



TEST REPORT

No. I22Z61444-WMD02

for

FIH CO., LTD.

BFL2

Model Name: EABF22206A, ECBF22208A

FCC ID: RYQEABF22206A

with

Hardware Version: 1.0

Software Version: EABF22206A_2140U

Issued Date: 2022-09-22

Note:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22Z61444-WMD02	Rev.0	1 st edition	2022-09-16
I22Z61444-WMD02	Rev.1	2 nd edition Modified the frequency for LTE band 14 on page 34.	2022-09-22

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

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1. Test Laboratory

1.1. Introduction & Accreditation

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

1.2. Testing Location

Location 1: CTTL (huayuan North Road)

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

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: 2022-08-01
Testing End Date: 2022-09-09

1.5. Signature



Dong Yuan
(Prepared this test report)



Zhou Yu
(Reviewed this test report)



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

2. Client Information

2.1. Applicant Information

Company Name: FIH CO., LTD.
Address /Post: No.4, Minsheng St., Tu-Cheng Dist., New Taipei City 23679, Taiwan
Contact: Hu Dongji
Email: dongji.hu@fih-foxconn.com
Telephone: 0086-1067869988 Ext.26442

2.2. Manufacturer Information

Company Name: FIH CO., LTD.
Address /Post: No.4, Minsheng St., Tu-Cheng Dist., New Taipei City 23679, Taiwan
Contact: Hu Dongji
Email: dongji.hu@fih-foxconn.com
Telephone: 0086-1067869988 Ext.26442

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

3.1. About EUT

Description	BFL2
Model Name	EABF22206A, ECBF22208A
FCC ID	RYQEABF22206A
Antenna	Embedded
Output power	25.00dBm maximum EIRP measured for LTE Band 4
Extreme vol. Limits	3.4VDC to 4.4VDC (nominal: 3.85VDC)
Extreme temp. Tolerance	-10°C to +55°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
UT37a	350702820001821	1.0	EABF22206A_2140U	2022-08-01
UT39a	350702820002050	1.0	EABF22206A_2140U	2022-08-01

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

3.3. Internal Identification of AE used during the test

AE ID* Description

AE1	Battery
AE2	Battery

AE1

Model	HE401
Manufacturer	ZHONGSHAN TIANMAO BATTERY CO., LTD.
Capacitance	3500mAh

AE2

Model	HE401
Manufacturer	Dongguan Milai Electronics Co., Ltd.
Capacitance	3500mAh

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

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	10-1-21 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-21 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-21 Edition
FCC Part 90	PRIVATE LAND MOBILE RADIO SERVICES	10-1-21 Edition
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB 971168 D01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS	v03r01

5. Laboratory Environment

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

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

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

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω

6. Summary Of Test Result

LTE Band 2

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

LTE Band 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 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 14

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	90.542	P
2	Emission Limit	2.1051/90.543	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	2.1049	P
6	Band Edge Compliance	90.543	P
7	Conducted Spurious Emission	90.543	P

LTE Band 30

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

Terms used in Verdict column

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

All the test results are based on normal power.

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.

7. Test Equipment Utilized

Description	Type	Series Number	Manufacture	Cal Due Date	Calibration Interval
Wideband Radio Communication Tester	CMW500	159082	R&S	2023-01-17	25 months
Spectrum Analyzer	FSU	200030	R&S	2023-05-25	1 year
Climate Chamber	SH-242	93008556	ESPEC	2023-12-23	3 years
Test Receiver	E4440A	MY48250642	Agilent	2023-03-10	1 year
Universal Radio Communication Tester	CMW500	143008	R&S	2022-12-01	1 year
EMI Antenna	VULB9163	9163-482	Schwarzbeck	2022-11-16	1 year
Signal Generator	SMF100A	101295	R&S	2022-12-23	1 year
EMI Antenna	3117	00058889	ETS-Lindgren	2022-11-07	1 year
EMI Antenna	LB-7180-NF	J203001300005	A-INFO	2023-02-23	1 year

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 2

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
1.4MHz	1 RB high	1909.3	22.02	21.41	21.23
		1880.0	22.48	21.85	21.71
		1850.7	22.43	21.76	21.63
	1 RB low	1909.3	22.04	21.36	21.12
		1880.0	22.49	21.81	21.73
		1850.7	22.43	21.79	21.63
	50% RB mid	1909.3	22.16	21.10	21.20
		1880.0	22.67	21.68	21.70
		1850.7	22.59	21.64	21.69
	100% RB	1909.3	21.10	20.27	20.18
		1880.0	21.61	20.76	20.65
		1850.7	21.54	20.69	20.59
3MHz	1 RB high	1908.5	22.06	21.34	21.25
		1880.0	22.52	21.90	21.75
		1851.5	22.47	21.81	21.70
	1 RB low	1908.5	22.10	21.37	21.24
		1880.0	22.54	21.76	21.71
		1851.5	22.49	21.82	21.67
	50% RB mid	1908.5	21.11	20.23	20.15
		1880.0	21.58	20.68	20.64
		1851.5	21.53	20.64	20.65
	100% RB	1908.5	21.11	20.16	20.12

		1880.0	21.54	20.61	20.58
		1851.5	21.51	20.53	20.53
5MHz	1 RB high	1907.5	22.03	21.30	21.06
		1880.0	22.45	21.77	21.59
		1852.5	22.39	21.78	21.49
	1 RB low	1907.5	22.06	21.39	21.26
		1880.0	22.43	21.83	21.68
		1852.5	22.38	21.74	21.61
	50% RB mid	1907.5	21.16	20.20	20.19
		1880.0	21.61	20.63	20.61
		1852.5	21.55	20.58	20.57
	100% RB	1907.5	21.11	20.14	20.16
		1880.0	21.59	20.63	20.62
		1852.5	21.51	20.55	20.52
10MHz	1 RB high	1905.0	22.05	21.36	21.13
		1880.0	22.52	21.84	21.75
		1855.0	22.44	21.84	21.68
	1 RB low	1905.0	22.35	21.59	21.54
		1880.0	22.48	21.90	21.71
		1855.0	22.49	21.80	21.59
	50% RB mid	1905.0	21.26	20.28	20.30
		1880.0	21.62	20.67	20.67
		1855.0	21.55	20.62	20.61
	100% RB	1905.0	21.23	20.29	20.27
		1880.0	21.63	20.64	20.63
		1855.0	21.54	20.58	20.58
15MHz	1 RB high	1902.5	22.07	21.29	21.10
		1880.0	22.53	21.78	21.71
		1857.5	22.42	21.78	21.66
	1 RB low	1902.5	22.42	21.84	21.67
		1880.0	22.46	21.70	21.71
		1857.5	22.44	21.82	21.64
	50% RB mid	1902.5	21.29	20.33	20.32
		1880.0	21.59	20.59	20.63
		1857.5	21.55	20.55	20.53
	100% RB	1902.5	21.28	20.32	20.32
		1880.0	21.57	20.60	20.58
		1857.5	21.49	20.54	20.52
20MHz	1 RB high	1900.0	22.27	21.54	21.34
		1880.0	22.79	22.04	21.83
		1860.0	22.66	21.85	21.74
	1 RB low	1900.0	22.75	22.11	21.89
		1880.0	22.72	21.99	21.87

		1860.0	22.64	21.88	21.79
	50% RB mid	1900.0	21.76	20.79	20.74
		1880.0	21.92	20.93	20.85
		1860.0	21.85	20.89	20.79
	100% RB	1900.0	21.82	20.83	20.77
		1880.0	21.88	20.87	20.81
		1860.0	21.78	20.79	20.74

LTE band 4

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
1.4MHz	1 RB high	1754.3	22.92	22.15	21.97
		1732.5	22.88	22.20	21.86
		1710.7	22.84	22.09	21.95
	1 RB low	1754.3	22.92	22.16	21.88
		1732.5	22.87	22.12	21.94
		1710.7	22.85	22.13	21.99
	50% RB mid	1754.3	23.10	22.04	21.96
		1732.5	23.03	22.01	21.95
		1710.7	23.00	21.96	21.93
	100% RB	1754.3	22.03	21.11	20.92
		1732.5	21.98	21.09	20.89
		1710.7	22.01	21.09	20.87
3MHz	1 RB high	1753.5	22.96	22.26	21.97
		1732.5	22.91	22.19	21.96
		1711.5	22.91	22.07	21.97
	1 RB low	1753.5	22.95	22.26	21.81
		1732.5	22.93	22.12	21.82
		1711.5	22.89	22.23	22.00
	50% RB mid	1753.5	22.04	21.11	20.98
		1732.5	21.99	21.07	20.90
		1711.5	22.00	21.02	20.90
	100% RB	1753.5	22.01	21.03	20.90
		1732.5	21.96	20.97	20.83
		1711.5	21.95	20.96	20.82
5MHz	1 RB high	1752.5	22.88	22.14	21.92
		1732.5	22.80	21.97	21.89
		1712.5	22.79	22.04	21.84
	1 RB low	1752.5	22.86	22.09	21.91
		1732.5	22.82	22.09	21.82
		1712.5	22.79	22.15	21.90
	50% RB mid	1752.5	22.07	21.07	20.93
		1732.5	22.01	20.97	20.85
		1712.5	22.01	20.99	20.90
	100% RB	1752.5	22.03	21.02	20.93
		1732.5	21.96	20.97	20.86
		1712.5	21.96	20.96	20.86
10MHz	1 RB high	1750.0	22.95	22.18	21.90
		1732.5	22.91	22.18	21.92
		1715.0	22.97	22.27	21.82
	1 RB low	1750.0	22.94	22.13	21.80

		1732.5	22.96	22.18	21.83
		1715.0	22.93	22.18	21.94
	50% RB mid	1750.0	22.08	21.08	20.96
		1732.5	22.04	21.02	20.90
		1715.0	22.00	21.00	20.90
	100% RB	1750.0	22.10	21.09	20.95
		1732.5	22.05	21.02	20.90
		1715.0	22.03	21.01	20.90
15MHz	1 RB high	1747.5	22.89	22.11	21.96
		1732.5	22.86	22.10	21.93
		1717.5	22.83	22.09	21.94
	1 RB low	1747.5	22.89	22.06	21.93
		1732.5	22.88	22.22	21.98
		1717.5	22.89	22.19	21.85
	50% RB mid	1747.5	22.06	21.00	20.89
		1732.5	22.04	20.99	20.90
		1717.5	22.03	21.00	20.89
	100% RB	1747.5	22.04	21.01	20.92
		1732.5	22.00	21.01	20.90
		1717.5	22.01	21.01	20.91
20MHz	1 RB high	1745.0	22.85	22.10	21.80
		1732.5	22.79	21.98	21.77
		1720.0	22.79	21.99	21.69
	1 RB low	1745.0	22.80	22.03	21.73
		1732.5	22.78	22.09	21.82
		1720.0	22.71	22.00	21.73
	50% RB mid	1745.0	22.08	21.02	20.86
		1732.5	22.02	21.01	20.81
		1720.0	22.00	20.97	20.83
	100% RB	1745.0	22.03	20.99	20.83
		1732.5	21.94	20.91	20.78
		1720.0	21.97	20.95	20.77

LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
1.4MHz	1 RB high	848.3	22.77	22.11	21.87
		836.5	22.67	21.94	21.78
		824.7	22.76	22.10	21.84
	1 RB low	848.3	22.79	22.09	21.81
		836.5	22.68	22.02	21.81
		824.7	22.74	22.04	21.82
	50% RB mid	848.3	22.94	21.99	21.89
		836.5	22.83	21.87	21.75
		824.7	22.88	21.91	21.80
	100% RB	848.3	21.94	21.01	20.82
		836.5	21.86	20.96	20.75
		824.7	21.91	20.95	20.74
3MHz	1 RB high	847.5	22.86	22.16	21.91
		836.5	22.80	22.11	21.80
		825.5	22.83	22.14	21.93
	1 RB low	847.5	22.83	22.10	21.94
		836.5	22.76	22.14	21.75
		825.5	22.81	22.04	21.83
	50% RB mid	847.5	21.97	21.04	20.88
		836.5	21.92	20.98	20.80
		825.5	21.93	21.00	20.85
	100% RB	847.5	21.95	20.95	20.80
		836.5	21.87	20.90	20.74
		825.5	21.86	20.88	20.71
5MHz	1 RB high	846.5	22.76	22.10	21.79
		836.5	22.67	21.97	21.67
		826.5	22.71	22.05	21.75
	1 RB low	846.5	22.72	22.11	21.81
		836.5	22.69	21.99	21.77
		826.5	22.68	22.10	21.67
	50% RB mid	846.5	21.99	21.02	20.83
		836.5	21.93	20.91	20.79
		826.5	21.95	20.92	20.80
	100% RB	846.5	21.94	20.96	20.82
		836.5	21.86	20.88	20.77
		826.5	21.89	20.92	20.79
10MHz	1 RB high	844.0	22.86	22.20	21.78
		836.5	22.81	22.06	21.72
		829.0	22.76	22.10	21.67
	1 RB low	844.0	22.86	22.22	21.82

		836.5	22.82	22.03	21.69
		829.0	22.86	22.06	21.66
	50% RB mid	844.0	22.01	21.04	20.72
		836.5	21.95	20.95	20.64
		829.0	21.95	21.01	20.68
	100% RB	844.0	22.03	21.05	20.74
		836.5	21.94	20.93	20.65
		829.0	21.98	20.97	20.66

LTE band 12

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
1.4MHz	1 RB high	715.3	21.98	21.17	20.73
		707.5	21.97	21.23	20.76
		699.7	22.02	21.33	20.81
	1 RB low	715.3	21.97	21.24	20.91
		707.5	21.99	21.30	20.85
		699.7	22.07	21.30	20.91
	50% RB mid	715.3	22.13	21.02	20.83
		707.5	22.17	21.07	20.88
		699.7	22.21	21.16	20.95
	100% RB	715.3	21.06	20.16	19.79
		707.5	21.14	20.25	19.87
		699.7	21.12	20.27	19.90
3MHz	1 RB high	714.5	22.00	21.19	20.84
		707.5	22.04	21.26	20.89
		700.5	22.10	21.26	20.99
	1 RB low	714.5	22.05	21.27	20.94
		707.5	22.07	21.26	20.91
		700.5	22.13	21.39	20.96
	50% RB mid	714.5	21.08	20.18	19.83
		707.5	21.13	20.22	19.90
		700.5	21.16	20.23	19.96
	100% RB	714.5	21.04	20.06	19.78
		707.5	21.06	20.11	19.80
		700.5	21.12	20.15	19.83
5MHz	1 RB high	713.5	21.91	21.17	20.74
		707.5	21.93	21.24	20.76
		701.5	21.96	21.12	20.81
	1 RB low	713.5	21.95	21.26	20.78
		707.5	21.95	21.29	20.82
		701.5	22.04	21.23	20.87
	50% RB mid	713.5	21.15	20.12	19.85
		707.5	21.14	20.17	19.85
		701.5	21.17	20.18	19.86
	100% RB	713.5	21.09	20.12	19.81
		707.5	21.07	20.11	19.79
		701.5	21.20	20.23	19.94
10MHz	1 RB high	711.0	21.86	21.19	20.75
		707.5	21.91	21.13	20.72
		704.0	21.93	21.14	20.81
	1 RB low	711.0	21.98	21.27	20.84

		707.5	21.99	21.29	20.86
		704.0	22.03	21.24	20.84
	50% RB mid	711.0	21.03	20.05	19.78
		707.5	21.06	20.09	19.79
		704.0	21.06	20.10	19.83
	100% RB	711.0	20.99	20.03	19.71
		707.5	20.97	20.00	19.72
		704.0	21.11	20.12	19.83

LTE band 14

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
5MHz	1 RB high	795.5	21.80	21.16	20.63
		793.0	21.80	20.99	20.56
		790.5	21.86	21.12	20.67
	1 RB low	795.5	21.84	21.03	20.71
		793.0	21.85	21.09	20.69
		790.5	21.84	21.15	20.58
	50% RB mid	795.5	20.99	19.98	19.62
		793.0	20.98	19.96	19.62
		790.5	21.00	19.98	19.66
	100% RB	795.5	20.97	19.96	19.65
		793.0	20.94	19.91	19.63
		790.5	20.99	19.93	19.68
10MHz	1 RB high	793.0	21.86	21.11	20.68
	1 RB low	793.0	21.95	21.14	20.74
	50% RB mid	793.0	21.00	19.97	19.70
	100% RB	793.0	21.02	20.01	19.68

LTE band 30

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		
			QPSK	16QAM	64QAM
5MHz	1 RB high	2312.5	23.22	22.47	21.89
		2310.0	23.22	22.45	21.89
		2307.5	23.22	22.41	21.88
	1 RB low	2312.5	23.26	22.43	21.94
		2310.0	23.24	22.53	21.96
		2307.5	23.26	22.55	21.93
	50% RB mid	2312.5	22.41	21.34	20.89
		2310.0	22.41	21.37	20.89
		2307.5	22.40	21.37	20.89
	100% RB	2312.5	22.37	21.33	20.90
		2310.0	22.34	21.34	20.87
		2307.5	22.36	21.33	20.89
10MHz	1 RB high	2310.0	23.22	22.51	21.97
	1 RB low	2310.0	23.31	22.54	21.91
	50% RB mid	2310.0	22.36	21.33	20.87
	100% RB	2310.0	22.29	21.24	20.81

A.1.3 Radiated

A.1.3.1 Description

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

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

LTE Band 14: 90.542(a) (7) specifies " Portable stations (hand-held de-vices) transmitting in the 758–768 MHz band and the 788–798 MHz band are limited to 3 watts ERP."

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

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

LTE Band 30: Rule Part 27.50(a)(3) specifies, " For mobile and portable stations transmitting in the 2305–2315 MHz band or the 2350–2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth ."

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

The antenna gain provided by the client may affect the validity of the measurement results in this report, and the client shall bear the impact and consequences arising therefrom.

LTE band 2-EIRP
Limits: ≤33dBm (2W)

Max EIRP: 23.99dBm

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)			Radiated Power (dBm) GT = 1.2 dBi		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4MHz	1 RB high	1909.3	22.02	21.41	21.23	23.22	22.61	22.43
		1880	22.48	21.85	21.71	23.68	23.05	22.91
		1850.7	22.43	21.76	21.63	23.63	22.96	22.83
	1 RB low	1909.3	22.04	21.36	21.12	23.24	22.56	22.32
		1880	22.49	21.81	21.73	23.69	23.01	22.93
		1850.7	22.43	21.79	21.63	23.63	22.99	22.83
	50% RB mid	1909.3	22.16	21.1	21.2	23.36	22.30	22.40
		1880	22.67	21.68	21.7	23.87	22.88	22.90
		1850.7	22.59	21.64	21.69	23.79	22.84	22.89
	100% RB	1909.3	21.1	20.27	20.18	22.30	21.47	21.38
		1880	21.61	20.76	20.65	22.81	21.96	21.85
		1850.7	21.54	20.69	20.59	22.74	21.89	21.79
3MHz	1 RB high	1908.5	22.06	21.34	21.25	23.26	22.54	22.45
		1880	22.52	21.9	21.75	23.72	23.10	22.95
		1851.5	22.47	21.81	21.7	23.67	23.01	22.90
	1 RB low	1908.5	22.1	21.37	21.24	23.30	22.57	22.44
		1880	22.54	21.76	21.71	23.74	22.96	22.91
		1851.5	22.49	21.82	21.67	23.69	23.02	22.87
	50% RB mid	1908.5	21.11	20.23	20.15	22.31	21.43	21.35
		1880	21.58	20.68	20.64	22.78	21.88	21.84
		1851.5	21.53	20.64	20.65	22.73	21.84	21.85
	100% RB	1908.5	21.11	20.16	20.12	22.31	21.36	21.32
		1880	21.54	20.61	20.58	22.74	21.81	21.78
		1851.5	21.51	20.53	20.53	22.71	21.73	21.73
5MHz	1 RB high	1907.5	22.03	21.3	21.06	23.23	22.50	22.26
		1880	22.45	21.77	21.59	23.65	22.97	22.79
		1852.5	22.39	21.78	21.49	23.59	22.98	22.69
	1 RB low	1907.5	22.06	21.39	21.26	23.26	22.59	22.46
		1880	22.43	21.83	21.68	23.63	23.03	22.88
		1852.5	22.38	21.74	21.61	23.58	22.94	22.81
	50% RB mid	1907.5	21.16	20.2	20.19	22.36	21.40	21.39
		1880	21.61	20.63	20.61	22.81	21.83	21.81
		1852.5	21.55	20.58	20.57	22.75	21.78	21.77
	100% RB	1907.5	21.11	20.14	20.16	22.31	21.34	21.36
		1880	21.59	20.63	20.62	22.79	21.83	21.82
		1852.5	21.51	20.55	20.52	22.71	21.75	21.72
10MHz	1 RB high	1905	22.05	21.36	21.13	23.25	22.56	22.33

		1880	22.52	21.84	21.75	23.72	23.04	22.95
		1855	22.44	21.84	21.68	23.64	23.04	22.88
		1905	22.35	21.59	21.54	23.55	22.79	22.74
	1 RB low	1880	22.48	21.9	21.71	23.68	23.10	22.91
		1855	22.49	21.8	21.59	23.69	23.00	22.79
		1905	21.26	20.28	20.3	22.46	21.48	21.50
	50% RB mid	1880	21.62	20.67	20.67	22.82	21.87	21.87
		1855	21.55	20.62	20.61	22.75	21.82	21.81
		1905	21.23	20.29	20.27	22.43	21.49	21.47
	100% RB	1880	21.63	20.64	20.63	22.83	21.84	21.83
		1855	21.54	20.58	20.58	22.74	21.78	21.78
15MHz	1 RB high	1902.5	22.07	21.29	21.1	23.27	22.49	22.30
		1880	22.53	21.78	21.71	23.73	22.98	22.91
		1857.5	22.42	21.78	21.66	23.62	22.98	22.86
	1 RB low	1902.5	22.42	21.84	21.67	23.62	23.04	22.87
		1880	22.46	21.7	21.71	23.66	22.90	22.91
		1857.5	22.44	21.82	21.64	23.64	23.02	22.84
	50% RB mid	1902.5	21.29	20.33	20.32	22.49	21.53	21.52
		1880	21.59	20.59	20.63	22.79	21.79	21.83
		1857.5	21.55	20.55	20.53	22.75	21.75	21.73
	100% RB	1902.5	21.28	20.32	20.32	22.48	21.52	21.52
		1880	21.57	20.6	20.58	22.77	21.80	21.78
		1857.5	21.49	20.54	20.52	22.69	21.74	21.72
20MHz	1 RB high	1900	22.27	21.54	21.34	23.47	22.74	22.54
		1880	22.79	22.04	21.83	23.99	23.24	23.03
		1860	22.66	21.85	21.74	23.86	23.05	22.94
	1 RB low	1900	22.75	22.11	21.89	23.95	23.31	23.09
		1880	22.72	21.99	21.87	23.92	23.19	23.07
		1860	22.64	21.88	21.79	23.84	23.08	22.99
	50% RB mid	1900	21.76	20.79	20.74	22.96	21.99	21.94
		1880	21.92	20.93	20.85	23.12	22.13	22.05
		1860	21.85	20.89	20.79	23.05	22.09	21.99
	100% RB	1900	21.82	20.83	20.77	23.02	22.03	21.97
		1880	21.88	20.87	20.81	23.08	22.07	22.01
		1860	21.78	20.79	20.74	22.98	21.99	21.94

LTE band 4-EIRP
Limits: ≤30dBm (1W)

Max EIRP: 25.00dBm

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)			Radiated Power (dBm) GT = 1.9 dBi		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4MHz	1 RB high	1754.3	22.92	22.15	21.97	24.82	24.05	23.87
		1732.5	22.88	22.2	21.86	24.78	24.10	23.76
		1710.7	22.84	22.09	21.95	24.74	23.99	23.85
	1 RB low	1754.3	22.92	22.16	21.88	24.82	24.06	23.78
		1732.5	22.87	22.12	21.94	24.77	24.02	23.84
		1710.7	22.85	22.13	21.99	24.75	24.03	23.89
	50% RB mid	1754.3	23.1	22.04	21.96	25.00	23.94	23.86
		1732.5	23.03	22.01	21.95	24.93	23.91	23.85
		1710.7	23	21.96	21.93	24.90	23.86	23.83
	100% RB	1754.3	22.03	21.11	20.92	23.93	23.01	22.82
		1732.5	21.98	21.09	20.89	23.88	22.99	22.79
		1710.7	22.01	21.09	20.87	23.91	22.99	22.77
3MHz	1 RB high	1753.5	22.96	22.26	21.97	24.86	24.16	23.87
		1732.5	22.91	22.19	21.96	24.81	24.09	23.86
		1711.5	22.91	22.07	21.97	24.81	23.97	23.87
	1 RB low	1753.5	22.95	22.26	21.81	24.85	24.16	23.71
		1732.5	22.93	22.12	21.82	24.83	24.02	23.72
		1711.5	22.89	22.23	22	24.79	24.13	23.90
	50% RB mid	1753.5	22.04	21.11	20.98	23.94	23.01	22.88
		1732.5	21.99	21.07	20.9	23.89	22.97	22.80
		1711.5	22	21.02	20.9	23.90	22.92	22.80
	100% RB	1753.5	22.01	21.03	20.9	23.91	22.93	22.80
		1732.5	21.96	20.97	20.83	23.86	22.87	22.73
		1711.5	21.95	20.96	20.82	23.85	22.86	22.72
5MHz	1 RB high	1752.5	22.88	22.14	21.92	24.78	24.04	23.82
		1732.5	22.8	21.97	21.89	24.70	23.87	23.79
		1712.5	22.79	22.04	21.84	24.69	23.94	23.74
	1 RB low	1752.5	22.86	22.09	21.91	24.76	23.99	23.81
		1732.5	22.82	22.09	21.82	24.72	23.99	23.72
		1712.5	22.79	22.15	21.9	24.69	24.05	23.80
	50% RB mid	1752.5	22.07	21.07	20.93	23.97	22.97	22.83
		1732.5	22.01	20.97	20.85	23.91	22.87	22.75
		1712.5	22.01	20.99	20.9	23.91	22.89	22.80
	100% RB	1752.5	22.03	21.02	20.93	23.93	22.92	22.83
		1732.5	21.96	20.97	20.86	23.86	22.87	22.76
		1712.5	21.96	20.96	20.86	23.86	22.86	22.76
10MHz	1 RB high	1750	22.95	22.18	21.9	24.85	24.08	23.80

		1732.5	22.91	22.18	21.92	24.81	24.08	23.82
		1715	22.97	22.27	21.82	24.87	24.17	23.72
	1 RB low	1750	22.94	22.13	21.8	24.84	24.03	23.70
		1732.5	22.96	22.18	21.83	24.86	24.08	23.73
		1715	22.93	22.18	21.94	24.83	24.08	23.84
	50% RB mid	1750	22.08	21.08	20.96	23.98	22.98	22.86
		1732.5	22.04	21.02	20.9	23.94	22.92	22.80
		1715	22	21	20.9	23.90	22.90	22.80
	100% RB	1750	22.1	21.09	20.95	24.00	22.99	22.85
		1732.5	22.05	21.02	20.9	23.95	22.92	22.80
		1715	22.03	21.01	20.9	23.93	22.91	22.80
15MHz	1 RB high	1747.5	22.89	22.11	21.96	24.79	24.01	23.86
		1732.5	22.86	22.1	21.93	24.76	24.00	23.83
		1717.5	22.83	22.09	21.94	24.73	23.99	23.84
	1 RB low	1747.5	22.89	22.06	21.93	24.79	23.96	23.83
		1732.5	22.88	22.22	21.98	24.78	24.12	23.88
		1717.5	22.89	22.19	21.85	24.79	24.09	23.75
	50% RB mid	1747.5	22.06	21	20.89	23.96	22.90	22.79
		1732.5	22.04	20.99	20.9	23.94	22.89	22.80
		1717.5	22.03	21	20.89	23.93	22.90	22.79
	100% RB	1747.5	22.04	21.01	20.92	23.94	22.91	22.82
		1732.5	22	21.01	20.9	23.90	22.91	22.80
		1717.5	22.01	21.01	20.91	23.91	22.91	22.81
20MHz	1 RB high	1745	22.85	22.1	21.8	24.75	24.00	23.70
		1732.5	22.79	21.98	21.77	24.69	23.88	23.67
		1720	22.79	21.99	21.69	24.69	23.89	23.59
	1 RB low	1745	22.8	22.03	21.73	24.70	23.93	23.63
		1732.5	22.78	22.09	21.82	24.68	23.99	23.72
		1720	22.71	22	21.73	24.61	23.90	23.63
	50% RB mid	1745	22.08	21.02	20.86	23.98	22.92	22.76
		1732.5	22.02	21.01	20.81	23.92	22.91	22.71
		1720	22	20.97	20.83	23.90	22.87	22.73
	100% RB	1745	22.03	20.99	20.83	23.93	22.89	22.73
		1732.5	21.94	20.91	20.78	23.84	22.81	22.68
		1720	21.97	20.95	20.77	23.87	22.85	22.67

LTE band 5-ERP
Limits: ≤38.4dBm (7W)

Max ERP: 16.79dBm

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)			Radiated Power (dBm) GT= -4 dBi		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4MHz	1 RB high	848.3	22.77	22.11	21.87	16.62	15.96	15.72
		836.5	22.67	21.94	21.78	16.52	15.79	15.63
		824.7	22.76	22.1	21.84	16.61	15.95	15.69
	1 RB low	848.3	22.79	22.09	21.81	16.64	15.94	15.66
		836.5	22.68	22.02	21.81	16.53	15.87	15.66
		824.7	22.74	22.04	21.82	16.59	15.89	15.67
	50% RB mid	848.3	22.94	21.99	21.89	16.79	15.84	15.74
		836.5	22.83	21.87	21.75	16.68	15.72	15.60
		824.7	22.88	21.91	21.8	16.73	15.76	15.65
	100% RB	848.3	21.94	21.01	20.82	15.79	14.86	14.67
		836.5	21.86	20.96	20.75	15.71	14.81	14.60
		824.7	21.91	20.95	20.74	15.76	14.80	14.59
3MHz	1 RB high	847.5	22.86	22.16	21.91	16.71	16.01	15.76
		836.5	22.8	22.11	21.8	16.65	15.96	15.65
		825.5	22.83	22.14	21.93	16.68	15.99	15.78
	1 RB low	847.5	22.83	22.1	21.94	16.68	15.95	15.79
		836.5	22.76	22.14	21.75	16.61	15.99	15.60
		825.5	22.81	22.04	21.83	16.66	15.89	15.68
	50% RB mid	847.5	21.97	21.04	20.88	15.82	14.89	14.73
		836.5	21.92	20.98	20.8	15.77	14.83	14.65
		825.5	21.93	21	20.85	15.78	14.85	14.70
	100% RB	847.5	21.95	20.95	20.8	15.80	14.80	14.65
		836.5	21.87	20.9	20.74	15.72	14.75	14.59
		825.5	21.86	20.88	20.71	15.71	14.73	14.56
5MHz	1 RB high	846.5	22.76	22.1	21.79	16.61	15.95	15.64
		836.5	22.67	21.97	21.67	16.52	15.82	15.52
		826.5	22.71	22.05	21.75	16.56	15.90	15.60
	1 RB low	846.5	22.72	22.11	21.81	16.57	15.96	15.66
		836.5	22.69	21.99	21.77	16.54	15.84	15.62
		826.5	22.68	22.1	21.67	16.53	15.95	15.52
	50% RB mid	846.5	21.99	21.02	20.83	15.84	14.87	14.68
		836.5	21.93	20.91	20.79	15.78	14.76	14.64
		826.5	21.95	20.92	20.8	15.80	14.77	14.65
	100% RB	846.5	21.94	20.96	20.82	15.79	14.81	14.67
		836.5	21.86	20.88	20.77	15.71	14.73	14.62
		826.5	21.89	20.92	20.79	15.74	14.77	14.64
10MHz	1 RB high	844	22.86	22.2	21.78	16.71	16.05	15.63

		836.5	22.81	22.06	21.72	16.66	15.91	15.57
		829	22.76	22.1	21.67	16.61	15.95	15.52
	1 RB low	844	22.86	22.22	21.82	16.71	16.07	15.67
		836.5	22.82	22.03	21.69	16.67	15.88	15.54
		829	22.86	22.06	21.66	16.71	15.91	15.51
	50% RB mid	844	22.01	21.04	20.72	15.86	14.89	14.57
		836.5	21.95	20.95	20.64	15.80	14.80	14.49
		829	21.95	21.01	20.68	15.80	14.86	14.53
	100% RB	844	22.03	21.05	20.74	15.88	14.90	14.59
		836.5	21.94	20.93	20.65	15.79	14.78	14.50
		829	21.98	20.97	20.66	15.83	14.82	14.51

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

Max ERP: 17.96dBm

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)			Radiated Power (dBm) GT = -2.1dBi		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4MHz	1 RB high	715.3	21.98	21.17	20.73	17.73	16.92	16.48
		707.5	21.97	21.23	20.76	17.72	16.98	16.51
		699.7	22.02	21.33	20.81	17.77	17.08	16.56
	1 RB low	715.3	21.97	21.24	20.91	17.72	16.99	16.66
		707.5	21.99	21.3	20.85	17.74	17.05	16.60
		699.7	22.07	21.3	20.91	17.82	17.05	16.66
	50% RB mid	715.3	22.13	21.02	20.83	17.88	16.77	16.58
		707.5	22.17	21.07	20.88	17.92	16.82	16.63
		699.7	22.21	21.16	20.95	17.96	16.91	16.70
	100% RB	715.3	21.06	20.16	19.79	16.81	15.91	15.54
		707.5	21.14	20.25	19.87	16.89	16.00	15.62
		699.7	21.12	20.27	19.9	16.87	16.02	15.65
3MHz	1 RB high	714.5	22	21.19	20.84	17.75	16.94	16.59
		707.5	22.04	21.26	20.89	17.79	17.01	16.64
		700.5	22.1	21.26	20.99	17.85	17.01	16.74
	1 RB low	714.5	22.05	21.27	20.94	17.80	17.02	16.69
		707.5	22.07	21.26	20.91	17.82	17.01	16.66
		700.5	22.13	21.39	20.96	17.88	17.14	16.71
	50% RB mid	714.5	21.08	20.18	19.83	16.83	15.93	15.58
		707.5	21.13	20.22	19.9	16.88	15.97	15.65
		700.5	21.16	20.23	19.96	16.91	15.98	15.71
	100% RB	714.5	21.04	20.06	19.78	16.79	15.81	15.53
		707.5	21.06	20.11	19.8	16.81	15.86	15.55
		700.5	21.12	20.15	19.83	16.87	15.90	15.58
5MHz	1 RB high	713.5	21.91	21.17	20.74	17.66	16.92	16.49
		707.5	21.93	21.24	20.76	17.68	16.99	16.51
		701.5	21.96	21.12	20.81	17.71	16.87	16.56
	1 RB low	713.5	21.95	21.26	20.78	17.70	17.01	16.53
		707.5	21.95	21.29	20.82	17.70	17.04	16.57
		701.5	22.04	21.23	20.87	17.79	16.98	16.62
	50% RB mid	713.5	21.15	20.12	19.85	16.90	15.87	15.60
		707.5	21.14	20.17	19.85	16.89	15.92	15.60
		701.5	21.17	20.18	19.86	16.92	15.93	15.61
	100% RB	713.5	21.09	20.12	19.81	16.84	15.87	15.56
		707.5	21.07	20.11	19.79	16.82	15.86	15.54
		701.5	21.2	20.23	19.94	16.95	15.98	15.69
10MHz	1 RB high	711	21.86	21.19	20.75	17.61	16.94	16.50

