TEST REPORT

No. 2013TAR911

for

Sony Mobile Communications (China) Co. Ltd

GSM/WCDMA/LTE Mobile Phone

Type: PM-0764-BV

FCC ID: PY7PM-0764

with

Hardware Version: A

Software Version: 19.0.B.0.228

Issued Date: Feb. 28th, 2014

Note:

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

Test Laboratory:

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

FCC 2.948 Listed: No.733176

IC O.A.T.S listed: No.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

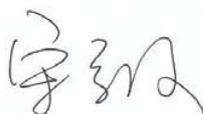|	
Receipt of Sample	Jan. 09th, 2014
Testing Start Date:	Jan. 20th, 2014
Testing End Date:	Feb. 26th, 2014

1.4. Signature

Qu Pengfei

(Prepared this test report)

Sun Xiangqian

(Reviewed this test report)

Song Chongwen

(Approved this test report)

2.   Client Information

2.1.   Applicant Information

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

2.2.   Manufacturer Information

Company Name:	Sony Mobile Communications AB
Address /Post:	Mobilvägen, 22188 Lund, Sweden
City:	Lund
Postal Code:	22188
Country:	Sweden
Contact Person:	Nilsson, Mikael
Telephone:	+46 703 227503
Fax:	+46 706 127385

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

3.1. About EUT

Description	GSM 850/900/1800/1900 quad bands, GPRS, EDGE, WCDMA FDD bands 1/2/4/5, HSDPA, HSUPA, LTE FDD bands 2/4/17, Bluetooth (EDR and 4.0), ANT+, WLAN (802.11 a/ac/b/g/n), NFC, FM, GPS mobile phone
Type	PM-0764-BV
FCC ID	PY7PM-0764
IC No.	4170B-PM0764
GSM Frequency Band	GSM 850/900/1800/1900
UMTS Frequency Band	FDD Band 1 / FDD Band 2 / FDD Band 4/ FDD Band 5/
LTE Frequency Band	FDD Band 2 / FDD Band 4 / FDD Band 17
Output power	22.11 dBm maximum EIRP measured for LTE FDD Band 2
	22.95 dBm maximum EIRP measured for LTE FDD Band 4
	23.69 dBm maximum ERP measured for LTE FDD Band 17
Antenna	Internal
Power supply	Battery (charged by travel adapter or vehicle charger)
Extreme vol. Limits	3.5VDC to 4.1VDC (nominal: 3.7VDC)
Extreme temp. Tolerance	-20°C to +55°C

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Telecommunication Metrology Center of MIIT of People's Republic of China.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN	IMEI	HW Version	SW Version
EUT1	CB512687E9	004402451862720	A	19.0.B.0.228
EUT2	CB512686ZM	004402451863389	A	19.0.B.0.228

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN	Revision
AE1	Travel Charger	4413W32301274SEM0600.1	1C
AE2	USB Cable	132907DD00F432C	1
AE4	Embedded Battery	/	1C

AE1

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

AE3
    Commercial name   EC801
    Type   AI-0401
    Manufacturer   Sony Mobile
    Length of cable   98.5 cm

AE4
    Model name   1277-4767
    Manufacturer   Sony Mobile
    Minimum Capacitance   3000 mAh
    Nominal Voltage   3.8V

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

3.4. General Description

The Equipment Under Test (EUT) is a model of GSM/WCDMA/LTE Mobile Phone with integrated antenna and embedded battery.

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

It has MP3, camera, USB memory, FM radio, GPS receiver, NFC, Bluetooth (EDR), ANT+, WLAN (802.11 a/ac/b/g/n) and Wi-Fi hotspot functions. For WLAN 802.11n, it supports 20MHz and 40MHz bandwidths on both 2.4GHz band and 5GHz/5.8GHz bands. For WLAN 802.11ac, it supports 20MHz, 40MHz and 80MHz bandwidths on both 2.4GHz band and 5GHz/5.8GHz bands. It consists of normal options: USB cable and travel charger.

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

Samples undergoing test were selected by the client.

3.5. EUT set-ups

EUT Set-up No.	Combination of EUT and AE	Remarks
Set.2	EUT1 + AE1 + AE2 + AE4	Tests with travel charger
Set.4	EUT1 + AE4	ERP/EIRP/RSE tests
Set.5	EUT2 + AE4	Conducted RF tests

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 15	Radio frequency devices☐	10-1-13 Edition
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-13 Edition
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 2

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Output Power	24.232(c)	A.1	P	B
2	Emission Limit	24.238(a), 2.1051	A.2	P	B
3	Conducted Emission	15.107/207	A.3	P	A
4	Frequency Stability	24.235, 2.1055	A.4	P	B
5	Occupied Bandwidth	2.1049(h)(i)	A.5	P	B
6	Emission Bandwidth	24.238(a)	A.6	P	B
7	Band Edge Compliance	24.238(a)	A.7	P	B
8	Conducted Spurious Emission	24.238, 2.1057	A.8	P	B

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	2014-03-28
2.	Test Receiver	ESCI 7	100948	R&S	2014-07-18
3.	Spectrum Analyzer	FSV40	101047	R&S	2014-06-30
4.	Spectrum Analyzer	E4440A	MY48250642	Agilent	2014-03-04
5.	LISN	ESH2-Z5	829991/012	R&S	2014-04-14
6.	EMI Antenna	VULB 9163	9163-234	Schwarzbeck	2016-09-15
7.	EMI Antenna	3117	00119024	ETS-Lindgren	2014-03-01
8.	EMI Antenna	3117	00119021	ETS-Lindgren	2014-04-19
9.	EMI Antenna	9117	177	Schwarzbeck	2014-06-29
10.	Signal Generator	N5183A	MY49060052	Agilent	2014-03-19
11.	Power Amplifier	5S1G4	0341863	AR	2016-03-01
12.	Climatic chamber	SH-241	92003546	ESPEC	2014-05-11
13.	Universal Radio Communication Tester	CMU200	109914	R&S	2014-04-18
14.	Universal Radio Communication Tester	CMU200	116455	R&S	2014-05-19
15.	Universal Radio Communication Tester	E5515C	MY48363198	Agilent	2014-07-08
16.	Universal Radio Communication Tester	E5515C	MY48250642	Agilent	2014-07-08
17.	Universal Radio Communication Tester	CMW500	127406	R&S	2015-01-28
18.	Universal Radio Communication Tester	CMW500	116588	R&S	2014-11-04

ANNEX A: MEASUREMENT RESULTS

A.1   OUTPUT POWER

Reference
FCC: 24.232(c), 27.50(d)(4), 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 2

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1850.7	22.00	21.12
		1880.0	21.92	20.87
		1909.3	**22.11**	21.19
	1 RB low	1850.7	21.91	21.10
		1880.0	21.89	20.82
		1909.3	22.05	21.20
	50% RB mid	1850.7	21.96	20.88
		1880.0	21.94	20.84
		1909.3	22.09	20.91
	100% RB	1850.7	20.98	20.12
		1880.0	20.92	20.07
		1909.3	21.03	20.11

(continued)

3MHz	1 RB high	1851.5	21.89	21.16
		1880.0	21.85	20.84
		1908.5	21.99	21.01
	1 RB low	1851.5	21.83	21.18
		1880.0	21.87	20.88
		1908.5	22.01	21.12
	50% RB mid	1851.5	20.92	19.97
		1880.0	20.88	19.96
		1908.5	20.97	20.06
	100% RB	1851.5	20.91	19.97
		1880.0	20.94	20.02
		1908.5	21.05	20.12
5MHz	1 RB high	1852.5	21.94	20.95
		1880.0	21.86	20.90
		1907.5	21.93	20.96
	1 RB low	1852.5	21.79	20.83
		1880.0	21.82	20.83
		1907.5	21.95	20.93
	50% RB mid	1852.5	20.91	19.97
		1880.0	20.90	20.01
		1907.5	20.97	20.11
	100% RB	1852.5	20.91	19.99
		1880.0	20.93	20.04
		1907.5	21.03	20.14
10MHz	1 RB high	1855.0	21.95	21.20
		1880.0	21.88	20.86
		1905.0	21.92	20.99
	1 RB low	1855.0	21.78	21.10
		1880.0	21.81	20.83
		1905.0	21.93	21.28
	50% RB mid	1855.0	20.86	19.94
		1880.0	20.93	20.01
		1905.0	20.98	20.04
	100% RB	1855.0	20.87	19.93
		1880.0	20.96	20.01
		1905.0	20.96	20.07

(continued)

15MHz	1 RB high	1857.5	21.94	21.21
		1880.0	21.87	21.20
		1902.5	21.97	21.30
	1 RB low	1857.5	21.75	21.07
		1880.0	21.76	21.09
		1902.5	21.94	21.19
	50% RB mid	1857.5	20.68	20.04
		1880.0	20.77	20.24
		1902.5	21.03	20.30
	100% RB	1857.5	20.86	19.91
		1880.0	20.98	20.05
		1902.5	20.88	20.16
20MHz	1 RB high	1860.0	22.11	21.16
		1880.0	21.93	21.13
		1900.0	21.99	21.12
	1 RB low	1860.0	21.90	20.99
		1880.0	21.93	21.04
		1900.0	21.98	21.02
	50% RB mid	1860.0	20.82	19.94
		1880.0	20.95	20.08
		1900.0	21.01	20.12
	100% RB	1860.0	20.87	19.95
		1880.0	20.97	20.05
		1900.0	21.04	20.12

LTE band 4

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1754.3	22.84	21.96
		1732.5	22.77	21.82
		1710.7	22.91	22.13
	1 RB low	1754.3	22.82	21.95
		1732.5	22.76	21.83
		1710.7	22.92	22.10
	50% RB mid	1754.3	22.78	21.72
		1732.5	22.73	21.62
		1710.7	**22.95**	21.85
	100% RB	1754.3	21.80	20.89
		1732.5	21.70	20.83
		1710.7	21.99	21.04
3MHz	1 RB high	1753.5	22.70	22.12
		1732.5	22.56	21.63
		1711.5	22.78	22.14
	1 RB low	1753.5	22.63	22.02
		1732.5	22.69	21.71
		1711.5	22.86	22.28
	50% RB mid	1753.5	21.65	20.78
		1732.5	21.65	20.70
		1711.5	21.83	20.85
	100% RB	1753.5	21.73	20.84
		1732.5	21.64	20.72
		1711.5	21.80	20.84
5MHz	1 RB high	1752.5	22.75	21.77
		1732.5	22.58	21.65
		1712.5	22.71	21.75
	1 RB low	1752.5	22.70	21.69
		1732.5	22.67	21.71
		1712.5	22.82	21.84
	50% RB mid	1752.5	21.70	20.81
		1732.5	21.69	20.75
		1712.5	21.89	20.89
	100% RB	1752.5	21.69	20.87
		1732.5	21.69	20.83
		1712.5	21.86	20.97

(continued)

	1 RB high	1750	22.71	22.11
		1732.5	22.57	21.98
		1715	22.57	21.97
	1 RB low	1750	22.70	22.15
		1732.5	22.66	22.06
10MHz		1715	22.79	22.24
	50% RB mid	1750	21.73	20.73
		1732.5	21.72	20.73
		1715	21.74	20.72
	100% RB	1750	21.79	20.87
		1732.5	21.68	20.72
		1715	21.71	20.74
	1 RB high	22.73	22.14	22.73
		22.63	22.00	22.63
		22.71	22.14	22.71
	1 RB low	22.55	21.91	22.55
		22.62	21.96	22.62
15MHz		22.81	22.12	22.81
	50% RB mid	21.70	21.12	21.70
		21.73	20.94	21.73
		21.80	20.96	21.81
	100% RB	21.81	20.88	21.81
		21.75	20.83	21.75
		21.78	20.82	21.78
	1 RB high	1745	22.93	21.96
		1732.5	22.81	21.89
		1720	22.84	21.93
	1 RB low	1745	22.65	21.63
		1732.5	22.74	21.80
20MHz		1720	22.87	21.87
	50% RB mid	1745	21.94	20.94
		1732.5	21.76	20.80
		1720	21.79	20.86
	100% RB	1745	21.82	20.83
		1732.5	21.76	20.78
		1720	21.77	20.86

LTE band 17

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	706.5	**23.69**	22.59
		710.0	23.51	22.56
		713.5	23.66	22.64
	1 RB low	706.5	23.56	22.48
		710.0	23.48	22.43
		713.5	23.48	22.46
	50% RB mid	706.5	22.52	21.45
		710.0	22.56	21.63
		713.5	22.62	21.68
	100% RB	706.5	22.55	21.72
		710.0	22.58	21.74
		713.5	22.64	21.74
10MHz	1 RB high	709	23.63	22.84
		710	23.63	22.79
		711	23.47	22.75
	1 RB low	709	23.52	22.79
		710	23.55	22.77
		711	23.48	22.70
	50% RB mid	709	22.63	21.58
		710	22.59	21.66
		711	22.64	21.66
	100% RB	709	22.63	21.54
		710	22.61	21.60
		711	22.61	21.67

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 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".

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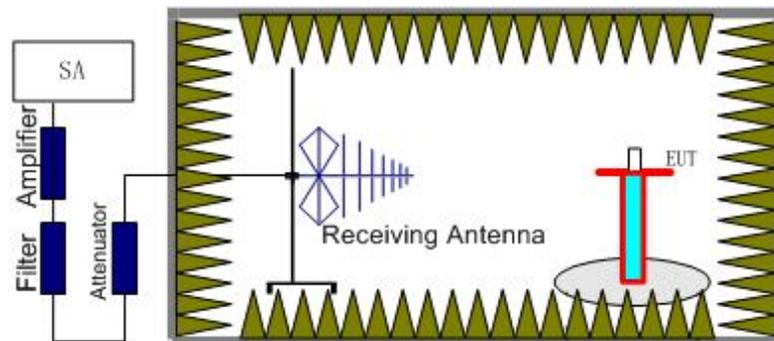
2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.
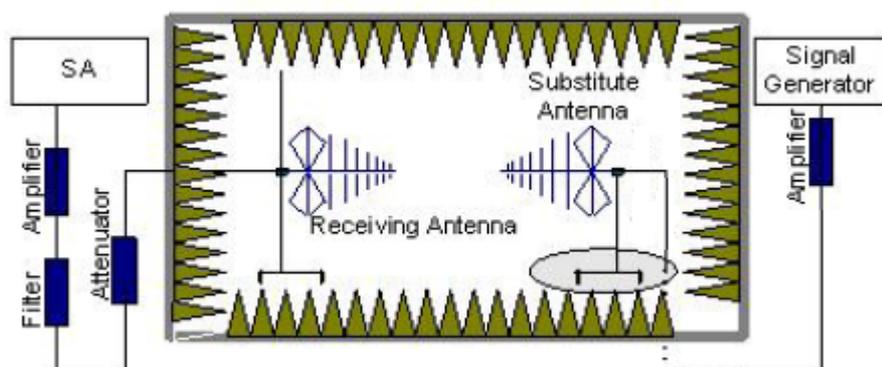
In the chamber, a substitution antenna for the frequency band of interest is placed at the

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.

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

A.1.3.3 Measurement result

LTE Band 2- EIRP 24. 232(b)

Limits: ≤33dBm (2W)

LTE Band 2_1.4MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1850.7	-28.01	3.18	-50.00	-4.56	23.37	Horizontal
1880.0	-28.78	3.11	-50.00	-4.43	22.54	Horizontal
1909.3	-27.37	3.18	-50.00	-4.30	**23.75**	Horizontal

LTE Band 2_3MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1851.5	-28.04	3.18	-50.00	-4.55	23.33	Horizontal
1880.0	-28.37	3.11	-50.00	-4.43	22.95	Horizontal
1908.5	-27.51	3.18	-50.00	-4.30	23.61	Horizontal

LTE Band 2_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1852.5	-28.06	3.18	-50.00	-4.55	23.31	Horizontal
1880.0	-28.36	3.11	-50.00	-4.43	22.96	Horizontal
1907.5	-27.55	3.18	-50.00	-4.31	23.58	Horizontal

LTE Band 2_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1855.0	-28.02	3.16	-50.00	-4.54	23.36	Horizontal
1880.0	-28.52	3.11	-50.00	-4.43	22.80	Horizontal
1905.0	-27.55	3.17	-50.00	-4.32	23.60	Horizontal

LTE Band 2_15MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1857.5	-28.01	3.15	-50.00	-4.53	23.37	Horizontal
1880.0	-28.39	3.11	-50.00	-4.43	22.93	Horizontal
1902.5	-27.65	3.16	-50.00	-4.33	23.52	Horizontal

LTE Band 2_20 MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1860.0	-28.03	3.14	-50.00	-4.52	23.35	Horizontal
1880.0	-28.37	3.11	-50.00	-4.43	22.95	Horizontal
1900.0	-27.59	3.16	-50.00	-4.34	23.59	Horizontal

LTE Band 2_1.4MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1850.7	-28.79	3.18	-50.00	-4.56	22.59	Horizontal
1880.0	-29.52	3.11	-50.00	-4.43	21.80	Horizontal
1909.3	-28.33	3.18	-50.00	-4.30	22.79	Horizontal

LTE Band 2_3MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1851.5	-28.81	3.18	-50.00	-4.55	22.56	Horizontal
1880.0	-29.21	3.11	-50.00	-4.43	22.11	Horizontal
1908.5	-28.29	3.18	-50.00	-4.30	22.83	Horizontal

LTE Band 2_5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1852.5	-28.70	3.18	-50.00	-4.55	22.67	Horizontal
1880.0	-29.17	3.11	-50.00	-4.43	22.15	Horizontal
1907.5	-28.27	3.18	-50.00	-4.31	22.86	Horizontal

LTE Band 2_10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1855.0	-28.75	3.16	-50.00	-4.54	22.63	Horizontal
1880.0	-29.25	3.11	-50.00	-4.43	22.07	Horizontal
1905.0	-28.14	3.17	-50.00	-4.32	23.01	Horizontal

LTE Band 2_15MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1857.5	-28.88	3.15	-50.00	-4.53	22.50	Horizontal
1880.0	-29.10	3.11	-50.00	-4.43	22.22	Horizontal
1902.5	-28.27	3.16	-50.00	-4.33	22.90	Horizontal

LTE Band 2_20 MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1860.0	-28.86	3.14	-50.00	-4.52	22.52	Horizontal
1880.0	-29.03	3.11	-50.00	-4.43	22.29	Horizontal
1900.0	-28.30	3.16	-50.00	-4.34	22.88	Horizontal

Sample calculation: LTE Band 2, 1.4MHz bandwidth, frequency 1909.3 MHz, QPSK

Peak EIRP(dBm) = P_{Mea}(-27.37 dBm) - G_a (-4.30 dBi) - P_{Ag} (-50.00 dB) - P_{cl} (3.18 dB)

= 23.75 dBm

LTE Band 4- EIRP 27.50(d)

Limits: ≤30dBm (1W)

LTE Band 4_1.4MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1710.7	-27.61	2.96	-50.00	-5.17	24.60	Horizontal
1732.5	-27.73	2.99	-50.00	-5.08	24.36	Horizontal
1754.3	-27.05	3.01	-50.00	-4.98	**24.92**	Horizontal

LTE Band 4_3MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1711.5	-27.76	2.96	-50.00	-5.17	24.45	Horizontal
1732.5	-27.66	2.99	-50.00	-5.08	24.43	Horizontal
1753.5	-27.07	3.01	-50.00	-4.98	24.90	Horizontal

LTE Band 4_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1712.5	-27.68	2.97	-50.00	-5.17	24.52	Horizontal
1732.5	-27.67	2.99	-50.00	-5.08	24.42	Horizontal
1752.5	-27.19	3.01	-50.00	-4.99	24.79	Horizontal

LTE Band 4_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1715.0	-27.55	2.97	-50.00	-5.15	24.63	Horizontal
1732.5	-27.72	2.99	-50.00	-5.08	24.37	Horizontal
1750.0	-27.67	3.00	-50.00	-5.00	24.33	Horizontal

LTE Band 4_15MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1717.5	-27.92	2.97	-50.00	-5.14	24.25	Horizontal
1732.5	-27.71	2.99	-50.00	-5.08	24.38	Horizontal
1747.5	-27.68	3.00	-50.00	-5.01	24.33	Horizontal

LTE Band 4_20MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1720.0	-28.22	2.97	-50.00	-5.13	23.94	Horizontal
1732.5	-27.66	2.99	-50.00	-5.08	24.43	Horizontal
1745.0	-27.85	3.00	-50.00	-5.02	24.17	Horizontal

LTE Band 4_1.4MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1710.70	-28.10	2.96	-50.00	-5.17	24.11	Horizontal
1732.50	-28.50	2.99	-50.00	-5.08	23.59	Horizontal
1754.30	-27.99	3.01	-50.00	-4.98	23.98	Horizontal

LTE Band 4_3MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1711.50	-28.26	2.96	-50.00	-5.17	23.95	Horizontal
1732.50	-28.48	2.99	-50.00	-5.08	23.61	Horizontal
1753.50	-28.00	3.01	-50.00	-4.98	23.97	Horizontal

LTE Band 4_5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1712.50	-28.43	2.97	-50.00	-5.17	23.77	Horizontal
1732.50	-28.38	2.99	-50.00	-5.08	23.71	Horizontal
1752.50	-27.93	3.01	-50.00	-4.99	24.05	Horizontal

LTE Band 4_10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1715.00	-28.28	2.97	-50.00	-5.15	23.90	Horizontal
1732.50	-28.51	2.99	-50.00	-5.08	23.58	Horizontal
1750.00	-28.42	3.00	-50.00	-5.00	23.58	Horizontal

LTE Band 4_15MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1717.50	-28.69	2.97	-50.00	-5.14	23.48	Horizontal
1732.50	-28.53	2.99	-50.00	-5.08	23.56	Horizontal
1747.50	-28.41	3.00	-50.00	-5.01	23.60	Horizontal

LTE Band 4_20MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1720.00	-28.95	2.97	-50.00	-5.13	23.21	Horizontal
1732.50	-28.50	2.99	-50.00	-5.08	23.59	Horizontal
1745.00	-28.78	3.00	-50.00	-5.02	23.24	Horizontal

Sample calculation: LTE Band 4, 1.4MHz bandwidth, frequency 1754.3 MHz, QPSK

Peak EIRP(dBm) = P_{Mea}(-27.05 dBm) - G_a (-4.98 dBi) - P_{Ag} (-50.00 dB) - P_{cl} (3.01 dB)

$= 24.92$ dBm

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

Limits: ≤34.77dBm (3W)

LTE Band 17_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
706.50	-27.99	1.91	-53.00	0.30	2.15	20.65	Horizontal
710.00	-27.94	1.92	-53.00	0.32	2.15	20.67	Horizontal
713.50	-27.93	1.93	-53.00	0.34	2.15	20.65	Horizontal

LTE Band 17_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
709.00	-27.89	1.92	-53.00	0.32	2.15	20.72	Horizontal
710.00	-28.02	1.92	-53.00	0.32	2.15	20.59	Horizontal
711.00	-27.75	1.92	-53.00	0.33	2.15	**20.85**	Horizontal

LTE Band 17_5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
706.50	-29.01	1.91	-53.00	0.30	2.15	19.63	Horizontal
710.00	-28.91	1.92	-53.00	0.32	2.15	19.70	Horizontal
713.50	-28.64	1.93	-53.00	0.34	2.15	19.94	Horizontal

LTE Band 17_10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	Cable Loss (dB)	P_{Ag} (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
709.00	-28.69	1.92	-53.00	0.32	2.15	19.92	Horizontal
710.00	-29.03	1.92	-53.00	0.32	2.15	19.58	Horizontal
711.00	-28.69	1.92	-53.00	0.33	2.15	19.91	Horizontal

Sample calculation: LTE Band 17, 10 MHz bandwidth, frequency 711.00 MHz, QPSK

Peak ERP(dBm) = P_{Mea}(-27.75 dBm) - G_a (0.33 dBi) - P_{Ag} (-53.00 dB) - P_{cl} (1.92 dB) -2.15 dB
= 20.85 dBm

ANALYZER SETTINGS:

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

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

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

A.2   EMISSION LIMT

Reference
FCC: CFR 2.1051, 24.238(a), 27.53(h) , 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 24.238(a), Part 27.53(h) 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 2, 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 24.238(a), 27.53(h) 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 2, 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 2, 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 2, 1.4MHz, QPSK, Channel 18607

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3701.53	-58.22	4.44	-8.14	-54.52	-13.00	Vertical
4408.03	-63.66	4.85	-8.74	-59.77	-13.00	Horizontal
7780.00	-60.48	6.63	-11.68	-55.43	-13.00	Vertical
10207.83	-60.40	7.63	-12.44	-55.59	-13.00	Vertical
12994.01	-56.62	8.95	-13.29	-52.28	-13.00	Vertical
17491.29	-53.20	10.98	-13.28	-50.90	-13.00	Horizontal

LTE Band 2, 1.4MHz, QPSK, Channel 18900

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3904.03	-62.38	4.51	-8.38	-58.51	-13.00	Vertical
5640.04	-48.88	5.45	-10.06	-44.27	-13.00	Vertical
8815.38	-61.99	7.36	-12.45	-56.90	-13.00	Vertical
10169.25	-60.46	7.79	-12.43	-55.82	-13.00	Vertical
12531.55	-57.15	8.92	-12.74	-53.33	-13.00	Horizontal
13597.78	-58.24	9.17	-13.84	-53.57	-13.00	Vertical

LTE Band 2, 1.4MHz, QPSK, Channel 19193

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3415.33	-63.93	4.19	-7.70	-60.42	-13.00	Horizontal
4172.05	-63.08	4.71	-8.60	-59.19	-13.00	Horizontal
5529.41	-62.18	5.47	-10.01	-57.64	-13.00	Horizontal
6950.56	-60.54	6.13	-11.05	-55.62	-13.00	Vertical
8533.78	-59.36	7.16	-12.23	-54.29	-13.00	Vertical
10535.78	-58.42	8.09	-12.49	-54.02	-13.00	Horizontal

LTE Band 2, 1.4MHz, 16QAM, Channel 18607

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3455.74	-61.49	4.24	-7.79	-57.94	-13.00	Horizontal
5005.96	-62.36	5.17	-9.70	-57.83	-13.00	Vertical
6525.26	-62.93	6.04	-10.63	-58.34	-13.00	Vertical
8508.99	-60.17	7.01	-12.21	-54.97	-13.00	Horizontal
10328.98	-59.31	7.94	-12.47	-54.78	-13.00	Vertical
13775.35	-56.24	9.12	-13.91	-51.45	-13.00	Horizontal

LTE Band 2, 1.4MHz, 16QAM, Channel 18900

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
4020.98	-63.70	4.66	-8.51	-59.85	-13.00	Vertical
6886.55	-61.96	6.08	-10.99	-57.05	-13.00	Horizontal
7081.10	-61.01	6.51	-11.15	-56.37	-13.00	Vertical
9053.50	-61.70	7.52	-12.60	-56.62	-13.00	Horizontal
10145.31	-58.94	7.89	-12.43	-54.40	-13.00	Vertical
13587.49	-58.83	9.23	-13.83	-54.23	-13.00	Vertical

LTE Band 2, 1.4MHz, 16QAM, Channel 19193

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
4020.98	-64.44	4.66	-8.51	-60.59	-13.00	Vertical
5265.01	-62.59	5.31	-9.86	-58.04	-13.00	Horizontal
7081.10	-60.71	6.51	-11.15	-56.07	-13.00	Vertical
8631.72	-59.85	7.37	-12.31	-54.91	-13.00	Horizontal
10145.31	-58.19	7.89	-12.43	-53.65	-13.00	Vertical
13587.49	-57.47	9.23	-13.83	-52.87	-13.00	Vertical

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
3421.72	-51.03	4.19	-7.71	-47.51	-13.00	Vertical
5132.36	-43.12	5.25	-9.78	-38.59	-13.00	Horizontal
6894.16	-62.00	6.09	-10.99	-57.10	-13.00	Vertical
8834.93	-60.64	7.35	-12.47	-55.52	-13.00	Horizontal
10203.50	-60.43	7.65	-12.44	-55.64	-13.00	Vertical
13794.27	-56.92	9.12	-13.92	-52.12	-13.00	Vertical

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
3465.25	-52.47	4.24	-7.82	-48.89	-13.00	Vertical
5202.57	-36.65	5.25	-9.82	-32.08	-13.00	Horizontal
7517.68	-62.70	6.78	-11.42	-58.06	-13.00	Vertical
8853.20	-60.19	7.30	-12.48	-55.01	-13.00	Horizontal
10116.30	-61.30	8.11	-12.42	-56.99	-13.00	Vertical
15593.47	-48.91	10.32	-13.33	-45.90	-13.00	Vertical

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
3508.81	-51.05	4.33	-7.91	-47.47	-13.00	Vertical
5263.19	-43.59	5.30	-9.86	-39.03	-13.00	Horizontal
6348.26	-62.12	5.83	-10.48	-57.47	-13.00	Vertical
9166.51	-61.56	7.68	-12.60	-56.64	-13.00	Horizontal
10119.02	-59.27	8.08	-12.42	-54.93	-13.00	Horizontal
13170.02	-58.13	9.21	-13.47	-53.87	-13.00	Horizontal

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

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3421.46	-50.57	4.19	-7.71	-47.05	-13.00	Vertical
5132.40	-44.98	5.25	-9.78	-40.45	-13.00	Horizontal
7714.18	-62.24	6.48	-11.61	-57.11	-13.00	Horizontal
10123.46	-58.75	8.04	-12.42	-54.37	-13.00	Horizontal
12663.45	-56.13	8.86	-12.90	-52.09	-13.00	Horizontal
15397.37	-45.83	9.71	-13.42	-42.12	-13.00	Vertical

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

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
5197.48	-39.32	5.23	-9.82	-34.73	-13.00	Horizontal
7173.18	-60.37	6.36	-11.20	-55.53	-13.00	Vertical
8628.70	-62.70	7.36	-12.30	-57.76	-13.00	Vertical
10330.89	-61.56	7.95	-12.47	-57.04	-13.00	Vertical
12549.14	-57.05	9.02	-12.76	-53.31	-13.00	Vertical
13242.73	-57.84	9.12	-13.54	-53.42	-13.00	Vertical

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

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit （dBm）	Polarization
3508.81	-51.05	4.33	-7.91	-47.47	-13.00	Vertical
5263.19	-43.59	5.30	-9.86	-39.03	-13.00	Horizontal
6348.26	-62.12	5.83	-10.48	-57.47	-13.00	Vertical
9166.51	-61.56	7.68	-12.60	-56.64	-13.00	Horizontal
10119.02	-59.27	8.08	-12.42	-54.93	-13.00	Horizontal
13170.02	-58.13	9.21	-13.47	-53.87	-13.00	Horizontal

