



TEST REPORT

No. I21N03152-RF-LTE

for

IDEMIA Identity and Security France

ID Screen 60

Model Name: MPH-MB004A

FCC ID: ZBW-MPHMB004

with

Hardware Version: V02

Software Version: IDEMIA_WM38_v01_211020

Issued Date: 2022-01-15

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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No. I21N03152-RF-LTE

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I21N03152-RF-LTE	Rev.0	1st edition	2022-01-15



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1. SUMMARY OF TEST REPORT

1.1. Test Items

Description	ID Screen 60
Model Name	MPH-MB004A
Applicant's name	IDEMIA Identity and Security France
Manufacturer's Name	IDEMIA Identity and Security France

1.2. Test Standards

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

1.3. Test Result

All test items are passed. 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 518000

1.5. Project Data

Testing Start Date: 2021-11-01

Testing End Date: 2022-01-15

1.6. Signature

Tan Pei
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2. CLIENT INFORMATION

2.1. Applicant Information

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3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT

(AE)

3.1. About EUT

Description	ID Screen 60
Model Name	MPH-MB004A
FCC ID	ZBW-MPHMB004
Frequency Bands	LTE Bands 2,4,5,7,38,41
Antenna	Integrated
Extreme vol. Limits	3.60V to 4.40V (nominal: 3.85V)
Condition of EUT as received	No abnormality in appearance

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of SAICT.

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Sample Arrival Date
UT01aa	351935780004083	V02	IDEMIA_WM38_v01_211 020	2021-11-01
UT05aa	351935780003366	V02	IDEMIA_WM38_v01_211 020	2021-11-12

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

UT01aa are used for conduction test, UT05aa are used for radiation test.

3.3. Internal Identification of AE used during the test

AE ID* Description

AE1 Battery

AE1

Model	293780548
Manufacturer	SCUD (Fujian) Electronics Co., Ltd.
Capacity	11900 mAh/45.81Wh
Nominal Voltage	3.87 V

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

3.4. General Description

The Equipment Under Test (EUT) is a model ID Screen 60 with integrated antenna. It consists of normal options: lithium battery, charger. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the Client.



4. REFERENCE DOCUMENTS

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

Reference	Title	Version
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-19 Edition
FCC Part 24	PERSONAL COMMUNICATIONS 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 C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB971168 D01	Power Meas License Digital Systems	v03r01

5. LABORATORY ENVIRONMENT

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

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, 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 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, 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



6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	P	Pass
	F	Fail
	NA	Not applicable
	NM	Not measured
Location Column	A/B/C/D	The test is performed in test location A, B, C or D which are described in section 1.4 of this report

LTE Band 2

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	2.1046/24.232	A.1	P
2	Field Strength of Spurious Radiation	2.1053/24.238	A.2	P
3	Frequency Stability	2.1055/24.235	A.3	P
4	Occupied Bandwidth	2.1049/24.238	A.4	P
5	Emission Bandwidth	2.1049/24.238	A.5	P
6	Band Edge Compliance	2.1051/24.238	A.6	P
7	Conducted Spurious Emission	2.1051/24.238	A.7	P
8	Peak-to-Average Power Ratio	24.232/ KDB971168 D01	A.8	P

LTE Band 4

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	2.1046/27.50(d)	A.1	P
2	Field Strength of Spurious Radiation	2.1053/27.53(h)	A.2	P
3	Frequency Stability	2.1055/27.54	A.3	P
4	Occupied Bandwidth	2.1049/27.53(g)	A.4	P
5	Emission Bandwidth	2.1049/27.53(g)	A.5	P
6	Band Edge Compliance	2.1051/27.53(h)	A.6	P
7	Conducted Spurious Emission	2.1051/27.53(h)	A.7	P
8	Peak-to-Average Power Ratio	27.50(d)/ KDB971168 D01	A.8	P

LTE Band 5

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	2.1046/22.913	A.1	P



2	Field Strength of Spurious Radiation	2.1053/22.917	A.2	P
3	Frequency Stability	2.1055/22.355	A.3	P
4	Occupied Bandwidth	2.1049/22.917	A.4	P
5	Emission Bandwidth	2.1049/22.917	A.5	P
6	Band Edge Compliance	2.1051/22.917	A.6	P
7	Conducted Spurious Emission	2.1051/22.917	A.7	P
8	Peak-to-Average Power Ratio	KDB971168 D01	A.8	P

LTE Band 7

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	2.1046/27.50(h)	A.1	P
2	Field Strength of Spurious Radiation	2.1053/27.53(m)	A.2	P
3	Frequency Stability	2.1055/27.54	A.3	P
4	Occupied Bandwidth	2.1049/27.53(m)	A.4	P
5	Emission Bandwidth	2.1049/27.53(m)	A.5	P
6	Band Edge Compliance	2.1051/27.53(m)	A.6	P
7	Conducted Spurious Emission	2.1051/27.53(m)	A.7	P
8	Peak-to-Average Power Ratio	27.50(a)/ KDB971168 D01	A.8	P

**LTE Band 38**

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	2.1046/27.50(h)	A.1	P
2	Field Strength of Spurious Radiation	2.1053/27.53(m)	A.2	P
3	Frequency Stability	2.1055/27.54	A.3	P
4	Occupied Bandwidth	2.1049/27.53(m)	A.4	P
5	Emission Bandwidth	2.1049/27.53(m)	A.5	P
6	Band Edge Compliance	2.1051/27.53(m)	A.6	P
7	Conducted Spurious Emission	2.1051/27.53(m)	A.7	P
8	Peak-to-Average Power Ratio	27.50(a)/ KDB971168 D01	A.8	P

LTE Band 41

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	2.1046/27.50(h)	A.1	P
2	Field Strength of Spurious Radiation	2.1053/27.53(m)	A.2	P
3	Frequency Stability	2.1055/27.54	A.3	P
4	Occupied Bandwidth	2.1049/27.53(m)	A.4	P
5	Emission Bandwidth	2.1049/27.53(m)	A.5	P
6	Band Edge Compliance	2.1051/27.53(m)	A.6	P
7	Conducted Spurious Emission	2.1051/27.53(m)	A.7	P
8	Peak-to-Average Power Ratio	27.50(a)/ KDB971168 D01	A.8	P



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7. STATEMENT

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

This report takes measured values as criterion of test conclusion. The test conclusion meets the limit requirements.

**8. TEST EQUIPMENTS UTILIZED**

NO.	Description	TYPE	Manufacture	series number	CAL DUE DATE
1	Test Receiver	ESR7	R&S	101676	2022-11-24
2	BiLog Antenna	3142E	ETS-Lindgren	0224831	2024-05-27
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	2022-11-24
10	Fully Anechoic Chamber	FACT3-2.0	ETS-Lindgren	1285	2023-05-29
11	Spectrum Analyzer	FSV40	R&S	101192	2022-01-13
12	Universal Radio Communication Tester	CMW500	R&S	152499	2022-07-14
13	Universal Radio Communication Tester	CMW500	R&S	129146	2022-04-24
14	Spectrum Analyzer	FSU	R&S	101506	2022-12-13
15	Temperature Chamber	SH-241	ESPEC	92007516	2022-10-15
16	DC Power Supply	U3606A	Agilent Technologies	MY50450012	2022-11-13

Test software

Item	Name	Vesion
Radiated	EMC32	V10.50.40



ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: CFR Part 2.1046, 22.913, 24.232, 27.50

A.1.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation. This result contains peak output power and ERP/EIRP measurements for the EUT.

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

A.1.2 Conducted

A.1.2.1 Method of Measurements

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

A.1.2.2 Measurement result

LTE band 2

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1909.3	23.51	22.65
		1880.0	23.61	22.83
		1850.7	23.59	22.83
	1 RB low	1909.3	23.51	22.71
		1880.0	23.57	22.89
		1850.7	23.61	22.88
	50% RB mid	1909.3	23.66	22.61
		1880.0	23.77	22.74
		1850.7	23.70	22.78
	100% RB	1909.3	22.66	21.72
		1880.0	22.68	21.87
		1850.7	22.68	21.82
3MHz	1 RB high	1908.5	23.49	22.79
		1880.0	23.60	22.89
		1851.5	23.58	22.84
	1 RB low	1908.5	23.47	22.81
		1880.0	23.58	22.87
		1851.5	23.59	22.89
	50% RB mid	1908.5	22.59	21.62
		1880.0	22.65	21.80
		1851.5	22.64	21.79



	100% RB	1908.5	22.56	21.61
		1880.0	22.62	21.70
		1851.5	22.62	21.66
5MHz	1 RB high	1907.5	23.42	22.61
		1880.0	23.49	22.76
		1852.5	23.44	22.76
	1 RB low	1907.5	23.44	22.67
		1880.0	23.50	22.81
		1852.5	23.50	22.83
	50% RB mid	1907.5	22.62	21.57
		1880.0	22.72	21.71
		1852.5	22.67	21.70
	100% RB	1907.5	22.59	21.59
		1880.0	22.61	21.70
		1852.5	22.61	21.69
10MHz	1 RB high	1905.0	23.47	22.75
		1880.0	23.52	22.77
		1855.0	23.55	22.85
	1 RB low	1905.0	23.50	22.81
		1880.0	23.54	22.82
		1855.0	23.59	22.85
	50% RB mid	1905.0	22.62	21.69
		1880.0	22.68	21.72
		1855.0	22.67	21.73
	100% RB	1905.0	22.65	21.67
		1880.0	22.68	21.78
		1855.0	22.63	21.70
15MHz	1 RB high	1902.5	23.40	22.67
		1880.0	23.49	22.81
		1857.5	23.50	22.79
	1 RB low	1902.5	23.43	22.75
		1880.0	23.56	22.88
		1857.5	23.60	22.83
	50% RB mid	1902.5	22.63	21.69
		1880.0	22.63	21.68
		1857.5	22.61	21.63
	100% RB	1902.5	22.60	21.66
		1880.0	22.69	21.71
		1857.5	22.63	21.68



20MHz	1 RB high	1900.0	23.39	22.64
		1880.0	23.41	22.76
		1860.0	23.37	22.66
	1 RB low	1900.0	23.43	22.72
		1880.0	23.53	22.79
		1860.0	23.50	22.69
	50% RB mid	1900.0	22.64	21.66
		1880.0	22.65	21.67
		1860.0	22.66	21.71
	100% RB	1900.0	22.59	21.61
		1880.0	22.65	21.69
		1860.0	22.59	21.65

Note: Expanded measurement uncertainty is $U = 0.49\text{dB}$, $k = 1.96$

LTE band 4

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1754.3	23.45	22.57
		1732.5	23.41	22.78
		1710.7	23.34	22.66
	1 RB low	1754.3	23.43	22.59
		1732.5	23.39	22.79
		1710.7	23.35	22.72
	50% RB mid	1754.3	23.60	22.53
		1732.5	23.56	22.63
		1710.7	23.45	22.53
	100% RB	1754.3	22.56	21.69
		1732.5	22.56	21.67
		1710.7	22.53	21.58
3MHz	1 RB high	1753.5	23.51	22.67
		1732.5	23.45	22.83
		1711.5	23.45	22.86
	1 RB low	1753.5	23.52	22.74
		1732.5	23.48	22.86
		1711.5	23.46	22.86
	50% RB mid	1753.5	22.58	21.72
		1732.5	22.58	21.65
		1711.5	22.53	21.55
	100% RB	1753.5	22.55	21.54
		1732.5	22.54	21.56



		1711.5	22.50	21.49
5MHz	1 RB high	1752.5	23.36	22.52
		1732.5	23.36	22.64
		1712.5	23.31	22.59
	1 RB low	1752.5	23.41	22.58
		1732.5	23.37	22.61
		1712.5	23.32	22.57
	50% RB mid	1752.5	22.59	21.60
		1732.5	22.60	21.61
		1712.5	22.55	21.51
	100% RB	1752.5	22.54	21.60
		1732.5	22.51	21.56
		1712.5	22.47	21.49
10MHz	1 RB high	1750.0	23.46	22.65
		1732.5	23.44	22.72
		1715.0	23.37	22.74
	1 RB low	1750.0	23.52	22.73
		1732.5	23.47	22.83
		1715.0	23.41	22.78
	50% RB mid	1750.0	22.63	21.64
		1732.5	22.56	21.59
		1715.0	22.57	21.56
	100% RB	1750.0	22.59	21.59
		1732.5	22.57	21.59
		1715.0	22.54	21.56
15MHz	1 RB high	1747.5	23.37	22.70
		1732.5	23.35	22.72
		1717.5	23.31	22.70
	1 RB low	1747.5	23.49	22.85
		1732.5	23.40	22.75
		1717.5	23.37	22.70
	50% RB mid	1747.5	22.59	21.62
		1732.5	22.58	21.55
		1717.5	22.52	21.54
	100% RB	1747.5	22.56	21.60
		1732.5	22.57	21.55
		1717.5	22.51	21.48
20MHz	1 RB high	1745.0	23.32	22.51
		1732.5	23.32	22.63



	1 RB low	1720.0	23.26	22.63	
		1745.0	23.37	22.68	
		1732.5	23.34	22.68	
	50% RB mid	1720.0	23.31	22.65	
		1745.0	22.61	21.59	
		1732.5	22.54	21.52	
	100% RB	1720.0	22.58	21.57	
		1745.0	22.56	21.54	
		1732.5	22.54	21.51	
			1720.0	22.45	21.47

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96

LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	848.3	23.85	23.45
		836.5	23.78	23.20
		824.7	23.79	23.07
	1 RB low	848.3	23.86	23.44
		836.5	23.75	23.29
		824.7	23.77	23.01
	50% RB mid	848.3	23.96	23.14
		836.5	23.92	22.97
		824.7	23.91	22.85
	100% RB	848.3	22.97	22.18
		836.5	22.91	22.01
		824.7	22.82	21.91
3MHz	1 RB high	847.5	23.95	23.39
		836.5	23.83	23.20
		825.5	23.81	23.13
	1 RB low	847.5	23.91	23.38
		836.5	23.79	23.28
		825.5	23.78	23.01
	50% RB mid	847.5	22.97	22.12
		836.5	22.89	22.08
		825.5	22.86	21.94
	100% RB	847.5	22.91	21.97
		836.5	22.85	21.95
		825.5	22.76	21.78
5MHz	1 RB high	846.5	23.86	23.34
		836.5	23.83	23.04

	1 RB low	826.5	23.77	23.26	
		846.5	23.79	23.07	
		836.5	23.75	23.21	
		826.5	23.70	22.96	
	50% RB mid	846.5	22.97	22.04	
		836.5	22.91	22.01	
		826.5	22.89	21.92	
	100% RB	846.5	22.94	21.98	
		836.5	22.91	21.93	
		826.5	22.84	21.80	
	10MHz	1 RB high	844.0	23.96	23.44
			836.5	23.89	23.21
829.0			23.95	23.56	
1 RB low		844.0	23.91	23.09	
		836.5	23.87	23.50	
		829.0	23.84	23.17	
50% RB mid		844.0	23.01	22.00	
		836.5	22.93	22.03	
		829.0	22.96	22.07	
100% RB		844.0	23.01	22.04	
		836.5	22.90	22.03	
		829.0	22.97	22.04	

Note: Expanded measurement uncertainty is $U = 0.49\text{dB}$, $k = 1.96$



LTE band 7

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	2567.5	23.32	22.57
		2535.0	23.22	22.59
		2502.5	23.26	22.52
	1 RB low	2567.5	23.24	22.54
		2535.0	23.21	22.59
		2502.5	23.21	22.47
	50% RB mid	2567.5	22.50	21.48
		2535.0	22.40	21.45
		2502.5	22.35	21.42
	100% RB	2567.5	22.45	21.48
		2535.0	22.39	21.39
		2502.5	22.41	21.43
10MHz	1 RB high	2565.0	23.47	22.74
		2535.0	23.28	22.64
		2505.0	23.32	22.69
	1 RB low	2565.0	23.30	22.71
		2535.0	23.33	22.63
		2505.0	23.25	22.64
	50% RB mid	2565.0	22.45	21.55
		2535.0	22.39	21.44
		2505.0	22.45	21.47
	100% RB	2565.0	22.51	21.47
		2535.0	22.41	21.41
		2505.0	22.47	21.50
15MHz	1 RB high	2562.5	23.39	22.66
		2535.0	23.32	22.68
		2507.5	23.29	22.65
	1 RB low	2562.5	23.29	22.51
		2535.0	23.24	22.59
		2507.5	23.23	22.52
	50% RB mid	2562.5	22.55	21.52
		2535.0	22.44	21.47
		2507.5	22.49	21.52
	100% RB	2562.5	22.46	21.53
		2535.0	22.41	21.45
		2507.5	22.47	21.45



20MHz	1 RB high	2560.0	23.32	22.73
		2535.0	23.26	22.64
		2510.0	23.29	22.62
	1 RB low	2560.0	23.15	22.61
		2535.0	23.09	22.41
		2510.0	23.16	22.46
	50% RB mid	2560.0	22.52	21.53
		2535.0	22.43	21.43
		2510.0	22.43	21.46
	100% RB	2560.0	22.43	21.48
		2535.0	22.37	21.39
		2510.0	22.41	21.44

Note: Expanded measurement uncertainty is $U = 0.49\text{dB}$, $k = 1.96$

LTE band 38

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	2617.5	22.89	21.91
		2595.0	22.91	21.92
		2572.5	22.86	21.87
	1 RB low	2617.5	22.90	21.95
		2595.0	22.94	21.89
		2572.5	22.94	21.96
	50% RB mid	2617.5	22.08	21.01
		2595.0	22.06	21.00
		2572.5	22.05	20.96
	100% RB	2617.5	22.02	20.98
		2595.0	22.02	21.01
		2572.5	21.93	20.92
10MHz	1 RB high	2615.0	22.96	22.01
		2595.0	22.93	22.01
		2575.0	22.95	21.95
	1 RB low	2615.0	22.98	22.03
		2595.0	22.98	22.03
		2575.0	23.02	22.02
	50% RB mid	2615.0	22.01	21.04
		2595.0	21.99	21.01
		2575.0	21.99	20.98
	100% RB	2615.0	21.97	20.95
		2595.0	22.02	20.99



		2575.0	21.94	20.95
15MHz	1 RB high	2612.5	22.88	21.95
		2595.0	22.85	21.94
		2577.5	22.95	21.93
		2612.5	22.91	21.94
	1 RB low	2595.0	22.90	21.99
		2577.5	22.96	21.98
		2612.5	22.03	20.94
	50% RB mid	2595.0	22.06	20.98
		2577.5	22.03	20.86
		2612.5	21.88	20.90
	100% RB	2595.0	21.91	20.96
		2577.5	21.96	20.88
2610.0		22.84	21.86	
20MHz	1 RB high	2595.0	22.82	21.86
		2580.0	22.83	21.88
		2610.0	22.80	21.88
	1 RB low	2595.0	22.90	21.90
		2580.0	22.86	21.90
		2610.0	21.85	20.91
	50% RB mid	2595.0	21.91	20.93
		2580.0	21.87	20.85
		2610.0	21.94	20.97
	100% RB	2595.0	21.96	20.94
		2580.0	21.91	20.97

Note: Expanded measurement uncertainty is $U = 0.49\text{dB}$, $k = 1.96$



LTE band 41

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	2687.5	21.35	20.39
		2593.0	21.33	20.38
		2498.5	21.46	20.46
	1 RB low	2687.5	21.35	20.38
		2593.0	21.39	20.41
		2498.5	21.43	20.43
	50% RB mid	2687.5	20.50	19.38
		2593.0	20.50	19.41
		2498.5	20.59	19.48
	100% RB	2687.5	20.40	19.38
		2593.0	20.47	19.47
		2498.5	20.47	19.49
10MHz	1 RB high	2685.0	21.47	20.49
		2593.0	21.45	20.48
		2501.0	21.54	20.56
	1 RB low	2685.0	21.46	20.46
		2593.0	21.50	20.54
		2501.0	21.57	20.56
	50% RB mid	2685.0	20.50	19.49
		2593.0	20.54	19.55
		2501.0	20.51	19.53
	100% RB	2685.0	20.38	19.37
		2593.0	20.43	19.41
		2501.0	20.49	19.46
15MHz	1 RB high	2682.5	21.35	20.37
		2593.0	21.35	20.37
		2503.5	21.44	20.47
	1 RB low	2682.5	21.35	20.38
		2593.0	21.44	20.47
		2503.5	21.46	20.46
	50% RB mid	2682.5	20.48	19.35
		2593.0	20.55	19.45
		2503.5	20.60	19.50
	100% RB	2682.5	20.38	19.35
		2593.0	20.38	19.37



		2503.5	20.44	19.40
20MHz	1 RB high	2680.0	21.29	20.31
		2593.0	21.33	20.32
		2506.0	21.37	20.40
	1 RB low	2680.0	21.26	20.33
		2593.0	21.40	20.44
		2506.0	21.36	20.44
	50% RB mid	2680.0	20.36	19.31
		2593.0	20.42	19.39
		2506.0	20.43	19.42
	100% RB	2680.0	20.38	19.35
		2593.0	20.45	19.44
		2506.0	20.49	19.47

Note: Expanded measurement uncertainty is $U = 0.49\text{dB}$, $k = 1.96$

A.1.3 Radiated

A.1.3.1 Description

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

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

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

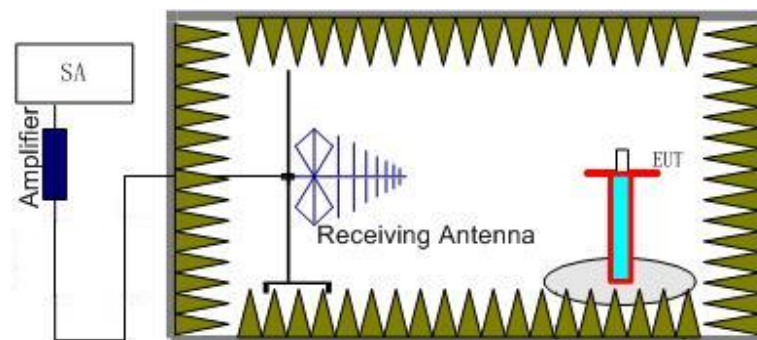
Rule Part 27.50(h)(2) specifies "Mobile stations are limited to 2.0 watts EIRP.".

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

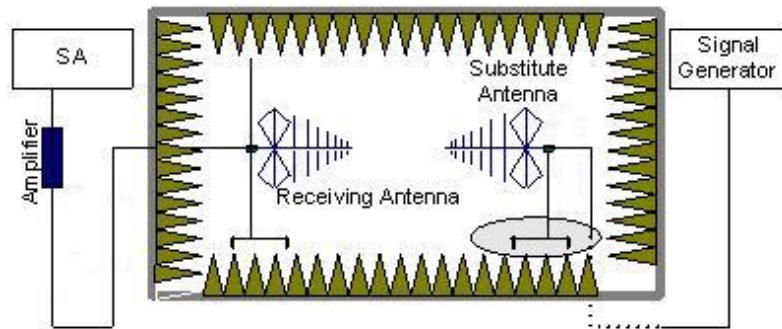
Rule Part 27.50(a)(3) specifies "For mobile and portable stations transmitting in the 2305–2315 MHz band or the 2350–2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth."

A.1.3.2 Method of Measurement

1. For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, EUT was placed on a 80 cm high non-conductive stand at a 3 meter test distance from the receive antenna. For radiated measurements performed at frequencies above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Receiving antenna was placed on the antenna mast 3 meters from the EUT. For emission measurements. The receiving antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



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



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

4. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna.

The cable loss (P_{cl}), the substitution Antenna Gain(dBi) (G_a) and the amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:

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

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15dB$.

**A.1.3.3 Measurement result****LTE Band 2- EIRP Part 24.232(b)**Limits: $\leq 33\text{dBm}$ (2W)**LTE Band 2_1.4MHz_QPSK**

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1850.70	-18.24	-29.30	8.10	19.16	33.00	H
1880.00	-16.00	-29.40	8.10	21.50	33.00	H
1909.30	-15.25	-29.30	8.10	22.15	33.00	H

LTE Band 2_3MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1851.50	-18.18	-29.30	8.10	19.22	33.00	H
1880.00	-16.12	-29.40	8.10	21.38	33.00	H
1908.50	-15.32	-29.30	8.10	22.08	33.00	H

LTE Band 2_5MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1852.50	-18.19	-29.30	8.10	19.21	33.00	H
1880.00	-17.35	-29.40	8.10	20.15	33.00	H
1907.50	-15.62	-29.30	8.10	21.78	33.00	H

LTE Band 2_10MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1855.00	-18.18	-29.30	8.10	19.22	33.00	H
1880.00	-16.79	-29.40	8.10	20.71	33.00	H
1905.00	-15.95	-29.30	8.10	21.45	33.00	H

LTE Band 2_15MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1857.50	-18.09	-29.30	8.10	19.31	33.00	H
1880.00	-16.85	-29.40	8.10	20.65	33.00	H
1902.50	-16.11	-29.30	8.10	21.29	33.00	H

LTE Band 2_20 MHz_QPSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1860.00	-18.17	-29.30	8.10	19.23	33.00	H
1880.00	-16.74	-29.40	8.10	20.76	33.00	H
1900.00	-16.16	-29.30	8.10	21.24	33.00	H



LTE Band 2_1.4MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1850.70	-17.50	-29.30	8.10	19.90	33.00	H
1880.00	-15.59	-29.40	8.10	21.91	33.00	H
1909.30	-14.81	-29.30	8.10	22.59	33.00	H

LTE Band 2_3MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1851.50	-17.52	-29.30	8.10	19.88	33.00	H
1880.00	-15.54	-29.40	8.10	21.96	33.00	H
1908.50	-14.85	-29.30	8.10	22.55	33.00	H

LTE Band 2_5MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1852.50	-17.42	-29.30	8.10	19.98	33.00	H
1880.00	-15.89	-29.40	8.10	21.61	33.00	H
1907.50	-14.99	-29.30	8.10	22.41	33.00	H

LTE Band 2_10MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1855.00	-17.23	-29.30	8.10	20.17	33.00	H
1880.00	-15.96	-29.40	8.10	21.54	33.00	H
1905.00	-15.25	-29.30	8.10	22.15	33.00	H

LTE Band 2_15MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1857.50	-17.42	-29.30	8.10	19.98	33.00	H
1880.00	-16.18	-29.40	8.10	21.32	33.00	H
1902.50	-15.73	-29.30	8.10	21.67	33.00	H

LTE Band 2_20 MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1860.00	-17.49	-29.30	8.10	19.91	33.00	H
1880.00	-16.09	-29.40	8.10	21.41	33.00	H
1900.00	-15.74	-29.30	8.10	21.66	33.00	H

Peak EIRP (dBm)=P_{Mea}(-14.81dBm)-(P_{cl}+P_{Ag})(-29.30dB)+G_a(8.10dB) =22.59dBm

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

Limits: ≤30dBm (1W)

LTE Band 4_1.4MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1710.70	-15.68	-29.60	8.10	22.02	30.00	H
1732.50	-17.03	-29.60	8.10	20.67	30.00	H
1754.30	-16.67	-29.50	8.10	20.93	30.00	H

LTE Band 4_3MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1711.50	-15.65	-29.60	8.10	22.05	30.00	H
1732.50	-16.70	-29.60	8.10	21.00	30.00	H
1753.50	-16.63	-29.50	8.10	20.97	30.00	H

LTE Band 4_5MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1712.50	-15.66	-29.60	8.10	22.04	30.00	H
1732.50	-16.62	-29.60	8.10	21.08	30.00	H
1752.50	-16.77	-29.50	8.10	20.83	30.00	H

LTE Band 4_10MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1715.00	-15.67	-29.60	8.10	22.03	30.00	H
1732.50	-16.58	-29.60	8.10	21.12	30.00	H
1750.00	-16.47	-29.50	8.10	21.13	30.00	H

LTE Band 4_15MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1717.50	-15.61	-29.60	8.10	22.09	30.00	H
1732.50	-16.40	-29.60	8.10	21.30	30.00	H
1747.50	-16.65	-29.50	8.10	20.95	30.00	H

LTE Band 4_20MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1720.00	-15.72	-29.60	8.10	21.98	30.00	H
1732.50	-16.16	-29.60	8.10	21.54	30.00	H
1745.00	-16.87	-29.50	8.10	20.73	30.00	H



LTE Band 4_1.4MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1710.70	-15.32	-29.60	8.10	22.38	30.00	H
1732.50	-16.18	-29.60	8.10	21.52	30.00	H
1754.30	-16.21	-29.50	8.10	21.39	30.00	H

LTE Band 4_3MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1711.50	-15.25	-29.60	8.10	22.45	30.00	H
1732.50	-15.99	-29.60	8.10	21.71	30.00	H
1753.50	-16.05	-29.50	8.10	21.55	30.00	H

LTE Band 4_5MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1712.50	-15.34	-29.60	8.10	22.36	30.00	H
1732.50	-16.24	-29.60	8.10	21.46	30.00	H
1752.50	-16.09	-29.50	8.10	21.51	30.00	H

LTE Band 4_10MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1715.00	-15.33	-29.60	8.10	22.37	30.00	H
1732.50	-15.99	-29.60	8.10	21.71	30.00	H
1750.00	-15.83	-29.50	8.10	21.77	30.00	H

LTE Band 4_15MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1717.50	-15.23	-29.60	8.10	22.47	30.00	H
1732.50	-15.77	-29.60	8.10	21.93	30.00	H
1747.50	-16.31	-29.50	8.10	21.29	30.00	H

LTE Band 4_20MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1720.00	-15.29	-29.60	8.10	22.41	30.00	H
1732.50	-15.38	-29.60	8.10	22.32	30.00	H
1745.00	-16.25	-29.50	8.10	21.35	30.00	H

Peak EIRP (dBm)=P_{Mea}(-15.23dBm)-(P_{cl}+P_{Ag})(-29.60dB)+G_a(8.10dB) =22.47dBm



LTE Band 5- ERP Part 22.913(a)

Limits: ≤38.45dBm (7W)

LTE Band 5_1.4MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
824.70	-11.99	-33.60	-0.79	2.15	18.67	38.45	V
836.50	-12.21	-33.50	-0.74	2.15	18.40	38.45	V
848.30	-12.55	-33.50	-0.73	2.15	18.07	38.45	V

LTE Band 5_3MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
825.50	-11.99	-33.60	-0.84	2.15	18.62	38.45	V
836.50	-12.08	-33.50	-0.74	2.15	18.53	38.45	V
847.50	-12.54	-33.50	-0.73	2.15	18.08	38.45	V

LTE Band 5_5MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
826.50	-12.01	-33.60	-0.84	2.15	18.60	38.45	V
836.50	-12.18	-33.50	-0.74	2.15	18.43	38.45	V
846.50	-12.50	-33.50	-0.73	2.15	18.12	38.45	V

LTE Band 5_10MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
829.00	-11.86	-33.60	-0.84	2.15	18.75	38.45	V
836.50	-12.14	-33.50	-0.74	2.15	18.47	38.45	V
844.00	-12.16	-33.50	-0.78	2.15	18.41	38.45	V



LTE Band 5_1.4MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
824.70	-12.00	-33.60	-0.79	2.15	18.66	38.45	V
836.50	-12.24	-33.50	-0.74	2.15	18.37	38.45	V
848.30	-12.62	-33.50	-0.73	2.15	18.00	38.45	V

LTE Band 5_3MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
825.50	-11.72	-33.60	-0.84	2.15	18.89	38.45	V
836.50	-12.17	-33.50	-0.74	2.15	18.44	38.45	V
847.50	-12.56	-33.50	-0.73	2.15	18.06	38.45	V

LTE Band 5_5MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
826.50	-11.81	-33.60	-0.84	2.15	18.80	38.45	V
836.50	-12.07	-33.50	-0.74	2.15	18.54	38.45	V
846.50	-12.39	-33.50	-0.73	2.15	18.23	38.45	V

LTE Band 5_10MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
829.00	-11.58	-33.60	-0.84	2.15	19.03	38.45	V
836.50	-11.92	-33.50	-0.74	2.15	18.69	38.45	V
844.00	-11.84	-33.50	-0.78	2.15	18.73	38.45	V

Peak ERP (dBm)=P_{Mea}(-11.58dBm)-(P_{cl}+P_{Ag})(-33.60dB)+G_a(-0.84dB) -2.15dB =19.03dBm

**LTE Band 7- EIRP Part 27.50(h)(2)****Limits:** ≤33 dBm (2W)**LTE Band 7_5MHz_QPSK**

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2502.50	-18.66	-28.70	10.70	20.74	33.00	H
2535.00	-17.85	-28.60	10.70	21.45	33.00	H
2567.50	-17.39	-28.60	10.70	21.91	33.00	H

LTE Band 7_10MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2505.00	-18.59	-28.70	10.70	20.81	33.00	H
2535.00	-18.15	-28.60	10.70	21.15	33.00	H
2565.00	-17.55	-28.60	10.70	21.75	33.00	H

LTE Band 7_15MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
2507.50	-18.71	-28.70	10.70	20.69	33.00	H
2535.00	-17.27	-28.60	10.70	22.03	33.00	H
2562.50	-17.26	-28.60	10.70	22.04	33.00	H

LTE Band 7_20MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2510.00	-18.65	-28.70	10.70	20.75	33.00	H
2535.00	-18.08	-28.60	10.70	21.22	33.00	H
2560.00	-17.84	-28.60	10.70	21.46	33.00	H



LTE Band 7_5MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2502.50	-18.01	-28.70	10.70	21.39	33.00	H
2535.00	-17.74	-28.60	10.70	21.56	33.00	H
2567.50	-17.70	-28.60	10.70	21.60	33.00	H

LTE Band 7_10MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2505.00	-18.16	-28.70	10.70	21.24	33.00	H
2535.00	-17.64	-28.60	10.70	21.66	33.00	H
2565.00	-17.21	-28.60	10.70	22.09	33.00	H

LTE Band 7_15MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2507.50	-18.19	-28.70	10.70	21.21	33.00	H
2535.00	-17.54	-28.60	10.70	21.76	33.00	H
2562.50	-17.19	-28.60	10.70	22.11	33.00	H

LTE Band 7_20MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2510.00	-18.63	-28.70	10.70	20.77	33.00	H
2535.00	-17.94	-28.60	10.70	21.36	33.00	H
2560.00	-16.98	-28.60	10.70	22.32	33.00	H

Peak EIRP (dBm)= $P_{Mea}(-16.98\text{dBm})-(P_{cl}+P_{Ag})(-28.60\text{dB})+G_a(10.70\text{dB})=22.32\text{dBm}$

**LTE Band 38 - EIRP Part 27.50(h)(2)**Limits: $\leq 33\text{dBm}$ (2W)**LTE Band 38_5MHz_QPSK**

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2572.50	-17.69	-28.60	10.70	21.61	33.00	H
2595.00	-17.44	-28.60	10.70	21.86	33.00	H
2617.50	-17.38	-28.60	10.70	21.92	33.00	H

LTE Band 38_10MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2575.00	-17.86	-28.60	10.70	21.44	33.00	H
2595.00	-17.20	-28.60	10.70	22.10	33.00	H
2615.00	-17.15	-28.60	10.70	22.15	33.00	H

LTE Band 38_15MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2577.50	-17.92	-28.60	10.70	21.38	33.00	H
2595.00	-17.33	-28.60	10.70	21.97	33.00	H
2612.50	-17.09	-28.60	10.70	22.21	33.00	H

LTE Band 38_20MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2580.00	-17.99	-28.60	10.70	21.31	33.00	H
2595.00	-17.50	-28.60	10.70	21.80	33.00	H
2610.00	-17.02	-28.60	10.70	22.28	33.00	H



LTE Band 38_5MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2572.50	-17.74	-28.60	10.70	21.56	33.00	H
2595.00	-17.59	-28.60	10.70	21.71	33.00	H
2617.50	-17.21	-28.60	10.70	22.09	33.00	H

LTE Band 38_10MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2575.00	-17.87	-28.60	10.70	21.43	33.00	H
2595.00	-17.34	-28.60	10.70	21.96	33.00	H
2615.00	-17.20	-28.60	10.70	22.10	33.00	H

LTE Band 38_15MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2577.50	-18.02	-28.60	10.70	21.28	33.00	H
2595.00	-17.50	-28.60	10.70	21.80	33.00	H
2612.50	-17.30	-28.60	10.70	22.00	33.00	H

LTE Band 38_20 MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2580.00	-17.95	-28.60	10.70	21.35	33.00	H
2595.00	-17.65	-28.60	10.70	21.65	33.00	H
2610.00	-16.95	-28.60	10.70	22.35	33.00	H

Peak EIRP (dBm)= $P_{Mea}(-16.95\text{dBm})-(P_{cl}+P_{Ag}) (-28.60\text{dB})+G_a(10.70\text{dB}) =22.35\text{dBm}$



LTE Band 41 - EIRP Part 27.50(h)(2)

Limits: ≤33dBm (2W)

LTE Band 41_5MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2498.50	-18.93	-28.70	10.70	20.47	33.00	H
2593.00	-18.27	-28.60	10.70	21.03	33.00	H
2687.50	-19.23	-28.50	10.70	19.97	33.00	H

LTE Band 41_10MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2501.00	-19.20	-28.70	10.70	20.20	33.00	H
2593.00	-18.46	-28.60	10.70	20.84	33.00	H
2685.00	-19.32	-28.50	10.70	19.88	33.00	H

LTE Band 41_15MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2503.00	-19.14	-28.70	10.70	20.26	33.00	H
2593.00	-18.42	-28.60	10.70	20.88	33.00	H
2682.50	-19.89	-28.50	10.70	19.31	33.00	H

LTE Band 41_20MHz_QPSK

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2506.00	-19.24	-28.70	10.70	20.16	33.00	H
2593.00	-18.59	-28.60	10.70	20.71	33.00	H
2680.00	-20.21	-28.50	10.70	18.99	33.00	H



LTE Band 41_5MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2498.50	-19.08	-28.70	10.70	20.32	33.00	H
2593.00	-18.98	-28.60	10.70	20.32	33.00	H
2687.50	-18.12	-28.50	10.70	21.08	33.00	H

LTE Band 41_10MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2501.00	-19.01	-28.70	10.70	20.39	33.00	H
2593.00	-18.91	-28.60	10.70	20.39	33.00	H
2685.00	-18.24	-28.50	10.70	20.96	33.00	H

LTE Band 41_15MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2503.00	-19.24	-28.70	10.70	20.16	33.00	H
2593.00	-19.14	-28.60	10.70	20.16	33.00	H
2682.50	-18.30	-28.50	10.70	20.90	33.00	H

LTE Band 41_20 MHz_16QAM

Frequency(MHz)	PMea(dBm)	Pcl(dB)+ PAg(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2506.00	-19.21	-28.70	10.70	20.19	33.00	H
2593.00	-18.28	-28.60	10.70	21.02	33.00	H
2680.00	-20.45	-28.50	10.70	18.75	33.00	H

Peak EIRP (dBm)= $P_{Mea}(-18.12\text{dBm})-(P_{cl}+P_{Ag})(-28.50\text{dB})+G_a(10.70\text{dB})=21.08\text{dBm}$

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

2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2

Note: Both of Vertical and Horizontal polarizations are evaluated, but only the worst case is recorded in this report.

A.2 FIELD STRENGTH OF SPURIOUS RADIATION

Reference

FCC: CFR 2.1053, 22.917, 24.238, 27.53.