		707.5	21.91	21.13	20.72	17.66	16.88	16.47
		704	21.93	21.14	20.81	17.68	16.89	16.56
	1 RB low	711	21.98	21.27	20.84	17.73	17.02	16.59
		707.5	21.99	21.29	20.86	17.74	17.04	16.61
		704	22.03	21.24	20.84	17.78	16.99	16.59
	50% RB mid	711	21.03	20.05	19.78	16.78	15.80	15.53
		707.5	21.06	20.09	19.79	16.81	15.84	15.54
		704	21.06	20.1	19.83	16.81	15.85	15.58
	100% RB	711	20.99	20.03	19.71	16.74	15.78	15.46
		707.5	20.97	20	19.72	16.72	15.75	15.47
		704	21.11	20.12	19.83	16.86	15.87	15.58

LTE band 14- ERP

Limits: ≤34.77 dBm (3W)

Max ERP: 18.00dBm

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm)			Radiated Power (dBm) GT= -1.8 dBi		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5MHz	1 RB high	795.5	21.8	21.16	20.63	17.85	17.21	16.68
		793.0	21.8	20.99	20.56	17.85	17.04	16.61
		790.5	21.86	21.12	20.67	17.91	17.17	16.72
	1 RB low	795.5	21.84	21.03	20.71	17.89	17.08	16.76
		793.0	21.85	21.09	20.69	17.90	17.14	16.74
		790.5	21.84	21.15	20.58	17.89	17.20	16.63
	50% RB mid	795.5	20.99	19.98	19.62	17.04	16.03	15.67
		793.0	20.98	19.96	19.62	17.03	16.01	15.67
		790.5	21	19.98	19.66	17.05	16.03	15.71
	100% RB	795.5	20.97	19.96	19.65	17.02	16.01	15.70
		793.0	20.94	19.91	19.63	16.99	15.96	15.68
		790.5	20.99	19.93	19.68	17.04	15.98	15.73
10MHz	1 RB high	793.0	21.86	21.11	20.68	17.91	17.16	16.73
	1 RB low	793.0	21.95	21.14	20.74	18.00	17.19	16.79
	50% RB mid	793.0	21	19.97	19.7	17.05	16.02	15.75
	100% RB	793.0	21.02	20.01	19.68	17.07	16.06	15.73

LTE band 30- EIRP

Limits: ≤24 dBm/5MHz

Max EIRP: 22.39dBm/5MHz

Bandwidth	RB size/offset	Frequency (MHz)	Conducted Power (dBm) (dBm/5MHz)			EIRP(dBm/5MHz) GT = 0.5dBi		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5MHz	1 RB high	2312.5	22.84	22.13	22.01	22.34	21.63	21.51
		2310	22.77	22.04	21.94	22.27	21.54	21.44
		2307.5	22.78	22.12	21.95	22.28	21.62	21.45
	1 RB low	2312.5	22.77	22.12	21.96	22.27	21.62	21.46
		2310	22.78	22.08	21.91	22.28	21.58	21.41
		2307.5	22.85	22.14	22.02	22.35	21.64	21.52
	50% RB mid	2312.5	21.22	20.19	20.21	20.72	19.69	19.71
		2310	21.09	20.08	20.09	20.59	19.58	19.59
		2307.5	21.21	20.17	20.15	20.71	19.67	19.65
	100% RB	2310	22.86	22.19	22.04	22.36	21.69	21.54
		2310	22.89	22.21	22.06	22.39	21.71	21.56
		2310	19.52	18.48	18.49	19.02	17.98	17.99
10MHz	1 RB high	2312.5	22.84	22.13	22.01	22.34	21.63	21.51
	1 RB low	2310	22.77	22.04	21.94	22.27	21.54	21.44
	50% RB mid	2307.5	22.78	22.12	21.95	22.28	21.62	21.45
	100% RB	2312.5	22.77	22.12	21.96	22.27	21.62	21.46

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

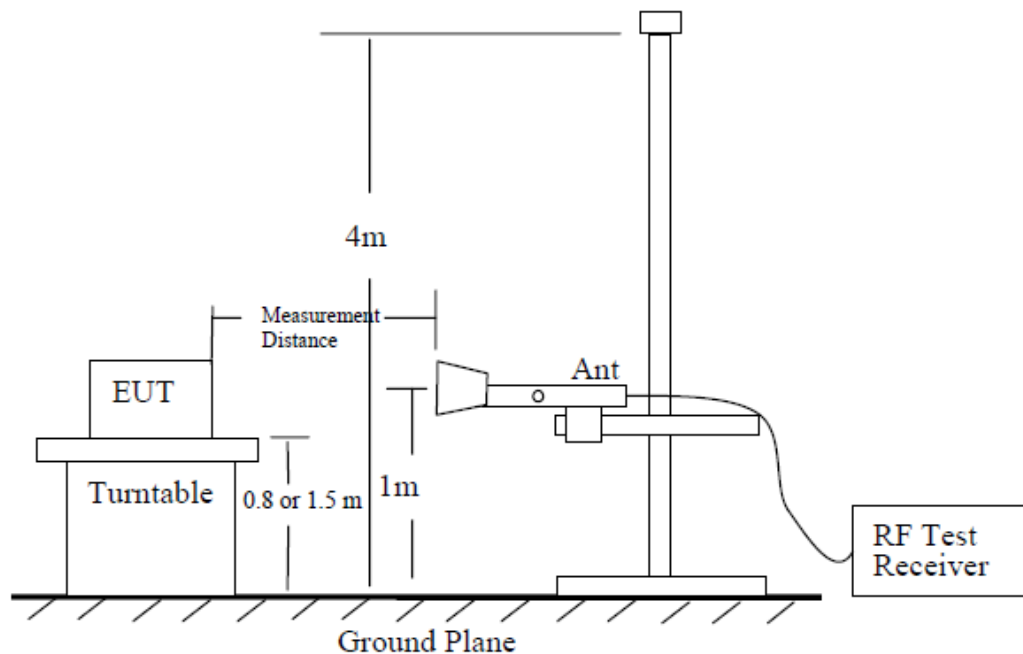
A.2 Emission Limit

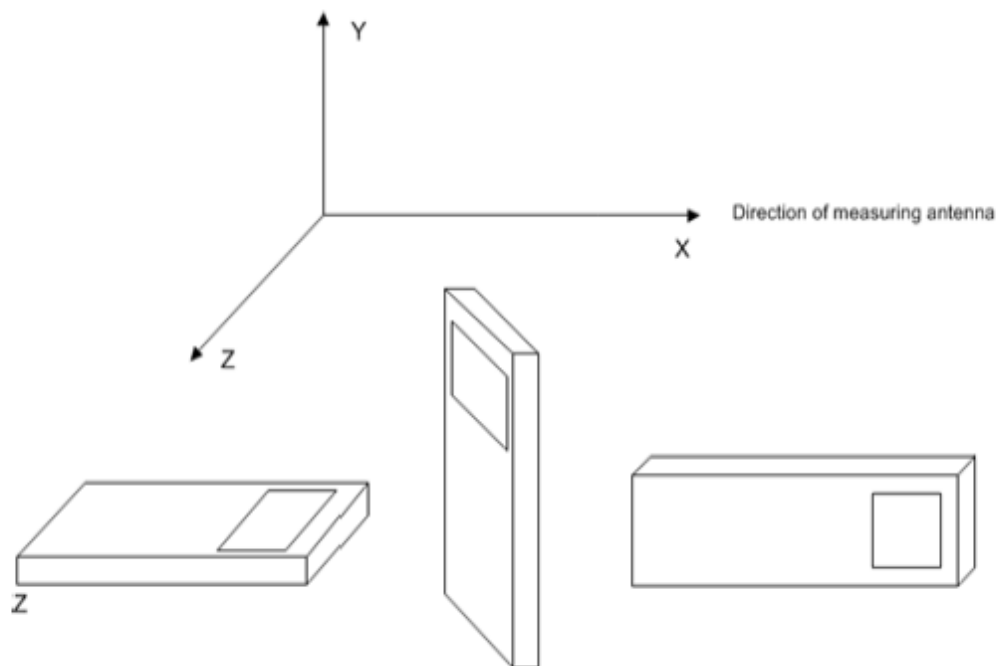
The measurements procedures in C63.26 are used.

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 the LTE Bands 2/4/5/12/14/30.

The procedure of radiated spurious emissions is as follows:

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





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

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

For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80 cm above the reference ground plane. Radiated measurements shall be made with the measurement antenna positioned in both horizontal and vertical polarization. The measurement antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level (i.e., field strength or received power). When orienting the measurement antenna in vertical polarization, the minimum height of the lowest element of the antenna shall clear the site reference ground plane by at least 25 cm.

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

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

A.2.2 Measurement Limit

FDD Band 2: 24.238 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

FDD Band 4: 27.53(h) specifies "AWS emission limits—(1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB"

FDD Band 5 Part 22.917 specifies " Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB."

FDD Band 12: 27.53(g) specifies " For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed ".

FDD Band 14: 90.543(e)(3) specifies " On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log(P)$ dB."

FDD Band 30: 27.53(a)(4)(ii) specify "By a factor of not less than $70 + 10 \log(P)$ dB below 2288 MHz" and 27.53(a)(4)(iii) specify "By a factor of not less than $70 + 10 \log(P)$ dB above 2365 MHz."

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE Bands 2/4/5/12/14/30 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.

Measurement Results:
LTE Band 2, 1.4MHz, QPSK, Channel 18607

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3702.02	-45.47	6.42	8.48	-43.41	-13.00	30.41	H
5553.02	-51.68	7.18	10.59	-48.27	-13.00	35.27	H
7404.01	-48.09	8.13	12.08	-44.14	-13.00	31.14	V
9254.01	-47.15	9.05	13.25	-42.95	-13.00	29.95	H
11067.01	-49.89	9.90	13.19	-46.60	-13.00	33.60	V
13004.01	-45.74	10.48	13.51	-42.71	-13.00	29.71	V

LTE Band 2, 1.4MHz, QPSK, Channel 18900

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.02	-45.15	6.26	8.56	-42.85	-13.00	29.85	H
5640.02	-46.79	7.27	10.57	-43.49	-13.00	30.49	H
7520.01	-43.97	8.31	12.22	-40.06	-13.00	27.06	H
9401.01	-49.38	9.04	13.34	-45.08	-13.00	32.08	H
11239.01	-48.57	9.63	13.15	-45.05	-13.00	32.05	V
13176.01	-44.03	10.60	13.75	-40.88	-13.00	27.88	V

LTE Band 2, 1.4MHz, QPSK, Channel 1919

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3819.02	-51.28	6.08	8.65	-48.71	-13.00	35.71	H
5728.02	-51.19	7.30	10.55	-47.94	-13.00	34.94	V
7641.01	-46.86	8.16	12.31	-42.71	-13.00	29.71	V
9521.01	-53.06	9.47	13.38	-49.15	-13.00	36.15	V
11435.01	-48.67	9.98	13.11	-45.54	-13.00	32.54	V
13344.01	-43.70	10.57	13.98	-40.29	-13.00	27.29	V

LTE Band 4, 1.4MHz, QPSK, Channel 19957

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3422.02	-53.20	5.38	8.01	-50.57	-13.00	37.57	H
5133.02	-65.57	6.86	10.09	-62.34	-13.00	49.34	H
6844.01	-64.41	7.83	11.41	-60.83	-13.00	47.83	H
8555.01	-62.45	8.57	13.01	-58.01	-13.00	45.01	H
10306.01	-61.28	9.65	13.02	-57.91	-13.00	44.91	V
12000.01	-58.46	10.05	13.00	-55.51	-13.00	42.51	V

LTE Band 4, 1.4MHz, QPSK, Channel 20175

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.02	-55.89	5.46	8.12	-53.23	-13.00	40.23	H
5199.02	-68.77	6.96	10.18	-65.55	-13.00	52.55	H
6930.01	-63.70	7.76	11.52	-59.94	-13.00	46.94	H
8664.01	-59.87	8.41	13.03	-55.25	-13.00	42.25	H
10438.01	-60.63	9.74	13.08	-57.29	-13.00	44.29	V
12162.01	-58.77	10.17	13.06	-55.88	-13.00	42.88	V

LTE Band 4, 1.4MHz, QPSK, Channel 20393

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3509.02	-54.74	5.54	8.21	-52.07	-13.00	39.07	H
5263.02	-67.60	6.99	10.27	-64.32	-13.00	51.32	V
7018.01	-63.49	8.27	11.62	-60.14	-13.00	47.14	H
8773.01	-62.45	8.58	13.05	-57.98	-13.00	44.98	H
10477.01	-60.94	9.69	13.09	-57.54	-13.00	44.54	V
12246.01	-58.46	10.03	13.10	-55.39	-13.00	42.39	V

LTE Band 5, 1.4MHz, QPSK, Channel 20407

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1650.01	-39.59	3.57	5.23	2.15	-40.08	-13.00	27.08	H
2481.00	-34.63	4.60	6.04	2.15	-35.34	-13.00	22.34	V
3301.02	-61.45	5.29	7.72	2.15	-61.17	-13.00	48.17	V
4118.02	-56.36	6.04	9.02	2.15	-55.53	-13.00	42.53	V
4948.01	-55.38	6.69	9.85	2.15	-54.37	-13.00	41.37	V
5774.01	-52.60	7.23	10.55	2.15	-51.43	-13.00	38.43	H

LTE Band 5, 1.4MHz, QPSK, Channel 20525

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.01	-39.67	3.58	5.19	2.15	-40.21	-13.00	27.21	H
2518.00	-46.10	4.64	6.13	2.15	-46.76	-13.00	33.76	H
3333.02	-61.31	5.30	7.80	2.15	-60.96	-13.00	47.96	V
4168.02	-57.67	6.13	9.07	2.15	-56.88	-13.00	43.88	V
5022.01	-56.72	6.57	9.93	2.15	-55.51	-13.00	42.51	V
5857.01	-54.79	7.26	10.53	2.15	-53.67	-13.00	40.67	H

LTE Band 5, 1.4MHz, QPSK, Channel 20643

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1697.01	-44.54	3.60	5.15	2.15	-45.14	-13.00	32.14	V
2545.00	-46.89	4.66	6.18	2.15	-47.52	-13.00	34.52	H
3398.02	-60.54	5.36	7.96	2.15	-60.09	-13.00	47.09	H
4255.02	-57.64	6.24	9.16	2.15	-56.87	-13.00	43.87	V
5092.01	-56.92	6.75	10.03	2.15	-55.79	-13.00	42.79	V
5940.01	-55.06	7.47	10.51	2.15	-54.17	-13.00	41.17	H

LTE Band 12, 1.4MHz, QPSK, Channel 23017

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1336.01	-56.30	3.16	4.65	2.15	-56.96	-13.00	43.96	H
2009.00	-50.33	4.08	4.63	2.15	-51.93	-13.00	38.93	H
2673.00	-41.91	4.76	6.41	2.15	-42.41	-13.00	29.41	H
3339.02	-61.31	5.31	7.81	2.15	-60.96	-13.00	47.96	V
4006.02	-58.59	6.06	8.91	2.15	-57.89	-13.00	44.89	H
4681.02	-58.06	6.49	9.58	2.15	-57.12	-13.00	44.12	V

LTE Band 12, 1.4MHz, QPSK, Channel 23095

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1415.01	-52.84	3.25	5.06	2.15	-53.18	-13.00	40.18	V
2123.00	-43.16	4.21	4.97	2.15	-44.55	-13.00	31.55	V
2821.00	-46.10	4.94	6.68	2.15	-46.51	-13.00	33.51	V
3529.02	-58.98	5.61	8.24	2.15	-58.50	-13.00	45.50	V
4247.02	-57.82	6.24	9.15	2.15	-57.06	-13.00	44.06	V
4952.01	-56.87	6.69	9.85	2.15	-55.86	-13.00	42.86	V

LTE Band 12, 1.4MHz, QPSK, Channel 23173

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1431.01	-53.63	3.28	5.14	2.15	-53.92	-13.00	40.92	V
2146.00	-44.98	4.24	5.04	2.15	-46.33	-13.00	33.33	H
2849.00	-45.73	4.96	6.73	2.15	-46.11	-13.00	33.11	H
3569.02	-58.56	6.02	8.30	2.15	-58.43	-13.00	45.43	V
4294.02	-57.32	6.20	9.19	2.15	-56.48	-13.00	43.48	V
5006.01	-57.50	6.59	9.91	2.15	-56.33	-13.00	43.33	H

LTE Band 14, 5MHz, QPSK, Channel 23305

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1581.34	-59.96	3.50	5.35	0.00	-60.26	-40.00	20.26	V
2373.81	-49.70	4.49	5.72	2.15	-50.62	-13.00	37.62	H
3163.52	-60.22	5.35	7.39	2.15	-60.33	-13.00	47.33	V
3951.02	-59.46	6.10	8.83	2.15	-58.88	-13.00	45.88	V
4738.02	-58.16	6.55	9.64	2.15	-57.22	-13.00	44.22	V
5535.01	-54.30	7.17	10.59	2.15	-53.03	-13.00	40.03	H

LTE Band 14, 5MHz, QPSK, Channel 23330

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1586.29	-59.07	3.50	5.34	0.00	-59.38	-40.00	19.38	V
2375.89	-48.28	4.49	5.73	2.15	-49.19	-13.00	36.19	H
3172.02	-60.35	5.34	7.41	2.15	-60.43	-13.00	47.43	H
3963.02	-59.32	6.10	8.85	2.15	-58.72	-13.00	45.72	V
4761.51	-57.98	6.59	9.66	2.15	-57.06	-13.00	44.06	H
5553.01	-55.17	7.18	10.59	2.15	-53.91	-13.00	40.91	H

LTE Band 14, 5MHz, QPSK, Channel 23355

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1591.33	-58.11	3.51	5.34	0.00	-58.43	-40.00	18.43	V
2388.40	-49.57	4.50	5.77	2.15	-50.45	-13.00	37.45	H
3180.52	-60.52	5.33	7.43	2.15	-60.57	-13.00	47.57	H
3978.02	-59.54	6.08	8.87	2.15	-58.90	-13.00	45.90	V
4773.51	-59.17	6.62	9.67	2.15	-58.27	-13.00	45.27	V
5569.51	-56.35	7.20	10.59	2.15	-55.11	-13.00	42.11	H

LTE Band 30, 5MHz, QPSK, Channel 27658

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4615.02	-62.55	6.45	9.52	-59.48	-40.00	19.48	V
6923.01	-56.80	7.72	11.51	-53.01	-40.00	13.01	H
9231.01	-58.64	9.00	13.24	-54.40	-40.00	14.40	V
11519.01	-59.74	9.81	13.10	-56.45	-40.00	16.45	V
13859.01	-54.99	10.72	14.42	-51.29	-40.00	11.29	H
16154.00	-51.12	11.79	13.67	-49.24	-40.00	9.24	H

LTE Band 30, 5MHz, QPSK, Channel 27710

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4620.02	-61.52	6.45	9.52	-58.45	-40.00	18.45	H
6931.01	-58.70	7.77	11.52	-54.95	-40.00	14.95	H
9241.01	-57.72	9.02	13.24	-53.50	-40.00	13.50	H
11532.01	-59.83	9.81	13.09	-56.55	-40.00	16.55	V
13871.01	-55.01	10.75	14.42	-51.34	-40.00	11.34	H
16171.00	-51.33	11.77	13.67	-49.43	-40.00	9.43	H

LTE Band 30, 5MHz, QPSK, Channel 27735

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4627.02	-63.66	6.45	9.53	-60.58	-40.00	20.58	V
6938.01	-65.20	7.82	11.53	-61.49	-40.00	21.49	H
9256.01	-63.06	9.05	13.25	-58.86	-40.00	18.86	V
11566.01	-59.91	9.80	13.09	-56.62	-40.00	16.62	V
13886.01	-54.83	10.78	14.43	-51.18	-40.00	11.18	H
16189.00	-52.72	11.74	13.66	-50.80	-40.00	10.80	H

Sample: 4627.02MHz

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

Power (-60.58dBm) = P_{Mea} (-63.66dBm) - P_{pl} (6.45dB) + G_a (9.53dBi)

Note: Expanded measurement uncertainty

Frequency range	Expanded measurement uncertainty
30MHz-1GHz	5.76dB, k=2
1GHz-18GHz	4.69dB, k=2
18GHz-40GHz	3.37dB, k=2

Note: The measurement results showed here are worst cases

A.3 Frequency Stability

A.3.1 Method of Measurement

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

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

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

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

A.3.2 Measurement results

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

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	1850.833	1909.199		
50				48.02	0.0255
40				-0.37	0.0002
30				-4.72	0.0025
10				2.86	0.0015
0				-2.53	0.0013
-10				46.99	0.0250
-20				-0.73	0.0004
-30				-4.36	0.0023

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
3.4	20	1850.833	1909.199	-3.12	0.0017
4.4				0.63	0.0003

LTE Band 4, 20MHz bandwidth QPSK (worst case of all bandwidths)

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	1710.833	1754.199		
50				-0.93	0.0005
40				-3.08	0.0018
30				0.34	0.0002
10				1.32	0.0008
0				-5.46	0.0032
-10				2.55	0.0015
-20				0.90	0.0005
-30				-0.06	0.0000

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
3.4	20	1710.833	1754.199	-1.17	0.0007
4.4				-0.46	0.0003

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

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	824.417	848.583		
50				1.70	0.0020
40				4.45	0.0053
30				1.56	0.0019
10				2.96	0.0035
0				1.87	0.0022
-10				1.47	0.0018
-20				3.62	0.0043
-30				5.51	0.0066

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
3.4	20	824.417	848.583	-0.63	0.0008
4.4				4.19	0.0050

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

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	699.481	715.519		
50				-0.10	0.0001
40				-1.75	0.0025
30				-1.36	0.0019
10				-2.79	0.0039
0				-0.20	0.0003
-10				3.13	0.0044
-20				-0.83	0.0012
-30				-3.35	0.0047

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
3.4	20	699.481	715.519	1.00	0.0014
4.4				-2.93	0.0041

LTE Band 14, 10MHz bandwidth QPSK (worst case of all bandwidths)

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	788.476	797.519		
50				2.29	0.0029
40				1.63	0.0021
30				2.35	0.0030
10				0.72	0.0009
0				1.53	0.0019
-10				0.21	0.0003
-20				2.59	0.0033
-30				2.35	0.0030

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
3.4	20	788.476	797.519	2.15	0.0027
4.4				2.09	0.0026

LTE Band 30, 10MHz bandwidth QPSK (worst case of all bandwidths)

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	2305.417	2314.583		
50				4.85	0.0021
40				-1.36	0.0006
30				-0.30	0.0001
10				-1.17	0.0005
0				2.96	0.0013
-10				4.58	0.0020
-20				6.14	0.0027
-30				3.69	0.0016

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
3.4	20	2305.417	2314.583	3.55	0.0015
4.4				1.75	0.0008

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

A.4 Occupied Bandwidth

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

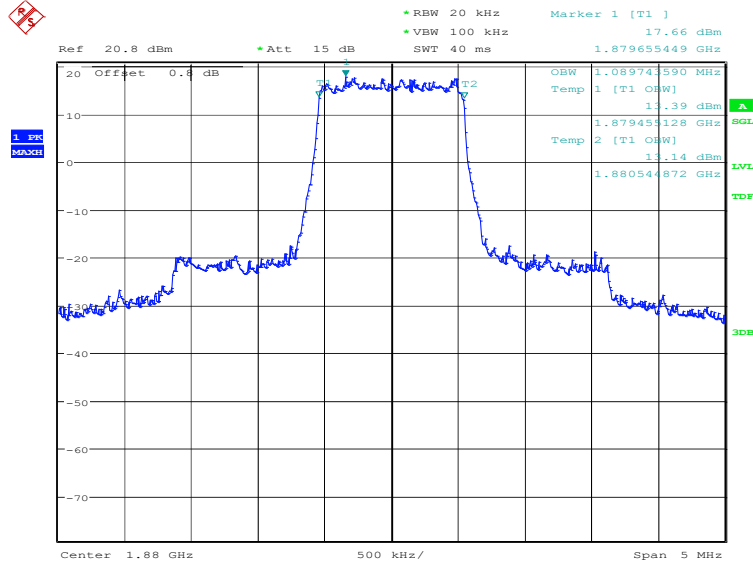
The measurement method is from ANSI C63.26:

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

LTE band 2, 1.4MHz (99%)

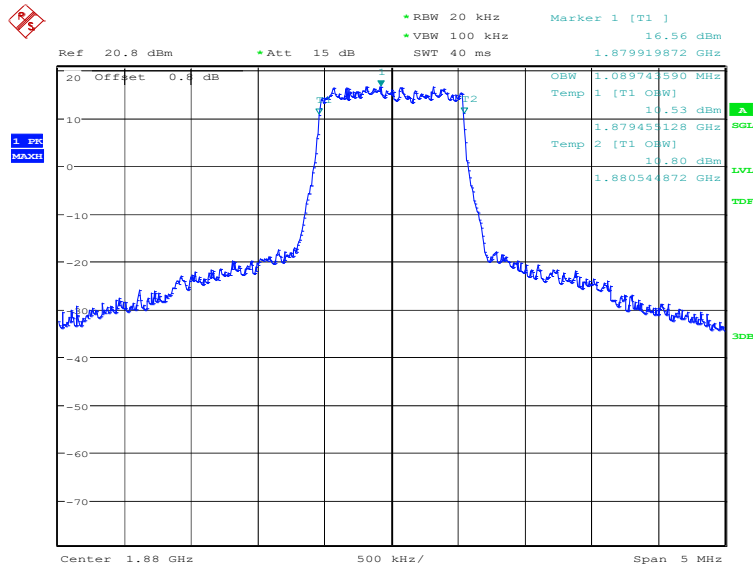
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	1089.74	1089.74

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



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

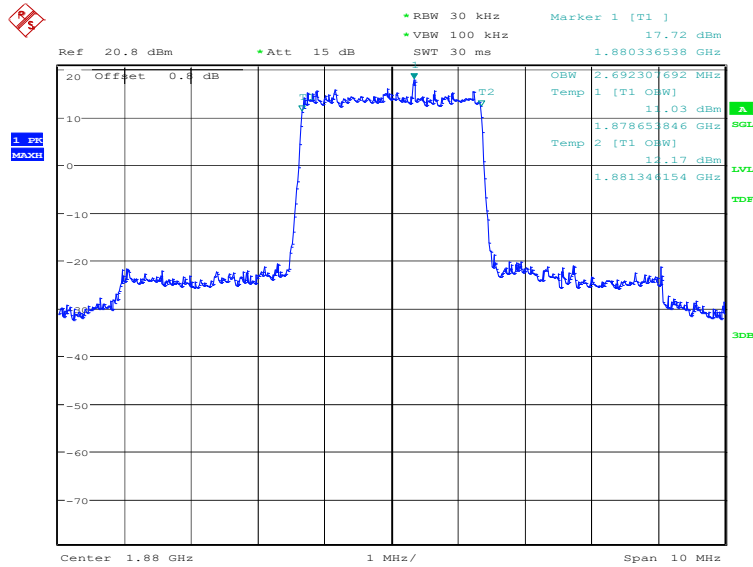


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LTE band 2, 3MHz (99%)

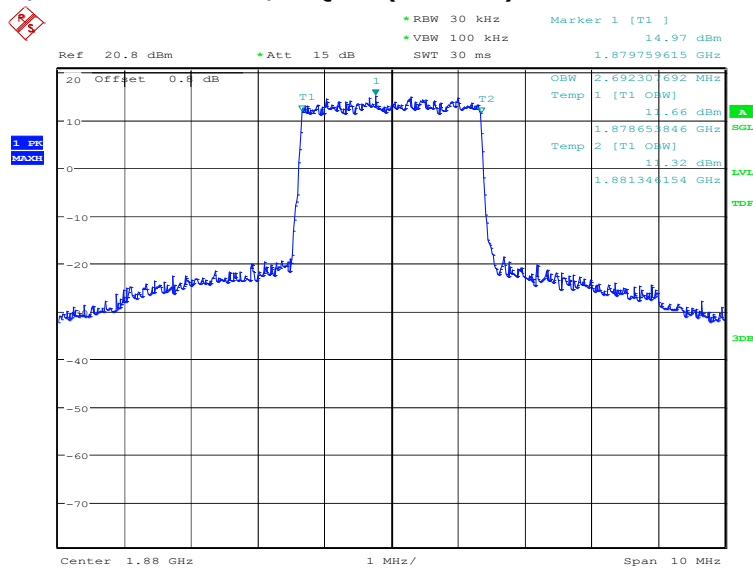
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	2692.31	2692.31

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



Date: 2.AUG.2022 17:40:36

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

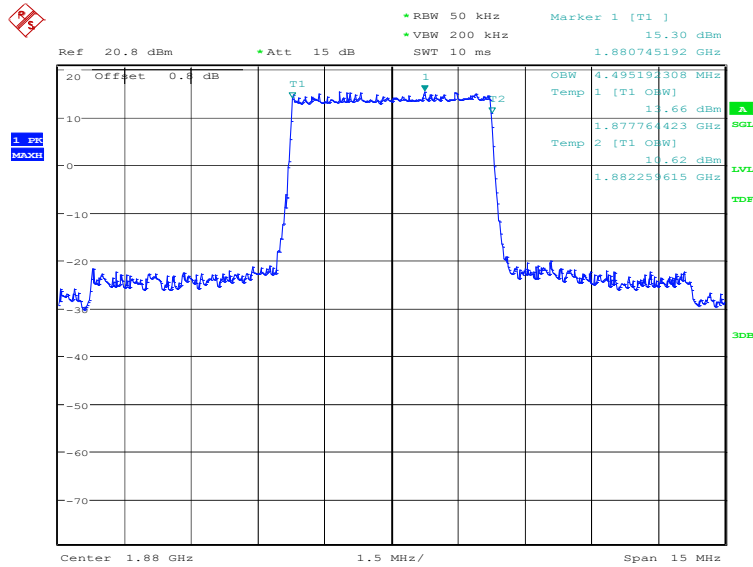


Date: 2.AUG.2022 17:41:16

LTE band 2, 5MHz (99%)

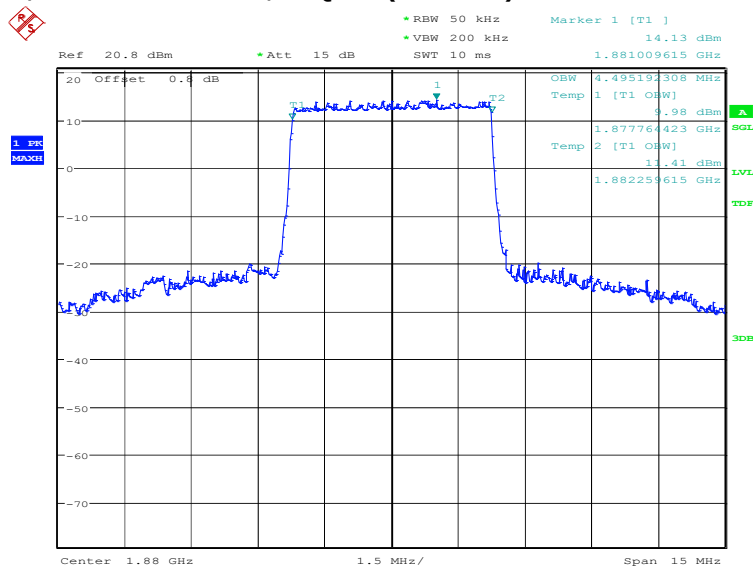
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	4495.19	4495.19

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



Date: 2.AUG.2022 17:41:57

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

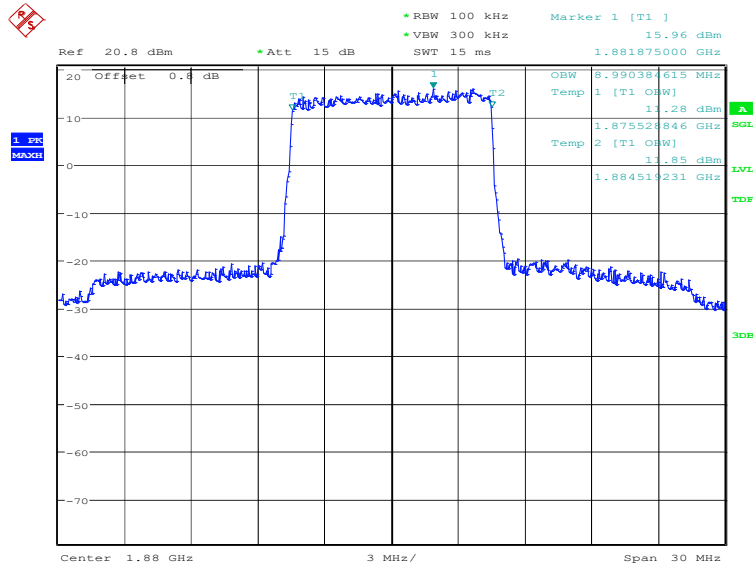


Date: 2.AUG.2022 17:42:37

LTE band 2, 10MHz (99%)

