



TEST REPORT

No. I20Z62129-WMD03

for

HMD Global Oy

GSM/WCDMA/LTE phone

Model Name: TA-1295

FCC ID: 2AJOTTA-1295

with

Hardware Version: 0301

Software Version: 0.2047.11.01

Issued Date: 2021-01-06

Note:

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The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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

Tel: +86(0)10-62304633-2512, Fax: +86(0)10-62304633-2504

Email: ctl_terminals@caict.ac.cn, website: www.caict.ac.cn



REPORT HISTORY

Report Number	Revision	Description	Issue Date
I20Z62129-WMD03	Rev.0	1 st edition	2021-01-06

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

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1. Test Laboratory

1.1. Introduction & Accreditation

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

1.2. Testing Location

Location 1: CTTL (huayuan North Road)

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

Location 2: CTTL(Shouxiang)

Address: No. 51 Shouxiang Science Building, Xueyuan Road,
Haidian District, Beijing, P. R. China 100191

1.3. Testing Environment

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

1.4. Project Data

Testing Start Date: 2020-12-02
Testing End Date: 2020-12-30

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: HMD Global Oy
Address /Post: Bertel Jungin aukio 9, 02600 Espoo, FINLAND
Contact: Mikko Kahlos
Email: mikko.kahlos@hmdglobal.com
Telephone: +358 408036126
Fax: +97143697604

2.2. Manufacturer Information

Company Name: HMD Global Oy
Address /Post: Bertel Jungin aukio 9, 02600 Espoo, FINLAND
Contact: Mikko Kahlos
Email: mikko.kahlos@hmdglobal.com
Telephone: +358 408036126
Fax: +97143697604

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

3.1. About EUT

Description	GSM/WCDMA/LTE phone
Model Name	TA-1295
FCC ID	2AJOTTA-1295
Antenna	Embedded
Output power	24.69dBm maximum EIRP measured for LTE Band 2
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.8VDC)
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
UT55a	355011390000394	0301	0.2047.11.01	2020-12-02
UT57a	004402972532224	0301	0.2047.11.01	2020-12-02

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

3.3. Internal Identification of AE used during the test

AE ID* Description

AE1 Battery

AE1

Model	BV-6A
Manufacturer	TIANJIN LISHEN BATTERY JOINT-STOCK CO., LTD.
Capacitance	1500mAh

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

4. Reference Documents

4.1. Documents supplied by applicant

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

4.2. Reference Documents for testing

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

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

5. Laboratory Environment

Fully-anechoic chamber FAC-3 (9 meters×6.5 meters×4 meters) 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	< 4 Ω
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

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	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	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	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	27.53	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	27.53	P
6	Band Edge Compliance	27.53	P
7	Conducted Spurious Emission	27.53	P
8	Peak-to-Average Power Ratio	27.50	P

LTE Band 13

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50	P
2	Emission Limit	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.

Explanation of worst-case configuration

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

7. Test Equipment Utilized

Description	Type	Series Number	Manufacture	Cal Due Date	Calibration Interval
Wideband Radio Communication Tester	CMW500	159082	R&S	2021-12-17	1 year
Spectrum Analyzer	FSU	200030	R&S	2021-06-01	1 year
Climate Chamber	SH-242	93008556	ESPEC	2023-12-23	3 years
EMI Antenna	9117	177	Schwarzbeck	2021-10-12	3 years
EMI Antenna	3117	00058889	ETS-Lindgren	2021-11-18	1 year
EMI Antenna	3117	00119021	ETS-Lindgren	2021-01-14	1 year
Signal Generator	SMF100A	101295	R&S	2021-11-06	1 year
Test Receiver	E4440A	MY48250642	Agilent	2021-03-12	1 year
Universal Radio Communication Tester	CMW500	143008	R&S	2021-11-26	1 year
EMI Antenna	VULB9163	9163-235	Schwarzbeck	2021-11-24	1 year
Power Amplifier	5S1G4	0341863	AR	/	/

Annex A: Measurement Results

A.1 Output Power

A.1.1 Summary

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

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

A.1.2 Conducted

A.1.2.1 Method of Measurements

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

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

A.1.2.2 Measurement Result

LTE band 2

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1909.3	21.85	20.90
		1880.0	21.92	20.93
		1850.7	22.02	20.53
	1 RB low	1909.3	21.96	20.90
		1880.0	21.56	20.88
		1850.7	21.70	20.47
	50% RB mid	1909.3	22.00	21.15
		1880.0	22.16	20.58
		1850.7	21.83	20.88
	100% RB	1909.3	20.91	19.93
		1880.0	20.90	19.63
		1850.7	20.94	19.67
3MHz	1 RB high	1908.5	21.86	20.84
		1880.0	21.85	20.98
		1851.5	21.93	21.33
	1 RB low	1908.5	21.99	21.12
		1880.0	21.96	21.17
		1851.5	21.93	20.67
	50% RB mid	1908.5	20.97	19.96
		1880.0	20.90	19.99
		1851.5	20.90	20.00

	100% RB	1908.5	20.93	19.84
		1880.0	20.97	20.07
		1851.5	20.93	20.02
5MHz	1 RB high	1907.5	21.82	20.48
		1880.0	21.82	20.69
		1852.5	21.76	20.34
	1 RB low	1907.5	21.93	20.52
		1880.0	21.78	20.33
		1852.5	21.71	20.50
	50% RB mid	1907.5	20.89	19.83
		1880.0	20.90	19.86
		1852.5	20.90	19.71
	100% RB	1907.5	20.89	20.04
		1880.0	20.91	20.02
		1852.5	20.97	19.90
10MHz	1 RB high	1905.0	21.93	20.87
		1880.0	21.84	21.14
		1855.0	21.86	21.16
	1 RB low	1905.0	21.87	21.03
		1880.0	21.72	21.26
		1855.0	22.01	20.36
	50% RB mid	1905.0	20.98	20.17
		1880.0	20.87	20.01
		1855.0	20.73	19.90
	100% RB	1905.0	20.95	19.94
		1880.0	20.98	19.90
		1855.0	20.77	20.04
15MHz	1 RB high	1902.5	22.07	20.89
		1880.0	22.19	21.51
		1857.5	22.06	20.93
	1 RB low	1902.5	21.76	20.57
		1880.0	21.83	21.07
		1857.5	22.06	21.11
	50% RB mid	1902.5	20.77	20.08
		1880.0	20.91	19.91
		1857.5	20.78	19.66
	100% RB	1902.5	20.77	19.86
		1880.0	20.85	19.86
		1857.5	20.81	19.81



20MHz	1 RB high	1900.0	21.71	20.79
		1880.0	21.67	20.70
		1860.0	21.47	20.62
	1 RB low	1900.0	21.70	20.67
		1880.0	21.29	20.05
		1860.0	21.34	20.29
	50% RB mid	1900.0	20.84	19.83
		1880.0	20.78	19.73
		1860.0	20.67	19.78
	100% RB	1900.0	20.72	19.63
		1880.0	20.83	19.70
		1860.0	20.70	19.72

LTE band 4

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1754.3	21.19	20.25
		1732.5	21.28	20.09
		1710.7	20.89	20.41
	1 RB low	1754.3	21.49	20.27
		1732.5	21.32	20.00
		1710.7	20.88	20.40
	50% RB mid	1754.3	21.36	20.43
		1732.5	21.30	20.29
		1710.7	21.16	20.08
	100% RB	1754.3	20.50	19.56
		1732.5	20.44	19.46
		1710.7	20.10	18.96
3MHz	1 RB high	1753.5	22.13	20.37
		1732.5	21.59	20.14
		1711.5	21.03	19.78
	1 RB low	1753.5	22.15	20.28
		1732.5	21.34	20.54
		1711.5	21.15	20.08
	50% RB mid	1753.5	20.95	19.12
		1732.5	20.30	19.37
		1711.5	20.22	19.24
	100% RB	1753.5	20.92	19.12
		1732.5	20.45	19.18
		1711.5	20.10	19.05
5MHz	1 RB high	1752.5	21.37	20.14
		1732.5	21.54	19.68
		1712.5	20.89	19.53
	1 RB low	1752.5	21.37	20.03
		1732.5	21.43	19.76
		1712.5	20.97	19.97
	50% RB mid	1752.5	20.42	19.39
		1732.5	20.40	19.22
		1712.5	20.16	19.05
	100% RB	1752.5	20.46	19.35
		1732.5	20.39	19.43
		1712.5	20.14	19.02
10MHz	1 RB high	1750.0	21.40	20.33
		1732.5	21.72	20.25
		1715.0	21.21	19.69
	1 RB low	1750.0	21.46	20.30

		1732.5	21.40	20.18
		1715.0	21.16	20.17
		1750.0	20.42	19.40
	50% RB mid	1732.5	20.35	19.08
		1715.0	20.16	19.14
		1750.0	20.38	19.30
	100% RB	1732.5	20.41	19.41
1715.0		20.17	19.01	
15MHz	1 RB high	1747.5	21.20	20.53
		1732.5	21.32	20.95
		1717.5	21.16	20.27
	1 RB low	1747.5	21.27	20.17
		1732.5	21.05	20.76
		1717.5	21.43	20.21
	50% RB mid	1747.5	20.42	19.41
		1732.5	20.34	19.06
		1717.5	20.24	19.05
	100% RB	1747.5	20.32	19.36
		1732.5	20.24	19.16
		1717.5	20.23	19.08
20MHz	1 RB high	1745.0	21.45	20.29
		1732.5	21.24	20.03
		1720.0	20.92	19.74
	1 RB low	1745.0	21.36	20.14
		1732.5	20.73	19.44
		1720.0	20.53	19.41
	50% RB mid	1745.0	20.22	19.22
		1732.5	20.22	19.08
		1720.0	20.05	18.99
	100% RB	1745.0	20.19	19.20
		1732.5	20.21	19.07
		1720.0	20.07	18.99

LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	848.3	23.04	21.58
		836.5	23.05	22.14
		824.7	23.19	21.62
	1 RB low	848.3	22.69	22.11
		836.5	23.09	22.23
		824.7	22.93	21.66
	50% RB mid	848.3	23.04	22.38
		836.5	23.12	22.06
		824.7	23.27	22.10
	100% RB	848.3	21.94	21.07
		836.5	22.10	21.32
		824.7	22.12	20.75
3MHz	1 RB high	847.5	22.74	21.98
		836.5	23.35	22.36
		825.5	22.98	21.75
	1 RB low	847.5	23.10	22.16
		836.5	22.94	22.43
		825.5	23.23	22.20
	50% RB mid	847.5	21.89	20.83
		836.5	22.01	20.96
		825.5	22.09	21.05
	100% RB	847.5	21.89	21.06
		836.5	21.99	21.06
		825.5	22.05	21.08
5MHz	1 RB high	846.5	22.75	21.71
		836.5	23.04	21.70
		826.5	22.78	21.98
	1 RB low	846.5	22.73	21.63
		836.5	23.25	21.45
		826.5	22.71	21.67
	50% RB mid	846.5	21.98	20.94
		836.5	22.10	21.04
		826.5	21.97	21.08
	100% RB	846.5	21.91	20.97
		836.5	22.23	21.29
		826.5	22.01	20.94
10MHz	1 RB high	844.0	22.83	22.25
		836.5	23.23	21.85



		829.0	23.42	22.16
	1 RB low	844.0	23.22	21.71
		836.5	22.87	21.82
		829.0	23.16	22.12
	50% RB mid	844.0	22.03	21.17
		836.5	21.98	21.07
		829.0	21.92	20.98
	100% RB	844.0	21.87	20.93
		836.5	22.02	20.93
		829.0	21.89	20.84

LTE band 12

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	715.3	22.47	21.62
		707.5	22.58	21.44
		699.7	22.32	21.88
	1 RB low	715.3	22.40	21.47
		707.5	22.53	21.30
		699.7	22.20	21.89
	50% RB mid	715.3	22.72	22.05
		707.5	22.81	21.57
		699.7	22.68	21.56
	100% RB	715.3	21.58	21.00
		707.5	21.69	21.01
		699.7	21.50	20.18
3MHz	1 RB high	714.5	22.59	21.76
		707.5	22.63	21.81
		700.5	22.46	21.56
	1 RB low	714.5	22.34	21.69
		707.5	22.59	21.77
		700.5	22.36	21.24
	50% RB mid	714.5	21.77	20.58
		707.5	21.69	20.51
		700.5	21.47	20.65
	100% RB	714.5	21.63	20.44
		707.5	21.76	20.78
		700.5	21.56	20.63
5MHz	1 RB high	713.5	22.80	21.18
		707.5	22.29	21.09
		701.5	22.53	21.67
	1 RB low	713.5	22.54	21.19
		707.5	22.50	21.23
		701.5	22.37	21.22
	50% RB mid	713.5	21.63	20.64
		707.5	21.71	20.48
		701.5	21.55	20.30
	100% RB	713.5	21.63	20.68
		707.5	21.64	20.59
		701.5	21.52	20.39
10MHz	1 RB high	711.0	22.59	21.94
		707.5	22.41	21.39



		704.0	22.57	21.53
	1 RB low	711.0	22.31	21.79
		707.5	22.45	21.32
		704.0	22.41	21.32
	50% RB mid	711.0	21.54	20.71
		707.5	21.46	20.84
		704.0	21.54	20.61
	100% RB	711.0	21.61	20.48
		707.5	21.50	20.50
		704.0	21.61	20.49

LTE band 13

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
5MHz	1 RB high	784.5	22.94	21.41
		782.0	22.71	21.09
		779.5	22.86	21.86
	1 RB low	784.5	22.69	21.43
		782.0	22.84	21.73
		779.5	22.77	21.53
	50% RB mid	784.5	21.75	20.70
		782.0	21.75	20.74
		779.5	21.90	20.66
	100% RB	784.5	21.79	20.60
		782.0	21.67	20.88
		779.5	21.95	20.84
10MHz	1 RB high	782.0	22.86	22.22
	1 RB low	782.0	22.69	21.62
	50% RB mid	782.0	21.69	20.62
	100% RB	782.0	21.67	20.67



A.1.3 Radiated

A.1.3.1 Description

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

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

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

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

FDD Band 12/71: Part 27.50(c) 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 13: Part 27.50(b) specifies "Portable stations (hand-held devices) transmitting in the 746–757 MHz, 776–788 MHz, and 805–806 MHz bands are limited to 3 watts ERP".

A.1.3.2 Method of Measurement

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

$$\text{ERP or EIRP} = P_T + G_T - L_C, \text{ ERP} = \text{EIRP} - 2.15, \text{ where}$$

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

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

P_T = transmitter output power in dBm;

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

L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

LTE Band 2
Limits: ≤33dBm (2W)

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		EIRP(dBm) (GT – LC = 2.5)	
			QPSK	16QAM	QPSK	16QAM
1.4MHz	1 RB high	1909.3	21.85	20.90	24.35	23.40
		1880	21.92	20.93	24.42	23.43
		1850.7	22.02	20.53	24.52	23.03
	1 RB low	1909.3	21.96	20.90	24.46	23.40
		1880	21.56	20.88	24.06	23.38
		1850.7	21.70	20.47	24.20	22.97
	50% RB mid	1909.3	22.00	21.15	24.50	23.65
		1880	22.16	20.58	24.66	23.08
		1850.7	21.83	20.88	24.33	23.38
	100% RB	1909.3	20.91	19.93	23.41	22.43
		1880	20.90	19.63	23.40	22.13
		1850.7	20.94	19.67	23.44	22.17
3MHz	1 RB high	1908.5	21.86	20.84	24.36	23.34
		1880	21.85	20.98	24.35	23.48
		1851.5	21.93	21.33	24.43	23.83
	1 RB low	1908.5	21.99	21.12	24.49	23.62
		1880	21.96	21.17	24.46	23.67
		1851.5	21.93	20.67	24.43	23.17
	50% RB mid	1908.5	20.97	19.96	23.47	22.46
		1880	20.90	19.99	23.40	22.49
		1851.5	20.90	20.00	23.40	22.50
	100% RB	1908.5	20.93	19.84	23.43	22.34
		1880	20.97	20.07	23.47	22.57
		1851.5	20.93	20.02	23.43	22.52
5MHz	1 RB high	1907.5	21.82	20.48	24.32	22.98
		1880	21.82	20.69	24.32	23.19
		1852.5	21.76	20.34	24.26	22.84
	1 RB low	1907.5	21.93	20.52	24.43	23.02
		1880	21.78	20.33	24.28	22.83
		1852.5	21.71	20.50	24.21	23.00
	50% RB mid	1907.5	20.89	19.83	23.39	22.33
		1880	20.90	19.86	23.40	22.36
		1852.5	20.90	19.71	23.40	22.21
	100% RB	1907.5	20.89	20.04	23.39	22.54
		1880	20.91	20.02	23.41	22.52
		1852.5	20.97	19.90	23.47	22.40

10MHz	1 RB high	1905	21.93	20.87	24.43	23.37
		1880	21.84	21.14	24.34	23.64
		1855	21.86	21.16	24.36	23.66
	1 RB low	1905	21.87	21.03	24.37	23.53
		1880	21.72	21.26	24.22	23.76
		1855	22.01	20.36	24.51	22.86
	50% RB mid	1905	20.98	20.17	23.48	22.67
		1880	20.87	20.01	23.37	22.51
		1855	20.73	19.90	23.23	22.40
	100% RB	1905	20.95	19.94	23.45	22.44
		1880	20.98	19.90	23.48	22.40
		1855	20.77	20.04	23.27	22.54
15MHz	1 RB high	1902.5	22.07	20.89	24.57	23.39
		1880	22.19	21.51	24.69	24.01
		1857.5	22.06	20.93	24.56	23.43
	1 RB low	1902.5	21.76	20.57	24.26	23.07
		1880	21.83	21.07	24.33	23.57
		1857.5	22.06	21.11	24.56	23.61
	50% RB mid	1902.5	20.77	20.08	23.27	22.58
		1880	20.91	19.91	23.41	22.41
		1857.5	20.78	19.66	23.28	22.16
	100% RB	1902.5	20.77	19.86	23.27	22.36
		1880	20.85	19.86	23.35	22.36
		1857.5	20.81	19.81	23.31	22.31
20MHz	1 RB high	1900	21.71	20.79	24.21	23.29
		1880	21.67	20.70	24.17	23.20
		1860	21.47	20.62	23.97	23.12
	1 RB low	1900	21.70	20.67	24.20	23.17
		1880	21.29	20.05	23.79	22.55
		1860	21.34	20.29	23.84	22.79
	50% RB mid	1900	20.84	19.83	23.34	22.33
		1880	20.78	19.73	23.28	22.23
		1860	20.67	19.78	23.17	22.28
	100% RB	1900	20.72	19.63	23.22	22.13
		1880	20.83	19.70	23.33	22.20
		1860	20.70	19.72	23.20	22.22

LTE Band 4
Limits: ≤33dBm (2W)

