TEST REPORT

No. I20N02478-RF-LTE

for

TCL Communication Ltd.

GSM/UMTS/LTE Mobile phone

Model Name: 5007S

FCC ID: 2ACCJH130

with

Hardware Version: 03

Software Version: v2D23UZ31

Issued Date: 2020-10-16

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.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I20N02478-RF-LTE	Rev.0	1st edition	2020-10-16

Note: the latest revision of the test report supersedes all previous version.

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1. SUMMARY OF TEST REPORT

1.1. Test Items

Description	GSM/UMTS/LTE Mobile phone
Model Name	5007S
Applicant's name	TCL Communication Ltd.
Manufacturer's Name	TCL Communication Ltd.

1.2. Test Standards

FCC Part 2/22/24/27	10-1-19 Edition
ANSI C63.26	2015
KDB971168 D01	v03r01
ANSI/TIA-603-E	2016

1.3. Test Result

All test items are pass. Please refer to "6 Summary of Test Results" for detail.

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518026

1.5. Project Data

Testing Start Date: 2020-09-07 Testing End Date: 2020-09-22

1.6. Signature

Lai Minghua
(Prepared this test report)

Huang Qiuqin
(Reviewed this test report)

Zhang Hao
(Approved this test report)

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2. Client Information

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address /Post:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact:	Gong Zhizhou
Email:	zhizhou.gong@tcl.com
Telephone:	0086-755-36611722
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2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address /Post:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact:	Gong Zhizhou
Email:	zhizhou.gong@tcl.com
Telephone:	0086-755-36611722
Fax:	0086-755-36612000-81722

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

3.1. About EUT

Description	GSM/UMTS/LTE Mobile phone
Model Name	5007S
FCC ID	2ACCJH130
Antenna	Embedded
Output power	22.04dBm maximum EIRP measured for LTE Band 2
Extreme vol. Limits	3.5VDC to 4.4VDC (nominal: 3.85VDC)
Extreme temp. Tolerance	-20°C to +60°C
Condition of EUT as received	No abnormality in appearance

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Date of receipt
UT02aa	015794000205337	03	v2D23UZ31	2020-09-07
UT01aa	015794000205394	03	v2D23UZ31	2020-09-07

*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

AE1

Model	TLp034G1
Manufacturer	BYD
Capacitance	3500mAh

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

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4. Reference Documents

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

Reference	Title	Version
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-19 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-19 Edition
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	10-1-19 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-19 Edition
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB 971168 D01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS	v03r01

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5. Laboratory Environment

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

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz>60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	>2 MΩ
Ground system resistance	< 4 Ω

Fully-anechoic chamber did not exceed following limits along the EMC testing

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Voltage Standing Wave Ratio （VSWR）	≤ 6 dB, from 1 to 18 GHz，3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

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6. Summary Of Test Result

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	Verdict
1	Output Power	24.232	P
2	Emission Limit	2.1051/24.238	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	24.238	P
6	Band Edge Compliance	24.238	P
7	Conducted Spurious Emission	24.238	P
8	Peak-to-Average Power Ratio	24.232	P

LTE Band 5

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	22.913	P
2	Emission Limit	2.1051/22.917	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	22.917	P
6	Band Edge Compliance	22.917	P
7	Conducted Spurious Emission	22.917	P

LTE Band 12

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50	P
2	Emission Limit	2.1051/27.53	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	27.53	P
6	Band Edge Compliance	27.53	P
7	Conducted Spurious Emission	27.53	P
8	Peak-to-Average Power Ratio	27.50	P

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LTE Band 13

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50	P
2	Emission Limit	2.1051/27.53	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	27.53	P
6	Band Edge Compliance	27.53	P
7	Conducted Spurious Emission	27.53	P
8	Peak-to-Average Power Ratio	27.50	P

LTE Band 66

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50	P
2	Emission Limit	2.1051/27.53	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	27.53	P
6	Band Edge Compliance	27.53	P
7	Conducted Spurious Emission	27.53	P
8	Peak-to-Average Power Ratio	27.50	P

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7. STATEMENT

Since the information of samples in this report is provided by the client, the laboratory is not respo nsible for the authenticity of sample information.

This report takes measured values as criterion of test conclusion. The test conlusion meets the li mit requirements.

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8. Test Equipment Utilized

NO.	Description	Type	Manufacture	Series Number	Cal Due Date
1	Test Receiver	ESR7	R&S	101676	2020-11-27
2	BiLog Antenna	3142E	ETS-lindgren	00224831	2021-05-17
3	Horn Antenna	3117	ETS-lindgren	00066577	2022-04-02
4	Horn Antenna	QSH-SL-18-26-S-20	Q-par	17013	2023-01-06
5	Antenna	BBHA 9120D	Schwarzbeck	1593	2022-12-05
6	Antenna	VUBA 9117	Schwarzbeck	207	2023-07-15
7	Antenna	QWH-SL-18-40-K-SG	Q-par	15979	2023-01-06
8	preamplifier	83017A	Agilent	MY39501110	/
9	Signal Generator	SMB100A	R&S	179725	2020-11-27
10	Fully Anechoic Chamber	FACT3-2.0	ETS-Lindgren	1285	2021-07-19
11	Spectrum Analyzer	FSV40	R&S	101192	2021-01-14
12	Universal Radio Communication Tester	CMW500	R&S	152499	2021.07.16
13	Universal Radio Communication Tester	CMW500	R&S	129146	2021-04-24
14	Spectrum Analyzer	FSU	R&S	101506	2020-12-13
15	Temperature Chamber	SH-241	ESPECs	92007516	2020-10-15
16	DC Power Supply	U3606A	Agilent Technologies	MY50450012	2020-11-13

Test software

Item	Name	Vesion
Radiated	EMC32	Version 10.01.00

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Annex A: Measurement Results

A.1 Output Power

A.1.1 Summary

During the process of testing, the EUT was controlled via communication tester to ensure max power transmission and proper modulation.

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	22.36	21.39
		1880.0	22.30	21.32
		1850.7	22.39	21.75
	1 RB low	1909.3	22.35	21.38
		1880.0	22.26	21.32
		1850.7	22.38	21.74
	50% RB mid	1909.3	22.49	21.65
		1880.0	22.38	21.39
		1850.7	22.54	21.69
	100% RB	1909.3	21.51	20.62
		1880.0	21.34	20.47
		1850.7	21.49	20.34
3MHz	1 RB high	1908.5	22.39	21.39
		1880.0	22.31	21.18
		1851.5	22.44	21.79
	1 RB low	1908.5	22.51	21.48
		1880.0	22.27	21.23
		1851.5	22.41	21.77
	50% RB mid	1908.5	21.53	20.52
		1880.0	21.37	20.50
		1851.5	21.46	20.57

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	100% RB	1908.5	21.53	20.42
		1880.0	21.34	20.38
		1851.5	21.41	20.45
5MHz	1 RB high	1907.5	22.35	21.38
		1880.0	22.28	21.42
		1852.5	22.28	21.83
	1 RB low	1907.5	22.41	21.42
		1880.0	22.28	21.35
		1852.5	22.29	21.79
	50% RB mid	1907.5	21.51	20.56
		1880.0	21.35	20.43
		1852.5	21.47	20.61
	100% RB	1907.5	21.41	20.37
		1880.0	21.27	20.33
		1852.5	21.40	20.47
10MHz	1 RB high	1905.0	22.35	21.33
		1880.0	22.23	21.20
		1855.0	22.33	21.66
	1 RB low	1905.0	22.36	21.37
		1880.0	22.23	21.12
		1855.0	22.39	21.72
	50% RB mid	1905.0	21.46	20.55
		1880.0	21.31	20.36
		1855.0	21.43	20.50
	100% RB	1905.0	21.35	20.38
		1880.0	21.29	20.31
		1855.0	21.39	20.44
15MHz	1 RB high	1902.5	22.31	21.59
		1880.0	22.20	21.63
		1857.5	22.23	21.17
	1 RB low	1902.5	22.37	21.72
		1880.0	22.21	21.50
		1857.5	22.25	21.22
	50% RB mid	1902.5	21.54	20.52
		1880.0	21.34	20.28
		1857.5	21.39	20.40
	100% RB	1902.5	21.41	20.44
		1880.0	21.32	20.28
		1857.5	21.40	20.40

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20MHz	1 RB high	1900.0	22.11	21.50
		1880.0	22.04	21.46
		1860.0	22.03	21.54
	1 RB low	1900.0	22.08	21.57
		1880.0	22.08	21.34
		1860.0	22.13	21.63
	50% RB mid	1900.0	21.42	20.44
		1880.0	21.31	20.30
		1860.0	21.37	20.38
	100% RB	1900.0	21.35	20.37
		1880.0	21.26	20.31
		1860.0	21.33	20.39

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LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	848.3	22.66	21.49
		836.5	22.67	21.53
		824.7	22.58	21.52
	1 RB low	848.3	22.71	21.53
		836.5	22.70	21.59
		824.7	22.61	21.55
	50% RB mid	848.3	22.74	21.94
		836.5	22.74	22.02
		824.7	22.67	21.97
	100% RB	848.3	22.72	21.74
		836.5	22.72	21.79
		824.7	22.62	21.71
3MHz	1 RB high	847.5	22.66	21.65
		836.5	22.66	21.83
		825.5	22.68	21.56
	1 RB low	847.5	22.71	21.65
		836.5	22.67	21.89
		825.5	22.67	21.61
	50% RB mid	847.5	22.72	21.66
		836.5	22.72	21.70
		825.5	22.71	21.80
	100% RB	847.5	21.74	20.61
		836.5	21.74	20.73
		825.5	21.74	20.79
5MHz	1 RB high	846.5	22.58	21.64
		836.5	22.71	21.75
		826.5	22.68	22.21
	1 RB low	846.5	22.58	21.63
		836.5	22.70	21.74
		826.5	22.63	22.14
	50% RB mid	846.5	21.71	20.73
		836.5	21.76	20.82
		826.5	21.83	20.99
	100% RB	846.5	21.61	20.57
		836.5	21.73	20.76
		826.5	21.74	20.84
10MHz	1 RB high	844.0	22.63	21.55

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		836.5	22.74	22.06
		829.0	22.71	21.73
	1 RB low	844.0	22.67	21.61
		836.5	22.75	22.08
		829.0	22.66	21.74
	50% RB mid	844.0	21.66	20.71
		836.5	21.73	20.78
		829.0	21.80	20.92
	100% RB	844.0	21.66	20.64
		836.5	21.79	20.83
		829.0	21.73	20.77

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LTE band 12

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	715.3	22.45	21.46
		707.5	22.48	21.51
		699.7	22.49	21.77
	1 RB low	715.3	22.44	21.45
		707.5	22.49	21.51
		699.7	22.46	21.75
	50% RB mid	715.3	22.62	21.69
		707.5	22.55	21.57
		699.7	22.53	21.65
	100% RB	715.3	21.57	20.78
		707.5	21.56	20.68
		699.7	21.50	20.43
3MHz	1 RB high	714.5	22.49	21.42
		707.5	22.50	21.38
		700.5	22.55	21.83
	1 RB low	714.5	22.54	21.57
		707.5	22.45	21.39
		700.5	22.46	21.82
	50% RB mid	714.5	21.61	20.65
		707.5	21.56	20.68
		700.5	21.53	20.62
	100% RB	714.5	21.50	20.51
		707.5	21.46	20.52
		700.5	21.44	20.54
5MHz	1 RB high	713.5	22.38	21.48
		707.5	22.43	21.56
		701.5	22.42	21.90
	1 RB low	713.5	22.42	21.52
		707.5	22.37	21.51
		701.5	22.35	21.80
	50% RB mid	713.5	21.55	20.62
		707.5	21.48	20.60
		701.5	21.50	20.68
	100% RB	713.5	21.47	20.46
		707.5	21.46	20.53
		701.5	21.43	20.58
10MHz	1 RB high	711.0	22.60	21.43

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		707.5	22.65	21.95
		704.0	22.58	21.59
	1 RB low	711.0	22.51	21.43
		707.5	22.57	21.82
		704.0	22.45	21.48
	50% RB mid	711.0	21.64	20.70
		707.5	21.63	20.67
		704.0	21.61	20.74
	100% RB	711.0	21.45	20.49
		707.5	21.72	20.80
		704.0	21.74	20.83

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LTE band 13

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
5MHz	1 RB high	784.5	22.61	21.74
		782.0	22.63	21.78
		779.5	22.61	22.14
	1 RB low	784.5	22.60	21.75
		782.0	22.44	21.55
		779.5	22.48	21.90
	50% RB mid	784.5	21.75	20.84
		782.0	21.77	20.87
		779.5	21.60	20.77
	100% RB	784.5	21.75	20.75
		782.0	21.72	20.77
		779.5	21.54	20.68
10MHz	1 RB high	782.0	22.60	21.65
	1 RB low	782.0	22.43	21.40
	50% RB mid	782.0	21.62	20.79
	100% RB	782.0	21.52	20.56

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LTE band 66

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1779.3	22.48	21.53
		1745.0	22.58	21.69
		1710.7	22.59	21.94
	1 RB low	1779.3	22.39	21.48
		1745.0	22.51	21.68
		1710.7	22.52	21.94
	50% RB mid	1779.3	22.60	21.78
		1745.0	22.69	21.77
		1710.7	22.70	21.86
	100% RB	1779.3	21.56	20.70
		1745.0	21.58	20.75
		1710.7	21.60	20.51
3MHz	1 RB high	1778.5	22.48	21.49
		1745.0	22.63	21.51
		1711.5	22.57	21.93
	1 RB low	1778.5	22.51	21.54
		1745.0	22.52	21.54
		1711.5	22.56	21.94
	50% RB mid	1778.5	21.54	20.63
		1745.0	21.59	20.79
		1711.5	21.61	20.72
	100% RB	1778.5	21.51	20.52
		1745.0	21.55	20.66
		1711.5	21.53	20.60
5MHz	1 RB high	1777.5	22.48	21.55
		1745.0	22.54	22.06
		1712.5	22.53	21.60
	1 RB low	1777.5	22.52	21.55
		1745.0	22.54	22.04
		1712.5	22.58	21.60
	50% RB mid	1777.5	21.55	20.64
		1745.0	21.64	20.76
		1712.5	21.64	20.65
	100% RB	1777.5	21.51	20.56
		1745.0	21.62	20.69
		1712.5	21.56	20.54
10MHz	1 RB high	1775.0	22.41	21.37

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		1745.0	22.59	21.97
		1715.0	22.54	21.53
	1 RB low	1775.0	22.46	21.34
		1745.0	22.62	21.95
		1715.0	22.54	21.62
	50% RB mid	1775.0	21.52	20.55
		1745.0	21.65	20.71
		1715.0	21.62	20.70
	100% RB	1775.0	21.54	20.57
		1745.0	21.67	20.70
		1715.0	21.66	20.72
15MHz	1 RB high	1772.5	22.44	21.74
		1745.0	22.50	21.91
		1717.5	22.43	21.33
	1 RB low	1772.5	22.51	21.82
		1745.0	22.54	21.94
		1717.5	22.48	21.42
	50% RB mid	1772.5	21.56	20.56
		1745.0	21.64	20.61
		1717.5	21.63	20.58
	100% RB	1772.5	21.54	20.56
		1745.0	21.65	20.65
		1717.5	21.58	20.57
20MHz	1 RB high	1770.0	22.09	21.58
		1745.0	22.16	21.64
		1720.0	22.21	21.71
	1 RB low	1770.0	22.11	21.63
		1745.0	22.19	21.58
		1720.0	22.20	21.71
	50% RB mid	1770.0	21.37	20.43
		1745.0	21.53	20.53
		1720.0	21.42	20.46
	100% RB	1770.0	21.28	20.34
		1745.0	21.53	20.58
		1720.0	21.32	20.38

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A.1.3 Radiated

A.1.3.1 Description

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

Part 24.232(c) specifies "Mobile and portable stations are limited to 2 watts EIRP".

Part 22.913(a) specifies "The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts".

Part 27.50(c)(10) specifies "Portable stations (hand-held devices) in the 600 MHz uplink band and the 698–746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP".

Part 27.50(b) specifies "Portable stations (hand-held devices) transmitting in the 746–757 MHz, 776–788 MHz, and 805–806 MHz bands are limited to 3 watts ERP".

Part 27.50(d)(4) specifies "Fixed, mobile, and portable (handheld) stations operating in the 1710–1755 MHz band and mobile and portable stations operating in the 1695–1710 MHz and 1755–1780 MHz bands are limited to 1 watt EIRP".

A.1.3.2 Method of Measurement

ANSI C63.26 chapter 5.2.5.5: when working in decibels (i.e., logarithmic scale), the ERP and EIRP represent the sum of the transmit antenna gain (in dBd or dBi, respectively) and the conducted RF output power (expressed in dB relative to watts or milliwatts).

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation (1) as follows:

$$\text{ERP or EIRP} = P_{Mea} + G_T$$

Where

ERP or EIRP	effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Mea} , e.g., dBm or dBW)
P_{Mea}	measured transmitter output power or PSD, in dBm or dBW
G_T	gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

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A.1.3.3 Measurement result

LTE Band 2-EIRP

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm		G_T (dBi)	Radiated Power (dBm)	
			QPSK	16QAM		QPSK	16QAM
1.4MHz	1 RB high	1909.3	22.36	21.39	-0.5	21.86	20.89
		1880.0	22.30	21.32	-0.5	21.8	20.82
		1850.7	22.39	21.75	-0.5	21.89	21.25
	1 RB low	1909.3	22.35	21.38	-0.5	21.85	20.88
		1880.0	22.26	21.32	-0.5	21.76	20.82
		1850.7	22.38	21.74	-0.5	21.88	21.24
	50% RB mid	1909.3	22.49	21.65	-0.5	21.99	21.15
		1880.0	22.38	21.39	-0.5	21.88	20.89
		1850.7	22.54	21.69	-0.5	22.04	21.19
	100% RB	1909.3	21.51	20.62	-0.5	21.01	20.12
		1880.0	21.34	20.47	-0.5	20.84	19.97
		1850.7	21.49	20.34	-0.5	20.99	19.84
3MHz	1 RB high	1908.5	22.39	21.39	-0.5	21.89	20.89
		1880.0	22.31	21.18	-0.5	21.81	20.68
		1851.5	22.44	21.79	-0.5	21.94	21.29
	1 RB low	1908.5	22.51	21.48	-0.5	22.01	20.98
		1880.0	22.27	21.23	-0.5	21.77	20.73
		1851.5	22.41	21.77	-0.5	21.91	21.27
	50% RB mid	1908.5	21.53	20.52	-0.5	21.03	20.02
		1880.0	21.37	20.50	-0.5	20.87	20
		1851.5	21.46	20.57	-0.5	20.96	20.07
	100% RB	1908.5	21.53	20.42	-0.5	21.03	19.92
		1880.0	21.34	20.38	-0.5	20.84	19.88
		1851.5	21.41	20.45	-0.5	20.91	19.95
5MHz	1 RB high	1907.5	22.35	21.38	-0.5	21.85	20.88
		1880.0	22.28	21.42	-0.5	21.78	20.92
		1852.5	22.28	21.83	-0.5	21.78	21.33
	1 RB low	1907.5	22.41	21.42	-0.5	21.91	20.92
		1880.0	22.28	21.35	-0.5	21.78	20.85
		1852.5	22.29	21.79	-0.5	21.79	21.29
	50% RB mid	1907.5	21.51	20.56	-0.5	21.01	20.06
		1880.0	21.35	20.43	-0.5	20.85	19.93
		1852.5	21.47	20.61	-0.5	20.97	20.11
	100% RB	1907.5	21.41	20.37	-0.5	20.91	19.87
		1880.0	21.27	20.33	-0.5	20.77	19.83

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		1852.5	21.40	20.47	-0.5	20.9	19.97
10MHz	1 RB high	1905.0	22.35	21.33	-0.5	21.85	20.83
		1880.0	22.23	21.20	-0.5	21.73	20.7
		1855.0	22.33	21.66	-0.5	21.83	21.16
	1 RB low	1905.0	22.36	21.37	-0.5	21.86	20.87
		1880.0	22.23	21.12	-0.5	21.73	20.62
		1855.0	22.39	21.72	-0.5	21.89	21.22
	50% RB mid	1905.0	21.46	20.55	-0.5	20.96	20.05
		1880.0	21.31	20.36	-0.5	20.81	19.86
		1855.0	21.43	20.50	-0.5	20.93	20
	100% RB	1905.0	21.35	20.38	-0.5	20.85	19.88
		1880.0	21.29	20.31	-0.5	20.79	19.81
		1855.0	21.39	20.44	-0.5	20.89	19.94
15MHz	1 RB high	1902.5	22.31	21.59	-0.5	21.81	21.09
		1880.0	22.20	21.63	-0.5	21.7	21.13
		1857.5	22.23	21.17	-0.5	21.73	20.67
	1 RB low	1902.5	22.37	21.72	-0.5	21.87	21.22
		1880.0	22.21	21.50	-0.5	21.71	21
		1857.5	22.25	21.22	-0.5	21.75	20.72
	50% RB mid	1902.5	21.54	20.52	-0.5	21.04	20.02
		1880.0	21.34	20.28	-0.5	20.84	19.78
		1857.5	21.39	20.40	-0.5	20.89	19.9
	100% RB	1902.5	21.41	20.44	-0.5	20.91	19.94
		1880.0	21.32	20.28	-0.5	20.82	19.78
		1857.5	21.40	20.40	-0.5	20.9	19.9
20MHz	1 RB high	1900.0	22.11	21.50	-0.5	21.61	21
		1880.0	22.04	21.46	-0.5	21.54	20.96
		1860.0	22.03	21.54	-0.5	21.53	21.04
	1 RB low	1900.0	22.08	21.57	-0.5	21.58	21.07
		1880.0	22.08	21.34	-0.5	21.58	20.84
		1860.0	22.13	21.63	-0.5	21.63	21.13
	50% RB mid	1900.0	21.42	20.44	-0.5	20.92	19.94
		1880.0	21.31	20.30	-0.5	20.81	19.8
		1860.0	21.37	20.38	-0.5	20.87	19.88
	100% RB	1900.0	21.35	20.37	-0.5	20.85	19.87
		1880.0	21.26	20.31	-0.5	20.76	19.81
		1860.0	21.33	20.39	-0.5	20.83	19.89

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LTE Band 5-ERP

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)		G_T (dBi)	Radiated Power (dBm)	
			QPSK	16QAM		QPSK	16QAM
1.4MHz	1 RB high	848.3	22.66	21.49	-4	16.51	15.34
		836.5	22.67	21.53	-4	16.52	15.38
		824.7	22.58	21.52	-4	16.43	15.37
	1 RB low	848.3	22.71	21.53	-4	16.56	15.38
		836.5	22.70	21.59	-4	16.55	15.44
		824.7	22.61	21.55	-4	16.46	15.4
	50% RB mid	848.3	22.74	21.94	-4	16.59	15.79
		836.5	22.74	22.02	-4	16.59	15.87
		824.7	22.67	21.97	-4	16.52	15.82
	100% RB	848.3	22.72	21.74	-4	16.57	15.59
		836.5	22.72	21.79	-4	16.57	15.64
		824.7	22.62	21.71	-4	16.47	15.56
3MHz	1 RB high	847.5	22.66	21.65	-4	16.51	15.5
		836.5	22.66	21.83	-4	16.51	15.68
		825.5	22.68	21.56	-4	16.53	15.41
	1 RB low	847.5	22.71	21.65	-4	16.56	15.5
		836.5	22.67	21.89	-4	16.52	15.74
		825.5	22.67	21.61	-4	16.52	15.46
	50% RB mid	847.5	22.72	21.66	-4	16.57	15.51
		836.5	22.72	21.70	-4	16.57	15.55
		825.5	22.71	21.80	-4	16.56	15.65
	100% RB	847.5	21.74	20.61	-4	15.59	14.46
		836.5	21.74	20.73	-4	15.59	14.58
		825.5	21.74	20.79	-4	15.59	14.64
5MHz	1 RB high	846.5	22.58	21.64	-4	16.43	15.49
		836.5	22.71	21.75	-4	16.56	15.6
		826.5	22.68	22.21	-4	16.53	16.06
	1 RB low	846.5	22.58	21.63	-4	16.43	15.48
		836.5	22.70	21.74	-4	16.55	15.59
		826.5	22.63	22.14	-4	16.48	15.99
	50% RB mid	846.5	21.71	20.73	-4	15.56	14.58
		836.5	21.76	20.82	-4	15.61	14.67
		826.5	21.83	20.99	-4	15.68	14.84
	100% RB	846.5	21.61	20.57	-4	15.46	14.42
		836.5	21.73	20.76	-4	15.58	14.61

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		826.5	21.74	20.84	-4	15.59	14.69
10MHz	1 RB high	844.0	22.63	21.55	-4	16.48	15.4
		836.5	22.74	22.06	-4	16.59	15.91
		829.0	22.71	21.73	-4	16.56	15.58
	1 RB low	844.0	22.67	21.61	-4	16.52	15.46
		836.5	22.75	22.08	-4	16.6	15.93
		829.0	22.66	21.74	-4	16.51	15.59
	50% RB mid	844.0	21.66	20.71	-4	15.51	14.56
		836.5	21.73	20.78	-4	15.58	14.63
		829.0	21.80	20.92	-4	15.65	14.77
	100% RB	844.0	21.66	20.64	-4	15.51	14.49
		836.5	21.79	20.83	-4	15.64	14.68
		829.0	21.73	20.77	-4	15.58	14.62

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LTE Band 12 -ERP

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm		G_T (dBi)	Radiated Power (dBm)	
			QPSK	16QAM		QPSK	16QAM
1.4MHz	1 RB high	715.3	22.45	21.46	-3.4	16.9	15.91
		707.5	22.48	21.51	-3.4	16.93	15.96
		699.7	22.49	21.77	-3.4	16.94	16.22
	1 RB low	715.3	22.44	21.45	-3.4	16.89	15.9
		707.5	22.49	21.51	-3.4	16.94	15.96
		699.7	22.46	21.75	-3.4	16.91	16.2
	50% RB mid	715.3	22.62	21.69	-3.4	17.07	16.14
		707.5	22.55	21.57	-3.4	17	16.02
		699.7	22.53	21.65	-3.4	16.98	16.1
	100% RB	715.3	21.57	20.78	-3.4	16.02	15.23
		707.5	21.56	20.68	-3.4	16.01	15.13
		699.7	21.50	20.43	-3.4	15.95	14.88
3MHz	1 RB high	714.5	22.49	21.42	-3.4	16.94	15.87
		707.5	22.50	21.38	-3.4	16.95	15.83
		700.5	22.55	21.83	-3.4	17	16.28
	1 RB low	714.5	22.54	21.57	-3.4	16.99	16.02
		707.5	22.45	21.39	-3.4	16.9	15.84
		700.5	22.46	21.82	-3.4	16.91	16.27
	50% RB mid	714.5	21.61	20.65	-3.4	16.06	15.1
		707.5	21.56	20.68	-3.4	16.01	15.13
		700.5	21.53	20.62	-3.4	15.98	15.07
	100% RB	714.5	21.50	20.51	-3.4	15.95	14.96
		707.5	21.46	20.52	-3.4	15.91	14.97
		700.5	21.44	20.54	-3.4	15.89	14.99
5MHz	1 RB high	713.5	22.38	21.48	-3.4	16.83	15.93
		707.5	22.43	21.56	-3.4	16.88	16.01
		701.5	22.42	21.90	-3.4	16.87	16.35
	1 RB low	713.5	22.42	21.52	-3.4	16.87	15.97
		707.5	22.37	21.51	-3.4	16.82	15.96
		701.5	22.35	21.80	-3.4	16.8	16.25
	50% RB mid	713.5	21.55	20.62	-3.4	16	15.07
		707.5	21.48	20.60	-3.4	15.93	15.05
		701.5	21.50	20.68	-3.4	15.95	15.13
	100% RB	713.5	21.47	20.46	-3.4	15.92	14.91
		707.5	21.46	20.53	-3.4	15.91	14.98

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		701.5	21.43	20.58	-3.4	15.88	15.03
10MHz	1 RB high	711.0	22.60	21.43	-3.4	17.05	15.88
		707.5	22.65	21.95	-3.4	17.1	16.4
		704.0	22.58	21.59	-3.4	17.03	16.04
	1 RB low	711.0	22.51	21.43	-3.4	16.96	15.88
		707.5	22.57	21.82	-3.4	17.02	16.27
		704.0	22.45	21.48	-3.4	16.9	15.93
	50% RB mid	711.0	21.64	20.70	-3.4	16.09	15.15
		707.5	21.63	20.67	-3.4	16.08	15.12
		704.0	21.61	20.74	-3.4	16.06	15.19
	100% RB	711.0	21.45	20.49	-3.4	15.9	14.94
		707.5	21.72	20.80	-3.4	16.17	15.25
		704.0	21.74	20.83	-3.4	16.19	15.28

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LTE Band 13-ERP

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm		G_T (dBi)	Radiated Power (dBm)	
			QPSK	16QAM		QPSK	16QAM
5MHz	1 RB high	784.5	22.61	21.74	-4	16.48	15.63
		782.0	22.63	21.78	-4	16.46	15.99
		779.5	22.61	22.14	-4	16.45	15.6
	1 RB low	784.5	22.60	21.75	-4	16.29	15.4
		782.0	22.44	21.55	-4	16.33	15.75
		779.5	22.48	21.90	-4	15.6	14.69
	50% RB mid	784.5	21.75	20.84	-4	15.62	14.72
		782.0	21.77	20.87	-4	15.45	14.62
		779.5	21.60	20.77	-4	15.6	14.6
	100% RB	784.5	21.75	20.75	-4	15.57	14.62
		782.0	21.72	20.77	-4	15.39	14.53
		779.5	21.54	20.68	-4	16.45	15.5
10MHz	1 RB high	782.0	22.60	21.65	-4	16.28	15.25
	1 RB low	782.0	22.43	21.40	-4	15.47	14.64
	50% RB mid	782.0	21.62	20.79	-4	15.37	14.41
	100% RB	782.0	21.52	20.56	-4	16.48	15.63