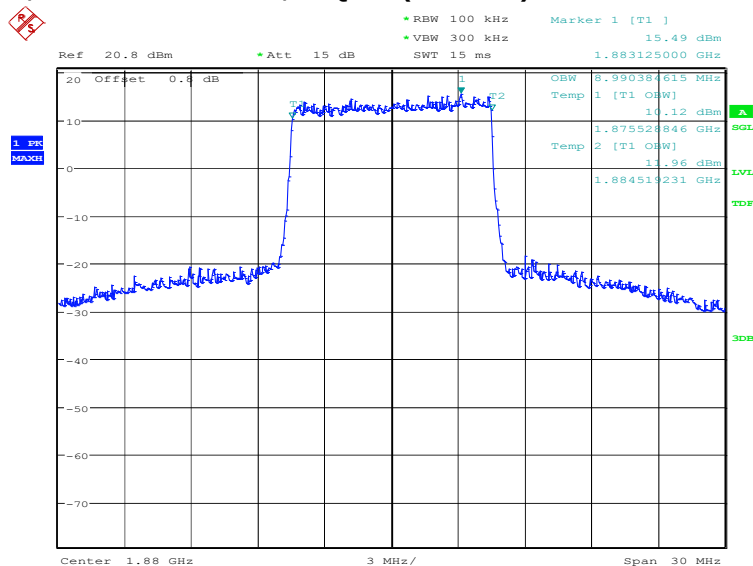
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	8990.38	8990.38

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



Date: 2.AUG.2022 17:43:18

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

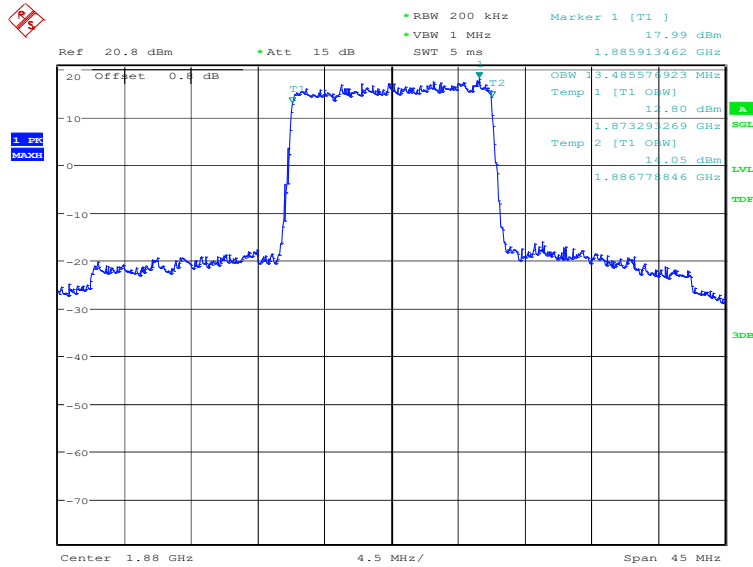


Date: 2.AUG.2022 17:43:57

LTE band 2, 15MHz (99%)

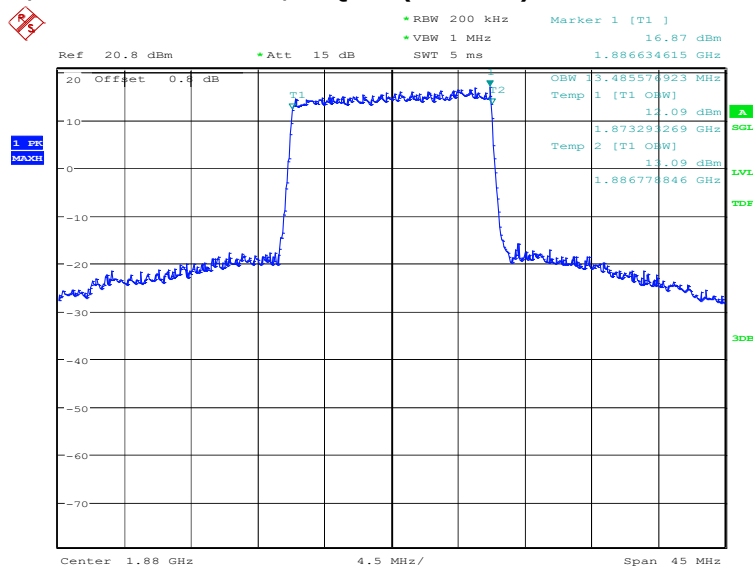
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	13485.58	13485.58

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



Date: 2.AUG.2022 17:44:38

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

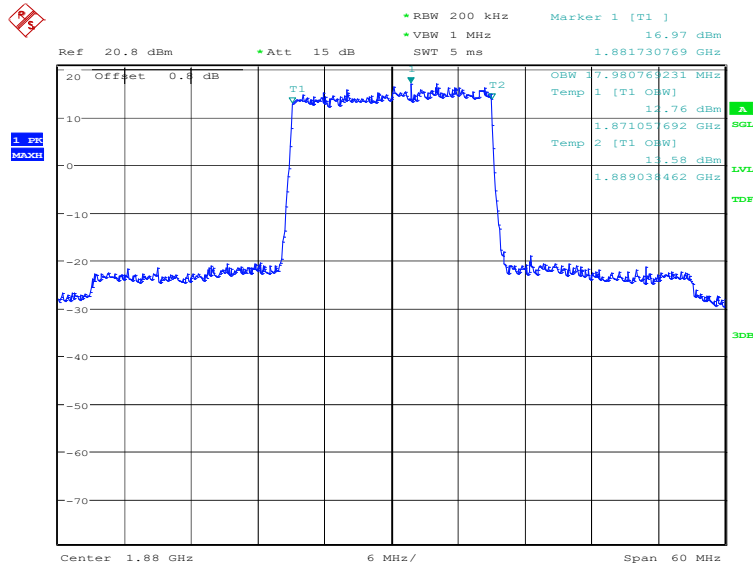


Date: 2.AUG.2022 17:45:18

LTE band 2, 20MHz (99%)

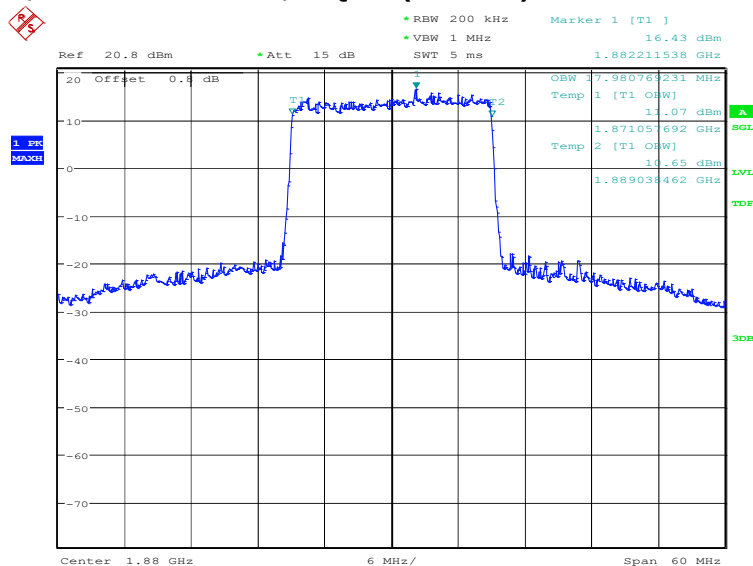
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1880.0	QPSK	16QAM
	17980.77	17980.77

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



Date: 2.AUG.2022 17:45:59

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

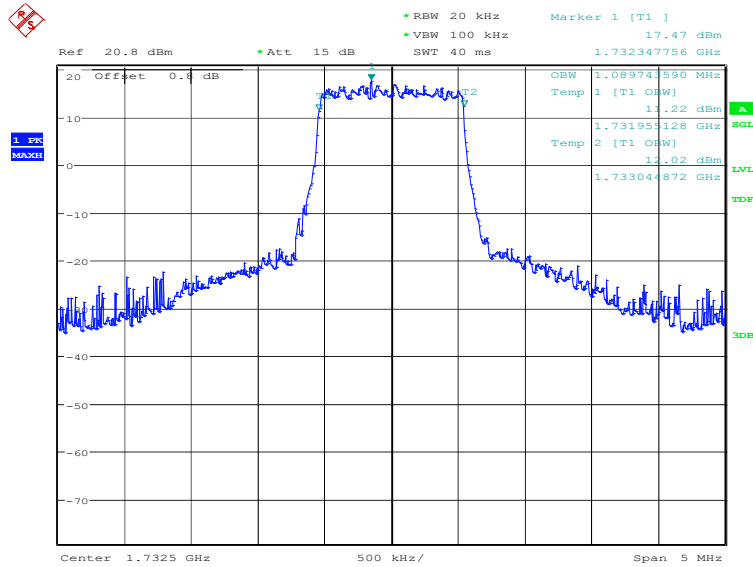


Date: 2.AUG.2022 17:46:39

LTE band 4, 1.4MHz (99%)

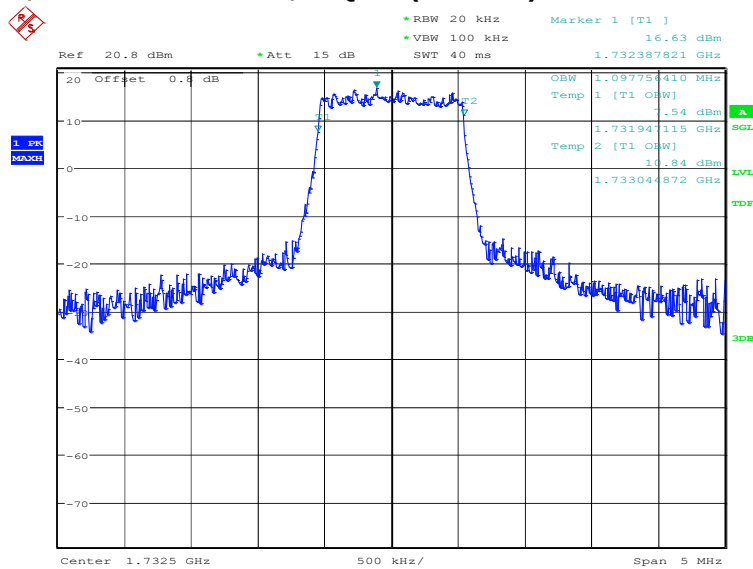
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	1089.74	1097.76

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



Date: 2.AUG.2022 17:47:21

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

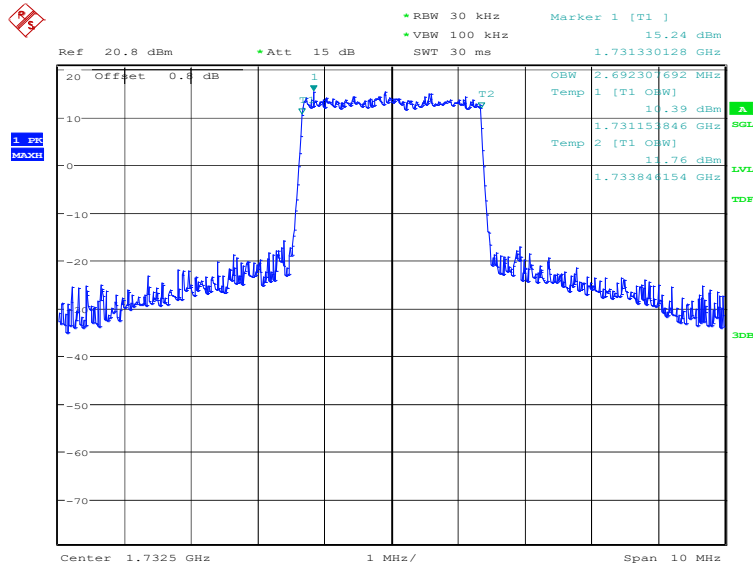


Date: 2.AUG.2022 17:48:00

LTE band 4, 3MHz (99%)

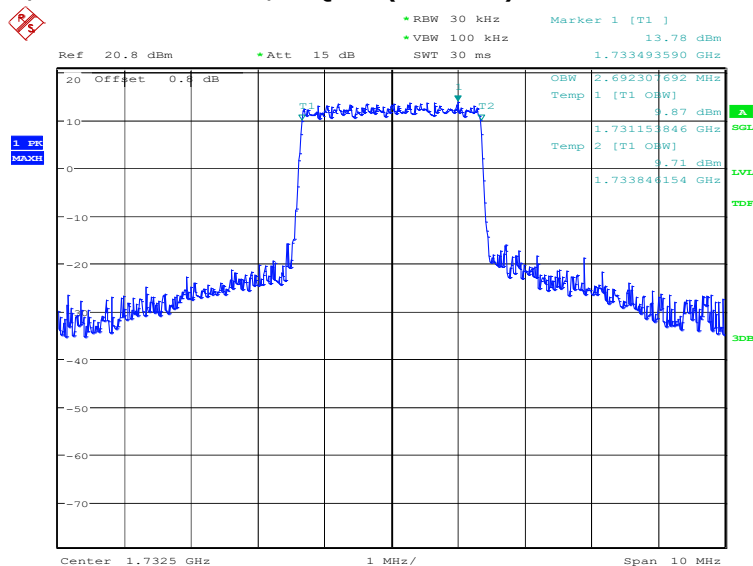
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	2692.31	2692.31

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



Date: 2.AUG.2022 17:48:41

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

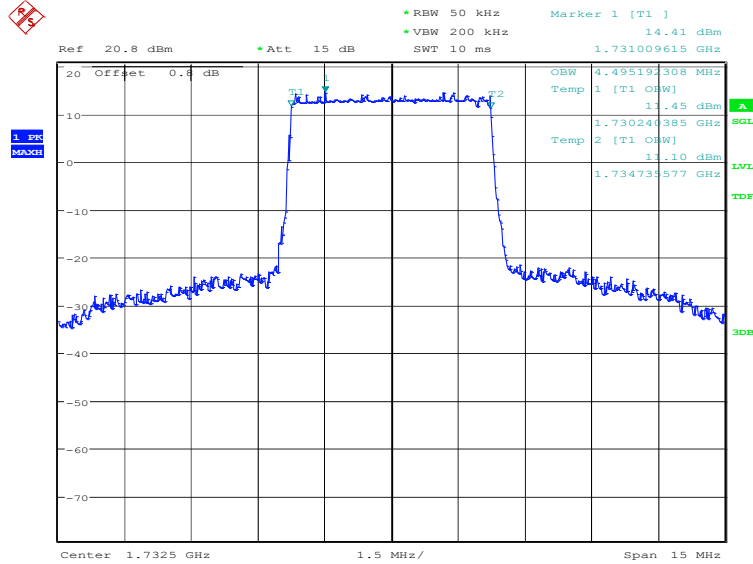


Date: 2.AUG.2022 17:49:21

LTE band 4, 5MHz (99%)

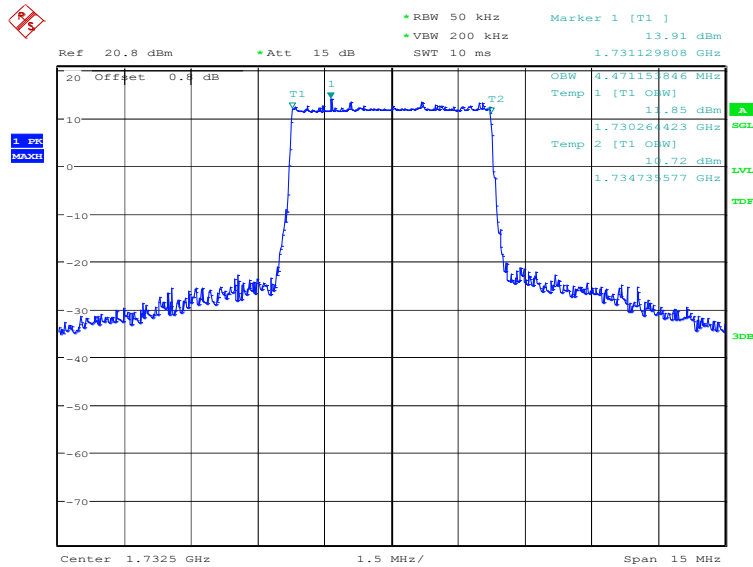
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	4495.19	4471.15

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



Date: 2.AUG.2022 17:50:02

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

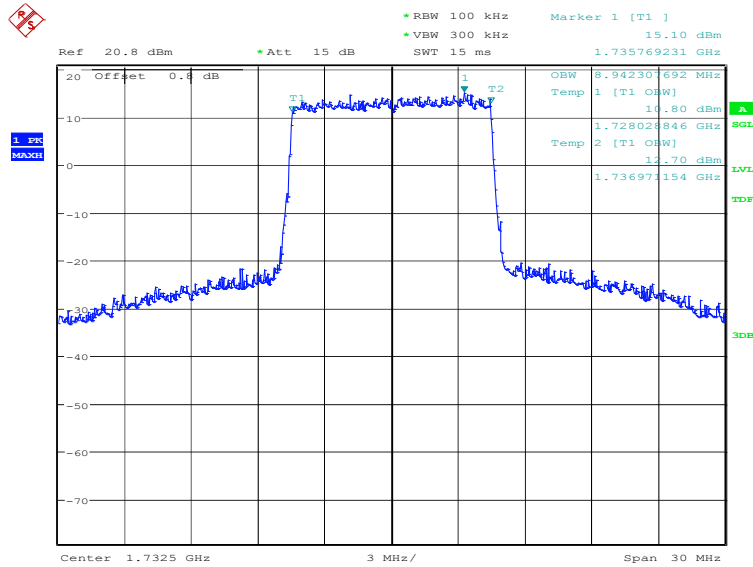


Date: 2.AUG.2022 17:50:42

LTE band 4, 10MHz (99%)

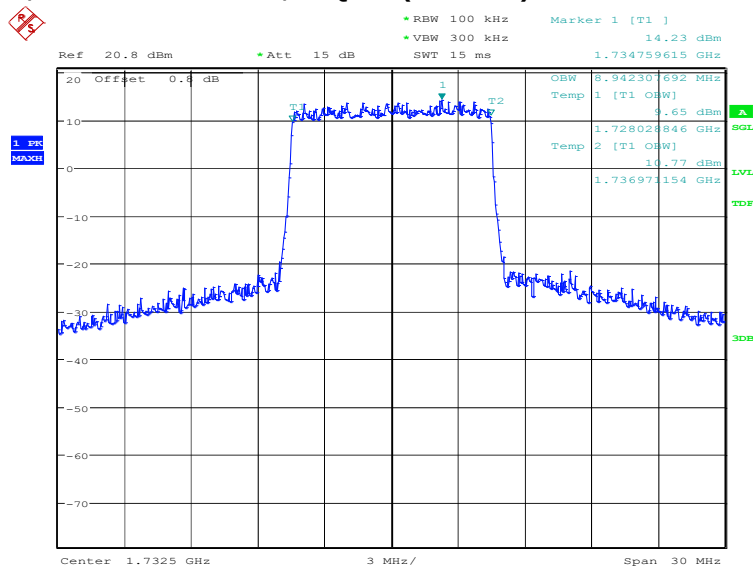
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	8942.31	8942.31

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



Date: 2.AUG.2022 17:51:23

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

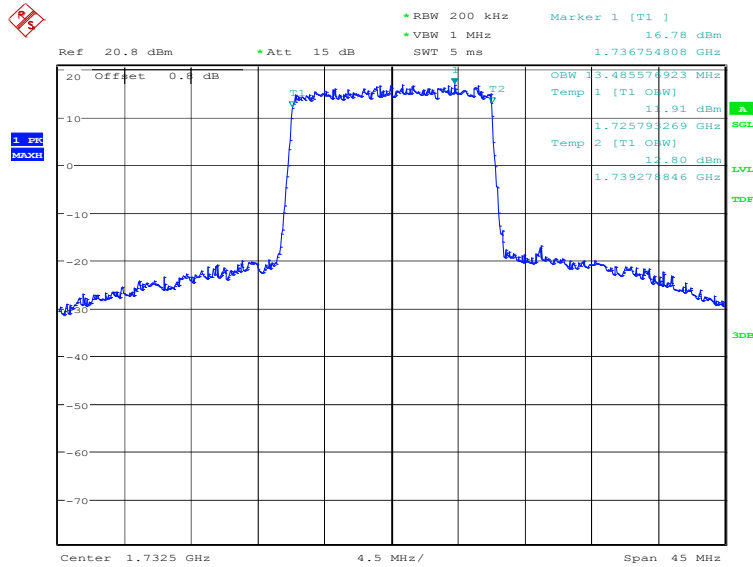


Date: 2.AUG.2022 17:52:02

LTE band 4, 15MHz (99%)

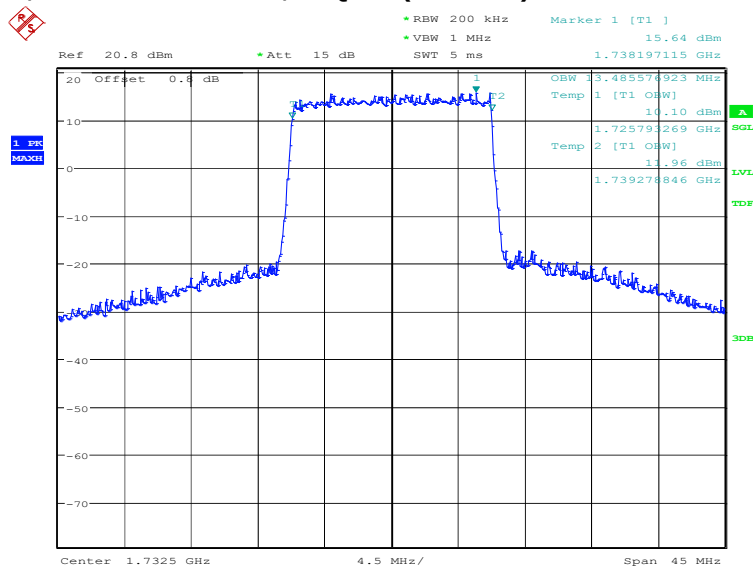
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	13485.58	13485.58

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



Date: 2.AUG.2022 17:52:43

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

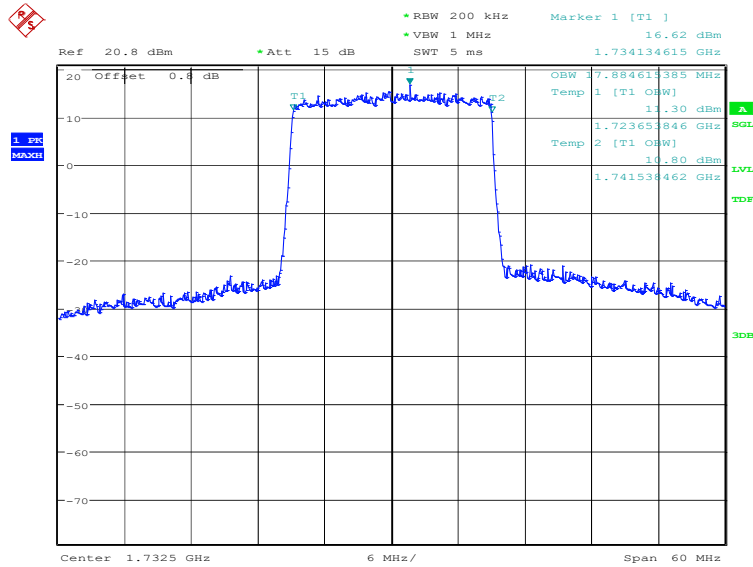


Date: 2.AUG.2022 17:53:23

LTE band 4, 20MHz (99%)

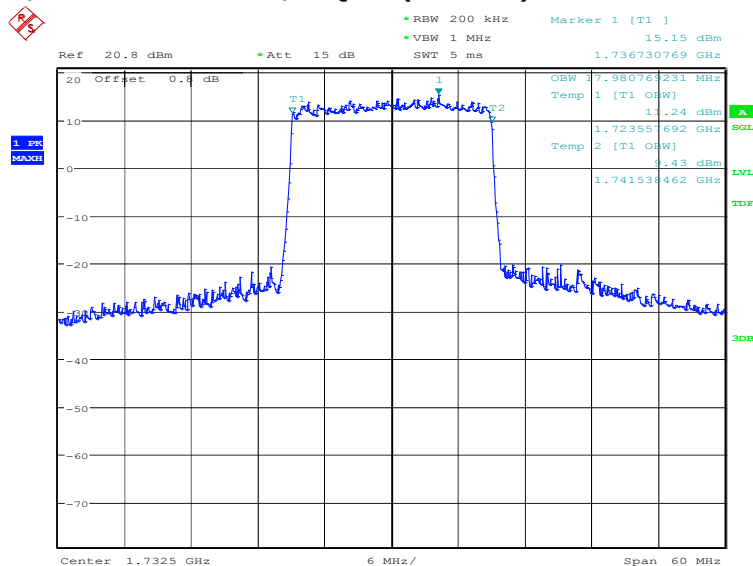
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
1732.5	QPSK	16QAM
	17884.62	17980.77

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



Date: 2.AUG.2022 17:54:04

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

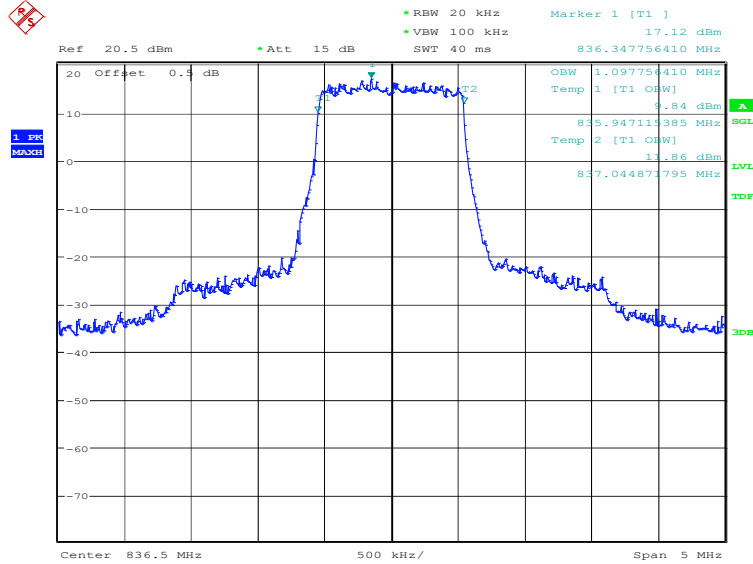


Date: 2.AUG.2022 17:54:44

LTE band 5, 1.4MHz (99%)

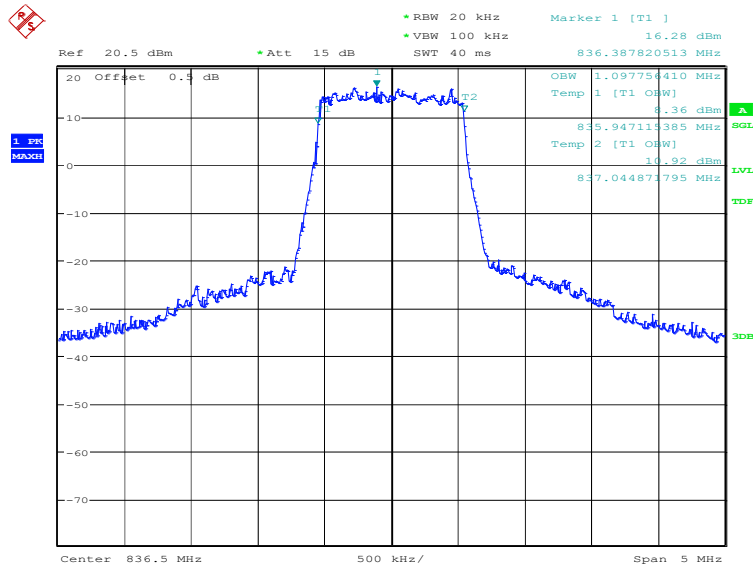
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	1097.76	1097.76

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



Date: 2.AUG.2022 17:55:27

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

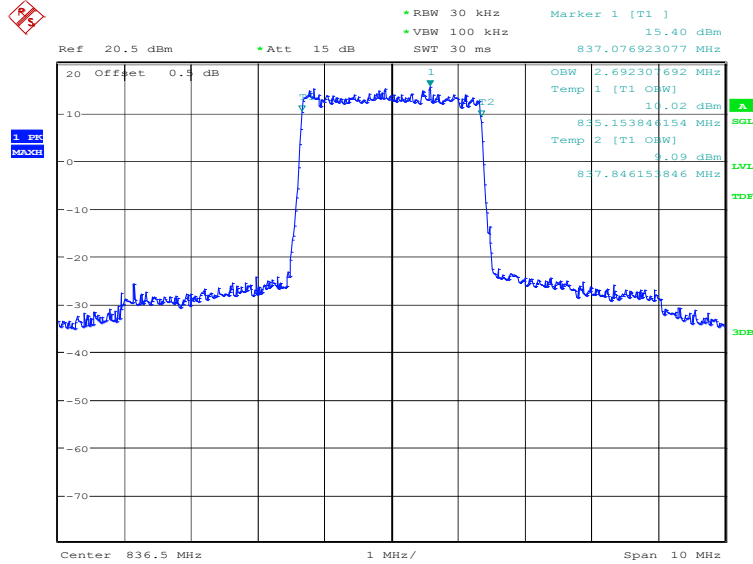


Date: 2.AUG.2022 17:56:06

LTE band 5, 3MHz (99%)

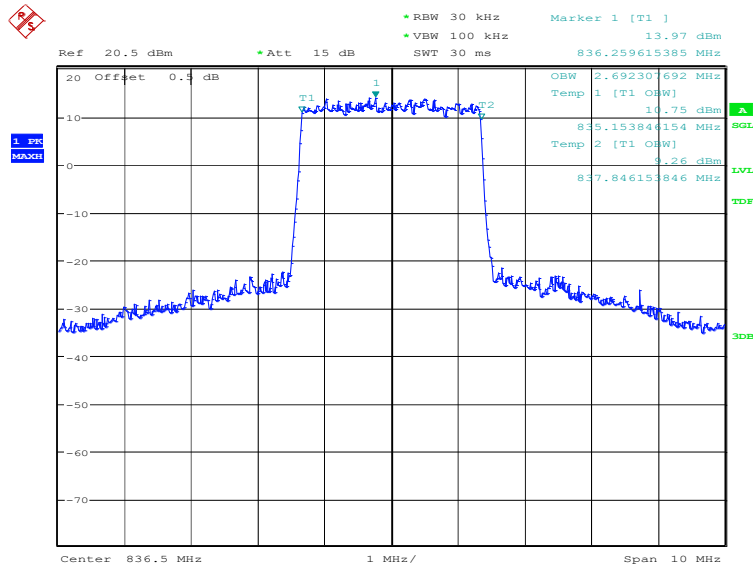
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	2692.31	2692.31

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



Date: 2.AUG.2022 17:56:48

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

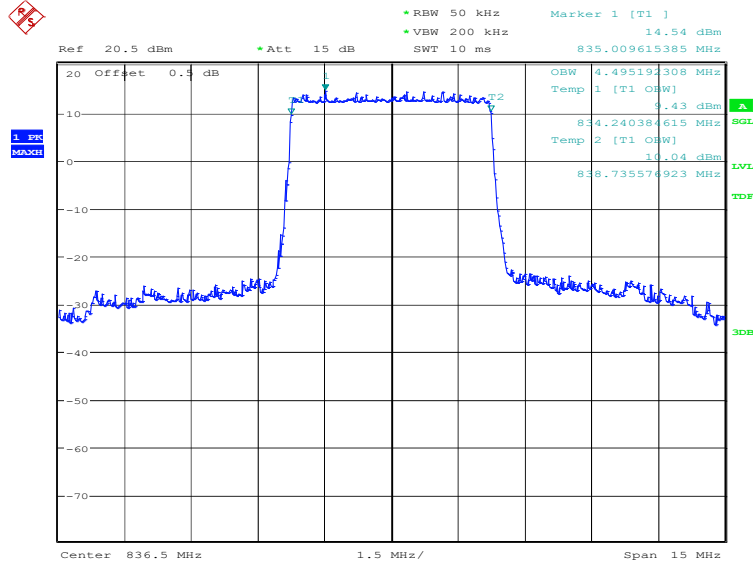


Date: 2.AUG.2022 17:57:27

LTE band 5, 5MHz (99%)

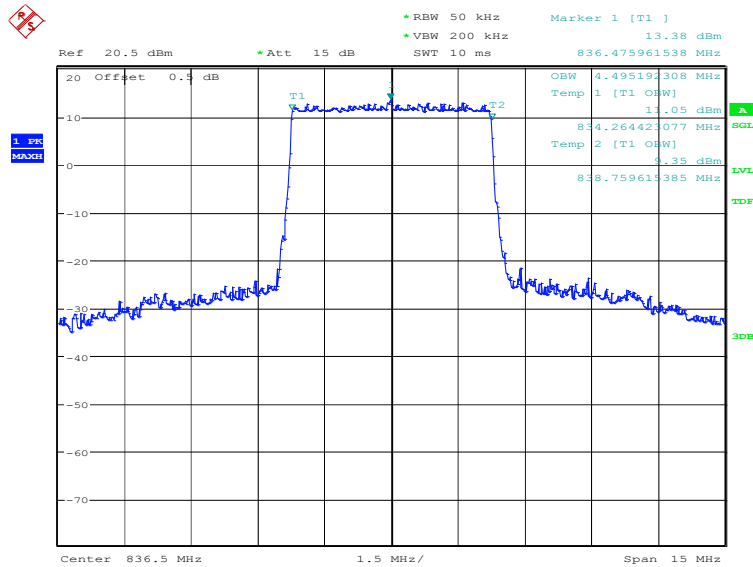
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	4495.19	4495.19

