LTE TEST REPORT

No. 24T04Z101135-WMD14

for

Schok LLC

ChronoVolt Smartwatch

Model Name: ChronoVolt_CV16

FCC ID: 2AM9L-CV16

with

Hardware Version: 1V0

Software Version: CV16_01.02.01

Issued Date: 2024-09-23

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
24T04Z101135-WMD14	Rev.0	1st edition	2024-09-23

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 American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

1.2. Testing Location

Location 1: CTTL (huayuan North Road)

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

Location 2: CTTL (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development Area, Beijing, P. R. China 100176

1.3. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.4. Project Data

Testing Start Date: 2024-05-27

Testing End Date: 2024-09-20

1.5. Signature

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Wang Xing

(Prepared this test report)

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(Reviewed this test report)

赵慧麟

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(Approved this test report)

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2. Client Information

2.1. Applicant Information

Company Name:	Schok LLC
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Contact:	Michael Harshbarger
Email:	mike.harsh@schokgear.com
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2.2. Manufacturer Information

Company Name:	Schok LLC
Address /Post:	5850 Town and Country Blvd, Suite 203, Frisco, TX 75034, USA
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Email:	mike.harsh@schokgear.com
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	ChronoVolt Smartwatch
Model Name	ChronoVolt_CV16
FCC ID	2AM9L-CV16
Antenna	Embedded
Output power	20.07dBm maximum EIRP measured for LTE B25
Extreme Voltage	3.5VDC to 4.45VDC (nominal: 3.8VDC)
Extreme Temperature	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
UT05a	357167500000233	1V0	CV16_01.02.01	2024-05-27
UT07a	357167500000167	1V0	CV16_01.02.01	2024-05-28

UT07a was used for emission limit test and UT05a was used for other testing cases.

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

3.3. Internal Identification of AE used during the test

AE ID*	Description
AE1	Battery

AE1

Model	572829A
Manufacturer	HUATIANTONG
Capacitance	700mAh

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

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4. Reference Documents

4.1. Documents supplied by applicant

EUT parameters are supplied by the customer, which are the bases of testing. CAICT is not responsible for the accuracy of customer supplied technical information that may affect the test results (for example, antenna gain and loss of customer supplied cable).

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	10-1-23 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-23 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-23 Edition
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB 971168 D01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS	v03r01

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5. Summary of Test Result

LTE Band 5

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

LTE Band 12

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

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

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LTE Band 25 (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 66 (4)

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 71

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

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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.

All the test results are based on normal power.

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.

LTE Band 25, Band 66 overlap the entire frequency range of LTE Band 2, Band 4. Therefore, test data provided in this report covers Band 2, Band 4 as well as Band 25, Band 66.

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 and 64QAM 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.

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6. Test Equipment Utilized

Test Instruments Utilized

Description	Type	Series Number	Manufacture	Cal Due Date	Calibration Interval
Wideband Radio Communication Tester	CMW500	159082	R&S	2024-12-28	1 year
Spectrum Analyzer	FSU	200030	R&S	2025-05-08	1 year
Climate chamber	SH-241	92004642	ESPEC	2024-10-15	1 year
Test Receiver	FSV30	101525	R&S	2025-01-18	1 Year
Antenna	VULB9163	9163-482	Schwarzbeck	2025-05-19	1 year
EMI Antenna	9117	167	Schwarzbeck	2024-10-15	1 Year
EMI Antenna	LB-7180-NF	J2030013000005	A-INFO	2025-05-16	1 Year
EMI Antenna	3115	00146404	ETS-Lindgren	2025-05-16	1 Year
Signal Generator	SMF100A	101295	R&S	2025-02-04	1 Year
Universal Radio Communication Tester	CMW500	143008	R&S	2025-02-18	1 Year

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Annex A: Measurement Results

A.1 Output Power

A.1.1 Summary

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

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

A.1.2 Conducted

A.1.2.1 Method of Measurements

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

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

The results below include a correction factor for cable loss that is provided by the customer.

A.1.2.2 Measurement Result

LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
1.4MHz	1 RB high	848.3	23.64	22.78	21.41
		836.5	23.59	22.07	21.29
		824.7	23.75	22.61	21.26
	1 RB low	848.3	23.67	22.27	21.44
		836.5	23.57	22.07	21.70
		824.7	23.54	22.54	21.74
	50% RB mid	848.3	23.89	22.59	21.69
		836.5	23.74	22.40	21.16
		824.7	23.97	22.86	21.32
	100% RB	848.3	22.60	21.54	20.42
		836.5	22.65	21.57	20.58
		824.7	22.56	21.76	20.47
3MHz	1 RB high	847.5	23.76	22.29	21.25
		836.5	23.59	22.17	21.62
		825.5	23.79	22.29	21.69
	1 RB low	847.5	23.71	22.16	21.20
		836.5	23.67	22.12	21.63
		825.5	23.72	22.32	21.63
	50% RB mid	847.5	22.84	21.87	20.67
		836.5	22.63	21.83	20.41
		825.5	22.70	22.21	20.53
	100% RB	847.5	22.68	21.63	20.69
		836.5	22.70	21.76	20.43

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		825.5	22.65	21.75	20.61
5MHz	1 RB high	846.5	23.65	22.73	21.49
		836.5	23.56	22.27	21.93
		826.5	23.49	22.06	21.25
	1 RB low	846.5	23.58	22.07	21.24
		836.5	23.56	22.04	21.59
		826.5	23.69	22.14	21.53
	50% RB mid	846.5	22.59	21.72	20.61
		836.5	22.66	21.65	20.91
		826.5	22.73	21.95	20.56
	100% RB	846.5	22.59	21.61	20.35
		836.5	22.65	21.75	20.85
		826.5	22.73	21.67	20.72
10MHz	1 RB high	844.0	23.54	22.75	21.64
		836.5	23.51	22.13	21.66
		829.0	23.61	22.14	21.22
	1 RB low	844.0	23.49	22.25	21.61
		836.5	23.55	22.14	21.17
		829.0	23.46	22.47	21.69
	50% RB mid	844.0	22.80	21.84	20.63
		836.5	22.69	22.03	20.84
		829.0	22.81	22.04	20.78
	100% RB	844.0	22.75	21.71	20.53
		836.5	22.74	21.79	20.57
		829.0	22.75	21.72	20.56

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LTE band 12

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
1.4MHz	1 RB high	715.3	23.15	22.63	21.63
		707.5	23.47	22.31	21.90
		699.7	23.58	22.40	22.19
	1 RB low	715.3	23.28	22.10	21.52
		707.5	23.35	22.37	21.80
		699.7	23.49	22.15	21.70
	50% RB mid	715.3	23.64	22.33	22.02
		707.5	23.69	22.33	21.80
		699.7	23.56	22.40	22.04
	100% RB	715.3	22.45	21.51	20.74
		707.5	22.31	21.29	20.63
		699.7	22.36	21.53	20.71
3MHz	1 RB high	714.5	23.41	22.35	22.04
		707.5	23.30	22.12	21.48
		700.5	23.40	22.14	21.87
	1 RB low	714.5	23.42	22.12	21.67
		707.5	23.43	22.18	21.96
		700.5	23.49	22.18	21.74
	50% RB mid	714.5	22.56	21.40	20.79
		707.5	22.42	21.54	20.71
		700.5	22.23	21.45	20.80
	100% RB	714.5	22.52	21.38	20.85
		707.5	22.54	21.52	20.83
		700.5	22.19	21.33	20.97
5MHz	1 RB high	713.5	23.16	22.28	21.47
		707.5	23.37	22.50	21.39
		701.5	23.55	22.05	21.56
	1 RB low	713.5	23.42	22.02	21.55
		707.5	23.51	22.08	21.94
		701.5	23.35	22.03	21.53
	50% RB mid	713.5	22.57	21.56	20.84
		707.5	22.65	21.75	21.03
		701.5	22.45	21.49	20.65
	100% RB	713.5	22.38	21.59	20.68
		707.5	22.43	21.54	20.71
		701.5	22.46	21.52	21.00
10MHz	1 RB high	711.0	23.44	22.63	21.78
		707.5	23.22	22.04	21.56
		704.0	23.42	22.06	21.94
	1 RB low	711.0	23.51	22.51	22.34

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		707.5	23.38	22.06	22.06
		704.0	23.58	22.07	21.82
	50% RB mid	711.0	22.51	21.64	20.93
		707.5	22.55	21.52	20.83
		704.0	22.51	21.68	20.78
	100% RB	711.0	22.53	21.60	21.06
		707.5	22.50	21.53	21.01
		704.0	22.47	21.56	20.92

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LTE band 13

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
5MHz	1 RB high	784.5	23.31	22.65	21.83
		782.0	23.78	22.89	21.96
		779.5	23.68	22.39	21.62
	1 RB low	784.5	23.80	22.09	21.36
		782.0	23.56	22.52	21.86
		779.5	23.79	22.54	21.71
	50% RB mid	784.5	22.72	21.81	20.99
		782.0	22.69	21.78	20.85
		779.5	22.75	21.70	20.97
	100% RB	784.5	22.67	21.98	20.69
		782.0	22.66	21.75	20.75
		779.5	22.61	21.97	20.88
10MHz	1 RB high	782.0	23.45	22.15	22.03
	1 RB low	782.0	23.50	22.24	22.06
	50% RB mid	782.0	22.75	21.80	20.93
	100% RB	782.0	22.67	21.76	20.85

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LTE band 25

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
1.4MHz	1 RB high	1914.3	20.89	20.06	20.09
		1882.5	21.96	20.26	19.65
		1850.7	21.97	20.68	19.96
	1 RB low	1914.3	20.88	19.96	19.96
		1882.5	21.70	20.45	20.12
		1850.7	21.70	20.66	19.82
	50% RB mid	1914.3	22.16	20.79	19.71
		1882.5	21.77	20.84	20.17
		1850.7	21.35	21.03	19.74
	100% RB	1914.3	21.11	19.71	18.80
		1882.5	20.87	19.92	18.99
		1850.7	20.98	19.97	19.18
3MHz	1 RB high	1913.5	21.83	20.59	19.67
		1882.5	21.82	20.45	20.05
		1851.5	21.98	20.64	19.79
	1 RB low	1913.5	21.80	20.66	19.69
		1882.5	21.93	20.83	19.67
		1851.5	21.86	20.87	20.23
	50% RB mid	1913.5	20.99	20.15	19.08
		1882.5	20.96	20.14	19.02
		1851.5	21.03	20.15	19.12
	100% RB	1913.5	20.81	19.97	18.88
		1882.5	21.00	20.04	18.99
		1851.5	20.98	20.06	19.02
5MHz	1 RB high	1912.5	21.90	21.15	19.65
		1882.5	21.74	20.26	19.58
		1852.5	21.90	20.68	19.69
	1 RB low	1912.5	21.70	20.73	19.77
		1882.5	21.91	20.58	19.71
		1852.5	22.11	20.91	19.72
	50% RB mid	1912.5	21.06	20.17	18.94
		1882.5	21.04	19.94	19.07
		1852.5	21.09	20.08	18.73
	100% RB	1912.5	20.95	20.01	19.08
		1882.5	20.98	20.08	19.19
		1852.5	21.04	20.14	18.84
10MHz	1 RB high	1910.0	21.91	20.68	19.76
		1882.5	21.86	20.60	19.78
		1855.0	22.11	20.70	20.24
	1 RB low	1910.0	21.87	20.73	20.00

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		1882.5	22.05	20.91	19.84
		1855.0	22.06	20.84	19.92
	50% RB mid	1910.0	20.99	20.19	19.02
		1882.5	21.14	20.11	19.28
		1855.0	21.17	20.13	19.19
	100% RB	1910.0	20.98	20.14	19.03
		1882.5	21.08	20.08	19.05
		1855.0	21.12	20.20	19.04
15MHz	1 RB high	1907.5	21.93	21.14	20.12
		1882.5	21.73	20.62	20.03
		1857.5	21.99	21.03	20.01
	1 RB low	1907.5	21.86	20.73	19.59
		1882.5	21.93	20.94	20.27
		1857.5	22.18	20.86	20.33
	50% RB mid	1907.5	20.94	19.99	19.07
		1882.5	21.12	20.01	19.04
		1857.5	21.12	20.02	19.12
	100% RB	1907.5	21.00	20.15	19.13
		1882.5	21.05	20.15	19.01
		1857.5	21.17	20.17	19.42
20MHz	1 RB high	1905.0	22.02	21.04	20.28
		1882.5	21.93	20.60	19.89
		1860.0	22.22	20.63	20.02
	1 RB low	1905.0	22.03	21.00	20.02
		1882.5	22.37	20.85	20.01
		1860.0	22.25	20.50	20.38
	50% RB mid	1905.0	20.99	20.27	19.16
		1882.5	21.11	20.28	19.23
		1860.0	21.31	20.27	19.30
	100% RB	1905.0	21.02	20.13	19.04
		1882.5	21.13	20.01	19.14
		1860.0	21.22	20.26	19.24

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LTE band 66

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
1.4MHz	1 RB high	1779.3	21.98	20.78	20.07
		1745.0	22.31	20.88	20.05
		1710.7	22.30	21.47	20.29
	1 RB low	1779.3	21.99	20.86	20.15
		1745.0	22.42	20.92	20.08
		1710.7	22.25	20.80	20.21
	50% RB mid	1779.3	22.13	21.12	19.70
		1745.0	22.49	21.49	19.90
		1710.7	22.47	21.19	20.02
	100% RB	1779.3	21.14	20.32	19.13
		1745.0	21.32	20.43	19.38
		1710.7	21.26	20.24	19.22
3MHz	1 RB high	1778.5	21.82	20.72	19.73
		1745.0	22.32	20.76	19.77
		1711.5	22.31	20.83	19.95
	1 RB low	1778.5	21.96	20.98	19.86
		1745.0	22.24	20.91	19.91
		1711.5	21.99	20.73	20.21
	50% RB mid	1778.5	21.08	20.40	19.13
		1745.0	21.42	20.47	19.35
		1711.5	21.34	20.42	19.18
	100% RB	1778.5	21.07	20.27	19.12
		1745.0	21.34	20.39	19.34
		1711.5	21.36	20.33	19.31
5MHz	1 RB high	1777.5	21.80	21.15	20.04
		1745.0	22.26	20.81	20.07
		1712.5	22.23	20.77	19.83
	1 RB low	1777.5	21.88	20.89	20.07
		1745.0	22.27	21.03	19.91
		1712.5	22.18	20.88	19.92
	50% RB mid	1777.5	21.16	20.09	19.24
		1745.0	21.45	20.36	19.43
		1712.5	21.28	20.10	19.40
	100% RB	1777.5	21.04	20.19	19.28
		1745.0	21.39	20.13	19.12
		1712.5	21.37	20.32	19.33
10MHz	1 RB high	1775.0	21.01	20.93	19.86
		1745.0	22.34	21.21	20.11
		1715.0	22.41	20.93	19.96
	1 RB low	1775.0	20.91	20.73	20.30

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		1745.0	22.32	20.94	20.46
		1715.0	22.13	20.93	20.28
	50% RB mid	1775.0	21.06	20.35	19.11
		1745.0	21.41	20.26	19.02
		1715.0	21.32	20.25	19.32
	100% RB	1775.0	21.11	20.10	19.11
		1745.0	21.43	20.46	19.46
		1715.0	21.35	20.30	19.40
15MHz	1 RB high	1772.5	21.67	20.73	20.10
		1745.0	21.51	21.03	20.43
		1717.5	21.49	20.91	20.04
	1 RB low	1772.5	21.49	20.83	20.25
		1745.0	21.44	21.10	20.30
		1717.5	21.28	20.83	20.38
	50% RB mid	1772.5	20.32	20.15	19.29
		1745.0	20.62	20.41	19.15
		1717.5	20.51	20.25	19.26
	100% RB	1772.5	20.43	20.16	19.31
		1745.0	20.60	20.32	19.43
		1717.5	20.54	20.34	19.39
20MHz	1 RB high	1770.0	22.04	21.17	20.05
		1745.0	22.28	21.13	20.13
		1720.0	22.38	20.93	20.29
	1 RB low	1770.0	21.98	20.96	20.27
		1745.0	22.33	21.08	20.33
		1720.0	22.11	20.92	20.41
	50% RB mid	1770.0	21.20	20.17	19.35
		1745.0	21.40	20.47	19.47
		1720.0	21.44	20.29	19.50
	100% RB	1770.0	21.28	20.25	19.37
		1745.0	21.16	20.49	19.40
		1720.0	21.40	20.27	19.48

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LTE band 71

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
5MHz	1 RB high	695.5	23.14	21.88	20.91
		680.5	23.26	21.83	20.80
		665.5	23.05	21.64	20.77
	1 RB low	695.5	23.19	22.21	20.94
		680.5	23.17	21.64	21.19
		665.5	23.01	21.58	21.23
	50% RB mid	695.5	22.35	21.21	21.18
		680.5	22.36	21.20	20.67
		665.5	22.27	21.20	20.83
	100% RB	695.5	22.31	21.12	19.96
		680.5	22.34	21.37	20.12
		665.5	22.23	21.25	20.01
10MHz	1 RB high	693.0	23.61	22.30	20.76
		680.5	23.28	22.17	21.12
		668.0	23.26	21.99	21.18
	1 RB low	693.0	23.71	22.40	20.71
		680.5	23.13	22.03	21.13
		668.0	23.28	22.00	21.13
	50% RB mid	693.0	22.83	21.91	20.20
		680.5	22.55	21.52	19.95
		668.0	22.43	21.45	20.07
	100% RB	693.0	22.73	21.84	20.22
		680.5	22.56	21.54	19.97
		668.0	22.46	21.37	20.15
15MHz	1 RB high	690.5	23.20	21.93	20.99
		680.5	23.22	22.00	21.41
		670.5	23.24	21.78	20.76
	1 RB low	690.5	23.07	21.86	20.75
		680.5	23.29	21.84	21.09
		670.5	23.26	21.76	21.03
	50% RB mid	690.5	22.28	21.39	20.15
		680.5	22.45	21.44	20.43
		670.5	22.36	21.40	20.10
	100% RB	690.5	22.48	21.48	19.90
		680.5	22.37	21.47	20.38
		670.5	22.37	21.32	20.25
20MHz	1 RB high	688.0	22.98	21.78	21.14
		680.5	23.16	21.81	21.15
		673.0	23.04	21.63	20.73
	1 RB low	688.0	22.99	21.68	21.11

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		680.5	23.19	21.75	20.68
		673.0	23.06	21.79	21.18
	50% RB mid	688.0	22.27	21.52	20.16
		680.5	22.28	21.39	20.37
		673.0	22.33	21.39	20.31
	100% RB	688.0	22.23	21.37	20.07
		680.5	22.22	21.25	20.11
		673.0	22.27	21.30	20.10

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A.1.3 Radiated

A.1.3.1 Description

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

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

FDD Band 12/71: Part 27.50(c)(10) specifies "Portable stations(hand-held devices) in the 600 MHz uplink band and the 698–746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP".

FDD Band 13: Part 27.50(b) specifies "Portable stations(hand-held devices) transmitting in the 746–757 MHz, 776–788 MHz, and 805–806 MHz bands are limited to 3 watts ERP".

FDD Band 25: Part 24.232(c) specifies "Mobile and portable stations are limited to 2 watts EIRP".

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

According to KDB 412172 D01 and ANSI C63.26 the relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$$\mathbf{ERP\ or\ EIRP} = \mathbf{P_T} + \mathbf{G_T} - \mathbf{L_C}$$

where;

- $\mathbf{ERP\ or\ EIRP} =$ effective radiated power or equivalent isotropically radiated power(expressed in the same units as P_T.
- $\mathbf{P_T} =$ transmitter output power, in this report the unit express as dBm;
- $\mathbf{G_T} =$ gain of the transmitting antenna, in dBd(ERP) or dBi(EIRP);
- $\mathbf{L_C} =$ signal attenuation in the connecting cable between the transmitter and antenna, in dB.

Alternatively, the EIRP can be determined from Equation above and then converted to ERP based on the maximum antenna gain relationship by applying the following equation:

$$\mathbf{ERP} = \mathbf{EIRP} - \mathbf{2.15dB}$$

Note: The antenna gain information was provided by the client. The laboratory is not responsible for identifying its authenticity during the test.

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A.1.3.3 Limits and Measurement Results

LTE Band 5-ERP

Limits: ≤38.45dBm(7W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power(dBm)			ERP(dBm)(Gt-Lc =-8.5)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4MHz	1 RB high	848.3	23.64	22.78	21.41	12.99	12.13	10.76
		836.5	23.59	22.07	21.29	12.94	11.42	10.64
		824.7	23.75	22.61	21.26	13.10	11.96	10.61
	1 RB low	848.3	23.67	22.27	21.44	13.02	11.62	10.79
		836.5	23.57	22.07	21.70	12.92	11.42	11.05
		824.7	23.54	22.54	21.74	12.89	11.89	11.09
	50% RB mid	848.3	23.89	22.59	21.69	13.24	11.94	11.04
		836.5	23.74	22.40	21.16	13.09	11.75	10.51
		824.7	23.97	22.86	21.32	13.32	12.21	10.67
	100% RB	848.3	22.60	21.54	20.42	11.95	10.89	9.77
		836.5	22.65	21.57	20.58	12.00	10.92	9.93
		824.7	22.56	21.76	20.47	11.91	11.11	9.82
3MHz	1 RB high	847.5	23.76	22.29	21.25	13.11	11.64	10.60
		836.5	23.59	22.17	21.62	12.94	11.52	10.97
		825.5	23.79	22.29	21.69	13.14	11.64	11.04
	1 RB low	847.5	23.71	22.16	21.20	13.06	11.51	10.55
		836.5	23.67	22.12	21.63	13.02	11.47	10.98
		825.5	23.72	22.32	21.63	13.07	11.67	10.98
	50% RB mid	847.5	22.84	21.87	20.67	12.19	11.22	10.02
		836.5	22.63	21.83	20.41	11.98	11.18	9.76
		825.5	22.70	22.21	20.53	12.05	11.56	9.88
	100% RB	847.5	22.68	21.63	20.69	12.03	10.98	10.04
		836.5	22.70	21.76	20.43	12.05	11.11	9.78
		825.5	22.65	21.75	20.61	12.00	11.10	9.96
5MHz	1 RB high	846.5	23.65	22.73	21.49	13.00	12.08	10.84
		836.5	23.56	22.27	21.93	12.91	11.62	11.28
		826.5	23.49	22.06	21.25	12.84	11.41	10.60
	1 RB low	846.5	23.58	22.07	21.24	12.93	11.42	10.59
		836.5	23.56	22.04	21.59	12.91	11.39	10.94
		826.5	23.69	22.14	21.53	13.04	11.49	10.88
	50% RB mid	846.5	22.59	21.72	20.61	11.94	11.07	9.96
		836.5	22.66	21.65	20.91	12.01	11.00	10.26
		826.5	22.73	21.95	20.56	12.08	11.30	9.91
	100% RB	846.5	22.59	21.61	20.35	11.94	10.96	9.70
		836.5	22.65	21.75	20.85	12.00	11.10	10.20

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		826.5	22.73	21.67	20.72	12.08	11.02	10.07
10MHz	1 RB high	844	23.54	22.75	21.64	12.89	12.10	10.99
		836.5	23.51	22.13	21.66	12.86	11.48	11.01
		829	23.61	22.14	21.22	12.96	11.49	10.57
	1 RB low	844	23.49	22.25	21.61	12.84	11.60	10.96
		836.5	23.55	22.14	21.17	12.90	11.49	10.52
		829	23.46	22.47	21.69	12.81	11.82	11.04
	50% RB mid	844	22.80	21.84	20.63	12.15	11.19	9.98
		836.5	22.69	22.03	20.84	12.04	11.38	10.19
		829	22.81	22.04	20.78	12.16	11.39	10.13
	100% RB	844	22.75	21.71	20.53	12.10	11.06	9.88
		836.5	22.74	21.79	20.57	12.09	11.14	9.92
		829	22.75	21.72	20.56	12.10	11.07	9.91

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LTE Band 12-ERP

Limits: ≤34.77dBm(3W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power(dBm)			ERP(dBm)(Gt-Lc =-9.1)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4MHz	1 RB high	715.3	23.15	22.63	21.63	11.90	11.38	10.38
		707.5	23.47	22.31	21.90	12.22	11.06	10.65
		699.7	23.58	22.40	22.19	12.33	11.15	10.94
	1 RB low	715.3	23.28	22.10	21.52	12.03	10.85	10.27
		707.5	23.35	22.37	21.80	12.10	11.12	10.55
		699.7	23.49	22.15	21.70	12.24	10.90	10.45
	50% RB mid	715.3	23.64	22.33	22.02	12.39	11.08	10.77
		707.5	23.69	22.33	21.80	12.44	11.08	10.55
		699.7	23.56	22.40	22.04	12.31	11.15	10.79
	100% RB	715.3	22.45	21.51	20.74	11.20	10.26	9.49
		707.5	22.31	21.29	20.63	11.06	10.04	9.38
		699.7	22.36	21.53	20.71	11.11	10.28	9.46
3MHz	1 RB high	714.5	23.41	22.35	22.04	12.16	11.10	10.79
		707.5	23.30	22.12	21.48	12.05	10.87	10.23
		700.5	23.40	22.14	21.87	12.15	10.89	10.62
	1 RB low	714.5	23.42	22.12	21.67	12.17	10.87	10.42
		707.5	23.43	22.18	21.96	12.18	10.93	10.71
		700.5	23.49	22.18	21.74	12.24	10.93	10.49
	50% RB mid	714.5	22.56	21.40	20.79	11.31	10.15	9.54
		707.5	22.42	21.54	20.71	11.17	10.29	9.46
		700.5	22.23	21.45	20.80	10.98	10.20	9.55
	100% RB	714.5	22.52	21.38	20.85	11.27	10.13	9.60
		707.5	22.54	21.52	20.83	11.29	10.27	9.58
		700.5	22.19	21.33	20.97	10.94	10.08	9.72
5MHz	1 RB high	713.5	23.16	22.28	21.47	11.91	11.03	10.22
		707.5	23.37	22.50	21.39	12.12	11.25	10.14
		701.5	23.55	22.05	21.56	12.30	10.80	10.31
	1 RB low	713.5	23.42	22.02	21.55	12.17	10.77	10.30
		707.5	23.51	22.08	21.94	12.26	10.83	10.69
		701.5	23.35	22.03	21.53	12.10	10.78	10.28
	50% RB mid	713.5	22.57	21.56	20.84	11.32	10.31	9.59
		707.5	22.65	21.75	21.03	11.40	10.50	9.78
		701.5	22.45	21.49	20.65	11.20	10.24	9.40
	100% RB	713.5	22.38	21.59	20.68	11.13	10.34	9.43
		707.5	22.43	21.54	20.71	11.18	10.29	9.46
		701.5	22.46	21.52	21.00	11.21	10.27	9.75
10MHz	1 RB high	711	23.44	22.63	21.78	12.19	11.38	10.53

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		707.5	23.22	22.04	21.56	11.97	10.79	10.31
		704	23.42	22.06	21.94	12.17	10.81	10.69
	1 RB low	711	23.51	22.51	22.34	12.26	11.26	11.09
		707.5	23.38	22.06	22.06	12.13	10.81	10.81
		704	23.58	22.07	21.82	12.33	10.82	10.57
	50% RB mid	711	22.51	21.64	20.93	11.26	10.39	9.68
		707.5	22.55	21.52	20.83	11.30	10.27	9.58
		704	22.51	21.68	20.78	11.26	10.43	9.53
	100% RB	711	22.53	21.60	21.06	11.28	10.35	9.81
		707.5	22.50	21.53	21.01	11.25	10.28	9.76
		704	22.47	21.56	20.92	11.22	10.31	9.67

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LTE Band 13-ERP

Limits: ≤34.77dBm(3W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power(dBm)			ERP(dBm)(Gt-Lc =-8.7)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5MHz	1 RB high	784.5	23.31	22.65	21.83	12.46	11.80	10.98
		782	23.78	22.89	21.96	12.93	12.04	11.11
		779.5	23.68	22.39	21.62	12.83	11.54	10.77
	1 RB low	784.5	23.80	22.09	21.36	12.95	11.24	10.51
		782	23.56	22.52	21.86	12.71	11.67	11.01
		779.5	23.79	22.54	21.71	12.94	11.69	10.86
	50% RB mid	784.5	22.72	21.81	20.99	11.87	10.96	10.14
		782	22.69	21.78	20.85	11.84	10.93	10.00
		779.5	22.75	21.70	20.97	11.90	10.85	10.12
	100% RB	784.5	22.67	21.98	20.69	11.82	11.13	9.84
		782	22.66	21.75	20.75	11.81	10.90	9.90
		779.5	22.61	21.97	20.88	11.76	11.12	10.03
10MHz	1 RB high	782	23.45	22.15	22.03	12.60	11.30	11.18
	1 RB low	782	23.50	22.24	22.06	12.65	11.39	11.21
	50% RB mid	782	22.75	21.80	20.93	11.90	10.95	10.08
	100% RB	782	22.67	21.76	20.85	11.82	10.91	10.00

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LTE Band 25-EIRP

Limits: ≤33dBm(2W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power(dBm)			EIRP(dBm)(Gt-Lc =-1.7)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4MHz	1 RB high	1914.3	20.89	20.06	20.09	19.19	18.36	18.39
		1882.5	21.96	20.26	19.65	20.26	18.56	17.95
		1850.7	21.97	20.68	19.96	20.27	18.98	18.26
	1 RB low	1914.3	20.88	19.96	19.96	19.18	18.26	18.26
		1882.5	21.70	20.45	20.12	20.00	18.75	18.42
		1850.7	21.70	20.66	19.82	20.00	18.96	18.12
	50% RB mid	1914.3	22.16	20.79	19.71	20.46	19.09	18.01
		1882.5	21.77	20.84	20.17	20.07	19.14	18.47
		1850.7	21.35	21.03	19.74	19.65	19.33	18.04
	100% RB	1914.3	21.11	19.71	18.80	19.41	18.01	17.10
		1882.5	20.87	19.92	18.99	19.17	18.22	17.29
		1850.7	20.98	19.97	19.18	19.28	18.27	17.48
3MHz	1 RB high	1913.5	21.83	20.59	19.67	20.13	18.89	17.97
		1882.5	21.82	20.45	20.05	20.12	18.75	18.35
		1851.5	21.98	20.64	19.79	20.28	18.94	18.09
	1 RB low	1913.5	21.80	20.66	19.69	20.10	18.96	17.99
		1882.5	21.93	20.83	19.67	20.23	19.13	17.97
		1851.5	21.86	20.87	20.23	20.16	19.17	18.53
	50% RB mid	1913.5	20.99	20.15	19.08	19.29	18.45	17.38
		1882.5	20.96	20.14	19.02	19.26	18.44	17.32
		1851.5	21.03	20.15	19.12	19.33	18.45	17.42
	100% RB	1913.5	20.81	19.97	18.88	19.11	18.27	17.18
		1882.5	21.00	20.04	18.99	19.30	18.34	17.29
		1851.5	20.98	20.06	19.02	19.28	18.36	17.32
5MHz	1 RB high	1912.5	21.90	21.15	19.65	20.20	19.45	17.95
		1882.5	21.74	20.26	19.58	20.04	18.56	17.88
		1852.5	21.90	20.68	19.69	20.20	18.98	17.99
	1 RB low	1912.5	21.70	20.73	19.77	20.00	19.03	18.07
		1882.5	21.91	20.58	19.71	20.21	18.88	18.01
		1852.5	22.11	20.91	19.72	20.41	19.21	18.02
	50% RB mid	1912.5	21.06	20.17	18.94	19.36	18.47	17.24
		1882.5	21.04	19.94	19.07	19.34	18.24	17.37
		1852.5	21.09	20.08	18.73	19.39	18.38	17.03
	100% RB	1912.5	20.95	20.01	19.08	19.25	18.31	17.38
		1882.5	20.98	20.08	19.19	19.28	18.38	17.49
		1852.5	21.04	20.14	18.84	19.34	18.44	17.14
10MHz	1 RB high	1910	21.91	20.68	19.76	20.21	18.98	18.06

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		1882.5	21.86	20.60	19.78	20.16	18.90	18.08
		1855	22.11	20.70	20.24	20.41	19.00	18.54
	1 RB low	1910	21.87	20.73	20.00	20.17	19.03	18.30
		1882.5	22.05	20.91	19.84	20.35	19.21	18.14
		1855	22.06	20.84	19.92	20.36	19.14	18.22
	50% RB mid	1910	20.99	20.19	19.02	19.29	18.49	17.32
		1882.5	21.14	20.11	19.28	19.44	18.41	17.58
		1855	21.17	20.13	19.19	19.47	18.43	17.49
	100% RB	1910	20.98	20.14	19.03	19.28	18.44	17.33
		1882.5	21.08	20.08	19.05	19.38	18.38	17.35
		1855	21.12	20.20	19.04	19.42	18.50	17.34
15MHz	1 RB high	1907.5	21.93	21.14	20.12	20.23	19.44	18.42
		1882.5	21.73	20.62	20.03	20.03	18.92	18.33
		1857.5	21.99	21.03	20.01	20.29	19.33	18.31
	1 RB low	1907.5	21.86	20.73	19.59	20.16	19.03	17.89
		1882.5	21.93	20.94	20.27	20.23	19.24	18.57
		1857.5	22.18	20.86	20.33	20.48	19.16	18.63
	50% RB mid	1907.5	20.94	19.99	19.07	19.24	18.29	17.37
		1882.5	21.12	20.01	19.04	19.42	18.31	17.34
		1857.5	21.12	20.02	19.12	19.42	18.32	17.42
	100% RB	1907.5	21.00	20.15	19.13	19.30	18.45	17.43
		1882.5	21.05	20.15	19.01	19.35	18.45	17.31
		1857.5	21.17	20.17	19.42	19.47	18.47	17.72
20MHz	1 RB high	1905	22.02	21.04	20.28	20.32	19.34	18.58
		1882.5	21.93	20.60	19.89	20.23	18.90	18.19
		1860	22.22	20.63	20.02	20.52	18.93	18.32
	1 RB low	1905	22.03	21.00	20.02	20.33	19.30	18.32
		1882.5	22.37	20.85	20.01	20.67	19.15	18.31
		1860	22.25	20.50	20.38	20.55	18.80	18.68
	50% RB mid	1905	20.99	20.27	19.16	19.29	18.57	17.46
		1882.5	21.11	20.28	19.23	19.41	18.58	17.53
		1860	21.31	20.27	19.30	19.61	18.57	17.60
	100% RB	1905	21.02	20.13	19.04	19.32	18.43	17.34
		1882.5	21.13	20.01	19.14	19.43	18.31	17.44
		1860	21.22	20.26	19.24	19.52	18.56	17.54

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LTE Band 66-EIRP

Limits: ≤30dBm(1W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power(dBm)			EIRP(dBm)(Gt-Lc =-3.2)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4MHz	1 RB high	1779.3	21.98	20.78	20.07	18.78	17.58	16.87
		1745	22.31	20.88	20.05	19.11	17.68	16.85
		1710.7	22.30	21.47	20.29	19.10	18.27	17.09
	1 RB low	1779.3	21.99	20.86	20.15	18.79	17.66	16.95
		1745	22.42	20.92	20.08	19.22	17.72	16.88
		1710.7	22.25	20.80	20.21	19.05	17.60	17.01
	50% RB mid	1779.3	22.13	21.12	19.70	18.93	17.92	16.50
		1745	22.49	21.49	19.90	19.29	18.29	16.70
		1710.7	22.47	21.19	20.02	19.27	17.99	16.82
	100% RB	1779.3	21.14	20.32	19.13	17.94	17.12	15.93
		1745	21.32	20.43	19.38	18.12	17.23	16.18
		1710.7	21.26	20.24	19.22	18.06	17.04	16.02
3MHz	1 RB high	1778.5	21.82	20.72	19.73	18.62	17.52	16.53
		1745	22.32	20.76	19.77	19.12	17.56	16.57
		1711.5	22.31	20.83	19.95	19.11	17.63	16.75
	1 RB low	1778.5	21.96	20.98	19.86	18.76	17.78	16.66
		1745	22.24	20.91	19.91	19.04	17.71	16.71
		1711.5	21.99	20.73	20.21	18.79	17.53	17.01
	50% RB mid	1778.5	21.08	20.40	19.13	17.88	17.20	15.93
		1745	21.42	20.47	19.35	18.22	17.27	16.15
		1711.5	21.34	20.42	19.18	18.14	17.22	15.98
	100% RB	1778.5	21.07	20.27	19.12	17.87	17.07	15.92
		1745	21.34	20.39	19.34	18.14	17.19	16.14
		1711.5	21.36	20.33	19.31	18.16	17.13	16.11
5MHz	1 RB high	1777.5	21.80	21.15	20.04	18.60	17.95	16.84
		1745	22.26	20.81	20.07	19.06	17.61	16.87
		1712.5	22.23	20.77	19.83	19.03	17.57	16.63
	1 RB low	1777.5	21.88	20.89	20.07	18.68	17.69	16.87
		1745	22.27	21.03	19.91	19.07	17.83	16.71
		1712.5	22.18	20.88	19.92	18.98	17.68	16.72
	50% RB mid	1777.5	21.16	20.09	19.24	17.96	16.89	16.04
		1745	21.45	20.36	19.43	18.25	17.16	16.23
		1712.5	21.28	20.10	19.40	18.08	16.90	16.20
	100% RB	1777.5	21.04	20.19	19.28	17.84	16.99	16.08
		1745	21.39	20.13	19.12	18.19	16.93	15.92
		1712.5	21.37	20.32	19.33	18.17	17.12	16.13
10MHz	1 RB high	1775	21.01	20.93	19.86	17.81	17.73	16.66