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
2119.98	-41.34	3.29	-4.26	2.15	-42.52	-13.00	Vertical
3225.37	-63.25	4.17	-7.24	2.15	-62.33	-13.00	Horizontal
4253.59	-62.55	4.79	-8.65	2.15	-60.84	-13.00	Horizontal
5075.89	-61.87	5.20	-9.75	2.15	-59.47	-13.00	Vertical
5964.83	-62.48	5.52	-10.19	2.15	-59.96	-13.00	Horizontal
6615.57	-63.46	6.09	-10.72	2.15	-60.98	-13.00	Horizontal

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
2130.30	-41.14	3.32	-4.29	2.15	-42.32	-13.00	Vertical
3552.72	-62.53	4.31	-7.96	2.15	-61.03	-13.00	Horizontal
4509.85	-62.26	4.86	-8.82	2.15	-60.45	-13.00	Vertical
5381.80	-62.06	5.43	-9.93	2.15	-59.71	-13.00	Vertical
6420.48	-60.89	5.83	-10.54	2.15	-58.33	-13.00	Horizontal
7182.04	-61.62	6.39	-11.21	2.15	-58.95	-13.00	Vertical

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
2141.08	-41.40	3.32	-4.32	2.15	-42.55	-13.00	Horizontal
3614.25	-62.98	4.39	-8.04	2.15	-61.48	-13.00	Vertical
4240.82	-64.53	4.74	-8.64	2.15	-62.78	-13.00	Horizontal
5358.59	-63.25	5.41	-9.92	2.15	-60.89	-13.00	Vertical
6570.01	-60.48	6.15	-10.67	2.15	-58.11	-13.00	Horizontal
8100.83	-60.72	6.91	-11.96	2.15	-57.82	-13.00	Horizontal

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

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Polarization
2119.92	-41.49	3.29	-4.26	2.15	-42.67	-13.00	Vertical
3239.73	-62.04	4.17	-7.28	2.15	-61.08	-13.00	Vertical
4455.21	-62.32	4.82	-8.77	2.15	-60.52	-13.00	Horizontal
5052.43	-63.54	5.24	-9.73	2.15	-61.20	-13.00	Horizontal
6441.82	-61.41	5.84	-10.55	2.15	-58.85	-13.00	Vertical
8373.69	-61.68	7.33	-12.12	2.15	-59.04	-13.00	Horizontal

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

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Polarization
2119.92	-29.34	3.29	-4.26	2.15	-30.52	-13.00	Vertical
4062.15	-61.58	4.77	-8.54	2.15	-59.96	-13.00	Horizontal
5016.39	-63.41	5.16	-9.71	2.15	-61.01	-13.00	Vertical
6303.73	-61.08	5.90	-10.44	2.15	-58.69	-13.00	Vertical
7317.33	-60.94	6.46	-11.29	2.15	-58.26	-13.00	Vertical
8384.66	-60.34	7.24	-12.13	2.15	-57.60	-13.00	Vertical

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

Frequency (MHz)	P_Mea (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Polarization
2119.92	-29.03	3.29	-4.26	2.15	-30.21	-13.00	Vertical
3547.01	-63.47	4.31	-7.96	2.15	-61.97	-13.00	Vertical
4338.44	-62.90	4.83	-8.70	2.15	-61.18	-13.00	Horizontal
5161.07	-63.79	5.22	-9.80	2.15	-61.36	-13.00	Horizontal
6440.71	-61.85	5.84	-10.55	2.15	-59.29	-13.00	Vertical
7801.44	-60.87	6.79	-11.70	2.15	-58.11	-13.00	Horizontal

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 2/4/17 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 2, 1.4 MHz bandwidth
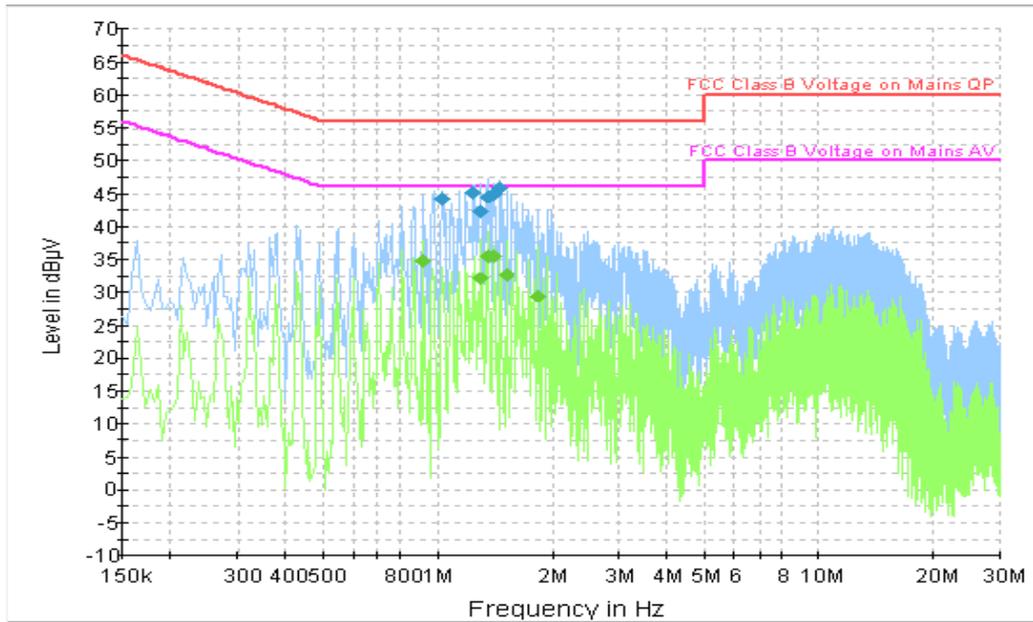
IF bandwidth 9 kHz

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

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
1.027500	44.1	GND	L1	9.7	11.9	56.0
1.243500	45.1	GND	L1	9.7	10.9	56.0
1.293000	42.3	GND	L1	9.7	13.7	56.0
1.356000	44.5	GND	L1	9.7	11.5	56.0
1.410000	45.0	GND	L1	9.7	11.0	56.0
1.459500	45.9	GND	L1	9.7	10.1	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.919500	34.7	GND	L1	9.7	11.3	46.0
1.293000	32.1	GND	L1	9.7	13.9	46.0
1.356000	35.5	GND	L1	9.7	10.5	46.0
1.410000	35.5	GND	L1	9.7	10.5	46.0
1.518000	32.7	GND	L1	9.7	13.3	46.0
1.842000	29.5	GND	L1	9.7	16.5	46.0

LTE Band 4, 1.4 MHz bandwidth
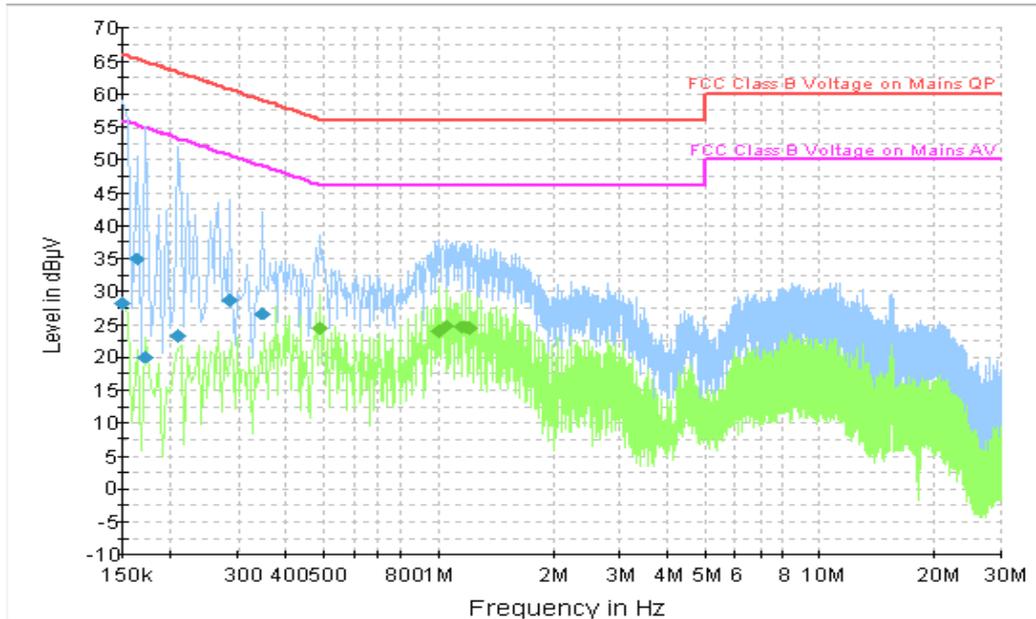
IF bandwidth 9 kHz

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

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	28.2	GND	L1	9.8	37.8	66.0
0.163500	35.0	GND	L1	9.8	30.3	65.3
0.172500	20.0	GND	L1	9.8	44.9	64.8
0.208500	23.2	GND	L1	9.8	40.0	63.3
0.285000	28.7	GND	L1	9.8	32.0	60.7
0.348000	26.6	GND	L1	9.8	32.4	59.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.492000	24.3	GND	L1	9.8	21.9	46.1
1.014000	23.9	GND	L1	9.7	22.1	46.0
1.045500	24.7	GND	L1	9.7	21.3	46.0
1.153500	24.5	GND	L1	9.7	21.5	46.0
1.185000	24.5	GND	L1	9.7	21.5	46.0
1.216500	24.3	GND	L1	9.7	21.7	46.0

LTE Band 17, 5 MHz bandwidth
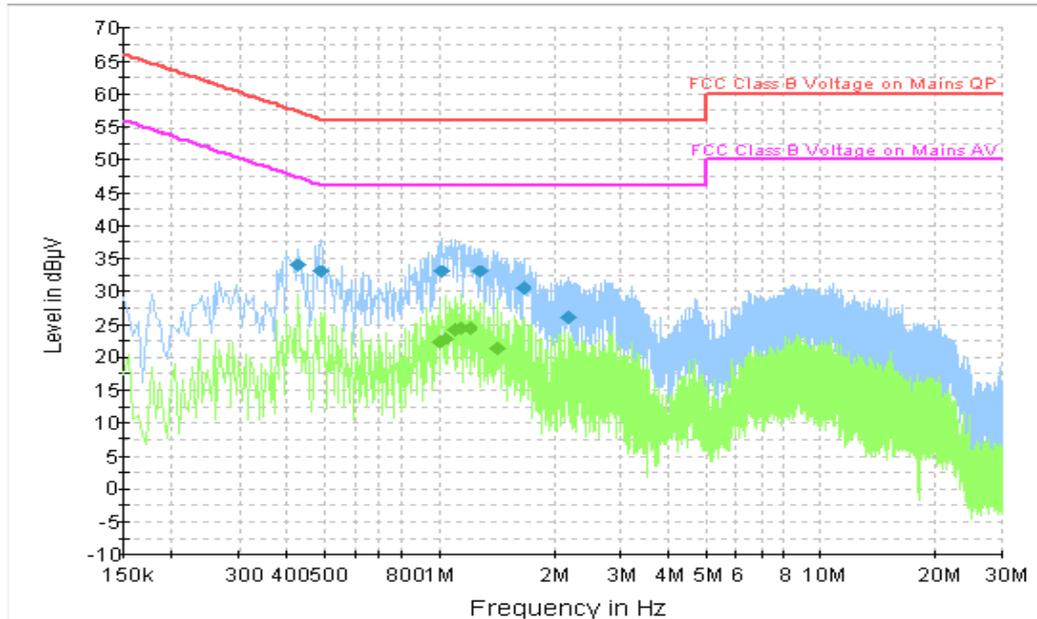
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.429000	34.0	GND	L1	9.8	23.3	57.3
0.492000	33.0	GND	L1	9.8	23.1	56.1
1.018500	33.0	GND	L1	9.7	23.0	56.0
1.284000	33.1	GND	L1	9.7	22.9	56.0
1.662000	30.5	GND	L1	9.7	25.5	56.0
2.179500	26.1	GND	L1	9.7	29.9	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.005000	22.2	GND	L1	9.7	23.8	46.0
1.036500	22.9	GND	L1	9.7	23.1	46.0
1.113000	24.1	GND	L1	9.7	21.9	46.0
1.144500	24.3	GND	L1	9.7	21.7	46.0
1.207500	24.3	GND	L1	9.7	21.7	46.0
1.419000	21.4	GND	L1	9.7	24.6	46.0

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

A.4　FREQUENCY STABILITY

Reference
FCC: CFR Part 2.1055, 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 middle channel for LTE band 2/4/5/7, 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. 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 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
Room Temperature: 24 ℃

LTE Band 2, 1.4MHz bandwidth (worst case of all bandwidths)
Frequency Error vs Voltage

Voltage	Frequency error (Hz)		Frequency error (ppm)	
(V)	QPSK	16QAM	QPSK	16QAM
3.7	1	20	0.000	0.011
4.1	3	16	0.002	0.008
3.5	0	15	0.000	0.008

Frequency Error vs Temperature

Temperature	Frequency error (Hz)		Frequency error (ppm)	
(℃)	QPSK	16QAM	QPSK	16QAM
50°	3	16	0.001	0.009
40°	1	17	0.001	0.009
30°	4	21	0.002	0.011
20°	-3	13	0.002	0.007
10°	3	18	0.001	0.010
0°	2	20	0.001	0.011
- 10°	-5	21	0.003	0.011
- 20°	1	20	0.000	0.011
- 30°	1	17	0.001	0.008

LTE Band 4, 1.4MHz bandwidth (worst case of all bandwidths)
Frequency Error vs Voltage

Voltage	Frequency error (Hz)		Frequency error (ppm)	
(V)	QPSK	16QAM	QPSK	16QAM
3.7	7	20	0.004	0.012
4.1	2	21	0.001	0.012
3.5	5	20	0.003	0.012

Frequency Error vs Temperature

Temperature	Frequency error (Hz)		Frequency error (ppm)	
(℃)	QPSK	16QAM	QPSK	16QAM
50°	-1	23	0.001	0.013
40°	2	20	0.001	0.011
30°	-2	20	0.001	0.012
20°	5	19	0.003	0.011
10°	2	20	0.001	0.011
0°	2	18	0.001	0.010
‒ 10°	2	20	0.001	0.012
‒ 20°	-2	16	0.001	0.009
‒ 30°	1	19	0.001	0.011

LTE Band 17, 5 MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage	Frequency error (Hz)		Frequency error (ppm)	
(V)	QPSK	16QAM	QPSK	16QAM
3.7	0	-10	0.002	0.005
4.1	1	1	0.002	0.005
3.5	1	-2	0.000	0.005

Frequency Error vs Temperature

Temperature	Frequency error (Hz)		Frequency error (ppm)	
(℃)	QPSK	16QAM	QPSK	16QAM
50°	1	-3	0.001	0.006
40°	2	-2	0.003	0.004
30°	0	-3	0.001	0.006
20°	2	-2	0.000	0.006
10°	1	-2	0.002	0.007
0°	0	0	0.001	0.005
– 10°	2	-3	0.000	0.005
– 20°	0	-2	0.000	0.004
– 30°	0	-4	0.003	0.009

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 Measurement Results

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the mid frequencies of the LTE bands 2, 4 and 17. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

A.5.1.1 Measurement results per FCC rules

LTE band 2, 1.4MHz (99% BW)

Frequency	Occupied Bandwidth (99% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	1091.346	1096.153

LTE band 2, 1.4MHz Bandwidth, QPSK (99% BW)
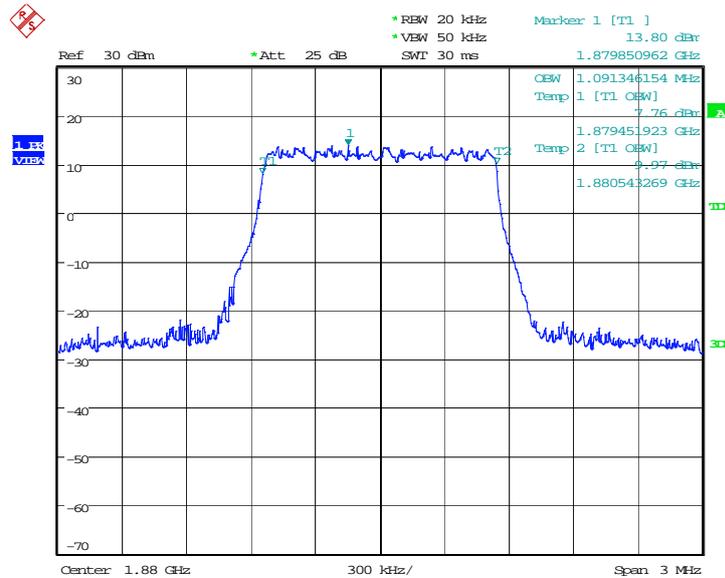
Date: 10.FEB.2014 16:46:14

LTE band 2, 1.4MHz Bandwidth, 16QAM (99% BW)
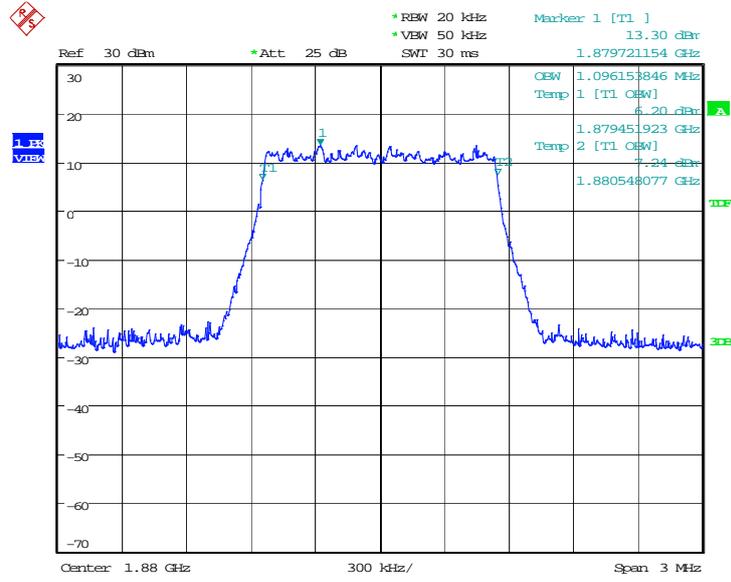
Date: 10.FEB.2014 16:46:28

LTE band 2, 3MHz (99% BW)

Frequency	Occupied Bandwidth (99% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	2692.308	2692.308

LTE band 2, 3MHz Bandwidth, QPSK (99% BW)
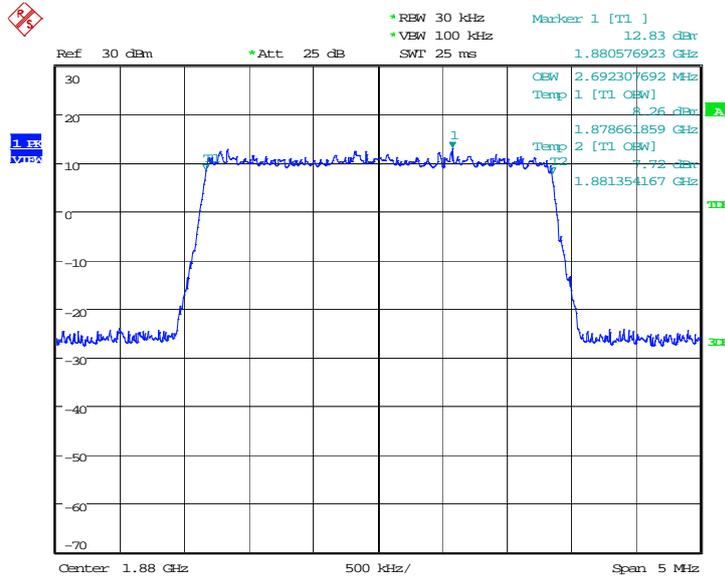
Date: 10.FEB.2014 17:12:52

LTE band 2, 3MHz Bandwidth, 16QAM (99% BW)
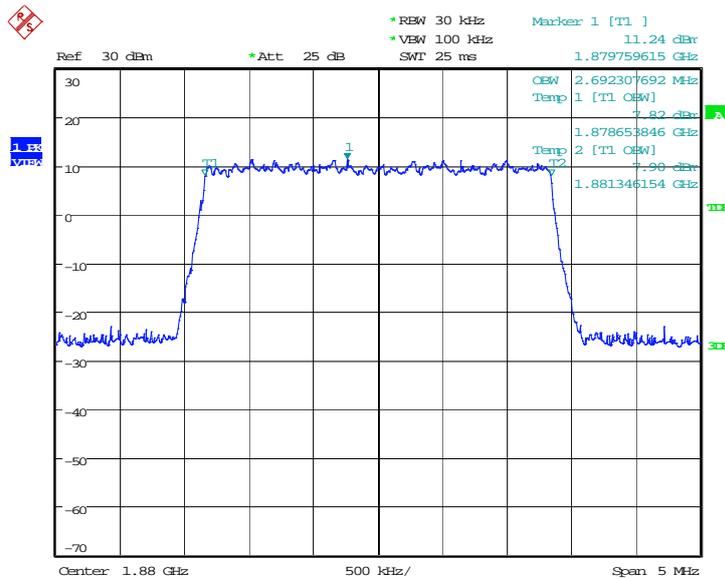
Date: 10.FEB.2014 17:13:06

LTE band 2, 5MHz (99% BW)

Frequency	Occupied Bandwidth (99% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	4471.154	4503.205

LTE band 2, 5MHz Bandwidth, QPSK (99% BW)
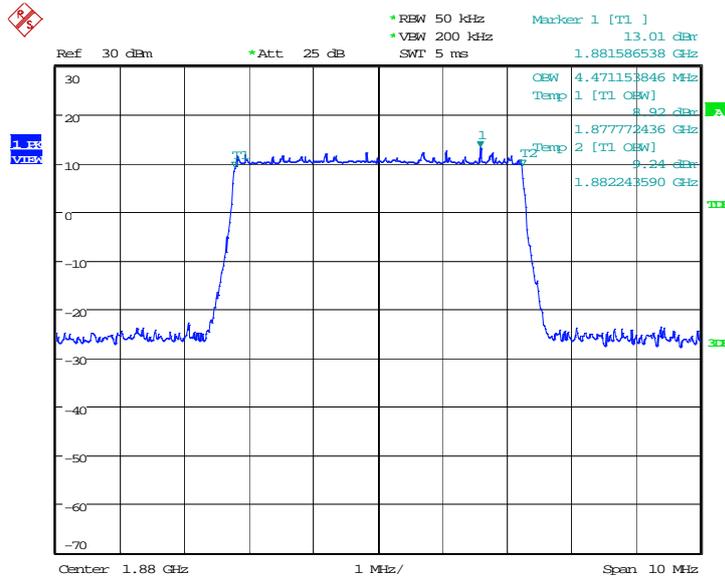
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LTE band 2, 5MHz Bandwidth,16QAM (99% BW)
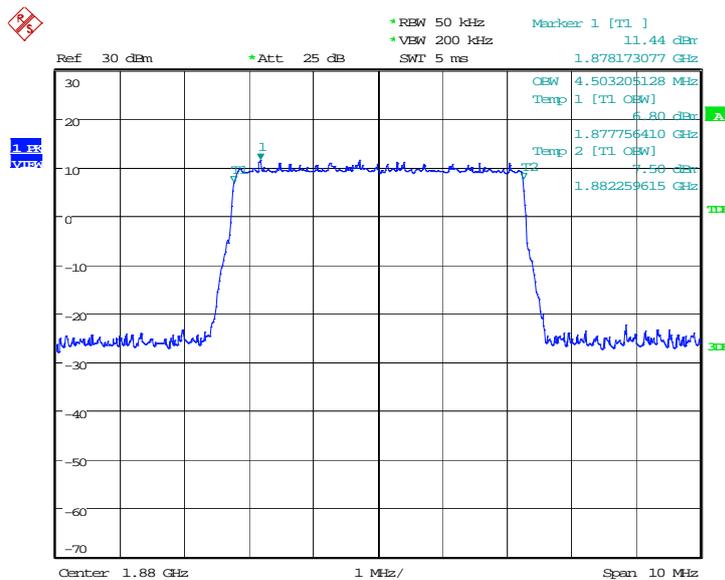
Date: 10.FEB.2014 17:39:42

LTE band 2, 10MHz (99% BW)

Frequency	Occupied Bandwidth (99% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	8990.385	8966.346

LTE band 2, 10MHz Bandwidth, QPSK (99% BW)
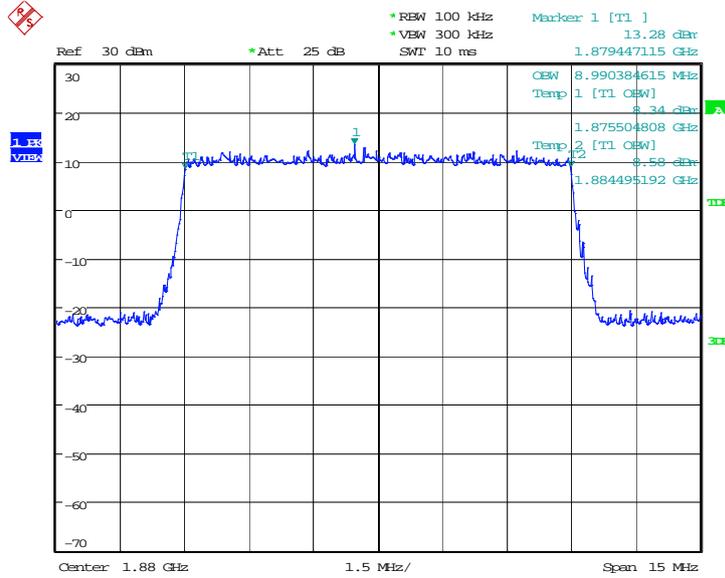
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LTE band 2, 10MHz Bandwidth, 16QAM (99% BW)
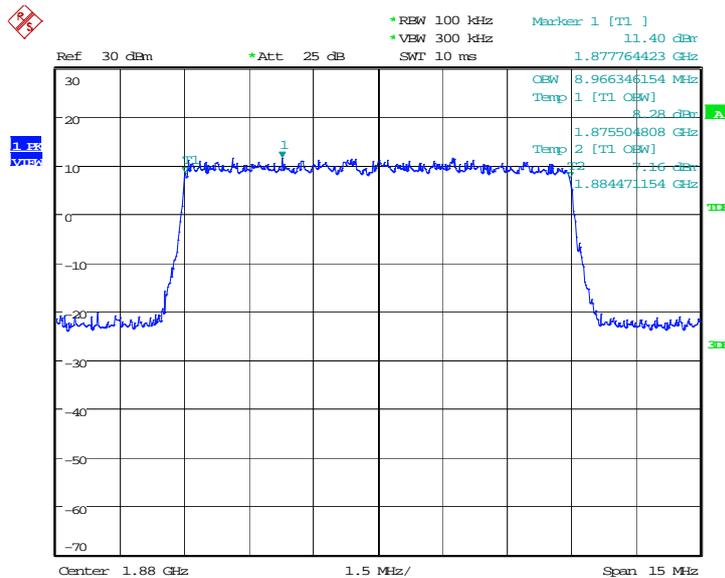
Date: 10.FEB.2014 18:06:20

LTE band 2, 15MHz (99% BW)

Frequency	Occupied Bandwidth (99% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	13429.487	13429.487

LTE band 2, 15MHz Bandwidth, QPSK (99% BW)
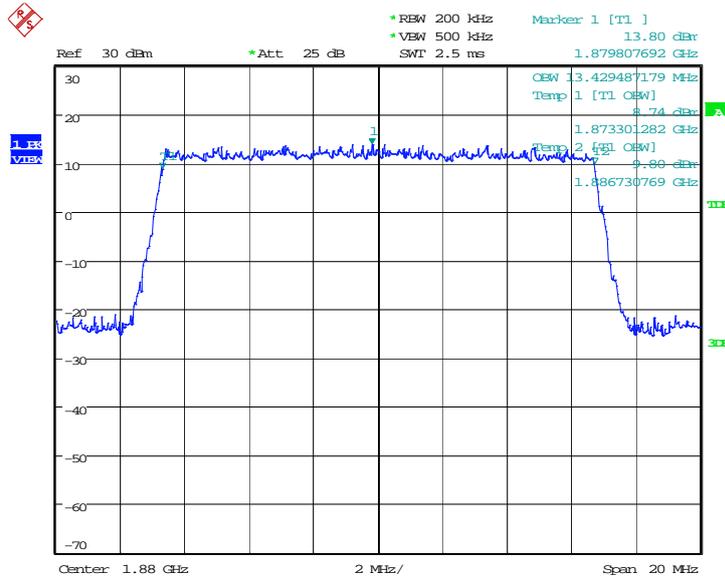
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LTE band 2, 15MHz Bandwidth, 16QAM (99% BW)
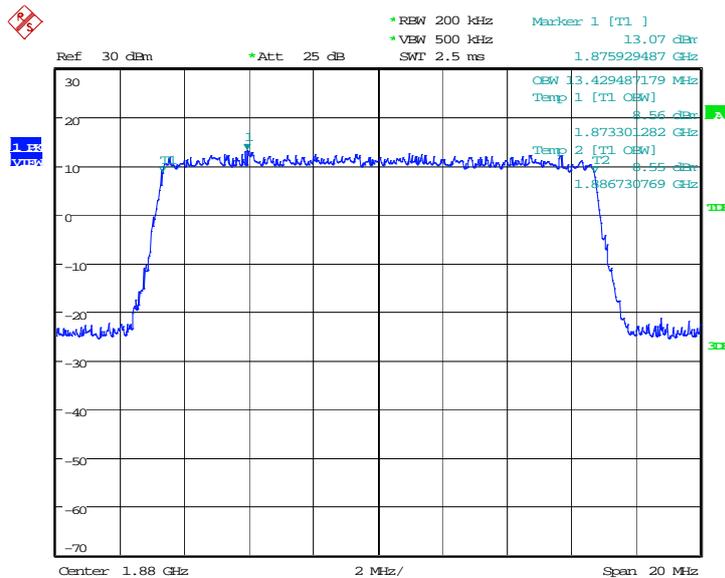
Date: 10.FEB.2014 18:33:01

LTE band 2, 20MHz (99% BW)

Frequency	Occupied Bandwidth (99% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	17884.615	17836.538