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



Date: 2.AUG.2022 17:58:08

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

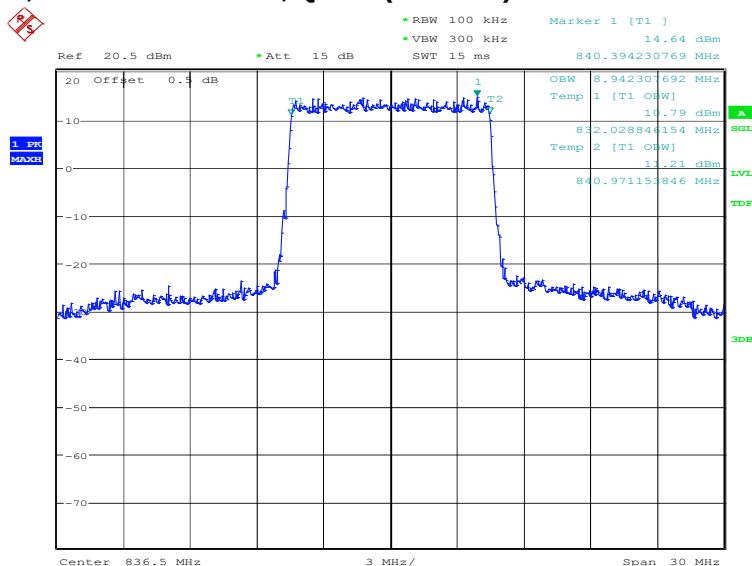


Date: 2.AUG.2022 17:58:48

LTE band 5, 10MHz (99%)

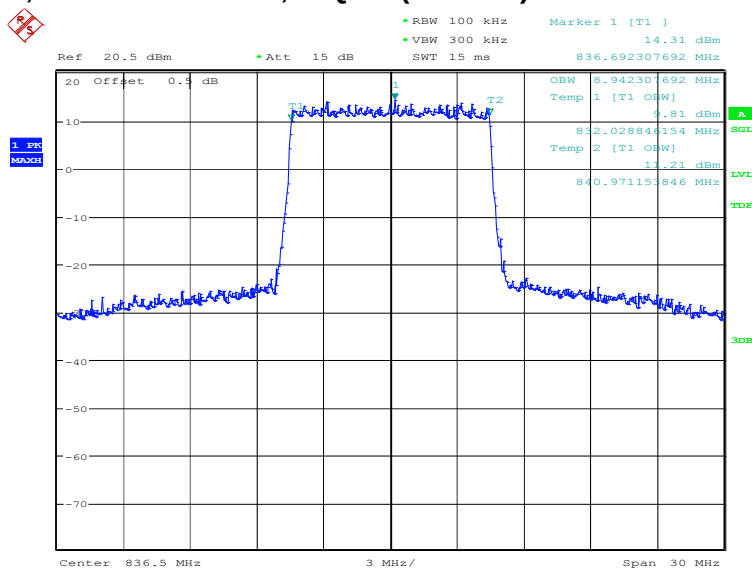
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	8942.31	8942.31

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



Date: 2.AUG.2022 17:59:29

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

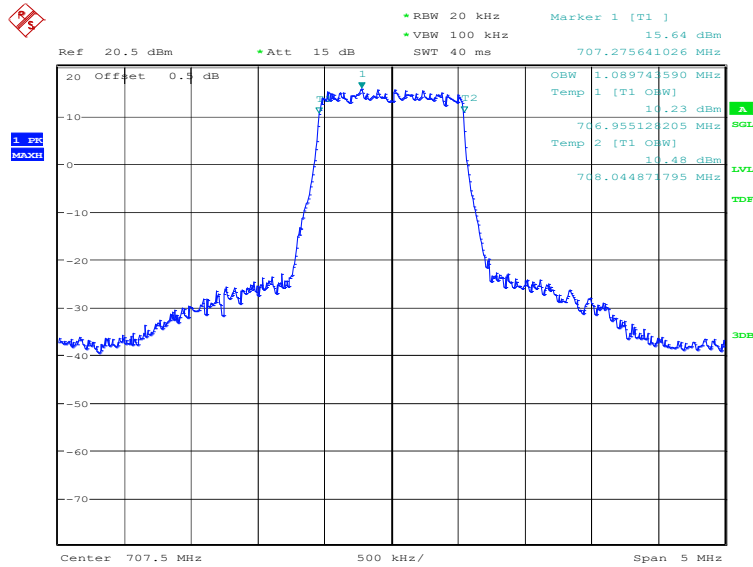


Date: 2.AUG.2022 18:00:09

LTE band 12, 1.4MHz (99%)

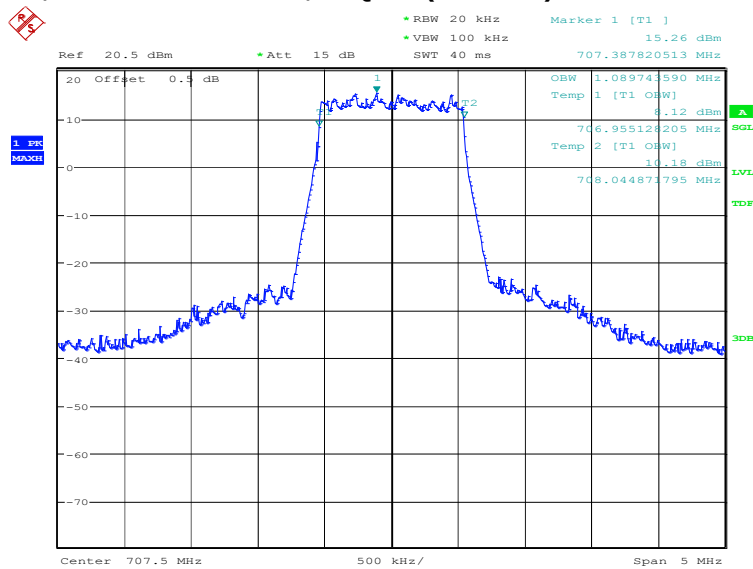
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	1089.74	1089.74

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



Date: 2.AUG.2022 18:00:51

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

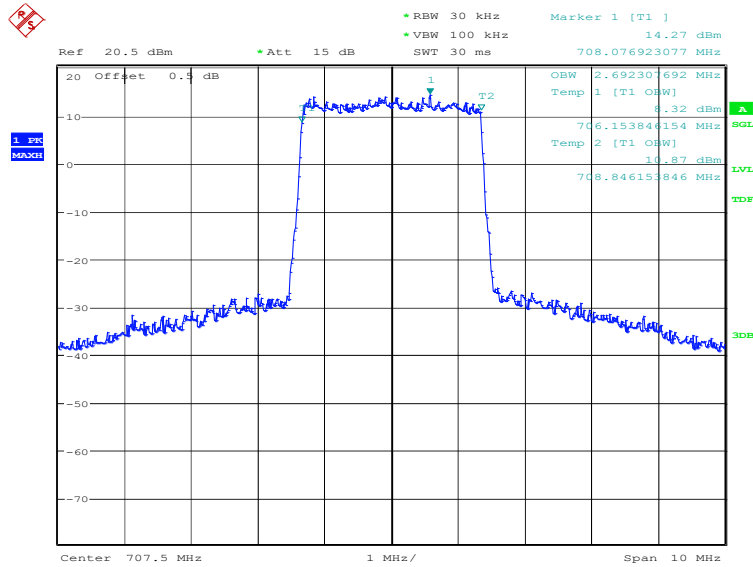


Date: 2.AUG.2022 18:01:31

LTE band 12, 3MHz (99%)

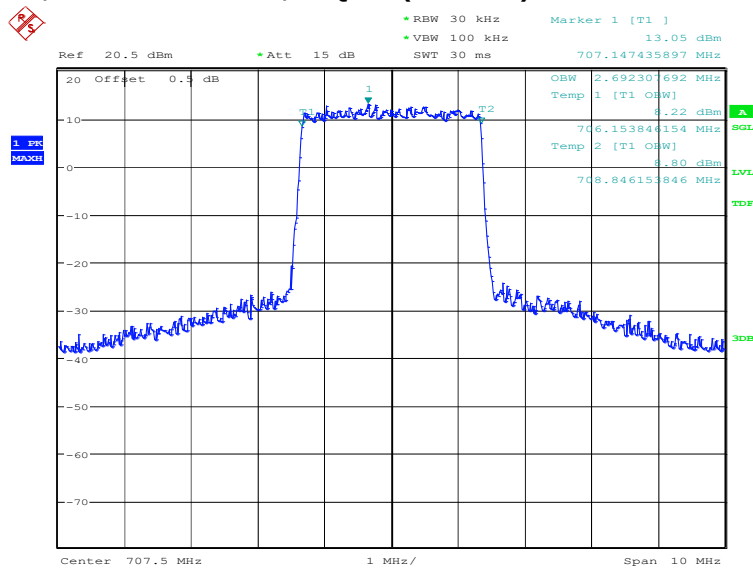
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	2692.31	2692.31

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



Date: 2.AUG.2022 18:02:12

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

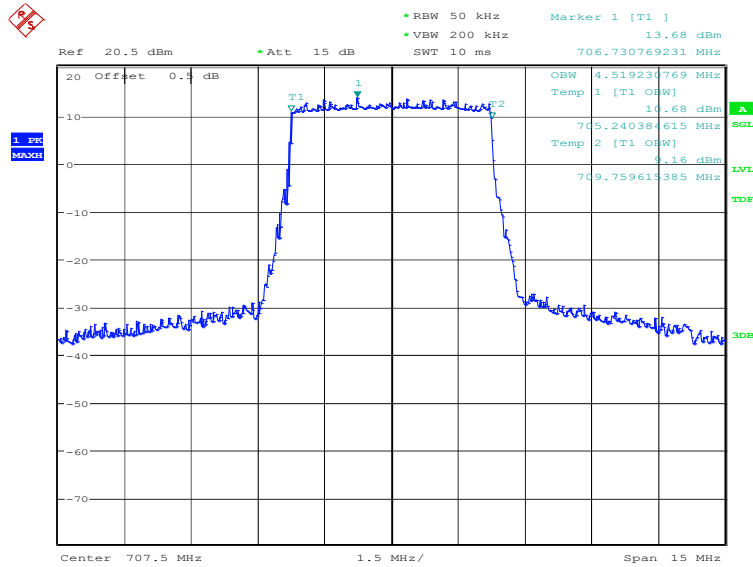


Date: 2.AUG.2022 18:02:52

LTE band 12, 5MHz (99%)

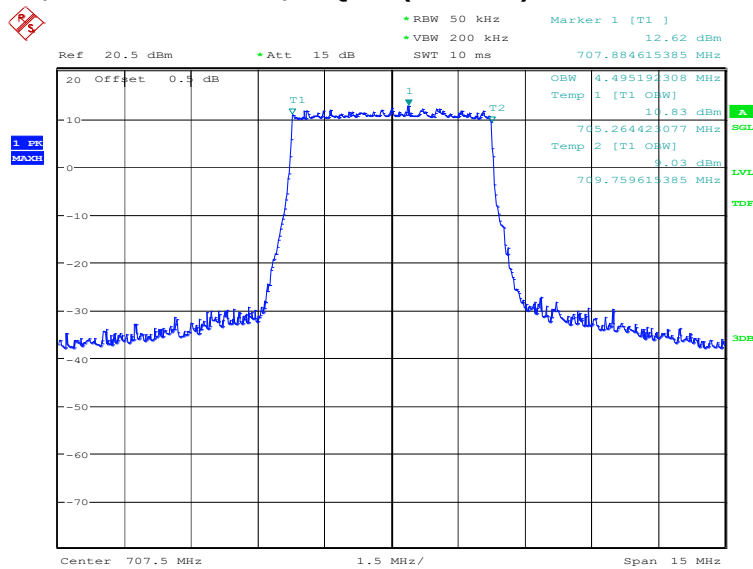
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	4519.23	4495.19

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



Date: 2.AUG.2022 18:03:34

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

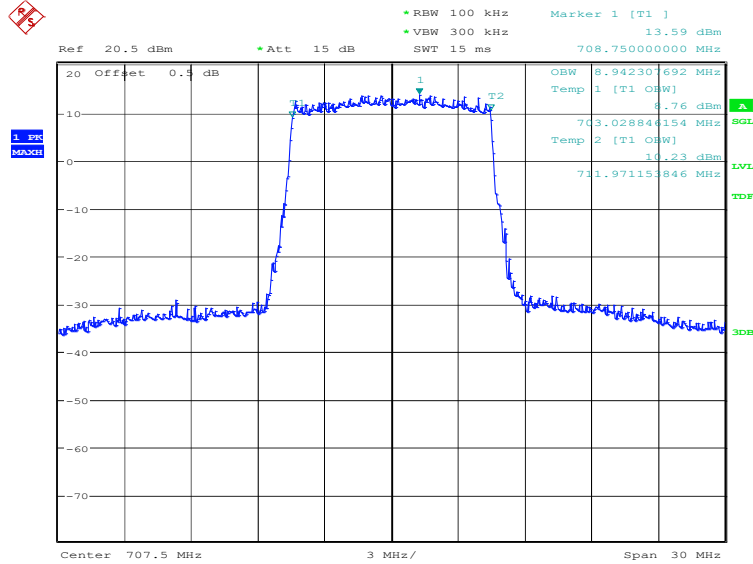


Date: 2.AUG.2022 18:04:13

LTE band 12, 10MHz (99%)

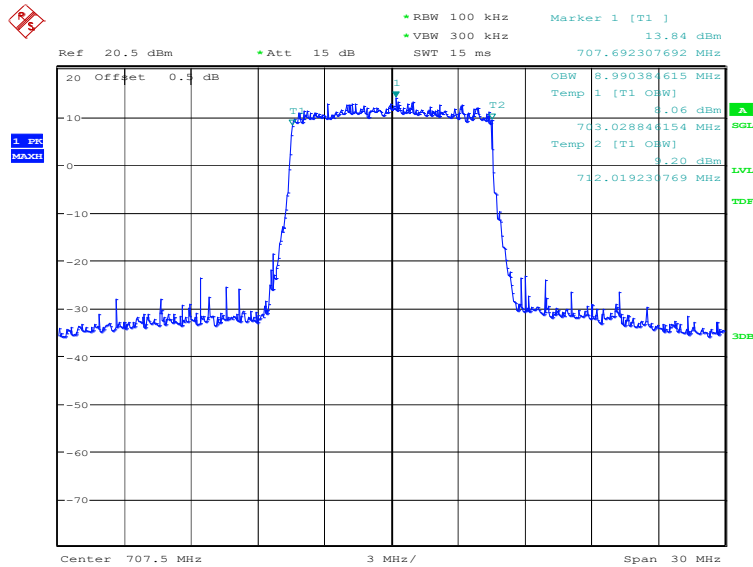
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
707.5	QPSK	16QAM
	8942.31	8990.38

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



Date: 2.AUG.2022 18:04:54

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

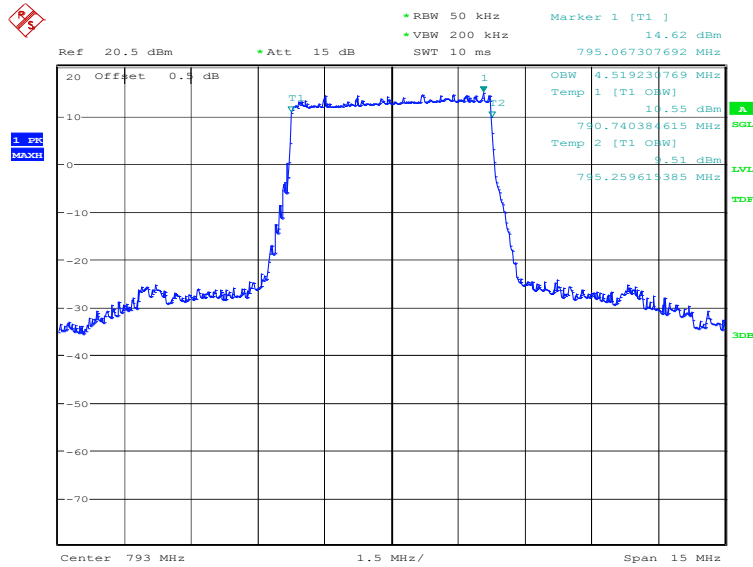


Date: 2.AUG.2022 18:05:34

LTE band 14, 5MHz (99%)

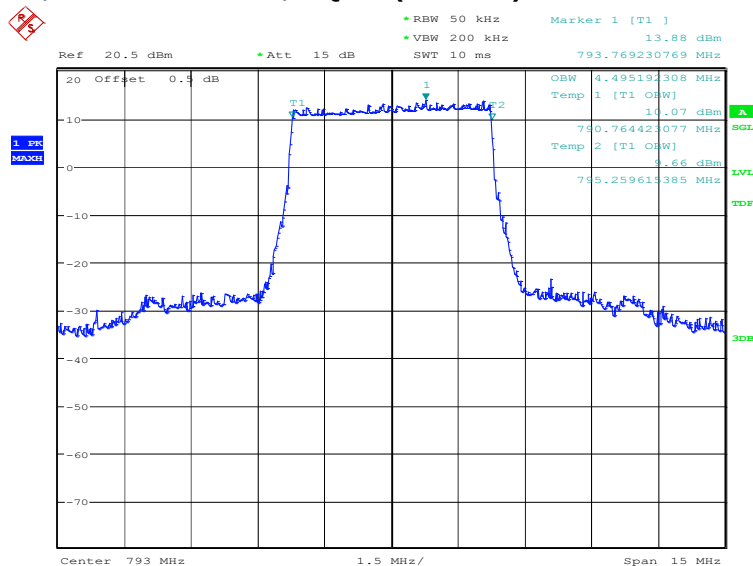
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
793.0	QPSK	16QAM
	4519.23	4495.19

LTE band 14, 5MHz Bandwidth, QPSK (99% BW)



Date: 2.AUG.2022 18:06:17

LTE band 14, 5MHz Bandwidth,16QAM (99% BW)

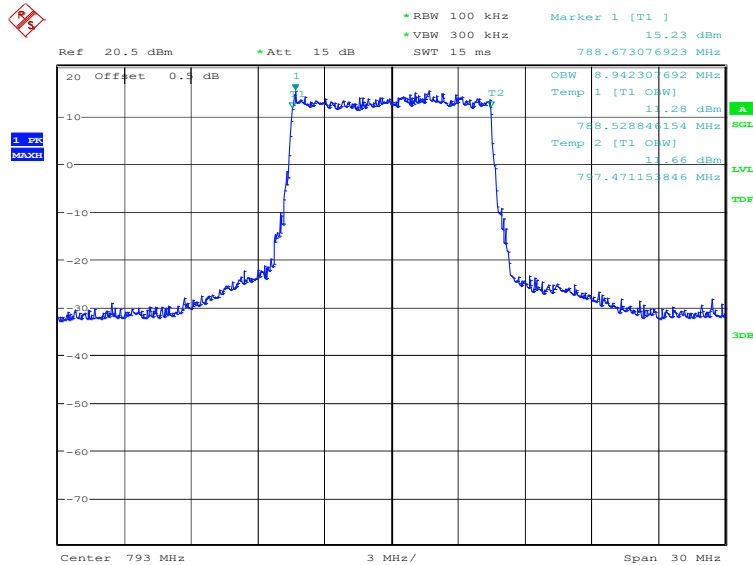


Date: 2.AUG.2022 18:06:56

LTE band 14, 10MHz (99%)

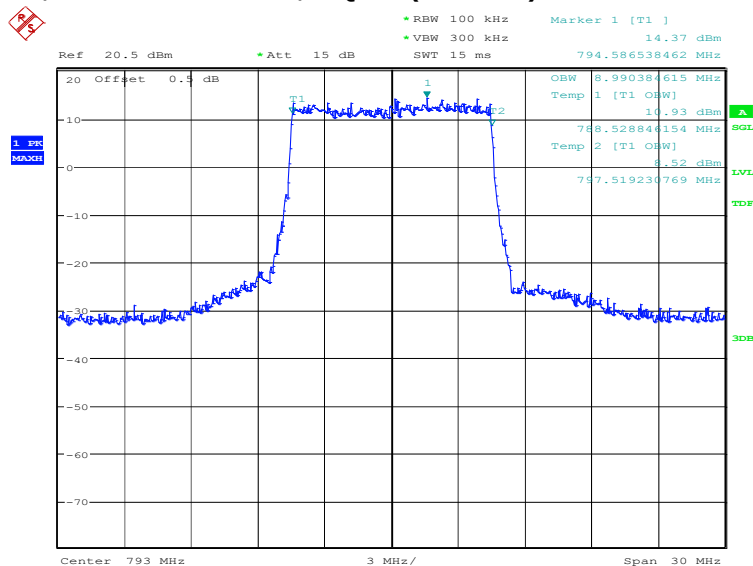
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
793.0	QPSK	16QAM
	8942.31	8990.38

LTE band 14, 10MHz Bandwidth, QPSK (99% BW)



Date: 2.AUG.2022 18:07:38

LTE band 14, 10MHz Bandwidth, 16QAM (99% BW)

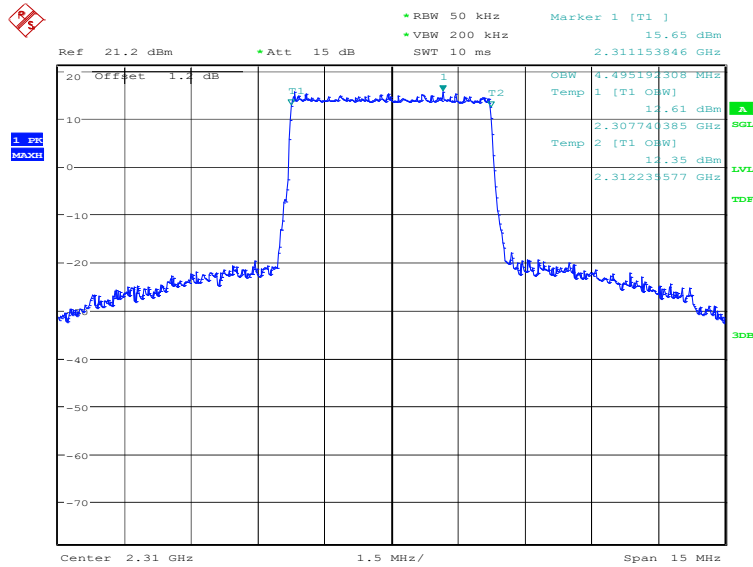


Date: 2.AUG.2022 18:08:17

LTE band 30, 5MHz (99%)

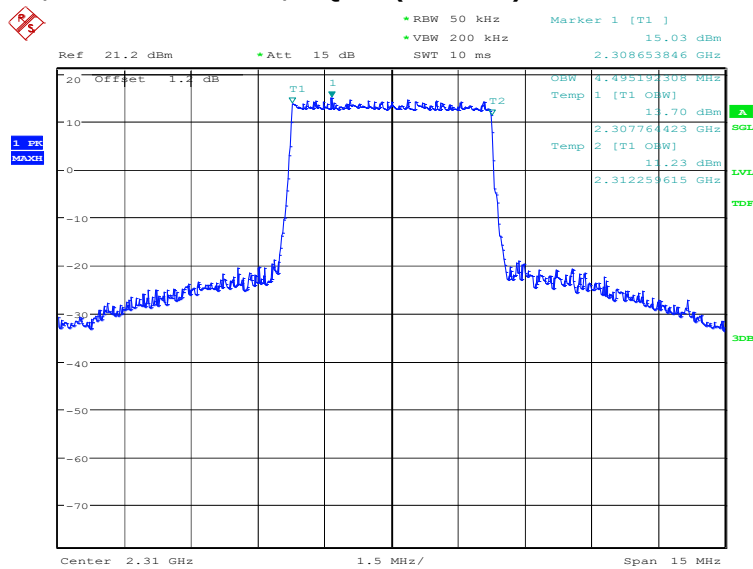
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2310.0	QPSK	16QAM
	4495.19	4495.19

LTE band 30, 5MHz Bandwidth, QPSK (99% BW)



Date: 2.AUG.2022 18:09:00

LTE band 30, 5MHz Bandwidth, 16QAM (99% BW)

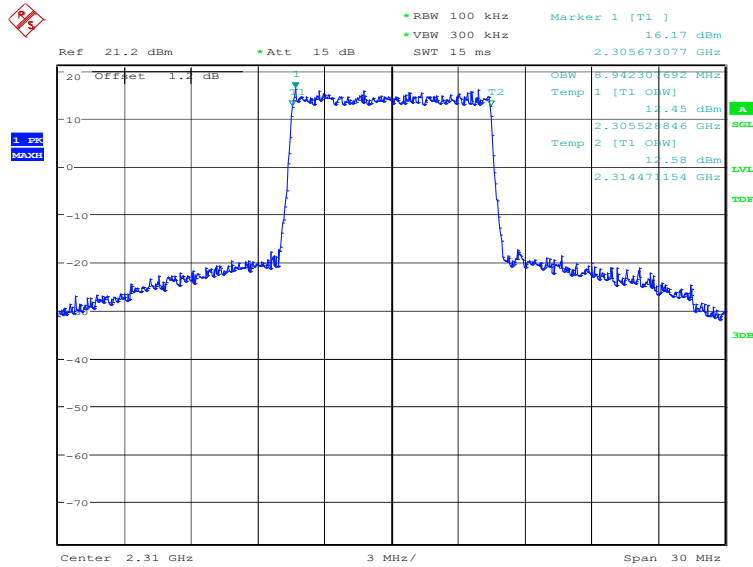


Date: 2.AUG.2022 18:09:40

LTE band 30, 10MHz (99%)

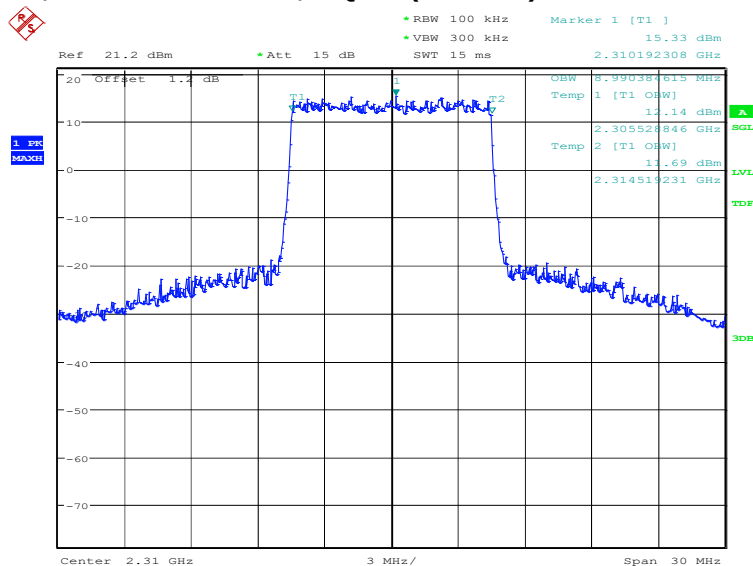
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2310.0	QPSK	16QAM
	8942.31	8990.38

LTE band 30, 10MHz Bandwidth, QPSK (99% BW)



Date: 2.AUG.2022 18:10:21

LTE band 30, 10MHz Bandwidth, 16QAM (99% BW)



Date: 2.AUG.2022 18:11:01

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

A.5 Emission Bandwidth

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

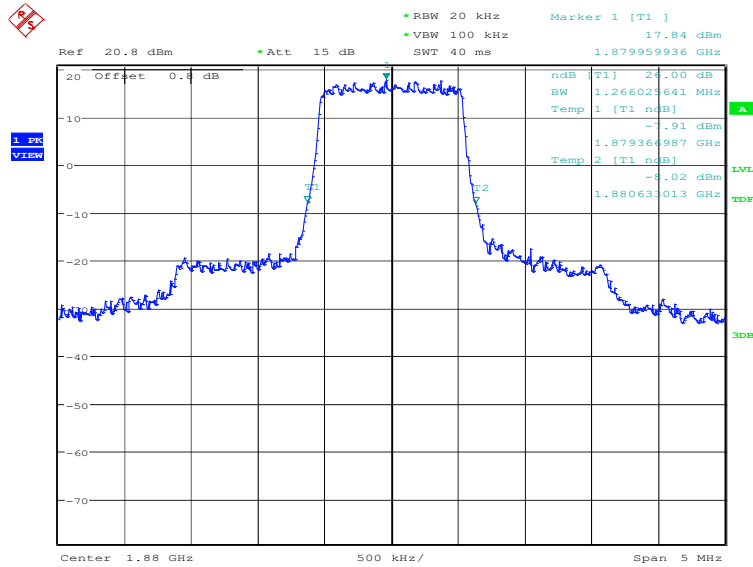
The measurement method is from ANSI C63.26:

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

LTE band 2, 1.4MHz (-26dBc)

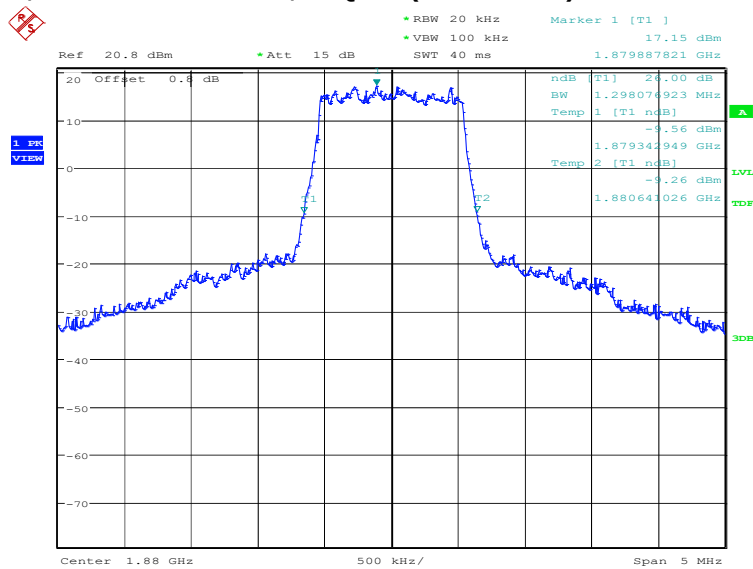
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	1266.03	1298.08

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



Date: 2.AUG.2022 18:12:33

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

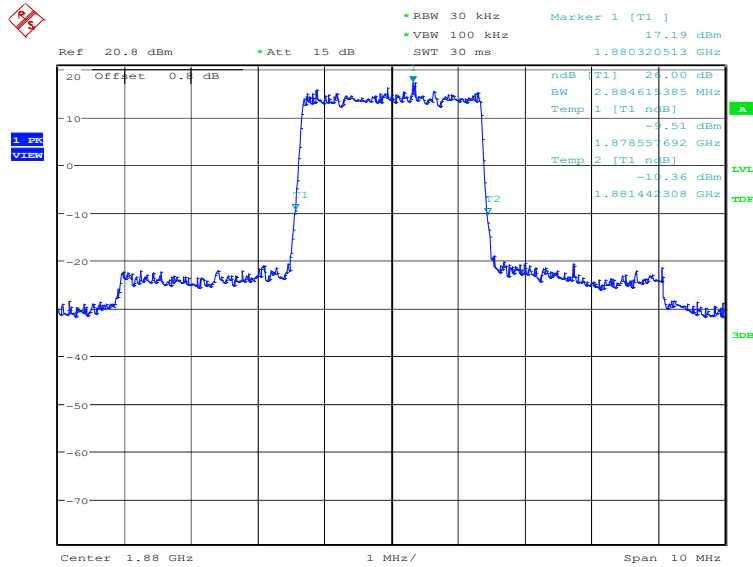


Date: 2.AUG.2022 18:13:13

LTE band 2, 3MHz (-26dBc)

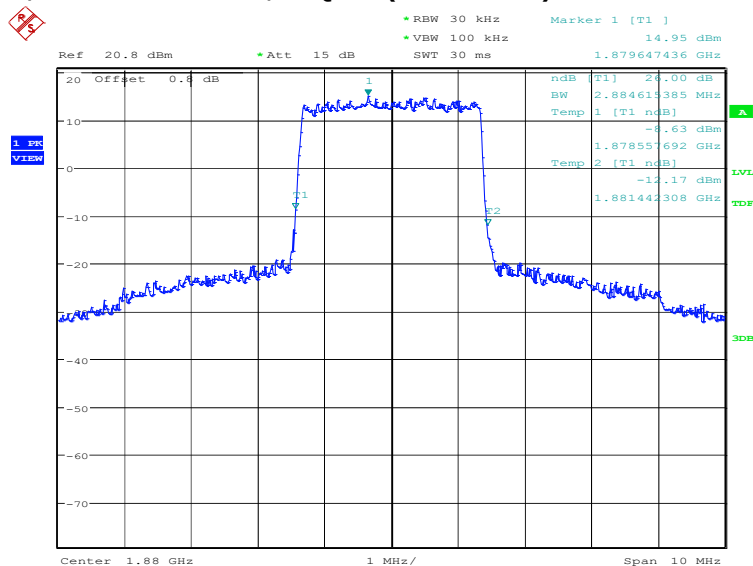
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	2884.62	2884.62

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



Date: 2.AUG.2022 18:13:54

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

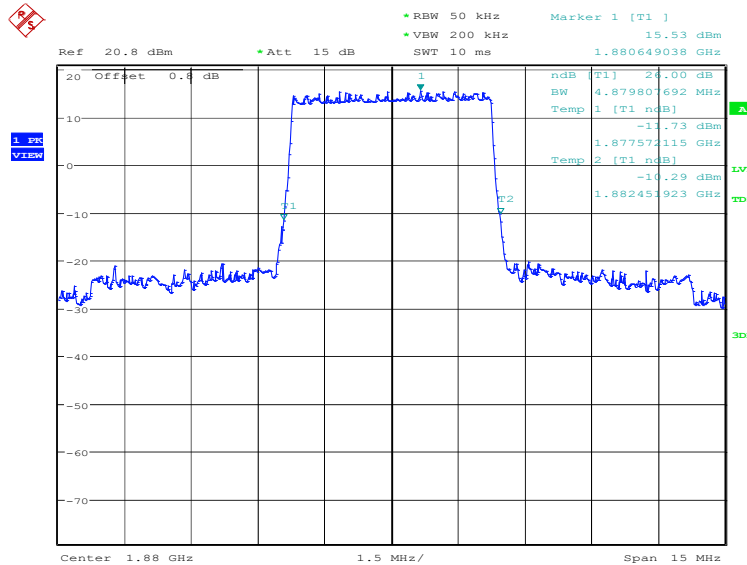


Date: 2.AUG.2022 18:14:34

LTE band 2, 5MHz (-26dBc)

