TEST REPORT

No. I14Z47685-GTE01

for

ZTE CORPORATION

LTE Wireless Data Terminal

Model Name: ZM8620

FCC ID: SRQ-ZM8620

with

Hardware Version: ZM8620-1.0.0

Software Version: BD_WELINK_ZM8620V1.0.0B06

Issued Date: 2014-10-23

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

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1. Test Laboratory

1.1. Testing Location

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

1.2. Testing Environment

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

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

1.3. Project data

Testing Start Date:	2014-09-22
Testing End Date:	2014-10-09

1.4. Signature

Zi Xiaogang

(Prepared this test report)

Sun Xiangqian

(Reviewed this test report)

Lu Bingsong

Deputy Director of the laboratory

(Approved this test report)

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2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

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

3.1. About EUT

Description	LTE Wireless Data Terminal
Model Name	ZM8620
FCC ID	SRQ-ZM8620
Antenna	Integrated
Output power	23.90dBm maximum ERP measured for LTE Band 12
Extreme vol. Limits	3.2VDC to 3.6VDC (nominal: 3.3VDC)
Extreme temp. Tolerance	-30°C to +50°C

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

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
UT04a	862828027013755	ZM8620-1.0.0	BD_WELINK_ZM8620V1.0.0B06

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

3.3. Internal Identification of AE used during the test

AE ID*	Description
N/A	N/A

*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 LTE Wireless Data Terminal with integrated antenna. Manual and specifications of the EUT were provided to fulfil the test.

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4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
FCC Part 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

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5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m/10m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

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

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 MHz

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

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

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6. SUMMARY OF TEST RESULTS

6.1. Summary of test results

Abbreviations used in this clause:		
Verdict Column	P	Pass
	F	Fail
	NA	Not applicable
	NM	Not measured
Location Column	A/B/C/D	The test is performed in test location A, B, C or D which are described in section 1.1 of this report

LTE Band 2

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

LTE Band 4

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

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LTE Band 5

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	§2.1046(a), 22.913(a)	A.1	P
2	Emission Limit	22.917, 2.1051	A.2	P
3	Frequency Stability	22.235, 2.1055	A.3	P
4	Occupied Bandwidth	2.1049(h)(i)	A.4	P
5	Emission Bandwidth	22.917(b)	A.5	P
6	Band Edge Compliance	22.917(b)	A.6	P
7	Conducted Spurious Emission	22.917, 2.1057	A.7	P

LTE Band 7

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

LTE Band 12

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

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LTE Band 17

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

6.2. Statements

The test cases listed in section 6.1 of this report for the EUT specified in section 3 were performed by TMC according to the standards or reference documents in section 4.1

The EUT met all applicable requirements of the standards or reference documents in section 4.1.

This report only deals with the LTE functions among the features described in section 3.

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7. Test Equipments Utilized

NO.	Description	TYPE	series number	MANUFACTURE	CAL DUE DATE	Calibration interval
1	Test Receiver	ESCI	100344	R&S	2015-03-03	1 year
2	Test Receiver	ESU26	100376	R&S	2014-11-05	1 year
3	EMI Antenna	VULB 9163	514	Schwarzbeck	2014-11-10	3 year
4	EMI Antenna	3117	00119024	ETS-Lindgren	2016-01-20	3 year
5	LISN	NV216	101200	R&S	2015-07-07	1 year
6	Universal Radio Communication Tester	CMW500	101675	R&S	2015-07-13	1 year
7	Universal Radio Communication Tester	E5515C	MY48361083	Agilent	2015-02-27	1 year
8	Spectrum Analyzer	E4440A	MY48250642	Agilent	2015-02-27	1 year
9	EMI Antenna	9117	167	Schwarzbeck	2016-04-01	3 year
10	EMI Antenna	VULB 9163	9163 175	Schwarzbeck	2015-07-15	3 year
11	EMI Antenna	3117	00119024	ETS-Lindgren	2016-01-20	3 year
12	Signal Generator	N5183A	MY49060052	Agilent	2015-03-02	1 year
13	Climate chamber	SH-241	92007454	ESPEC	2015-12-14	2 year
14	Loop Antenna	HFH2-Z2	829324/007	R&S	2014-12-12	3 year

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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 and ERP/EIRP measurements for the EUT.
In all cases, output power is within the specified limits.

A.1.2 Conducted

A.1.2.1 Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.
The power was measured with spectrum analyzer's RMS detector.
These measurements were done at 3 frequencies (bottom, middle and top of operational frequency range) for each bandwidth.

A.1.2.2 Measurement result

LTE band 2

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1850.7	21.54	20.43
		1880.0	21.89	20.76
		1909.3	21.16	20.05
	1 RB low	1850.7	21.61	20.48
		1880.0	21.83	20.75
		1909.3	20.99	19.94
	50% RB mid	1850.7	21.56	20.49
		1880.0	21.87	20.75
		1909.3	21.26	20.17
	100% RB	1850.7	20.68	19.78
		1880.0	21.01	20.11
		1909.3	20.30	19.52
3MHz	1 RB high	1851.5	21.49	20.94
		1880.0	21.59	21.20
		1908.5	20.94	20.58
	1 RB low	1851.5	21.55	20.99
		1880.0	21.77	21.36

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		1908.5	21.02	20.61
	50% RB mid	1851.5	20.68	19.75
		1880.0	20.90	20.12
		1908.5	20.25	19.43
	100% RB	1851.5	20.63	19.70
		1880.0	20.93	20.00
		1908.5	20.21	19.32
5MHz	1 RB high	1852.5	21.68	20.48
		1880.0	21.66	20.62
		1907.5	21.04	19.75
	1 RB low	1852.5	21.84	20.72
		1880.0	21.99	20.86
		1907.5	21.13	19.78
	50% RB mid	1852.5	20.70	19.74
		1880.0	21.01	20.02
		1907.5	20.23	19.30
	100% RB	1852.5	20.68	19.78
		1880.0	20.95	20.09
		1907.5	20.23	19.42
10MHz	1 RB high	1855.0	21.59	21.32
		1880.0	21.62	21.38
		1905.0	20.88	20.62
	1 RB low	1855.0	22.11	21.96
		1880.0	21.95	21.77
		1905.0	21.26	21.10
	50% RB mid	1855.0	20.86	19.90
		1880.0	20.95	20.05
		1905.0	20.16	19.21
	100% RB	1855.0	20.87	19.90
		1880.0	20.84	19.94
		1905.0	20.14	19.09
15MHz	1 RB high	1857.5	21.62	21.35
		1880.0	21.49	21.34
		1902.5	21.15	20.93
	1 RB low	1857.5	21.99	21.84
		1880.0	21.89	21.73
		1902.5	21.18	21.12
	50% RB mid	1857.5	21.04	20.13
		1880.0	20.93	20.03
		1902.5	21.01	19.12

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	100% RB	1857.5	20.86	19.87
		1880.0	20.80	19.84
		1902.5	19.96	19.04
20MHz	1 RB high	1860.0	21.65	20.52
		1880.0	21.53	20.44
		1900.0	21.61	20.53
	1 RB low	1860.0	21.66	20.64
		1880.0	21.82	20.80
		1900.0	21.33	20.23
	50% RB mid	1860.0	21.10	20.13
		1880.0	20.87	19.94
		1900.0	19.91	18.94
	100% RB	1860.0	20.95	20.00
		1880.0	20.76	19.85
		1900.0	20.13	19.18

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LTE band 4

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1754.3	21.84	20.66
		1732.5	22.09	20.88
		1710.7	22.45	21.30
	1 RB low	1754.3	22.10	20.91
		1732.5	22.01	20.79
		1710.7	22.30	21.27
	50% RB mid	1754.3	21.87	20.85
		1732.5	21.96	20.70
		1710.7	22.52	21.33
	100% RB	1754.3	20.98	20.17
		1732.5	20.92	20.08
		1710.7	21.57	20.60
3MHz	1 RB high	1753.5	21.57	21.14
		1732.5	21.82	21.34
		1711.5	22.35	21.86
	1 RB low	1753.5	22.03	21.58
		1732.5	21.78	21.33
		1711.5	22.44	21.86
	50% RB mid	1753.5	21.08	20.28
		1732.5	20.84	19.95
		1711.5	21.48	20.53
	100% RB	1753.5	21.14	20.15
		1732.5	20.88	19.85
		1711.5	21.55	20.49
5MHz	1 RB high	1752.5	21.74	20.61
		1732.5	22.02	20.76
		1712.5	22.39	21.14
	1 RB low	1752.5	22.19	20.93
		1732.5	21.92	20.68
		1712.5	22.37	21.13
	50% RB mid	1752.5	21.10	20.17
		1732.5	20.86	19.93
		1712.5	21.54	20.42
	100% RB	1752.5	21.04	20.12
		1732.5	20.84	19.90
		1712.5	21.42	20.50
10MHz	1 RB high	1750	21.77	21.52
		1732.5	22.06	21.47

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		1715	22.08	21.78
	1 RB low	1750	22.33	22.08
		1732.5	21.92	21.40
		1715	22.53	22.34
	50% RB mid	1750	21.18	20.28
		1732.5	20.90	19.98
		1715	21.24	20.33
	100% RB	1750	21.11	20.11
		1732.5	20.81	19.89
		1715	21.16	20.15
15MHz	1 RB high	1747.5	21.76	21.24
		1732.5	22.23	21.68
		1717.5	21.96	21.45
	1 RB low	1747.5	22.29	21.75
		1732.5	21.86	21.40
		1717.5	22.54	21.94
	50% RB mid	1747.5	21.01	20.23
		1732.5	20.80	19.87
		1717.5	20.99	20.15
	100% RB	1747.5	21.00	20.06
		1732.5	20.70	19.77
		1717.5	20.95	19.92
20MHz	1 RB high	1745	22.02	20.87
		1732.5	22.25	21.00
		1720	21.92	21.22
	1 RB low	1745	21.96	20.68
		1732.5	22.03	20.90
		1720	22.50	21.73
	50% RB mid	1745	21.17	20.23
		1732.5	20.71	19.89
		1720	20.94	19.94
	100% RB	1745	21.18	20.22
		1732.5	20.86	19.94
		1720	21.03	20.10

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LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	848.3	21.69	20.47
		836.5	22.74	21.54
		824.7	23.03	21.80
	1 RB low	848.3	21.69	20.47
		836.5	22.70	21.53
		824.7	23.17	21.97
	50% RB mid	848.3	21.59	20.43
		836.5	22.61	21.46
		824.7	23.20	22.04
	100% RB	848.3	20.63	19.77
		836.5	21.69	20.74
		824.7	22.22	21.32
3MHz	1 RB high	847.5	21.51	20.92
		836.5	22.40	21.90
		825.5	22.82	22.37
	1 RB low	847.5	21.49	20.99
		836.5	22.58	22.05
		825.5	23.09	22.61
	50% RB mid	847.5	20.53	19.60
		836.5	21.58	20.80
		825.5	22.12	21.22
	100% RB	847.5	20.57	19.54
		836.5	21.68	20.65
		825.5	22.16	21.16
5MHz	1 RB high	846.5	21.62	20.40
		836.5	22.52	21.32
		826.5	22.93	21.72
	1 RB low	846.5	21.65	20.42
		836.5	22.70	21.49
		826.5	23.12	21.95
	50% RB mid	846.5	20.66	19.60
		836.5	21.72	20.72
		826.5	22.05	21.01
	100% RB	846.5	20.55	19.69
		836.5	21.58	20.67
		826.5	21.87	21.03
10MHz	1 RB high	844.0	21.51	21.23
		836.5	21.95	21.72

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		829.0	22.47	22.11
	1 RB low	844.0	22.23	21.98
		836.5	22.73	22.44
		829.0	23.19	22.95
	50% RB mid	844.0	20.55	19.57
		836.5	21.58	20.55
		829.0	21.84	20.85
	100% RB	844.0	20.56	19.63
		836.5	21.44	20.43
		829.0	21.75	20.74

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LTE band 7

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	2502.5	21.83	20.65
		2535	21.52	20.29
		2567.5	21.20	19.97
	1 RB low	2502.5	21.84	20.63
		2535	21.70	20.53
		2567.5	21.14	19.87
	50% RB mid	2502.5	21.02	19.93
		2535	20.57	19.54
		2567.5	20.49	19.48
	100% RB	2502.5	20.99	19.99
		2535	20.52	19.67
		2567.5	20.36	19.49
10MHz	1 RB high	2505	22.01	21.66
		2535	21.50	21.17
		2565	21.49	21.02
	1 RB low	2505	21.91	21.55
		2535	21.83	21.53
		2565	21.45	20.81
	50% RB mid	2505	20.98	19.93
		2535	20.54	19.64
		2565	20.60	19.66
	100% RB	2505	20.99	19.94
		2535	20.50	19.54
		2565	20.36	19.45
15MHz	1 RB high	2507.5	22.03	21.72
		2535	21.57	21.18
		2562.5	21.59	21.05
	1 RB low	2507.5	21.89	21.63
		2535	22.06	21.74
		2562.5	21.45	20.90
	50% RB mid	2507.5	20.68	19.90
		2535	20.54	19.63
		2562.5	20.48	19.63
	100% RB	2507.5	20.78	19.75
		2535	20.47	19.55
		2562.5	20.44	19.48
20MHz	1 RB high	2510	22.06	20.94

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		2535	21.77	20.70
		2560	21.73	21.10
	1 RB low	2510	21.93	20.80
		2535	22.13	20.98
		2560	21.50	20.81
	50% RB mid	2510	20.60	19.68
		2535	20.53	19.55
		2560	20.56	19.54
	100% RB	2510	20.75	19.92
		2535	20.70	19.70
		2560	20.41	19.51

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LTE band 12

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	715.3	24.70	23.50
		707.5	22.99	21.92
		699.7	21.61	20.41
	1 RB low	715.3	24.95	23.74
		707.5	22.93	21.78
		699.7	21.58	20.26
	50% RB mid	715.3	24.68	23.60
		707.5	22.59	21.62
		699.7	21.52	20.39
	100% RB	715.3	23.88	22.86
		707.5	21.97	21.09
		699.7	20.67	19.66
3MHz	1 RB high	714.5	24.64	24.14
		707.5	23.03	22.55
		700.5	21.74	21.17
	1 RB low	714.5	24.33	23.76
		707.5	22.58	22.08
		700.5	21.58	20.97
	50% RB mid	714.5	23.91	22.96
		707.5	21.87	20.99
		700.5	20.86	19.82
	100% RB	714.5	23.72	22.74
		707.5	21.80	20.86
		700.5	20.69	19.64
5MHz	1 RB high	713.5	24.78	23.51
		707.5	23.22	22.10
		701.5	22.11	20.73
	1 RB low	713.5	23.54	22.32
		707.5	22.46	21.27
		701.5	21.64	20.19
	50% RB mid	713.5	23.54	22.48
		707.5	21.86	20.79
		701.5	20.81	19.75
	100% RB	713.5	23.31	22.41
		707.5	21.79	20.79
		701.5	20.70	19.72
10MHz	1 RB high	711.0	24.67	24.22
		707.5	23.83	23.47

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		704.0	22.94	22.40
	1 RB low	711.0	22.57	22.38
		707.5	22.09	21.84
		704.0	21.51	20.90
	50% RB mid	711.0	22.43	21.40
		707.5	21.74	20.76
		704.0	21.20	20.13
	100% RB	711.0	22.46	21.53
		707.5	21.74	20.75
		704.0	21.11	20.13

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LTE band 17

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	706.5	22.95	21.79
		710.0	22.73	21.49
		713.5	22.90	21.43
	1 RB low	706.5	22.52	21.26
		710.0	22.62	21.28
		713.5	23.19	21.67
	50% RB mid	706.5	21.86	20.85
		710.0	21.59	20.53
		713.5	21.82	20.85
	100% RB	706.5	21.77	20.77
		710.0	21.50	20.66
		713.5	21.87	20.87
10MHz	1 RB high	709	22.89	22.52
		710	23.09	22.81
		711	22.95	22.25
	1 RB low	709	22.93	22.56
		710	22.95	22.66
		711	23.03	22.46
	50% RB mid	709	21.48	20.53
		710	21.56	20.49
		711	21.56	20.50
	100% RB	709	21.53	20.57
		710	21.53	20.54
		711	21.50	20.42

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

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A.1.3 Radiated

A.1.3.1 Description

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

Rule Part 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”.

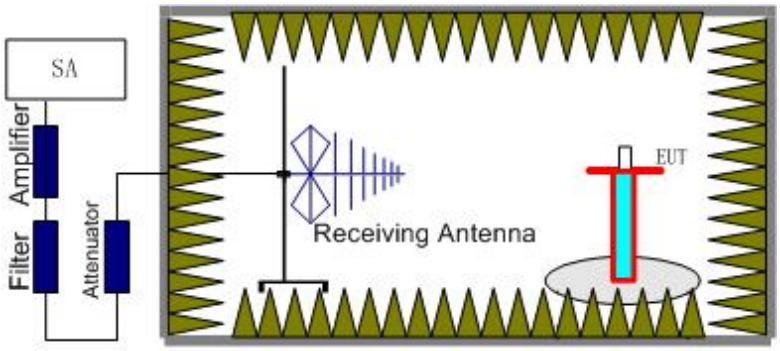
Rule Part 27.50(h)(2) specifies “Mobile stations are limited to 2.0 watts EIRP.”.

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

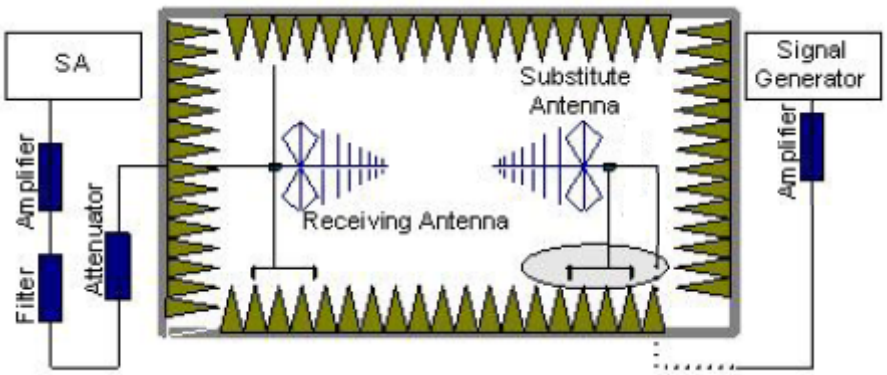
A.1.3.2 Method of Measurement

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.



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

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

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A.1.3.3 Measurement result

LTE Band 2- EIRP 24. 232(b)

Limits: ≤33dBm (2W)

LTE Band 2_1.4MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1850.70	-23.88	5.96	-43.75	-4.56	**18.47**	33.00	14.53	V
1880.00	-24.07	7.05	-43.75	-4.43	17.06	33.00	15.94	V
1909.30	-22.03	9.07	-43.77	-4.30	16.97	33.00	16.03	V

LTE Band 2_3MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1851.50	-23.79	5.99	-43.75	-4.56	**18.53**	33.00	14.47	V
1880.00	-24.11	7.05	-43.75	-4.43	17.02	33.00	15.98	V
1908.50	-22.05	8.99	-43.78	-4.30	17.04	33.00	15.96	V

LTE Band 2_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1852.50	-23.85	6.00	-43.75	-4.55	**18.45**	33.00	14.55	V
1880.00	-24.20	7.05	-43.75	-4.43	16.93	33.00	16.07	V
1907.50	-22.16	8.87	-43.77	-4.31	17.05	33.00	15.95	V

LTE Band 2_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1855.00	-24.35	5.58	-43.74	-4.54	**18.35**	33.00	14.65	V
1880.00	-24.16	7.05	-43.75	-4.43	16.97	33.00	16.03	V
1905.00	-23.21	8.05	-43.77	-4.32	16.83	33.00	16.17	V

LTE Band 2_15MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1857.50	-24.97	5.16	-43.75	-4.53	**18.15**	33.00	14.85	V
1880.00	-24.11	7.05	-43.75	-4.43	17.02	33.00	15.98	V
1902.50	-24.16	7.23	-43.77	-4.33	16.71	33.00	16.29	V

LTE Band 2_20 MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1860.00	-25.83	4.75	-43.75	-4.52	**17.68**	33.00	15.32	V
1880.00	-24.39	7.05	-43.75	-4.43	16.74	33.00	16.26	V
1900.00	-24.97	6.41	-43.77	-4.34	16.73	33.00	16.27	V

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LTE Band 2_1.4MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1850.70	-24.77	5.96	-43.75	-4.56	**17.58**	33.00	15.42	V
1880.00	-25.29	7.05	-43.75	-4.43	15.84	33.00	17.16	V
1909.30	-23.08	9.07	-43.77	-4.30	15.92	33.00	17.08	V

LTE Band 2_3MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1851.50	-24.81	5.99	-43.75	-4.56	**17.51**	33.00	15.49	V
1880.00	-25.20	7.05	-43.75	-4.43	15.93	33.00	17.07	V
1908.50	-22.99	8.99	-43.78	-4.30	16.10	33.00	16.90	V

LTE Band 2_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1852.50	-24.56	6.00	-43.75	-4.55	**17.74**	33.00	15.26	V
1880.00	-25.41	7.05	-43.75	-4.43	15.72	33.00	17.28	V
1907.50	-23.20	8.87	-43.77	-4.31	16.01	33.00	16.99	V

LTE Band 2_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1855.00	-24.96	5.58	-43.74	-4.54	**17.74**	33.00	15.26	V
1880.00	-25.49	7.05	-43.75	-4.43	15.64	33.00	17.36	V
1905.00	-24.45	8.05	-43.77	-4.32	15.59	33.00	17.41	V

LTE Band 2_15MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1857.50	-25.49	5.16	-43.75	-4.53	**17.63**	33.00	15.37	V
1880.00	-25.40	7.05	-43.75	-4.43	15.73	33.00	17.27	V
1902.50	-25.46	7.23	-43.77	-4.33	15.41	33.00	17.59	V

LTE Band 2_20 MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1860.00	-26.96	4.75	-43.75	-4.52	**16.55**	33.00	16.45	V
1880.00	-25.31	7.05	-43.75	-4.43	15.82	33.00	17.18	V
1900.00	-25.60	6.41	-43.77	-4.34	16.10	33.00	16.90	V

Peak EIRP(dBm) = P_{Mea}(-23.79dBm) - G_a (-4.56dBi) - P_{Ag} (-43.75dB) - P_{cl} (5.99dB) = 18.53dBm

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LTE Band 4- EIRP 27.50(d)

Limits: ≤30dBm (1W)

LTE Band 4_1.4MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1710.70	-27.09	3.17	-44.10	-5.17	19.01	33.00	13.99	V
1732.50	-26.10	3.33	-44.14	-5.08	**19.79**	33.00	13.21	V
1754.30	-26.18	3.76	-44.14	-4.98	19.18	33.00	13.82	V

LTE Band 4_3MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1711.50	-26.84	3.40	-44.10	-5.17	19.03	33.00	13.97	V
1732.50	-26.06	3.33	-44.14	-5.08	**19.83**	33.00	13.17	V
1753.50	-26.16	3.80	-44.13	-4.98	19.15	33.00	13.85	V

LTE Band 4_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1712.50	-26.54	3.66	-44.10	-5.17	19.07	33.00	13.93	V
1732.50	-26.14	3.33	-44.14	-5.08	**19.75**	33.00	13.25	V
1752.50	-26.04	3.82	-44.14	-4.99	19.27	33.00	13.73	V

LTE Band 4_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1715.00	-26.73	3.56	-44.10	-5.16	18.97	33.00	14.03	V
1732.50	-26.15	3.33	-44.14	-5.08	**19.74**	33.00	13.26	V
1750.50	-26.92	3.16	-44.14	-5.00	19.06	33.00	13.94	V

LTE Band 4_15MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1717.50	-27.36	3.47	-44.11	-5.15	18.43	33.00	14.57	V
1732.50	-26.09	3.33	-44.14	-5.08	**19.80**	33.00	13.20	V
1747.50	-26.62	3.34	-44.15	-5.01	19.20	33.00	13.80	V

LTE Band 4_20MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1720.00	-27.76	3.37	-44.11	-5.13	18.11	33.00	14.89	V
1732.50	-26.13	3.33	-44.14	-5.08	**19.76**	33.00	13.24	V
1745.00	-26.51	3.68	-44.16	-5.02	18.99	33.00	14.01	V

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LTE Band 4_1.4MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1710.70	-28.13	3.17	-44.10	-5.17	17.97	33.00	15.03	V
1732.50	-27.09	3.33	-44.14	-5.08	**18.80**	33.00	14.20	V
1754.30	-27.22	3.76	-44.14	-4.98	18.14	33.00	14.86	V

LTE Band 4_3MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1711.50	-27.78	3.40	-44.10	-5.17	18.09	33.00	14.91	V
1732.50	-27.05	3.33	-44.14	-5.08	**18.84**	33.00	14.16	V
1753.50	-27.19	3.80	-44.13	-4.98	18.12	33.00	14.88	V

LTE Band 4_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1712.50	-27.68	3.66	-44.10	-5.17	17.93	33.00	15.07	V
1732.50	-27.18	3.33	-44.14	-5.08	**18.71**	33.00	14.29	V
1752.50	-26.77	3.82	-44.14	-4.99	18.54	33.00	14.46	V

LTE Band 4_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1715.00	-28.26	3.56	-44.10	-5.16	17.44	33.00	15.56	V
1732.50	-26.76	3.33	-44.14	-5.08	**19.13**	33.00	13.87	V
1750.50	-28.12	3.16	-44.14	-5.00	17.86	33.00	15.14	V

LTE Band 4_15MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1717.50	-28.77	3.47	-44.11	-5.15	17.02	33.00	15.98	V
1732.50	-27.37	3.33	-44.14	-5.08	18.52	33.00	14.48	V
1747.50	-27.24	3.34	-44.15	-5.01	**18.58**	33.00	14.42	V

LTE Band 4_20MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
1720.00	-28.82	3.37	-44.11	-5.13	17.05	33.00	15.95	V
1732.50	-27.36	3.33	-44.14	-5.08	**18.53**	33.00	14.47	V
1745.00	-27.13	3.68	-44.16	-5.02	18.37	33.00	14.63	V

Peak EIRP(dBm) = P_{Mea}(-26.06dBm) - G_a (-5.08dBi) - P_{Ag} (-44.14dB) - P_{cl} (3.33dB) = 19.83dBm

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LTE Band 5- ERP 22.913(a)

Limits: ≤38.45dBm (7W)

LTE Band 5_1.4MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
824.70	-18.32	2.26	-45.79	0.84	2.15	**22.22**	38.45	16.23	V
836.50	-18.54	2.26	-45.66	0.90	2.15	21.81	38.45	16.64	V
848.30	-20.58	2.27	-45.55	0.95	2.15	19.60	38.45	18.85	V

LTE Band 5_3MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
825.50	-18.13	2.26	-45.79	0.84	2.15	**22.41**	38.45	16.04	V
836.50	-18.52	2.26	-45.66	0.90	2.15	21.83	38.45	16.62	V
847.50	-20.61	2.27	-45.56	0.95	2.15	19.58	38.45	18.87	V

LTE Band 5_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
826.50	-18.36	2.25	-45.77	0.85	2.15	**22.16**	38.45	16.29	V
836.50	-18.74	2.26	-45.66	0.90	2.15	21.61	38.45	16.84	V
846.50	-20.78	2.26	-45.56	0.94	2.15	19.43	38.45	19.02	V

LTE Band 5_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
829.00	-18.37	2.13	-45.74	0.86	2.15	**22.23**	38.45	16.22	V
836.50	-18.72	2.26	-45.66	0.90	2.15	21.63	38.45	16.82	V
844.00	-20.00	2.26	-45.59	0.93	2.15	20.25	38.45	18.20	V

LTE Band 5_1.4MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
824.70	-19.29	2.26	-45.79	0.84	2.15	**21.25**	38.45	17.20	V
836.50	-19.54	2.26	-45.66	0.90	2.15	20.81	38.45	17.64	V
848.30	-21.61	2.27	-45.55	0.95	2.15	18.57	38.45	19.88	V

LTE Band 5_3MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
825.50	-19.41	2.26	-45.79	0.84	2.15	**21.13**	38.45	17.32	V
836.50	-19.25	2.26	-45.66	0.90	2.15	21.10	38.45	17.35	V
847.50	-21.57	2.27	-45.56	0.95	2.15	18.62	38.45	19.83	V

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LTE Band 5_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
826.50	-19.49	2.25	-45.77	0.85	2.15	**21.03**	38.45	17.42	V
836.50	-19.42	2.26	-45.66	0.90	2.15	20.93	38.45	17.52	V
846.50	-21.95	2.26	-45.56	0.94	2.15	18.26	38.45	20.19	V

LTE Band 5_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
829.00	-19.69	2.13	-45.74	0.86	2.15	**20.91**	38.45	17.54	V
836.50	-20.04	2.26	-45.66	0.90	2.15	20.31	38.45	18.14	V
844.00	-20.65	2.26	-45.59	0.93	2.15	19.60	38.45	18.85	V

Peak ERP(dBm)=P_{Mea}(-18.13dBm)-G_a(0.84dBi)-P_{Ag}(-45.79dB)-P_{cl} (2.26dB)-2.15dB = 22.41dBm

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LTE Band 7- EIRP 27.50(h)(2)

Limits: ≤33 dBm (2W)

LTE Band 7_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2502.50	-31.48	3.59	-45.68	-5.41	16.02	38.45	22.43	V
2535.00	-32.78	3.63	-44.82	-5.49	13.90	38.45	24.55	V
2567.50	-30.20	3.65	-44.92	-5.58	**16.65**	38.45	21.80	V

LTE Band 7_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2505.00	-31.62	3.59	-45.64	-5.41	15.84	38.45	22.61	V
2535.00	-32.80	3.63	-44.82	-5.49	13.88	38.45	24.57	V
2565.00	-29.85	3.65	-44.97	-5.57	**17.04**	38.45	21.41	V

LTE Band 7_15MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2507.50	-31.67	3.59	-44.92	-5.42	15.08	38.45	23.37	V
2535.00	-32.78	3.63	-44.82	-5.49	13.90	38.45	24.55	V
2562.50	-30.96	3.65	-45.67	-5.57	**16.63**	38.45	21.82	V

LTE Band 7_20MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2510.00	-32.94	3.59	-45.36	-5.43	14.26	38.45	24.19	V
2535.00	-32.92	3.63	-44.82	-5.49	13.76	38.45	24.69	V
2560.00	-31.27	3.64	-45.98	-5.56	**16.63**	38.45	21.82	V

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LTE Band 7_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2502.50	-33.01	3.59	-45.68	-5.41	14.49	38.45	23.96	V
2535.00	-33.54	3.63	-44.82	-5.49	13.14	38.45	25.31	V
2567.50	-31.31	3.65	-44.92	-5.58	**15.54**	38.45	22.91	V

LTE Band 7_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2505.00	-32.40	3.59	-45.64	-5.41	15.06	38.45	23.39	V
2535.00	-34.14	3.63	-44.82	-5.49	12.54	38.45	25.91	V
2565.00	-31.29	3.65	-44.97	-5.57	**15.60**	38.45	22.85	V

LTE Band 7_15MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2507.50	-32.33	3.59	-44.92	-5.42	14.42	38.45	24.03	V
2535.00	-34.18	3.63	-44.82	-5.49	12.50	38.45	25.95	V
2562.50	-32.19	3.65	-45.67	-5.57	**15.40**	38.45	23.05	V

LTE Band 7_20MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2510.00	-33.82	3.59	-45.36	-5.43	13.38	38.45	25.07	V
2535.00	-34.03	3.63	-44.82	-5.49	12.65	38.45	25.80	V
2560.00	-31.93	3.64	-45.98	-5.56	**15.97**	38.45	22.48	V

Peak EIRP(dBm) = P_{Mea}(-29.85dBm) - G_a (-5.57dBi) - P_{Ag} (-44.97dB) - P_{cl} (3.65dB) = 17.04dBm

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LTE Band 12 - ERP 27.50(c)(10)

Limits: ≤34.77dBm (3W)

LTE Band 12_1.4MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
699.70	-22.18	1.90	-45.24	-1.12	2.15	20.13	34.77	14.64	V
707.50	-20.76	1.91	-45.64	-0.96	2.15	21.79	34.77	12.98	H
715.30	-19.45	1.92	-45.85	-0.80	2.15	**23.12**	34.77	11.65	H

LTE Band 12_3MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
700.50	-22.12	1.90	-45.27	-1.10	2.15	20.21	34.77	14.56	V
707.50	-20.69	1.91	-45.64	-0.96	2.15	21.85	34.77	12.92	H
714.50	-18.64	1.92	-45.79	-0.82	2.15	**23.90**	34.77	10.87	H

LTE Band 12_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
701.50	-22.31	1.90	-45.32	-1.08	2.15	20.04	34.77	14.73	V
707.50	-20.55	1.91	-45.64	-0.96	2.15	21.99	34.77	12.78	H
713.50	-18.81	1.92	-45.73	-0.84	2.15	**23.69**	34.77	11.08	H

LTE Band 12_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
704.00	-21.70	1.90	-45.42	-1.03	2.15	20.71	34.77	14.06	V
707.50	-20.71	1.91	-45.64	-0.96	2.15	**21.83**	34.77	12.94	H
711.00	-20.77	1.92	-45.57	-0.89	2.15	21.62	34.77	13.15	H

LTE Band 12_1.4MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
699.70	-23.19	1.90	-45.24	-1.12	2.15	19.12	34.77	15.65	V
707.50	-21.86	1.91	-45.64	-0.96	2.15	20.69	34.77	14.08	H
715.30	-20.44	1.92	-45.85	-0.80	2.15	**22.13**	34.77	12.64	H

LTE Band 12_3MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
700.50	-23.29	1.90	-45.27	-1.10	2.15	19.04	34.77	15.73	V
707.50	-21.62	1.91	-45.64	-0.96	2.15	20.92	34.77	13.85	H
714.50	-19.66	1.92	-45.79	-0.82	2.15	**22.88**	34.77	11.89	H

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LTE Band 12_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
701.50	-23.52	1.90	-45.32	-1.08	2.15	18.83	34.77	15.94	V
707.50	-21.57	1.91	-45.64	-0.96	2.15	20.97	34.77	13.80	H
713.50	-19.64	1.92	-45.73	-0.84	2.15	**22.86**	34.77	11.91	H

LTE Band 12_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
704.00	-23.18	1.90	-45.42	-1.03	2.15	19.23	34.77	15.54	V
707.50	-21.32	1.91	-45.64	-0.96	2.15	**21.22**	34.77	13.55	H
711.00	-21.96	1.92	-45.57	-0.89	2.15	20.43	34.77	14.34	H

Peak ERP(dBm)=P_{Mea}(-18.64dBm)-G_a(-0.82dBi)-P_{Ag}(-45.79dB)-P_{cl} (1.92dB)-2.15dB = 23.90dBm

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

Limits: ≤34.77dBm (3W)

LTE Band 17_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
706.50	-22.59	1.91	-45.53	-0.98	2.15	**19.86**	34.77	14.91	H
710.00	-24.04	1.92	-45.68	-0.91	2.15	18.48	34.77	16.29	H
713.50	-23.15	1.92	-45.73	-0.84	2.15	19.35	34.77	15.42	H

LTE Band 17_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
709.00	-23.55	1.92	-45.64	-0.93	2.15	**18.95**	34.77	15.82	H
710.00	-23.98	1.92	-45.68	-0.91	2.15	18.54	34.77	16.23	H
711.00	-24.40	1.92	-45.73	-0.89	2.15	18.15	34.77	16.62	H

LTE Band 17_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
706.50	-23.33	1.91	-45.53	-0.98	2.15	**19.12**	34.77	15.65	H
710.00	-25.16	1.92	-45.68	-0.91	2.15	17.36	34.77	17.41	H
713.50	-24.23	1.92	-45.73	-0.84	2.15	18.27	34.77	16.50	H

LTE Band 17_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
709.00	-24.79	1.92	-45.64	-0.93	2.15	17.71	34.77	17.06	H
710.00	-24.70	1.92	-45.68	-0.91	2.15	**17.82**	34.77	16.95	H
711.00	-25.63	1.92	-45.73	-0.89	2.15	16.92	34.77	17.85	H

Peak ERP(dBm) = P_{Mea}(-22.59dBm) - G_a (-0.98dBi) - P_{Ag} (-45.53dB) - P_{cl} (1.91dB) -2.15 dB
= 19.86dBm

ANALYZER SETTINGS:

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

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

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

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A.2 EMISSION LIMIT

Reference

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

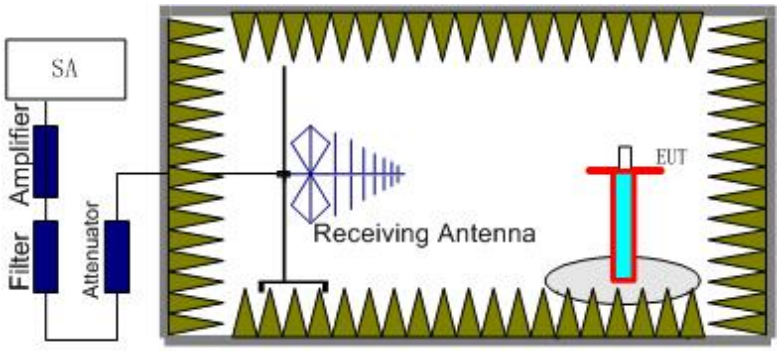
A.2.1 Measurement Method

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

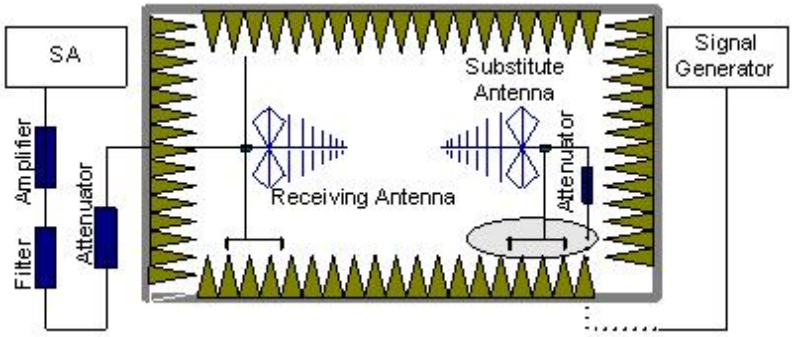
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 22.917, 24.238(a), Part 27.53(h), Part 27.53(m) and Part 27.53(g). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 2, 4, 5, 7, 12 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.



