



TEST REPORT

No. I21Z61156-WMD02

for

TCL Communication Ltd.

LINKHUB

Model Name: HH42NK1

FCC ID: 2ACCJB160

with

Hardware Version: V02

Software Version: HH42LITENK1_00_02.00_02

Issued Date: 2021-07-06

Note:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I21Z61156-WMD02	Rev.0	1 st edition	2021-06-29
I21Z61156-WMD02	Rev.1	2 nd edition Change the low voltage to 10.2	2021-06-30
I21Z61156-WMD02	Rev.2	3 rd edition Change the the frequency for LTE Band 2 in A.1.3	2021-07-06

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

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1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0 and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (CN0066). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1: CTTL (huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China 100191

1.3. Testing Environment

Normal Temperature: 15-35°C
Relative Humidity: 20-75%

1.4. Project Data

Testing Start Date: 2021-06-15
Testing End Date: 2020-06-28

1.5. Signature



Dong Yuan
(Prepared this test report)



Zhou Yu
(Reviewed this test report)



Zhao Hui Lin
Deputy Director of the laboratory
(Approved this test report)



2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	LINKHUB
Model Name	HH42NK1
FCC ID	2ACCJB160
Antenna	Integral
Output power	24.94dBm maximum EIRP measured for LTE Band 66
Extreme vol. Limits	10.2VDC to 13.8VDC (nominal: 12VDC)
Extreme temp. Tolerance	0°C to +45°C

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

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Date of receipt
UT09a	350969640000123	V02	HH42LITENK1_00_02.00_02	2021-06-15
UT03a	350969640000099	V02	HH42LITENK1_00_02.00_02	2021-06-15

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

3.3. Internal Identification of AE used during the test

AE ID*	Description
AE1	charger
AE1	
Model	S012CDU1200100
Manufacturer	Tenpao

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

4. Reference Documents

4.1. Documents supplied by applicant

EUT parameters, referring to Annex A for detailed information, is supplied by the client or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

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

Reference	Title	Version
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-20 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-20 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-20 Edition
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB 971168 D01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS	v03r01

5. Laboratory Environment

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

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

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

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

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

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

6. Summary Of Test Result

LTE Band 2

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

LTE Band 5

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

LTE Band 7

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

LTE Band 12

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

LTE Band 13

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

LTE Band 66

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

Terms used in Verdict column

P	Pass. The EUT complies with the essential requirements in the standard.
NP	Not Performed. The test was not performed by CTTL.
NA	Not Applicable. The test was not applicable.
BR	Re-use test data from basic model report.
F	Fail. The EUT does not comply with the essential requirements in the standard.

LTE Band 66 and Band 12 overlaps the entire frequency range of LTE Band 4 and Band 17. Therefore, test data provided in this report covers Band 4, Band 17 as well as Band 66, Band 12.

Explanation of worst-case configuration

The worst-case scenario for all measurements is based on the conducted output power measurement investigation results. Output power was measured on QPSK, 16QAM modulations. It was found that QPSK was the worst case. All testing was performed using QPSK modulations to represent the worst case unless otherwise stated. The test results shown in the following sections represent the worst case emission.

7. Test Equipment Utilized

Description	Type	Series Number	Manufacture	Cal Due Date	Calibration Interval
Wideband Radio Communication Tester	CMW500	159082	R&S	2021-12-17	1 year
Spectrum Analyzer	FSU	200030	R&S	2022-06-02	1 year
Climate Chamber	SH-242	93008556	ESPEC	2023-12-23	3 years
EMI Antenna	VULB9163	9163-301	Schwarzbeck	2021-08-04	1 year
EMI Antenna	3117	00058889	ETS-Lindgren	2021-09-22	1 year
EMI Antenna	3117	00119024	ETS-Lindgren	2022-04-11	1 year
EMI Antenna	9117	167	Schwarzbeck	2021-08-19	1 year
Signal Generator	N5183A	MY49060052	Agilent	2021-07-01	1 year
Test Receiver	E4440A	MY48250642	Agilent	2022-03-04	1 year
Universal Radio Communication Tester	MT8821C	6201623363	Anritsu	2021-09-10	1 year
Power Amplifier	5S1G4	0341863	AR	/	/

Annex A: Measurement Results

A.1 Output Power

A.1.1 Summary

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

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

A.1.2 Conducted

A.1.2.1 Method of Measurements

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

These measurements were done at 3 frequencies (bottom, middle and top of operational frequency range) for each bandwidth.

A.1.2.2 Measurement Result

LTE band 2

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1909.3	21.83	21.12
		1880.0	22.08	21.18
		1850.7	22.60	21.61
	1 RB low	1909.3	21.95	21.17
		1880.0	21.96	21.15
		1850.7	22.49	21.54
	50% RB mid	1909.3	22.02	21.37
		1880.0	21.91	21.20
		1850.7	22.44	21.91
	100% RB	1909.3	20.81	19.84
		1880.0	20.96	20.13
		1850.7	21.33	20.55
3MHz	1 RB high	1908.5	21.62	21.28
		1880.0	22.18	21.38
		1851.5	22.42	21.79
	1 RB low	1908.5	22.16	21.50
		1880.0	21.73	21.52
		1851.5	22.39	21.85
	50% RB mid	1908.5	20.95	20.14
		1880.0	20.92	19.98
		1851.5	21.43	20.48

	100% RB	1908.5	20.97	20.03
		1880.0	20.93	20.02
		1851.5	21.38	20.46
5MHz	1 RB high	1907.5	21.58	21.18
		1880.0	22.09	21.40
		1852.5	22.25	21.56
	1 RB low	1907.5	22.03	21.26
		1880.0	21.83	21.14
		1852.5	22.20	21.60
	50% RB mid	1907.5	20.85	19.96
		1880.0	20.83	19.80
		1852.5	21.29	20.39
	100% RB	1907.5	20.98	19.72
		1880.0	20.88	19.98
		1852.5	21.22	20.30
10MHz	1 RB high	1905.0	21.70	21.23
		1880.0	21.92	21.59
		1855.0	22.26	21.54
	1 RB low	1905.0	22.22	21.43
		1880.0	21.85	21.55
		1855.0	22.27	21.53
	50% RB mid	1905.0	20.88	19.90
		1880.0	20.91	20.04
		1855.0	21.21	20.30
	100% RB	1905.0	20.93	20.00
		1880.0	20.92	20.08
		1855.0	21.11	20.17
15MHz	1 RB high	1902.5	21.68	21.12
		1880.0	21.96	21.30
		1857.5	22.13	21.70
	1 RB low	1902.5	22.24	21.77
		1880.0	21.84	21.26
		1857.5	22.26	21.62
	50% RB mid	1902.5	20.90	19.93
		1880.0	20.95	20.09
		1857.5	21.05	20.15
	100% RB	1902.5	20.86	19.88
		1880.0	20.93	20.02
		1857.5	21.00	20.10

20MHz	1 RB high	1900.0	22.05	20.89
		1880.0	22.26	21.12
		1860.0	21.95	21.12
	1 RB low	1900.0	22.07	21.15
		1880.0	21.94	21.21
		1860.0	22.14	21.26
	50% RB mid	1900.0	20.88	19.91
		1880.0	21.06	20.01
		1860.0	20.95	20.08
	100% RB	1900.0	20.98	20.03
		1880.0	21.02	20.00
		1860.0	21.01	19.98

LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	848.3	21.83	20.94
		836.5	21.94	20.97
		824.7	22.08	21.24
	1 RB low	848.3	21.90	20.93
		836.5	21.78	20.96
		824.7	22.09	21.16
	50% RB mid	848.3	21.92	20.92
		836.5	21.82	21.36
		824.7	21.93	21.16
	100% RB	848.3	20.89	19.91
		836.5	20.89	20.15
		824.7	20.94	20.18
3MHz	1 RB high	847.5	21.83	21.04
		836.5	22.05	21.17
		825.5	21.89	21.10
	1 RB low	847.5	22.03	20.78
		836.5	21.91	21.06
		825.5	21.72	21.03
	50% RB mid	847.5	20.78	19.77
		836.5	20.97	19.92
		825.5	20.90	20.13
	100% RB	847.5	20.80	20.07
		836.5	20.90	20.09
		825.5	20.88	19.99
5MHz	1 RB high	846.5	21.64	21.24
		836.5	21.95	21.31
		826.5	21.85	20.70
	1 RB low	846.5	21.81	21.08
		836.5	21.93	21.23
		826.5	21.60	21.10
	50% RB mid	846.5	20.79	20.01
		836.5	20.95	20.10
		826.5	20.93	19.88
	100% RB	846.5	20.84	19.95
		836.5	20.98	20.13
		826.5	20.89	20.02
10MHz	1 RB high	844.0	21.82	21.73
		836.5	22.06	21.57

		829.0	21.76	21.03
	1 RB low	844.0	22.10	21.60
		836.5	22.04	21.30
		829.0	21.87	21.10
	50% RB mid	844.0	21.06	20.17
		836.5	20.93	20.08
		829.0	20.96	20.06
	100% RB	844.0	20.94	20.03
		836.5	20.96	19.99
		829.0	20.92	19.91

LTE band 7

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
5MHz	1 RB high	2567.5	22.11	21.45
		2535.0	22.15	21.39
		2502.5	22.08	21.32
	1 RB low	2567.5	22.20	21.43
		2535.0	22.11	21.41
		2502.5	22.04	21.34
	50% RB mid	2567.5	21.14	20.30
		2535.0	21.28	20.33
		2502.5	21.31	20.32
	100% RB	2567.5	21.15	20.29
		2535.0	21.19	20.43
		2502.5	21.23	20.24
10MHz	1 RB high	2565.0	22.37	22.01
		2535.0	22.29	21.80
		2505.0	22.37	21.83
	1 RB low	2565.0	22.56	22.05
		2535.0	22.35	21.98
		2505.0	22.25	21.70
	50% RB mid	2565.0	21.42	20.55
		2535.0	21.52	20.65
		2505.0	21.55	20.60
	100% RB	2565.0	21.43	20.45
		2535.0	21.41	20.51
		2505.0	21.42	20.45
15MHz	1 RB high	2562.5	22.47	21.87
		2535.0	22.29	21.77
		2507.5	22.26	21.79
	1 RB low	2562.5	22.36	21.92
		2535.0	22.29	21.98
		2507.5	22.46	22.10
	50% RB mid	2562.5	21.55	20.76
		2535.0	21.52	20.53
		2507.5	21.56	20.65
	100% RB	2562.5	21.38	20.50
		2535.0	21.42	20.36
		2507.5	21.42	20.48
20MHz	1 RB high	2560.0	22.69	21.50
		2535.0	22.74	21.43
		2510.0	22.29	21.55
	1 RB low	2560.0	22.38	21.38



		2535.0	22.46	21.53
		2510.0	22.49	21.38
	50% RB mid	2560.0	21.55	20.47
		2535.0	21.59	20.63
		2510.0	21.43	20.39
	100% RB	2560.0	21.36	20.47
		2535.0	21.40	20.53
		2510.0	21.50	20.63

LTE band 12

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	715.3	22.20	21.27
		707.5	22.17	21.79
		699.7	22.24	21.28
	1 RB low	715.3	22.41	21.13
		707.5	22.07	21.41
		699.7	22.08	21.03
	50% RB mid	715.3	22.12	21.32
		707.5	22.21	21.43
		699.7	22.33	21.44
	100% RB	715.3	21.11	20.07
		707.5	21.24	20.15
		699.7	21.23	20.18
3MHz	1 RB high	714.5	22.37	21.61
		707.5	22.30	21.55
		700.5	22.28	21.54
	1 RB low	714.5	22.28	21.50
		707.5	22.12	21.59
		700.5	22.07	21.25
	50% RB mid	714.5	21.03	20.25
		707.5	21.05	20.31
		700.5	21.17	20.39
	100% RB	714.5	21.09	20.18
		707.5	21.24	20.23
		700.5	21.14	20.23
5MHz	1 RB high	713.5	22.09	21.58
		707.5	22.17	21.48
		701.5	22.12	21.44
	1 RB low	713.5	22.07	21.64
		707.5	22.09	21.64
		701.5	22.30	21.66
	50% RB mid	713.5	21.01	20.16
		707.5	21.16	20.27
		701.5	21.08	20.29
	100% RB	713.5	21.14	20.34
		707.5	21.17	20.40
		701.5	21.14	20.25
10MHz	1 RB high	711.0	22.13	21.52
		707.5	22.10	21.59



		704.0	22.10	21.68
	1 RB low	711.0	22.11	21.67
		707.5	22.22	21.49
		704.0	22.17	21.28
	50% RB mid	711.0	21.21	20.33
		707.5	21.19	20.28
		704.0	21.02	20.22
	100% RB	711.0	21.23	20.32
		707.5	21.18	20.26
		704.0	21.14	20.21

LTE band 13

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
5MHz	1 RB high	784.5	22.29	22.09
		782.0	22.51	21.96
		779.5	22.50	21.63
	1 RB low	784.5	22.48	21.91
		782.0	22.30	21.88
		779.5	22.28	21.14
	50% RB mid	784.5	21.43	20.56
		782.0	21.38	20.61
		779.5	21.57	20.56
	100% RB	784.5	21.48	20.59
		782.0	21.53	20.65
		779.5	21.40	20.55
10MHz	1 RB high	782.0	22.63	22.14
	1 RB low	782.0	22.43	21.85
	50% RB mid	782.0	21.54	20.60
	100% RB	782.0	21.41	20.52

LTE band 66

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1779.3	22.92	22.03
		1745.0	22.68	22.21
		1710.7	22.91	21.94
	1 RB low	1779.3	22.86	22.03
		1745.0	22.72	22.17
		1710.7	22.81	21.92
	50% RB mid	1779.3	22.86	22.11
		1745.0	23.07	22.24
		1710.7	22.57	21.79
	100% RB	1779.3	21.92	21.08
		1745.0	21.83	21.07
		1710.7	21.65	20.76
3MHz	1 RB high	1778.5	23.04	22.45
		1745.0	22.99	22.27
		1711.5	22.64	21.95
	1 RB low	1778.5	22.98	22.26
		1745.0	22.69	22.21
		1711.5	22.51	22.18
	50% RB mid	1778.5	21.81	20.96
		1745.0	21.93	21.06
		1711.5	21.65	20.77
	100% RB	1778.5	21.81	20.98
		1745.0	21.80	20.98
		1711.5	21.61	20.67
5MHz	1 RB high	1777.5	22.73	22.16
		1745.0	22.86	22.26
		1712.5	22.49	21.94
	1 RB low	1777.5	22.83	22.09
		1745.0	22.63	22.20
		1712.5	22.42	21.97
	50% RB mid	1777.5	21.74	20.90
		1745.0	21.79	20.80
		1712.5	21.61	20.64
	100% RB	1777.5	21.83	20.94
		1745.0	21.77	20.82
		1712.5	21.67	20.52
10MHz	1 RB high	1775.0	22.66	22.37
		1745.0	22.91	22.47

	1 RB low	1715.0	22.75	22.31
		1775.0	22.87	22.56
		1745.0	22.96	22.64
		1715.0	22.57	22.13
	50% RB mid	1775.0	21.96	21.07
		1745.0	21.97	21.03
		1715.0	21.90	20.80
	100% RB	1775.0	21.91	20.90
		1745.0	22.03	20.87
1715.0		21.66	20.71	
15MHz	1 RB high	1772.5	22.70	22.56
		1745.0	23.00	22.70
		1717.5	22.67	22.36
	1 RB low	1772.5	22.83	22.52
		1745.0	22.79	22.69
		1717.5	22.53	22.36
	50% RB mid	1772.5	21.84	20.99
		1745.0	21.97	20.92
		1717.5	21.69	20.76
	100% RB	1772.5	21.84	20.97
		1745.0	21.90	21.09
		1717.5	21.60	20.58
20MHz	1 RB high	1770.0	22.85	22.12
		1745.0	23.29	22.18
		1720.0	23.31	22.02
	1 RB low	1770.0	23.16	21.80
		1745.0	23.34	21.56
		1720.0	22.86	21.03
	50% RB mid	1770.0	21.90	21.04
		1745.0	22.07	20.98
		1720.0	21.65	20.72
	100% RB	1770.0	21.92	20.98
		1745.0	21.96	21.07
		1720.0	21.65	20.71

A.1.3 Radiated

A.1.3.1 Description

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

FDD Band 7: 27.50(h)(2) specifies " *Mobile and other user stations*. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power".

FDD Band 12: 27.50(c)(10) specifies " Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP ".

FDD Band 13: 27.50(c)(10) specifies " Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP ".

FDD Band 2: 24.232(c) specifies " Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications ".

FDD Band 5: 22.913(a) specifies " The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts. "

FDD Band 66: Part 27.50(d)(4) specifies "Fixed, mobile, and portable (handheld) stations operating in the 1710–1755 MHz band and mobile and portable stations operating in the 1695–1710 MHz and 1755–1780 MHz bands are limited to 1 watt EIRP".

A.1.3.2 Method of Measurement

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

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

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

Where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively

(expressed in the same units as P_{Mea} , e.g., dBm or dBW)

P_{Mea} measured transmitter output power or PSD, in dBm or dBW

G_T gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

A.1.3.3 Measurement result

LTE Band 2-EIRP

Limits: $\leq 33\text{dBm}$ (2W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)			Radiated Power (dBm) (GT (dBi)=1.8)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4 MHz	1 RB high	1909.3	21.83	21.12	/	23.63	22.92	/
		1880.0	22.08	21.18	/	23.88	22.98	/
		1850.7	22.60	21.61	/	24.40	23.41	/
	1 RB low	1909.3	21.95	21.17	/	23.75	22.97	/
		1880.0	21.96	21.15	/	23.76	22.95	/
		1850.7	22.49	21.54	/	24.29	23.34	/
	50% RB mid	1909.3	22.02	21.37	/	23.82	23.17	/
		1880.0	21.91	21.20	/	23.71	23.00	/
		1850.7	22.44	21.91	/	24.24	23.71	/
	100% RB	1909.3	20.81	19.84	/	22.61	21.64	/
		1880.0	20.96	20.13	/	22.76	21.93	/
		1850.7	21.33	20.55	/	23.13	22.35	/
3MHz	1 RB high	1908.5	21.62	21.28	/	23.42	23.08	/
		1880.0	22.18	21.38	/	23.98	23.18	/
		1851.5	22.42	21.79	/	24.22	23.59	/
	1 RB low	1908.5	22.16	21.50	/	23.96	23.30	/
		1880.0	21.73	21.52	/	23.53	23.32	/
		1851.5	22.39	21.85	/	24.19	23.65	/
	50% RB mid	1908.5	20.95	20.14	/	22.75	21.94	/
		1880.0	20.92	19.98	/	22.72	21.78	/
		1851.5	21.43	20.48	/	23.23	22.28	/
	100% RB	1908.5	20.97	20.03	/	22.77	21.83	/
		1880.0	20.93	20.02	/	22.73	21.82	/
		1851.5	21.38	20.46	/	23.18	22.26	/
5MHz	1 RB high	1907.5	21.58	21.18	/	23.38	22.98	/
		1880.0	22.09	21.40	/	23.89	23.20	/
		1852.5	22.25	21.56	/	24.05	23.36	/
	1 RB low	1907.5	22.03	21.26	/	23.83	23.06	/
		1880.0	21.83	21.14	/	23.63	22.94	/
		1852.5	22.20	21.60	/	24.00	23.40	/
	50% RB mid	1907.5	20.85	19.96	/	22.65	21.76	/
		1880.0	20.83	19.80	/	22.63	21.60	/
		1852.5	21.29	20.39	/	23.09	22.19	/
	100% RB	1907.5	20.98	19.72	/	22.78	21.52	/
		1880.0	20.88	19.98	/	22.68	21.78	/

		1852.5	21.22	20.30	/	23.02	22.10	/
10M Hz	1 RB high	1905.0	21.70	21.23	/	23.50	23.03	/
		1880.0	21.92	21.59	/	23.72	23.39	/
		1855.0	22.26	21.54	/	24.06	23.34	/
	1 RB low	1905.0	22.22	21.43	/	24.02	23.23	/
		1880.0	21.85	21.55	/	23.65	23.35	/
		1855.0	22.27	21.53	/	24.07	23.33	/
	50% RB mid	1905.0	20.88	19.90	/	22.68	21.70	/
		1880.0	20.91	20.04	/	22.71	21.84	/
		1855.0	21.21	20.30	/	23.01	22.10	/
	100% RB	1905.0	20.93	20.00	/	22.73	21.80	/
		1880.0	20.92	20.08	/	22.72	21.88	/
		1855.0	21.11	20.17	/	22.91	21.97	/
15M Hz	1 RB high	1902.5	21.68	21.12	/	23.48	22.92	/
		1880.0	21.96	21.30	/	23.76	23.10	/
		1857.5	22.13	21.70	/	23.93	23.50	/
	1 RB low	1902.5	22.24	21.77	/	24.04	23.57	/
		1880.0	21.84	21.26	/	23.64	23.06	/
		1857.5	22.26	21.62	/	24.06	23.42	/
	50% RB mid	1902.5	20.90	19.93	/	22.70	21.73	/
		1880.0	20.95	20.09	/	22.75	21.89	/
		1857.5	21.05	20.15	/	22.85	21.95	/
	100% RB	1902.5	20.86	19.88	/	22.66	21.68	/
		1880.0	20.93	20.02	/	22.73	21.82	/
		1857.5	21.00	20.10	/	22.80	21.90	/
20M Hz	1 RB high	1900.0	22.05	20.89	/	23.85	22.69	/
		1880.0	22.26	21.12	/	24.06	22.92	/
		1860.0	21.95	21.12	/	23.75	22.92	/
	1 RB low	1900.0	22.07	21.15	/	23.87	22.95	/
		1880.0	21.94	21.21	/	23.74	23.01	/
		1860.0	22.14	21.26	/	23.94	23.06	/
	50% RB mid	1900.0	20.88	19.91	/	22.68	21.71	/
		1880.0	21.06	20.01	/	22.86	21.81	/
		1860.0	20.95	20.08	/	22.75	21.88	/
	100% RB	1900.0	20.98	20.03	/	22.78	21.83	/
		1880.0	21.02	20.00	/	22.82	21.80	/
		1860.0	21.01	19.98	/	22.81	21.78	/

LTE Band 5-EIRP
Limits: ≤38.5dBm (7W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)			Radiated Power (dBm) (GT (dBi)=0.5)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4 MHz	1 RB high	848.3	21.83	20.94	/	20.18	19.29	/
		836.5	21.94	20.97	/	20.29	19.32	/
		824.7	22.08	21.24	/	20.43	19.59	/
	1 RB low	848.3	21.9	20.93	/	20.25	19.28	/
		836.5	21.78	20.96	/	20.13	19.31	/
		824.7	22.09	21.16	/	20.44	19.51	/
	50% RB mid	848.3	21.92	20.92	/	20.27	19.27	/
		836.5	21.82	21.36	/	20.17	19.71	/
		824.7	21.93	21.16	/	20.28	19.51	/
	100% RB	848.3	20.89	19.91	/	19.24	18.26	/
		836.5	20.89	20.15	/	19.24	18.50	/
		824.7	20.94	20.18	/	19.29	18.53	/
3MHz	1 RB high	847.5	21.83	21.04	/	20.18	19.39	/
		836.5	22.05	21.17	/	20.40	19.52	/
		825.5	21.89	21.1	/	20.24	19.45	/
	1 RB low	847.5	22.03	20.78	/	20.38	19.13	/
		836.5	21.91	21.06	/	20.26	19.41	/
		825.5	21.72	21.03	/	20.07	19.38	/
	50% RB mid	847.5	20.78	19.77	/	19.13	18.12	/
		836.5	20.97	19.92	/	19.32	18.27	/
		825.5	20.9	20.13	/	19.25	18.48	/
	100% RB	847.5	20.8	20.07	/	19.15	18.42	/
		836.5	20.9	20.09	/	19.25	18.44	/
		825.5	20.88	19.99	/	19.23	18.34	/
5MHz	1 RB high	846.5	21.64	21.24	/	19.99	19.59	/
		836.5	21.95	21.31	/	20.30	19.66	/
		826.5	21.85	20.7	/	20.20	19.05	/
	1 RB low	846.5	21.81	21.08	/	20.16	19.43	/
		836.5	21.93	21.23	/	20.28	19.58	/
		826.5	21.6	21.1	/	19.95	19.45	/
	50% RB mid	846.5	20.79	20.01	/	19.14	18.36	/
		836.5	20.95	20.1	/	19.30	18.45	/
		826.5	20.93	19.88	/	19.28	18.23	/
	100% RB	846.5	20.84	19.95	/	19.19	18.30	/
		836.5	20.98	20.13	/	19.33	18.48	/
		826.5	20.89	20.02	/	19.24	18.37	/

10M Hz	1 RB high	844	21.82	21.73	/	20.17	20.08	/
		836.5	22.06	21.57	/	20.41	19.92	/
		829	21.76	21.03	/	20.11	19.38	/
	1 RB low	844	22.1	21.6	/	20.45	19.95	/
		836.5	22.04	21.3	/	20.39	19.65	/
		829	21.87	21.1	/	20.22	19.45	/
	50% RB mid	844	21.06	20.17	/	19.41	18.52	/
		836.5	20.93	20.08	/	19.28	18.43	/
		829	20.96	20.06	/	19.31	18.41	/
	100% RB	844	20.94	20.03	/	19.29	18.38	/
		836.5	20.96	19.99	/	19.31	18.34	/
		829	20.92	19.91	/	19.27	18.26	/

LTE Band 7-EIRP
Limits: ≤33 dBm (2W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)			Radiated Power (dBm) (GT (dBi)=1.2)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5MHz	1 RB high	2567.5	22.11	21.45	/	23.31	22.65	/
		2535	22.15	21.39	/	23.35	22.59	/
		2502.5	22.08	21.32	/	23.28	22.52	/
	1 RB low	2567.5	22.2	21.43	/	23.40	22.63	/
		2535	22.11	21.41	/	23.31	22.61	/
		2502.5	22.04	21.34	/	23.24	22.54	/
	50% RB mid	2567.5	21.14	20.3	/	22.34	21.50	/
		2535	21.28	20.33	/	22.48	21.53	/
		2502.5	21.31	20.32	/	22.51	21.52	/
	100% RB	2567.5	21.15	20.29	/	22.35	21.49	/
		2535	21.19	20.43	/	22.39	21.63	/
		2502.5	21.23	20.24	/	22.43	21.44	/
10MHz	1 RB high	2565	22.37	22.01	/	23.57	23.21	/
		2535	22.29	21.8	/	23.49	23.00	/
		2505	22.37	21.83	/	23.57	23.03	/
	1 RB low	2565	22.56	22.05	/	23.76	23.25	/
		2535	22.35	21.98	/	23.55	23.18	/
		2505	22.25	21.7	/	23.45	22.90	/
	50% RB mid	2565	21.42	20.55	/	22.62	21.75	/
		2535	21.52	20.65	/	22.72	21.85	/
		2505	21.55	20.6	/	22.75	21.80	/
	100% RB	2565	21.43	20.45	/	22.63	21.65	/
		2535	21.41	20.51	/	22.61	21.71	/
		2505	21.42	20.45	/	22.62	21.65	/
15MHz	1 RB high	2562.5	22.47	21.87	/	23.67	23.07	/
		2535	22.29	21.77	/	23.49	22.97	/
		2507.5	22.26	21.79	/	23.46	22.99	/
	1 RB low	2562.5	22.36	21.92	/	23.56	23.12	/
		2535	22.29	21.98	/	23.49	23.18	/
		2507.5	22.46	22.1	/	23.66	23.30	/
	50% RB mid	2562.5	21.55	20.76	/	22.75	21.96	/
		2535	21.52	20.53	/	22.72	21.73	/
		2507.5	21.56	20.65	/	22.76	21.85	/
	100% RB	2562.5	21.38	20.5	/	22.58	21.70	/
		2535	21.42	20.36	/	22.62	21.56	/

		2507.5	21.42	20.48	/	22.62	21.68	/
20M Hz	1 RB high	2560	22.69	21.5	/	23.89	22.70	/
		2535	22.74	21.43	/	23.94	22.63	/
		2510	22.29	21.55	/	23.49	22.75	/
	1 RB low	2560	22.38	21.38	/	23.58	22.58	/
		2535	22.46	21.53	/	23.66	22.73	/
		2510	22.49	21.38	/	23.69	22.58	/
	50% RB mid	2560	21.55	20.47	/	22.75	21.67	/
		2535	21.59	20.63	/	22.79	21.83	/
		2510	21.43	20.39	/	22.63	21.59	/
	100% RB	2560	21.36	20.47	/	22.56	21.67	/
		2535	21.4	20.53	/	22.60	21.73	/
		2510	21.5	20.63	/	22.70	21.83	/

LTE Band 12 -ERP
Limits: ≤34.77dBm (3W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)			Radiated Power (dBm) (GT (dBi)=0.3)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4 MHz	1 RB high	715.3	22.2	21.27	/	20.35	19.42	/
		707.5	22.17	21.79	/	20.32	19.94	/
		699.7	22.24	21.28	/	20.39	19.43	/
	1 RB low	715.3	22.41	21.13	/	20.56	19.28	/
		707.5	22.07	21.41	/	20.22	19.56	/
		699.7	22.08	21.03	/	20.23	19.18	/
	50% RB mid	715.3	22.12	21.32	/	20.27	19.47	/
		707.5	22.21	21.43	/	20.36	19.58	/
		699.7	22.33	21.44	/	20.48	19.59	/
	100% RB	715.3	21.11	20.07	/	19.26	18.22	/
		707.5	21.24	20.15	/	19.39	18.30	/
		699.7	21.23	20.18	/	19.38	18.33	/
3MHz	1 RB high	714.5	22.37	21.61	/	20.52	19.76	/
		707.5	22.3	21.55	/	20.45	19.70	/
		700.5	22.28	21.54	/	20.43	19.69	/
	1 RB low	714.5	22.28	21.5	/	20.43	19.65	/
		707.5	22.12	21.59	/	20.27	19.74	/
		700.5	22.07	21.25	/	20.22	19.40	/
	50% RB mid	714.5	21.03	20.25	/	19.18	18.40	/
		707.5	21.05	20.31	/	19.20	18.46	/
		700.5	21.17	20.39	/	19.32	18.54	/
	100% RB	714.5	21.09	20.18	/	19.24	18.33	/
		707.5	21.24	20.23	/	19.39	18.38	/
		700.5	21.14	20.23	/	19.29	18.38	/
5MHz	1 RB high	713.5	22.09	21.58	/	20.24	19.73	/
		707.5	22.17	21.48	/	20.32	19.63	/
		701.5	22.12	21.44	/	20.27	19.59	/
	1 RB low	713.5	22.07	21.64	/	20.22	19.79	/
		707.5	22.09	21.64	/	20.24	19.79	/
		701.5	22.3	21.66	/	20.45	19.81	/
	50% RB mid	713.5	21.01	20.16	/	19.16	18.31	/
		707.5	21.16	20.27	/	19.31	18.42	/
		701.5	21.08	20.29	/	19.23	18.44	/
	100% RB	713.5	21.14	20.34	/	19.29	18.49	/
		707.5	21.17	20.4	/	19.32	18.55	/

		701.5	21.14	20.25	/	19.29	18.40	/
10M Hz	1 RB high	711	22.13	21.52	/	20.28	19.67	/
		707.5	22.1	21.59	/	20.25	19.74	/
		704	22.1	21.68	/	20.25	19.83	/
	1 RB low	711	22.11	21.67	/	20.26	19.82	/
		707.5	22.22	21.49	/	20.37	19.64	/
		704	22.17	21.28	/	20.32	19.43	/
	50% RB mid	711	21.21	20.33	/	19.36	18.48	/
		707.5	21.19	20.28	/	19.34	18.43	/
		704	21.02	20.22	/	19.17	18.37	/
	100% RB	711	21.23	20.32	/	19.38	18.47	/
		707.5	21.18	20.26	/	19.33	18.41	/
		704	21.14	20.21	/	19.29	18.36	/

LTE Band 13-ERP
Limits: ≤34.77 dBm (3W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)			Radiated Power (dBm) (GT (dBi)=0.4)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5MHz	1 RB high	784.5	22.29	22.09	/	20.54	20.34	/
		782	22.51	21.96	/	20.76	20.21	/
		779.5	22.5	21.63	/	20.75	19.88	/
	1 RB low	784.5	22.48	21.91	/	20.73	20.16	/
		782	22.3	21.88	/	20.55	20.13	/
		779.5	22.28	21.14	/	20.53	19.39	/
	50% RB mid	784.5	21.43	20.56	/	19.68	18.81	/
		782	21.38	20.61	/	19.63	18.86	/
		779.5	21.57	20.56	/	19.82	18.81	/
	100% RB	784.5	21.48	20.59	/	19.73	18.84	/
		782	21.53	20.65	/	19.78	18.90	/
		779.5	21.4	20.55	/	19.65	18.80	/
10MHz	1 RB high	782	22.63	22.14	/	20.88	20.39	/
	1 RB low	782	22.43	21.85	/	20.68	20.10	/
	50% RB mid	782	21.54	20.6	/	19.79	18.85	/
	100% RB	782	21.41	20.52	/	19.66	18.77	/

LTE Band 66-EIRP
Limits: ≤30dBm (1W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)			Radiated Power (dBm) (GT (dBi)=1.6)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4 MHz	1 RB high	1779.3	22.92	22.03	/	24.52	23.63	/
		1745	22.68	22.21	/	24.28	23.81	/
		1710.7	22.91	21.94	/	24.51	23.54	/
	1 RB low	1779.3	22.86	22.03	/	24.46	23.63	/
		1745	22.72	22.17	/	24.32	23.77	/
		1710.7	22.81	21.92	/	24.41	23.52	/
	50% RB mid	1779.3	22.86	22.11	/	24.46	23.71	/
		1745	23.07	22.24	/	24.67	23.84	/
		1710.7	22.57	21.79	/	24.17	23.39	/
	100% RB	1779.3	21.92	21.08	/	23.52	22.68	/
		1745	21.83	21.07	/	23.43	22.67	/
		1710.7	21.65	20.76	/	23.25	22.36	/
3MHz	1 RB high	1778.5	23.04	22.45	/	24.64	24.05	/
		1745	22.99	22.27	/	24.59	23.87	/
		1711.5	22.64	21.95	/	24.24	23.55	/
	1 RB low	1778.5	22.98	22.26	/	24.58	23.86	/
		1745	22.69	22.21	/	24.29	23.81	/
		1711.5	22.51	22.18	/	24.11	23.78	/
	50% RB mid	1778.5	21.81	20.96	/	23.41	22.56	/
		1745	21.93	21.06	/	23.53	22.66	/
		1711.5	21.65	20.77	/	23.25	22.37	/
	100% RB	1778.5	21.81	20.98	/	23.41	22.58	/
		1745	21.8	20.98	/	23.40	22.58	/
		1711.5	21.61	20.67	/	23.21	22.27	/
5MHz	1 RB high	1777.5	22.73	22.16	/	24.33	23.76	/
		1745	22.86	22.26	/	24.46	23.86	/
		1712.5	22.49	21.94	/	24.09	23.54	/
	1 RB low	1777.5	22.83	22.09	/	24.43	23.69	/
		1745	22.63	22.2	/	24.23	23.80	/
		1712.5	22.42	21.97	/	24.02	23.57	/
	50% RB mid	1777.5	21.74	20.9	/	23.34	22.50	/
		1745	21.79	20.8	/	23.39	22.40	/
		1712.5	21.61	20.64	/	23.21	22.24	/
	100% RB	1777.5	21.83	20.94	/	23.43	22.54	/
		1745	21.77	20.82	/	23.37	22.42	/
		1712.5	21.67	20.52	/	23.27	22.12	/