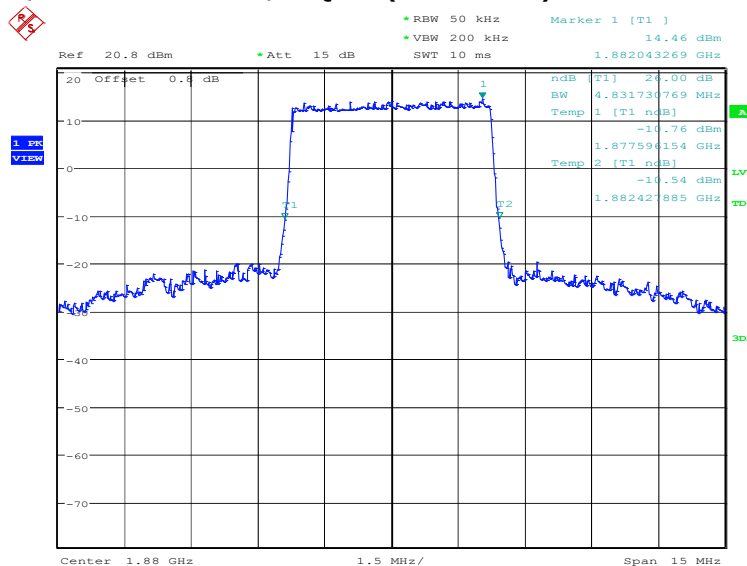
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	4879.81	4831.73

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



Date: 2.AUG.2022 18:15:15

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

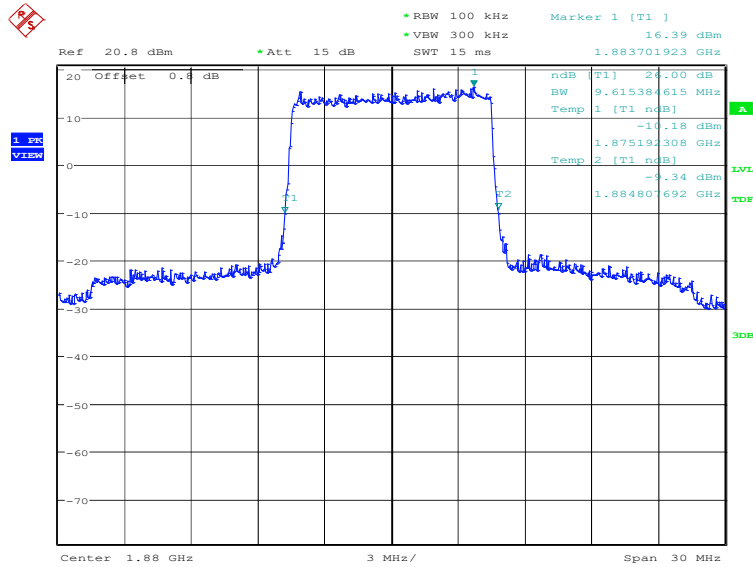


Date: 2.AUG.2022 18:15:55

LTE band 2, 10MHz (-26dBc)

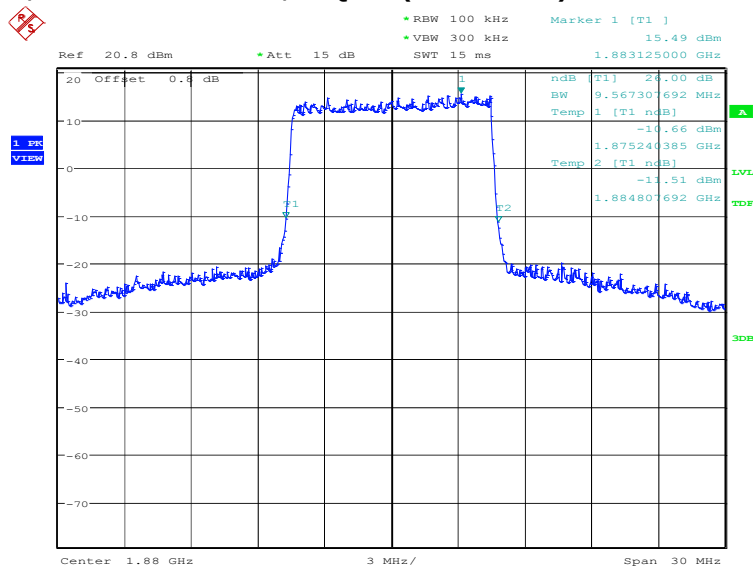
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	9615.38	9567.31

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



Date: 2.AUG.2022 18:16:37

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

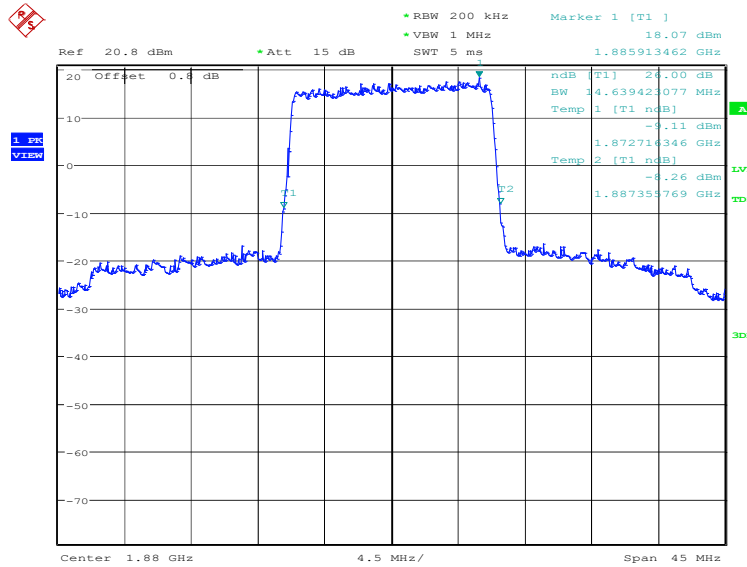


Date: 2.AUG.2022 18:17:17

LTE band 2, 15MHz (-26dBc)

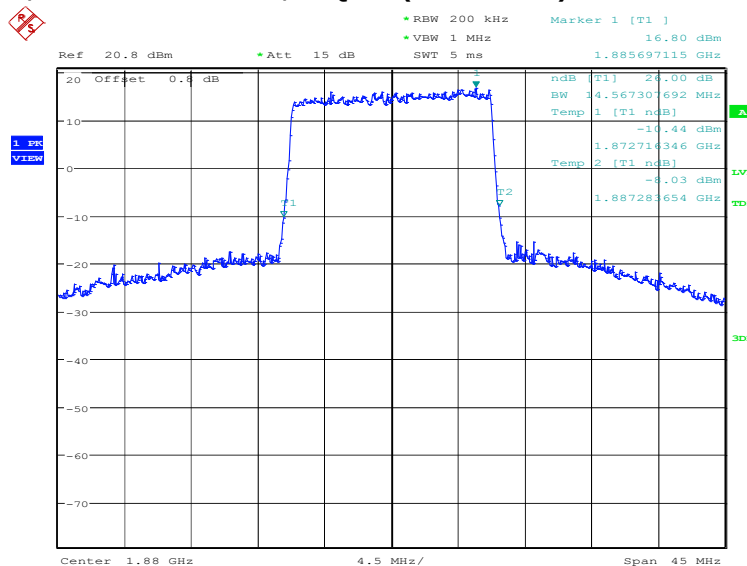
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	14639.42	14567.31

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



Date: 2.AUG.2022 18:17:59

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

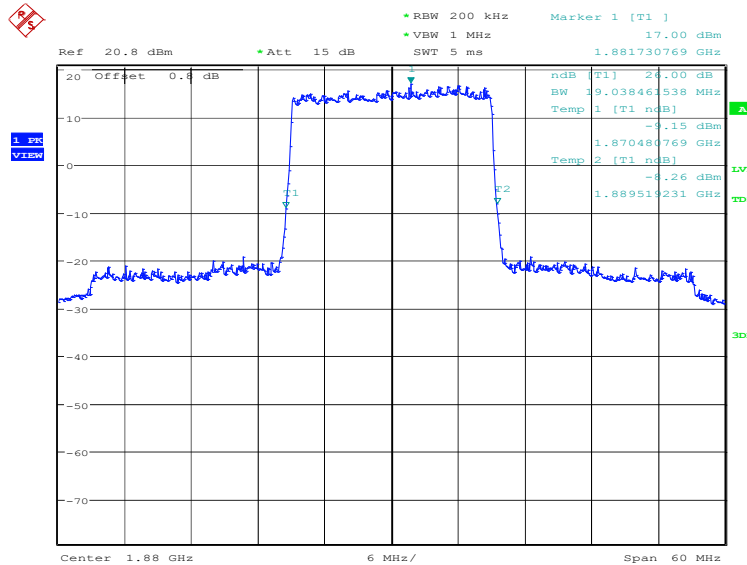


Date: 2.AUG.2022 18:18:39

LTE band 2, 20MHz (-26dBc)

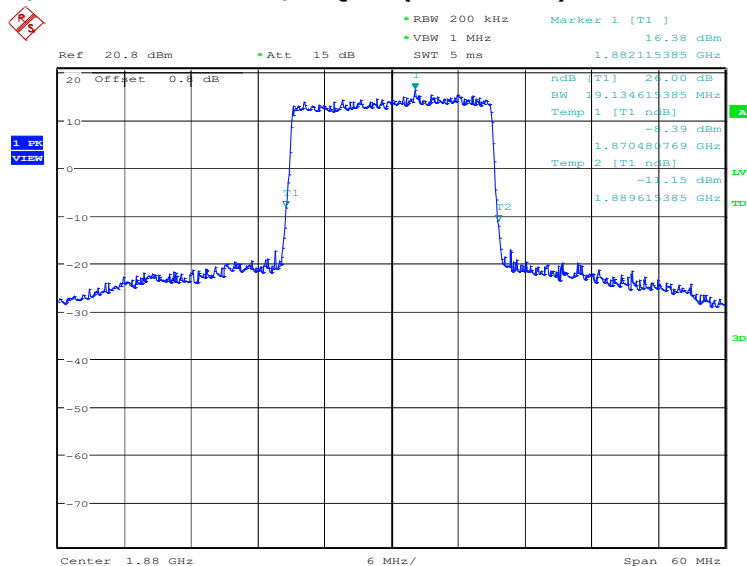
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1880.0	QPSK	16QAM
	19038.46	19134.62

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



Date: 2.AUG.2022 18:19:20

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

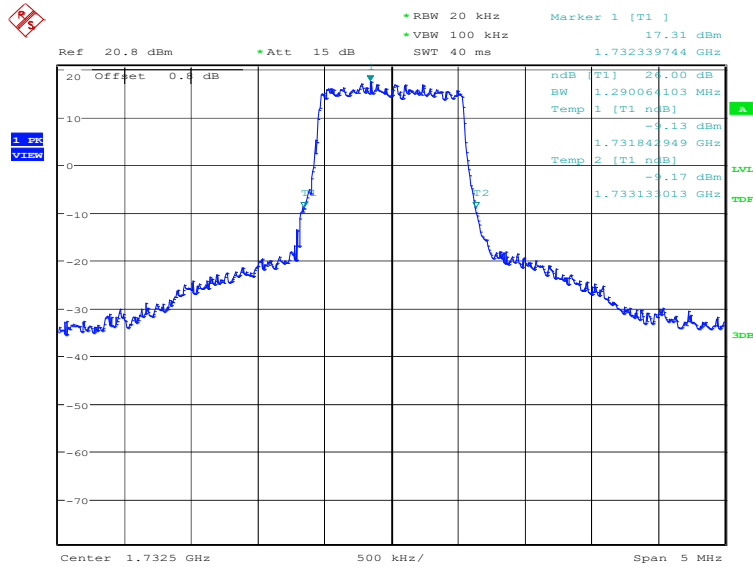


Date: 2.AUG.2022 18:20:00

LTE band 4, 1.4MHz (-26dBc)

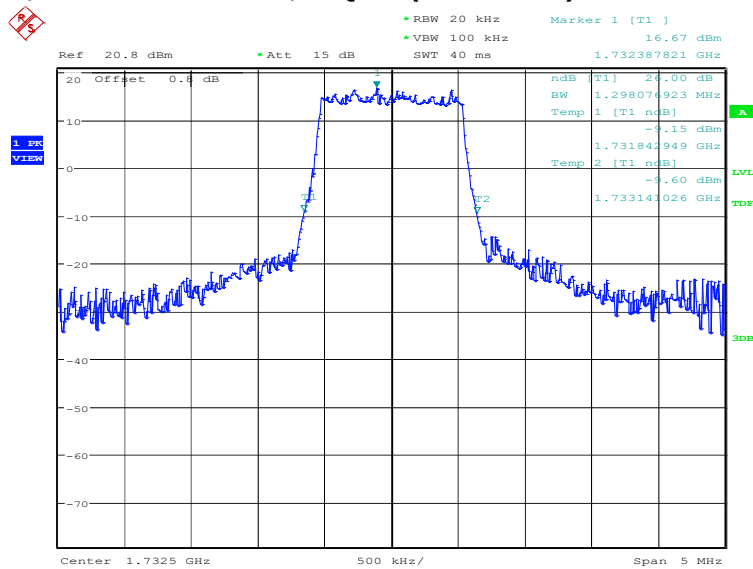
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	1290.06	1298.08

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



Date: 2.AUG.2022 18:20:43

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

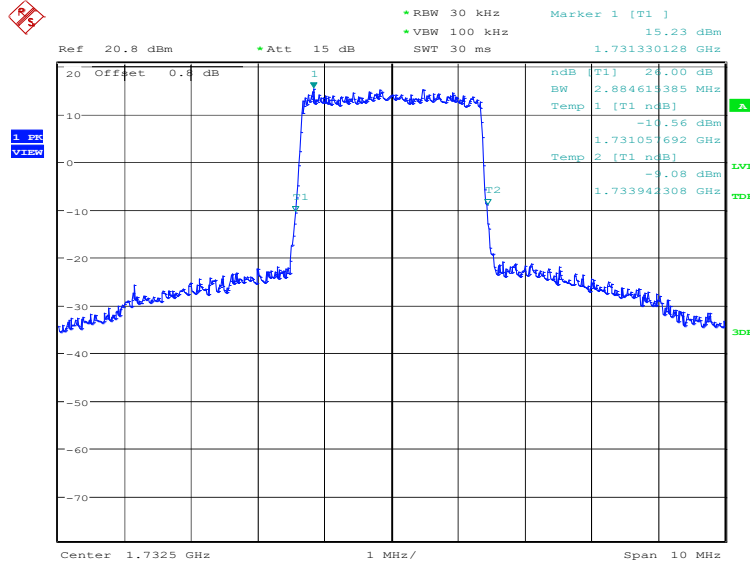


Date: 2.AUG.2022 18:21:23

LTE band 4, 3MHz (-26dBc)

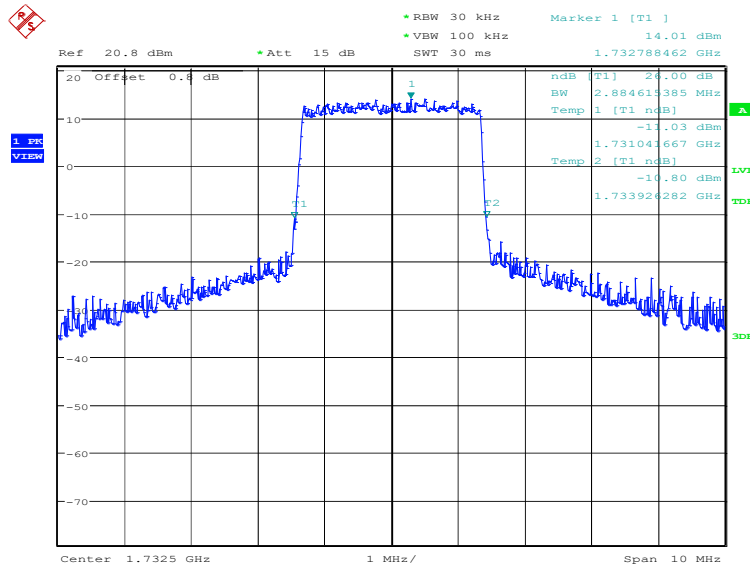
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	2884.62	2884.62

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



Date: 2.AUG.2022 18:22:05

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

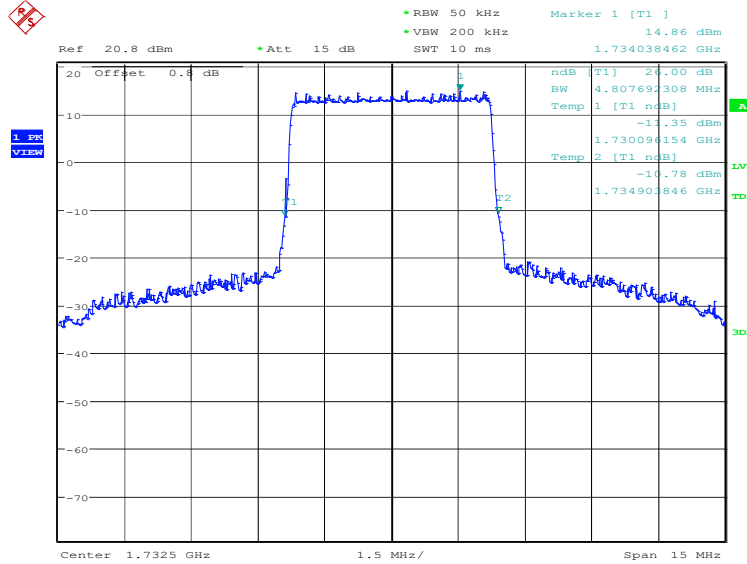


Date: 2.AUG.2022 18:22:45

LTE band 4, 5MHz (-26dBc)

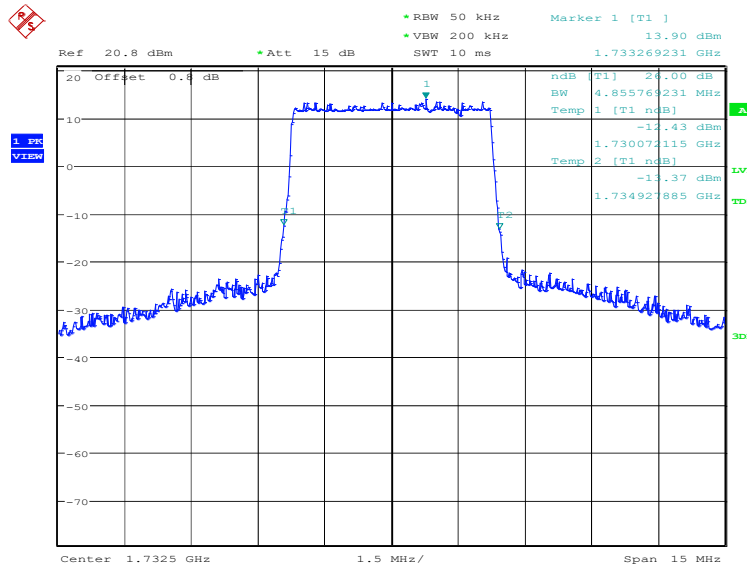
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	4807.69	4855.77

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



Date: 2.AUG.2022 18:23:26

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

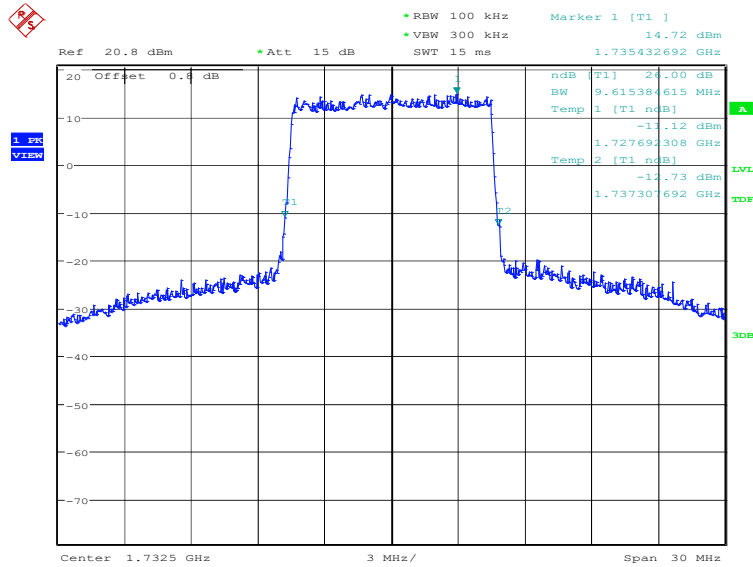


Date: 2.AUG.2022 18:24:06

LTE band 4, 10MHz (-26dBc)

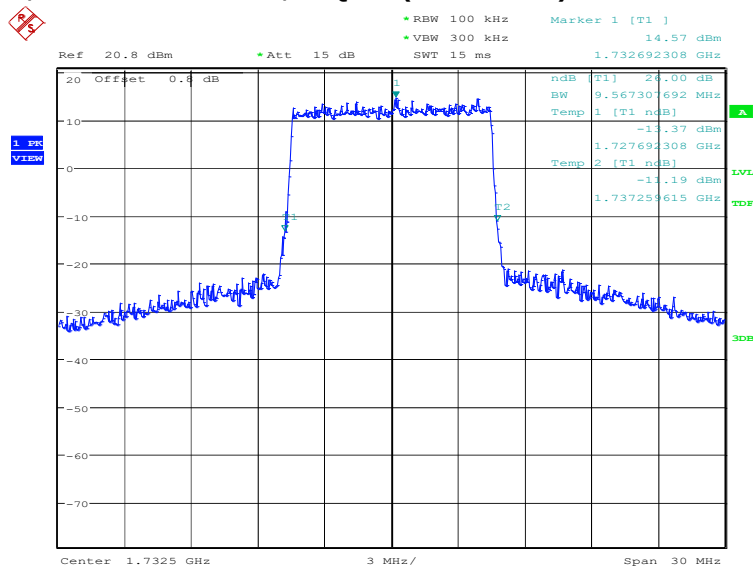
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	9615.38	9567.31

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



Date: 2.AUG.2022 18:24:48

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

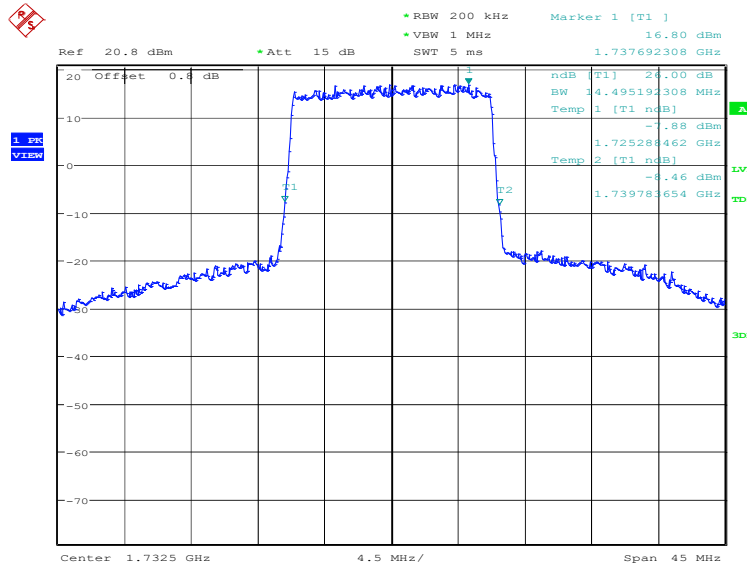


Date: 2.AUG.2022 18:25:28

LTE band 4, 15MHz (-26dBc)

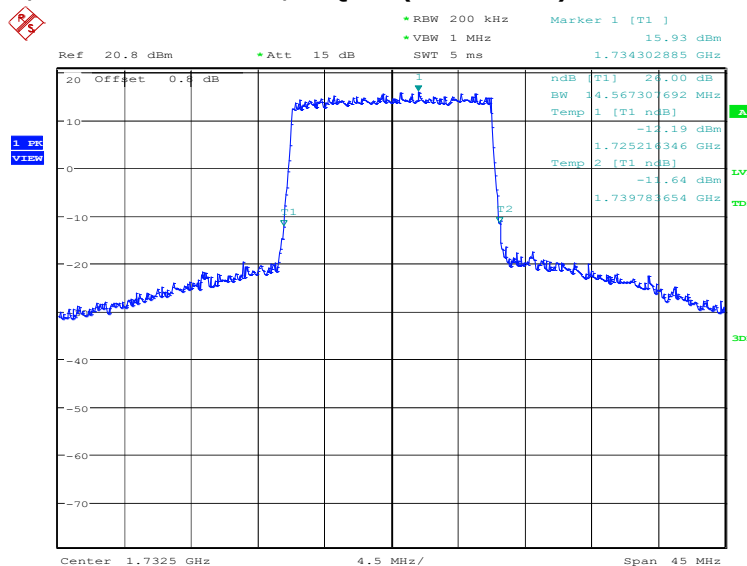
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	14495.19	14567.31

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



Date: 2.AUG.2022 18:26:10

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

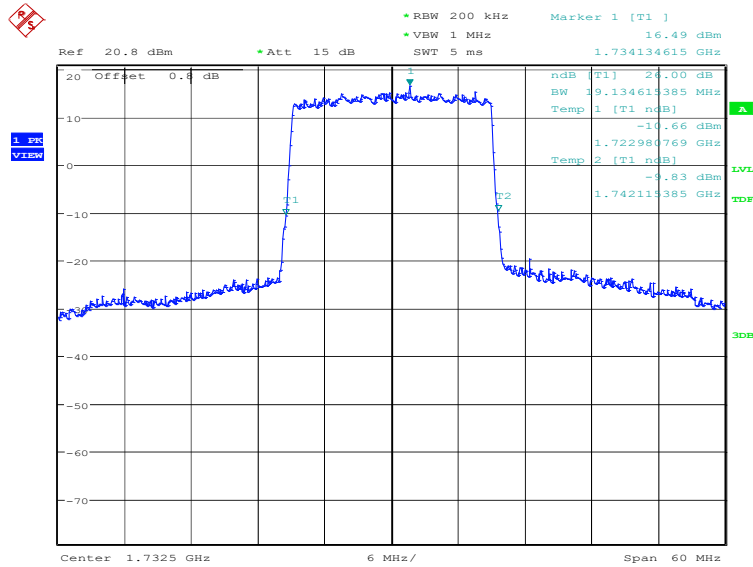


Date: 2.AUG.2022 18:26:50

LTE band 4, 20MHz (-26dBc)

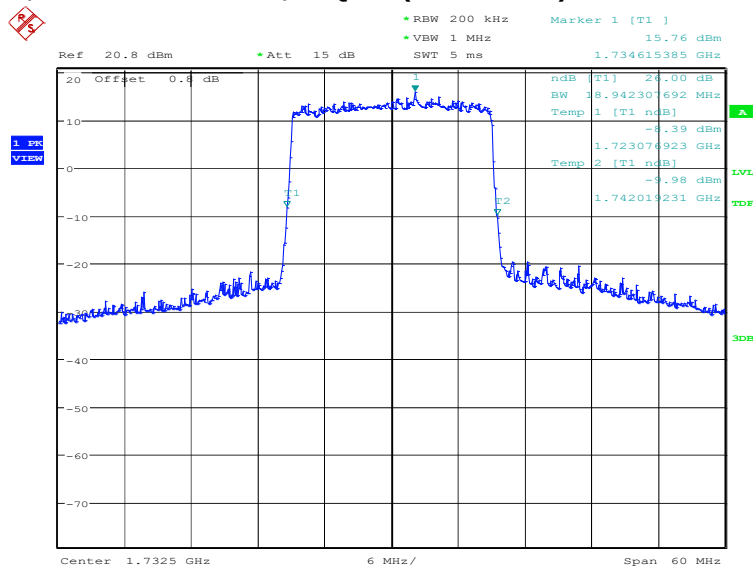
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
1732.5	QPSK	16QAM
	19134.62	18942.31

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



Date: 2.AUG.2022 18:27:32

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

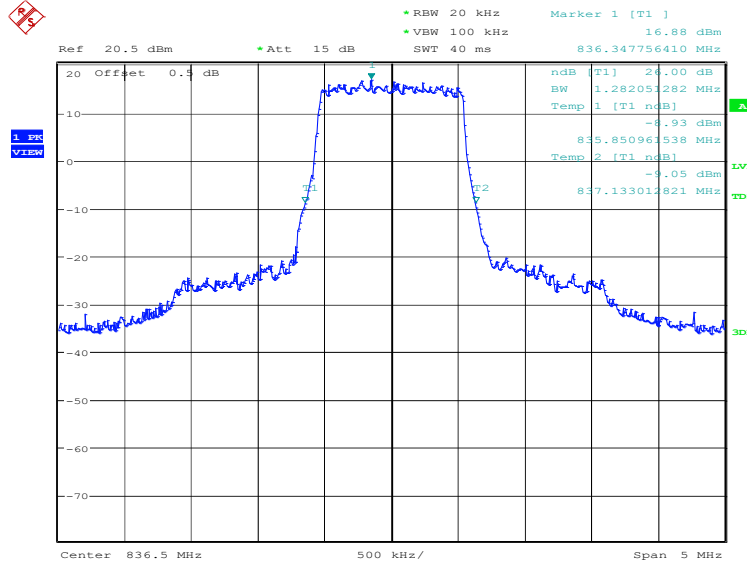


Date: 2.AUG.2022 18:28:12

LTE band 5, 1.4MHz (-26dBc)

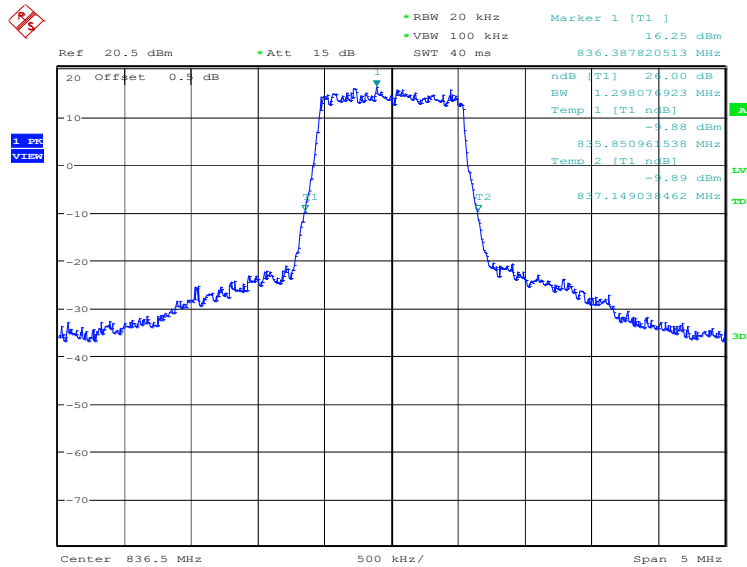
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	1282.05	1298.08

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



Date: 2.AUG.2022 18:28:55

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

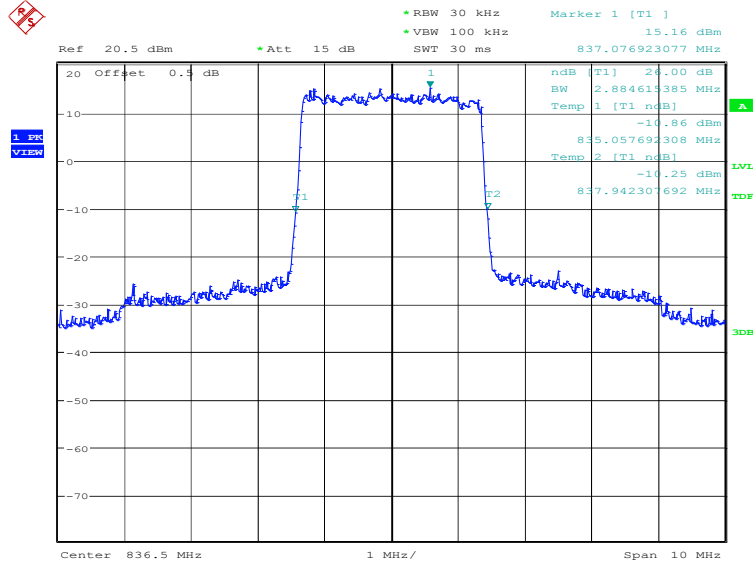


Date: 2.AUG.2022 18:29:36

LTE band 5, 3MHz (-26dBc)

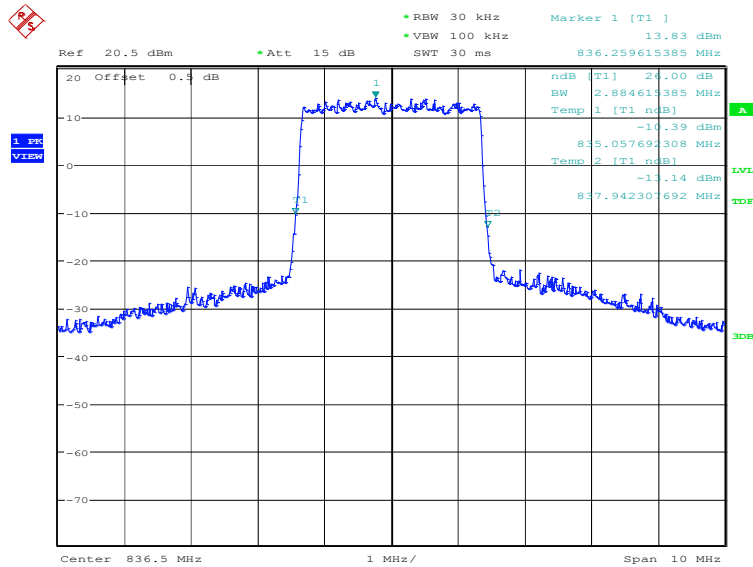
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	2884.62	2884.62