LTE band 2, 20MHz Bandwidth, QPSK (99% BW)
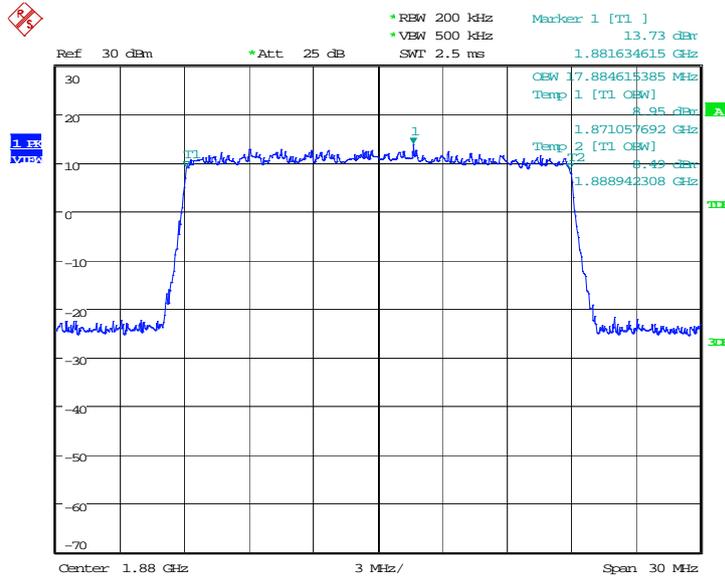
Date: 10.FEB.2014 18:58:27

LTE band 2, 20MHz Bandwidth, 16QAM (99% BW)
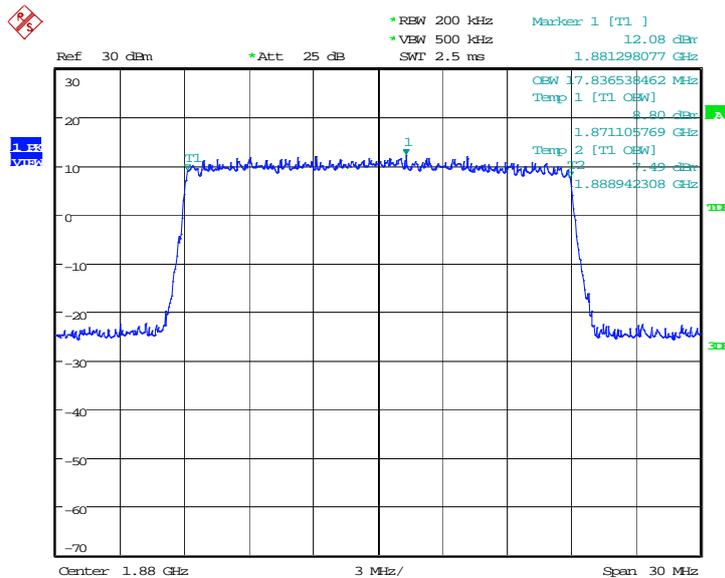
Date: 10.FEB.2014 18:58:40

LTE band 4, 1.4MHz (99% BW)

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

LTE band 4, 1.4MHz Bandwidth, QPSK (99% BW)
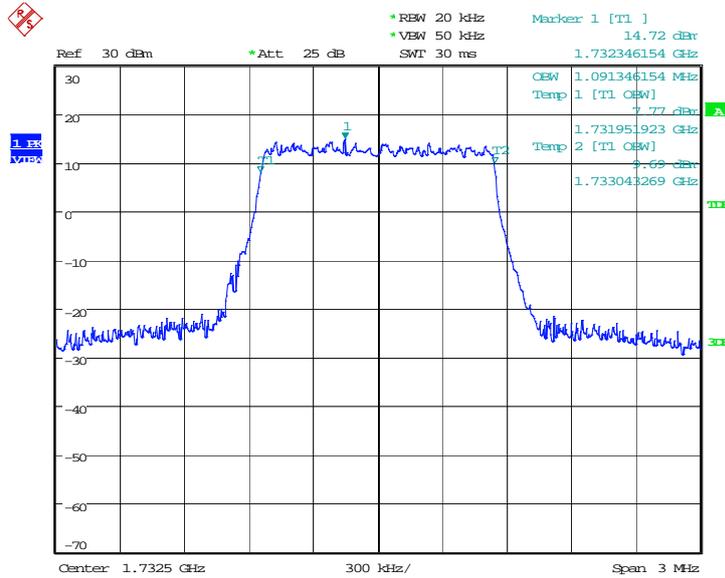
Date: 10.FEB.2014 19:43:17

LTE band 4, 1.4MHz Bandwidth, 16QAM (99% BW)
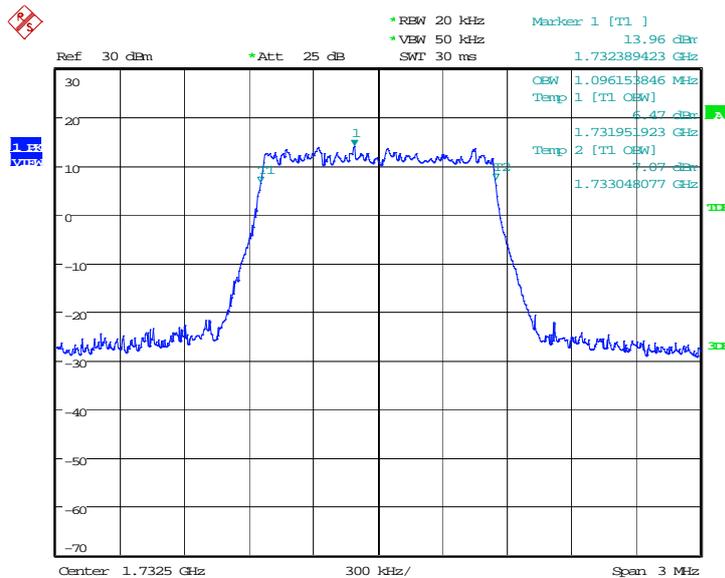
Date: 10.FEB.2014 19:43:30

LTE band 4, 3MHz (99% BW)

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

LTE band 4, 3MHz Bandwidth, QPSK (99% BW)
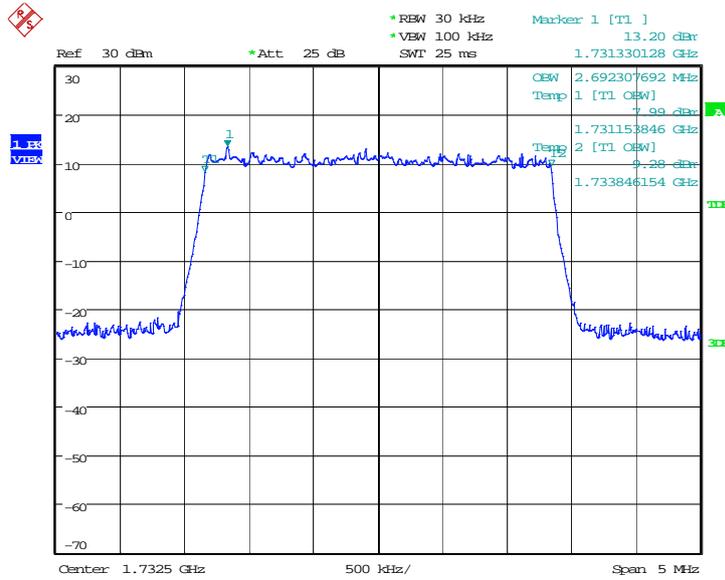
Date: 10.FEB.2014 21:08:10

LTE band 4, 3MHz Bandwidth, 16QAM (99% BW)
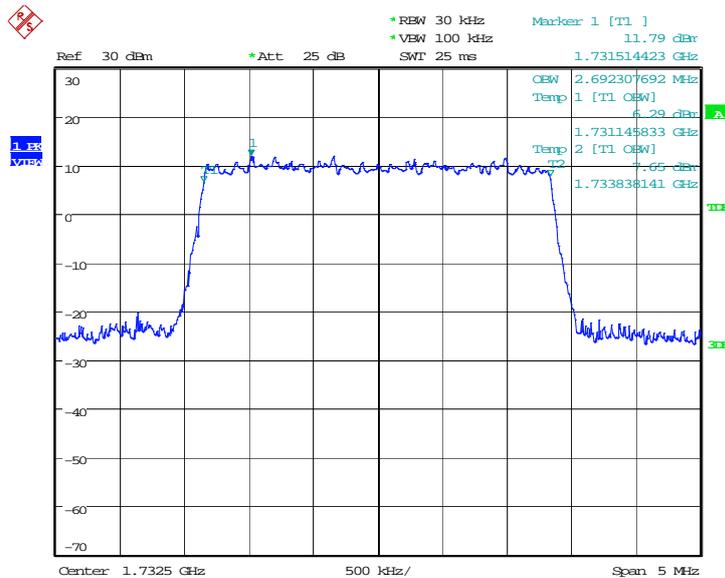
Date: 10.FEB.2014 21:08:23

LTE band 4, 5MHz (99% BW)

Frequency (MHz)	Occupied Bandwidth (99% BW)(kHz)	
	QPSK	16QAM
1732.5	4471.154	4487.179

LTE band 4, 5MHz Bandwidth, QPSK (99% BW)
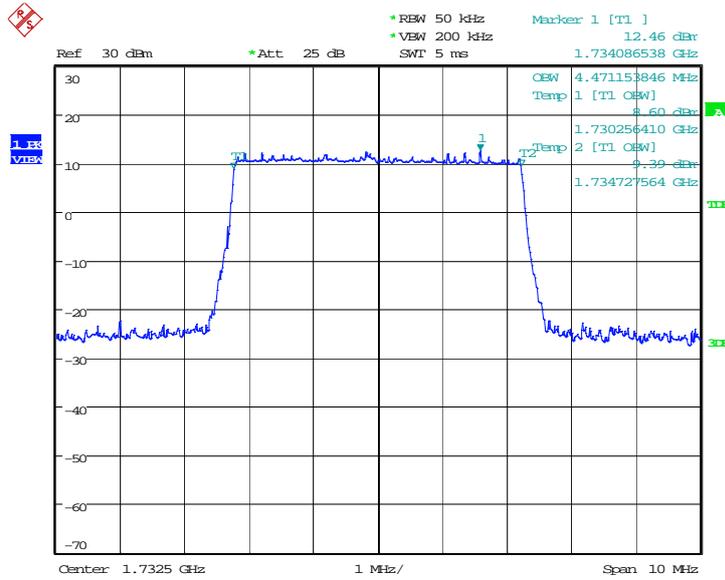
Date: 14.FEB.2014 16:59:35

LTE band 4, 5MHz Bandwidth,16QAM (99% BW)
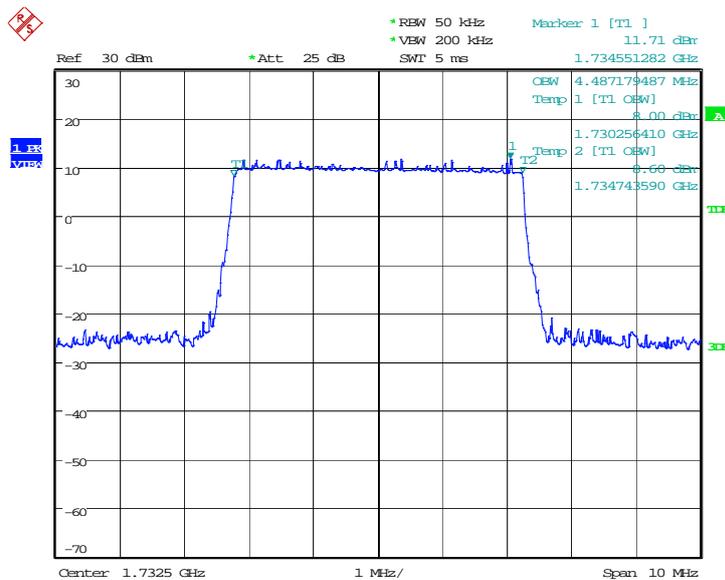
Date: 14.FEB.2014 16:59:48

LTE band 4, 10MHz (99% BW)

Frequency	Occupied Bandwidth (99% BW)(kHz)	
(MHz)	QPSK	16QAM
1732.5	8966.346	8942.308

LTE band 4, 10MHz Bandwidth, QPSK (99% BW)
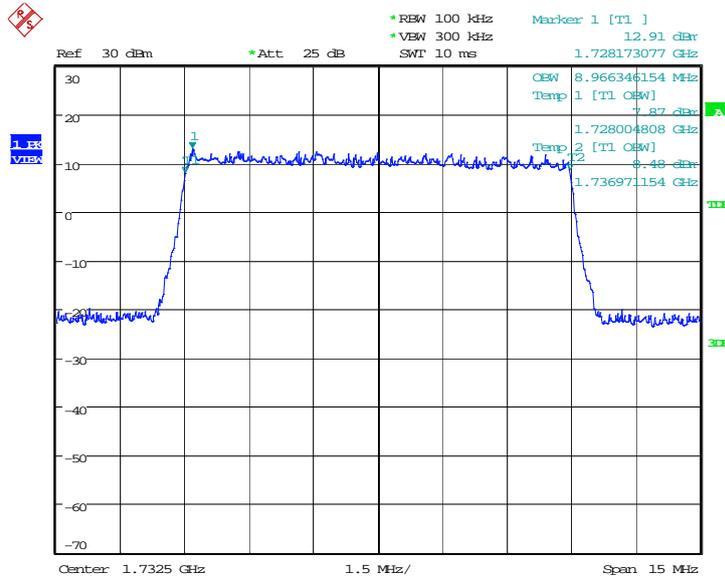
Date: 14.FEB.2014 17:26:13

LTE band 4, 10MHz Bandwidth, 16QAM (99% BW)
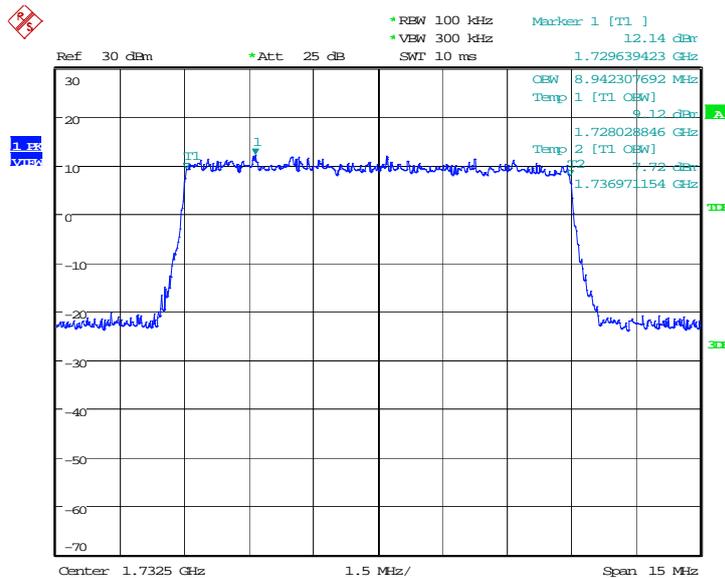
Date: 14.FEB.2014 17:26:27

LTE band 4, 15MHz (99% BW)

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

LTE band 4, 15MHz Bandwidth, QPSK (99% BW)
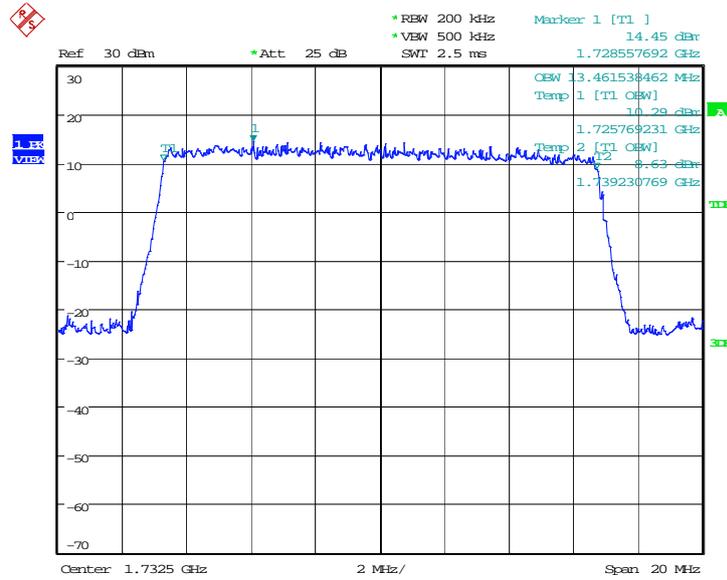
Date: 14.FEB.2014 17:53:23

LTE band 4, 15MHz Bandwidth, 16QAM (99% BW)
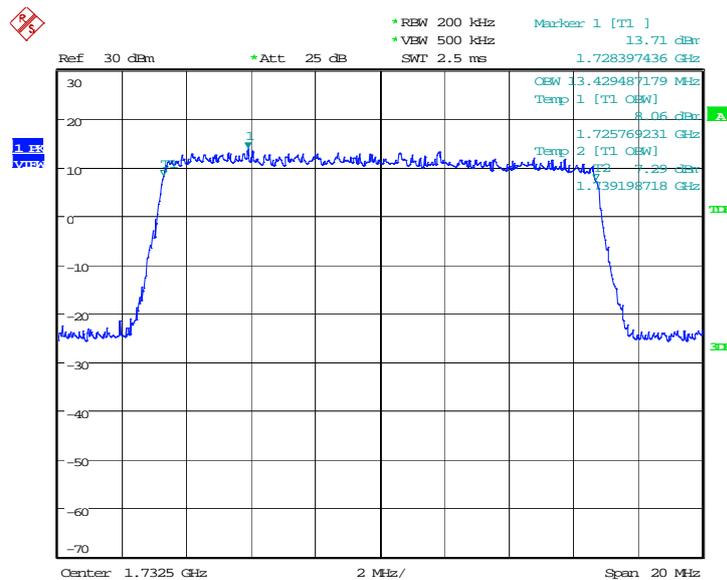
Date: 14.FEB.2014 17:53:37

LTE band 4, 20MHz (99% BW)

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

LTE band 4, 20MHz Bandwidth, QPSK (99% BW)
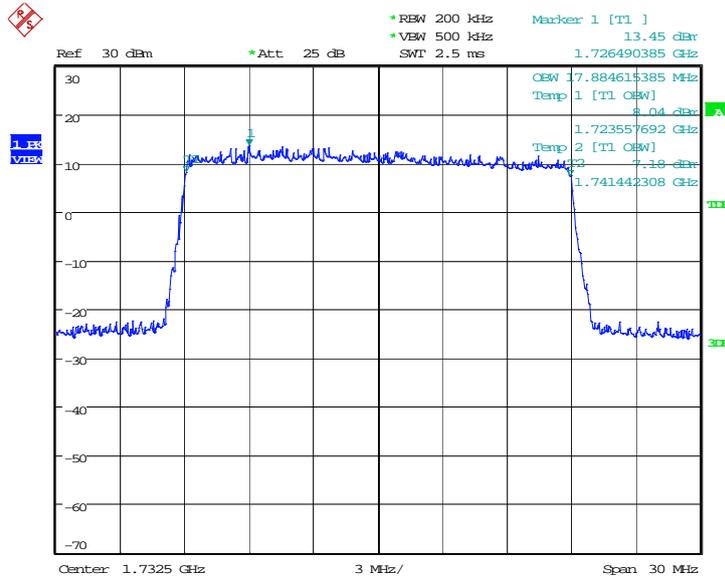
Date: 14.FEB.2014 18:20:07

LTE band 4, 20MHz Bandwidth, 16QAM (99% BW)
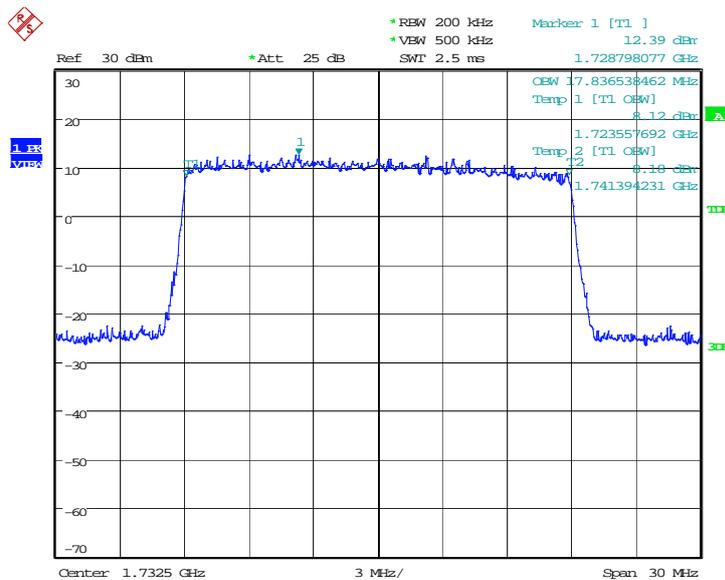
Date: 14.FEB.2014 18:20:21

LTE band 17, 5MHz (99% BW)

Frequency	Occupied Bandwidth (99% BW)(kHz)	
(MHz)	QPSK	16QAM
710	4471.154	4487.179

LTE band 17, 5MHz Bandwidth, QPSK (99% BW)
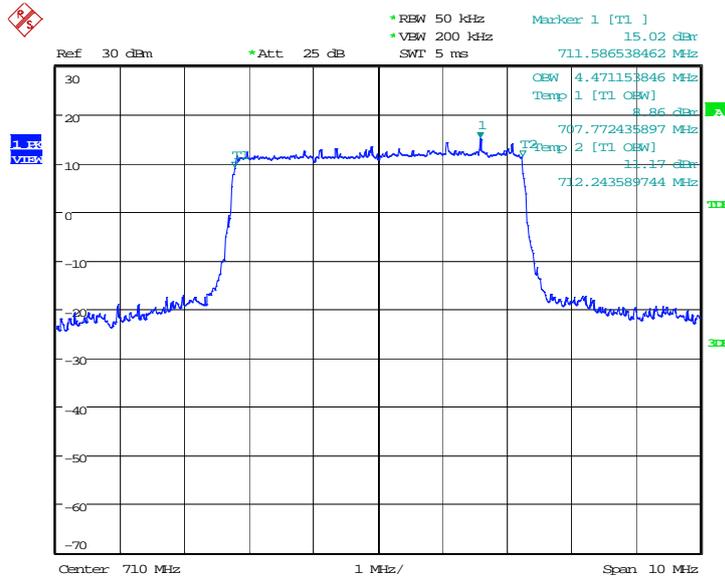
Date: 18.FEB.2014 14:23:39

LTE band 17, 5MHz Bandwidth,16QAM (99% BW)
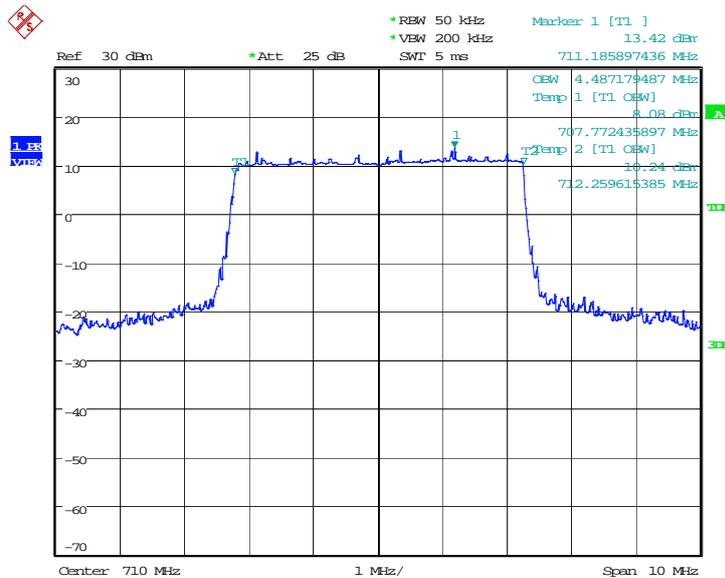
Date: 18.FEB.2014 14:23:52

LTE band 17, 10MHz (99% BW)

Frequency	Occupied Bandwidth (99% BW)(kHz)	
(MHz)	QPSK	16QAM
710	8966.346	8966.346

LTE band 17, 10MHz Bandwidth, QPSK (99% BW)
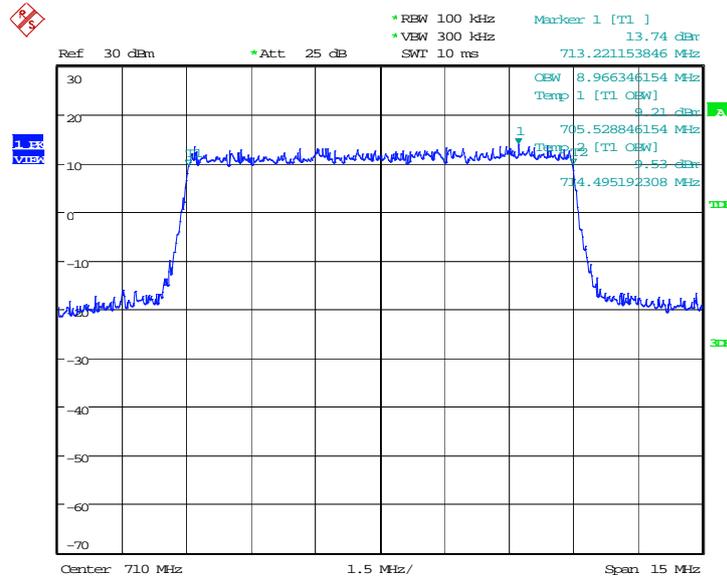
Date: 18.FEB.2014 14:29:19

LTE band 17, 10MHz Bandwidth, 16QAM (99% BW)
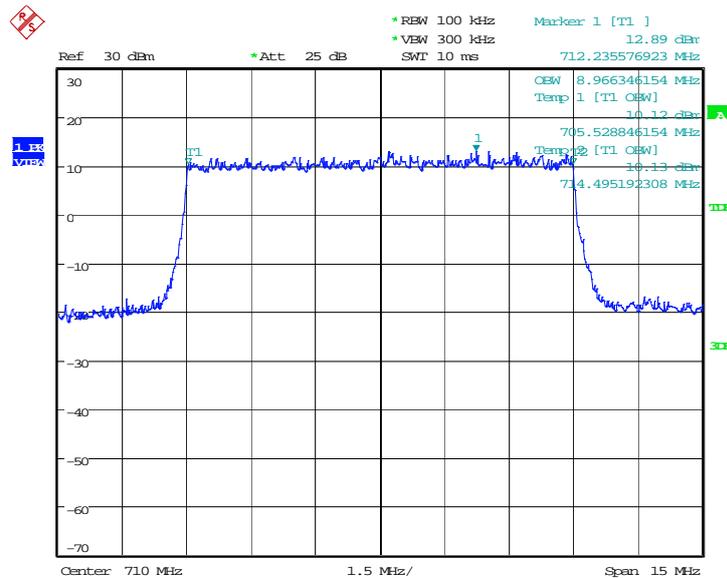
Date: 18.FEB.2014 14:29:33

A.6   EMISSION BANDWIDTH

Reference

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

A.6.1 Emission Bandwidth Measurement Results

Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the mid frequencies of the LTE bands 2, 4 and 17. Table below lists the measured 100% BW. Spectrum analyzer plots are included on the following pages.