10M Hz	1 RB high	1775	22.66	22.37	/	24.26	23.97	/
		1745	22.91	22.47	/	24.51	24.07	/
		1715	22.75	22.31	/	24.35	23.91	/
	1 RB low	1775	22.87	22.56	/	24.47	24.16	/
		1745	22.96	22.64	/	24.56	24.24	/
		1715	22.57	22.13	/	24.17	23.73	/
	50% RB mid	1775	21.96	21.07	/	23.56	22.67	/
		1745	21.97	21.03	/	23.57	22.63	/
		1715	21.9	20.8	/	23.50	22.40	/
	100% RB	1775	21.91	20.9	/	23.51	22.50	/
		1745	22.03	20.87	/	23.63	22.47	/
		1715	21.66	20.71	/	23.26	22.31	/
15M Hz	1 RB high	1772.5	22.7	22.56	/	24.30	24.16	/
		1745	23	22.7	/	24.60	24.30	/
		1717.5	22.67	22.36	/	24.27	23.96	/
	1 RB low	1772.5	22.83	22.52	/	24.43	24.12	/
		1745	22.79	22.69	/	24.39	24.29	/
		1717.5	22.53	22.36	/	24.13	23.96	/
	50% RB mid	1772.5	21.84	20.99	/	23.44	22.59	/
		1745	21.97	20.92	/	23.57	22.52	/
		1717.5	21.69	20.76	/	23.29	22.36	/
	100% RB	1772.5	21.84	20.97	/	23.44	22.57	/
		1745	21.9	21.09	/	23.50	22.69	/
		1717.5	21.6	20.58	/	23.20	22.18	/
20M Hz	1 RB high	1770	22.85	22.12	/	24.45	23.72	/
		1745	23.29	22.18	/	24.89	23.78	/
		1720	23.31	22.02	/	24.91	23.62	/
	1 RB low	1770	23.16	21.8	/	24.76	23.40	/
		1745	23.34	21.56	/	24.94	23.16	/
		1720	22.86	21.03	/	24.46	22.63	/
	50% RB mid	1770	21.9	21.04	/	23.50	22.64	/
		1745	22.07	20.98	/	23.67	22.58	/
		1720	21.65	20.72	/	23.25	22.32	/
	100% RB	1770	21.92	20.98	/	23.52	22.58	/
		1745	21.96	21.07	/	23.56	22.67	/
		1720	21.65	20.71	/	23.25	22.31	/

Sample:1770MHz

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

$$24.45\text{dBm} = 22.85\text{dBm} + (1.6\text{dBi})$$

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A.2 Emission Limit

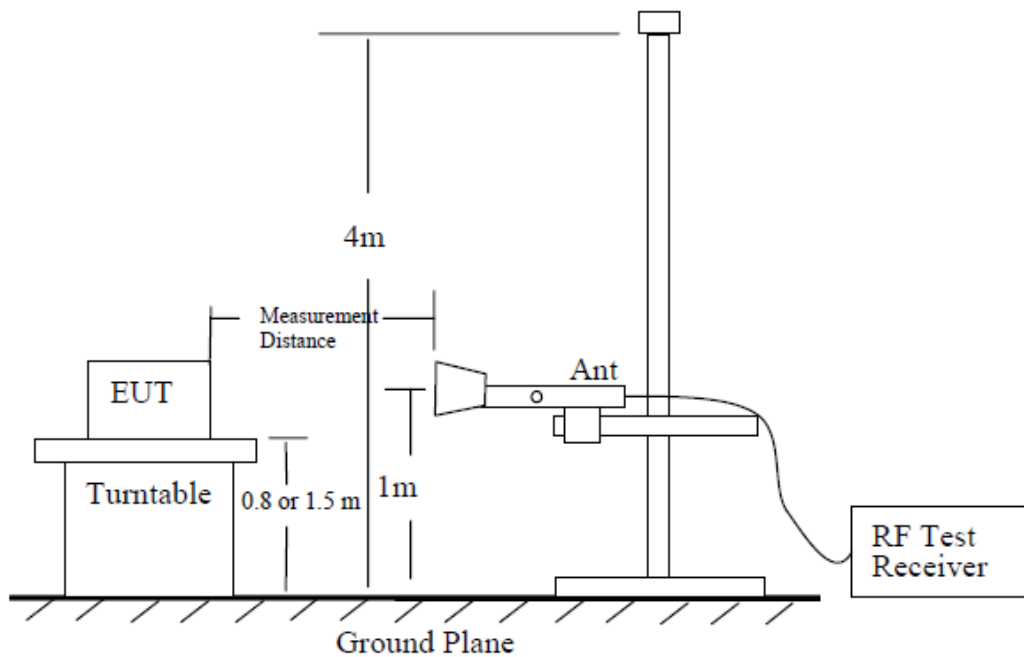
A.2.1 Measurement Method

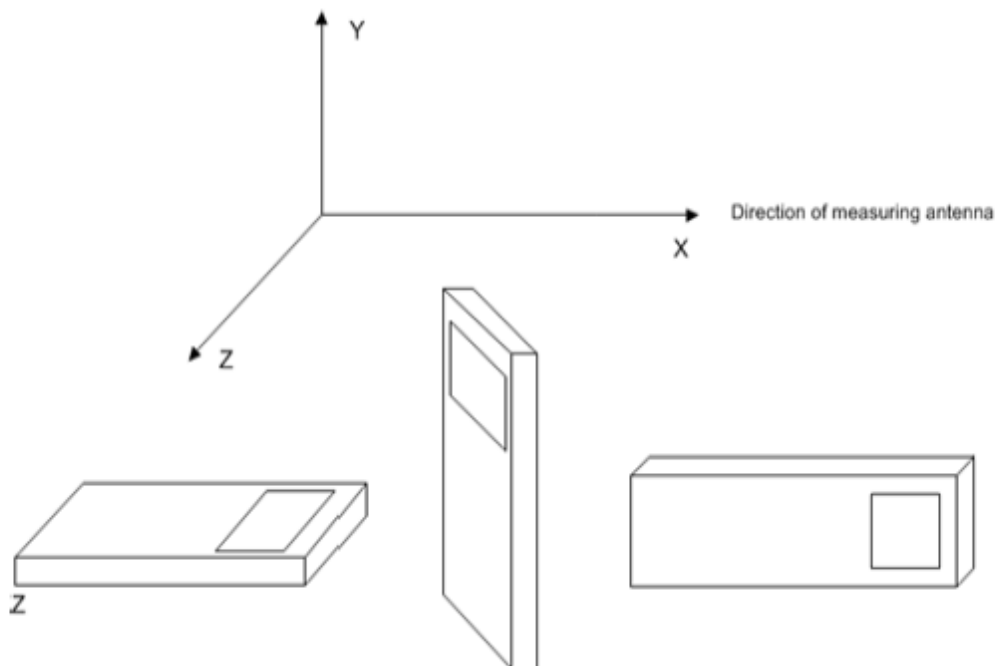
The measurements procedures in C63.26 are used. This measurement is carried out in fully anechoic chamber FAC-3.

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

The procedure of radiated spurious emissions is as follows:

Using the test configuration as follow, measure the radiated emissions directly from the EUT and convert the measured field strength or received power to ERP or EIRP, as required, for comparison to the applicable limits.





The emission characteristics of the EUT can be identified from the pre-scan measurement information.

Exploratory radiated measurements (pre-scans) may be performed to determine the general EUT radiated emissions characteristics and, when necessary, the EUT-to-measurement antenna orientation that produces the maximum emission amplitude. Pre-scans shall only be used to determine the emission frequencies (i.e., not amplitude levels). The information garnered from a pre-scan can then be used to perform final compliance measurements using either the substitution or direct field strength method.

For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80 cm above the reference ground plane. Radiated measurements shall be made with the measurement antenna positioned in both horizontal and vertical polarization. The measurement 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 (i.e., field strength or received power). When orienting the measurement antenna in vertical polarization, the minimum height of the lowest element of the antenna shall clear the site reference ground plane by at least 25 cm.

The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.

For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table or support at a nominal height of 1.5 m above the ground plane. When maximizing the emissions from the EUT for measurement, the EUT and its transmitting antenna(s) shall be rotated through 360°. For each mode of operation to be tested, the frequency spectrum (based on findings from exploratory measurements) shall be monitored. Final measurements shall be performed for the worst case combination(s) of variable technical parameters that result in the maximum measured emission amplitude, record the frequency and amplitude of the highest fundamental emission (if applicable), and the frequency and amplitude data for the six highest-amplitude spurious emissions.

A.2.2 Measurement Limit

FDD Band 7: 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. "

FDD Band 12: 27.53(g) specifies " 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 ".

FDD Band 13: 27.53(f) specifies " For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete 离散 emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation. "

FDD Band 2: 24.238 (a) specifies " *Out of band emissions.* 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."

FDD Band 66: 27.53(h) specifies " *AWS emission limits—(1) General protection levels.* Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB."

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of each LTE Band. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of each LTE Band into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this. The range of evaluated frequency is from 30MHz to 26GHz.

LTE Band 2, 1.4 MHz, QPSK, Channel 18607

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3702.02	-39.03	-6.42	8.48	-36.97	-13.00	23.97	V
5558.02	-36.48	-7.19	10.59	-33.08	-13.00	20.08	V
7406.01	-46.04	-8.13	12.09	-42.08	-13.00	29.08	H
9260.01	-40.35	-9.06	13.26	-36.15	-13.00	23.15	H
11117.01	-44.68	-9.76	13.18	-41.26	-13.00	28.26	H
13003.01	-49.02	-10.48	13.50	-46.00	-13.00	33.00	V

LTE Band 2, 1.4 MHz, QPSK, Channel 18900

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.02	-38.37	-6.26	8.56	-36.07	-13.00	23.07	V
5645.02	-38.97	-7.27	10.57	-35.67	-13.00	22.67	V
7524.01	-46.86	-8.29	12.22	-42.93	-13.00	29.93	H
9406.01	-45.06	-9.07	13.34	-40.79	-13.00	27.79	H
11293.01	-46.22	-9.95	13.14	-43.03	-13.00	30.03	H
13154.01	-48.10	-10.70	13.72	-45.08	-13.00	32.08	V

LTE Band 2, 1.4 MHz, QPSK, Channel 19193

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3819.02	-42.11	-6.08	8.65	-39.54	-13.00	26.54	V
5732.02	-38.93	-7.29	10.55	-35.67	-13.00	22.67	V
7641.01	-44.22	-8.16	12.31	-40.07	-13.00	27.07	H
9551.01	-45.60	-9.36	13.35	-41.61	-13.00	28.61	H
11466.01	-43.90	-9.90	13.11	-40.69	-13.00	27.69	H
13407.01	-47.53	-10.57	14.07	-44.03	-13.00	31.03	H

LTE Band 5, 1.4 MHz, QPSK, Channel 20407

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1650.01	-43.32	-3.57	5.23	2.15	-43.81	-13.00	30.81	V
2474.00	-42.88	-4.60	6.02	2.15	-43.61	-13.00	30.61	V
3299.02	-46.78	-5.29	7.72	2.15	-46.50	-13.00	33.50	V
4124.02	-37.28	-6.04	9.02	2.15	-36.45	-13.00	23.45	V
4950.01	-41.83	-6.69	9.85	2.15	-40.82	-13.00	27.82	V
5775.01	-52.74	-7.23	10.54	2.15	-51.58	-13.00	38.58	V

LTE Band 5, 1.4 MHz, QPSK, Channel 20525

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.01	-47.49	-3.58	5.19	2.15	-48.03	-13.00	35.03	V
2510.00	-44.33	-4.63	6.12	2.15	-44.99	-13.00	31.99	V
3346.02	-40.70	-5.31	7.83	2.15	-40.33	-13.00	27.33	V
4183.02	-35.55	-6.17	9.08	2.15	-34.79	-13.00	21.79	V
5021.01	-41.02	-6.57	9.93	2.15	-39.81	-13.00	26.81	V
5841.01	-52.91	-7.21	10.53	2.15	-51.74	-13.00	38.74	V

LTE Band 5, 1.4 MHz, QPSK, Channel 20643

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1697.01	-54.38	-3.60	5.15	2.15	-54.98	-13.00	41.98	V
2545.00	-47.30	-4.66	6.18	2.15	-47.93	-13.00	34.93	V
3394.02	-39.92	-5.36	7.95	2.15	-39.48	-13.00	26.48	V
4242.02	-35.43	-6.25	9.14	2.15	-34.69	-13.00	21.69	V
5091.01	-42.36	-6.75	10.03	2.15	-41.23	-13.00	28.23	V
5934.01	-53.34	-7.47	10.51	2.15	-52.45	-13.00	39.45	V

LTE Band 7, 5 MHz, QPSK, Channel 20775

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5005.33	-35.30	-6.59	9.91	-31.98	-25.00	6.98	V
7508.45	-48.28	-8.36	12.21	-44.43	-25.00	19.43	H
10011.10	-36.03	-9.21	12.90	-32.34	-25.00	7.34	V
12513.76	-42.96	-10.21	13.21	-39.96	-25.00	14.96	H
14996.25	-46.55	-11.21	14.00	-43.76	-25.00	18.76	H
17507.34	-44.50	-12.75	14.91	-42.34	-25.00	17.34	H

LTE Band 7, 5 MHz, QPSK, Channel 21100

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5071.02	-36.10	-6.69	10.00	-32.79	-25.00	7.79	V
7609.01	-43.29	-8.01	12.29	-39.01	-25.00	14.01	H
10156.01	-42.78	-9.37	12.96	-39.19	-25.00	14.19	V
12690.01	-44.59	-10.31	13.31	-41.59	-25.00	16.59	H
15209.00	-46.61	-11.39	13.87	-44.13	-25.00	19.13	H
17759.00	-44.42	-12.51	15.26	-41.67	-25.00	16.67	H

LTE Band 7, 5 MHz, QPSK, Channel 21425

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5135.02	-40.45	-6.86	10.09	-37.22	-25.00	12.22	V
7706.01	-41.90	-8.42	12.36	-37.96	-25.00	12.96	H
10280.01	-39.74	-9.57	13.01	-36.30	-25.00	11.30	H
12854.01	-39.66	-10.63	13.41	-36.88	-25.00	11.88	H
15428.00	-35.59	-11.43	13.74	-33.28	-25.00	8.28	H
17964.00	-44.56	-12.89	15.55	-41.90	-25.00	16.90	V

LTE Band 12, 1.4MHz, QPSK, Channel 23017

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1400.01	-46.93	-3.24	4.98	2.15	-47.34	-13.00	34.34	V
2099.00	-40.52	-4.19	4.90	2.15	-41.96	-13.00	28.96	V
2801.00	-52.75	-4.91	6.64	2.15	-53.17	-13.00	40.17	H
3499.02	-36.27	-5.52	8.20	2.15	-35.74	-13.00	22.74	V
4199.02	-45.53	-6.20	9.10	2.15	-44.78	-13.00	31.78	V
4899.01	-46.76	-6.73	9.80	2.15	-45.84	-13.00	32.84	V

LTE Band 12, 1.4MHz, QPSK, Channel 23095

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1415.01	-44.53	-3.25	5.06	2.15	-44.87	-13.00	31.87	V
2123.00	-43.77	-4.21	4.97	2.15	-45.16	-13.00	32.16	V
2843.00	-51.44	-4.96	6.72	2.15	-51.83	-13.00	38.83	H
3538.02	-34.27	-5.70	8.25	2.15	-33.87	-13.00	20.87	V
4246.02	-42.46	-6.24	9.15	2.15	-41.70	-13.00	28.70	V
4954.01	-43.69	-6.68	9.85	2.15	-42.67	-13.00	29.67	V

LTE Band 12, 1.4MHz, QPSK, Channel 23173

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1431.01	-41.99	-3.28	5.14	2.15	-42.28	-13.00	29.28	V
2146.00	-45.39	-4.24	5.04	2.15	-46.74	-13.00	33.74	V
2862.00	-49.09	-4.96	6.75	2.15	-49.45	-13.00	36.45	V
3577.02	-32.19	-6.10	8.31	2.15	-32.13	-13.00	19.13	H
4294.02	-40.82	-6.20	9.19	2.15	-39.98	-13.00	26.98	V
5009.01	-40.63	-6.59	9.91	2.15	-39.46	-13.00	26.46	V

LTE Band 13, 5MHz, QPSK, Channel 23205

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1559.46	-51.80	-3.47	5.39	0.00	-52.03	-40.00	12.03	V
2338.98	-40.62	-4.44	5.62	2.15	-41.59	-13.00	28.59	V
3118.52	-53.07	-5.38	7.28	2.15	-53.32	-13.00	40.32	H
3899.02	-52.75	-6.11	8.76	2.15	-52.25	-13.00	39.25	V
4678.52	-52.23	-6.49	9.58	2.15	-51.29	-13.00	38.29	V
5458.51	-47.61	-6.90	10.54	2.15	-46.12	-13.00	33.12	V

LTE Band 13, 5MHz, QPSK, Channel 23230

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1564.41	-49.96	-3.48	5.38	0.00	-50.21	-40.00	10.21	V
2346.70	-46.59	-4.45	5.64	2.15	-47.55	-13.00	34.55	V
3128.02	-52.49	-5.40	7.31	2.15	-52.73	-13.00	39.73	H
3911.02	-53.36	-6.12	8.78	2.15	-52.85	-13.00	39.85	V
4693.52	-47.45	-6.50	9.59	2.15	-46.51	-13.00	33.51	V
5478.01	-45.82	-6.98	10.57	2.15	-44.38	-13.00	31.38	V

LTE Band 13, 5MHz, QPSK, Channel 23255

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1569.40	-51.41	-3.48	5.38	0.00	-51.66	-40.00	11.66	V
2354.16	-41.87	-4.46	5.66	2.15	-42.82	-13.00	29.82	V
3141.52	-52.69	-5.38	7.34	2.15	-52.88	-13.00	39.88	V
3914.02	-54.73	-6.12	8.78	2.15	-54.22	-13.00	41.22	V
4708.02	-47.94	-6.51	9.61	2.15	-46.99	-13.00	33.99	V
5495.51	-44.93	-7.04	10.59	2.15	-43.53	-13.00	30.53	V

LTE Band 66, 1.4MHz QPSK, Channel 131979

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3422.02	-59.77	-5.38	8.01	-57.14	-13.00	44.14	V
5138.02	-60.32	-6.86	10.09	-57.09	-13.00	44.09	V
6846.01	-59.76	-7.83	11.42	-56.17	-13.00	43.17	H
8557.01	-41.71	-8.57	13.01	-37.27	-13.00	24.27	H
10268.01	-56.24	-9.53	13.01	-52.76	-13.00	39.76	H
11981.01	-47.56	-10.14	13.00	-44.70	-13.00	31.70	H

LTE Band 66, 1.4MHz, QPSK, Channel 132322

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3490.02	-59.13	-5.50	8.18	-56.45	-13.00	43.45	H
5240.02	-61.50	-7.00	10.24	-58.26	-13.00	45.26	V
6984.01	-54.74	-8.17	11.58	-51.33	-13.00	38.33	H
8729.01	-44.92	-8.45	13.05	-40.32	-13.00	27.32	H
10480.01	-51.96	-9.68	13.09	-48.55	-13.00	35.55	H
12230.01	-48.39	-10.04	13.09	-45.34	-13.00	32.34	H

LTE Band 66, 1.4MHz, QPSK, Channel 132665

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3559.02	-51.82	-5.92	8.28	-49.46	-13.00	36.46	V
5343.02	-53.49	-6.95	10.38	-50.06	-13.00	37.06	V
7119.01	-52.92	-8.16	11.74	-49.34	-13.00	36.34	H
8898.01	-41.40	-8.84	13.08	-37.16	-13.00	24.16	H
10682.01	-47.97	-9.30	13.14	-44.13	-13.00	31.13	H
12465.01	-50.32	-10.27	13.19	-47.40	-13.00	34.40	H

Sample: 3559.02MHz

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

$$\text{Power (-49.46dBm)} = P_{\text{Mea}} - 51.82\text{dBm} + P_{\text{pl}} (-5.92 \text{ dB}) + G_{\text{a}}(8.28 \text{ dBi})$$

Note: Expanded measurement uncertainty is U = 5.16 dB, k = 2.

A.3 Frequency Stability

A.3.1 Method of Measurement

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

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

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMW500, and in a simulated call on middle channel for each LTE band, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°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 center channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 °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.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of the lower, higher and nominal voltage. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress.

A.3.2 Measurement results

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

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	12	1850.865	1909.199		
50				-0.83	0.0004
40				0.03	0.0000
30				0.92	0.0005
10				-0.43	0.0002
0				0.09	0.0000
-10				-1.62	0.0009
-20				-1.03	0.0005
-30				-1.12	0.0006

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
10.2	20	1850.865	1909.199	-1.23	0.0007
13.8				-2.17	0.0012

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

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	12	824.433	848.567		
50				0.04	0.0000
40				-0.44	0.0005
30				-0.96	0.0011
10				0.94	0.0011
0				-0.30	0.0004
-10				-1.30	0.0016
-20				-1.09	0.0013
-30				0.96	0.0011

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
10.2	20	824.433	848.567	-0.14	0.0002
13.8				8.57	0.0102

LTE Band 7, 20MHz bandwidth QPSK (worst case of all bandwidths)
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	12	2500.897	2569.103		
50				0.10	0.0000
40				-0.41	0.0002
30				-1.36	0.0005
10				-0.44	0.0002
0				0.11	0.0000
-10				-1.32	0.0005
-20				0.87	0.0003
-30				-2.39	0.0009

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
10.2	20	2500.897	2569.103	1.22	0.0005
13.8				-1.30	0.0005

LTE Band 12, 10MHz bandwidth QPSK (worst case of all bandwidths)
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	12	699.481	715.519		
50				0.36	0.0005
40				0.63	0.0009
30				-0.09	0.0001
10				0.60	0.0008
0				0.06	0.0001
-10				0.72	0.0010
-20				0.87	0.0012
-30				0.16	0.0002

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
10.2	20	699.481	715.519	0.07	0.0001
13.8				0.57	0.0008

LTE Band 13, 10MHz bandwidth QPSK (worst case of all bandwidths)
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	12	777.465	786.519		
50				-0.37	0.0005
40				0.10	0.0001
30				0.83	0.0011
10				0.21	0.0003
0				0.53	0.0007
-10				-0.23	0.0003
-20				0.07	0.0001
-30				-0.84	0.0011

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
10.2	20	777.465	786.519	-0.50	0.0006
13.8				0.00	0.0000

LTE Band 66, 20MHz bandwidth QPSK (worst case of all bandwidths)
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	12	1710.865	1779.199		
50				0.47	0.0003
40				-0.06	0.0000
30				1.50	0.0009
10				0.36	0.0002
0				0.26	0.0001
-10				-0.86	0.0005
-20				1.77	0.0010
-30				-0.59	0.0003

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
10.2	20	1710.865	1779.199	0.16	0.0001
13.8				1.57	0.0009

A.4 Occupied Bandwidth

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

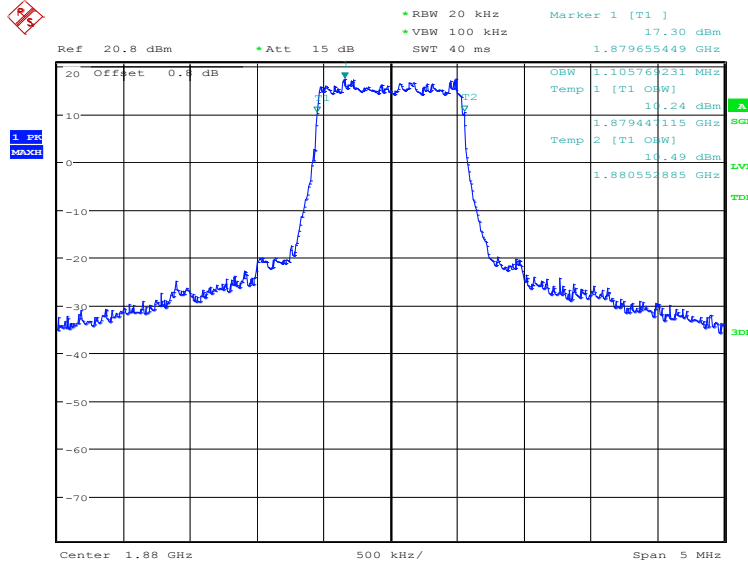
The measurement method is from ANSI C63.26:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts.
- b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times$ RBW.
- c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
- d) Set the detection mode to peak, and the trace mode to max-hold.

LTE band 2, 1.4MHz (99%)

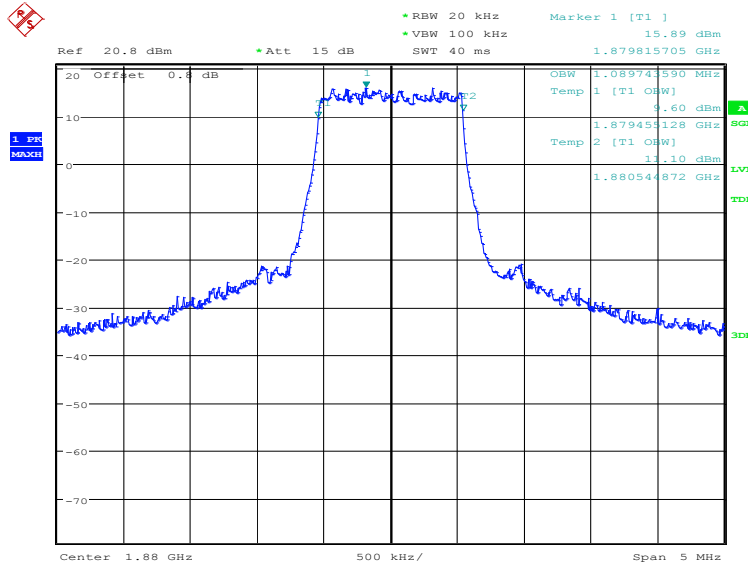
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	1105.77	1089.74

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



Date: 16.JUN.2021 17:52:16

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

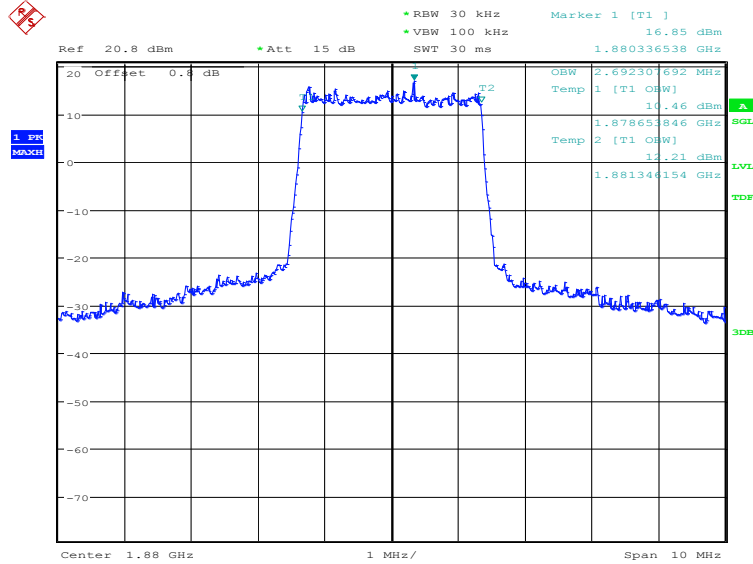


Date: 16.JUN.2021 17:52:56

LTE band 2, 3MHz (99%)

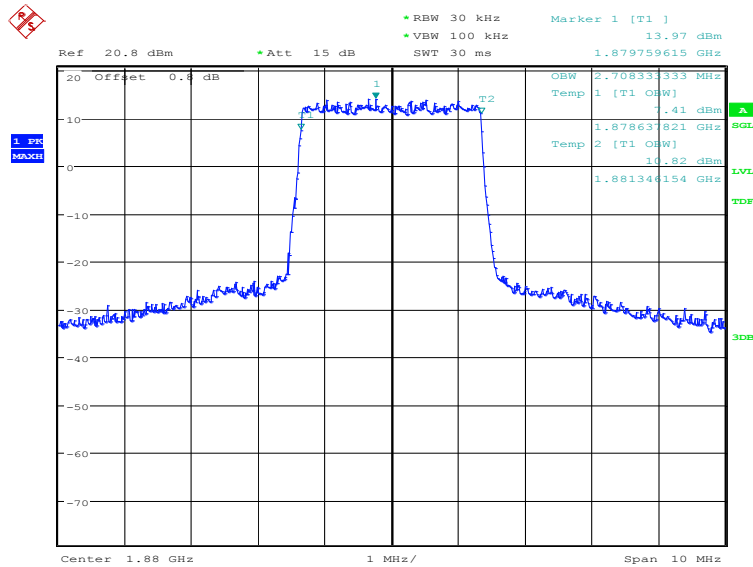
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	2692.31	2708.33

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



Date: 16.JUN.2021 17:53:37

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

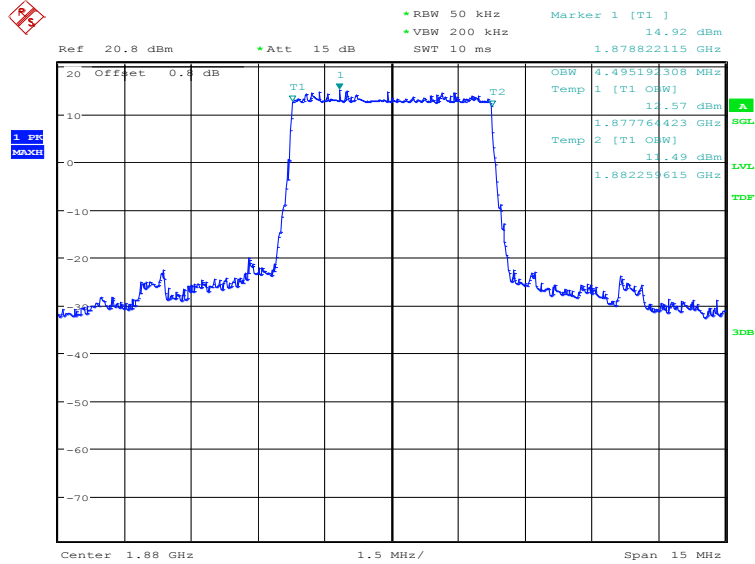


Date: 16.JUN.2021 17:54:16

LTE band 2, 5MHz (99%)

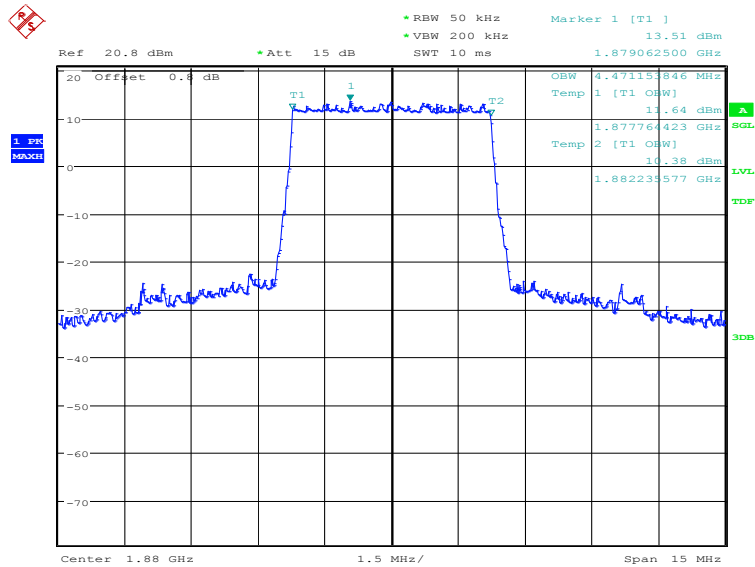
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	4495.19	4471.15

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



Date: 16.JUN.2021 17:54:57

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

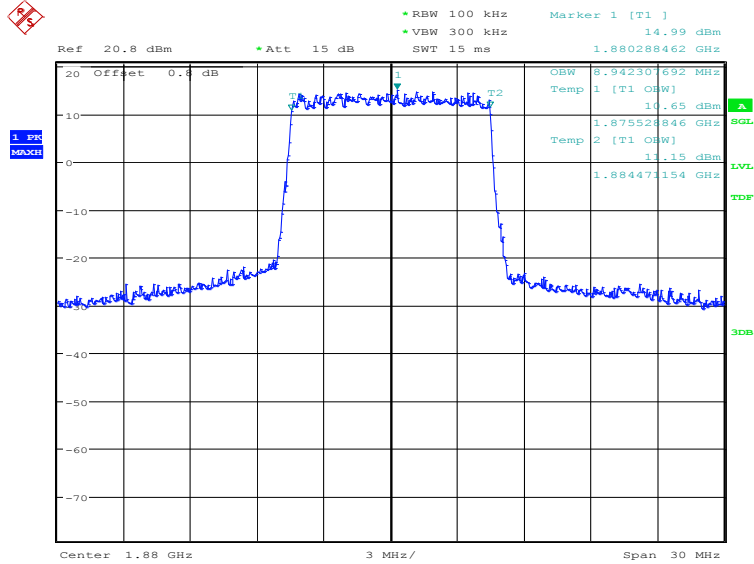


Date: 16.JUN.2021 17:55:36

LTE band 2, 10MHz (99%)

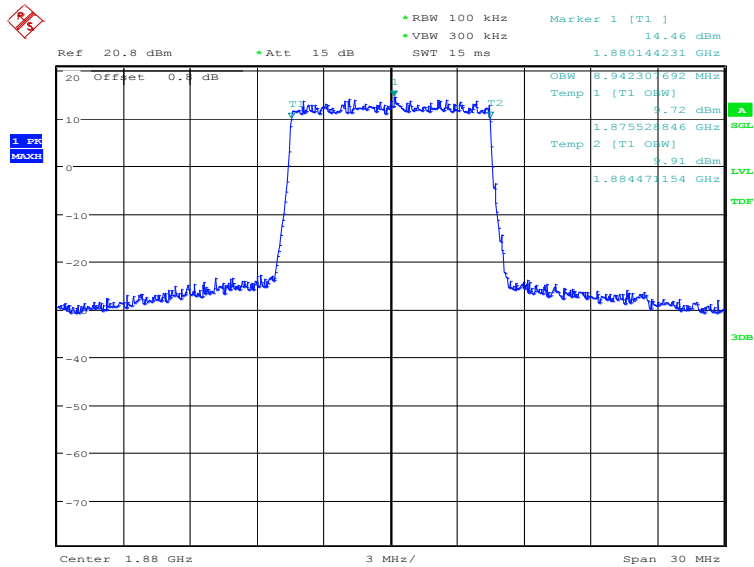
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	8942.31	8942.31

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



Date: 16.JUN.2021 17:56:17

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

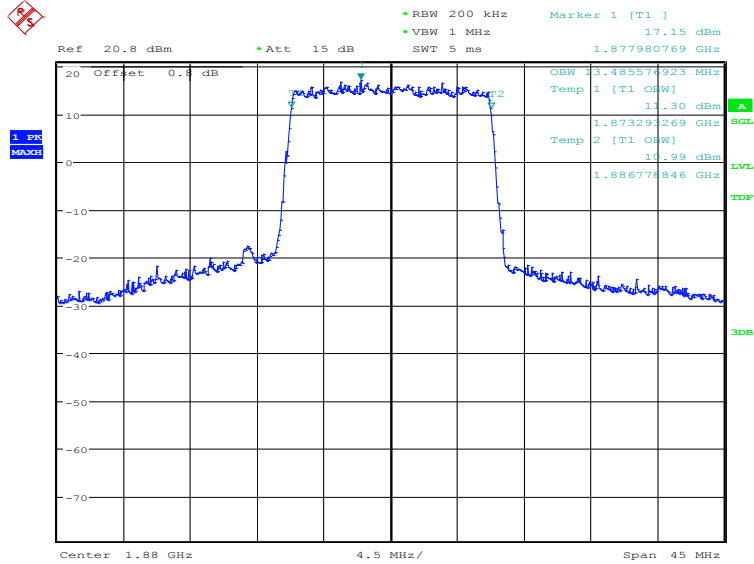


Date: 16.JUN.2021 17:56:57

LTE band 2, 15MHz (99%)