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



Date: 2.AUG.2022 18:30:17

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

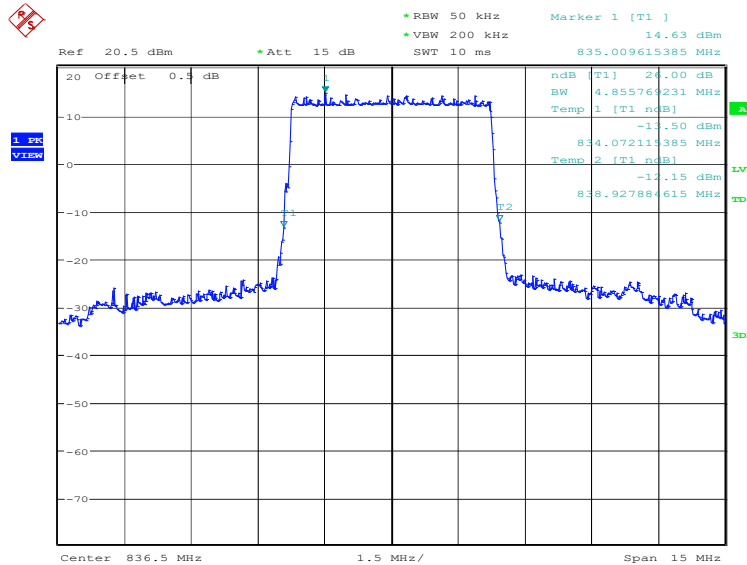


Date: 2.AUG.2022 18:30:57

LTE band 5, 5MHz (-26dBc)

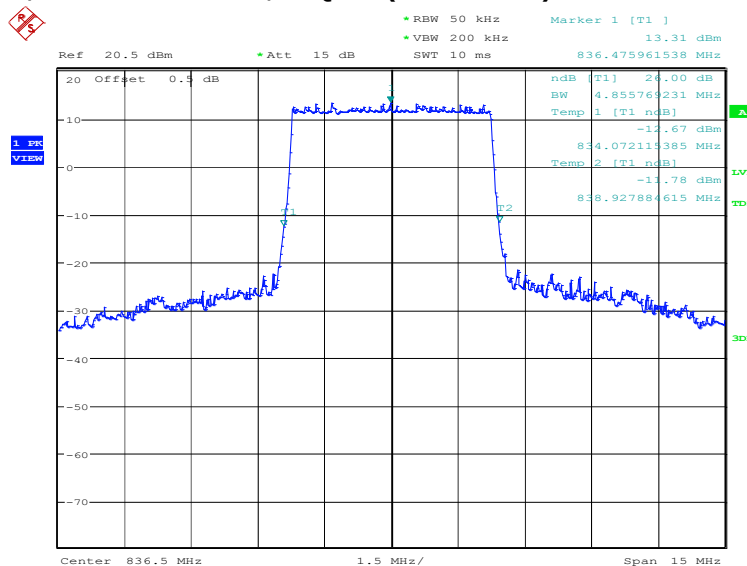
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	4855.77	4855.77

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



Date: 2.AUG.2022 18:31:39

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

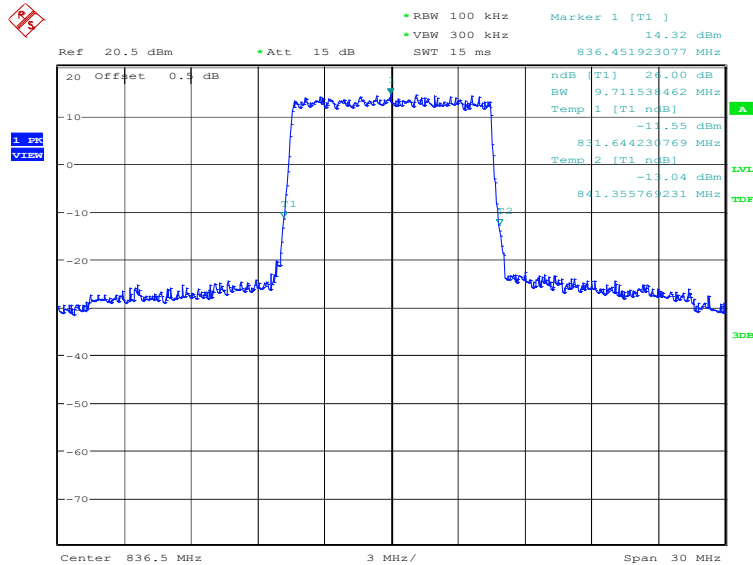


Date: 2.AUG.2022 18:32:19

LTE band 5, 10MHz (-26dBc)

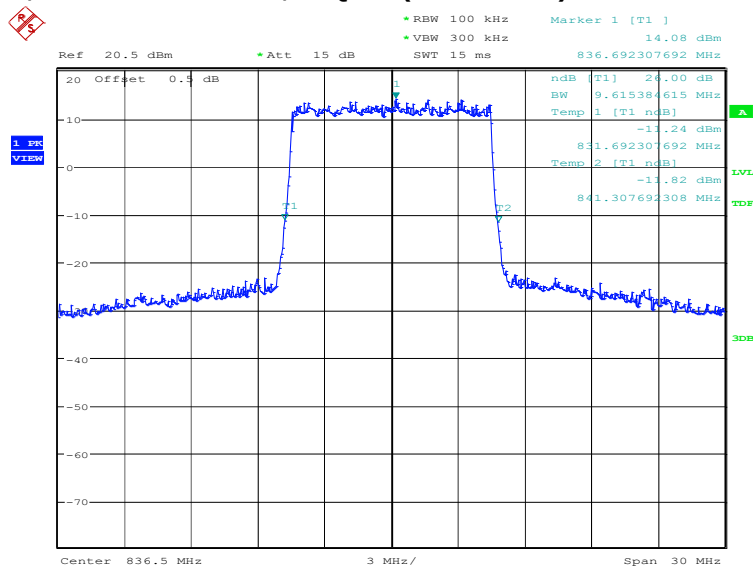
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	9711.54	9615.38

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



Date: 2.AUG.2022 18:33:01

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

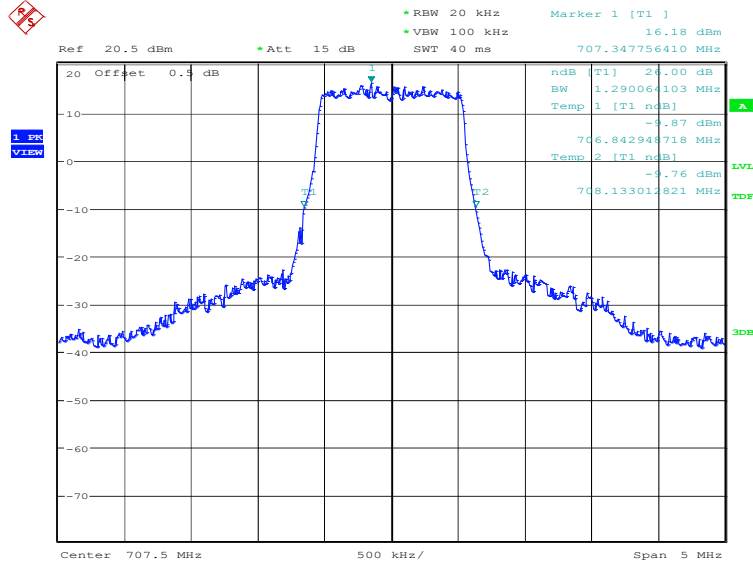


Date: 2.AUG.2022 18:33:41

LTE band 12, 1.4MHz (-26dBc)

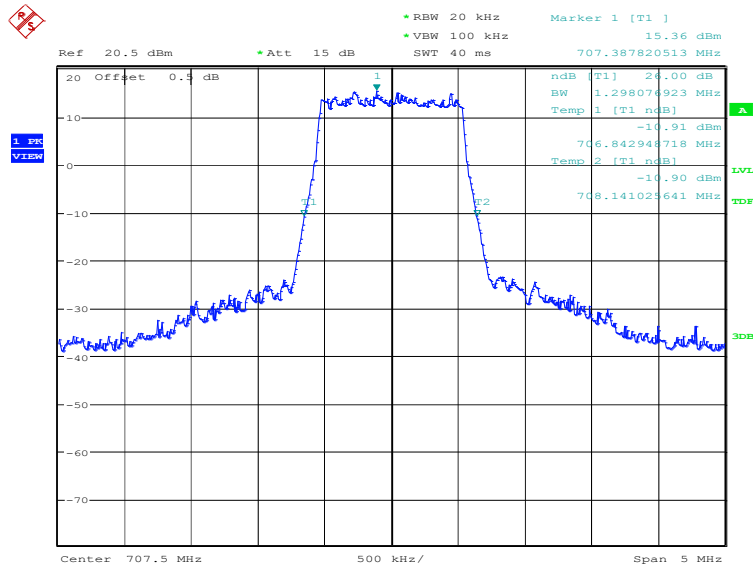
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	1290.06	1298.08

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



Date: 2.AUG.2022 18:34:24

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

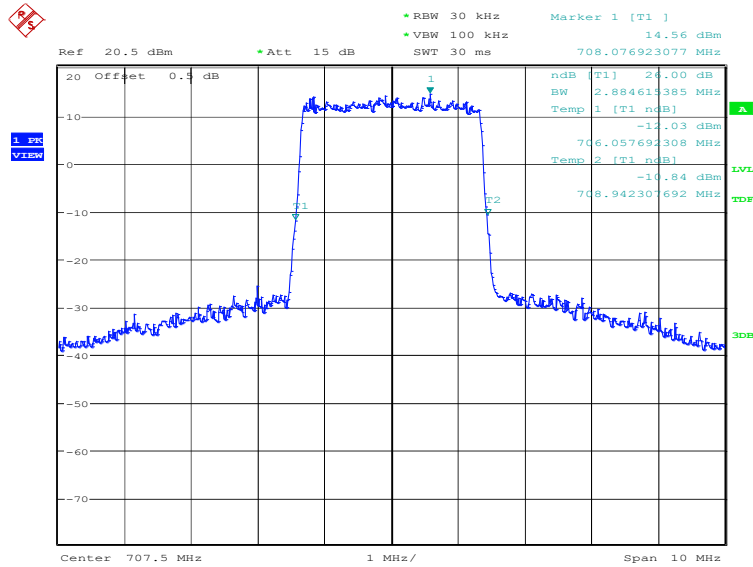


Date: 2.AUG.2022 18:35:04

LTE band 12, 3MHz (-26dBc)

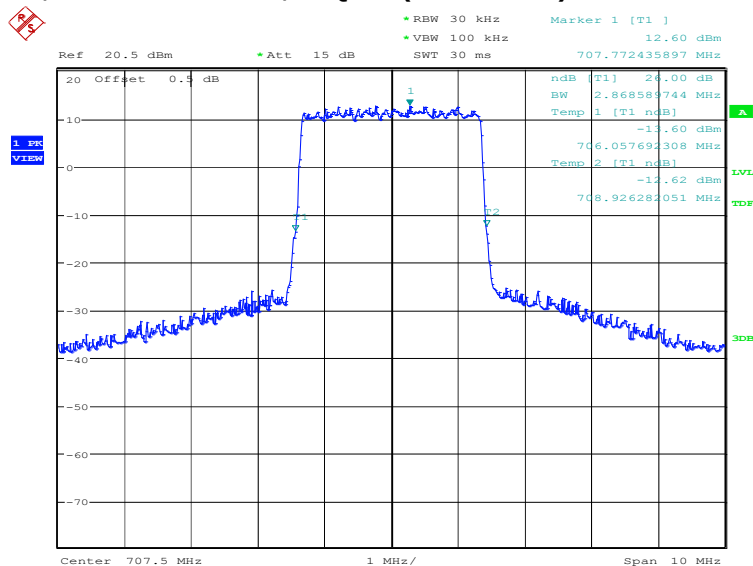
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	2884.62	2868.59

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



Date: 2.AUG.2022 18:35:45

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

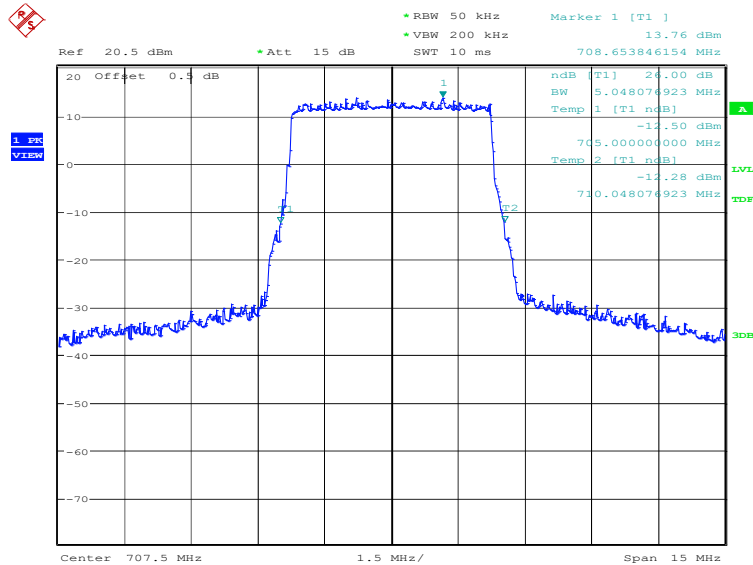


Date: 2.AUG.2022 18:36:26

LTE band 12, 5MHz (-26dBc)

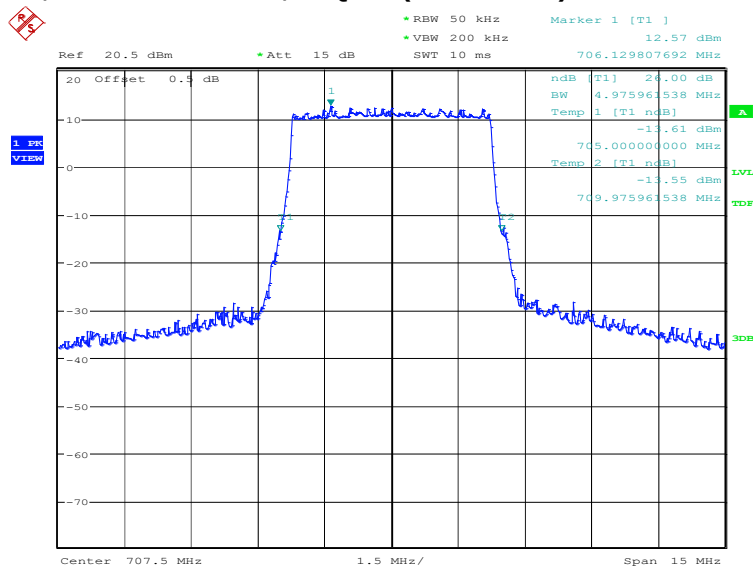
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	5048.08	4975.96

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



Date: 2.AUG.2022 18:37:07

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

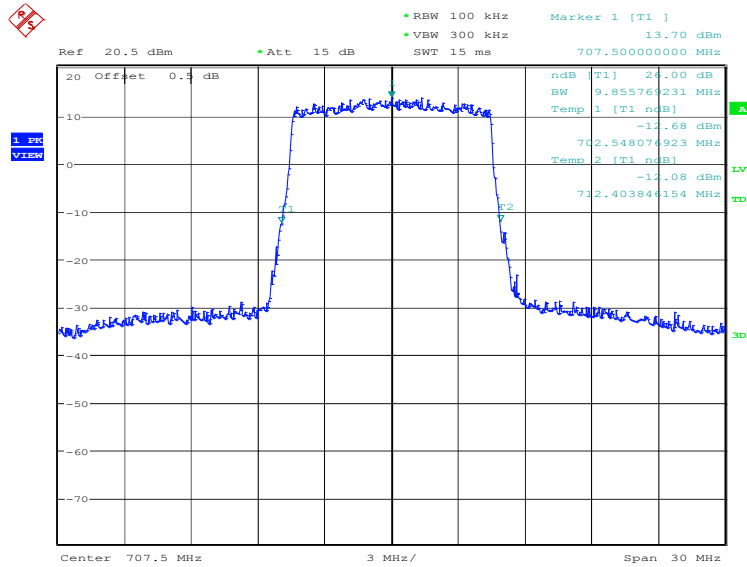


Date: 2.AUG.2022 18:37:48

LTE band 12, 10MHz (-26dBc)

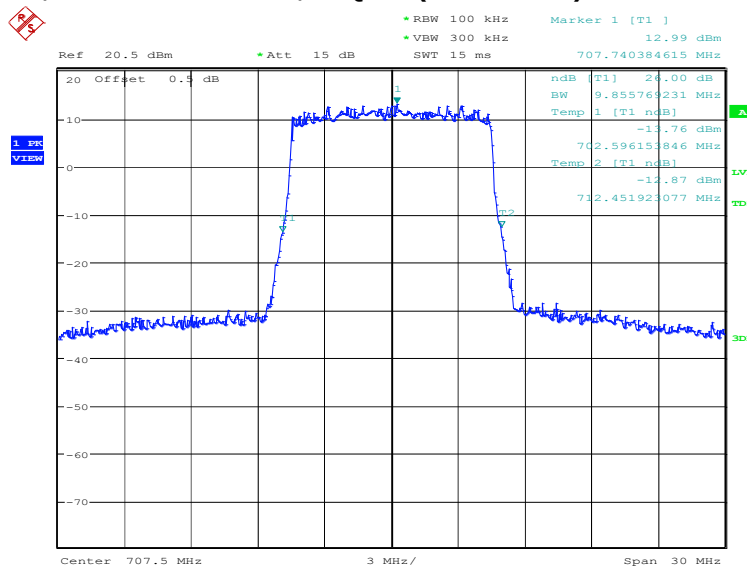
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
707.5	QPSK	16QAM
	9855.77	9855.77

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



Date: 2.AUG.2022 18:38:30

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

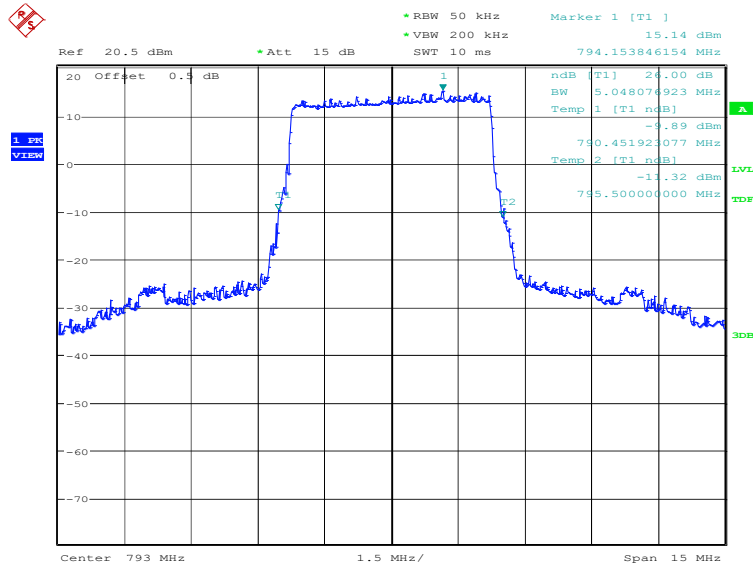


Date: 2.AUG.2022 18:39:10

LTE band 14, 5MHz (-26dBc)

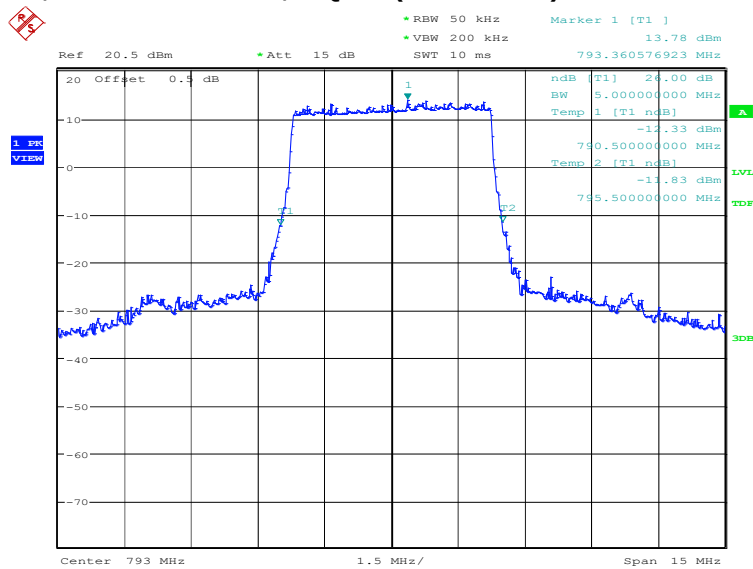
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
793.0	QPSK	16QAM
	5048.08	5000.00

LTE band 14, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.AUG.2022 18:39:53

LTE band 14, 5MHz Bandwidth,16QAM (-26dBc BW)

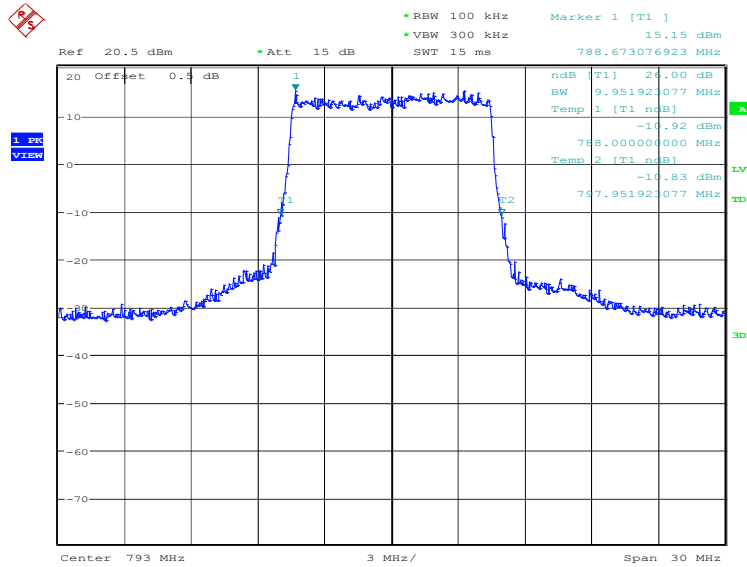


Date: 2.AUG.2022 18:40:33

LTE band 14, 10MHz (-26dBc)

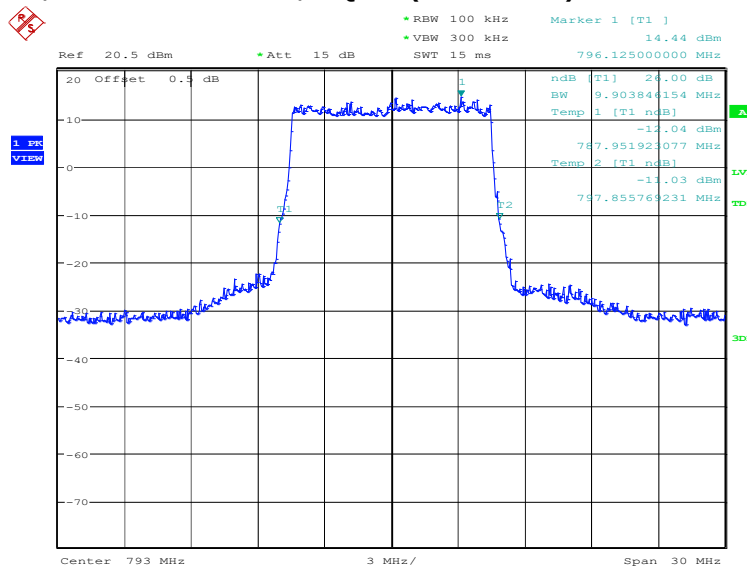
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
793.0	QPSK	16QAM
	9951.92	9903.85

LTE band 14, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.AUG.2022 18:41:15

LTE band 14, 10MHz Bandwidth, 16QAM (-26dBc BW)

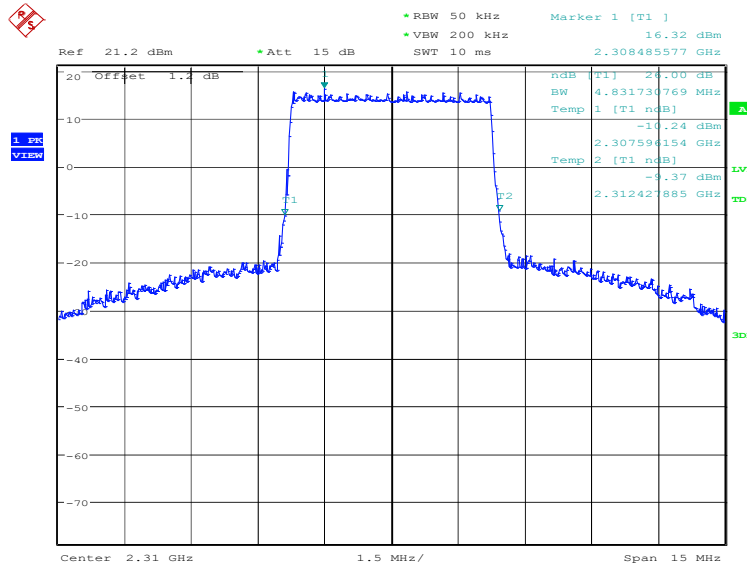


Date: 2.AUG.2022 18:41:55

LTE band 30, 5MHz (-26dBc)

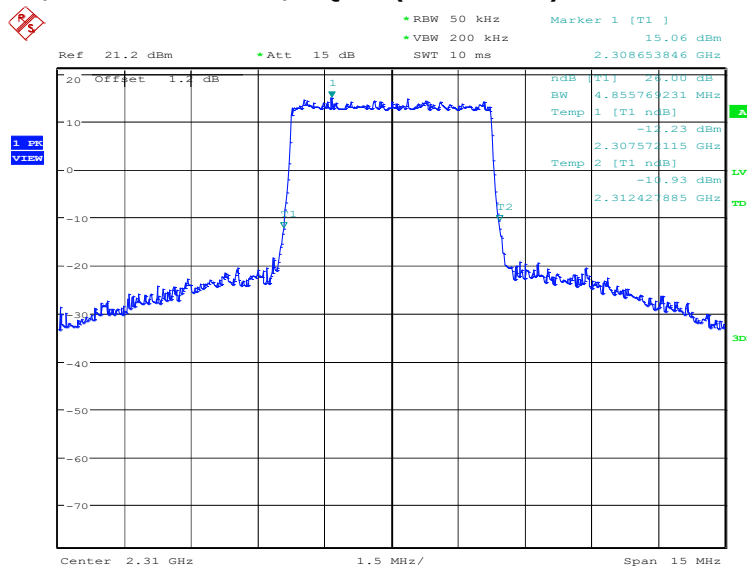
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
2310.0	QPSK	16QAM
	4831.73	4855.77

LTE band 30, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.AUG.2022 18:42:38

LTE band 30, 5MHz Bandwidth,16QAM (-26dBc BW)

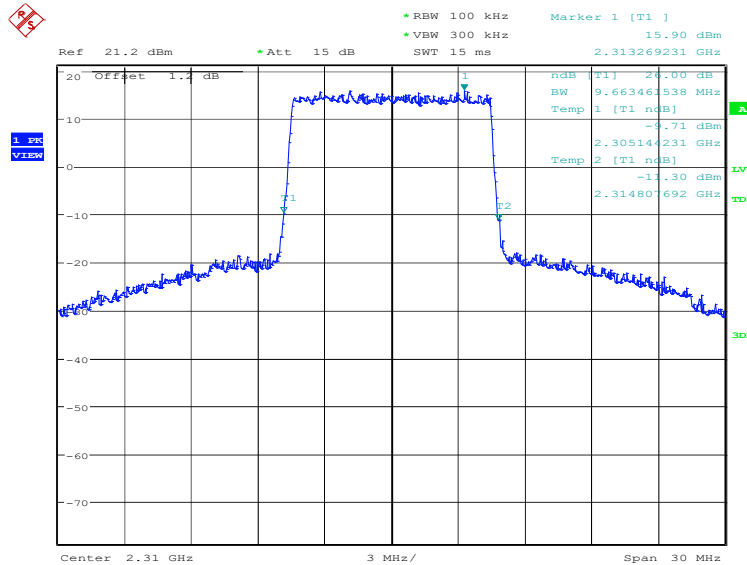


Date: 2.AUG.2022 18:43:18

LTE band 30, 10MHz (-26dBc)

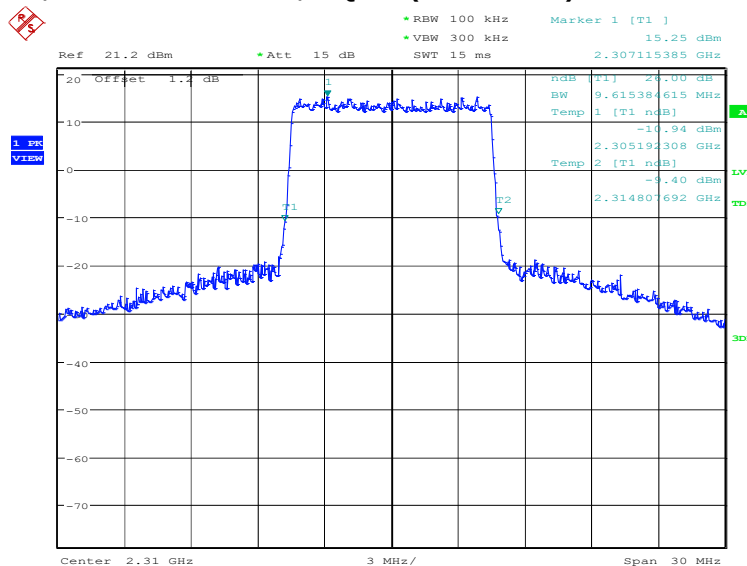
Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)	
2310.0	QPSK	16QAM
	9663.46	9615.38

LTE band 30, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.AUG.2022 18:43:59

LTE band 30, 10MHz Bandwidth, 16QAM (-26dBc BW)



Date: 2.AUG.2022 18:44:38

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

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

Part 27.53(a) states for mobile and portable stations operating in the 2305–2315 MHz and 2350–2360 MHz bands: By a factor of not less than: $43 + 10 \log(P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log(P)$ dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $61 + 10 \log(P)$ dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $67 + 10 \log(P)$ dB on all frequencies between 2328 and 2337 MHz; By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log(P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log(P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log(P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log(P)$ dB below 2288 MHz; By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log(P)$ dB above 2365 MHz.