LTE band 2, 1.4MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	1302.885	1298.077

LTE band 2, 1.4MHz Bandwidth, QPSK (100% BW)
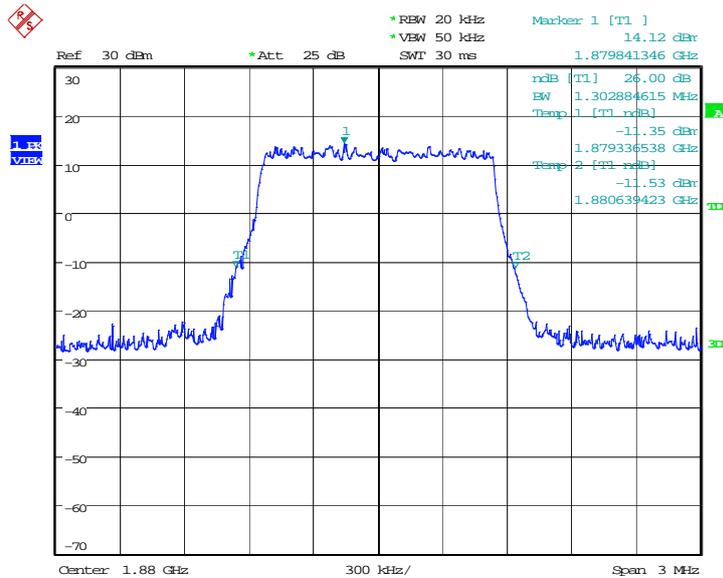
Date: 10.FEB.2014 16:50:35

LTE band 2, 1.4MHz Bandwidth, 16QAM (100% BW)
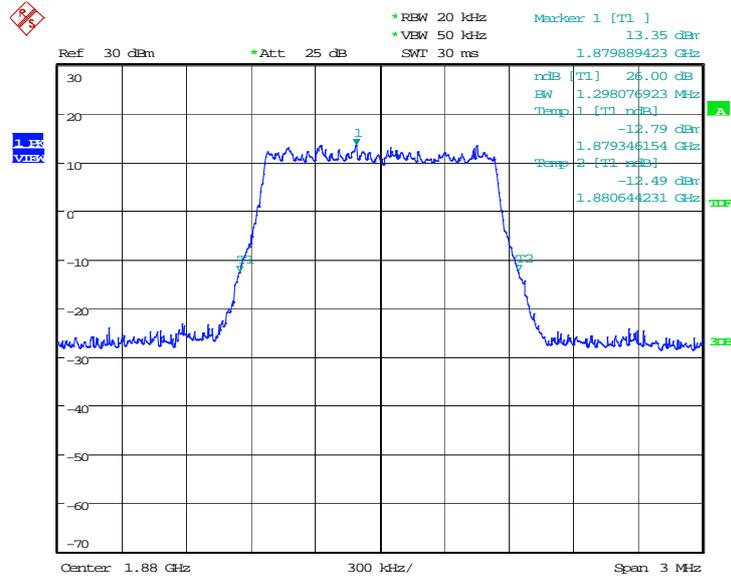
Date: 10.FEB.2014 16:50:51

LTE band 2, 3MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	2964.744	2948.718

LTE band 2, 3MHz Bandwidth, QPSK (100% BW)
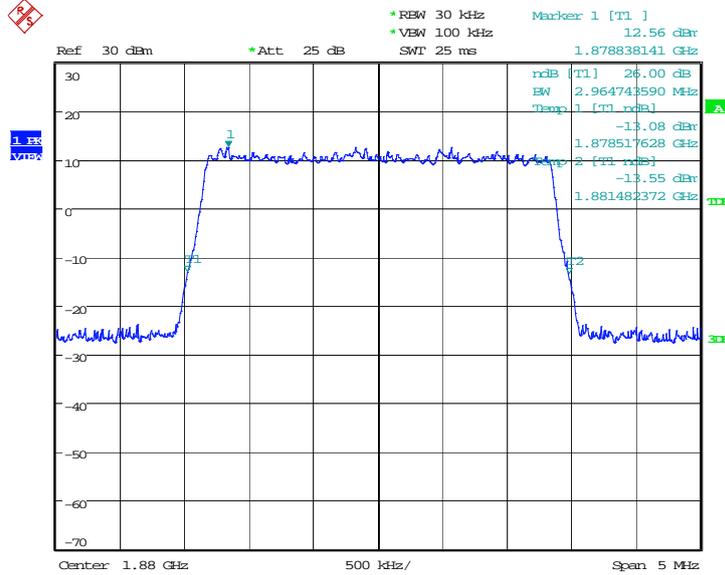
Date: 10.FEB.2014 17:17:13

LTE band 2, 3MHz Bandwidth, 16QAM (100% BW)
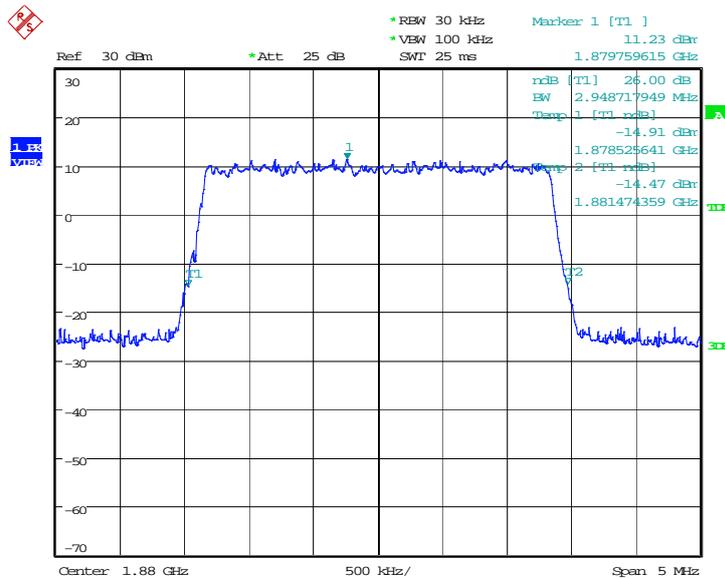
Date: 10.FEB.2014 17:17:29

LTE band 2, 5MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	4887.821	4935.897

LTE band 2, 5MHz Bandwidth, QPSK (100% BW)
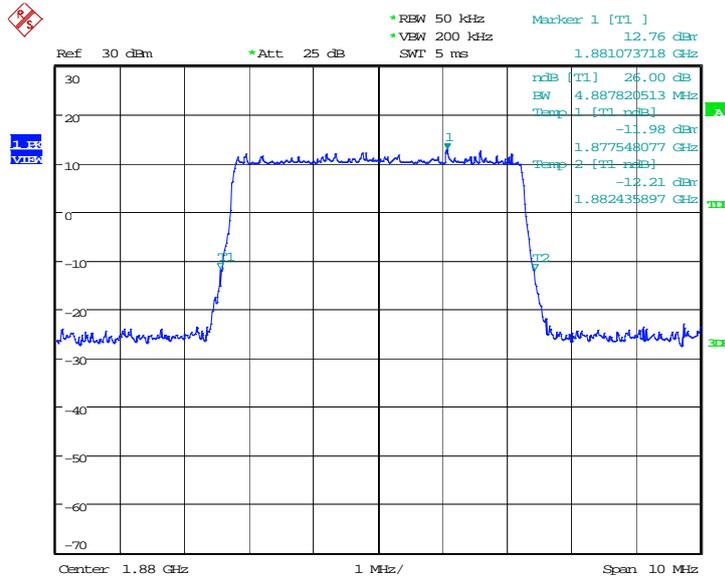
Date: 10.FEB.2014 17:43:50

LTE band 2, 5MHz Bandwidth,16QAM (100% BW)
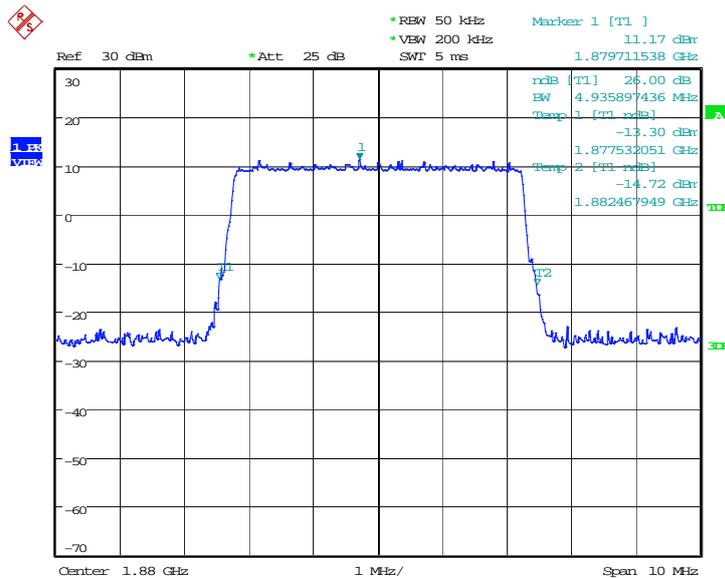
Date: 10.FEB.2014 17:44:06

LTE band 2, 10MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	9783.654	9807.692

LTE band 2, 10MHz Bandwidth, QPSK (100% BW)
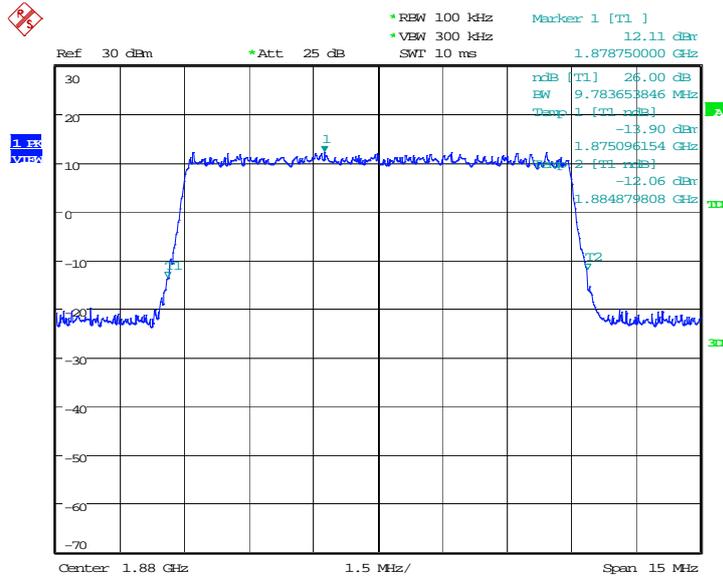
Date: 10.FEB.2014 18:10:28

LTE band 2, 10MHz Bandwidth, 16QAM (100% BW)
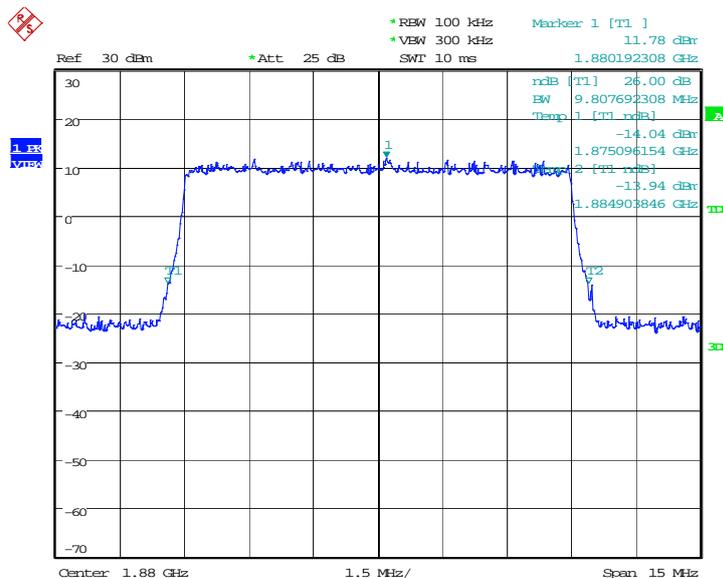
Date: 10.FEB.2014 18:10:43

LTE band 2, 15MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	14583.333	14647.436

LTE band 2, 15MHz Bandwidth, QPSK (100% BW)
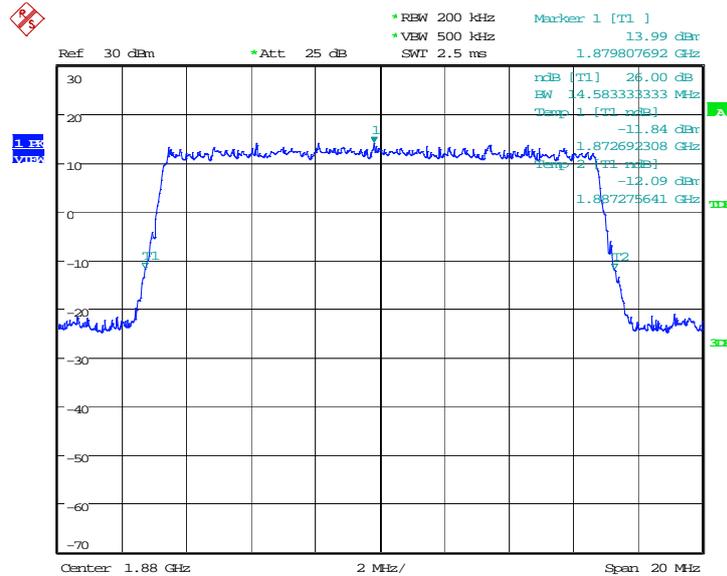
Date: 10.FEB.2014 18:37:09

LTE band 2, 15MHz Bandwidth, 16QAM (100% BW)
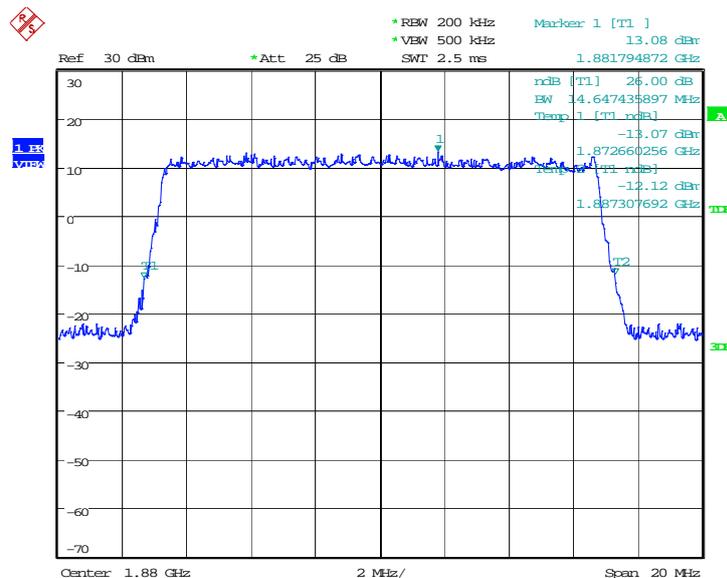
Date: 10.FEB.2014 18:37:25

LTE band 2, 20MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
1880.0	19086.538	19134.615

LTE band 2, 20MHz Bandwidth, QPSK (100% BW)
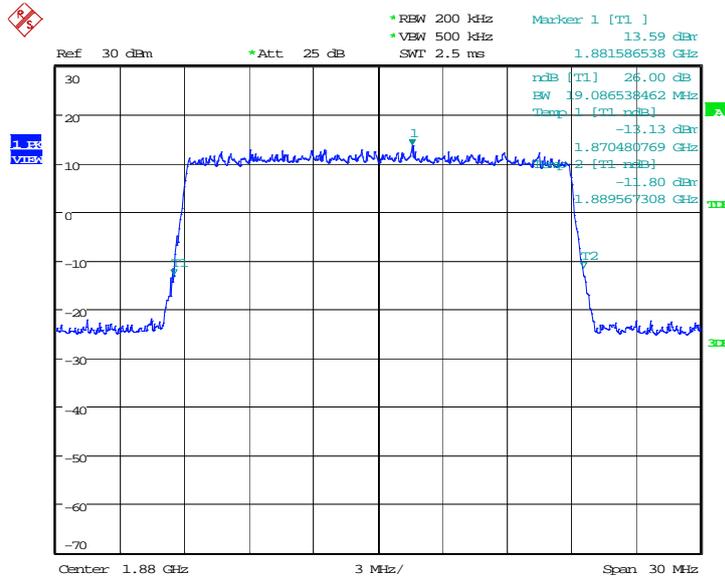
Date: 10.FEB.2014 19:03:10

LTE band 2, 20MHz Bandwidth, 16QAM (100% BW)
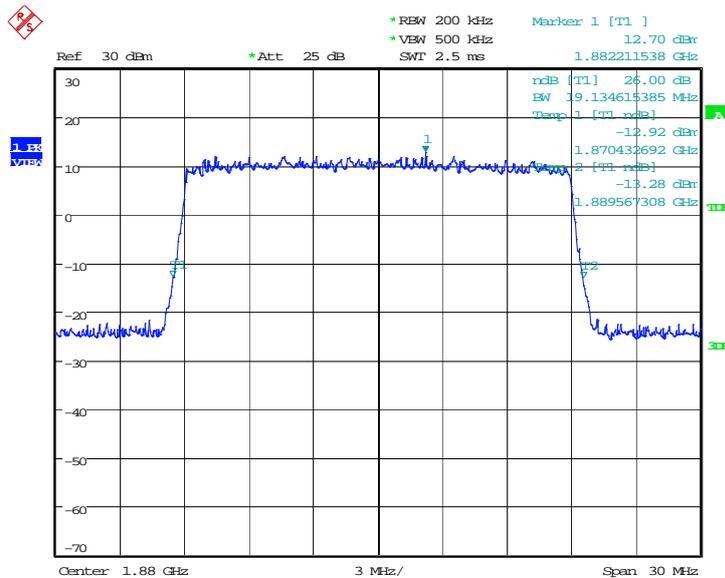
Date: 10.FEB.2014 19:03:25

LTE band 4, 1.4MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
1732.5	1302.885	1293.269

LTE band 4, 1.4MHz Bandwidth, QPSK (100% BW)
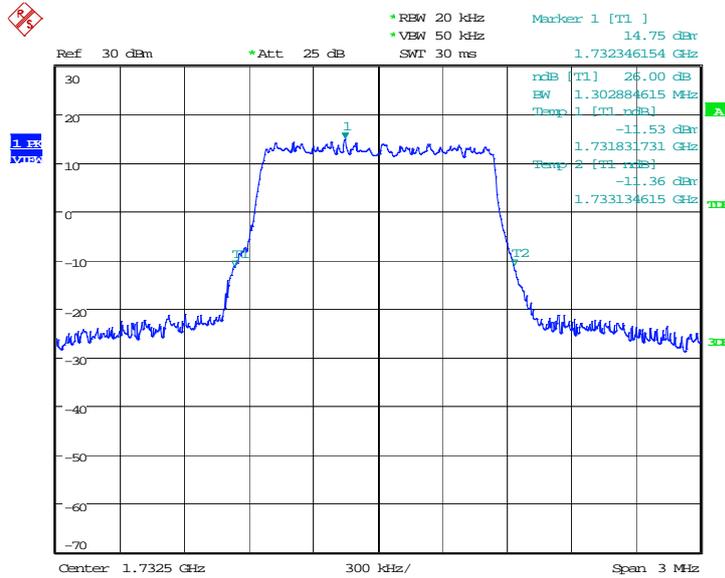
Date: 10.FEB.2014 20:47:39

LTE band 4, 1.4MHz Bandwidth, 16QAM (100% BW)
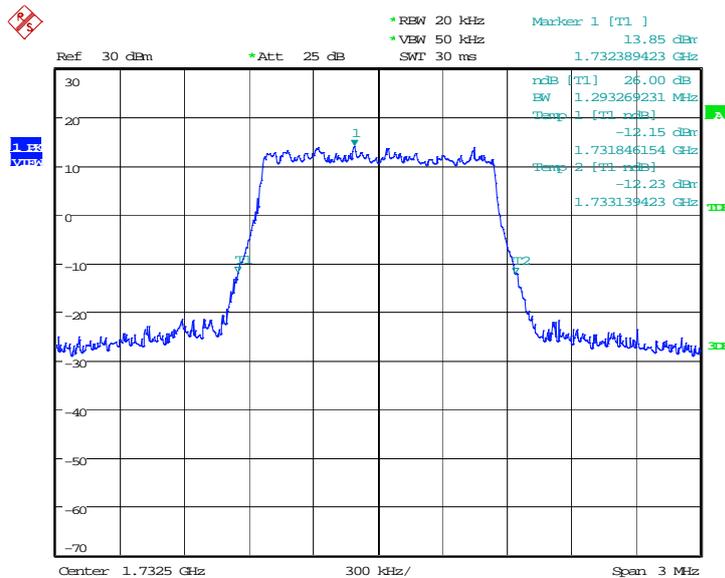
Date: 10.FEB.2014 20:47:54

LTE band 4, 3MHz (100% BW)

Frequency (MHz)	Occupied Bandwidth (100% BW)(kHz)	
	QPSK	16QAM
1732.5	2956.731	2940.705

LTE band 4, 3MHz Bandwidth, QPSK (100% BW)
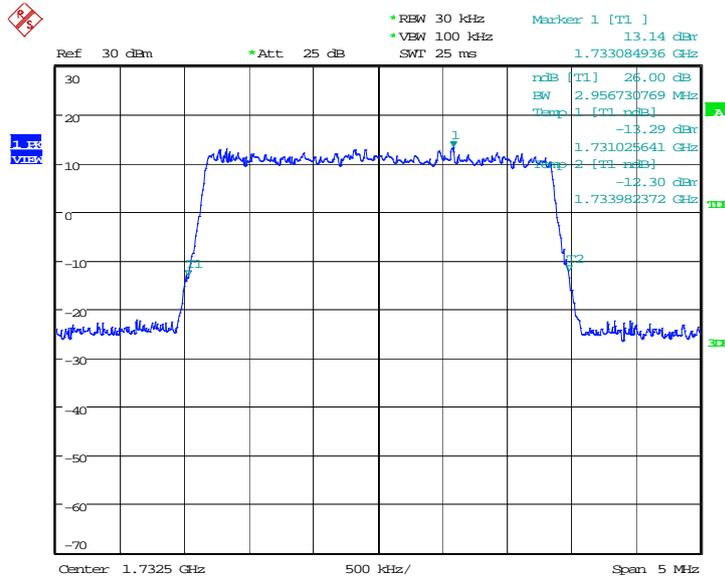
Date: 10.FEB.2014 21:12:22

LTE band 4, 3MHz Bandwidth, 16QAM (100% BW)
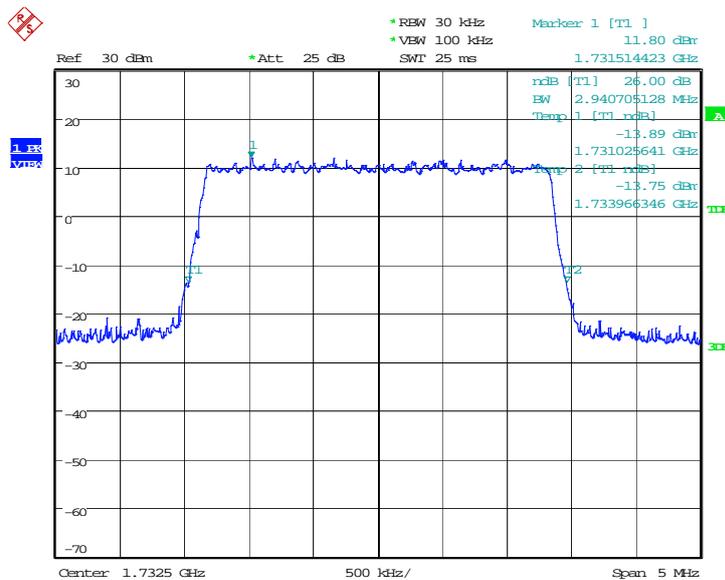
Date: 10.FEB.2014 21:12:38

LTE band 4, 5MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
1732.5	4887.821	4935.897

LTE band 4, 5MHz Bandwidth, QPSK (100% BW)
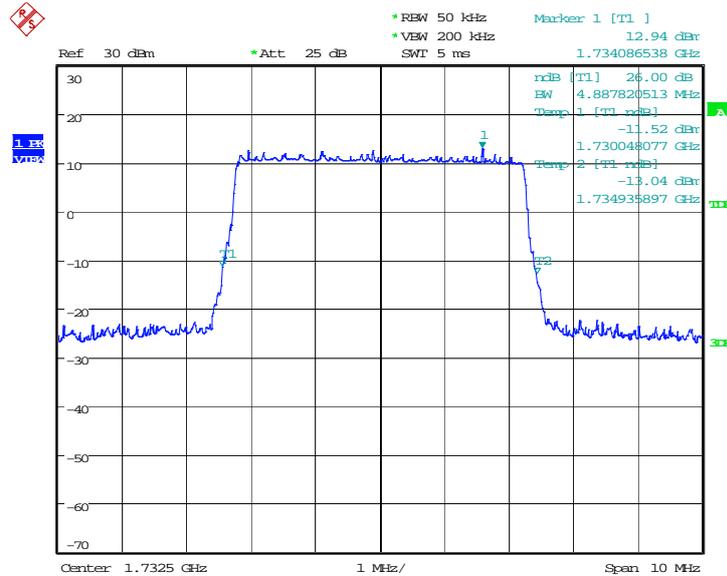
Date: 14.FEB.2014 17:03:57

LTE band 4, 5MHz Bandwidth,16QAM (100% BW)
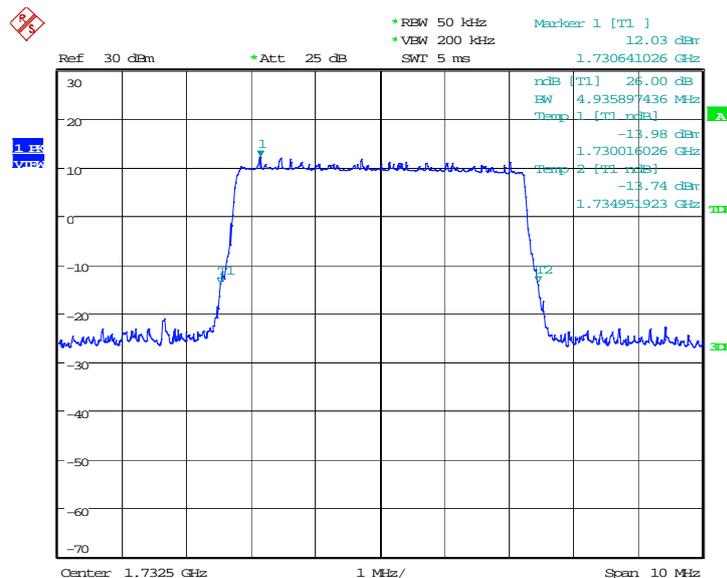
Date: 14.FEB.2014 17:04:13

LTE band 4, 10MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
1732.5	9807.692	9783.654

LTE band 4, 10MHz Bandwidth, QPSK (100% BW)
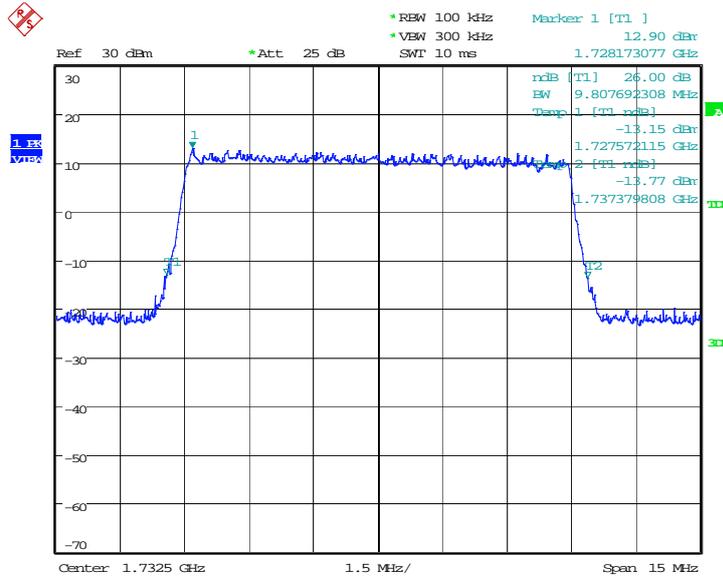
Date: 14.FEB.2014 17:31:04

LTE band 4, 10MHz Bandwidth, 16QAM (100% BW)
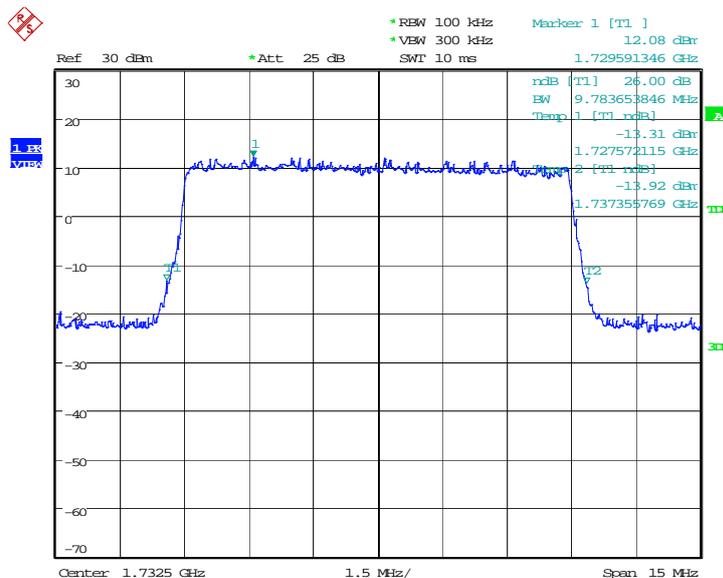
Date: 14.FEB.2014 17:31:20

LTE band 4, 15MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
1732.5	14583.333	14519.231

LTE band 4, 15MHz Bandwidth, QPSK (100% BW)
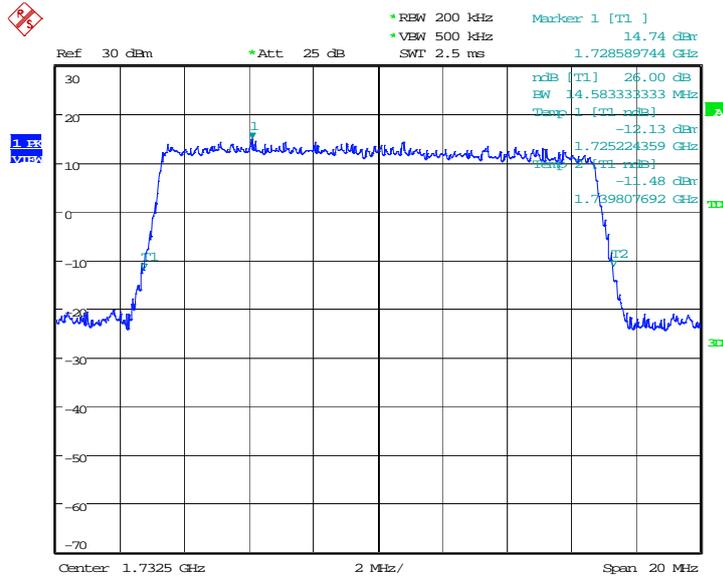
Date: 14.FEB.2014 17:57:45

LTE band 4, 15MHz Bandwidth, 16QAM (100% BW)
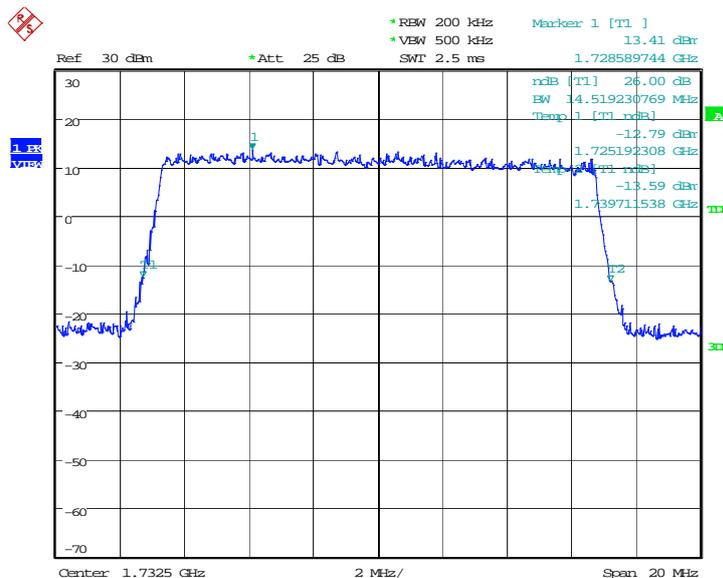
Date: 14.FEB.2014 17:58:01

LTE band 4, 20MHz (100% BW)

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

LTE band 4, 20MHz Bandwidth, QPSK (100% BW)
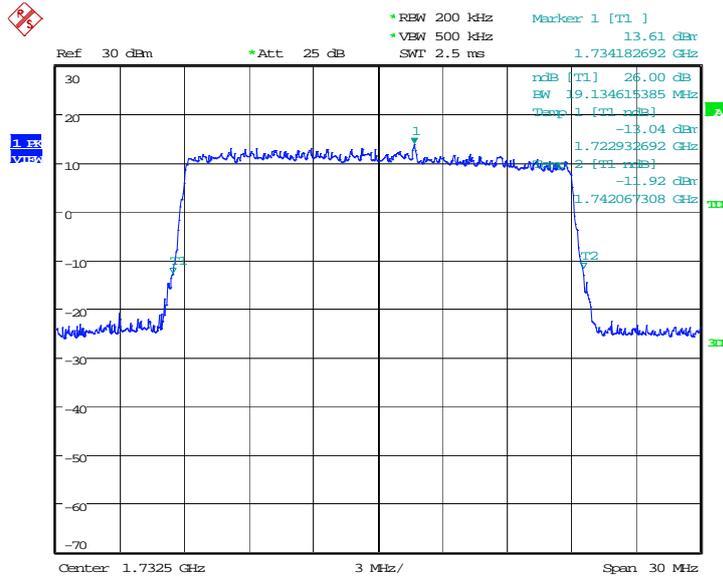
Date: 14.FEB.2014 18:24:29

LTE band 4, 20MHz Bandwidth, 16QAM (100% BW)
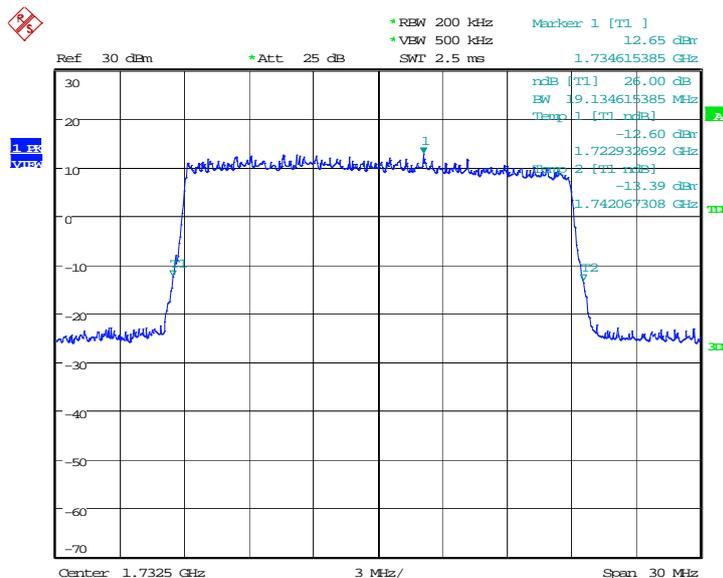
Date: 14.FEB.2014 18:24:45