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LTE Band 66-EIRP

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm		G_T (dBi)	Radiated Power (dBm)	
			QPSK	16QAM		QPSK	16QAM
1.4MHz	1 RB high	1779.3	22.48	21.53	-1.5	20.98	20.03
		1745.0	22.58	21.69	-1.5	21.08	20.19
		1710.7	22.59	21.94	-1.5	21.09	20.44
	1 RB low	1779.3	22.39	21.48	-1.5	20.89	19.98
		1745.0	22.51	21.68	-1.5	21.01	20.18
		1710.7	22.52	21.94	-1.5	21.02	20.44
	50% RB mid	1779.3	22.60	21.78	-1.5	21.1	20.28
		1745.0	22.69	21.77	-1.5	21.19	20.27
		1710.7	22.70	21.86	-1.5	21.2	20.36
	100% RB	1779.3	21.56	20.70	-1.5	20.06	19.2
		1745.0	21.58	20.75	-1.5	20.08	19.25
		1710.7	21.60	20.51	-1.5	20.1	19.01
3MHz	1 RB high	1778.5	22.48	21.49	-1.5	20.98	19.99
		1745.0	22.63	21.51	-1.5	21.13	20.01
		1711.5	22.57	21.93	-1.5	21.07	20.43
	1 RB low	1778.5	22.51	21.54	-1.5	21.01	20.04
		1745.0	22.52	21.54	-1.5	21.02	20.04
		1711.5	22.56	21.94	-1.5	21.06	20.44
	50% RB mid	1778.5	21.54	20.63	-1.5	20.04	19.13
		1745.0	21.59	20.79	-1.5	20.09	19.29
		1711.5	21.61	20.72	-1.5	20.11	19.22
	100% RB	1778.5	21.51	20.52	-1.5	20.01	19.02
		1745.0	21.55	20.66	-1.5	20.05	19.16
		1711.5	21.53	20.60	-1.5	20.03	19.1
5MHz	1 RB high	1777.5	22.48	21.55	-1.5	20.98	20.05
		1745.0	22.54	22.06	-1.5	21.04	20.56
		1712.5	22.53	21.60	-1.5	21.03	20.1
	1 RB low	1777.5	22.52	21.55	-1.5	21.02	20.05
		1745.0	22.54	22.04	-1.5	21.04	20.54
		1712.5	22.58	21.60	-1.5	21.08	20.1
	50% RB mid	1777.5	21.55	20.64	-1.5	20.05	19.14
		1745.0	21.64	20.76	-1.5	20.14	19.26
		1712.5	21.64	20.65	-1.5	20.14	19.15
	100% RB	1777.5	21.51	20.56	-1.5	20.01	19.06
		1745.0	21.62	20.69	-1.5	20.12	19.19

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		1712.5	21.56	20.54	-1.5	20.06	19.04
10MHz	1 RB high	1775.0	22.41	21.37	-1.5	20.91	19.87
		1745.0	22.59	21.97	-1.5	21.09	20.47
		1715.0	22.54	21.53	-1.5	21.04	20.03
	1 RB low	1775.0	22.46	21.34	-1.5	20.96	19.84
		1745.0	22.62	21.95	-1.5	21.12	20.45
		1715.0	22.54	21.62	-1.5	21.04	20.12
	50% RB mid	1775.0	21.52	20.55	-1.5	20.02	19.05
		1745.0	21.65	20.71	-1.5	20.15	19.21
		1715.0	21.62	20.70	-1.5	20.12	19.2
	100% RB	1775.0	21.54	20.57	-1.5	20.04	19.07
		1745.0	21.67	20.70	-1.5	20.17	19.2
		1715.0	21.66	20.72	-1.5	20.16	19.22
15MHz	1 RB high	1772.5	22.44	21.74	-1.5	20.94	20.24
		1745.0	22.50	21.91	-1.5	21	20.41
		1717.5	22.43	21.33	-1.5	20.93	19.83
	1 RB low	1772.5	22.51	21.82	-1.5	21.01	20.32
		1745.0	22.54	21.94	-1.5	21.04	20.44
		1717.5	22.48	21.42	-1.5	20.98	19.92
	50% RB mid	1772.5	21.56	20.56	-1.5	20.06	19.06
		1745.0	21.64	20.61	-1.5	20.14	19.11
		1717.5	21.63	20.58	-1.5	20.13	19.08
	100% RB	1772.5	21.54	20.56	-1.5	20.04	19.06
		1745.0	21.65	20.65	-1.5	20.15	19.15
		1717.5	21.58	20.57	-1.5	20.08	19.07
20MHz	1 RB high	1770.0	22.09	21.58	-1.5	20.59	20.08
		1745.0	22.16	21.64	-1.5	20.66	20.14
		1720.0	22.21	21.71	-1.5	20.71	20.21
	1 RB low	1770.0	22.11	21.63	-1.5	20.61	20.13
		1745.0	22.19	21.58	-1.5	20.69	20.08
		1720.0	22.20	21.71	-1.5	20.7	20.21
	50% RB mid	1770.0	21.37	20.43	-1.5	19.87	18.93
		1745.0	21.53	20.53	-1.5	20.03	19.03
		1720.0	21.42	20.46	-1.5	19.92	18.96
	100% RB	1770.0	21.28	20.34	-1.5	19.78	18.84
		1745.0	21.53	20.58	-1.5	20.03	19.08
		1720.0	21.32	20.38	-1.5	19.82	18.88

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A.2 Emission Limit

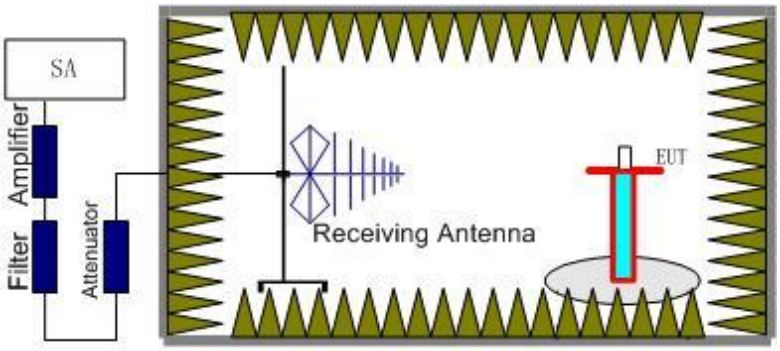
A.2.1 Measurement Method

The measurements procedures in TIA-603E-2016 are used. This measurement is carried out in fully anechoic chamber FAC-3.

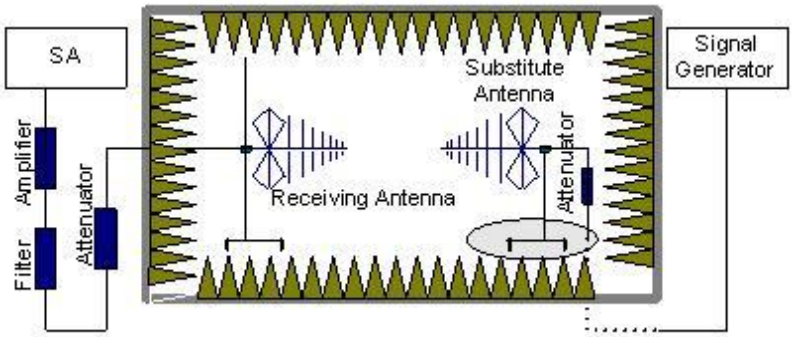
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of each LTE Band.

The procedure of radiated spurious emissions is as follows:

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



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



In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere

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

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

A.2.2 Measurement Limit

Part 24.238 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.

Part 22.917 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.

Part 27.53(g) states for operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Part 27.53(g) states for operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Part 27.53(h) 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.

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of each LTE Band. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was

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seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of each LTE Band 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. The range of evaluated frequency is from 30MHz to 26GHz.

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LTE Band 2, 1.4MHz, QPSK, Channel 18607

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3702.02	-51.13	6.42	8.48	-49.07	-13.00	36.07	H
5555.02	-29.20	7.19	10.59	-25.80	-13.00	12.80	H
7443.01	-53.67	8.24	12.13	-49.78	-13.00	36.78	V
9256.01	-45.66	9.05	13.25	-41.46	-13.00	28.46	V
11055.01	-50.48	9.92	13.19	-47.21	-13.00	34.21	V
12968.01	-46.59	10.48	13.48	-43.59	-13.00	30.59	H

LTE Band 2, 1.4MHz, QPSK, Channel 18900

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.02	-55.40	6.26	8.56	-53.10	-13.00	40.10	H
5644.02	-33.60	7.27	10.57	-30.30	-13.00	17.30	H
7525.01	-52.27	8.29	12.22	-48.34	-13.00	35.34	H
9407.01	-48.88	9.07	13.34	-44.61	-13.00	31.61	V
11259.01	-50.18	9.75	13.15	-46.78	-13.00	33.78	V
13164.01	-48.49	10.66	13.73	-45.42	-13.00	32.42	V

LTE Band 2, 1.4MHz, QPSK, Channel 19193

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3819.02	-55.23	6.08	8.65	-52.66	-13.00	39.66	H
5732.02	-38.67	7.29	10.55	-35.41	-13.00	22.41	H
7642.01	-46.59	8.16	12.31	-42.44	-13.00	29.44	H
9557.01	-48.89	9.34	13.34	-44.89	-13.00	31.89	H
11469.01	-49.59	9.89	13.11	-46.37	-13.00	33.37	H
13384.01	-43.63	10.57	14.04	-40.16	-13.00	27.16	V

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LTE Band 5, 1.4MHz, QPSK, Channel 20407

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1650.01	-47.42	3.57	5.23	2.15	-47.91	-13.00	34.91	H
2474.00	-48.35	4.60	6.02	2.15	-49.08	-13.00	36.08	V
3307.02	-55.26	5.29	7.74	2.15	-54.96	-13.00	41.96	H
4124.02	-52.23	6.04	9.02	2.15	-51.40	-13.00	38.40	V
4960.01	-54.66	6.67	9.86	2.15	-53.62	-13.00	40.62	H
5781.01	-53.51	7.22	10.54	2.15	-52.34	-13.00	39.34	V

LTE Band 5, 1.4MHz, QPSK, Channel 20525

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.01	-45.78	3.58	5.19	2.15	-46.32	-13.00	33.32	H
2510.00	-51.39	4.63	6.12	2.15	-52.05	-13.00	39.05	H
3334.02	-54.69	5.30	7.80	2.15	-54.34	-13.00	41.34	V
4187.02	-50.12	6.18	9.09	2.15	-49.36	-13.00	36.36	H
5023.01	-54.63	6.56	9.93	2.15	-53.41	-13.00	40.41	H
5866.01	-53.55	7.29	10.53	2.15	-52.46	-13.00	39.46	V

LTE Band 5, 1.4MHz, QPSK, Channel 20643

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1697.01	-47.89	3.60	5.15	2.15	-48.49	-13.00	35.49	H
2545.00	-52.37	4.66	6.18	2.15	-53.00	-13.00	40.00	V
3395.02	-55.70	5.36	7.95	2.15	-55.26	-13.00	42.26	V
4247.02	-50.75	6.24	9.15	2.15	-49.99	-13.00	36.99	H
5080.01	-53.29	6.72	10.01	2.15	-52.15	-13.00	39.15	H
5933.01	-52.59	7.47	10.51	2.15	-51.70	-13.00	38.70	V

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LTE Band 12, 1.4MHz, QPSK, Channel 23017

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1400.01	-38.68	3.24	4.98	2.15	-39.09	-13.00	26.09	H
2099.00	-39.33	4.19	4.90	2.15	-40.77	-13.00	27.77	H
2785.00	-52.71	4.89	6.61	2.15	-53.14	-13.00	40.14	V
3499.02	-52.94	5.52	8.20	2.15	-52.41	-13.00	39.41	H
4204.02	-51.24	6.22	9.10	2.15	-50.51	-13.00	37.51	H
4903.01	-51.22	6.73	9.80	2.15	-50.30	-13.00	37.30	H

LTE Band 12, 1.4MHz, QPSK, Channel 23095

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1415.01	-37.09	3.25	5.06	2.15	-37.43	-13.00	24.43	H
2123.00	-39.39	4.21	4.97	2.15	-40.78	-13.00	27.78	H
2828.00	-52.09	4.95	6.69	2.15	-52.50	-13.00	39.50	V
3538.02	-53.02	5.70	8.25	2.15	-52.62	-13.00	39.62	H
4248.02	-50.57	6.24	9.15	2.15	-49.81	-13.00	36.81	V
4956.01	-53.91	6.68	9.86	2.15	-52.88	-13.00	39.88	H

LTE Band 12, 1.4MHz, QPSK, Channel 23173

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1431.01	-34.90	3.28	5.14	2.15	-35.19	-13.00	22.19	H
2146.00	-38.33	4.24	5.04	2.15	-39.68	-13.00	26.68	H
2850.00	-52.20	4.96	6.73	2.15	-52.58	-13.00	39.58	V
3580.02	-54.57	6.13	8.31	2.15	-54.54	-13.00	41.54	V
4294.02	-51.74	6.20	9.19	2.15	-50.90	-13.00	37.90	V
5012.01	-52.98	6.58	9.92	2.15	-51.79	-13.00	38.79	H

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LTE Band 13, 5MHz, QPSK, Channel 23205

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1555.01	-59.02	3.47	5.40	2.15	-59.24	-13.00	46.24	V
2339.00	-40.23	4.44	5.62	2.15	-41.20	-13.00	28.20	H
3109.02	-53.35	5.35	7.26	2.15	-53.59	-13.00	40.59	H
3899.02	-53.11	6.11	8.76	2.15	-52.61	-13.00	39.61	V
4682.02	-54.11	6.49	9.58	2.15	-53.17	-13.00	40.17	H
5462.01	-50.94	6.92	10.55	2.15	-49.46	-13.00	36.46	H

LTE Band 13, 5MHz, QPSK, Channel 23230

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1564.01	-59.79	3.48	5.38	2.15	-60.04	-13.00	47.04	V
2347.00	-39.74	4.45	5.64	2.15	-40.70	-13.00	27.70	V
3142.02	-53.52	5.38	7.34	2.15	-53.71	-13.00	40.71	H
3911.02	-51.75	6.12	8.78	2.15	-51.24	-13.00	38.24	V
4687.02	-54.91	6.49	9.59	2.15	-53.96	-13.00	40.96	V
5481.01	-50.92	6.99	10.57	2.15	-49.49	-13.00	36.49	H

LTE Band 13, 5MHz, QPSK, Channel 23255

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1563.01	-59.39	3.48	5.39	2.15	-59.63	-13.00	46.63	H
2354.00	-38.29	4.46	5.66	2.15	-39.24	-13.00	26.24	V
3125.02	-53.04	5.40	7.30	2.15	-53.29	-13.00	40.29	H
3924.02	-52.38	6.12	8.79	2.15	-51.86	-13.00	38.86	H
4721.02	-54.66	6.52	9.62	2.15	-53.71	-13.00	40.71	V
5497.01	-52.48	7.05	10.60	2.15	-51.08	-13.00	38.08	H

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LTE Band 66, 1.4MHz QPSK, Channel 131979

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3422.02	-56.99	5.38	8.01	-54.36	-13.00	41.36	H
5137.02	-49.96	6.86	10.09	-46.73	-13.00	33.73	H
6844.01	-64.35	7.83	11.41	-60.77	-13.00	47.77	V
8555.01	-63.38	8.57	13.01	-58.94	-13.00	45.94	V
10319.01	-62.07	9.67	13.03	-58.71	-13.00	45.71	V
12029.01	-59.92	10.14	13.01	-57.05	-13.00	44.05	V

LTE Band 66, 1.4MHz, QPSK, Channel 132322

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3490.02	-56.03	5.50	8.18	-53.35	-13.00	40.35	H
5241.02	-43.38	7.00	10.24	-40.14	-13.00	27.14	H
6984.01	-64.33	8.17	11.58	-60.92	-13.00	47.92	H
8732.01	-62.82	8.46	13.05	-58.23	-13.00	45.23	V
10504.01	-61.72	9.64	13.10	-58.26	-13.00	45.26	V
12213.01	-59.90	10.05	13.09	-56.86	-13.00	43.86	V

LTE Band 66, 1.4MHz, QPSK, Channel 132665

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3559.02	-54.80	5.92	8.28	-52.44	-13.00	39.44	H
5343.02	-40.94	6.95	10.38	-37.51	-13.00	24.51	H
7151.01	-64.78	8.18	11.78	-61.18	-13.00	48.18	V
8904.01	-61.66	8.86	13.08	-57.44	-13.00	44.44	V
10706.01	-61.47	9.32	13.14	-57.65	-13.00	44.65	V
12473.01	-59.19	10.25	13.19	-56.25	-13.00	43.25	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 5.16 dB, k = 2.

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A.3 Frequency Stability

A.3.1 Method of Measurement

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage. Two reference points are established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as F_L and F_H respectively.

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 CMW500.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500, and in a simulated call on middle channel for each LTE band, 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 center 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 -30℃ to +50℃. 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.

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 the lower, higher and nominal voltage. 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.

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A.3.2 Measurement results

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

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	1850.833	1909.199		
50				-2.17	0.0012
40				-6.47	0.0034
30				-2.69	0.0014
10				-4.55	0.0024
0				-2.70	0.0014
-10				-2.09	0.0011
-20				0.00	0.0000
-30				-4.42	0.0024

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	1850.833	1909.199	-1.96	0.0010
4.4				-3.76	0.0020

LTE Band 5, 10MHz bandwidth QPSK (worst case of all bandwidths)

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	824.417	848.583		
50				-29.55	0.0353
40				-1.56	0.0019
30				-0.57	0.0007
10				-2.16	0.0026
0				0.74	0.0009
-10				-2.66	0.0032
-20				-0.19	0.0002
-30				-3.81	0.0046

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	824.417	848.583	-4.45	0.0053
4.4				-1.17	0.0014

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LTE Band 12, 10MHz bandwidth QPSK (worst case of all bandwidths)

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	699.465	715.519		
50				0.63	0.0009
40				-1.04	0.0015
30				-0.24	0.0003
10				-1.50	0.0021
0				1.34	0.0019
-10				-1.49	0.0021
-20				-2.99	0.0042
-30				-1.10	0.0016

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	699.465	715.519	-0.11	0.0002
4.4				-0.60	0.0008

LTE Band 13, 10MHz bandwidth QPSK (worst case of all bandwidths)

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	777.417	786.551		
50				-0.33	0.0004
40				3.33	0.0043
30				-1.13	0.0014
10				-0.03	0.0000
0				1.56	0.0020
-10				2.65	0.0034
-20				0.53	0.0007
-30				0.31	0.0004

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	777.417	786.551	2.30	0.0029
4.4				1.93	0.0025

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LTE Band 66, 20MHz bandwidth QPSK (worst case of all bandwidths)

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	1710.833	1779.167		
50				0.31	0.0002
40				-0.11	0.0001
30				-2.80	0.0016
10				0.20	0.0001
0				-1.63	0.0009
-10				-0.77	0.0004
-20				-0.27	0.0002
-30				21.92	0.0126

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	1710.833	1779.167	-1.16	0.0007
4.4				-2.33	0.0013

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A.4 Occupied Bandwidth

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the mid frequencies frequency. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.
The measurement method is from ANSI C63.26:
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.
b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
d) Set the detection mode to peak, and the trace mode to max-hold.

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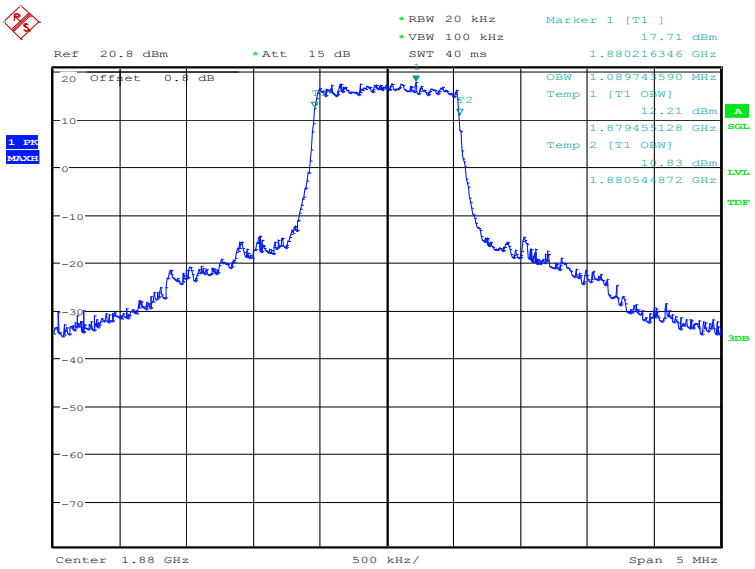
LTE band 2, 1.4MHz (99%)

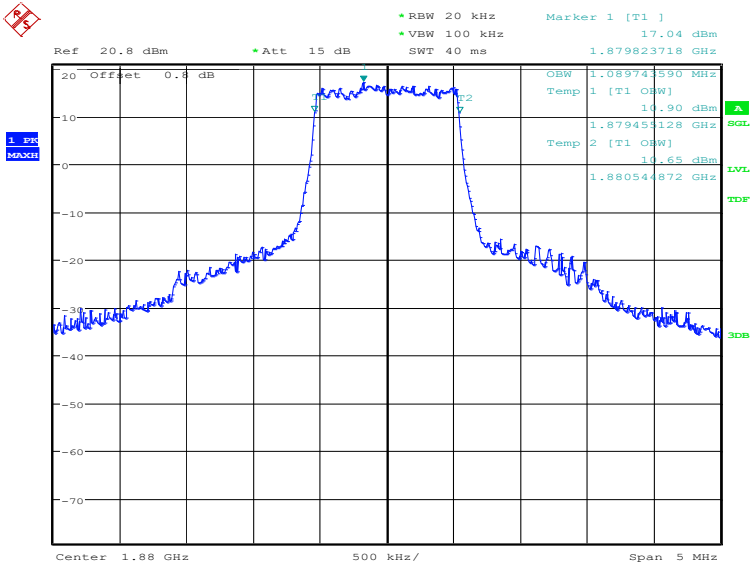
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	1089.74	1089.74

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



Date: 7.SEP.2020 18:32:14

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



Date: 7.SEP.2020 18:32:53

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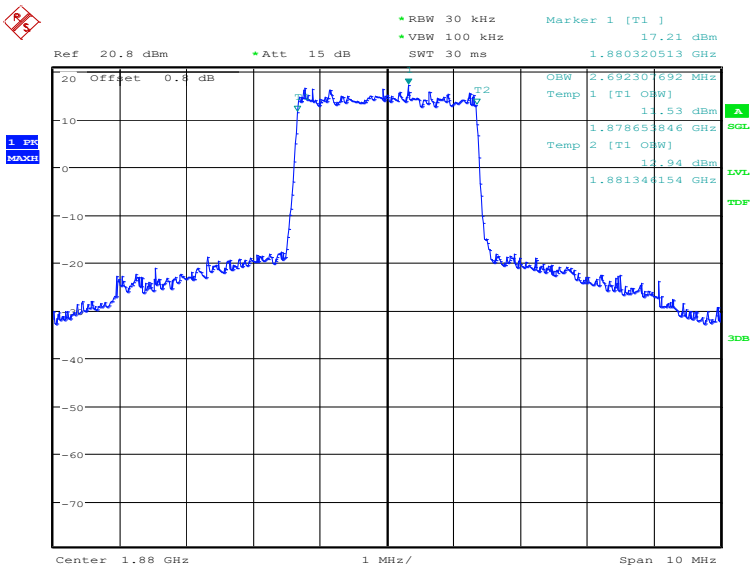
LTE band 2, 3MHz (99%)

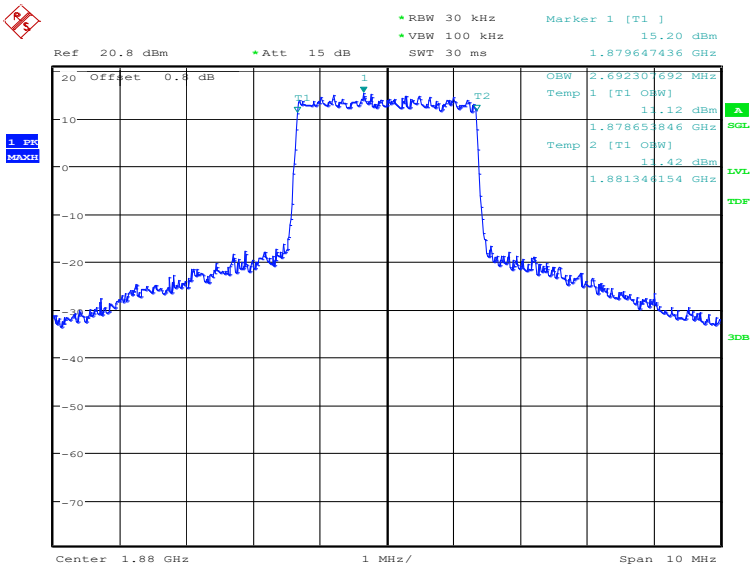
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	2692.31	2692.31

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



Date: 7.SEP.2020 18:34:21

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



Date: 7.SEP.2020 18:35:00

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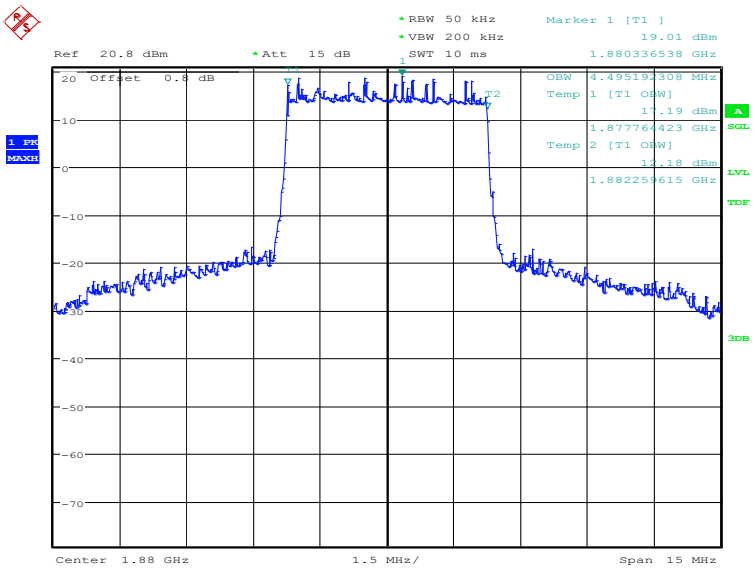
LTE band 2, 5MHz (99%)

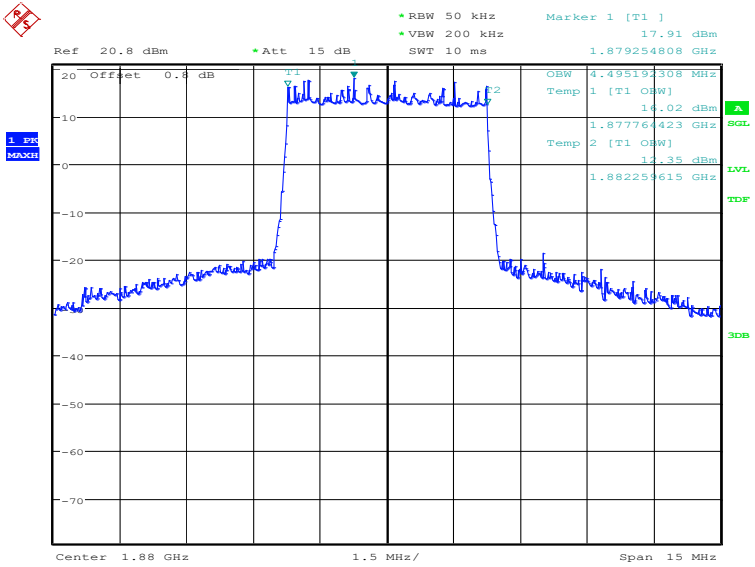
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	4495.19	4495.19

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



Date: 7.SEP.2020 18:36:28

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



Date: 7.SEP.2020 18:37:06

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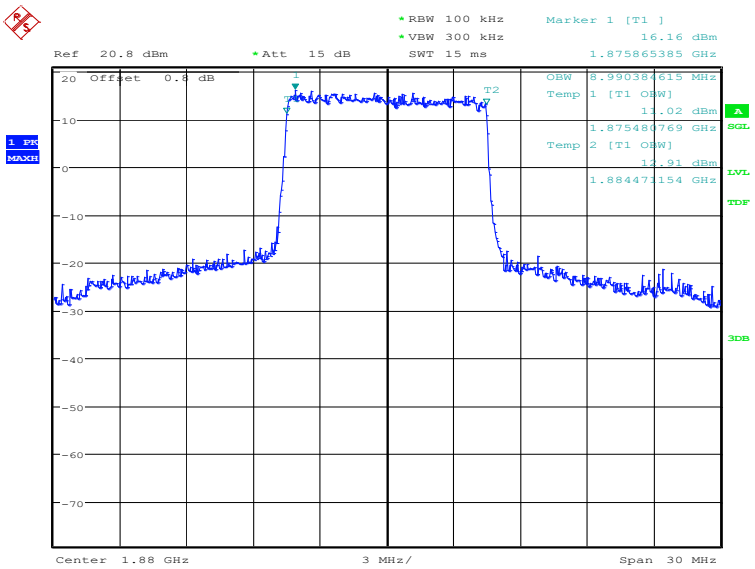
LTE band 2, 10MHz (99%)

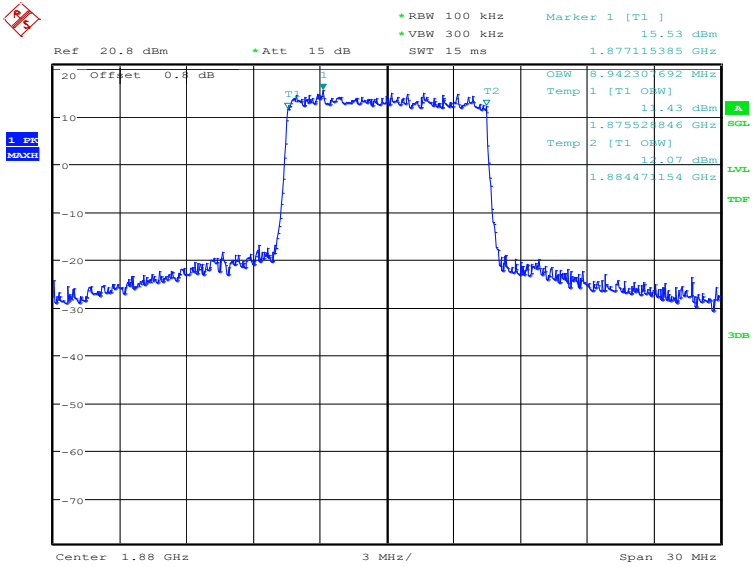
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	8990.38	8942.31

