TEST REPORT
No. I18N00056-LTE

for

Doro AB.

Doro 4GLTE Clamshell phone

Model Name: DFC-0180

FCC ID: WS5DFC0180

with

Hardware Version: 1021

Software Version:

CALM01A-S00A_DFC0180_113_USERDEBUG_SECUREBOOT_1801

09

Issued Date: 2018-02-05

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 SAICT.

Test Laboratory:

SAICT, Shenzhen Academy of Information and Communications Technology

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I18N00056-LTE	Rev.0	1st edition	2018-02-05

CONTENTS

1. Test Laboratory

1.1. Testing Location

Company Name:	Shenzhen Academy of Information and Communications Technology
Address:	Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China
Postal Code:	518026
Telephone:	+86(0)755-33322000
Fax:	+86(0)755-33322001

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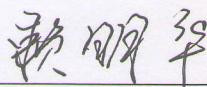
Normal Temperature:	15-35℃
Relative Humidity:	20-75%
Air pressure	980 - 1040 hPa

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
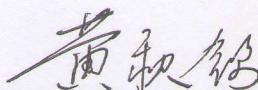
Testing Start Date:	2018-01-15
Testing End Date:	2018-02-05

1.4. Signature
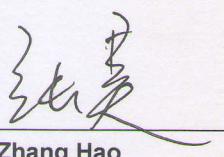
Lai Minghua

(Prepared this test report)

Huang Qiuqin

(Reviewed this test report)

Zhang Hao

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Doro AB
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Contact Email	per.carlenhag@doro.com
Telephone:	+46 46 280 5000
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2.2. Manufacturer Information

Company Name:	CK TELECOM LTD.
Address /Post:	Technology Road.High-Tech Development Zone. Heyuan, Guangdong, P.R.China
Contact Person:	Xin Li
Contact Email	xin.li@ck-telecom.com
Telephone:	0755-26739100 ext.8515
Fax:	0755-26739600

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

3.1. About EUT

Description	Doro 4GLTE Clamshell phone
Model Name	DFC-0180
FCC ID	WS5DFC0180
Frequency Bands	LTE Band 2/4/5/7/12
Antenna	Integrated
Extreme vol. Limits	3.4VDC to 4.35VDC (nominal: 3.8VDC)
Extreme temp. Tolerance	-30°C to +50°C

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Sample Arrival Date
UT07aa	352498090005307	1021	CALM01A-S00A_DFC0180_113_USERDEBUG_SECUREBOOT_180109	2018-01-15

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

3.3. Internal Identification of AE used during the test

AE ID*	Description
AE1	Battery
AE2	Charger

AE1

Model	DBS-1350A
Manufacturer	Veken
Capacitance	1350 mAh

AE2

Model	A8-501000
Manufacturer	Dongguan Aohai Power Techonolgy Co.,LTD

*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 TD-LTE mobile phone with integrated antenna. It consists of normal options: lithium battery, charger. Manual and specifications of the EUT were provided to fulfil the test.

4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-16 Edition
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-16 Edition
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	10-1-16 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-16 Edition
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
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	2014
KDB 971168 D01	Power Meas License Digital Systems	v03

5. LABORATORY ENVIRONMENT

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

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

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

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

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

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

6. SUMMARY OF TEST RESULTS

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

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

6.2. Statements

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

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

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

7. Test Equipments Utilized

NO.	Description	TYPE	Manufacture	series number	CAL DUE DATE
1	Test Receiver	ESR7	R&S	101676	2018.11.29
2	BiLog Antenna	VULB9163	Schwarzbeck	9163 329	2020.02.27
3	Horn Antenna	3117	ETS-lindgren	00066577	2019.04.05
4	Horn Antenna	QSH-SL-18-26-S-20	Q-par	17013	2020.01.15
5	Antenna	SBA 9113	Schwarzbeck	814	/
6	Antenna	SBA 9112	Schwarzbeck	302	/
7	Antenna	QWH-SL-18-40-K-SG	Q-par	15979	2020.01.16
8	preamplifier	83017A	Agilent	MY39501110	/
9	Signal Generator	SMB100A	R&S	179725	2018.11.29
10	Fully Anechoic Chamber	FACT3-2.0	ETS-Lindgren	1285	2019.11.27
11	Spectrum Analyzer	FSV40	R&S	101192	2018.05.22
12	Universal Radio Communication Tester	CMW500	R&S	152499	2018-07-19
13	Universal Radio Communication Tester	CMW500	R&S	115794	2018-03-01
14	Spectrum Analyzer	FSU	R&S	200679	2018-12-13
15	Temperature Chamber	SH-241	ESPECs	92007516	2018-11-14
16	DC Power Supply	U3606A	Agilent Technologies	MY50450012	2018-11-14

Test software

Item	Name	Vesion
Radiated	EMC32	Version 10.01.00

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: 22.913(a), 24.232(c), 27.50(h)(2).

A.1.1 Summary

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

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

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

A.1.2 Conducted

A.1.2.1 Method of Measurements

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

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	1909.3	22.75	22.40
		1880.0	22.87	22.62
		1850.7	22.87	21.95
	1 RB low	1909.3	22.98	22.20
		1880.0	22.96	22.33
		1850.7	22.75	21.84
	50% RB mid	1909.3	22.88	21.99
		1880.0	23.18	22.03
		1850.7	23.08	22.04
	100% RB	1909.3	21.86	20.74
		1880.0	22.14	21.12
		1850.7	21.91	20.78
3MHz	1 RB high	1908.5	22.70	22.16
		1880.0	22.81	22.11
		1851.5	22.90	22.19
	1 RB low	1908.5	22.93	22.30
		1880.0	23.18	22.31
		1851.5	22.93	22.13
	50% RB mid	1908.5	21.94	20.97
		1880.0	22.17	21.08
		1851.5	21.97	21.00

		1908.5	21.91	21.01
	100% RB	1880.0	22.13	21.01
		1851.5	21.93	21.03
5MHz	1 RB high	1907.5	22.80	22.23
		1880.0	22.90	22.22
		1852.5	22.97	22.47
	1 RB low	1907.5	22.82	22.43
		1880.0	23.00	22.41
		1852.5	23.06	22.39
	50% RB mid	1907.5	21.94	21.14
		1880.0	22.05	21.11
		1852.5	22.04	20.97
	100% RB	1907.5	21.92	20.95
		1880.0	22.11	21.20
		1852.5	21.94	21.14
10MHz	1 RB high	1905.0	22.34	21.55
		1880.0	23.12	22.31
		1855.0	22.97	22.88
	1 RB low	1905.0	22.90	22.20
		1880.0	22.94	22.18
		1855.0	22.92	22.32
	50% RB mid	1905.0	22.09	21.11
		1880.0	22.23	21.23
		1855.0	22.10	21.11
	100% RB	1905.0	21.94	21.02
		1880.0	22.13	21.09
		1855.0	22.00	21.08
15MHz	1 RB high	1902.5	22.24	21.46
		1880.0	22.93	22.55
		1857.5	22.81	22.56
	1 RB low	1902.5	23.16	22.43
		1880.0	22.85	22.10
		1857.5	22.93	22.78
	50% RB mid	1902.5	22.10	20.99
		1880.0	22.20	21.21
		1857.5	22.21	21.14
	100% RB	1902.5	21.99	21.09
		1880.0	22.10	21.08
		1857.5	22.01	21.12
20MHz	1 RB high	1900.0	22.10	21.34

		1880.0	23.20	22.07
		1860.0	22.86	22.13
	1 RB low	1900.0	23.08	22.13
		1880.0	22.76	22.04
		1860.0	23.22	22.14
	50% RB mid	1900.0	22.21	21.03
		1880.0	22.22	21.10
		1860.0	22.14	21.24
	100% RB	1900.0	22.03	21.11
		1880.0	22.12	21.18
		1860.0	22.10	21.07

LTE band 4

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1754.3	22.31	21.47
		1732.5	23.03	22.38
		1710.7	22.75	22.20
	1 RB low	1754.3	22.39	21.53
		1732.5	23.09	22.75
		1710.7	22.99	22.18
	50% RB mid	1754.3	22.39	21.59
		1732.5	23.06	22.10
		1710.7	22.97	22.18
	100% RB	1754.3	22.03	20.86
		1732.5	22.10	21.02
		1710.7	22.10	21.08
3MHz	1 RB high	1753.5	22.30	21.44
		1732.5	22.91	22.25
		1711.5	22.86	22.04
	1 RB low	1753.5	22.53	21.70
		1732.5	23.23	22.37
		1711.5	22.93	22.14
	50% RB mid	1753.5	21.94	20.86
		1732.5	22.10	21.08
		1711.5	22.15	21.36
	100% RB	1753.5	21.92	21.09
		1732.5	22.05	20.98
		1711.5	22.11	21.20
5MHz	1 RB high	1752.5	22.27	21.56
		1732.5	22.88	22.37
		1712.5	22.81	22.13
	1 RB low	1752.5	22.68	21.98
		1732.5	23.13	22.31
		1712.5	22.90	22.23
	50% RB mid	1752.5	22.08	20.99
		1732.5	22.09	21.25
		1712.5	22.07	21.26
	100% RB	1752.5	21.99	21.09
		1732.5	22.06	21.23
		1712.5	22.15	21.16
10MHz	1 RB high	1750.0	21.39	20.56
		1732.5	22.73	21.92

		1715.0	21.93	21.10
	1 RB low	1750.0	22.31	21.50
		1732.5	22.38	21.53
		1715.0	22.12	21.33
	50% RB mid	1750.0	22.11	21.06
		1732.5	22.09	21.04
		1715.0	22.14	21.03
	100% RB	1750.0	21.96	21.00
		1732.5	22.03	20.97
		1715.0	22.02	20.97
15MHz	1 RB high	1747.5	21.35	20.52
		1732.5	22.58	21.78
		1717.5	22.01	21.18
	1 RB low	1747.5	22.53	21.71
		1732.5	22.15	21.29
		1717.5	22.04	21.25
	50% RB mid	1747.5	22.12	21.09
		1732.5	22.20	21.28
		1717.5	22.20	21.29
	100% RB	1747.5	22.00	21.05
		1732.5	22.07	21.03
		1717.5	21.97	21.04
20MHz	1 RB high	1745.0	21.20	20.41
		1732.5	22.33	21.55
		1720.0	22.12	21.32
	1 RB low	1745.0	22.49	21.70
		1732.5	21.87	21.08
		1720.0	21.86	21.11
	50% RB mid	1745.0	22.09	21.04
		1732.5	22.07	21.01
		1720.0	22.02	20.92
	100% RB	1745.0	21.94	20.98
		1732.5	22.02	21.04
		1720.0	21.99	21.01

LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	848.3	23.09	22.31
		836.5	22.84	21.95
		824.7	22.75	22.10
	1 RB low	848.3	23.29	22.48
		836.5	22.91	22.01
		824.7	22.82	21.99
	50% RB mid	848.3	23.12	22.14
		836.5	22.97	22.21
		824.7	22.85	22.10
	100% RB	848.3	22.14	21.13
		836.5	22.05	20.85
		824.7	21.96	20.95
3MHz	1 RB high	847.5	23.07	22.29
		836.5	22.80	21.97
		825.5	22.83	22.01
	1 RB low	847.5	23.02	22.61
		836.5	23.04	22.23
		825.5	22.74	21.93
	50% RB mid	847.5	22.09	21.25
		836.5	22.09	21.26
		825.5	21.95	21.11
	100% RB	847.5	22.05	21.16
		836.5	22.08	21.09
		825.5	22.00	21.02
5MHz	1 RB high	846.5	22.98	22.34
		836.5	22.63	21.96
		826.5	22.85	22.26
	1 RB low	846.5	23.06	22.48
		836.5	23.02	22.35
		826.5	22.67	22.00
	50% RB mid	846.5	22.04	21.02
		836.5	22.10	21.23
		826.5	22.16	21.30
	100% RB	846.5	22.03	21.16
		836.5	22.07	21.10
		826.5	22.07	21.14
10MHz	1 RB high	844.0	22.42	21.66
		836.5	22.19	21.39

		829.0	22.44	21.66
		844.0	21.98	21.18
	1 RB low	836.5	22.54	21.76
		829.0	22.05	21.26
		844.0	22.14	21.11
	50% RB mid	836.5	22.16	21.09
		829.0	22.11	21.14
		844.0	22.09	21.09
	100% RB	836.5	22.07	21.00
		829.0	22.06	21.17

LTE band 7

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	2567.5	21.63	21.07
		2535.0	22.06	21.18
		2502.5	21.95	21.21
	1 RB low	2567.5	21.81	21.09
		2535.0	21.82	21.29
		2502.5	21.81	20.80
	50% RB mid	2567.5	20.85	19.92
		2535.0	20.99	20.15
		2502.5	21.14	20.13
	100% RB	2567.5	20.84	20.02
		2535.0	21.01	20.29
		2502.5	21.10	20.34
10MHz	1 RB high	2565.0	21.41	20.76
		2535.0	22.11	21.41
		2505.0	21.99	21.55
	1 RB low	2565.0	21.66	20.92
		2535.0	22.15	21.65
		2505.0	22.02	21.29
	50% RB mid	2565.0	20.88	20.03
		2535.0	21.17	20.15
		2505.0	21.22	20.38
	100% RB	2565.0	20.91	20.04
		2535.0	21.05	20.08
		2505.0	21.14	20.19
15MHz	1 RB high	2562.5	21.46	20.82
		2535.0	21.78	21.35
		2507.5	21.98	21.79
	1 RB low	2562.5	21.68	20.95
		2535.0	22.14	21.42
		2507.5	22.18	21.80
	50% RB mid	2562.5	21.04	20.20
		2535.0	21.14	20.30
		2507.5	21.22	20.22
	100% RB	2562.5	20.91	20.14
		2535.0	21.07	20.21
		2507.5	20.98	20.12
20MHz	1 RB high	2560.0	21.33	20.67

		2535.0	21.97	21.28
		2510.0	22.17	21.26
	1 RB low	2560.0	21.61	20.93
		2535.0	22.39	21.25
		2510.0	22.07	21.06
	50% RB mid	2560.0	21.03	20.06
		2535.0	21.16	20.21
		2510.0	21.15	20.20
	100% RB	2560.0	20.99	20.12
		2535.0	21.13	20.34
		2510.0	21.19	20.24

LTE band 12

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	715.3	22.51	21.72
		707.5	22.51	22.35
		699.7	22.38	21.52
	1 RB low	715.3	22.38	22.10
		707.5	22.48	22.31
		699.7	22.55	21.54
	50% RB mid	715.3	22.66	21.57
		707.5	22.78	21.65
		699.7	22.39	21.60
	100% RB	715.3	21.48	20.37
		707.5	21.68	20.40
		699.7	21.48	20.44
3MHz	1 RB high	714.5	22.48	21.82
		707.5	22.71	21.74
		700.5	22.43	21.81
	1 RB low	714.5	22.58	22.13
		707.5	22.38	21.86
		700.5	22.60	21.79
	50% RB mid	714.5	21.59	20.73
		707.5	21.60	20.63
		700.5	21.50	20.62
	100% RB	714.5	21.53	20.65
		707.5	21.73	20.67
		700.5	21.41	20.51
5MHz	1 RB high	713.5	22.11	21.61
		707.5	22.35	21.79
		701.5	22.23	21.76
	1 RB low	713.5	22.57	21.90
		707.5	22.20	21.81
		701.5	22.36	21.77
	50% RB mid	713.5	21.54	20.66
		707.5	21.69	20.79
		701.5	21.43	20.45
	100% RB	713.5	21.50	20.70
		707.5	21.55	20.56
		701.5	21.37	20.48
10MHz	1 RB high	711.0	22.27	21.92
		707.5	22.63	22.13

		704.0	22.43	21.98
	1 RB low	711.0	22.56	21.89
		707.5	22.26	21.99
		704.0	22.40	21.95
	50% RB mid	711.0	21.64	20.75
		707.5	21.52	20.62
		704.0	21.42	20.53
	100% RB	711.0	21.60	20.69
		707.5	21.49	20.59
		704.0	21.39	20.39

Note: Expanded measurement uncertainty is $U = 0.488$ dB, $k = 1.96$

A.1.3 Radiated

A.1.3.1 Description

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

Rule Part 22.913(a)   specifies "Mobile stations are limited to 2.0 watts EIRP.".
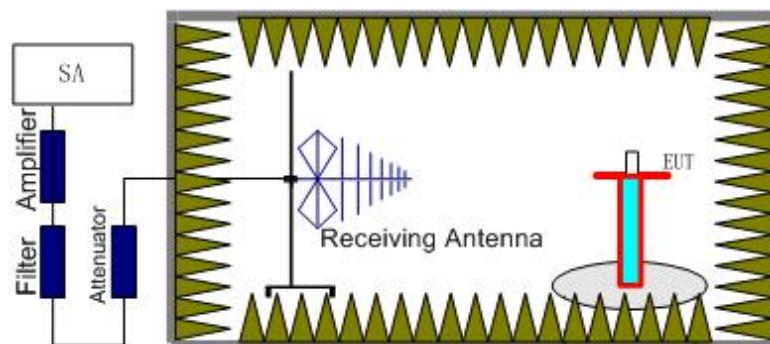
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 27.50(h)(2) specifies "Mobile stations are limited to 2.0 watts EIRP.".
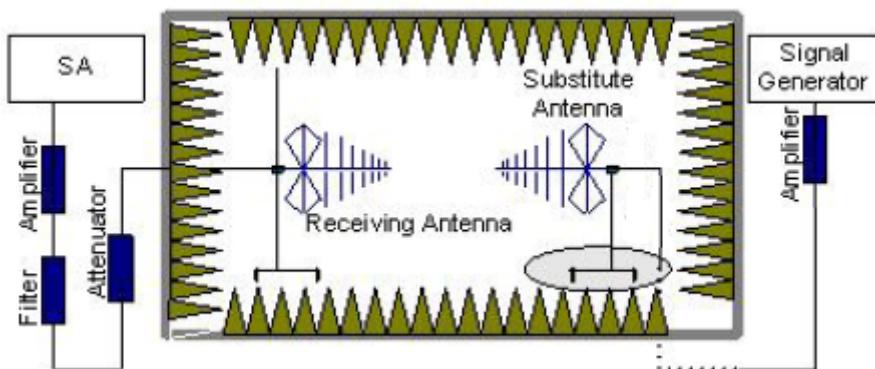
A.1.3.2 Method of Measurement

The measurements procedures in TIA-603-E-2016 are used.

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

2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).

3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.

In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the

substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna.
   The cable loss (P_{cl}), the substitution antenna Gain (G_a) and the amplifier Gain (P_{Ag}) should be recorded after test.
   The measurement results are obtained as described below:
   Power (EIRP) = P_{Mea} - P_{Ag} - P_{cl} + G_a

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit dBi) and known input power.

6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dB.

A.1.3.3 Measurement result

LTE Band 2- EIRP

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)	Polarization
1850.70	-7.90	-29.40	0.15	21.65	33.00	V
1880.00	-7.68	-29.30	0.25	21.87	33.00	V
1909.30	-7.17	-29.30	0.35	22.48	33.00	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)	Polarization
1851.50	-8.00	-29.40	0.15	21.56	33.00	V
1880.00	-7.57	-29.30	0.25	21.99	33.00	V
1908.50	-7.34	-29.30	0.35	22.31	33.00	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)	Polarization
1852.50	-8.77	-29.40	0.15	20.78	33.00	V
1880.00	-8.28	-29.30	0.25	21.27	33.00	V
1907.50	-7.94	-29.30	0.35	21.71	33.00	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)	Polarization
1855.00	-9.59	-29.40	0.15	19.96	33.00	V
1880.00	-8.54	-29.30	0.25	21.01	33.00	V
1905.00	-8.59	-29.30	0.35	21.06	33.00	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)	Polarization
1857.50	-9.89	-29.40	0.15	19.66	33.00	V
1880.00	-9.13	-29.30	0.25	20.42	33.00	V
1902.50	-8.79	-29.30	0.35	20.86	33.00	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)	Polarization
1860.00	-10.16	-29.40	0.15	19.40	33.00	V
1880.00	-9.38	-29.30	0.25	20.17	33.00	V
1900.00	-9.05	-29.30	0.35	20.60	33.00	V

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)	Polarization
1850.70	-7.90	-29.40	0.15	21.65	33.00	V
1880.00	-7.89	-29.30	0.25	21.67	33.00	V
1909.30	-7.15	-29.30	0.35	22.50	33.00	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)	Polarization
1851.50	-7.72	-29.40	0.15	21.83	33.00	V
1880.00	-7.46	-29.30	0.25	22.09	33.00	V
1908.50	**-7.03**	**-29.30**	**0.35**	**22.62**	**33.00**	**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)	Polarization
1852.50	-9.17	-29.40	0.15	20.38	33.00	V
1880.00	-8.38	-29.30	0.25	21.17	33.00	V
1907.50	-8.01	-29.30	0.35	21.64	33.00	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)	Polarization
1855.00	-9.51	-29.40	0.15	20.04	33.00	V
1880.00	-8.64	-29.30	0.25	20.91	33.00	V
1905.00	-8.42	-29.30	0.35	21.23	33.00	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)	Polarization
1857.50	-9.79	-29.40	0.15	19.77	33.00	V
1880.00	-8.96	-29.30	0.25	20.59	33.00	V
1902.50	-8.88	-29.30	0.35	20.77	33.00	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)	Polarization
1860.00	-10.24	-29.40	0.15	19.32	33.00	V
1880.00	-9.30	-29.30	0.25	20.25	33.00	V
1900.00	-9.24	-29.30	0.35	20.41	33.00	V

Peak EIRP (dBm)=P_{Mea}(-7.03dBm)- (P_{cl}+P_{Ag}) (-29.30dB)+G_a(0.35dB) =22.62dBm

LTE Band 4- EIRP

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)	Polarization
1710.70	-8.49	-29.60	0.39	21.50	30.00	V
1732.50	-7.74	-29.60	0.27	22.13	30.00	V
1754.30	-6.20	-29.50	0.17	23.47	30.00	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)	Polarization
1711.50	-8.62	-29.60	0.39	21.37	30.00	V
1732.50	-7.89	-29.60	0.27	21.98	30.00	V
1753.50	**-6.19**	**-29.50**	**0.17**	**23.48**	**30.00**	**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)	Polarization
1712.50	-8.73	-29.60	0.39	21.26	30.00	V
1732.50	-8.14	-29.60	0.27	21.73	30.00	V
1752.50	-6.66	-29.50	0.17	23.01	30.00	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)	Polarization
1715.00	-8.74	-29.60	0.39	21.25	30.00	V
1732.50	-8.27	-29.60	0.27	21.60	30.00	V
1750.50	-7.06	-29.50	0.17	22.61	30.00	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)	Polarization
1717.50	-9.41	-29.60	0.39	20.59	30.00	V
1732.50	-9.36	-29.60	0.27	20.51	30.00	V
1747.50	-7.98	-29.50	0.17	21.69	30.00	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)	Polarization
1720.00	-9.77	-29.60	0.39	20.22	30.00	V
1732.50	-9.79	-29.60	0.27	20.08	30.00	V
1745.00	-8.23	-29.50	0.17	21.44	30.00	V

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)	Polarization
1710.70	-8.49	-29.60	0.39	21.50	30.00	V
1732.50	-7.74	-29.60	0.27	22.13	30.00	V
1754.30	-6.20	-29.50	0.17	23.47	30.00	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)	Polarization
1711.50	-8.66	-29.60	0.39	21.33	30.00	V
1732.50	-7.96	-29.60	0.27	21.91	30.00	V
1753.50	-6.39	-29.50	0.17	23.28	30.00	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)	Polarization
1712.50	-8.50	-29.60	0.39	21.50	30.00	V
1732.50	-8.04	-29.60	0.27	21.84	30.00	V
1752.50	-6.48	-29.50	0.17	23.19	30.00	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)	Polarization
1715.00	-8.73	-29.60	0.39	21.26	30.00	V
1732.50	-8.25	-29.60	0.27	21.62	30.00	V
1750.50	-6.86	-29.50	0.17	22.81	30.00	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)	Polarization
1717.50	-9.32	-29.60	0.39	20.67	30.00	V
1732.50	-8.85	-29.60	0.27	21.03	30.00	V
1747.50	-8.12	-29.50	0.17	21.55	30.00	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)	Polarization
1720.00	-9.41	-29.60	0.39	20.58	30.00	V
1732.50	-9.35	-29.60	0.27	20.52	30.00	V
1745.00	-8.50	-29.50	0.17	21.17	30.00	V

Peak EIRP (dBm)=P_{Mea}(-6.19dBm)- (P_{cl}+P_{Ag}) (-29.50dB)+G_a(0.17dB) =23.48dBm

LTE Band 5- ERP

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)	Polarization
824.70	-9.90	-33.60	0.28	2.15	21.83	38.45	V
836.50	**-7.72**	**-33.50**	**0.25**	**2.15**	**23.89**	**38.45**	**V**
848.30	-8.59	-33.50	0.21	2.15	22.97	38.45	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)	Polarization
825.50	-9.92	-33.60	0.28	2.15	21.81	38.45	V
836.50	-8.15	-33.50	0.25	2.15	23.45	38.45	V
847.50	-8.45	-33.50	0.21	2.15	23.11	38.45	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)	Polarization
826.50	-10.14	-33.60	0.28	2.15	21.60	38.45	V
836.50	-8.60	-33.50	0.25	2.15	23.00	38.45	V
846.50	-9.11	-33.50	0.21	2.15	22.45	38.45	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)	Polarization
829.00	-10.35	-33.60	0.28	2.15	21.38	38.45	V
836.50	-9.70	-33.50	0.25	2.15	21.90	38.45	V
844.00	-9.77	-33.50	0.21	2.15	21.37	38.45	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)	Polarization
824.70	-9.85	-33.60	0.28	2.15	21.88	38.45	V
836.50	-8.24	-33.50	0.25	2.15	23.36	38.45	V
848.30	-8.57	-33.50	0.21	2.15	22.99	38.45	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)	Polarization
825.50	-9.98	-33.60	0.28	2.15	21.75	38.45	V
836.50	-8.09	-33.50	0.25	2.15	23.51	38.45	V
847.50	-8.96	-33.50	0.21	2.15	22.60	38.45	V

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)	Polarization
826.50	-10.09	-33.60	0.28	2.15	21.64	38.45	V
836.50	-8.30	-33.50	0.25	2.15	23.30	38.45	V
846.50	-9.29	-33.50	0.21	2.15	22.27	38.45	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)	Polarization
829.00	-10.72	-33.60	0.28	2.15	21.01	38.45	V
836.50	-9.36	-33.50	0.25	2.15	22.24	38.45	V
844.00	-9.67	-33.50	0.21	2.15	21.89	38.45	V

Peak ERP (dBm)=P_{Mea}(-7.72dBm)- (P_{cl}+P_{Ag}) (-33.50dB)+G_a(0.25dB) -2.15dB =23.89dBm

LTE Band 7- EIRP

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)	Polarization
2502.50	-10.36	-28.70	0.59	18.93	33.00	V
2535.00	-9.48	-28.60	0.45	19.57	33.00	V
2567.50	-9.49	-28.60	0.38	19.49	33.00	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)	Polarization
2505.00	-10.71	-28.70	0.59	18.58	33.00	V
2535.00	-9.87	-28.60	0.45	19.18	33.00	V
2565.00	-9.80	-28.60	0.38	19.18	33.00	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)	Polarization
2507.50	-11.22	-28.70	0.59	18.07	33.00	V
2535.00	-10.11	-28.60	0.45	18.94	33.00	V
2562.50	-10.14	-28.60	0.38	18.84	33.00	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)	Polarization
2510.00	-11.58	-28.70	0.59	17.71	33.00	V
2535.00	-10.44	-28.60	0.45	18.61	33.00	V
2560.00	-10.45	-28.60	0.38	18.53	33.00	V

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)	Polarization
2502.50	-10.62	-28.70	0.59	18.67	33.00	V
2535.00	**-9.41**	**-28.60**	**0.45**	**19.64**	**33.00**	**V**
2567.50	-9.74	-28.60	0.38	19.24	33.00	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)	Polarization
2505.00	-11.02	-28.70	0.59	18.28	33.00	V
2535.00	-9.69	-28.60	0.45	19.36	33.00	V
2565.00	**-9.34**	**-28.60**	**0.38**	**19.64**	**33.00**	**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)	Polarization
2507.50	-11.55	-28.70	0.59	17.74	33.00	V
2535.00	-10.09	-28.60	0.45	18.96	33.00	V
2562.50	-9.86	-28.60	0.38	19.12	33.00	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)	Polarization
2510.00	-11.91	-28.70	0.59	17.38	33.00	V
2535.00	-10.51	-28.60	0.45	18.54	33.00	V
2560.00	-10.31	-28.60	0.38	18.67	33.00	V

Peak EIRP (dBm)=P_{Mea}(-9.41dBm)-(P_{cl}+P_{Ag})(-28.60dB)+G_a(0.45dB) -2.15dB =19.64dBm

Peak EIRP (dBm)=P_{Mea}(-9.34dBm)-(P_{cl}+P_{Ag})(-28.60dB)+G_a(0.38dB) -2.15dB =19.64dBm

LTE Band 12 - ERP

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)	Polarization
699.70	-13.75	-34.80	1.02	2.15	19.92	34.77	V
707.50	-13.40	-34.70	1.14	2.15	20.29	34.77	V
715.30	-13.30	-34.70	1.10	2.15	20.35	34.77	V

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)	Polarization
700.50	**-13.16**	**-34.80**	**1.02**	**2.15**	**20.51**	**34.77**	**V**
707.50	-13.46	-34.70	1.14	2.15	20.23	34.77	V
714.50	-13.98	-34.70	1.10	2.15	19.67	34.77	V

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)	Polarization
701.50	-13.53	-34.80	1.02	2.15	20.14	34.77	V
707.50	-14.55	-34.70	1.14	2.15	19.14	34.77	V
713.50	-14.01	-34.70	1.10	2.15	19.64	34.77	V

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)	Polarization
704.00	-14.31	-34.80	1.02	2.15	19.36	34.77	V
707.50	-14.57	-34.70	1.14	2.15	19.12	34.77	V
711.00	-14.59	-34.70	1.10	2.15	19.06	**34.77**	V

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)	Polarization
699.70	-13.82	-34.80	1.02	2.15	19.85	34.77	V
707.50	-14.06	-34.70	1.14	2.15	19.63	34.77	V
715.30	-13.90	-34.70	1.10	2.15	19.75	34.77	V

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)	Polarization
700.50	-13.25	-34.80	1.02	2.15	20.43	34.77	V
707.50	-14.16	-34.70	1.14	2.15	19.53	34.77	V
714.50	-14.16	-34.70	1.10	2.15	19.49	34.77	V

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)	Polarization
701.50	-13.87	-34.80	1.02	2.15	19.80	34.77	V
707.50	-14.38	-34.70	1.14	2.15	19.31	34.77	V
713.50	-14.04	-34.70	1.10	2.15	19.61	34.77	V

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)	Polarization
704.00	-14.16	-34.80	1.02	2.15	19.51	34.77	V
707.50	-14.45	-34.70	1.14	2.15	19.24	34.77	V
711.00	-14.50	-34.70	1.10	2.15	19.16	34.77	V

Peak ERP (dBm)=P_{Mea}(-13.16dBm)-(P_{cl}+P_{Ag})(-34.80dB)+G_a(1.02dB) -2.15dB =20.51dBm

ANALYZER SETTINGS:

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

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

Note: The maximum value of expanded measurement uncertainty for this test item is $U =$

4.92dB(30MHz-3GHz)/4.88dB(3GHz-18GHz)/5.66dB(18GHz-40GHz), $k = 2$

A.2 EMISSION LIMIT

Reference
FCC: CFR 2.1051, 22.917, 24.238(a), 27.53(m).
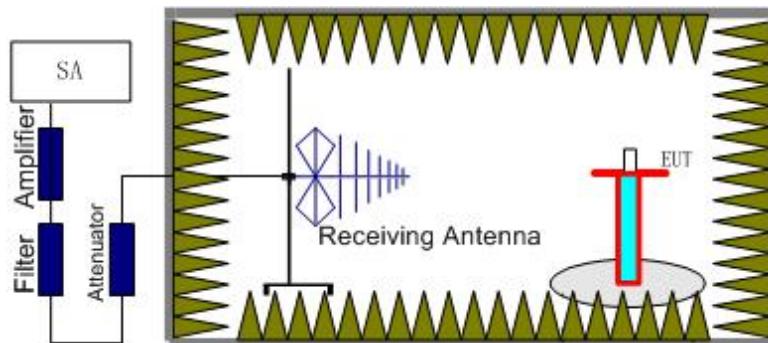
A.2.1 Measurement Method

The measurements procedures in TIA-603-E-2016 are used. This measurement is carried out in fully-anechoic chamber FAC-3.
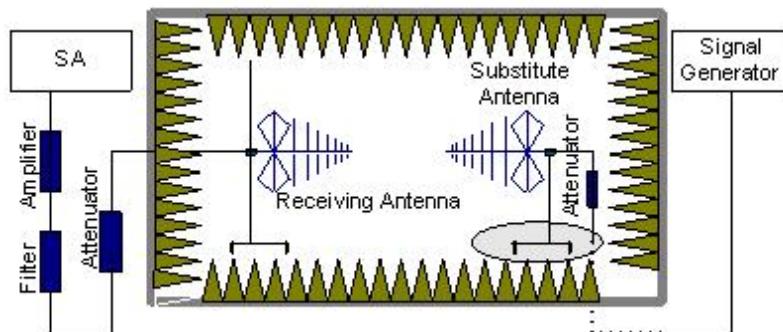
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 22.917, 24.238(a), Part 27.53(m). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 2, 4, 5, 7,12.