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

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

A.2.2 Measurement Limit

Part 22.917, 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, 12, 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, 12, 17 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

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LTE Band 2, 1.4MHz, QPSK, Channel 18607

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3702.23	-58.09	4.44	-8.14	-54.39	-13.00	41.39	H
7402.52	-48.20	6.42	-11.34	-43.28	-13.00	30.28	V
9251.08	-56.12	7.65	-12.60	-51.17	-13.00	38.17	H
10734.53	-57.74	7.90	-12.45	-53.19	-13.00	40.19	H
13611.78	-54.33	9.09	-13.84	-49.58	-13.00	36.58	H
15882.61	-48.67	10.05	-13.09	-45.63	-13.00	32.63	V

LTE Band 2, 1.4MHz, QPSK, Channel 18900

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3755.56	-58.74	4.53	-8.21	-55.06	-13.00	42.06	H
7511.47	-46.37	6.68	-11.41	-41.64	-13.00	28.64	V
9389.23	-53.18	7.48	-12.60	-48.06	-13.00	35.06	V
11361.55	-55.91	8.63	-12.40	-52.14	-13.00	39.14	H
12772.55	-55.56	9.08	-13.03	-51.61	-13.00	38.61	H
13624.18	-51.79	9.19	-13.85	-47.13	-13.00	34.13	H

LTE Band 2, 1.4MHz, QPSK, Channel 19193

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3818.88	-54.67	4.49	-8.28	-50.88	-13.00	37.88	H
7636.95	-53.43	6.76	-11.54	-48.65	-13.00	35.65	V
9546.23	-54.26	7.78	-12.58	-49.46	-13.00	36.46	H
10589.10	-58.45	8.13	-12.48	-54.10	-13.00	41.10	H
13676.43	-51.30	8.97	-13.87	-46.40	-13.00	33.40	V
14696.94	-50.94	9.43	-13.56	-46.81	-13.00	33.81	V

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3700.69	-57.88	4.44	-8.14	-54.18	-13.00	41.18	H
7400.87	-46.43	6.42	-11.34	-41.51	-13.00	28.51	V
9251.24	-54.12	7.65	-12.60	-49.17	-13.00	36.17	V
10334.73	-60.12	7.96	-12.47	-55.61	-13.00	42.61	H
13610.37	-53.37	9.08	-13.84	-48.61	-13.00	35.61	H
14347.11	-51.89	9.40	-13.72	-47.57	-13.00	34.57	H

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3759.11	-58.96	4.53	-8.21	-55.28	-13.00	42.28	V
7518.15	-47.11	6.79	-11.42	-42.48	-13.00	29.48	V
9397.80	-52.60	7.46	-12.60	-47.46	-13.00	34.46	V
10611.46	-57.75	8.40	-12.48	-53.67	-13.00	40.67	H
12637.21	-54.75	8.75	-12.86	-50.64	-13.00	37.64	V
14188.75	-52.30	9.09	-13.85	-47.54	-13.00	34.54	V

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3817.70	-53.13	4.49	-8.28	-49.34	-13.00	36.34	H
7635.23	-51.37	6.78	-11.54	-46.61	-13.00	33.61	V
9544.21	-54.00	7.77	-12.58	-49.19	-13.00	36.19	H
13325.01	-53.00	8.99	-13.63	-48.36	-13.00	35.36	H
14539.61	-53.95	9.46	-13.59	-49.82	-13.00	36.82	H
16137.72	-50.10	10.33	-12.83	-47.60	-13.00	34.60	V

LTE Band 4, 1.4MHz QPSK, Channel 19957

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3420.52	-56.88	4.19	-7.71	-53.36	-13.00	40.36	V
5130.77	-59.84	5.25	-9.78	-55.31	-13.00	42.31	H
6066.84	-61.10	5.81	-10.25	-56.66	-13.00	43.66	H
7174.73	-60.07	6.36	-11.20	-55.23	-13.00	42.23	H
8551.63	-54.30	7.27	-12.24	-49.33	-13.00	36.33	H
10318.38	-58.39	7.82	-12.46	-53.75	-13.00	40.75	V

LTE Band 4, 1.4MHz, QPSK, Channel 20175

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3463.83	-59.21	4.24	-7.81	-55.64	-13.00	42.64	V
5968.56	-62.77	5.53	-10.19	-58.11	-13.00	45.11	H
8660.25	-52.07	7.44	-12.33	-47.18	-13.00	34.18	H
10392.50	-57.08	8.04	-12.48	-52.64	-13.00	39.64	H
11836.08	-58.52	8.75	-12.47	-54.80	-13.00	41.80	H
13806.31	-53.64	9.20	-13.92	-48.92	-13.00	35.92	H

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LTE Band 4, 1.4MHz, QPSK, Channel 20393

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3507.57	-58.53	4.32	-7.91	-54.94	-13.00	41.94	H
7015.50	-50.55	6.34	-11.11	-45.78	-13.00	32.78	V
8769.18	-52.12	7.36	-12.42	-47.06	-13.00	34.06	H
10523.39	-54.39	8.05	-12.50	-49.94	-13.00	36.94	V
11380.30	-54.19	8.65	-12.40	-50.44	-13.00	37.44	V
13575.35	-51.56	9.22	-13.83	-46.95	-13.00	33.95	V

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3420.49	-60.22	4.19	-7.71	-56.70	-13.00	43.70	H
4803.40	-62.46	5.10	-9.35	-58.21	-13.00	45.21	V
6732.38	-58.53	6.10	-10.83	-53.80	-13.00	40.80	V
8551.18	-54.33	7.28	-12.24	-49.37	-13.00	36.37	H
10261.62	-58.11	7.56	-12.45	-53.22	-13.00	40.22	V
13591.74	-53.08	9.21	-13.84	-48.45	-13.00	35.45	H

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3464.08	-59.18	4.24	-7.81	-55.61	-13.00	42.61	H
4464.11	-61.55	4.83	-8.78	-57.60	-13.00	44.60	H
7121.37	-60.04	6.40	-11.17	-55.27	-13.00	42.27	V
8660.58	-52.38	7.44	-12.33	-47.49	-13.00	34.49	V
10392.12	-56.97	8.04	-12.48	-52.53	-13.00	39.53	V
12362.10	-55.32	8.65	-12.64	-51.33	-13.00	38.33	H

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3504.29	-62.69	4.31	-7.91	-59.09	-13.00	46.09	V
4158.54	-59.90	4.67	-8.60	-55.97	-13.00	42.97	H
7018.89	-60.47	6.36	-11.11	-55.72	-13.00	42.72	H
8767.65	-60.17	7.35	-12.41	-55.11	-13.00	42.11	H
10523.81	-57.27	8.05	-12.50	-52.82	-13.00	39.82	H
12642.62	-55.58	8.74	-12.87	-51.45	-13.00	38.45	H

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LTE Band 5, 1.4MHz, QPSK, Channel 20407

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
1648.42	-57.86	2.91	-5.45	2.15	-57.47	-13.00	44.47	V
3259.87	-60.11	4.16	-7.32	2.15	-59.10	-13.00	46.10	V
4434.47	-60.36	4.81	-8.76	2.15	-58.56	-13.00	45.56	V
4784.90	-62.16	5.03	-9.31	2.15	-60.03	-13.00	47.03	V
6099.23	-61.33	5.79	-10.28	2.15	-58.99	-13.00	45.99	V
7192.88	-62.09	6.42	-11.22	2.15	-59.44	-13.00	46.44	H

LTE Band 5, 1.4MHz, QPSK, Channel 20525

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3285.59	-63.43	4.23	-7.39	2.15	-62.42	-13.00	49.42	H
4101.66	-62.39	4.69	-8.56	2.15	-60.67	-13.00	47.67	H
5033.85	-61.22	5.17	-9.72	2.15	-58.82	-13.00	45.82	H
6113.32	-60.88	5.78	-10.29	2.15	-58.52	-13.00	45.52	V
7006.47	-59.66	6.29	-11.10	2.15	-57.00	-13.00	44.00	V
8549.80	-60.84	7.28	-12.24	2.15	-58.03	-13.00	45.03	H

LTE Band 5, 1.4MHz, QPSK, Channel 20643

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
1695.79	-55.54	2.95	-5.24	2.15	-55.40	-13.00	42.40	H
3092.08	-58.80	3.99	-6.92	2.15	-58.02	-13.00	45.02	H
3751.44	-62.25	4.54	-8.20	2.15	-60.74	-13.00	47.74	H
4390.59	-59.76	4.80	-8.73	2.15	-57.98	-13.00	44.98	H
5766.61	-60.26	5.69	-10.11	2.15	-57.99	-13.00	44.99	V
6628.34	-61.87	6.09	-10.73	2.15	-59.38	-13.00	46.38	H

LTE Band 5, 1.4MHz, 16QAM, Channel 20407

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
1648.77	-58.32	2.91	-5.45	2.15	-57.93	-13.00	44.93	H
3375.85	-62.01	4.23	-7.60	2.15	-60.79	-13.00	47.79	H
4201.81	-62.52	4.72	-8.62	2.15	-60.77	-13.00	47.77	V
5523.33	-59.94	5.47	-10.01	2.15	-57.55	-13.00	44.55	H
6378.35	-59.86	5.82	-10.50	2.15	-57.33	-13.00	44.33	V
7356.97	-59.75	6.47	-11.31	2.15	-57.06	-13.00	44.06	V

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LTE Band 5, 1.4MHz, 16QAM, Channel 20525

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3292.78	-60.89	4.24	-7.40	2.15	-59.88	-13.00	46.88	V
4574.49	-60.56	4.95	-8.93	2.15	-58.73	-13.00	45.73	V
5608.94	-61.45	5.46	-10.04	2.15	-59.02	-13.00	46.02	H
6071.76	-59.16	5.82	-10.26	2.15	-56.87	-13.00	43.87	V
7007.79	-60.58	6.30	-11.10	2.15	-57.93	-13.00	44.93	H
7350.15	-60.60	6.49	-11.31	2.15	-57.93	-13.00	44.93	H

LTE Band 5, 1.4MHz, 16QAM, Channel 20643

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
1695.49	-56.07	2.95	-5.24	2.15	-55.93	-13.00	42.93	H
3408.23	-61.91	4.19	-7.68	2.15	-60.57	-13.00	47.57	H
4291.70	-61.14	4.80	-8.68	2.15	-59.41	-13.00	46.41	V
5706.72	-62.60	5.51	-10.08	2.15	-60.18	-13.00	47.18	H
6174.72	-61.87	5.79	-10.34	2.15	-59.47	-13.00	46.47	H
7558.87	-60.62	6.79	-11.46	2.15	-58.10	-13.00	45.10	V

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LTE Band 7, 5 MHz, QPSK, Channel 20775

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
5000.48	-50.34	5.17	-9.70	-45.81	-13.00	32.81	H
7501.12	-51.45	6.61	-11.40	-46.66	-13.00	33.66	V
10001.53	-55.59	7.99	-12.40	-51.18	-13.00	38.18	H
11738.00	-57.46	8.87	-12.45	-53.88	-13.00	40.88	H
13429.12	-53.98	9.14	-13.73	-49.39	-13.00	36.39	V
14208.49	-53.46	9.17	-13.83	-48.80	-13.00	35.80	H

LTE Band 7, 5 MHz, QPSK, Channel 21100

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3281.48	-62.51	4.21	-7.38	-59.34	-13.00	46.34	H
5065.60	-46.55	5.22	-9.74	-42.03	-13.00	29.03	H
7598.62	-54.68	6.88	-11.50	-50.06	-13.00	37.06	V
8561.60	-59.64	7.19	-12.25	-54.58	-13.00	41.58	H
9930.49	-60.11	7.67	-12.43	-55.35	-13.00	42.35	H
11643.78	-55.10	8.63	-12.43	-51.30	-13.00	38.30	V

LTE Band 7, 5 MHz, QPSK, Channel 21425

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
5130.58	-49.42	5.25	-9.78	-44.89	-13.00	31.89	V
7695.74	-51.68	6.56	-11.60	-46.64	-13.00	33.64	H
10261.20	-54.50	7.55	-12.45	-49.60	-13.00	36.60	V
10949.66	-57.47	8.56	-12.41	-53.62	-13.00	40.62	V
13886.75	-52.29	9.17	-13.95	-47.51	-13.00	34.51	H
16664.82	-46.72	10.24	-12.40	-44.56	-13.00	31.56	H

LTE Band 7, 5 MHz, 16QAM, Channel 20775

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
5000.68	-51.15	5.17	-9.70	-46.62	-13.00	33.62	V
7500.97	-50.12	6.61	-11.40	-45.33	-13.00	32.33	V
10001.62	-55.76	7.98	-12.40	-51.34	-13.00	38.34	H
13199.32	-53.43	9.25	-13.50	-49.18	-13.00	36.18	V
13621.36	-54.06	9.17	-13.85	-49.38	-13.00	36.38	V
16111.72	-49.14	10.42	-12.87	-46.69	-13.00	33.69	V

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LTE Band 7, 5 MHz, 16QAM, Channel 21100

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
5065.53	-47.84	5.22	-9.74	-43.32	-13.00	30.32	V
7349.07	-60.67	6.49	-11.31	-55.85	-13.00	42.85	V
8273.87	-61.06	7.15	-12.06	-56.15	-13.00	43.15	V
9734.31	-61.22	7.81	-12.51	-56.52	-13.00	43.52	H
11670.05	-58.19	8.64	-12.43	-54.40	-13.00	41.40	V
13501.52	-55.23	9.22	-13.80	-50.65	-13.00	37.65	V

LTE Band 7, 5 MHz, 16QAM, Channel 21425

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Margin(dB)	Polarization
5130.71	-49.52	5.25	-9.78	-44.99	-13.00	31.99	V
7696.09	-52.91	6.56	-11.60	-47.87	-13.00	34.87	V
10261.42	-55.23	7.55	-12.45	-50.33	-13.00	37.33	V
13544.84	-53.10	9.33	-13.82	-48.61	-13.00	35.61	H
14251.34	-52.17	9.27	-13.80	-47.64	-13.00	34.64	V
16213.65	-48.25	10.00	-12.74	-45.51	-13.00	32.51	V

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LTE Band 12, 1.4MHz, QPSK, Channel 23017

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3275.71	-62.95	4.19	-7.36	2.15	-61.93	-13.00	48.93	H
4116.51	-60.55	4.67	-8.57	2.15	-58.80	-13.00	45.80	H
4814.98	-61.43	5.13	-9.37	2.15	-59.34	-13.00	46.34	H
5659.85	-61.42	5.46	-10.06	2.15	-58.97	-13.00	45.97	V
6773.41	-61.00	6.15	-10.87	2.15	-58.43	-13.00	45.43	V
7497.93	-60.11	6.59	-11.40	2.15	-57.45	-13.00	44.45	H

LTE Band 12, 1.4MHz, QPSK, Channel 23095

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3878.43	-61.12	4.52	-8.35	2.15	-59.44	-13.00	46.44	V
4367.97	-60.66	4.89	-8.72	2.15	-58.98	-13.00	45.98	V
5567.46	-59.97	5.42	-10.03	2.15	-57.51	-13.00	44.51	H
6269.72	-61.11	5.84	-10.42	2.15	-58.68	-13.00	45.68	H
6978.56	-61.20	6.26	-11.08	2.15	-58.53	-13.00	45.53	H
7437.60	-59.57	6.42	-11.36	2.15	-56.78	-13.00	43.78	H

LTE Band 12, 1.4MHz, QPSK, Channel 23173

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3386.08	-61.21	4.23	-7.63	2.15	-59.96	-13.00	46.96	H
4409.25	-63.03	4.85	-8.75	2.15	-61.28	-13.00	48.28	V
4849.72	-61.84	5.10	-9.43	2.15	-59.66	-13.00	46.66	V
5749.88	-60.31	5.69	-10.10	2.15	-58.05	-13.00	45.05	H
6180.59	-61.05	5.78	-10.34	2.15	-58.64	-13.00	45.64	V
7258.26	-59.82	6.38	-11.25	2.15	-57.10	-13.00	44.10	V

LTE Band 12, 1.4MHz, 16QAM, Channel 23017

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3492.45	-60.17	4.27	-7.88	2.15	-58.71	-13.00	45.71	H
3756.35	-61.61	4.53	-8.21	2.15	-60.08	-13.00	47.08	H
4658.28	-59.32	4.94	-9.08	2.15	-57.33	-13.00	44.33	H
5721.79	-60.66	5.53	-10.09	2.15	-58.25	-13.00	45.25	H
7489.08	-60.59	6.55	-11.39	2.15	-57.90	-13.00	44.90	V
8746.56	-60.57	7.28	-12.40	2.15	-57.60	-13.00	44.60	H

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LTE Band 12, 1.4MHz 16QAM, Channel 23095

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3387.26	-60.86	4.24	-7.63	2.15	-59.62	-13.00	46.62	H
4145.58	-60.92	4.66	-8.59	2.15	-59.14	-13.00	46.14	H
5808.24	-60.40	5.69	-10.12	2.15	-58.12	-13.00	45.12	H
6759.70	-60.01	6.14	-10.86	2.15	-57.44	-13.00	44.44	V
7488.10	-59.18	6.55	-11.39	2.15	-56.49	-13.00	43.49	H
8588.00	-59.54	7.31	-12.27	2.15	-56.73	-13.00	43.73	V

LTE Band 12, 1.4MHz, 16QAM, Channel 23173

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3157.88	-61.79	4.03	-7.08	2.15	-60.89	-13.00	47.89	V
3914.00	-61.00	4.51	-8.40	2.15	-59.26	-13.00	46.26	V
4746.09	-57.87	4.99	-9.24	2.15	-55.77	-13.00	42.77	H
5418.44	-61.81	5.40	-9.95	2.15	-59.41	-13.00	46.41	H
6212.37	-61.15	5.79	-10.37	2.15	-58.72	-13.00	45.72	H
7338.72	-61.49	6.46	-11.30	2.15	-58.80	-13.00	45.80	H

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LTE Band 17, 5MHz, QPSK, Channel 23755

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3533.42	-54.21	4.32	-7.94	2.15	-52.74	-13.00	39.74	H
4367.74	-60.58	4.89	-8.72	2.15	-58.90	-13.00	45.90	V
5526.24	-58.95	5.47	-10.01	2.15	-56.56	-13.00	43.56	V
6412.77	-59.72	5.83	-10.53	2.15	-57.17	-13.00	44.17	V
7034.20	-58.91	6.44	-11.12	2.15	-56.38	-13.00	43.38	H
7837.11	-58.81	6.95	-11.74	2.15	-56.17	-13.00	43.17	V

LTE Band 17, 5MHz, QPSK, Channel 23790

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3223.81	-61.27	4.16	-7.24	2.15	-60.34	-13.00	47.34	V
4040.92	-61.32	4.66	-8.52	2.15	-59.61	-13.00	46.61	V
4701.86	-61.31	4.95	-9.16	2.15	-59.25	-13.00	46.25	V
5127.51	-59.91	5.25	-9.78	2.15	-57.53	-13.00	44.53	H
5636.88	-62.55	5.45	-10.05	2.15	-60.10	-13.00	47.10	V
7361.78	-60.18	6.45	-11.32	2.15	-57.46	-13.00	44.46	H

LTE Band 17, 5MHz, QPSK, Channel 23825

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3425.30	-60.15	4.19	-7.72	2.15	-58.77	-13.00	45.77	H
4576.95	-58.75	4.96	-8.94	2.15	-56.92	-13.00	43.92	V
5221.27	-60.59	5.27	-9.83	2.15	-58.18	-13.00	45.18	V
6338.62	-59.25	5.84	-10.47	2.15	-56.77	-13.00	43.77	H
7353.26	-58.21	6.48	-11.31	2.15	-55.53	-13.00	42.53	V
8643.82	-58.82	7.46	-12.32	2.15	-56.11	-13.00	43.11	H

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3533.33	-55.97	4.32	-7.94	2.15	-54.50	-13.00	41.50	V
4270.85	-60.35	4.79	-8.66	2.15	-58.63	-13.00	45.63	V
5249.21	-62.63	5.26	-9.85	2.15	-60.19	-13.00	47.19	H
6997.53	-60.72	6.25	-11.10	2.15	-58.02	-13.00	45.02	H
8076.77	-58.45	6.93	-11.95	2.15	-55.58	-13.00	42.58	V
9624.88	-58.34	7.89	-12.55	2.15	-55.83	-13.00	42.83	V

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3093.32	-59.27	4.00	-6.92	2.15	-58.50	-13.00	45.50	H
3539.32	-59.43	4.32	-7.95	2.15	-57.95	-13.00	44.95	V
4178.27	-62.64	4.69	-8.61	2.15	-60.87	-13.00	47.87	H
5145.28	-61.34	5.24	-9.79	2.15	-58.94	-13.00	45.94	V
5900.35	-59.06	5.60	-10.16	2.15	-56.65	-13.00	43.65	V
7165.40	-58.99	6.35	-11.20	2.15	-56.29	-13.00	43.29	V

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3568.40	-57.09	4.34	-7.98	2.15	-55.60	-13.00	42.60	H
4901.64	-60.53	5.15	-9.52	2.15	-58.31	-13.00	45.31	H
5892.33	-58.81	5.59	-10.16	2.15	-56.39	-13.00	43.39	V
7148.38	-59.87	6.37	-11.19	2.15	-57.20	-13.00	44.20	V
8374.36	-58.81	7.32	-12.12	2.15	-56.16	-13.00	43.16	V
9452.43	-59.91	7.45	-12.60	2.15	-56.91	-13.00	43.91	H

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

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A.3 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.235, 24.235, 27.54.

A.4.1 Method of Measurement

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 2/4/5/7, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 ℃ increments from +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

A.4.2 Measurement Limit

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d) (2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.2VDC and 3.6VDC, with a nominal voltage of 3.3VDC. 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.

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A.4.3 Measurement results

LTE Band 2, 20MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.2	-7	-10	0.004	0.006
3.3	-17	-14	0.009	0.007
3.6	-13	-10	0.007	0.005

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	-22	-12	0.012	0.007
40°	-1	-7	0.000	0.004
30°	5	-7	0.003	0.004
20°	-1	-3	0.001	0.002
10°	-4	-8	0.002	0.004
0°	-8	-4	0.004	0.002
- 10°	-7	-32	0.004	0.017
- 20°	-6	-14	0.003	0.007
- 30°	-13	-30	0.007	0.016

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
3.2	1	15	0.000	0.009
3.3	-4	19	0.002	0.011
3.6	-4	18	0.002	0.010

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	1	18	0.000	0.010
40°	-2	18	0.001	0.011
30°	1	19	0.001	0.011
20°	0	19	0.000	0.011
10°	-4	21	0.003	0.012
0°	1	12	0.001	0.007
- 10°	-4	18	0.002	0.010
- 20°	-6	19	0.004	0.011
- 30°	-7	20	0.004	0.011

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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
3.2	-1.62	20.90	0.002	0.025
3.3	0.76	24.98	0.001	0.030
3.6	4.71	22.09	0.006	0.026

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	-0.37	22.04	0.000	0.026
40°	-0.67	19.31	0.001	0.023
30°	0.83	22.70	0.001	0.027
20°	1.73	23.10	0.002	0.028
10°	0.16	24.98	0.000	0.030
0°	1.97	17.15	0.002	0.021
- 10°	-2.63	20.44	0.003	0.024
- 20°	0.20	18.55	0.000	0.022
- 30°	2.25	21.77	0.003	0.026

LTE Band 7, 20MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.2	-20	4	0.008	0.001
3.3	-1	3	0.000	0.001
3.6	-20	-27	0.008	0.011

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	-2	-29	0.001	0.012
40°	-15	-29	0.006	0.011
30°	4	-25	0.002	0.010
20°	-8	-25	0.003	0.010
10°	-26	-21	0.010	0.008
0°	0	-17	0.000	0.007
- 10°	-17	-21	0.007	0.008
- 20°	-2	-6	0.001	0.002
- 30°	-2	-19	0.001	0.007

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LTE Band 12, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.2	-1	18	0.001	0.025
3.3	1	20	0.001	0.028
3.6	1	18	0.001	0.026

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	1	19	0.001	0.027
40°	-3	17	0.004	0.024
30°	-1	17	0.001	0.025
20°	1	16	0.002	0.023
10°	-2	18	0.003	0.025
0°	-3	17	0.004	0.024
- 10°	0	17	0.000	0.024
- 20°	-4	21	0.005	0.030
- 30°	-1	20	0.001	0.028

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

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.2	-2	-7	0.002	0.009
3.3	-3	-8	0.005	0.012
3.6	0	-3	0.000	0.004

Frequency Error vs Temperature

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

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

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A.4 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049(h)(i)

A.4.1 Occupied Bandwidth Results

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the US Cellular/PCS frequency bands. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

The measurement method is from KDB 971168 v02r01 4.2:

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

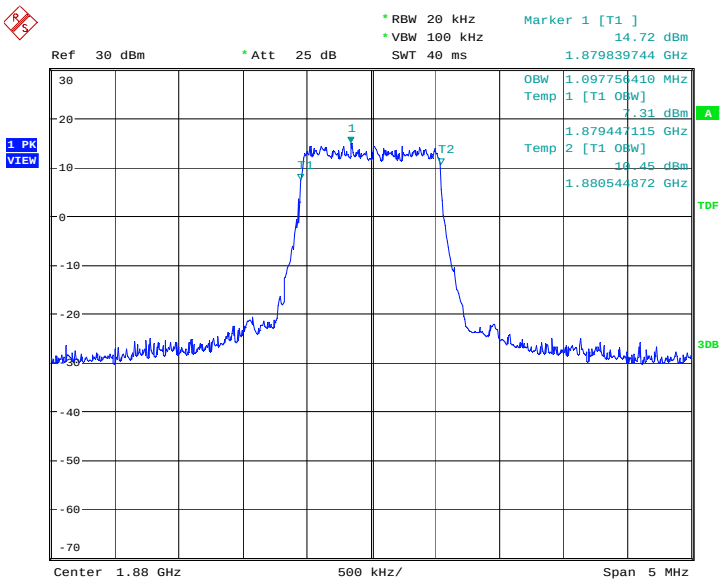
e) Set the detection mode to peak, and the trace mode to max hold.

d) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

LTE band 2, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	1097.76	1097.76

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



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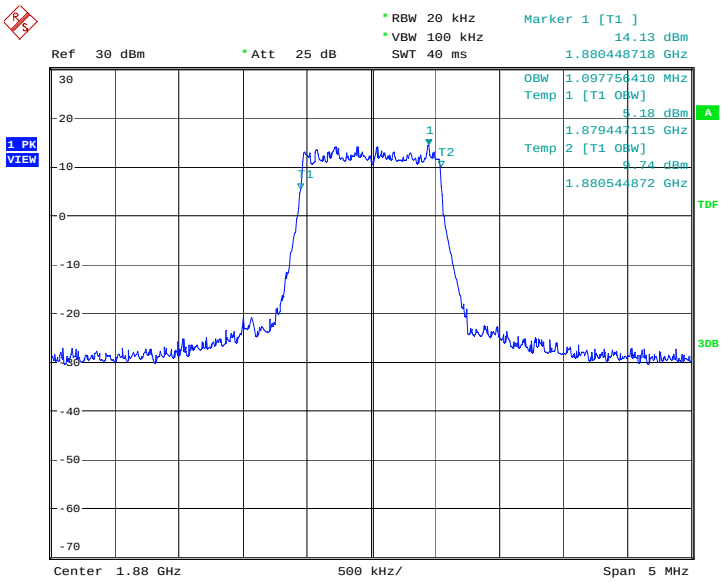
LTE band 2, 1.4MHz Bandwidth, 16QAM (99% BW)



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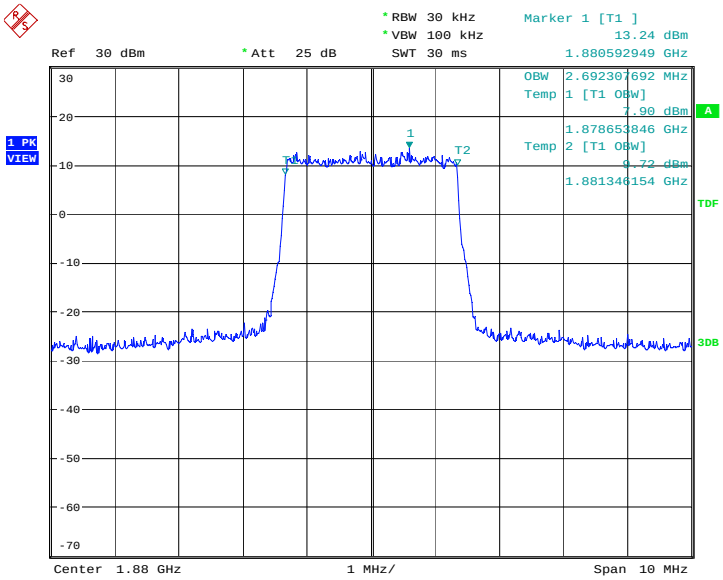
LTE band 2, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	2692.31	2692.31

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



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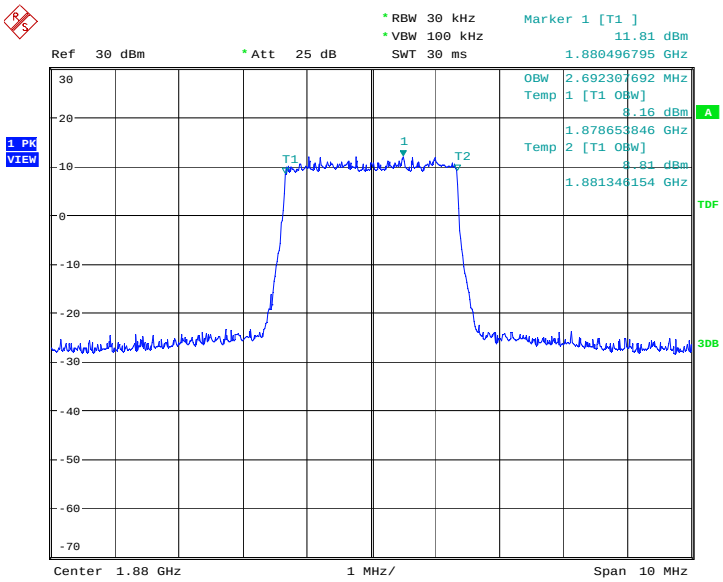
LTE band 2, 3MHz Bandwidth, 16QAM (99% BW)



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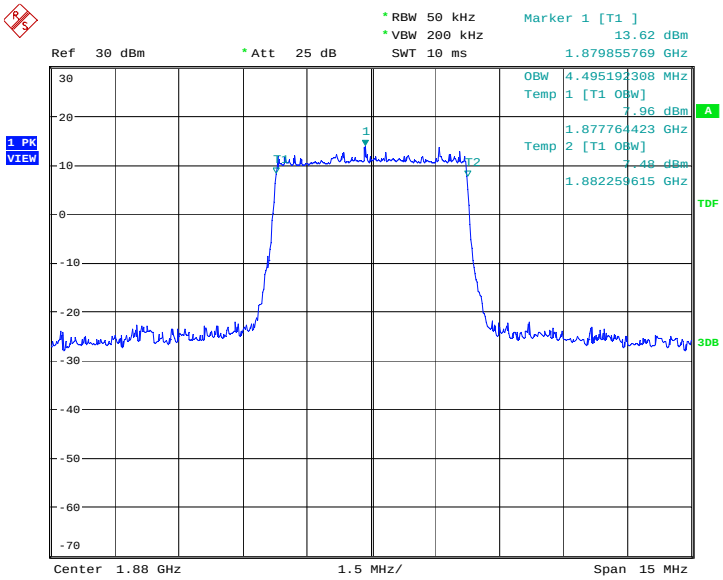
LTE band 2, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	4495.19	4495.19