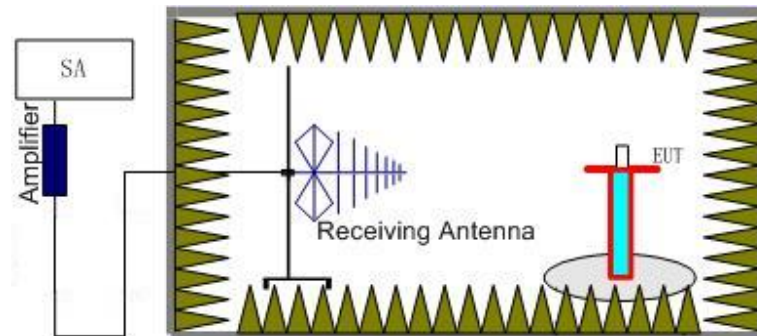
A.2.1 Measurement Method

This measurement is carried out in fully-anechoic chamber FAC-3.

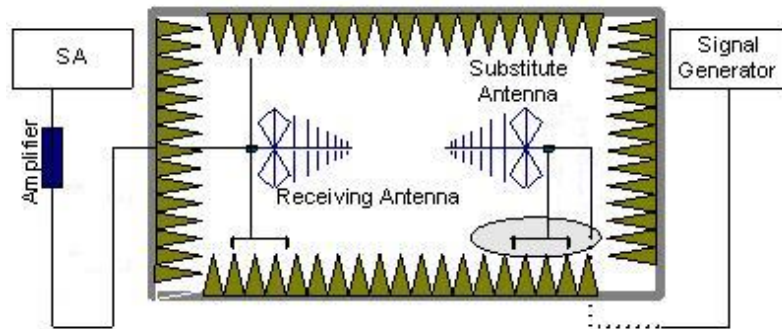
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 22.917, 24.238, 27.53(h) and 90.691. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 2,4,5,7,38,41.

The procedure of radiated spurious emissions is as follows:

1. For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, EUT was placed on a 80 cm high non-conductive stand at a 3 meter test distance from the receive antenna. For radiated measurements performed at frequencies above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Receiving antenna was placed on the antenna mast 3 meters from the EUT. For emission measurements. The receiving antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



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



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna and adjusts 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(dBi) (G_a) should be recorded after test.

An amplifier should be connected in for the test.

The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.

The measurement results are obtained as described below:

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

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dB}$.

A.2.2 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands 2,4,5,7 ,38,41. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE Bands 2,4,5,7,38,41. 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.

Only worst case result is given below.



	Frequency (MHz)	Ppm (dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP (dBm)	limit	Polarizati on
LTE BAND 2 18607 QPSK	2990.40	-46.51	1.00	10.70	-36.81	-13.00	V
	8351.50	-59.60	1.80	11.30	-50.10	-13.00	V
	10088.50	-58.50	2.00	11.30	-49.20	-13.00	H
	11905.00	-55.84	2.50	11.00	-47.34	-13.00	H
	14562.00	-54.89	2.60	11.20	-46.29	-13.00	H
	17832.00	-53.20	3.60	12.80	-44.00	-13.00	H
	frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarizati on
LTE BAND 2 18900 QPSK	2944.00	-46.06	1.00	10.70	-36.36	-13.00	H
	8534.50	-60.03	2.10	12.00	-50.13	-13.00	V
	10168.50	-57.95	2.20	11.30	-48.85	-13.00	V
	12032.00	-57.46	2.60	12.60	-47.46	-13.00	V
	14372.50	-55.55	2.60	11.90	-46.25	-13.00	H
	17808.00	-52.58	3.60	12.80	-43.38	-13.00	H
	frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarizati on
LTE BAND 2 19193 QPSK	2956.80	-46.39	1.00	10.70	-36.69	-13.00	V
	8248.00	-60.33	1.90	11.30	-50.93	-13.00	H
	10451.50	-57.72	2.30	11.30	-48.72	-13.00	H
	12006.00	-57.37	2.60	12.60	-47.37	-13.00	V
	15019.00	-55.72	2.40	12.40	-45.72	-13.00	V
	17792.00	-52.69	3.60	12.80	-43.49	-13.00	H

	Frequency (MHz)	Ppm (dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP (dBm)	limit	Polarizati on
LTE BAND 2 18607 16QAM	2962.40	-46.17	1.00	10.70	-36.47	-13.00	V
	6966.00	-61.36	1.80	12.40	-50.76	-13.00	H
	10147.50	-58.37	2.00	11.30	-49.07	-13.00	H
	11944.00	-55.95	2.60	11.00	-47.55	-13.00	V
	14406.50	-56.24	2.60	11.90	-46.94	-13.00	H
	17819.50	-52.66	3.60	12.80	-43.46	-13.00	H
	frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarizati on
LTE BAND 2 18900 16QAM	2946.13	-46.79	1.00	10.70	-37.09	-13.00	H
	8783.00	-60.47	1.90	12.00	-50.37	-13.00	V
	10089.00	-57.73	2.00	11.30	-48.43	-13.00	H
	12505.50	-58.90	2.60	13.80	-47.70	-13.00	V
	14367.50	-56.25	2.60	11.90	-46.95	-13.00	H
	17865.00	-53.27	3.60	12.80	-44.07	-13.00	H
LTE	frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarizati on



BAND 2	Hz))	loss	Gain(dBi))		on
19193	2945.87	-46.23	1.00	10.70	-36.53	-13.00	H
16QAM	8521.00	-60.20	2.10	12.00	-50.30	-13.00	H
	9975.00	-58.29	2.20	11.20	-49.29	-13.00	H
	11946.00	-56.05	2.60	11.00	-47.65	-13.00	H
	15024.50	-56.24	2.40	12.40	-46.24	-13.00	V
	17827.00	-52.64	3.60	12.80	-43.44	-13.00	H

LTE BAND 4 19957	Frequency (MHz)	Ppm (dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP (dBm)	limit	Polarization
	2987.20	-46.57	1.00	10.70	-36.87	-13.00	V
	8325.00	-59.67	1.90	11.30	-50.27	-13.00	H
	10399.50	-57.77	2.30	11.30	-48.77	-13.00	H
	12035.50	-57.66	2.70	12.60	-47.76	-13.00	H
	15036.50	-56.18	2.40	12.40	-46.18	-13.00	V
	17813.00	-51.61	3.60	12.80	-42.41	-13.00	H
LTE BAND 4 20175	frequency(MHz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarization
	2835.73	-46.26	1.00	10.70	-36.56	-13.00	V
	8491.00	-60.13	1.80	11.30	-50.63	-13.00	V
	10010.00	-58.63	2.20	11.30	-49.53	-13.00	H
	11949.50	-56.25	2.60	11.00	-47.85	-13.00	V
	14244.50	-55.46	2.50	11.90	-46.06	-13.00	V
	17812.50	-53.04	3.60	12.80	-43.84	-13.00	H
LTE BAND 4 20393	frequency(MHz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarization
	2962.13	-45.86	1.00	10.70	-36.16	-13.00	V
	9556.00	-59.23	2.10	11.20	-50.13	-13.00	V
	12672.50	-57.89	2.60	13.80	-46.69	-13.00	V
	14975.00	-55.13	2.70	11.20	-46.63	-13.00	H
	16718.00	-58.49	2.90	16.50	-44.89	-13.00	H
	17829.00	-52.80	3.60	12.80	-43.60	-13.00	H

LTE BAND 4 19957 16QAM	Frequency (MHz)	Ppm (dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP (dBm)	limit	Polarization
	2821.87	-46.76	1.00	10.70	-37.06	-13.00	H
	8571.50	-60.65	2.10	12.00	-50.75	-13.00	H
	10481.00	-58.59	2.30	11.30	-49.59	-13.00	V
	10817.50	-55.59	2.30	10.80	-47.09	-13.00	H
	14370.50	-55.66	2.60	11.90	-46.36	-13.00	V
	17792.00	-53.23	3.60	12.80	-44.03	-13.00	H
LTE BAND 4	frequency(MHz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarization



20175 16QAM	2965.60	-46.34	1.00	10.70	-36.64	-13.00	V
	6676.00	-60.89	1.80	12.40	-50.29	-13.00	H
	10443.50	-58.32	2.30	11.30	-49.32	-13.00	H
	11941.50	-55.72	2.60	11.00	-47.32	-13.00	V
	14240.50	-55.01	2.50	11.90	-45.61	-13.00	H
	17790.50	-52.69	3.60	12.80	-43.49	-13.00	H
LTE BAND 4 20393 16QAM	frequency(M Hz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	EIRP(dB m)	limit	Polarization
	2956.00	-46.21	1.00	10.70	-36.51	-13.00	H
	8206.50	-59.42	2.20	11.30	-50.32	-13.00	H
	10056.50	-58.71	2.20	11.30	-49.61	-13.00	H
	12008.00	-58.04	2.60	12.60	-48.04	-13.00	V
	14302.50	-55.96	2.60	11.90	-46.66	-13.00	H
17786.00	-52.96	3.60	12.80	-43.76	-13.00	H	

LTE BAND 5 20407	frequency(M Hz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	ERP(dB m)	limit	Polarization
	2963.47	-45.40	1.00	10.70	-37.85	-13.00	V
	3297.00	-55.17	1.10	11.50	-46.92	-13.00	V
	4576.00	-63.49	1.30	12.50	-54.44	-13.00	H
	5374.00	-64.07	1.30	12.50	-55.02	-13.00	V
	6159.50	-62.83	1.60	13.10	-53.48	-13.00	H
	6979.50	-62.04	1.80	12.40	-53.59	-13.00	V
LTE BAND 5 20525	frequency(M Hz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	ERP(dB m)	limit	Polarization
	2957.87	-45.10	1.00	10.70	-37.55	-13.00	V
	3344.00	-58.30	1.10	11.50	-50.05	-13.00	V
	4391.00	-64.65	1.30	12.40	-55.70	-13.00	H
	5143.00	-64.31	1.30	12.50	-55.26	-13.00	V
	5808.00	-63.95	1.50	13.10	-54.50	-13.00	H
	6465.00	-63.58	1.60	13.10	-54.23	-13.00	H
LTE BAND 5 20643	frequency(M Hz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	ERP(dB m)	limit	Polarization
	2944.00	-46.04	1.00	10.70	-38.49	-13.00	H
	3391.50	-61.60	1.10	11.50	-53.35	-13.00	V
	3905.50	-63.89	1.20	12.20	-55.04	-13.00	V
	4511.00	-64.77	1.20	12.50	-55.62	-13.00	H
	5387.00	-63.61	1.20	12.50	-54.46	-13.00	H
	6303.50	-63.13	1.60	13.10	-53.78	-13.00	V

LTE BAND 5	frequency(M Hz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	ERP(dB m)	limit	Polarization
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20407 16QAM	2973.60	-45.94	1.00	10.70	-38.39	-13.00	V
	3296.50	-54.53	1.10	11.50	-46.28	-13.00	V
	3910.50	-63.71	1.30	12.20	-54.96	-13.00	H
	4578.50	-64.77	1.30	12.50	-55.72	-13.00	H
	5193.00	-63.38	1.60	12.50	-54.63	-13.00	V
	5815.00	-63.97	1.50	13.10	-54.52	-13.00	H
LTE BAND 5 20525 16QAM	frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	ERP(dBm)	limit	Polarization
	2946.67	-46.11	1.00	10.70	-38.56	-13.00	H
	3344.50	-56.75	1.10	11.50	-48.50	-13.00	V
	4013.00	-64.38	1.20	12.40	-55.33	-13.00	V
	4753.00	-64.90	1.30	12.50	-55.85	-13.00	H
	5623.50	-64.64	1.30	13.10	-54.99	-13.00	H
LTE BAND 5 20643 16QAM	frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	ERP(dBm)	limit	Polarization
	2958.93	-46.41	1.00	10.70	-38.86	-13.00	V
	3391.50	-56.47	1.10	11.50	-48.22	-13.00	V
	4266.00	-64.73	1.20	12.40	-55.68	-13.00	H
	5031.00	-63.74	1.30	12.50	-54.69	-13.00	H
	5922.50	-63.36	1.50	13.10	-53.91	-13.00	H
6675.00	-62.65	1.80	12.40	-54.20	-13.00	H	

LTE BAND 7 20775	frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarization
	2951.47	-46.47	1.00	10.70	-36.77	-25.00	V
	8361.00	-59.92	1.80	11.30	-50.42	-25.00	H
	9980.50	-58.17	2.20	11.20	-49.17	-25.00	H
	12010.00	-57.53	2.60	12.60	-47.53	-25.00	H
	15018.00	-56.53	2.40	12.40	-46.53	-25.00	V
LTE BAND 7 21100	frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarization
	17787.00	-52.89	3.60	12.80	-43.69	-25.00	H
	2952.27	-46.40	1.00	10.70	-36.70	-25.00	H
	7462.00	-60.41	1.90	12.00	-50.31	-25.00	H
	10482.50	-57.80	2.30	11.30	-48.80	-25.00	H
	11930.50	-55.86	2.60	11.00	-47.46	-25.00	H
LTE BAND 7	14289.00	-55.65	2.60	11.90	-46.35	-25.00	H
	17822.00	-52.94	3.60	12.80	-43.74	-25.00	H
frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarization	



21425	2896.00	-46.39	1.00	10.70	-36.69	-25.00	H
	8709.00	-60.07	2.00	12.00	-50.07	-25.00	V
	9702.00	-57.42	2.20	11.20	-48.42	-25.00	H
	12034.50	-56.51	2.70	12.60	-46.61	-25.00	V
	15023.50	-56.74	2.40	12.40	-46.74	-25.00	V
	17790.50	-52.69	3.60	12.80	-43.49	-25.00	H

	frequency(MHz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarization
LTE BAND 7 20775 16QAM	2984.27	-46.63	1.00	10.70	-36.93	-25.00	V
	8672.00	-60.67	2.00	12.00	-50.67	-25.00	H
	10024.50	-58.24	2.20	11.30	-49.14	-25.00	V
	12034.50	-58.23	2.70	12.60	-48.33	-25.00	V
	14284.50	-56.20	2.60	11.90	-46.90	-25.00	H
	17817.50	-52.79	3.60	12.80	-43.59	-25.00	H
LTE BAND 7 21100 16QAM	2978.13	-46.65	1.00	10.70	-36.95	-25.00	V
	8763.50	-60.63	1.90	12.00	-50.53	-25.00	H
	9964.00	-57.55	2.20	11.20	-48.55	-25.00	H
	12037.00	-57.70	2.70	12.60	-47.80	-25.00	V
	14682.50	-55.76	2.50	11.20	-47.06	-25.00	H
	17795.50	-52.89	3.60	12.80	-43.69	-25.00	H
LTE BAND 7 21425 16QAM	2989.63	-47.35	1.00	10.70	-37.65	-25.00	V
	8649.50	-61.02	2.00	12.00	-51.02	-25.00	H
	10061.50	-58.50	2.00	11.30	-49.20	-25.00	H
	11957.50	-56.24	2.60	11.00	-47.84	-25.00	V
	15012.00	-56.46	2.40	12.40	-46.46	-25.00	V
	17814.00	-53.26	3.60	12.80	-44.06	-25.00	H

	frequency (MHz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarization
LTE BAND 38 37775	2972.53	-46.05	1.00	10.70	-36.35	-25.00	H
	7710.50	-59.14	1.80	11.30	-49.64	-25.00	V
	10477.00	-57.70	2.30	11.30	-48.70	-25.00	H
	11912.50	-56.00	2.50	11.00	-47.50	-25.00	V
	14727.00	-55.30	2.50	11.20	-46.60	-25.00	H
	17814.00	-53.14	3.60	12.80	-43.94	-25.00	H
LTE BAND 38	frequency (MHz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dBm)	limit	Polarization



38000	2856.80	-46.07	1.00	10.70	-36.37	-25.00	V
	7778.50	-57.47	1.80	11.30	-47.97	-25.00	V
	10007.50	-57.72	2.20	11.30	-48.62	-25.00	H
	10978.00	-56.06	2.40	10.80	-47.66	-25.00	V
	14171.50	-55.80	2.50	11.90	-46.40	-25.00	H
	17822.50	-52.75	3.60	12.80	-43.55	-25.00	H
LTE BAND 38 38225	frequency (MHz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	EIRP(dB m)	limit	Polarizat ion
	2985.33	-46.49	1.00	10.70	-36.79	-25.00	V
	7846.00	-59.71	1.70	11.30	-50.11	-25.00	V
	9999.50	-57.74	2.20	11.20	-48.74	-25.00	H
	12550.50	-59.36	2.40	13.80	-47.96	-25.00	V
	14199.00	-56.15	2.50	11.90	-46.75	-25.00	H
17815.50	-52.77	3.60	12.80	-43.57	-25.00	H	

LTE BAND 38 37775 16QAM	frequency (MHz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	EIRP(dB m)	limit	Polarizat ion
	2943.47	-45.47	1.00	10.70	-35.77	-25.00	V
	7711.50	-56.47	1.80	11.30	-46.97	-25.00	V
	10494.00	-57.12	2.30	11.30	-48.12	-25.00	H
	11978.00	-55.84	2.60	11.00	-47.44	-25.00	V
	15041.50	-56.10	2.40	12.40	-46.10	-25.00	V
17795.50	-53.02	3.60	12.80	-43.82	-25.00	H	

LTE BAND 38 38000 16QAM	frequency (MHz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	EIRP(dB m)	limit	Polarizat ion
	2940.00	-46.20	1.00	10.70	-36.50	-25.00	H
	8196.00	-59.69	2.20	11.30	-50.59	-25.00	H
	10063.00	-58.48	2.00	11.30	-49.18	-25.00	H
	12206.50	-57.78	2.60	12.60	-47.78	-25.00	H
	14218.50	-55.12	2.50	11.90	-45.72	-25.00	H
17828.00	-52.51	3.60	12.80	-43.31	-25.00	H	

LTE BAND 38 38225 16QAM	frequency (MHz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	EIRP(dB m)	limit	Polarizat ion
	2958.13	-46.32	1.00	10.70	-36.62	-25.00	V
	7846.50	-59.15	1.70	11.30	-49.55	-25.00	H
	10310.50	-57.63	2.10	11.30	-48.43	-25.00	H
	11939.50	-55.92	2.60	11.00	-47.52	-25.00	V
	14371.00	-55.69	2.60	11.90	-46.39	-25.00	H
17789.50	-52.55	3.60	12.80	-43.35	-25.00	H	

LTE BAND 41	frequency (MHz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	EIRP(dB m)	limit	Polarizat ion
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39675	2961.60	-45.54	1.00	10.70	-35.84	-25.00	H
	7489.00	-56.78	1.90	12.00	-46.68	-25.00	V
	9896.00	-58.07	2.20	11.20	-49.07	-25.00	H
	11893.00	-56.57	2.50	11.00	-48.07	-25.00	V
	14868.50	-54.87	2.70	11.20	-46.37	-25.00	H
	17828.00	-53.10	3.60	12.80	-43.90	-25.00	H
LTE BAND 41 40620	frequency (MHz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	EIRP(dB m)	limit	Polarizat ion
	2959.73	-46.04	1.00	10.70	-36.34	-25.00	V
	7772.50	-57.39	1.80	11.30	-47.89	-25.00	V
	10027.50	-57.98	2.20	11.30	-48.88	-25.00	H
	11883.50	-56.48	2.50	11.00	-47.98	-25.00	H
	15037.00	-57.01	2.40	12.40	-47.01	-25.00	H
LTE BAND 41 41565	frequency (MHz)	Ppm(dB m)	Path loss	Ga Antenna Gain(dBi)	EIRP(dB m)	limit	Polarizat ion
	2954.40	-46.24	1.00	10.70	-36.54	-25.00	V
	8393.50	-59.11	1.80	11.30	-49.61	-25.00	H
	9924.00	-58.32	2.20	11.20	-49.32	-25.00	H
	11944.00	-55.61	2.60	11.00	-47.21	-25.00	V
	15035.50	-56.82	2.40	12.40	-46.82	-25.00	H
	17794.00	-52.36	3.60	12.80	-43.16	-25.00	H

LTE BAND 41 39675 16QAM	frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dB m)	limit	Polariza tion
	2952.53	-46.47	1.00	10.70	-36.77	-25.00	V
	7489.50	-60.63	1.90	12.00	-50.53	-25.00	H
	10360.50	-58.78	2.10	11.30	-49.58	-25.00	H
	12007.00	-57.73	2.60	12.60	-47.73	-25.00	V
	14324.00	-56.25	2.60	11.90	-46.95	-25.00	H
	17783.50	-52.38	3.60	12.80	-43.18	-25.00	H
LTE BAND 41 40620 16QAM	frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dB m)	limit	Polariza tion
	2940.53	-45.90	1.00	10.70	-36.20	-25.00	V
	7772.50	-56.45	1.80	11.30	-46.95	-25.00	V
	9851.00	-58.49	2.30	11.20	-49.59	-25.00	H
	12229.00	-57.91	2.60	12.60	-47.91	-25.00	H
	14245.00	-56.01	2.50	11.90	-46.61	-25.00	H
	17821.50	-52.73	3.60	12.80	-43.53	-25.00	H
LTE BAND 41 41565 16QAM	frequency(M Hz)	Ppm(dBm)	Path loss	Ga Antenna Gain(dBi)	EIRP(dB m)	limit	Polariza tion
	2928.27	-46.08	1.00	10.70	-36.38	-25.00	H
	8055.50	-59.52	2.00	11.30	-50.22	-25.00	H



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10055.00	-58.20	2.20	11.30	-49.10	-25.00	V
11885.00	-55.78	2.50	11.00	-47.28	-25.00	H
14286.00	-56.26	2.60	11.90	-46.96	-25.00	H
17778.00	-53.07	3.60	12.80	-43.87	-25.00	H

Note: The maximum value of expanded measurement uncertainty for this test item is $U = 2.87\text{dB}(30\text{MHz}-3\text{GHz})/3.35\text{dB}(3\text{GHz}-18\text{GHz})/2.68\text{dB}(18\text{GHz}-40\text{GHz})$, $k = 2$



A.3 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.355, 24.235, 27.54.

A.3.1 Method of Measurement

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

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

A.3.2 Measurement Limit

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.60V and 4.40V, with a nominal voltage of 3.85V. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -6.9 % and +14 %. For the purposes of measuring frequency stability these voltage limits are to be used.



A.3.3 Measurement results

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

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.60	-18	-15	0.010	0.008
3.85	-6	-25	0.003	0.013
4.40	-10	-18	0.005	0.010

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30	22	-22	0.012	0.012
-20	-15	33	0.008	0.018
-10	-14	24	0.007	0.013
0	16	-9	0.009	0.005
10	3	-8	0.002	0.004
20	-1	5	0.001	0.003
30	-10	-16	0.005	0.009
40	-25	-28	0.013	0.015
50	-38	-8	0.020	0.004

Expanded measurement uncertainty is 10 Hz, k = 2

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

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.60	-22	-15	0.013	0.009
3.85	-17	13	0.010	0.008
4.40	-14	-18	0.008	0.010

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30	-29	-30	0.017	0.017
-20	-22	-33	0.013	0.019
-10	18	21	0.010	0.012
0	-16	-19	0.009	0.011
10	-14	-18	0.008	0.010
20	-20	-18	0.012	0.010
30	-22	-22	0.013	0.013
40	-29	-27	0.017	0.016
50	-35	-34	0.020	0.020

Expanded measurement uncertainty is 10 Hz, k = 2



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

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.60	-15	-20	0.018	0.024
3.85	-10	-17	0.012	0.020
4.40	-14	-16	0.017	0.019

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30	-32	-33	0.038	0.039
-20	-25	-31	0.030	0.037
-10	-18	-26	0.022	0.031
0	19	-15	0.023	0.018
10	-10	-9	0.012	0.011
20	17	-18	0.020	0.022
30	-14	19	0.017	0.023
40	-22	-24	0.026	0.029
50	-34	-22	0.041	0.026

Expanded measurement uncertainty is 10 Hz, k = 2

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

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.60	-39	-45	0.015	0.018
3.85	-34	-40	0.013	0.016
4.40	-41	-36	0.016	0.014

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30	-41	-43	0.016	0.017
-20	-28	-41	0.011	0.016
-10	-31	-28	0.012	0.011
0	-32	-20	0.013	0.008
10	-36	-39	0.014	0.015
20	-25	-35	0.010	0.014
30	-33	-27	0.013	0.011
40	-27	-36	0.011	0.014
50	-37	-30	0.015	0.012

Expanded measurement uncertainty is 10 Hz, k = 2



LTE Band 38, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.60	-36	-45	0.014	0.017
3.85	-45	-47	0.017	0.018
4.40	-49	-50	0.019	0.019

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30	-39	-37	0.015	0.014
-20	-46	-60	0.018	0.023
-10	-34	-36	0.013	0.014
0	-39	-41	0.015	0.016
10	-28	-38	0.011	0.015
20	-44	-33	0.017	0.013
30	-51	-42	0.020	0.016
40	-55	-28	0.021	0.011
50	-41	-49	0.016	0.019

Expanded measurement uncertainty is 10 Hz, k = 2

LTE Band 41, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.60	-33	-36	0.013	0.014
3.85	-38	-30	0.015	0.012
4.40	-28	-39	0.011	0.015

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30	-45	-55	0.017	0.021
-20	-36	-47	0.014	0.018
-10	-35	-47	0.013	0.018
0	-35	-39	0.013	0.015
10	-25	-30	0.010	0.012
20	-33	-41	0.013	0.016
30	-42	-34	0.016	0.013
40	-37	-33	0.014	0.013
50	-40	-37	0.015	0.014

Expanded measurement uncertainty is 10 Hz, k = 2



A.4 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 24.238, 27.53.

A.4.1 Occupied Bandwidth Results

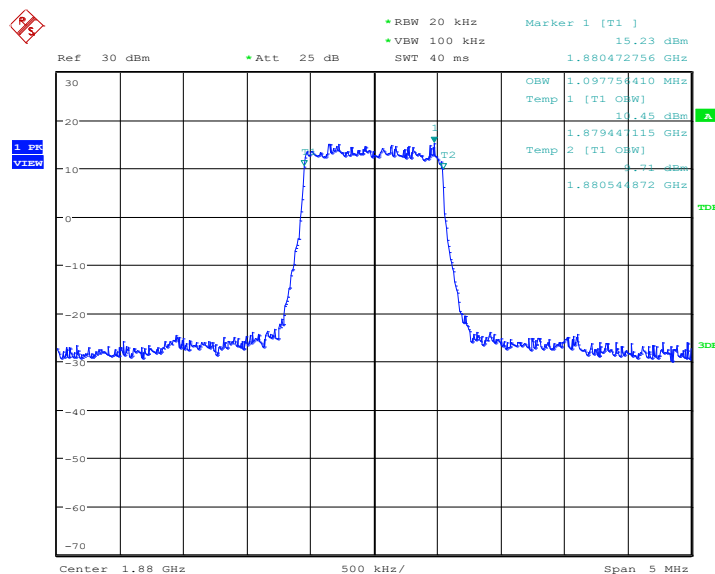
Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the US Cellular/PCS frequency bands. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the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

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
- c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.
- d) Set the detection mode to peak, and the trace mode to max hold.
- e) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

LTE band 2, 1.4MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1880.0	QPSK	16QAM
	1097.76	1089.74

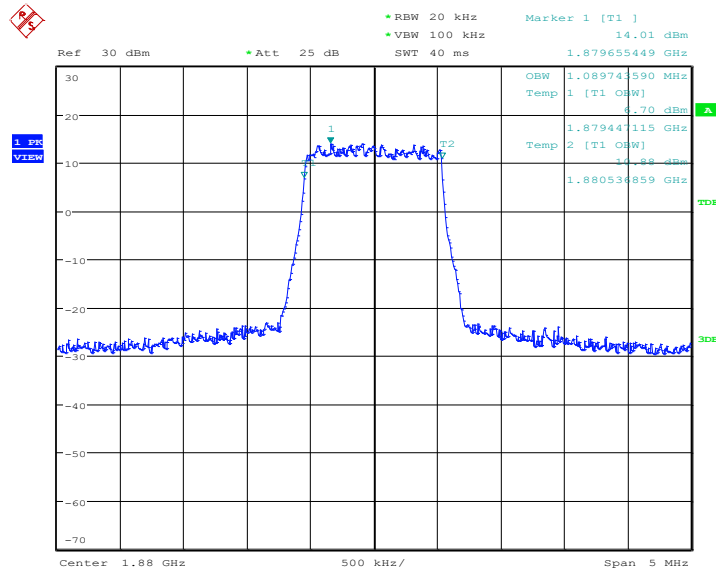
LTE band 2, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 29.NOV.2021 09:28:11



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



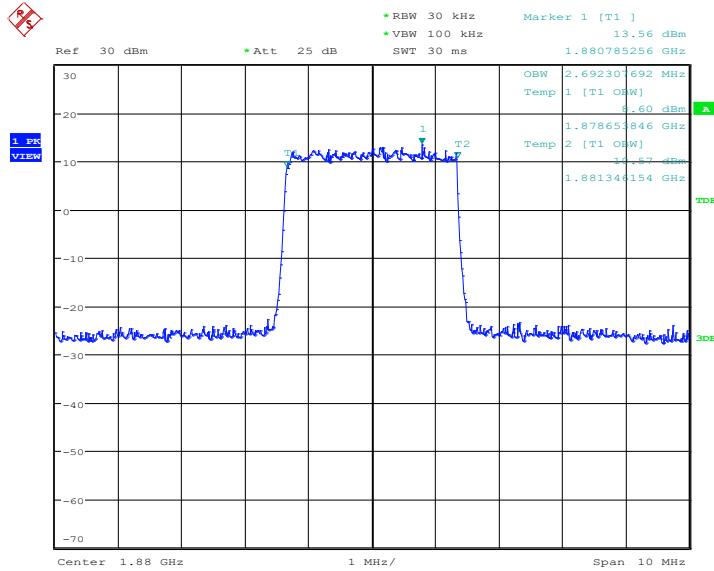
Date: 29.NOV.2021 09:28:26



LTE band 2, 3MHz (99% BW)

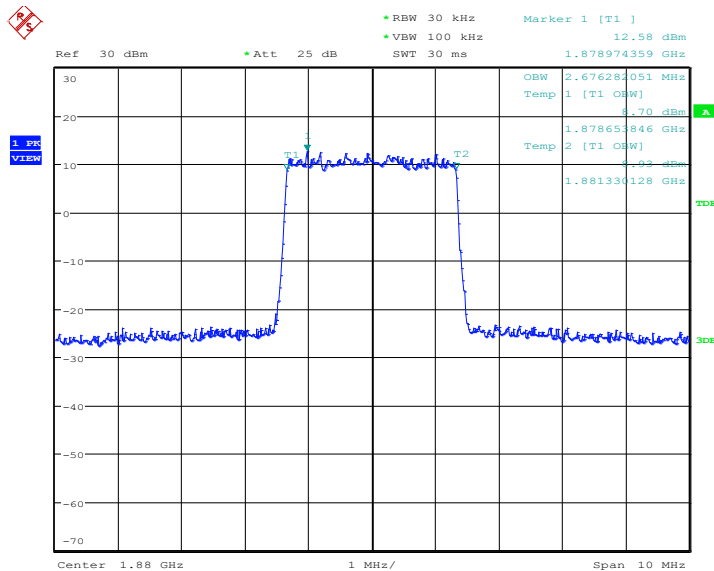
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
	1880.0	QPSK
	2692.31	2676.28

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



Date: 29.NOV.2021 09:31:26

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



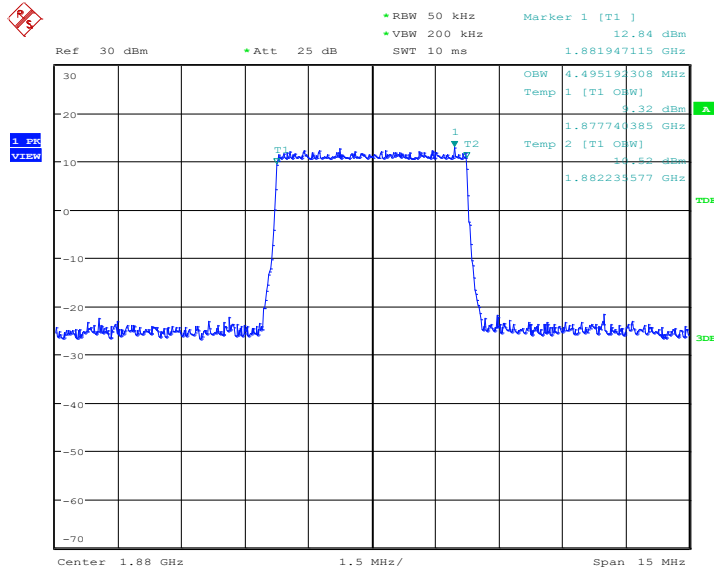
Date: 29.NOV.2021 09:31:41



LTE band 2, 5MHz (99% BW)

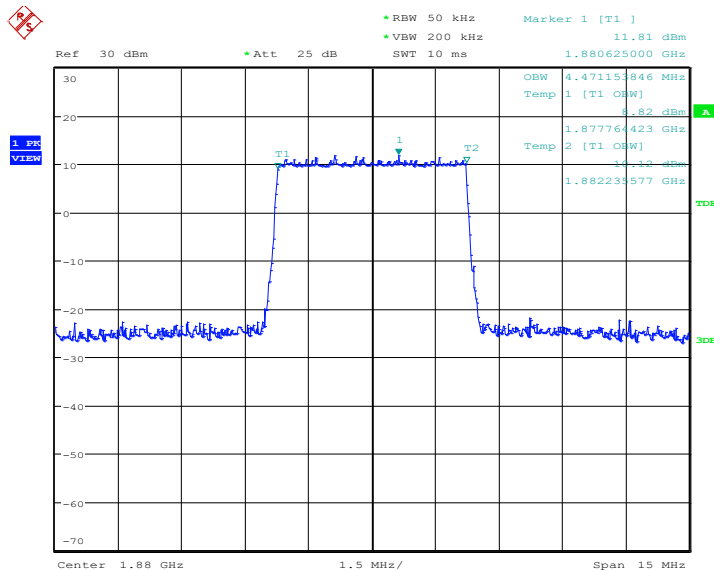
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1880.0	QPSK	16QAM
	4495.19	4471.15

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



Date: 29.NOV.2021 09:34:40

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



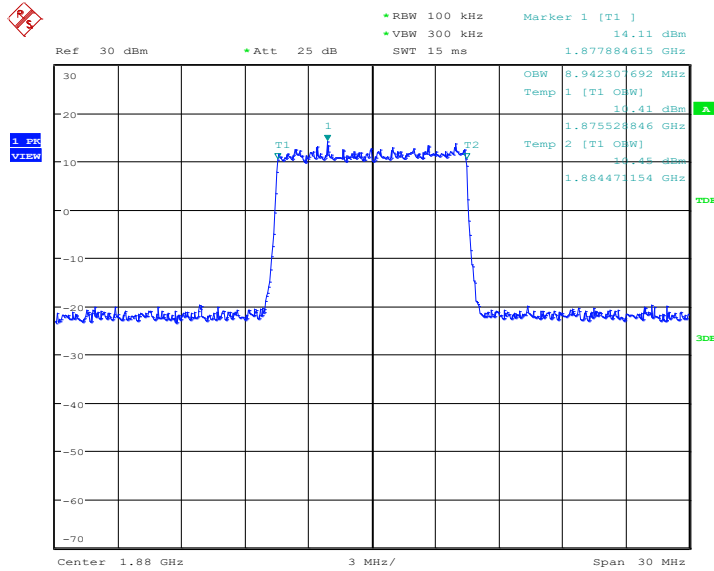
Date: 29.NOV.2021 09:34:55



LTE band 2, 10MHz (99% BW)

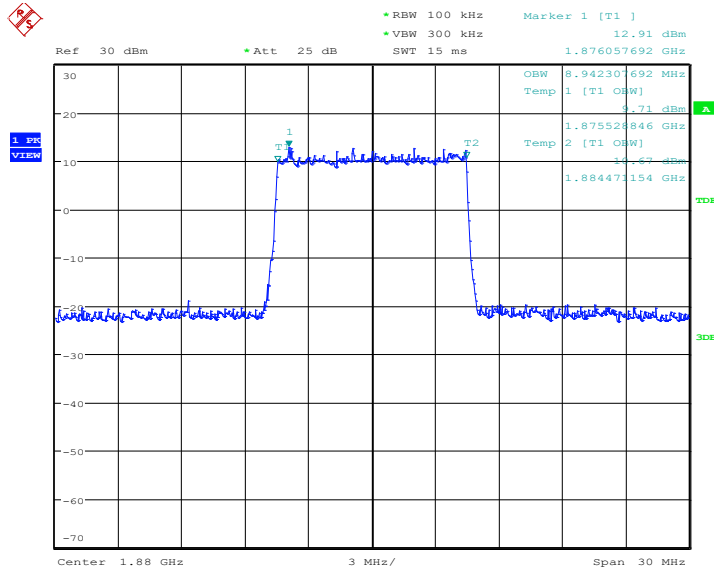
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
	1880.0	QPSK
	8942.31	8942.31

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



Date: 29.NOV.2021 09:37:55

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



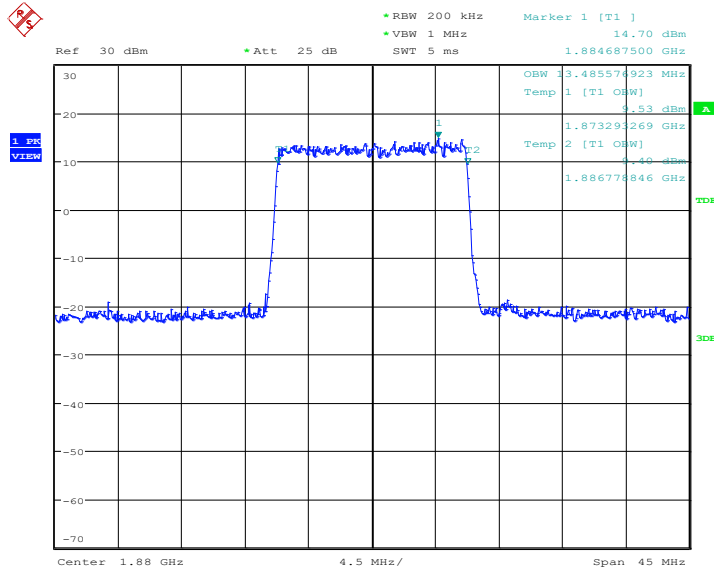
Date: 29.NOV.2021 09:38:10



LTE band 2, 15MHz (99% BW)

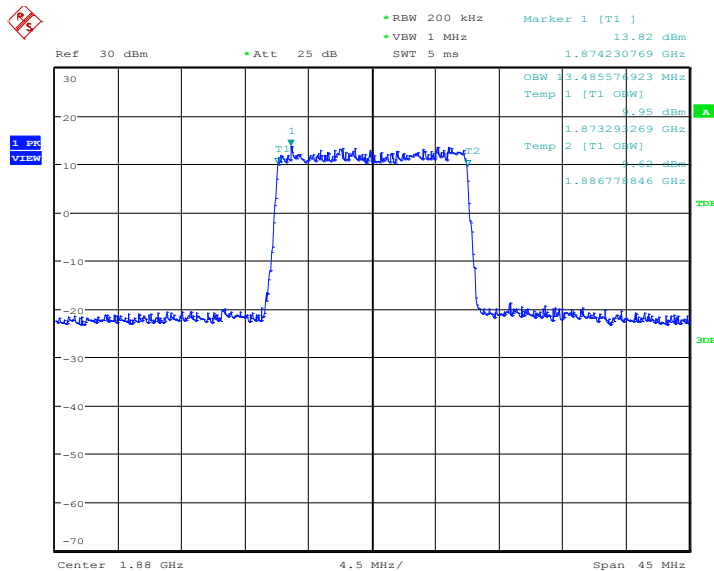
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1880.0	QPSK	16QAM
	13485.58	13485.58