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		EIRP(dBm) (GT – LC = 1.46)	
			QPSK	16QAM	QPSK	16QAM
1.4MHz	1 RB high	1754.3	21.19	20.25	22.65	21.71
		1732.5	21.28	20.09	22.74	21.55
		1710.7	20.89	20.41	22.35	21.87
	1 RB low	1754.3	21.49	20.27	22.95	21.73
		1732.5	21.32	20.00	22.78	21.46
		1710.7	20.88	20.40	22.34	21.86
	50% RB mid	1754.3	21.36	20.43	22.82	21.89
		1732.5	21.30	20.29	22.76	21.75
		1710.7	21.16	20.08	22.62	21.54
	100% RB	1754.3	20.50	19.56	21.96	21.02
		1732.5	20.44	19.46	21.90	20.92
		1710.7	20.10	18.96	21.56	20.42
3MHz	1 RB high	1753.5	22.13	20.37	23.59	21.83
		1732.5	21.59	20.14	23.05	21.60
		1711.5	21.03	19.78	22.49	21.24
	1 RB low	1753.5	22.15	20.28	23.61	21.74
		1732.5	21.34	20.54	22.80	22.00
		1711.5	21.15	20.08	22.61	21.54
	50% RB mid	1753.5	20.95	19.12	22.41	20.58
		1732.5	20.30	19.37	21.76	20.83
		1711.5	20.22	19.24	21.68	20.70
	100% RB	1753.5	20.92	19.12	22.38	20.58
		1732.5	20.45	19.18	21.91	20.64
		1711.5	20.10	19.05	21.56	20.51
5MHz	1 RB high	1752.5	21.37	20.14	22.83	21.60
		1732.5	21.54	19.68	23.00	21.14
		1712.5	20.89	19.53	22.35	20.99
	1 RB low	1752.5	21.37	20.03	22.83	21.49
		1732.5	21.43	19.76	22.89	21.22
		1712.5	20.97	19.97	22.43	21.43
	50% RB mid	1752.5	20.42	19.39	21.88	20.85
		1732.5	20.40	19.22	21.86	20.68
		1712.5	20.16	19.05	21.62	20.51
	100% RB	1752.5	20.46	19.35	21.92	20.81
		1732.5	20.39	19.43	21.85	20.89

		1712.5	20.14	19.02	21.60	20.48
10MHz	1 RB high	1750	21.40	20.33	22.86	21.79
		1732.5	21.72	20.25	23.18	21.71
		1715	21.21	19.69	22.67	21.15
	1 RB low	1750	21.46	20.30	22.92	21.76
		1732.5	21.40	20.18	22.86	21.64
		1715	21.16	20.17	22.62	21.63
	50% RB mid	1750	20.42	19.40	21.88	20.86
		1732.5	20.35	19.08	21.81	20.54
		1715	20.16	19.14	21.62	20.60
	100% RB	1750	20.38	19.30	21.84	20.76
		1732.5	20.41	19.41	21.87	20.87
		1715	20.17	19.01	21.63	20.47
15MHz	1 RB high	1747.5	21.20	20.53	22.66	21.99
		1732.5	21.32	20.95	22.78	22.41
		1717.5	21.16	20.27	22.62	21.73
	1 RB low	1747.5	21.27	20.17	22.73	21.63
		1732.5	21.05	20.76	22.51	22.22
		1717.5	21.43	20.21	22.89	21.67
	50% RB mid	1747.5	20.42	19.41	21.88	20.87
		1732.5	20.34	19.06	21.80	20.52
		1717.5	20.24	19.05	21.70	20.51
	100% RB	1747.5	20.32	19.36	21.78	20.82
		1732.5	20.24	19.16	21.70	20.62
		1717.5	20.23	19.08	21.69	20.54
20MHz	1 RB high	1745	21.45	20.29	22.91	21.75
		1732.5	21.24	20.03	22.70	21.49
		1720	20.92	19.74	22.38	21.20
	1 RB low	1745	21.36	20.14	22.82	21.60
		1732.5	20.73	19.44	22.19	20.90
		1720	20.53	19.41	21.99	20.87
	50% RB mid	1745	20.22	19.22	21.68	20.68
		1732.5	20.22	19.08	21.68	20.54
		1720	20.05	18.99	21.51	20.45
	100% RB	1745	20.19	19.20	21.65	20.66
		1732.5	20.21	19.07	21.67	20.53
		1720	20.07	18.99	21.53	20.45

LTE Band 5
Limits: ≤38.45dBm (7W)

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		ERP(dBm) (GT – LC = 0.09)		
			QPSK	16QAM	QPSK	16QAM	
1.4MHz	1 RB high	848.3	23.04	21.58	20.98	19.52	
		836.5	23.05	22.14	20.99	20.08	
		824.7	23.19	21.62	21.13	19.56	
	1 RB low	848.3	22.69	22.11	20.63	20.05	
		836.5	23.09	22.23	21.03	20.17	
		824.7	22.93	21.66	20.87	19.60	
	50% RB mid	848.3	23.04	22.38	20.98	20.32	
		836.5	23.12	22.06	21.06	20.00	
		824.7	23.27	22.10	21.21	20.04	
	100% RB	848.3	21.94	21.07	19.88	19.01	
		836.5	22.10	21.32	20.04	19.26	
		824.7	22.12	20.75	20.06	18.69	
	3MHz	1 RB high	847.5	22.74	21.98	20.68	19.92
			836.5	23.35	22.36	21.29	20.30
			825.5	22.98	21.75	20.92	19.69
1 RB low		847.5	23.10	22.16	21.04	20.10	
		836.5	22.94	22.43	20.88	20.37	
		825.5	23.23	22.20	21.17	20.14	
50% RB mid		847.5	21.89	20.83	19.83	18.77	
		836.5	22.01	20.96	19.95	18.90	
		825.5	22.09	21.05	20.03	18.99	
100% RB		847.5	21.89	21.06	19.83	19.00	
		836.5	21.99	21.06	19.93	19.00	
		825.5	22.05	21.08	19.99	19.02	
5MHz		1 RB high	846.5	22.75	21.71	20.69	19.65
			836.5	23.04	21.70	20.98	19.64
			826.5	22.78	21.98	20.72	19.92
	1 RB low	846.5	22.73	21.63	20.67	19.57	
		836.5	23.25	21.45	21.19	19.39	
		826.5	22.71	21.67	20.65	19.61	
	50% RB mid	846.5	21.98	20.94	19.92	18.88	
		836.5	22.10	21.04	20.04	18.98	
		826.5	21.97	21.08	19.91	19.02	
	100% RB	846.5	21.91	20.97	19.85	18.91	
		836.5	22.23	21.29	20.17	19.23	
		826.5	22.01	20.94	19.95	18.88	

10MHz	1 RB high	844	22.83	22.25	20.77	20.19
		836.5	23.23	21.85	21.17	19.79
		829	23.42	22.16	21.36	20.10
	1 RB low	844	23.22	21.71	21.16	19.65
		836.5	22.87	21.82	20.81	19.76
		829	23.16	22.12	21.10	20.06
	50% RB mid	844	22.03	21.17	19.97	19.11
		836.5	21.98	21.07	19.92	19.01
		829	21.92	20.98	19.86	18.92
	100% RB	844	21.87	20.93	19.81	18.87
		836.5	22.02	20.93	19.96	18.87
		829	21.89	20.84	19.83	18.78

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

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		ERP(dBm) (GT – LC = 0.42)	
			QPSK	16QAM	QPSK	16QAM
1.4MHz	1 RB high	715.3	22.47	21.62	20.74	19.89
		707.5	22.58	21.44	20.85	19.71
		699.7	22.32	21.88	20.59	20.15
	1 RB low	715.3	22.4	21.47	20.67	19.74
		707.5	22.53	21.3	20.80	19.57
		699.7	22.2	21.89	20.47	20.16
	50% RB mid	715.3	22.72	22.05	20.99	20.32
		707.5	22.81	21.57	21.08	19.84
		699.7	22.68	21.56	20.95	19.83
	100% RB	715.3	21.58	21	19.85	19.27
		707.5	21.69	21.01	19.96	19.28
		699.7	21.5	20.18	19.77	18.45
3MHz	1 RB high	714.5	22.59	21.76	20.86	20.03
		707.5	22.63	21.81	20.90	20.08
		700.5	22.46	21.56	20.73	19.83
	1 RB low	714.5	22.34	21.69	20.61	19.96
		707.5	22.59	21.77	20.86	20.04
		700.5	22.36	21.24	20.63	19.51
	50% RB mid	714.5	21.77	20.58	20.04	18.85
		707.5	21.69	20.51	19.96	18.78
		700.5	21.47	20.65	19.74	18.92
	100% RB	714.5	21.63	20.44	19.90	18.71
		707.5	21.76	20.78	20.03	19.05
		700.5	21.56	20.63	19.83	18.90
5MHz	1 RB high	713.5	22.8	21.18	21.07	19.45
		707.5	22.29	21.09	20.56	19.36
		701.5	22.53	21.67	20.80	19.94
	1 RB low	713.5	22.54	21.19	20.81	19.46
		707.5	22.5	21.23	20.77	19.50
		701.5	22.37	21.22	20.64	19.49
	50% RB mid	713.5	21.63	20.64	19.90	18.91
		707.5	21.71	20.48	19.98	18.75
		701.5	21.55	20.3	19.82	18.57
	100% RB	713.5	21.63	20.68	19.90	18.95
		707.5	21.64	20.59	19.91	18.86
		701.5	21.52	20.39	19.79	18.66

10MHz	1 RB high	711	22.59	21.94	20.86	20.21
		707.5	22.41	21.39	20.68	19.66
		704	22.57	21.53	20.84	19.80
	1 RB low	711	22.31	21.79	20.58	20.06
		707.5	22.45	21.32	20.72	19.59
		704	22.41	21.32	20.68	19.59
	50% RB mid	711	21.54	20.71	19.81	18.98
		707.5	21.46	20.84	19.73	19.11
		704	21.54	20.61	19.81	18.88
	100% RB	711	21.61	20.48	19.88	18.75
		707.5	21.5	20.5	19.77	18.77
		704	21.61	20.49	19.88	18.76

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

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)		ERP(dBm) (GT – LC = 0.42)	
			QPSK	16QAM	QPSK	16QAM
5MHz	1 RB high	784.5	22.94	21.41	21.21	19.68
		782.0	22.71	21.09	20.98	19.36
		779.5	22.86	21.86	21.13	20.13
	1 RB low	784.5	22.69	21.43	20.96	19.70
		782.0	22.84	21.73	21.11	20.00
		779.5	22.77	21.53	21.04	19.80
	50% RB mid	784.5	21.75	20.7	20.02	18.97
		782.0	21.75	20.74	20.02	19.01
		779.5	21.9	20.66	20.17	18.93
	100% RB	784.5	21.79	20.6	20.06	18.87
		782.0	21.67	20.88	19.94	19.15
		779.5	21.95	20.84	20.22	19.11
10MHz	1 RB high	782.0	22.86	22.22	21.13	20.49
	1 RB low	782.0	22.69	21.62	20.96	19.89
	50% RB mid	782.0	21.69	20.62	19.96	18.89
	100% RB	782.0	21.67	20.67	19.94	18.94

A.2 Emission Limit

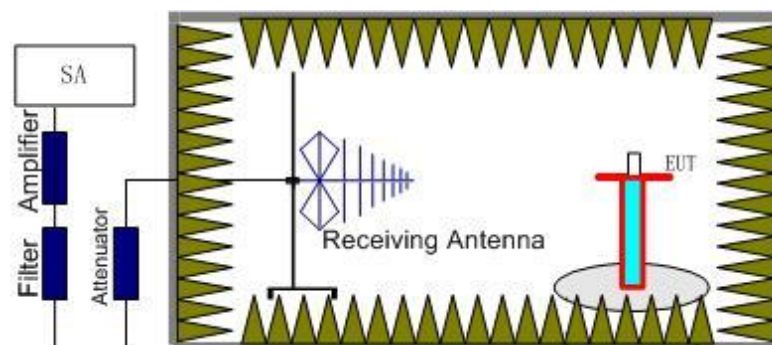
A.2.1 Measurement Method

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

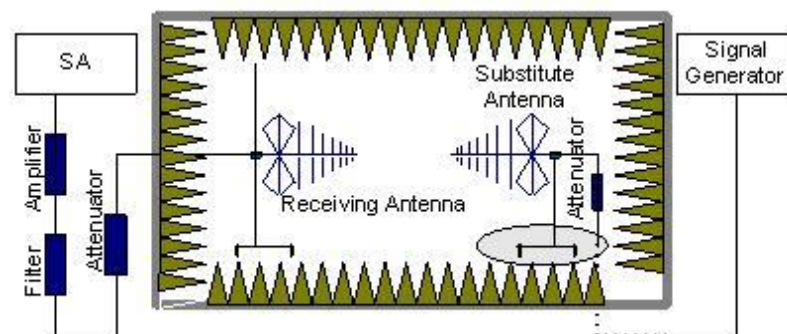
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and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

The procedure of radiated spurious emissions is as follows:

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



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



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

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

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.

An amplifier should be connected in for the test.

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

The measurement results are obtained as described below:

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

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

A.2.2 Measurement Limit

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

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

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

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

A.2.3 Measurement Results

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

seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of each LTE Band into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this. The range of evaluated frequency is from 30MHz to 26GHz.

LTE Band 2, 1.4MHz, QPSK, Channel 18607

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3740.02	-55.58	6.32	8.54	-53.36	-13.00	40.36	V
5555.02	-48.21	7.19	10.59	-44.81	-13.00	31.81	V
7408.01	-39.74	8.14	12.09	-35.79	-13.00	22.79	H
9254.01	-49.69	9.05	13.25	-45.49	-13.00	32.49	H
11109.01	-50.09	9.80	13.18	-46.71	-13.00	33.71	H
12969.01	-48.86	10.48	13.48	-45.86	-13.00	32.86	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
3747.02	-55.12	6.30	8.55	-52.87	-13.00	39.87	V
5642.02	-49.44	7.27	10.57	-46.14	-13.00	33.14	V
7525.01	-42.13	8.29	12.22	-38.20	-13.00	25.20	H
9401.01	-50.54	9.04	13.34	-46.24	-13.00	33.24	H
11285.01	-47.57	9.91	13.14	-44.34	-13.00	31.34	H
13128.01	-47.23	10.81	13.68	-44.36	-13.00	31.36	H

LTE Band 2, 1.4MHz, QPSK, Channel 19193

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3819.02	-56.13	6.08	8.65	-53.56	-13.00	40.56	V
5730.02	-47.55	7.29	10.55	-44.29	-13.00	31.29	V
7642.01	-44.13	8.16	12.31	-39.98	-13.00	26.98	H
9547.01	-49.62	9.37	13.35	-45.64	-13.00	32.64	H
11460.01	-46.64	9.91	13.11	-43.44	-13.00	30.44	H
13365.01	-48.29	10.57	14.01	-44.85	-13.00	31.85	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	-61.46	5.38	8.01	-58.83	-13.00	45.83	V
5136.02	-65.09	6.86	10.09	-61.86	-13.00	48.86	V
6845.01	-50.67	7.83	11.41	-47.09	-13.00	34.09	V
8558.01	-60.40	8.57	13.01	-55.96	-13.00	42.96	V
10286.01	-62.07	9.60	13.01	-58.66	-13.00	45.66	V
11998.01	-58.18	10.06	13.00	-55.24	-13.00	42.24	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	-60.80	5.46	8.12	-58.14	-13.00	45.14	V
5201.02	-61.59	6.96	10.18	-58.37	-13.00	45.37	V
6933.01	-48.77	7.78	11.52	-45.03	-13.00	32.03	V
8666.01	-58.67	8.40	13.03	-54.04	-13.00	41.04	V
10362.01	-62.10	9.74	13.04	-58.80	-13.00	45.80	V
12156.01	-58.41	10.19	13.06	-55.54	-13.00	42.54	H

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	-63.78	5.54	8.21	-61.11	-13.00	48.11	V
5266.02	-56.85	6.99	10.27	-53.57	-13.00	40.57	V
7020.01	-48.96	8.27	11.62	-45.61	-13.00	32.61	V
8775.01	-57.33	8.59	13.06	-52.86	-13.00	39.86	V
10527.01	-61.87	9.55	13.11	-58.31	-13.00	45.31	H
12307.01	-57.84	10.03	13.12	-54.75	-13.00	41.75	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	-48.78	3.57	5.23	2.15	-49.27	-13.00	36.27	V
2474.00	-51.22	4.60	6.02	2.15	-51.95	-13.00	38.95	V
3307.02	-54.49	5.29	7.74	2.15	-54.19	-13.00	41.19	V
4126.02	-54.42	6.04	9.03	2.15	-53.58	-13.00	40.58	V
4939.01	-53.09	6.71	9.84	2.15	-52.11	-13.00	39.11	V
5776.01	-50.32	7.23	10.54	2.15	-49.16	-13.00	36.16	V

LTE Band 5, 1.4MHz, QPSK, Channel 20525

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.01	-44.49	3.58	5.19	2.15	-45.03	-13.00	32.03	V
2510.00	-51.80	4.63	6.12	2.15	-52.46	-13.00	39.46	H
3347.02	-54.20	5.32	7.83	2.15	-53.84	-13.00	40.84	H
4185.02	-54.08	6.17	9.09	2.15	-53.31	-13.00	40.31	V
5023.01	-51.16	6.56	9.93	2.15	-49.94	-13.00	36.94	V
5858.01	-50.52	7.26	10.53	2.15	-49.40	-13.00	36.40	V

LTE Band 5, 1.4MHz, QPSK, Channel 20643

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1697.01	-42.45	3.60	5.15	2.15	-43.05	-13.00	30.05	V
2545.00	-49.49	4.66	6.18	2.15	-50.12	-13.00	37.12	H
3402.02	-55.13	5.36	7.96	2.15	-54.68	-13.00	41.68	H
4252.02	-54.57	6.24	9.15	2.15	-53.81	-13.00	40.81	H
5095.01	-50.83	6.76	10.03	2.15	-49.71	-13.00	36.71	V
5941.01	-46.61	7.47	10.51	2.15	-45.72	-13.00	32.72	V

LTE Band 12, 1.4MHz, QPSK, Channel 23017

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1400.01	-47.35	3.24	4.98	2.15	-47.76	-13.00	34.76	V
2099.00	-52.18	4.19	4.90	2.15	-53.62	-13.00	40.62	H
2802.00	-45.47	4.92	6.64	2.15	-45.90	-13.00	32.90	V
3499.02	-54.37	5.52	8.20	2.15	-53.84	-13.00	40.84	H
4201.02	-52.99	6.21	9.10	2.15	-52.25	-13.00	39.25	V
4889.01	-53.67	6.73	9.79	2.15	-52.76	-13.00	39.76	H

LTE Band 12, 1.4MHz, QPSK, Channel 23095

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1415.01	-52.13	3.25	5.06	2.15	-52.47	-13.00	39.47	H
2116.00	-53.16	4.21	4.95	2.15	-54.57	-13.00	41.57	H
2820.00	-51.81	4.94	6.68	2.15	-52.22	-13.00	39.22	V
3538.02	-54.86	5.70	8.25	2.15	-54.46	-13.00	41.46	H
4239.02	-54.67	6.25	9.14	2.15	-53.93	-13.00	40.93	V
4953.01	-53.80	6.68	9.85	2.15	-52.78	-13.00	39.78	H

LTE Band 12, 1.4MHz, QPSK, Channel 23173

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1431.01	-54.83	3.28	5.14	2.15	-55.12	-13.00	42.12	V
2142.00	-55.55	4.24	5.03	2.15	-56.91	-13.00	43.91	V
2872.00	-52.19	4.97	6.77	2.15	-52.54	-13.00	39.54	V
3569.02	-53.99	6.02	8.30	2.15	-53.86	-13.00	40.86	V
4297.02	-54.34	6.20	9.20	2.15	-53.49	-13.00	40.49	V
5011.01	-53.36	6.58	9.92	2.15	-52.17	-13.00	39.17	V