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



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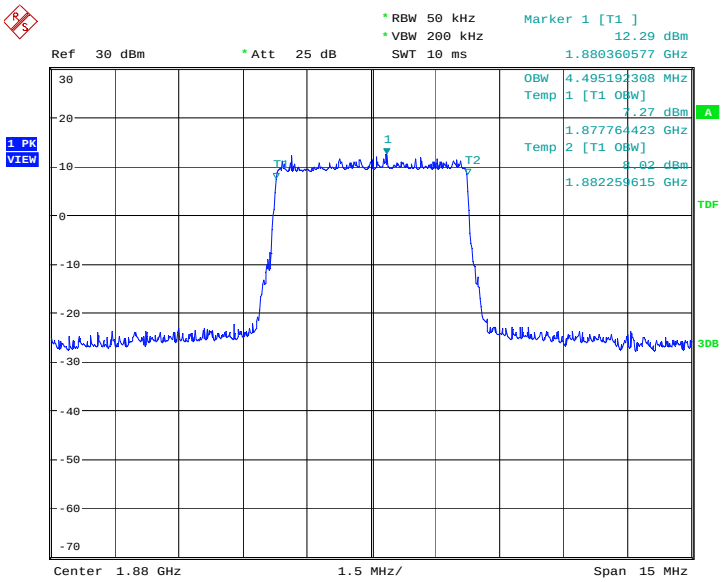
LTE band 2, 5MHz Bandwidth,16QAM (99% BW)



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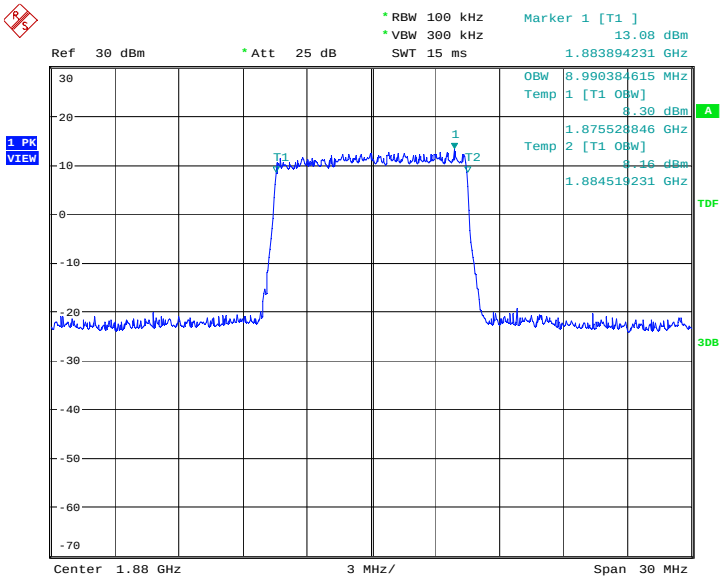
LTE band 2, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	8990.38	8990.38

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



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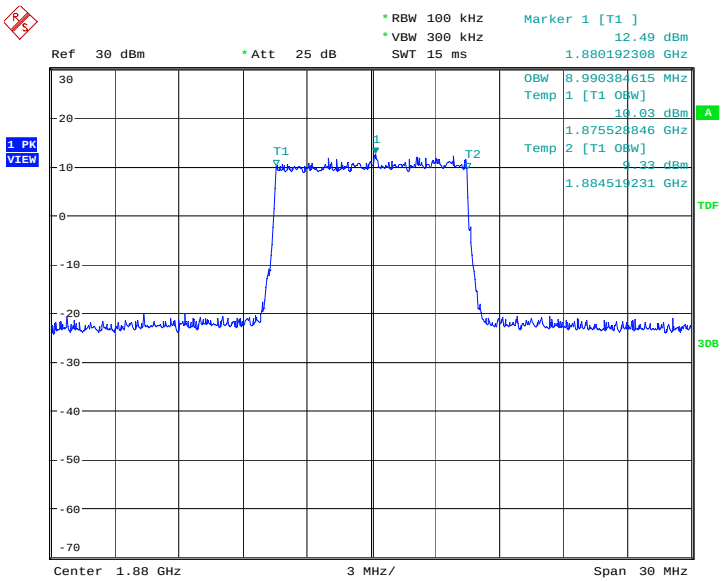
LTE band 2, 10MHz Bandwidth, 16QAM (99% BW)



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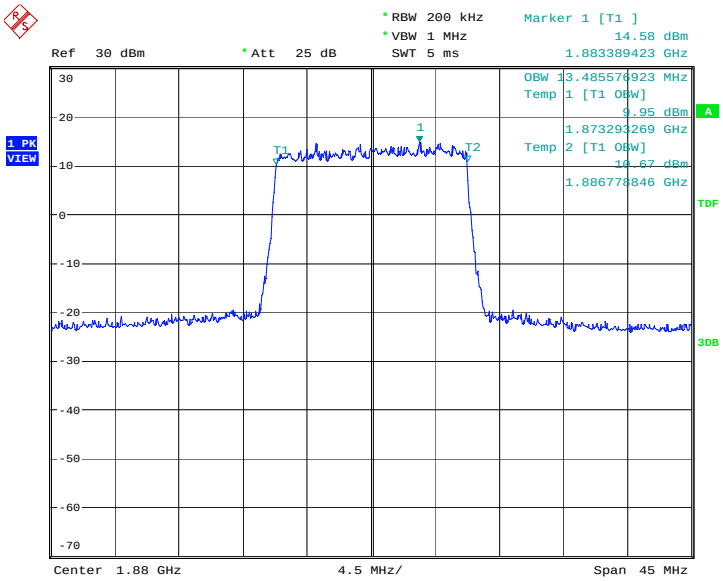
LTE band 2, 15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	13485.58	13485.58

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



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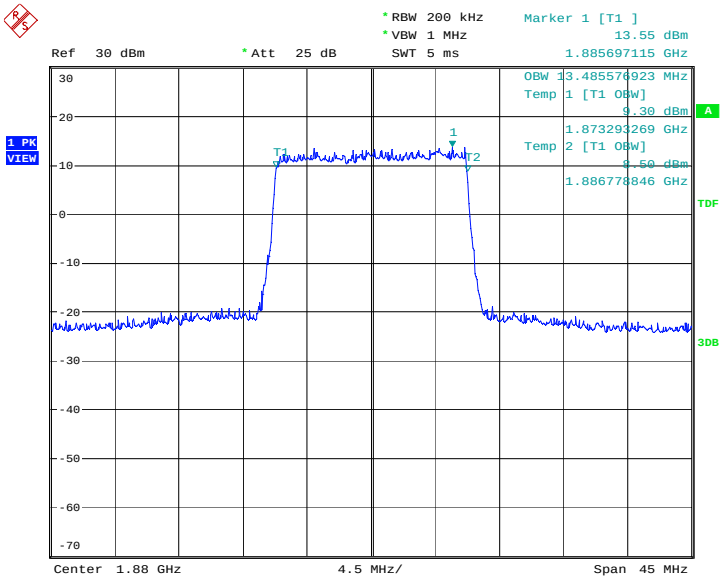
LTE band 2, 15MHz Bandwidth, 16QAM (99% BW)



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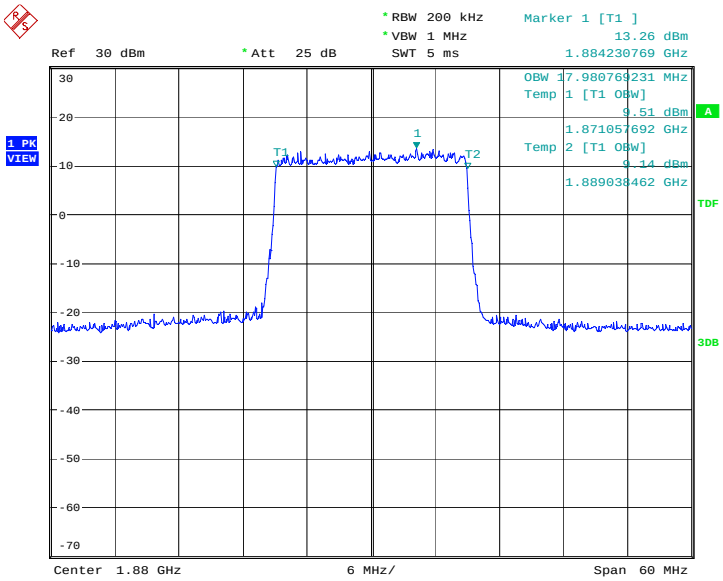
LTE band 2, 20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	17980.77	17980.77

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



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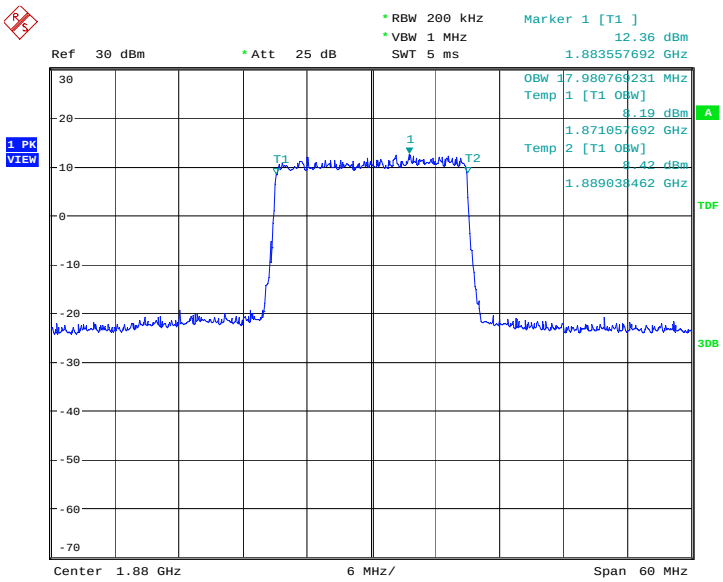
LTE band 2, 20MHz Bandwidth, 16QAM (99% BW)



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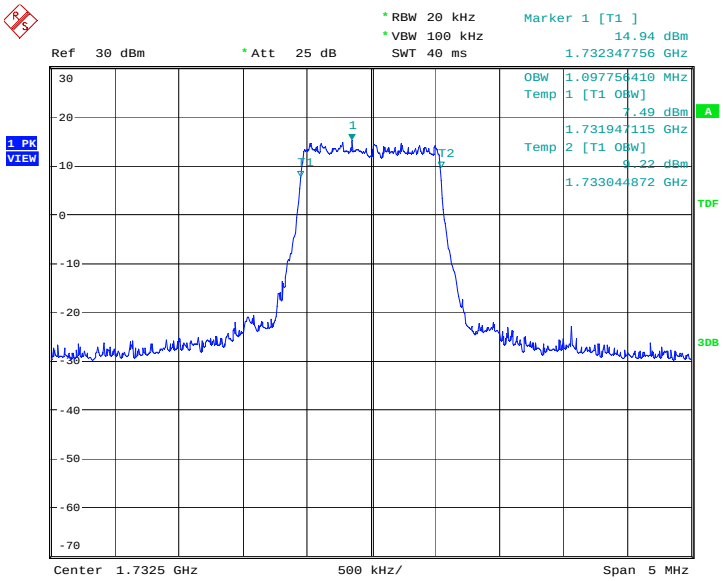
LTE band 4, 1.4MHz (99%)

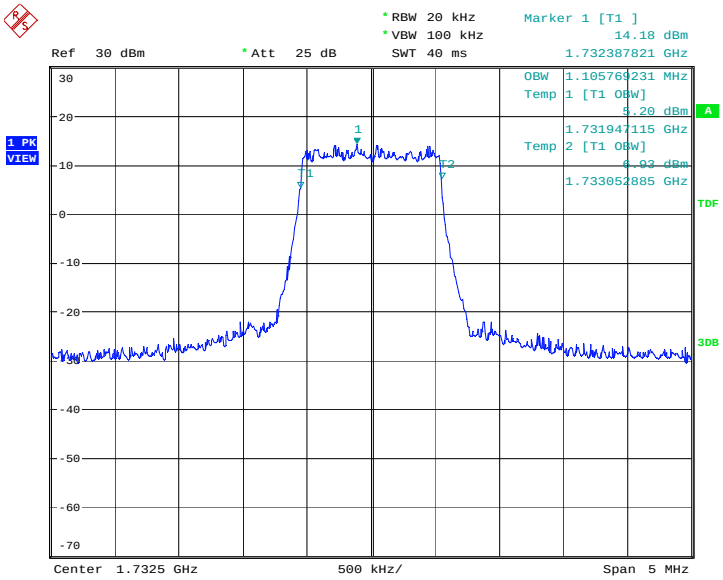
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	1097.76	1105.77

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



Date: 22.SEP.2014 18:09:47

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



Date: 22.SEP.2014 18:10:02

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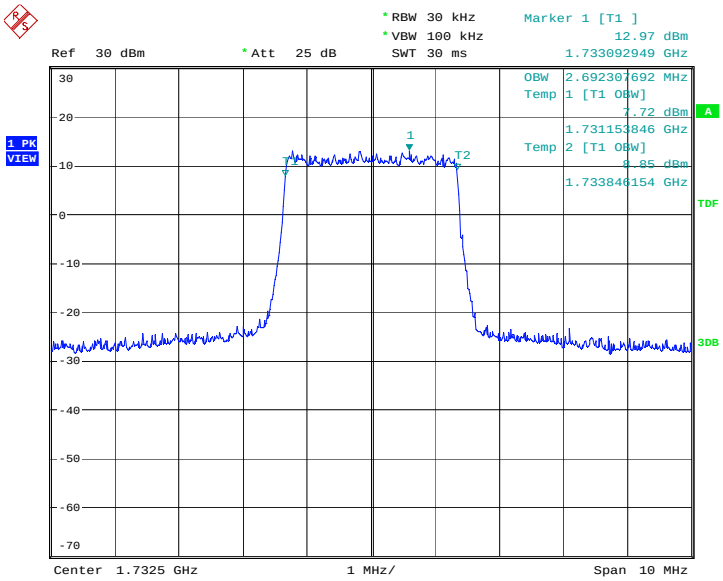
LTE band 4, 3MHz (99%)

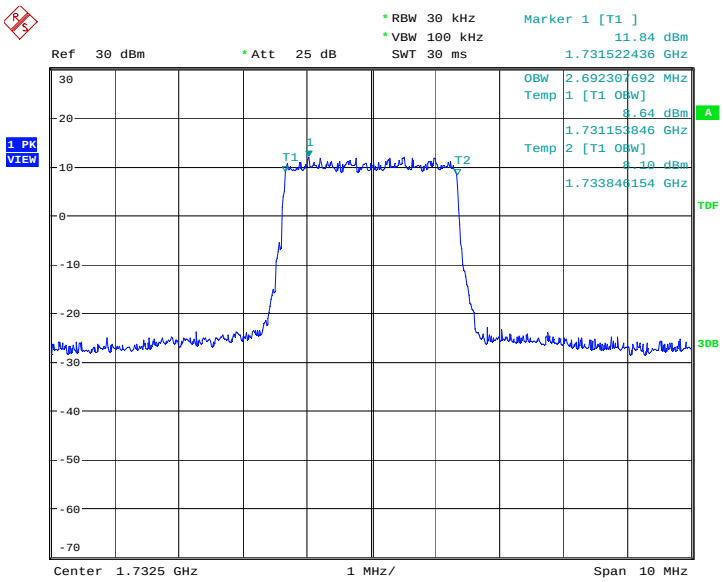
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	2692.31	2692.31

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



Date: 22.SEP.2014 18:16:20

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



Date: 22.SEP.2014 18:16:33

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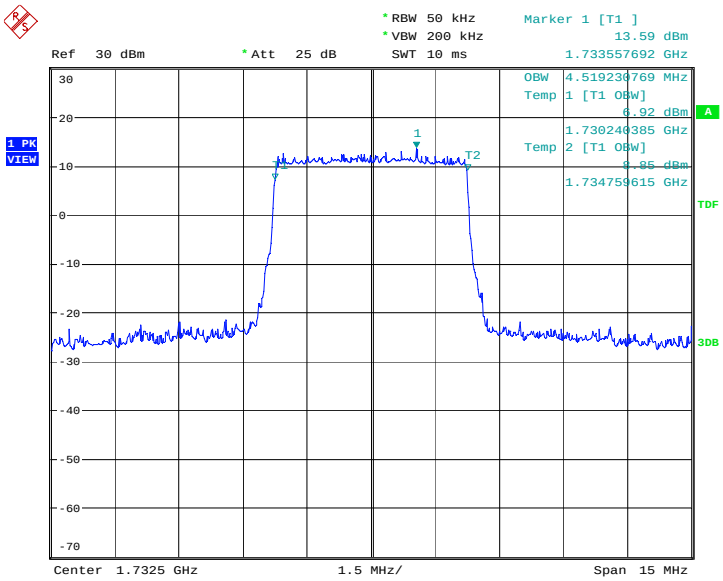
LTE band 4, 5MHz (99%)

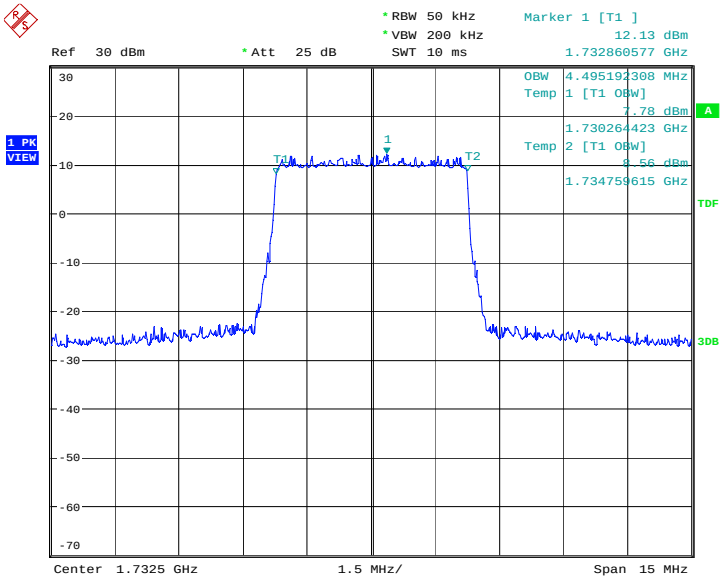
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	4519.23	4495.19

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



Date: 22.SEP.2014 18:22:46

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



Date: 22.SEP.2014 18:23:00

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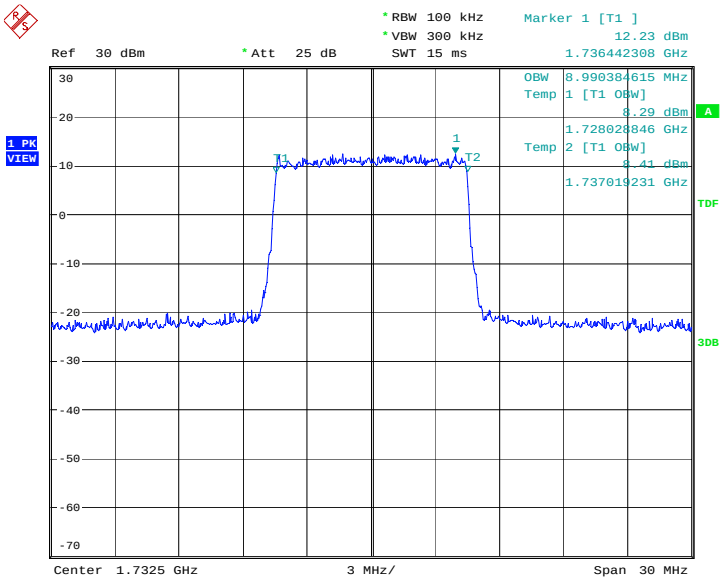
LTE band 4, 10MHz (99%)

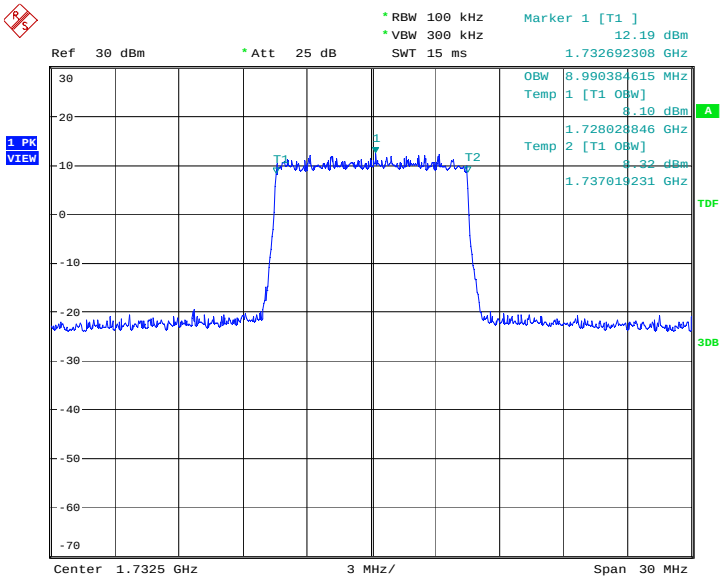
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	8990.38	8990.38

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



Date: 22.SEP.2014 18:29:13

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



Date: 22.SEP.2014 18:29:27

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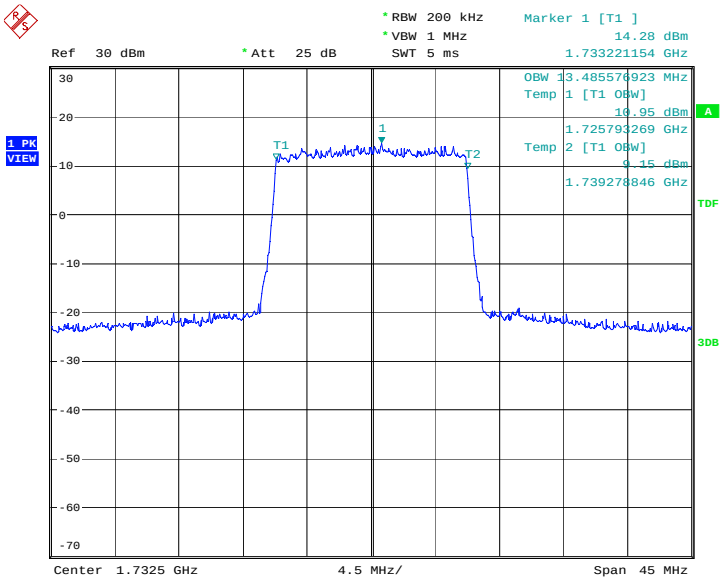
LTE band 4, 15MHz (99%)

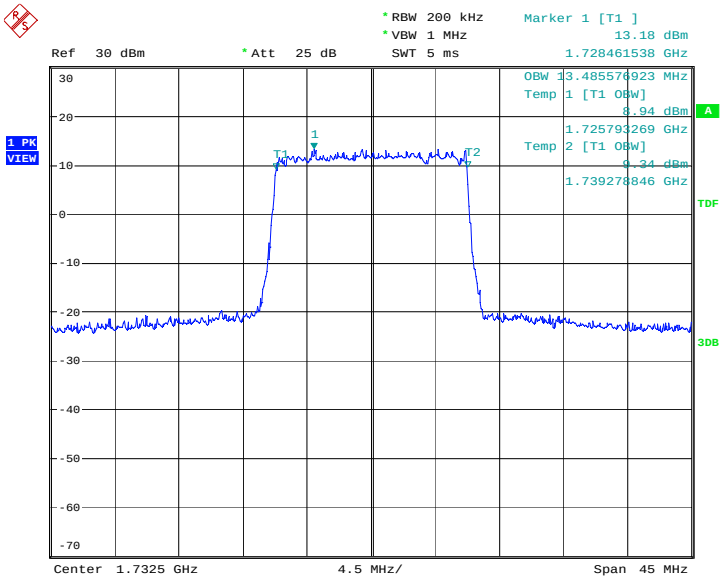
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	13485.58	13485.58

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



Date: 22.SEP.2014 18:35:44

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



Date: 22.SEP.2014 18:35:57

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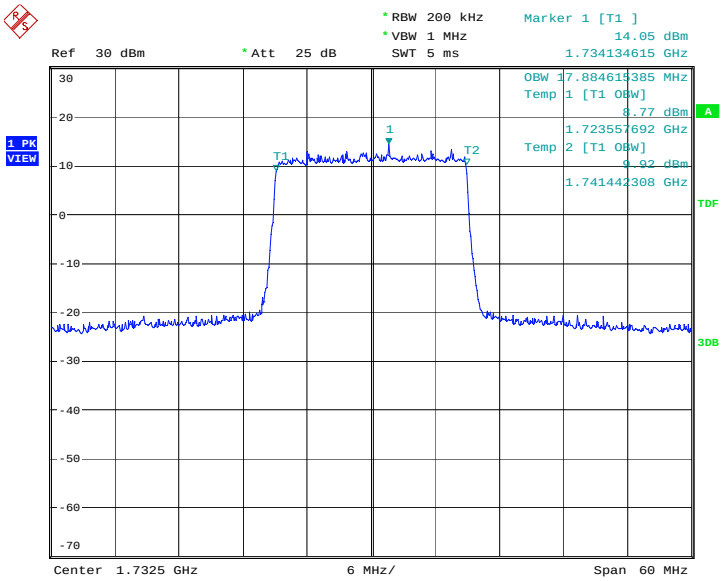
LTE band 4, 20MHz (99%)

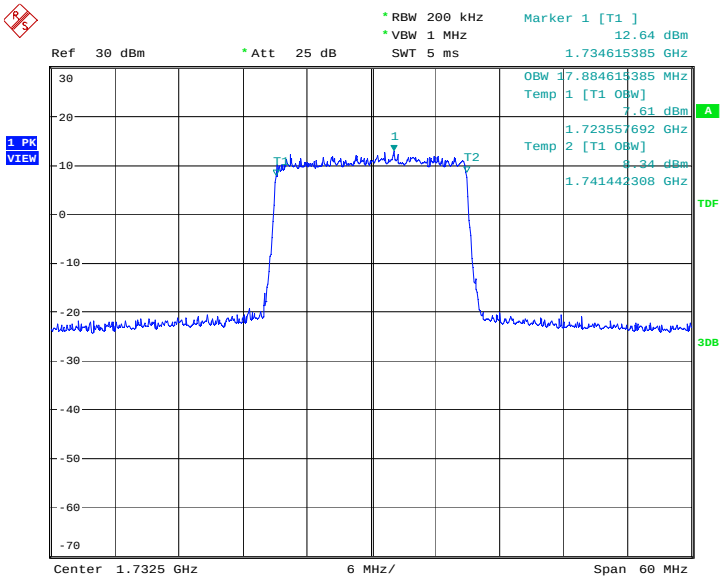
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	17884.62	17884.62

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



Date: 22.SEP.2014 18:43:49

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



Date: 22.SEP.2014 18:44:03

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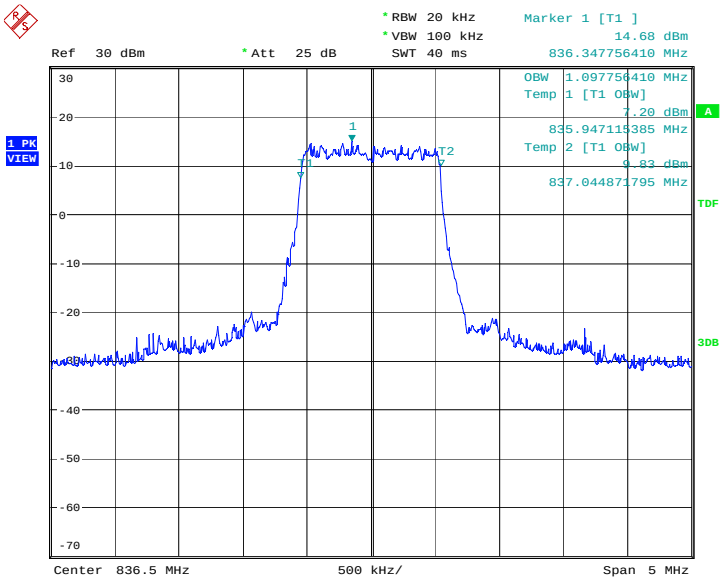
LTE band 5, 1.4MHz (99%)

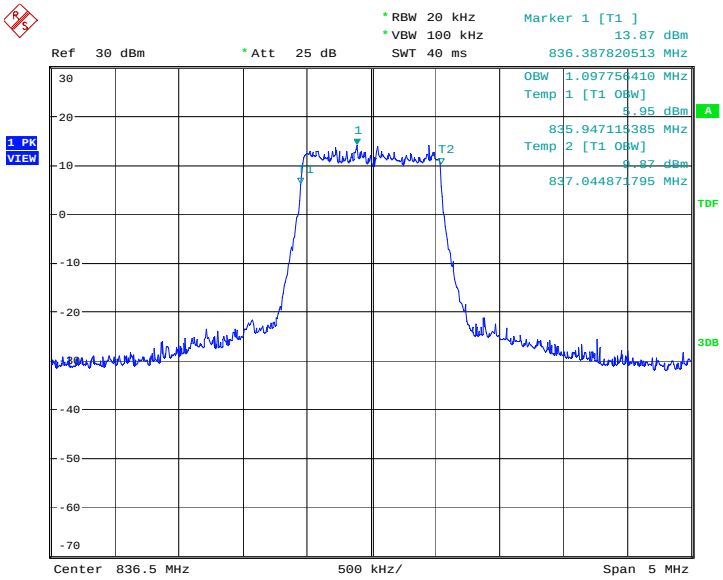
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	1097.76	1097.76

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



Date: 22.SEP.2014 17:03:55

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



Date: 22.SEP.2014 17:04:10

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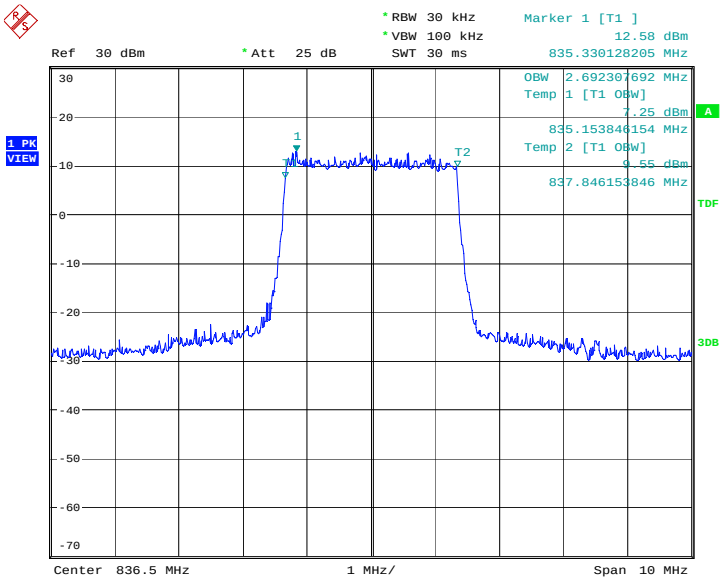
LTE band 5, 3MHz (99%)

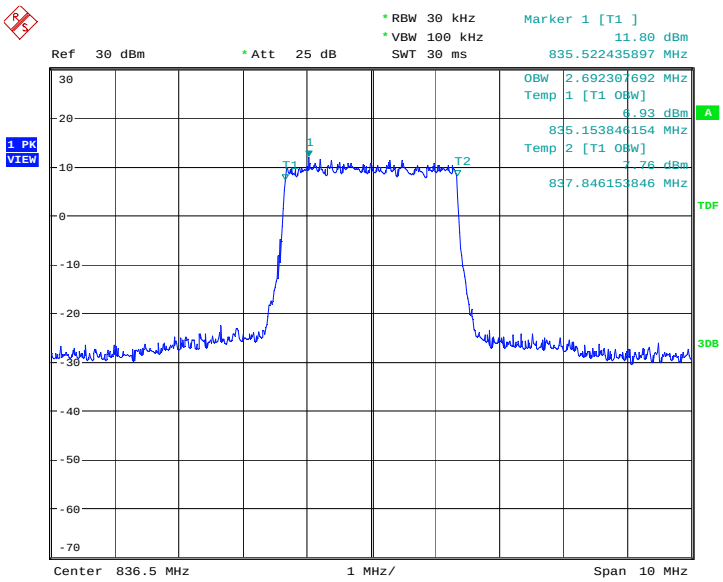
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	2692.31	2692.31

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



Date: 22.SEP.2014 17:10:28

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



Date: 22.SEP.2014 17:10:43

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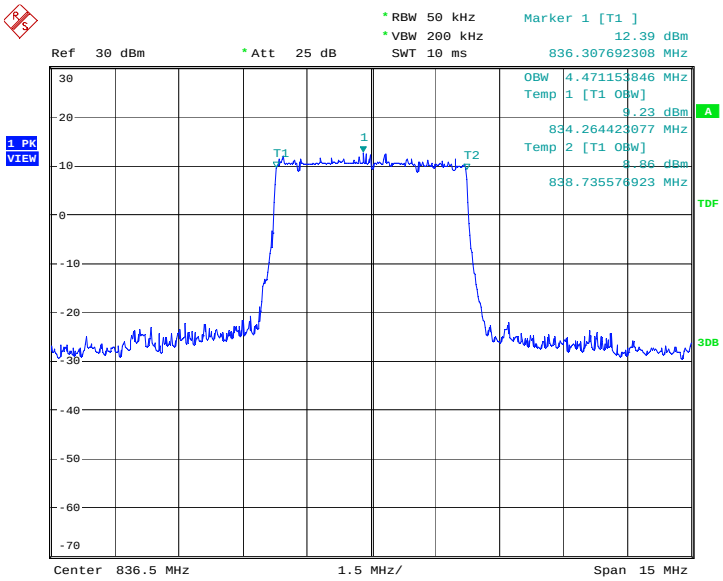
LTE band 5, 5MHz (99%)

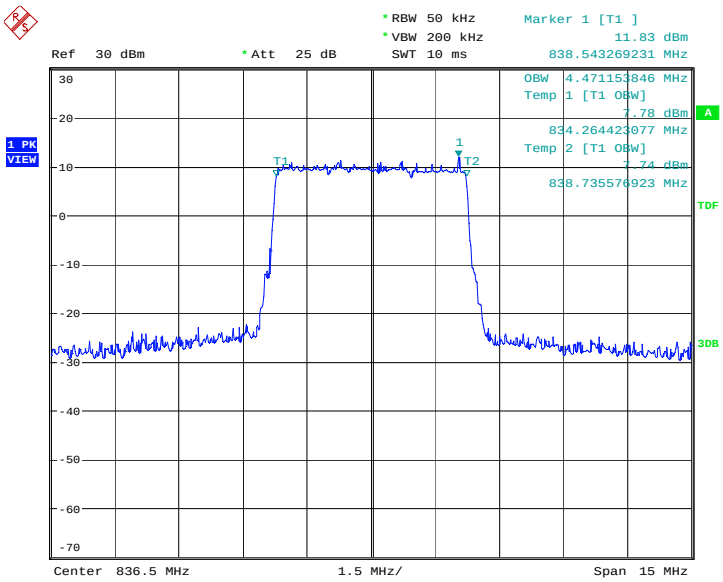
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	4471.15	4471.15