The procedure of radiated spurious emissions is as follows:

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.

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

In the chamber, an substitution antenna for the frequency band of interest is placed at the

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

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.
    An amplifier should be connected in for the test.
    The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.
    The measurement results are obtained as described below:
    Power (EIRP)=P_{Mea} - P_{pl} + G_a

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.

6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dB.

A.2.2 Measurement Limit

Part 22.917, 24.238(a), 27.53(m) 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. 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 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

LTE Band 2, 1.4MHz, QPSK, Channel 18607

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
17197.40625	-34.28	2.90	-0.79	-37.97	-13.00	H
17343.09375	-34.95	2.90	-0.98	-38.83	-13.00	H
17390.34375	-34.32	2.90	-0.98	-38.20	-13.00	H
17627.90625	-34.24	3.20	-1.01	-38.45	-13.00	H
17800.5	-33.39	3.20	-0.84	-37.43	-13.00	V
17914.6875	-33.36	3.20	-0.64	-37.20	-13.00	H

LTE Band 2, 1.4MHz, QPSK, Channel 18900

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
17205.28125	-33.97	2.90	-1.01	-37.88	-13.00	H
17354.90625	-34.18	2.90	-0.98	-38.06	-13.00	H
17448.09375	-33.41	3.20	-1.08	-37.69	-13.00	H
17595.09375	-33.93	3.20	-0.81	-37.94	-13.00	H
17784.09375	-33.43	3.20	-0.75	-37.38	-13.00	H
17921.25	-32.62	3.20	-0.64	-36.46	-13.00	H

LTE Band 2, 1.4MHz, QPSK, Channel 19193

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
17213.15625	-33.77	2.90	-1.01	-37.68	-13.00	H
17362.78125	-34.13	2.90	-0.98	-38.01	-13.00	H
17446.78125	-33.28	3.20	-1.08	-37.56	-13.00	H
17599.6875	-34.19	3.20	-0.81	-38.20	-13.00	H
17789.34375	-32.85	3.20	-0.75	-36.80	-13.00	V
17916	-32.87	3.20	-0.64	-36.71	-13.00	H

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

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
16803	-35.39	2.90	-0.26	-38.55	-13.00	H
17208.5625	-34.12	2.90	-1.01	-38.03	-13.00	H
17275.5	-34.35	2.90	-1.01	-38.26	-13.00	H
17446.125	-33.70	3.20	-1.08	-37.98	-13.00	H
17771.625	-33.79	3.20	-0.75	-37.74	-13.00	H
17849.0625	-32.54	3.20	-0.84	-36.58	-13.00	H

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

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
16800.375	-35.61	2.90	-0.26	-38.77	-13.00	V
17203.3125	-34.42	2.90	-1.01	-38.33	-13.00	H
17367.375	-34.37	2.90	-0.98	-38.25	-13.00	H
17394.28125	-34.26	2.90	-0.98	-38.14	-13.00	H
17801.8125	-33.53	3.20	-0.84	-37.57	-13.00	V
17926.5	-32.94	3.20	-0.64	-36.78	-13.00	H

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

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
17195.4375	-34.79	2.90	-0.79	-38.48	-13.00	H
17265	-33.76	2.90	-1.01	-37.67	-13.00	H
17456.625	-33.64	3.20	-1.08	-37.92	-13.00	H
17609.53125	-33.31	3.20	-1.01	-37.52	-13.00	H
17794.59375	-33.69	3.20	-0.75	-37.64	-13.00	H
17921.25	-31.76	3.20	-0.64	-35.60	-13.00	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 4.92dB(30MHz-3GHz)/4.88dB(3GHz-18GHz)/5.66dB(18GHz-40GHz), k = 2.

LTE Band 4, 1.4MHz QPSK, Channel 19957

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
16804.3125	-34.26	2.90	-0.26	-37.42	-13.00	H
17190.84375	-33.87	2.90	-0.79	-37.56	-13.00	H
17445.46875	-33.58	3.20	-1.08	-37.86	-13.00	H
17591.15625	-33.89	3.20	-0.81	-37.90	-13.00	H
17805.09375	-32.90	3.20	-0.84	-36.94	-13.00	V
17921.90625	-31.87	3.20	-0.64	-35.71	-13.00	H

LTE Band 4, 1.4MHz, QPSK, Channel 20175

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
16194.65625	-33.26	2.90	0.59	-35.57	-13.00	V
17350.96875	-31.98	2.90	-0.98	-35.86	-13.00	H
17410.03125	-31.17	3.20	-1.08	-35.45	-13.00	H
17625.28125	-30.53	3.20	-1.01	-34.74	-13.00	H
17770.3125	-31.62	3.20	-0.75	-35.57	-13.00	H
17925.1875	-30.49	3.20	-0.64	-34.33	-13.00	H

LTE Band 4, 1.4MHz, QPSK, Channel 20393

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
16805.625	-35.33	2.90	-0.26	-38.49	-13.00	H
17213.15625	-33.47	2.90	-1.01	-37.38	-13.00	H
17441.53125	-33.31	3.20	-1.08	-37.59	-13.00	H
17616.09375	-34.39	3.20	-1.01	-38.60	-13.00	H
17794.59375	-33.48	3.20	-0.75	-37.43	-13.00	V
17922.5625	-32.59	3.20	-0.64	-36.43	-13.00	H

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

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
16810.21875	-34.48	2.90	-0.26	-37.64	-13.00	H
17302.40625	-33.69	2.90	-0.98	-37.57	-13.00	H
17443.5	-33.68	3.20	-1.08	-37.96	-13.00	H
17624.625	-33.64	3.20	-1.01	-37.85	-13.00	H
17790.65625	-33.73	3.20	-0.75	-37.68	-13.00	H
17929.125	-32.43	3.20	-0.64	-36.27	-13.00	H

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

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
17202.65625	-34.65	2.90	-1.01	-38.56	-13.00	H
17281.40625	-34.48	2.90	-1.01	-38.39	-13.00	H
17377.21875	-34.47	2.90	-0.98	-38.35	-13.00	H
17615.4375	-33.62	3.20	-1.01	-37.83	-13.00	H
17795.25	-33.43	3.20	-0.75	-37.38	-13.00	H
17930.4375	-32.38	3.20	-0.64	-36.22	-13.00	H

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

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
16831.21875	-35.32	2.90	-0.26	-38.48	-13.00	H
17197.40625	-33.84	2.90	-0.79	-37.53	-13.00	H
17453.34375	-33.17	3.20	-1.08	-37.45	-13.00	H
17627.90625	-34.31	3.20	-1.01	-38.52	-13.00	H
17754.5625	-33.83	3.20	-0.75	-37.78	-13.00	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 4.92dB(30MHz-3GHz)/4.88dB(3GHz-18GHz)/5.66dB(18GHz-40GHz), k = 2.

LTE Band 5, 1.4MHz, QPSK, Channel 20407

Frequency(MHz)	P_Mea(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit (dBm)	Polarization
3298.5	-22.63	1.10	-11.08	-36.96	-13.00	V
7117	-36.03	1.80	-2.77	-42.75	-13.00	V
8247	-36.21	1.80	-1.90	-42.06	-13.00	V
8972	-36.70	2.10	-1.58	-42.53	-13.00	V
9167	-37.44	2.10	-1.36	-43.05	-13.00	V
9404	-37.52	2.10	-0.86	-42.63	-13.00	V

LTE Band 5, 1.4MHz, QPSK, Channel 20525

Frequency(MHz)	P_Mea(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit (dBm)	Polarization
3346.5	-29.16	1.10	-9.95	-42.36	-13.00	V
7025	-36.18	1.80	-2.85	-42.98	-13.00	V
8254	-36.75	1.80	-1.90	-42.60	-13.00	V
8552	-36.92	2.00	-1.77	-42.84	-13.00	V
9257	-37.40	2.10	-1.16	-42.81	-13.00	H
9396	-37.62	2.10	-1.12	-42.99	-13.00	H

LTE Band 5, 1.4MHz, QPSK, Channel 20643

Frequency(MHz)	P_Mea(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit (dBm)	Polarization
3392.25	-27.37	1.10	-9.95	-40.57	-13.00	V
7355	-36.20	1.80	-2.65	-42.80	-13.00	V
8549	-37.16	2.00	-1.77	-43.08	-13.00	H
8920	-37.25	2.10	-1.58	-43.08	-13.00	H
9329	-37.72	2.10	-1.12	-43.09	-13.00	V
9408	-37.80	2.10	-0.86	-42.91	-13.00	V

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

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
3298.5	-22.63	1.10	-11.08	-36.96	-13.00	V
7066	-36.31	1.80	-2.85	-43.11	-13.00	V
8099	-37.38	1.80	-2.18	-43.51	-13.00	H
8245	-35.88	1.80	-1.90	-41.73	-13.00	V
8776	-36.97	2.00	-1.63	-42.75	-13.00	V
9392	-37.60	2.10	-1.12	-42.97	-13.00	V

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

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
3345.75	-30.03	1.10	-9.95	-43.23	-13.00	V
6791	-36.64	1.80	-2.82	-43.41	-13.00	V
7025	-36.57	1.80	-2.85	-43.37	-13.00	V
9060	-37.63	2.10	-1.42	-43.30	-13.00	H
9405	-38.07	2.10	-0.86	-43.18	-13.00	V
9617	-38.38	2.10	-0.66	-43.29	-13.00	V

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

Frequency(MHz)	P$_{Mea}$(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
3393.75	-28.50	1.10	-9.95	-41.70	-13.00	V
7014	-36.31	1.80	-2.85	-43.11	-13.00	V
7109	-36.67	1.80	-2.77	-43.39	-13.00	V
8259	-36.47	1.80	-1.90	-42.32	-13.00	V
8593	-37.01	2.00	-1.77	-42.93	-13.00	V
8737	-37.15	2.00	-1.63	-42.93	-13.00	V

Note: The maximum value of expanded measurement uncertainty for this test item is U = 4.92dB(30MHz-3GHz)/4.88dB(3GHz-18GHz)/5.66dB(18GHz-40GHz), k = 2.

LTE Band 7, 5 MHz, QPSK, Channel 20775

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
16808.90625	-34.47	2.90	-0.26	-37.63	-13.00	H
17205.28125	-33.30	2.90	-1.01	-37.21	-13.00	H
17375.25	-33.45	2.90	-0.98	-37.33	-13.00	H
17602.96875	-33.83	3.20	-1.01	-38.04	-13.00	H
17791.3125	-33.39	3.20	-0.75	-37.34	-13.00	H
17933.0625	-32.64	3.20	-0.64	-36.48	-13.00	H

LTE Band 7, 5 MHz, QPSK, Channel 21100

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
17200.6875	-32.33	2.90	-1.01	-36.24	-13.00	H
17234.8125	-32.47	2.90	-1.01	-36.38	-13.00	V
17446.78125	-31.22	3.20	-1.08	-35.50	-13.00	H
17600.34375	-31.18	3.20	-1.01	-35.39	-13.00	H
17798.53125	-31.07	3.20	-0.75	-35.02	-13.00	V
17925.1875	-30.24	3.20	-0.64	-34.08	-13.00	H

LTE Band 7, 5 MHz, QPSK, Channel 21425

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
16825.96875	-34.59	2.90	-0.26	-37.75	-13.00	H
17301.75	-34.52	2.90	-0.98	-38.40	-13.00	H
17454.65625	-33.36	3.20	-1.08	-37.64	-13.00	H
17615.4375	-34.21	3.20	-1.01	-38.42	-13.00	H
17749.96875	-32.80	3.20	-0.75	-36.75	-13.00	H
17841.84375	-32.83	3.20	-0.84	-36.87	-13.00	H

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
16801.03125	-34.84	2.90	-0.26	-38.00	-13.00	H
17205.9375	-34.22	2.90	-1.01	-38.13	-13.00	H
17390.34375	-34.54	2.90	-0.98	-38.42	-13.00	H
17612.8125	-34.26	3.20	-1.01	-38.47	-13.00	H
17774.90625	-33.96	3.20	-0.75	-37.91	-13.00	H
17923.21875	-32.90	3.20	-0.64	-36.74	-13.00	H

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
16841.0625	-33.54	2.90	-0.26	-36.70	-13.00	V
17195.4375	-33.05	2.90	-0.79	-36.74	-13.00	H
17490.09375	-31.88	3.20	-1.08	-36.16	-13.00	V
17590.5	-32.97	3.20	-0.81	-36.98	-13.00	H
17802.46875	-32.36	3.20	-0.84	-36.40	-13.00	V
17924.53125	-29.72	3.20	-0.64	-33.56	-13.00	H

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
16827.9375	-35.12	2.90	-0.26	-38.28	-13.00	H
17274.1875	-34.26	2.90	-1.01	-38.17	-13.00	H
17429.71875	-33.81	3.20	-1.08	-38.09	-13.00	H
17618.0625	-34.42	3.20	-1.01	-38.63	-13.00	H
17806.40625	-33.79	3.20	-0.84	-37.83	-13.00	V
17898.9375	-33.29	3.20	-0.84	-37.33	-13.00	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 4.92dB(30MHz-3GHz)/4.88dB(3GHz-18GHz)/5.66dB(18GHz-40GHz), k = 2.

LTE Band 12, 1.4MHz, QPSK, Channel 23017

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2975.5	-25.22	1.10	-14.98	-43.45	-13.00	H
3496	-25.22	1.10	-8.82	-37.29	-13.00	V
4195.5	-35.54	1.30	-2.56	-41.55	-13.00	H
4895	-38.74	1.30	-1.54	-43.73	-13.00	V
7691.5	-39.08	1.80	-2.58	-45.61	-13.00	H
9931.2	-39.10	2.20	-0.40	-43.85	-13.00	H

LTE Band 12, 1.4MHz, QPSK, Channel 23095

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2467	-20.87	1.10	-21.55	-45.67	-13.00	H
2779.5	-22.36	1.10	-17.57	-43.18	-13.00	V
3535	-27.29	1.10	-7.78	-38.32	-13.00	V
6883.5	-38.60	1.80	-2.85	-45.40	-13.00	H
9359.5	-39.43	2.10	-1.12	-44.80	-13.00	V
9923.7	-39.73	2.20	-0.40	-44.48	-13.00	V

LTE Band 12, 1.4MHz, QPSK, Channel 23173

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2785.5	-22.78	1.10	-17.57	-43.60	-13.00	V
3574	-27.30	1.10	-7.78	-38.33	-13.00	V
6639.5	-38.68	1.80	-2.85	-45.48	-13.00	V
8577.8	-37.94	2.00	-1.77	-43.86	-13.00	V
8577.8	-37.94	2.00	-1.77	-43.86	-13.00	V
9937.8	-39.43	2.20	-0.40	-44.18	-13.00	V

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

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2979	-25.79	1.10	-14.98	-44.02	-13.00	H
3496.5	-25.70	1.10	-8.82	-37.77	-13.00	V
4195.5	-35.25	1.30	-2.56	-41.26	-13.00	H
4894.5	-39.18	1.30	-1.54	-44.17	-13.00	V
7591.5	-39.04	1.80	-2.57	-45.56	-13.00	H
9988.8	-39.77	2.20	-0.40	-44.52	-13.00	V

LTE Band 12, 1.4MHz 16QAM, Channel 23095

Frequency(MHz)	PMea(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2392	-19.71	1.10	-22.88	-45.84	-13.00	V
2850	-24.02	1.10	-16.13	-43.40	-13.00	V
3535	-27.52	1.10	-7.78	-38.55	-13.00	V
4242.5	-40.80	1.30	-2.02	-46.27	-13.00	H
6858.5	-38.95	1.80	-2.85	-45.75	-13.00	H
9345.3	-38.53	2.10	-1.12	-43.90	-13.00	V

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

Frequency(MHz)	PMea(dBm)	Path Loss	Antenna Gain	Peak ERP(dBm)	Limit （dBm）	Polarization
2391	-18.90	1.10	-22.88	-45.03	-13.00	V
2859.5	-23.68	1.10	-16.13	-43.06	-13.00	V
3574	-27.59	1.10	-7.78	-38.62	-13.00	V
8577.8	-38.24	2.00	-1.77	-44.16	-13.00	V
8577.8	-38.24	2.00	-1.77	-44.16	-13.00	V
9140.5	-38.69	2.10	-1.36	-44.30	-13.00	V

Note: The maximum value of expanded measurement uncertainty for this test item is U = 4.92dB(30MHz-3GHz)/4.88dB(3GHz-18GHz)/5.66dB(18GHz-40GHz), k = 2

A.3 FREQUENCY STABILITY

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

A.3.1 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, 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.3.2 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 3.4VDC and 4.35VDC, with a nominal voltage of 3.8VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance from -5.4% to 10.8%. For the purposes of measuring frequency stability these voltage limits are to be used.

A.3.3 Measurement results

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

Frequency Error vs Voltage

Voltage	Frequency error (Hz)		Frequency error (ppm)	
(V)	QPSK	16QAM	QPSK	16QAM
3.4	-6	11	0.003	0.006
3.8	-3	18	0.002	0.010
4.35	-2	23	0.001	0.012

Frequency Error vs Temperature

Temperature	Frequency error (Hz)		Frequency error (ppm)	
(℃)	QPSK	16QAM	QPSK	16QAM
-30°	-7	9	0.004	0.005
-20°	-5	18	0.003	0.010
-10°	-4	17	0.002	0.009
0°	-1	15	0.001	0.008
10°	-2	12	0.001	0.006
20°	-3	6	0.002	0.003
30°	-9	18	0.005	0.010
40°	-10	15	0.005	0.008
50°	-6	22	0.003	0.012

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

Frequency Error vs Voltage

Voltage	Frequency error (Hz)		Frequency error (ppm)	
(V)	QPSK	16QAM	QPSK	16QAM
3.4	4	14	0.002	0.008
3.8	9	12	0.005	0.007
4.35	6	5	0.003	0.003

Frequency Error vs Temperature

Temperature	Frequency error (Hz)		Frequency error (ppm)	
(℃)	QPSK	16QAM	QPSK	16QAM
-30°	3	7	0.002	0.004
-20°	6	9	0.003	0.005
-10°	4	6	0.002	0.003
0°	7	5	0.004	0.003
10°	7	11	0.004	0.006
20°	16	2	0.009	0.001
30°	5	5	0.003	0.003
40°	9	8	0.005	0.005
50°	7	14	0.004	0.008

LTE Band 5, 1.4MHz bandwidth (worst case of all bandwidths)
Frequency Error vs Voltage

Voltage	Frequency error (Hz)		Frequency error (ppm)	
(V)	QPSK	16QAM	QPSK	16QAM
3.4	-2	-9	0.002	0.011
3.8	-6	-11	0.007	0.013
4.35	-7	-18	0.008	0.022

Frequency Error vs Temperature

Temperature	Frequency error (Hz)		Frequency error (ppm)	
(℃)	QPSK	16QAM	QPSK	16QAM
-30°	-4	-15	0.005	0.018
-20°	-6	-6	0.007	0.007
-10°	-9	-9	0.011	0.011
0°	-2	-18	0.002	0.022
10°	-4	-21	0.005	0.025
20°	-3	-5	0.004	0.006
30°	-1	-6	0.001	0.007
40°	-2	-13	0.002	0.016
50°	-6	-11	0.007	0.013

LTE Band 7, 10MHz bandwidth (worst case of all bandwidths)
Frequency Error vs Voltage

Voltage	Frequency error (Hz)		Frequency error (ppm)	
(V)	QPSK	16QAM	QPSK	16QAM
3.4	-5	-9	0.002	0.004
3.8	-3	-11	0.001	0.004
4.35	-11	-26	0.004	0.010

Frequency Error vs Temperature

Temperature	Frequency error (Hz)		Frequency error (ppm)	
(℃)	QPSK	16QAM	QPSK	16QAM
-30°	-7	-17	0.003	0.007
-20°	-6	-24	0.002	0.009
-10°	-1	-15	0.000	0.006
0°	-2	-16	0.001	0.006
10°	-5	-23	0.002	0.009
20°	-7	-25	0.003	0.010
30°	-6	-8	0.002	0.003
40°	-3	-14	0.001	0.006
50°	-8	-3	0.003	0.001

LTE Band 12, 1.4MHz bandwidth (worst case of all bandwidths)
Frequency Error vs Voltage

Voltage	Frequency error (Hz)		Frequency error (ppm)	
(V)	QPSK	16QAM	QPSK	16QAM
3.4	2	10	0.003	0.014
3.8	5	11	0.007	0.016
4.35	14	15	0.020	0.021

Frequency Error vs Temperature

Temperature	Frequency error (Hz)		Frequency error (ppm)	
(℃)	QPSK	16QAM	QPSK	16QAM
-30°	6	8	0.008	0.011
-20°	11	14	0.016	0.020
-10°	9	11	0.013	0.016
0°	5	15	0.007	0.021
10°	18	16	0.025	0.023
20°	7	13	0.010	0.018
30°	5	14	0.007	0.020
40°	2	15	0.003	0.021
50°	9	17	0.013	0.024

Expanded measurement uncertainty is 10 Hz, $k = 2$

A.4 OCCUPIED BANDWIDTH

Reference
FCC: CFR Part 2.1049(h)(i)

A.4.1 Occupied Bandwidth Results
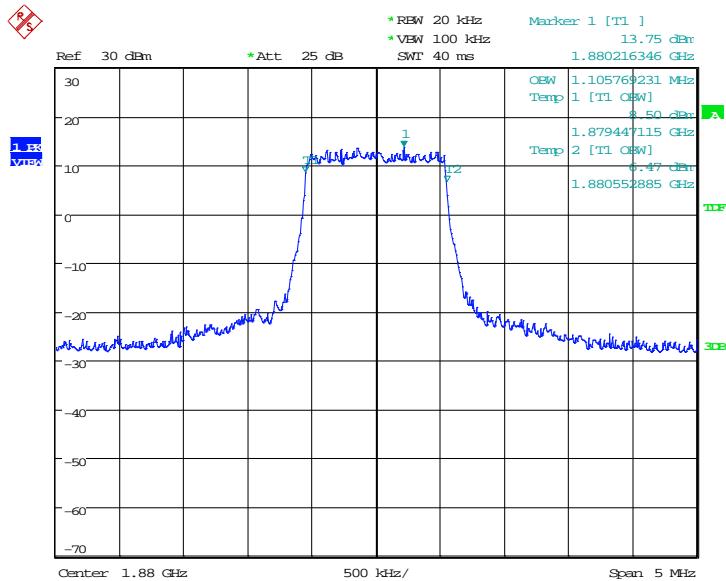
Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the US Cellular/PCS frequency bands. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

The measurement method is from KDB 971168 4.2:
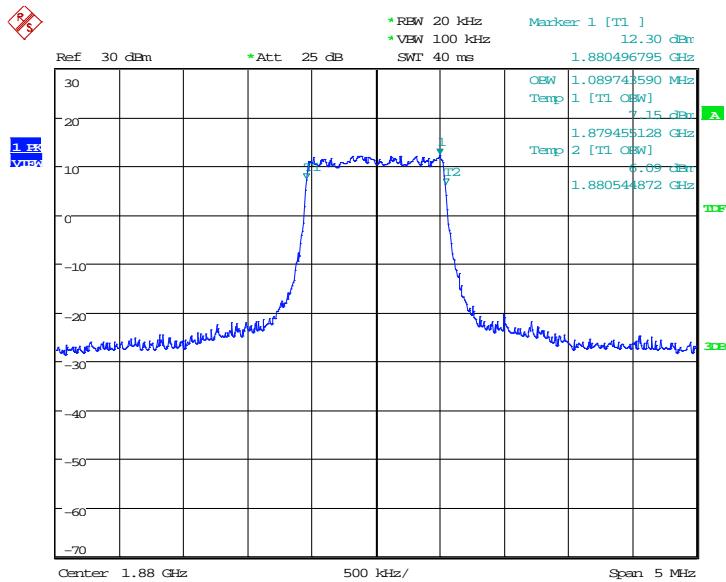
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).

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.