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		1745	22.34	21.21	20.11	19.14	18.01	16.91
		1715	22.41	20.93	19.96	19.21	17.73	16.76
	1 RB low	1775	20.91	20.73	20.30	17.71	17.53	17.10
		1745	22.32	20.94	20.46	19.12	17.74	17.26
		1715	22.13	20.93	20.28	18.93	17.73	17.08
	50% RB mid	1775	21.06	20.35	19.11	17.86	17.15	15.91
		1745	21.41	20.26	19.02	18.21	17.06	15.82
		1715	21.32	20.25	19.32	18.12	17.05	16.12
	100% RB	1775	21.11	20.10	19.11	17.91	16.90	15.91
		1745	21.43	20.46	19.46	18.23	17.26	16.26
		1715	21.35	20.30	19.40	18.15	17.10	16.20
15MHz	1 RB high	1772.5	21.67	20.73	20.10	18.47	17.53	16.90
		1745	21.51	21.03	20.43	18.31	17.83	17.23
		1717.5	21.49	20.91	20.04	18.29	17.71	16.84
	1 RB low	1772.5	21.49	20.83	20.25	18.29	17.63	17.05
		1745	21.44	21.10	20.30	18.24	17.90	17.10
		1717.5	21.28	20.83	20.38	18.08	17.63	17.18
	50% RB mid	1772.5	20.32	20.15	19.29	17.12	16.95	16.09
		1745	20.62	20.41	19.15	17.42	17.21	15.95
		1717.5	20.51	20.25	19.26	17.31	17.05	16.06
	100% RB	1772.5	20.43	20.16	19.31	17.23	16.96	16.11
		1745	20.60	20.32	19.43	17.40	17.12	16.23
		1717.5	20.54	20.34	19.39	17.34	17.14	16.19
20MHz	1 RB high	1770	22.04	21.17	20.05	18.84	17.97	16.85
		1745	22.28	21.13	20.13	19.08	17.93	16.93
		1720	22.38	20.93	20.29	19.18	17.73	17.09
	1 RB low	1770	21.98	20.96	20.27	18.78	17.76	17.07
		1745	22.33	21.08	20.33	19.13	17.88	17.13
		1720	22.11	20.92	20.41	18.91	17.72	17.21
	50% RB mid	1770	21.20	20.17	19.35	18.00	16.97	16.15
		1745	21.40	20.47	19.47	18.20	17.27	16.27
		1720	21.44	20.29	19.50	18.24	17.09	16.30
	100% RB	1770	21.28	20.25	19.37	18.08	17.05	16.17
		1745	21.16	20.49	19.40	17.96	17.29	16.20
		1720	21.40	20.27	19.48	18.20	17.07	16.28

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LTE Band 71-ERP

Limits: ≤34.77dBm(3W)

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power(dBm)			ERP(dBm)(Gt-Lc =-12.6)		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5MHz	1 RB high	695.5	23.14	21.88	20.91	8.39	7.13	6.16
		680.5	23.26	21.83	20.80	8.51	7.08	6.05
		665.5	23.05	21.64	20.77	8.30	6.89	6.02
	1 RB low	695.5	23.19	22.21	20.94	8.44	7.46	6.19
		680.5	23.17	21.64	21.19	8.42	6.89	6.44
		665.5	23.01	21.58	21.23	8.26	6.83	6.48
	50% RB mid	695.5	22.35	21.21	21.18	7.60	6.46	6.43
		680.5	22.36	21.20	20.67	7.61	6.45	5.92
		665.5	22.27	21.20	20.83	7.52	6.45	6.08
	100% RB	695.5	22.31	21.12	19.96	7.56	6.37	5.21
		680.5	22.34	21.37	20.12	7.59	6.62	5.37
		665.5	22.23	21.25	20.01	7.48	6.50	5.26
10MHz	1 RB high	693	23.61	22.30	20.76	8.86	7.55	6.01
		680.5	23.28	22.17	21.12	8.53	7.42	6.37
		668	23.26	21.99	21.18	8.51	7.24	6.43
	1 RB low	693	23.71	22.40	20.71	8.96	7.65	5.96
		680.5	23.13	22.03	21.13	8.38	7.28	6.38
		668	23.28	22.00	21.13	8.53	7.25	6.38
	50% RB mid	693	22.83	21.91	20.20	8.08	7.16	5.45
		680.5	22.55	21.52	19.95	7.80	6.77	5.20
		668	22.43	21.45	20.07	7.68	6.70	5.32
	100% RB	693	22.73	21.84	20.22	7.98	7.09	5.47
		680.5	22.56	21.54	19.97	7.81	6.79	5.22
		668	22.46	21.37	20.15	7.71	6.62	5.40
15MHz	1 RB high	690.5	23.20	21.93	20.99	8.45	7.18	6.24
		680.5	23.22	22.00	21.41	8.47	7.25	6.66
		670.5	23.24	21.78	20.76	8.49	7.03	6.01
	1 RB low	690.5	23.07	21.86	20.75	8.32	7.11	6.00
		680.5	23.29	21.84	21.09	8.54	7.09	6.34
		670.5	23.26	21.76	21.03	8.51	7.01	6.28
	50% RB mid	690.5	22.28	21.39	20.15	7.53	6.64	5.40
		680.5	22.45	21.44	20.43	7.70	6.69	5.68
		670.5	22.36	21.40	20.10	7.61	6.65	5.35
	100% RB	690.5	22.48	21.48	19.90	7.73	6.73	5.15
		680.5	22.37	21.47	20.38	7.62	6.72	5.63
		670.5	22.37	21.32	20.25	7.62	6.57	5.50
20MHz	1 RB high	688	22.98	21.78	21.14	8.23	7.03	6.39

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		680.5	23.16	21.81	21.15	8.41	7.06	6.40
		673	23.04	21.63	20.73	8.29	6.88	5.98
	1 RB low	688	22.99	21.68	21.11	8.24	6.93	6.36
		680.5	23.19	21.75	20.68	8.44	7.00	5.93
		673	23.06	21.79	21.18	8.31	7.04	6.43
	50% RB mid	688	22.27	21.52	20.16	7.52	6.77	5.41
		680.5	22.28	21.39	20.37	7.53	6.64	5.62
		673	22.33	21.39	20.31	7.58	6.64	5.56
	100% RB	688	22.23	21.37	20.07	7.48	6.62	5.32
		680.5	22.22	21.25	20.11	7.47	6.50	5.36
		673	22.27	21.30	20.10	7.52	6.55	5.35

Note: Expanded measurement uncertainty is U = 0.578 dB, *k* = 2.

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A.2 Emission Limit

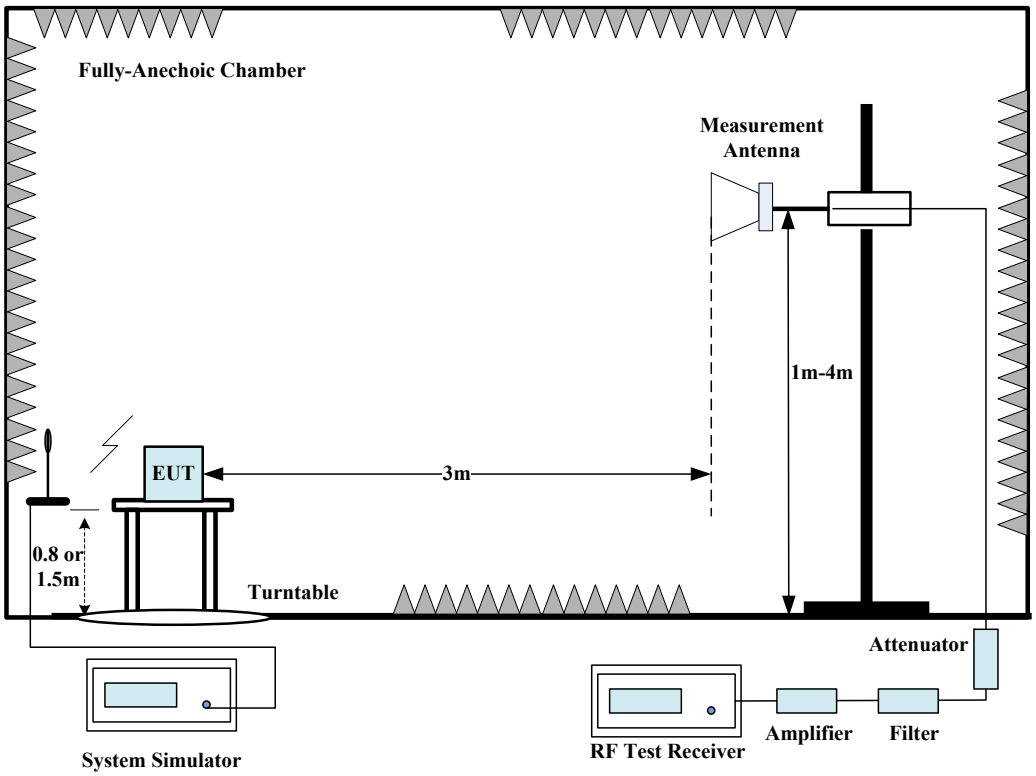
A.2.1 Measurement Method

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

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:

For measurements performed at frequencies less than or equal to 1 GHz, the EUT was placed on a 80cm-high non-conductive support; For measurements performed at frequencies above 1GHz,EUT was placed on a 1.5-meter-high non-conductive support. A measurement antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. In the initial test, the height of the measurement antenna was varied from 1 m to 4 m for the relative positioning that produces the maximum radiated signal level. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



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

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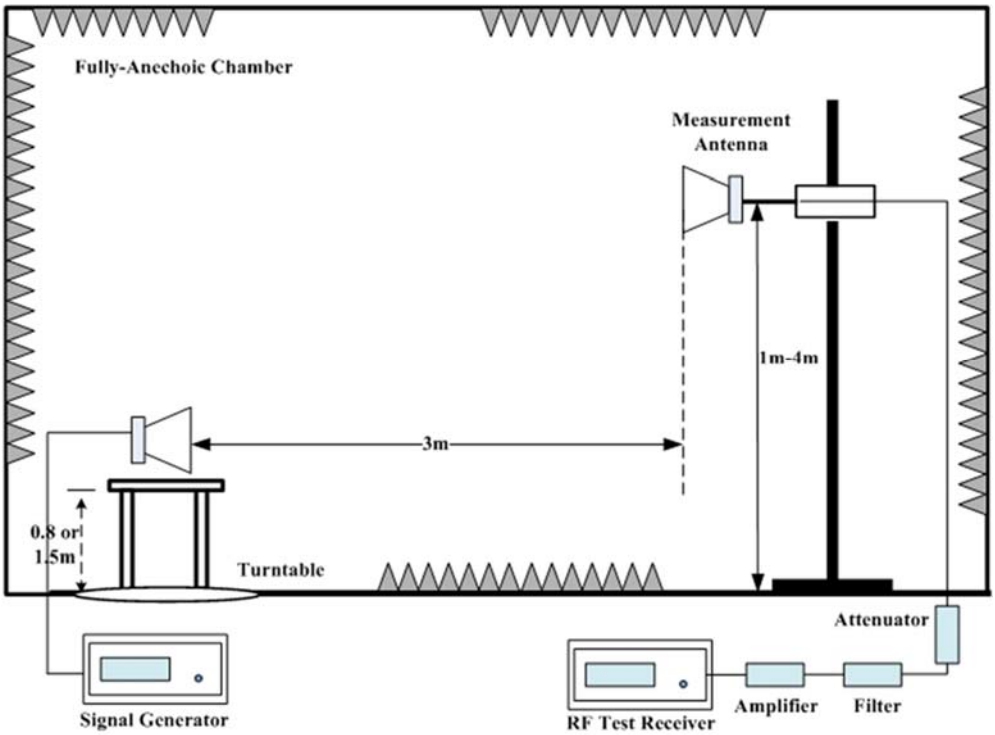

In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. The height of measurement antenna varied between 1 m to 4 m to maximize the received signal amplitude for each emission that was detected and measured in the initial test. A power (P_{Mea}) is applied to the input of the substitution antenna and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test was performed with the measurement antenna in both vertical and horizontal polarization.

3. The Path loss (P_{pl}) between the Signal Source and the Substitution Antenna and the Substitution Antenna Gain (G_a) were recorded after test.A amplifier was connected in for the test. The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.
4. The measurement results are obtained as described below:

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

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

A.2.2 Measurement Limit

FDD Band 2/25: Part 24.238 specifies 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.

FDD Band 12/13/71: 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

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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 5: Part 22.917 specifies 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.

FDD Band 66: Part 27.53(h) specifies that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

A.2.3 Measurement Results

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

Note 1: Both of Vertical and Horizontal polarizations are evaluated, but only the worst case is recorded in this report.

A.2.4 Measurement Results Table

Frequency	Channel	Frequency Range	Result
LTE Bands	Low	9kHz-26GHz	Pass
	Middle	9kHz-26GHz	Pass
	High	9kHz-26GHz	Pass

A.2.5 Sweep Table

Subrange	RBW	VBW
9~150 kHz	0.2kHz	0.6kHz
150kHz~30MHz	9kHz	27kHz
30MHz~1 GHz	100KHz	300KHz
1~20 GHz	1 MHz	3 MHz

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A.2.6 Measurement Result

LTE Band 2, 1.4MHz,CH18607,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3701.50	-45.06	3.47	10.39	-38.14	-13.00	25.14	H
5552.50	-36.18	5.33	11.20	-30.31	-13.00	17.31	V
7403.00	-39.84	8.08	10.10	-37.82	-13.00	24.82	H
9254.00	-45.03	8.85	11.70	-42.18	-13.00	29.18	H
11090.00	-49.50	9.63	12.59	-46.54	-13.00	33.54	V
12942.00	-47.50	12.47	12.76	-47.21	-13.00	34.21	V

LTE Band 2, 1.4MHz,CH18900,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.00	-40.32	3.81	10.16	-33.97	-13.00	20.97	H
5640.00	-48.53	5.61	11.38	-42.76	-13.00	29.76	H
7520.00	-43.08	7.71	10.24	-40.55	-13.00	27.55	H
9400.50	-46.51	9.10	11.50	-44.11	-13.00	31.11	H
11284.50	-47.61	10.63	12.62	-45.62	-13.00	32.62	V
13148.50	-44.50	13.25	12.55	-45.20	-13.00	32.20	H

LTE Band 2, 1.4MHz,CH19193,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3818.50	-40.54	3.94	9.96	-34.52	-13.00	21.52	H
5728.00	-35.36	5.89	11.34	-29.91	-13.00	16.91	V
7637.50	-43.71	6.77	10.38	-40.10	-13.00	27.10	V
9547.00	-47.76	9.11	11.89	-44.98	-13.00	31.98	H
11446.00	-46.41	12.40	12.55	-46.26	-13.00	33.26	V
13355.00	-42.54	13.11	12.44	-43.21	-13.00	30.21	V

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LTE Band 5, 1.4MHz,CH20407,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1649.50	-41.83	2.60	9.50	2.15	-37.08	-13.00	24.08	H
2474.50	-42.97	4.33	10.35	2.15	-39.10	-13.00	26.10	H
3299.00	-43.51	3.56	10.40	2.15	-38.82	-13.00	25.82	H
4124.00	-49.11	4.72	10.05	2.15	-45.93	-13.00	32.93	H
7413.50	-48.18	8.02	10.10	2.15	-48.25	-13.00	35.25	H
8245.50	-50.93	7.59	11.20	2.15	-49.47	-13.00	36.47	V

LTE Band 5, 1.4MHz,CH20525,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.00	-39.13	2.78	9.45	2.15	-34.61	-13.00	21.61	V
2510.00	-42.70	4.42	10.30	2.15	-38.97	-13.00	25.97	H
3346.50	-45.23	3.46	10.21	2.15	-40.63	-13.00	27.63	H
4182.50	-49.90	4.07	10.06	2.15	-46.06	-13.00	33.06	V
7522.50	-48.62	7.71	10.24	2.15	-48.24	-13.00	35.24	H
8364.00	-50.39	8.22	11.30	2.15	-49.46	-13.00	36.46	V

LTE Band 5, 1.4MHz,CH20643,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1697.00	-42.23	2.92	9.41	2.15	-37.89	-13.00	24.89	V
2545.50	-37.27	4.61	10.30	2.15	-33.73	-13.00	20.73	H
3393.50	-36.55	3.53	10.03	2.15	-32.20	-13.00	19.20	V
4242.00	-43.46	4.43	10.27	2.15	-39.77	-13.00	26.77	V
5090.50	-53.91	5.30	11.60	2.15	-49.76	-13.00	36.76	V
8484.50	-49.47	8.88	11.30	2.15	-49.20	-13.00	36.20	V

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LTE Band 12, 1.4MHz,CH23017,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1399.50	-32.34	1.93	8.09	2.15	-28.33	-13.00	15.33	H
2098.00	-51.01	3.52	7.80	2.15	-48.88	-13.00	35.88	H
2799.50	-43.95	5.27	10.40	2.15	-40.97	-13.00	27.97	H
3499.00	-47.59	2.98	10.10	2.15	-42.62	-13.00	29.62	H
4198.50	-54.36	4.16	10.10	2.15	-50.57	-13.00	37.57	H
7002.00	-49.79	7.77	10.40	2.15	-49.31	-13.00	36.31	V

LTE Band 12, 1.4MHz,CH23095,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1415.00	-32.81	2.31	8.19	2.15	-29.08	-13.00	16.08	H
2123.00	-46.07	3.72	8.17	2.15	-43.77	-13.00	30.77	V
2830.50	-44.89	5.03	10.46	2.15	-41.61	-13.00	28.61	H
3538.00	-47.44	3.28	10.25	2.15	-42.62	-13.00	29.62	V
4245.50	-53.94	4.94	10.28	2.15	-50.75	-13.00	37.75	V
7066.50	-50.15	6.84	10.43	2.15	-48.71	-13.00	35.71	V

LTE Band 12, 1.4MHz,CH23173,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1430.50	-33.00	1.89	8.28	2.15	-28.76	-13.00	15.76	H
2146.00	-39.22	3.71	8.54	2.15	-36.54	-13.00	23.54	H
2861.50	-42.06	5.52	10.57	2.15	-39.16	-13.00	26.16	H
3576.50	-45.78	3.06	10.41	2.15	-40.58	-13.00	27.58	H
4292.00	-54.03	4.65	10.55	2.15	-50.28	-13.00	37.28	H
7162.50	-51.27	6.73	10.12	2.15	-50.03	-13.00	37.03	H

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LTE Band 13, 5MHz,CH23205,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1559.00	-52.91	3.47	5.39	0.00	-53.14	-40.00	13.14	H
2339.25	-36.72	4.44	5.62	2.15	-37.69	-13.00	24.69	H
3115.00	-53.43	5.37	7.28	2.15	-53.67	-13.00	40.67	V
3900.00	-54.24	6.11	8.76	2.15	-53.74	-13.00	40.74	H
4677.50	-54.03	6.49	9.58	2.15	-53.09	-13.00	40.09	H
5455.00	-53.26	6.89	10.54	2.15	-51.76	-13.00	38.76	H

LTE Band 13, 5MHz,CH23230,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2346.70	-38.13	4.45	5.64	2.15	-39.09	-13.00	26.09	V
3127.50	-54.31	5.40	7.31	2.15	-54.55	-13.00	41.55	H
3915.00	-53.52	6.12	8.78	2.15	-53.01	-13.00	40.01	H
4692.50	-54.39	6.50	9.59	2.15	-53.45	-13.00	40.45	H
5475.00	-52.73	6.97	10.57	2.15	-51.28	-13.00	38.28	V
6260.00	-52.09	7.46	10.76	2.15	-50.94	-13.00	37.94	H

LTE Band 13, 5MHz,CH23255,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2354.15	-36.14	4.46	5.66	2.15	-37.09	-13.00	24.09	H
3125.00	-55.27	5.40	7.30	2.15	-55.52	-13.00	42.52	V
3917.50	-53.96	6.12	8.78	2.15	-53.45	-13.00	40.45	V
4700.00	-53.27	6.50	9.60	2.15	-52.32	-13.00	39.32	V
5482.50	-53.04	6.99	10.58	2.15	-51.60	-13.00	38.60	V
6275.00	-52.39	7.48	10.78	2.15	-51.24	-13.00	38.24	H

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LTE Band 66, 1.4MHz,CH131979,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3421.50	-45.45	3.24	10.04	-38.65	-13.00	25.65	H
5132.00	-41.45	5.56	11.60	-35.41	-13.00	22.41	V
6843.00	-45.12	6.54	10.31	-41.35	-13.00	28.35	V
8554.00	-55.99	8.52	11.20	-53.31	-13.00	40.31	V
10264.50	-54.99	10.80	11.90	-53.89	-13.00	40.89	H
17115.50	-48.53	18.45	13.48	-53.50	-13.00	40.50	H

LTE Band 66, 1.4MHz,CH132322,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3490.00	-48.30	2.86	10.10	-41.06	-13.00	28.06	V
5235.00	-41.02	4.70	11.70	-34.02	-13.00	21.02	V
6980.00	-43.54	8.06	10.40	-41.20	-13.00	28.20	H
8725.00	-55.92	8.45	11.10	-53.27	-13.00	40.27	H
15706.00	-53.64	16.64	15.51	-54.77	-13.00	41.77	V
17440.00	-45.43	19.25	13.04	-51.64	-13.00	38.64	H

LTE Band 66, 1.4MHz,CH132665,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3558.50	-48.14	2.98	10.33	-40.79	-13.00	27.79	V
5338.00	-38.65	6.18	11.72	-33.11	-13.00	20.11	V
7117.50	-37.97	6.56	10.26	-34.27	-13.00	21.27	V
8897.00	-51.50	8.04	11.59	-47.95	-13.00	34.95	V
10676.50	-51.35	10.04	12.08	-49.31	-13.00	36.31	V
16014.50	-50.20	17.47	15.36	-52.31	-13.00	39.31	V

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LTE Band 25, 1.4MHz,CH26047,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3701.50	-39.21	3.47	10.39	-32.29	-13.00	19.29	H
5552.50	-32.38	5.33	11.20	-26.51	-13.00	13.51	V
7403.00	-33.25	8.08	10.10	-31.23	-13.00	18.23	H
9254.00	-45.70	8.85	11.70	-42.85	-13.00	29.85	H
11104.50	-49.15	9.75	12.60	-46.30	-13.00	33.30	V
12949.50	-48.39	12.49	12.75	-48.13	-13.00	35.13	H

LTE Band 25, 1.4MHz,CH26365,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3765.00	-40.99	3.79	10.14	-34.64	-13.00	21.64	H
5648.00	-33.17	5.60	11.40	-27.37	-13.00	14.37	V
7530.50	-41.31	7.72	10.26	-38.77	-13.00	25.77	V
9413.00	-44.61	9.06	11.55	-42.12	-13.00	29.12	V
11295.50	-46.53	10.61	12.60	-44.54	-13.00	31.54	V
13163.00	-43.95	13.20	12.54	-44.61	-13.00	31.61	V

LTE Band 25, 1.4MHz,CH26683,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3828.50	-37.80	3.92	9.94	-31.78	-13.00	18.78	H
5743.00	-25.80	5.86	11.31	-20.35	-13.00	7.35	H
7657.50	-32.90	6.90	10.43	-29.37	-13.00	16.37	V
9571.50	-39.62	8.64	11.90	-36.36	-13.00	23.36	H
11486.50	-42.52	12.28	12.51	-42.29	-13.00	29.29	V
13411.00	-44.38	12.49	12.39	-44.48	-13.00	31.48	V

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LTE Band 71, 5MHz,CH133147,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1331.00	-36.70	1.84	7.45	2.15	-33.24	-13.00	20.24	H
1997.00	-43.63	3.37	7.73	2.15	-41.42	-13.00	28.42	H
2663.00	-45.43	4.74	10.20	2.15	-42.12	-13.00	29.12	H
3328.00	-41.18	3.10	10.29	2.15	-36.14	-13.00	23.14	H
3994.00	-52.46	3.81	9.90	2.15	-48.52	-13.00	35.52	H
6651.50	-54.45	6.17	10.40	2.15	-52.37	-13.00	39.37	H

LTE Band 71, 5MHz,CH133297,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1361.00	-37.78	1.84	7.71	2.15	-34.06	-13.00	21.06	H
2042.00	-46.64	3.71	7.70	2.15	-44.80	-13.00	31.80	H
2723.00	-47.85	4.88	10.25	2.15	-44.63	-13.00	31.63	H
3403.00	-46.85	3.49	10.01	2.15	-42.48	-13.00	29.48	H
4084.00	-52.07	3.85	10.07	2.15	-48.00	-13.00	35.00	V
6132.00	-55.26	6.13	10.66	2.15	-52.88	-13.00	39.88	V

LTE Band 71, 5MHz,CH133447,QPSK

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1391.00	-40.05	1.86	8.01	2.15	-36.05	-13.00	23.05	H
2087.00	-38.21	3.52	7.77	2.15	-36.11	-13.00	23.11	H
2783.00	-45.62	4.90	10.37	2.15	-42.30	-13.00	29.30	H
3478.00	-45.83	3.69	10.10	2.15	-41.57	-13.00	28.57	H
4173.50	-54.37	4.01	10.05	2.15	-50.48	-13.00	37.48	H
6964.00	-51.90	8.28	10.40	2.15	-51.93	-13.00	38.93	V

Note: Expanded measurement uncertainty is U = 3.44dB, *k* = 2.

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A.3 Frequency Stability

A.3.1 Method of Measurement

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

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

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

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

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A.3.2 Measurement results

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

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	824.417	848.583		
50				-0.69	0.0008
40				-0.14	0.0002
30				0.11	0.0001
10				-0.01	0.0000
0				-1.22	0.0015
-10				-0.10	0.0001
-20				-1.95	0.0023
-30				0.16	0.0002

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	824.417	848.583	-0.92	0.0011
4.45				-0.01	0.0000

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

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	699.481	715.519		
50				-0.67	0.0009
40				-0.07	0.0001
30				-0.50	0.0007
10				-1.22	0.0017
0				-0.13	0.0002
-10				0.16	0.0002
-20				-0.21	0.0003
-30				-0.49	0.0007

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	699.481	715.519	5.55	0.0078
4.45				-0.96	0.0014

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

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	777.465	786.519		
50				0.01	0.0000
40				0.13	0.0002
30				0.00	0.0000
10				0.83	0.0011
0				1.16	0.0015
-10				-0.44	0.0006
-20				0.13	0.0002
-30				-0.41	0.0005

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	777.465	786.519	0.51	0.0007
4.45				0.21	0.0003

LTE Band 25, 20MHz bandwidth QPSK (worst case of all bandwidths)

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	1850.801	1914.167		
50				1.99	0.0011
40				0.97	0.0005
30				0.53	0.0003
10				0.74	0.0004
0				1.90	0.0010
-10				1.20	0.0006
-20				2.06	0.0011
-30				7.11	0.0038

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	1850.801	1914.167	0.76	0.0004
4.45				2.50	0.0013

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

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	1710.801	1779.199		
50				-0.14	0.0001
40				0.79	0.0005
30				0.00	0.0000
10				16.79	0.0096
0				0.24	0.0001
-10				0.20	0.0001
-20				-3.42	0.0020
-30				1.59	0.0009

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	1710.801	1779.199	1.40	0.0008
4.45				1.09	0.0006

LTE Band 71, 20MHz bandwidth QPSK (worst case of all bandwidths)

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	663.994	697.006		
50				-0.90	0.0013
40				-0.92	0.0014
30				-2.13	0.0031
10				-1.06	0.0016
0				-0.89	0.0013
-10				-1.97	0.0029
-20				0.16	0.0002
-30				-0.79	0.0012

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	F_L(MHz)	F_H(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	663.994	697.006	-1.06	0.0016
4.45				-1.99	0.0029

Note: Expanded measurement uncertainty is U = 0.01 PPM, *k* = 2.

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A.4 Occupied Bandwidth

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

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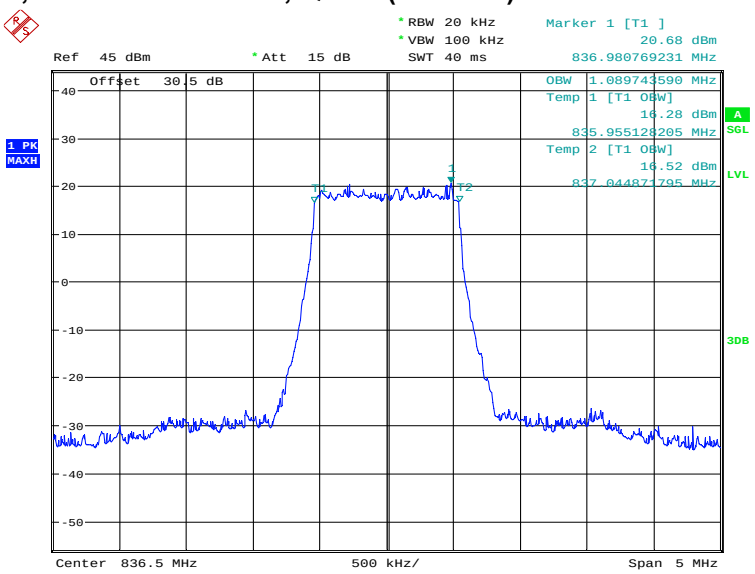
LTE band 5, 1.4MHz (99%)

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

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



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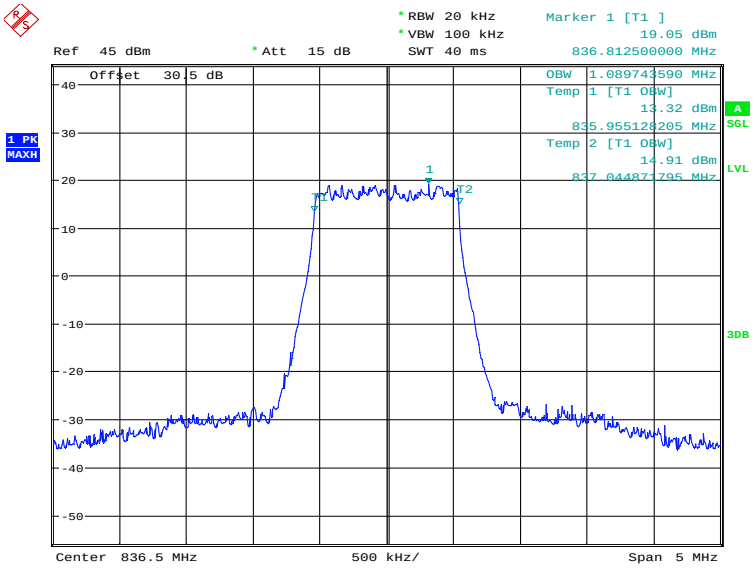
LTE band 5, 1.4MHz Bandwidth, 16QAM (99% BW)



Date: 30.MAY.2024 10:18:47

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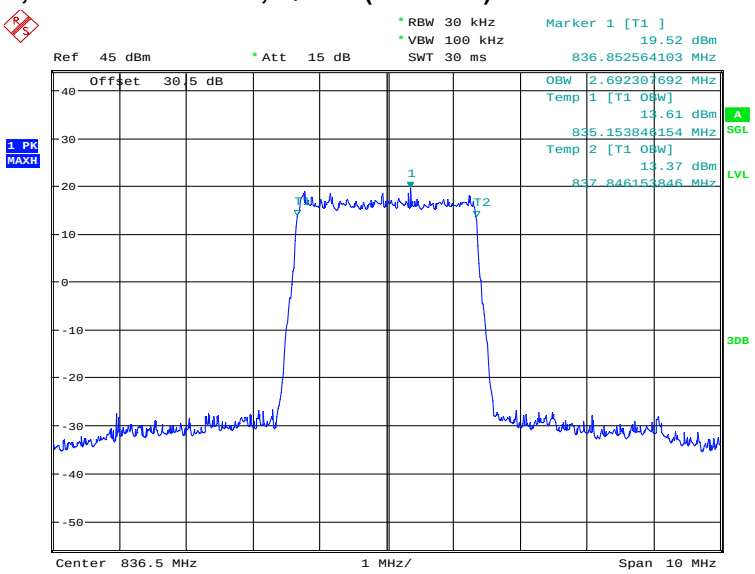
LTE band 5, 3MHz (99%)

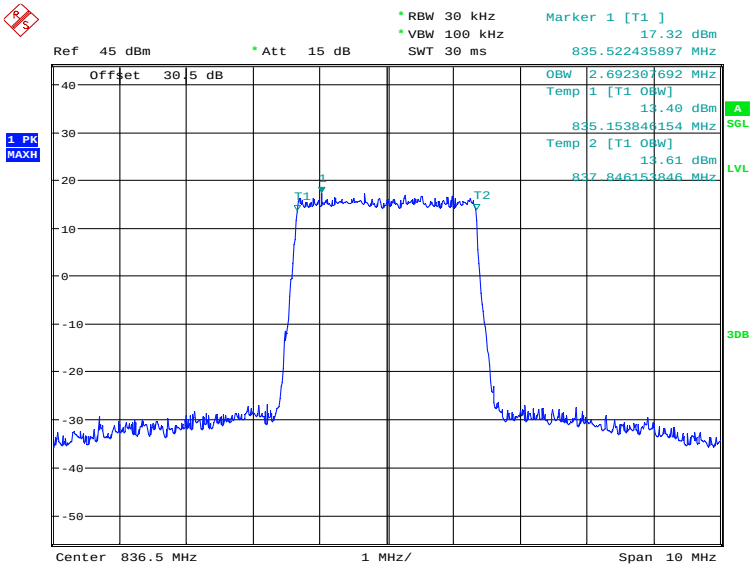
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	2692.31	2692.31

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



Date: 30.MAY.2024 10:19:29

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



Date: 30.MAY.2024 10:20:09

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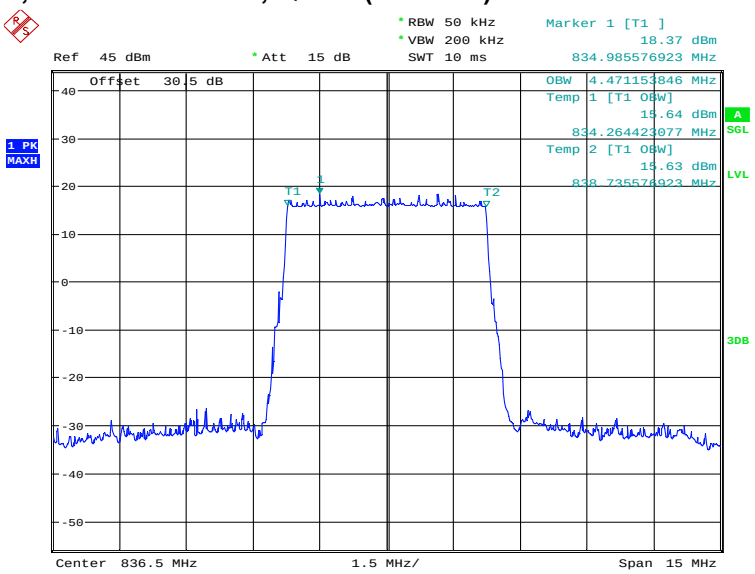
LTE band 5, 5MHz (99%)

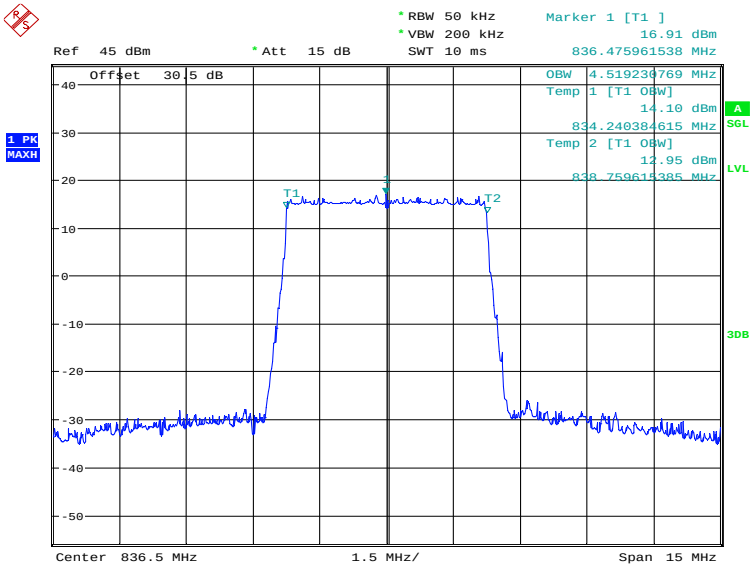
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	4471.15	4519.23

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



Date: 30.MAY.2024 10:20:50

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



Date: 30.MAY.2024 10:21:30

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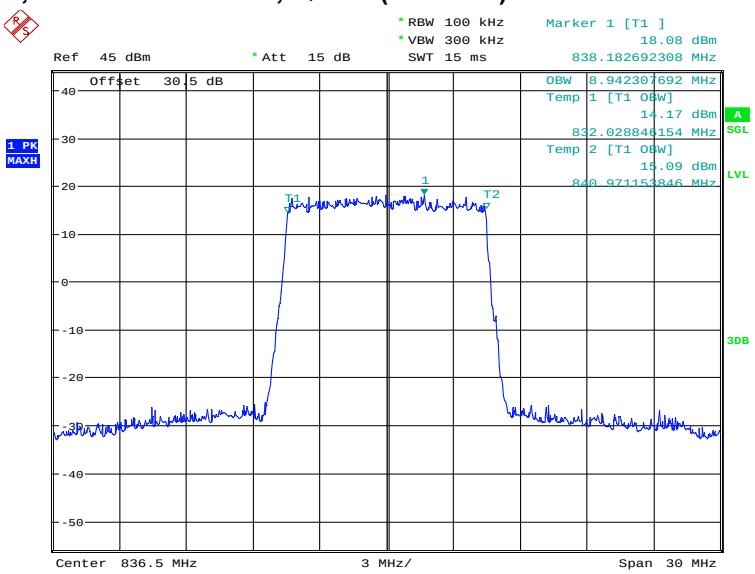
LTE band 5, 10MHz (99%)