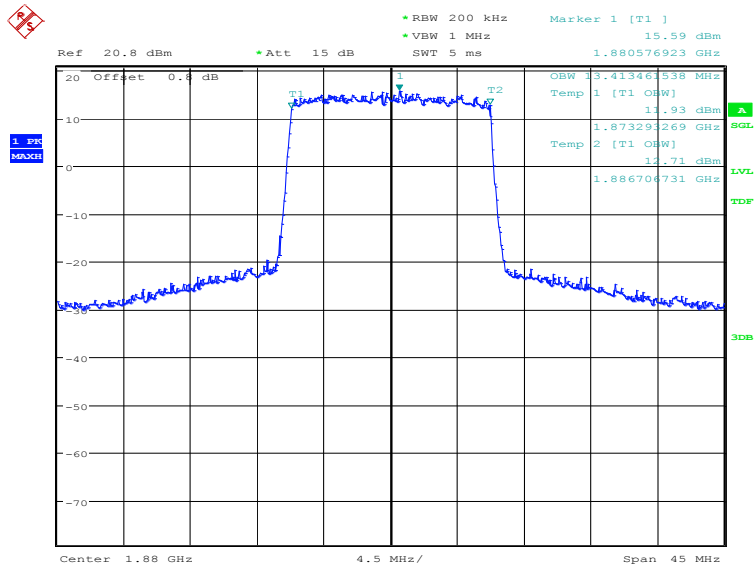
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	1880.0	QPSK
	13485.58	13413.46

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



Date: 16.JUN.2021 17:57:37

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

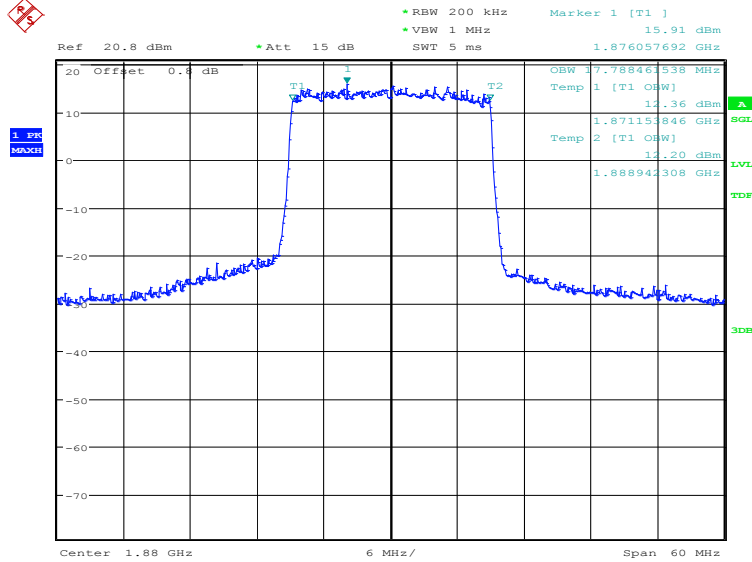


Date: 16.JUN.2021 17:58:17

LTE band 2, 20MHz (99%)

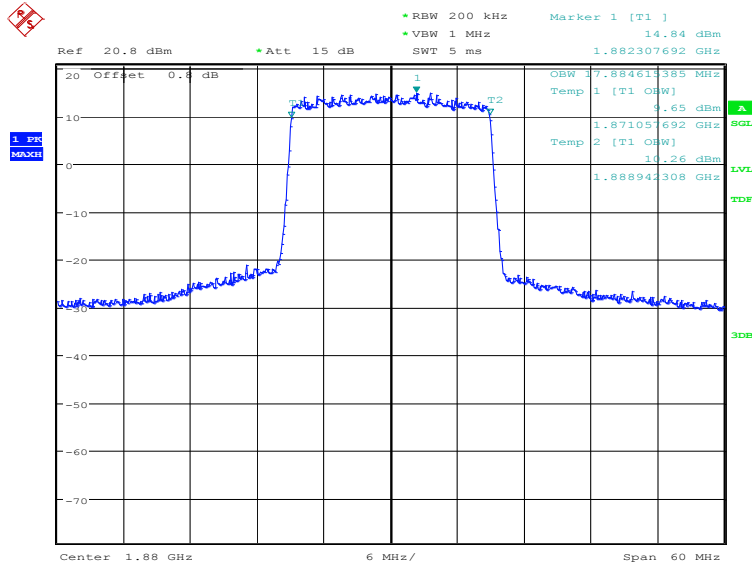
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	17788.46	17884.62

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



Date: 16.JUN.2021 17:58:58

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

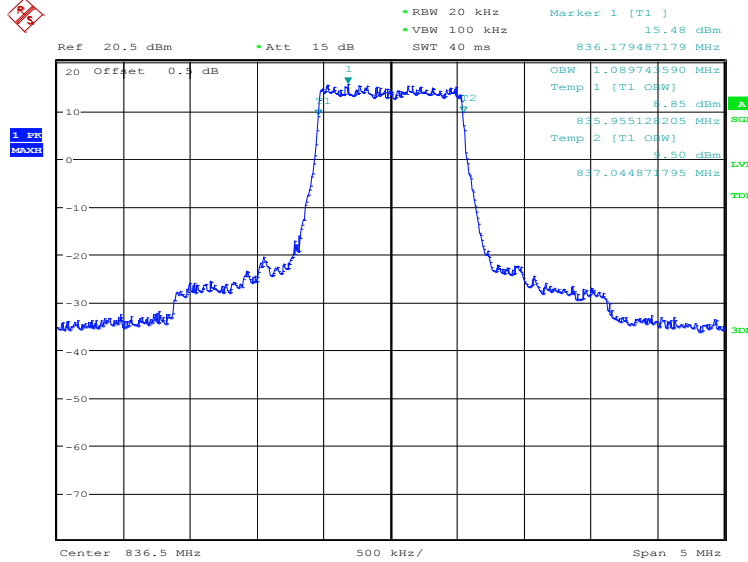


Date: 16.JUN.2021 17:59:37

LTE band 5, 1.4MHz (99%)

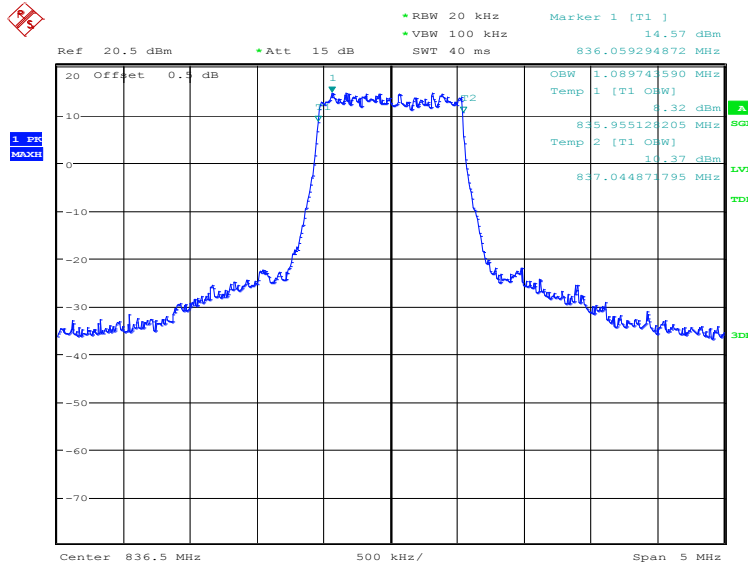
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	1089.74	1089.74

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



Date: 16.JUN.2021 18:01:24

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

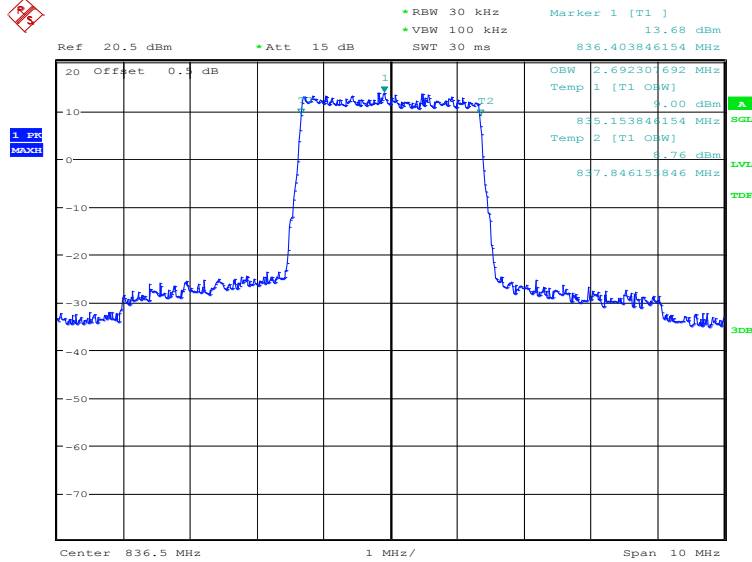


Date: 16.JUN.2021 18:02:03

LTE band 5, 3MHz (99%)

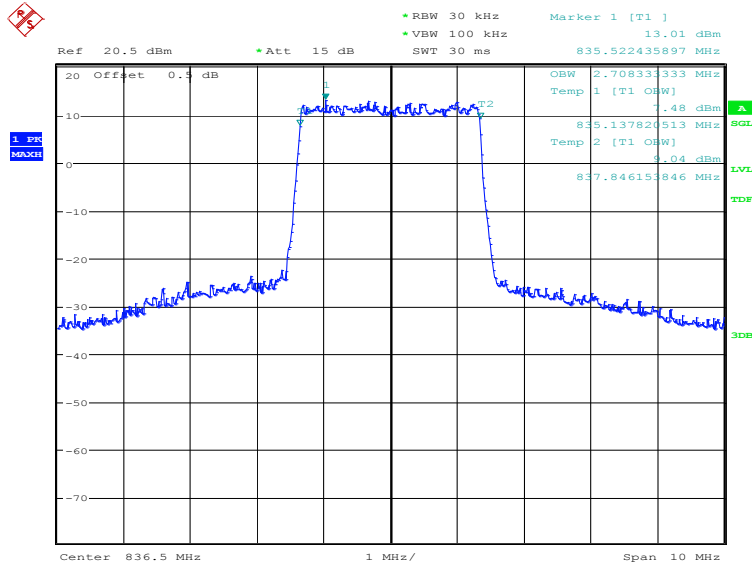
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	2692.31	2708.33

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



Date: 16.JUN.2021 18:02:44

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

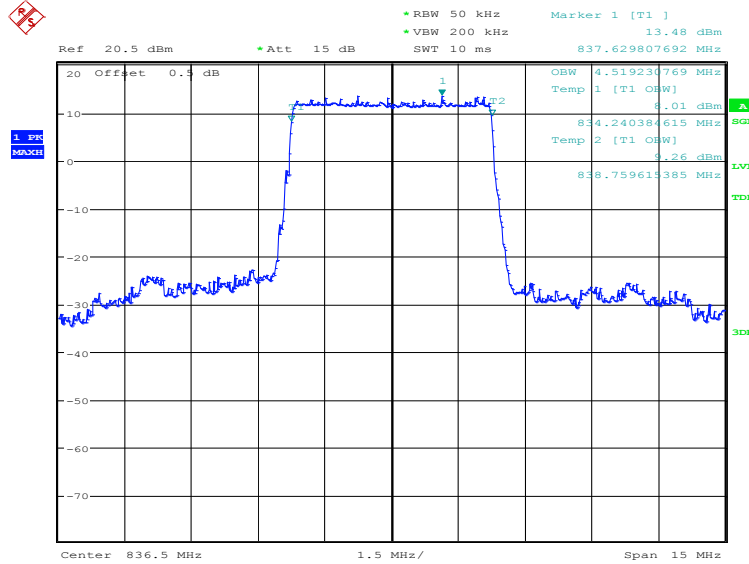


Date: 16.JUN.2021 18:03:24

LTE band 5, 5MHz (99%)

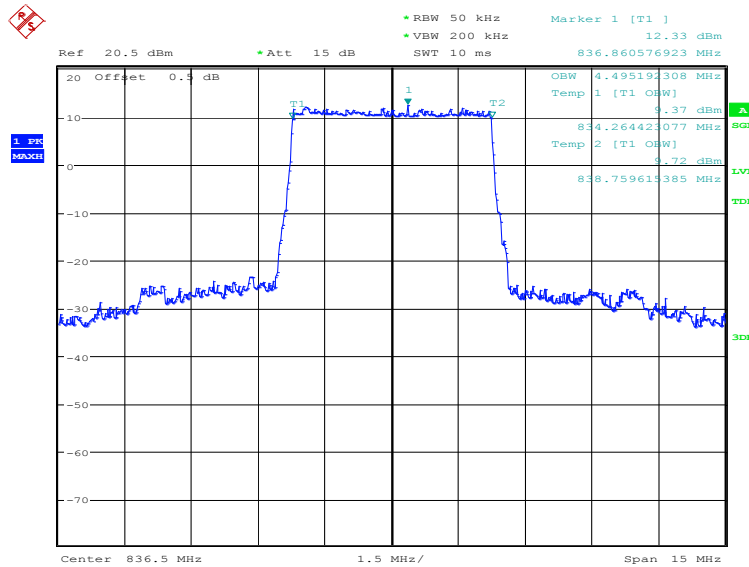
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	4519.23	4495.19

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



Date: 16.JUN.2021 18:04:05

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

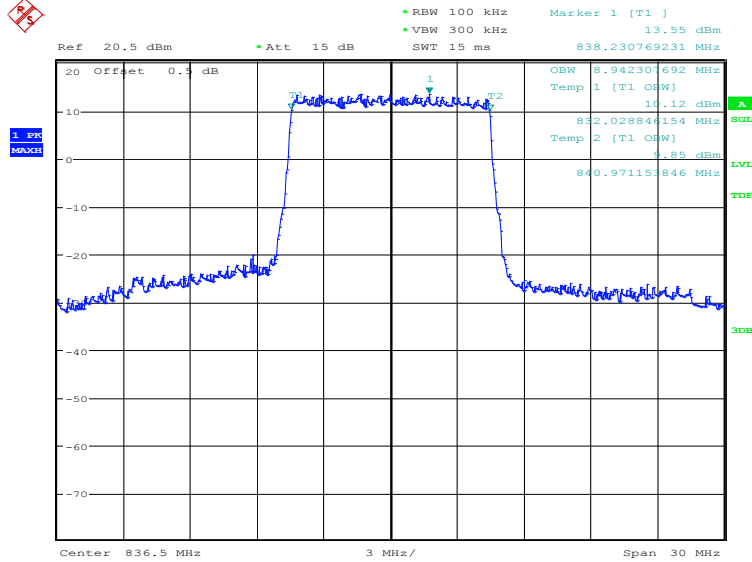


Date: 16.JUN.2021 18:04:44

LTE band 5, 10MHz (99%)

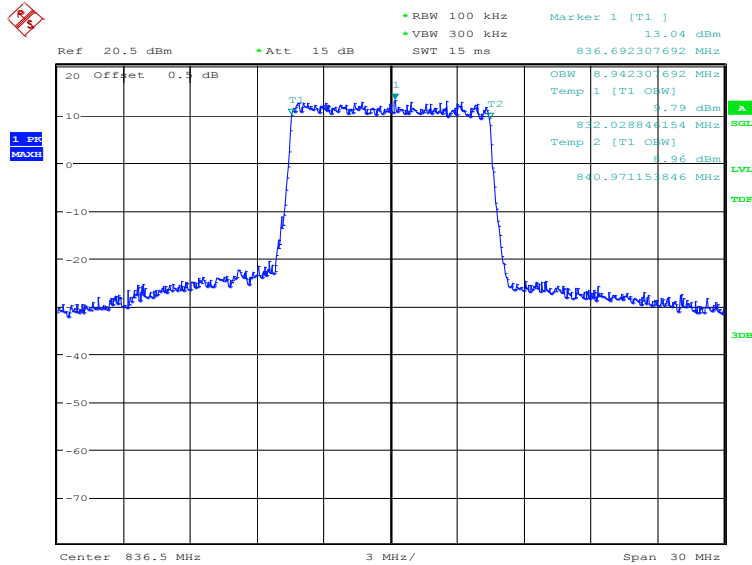
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	8942.31	8942.31

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



Date: 16.JUN.2021 18:05:25

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

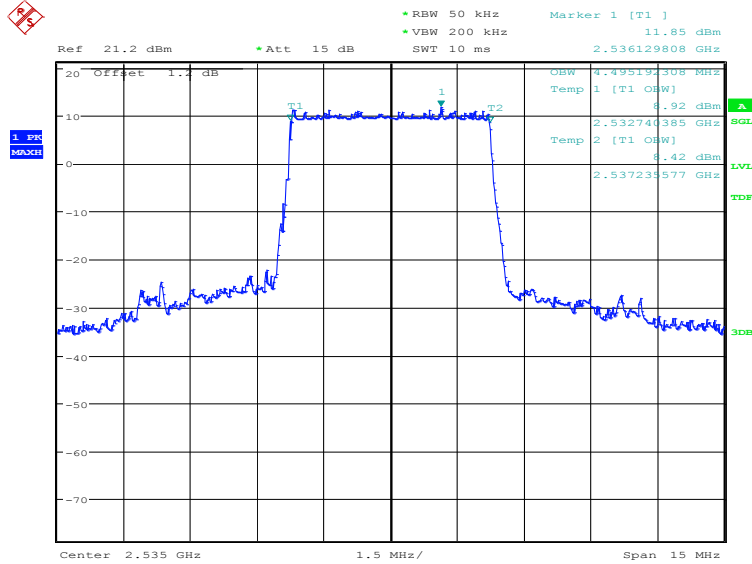


Date: 16.JUN.2021 18:06:04

LTE band 7, 5MHz (99%)

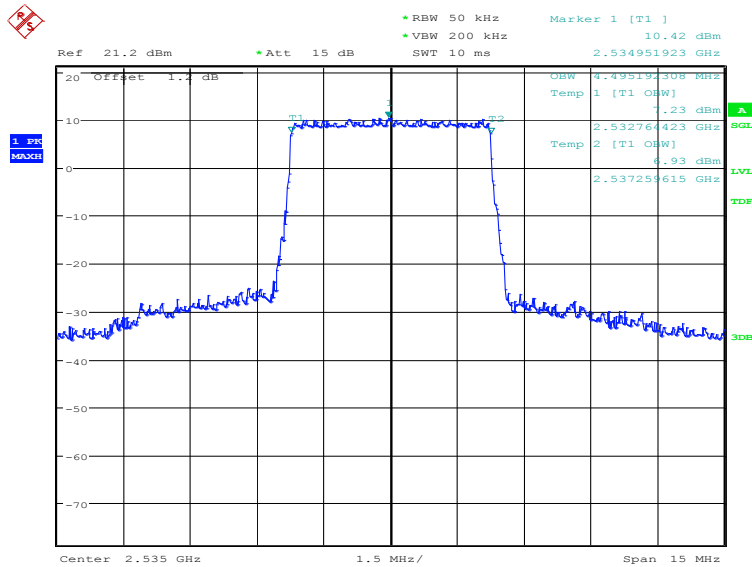
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	4495.19	4495.19

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



Date: 16.JUN.2021 18:06:47

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

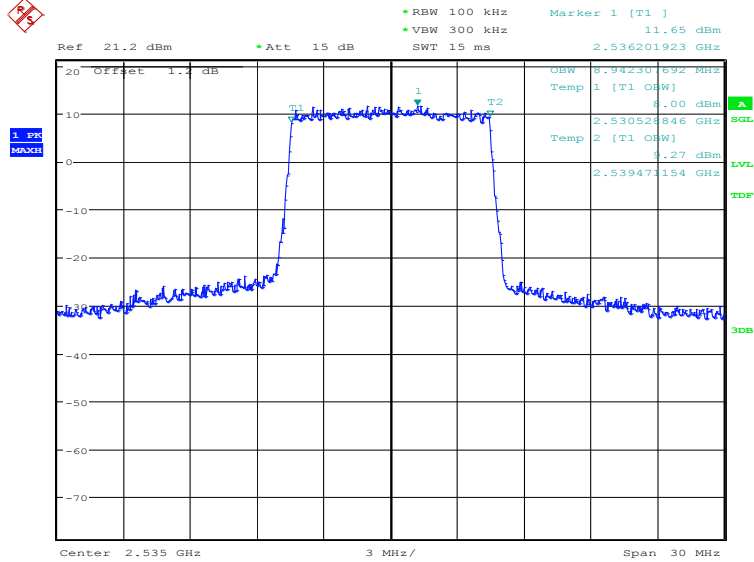


Date: 16.JUN.2021 18:07:26

LTE band 7, 10MHz (99%)

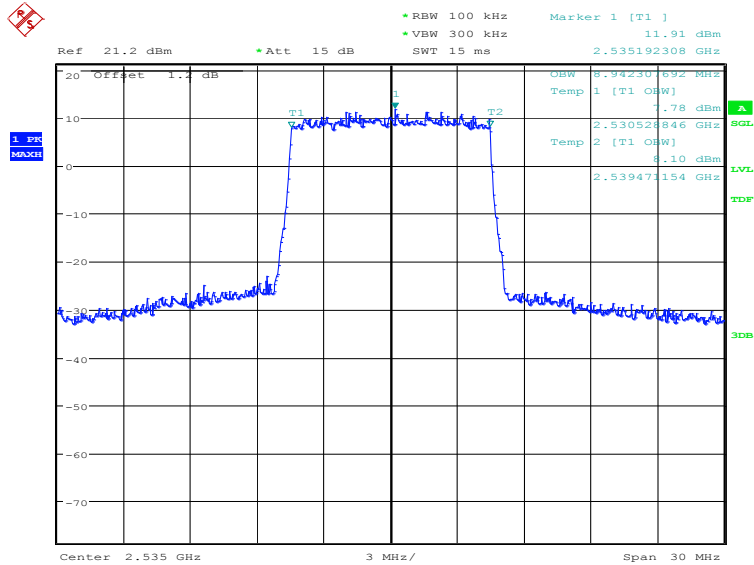
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	8942.31	8942.31

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



Date: 16.JUN.2021 18:08:07

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

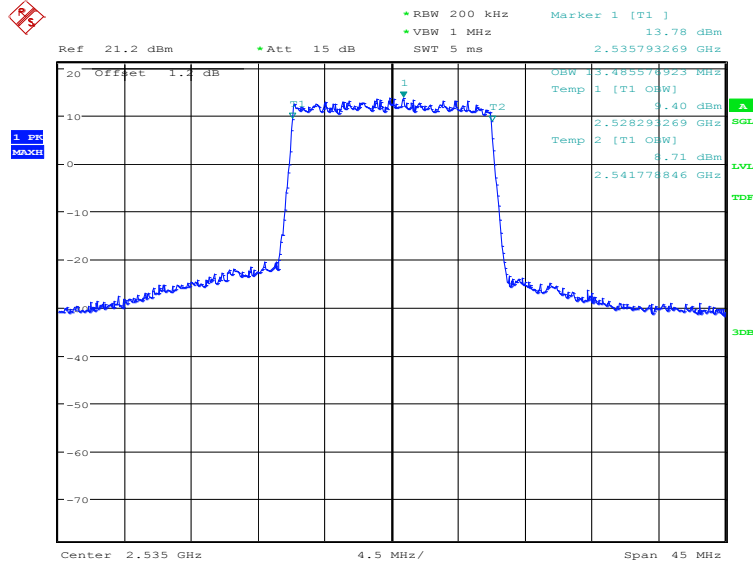


Date: 16.JUN.2021 18:08:46

LTE band 7, 15MHz (99%)

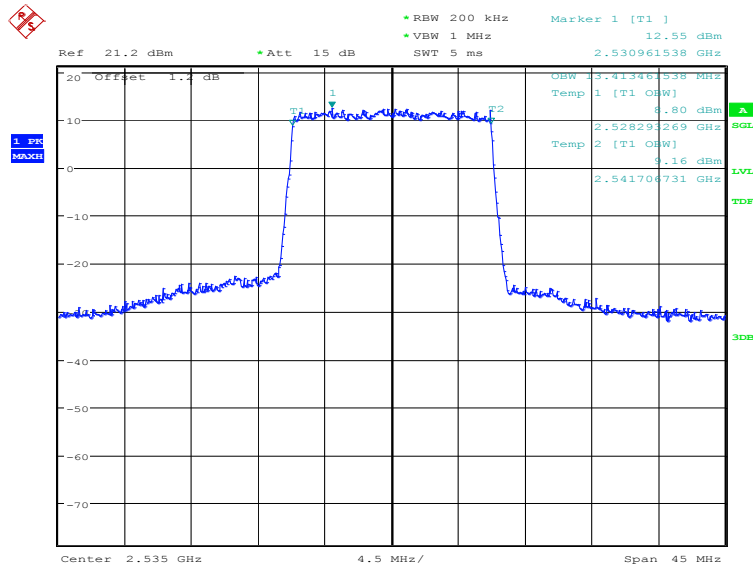
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	13485.58	13413.46

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



Date: 16.JUN.2021 18:09:27

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

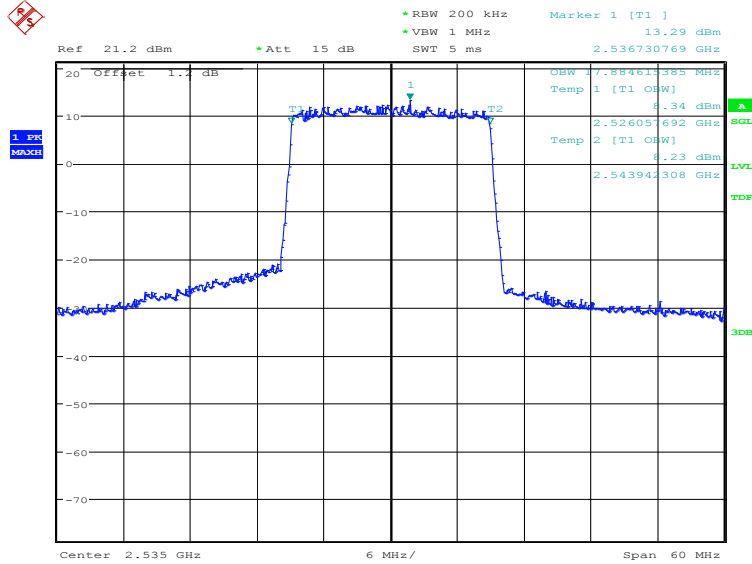


Date: 16.JUN.2021 18:10:07

LTE band 7, 20MHz (99%)

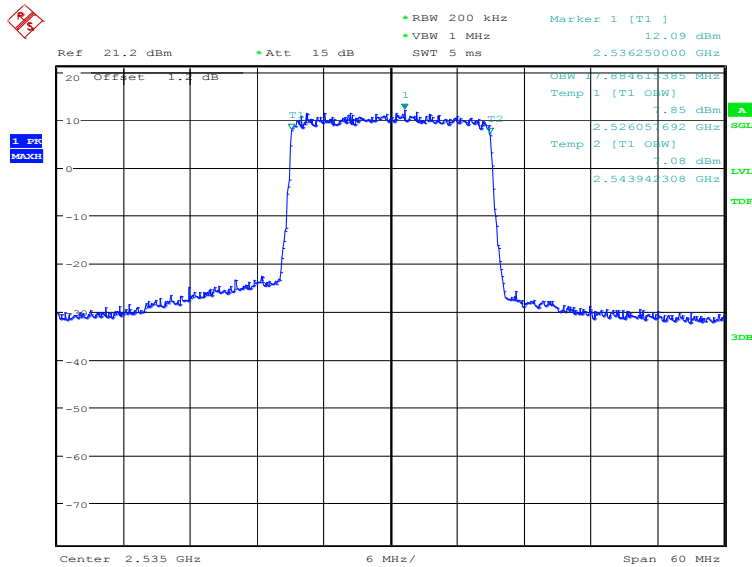
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	17884.62	17884.62

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



Date: 16.JUN.2021 18:10:48

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

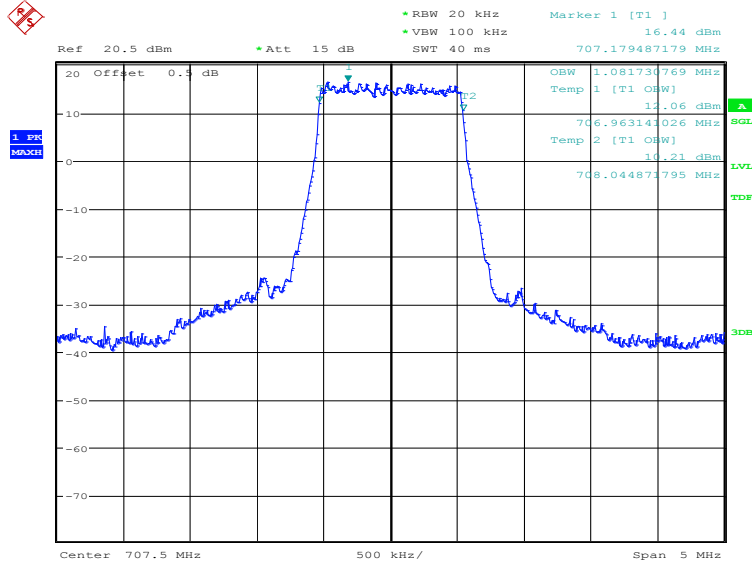


Date: 16.JUN.2021 18:11:27

LTE band 12, 1.4MHz (99%)

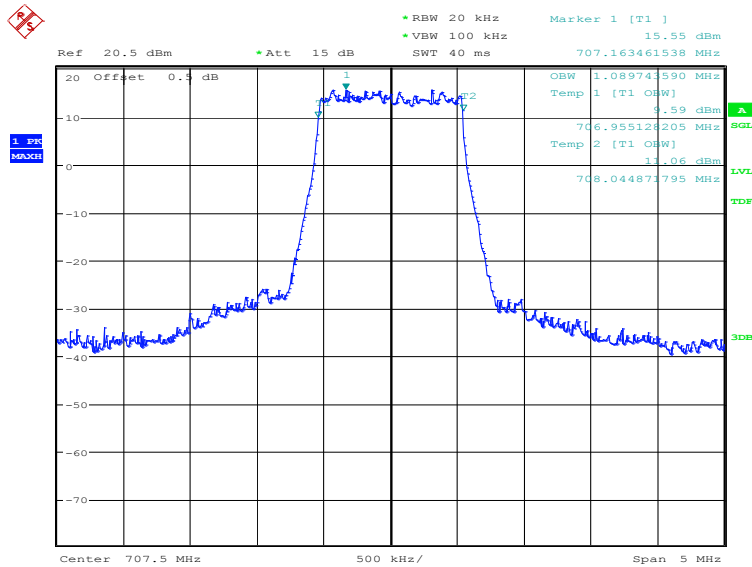
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	1081.73	1089.74

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



Date: 16.JUN.2021 18:12:56

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

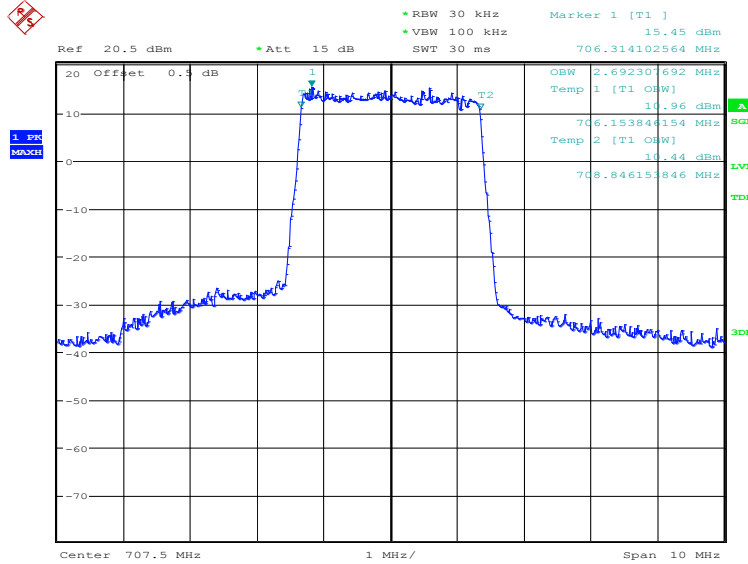


Date: 16.JUN.2021 18:13:36

LTE band 12, 3MHz (99%)

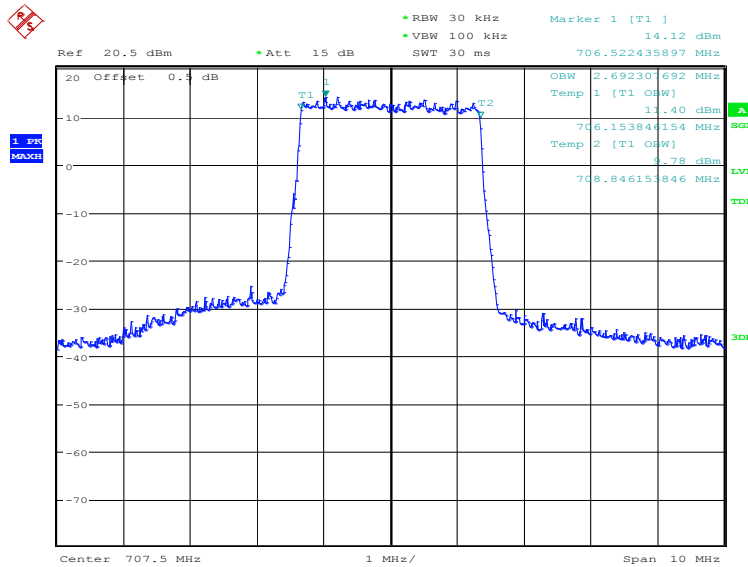
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	2692.31	2692.31

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



Date: 16.JUN.2021 18:14:16

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

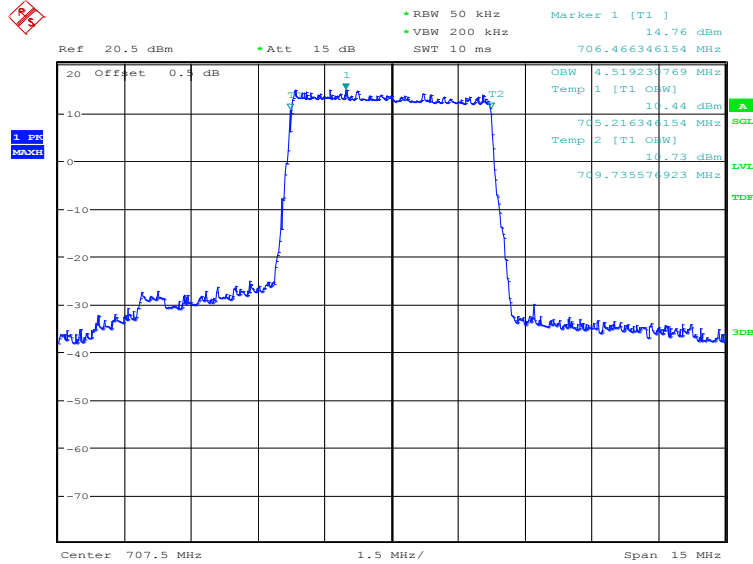


Date: 16.JUN.2021 18:14:56

LTE band 12, 5MHz (99%)