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

e) 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)	
	QPSK	16QAM
1880.0	1105.77	1089.74

LTE band 2, 1.4MHz Bandwidth, QPSK (99% BW)
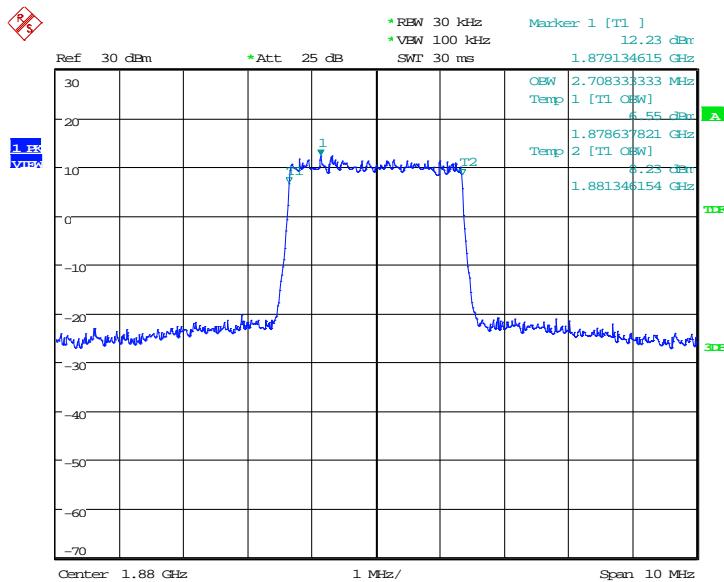
Date: 16.JAN.2018 09:53:44

LTE band 2, 1.4MHz Bandwidth, 16QAM (99% BW)
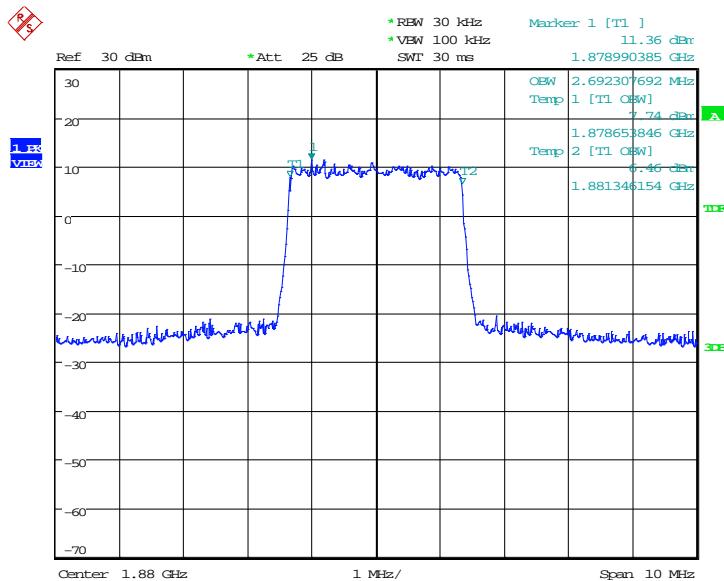
Date: 16.JAN.2018 09:53:58

LTE band 2, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	2708.33	2692.31

LTE band 2, 3MHz Bandwidth, QPSK (99% BW)
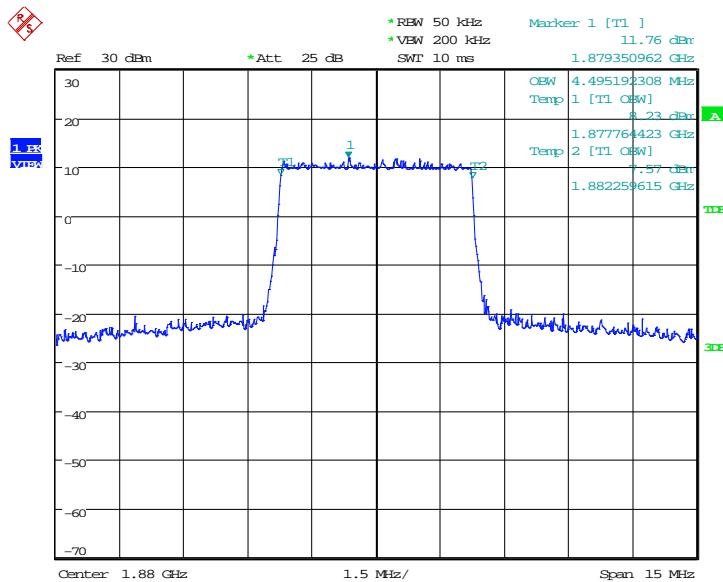
Date: 16.JAN.2018 10:02:24

LTE band 2, 3MHz Bandwidth, 16QAM (99% BW)
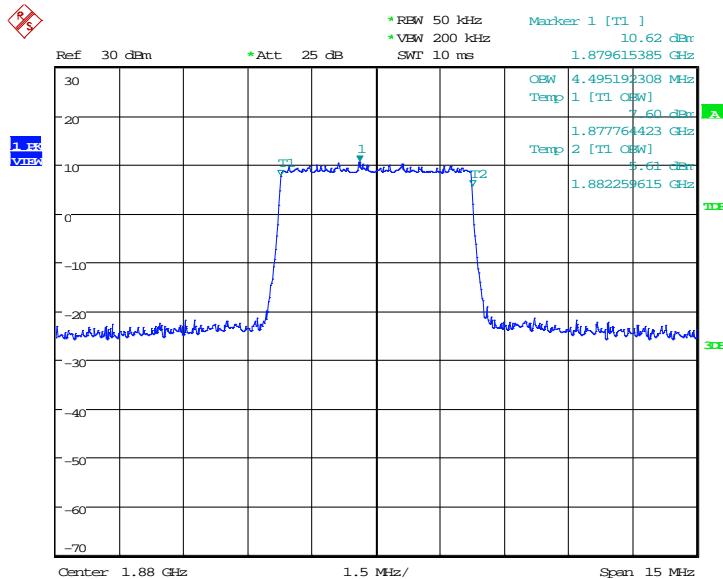
Date: 16.JAN.2018 10:02:37

LTE band 2, 5MHz (99%)

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

LTE band 2, 5MHz Bandwidth, QPSK (99% BW)
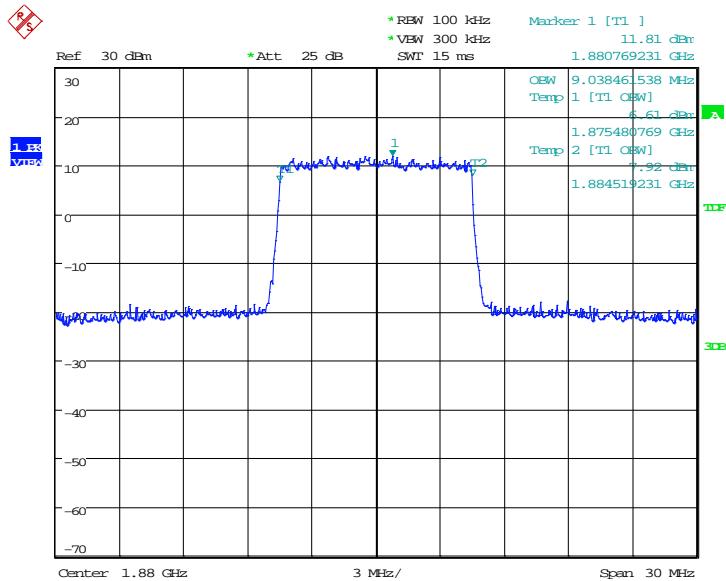
Date: 16.JAN.2018 10:11:03

LTE band 2, 5MHz Bandwidth,16QAM (99% BW)
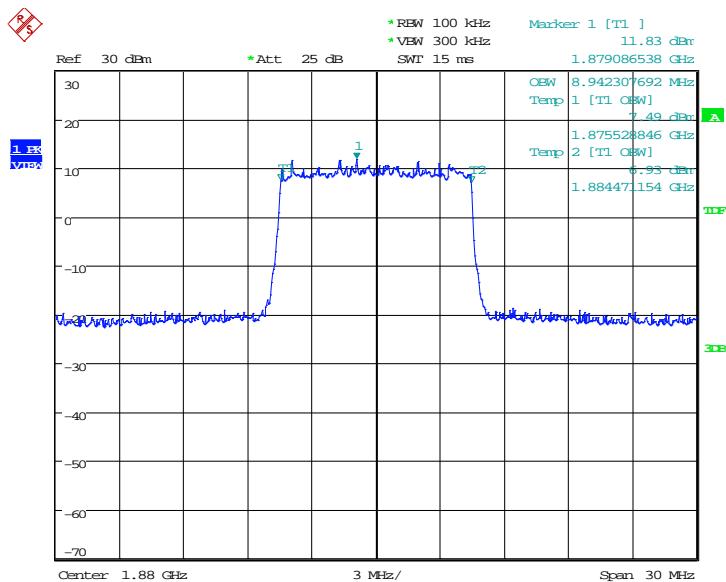
Date: 16.JAN.2018 10:11:17

LTE band 2, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	9038.46	8942.31

LTE band 2, 10MHz Bandwidth, QPSK (99% BW)
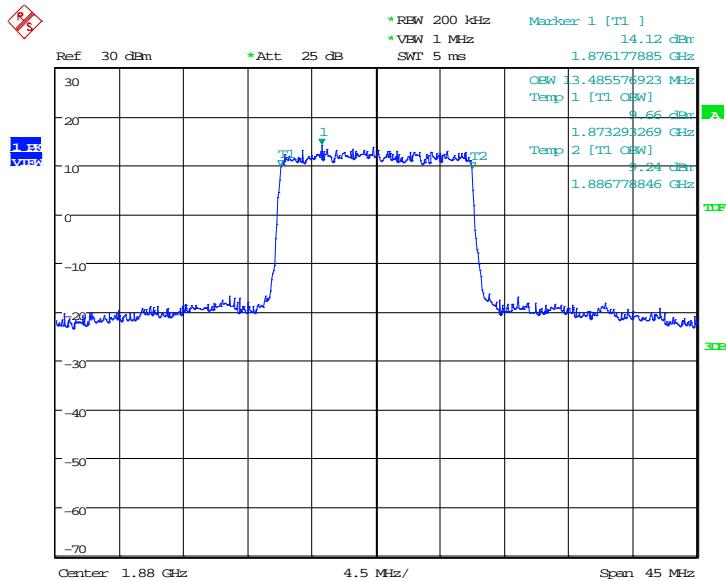
Date: 16.JAN.2018 10:19:43

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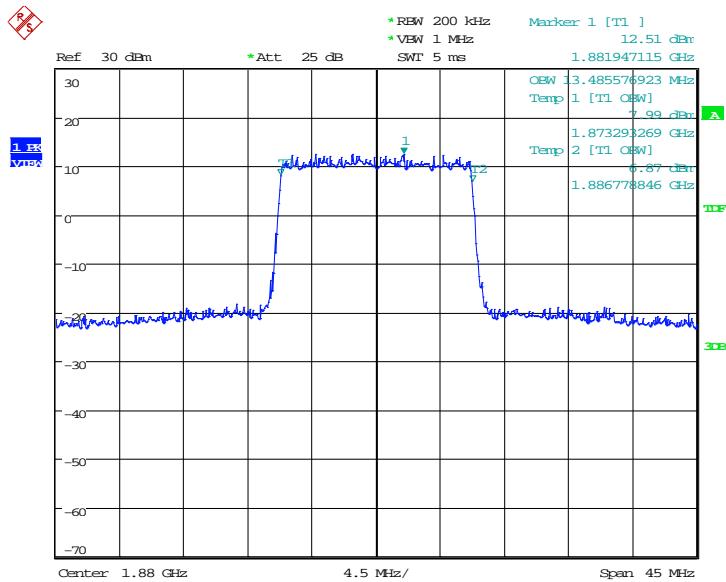

Date: 16.JAN.2018 10:19:57

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)
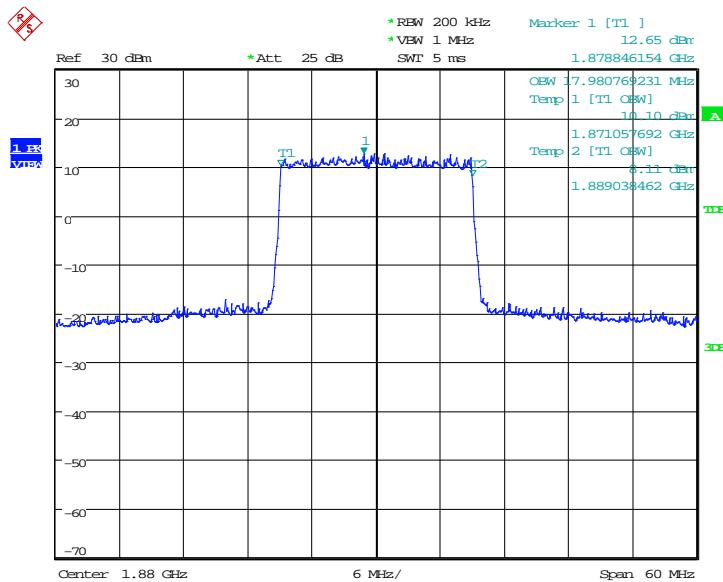
Date: 16.JAN.2018 10:28:28

LTE band 2, 15MHz Bandwidth, 16QAM (99% BW)
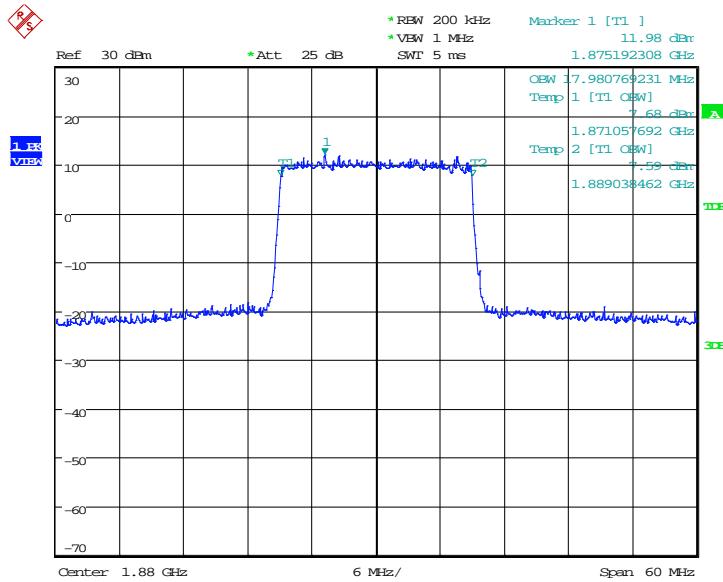
Date: 16.JAN.2018 10:28:42

LTE band 2, 20MHz (99%)

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

LTE band 2, 20MHz Bandwidth, QPSK (99% BW)
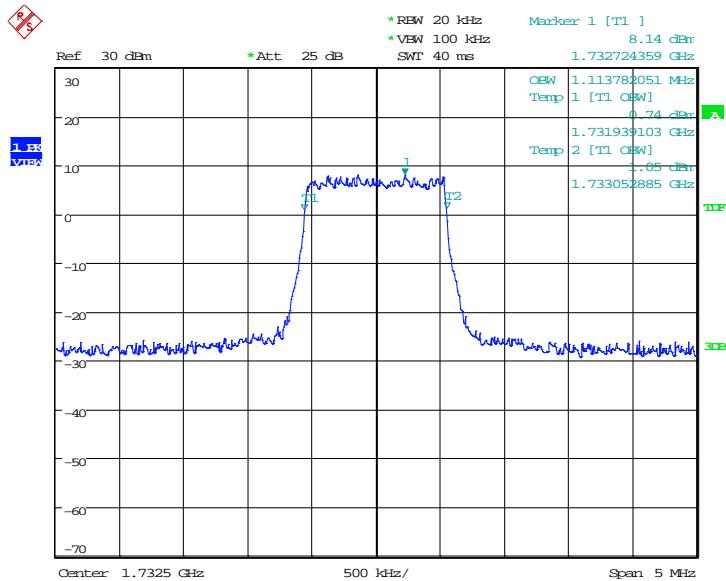
Date: 16.JAN.2018 10:37:16

LTE band 2, 20MHz Bandwidth, 16QAM (99% BW)
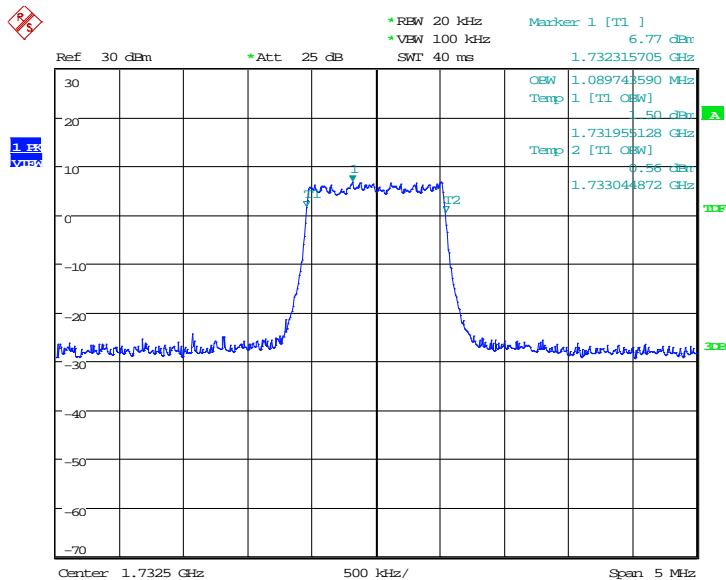
Date: 16.JAN.2018 10:37:30

LTE band 4, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	1113.78	1089.74

LTE band 4, 1.4MHz Bandwidth, QPSK (99% BW)
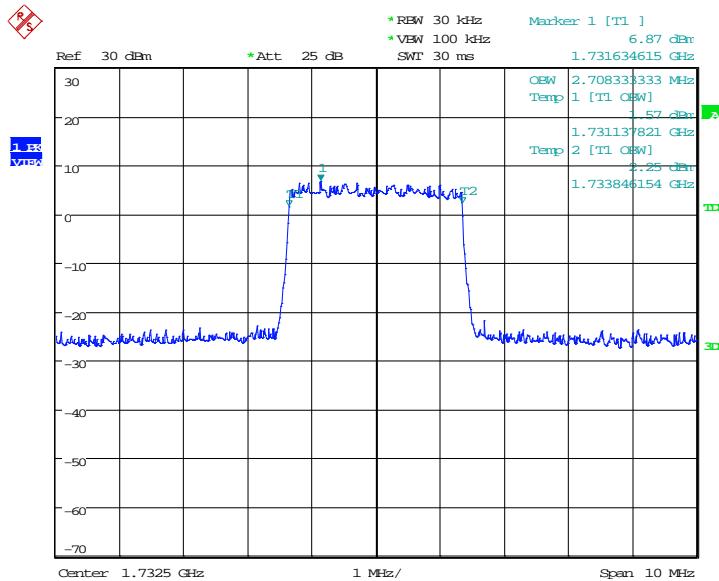
Date: 16.JAN.2018 11:42:14

LTE band 4, 1.4MHz Bandwidth, 16QAM (99% BW)
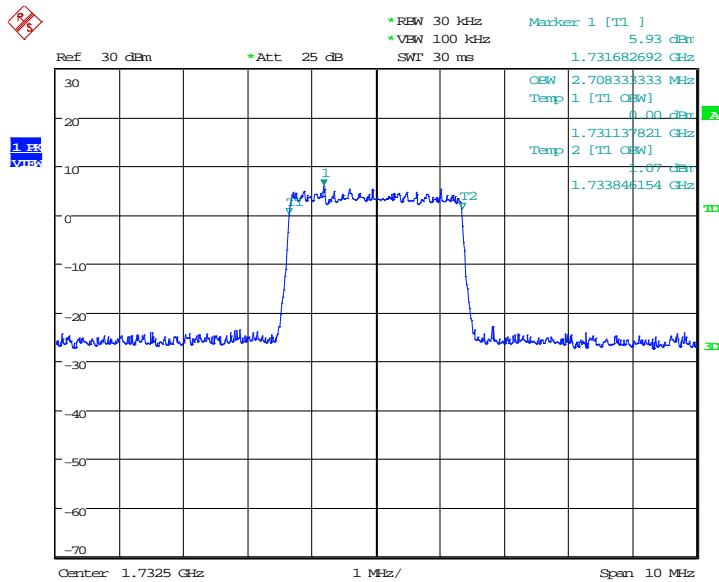
Date: 16.JAN.2018 11:42:28

LTE band 4, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	2708.33	2708.33

LTE band 4, 3MHz Bandwidth, QPSK (99% BW)
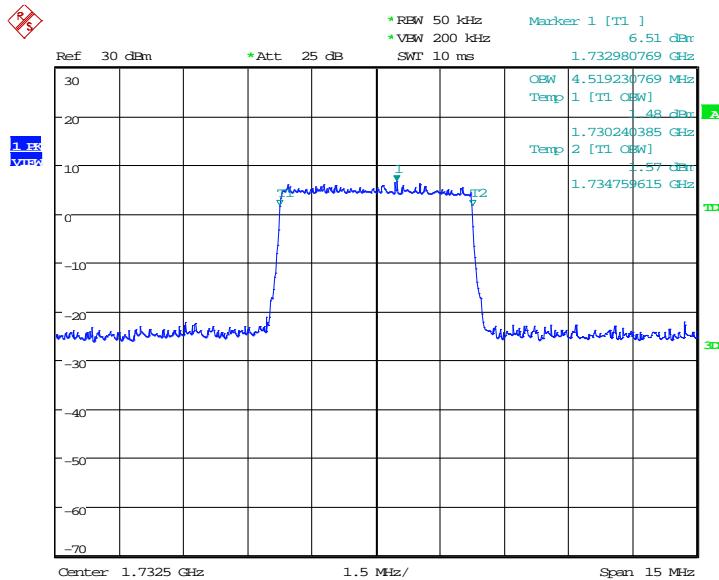
Date: 16.JAN.2018 11:50:53

LTE band 4, 3MHz Bandwidth, 16QAM (99% BW)
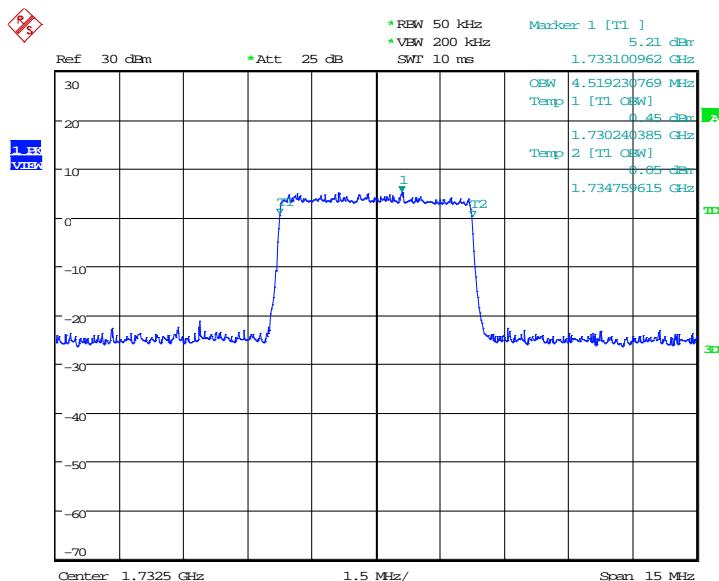
Date: 16.JAN.2018 11:51:07

LTE band 4, 5MHz (99%)

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

LTE band 4, 5MHz Bandwidth, QPSK (99% BW)
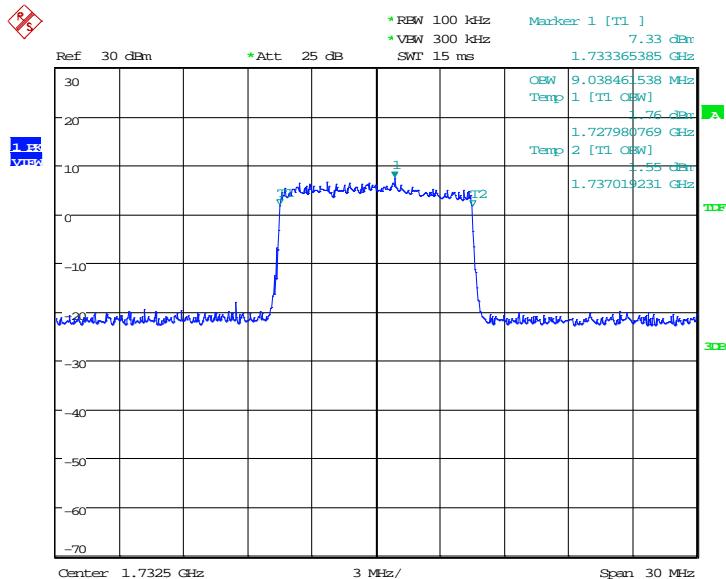
Date: 16.JAN.2018 11:59:33

LTE band 4, 5MHz Bandwidth,16QAM (99% BW)
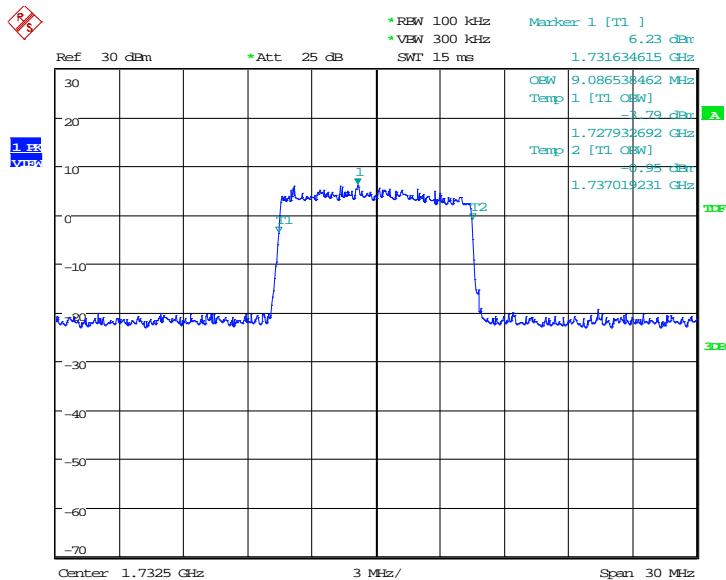
Date: 16.JAN.2018 11:59:47

LTE band 4, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
1732.5	9038.46	9086.54

LTE band 4, 10MHz Bandwidth, QPSK (99% BW)
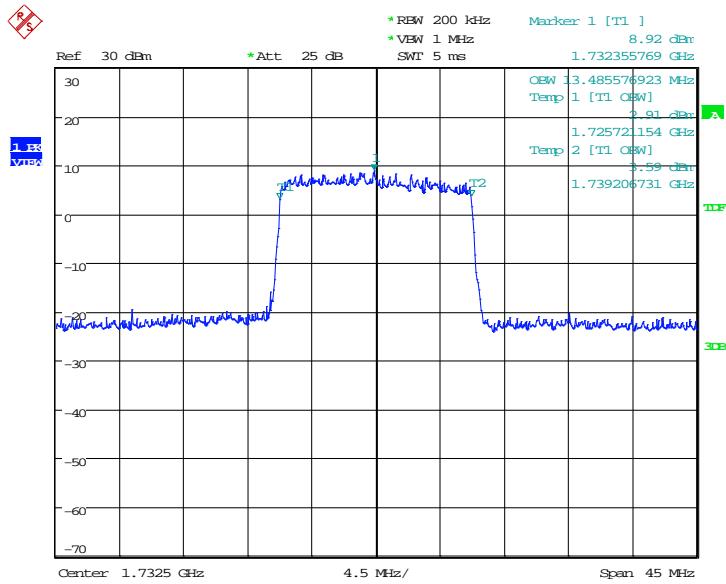
Date: 16.JAN.2018 12:08:13

LTE band 4, 10MHz Bandwidth, 16QAM (99% BW)
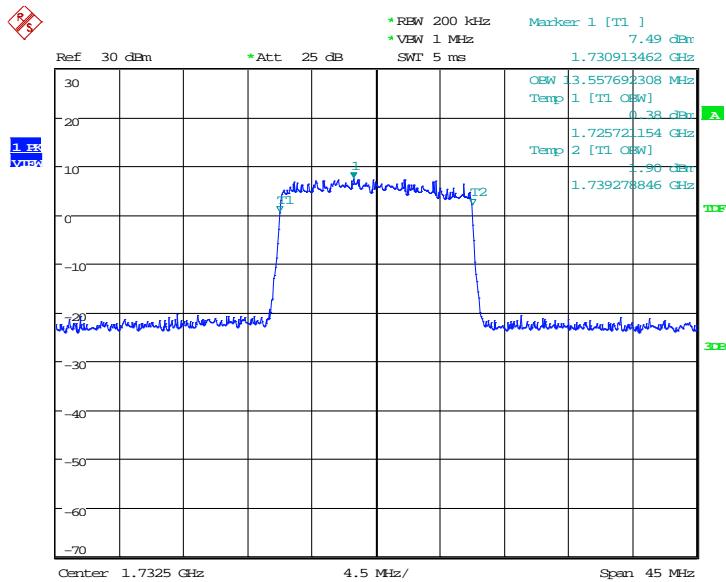
Date: 16.JAN.2018 12:08:27

LTE band 4, 15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
1732.5	13485.58	13557.69

LTE band 4, 15MHz Bandwidth, QPSK (99% BW)
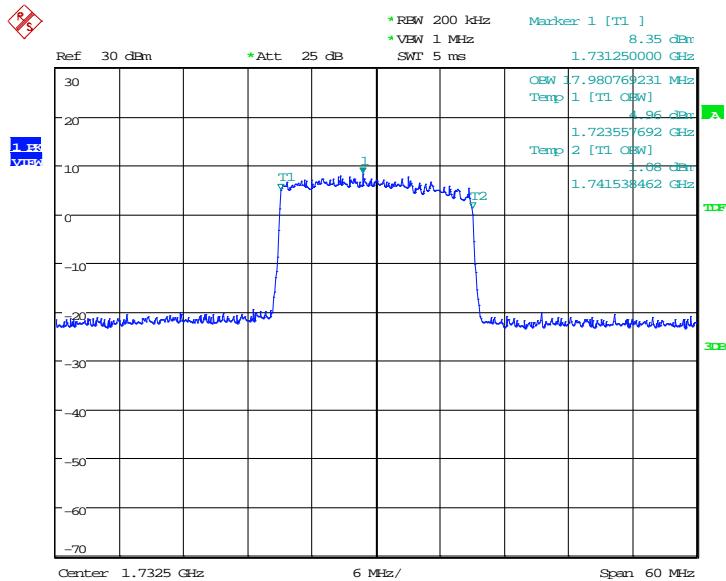
Date: 16.JAN.2018 12:19:58

LTE band 4, 15MHz Bandwidth, 16QAM (99% BW)
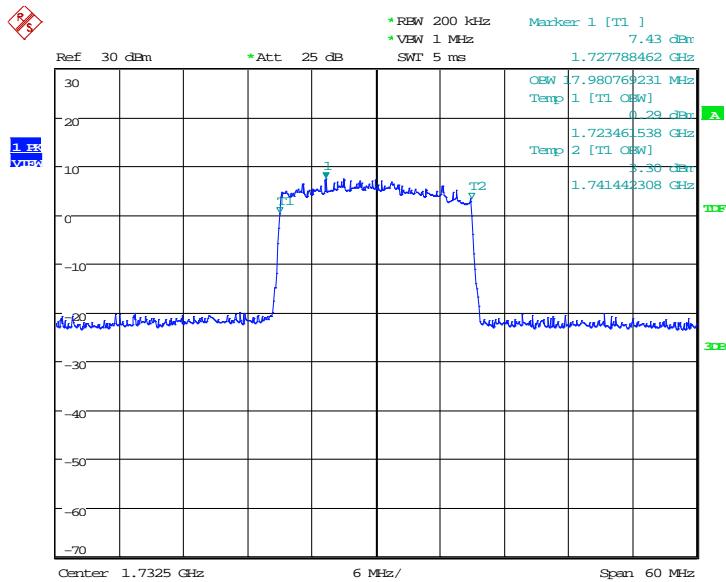
Date: 16.JAN.2018 12:20:11

LTE band 4, 20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
1732.5	17980.77	17980.77

LTE band 4, 20MHz Bandwidth, QPSK (99% BW)
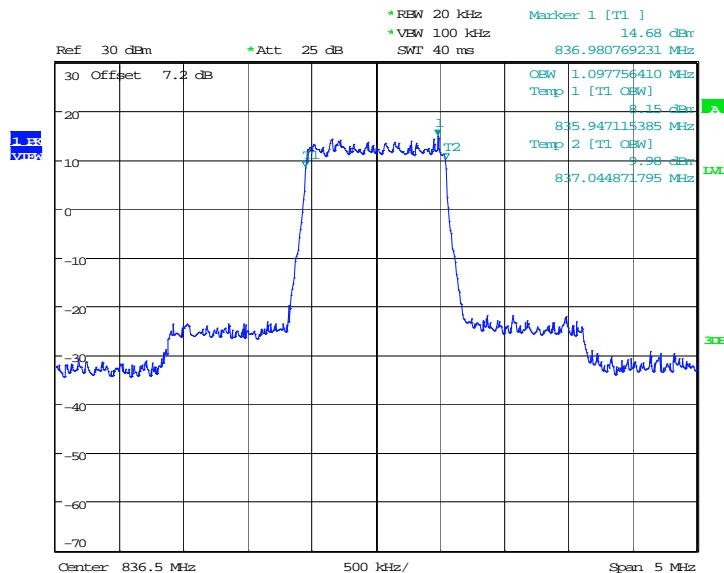
Date: 16.JAN.2018 12:41:46

LTE band 4, 20MHz Bandwidth, 16QAM (99% BW)
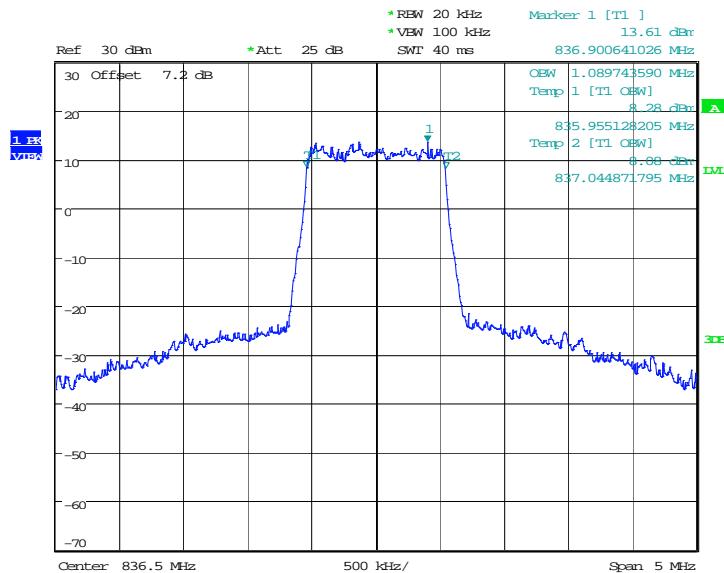
Date: 16.JAN.2018 12:41:59