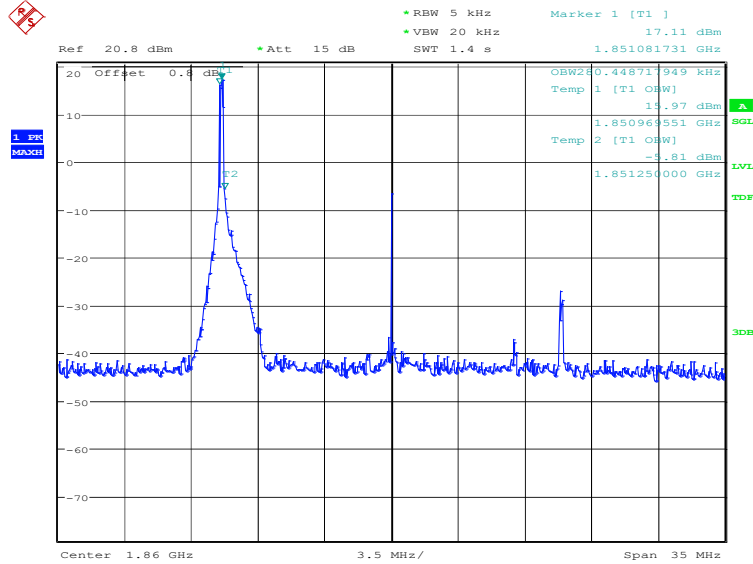
Part 90.543 states that for operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations. (2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations. (3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log(P)$ dB. (4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment. (5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

A.6.2 Measurement result

Only the worst case result is given below

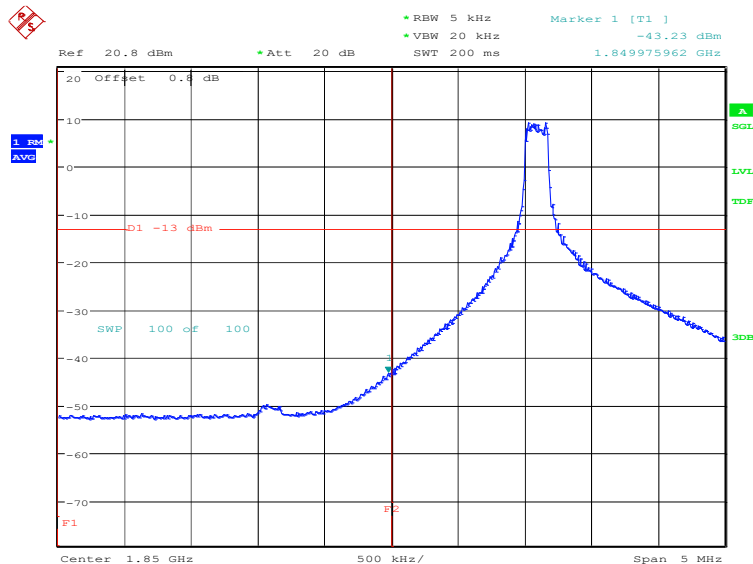
LTE band 2

OBW: 1RB-low_offset



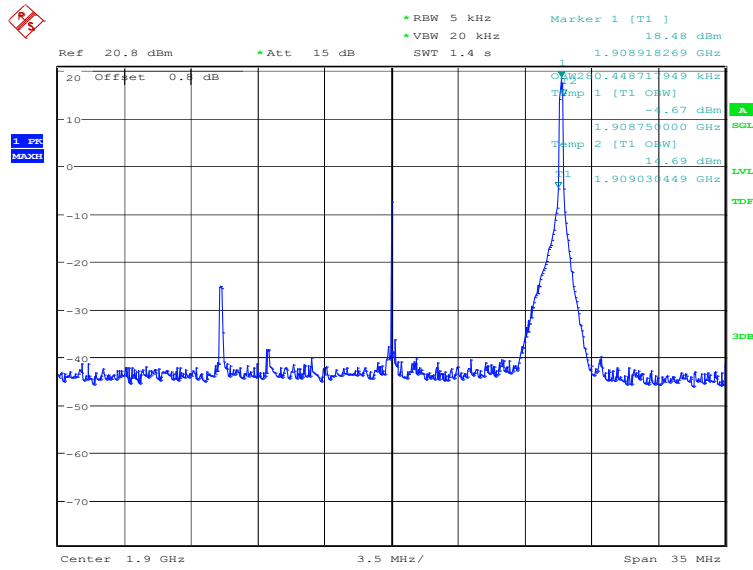
Date: 30.AUG.2022 08:51:22

LOW BAND EDGE BLOCK-1RB-low_offset



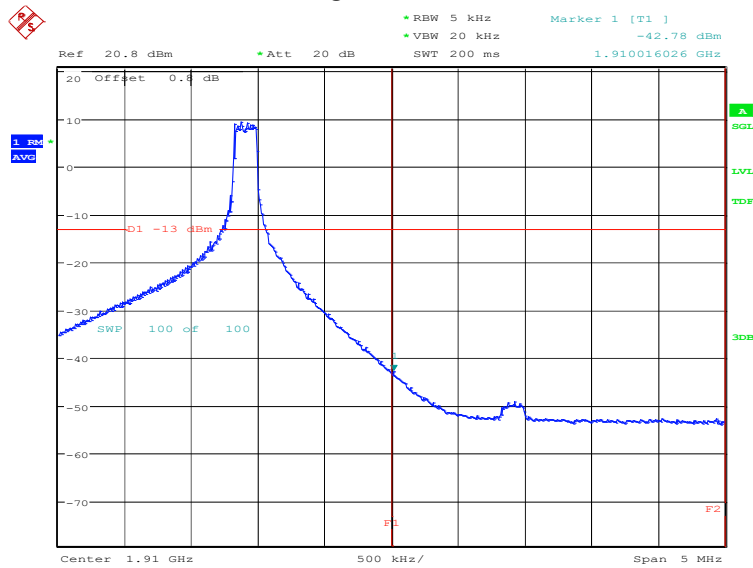
Date: 30.AUG.2022 08:52:36

OBW: 1RB-high_offset



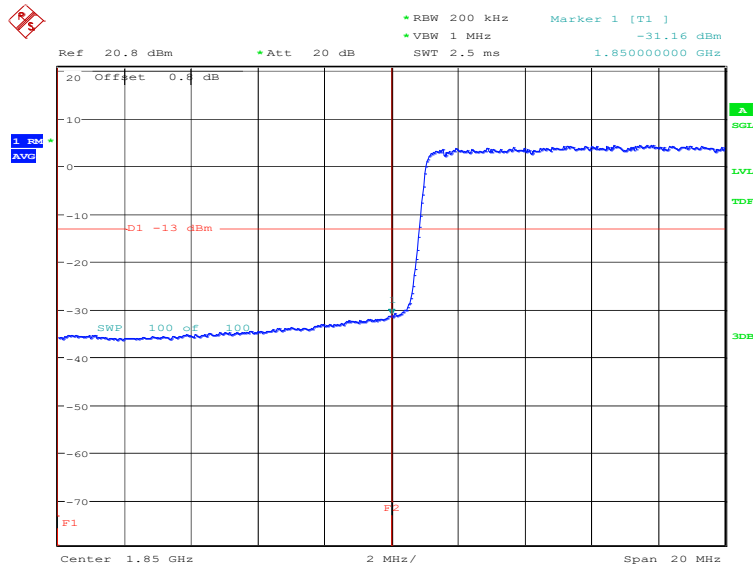
Date: 30.AUG.2022 08:53:11

HIGH BAND EDGE BLOCK-1RB-high_offset



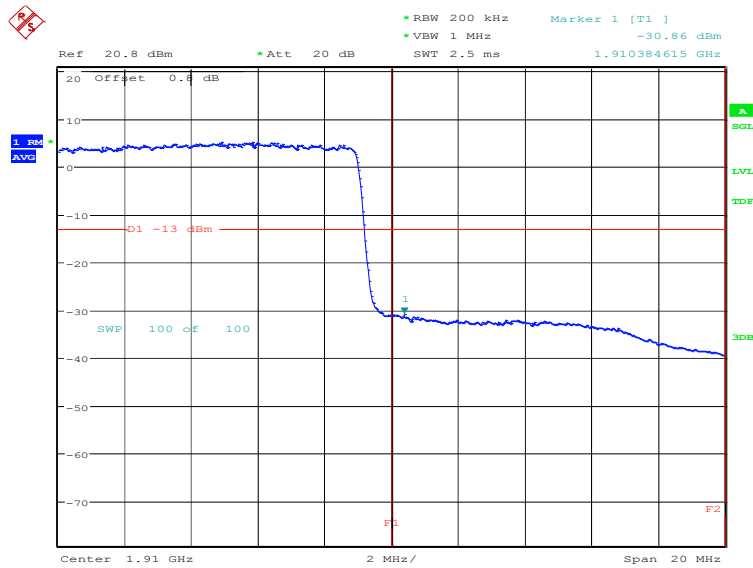
Date: 30.AUG.2022 08:54:25

LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 2.AUG.2022 18:45:49

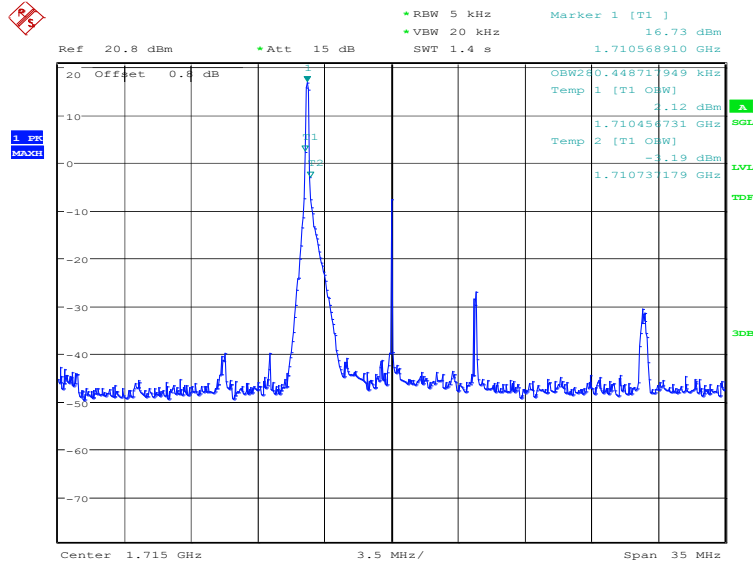
HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 2.AUG.2022 18:47:19

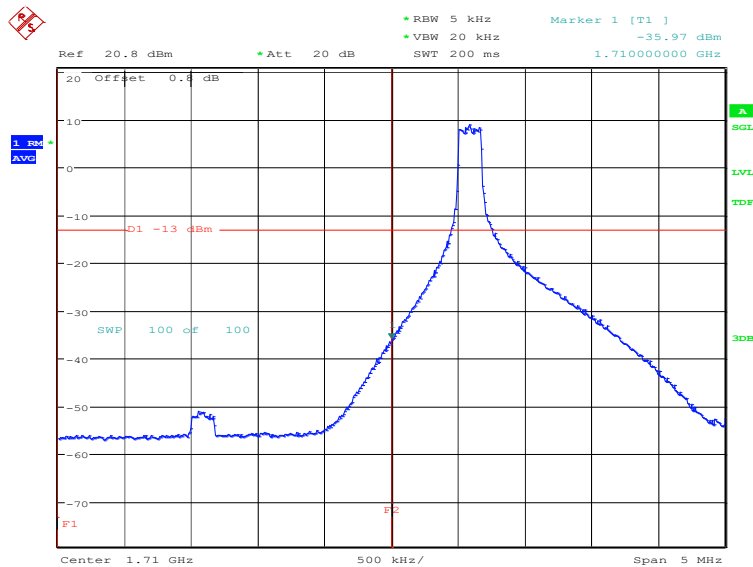
LTE band 4

OBW: 1RB-low_offset



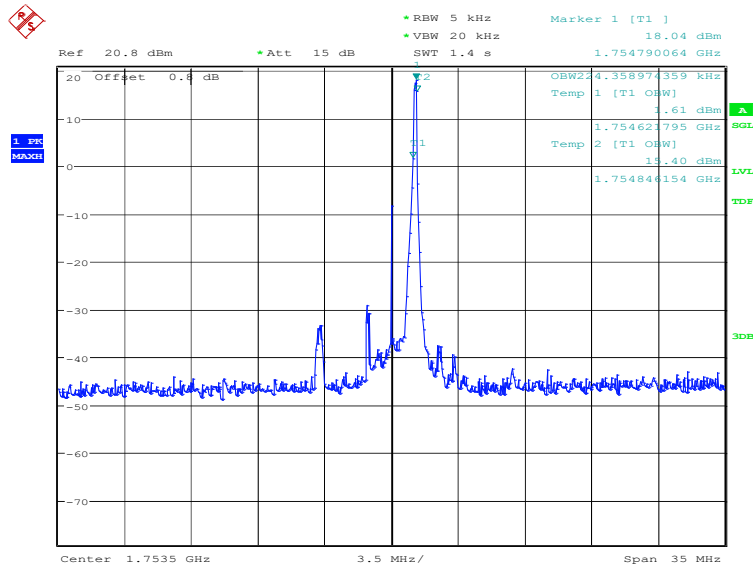
Date: 30.AUG.2022 08:55:43

LOW BAND EDGE BLOCK-1RB-low_offset



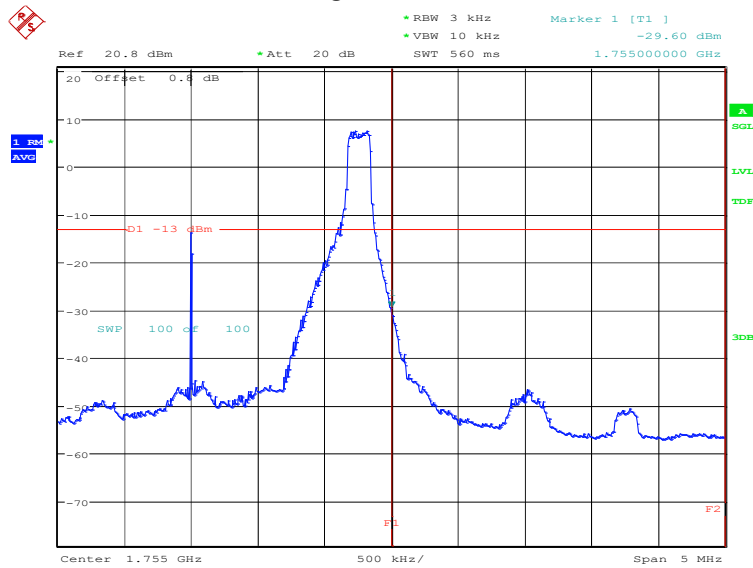
Date: 30.AUG.2022 08:56:56

OBW: 1RB-high_offset



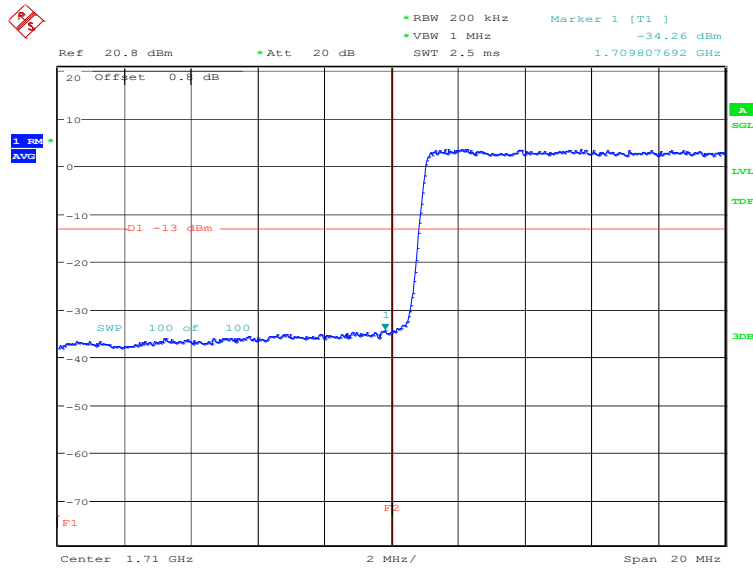
Date: 30.AUG.2022 08:59:55

HIGH BAND EDGE BLOCK-1RB-high_offset



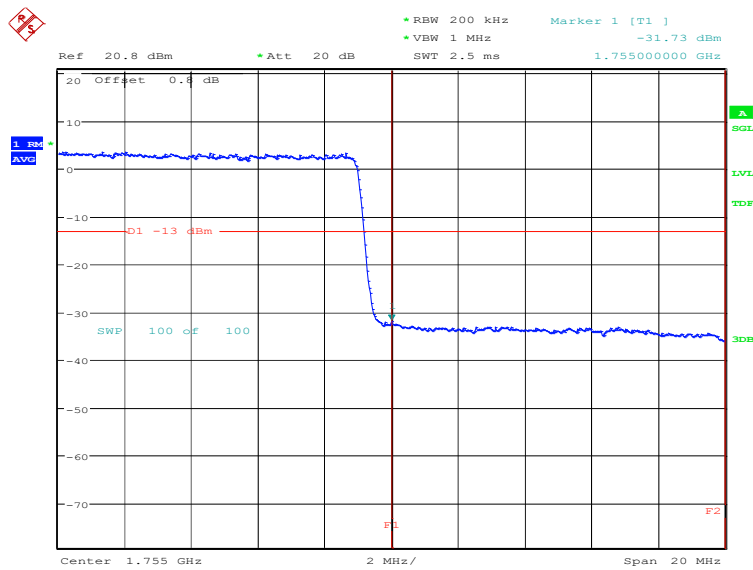
Date: 30.AUG.2022 09:01:09

LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 2.AUG.2022 18:48:51

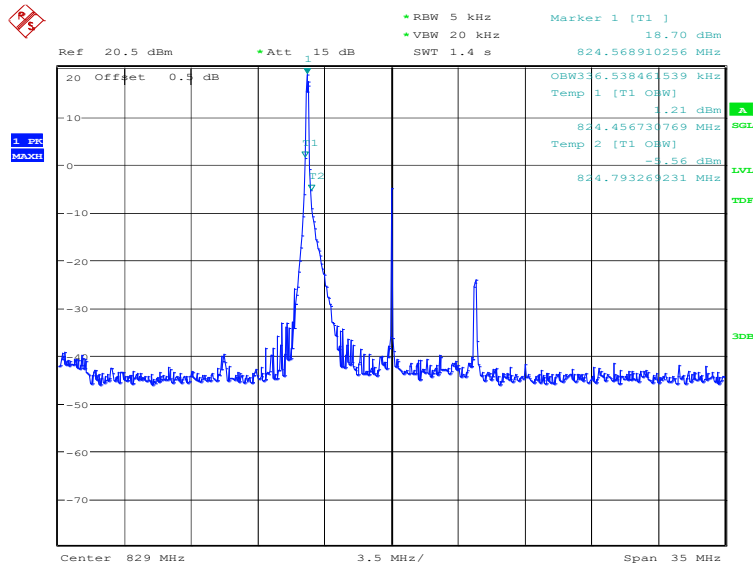
HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 2.AUG.2022 18:50:21

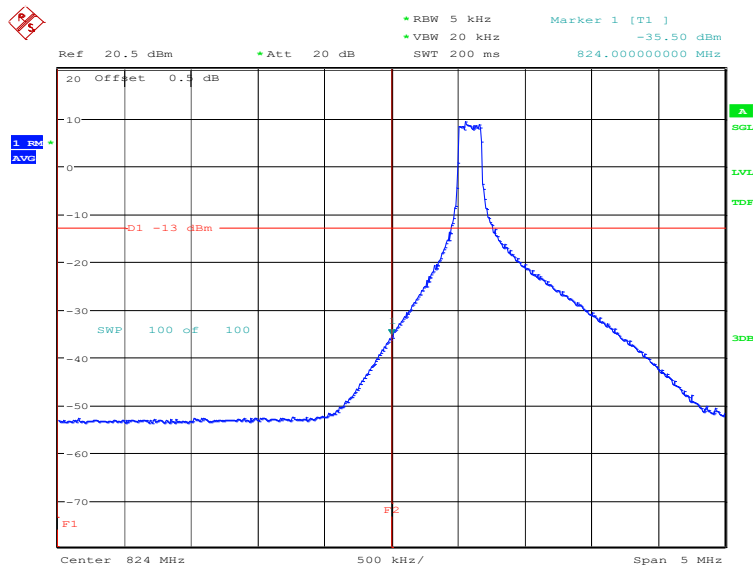
LTE band 5

OBW: 1RB-low_offset



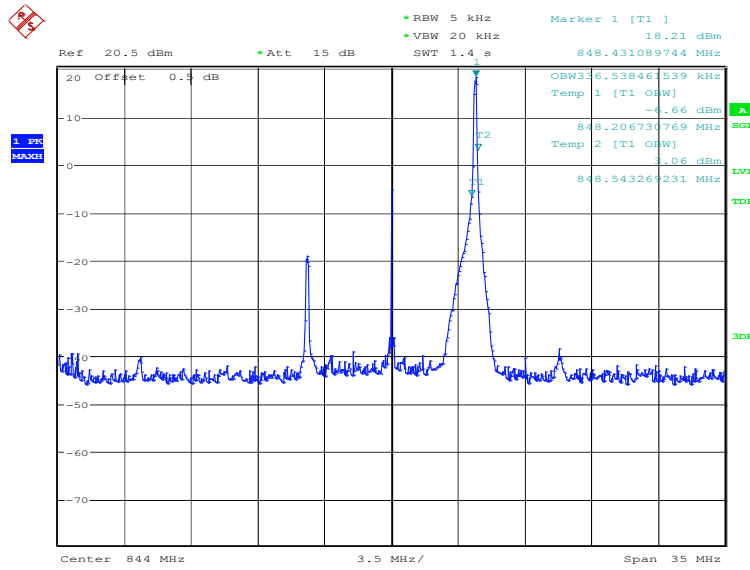
Date: 30.AUG.2022 09:01:47

LOW BAND EDGE BLOCK-1RB-low_offset



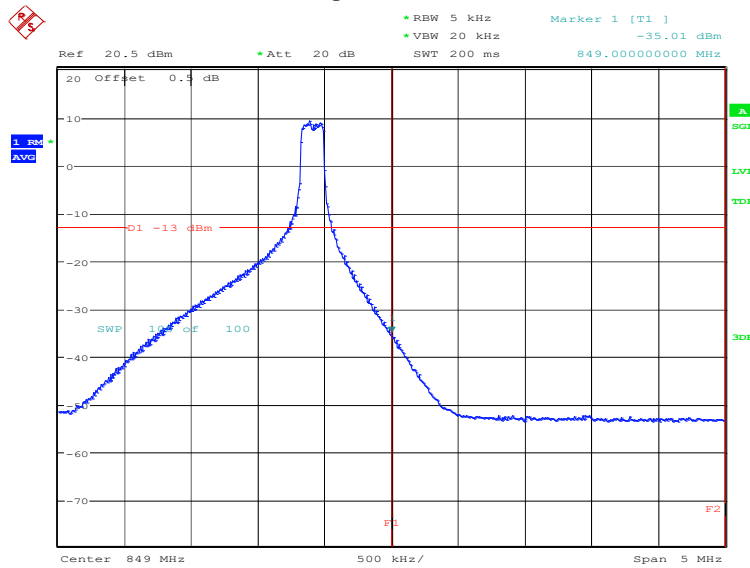
Date: 30.AUG.2022 09:03:00

OBW: 1RB-high_offset



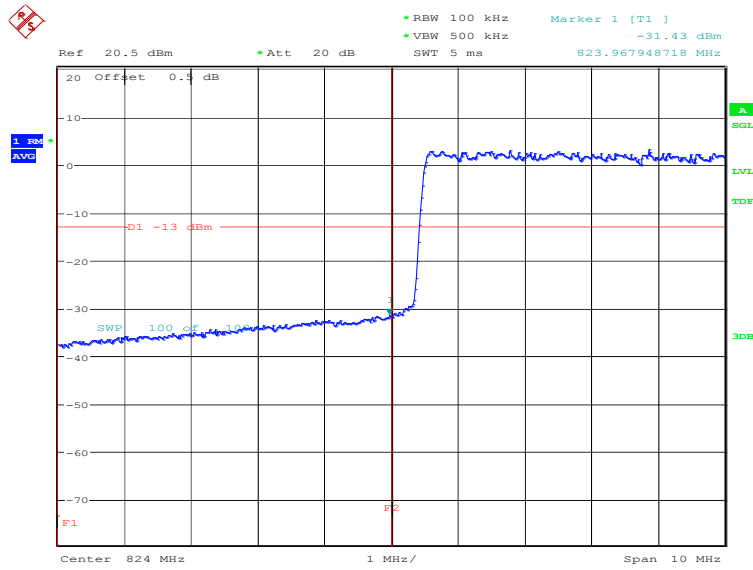
Date: 30.AUG.2022 09:03:35

HIGH BAND EDGE BLOCK-1RB-high_offset



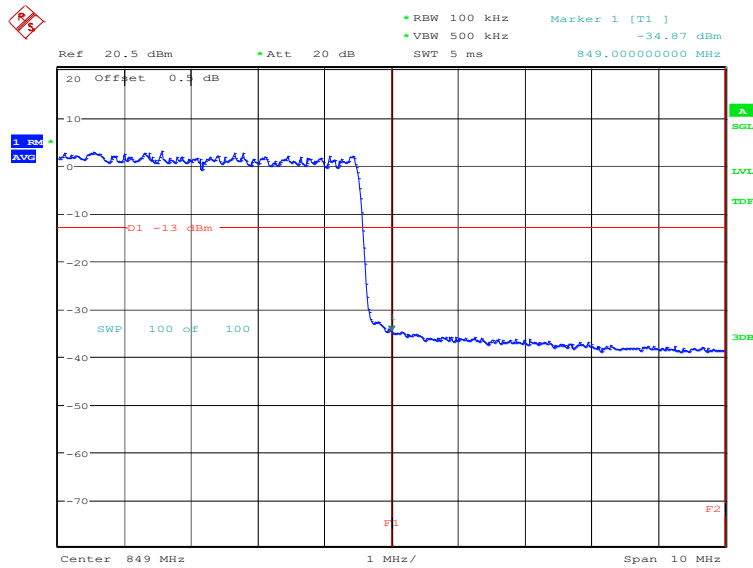
Date: 30.AUG.2022 09:04:48

LOW BAND EDGE BLOCK-10MHz-100%RB



Date: 2.AUG.2022 18:52:35

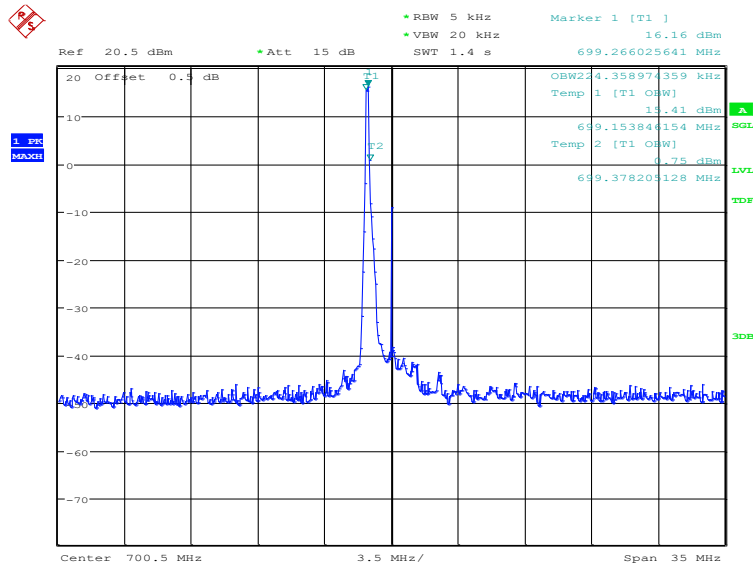
HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 2.AUG.2022 18:54:06

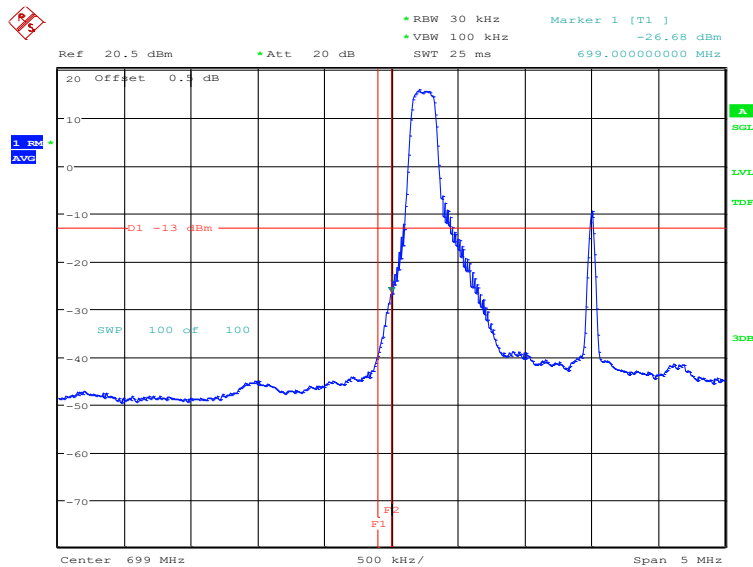
LTE band 12

OBW: 1RB-low_offset



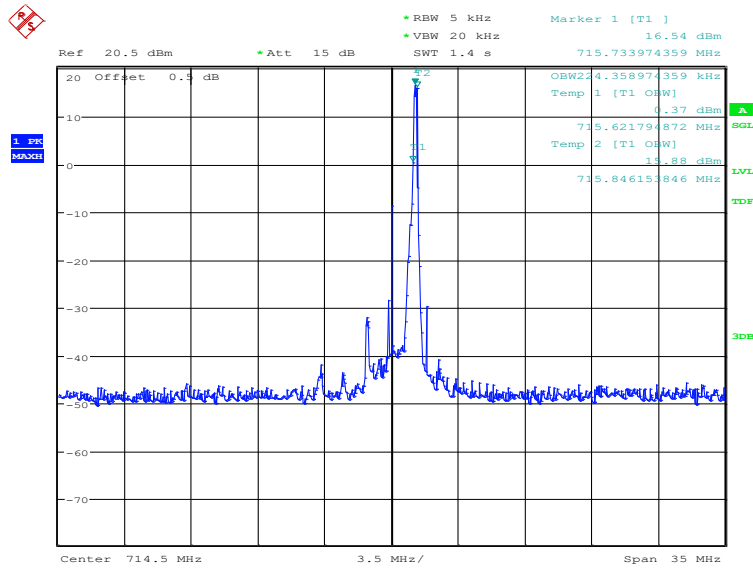
Date: 30.AUG.2022 10:36:42

LOW BAND EDGE BLOCK-1RB-low_offset



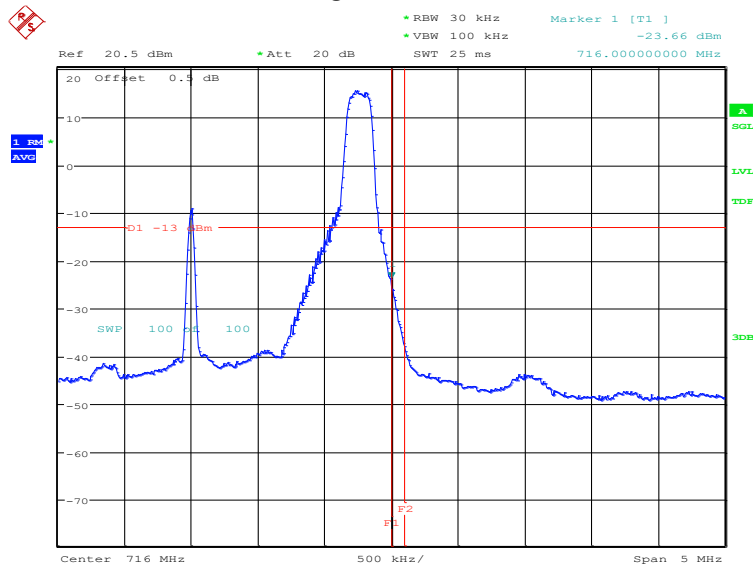
Date: 30.AUG.2022 10:37:01

OBW: 1RB-high_offset



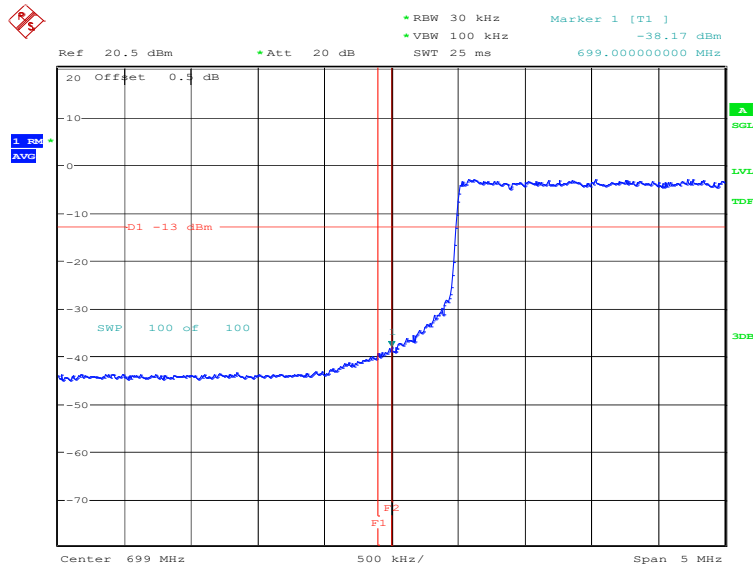
Date: 30.AUG.2022 10:37:37

HIGH BAND EDGE BLOCK-1RB-high_offset



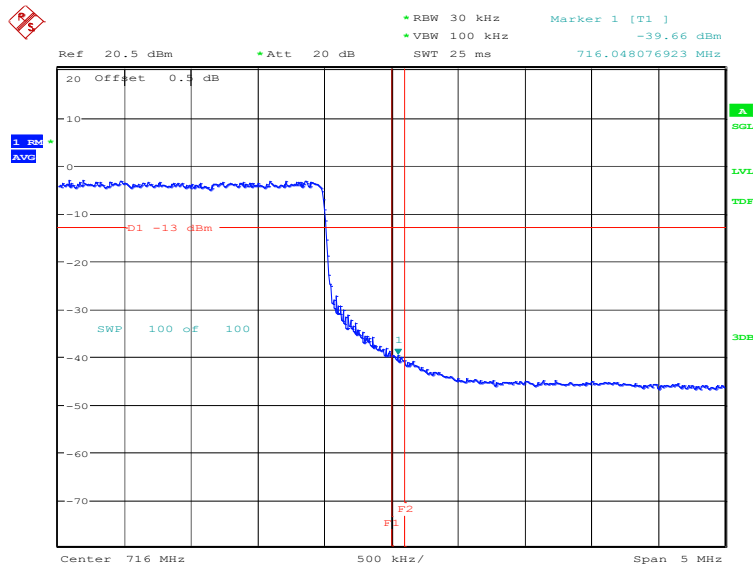
Date: 30.AUG.2022 10:37:55

LOW BAND EDGE BLOCK-10MHz-100%RB



Date: 3.AUG.2022 08:20:03

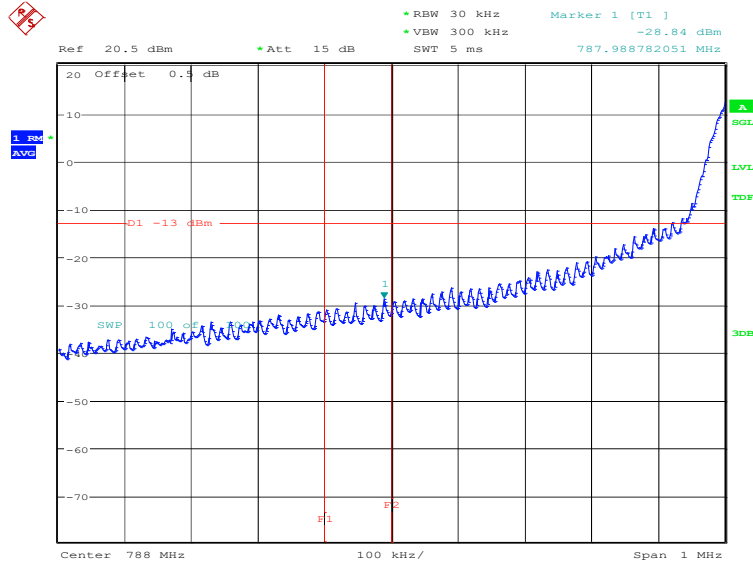
HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 3.AUG.2022 08:21:33

