



# TEST REPORT

**No. I14Z47255-EMC03**

**for**

**Sony Mobile Communications Inc.**

**GSM/WCDMA/LTE Mobile Phone**

**FCC ID: PY7PM-0808**

**with**

**Hardware Version: A**

**Software Version: 23.0.F.0.56**

**Issued Date: Aug. 21<sup>st</sup>, 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:**

***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.

Tel:+86(0) 10-62304633-2561, Fax:+86(0)10-62304633-2504 Email:welcme@emccte.com. www.emccte.com

## **CONTENTS**

<b>1. TEST LABORATORY</b> .....	<b>3</b>
1.1. TESTING LOCATION .....	3
1.2. TESTING ENVIRONMENT .....	3
1.3. PROJECT DATA.....	3
1.4. SIGNATURE .....	3
<b>2. CLIENT INFORMATION</b> .....	<b>4</b>
2.1. APPLICANT INFORMATION.....	4
2.2. MANUFACTURER INFORMATION.....	4
<b>3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) .....</b>	<b>5</b>
3.1. ABOUT EUT .....	5
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST .....	5
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST.....	5
3.4. GENERAL DESCRIPTION .....	5
3.5. EUT SET-UPS .....	6
<b>4. REFERENCE DOCUMENTS .....</b>	<b>7</b>
4.1. REFERENCE DOCUMENTS FOR TESTING .....	7
<b>5. LABORATORY ENVIRONMENT .....</b>	<b>8</b>
<b>6. SUMMARY OF TEST RESULTS.....</b>	<b>9</b>
6.1. SUMMARY OF TEST RESULTS .....	9
6.2. STATEMENTS .....	10
<b>7. TEST EQUIPMENTS UTILIZED.....</b>	<b>11</b>
<b>ANNEX A: MEASUREMENT RESULTS .....</b>	<b>12</b>
A.1 OUTPUT POWER.....	12
A.2 EMISSION LIMIT .....	33
A.3 CONDUCTED EMISSION.....	43
A.4 FREQUENCY STABILITY .....	49
A.5 OCCUPIED BANDWIDTH .....	53
A.6 EMISSION BANDWIDTH.....	76
A.7 BAND EDGE COMPLIANCE .....	99
A.8 CONDUCTED SPURIOUS EMISSION .....	144
<b>ANNEX B: TEST LAYOUT .....</b>	<b>172</b>
<b>ANNEX C: EUT PHOTOGRAPH.....</b>	<b>173</b>

## 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°C  
Relative Humidity: 20-75%  
Air pressure 980 - 1040 hPa

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

### 1.3. Project data

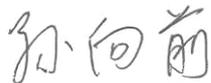
Receipt of Sample Jul. 08<sup>th</sup>, 2014  
Testing Start Date: Jul. 16<sup>th</sup>, 2014  
Testing End Date: Jul. 26<sup>th</sup>, 2014

### 1.4. Signature



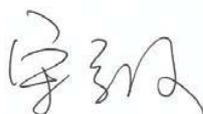
---

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 Inc.  
Address /Post: 1-8-15 Konan, Minato-ku, Tokyo, 108-0075, Japan  
City: Tokyo  
Postal Code: 108-0075  
Country: Japan

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

#### **3.1. About EUT**

Description	GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA, LTE Bluetooth (EDR and BLE), ANT+, WLAN ( 802.11 a/ac/b/g/n), NFC, FM, GPS mobile phone
FCC ID	PY7PM-0808
Antenna	Internal
Power supply	Battery ( charged by travel adapter or vehicle charger )
Extreme vol. Limits	3.6VDC to 4.2VDC (nominal: 3.8VDC)
Extreme temp. Tolerance	-10°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**

<b>EUT ID*</b>	<b>SN</b>	<b>IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
EUT7	CB5A1ZTFL3	004402452521127	A	23.0.F.0.56

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

#### **3.3. Internal Identification of AE used during the test**

<b>AE ID*</b>	<b>Description</b>	<b>SN</b>	<b>Revision</b>
AE1	Travel Charger	/	/
AE3	USB Cable	134912A21208328	AP1.0

AE1

Commercial name	EP880
Type	AC-0400-EU
Manufacturer	SALCOMP
Length of cable	100 cm (length of USB cable)

AE3

Commercial name	EC803
Type	AI-0404
Manufacturer	Sony Mobile
Length of cable	100 cm

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

#### **3.4. General Description**

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

The EUT supports GSM, WCDMA and LTE. It supports GPRS service with multi-slots class 33 and EGPRS service with multi-slots class 33. The HSDPA (Cat 24) and HSUPA (Cat 6) features are

also supported.

It has MP3, camera, USB memory, FM radio, GPS receiver, NFC, Bluetooth (EDR, BLE), ANT+, WLAN (802.11 a/ac/b/g/n) and Wi-Fi hotspot functions.

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.8	EUT7 + AE1 + AE3	Tests with travel charger
Set.9	EUT7	ERP/EIRP/RSE tests
Set.10	EUT13	Conducted RF tests

## 4. Reference Documents

### 4.1. Reference Documents for testing

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

<b>Reference</b>	<b>Title</b>	<b>Version</b>
FCC Part 15	Radio frequency devices	10-1-13 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	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 °C, Max. = 35 °C
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 °C, Max. = 35 °C
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 °C, Max. = 35 °C
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 5**

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Output Power	22.913(a)	A.1	P	B
2	Emission Limit	22.917, 2.1051	A.2	P	B
3	Conducted Emission	15.107/207	A.3	P	A
4	Frequency Stability	22.355, 2.1055	A.4	P	B
5	Occupied Bandwidth	2.1049(h)(i)	A.5	P	B
6	Emission Bandwidth	22.917(b)	A.6	P	B
7	Band Edge Compliance	22.917(b)	A.7	P	B
8	Conducted Spurious Emission	22.917, 2.1057	A.8	P	B

**LTE Band 7**

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Output Power	27.50(h)(2)	A.1	P	B
2	Emission Limit	27.53(m), 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(m)	A.6	P	B
7	Band Edge Compliance	27.53(m)	A.7	P	B
8	Conducted Spurious Emission	27.53(m), 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.	NAME	TYPE	SERIES NUMBER	PRODUCER	CAL. DUE DATE	CAL. INTERVAL
1.	EMI Antenna	VULB 9163	9163-235	Schwarzbeck	2014-09-28	3 Years
2.	Test Receiver	ESCI	100344	R&S	2015-03-03	1 Year
3.	EMI Antenna	3117	00119024	ETS-Lindgren	2016-01-20	3 Years
4.	EMI Antenna	9117	167	Schwarzbeck	2015-07-06	
5.	EMI Antenna	3117	00058889	ETS-Lindgren	2014-12-20	3 Years
6.	Signal Generator	N5183A	MY49060052	Agilent	2015-03-02	1 Year
7.	Power Amplifier	5S1G4	0341863	AR	/	1 Year
8.	Universal Radio Communication Tester	CMW500	143008	R&S	2014-12-09	1 Year
9.	Universal Radio Communication Tester	CMW500	116588	R&S	2014-10-27	1 Year
10.	Universal Radio Communication Tester	E5515C	MY48363198	Agilent	2015-07-06	1 Year
11.	Spectrum Analyzer	E4440A	MY48250642	Agilent	2015-02-27	1 Year
12.	LISN	ESH2-Z5	829991/012	R&S	2015-04-14	1 Year
13.	Climatic chamber	SH-641	92014694	ESPEC	2015-11-27	1 Year

## **ANNEX A: MEASUREMENT RESULTS**

### **A.1 OUTPUT POWER**

#### **Reference**

FCC: 22.913(a), 24.232(c), 27.50(d)(4), 27.50(h)(2), 27.50(c)(10)

#### **A.1.1 Summary**

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

This result contains peak output power, ERP/EIRP measurements and peak-to-average power ratio (PAPR) 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	23.16	22.27
		1880.0	23.28	22.55
		1909.3	23.30	22.54
	1 RB low	1850.7	23.13	22.27
		1880.0	23.30	22.52
		1909.3	23.30	22.53
	50% RB mid	1850.7	23.12	22.08
		1880.0	23.36	22.34
		1909.3	23.34	22.24
	100% RB	1850.7	22.17	21.26
		1880.0	22.42	21.49
		1909.3	22.37	21.43

(continued)

3MHz	1 RB high	1851.5	23.04	22.45
		1880.0	23.15	22.72
		1908.5	23.20	22.65
	1 RB low	1851.5	23.01	22.40
		1880.0	23.18	22.62
		1908.5	23.18	22.65
	50% RB mid	1851.5	22.12	21.13
		1880.0	22.40	21.39
		1908.5	22.27	21.35
	100% RB	1851.5	22.12	21.21
		1880.0	22.47	21.42
		1908.5	22.39	21.30
5MHz	1 RB high	1852.5	23.11	22.15
		1880.0	23.22	22.30
		1907.5	23.12	22.20
	1 RB low	1852.5	22.88	21.88
		1880.0	23.03	22.07
		1907.5	23.14	22.17
	50% RB mid	1852.5	22.02	21.11
		1880.0	22.36	21.33
		1907.5	22.34	21.42
	100% RB	1852.5	22.05	21.23
		1880.0	22.35	21.45
		1907.5	22.41	21.46
10MHz	1 RB high	1855.0	23.11	22.49
		1880.0	23.13	22.51
		1905.0	23.20	22.70
	1 RB low	1855.0	22.72	22.28
		1880.0	22.79	22.36
		1905.0	23.18	22.45
	50% RB mid	1855.0	21.89	21.00
		1880.0	22.40	21.39
		1905.0	22.32	21.30
	100% RB	1855.0	21.93	20.98
		1880.0	22.42	21.35
		1905.0	22.33	21.36

(continued)

15MHz	1 RB high	1857.5	23.09	22.36
		1880.0	23.19	22.63
		1902.5	22.96	22.36
	1 RB low	1857.5	22.75	22.19
		1880.0	22.81	22.27
		1902.5	23.07	22.50
	50% RB mid	1857.5	21.87	21.06
		1880.0	22.30	21.45
		1902.5	22.35	21.48
	100% RB	1857.5	22.09	21.12
		1880.0	22.31	21.29
		1902.5	22.37	21.36
20MHz	1 RB high	1860.0	23.14	22.30
		1880.0	23.49	22.55
		1900.0	22.91	22.08
	1 RB low	1860.0	23.00	22.28
		1880.0	22.84	21.94
		1900.0	23.22	22.26
	50% RB mid	1860.0	22.00	21.11
		1880.0	22.43	21.46
		1900.0	22.25	21.27
	100% RB	1860.0	22.06	21.13
		1880.0	22.32	21.40
		1900.0	22.23	21.25

**LTE band 4**

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1754.3	23.10	22.28
		1732.5	23.14	22.38
		1710.7	22.95	22.19
	1 RB low	1754.3	23.07	22.28
		1732.5	23.10	22.34
		1710.7	23.01	22.18
	50% RB mid	1754.3	23.03	22.06
		1732.5	23.11	22.13
		1710.7	23.01	21.96
	100% RB	1754.3	22.10	21.17
		1732.5	22.23	21.19
		1710.7	22.04	21.10
3MHz	1 RB high	1753.5	22.99	22.45
		1732.5	22.93	22.43
		1711.5	22.94	22.39
	1 RB low	1753.5	22.84	22.29
		1732.5	23.12	22.62
		1711.5	22.89	22.35
	50% RB mid	1753.5	21.97	20.99
		1732.5	22.11	21.13
		1711.5	22.01	21.01
	100% RB	1753.5	22.03	20.99
		1732.5	22.17	21.19
		1711.5	22.07	21.01
5MHz	1 RB high	1752.5	22.99	22.06
		1732.5	22.93	22.02
		1712.5	22.91	21.99
	1 RB low	1752.5	22.90	21.96
		1732.5	23.12	22.13
		1712.5	22.80	21.84
	50% RB mid	1752.5	21.97	20.98
		1732.5	22.14	21.18
		1712.5	22.02	21.03
	100% RB	1752.5	21.95	21.03
		1732.5	22.14	21.21
		1712.5	22.06	21.09

(continued)

10MHz	1 RB high	1750	22.97	22.42
		1732.5	22.94	22.41
		1715	22.84	22.28
	1 RB low	1750	23.01	22.49
		1732.5	23.01	22.41
		1715	22.82	22.33
	50% RB mid	1750	21.96	20.94
		1732.5	22.19	21.12
		1715	22.09	21.05
	100% RB	1750	22.16	21.11
		1732.5	22.24	21.20
		1715	22.20	21.11
15MHz	1 RB high	1747.5	23.05	22.41
		1732.5	22.95	22.37
		1717.5	22.93	22.34
	1 RB low	1747.5	22.83	22.30
		1732.5	22.82	22.28
		1717.5	22.81	22.30
	50% RB mid	1747.5	22.13	21.28
		1732.5	22.18	21.32
		1717.5	22.09	21.29
	100% RB	1747.5	22.25	21.20
		1732.5	22.29	21.28
		1717.5	22.18	21.14
20MHz	1 RB high	1745	23.15	22.22
		1732.5	23.12	22.19
		1720	<b>23.18</b>	22.28
	1 RB low	1745	22.96	21.89
		1732.5	22.93	22.03
		1720	23.03	21.89
	50% RB mid	1745	22.15	21.15
		1732.5	22.23	21.20
		1720	22.09	21.08
	100% RB	1745	22.19	21.20
		1732.5	22.14	21.10
		1720	22.14	21.19

**LTE band 5**

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1754.3	22.36	21.54
		1732.5	22.50	21.61
		1710.7	22.39	21.57
	1 RB low	1754.3	22.40	21.52
		1732.5	22.50	21.60
		1710.7	22.42	21.57
	50% RB mid	1754.3	22.34	21.30
		1732.5	22.40	21.39
		1710.7	22.39	21.29
	100% RB	1754.3	21.45	20.55
		1732.5	21.47	20.55
		1710.7	21.35	20.49
3MHz	1 RB high	1753.5	22.32	21.76
		1732.5	22.40	21.78
		1711.5	22.27	21.77
	1 RB low	1753.5	22.31	21.77
		1732.5	22.41	21.88
		1711.5	22.30	21.71
	50% RB mid	1753.5	21.40	20.48
		1732.5	21.51	20.54
		1711.5	21.30	20.42
	100% RB	1753.5	21.42	20.52
		1732.5	21.54	20.57
		1711.5	21.35	20.47
5MHz	1 RB high	1752.5	22.36	21.47
		1732.5	22.43	21.49
		1712.5	22.29	21.35
	1 RB low	1752.5	22.33	21.36
		1732.5	22.46	21.55
		1712.5	22.23	21.24
	50% RB mid	1752.5	21.50	20.50
		1732.5	21.47	20.54
		1712.5	21.36	20.48
	100% RB	1752.5	21.43	20.61
		1732.5	21.49	20.64
		1712.5	21.44	20.51

(continued)

10MHz	1 RB high	1750	22.33	21.80
		1732.5	22.29	21.71
		1715	22.47	21.91
	1 RB low	1750	22.40	21.83
		1732.5	22.26	21.70
		1715	22.22	21.66
	50% RB mid	1750	21.52	20.54
		1732.5	21.53	20.56
		1715	21.41	20.43
	100% RB	1750	21.54	20.59
		1732.5	21.57	20.57
		1715	21.51	20.49

**LTE band 7**

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	2502.5	23.23	22.22
		2535	23.22	22.28
		2567.5	23.26	22.23
	1 RB low	2502.5	23.15	22.14
		2535	23.23	22.24
		2567.5	23.15	22.15
	50% RB mid	2502.5	22.21	21.23
		2535	22.28	21.29
		2567.5	22.25	21.28
	100% RB	2502.5	22.20	21.32
		2535	22.34	21.32
		2567.5	22.21	21.31
10MHz	1 RB high	2505	23.17	22.40
		2535	23.30	22.49
		2565	23.18	22.50
	1 RB low	2505	23.19	22.49
		2535	23.21	22.49
		2565	23.09	22.43
	50% RB mid	2505	22.22	21.19
		2535	22.34	21.24
		2565	22.28	21.25
	100% RB	2505	22.24	21.24
		2535	22.32	21.30
		2565	22.33	21.32
15MHz	1 RB high	2507.5	23.20	22.34
		2535	23.32	22.50
		2562.5	23.08	22.47
	1 RB low	2507.5	23.26	22.48
		2535	23.20	22.49
		2562.5	23.06	22.44
	50% RB mid	2507.5	22.34	21.50
		2535	22.28	21.49
		2562.5	22.17	21.48
	100% RB	2507.5	22.36	21.35
		2535	22.41	21.32
		2562.5	22.33	21.23

(Continued)

20MHz	1 RB high	2510	23.37	22.42
		2535	23.47	22.49
		2560	23.24	22.31
	1 RB low	2510	23.39	22.49
		2535	23.27	22.36
		2560	23.18	22.17
	50% RB mid	2510	22.42	21.39
		2535	22.42	21.35
		2560	22.27	21.21
	100% RB	2510	22.33	21.41
		2535	22.34	21.33
		2560	22.26	21.19

**LTE band 17**

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	706.5	23.05	22.09
		710.0	23.08	22.08
		713.5	22.97	22.05
	1 RB low	706.5	22.88	21.89
		710.0	22.87	21.78
		713.5	23.06	22.07
	50% RB mid	706.5	22.03	20.98
		710.0	21.98	20.99
		713.5	22.02	20.98
	100% RB	706.5	22.01	21.04
		710.0	22.01	21.03
		713.5	22.01	21.05

(Continued)

10MHz	1 RB high	709	23.07	22.40
		710	23.08	22.53
		711	<b>23.09</b>	22.47
	1 RB low	709	22.76	22.17
		710	22.81	22.29
		711	22.86	22.17
	50% RB mid	709	21.91	20.86
		710	22.02	20.90
		711	22.04	20.95
	100% RB	709	21.95	20.87
		710	22.09	20.99
		711	22.05	20.98

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

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

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

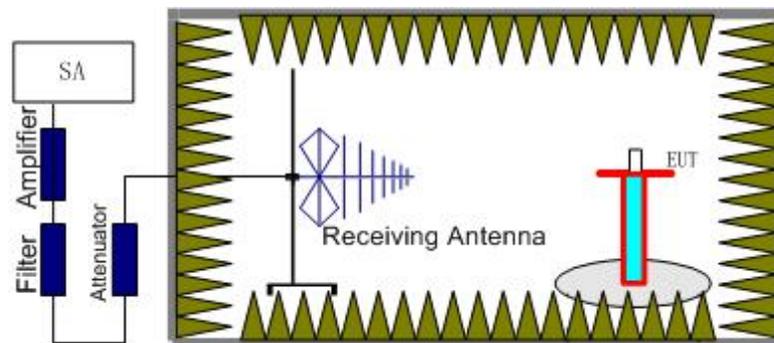
Rule Part 27.50(h)(2) specifies "Mobile stations are limited to 2.0 watts EIRP".

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

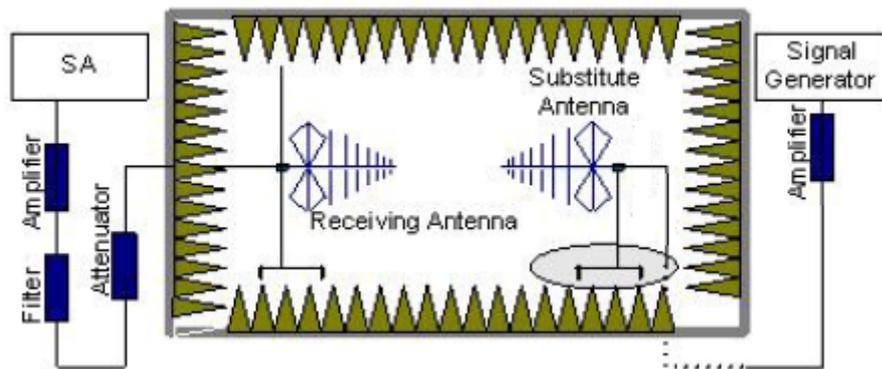
#### A.1.3.2 Method of Measurement

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

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



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



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

4. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna. The cable loss ( $P_{cl}$ ), the substitution antenna Gain ( $G_a$ ) and the amplifier Gain ( $P_{Ag}$ ) should be recorded after test.

The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{Mea} - P_{Ag} - P_{cl} - G_a$$

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 <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1850.70	-29.23	3.18	-50.00	-4.56	22.15	Horizontal
1880.00	-27.72	3.11	-50.00	-4.43	<b>23.60</b>	Horizontal
1909.30	-29.11	3.18	-50.00	-4.30	22.01	Horizontal

**LTE Band 2\_3MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1851.50	-29.20	3.18	-50.00	-4.55	22.17	Horizontal
1880.00	-27.72	3.11	-50.00	-4.43	23.60	Horizontal
1908.50	-28.99	3.18	-50.00	-4.30	22.13	Horizontal

**LTE Band 2\_5MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1852.50	-29.16	3.18	-50.00	-4.55	22.21	Horizontal
1880.00	-27.82	3.11	-50.00	-4.43	23.50	Horizontal
1907.50	-29.06	3.18	-50.00	-4.31	22.07	Horizontal

**LTE Band 2\_10MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1855.00	-29.19	3.16	-50.00	-4.54	22.19	Horizontal
1880.00	-27.85	3.11	-50.00	-4.43	23.47	Horizontal
1905.00	-28.50	3.17	-50.00	-4.32	22.65	Horizontal

**LTE Band 2\_15MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1857.50	-29.03	3.15	-50.00	-4.53	22.35	Horizontal
1880.00	-27.88	3.11	-50.00	-4.43	23.44	Horizontal
1902.50	-28.22	3.16	-50.00	-4.33	22.95	Horizontal

**LTE Band 2\_20 MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1860.00	-28.96	3.14	-50.00	-4.52	22.42	Horizontal
1880.00	-27.79	3.11	-50.00	-4.43	23.53	Horizontal
1900.00	-28.41	3.16	-50.00	-4.34	22.77	Horizontal

**LTE Band 2\_1.4MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1850.70	-30.25	3.18	-50.00	-4.56	21.13	Horizontal
1880.00	-28.35	3.11	-50.00	-4.43	22.97	Horizontal
1909.30	-29.97	3.18	-50.00	-4.30	21.15	Horizontal

**LTE Band 2\_3MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1851.50	-30.13	3.18	-50.00	-4.55	21.24	Horizontal
1880.00	-28.63	3.11	-50.00	-4.43	22.69	Horizontal
1908.50	-30.12	3.18	-50.00	-4.30	21.00	Horizontal

**LTE Band 2\_5MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1852.50	-30.10	3.18	-50.00	-4.55	21.27	Horizontal
1880.00	-28.71	3.11	-50.00	-4.43	22.61	Horizontal
1907.50	-30.12	3.18	-50.00	-4.31	21.01	Horizontal

**LTE Band 2\_10MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1855.00	-29.93	3.16	-50.00	-4.54	21.45	Horizontal
1880.00	-28.82	3.11	-50.00	-4.43	22.50	Horizontal
1905.00	-29.51	3.17	-50.00	-4.32	21.64	Horizontal

**LTE Band 2\_15MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1857.50	-29.88	3.15	-50.00	-4.53	21.50	Horizontal
1880.00	-28.76	3.11	-50.00	-4.43	22.56	Horizontal
1902.50	-29.28	3.16	-50.00	-4.33	21.89	Horizontal

**LTE Band 2\_20 MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1860.00	-30.18	3.14	-50.00	-4.52	21.20	Horizontal
1880.00	-28.89	3.11	-50.00	-4.43	22.43	Horizontal
1900.00	-29.66	3.16	-50.00	-4.34	21.52	Horizontal

Sample calculation: LTE Band 2, 1.4MHz bandwidth, frequency 1880.00 MHz, QPSK  
 Peak EIRP(dBm) = P<sub>Mea</sub>(-27.72dBm) - G<sub>a</sub> (-4.43 dBi) - P<sub>Ag</sub> (-50.00 dB) - P<sub>cl</sub> (3.11 dB)  
 = 23.60 dBm

**LTE Band 4- EIRP 27.50(d)**

Limits: ≤30dBm (1W)

**LTE Band 4\_1.4MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1710.70	-29.09	2.96	-50.00	-5.17	23.12	Vertical
1732.50	-29.29	2.99	-50.00	-5.08	22.80	Vertical
1754.30	-28.86	3.01	-50.00	-4.98	23.11	Vertical

**LTE Band 4\_3MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1711.50	-28.97	2.96	-50.00	-5.17	23.24	Vertical
1732.50	-29.35	2.99	-50.00	-5.08	22.74	Vertical
1753.50	-28.81	3.01	-50.00	-4.98	23.16	Vertical

**LTE Band 4\_5MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1712.50	-28.84	2.97	-50.00	-5.17	23.36	Vertical
1732.50	-29.36	2.99	-50.00	-5.08	22.73	Vertical
1752.50	-29.00	3.01	-50.00	-4.99	22.98	Vertical

**LTE Band 4\_10MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1715.00	-28.68	2.97	-50.00	-5.15	23.50	Vertical
1732.50	-29.51	2.99	-50.00	-5.08	22.58	Vertical
1750.00	-29.07	3.00	-50.00	-5.00	22.93	Vertical

**LTE Band 4\_15MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1717.50	-28.78	2.97	-50.00	-5.14	23.39	Vertical
1732.50	-29.50	2.99	-50.00	-5.08	22.59	Vertical
1747.50	-29.00	3.00	-50.00	-5.01	23.01	Vertical

**LTE Band 4\_20MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1720.00	-28.81	2.97	-50.00	-5.13	23.35	Vertical
1732.50	-29.51	2.99	-50.00	-5.08	22.58	Vertical
1745.00	-29.10	3.00	-50.00	-5.02	22.92	Vertical

**LTE Band 4\_1.4MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1710.70	-30.30	2.96	-50.00	-5.17	21.91	Vertical
1732.50	-30.23	2.99	-50.00	-5.08	21.86	Vertical
1754.30	-29.76	3.01	-50.00	-4.98	22.21	Vertical

**LTE Band 4\_3MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1711.50	-29.89	2.96	-50.00	-5.17	22.32	Vertical
1732.50	-30.29	2.99	-50.00	-5.08	21.80	Vertical
1753.50	-29.87	3.01	-50.00	-4.98	22.10	Vertical

**LTE Band 4\_5MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1712.50	-29.85	2.97	-50.00	-5.17	22.35	Vertical
1732.50	-30.31	2.99	-50.00	-5.08	21.78	Vertical
1752.50	-29.67	3.01	-50.00	-4.99	22.31	Vertical

**LTE Band 4\_10MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1715.00	-29.64	2.97	-50.00	-5.15	22.54	Vertical
1732.50	-30.40	2.99	-50.00	-5.08	21.69	Vertical
1750.00	-29.84	3.00	-50.00	-5.00	22.16	Vertical

**LTE Band 4\_15MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1717.50	-29.71	2.97	-50.00	-5.14	22.46	Vertical
1732.50	-30.37	2.99	-50.00	-5.08	21.72	Vertical
1747.50	-29.95	3.00	-50.00	-5.01	22.06	Vertical

**LTE Band 4\_20MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
1720.00	-29.77	2.97	-50.00	-5.13	22.39	Vertical
1732.50	-30.47	2.99	-50.00	-5.08	21.62	Vertical
1745.00	-30.21	3.00	-50.00	-5.02	21.81	Vertical

Sample calculation: LTE Band 4, 10MHz bandwidth, frequency 1715.00 MHz, QPSK  
 Peak EIRP(dBm) = P<sub>Mea</sub>(-28.68 dBm) - G<sub>a</sub> (-5.15 dBi) - P<sub>Ag</sub> (-50.00 dB) - P<sub>cl</sub> (2.97 dB)  
 = 23.50 dBm

**LTE Band 5- ERP 22.913(a)**

Limits:  $\leq 38.45\text{dBm}$  (7W)

**LTE Band 5\_1.4MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
824.70	-28.40	2.07	-53.00	0.84	2.15	<b>19.54</b>	Vertical
836.50	-28.42	2.08	-53.00	0.90	2.15	19.45	Vertical
848.30	-29.40	2.09	-53.00	0.95	2.15	18.41	Vertical

**LTE Band 5\_3MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
825.50	-28.40	2.07	-53.00	0.85	2.15	19.53	Vertical
836.50	-28.49	2.08	-53.00	0.90	2.15	19.38	Vertical
847.50	-29.35	2.09	-53.00	0.94	2.15	18.47	Vertical

**LTE Band 5\_5MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
826.50	-28.47	2.07	-53.00	0.85	2.15	19.46	Vertical
836.50	-28.64	2.08	-53.00	0.90	2.15	19.23	Vertical
846.50	-29.40	2.09	-53.00	0.94	2.15	18.42	Vertical

**LTE Band 5\_10MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
829.00	-28.43	2.08	-53.00	0.86	2.15	19.48	Vertical
836.50	-28.63	2.08	-53.00	0.90	2.15	19.24	Vertical
844.00	-29.10	2.09	-53.00	0.93	2.15	18.73	Vertical

**LTE Band 5\_1.4MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
824.70	-29.26	2.07	-53.00	0.84	2.15	18.68	Vertical
836.50	-29.27	2.08	-53.00	0.90	2.15	18.60	Vertical
848.30	-30.09	2.09	-53.00	0.95	2.15	17.72	Vertical

**LTE Band 5\_3MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
825.50	-29.32	2.07	-53.00	0.85	2.15	18.61	Vertical
836.50	-29.43	2.08	-53.00	0.90	2.15	18.44	Vertical
847.50	-30.28	2.09	-53.00	0.94	2.15	17.54	Vertical

**LTE Band 5\_5MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
826.50	-29.34	2.07	-53.00	0.85	2.15	18.59	Vertical
836.50	-29.56	2.08	-53.00	0.90	2.15	18.31	Vertical
846.50	-30.37	2.09	-53.00	0.94	2.15	17.45	Vertical

**LTE Band 5\_10MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
829.00	-29.42	2.08	-53.00	0.86	2.15	18.49	Vertical
836.50	-29.78	2.08	-53.00	0.90	2.15	18.09	Vertical
844.00	-29.84	2.09	-53.00	0.93	2.15	17.99	Vertical

Sample calculation: LTE Band 5, 1.4MHz bandwidth, frequency 824.70 MHz, QPSK  
 $\text{Peak ERP(dBm)} = P_{\text{Mea}}(-28.40\text{dBm}) - G_a(0.84\text{dBi}) - P_{\text{Ag}}(-53.00\text{ dB}) - P_{\text{cl}}(2.07\text{ dB}) - 2.15\text{ dB}$   
 $= 19.54\text{ dBm}$

**LTE Band 7- ERP 27.50(h)(2)**

Limits: ≤33 dBm (2W)

**LTE Band 7\_5MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
2502.50	-29.50	3.59	-50.00	-5.41	22.32	Horizontal
2535.00	-28.90	3.62	-50.00	-5.49	22.97	Horizontal
2567.50	-29.25	3.65	-50.00	-5.58	22.68	Horizontal

**LTE Band 7\_10MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
2505.00	-29.45	3.59	-50.00	-5.41	22.37	Horizontal
2535.00	-28.96	3.62	-50.00	-5.49	22.91	Horizontal
2565.00	-29.32	3.65	-50.00	-5.57	22.60	Horizontal

**LTE Band 7\_15MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
2507.50	-29.31	3.59	-50.00	-5.42	22.52	Horizontal
2535.00	-28.87	3.62	-50.00	-5.49	23.00	Horizontal
2562.50	-29.46	3.64	-50.00	-5.56	22.46	Horizontal

**LTE Band 7\_20MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
2510.00	-29.20	3.59	-50.00	-5.43	22.64	Horizontal
2535.00	-28.86	3.62	-50.00	-5.49	<b>23.01</b>	Horizontal
2560.00	-29.36	3.64	-50.00	-5.56	22.56	Horizontal

**LTE Band 7\_5MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
2502.50	-30.33	3.59	-50.00	-5.41	21.49	Horizontal
2535.00	-29.76	3.62	-50.00	-5.49	22.11	Horizontal
2567.50	-30.10	3.65	-50.00	-5.58	21.83	Horizontal

**LTE Band 7\_10MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
2505.00	-30.38	3.59	-50.00	-5.41	21.44	Horizontal
2535.00	-29.93	3.62	-50.00	-5.49	21.94	Horizontal
2565.00	-30.18	3.65	-50.00	-5.57	21.74	Horizontal

**LTE Band 7\_15MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
2507.50	-30.29	3.59	-50.00	-5.42	21.54	Horizontal
2535.00	-30.01	3.62	-50.00	-5.49	21.86	Horizontal
2562.50	-30.43	3.64	-50.00	-5.56	21.49	Horizontal

**LTE Band 7\_20MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	RMS EIRP(dBm)	Polarization
2510.00	-30.18	3.59	-50.00	-5.43	21.66	Horizontal
2535.00	-29.81	3.62	-50.00	-5.49	22.06	Horizontal
2560.00	-30.54	3.64	-50.00	-5.56	21.38	Horizontal

Sample calculation: LTE Band 7, 20 MHz bandwidth, frequency 2535.00 MHz, QPSK  
 Peak EIRP(dBm) = P<sub>Mea</sub>(-28.86dBm) - G<sub>a</sub> (-5.49dBi) - P<sub>Ag</sub> (-50.00 dB) - P<sub>cl</sub> (3.62dB)  
 = 23.01 dBm

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

**Limits:** ≤34.77dBm (3W)

**LTE Band 17\_5MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
706.50	-31.03	1.91	-53.00	0.30	2.15	<b>17.61</b>	Vertical
710.00	-31.30	1.92	-53.00	0.32	2.15	17.31	Vertical
713.50	-31.06	1.93	-53.00	0.34	2.15	17.52	Vertical

**LTE Band 17\_10MHz\_QPSK**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
709.00	-31.05	1.92	-53.00	0.32	2.15	17.56	Vertical
710.00	-31.40	1.92	-53.00	0.32	2.15	17.21	Vertical
711.00	-31.20	1.92	-53.00	0.33	2.15	17.40	Vertical

**LTE Band 17\_5MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
706.50	-31.67	1.91	-53.00	0.30	2.15	16.97	Vertical
710.00	-32.12	1.92	-53.00	0.32	2.15	16.49	Vertical
713.50	-32.13	1.93	-53.00	0.34	2.15	16.45	Vertical

**LTE Band 17\_10MHz\_16QAM**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Cable Loss (dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction (dB)	RMS ERP (dBm)	Polarization
709.00	-31.92	1.92	-53.00	0.32	2.15	16.69	Vertical
710.00	-32.18	1.92	-53.00	0.32	2.15	16.43	Vertical
711.00	-32.17	1.92	-53.00	0.33	2.15	16.43	Vertical

Sample calculation: LTE Band 17, 5 MHz bandwidth, frequency 706.50 MHz, QPSK

$$\begin{aligned} \text{Peak ERP(dBm)} &= P_{\text{Mea}}(-31.03 \text{ dBm}) - G_a (0.30 \text{ dBi}) - P_{\text{Ag}} (-53.00 \text{ dB}) - P_{\text{cl}} (1.91 \text{ dB}) - 2.15 \text{ dB} \\ &= 17.61 \text{ dBm} \end{aligned}$$

**ANALYZER SETTINGS:**

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

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

Note: Expanded measurement uncertainty is  $U = 0.96 \text{ dB}$ ,  $k = 2$ .

## A.2 EMISSION LIMIT

### Reference

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

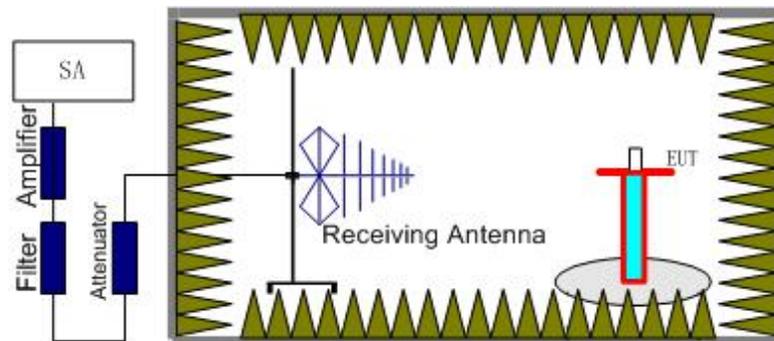
### A.2.1 Measurement Method

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

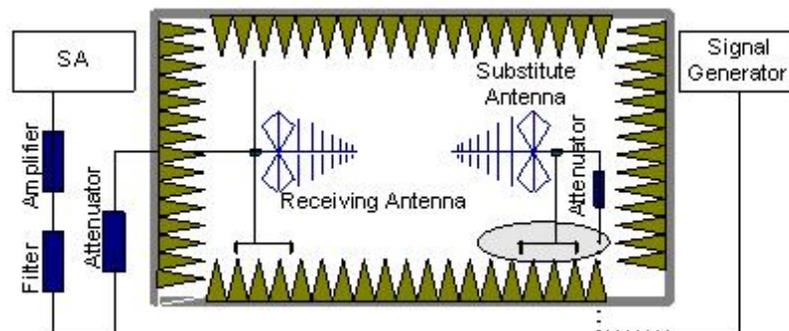
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 22.917(a), 24.238(a), Part 27.53(h), Part 27.53(m) and Part 27.53(g). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 2, 4, 5, 7 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, 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. 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:

$$\text{Power (EIRP)} = P_{Mea} + P_{pl} + G_a$$

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,  $ERP = EIRP - 2.15\text{dB}$ .

### A.2.2 Measurement Limit

Part 22.917(a)24.238(a), 27.53(h), 27.53(m) and 27.53(g) all specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power ( $P$ ) by a factor of at least  $43 + 10 \log(P)$  dB. The specification that emissions shall be attenuated below the transmitter power ( $P$ ) by at least  $43 + 10 \log(P)$  dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

### A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands 2, 4, 5, 7 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, 5, 7 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, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3701.67	-55.99	4.44	-8.14	-52.29	-13.00	Horizontal
6801.04	-58.23	6.16	-10.90	-53.49	-13.00	Horizontal
7479.24	-58.46	6.59	-11.39	-53.66	-13.00	Vertical
8602.96	-59.71	7.44	-12.28	-54.87	-13.00	Vertical
10865.51	-55.92	8.18	-12.43	-51.67	-13.00	Vertical
13579.55	-52.31	9.22	-13.83	-47.70	-13.00	Vertical

**LTE Band 2, 1.4MHz, QPSK, Channel 18900, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3760.44	-54.03	4.52	-8.21	-50.34	-13.00	Horizontal
5640.26	-57.90	5.45	-10.06	-53.29	-13.00	Horizontal
8554.53	-59.59	7.25	-12.24	-54.60	-13.00	Vertical
10085.31	-55.07	8.23	-12.42	-50.88	-13.00	Horizontal
11016.95	-55.36	8.65	-12.40	-51.61	-13.00	Vertical
14727.87	-52.46	9.46	-13.55	-48.37	-13.00	Vertical

**LTE Band 2, 1.4MHz, QPSK, Channel 19193, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3818.89	-57.19	4.49	-8.28	-53.40	-13.00	Horizontal
4598.50	-59.90	5.00	-8.98	-55.92	-13.00	Vertical
7637.11	-50.36	6.76	-11.54	-45.58	-13.00	Horizontal
8661.13	-59.38	7.44	-12.33	-54.49	-13.00	Vertical
10338.49	-56.80	7.97	-12.47	-52.30	-13.00	Horizontal
13605.67	-52.85	9.11	-13.84	-48.12	-13.00	Vertical

**LTE Band 2, 1.4MHz, 16QAM, Channel 18607, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3701.74	-56.44	4.44	-8.14	-52.74	-13.00	Horizontal
7403.18	-55.19	6.42	-11.34	-50.27	-13.00	Horizontal
8460.64	-57.88	6.91	-12.18	-52.61	-13.00	Vertical
9986.77	-56.89	7.98	-12.41	-52.46	-13.00	Horizontal
11029.24	-54.00	8.45	-12.40	-50.05	-13.00	Horizontal
14356.55	-51.70	9.39	-13.71	-47.38	-13.00	Horizontal

**LTE Band 2, 1.4MHz, 16QAM, Channel 18900, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3796.21	-61.50	4.54	-8.26	-57.78	-13.00	Vertical
5490.77	-60.98	5.41	-9.99	-56.40	-13.00	Horizontal
7754.30	-57.92	6.68	-11.65	-52.95	-13.00	Horizontal
10721.53	-56.10	7.95	-12.46	-51.59	-13.00	Vertical
13335.32	-52.49	8.99	-13.64	-47.84	-13.00	Vertical
14210.12	-52.11	9.18	-13.83	-47.46	-13.00	Horizontal

**LTE Band 2, 1.4MHz, 16QAM, Channel 19193, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3818.65	-55.30	4.49	-8.28	-51.51	-13.00	Horizontal
6069.10	-60.16	5.82	-10.26	-55.72	-13.00	Horizontal
7055.41	-55.98	6.52	-11.13	-51.37	-13.00	Vertical
8484.84	-55.92	7.00	-12.19	-50.73	-13.00	Vertical
9794.90	-57.48	7.74	-12.48	-52.74	-13.00	Horizontal
13375.41	-52.79	9.03	-13.68	-48.14	-13.00	Horizontal

**LTE Band 4, 1.4MHz, QPSK, Channel 19957, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
4211.00	-62.05	4.75	-8.63	-58.17	-13.00	Horizontal
6843.04	-53.89	6.17	-10.94	-49.12	-13.00	Horizontal
8553.92	-52.76	7.26	-12.24	-47.78	-13.00	Horizontal
9551.14	-57.78	7.79	-12.58	-52.99	-13.00	Horizontal
10342.96	-57.22	7.98	-12.47	-52.73	-13.00	Vertical
13375.08	-54.05	9.03	-13.68	-49.40	-13.00	Horizontal

**LTE Band 4, 1.4MHz, QPSK, Channel 20175, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3233.32	-60.76	4.18	-7.26	-57.68	-13.00	Horizontal
5316.19	-60.90	5.39	-9.89	-56.40	-13.00	Horizontal
6930.60	-52.21	6.06	-11.03	-47.24	-13.00	Horizontal
9154.78	-59.27	7.63	-12.60	-54.30	-13.00	Horizontal
12128.21	-49.82	8.82	-12.55	-46.09	-13.00	Horizontal
15843.03	-50.45	10.00	-13.13	-47.32	-13.00	Vertical

**LTE Band 4, 1.4MHz, QPSK, Channel 20393, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
4118.45	-61.01	4.67	-8.57	-57.11	-13.00	Horizontal
5128.74	-59.83	5.25	-9.78	-55.30	-13.00	Vertical
6882.98	-61.13	6.07	-10.98	-56.22	-13.00	Horizontal
8229.71	-59.75	6.96	-12.04	-54.67	-13.00	Horizontal
11854.23	-55.94	8.78	-12.47	-52.25	-13.00	Vertical
13497.03	-53.26	9.23	-13.80	-48.69	-13.00	Vertical

**LTE Band 4, 1.4MHz, 16QAM, Channel 19957, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3349.47	-61.62	4.24	-7.54	-58.32	-13.00	Vertical
4417.56	-61.63	4.84	-8.75	-57.72	-13.00	Vertical
6843.38	-55.99	6.17	-10.94	-51.22	-13.00	Horizontal
8137.56	-59.37	6.99	-11.98	-54.38	-13.00	Horizontal
11262.38	-57.72	8.42	-12.40	-53.74	-13.00	Horizontal
14297.98	-51.97	9.42	-13.76	-47.63	-13.00	Vertical

**LTE Band 4, 1.4MHz, 16QAM, Channel 20175, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3615.22	-61.60	4.38	-8.04	-57.94	-13.00	Horizontal
5600.32	-58.55	5.44	-10.04	-53.95	-13.00	Horizontal
6656.37	-58.54	6.09	-10.76	-53.87	-13.00	Vertical
8629.82	-58.21	7.35	-12.30	-53.26	-13.00	Vertical
10365.39	-57.39	8.04	-12.47	-52.96	-13.00	Horizontal
12128.20	-45.94	8.82	-12.55	-42.21	-13.00	Horizontal

**LTE Band 4, 1.4MHz, 16QAM, Channel 20393, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
4368.10	-61.26	4.89	-8.72	-57.43	-13.00	Vertical
5263.38	-59.65	5.30	-9.86	-55.09	-13.00	Horizontal
6706.04	-57.21	6.08	-10.81	-52.48	-13.00	Horizontal
8712.02	-59.56	7.47	-12.37	-54.66	-13.00	Horizontal
9960.49	-60.27	7.73	-12.42	-55.58	-13.00	Horizontal
13467.27	-53.13	9.39	-13.77	-48.75	-13.00	Horizontal

**LTE Band 5, 1.4MHz, QPSK, Channel 20407, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1649.69	-57.20	2.91	-5.44	2.15	-56.82	-13.00	Horizontal
3766.08	-61.23	4.51	-8.22	2.15	-59.67	-13.00	Vertical
4411.37	-61.41	4.85	-8.75	2.15	-59.66	-13.00	Horizontal
5127.02	-61.13	5.25	-9.78	2.15	-58.75	-13.00	Horizontal
5655.44	-60.19	5.45	-10.06	2.15	-57.73	-13.00	Vertical
7100.83	-59.13	6.40	-11.16	2.15	-56.52	-13.00	Vertical

**LTE Band 5, 1.4MHz, QPSK, Channel 20525, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
3466.61	-61.70	4.24	-7.82	2.15	-60.27	-13.00	Horizontal
4331.46	-62.76	4.81	-8.70	2.15	-61.02	-13.00	Vertical
5148.38	-61.28	5.24	-9.79	2.15	-58.88	-13.00	Horizontal
5989.39	-59.47	5.61	-10.20	2.15	-57.03	-13.00	Vertical
6696.64	-59.02	6.11	-10.80	2.15	-56.48	-13.00	Horizontal
8070.67	-59.67	6.91	-11.94	2.15	-56.79	-13.00	Vertical

**LTE Band 5, 1.4MHz, QPSK, Channel 20643, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1355.82	-61.29	2.69	-4.74	2.15	-61.39	-13.00	Horizontal
1696.72	-57.74	2.95	-5.23	2.15	-57.61	-13.00	Horizontal
3097.79	-60.62	4.00	-6.93	2.15	-59.84	-13.00	Horizontal
3920.35	-60.66	4.50	-8.40	2.15	-58.91	-13.00	Vertical
5059.31	-62.06	5.23	-9.74	2.15	-59.70	-13.00	Vertical
5528.39	-60.94	5.47	-10.01	2.15	-58.55	-13.00	Horizontal

**LTE Band 5, 1.4MHz, 16QAM, Channel 20407, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1649.81	-57.60	2.91	-5.44	2.15	-57.22	-13.00	Horizontal
3622.27	-60.20	4.38	-8.05	2.15	-58.68	-13.00	Vertical
4947.16	-59.69	5.11	-9.60	2.15	-57.35	-13.00	Vertical
5634.60	-60.35	5.46	-10.05	2.15	-57.91	-13.00	Horizontal
7201.90	-59.45	6.39	-11.22	2.15	-56.77	-13.00	Horizontal
7853.21	-57.69	7.05	-11.75	2.15	-55.14	-13.00	Vertical

**LTE Band 5, 1.4MHz, 16QAM, Channel 20525, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
3206.65	-60.20	4.10	-7.20	2.15	-59.25	-13.00	Horizontal
4044.02	-59.45	4.65	-8.53	2.15	-57.72	-13.00	Vertical
4639.71	-59.83	4.95	-9.05	2.15	-57.88	-13.00	Vertical
5795.22	-60.55	5.67	-10.12	2.15	-58.25	-13.00	Horizontal
6864.37	-60.45	6.09	-10.96	2.15	-57.73	-13.00	Horizontal
8070.39	-60.43	6.91	-11.94	2.15	-57.55	-13.00	Vertical

**LTE Band 5, 1.4MHz, 16QAM, Channel 20643, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1696.80	-55.87	2.95	-5.23	2.15	-55.74	-13.00	Vertical
3427.74	-62.08	4.19	-7.73	2.15	-60.69	-13.00	Horizontal
3990.14	-60.85	4.60	-8.49	2.15	-59.11	-13.00	Horizontal
4605.60	-61.21	4.98	-8.99	2.15	-59.35	-13.00	Vertical
5762.08	-58.97	5.69	-10.10	2.15	-56.71	-13.00	Horizontal
7163.08	-59.96	6.35	-11.20	2.15	-57.26	-13.00	Vertical

**LTE Band 7, 5 MHz, QPSK, Channel 20775, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
4516.23	-60.15	4.89	-8.83	-56.21	-13.00	Vertical
5005.25	-54.26	5.17	-9.70	-49.73	-13.00	Horizontal
7064.63	-59.02	6.55	-11.14	-54.43	-13.00	Horizontal
8522.46	-60.84	7.09	-12.22	-55.71	-13.00	Vertical
10010.49	-50.84	7.96	-12.40	-46.40	-13.00	Horizontal
14064.70	-52.65	9.24	-13.95	-47.94	-13.00	Vertical

**LTE Band 7, 5 MHz, QPSK, Channel 21100, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
4161.86	-61.31	4.68	-8.60	-57.39	-13.00	Horizontal
5070.38	-51.97	5.21	-9.74	-47.44	-13.00	Horizontal
6804.58	-60.61	6.16	-10.90	-55.87	-13.00	Vertical
8541.00	-58.82	7.22	-12.23	-53.81	-13.00	Vertical
10140.34	-52.15	7.92	-12.43	-47.64	-13.00	Horizontal
12365.68	-54.12	8.64	-12.65	-50.11	-13.00	Horizontal

**LTE Band 7, 5 MHz, QPSK, Channel 21425, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3326.11	-63.03	4.15	-7.48	-59.70	-13.00	Horizontal
5376.31	-59.00	5.42	-9.93	-54.49	-13.00	Vertical
7035.27	-59.83	6.45	-11.12	-55.16	-13.00	Horizontal
10271.16	-53.91	7.60	-12.45	-49.06	-13.00	Horizontal
12528.74	-55.68	8.91	-12.73	-51.86	-13.00	Vertical
13604.10	-51.84	9.12	-13.84	-47.12	-13.00	Horizontal

**LTE Band 7, 5 MHz, 16QAM, Channel 20775, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3578.55	-60.77	4.36	-7.99	-57.14	-13.00	Vertical
5005.57	-53.42	5.17	-9.70	-48.89	-13.00	Horizontal
5899.41	-60.21	5.59	-10.16	-55.64	-13.00	Horizontal
6829.23	-59.56	6.19	-10.93	-54.82	-13.00	Horizontal
10010.71	-51.22	7.96	-12.40	-46.78	-13.00	Horizontal
11551.80	-57.42	8.56	-12.41	-53.57	-13.00	Horizontal

**LTE Band 7, 5 MHz, 16QAM, Channel 21100, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
5070.20	-52.72	5.21	-9.74	-48.19	-13.00	Horizontal
6807.74	-60.49	6.16	-10.91	-55.74	-13.00	Vertical
8079.92	-60.62	6.94	-11.95	-55.61	-13.00	Horizontal
10140.85	-51.48	7.92	-12.43	-46.97	-13.00	Horizontal
12001.66	-57.22	8.73	-12.50	-53.45	-13.00	Horizontal
13918.49	-53.11	9.19	-13.97	-48.33	-13.00	Horizontal

**LTE Band 7, 5 MHz, 16QAM, Channel 21425, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
3495.24	-62.50	4.28	-7.89	-58.89	-13.00	Horizontal
4914.97	-58.52	5.12	-9.55	-54.09	-13.00	Vertical
6834.20	-60.54	6.18	-10.93	-55.79	-13.00	Vertical
7671.01	-58.82	6.55	-11.57	-53.80	-13.00	Horizontal
10270.73	-53.88	7.60	-12.45	-49.03	-13.00	Horizontal
13578.39	-52.80	9.22	-13.83	-48.19	-13.00	Vertical

**LTE Band 17, 5MHz, QPSK, Channel 23755, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
3305.18	-61.36	4.18	-7.43	2.15	-60.26	-13.00	Horizontal
4075.13	-60.76	4.83	-8.55	2.15	-59.19	-13.00	Horizontal
4842.88	-59.71	5.11	-9.42	2.15	-57.55	-13.00	Vertical
5720.94	-59.43	5.53	-10.09	2.15	-57.02	-13.00	Horizontal
6489.12	-59.01	5.95	-10.59	2.15	-56.52	-13.00	Vertical
7177.14	-61.12	6.37	-11.21	2.15	-58.43	-13.00	Vertical

**LTE Band 17, 5MHz, QPSK, Channel 23790, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
3562.30	-61.45	4.33	-7.97	2.15	-59.96	-13.00	Vertical
4252.92	-61.54	4.79	-8.65	2.15	-59.83	-13.00	Horizontal
4971.33	-58.09	5.11	-9.65	2.15	-55.70	-13.00	Horizontal
5674.01	-59.21	5.48	-10.07	2.15	-56.77	-13.00	Vertical
6370.07	-59.37	5.83	-10.50	2.15	-56.85	-13.00	Horizontal
7093.21	-58.93	6.44	-11.16	2.15	-56.36	-13.00	Vertical

**LTE Band 17, 5MHz, QPSK, Channel 23825, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
3624.15	-58.84	4.38	-8.05	2.15	-57.32	-13.00	Horizontal
4360.87	-61.20	4.88	-8.72	2.15	-59.51	-13.00	Vertical
5077.87	-60.24	5.20	-9.75	2.15	-57.84	-13.00	Vertical
5796.35	-61.09	5.67	-10.12	2.15	-58.79	-13.00	Horizontal
6521.63	-59.42	6.03	-10.62	2.15	-56.98	-13.00	Vertical
7242.56	-60.05	6.40	-11.25	2.15	-57.35	-13.00	Horizontal

**LTE Band 17, 5MHz, 16QAM, Channel 23755, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
3309.60	-62.12	4.16	-7.44	2.15	-60.99	-13.00	Horizontal
4082.07	-61.73	4.79	-8.55	2.15	-60.12	-13.00	Vertical
4817.87	-60.62	5.13	-9.37	2.15	-58.53	-13.00	Vertical
5598.80	-61.46	5.43	-10.04	2.15	-59.00	-13.00	Horizontal
6335.49	-58.66	5.84	-10.47	2.15	-56.18	-13.00	Vertical
7089.01	-60.93	6.46	-11.15	2.15	-58.39	-13.00	Vertical

**LTE Band 17, 5MHz, 16QAM, Channel 23790, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
3586.97	-59.97	4.37	-8.00	2.15	-58.49	-13.00	Vertical
4265.39	-62.25	4.79	-8.66	2.15	-60.53	-13.00	Vertical
4969.05	-60.06	5.11	-9.64	2.15	-57.68	-13.00	Horizontal
5655.97	-60.17	5.45	-10.06	2.15	-57.71	-13.00	Horizontal
6342.65	-60.61	5.83	-10.47	2.15	-58.12	-13.00	Horizontal
7107.96	-61.12	6.37	-11.16	2.15	-58.48	-13.00	Vertical

**LTE Band 17, 5MHz, 16QAM, Channel 23825, RB=1, RB position=middle.**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
3641.00	-60.67	4.38	-8.07	2.15	-59.13	-13.00	Vertical
4480.73	-61.88	4.88	-8.79	2.15	-60.12	-13.00	Horizontal
5174.20	-61.73	5.20	-9.80	2.15	-59.28	-13.00	Horizontal
5912.88	-60.50	5.60	-10.17	2.15	-58.08	-13.00	Horizontal
6610.24	-60.14	6.10	-10.71	2.15	-57.68	-13.00	Vertical
7282.21	-60.44	6.46	-11.27	2.15	-57.78	-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 2/4/7/17 traffic mode which is the worst case of conducted emission measurement.