LTE band 5, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	1097.76	1089.74

LTE band 5, 1.4MHz Bandwidth, QPSK (99% BW)
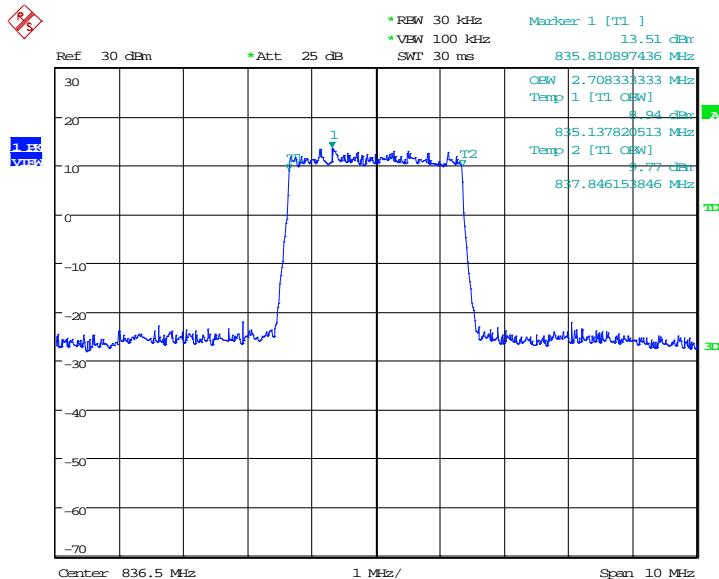
Date: 15.FEB.2017 01:41:34

LTE band 5, 1.4MHz Bandwidth, 16QAM (99% BW)
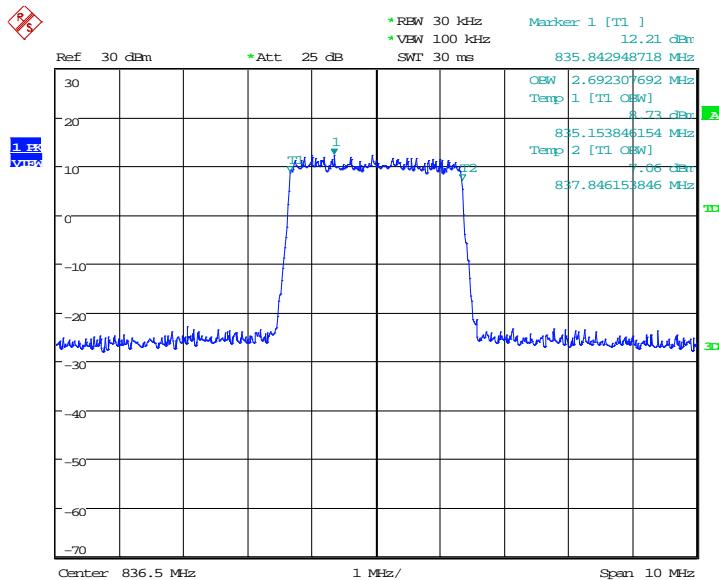
Date: 15.FEB.2017 01:42:20

LTE band 5, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
836.5	2708.33	2692.31

LTE band 5, 3MHz Bandwidth, QPSK (99% BW)
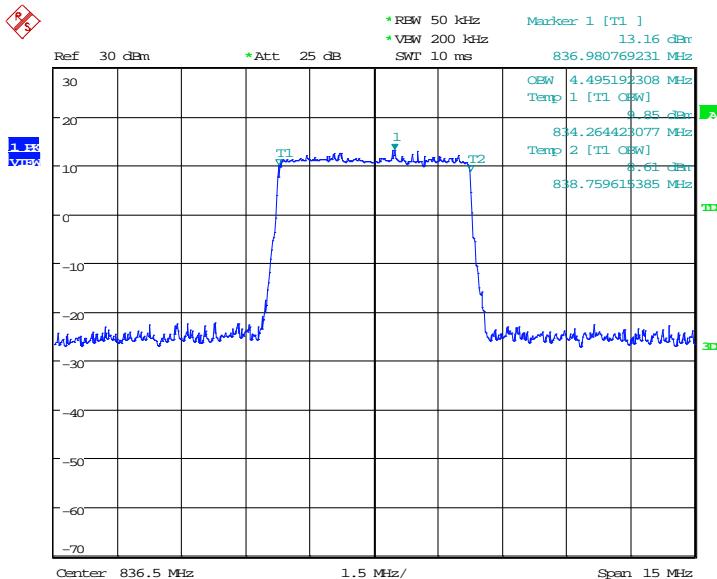
Date: 16.JAN.2018 09:27:42

LTE band 5, 3MHz Bandwidth, 16QAM (99% BW)
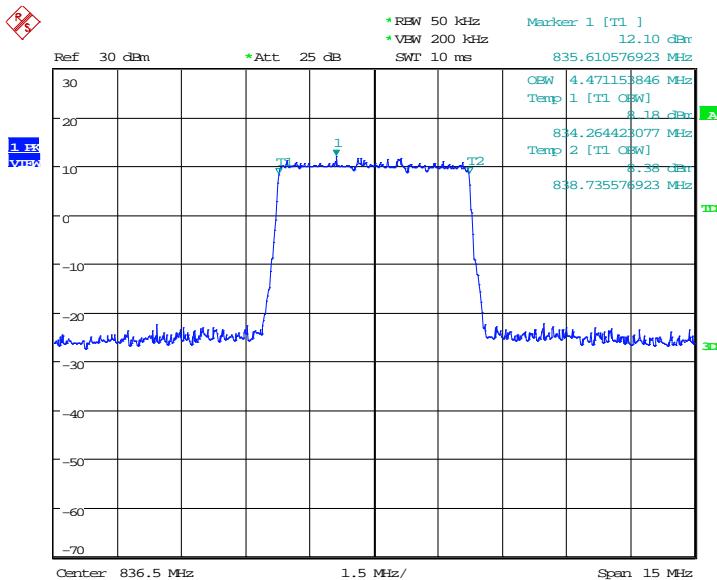
Date: 16.JAN.2018 09:27:55

LTE band 5, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
836.5	4495.19	4471.15

LTE band 5, 5MHz Bandwidth, QPSK (99% BW)
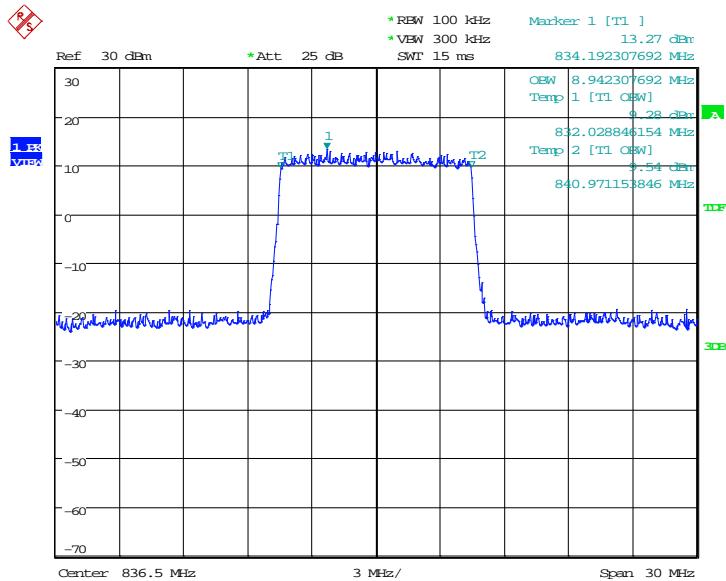
Date: 16.JAN.2018 09:36:21

LTE band 5, 5MHz Bandwidth,16QAM (99% BW)
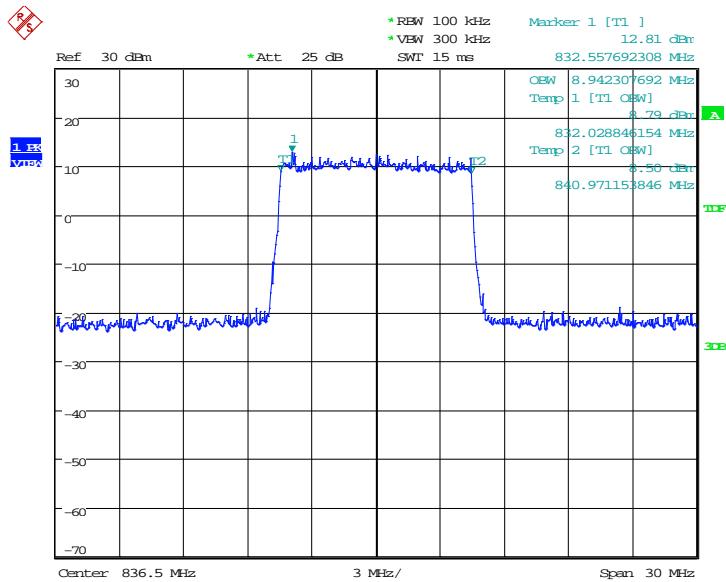
Date: 16.JAN.2018 09:36:35

LTE band 5, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
836.5		
	8942.31	8942.31

LTE band 5, 10MHz Bandwidth, QPSK (99% BW)
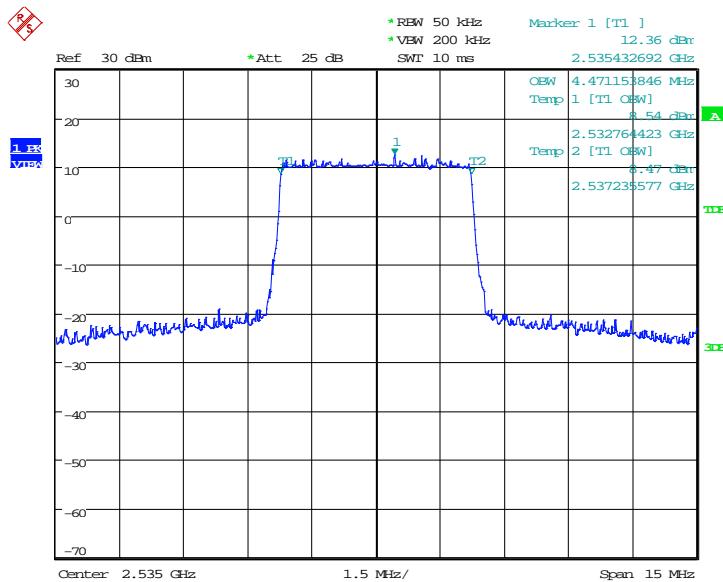
Date: 16.JAN.2018 09:45:01

LTE band 5, 10MHz Bandwidth, 16QAM (99% BW)
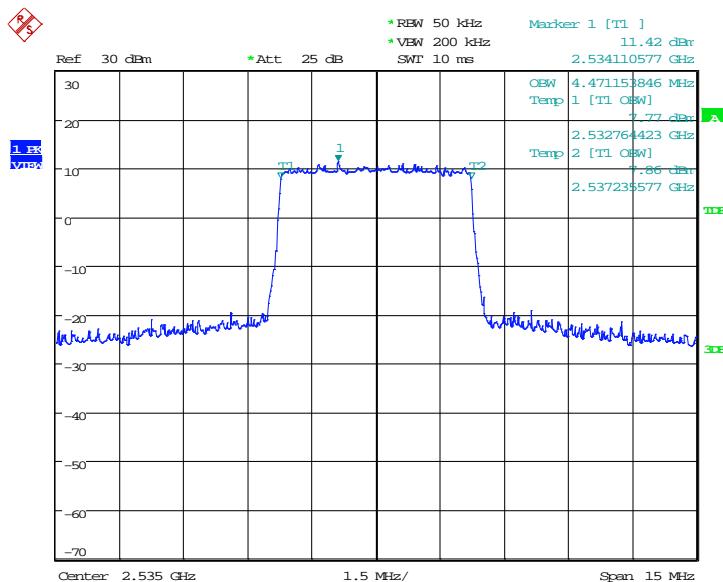
Date: 16.JAN.2018 09:45:15

LTE band 7, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	4471.15	4471.15

LTE band 7, 5MHz Bandwidth, QPSK (99% BW)
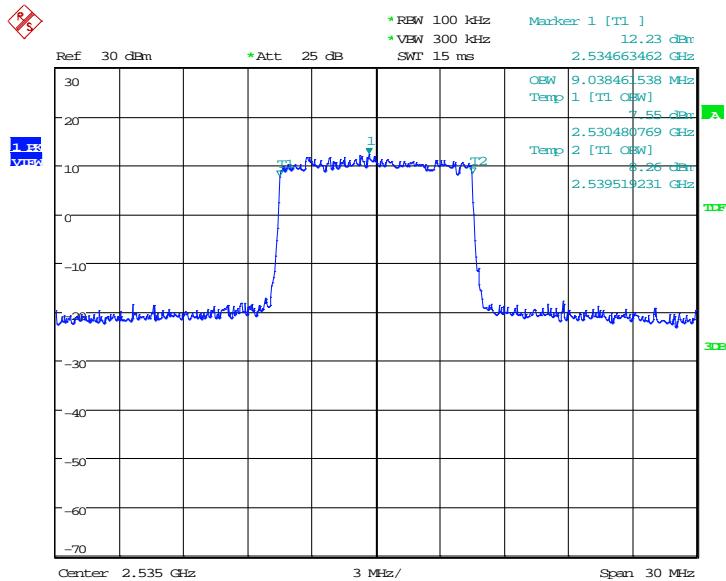
Date: 16.JAN.2018 07:45:42

LTE band 7, 5MHz Bandwidth,16QAM (99% BW)
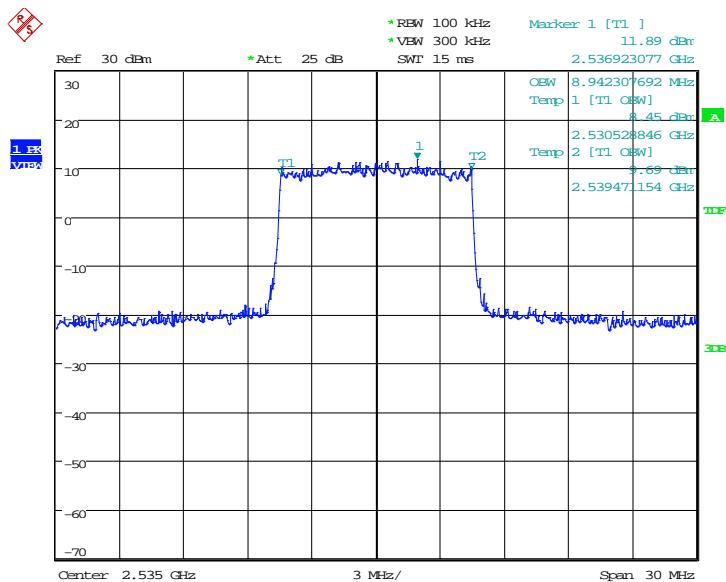
Date: 16.JAN.2018 07:45:56

LTE band 7, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	9038.46	8942.31

LTE band 7, 10MHz Bandwidth, QPSK (99% BW)
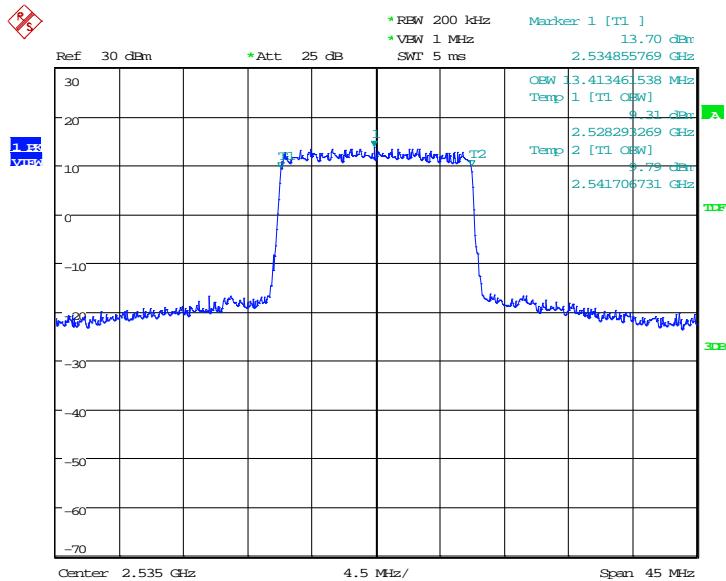
Date: 16.JAN.2018 07:54:23

LTE band 7, 10MHz Bandwidth, 16QAM (99% BW)
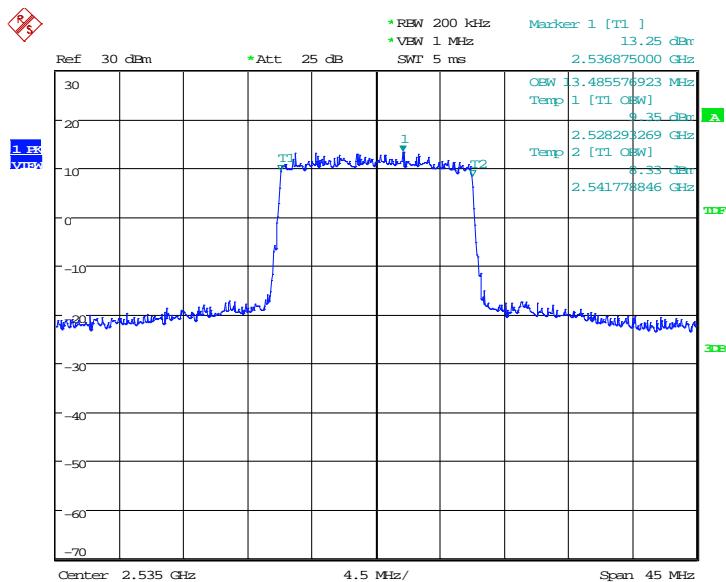
Date: 16.JAN.2018 07:54:36

LTE band 7, 15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
2535.0	13413.46	13485.58

LTE band 7, 15MHz Bandwidth, QPSK (99% BW)
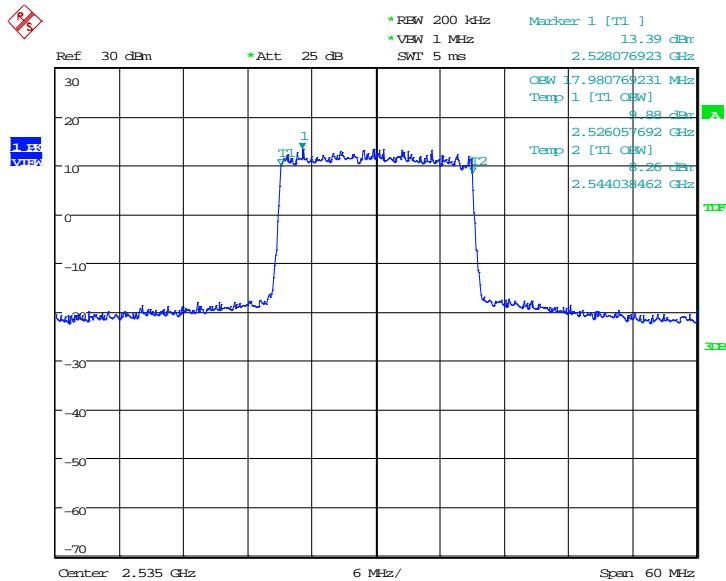
Date: 16.JAN.2018 08:03:08

LTE band 7, 15MHz Bandwidth, 16QAM (99% BW)
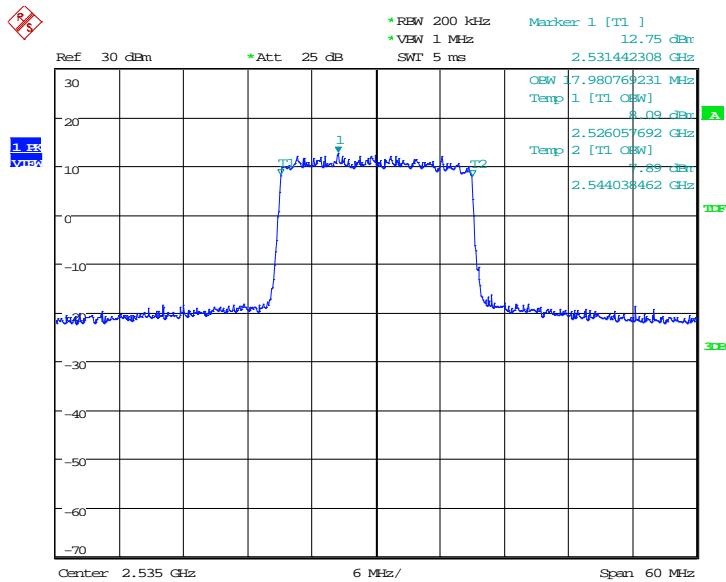
Date: 16.JAN.2018 08:03:22

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)
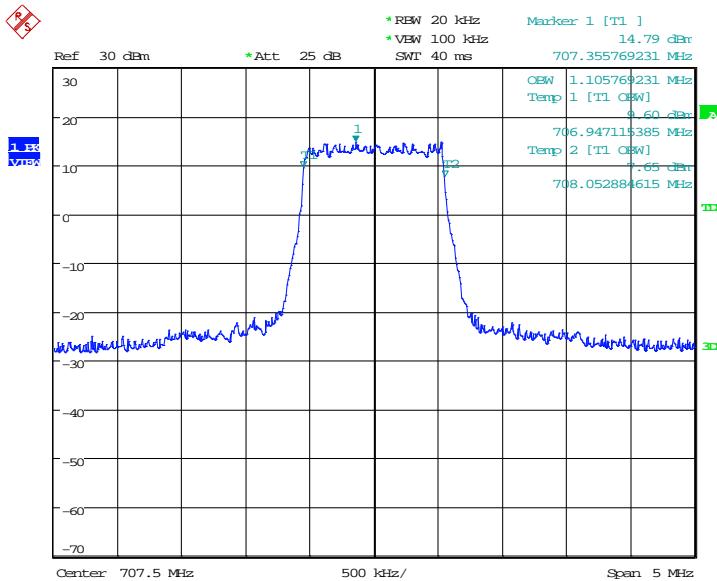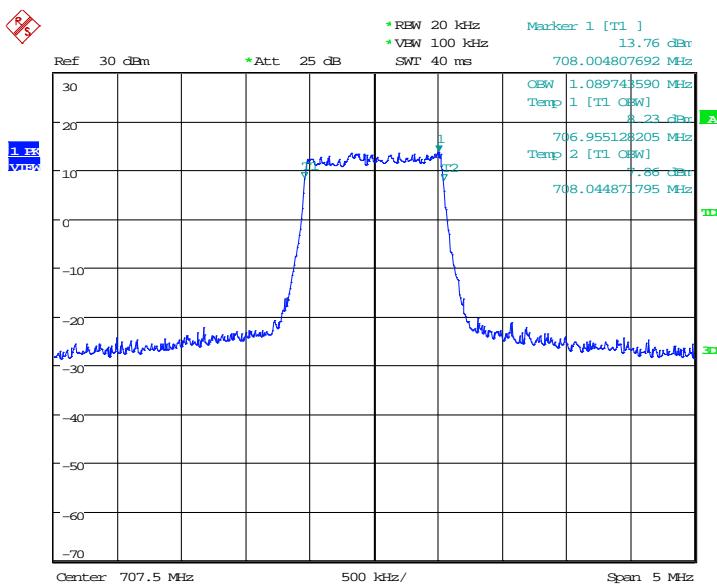
Date: 16.JAN.2018 08:11:56

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

Date: 16.JAN.2018 08:12:10
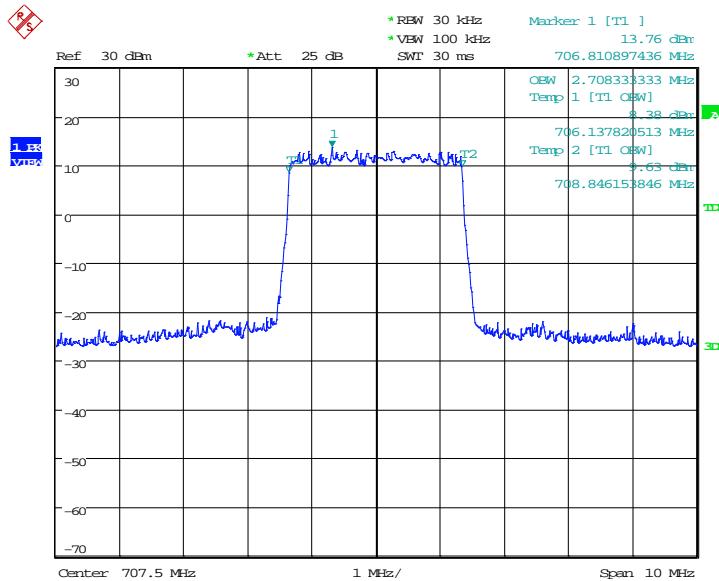
LTE band 12, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
707.5	1105.77	1089.74
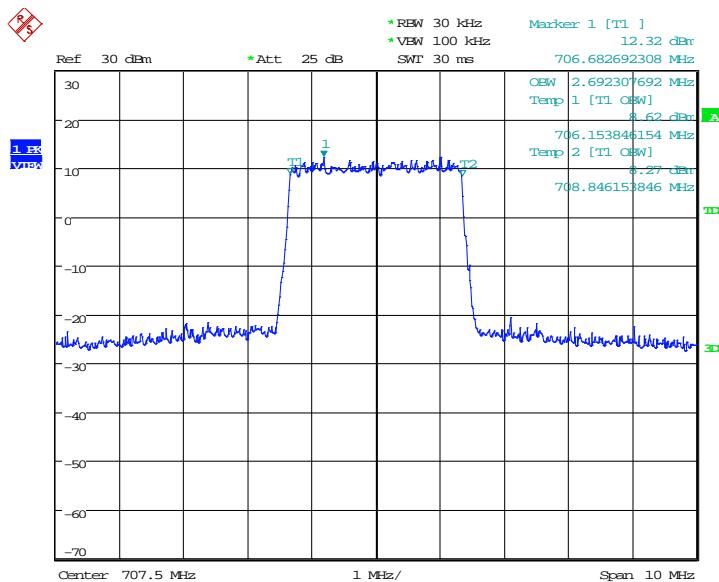
LTE band 12, 1.4MHz Bandwidth, QPSK (99% BW)

Date: 16.JAN.2018 10:55:30

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

Date: 16.JAN.2018 10:55:44

LTE band 12, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	2708.33	2692.31

LTE band 12, 3MHz Bandwidth, QPSK (99% BW)
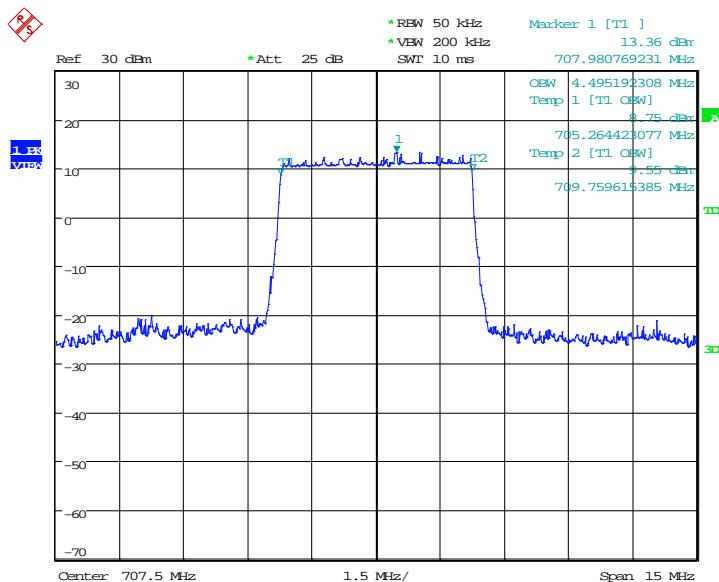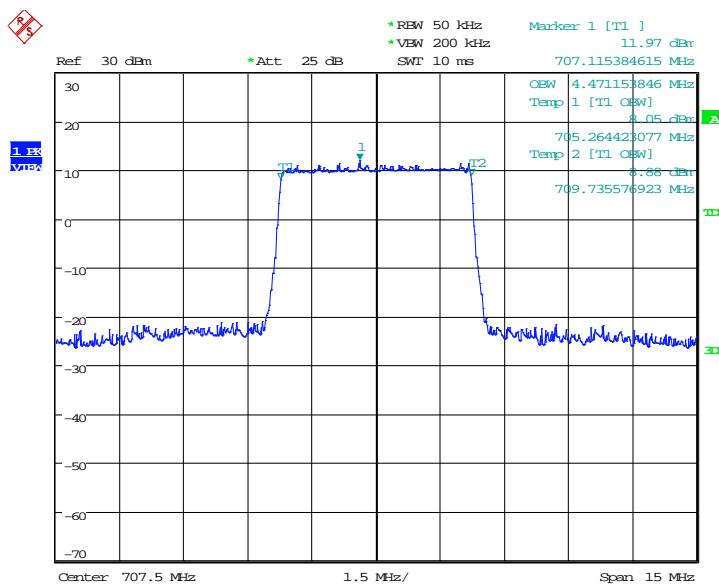
Date: 16.JAN.2018 11:04:10

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

Date: 16.JAN.2018 11:04:24
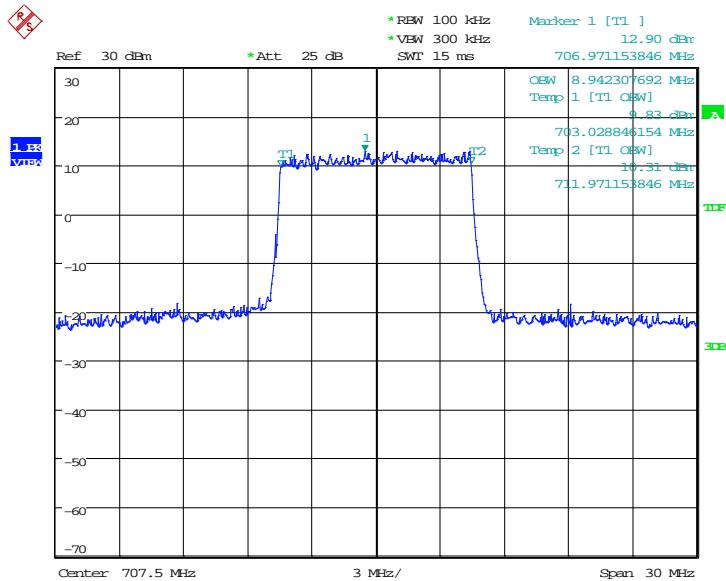
LTE band 12, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
707.5	4495.19	4471.15
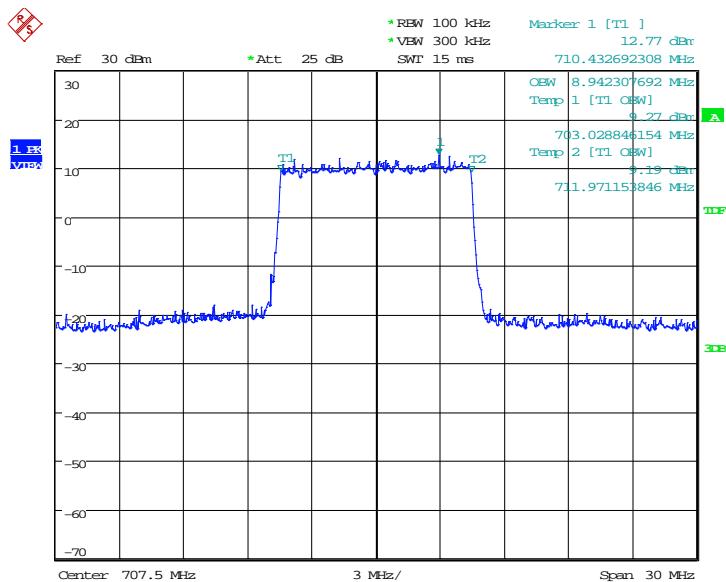
LTE band 12, 5MHz Bandwidth, QPSK (99% BW)