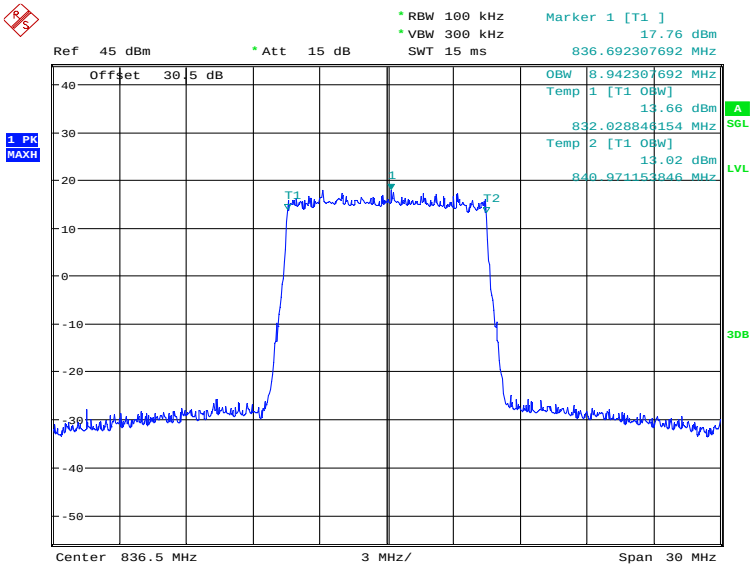
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	8942.31	8942.31

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



Date: 30.MAY.2024 10:22:12

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



Date: 30.MAY.2024 10:22:52

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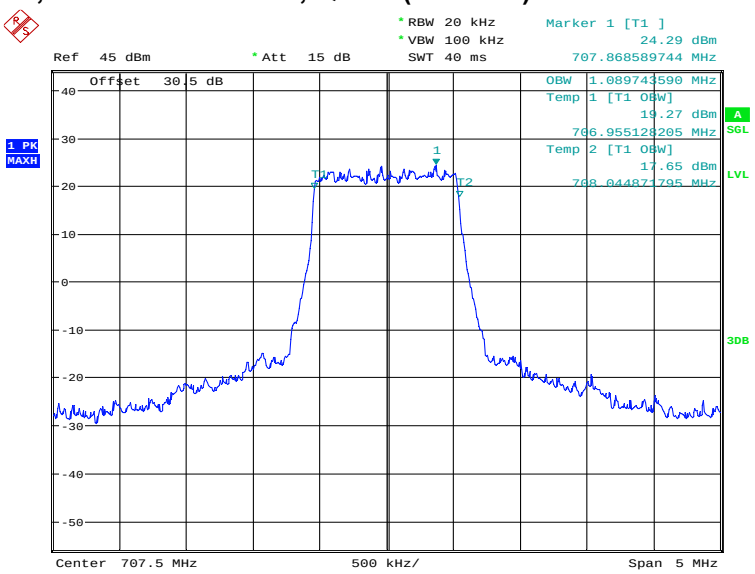
LTE band 12, 1.4MHz (99%)

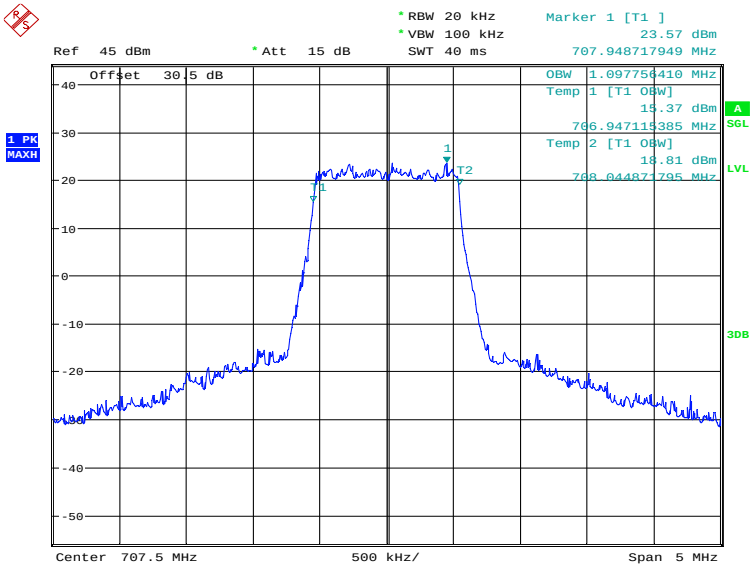
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	1089.74	1097.76

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



Date: 30.MAY.2024 16:03:34

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



Date: 30.MAY.2024 16:04:14

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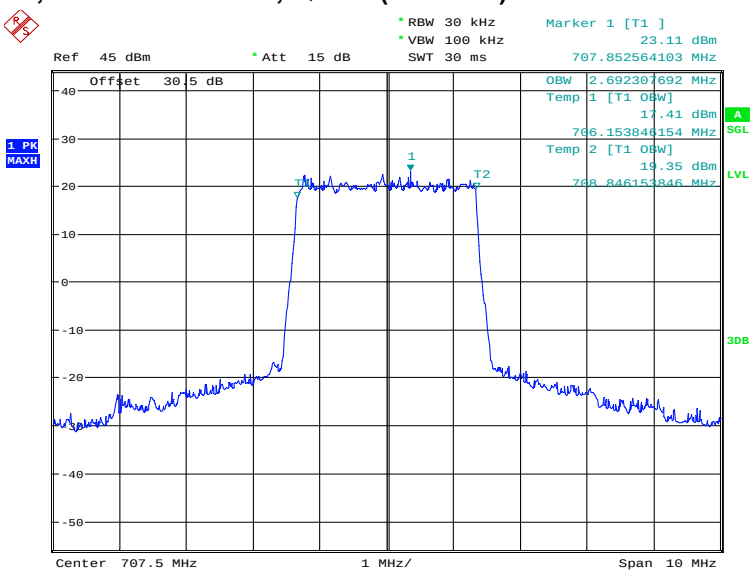
LTE band 12, 3MHz (99%)

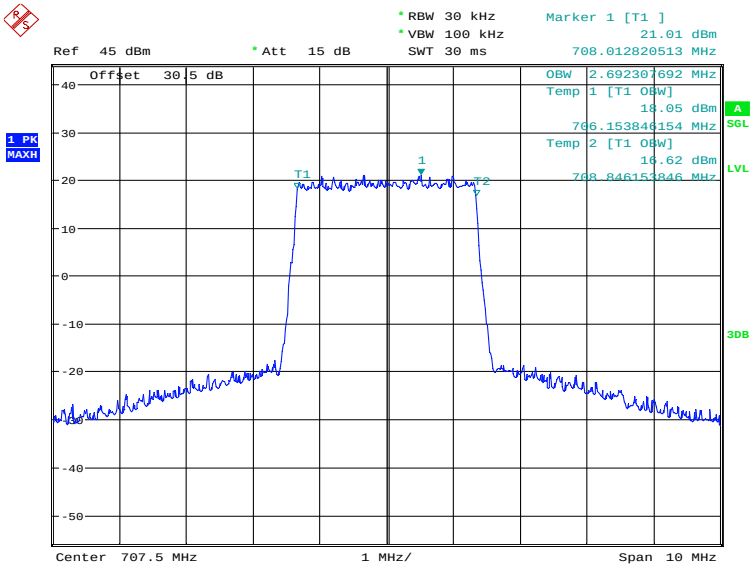
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	2692.31	2692.31

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



Date: 30.MAY.2024 16:04:55

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



Date: 30.MAY.2024 16:05:35

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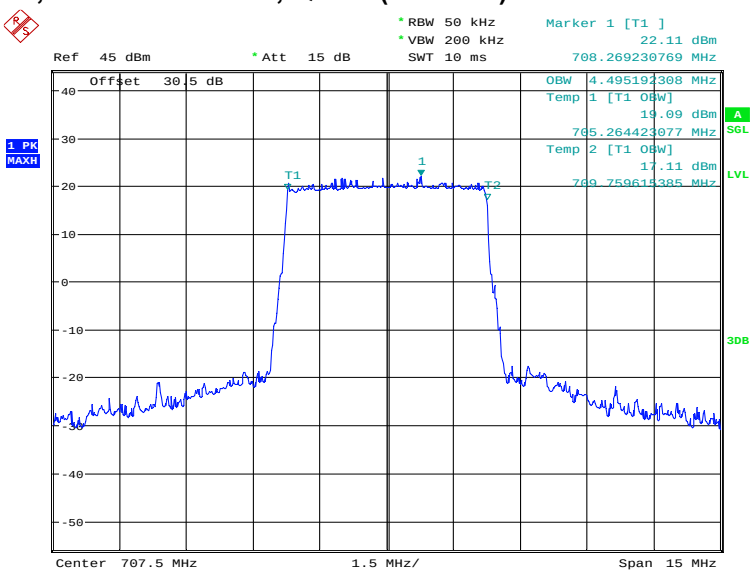
LTE band 12, 5MHz (99%)

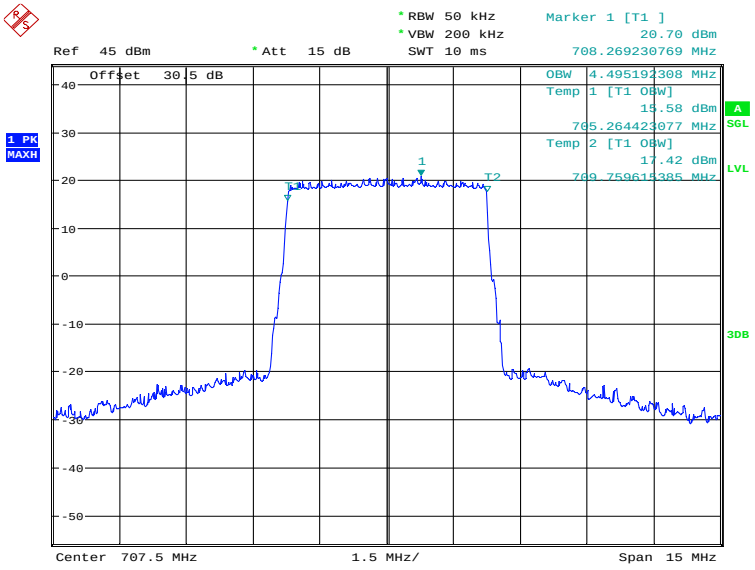
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	4495.19	4495.19

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



Date: 30.MAY.2024 16:06:17

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



Date: 30.MAY.2024 16:06:57

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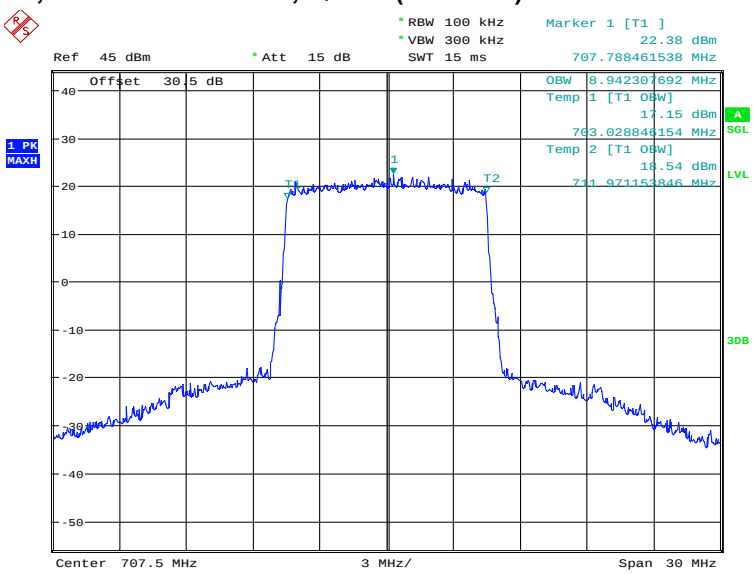
LTE band 12, 10MHz (99%)

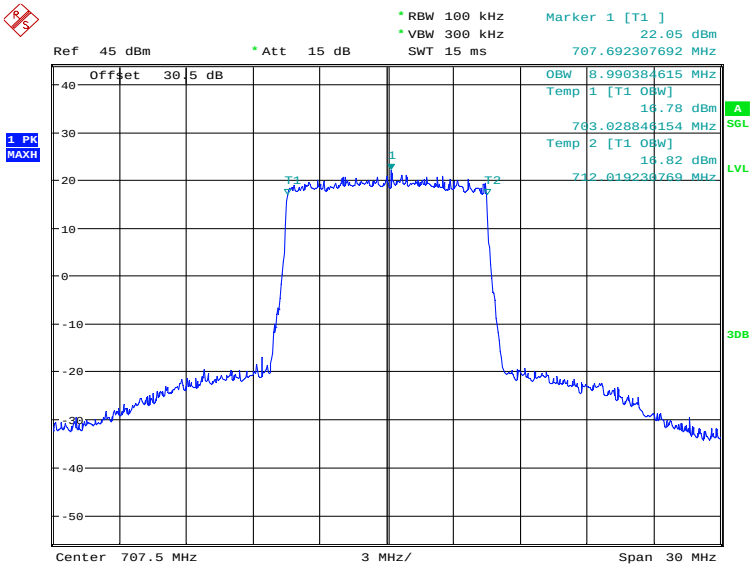
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	8942.31	8990.38

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



Date: 30.MAY.2024 16:07:39

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



Date: 30.MAY.2024 16:08:18

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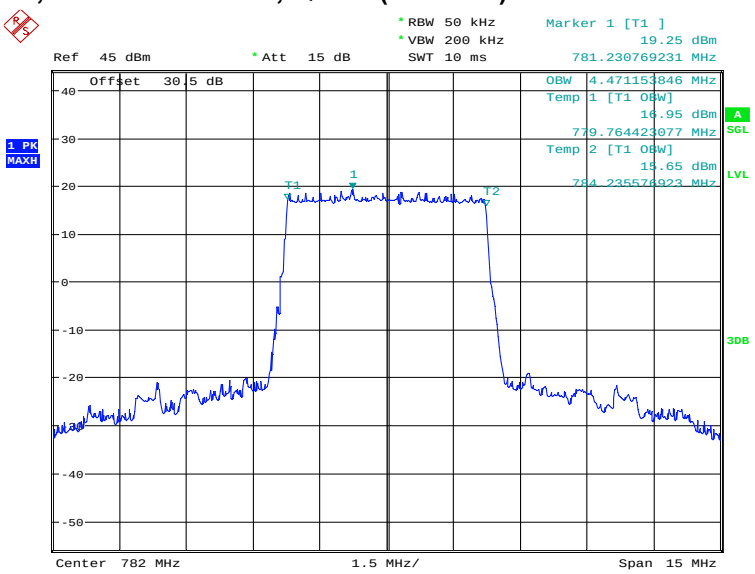
LTE band 13, 5MHz (99%)

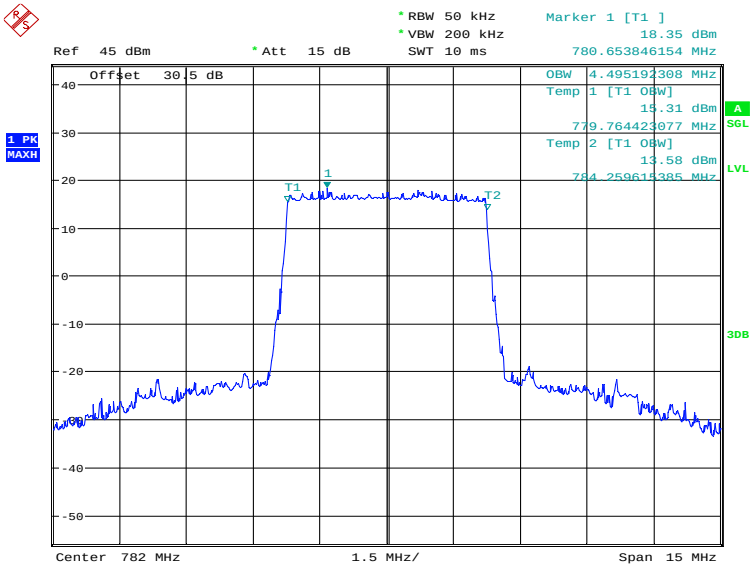
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
782.0	QPSK	16QAM
	4471.15	4495.19

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



Date: 30.MAY.2024 10:42:11

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



Date: 30.MAY.2024 10:42:51

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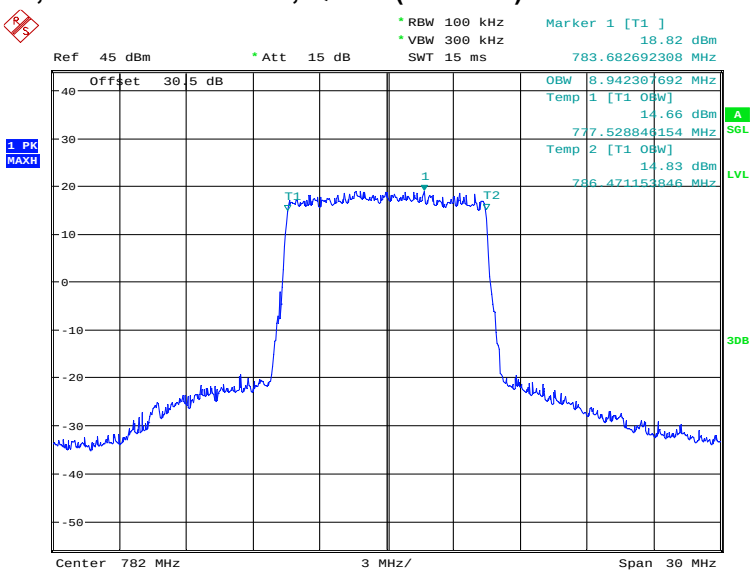
LTE band 13, 10MHz (99%)

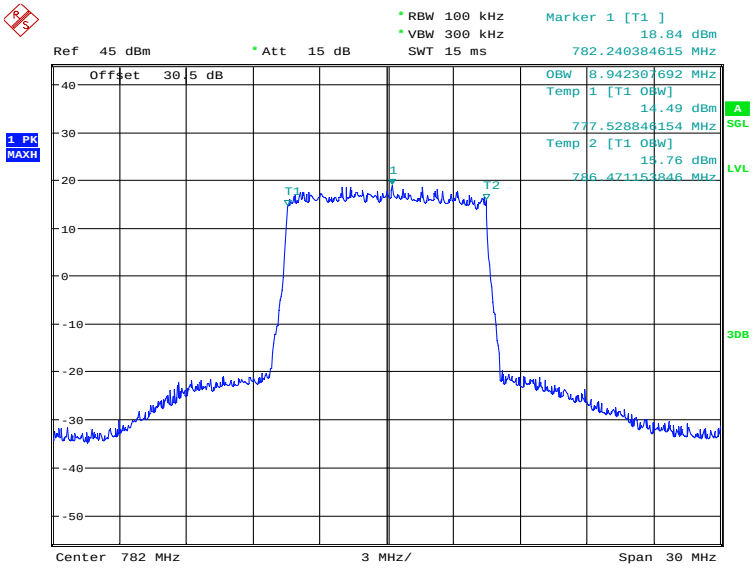
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
782.0	QPSK	16QAM
	8942.31	8942.31

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



Date: 30.MAY.2024 10:43:33

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



Date: 30.MAY.2024 10:44:13

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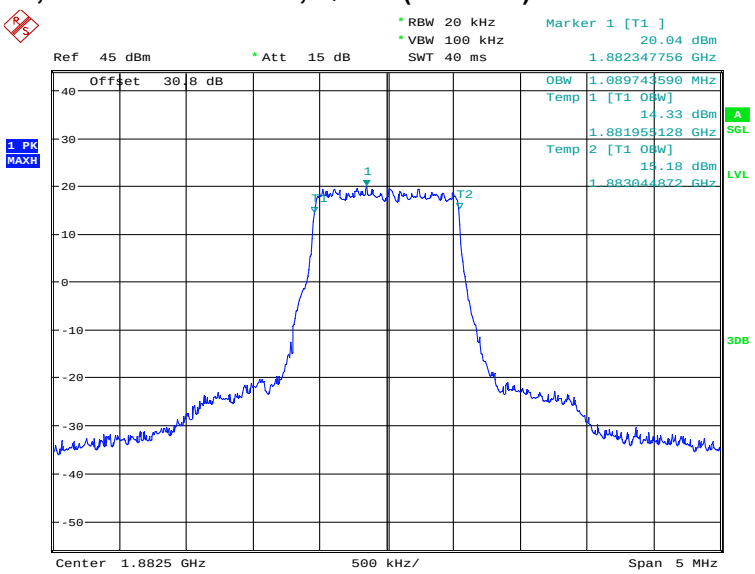
LTE band 25, 1.4MHz (99%)

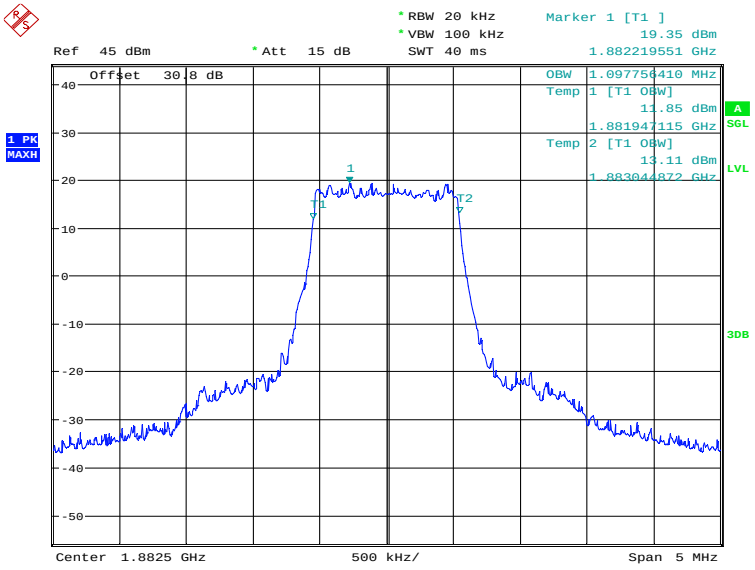
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1882.5	QPSK	16QAM
	1089.74	1097.76

LTE band 25, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 30.MAY.2024 10:44:56

LTE band 25, 1.4MHz Bandwidth, 16QAM (99% BW)



Date: 30.MAY.2024 10:45:36

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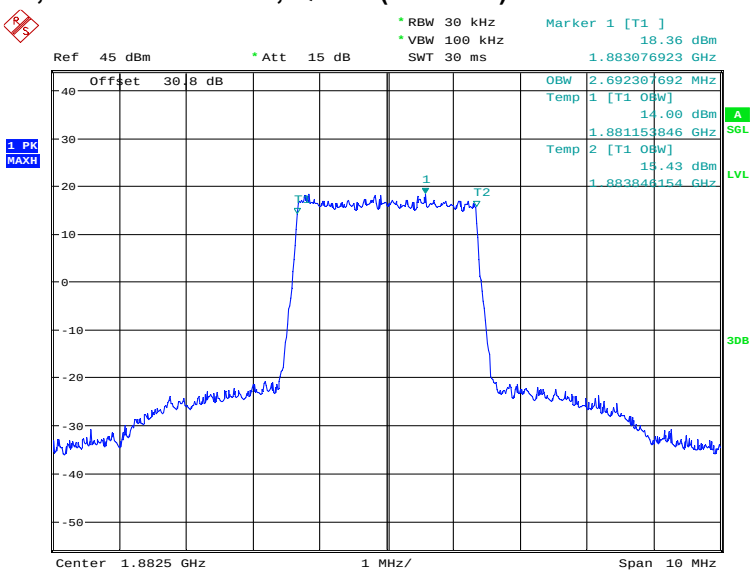
LTE band 25, 3MHz (99%)

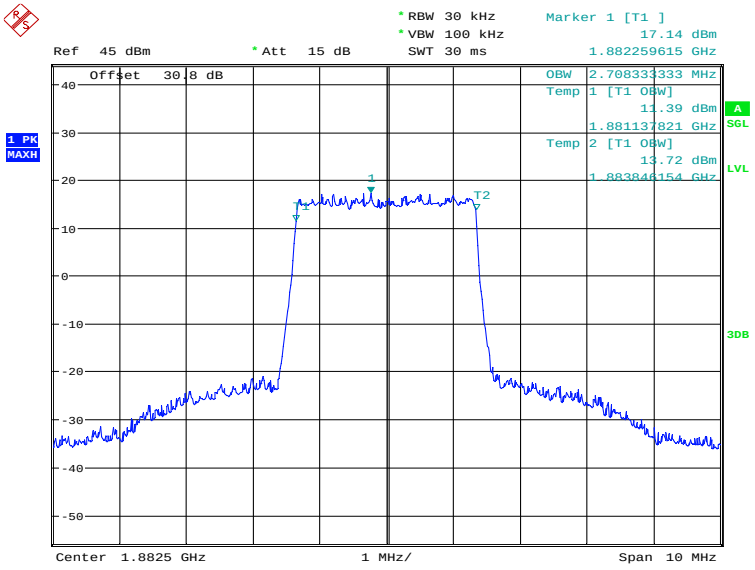
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1882.5	QPSK	16QAM
	2692.31	2708.33

LTE band 25, 3MHz Bandwidth, QPSK (99% BW)



Date: 30.MAY.2024 10:46:18

LTE band 25, 3MHz Bandwidth, 16QAM (99% BW)



Date: 30.MAY.2024 10:46:58

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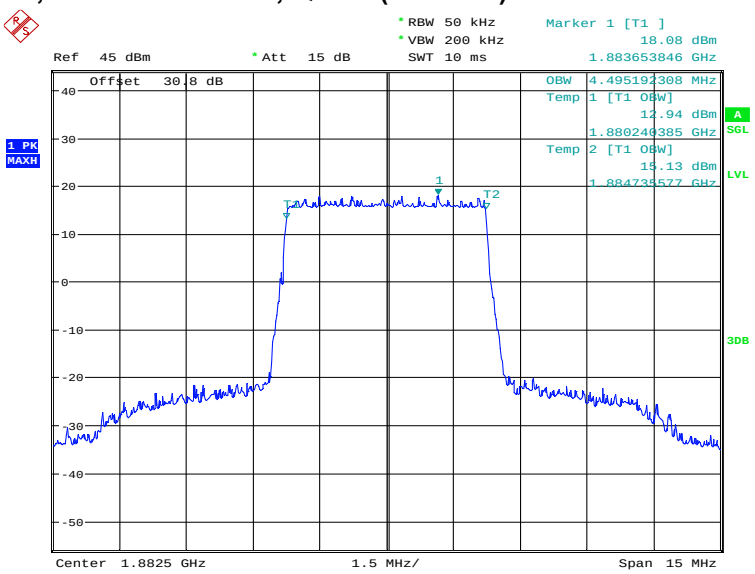
LTE band 25, 5MHz (99%)

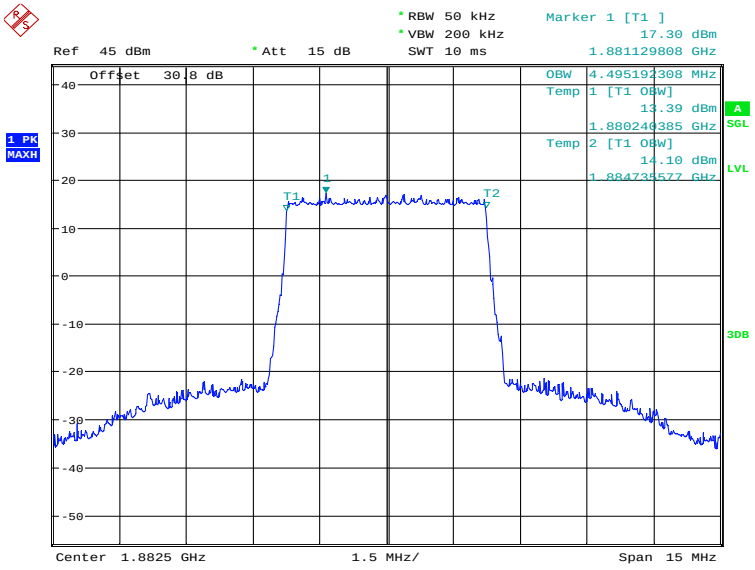
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1882.5	QPSK	16QAM
	4495.19	4495.19

LTE band 25, 5MHz Bandwidth, QPSK (99% BW)



Date: 30.MAY.2024 10:47:40

LTE band 25, 5MHz Bandwidth, 16QAM (99% BW)



Date: 30.MAY.2024 10:48:20

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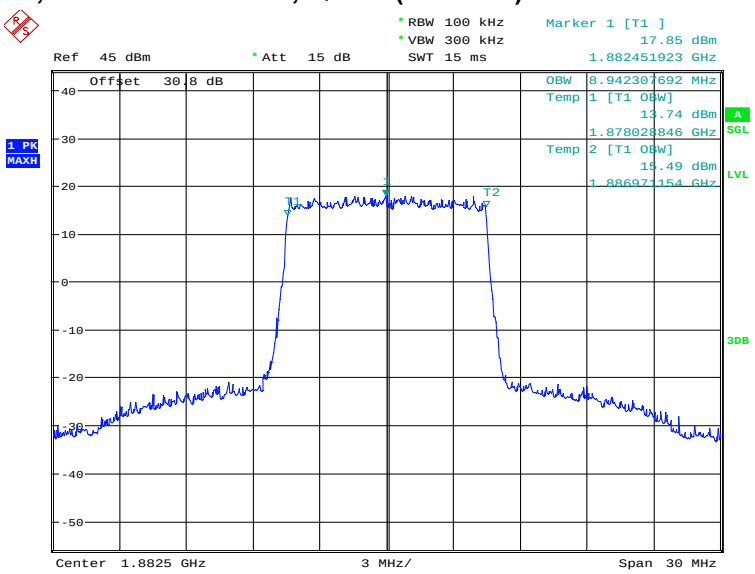
LTE band 25, 10MHz (99%)

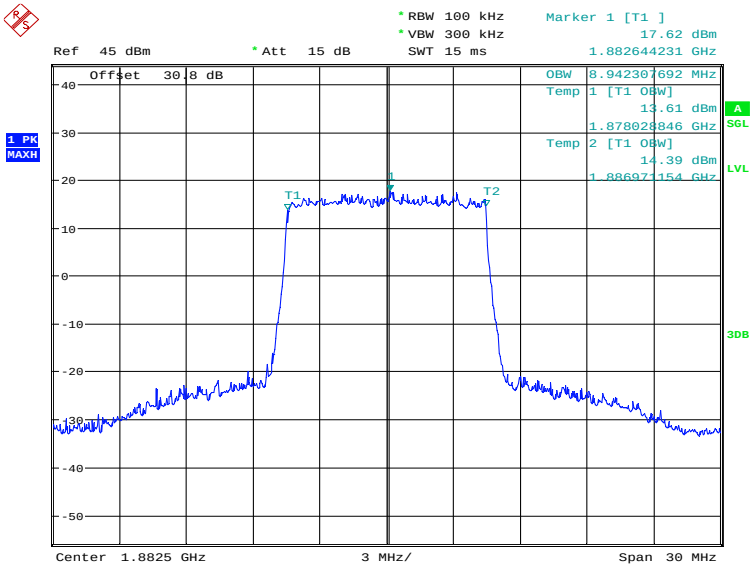
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1882.5	QPSK	16QAM
	8942.31	8942.31

LTE band 25, 10MHz Bandwidth, QPSK (99% BW)



Date: 30.MAY.2024 10:49:01

LTE band 25, 10MHz Bandwidth, 16QAM (99% BW)



Date: 30.MAY.2024 10:49:42

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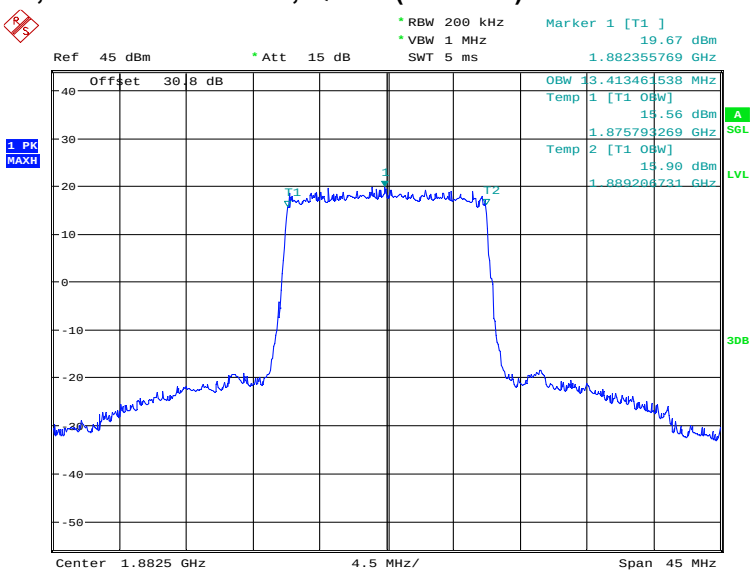
LTE band 25, 15MHz (99%)

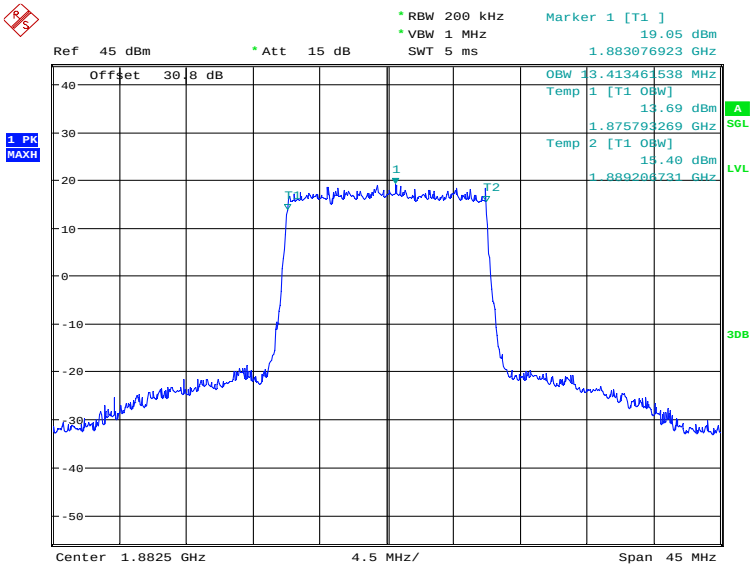
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1882.5	QPSK	16QAM
	13413.46	13413.46

LTE band 25, 15MHz Bandwidth, QPSK (99% BW)



Date: 30.MAY.2024 10:50:23

LTE band 25, 15MHz Bandwidth, 16QAM (99% BW)



Date: 30.MAY.2024 10:51:03

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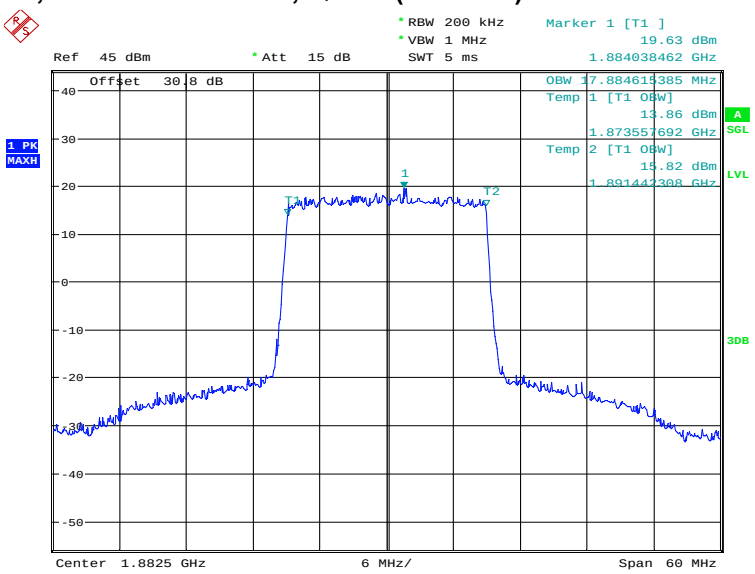
LTE band 25, 20MHz (99%)

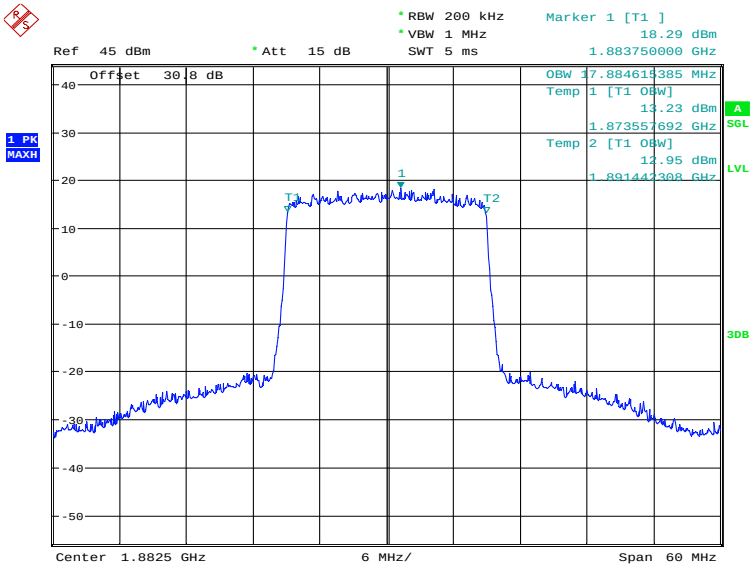
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1882.5	QPSK	16QAM
	17884.62	17884.62

LTE band 25, 20MHz Bandwidth, QPSK (99% BW)



Date: 30.MAY.2024 10:51:45

LTE band 25, 20MHz Bandwidth, 16QAM (99% BW)