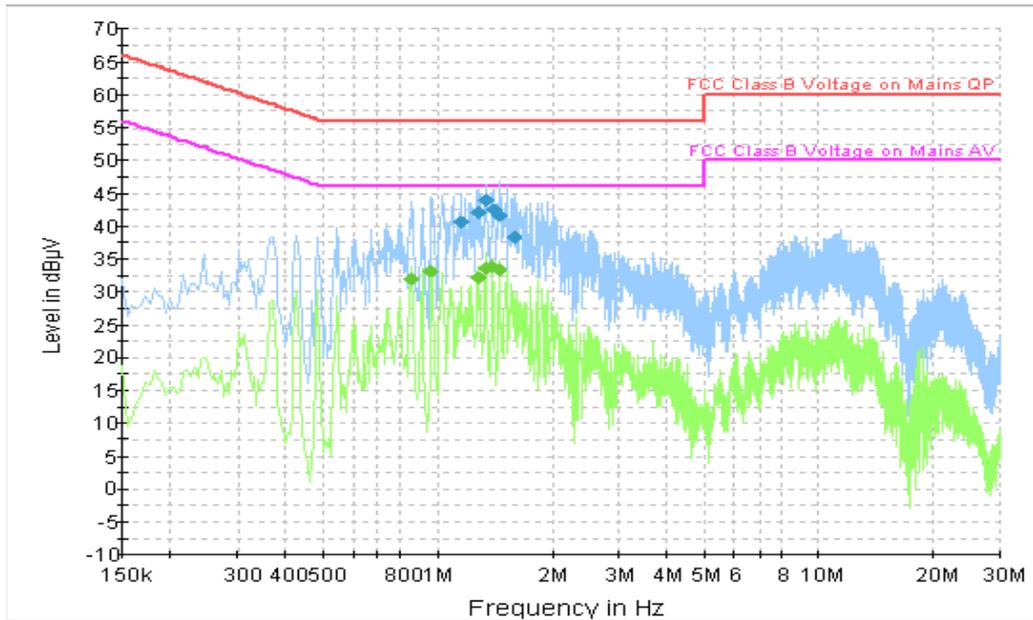
For test layout photo, please refer to Pic.2 in Annex B.

#### **A.3.1 Limit**

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	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.

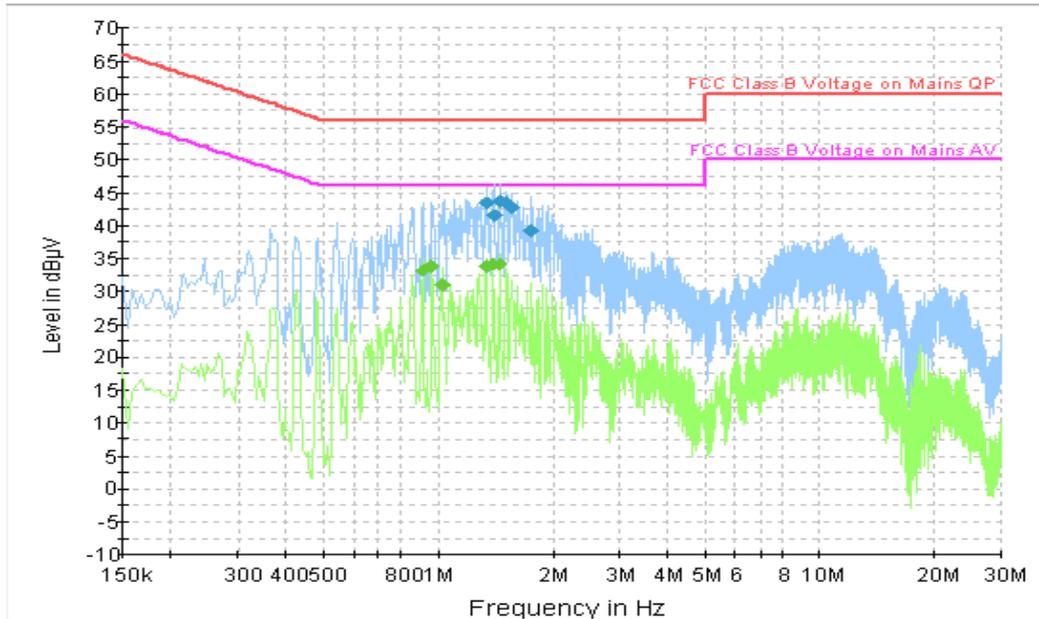
**Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.158000	40.6	GND	L1	9.7	15.4	56.0
1.284000	42.0	GND	L1	9.7	14.0	56.0
1.342500	43.9	GND	L1	9.7	12.1	56.0
1.405500	42.5	GND	L1	9.7	13.5	56.0
1.464000	41.7	GND	L1	9.7	14.3	56.0
1.590000	38.2	GND	L1	9.7	17.8	56.0

**Final Result 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.852000	31.8	GND	L1	9.8	14.2	46.0
0.969000	33.2	GND	L1	9.7	12.8	46.0
1.284000	32.1	GND	L1	9.7	13.9	46.0
1.342500	33.6	GND	L1	9.7	12.4	46.0
1.392000	33.8	GND	L1	9.7	12.2	46.0
1.455000	33.3	GND	L1	9.7	12.7	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.

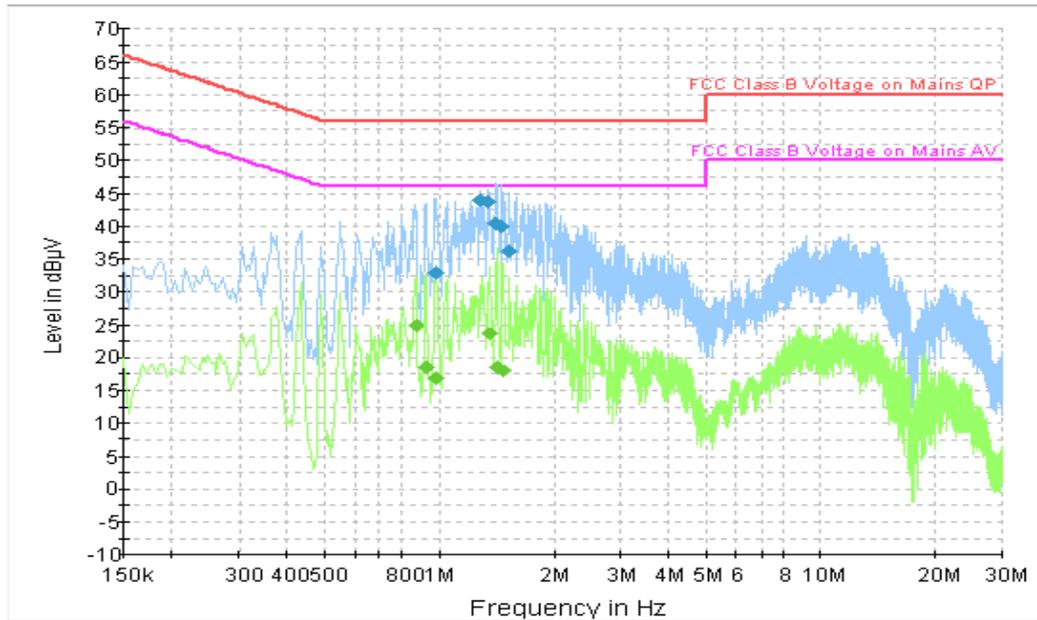
**Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.342500	43.4	GND	L1	9.7	12.6	56.0
1.405500	41.5	GND	L1	9.7	14.5	56.0
1.450500	43.8	GND	L1	9.7	12.2	56.0
1.509000	43.6	GND	L1	9.7	12.4	56.0
1.563000	42.8	GND	L1	9.7	13.2	56.0
1.765500	39.3	GND	L1	9.7	16.7	56.0

**Final Result 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.910500	33.3	GND	L1	9.7	12.7	46.0
0.969000	33.8	GND	L1	9.7	12.2	46.0
1.027500	30.9	GND	L1	9.7	15.1	46.0
1.342500	33.7	GND	L1	9.7	12.3	46.0
1.392000	34.1	GND	L1	9.7	11.9	46.0
1.450500	34.2	GND	L1	9.7	11.8	46.0

**LTE Band 5, 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.

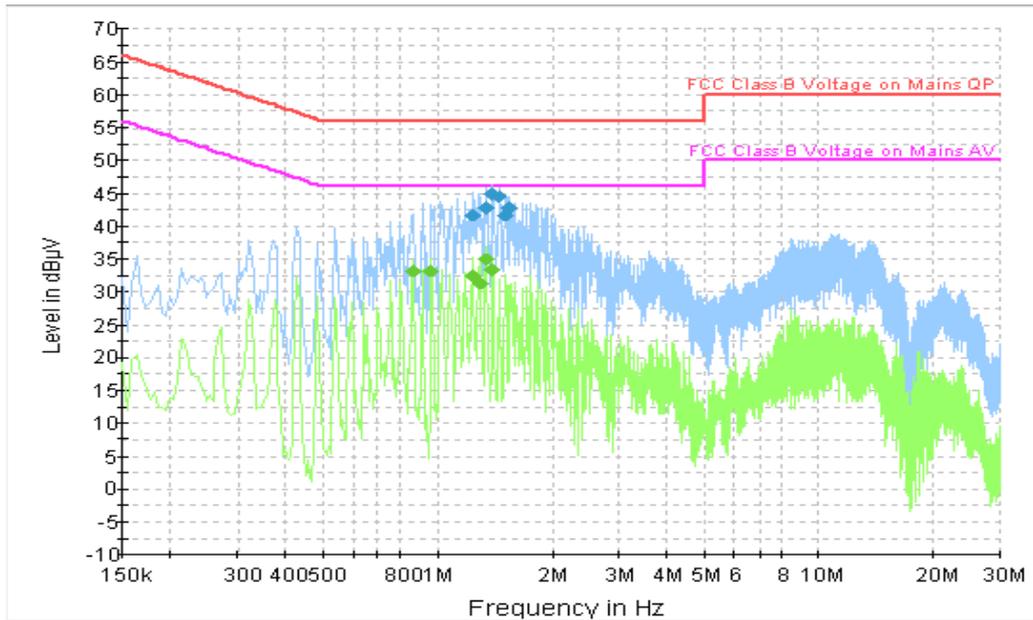
**Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.987000	32.7	GND	L1	9.7	23.3	56.0
1.288500	43.9	GND	L1	9.7	12.1	56.0
1.347000	43.8	GND	L1	9.7	12.2	56.0
1.410000	40.4	GND	L1	9.7	15.6	56.0
1.468500	40.1	GND	L1	9.7	15.9	56.0
1.531500	36.2	GND	L1	9.7	19.8	56.0

**Final Result 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.870000	24.9	GND	L1	9.8	21.1	46.0
0.928500	18.6	GND	L1	9.7	27.4	46.0
0.987000	16.8	GND	L1	9.7	29.2	46.0
1.360500	23.5	GND	L1	9.7	22.5	46.0
1.419000	18.5	GND	L1	9.7	27.5	46.0
1.477500	18.0	GND	L1	9.7	28.0	46.0

**LTE Band 7, 5 MHz bandwidth**



IF bandwidth 9 kHz

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

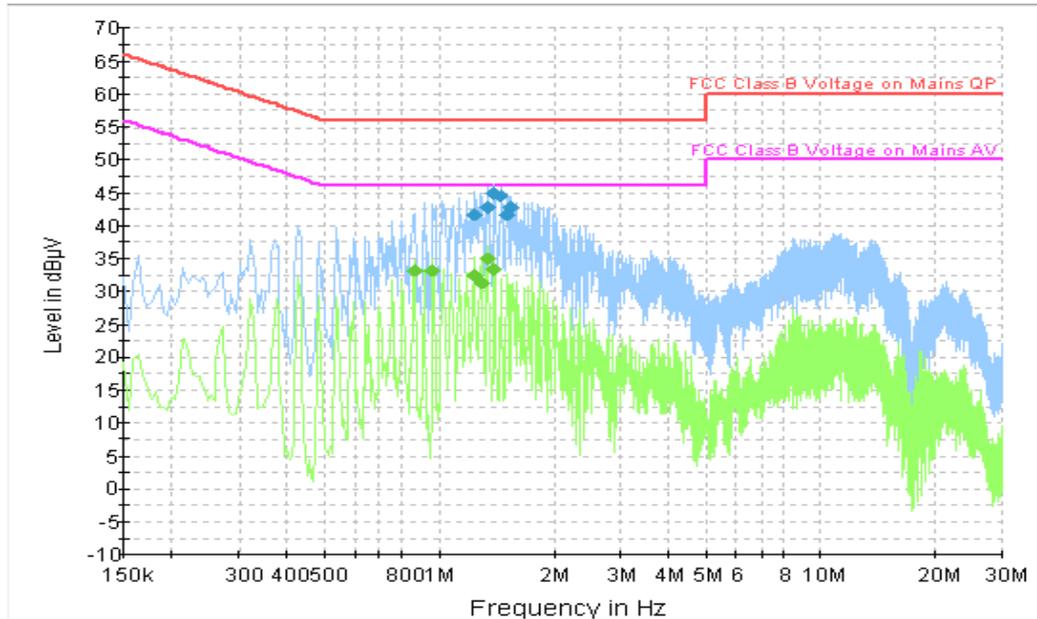
**Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.234500	41.7	GND	L1	9.7	14.3	56.0
1.342500	42.8	GND	L1	9.7	13.2	56.0
1.392000	44.9	GND	L1	9.7	11.1	56.0
1.446000	44.5	GND	L1	9.7	11.5	56.0
1.504500	41.8	GND	L1	9.7	14.2	56.0
1.554000	42.9	GND	L1	9.7	13.1	56.0

**Final Result 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.861000	33.2	GND	L1	9.8	12.8	46.0
0.969000	33.3	GND	L1	9.7	12.7	46.0
1.234500	32.4	GND	L1	9.7	13.6	46.0
1.293000	31.4	GND	L1	9.7	14.6	46.0
1.342500	34.8	GND	L1	9.7	11.2	46.0
1.392000	33.4	GND	L1	9.7	12.6	46.0

**LTE Band 17, 5 MHz bandwidth**



**Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.234500	41.7	GND	L1	9.7	14.3	56.0
1.342500	42.8	GND	L1	9.7	13.2	56.0
1.392000	44.9	GND	L1	9.7	11.1	56.0
1.446000	44.5	GND	L1	9.7	11.5	56.0
1.504500	41.8	GND	L1	9.7	14.2	56.0
1.554000	42.9	GND	L1	9.7	13.1	56.0

**Final Result 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.861000	33.2	GND	L1	9.8	12.8	46.0
0.969000	33.3	GND	L1	9.7	12.7	46.0
1.234500	32.4	GND	L1	9.7	13.6	46.0
1.293000	31.4	GND	L1	9.7	14.6	46.0
1.342500	34.8	GND	L1	9.7	11.2	46.0
1.392000	33.4	GND	L1	9.7	12.6	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, 22.355, 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°C.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 2/4/5/7/17, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. 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°C.
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 °C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C 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 3.6VDC and 4.2VDC, with a nominal voltage of 3.8VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance 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 °C

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

##### Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.8	2	24	0.001	0.013
4.2	-3	21	0.002	0.011
3.6	-2	17	0.001	0.009

##### Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	-2	24	0.001	0.013
40°	2	17	0.001	0.009
30°	3	17	0.001	0.009
20°	-1	21	0.001	0.011
10°	-3	21	0.002	0.011
0°	1	24	0.001	0.013
- 10°	3	22	0.002	0.012
- 20°	-2	22	0.001	0.012
- 30°	-2	13	0.001	0.007

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

##### Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.8	4	20	0.003	0.012
4.2	4	18	0.002	0.010
3.6	-6	23	0.004	0.013

##### Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	2	21	0.001	0.012
40°	-7	21	0.004	0.012
30°	-4	20	0.002	0.012
20°	3	27	0.002	0.015
10°	1	18	0.000	0.010
0°	-3	21	0.002	0.012
- 10°	3	20	0.002	0.012
- 20°	2	24	0.001	0.014
- 30°	4	19	0.002	0.011

**LTE Band 5, 1.4MHz bandwidth (worst case of all bandwidths)**

**Frequency Error vs Voltage**

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.8	-1	20	0.001	0.023
4.2	0	18	0.000	0.021
3.6	-1	18	0.001	0.022

**Frequency Error vs Temperature**

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	0	19	0.000	0.022
40°	1	17	0.001	0.020
30°	-4	17	0.005	0.020
20°	2	18	0.003	0.021
10°	3	18	0.003	0.021
0°	-2	17	0.003	0.020
- 10°	0	18	0.000	0.021
- 20°	-3	17	0.004	0.020
- 30°	1	19	0.001	0.023

**LTE Band 7, 5 MHz bandwidth (worst case of all bandwidths)**

**Frequency Error vs Voltage**

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.8	13	-4	0.005	0.002
4.2	-9	-11	0.004	0.005
3.6	-2	-4	0.001	0.002

**Frequency Error vs Temperature**

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	7	-3	0.003	0.001
40°	0	-1	0.000	0.000
30°	-30	-7	0.012	0.003
20°	4	-6	0.002	0.002
10°	4	7	0.001	0.003
0°	-2	-7	0.001	0.003
- 10°	9	-5	0.004	0.002
- 20°	5	7	0.002	0.003
- 30°	-4	-3	0.002	0.001

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

**Frequency Error vs Voltage**

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.8	2	-3	0.003	0.004
4.2	1	-1	0.001	0.001
3.6	2	-3	0.002	0.004

**Frequency Error vs Temperature**

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	2	-2	0.002	0.003
40°	41	-3	0.057	0.004
30°	2	-4	0.003	0.005
20°	0	-3	0.001	0.005
10°	1	-3	0.002	0.005
0°	2	-2	0.003	0.003
- 10°	0	-1	0.000	0.002
- 20°	-2	-4	0.003	0.005
- 30°	-2	-4	0.003	0.005

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

## A.5 OCCUPIED BANDWIDTH

### Reference

FCC: CFR Part 2.1049(h)(i)

### A.5.1 Occupied Bandwidth Measurement Results

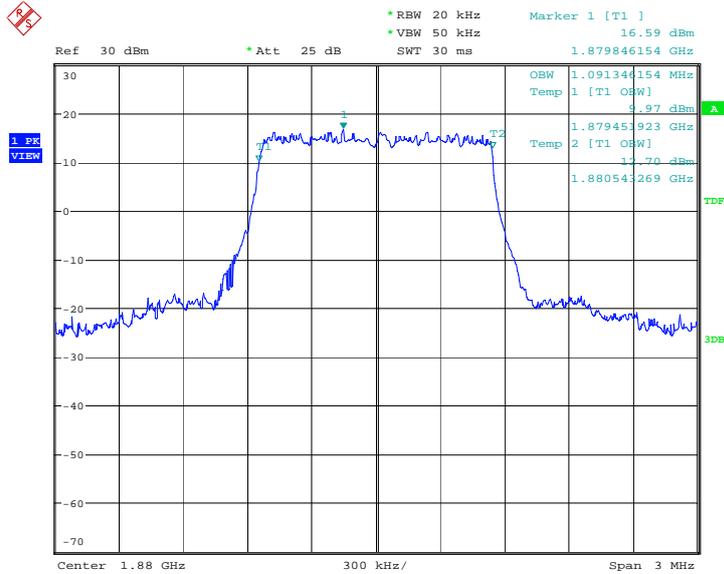
Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the mid frequencies of the LTE bands 2, 4, 5, 7 and 17. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

#### A.5.1.1 Measurement results per FCC rules

##### LTE band 2, 1.4MHz (99% BW)

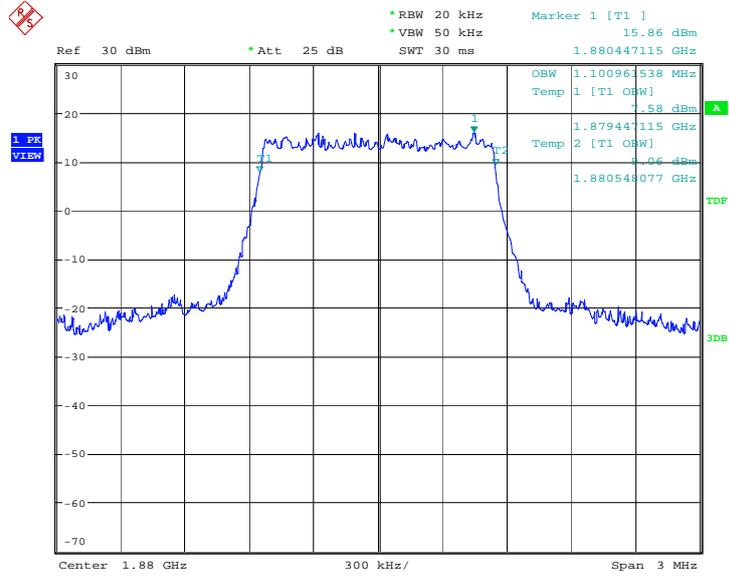
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1880.0	1091.346	1100.962

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



Date: 23.JUL.2014 13:54:56

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

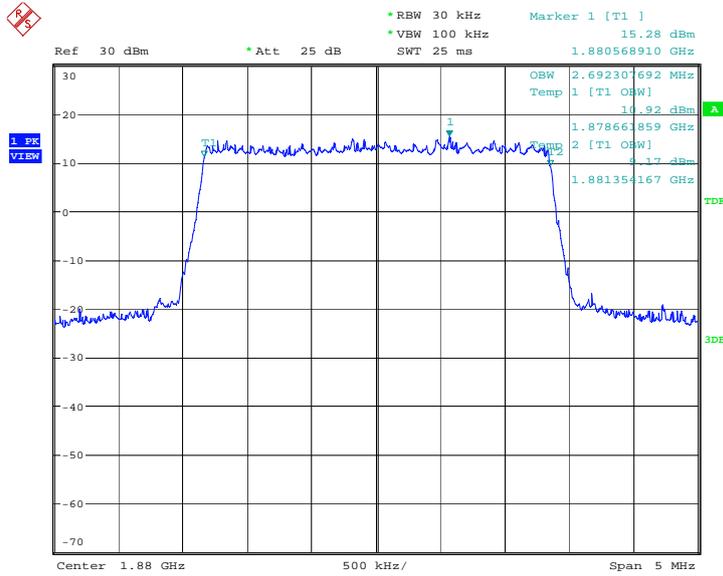


Date: 23.JUL.2014 13:55:10

**LTE band 2, 3MHz (99% BW)**

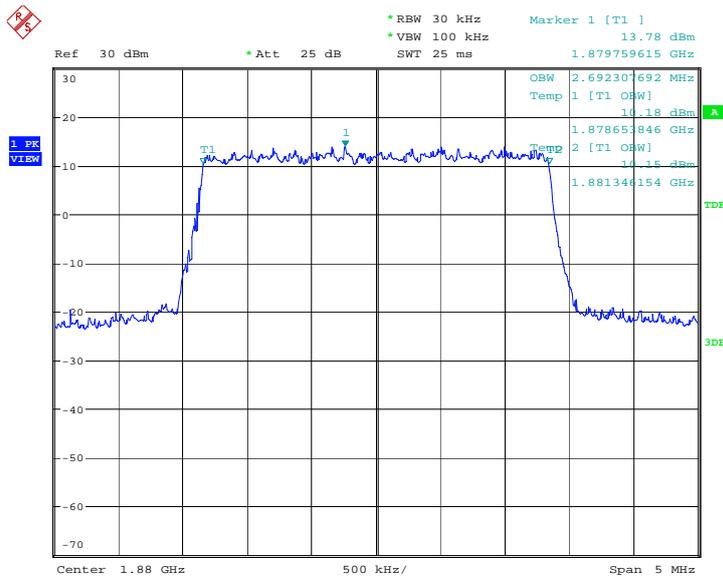
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1880.0	2692.308	2692.308

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



Date: 23.JUL.2014 14:05:12

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

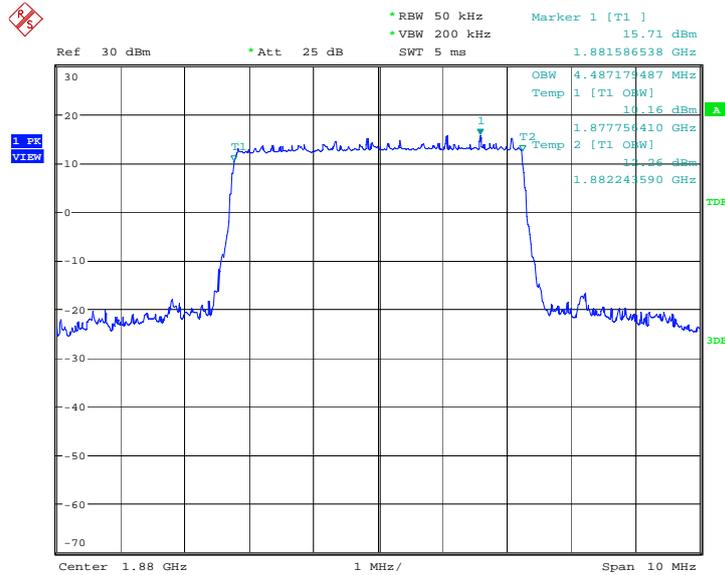


Date: 23.JUL.2014 14:05:26

**LTE band 2, 5MHz (99% BW)**

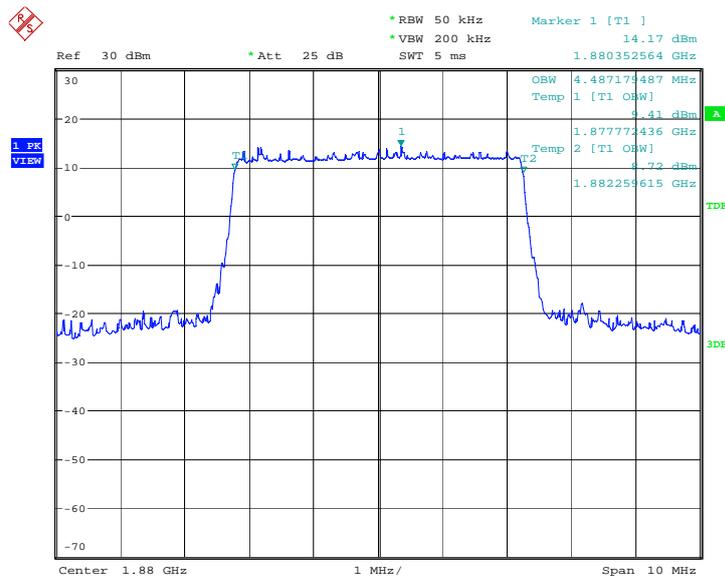
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1880.0	4487.179	4487.179

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



Date: 23.JUL.2014 14:14:26

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

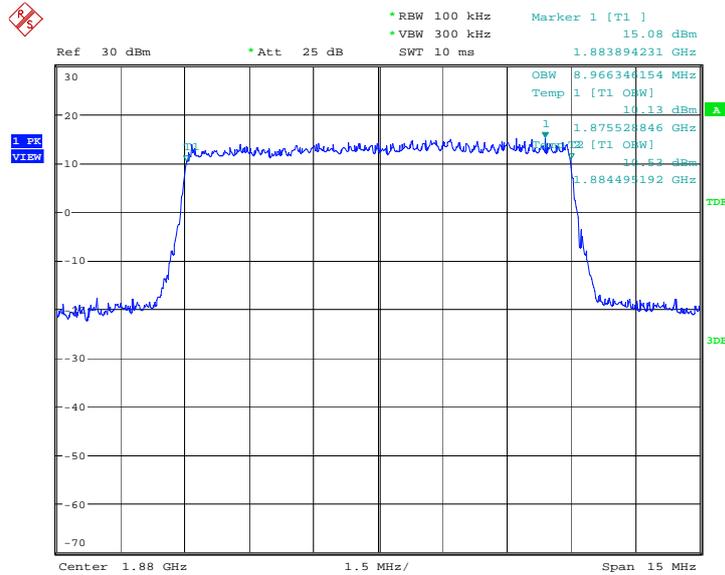


Date: 23.JUL.2014 14:14:40

**LTE band 2, 10MHz (99% BW)**

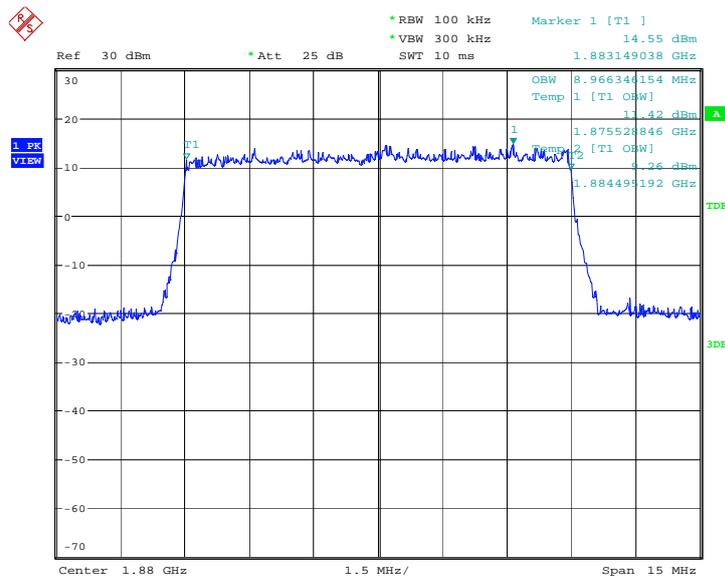
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1880.0	8966.346	8966.346

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



Date: 23.JUL.2014 14:23:41

**LTE band 2, 10MHz Bandwidth, 16QAM (99% BW)**

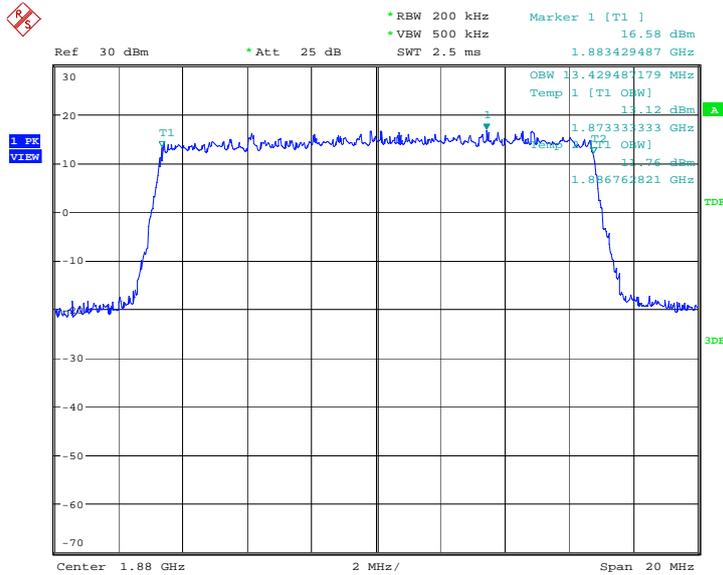


Date: 23.JUL.2014 14:23:55

**LTE band 2, 15MHz (99% BW)**

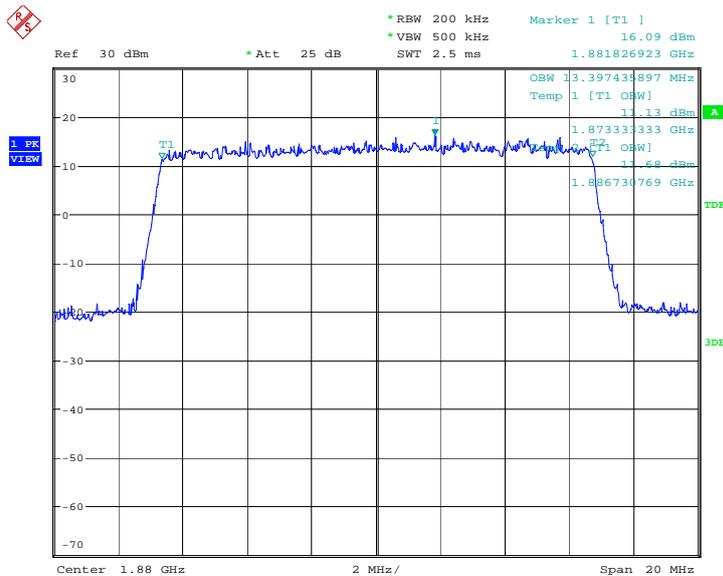
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1880.0	13429.487	13397.436

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



Date: 23.JUL.2014 14:32:00

**LTE band 2, 15MHz Bandwidth, 16QAM (99% BW)**

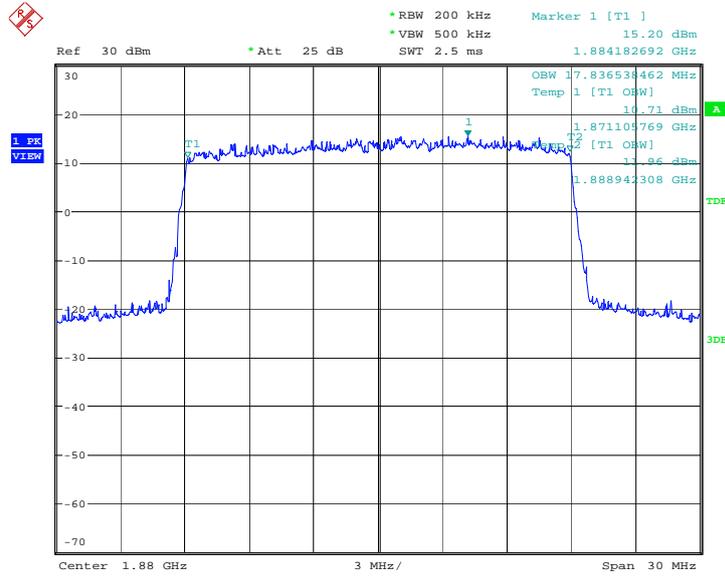


Date: 23.JUL.2014 14:32:14

**LTE band 2, 20MHz (99% BW)**

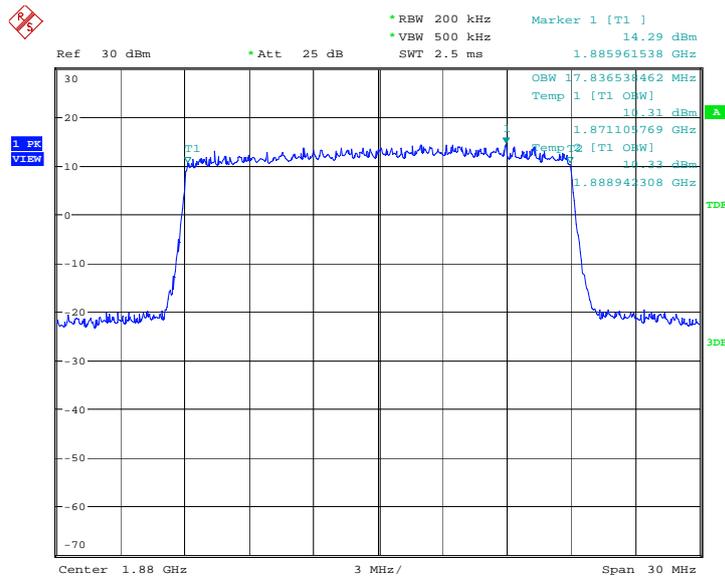
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1880.0	17836.538	17836.538

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



Date: 23.JUL.2014 14:40:21

**LTE band 2, 20MHz Bandwidth, 16QAM (99% BW)**

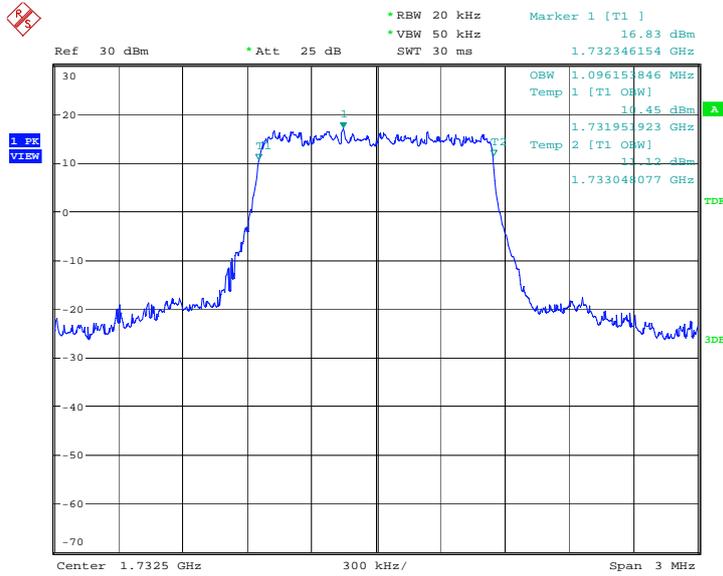


Date: 23.JUL.2014 14:40:35

**LTE band 4, 1.4MHz (99% BW)**

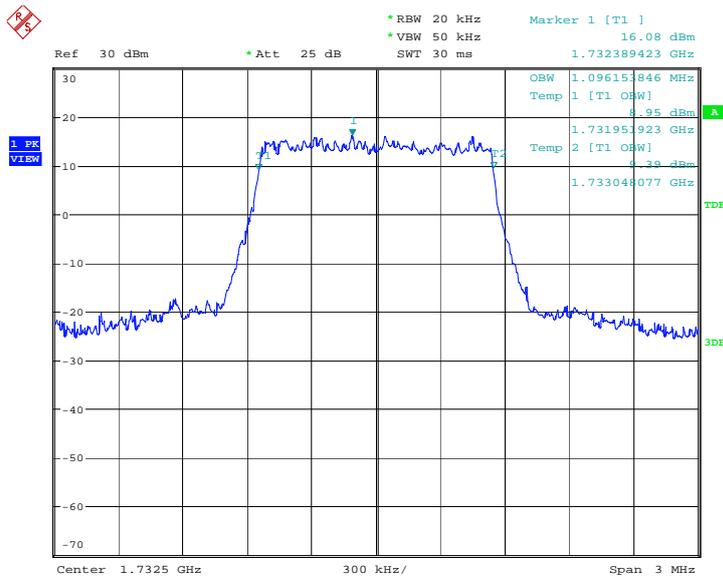
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1732.5	1096.154	1096.154

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



Date: 23.JUL.2014 14:52:15

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

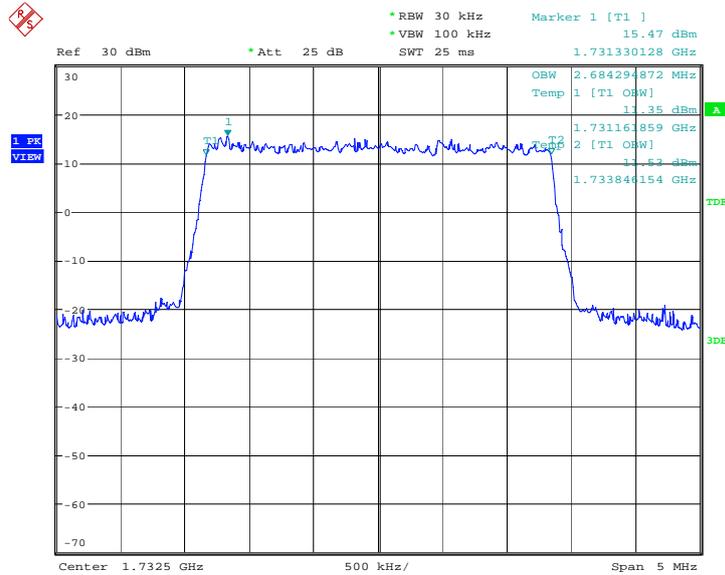


Date: 23.JUL.2014 14:52:29

**LTE band 4, 3MHz (99% BW)**

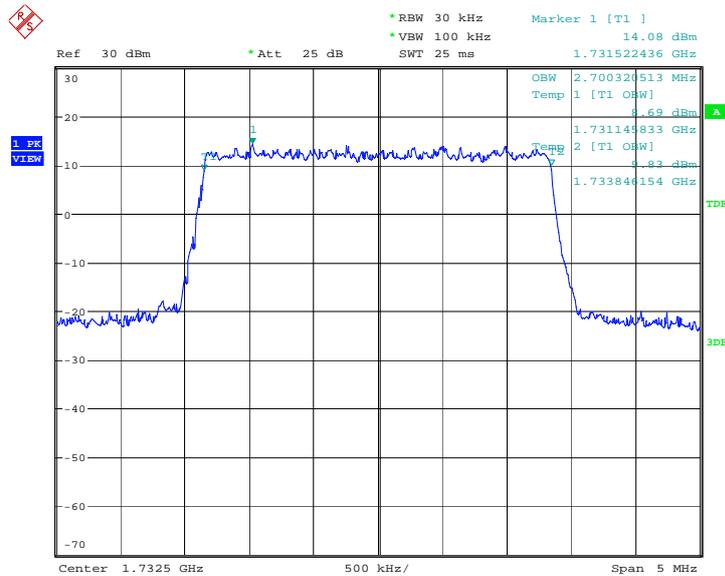
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1732.5	2684.295	2700.321

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



Date: 23.JUL.2014 15:03:02

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

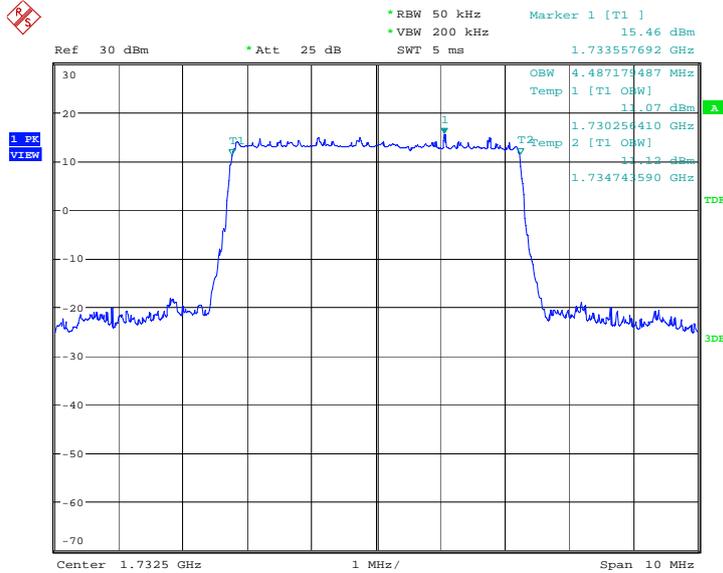


Date: 23.JUL.2014 15:03:16

**LTE band 4, 5MHz (99% BW)**

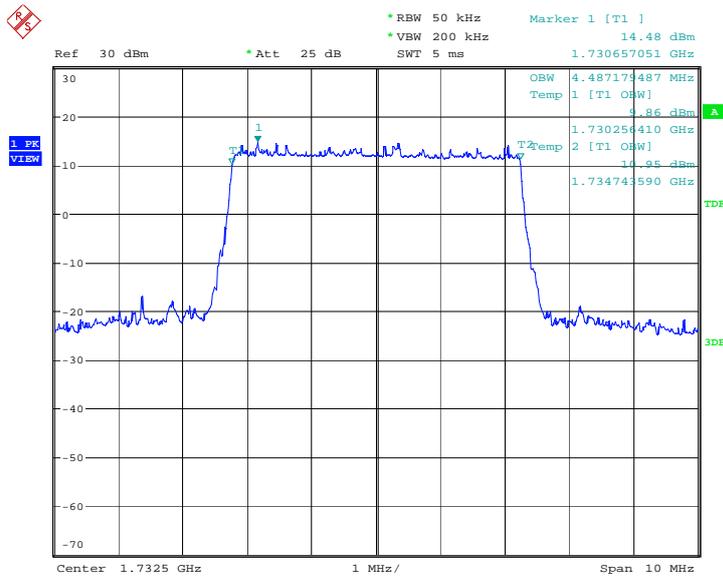
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1732.5	4487.179	4487.179

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



Date: 23.JUL.2014 15:10:44

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

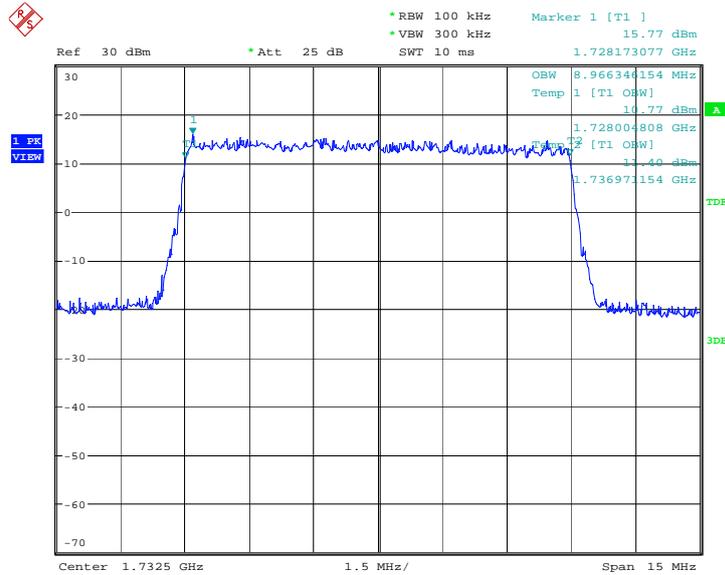


Date: 23.JUL.2014 15:10:58

**LTE band 4, 10MHz (99% BW)**

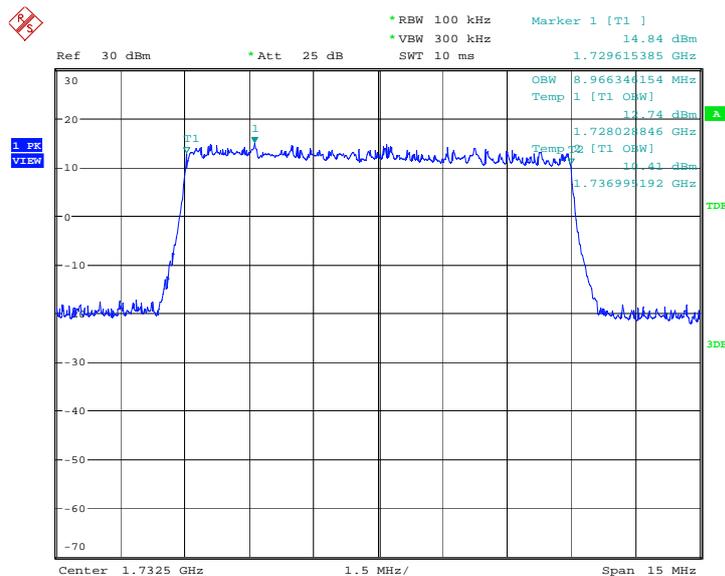
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1732.5	8966.346	8966.346