LTE Band 13, 5MHz, QPSK, Channel 23205

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1555.01	-59.22	3.47	5.40	2.15	-59.44	-13.00	46.44	H
2345.00	-54.30	4.45	5.64	2.15	-55.26	-13.00	42.26	V
3121.02	-52.78	5.39	7.29	2.15	-53.03	-13.00	40.03	H
3898.02	-52.56	6.11	8.76	2.15	-52.06	-13.00	39.06	V
4670.02	-53.61	6.48	9.57	2.15	-52.67	-13.00	39.67	V
5461.01	-44.26	6.91	10.55	2.15	-42.77	-13.00	29.77	V

LTE Band 13, 5MHz, QPSK, Channel 23230

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1558.01	-57.55	3.47	5.40	2.15	-57.77	-13.00	44.77	H
2346.00	-49.58	4.45	5.64	2.15	-50.54	-13.00	37.54	H
3124.02	-51.91	5.40	7.30	2.15	-52.16	-13.00	39.16	H
3917.02	-54.22	6.12	8.78	2.15	-53.71	-13.00	40.71	V
4686.02	-53.11	6.49	9.59	2.15	-52.16	-13.00	39.16	V
5479.01	-45.59	6.98	10.57	2.15	-44.15	-13.00	31.15	V

LTE Band 13, 5MHz, QPSK, Channel 23255

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1571.01	-58.41	3.49	5.37	2.15	-58.68	-13.00	45.68	H
2354.00	-53.65	4.46	5.66	2.15	-54.60	-13.00	41.60	H
3129.02	-52.55	5.40	7.31	2.15	-52.79	-13.00	39.79	H
3924.02	-53.11	6.12	8.79	2.15	-52.59	-13.00	39.59	V
4711.02	-53.31	6.51	9.61	2.15	-52.36	-13.00	39.36	H
5496.01	-44.81	7.04	10.59	2.15	-43.41	-13.00	30.41	V

A.3 Frequency Stability

A.3.1 Method of Measurement

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

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

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

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

A.3.2 Measurement results

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

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	1850.833	1909.199		
50				0.06	0.0000
40				-2.19	0.0012
30				0.03	0.0000
10				-0.07	0.0000
0				-0.06	0.0000
-10				1.12	0.0006
-20				0.92	0.0005
-30				0.40	0.0002

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	1850.833	1909.199	-0.13	0.0001
4.2				0.99	0.0005

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	3.8	1710.833	1754.199		
50				7.67	0.0044
40				7.67	0.0044
30				1.89	0.0011
10				7.80	0.0045
0				8.01	0.0046
-10				1.00	0.0006
-20				7.98	0.0046
-30				8.67	0.0050

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	1710.833	1754.199	1.36	0.0008
4.2				8.84	0.0051

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	3.8	824.417	848.583		
50				-0.49	0.0006
40				-0.21	0.0003
30				-0.03	0.0000
10				1.24	0.0015
0				-0.04	0.0000
-10				0.51	0.0006
-20				0.24	0.0003
-30				0.43	0.0005

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	824.417	848.583	0.06	0.0001
4.2				0.57	0.0007

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	3.8	699.481	715.519		
50				0.34	0.0005
40				0.67	0.0009
30				0.86	0.0012
10				-0.46	0.0007
0				0.06	0.0001
-10				-0.23	0.0003
-20				-0.14	0.0002
-30				0.13	0.0002

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	699.481	715.519	0.76	0.0011
4.2				0.33	0.0005

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

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	777.417	786.567		
50				0.13	0.0002
40				0.17	0.0002
30				-0.50	0.0006
10				-0.26	0.0003
0				0.06	0.0001
-10				0.31	0.0004
-20				0.06	0.0001
-30				0.01	0.0000

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F _L (MHz)	F _H (MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	777.417	786.567	0.37	0.0005
4.2				-0.03	0.0000

A.4 Occupied Bandwidth

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

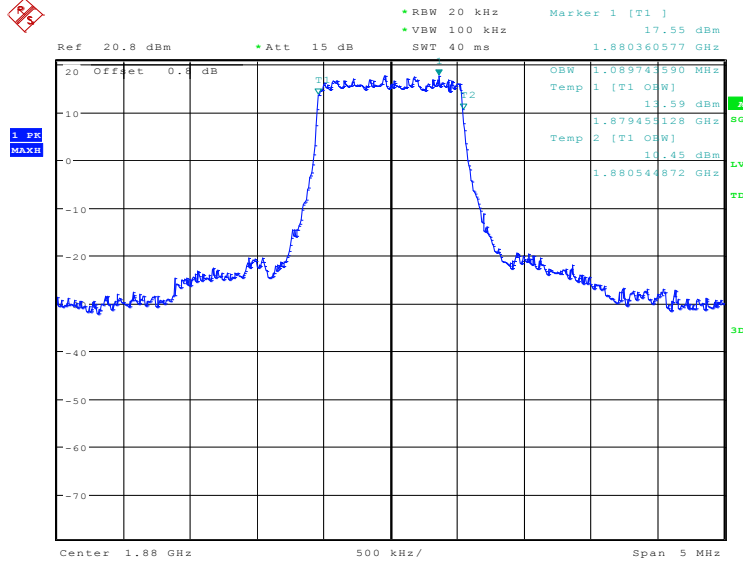
The measurement method is from ANSI C63.26:

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

LTE band 2, 1.4MHz (99%)

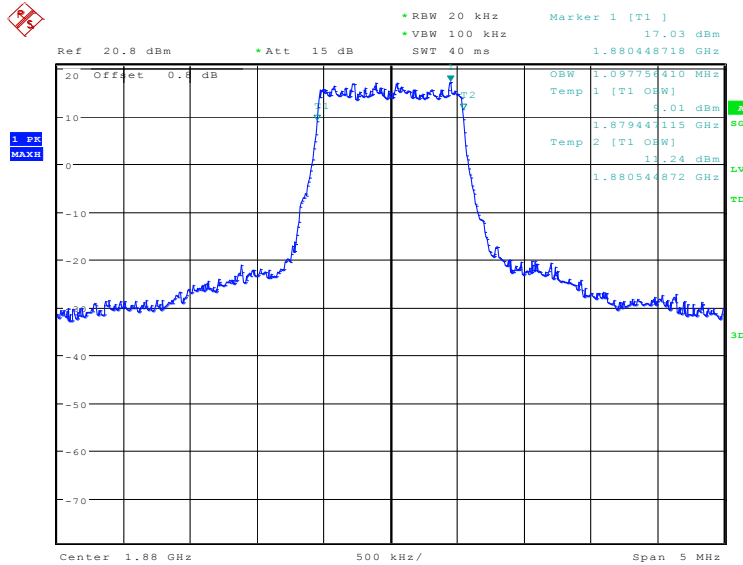
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	1089.74	1097.76

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



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

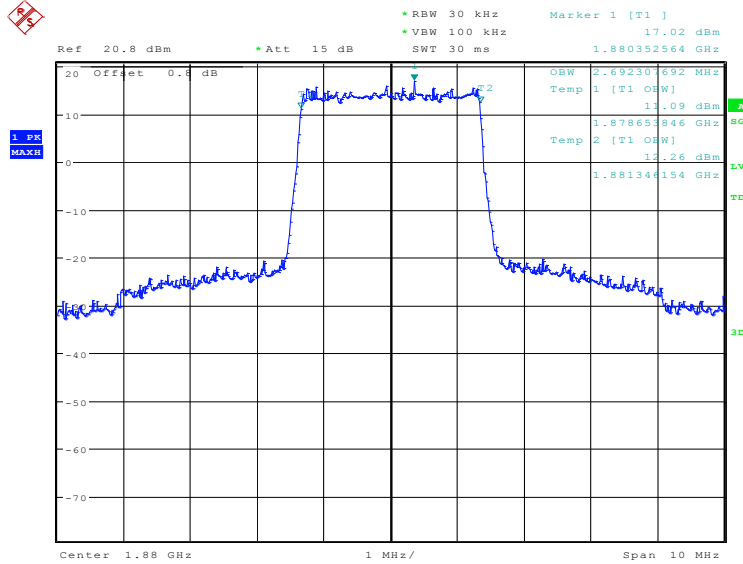


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LTE band 2, 3MHz (99%)

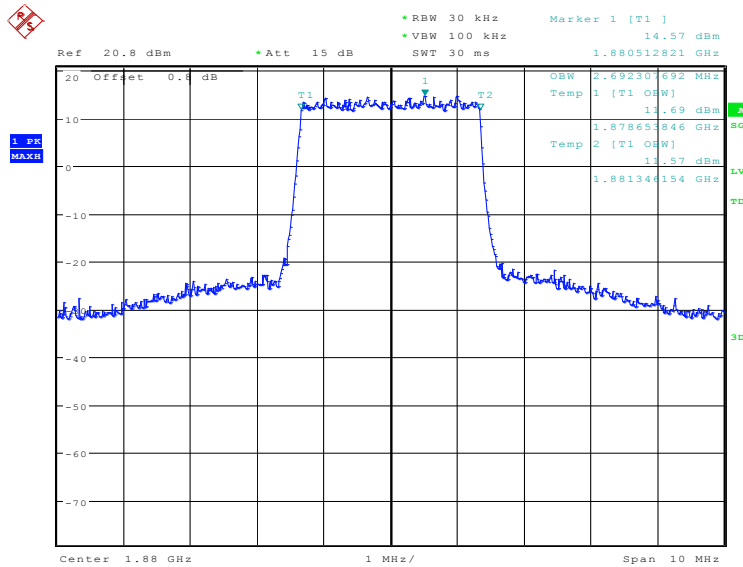
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	2692.31	2692.31

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



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

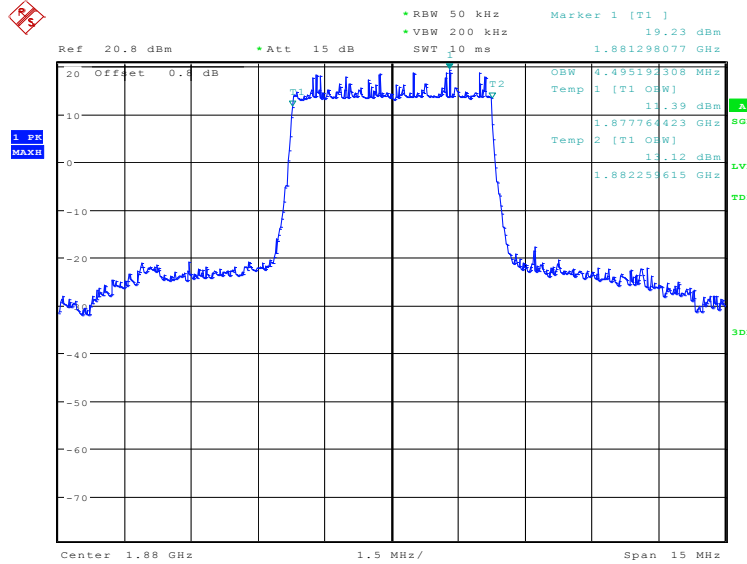


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LTE band 2, 5MHz (99%)

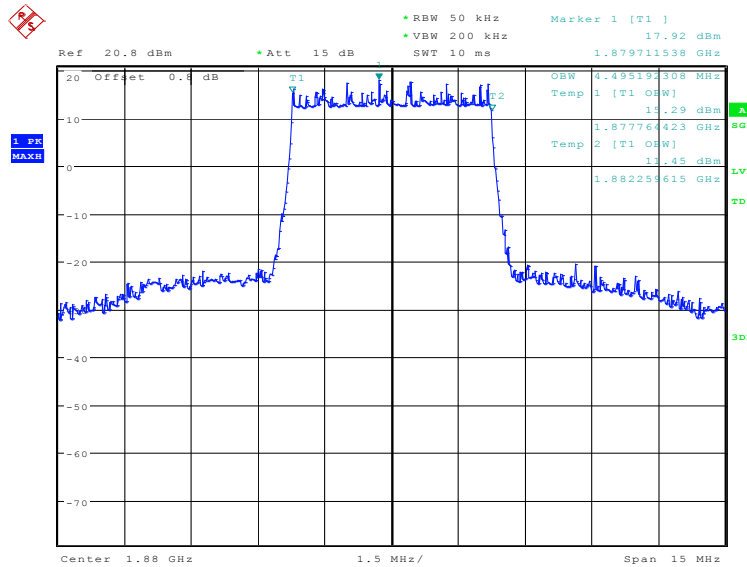
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	4495.19	4495.19

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



Date: 2.DEC.2020 16:58:34

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

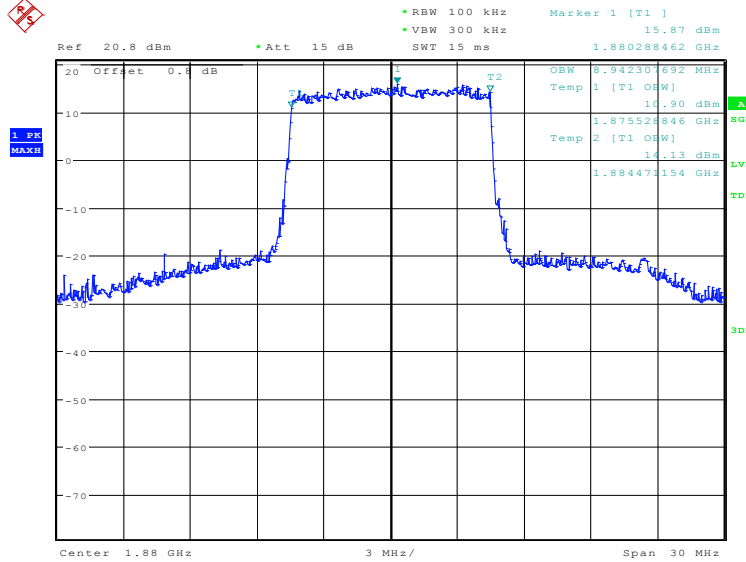


Date: 2.DEC.2020 16:59:13

LTE band 2, 10MHz (99%)

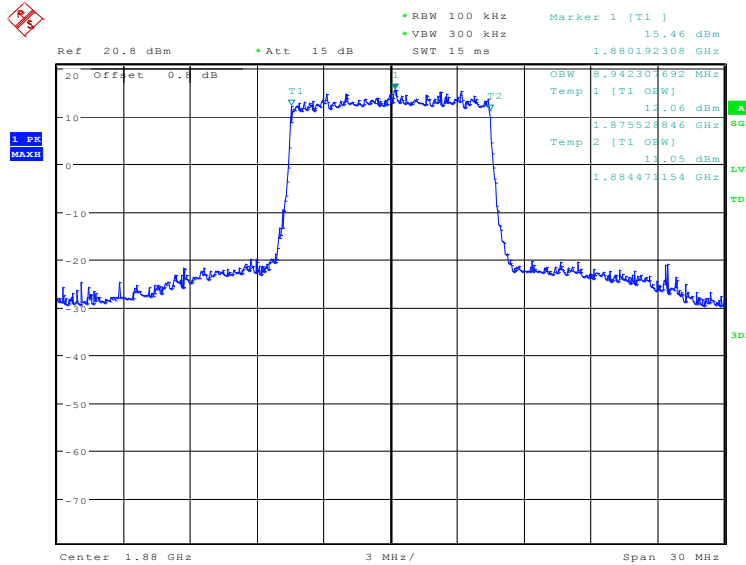
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	8942.31	8942.31

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



Date: 2.DEC.2020 16:59:52

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

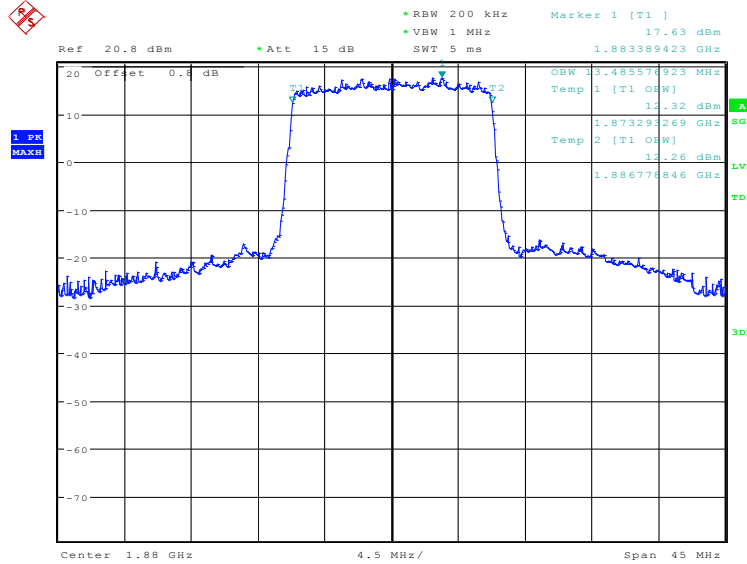


Date: 2.DEC.2020 17:00:31

LTE band 2, 15MHz (99%)

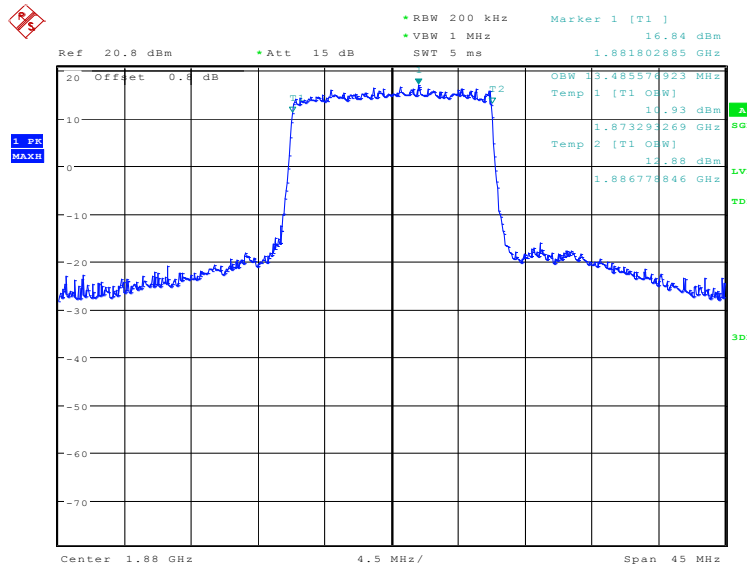
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	13485.58	13485.58