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



Date: 29.NOV.2021 09:41:10

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



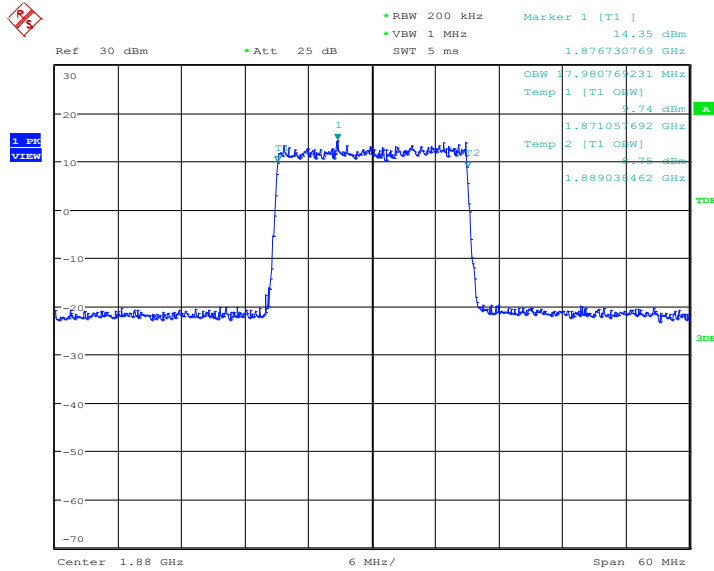
Date: 29.NOV.2021 09:41:25



LTE band 2, 20MHz (99% BW)

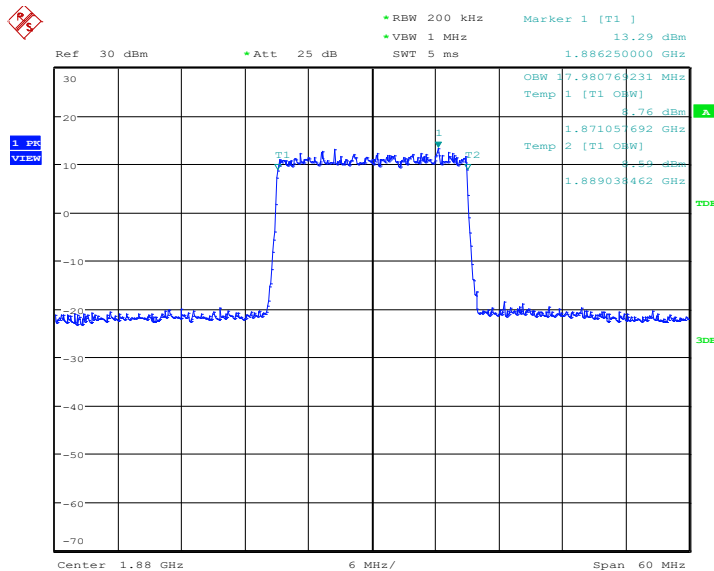
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1880.0	QPSK	16QAM
	17980.77	17980.77

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



Date: 29.NOV.2021 09:44:24

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



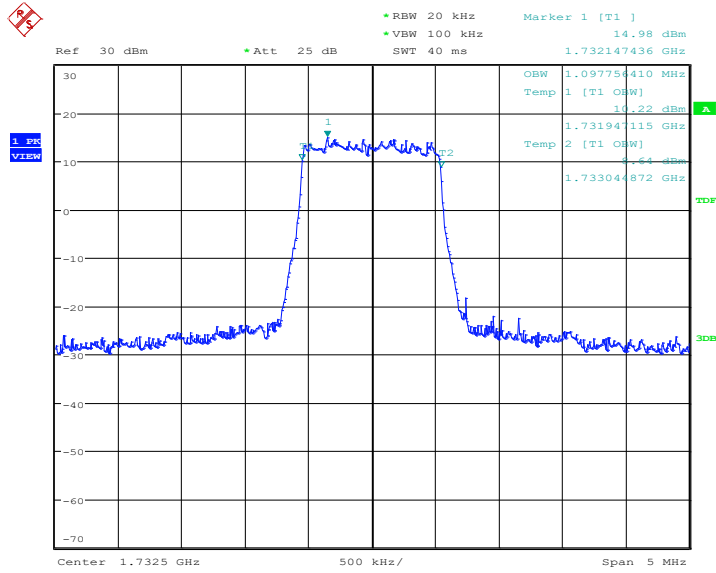
Date: 29.NOV.2021 09:44:39



LTE band 4, 1.4MHz (99% BW)

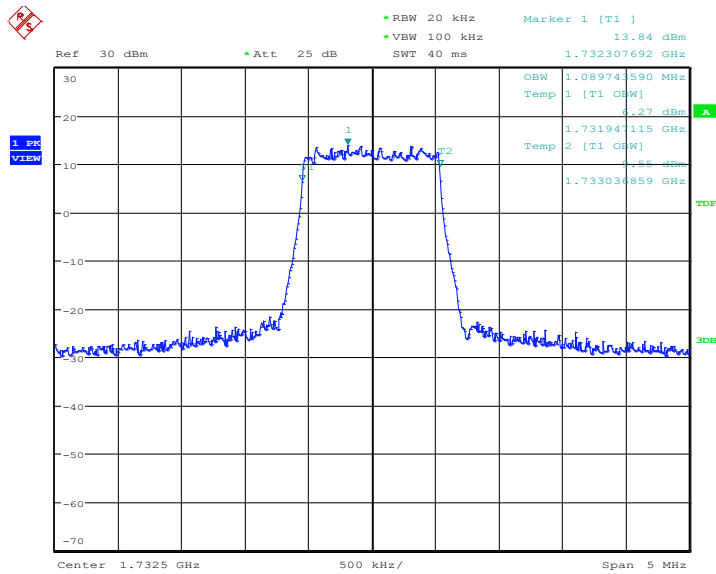
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1732.5	QPSK	16QAM
	1097.76	1089.74

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



Date: 29.NOV.2021 09:48:11

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



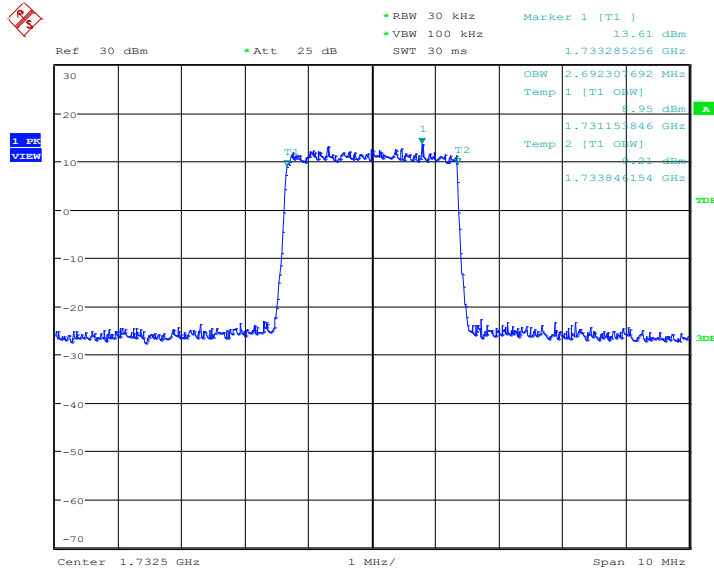
Date: 29.NOV.2021 09:48:26



LTE band 4, 3MHz (99% BW)

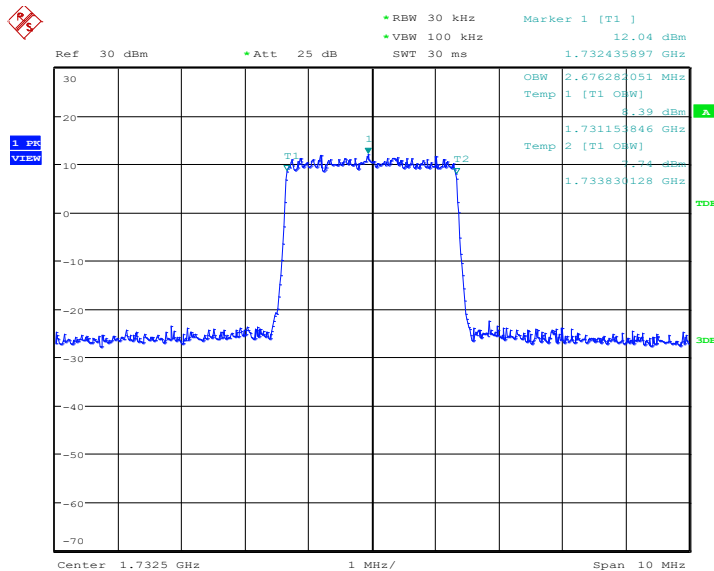
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1732.5	QPSK	16QAM
	2692.31	2676.28

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



Date: 29.NOV.2021 09:51:25

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



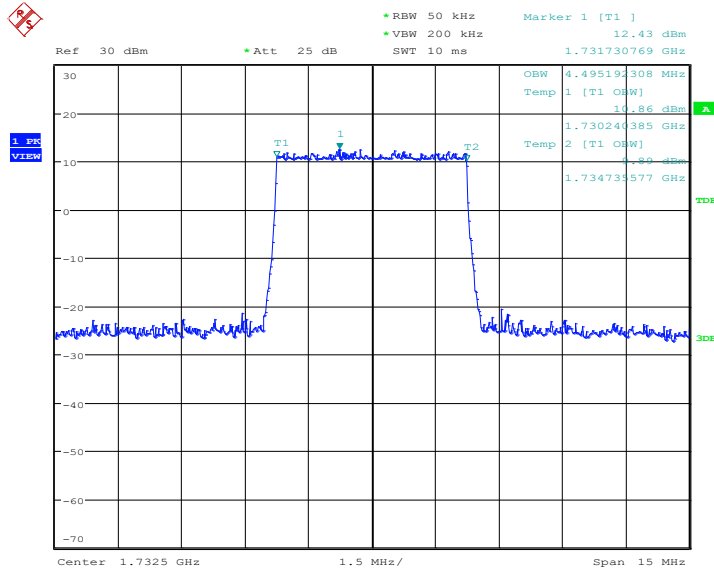
Date: 29.NOV.2021 09:51:40



LTE band 4, 5MHz (99% BW)

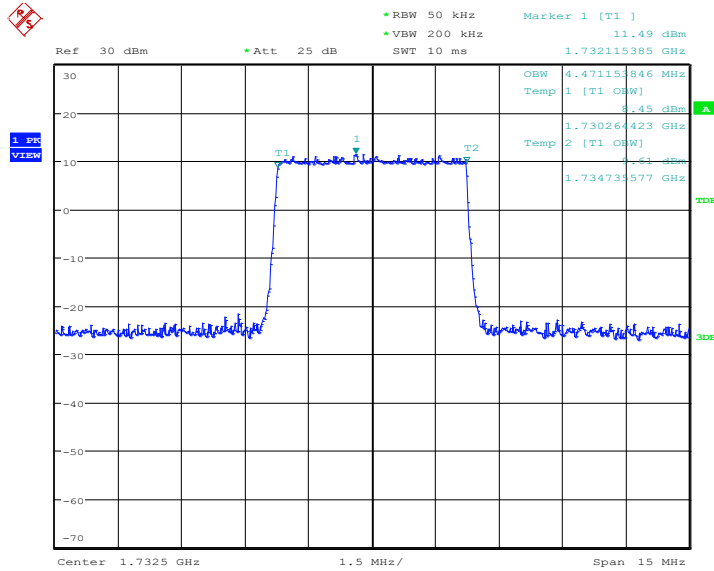
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1732.5	QPSK	16QAM
	4495.19	4471.15

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



Date: 29.NOV.2021 09:54:40

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



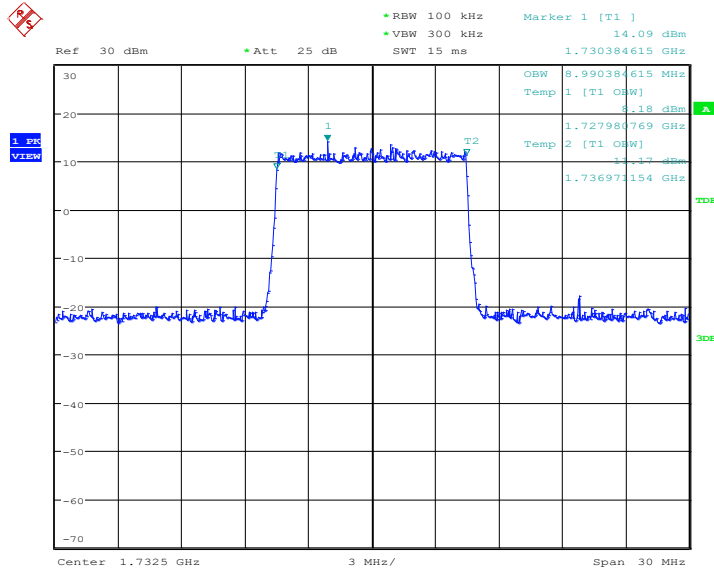
Date: 29.NOV.2021 09:54:55



LTE band 4, 10MHz (99% BW)

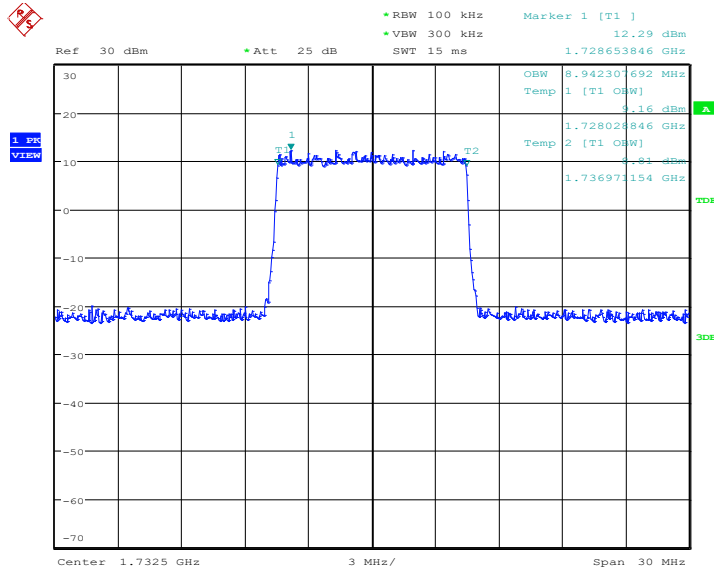
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1732.5	QPSK	16QAM
	8990.38	8942.31

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



Date: 29.NOV.2021 09:57:54

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



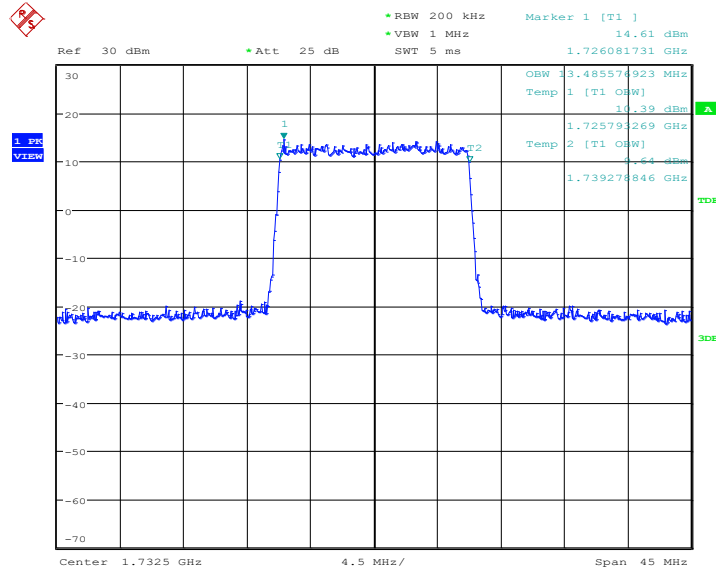
Date: 29.NOV.2021 09:58:09



LTE band 4, 15MHz (99% BW)

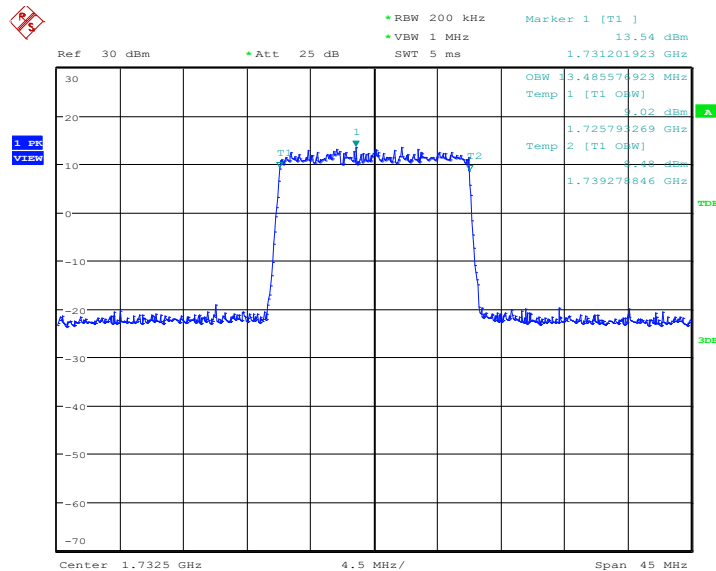
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
1732.5	QPSK	16QAM
	13485.58	13485.58

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



Date: 29.NOV.2021 10:01:09

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



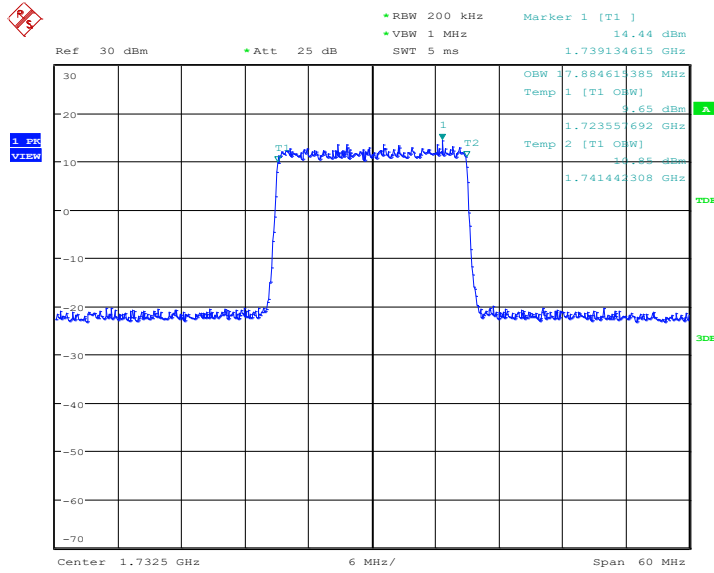
Date: 29.NOV.2021 10:01:24



LTE band 4, 20MHz (99% BW)

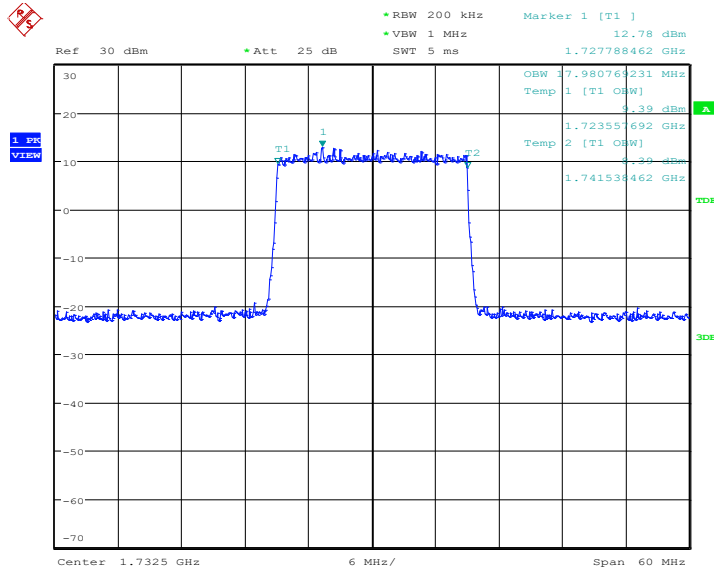
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
	1732.5	QPSK
17884.62		17980.77

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



Date: 29.NOV.2021 10:04:24

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



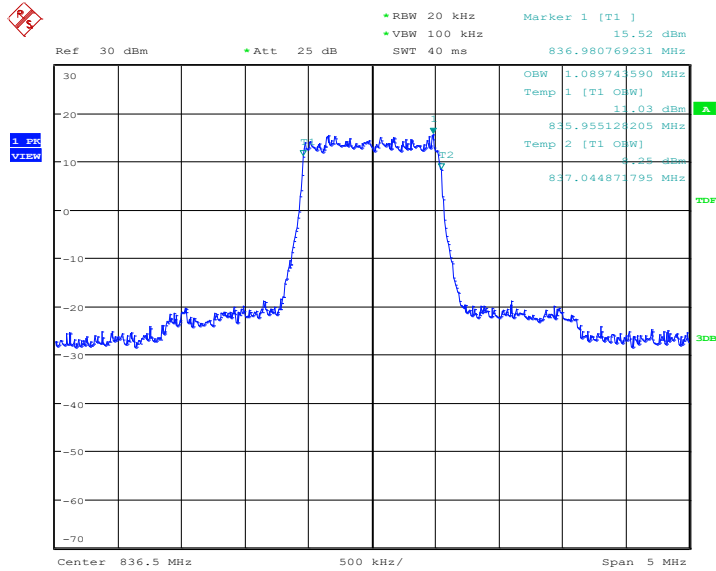
Date: 29.NOV.2021 10:04:39



LTE band 5, 1.4MHz (99% BW)

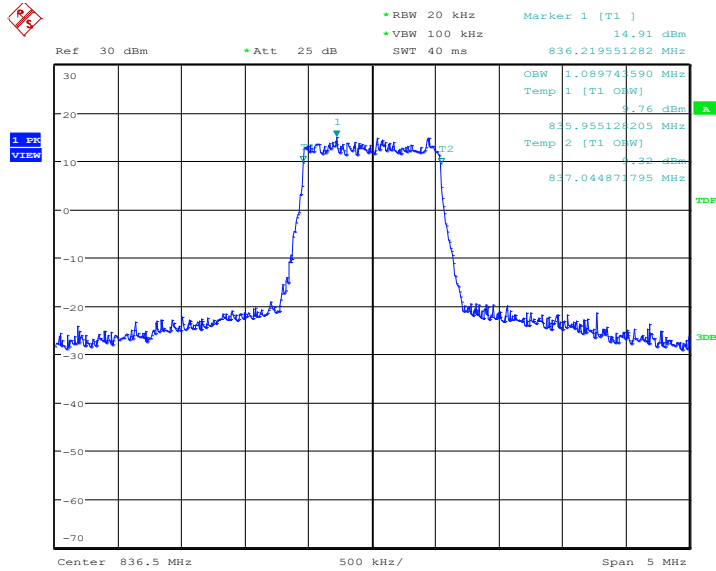
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
836.5	QPSK	16QAM
	1089.74	1089.74

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



Date: 23.NOV.2021 16:27:20

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



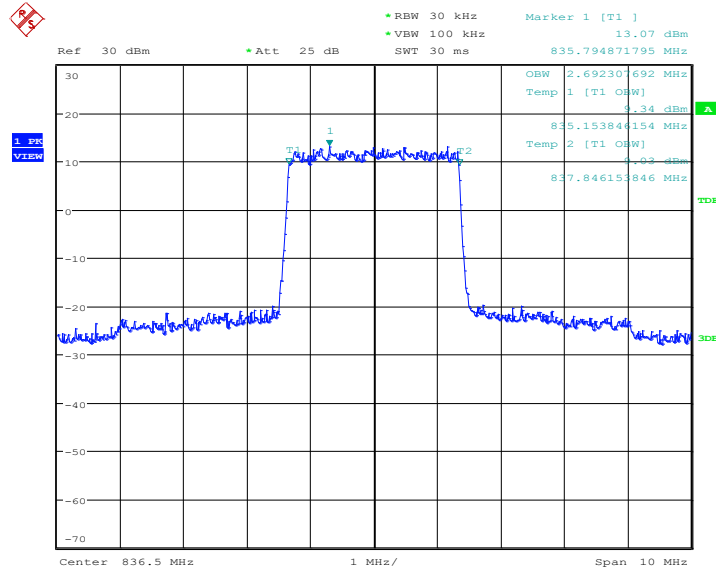
Date: 23.NOV.2021 14:09:20



LTE band 5, 3MHz (99% BW)

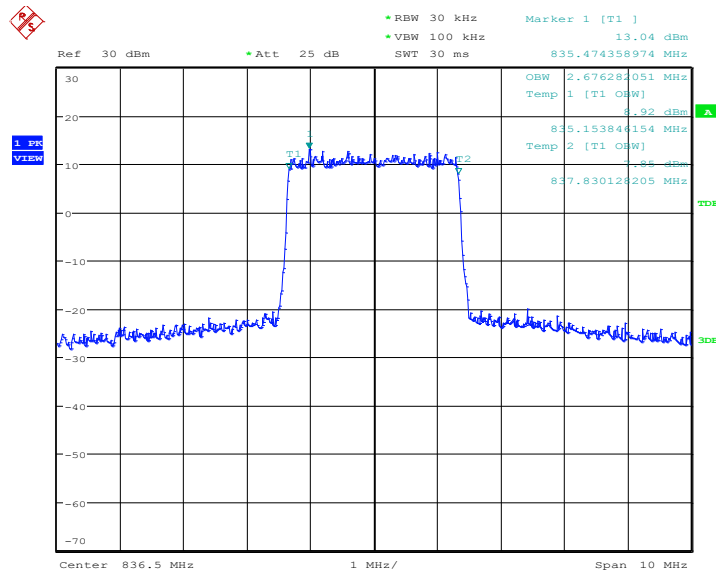
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
	836.5	QPSK
2692.31		2676.28

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



Date: 23.NOV.2021 16:30:56

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



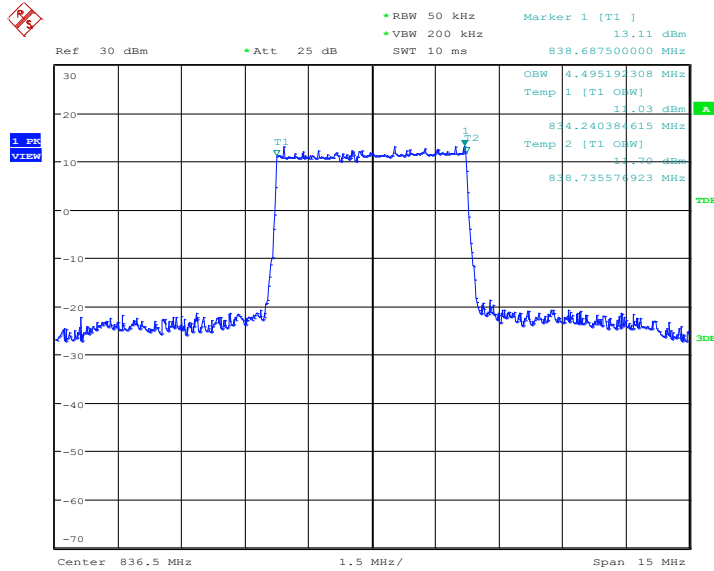
Date: 23.NOV.2021 14:13:50



LTE band 5, 5MHz (99% BW)

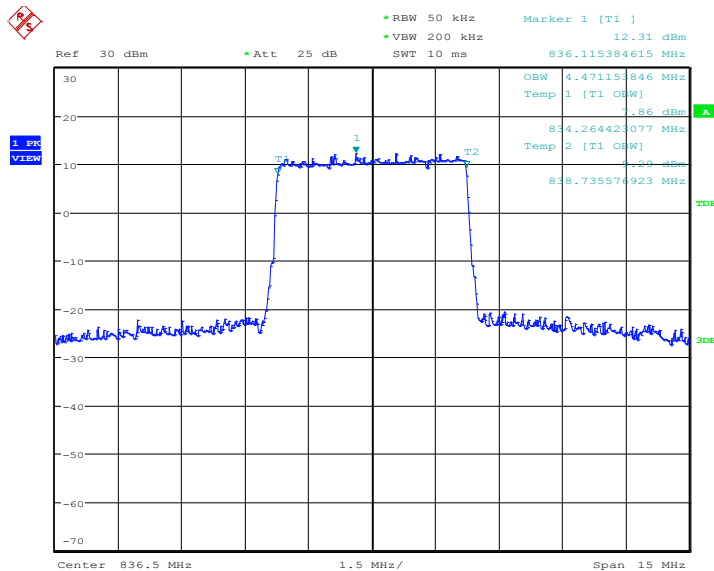
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
	836.5	QPSK
4495.19		4471.15

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



Date: 23.NOV.2021 16:34:31

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



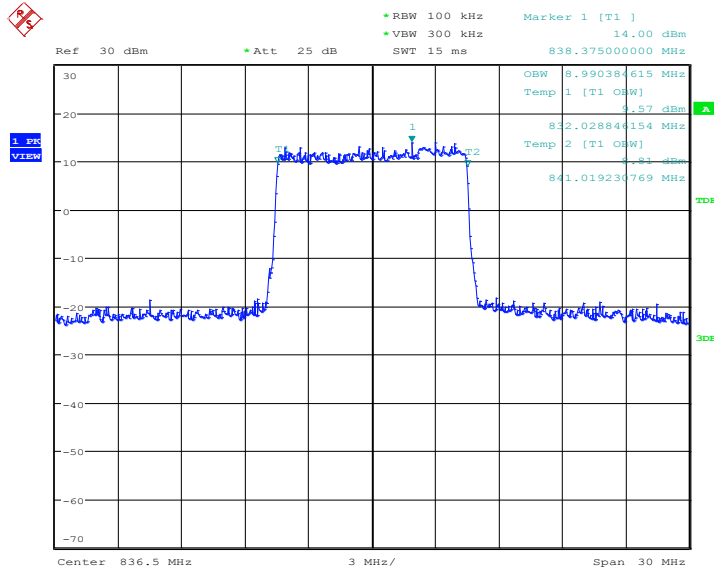
Date: 23.NOV.2021 14:18:21



LTE band 5, 10MHz (99% BW)

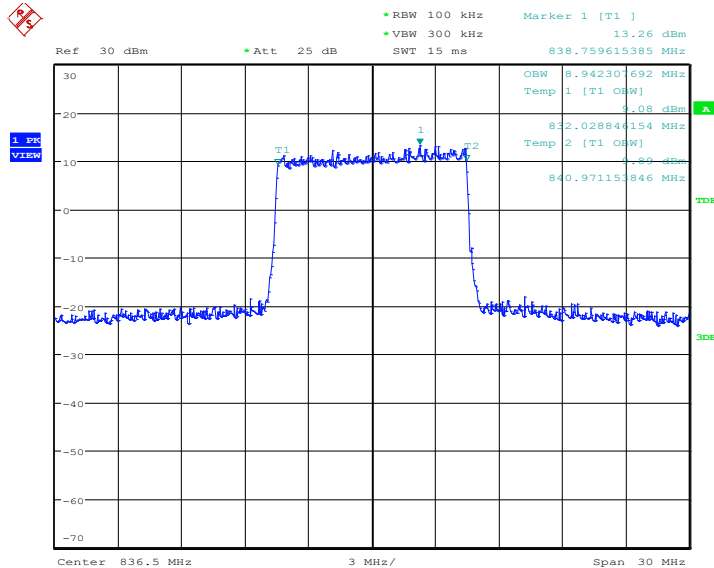
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
836.5	QPSK	16QAM
	8990.38	8942.31

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



Date: 23.NOV.2021 16:38:36

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



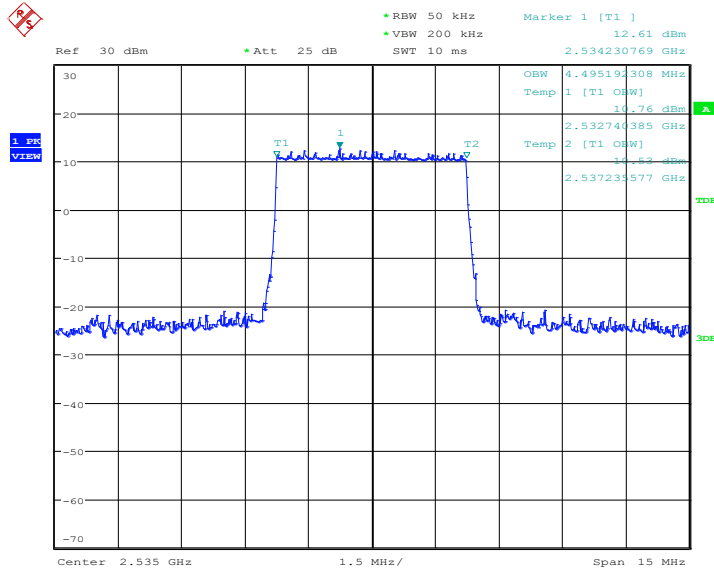
Date: 23.NOV.2021 14:22:51



LTE band 7, 5MHz (99% BW)

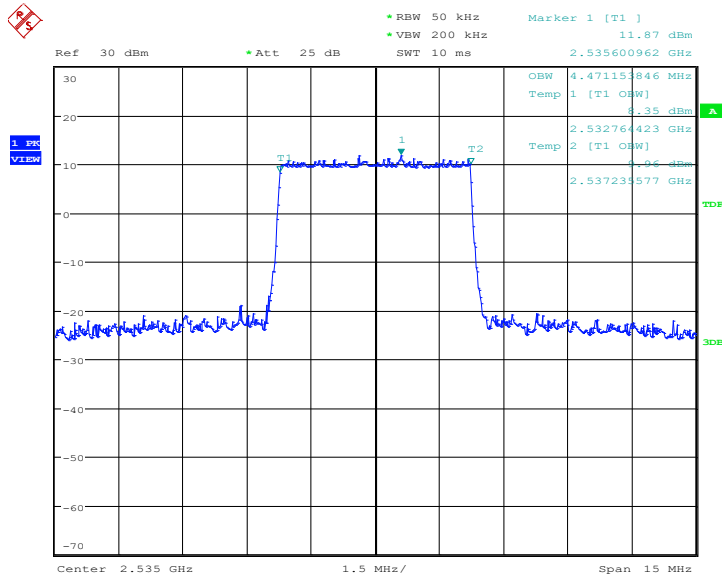
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
2535.0	QPSK	16QAM
	4495.19	4471.15

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



Date: 23.NOV.2021 15:58:28

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



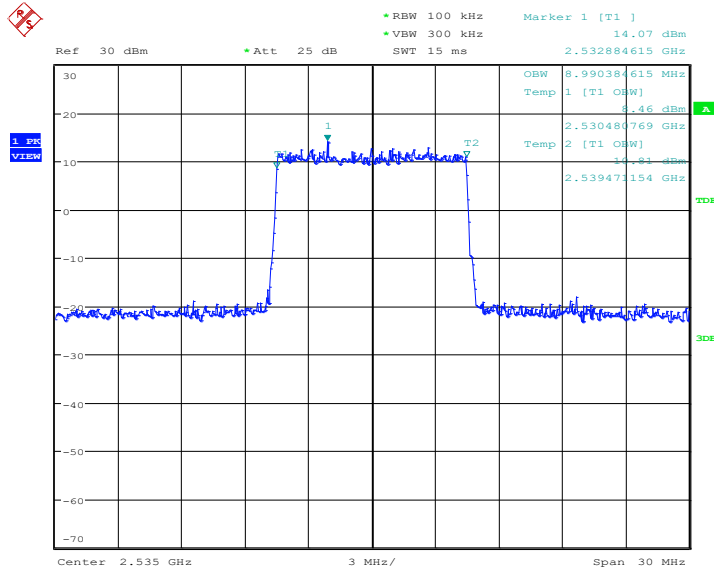
Date: 15.JAN.2022 06:50:37



LTE band 7, 10MHz (99% BW)

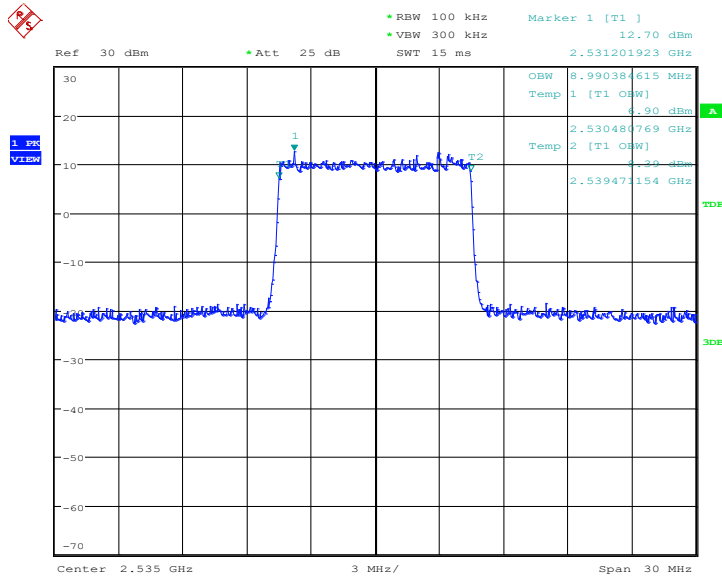
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
2535.0	QPSK	16QAM
	8990.38	8990.38

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



Date: 23.NOV.2021 16:02:03

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



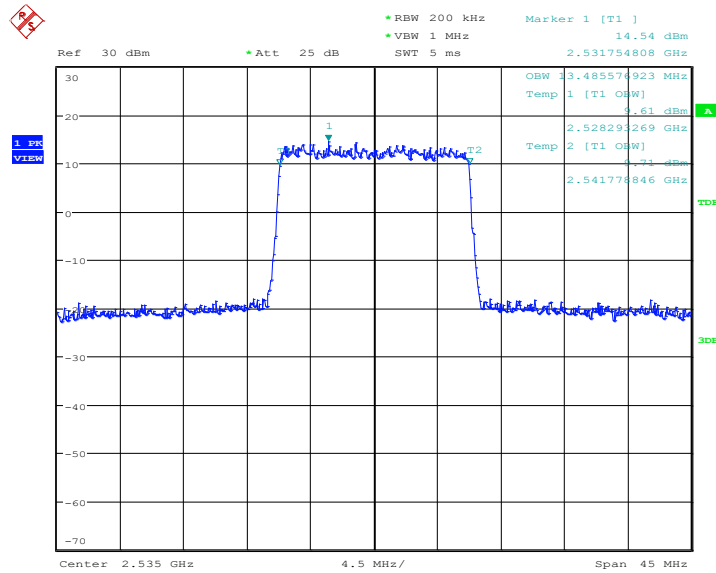
Date: 15.JAN.2022 06:57:29



LTE band 7, 15MHz (99% BW)