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



Date: 22.SEP.2014 17:17:01

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



Date: 22.SEP.2014 17:17:16

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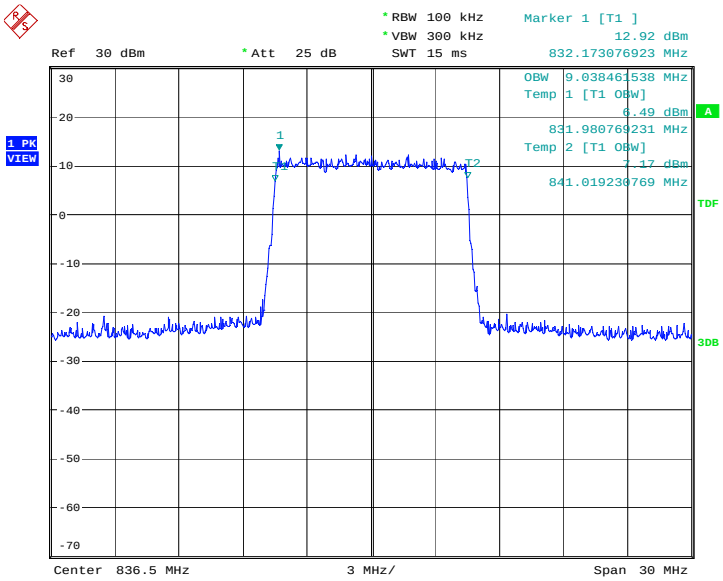
LTE band 5, 10MHz (99%)

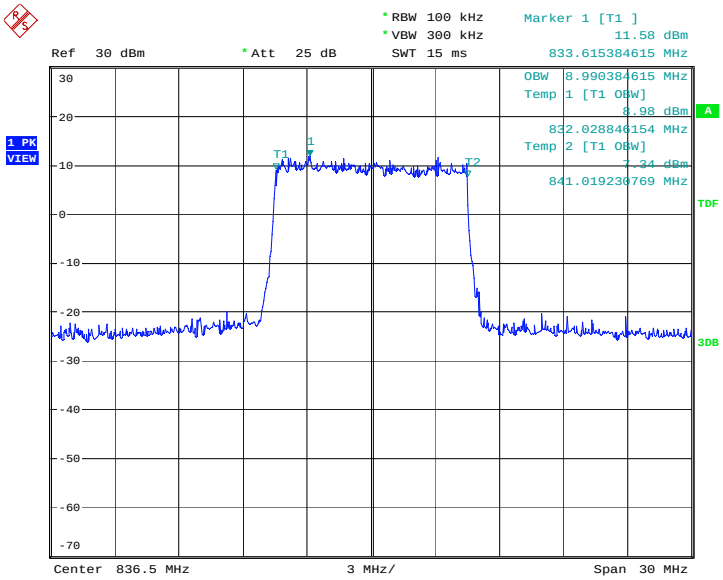
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	9038.46	8990.38

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



Date: 22.SEP.2014 17:23:34

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



Date: 22.SEP.2014 17:23:49

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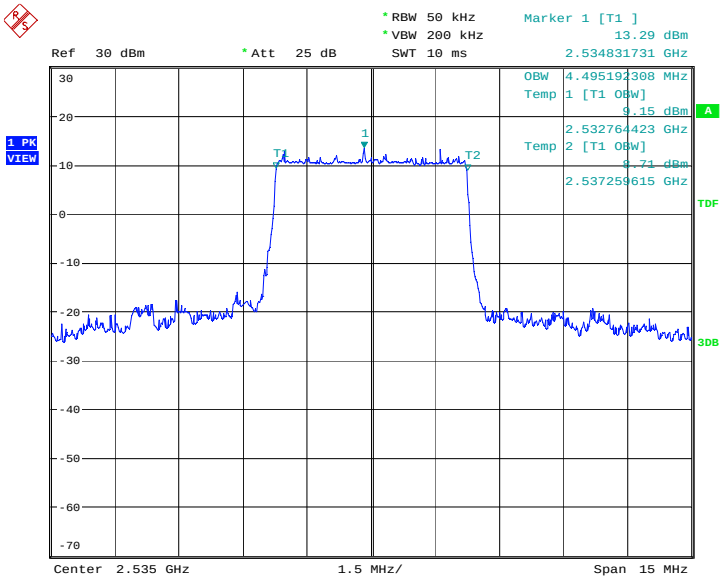
LTE band 7, 5MHz (99%)

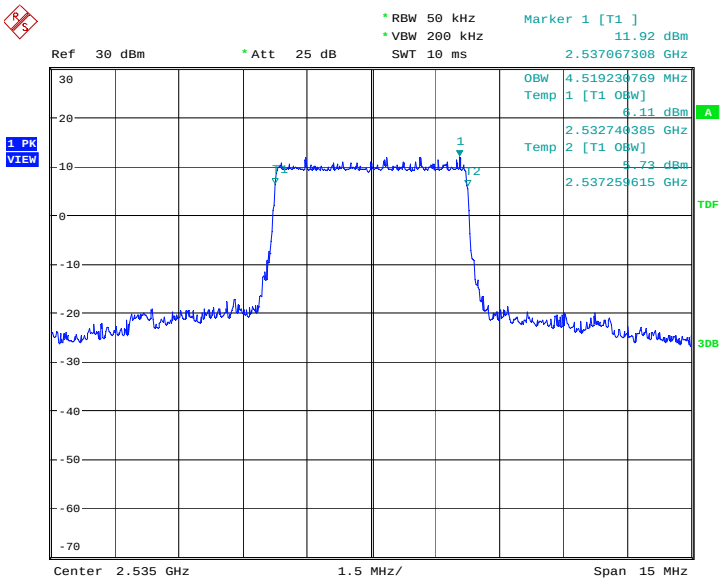
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	4495.19	4519.23

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



Date: 22.SEP.2014 16:37:25

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



Date: 22.SEP.2014 16:37:40

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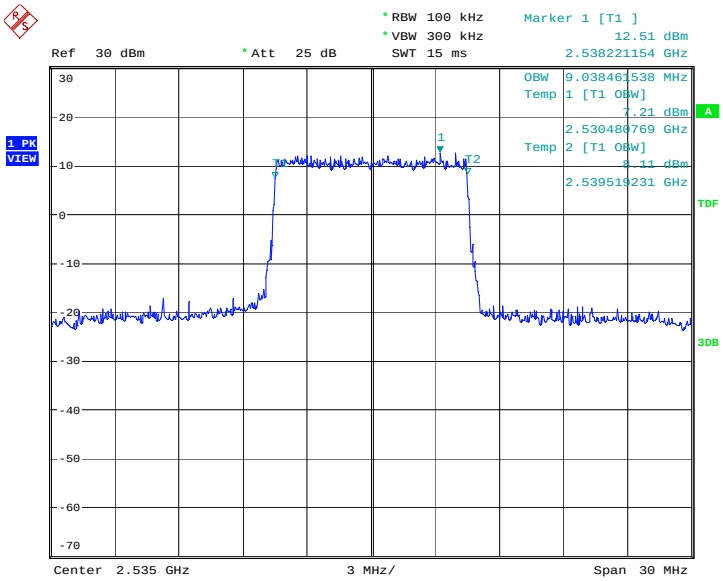
LTE band 7, 10MHz (99%)

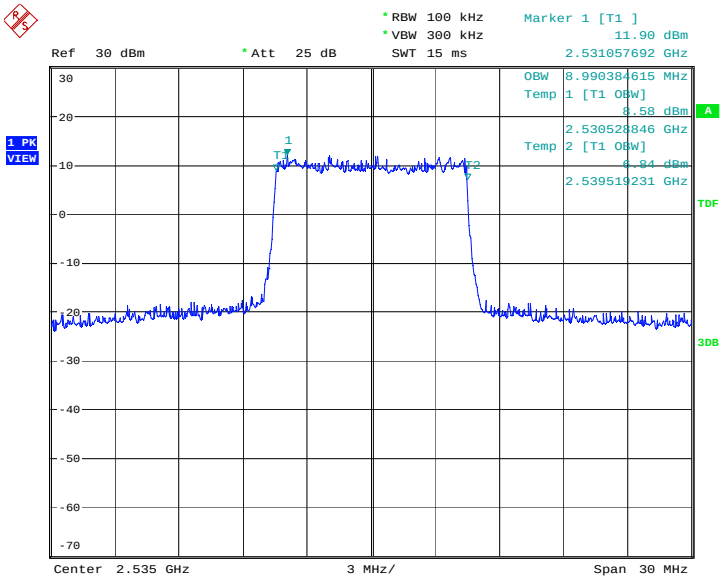
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	9038.46	8990.38

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



Date: 22.SEP.2014 16:43:59

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



Date: 22.SEP.2014 16:44:14

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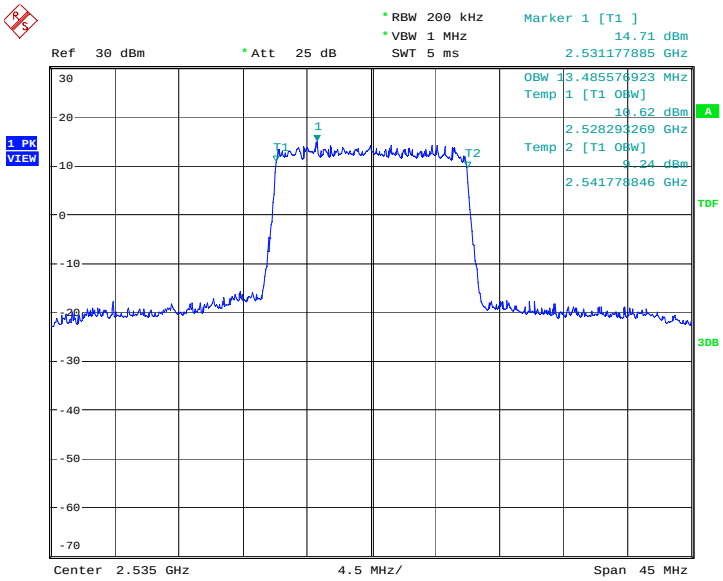
LTE band 7, 15MHz (99%)

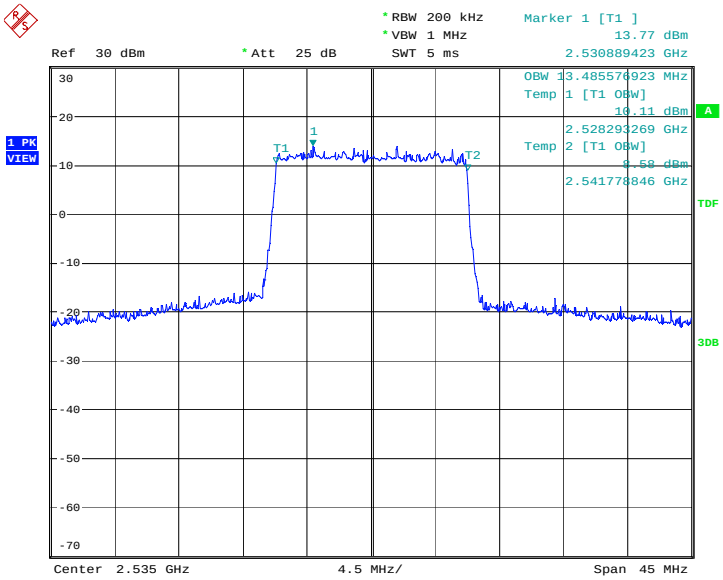
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	13485.58	13485.58

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



Date: 22.SEP.2014 16:50:36

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



Date: 22.SEP.2014 16:50:51

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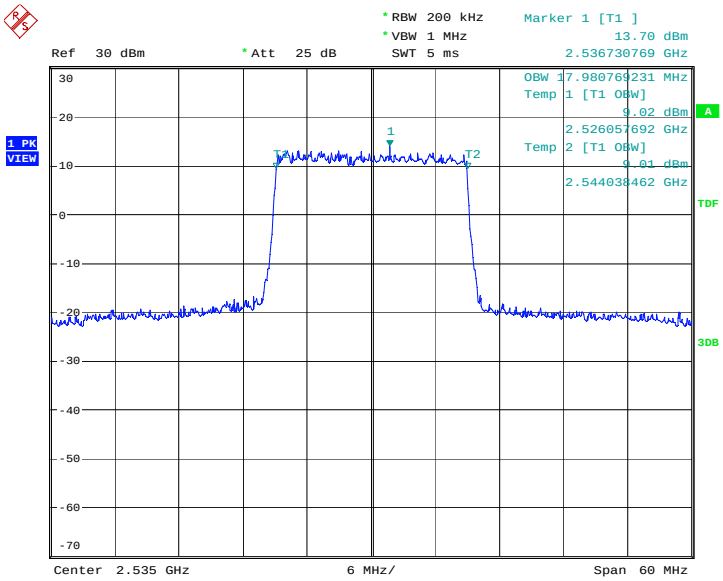
LTE band 7, 20MHz (99%)

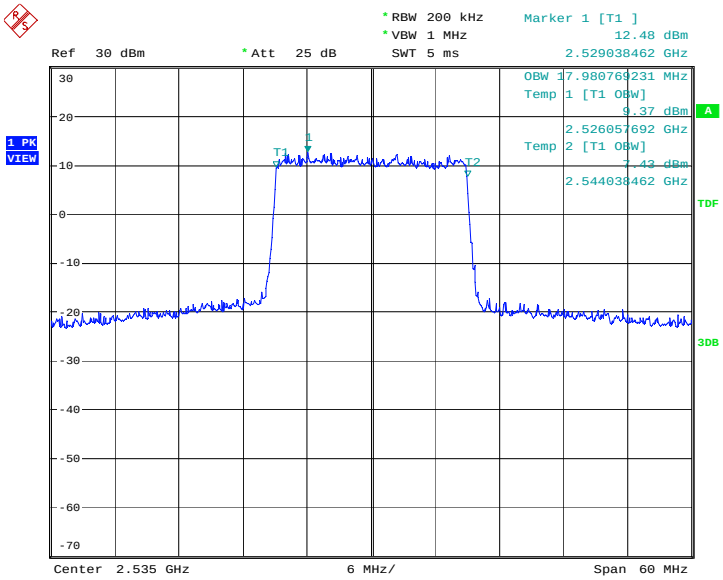
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	17980.77	17980.77

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



Date: 22.SEP.2014 16:57:18

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



Date: 22.SEP.2014 16:57:33

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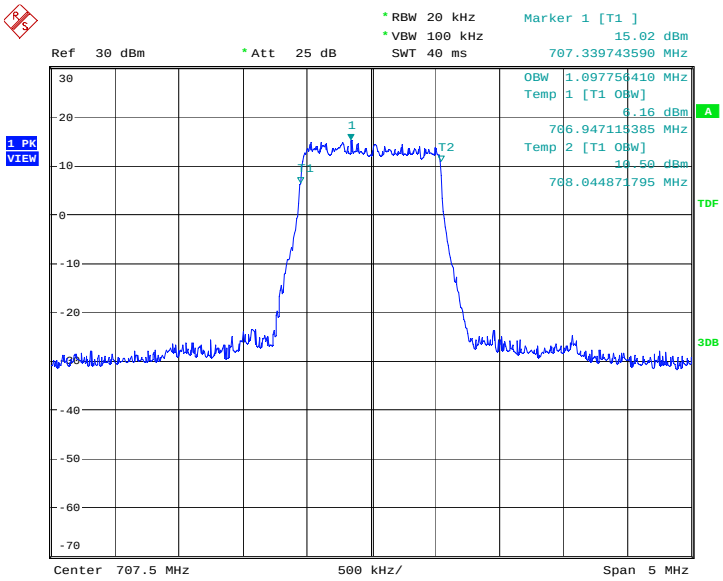
LTE band 12, 1.4MHz (99%)

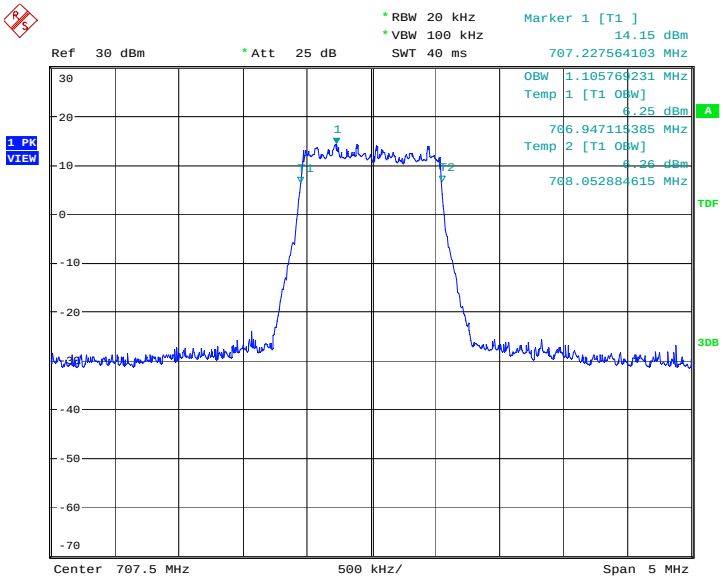
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	1097.76	1105.77

LTE band 12, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 22.SEP.2014 18:51:18

LTE band 12, 1.4MHz Bandwidth, 16QAM (99% BW)



Date: 22.SEP.2014 18:51:32

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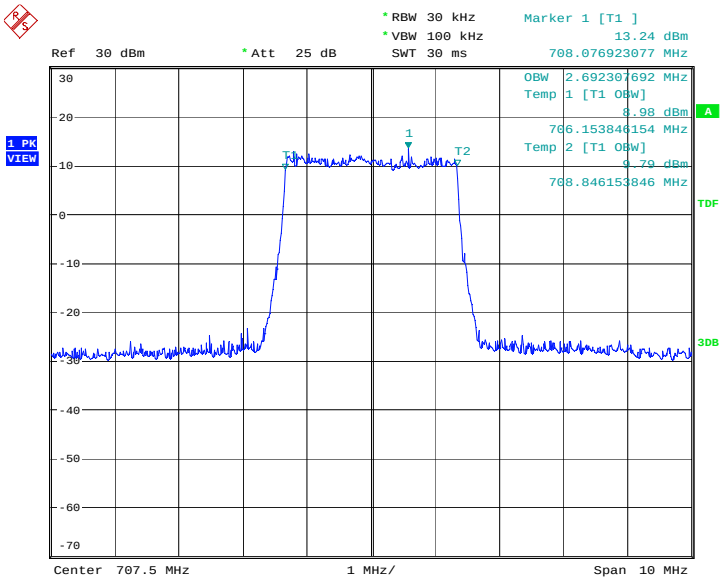
LTE band 12, 3MHz (99%)

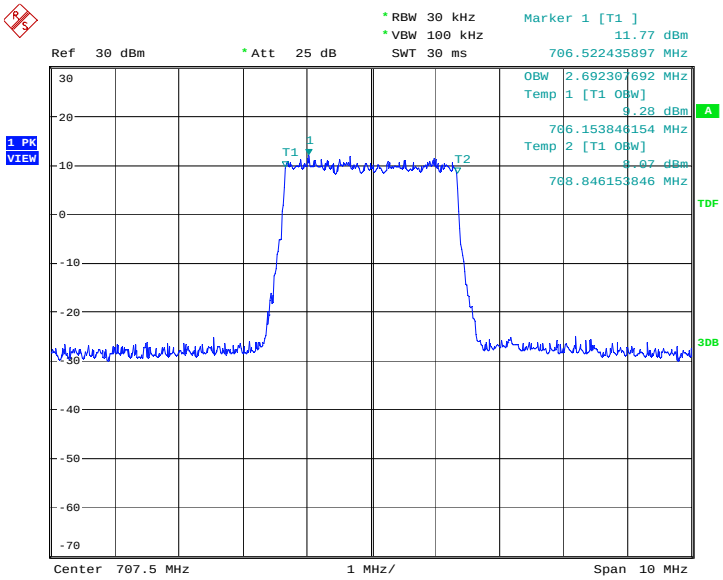
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	2692.31	2692.31

LTE band 12, 3MHz Bandwidth, QPSK (99% BW)



Date: 22.SEP.2014 18:57:45

LTE band 12, 3MHz Bandwidth, 16QAM (99% BW)



Date: 22.SEP.2014 18:57:58

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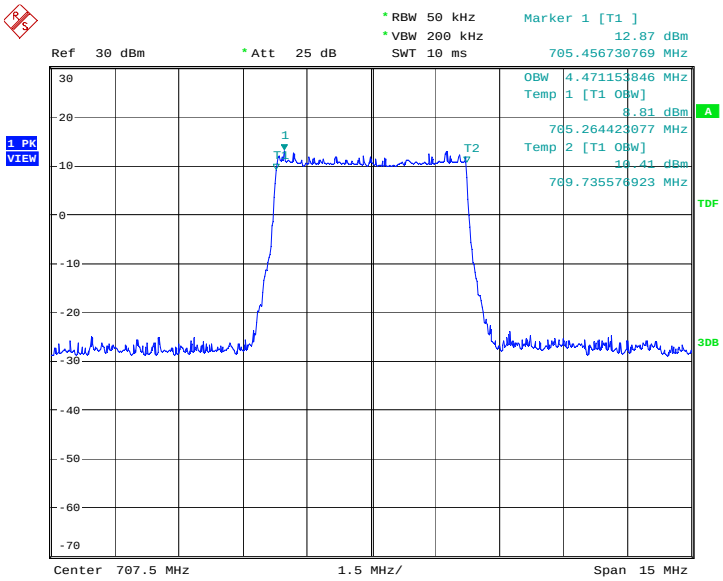
LTE band 12, 5MHz (99%)

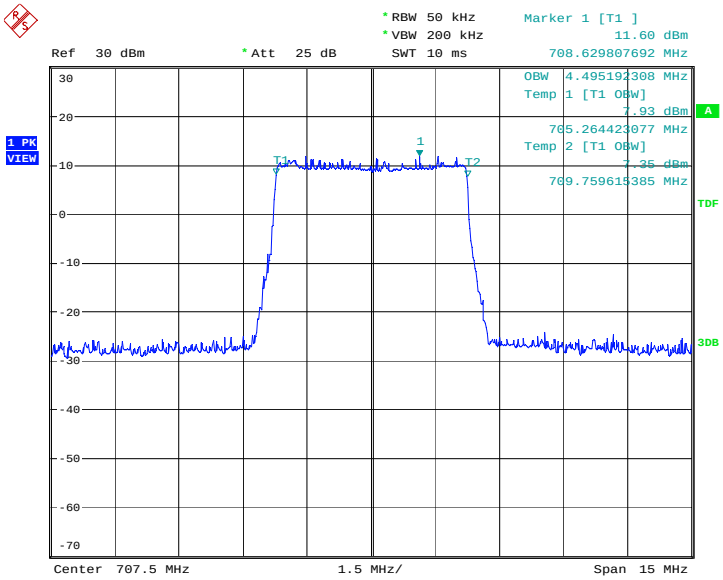
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	4471.15	4495.19

LTE band 12, 5MHz Bandwidth, QPSK (99% BW)



Date: 22.SEP.2014 19:04:11

LTE band 12, 5MHz Bandwidth,16QAM (99% BW)



Date: 22.SEP.2014 19:04:25

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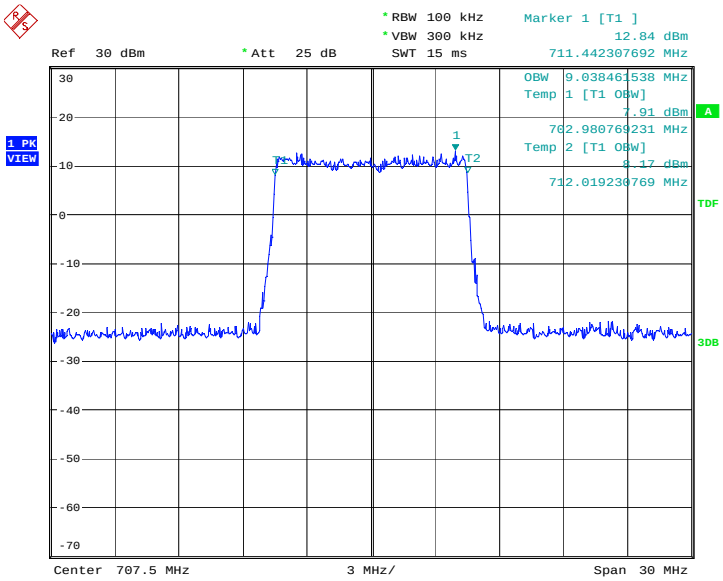
LTE band 12, 10MHz (99%)

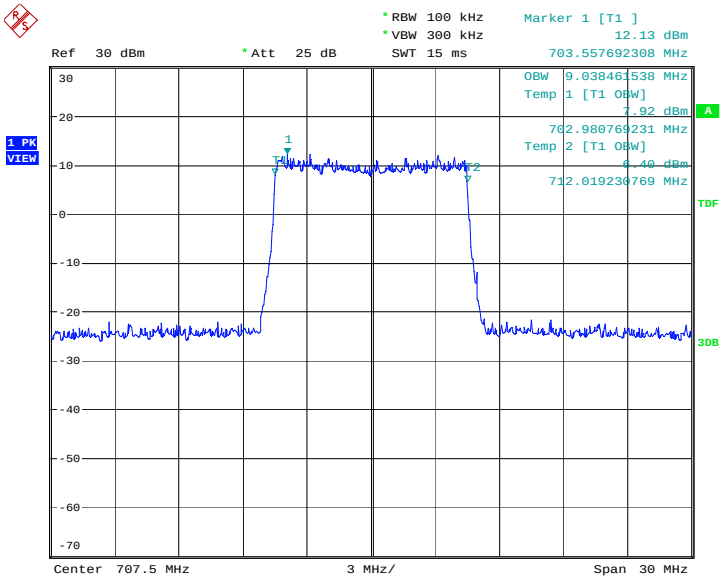
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	9038.46	9038.46

LTE band 12, 10MHz Bandwidth, QPSK (99% BW)



Date: 22.SEP.2014 19:10:38

LTE band 12, 10MHz Bandwidth, 16QAM (99% BW)



Date: 22.SEP.2014 19:10:52

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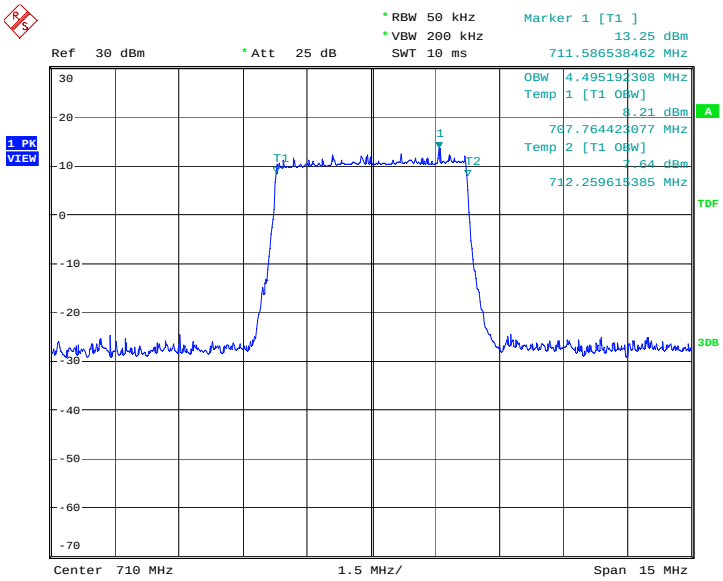
LTE band 17, 5MHz (99%)

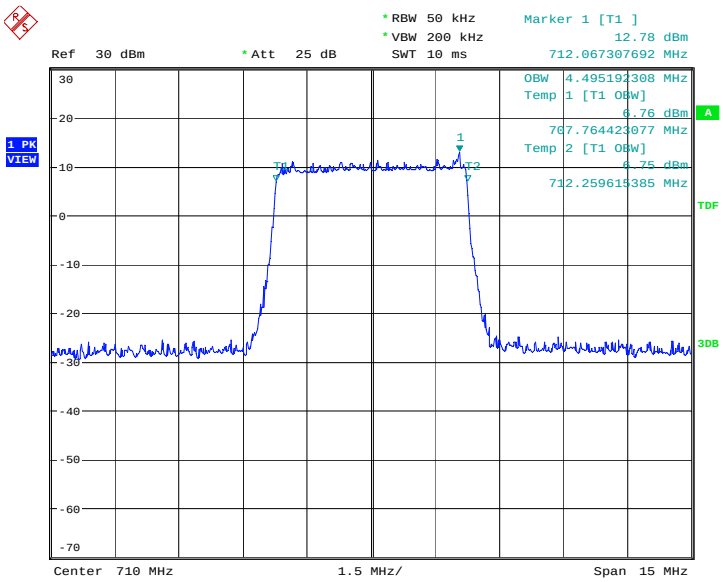
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
710.0	QPSK	16QAM
	4495.19	4495.19

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



Date: 22.SEP.2014 19:17:07

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



Date: 22.SEP.2014 19:17:21

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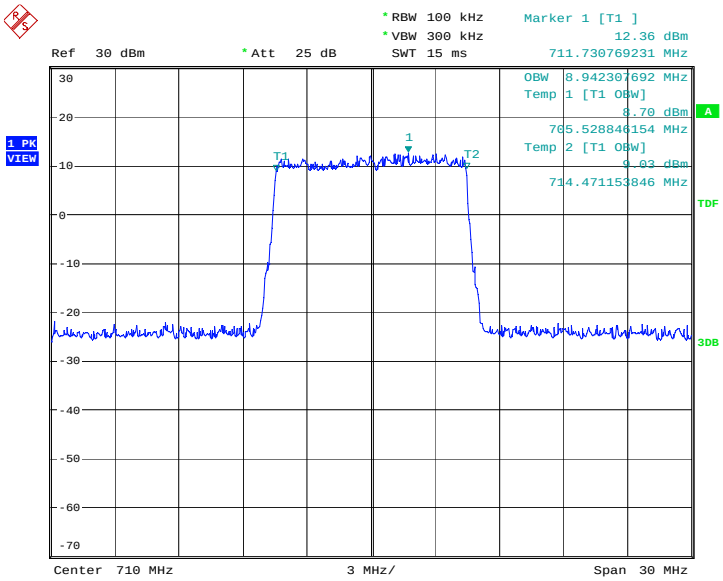
LTE band 17, 10MHz (99%)

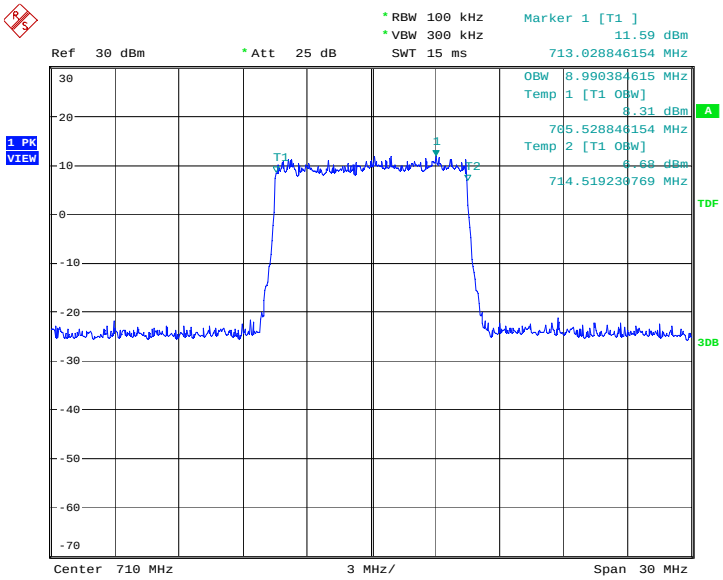
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
710.0	QPSK	16QAM
	8942.31	8990.38

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



Date: 22.SEP.2014 19:23:34

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



Date: 22.SEP.2014 19:23:47

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A.5 EMISSION BANDWIDTH

Reference

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

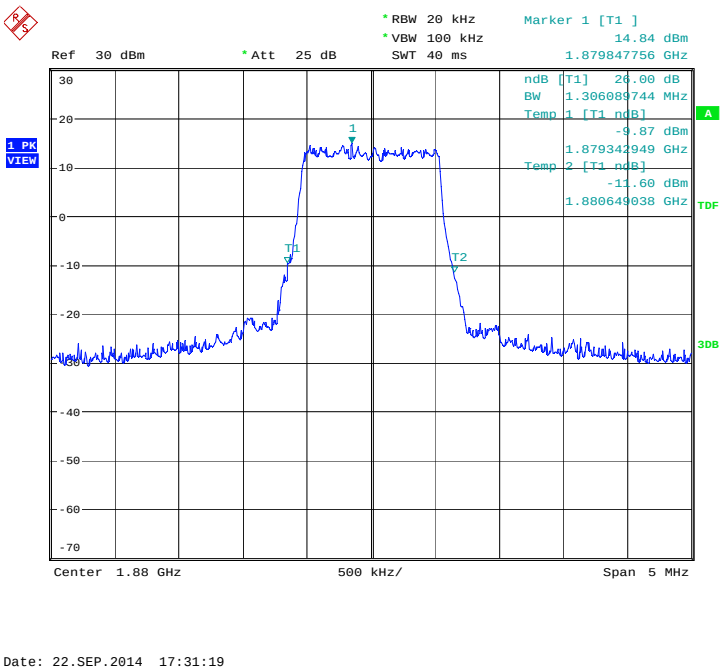
A.5.1Emission Bandwidth Results

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

LTE band 2, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	1306.09	1314.10

LTE band 2, 1.4MHz Bandwidth, QPSK (-26dBc BW)



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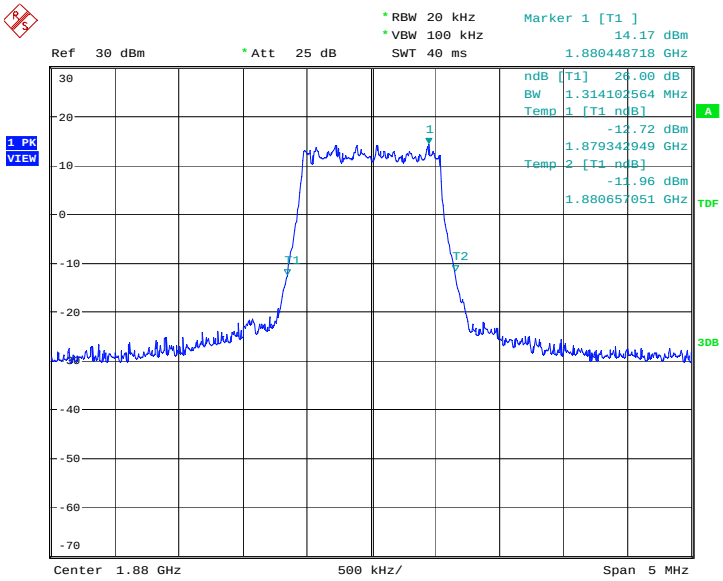
LTE band 2, 1.4MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 17:31:36