LTE band 17, 5 MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
710	4935.897	4935.897

LTE band 17, 5 MHz Bandwidth, QPSK (100% BW)
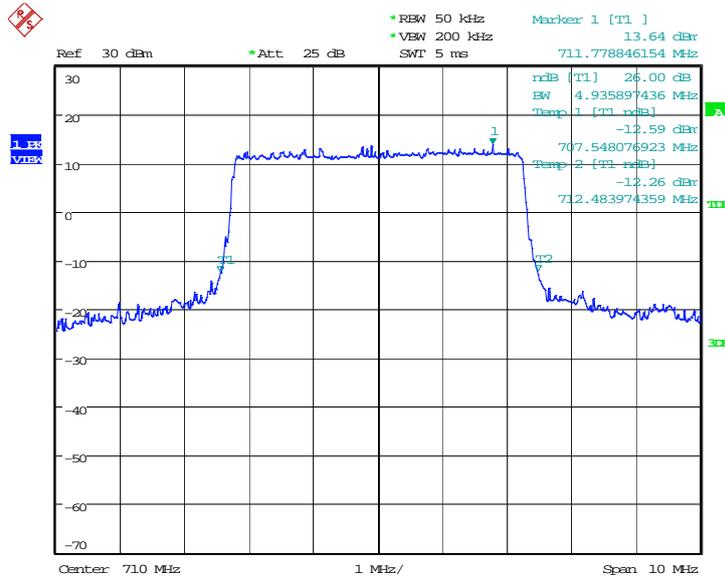
Date: 18.FEB.2014 14:24:46

LTE band 17, 5 MHz Bandwidth,16QAM (100% BW)
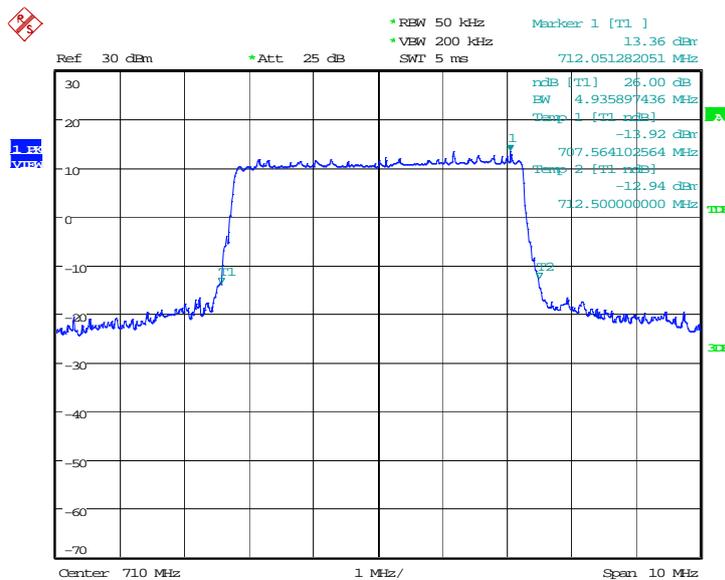
Date: 18.FEB.2014 14:25:01

LTE band 17, 10 MHz (100% BW)

Frequency	Occupied Bandwidth (100% BW)(kHz)	
(MHz)	QPSK	16QAM
710	9831.731	9807.692

LTE band 17, 10 MHz Bandwidth, QPSK (100% BW)
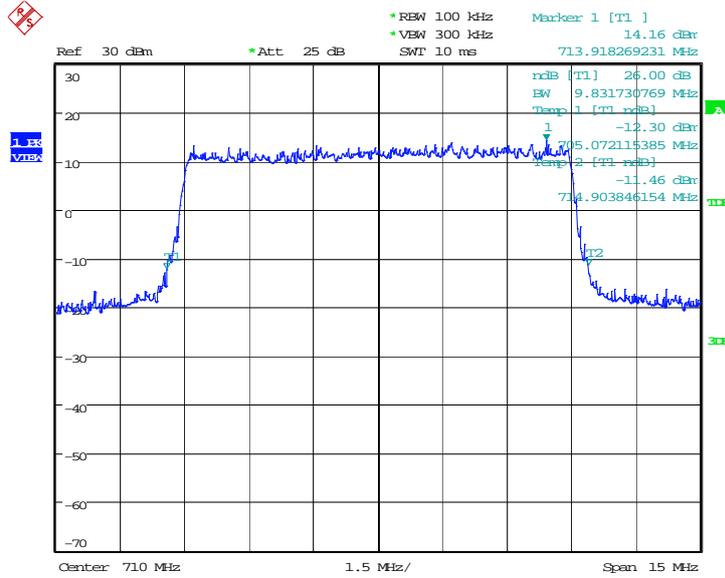
Date: 18.FEB.2014 14:30:26

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

Date: 18.FEB.2014 14:30:41

A.7 BAND EDGE COMPLIANCE

Reference

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

A.7.1 Measurement limit

On any frequency outside frequency band of the LTE FDD bands 2, 4 and 17 spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

A.7.2 Measurement result

LTE band 2, 1.4MHz

LOW BAND EDGE BLOCK-QPSK

Date: 10.FEB.2014 16:49:30

HIGH BAND EDGE BLOCK-QPSK

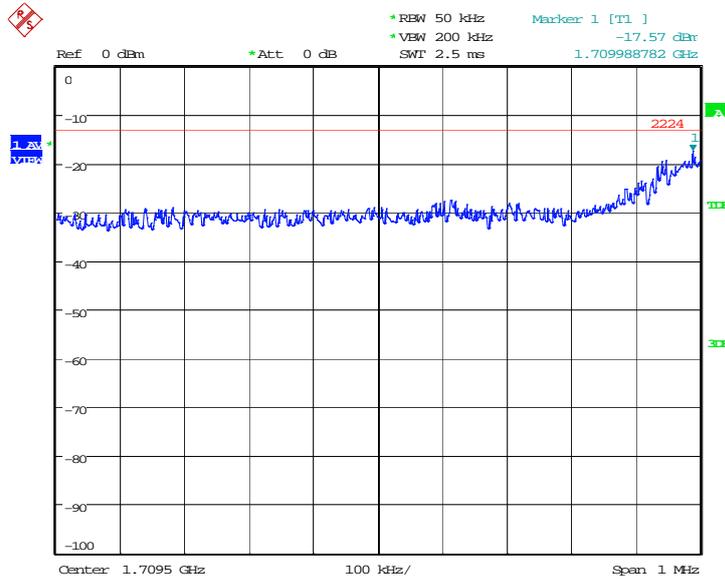

Date: 10.FEB.2014 16:52:50

LOW BAND EDGE BLOCK-16QAM
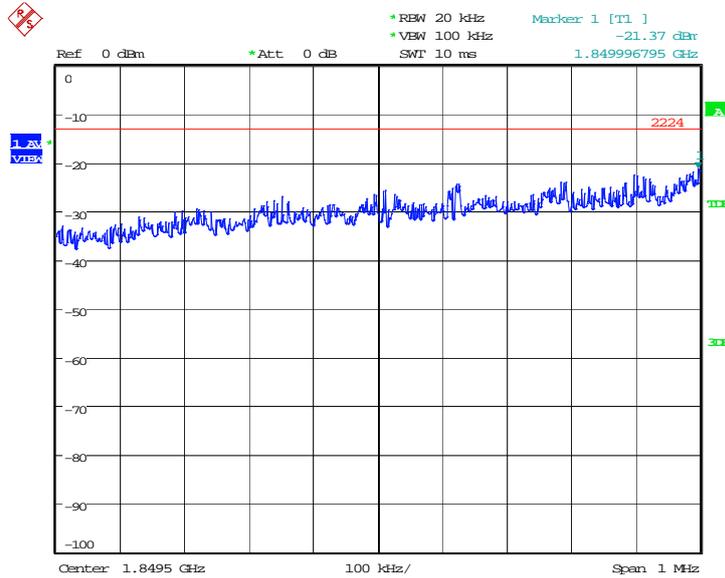

Date: 10.FEB.2014 16:49:40

HIGH BAND EDGE BLOCK-16QAM
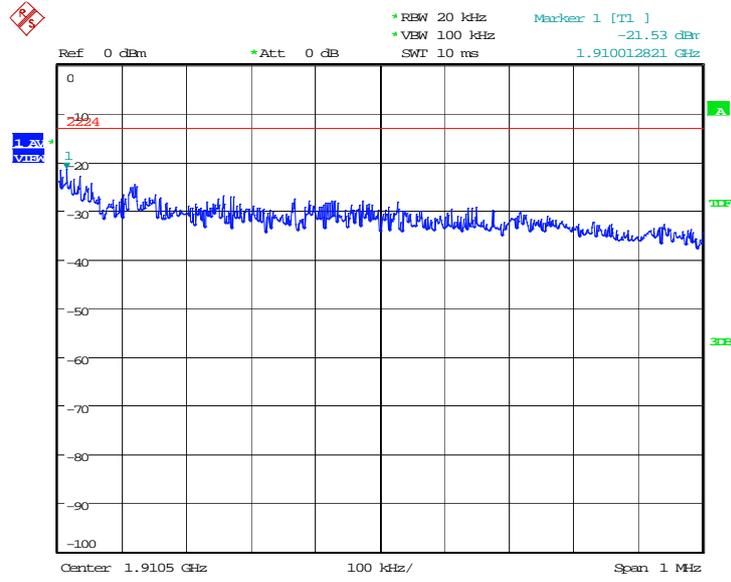
Date: 10.FEB.2014 16:53:00

LTE band 2, 3MHz
LOW BAND EDGE BLOCK-QPSK

```
                                          *RBW  30 kHz      Marker 1 [T1 ]
                                          *VBW 100 kHz              -15.89 dBm
        Ref   0 dBm          *Att  0 dB    SWT 5 ms          1.850000000 GHz
```



```
        Center  1.8495 GHz            100 kHz/              Span  1 MHz
```
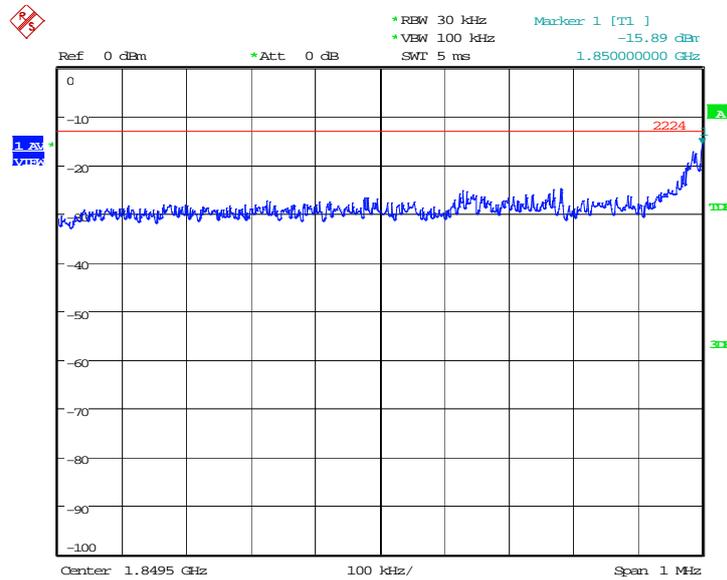
Date: 10.FEB.2014 17:16:08

HIGH BAND EDGE BLOCK-QPSK

```
                                          *RBW  30 kHz      Marker 1 [T1 ]
                                          *VBW 100 kHz              -18.31 dBm
        Ref   0 dBm          *Att  0 dB    SWT 5 ms          1.910000000 GHz
```



```
        Center  1.9105 GHz            100 kHz/              Span  1 MHz
```
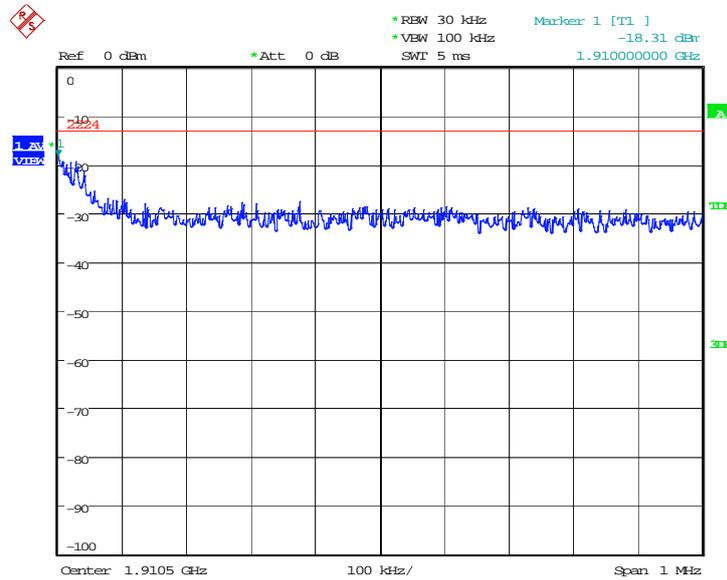
Date: 10.FEB.2014 17:19:28

LOW BAND EDGE BLOCK-16QAM

RBW 30 kHz   Marker 1 [T1]
VBW 100 kHz   -16.81 dBm
Ref 0 dBm   *Att 0 dB   SWT 5 ms   1.849995192 GHz

Center 1.8495 GHz   100 kHz/   Span 1 MHz
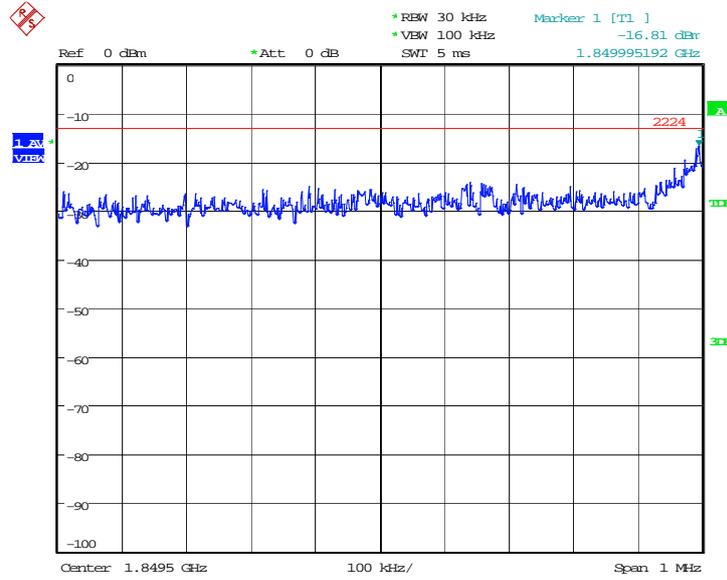
Date: 10.FEB.2014 17:16:18

HIGH BAND EDGE BLOCK-16QAM

RBW 30 kHz   Marker 1 [T1]
VBW 100 kHz   -20.38 dBm
Ref 0 dBm   *Att 0 dB   SWT 5 ms   1.910003205 GHz

Center 1.9105 GHz   100 kHz/   Span 1 MHz
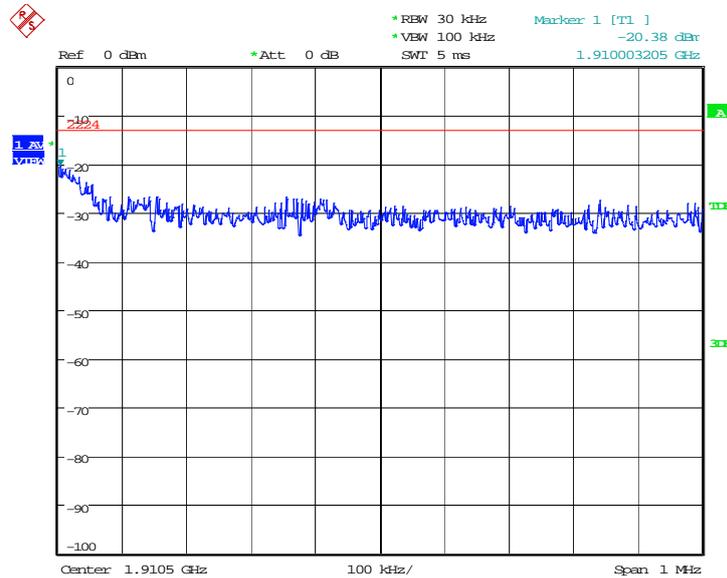
Date: 10.FEB.2014 17:19:38

LTE band 2, 5MHz
LOW BAND EDGE BLOCK-QPSK
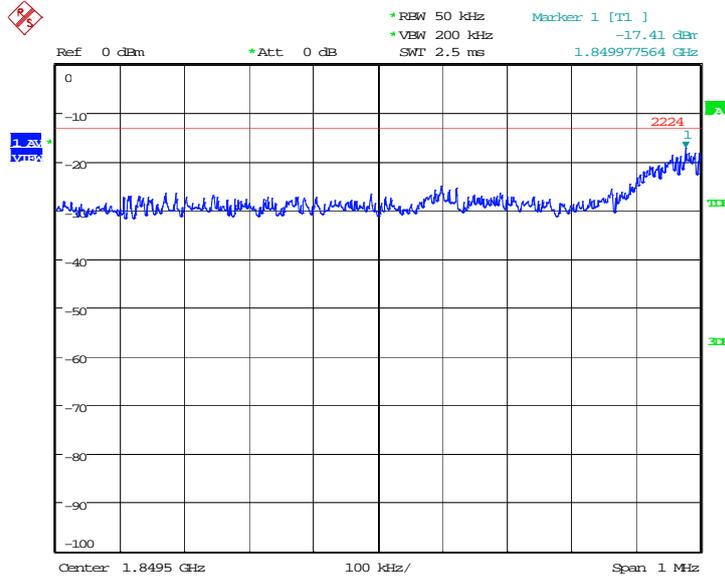
Date: 10.FEB.2014 17:42:45

HIGH BAND EDGE BLOCK-QPSK
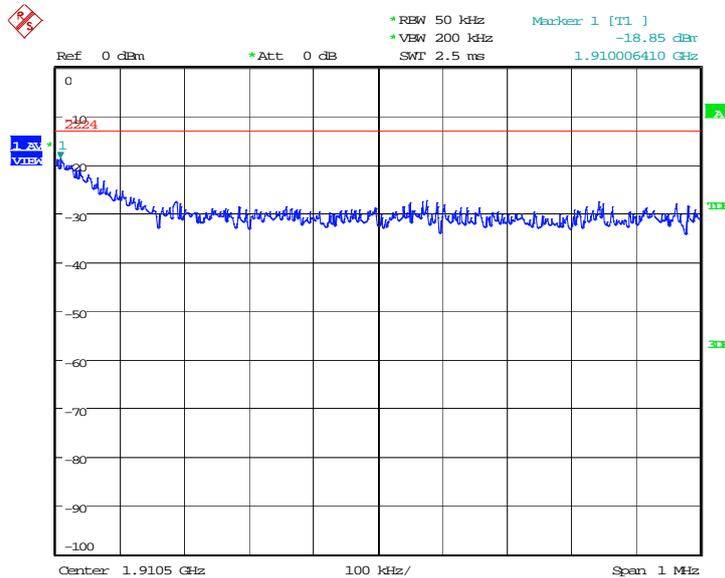
Date: 10.FEB.2014 17:46:05
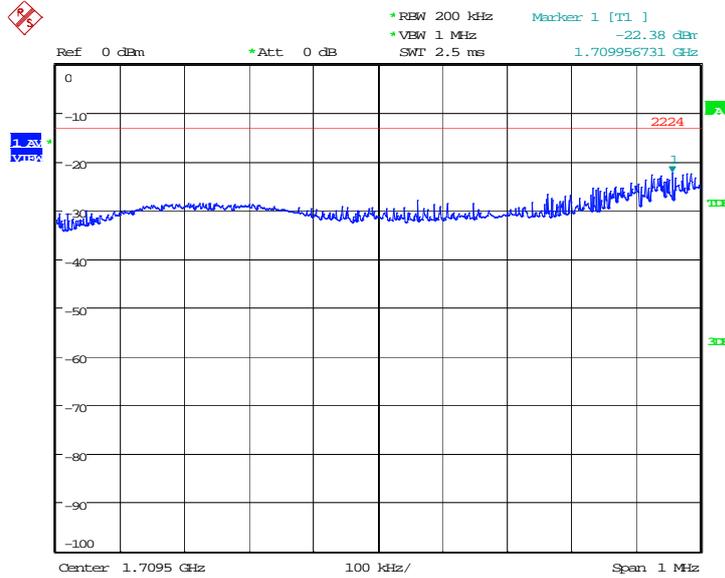
LOW BAND EDGE BLOCK-16QAM

	*RBW 50 kHz
	*VBW 200 kHz
Ref 0 dBm *Att 0 dB	SWT 2.5 ms

Marker 1 [T1]
−16.94 dBm
1.849995192 GHz

2224

Center 1.8495 GHz   100 kHz/   Span 1 MHz
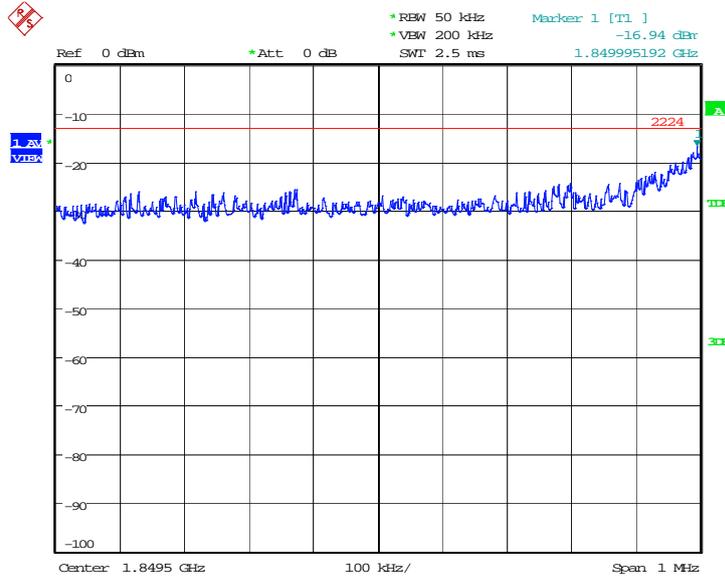
Date: 10.FEB.2014 17:42:55

HIGH BAND EDGE BLOCK-16QAM

	*RBW 50 kHz
	*VBW 200 kHz
Ref 0 dBm *Att 0 dB	SWT 2.5 ms

Marker 1 [T1]
−17.77 dBm
1.910000000 GHz

2224

Center 1.9105 GHz   100 kHz/   Span 1 MHz
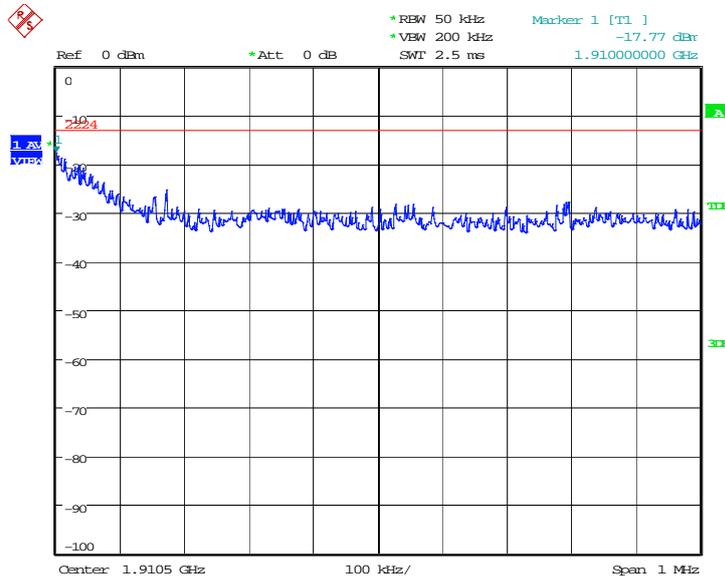
Date: 10.FEB.2014 17:46:15

LTE band 2, 10MHz
LOW BAND EDGE BLOCK-QPSK
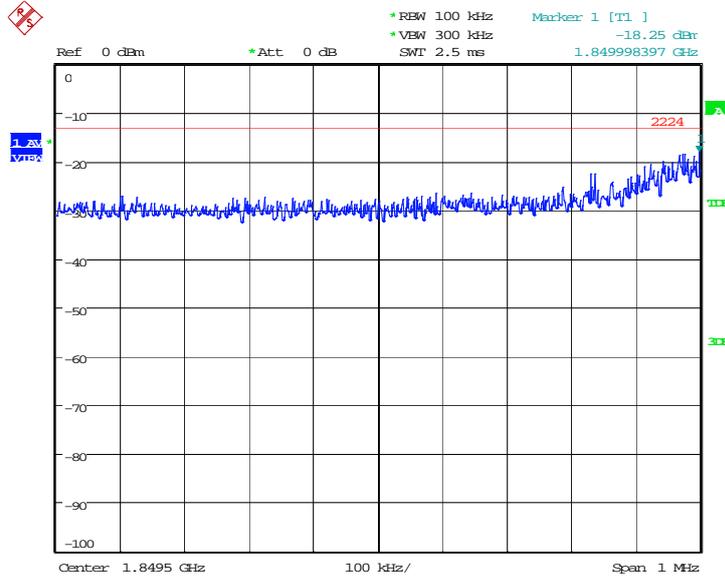
Date: 10.FEB.2014 18:09:22

HIGH BAND EDGE BLOCK-QPSK
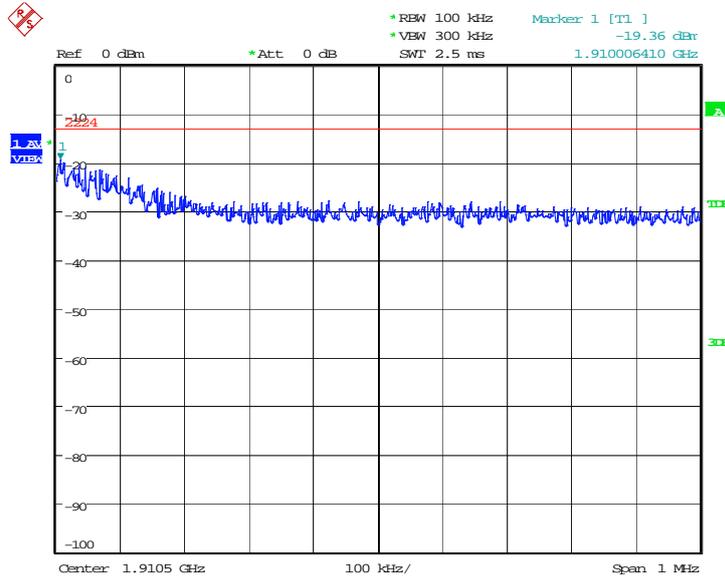
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LOW BAND EDGE BLOCK-16QAM
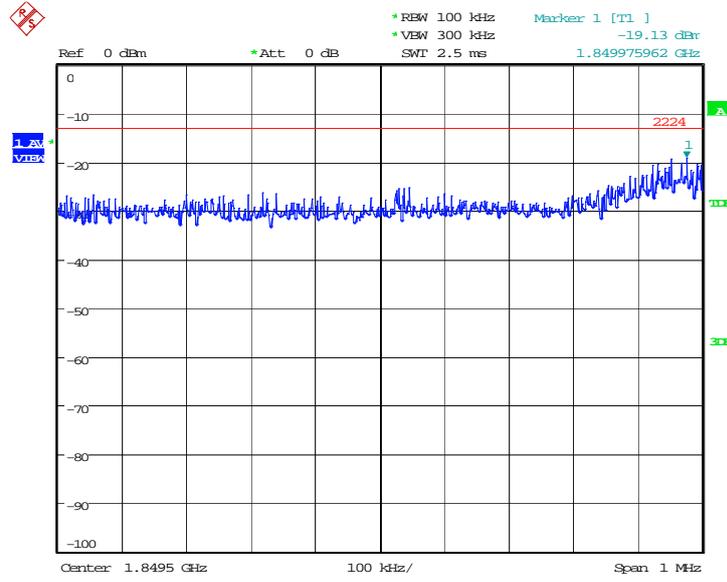
Date: 10.FEB.2014 18:09:33