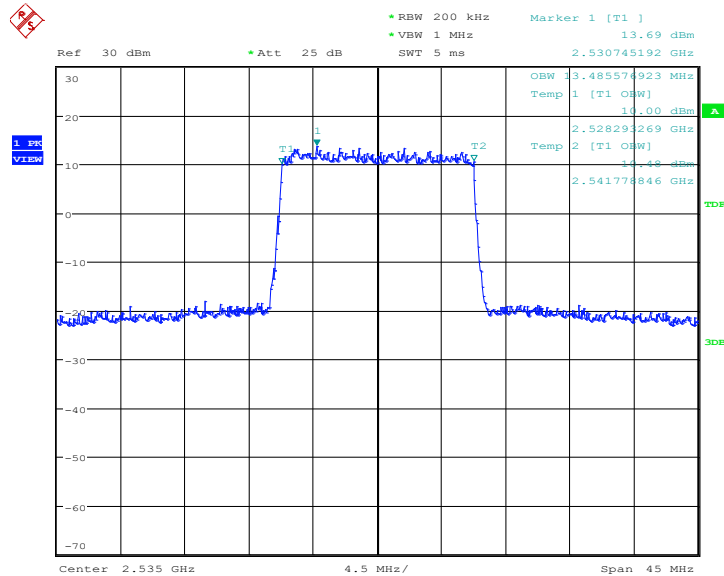
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
2535.0	QPSK	16QAM
	13485.58	13485.58

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



Date: 23.NOV.2021 16:05:38

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

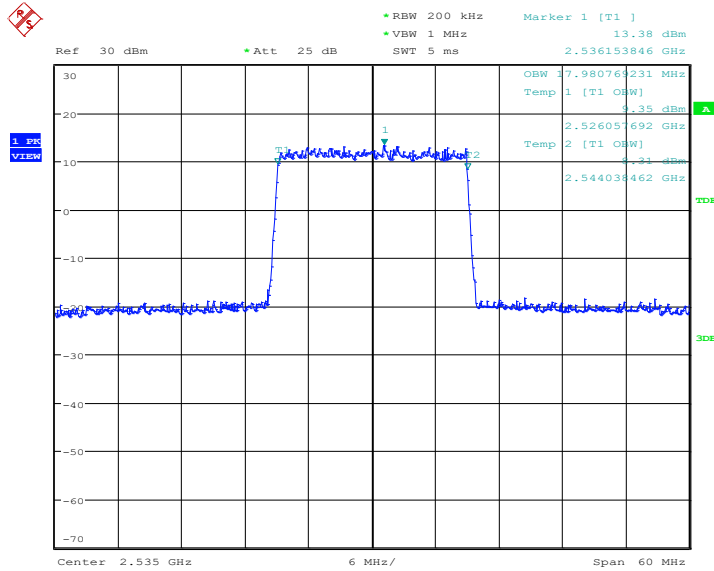


Date: 15.JAN.2022 07:04:42

LTE band 7, 20MHz (99% BW)

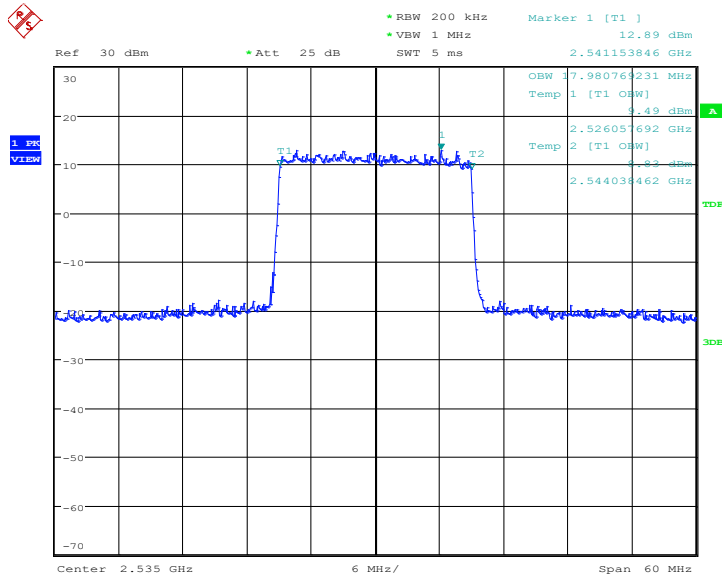
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
2535.0	QPSK	16QAM
	17980.77	17980.77

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



Date: 23.NOV.2021 16:09:13

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



Date: 15.JAN.2022 07:11:55

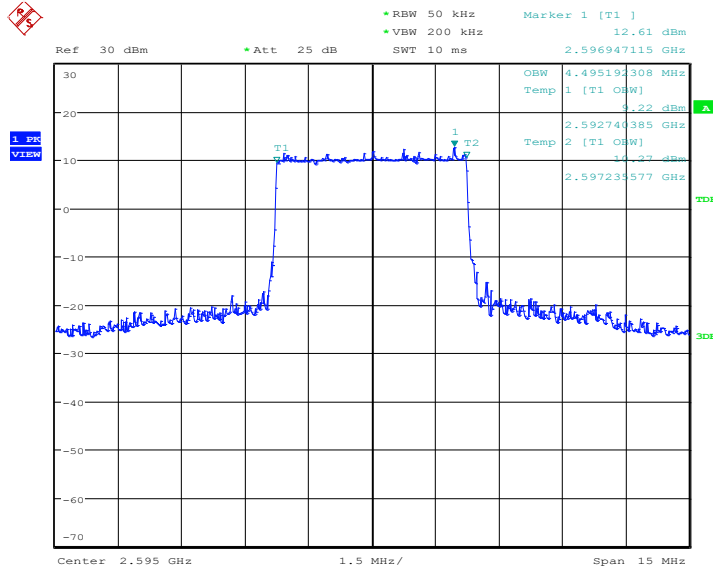
Note: Expanded measurement uncertainty is $U = 3428\text{Hz}$, $k = 2$



LTE band 38, 5MHz (99% BW)

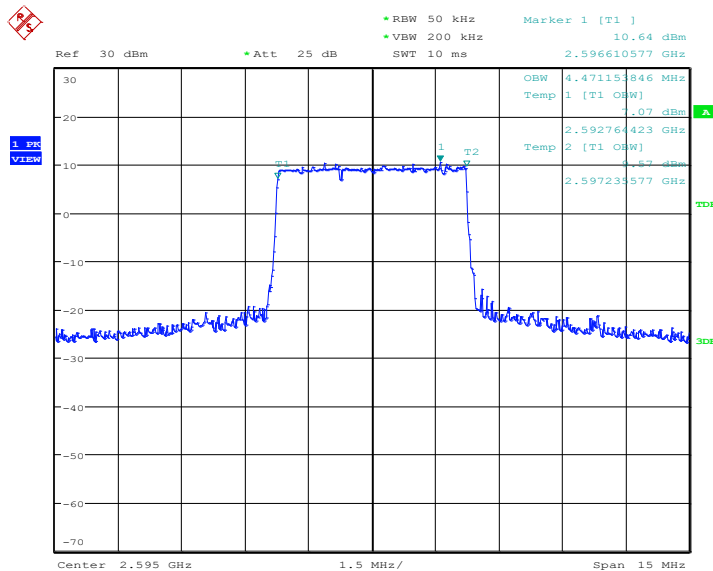
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
2595.0	QPSK	16QAM
	4495.19	4471.15

LTE band 38, 5MHz Bandwidth, QPSK (99% BW)



Date: 29.NOV.2021 09:15:04

LTE band 38, 5MHz Bandwidth, 16QAM (99% BW)



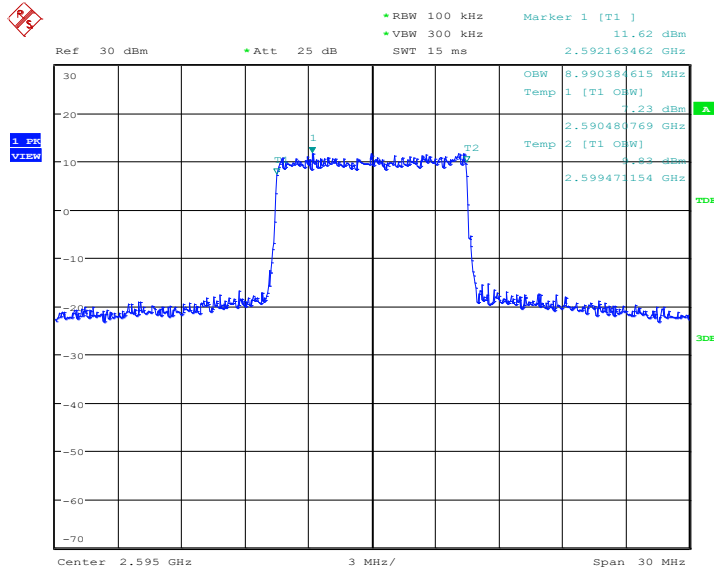
Date: 29.NOV.2021 09:15:19



LTE band 38, 10MHz (99% BW)

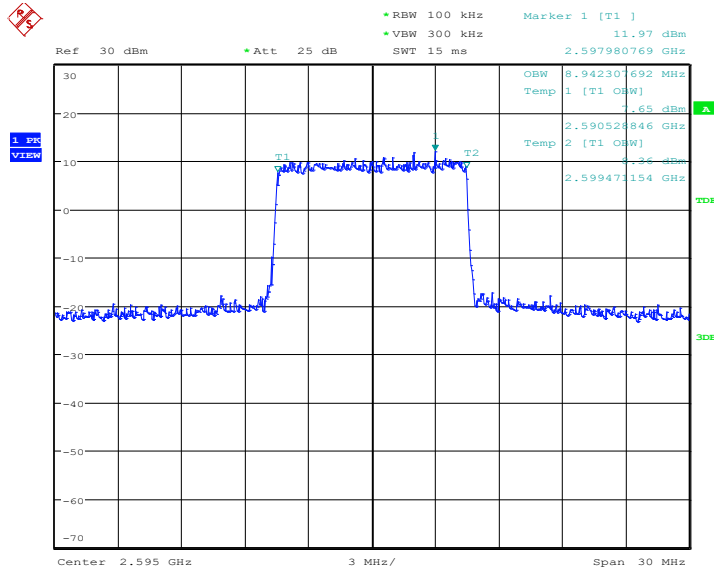
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
	2595.0	QPSK
	8990.38	8942.31

LTE band 38, 10MHz Bandwidth, QPSK (99% BW)



Date: 29.NOV.2021 09:18:20

LTE band 38, 10MHz Bandwidth, 16QAM (99% BW)



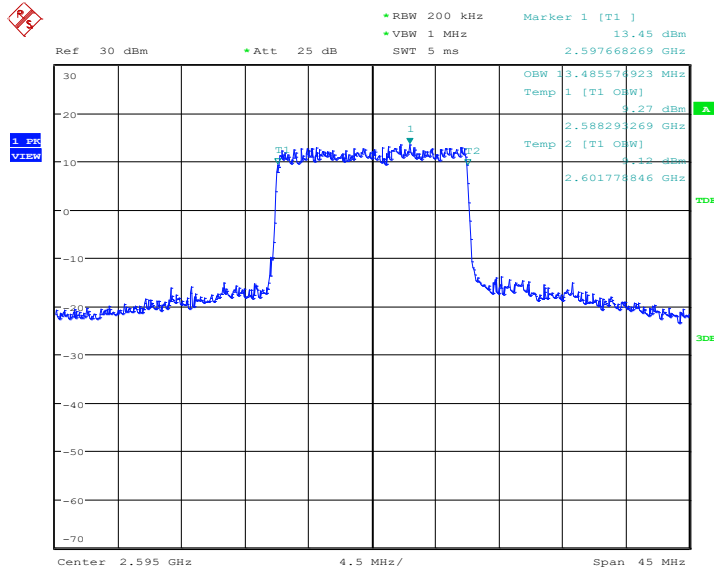
Date: 29.NOV.2021 09:18:35



LTE band 38, 15MHz (99% BW)

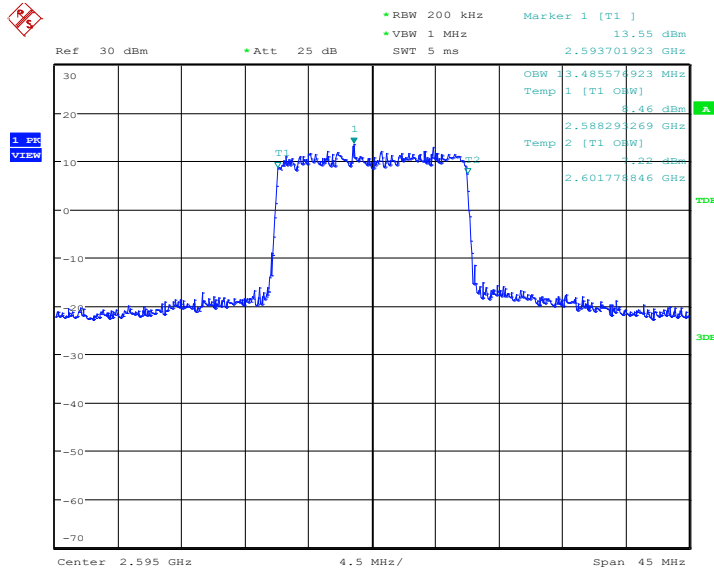
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
	2595.0	QPSK
	13485.58	13485.58

LTE band 38, 15MHz Bandwidth, QPSK (99% BW)



Date: 29.NOV.2021 09:21:36

LTE band 38, 15MHz Bandwidth, 16QAM (99% BW)



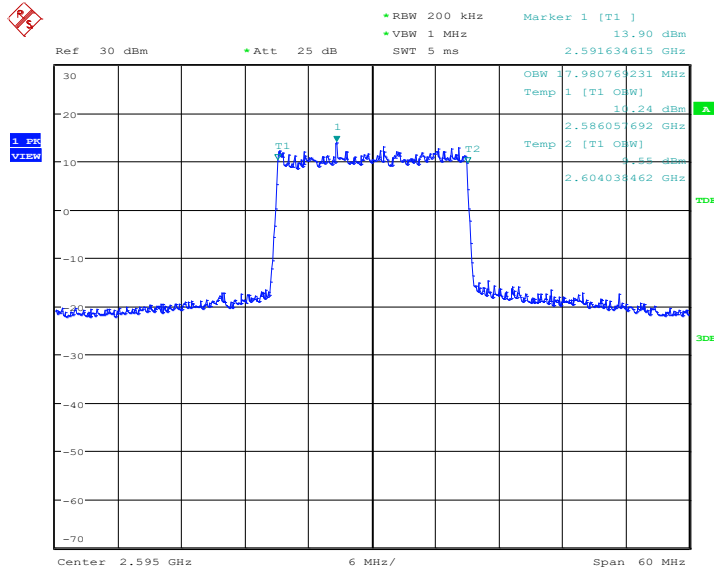
Date: 29.NOV.2021 09:21:51



LTE band 38, 20MHz (99% BW)

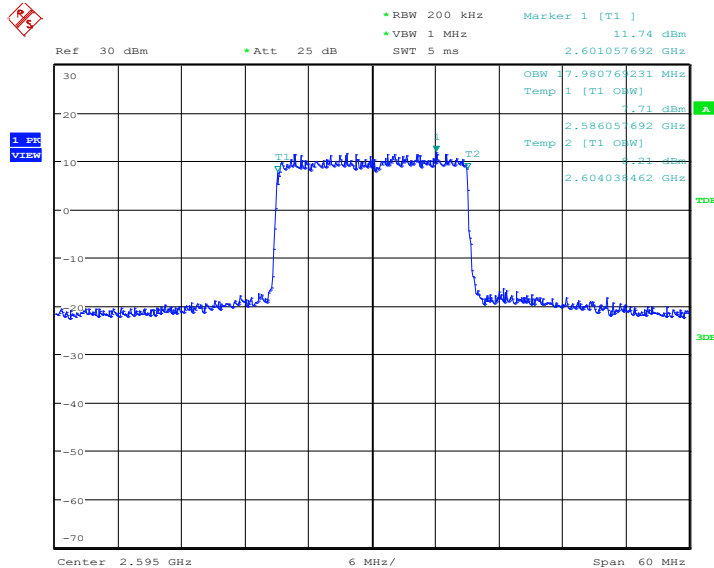
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
2595.0	QPSK	16QAM
	17980.77	17980.77

LTE band 38, 20MHz Bandwidth, QPSK (99% BW)



Date: 29.NOV.2021 09:24:53

LTE band 38, 20MHz Bandwidth, 16QAM (99% BW)



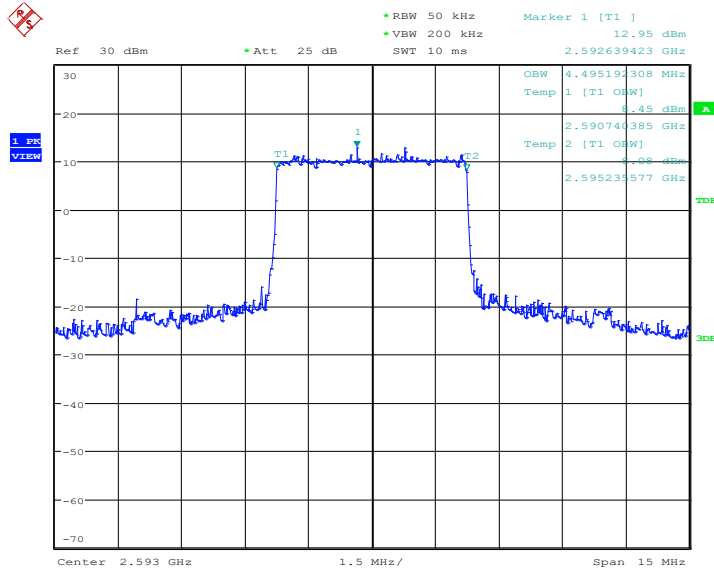
Date: 29.NOV.2021 09:25:08



LTE band 41, 5MHz (99% BW)

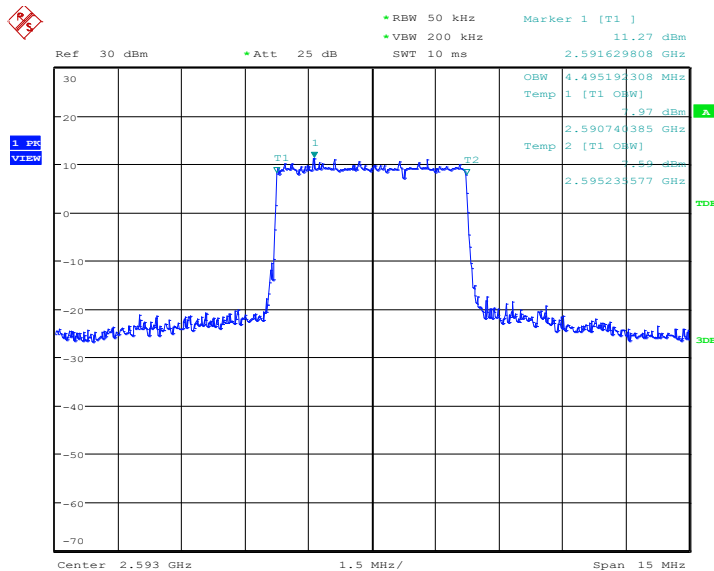
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
2593.0	QPSK	16QAM
	4495.19	4495.19

LTE band 41, 5MHz Bandwidth, QPSK (99% BW)



Date: 29.NOV.2021 10:08:01

LTE band 41, 5MHz Bandwidth,16QAM (99% BW)



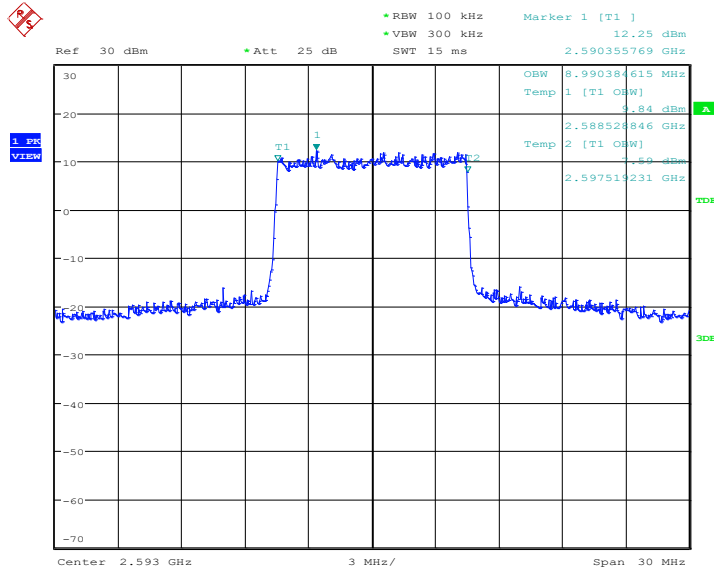
Date: 29.NOV.2021 10:08:16



LTE band 41, 10MHz (99% BW)

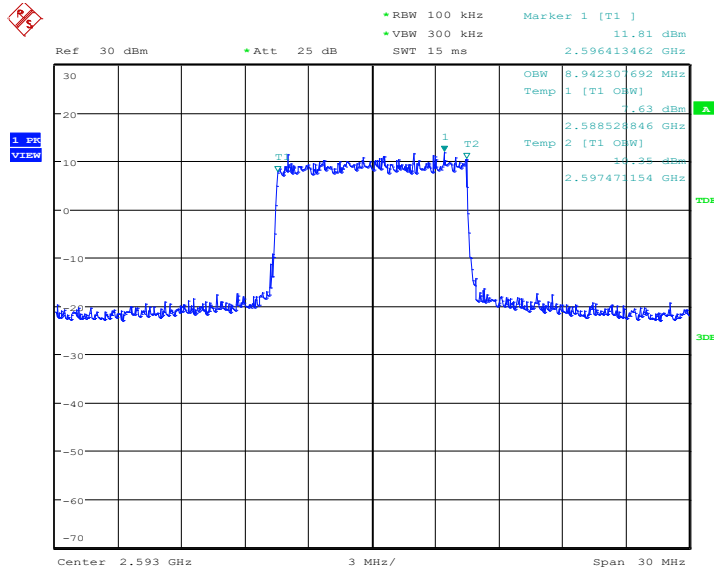
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
2593.0	QPSK	16QAM
	8990.38	8942.31

LTE band 41, 10MHz Bandwidth, QPSK (99% BW)



Date: 29.NOV.2021 10:11:17

LTE band 41, 10MHz Bandwidth, 16QAM (99% BW)



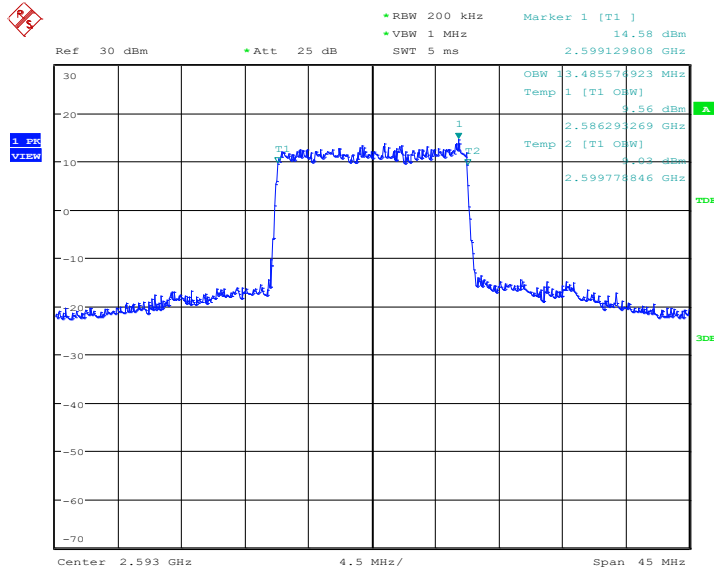
Date: 29.NOV.2021 10:11:32



LTE band 41, 15MHz (99% BW)

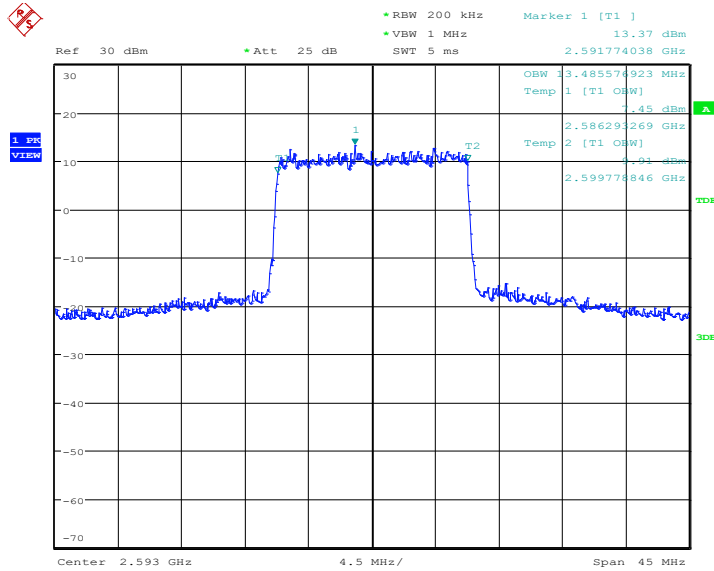
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
2593.0	QPSK	16QAM
	13485.58	13485.58

LTE band 41, 15MHz Bandwidth, QPSK (99% BW)



Date: 29.NOV.2021 10:14:33

LTE band 41, 15MHz Bandwidth, 16QAM (99% BW)

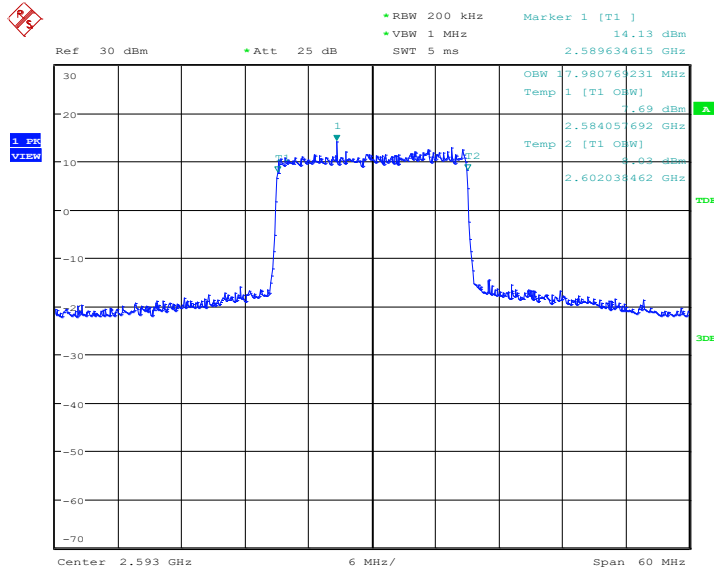


Date: 29.NOV.2021 10:14:48

LTE band 41, 20MHz (99% BW)

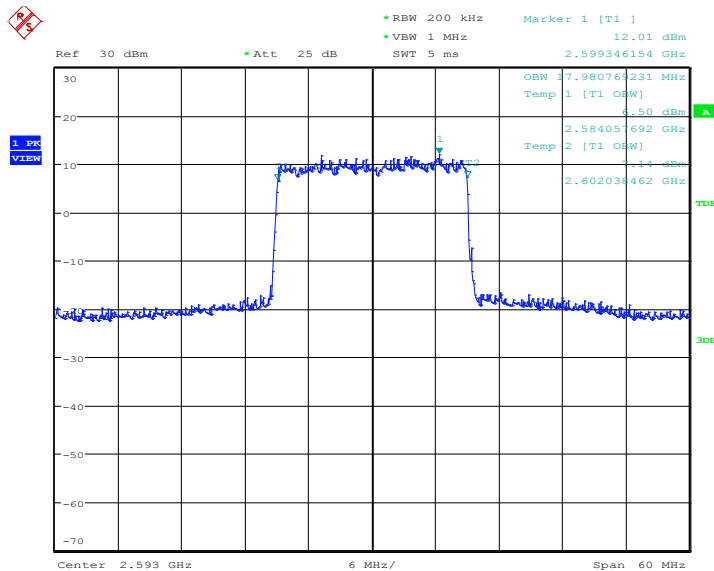
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)	
2593.0	QPSK	16QAM
	17980.77	17980.77

LTE band 41, 20MHz Bandwidth, QPSK (99% BW)



Date: 29.NOV.2021 10:17:50

LTE band 41, 20MHz Bandwidth, 16QAM (99% BW)



Date: 29.NOV.2021 10:18:05

Note: Expanded measurement uncertainty is $U = 3428 \text{ Hz}$, $k = 2$



A.5 EMISSION BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 24.238, 27.53.

A.5.1 Measurement Procedure

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.

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
- c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.
- d) Set the detection mode to peak, and the trace mode to max hold.
- e) Use the 26dB bandwidth function of the spectrum analyzer and report the measured bandwidth.

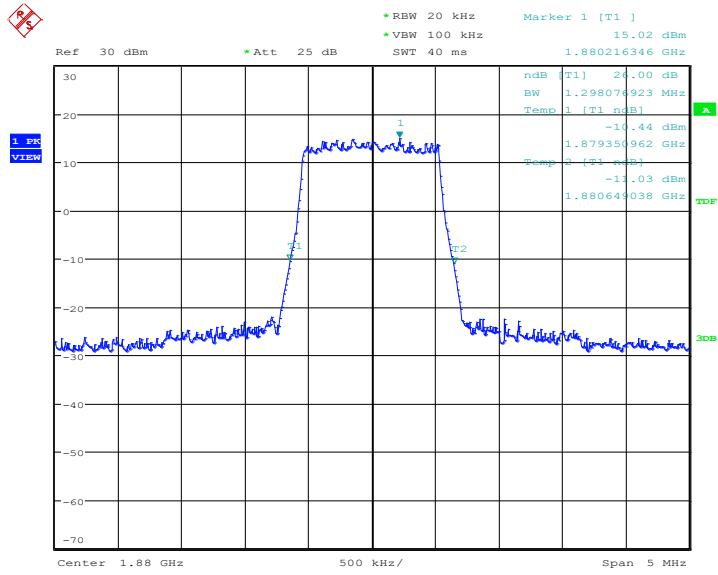
A.5.2 Emission Bandwidth Results

Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

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

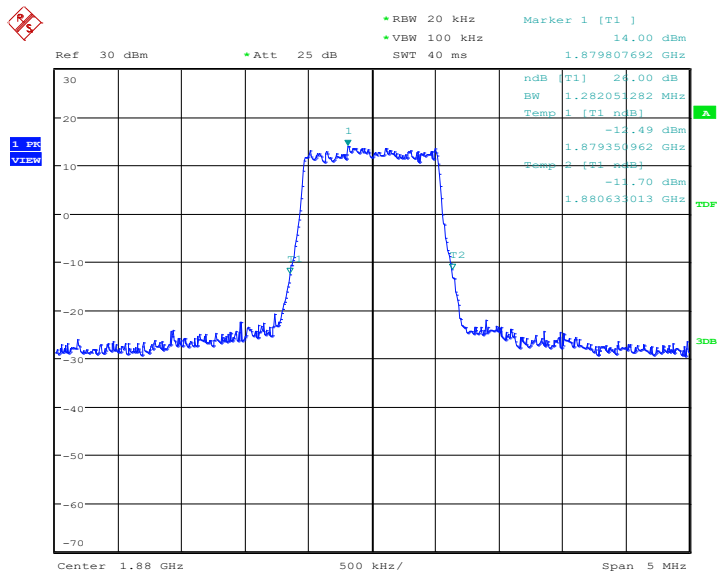
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
1880.0	QPSK	16QAM
	1298.08	1282.05

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



Date: 29.NOV.2021 09:29:22

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

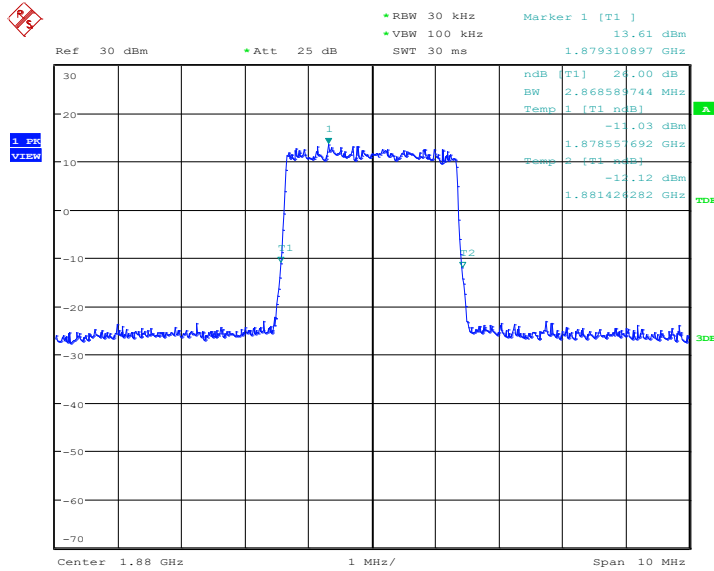


Date: 29.NOV.2021 09:29:39

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

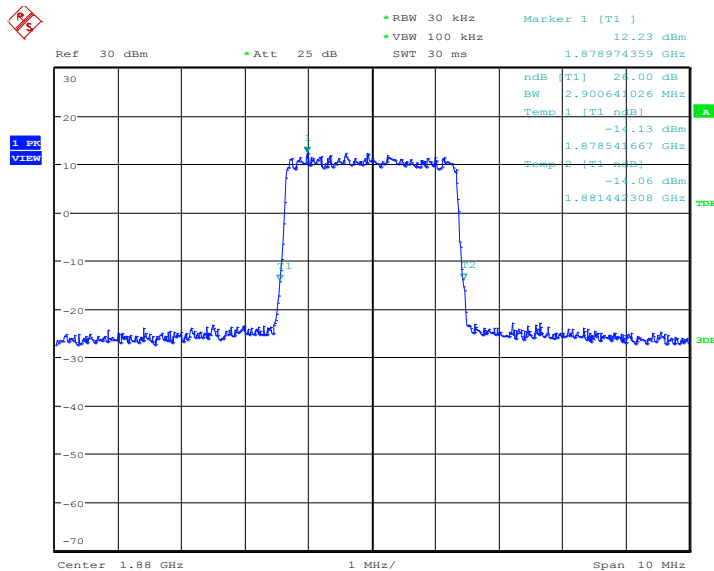
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	1880.0	QPSK
2868.59		2900.64

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



Date: 29.NOV.2021 09:32:36

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



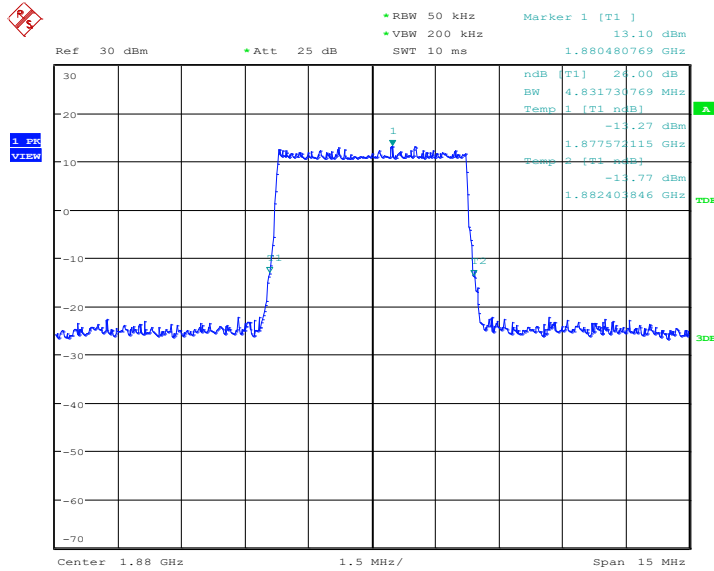
Date: 29.NOV.2021 09:32:53



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

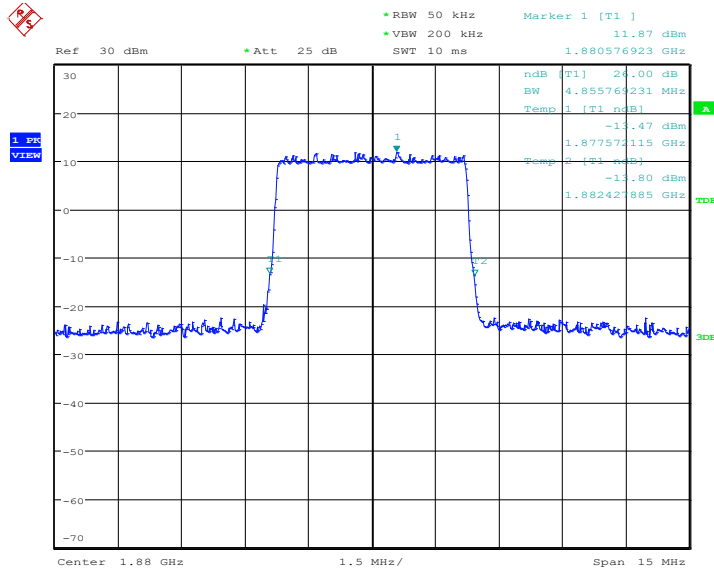
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	1880.0	QPSK
4831.73		4855.77

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



Date: 29.NOV.2021 09:35:51

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



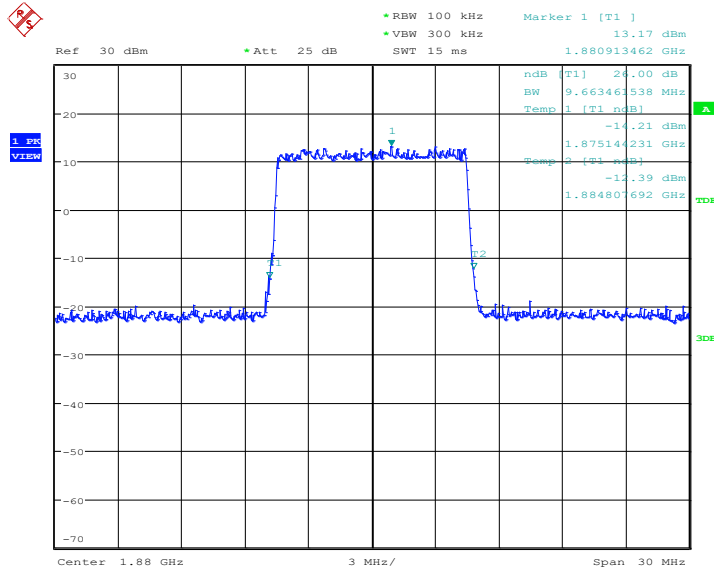
Date: 29.NOV.2021 09:36:08



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

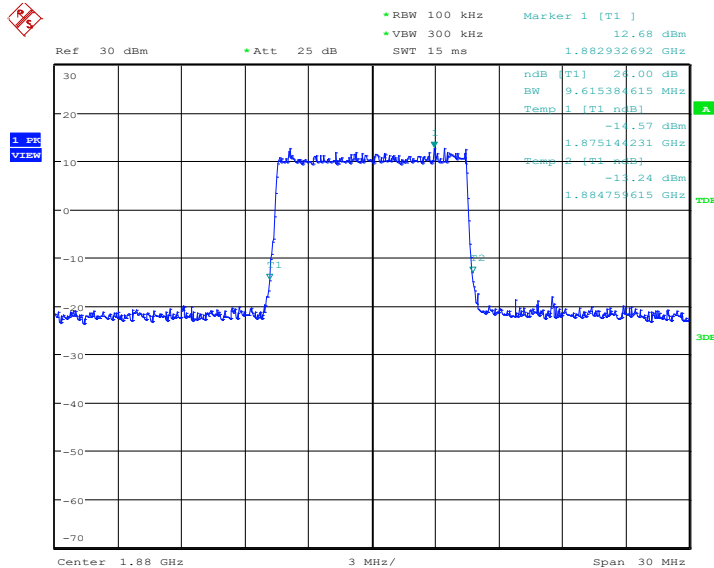
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
1880.0	QPSK	16QAM
	9663.46	9615.38