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



Date: 2.DEC.2020 17:01:11

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

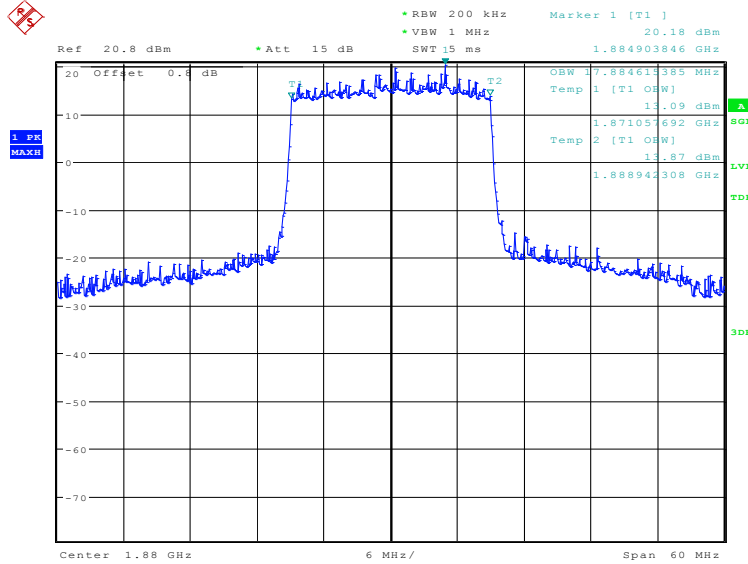


Date: 2.DEC.2020 17:01:50

LTE band 2, 20MHz (99%)

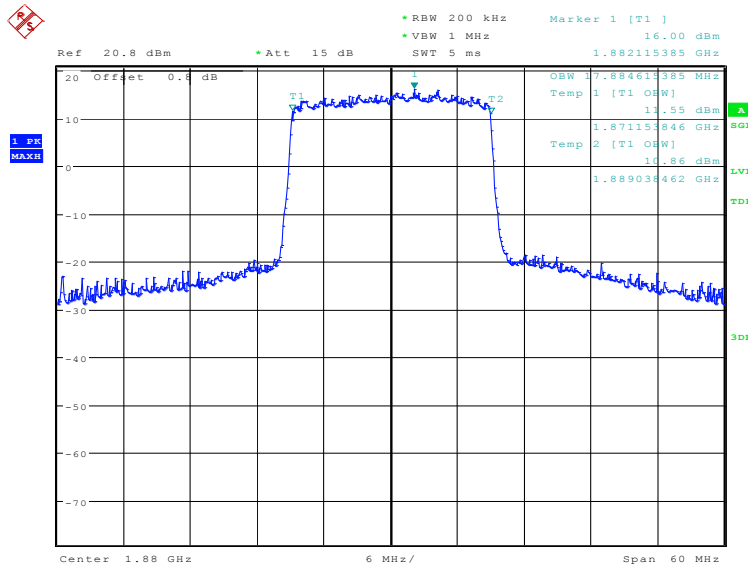
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1880.0	QPSK	16QAM
	17884.62	17884.62

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



Date: 2.DEC.2020 17:02:30

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

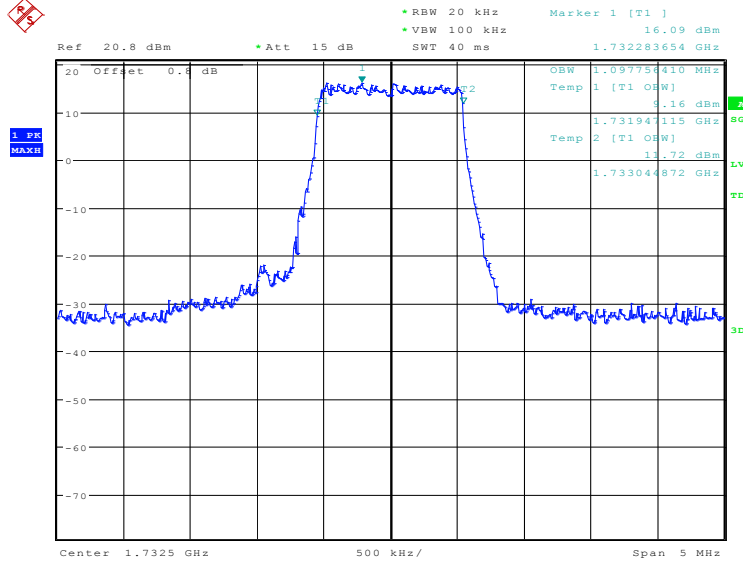


Date: 2.DEC.2020 17:03:09

LTE band 4, 1.4MHz (99%)

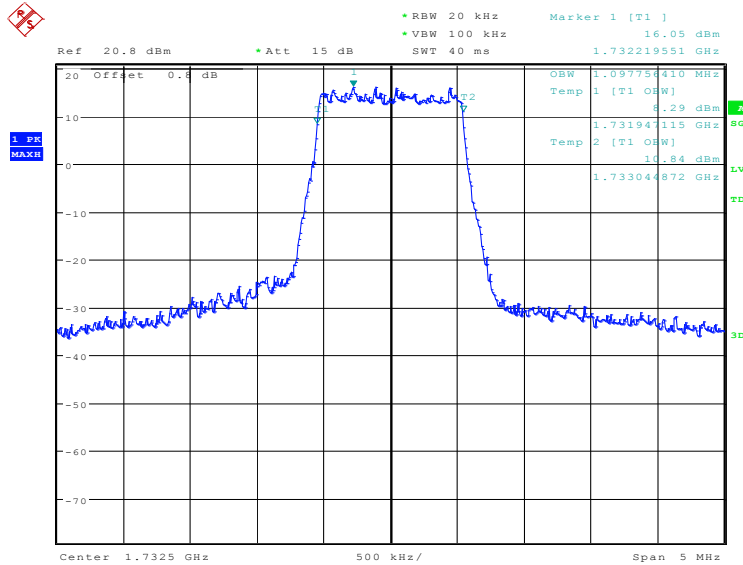
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1732.5	QPSK	16QAM
	1097.76	1097.76

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



Date: 2.DEC.2020 17:03:51

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

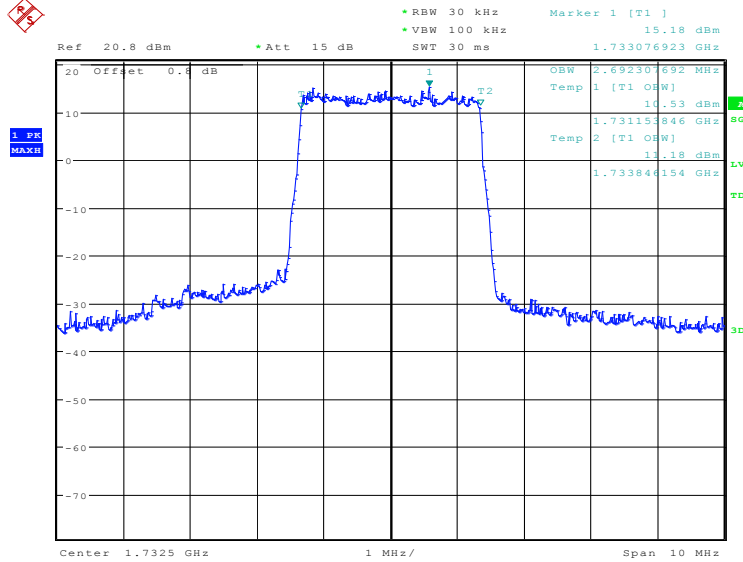


Date: 2.DEC.2020 17:04:30

LTE band 4, 3MHz (99%)

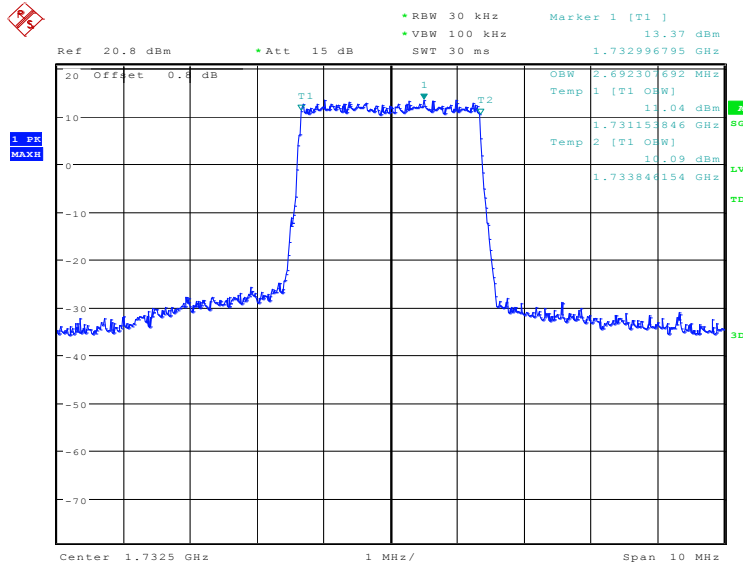
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1732.5	QPSK	16QAM
	2692.31	2692.31

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



Date: 2.DEC.2020 17:05:10

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

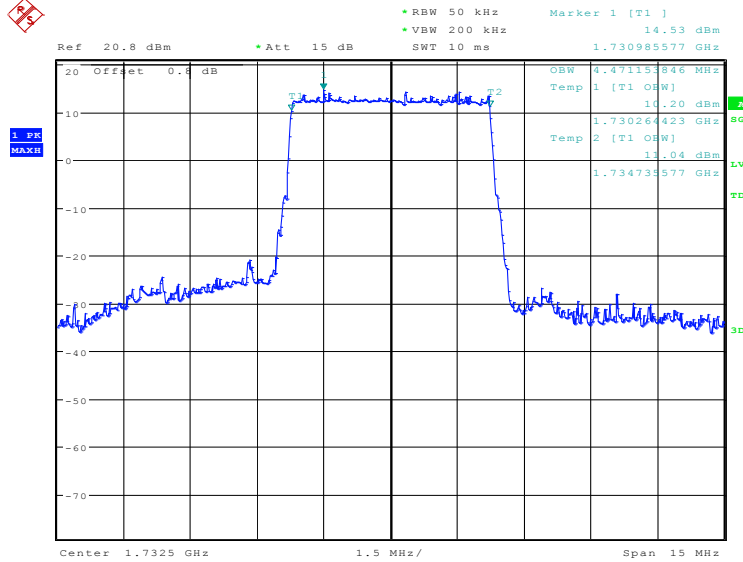


Date: 2.DEC.2020 17:05:48

LTE band 4, 5MHz (99%)

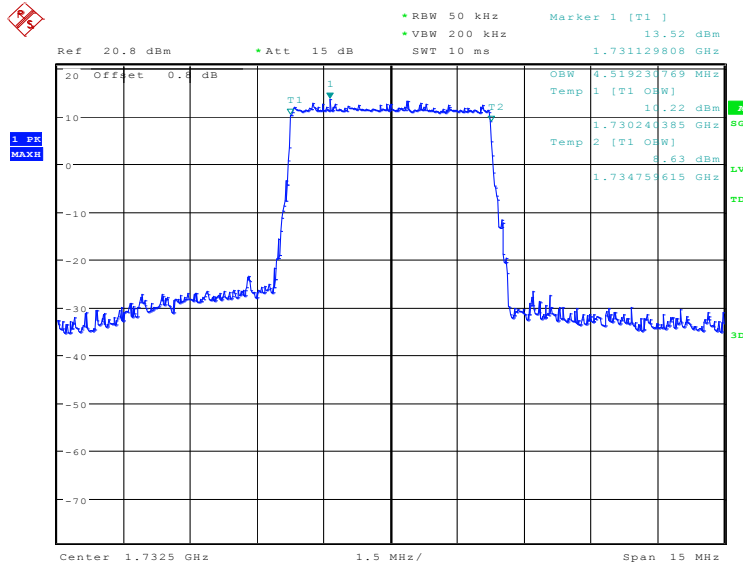
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1732.5	QPSK	16QAM
	4471.15	4519.23

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



Date: 2.DEC.2020 17:06:28

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

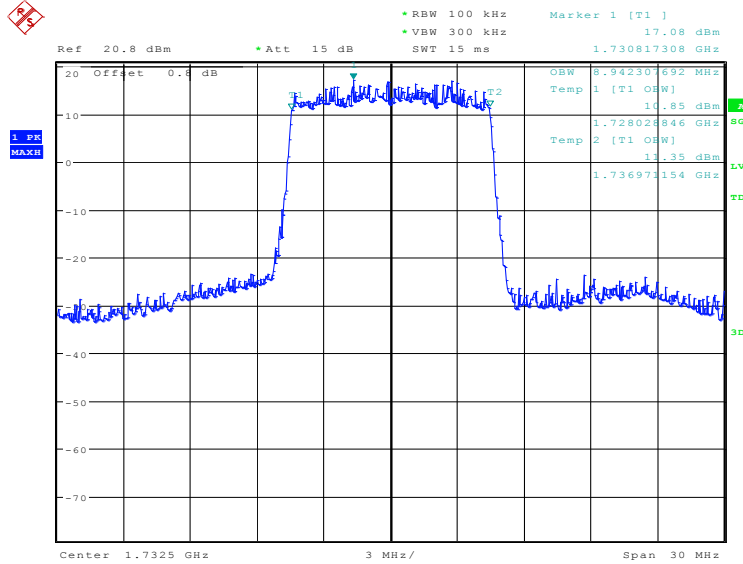


Date: 2.DEC.2020 17:07:07

LTE band 4, 10MHz (99%)

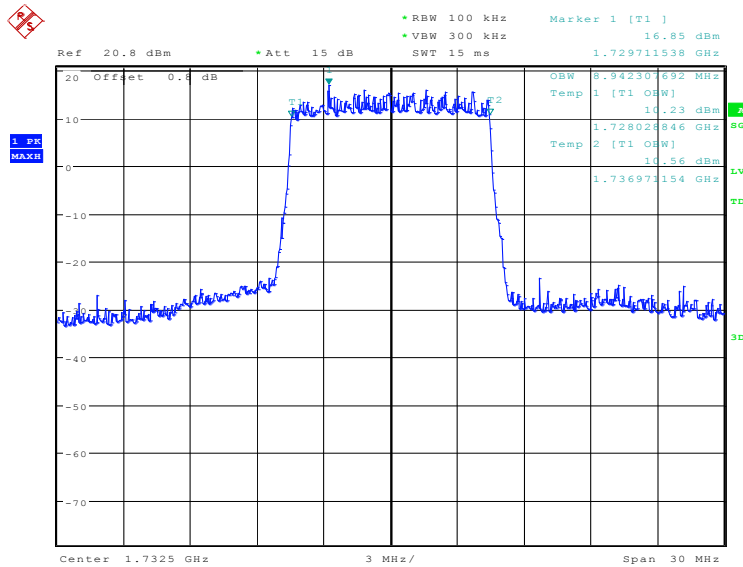
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1732.5	QPSK	16QAM
	8942.31	8942.31

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



Date: 2.DEC.2020 17:07:47

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

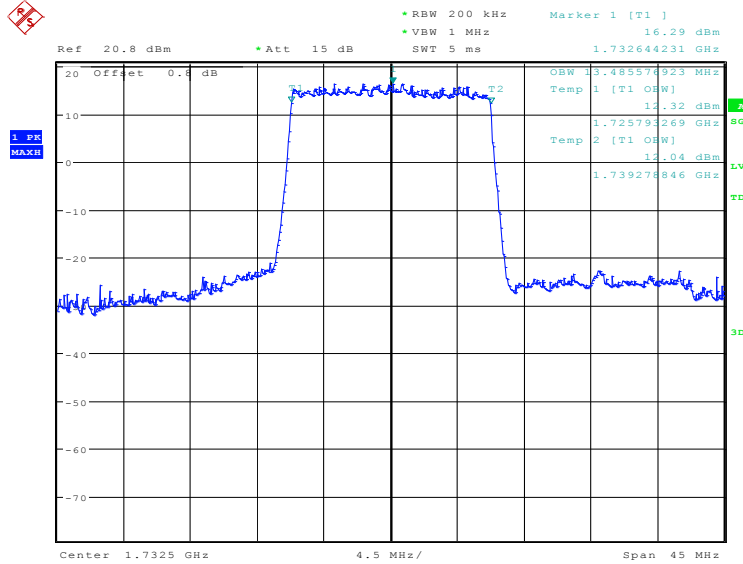


Date: 2.DEC.2020 17:08:26

LTE band 4, 15MHz (99%)

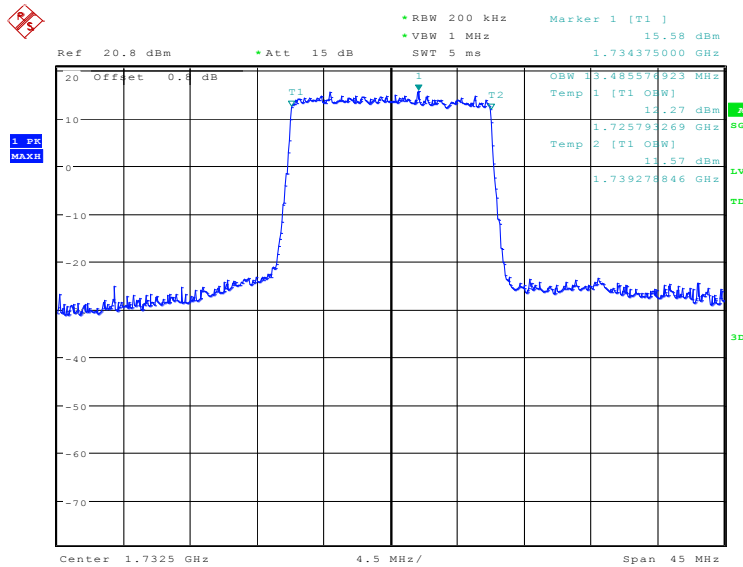
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1732.5	QPSK	16QAM
	13485.58	13485.58

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



Date: 2.DEC.2020 17:09:06

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

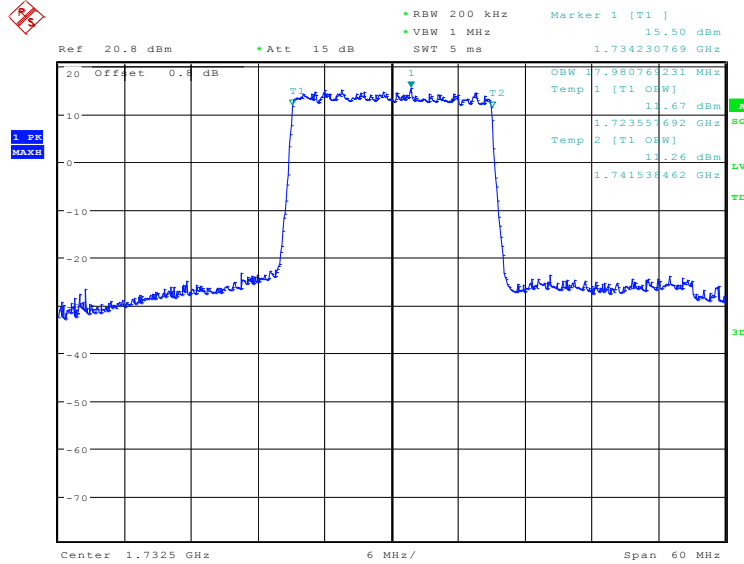


Date: 2.DEC.2020 17:09:45

LTE band 4, 20MHz (99%)