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



Date: 7.SEP.2020 18:38:34

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



Date: 7.SEP.2020 18:39:13

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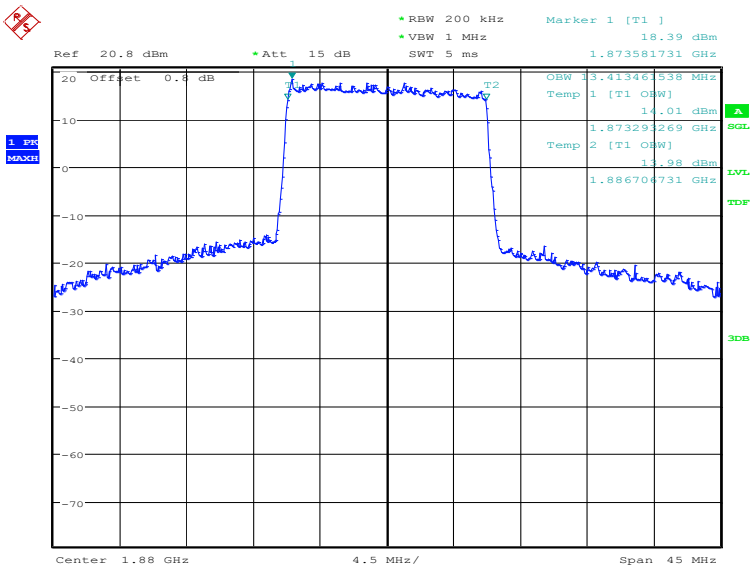
LTE band 2, 15MHz (99%)

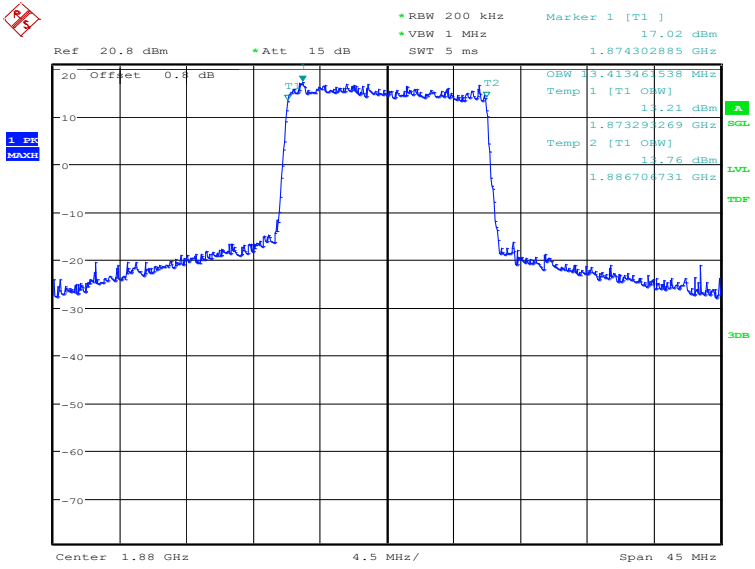
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	13413.46	13413.46

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



Date: 7.SEP.2020 18:40:41

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



Date: 7.SEP.2020 18:41:19

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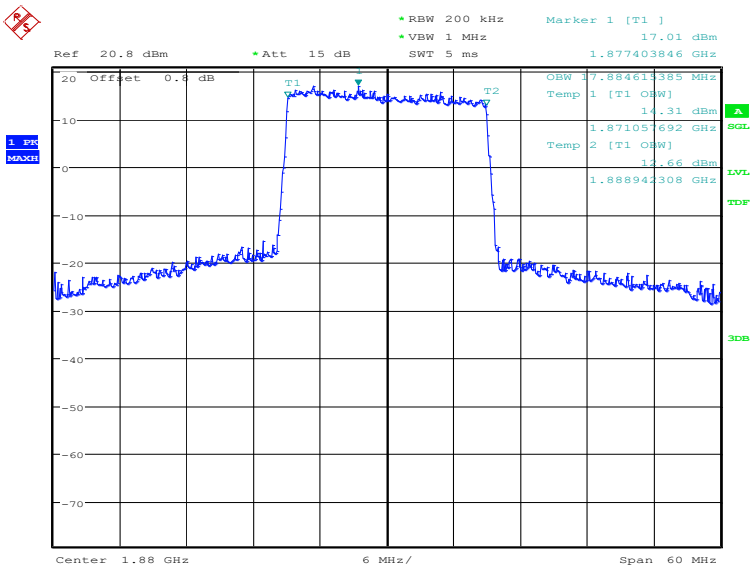
LTE band 2, 20MHz (99%)

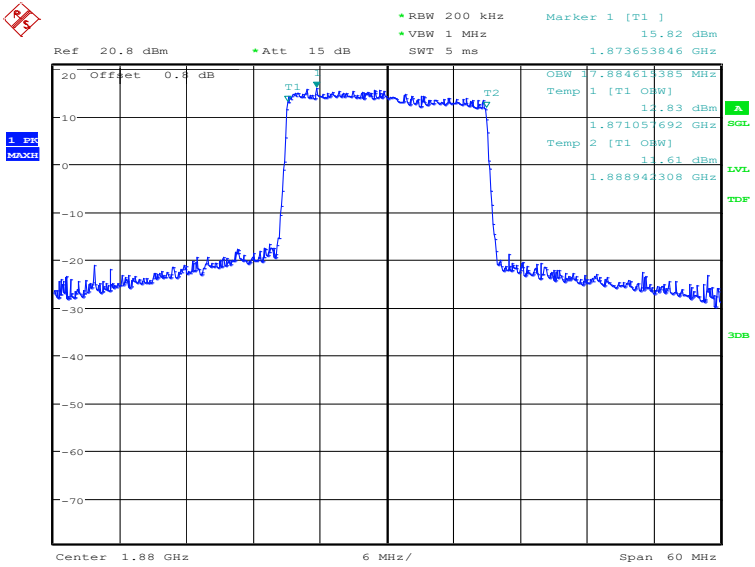
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	17884.62	17884.62

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



Date: 7.SEP.2020 18:42:47

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



Date: 7.SEP.2020 18:43:26

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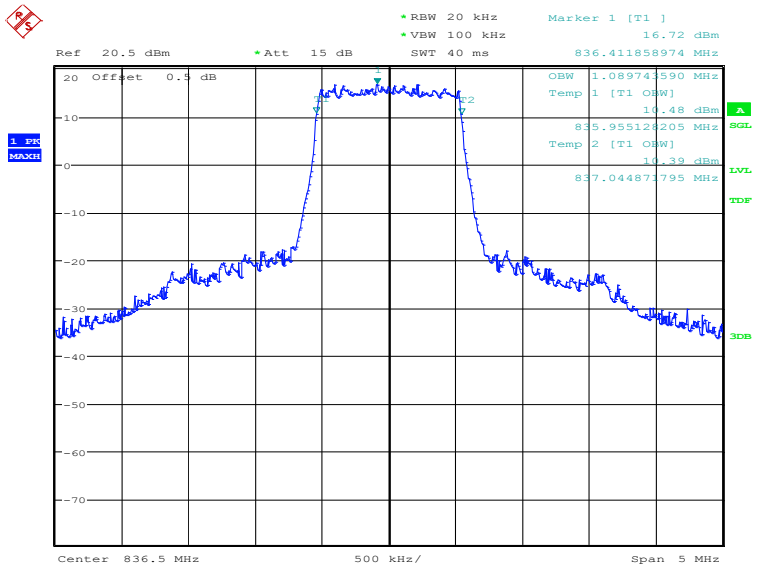
LTE band 5, 1.4MHz (99%)

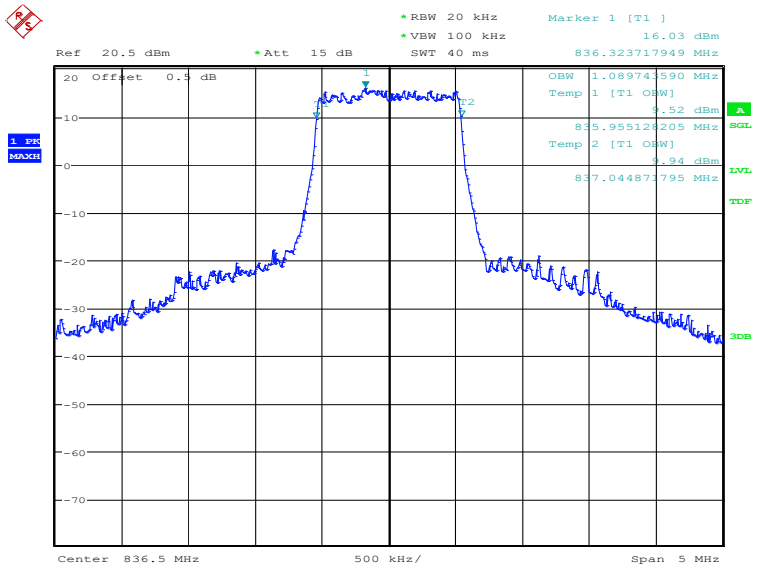
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
836.5	QPSK	16QAM
	1089.74	1089.74

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



Date: 8.SEP.2020 08:19:57

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



Date: 8.SEP.2020 08:20:36

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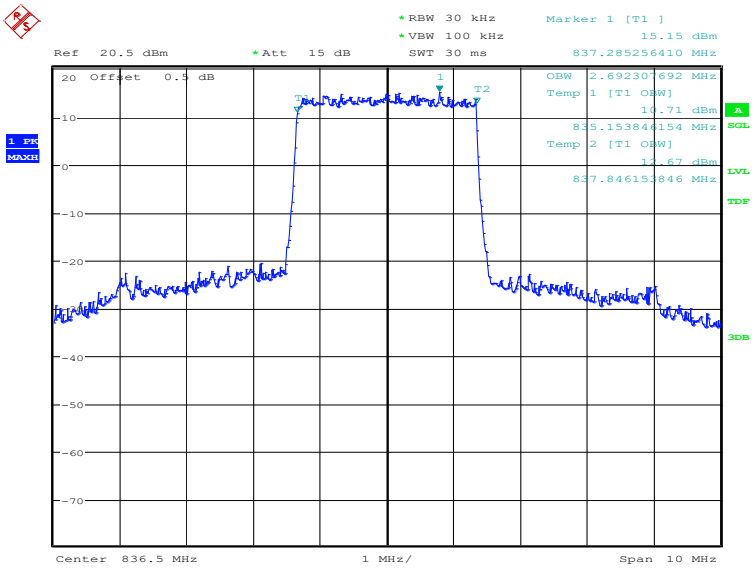
LTE band 5, 3MHz (99%)

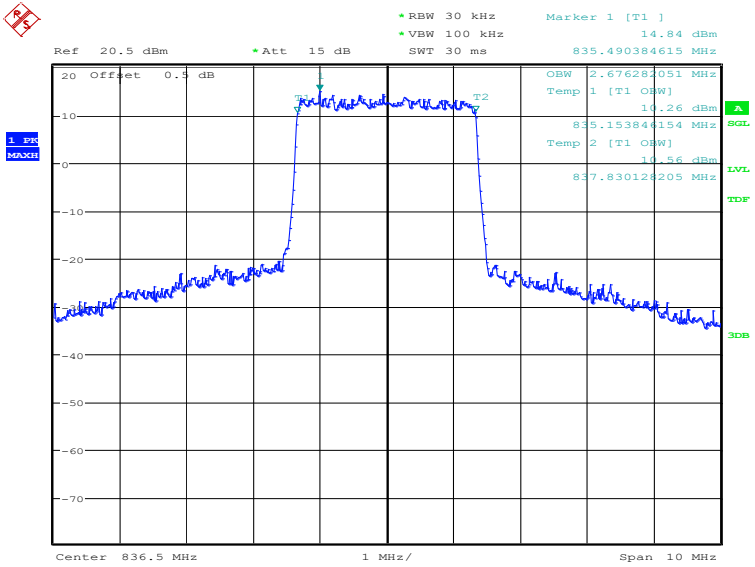
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
836.5	QPSK	16QAM
	2692.31	2676.28

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



Date: 8.SEP.2020 08:22:03

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



Date: 8.SEP.2020 08:22:42

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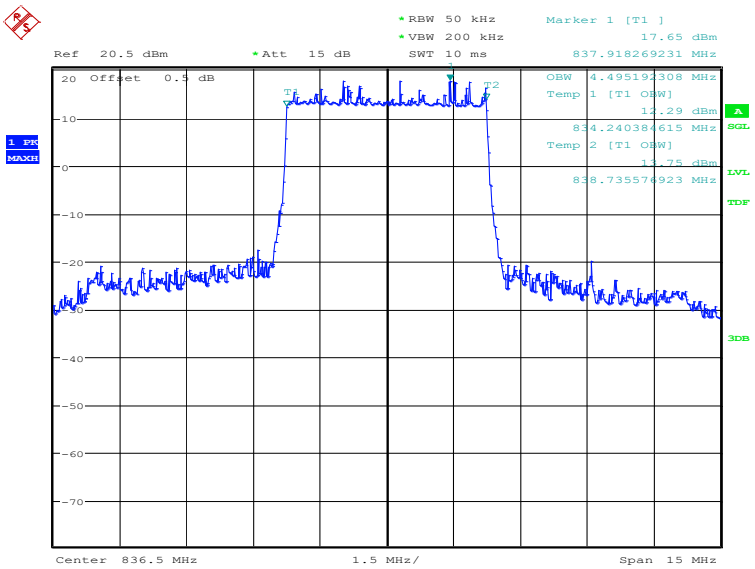
LTE band 5, 5MHz (99%)

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

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



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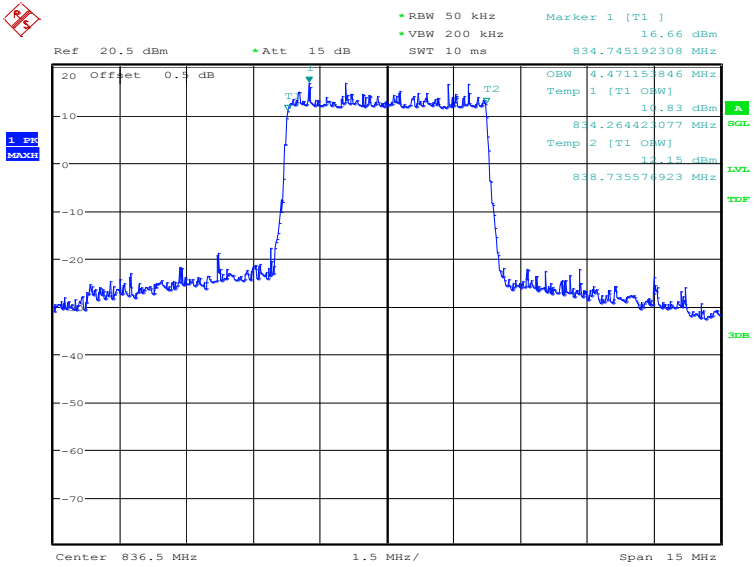
LTE band 5, 5MHz Bandwidth, 16QAM (99% BW)



Date: 8.SEP.2020 08:24:48

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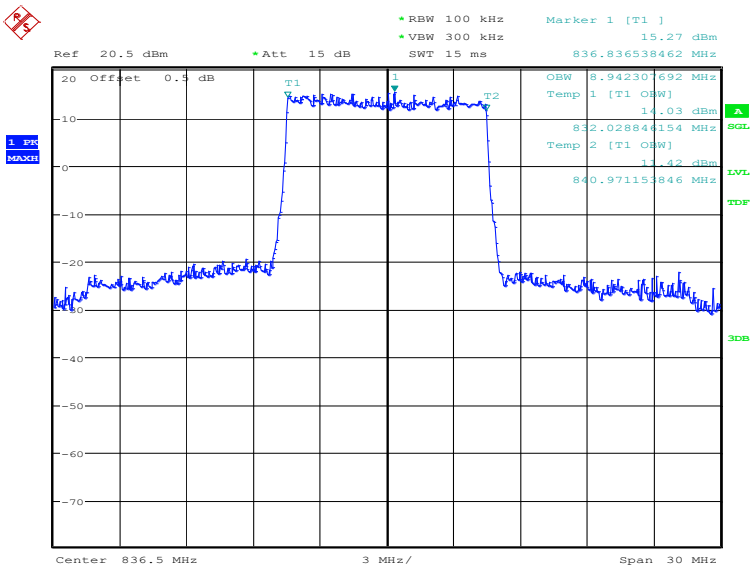
LTE band 5, 10MHz (99%)

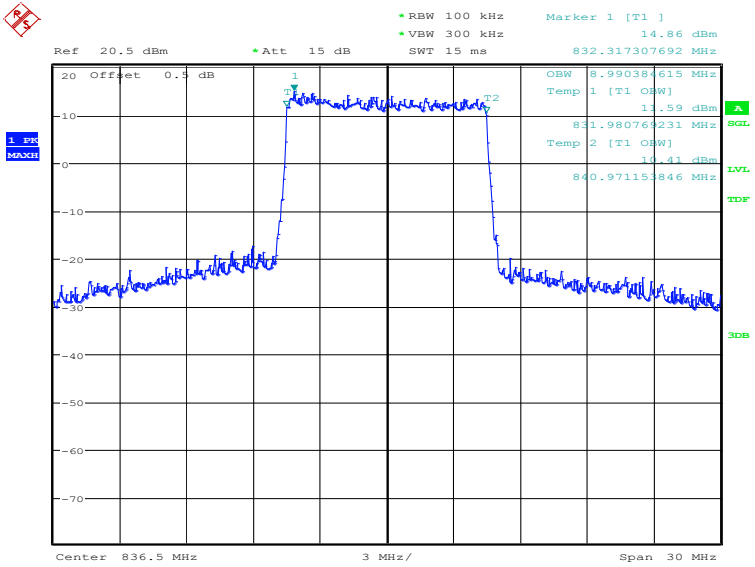
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
836.5	QPSK	16QAM
	8942.31	8990.38

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



Date: 8.SEP.2020 08:26:15

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



Date: 8.SEP.2020 08:26:54

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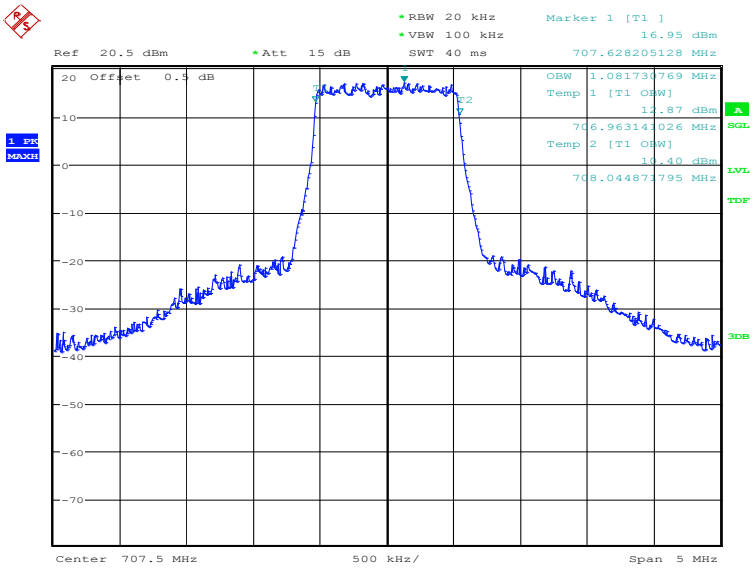
LTE band 12, 1.4MHz (99%)

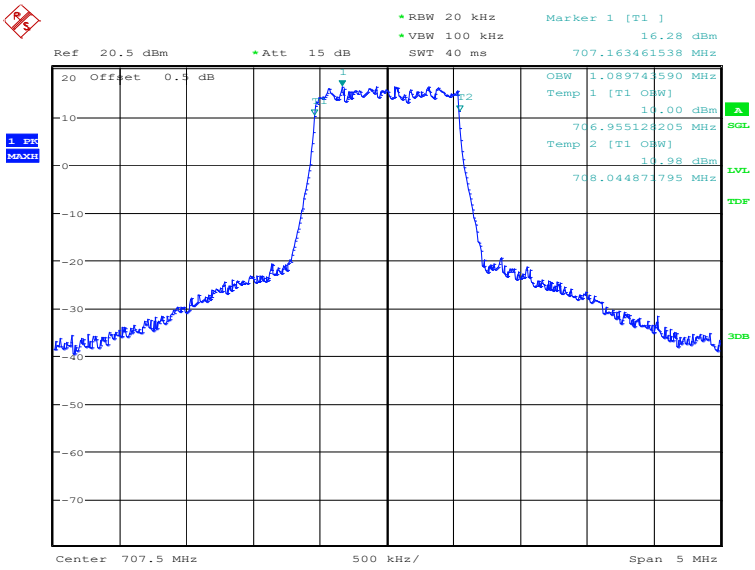
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
707.5	QPSK	16QAM
	1081.73	1089.74

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



Date: 8.SEP.2020 08:28:23

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



Date: 8.SEP.2020 08:29:01

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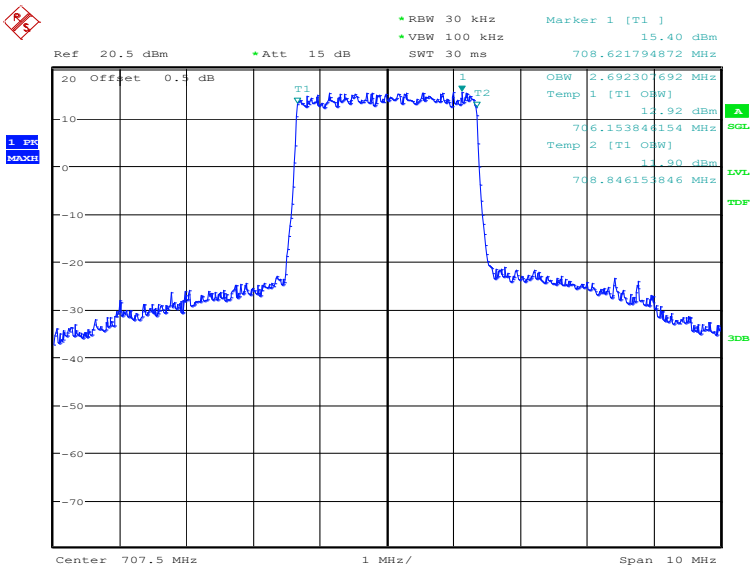
LTE band 12, 3MHz (99%)

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

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



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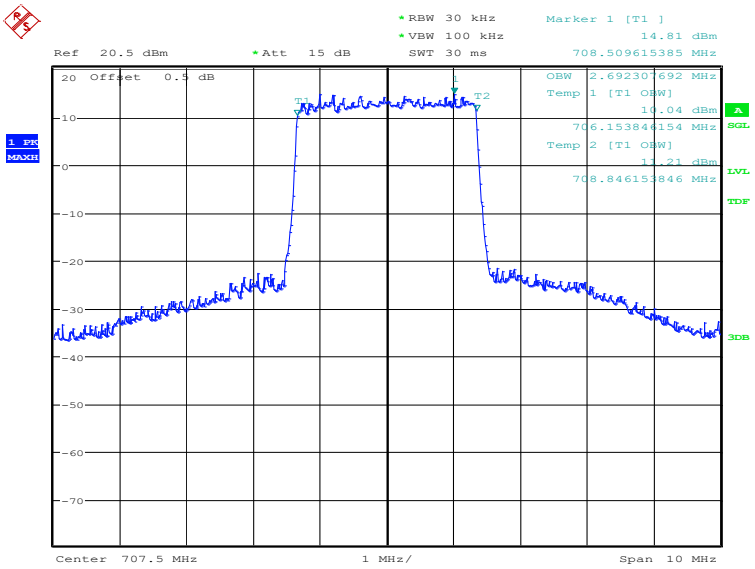
LTE band 12, 3MHz Bandwidth, 16QAM (99% BW)



Date: 8.SEP.2020 08:31:07

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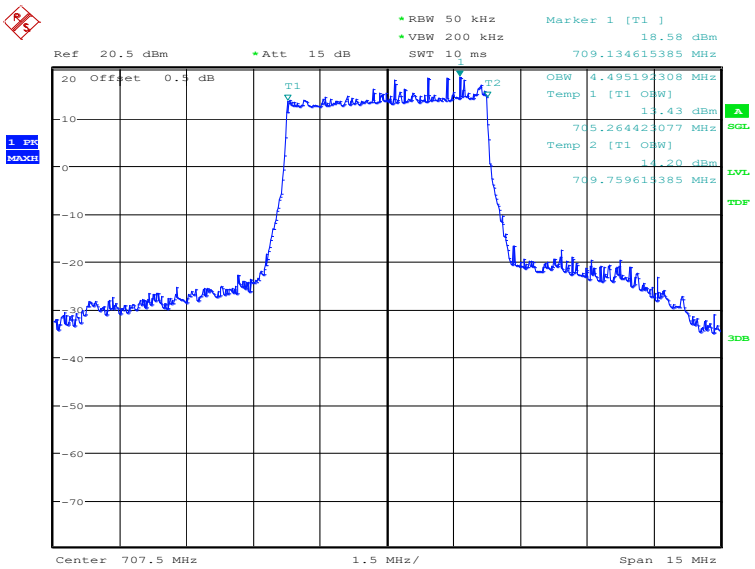
LTE band 12, 5MHz (99%)

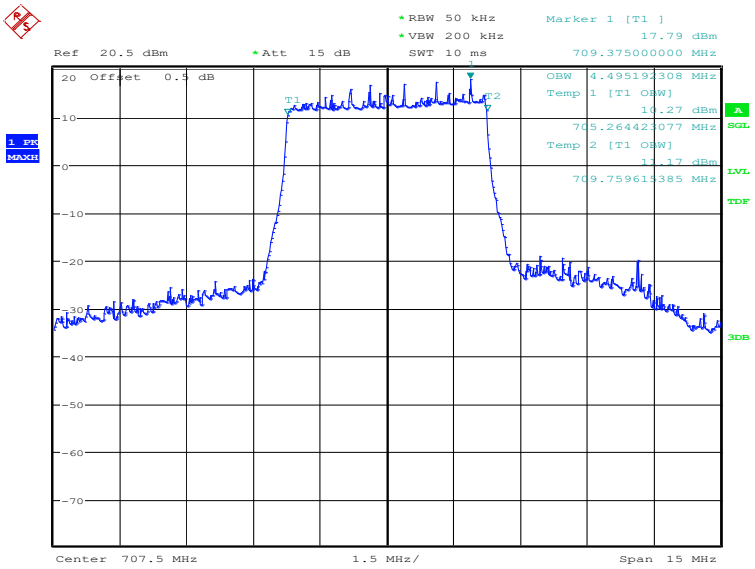
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
707.5	QPSK	16QAM
	4495.19	4495.19

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



Date: 8.SEP.2020 08:32:35

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



Date: 8.SEP.2020 08:33:14

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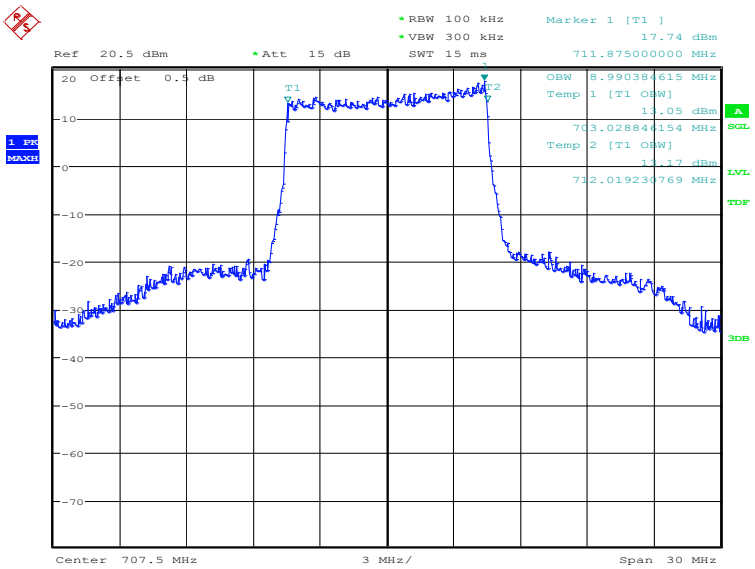
LTE band 12, 10MHz (99%)

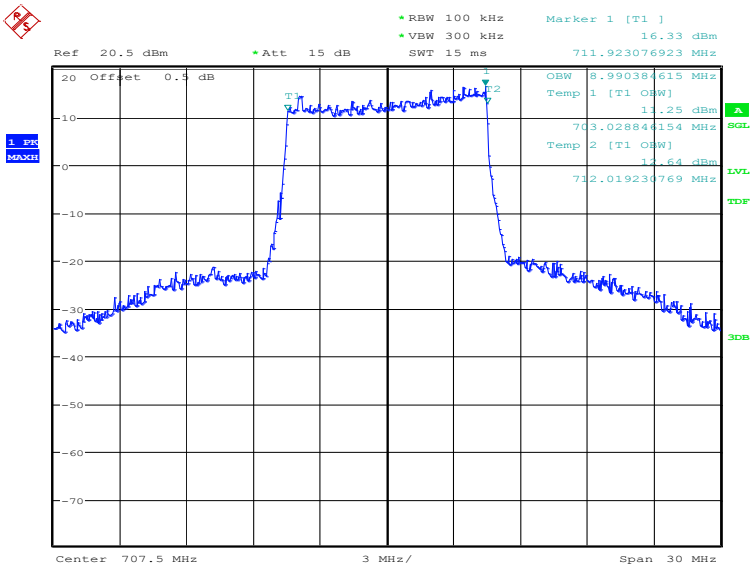
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
707.5	QPSK	16QAM
	8990.38	8990.38