Date: 30.MAY.2024 10:52:25

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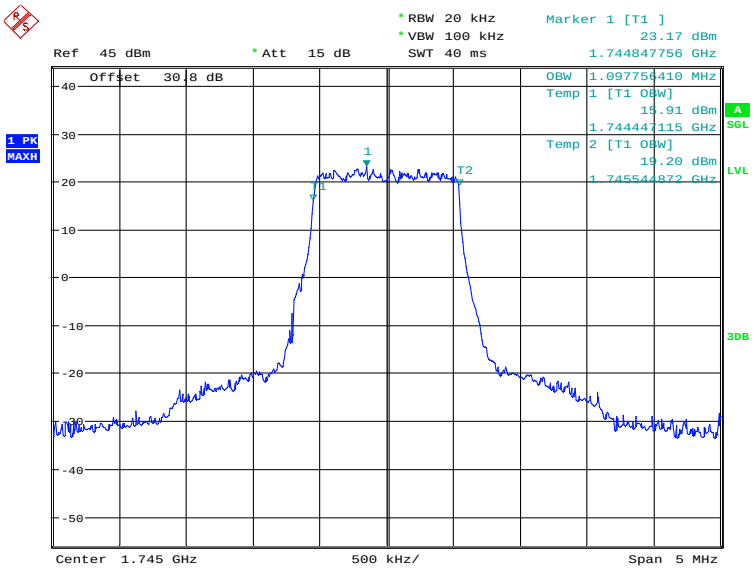
LTE band 66, 1.4MHz (99%)

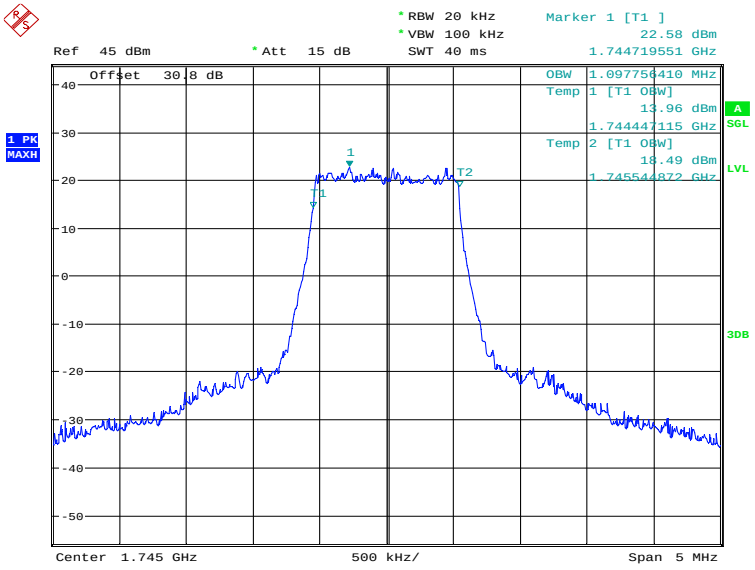
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	1097.76	1097.76

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



Date: 30.MAY.2024 10:53:08

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



Date: 30.MAY.2024 10:53:49

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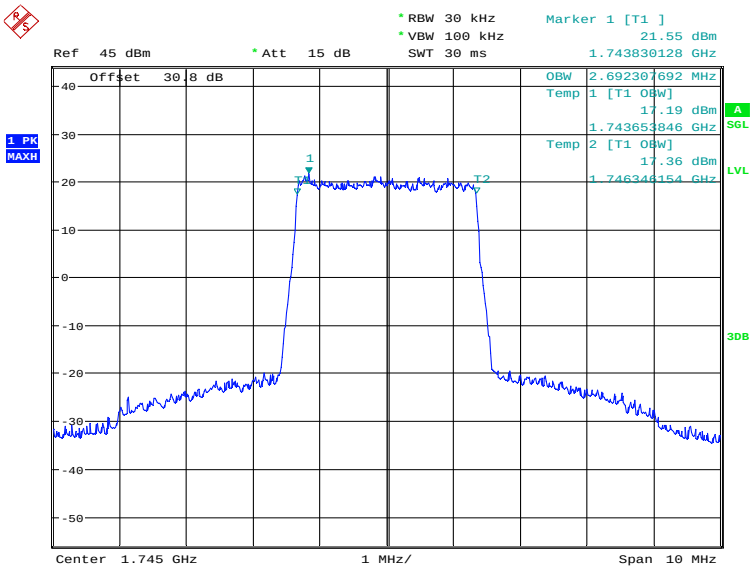
LTE band 66, 3MHz (99%)

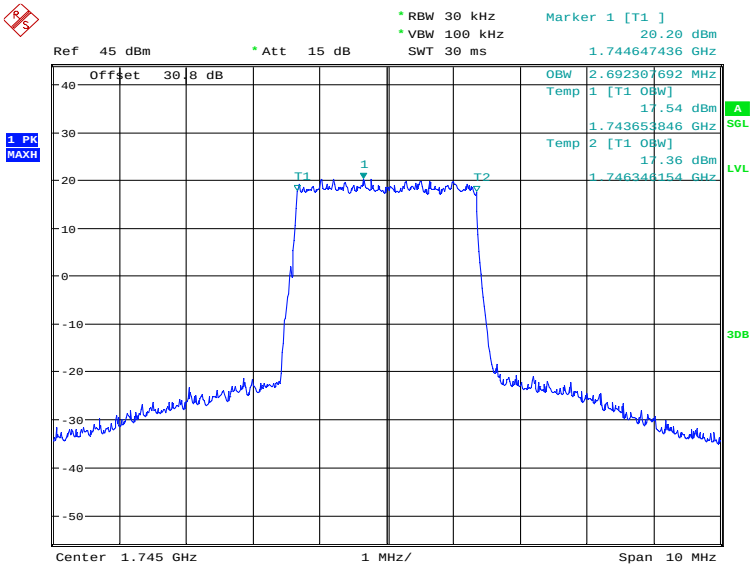
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	2692.31	2692.31

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



Date: 30.MAY.2024 10:54:30

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



Date: 30.MAY.2024 10:55:11

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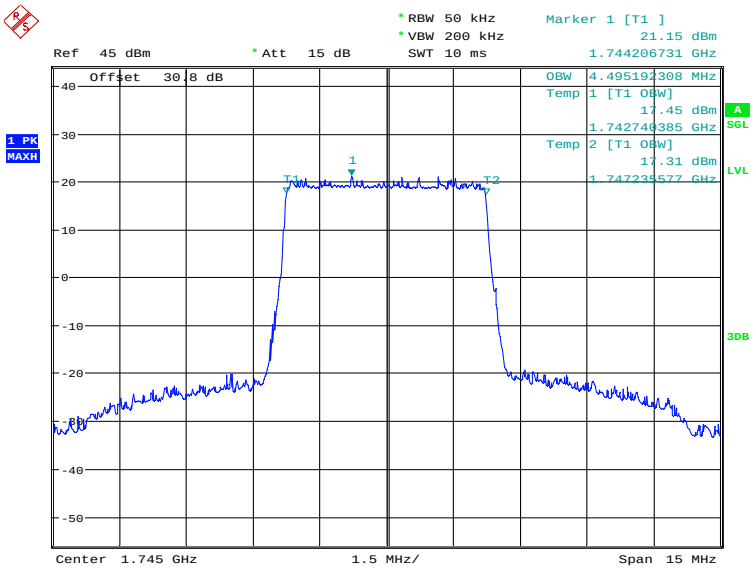
LTE band 66, 5MHz (99%)

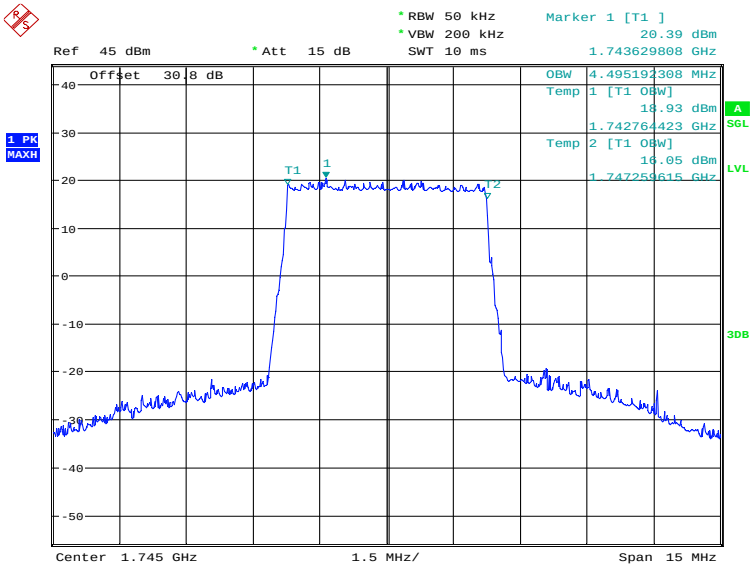
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	4495.19	4495.19

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



Date: 30.MAY.2024 10:55:52

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



Date: 30.MAY.2024 10:56:32

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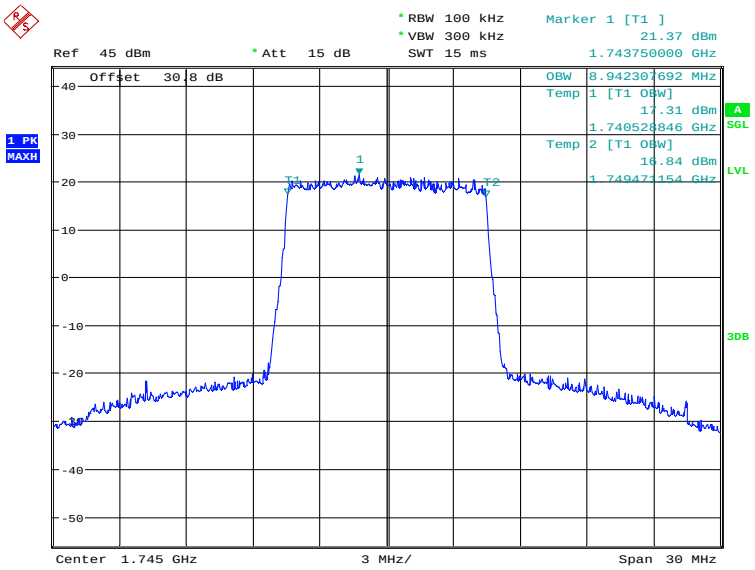
LTE band 66, 10MHz (99%)

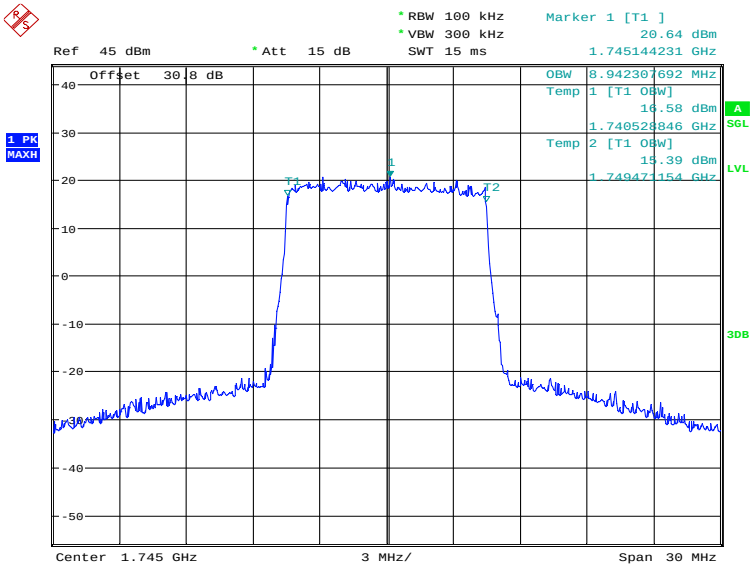
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	8942.31	8942.31

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



Date: 30.MAY.2024 10:57:14

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



Date: 30.MAY.2024 10:57:54

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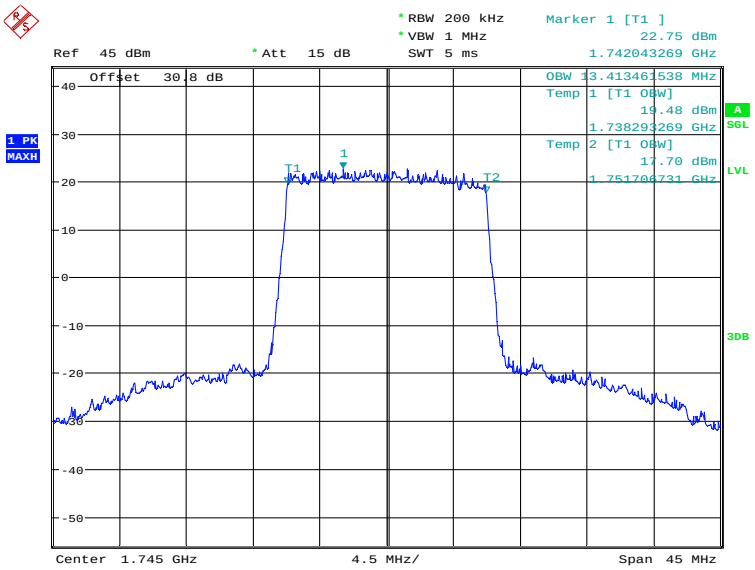
LTE band 66, 15MHz (99%)

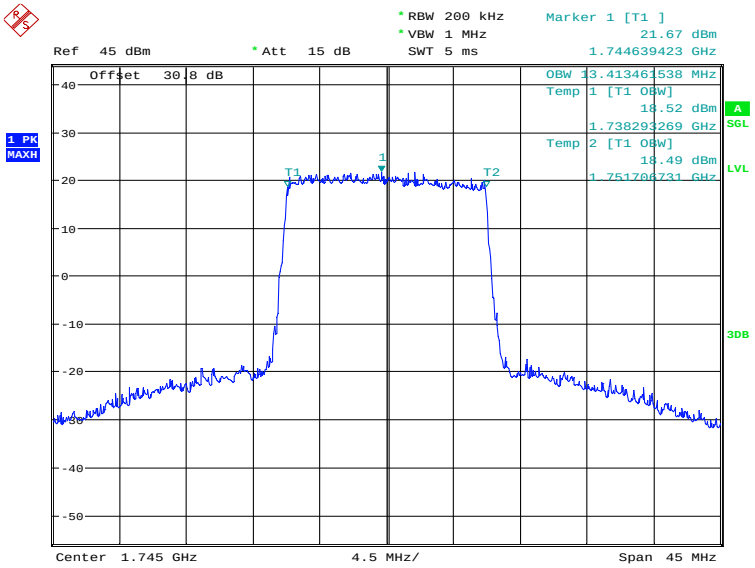
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	13413.46	13413.46

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



Date: 30.MAY.2024 10:58:36

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



Date: 30.MAY.2024 10:59:17

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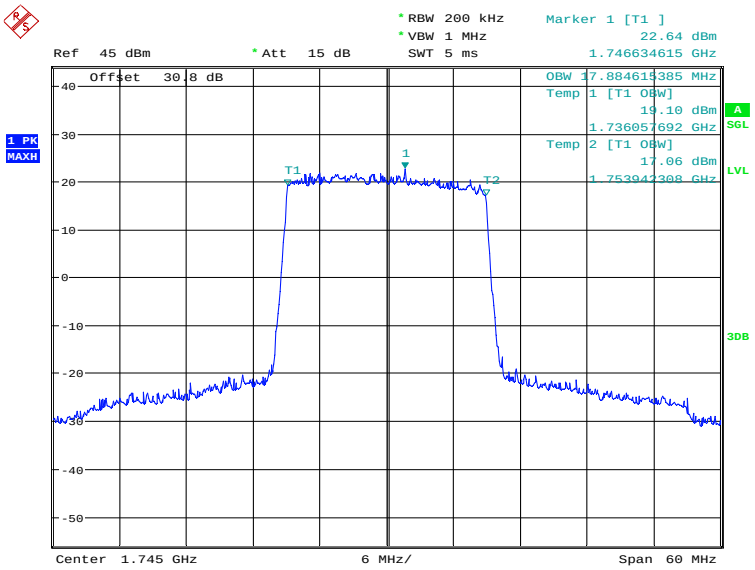
LTE band 66, 20MHz (99%)

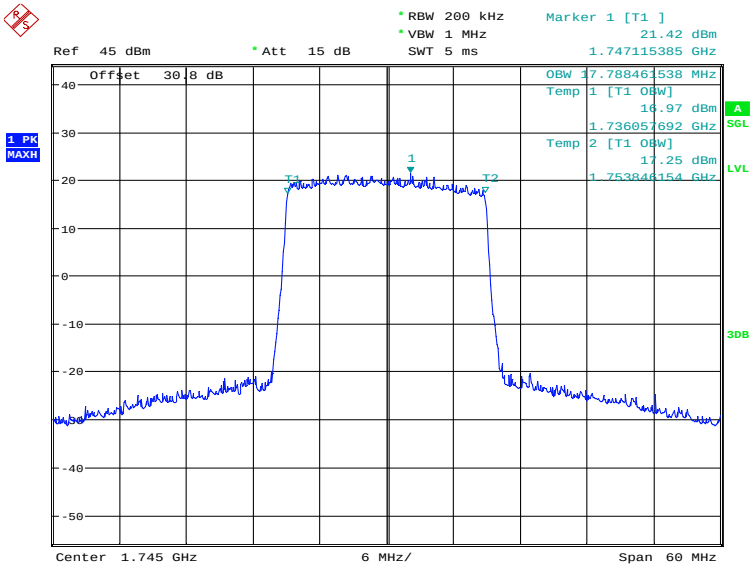
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1745.0	QPSK	16QAM
	17884.62	17788.46

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



Date: 30.MAY.2024 10:59:59

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



Date: 30.MAY.2024 11:00:39

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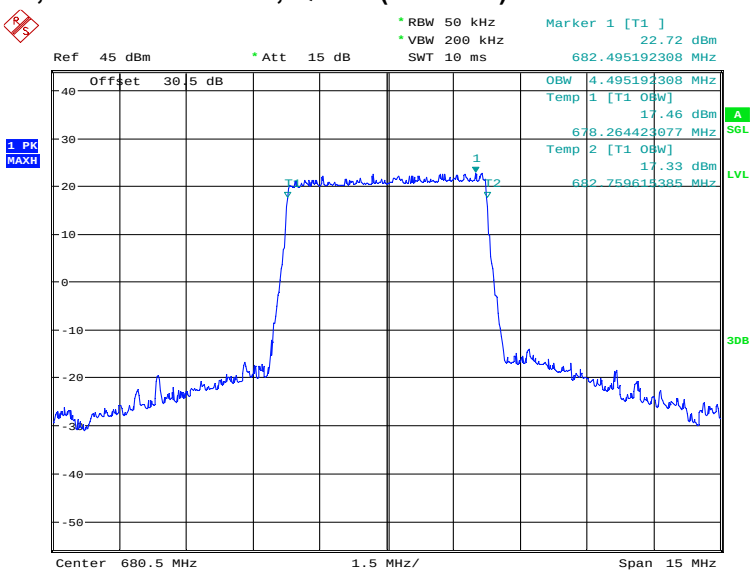
LTE band 71, 5MHz (99%)

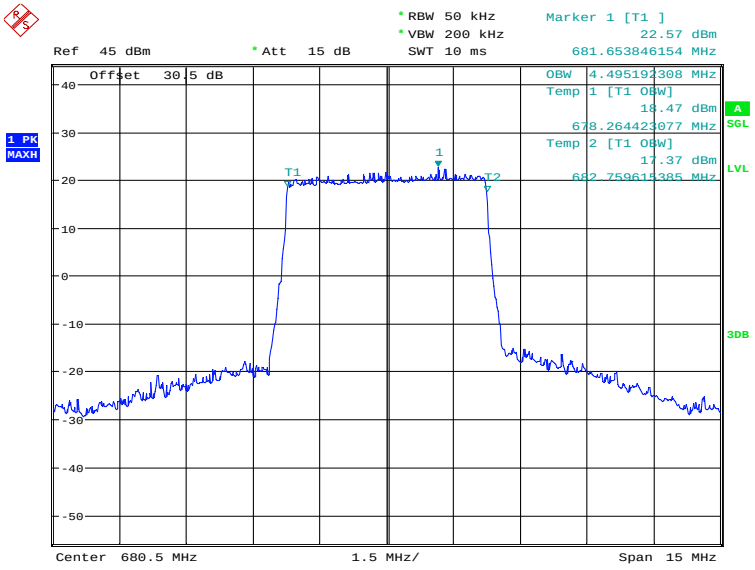
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
680.5	QPSK	16QAM
	4495.19	4495.19

LTE band 71, 5MHz Bandwidth, QPSK (99% BW)



Date: 30.MAY.2024 10:11:55

LTE band 71, 5MHz Bandwidth, 16QAM (99% BW)



Date: 30.MAY.2024 10:12:35

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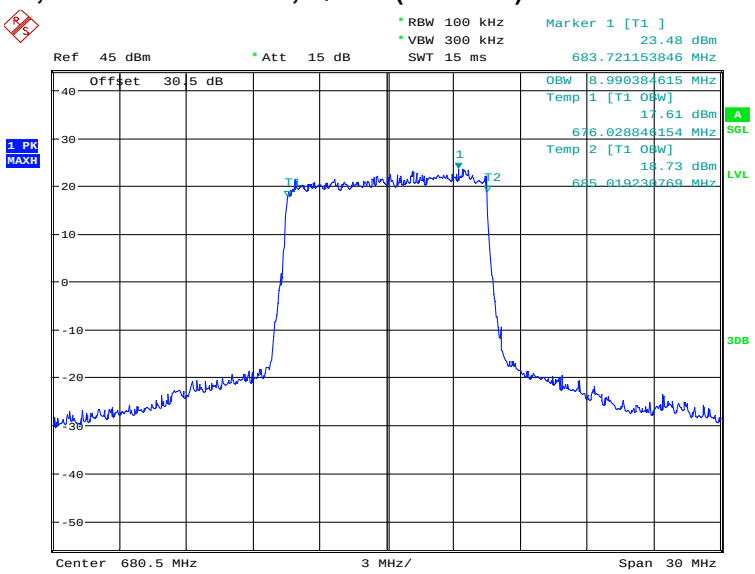
LTE band 71, 10MHz (99%)

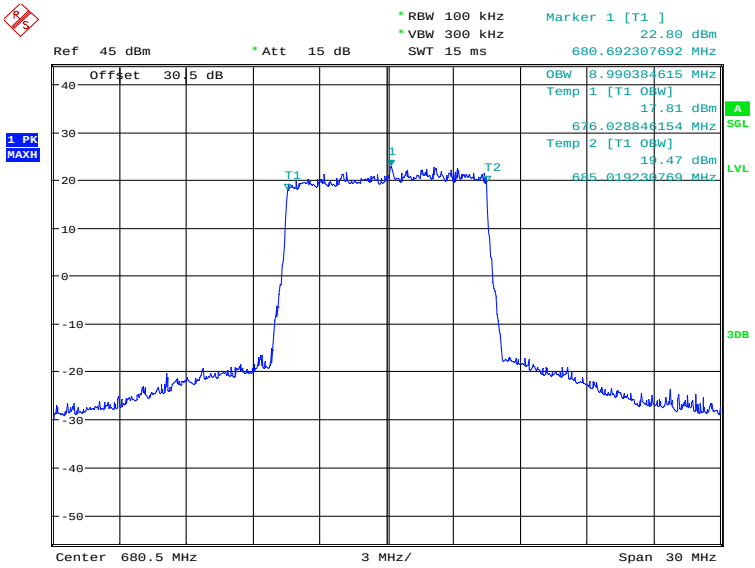
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
680.5	QPSK	16QAM
	8990.38	8990.38

LTE band 71, 10MHz Bandwidth, QPSK (99% BW)



Date: 30.MAY.2024 10:13:17

LTE band 71, 10MHz Bandwidth, 16QAM (99% BW)



Date: 30.MAY.2024 10:13:57

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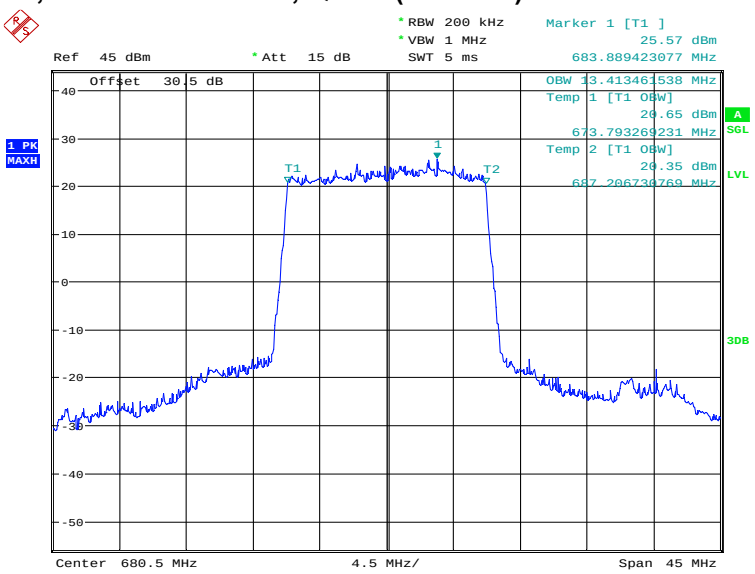
LTE band 71, 15MHz (99%)

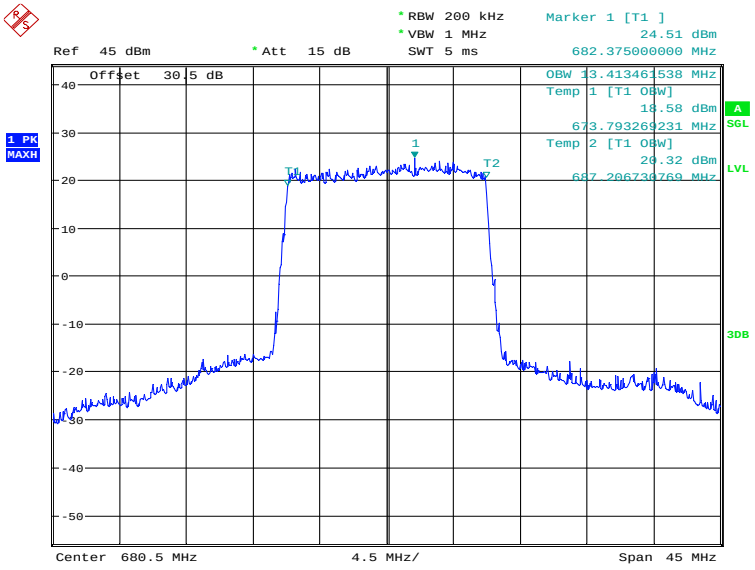
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
680.5	QPSK	16QAM
	13413.46	13413.46

LTE band 71, 15MHz Bandwidth, QPSK (99% BW)



Date: 30.MAY.2024 10:14:38

LTE band 71, 15MHz Bandwidth, 16QAM (99% BW)



Date: 30.MAY.2024 10:15:18

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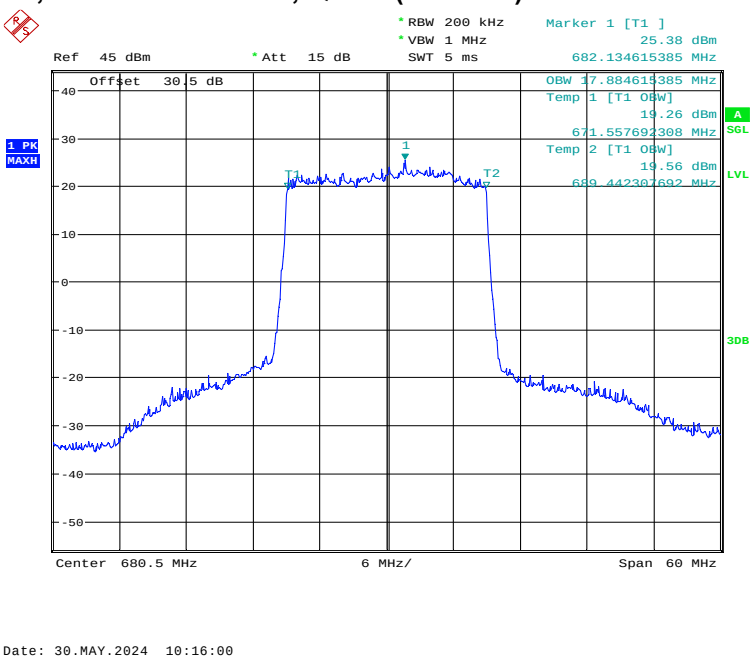
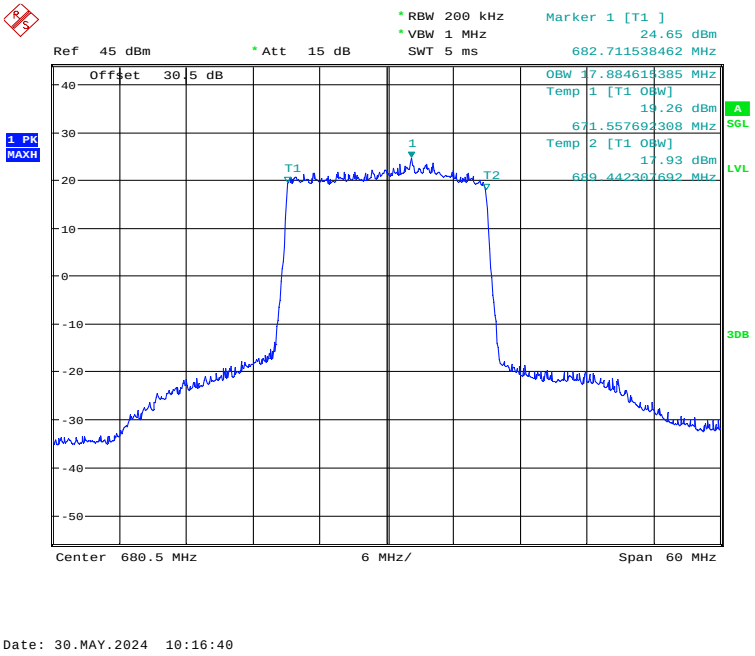
LTE band 71, 20MHz (99%)

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

LTE band 71, 20MHz Bandwidth, QPSK (99% BW)



LTE band 71, 20MHz Bandwidth, 16QAM (99% BW)



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

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A.5 Emission Bandwidth

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

The measurement method is from ANSI C63.26:

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.

b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.

d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.

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

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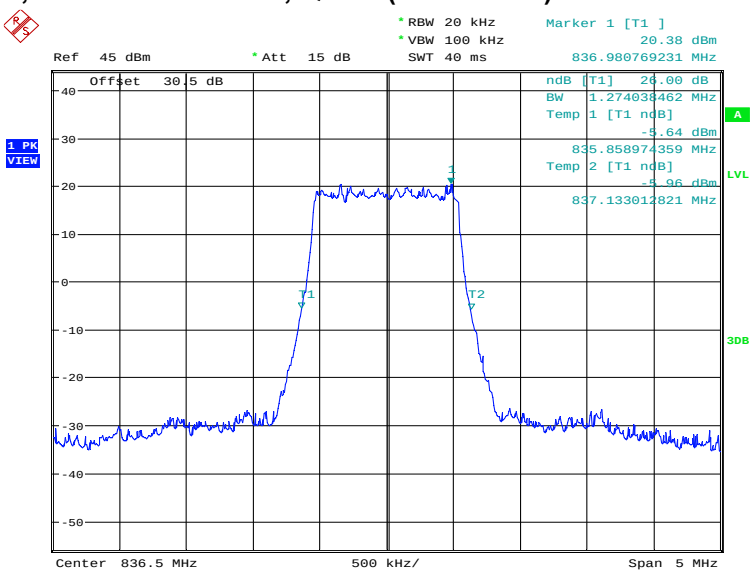
LTE band 5, 1.4MHz (-26dBc)

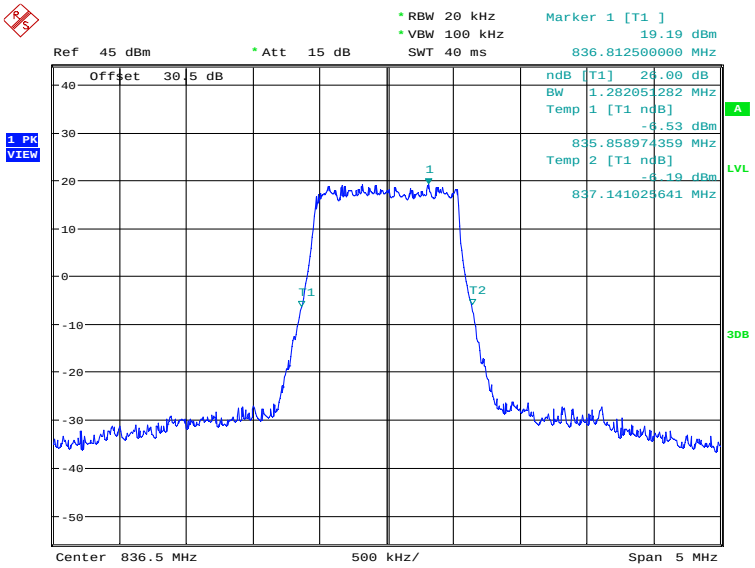
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	1274.04	1282.05

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



Date: 30.MAY.2024 13:36:57

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



Date: 30.MAY.2024 13:37:38

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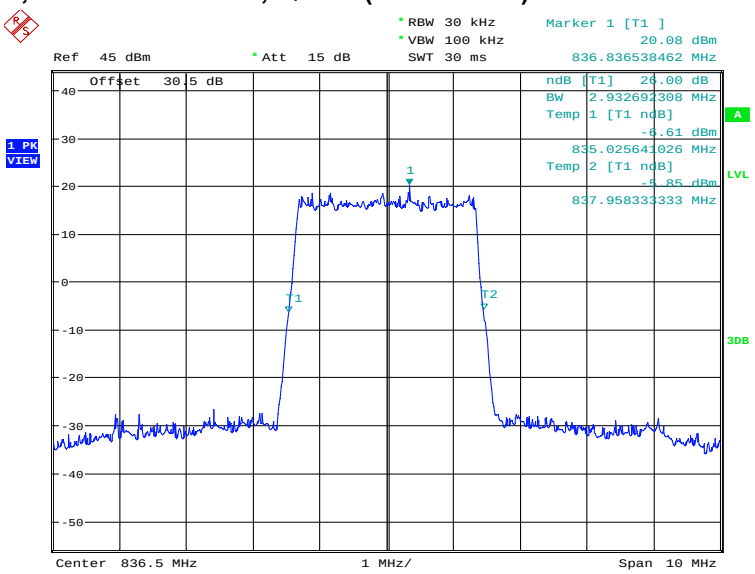
LTE band 5, 3MHz (-26dBc)

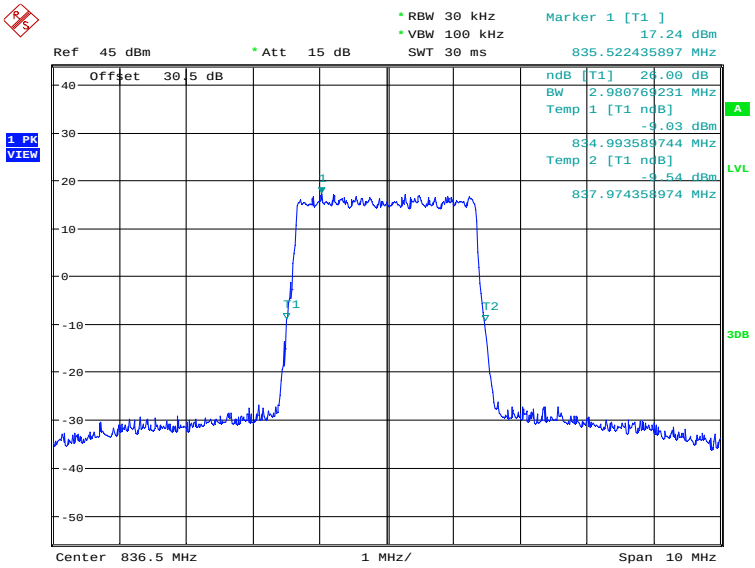
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	2932.69	2980.77

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



Date: 30.MAY.2024 13:38:20

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



Date: 30.MAY.2024 13:39:00

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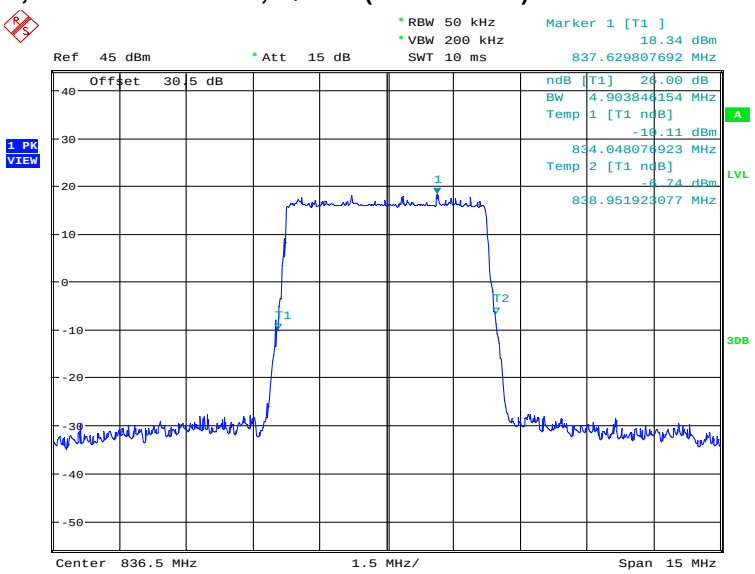
LTE band 5, 5MHz (-26dBc)