HIGH BAND EDGE BLOCK-16QAM
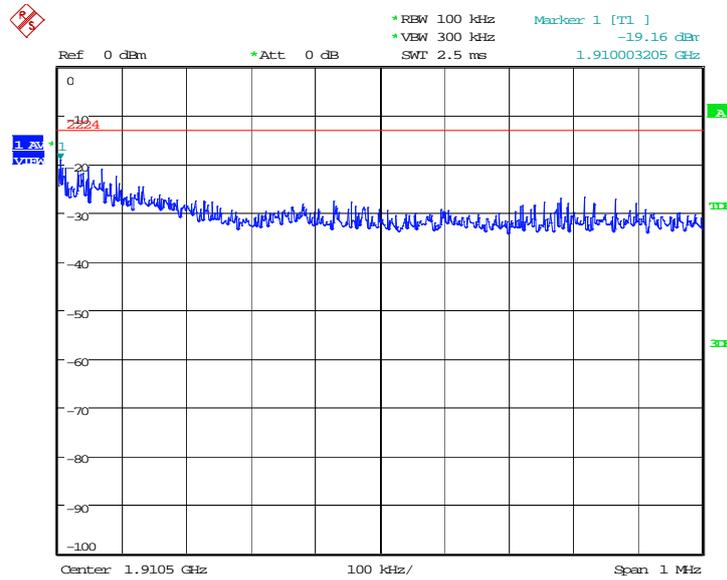
Date: 10.FEB.2014 18:12:53
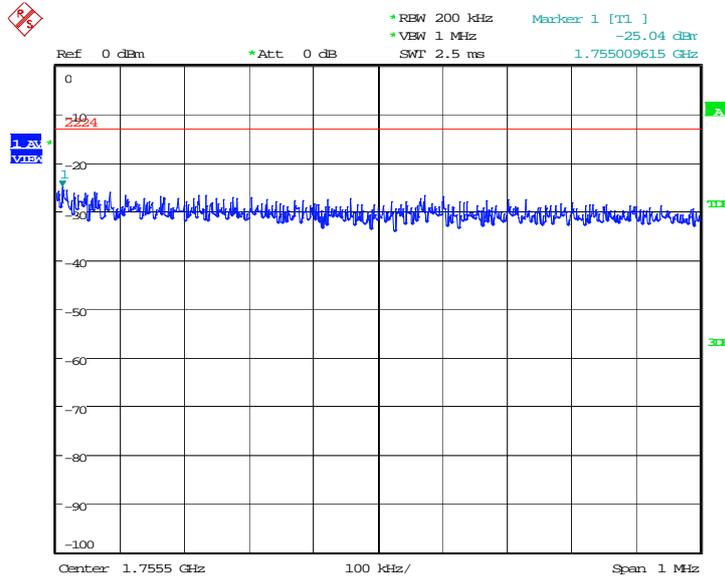
LTE band 2, 15MHz
LOW BAND EDGE BLOCK-QPSK


```
                                          * RBW 200 kHz    Marker 1 [T1 ]
                                          * VBW 1 MHz              -19.47 dBm
        Ref   0 dBm        * Att  0 dB    SWT 2.5 ms        1.849998397 GHz
```
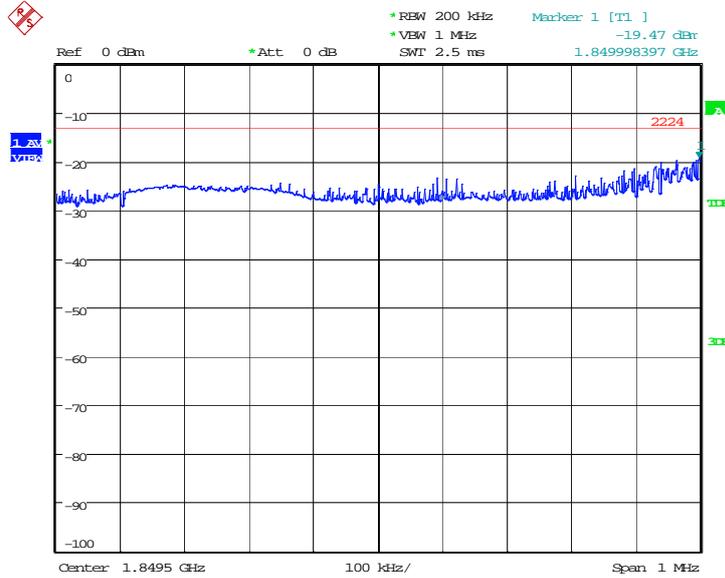
Date: 10.FEB.2014 18:36:04

HIGH BAND EDGE BLOCK-QPSK


```
                                          * RBW 200 kHz    Marker 1 [T1 ]
                                          * VBW 1 MHz              -20.58 dBm
        Ref   0 dBm        * Att  0 dB    SWT 2.5 ms        1.910020833 GHz
```

Date: 10.FEB.2014 18:39:24

LOW BAND EDGE BLOCK-16QAM


```
                                        *RBW 200 kHz      Marker 1 [T1 ]
                                        *VBW 1 MHz                -20.64 dBm
Ref   0 dBm          *Att  0 dB         SWT 2.5 ms        1.849998397 GHz
```

Center 1.8495 GHz   100 kHz/   Span 1 MHz

Date: 10.FEB.2014 18:36:14

HIGH BAND EDGE BLOCK-16QAM


```
                                        *RBW 200 kHz      Marker 1 [T1 ]
                                        *VBW 1 MHz                -20.81 dBm
Ref   0 dBm          *Att  0 dB         SWT 2.5 ms        1.910000000 GHz
```

Center 1.9105 GHz   100 kHz/   Span 1 MHz

Date: 10.FEB.2014 18:39:35

LTE band 2, 20MHz
LOW BAND EDGE BLOCK-QPSK
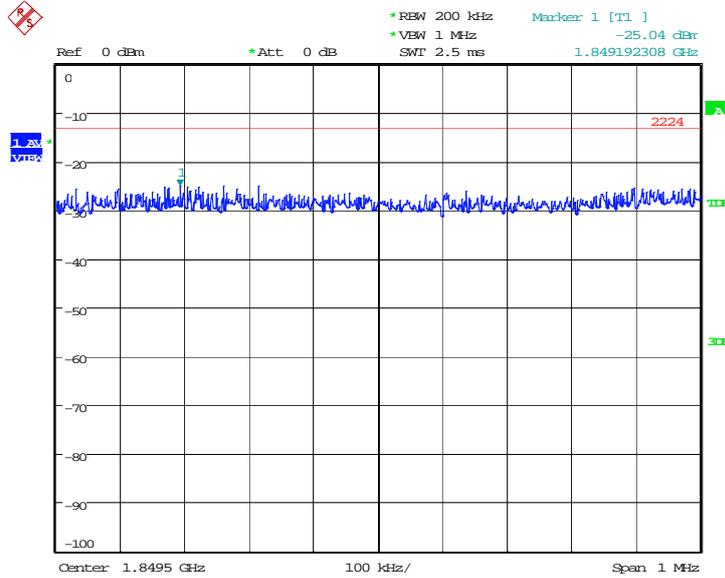
Date: 10.FEB.2014 19:02:07

HIGH BAND EDGE BLOCK-QPSK
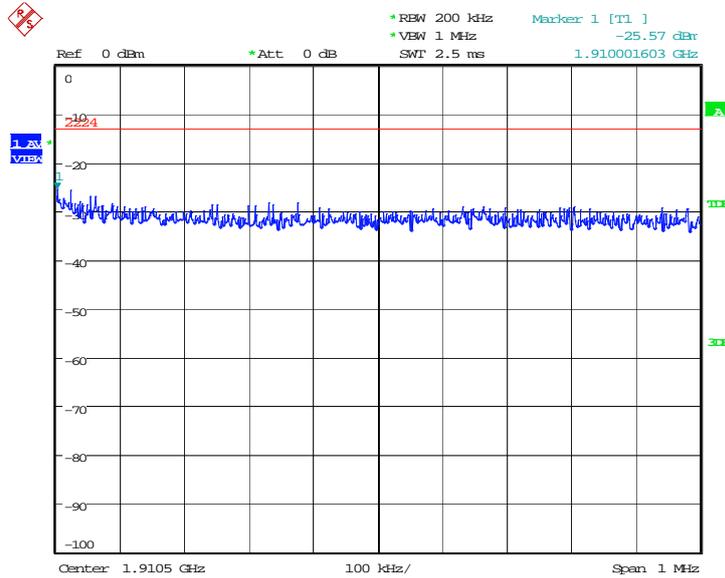
Date: 10.FEB.2014 19:05:22

LOW BAND EDGE BLOCK-16QAM
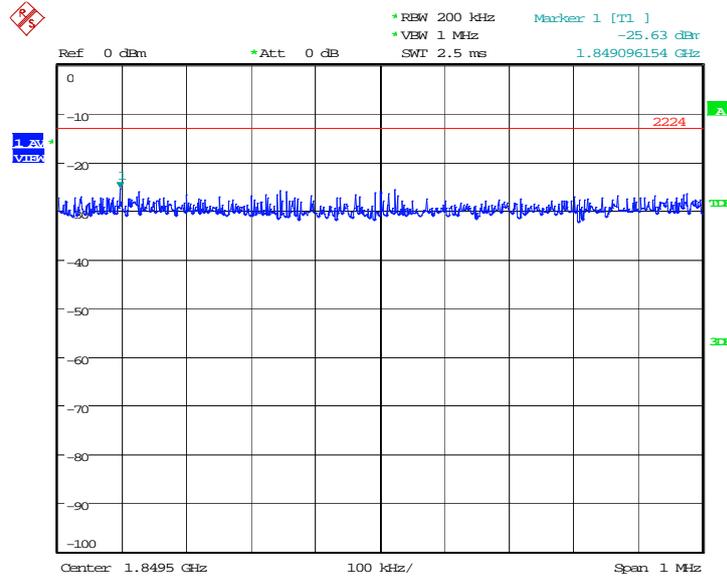
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HIGH BAND EDGE BLOCK-16QAM
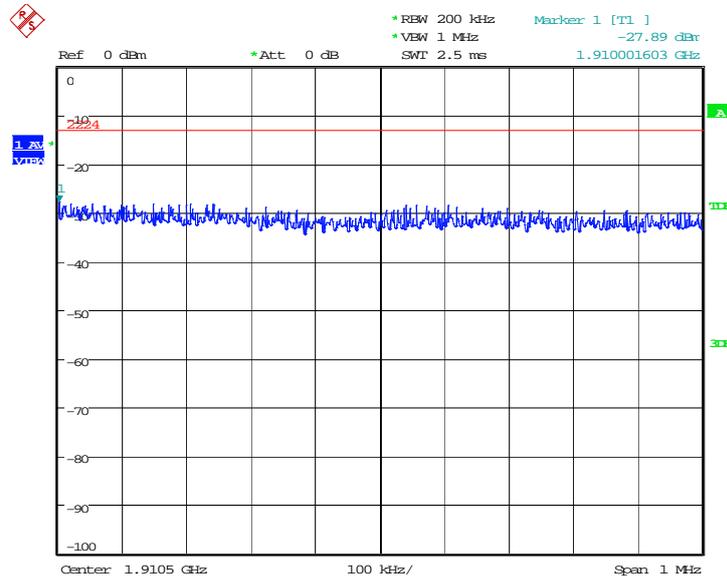
Date: 10.FEB.2014 19:05:30

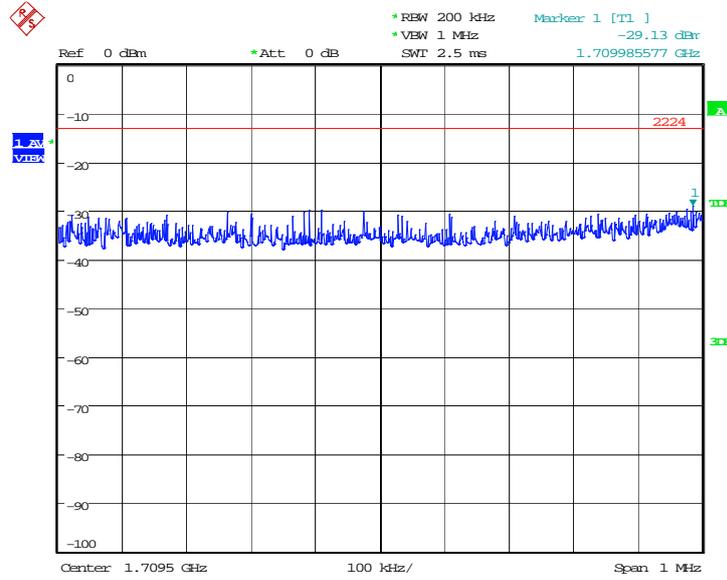**LTE band 4, 1.4MHz**
LOW BAND EDGE BLOCK-QPSK
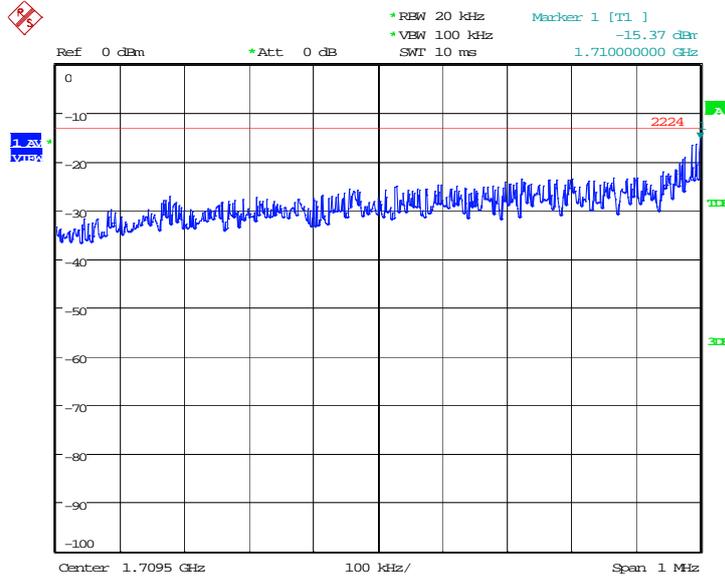
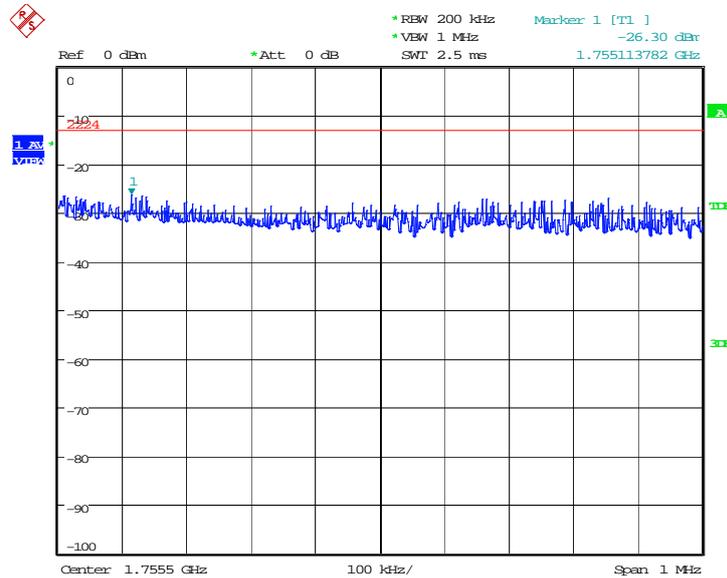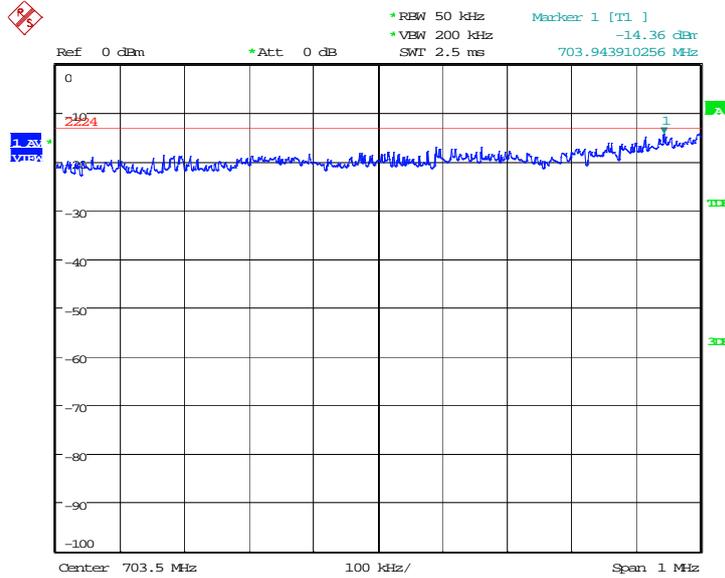Date: 10.FEB.2014 20:46:37

HIGH BAND EDGE BLOCK-QPSK
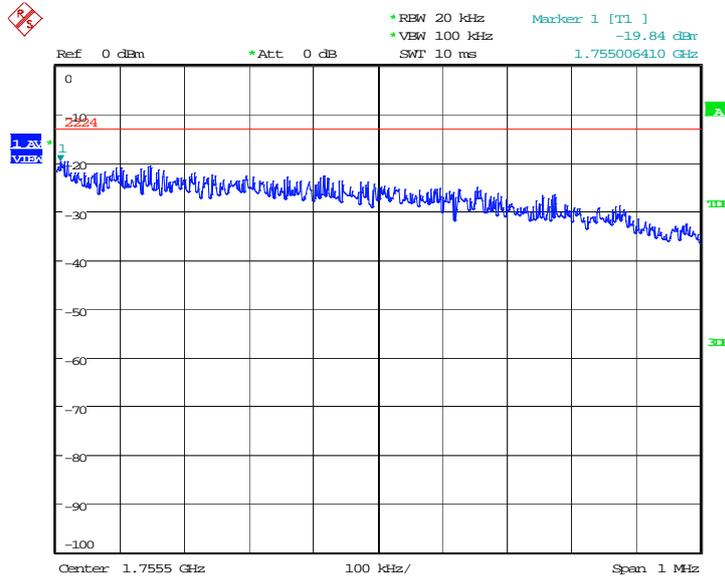
Date: 10.FEB.2014 20:49:50

LOW BAND EDGE BLOCK-16QAM
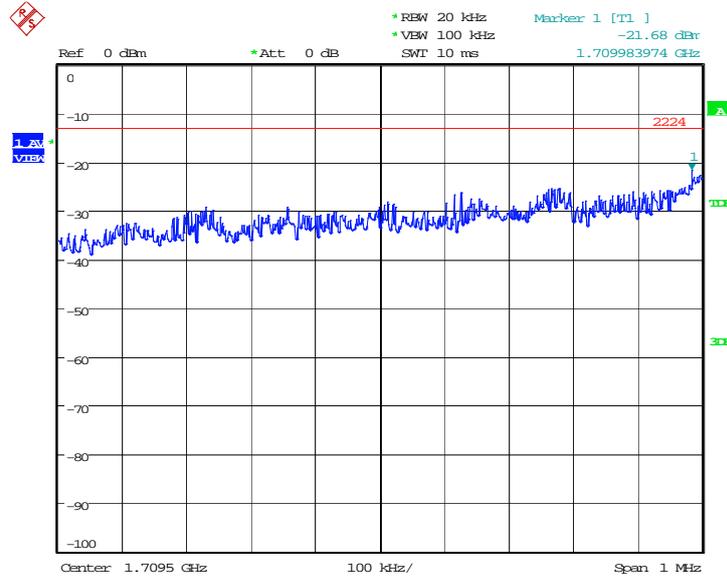
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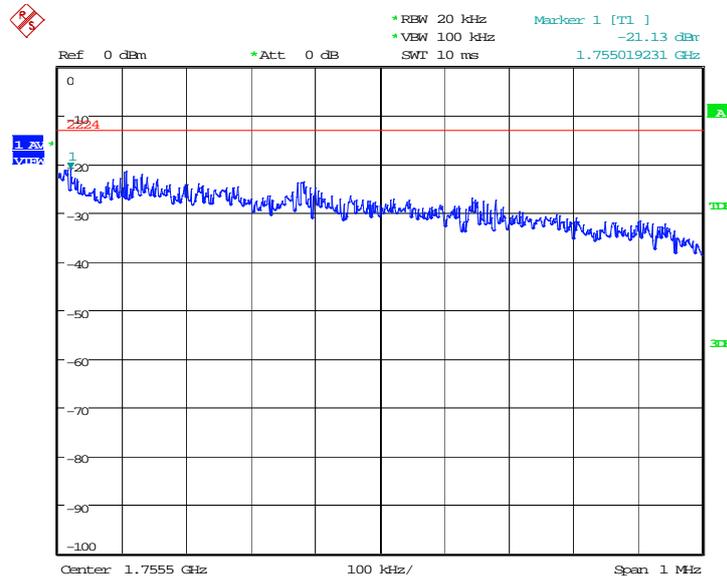
Date: 10.FEB.2014 20:49:59

LTE band 4, 3MHz
LOW BAND EDGE BLOCK-QPSK
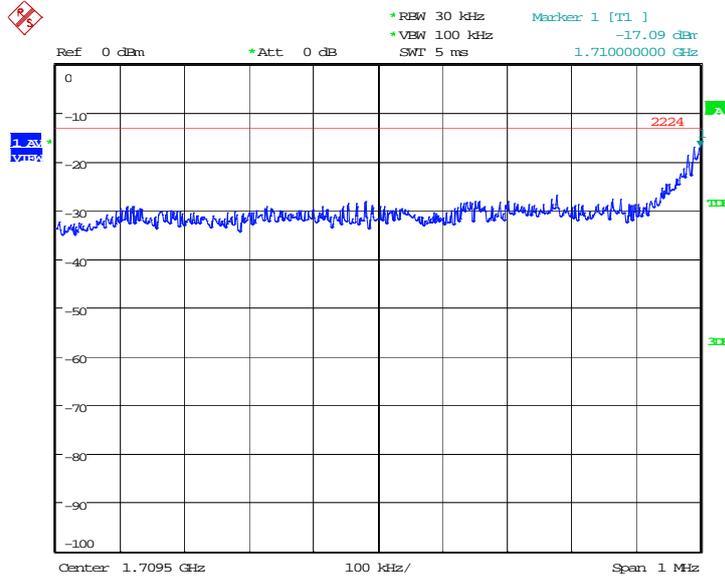

Date: 10.FEB.2014 21:11:20

HIGH BAND EDGE BLOCK-QPSK
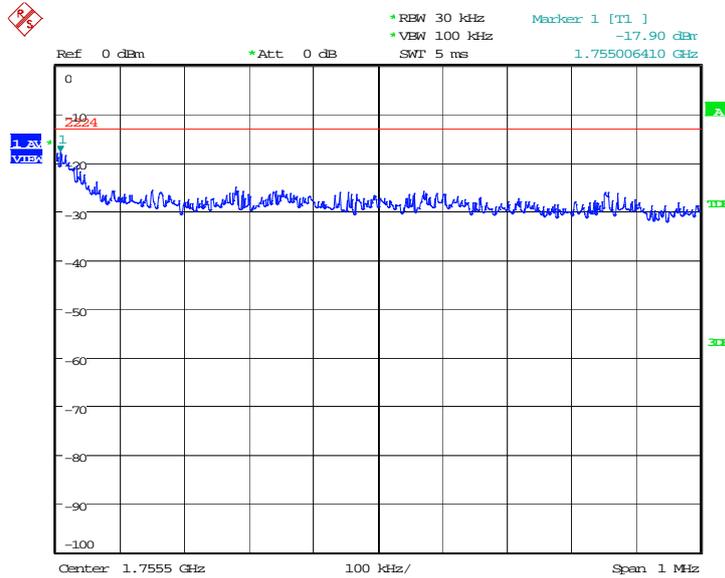
Date: 10.FEB.2014 21:14:33

LOW BAND EDGE BLOCK-16QAM

Ref 0 dBm	*Att 0 dB
*RBW 30 kHz	Marker 1 [T1]
*VBW 100 kHz	−16.80 dBm
SWT 5 ms	1.710000000 GHz

Center 1.7095 GHz   100 kHz/   Span 1 MHz
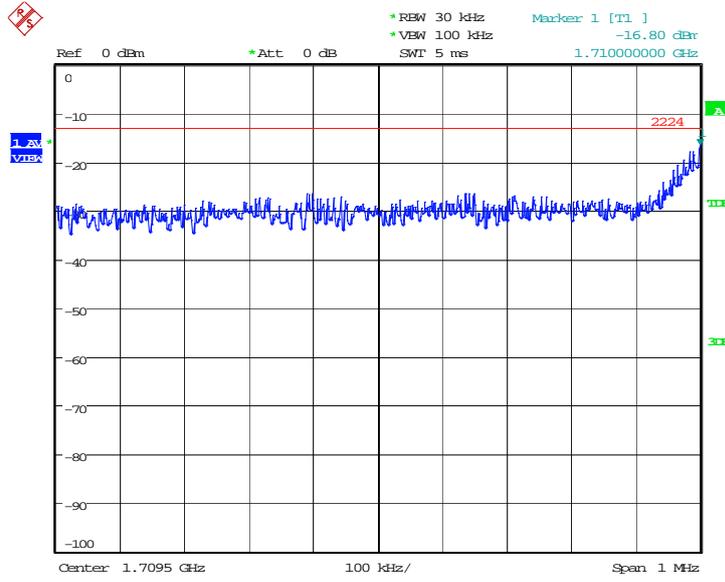
Date: 10.FEB.2014 21:11:29

HIGH BAND EDGE BLOCK-16QAM

Ref 0 dBm	*Att 0 dB
*RBW 30 kHz	Marker 1 [T1]
*VBW 100 kHz	−19.17 dBm
SWT 5 ms	1.755000000 GHz

Center 1.7555 GHz   100 kHz/   Span 1 MHz
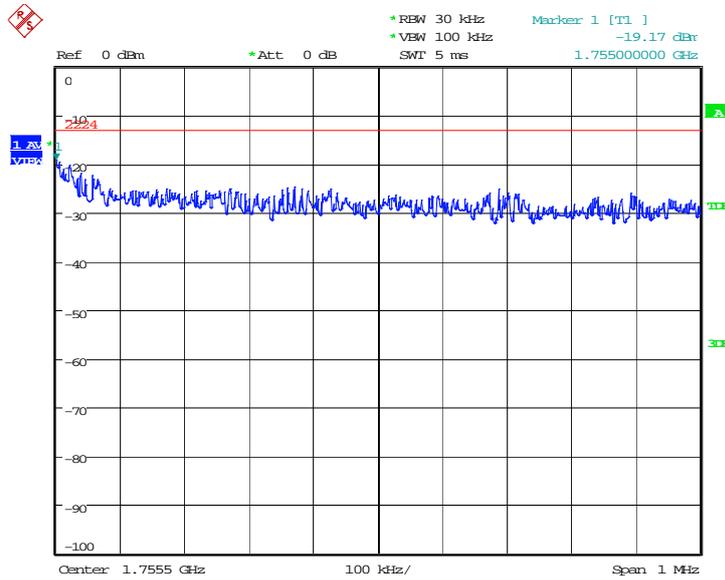
Date: 10.FEB.2014 21:14:42

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

Date: 14.FEB.2014 17:02:51

HIGH BAND EDGE BLOCK-QPSK
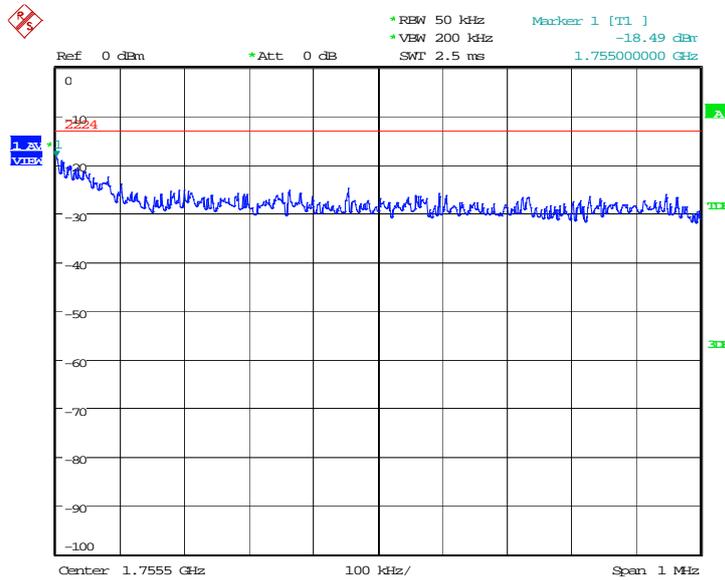
Date: 14.FEB.2014 17:06:12

LOW BAND EDGE BLOCK-16QAM
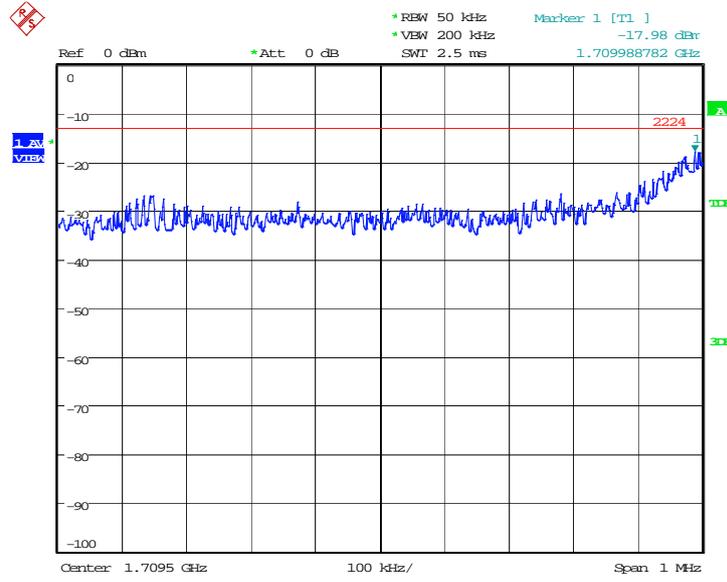
Date: 14.FEB.2014 17:03:02

HIGH BAND EDGE BLOCK-16QAM
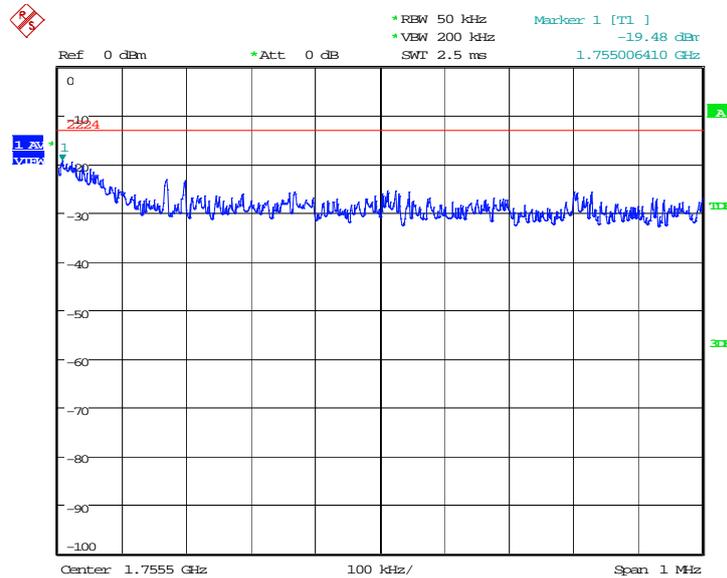

Date: 14.FEB.2014 17:06:22

LTE band 4, 10MHz
LOW BAND EDGE BLOCK-QPSK
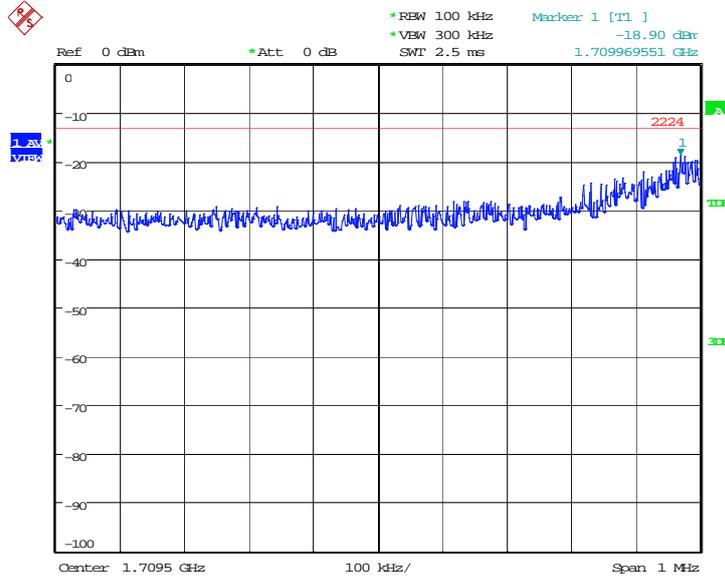