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



Date: 8.SEP.2020 08:34:41

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



Date: 8.SEP.2020 08:35:20

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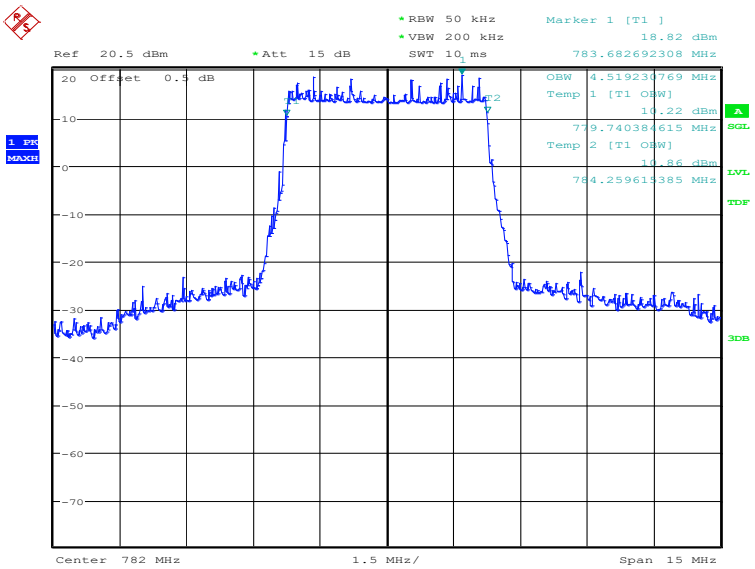
LTE band 13, 5MHz (99%)

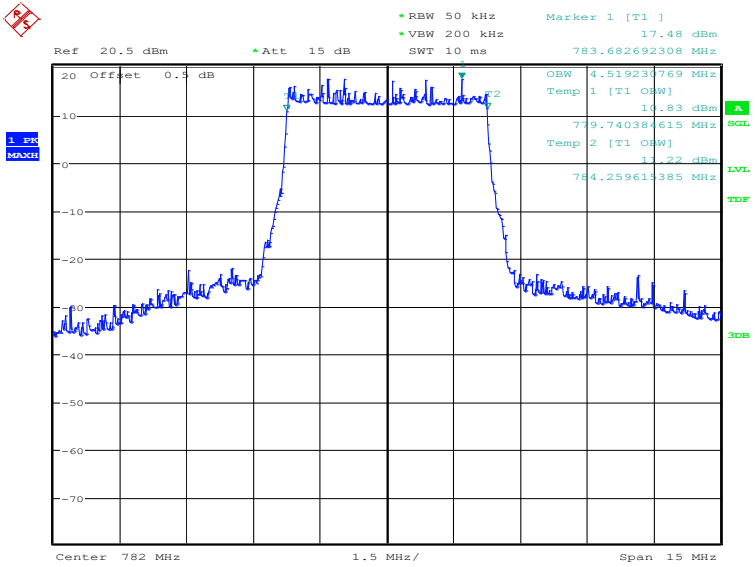
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
782.0	QPSK	16QAM
	4519.23	4519.23

LTE band 13, 5MHz Bandwidth, QPSK (99% BW)



Date: 7.SEP.2020 18:44:54

LTE band 13, 5MHz Bandwidth,16QAM (99% BW)



Date: 7.SEP.2020 18:45:33

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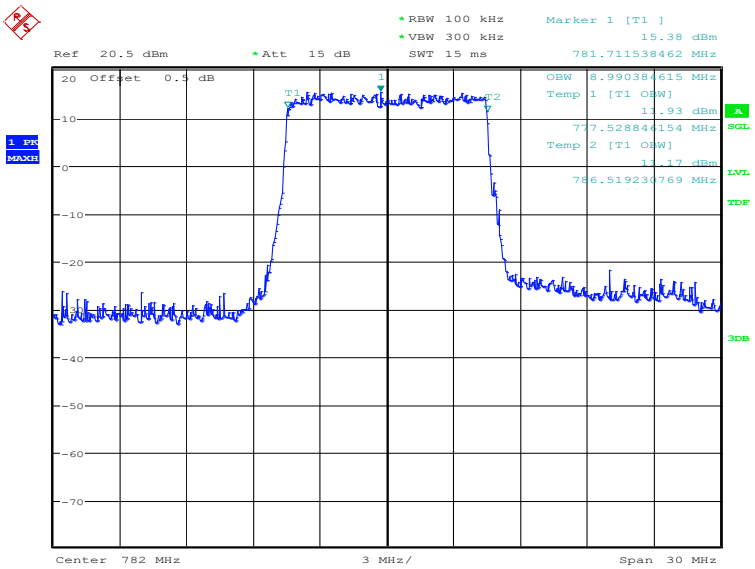
LTE band 13, 10MHz (99%)

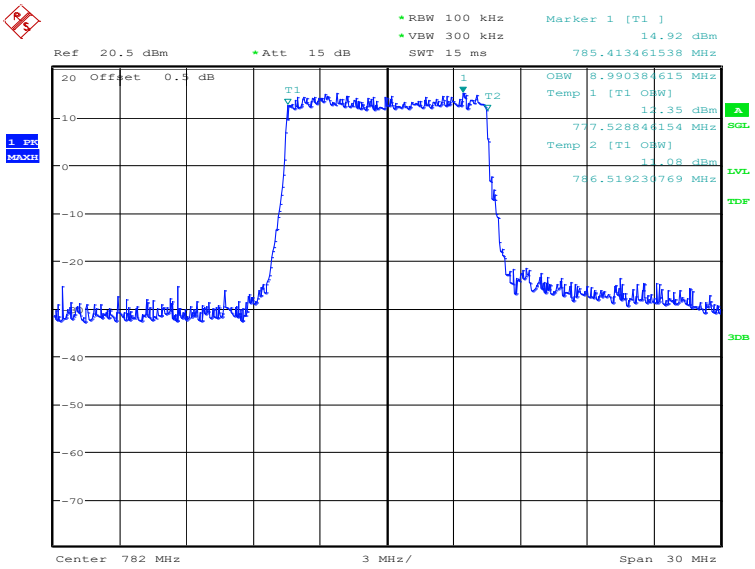
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
782.0	QPSK	16QAM
	8990.38	8990.38

LTE band 13, 10MHz Bandwidth, QPSK (99% BW)



Date: 7.SEP.2020 18:47:01

LTE band 13, 10MHz Bandwidth,16QAM (99% BW)



Date: 7.SEP.2020 18:47:39

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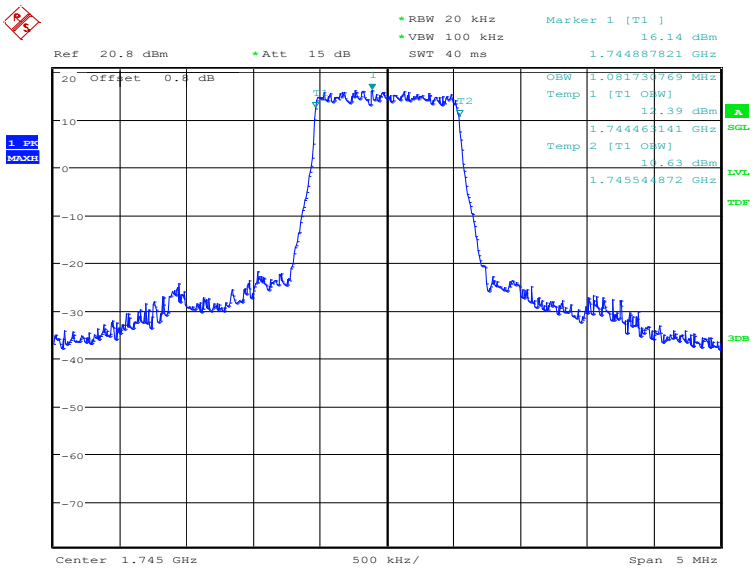
LTE band 66, 1.4MHz (99%)

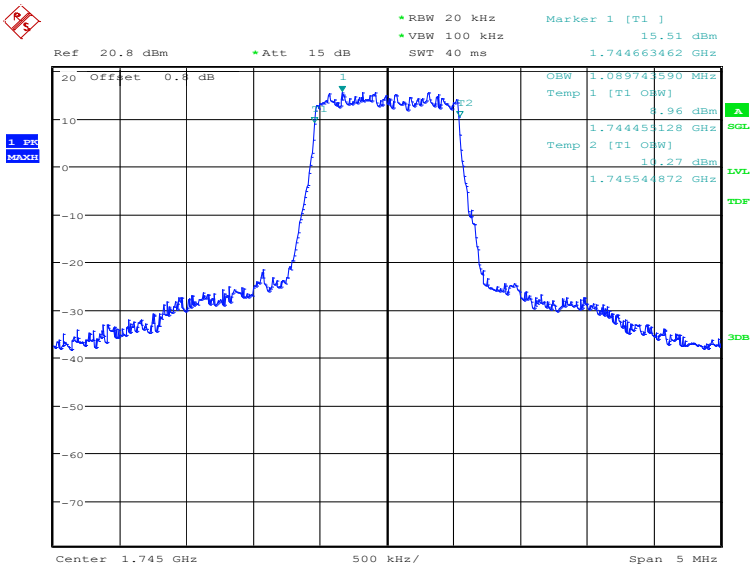
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1745.0	QPSK	16QAM
	1081.73	1089.74

LTE band 66, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 7.SEP.2020 18:49:08

LTE band 66, 1.4MHz Bandwidth, 16QAM (99% BW)



Date: 7.SEP.2020 18:49:47

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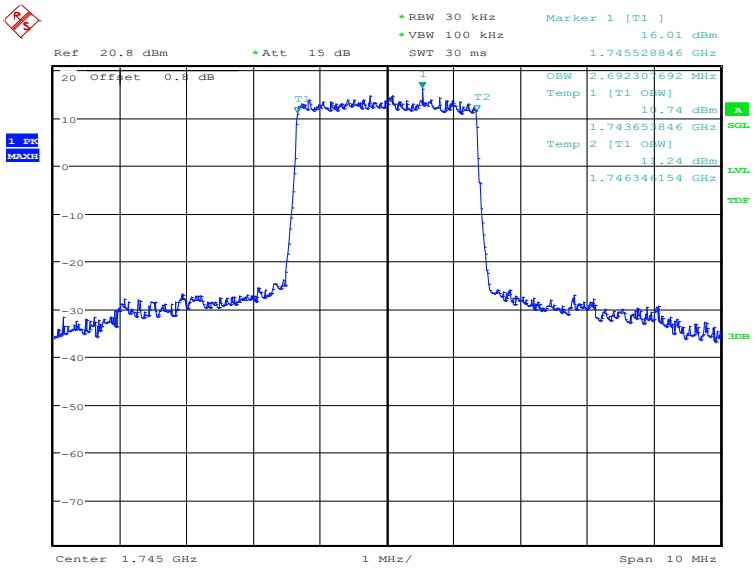
LTE band 66, 3MHz (99%)

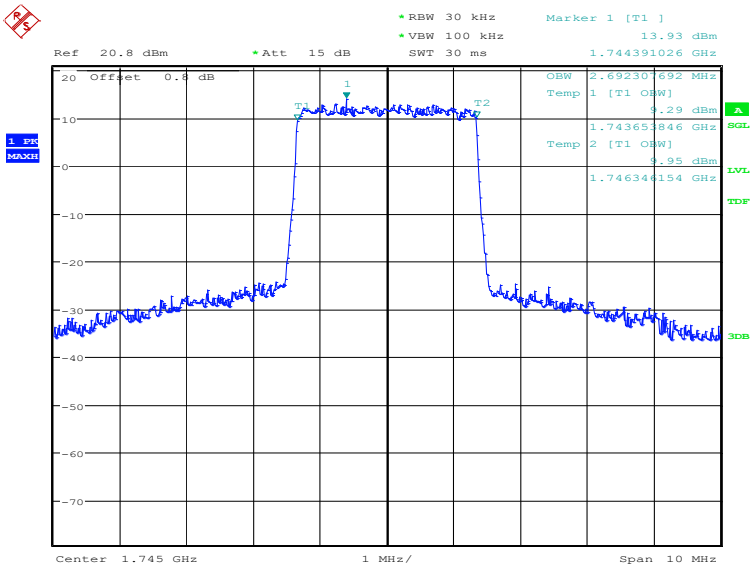
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1745.0	QPSK	16QAM
	2692.31	2692.31

LTE band 66, 3MHz Bandwidth, QPSK (99% BW)



Date: 7.SEP.2020 18:51:15

LTE band 66, 3MHz Bandwidth, 16QAM (99% BW)



Date: 7.SEP.2020 18:51:54

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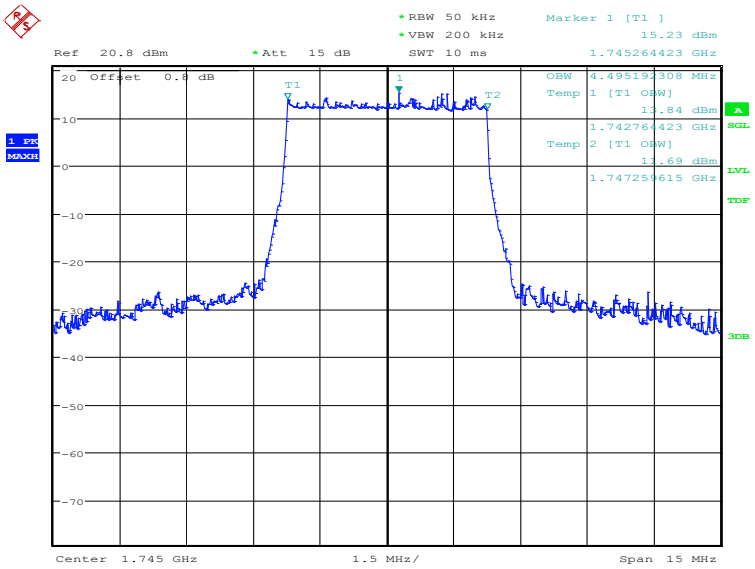
LTE band 66, 5MHz (99%)

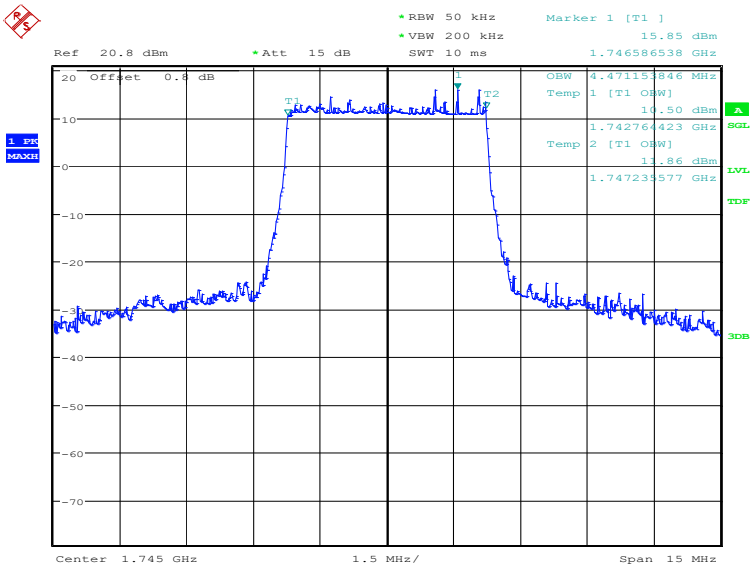
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1745.0	QPSK	16QAM
	4495.19	4471.15

LTE band 66, 5MHz Bandwidth, QPSK (99% BW)



Date: 7.SEP.2020 18:53:21

LTE band 66, 5MHz Bandwidth, 16QAM (99% BW)



Date: 7.SEP.2020 18:54:00

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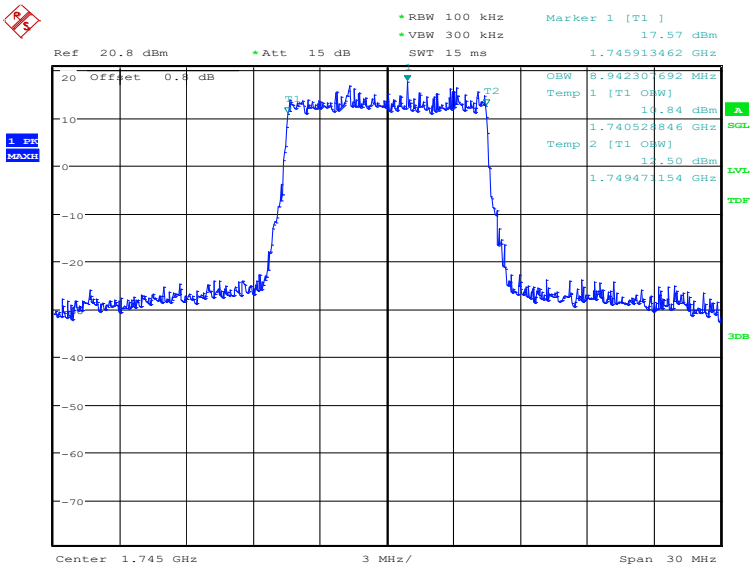
LTE band 66, 10MHz (99%)

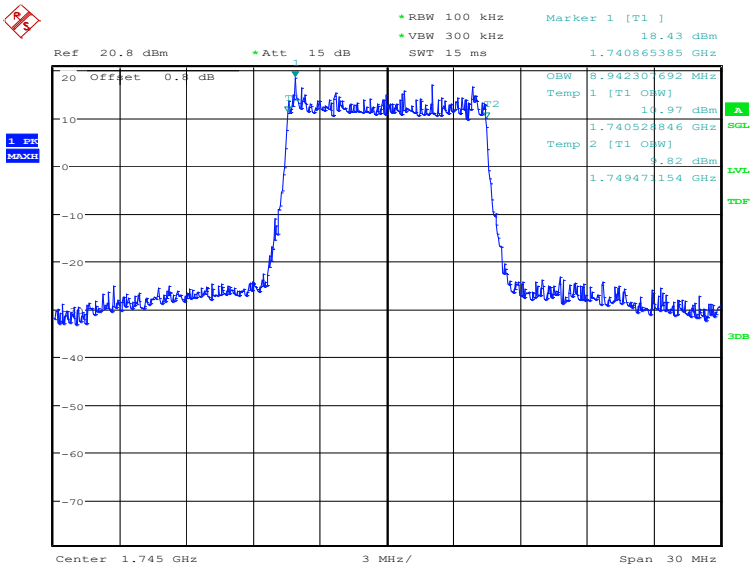
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1745.0	QPSK	16QAM
	8942.31	8942.31

LTE band 66, 10MHz Bandwidth, QPSK (99% BW)



Date: 7.SEP.2020 18:55:28

LTE band 66, 10MHz Bandwidth, 16QAM (99% BW)



Date: 7.SEP.2020 18:56:07

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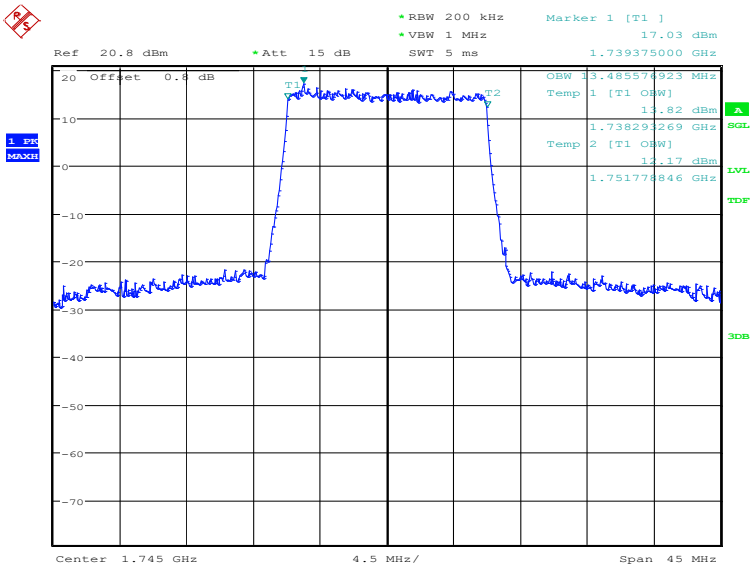
LTE band 66, 15MHz (99%)

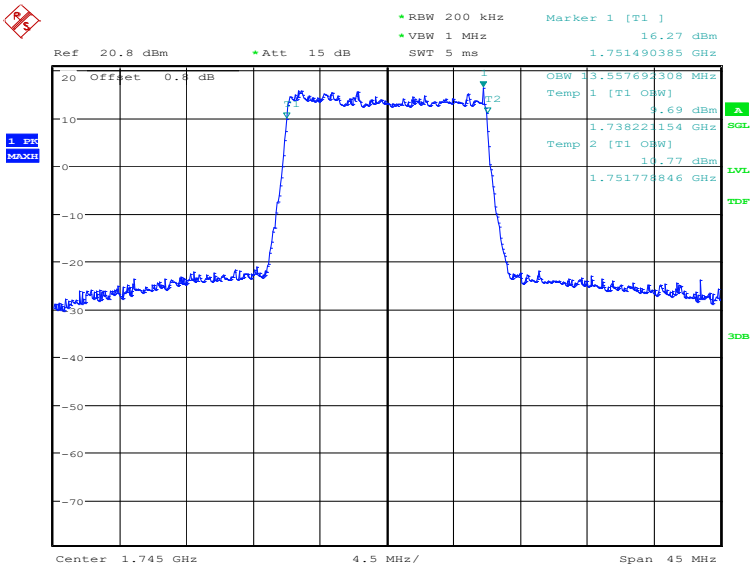
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1745.0	QPSK	16QAM
	13485.58	13557.69

LTE band 66, 15MHz Bandwidth, QPSK (99% BW)



Date: 7.SEP.2020 18:57:35

LTE band 66, 15MHz Bandwidth, 16QAM (99% BW)



Date: 7.SEP.2020 18:58:14

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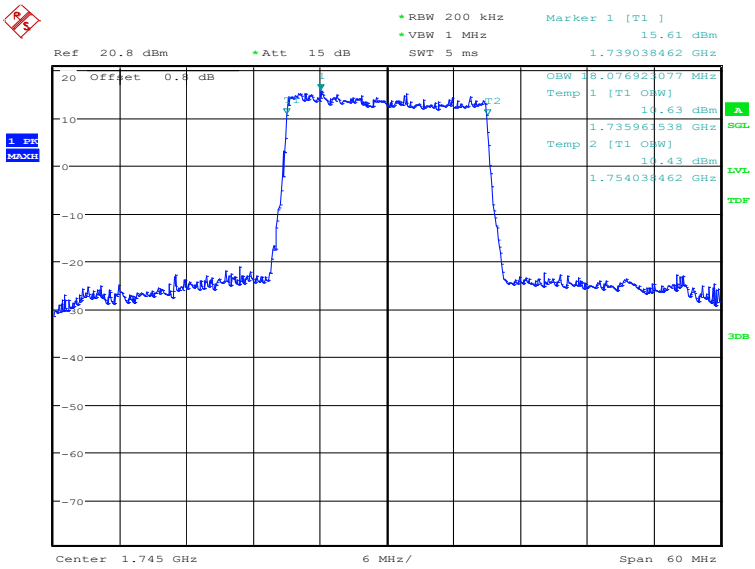
LTE band 66, 20MHz (99%)

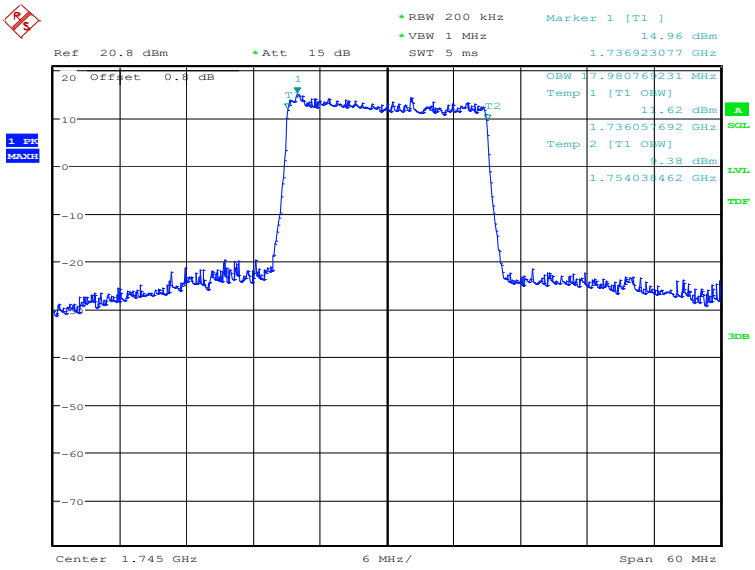
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1745.0	QPSK	16QAM
	18076.92	17980.77

LTE band 66, 20MHz Bandwidth, QPSK (99% BW)



Date: 7.SEP.2020 18:59:42

LTE band 66, 20MHz Bandwidth, 16QAM (99% BW)



Date: 7.SEP.2020 19:00:20

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A.5 Emission Bandwidth

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.
The measurement method is from ANSI C63.26:
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

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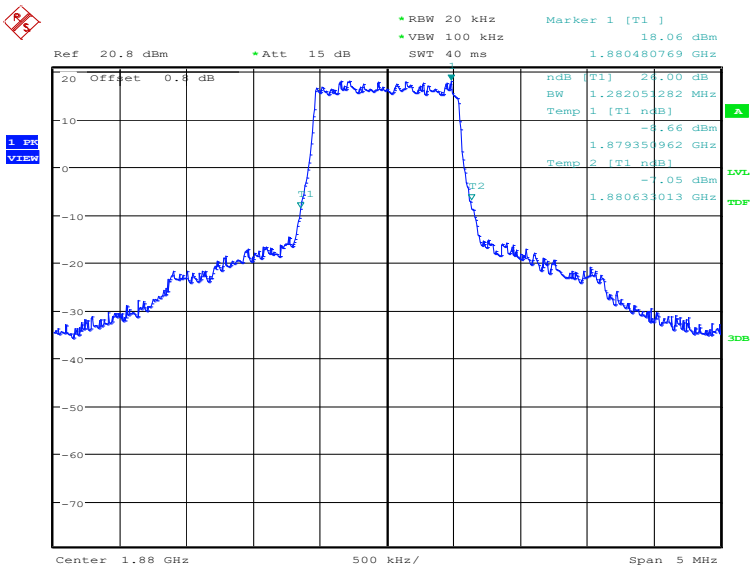
LTE band 2, 1.4MHz (-26dBc)

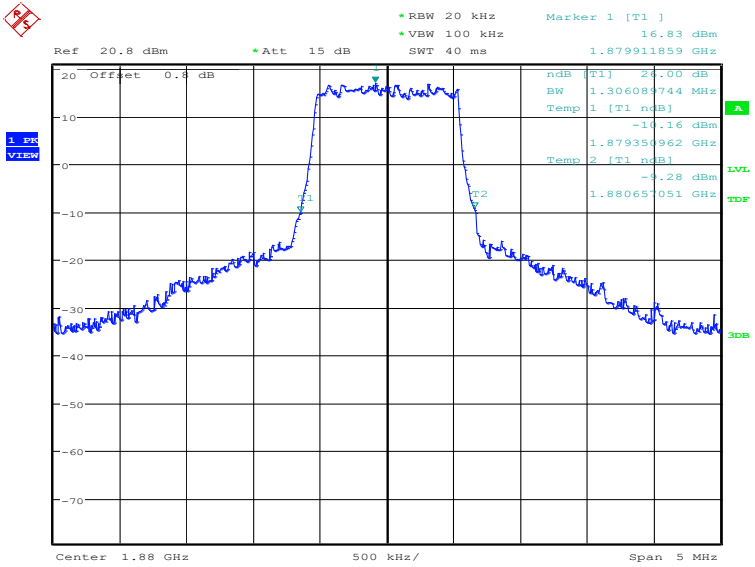
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1880.0	QPSK	16QAM
	1282.05	1306.09

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



Date: 7.SEP.2020 19:01:34

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



Date: 7.SEP.2020 19:02:13

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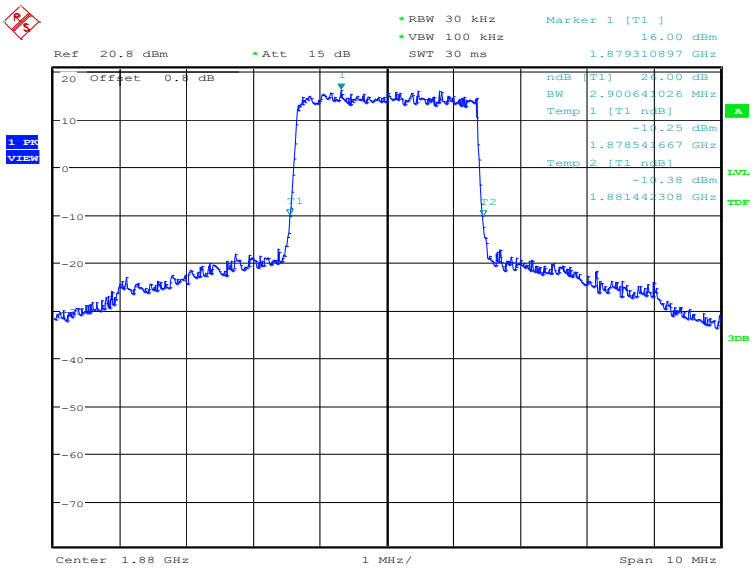
LTE band 2, 3MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1880.0	QPSK	16QAM
	2900.64	2884.62

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



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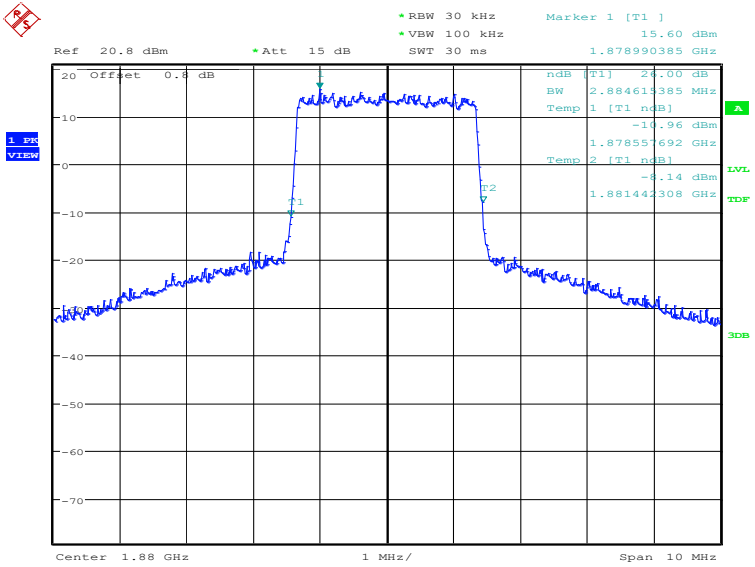
LTE band 2, 3MHz Bandwidth, 16QAM (-26dBc BW)