Date: 16.JAN.2018 11:12:49

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

Date: 16.JAN.2018 11:13:03

LTE band 12, 10MHz (99%)

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

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

Date: 16.JAN.2018 11:21:29

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

Date: 16.JAN.2018 11:21:43

Note: Expanded measurement uncertainty is U = 3428 Hz, k = 2

A.5 EMISSION BANDWIDTH

Reference

FCC: CFR Part 22.917(b), 24.238(a), 27.53(h)
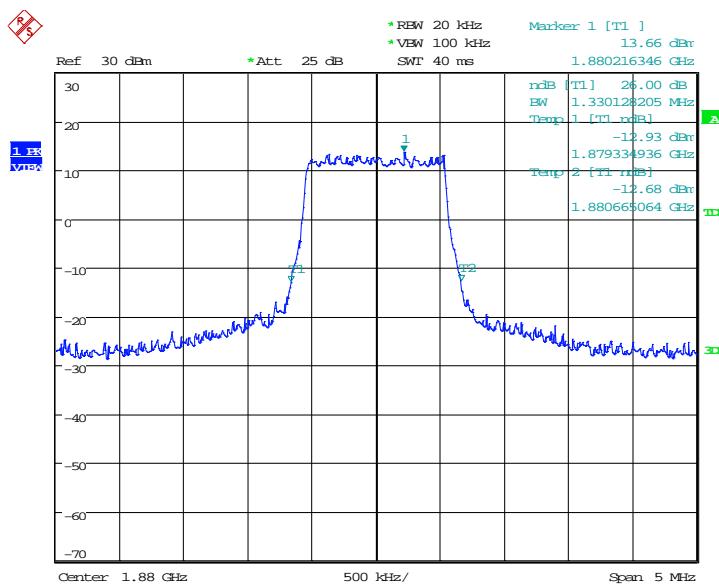
A.5.1 Emission Bandwidth Results

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.
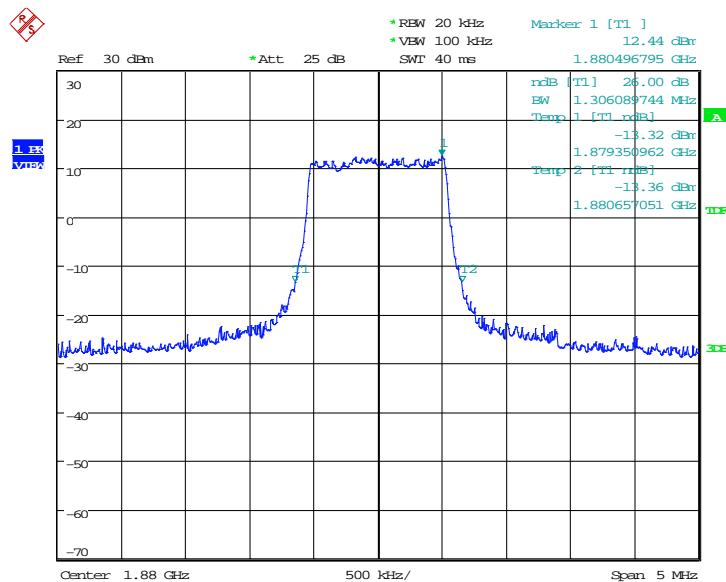
LTE band 2, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	1330.13	1306.09

LTE band 2, 1.4MHz Bandwidth, QPSK (-26dBc BW)
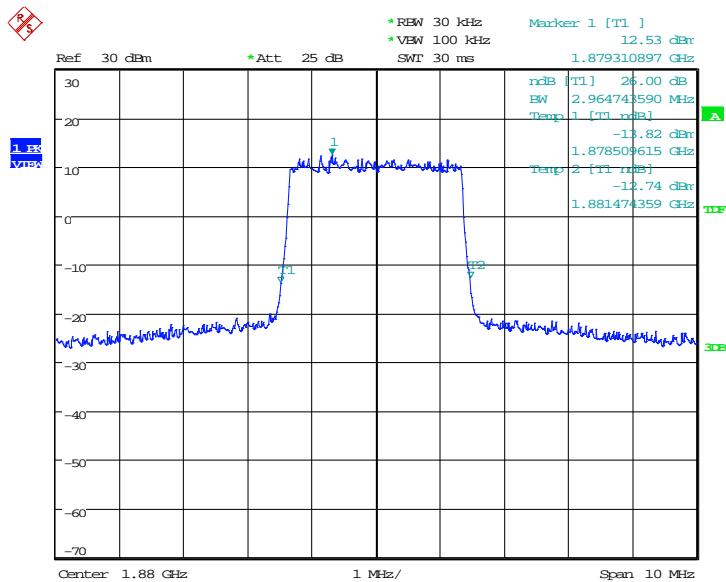
Date: 16.JAN.2018 09:54:50

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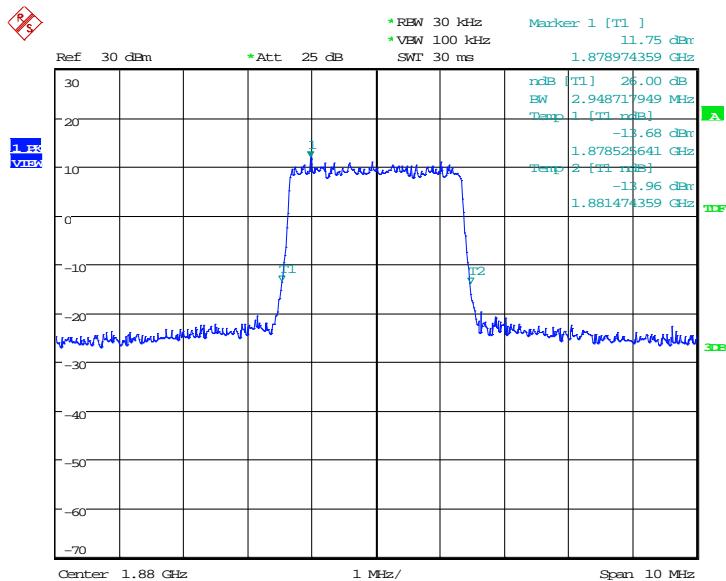

Date: 16.JAN.2018 09:55:06

LTE band 2, 3MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
1880.0	2964.74	2948.72

LTE band 2, 3MHz Bandwidth, QPSK (-26dBc BW)
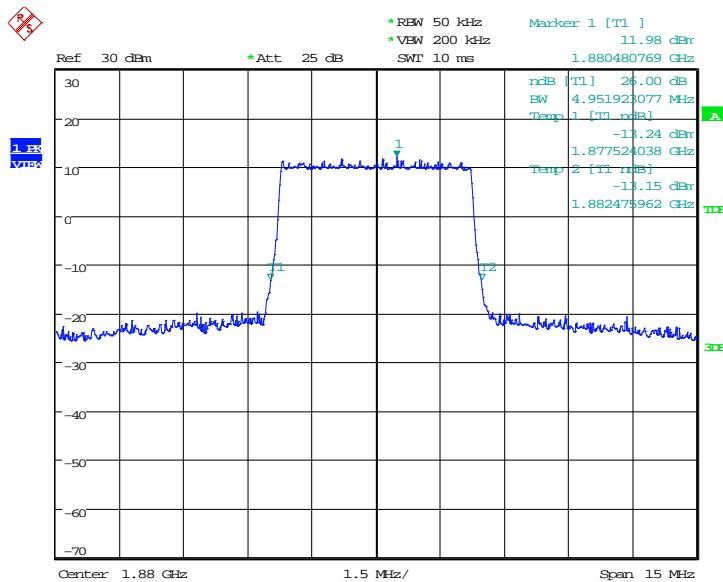
Date: 16.JAN.2018 10:03:29

LTE band 2, 3MHz Bandwidth, 16QAM (-26dBc BW)
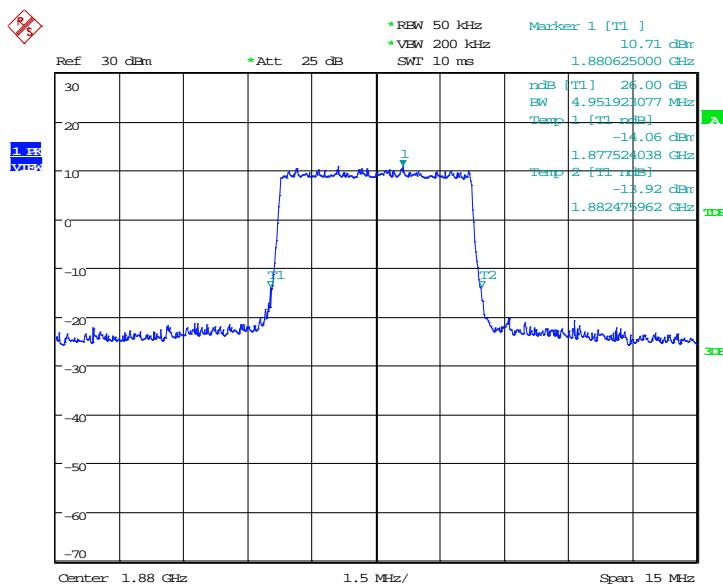
Date: 16.JAN.2018 10:03:45

LTE band 2, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
1880.0	4951.92	4951.92

LTE band 2, 5MHz Bandwidth, QPSK (-26dBc BW)
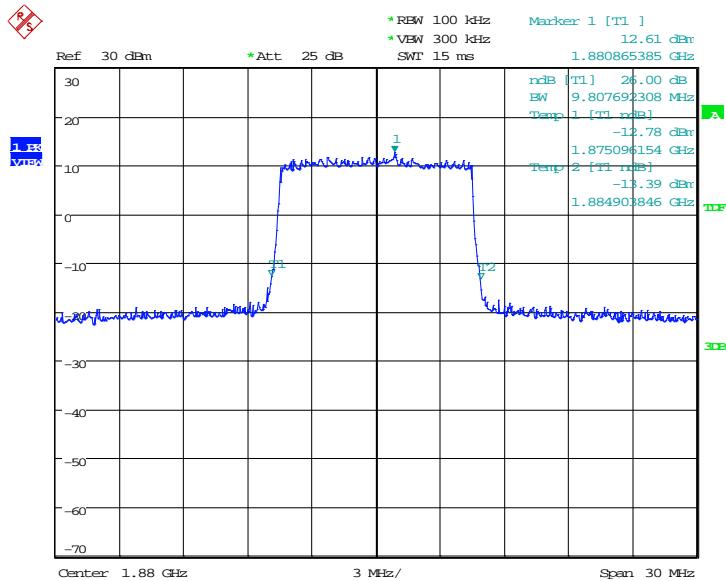
Date: 16.JAN.2018 10:12:09

LTE band 2, 5MHz Bandwidth,16QAM (-26dBc BW)
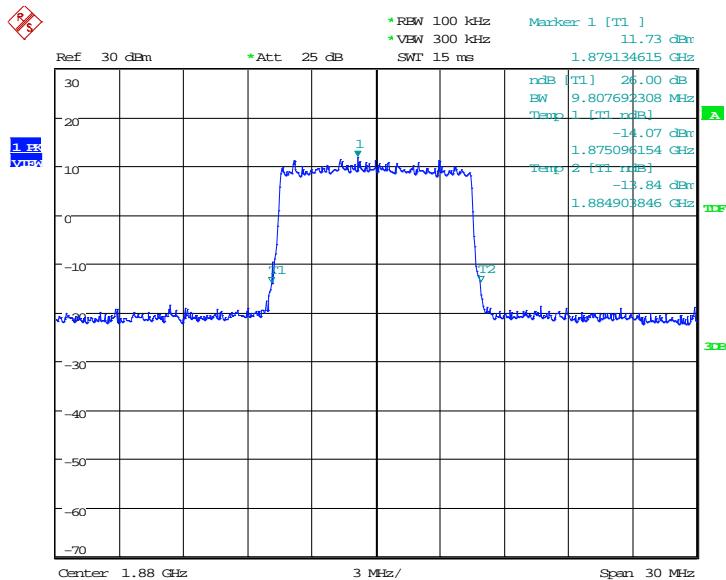
Date: 16.JAN.2018 10:12:25

LTE band 2, 10MHz (-26dBc)

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

LTE band 2, 10MHz Bandwidth, QPSK (-26dBc BW)
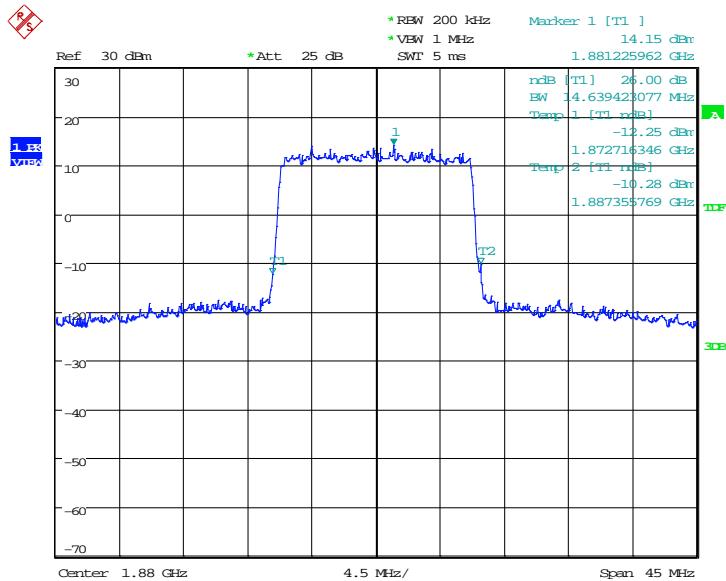
Date: 16.JAN.2018 10:20:49

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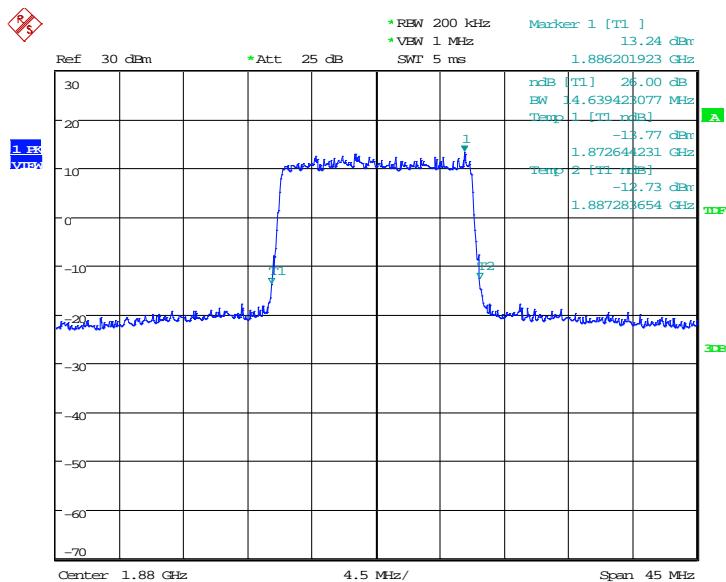

Date: 16.JAN.2018 10:21:05

LTE band 2, 15MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
1880.0	14639.42	14639.42

LTE band 2, 15MHz Bandwidth, QPSK (-26dBc BW)
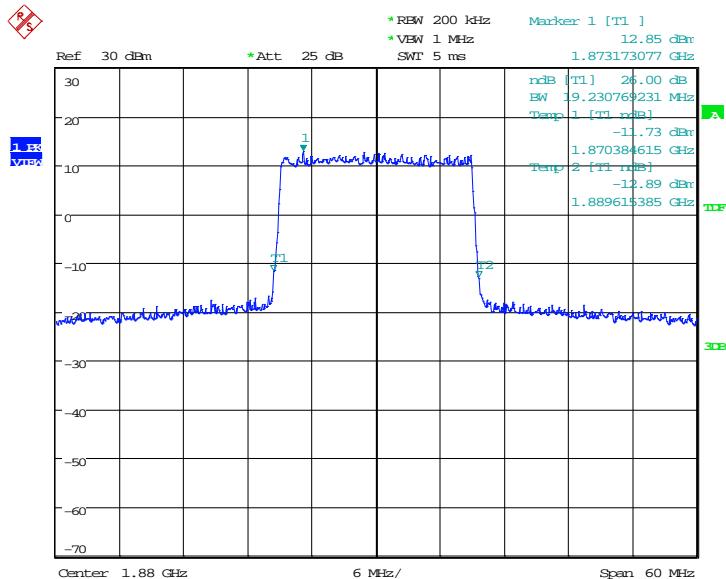
Date: 16.JAN.2018 10:29:34

LTE band 2, 15MHz Bandwidth, 16QAM (-26dBc BW)
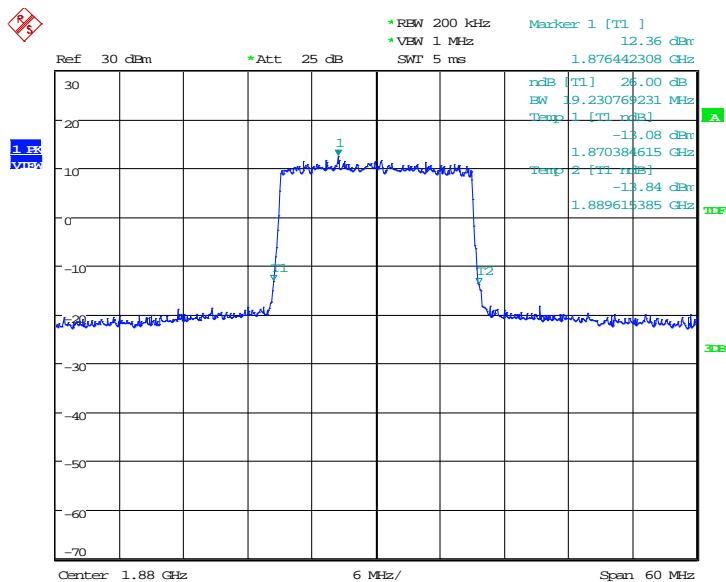
Date: 16.JAN.2018 10:29:49

LTE band 2, 20MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
1880.0	19230.77	19230.77

LTE band 2, 20MHz Bandwidth, QPSK (-26dBc BW)
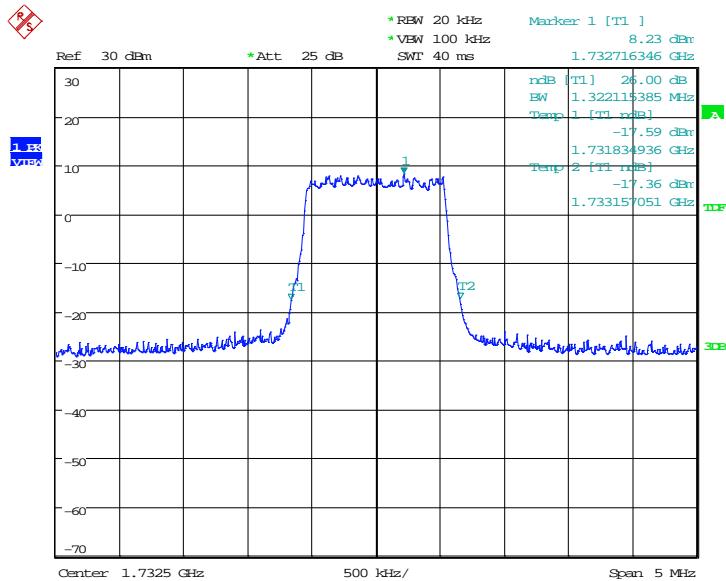
Date: 16.JAN.2018 10:38:22

LTE band 2, 20MHz Bandwidth, 16QAM (-26dBc BW)
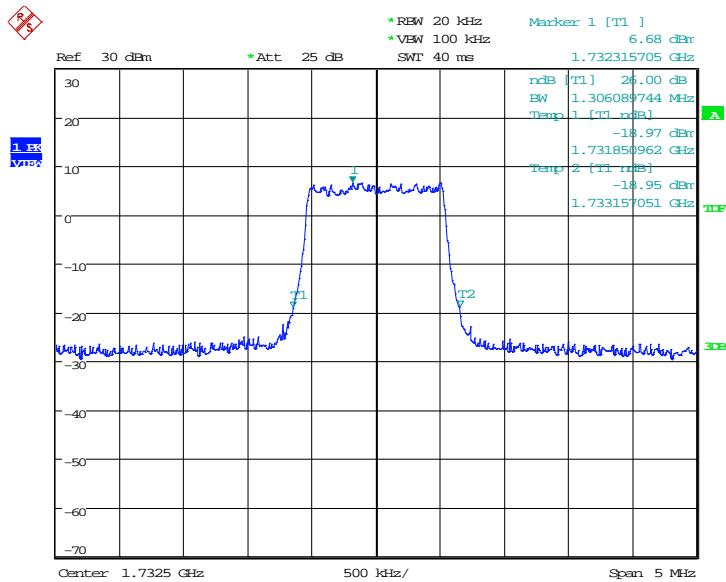
Date: 16.JAN.2018 10:38:38

LTE band 4, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
1732.5	1322.12	1306.09

LTE band 4, 1.4MHz Bandwidth, QPSK (-26dBc BW)
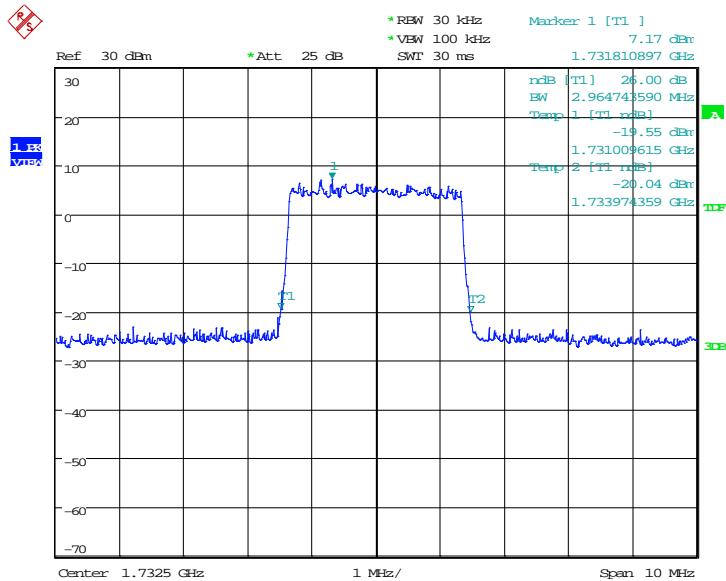
Date: 16.JAN.2018 11:43:20

LTE band 4, 1.4MHz Bandwidth, 16QAM (-26dBc BW)
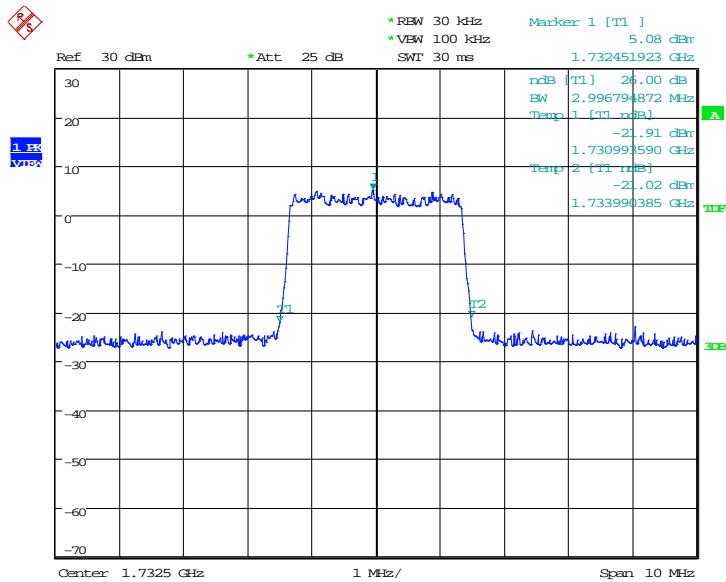
Date: 16.JAN.2018 11:43:35

LTE band 4, 3MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
1732.5	2964.74	2996.79

LTE band 4, 3MHz Bandwidth, QPSK (-26dBc BW)
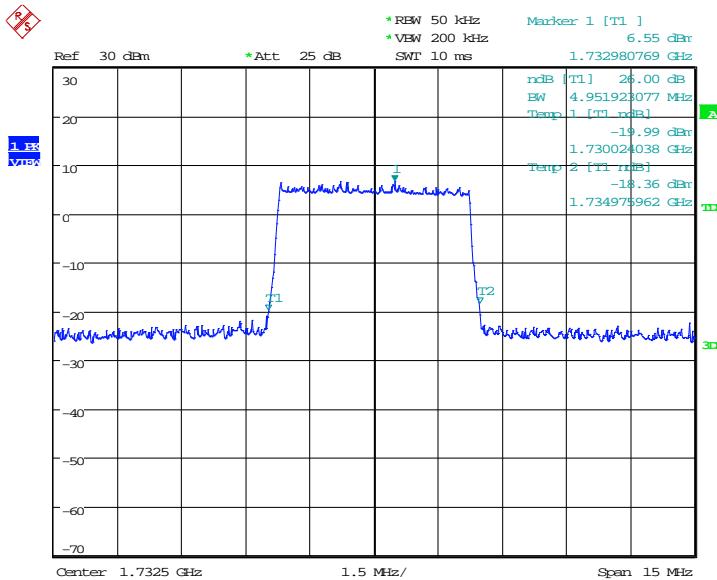
Date: 16.JAN.2018 11:51:59

LTE band 4, 3MHz Bandwidth, 16QAM (-26dBc BW)
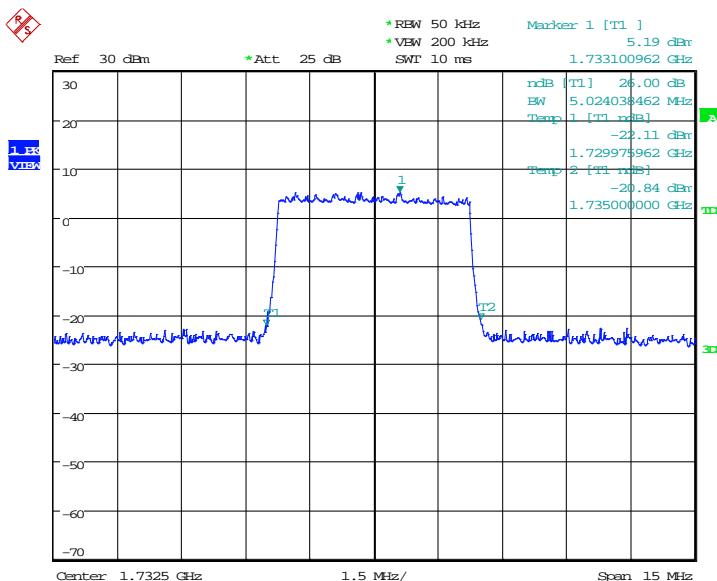
Date: 16.JAN.2018 11:52:15

LTE band 4, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
1732.5	4951.92	5024.04

LTE band 4, 5MHz Bandwidth, QPSK (-26dBc BW)
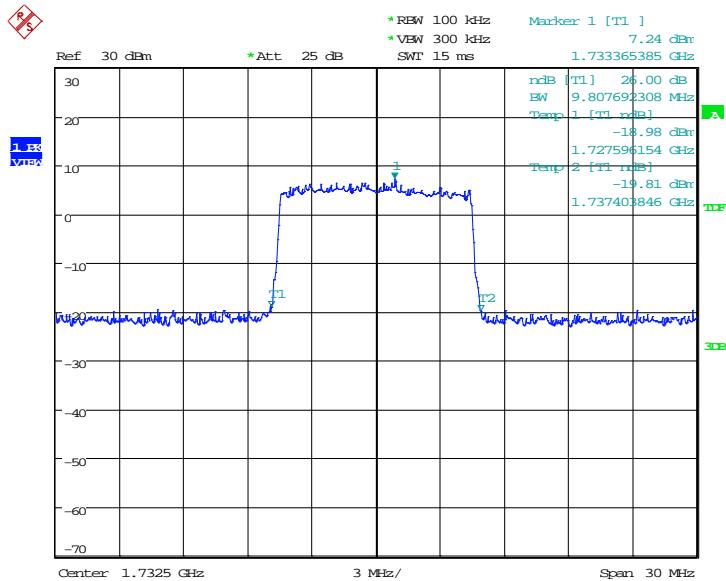
Date: 16.JAN.2018 12:00:39

LTE band 4, 5MHz Bandwidth,16QAM (-26dBc BW)
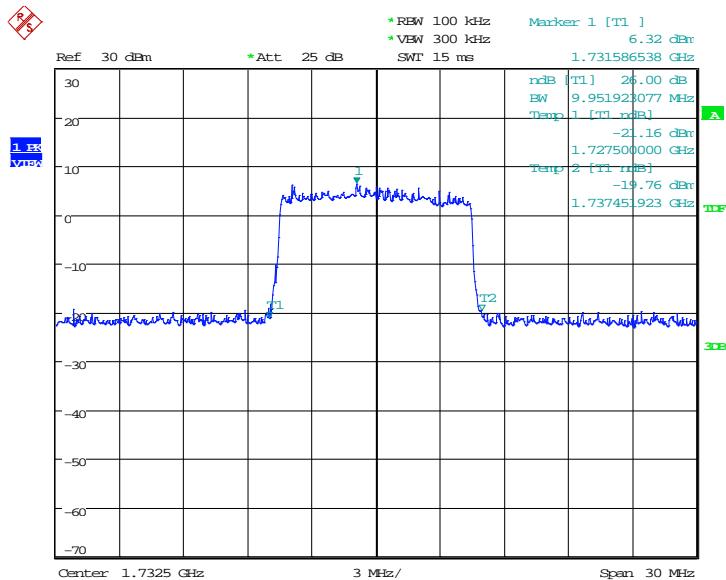
Date: 16.JAN.2018 12:00:55

LTE band 4, 10MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
1732.5	9807.69	9951.92