Date: 14.FEB.2014 17:29:59

HIGH BAND EDGE BLOCK-QPSK
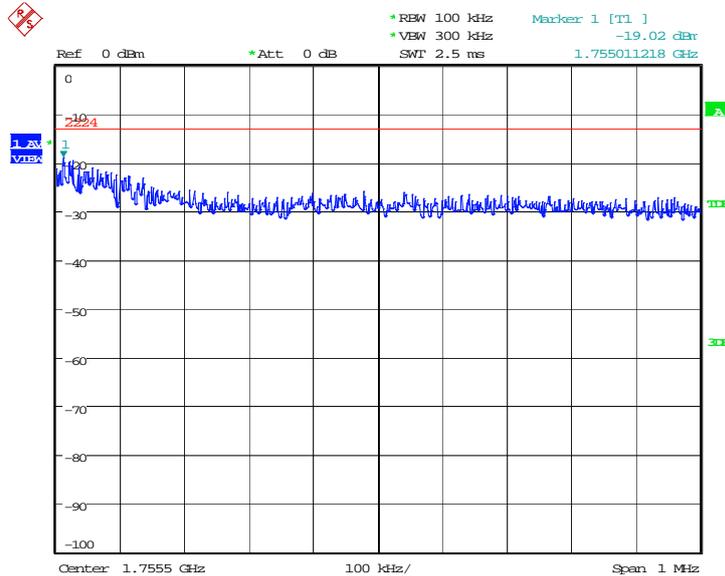
Date: 14.FEB.2014 17:33:19

LOW BAND EDGE BLOCK-16QAM
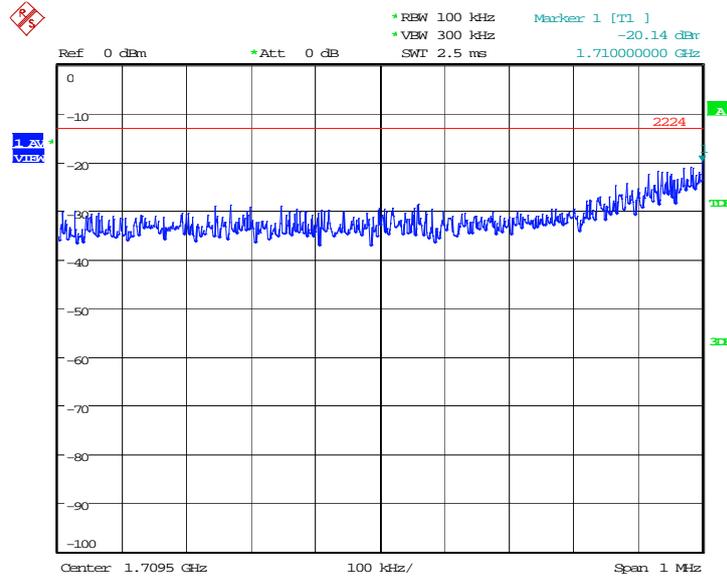
Date: 14.FEB.2014 17:30:09

HIGH BAND EDGE BLOCK-16QAM
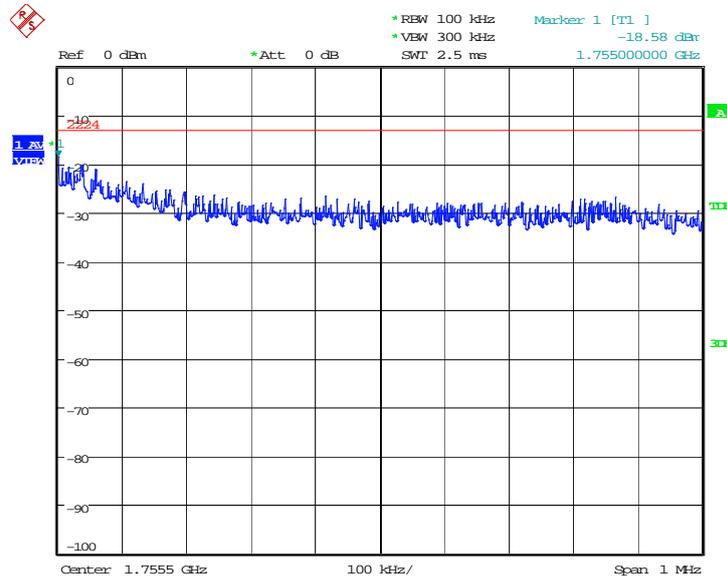
Date: 14.FEB.2014 17:33:30

LTE band 4, 15MHz
LOW BAND EDGE BLOCK-QPSK

Date: 14.FEB.2014 17:56:40

HIGH BAND EDGE BLOCK-QPSK
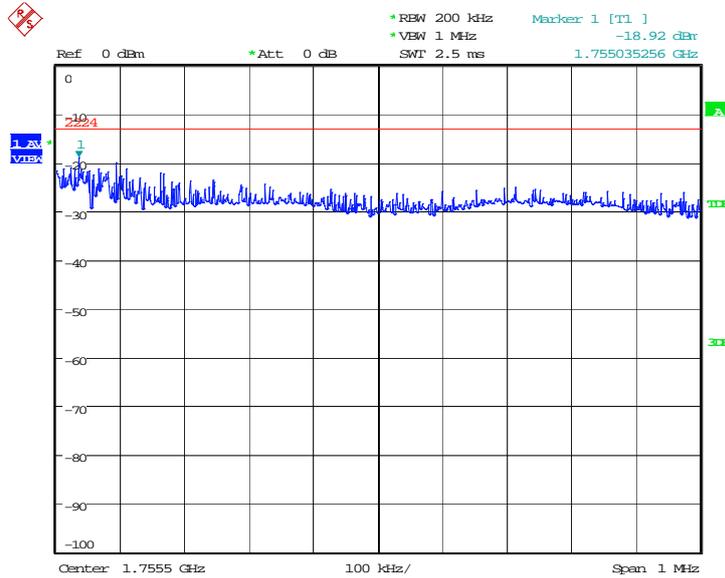
Date: 14.FEB.2014 18:00:01

LOW BAND EDGE BLOCK-16QAM
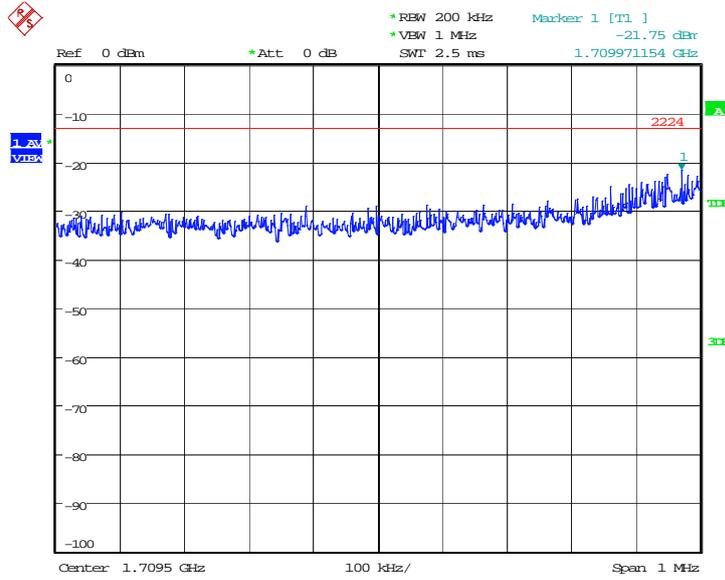
Date: 14.FEB.2014 17:56:50

HIGH BAND EDGE BLOCK-16QAM
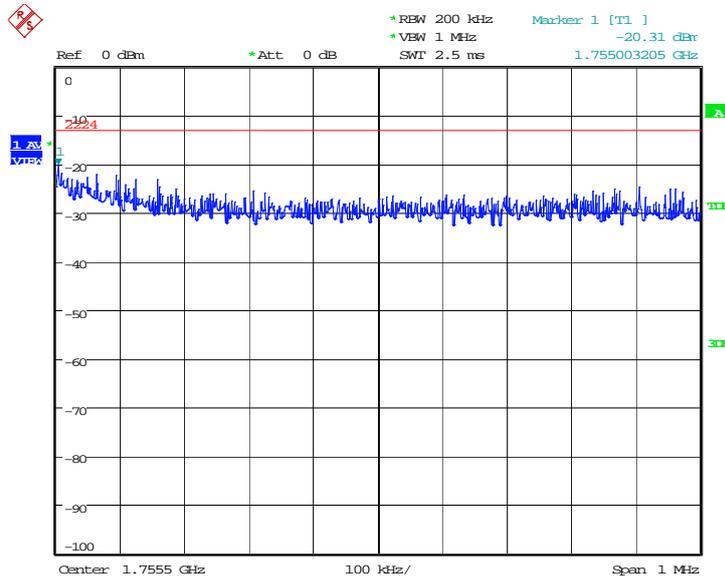
Date: 14.FEB.2014 18:00:11

LTE band 4, 20MHz
LOW BAND EDGE BLOCK-QPSK
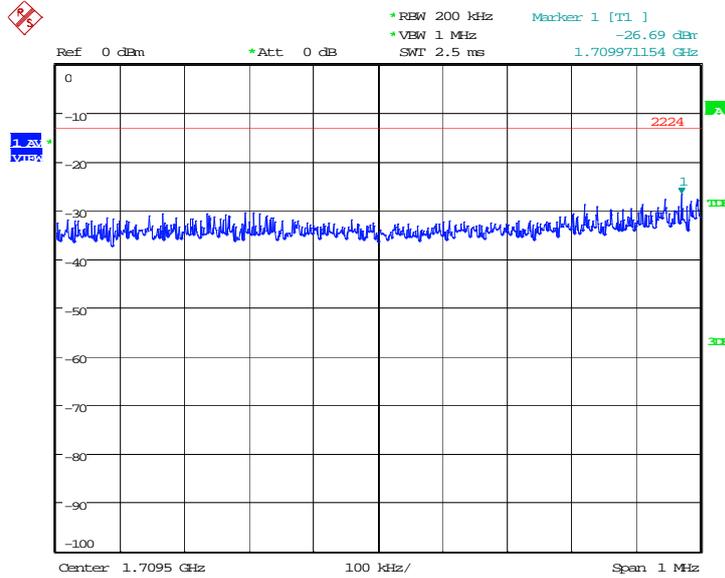
Date: 14.FEB.2014 18:23:23

HIGH BAND EDGE BLOCK-QPSK

Date: 14.FEB.2014 18:26:44

LOW BAND EDGE BLOCK-16QAM

Ref 0 dBm   *Att 0 dB   *RBW 200 kHz   Marker 1 [T1]
*VBW 1 MHz   −29.13 dBm
SWT 2.5 ms   1.709985577 GHz

Center 1.7095 GHz   100 kHz/   Span 1 MHz

Date: 14.FEB.2014 18:23:34

HIGH BAND EDGE BLOCK-16QAM

Ref 0 dBm   *Att 0 dB   *RBW 200 kHz   Marker 1 [T1]
*VBW 1 MHz   −26.30 dBm
SWT 2.5 ms   1.755113782 GHz

Center 1.7555 GHz   100 kHz/   Span 1 MHz

Date: 14.FEB.2014 18:26:54

LTE band 17, 5MHz
LOW BAND EDGE BLOCK-QPSK

Date: 18.FEB.2014 14:33:10

HIGH BAND EDGE BLOCK-QPSK
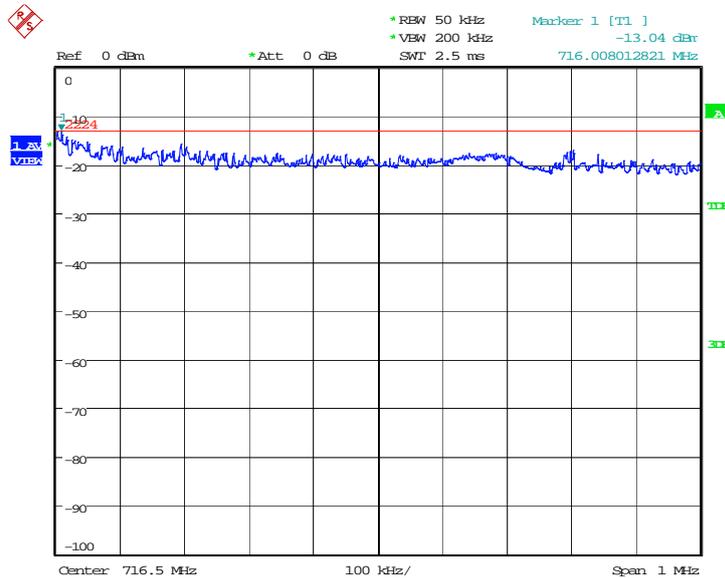
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LOW BAND EDGE BLOCK-16QAM
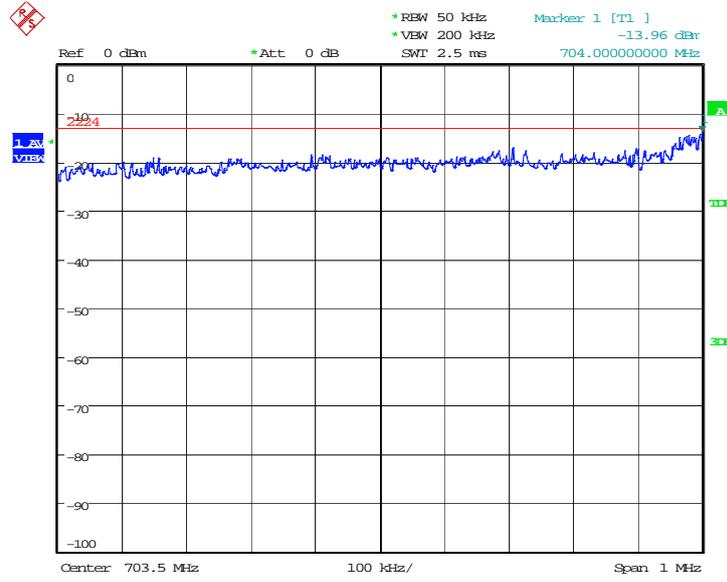
Date: 18.FEB.2014 14:33:20

HIGH BAND EDGE BLOCK-16QAM
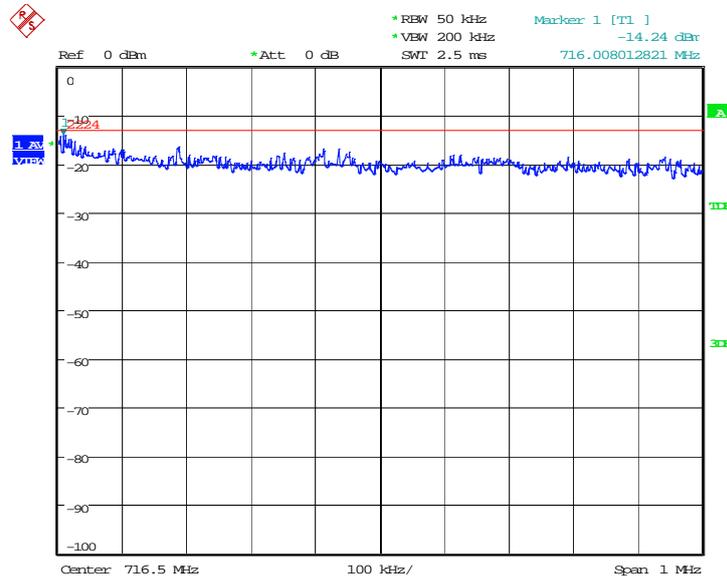
Date: 18.FEB.2014 14:35:29

LTE band 17, 10MHz
LOW BAND EDGE BLOCK-QPSK
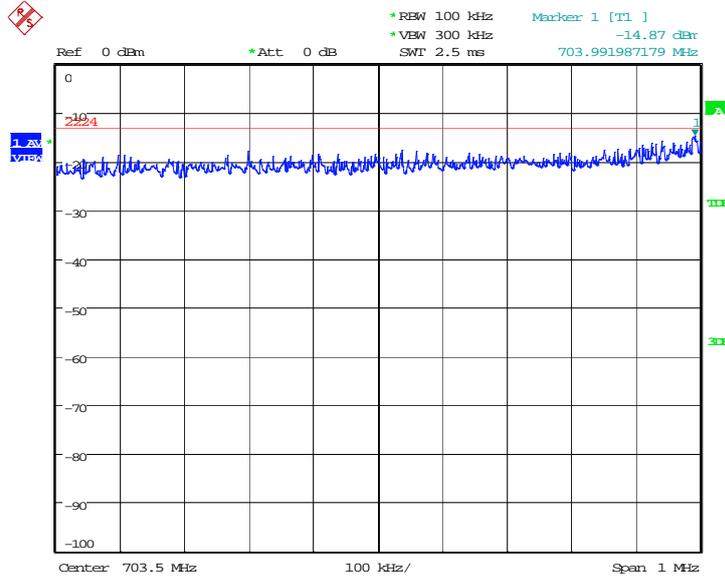
Date: 18.FEB.2014 14:39:37

HIGH BAND EDGE BLOCK-QPSK
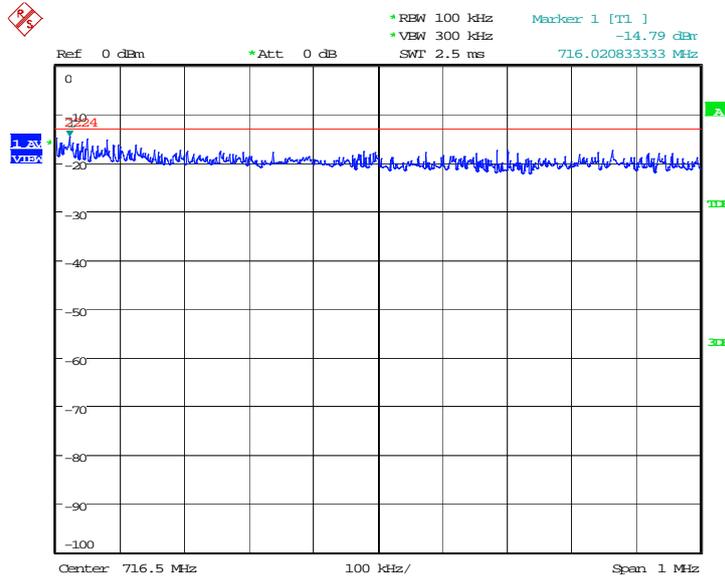
Date: 18.FEB.2014 14:42:17

LOW BAND EDGE BLOCK-16QAM
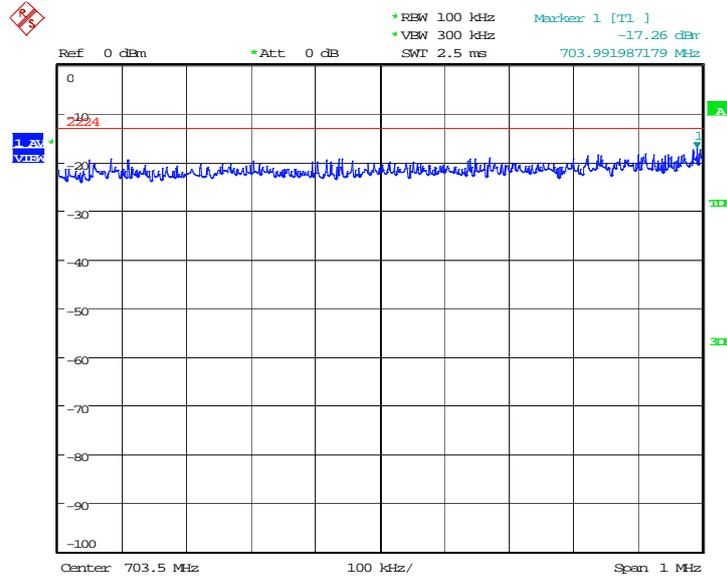
Date: 18.FEB.2014 14:39:48

HIGH BAND EDGE BLOCK-16QAM
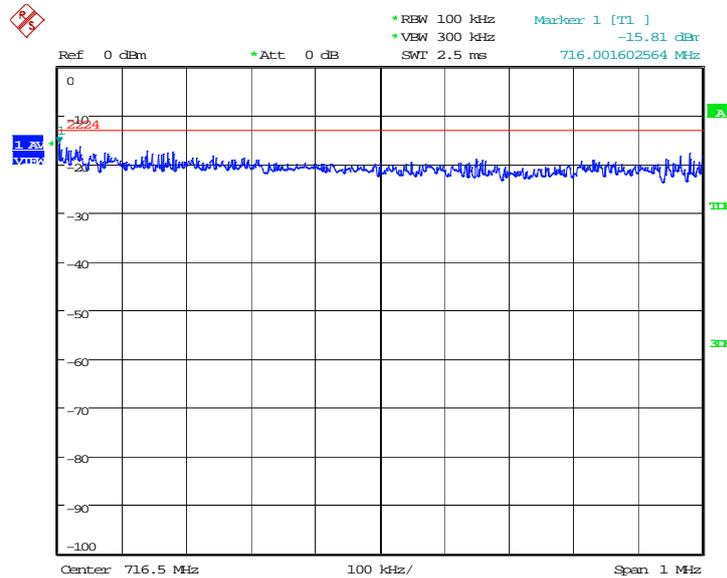
Date: 18.FEB.2014 14:42:27

A.8   CONDUCTED SPURIOUS EMISSION

Reference
FCC: CFR Part 24.238(a), 27.53(h) , 27.53(g)

A.8.1 Measurement Method
The following steps outline the procedure used to measure the conducted emissions from the EUT.
1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

A. 8.2 Measurement Limit
Part 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

Measurement Uncertainty: 0.3dB

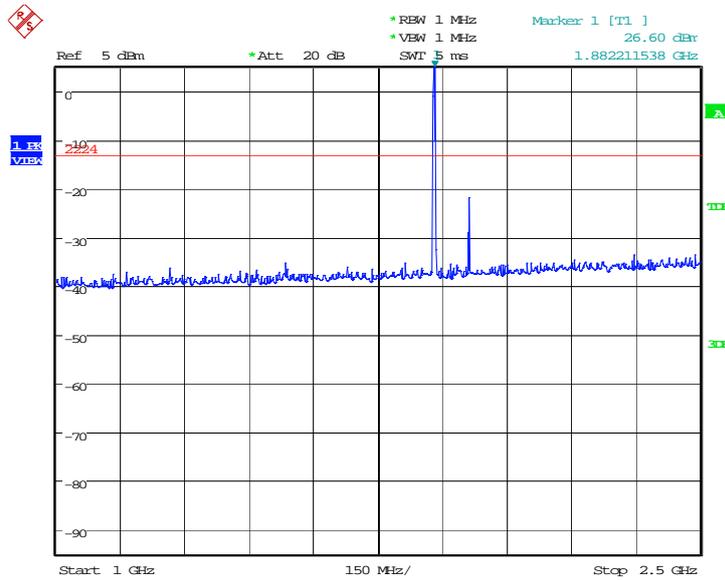**LTE band 2, 1.4MHz bandwidth**

QPSK: 30MHz – 1GHz

Spurious emission limit –13dBm.
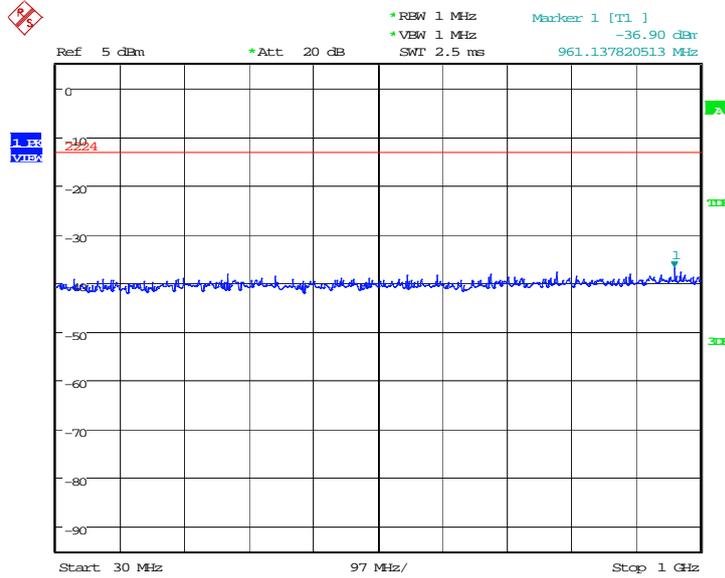
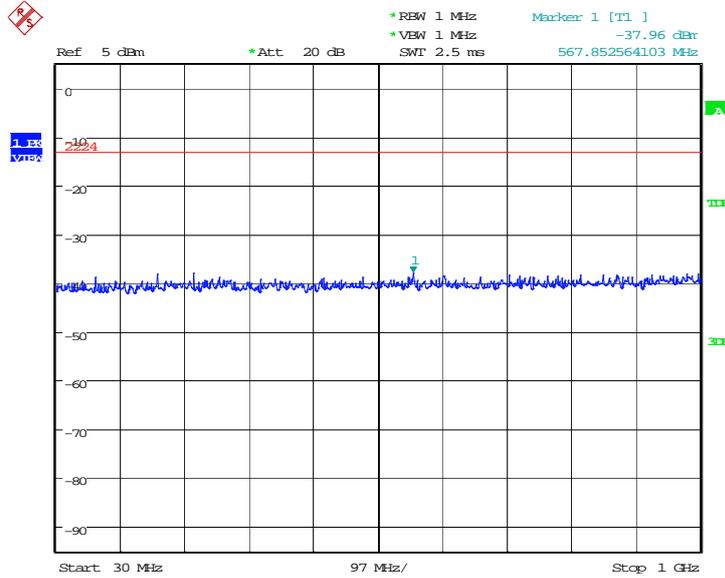Date: 10.FEB.2014 16:57:48

QPSK: 1GHz – 2.5GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 16:57:56

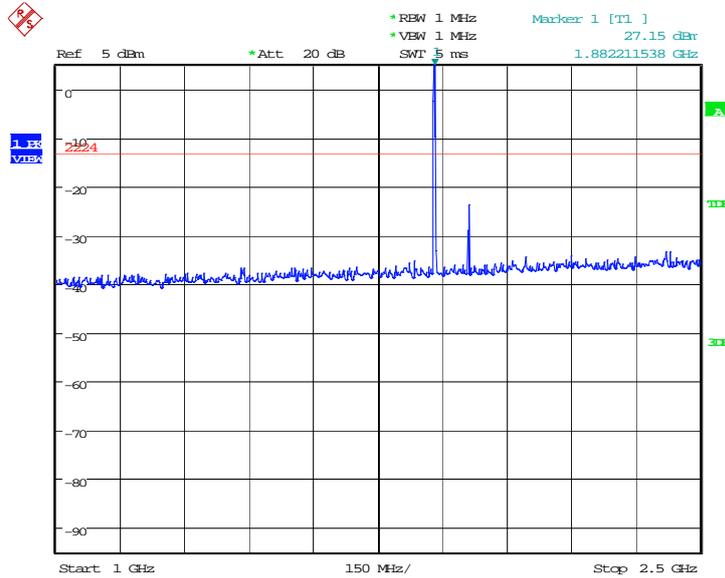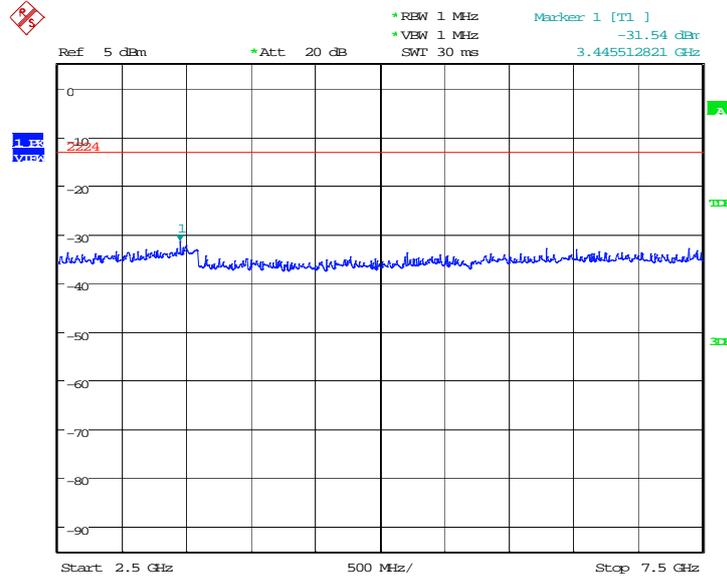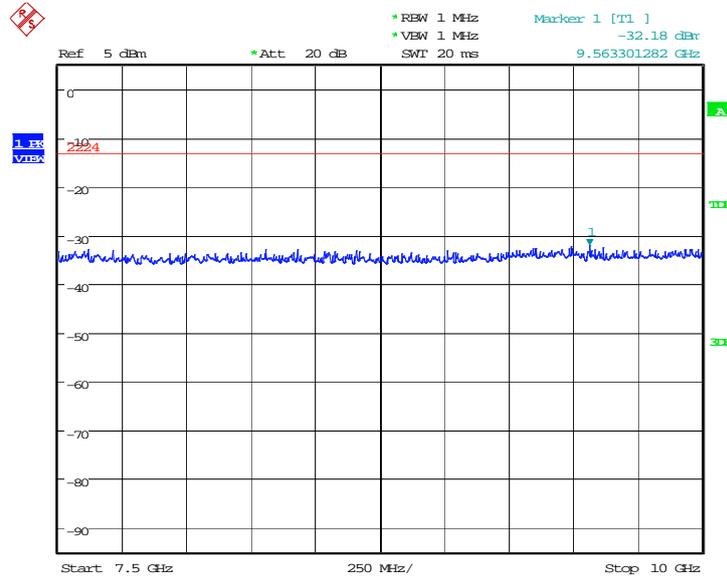## QPSK: 2.5GHz – 7.5GHz

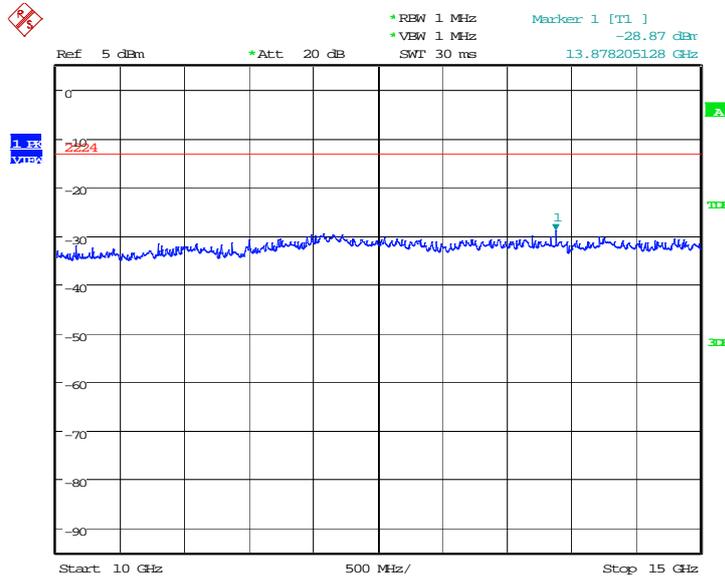Spurious emission limit –13dBm.