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



Date: 23.JUL.2014 15:18:56

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

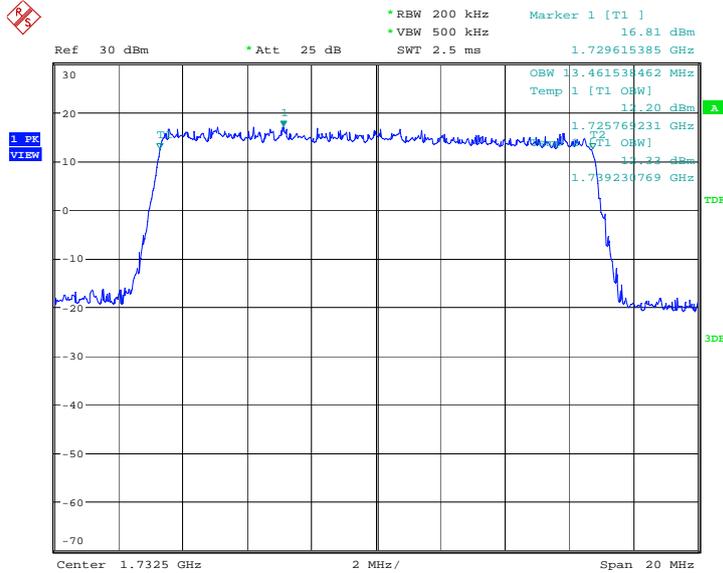


Date: 23.JUL.2014 15:19:10

**LTE band 4, 15MHz (99% BW)**

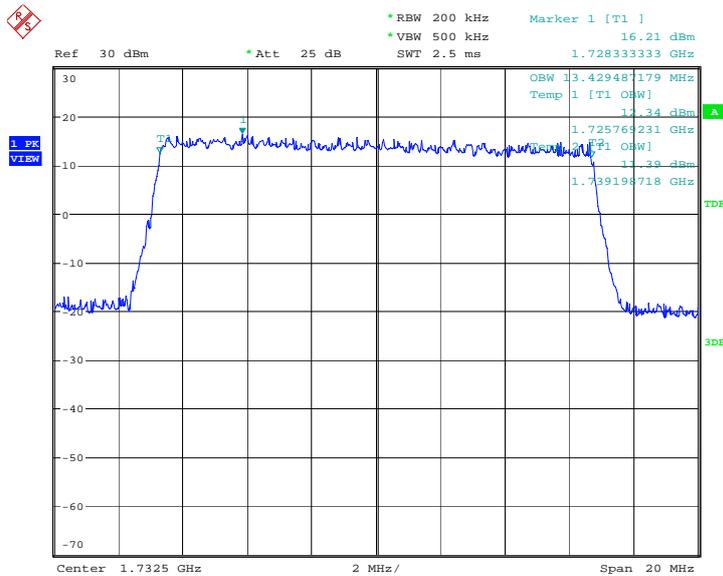
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1732.5	13461.538	13429.487

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



Date: 23.JUL.2014 15:27:14

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

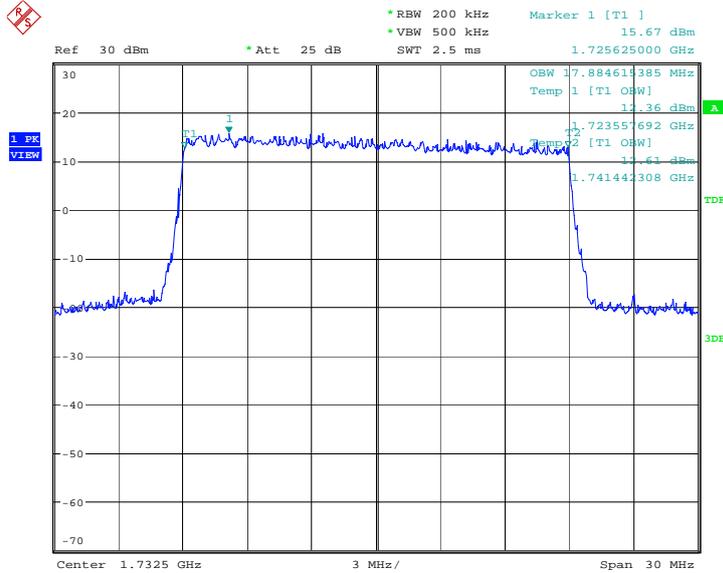


Date: 23.JUL.2014 15:27:28

**LTE band 4, 20MHz (99% BW)**

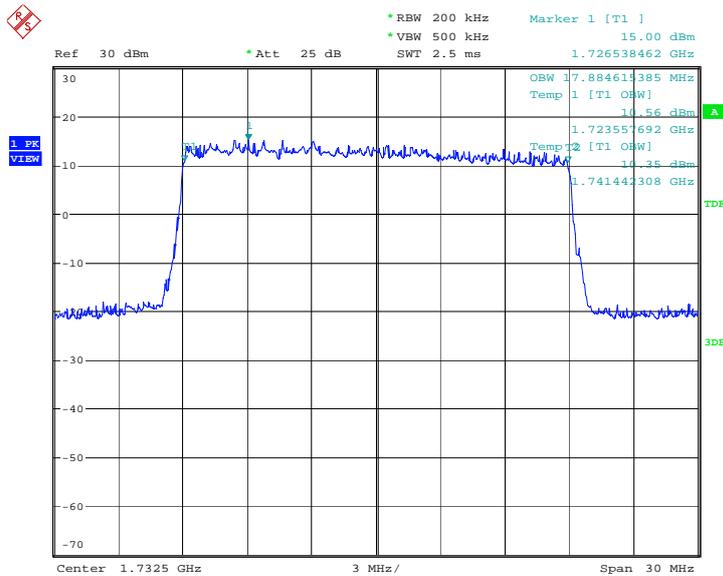
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
1732.5	17884.615	17884.615

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



Date: 23.JUL.2014 15:35:34

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

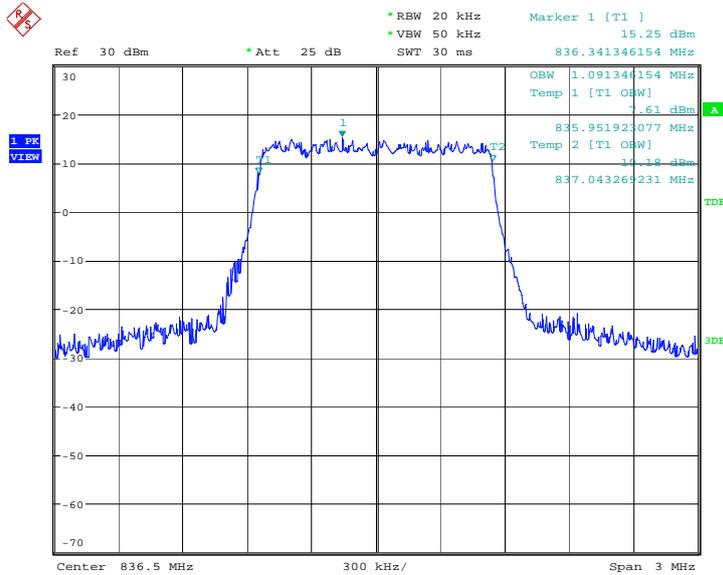


Date: 23.JUL.2014 15:35:47

**LTE band 5, 1.4MHz (99%BW)**

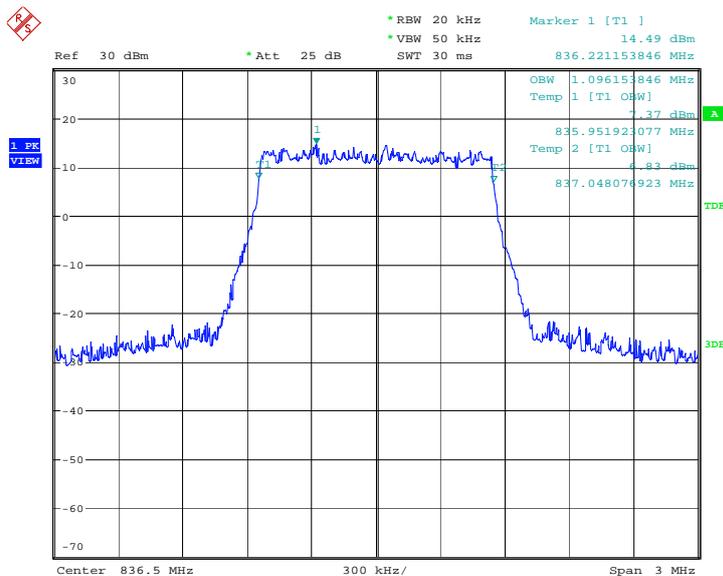
Frequency(MHz)	Occupied Bandwidth (99%)( kHz)	
836.5	QPSK	16QAM
	1091.346	1096.154

**LTE band 5, 1.4MHz Bandwidth, QPSK (99% BW)**



Date: 23.JUL.2014 10:10:21

**LTE band 5, 1.4MHz Bandwidth, 16QAM (99% BW)**

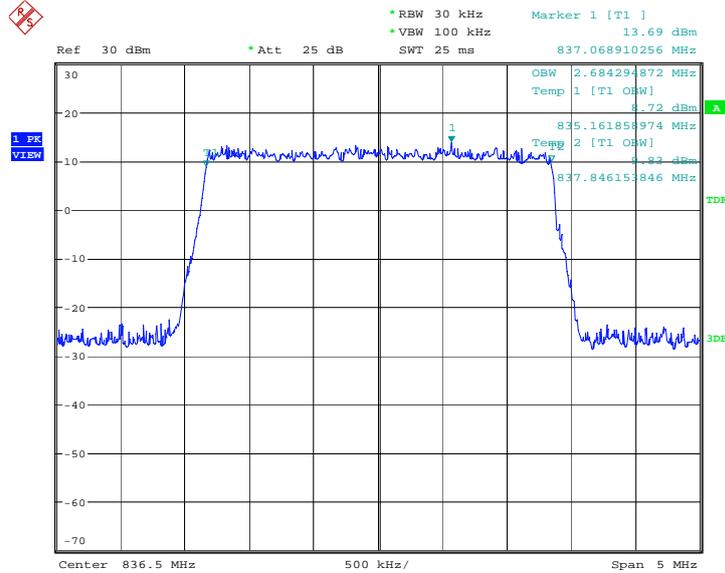


Date: 23.JUL.2014 10:10:35

**LTE band 5, 3MHz (99%BW)**

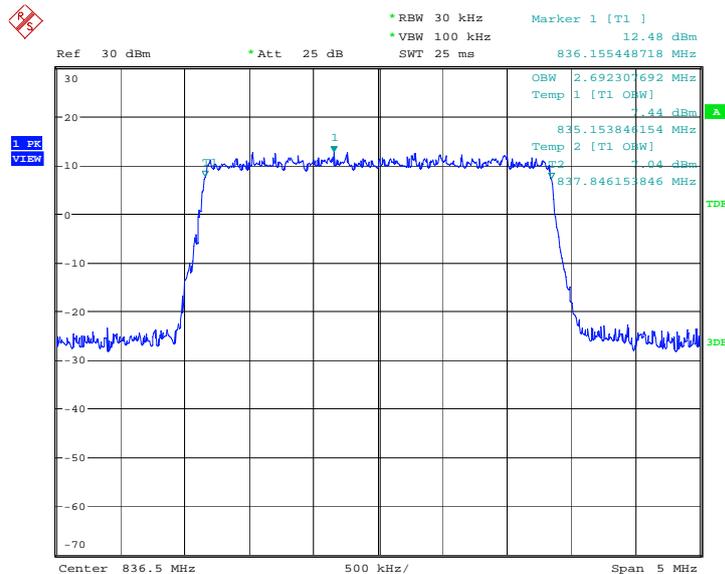
Frequency(MHz)	Occupied Bandwidth (99%)( kHz)	
836.5	QPSK	16QAM
	2684.295	2692.308

**LTE band 5, 3MHz Bandwidth, QPSK (99% BW)**



Date: 23.JUL.2014 10:22:38

**LTE band 5, 3MHz Bandwidth, 16QAM (99% BW)**

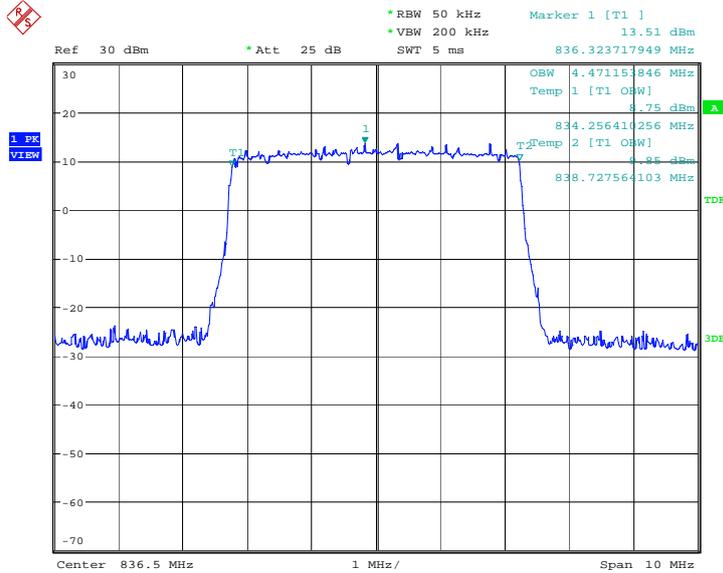


Date: 23.JUL.2014 10:22:52

**LTE band 5, 5MHz (99%BW)**

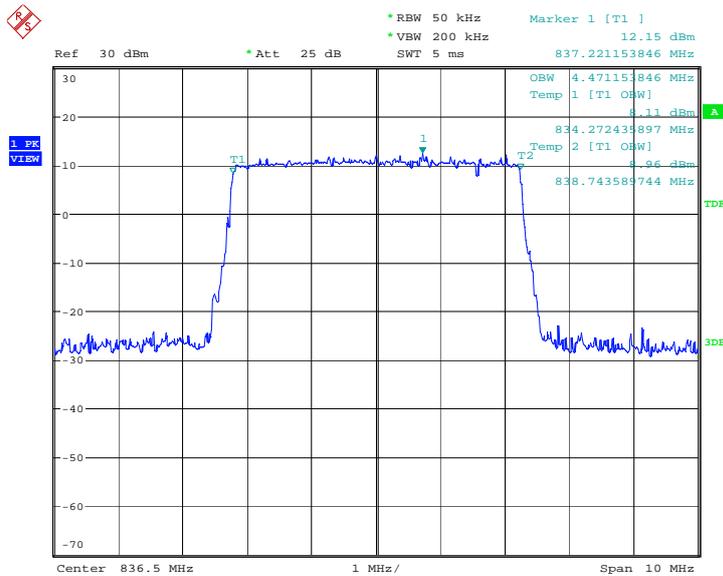
Frequency(MHz)	Occupied Bandwidth (99%)( kHz)	
836.5	QPSK	16QAM
	4471.154	4471.154

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



Date: 23.JUL.2014 10:32:54

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

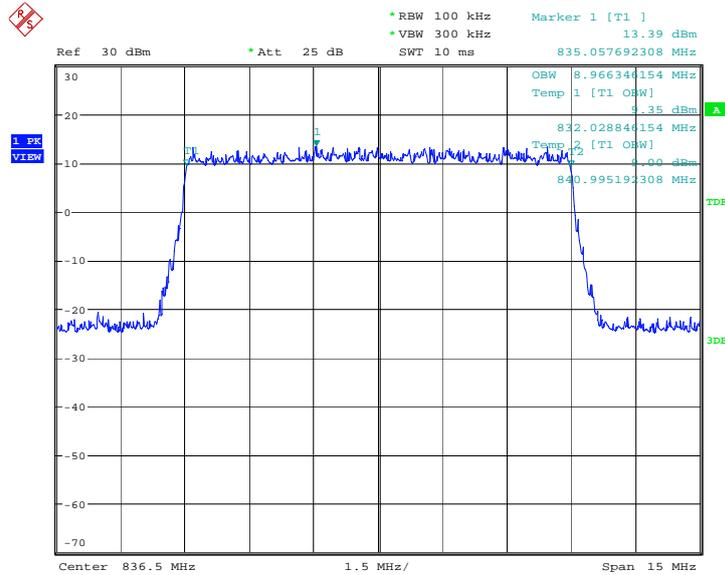


Date: 23.JUL.2014 10:33:08

**LTE band 5, 10MHz (99%BW)**

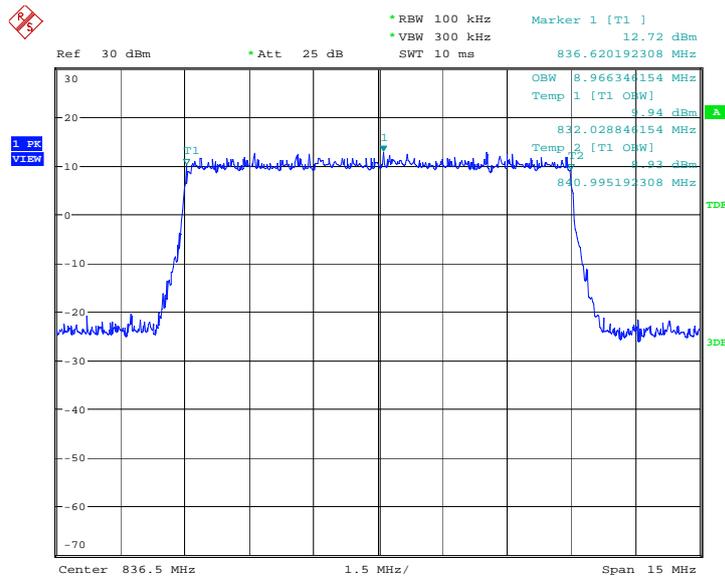
Frequency(MHz)	Occupied Bandwidth (99%)( kHz)	
836.5	QPSK	16QAM
	8966.346	8966.346

**LTE band 5, 10MHz Bandwidth, QPSK (99% BW)**



Date: 23.JUL.2014 10:43:09

**LTE band 5, 10MHz Bandwidth, 16QAM (99% BW)**

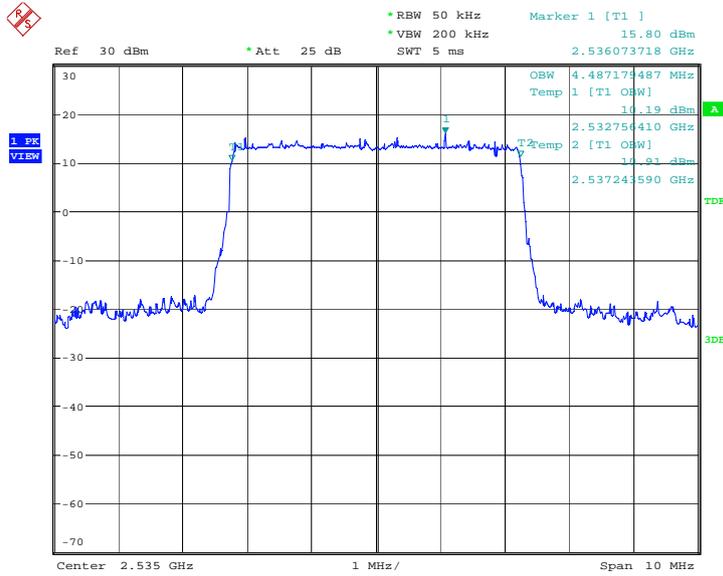


Date: 23.JUL.2014 10:43:23

**LTE band 7, 5MHz (99% BW)**

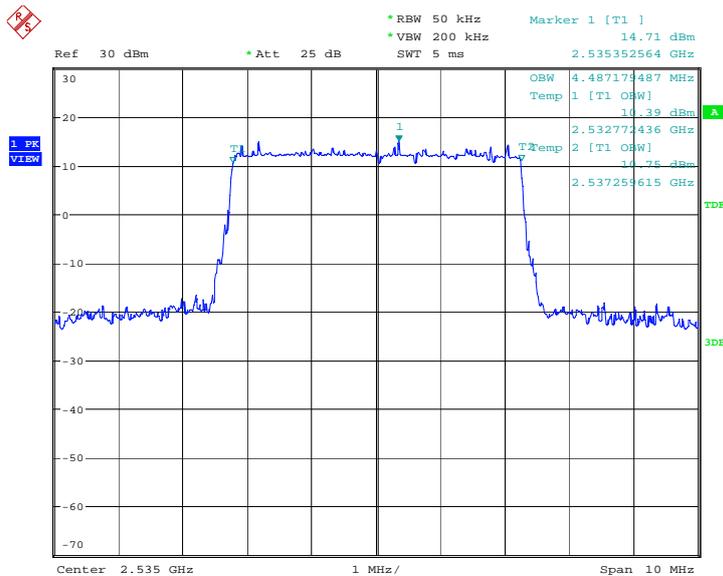
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
2535	4487.179	4487.179

**LTE band 7, 5MHz Bandwidth, QPSK (99% BW)**



Date: 23.JUL.2014 09:20:49

**LTE band 7, 5MHz Bandwidth,16QAM (99% BW)**

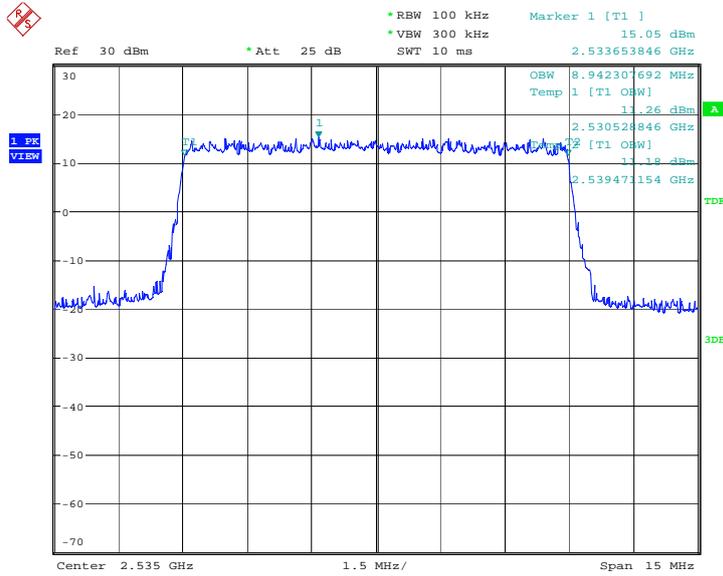


Date: 23.JUL.2014 09:21:03

**LTE band 7, 10MHz (99% BW)**

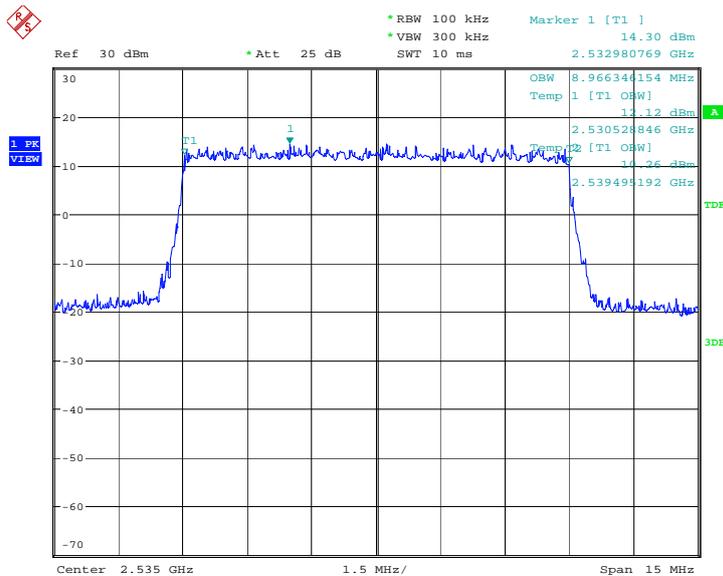
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
2535	8942.307692	8966.346154

**LTE band 7, 10MHz Bandwidth, QPSK (99% BW)**



Date: 23.JUL.2014 09:33:05

**LTE band 7, 10MHz Bandwidth, 16QAM (99% BW)**

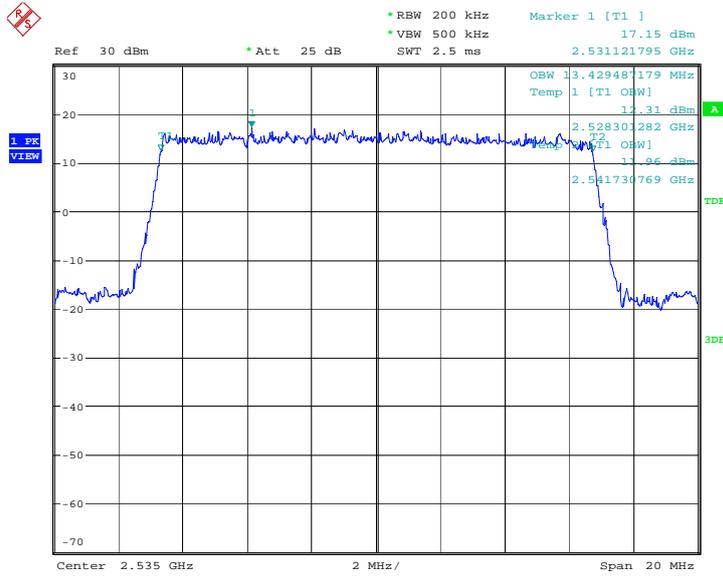


Date: 23.JUL.2014 09:33:18

**LTE band 7, 15MHz (99% BW)**

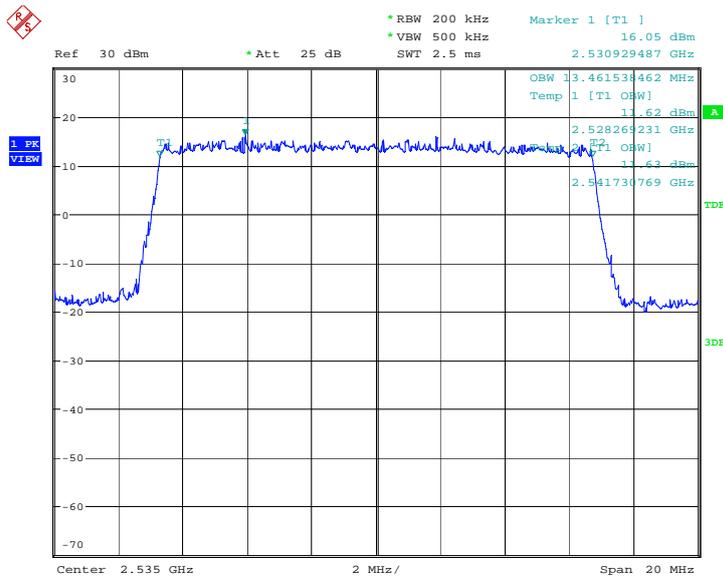
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
2535	13429.487	13461.538

**LTE band 7, 15MHz Bandwidth, QPSK (99% BW)**



Date: 23.JUL.2014 09:42:24

**LTE band 7, 15MHz Bandwidth, 16QAM (99% BW)**

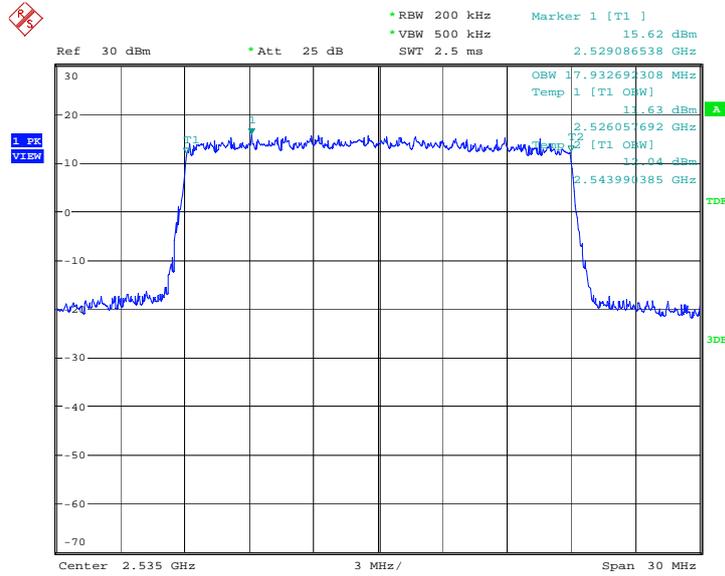


Date: 23.JUL.2014 09:42:38

**LTE band 7, 20MHz (99% BW)**

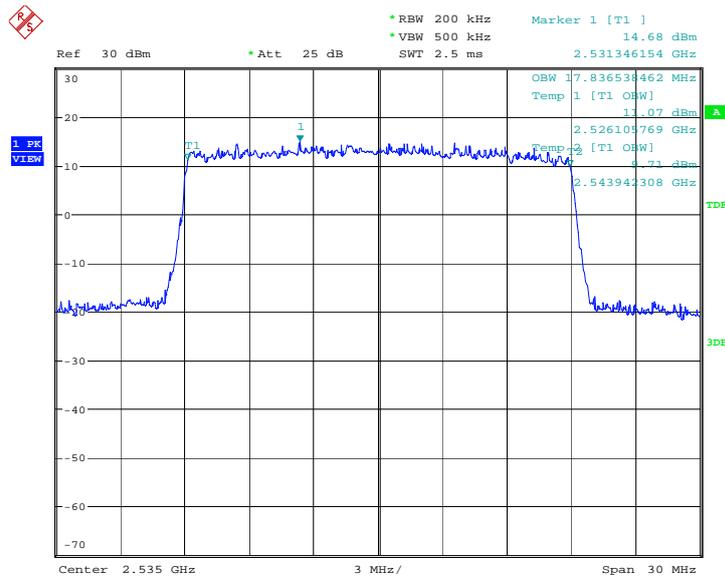
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
2535	17932.692	17836.538

**LTE band 7, 20MHz Bandwidth, QPSK (99% BW)**



Date: 23.JUL.2014 09:53:19

**LTE band 7, 20MHz Bandwidth, 16QAM (99% BW)**

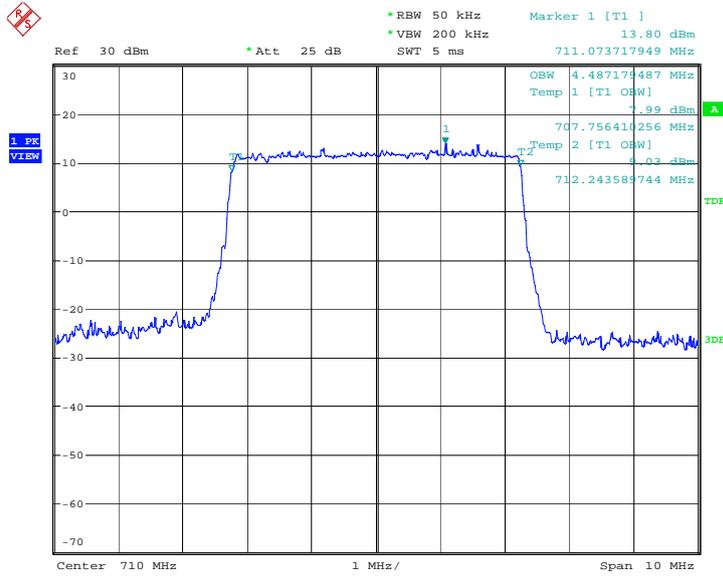


Date: 23.JUL.2014 09:53:33

**LTE band 17, 5MHz (99% BW)**

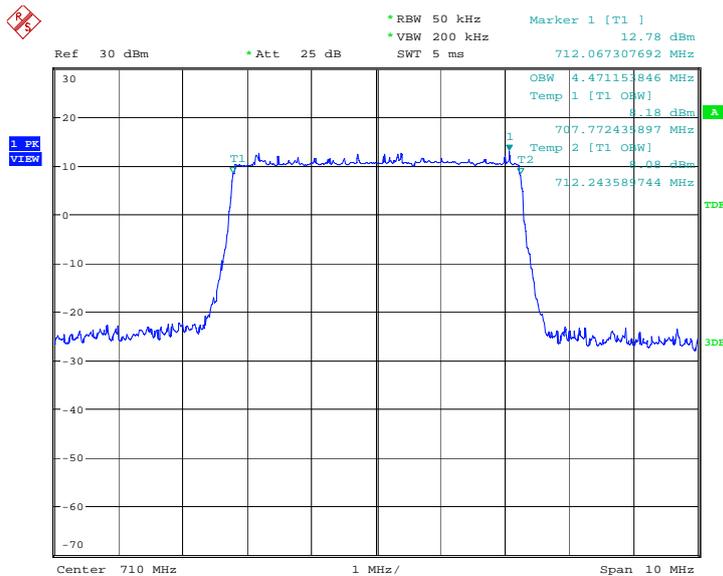
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
710	4487.179	4471.154

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



Date: 23.JUL.2014 15:44:19

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

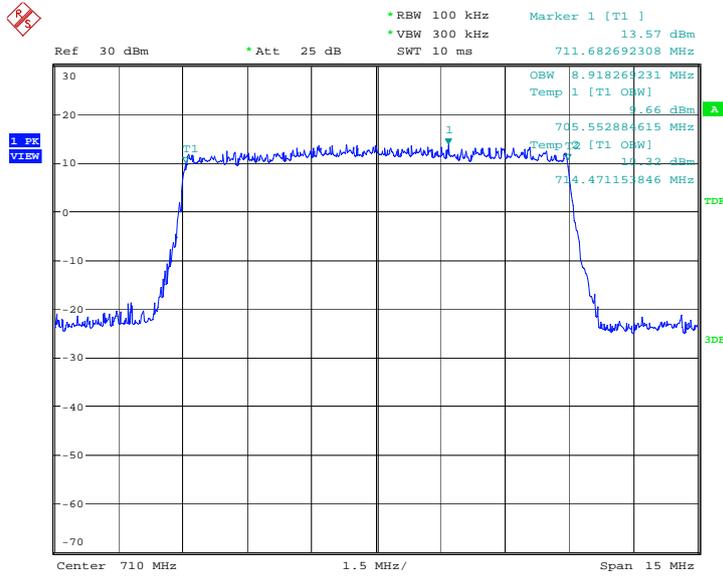


Date: 23.JUL.2014 15:44:32

**LTE band 17, 10MHz (99% BW)**

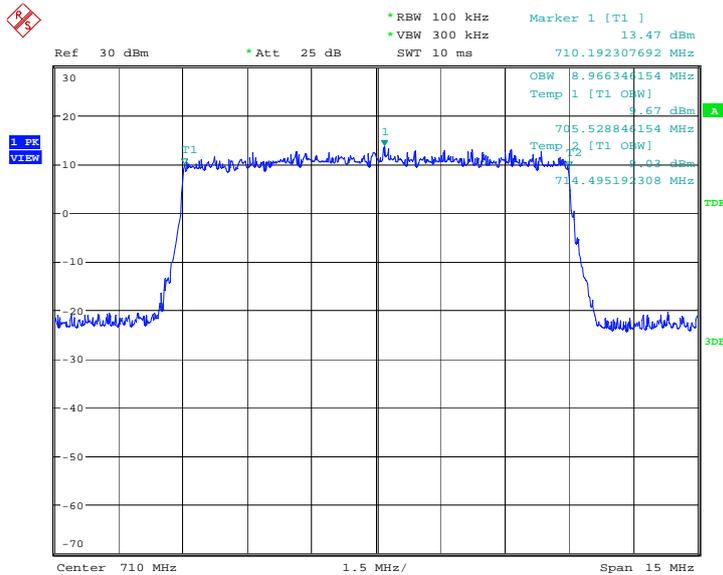
Frequency (MHz)	Occupied Bandwidth (99% BW)( kHz)	
	QPSK	16QAM
710	8918.269	8966.346

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



Date: 23.JUL.2014 16:09:03

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



Date: 23.JUL.2014 16:09:16

## A.6 EMISSION BANDWIDTH

### Reference

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

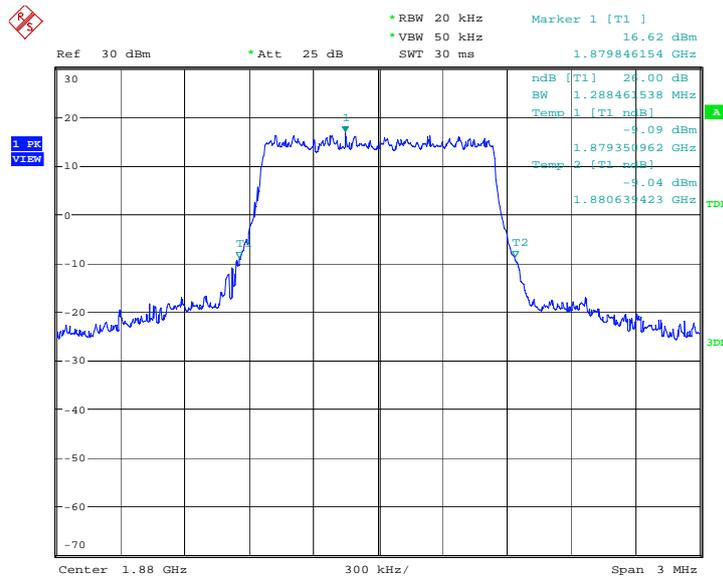
### A.6.1 Emission Bandwidth Measurement Results

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, 5, 7 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)

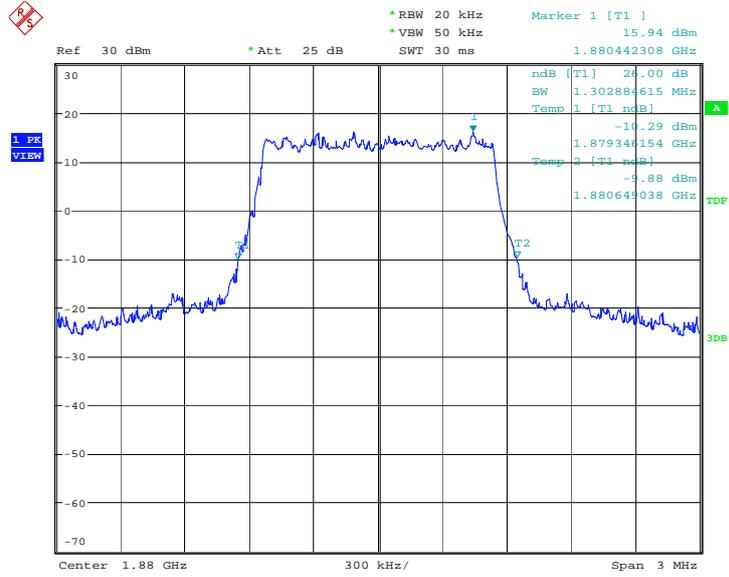
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1880.0	1288.462	1302.885

#### LTE band 2, 1.4MHz Bandwidth, QPSK (100% BW)



Date: 23.JUL.2014 13:57:05

LTE band 2, 1.4MHz Bandwidth, 16QAM (100% BW)

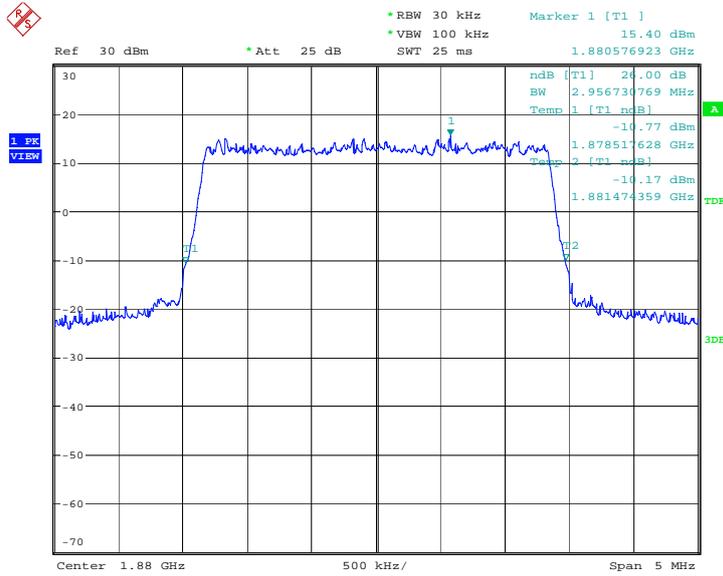


Date: 23.JUL.2014 13:57:21

**LTE band 2, 3MHz (100% BW)**

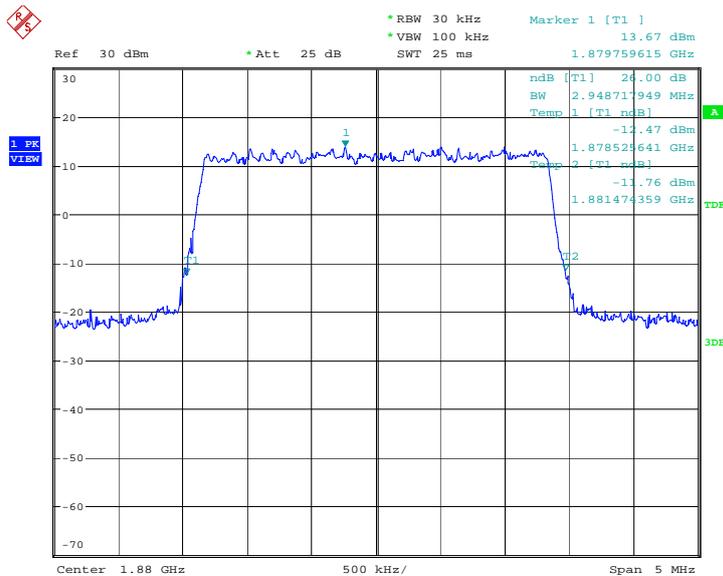
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1880.0	2956.731	2948.718

**LTE band 2, 3MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 14:07:21

**LTE band 2, 3MHz Bandwidth, 16QAM (100% BW)**

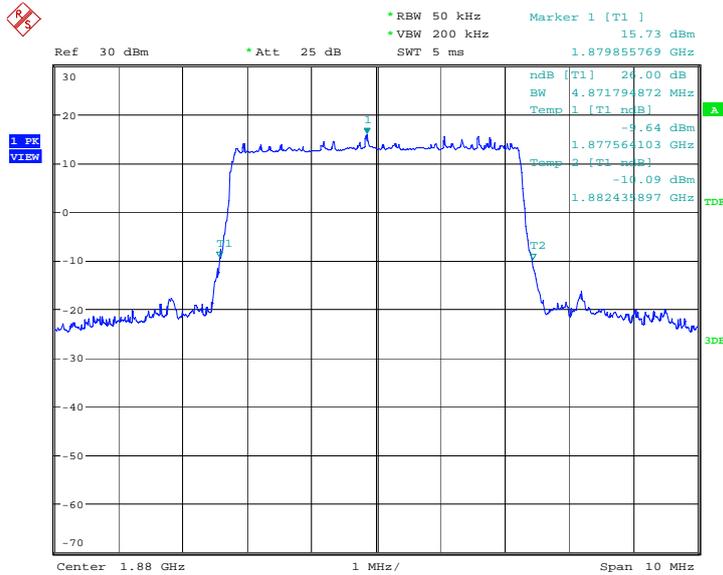


Date: 23.JUL.2014 14:07:36

**LTE band 2, 5MHz (100% BW)**

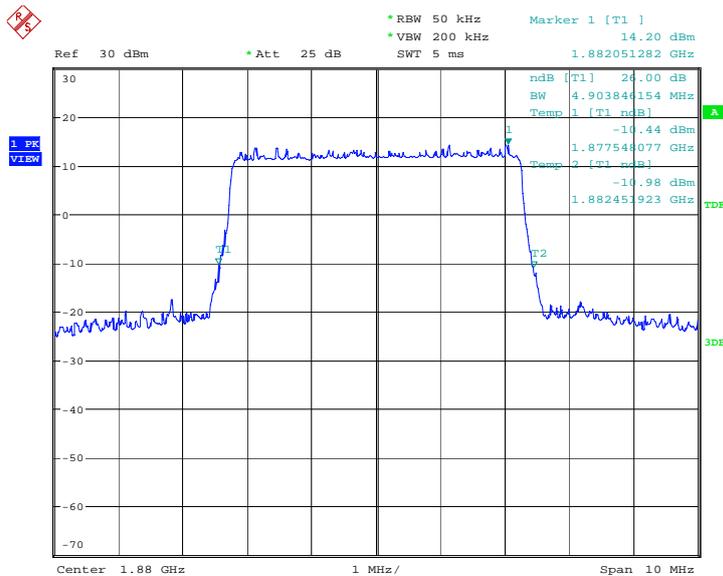
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1880.0	4871.795	4903.846

**LTE band 2, 5MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 14:17:05

**LTE band 2, 5MHz Bandwidth,16QAM (100% BW)**

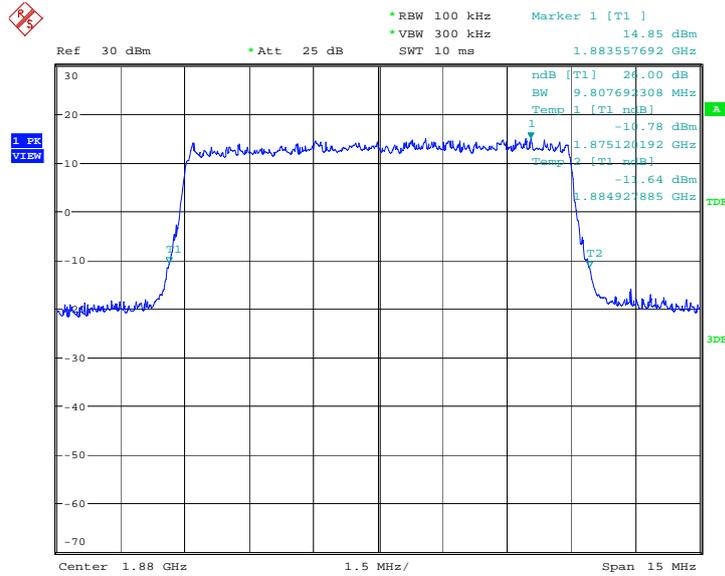


Date: 23.JUL.2014 14:17:20

**LTE band 2, 10MHz (100% BW)**

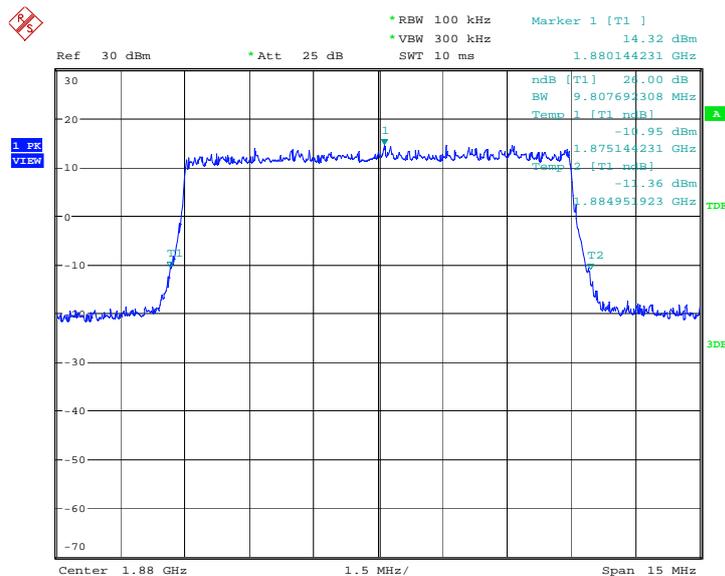
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1880.0	9807.692	9807.692

**LTE band 2, 10MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 14:26:20

**LTE band 2, 10MHz Bandwidth, 16QAM (100% BW)**

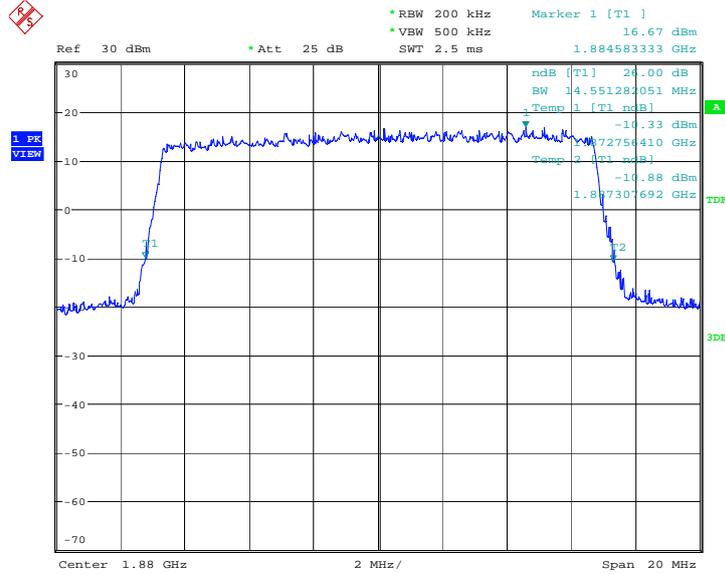


Date: 23.JUL.2014 14:26:36

**LTE band 2, 15MHz (100% BW)**

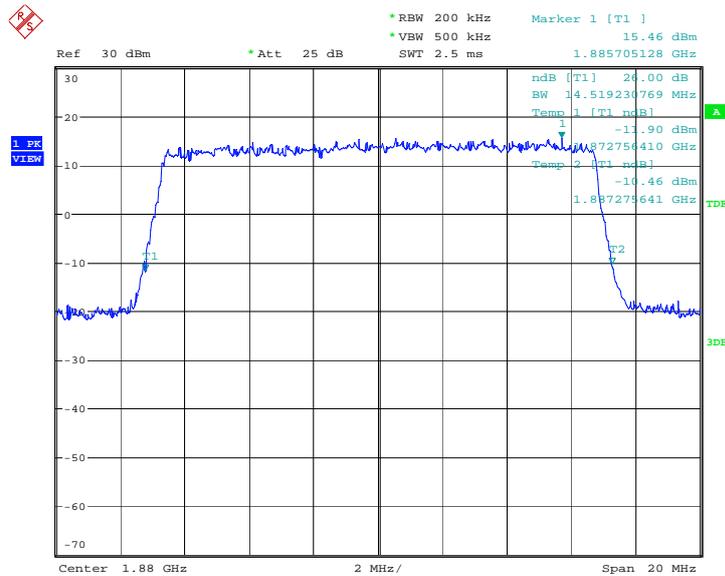
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1880.0	14551.282	14519.231