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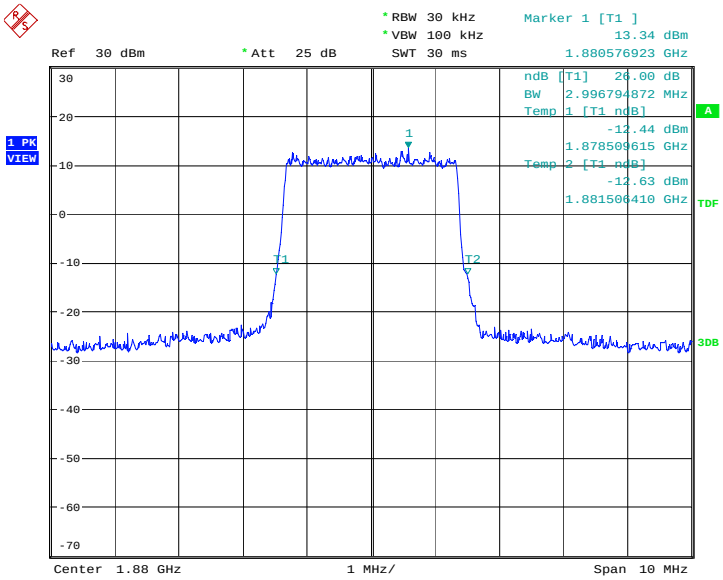
LTE band 2, 3MHz (-26dBc)

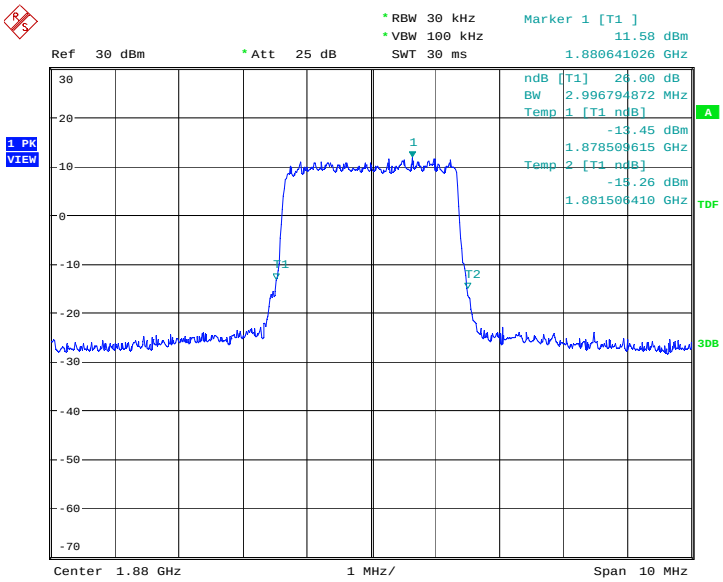
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	2996.79	2996.79

LTE band 2, 3MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 17:37:52

LTE band 2, 3MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 17:38:09

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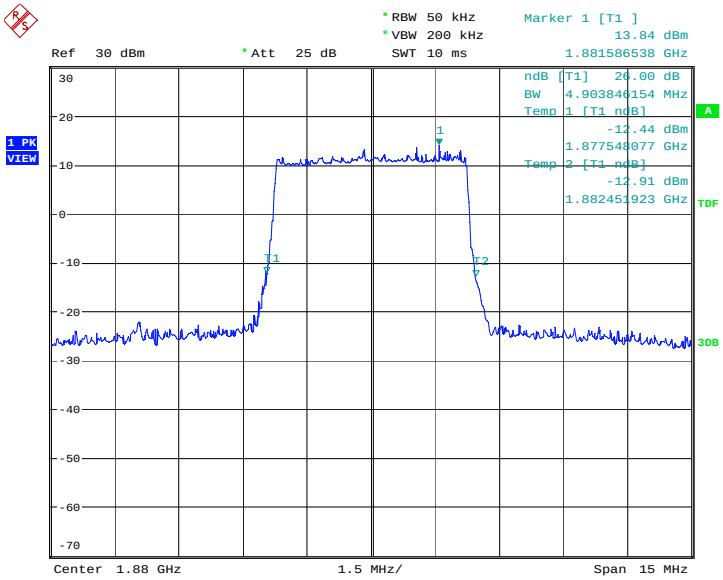
LTE band 2, 5MHz (-26dBc)

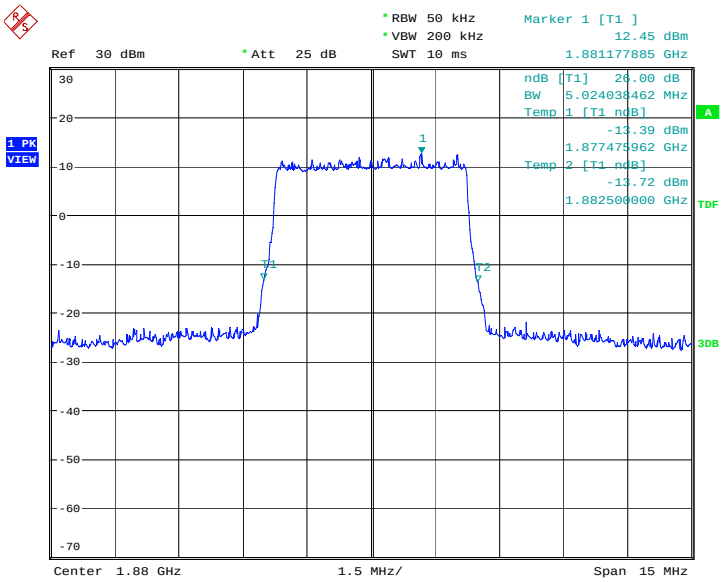
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	4903.85	5024.04

LTE band 2, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 17:44:25

LTE band 2, 5MHz Bandwidth,16QAM (-26dBc BW)



Date: 22.SEP.2014 17:44:42

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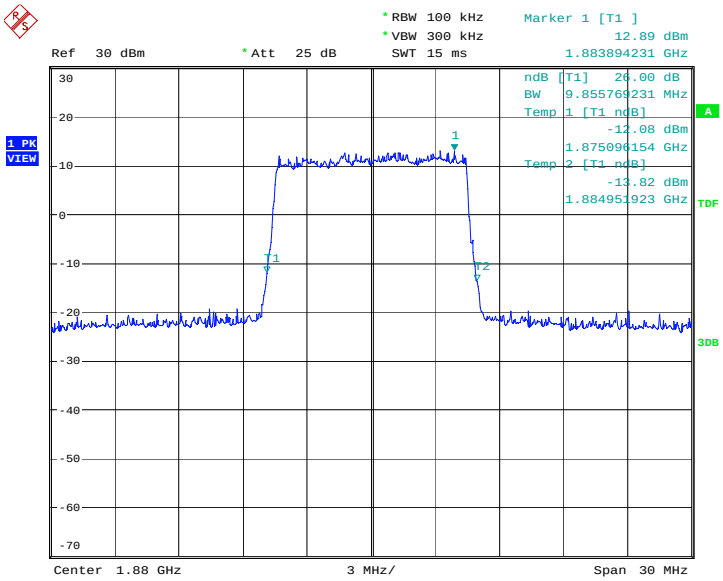
LTE band 2, 10MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	9855.77	9807.69

LTE band 2, 10MHz Bandwidth, QPSK (-26dBc BW)



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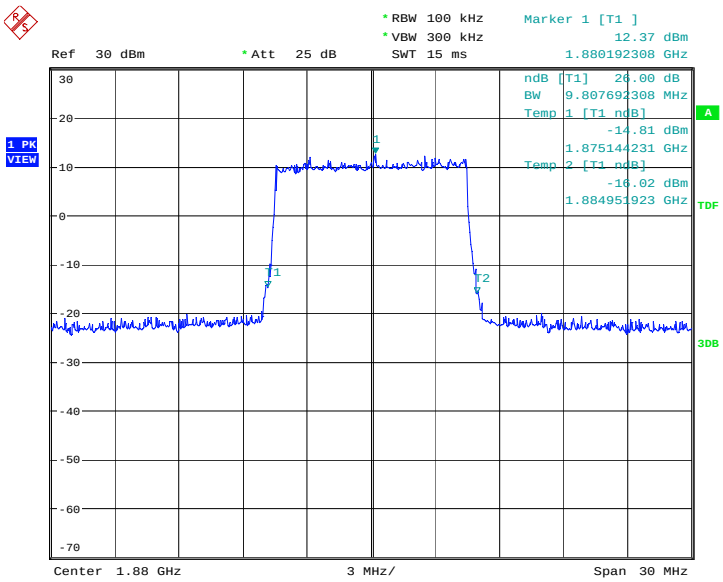
LTE band 2, 10MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 17:51:15

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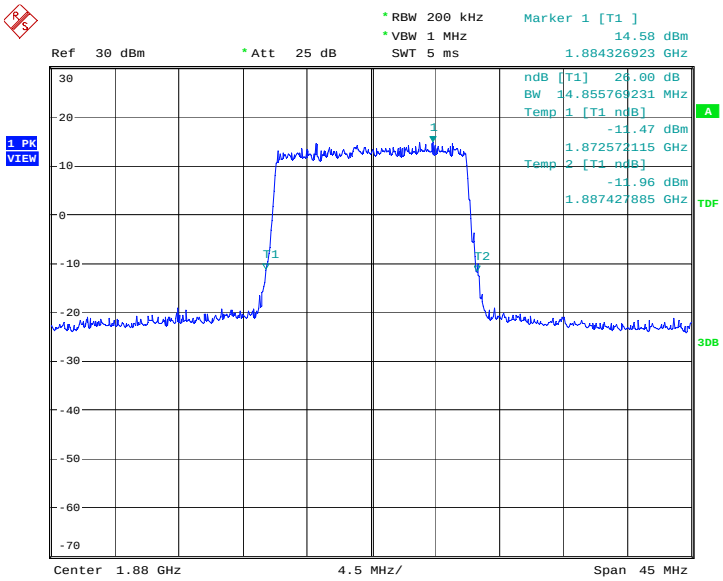
LTE band 2, 15MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	14855.77	14783.65

LTE band 2, 15MHz Bandwidth, QPSK (-26dBc BW)



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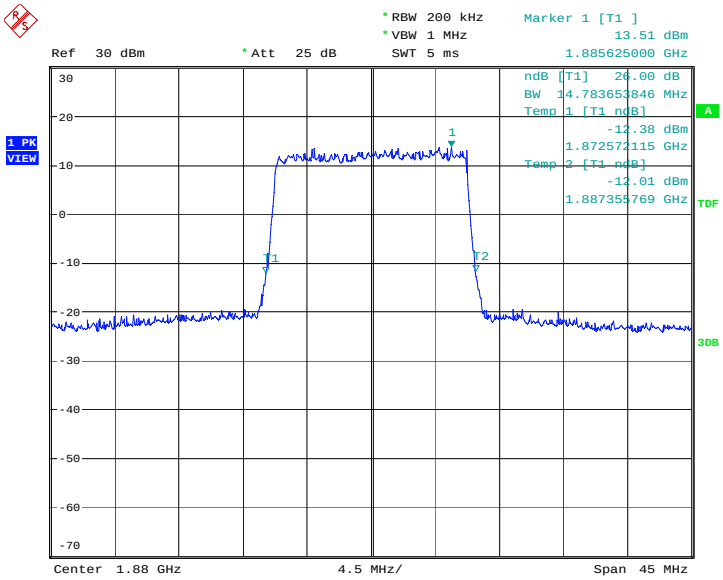
LTE band 2, 15MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 17:57:53

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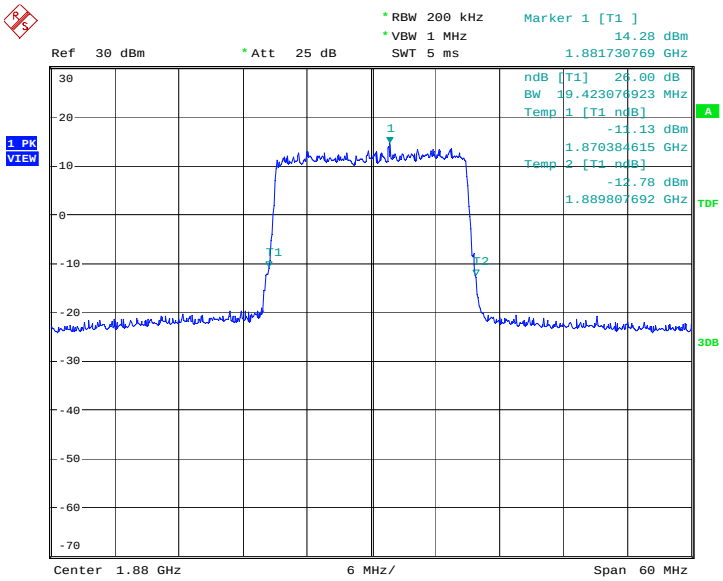
LTE band 2, 20MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	19423.08	19423.08

LTE band 2, 20MHz Bandwidth, QPSK (-26dBc BW)



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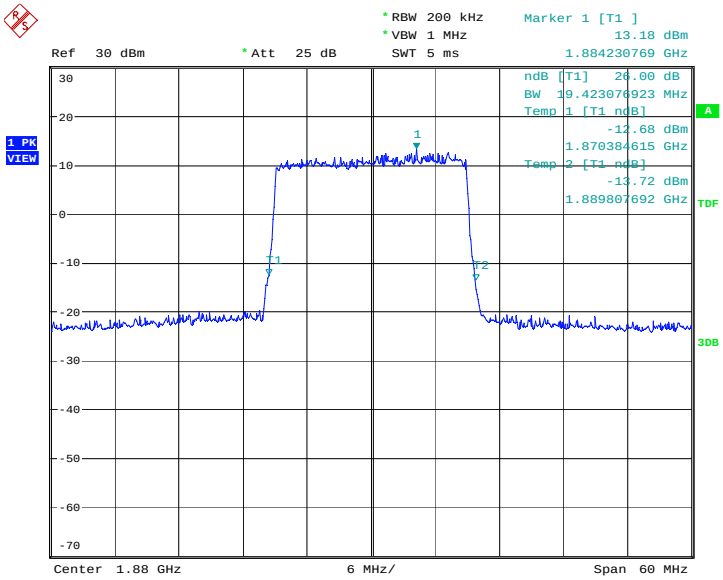
LTE band 2, 20MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 18:04:35

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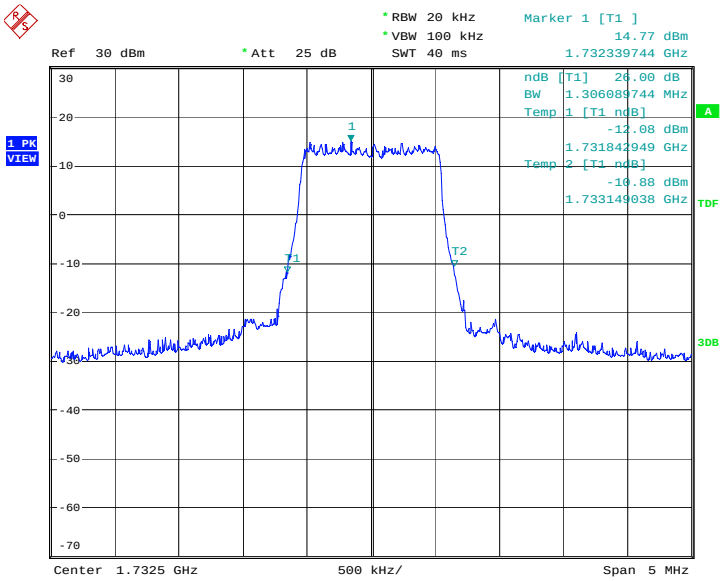
LTE band 4, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	1306.09	1314.10

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



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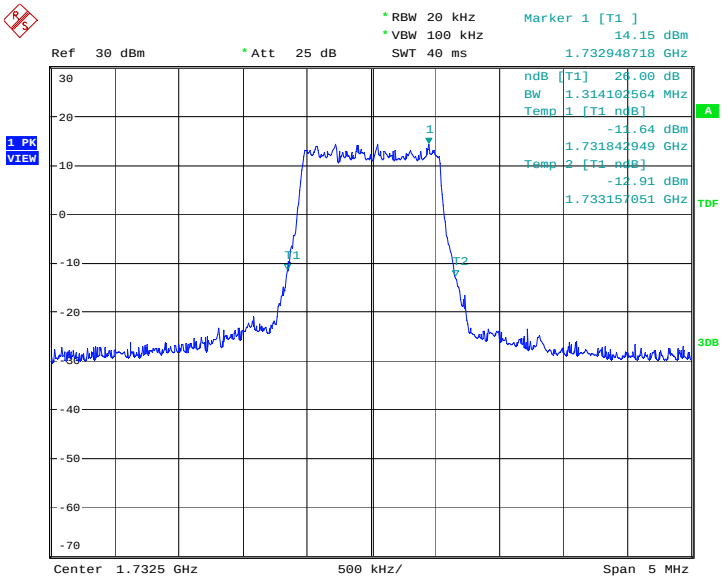
LTE band 4, 1.4MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 18:11:12

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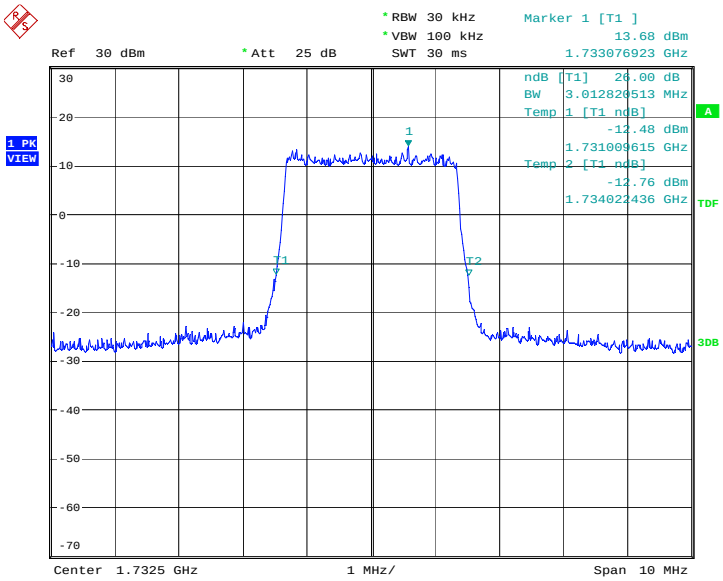
LTE band 4, 3MHz (-26dBc)

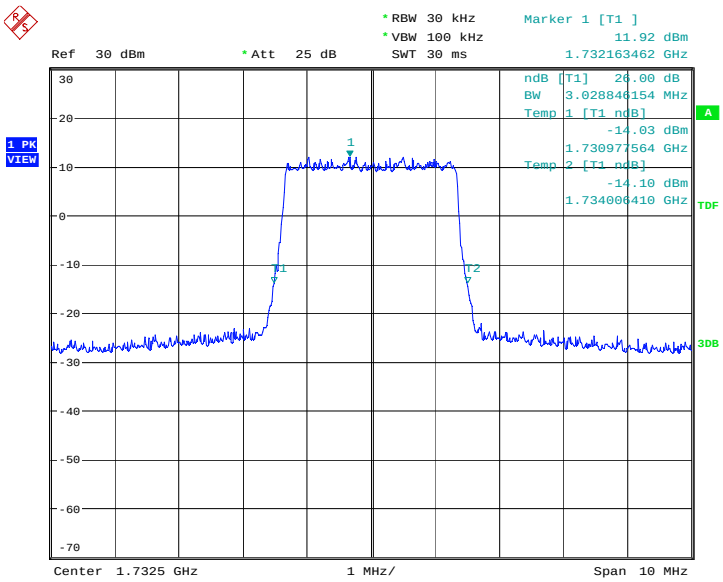
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	3012.82	3028.85

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



Date: 22.SEP.2014 18:17:25

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



Date: 22.SEP.2014 18:17:41

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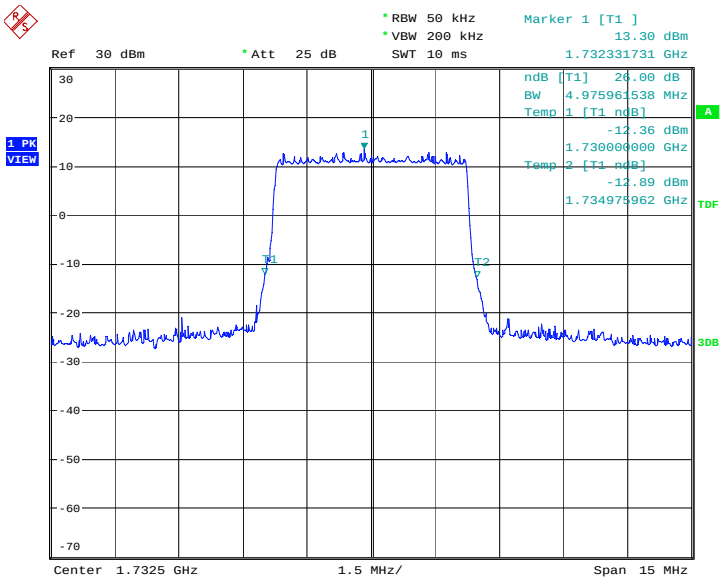
LTE band 4, 5MHz (-26dBc)

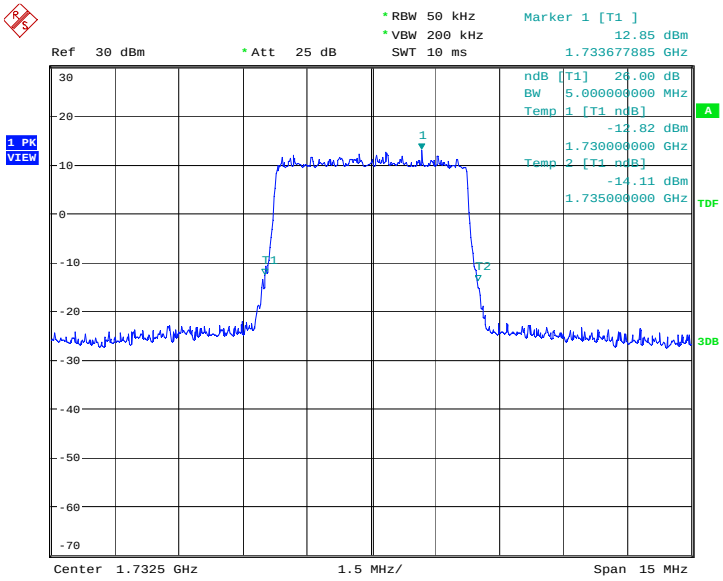
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	4975.96	5000.00

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



Date: 22.SEP.2014 18:23:52

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



Date: 22.SEP.2014 18:24:08

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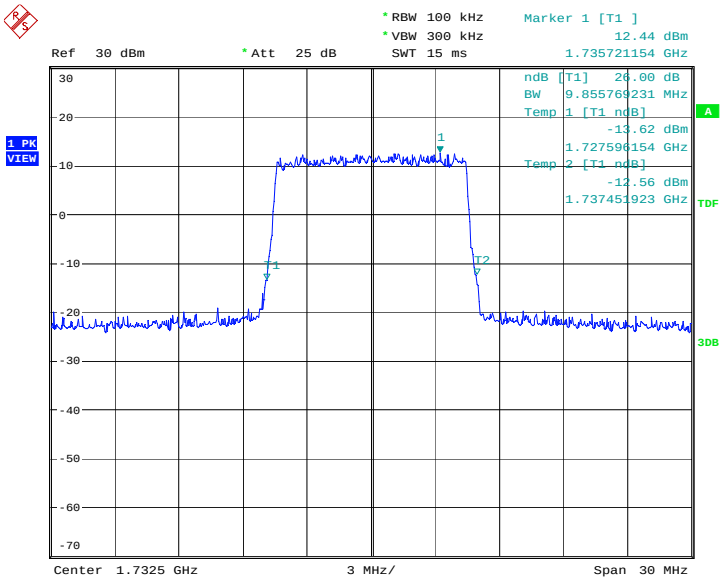
LTE band 4, 10MHz (-26dBc)

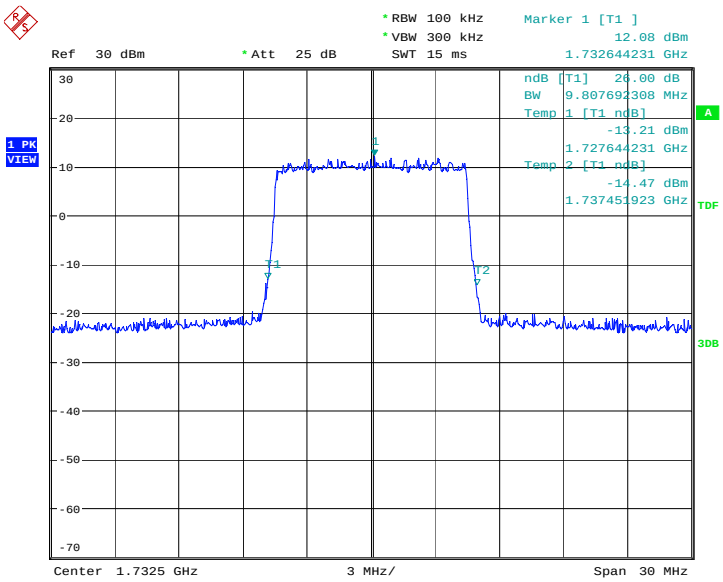
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	9855.77	9807.69

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



Date: 22.SEP.2014 18:30:19

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



Date: 22.SEP.2014 18:30:34

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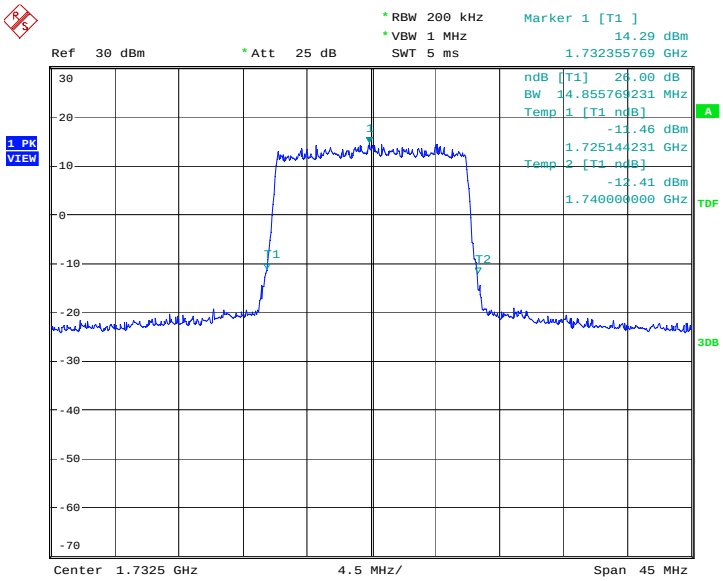
LTE band 4, 15MHz (-26dBc)

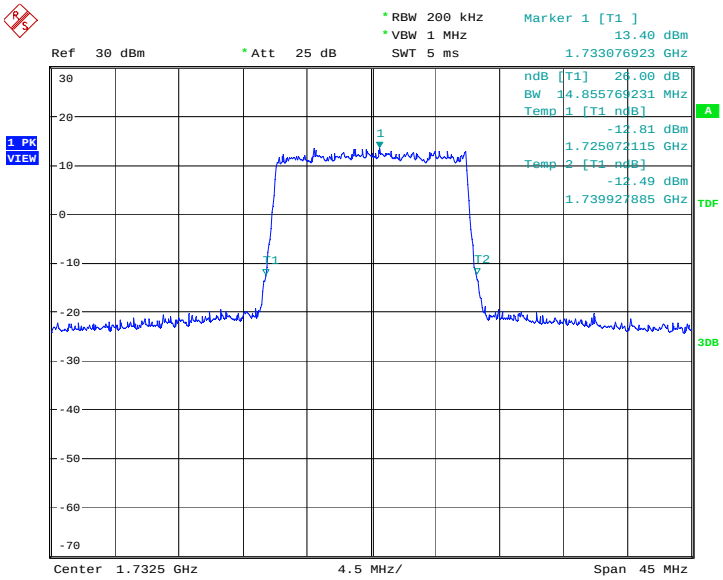
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	14855.77	14855.77

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



Date: 22.SEP.2014 18:36:49

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



Date: 22.SEP.2014 18:37:05

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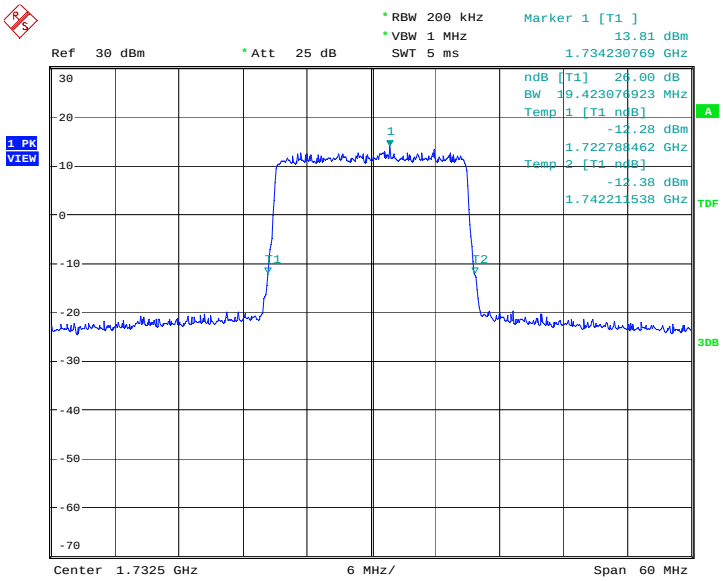
LTE band 4, 20MHz (-26dBc)

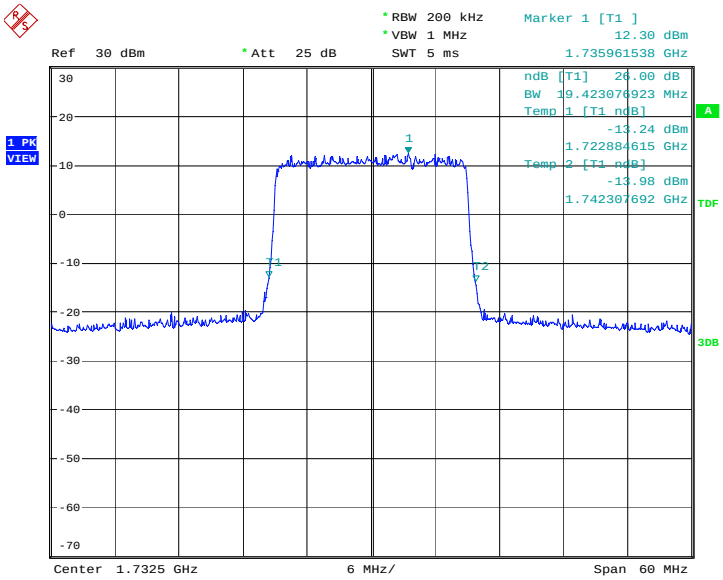
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	19423.08	19423.08

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



Date: 22.SEP.2014 18:44:55

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



Date: 22.SEP.2014 18:45:10

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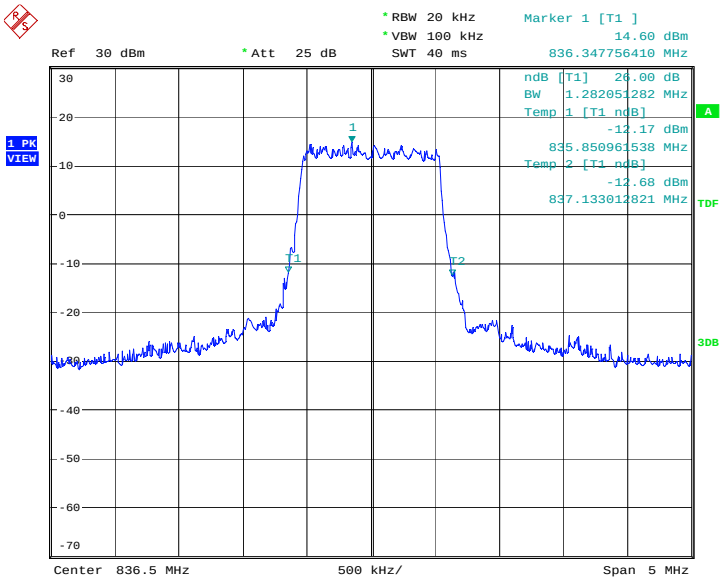
LTE band 5, 1.4MHz (-26dBc)

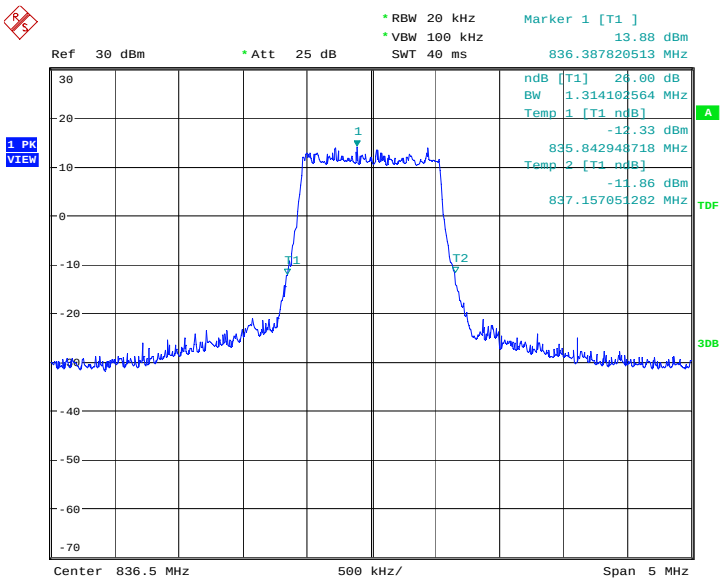
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	1282.05	1314.10

LTE band 5, 1.4MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 17:05:03

LTE band 5, 1.4MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 17:05:20

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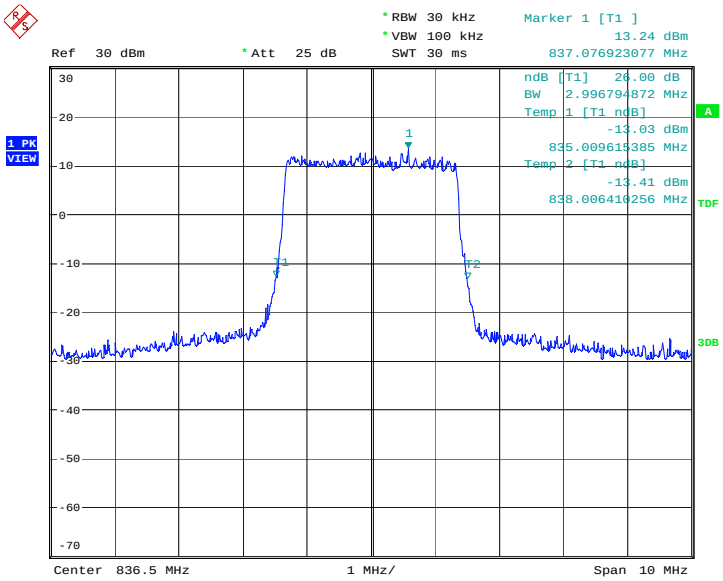
LTE band 5, 3MHz (-26dBc)