LTE band 4, 10MHz Bandwidth, QPSK (-26dBc BW)
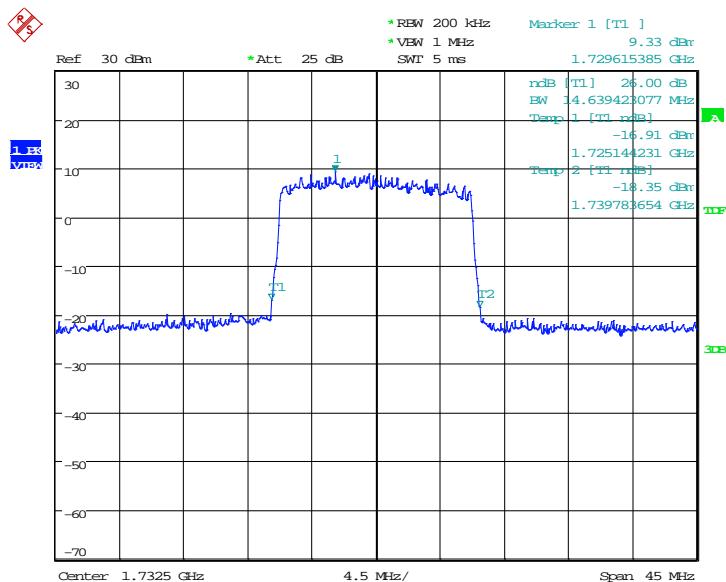
Date: 16.JAN.2018 12:09:19

LTE band 4, 10MHz Bandwidth, 16QAM (-26dBc BW)
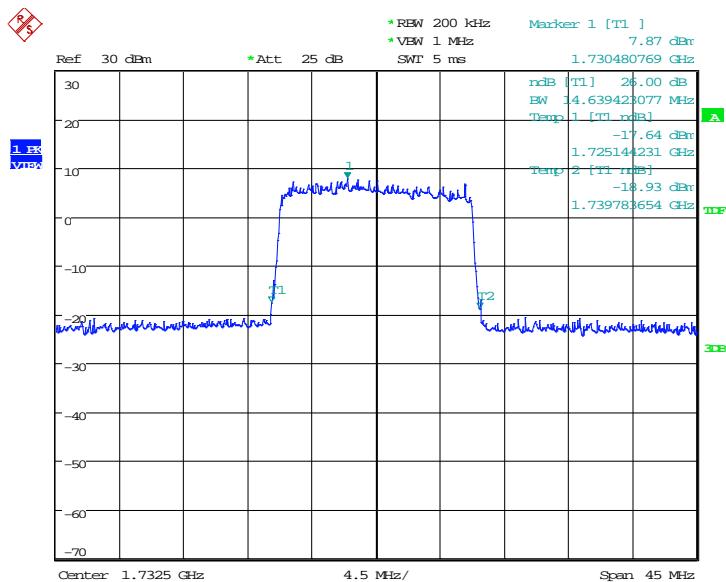
Date: 16.JAN.2018 12:09:34

LTE band 4, 15MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
1732.5	14639.42	14639.42

LTE band 4, 15MHz Bandwidth, QPSK (-26dBc BW)
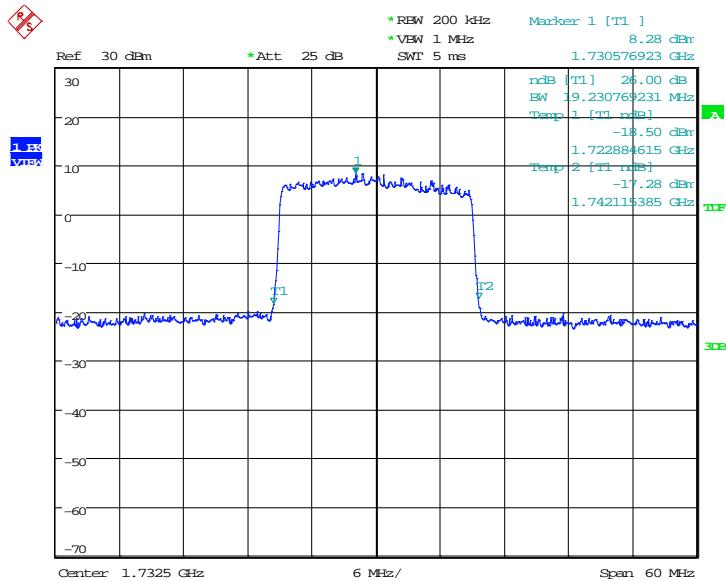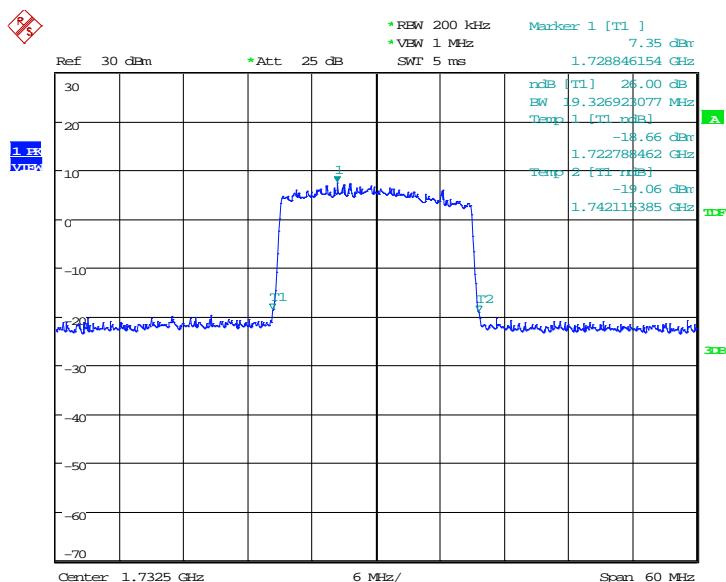
Date: 16.JAN.2018 12:21:03

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

Date: 16.JAN.2018 12:21:19

LTE band 4, 20MHz (-26dBc)
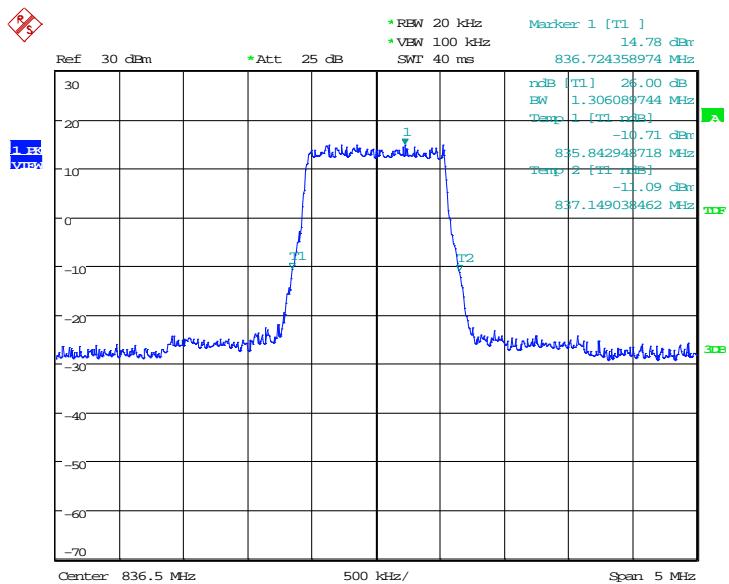
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	19230.77	19326.92

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

Date: 16.JAN.2018 12:42:52

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

Date: 16.JAN.2018 12:43:07

LTE band 5, 1.4MHz (-26dBc)
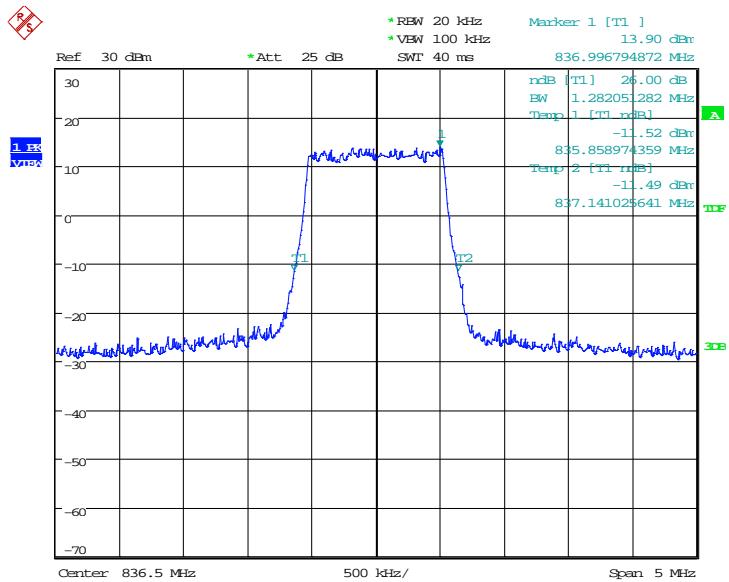
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	1306.09	1282.05

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

Date: 16.JAN.2018 09:20:08
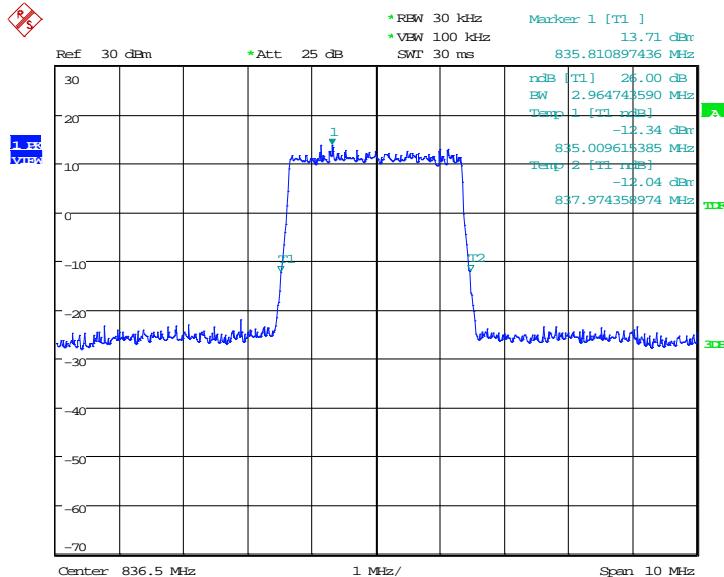
LTE band 5, 1.4MHz Bandwidth, 16QAM (-26dBc BW)
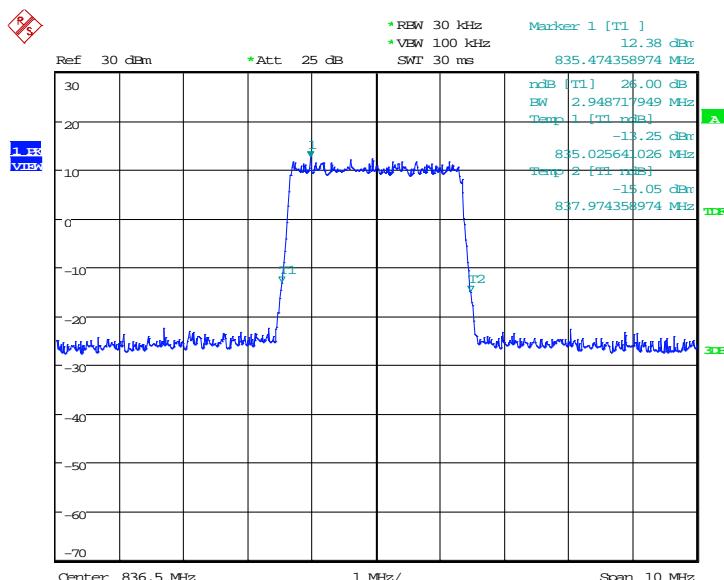
Date: 16.JAN.2018 09:20:23

LTE band 5, 3MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	2964.74	2948.72

LTE band 5, 3MHz Bandwidth, QPSK (-26dBc BW)
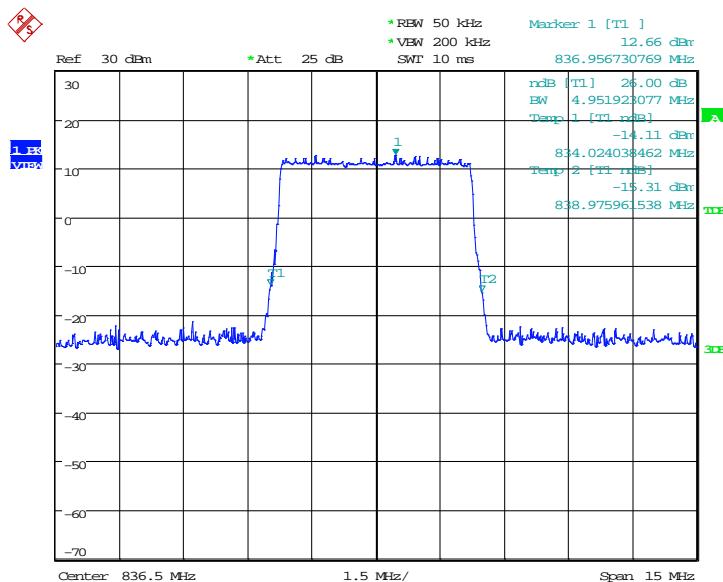
Date: 16.JAN.2018 09:28:47

LTE band 5, 3MHz Bandwidth, 16QAM (-26dBc BW)
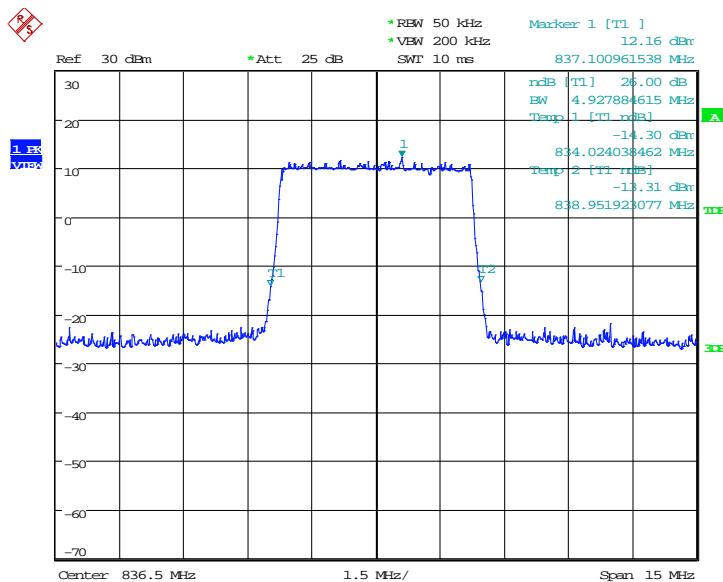
Date: 16.JAN.2018 09:29:03

LTE band 5, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
836.5		
	4951.92	4927.88

LTE band 5, 5MHz Bandwidth, QPSK (-26dBc BW)
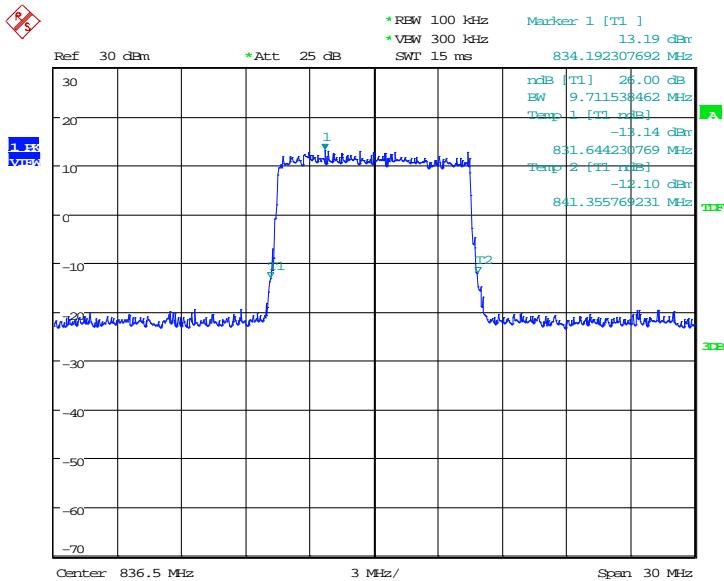
Date: 16.JAN.2018 09:37:27

LTE band 5, 5MHz Bandwidth,16QAM (-26dBc BW)
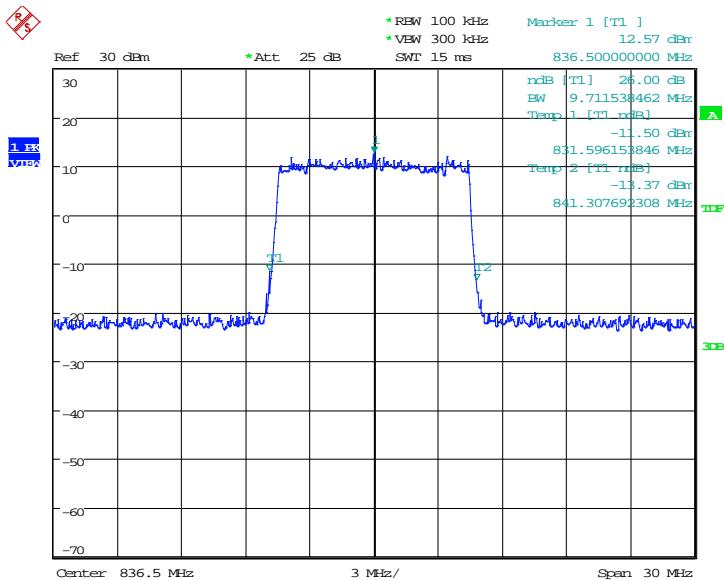
Date: 16.JAN.2018 09:37:43

LTE band 5, 10MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	9711.54	9711.54

LTE band 5, 10MHz Bandwidth, QPSK (-26dBc BW)
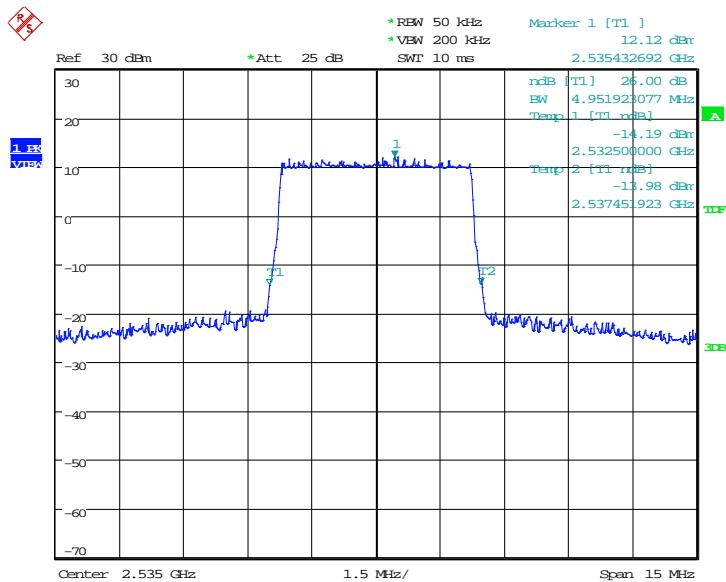
Date: 16.JAN.2018 09:46:07

LTE band 5, 10MHz Bandwidth, 16QAM (-26dBc BW)
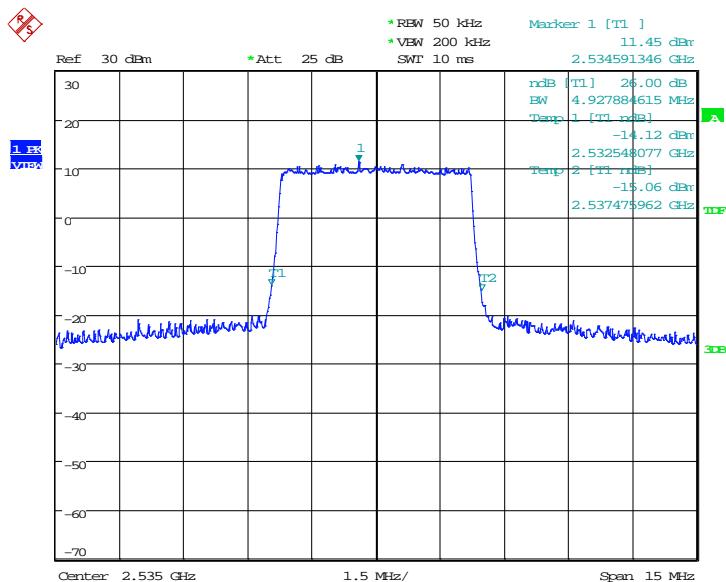
Date: 16.JAN.2018 09:46:22

LTE band 7, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
2535.0	4951.92	4927.88

LTE band 7, 5MHz Bandwidth, QPSK (-26dBc BW)
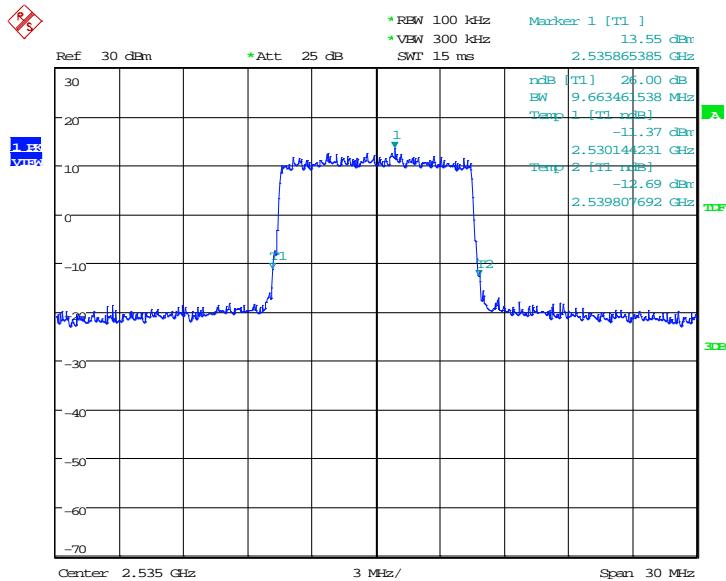
Date: 16.JAN.2018 07:46:48

LTE band 7, 5MHz Bandwidth,16QAM (-26dBc BW)
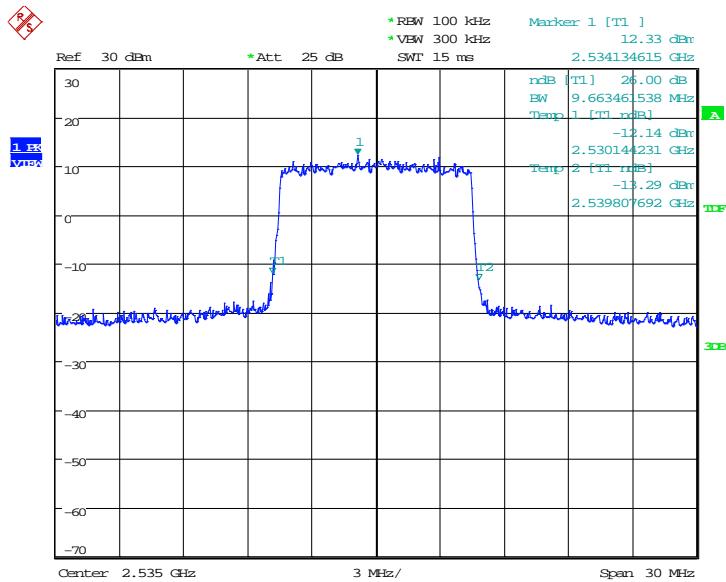
Date: 16.JAN.2018 07:47:04

LTE band 7, 10MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	9663.46	9663.46

LTE band 7, 10MHz Bandwidth, QPSK (-26dBc BW)
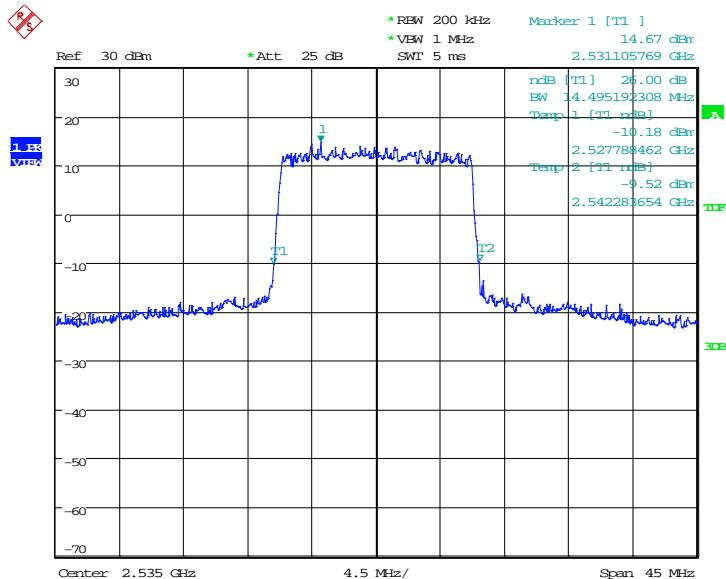
Date: 16.JAN.2018 07:55:28

LTE band 7, 10MHz Bandwidth, 16QAM (-26dBc BW)
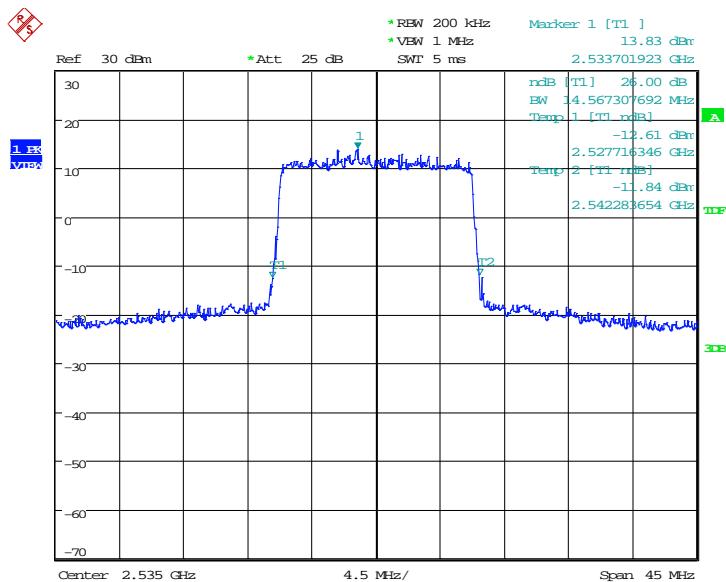
Date: 16.JAN.2018 07:55:44

LTE band 7, 15MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
2535.0	14495.19	14567.31

LTE band 7, 15MHz Bandwidth, QPSK (-26dBc BW)
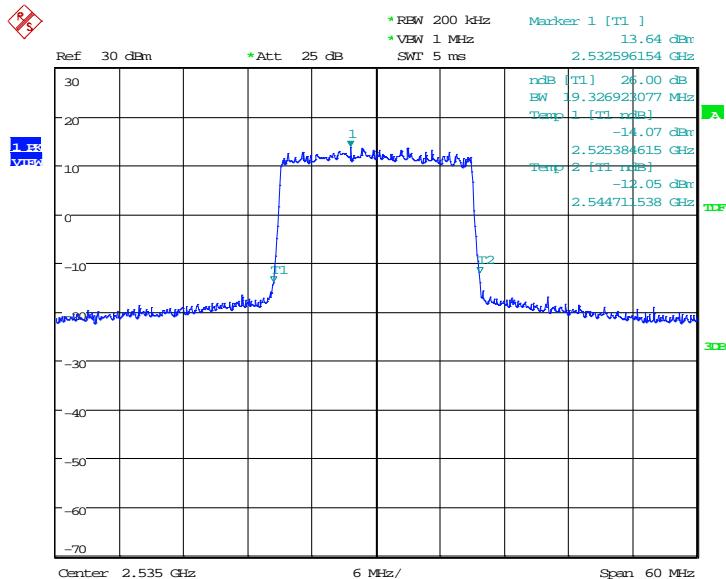
Date: 16.JAN.2018 08:04:14

LTE band 7, 15MHz Bandwidth, 16QAM (-26dBc BW)
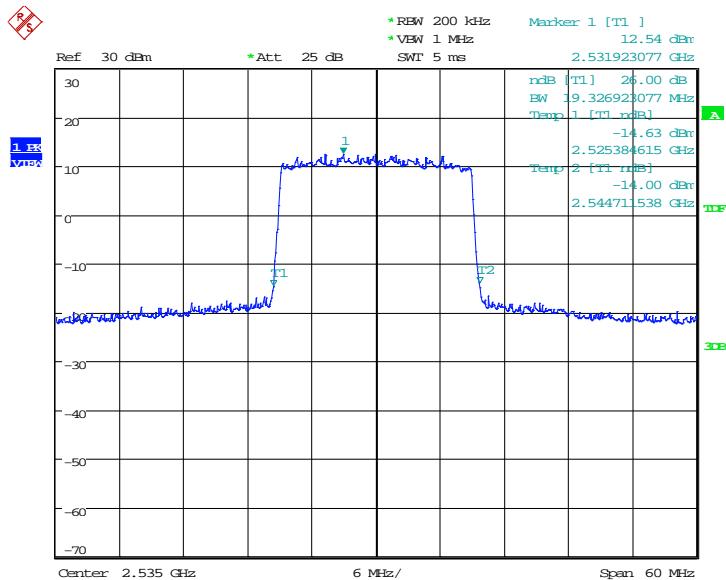
Date: 16.JAN.2018 08:04:29

LTE band 7, 20MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
2535.0	19326.92	19326.92

LTE band 7, 20MHz Bandwidth, QPSK (-26dBc BW)
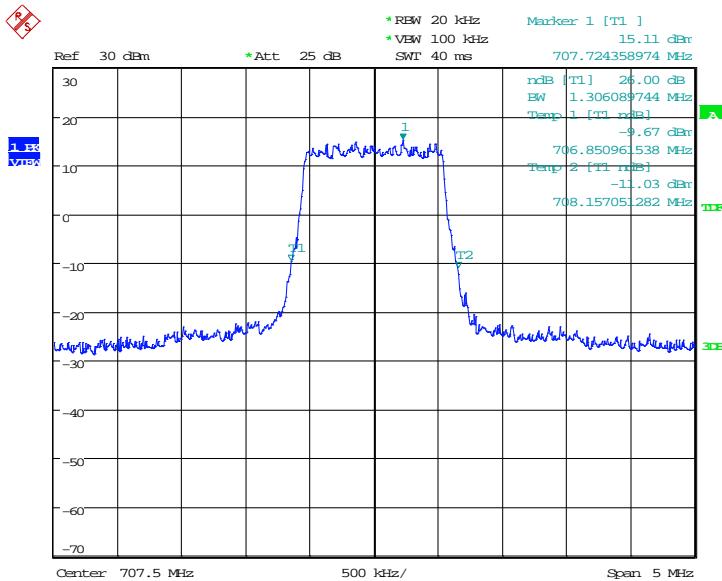
Date: 16.JAN.2018 08:13:02