**LTE band 2, 15MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 14:33:08

**LTE band 2, 15MHz Bandwidth, 16QAM (100% BW)**

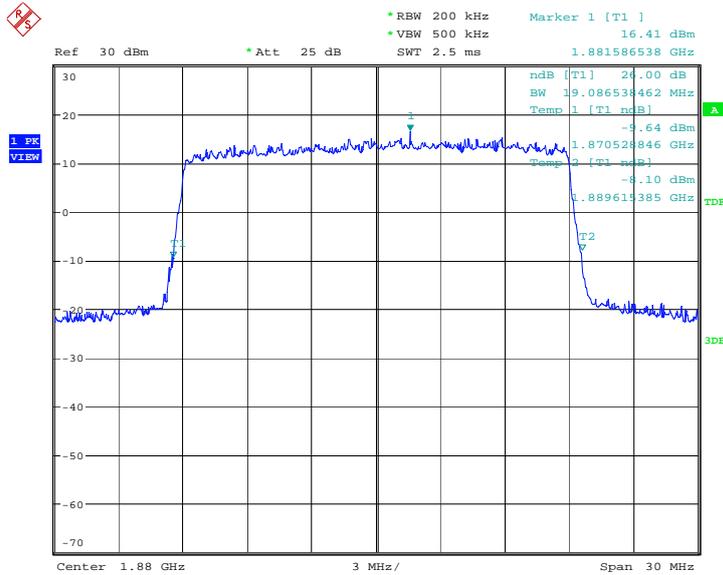


Date: 23.JUL.2014 14:33:23

**LTE band 2, 20MHz (100% BW)**

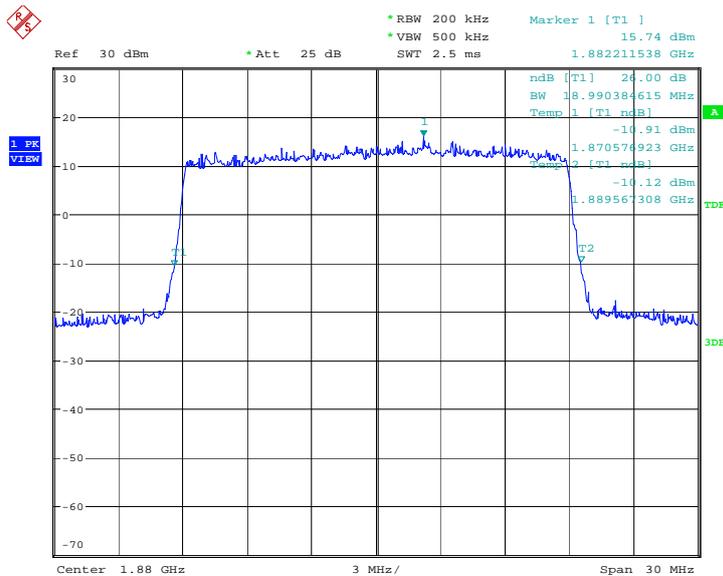
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1880.0	19086.539	18990.385

**LTE band 2, 20MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 14:43:01

**LTE band 2, 20MHz Bandwidth, 16QAM (100% BW)**

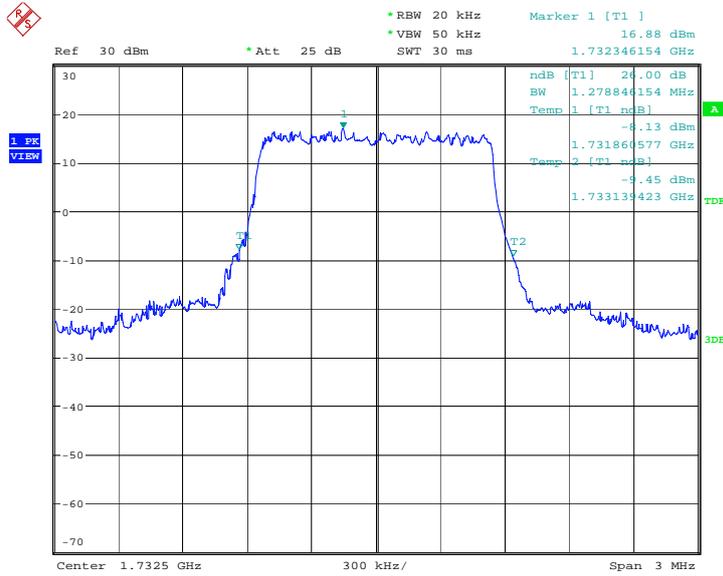


Date: 23.JUL.2014 14:43:17

**LTE band 4, 1.4MHz (100% BW)**

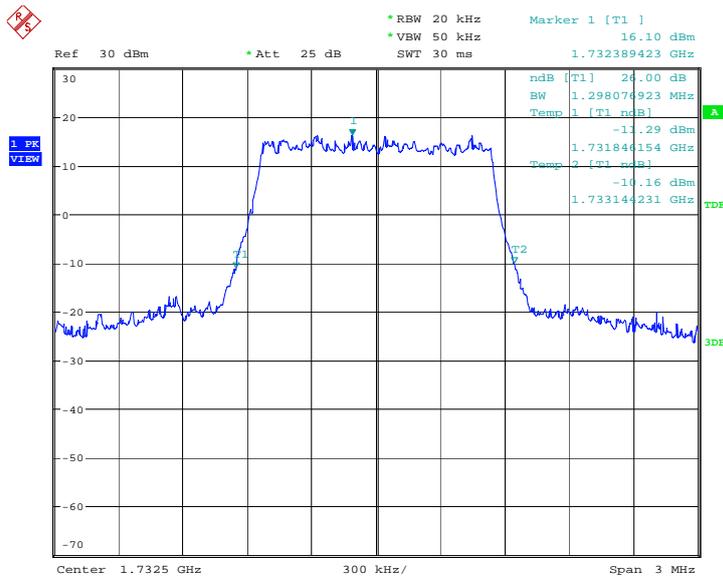
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1732.5	1278.846	1298.077

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



Date: 23.JUL.2014 14:55:55

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

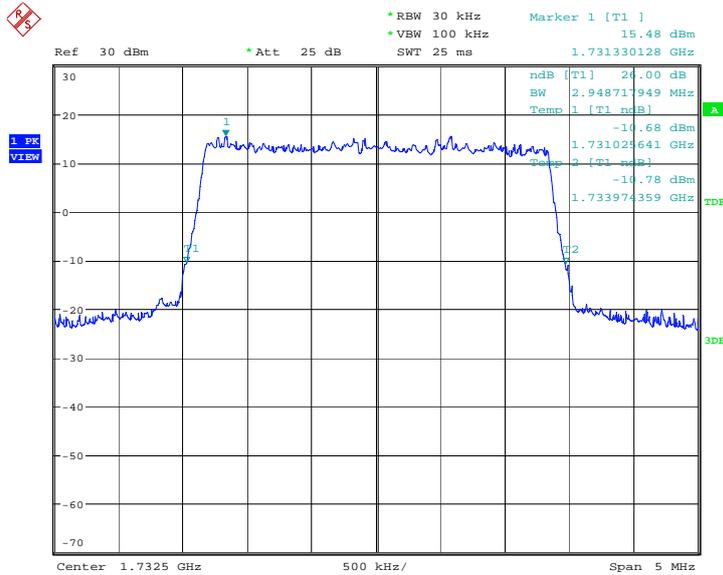


Date: 23.JUL.2014 14:56:11

**LTE band 4, 3MHz (100% BW)**

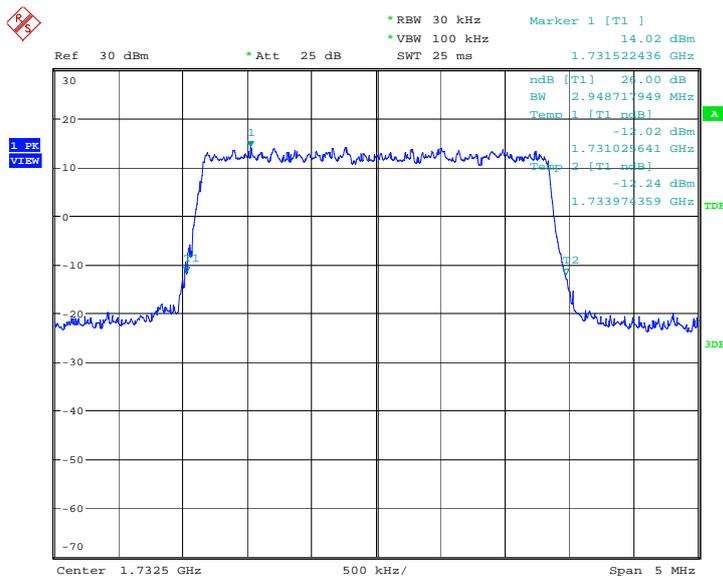
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1732.5	2948.718	2948.718

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



Date: 23.JUL.2014 15:06:11

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

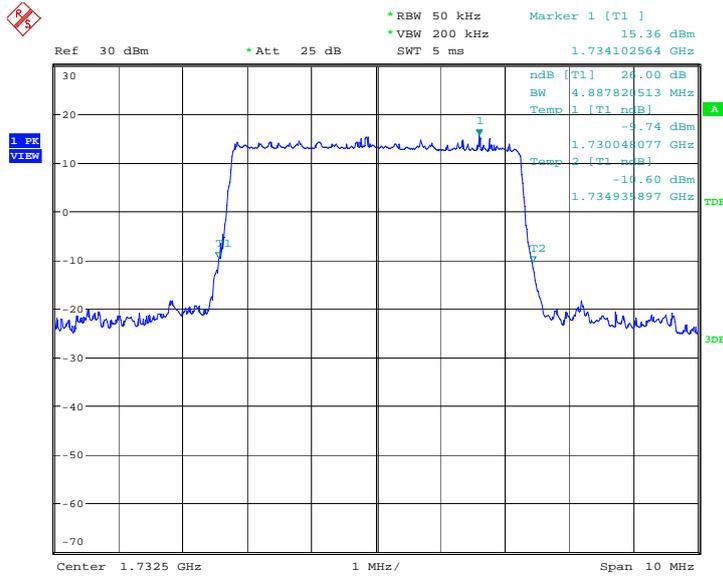


Date: 23.JUL.2014 15:06:26

**LTE band 4, 5MHz (100% BW)**

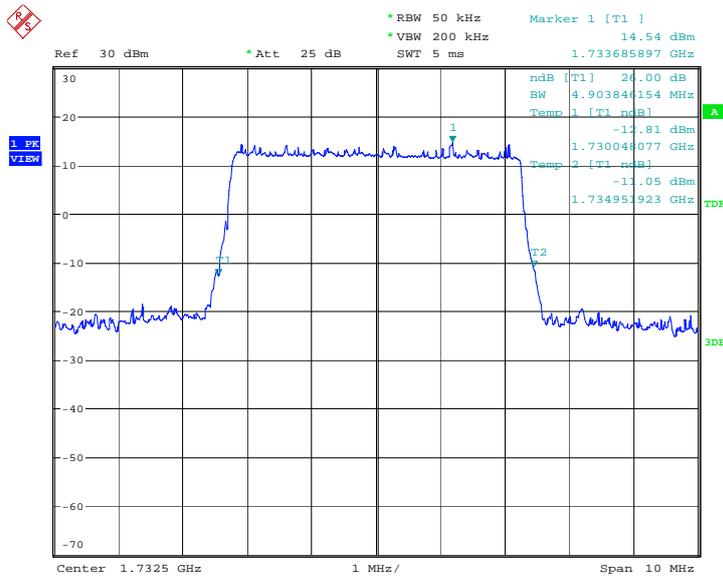
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1732.5	4887.821	4903.846

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



Date: 23.JUL.2014 15:14:23

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

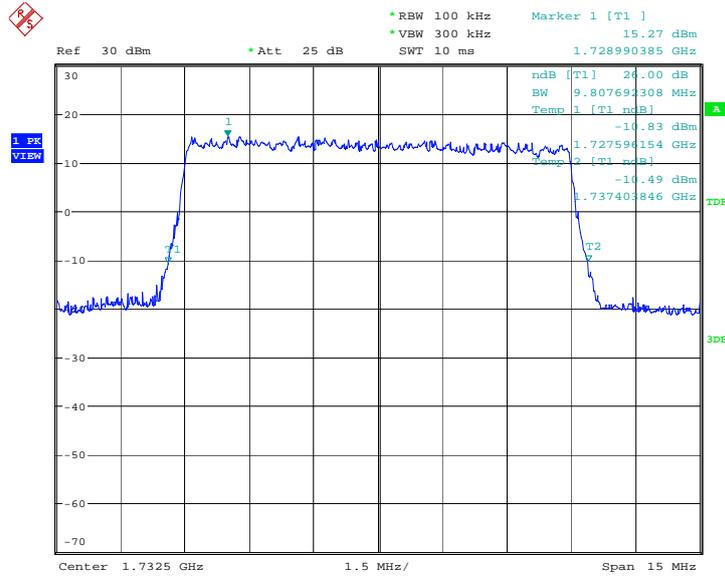


Date: 23.JUL.2014 15:14:38

**LTE band 4, 10MHz (100% BW)**

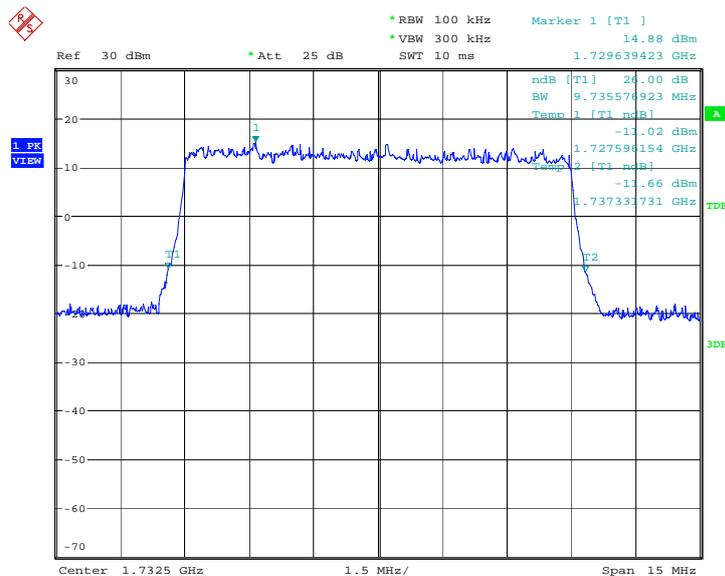
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1732.5	9807.692	9735.577

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



Date: 23.JUL.2014 15:22:35

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

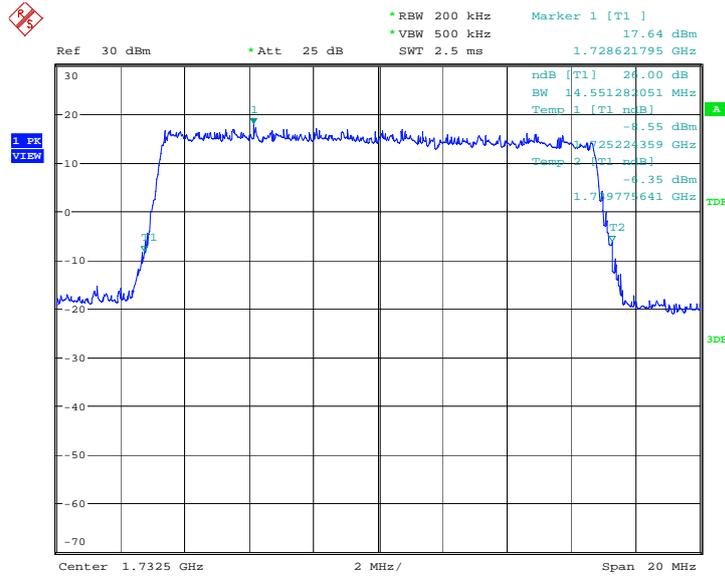


Date: 23.JUL.2014 15:22:50

**LTE band 4, 15MHz (100% BW)**

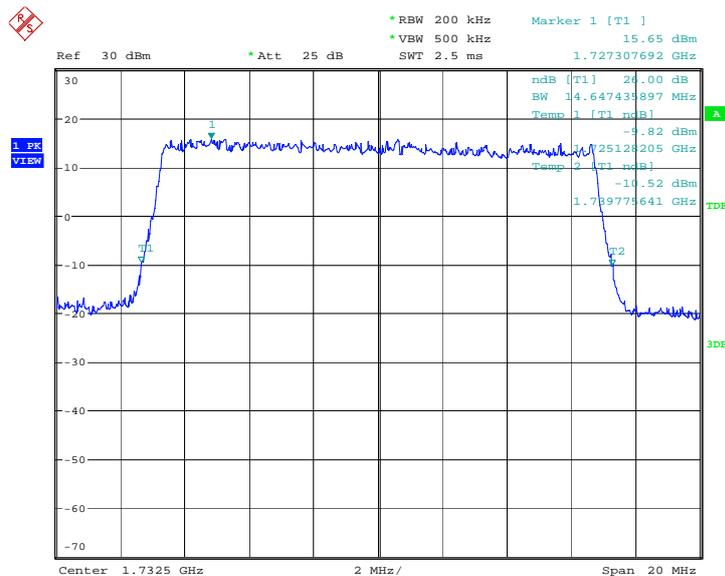
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1732.5	14551.282	14647.436

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



Date: 23.JUL.2014 15:28:21

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

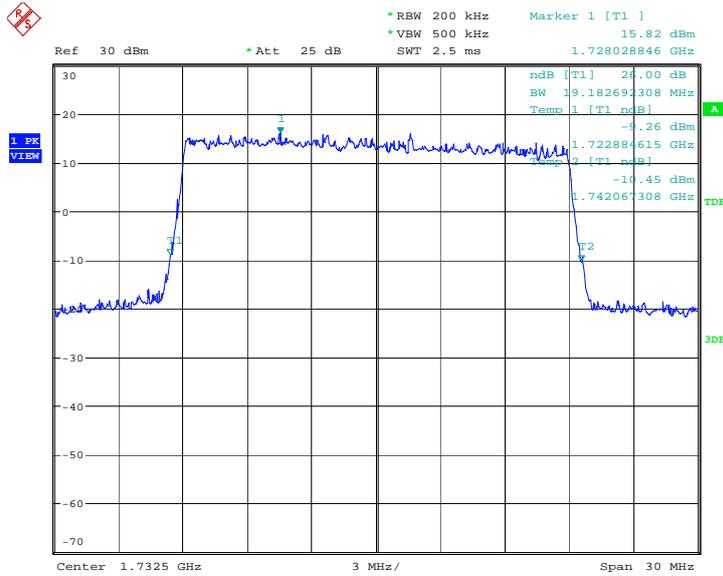


Date: 23.JUL.2014 15:28:36

**LTE band 4, 20MHz (100% BW)**

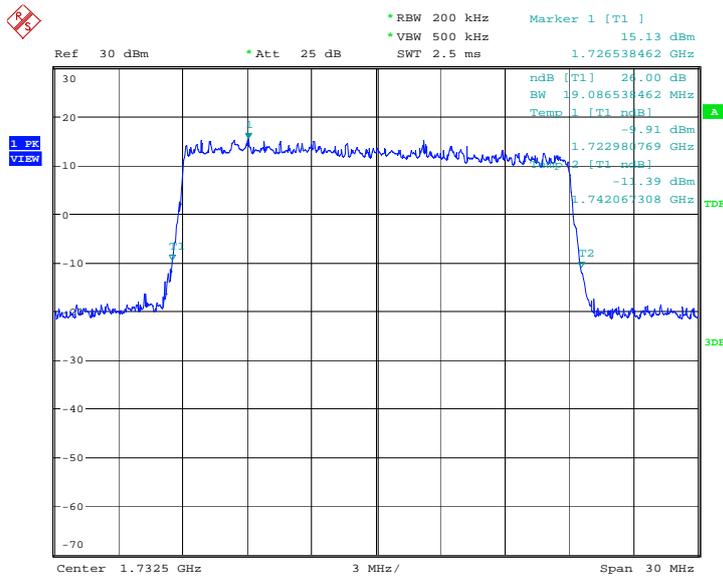
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
1732.5	19182.692	19086.538

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



Date: 23.JUL.2014 15:36:41

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

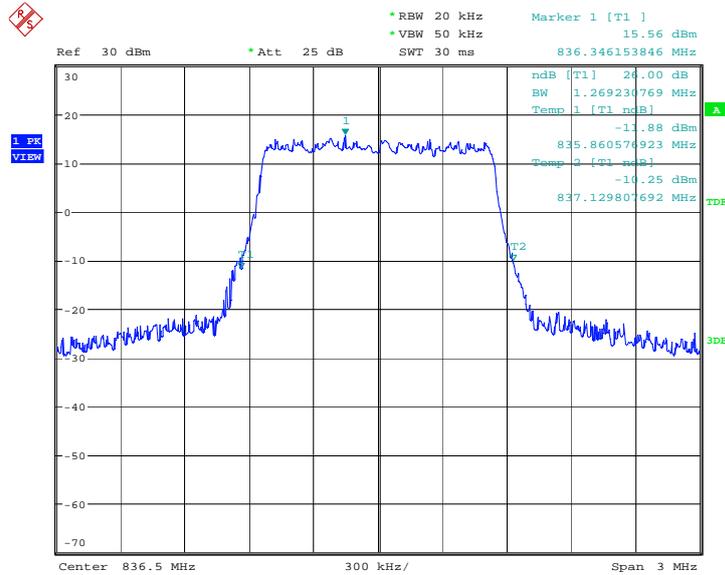


Date: 23.JUL.2014 15:36:56

**LTE band 5, 1.4MHz (100% BW)**

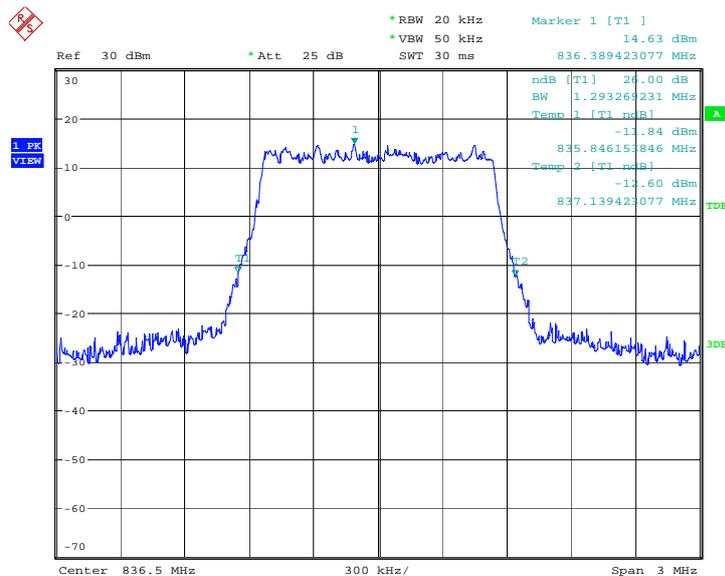
Frequency(MHz)	Occupied Bandwidth (-26dBc)( kHz)	
	836.5	QPSK
	1269.231	1293.269

**LTE band 5, 1.4MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 10:14:33

**LTE band 5, 1.4MHz Bandwidth, 16QAM (100% BW)**

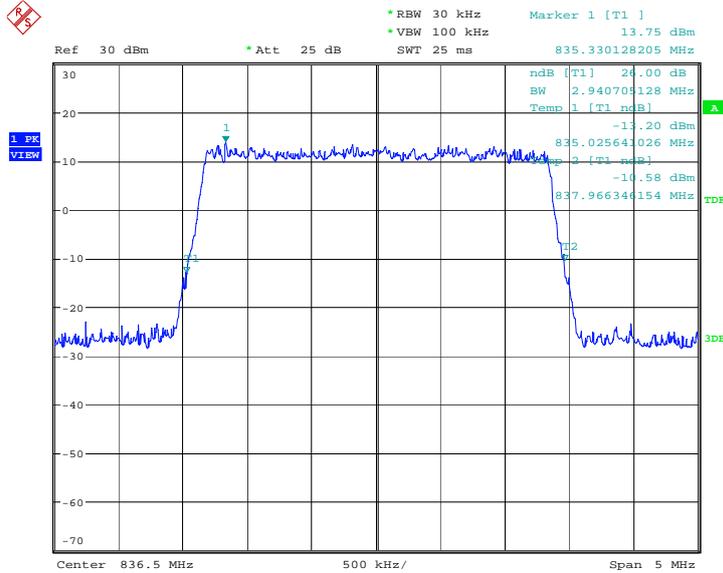


Date: 23.JUL.2014 10:14:49

**LTE band 5, 3MHz (100% BW)**

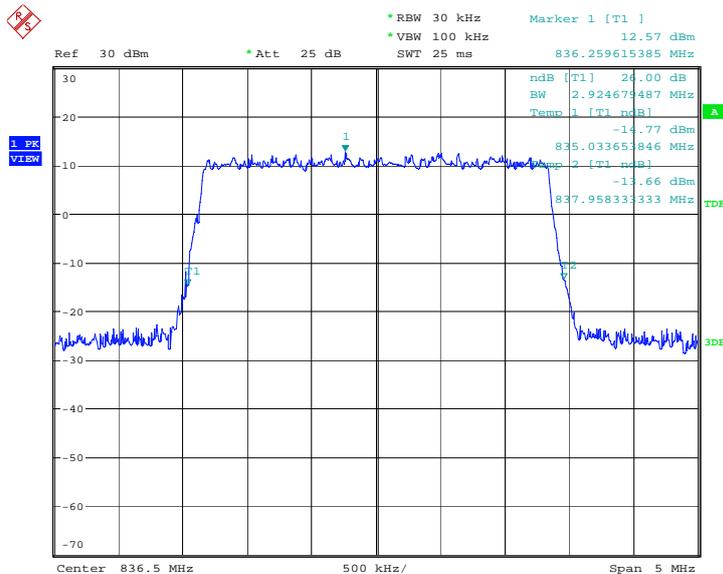
Frequency(MHz)	Occupied Bandwidth (-26dBc)( kHz)	
836.5	QPSK	16QAM
	2940.705	2924.679

**LTE band 5, 3MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 10:25:17

**LTE band 5, 3MHz Bandwidth, 16QAM (100% BW)**



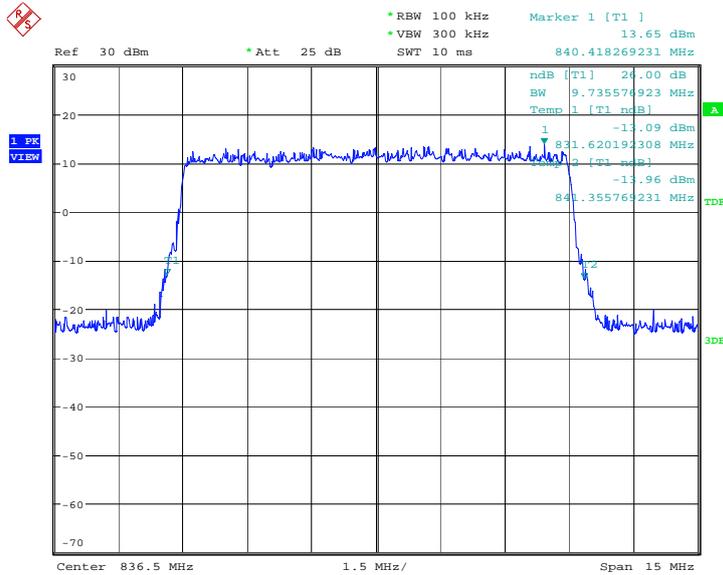
Date: 23.JUL.2014 10:25:33



**LTE band 5, 10MHz (100% BW)**

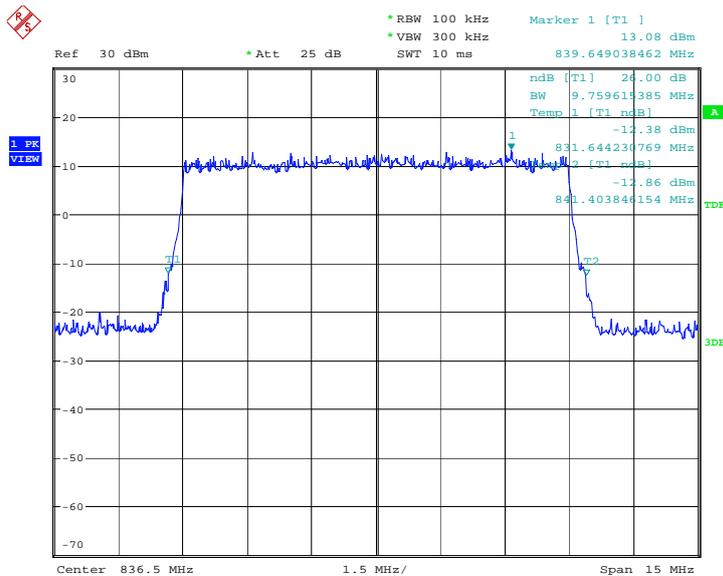
Frequency(MHz)	Occupied Bandwidth (-26dBc)( kHz)	
836.5	QPSK	16QAM
	9735.577	9759.615

**LTE band 5, 10MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 10:45:48

**LTE band 5, 10MHz Bandwidth, 16QAM (100% BW)**

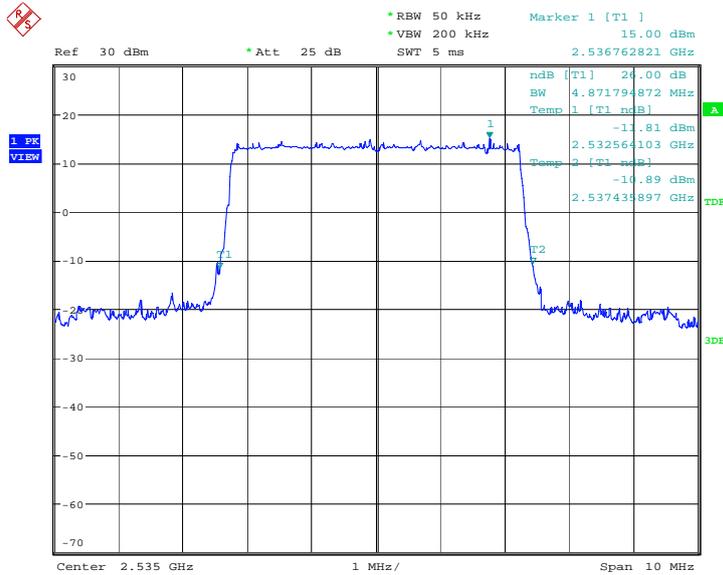


Date: 23.JUL.2014 10:46:04

**LTE band 7, 5MHz (100% BW)**

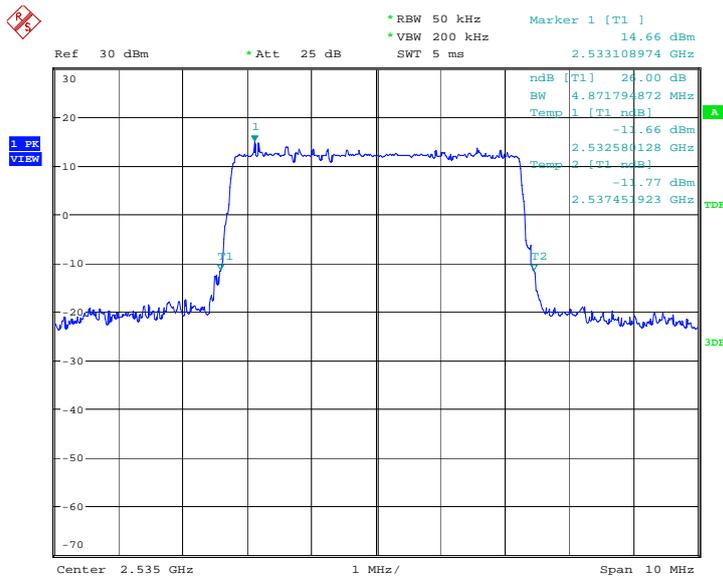
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
2535	4871.795	4871.795

**LTE band 7, 5MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 09:25:27

**LTE band 7, 5MHz Bandwidth,16QAM (100% BW)**

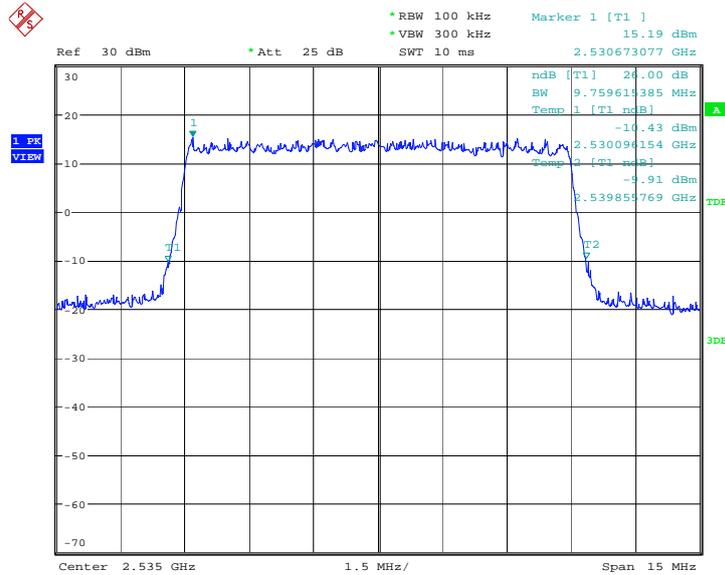


Date: 23.JUL.2014 09:25:43

**LTE band 7, 10MHz (100% BW)**

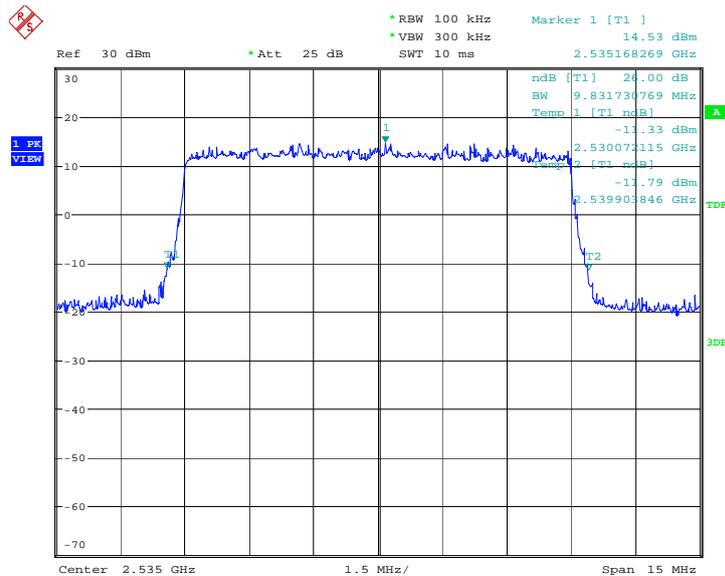
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
2535	9759.615	9831.731

**LTE band 7, 10MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 09:35:14

**LTE band 7, 10MHz Bandwidth, 16QAM (100% BW)**

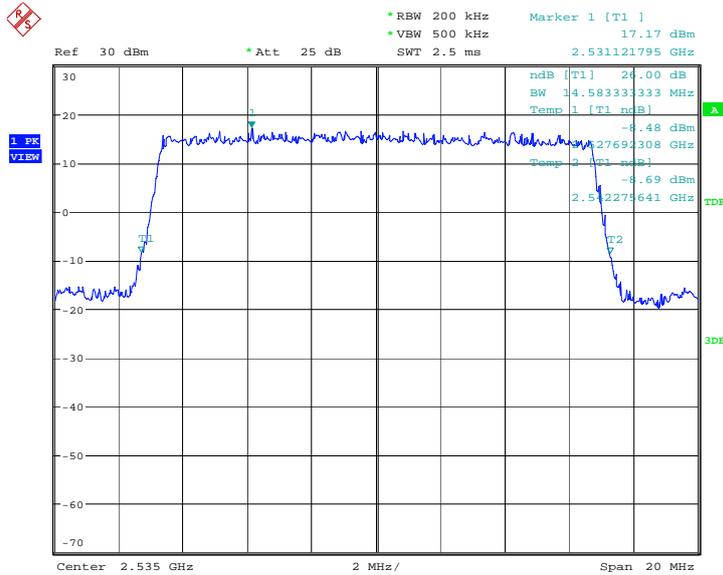


Date: 23.JUL.2014 09:35:30

**LTE band 7, 15MHz (100% BW)**

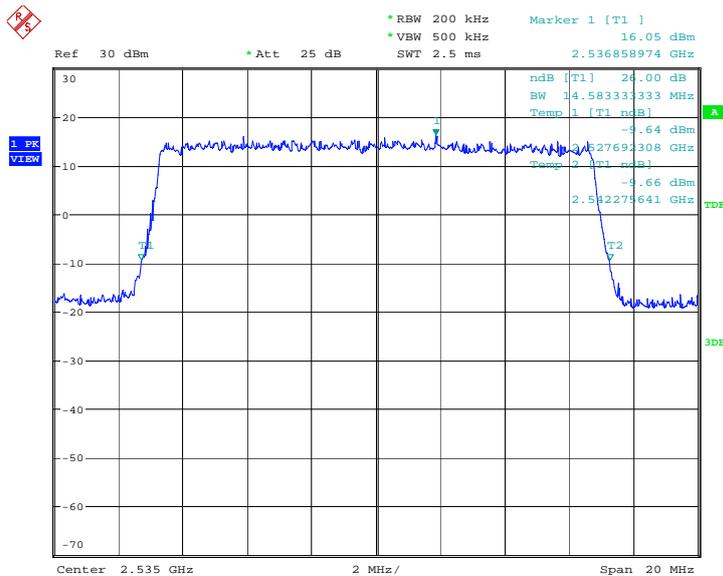
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
2535	14583.333	14583.333

**LTE band 7, 15MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 09:48:05

**LTE band 7, 15MHz Bandwidth, 16QAM (100% BW)**

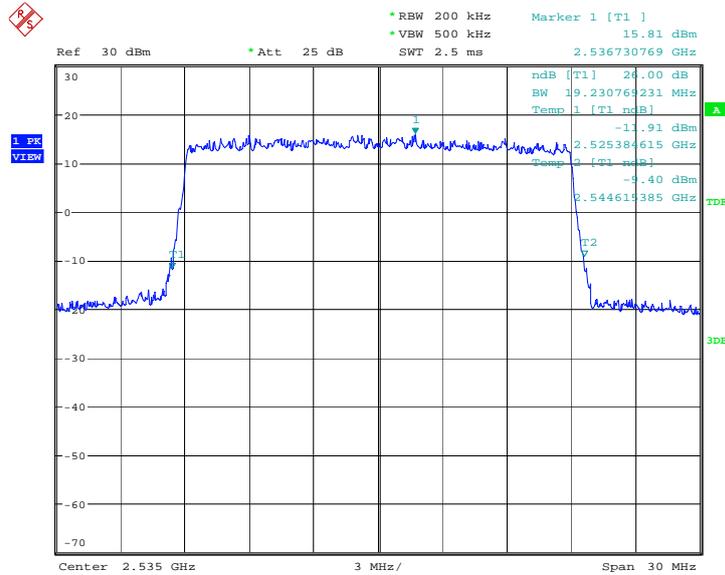


Date: 23.JUL.2014 09:48:21

**LTE band 7, 20MHz (100% BW)**

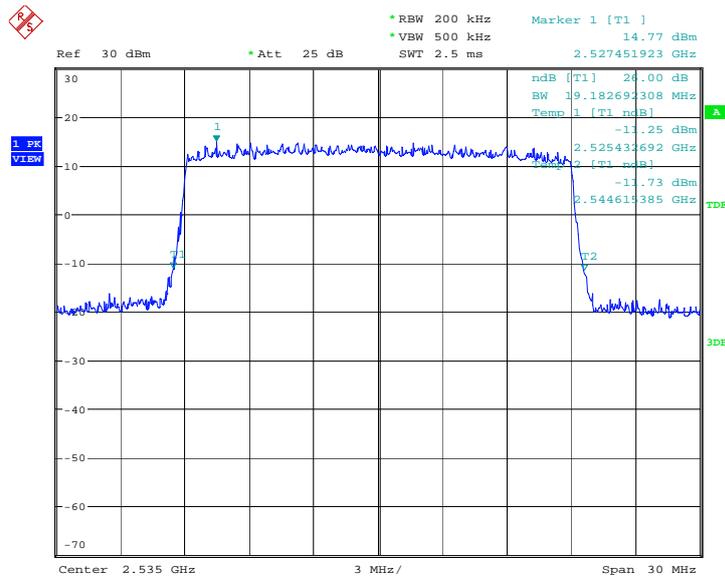
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
2535	19230.769	19182.692

**LTE band 7, 20MHz Bandwidth, QPSK (100% BW)**



Date: 23.JUL.2014 09:56:28

**LTE band 7, 20MHz Bandwidth, 16QAM (100% BW)**

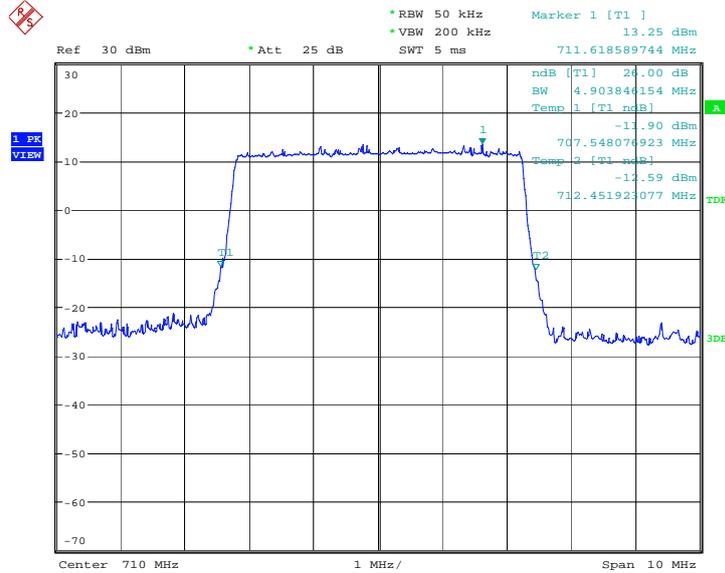


Date: 23.JUL.2014 09:56:44

**LTE band 17, 5 MHz (100% BW)**

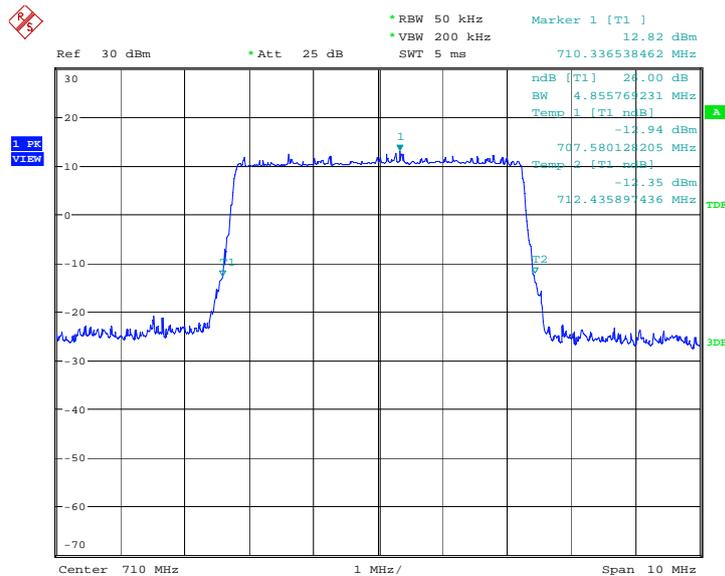
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
710	4903.846	4855.769

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



Date: 23.JUL.2014 15:45:57

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

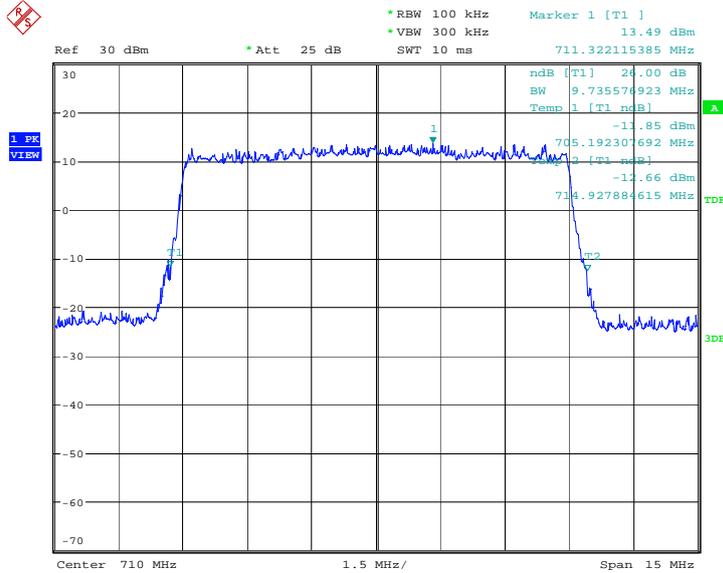


Date: 23.JUL.2014 15:46:12

**LTE band 17, 10 MHz (100% BW)**

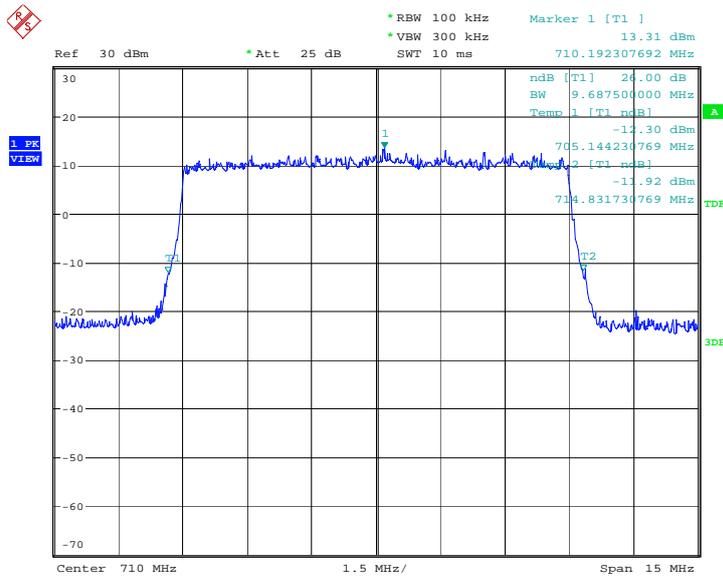
Frequency (MHz)	Occupied Bandwidth (100% BW)( kHz)	
	QPSK	16QAM
710	9735.577	9687.500

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



Date: 23.JUL.2014 16:12:47

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



Date: 23.JUL.2014 16:13:03

## A.7 BAND EDGE COMPLIANCE

### Reference

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

#### A.7.1 Measurement limit

On any frequency outside frequency band of the LTE FDD bands 2, 4, 5, 7 and 17 spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least  $43+10\log(P)$  dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

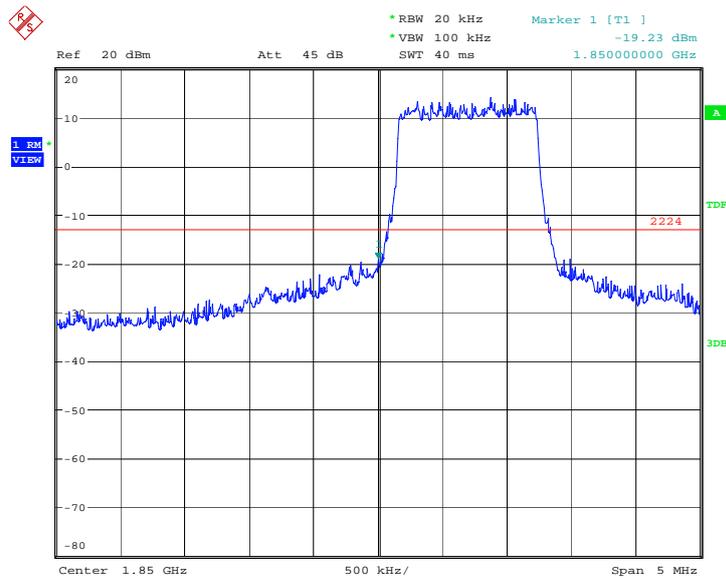
#### A.7.2 Measurement result

RB=100%.

According to KDB 971168 v02r01, a minimum RBW of 1% of the OBW can be used to measure the Band Edge. The OBW is the maximum when the RB is 100%, so the permitted RBW value is also the maximum which causes a worst case to measure the Band Edge.