Date: 7.SEP.2020 19:04:21

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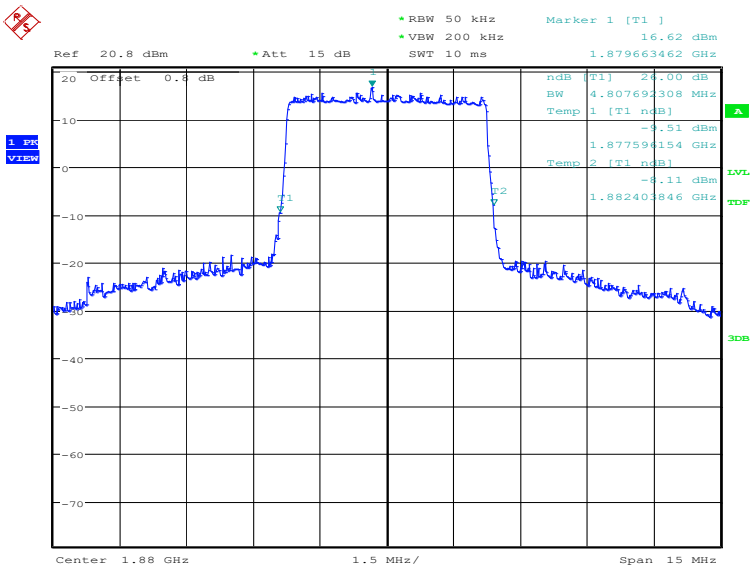
LTE band 2, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1880.0	QPSK	16QAM
	4807.69	4807.69

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



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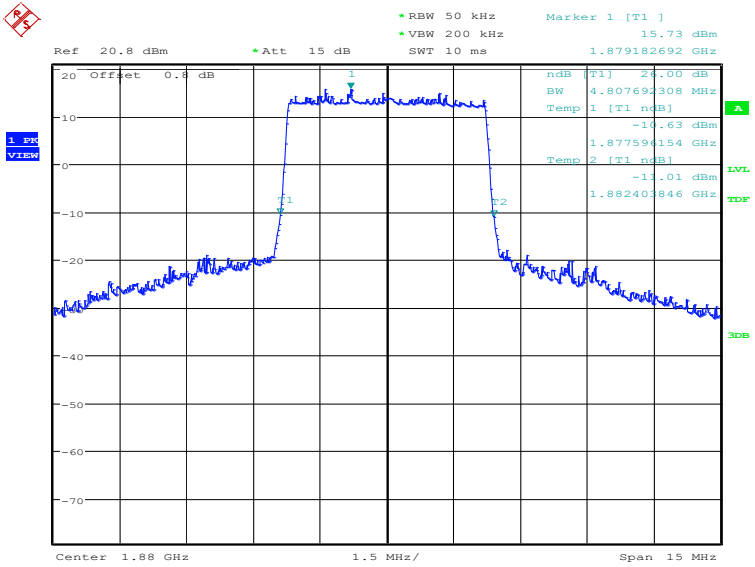
LTE band 2, 5MHz Bandwidth, 16QAM (-26dBc BW)



Date: 7.SEP.2020 19:06:29

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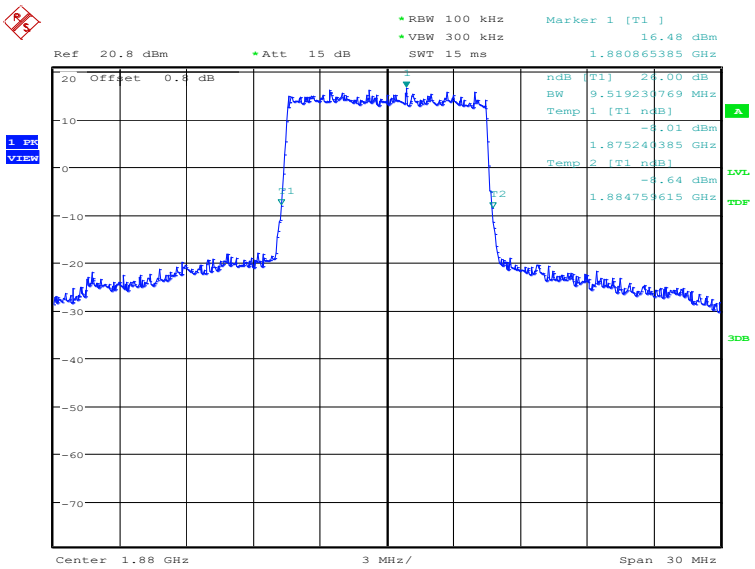
LTE band 2, 10MHz (-26dBc)

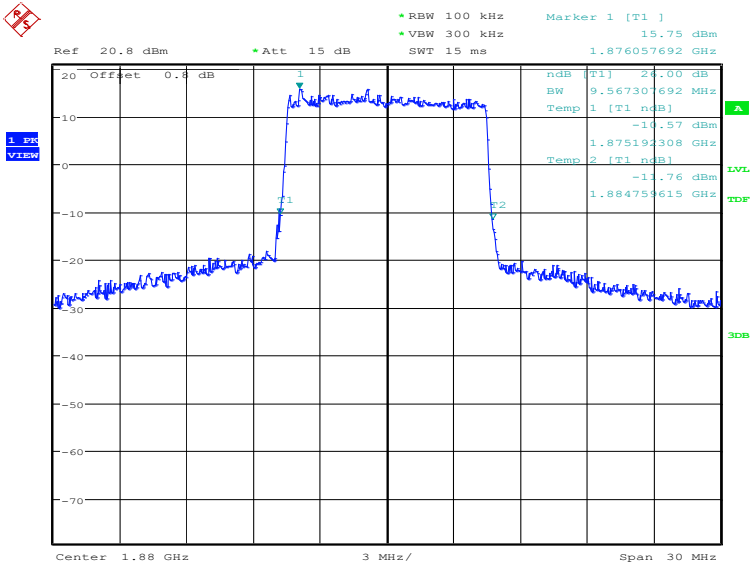
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1880.0	QPSK	16QAM
	9519.23	9567.31

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



Date: 7.SEP.2020 19:07:57

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



Date: 7.SEP.2020 19:08:36

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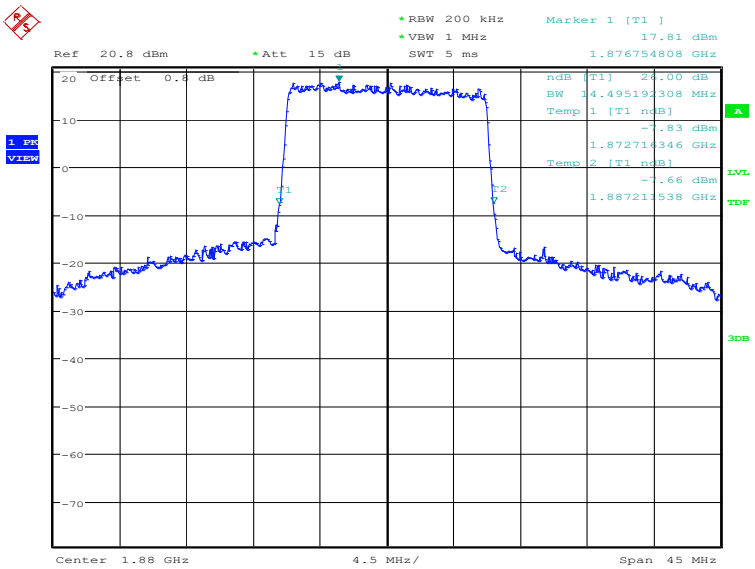
LTE band 2, 15MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1880.0	QPSK	16QAM
	14495.19	14639.42

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



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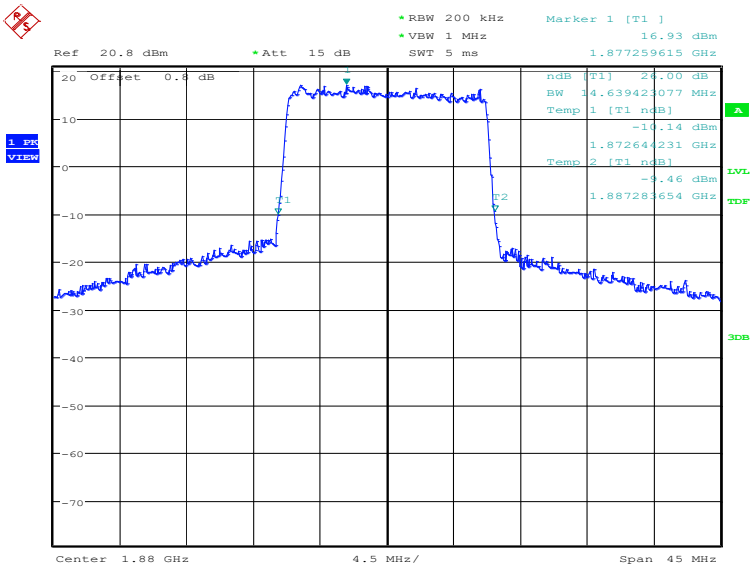
LTE band 2, 15MHz Bandwidth, 16QAM (-26dBc BW)



Date: 7.SEP.2020 19:10:44

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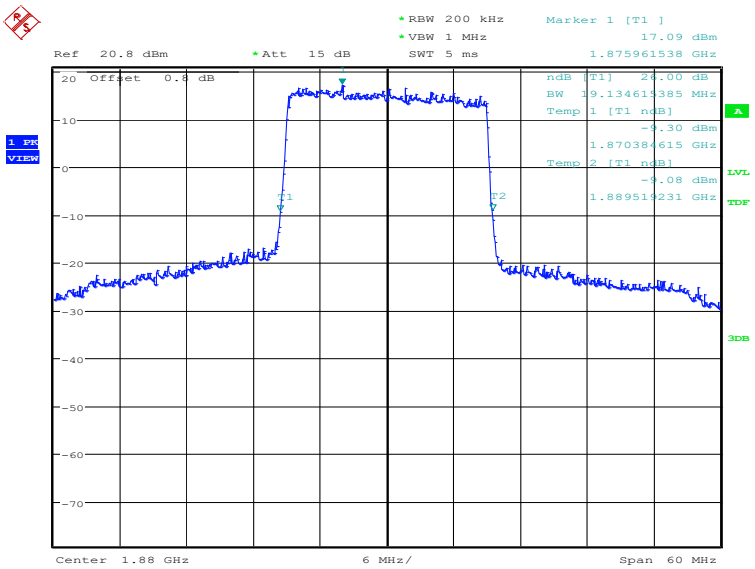
LTE band 2, 20MHz (-26dBc)

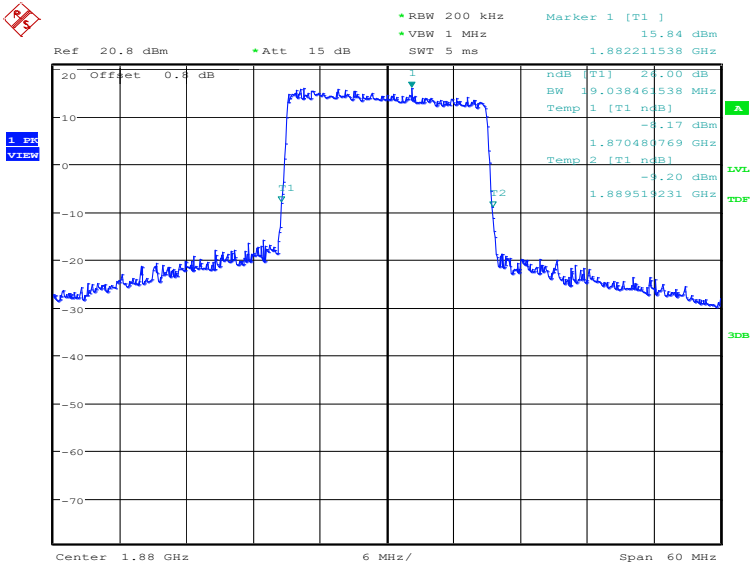
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1880.0	QPSK	16QAM
	19134.62	19038.46

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



Date: 7.SEP.2020 19:12:13

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



Date: 7.SEP.2020 19:12:52

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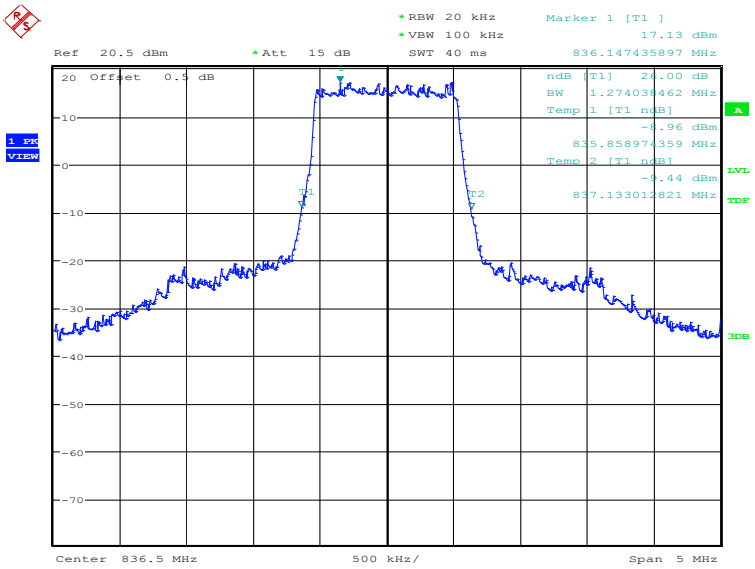
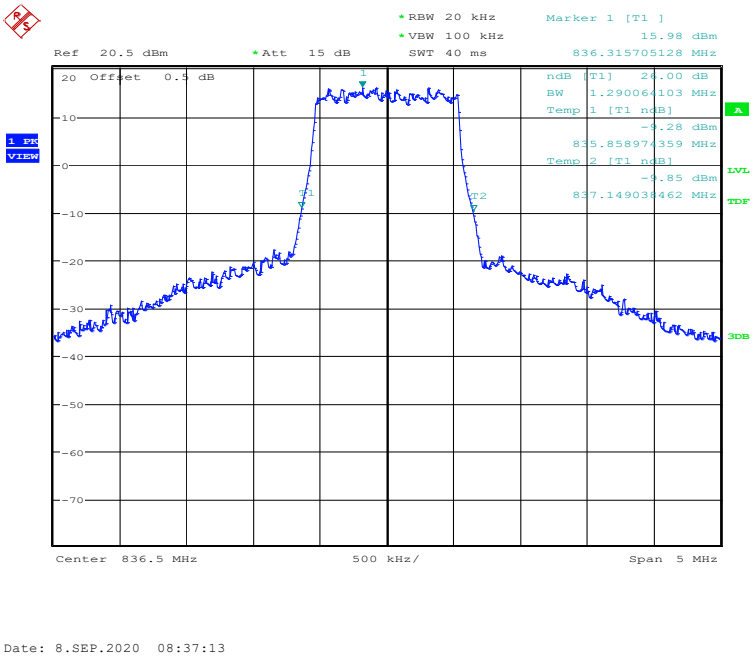
LTE band 5, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
836.5	QPSK	16QAM
	1274.04	1290.06

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



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



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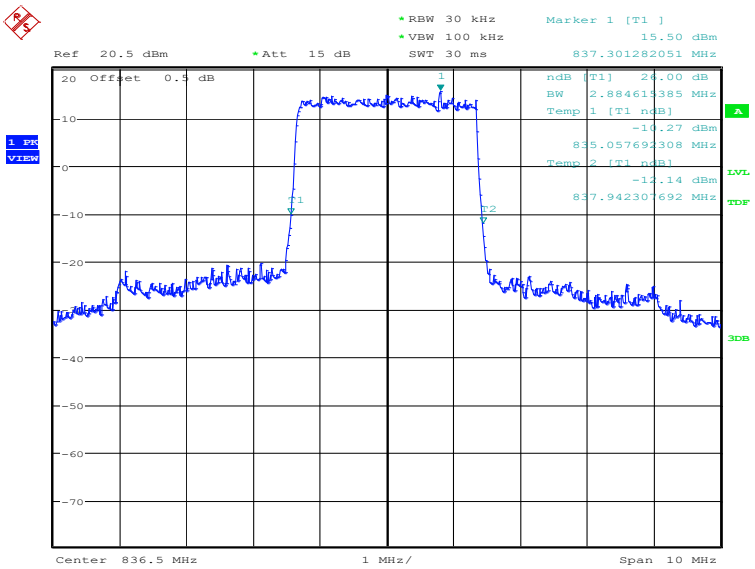
LTE band 5, 3MHz (-26dBc)

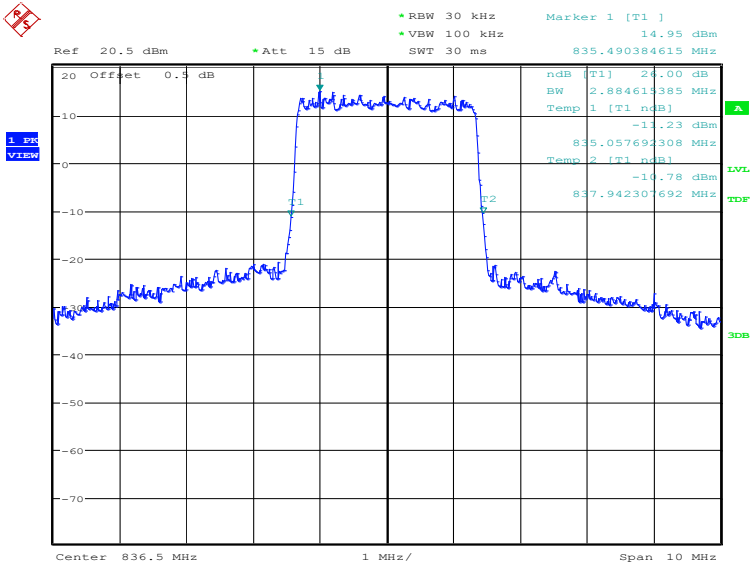
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
836.5	QPSK	16QAM
	2884.62	2884.62

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



Date: 8.SEP.2020 08:38:41

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



Date: 8.SEP.2020 08:39:20

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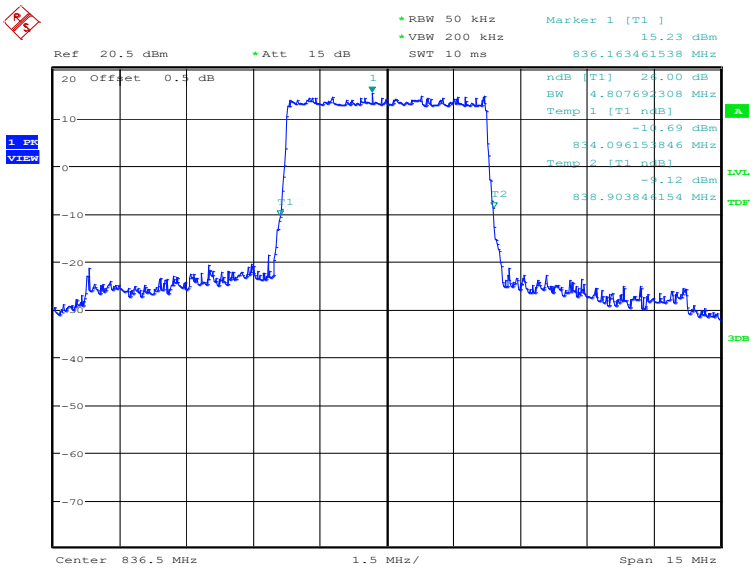
LTE band 5, 5MHz (-26dBc)

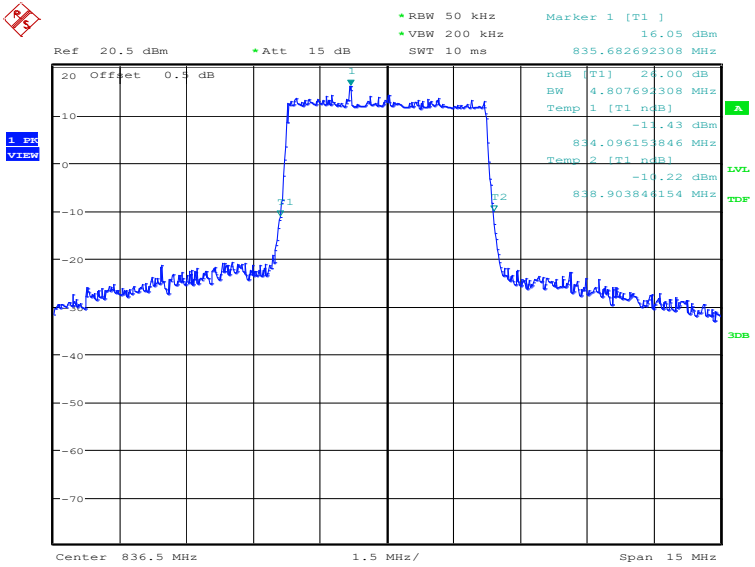
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
836.5	QPSK	16QAM
	4807.69	4807.69

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



Date: 8.SEP.2020 08:40:48

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



Date: 8.SEP.2020 08:41:27

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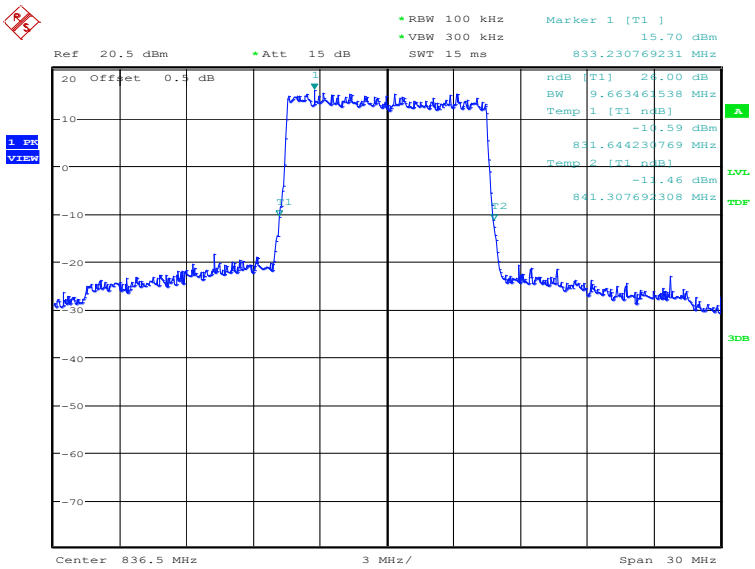
LTE band 5, 10MHz (-26dBc)

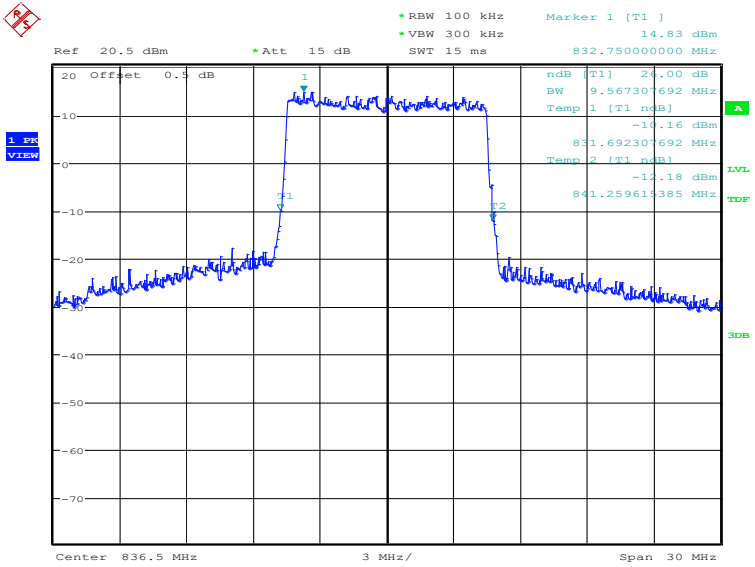
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
836.5	QPSK	16QAM
	9663.46	9567.31

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



Date: 8.SEP.2020 08:42:55

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



Date: 8.SEP.2020 08:43:34

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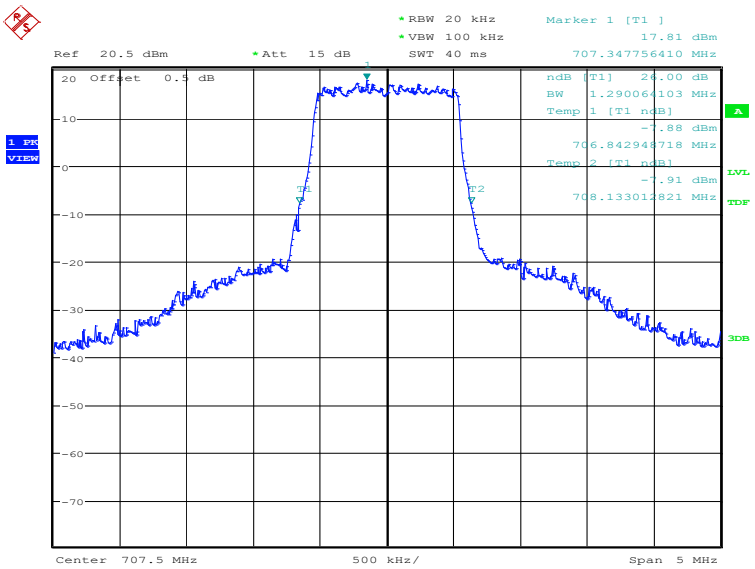
LTE band 12, 1.4MHz (-26dBc)

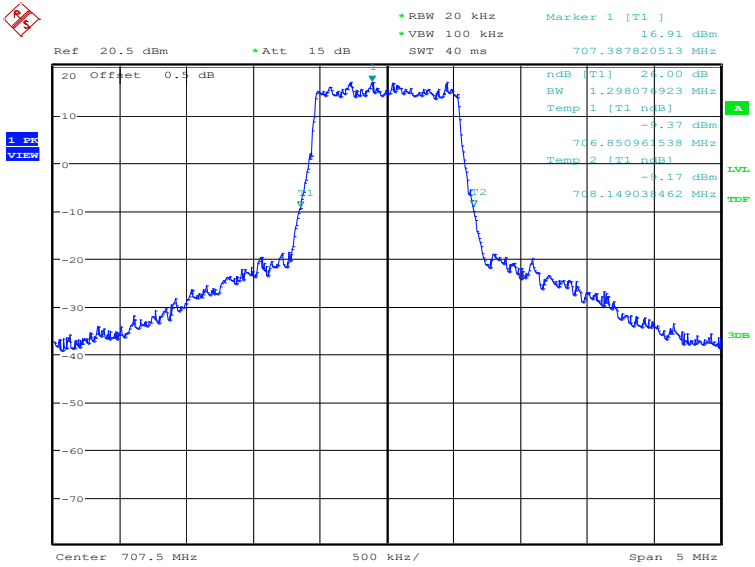
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
707.5	QPSK	16QAM
	1290.06	1298.08

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



Date: 8.SEP.2020 08:45:03

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



Date: 8.SEP.2020 08:45:42

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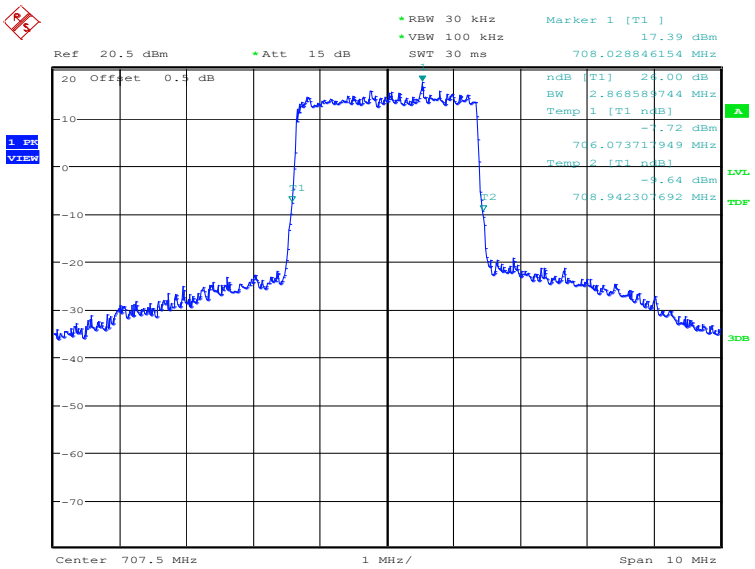
LTE band 12, 3MHz (-26dBc)

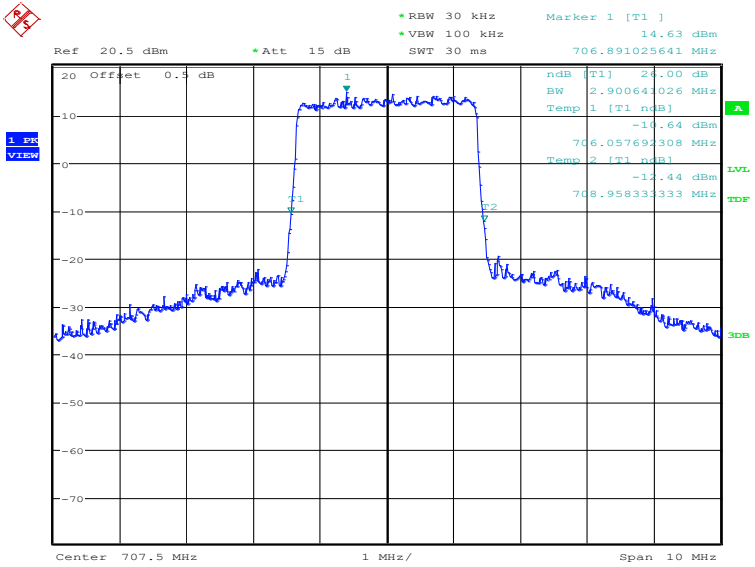
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
707.5	QPSK	16QAM
	2868.59	2900.64