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



Date: 29.NOV.2021 09:39:05

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



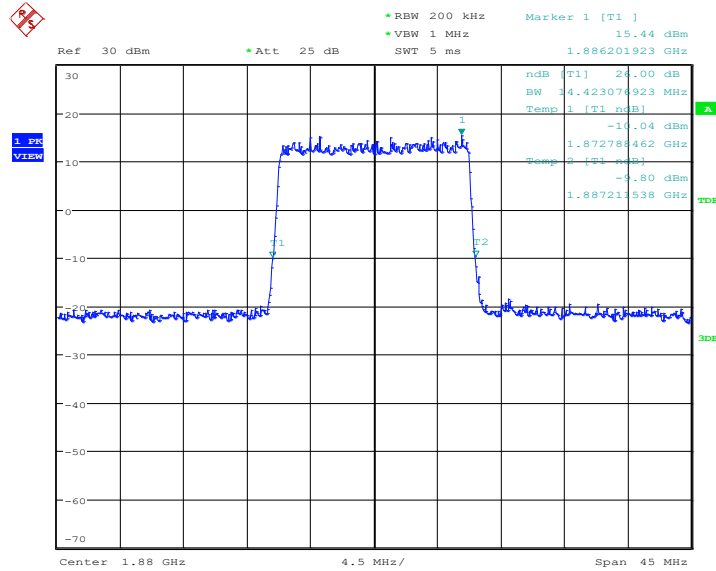
Date: 29.NOV.2021 09:39:22



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

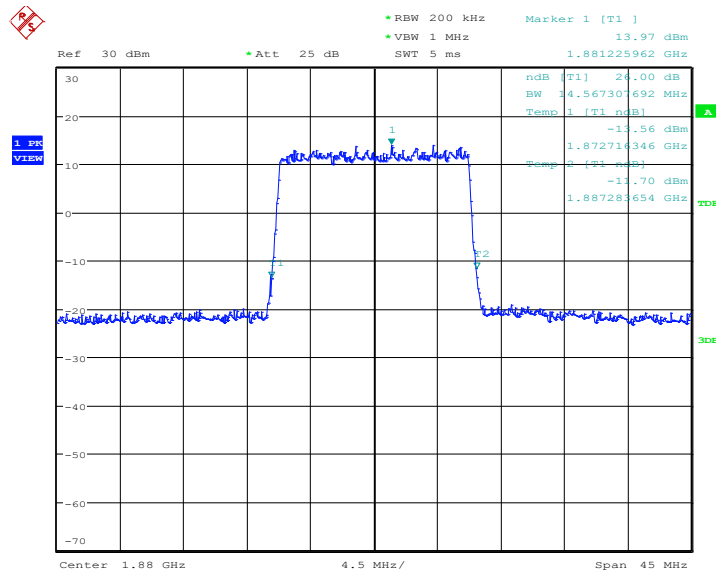
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	1880.0	QPSK
	14423.08	14567.31

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



Date: 29.NOV.2021 09:42:20

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



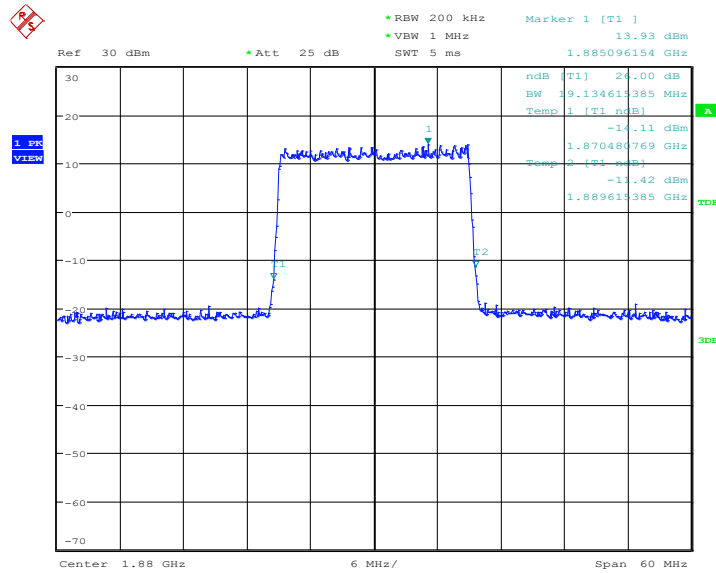
Date: 29.NOV.2021 09:42:37



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

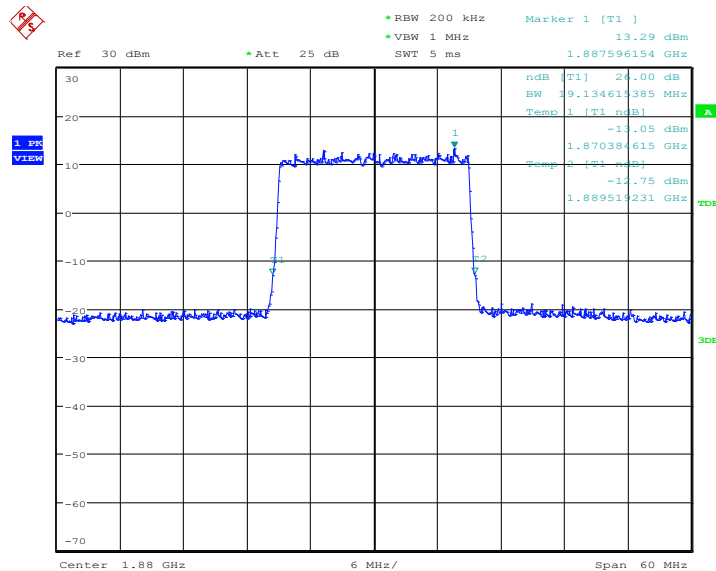
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	1880.0	QPSK
19134.62		19134.62

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



Date: 29.NOV.2021 09:45:35

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



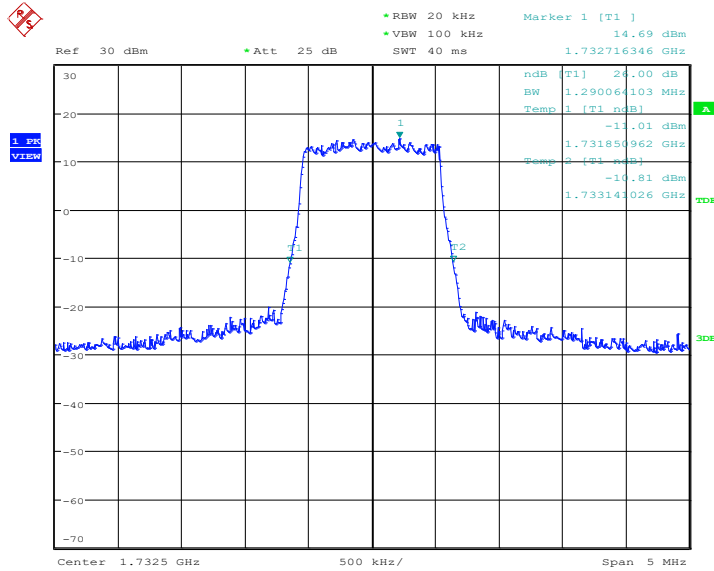
Date: 29.NOV.2021 09:45:52



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

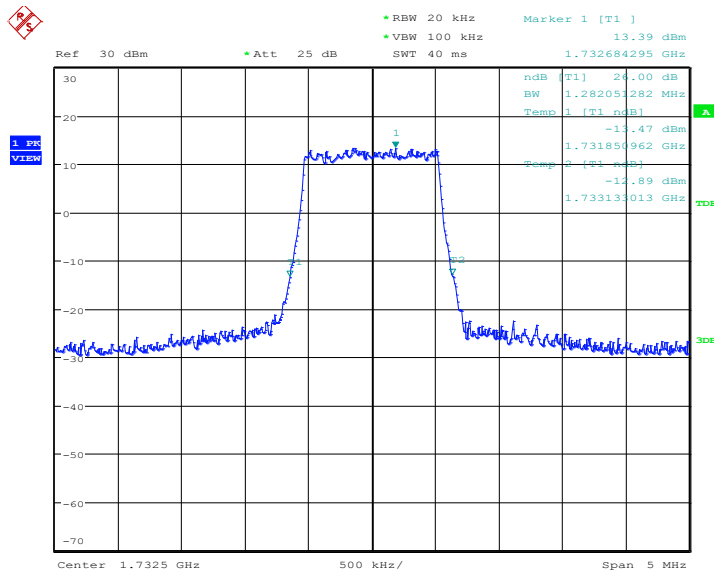
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
1732.5	QPSK	16QAM
	1290.06	1282.05

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



Date: 29.NOV.2021 09:49:21

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



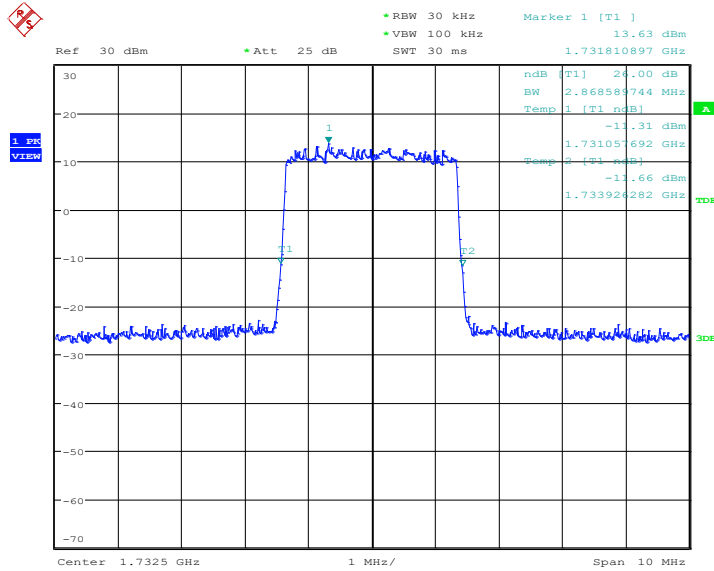
Date: 29.NOV.2021 09:49:38



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

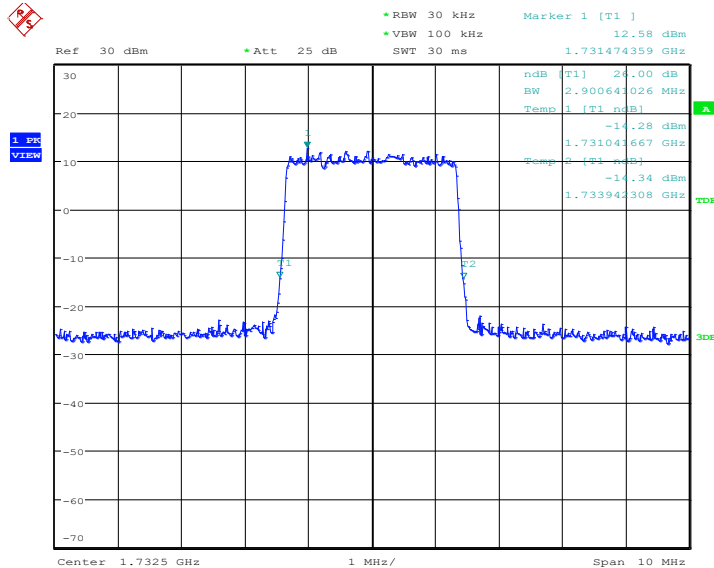
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	1732.5	QPSK
	2868.59	2900.64

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



Date: 29.NOV.2021 09:52:35

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



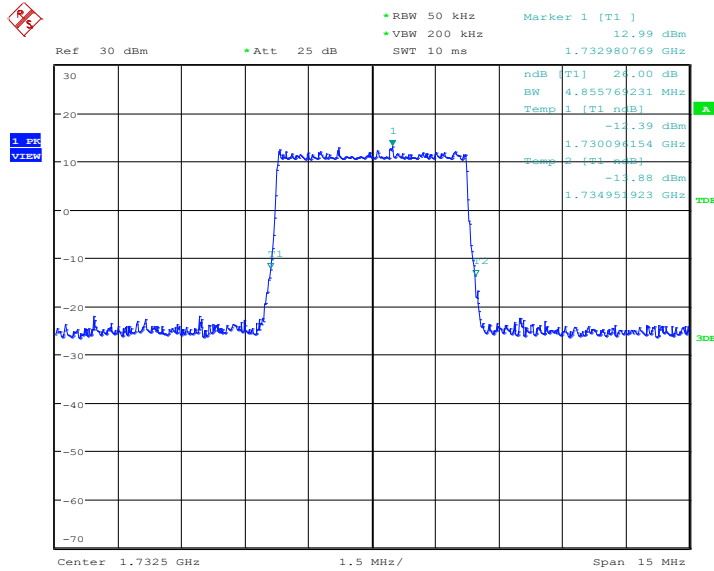
Date: 29.NOV.2021 09:52:53



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

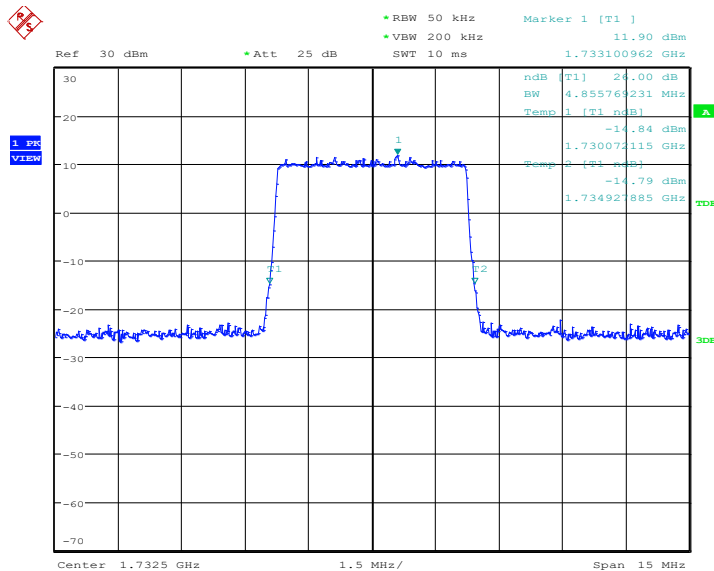
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	1732.5	QPSK
4855.77		4855.77

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



Date: 29.NOV.2021 09:55:50

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



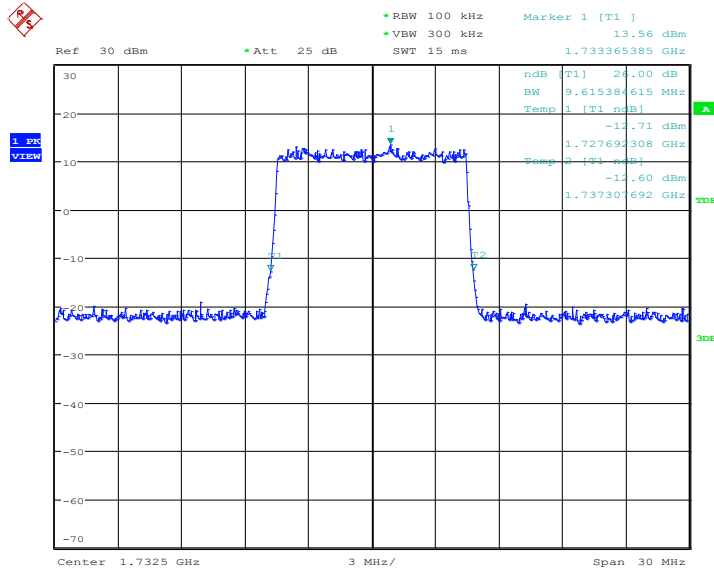
Date: 29.NOV.2021 09:56:07



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

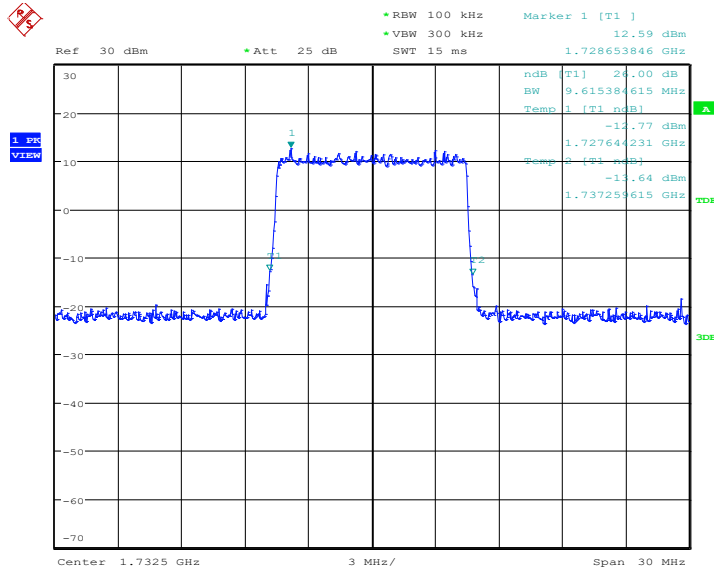
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
1732.5	QPSK	16QAM
	9615.38	9615.38

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



Date: 29.NOV.2021 09:59:05

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

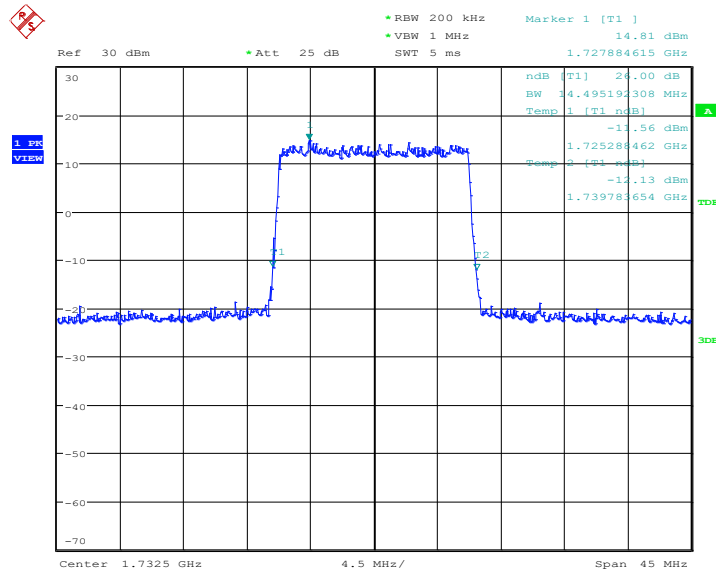


Date: 29.NOV.2021 09:59:22

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

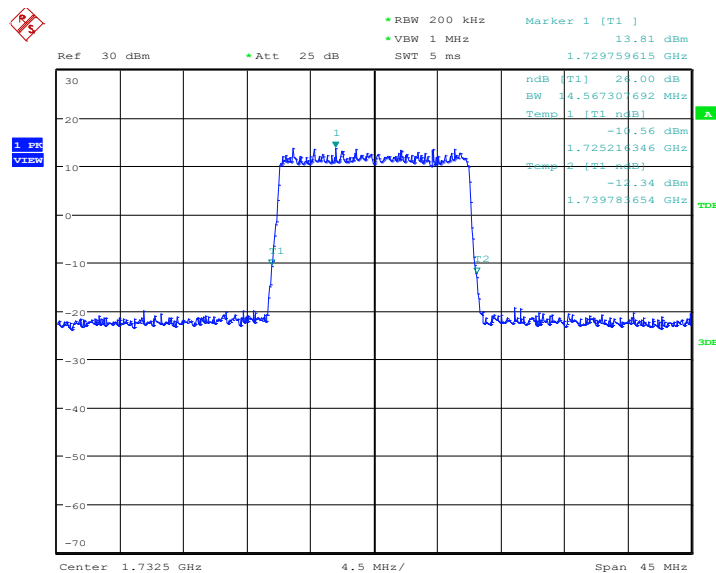
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
1732.5	QPSK	16QAM
	14495.19	14567.31

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



Date: 29.NOV.2021 10:02:19

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



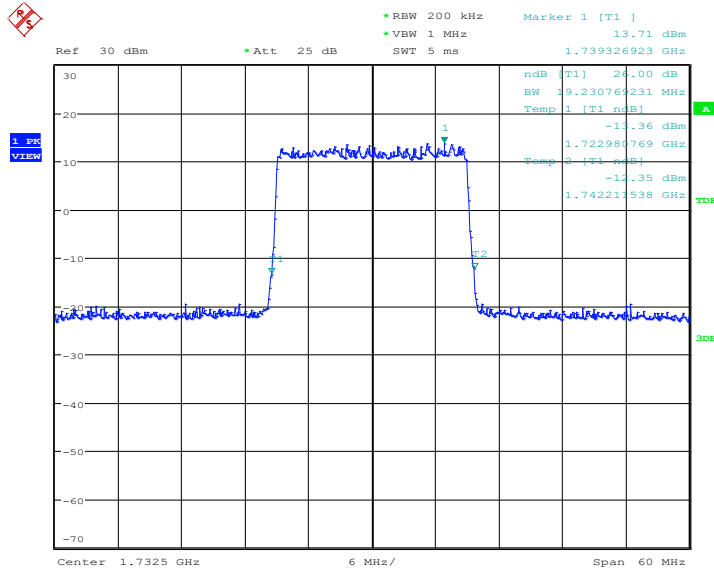
Date: 29.NOV.2021 10:02:36



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

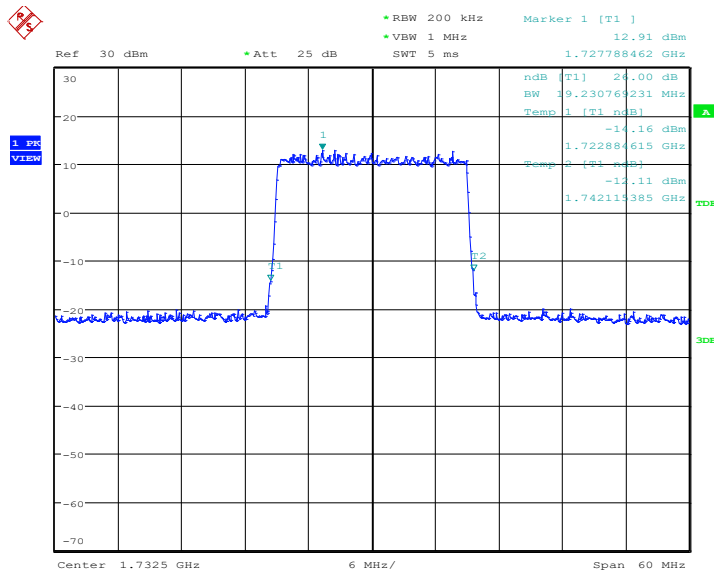
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	1732.5	QPSK
	19230.77	19230.77

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



Date: 29.NOV.2021 10:05:34

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

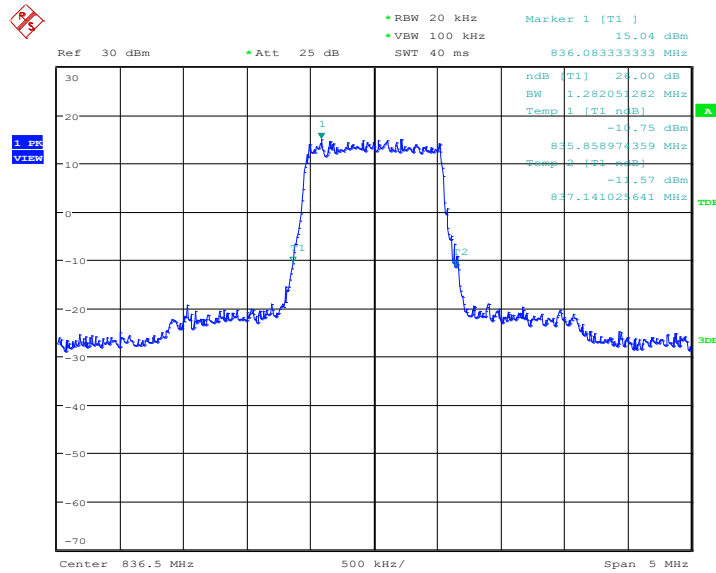


Date: 29.NOV.2021 10:05:51

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

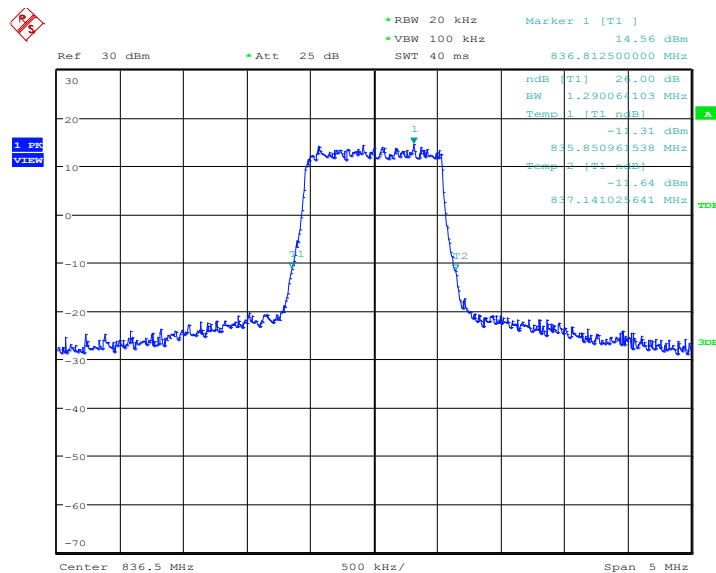
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	836.5	QPSK
1282.05		1290.06

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



Date: 23.NOV.2021 16:28:16

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



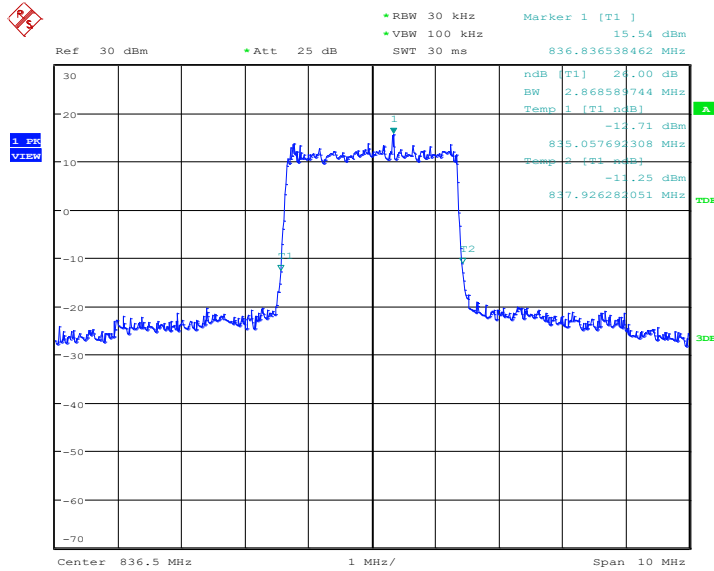
Date: 23.NOV.2021 14:10:32



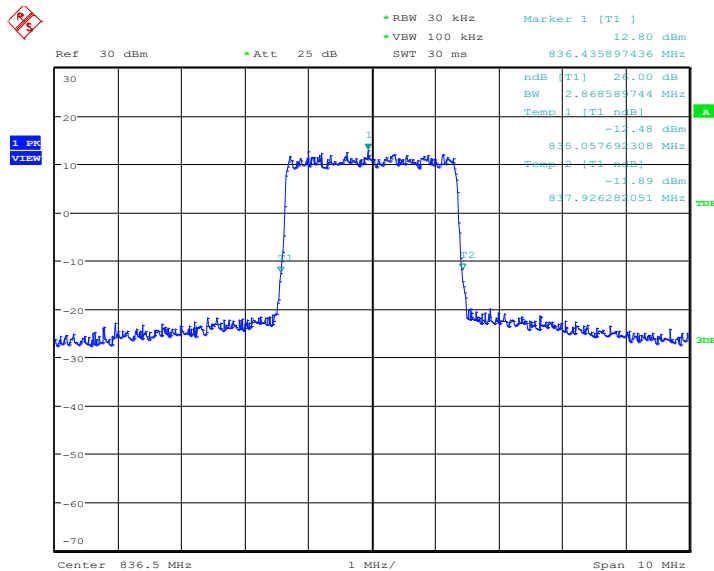
LTE band 5, 3MHz (-26dBc BW)

Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	836.5	QPSK
2868.59		2868.59

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



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

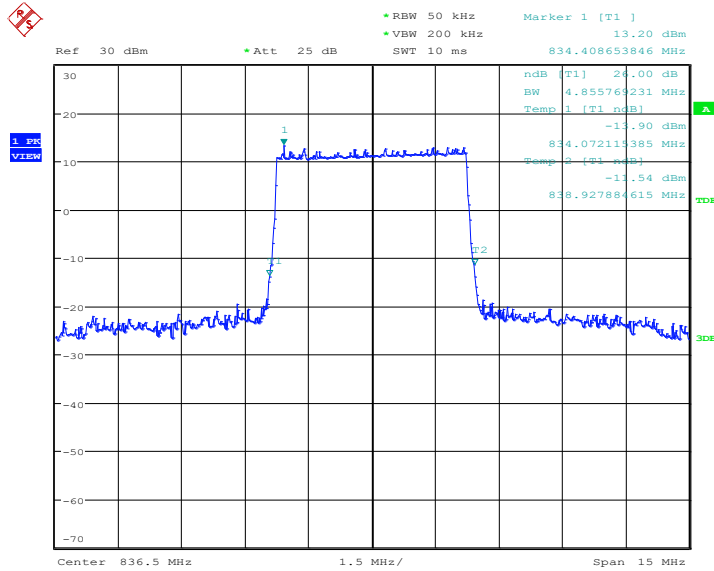




LTE band 5, 5MHz (-26dBc BW)

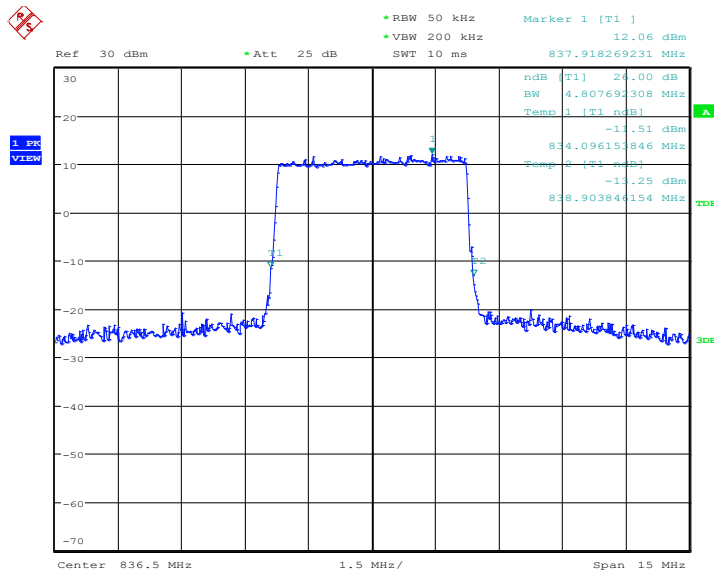
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	836.5	QPSK
4855.77		4807.69

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



Date: 23.NOV.2021 16:35:26

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



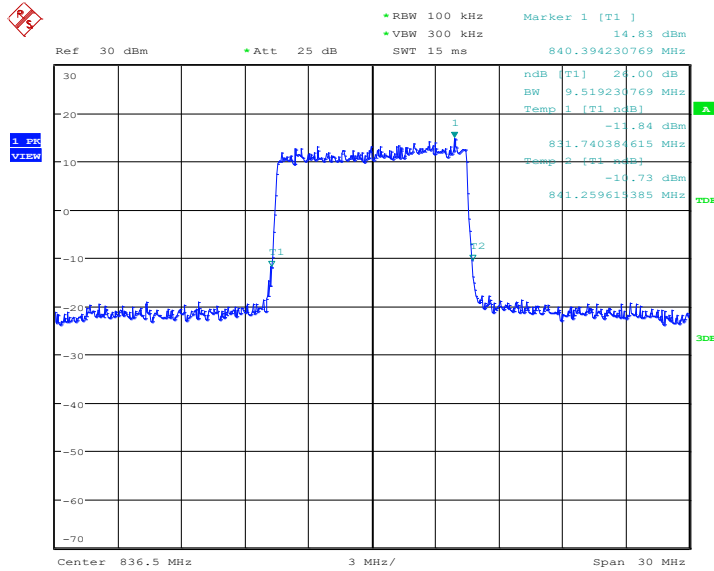
Date: 23.NOV.2021 14:19:33



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

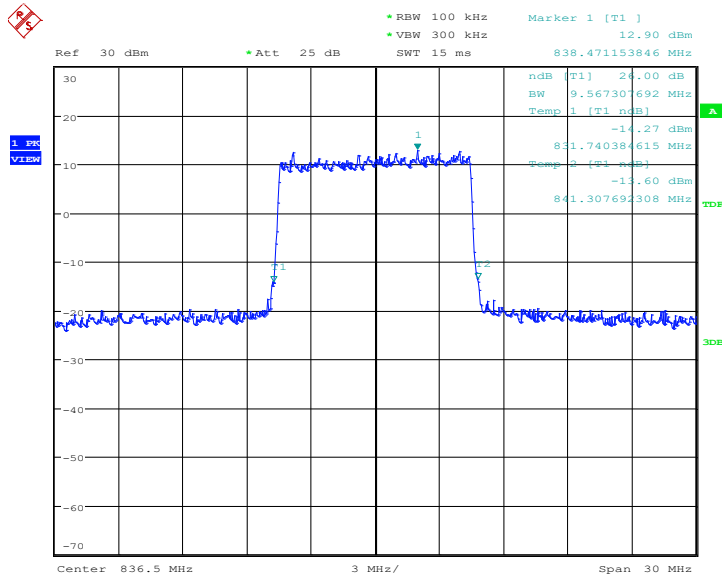
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	836.5	QPSK
9519.23		9567.31

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



Date: 23.NOV.2021 17:07:06

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



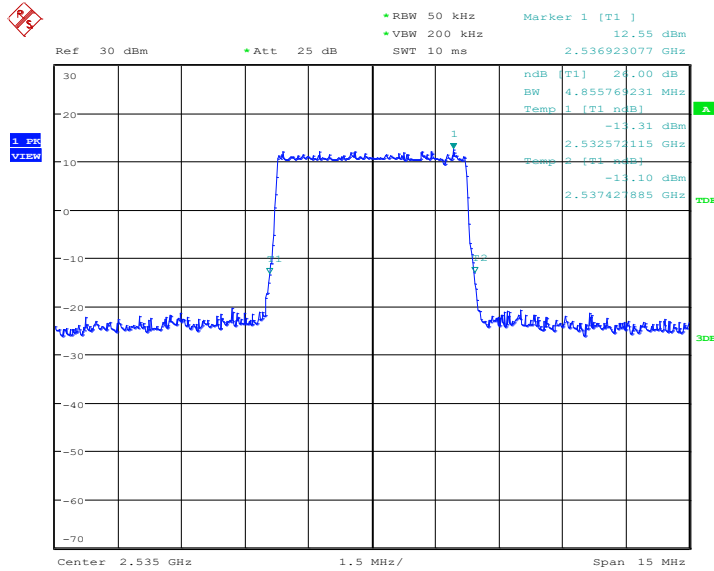
Date: 15.JAN.2022 07:31:31



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

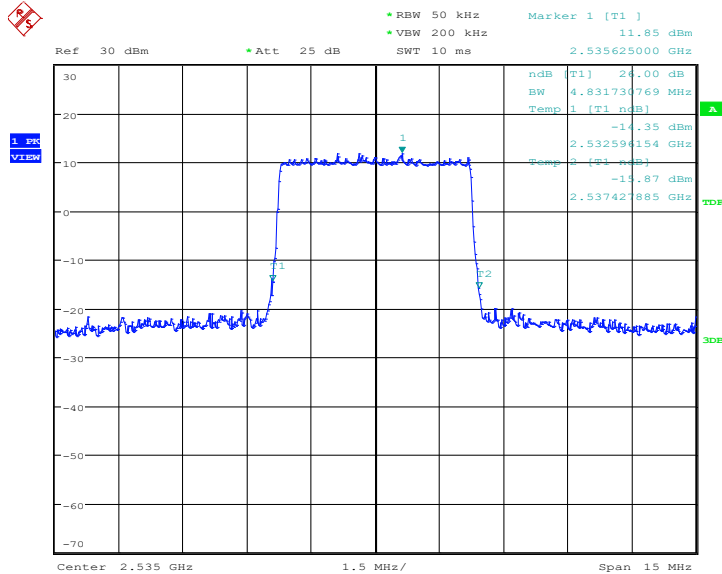
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	2535.0	QPSK
4855.77		4831.73

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



Date: 23.NOV.2021 15:59:24

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



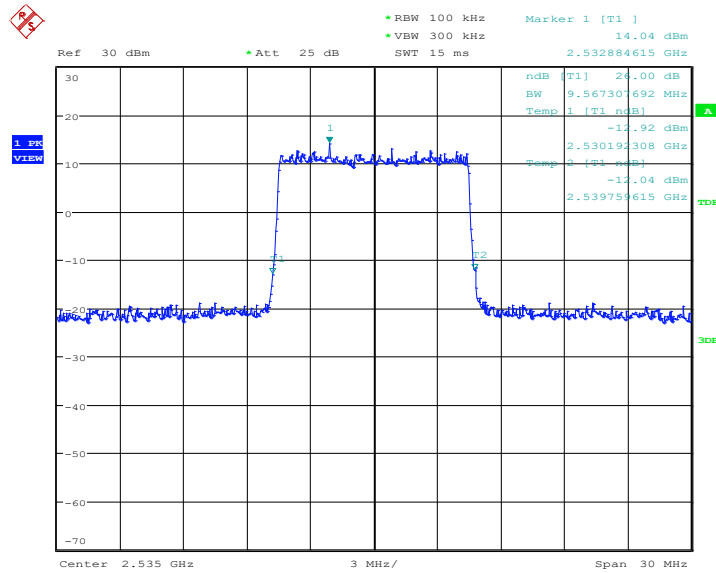
Date: 15.JAN.2022 06:51:32



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

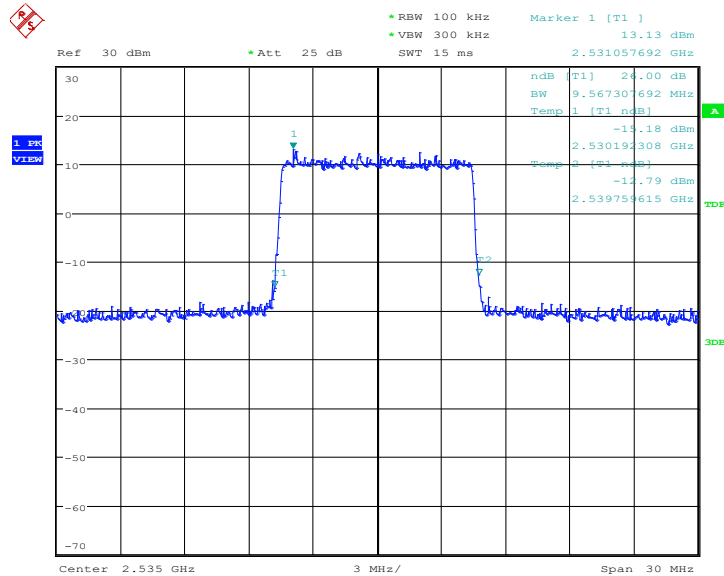
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	2535.0	QPSK
	9567.31	9567.31