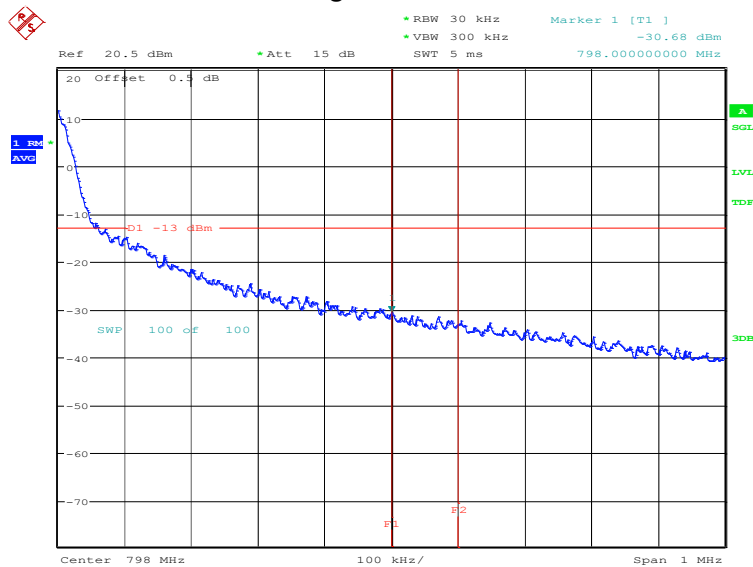
LTE band 14

LOW BAND EDGE BLOCK-1RB-low_offset



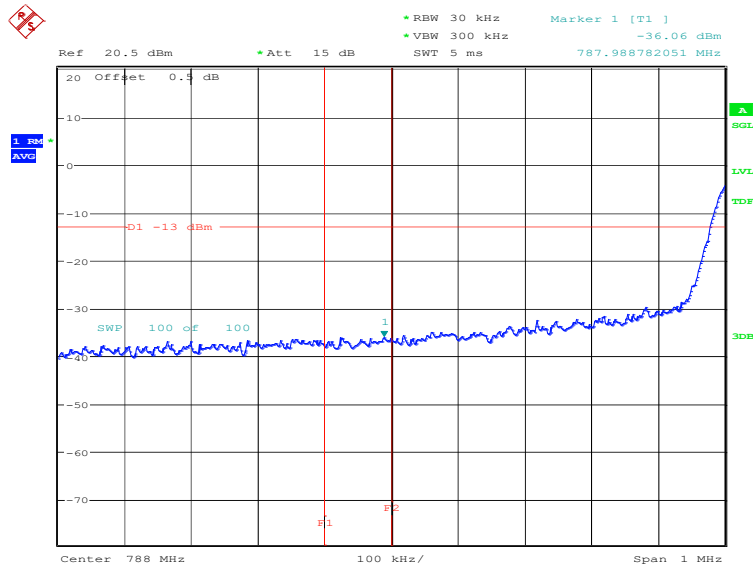
Date: 30.AUG.2022 09:25:13

HIGH BAND EDGE BLOCK-1RB-high_offset



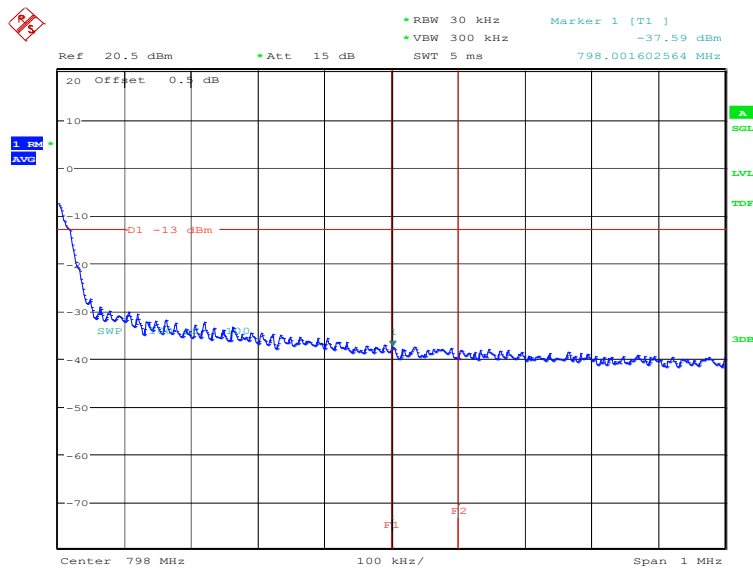
Date: 30.AUG.2022 09:25:48

LOW BAND EDGE BLOCK-10MHz-100%RB



Date: 2.AUG.2022 19:21:10

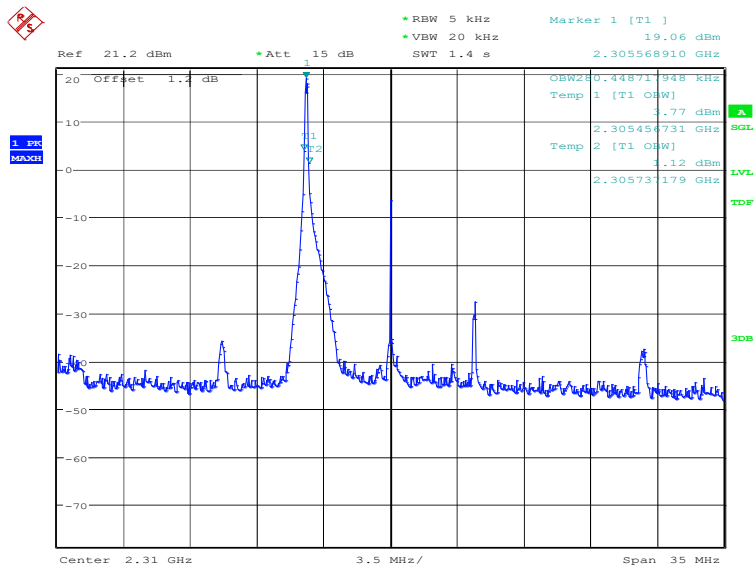
HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 2.AUG.2022 19:22:42

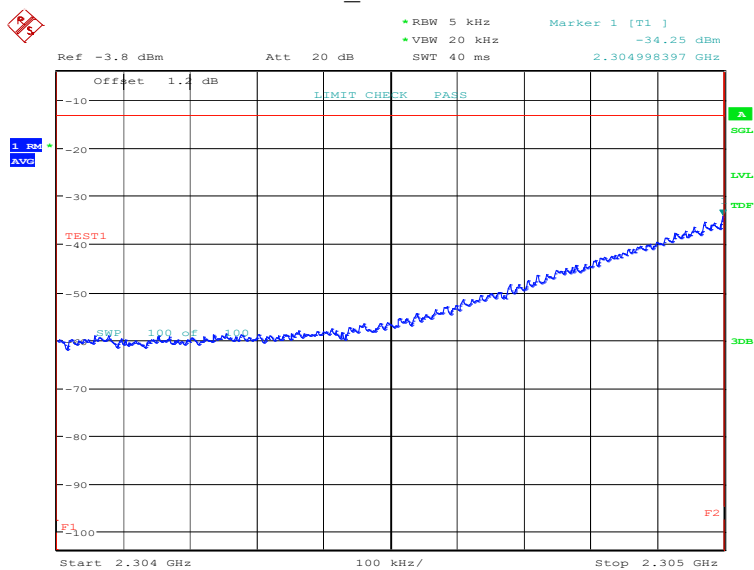
LTE band 30

OBW: 1RB-low_offset

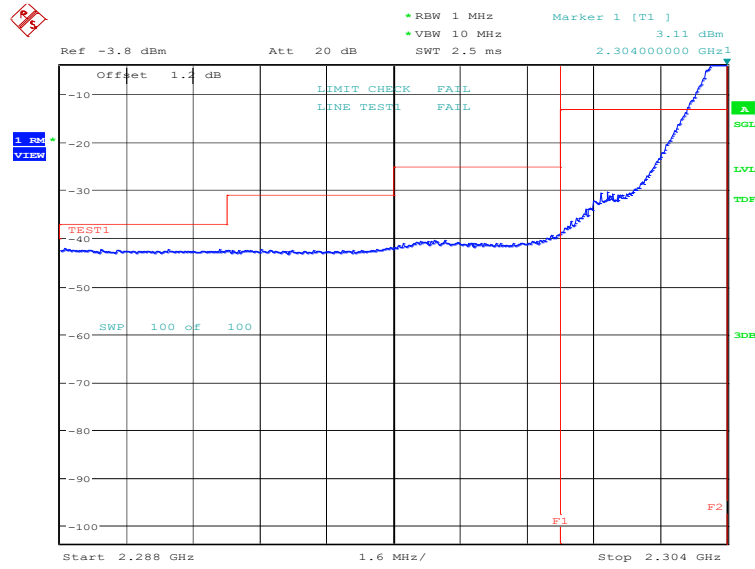


Date: 30.AUG.2022 09:07:54

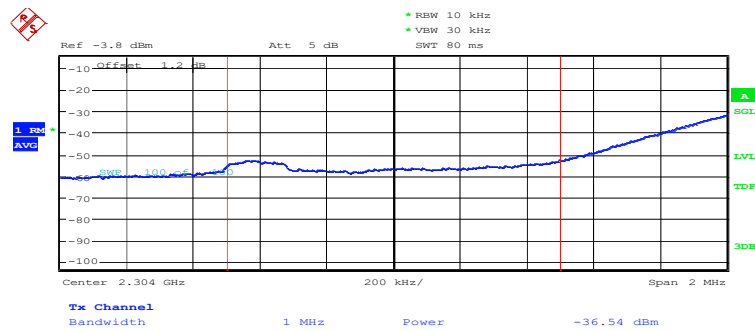
LOW BAND EDGE BLOCK-1RB-low offset



Date: 30.AUG.2022 09:09:14

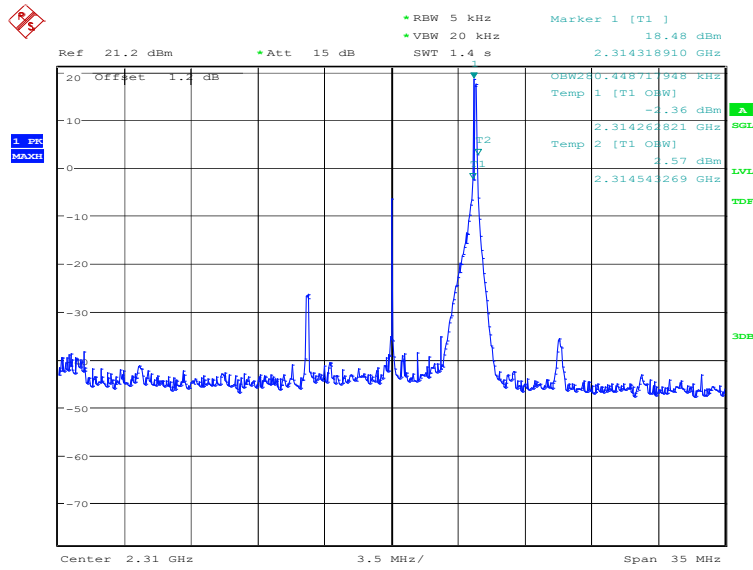


Date: 30.AUG.2022 09:11:03



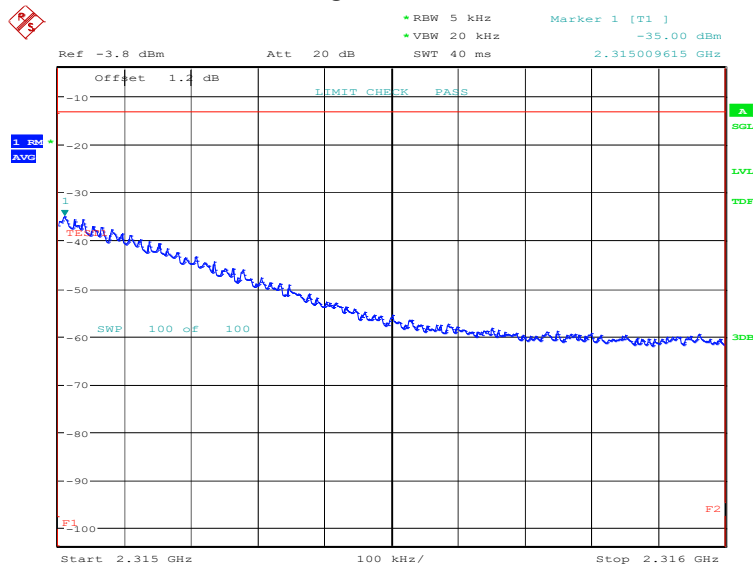
Date: 30.AUG.2022 09:11:30

OBW: 1RB-high_offset

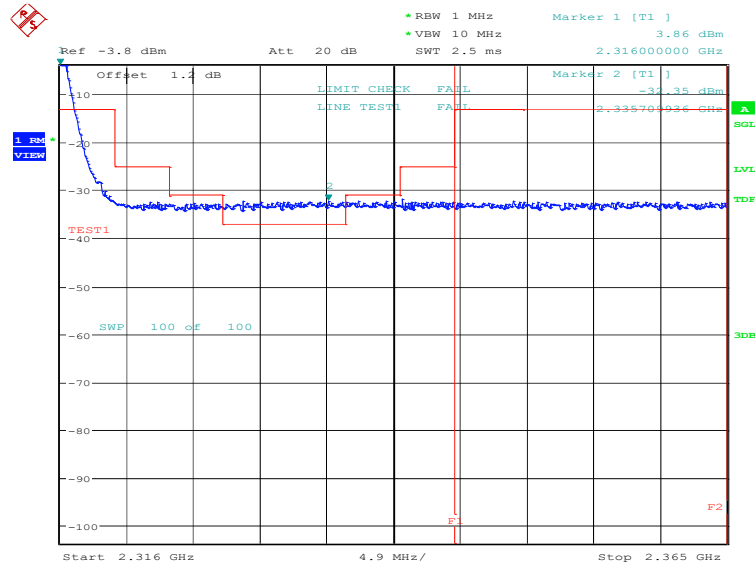


Date: 30.AUG.2022 09:12:04

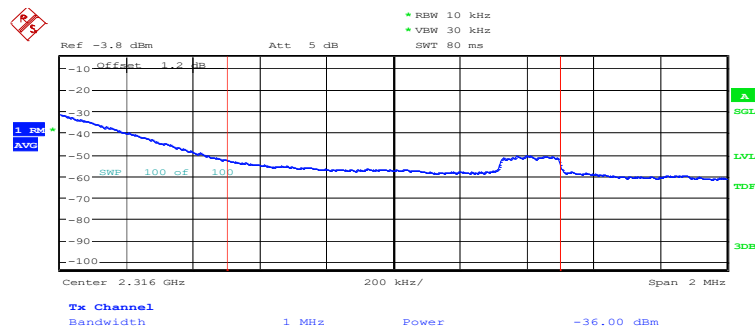
HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 30.AUG.2022 09:13:24



Date: 30.AUG.2022 09:15:22



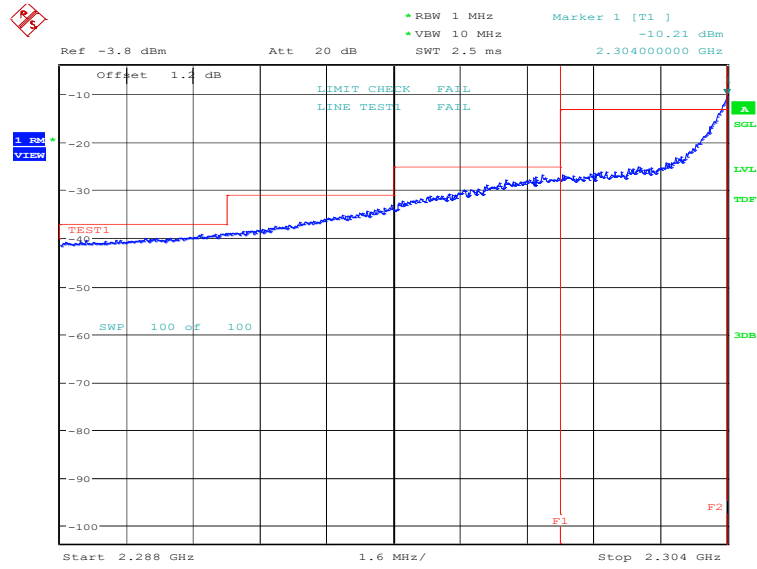
Date: 30.AUG.2022 09:15:48



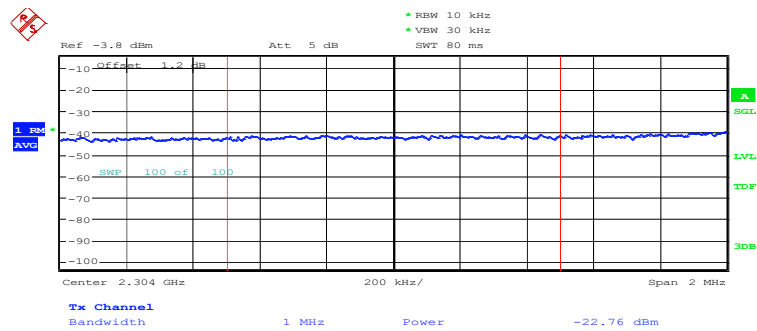
Ref 1.2 dBm Att 25 dB
 RBW 100 kHz VBW 1 MHz SWT 2.5 ms
 Marker 1 [T1] -31.60 dBm
 2.304966346 GHz

0 Offset 1.2 dB
 LIMIT CHECK PASS
 1
 TEST1
 SWP 100 of 100
 F1 F2
 Start 2.304 GHz 100 kHz/ Stop 2.305 GHz

Date: 4.AUG.2022 09:04:38

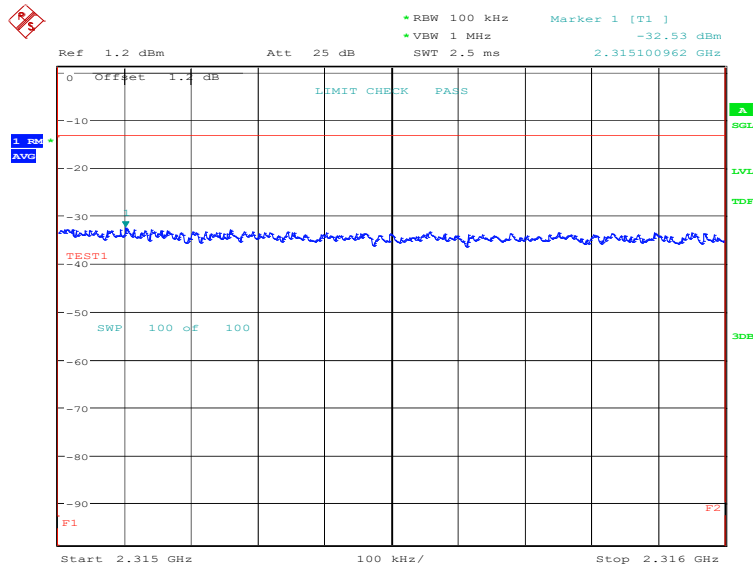


Date: 4.AUG.2022 09:06:28

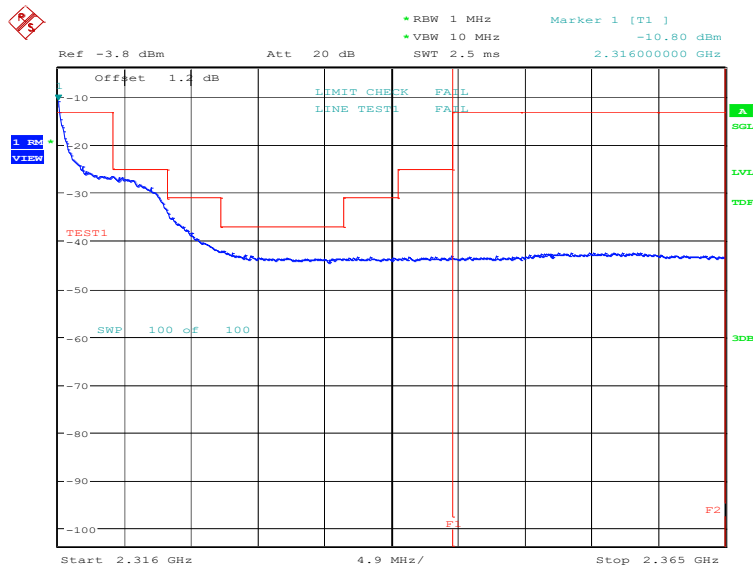


Date: 4.AUG.2022 09:06:56

HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 4.AUG.2022 09:45:23



Date: 4.AUG.2022 09:47:21



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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 $2 \times \text{span/RBW}$.

A. 7.2 Measurement Limit

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

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

Part 27.53(a) states for mobile and portable stations operating in the 2305–2315 MHz and 2350–2360 MHz bands: By a factor of not less than: $43 + 10 \log(P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log(P)$ dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $61 + 10 \log(P)$ dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $67 + 10 \log(P)$ dB on all frequencies between 2328 and 2337 MHz; By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log(P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log(P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log(P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log(P)$ dB below 2288 MHz; By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log(P)$ dB above 2365 MHz.

Part 90.543 states that for operations in the 758–768 MHz and the 788–798 MHz bands, 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 all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations. (2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less

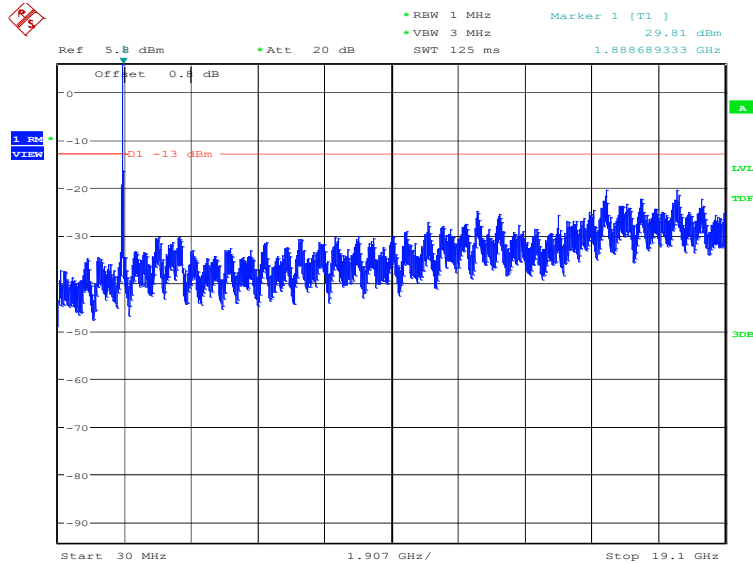
than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations. (3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log (P)$ dB. (4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment. (5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

A. 7.3 Measurement result

Only the worst case result is given below

LTE band 2: 30MHz – 19.1GHz

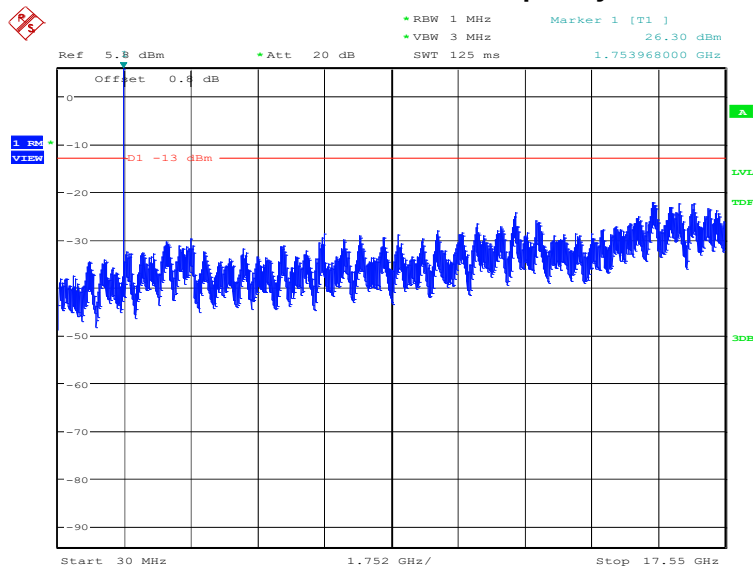
NOTE: peak above the limit line is the carrier frequency.



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LTE band 4: 30MHz – 17.55GHz

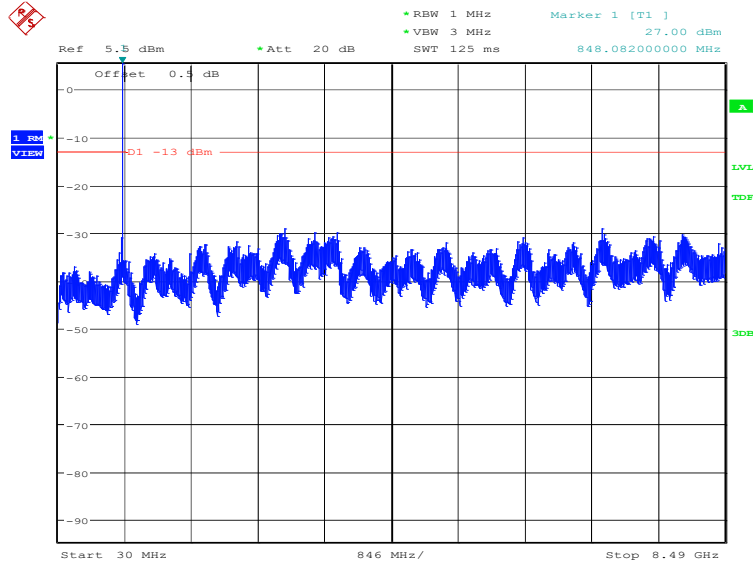
NOTE: peak above the limit line is the carrier frequency.



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LTE band 5: 30MHz – 8.49GHz

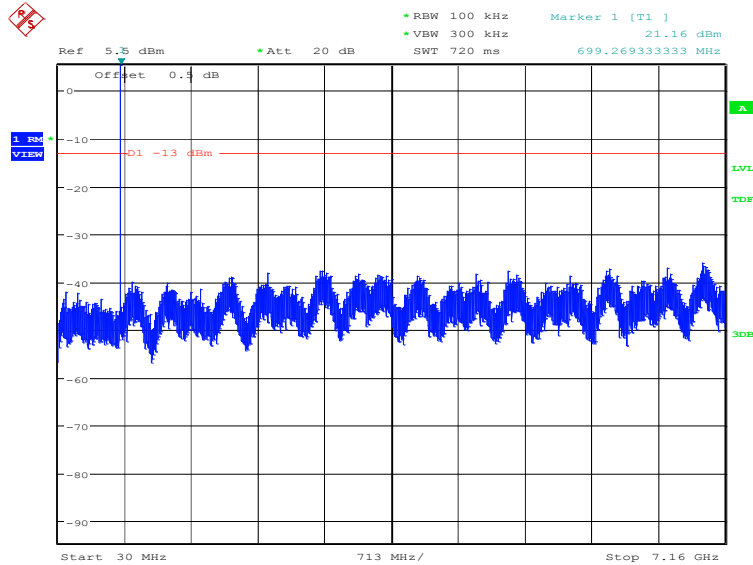
NOTE: peak above the limit line is the carrier frequency.



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LTE band 12: 30MHz – 7.16GHz

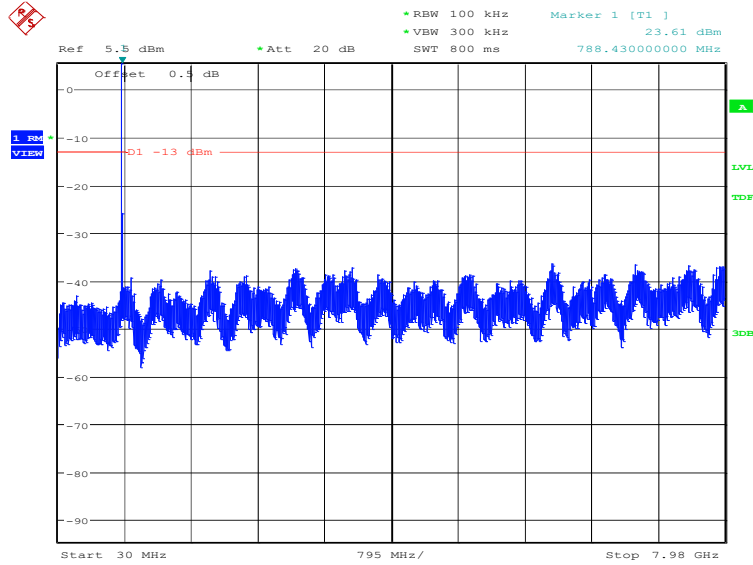
NOTE: peak above the limit line is the carrier frequency.



Date: 30.AUG.2022 09:20:15

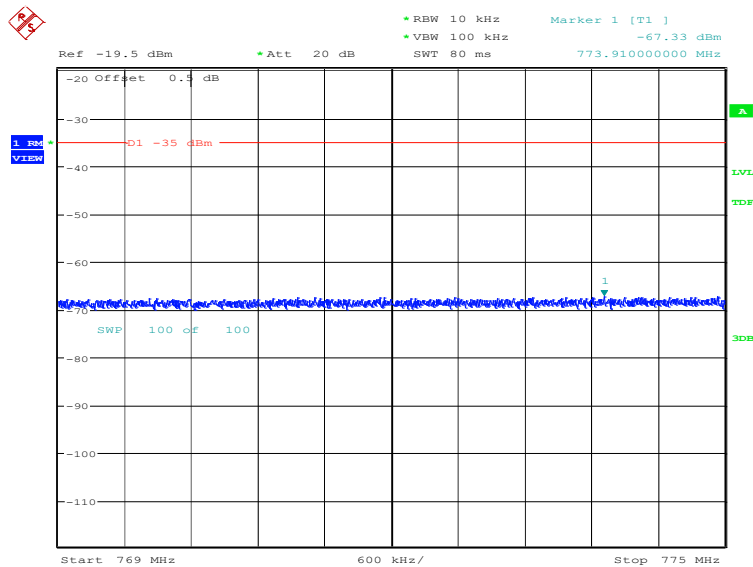
LTE band 14: 30MHz – 7.98GHz

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



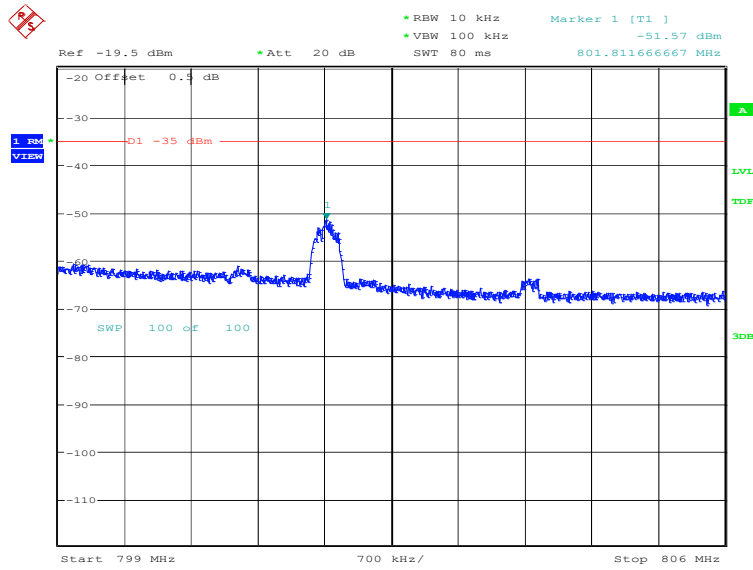
Date: 30.AUG.2022 09:20:58

LTE band 14: 769MHz~775MHz



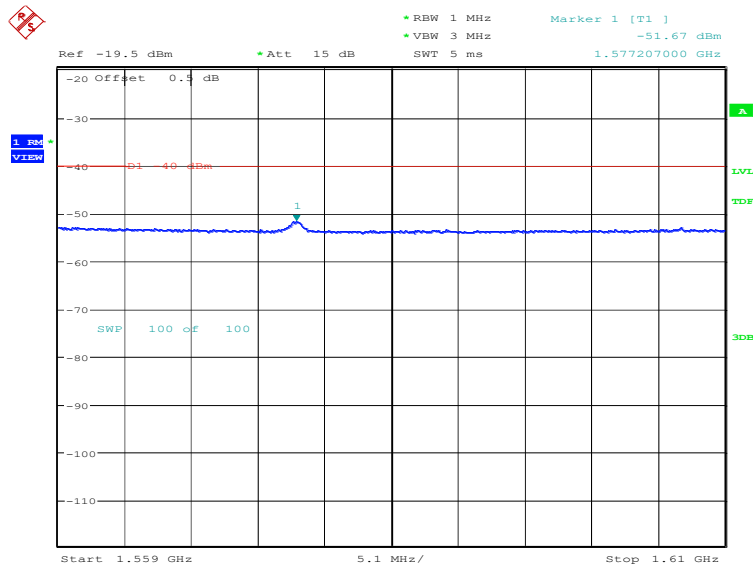
Date: 30.AUG.2022 09:21:22

LTE band 14: 799MHz~806MHz



Date: 30.AUG.2022 09:21:46

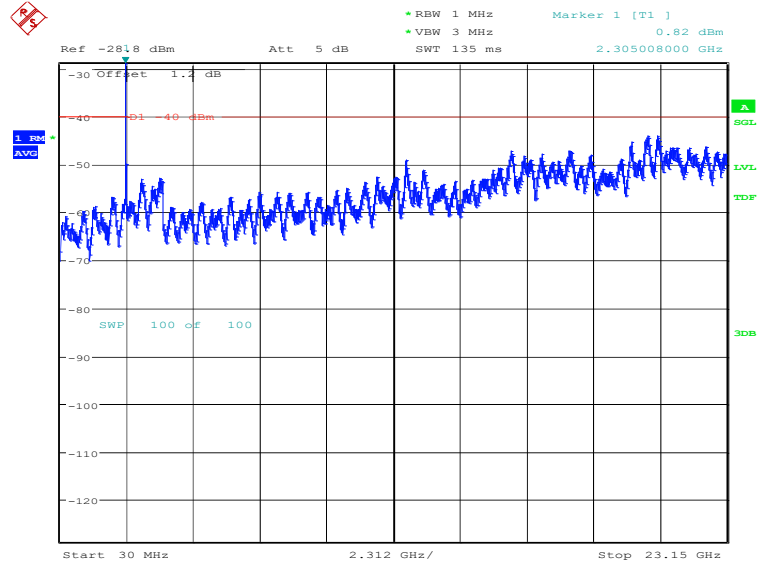
LTE band 14: 1559MHz~1610MHz



Date: 30.AUG.2022 09:22:10

LTE band 30: 30MHz – 23.15GHz

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



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Note: Expanded measurement uncertainty is $U = 0.622 \text{ dB}$, $k = 2$.

A.8 Peak-to-Average Power Ratio

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

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

LTE band 2, 20MHz

Frequency(MHz)	PAPR(dB)		
1880.0	QPSK	16QAM	64QAM
	6.76	7.44	7.40

LTE band 4, 20MHz

Frequency(MHz)	PAPR(dB)		
1732.5	QPSK	16QAM	64QAM
	6.54	7.24	7.21

LTE band 12, 10MHz

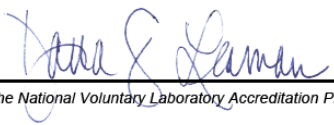
Frequency(MHz)	PAPR(dB)		
707.5	QPSK	16QAM	64QAM
	5.51	6.41	6.38

LTE band 30, 10MHz

Frequency(MHz)	PAPR(dB)		
2310.0	QPSK	16QAM	64QAM
	5.71	6.38	6.44

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

Annex B: Accreditation Certificate

United States Department of Commerce National Institute of Standards and Technology NVLAP[®]  ILAC-MRA	
Certificate of Accreditation to ISO/IEC 17025:2017	
NVLAP LAB CODE: 600118-0	
Telecommunication Technology Labs, CAICT Beijing China	
<i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i>	
Electromagnetic Compatibility & Telecommunications	
<i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).</i>	
2021-09-29 through 2022-09-30 <i>Effective Dates</i>	 DEPARTMENT OF COMMERCE UNITED STATES OF AMERICA  For the National Voluntary Laboratory Accreditation Program

END OF REPORT