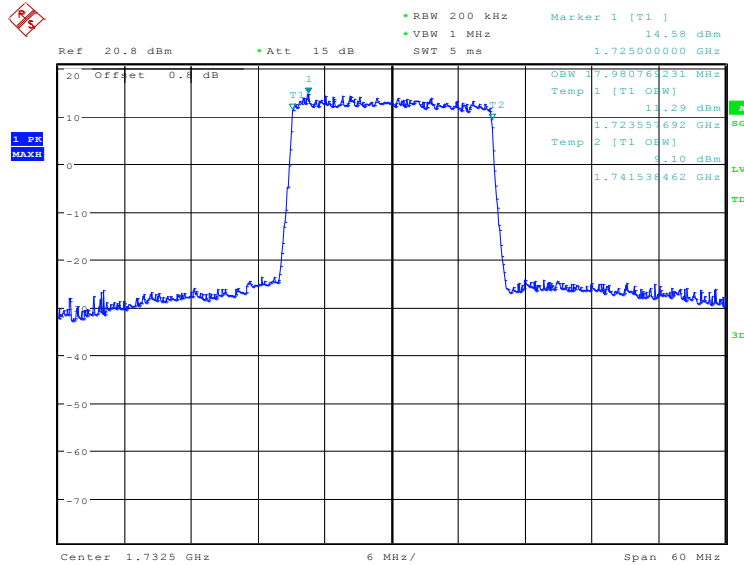
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1732.5	QPSK	16QAM
	17980.77	17980.77

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



Date: 2.DEC.2020 17:10:25

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

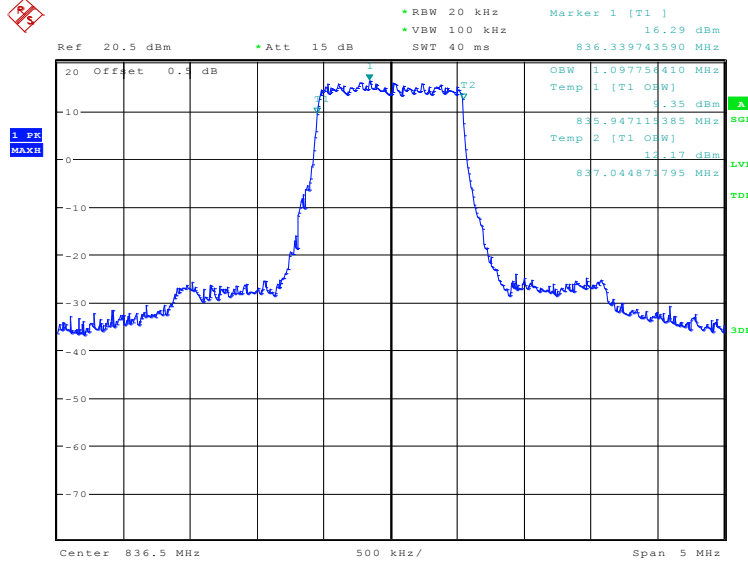


Date: 2.DEC.2020 17:11:03

LTE band 5, 1.4MHz (99%)

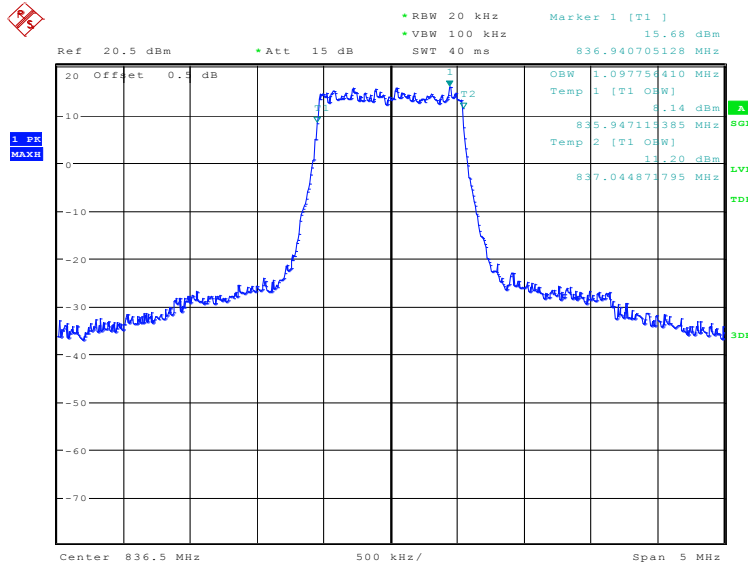
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
836.5	QPSK	16QAM
	1097.76	1097.76

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



Date: 2.DEC.2020 17:12:32

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

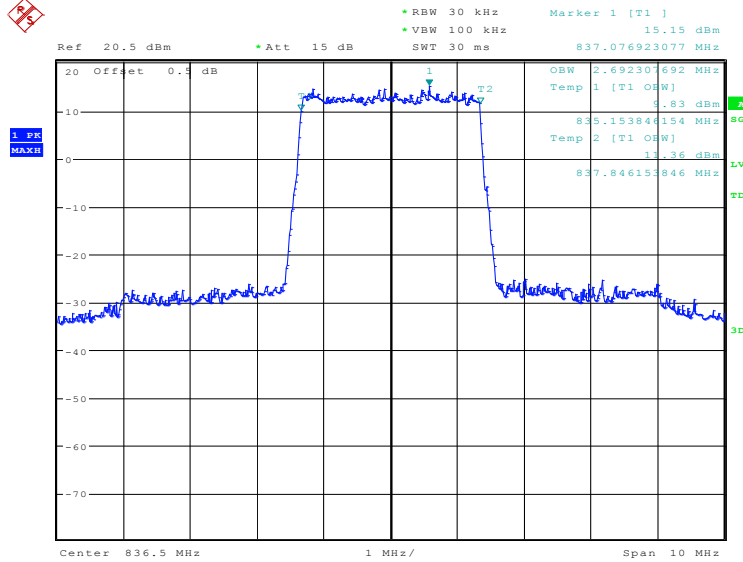


Date: 2.DEC.2020 17:13:10

LTE band 5, 3MHz (99%)

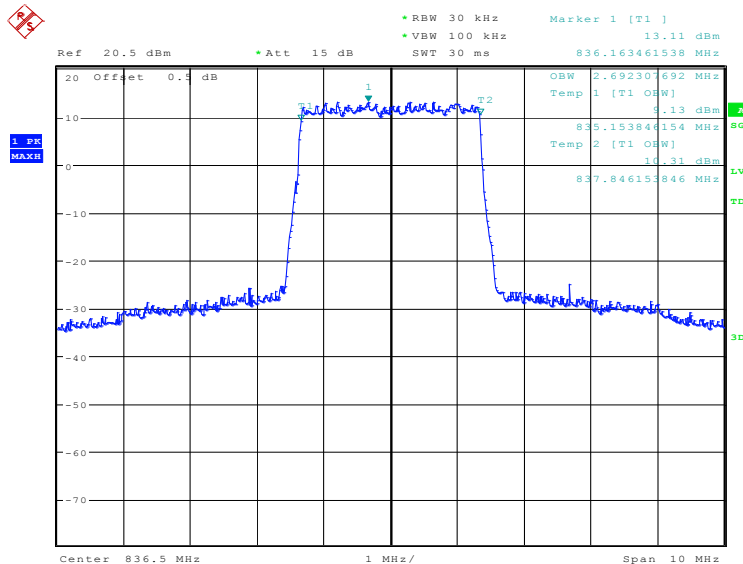
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
836.5	QPSK	16QAM
	2692.31	2692.31

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



Date: 2.DEC.2020 17:13:50

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

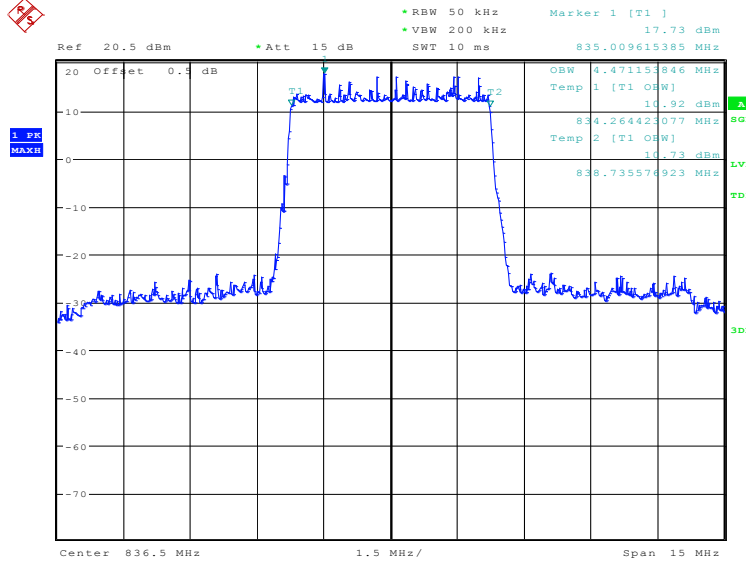


Date: 2.DEC.2020 17:14:29

LTE band 5, 5MHz (99%)

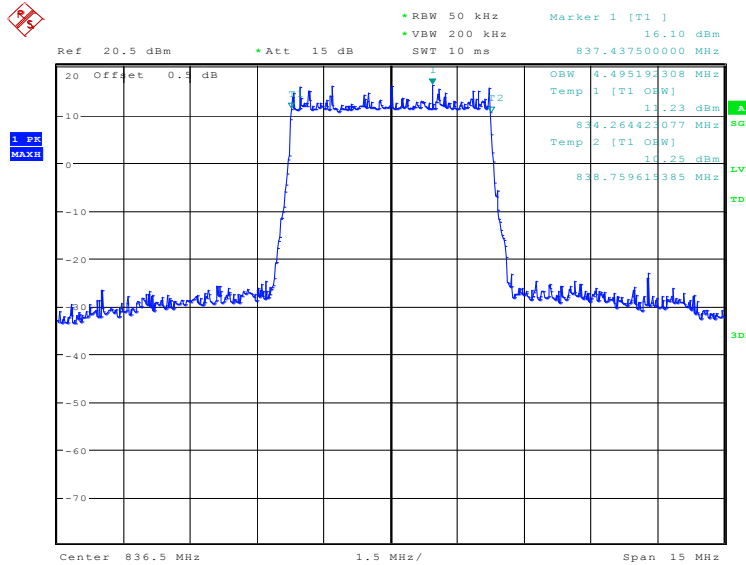
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
836.5	QPSK	16QAM
	4471.15	4495.19

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



Date: 2.DEC.2020 17:15:09

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

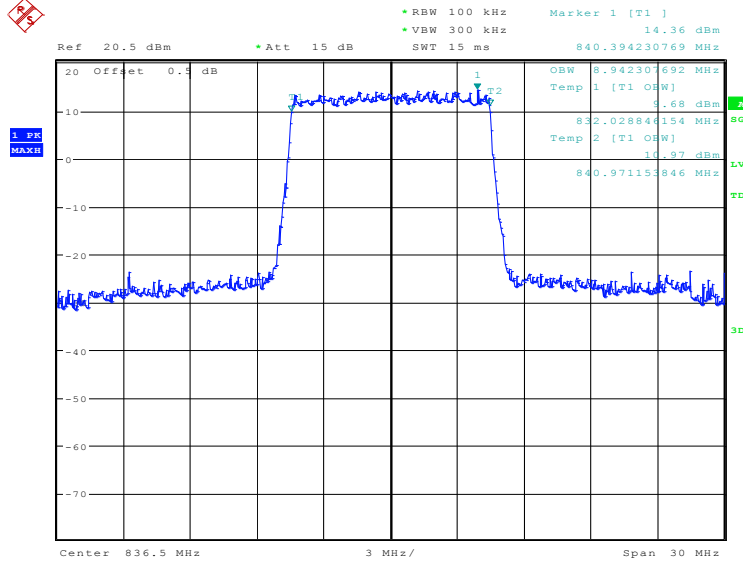


Date: 2.DEC.2020 17:15:48

LTE band 5, 10MHz (99%)

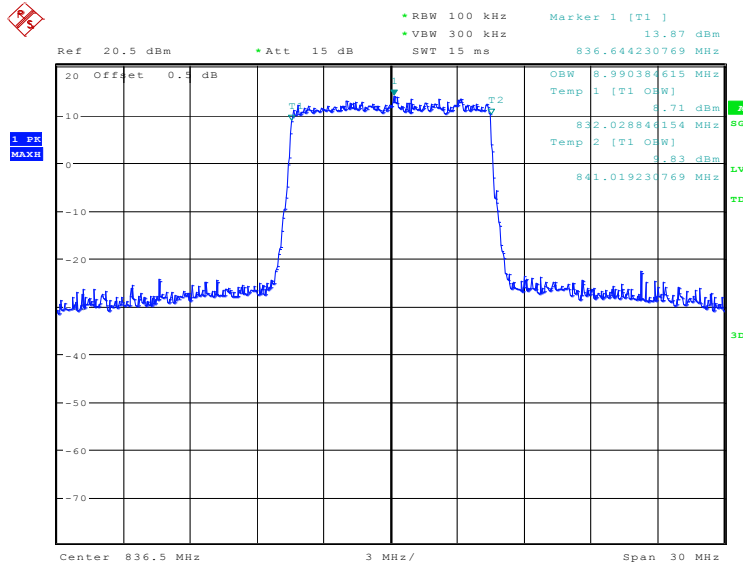
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
836.5	QPSK	16QAM
	8942.31	8990.38

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



Date: 2.DEC.2020 17:16:28

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

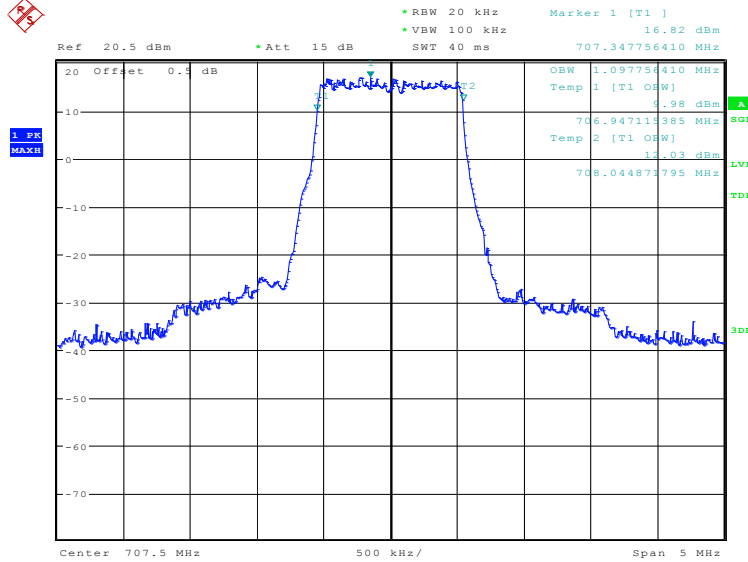


Date: 2.DEC.2020 17:17:06

LTE band 12, 1.4MHz (99%)

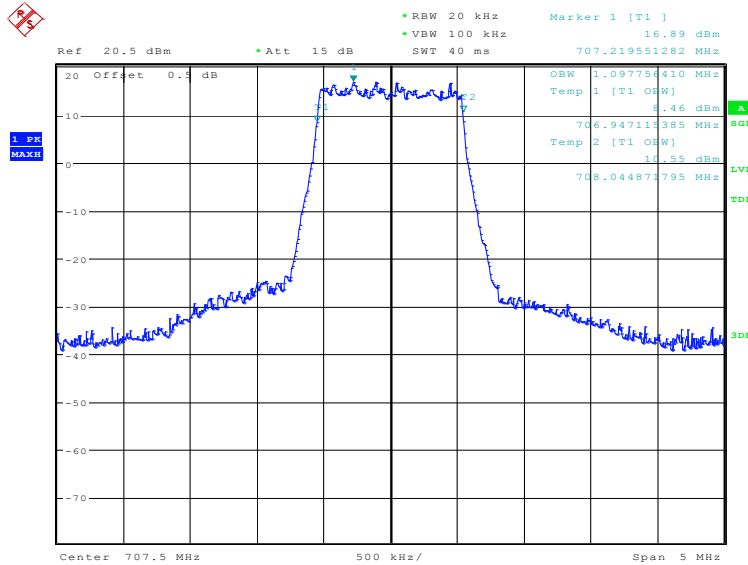
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
707.5	QPSK	16QAM
	1097.76	1097.76

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



Date: 2.DEC.2020 17:17:51

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

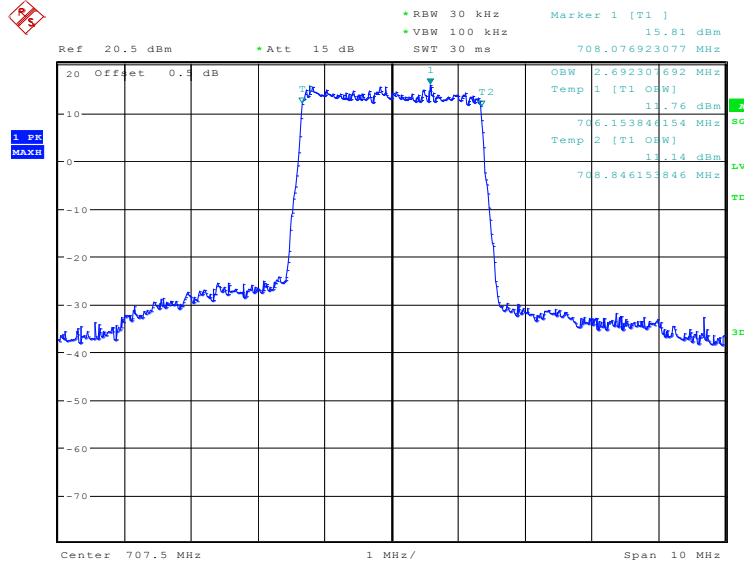


Date: 2.DEC.2020 17:18:29

LTE band 12, 3MHz (99%)

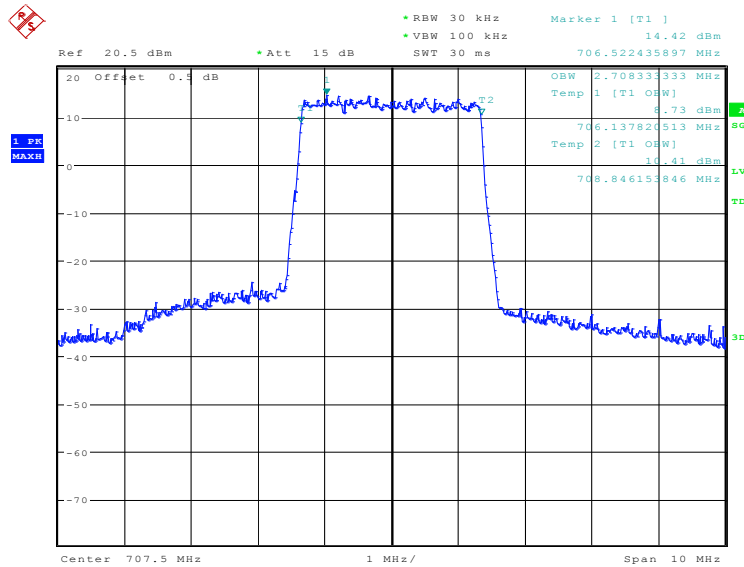
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
707.5	QPSK	16QAM
	2692.31	2708.33