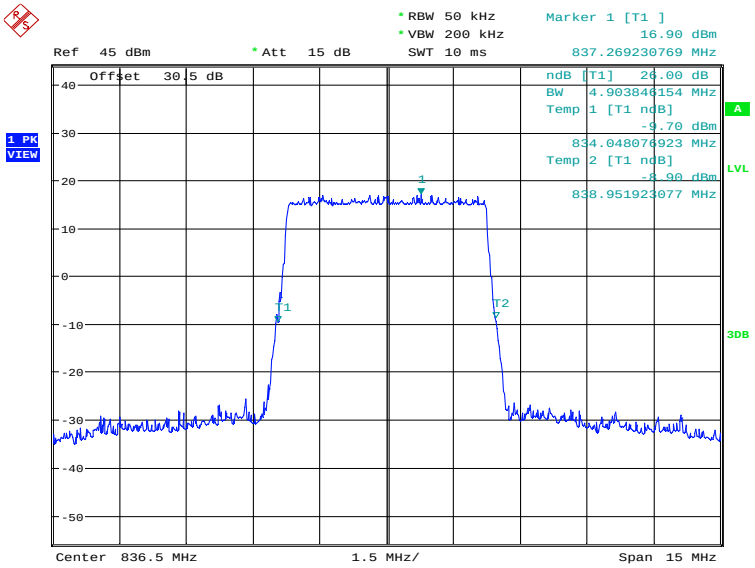
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	4903.85	4903.85

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



Date: 30.MAY.2024 13:39:43

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



Date: 30.MAY.2024 13:40:23

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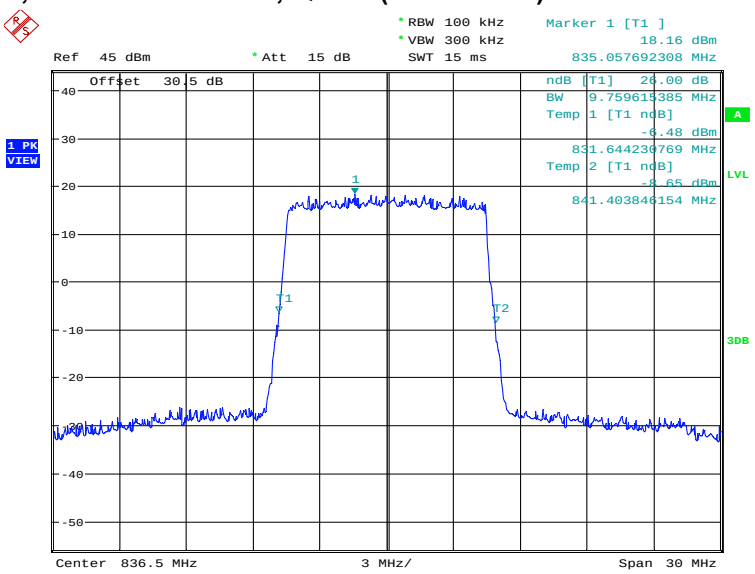
LTE band 5, 10MHz (-26dBc)

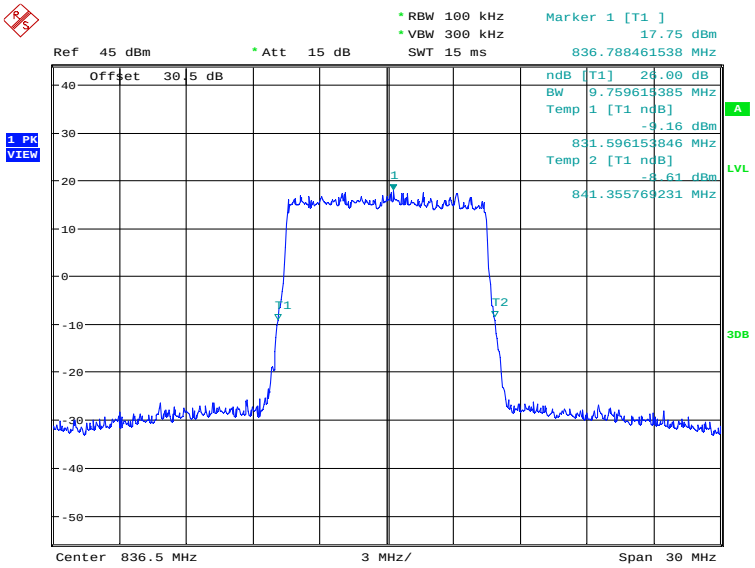
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	9759.62	9759.62

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



Date: 30.MAY.2024 13:41:05

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



Date: 30.MAY.2024 13:41:46

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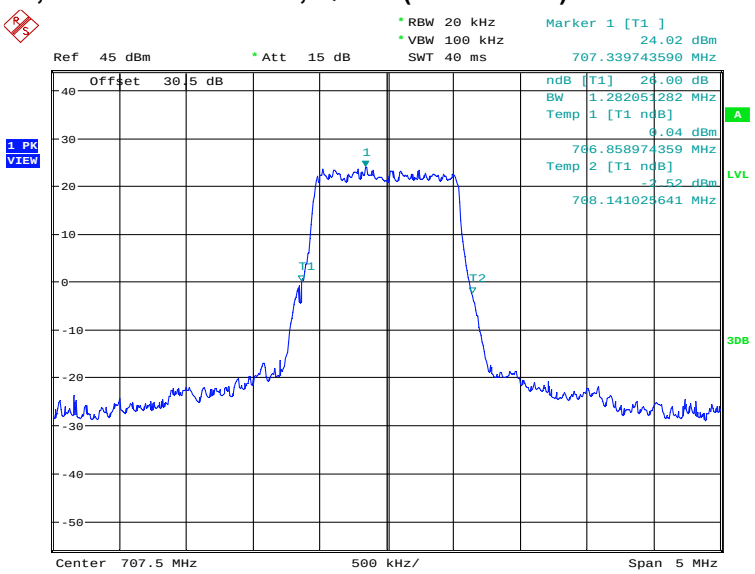
LTE band 12, 1.4MHz (-26dBc)

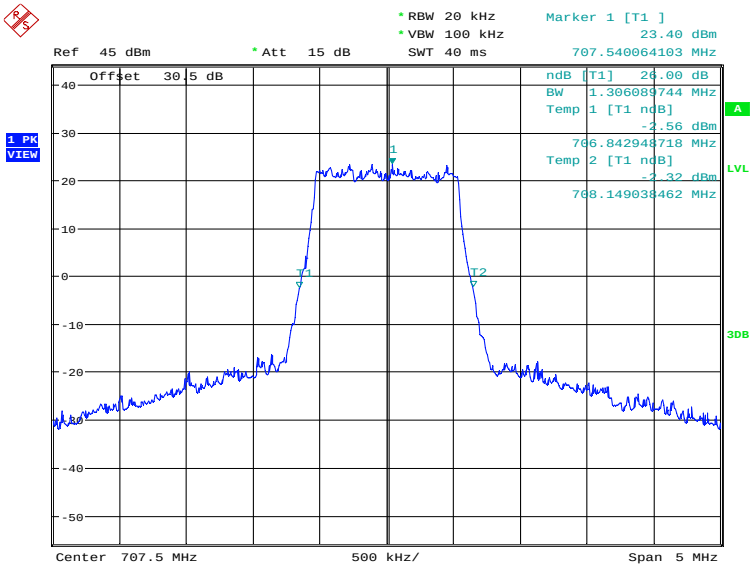
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	1282.05	1306.09

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



Date: 30.MAY.2024 13:42:29

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



Date: 30.MAY.2024 13:43:10

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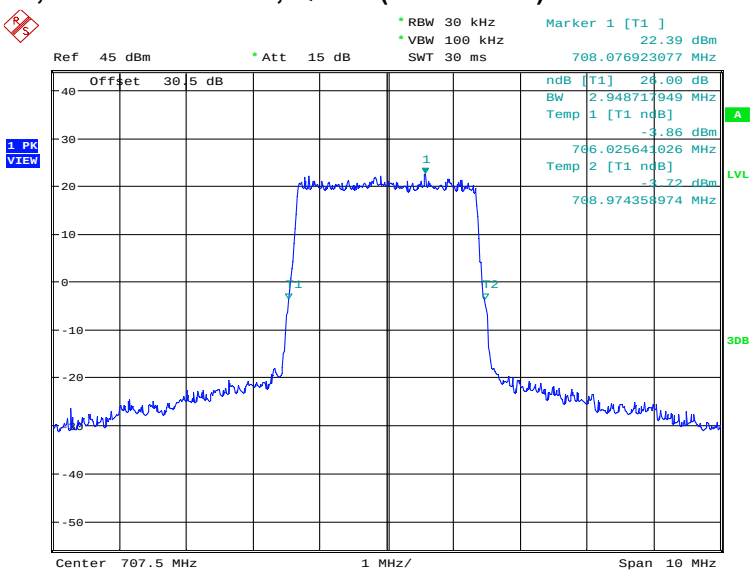
LTE band 12, 3MHz (-26dBc)

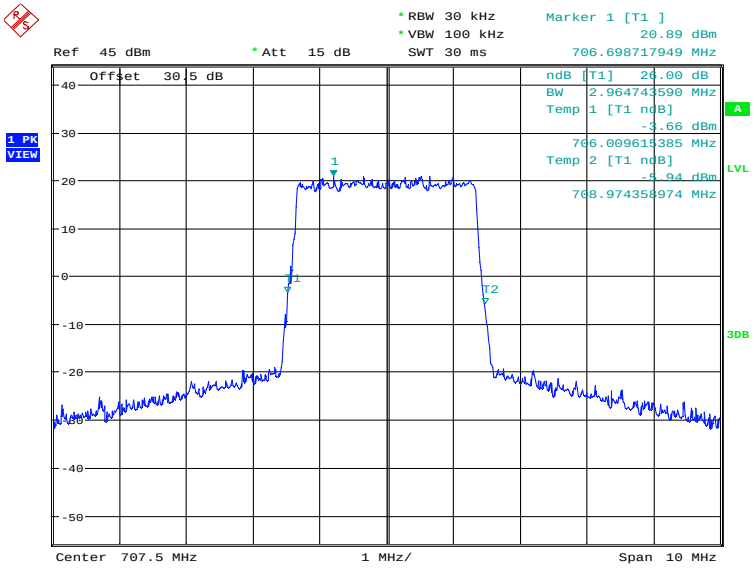
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	2948.72	2964.74

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



Date: 30.MAY.2024 13:43:52

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



Date: 30.MAY.2024 13:44:32

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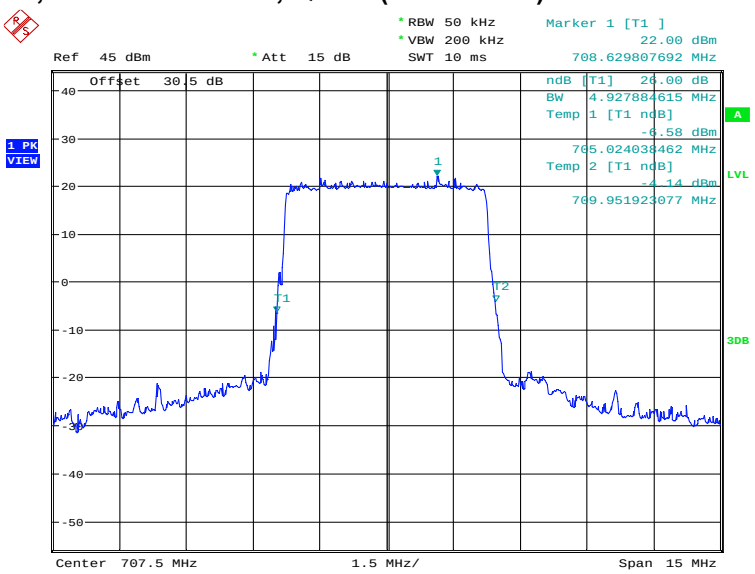
LTE band 12, 5MHz (-26dBc)

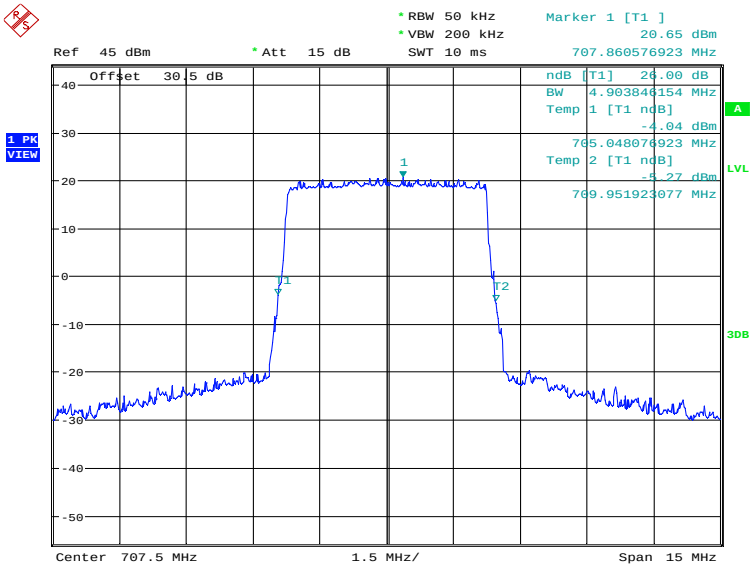
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	4927.88	4903.85

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



Date: 30.MAY.2024 13:45:15

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



Date: 30.MAY.2024 13:45:55

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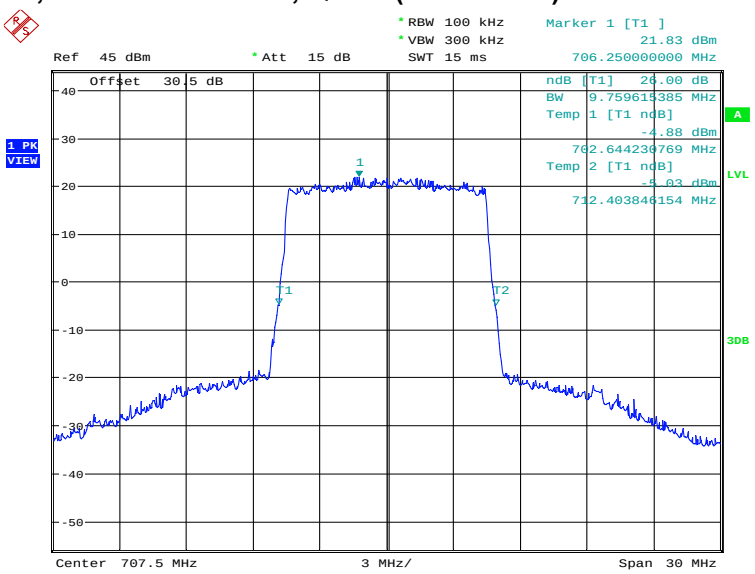
LTE band 12, 10MHz (-26dBc)

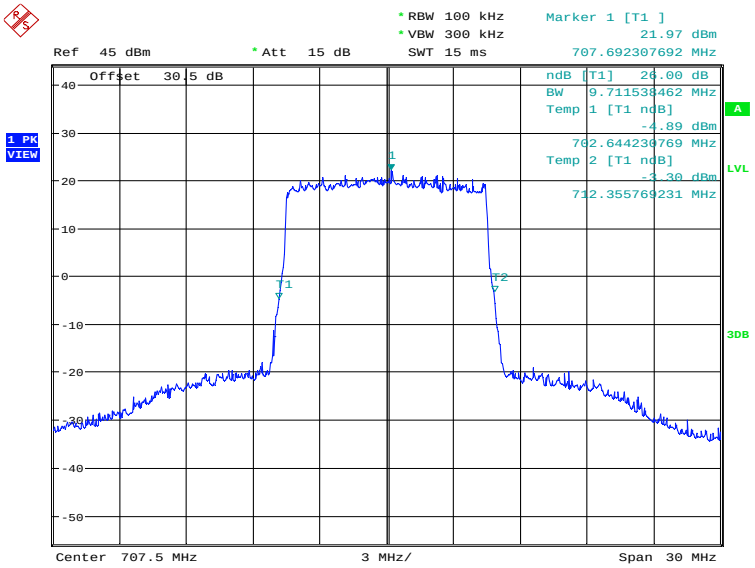
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	9759.62	9711.54

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



Date: 30.MAY.2024 13:46:37

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



Date: 30.MAY.2024 13:47:18

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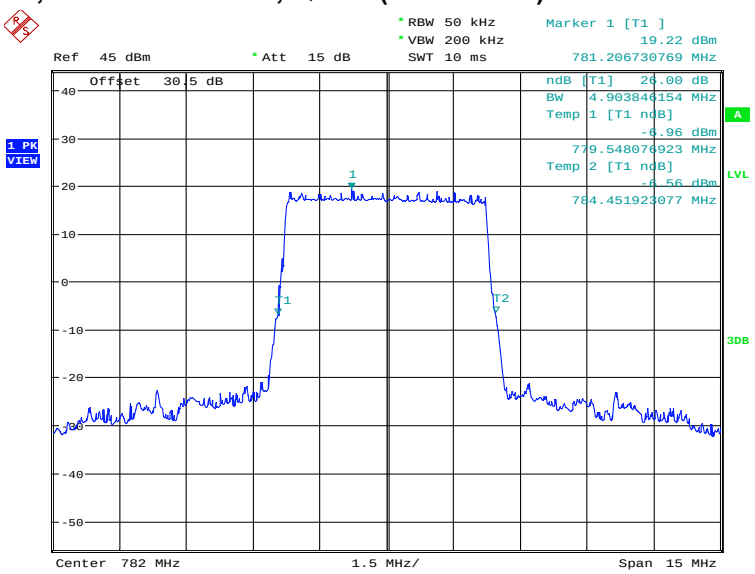
LTE band 13, 5MHz (-26dBc)

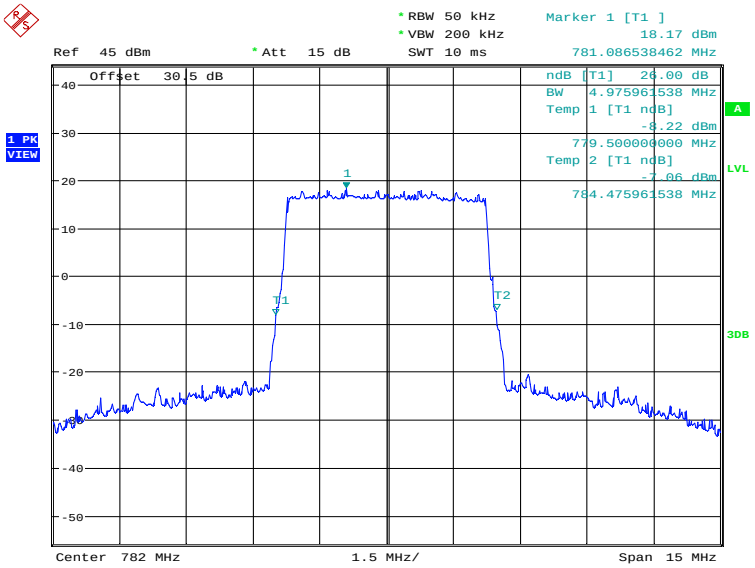
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
782.0	QPSK	16QAM
	4903.85	4975.96

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



Date: 30.MAY.2024 13:48:01

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



Date: 30.MAY.2024 13:48:42

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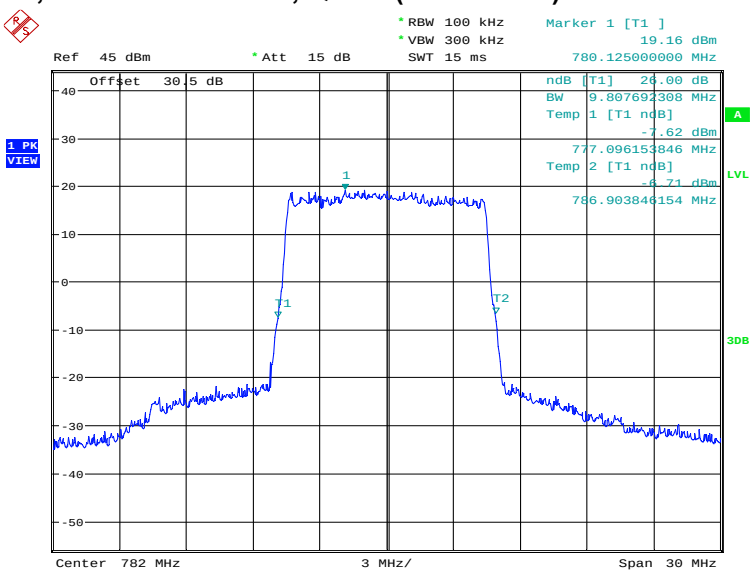
LTE band 13, 10MHz (-26dBc)

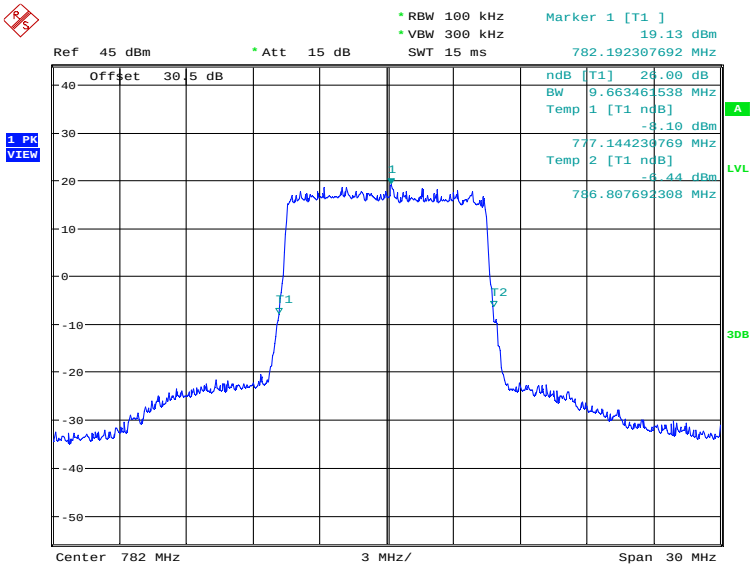
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
782.0	QPSK	16QAM
	9807.69	9663.46

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



Date: 30.MAY.2024 13:49:24

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



Date: 30.MAY.2024 13:50:05

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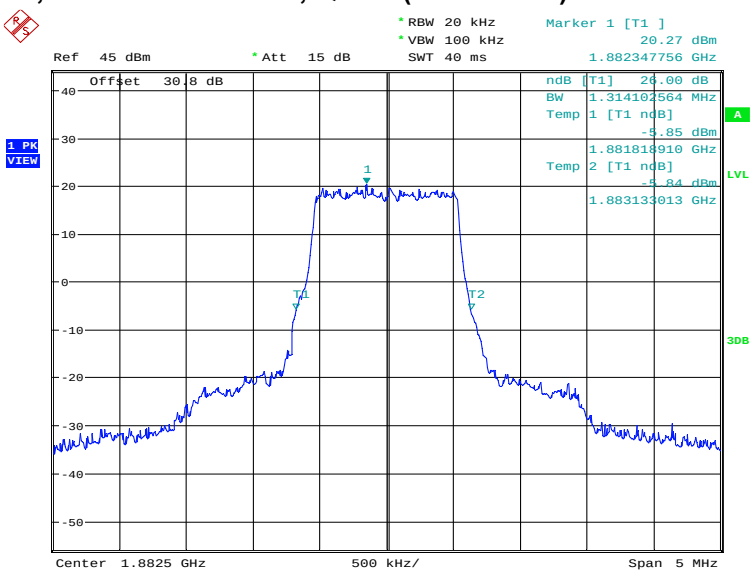
LTE band 25, 1.4MHz (-26dBc)

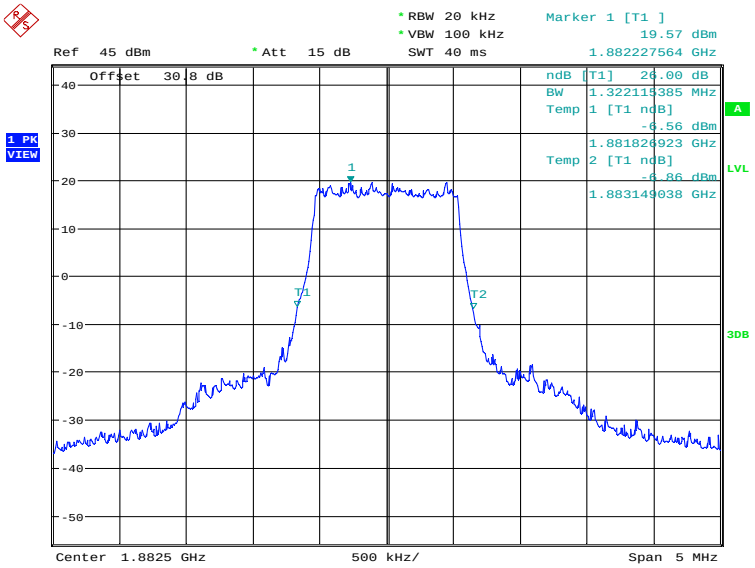
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1882.5	QPSK	16QAM
	1314.10	1322.12

LTE band 25, 1.4MHz Bandwidth, QPSK (-26dBc BW)



Date: 30.MAY.2024 13:50:48

LTE band 25, 1.4MHz Bandwidth, 16QAM (-26dBc BW)



Date: 30.MAY.2024 13:51:29

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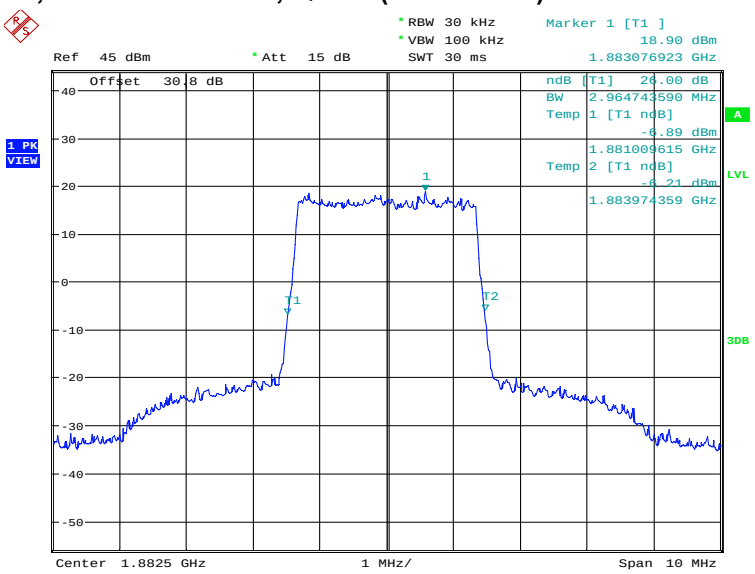
LTE band 25, 3MHz (-26dBc)

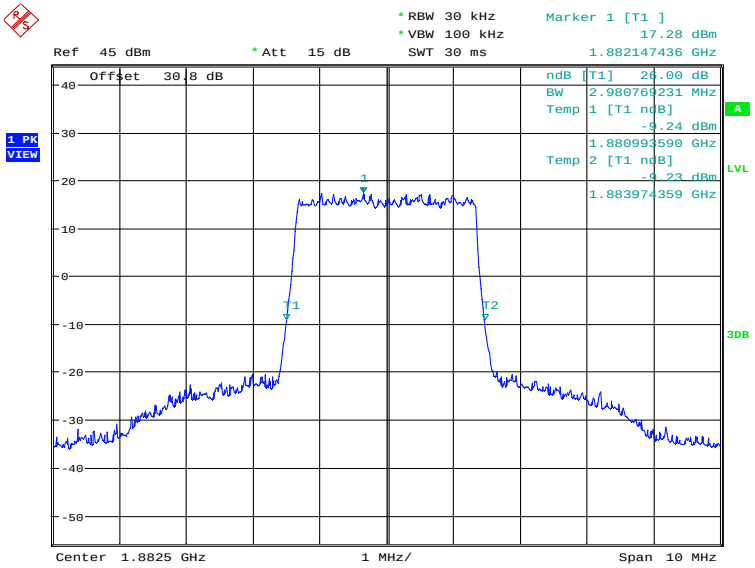
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1882.5	QPSK	16QAM
	2964.74	2980.77

LTE band 25, 3MHz Bandwidth, QPSK (-26dBc BW)



Date: 30.MAY.2024 13:52:11

LTE band 25, 3MHz Bandwidth, 16QAM (-26dBc BW)



Date: 30.MAY.2024 13:52:52

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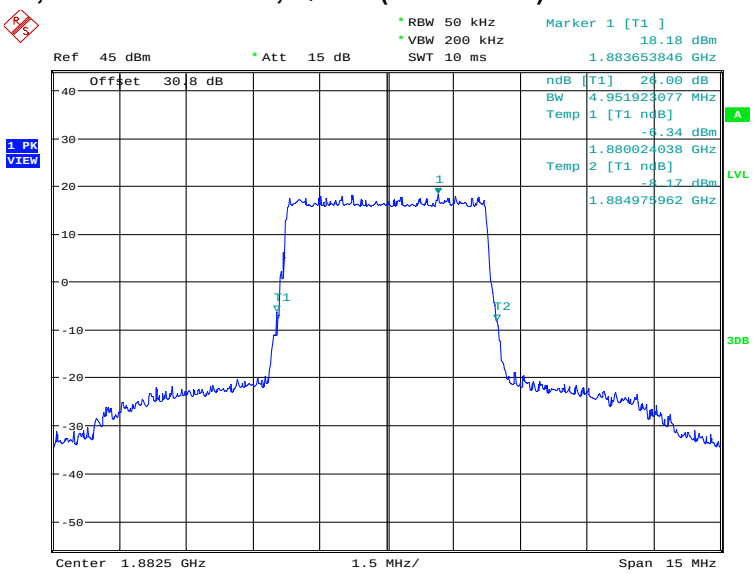
LTE band 25, 5MHz (-26dBc)

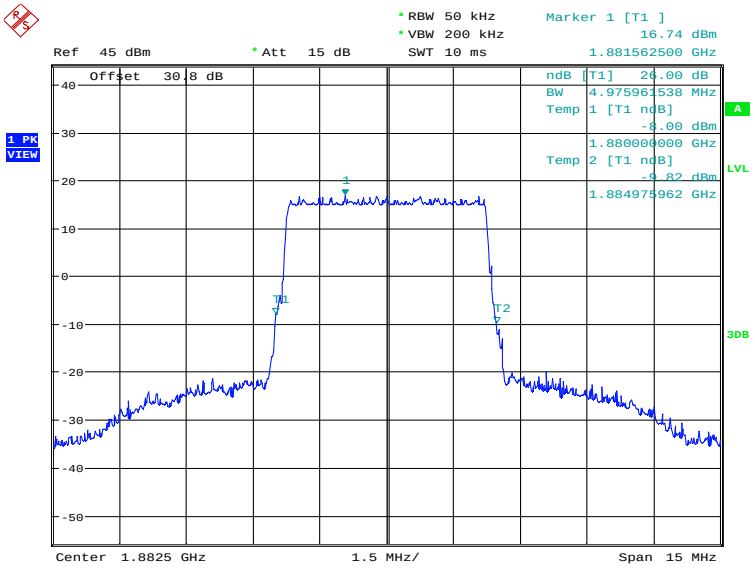
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1882.5	QPSK	16QAM
	4951.92	4975.96

LTE band 25, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 30.MAY.2024 13:53:34

LTE band 25, 5MHz Bandwidth, 16QAM (-26dBc BW)



Date: 30.MAY.2024 13:54:15

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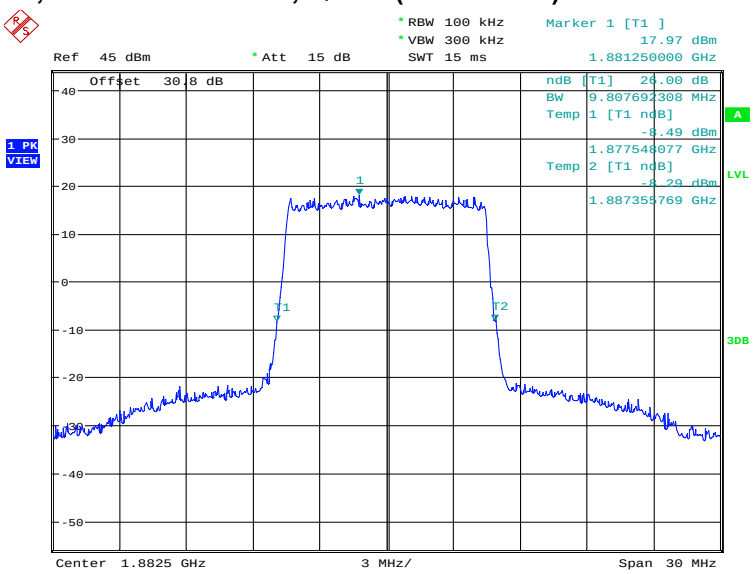
LTE band 25, 10MHz (-26dBc)

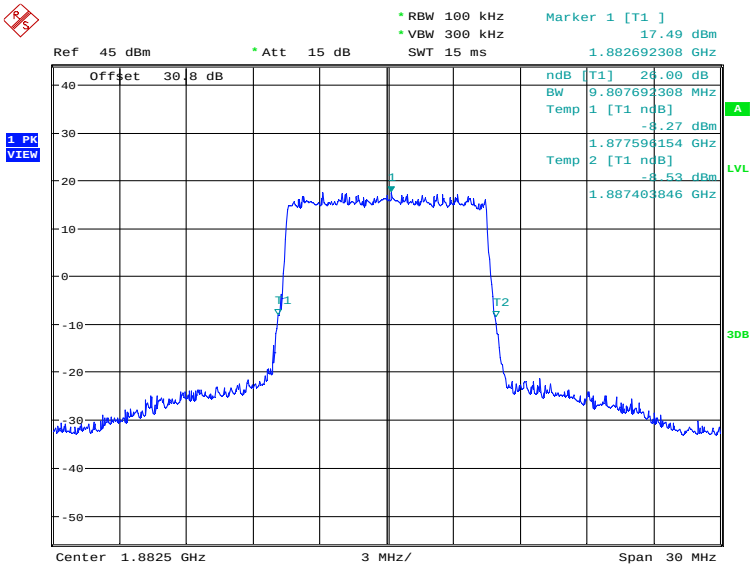
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1882.5	QPSK	16QAM
	9807.69	9807.69

LTE band 25, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 30.MAY.2024 13:58:53

LTE band 25, 10MHz Bandwidth, 16QAM (-26dBc BW)



Date: 30.MAY.2024 13:59:34

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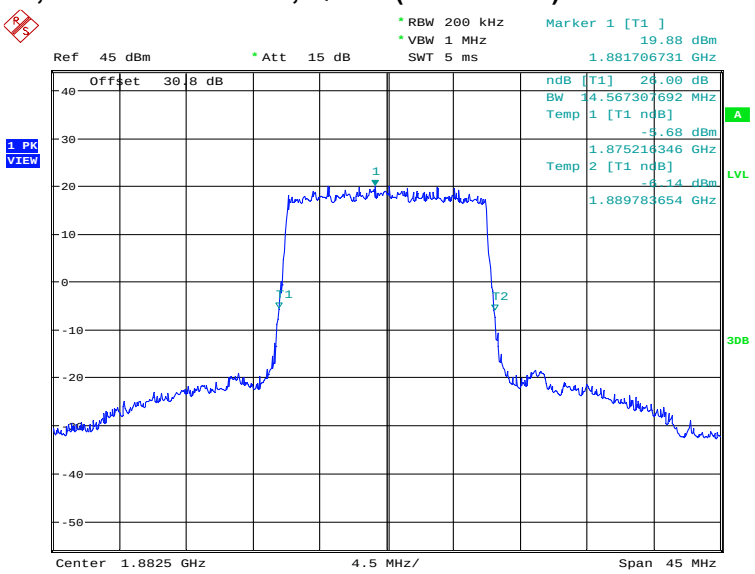
LTE band 25, 15MHz (-26dBc)

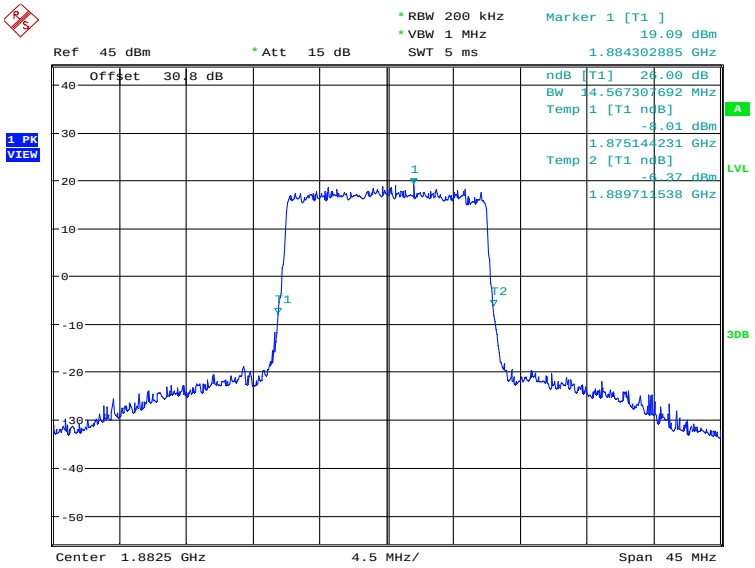
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1882.5	QPSK	16QAM
	14567.31	14567.31

LTE band 25, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 30.MAY.2024 14:00:16

LTE band 25, 15MHz Bandwidth, 16QAM (-26dBc BW)