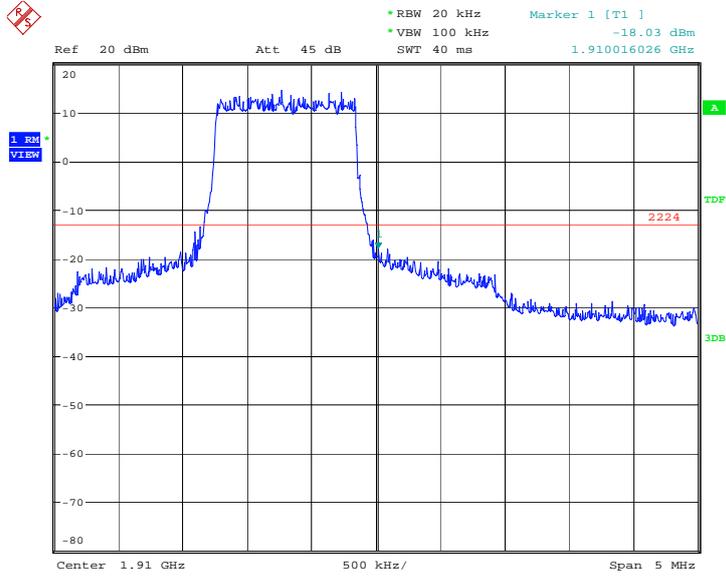
### LTE band 2, 1.4MHz

#### LOW BAND EDGE BLOCK-QPSK



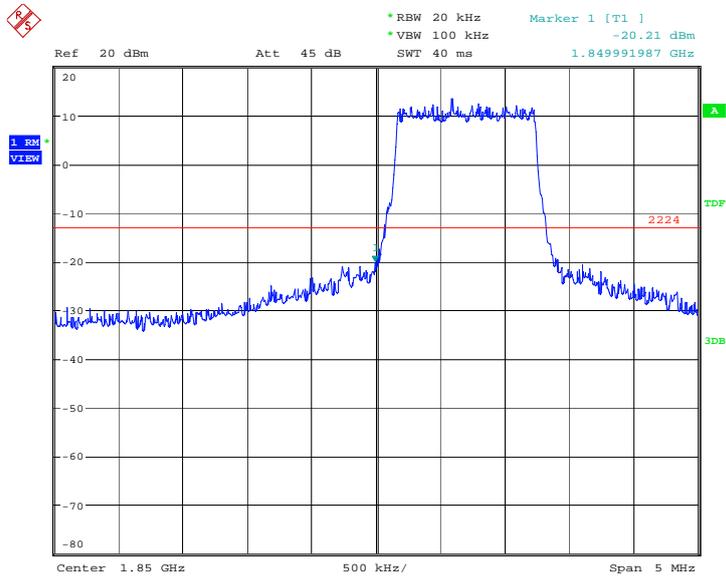
Date: 25.JUL.2014 14:13:25

### HIGH BAND EDGE BLOCK-QPSK



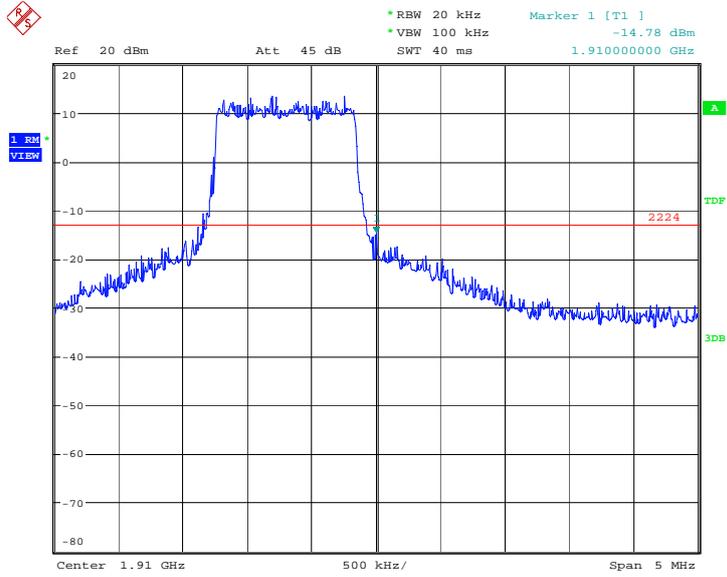
Date: 25.JUL.2014 14:15:25

### LOW BAND EDGE BLOCK-16QAM



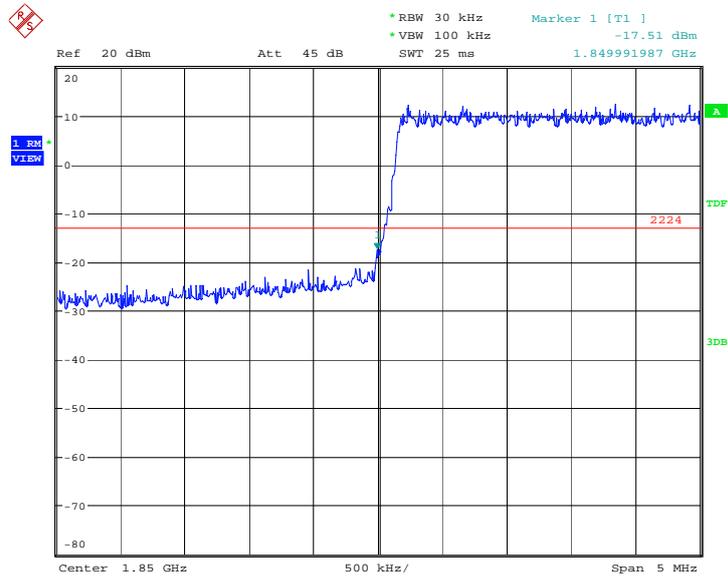
Date: 25.JUL.2014 14:13:35

### HIGH BAND EDGE BLOCK-16QAM



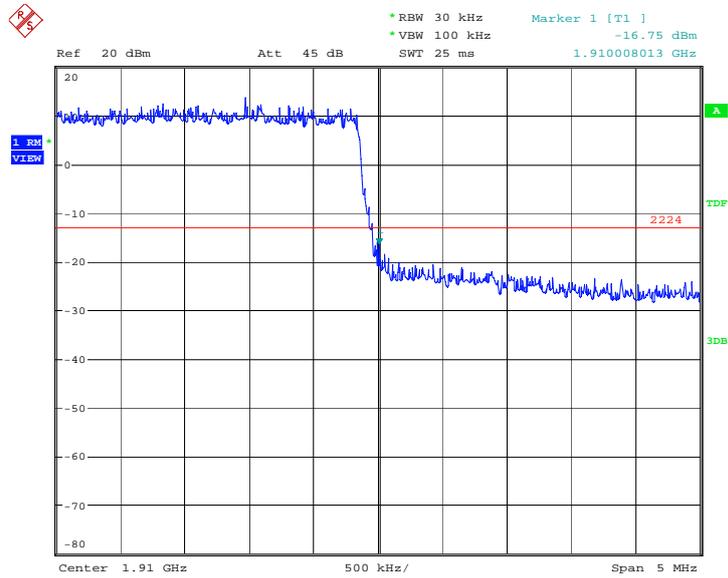
Date: 25.JUL.2014 14:15:35

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



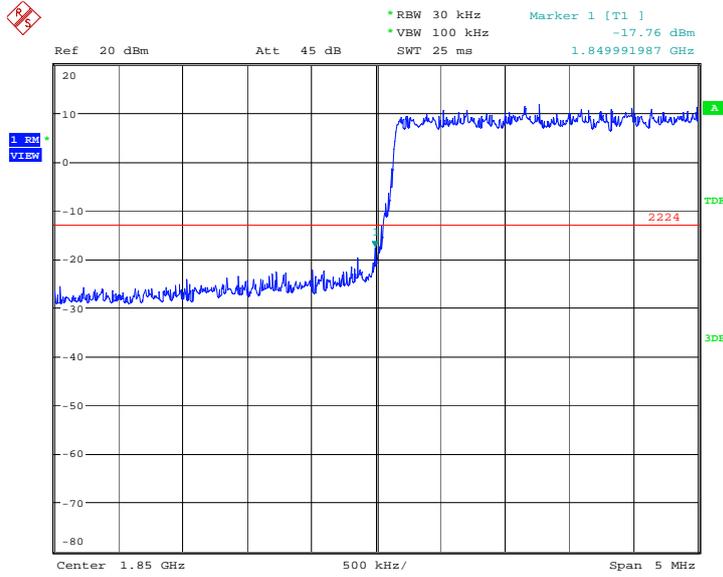
Date: 25.JUL.2014 14:16:54

**HIGH BAND EDGE BLOCK-QPSK**



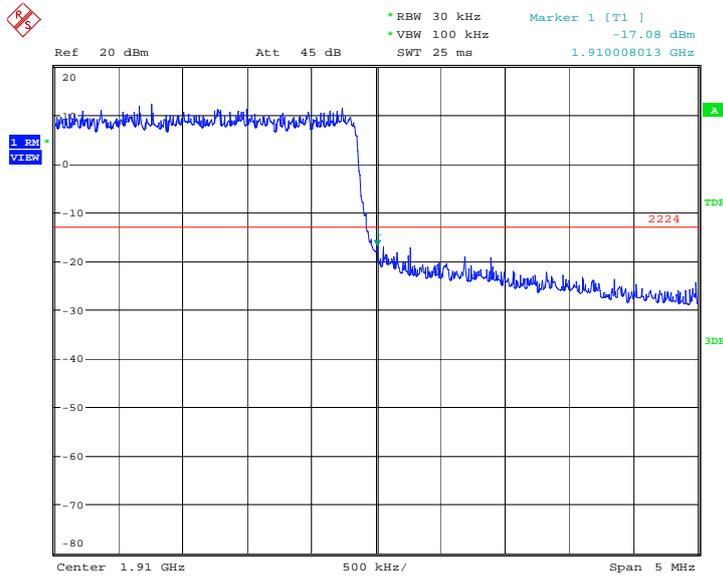
Date: 25.JUL.2014 14:18:54

### LOW BAND EDGE BLOCK-16QAM



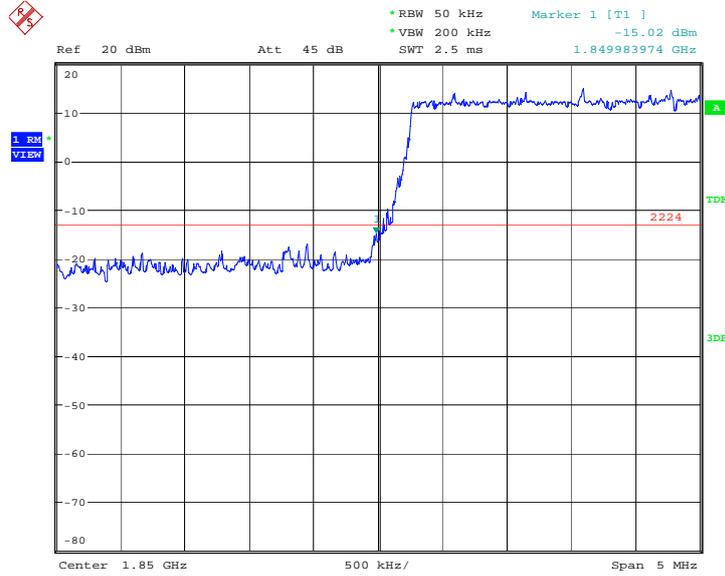
Date: 25.JUL.2014 14:17:04

### HIGH BAND EDGE BLOCK-16QAM



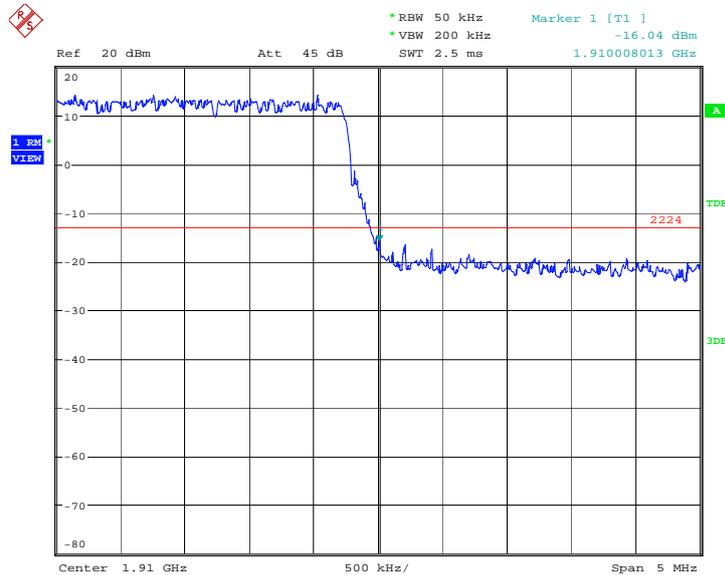
Date: 25.JUL.2014 14:19:04

**LTE band 2, 5MHz  
LOW BAND EDGE BLOCK-QPSK**



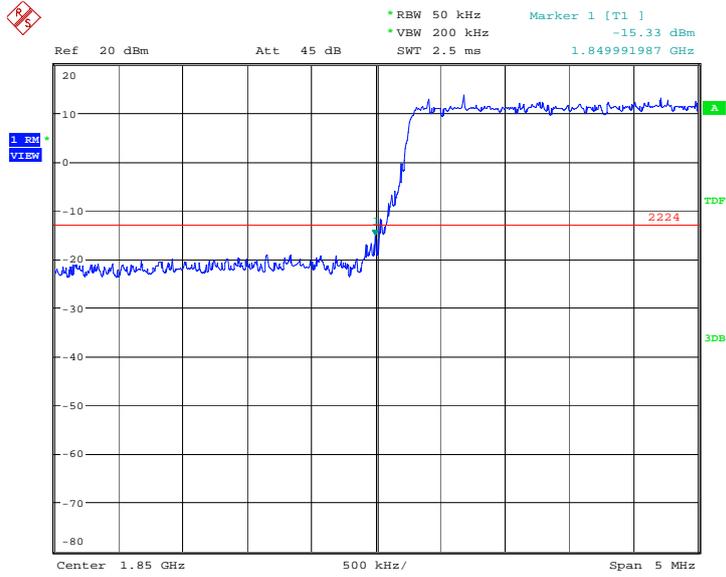
Date: 25.JUL.2014 14:20:53

**HIGH BAND EDGE BLOCK-QPSK**



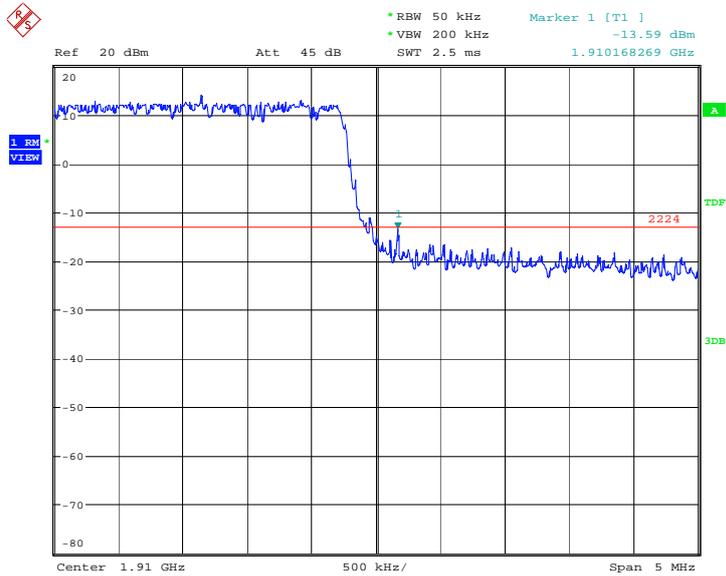
Date: 25.JUL.2014 14:22:53

### LOW BAND EDGE BLOCK-16QAM



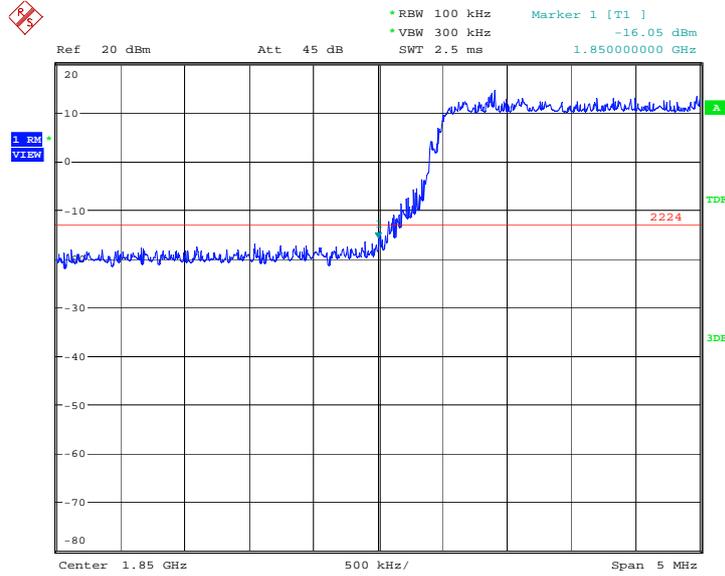
Date: 25.JUL.2014 14:21:03

### HIGH BAND EDGE BLOCK-16QAM



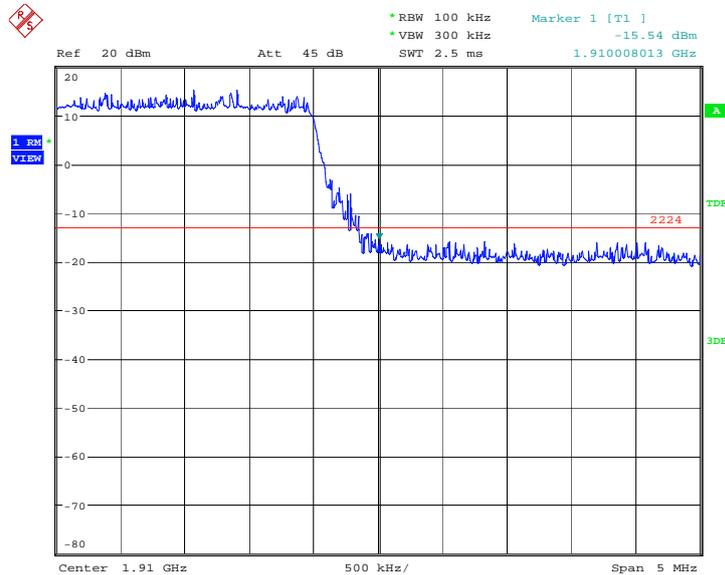
Date: 25.JUL.2014 14:23:03

**LTE band 2, 10MHz  
LOW BAND EDGE BLOCK-QPSK**



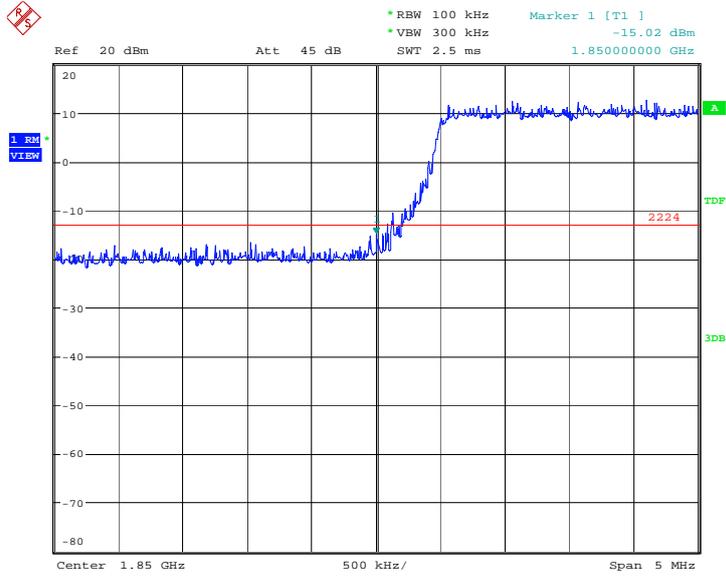
Date: 25.JUL.2014 14:25:23

**HIGH BAND EDGE BLOCK-QPSK**



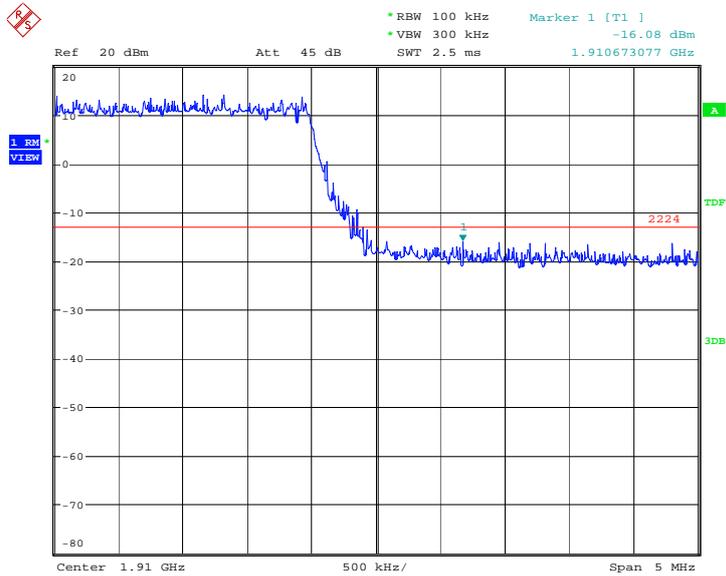
Date: 25.JUL.2014 14:26:51

### LOW BAND EDGE BLOCK-16QAM



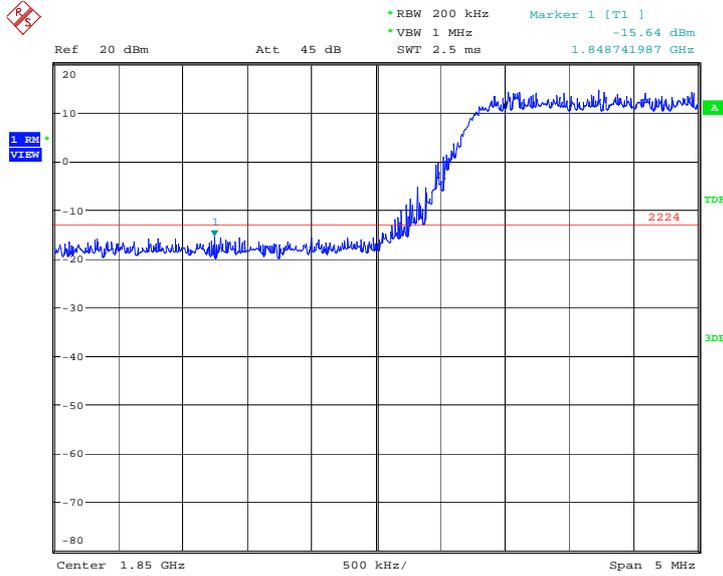
Date: 25.JUL.2014 14:25:33

### HIGH BAND EDGE BLOCK-16QAM



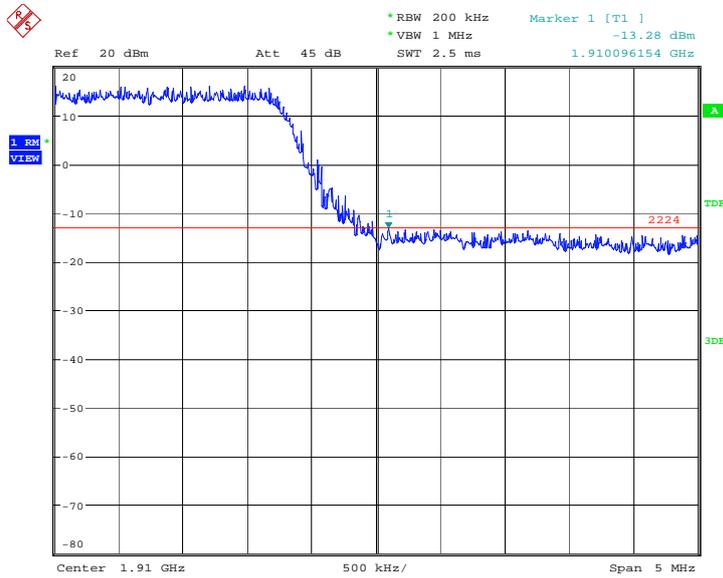
Date: 25.JUL.2014 14:27:01

**LTE band 2, 15MHz  
LOW BAND EDGE BLOCK-QPSK**



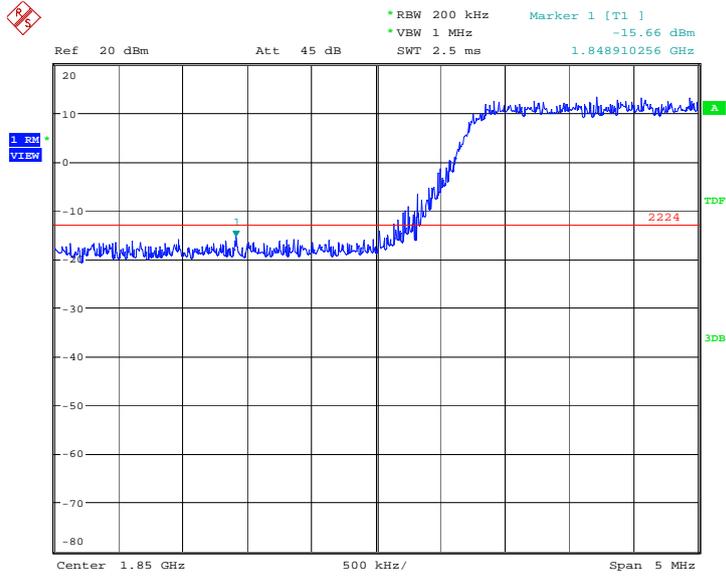
Date: 25.JUL.2014 14:31:23

**HIGH BAND EDGE BLOCK-QPSK**



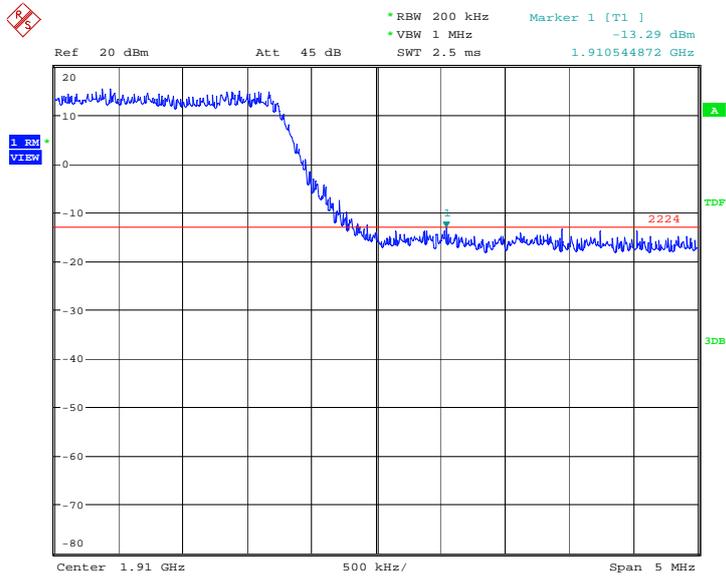
Date: 25.JUL.2014 15:42:57

### LOW BAND EDGE BLOCK-16QAM



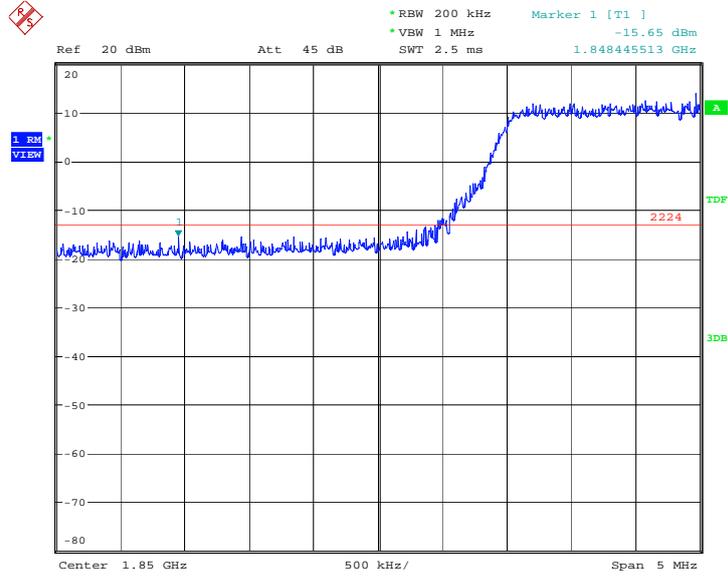
Date: 25.JUL.2014 14:31:33

### HIGH BAND EDGE BLOCK-16QAM



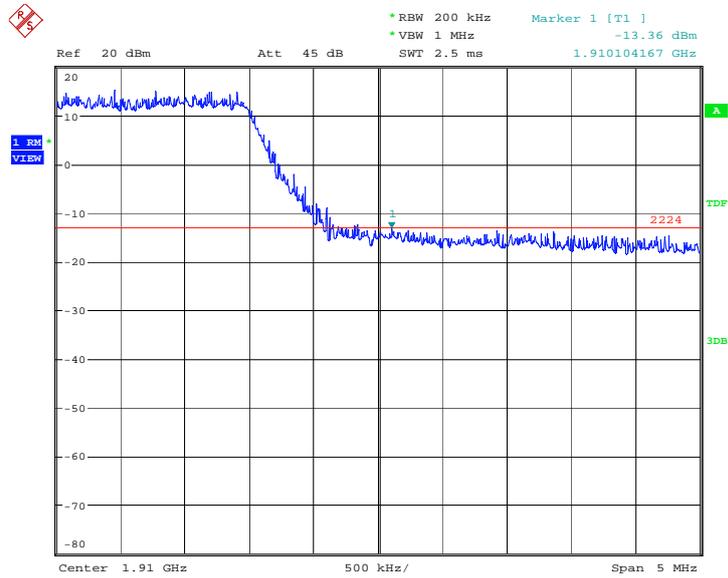
Date: 25.JUL.2014 15:36:14

**LTE band 2, 20MHz**  
**LOW BAND EDGE BLOCK-QPSK**



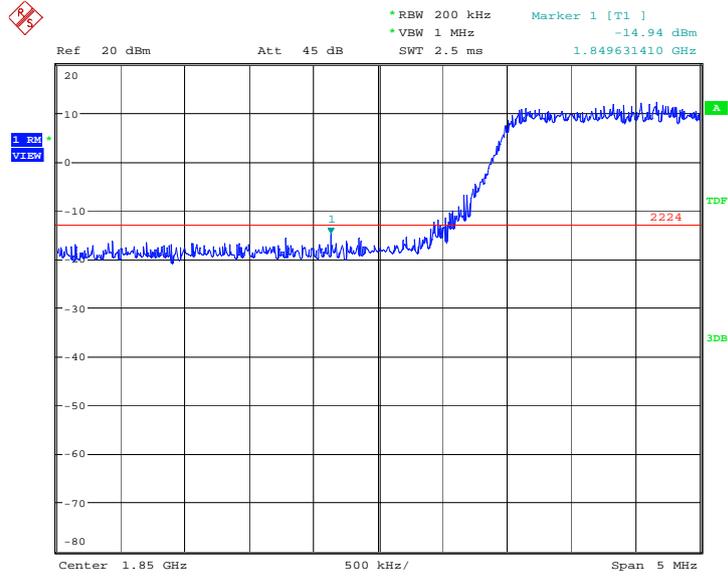
Date: 25.JUL.2014 14:37:54

**HIGH BAND EDGE BLOCK-QPSK**



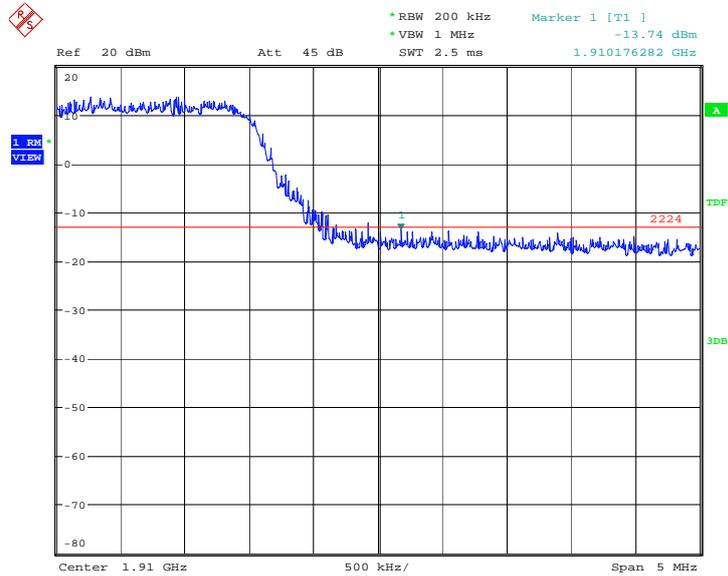
Date: 25.JUL.2014 14:40:57

### LOW BAND EDGE BLOCK-16QAM



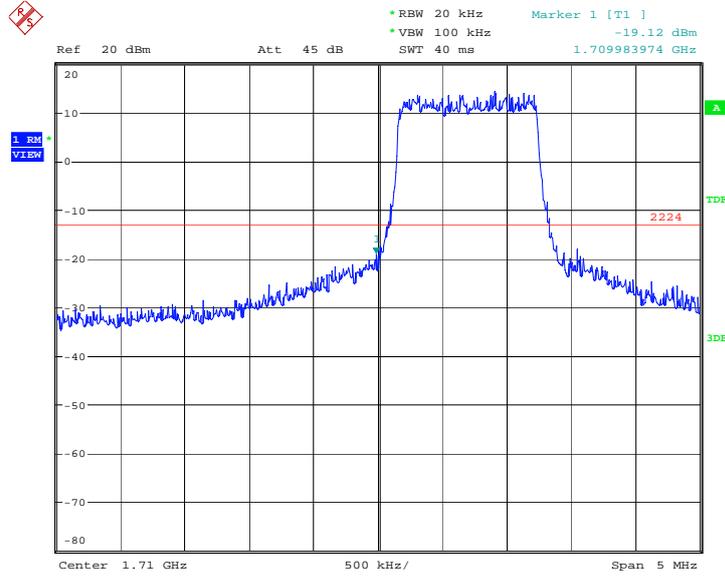
Date: 25.JUL.2014 14:38:04

### HIGH BAND EDGE BLOCK-16QAM



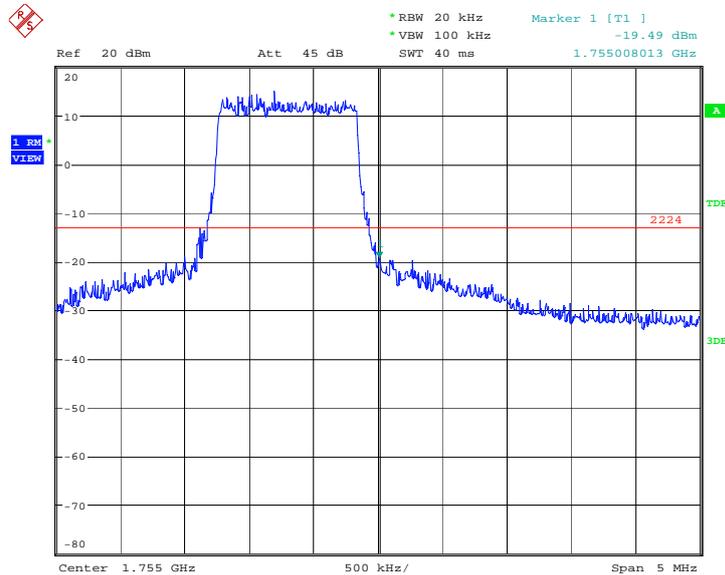
Date: 25.JUL.2014 14:41:07

**LTE band 4, 1.4MHz  
LOW BAND EDGE BLOCK-QPSK**



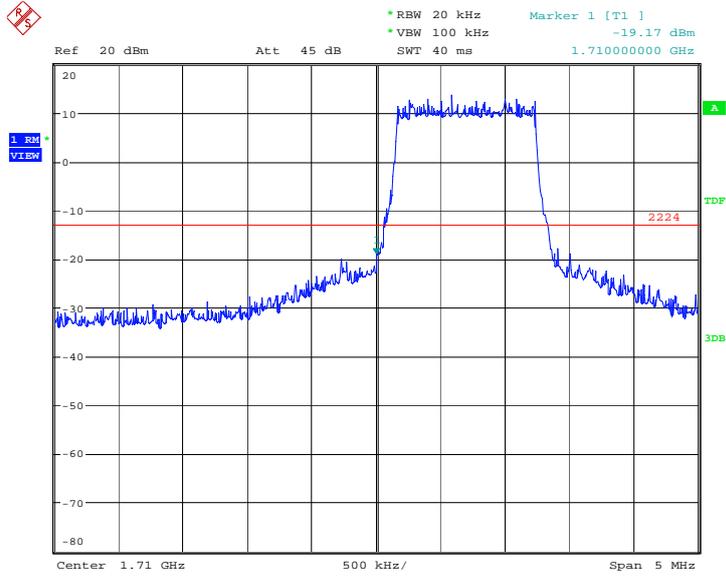
Date: 25.JUL.2014 14:43:30

**HIGH BAND EDGE BLOCK-QPSK**



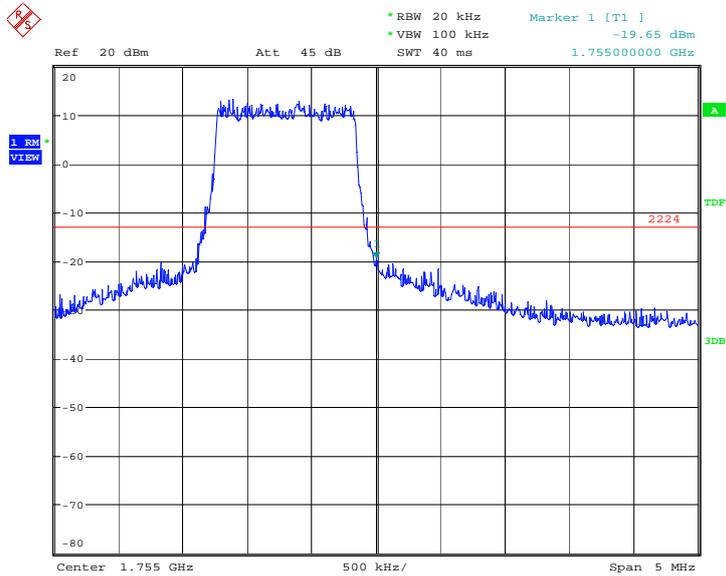
Date: 25.JUL.2014 14:45:03

### LOW BAND EDGE BLOCK-16QAM



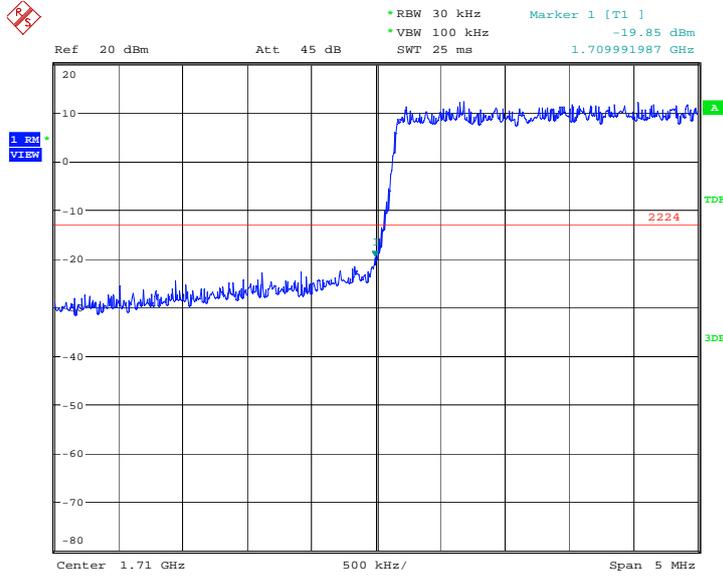
Date: 25.JUL.2014 14:43:40

### HIGH BAND EDGE BLOCK-16QAM



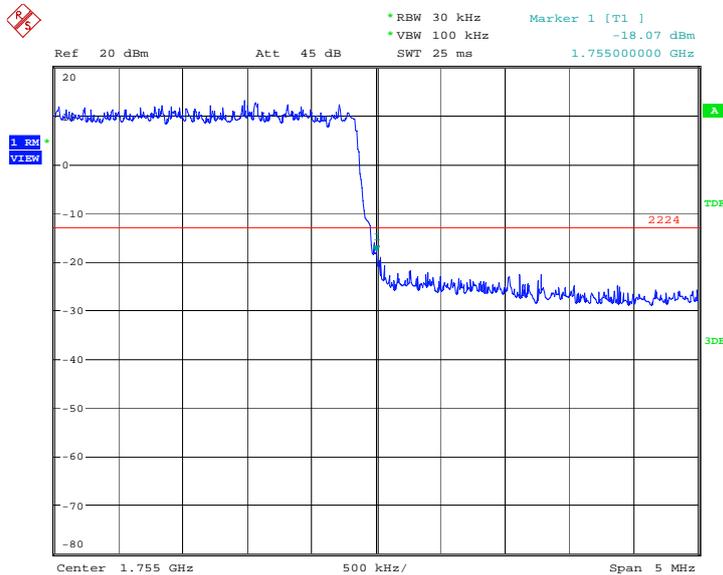
Date: 25.JUL.2014 14:45:13

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



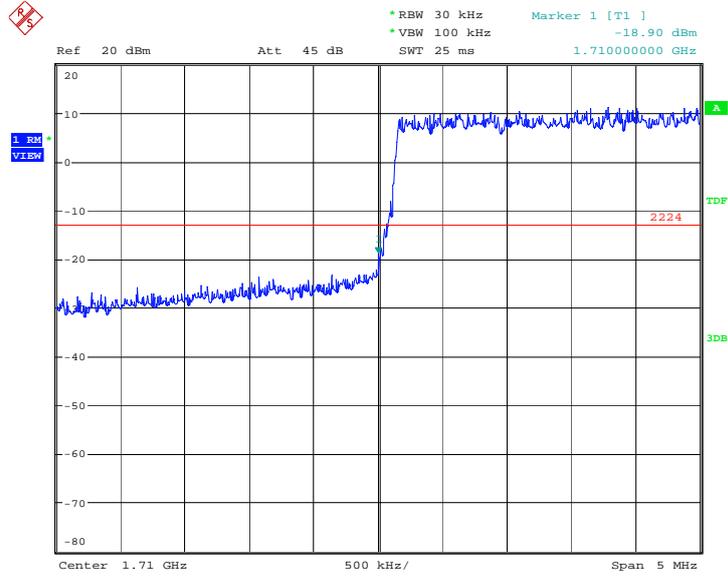
Date: 25.JUL.2014 14:49:04

**HIGH BAND EDGE BLOCK-QPSK**



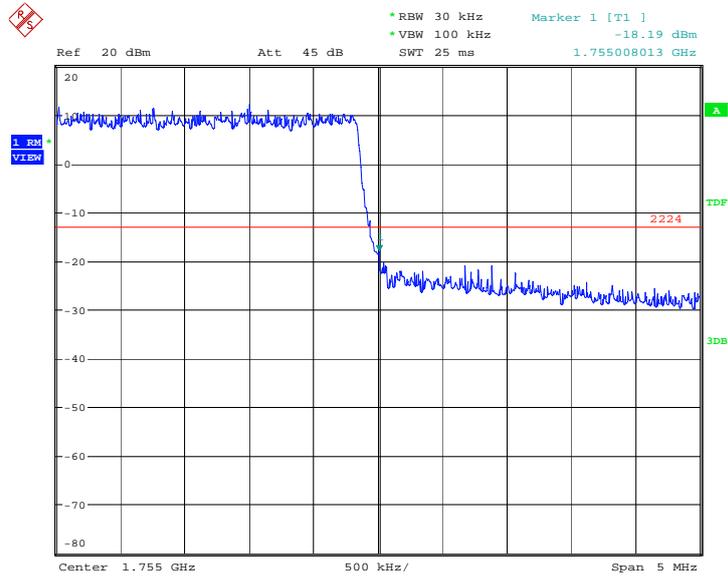
Date: 25.JUL.2014 14:52:06

### LOW BAND EDGE BLOCK-16QAM



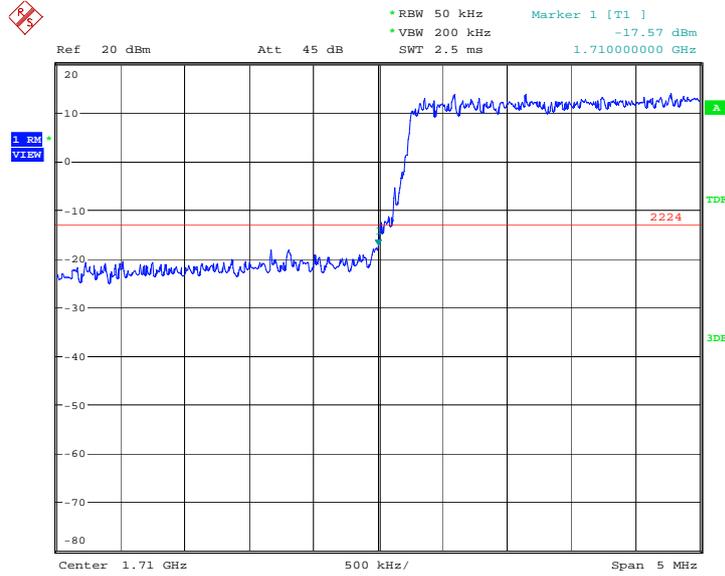
Date: 25.JUL.2014 14:49:14

### HIGH BAND EDGE BLOCK-16QAM



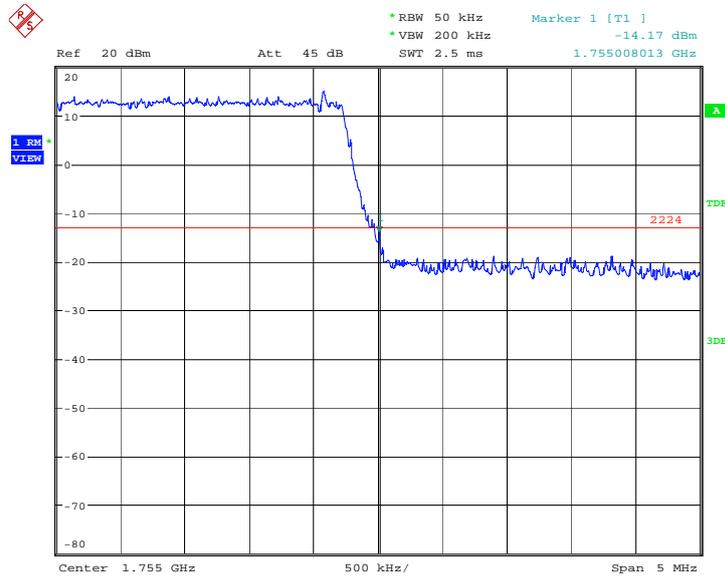
Date: 25.JUL.2014 14:52:16

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



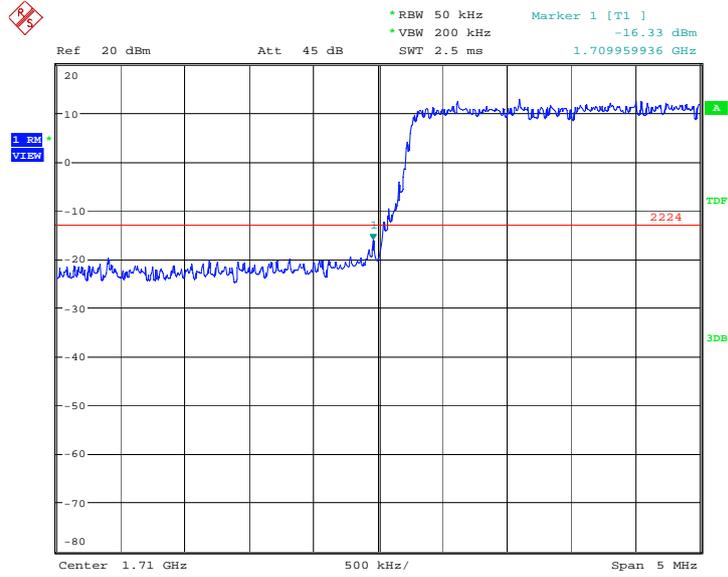
Date: 25.JUL.2014 14:56:38

**HIGH BAND EDGE BLOCK-QPSK**



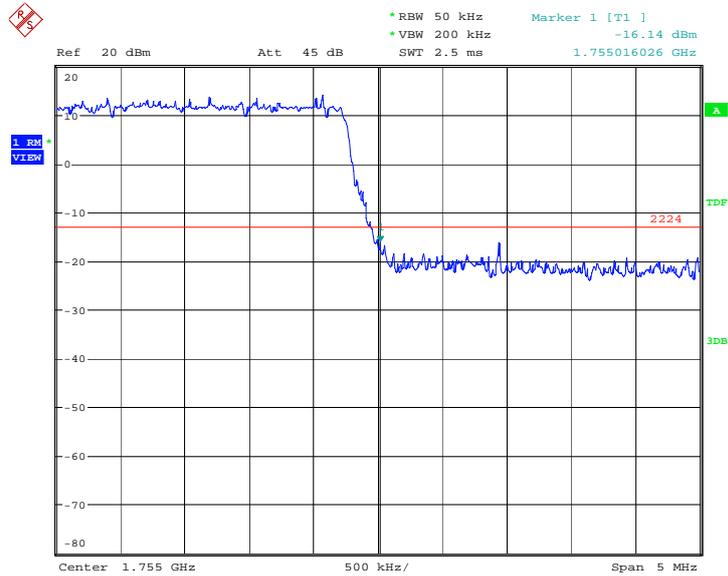
Date: 25.JUL.2014 14:57:38

### LOW BAND EDGE BLOCK-16QAM



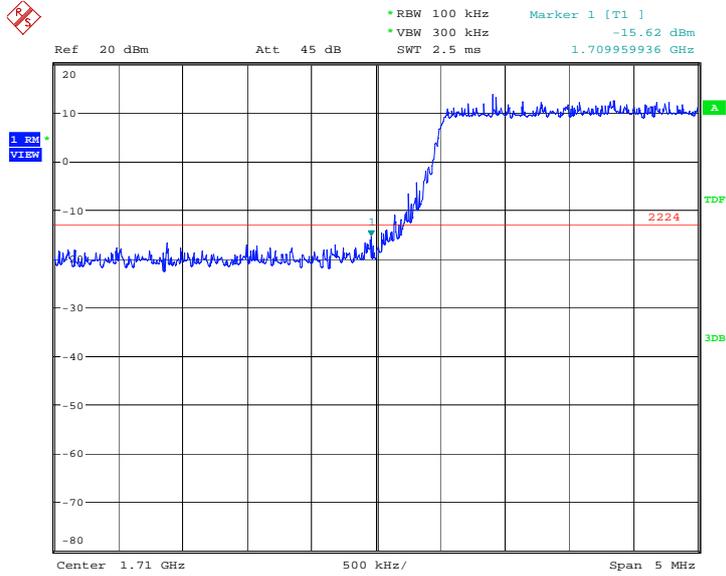
Date: 25.JUL.2014 14:56:49

### HIGH BAND EDGE BLOCK-16QAM



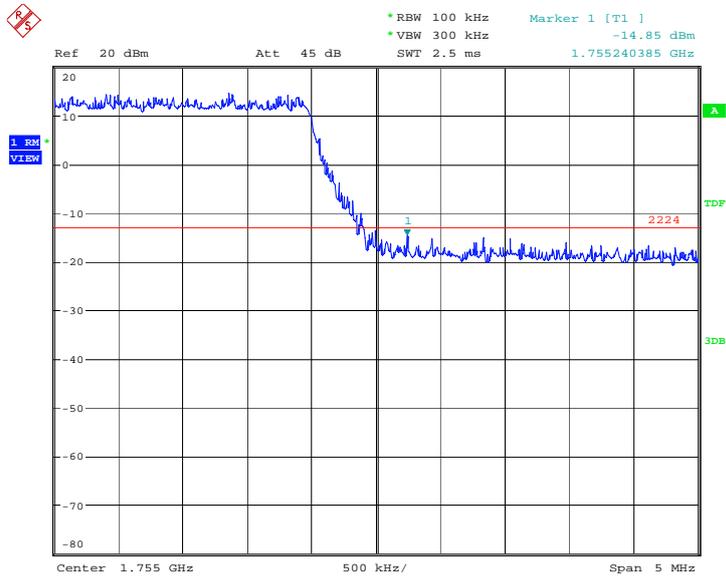
Date: 25.JUL.2014 14:57:49

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



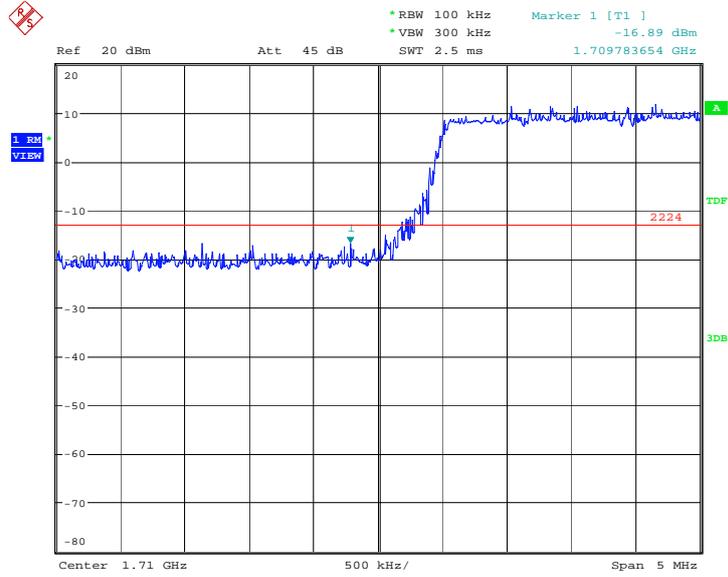
Date: 25.JUL.2014 14:59:37

**HIGH BAND EDGE BLOCK-QPSK**



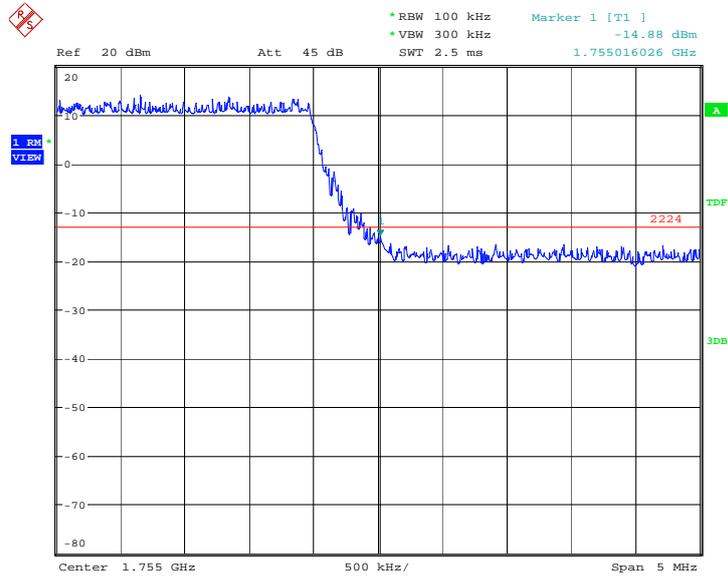
Date: 25.JUL.2014 15:02:38