LTE band 7, 20MHz Bandwidth, 16QAM (-26dBc BW)
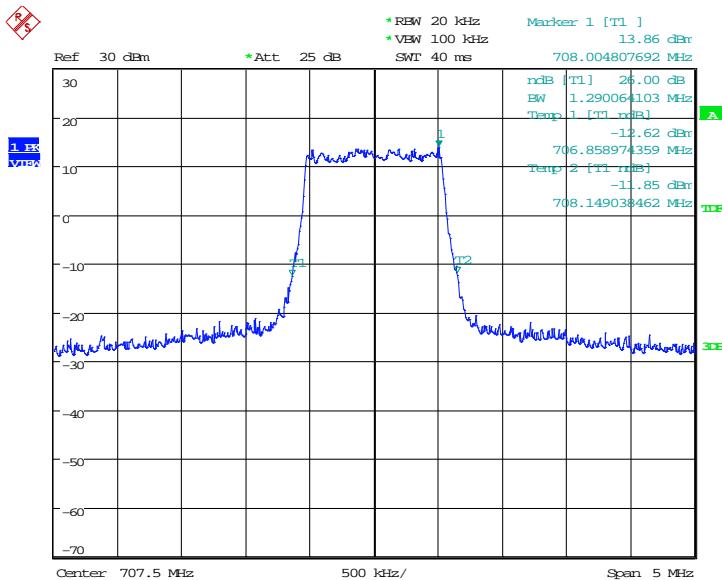
Date: 16.JAN.2018 08:13:18

LTE band 12, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
707.5	1306.09	1290.06

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


```
                                          *RBW  20 kHz     Marker 1 [T1 ]
                                          *VBW 100 kHz              15.11 dBm
Ref   30 dBm          *Att   25 dB     SWT 40 ms        707.724358974 MHz
  30                                              ndB [T1]     26.00 dB
                                                  BW    1.306089744 MHz
  20                              1               Temp 1 [T1 ndB]
                                                             -9.67 dBm
  10                                              706.850961538 MHz
                                                  Temp 2 [T1 ndB]
   0                                                       -11.03 dBm
                                                  708.157051282 MHz
 -10         T1                 T2
 -20
 -30
 -40
 -50
 -60
 -70
Center 707.5 MHz          500 kHz/              Span 5 MHz
```
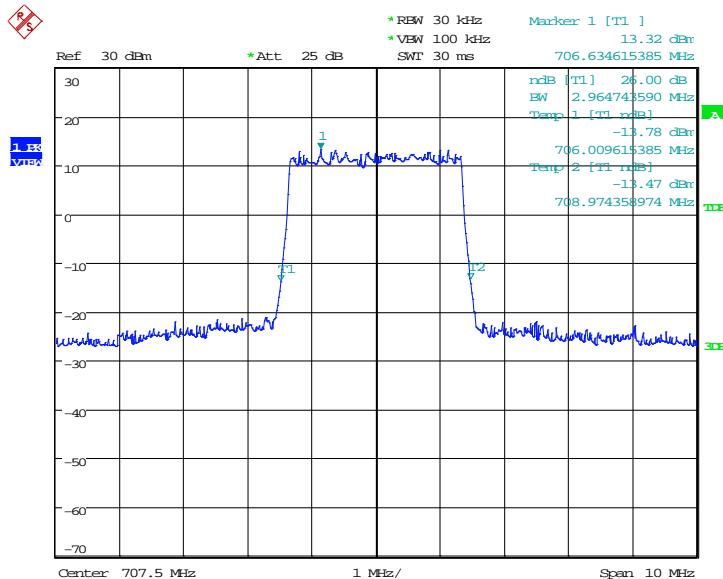
Date: 16.JAN.2018 10:56:36

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


```
                                          *RBW  20 kHz     Marker 1 [T1 ]
                                          *VBW 100 kHz              13.86 dBm
Ref   30 dBm          *Att   25 dB     SWT 40 ms        708.004807692 MHz
  30                                              ndB [T1]     26.00 dB
                                                  BW    1.290064103 MHz
  20                                    1         Temp 1 [T1 ndB]
                                                            -12.62 dBm
  10                                              706.858974359 MHz
                                                  Temp 2 [T1 ndB]
   0                                                       -11.85 dBm
                                                  708.149038462 MHz
 -10         T1                 T2
 -20
 -30
 -40
 -50
 -60
 -70
Center 707.5 MHz          500 kHz/              Span 5 MHz
```
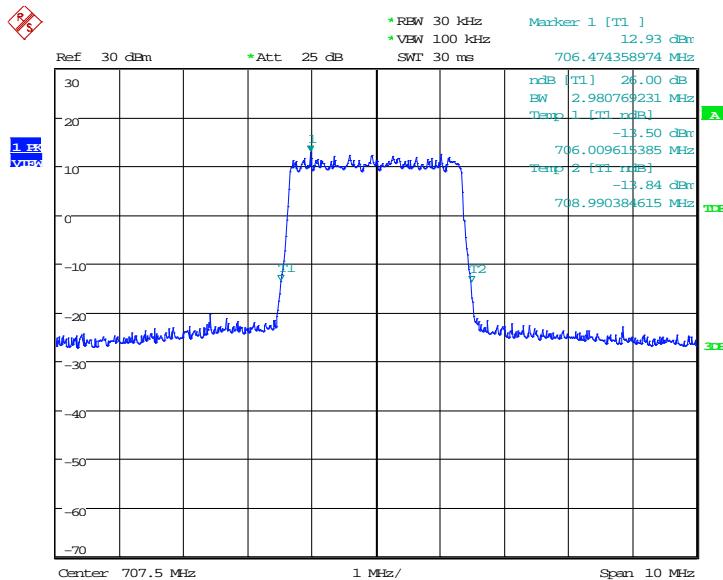
Date: 16.JAN.2018 10:56:52

LTE band 12, 3MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
707.5	2964.74	2980.77

LTE band 12, 3MHz Bandwidth, QPSK (-26dBc BW)
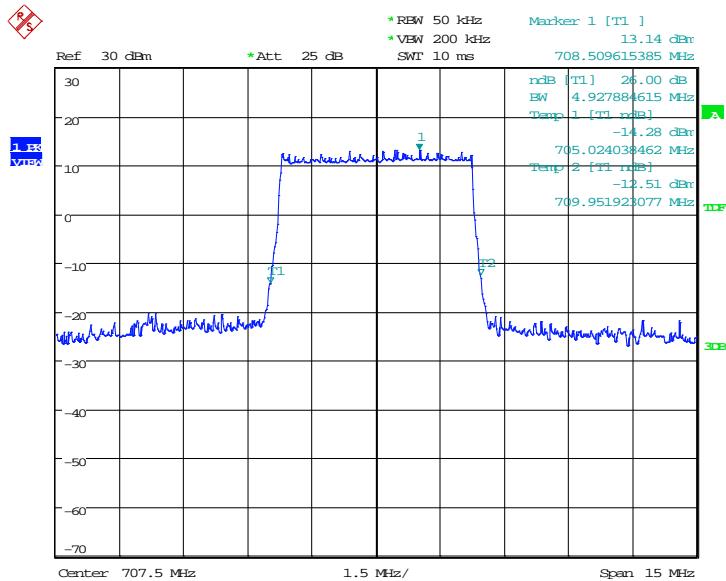
Date: 16.JAN.2018 11:05:16

LTE band 12, 3MHz Bandwidth, 16QAM (-26dBc BW)
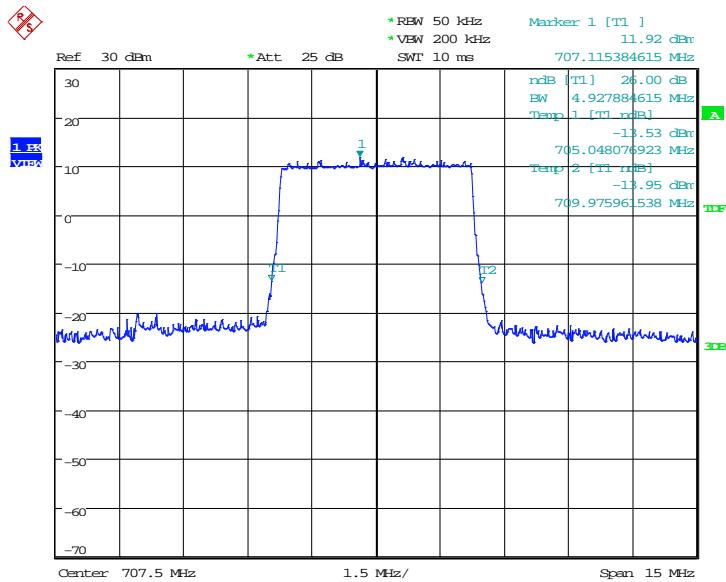
Date: 16.JAN.2018 11:05:31

LTE band 12, 5MHz (-26dBc)

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

LTE band 12, 5MHz Bandwidth, QPSK (-26dBc BW)
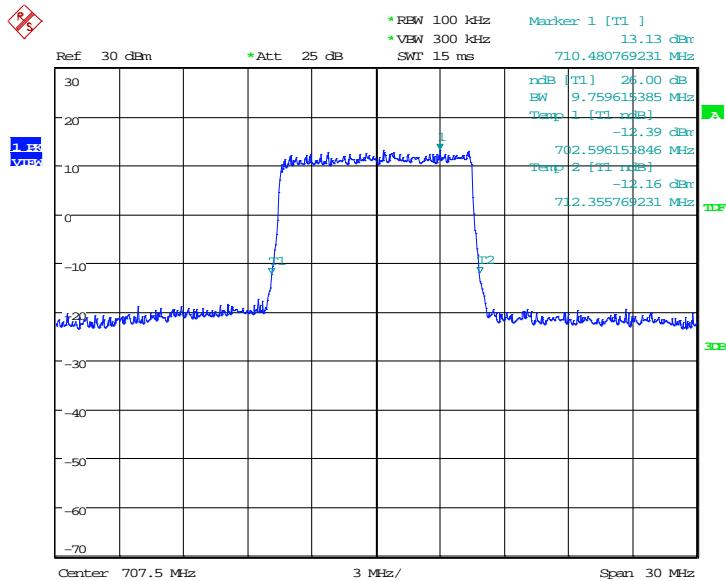
Date: 16.JAN.2018 11:13:55

LTE band 12, 5MHz Bandwidth,16QAM (-26dBc BW)
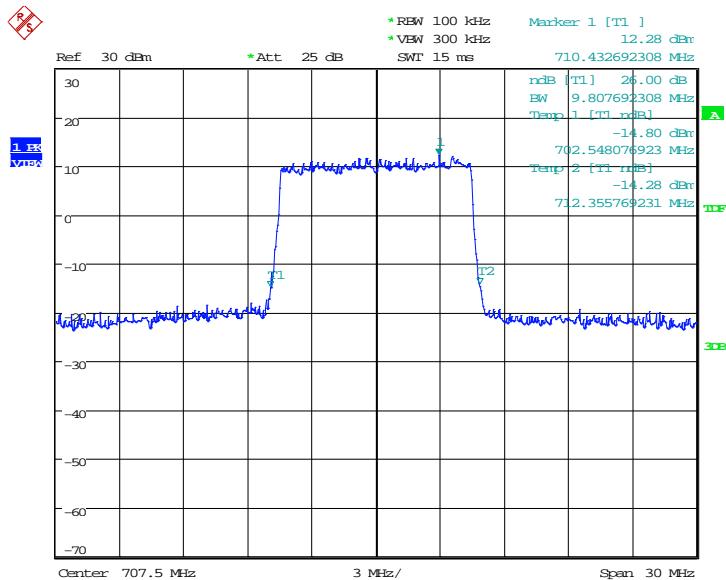
Date: 16.JAN.2018 11:14:11

LTE band 12, 10MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
707.5	9759.62	9807.69

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

Date: 16.JAN.2018 11:22:35

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

Date: 16.JAN.2018 11:22:50

Note: Expanded measurement uncertainty is U = 3428 Hz, k = 2.

A.6 BAND EDGE COMPLIANCE

Reference

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

A.6.1 Measurement limit
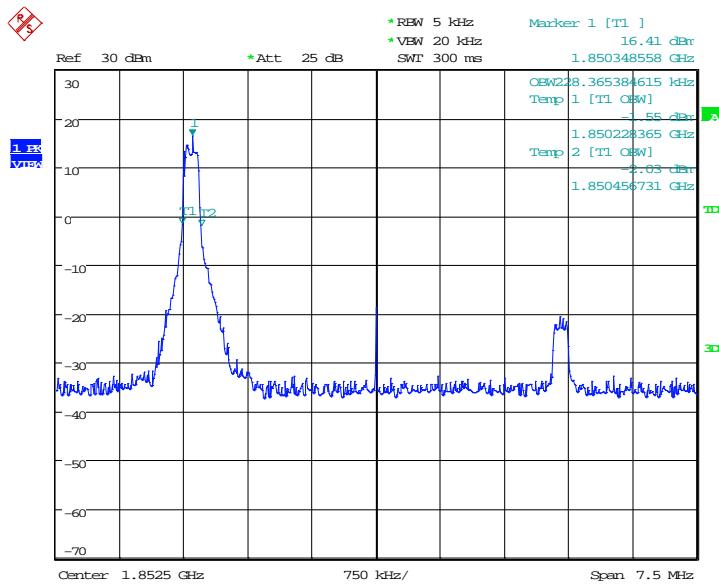
On any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm. According to KDB 971168 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
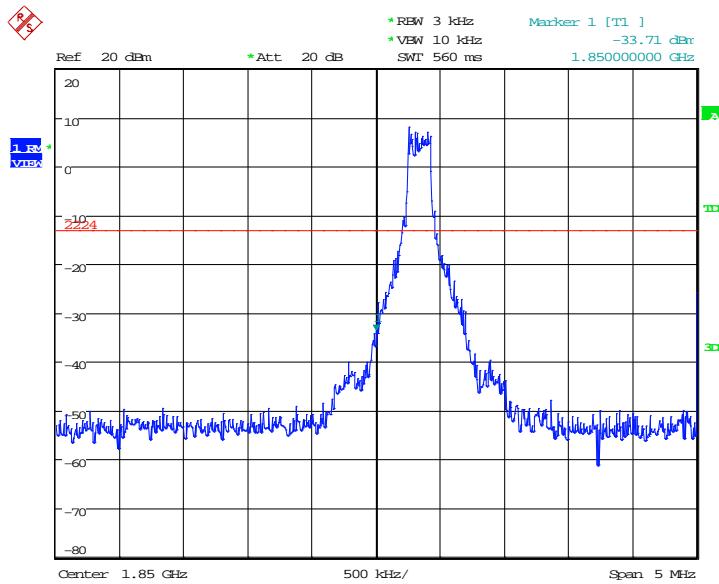
Only worst case result is given below

LTE band 2
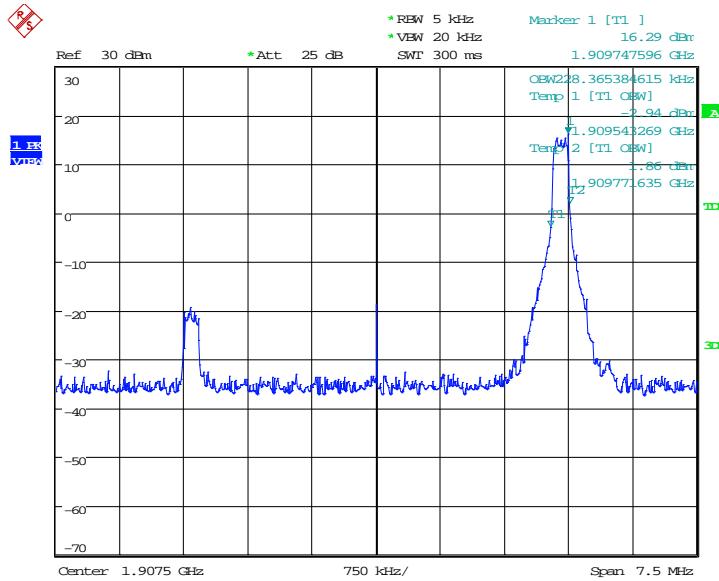
OBW: 1RB-low_offset
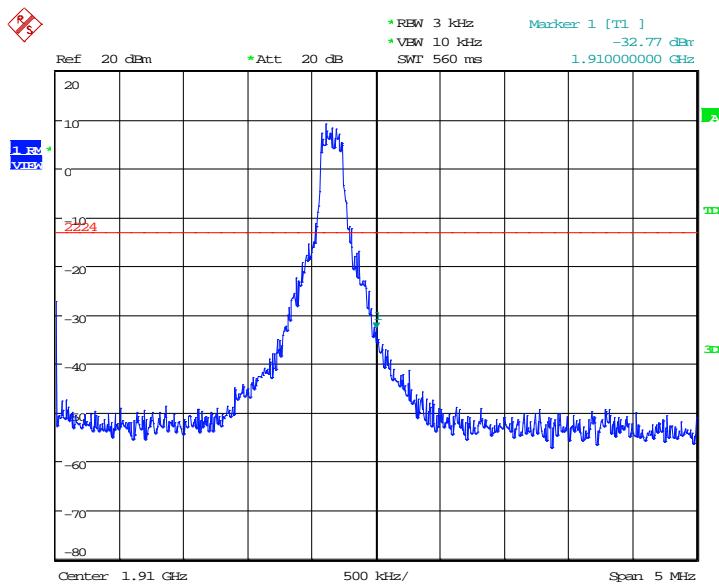
Date: 18.JAN.2018 11:07:50

LOW BAND EDGE BLOCK-1RB-low_offset
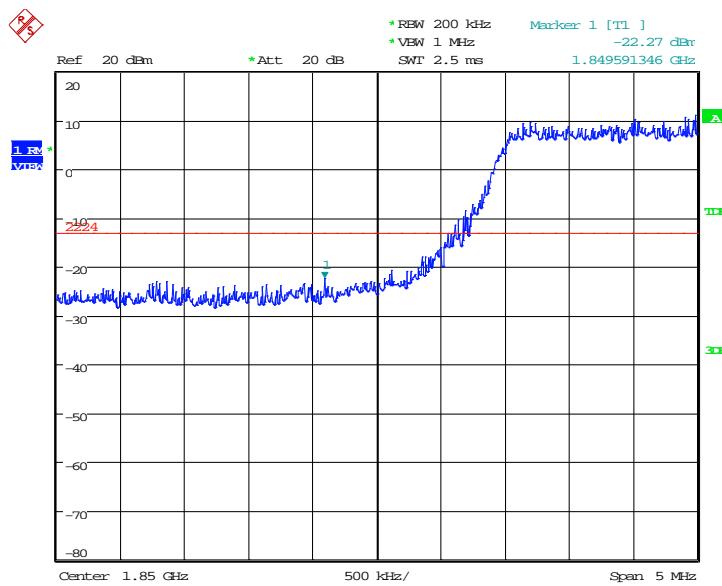
Date: 18.JAN.2018 11:09:42

OBW: 1RB-high_offset
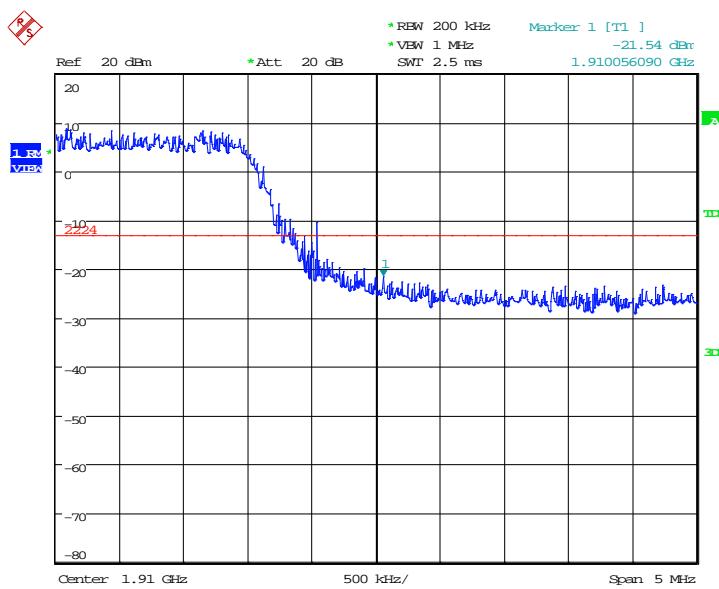
Date: 18.JAN.2018 11:08:40

HIGH BAND EDGE BLOCK-1RB-high_offset
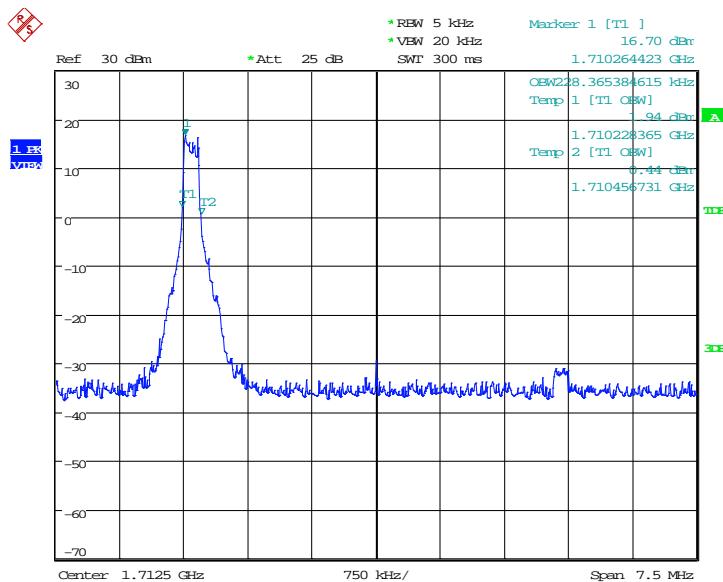
Date: 18.JAN.2018 11:10:26

LOW BAND EDGE BLOCK-20MHz-100%RB
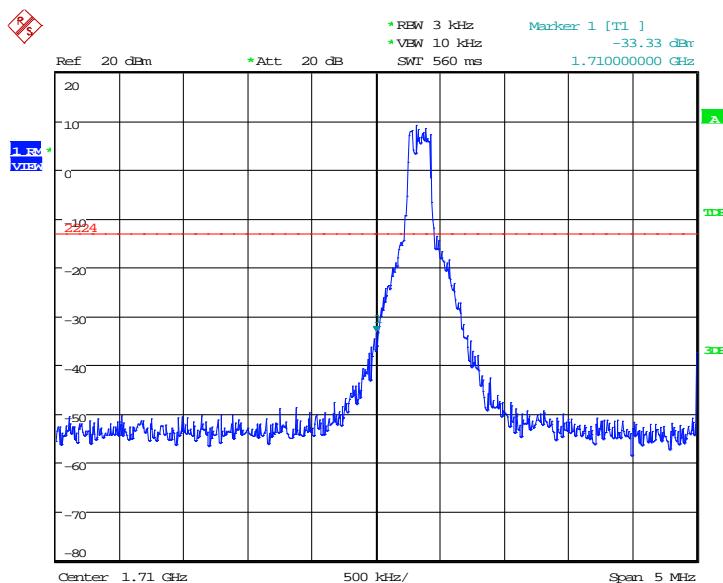
Date: 18.JAN.2018 12:41:06

**HIGH BAND EDGE BLOCK-20MHz-100%RB**
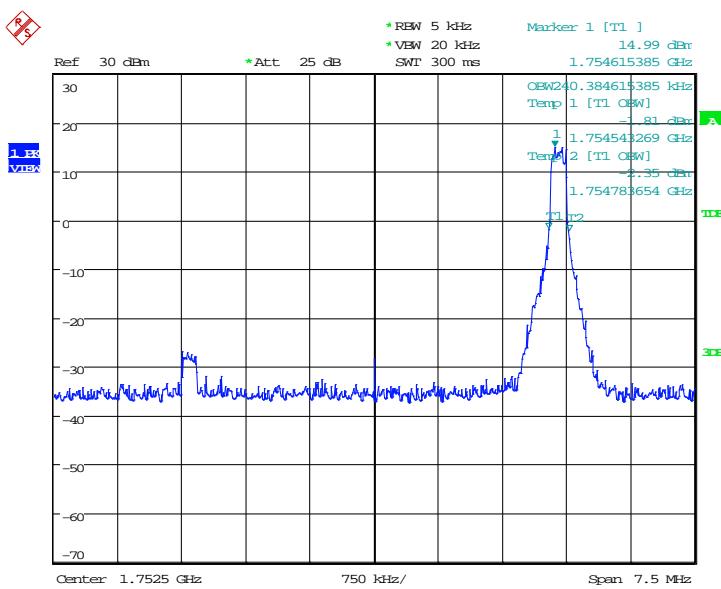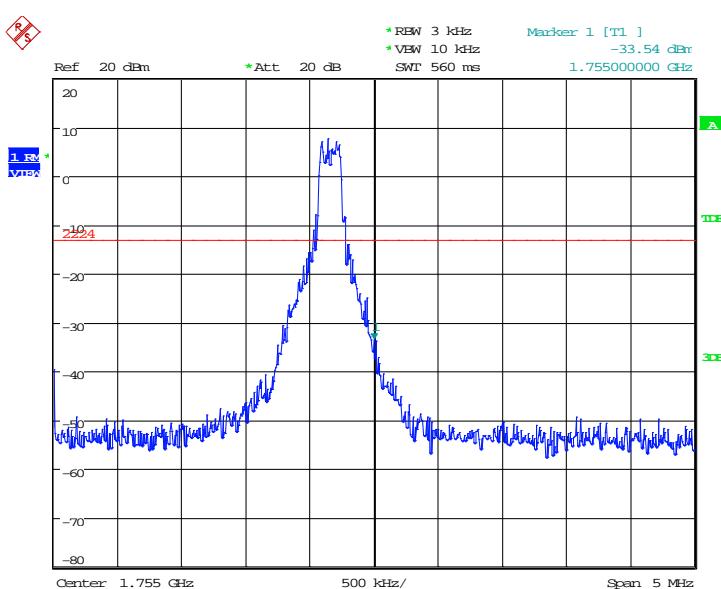
Date: 18.JAN.2018 12:25:00
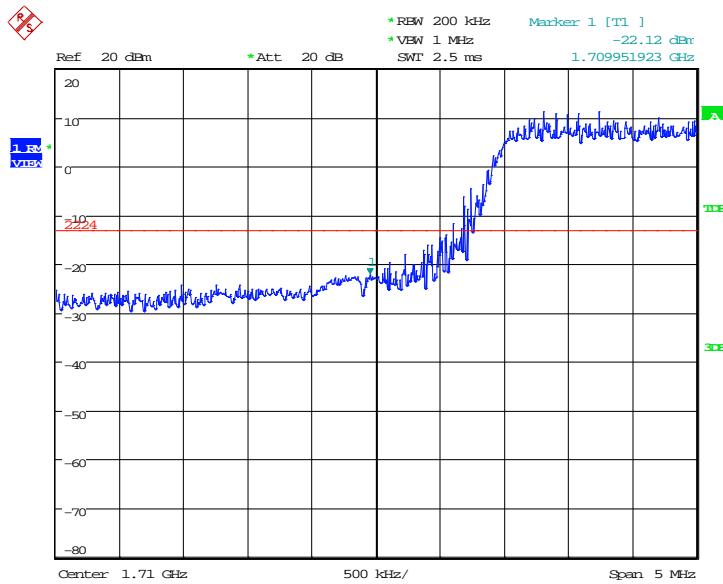
LTE band 4
OBW: 1RB-low_offset

Date: 18.JAN.2018 11:16:30
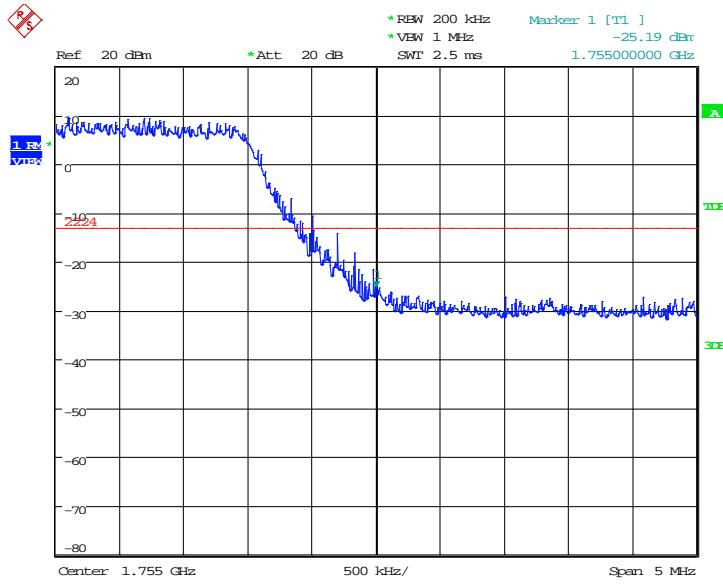
LOW BAND EDGE BLOCK-1RB-low_offset

Date: 18.JAN.2018 11:18:22
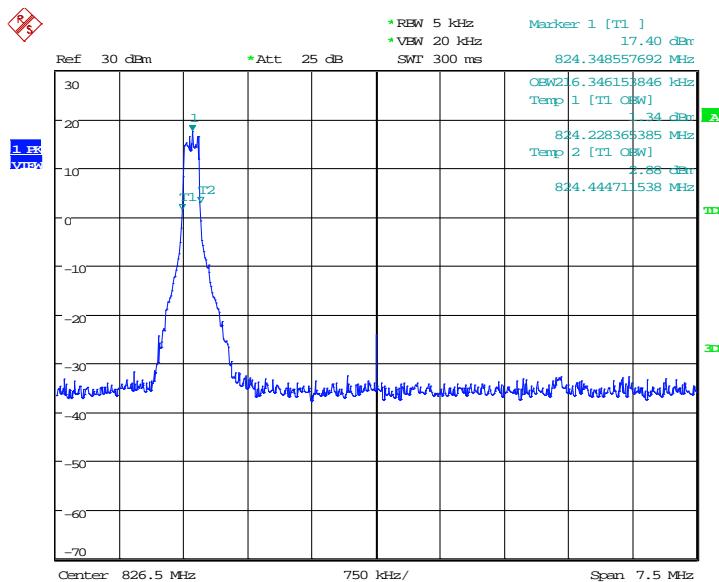
OBW: 1RB-high_offset

Date: 18.JAN.2018 11:17:20

HIGH BAND EDGE BLOCK-1RB-high_offset

Date: 18.JAN.2018 11:19:06

LOW BAND EDGE BLOCK-20MHz-100%RB
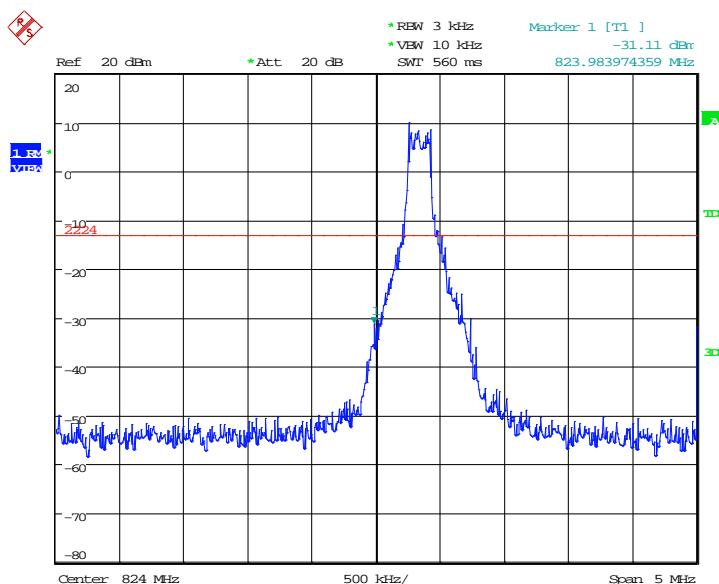
Date: 18.JAN.2018 12:41:51