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



Date: 8.SEP.2020 08:47:10

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



Date: 8.SEP.2020 08:47:49

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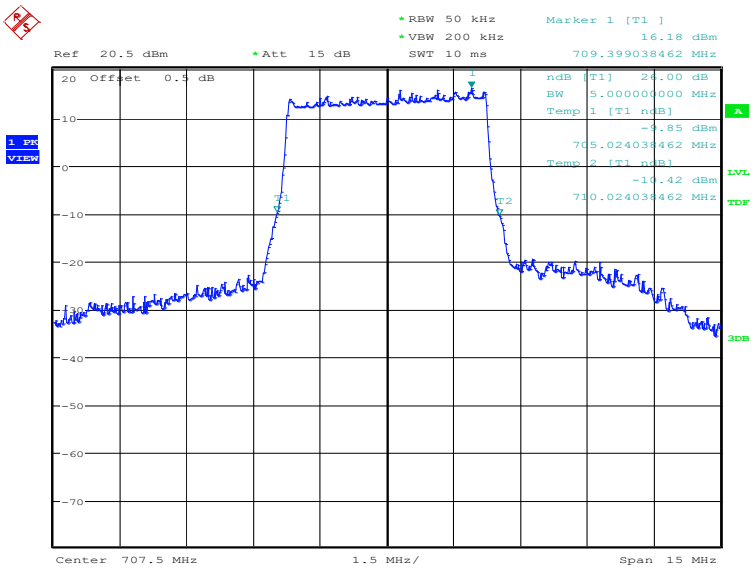
LTE band 12, 5MHz (-26dBc)

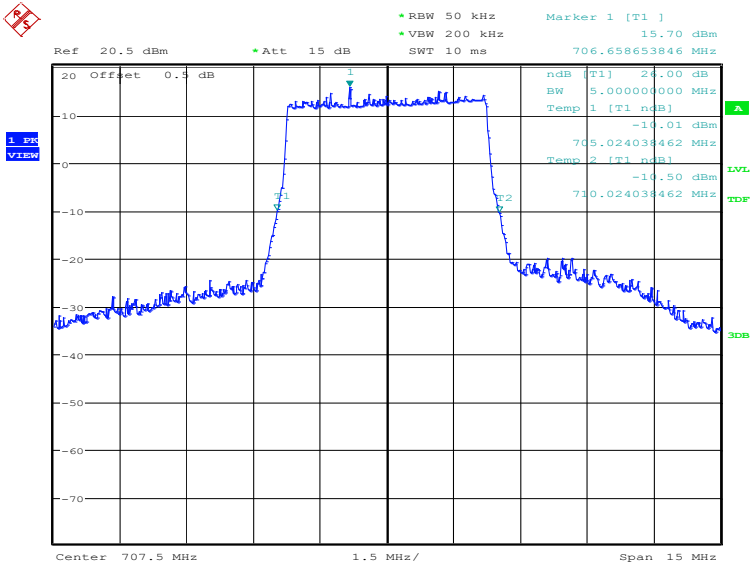
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
707.5	QPSK	16QAM
	5000.00	5000.00

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



Date: 8.SEP.2020 08:49:18

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



Date: 8.SEP.2020 08:49:57

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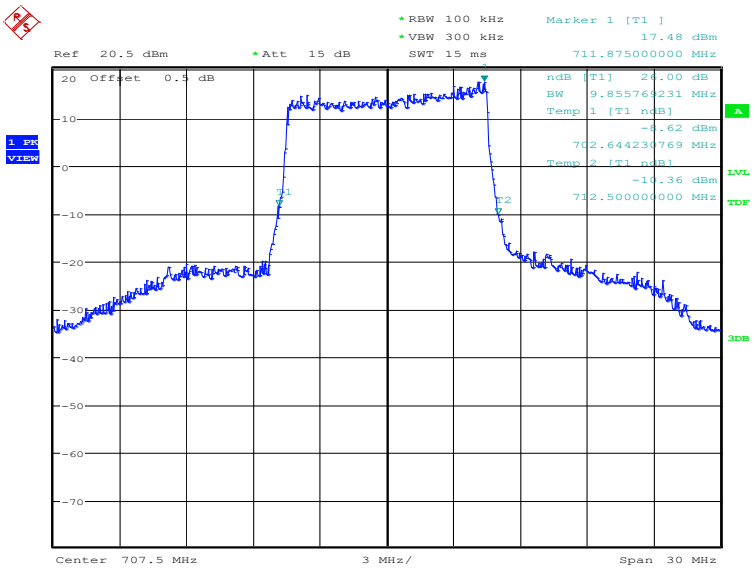
LTE band 12, 10MHz (-26dBc)

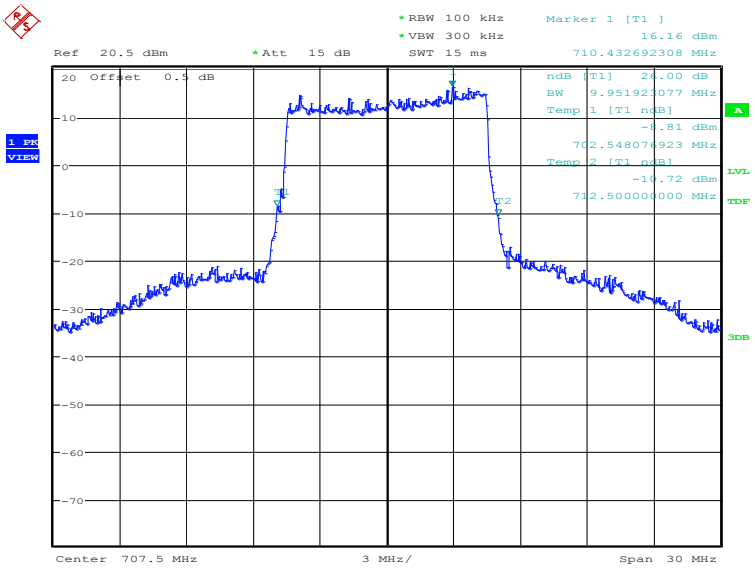
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
707.5	QPSK	16QAM
	9855.77	9951.92

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



Date: 8.SEP.2020 08:51:25

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



Date: 8.SEP.2020 08:52:04

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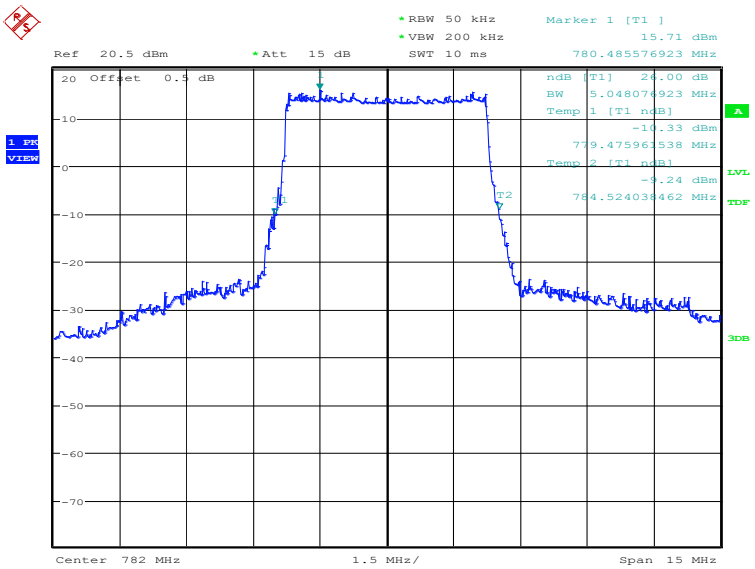
LTE band 13, 5MHz (-26dBc)

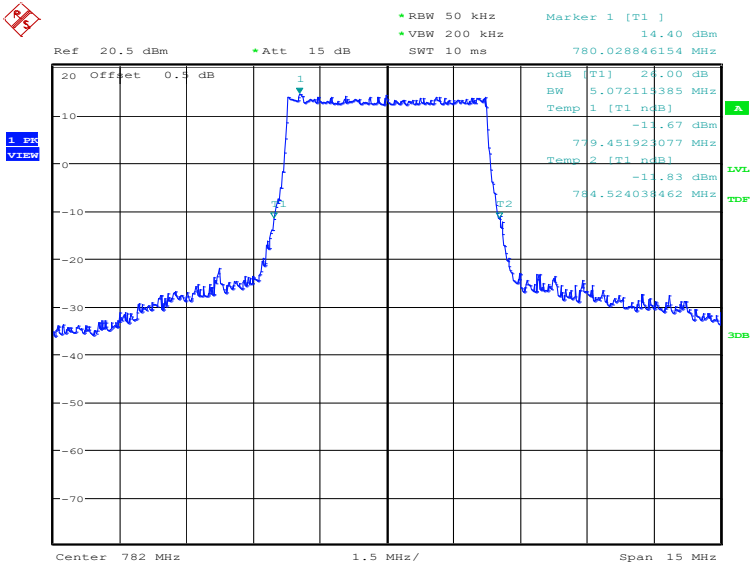
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
782.0	QPSK	16QAM
	5048.08	5072.12

LTE band 13, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.SEP.2020 19:14:21

LTE band 13, 5MHz Bandwidth,16QAM (-26dBc BW)



Date: 7.SEP.2020 19:15:00

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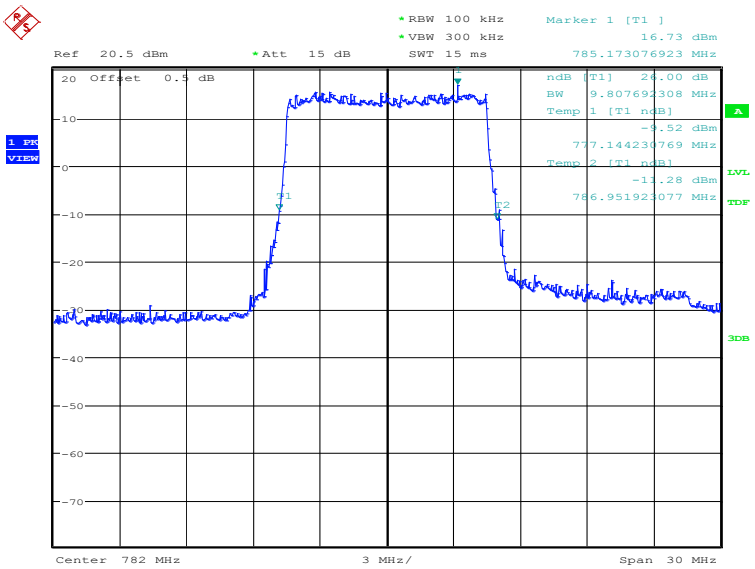
LTE band 13, 10MHz (-26dBc)

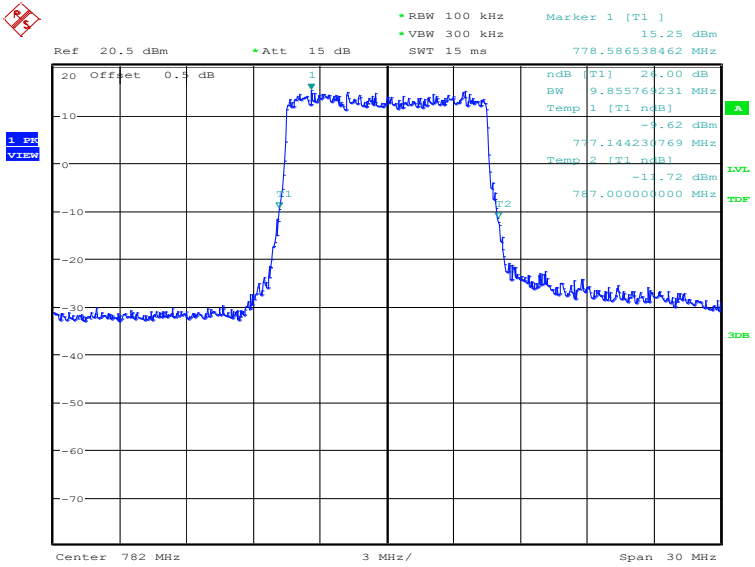
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
782.0	QPSK	16QAM
	9807.69	9855.77

LTE band 13, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.SEP.2020 19:16:29

LTE band 13, 10MHz Bandwidth,16QAM (-26dBc BW)



Date: 7.SEP.2020 19:17:08

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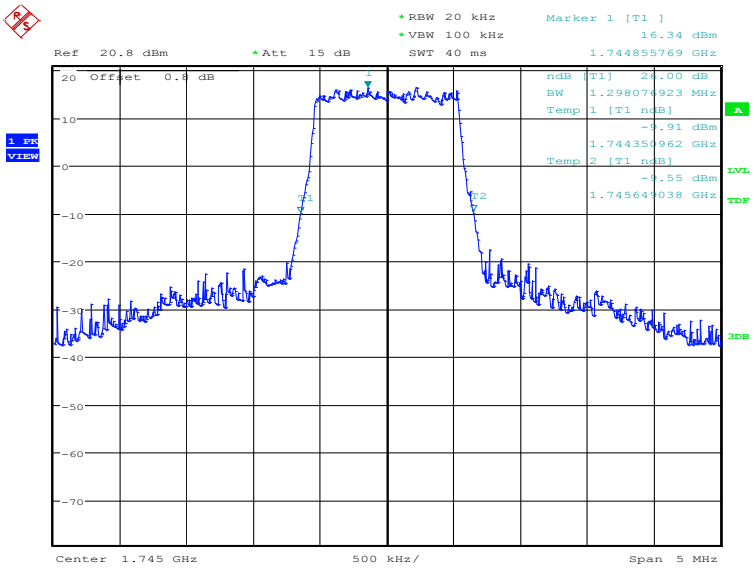
LTE band 66, 1.4MHz (-26dBc)

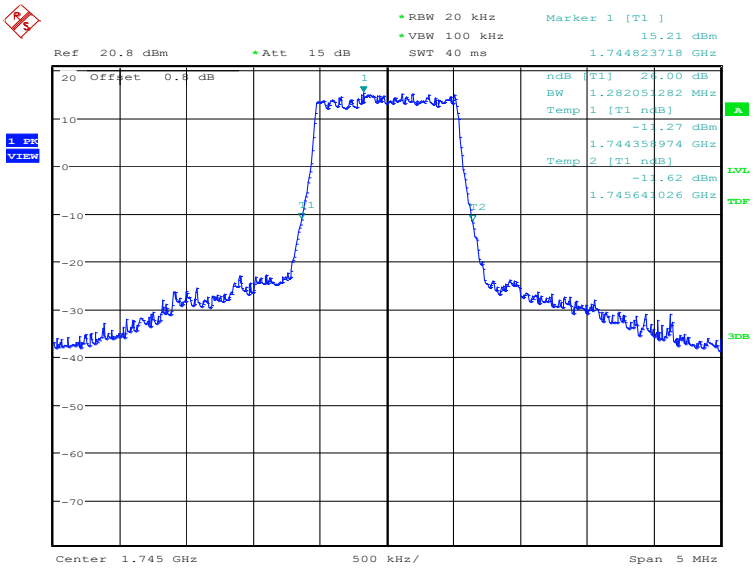
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1745.0	QPSK	16QAM
	1298.08	1282.05

LTE band 66, 1.4MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.SEP.2020 19:18:38

LTE band 66, 1.4MHz Bandwidth, 16QAM (-26dBc BW)



Date: 7.SEP.2020 19:19:17

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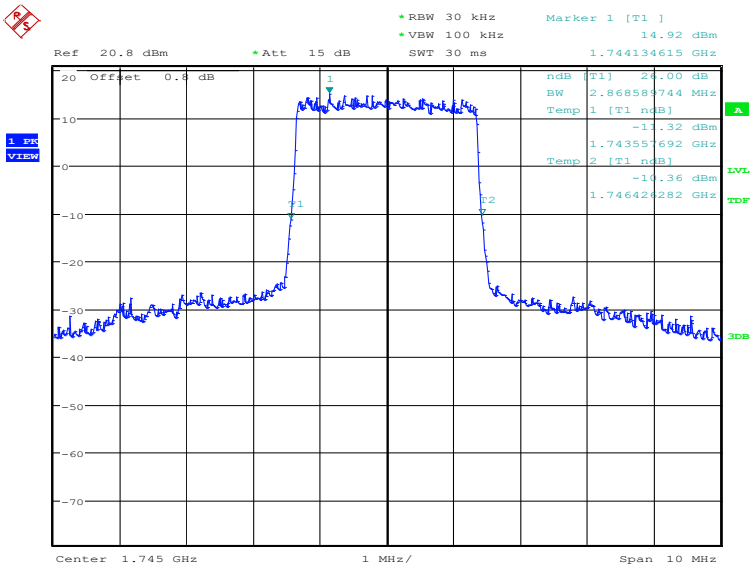
LTE band 66, 3MHz (-26dBc)

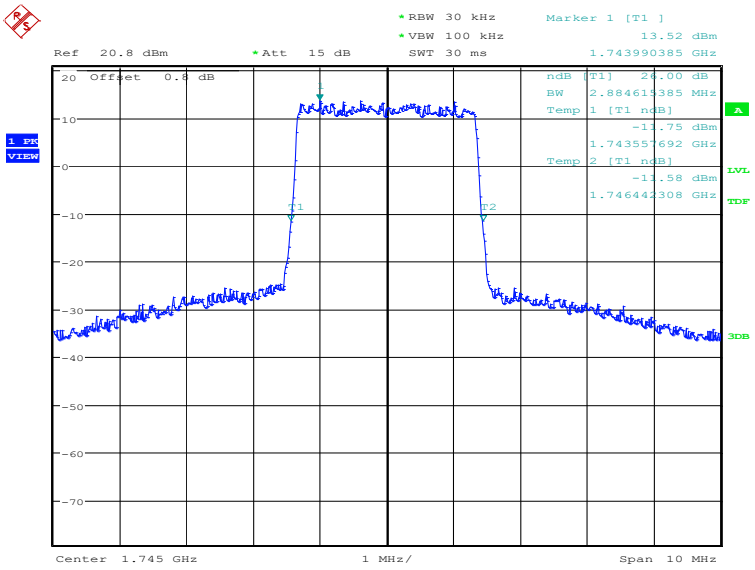
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1745.0	QPSK	16QAM
	2868.59	2884.62

LTE band 66, 3MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.SEP.2020 19:20:46

LTE band 66, 3MHz Bandwidth, 16QAM (-26dBc BW)



Date: 7.SEP.2020 19:21:25

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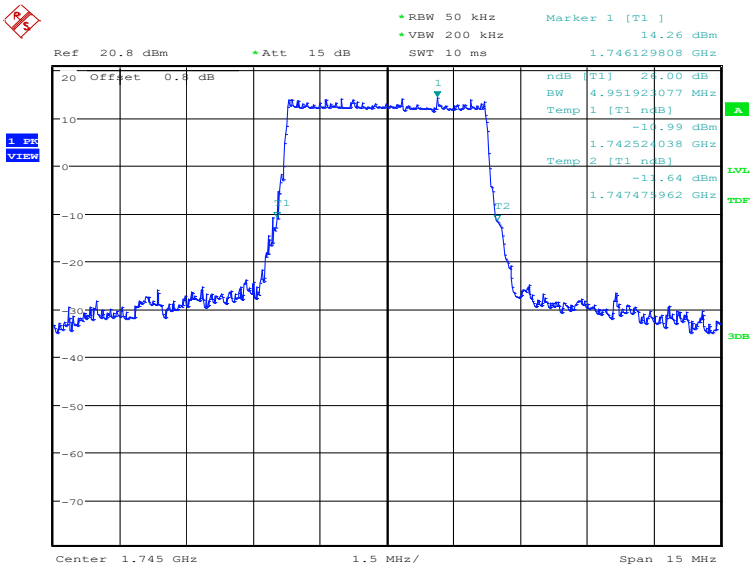
LTE band 66, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1745.0	QPSK	16QAM
	4951.92	5072.12

LTE band 66, 5MHz Bandwidth, QPSK (-26dBc BW)



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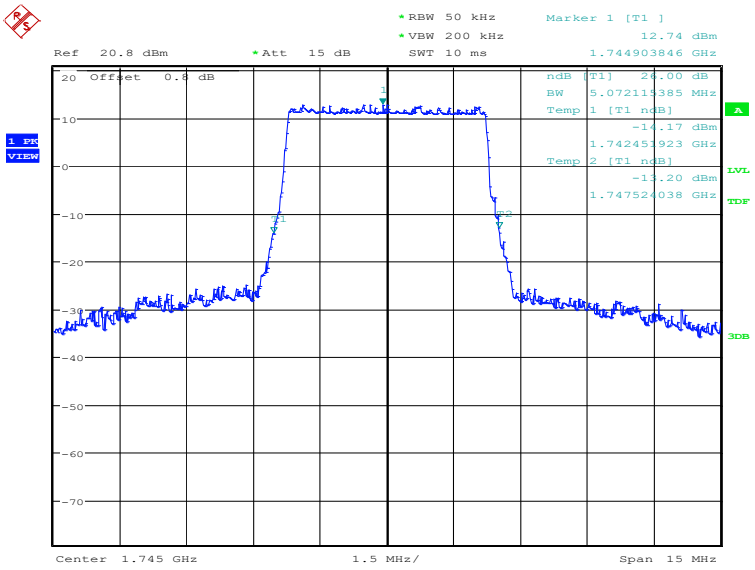
LTE band 66, 5MHz Bandwidth, 16QAM (-26dBc BW)



Date: 7.SEP.2020 19:23:33

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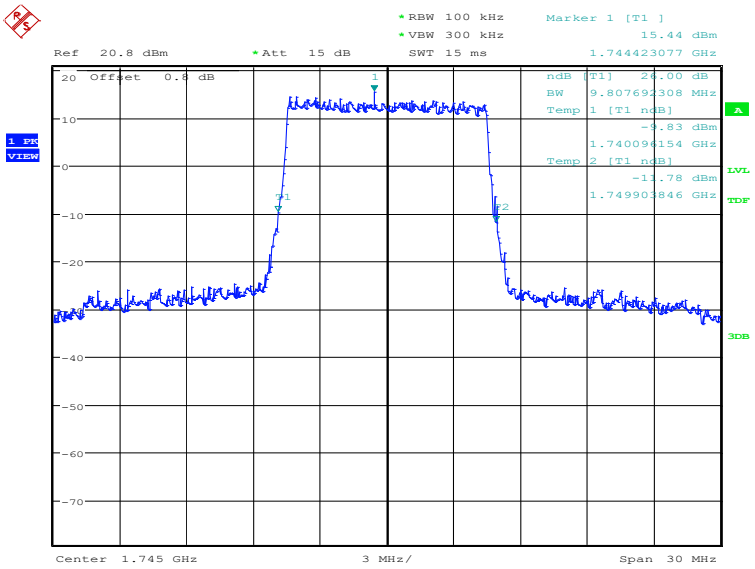
LTE band 66, 10MHz (-26dBc)

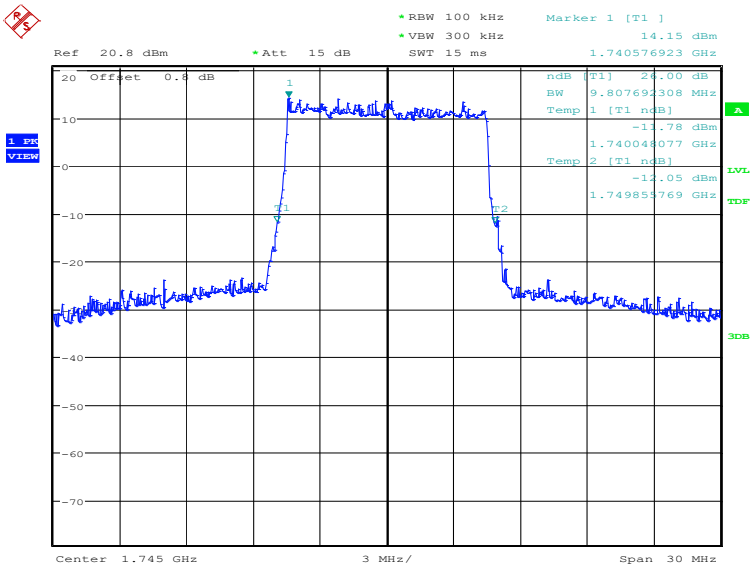
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1745.0	QPSK	16QAM
	9807.69	9807.69

LTE band 66, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.SEP.2020 19:25:01

LTE band 66, 10MHz Bandwidth, 16QAM (-26dBc BW)



Date: 7.SEP.2020 19:25:41

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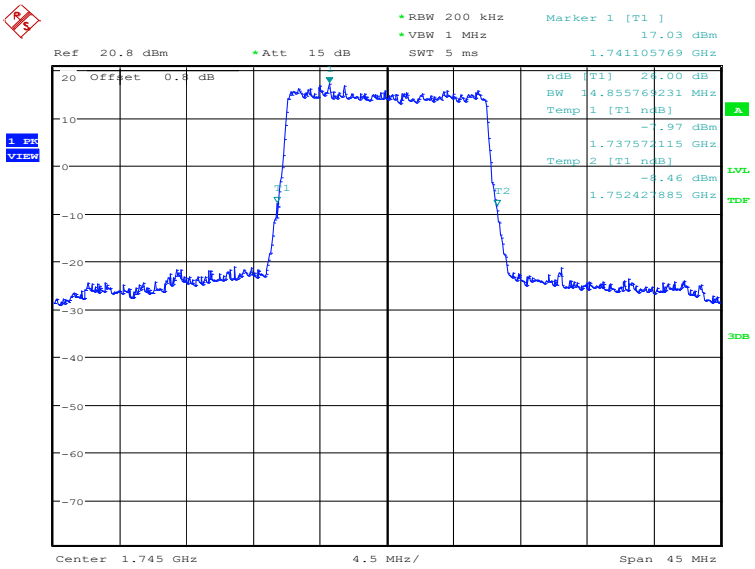
LTE band 66, 15MHz (-26dBc)

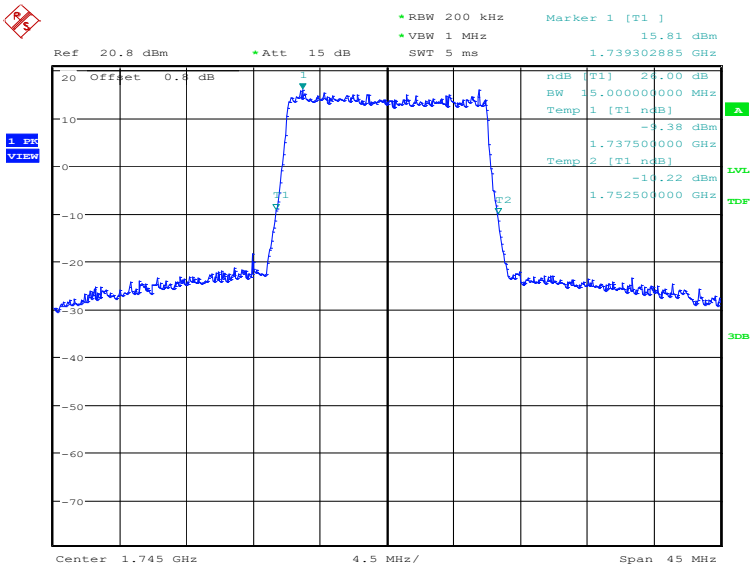
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1745.0	QPSK	16QAM
	14855.77	15000.00

LTE band 66, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.SEP.2020 19:27:10

LTE band 66, 15MHz Bandwidth, 16QAM (-26dBc BW)



Date: 7.SEP.2020 19:27:49

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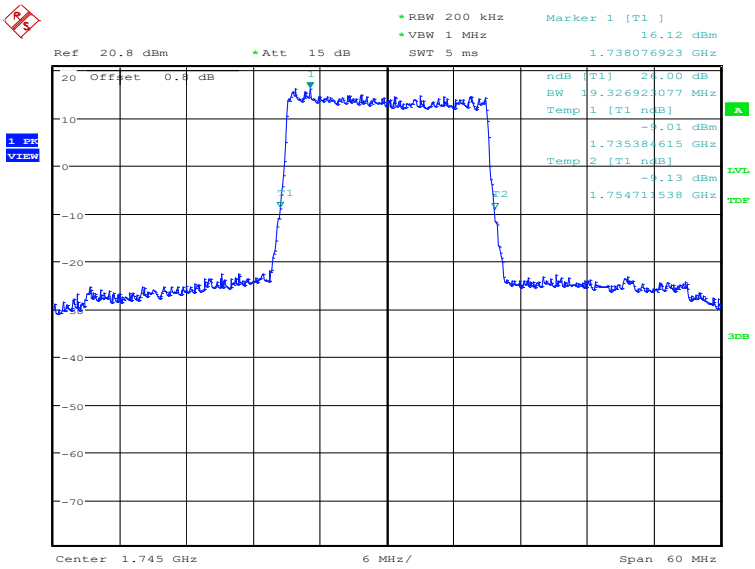
LTE band 66, 20MHz (-26dBc)

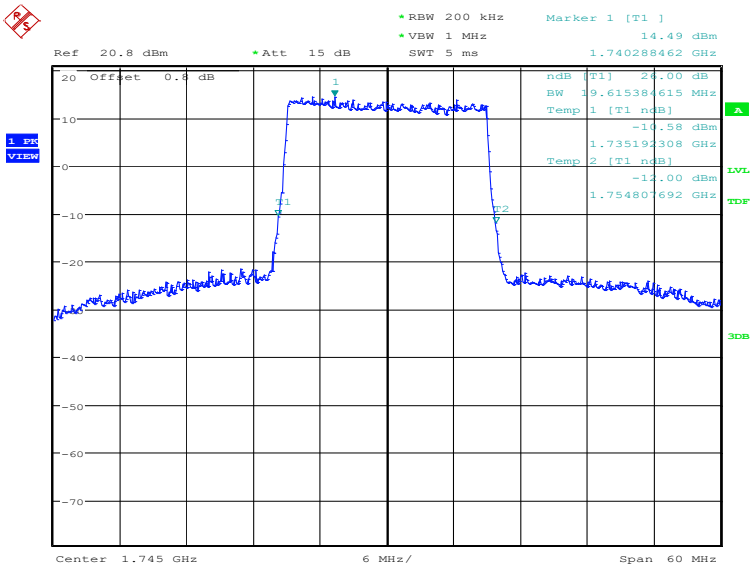
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1745.0	QPSK	16QAM
	19326.92	19615.38

LTE band 66, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.SEP.2020 19:29:18

LTE band 66, 20MHz Bandwidth, 16QAM (-26dBc BW)



Date: 7.SEP.2020 19:29:57

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A.6 Band Edge Compliance

A.6.1 Measurement limit

Part 22.917, Part 24.238 and Part 27.53(h) 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.

Part 27.53(c) states for operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

Part 27.53(g) states for operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee’s frequency block, a resolution bandwidth of at least 30 kHz may be employed.