### LOW BAND EDGE BLOCK-16QAM



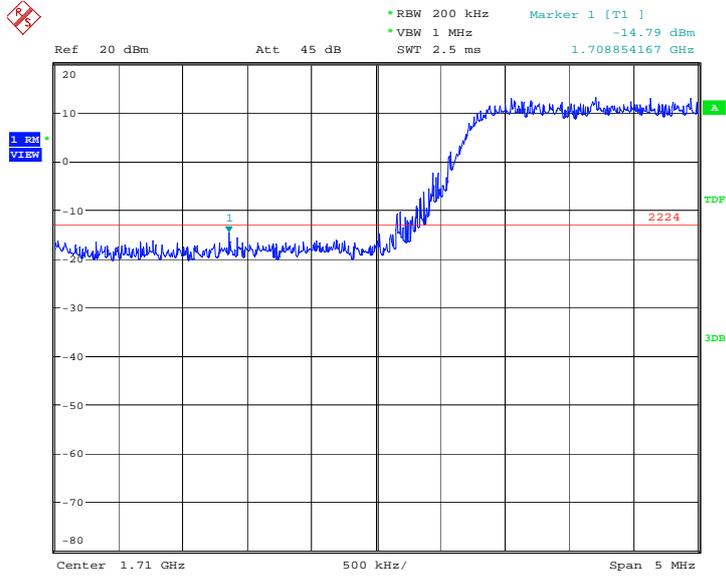
Date: 25.JUL.2014 14:59:47

### HIGH BAND EDGE BLOCK-16QAM



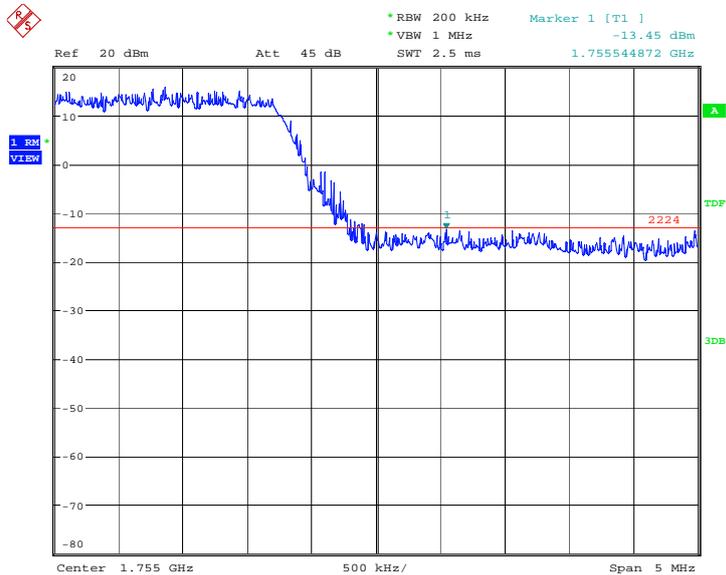
Date: 25.JUL.2014 15:02:48

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



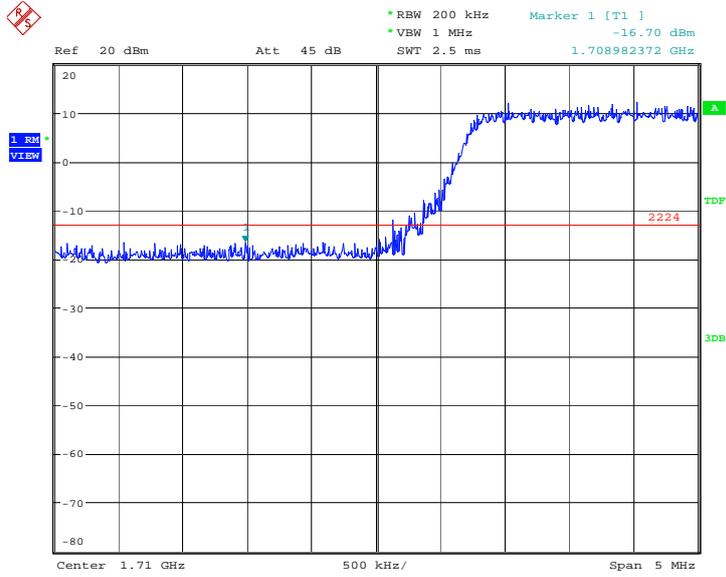
Date: 25.JUL.2014 15:05:08

**HIGH BAND EDGE BLOCK-QPSK**



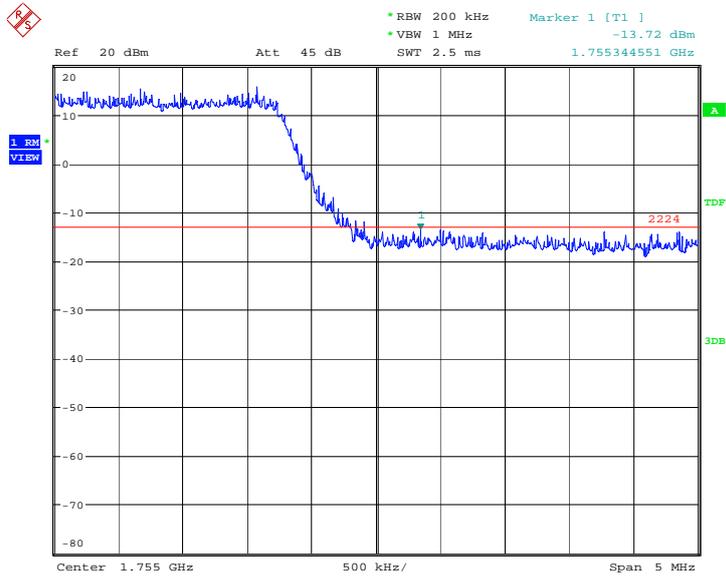
Date: 25.JUL.2014 15:45:27

### LOW BAND EDGE BLOCK-16QAM



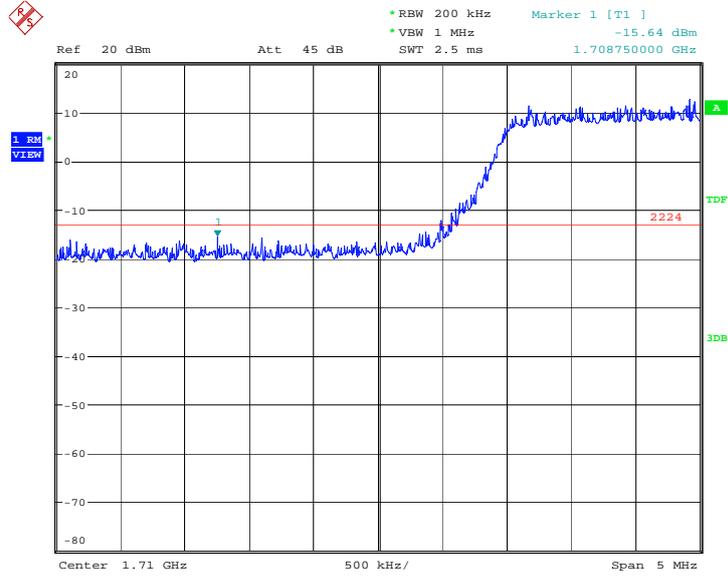
Date: 25.JUL.2014 15:05:18

### HIGH BAND EDGE BLOCK-16QAM



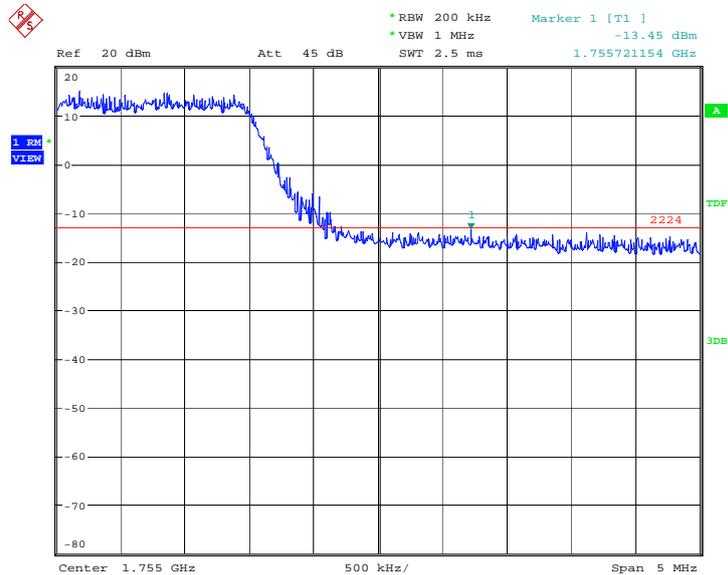
Date: 25.JUL.2014 15:07:49

**LTE band 4, 20MHz  
LOW BAND EDGE BLOCK-QPSK**



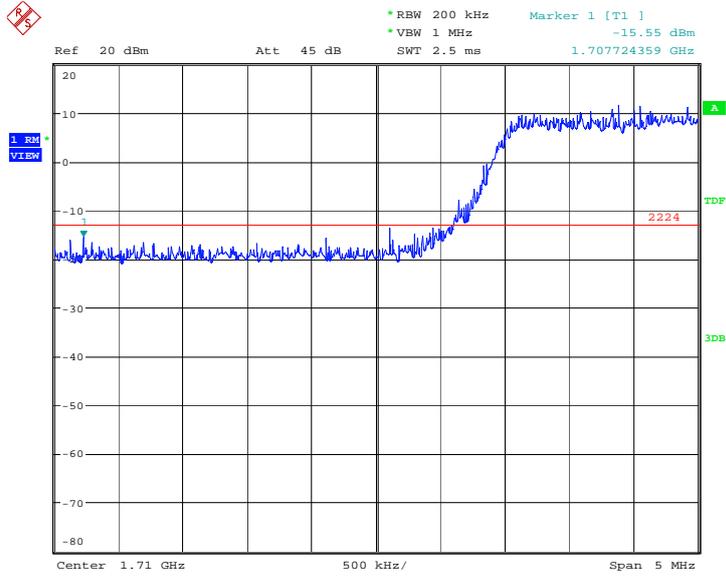
Date: 25.JUL.2014 15:10:39

**HIGH BAND EDGE BLOCK-QPSK**



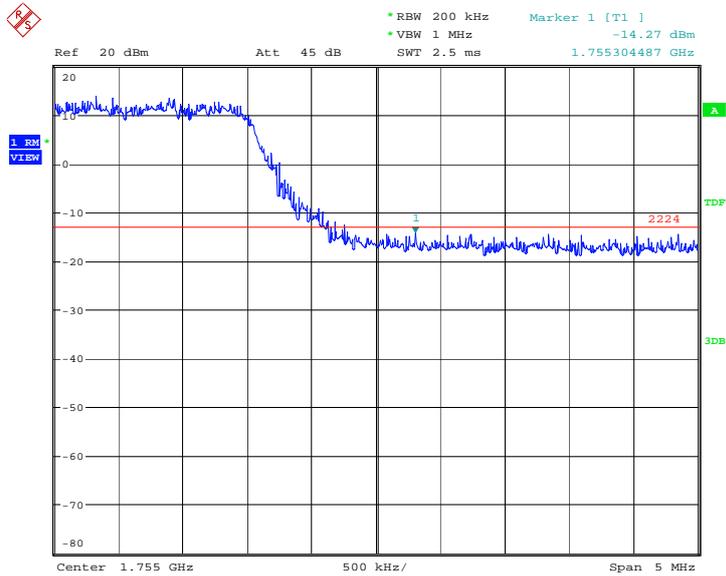
Date: 25.JUL.2014 15:12:39

### LOW BAND EDGE BLOCK-16QAM



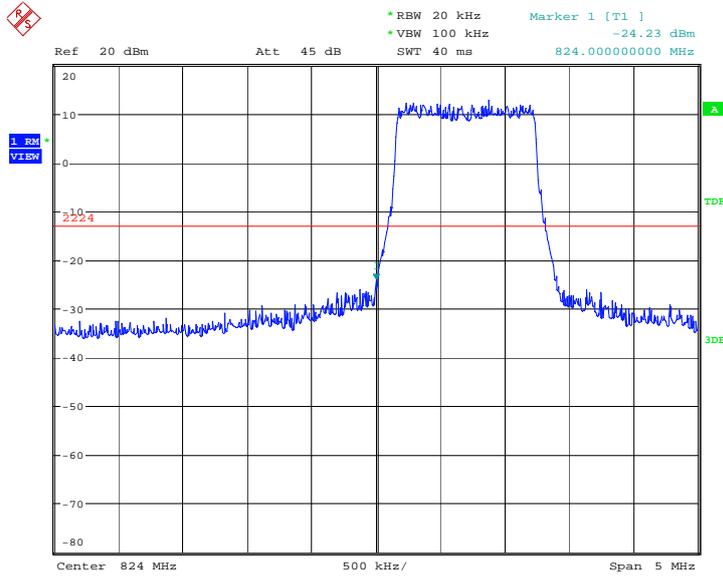
Date: 25.JUL.2014 15:10:49

### HIGH BAND EDGE BLOCK-16QAM



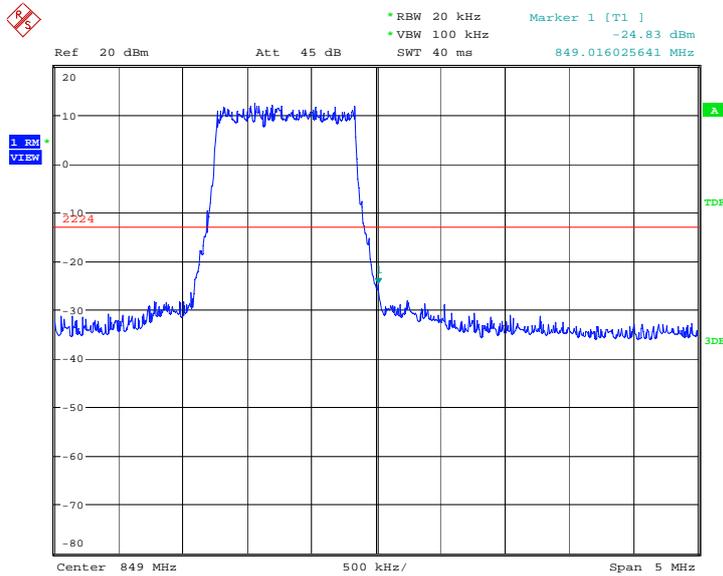
Date: 25.JUL.2014 15:12:50

**LTE band 5, 1.4MHz**  
**LOW BAND EDGE BLOCK-QPSK**



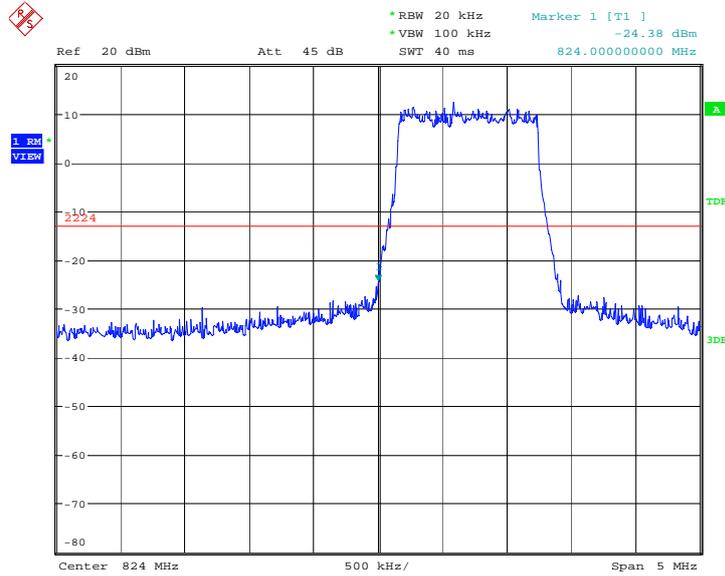
Date: 25.JUL.2014 13:49:38

**HIGH BAND EDGE BLOCK-QPSK**



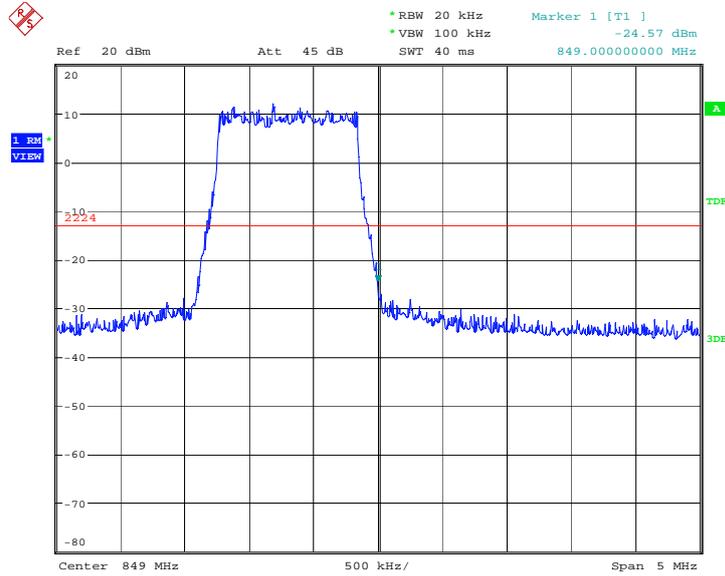
Date: 25.JUL.2014 13:51:07

### LOW BAND EDGE BLOCK-16QAM



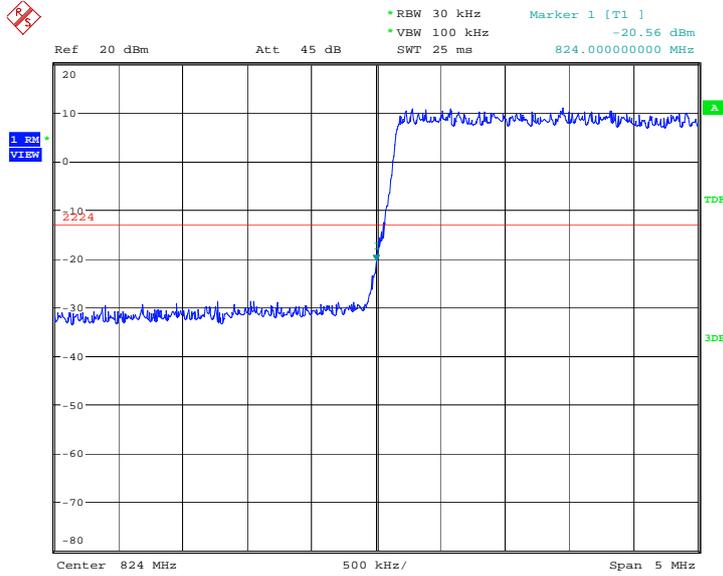
Date: 25.JUL.2014 13:49:49

### HIGH BAND EDGE BLOCK-16QAM



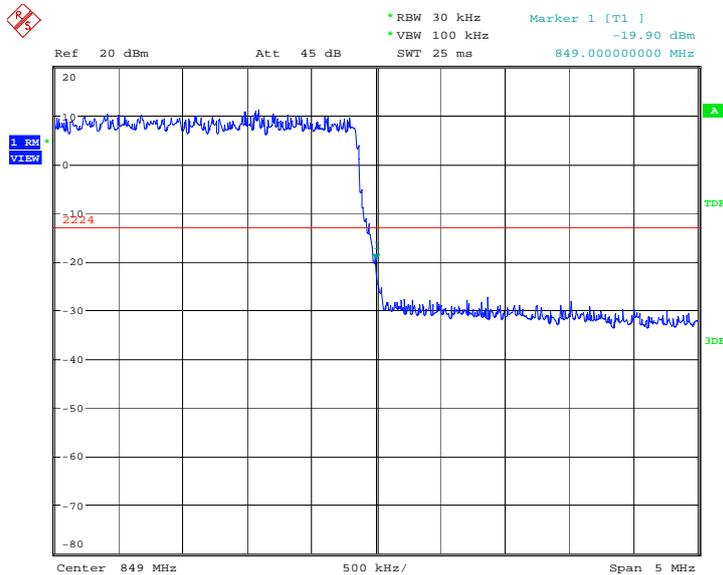
Date: 25.JUL.2014 13:51:17

**LTE band 5, 3MHz  
LOW BAND EDGE BLOCK-QPSK**



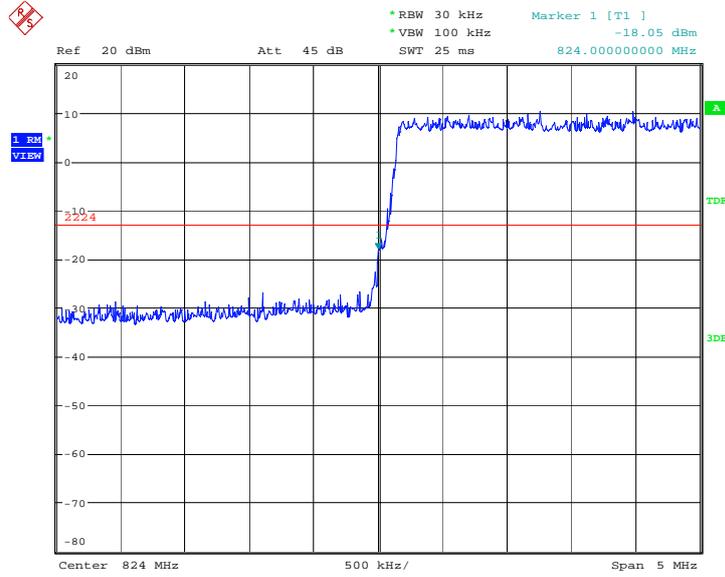
Date: 25.JUL.2014 13:54:08

**HIGH BAND EDGE BLOCK-QPSK**



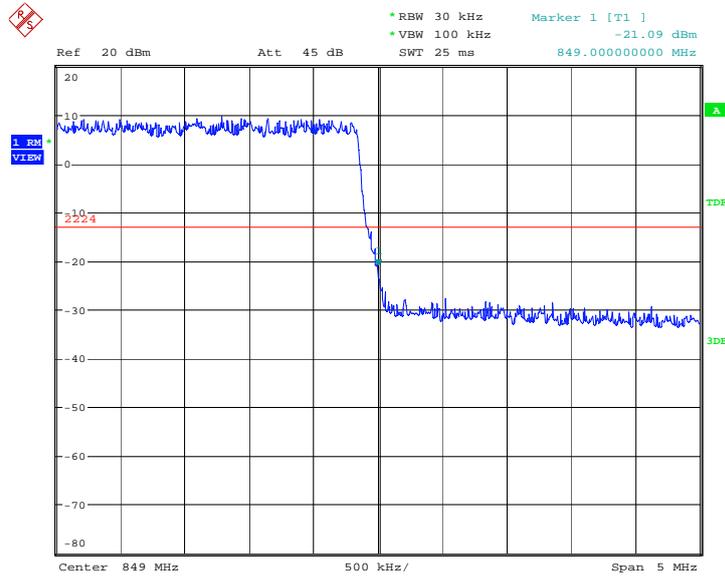
Date: 25.JUL.2014 13:56:39

### LOW BAND EDGE BLOCK-16QAM



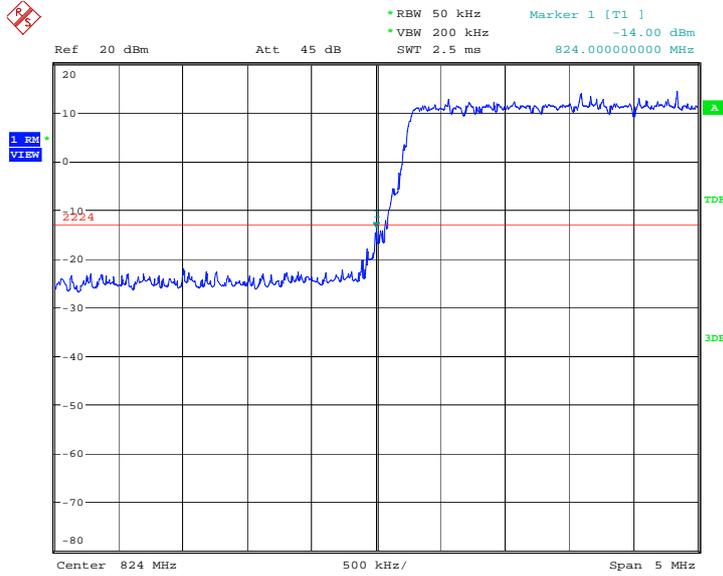
Date: 25.JUL.2014 13:54:18

### HIGH BAND EDGE BLOCK-16QAM



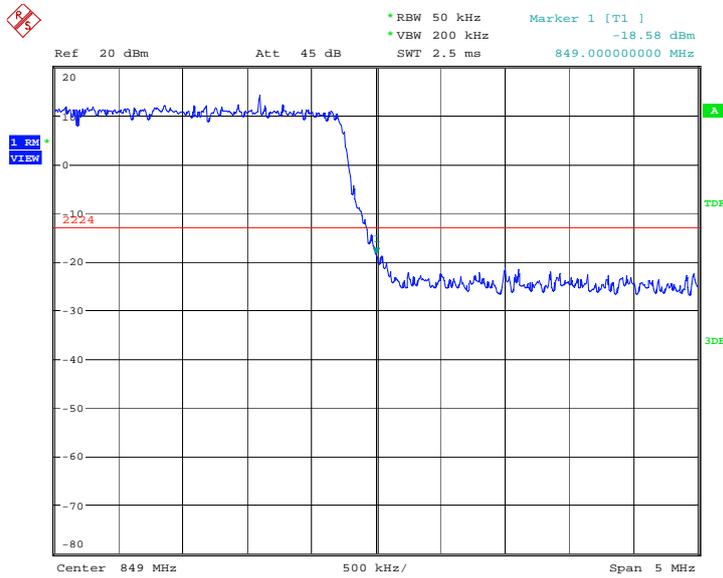
Date: 25.JUL.2014 13:56:49

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



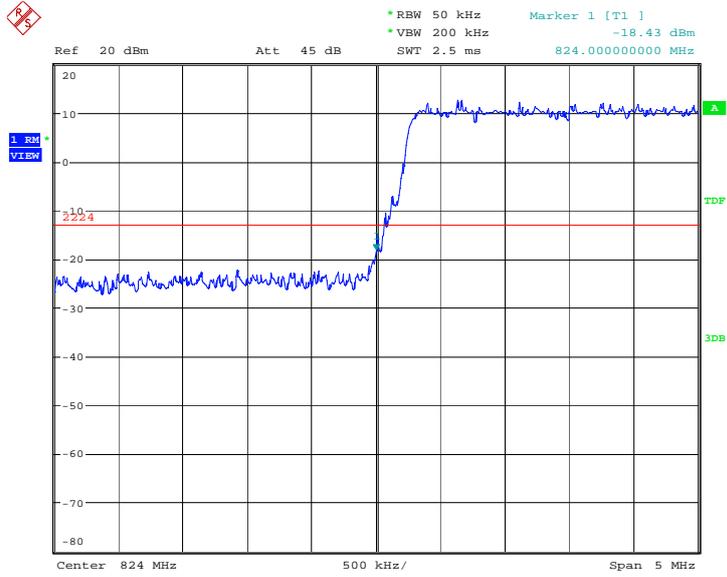
Date: 25.JUL.2014 13:59:09

**HIGH BAND EDGE BLOCK-QPSK**



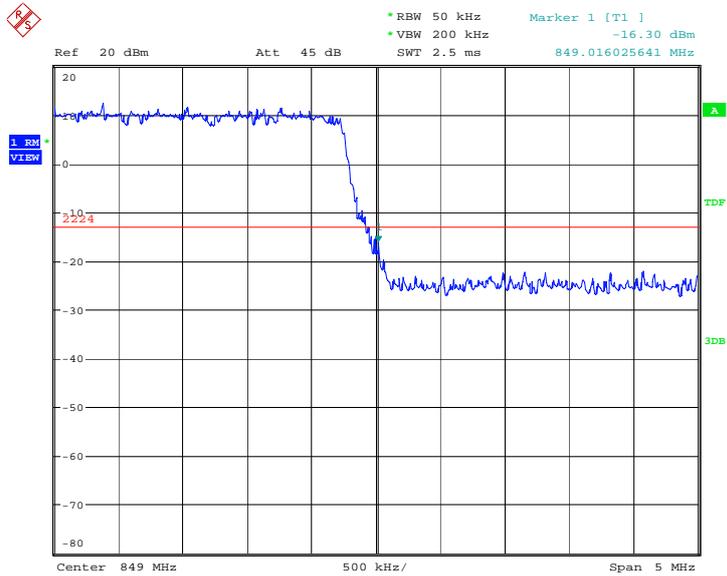
Date: 25.JUL.2014 14:00:40

### LOW BAND EDGE BLOCK-16QAM



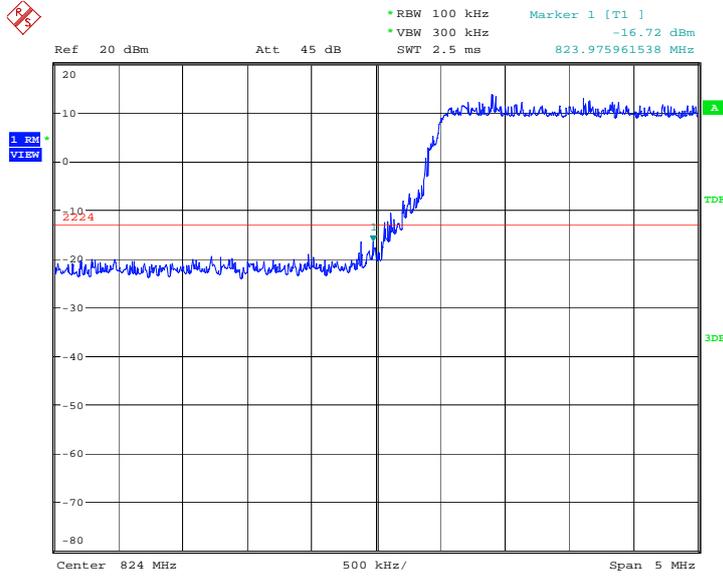
Date: 25.JUL.2014 13:59:19

### HIGH BAND EDGE BLOCK-16QAM



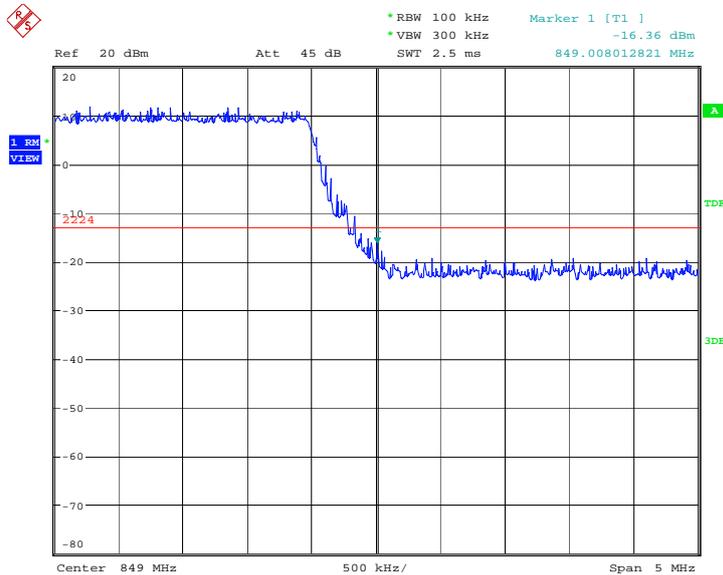
Date: 25.JUL.2014 14:00:50

### LTE band 5, 10MHz LOW BAND EDGE BLOCK-QPSK



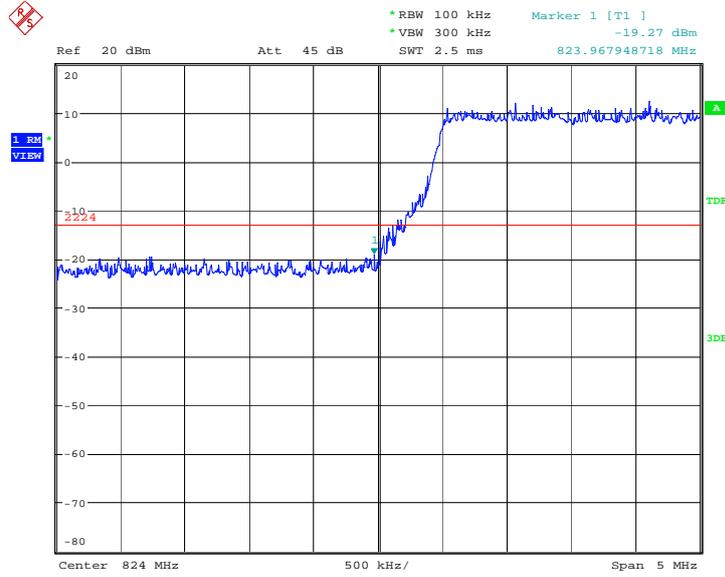
Date: 25.JUL.2014 14:03:43

### HIGH BAND EDGE BLOCK-QPSK



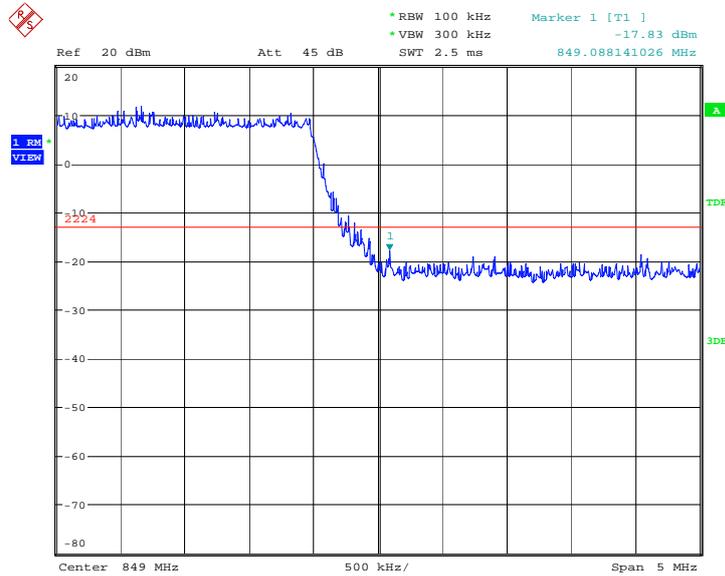
Date: 25.JUL.2014 14:06:13

### LOW BAND EDGE BLOCK-16QAM



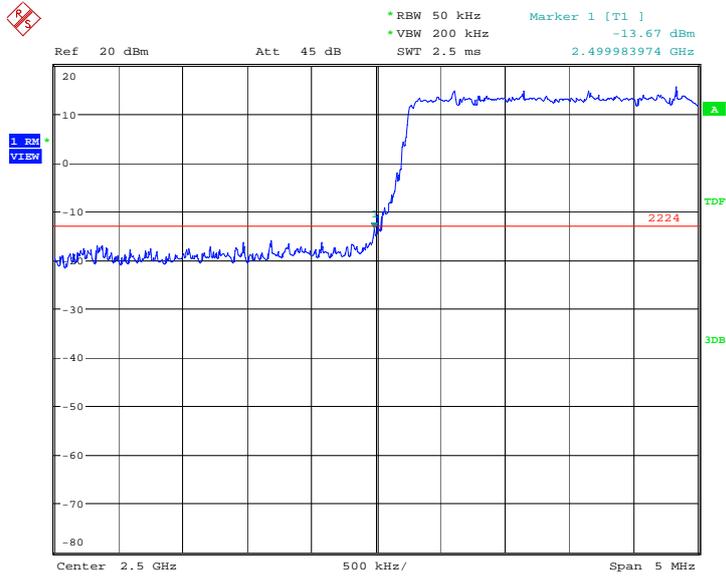
Date: 25.JUL.2014 14:03:53

### HIGH BAND EDGE BLOCK-16QAM



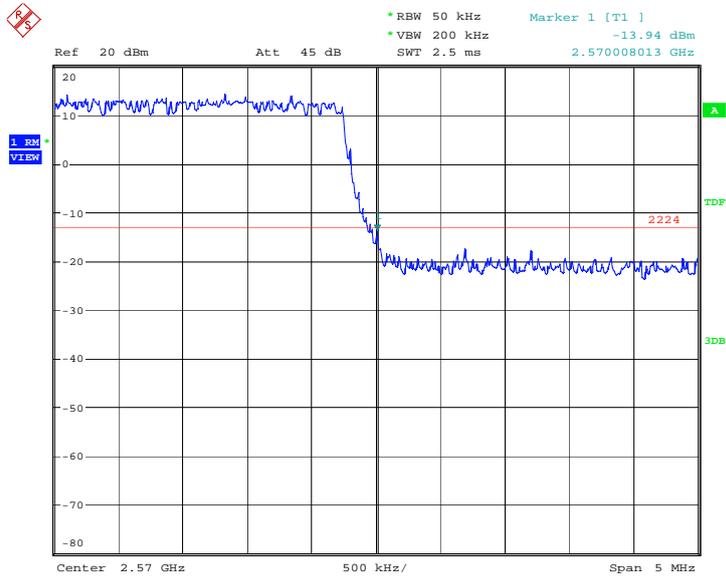
Date: 25.JUL.2014 14:06:23

**LTE band 7, 5MHz  
LOW BAND EDGE BLOCK-QPSK**



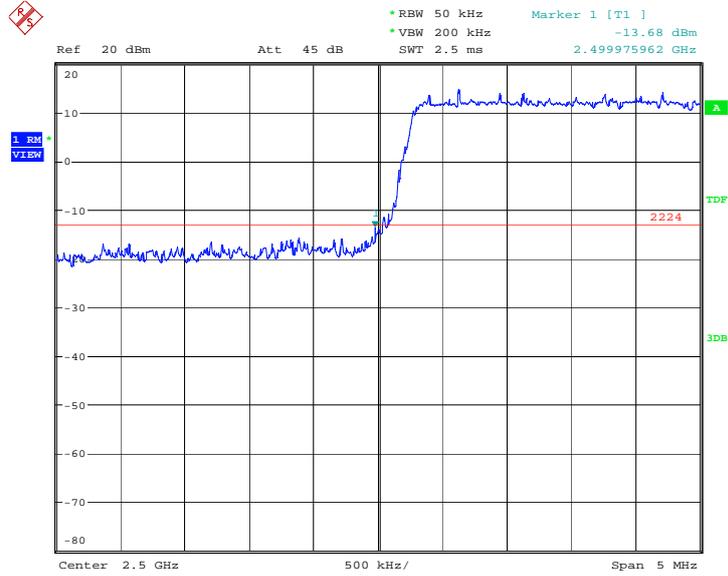
Date: 25.JUL.2014 13:32:59

**HIGH BAND EDGE BLOCK-QPSK**



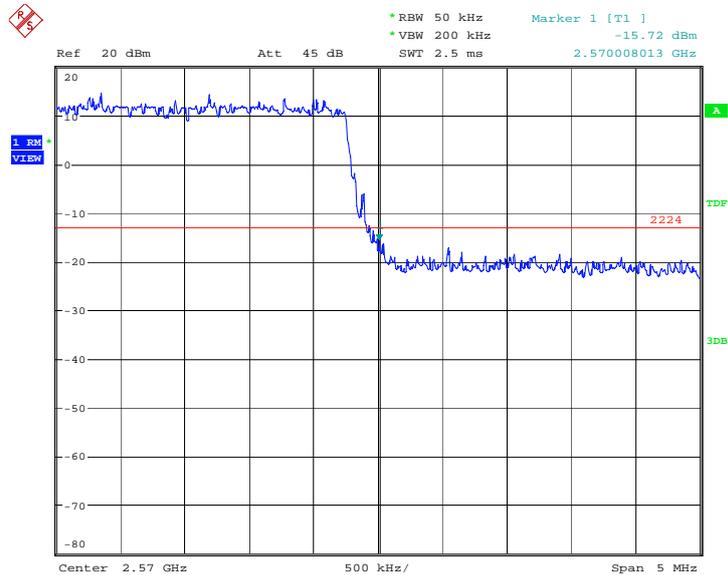
Date: 25.JUL.2014 13:35:29

### LOW BAND EDGE BLOCK-16QAM



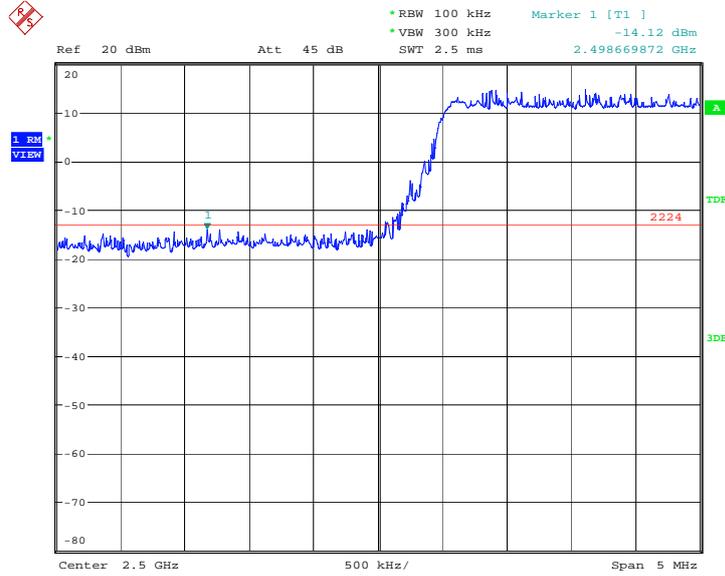
Date: 25.JUL.2014 13:33:10

### HIGH BAND EDGE BLOCK-16QAM



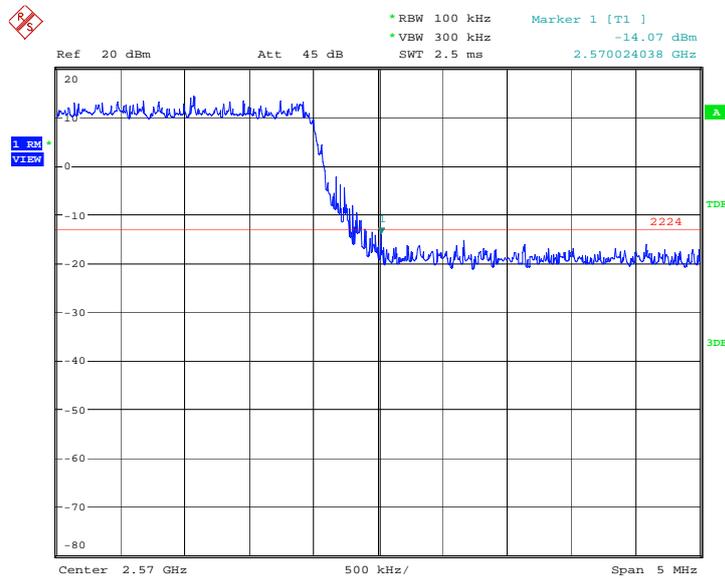
Date: 25.JUL.2014 13:35:39

**LTE band 7, 10MHz  
LOW BAND EDGE BLOCK-QPSK**



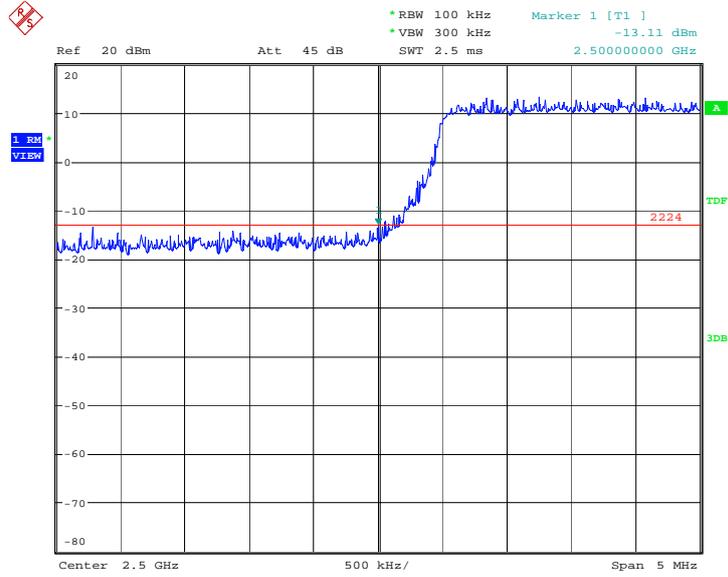
Date: 25.JUL.2014 13:36:28

**HIGH BAND EDGE BLOCK-QPSK**



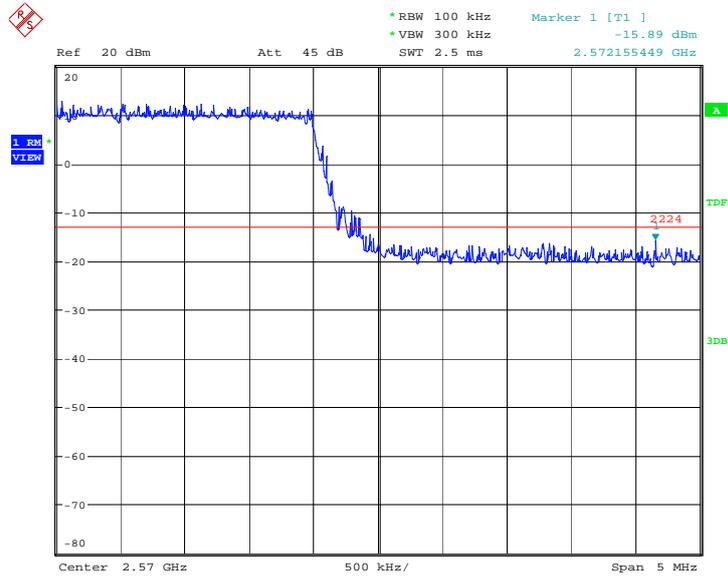
Date: 25.JUL.2014 13:38:59

### LOW BAND EDGE BLOCK-16QAM



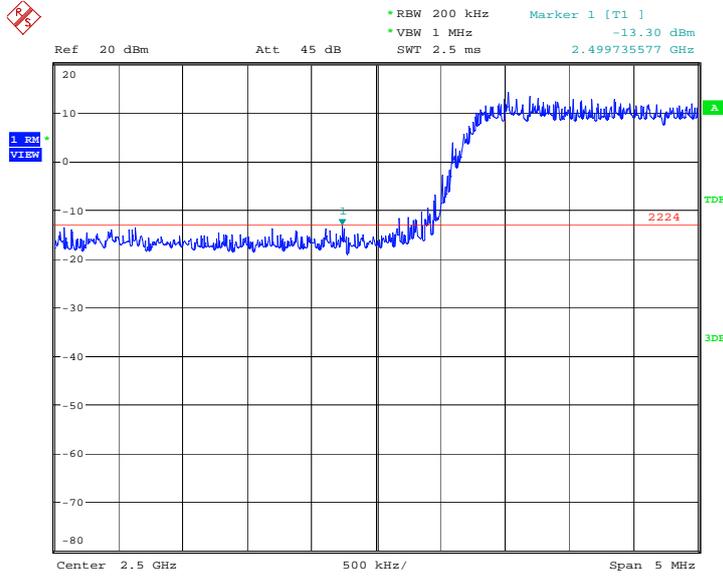
Date: 25.JUL.2014 13:36:38

### HIGH BAND EDGE BLOCK-16QAM



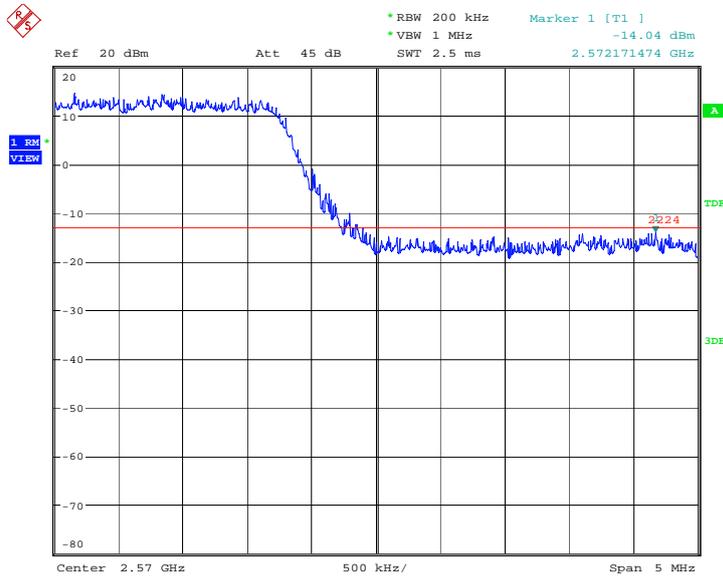
Date: 25.JUL.2014 13:39:09

**LTE band 7, 15MHz  
LOW BAND EDGE BLOCK-QPSK**



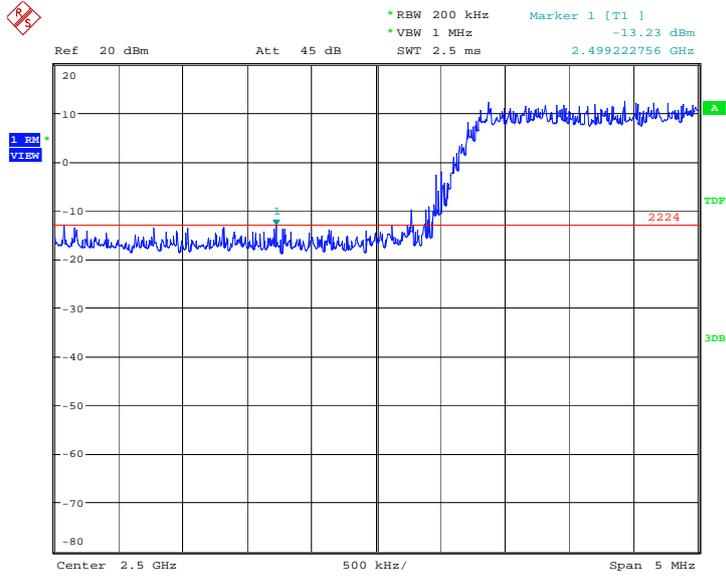
Date: 25.JUL.2014 15:55:24

**HIGH BAND EDGE BLOCK-QPSK**



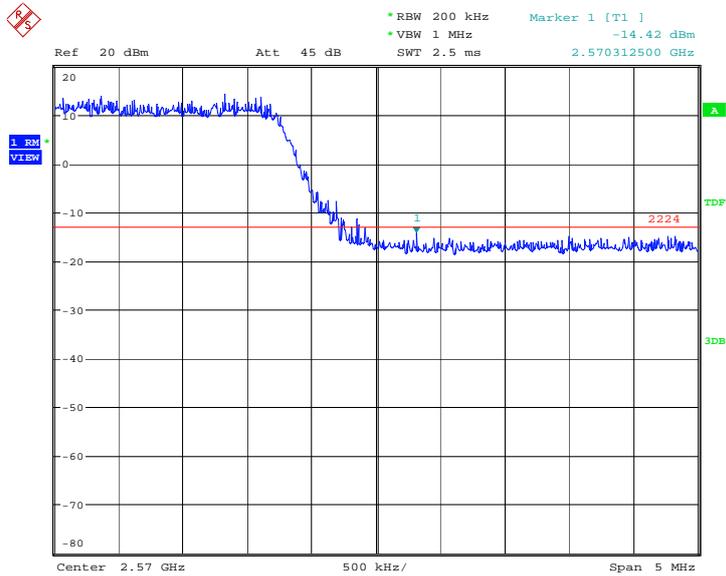
Date: 25.JUL.2014 13:42:28

### LOW BAND EDGE BLOCK-16QAM



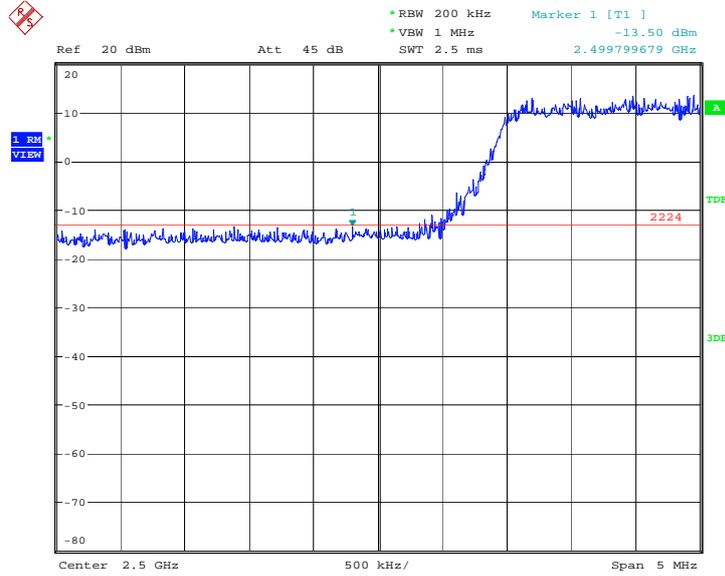
Date: 25.JUL.2014 15:49:29

### HIGH BAND EDGE BLOCK-16QAM



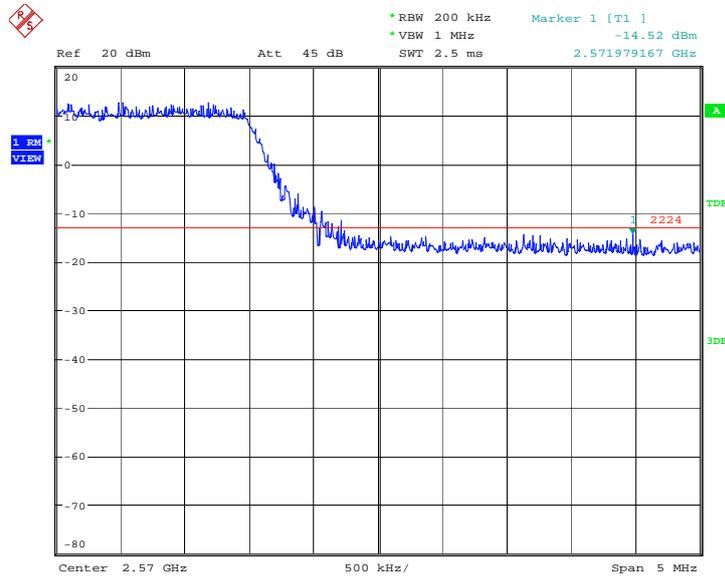
Date: 25.JUL.2014 13:42:39

**LTE band 7, 20MHz  
LOW BAND EDGE BLOCK-QPSK**



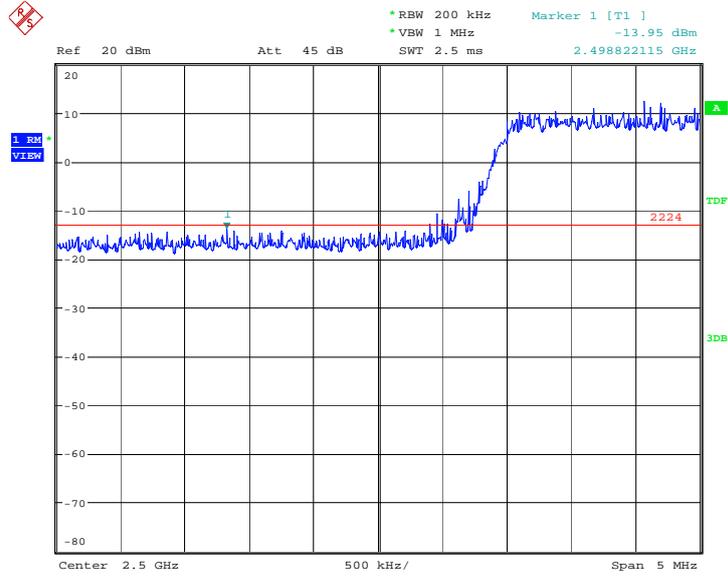
Date: 25.JUL.2014 13:45:29