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



Date: 23.NOV.2021 16:02:58

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



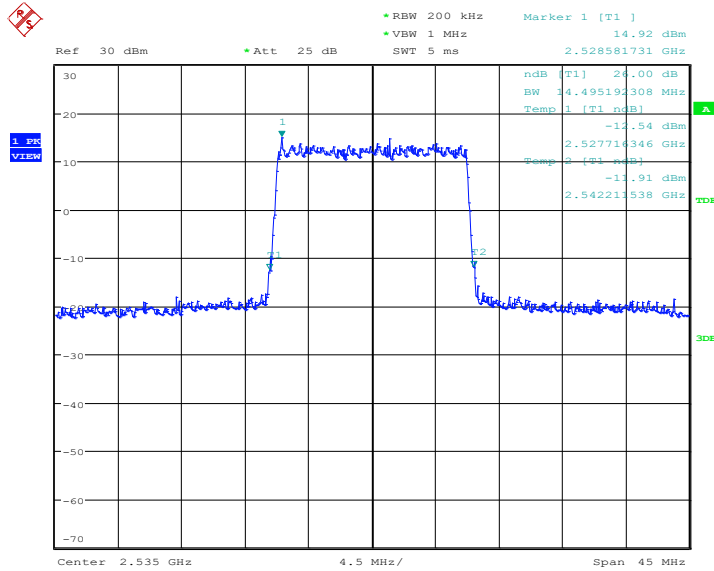
Date: 15.JAN.2022 06:58:26



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

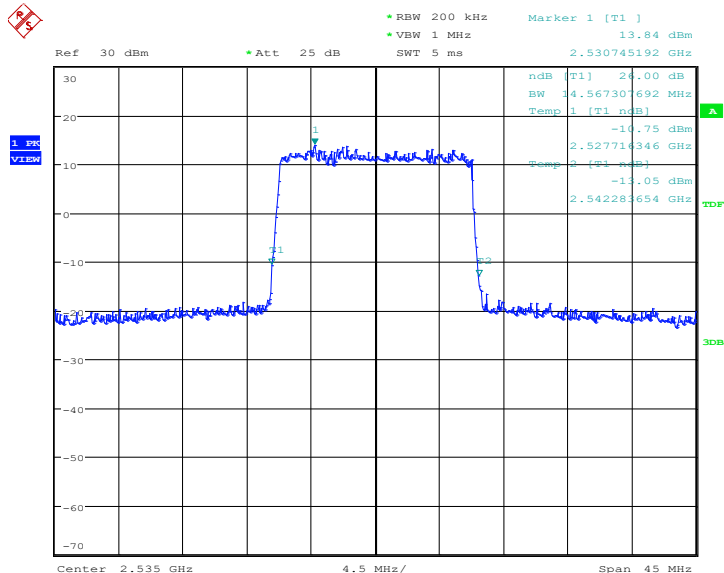
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
2535.0	QPSK	16QAM
	14495.19	14567.31

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



Date: 23.NOV.2021 16:06:34

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



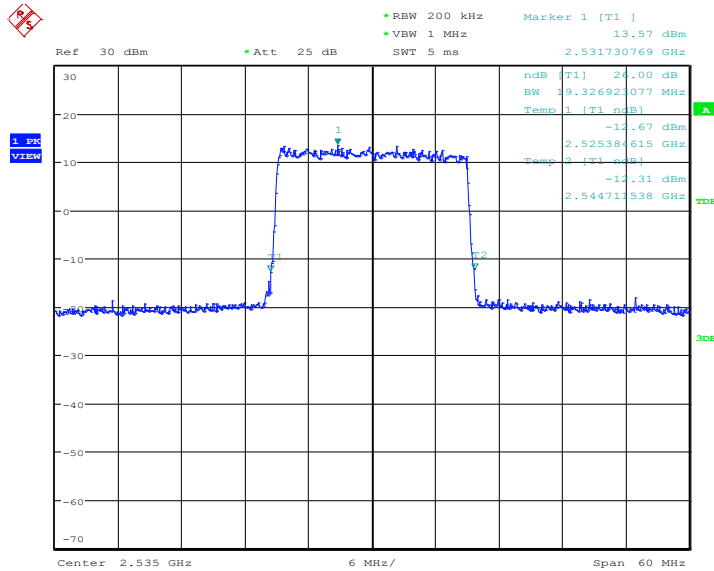
Date: 15.JAN.2022 07:05:37



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

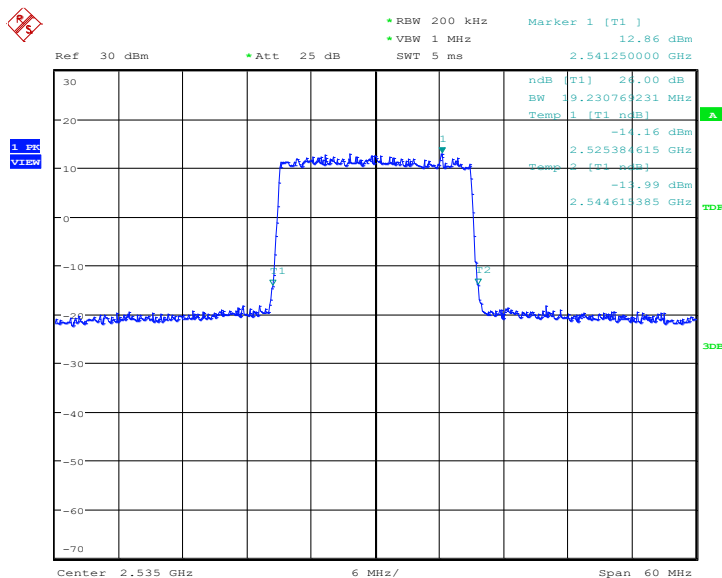
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
2535.0	QPSK	16QAM
	19326.92	19230.77

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



Date: 23.NOV.2021 16:10:08

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



Date: 15.JAN.2022 07:12:49

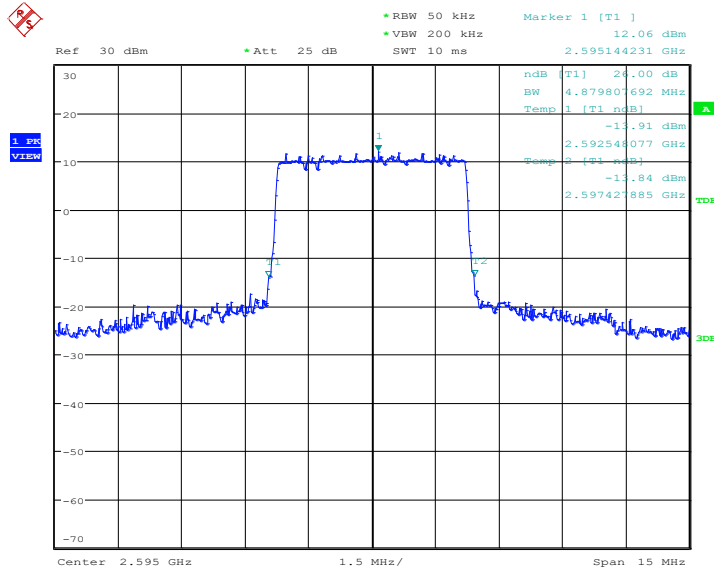
Note: Expanded measurement uncertainty is $U = 3428\text{Hz}$, $k = 2$



LTE band 38, 5MHz (-26dBc BW)

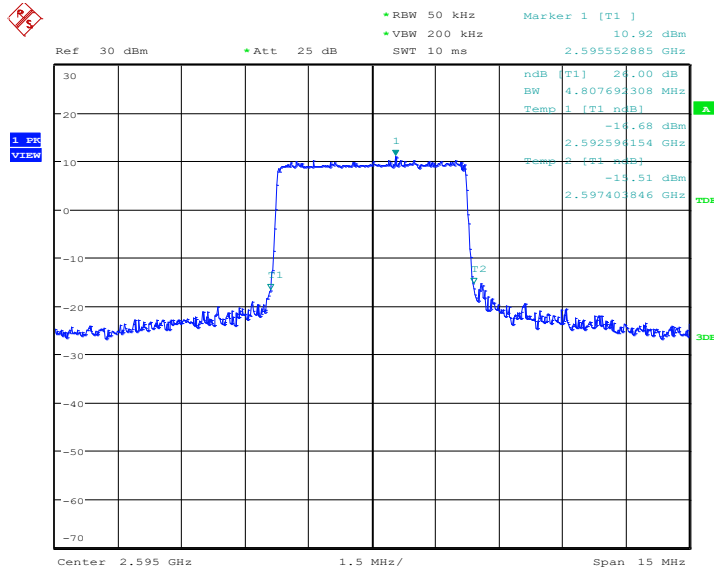
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	2595.0	QPSK
4879.81		4807.69

LTE band 38, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 29.NOV.2021 09:16:14

LTE band 38, 5MHz Bandwidth,16QAM (-26dBc BW)



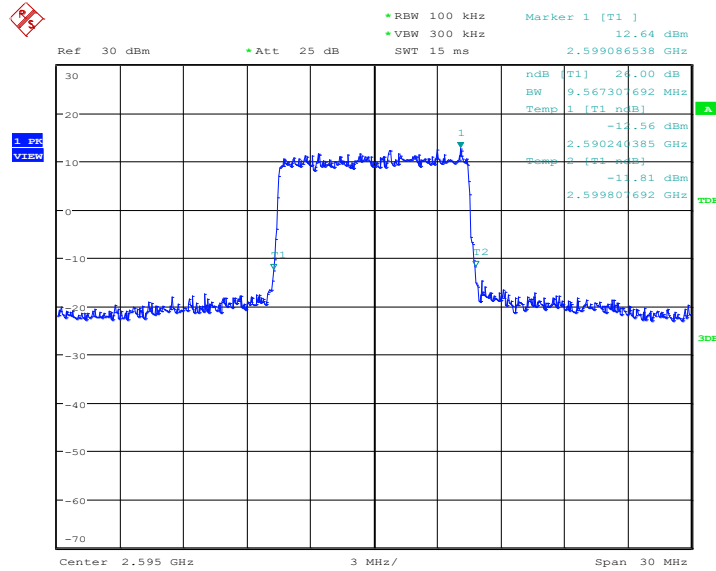
Date: 29.NOV.2021 09:16:31



LTE band 38, 10MHz (-26dBc BW)

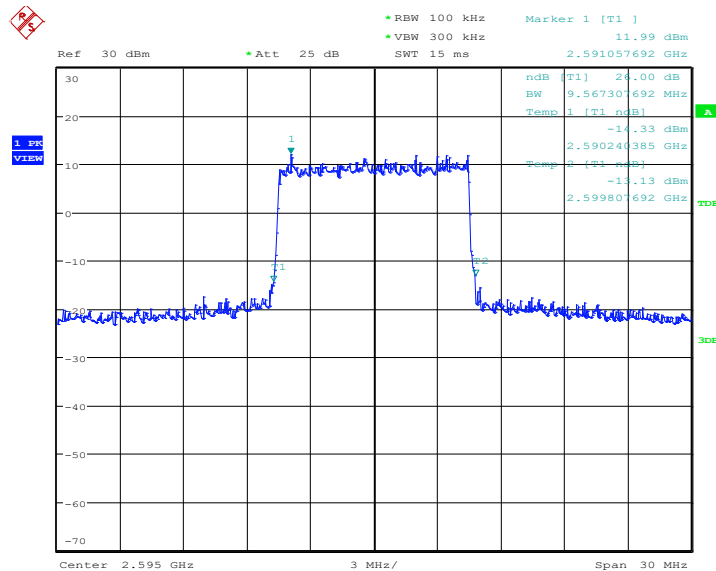
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
2595.0	QPSK	16QAM
	9567.31	9567.31

LTE band 38, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 29.NOV.2021 09:19:30

LTE band 38, 10MHz Bandwidth, 16QAM (-26dBc BW)



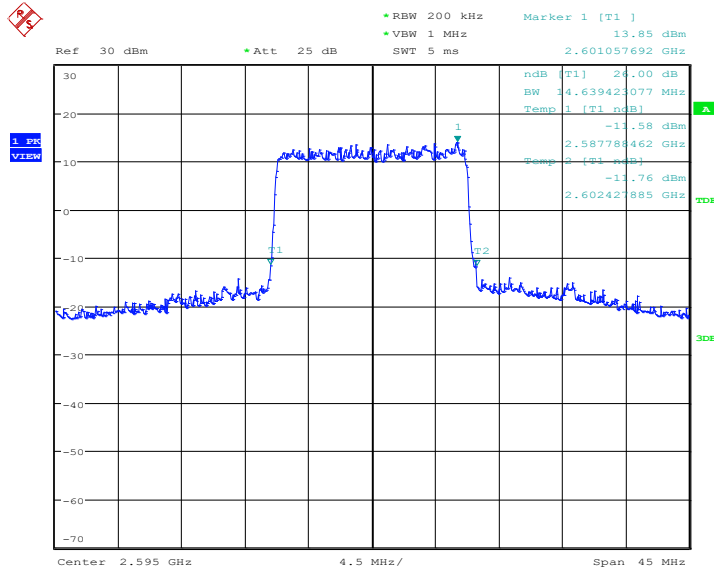
Date: 29.NOV.2021 09:19:47



LTE band 38, 15MHz (-26dBc BW)

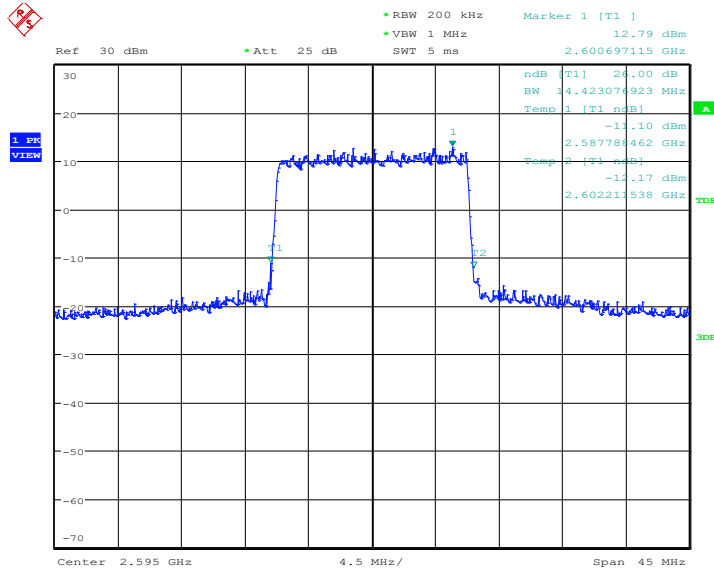
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	2595.0	QPSK
	14639.42	14423.08

LTE band 38, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 29.NOV.2021 09:22:47

LTE band 38, 15MHz Bandwidth, 16QAM (-26dBc BW)



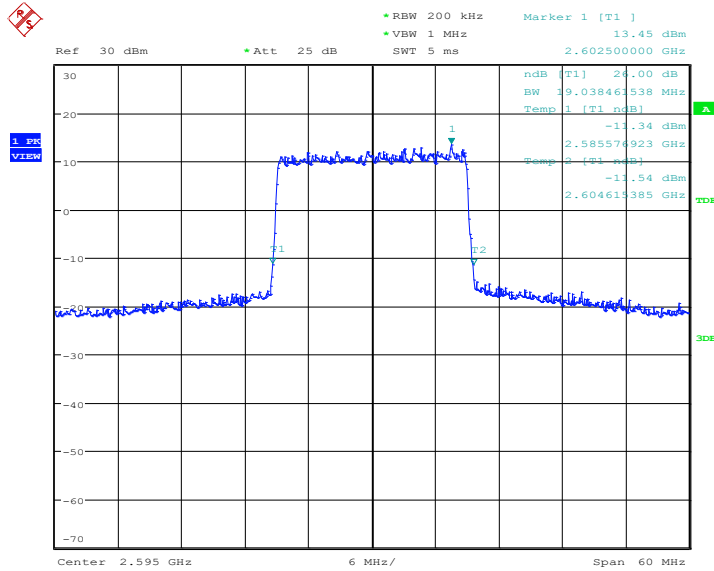
Date: 29.NOV.2021 09:23:04



LTE band 38, 20MHz (-26dBc BW)

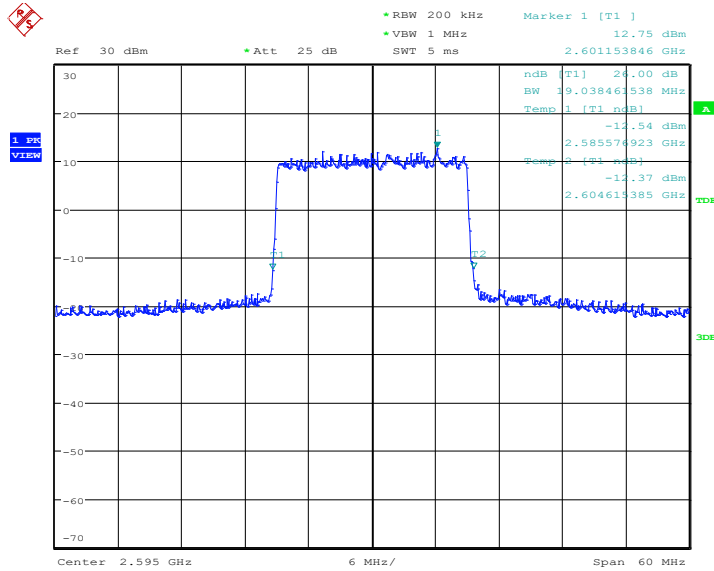
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	2595.0	QPSK
	19038.46	19038.46

LTE band 38, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 29.NOV.2021 09:26:04

LTE band 38, 20MHz Bandwidth, 16QAM (-26dBc BW)



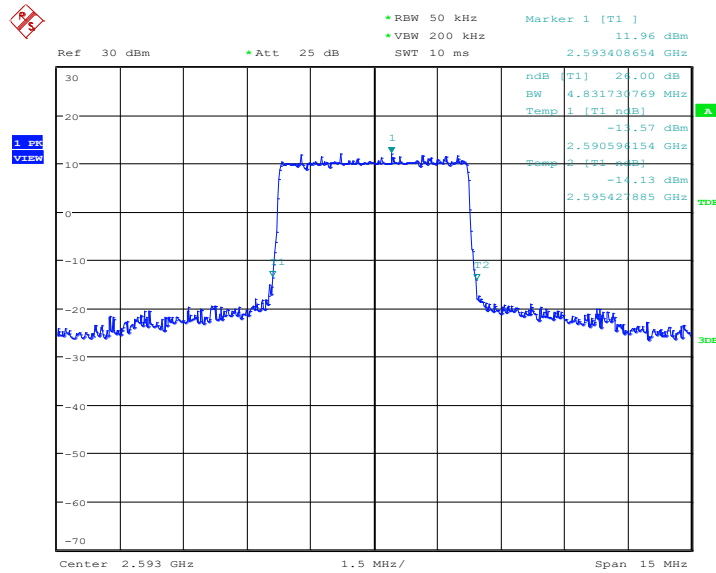
Date: 29.NOV.2021 09:26:21



LTE band 41, 5MHz (-26dBc BW)

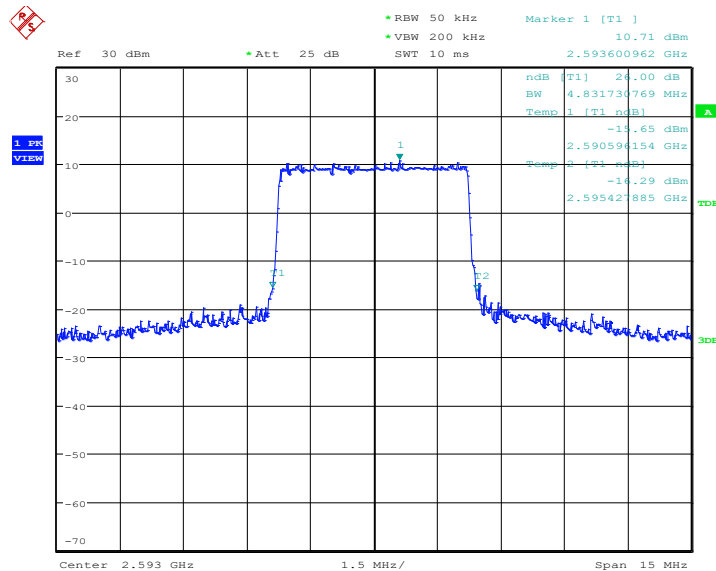
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	2593.0	QPSK
4831.73		4831.73

LTE band 41, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 29.NOV.2021 10:09:11

LTE band 41, 5MHz Bandwidth,16QAM (-26dBc BW)



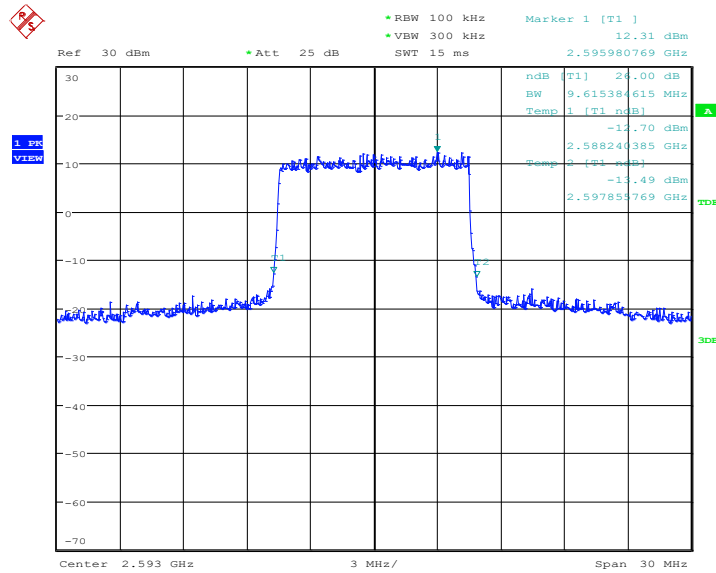
Date: 29.NOV.2021 10:09:28



LTE band 41, 10MHz (-26dBc BW)

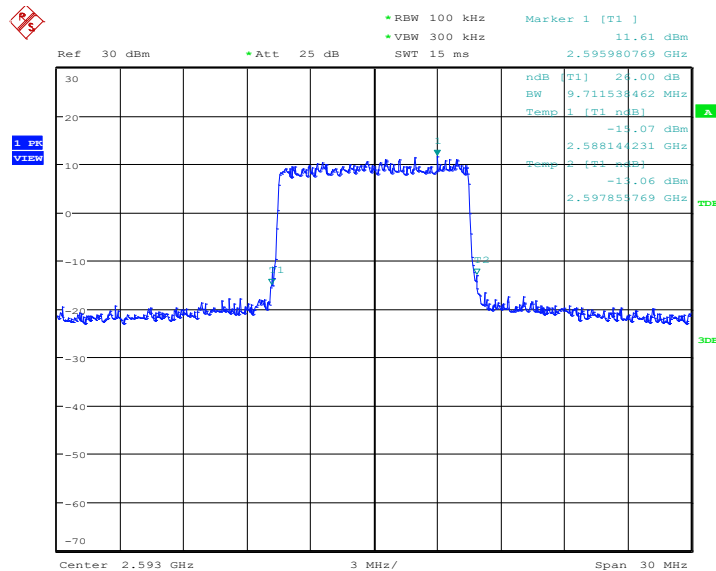
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
2593.0	QPSK	16QAM
	9615.38	9711.54

LTE band 41, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 29.NOV.2021 10:12:27

LTE band 41, 10MHz Bandwidth, 16QAM (-26dBc BW)



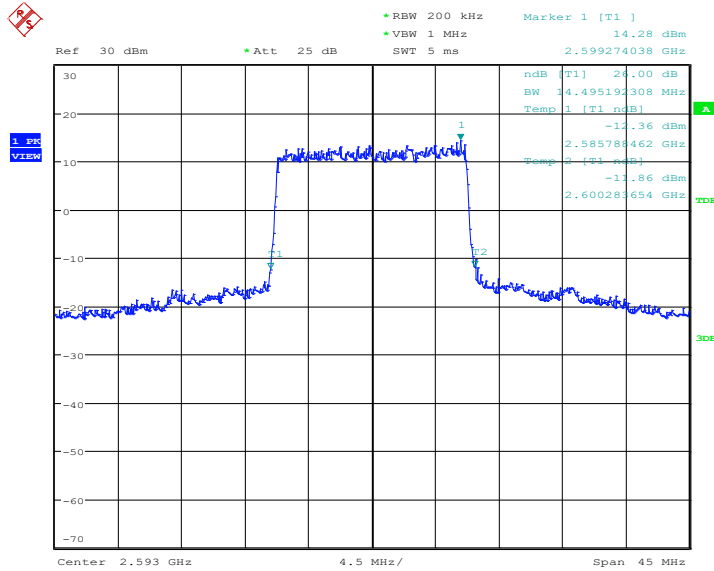
Date: 29.NOV.2021 10:12:44



LTE band 41, 15MHz (-26dBc BW)

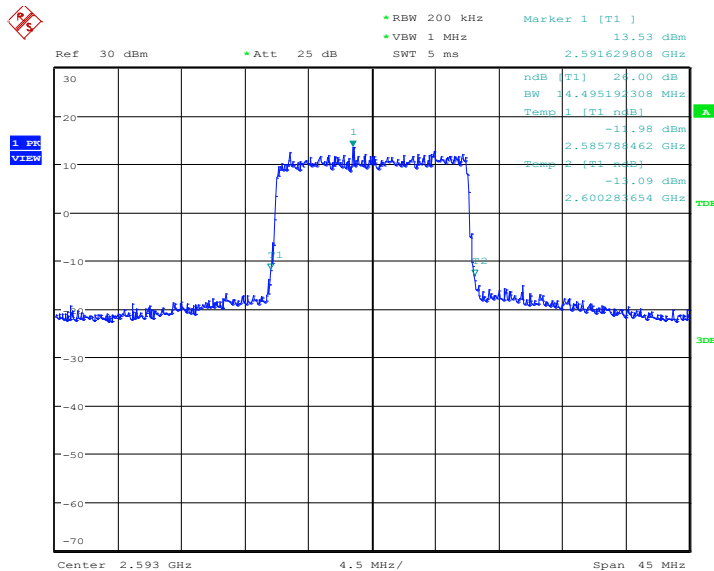
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	2593.0	QPSK
	14495.19	14495.19

LTE band 41, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 29.NOV.2021 10:15:44

LTE band 41, 15MHz Bandwidth, 16QAM (-26dBc BW)

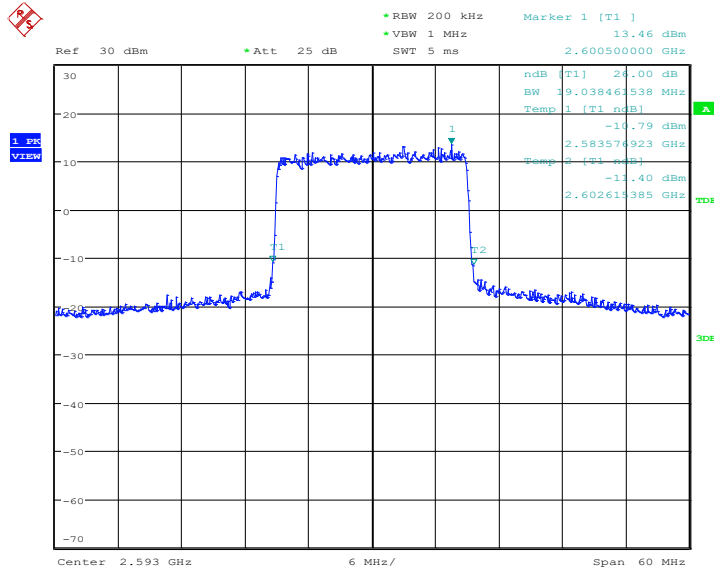


Date: 29.NOV.2021 10:16:01

LTE band 41, 20MHz (-26dBc BW)

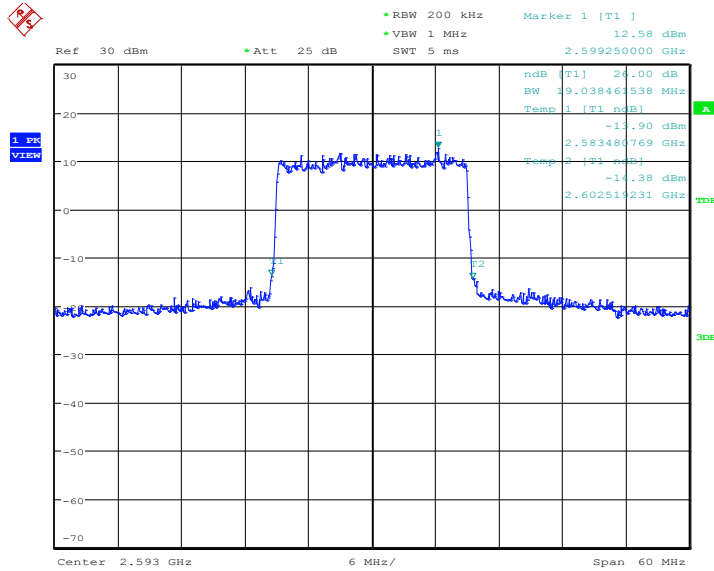
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)	
	2593.0	QPSK
	19038.46	19038.46

LTE band 41, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 29.NOV.2021 10:19:00

LTE band 41, 20MHz Bandwidth, 16QAM (-26dBc BW)



Date: 29.NOV.2021 10:19:17

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



A.6 BAND EDGE COMPLIANCE

Reference

FCC: CFR Part 2.1051, 22.917, 24.238, 27.53.

A.6.1 Measurement limit

Part 22.917 For operations in the 824–849MHz band, the FCC limit is $43 + 10 \log(P)$ dB below the transmitter power(P) in a 100kHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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(m) specifies for mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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.

A.6.2 Measurement Procedure

The testing follows ANSI C63.26

- a) The EUT was connected to spectrum analyzer and system simulator via a power divider.
- b) The band edges of low and high channels for the highest RF powers were measured.
- c) Set RBW \geq 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
- d) Set spectrum analyzer with RMS detector.
- e) The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- f) Checked that all the results comply with the emission limit line.

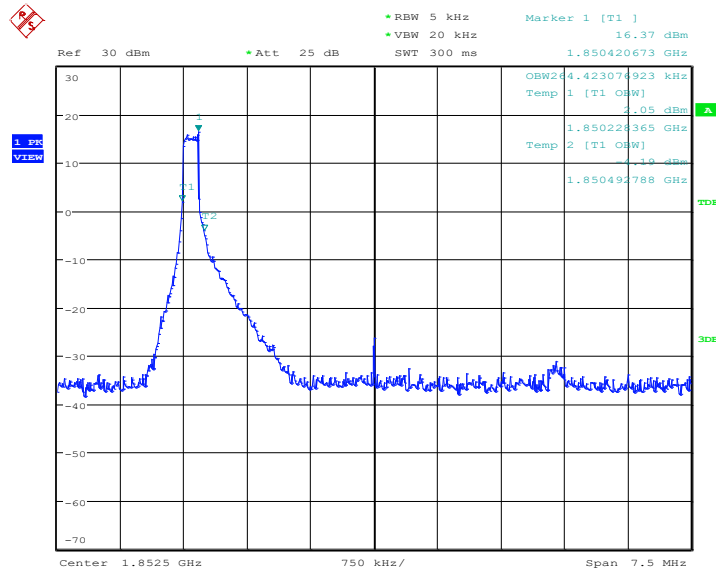
A.6.3 Measurement result

Only worst case result is given below

LTE band 2

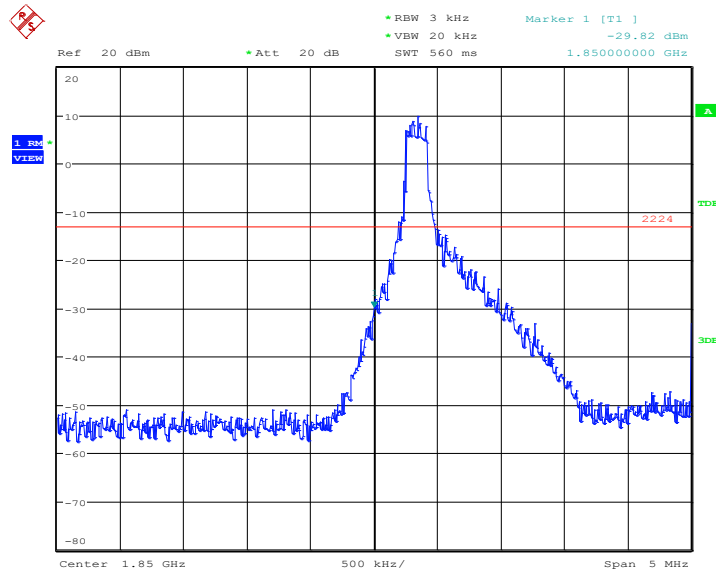


OBW: 1RB-low_offset



Date: 29.NOV.2021 15:13:04

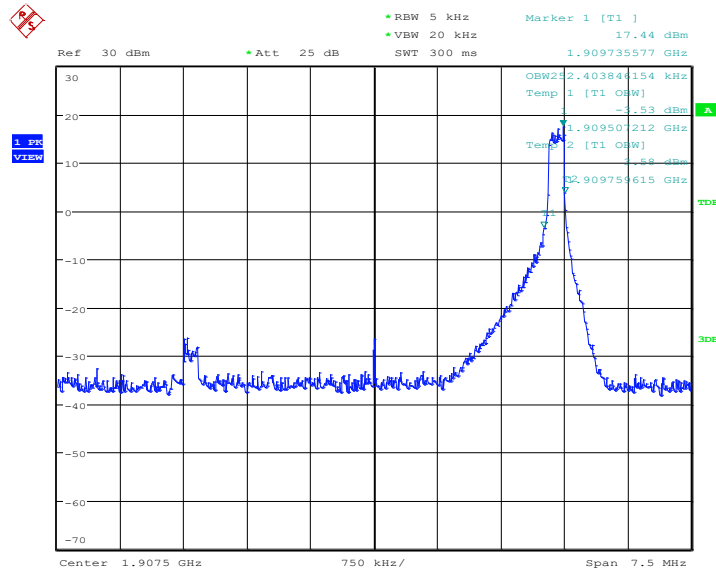
LOW BAND EDGE BLOCK-1RB-low_offset



Date: 29.NOV.2021 15:14:02

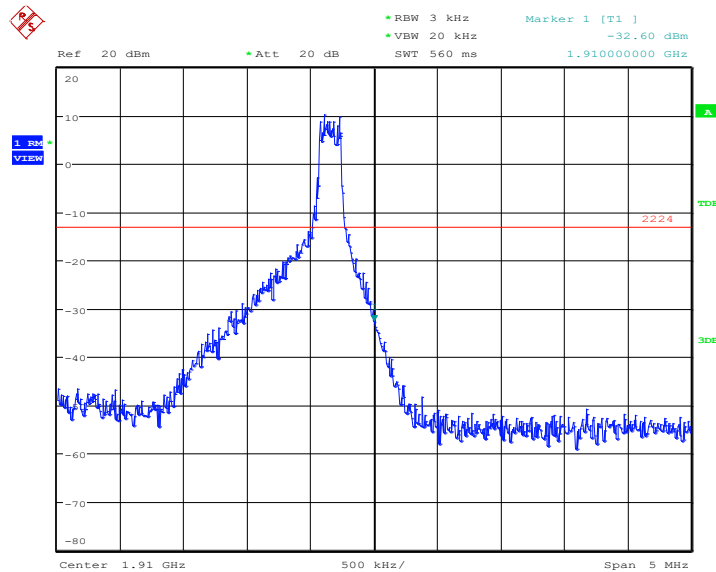


OBW: 1RB-high_offset



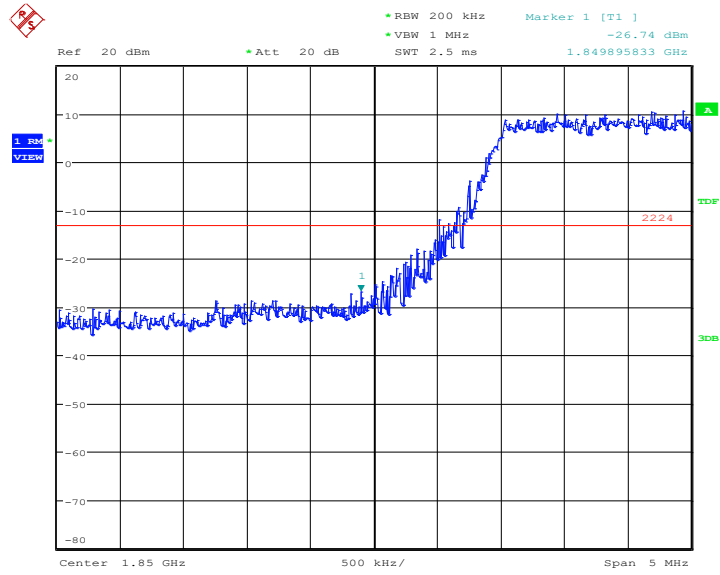
Date: 29.NOV.2021 13:58:07

HIGH BAND EDGE BLOCK-1RB-high_offset



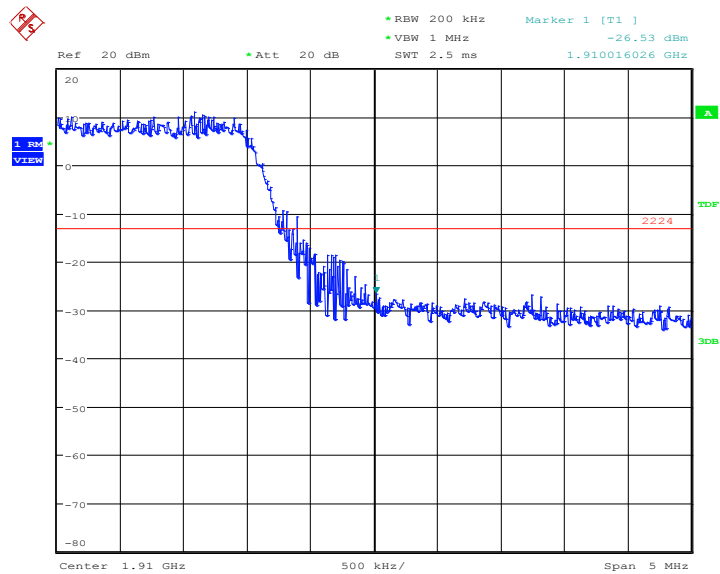
Date: 29.NOV.2021 13:59:08

LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 29.NOV.2021 12:56:41

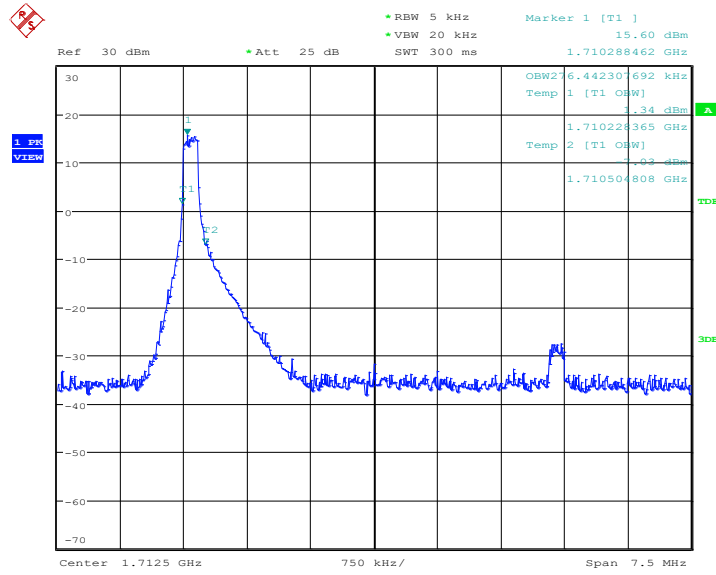
HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 29.NOV.2021 12:57:36