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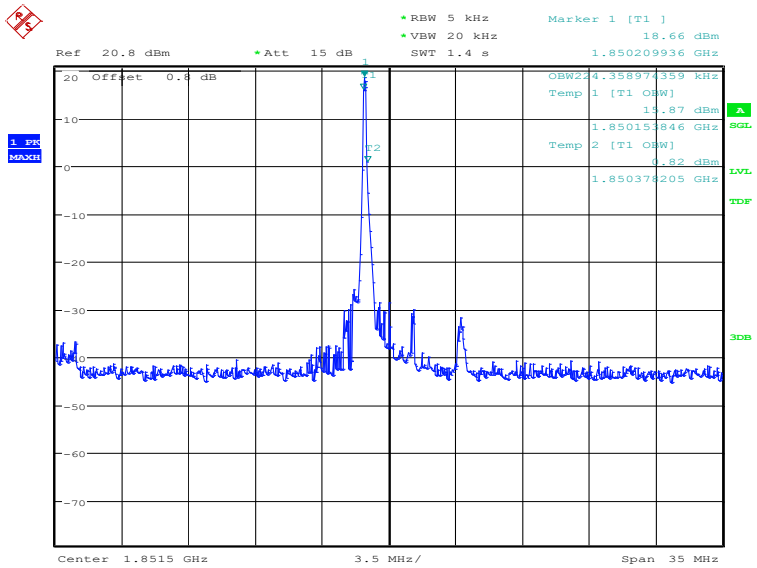
A.6.2 Measurement result

Only the worst case result is given below

LTE band 2

OBW: 1RB-low_offset



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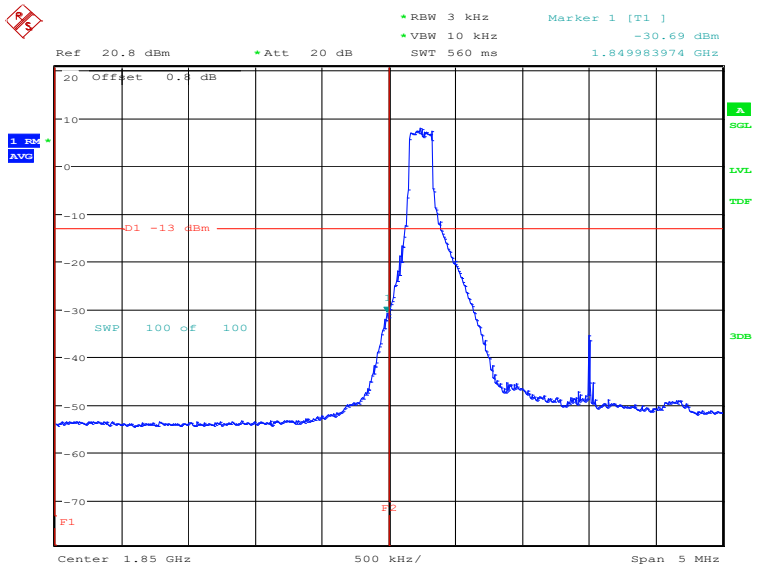
LOW BAND EDGE BLOCK-1RB-low_offset



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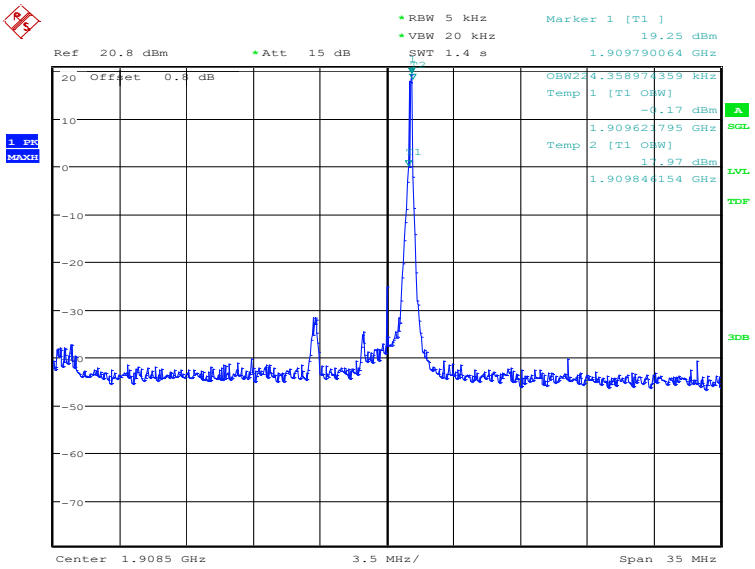
OBW: 1RB-high_offset



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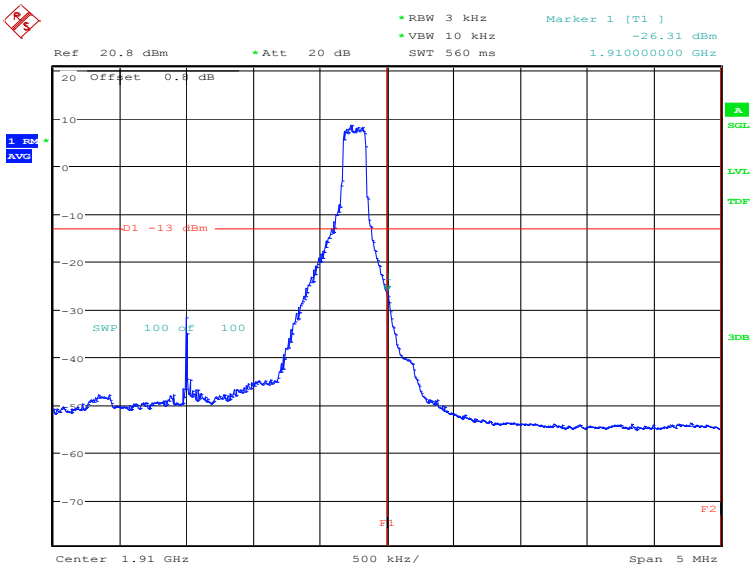
HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 21.SEP.2020 13:57:57

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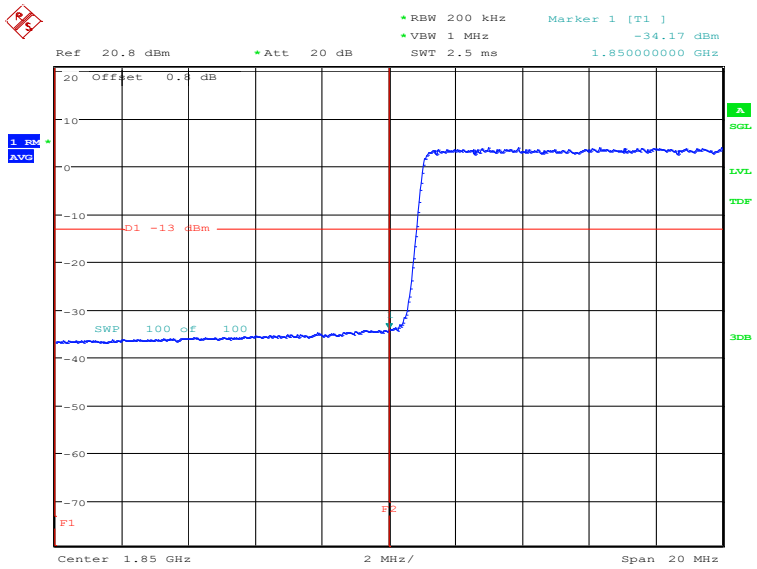
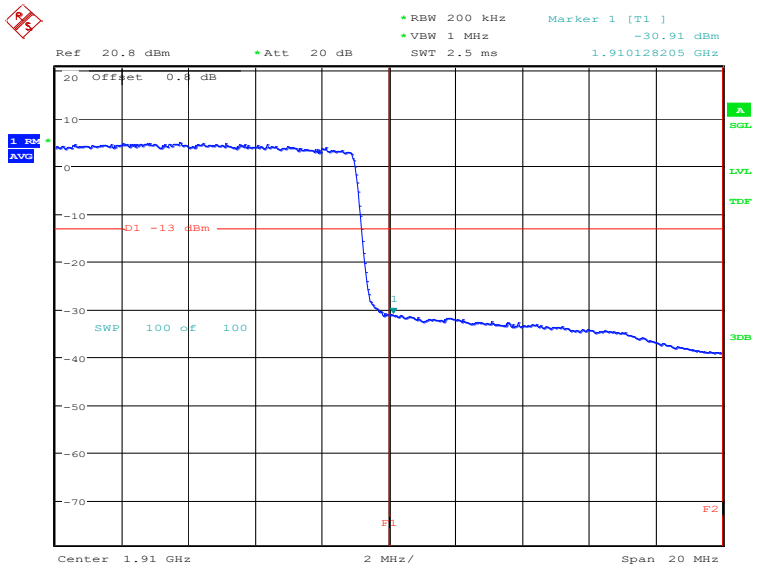
LOW BAND EDGE BLOCK-20MHz-100%RB



HIGH BAND EDGE BLOCK-20MHz-100%RB



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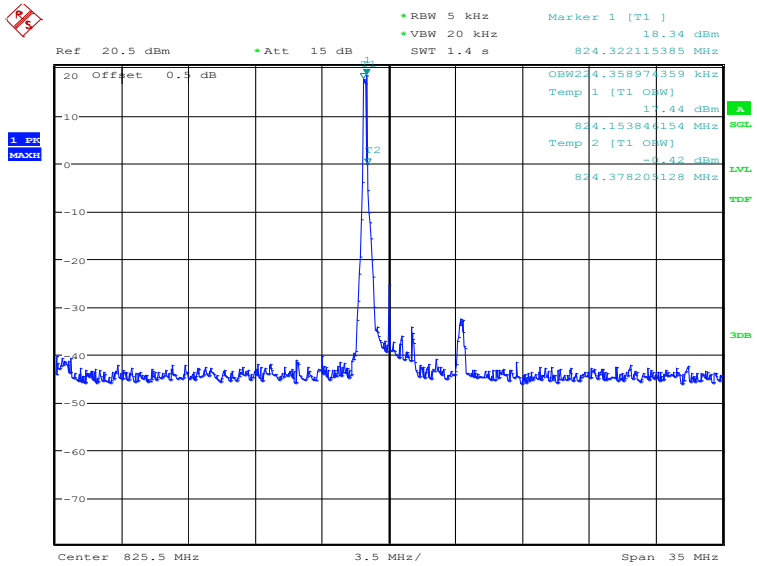
LTE band 5

OBW: 1RB-low_offset



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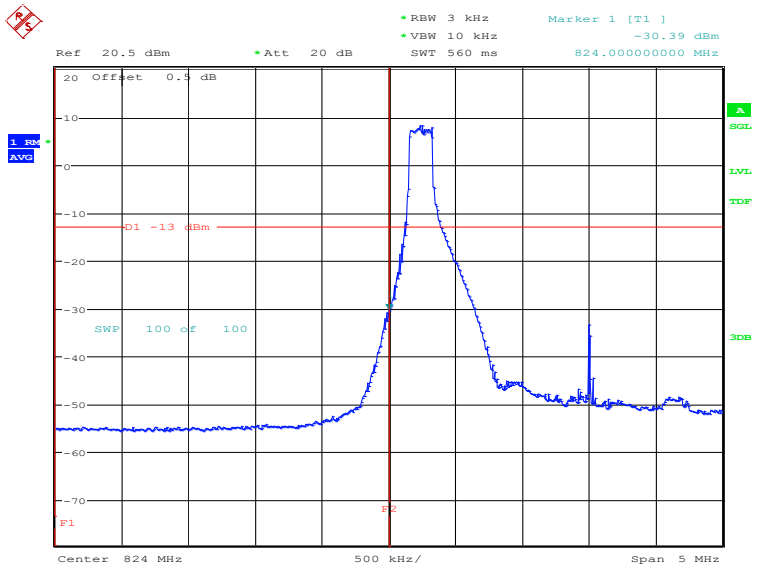
LOW BAND EDGE BLOCK-1RB-low_offset



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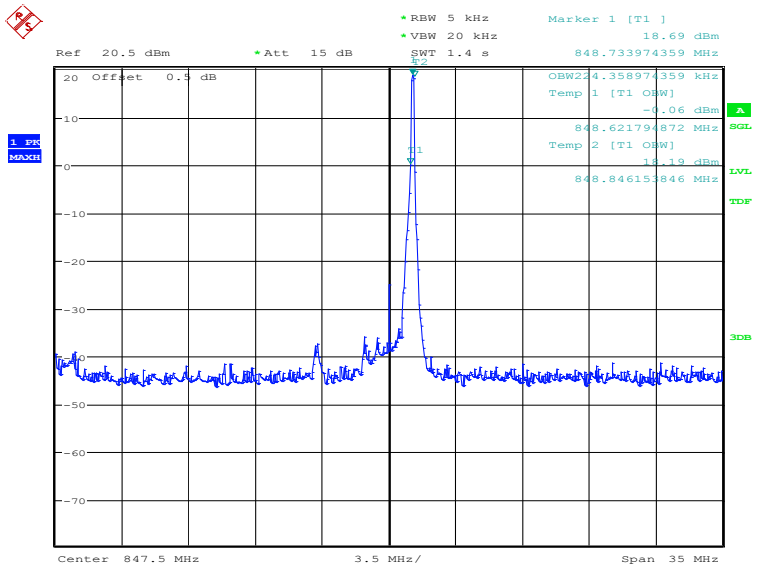
OBW: 1RB-high_offset



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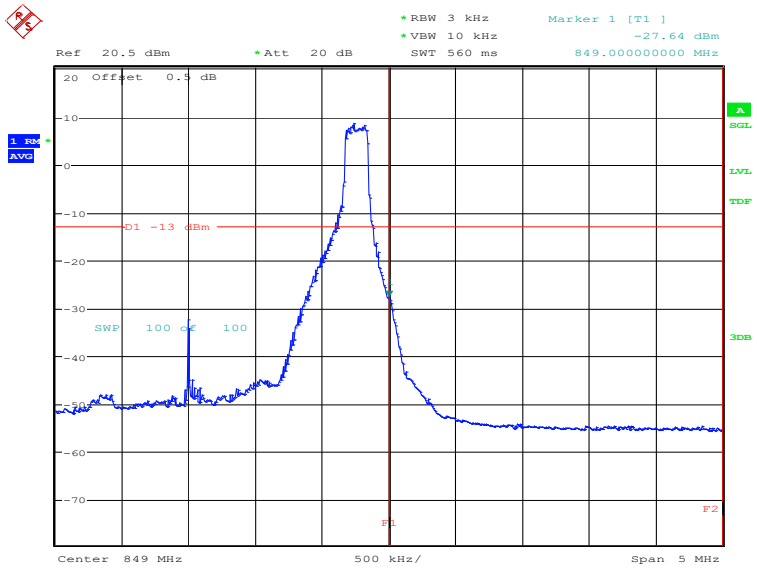
HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 21.SEP.2020 13:45:59

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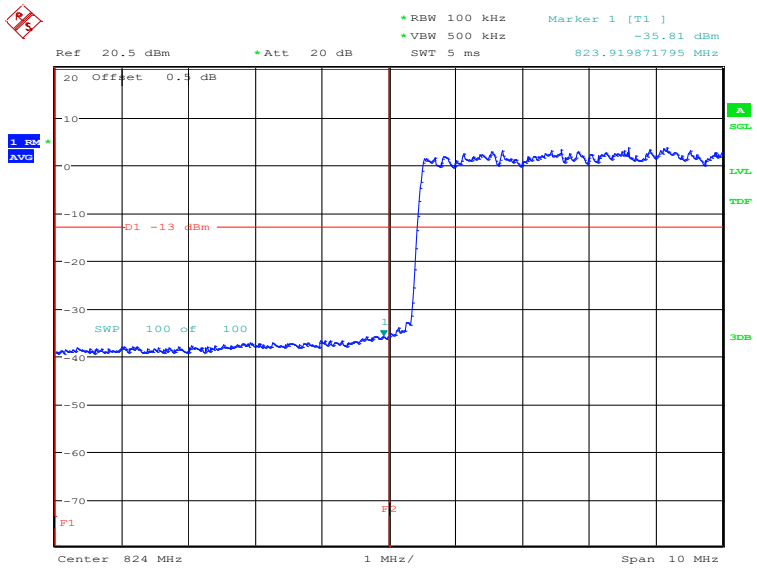
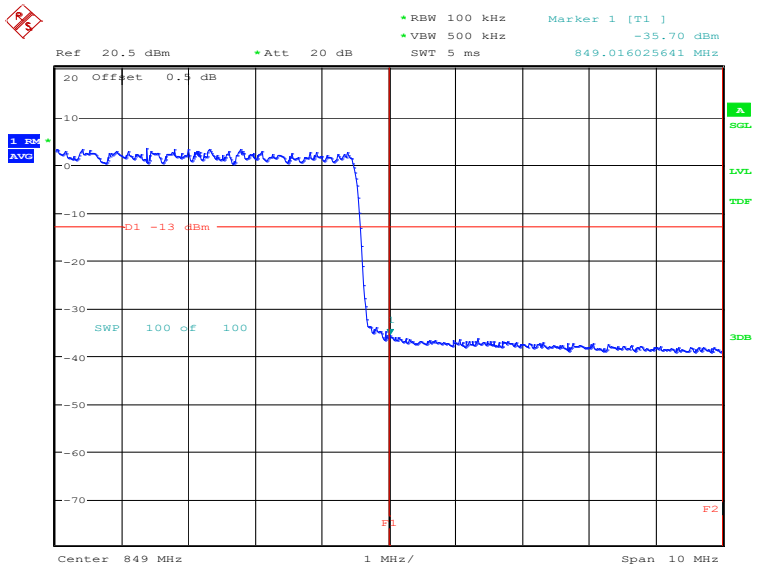
LOW BAND EDGE BLOCK-10MHz-100%RB



HIGH BAND EDGE BLOCK-10MHz-100%RB



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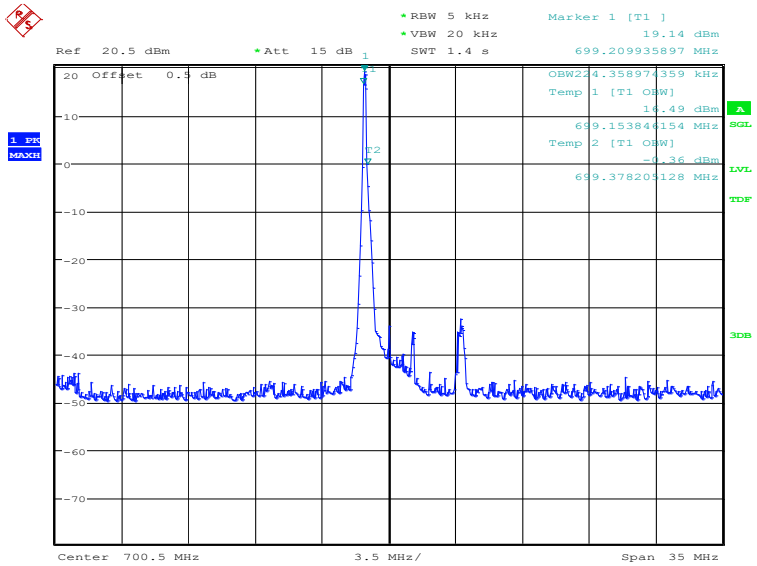
LTE band 12

OBW: 1RB-low_offset



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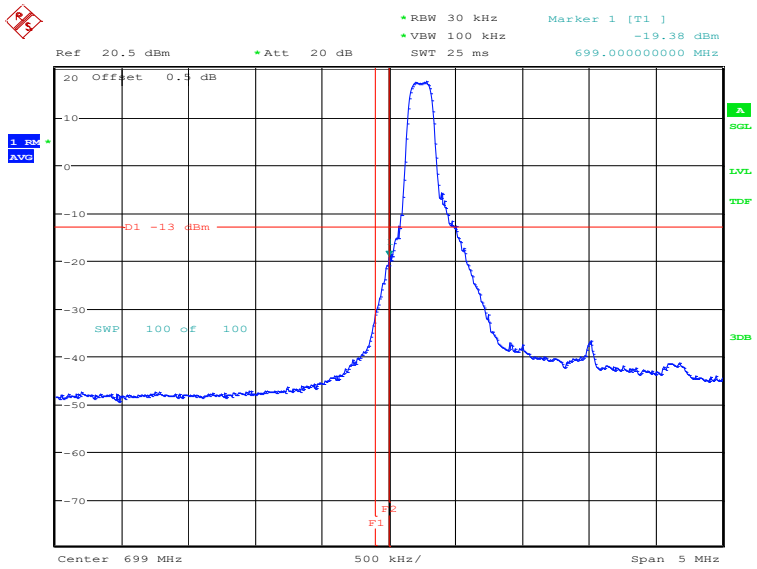
LOW BAND EDGE BLOCK-1RB-low_offset



Date: 21.SEP.2020 13:46:47

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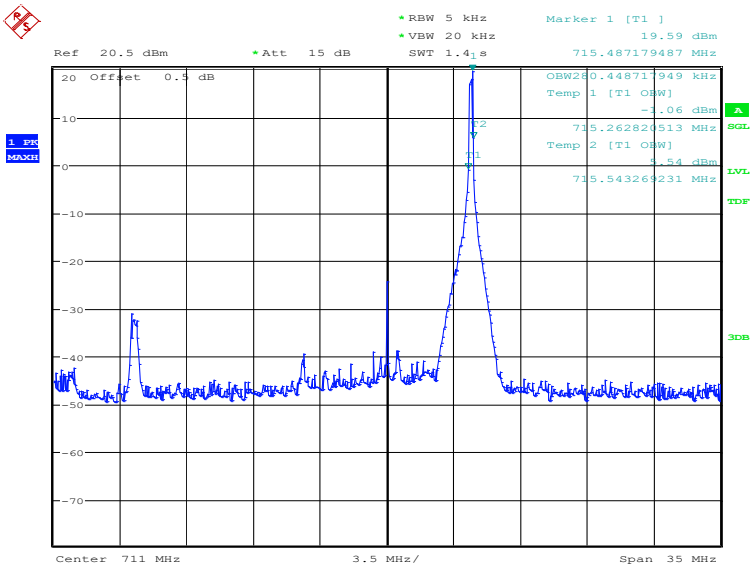
OBW: 1RB-high_offset



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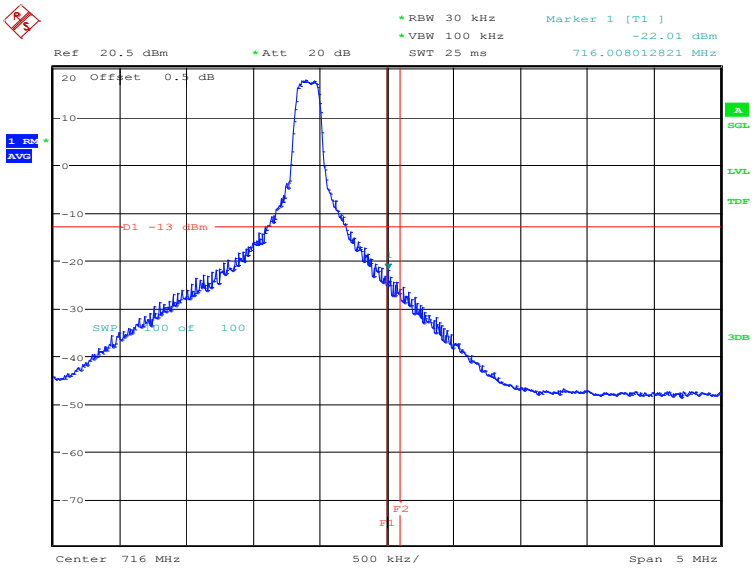
HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 21.SEP.2020 13:47:45

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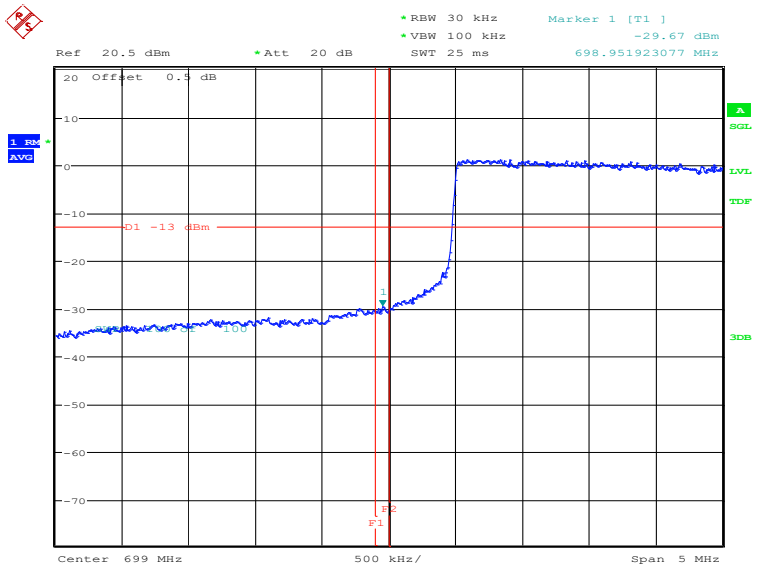
LOW BAND EDGE BLOCK-10MHz-100%RB



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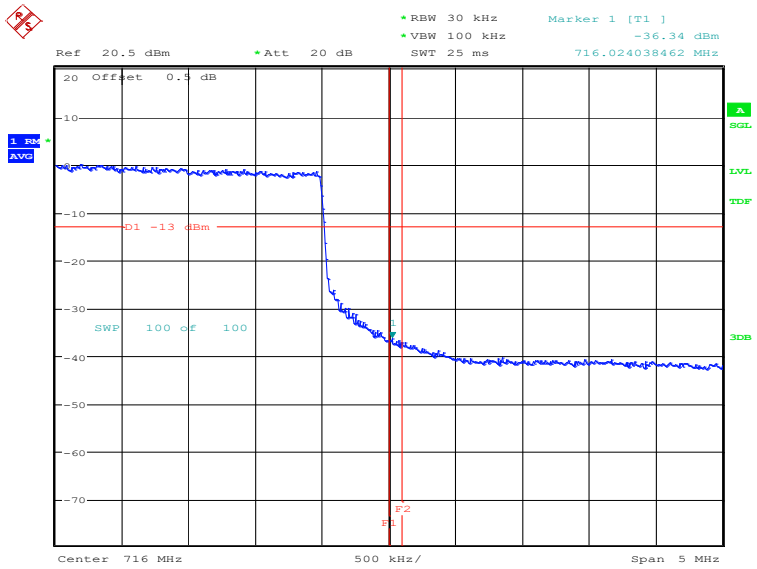
HIGH BAND EDGE BLOCK-10MHz-100%RB



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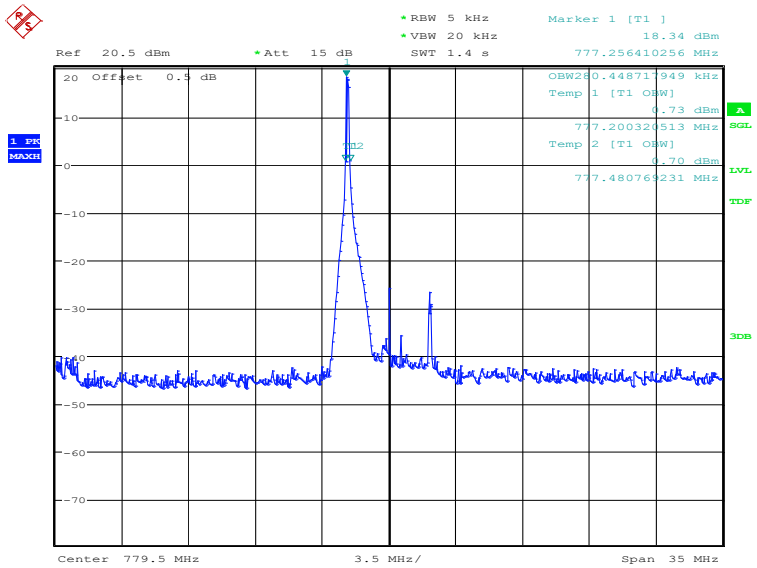
LTE band 13

OBW: 1RB-low_offset



Date: 21.SEP.2020 13:58:48

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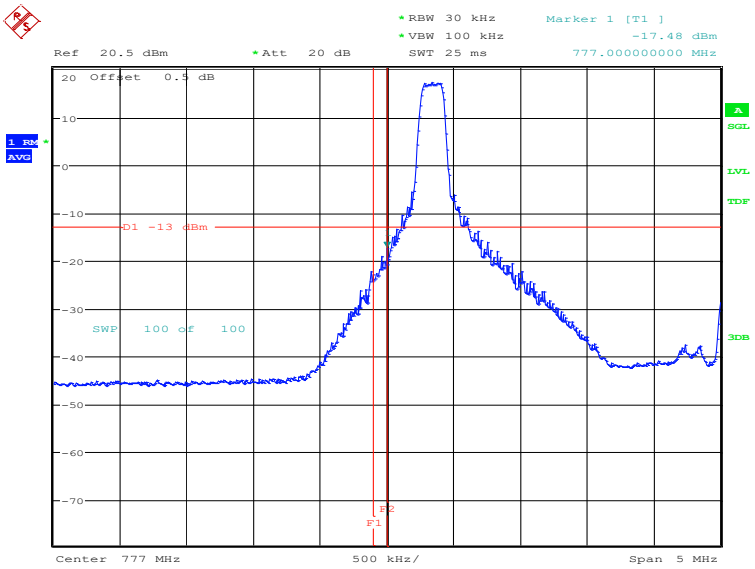
LOW BAND EDGE BLOCK-1RB-low_offset



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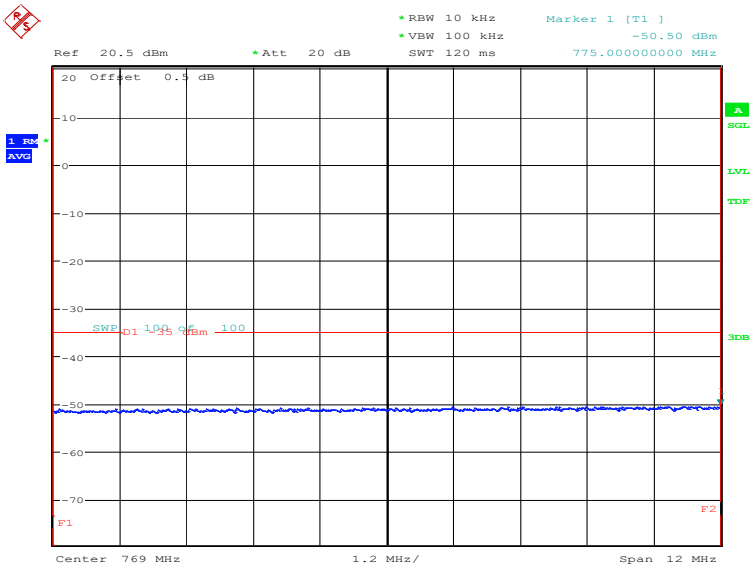