Date: 30.MAY.2024 14:00:57

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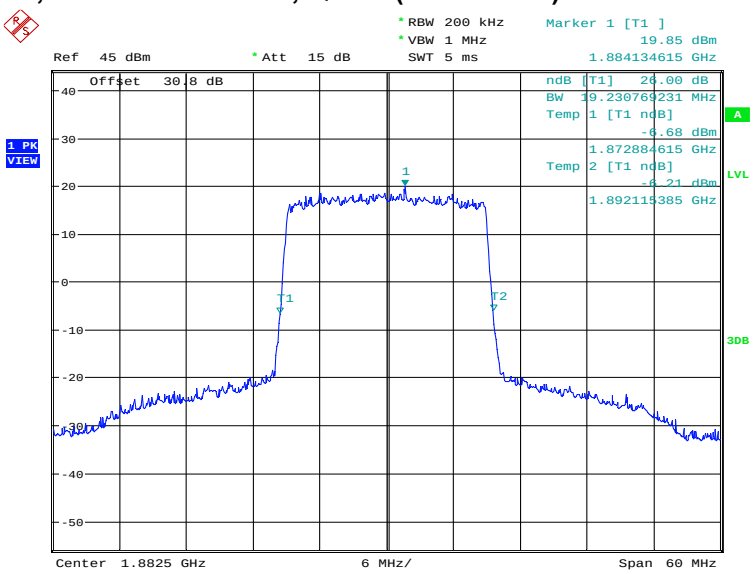
LTE band 25, 20MHz (-26dBc)

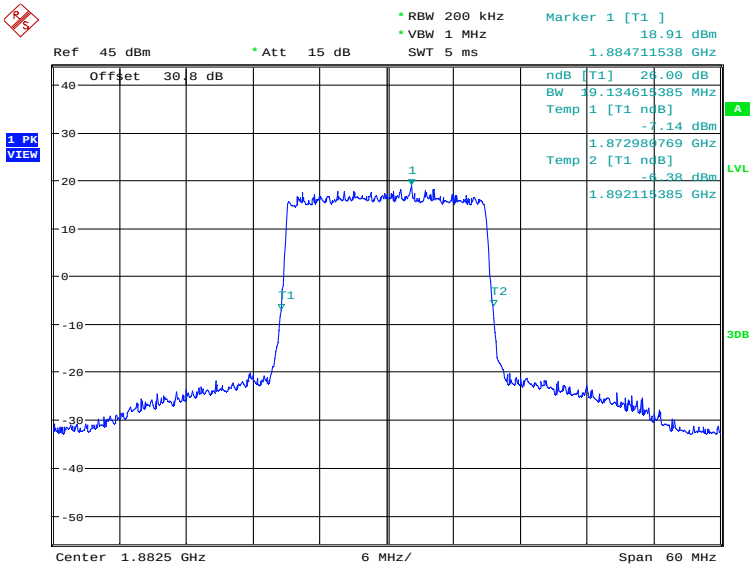
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1882.5	QPSK	16QAM
	19230.77	19134.62

LTE band 25, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 30.MAY.2024 14:01:40

LTE band 25, 20MHz Bandwidth, 16QAM (-26dBc BW)



Date: 30.MAY.2024 14:02:20

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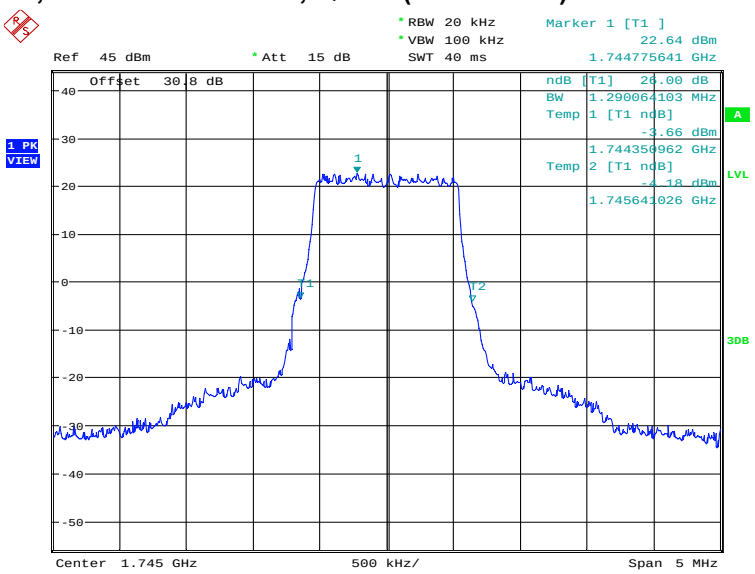
LTE band 66, 1.4MHz (-26dBc)

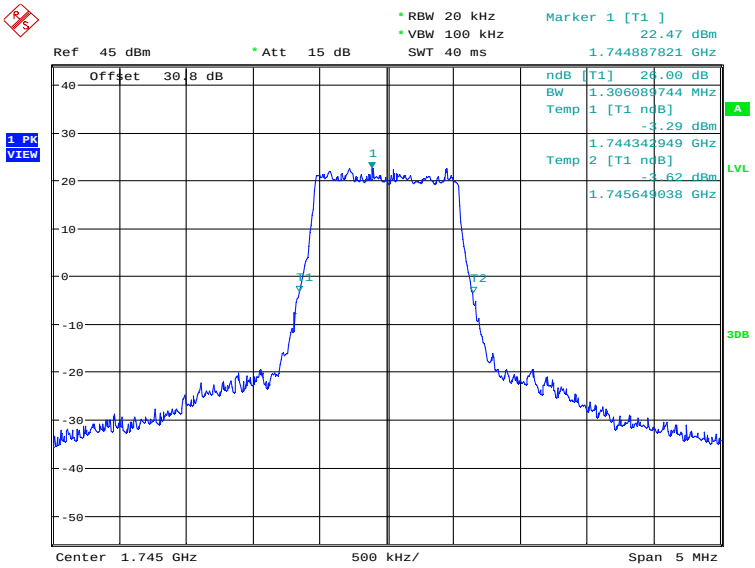
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1745.0	QPSK	16QAM
	1290.06	1306.09

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



Date: 30.MAY.2024 14:03:04

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



Date: 30.MAY.2024 14:03:44

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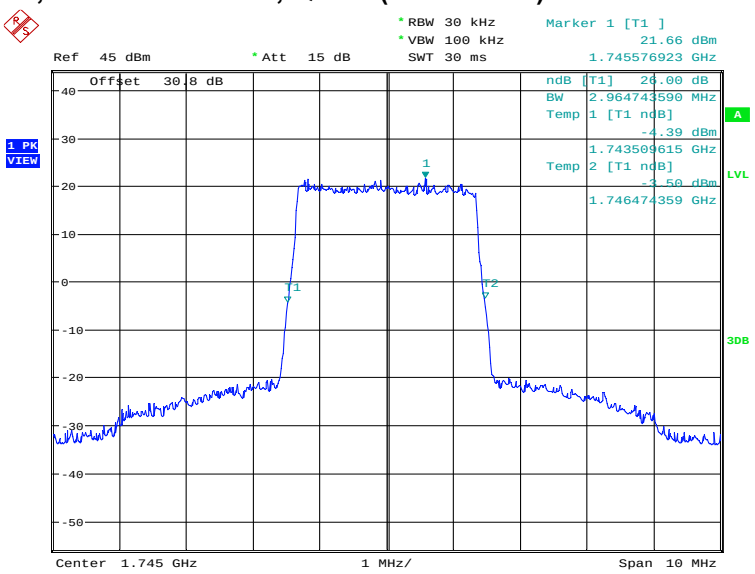
LTE band 66, 3MHz (-26dBc)

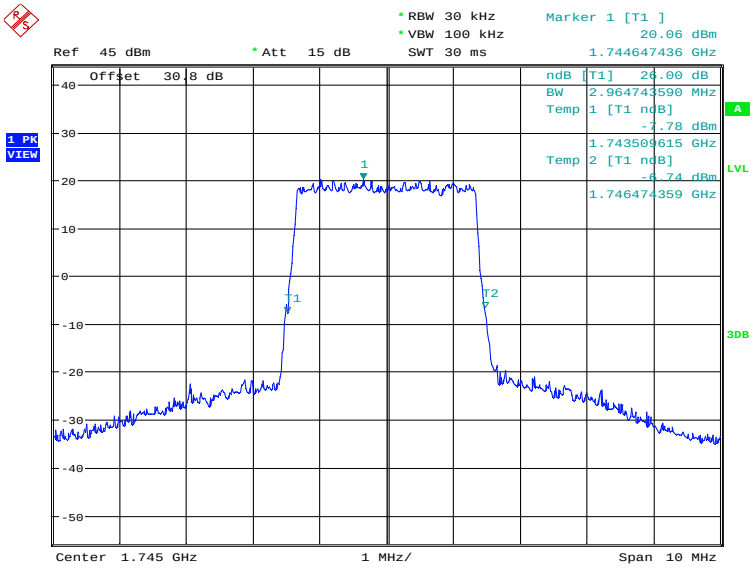
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1745.0	QPSK	16QAM
	2964.74	2964.74

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



Date: 30.MAY.2024 14:04:27

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



Date: 30.MAY.2024 14:05:07

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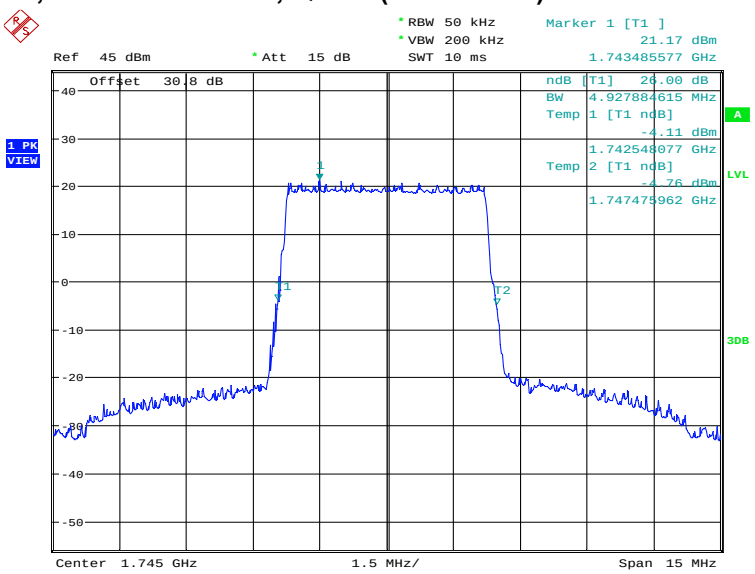
LTE band 66, 5MHz (-26dBc)

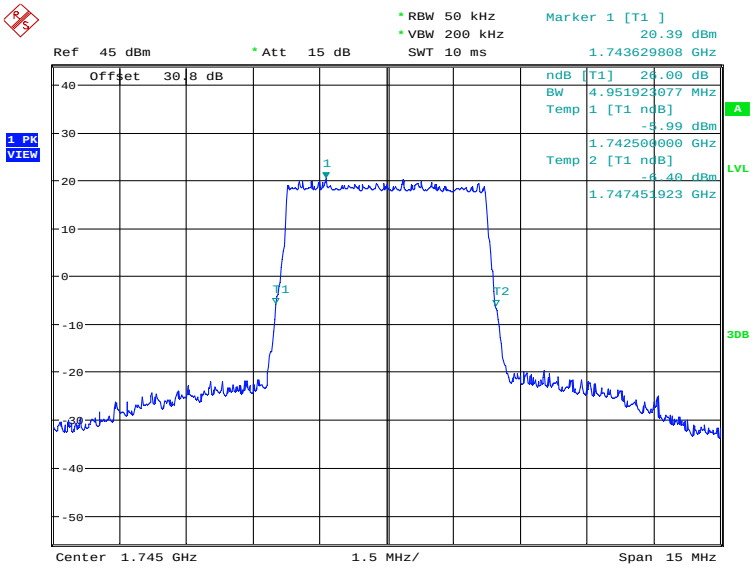
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1745.0	QPSK	16QAM
	4927.88	4951.92

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



Date: 30.MAY.2024 14:05:49

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



Date: 30.MAY.2024 14:06:30

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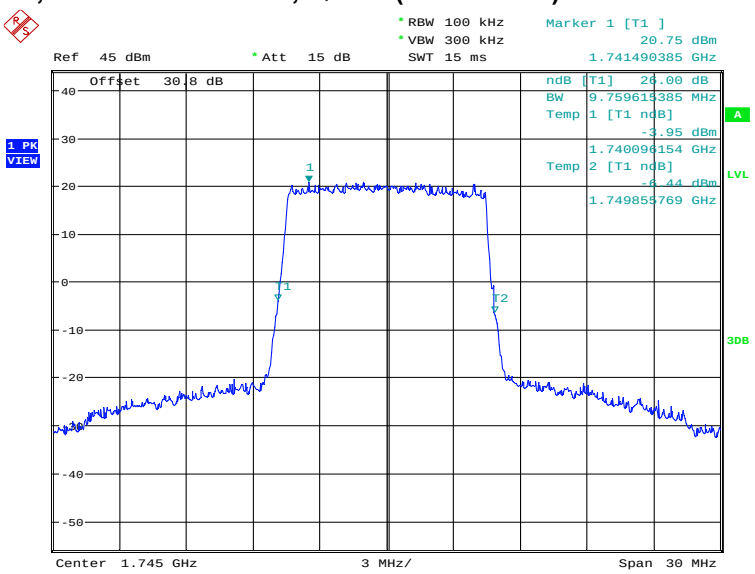
LTE band 66, 10MHz (-26dBc)

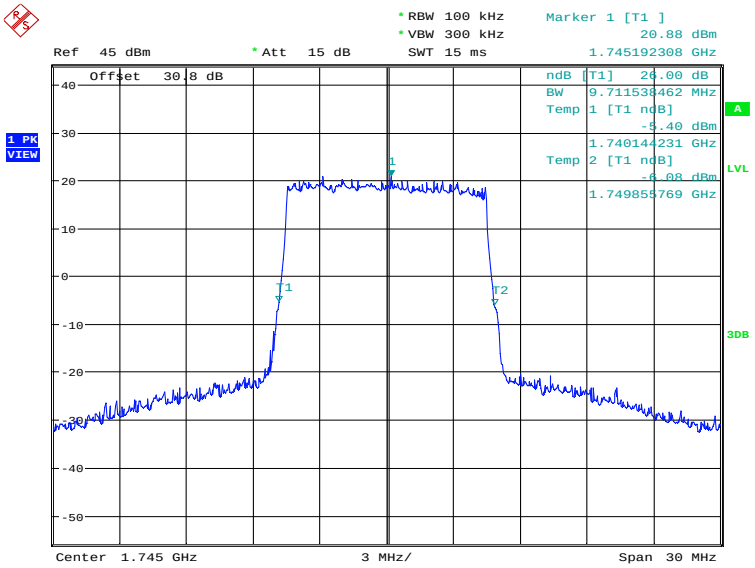
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1745.0	QPSK	16QAM
	9759.62	9711.54

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



Date: 30.MAY.2024 14:07:13

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



Date: 30.MAY.2024 14:07:53

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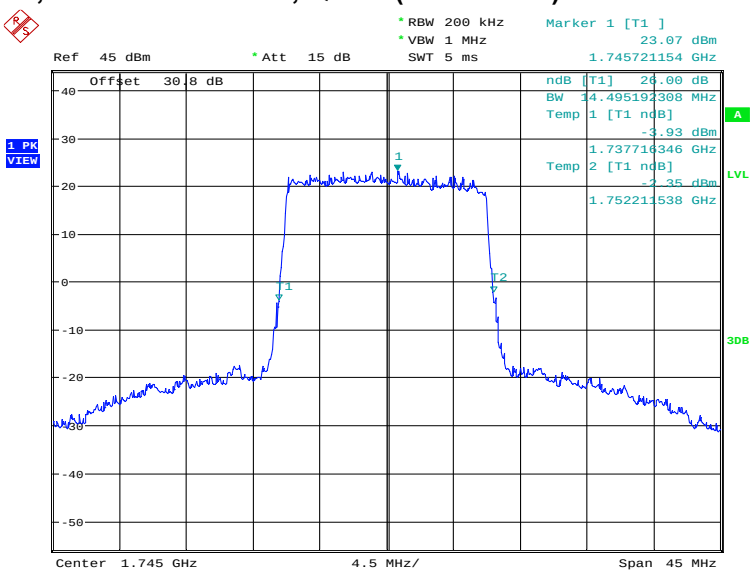
LTE band 66, 15MHz (-26dBc)

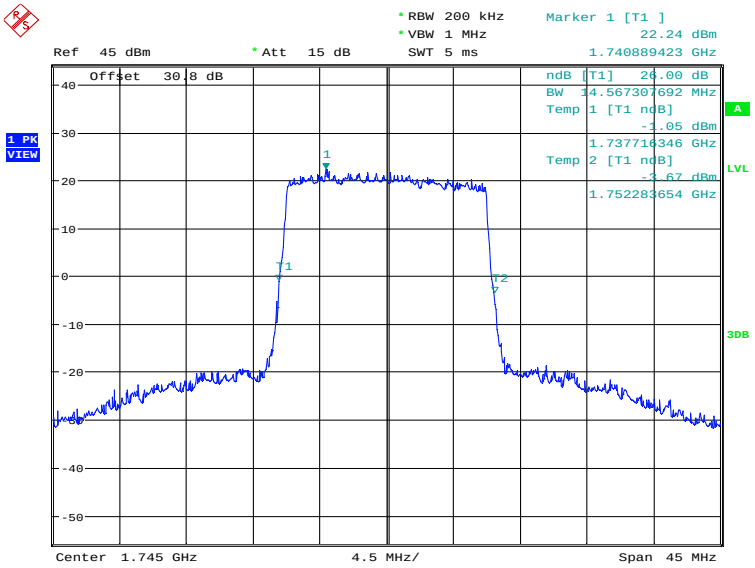
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1745.0	QPSK	16QAM
	14495.19	14567.31

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



Date: 30.MAY.2024 14:08:36

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



Date: 30.MAY.2024 14:09:16

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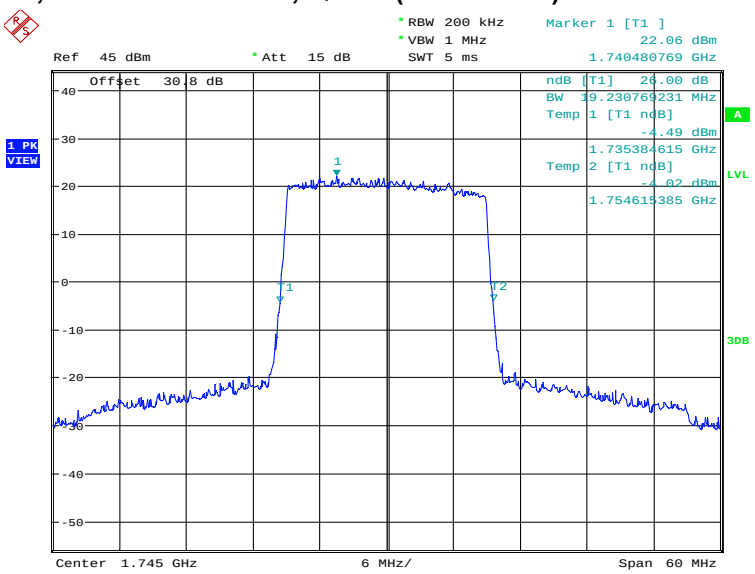
LTE band 66, 20MHz (-26dBc)

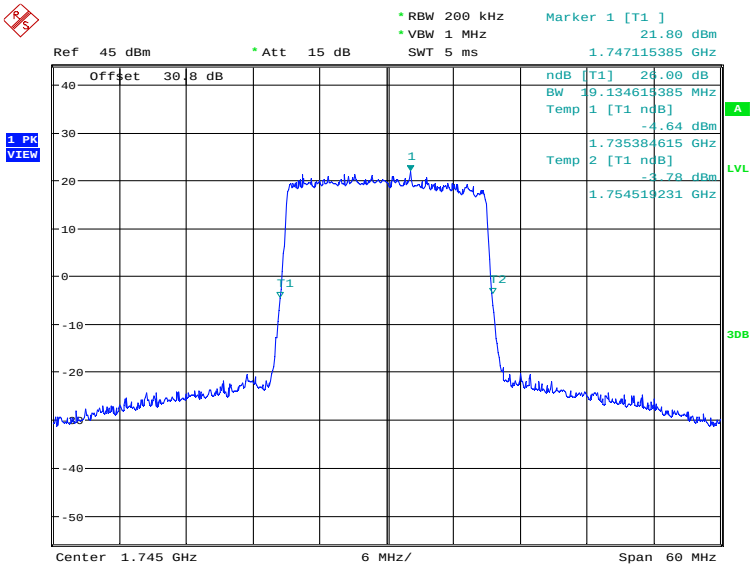
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1745.0	QPSK	16QAM
	19230.77	19134.62

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



Date: 30.MAY.2024 14:09:59

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



Date: 30.MAY.2024 14:10:40

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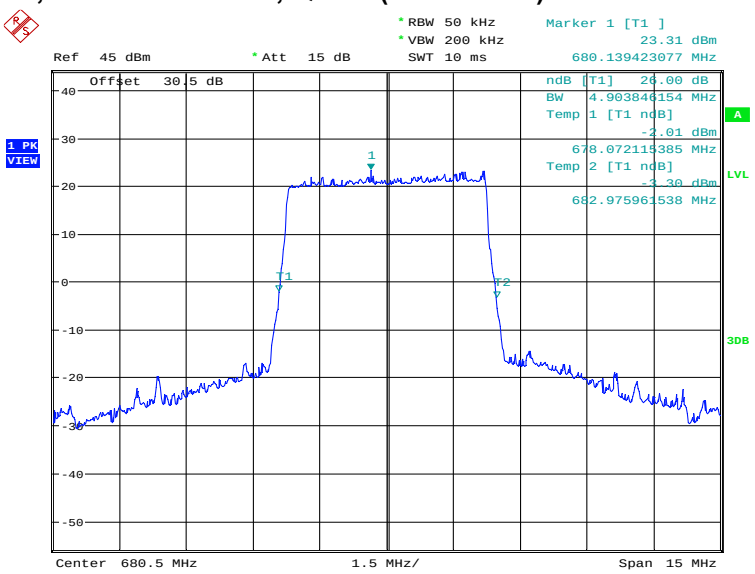
LTE band 71, 5MHz (-26dBc)

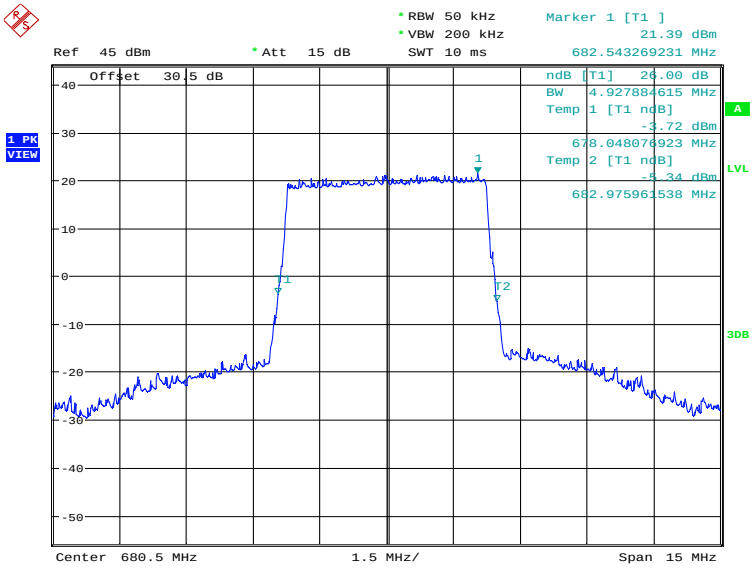
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
680.5	QPSK	16QAM
	4903.85	4927.88

LTE band 71, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 30.MAY.2024 14:42:16

LTE band 71, 5MHz Bandwidth, 16QAM (-26dBc BW)



Date: 30.MAY.2024 16:50:13

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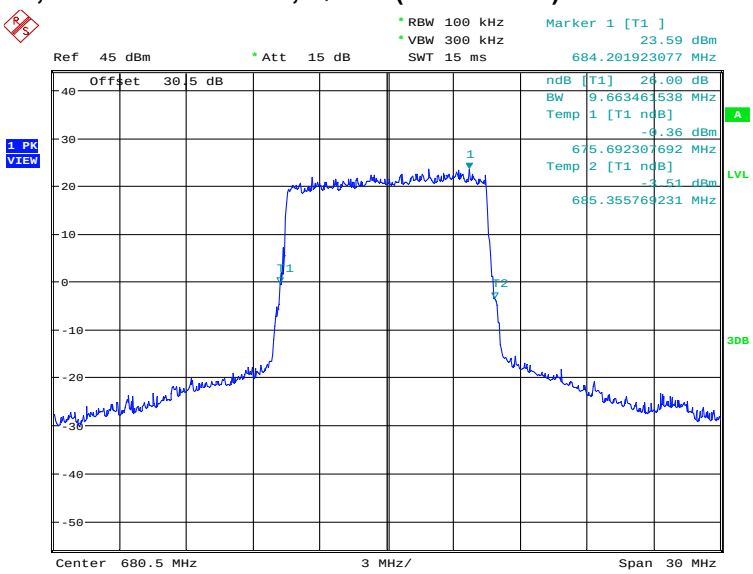
LTE band 71, 10MHz (-26dBc)

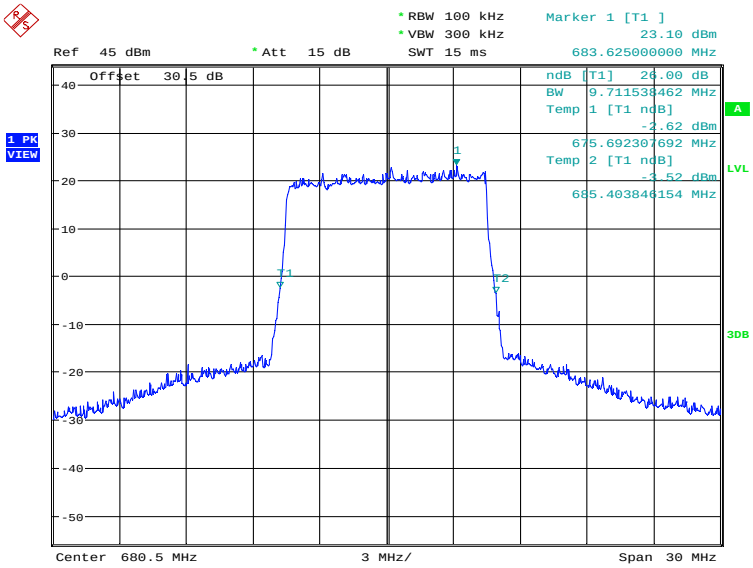
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
680.5	QPSK	16QAM
	9663.46	9711.54

LTE band 71, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 30.MAY.2024 13:32:04

LTE band 71, 10MHz Bandwidth, 16QAM (-26dBc BW)



Date: 30.MAY.2024 13:32:45

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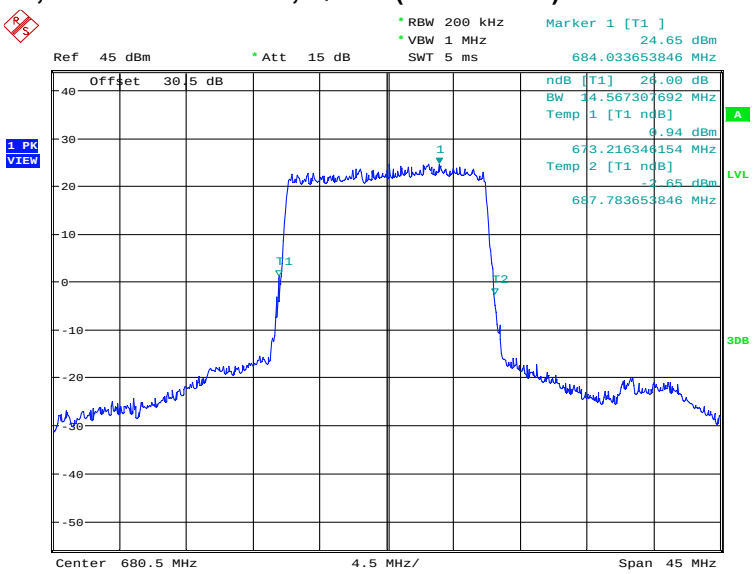
LTE band 71, 15MHz (-26dBc)

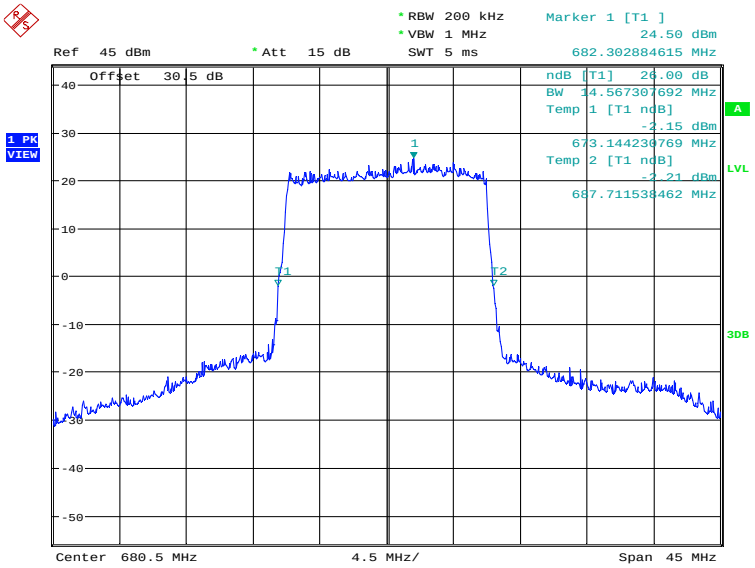
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
680.5	QPSK	16QAM
	14567.31	14567.31

LTE band 71, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 30.MAY.2024 13:33:27

LTE band 71, 15MHz Bandwidth, 16QAM (-26dBc BW)



Date: 30.MAY.2024 13:34:07

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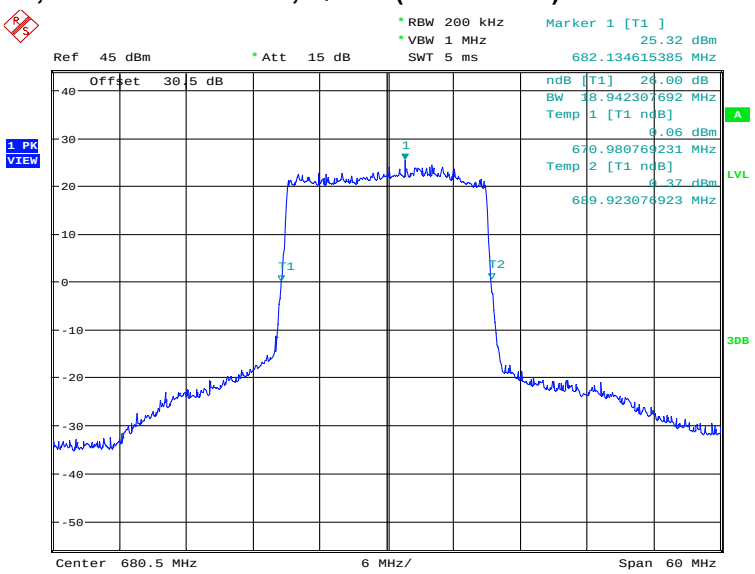
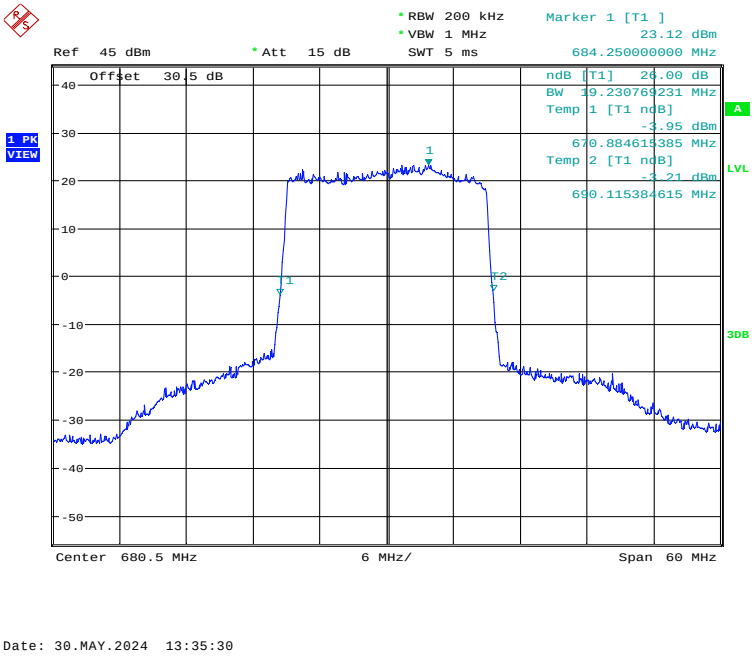
LTE band 71, 20MHz (-26dBc)

Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
680.5	QPSK	16QAM
	18942.31	19230.77

LTE band 71, 20MHz Bandwidth, QPSK (-26dBc BW)



LTE band 71, 20MHz Bandwidth, 16QAM (-26dBc BW)



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

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A.6 Band Edge Compliance

A.6.1 Measurement limit

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

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

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

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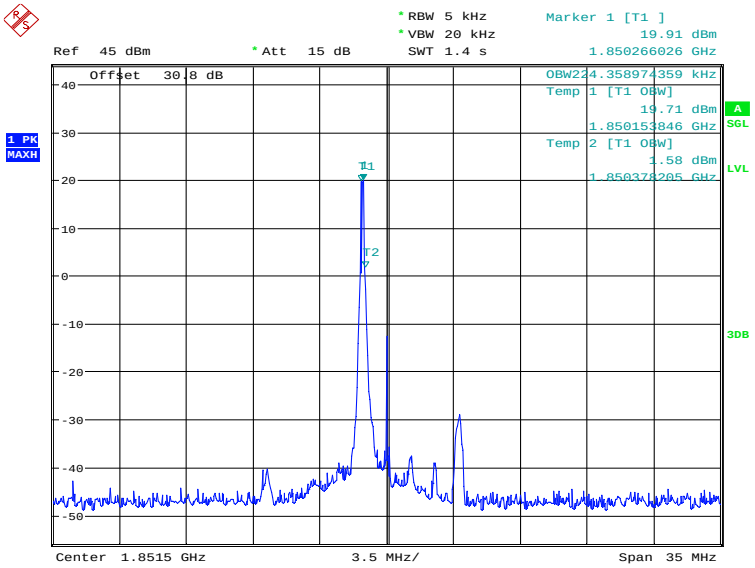
A.6.2 Measurement result

Only the worst case result is given below

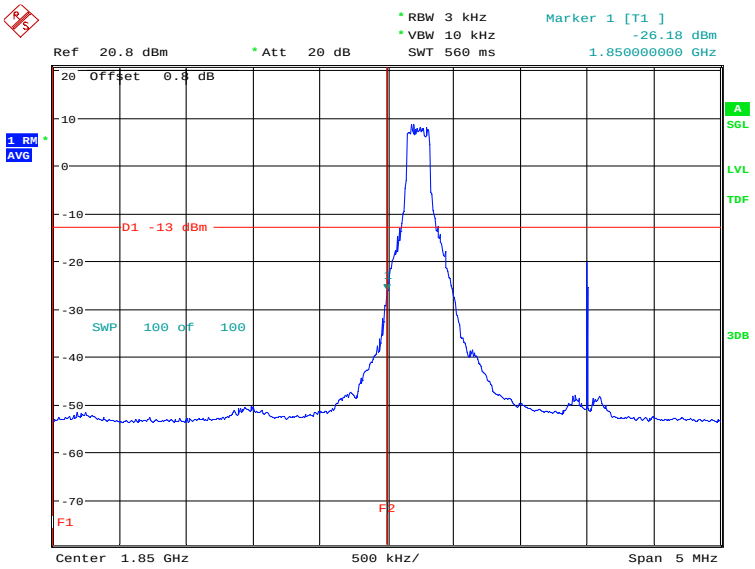
LTE band 2

OBW: 1RB-low_offset



Date: 21.JUN.2024 10:43:51

LOW BAND EDGE BLOCK-1RB-low_offset



Date: 21.JUN.2024 10:45:06

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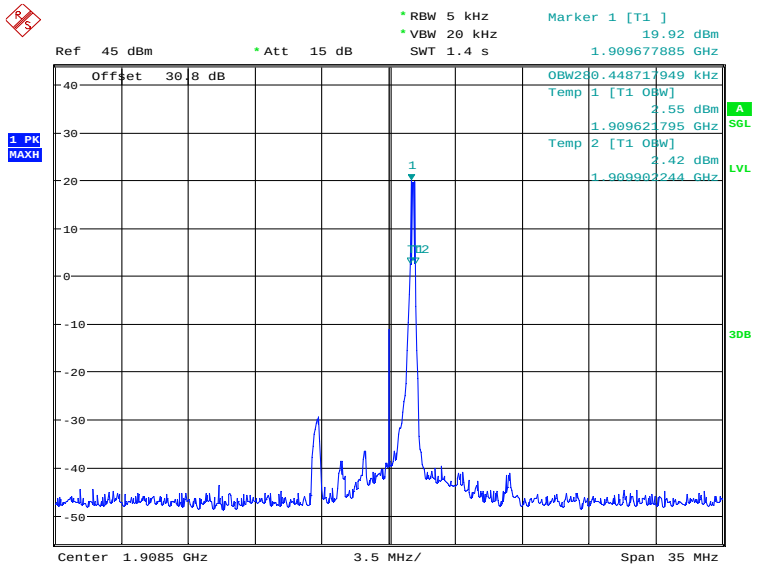
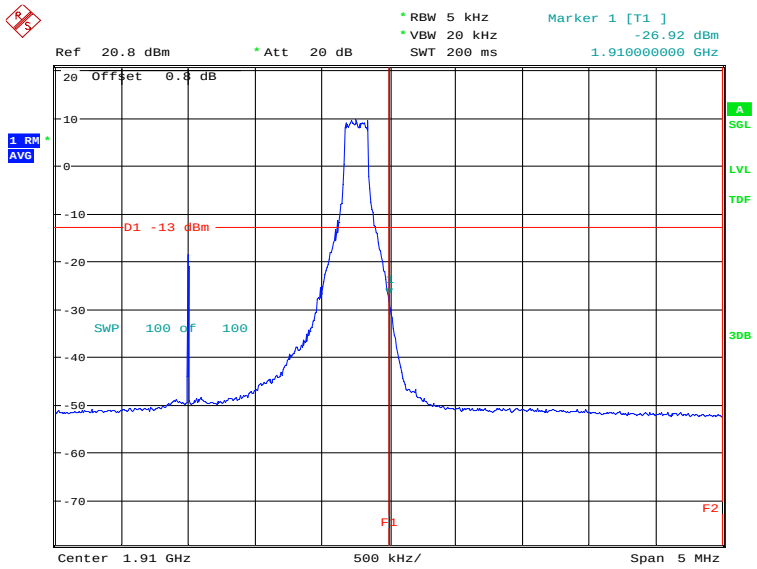
OBW: 1RB-high_offset



