03:24

16QAM: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.



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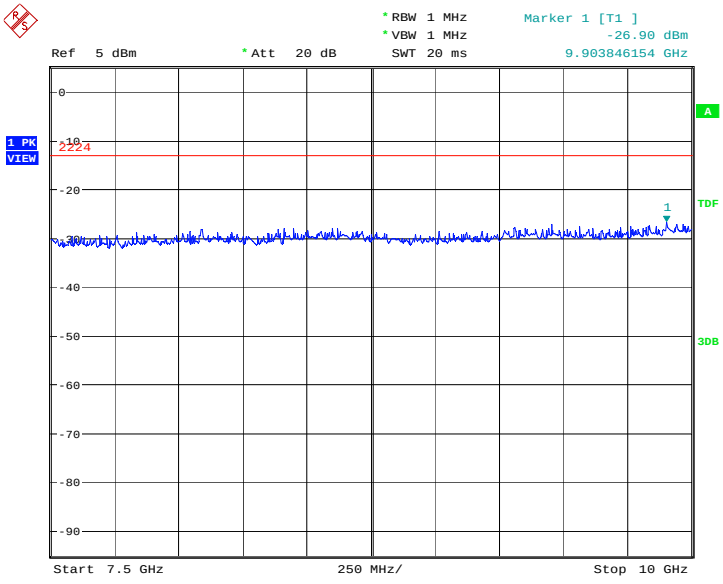
16QAM: 7.5GHz –10GHz

Spurious emission limit –13dBm.



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