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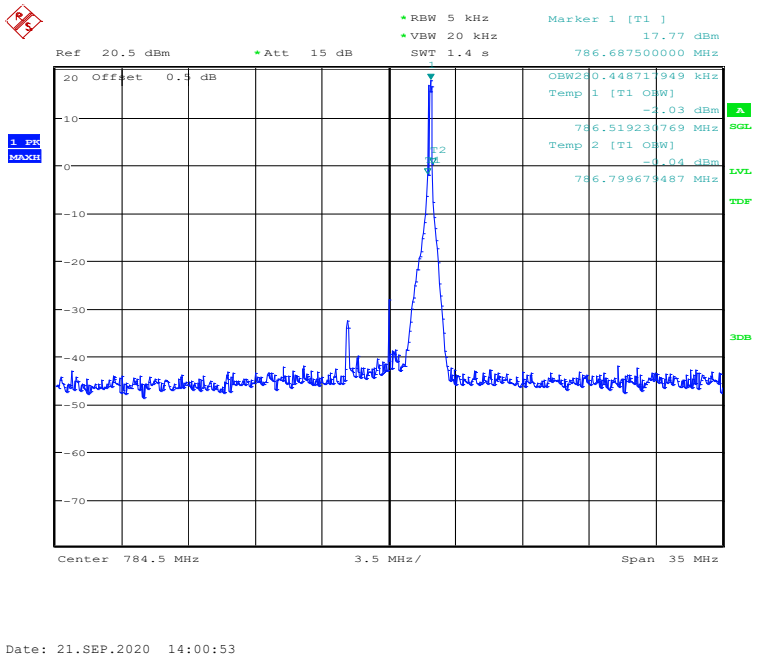
OBW: 1RB-high_offset



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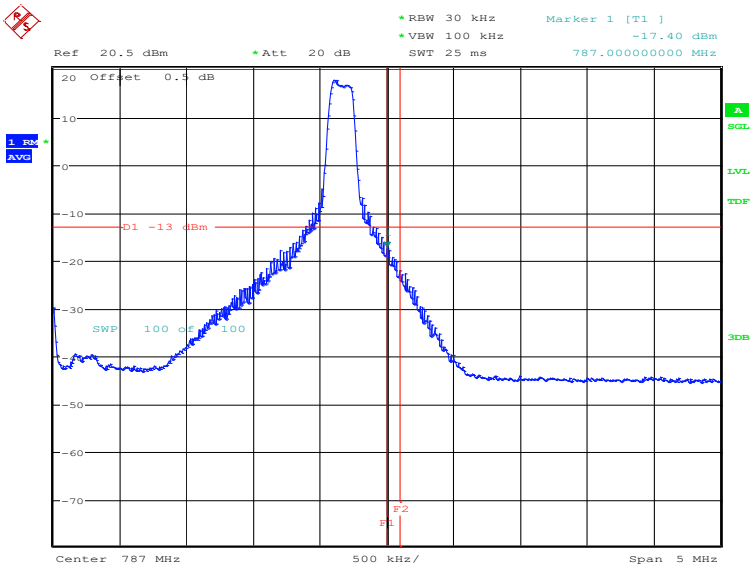
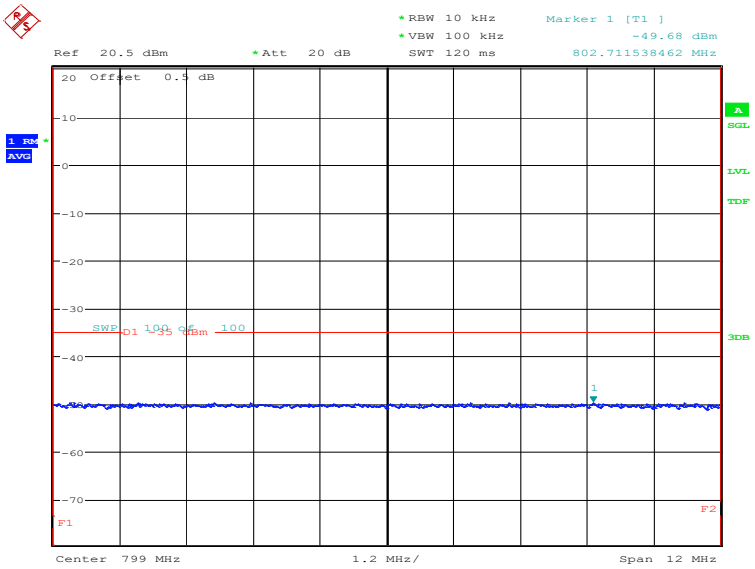
HIGH BAND EDGE BLOCK-1RB-high_offset





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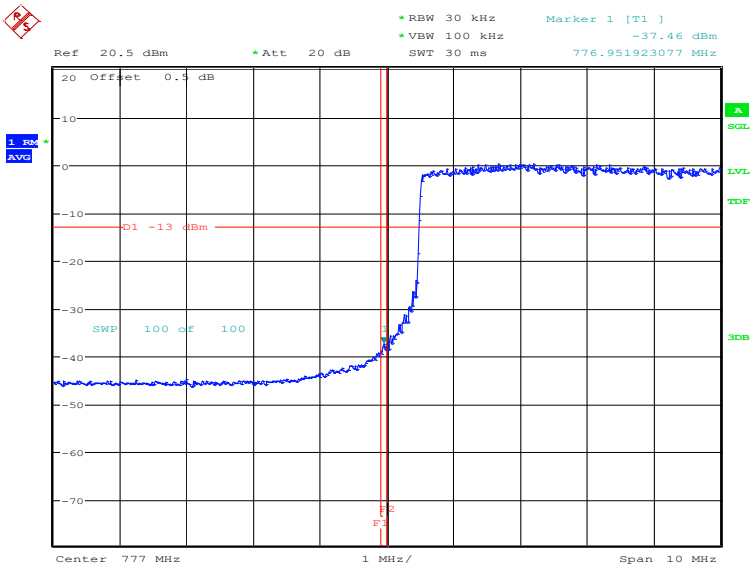
LOW BAND EDGE BLOCK-10MHz-100%RB



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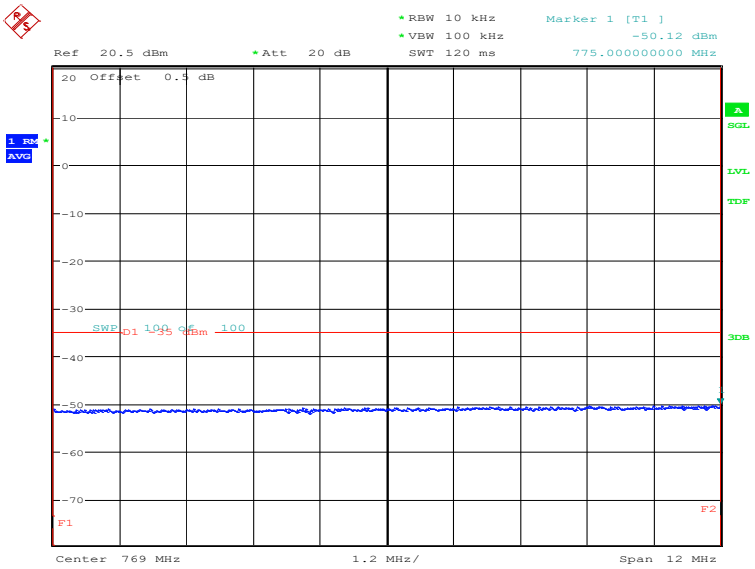

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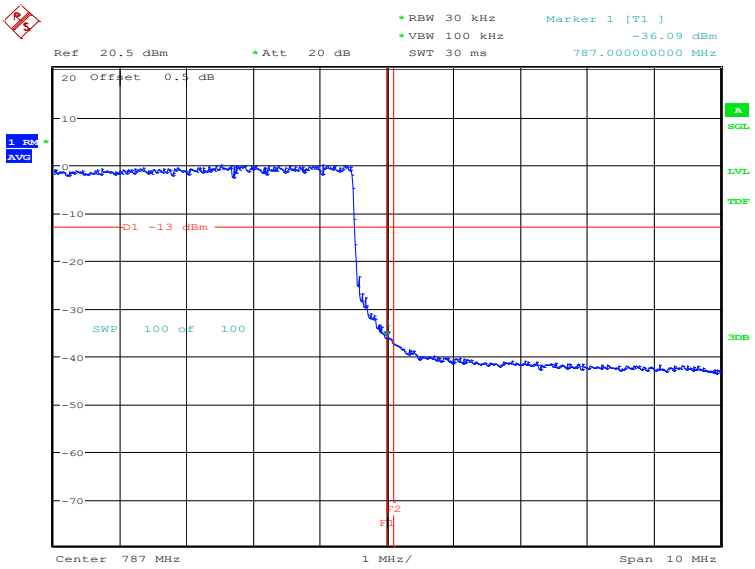
HIGH BAND EDGE BLOCK-10MHz-100%RB



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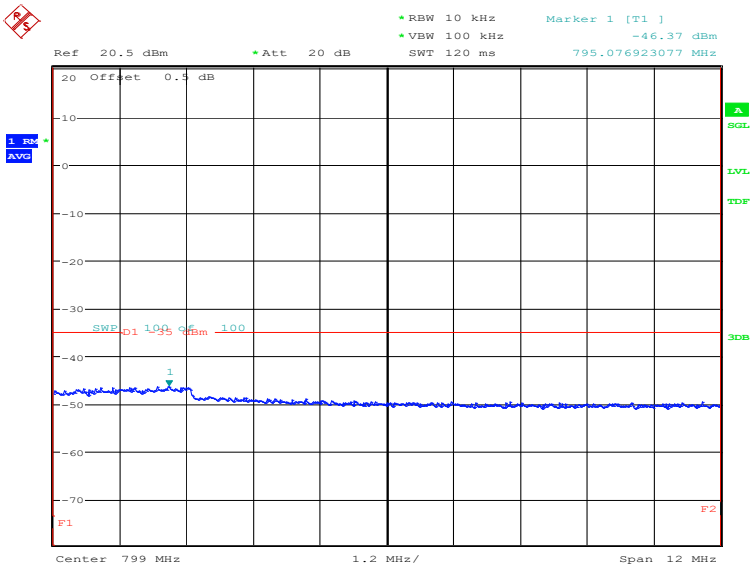

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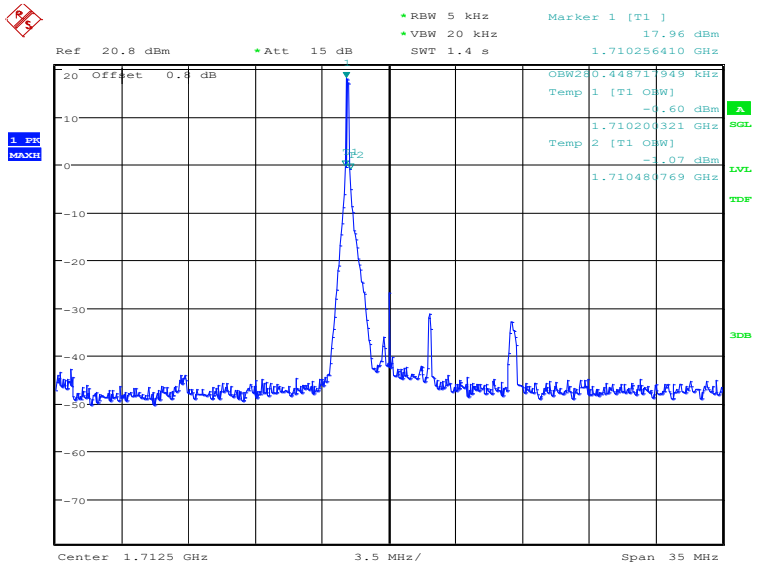
LTE band 66

OBW: 1RB-low_offset



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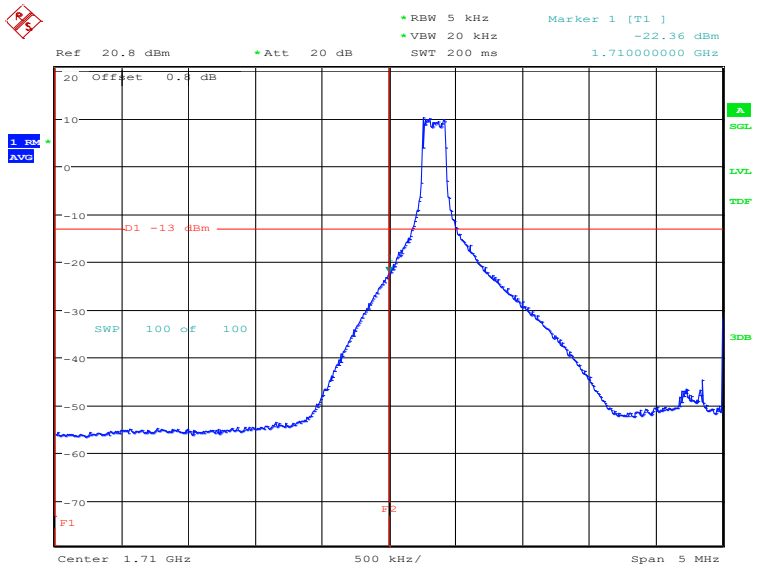
LOW BAND EDGE BLOCK-1RB-low_offset



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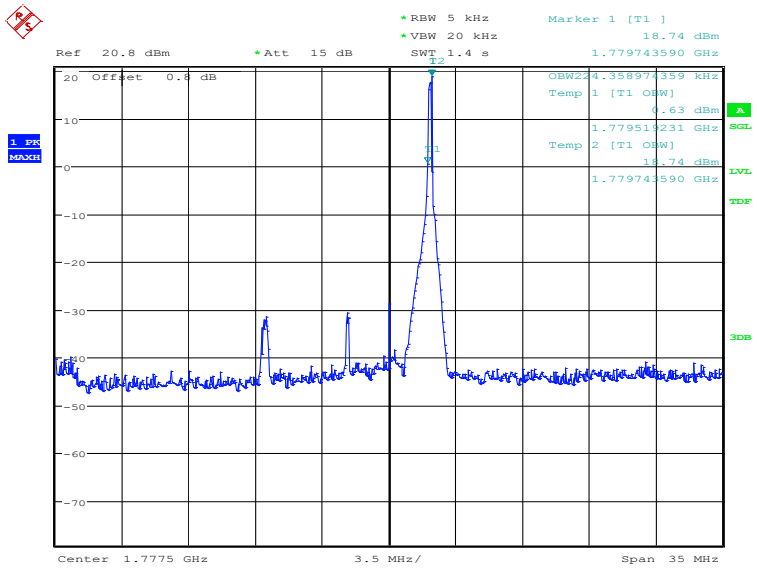
OBW: 1RB-high_offset



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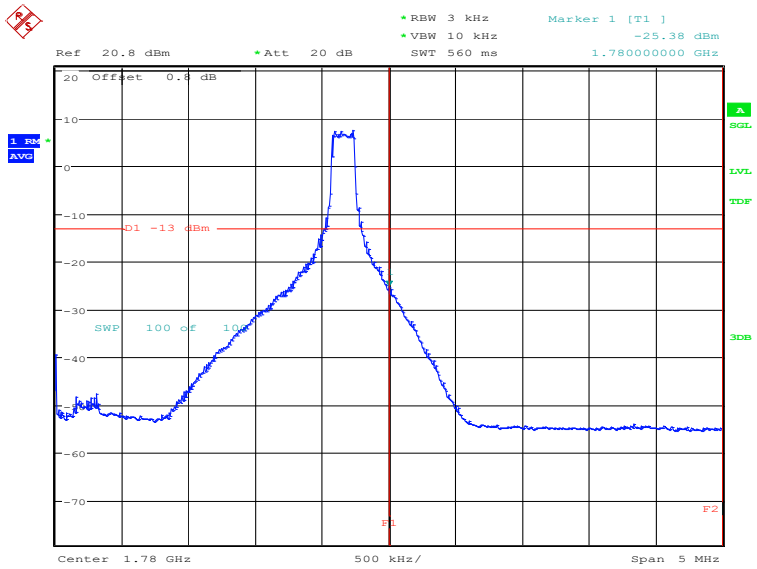
HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 21.SEP.2020 14:05:32

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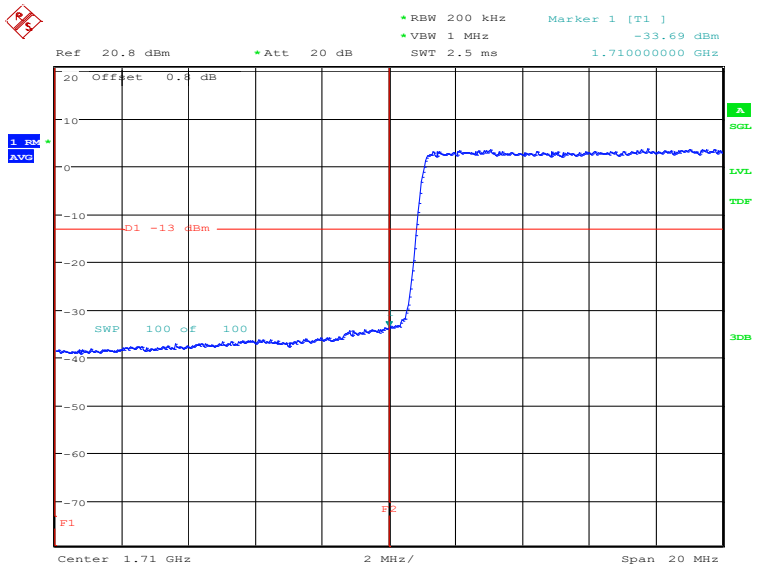
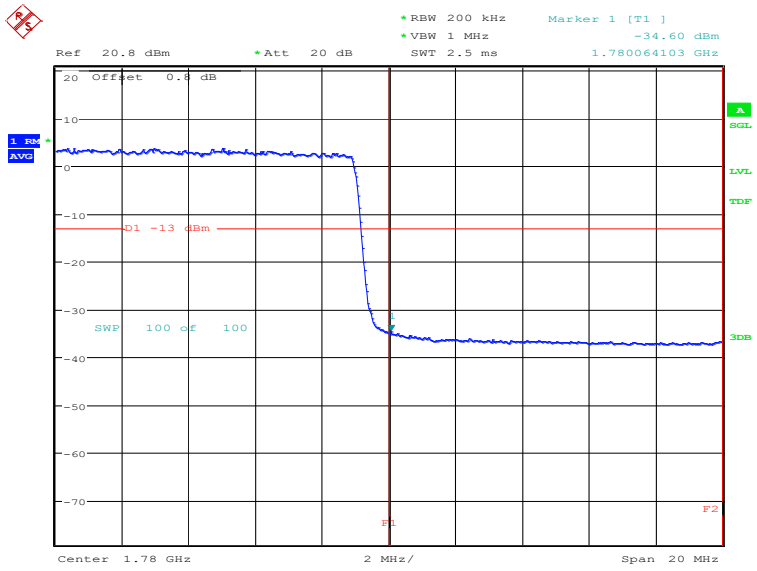
LOW BAND EDGE BLOCK-20MHz-100%RB



HIGH BAND EDGE BLOCK-20MHz-100%RB



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A.7 Conducted Spurious Emission

A.7.1 Measurement Method

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

1. In measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least the frequency given below:
   (a) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
   (b) If the equipment operates at or above 10 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.
3. The number of sweep points of spectrum analyzer is set to 30001 which is greater than span/RBW.

A. 7.2 Measurement Limit

Part 22.917, Part 24.238 and Part 27.53(h) 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.

Part 27.53(c) states for operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

Part 27.53(f) states for operations in the 746–758 MHz,775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to -70dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals.

Part 27.53(g) states for operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee’s frequency block, a resolution bandwidth of at least 30 kHz may be employed.

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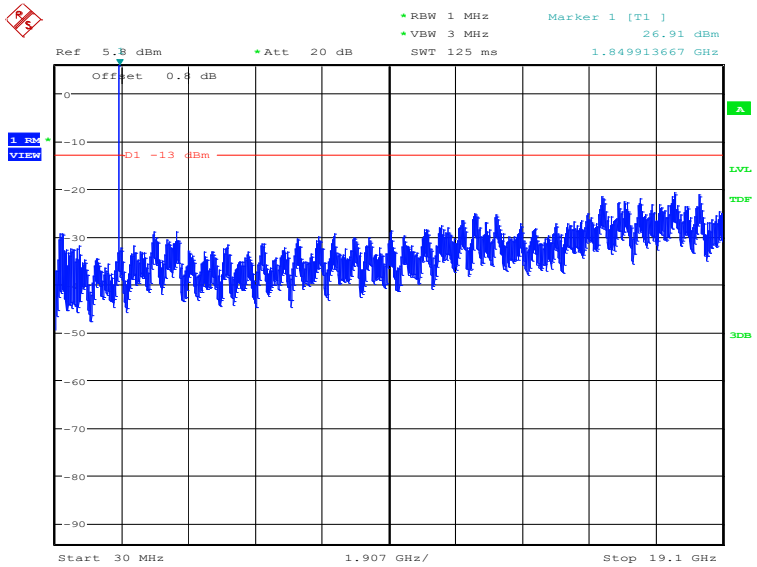
A. 7.3 Measurement result

Only the worst case result is given below

LTE band 2: 30MHz – 19.1GHz

NOTE: peak above the limit line is the carrier frequency.



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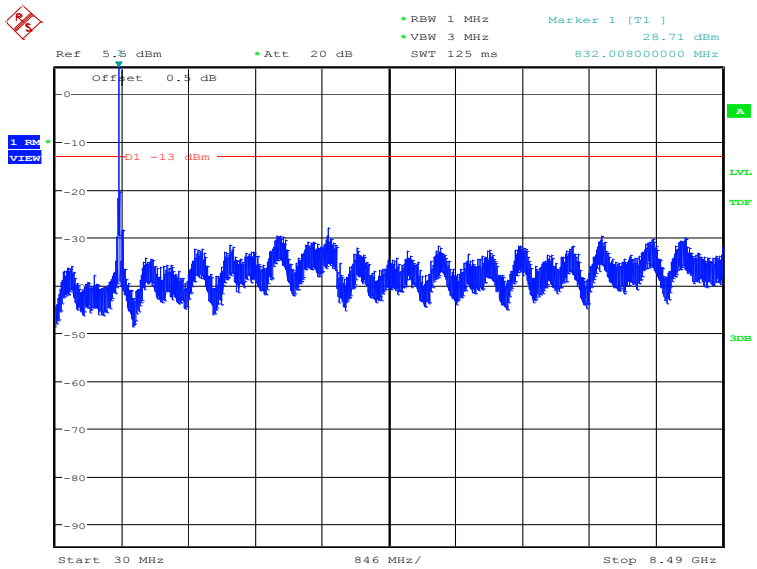
LTE band 5: 30MHz – 8.49GHz

NOTE: peak above the limit line is the carrier frequency.



Date: 21.SEP.2020 13:48:58

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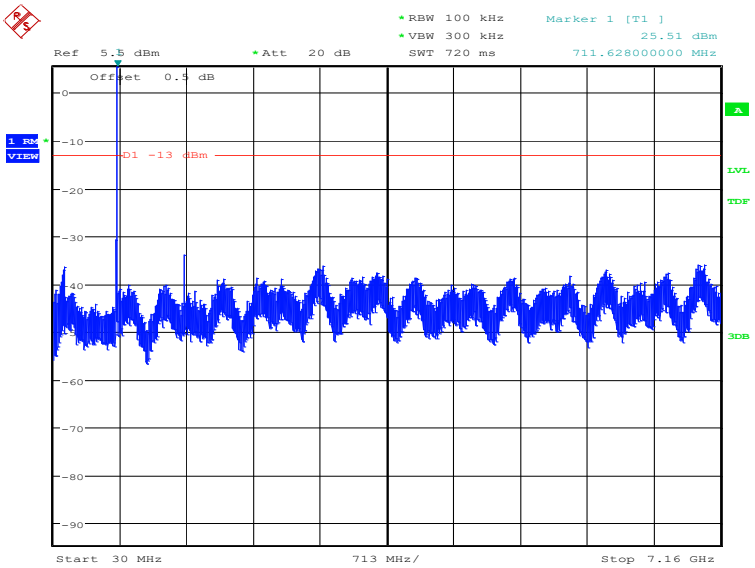
LTE band 12: 30MHz – 7.16GHz

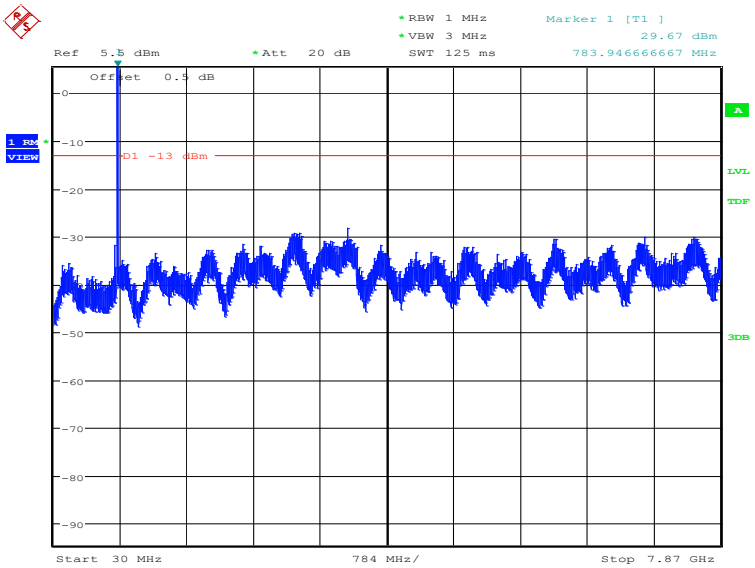
NOTE: peak above the limit line is the carrier frequency.



Date: 21.SEP.2020 13:49:38

LTE band 13: 30MHz – 7.87GHz

NOTE: peak above the limit line is the carrier frequency.



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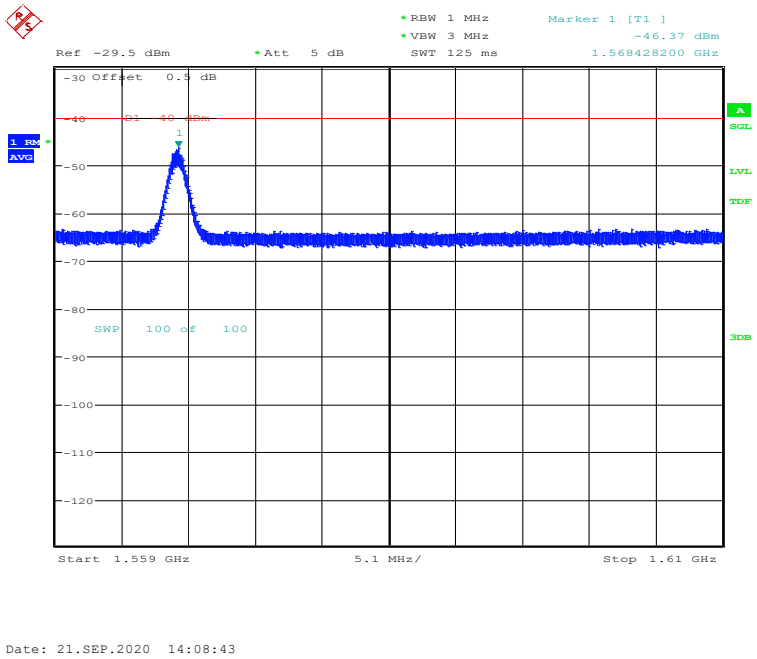
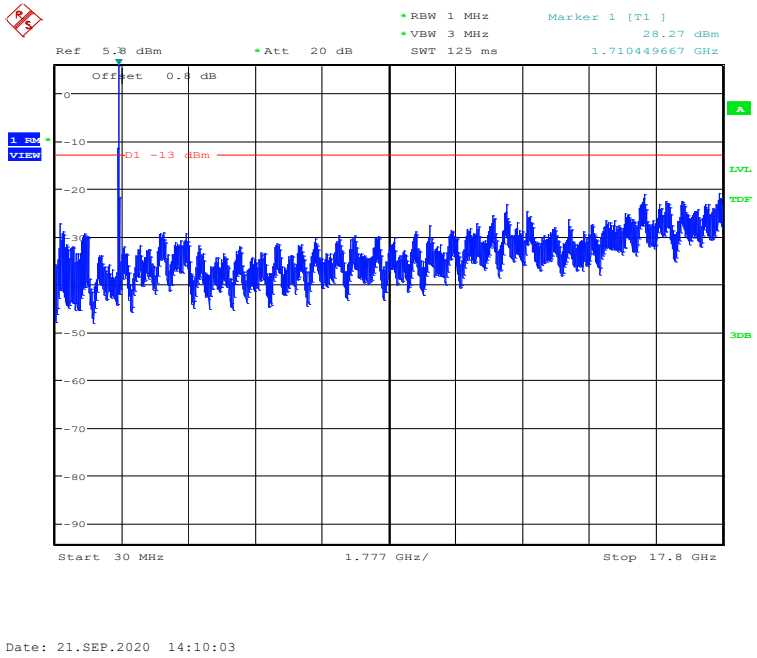
LTE band 13: 1559MHz – 1610MHz



LTE band 66: 30MHz – 17.8GHz

NOTE: peak above the limit line is the carrier frequency.



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A.8 Peak-to-Average Power Ratio

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

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

LTE band 2, 20MHz

Frequency(MHz)	PAPR(dB)	
1880.0	QPSK	16QAM
	6.70	7.31

LTE band 12,10MHz

Frequency(MHz)	PAPR(dB)	
707.5	QPSK	16QAM
	5.83	6.51

LTE band 13,10MHz

Frequency(MHz)	PAPR(dB)	
782.0	QPSK	16QAM
	5.67	6.41

LTE band 66, 20MHz

Frequency(MHz)	PAPR(dB)	
1745.0	QPSK	16QAM
	6.54	7.31

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

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