**HIGH BAND EDGE BLOCK-QPSK**



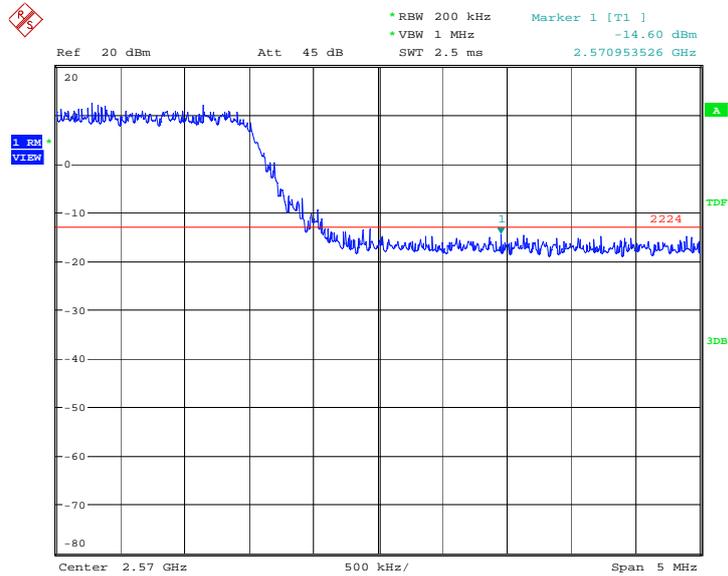
Date: 25.JUL.2014 13:47:31

### LOW BAND EDGE BLOCK-16QAM



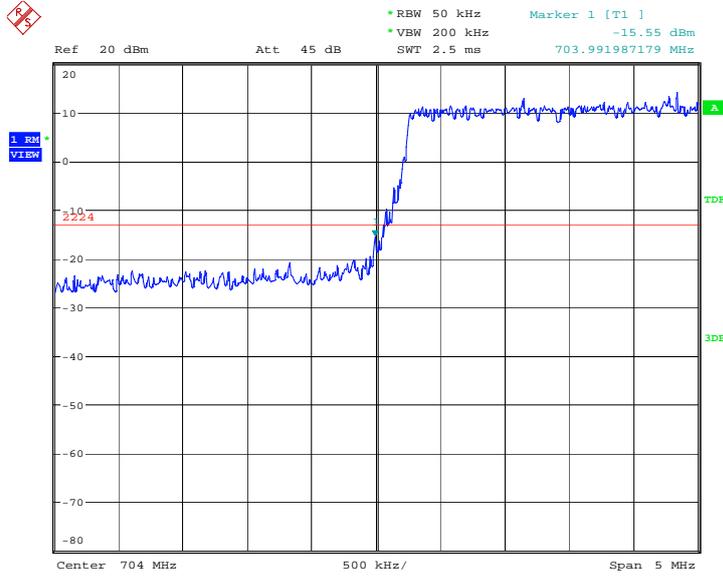
Date: 25.JUL.2014 16:07:26

### HIGH BAND EDGE BLOCK-16QAM



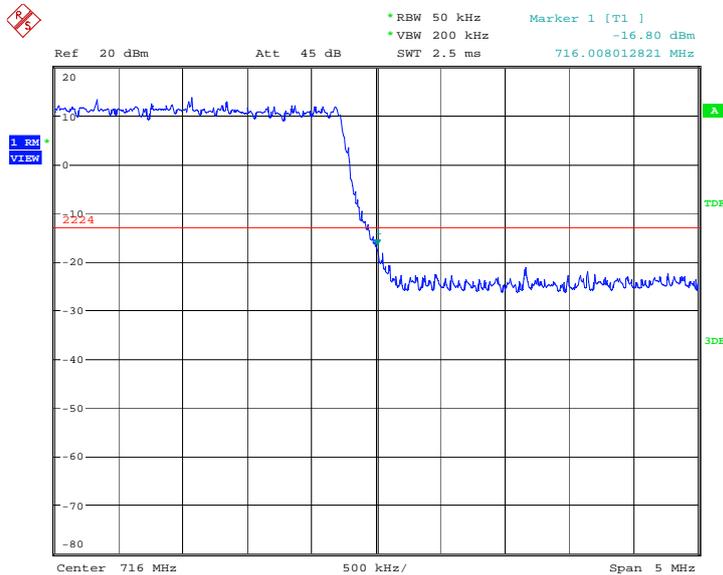
Date: 25.JUL.2014 13:47:41

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



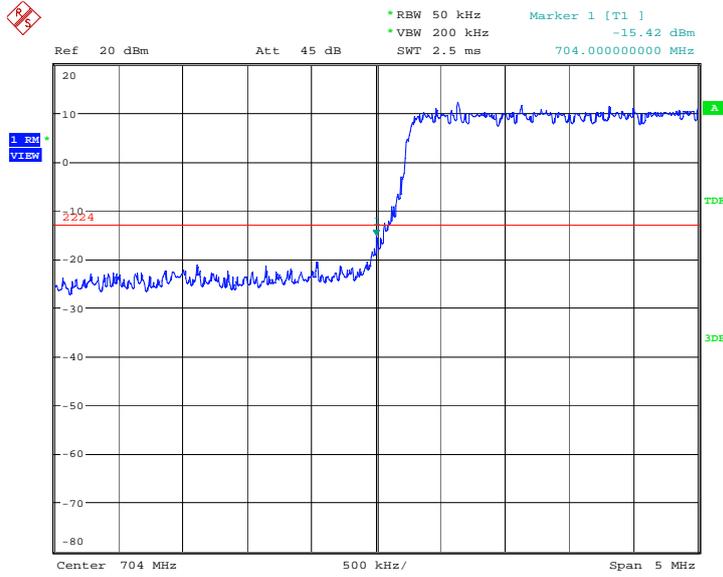
Date: 25.JUL.2014 15:14:13

**HIGH BAND EDGE BLOCK-QPSK**



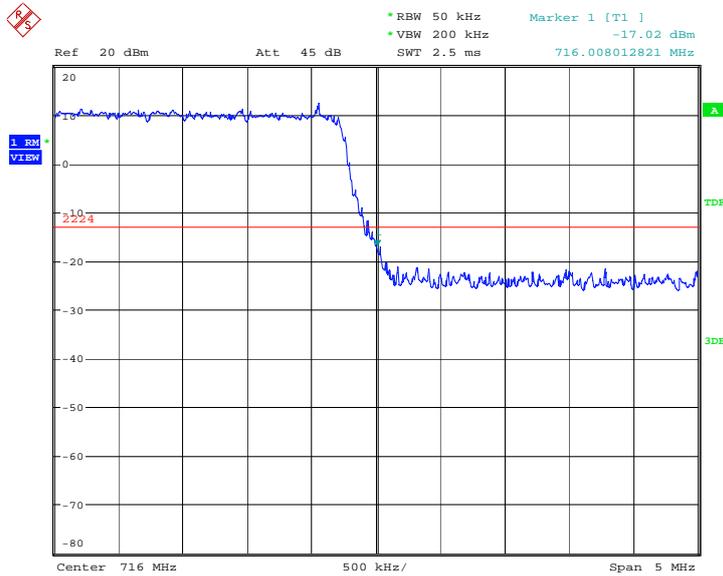
Date: 25.JUL.2014 15:18:13

### LOW BAND EDGE BLOCK-16QAM



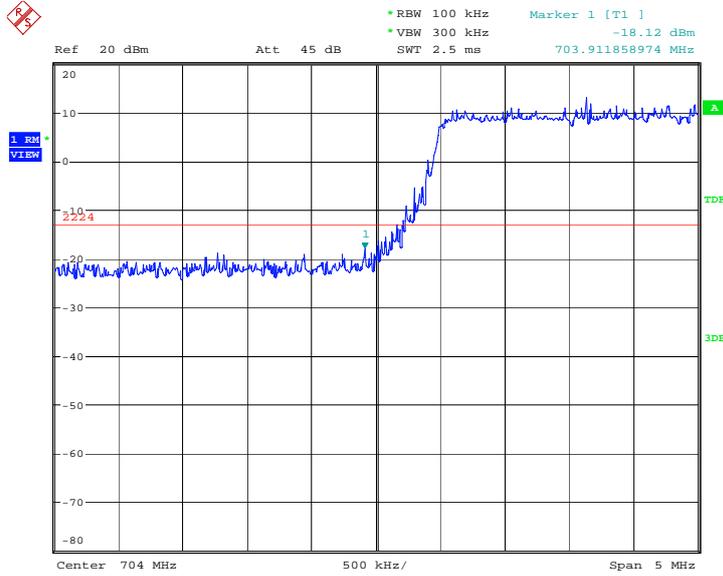
Date: 25.JUL.2014 15:14:23

### HIGH BAND EDGE BLOCK-16QAM



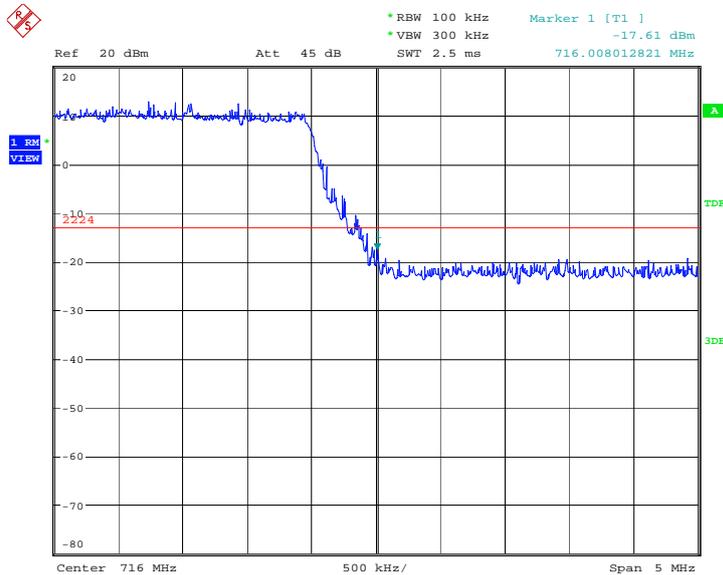
Date: 25.JUL.2014 15:18:23

**LTE band 17, 10MHz  
LOW BAND EDGE BLOCK-QPSK**



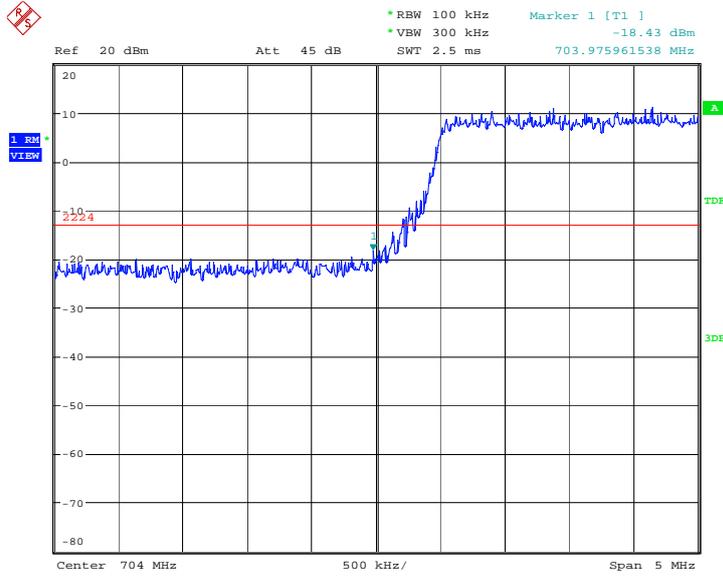
Date: 25.JUL.2014 15:20:43

**HIGH BAND EDGE BLOCK-QPSK**



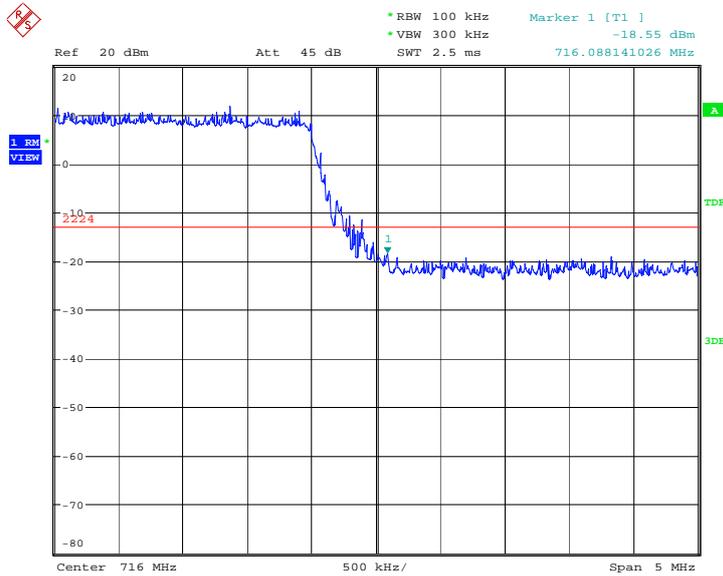
Date: 25.JUL.2014 15:22:43

### LOW BAND EDGE BLOCK-16QAM



Date: 25.JUL.2014 15:20:53

### HIGH BAND EDGE BLOCK-16QAM



Date: 25.JUL.2014 15:22:54

## **A.8 CONDUCTED SPURIOUS EMISSION**

### **Reference**

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

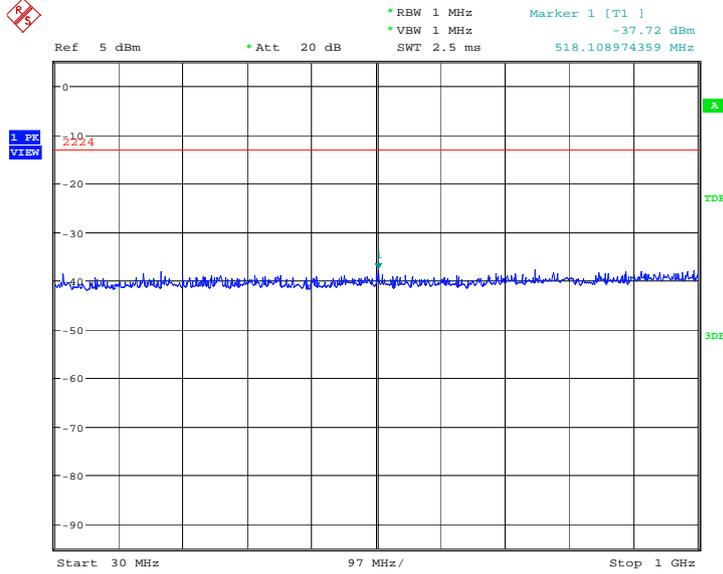
The specification that emissions shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of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

### **A. 8.3 Measurement result**

Measurement Uncertainty: 0.3dB

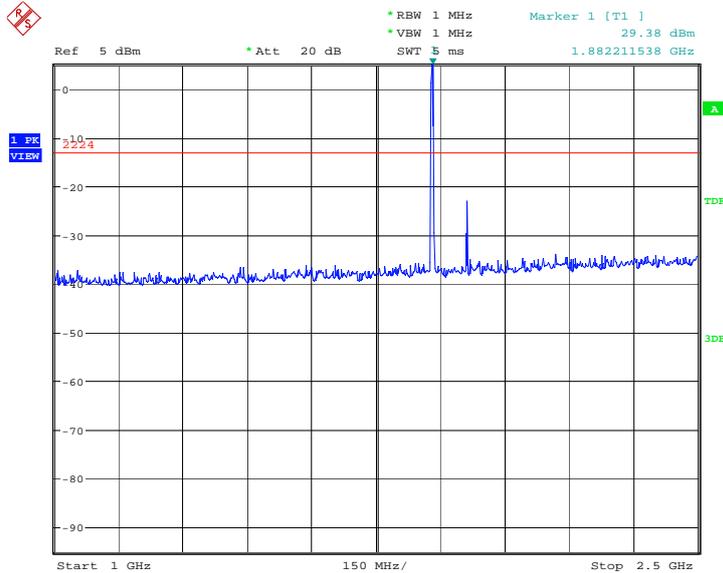
Only worst cases are given below.

**LTE band 2, 20MHz bandwidth**  
**RB:1 Offset:High**  
**QPSK: 30MHz – 1GHz**  
 Spurious emission limit –13dBm.



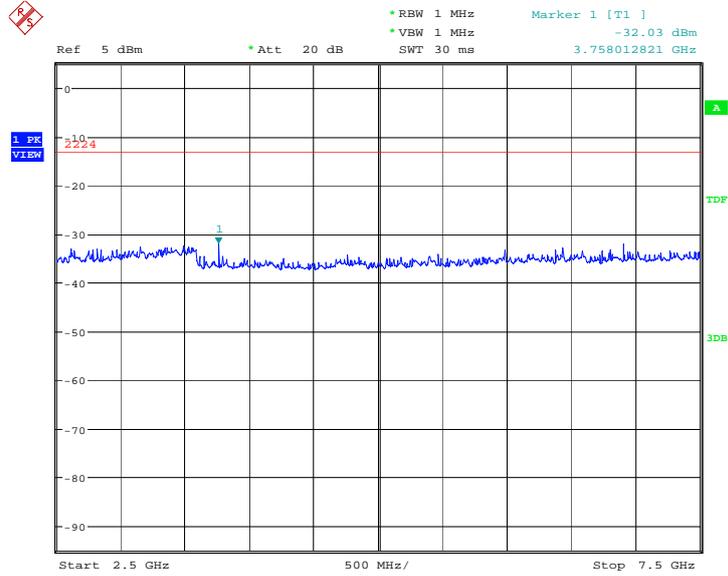
Date: 25.JUL.2014 09:44:27

**QPSK: 1GHz – 2.5GHz**  
 Spurious emission limit –13dBm.



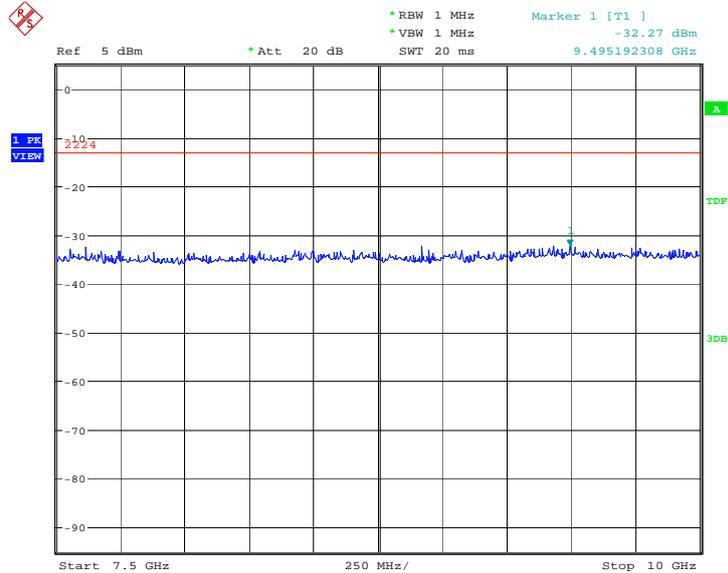
Date: 25.JUL.2014 09:44:35

**QPSK: 2.5GHz – 7.5GHz**  
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:44:43

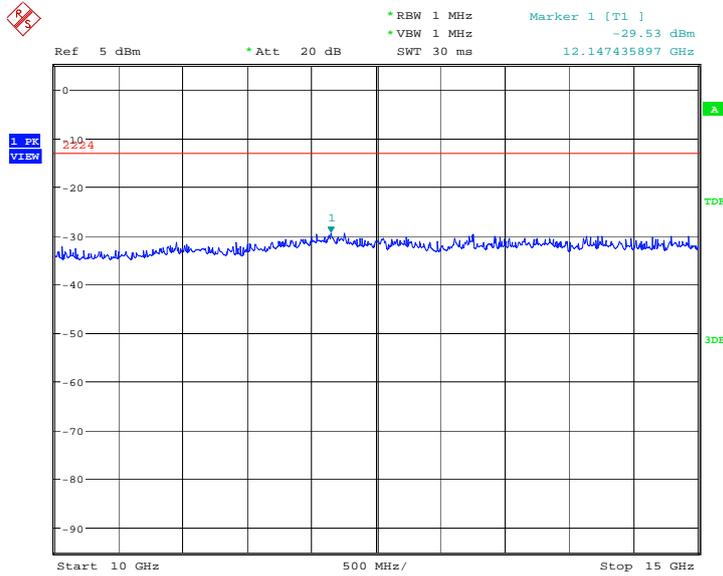
**QPSK: 7.5GHz –10GHz**  
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:44:51

**QPSK: 10GHz –15GHz**

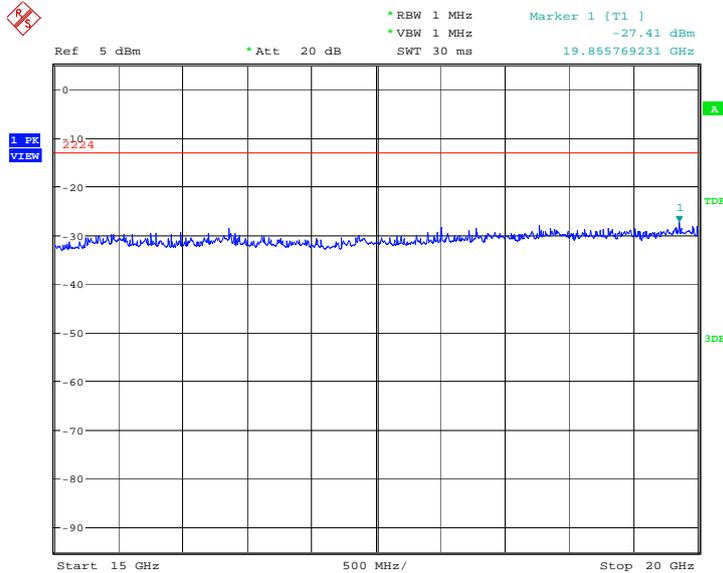
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:44:59

**QPSK: 15GHz –20GHz**

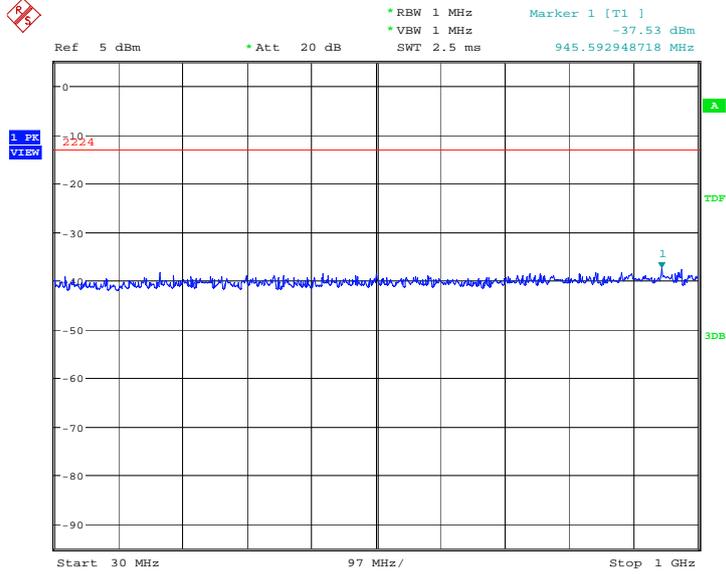
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:45:07

**16QAM: 30MHz – 1GHz**

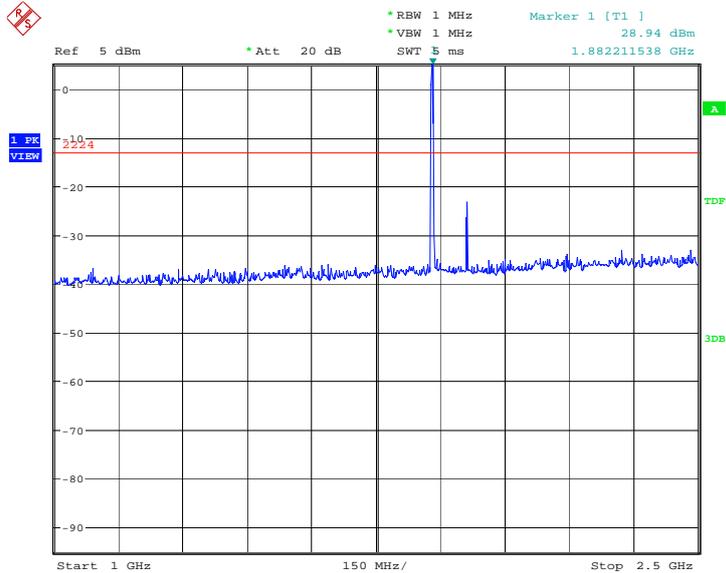
Spurious emission limit –13dBm.



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

**16QAM: 1GHz – 2.5GHz**

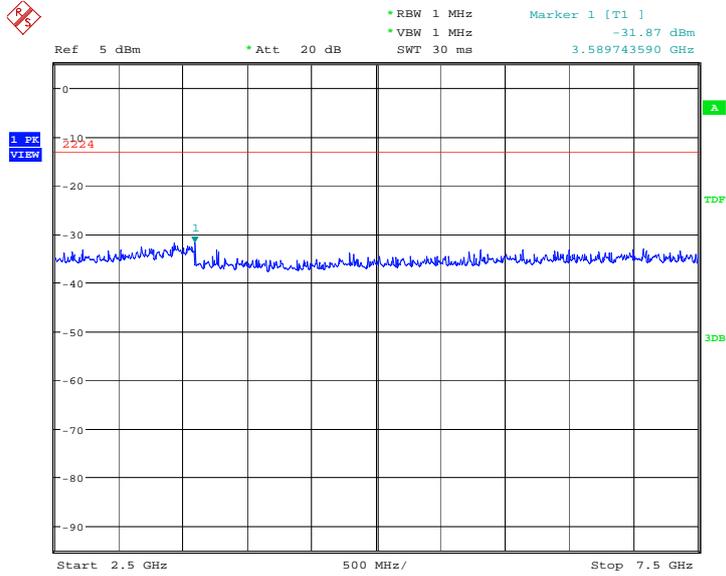
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:45:25

**16QAM: 2.5GHz – 7.5GHz**

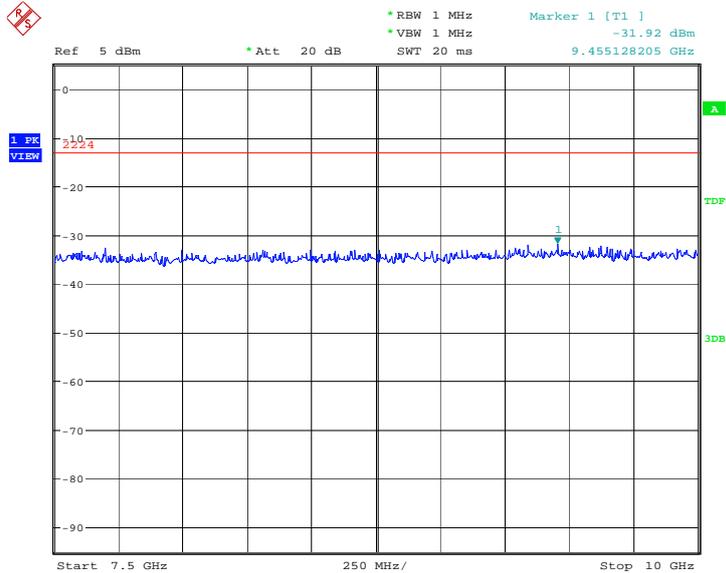
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:45:33

**16QAM: 7.5GHz – 10GHz**

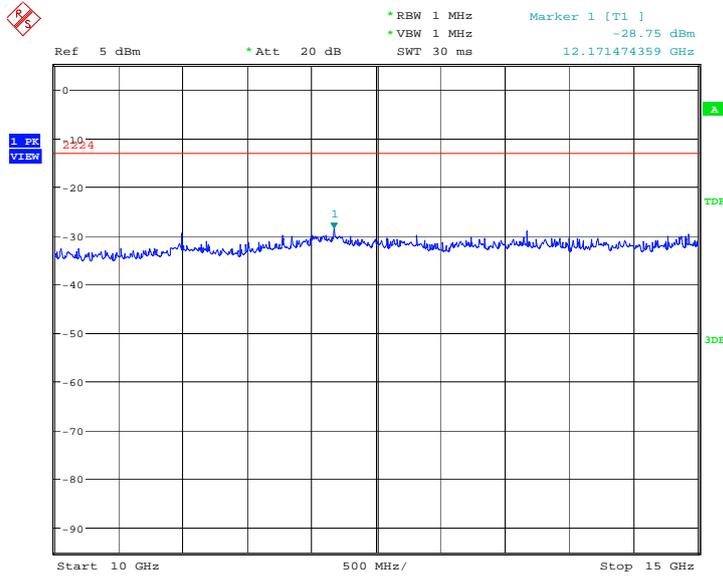
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:45:41

**16QAM: 10GHz –15GHz**

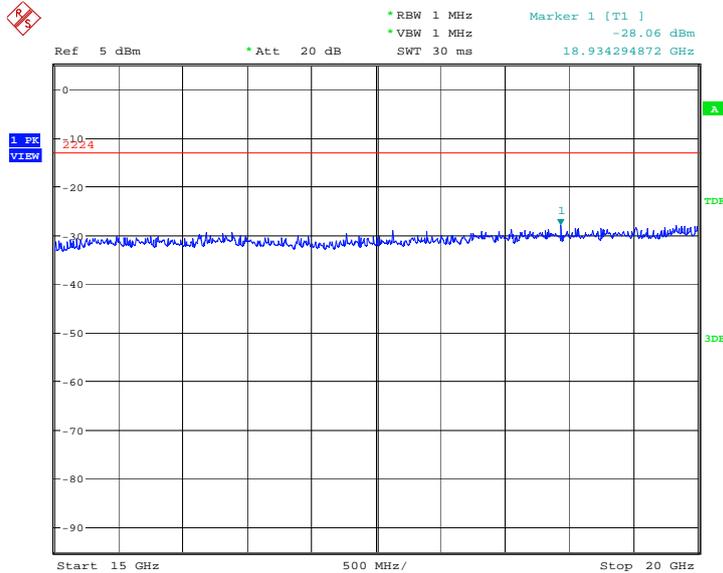
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:45:49

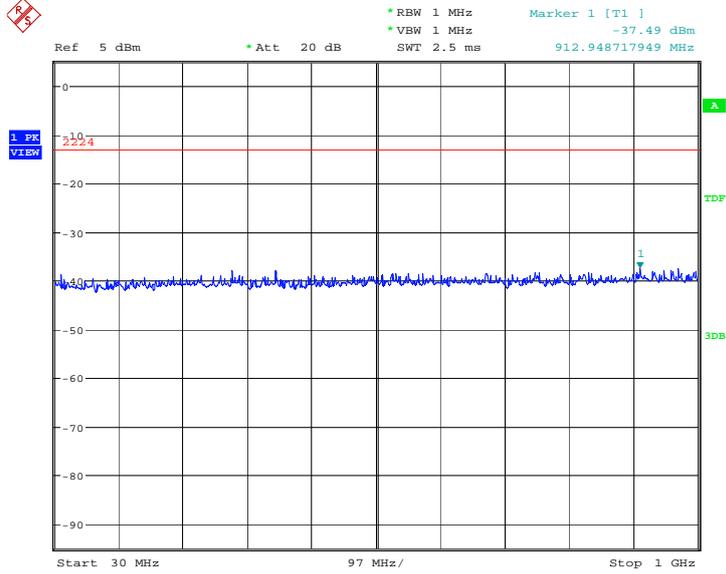
**16QAM: 15GHz –20GHz**

Spurious emission limit –13dBm.



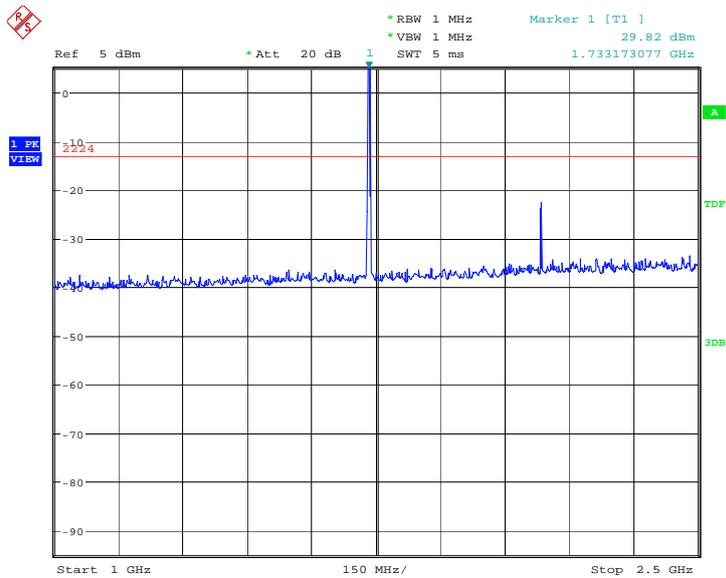
Date: 25.JUL.2014 09:45:58

**LTE band 4, 20MHz bandwidth**  
**RB:1 Offset:High**  
**QPSK: 30MHz – 1GHz**  
 Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:49:24

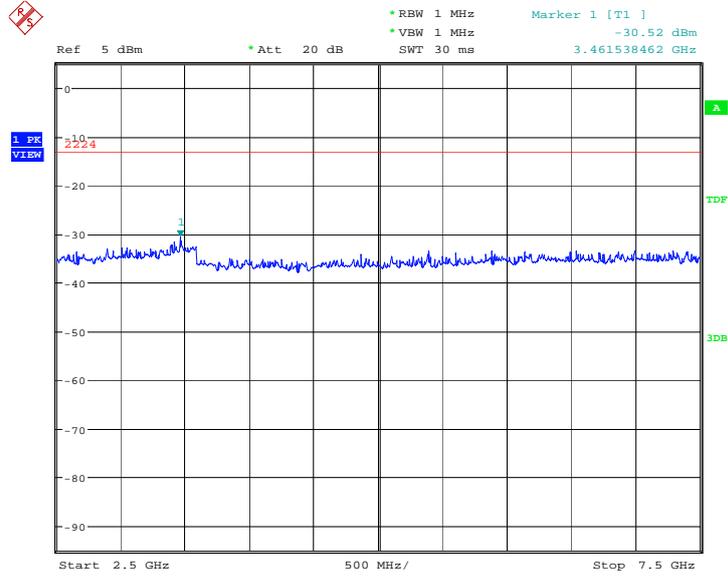
**QPSK: 1GHz – 2.5GHz**  
 Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:49:32

**QPSK: 2.5GHz – 7.5GHz**

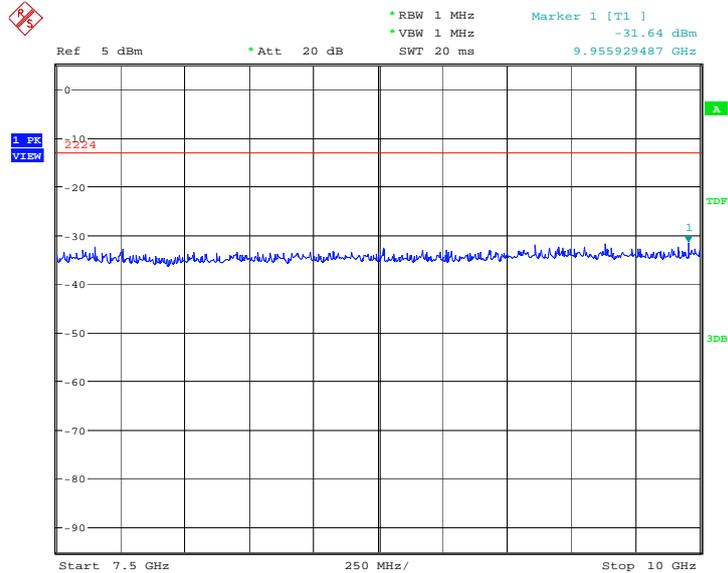
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:49:40

**QPSK: 7.5GHz –10GHz**

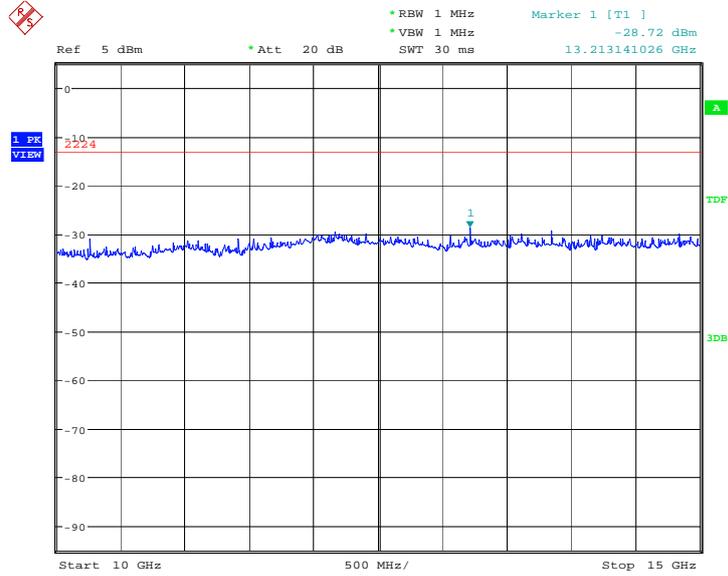
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:49:48

**QPSK: 10GHz –15GHz**

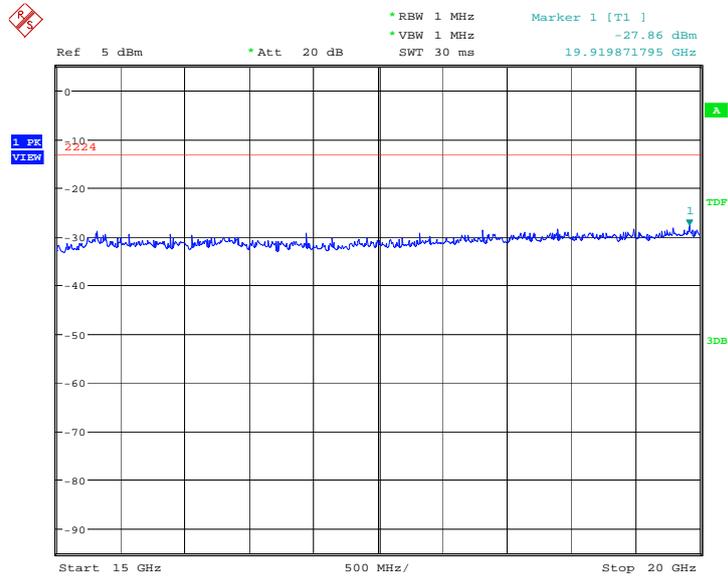
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:49:56

**QPSK: 15GHz –20GHz**

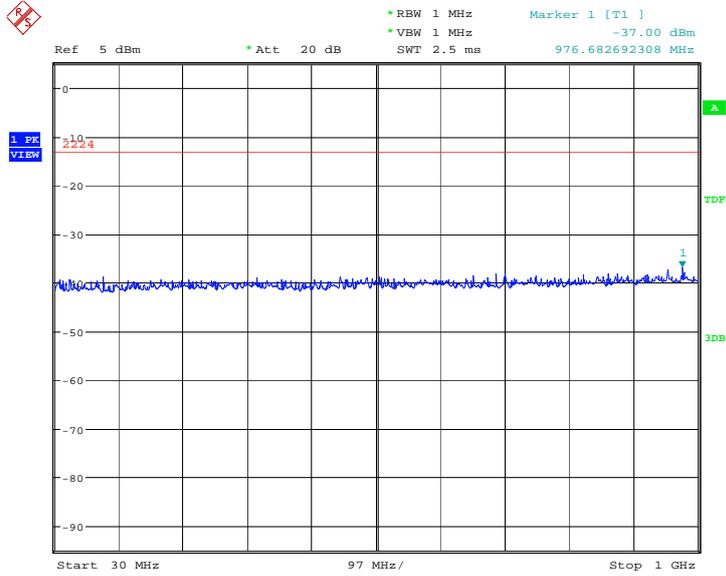
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:50:04

**16QAM: 30MHz – 1GHz**

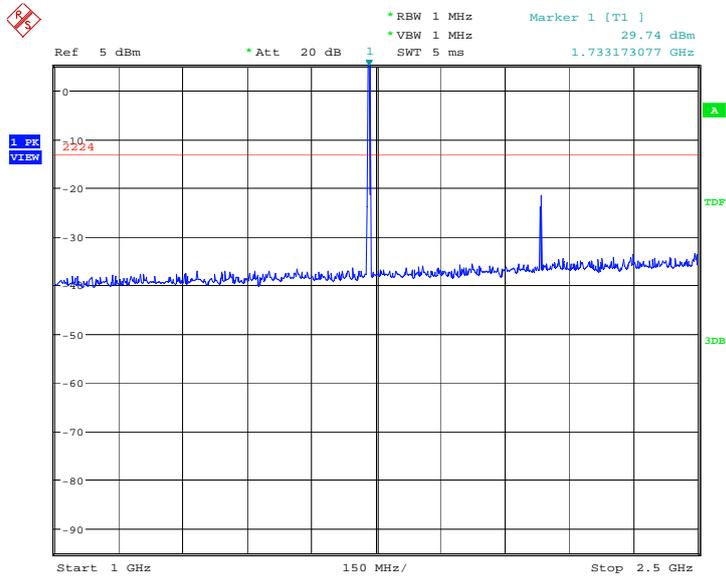
Spurious emission limit -13dBm.



Date: 25.JUL.2014 09:50:14

**16QAM: 1GHz – 2.5GHz**

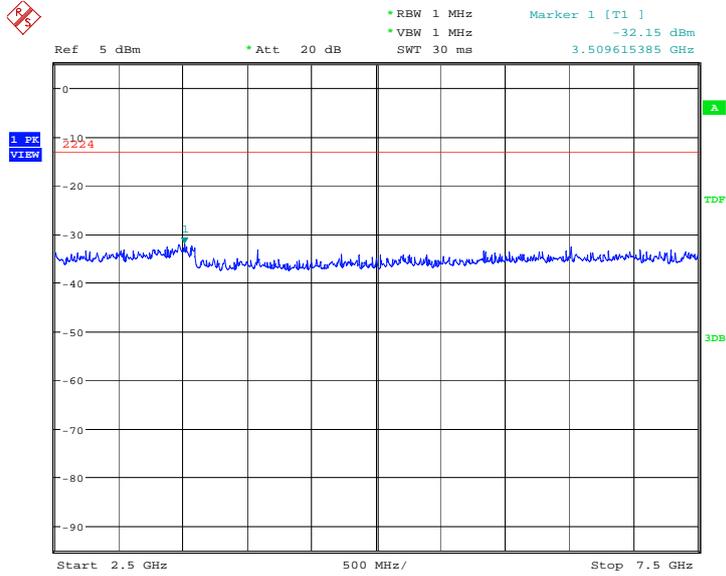
Spurious emission limit -13dBm.