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



Date: 2.DEC.2020 17:19:09

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

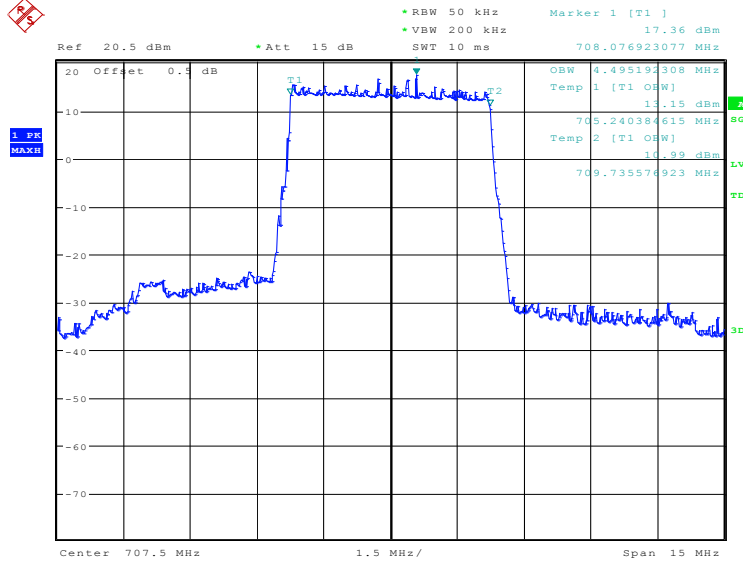


Date: 2.DEC.2020 17:19:48

LTE band 12, 5MHz (99%)

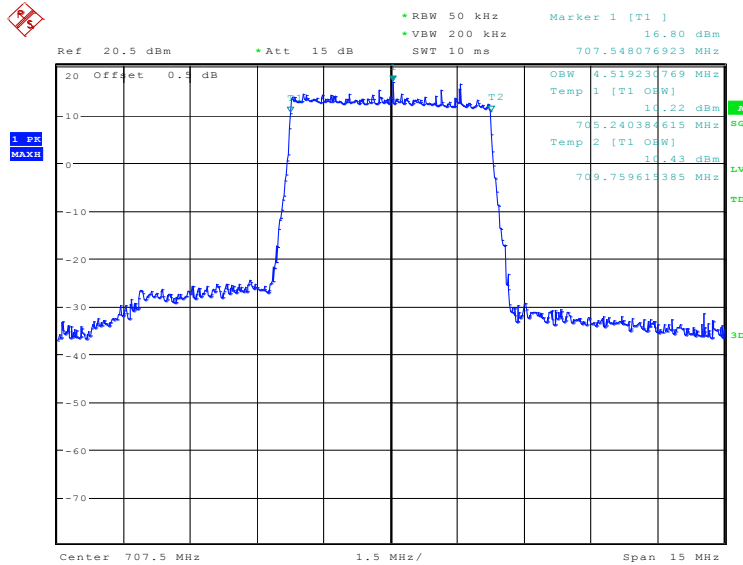
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
707.5	QPSK	16QAM
	4495.19	4519.23

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



Date: 2.DEC.2020 17:20:28

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

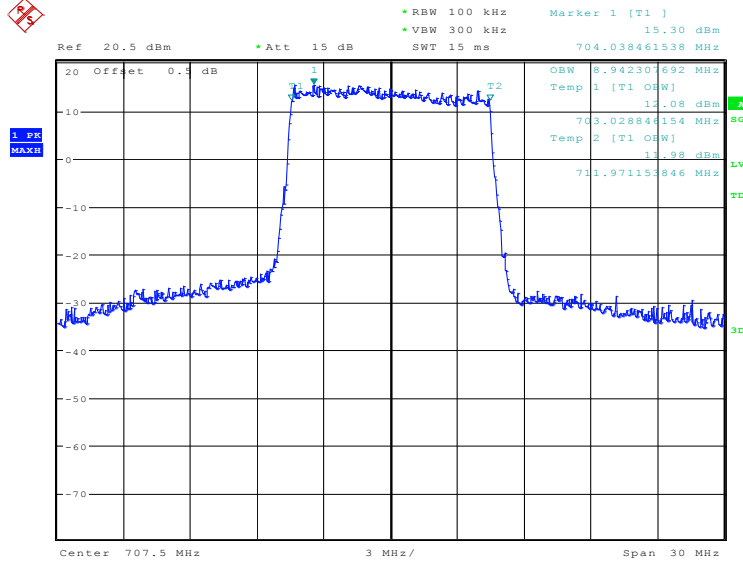


Date: 2.DEC.2020 17:21:07

LTE band 12, 10MHz (99%)

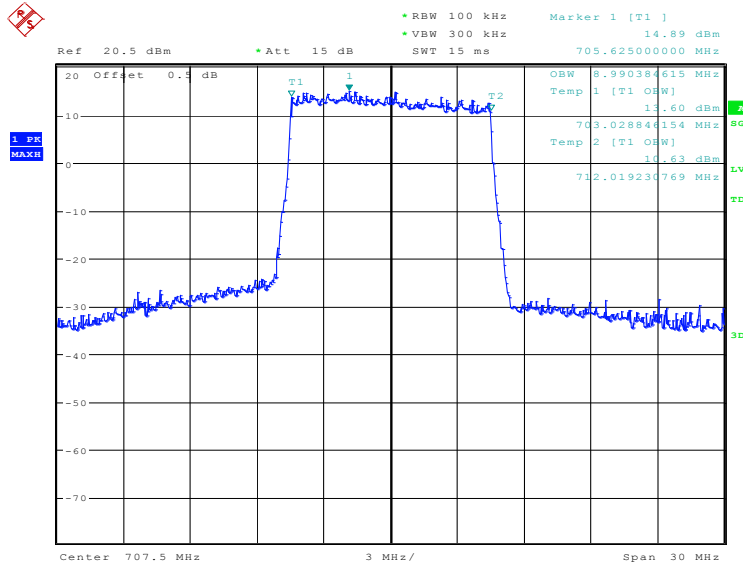
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
707.5	QPSK	16QAM
	8942.31	8990.38

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



Date: 2.DEC.2020 17:21:47

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

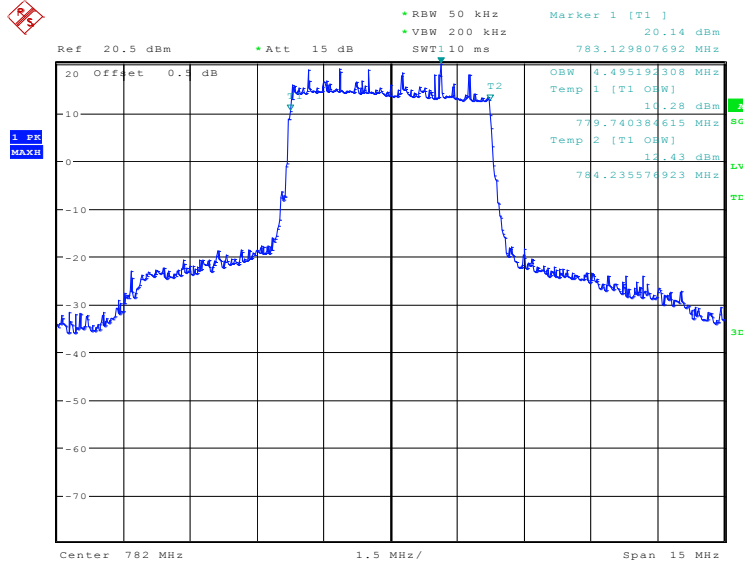


Date: 2.DEC.2020 17:22:26

LTE band 13, 5MHz (99%)

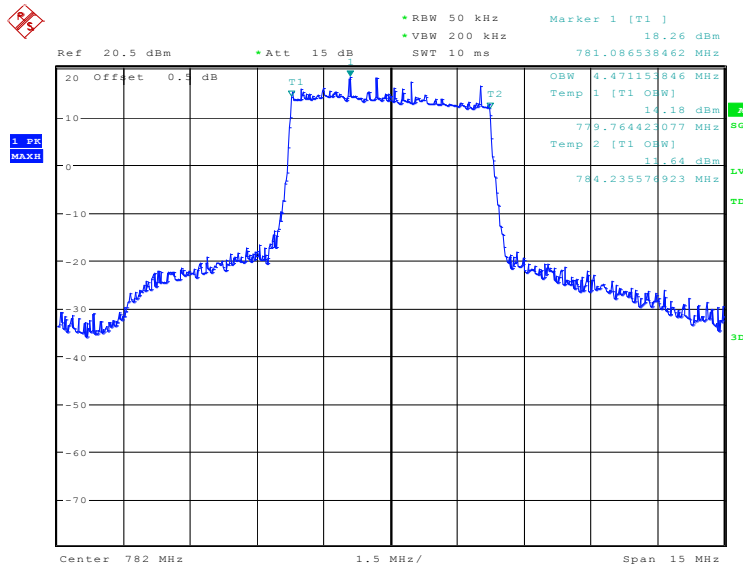
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
782.0	QPSK	16QAM
	4495.19	4471.15

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



Date: 2.DEC.2020 17:23:07

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

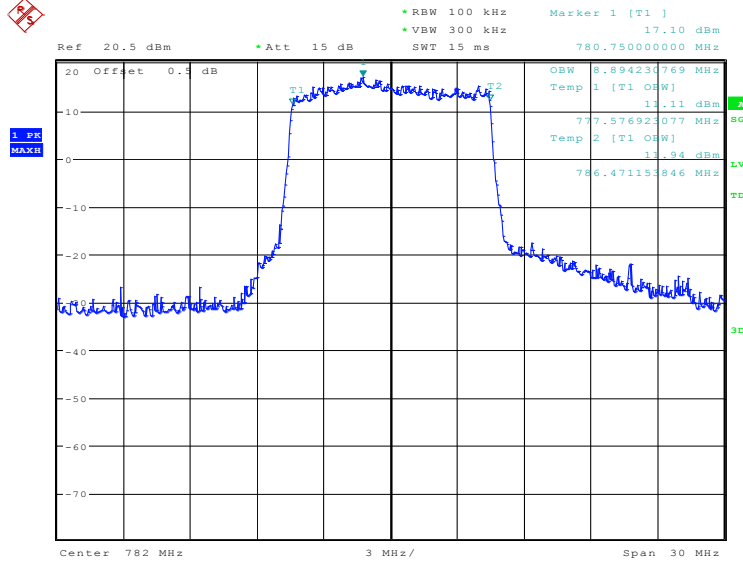


Date: 2.DEC.2020 17:23:46

LTE band 13, 10MHz (99%)

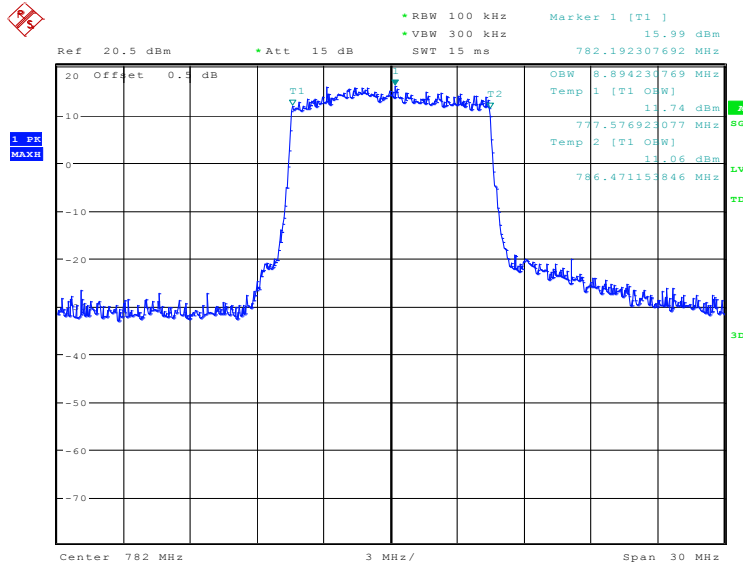
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
782.0	QPSK	16QAM
	8894.23	8894.23

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



Date: 2.DEC.2020 17:24:26

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



Date: 2.DEC.2020 17:25:04

A.5 Emission Bandwidth

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

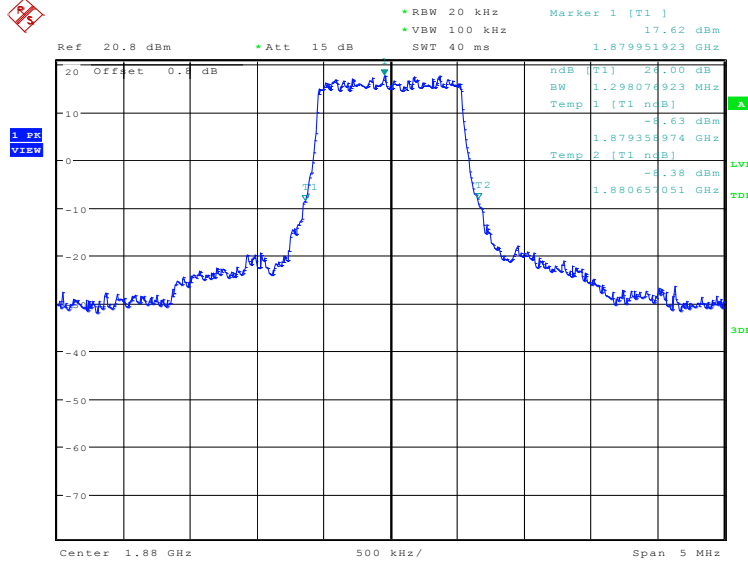
The measurement method is from ANSI C63.26:

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

LTE band 2, 1.4MHz (-26dBc)

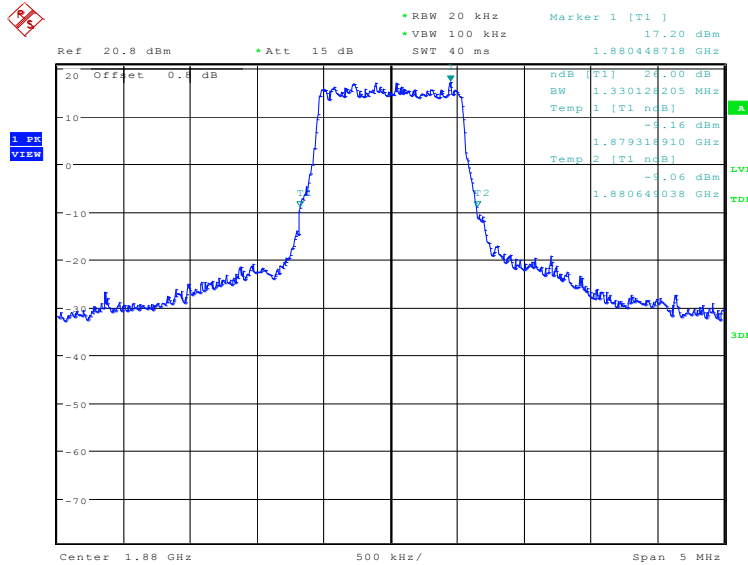
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	1880.0	QPSK
1298.08		1330.13

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



Date: 2.DEC.2020 17:26:18

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

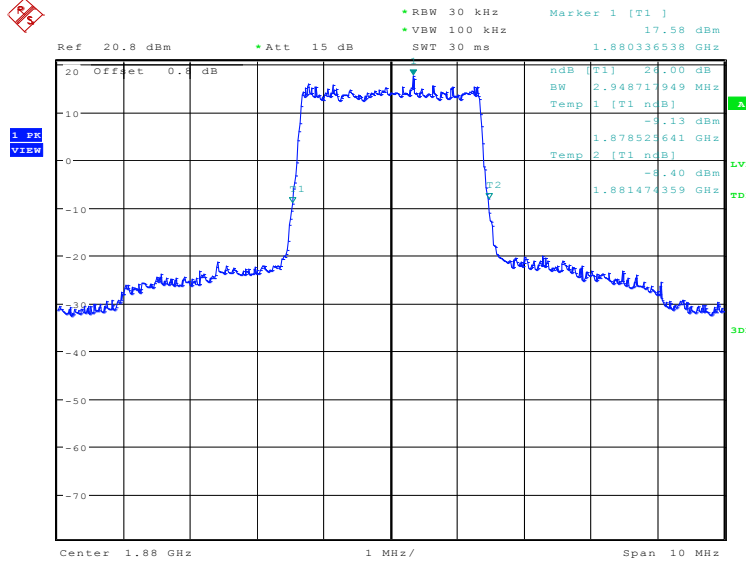


Date: 2.DEC.2020 17:26:57

LTE band 2, 3MHz (-26dBc)

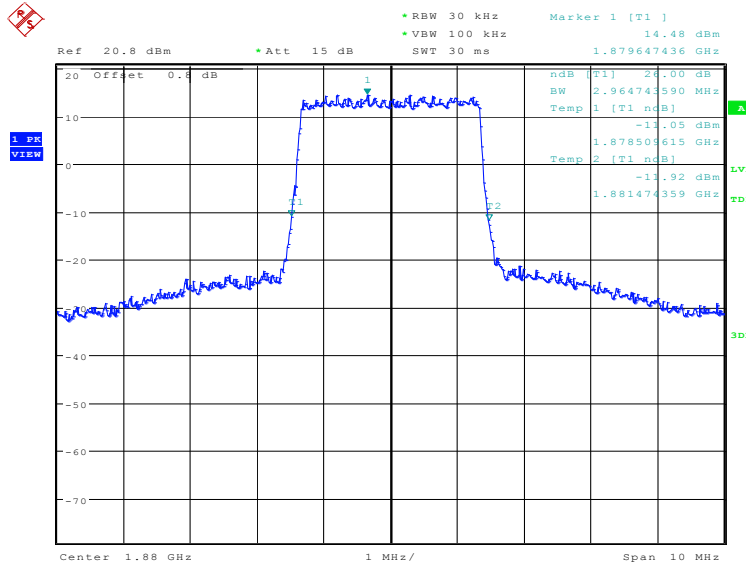
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1880.0	QPSK	16QAM
	2948.72	2964.74

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



Date: 2.DEC.2020 17:27:38

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

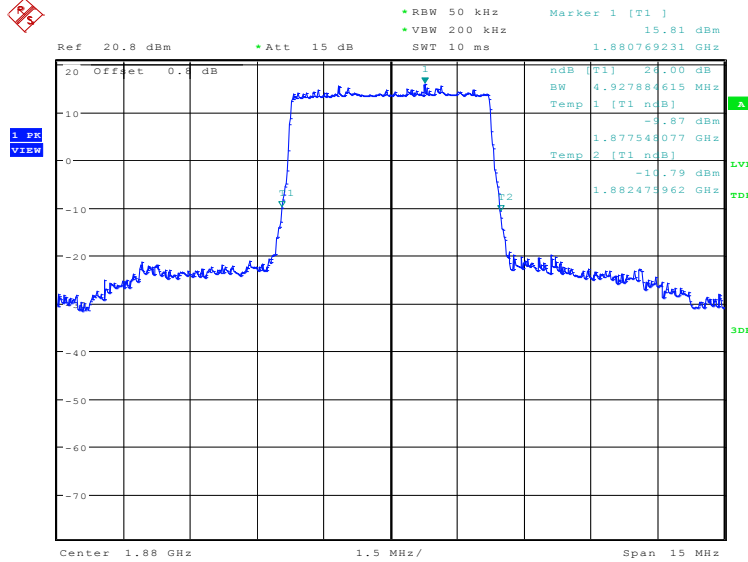


Date: 2.DEC.2020 17:28:17

LTE band 2, 5MHz (-26dBc)