HIGH BAND EDGE BLOCK-20MHz-100%RB
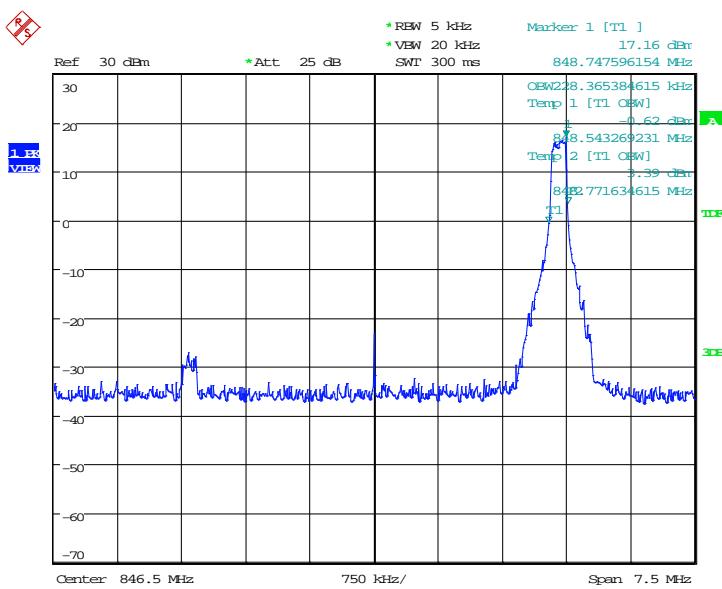
Date: 18.JAN.2018 12:25:45

LTE band 5
OBW: 1RB-low_offset
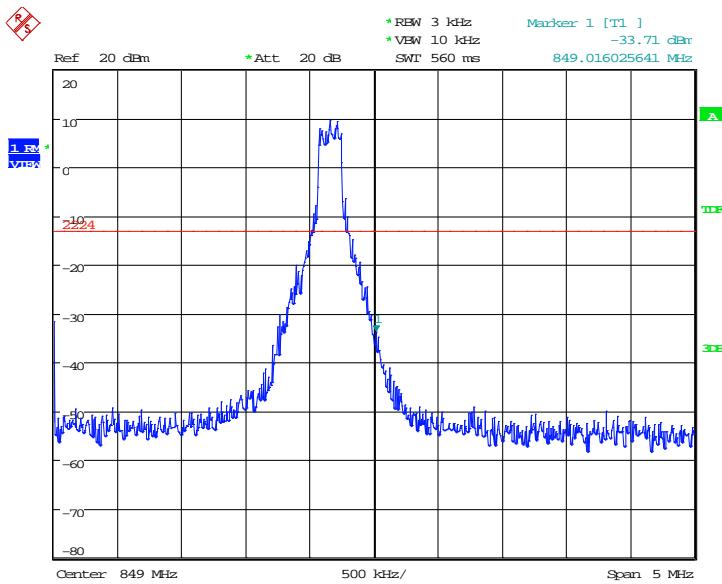
Date: 18.JAN.2018 10:58:35

LOW BAND EDGE BLOCK-1RB-low_offset
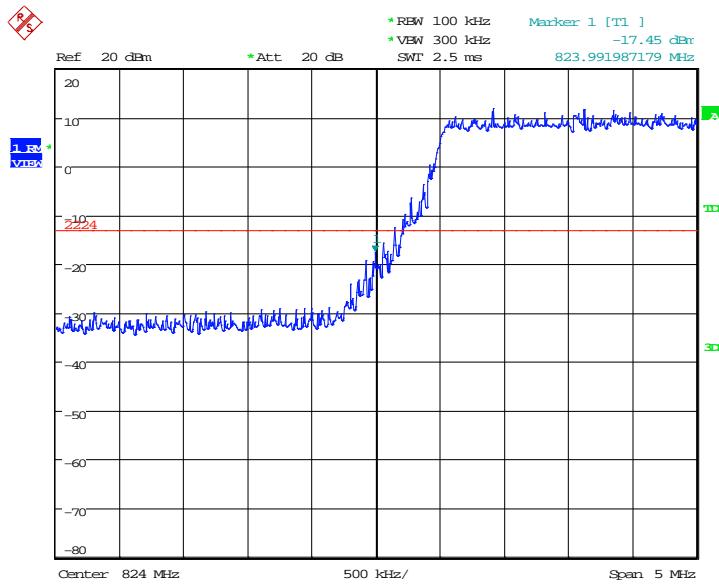
Date: 18.JAN.2018 11:00:26

OBW: 1RB-high_offset
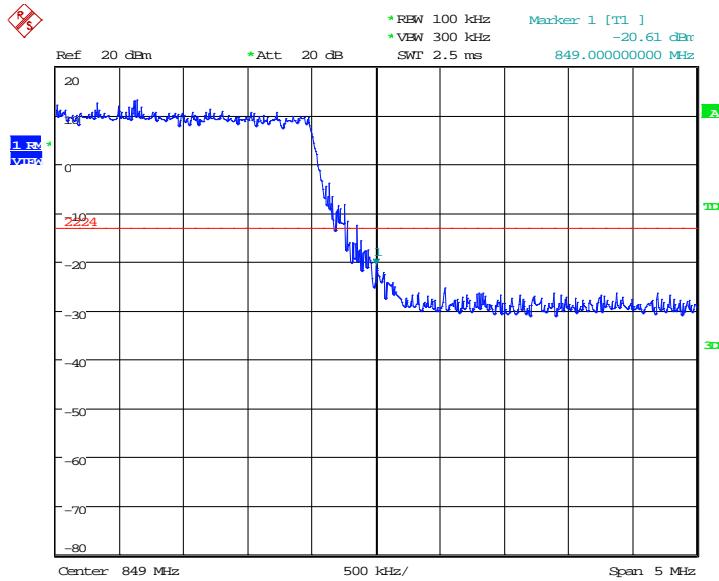
Date: 18.JAN.2018 10:59:25

HIGH BAND EDGE BLOCK-1RB-high_offset
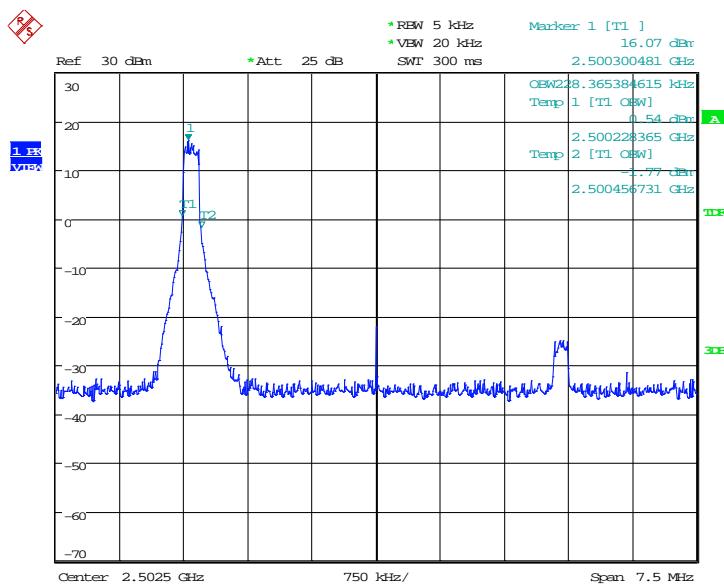
Date: 18.JAN.2018 11:01:10

LOW BAND EDGE BLOCK-10MHz-100%RB
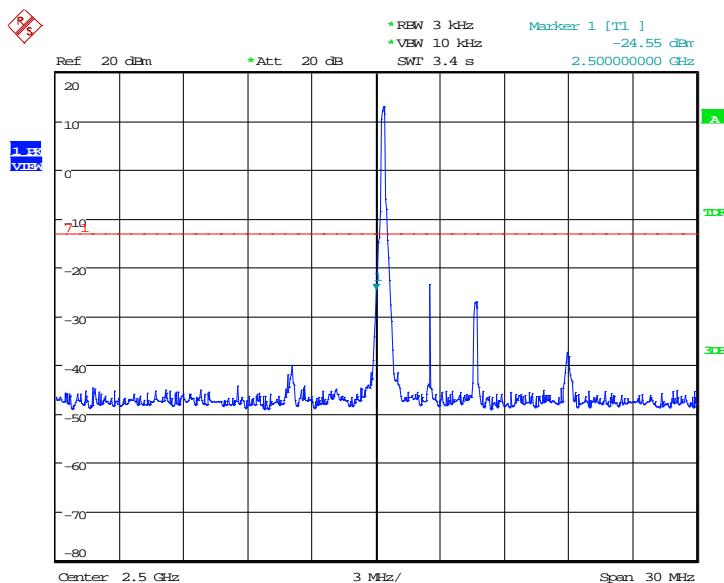
Date: 18.JAN.2018 12:44:43

HIGH BAND EDGE BLOCK-10MHz-100%RB
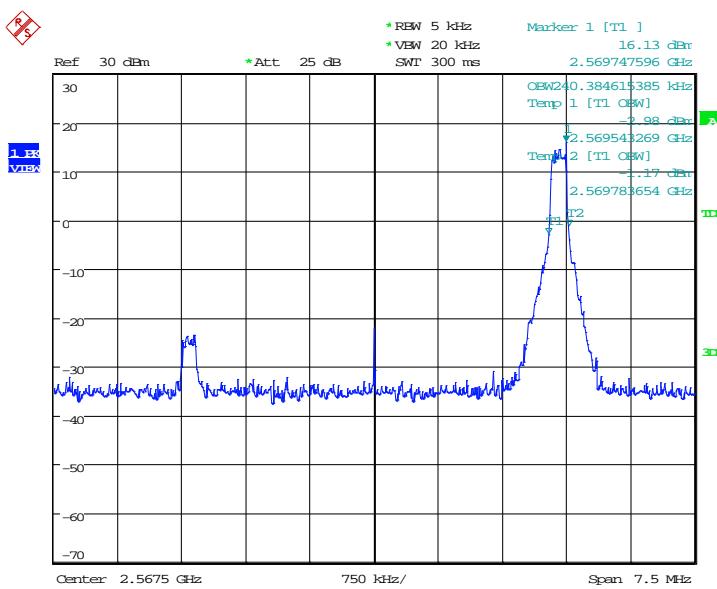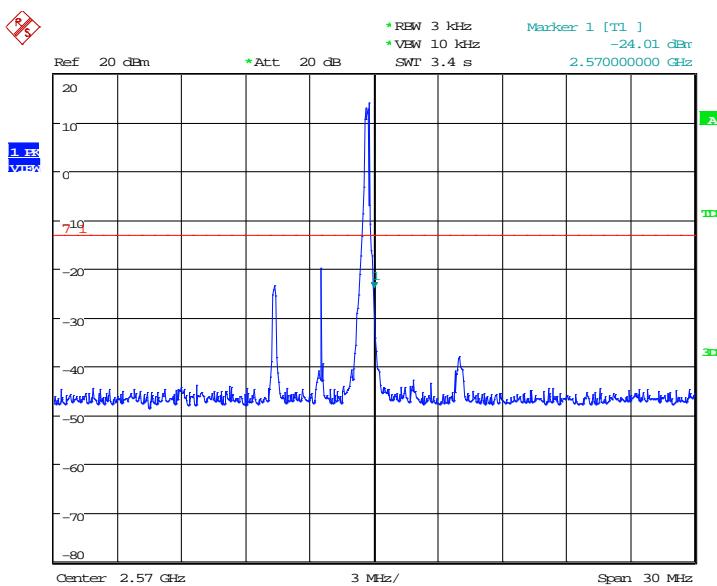
Date: 18.JAN.2018 12:46:21
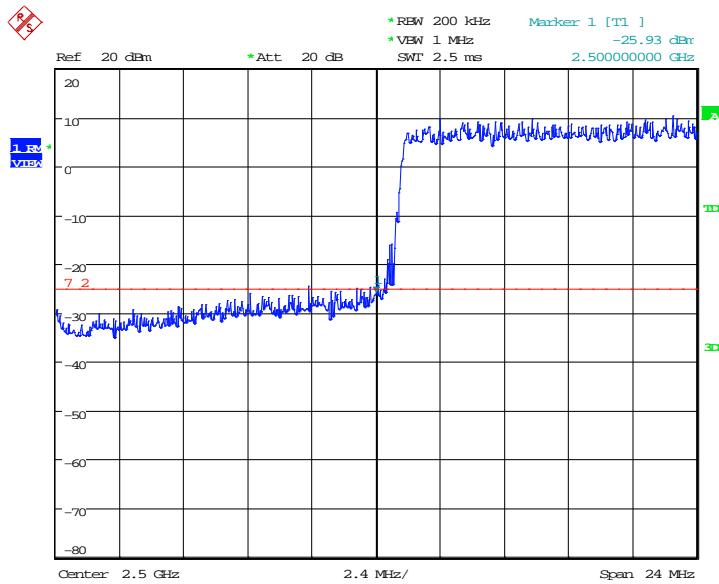
LTE band 7
OBW: 1RB-low_offset

Date: 18.JAN.2018 10:35:37
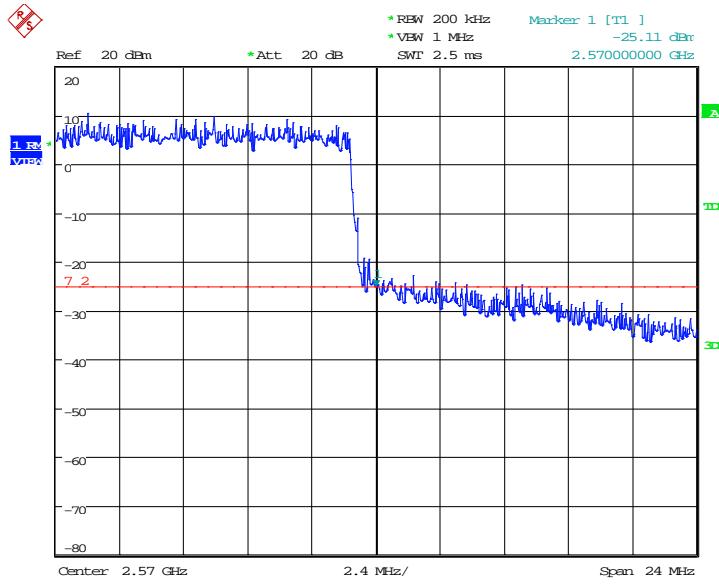
LOW BAND EDGE BLOCK-1RB-low_offset

Date: 18.JAN.2018 12:08:32
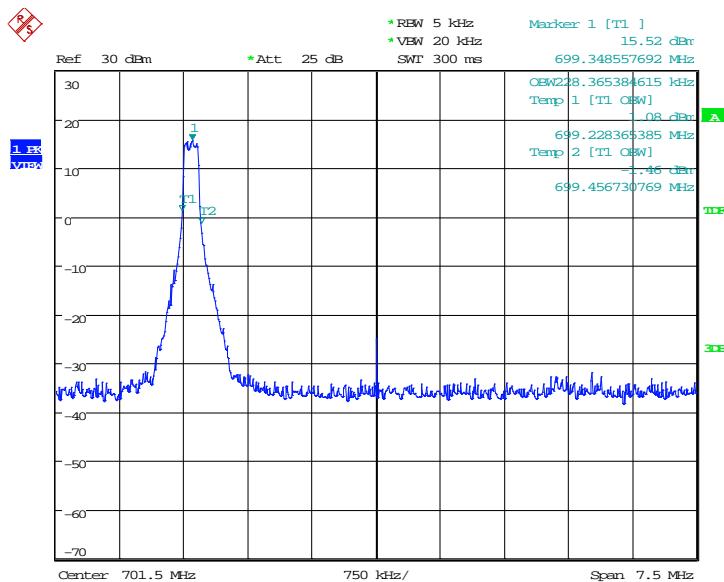
OBW: 1RB-high_offset

Date: 18.JAN.2018 10:36:27

HIGH BAND EDGE BLOCK-1RB-high_offset

Date: 18.JAN.2018 12:06:02

LOW BAND EDGE BLOCK-20MHz-100%RB
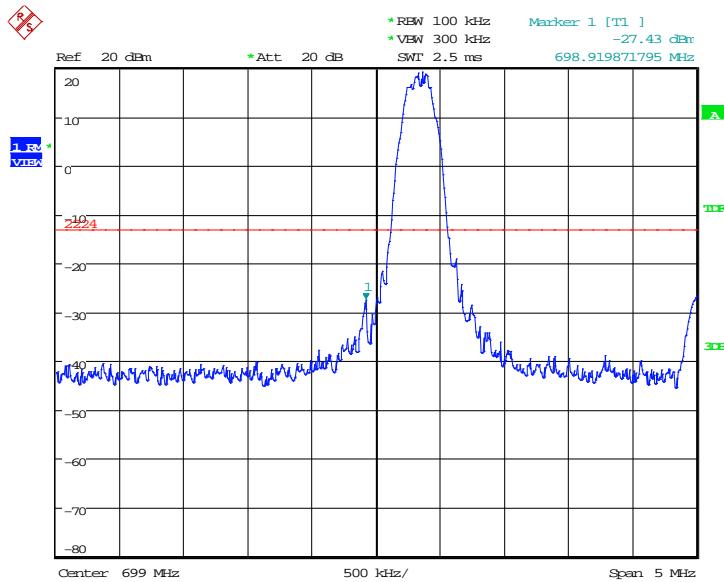
Date: 19.JAN.2018 10:32:30

HIGH BAND EDGE BLOCK-20MHz-100%RB
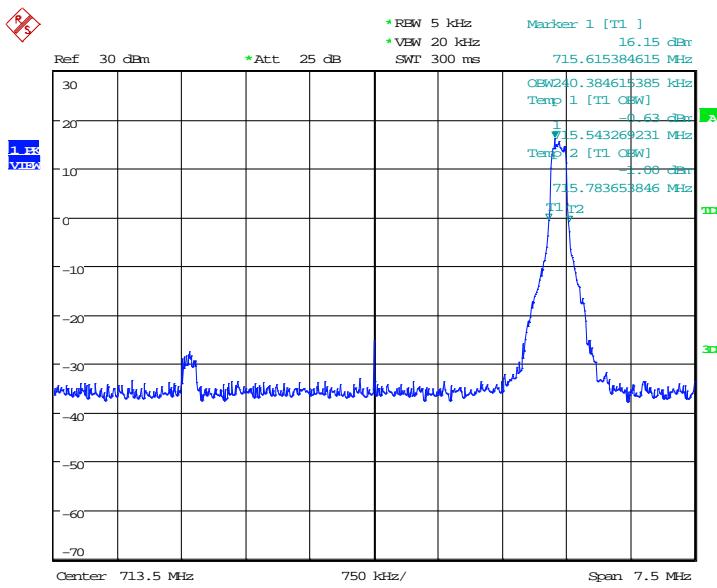
Date: 19.JAN.2018 10:33:46

LTE band 12
OBW: 1RB-low_offset
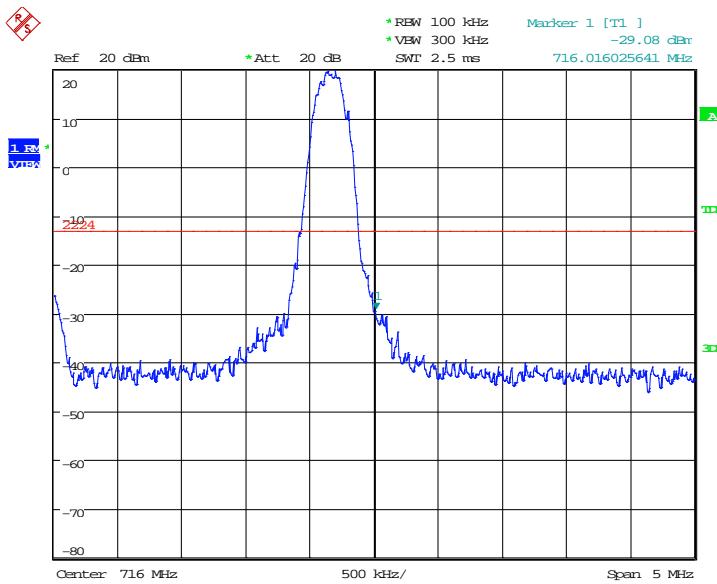
Date: 18.JAN.2018 11:20:19

LOW BAND EDGE BLOCK-1RB-low_offset
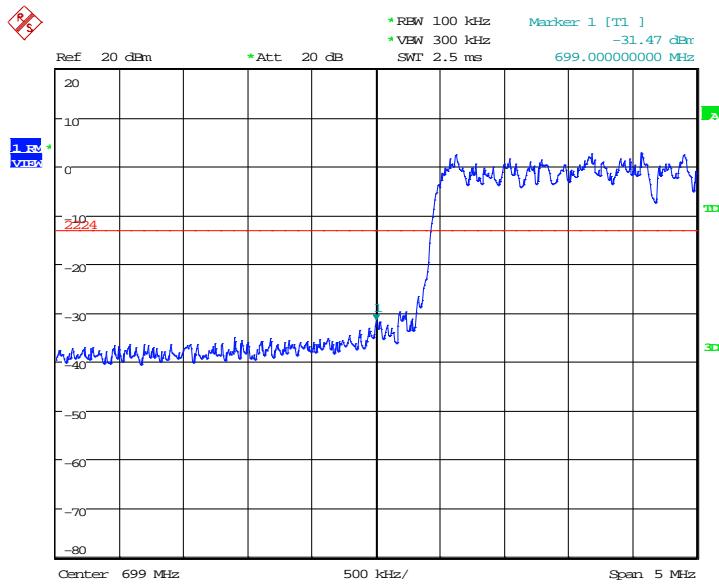
Date: 18.JAN.2018 11:22:11

OBW: 1RB-high_offset
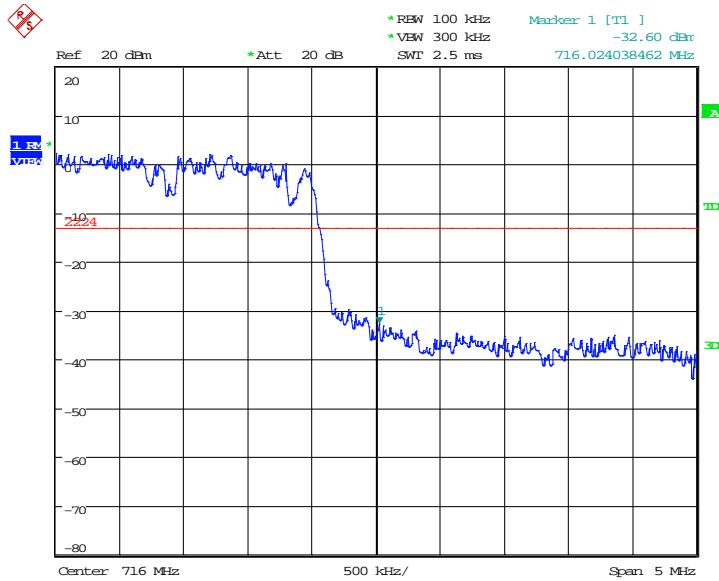
Date: 18.JAN.2018 11:21:10

**HIGH BAND EDGE BLOCK-1RB-high_offset**

Date: 18.JAN.2018 11:22:56

LOW BAND EDGE BLOCK-10MHz-100%RB

Date: 18.JAN.2018 12:45:29

HIGH BAND EDGE BLOCK-10MHz-100%RB

Date: 18.JAN.2018 12:47:06

Note: Expanded measurement uncertainty is U = 0.488 dB(100KHz-2GHz)/1.211 dB(2GHz-20GHz), k = 1.96

A.7 CONDUCTED SPURIOUS EMISSION

Reference
FCC: CFR Part 2.1057, 22.917, 24.238, 27.53(h).

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.

A. 7.3 Measurement result

Only worst case result is given below

LTE band 2: 30MHz – 20GHz
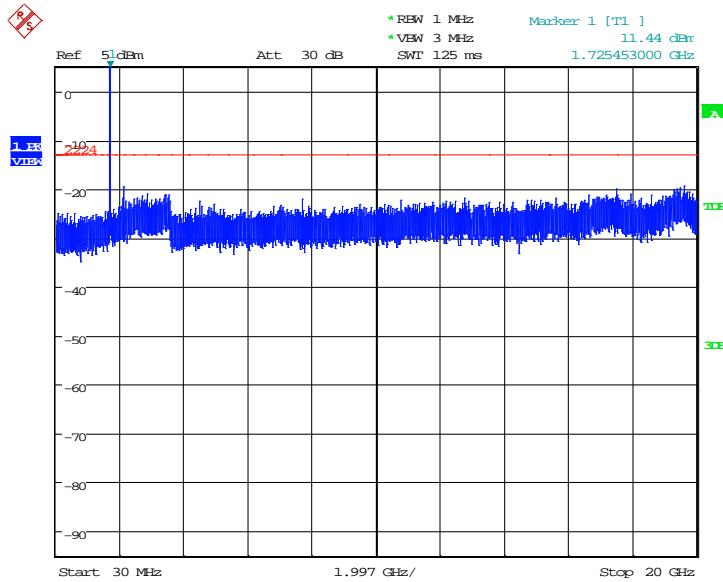
Spurious emission limit –13dBm.

Date: 16.JAN.2018 10:39:30

**LTE band 4: 30MHz – 20GHz**
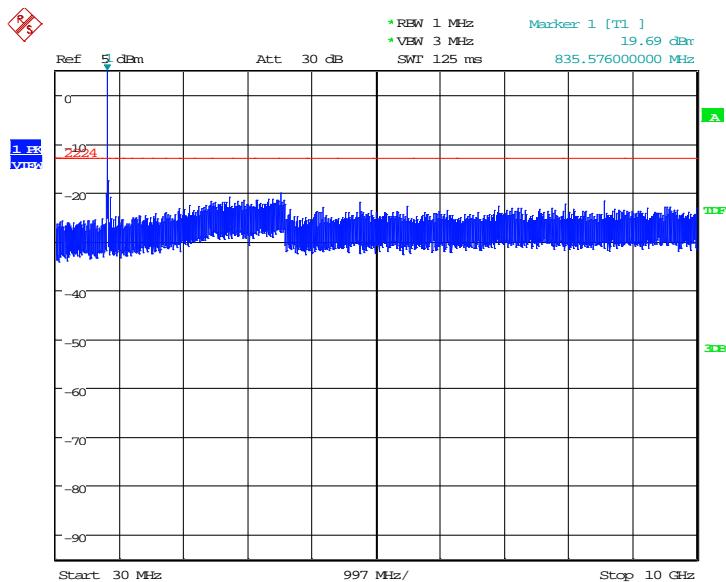
Spurious emission limit –13dBm.

Date: 16.JAN.2018 12:44:00

LTE band 5: 30MHz – 10GHz
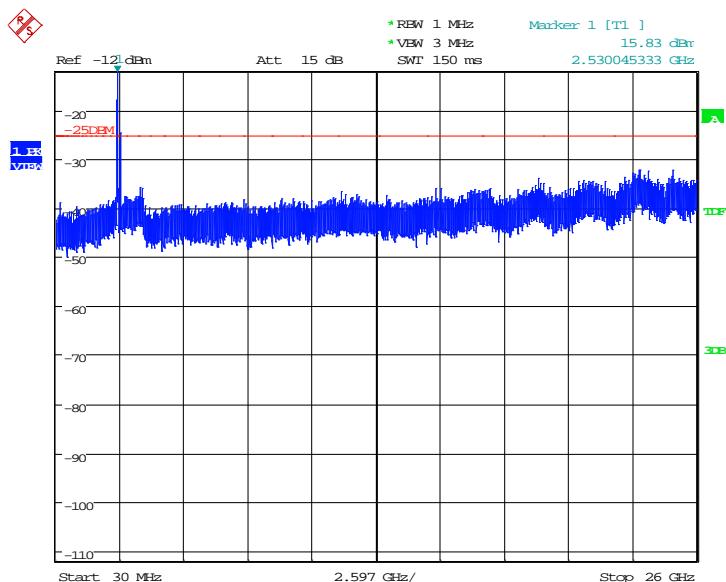
Spurious emission limit –13dBm.


Date: 16.JAN.2018 09:47:15

LTE band 7: 30MHz – 26GHz
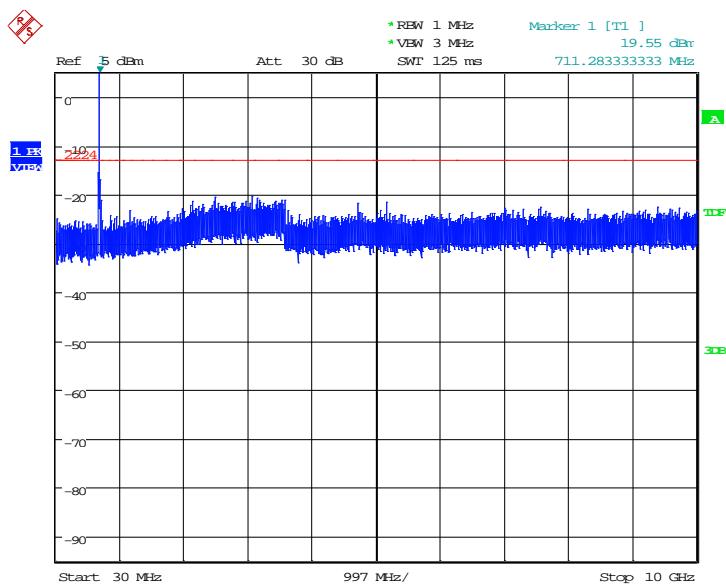
Spurious emission limit –25dBm.

Date: 17.JAN.2018 12:13:56

LTE band 12: 30MHz – 10GHz

Spurious emission limit –13dBm.

Date: 16.JAN.2018 11:23:43

Note: Expanded measurement uncertainty is U = 0.488 dB(100KHz-2GHz)/1.211 dB(2GHz-20GHz), k = 1.96.

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 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

LTE band 2

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
1860.0	20	7.08	7.47
	15	6.57	7.21
	10	5.74	6.38
	5	5.48	6.09
	3	5.32	6.12
	1.4	5.35	6.12

LTE band 4

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
1732.5	20	7.50	7.82
	15	7.15	7.56
	10	6.57	7.08
	5	6.44	7.05
	3	6.57	7.02
	1.4	6.57	6.96

LTE band 7

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
2510.0	20	6.59	7.14
	15	6.70	7.24
	10	5.96	6.67
	5	5.80	6.31

LTE band 12

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
707.5	10	5.58	6.41
	5	5.32	6.09
	3	5.26	6.12
	1.4	5.32	6.15

Note: Expanded measurement uncertainty is $U = 0.483$, $k = 2$

END OF REPORT