Date: 21.JUN.2024 14:05:24

HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 21.JUN.2024 14:06:39

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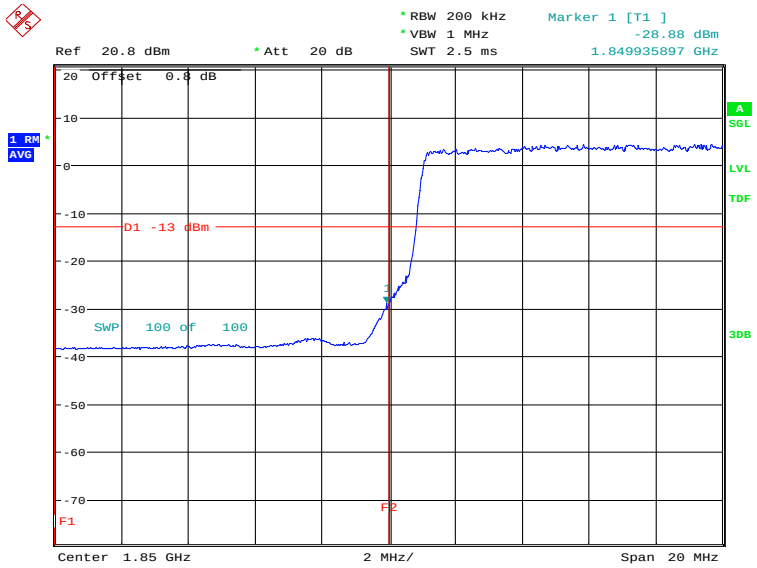
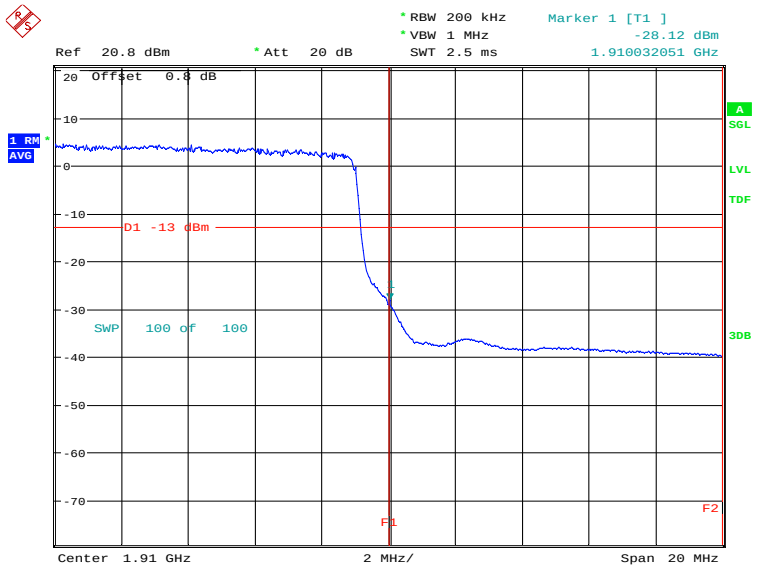
LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 30.MAY.2024 16:10:40

HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 30.MAY.2024 16:12:12

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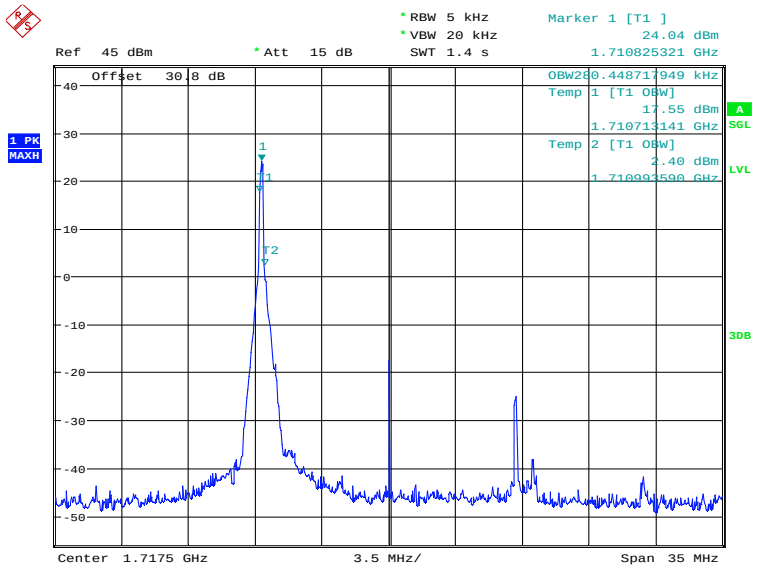
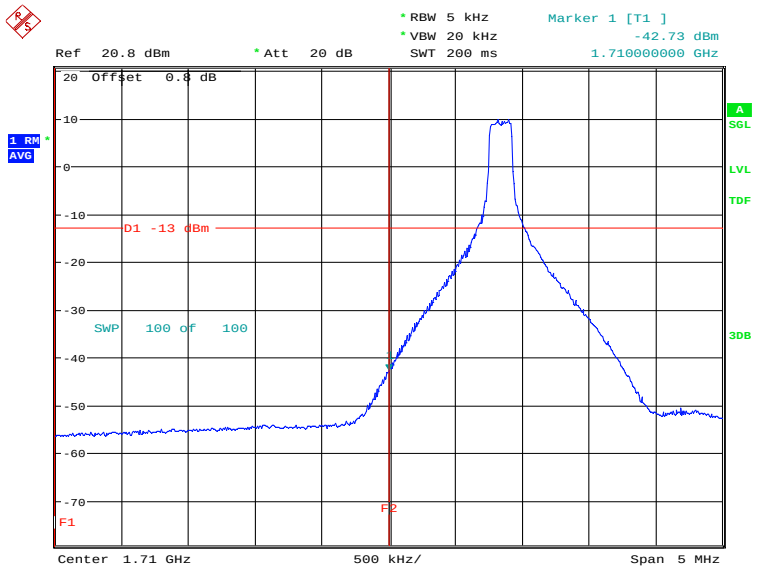
LTE band 4

OBW: 1RB-low_offset



Date: 21.JUN.2024 10:47:27

LOW BAND EDGE BLOCK-1RB-low_offset



Date: 21.JUN.2024 10:48:41

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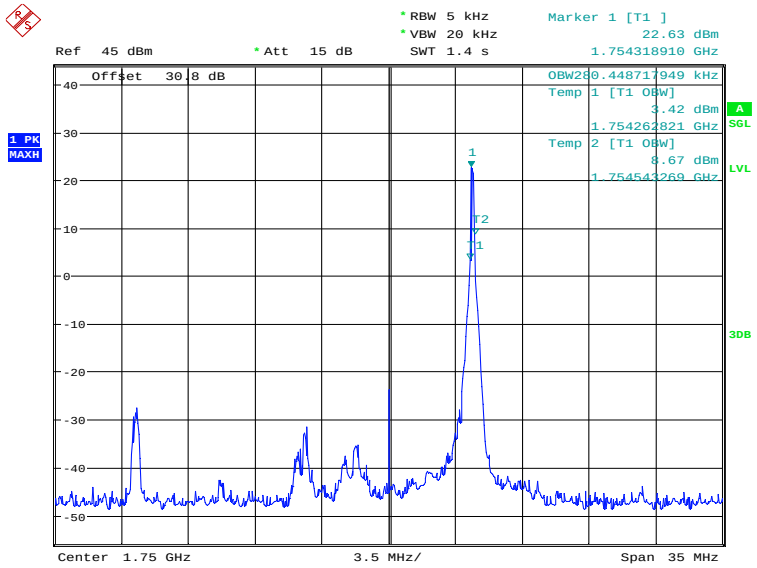
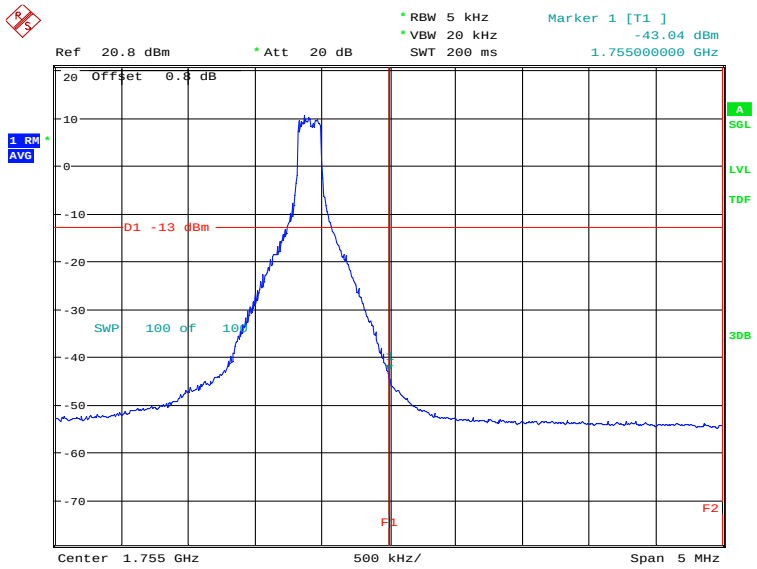
OBW: 1RB-high_offset



Date: 21.JUN.2024 10:51:35

HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 21.JUN.2024 10:52:49

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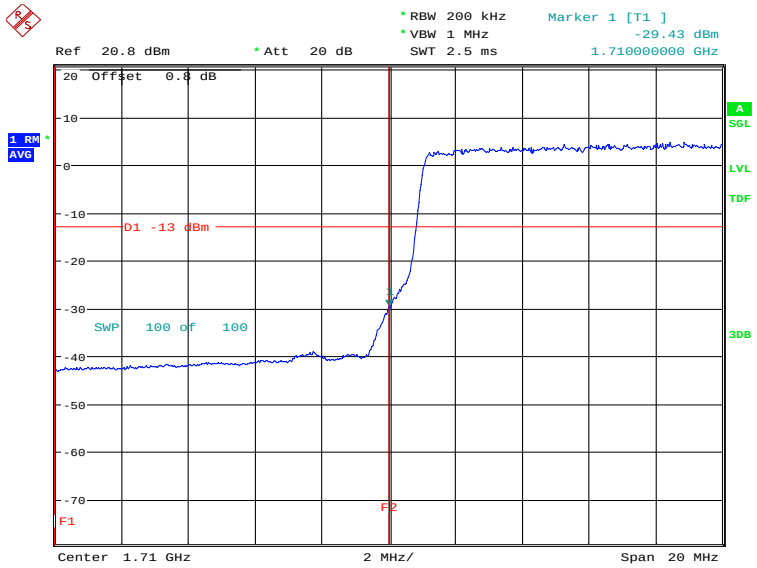
LOW BAND EDGE BLOCK-20MHz-100%RB



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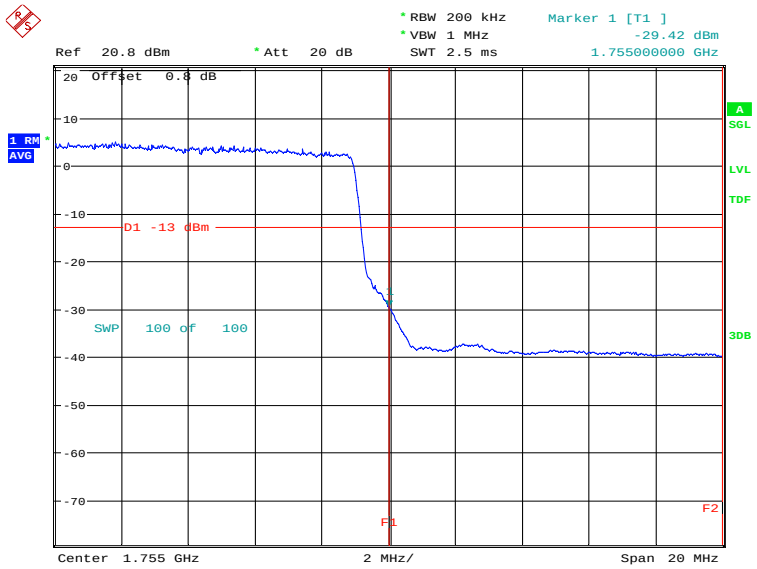
HIGH BAND EDGE BLOCK-20MHz-100%RB



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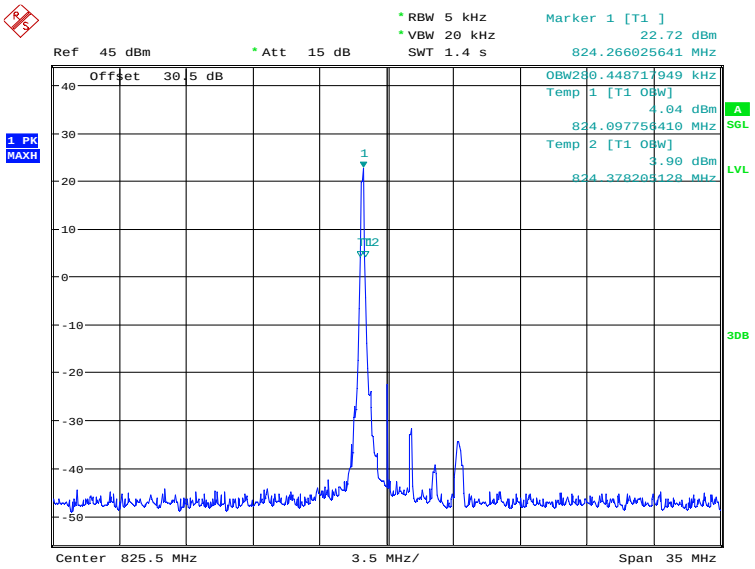
LTE band 5

OBW: 1RB-low_offset



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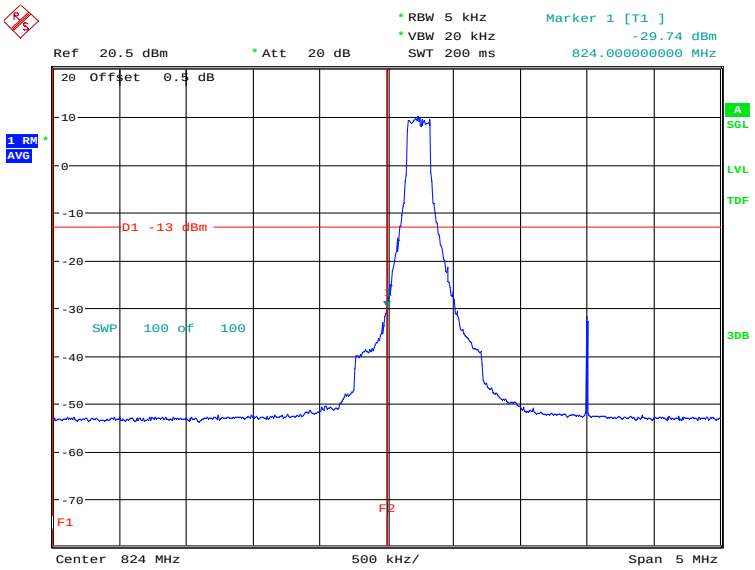
LOW BAND EDGE BLOCK-1RB-low_offset



Date: 21.JUN.2024 10:56:49

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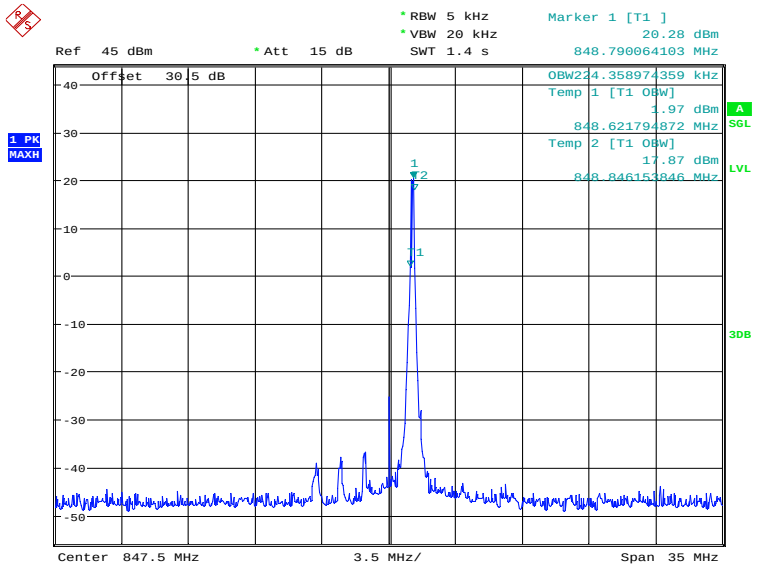
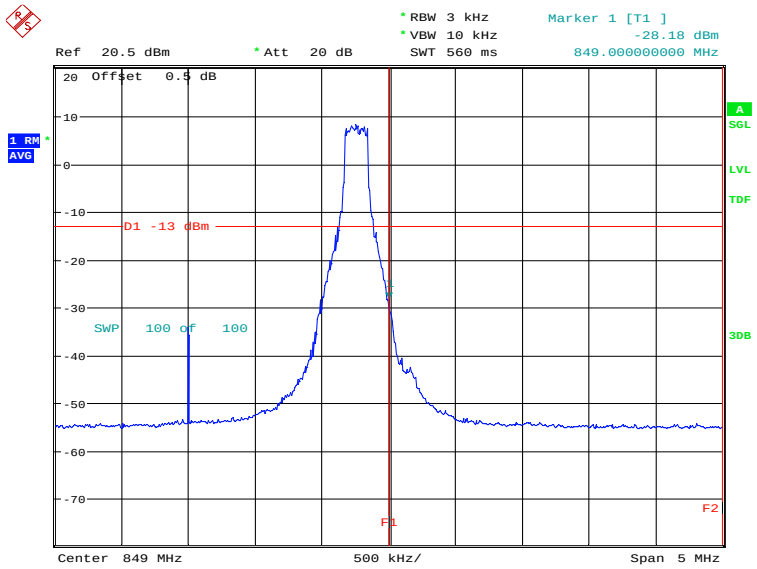
OBW: 1RB-high_offset



Date: 21.JUN.2024 14:07:04

HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 21.JUN.2024 14:08:19

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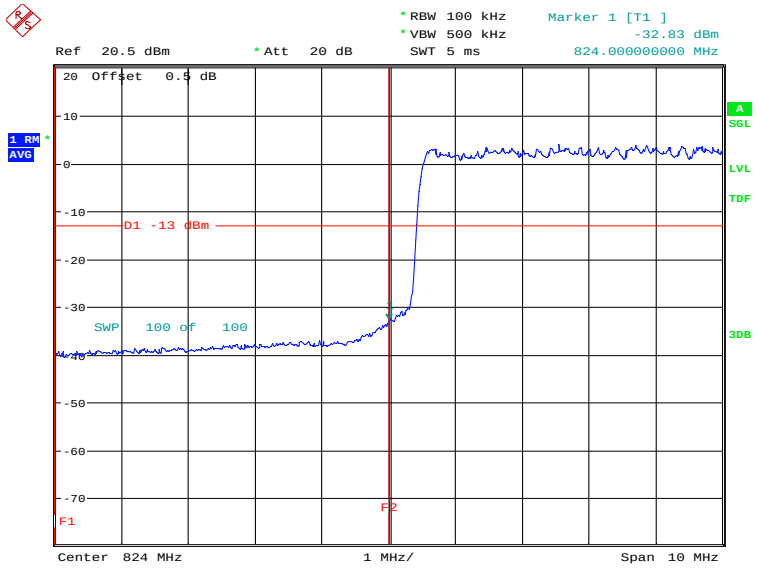
LOW BAND EDGE BLOCK-10MHz-100%RB



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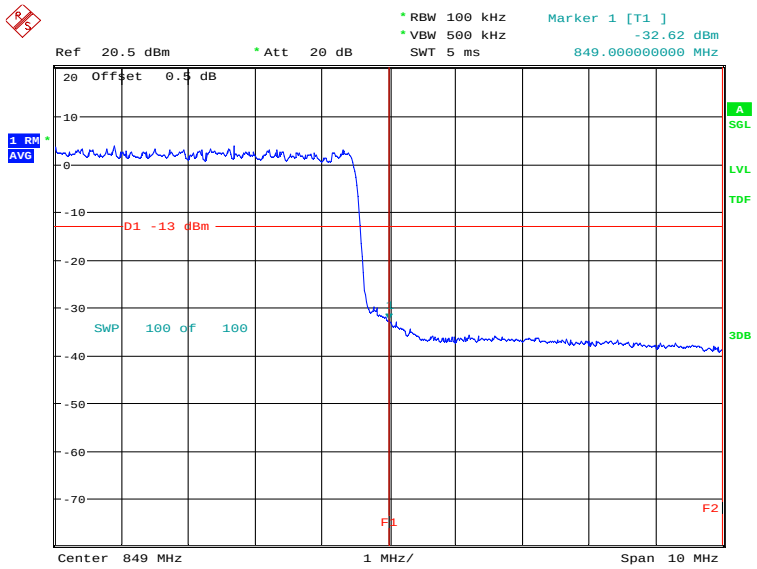
HIGH BAND EDGE BLOCK-10MHz-100%RB



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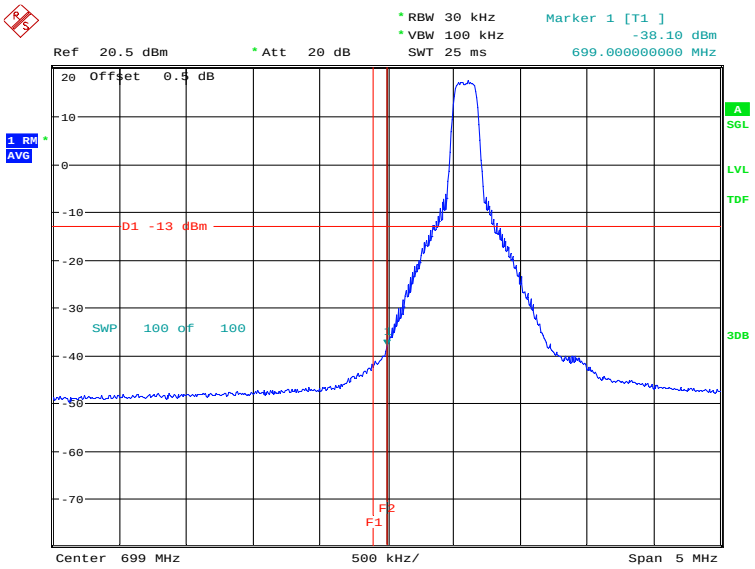
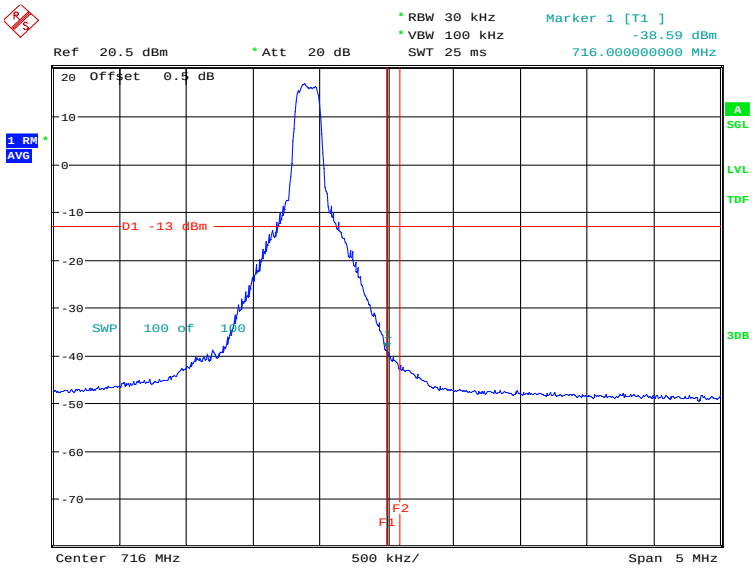
LTE band 12

LOW BAND EDGE BLOCK-1RB-low_offset



Date: 21.JUN.2024 11:02:06

HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 21.JUN.2024 11:02:50

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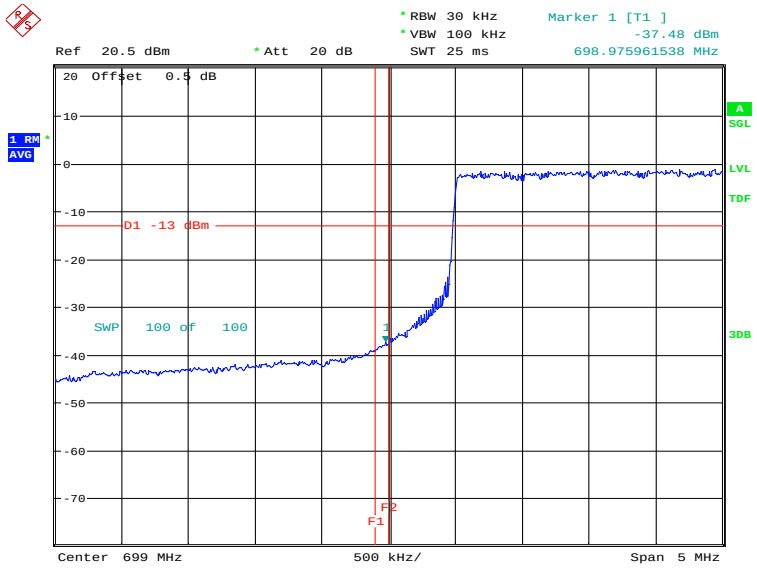
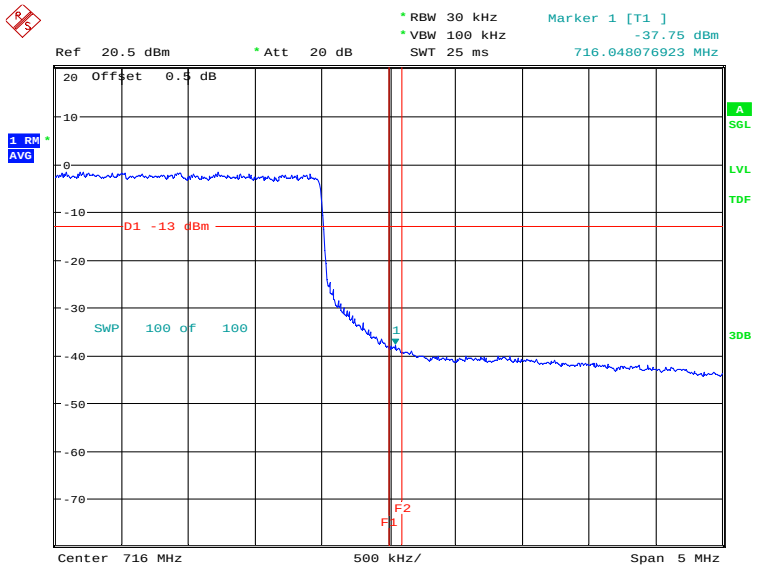
LOW BAND EDGE BLOCK-10MHz-100%RB



Date: 30.MAY.2024 14:19:42

HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 30.MAY.2024 14:23:45

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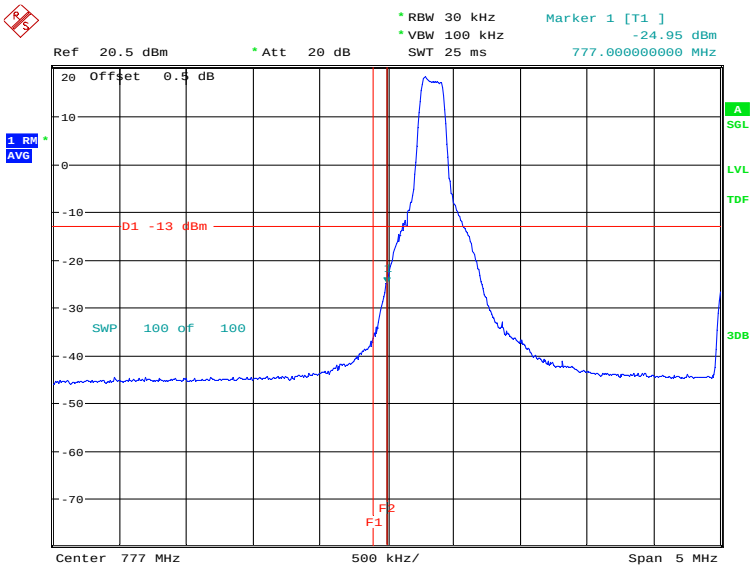
LTE band 13

LOW BAND EDGE BLOCK-1RB-low_offset



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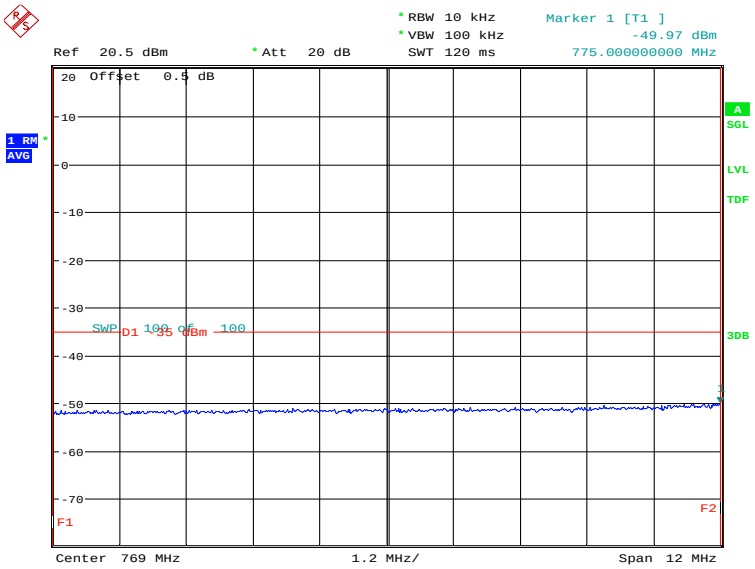

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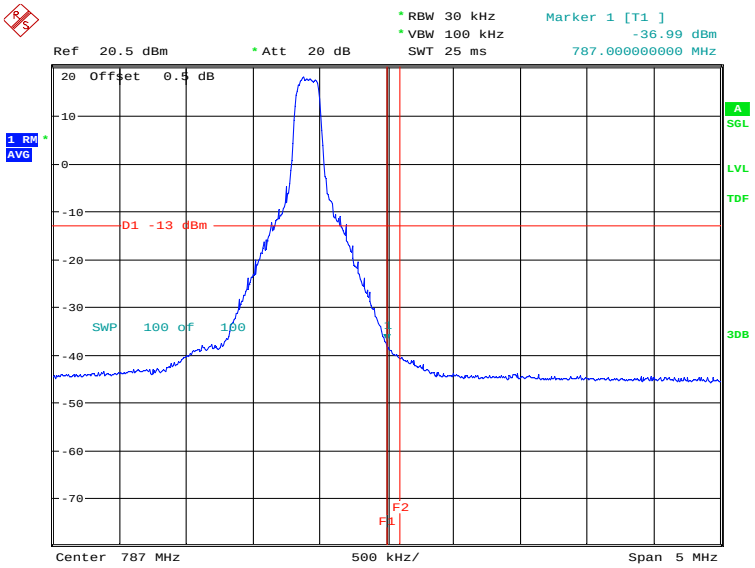
HIGH BAND EDGE BLOCK-1RB-high_offset



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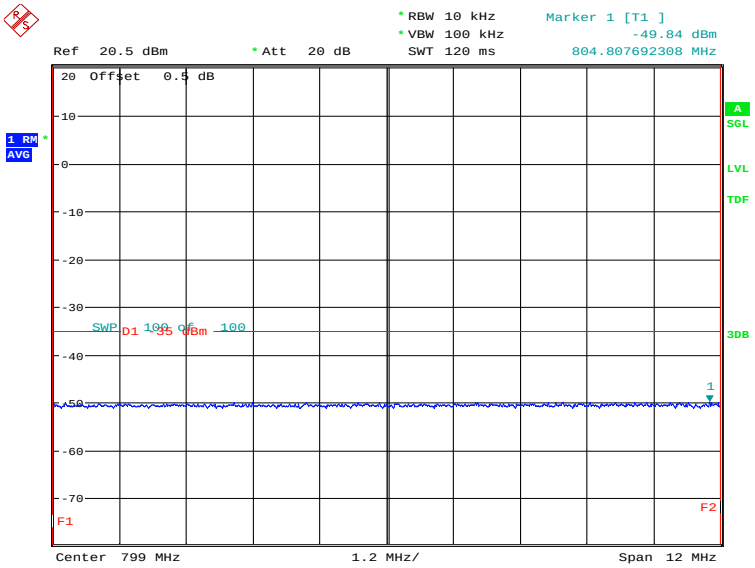

Date: 21.JUN.2024 14:17:14

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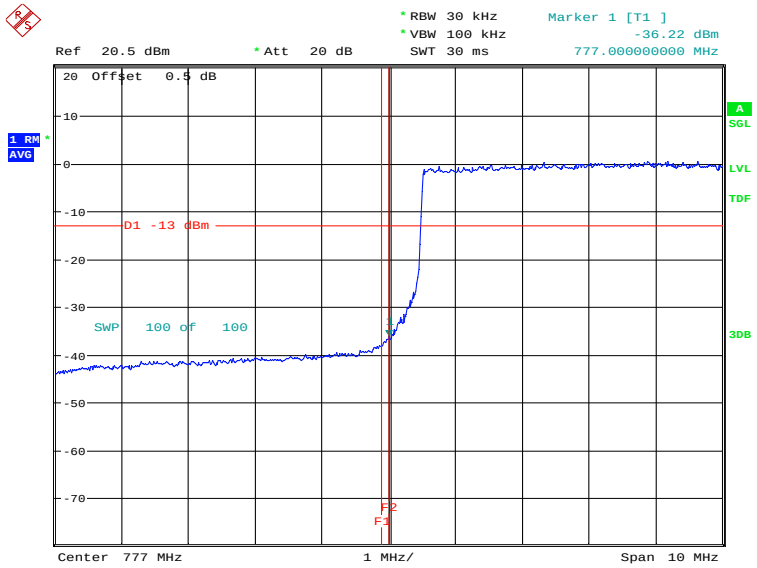
LOW BAND EDGE BLOCK-10MHz-100%RB



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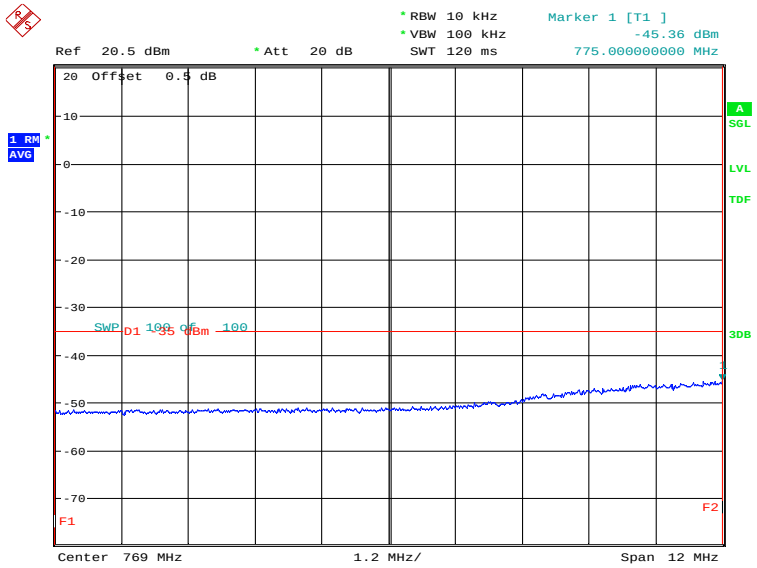

Date: 30.MAY.2024 14:25:58

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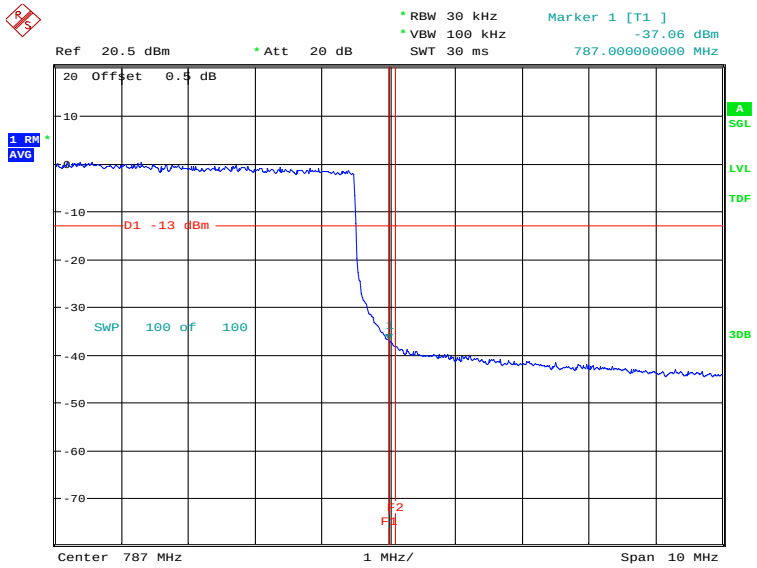
HIGH BAND EDGE BLOCK-10MHz-100%RB