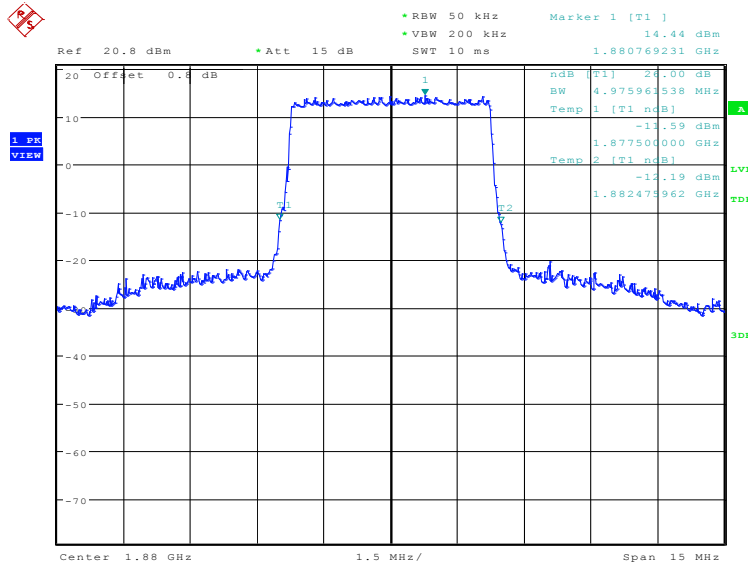
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1880.0	QPSK	16QAM
	4927.88	4975.96

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



Date: 2.DEC.2020 17:28:57

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

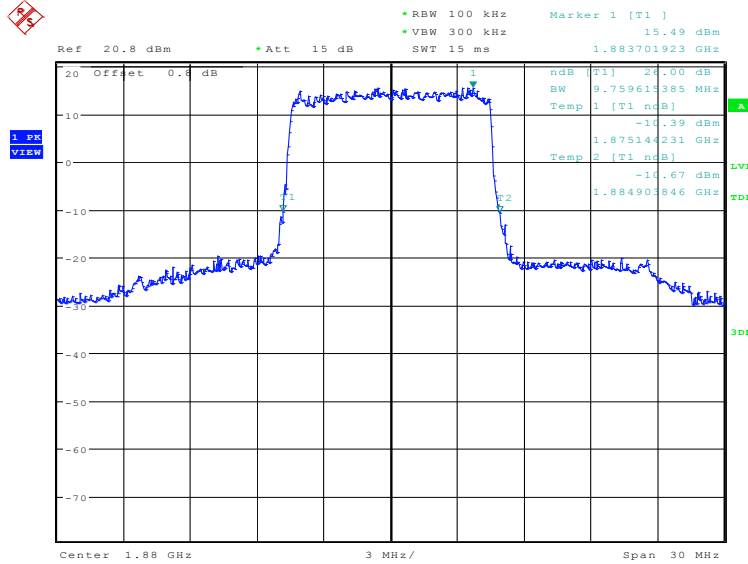


Date: 2.DEC.2020 17:29:37

LTE band 2, 10MHz (-26dBc)

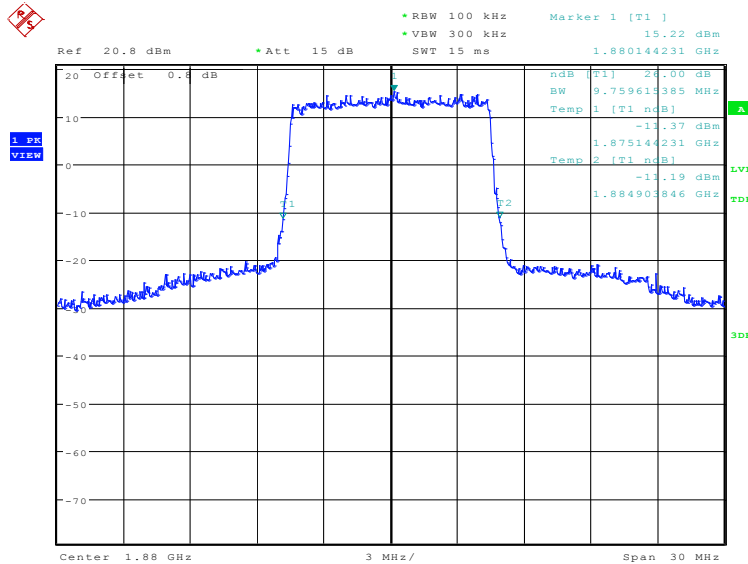
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1880.0	QPSK	16QAM
	9759.62	9759.62

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



Date: 2.DEC.2020 17:30:17

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

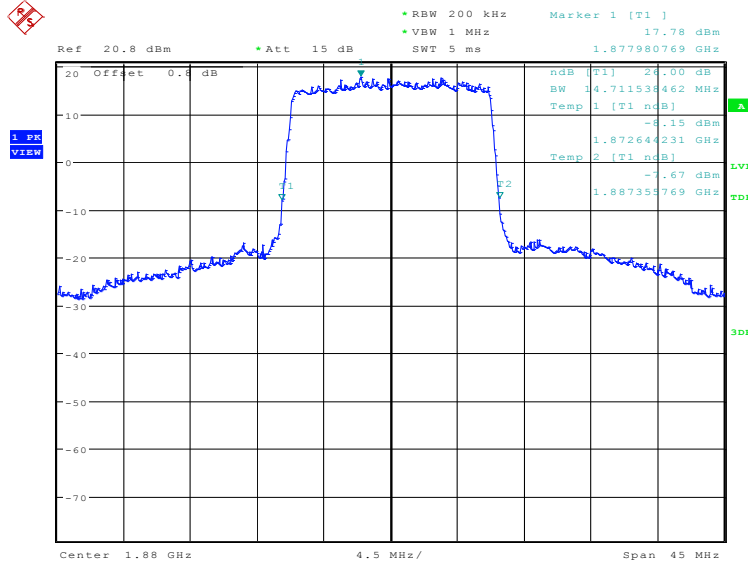


Date: 2.DEC.2020 17:30:56

LTE band 2, 15MHz (-26dBc)

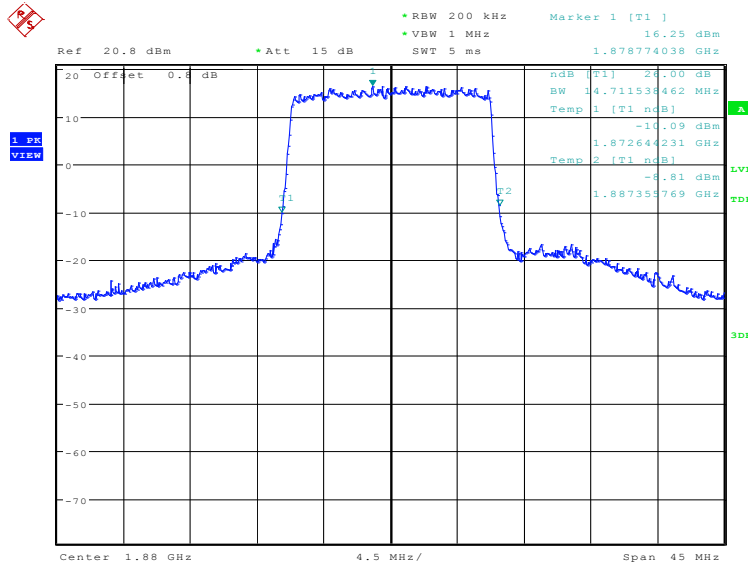
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	1880.0	QPSK
14711.54		14711.54

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



Date: 2.DEC.2020 17:31:37

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

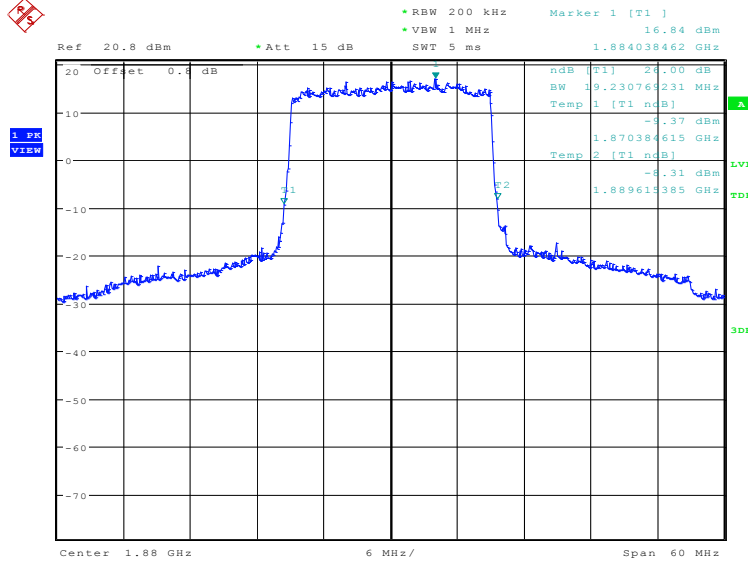


Date: 2.DEC.2020 17:32:16

LTE band 2, 20MHz (-26dBc)

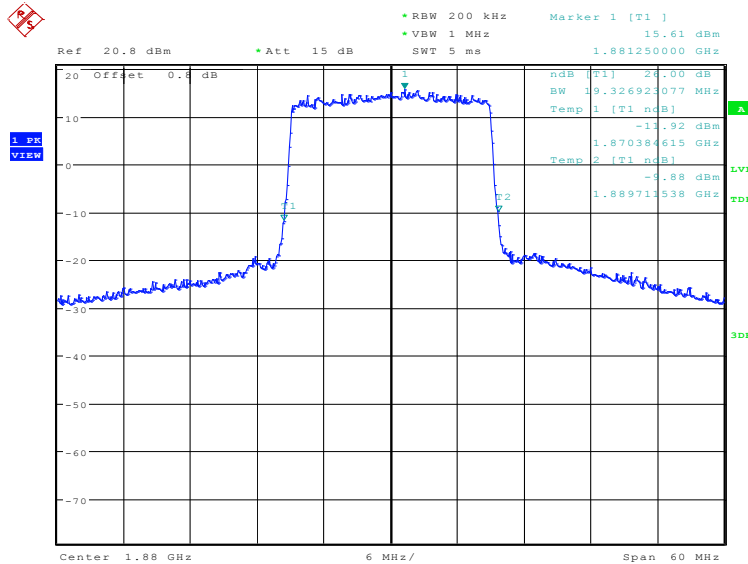
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	1880.0	QPSK
	19230.77	19326.92

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



Date: 2.DEC.2020 17:32:57

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

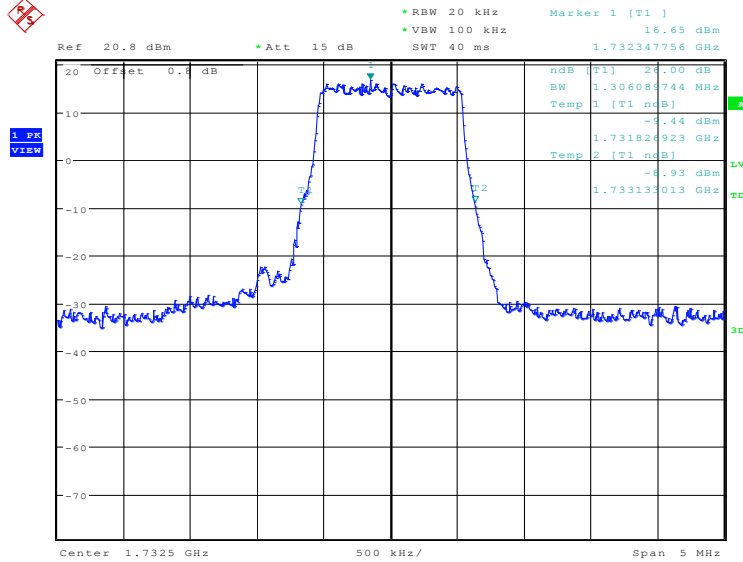


Date: 2.DEC.2020 17:33:36

LTE band 4, 1.4MHz (-26dBc)

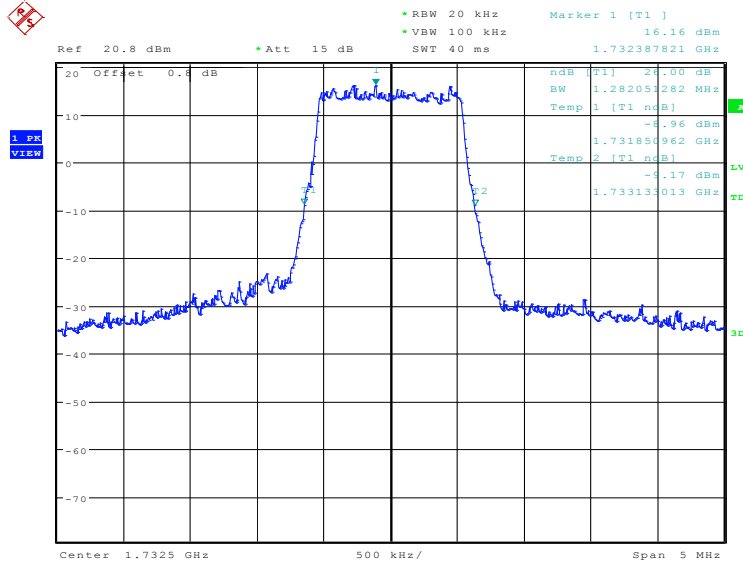
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1732.5	QPSK	16QAM
	1306.09	1282.05

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



Date: 2.DEC.2020 17:34:19

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

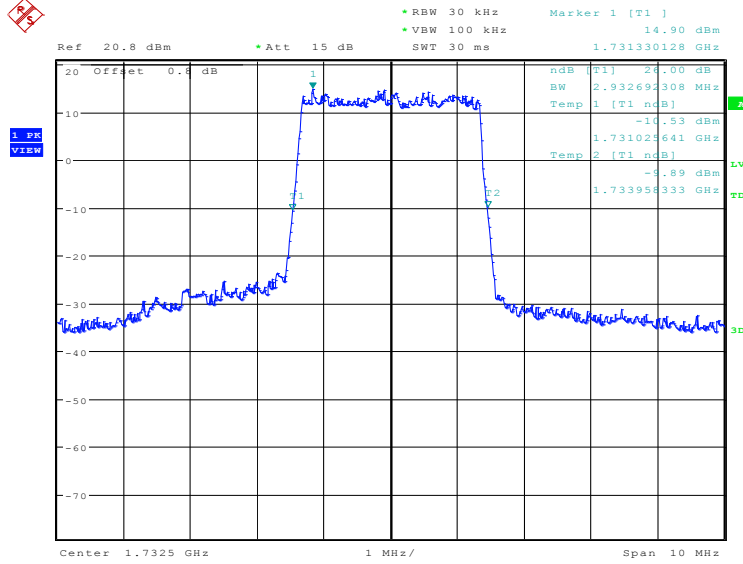


Date: 2.DEC.2020 17:34:59

LTE band 4, 3MHz (-26dBc)

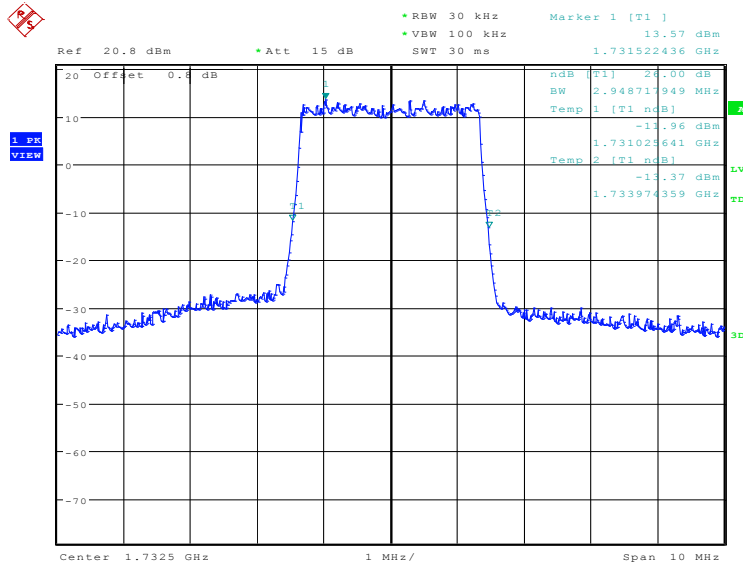
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1732.5	QPSK	16QAM
	2932.69	2948.72

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



Date: 2.DEC.2020 17:35:39

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

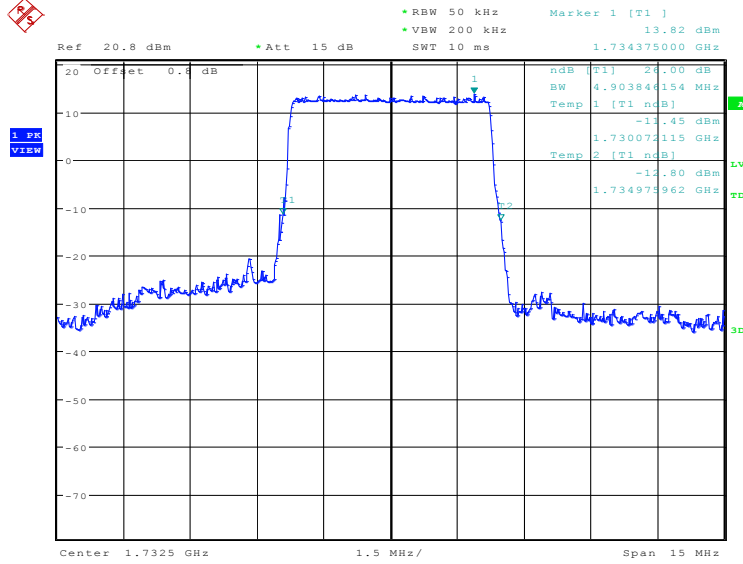


Date: 2.DEC.2020 17:36:19

LTE band 4, 5MHz (-26dBc)

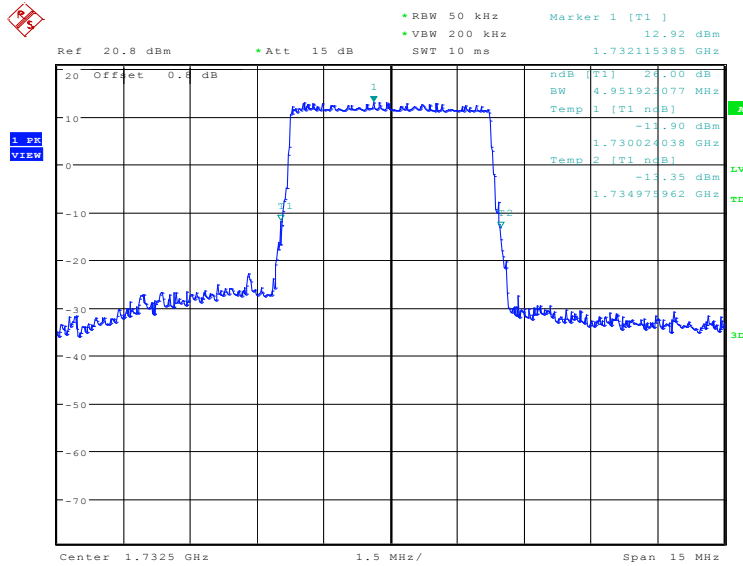
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1732.5	QPSK	16QAM
	4903.85	4951.92