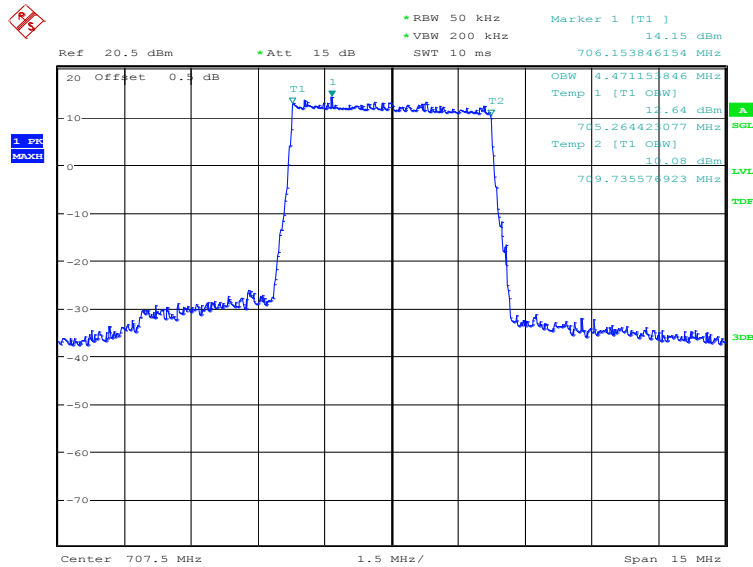
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	4519.23	4471.15

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



Date: 16.JUN.2021 18:15:37

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

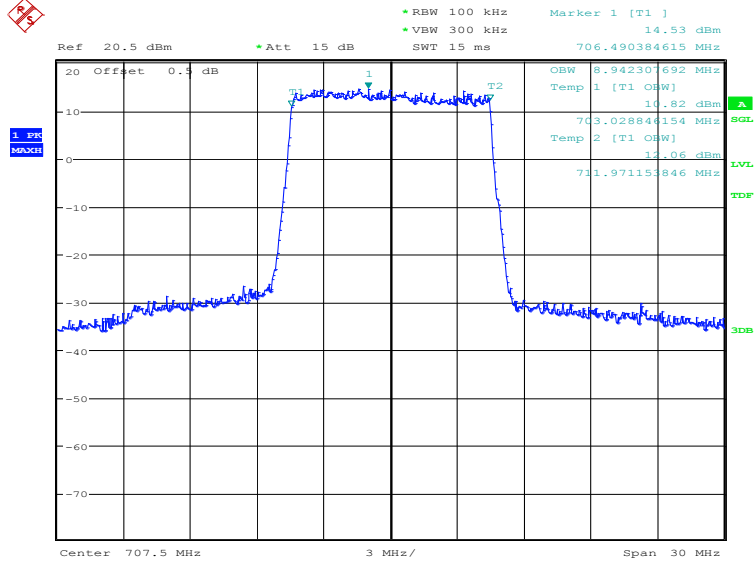


Date: 16.JUN.2021 18:16:16

LTE band 12, 10MHz (99%)

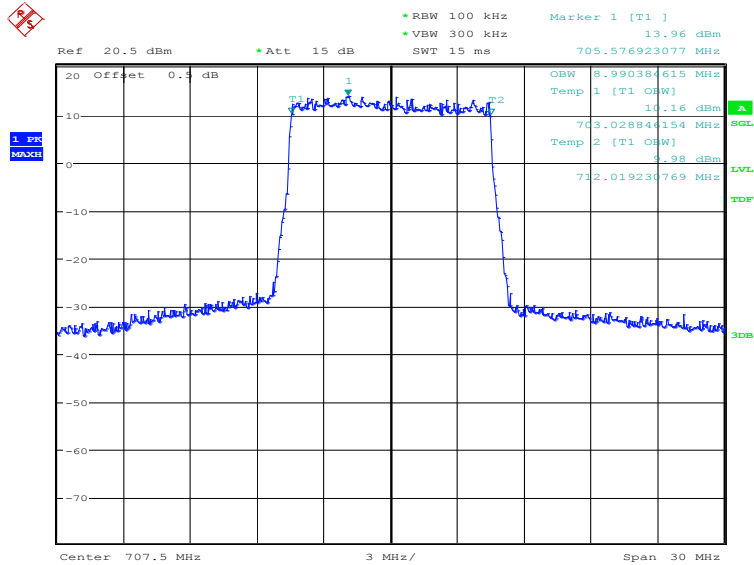
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	8942.31	8990.38

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



Date: 16.JUN.2021 18:16:57

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

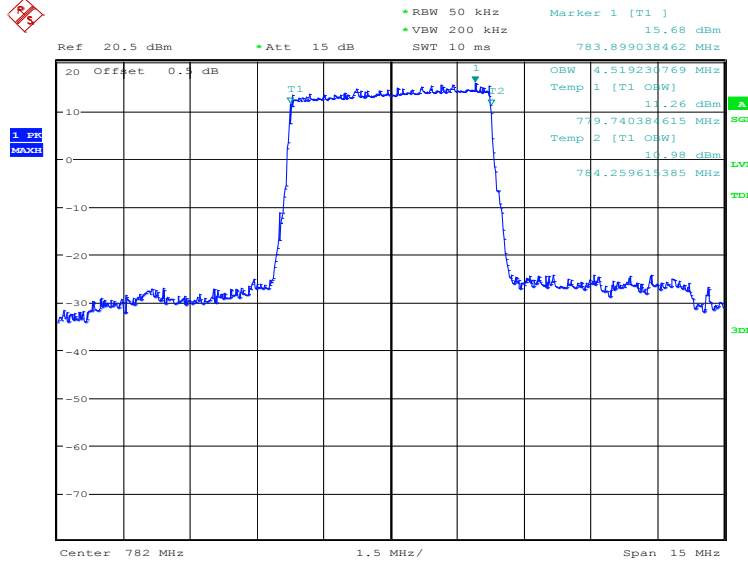


Date: 16.JUN.2021 18:17:36

LTE band 13, 5MHz (99%)

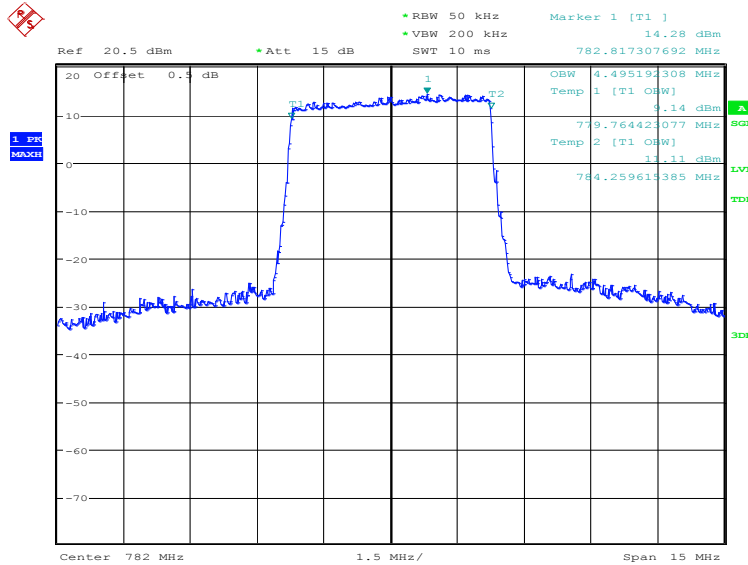
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
782.0	QPSK	16QAM
	4519.23	4495.19

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



Date: 16.JUN.2021 18:18:19

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

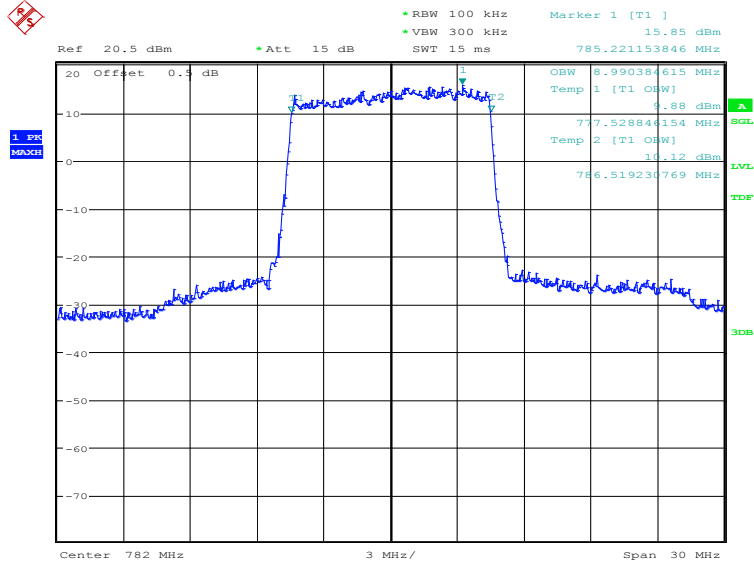


Date: 16.JUN.2021 18:18:58

LTE band 13, 10MHz (99%)

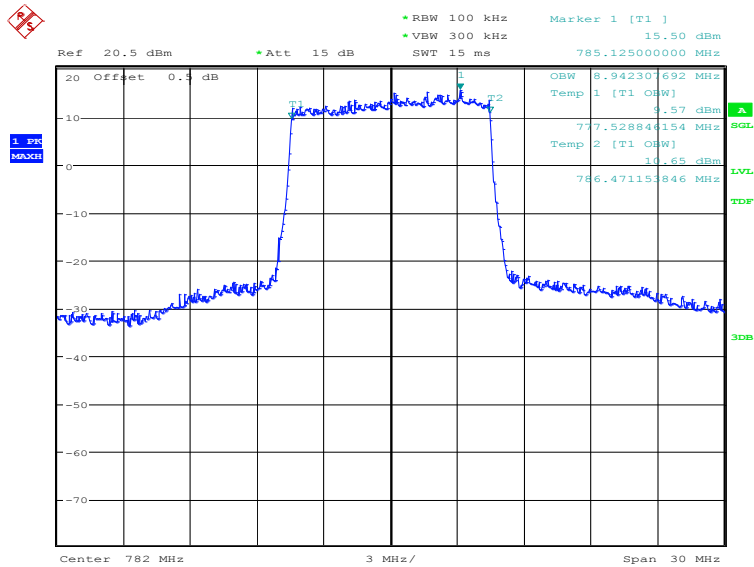
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
782.0	QPSK	16QAM
	8990.38	8942.31

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



Date: 16.JUN.2021 18:19:39

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

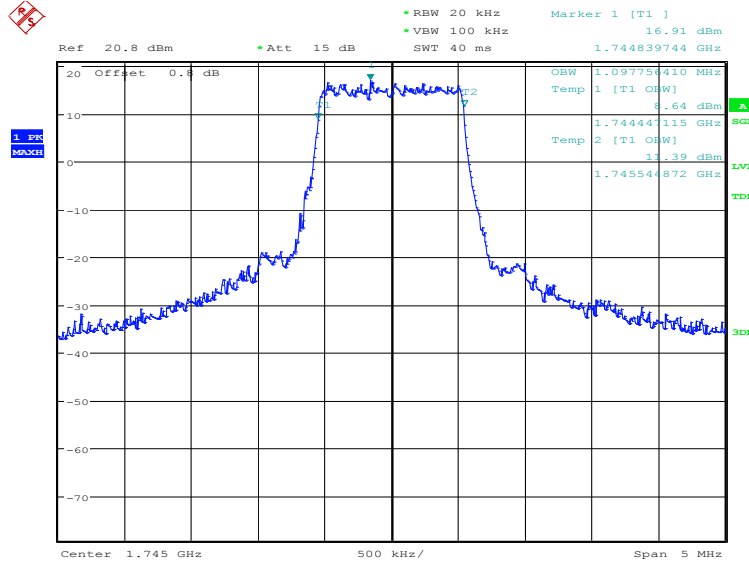


Date: 16.JUN.2021 18:20:18

LTE band 66, 1.4MHz (99%)

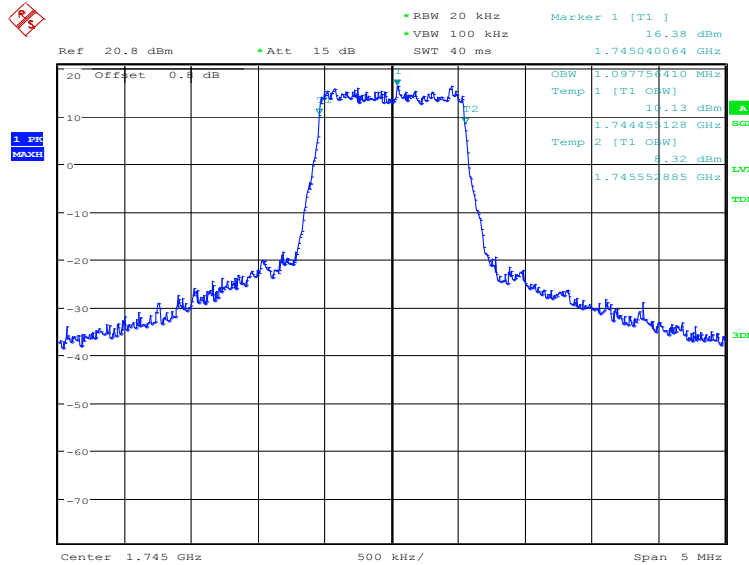
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	1097.76	1097.76

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



Date: 16.JUN.2021 18:21:02

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

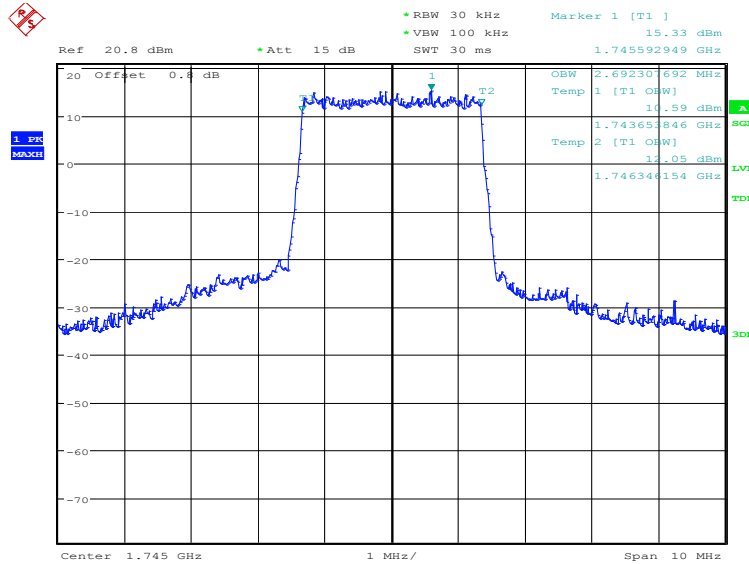


Date: 16.JUN.2021 18:21:41

LTE band 66, 3MHz (99%)

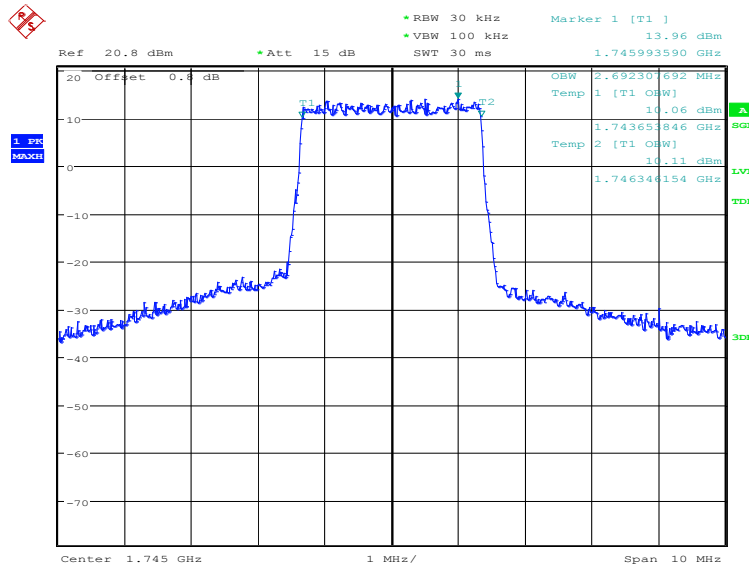
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	2692.31	2692.31

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



Date: 16.JUN.2021 18:22:23

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

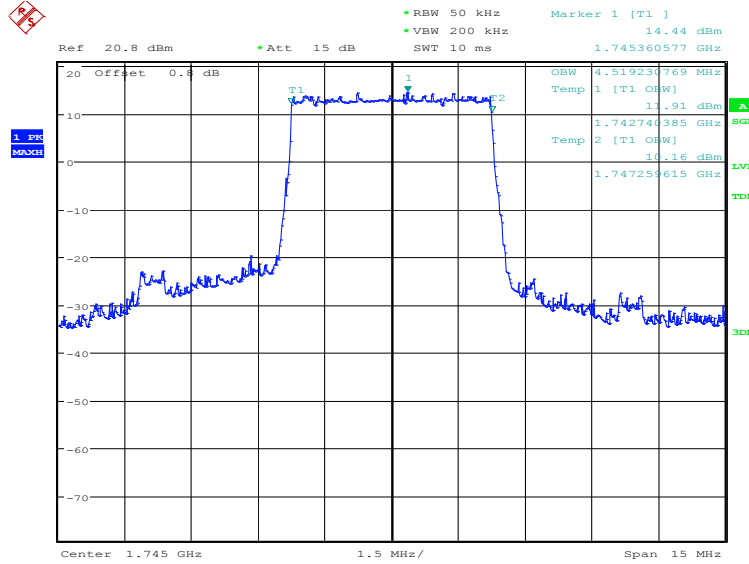


Date: 16.JUN.2021 18:23:02

LTE band 66, 5MHz (99%)

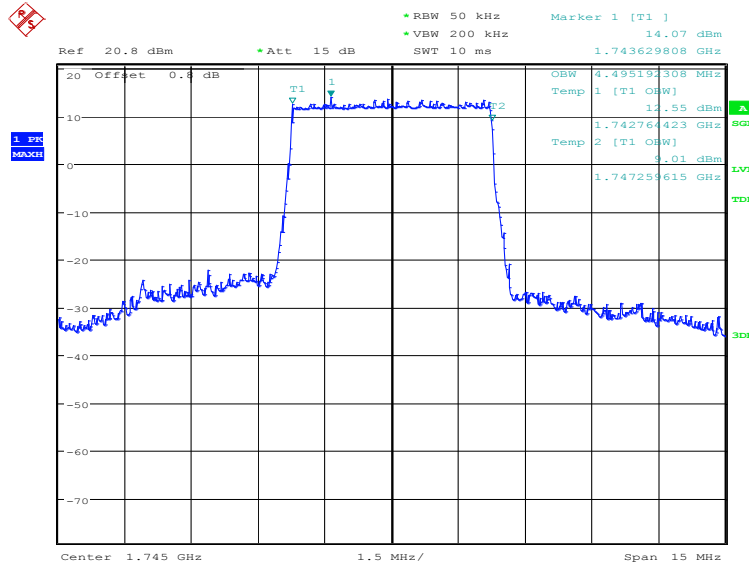
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	4519.23	4495.19

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



Date: 16.JUN.2021 18:23:43

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

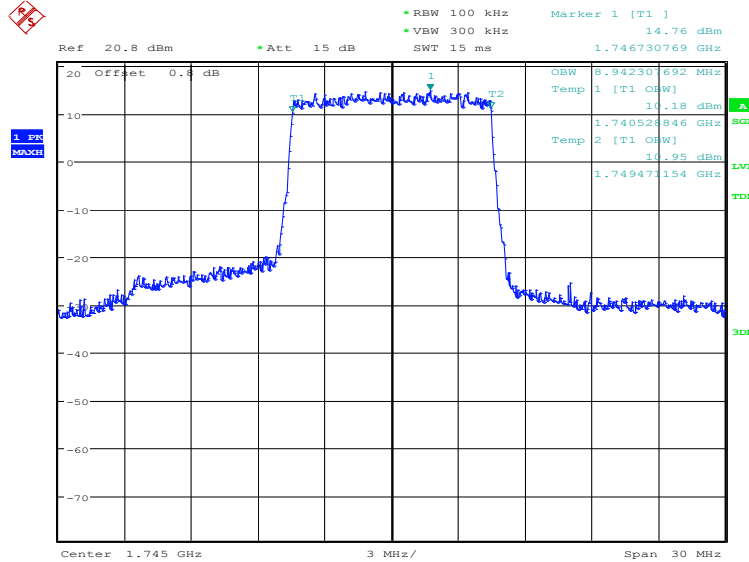


Date: 16.JUN.2021 18:24:23

LTE band 66, 10MHz (99%)

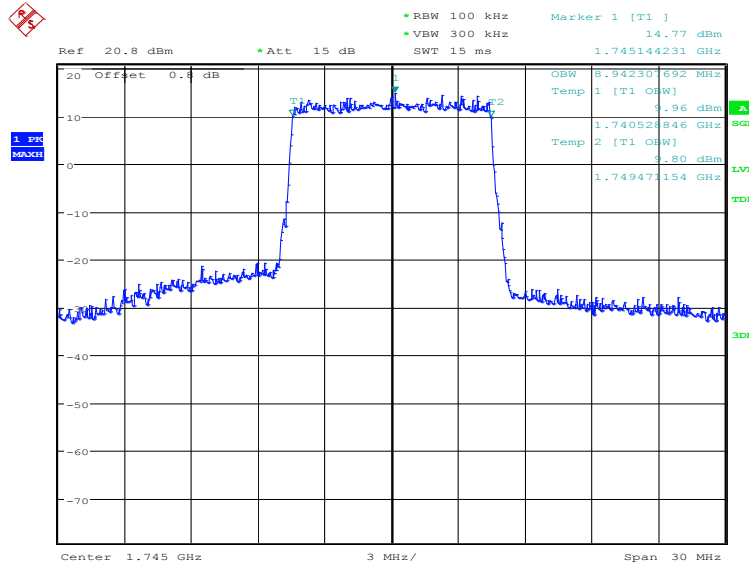
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	8942.31	8942.31

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



Date: 16.JUN.2021 18:25:04

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

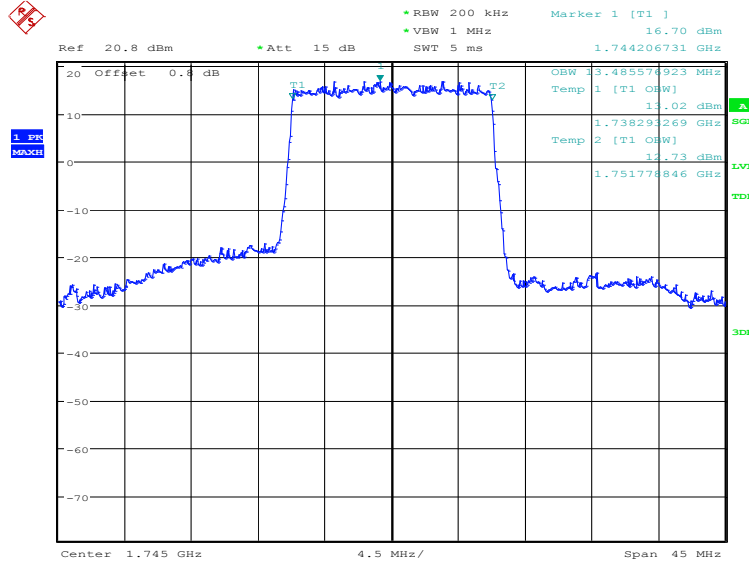


Date: 16.JUN.2021 18:25:43

LTE band 66, 15MHz (99%)

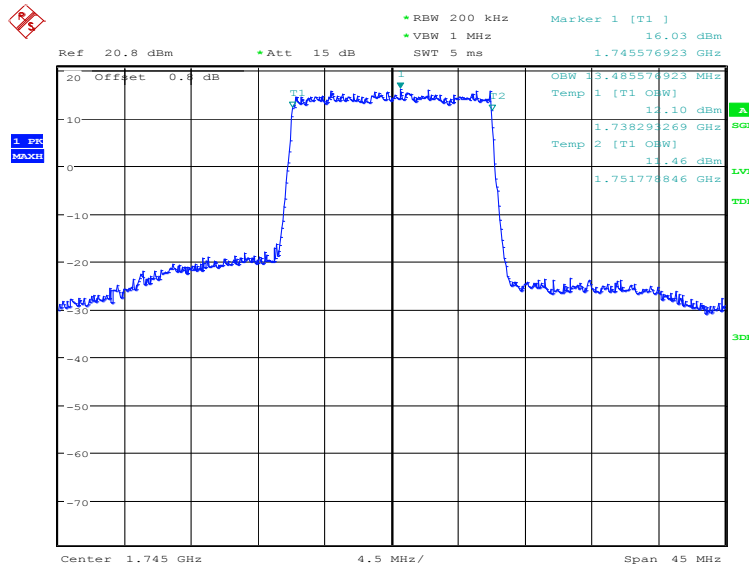
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	13485.58	13485.58

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



Date: 16.JUN.2021 18:26:24

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

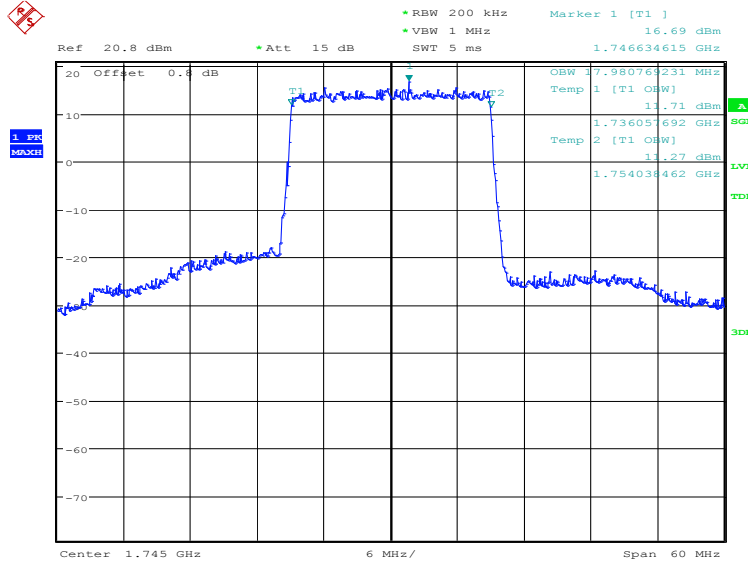


Date: 16.JUN.2021 18:27:04

LTE band 66, 20MHz (99%)

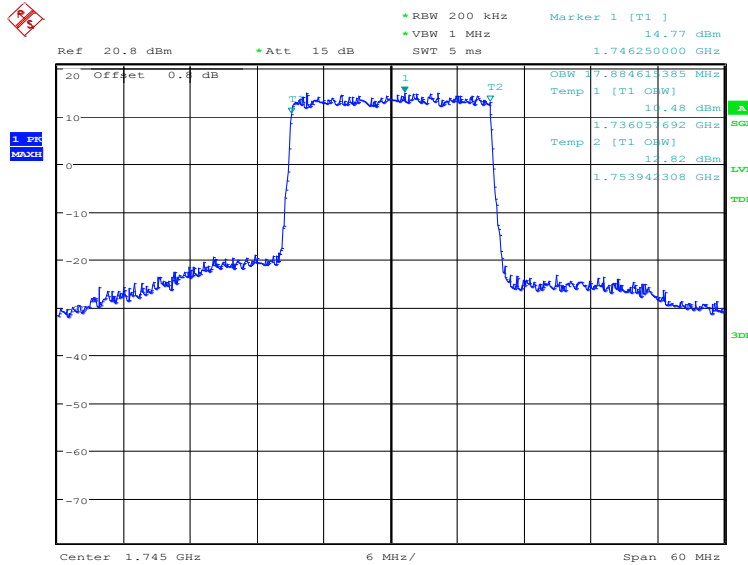
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	17980.77	17884.62

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



Date: 16.JUN.2021 18:27:45

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



Date: 16.JUN.2021 18:28:24

A.5 Emission Bandwidth

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

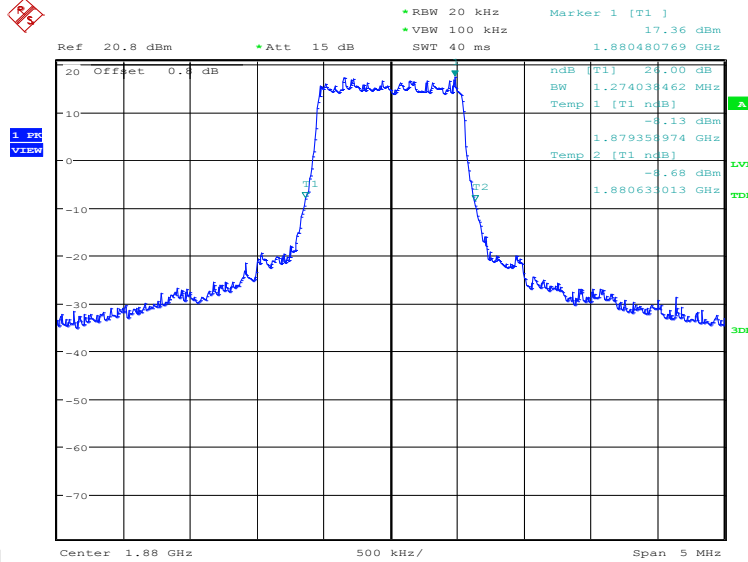
The measurement method is from ANSI C63.26:

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

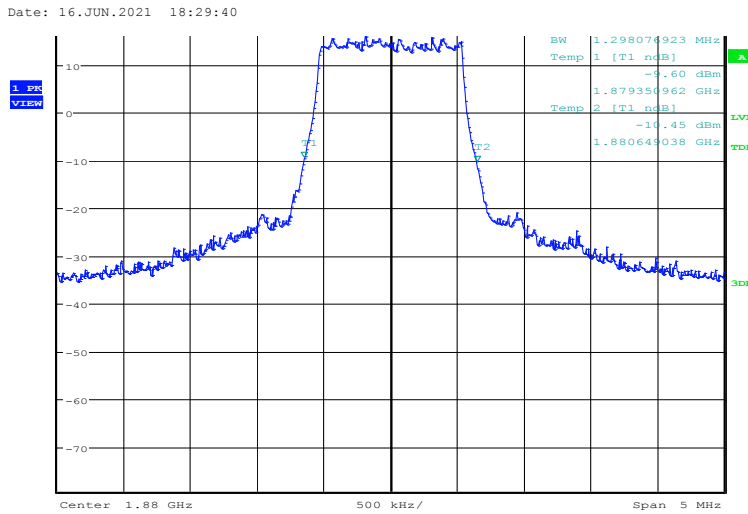
LTE band 2, 1.4MHz (-26dBc)

Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	1274.04	1298.08

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



LTE band

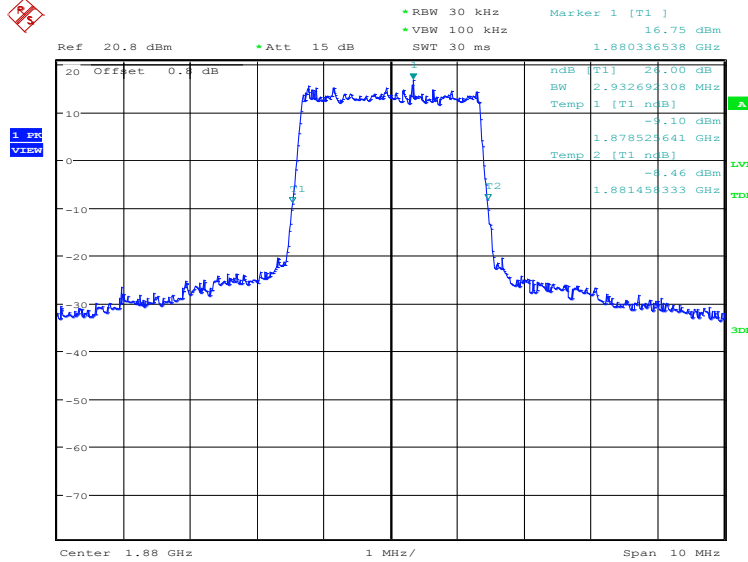


Date: 16.JUN.2021 18:30:20

LTE band 2, 3MHz (-26dBc)

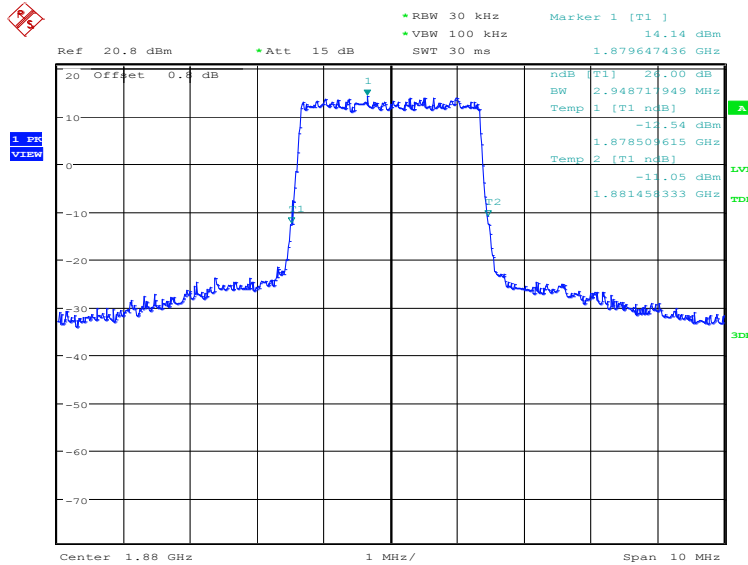
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	2932.69	2948.72

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



Date: 16.JUN.2021 18:31:01

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

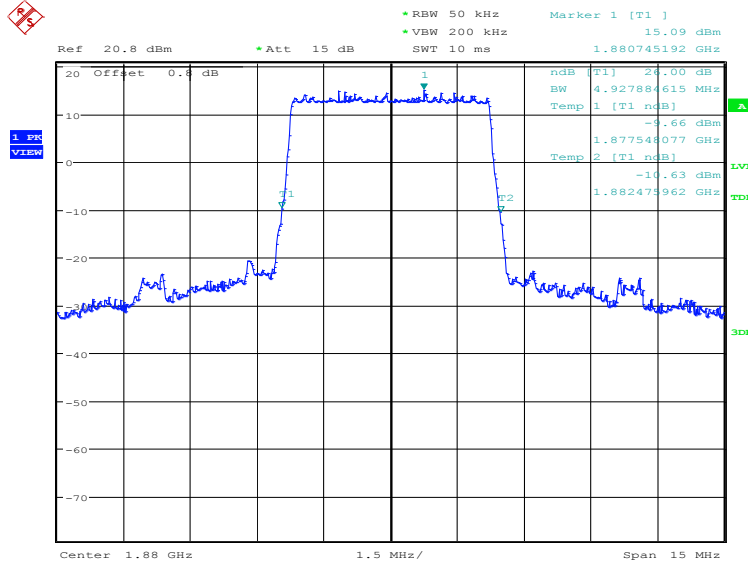


Date: 16.JUN.2021 18:31:41

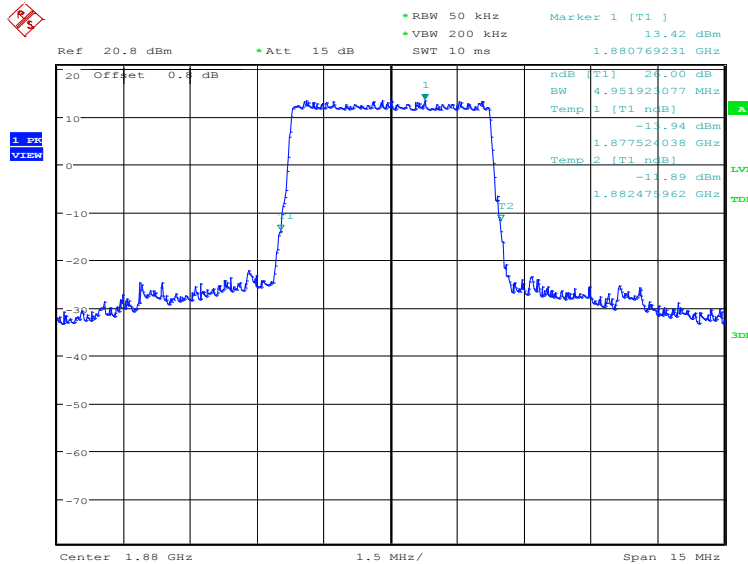
LTE band 2, 5MHz (-26dBc)

Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	4927.88	4951.92

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



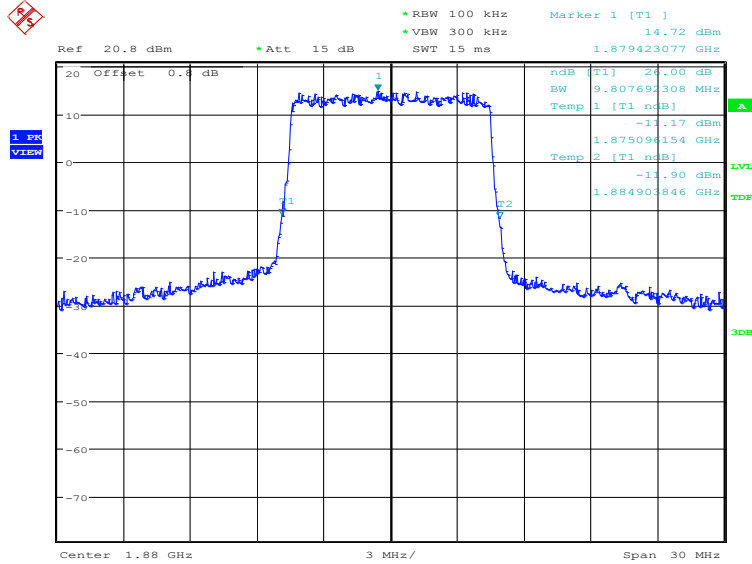
LTE band 2, 5MHz Bandwidth, 16QAM (-26dBc BW)



LTE band 2, 10MHz (-26dBc)

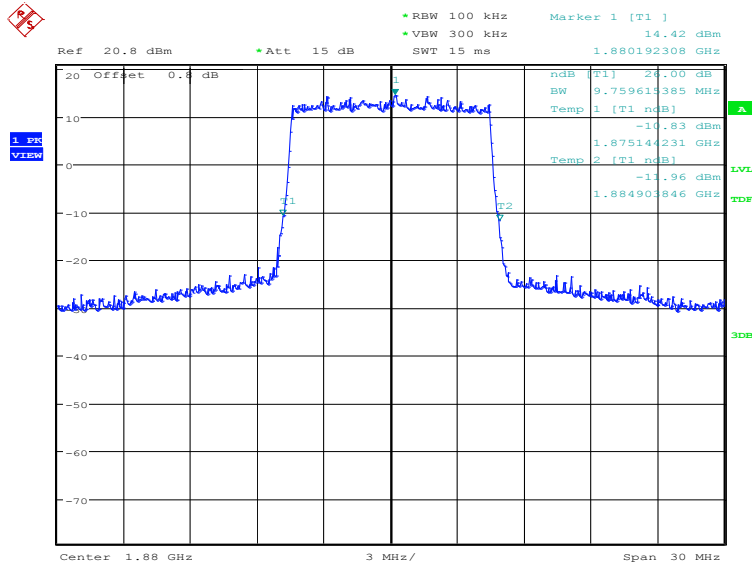
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	9807.69	9759.62

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



Date: 16.JUN.2021 18:33:43

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

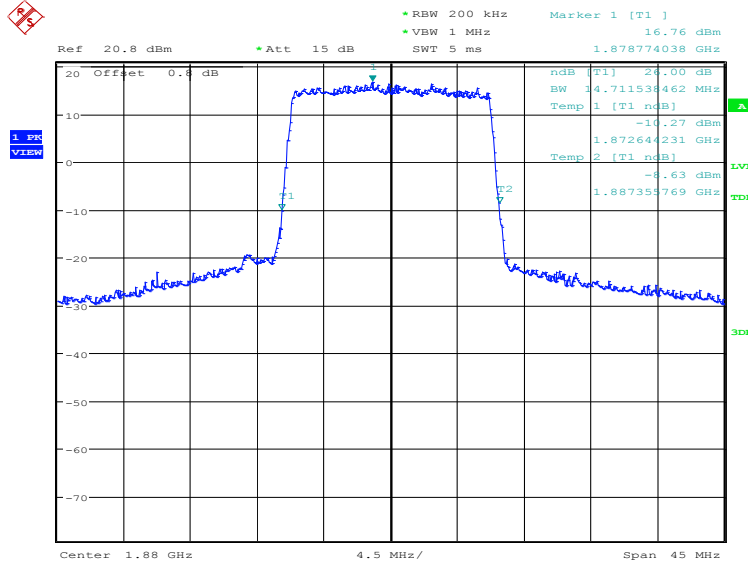


Date: 16.JUN.2021 18:34:23

LTE band 2, 15MHz (-26dBc)

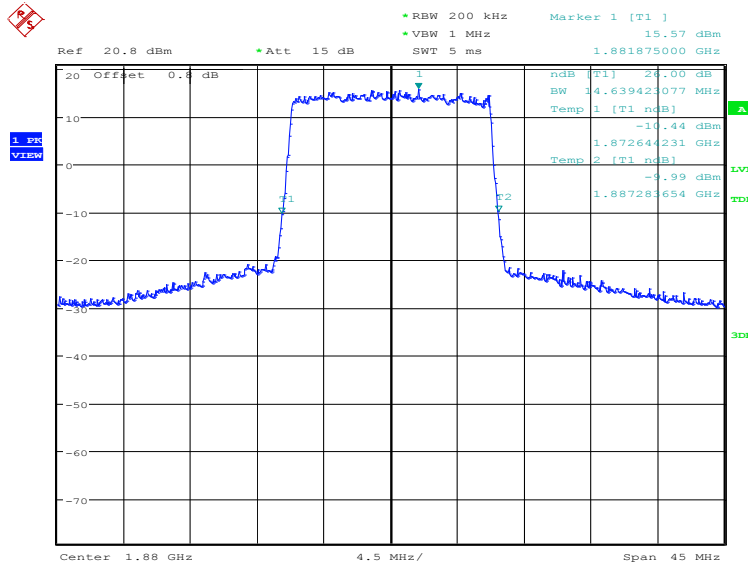
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	14711.54	14639.42

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



Date: 16.JUN.2021 18:35:04

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

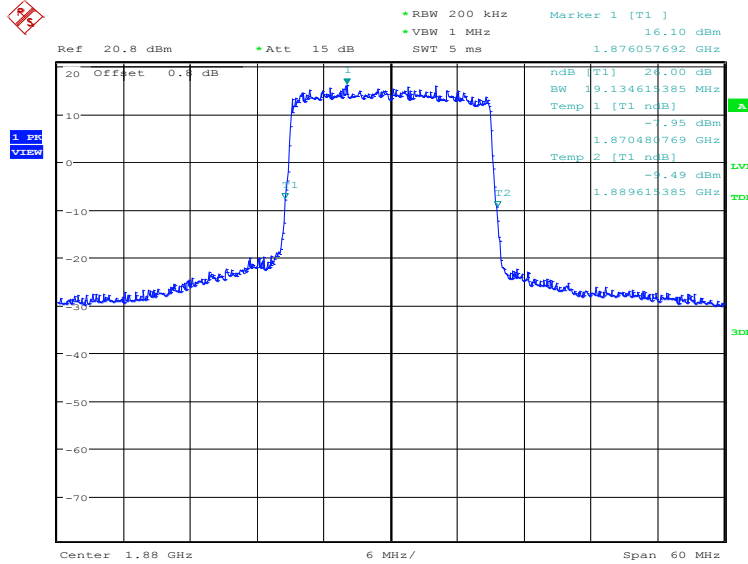


Date: 16.JUN.2021 18:35:44

LTE band 2, 20MHz (-26dBc)

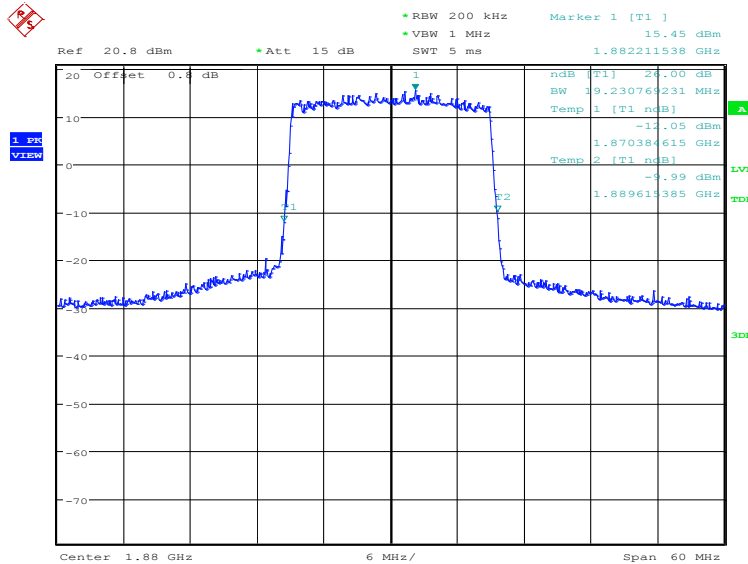
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
	1880.0	QPSK
	19134.62	19230.77

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



Date: 16.JUN.2021 18:36:26

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

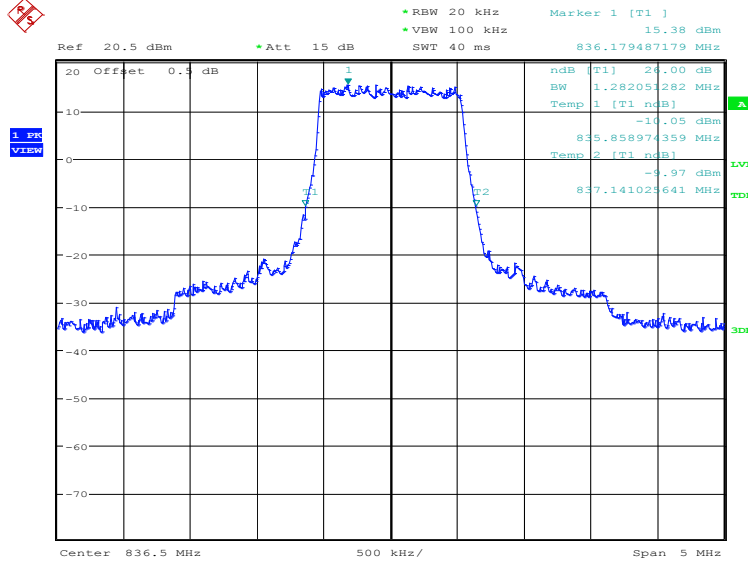


Date: 16.JUN.2021 18:37:06

LTE band 5, 1.4MHz (-26dBc)

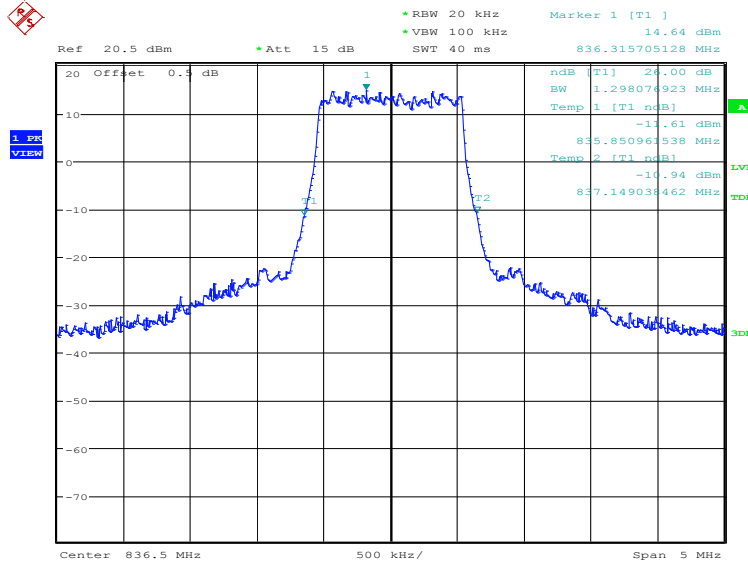
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
	836.5	QPSK
1282.05		1298.08

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



Date: 16.JUN.2021 18:38:51

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

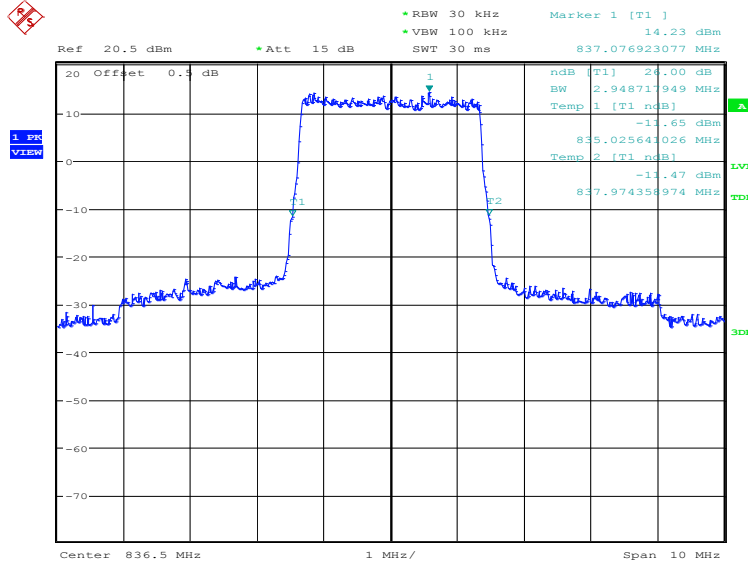


Date: 16.JUN.2021 18:39:30

LTE band 5, 3MHz (-26dBc)

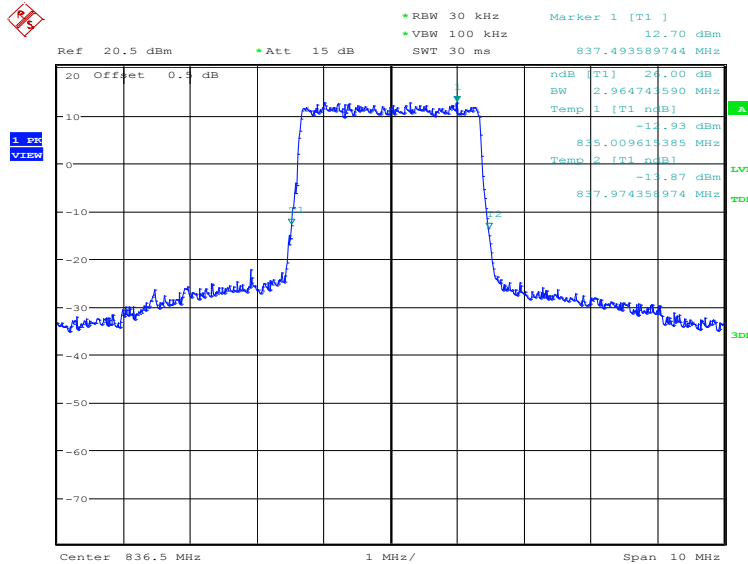
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	2948.72	2964.74

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



Date: 16.JUN.2021 18:40:12

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

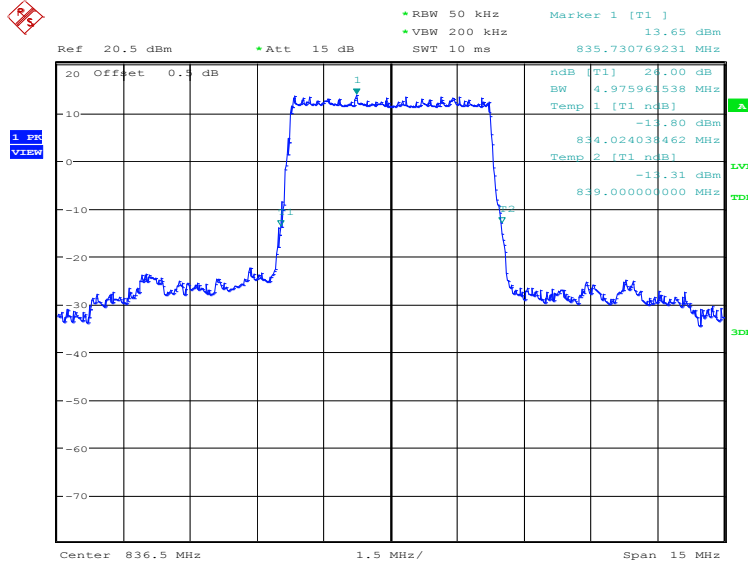


Date: 16.JUN.2021 18:40:52

LTE band 5, 5MHz (-26dBc)

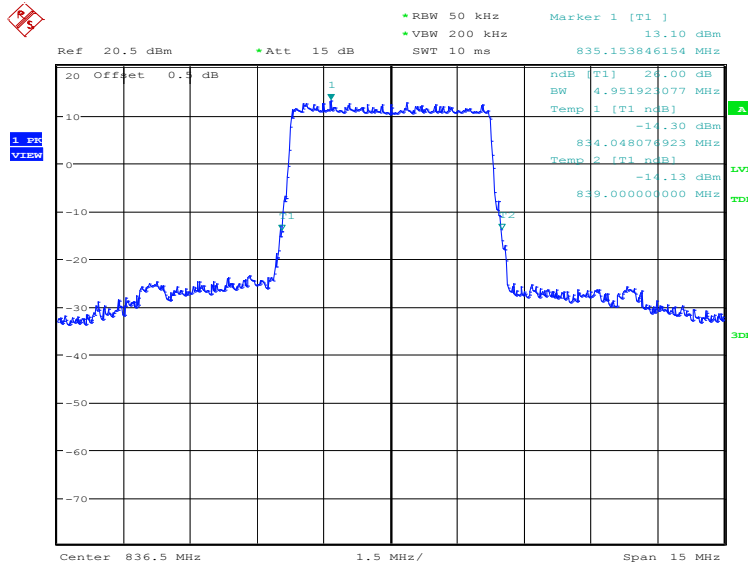
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	4975.96	4951.92

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



Date: 16.JUN.2021 18:41:33

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

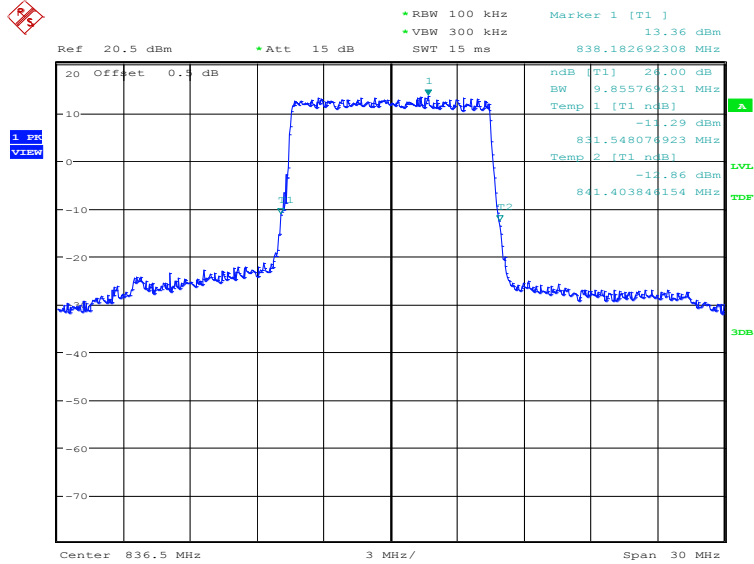


Date: 16.JUN.2021 18:42:13

LTE band 5, 10MHz (-26dBc)

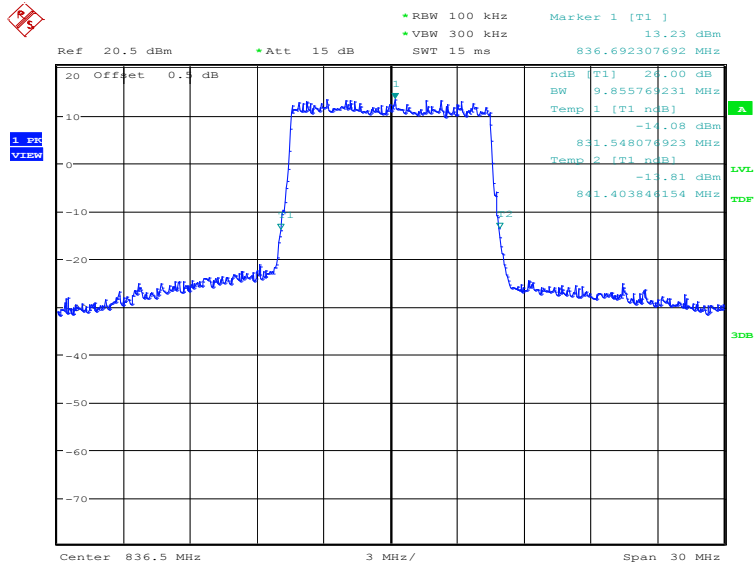
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	9855.77	9855.77

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



Date: 16.JUN.2021 18:42:54

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

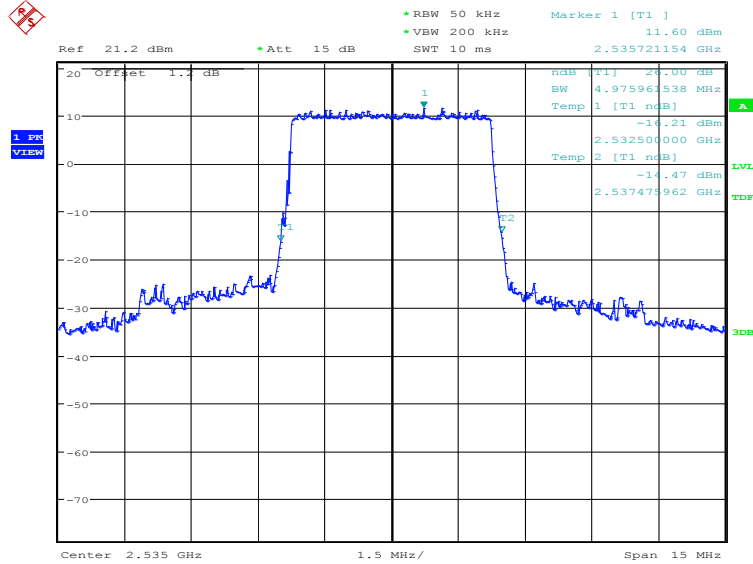


Date: 16.JUN.2021 18:43:34

LTE band 7, 5MHz (-26dBc)

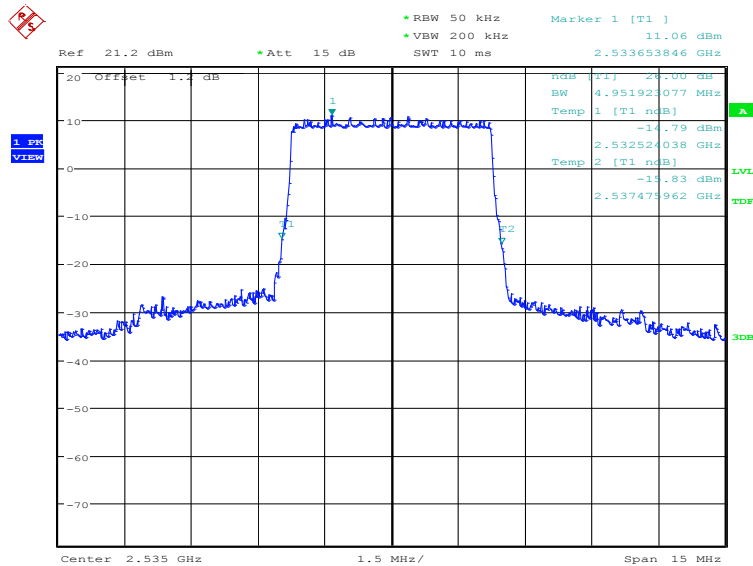
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	4975.96	4951.92

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



Date: 16.JUN.2021 18:44:17

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

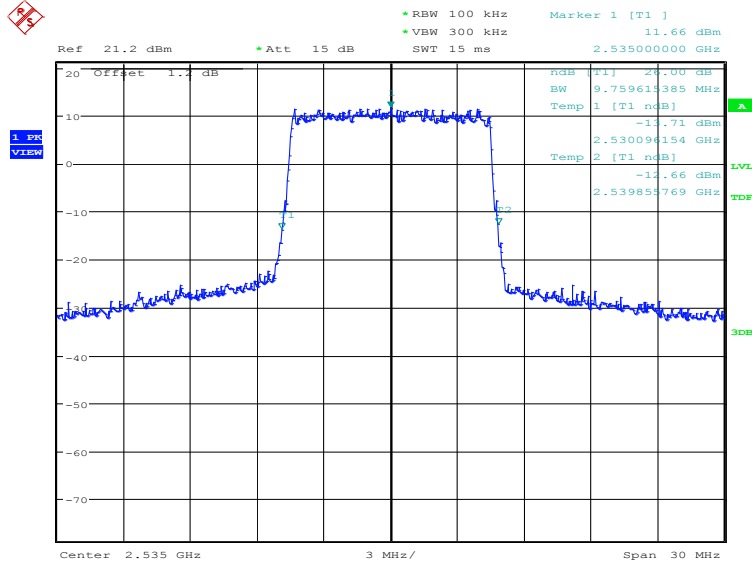


Date: 16.JUN.2021 18:44:57

LTE band 7, 10MHz (-26dBc)

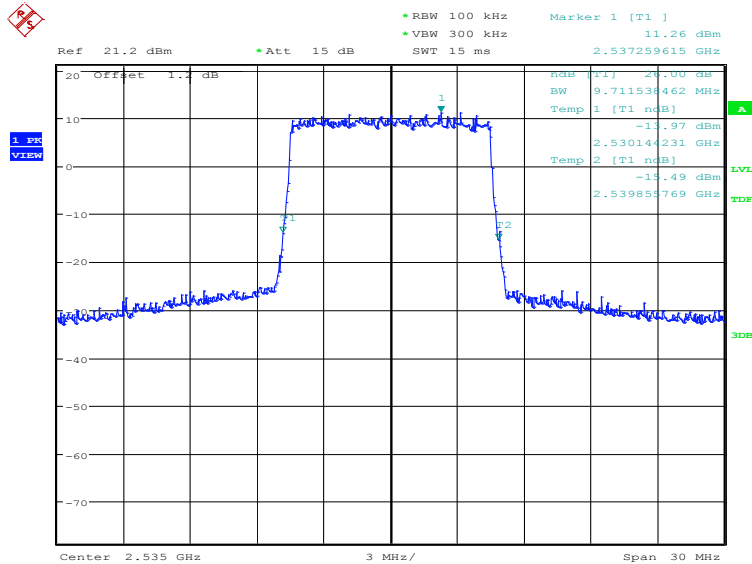
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	9759.62	9711.54

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



Date: 16.JUN.2021 18:45:38

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

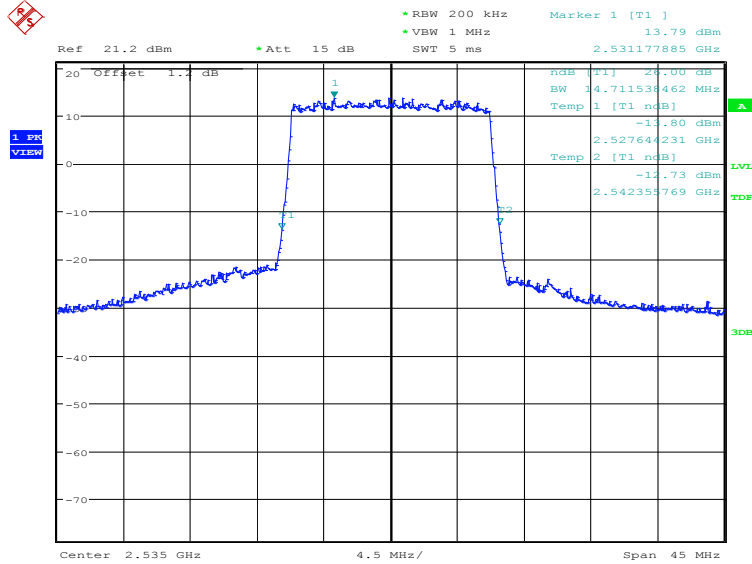


Date: 16.JUN.2021 18:46:18

LTE band 7, 15MHz (-26dBc)

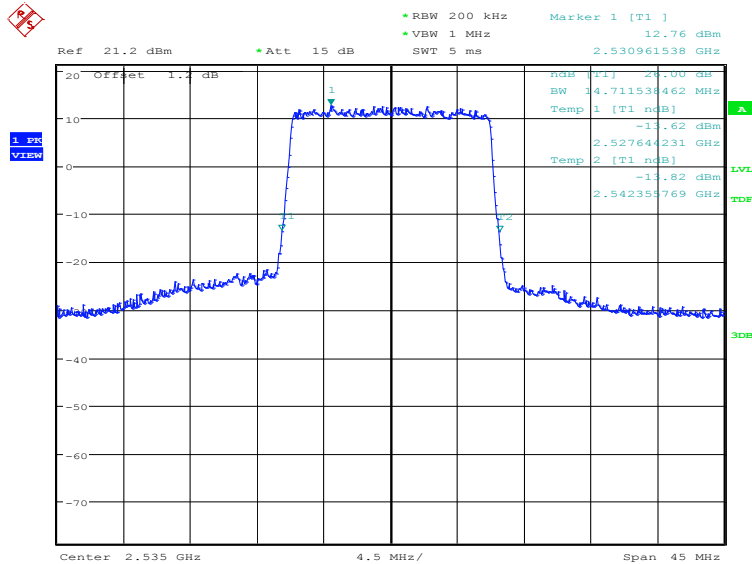
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	14711.54	14711.54

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



Date: 16.JUN.2021 18:46:59

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

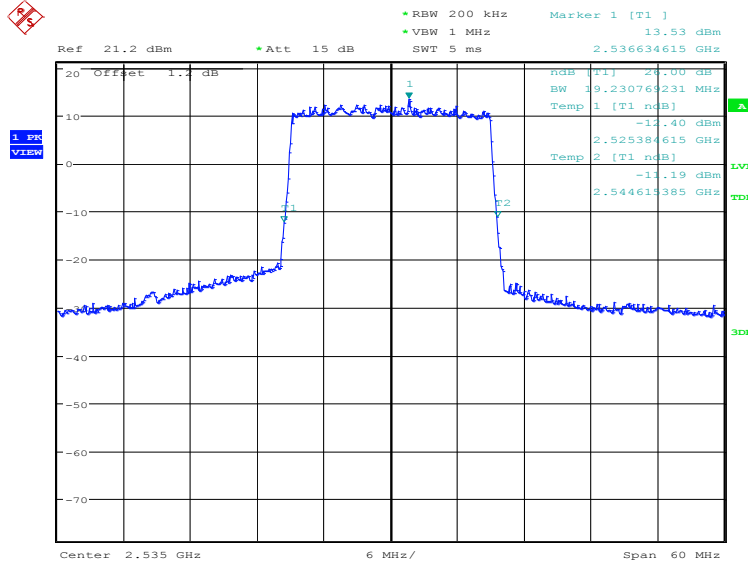


Date: 16.JUN.2021 18:47:39

LTE band 7, 20MHz (-26dBc)

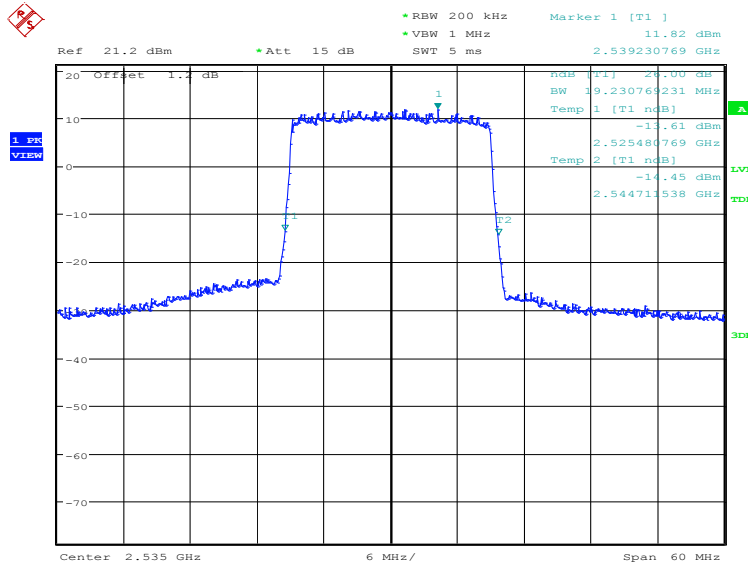
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	19230.77	19230.77

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



Date: 16.JUN.2021 18:48:21

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

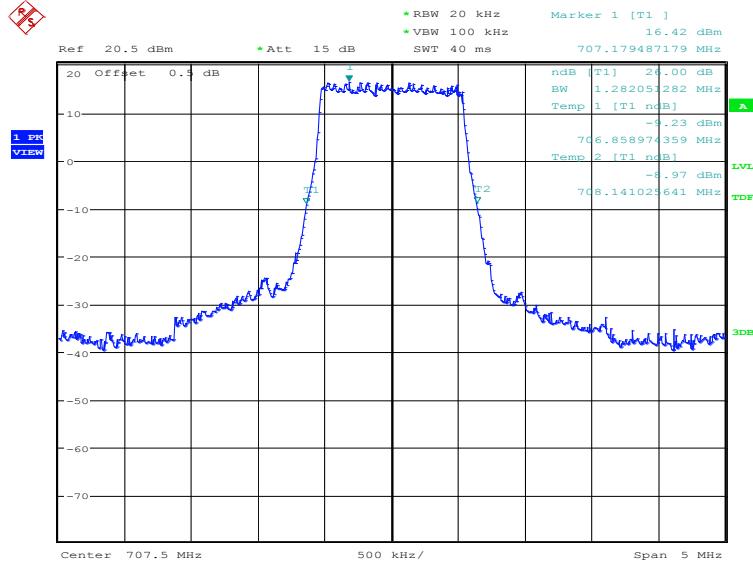


Date: 16.JUN.2021 18:49:00

LTE band 12, 1.4MHz (-26dBc)

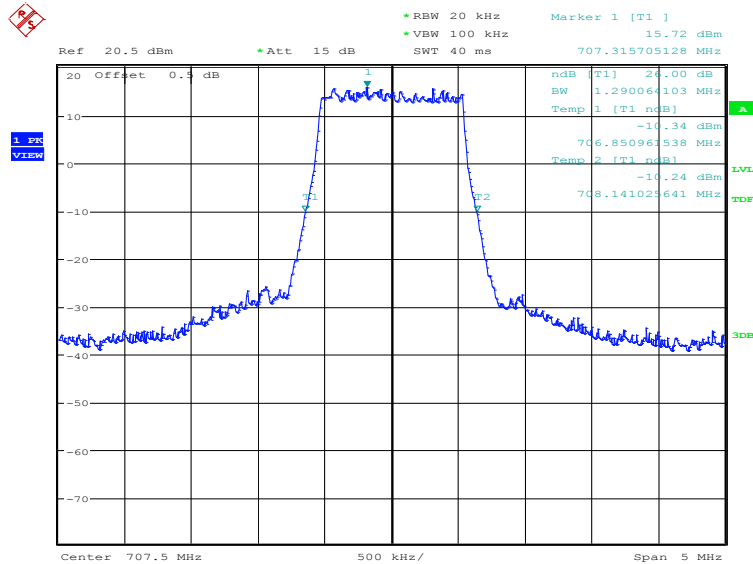
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	1282.05	1290.06