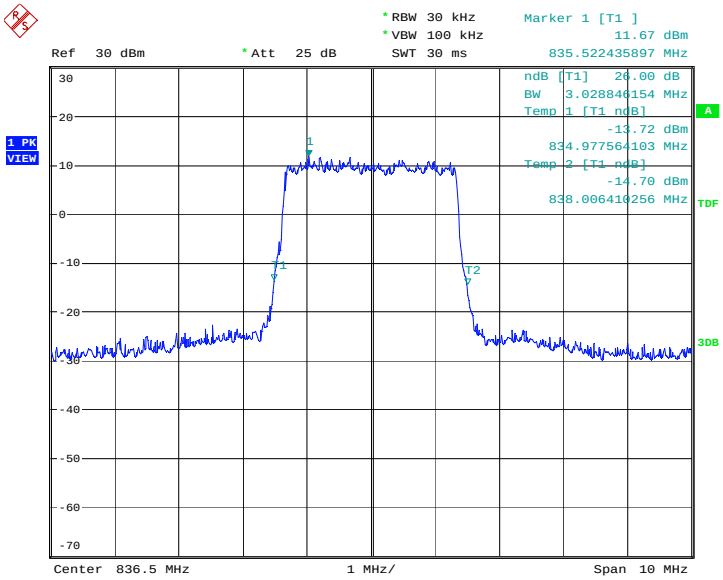
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	2996.79	3028.85

LTE band 5, 3MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 17:11:36

LTE band 5, 3MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 17:11:53

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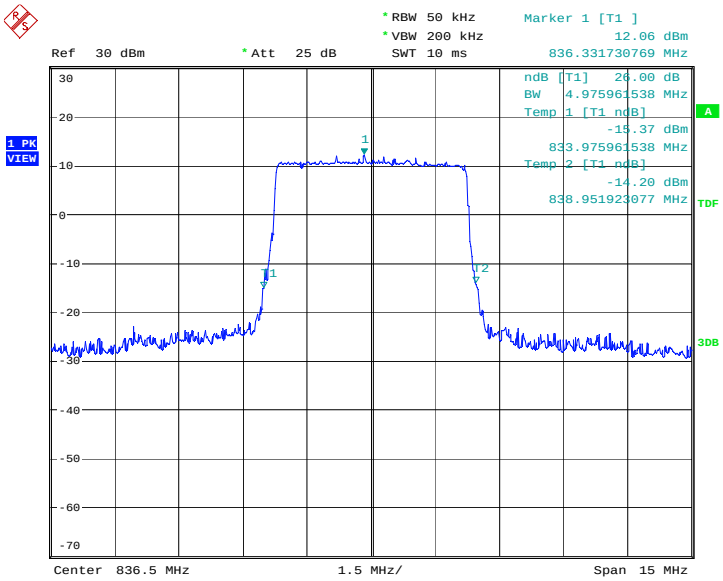
LTE band 5, 5MHz (-26dBc)

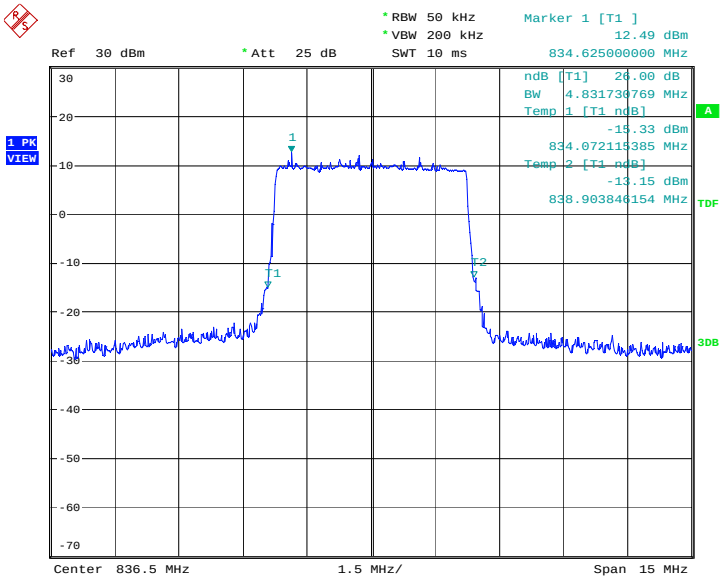
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	4975.96	4831.73

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



Date: 22.SEP.2014 17:18:09

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



Date: 22.SEP.2014 17:18:26

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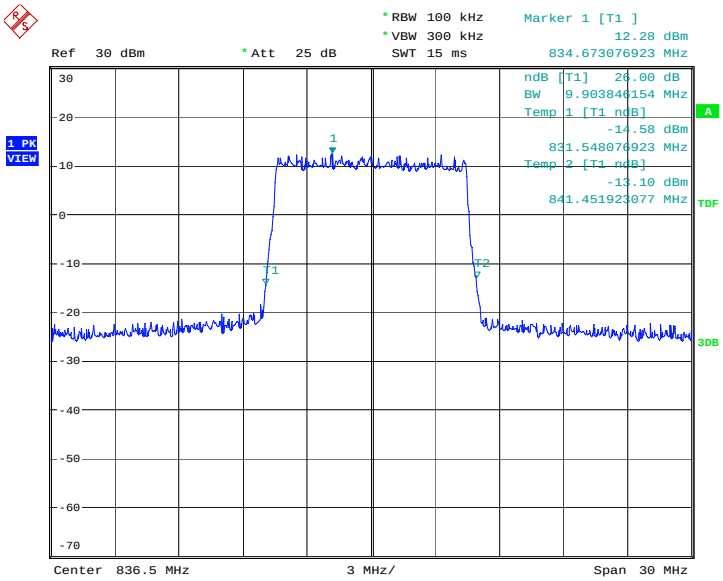
LTE band 5, 10MHz (-26dBc)

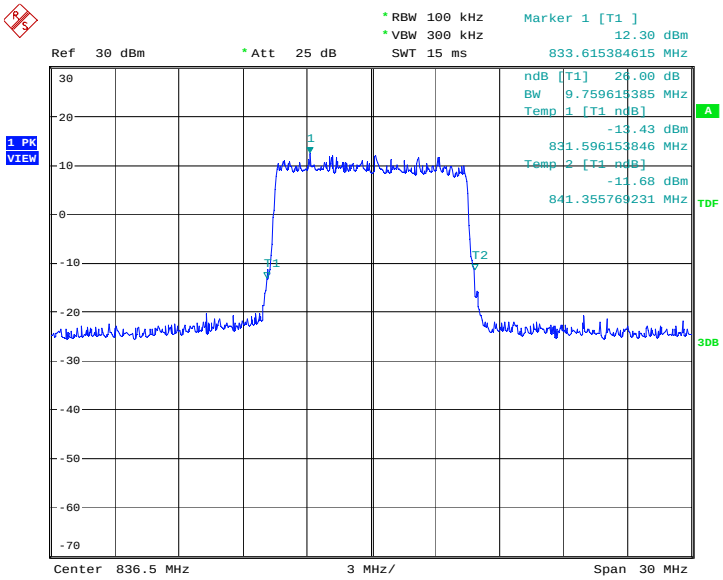
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	9903.85	9759.62

LTE band 5, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 17:24:42

LTE band 5, 10MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 17:24:59

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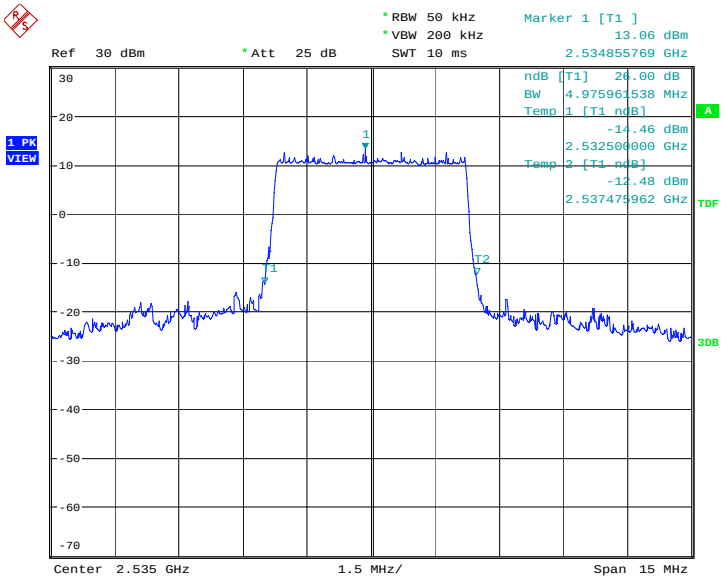
LTE band 7, 5MHz (-26dBc)

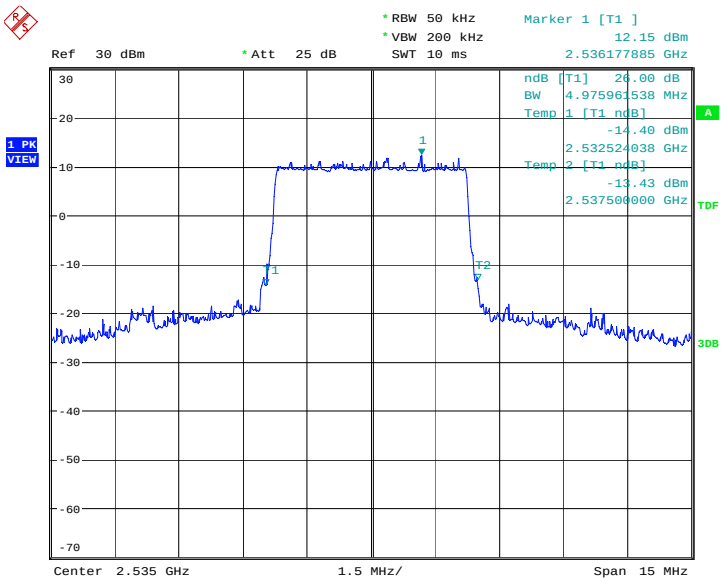
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	4975.96	4975.96

LTE band 7, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 16:38:34

LTE band 7, 5MHz Bandwidth,16QAM (-26dBc BW)



Date: 22.SEP.2014 16:38:51

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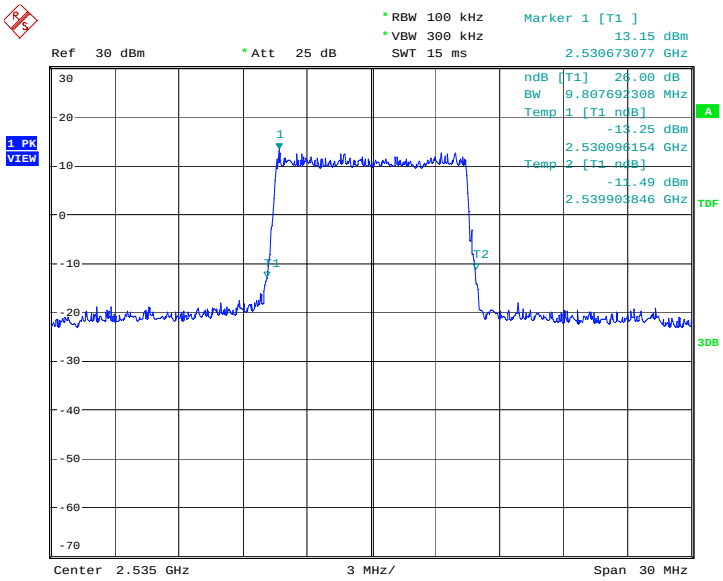
LTE band 7, 10MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	9807.69	9855.77

LTE band 7, 10MHz Bandwidth, QPSK (-26dBc BW)



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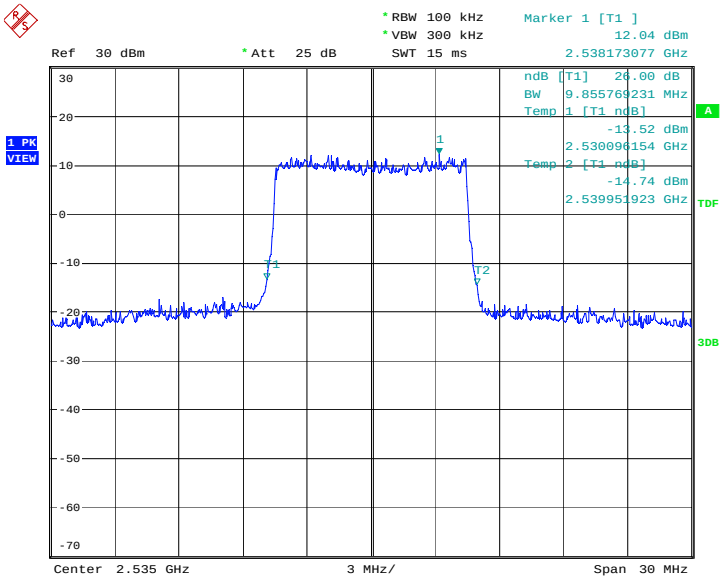
LTE band 7, 10MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 16:45:24

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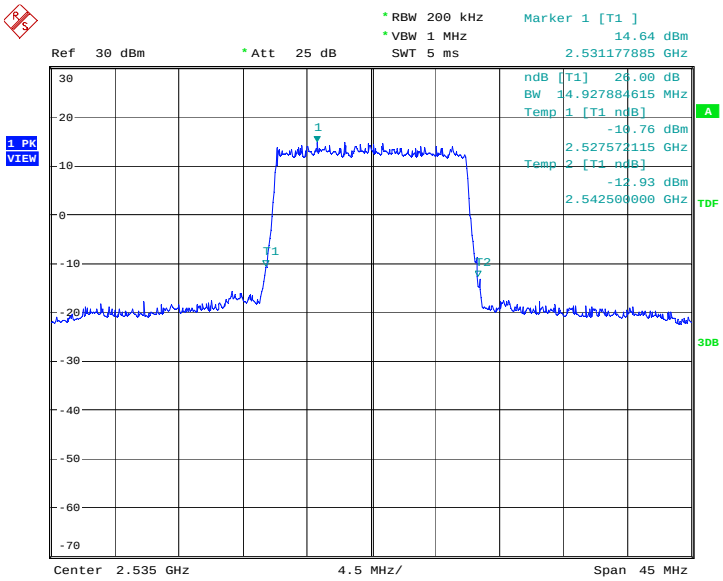
LTE band 7, 15MHz (-26dBc)

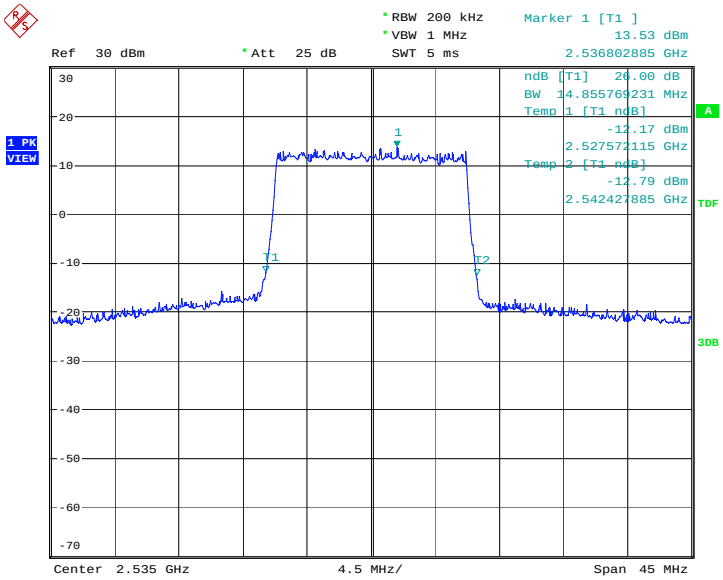
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	14927.88	14855.77

LTE band 7, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 16:51:44

LTE band 7, 15MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 16:52:01

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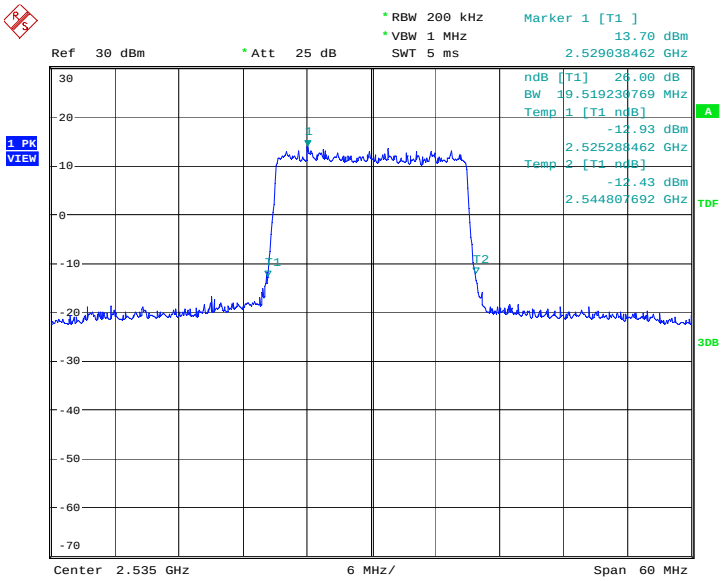
LTE band 7, 20MHz (-26dBc)

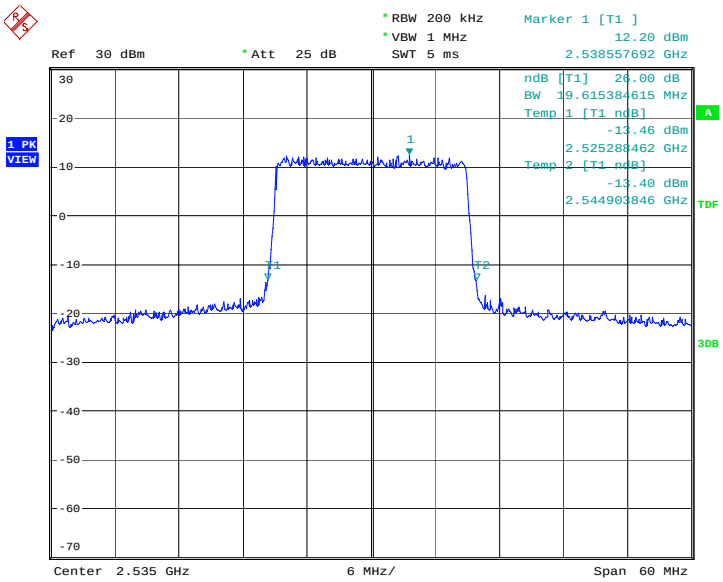
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	19519.23	19615.38

LTE band 7, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 16:58:26

LTE band 7, 20MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 16:58:43

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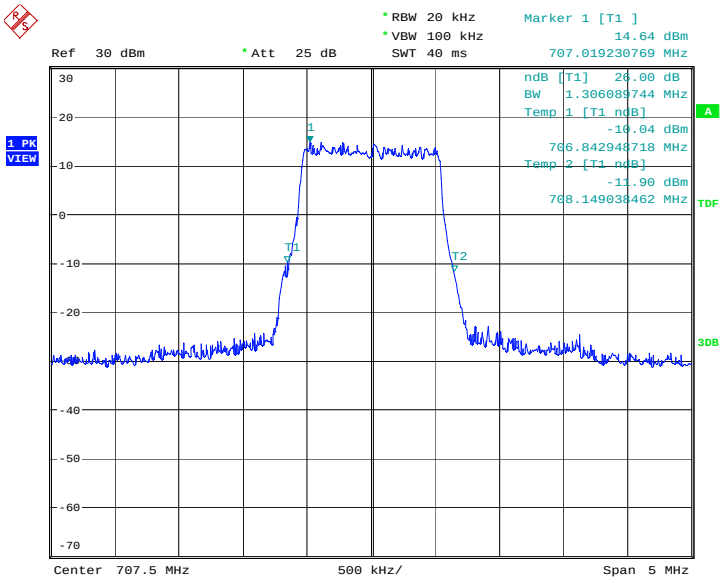
LTE band 12, 1.4MHz (-26dBc)

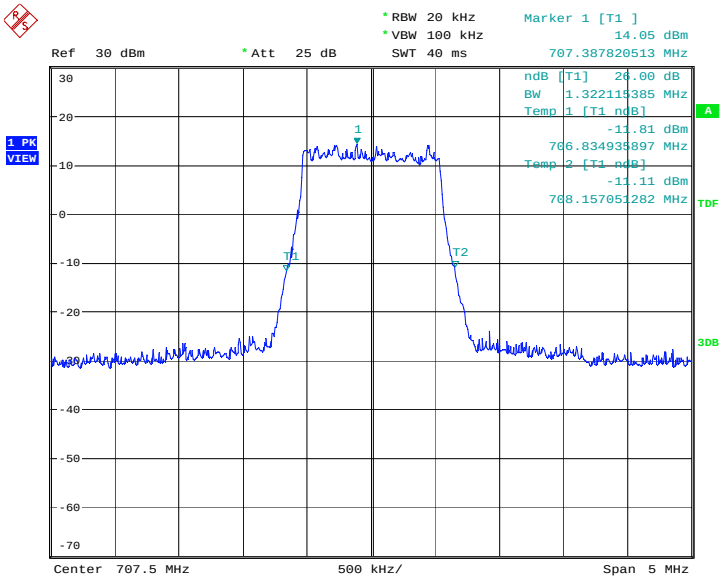
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	1306.09	1322.12

LTE band 12, 1.4MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 18:52:24

LTE band 12, 1.4MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 18:52:39

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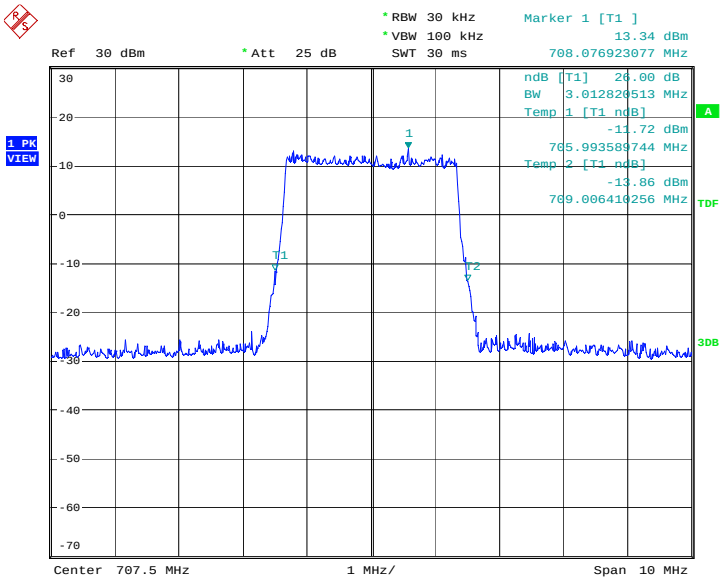
LTE band 12, 3MHz (-26dBc)

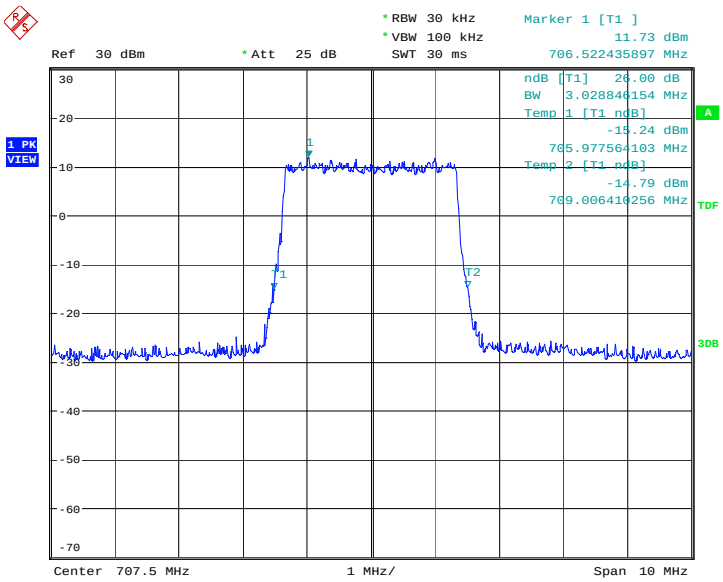
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	3012.82	3028.85

LTE band 12, 3MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 18:58:50

LTE band 12, 3MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 18:59:06

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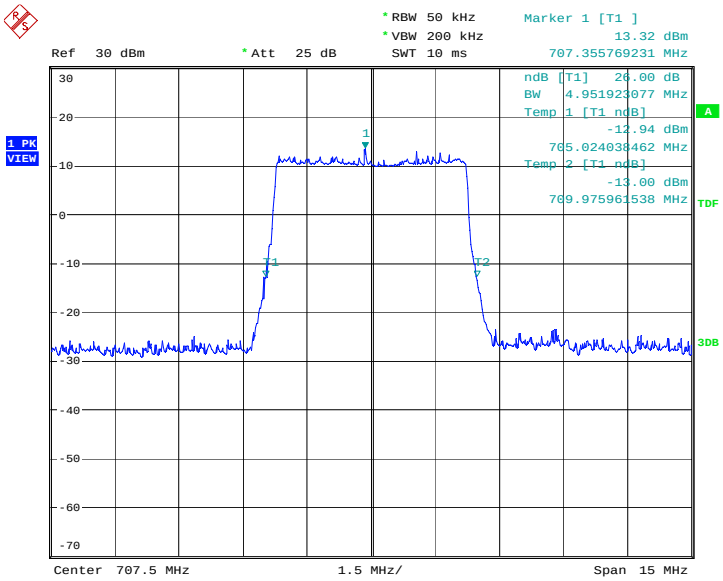
LTE band 12, 5MHz (-26dBc)

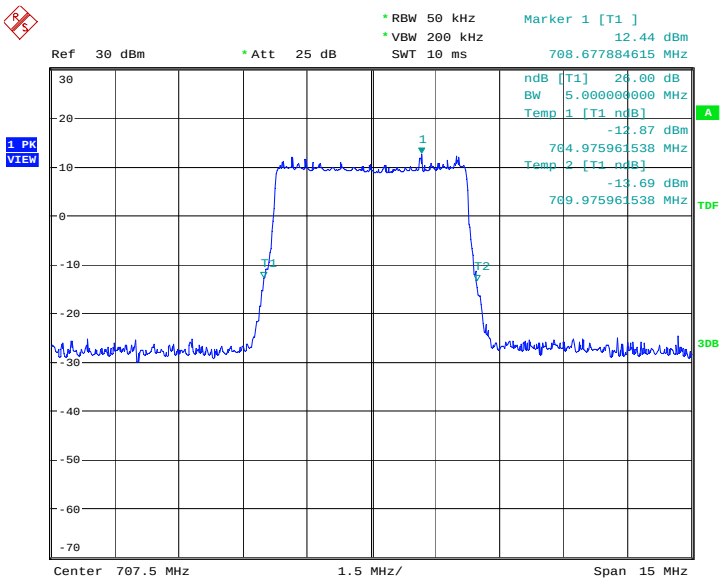
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	4951.92	5000.00

LTE band 12, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 19:05:17

LTE band 12, 5MHz Bandwidth,16QAM (-26dBc BW)



Date: 22.SEP.2014 19:05:33

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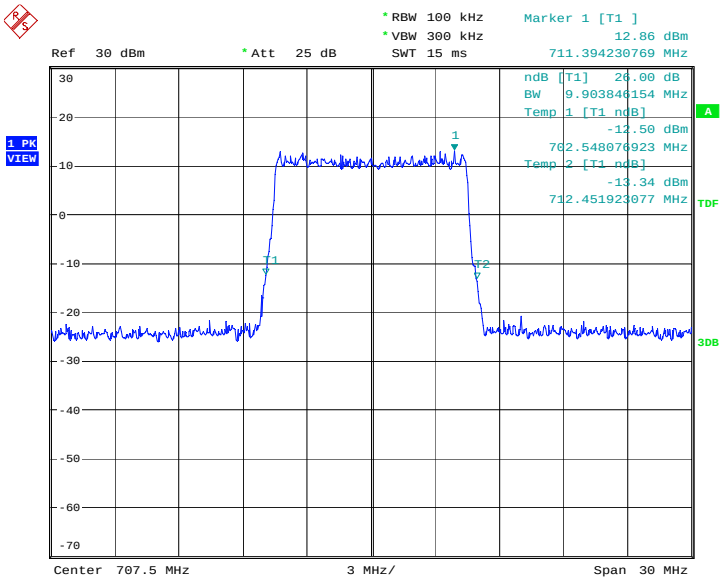
LTE band 12, 10MHz (-26dBc)

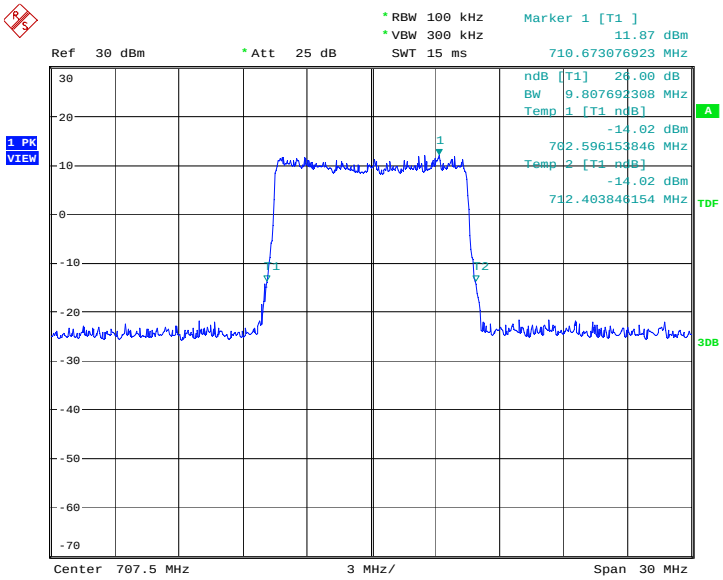
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	9903.85	9807.69

LTE band 12, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 22.SEP.2014 19:11:43

LTE band 12, 10MHz Bandwidth, 16QAM (-26dBc BW)



Date: 22.SEP.2014 19:11:59

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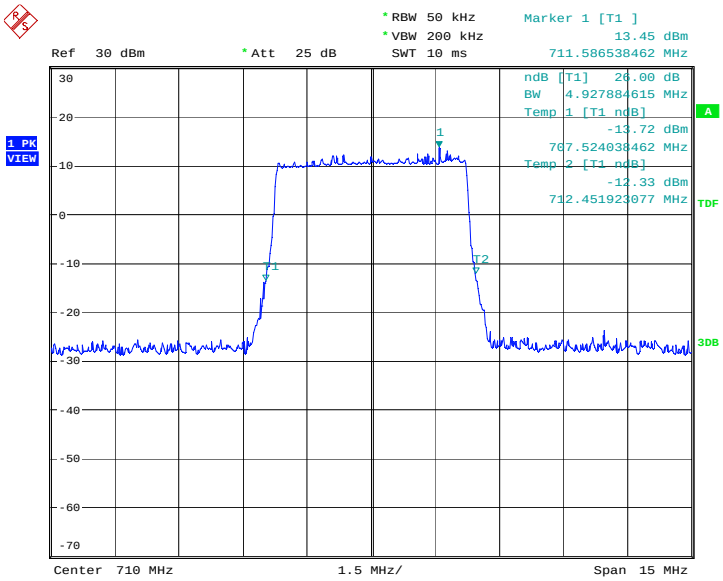
LTE band 17, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
710.0	QPSK	16QAM
	4927.88	4975.96

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



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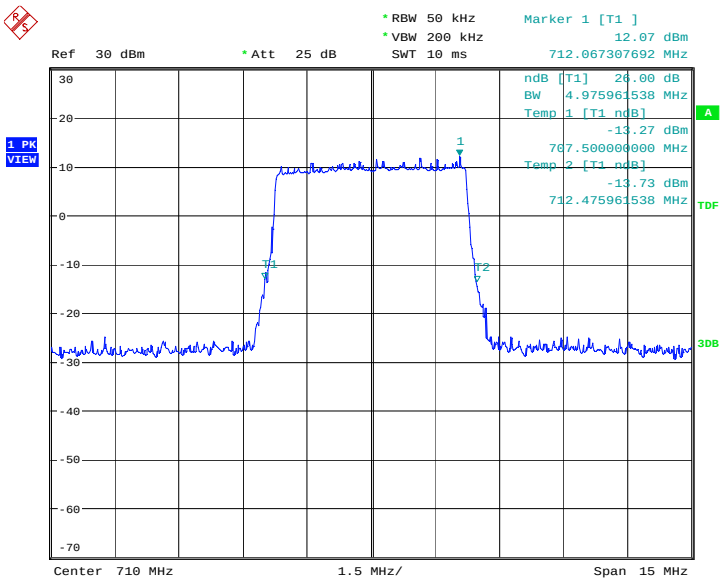
LTE band 17, 5MHz Bandwidth,16QAM (-26dBc BW)



Date: 22.SEP.2014 19:18:28

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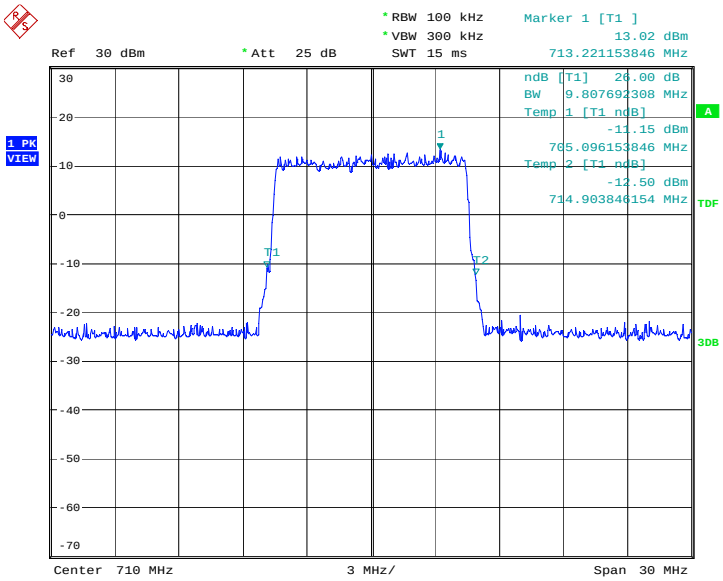
LTE band 17, 10MHz (-26dBc)

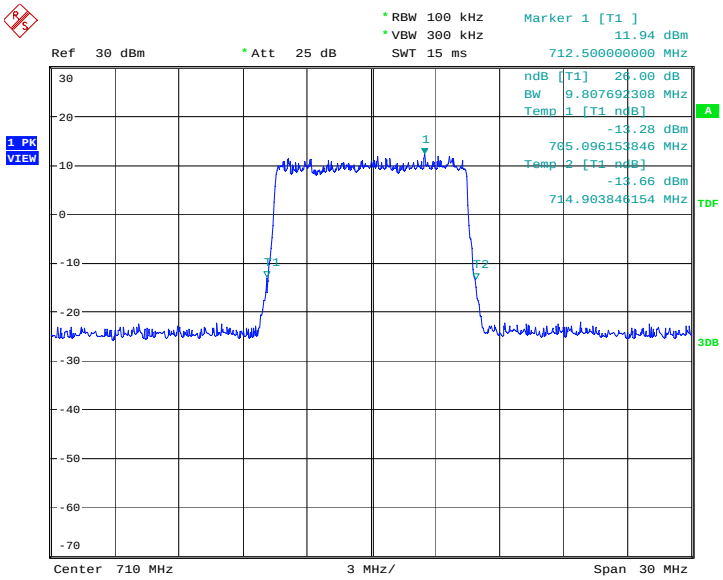
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
710.0	QPSK	16QAM
	9807.69	9807.69

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



Date: 22.SEP.2014 19:24:39

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



Date: 22.SEP.2014 19:24:55

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A.6 BAND EDGE COMPLIANCE

Reference

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

A.6.1 Measurement limit

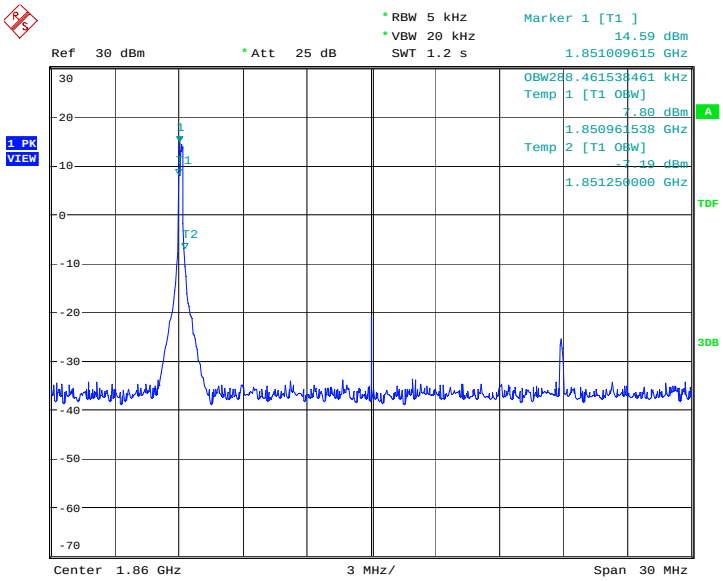
On any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm. According to KDB 971168 v02r01 6.0, a relaxation of the reference bandwidth is often provided for measurements within a specified frequency range at the edge of the authorized frequency block/band. This is often implemented by permitting the use of a narrower RBW (typically limited to a minimum RBW of 1% of the OBW) for measuring the out-of-band emissions without a requirement to integrate the result over the full reference bandwidth.