Date: 10.FEB.2014 16:58:04

QPSK: 7.5GHz –10GHz

Spurious emission limit –13dBm.
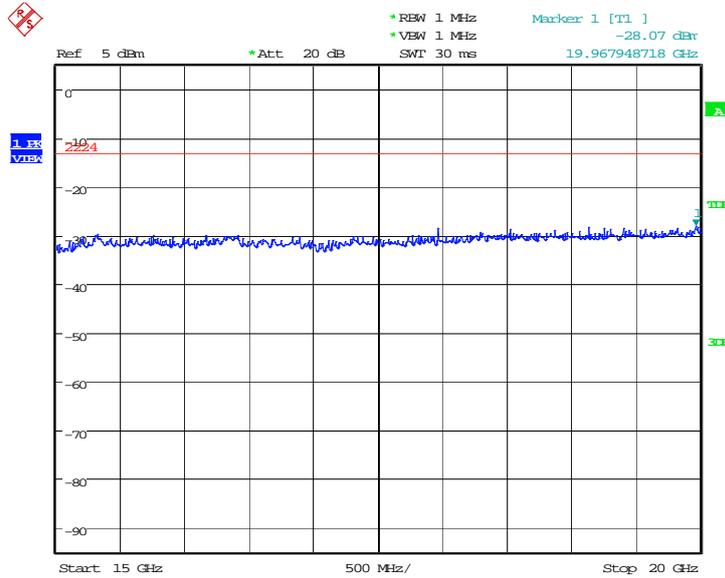

Date: 10.FEB.2014 16:58:12

QPSK: 10GHz –15GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 16:58:20

QPSK: 15GHz –20GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 16:58:28

16QAM: 30MHz – 1GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 16:59:29

16QAM: 1GHz – 2.5GHz

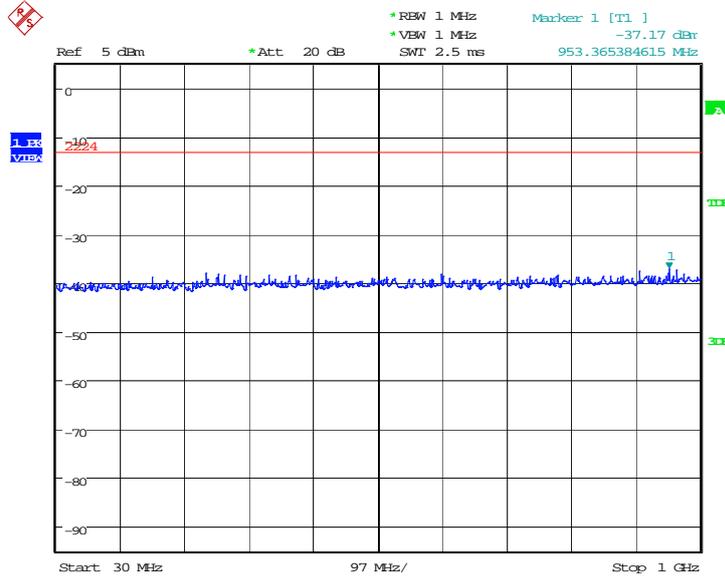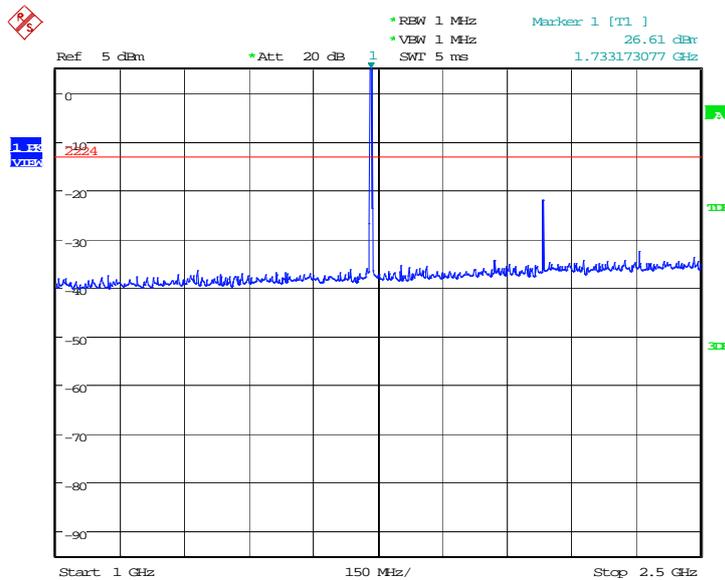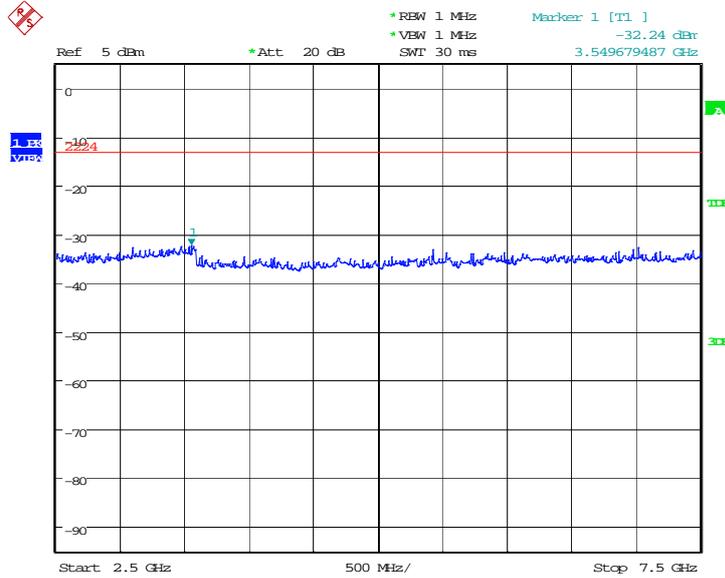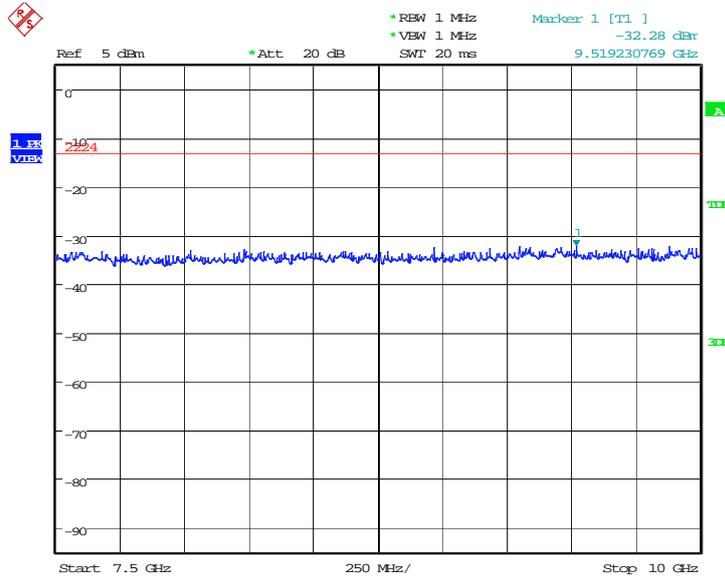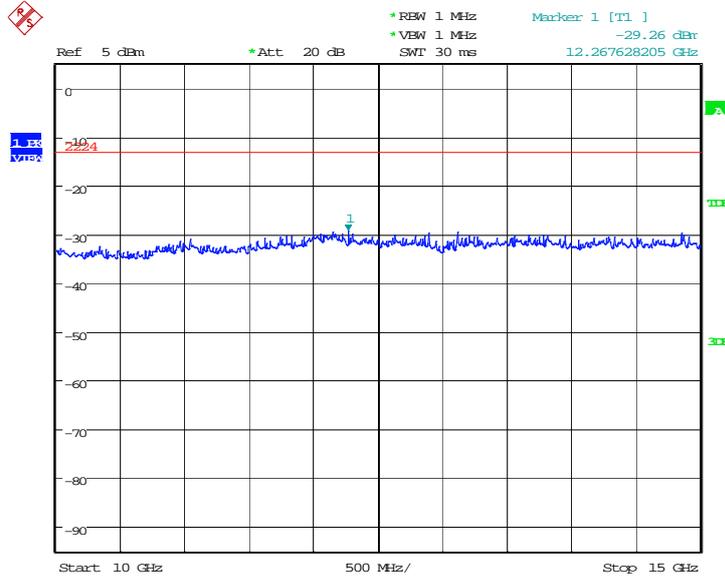Spurious emission limit –13dBm.

Date: 10.FEB.2014 16:59:37

16QAM: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.

```
                                              *RBW 1 MHz      Marker 1 [T1 ]
                                              *VBW 1 MHz           -31.54 dBm
        Ref   5 dBm        *Att   20 dB       SWT 30 ms       3.445512821 GHz
```



```
        Start 2.5 GHz              500 MHz/              Stop 7.5 GHz
```

Date: 10.FEB.2014 16:59:45

16QAM: 7.5GHz –10GHz

Spurious emission limit –13dBm.

```
                                              *RBW 1 MHz      Marker 1 [T1 ]
                                              *VBW 1 MHz           -32.18 dBm
        Ref   5 dBm        *Att   20 dB       SWT 20 ms       9.563301282 GHz
```



```
        Start 7.5 GHz              250 MHz/              Stop 10 GHz
```

Date: 10.FEB.2014 16:59:53

16QAM: 10GHz –15GHz

Spurious emission limit –13dBm.


```
                                         *RBW  1 MHz      Marker 1 [T1 ]
                                         *VBW  1 MHz              -28.87 dBm
      Ref  5 dBm        *Att  20 dB      SWT 30 ms        13.878205128 GHz
```

Date: 10.FEB.2014 17:00:01

16QAM: 15GHz –20GHz

Spurious emission limit –13dBm.


```
                                         *RBW  1 MHz      Marker 1 [T1 ]
                                         *VBW  1 MHz              -28.07 dBm
      Ref  5 dBm        *Att  20 dB      SWT 30 ms        19.967948718 GHz
```

Date: 10.FEB.2014 17:00:09

LTE band 4, 1.4MHz bandwidth

QPSK: 30MHz – 1GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 20:54:14

QPSK: 1GHz – 2.5GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 20:54:21

QPSK: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 20:54:27

QPSK: 7.5GHz –10GHz

Spurious emission limit –13dBm.

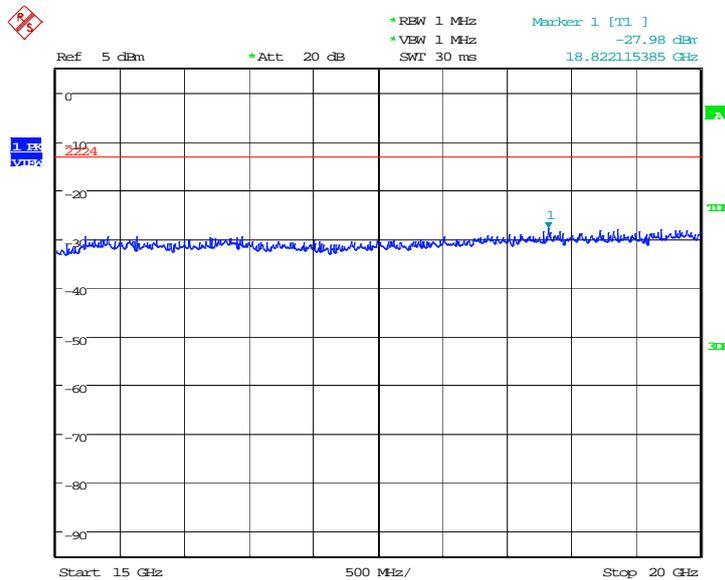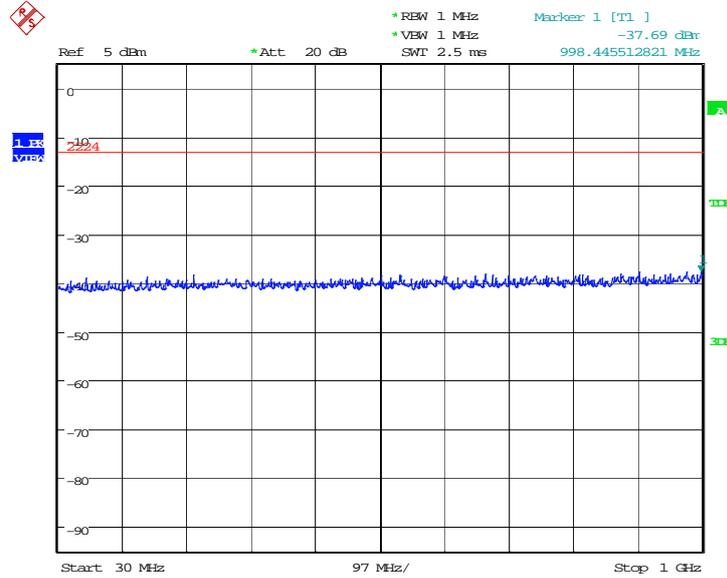Date: 10.FEB.2014 20:54:34

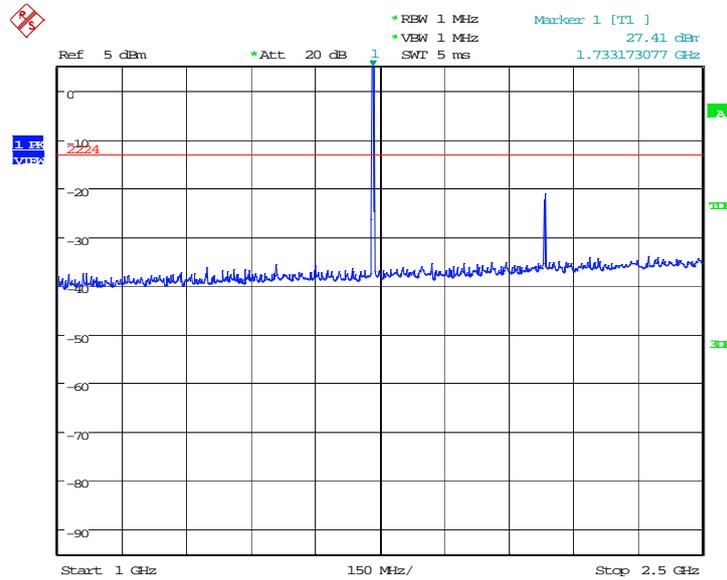### QPSK: 10GHz –15GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 20:54:41

QPSK: 15GHz –20GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 20:54:48

16QAM: 30MHz – 1GHz

Spurious emission limit –13dBm.

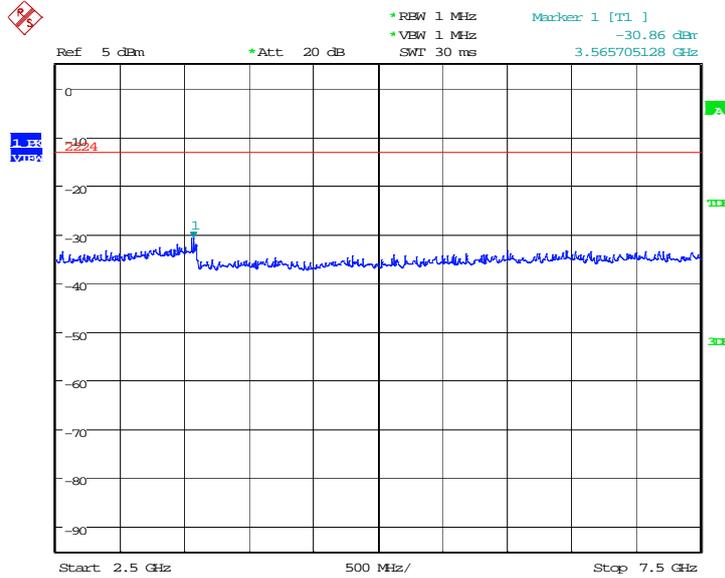Date: 10.FEB.2014 20:55:39

16QAM: 1GHz – 2.5GHz

Spurious emission limit –13dBm.

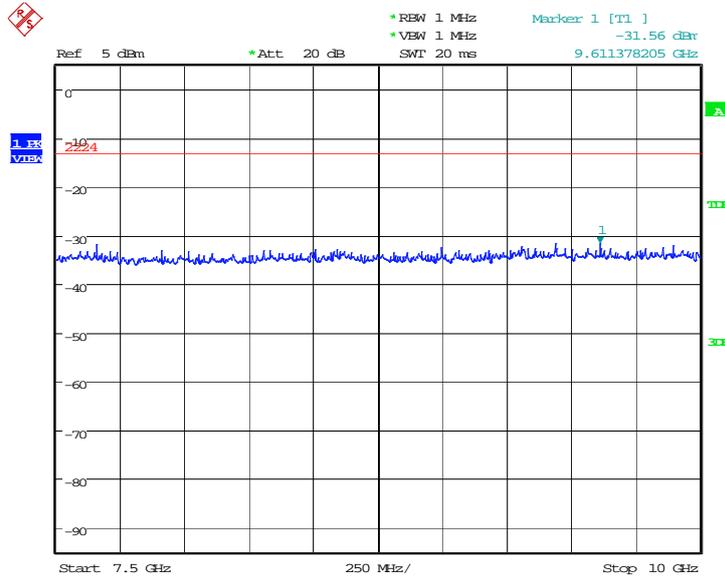
Date: 10.FEB.2014 20:55:46

16QAM: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.
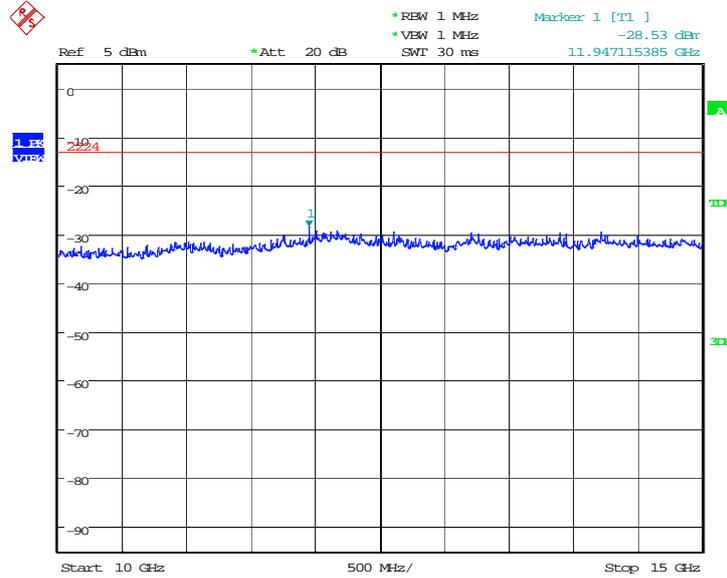

Date: 10.FEB.2014 20:55:53

16QAM: 7.5GHz –10GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 20:55:59
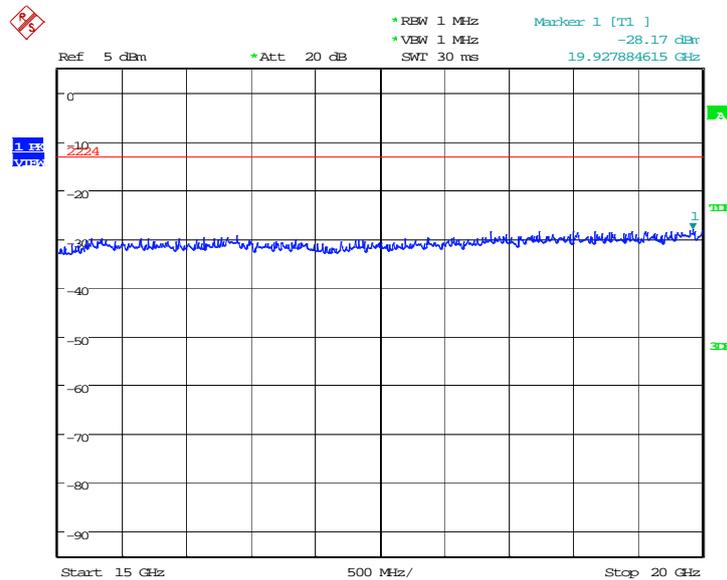
16QAM: 10GHz –15GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 20:56:06
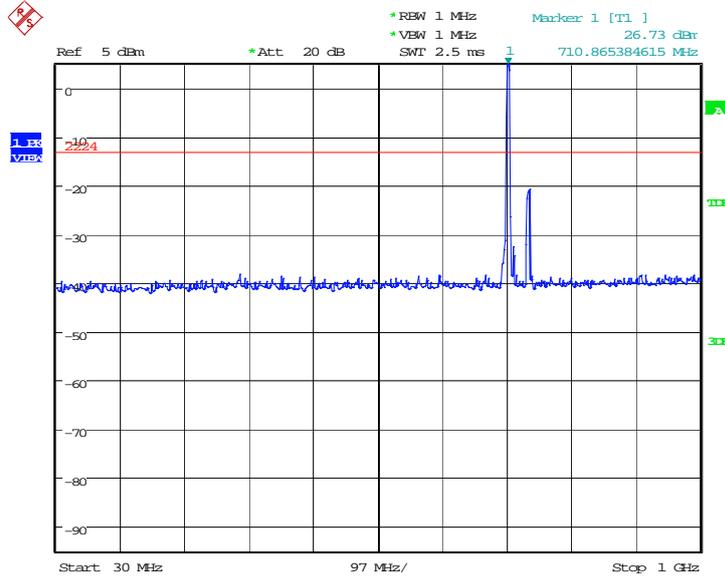
16QAM: 15GHz –20GHz

Spurious emission limit –13dBm.

Date: 10.FEB.2014 20:56:13

LTE band 17, 5MHz bandwidth
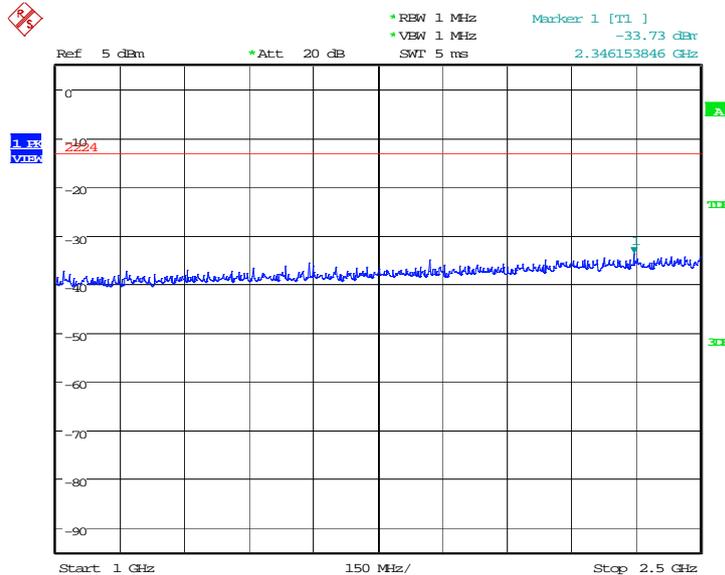
QPSK: 30MHz – 1GHz

Spurious emission limit –13dBm.

Date: 18.FEB.2014 14:45:31

QPSK: 1GHz – 2.5GHz

Spurious emission limit –13dBm.
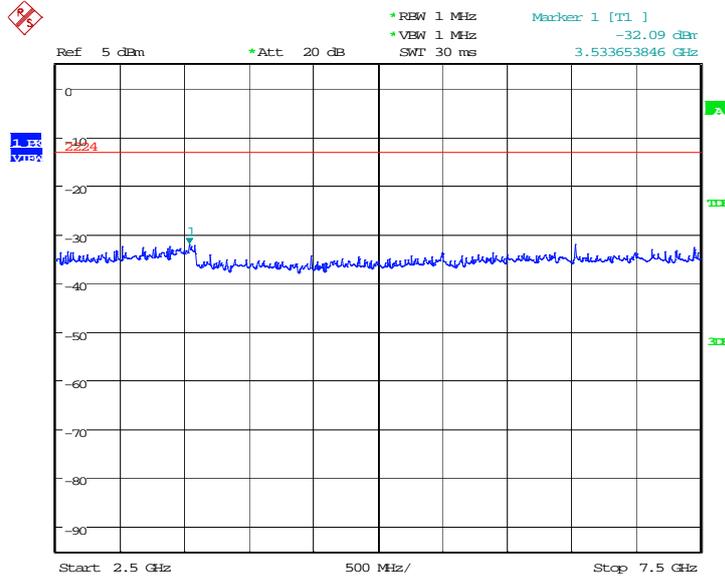

Date: 18.FEB.2014 14:45:39
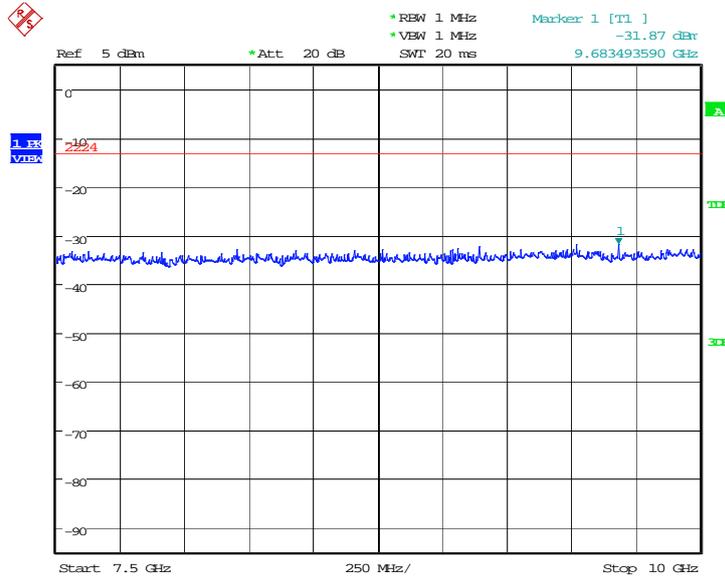
QPSK: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.

Date: 18.FEB.2014 14:45:47
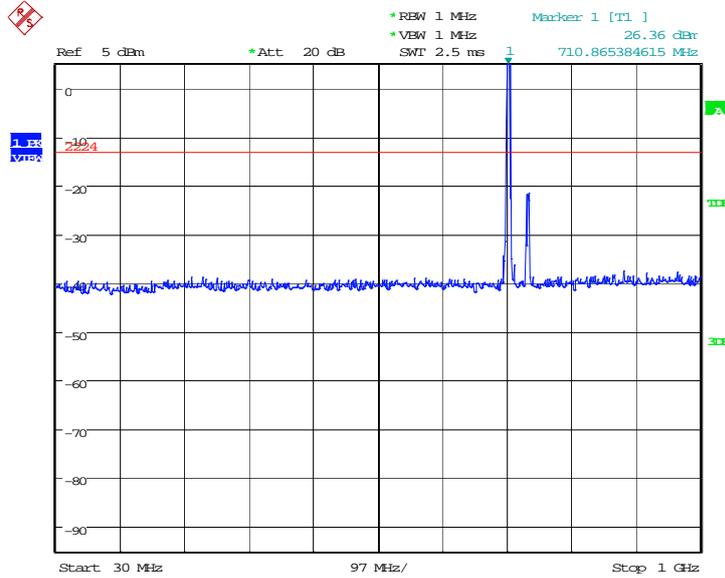
QPSK: 7.5GHz –10GHz

Spurious emission limit –13dBm.

Date: 18.FEB.2014 14:45:55

16QAM: 30MHz – 1GHz

Spurious emission limit –13dBm.

Date: 18.FEB.2014 14:46:05

16QAM: 1GHz – 2.5GHz

Spurious emission limit –13dBm.

Date: 18.FEB.2014 14:46:13

16QAM: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.

```
                                    *RBW  1 MHz      Marker 1 [T1 ]
                                    *VBW  1 MHz              -32.30 dBm
     Ref   5 dBm        *Att  20 dB  SWT  30 ms       3.589743590 GHz
```

Date: 18.FEB.2014 14:46:21

16QAM: 7.5GHz –10GHz

Spurious emission limit –13dBm.

```
                                    *RBW  1 MHz      Marker 1 [T1 ]
                                    *VBW  1 MHz              -31.89 dBm
     Ref   5 dBm        *Att  20 dB  SWT  20 ms       9.611378205 GHz
```
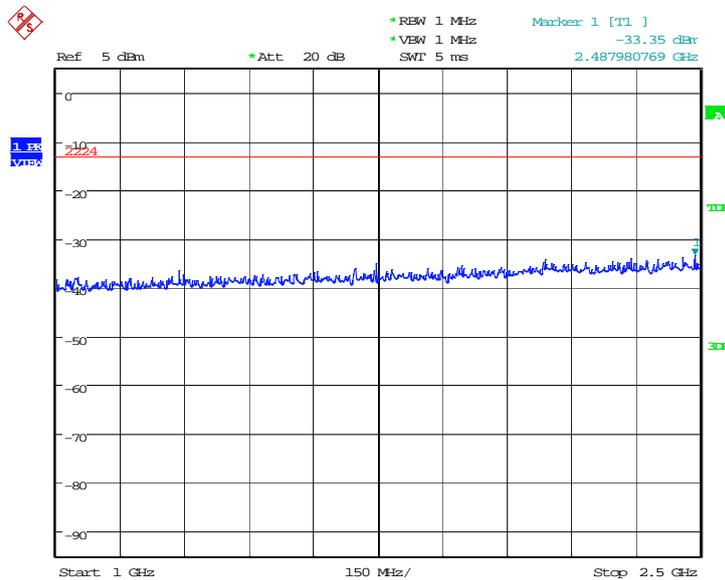
Date: 18.FEB.2014 14:46:29

ANNEX B: TEST LAYOUT

No Display.

Pic.1 Radiated spurious emission

No Display.

Pic.2 Conducted emission

ANNEX C: EUT photograph

No Display.

Mobile Phone

No Display.

Mobile Phone

No Display.

Mobile Phone

No Display.

Mobile Phone

No Display.

Mobile Phone

No Display.

Mobile Phone

No Display.

Mobile Phone Disassembly and Inbuilt Battery

No Display.

Mobile Phone Disassembly and Inbuilt Battery

No Display.

Mobile Phone Disassembly and Inbuilt Battery

No Display.

Mobile Phone Disassembly

No Display.

Mobile Phone Disassembly

No Display.

Mobile Phone Disassembly

No Display.

Mobile Phone Disassembly

No Display.

Mobile Phone Disassembly

No Display.

Mobile Phone Disassembly

No Display.

Mobile Phone Disassembly

No Display.

Mobile Phone Disassembly

No Display.

Travel Charger

No Display.

Label of Travel Charger

No Display.

USB Cable

END OF REPORT