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



Date: 16.JUN.2021 18:50:30

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

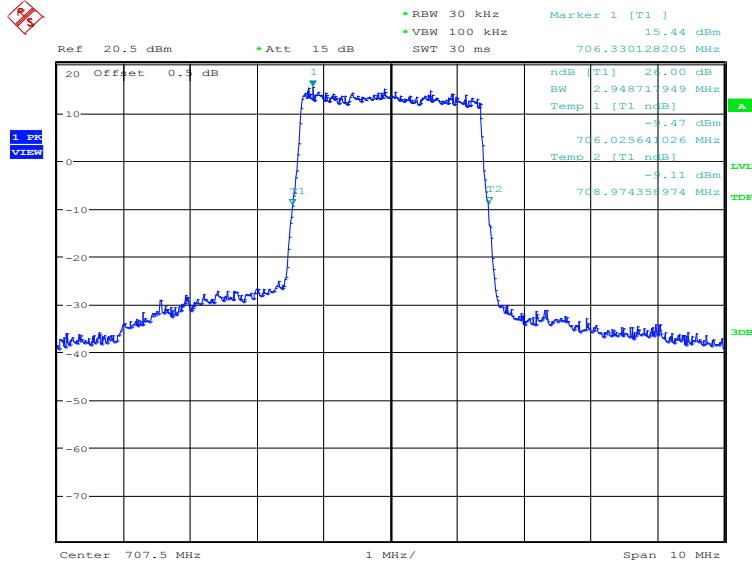


Date: 16.JUN.2021 18:51:10

LTE band 12, 3MHz (-26dBc)

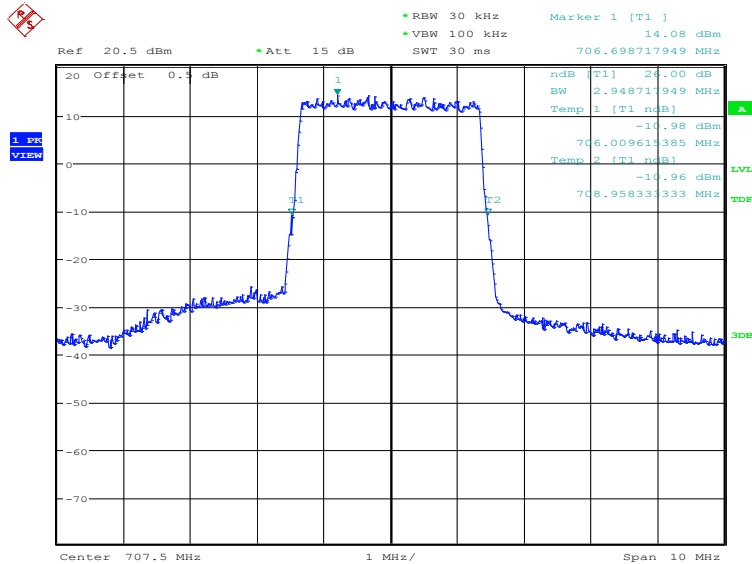
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	2948.72	2948.72

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



Date: 16.JUN.2021 18:51:51

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

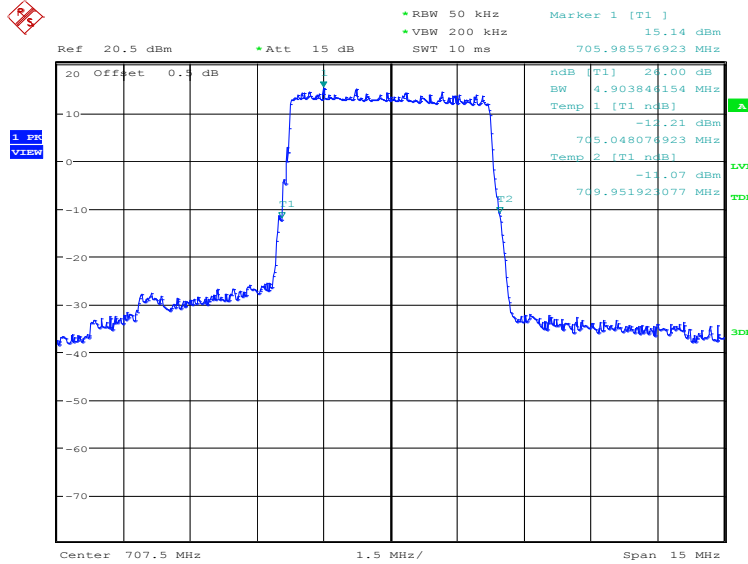


Date: 16.JUN.2021 18:52:31

LTE band 12, 5MHz (-26dBc)

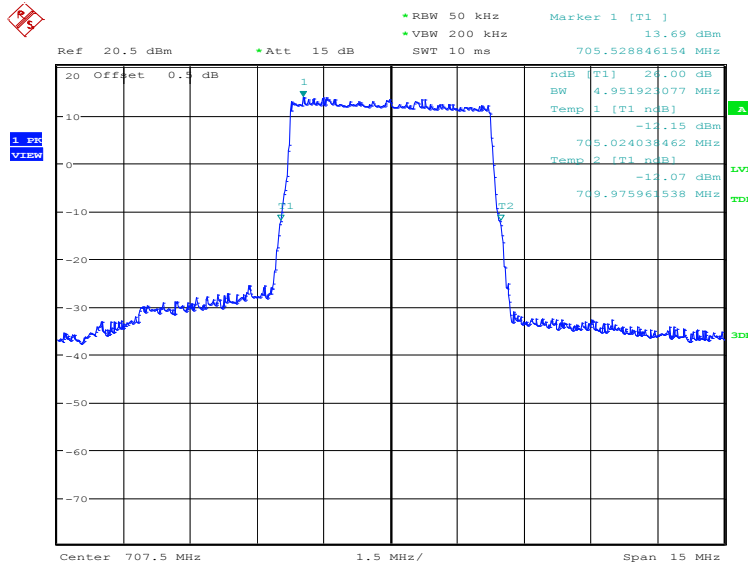
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	4903.85	4951.92

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



Date: 16.JUN.2021 18:53:13

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

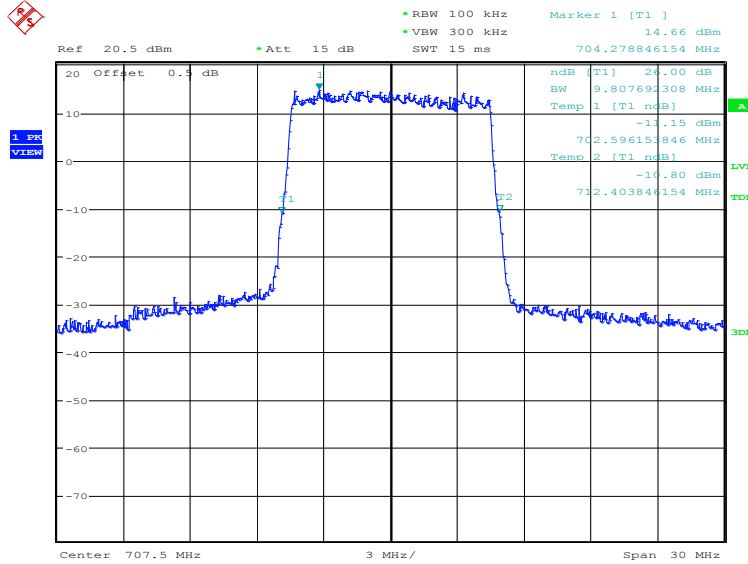


Date: 16.JUN.2021 18:53:53

LTE band 12, 10MHz (-26dBc)

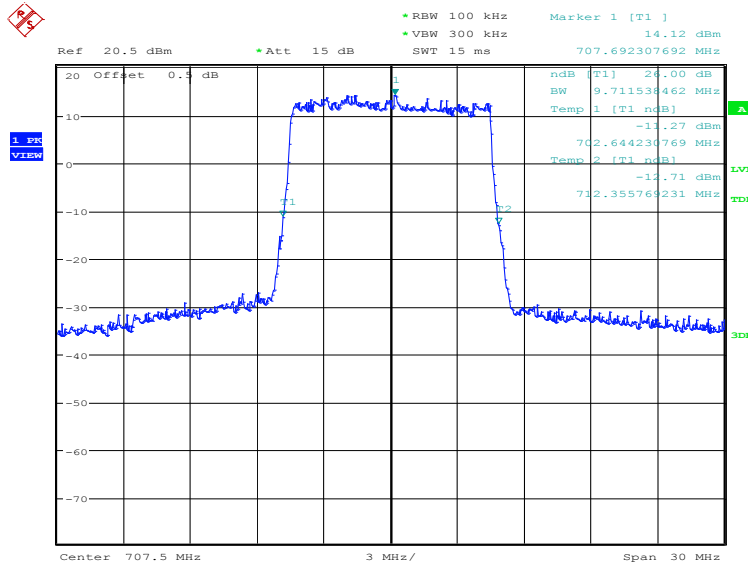
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	9807.69	9711.54

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



Date: 16.JUN.2021 18:54:34

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

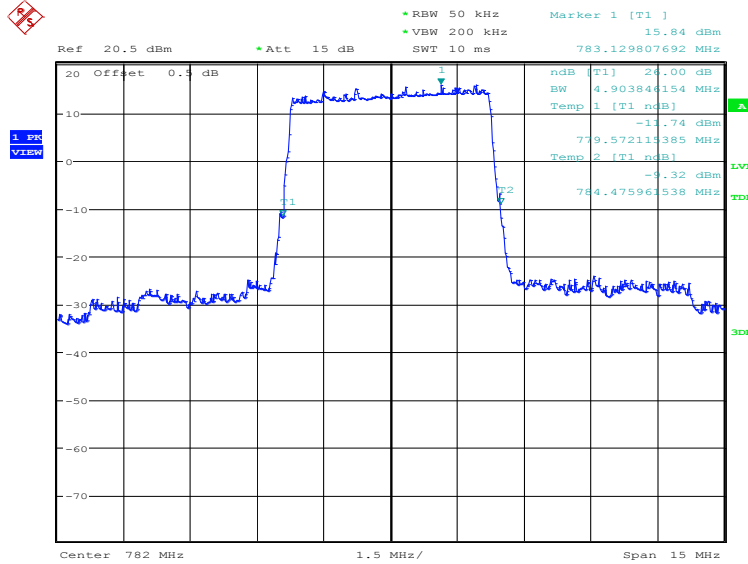


Date: 16.JUN.2021 18:55:14

LTE band 13, 5MHz (-26dBc)

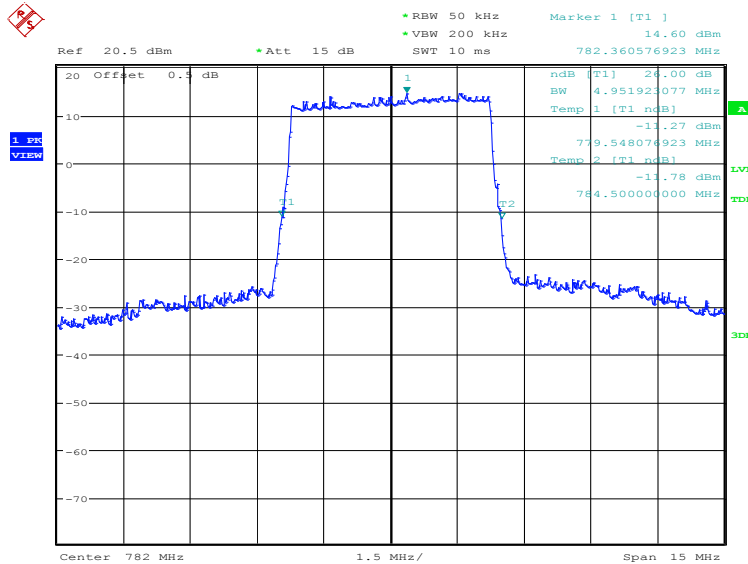
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
782.0	QPSK	16QAM
	4903.85	4951.92

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



Date: 16.JUN.2021 18:55:56

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

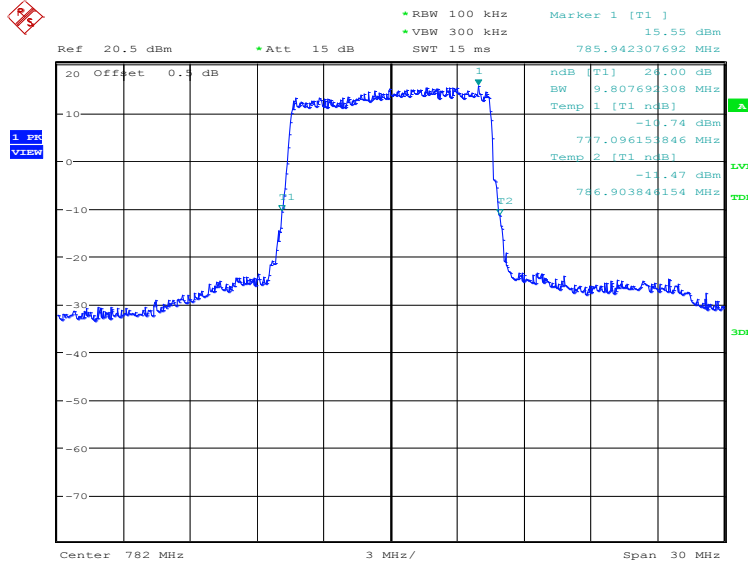


Date: 16.JUN.2021 18:56:36

LTE band 13, 10MHz (-26dBc)

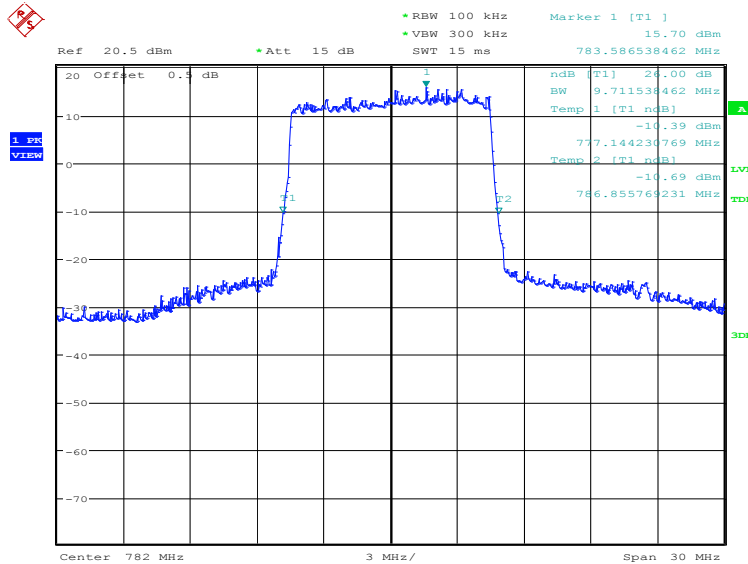
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
782.0	QPSK	16QAM
	9807.69	9711.54

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



Date: 16.JUN.2021 18:57:18

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

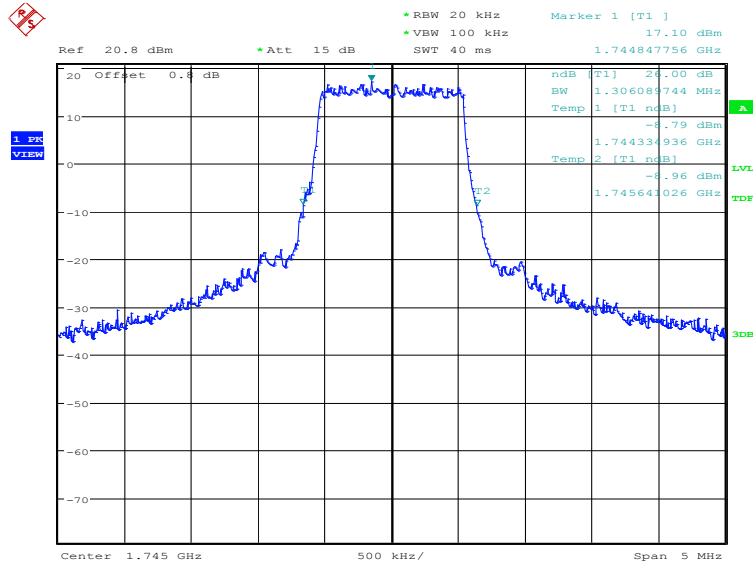


Date: 16.JUN.2021 18:57:58

LTE band 66, 1.4MHz (-26dBc)

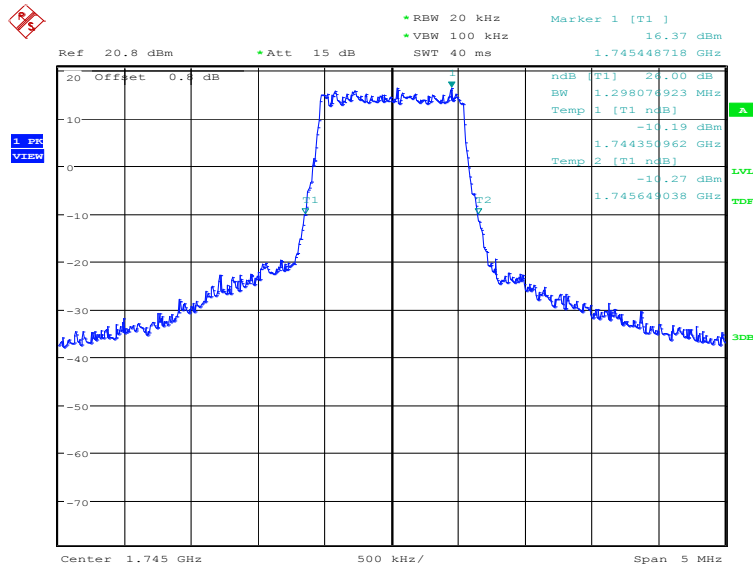
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
	1745.0	QPSK
	1306.09	1298.08

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



Date: 16.JUN.2021 18:58:45

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

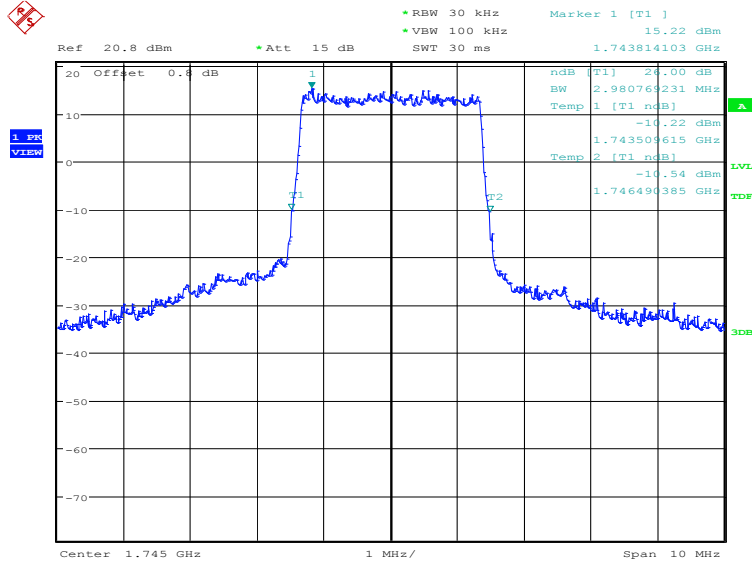


Date: 16.JUN.2021 18:59:25

LTE band 66, 3MHz (-26dBc)

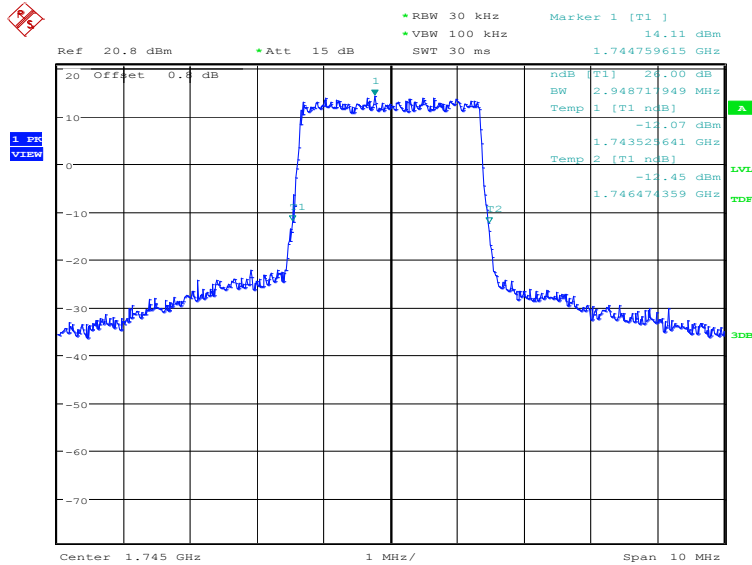
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
	1745.0	QPSK
2980.77		2948.72

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



Date: 16.JUN.2021 19:00:06

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

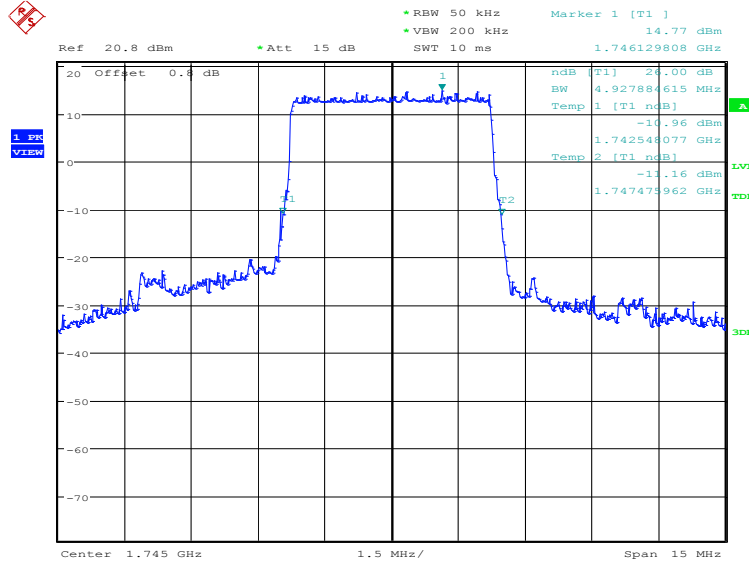


Date: 16.JUN.2021 19:00:47

LTE band 66, 5MHz (-26dBc)

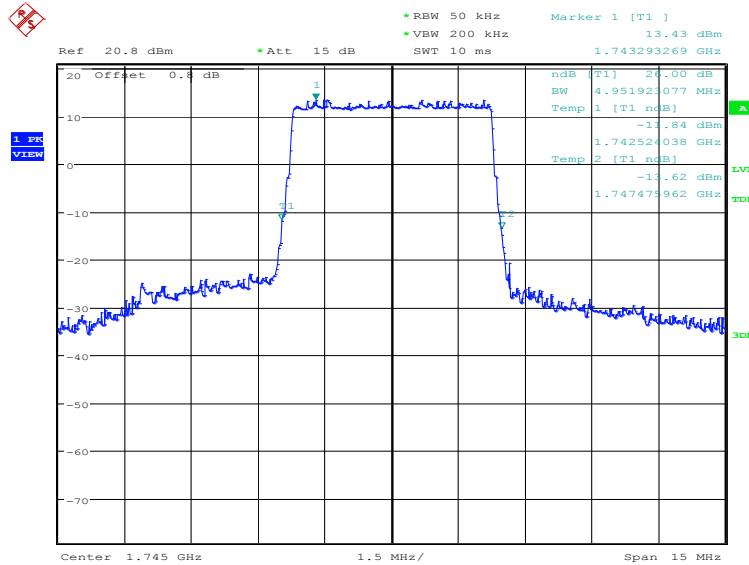
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1745.0	QPSK	16QAM
	4927.88	4951.92

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



Date: 16.JUN.2021 19:01:28

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

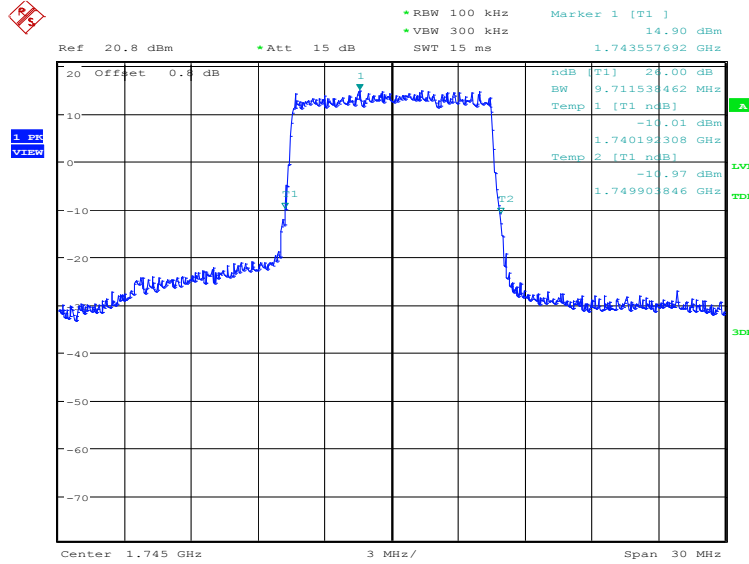


Date: 16.JUN.2021 19:02:08

LTE band 66, 10MHz (-26dBc)

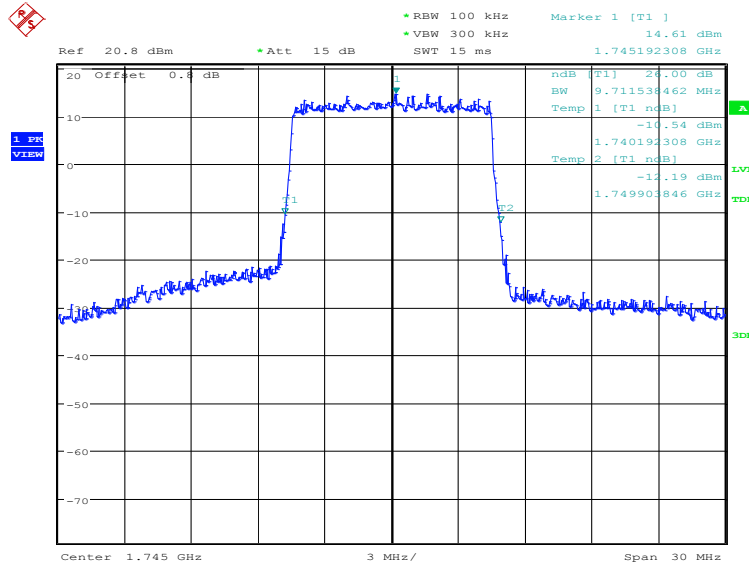
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
	1745.0	QPSK
	9711.54	9711.54

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



Date: 16.JUN.2021 19:02:50

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

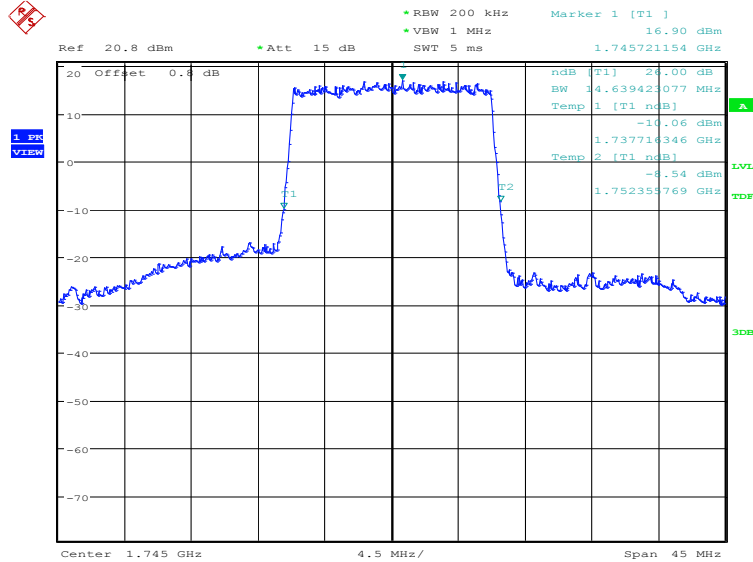


Date: 16.JUN.2021 19:03:30

LTE band 66, 15MHz (-26dBc)

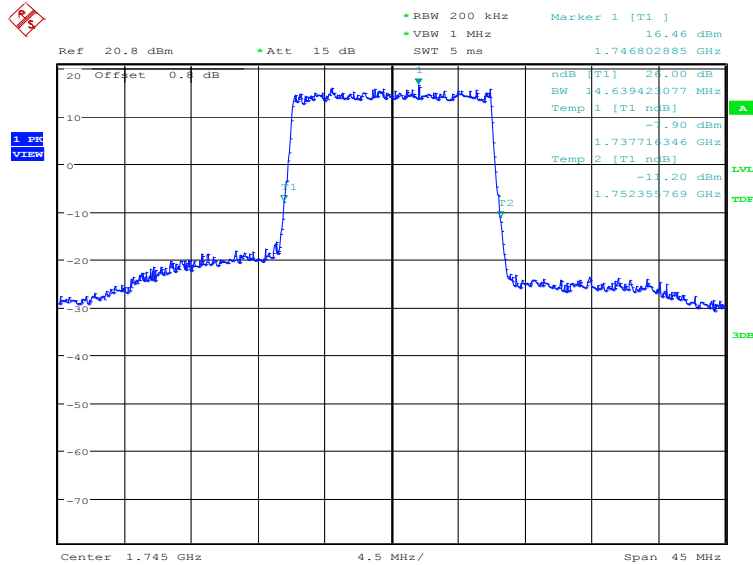
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
	1745.0	QPSK
	14639.42	14639.42

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



Date: 16.JUN.2021 19:04:11

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

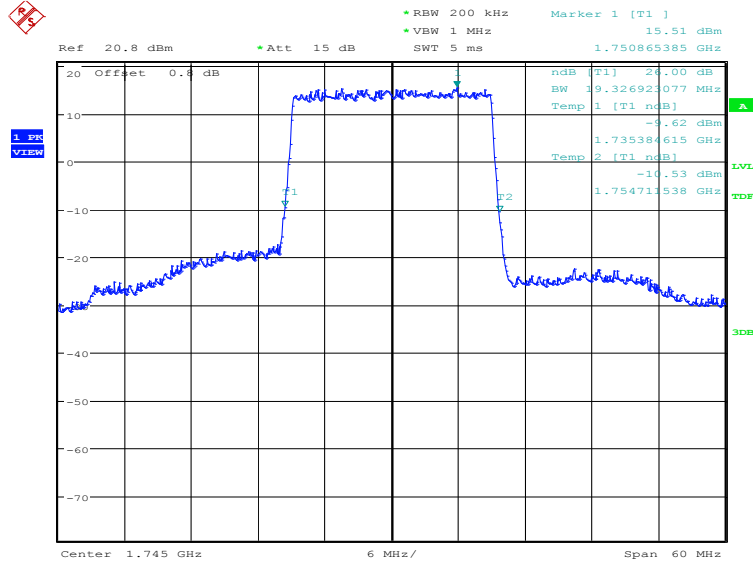


Date: 16.JUN.2021 19:04:51

LTE band 66, 20MHz (-26dBc)

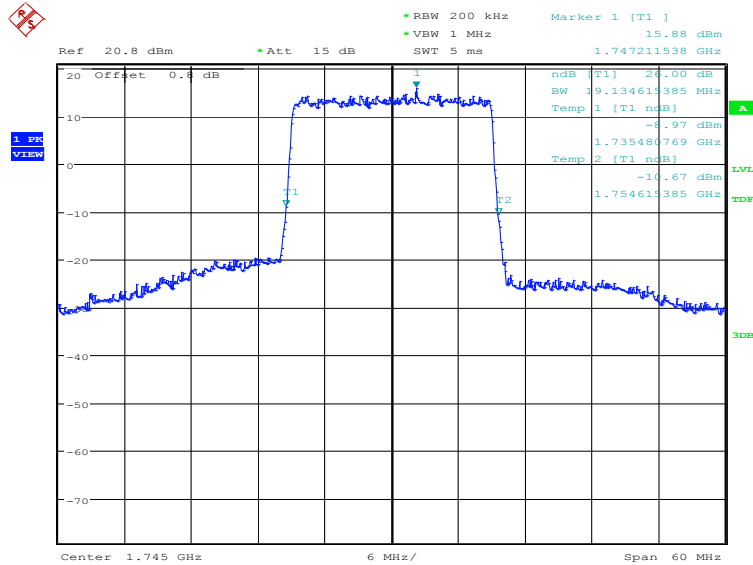
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
	1745.0	QPSK
	19326.92	19134.62

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



Date: 16.JUN.2021 19:05:33

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



Date: 16.JUN.2021 19:06:13

A.6 Band Edge Compliance

A.6.1 Measurement limit

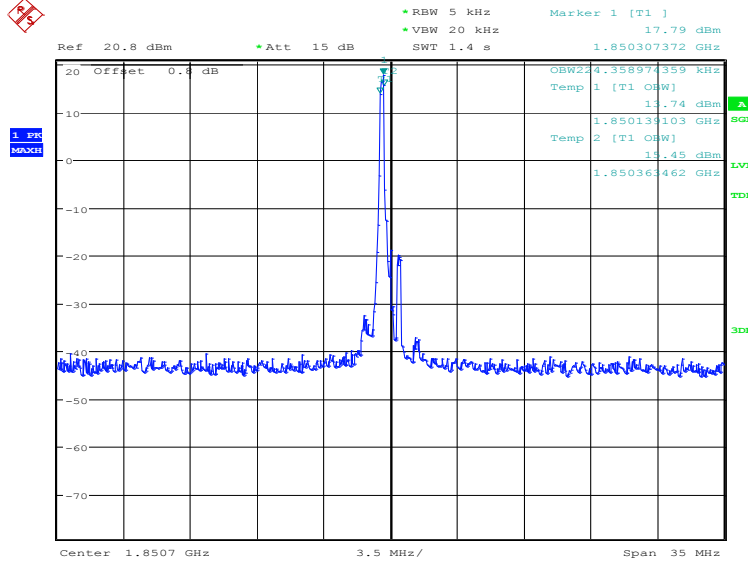
Part 22.917, Part 24.238 and Part 27.53(h) specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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

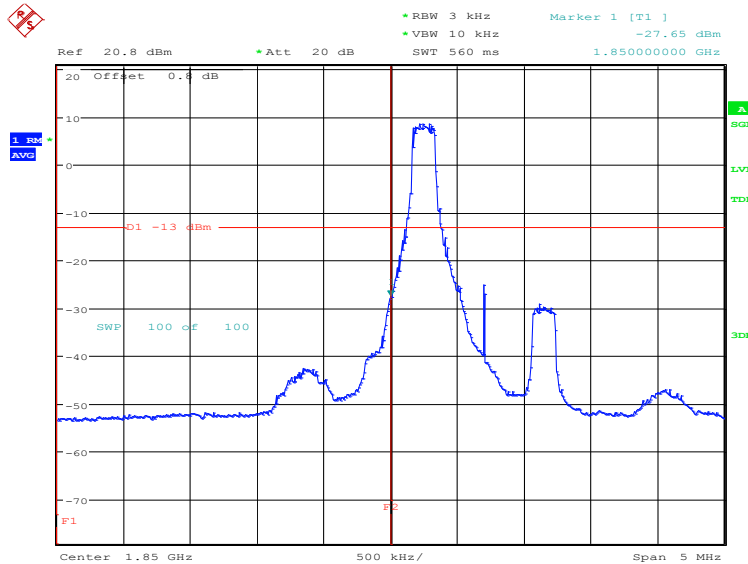
Part 27.53(g) states for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$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

A.6.2 Measurement result
Only the worst case result is given below
LTE band 2
OBW: 1RB-low_offset