Date: 25.JUL.2014 09:50:22

**16QAM: 2.5GHz – 7.5GHz**

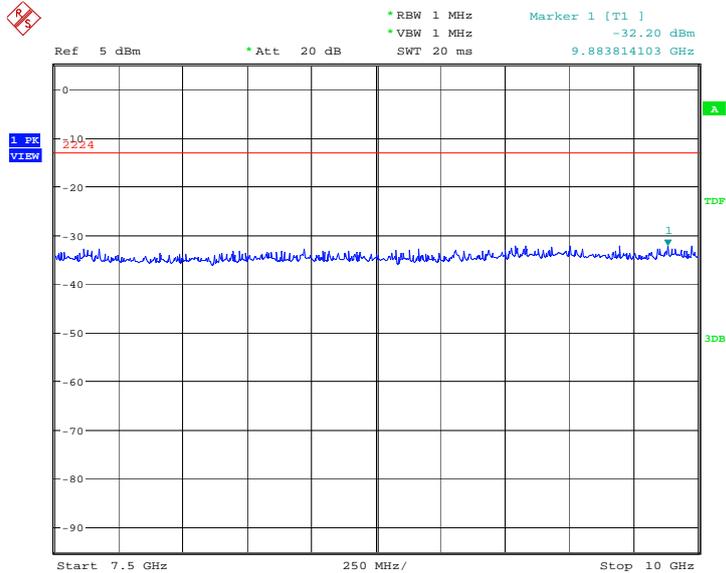
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:50:30

**16QAM: 7.5GHz – 10GHz**

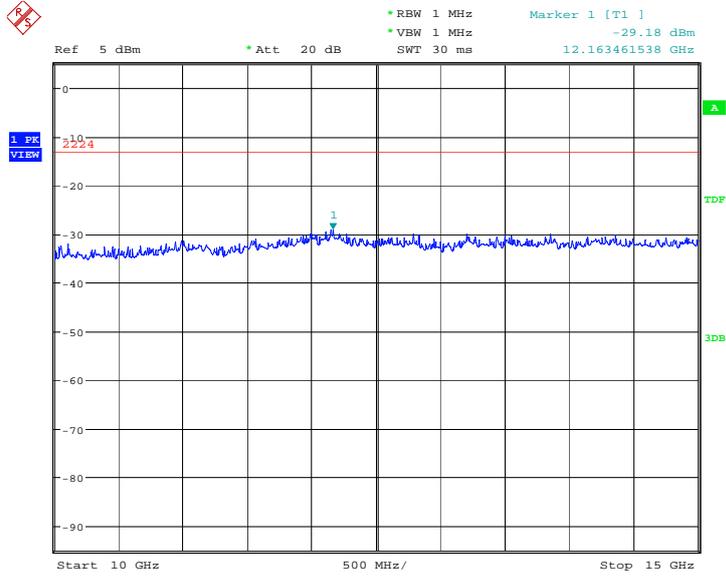
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:50:38

### 16QAM: 10GHz –15GHz

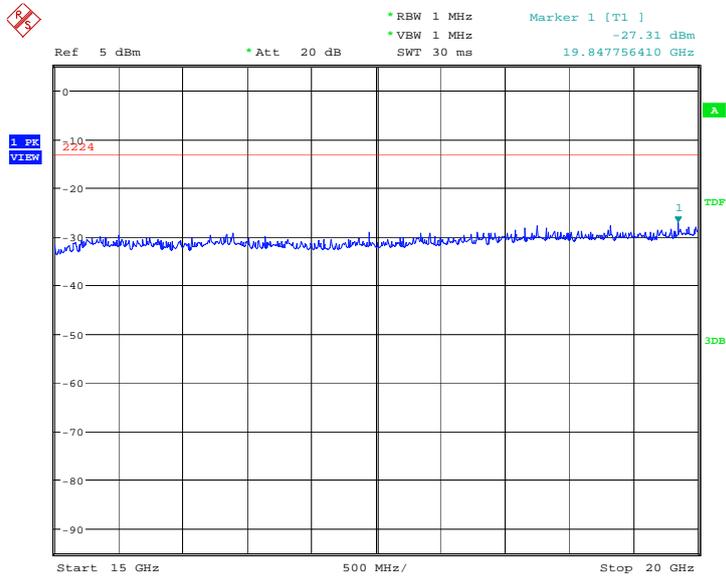
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:50:46

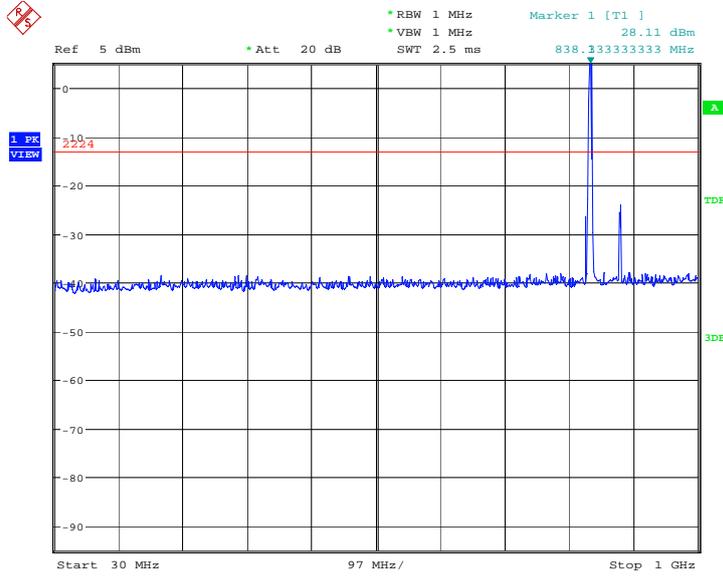
### 16QAM: 15GHz –20GHz

Spurious emission limit –13dBm.



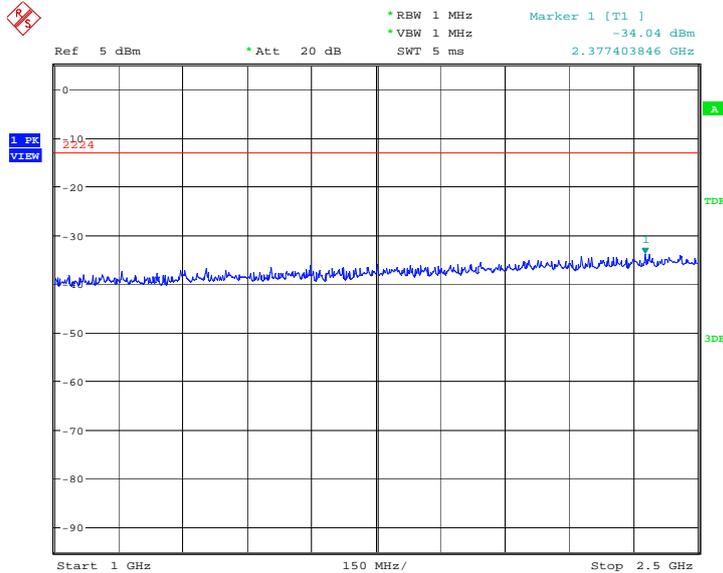
Date: 25.JUL.2014 09:50:54

**LTE band 5, 1.4MHz bandwidth**  
**RB:1 Offset:Low**  
**QPSK: 30MHz – 1GHz**  
 Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:39:19

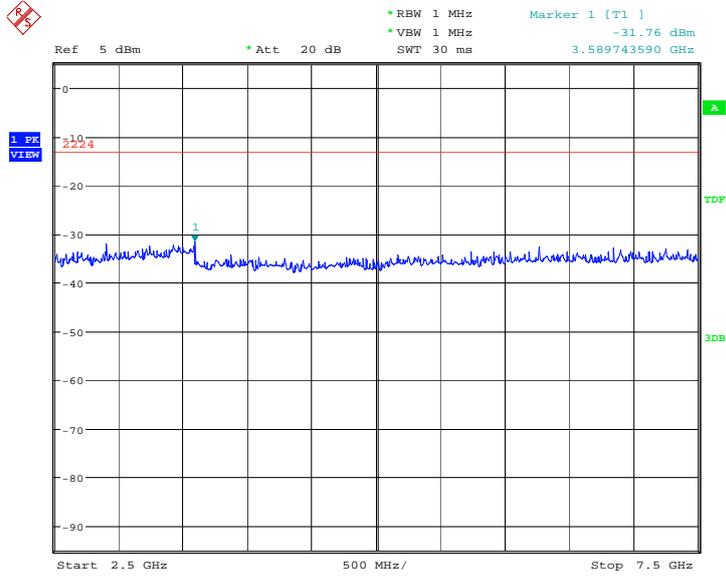
**QPSK: 1GHz – 2.5GHz**  
 Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:39:27

**QPSK: 2.5GHz – 7.5GHz**

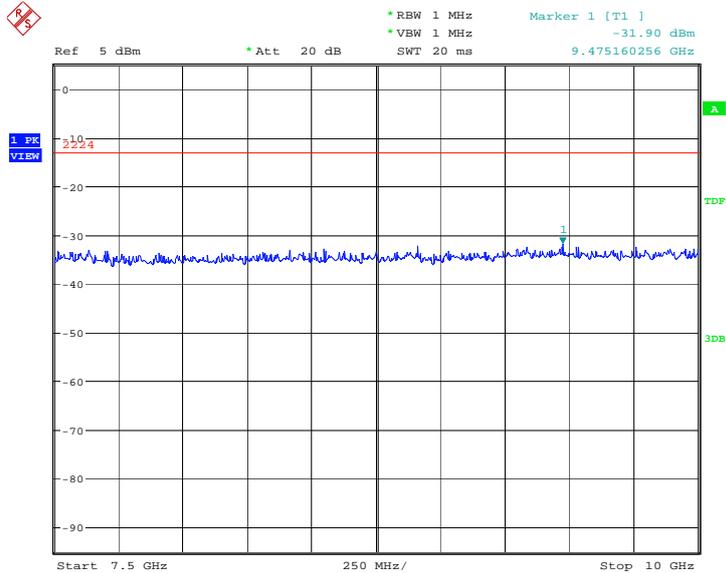
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:39:35

**QPSK: 7.5GHz –10GHz**

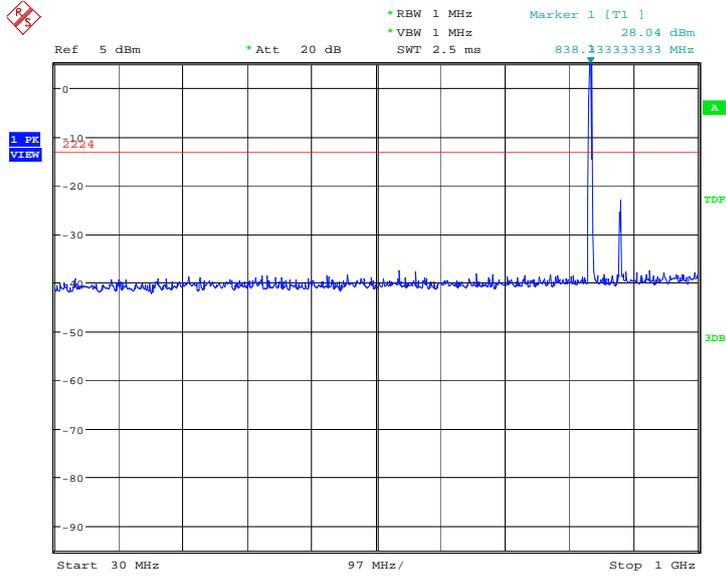
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:39:43

**16QAM: 30MHz – 1GHz**

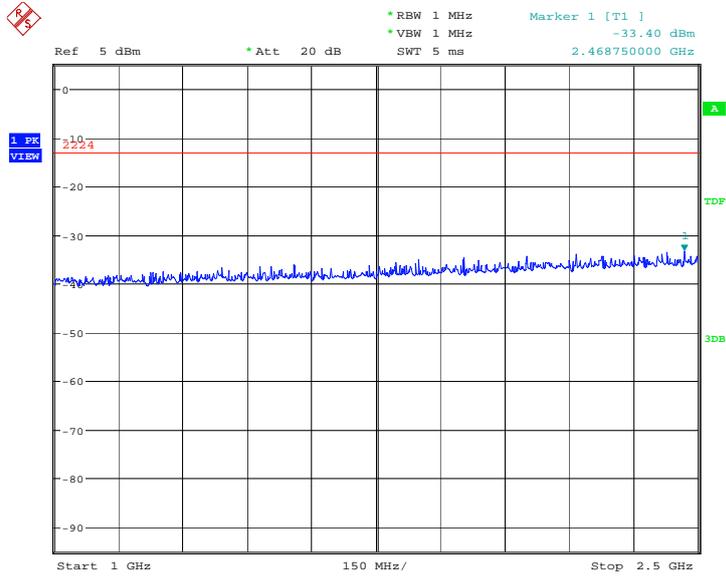
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:39:53

**16QAM: 1GHz – 2.5GHz**

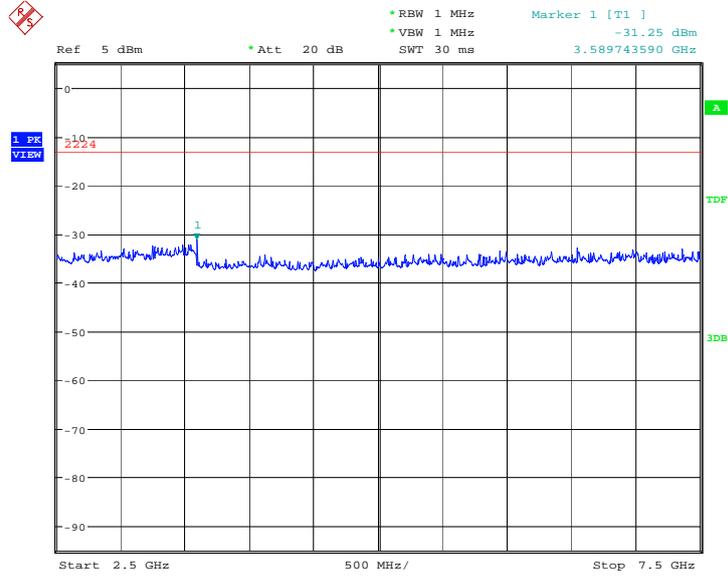
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:40:01

**16QAM: 2.5GHz – 7.5GHz**

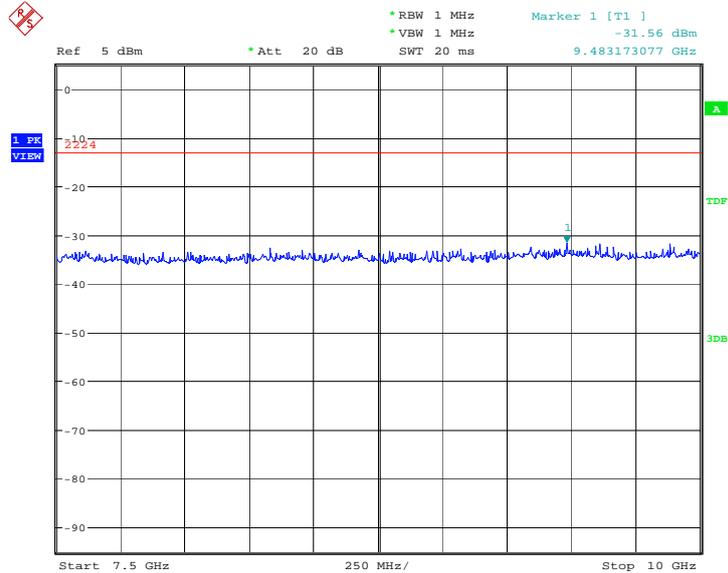
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:40:09

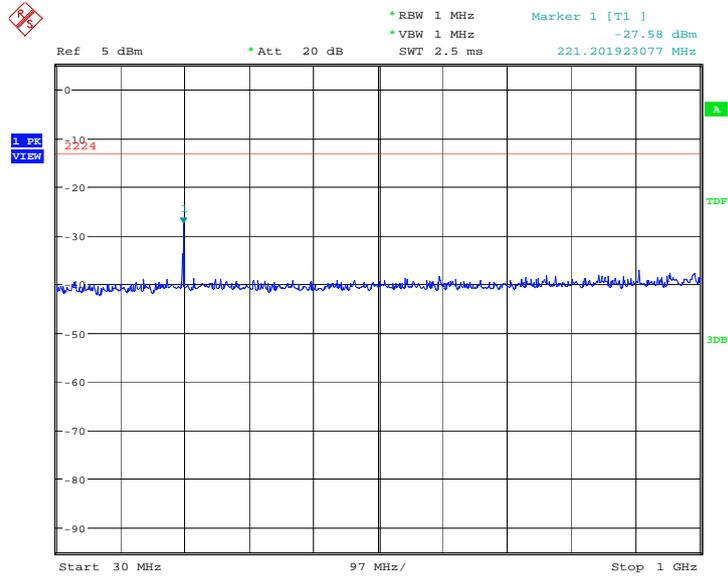
**16QAM: 7.5GHz – 10GHz**

Spurious emission limit –13dBm.



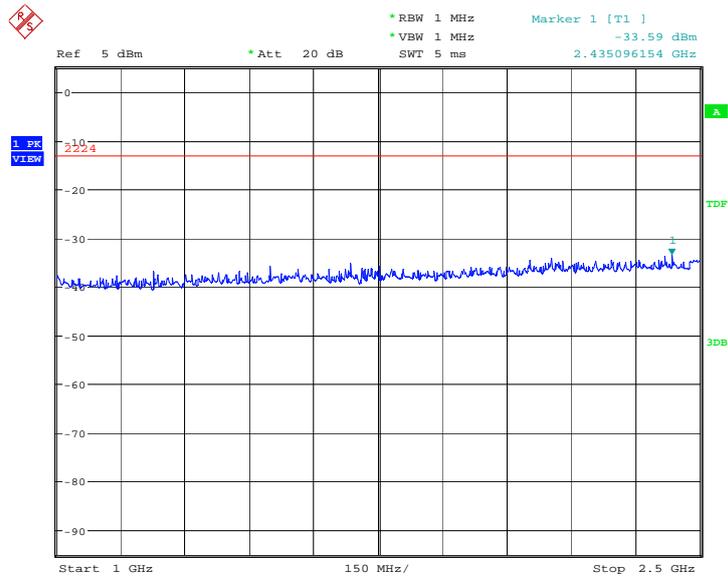
Date: 25.JUL.2014 09:40:17

**LTE band 7, 20MHz bandwidth**  
**RB:1 Offset:High**  
**QPSK: 30MHz – 1GHz**  
 Spurious emission limit –13dBm.



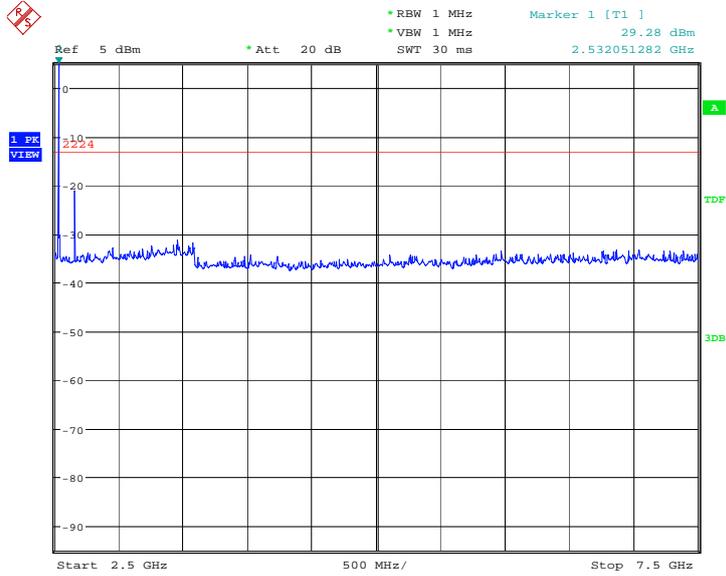
Date: 25.JUL.2014 09:26:37

**QPSK: 1GHz – 2.5GHz**  
 Spurious emission limit –13dBm.



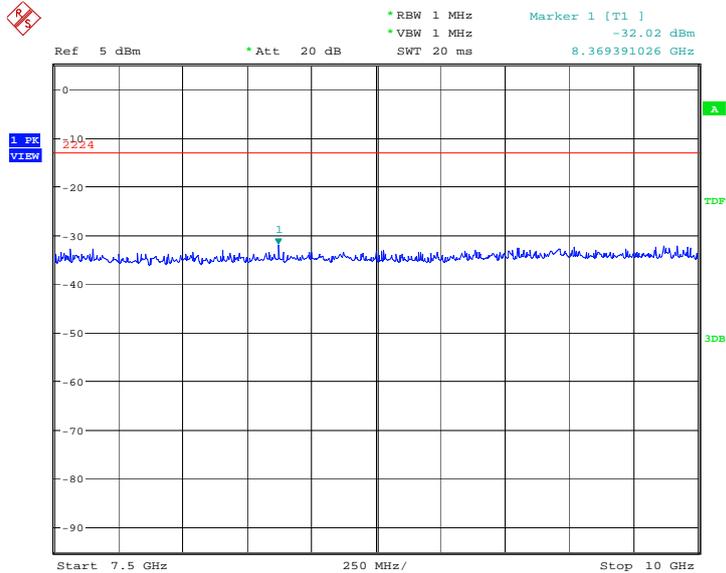
Date: 25.JUL.2014 09:26:45

**QPSK: 2.5GHz – 7.5GHz**  
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:26:53

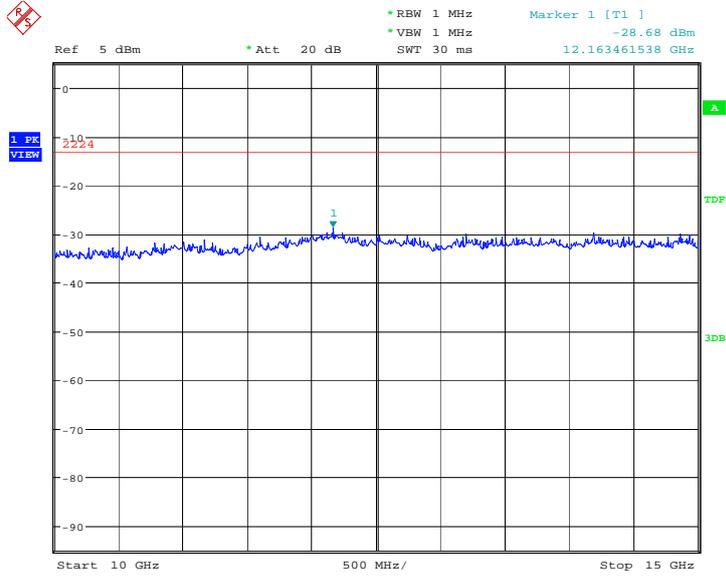
**QPSK: 7.5GHz – 10GHz**  
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:27:01

**QPSK: 10GHz –15GHz**

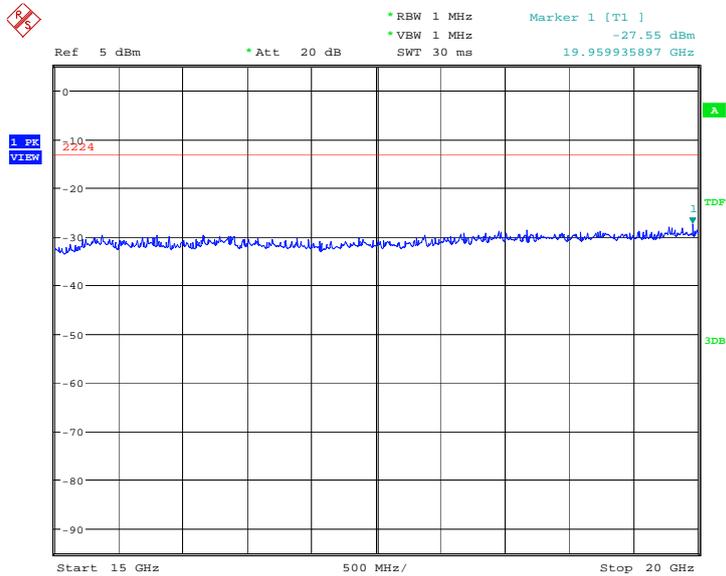
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:27:09

**QPSK: 15GHz –20GHz**

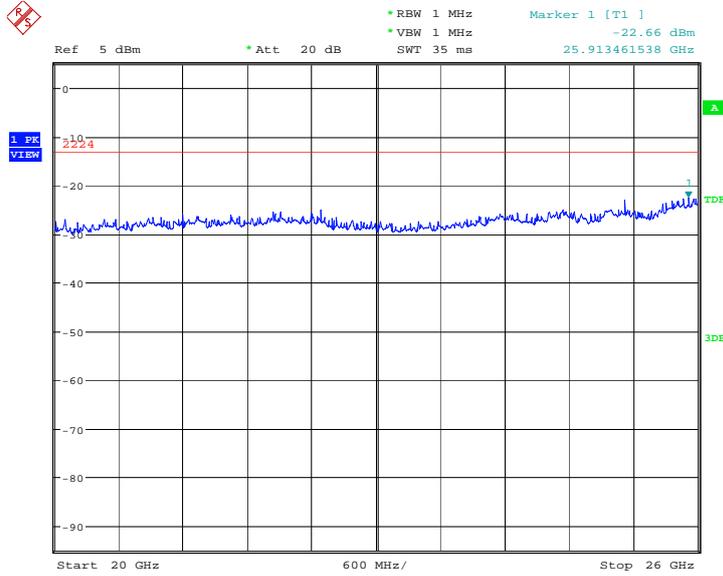
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:27:17

**QPSK: 20GHz –26GHz**

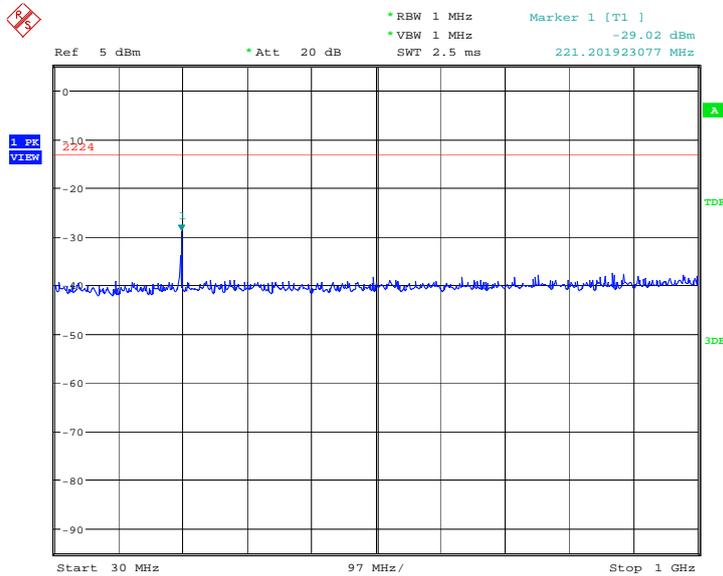
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:27:25

**16QAM: 30MHz – 1GHz**

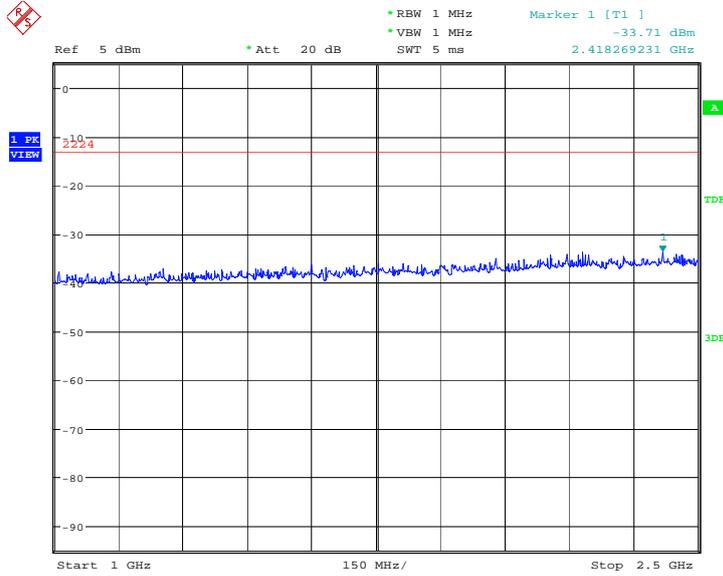
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:27:35

**16QAM: 1GHz – 2.5GHz**

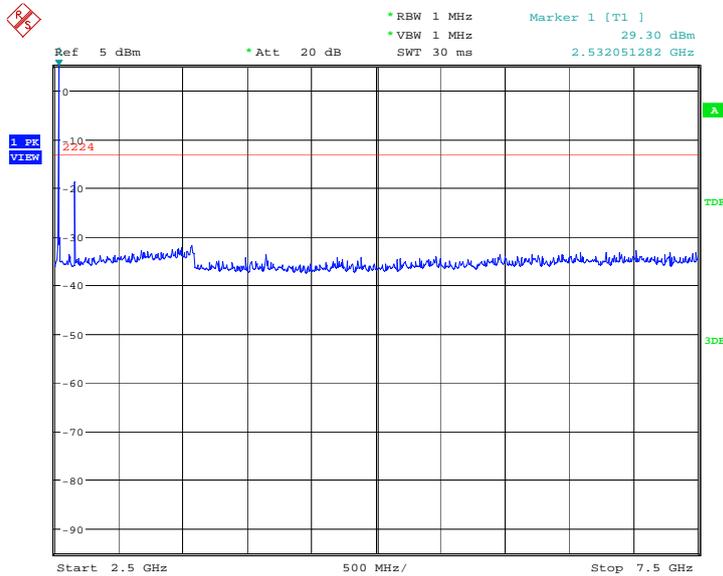
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:27:44

**16QAM: 2.5GHz – 7.5GHz**

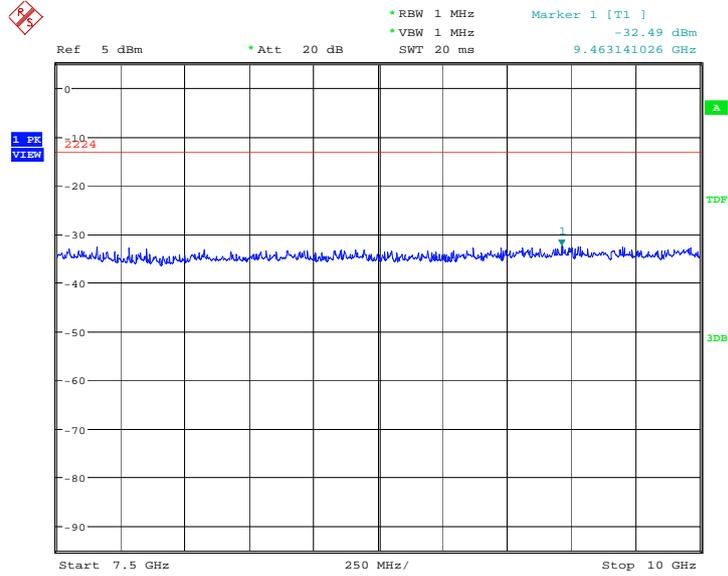
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:27:51

**16QAM: 7.5GHz –10GHz**

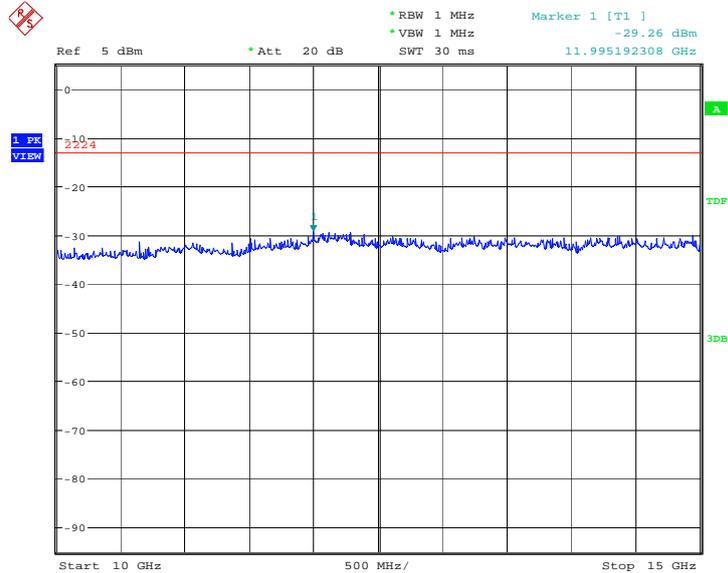
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:27:59

**16QAM: 10GHz –15GHz**

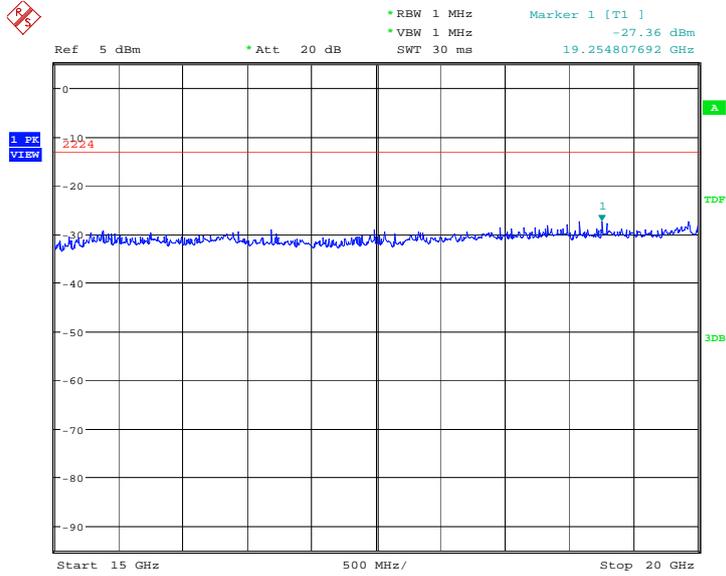
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:28:08

**16QAM: 15GHz –20GHz**

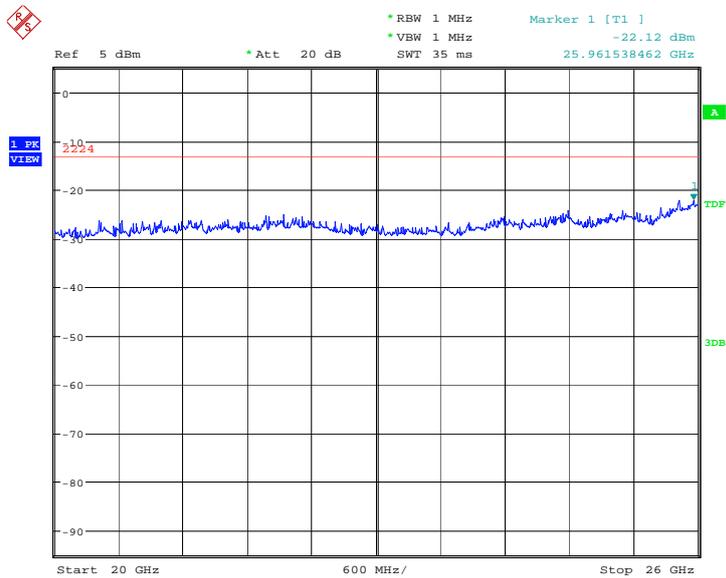
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:28:16

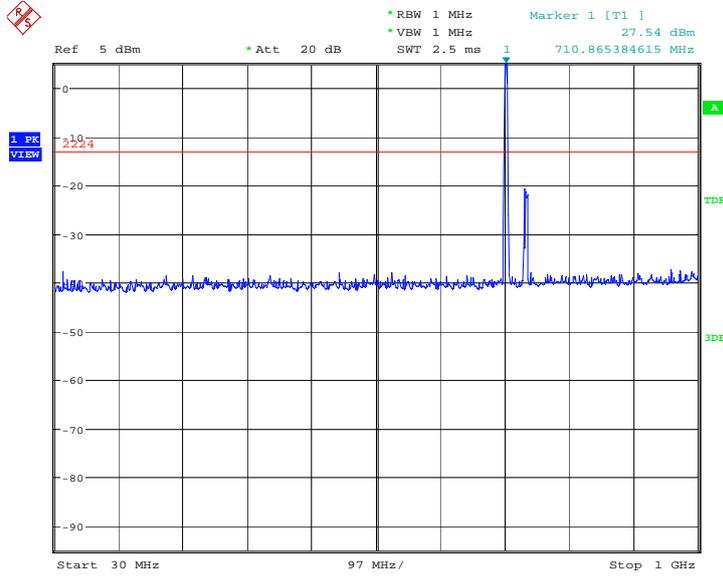
**16QAM: 20GHz –26GHz**

Spurious emission limit –13dBm.



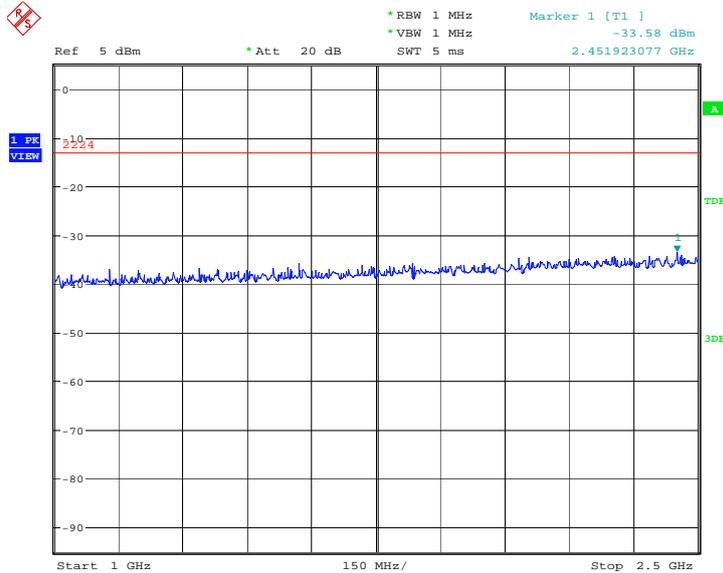
Date: 25.JUL.2014 09:28:24

**LTE band 17, 10MHz bandwidth**  
**RB:1 Offset:High**  
**QPSK: 30MHz – 1GHz**  
 Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:52:50

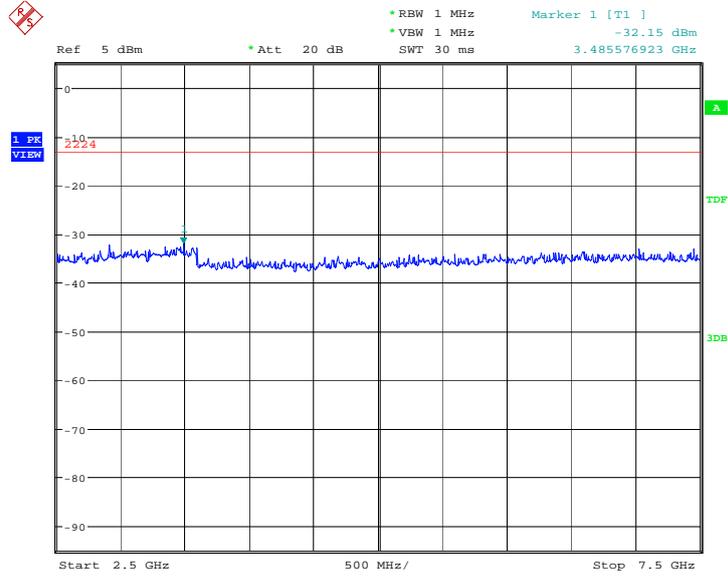
**QPSK: 1GHz – 2.5GHz**  
 Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:52:58

**QPSK: 2.5GHz – 7.5GHz**

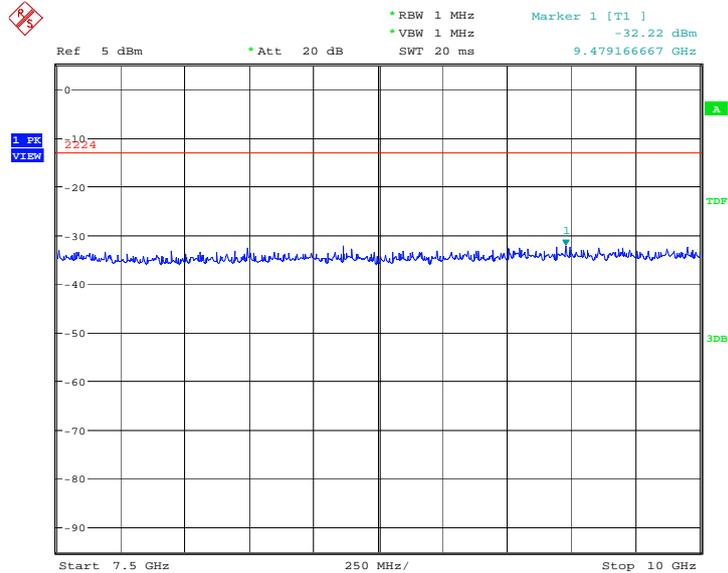
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:53:06

**QPSK: 7.5GHz –10GHz**

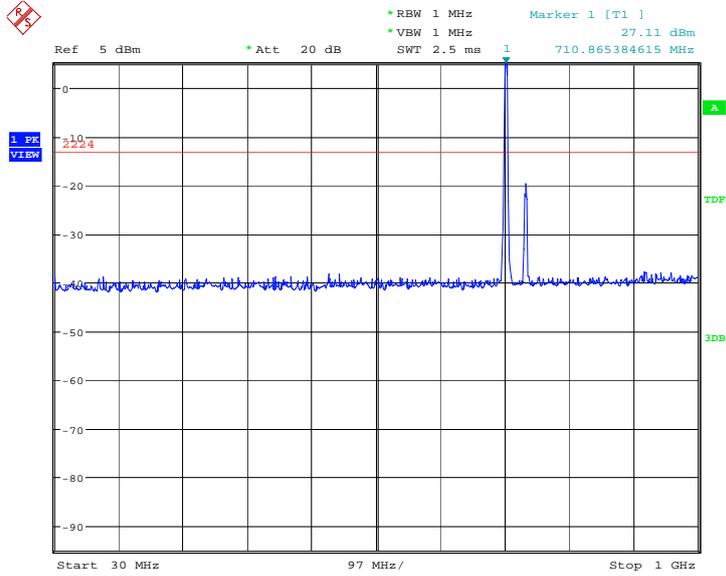
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:53:14

**16QAM: 30MHz – 1GHz**

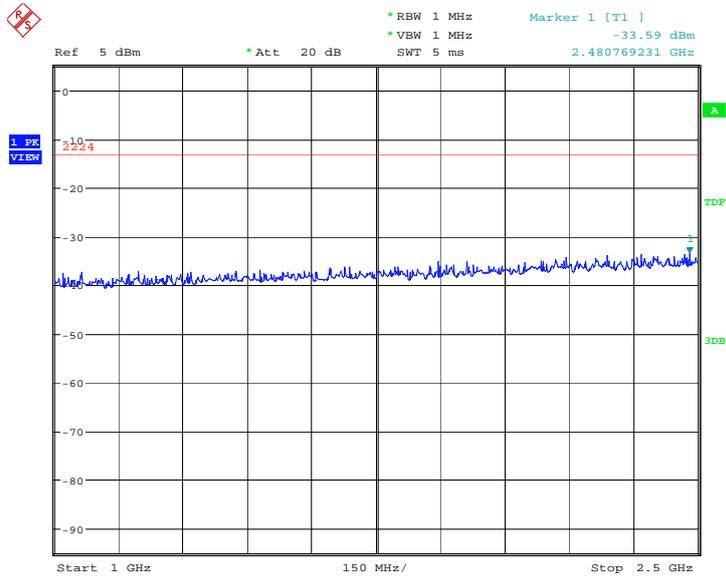
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:53:24

**16QAM: 1GHz – 2.5GHz**

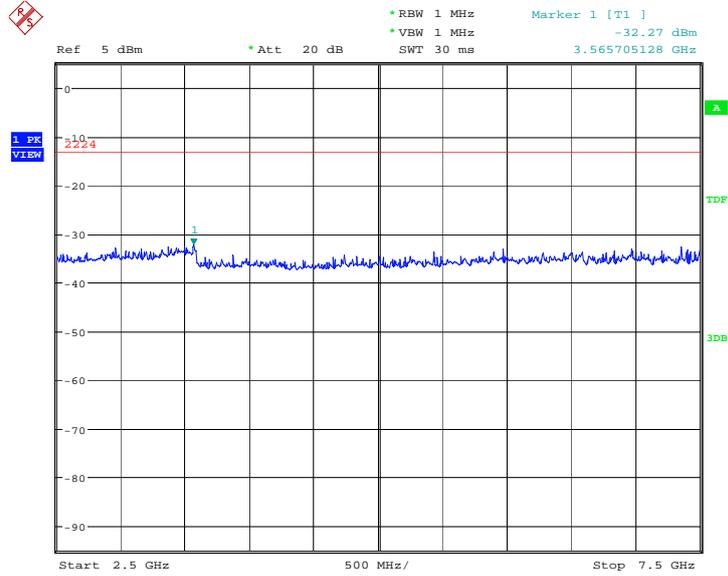
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:53:32

**16QAM: 2.5GHz – 7.5GHz**

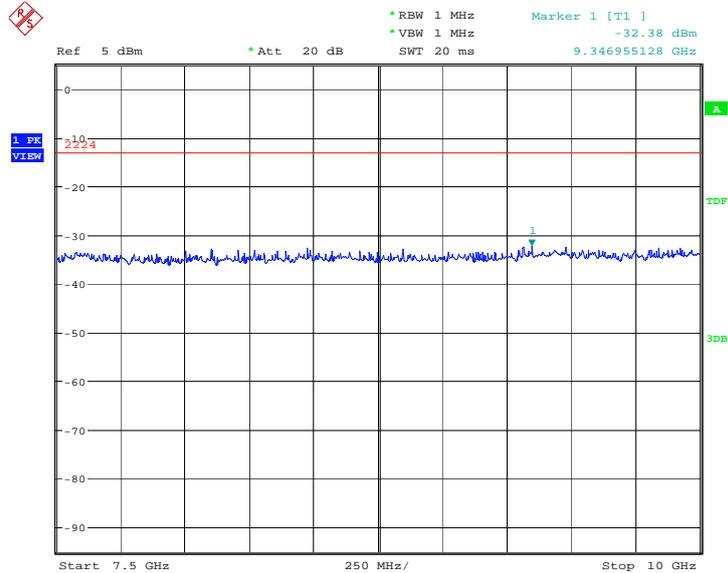
Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:53:40

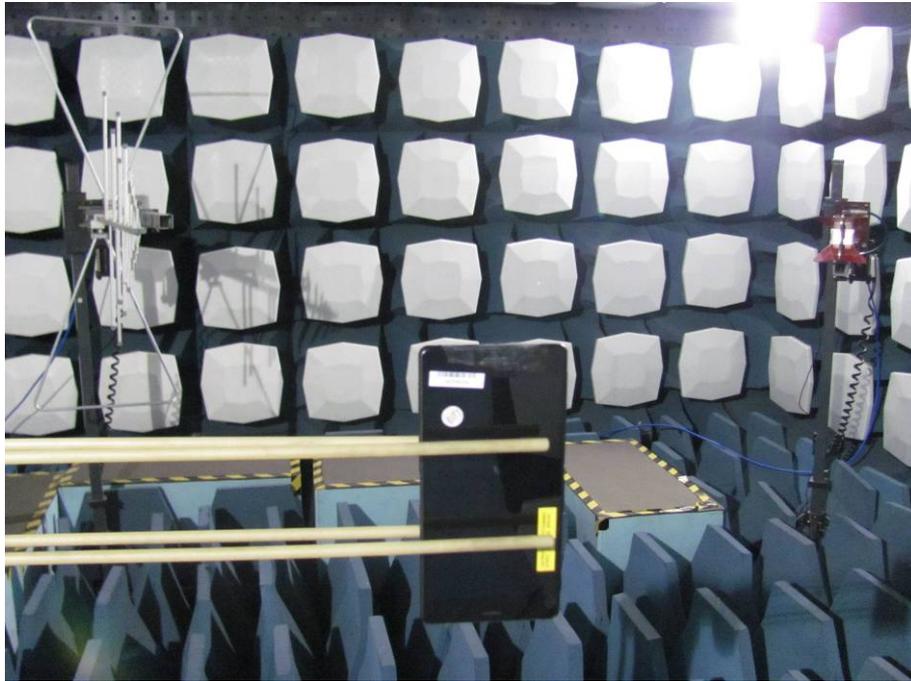
**16QAM: 7.5GHz – 10GHz**

Spurious emission limit –13dBm.



Date: 25.JUL.2014 09:53:48

**ANNEX B: TEST LAYOUT**



**Pic.1 Radiated spurious emission**



**Pic.2 Conducted emission**

**ANNEX C: EUT photograph**



**Mobile Phone**



**Mobile Phone**



**Mobile Phone**



**Mobile Phone**



**Mobile Phone**



**Mobile Phone**



Mobile Phone Disassembly and Inbuilt Battery



Mobile Phone Disassembly and Inbuilt Battery



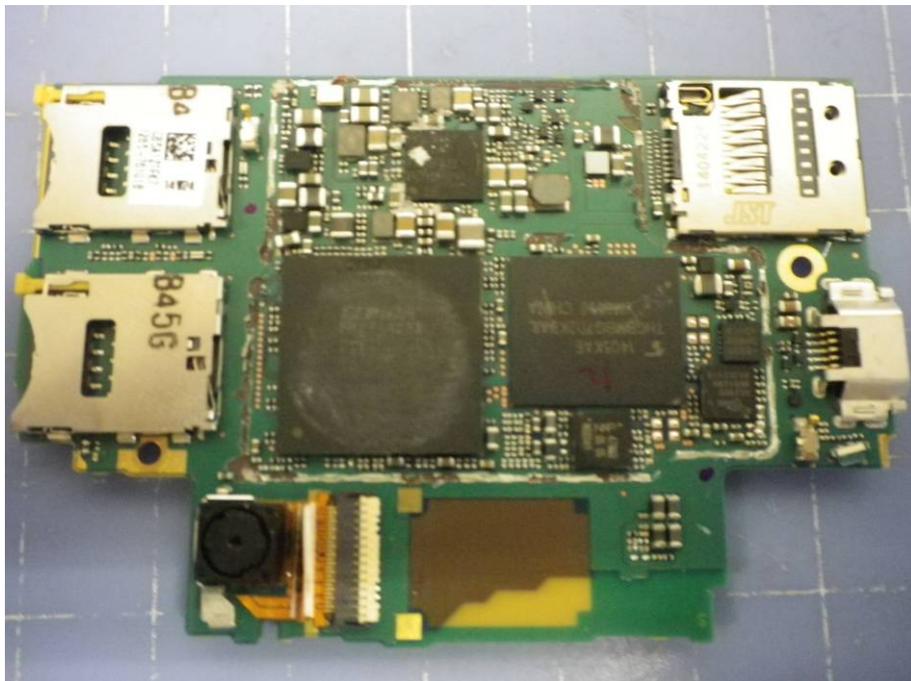
**Mobile Phone Disassembly**



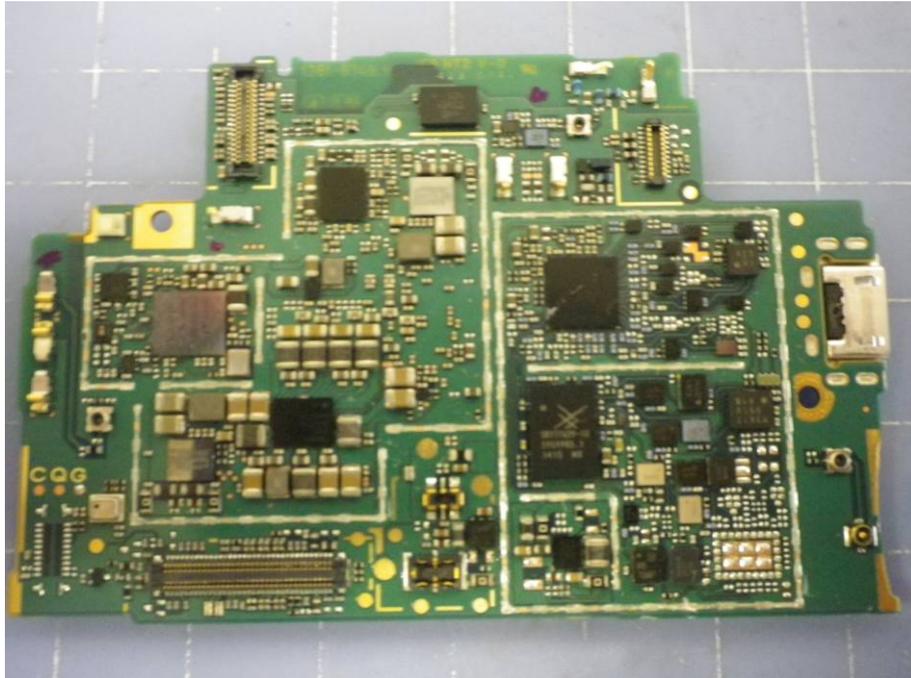
**Mobile Phone Disassembly**



**Mobile Phone Disassembly**



**Mobile Phone Disassembly**



**Mobile Phone Disassembly**



**Travel Charger**



**Label of Travel Charger**



**USB Cable**

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