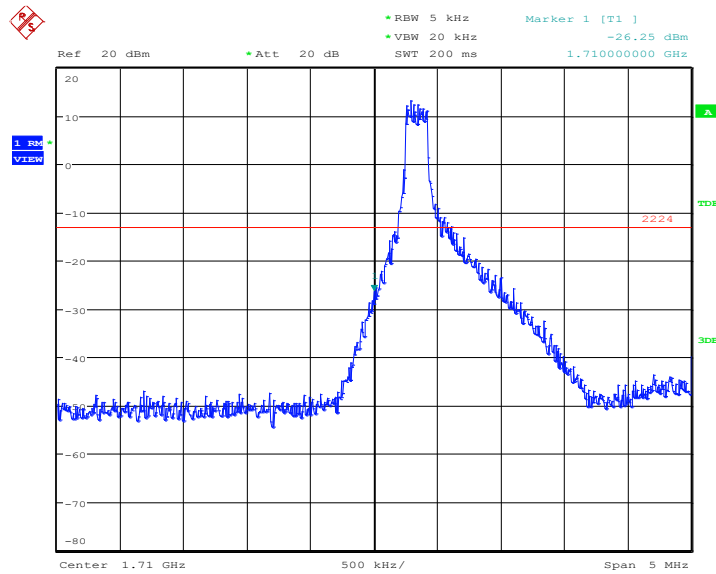


LTE band 4
OBW: 1RB-low_offset



Date: 29.NOV.2021 15:25:20

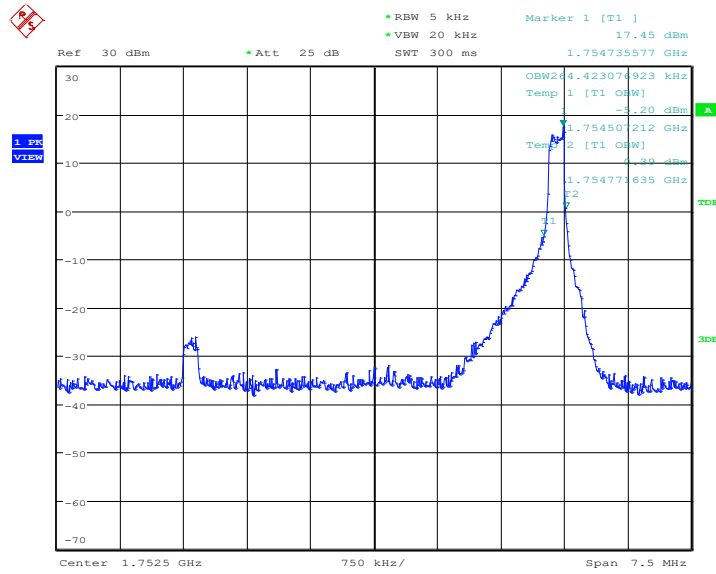
LOW BAND EDGE BLOCK-1RB-low_offset



Date: 29.NOV.2021 15:26:18

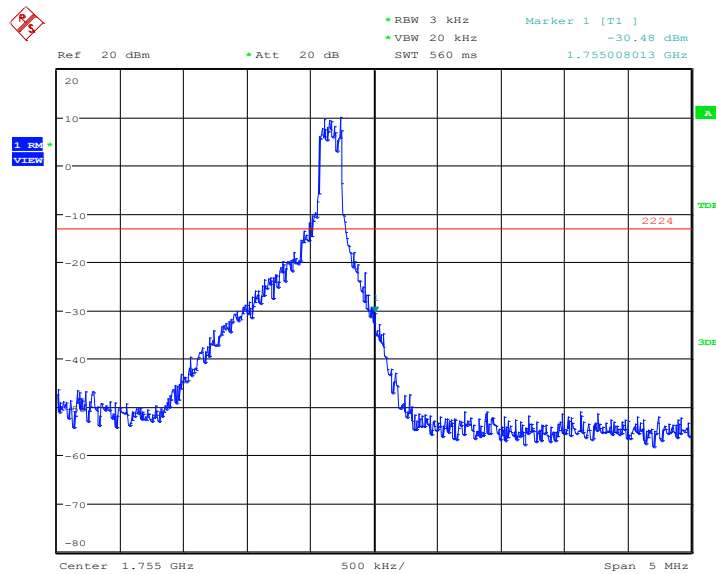


OBW: 1RB-high_offset



Date: 29.NOV.2021 14:10:56

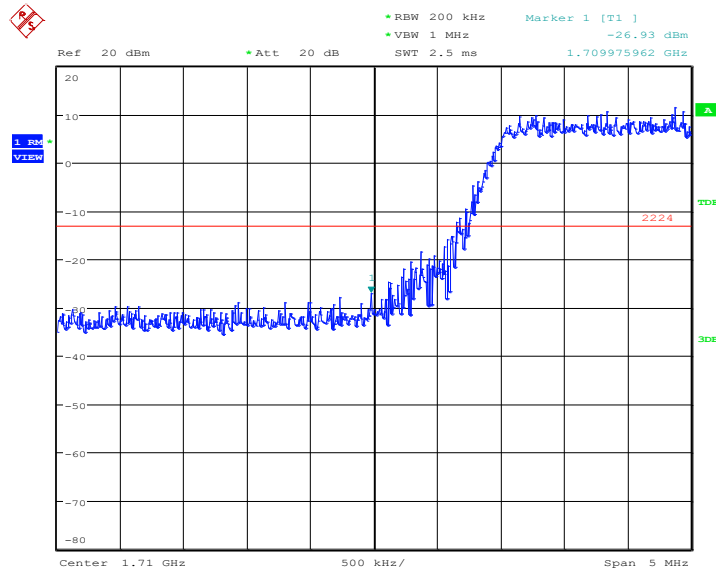
HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 29.NOV.2021 14:11:57

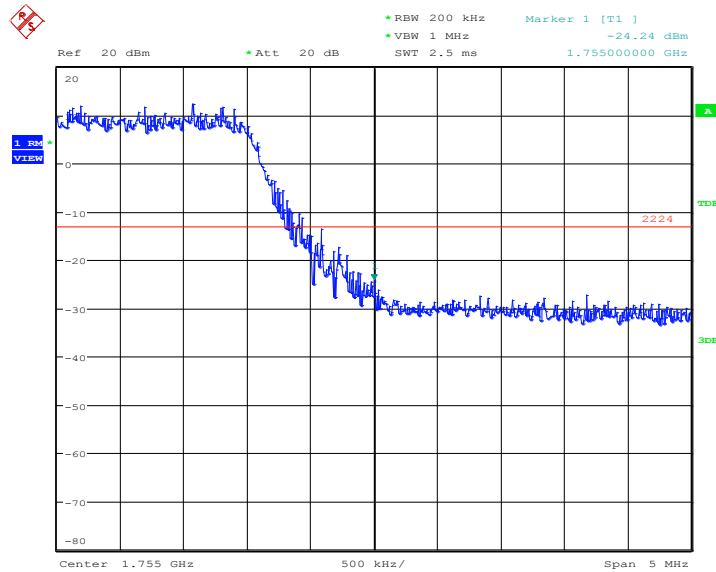


LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 29.NOV.2021 13:08:09

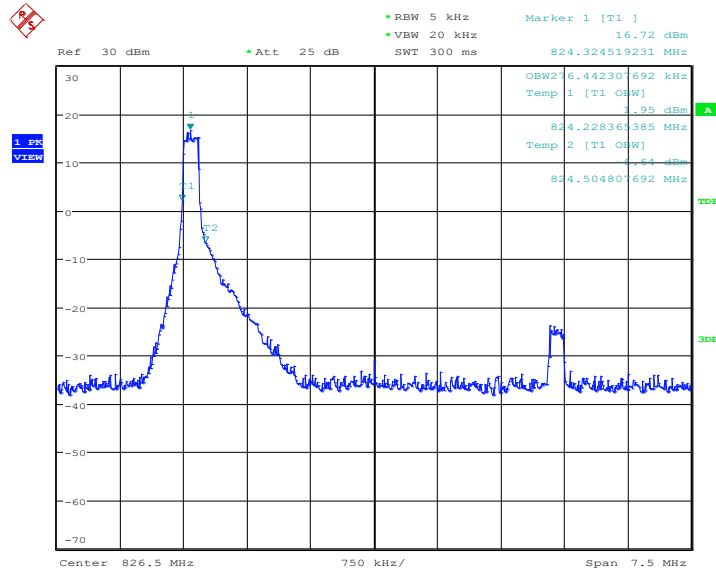
HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 29.NOV.2021 13:09:03