A.6.2 Measurement result

Only worst case result is given below

LTE band 2

OBW: QPSK-1RB-low_offset



Date: 22.SEP.2014 21:39:03

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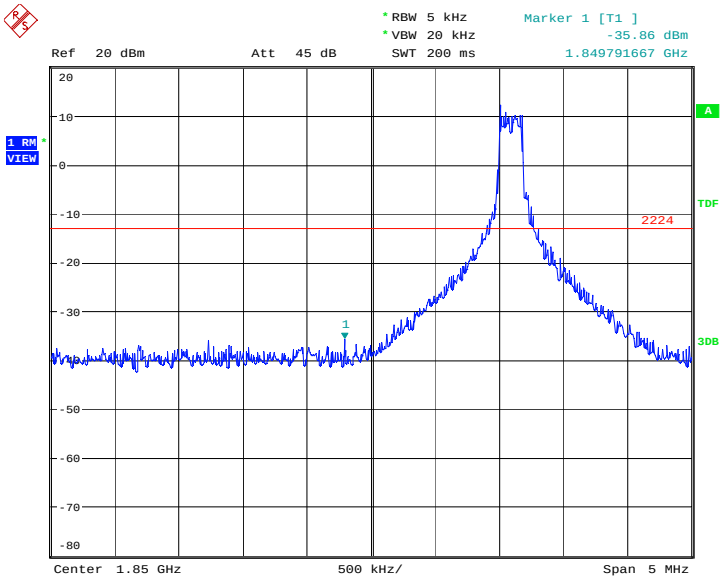
LOW BAND EDGE BLOCK-QPSK-1RB-low_offset



Date: 22.SEP.2014 21:39:49

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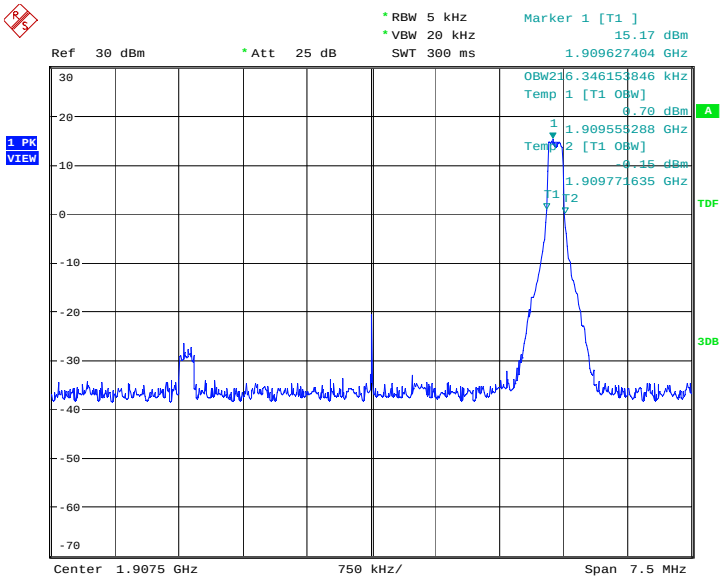
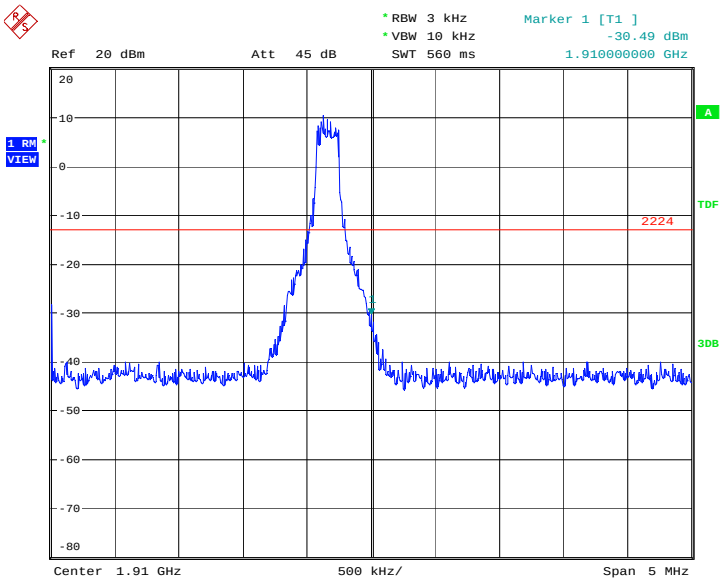
OBW: QPSK-1RB-high_offset



Date: 22.SEP.2014 21:20:41

HIGH BAND EDGE BLOCK-QPSK-1RB-high_offset



Date: 22.SEP.2014 21:21:27

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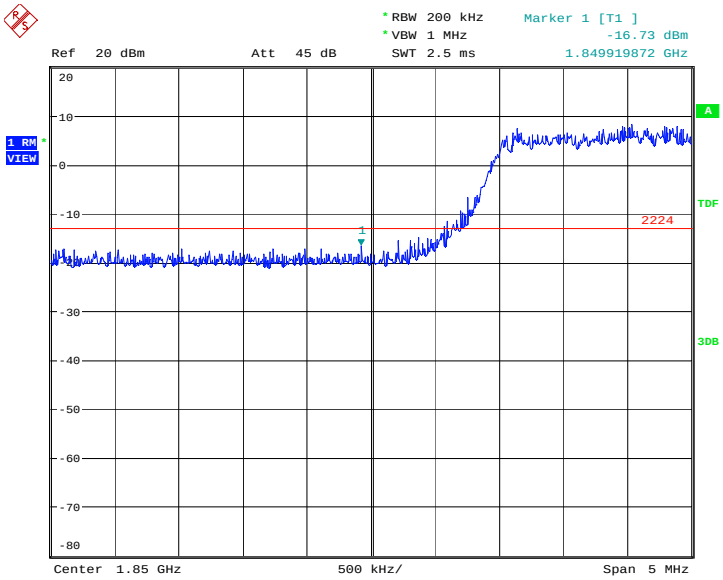
LOW BAND EDGE BLOCK-QPSK-20MHz-100%RB



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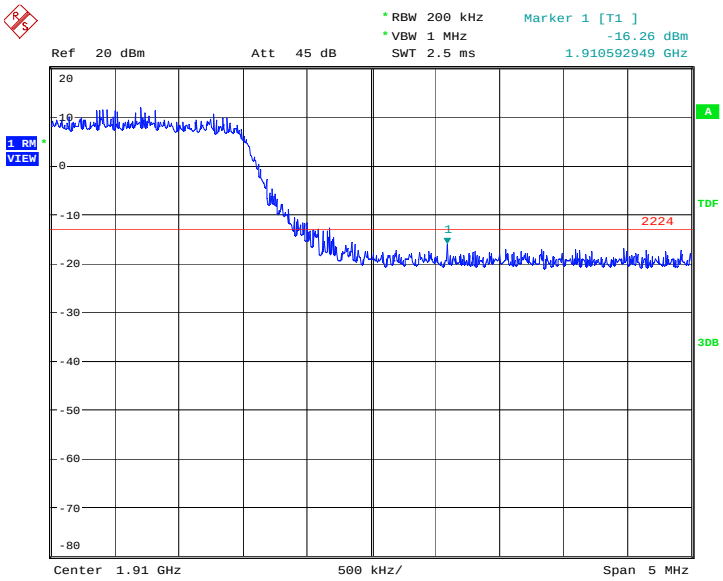
HIGH BAND EDGE BLOCK-QPSK-20MHz-100%RB



Date: 22.SEP.2014 20:41:13

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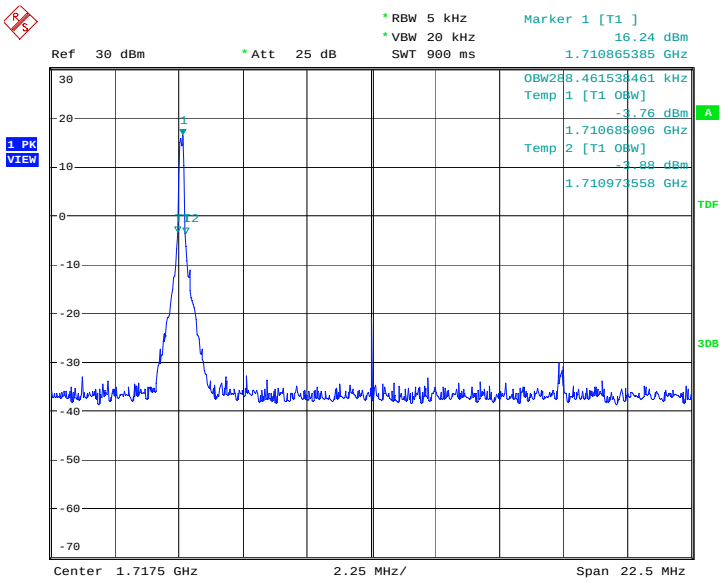
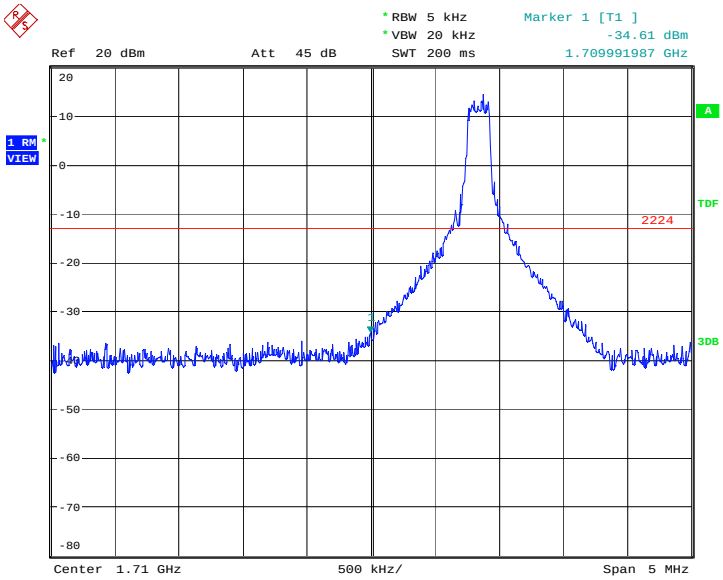
LTE band 4

OBW: QPSK-1RB-low_offset



Date: 22.SEP.2014 21:40:52

LOW BAND EDGE BLOCK-QPSK-1RB-low_offset



Date: 22.SEP.2014 21:41:38

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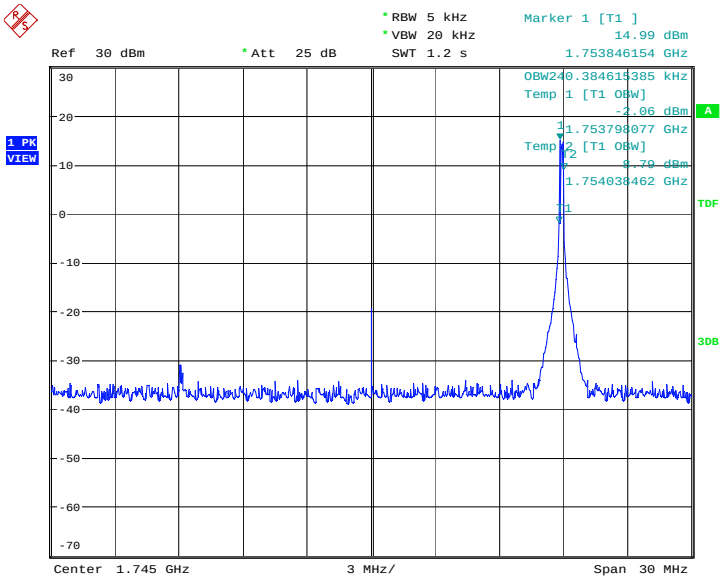
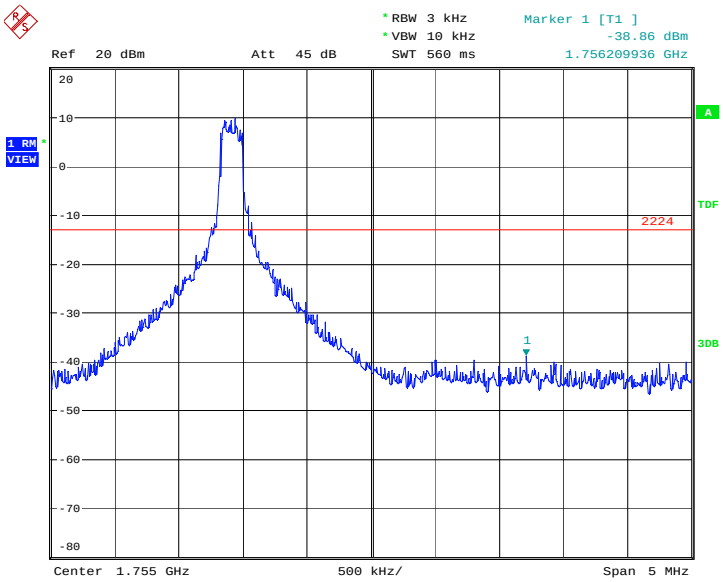
OBW: QPSK-1RB-high_offset



Date: 22.SEP.2014 21:18:20

HIGH BAND EDGE BLOCK-QPSK-1RB-high_offset



Date: 22.SEP.2014 21:19:06

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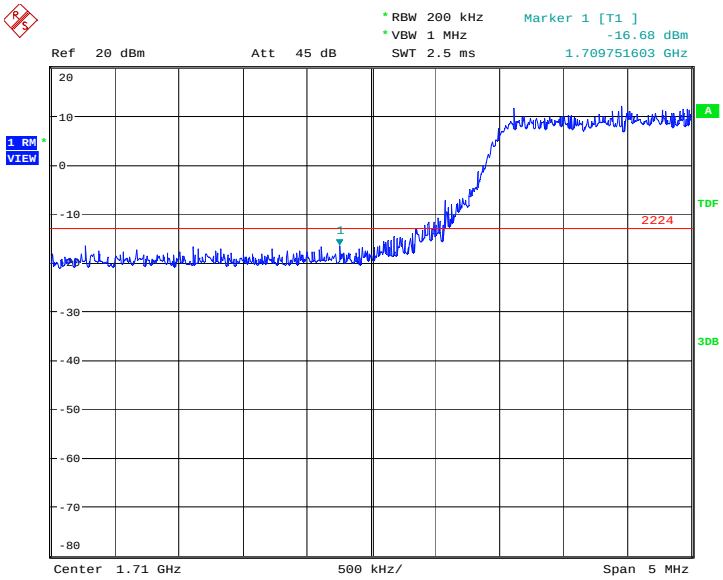
LOW BAND EDGE BLOCK-QPSK-20MHz-100%RB



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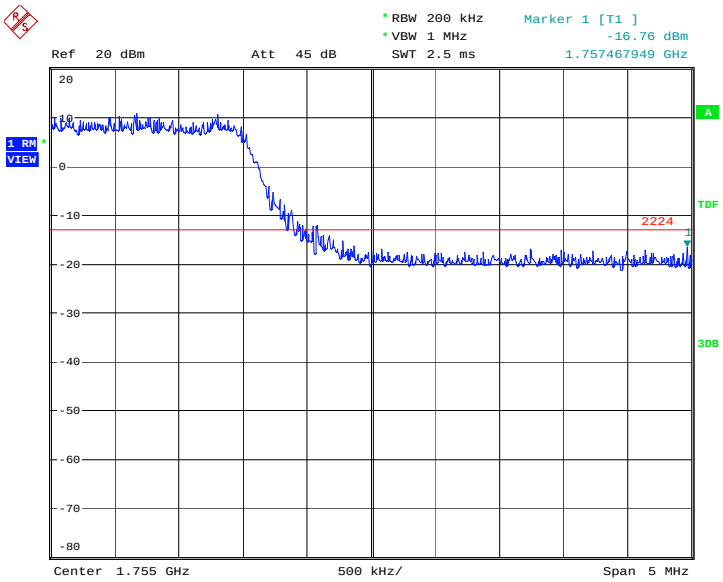
HIGH BAND EDGE BLOCK-QPSK-20MHz-100%RB



Date: 22.SEP.2014 20:43:15

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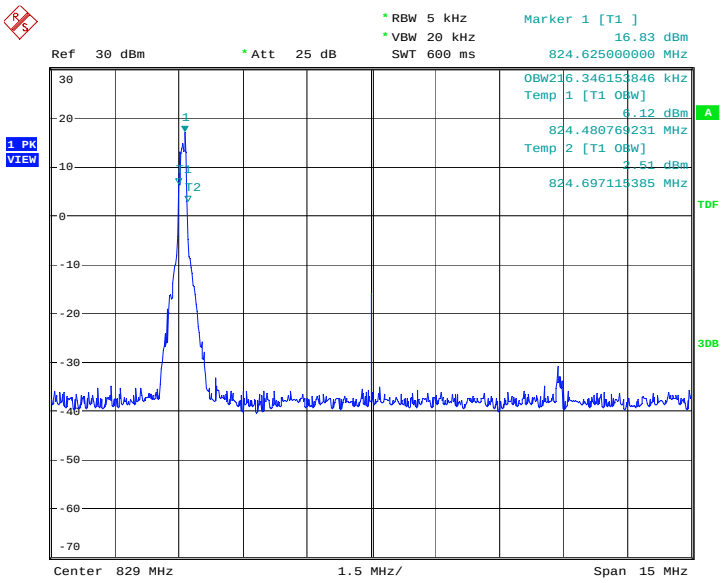
LTE band 5

OBW: QPSK-1RB-low_offset



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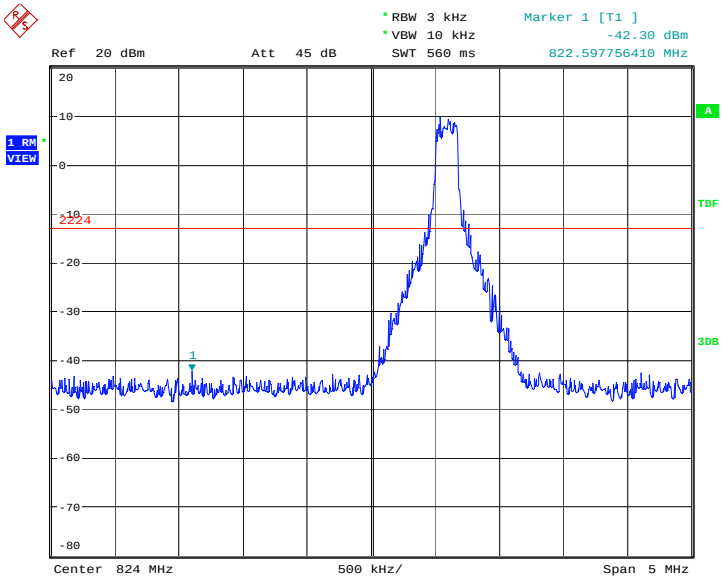
LOW BAND EDGE BLOCK-QPSK-1RB-low_offset



Date: 22.SEP.2014 21:36:55

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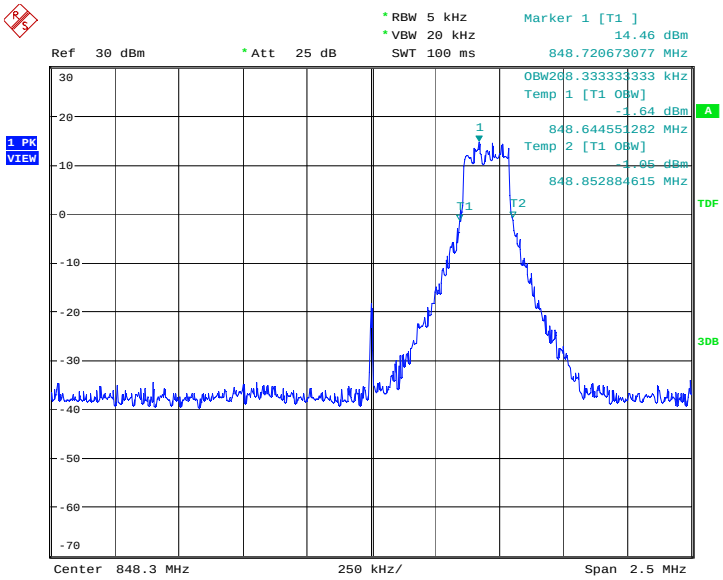
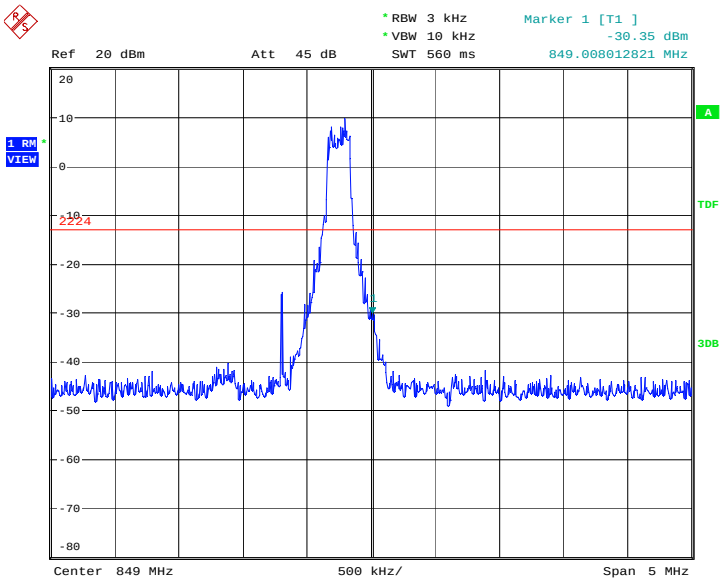
OBW: QPSK-1RB-high_offset



Date: 25.SEP.2014 13:40:53

HIGH BAND EDGE BLOCK-QPSK-1RB-high_offset



Date: 25.SEP.2014 13:41:39

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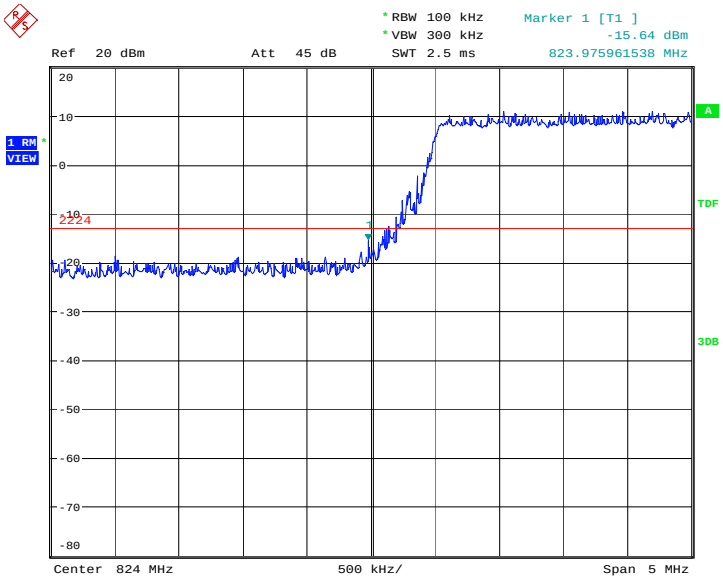
LOW BAND EDGE BLOCK-QPSK-10MHz-100%RB



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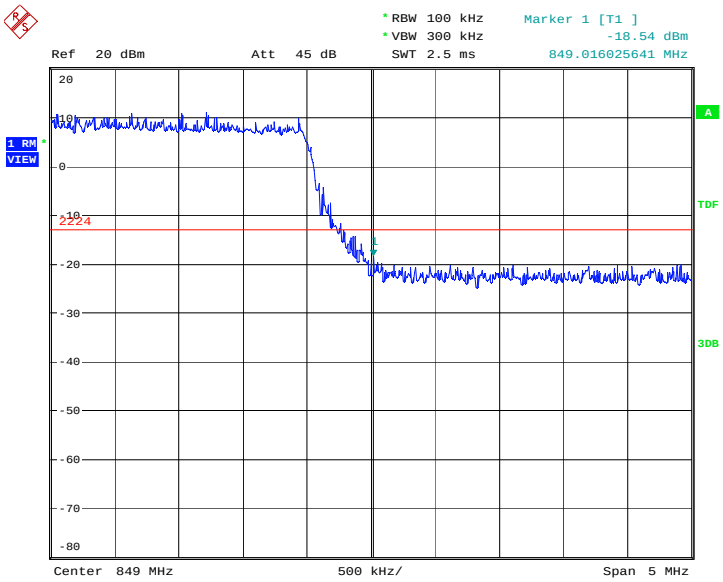
HIGH BAND EDGE BLOCK-QPSK-10MHz-100%RB



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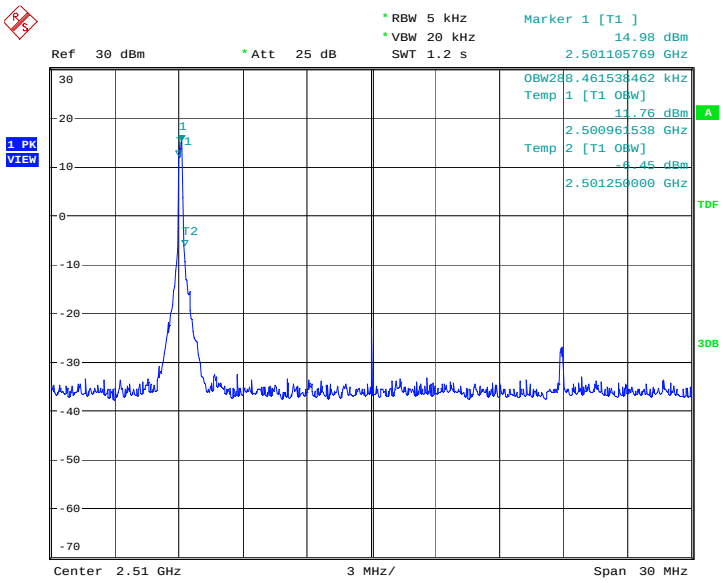
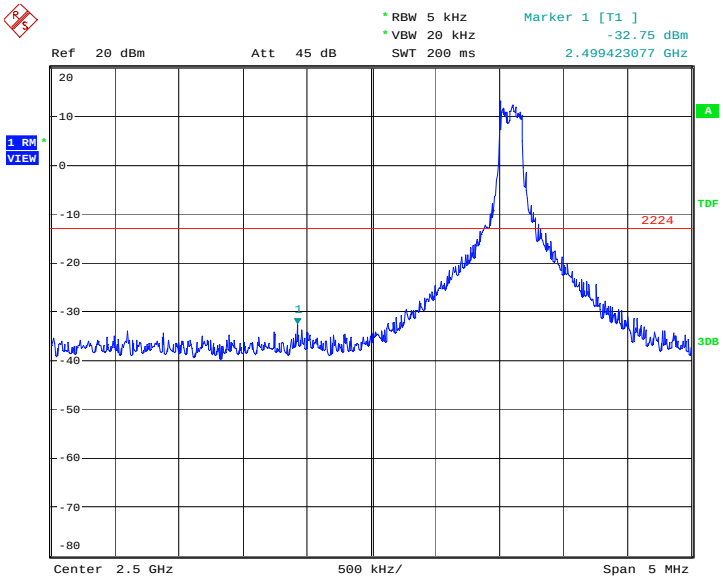
LTE band 7

OBW: QPSK-1RB-low_offset



Date: 22.SEP.2014 21:32:44

LOW BAND EDGE BLOCK-QPSK-1RB-low_offset



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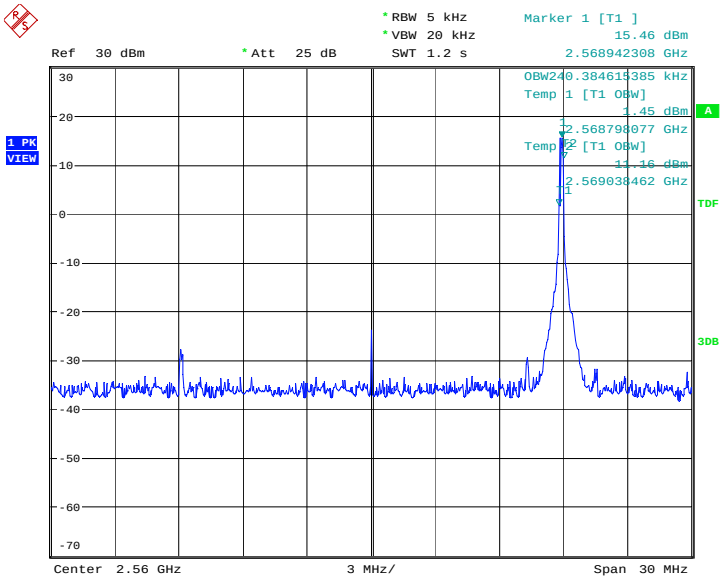
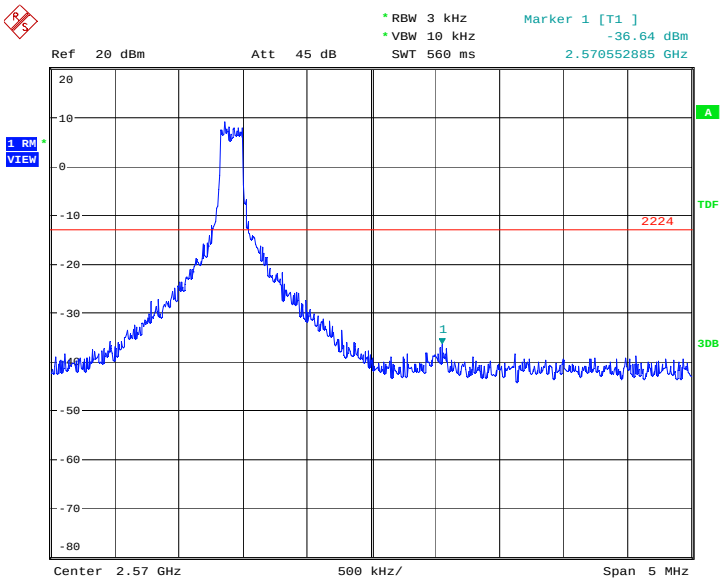
OBW: QPSK-1RB-high_offset



Date: 22.SEP.2014 21:29:19

HIGH BAND EDGE BLOCK-QPSK-1RB-high_offset



Date: 22.SEP.2014 21:30:06

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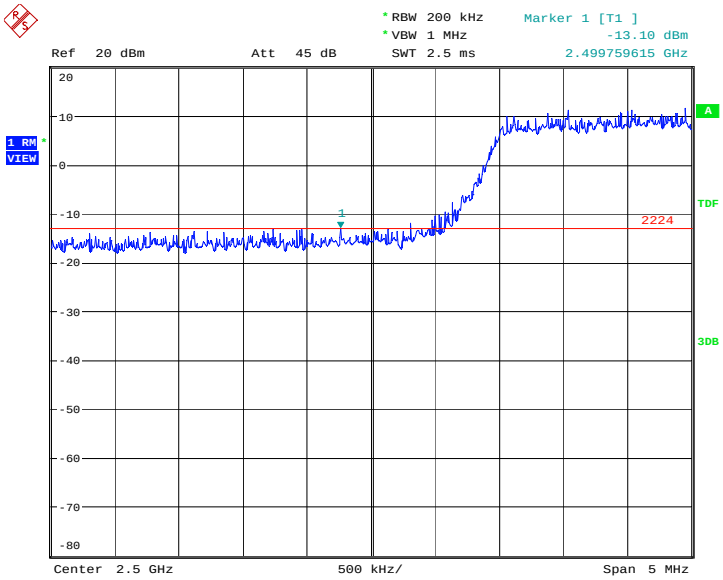
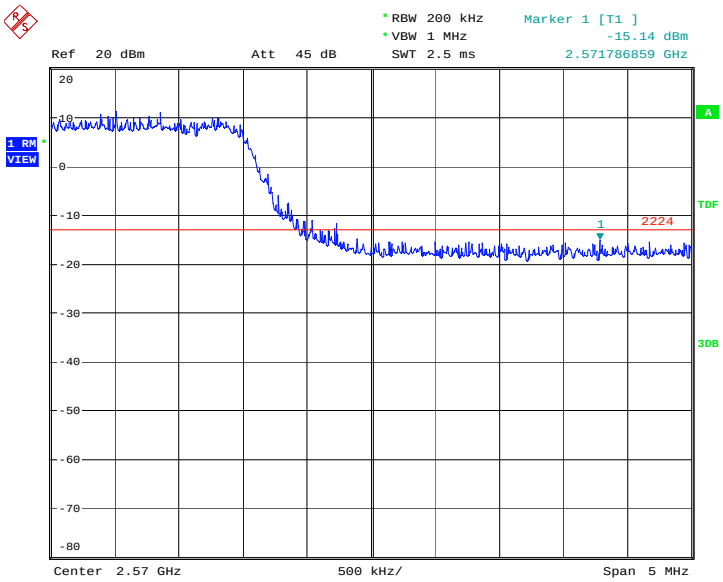
LOW BAND EDGE BLOCK-QPSK-20MHz-100%RB