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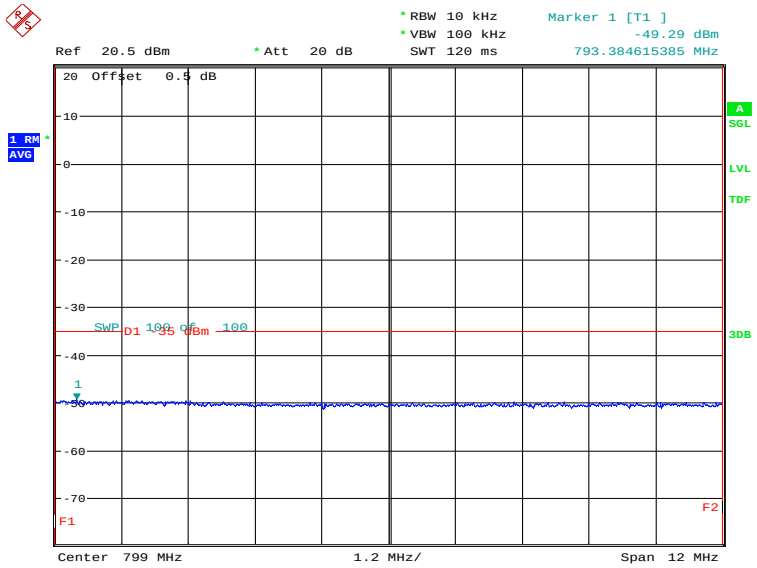

Date: 30.MAY.2024 14:28:10

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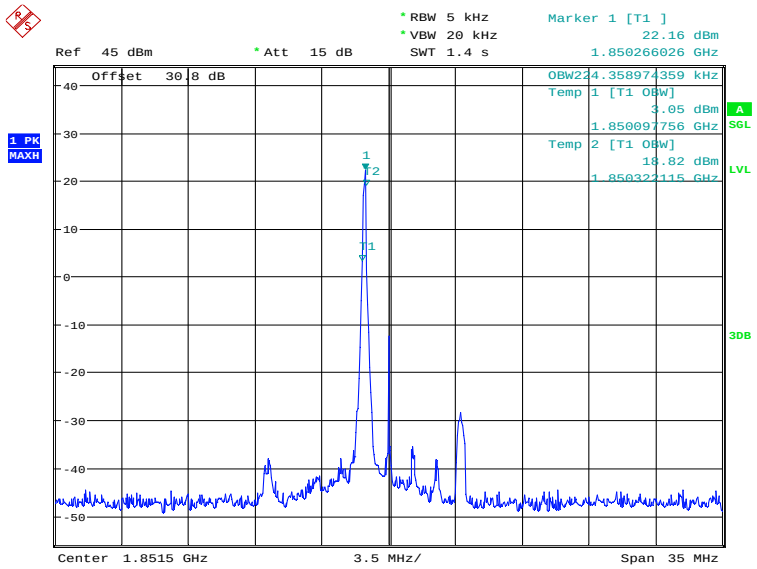
LTE band 25

OBW: 1RB-low_offset



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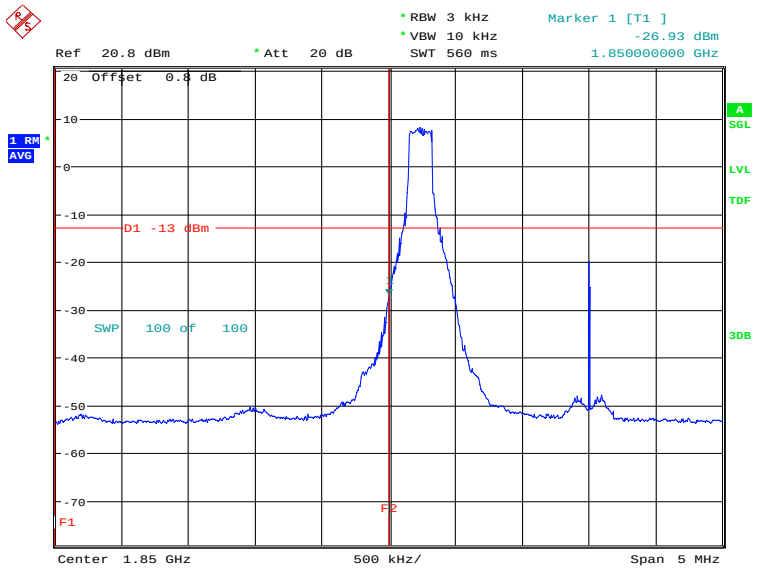
LOW BAND EDGE BLOCK-1RB-low_offset



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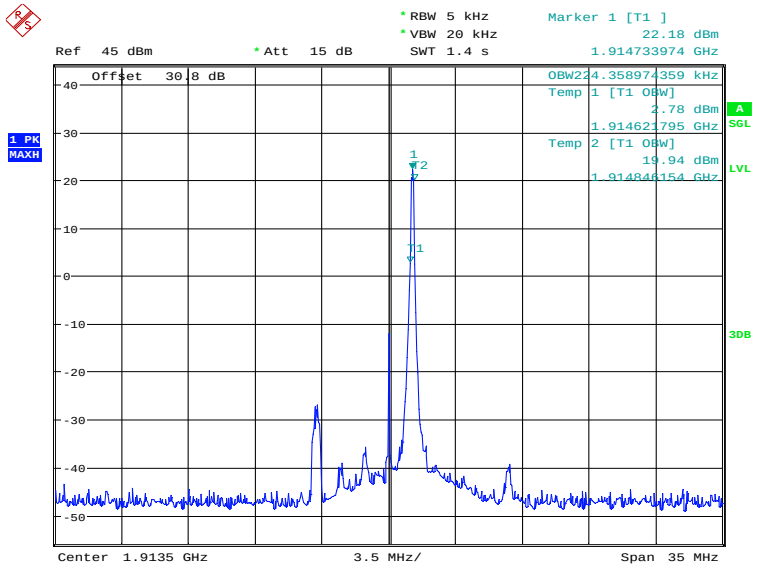
OBW: 1RB-high_offset



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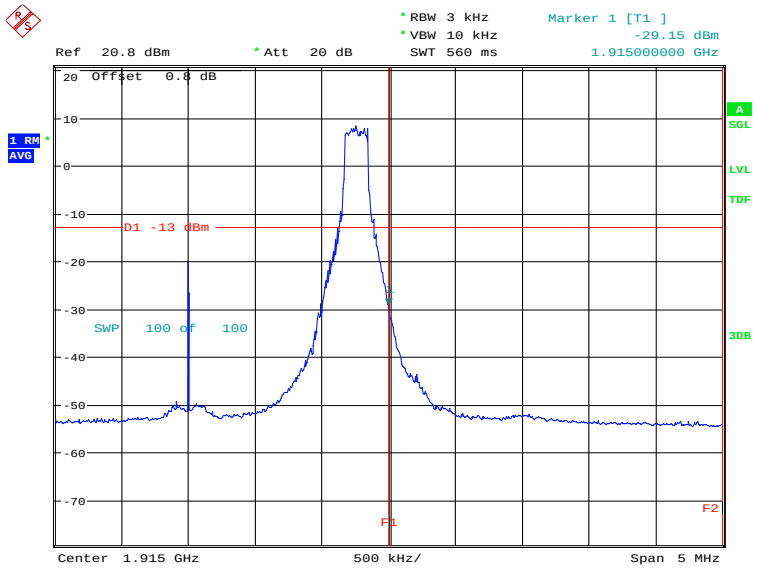
HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 21.JUN.2024 11:11:38

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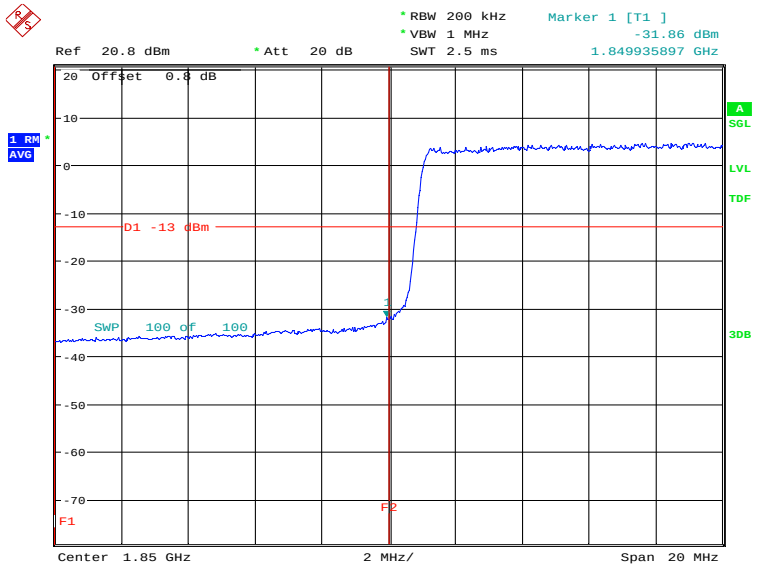
LOW BAND EDGE BLOCK-20MHz-100%RB



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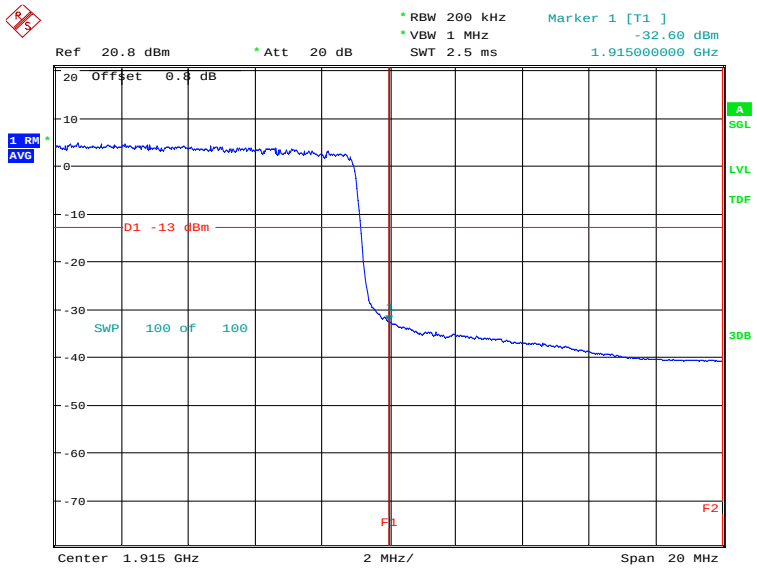
HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 30.MAY.2024 14:31:18

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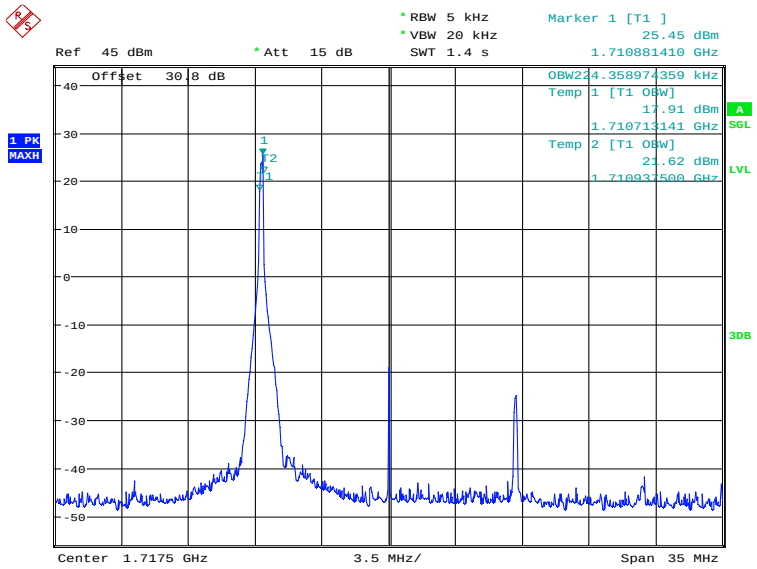
LTE band 66

OBW: 1RB-low_offset



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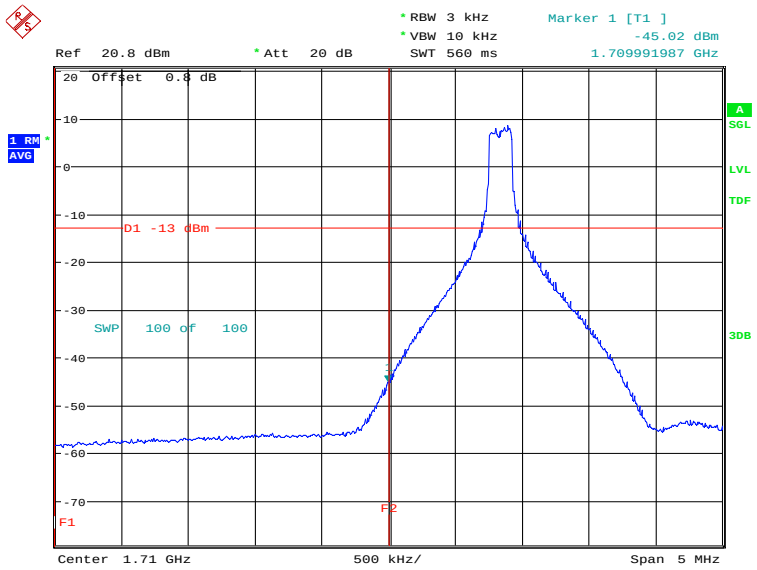
LOW BAND EDGE BLOCK-1RB-low_offset



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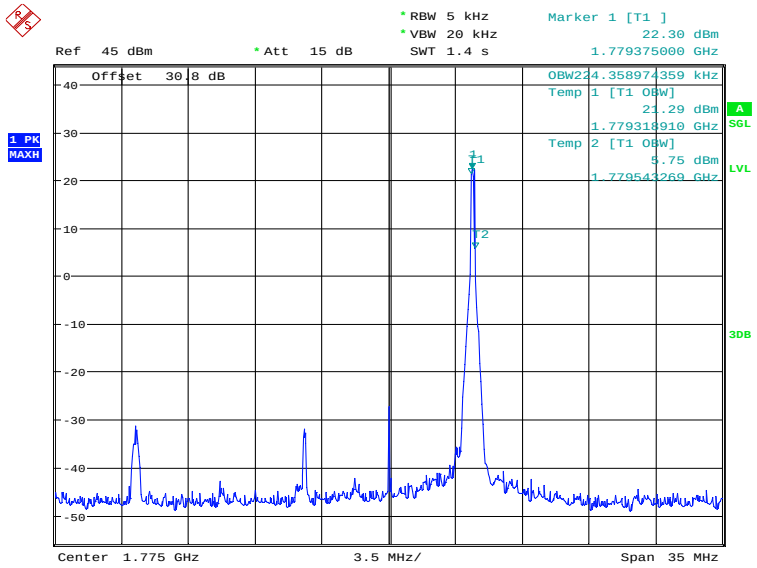
OBW: 1RB-high_offset



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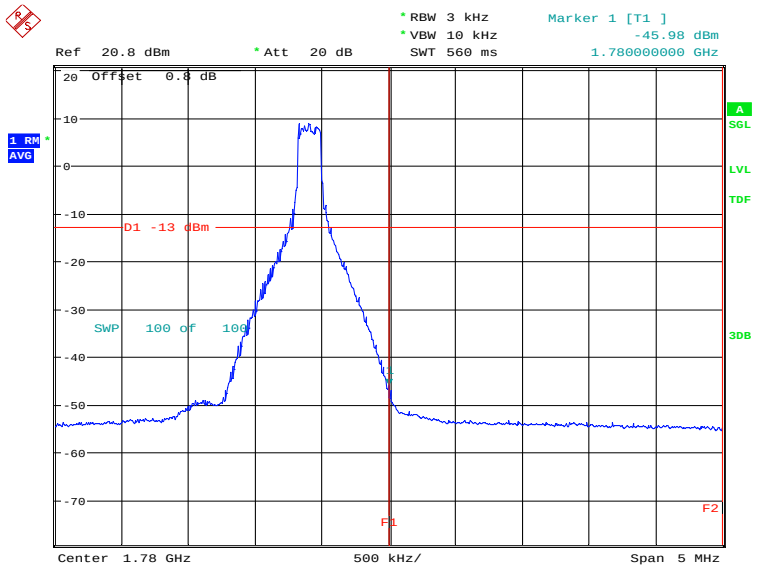
HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 21.JUN.2024 11:21:18

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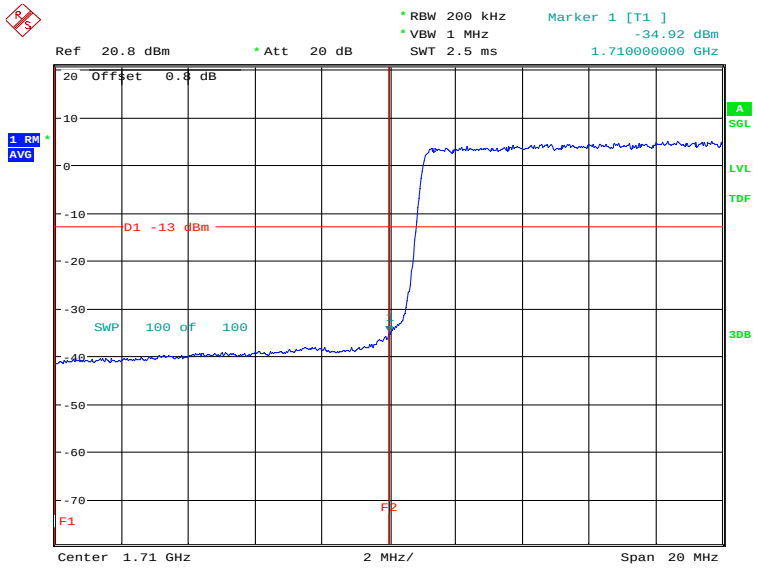
LOW BAND EDGE BLOCK-20MHz-100%RB



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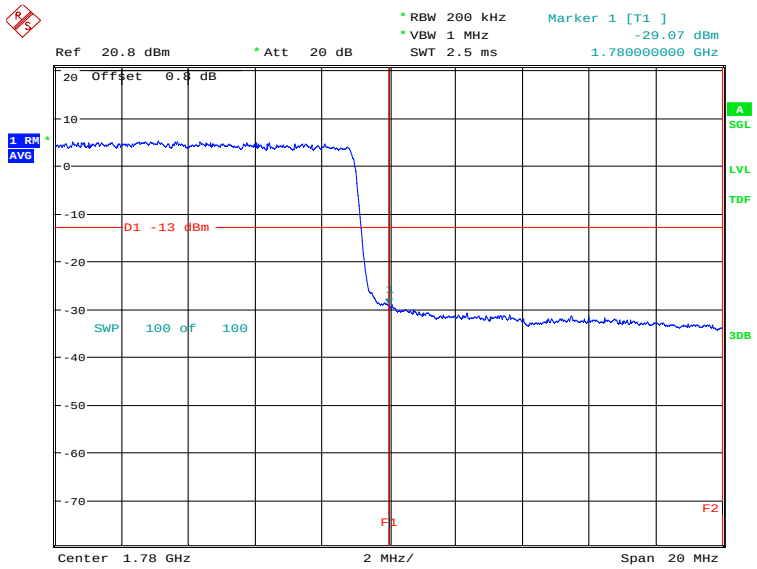
HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 30.MAY.2024 14:34:25

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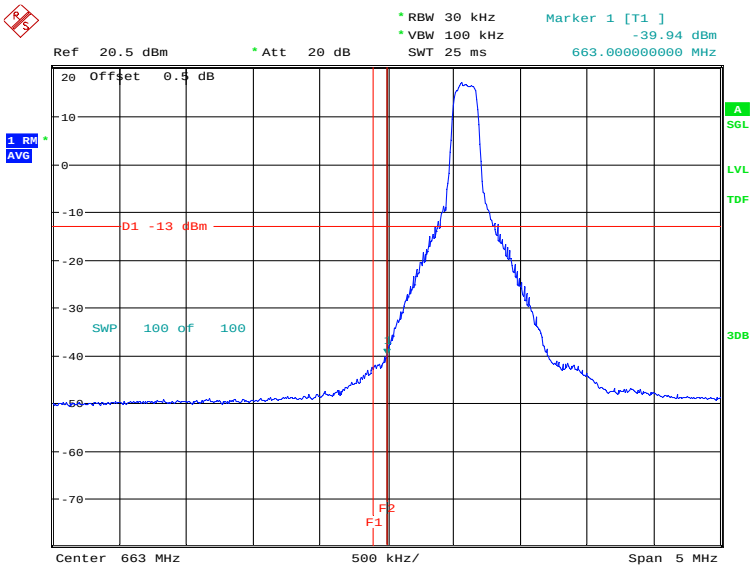
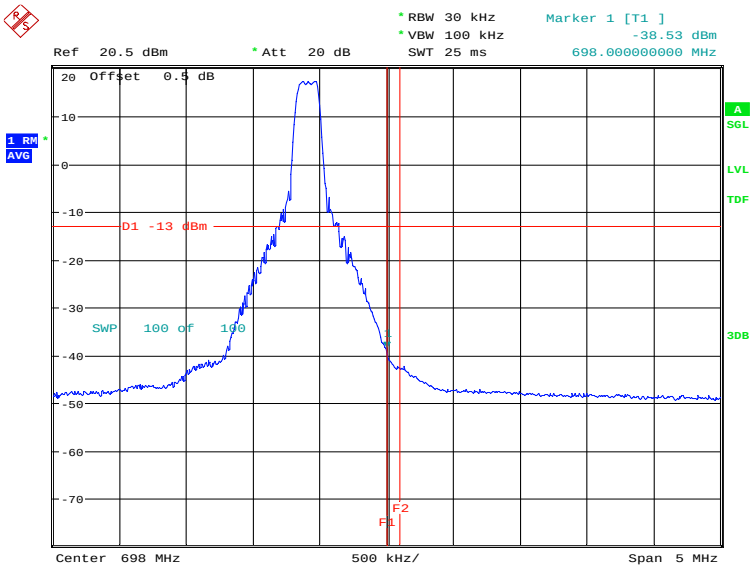
LTE band 71

LOW BAND EDGE BLOCK-1RB-low_offset



HIGH BAND EDGE BLOCK-1RB-high_offset



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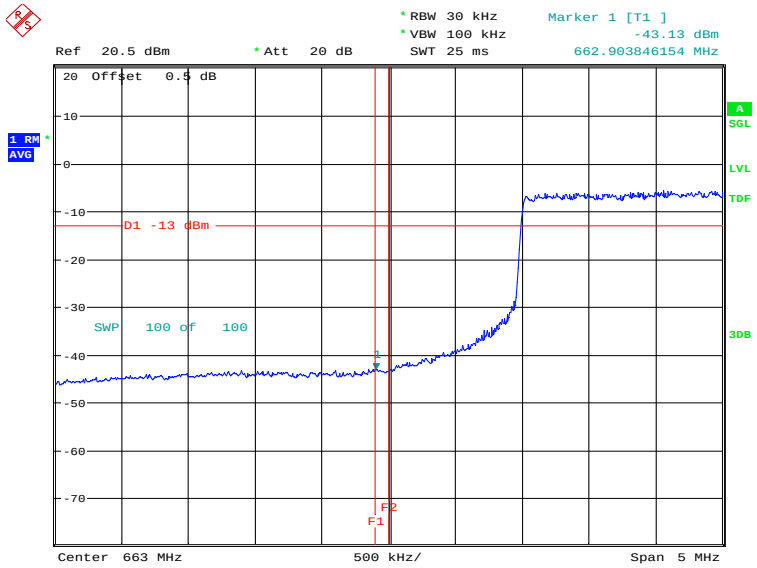
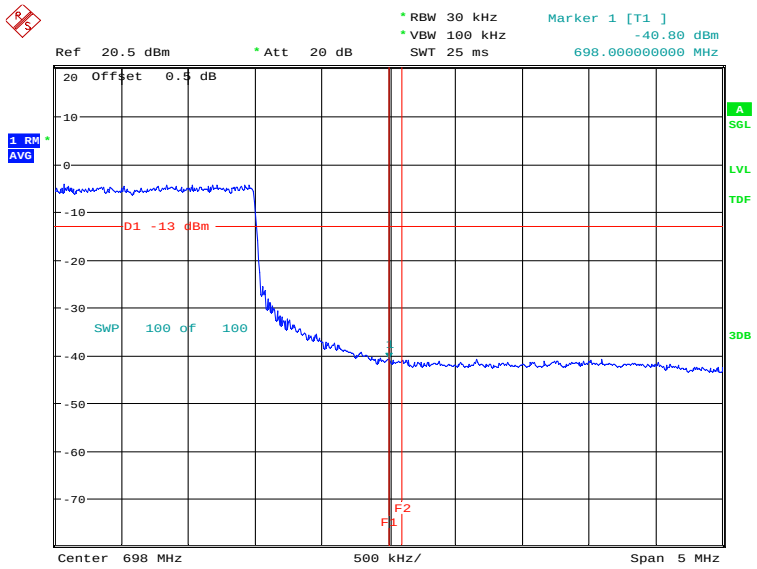
LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 30.MAY.2024 14:12:43

HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 30.MAY.2024 14:14:15

Note: Expanded measurement uncertainty is U = 0.622 dB, *k* = 2.

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A.7 Conducted Spurious Emission

A.7.1 Measurement Method

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

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

A. 7.2 Measurement Limit

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

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

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

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

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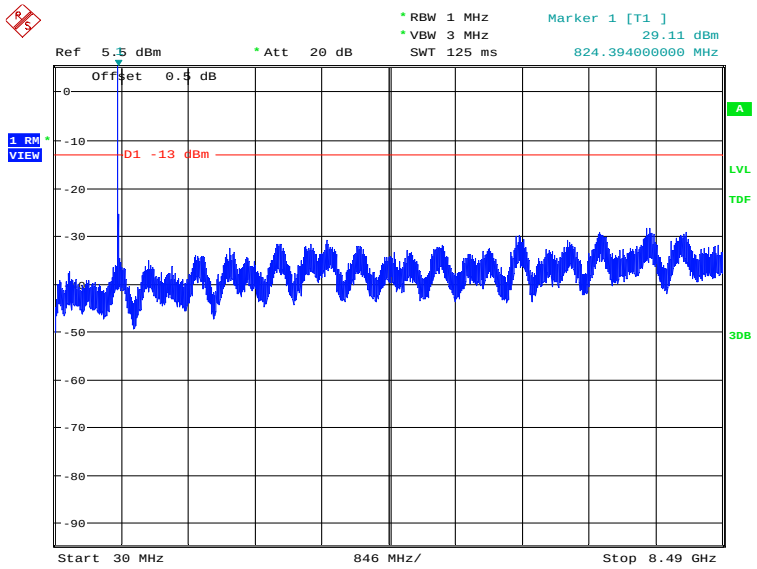
A. 7.3 Measurement result

Only the worst case result is given below

LTE band 5: 30MHz – 8.49GHz

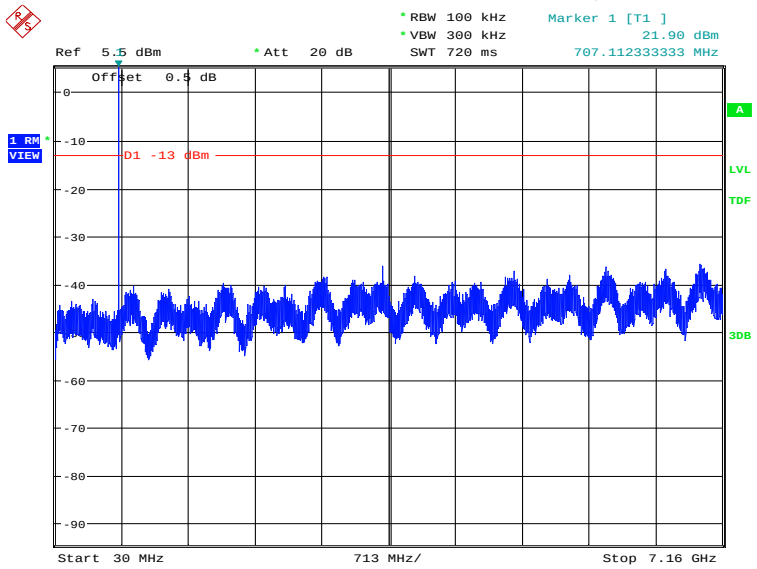
NOTE: peak above the limit line is the carrier frequency.



Date: 21.JUN.2024 11:25:19

LTE band 12: 30MHz – 7.16GHz

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



Date: 21.JUN.2024 11:25:59

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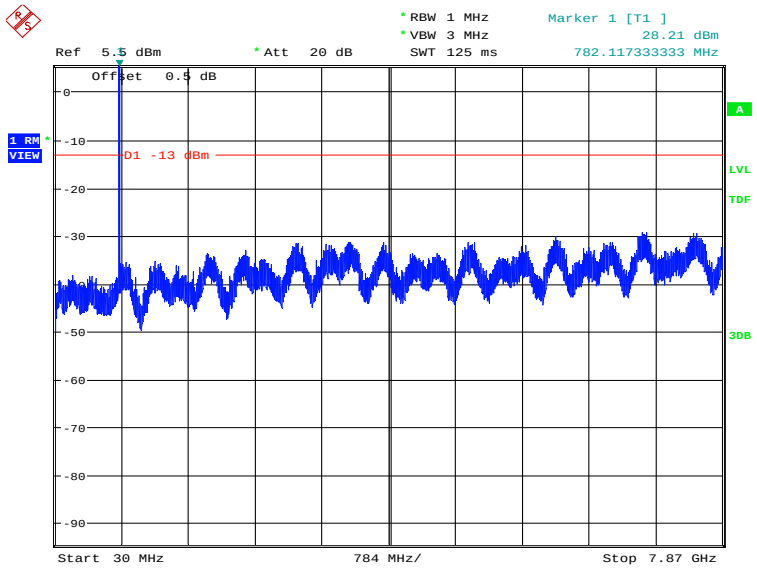
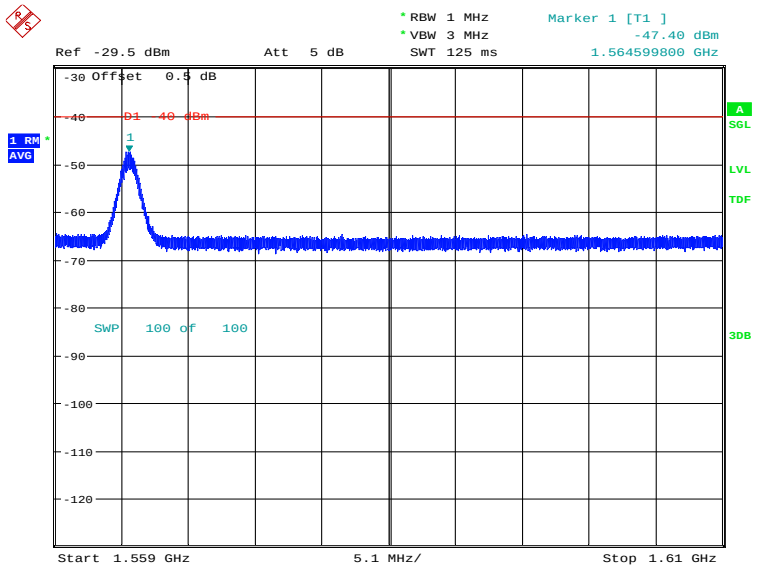
LTE band 13: 30MHz – 7.87GHz

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



Date: 21.JUN.2024 11:29:48

LTE band 13: 1559MHz – 1610MHz



Date: 21.JUN.2024 11:30:23

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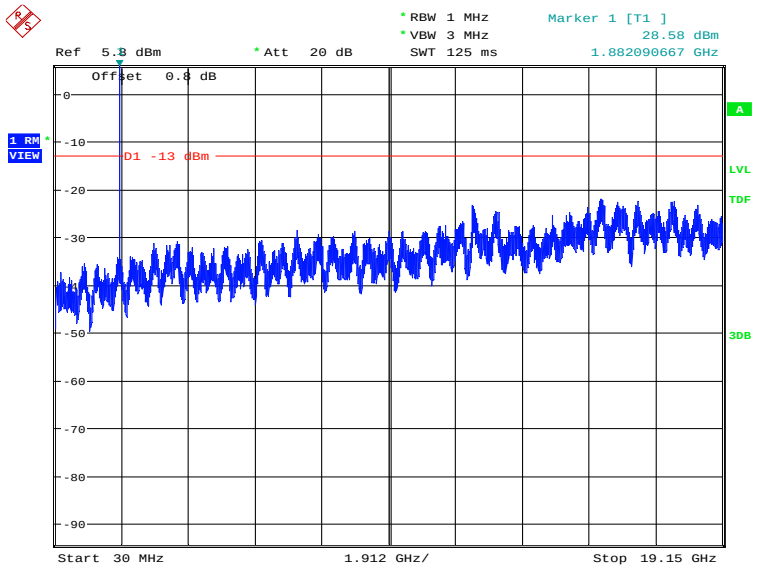
LTE band 25: 30MHz – 19.15GHz

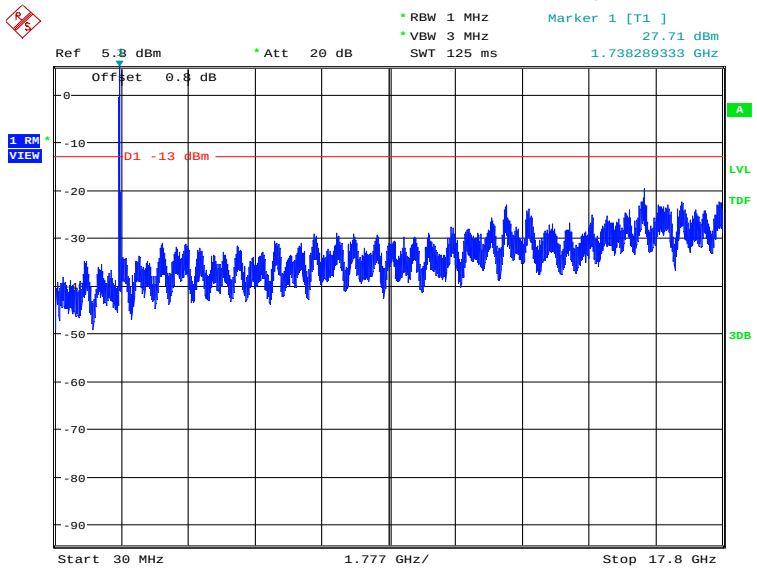
NOTE: peak above the limit line is the carrier frequency.



Date: 21.JUN.2024 11:31:06

LTE band 66: 30MHz – 17.8GHz

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



Date: 21.JUN.2024 11:32:51

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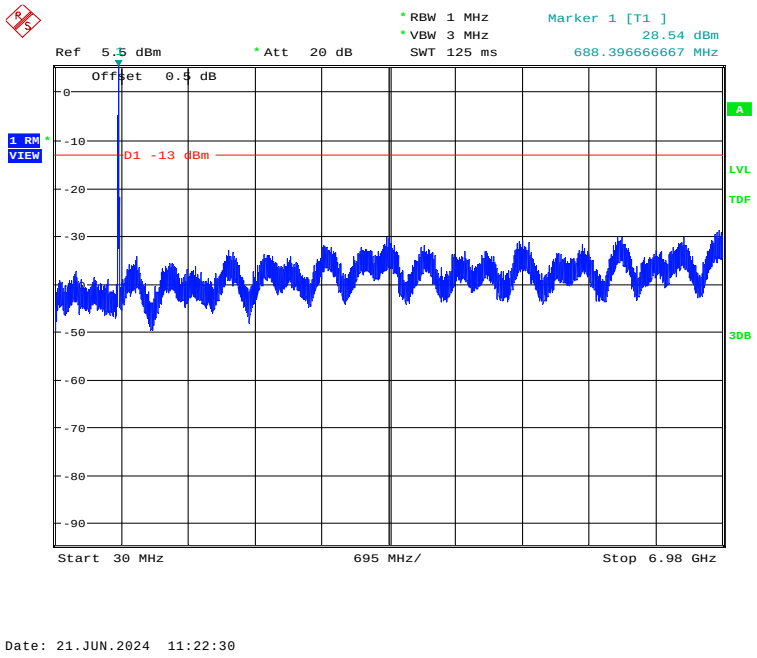
LTE band 71: 30MHz – 6.98GHz

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



Note: Expanded measurement uncertainty is U = 0.622 dB, *k* = 2.

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A.8 Peak-to-Average Power Ratio

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

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

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

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

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

LTE band 12, 10MHz

Frequency(MHz)	PAPR(dB)		
707.5	QPSK	16QAM	64QAM
	5.35	6.28	6.67

LTE band 13, 10MHz

Frequency(MHz)	PAPR(dB)		
782.0	QPSK	16QAM	64QAM
	5.35	6.22	6.67

LTE band 25, 20MHz

Frequency(MHz)	PAPR(dB)		
1882.5	QPSK	16QAM	64QAM
	6.63	7.21	7.28

LTE band 66, 20MHz

Frequency(MHz)	PAPR(dB)		
1745.0	QPSK	16QAM	64QAM
	6.47	7.21	7.34

LTE band 71, 20MHz

Frequency(MHz)	PAPR(dB)		
680.5	QPSK	16QAM	64QAM
	6.63	7.28	7.40

Note: Expanded measurement uncertainty is U = 0.578 dB, *k* = 2.

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Annex B: Accreditation Certificate

Accredited Laboratory

A2LA has accredited

TELECOMMUNICATION TECHNOLOGY LABS, CAICT

Beijing, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 23rd day of July 2024.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 7049.01
Valid to July 31, 2026

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

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

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