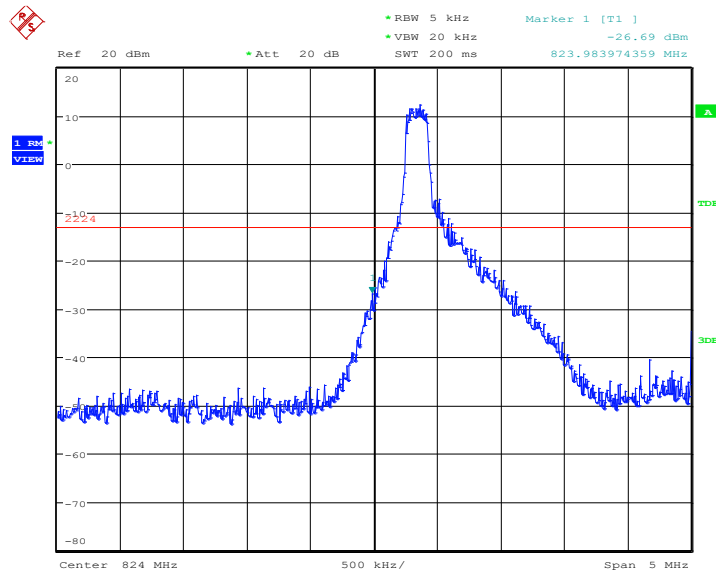


LTE band 5
OBW: 1RB-low_offset



Date: 29.NOV.2021 15:04:44

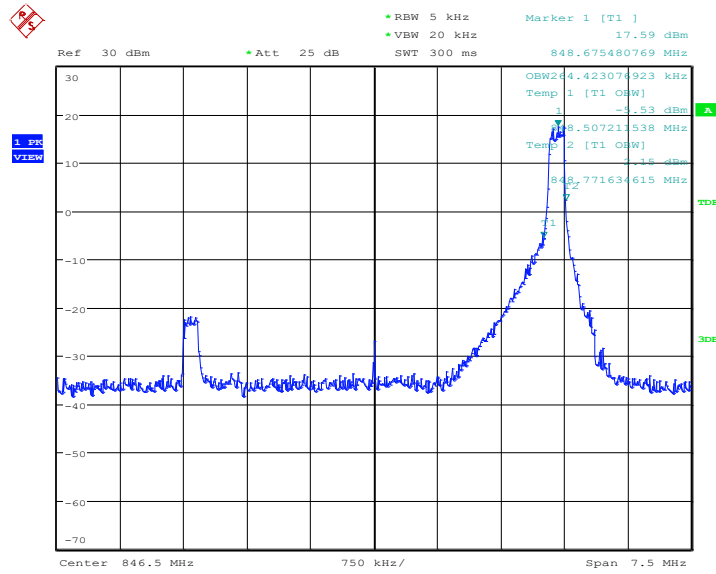
LOW BAND EDGE BLOCK-1RB-low_offset



Date: 29.NOV.2021 15:05:42

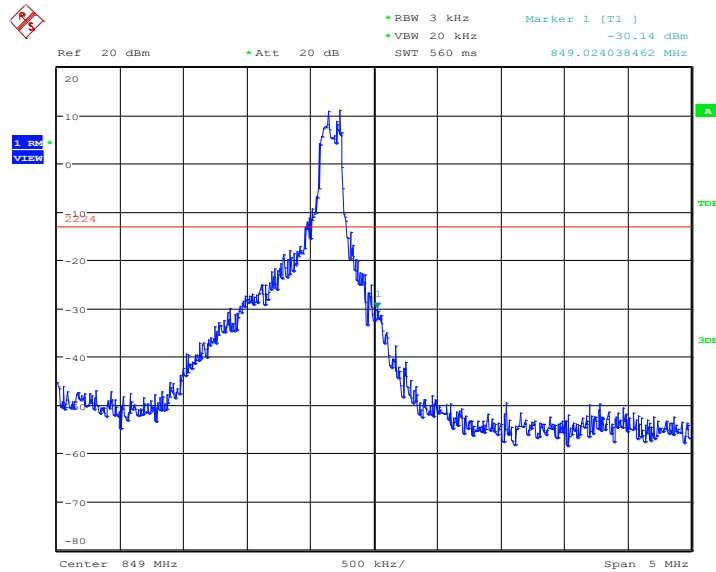


OBW: 1RB-high_offset



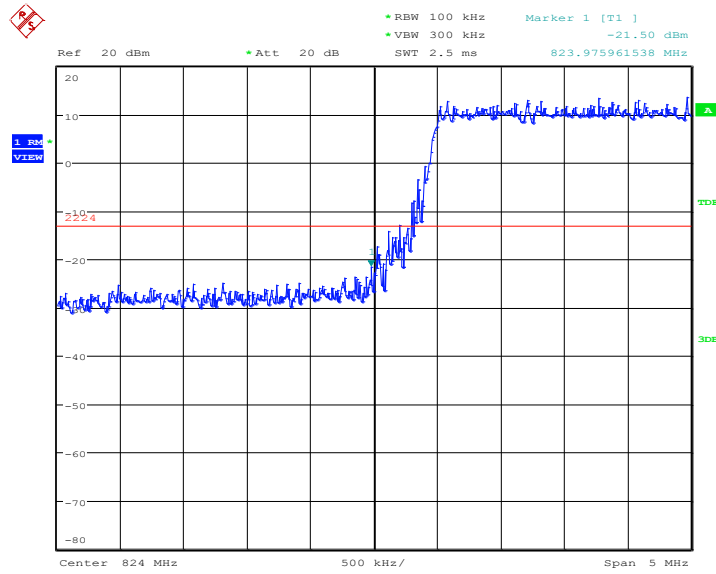
Date: 29.NOV.2021 13:48:55

HIGH BAND EDGE BLOCK-1RB-high_offset



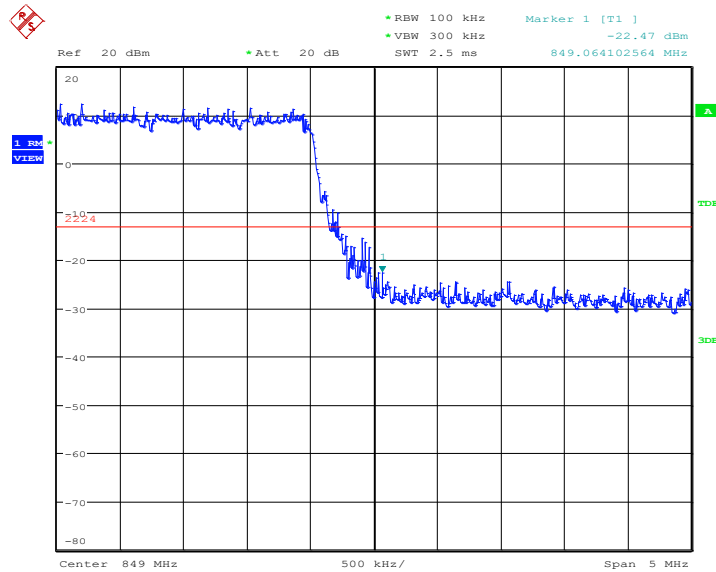
Date: 29.NOV.2021 13:49:56

LOW BAND EDGE BLOCK-10MHz-100%RB



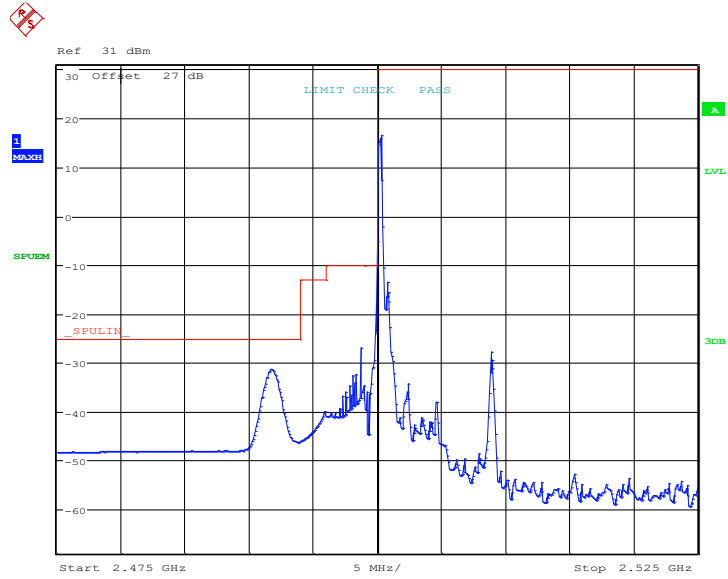
Date: 29.NOV.2021 12:45:15

HIGH BAND EDGE BLOCK-10MHz-100%RB



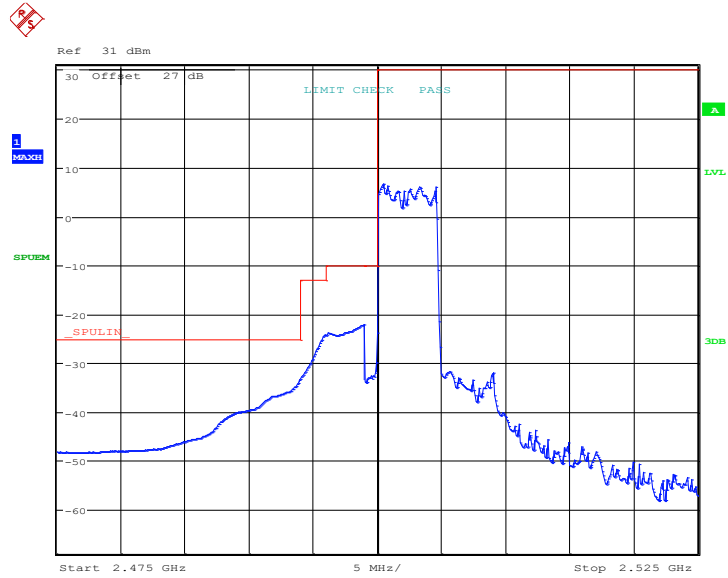
Date: 29.NOV.2021 12:46:09

LTE band 7
LOW BAND EDGE BLOCK-5MHz_1RB-low_offset



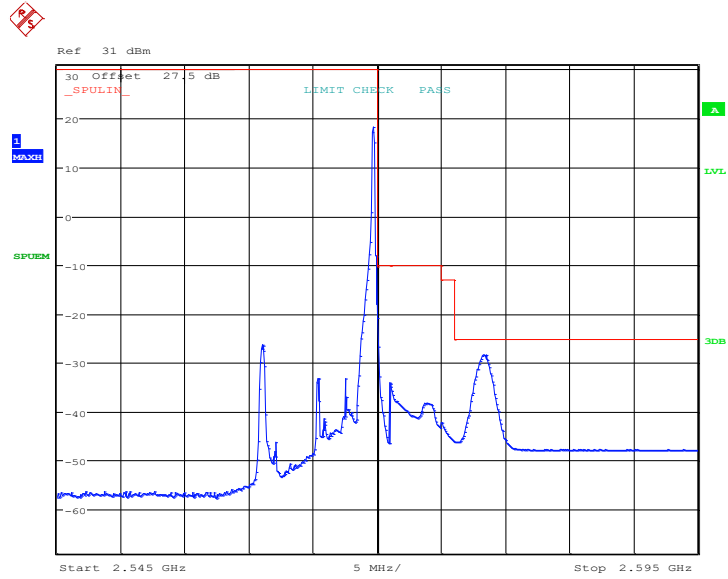
Date: 10.DEC.2021 03:12:02

LOW BAND EDGE BLOCK-5MHz_FULL RB-low_offset



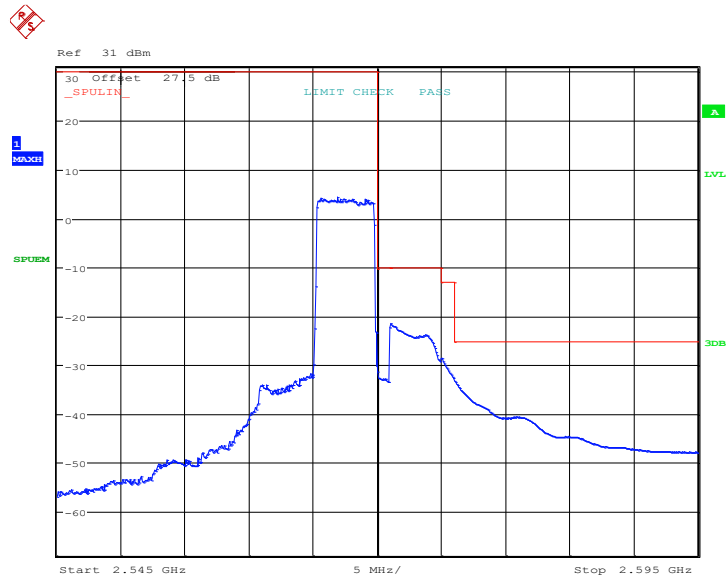
Date: 10.DEC.2021 03:13:42

HIGH BAND EDGE BLOCK-5MHz_1RB-high_offset



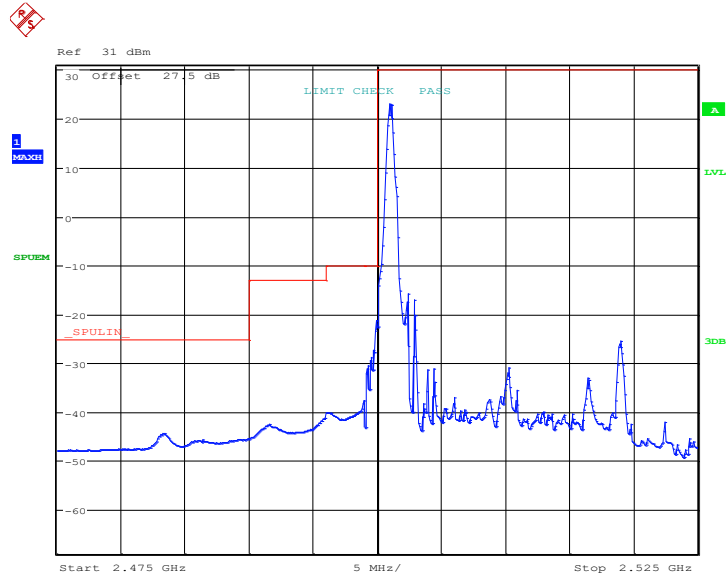
Date: 10.DEC.2021 03:18:32

HIGH BAND EDGE BLOCK-5MHz_FULL RB-high_offset



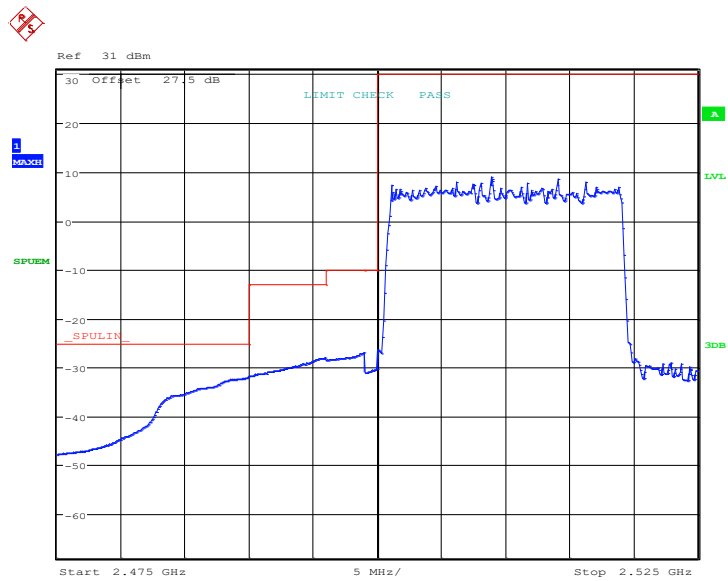
Date: 10.DEC.2021 03:16:41

LOW BAND EDGE BLOCK-20MHz_1RB-low_offset



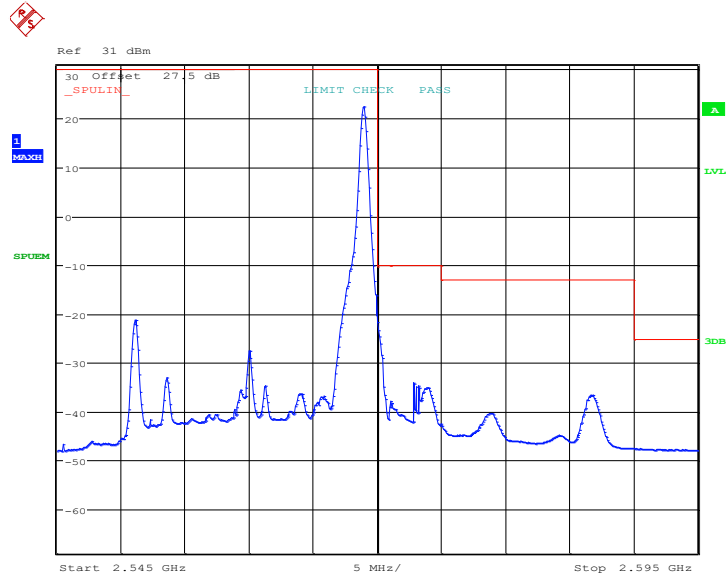
Date: 10.DEC.2021 03:42:25

LOW BAND EDGE BLOCK-20MHz_FULL RB-low_offset



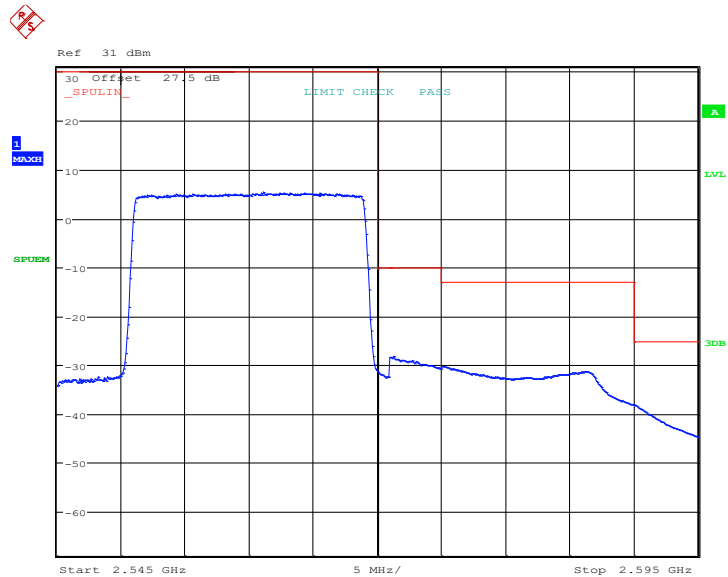
Date: 10.DEC.2021 03:43:13

HIGH BAND EDGE BLOCK-20MHz_1RB-high_offset



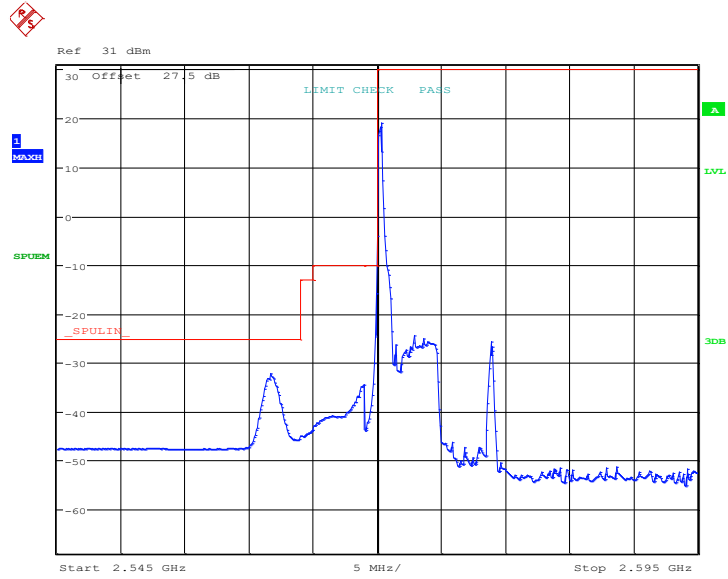
Date: 10.DEC.2021 03:46:31

HIGH BAND EDGE BLOCK-20MHz_FULL RB-high_offset



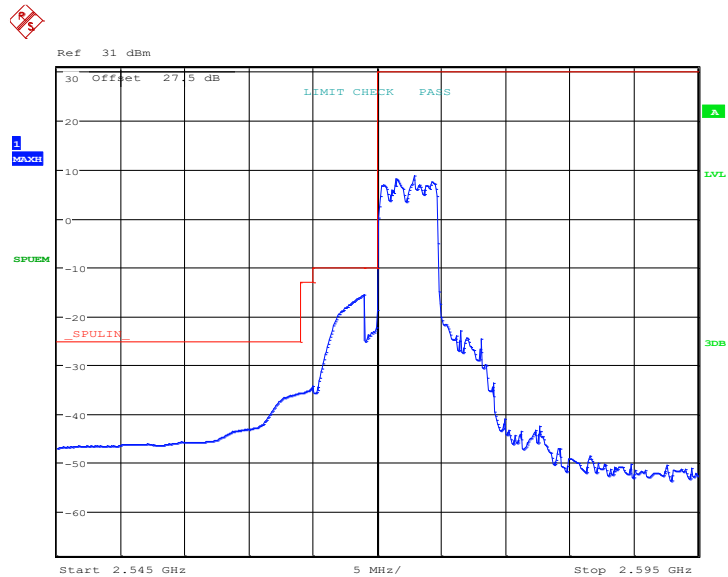
Date: 10.DEC.2021 03:45:37

LTE band 38
LOW BAND EDGE BLOCK-5MHz_1RB-low_offset



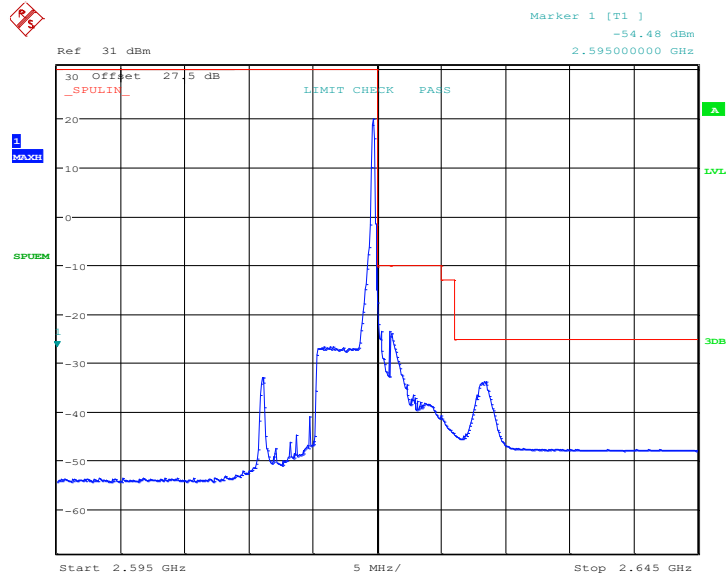
Date: 10.DEC.2021 03:55:24

LOW BAND EDGE BLOCK-5MHz_FULL RB-low_offset



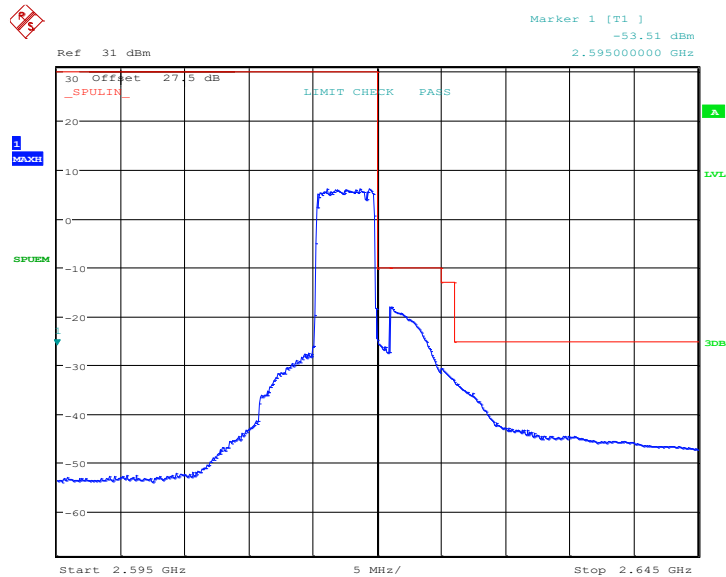
Date: 10.DEC.2021 04:17:04

HIGH BAND EDGE BLOCK-5MHz_1RB-high_offset



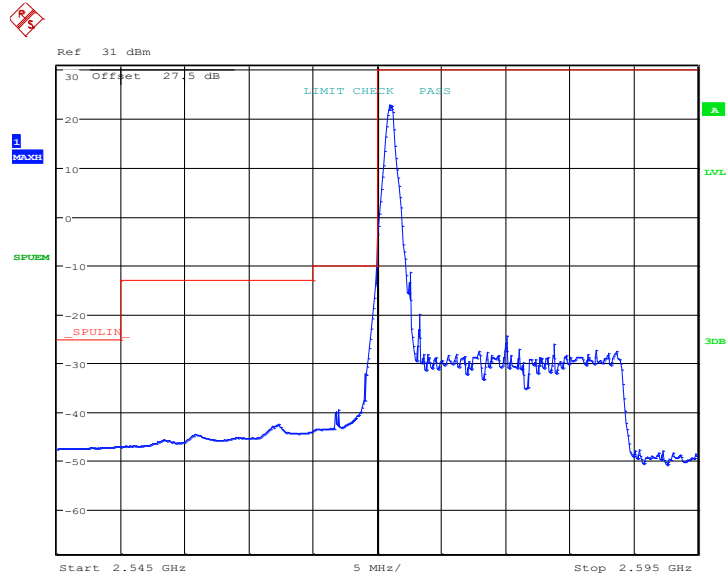
Date: 10.DEC.2021 04:20:00

HIGH BAND EDGE BLOCK-5MHz_FULL RB-high_offset



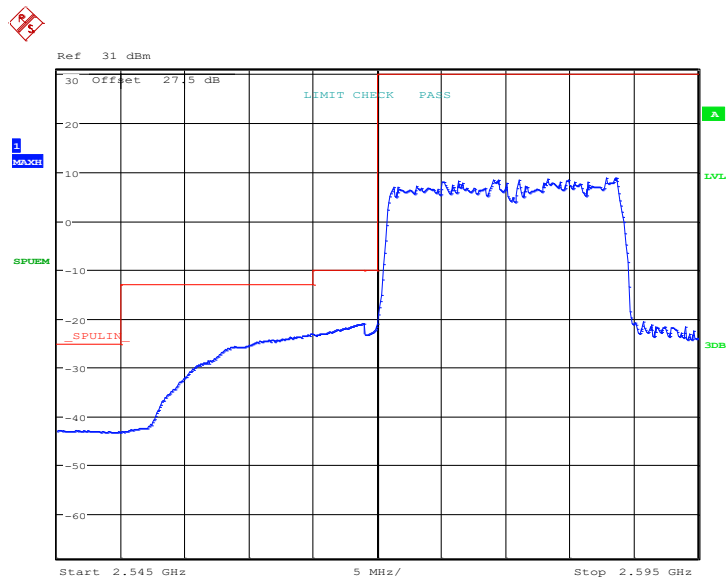
Date: 10.DEC.2021 04:19:18

LOW BAND EDGE BLOCK-20MHz_1RB-low_offset



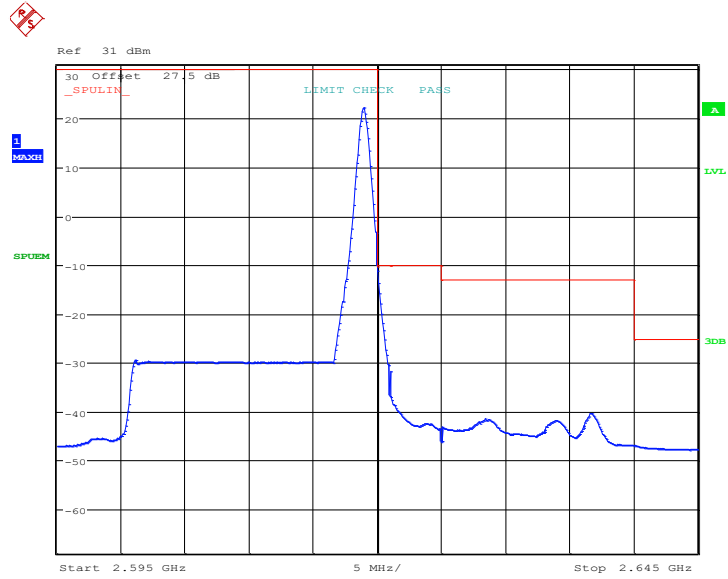
Date: 10.DEC.2021 04:39:04

LOW BAND EDGE BLOCK-20MHz_FULL RB-low_offset



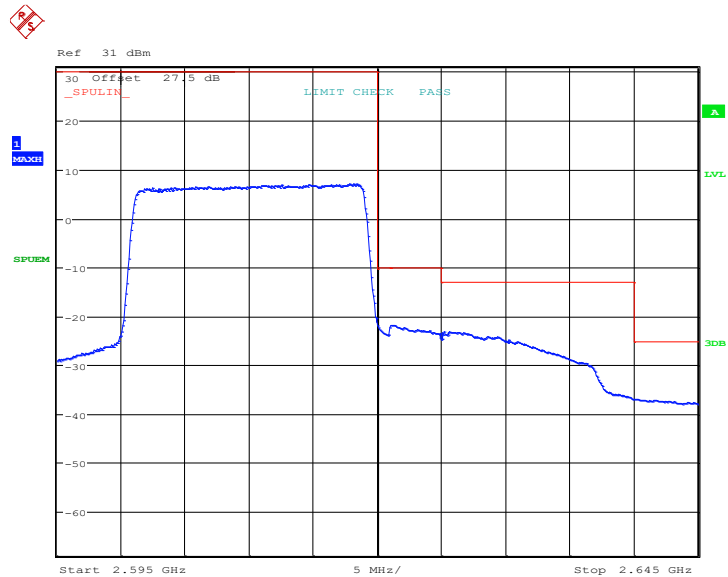
Date: 10.DEC.2021 04:57:42

HIGH BAND EDGE BLOCK-20MHz_1RB-high_offset



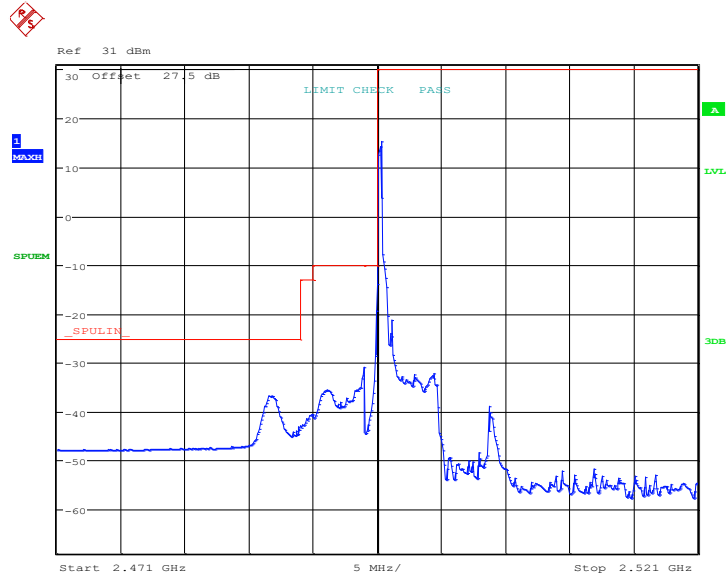
Date: 10.DEC.2021 05:03:25

HIGH BAND EDGE BLOCK-20MHz_FULL RB-high_offset



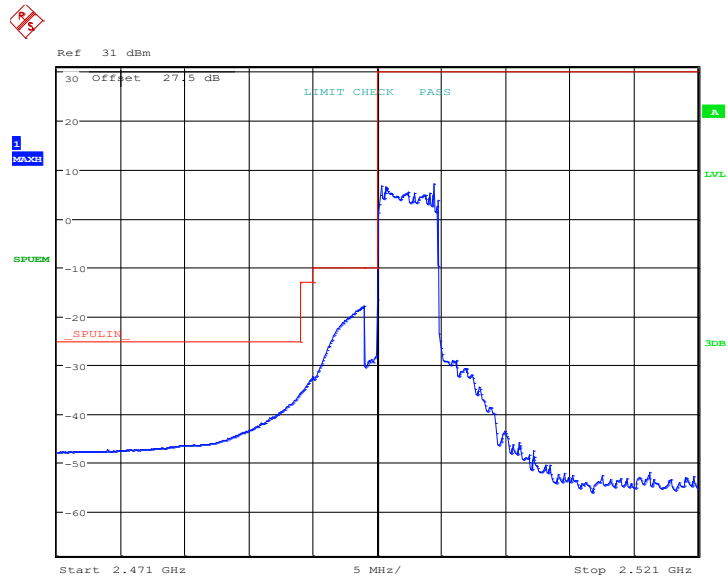
Date: 10.DEC.2021 05:00:23

LTE band 41
LOW BAND EDGE BLOCK-5MHz_1RB-low_offset



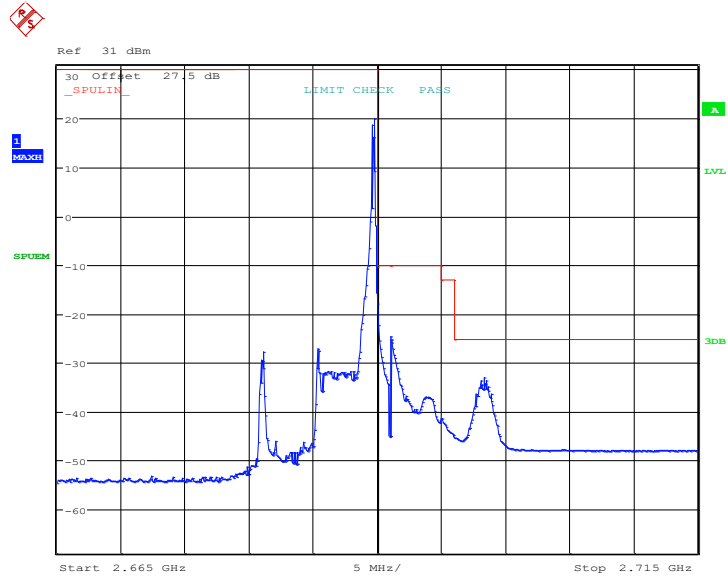
Date: 10.DEC.2021 05:07:50

LOW BAND EDGE BLOCK-5MHz_FULL RB-low_offset



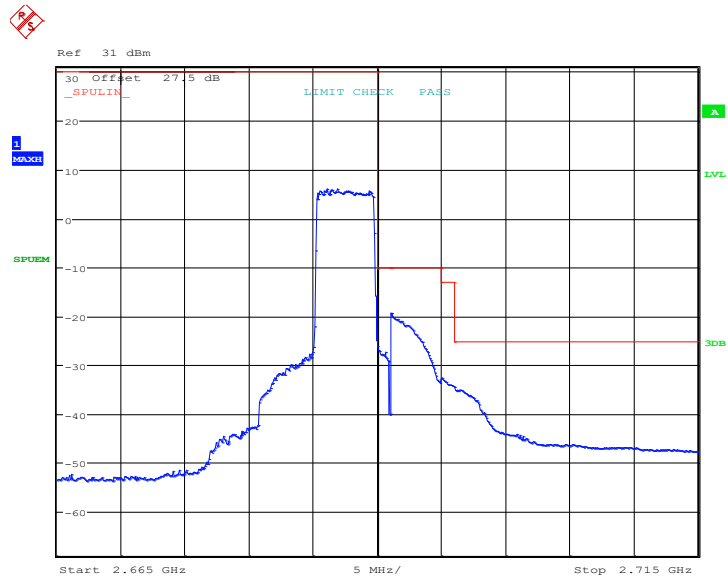
Date: 10.DEC.2021 05:12:19

HIGH BAND EDGE BLOCK-5MHz_1RB-high_offset



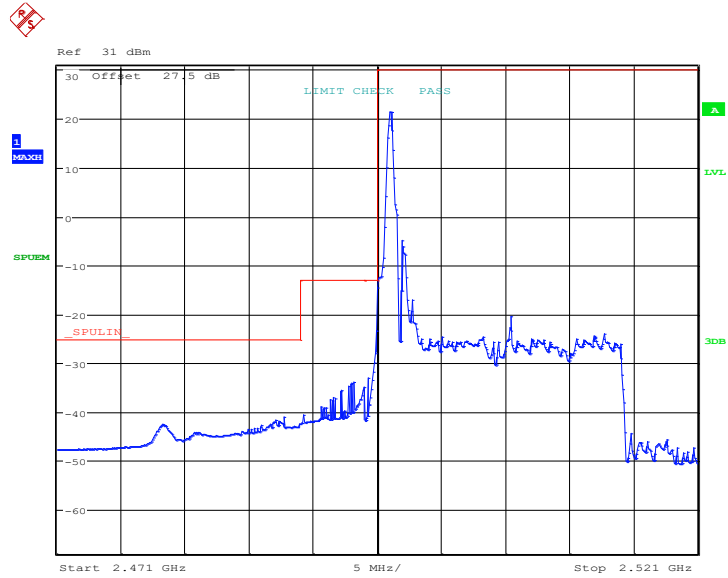
Date: 10.DEC.2021 05:14:52

HIGH BAND EDGE BLOCK-5MHz_FULL RB-high_offset



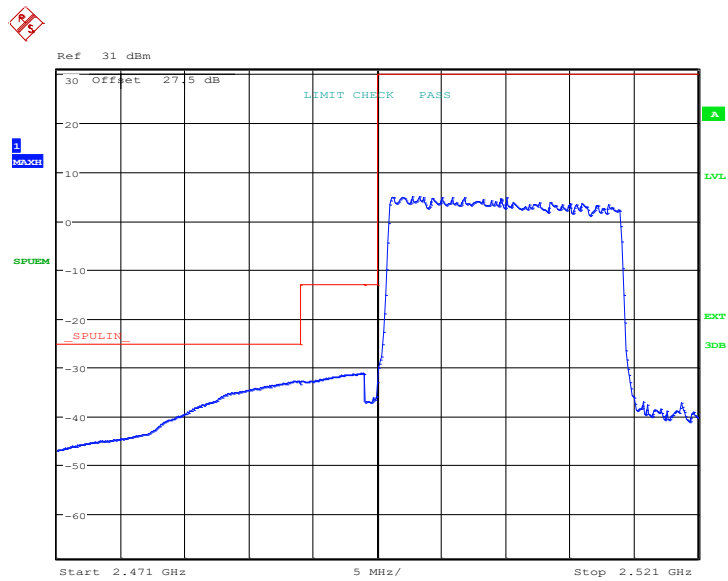
Date: 10.DEC.2021 05:14:04

LOW BAND EDGE BLOCK-20MHz_1RB-low_offset



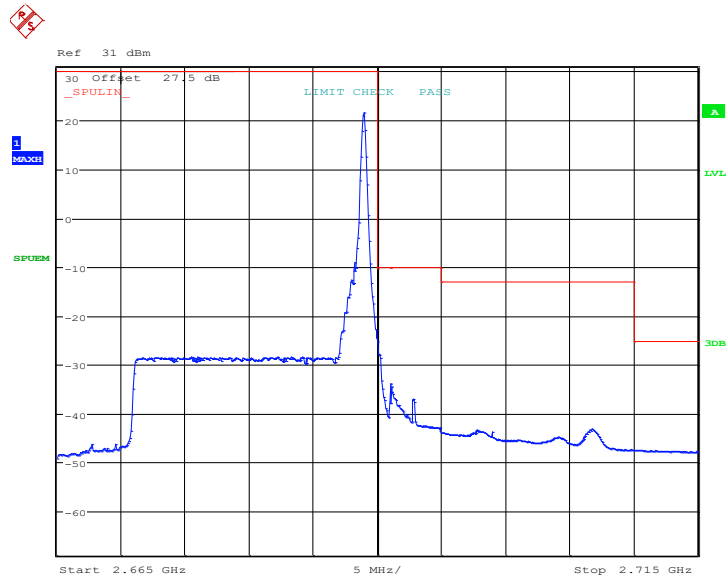
Date: 10.DEC.2021 09:02:42

LOW BAND EDGE BLOCK-20MHz_FULL RB-low_offset



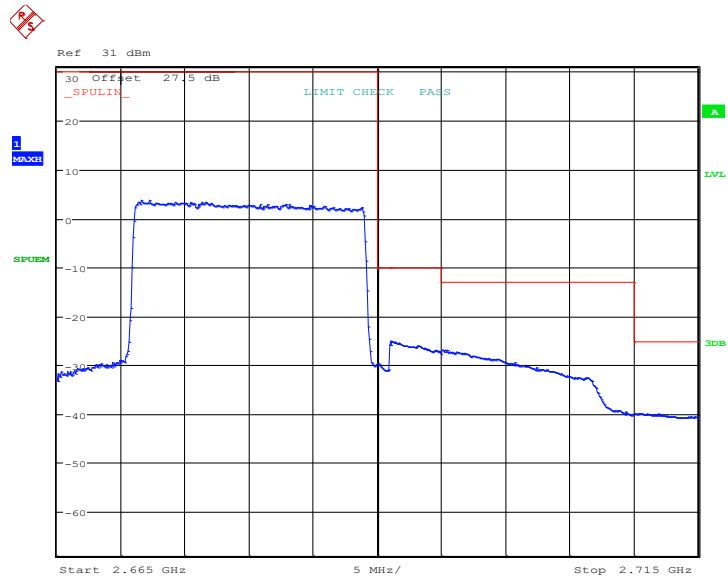
Date: 28.DEC.2021 09:43:01

HIGH BAND EDGE BLOCK-20MHz_1RB-high_offset



Date: 10.DEC.2021 09:08:17

HIGH BAND EDGE BLOCK-20MHz_FULL RB-high_offset



Date: 10.DEC.2021 09:07:30

Note: Expanded measurement uncertainty is $U = 0.49\text{dB}(100\text{kHz}-2\text{GHz})/1.21\text{dB}(2\text{GHz}-26.5\text{GHz})$, $k = 1.96$

A.7 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1051, 22.917, 24.238, 27.53.

A.7.1 Measurement Method

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

1. Determine frequency range for measurements: From CFR 2.1051 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.
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.

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

Part 27.53(m)(4) specifies for mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Part 27.53(a) states for mobile and portable stations operating in the 2305–2315 MHz and 2350–2360 MHz bands: By a factor of not less than: $43 + 10 \log(P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log(P)$ dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $61 + 10 \log(P)$ dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $67 + 10 \log(P)$ dB on all frequencies between 2328 and 2337 MHz;



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By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log (P)$ dB on all frequencies between 2296 and 2300MHz, $61 + 10 \log (P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log (P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log (P)$ dB below 2288 MHz; By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log (P)$ dB above 2365 MHz.

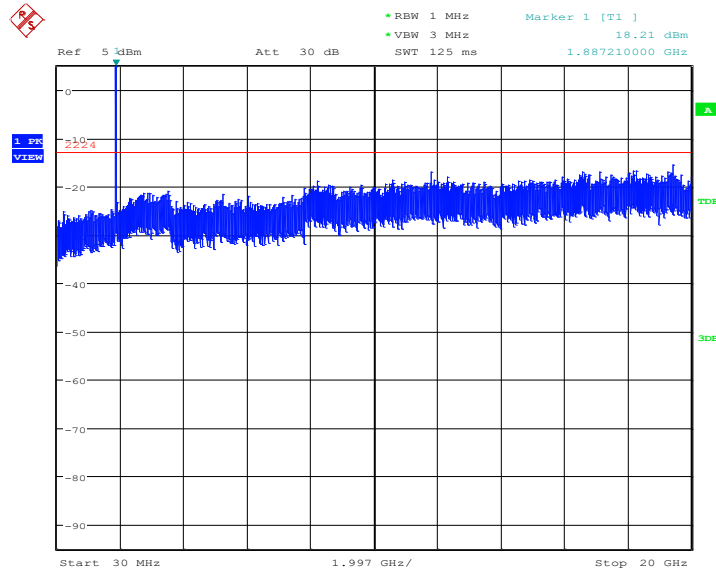
A. 7.3 Measurement result

Only worst case result is given below

LTE band 2 : 30MHz – 20GHz

Spurious emission limit –13dBm.

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

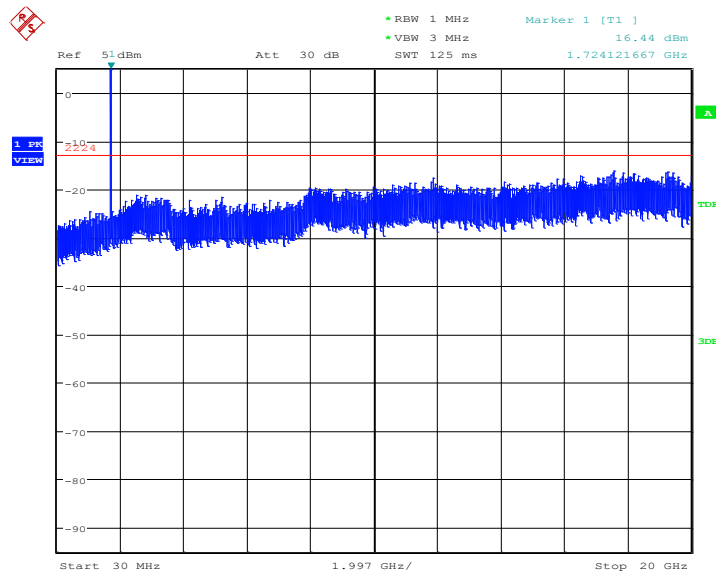


Date: 29.NOV.2021 12:06:22

LTE band 4 : 30MHz – 20GHz

Spurious emission limit –13dBm.

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



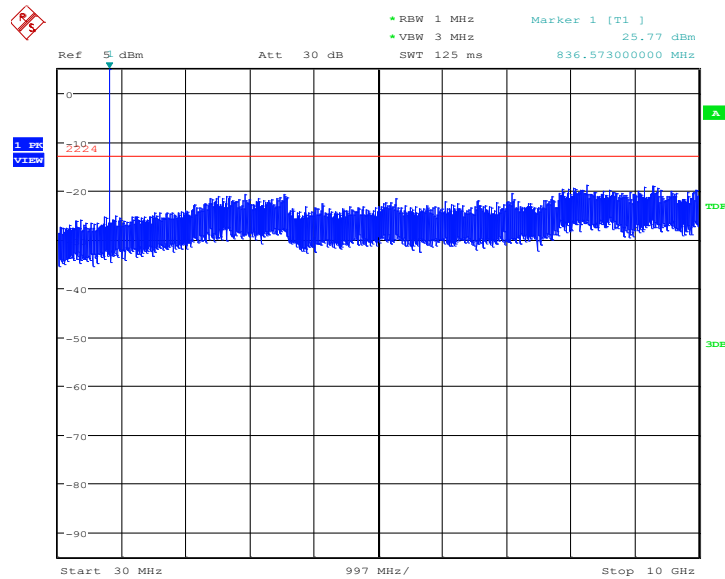
Date: 29.NOV.2021 12:14:20



LTE band 5 : 30MHz – 10GHz

Spurious emission limit –13dBm.

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

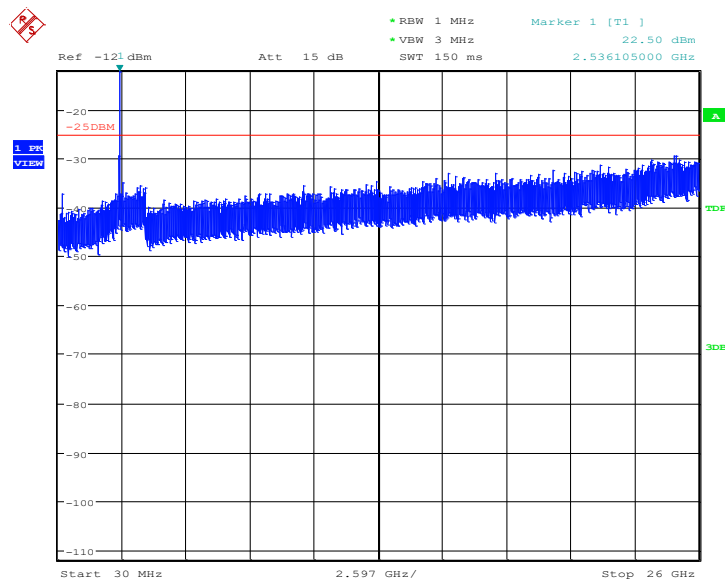


Date: 29.NOV.2021 11:54:53

LTE band 7 20MHz QPSK: 30MHz – 26GHz

Spurious emission limit –25dBm.

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



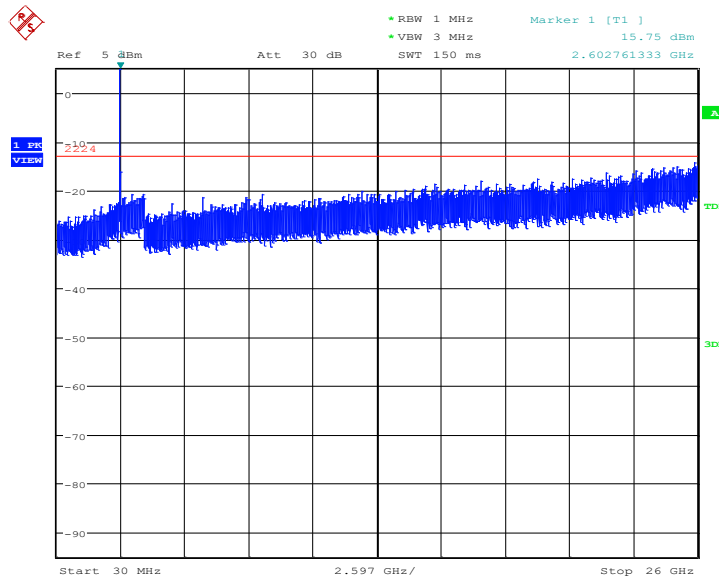
Date: 9.DEC.2021 09:52:08



LTE band 38: 30MHz – 26GHz

Spurious emission limit –25dBm.

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

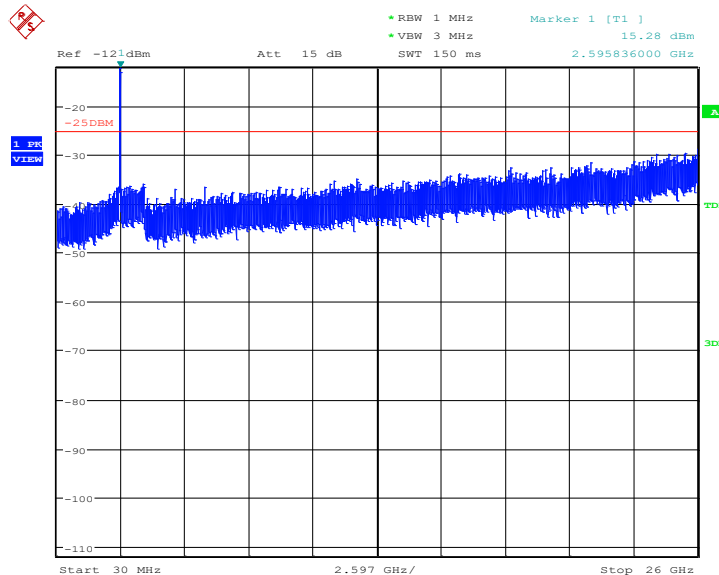


Date: 9.DEC.2021 10:28:54

LTE band 41: 30MHz – 26GHz

Spurious emission limit –25dBm.

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



Date: 9.DEC.2021 10:02:30

Note: Expanded measurement uncertainty is $U = 0.49\text{dB}(100\text{KHz}-2\text{GHz})/1.21\text{dB}(2\text{GHz}-26.5\text{GHz})$, $k = 1.96$

A.8 PEAK-TO-AVERAGE POWER RATIO

Reference

FCC: CFR Part 24.232, 27.50(d), KDB971168 D01(5.7).

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

- a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
- b) Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
- c) Set the number of counts to a value that stabilizes the measured CCDF curve;
- d) Set the measurement interval to 1 ms
- e) Record the maximum PAPR level associated with a probability of 0.1%

A.8.1 Measurement limit

not exceed 13 dB

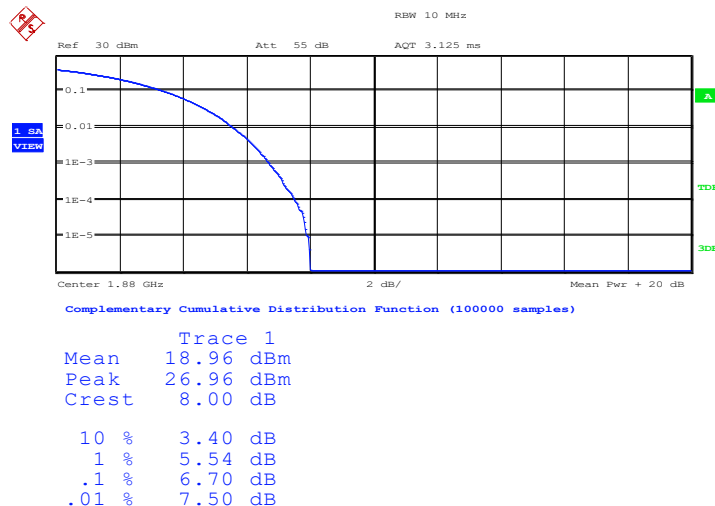
A.8.2 Measurement results

Only worst case result is given below

LTE band 2

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
1880.0	20	6.70	7.31

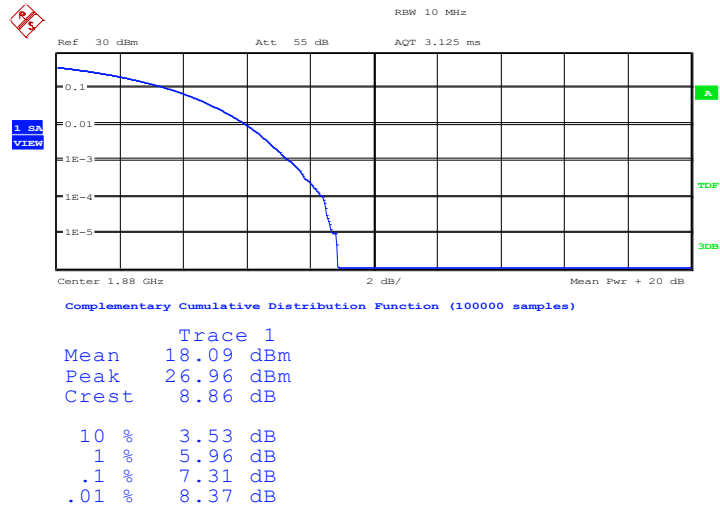
LTE band 2, 20MHz Bandwidth, QPSK (PAPR)



Date: 29.NOV.2021 09:46:39



LTE band 2, 20MHz Bandwidth, 16QAM (PAPR)



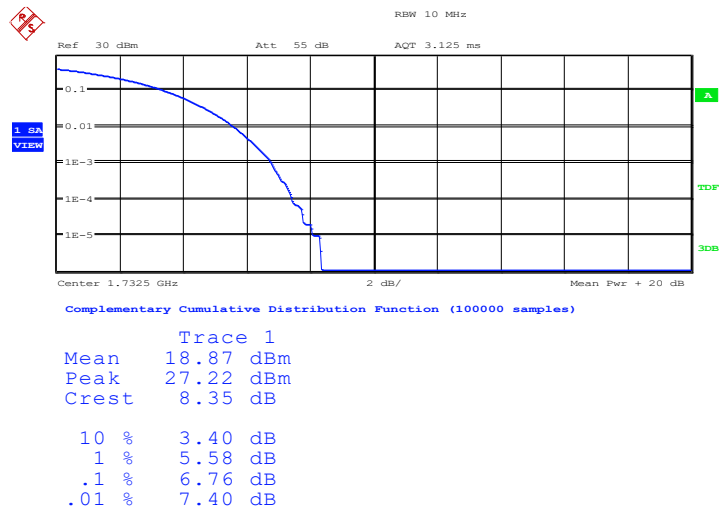
Date: 29.NOV.2021 09:46:46



LTE band 4

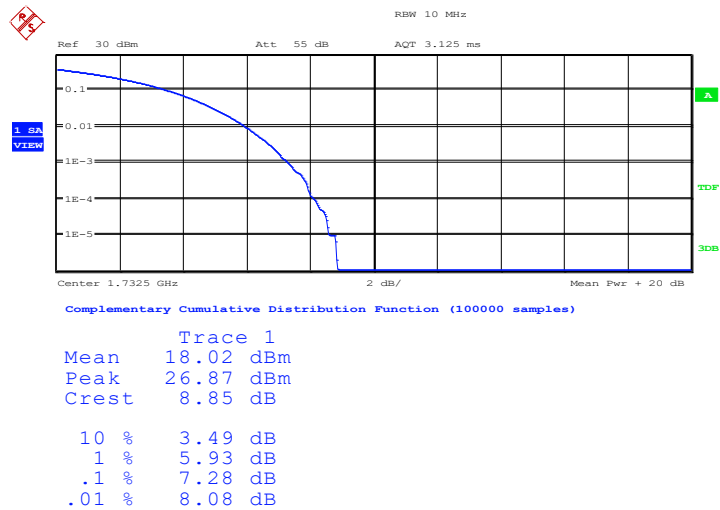
Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
1732.5	20	6.76	7.28

LTE band 4, 20MHz Bandwidth, QPSK (PAPR)



Date: 29.NOV.2021 10:06:39

LTE band 4, 20MHz Bandwidth, 16QAM (PAPR)



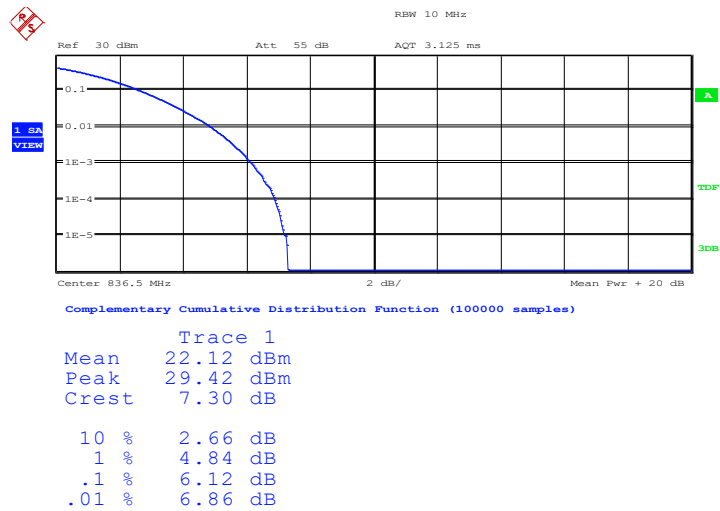
Date: 29.NOV.2021 10:06:45



LTE band 5

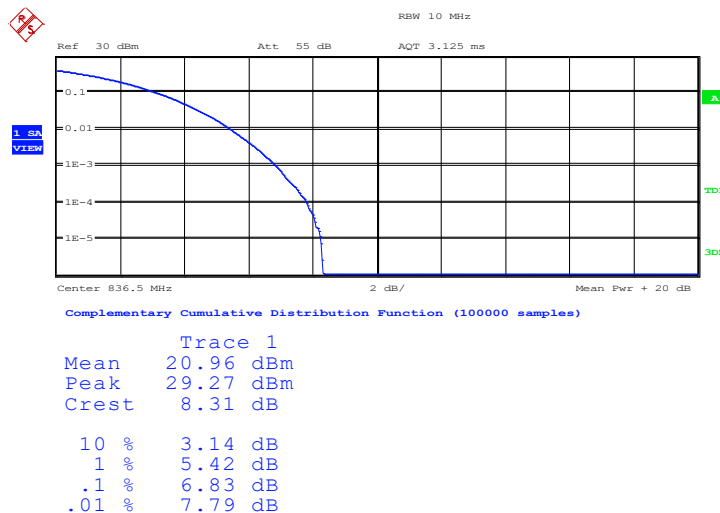
Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
836.5	10	6.12	6.83

LTE band 5, 10MHz Bandwidth, QPSK (PAPR)



Date: 23.NOV.2021 19:42:38

LTE band 5, 10MHz Bandwidth, 16QAM (PAPR)



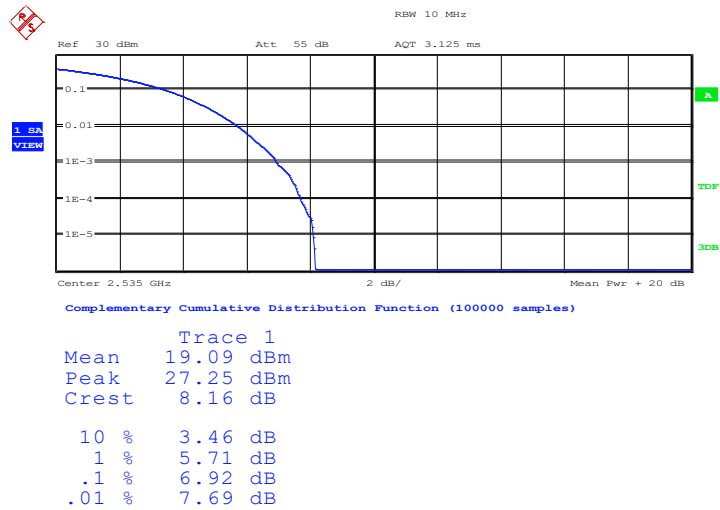
Date: 15.JAN.2022 07:33:19



LTE band 7

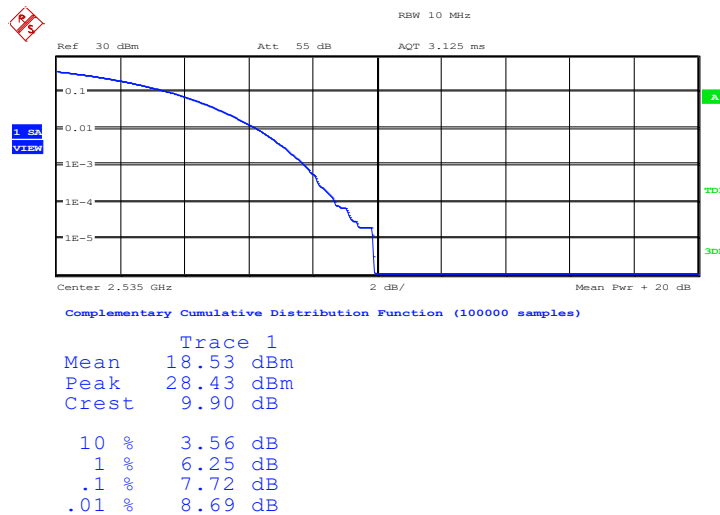
Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
2510.0	20	6.92	7.72

LTE band 7, 20MHz Bandwidth, QPSK (PAPR)



Date: 23.NOV.2021 16:11:55

LTE band 7, 20MHz Bandwidth, 16QAM (PAPR)

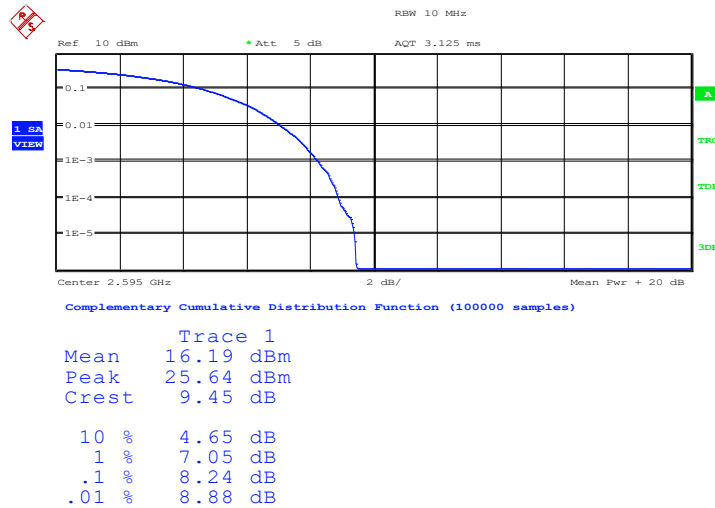


Date: 15.JAN.2022 07:14:36

LTE band 38

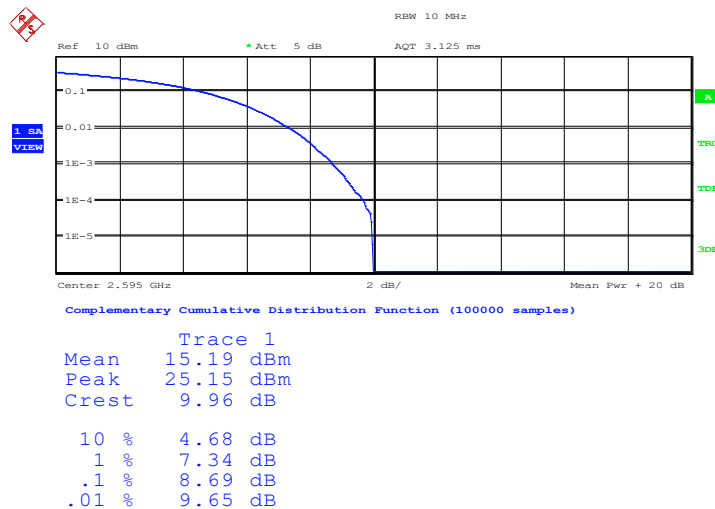
Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
2595.0	20	8.24	8.69

LTE band 38, 20MHz Bandwidth, QPSK (PAPR)



Date: 29.NOV.2021 09:27:09

LTE band 38, 20MHz Bandwidth, 16QAM (PAPR)

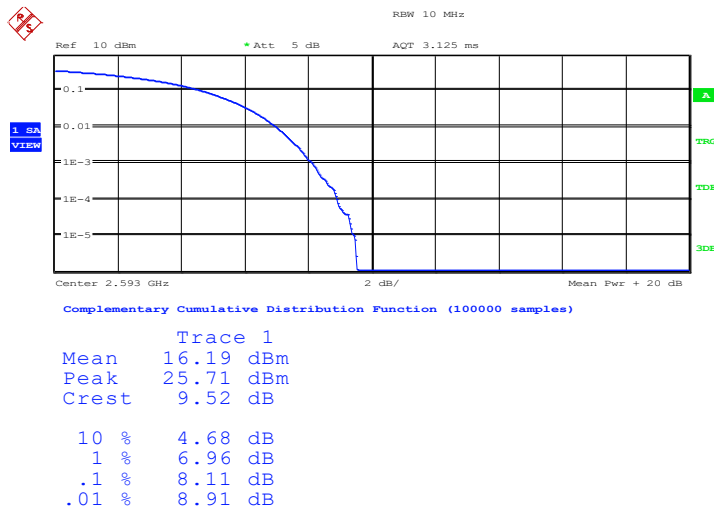


Date: 29.NOV.2021 09:27:16

LTE band 41

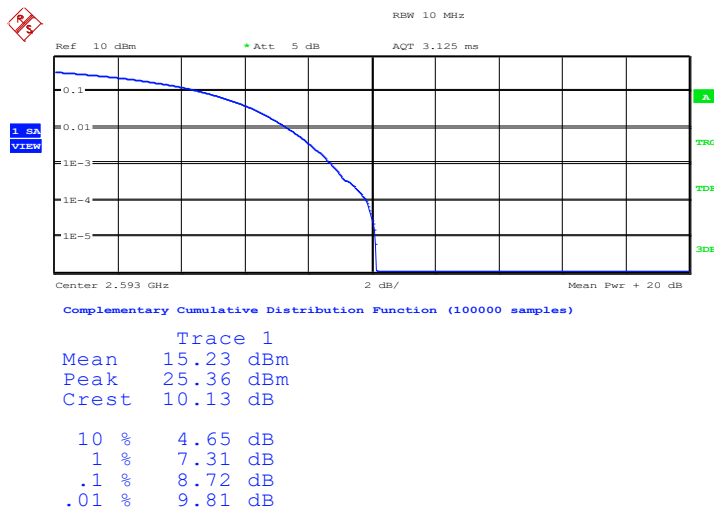
Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
2593.0	20	8.11	8.72

LTE band 41, 20MHz Bandwidth, QPSK (PAPR)



Date: 29.NOV.2021 10:20:05

LTE band 41, 20MHz Bandwidth, 16QAM (PAPR)



Date: 29.NOV.2021 10:20:13

Note: Expanded measurement uncertainty is $U = 0.48$, $k = 2$

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