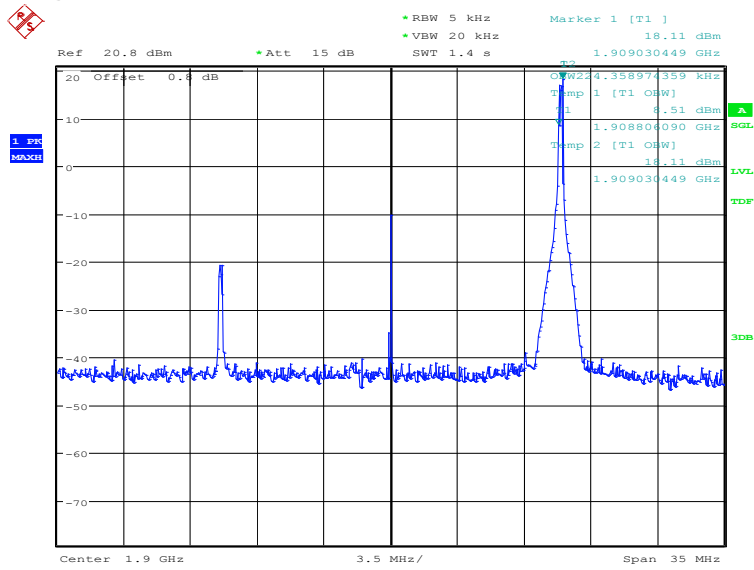
Date: 22.JUN.2021 14:18:38

LOW BAND EDGE BLOCK-1RB-low_offset



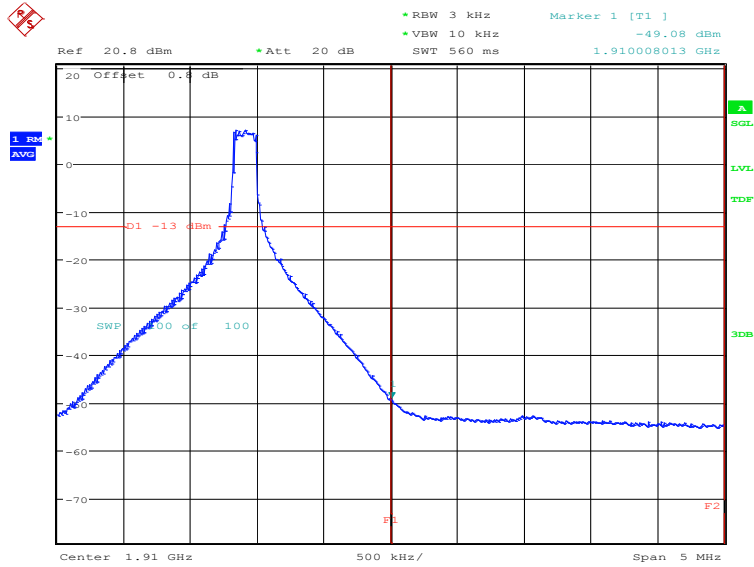
Date: 22.JUN.2021 14:19:52

OBW: 1RB-high_offset



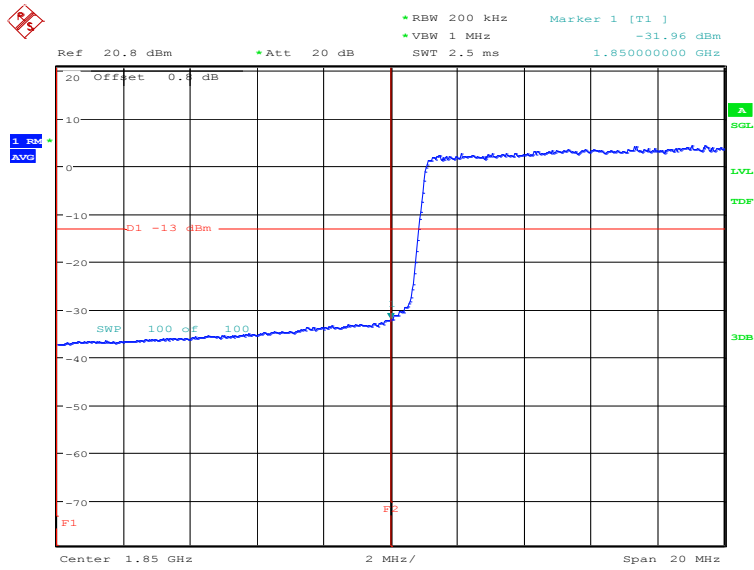
Date: 22.JUN.2021 14:20:29

HIGH BAND EDGE BLOCK-1RB-high_offset



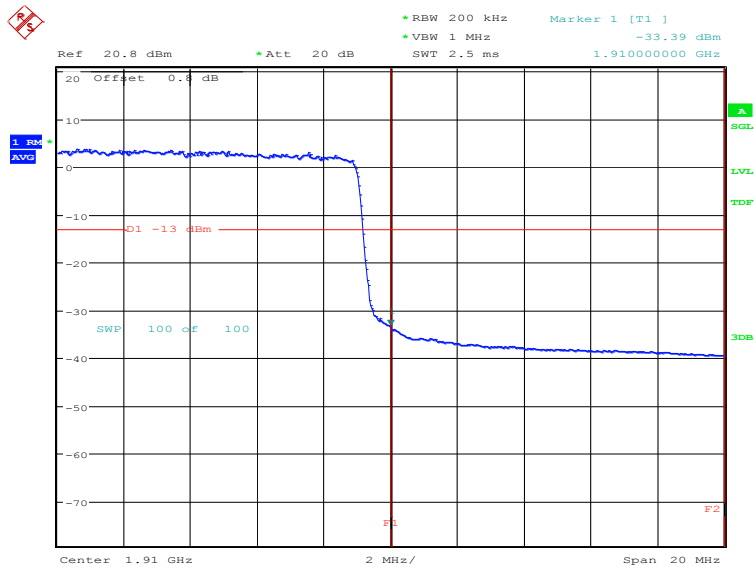
Date: 22.JUN.2021 14:21:43

LOW BAND EDGE BLOCK-20MHz-100%RB



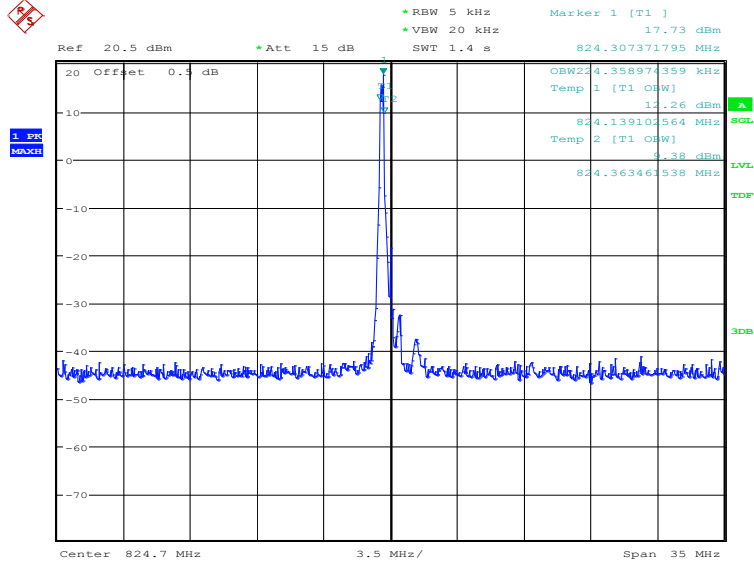
Date: 16.JUN.2021 19:08:25

HIGH BAND EDGE BLOCK-20MHz-100%RB



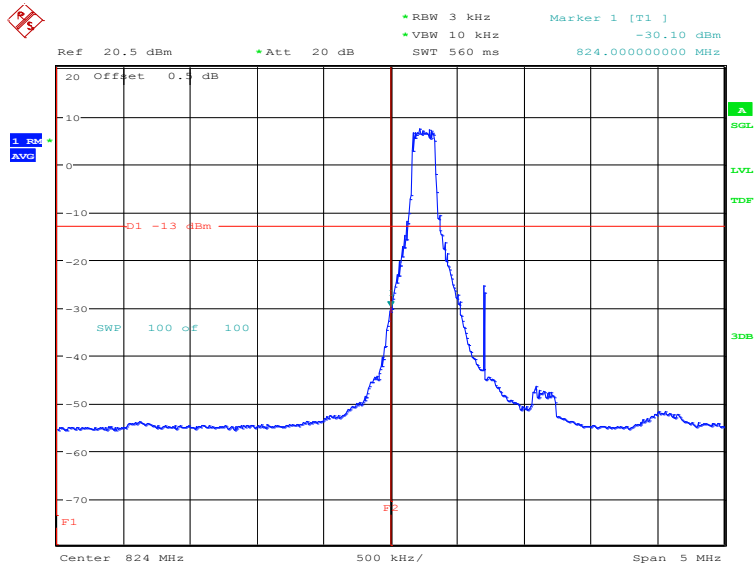
Date: 16.JUN.2021 19:09:56

LTE band 5
OBW: 1RB-low_offset



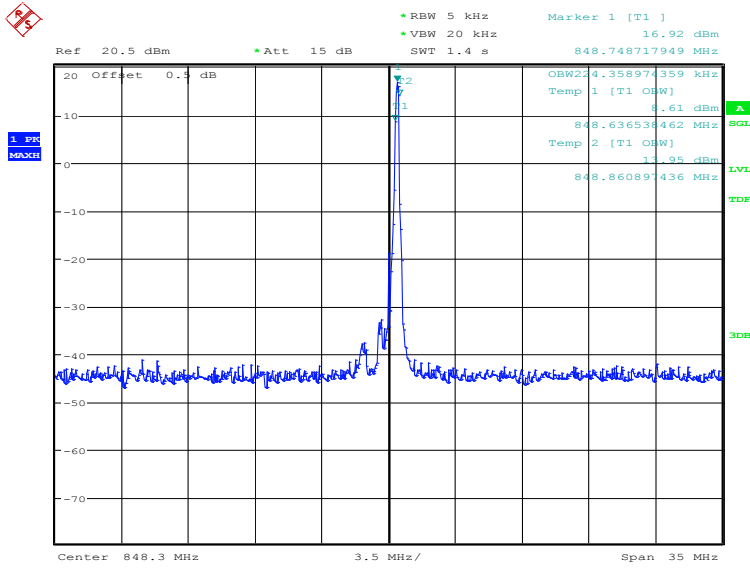
Date: 22.JUN.2021 14:23:40

LOW BAND EDGE BLOCK-1RB-low_offset



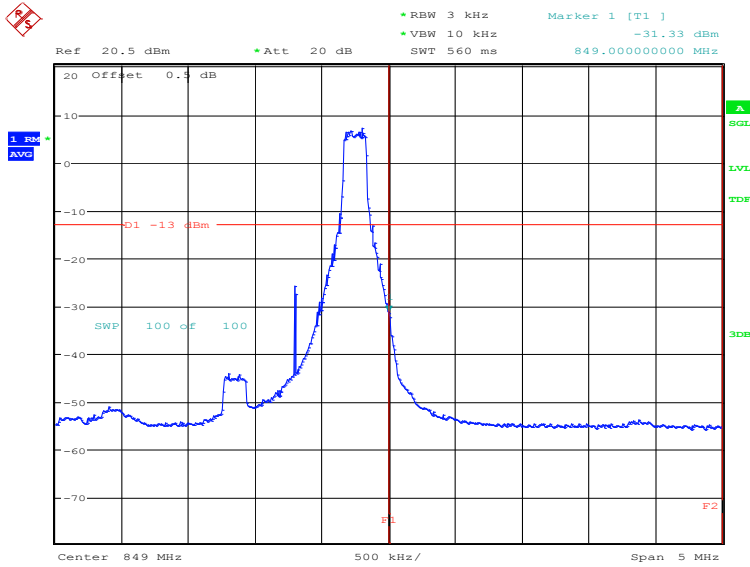
Date: 22.JUN.2021 14:24:54

OBW: 1RB-high_offset



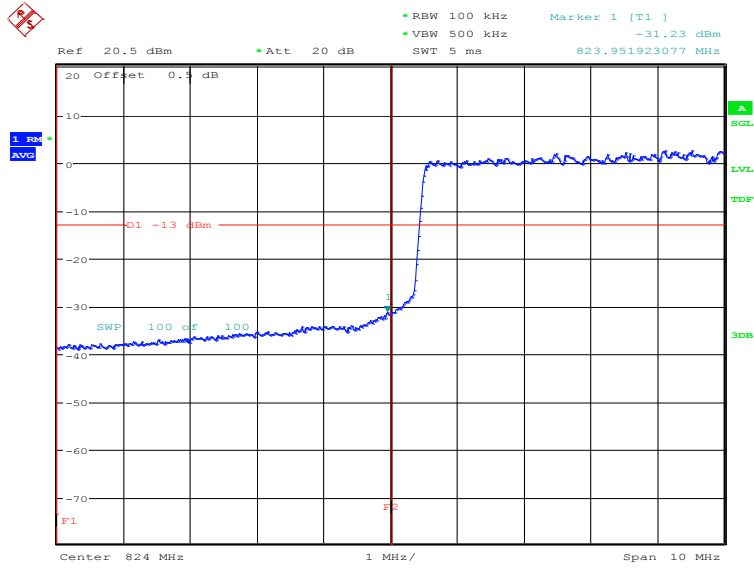
Date: 22.JUN.2021 14:25:29

HIGH BAND EDGE BLOCK-1RB-high_offset



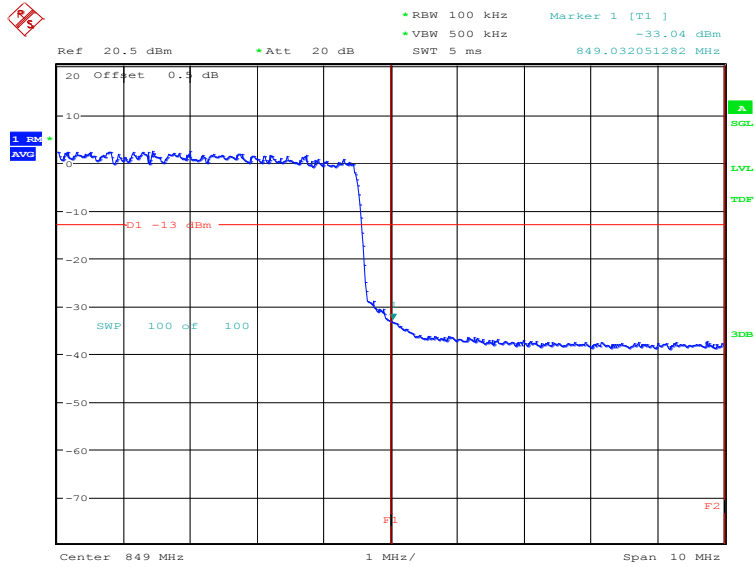
Date: 22.JUN.2021 14:26:43

LOW BAND EDGE BLOCK-10MHz-100%RB



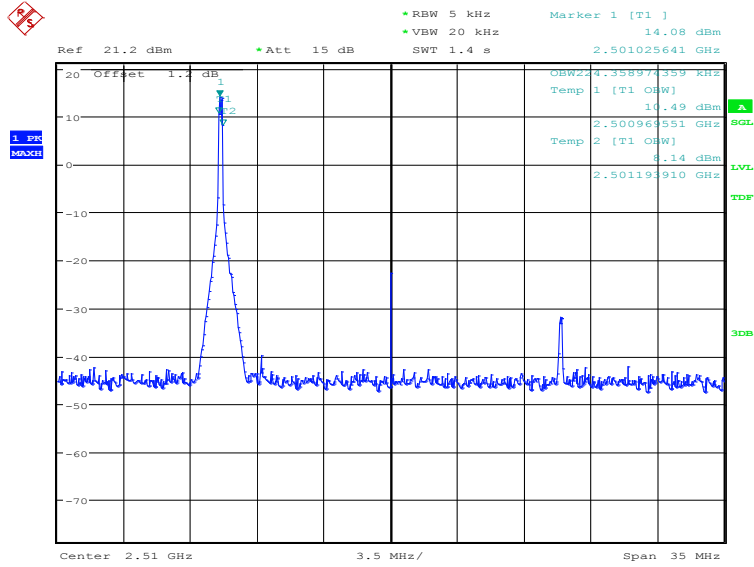
Date: 16.JUN.2021 19:13:07

HIGH BAND EDGE BLOCK-10MHz-100%RB



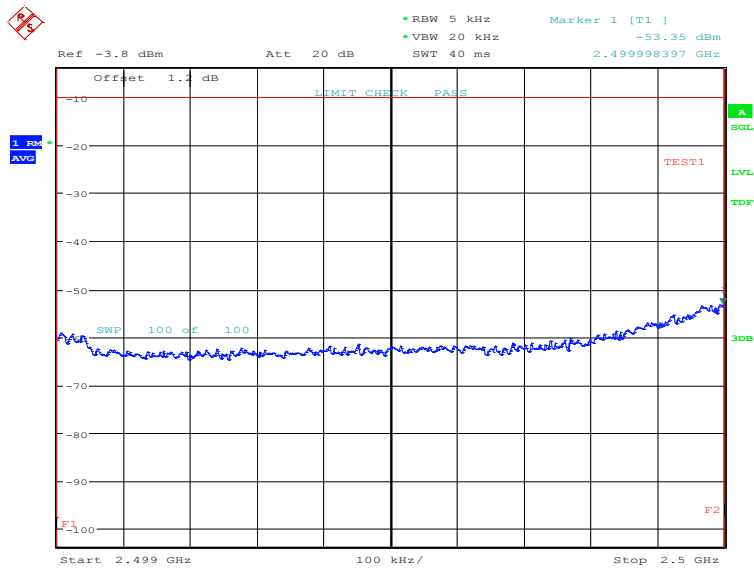
Date: 16.JUN.2021 19:14:37

LTE band 7
OBW: 1RB-low_offset

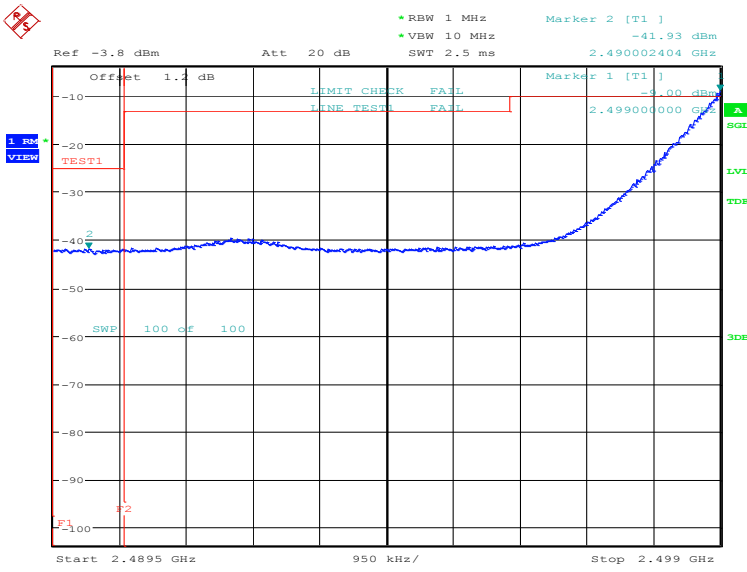


Date: 22.JUN.2021 14:28:51

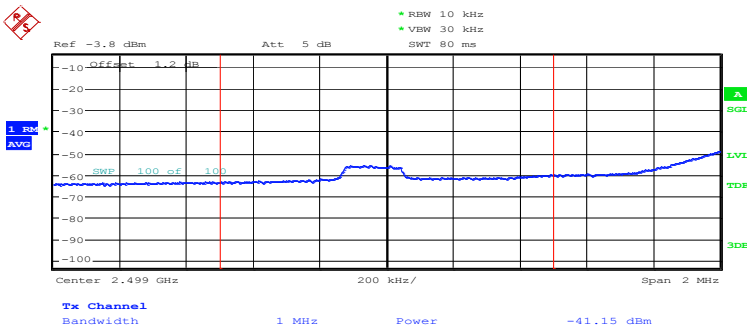
LOW BAND EDGE BLOCK-1RB-low_offset



Date: 22.JUN.2021 14:30:12

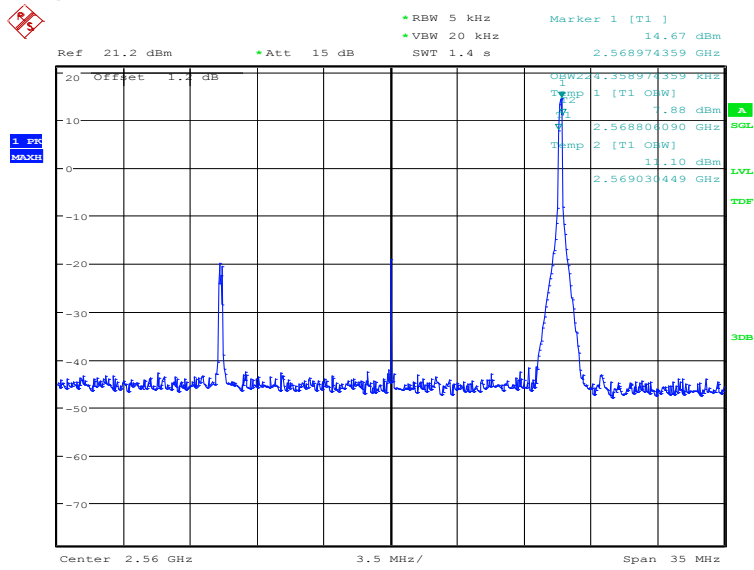


Date: 22.JUN.2021 14:32:00



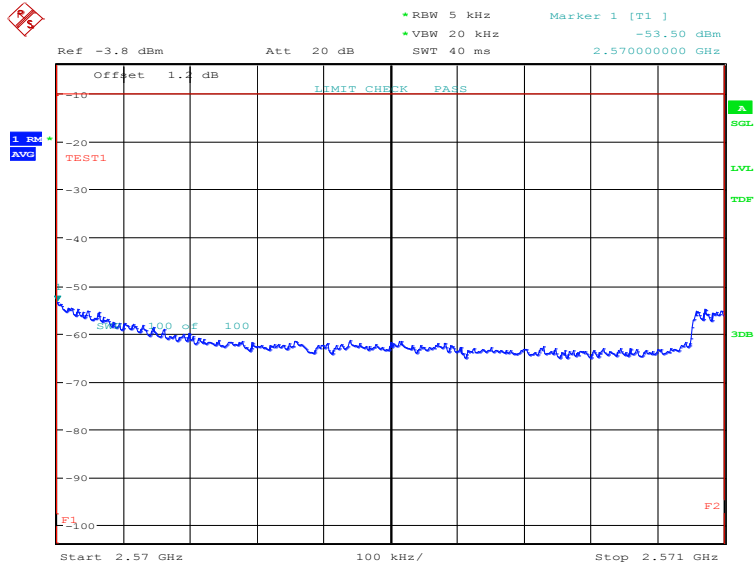
Date: 22.JUN.2021 14:32:27

OBW: 1RB-high_offset

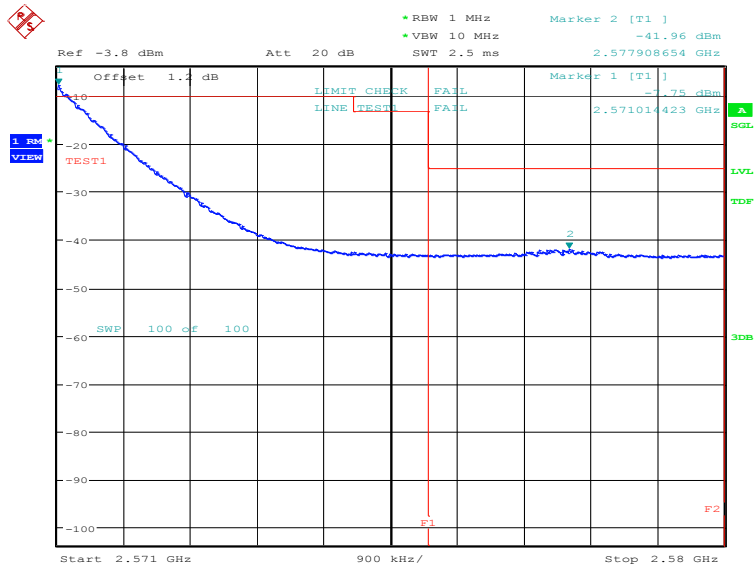


Date: 22.JUN.2021 14:33:02

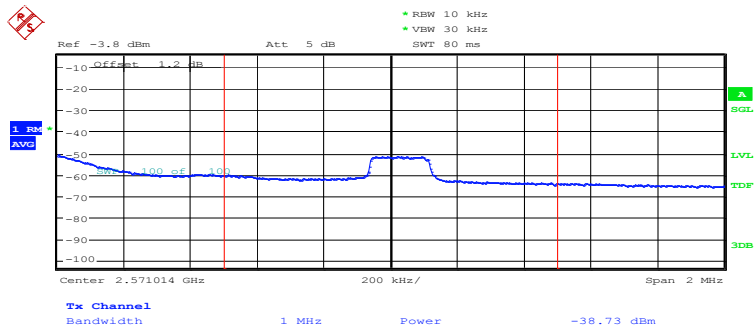
HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 22.JUN.2021 14:34:23

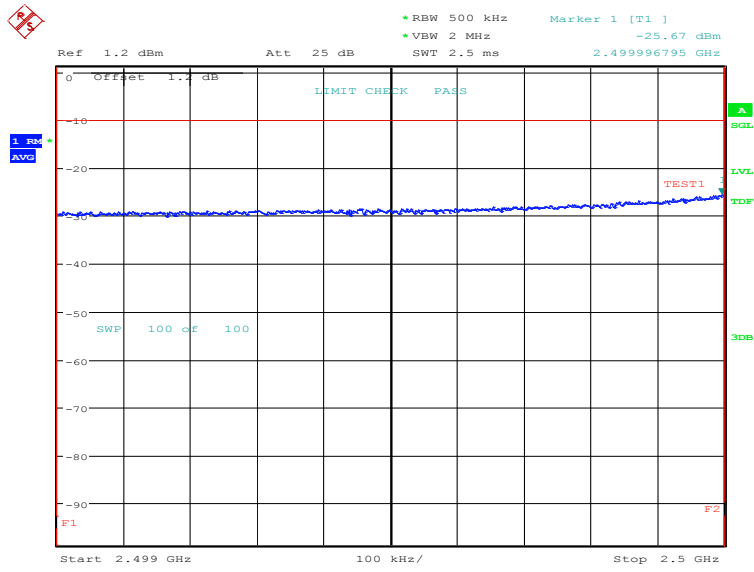


Date: 22.JUN.2021 14:36:11

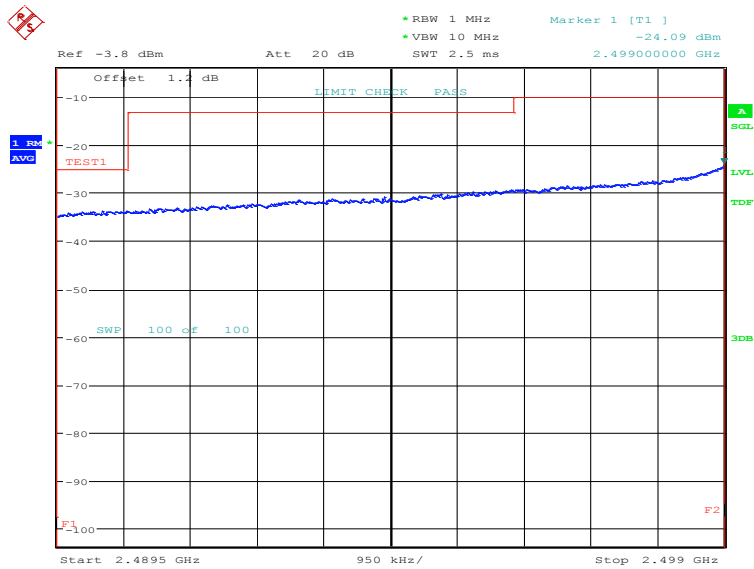


Date: 22.JUN.2021 14:36:38

LOW BAND EDGE BLOCK-20MHz-100%RB

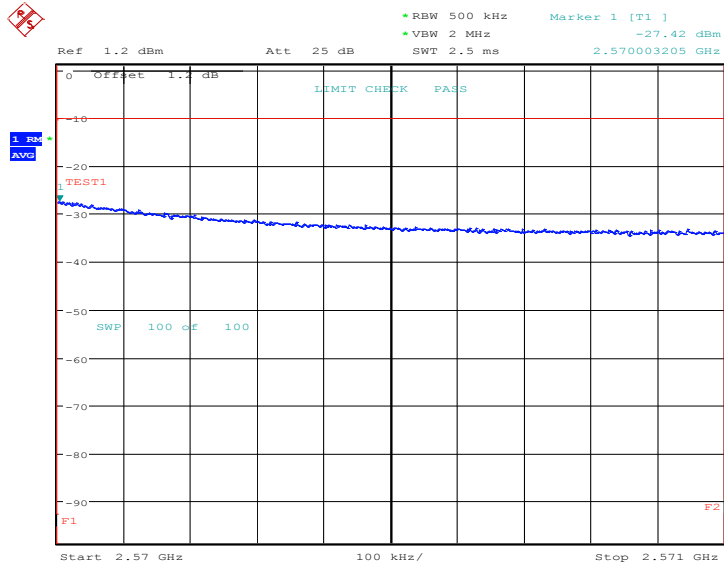


Date: 16.JUN.2021 19:17:35

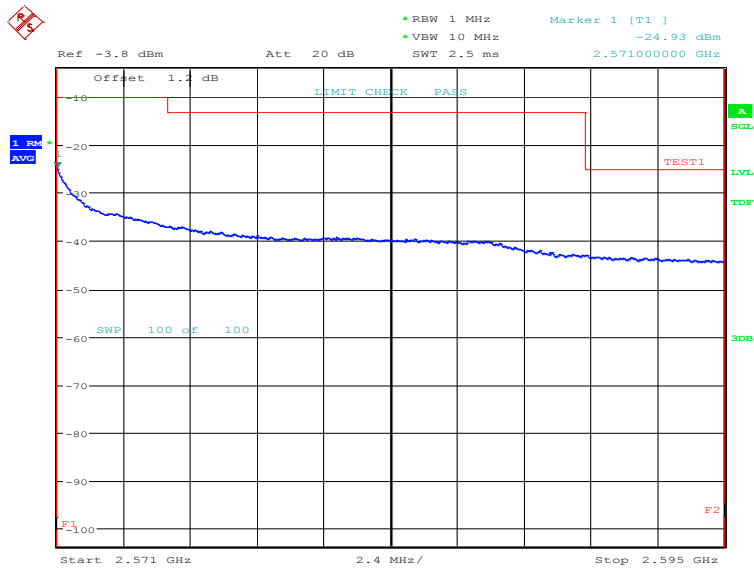


Date: 16.JUN.2021 19:19:16

HIGH BAND EDGE BLOCK-20MHz-100%RB

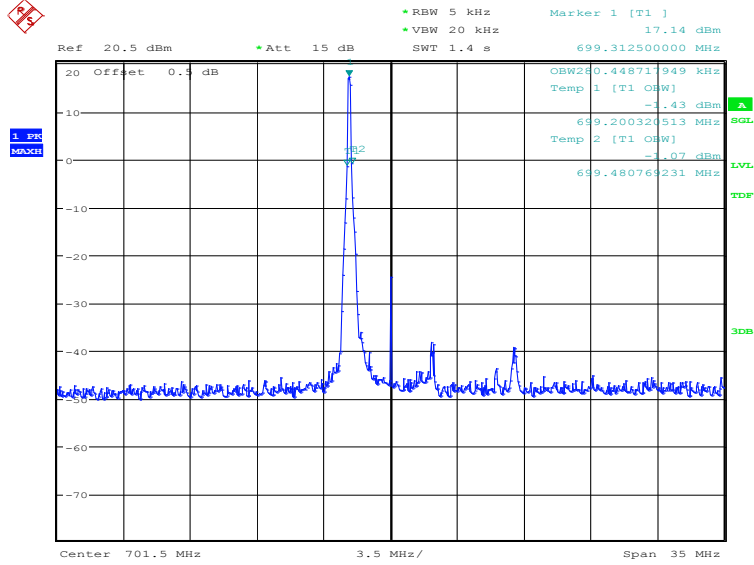


Date: 16.JUN.2021 19:22:12



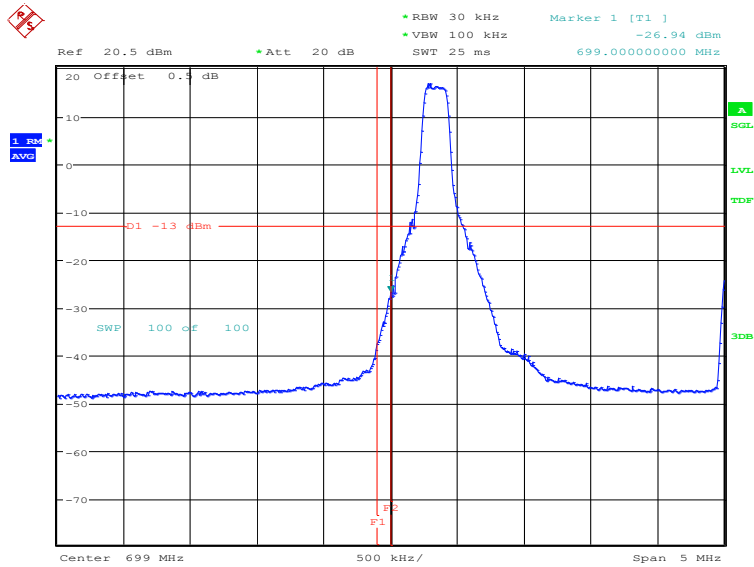
Date: 16.JUN.2021 19:23:53

LTE band 12
OBW: 1RB-low_offset



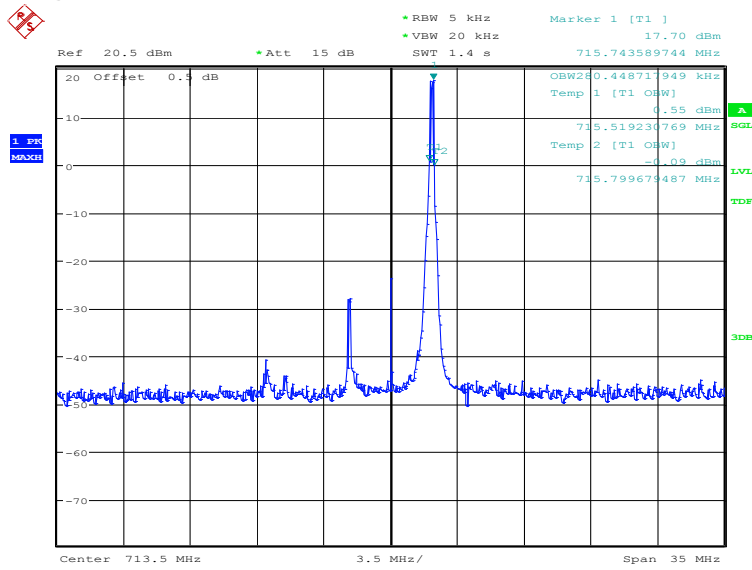
Date: 22.JUN.2021 14:39:18

LOW BAND EDGE BLOCK-1RB-low_offset



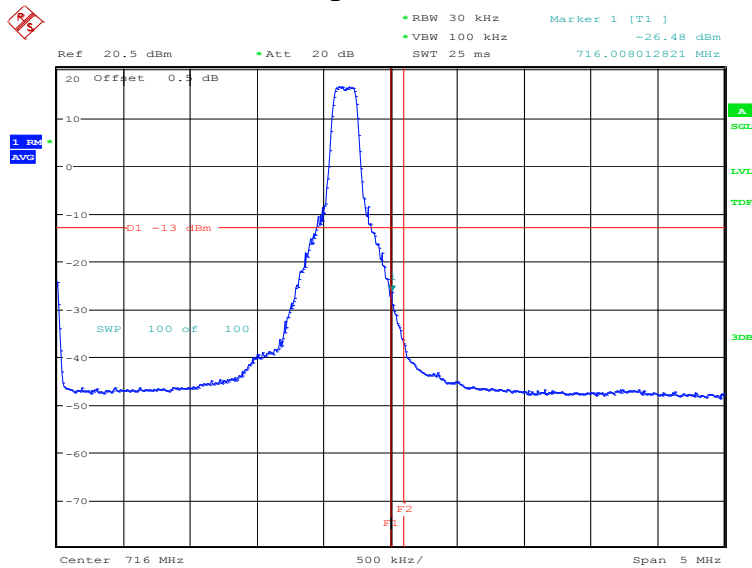
Date: 22.JUN.2021 14:39:37

OBW: 1RB-high_offset



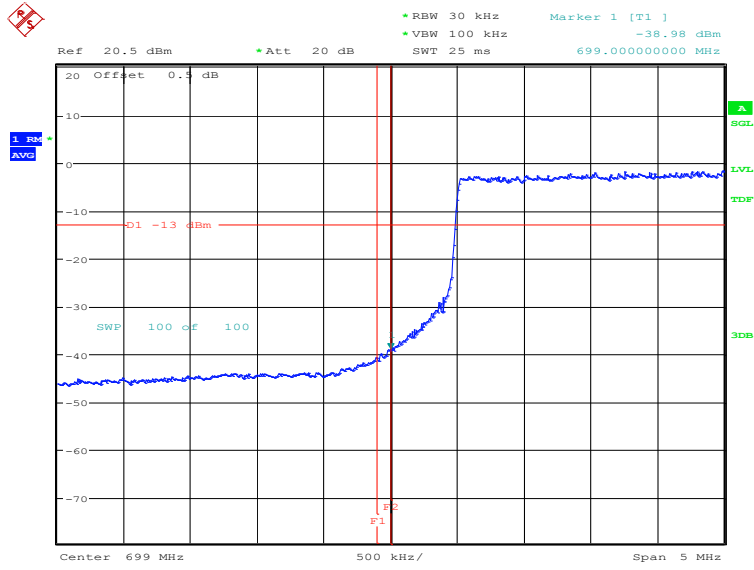
Date: 22.JUN.2021 14:40:12

HIGH BAND EDGE BLOCK-1RB-high_offset



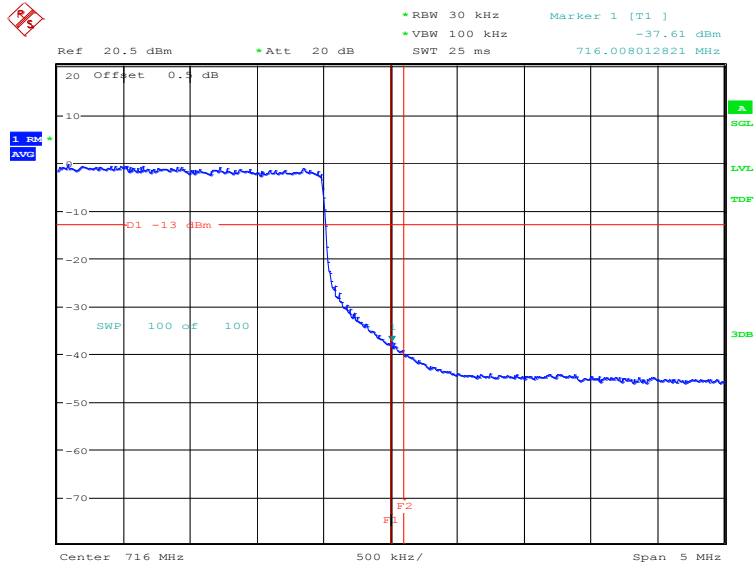
Date: 22.JUN.2021 14:40:31

LOW BAND EDGE BLOCK-10MHz-100%RB



Date: 16.JUN.2021 19:26:59

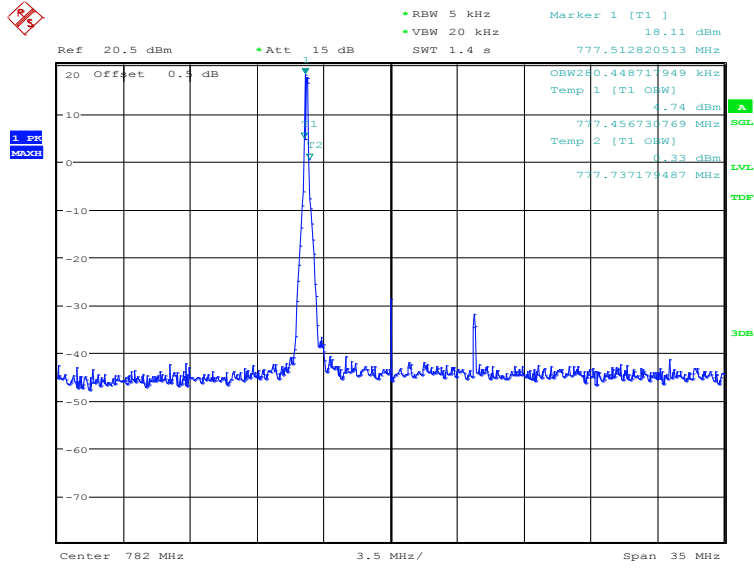
HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 16.JUN.2021 19:28:30