Date: 22.SEP.2014 20:29:09

HIGH BAND EDGE BLOCK-QPSK-20MHz-100%RB



Date: 22.SEP.2014 20:29:58

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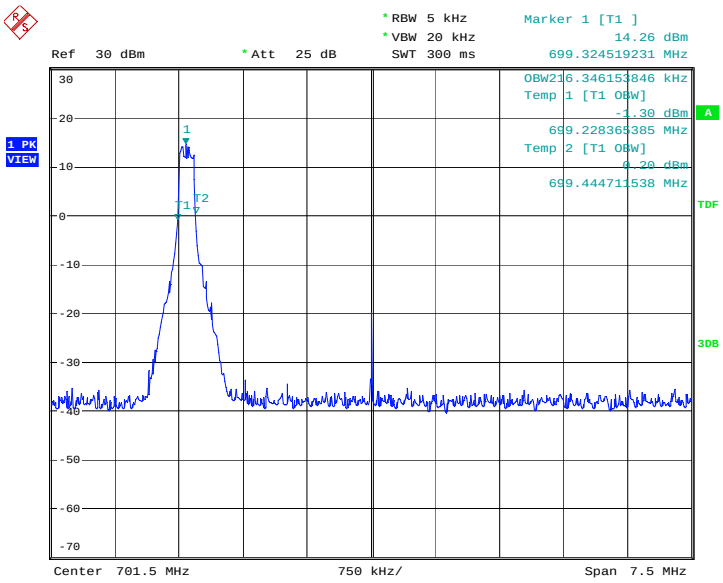
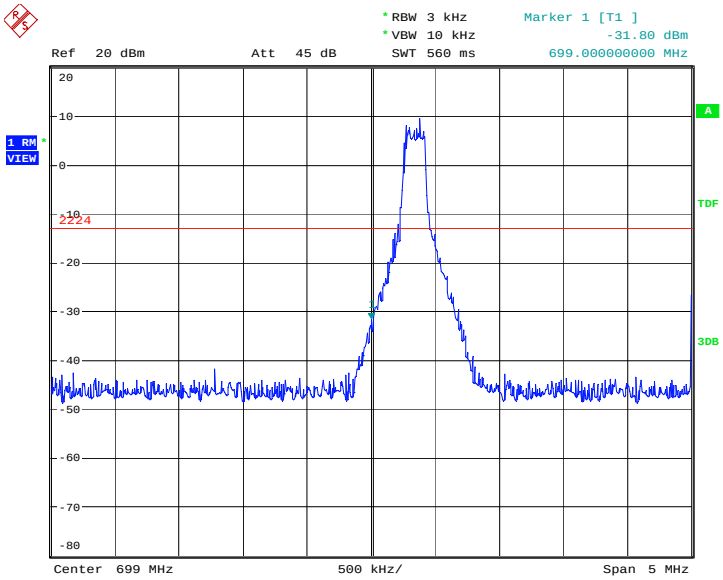
LTE band 12

OBW: QPSK-1RB-low_offset



Date: 22.SEP.2014 21:44:24

LOW BAND EDGE BLOCK-QPSK-1RB-low_offset



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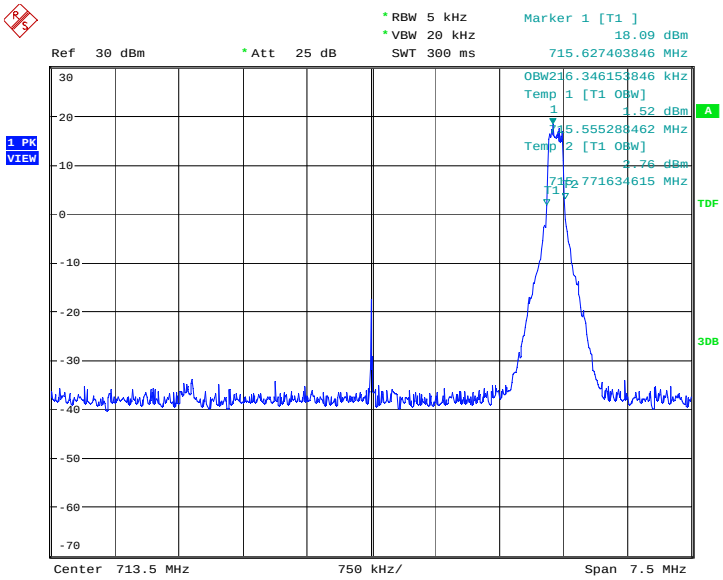
OBW: QPSK-1RB-high_offset



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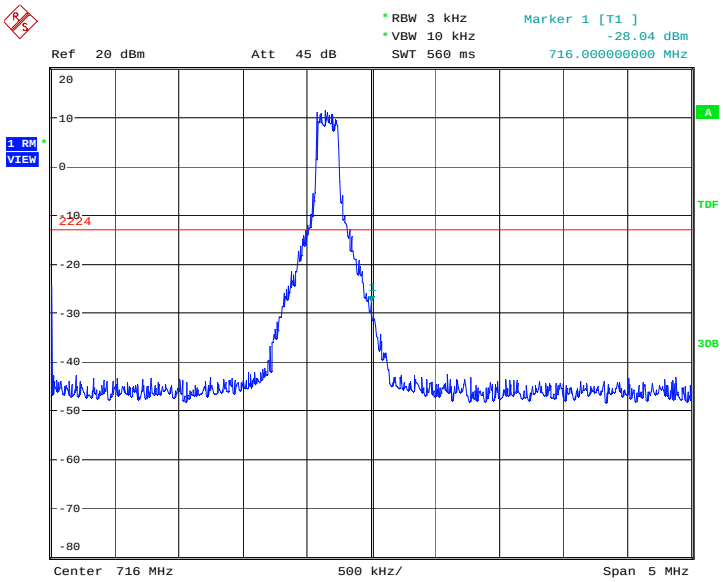
HIGH BAND EDGE BLOCK-QPSK-1RB-high_offset



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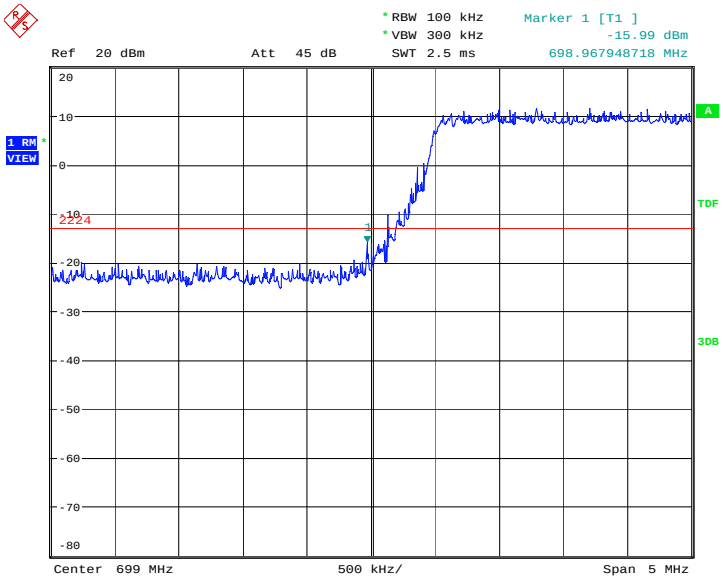
LOW BAND EDGE BLOCK-QPSK-10MHz-100%RB



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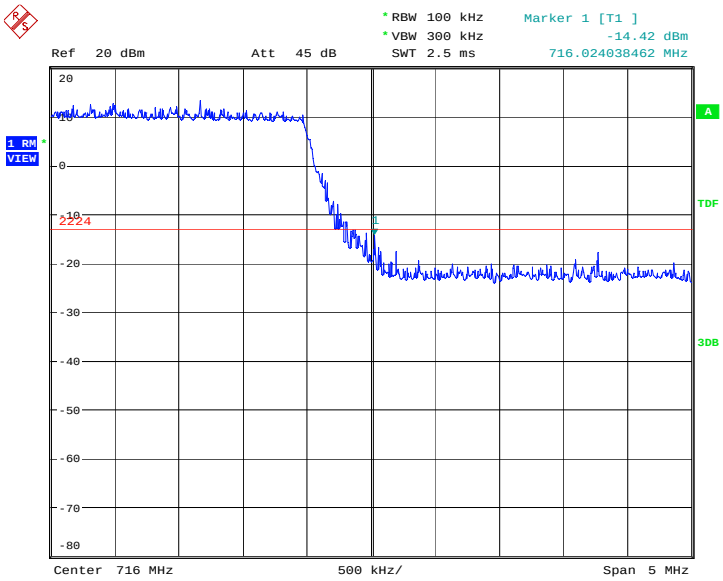
HIGH BAND EDGE BLOCK-QPSK-10MHz-100%RB



Date: 22.SEP.2014 20:48:55

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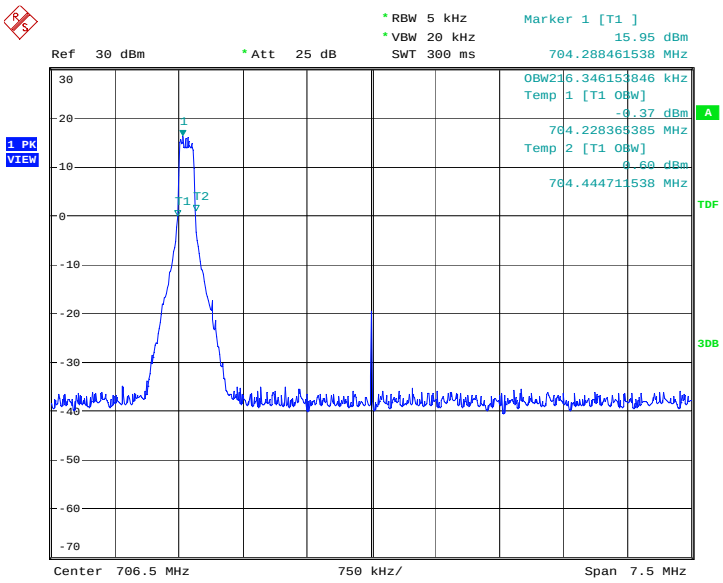
LTE band 17

OBW: QPSK-1RB-low_offset



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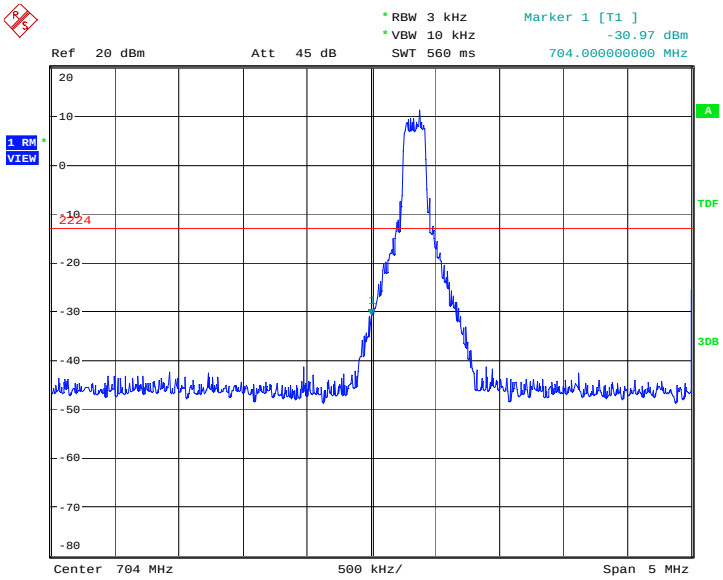
LOW BAND EDGE BLOCK-QPSK-1RB-low_offset



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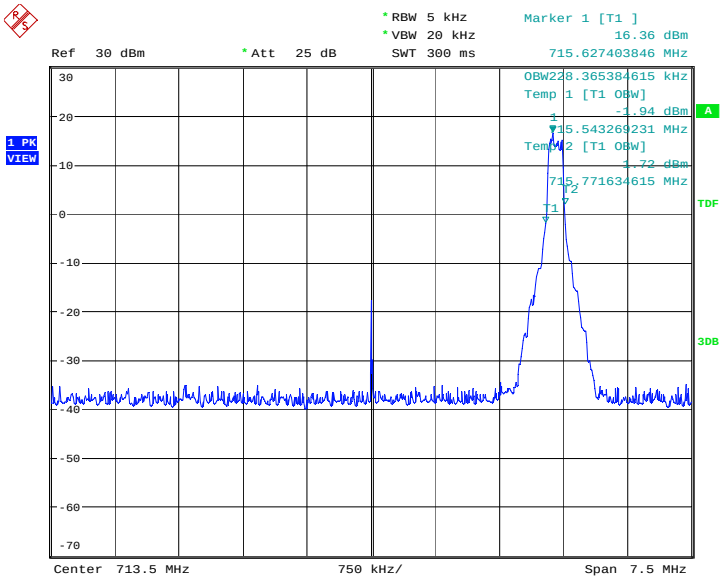
OBW: QPSK-1RB-high_offset



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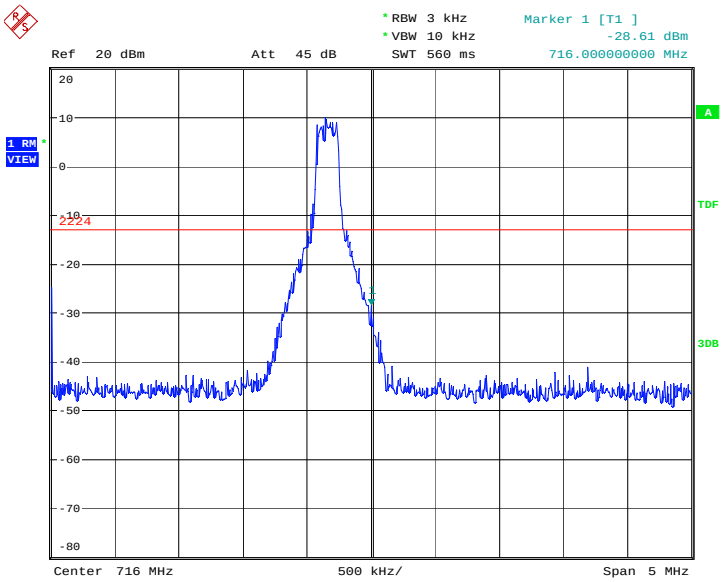
HIGH BAND EDGE BLOCK-QPSK-1RB-high_offset



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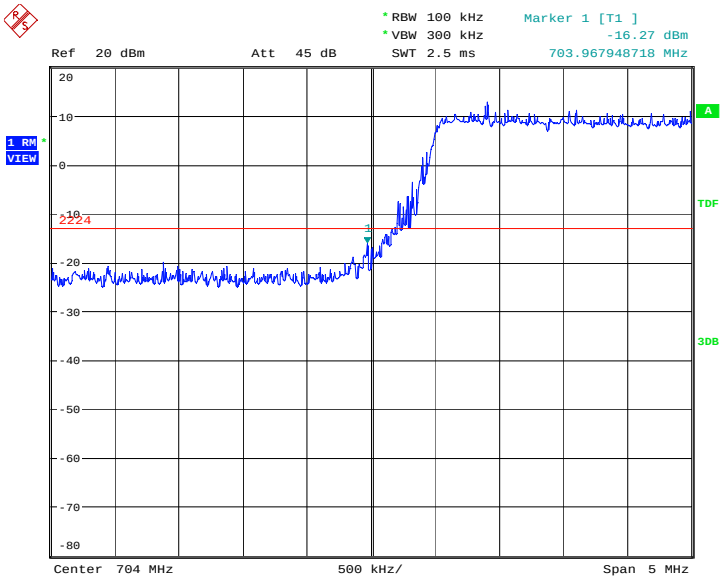
LOW BAND EDGE BLOCK-QPSK-10MHz-100%RB



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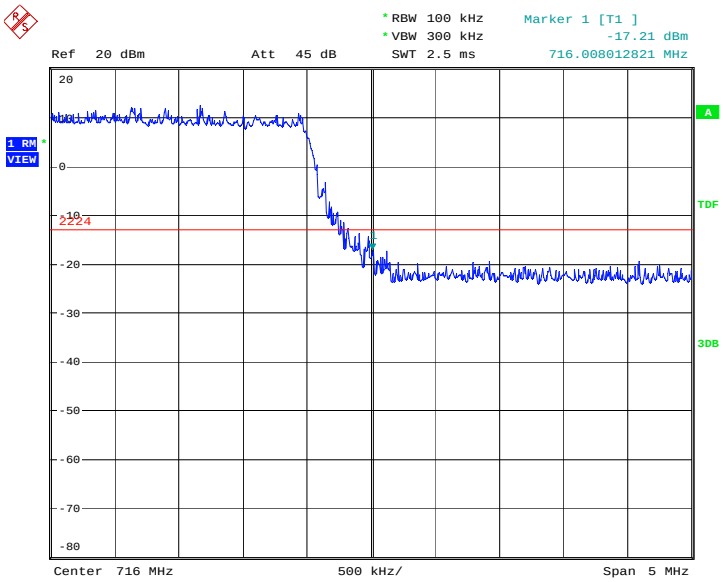
HIGH BAND EDGE BLOCK-QPSK-10MHz-100%RB



Date: 22.SEP.2014 20:56:09

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A.7 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1057, 22.917, 24.238, 27.53(h), 27.53(m), 27.53(g)

A.7.1 Measurement Method

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

A. 7.2 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.

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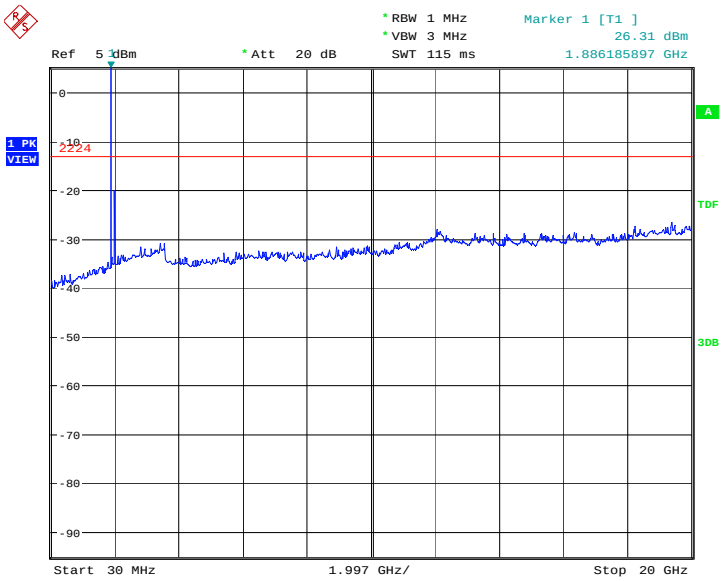
A. 7.3 Measurement result

Only worst case result is given below

LTE band 2: 30MHz – 20GHz

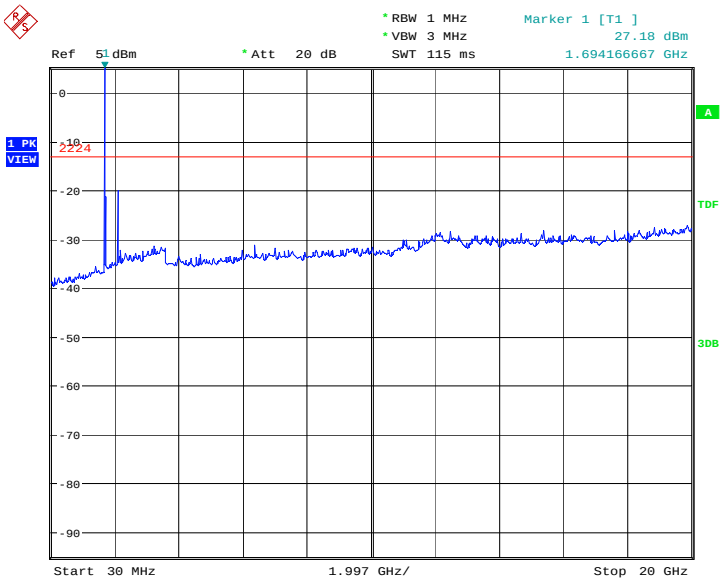
Spurious emission limit –13dBm.



Date: 22.SEP.2014 20:12:01

LTE band 4: 30MHz – 20GHz

Spurious emission limit –13dBm.



Date: 22.SEP.2014 20:16:13

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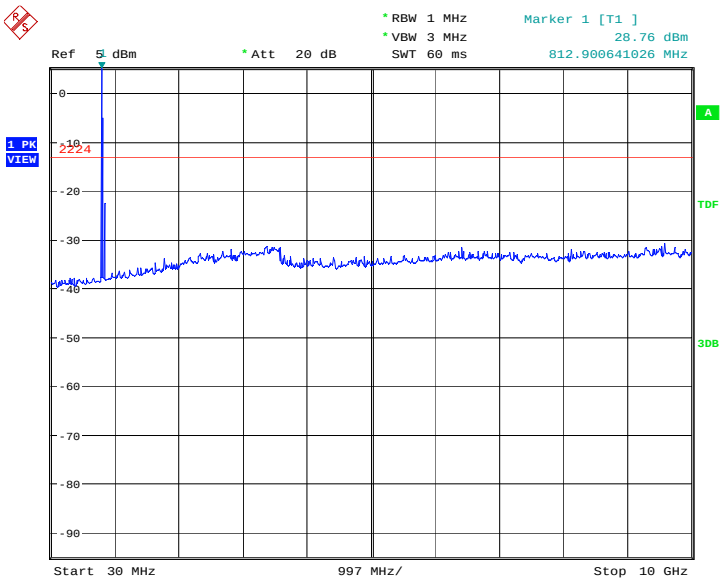
LTE band 5: 30MHz – 10GHz

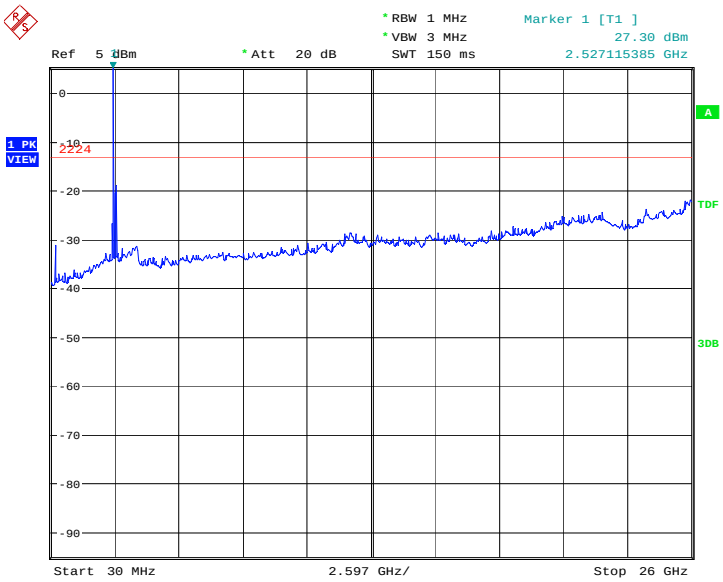
Spurious emission limit –13dBm.



Date: 22.SEP.2014 20:06:58

LTE band 7: 30MHz – 26GHz

Spurious emission limit –13dBm.



Date: 22.SEP.2014 20:02:18

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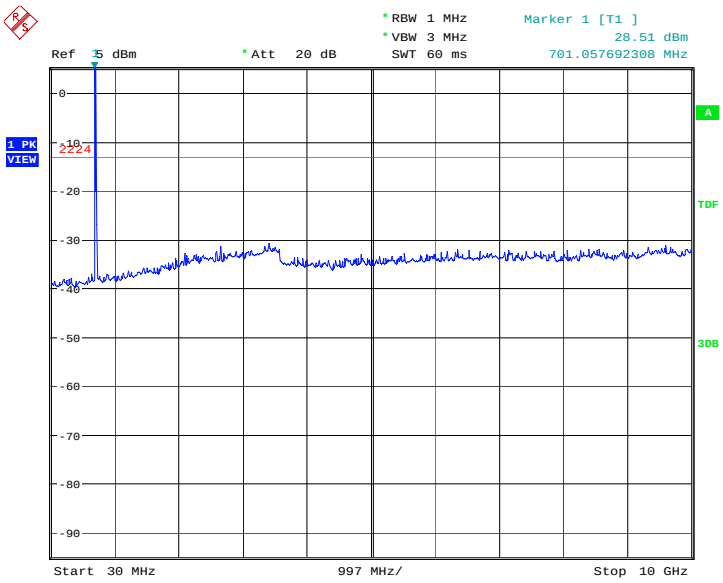
LTE band 12: 30MHz – 10GHz

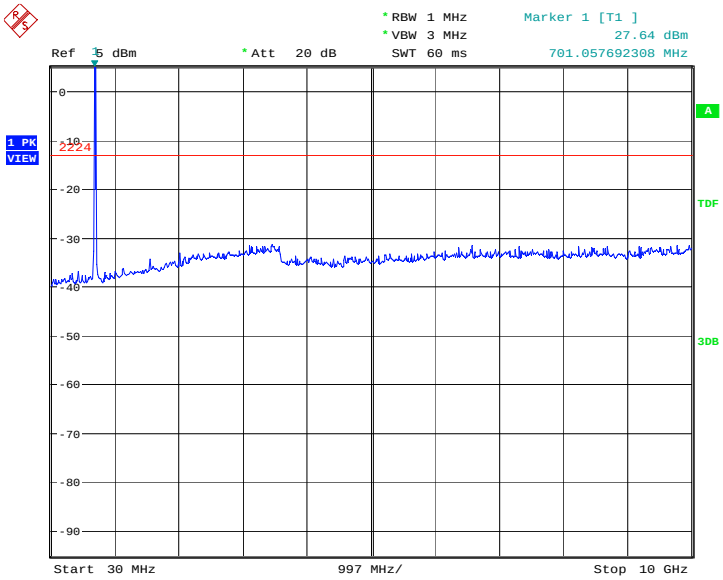
Spurious emission limit –13dBm.



Date: 22.SEP.2014 20:18:39

LTE band 17: 30MHz – 10GHz

Spurious emission limit –13dBm.



Date: 22.SEP.2014 20:24:16

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A.8 PEAK-TO-AVERAGE POWER RATIO

Reference

FCC: CFR Part 24.232 (d), 27.50(a)

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

According to KDB 971168 v02r01 5.7.1:

a)Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;

b) Set resolution/measurement bandwidth ⩾ signal' s occupied bandwidth;

c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Set the measurement interval to 1 ms

e)Record the maximum PAPR level associated with a probability of 0.1%

A.8.1 Measurement limit

not exceed 13 dB

A.8.2 Measurement results

Only worst case result is given below

LTE band 2

PAPR(dB)	
QPSK	16QAM
6.09	7.02

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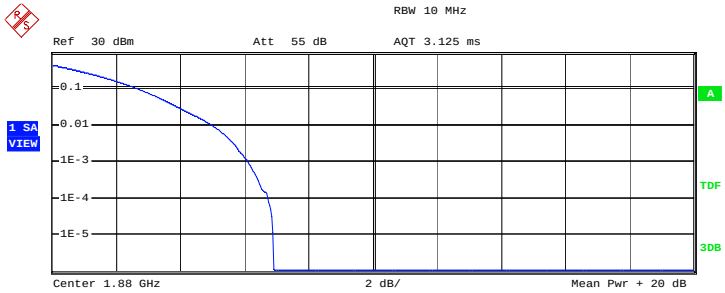

Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	22.29 dBm
Peak	29.20 dBm
Crest	6.90 dB
10 %	2.69 dB
1 %	4.97 dB
.1 %	6.09 dB
.01 %	6.73 dB

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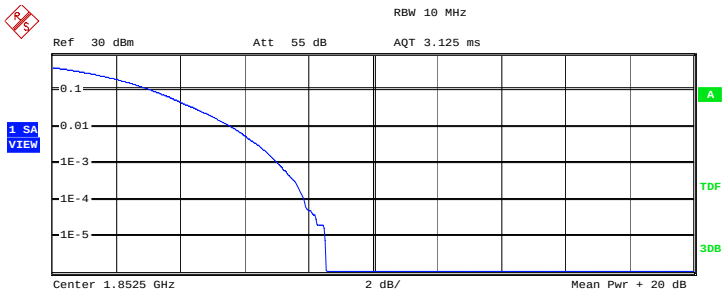

Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	19.62 dBm
Peak	28.16 dBm
Crest	8.54 dB
10 %	3.08 dB
1 %	5.58 dB
.1 %	7.02 dB
.01 %	7.85 dB

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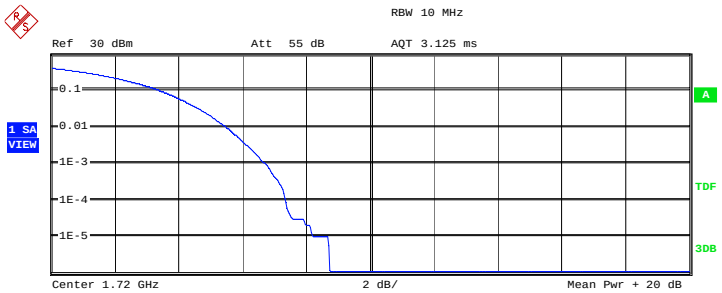
LTE band 4

PAPR(dB)	
QPSK	16QAM
6.70	7.31



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	18.27 dBm
Peak	27.01 dBm
Crest	8.74 dB
10 %	3.37 dB
1 %	5.45 dB
.1 %	6.70 dB
.01 %	7.34 dB

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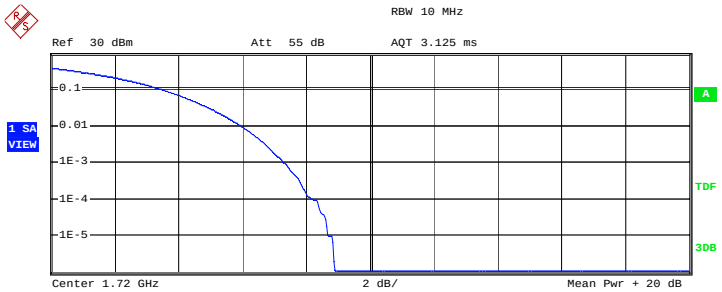

Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	17.36 dBm
Peak	26.23 dBm
Crest	8.88 dB
10 %	3.49 dB
1 %	5.96 dB
.1 %	7.31 dB
.01 %	8.30 dB

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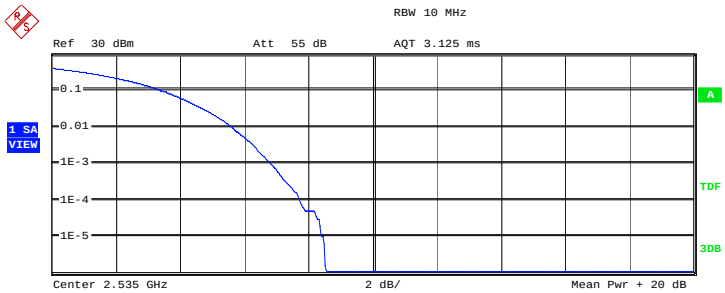
LTE band 7

PAPR(dB)	
QPSK	16QAM
6.79	7.56



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	18.48 dBm
Peak	27.00 dBm
Crest	8.52 dB
10 %	3.40 dB
1 %	5.58 dB
.1 %	6.79 dB
.01 %	7.72 dB

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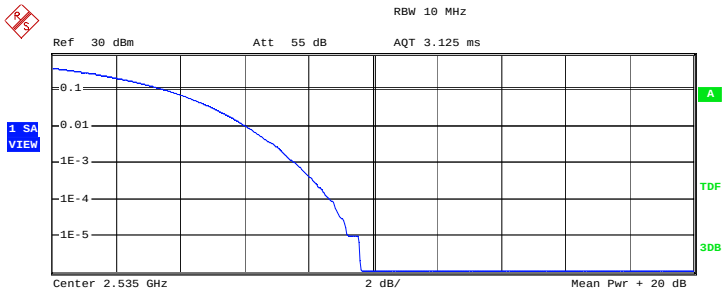

Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	17.60 dBm
Peak	27.21 dBm
Crest	9.61 dB
10 %	3.49 dB
1 %	6.03 dB
.1 %	7.56 dB
.01 %	8.65 dB

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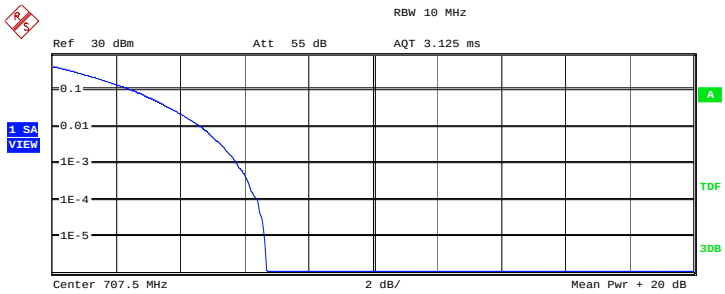
LTE band 12

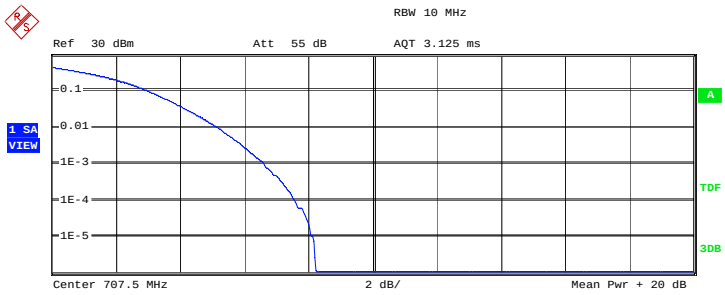
PAPR(dB)	
QPSK	16QAM
5.74	6.60



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	21.10 dBm
Peak	27.78 dBm
Crest	6.68 dB
10 %	2.50 dB
1 %	4.62 dB
.1 %	5.74 dB
.01 %	6.41 dB

Date: 22.SEP.2014 16:09:12



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	20.28 dBm
Peak	28.49 dBm
Crest	8.21 dB
10 %	2.95 dB
1 %	5.13 dB
.1 %	6.60 dB
.01 %	7.56 dB

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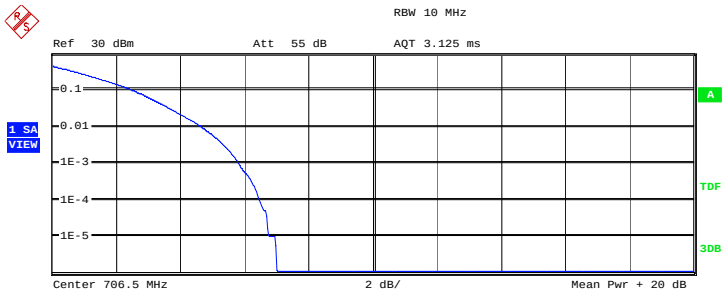
LTE band 17

PAPR(dB)	
QPSK	16QAM
5.80	6.63



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	21.12 dBm
Peak	28.13 dBm
Crest	7.01 dB
10 %	2.50 dB
1 %	4.65 dB
.1 %	5.80 dB
.01 %	6.47 dB

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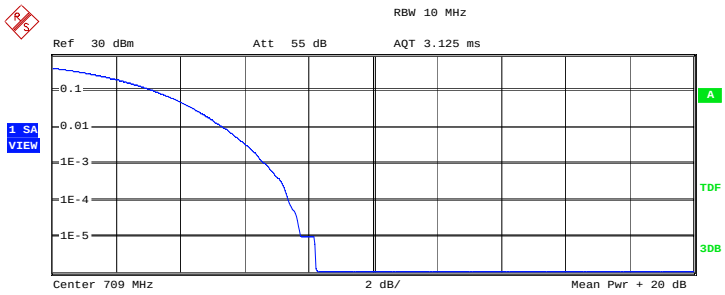

Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	19.41 dBm
Peak	27.65 dBm
Crest	8.23 dB
10 %	3.14 dB
1 %	5.32 dB
.1 %	6.63 dB
.01 %	7.37 dB

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

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