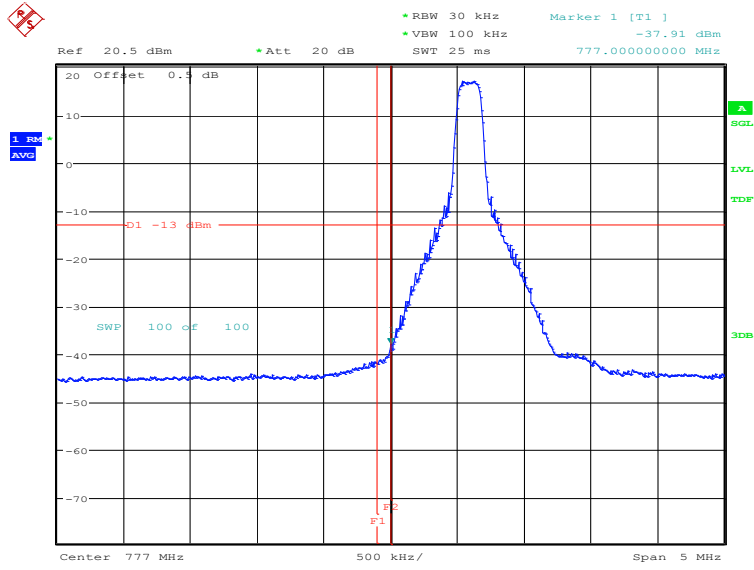


LTE band 13
OBW: 1RB-low_offset

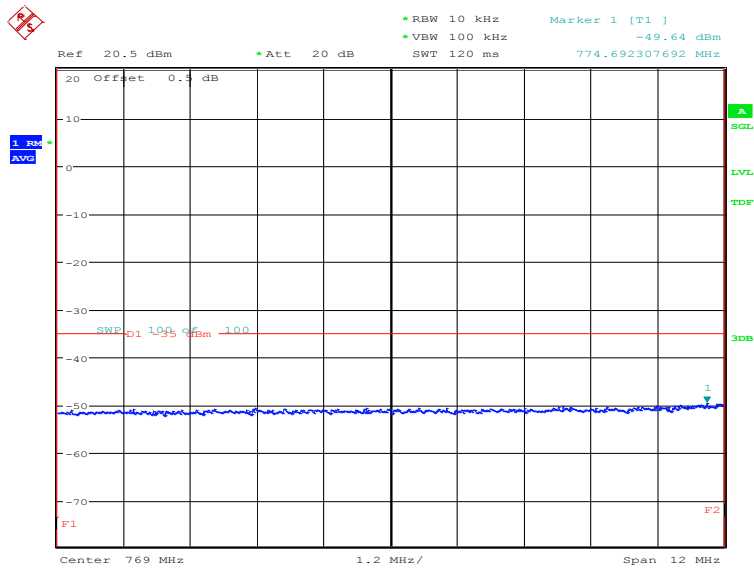


Date: 22.JUN.2021 15:04:18

LOW BAND EDGE BLOCK-1RB-low_offset

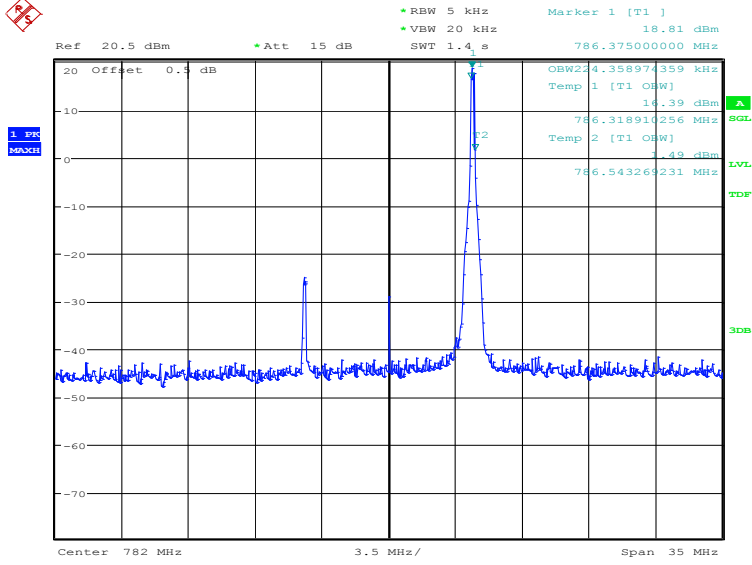


Date: 22.JUN.2021 15:04:37



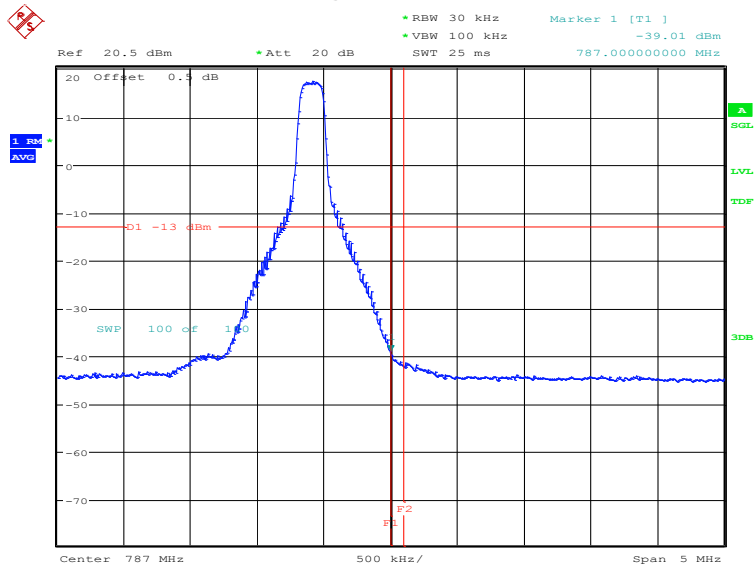
Date: 22.JUN.2021 15:05:01

OBW: 1RB-high_offset

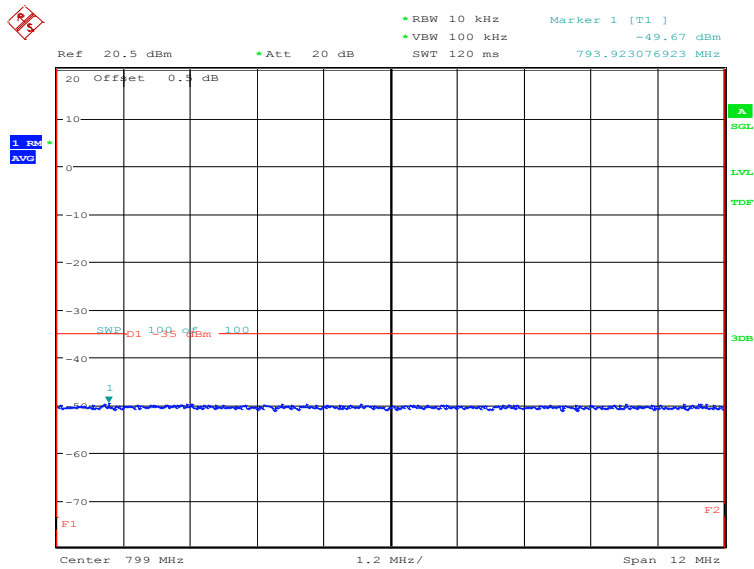


Date: 22.JUN.2021 15:02:33

HIGH BAND EDGE BLOCK-1RB-high_offset

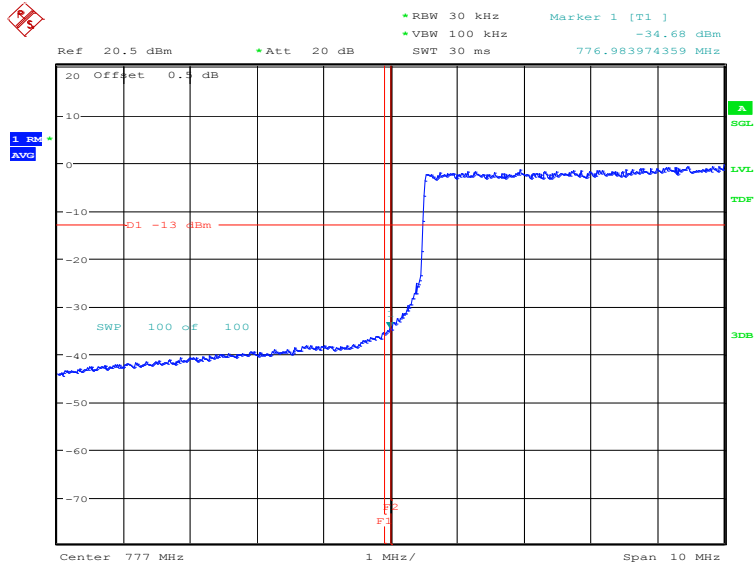


Date: 22.JUN.2021 15:02:52

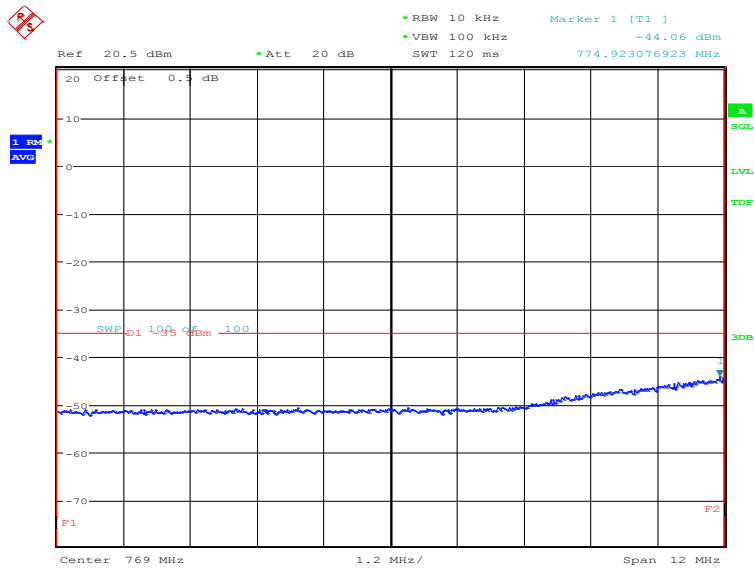


Date: 22.JUN.2021 15:03:18

LOW BAND EDGE BLOCK-10MHz-100%RB

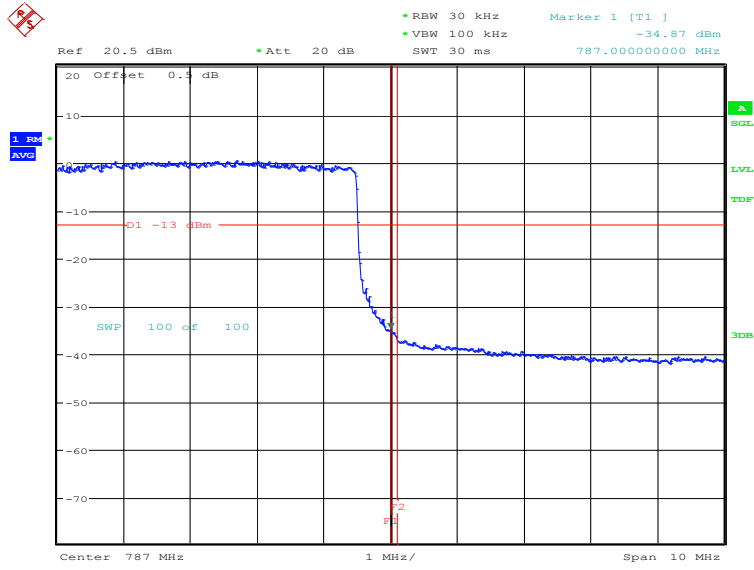


Date: 17.JUN.2021 10:10:56

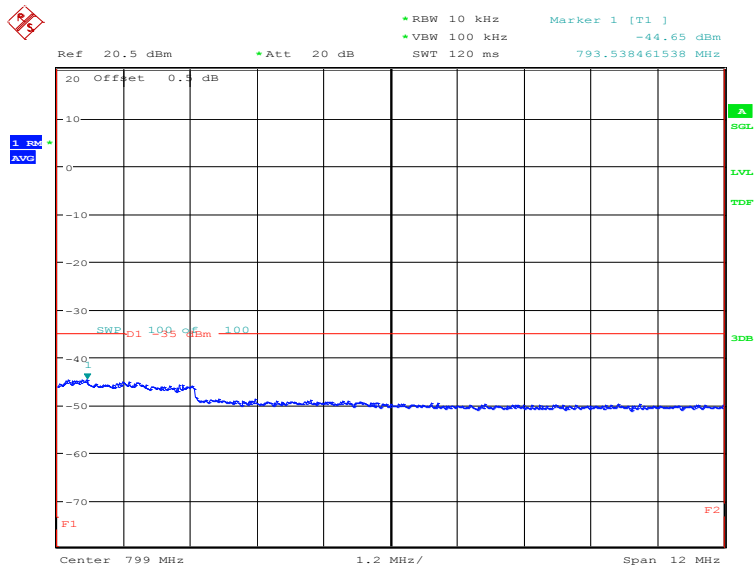


Date: 17.JUN.2021 10:11:23

HIGH BAND EDGE BLOCK-10MHz-100%RB

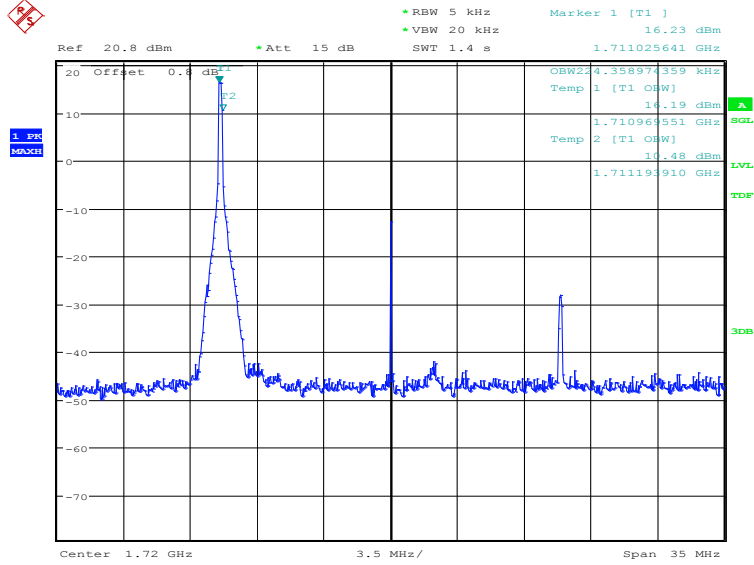


Date: 17.JUN.2021 10:12:54



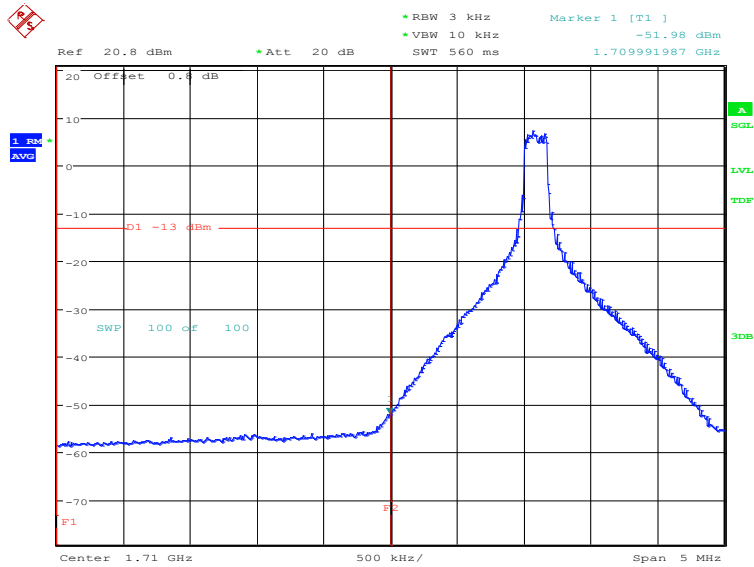
Date: 17.JUN.2021 10:13:21

LTE band 66
OBW: 1RB-low_offset



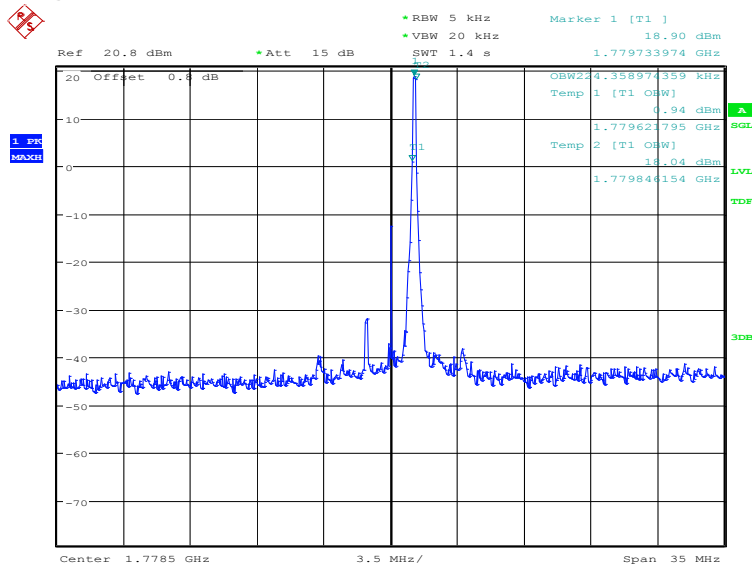
Date: 22.JUN.2021 14:46:28

LOW BAND EDGE BLOCK-1RB-low_offset



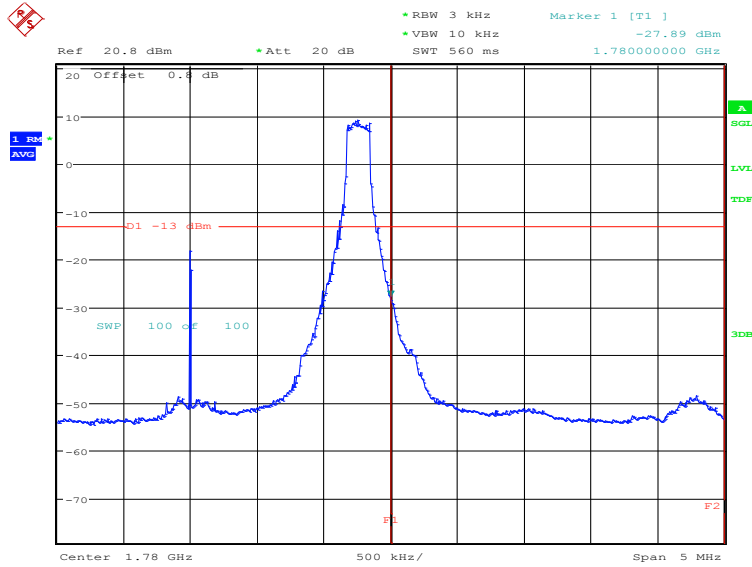
Date: 22.JUN.2021 14:47:42

OBW: 1RB-high_offset



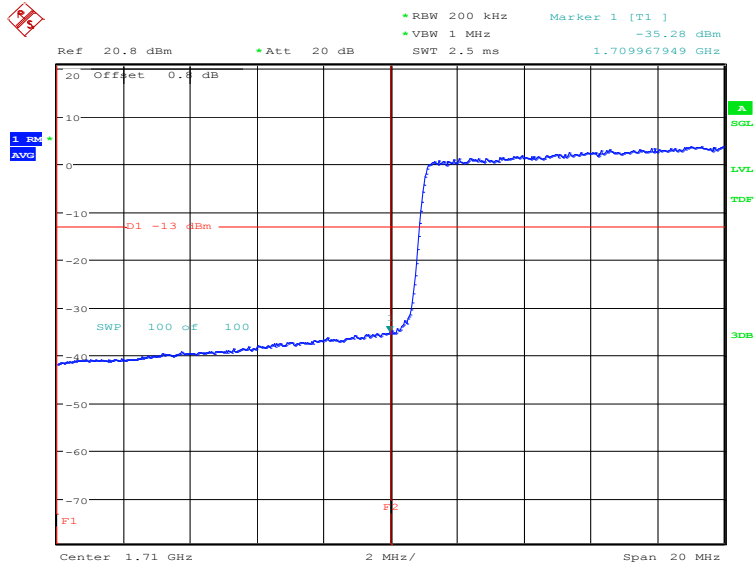
Date: 22.JUN.2021 16:44:44

HIGH BAND EDGE BLOCK-1RB-high_offset



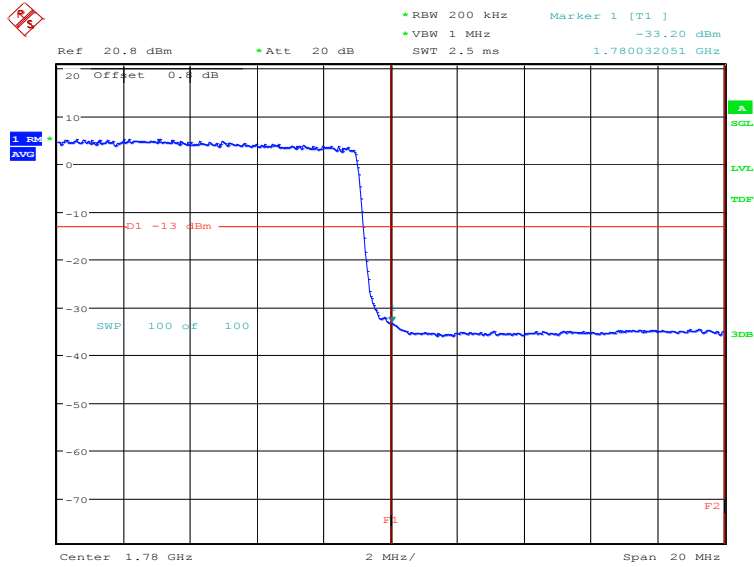
Date: 22.JUN.2021 16:45:58

LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 16.JUN.2021 19:33:43

HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 16.JUN.2021 19:35:14

A.7 Conducted Spurious Emission

A.7.1 Measurement Method

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

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

A. 7.2 Measurement Limit

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

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

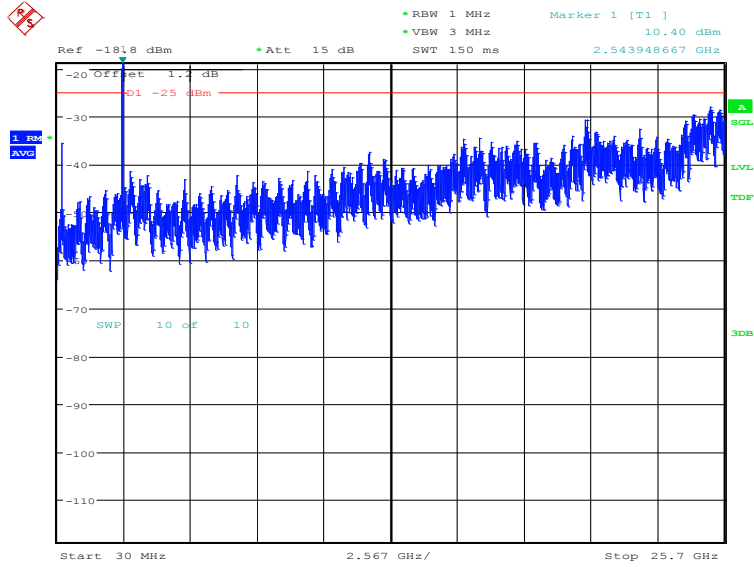
Part 27.53(f) states for operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to -70dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals.



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

LTE band 7: 30MHz – 25.7GHz

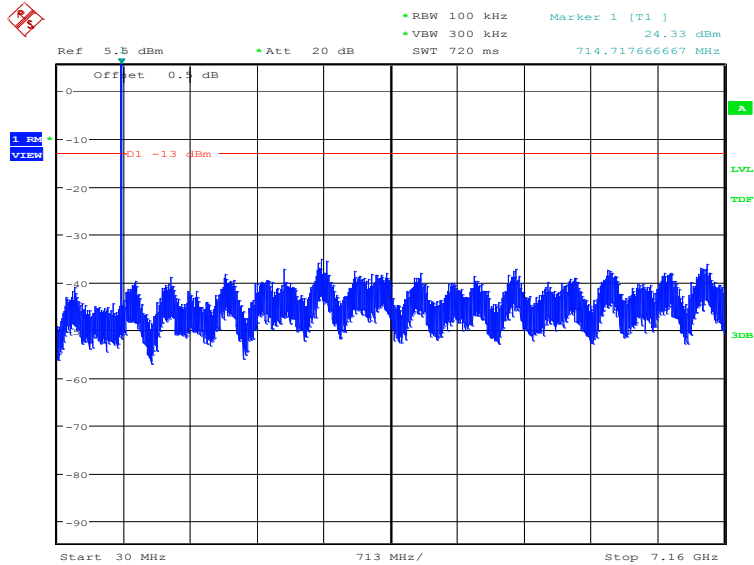
NOTE: peak above the limit line is the carrier frequency.



Date: 22.JUN.2021 14:52:51

LTE band 12: 30MHz – 7.16GHz

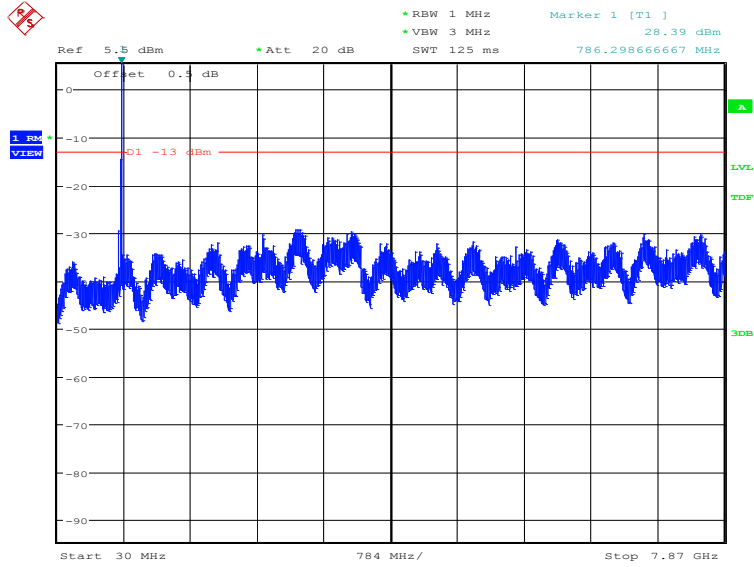
NOTE: peak above the limit line is the carrier frequency.



Date: 22.JUN.2021 14:54:58

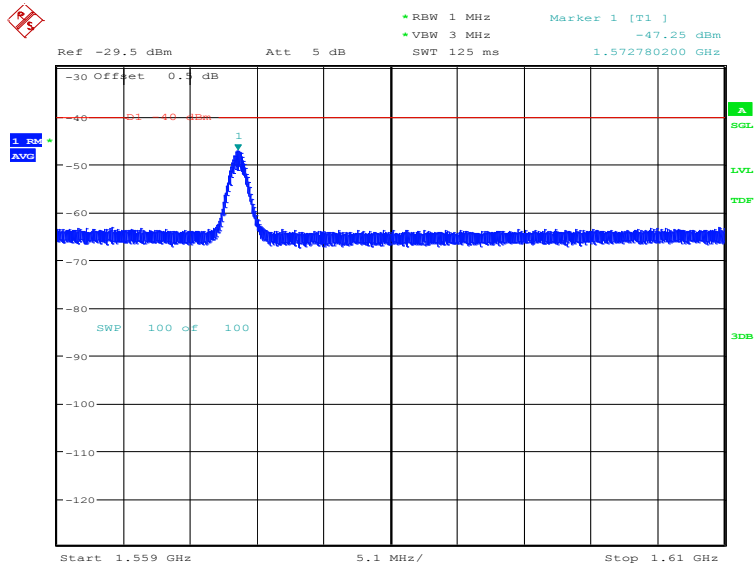
LTE band 13: 30MHz – 7.87GHz

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



Date: 22.JUN.2021 14:56:51

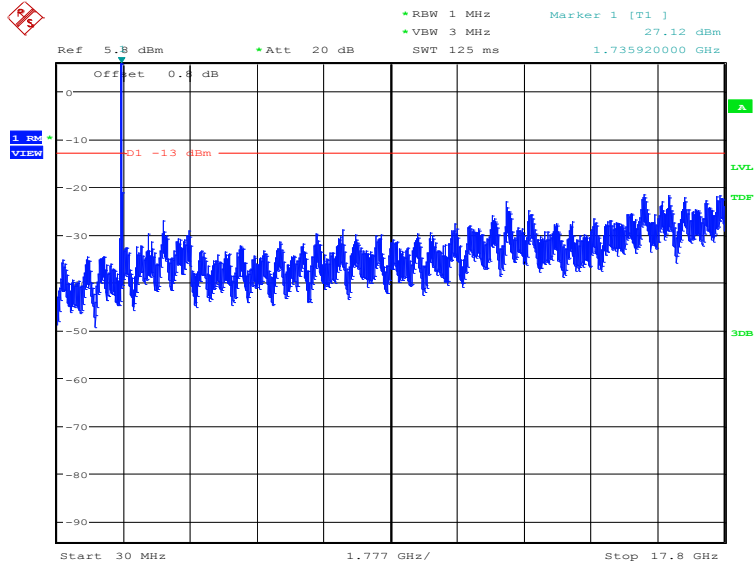
LTE band 13: 1559MHz – 1610MHz



Date: 22.JUN.2021 14:57:26

LTE band 66: 30MHz – 17.8GHz

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



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A.8 Peak-to-Average Power Ratio

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

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

LTE band 2, 20MHz

Frequency(MHz)	PAPR(dB)	
1880.0	QPSK	16QAM
	6.60	7.40

LTE band 7, 20MHz

Frequency(MHz)	PAPR(dB)	
2535.0	QPSK	16QAM
	6.83	7.40

LTE band 12,10MHz

Frequency(MHz)	PAPR(dB)	
707.5	QPSK	16QAM
	5.42	6.44

LTE band 13,10MHz

Frequency(MHz)	PAPR(dB)	
782.0	QPSK	16QAM
	5.48	6.38

LTE band 66, 20MHz

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

Annex B: Accreditation Certificate

<p>United States Department of Commerce National Institute of Standards and Technology</p>  	
<hr/> Certificate of Accreditation to ISO/IEC 17025:2017 <hr/>	
NVLAP LAB CODE: 600118-0	
Telecommunication Technology Labs, CAICT Beijing China	
<i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i>	
Electromagnetic Compatibility & Telecommunications	
<i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).</i>	
<hr/> 2020-09-29 through 2021-09-30 Effective Dates	 For the National Voluntary Laboratory Accreditation Program

END OF REPORT