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



Date: 2.DEC.2020 17:36:59

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

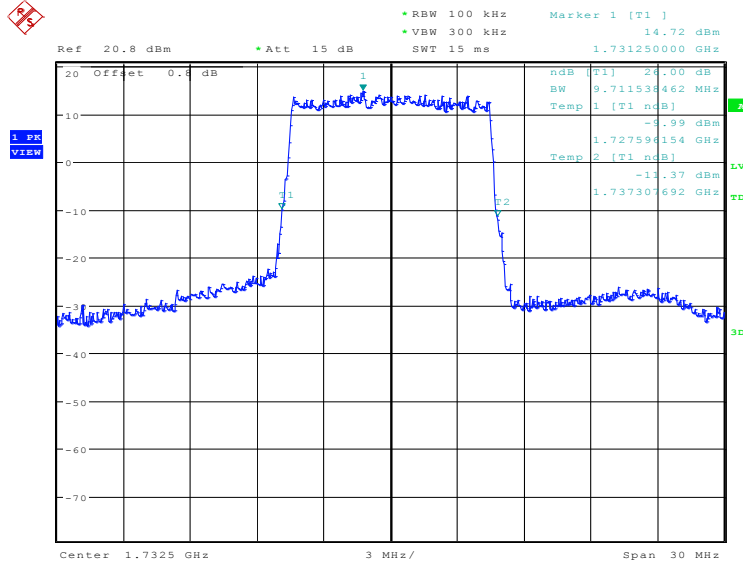


Date: 2.DEC.2020 17:37:39

LTE band 4, 10MHz (-26dBc)

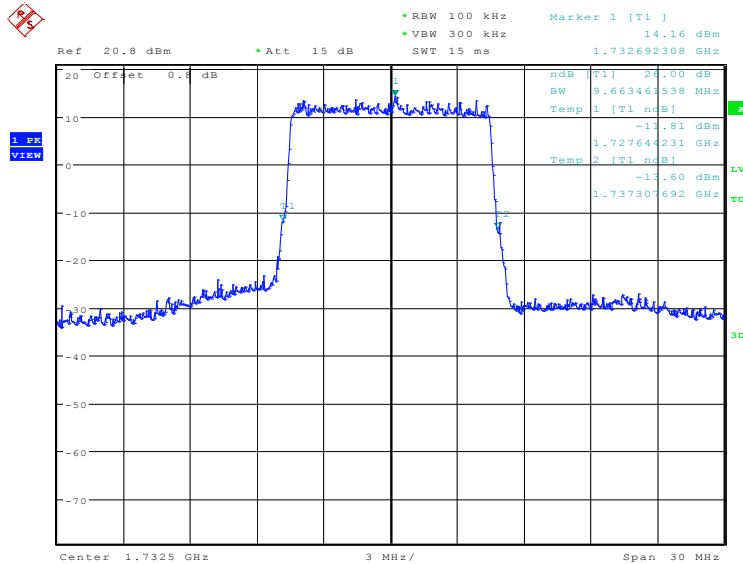
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1732.5	QPSK	16QAM
	9711.54	9663.46

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



Date: 2.DEC.2020 17:38:19

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

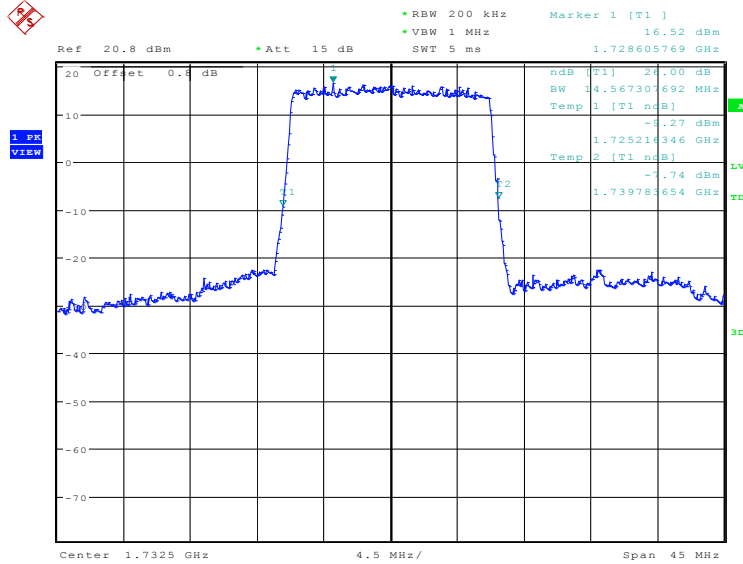


Date: 2.DEC.2020 17:38:59

LTE band 4, 15MHz (-26dBc)

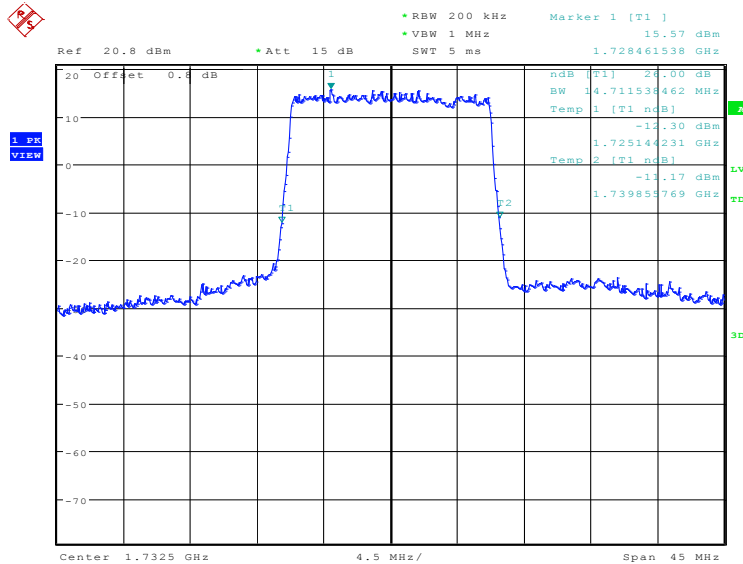
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	1732.5	QPSK
14567.31		14711.54

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



Date: 2.DEC.2020 17:39:40

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

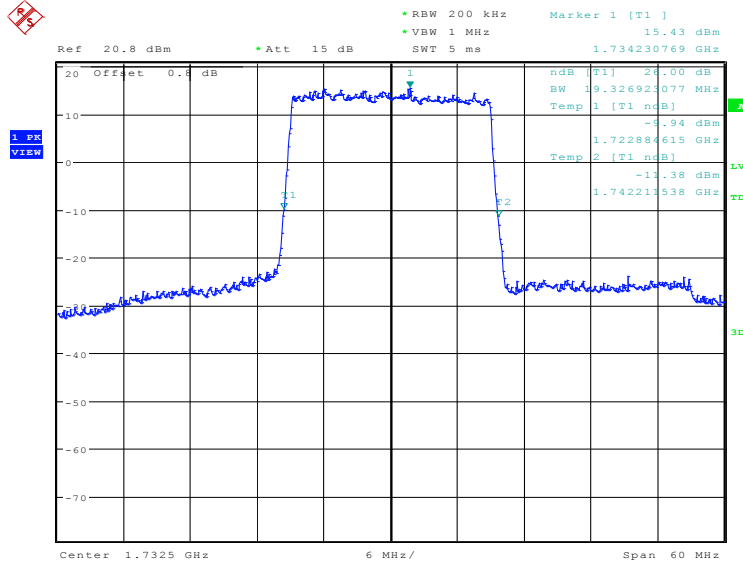


Date: 2.DEC.2020 17:40:19

LTE band 4, 20MHz (-26dBc)

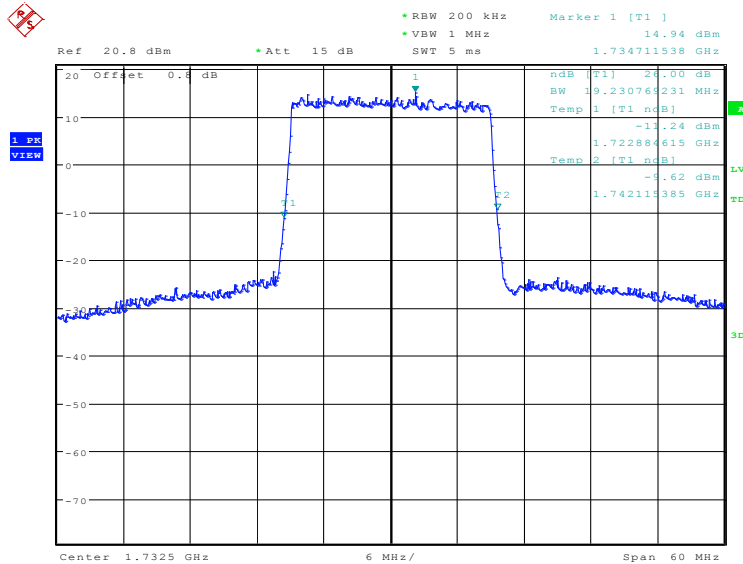
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1732.5	QPSK	16QAM
	19326.92	19230.77

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



Date: 2.DEC.2020 17:41:00

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

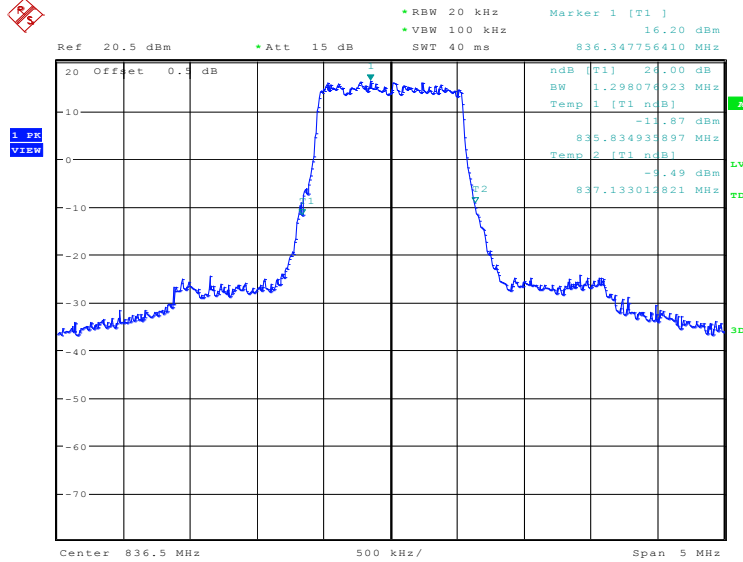


Date: 2.DEC.2020 17:41:39

LTE band 5, 1.4MHz (-26dBc)

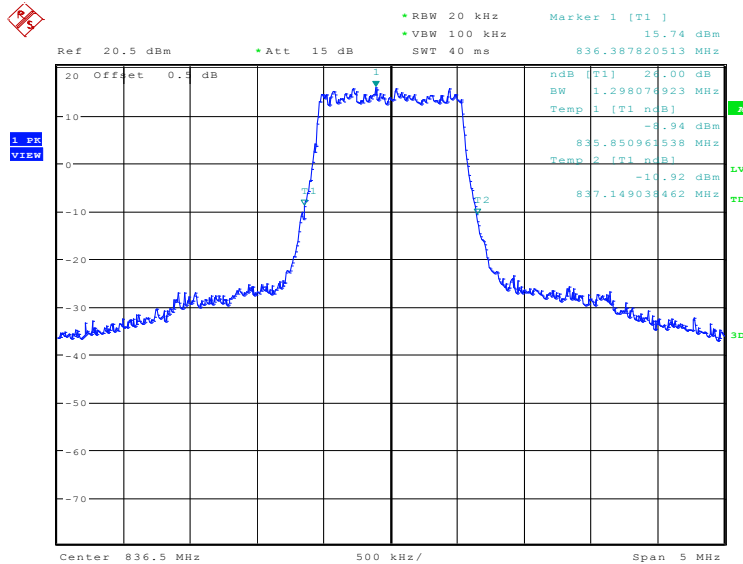
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	836.5	QPSK
1298.08		1298.08

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



Date: 2.DEC.2020 17:43:08

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

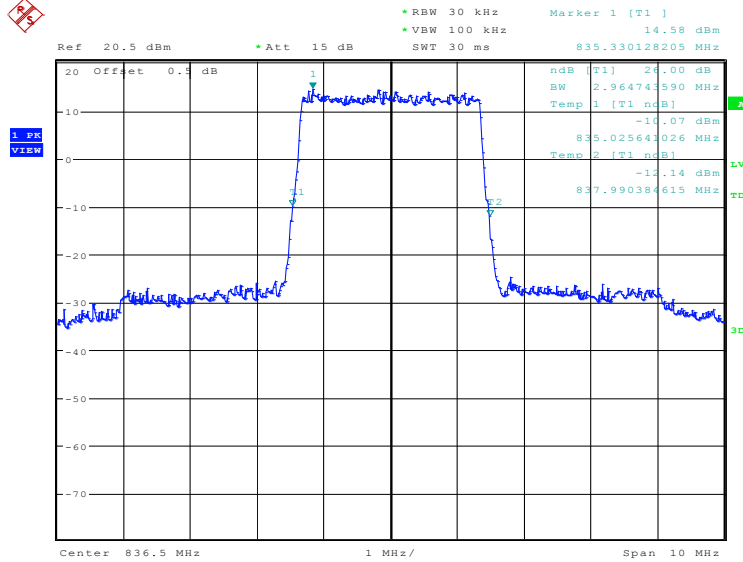


Date: 2.DEC.2020 17:43:47

LTE band 5, 3MHz (-26dBc)

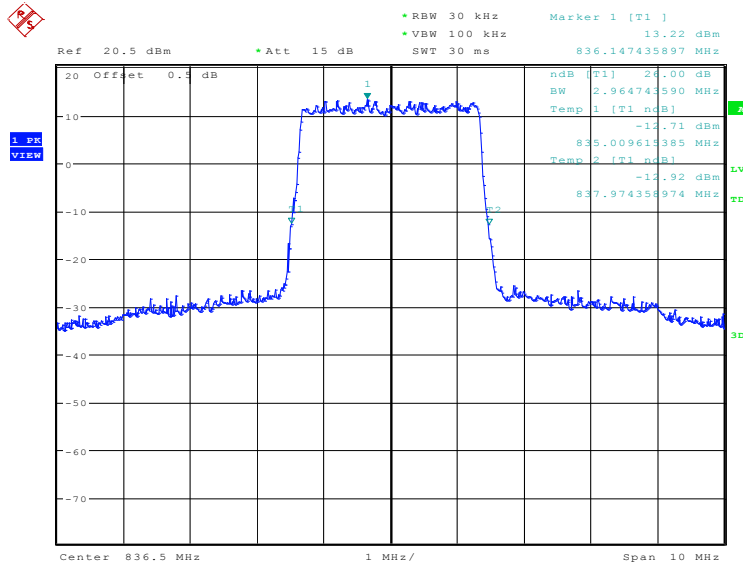
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
836.5	QPSK	16QAM
	2964.74	2964.74

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



Date: 2.DEC.2020 17:44:28

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

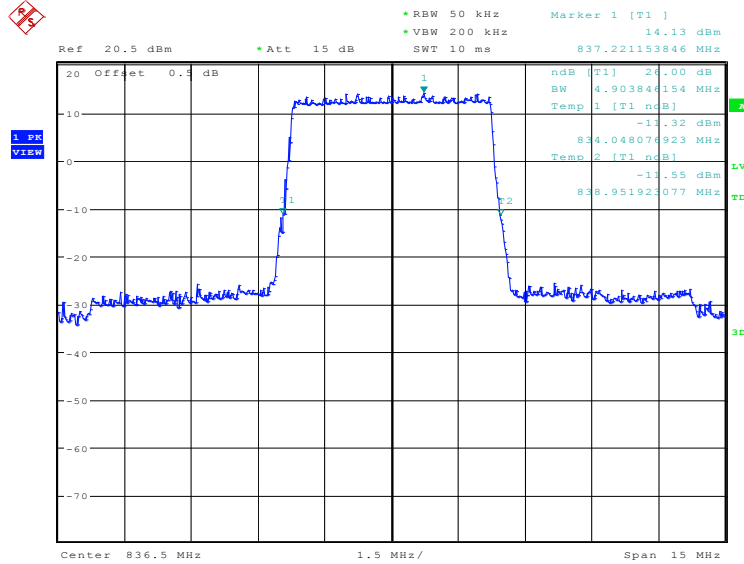


Date: 2.DEC.2020 17:45:07

LTE band 5, 5MHz (-26dBc)

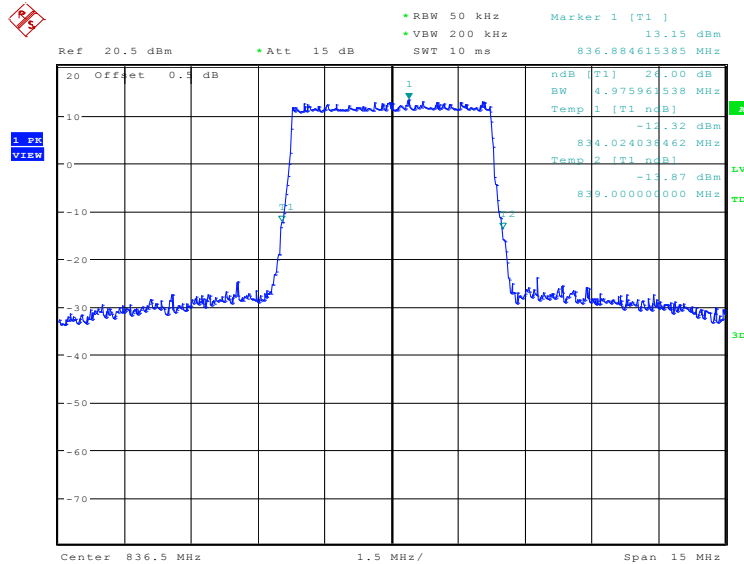
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
836.5	QPSK	16QAM
	4903.85	4975.96

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



Date: 2.DEC.2020 17:45:48

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

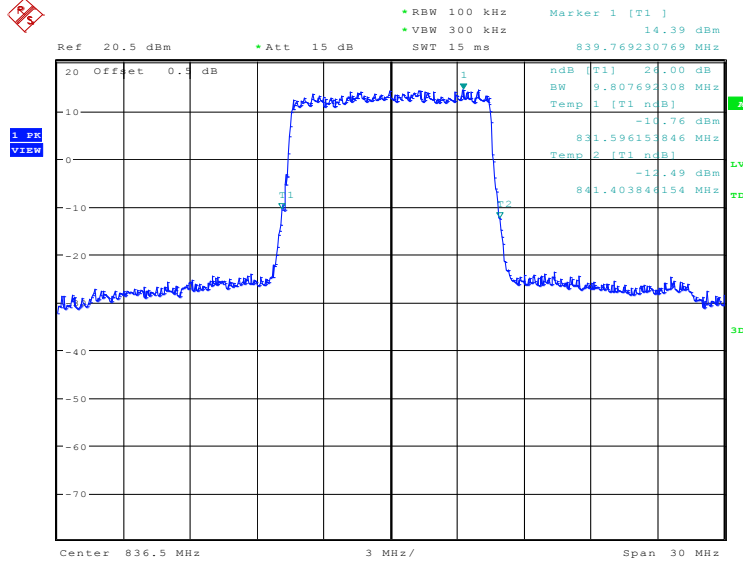


Date: 2.DEC.2020 17:46:27

LTE band 5, 10MHz (-26dBc)

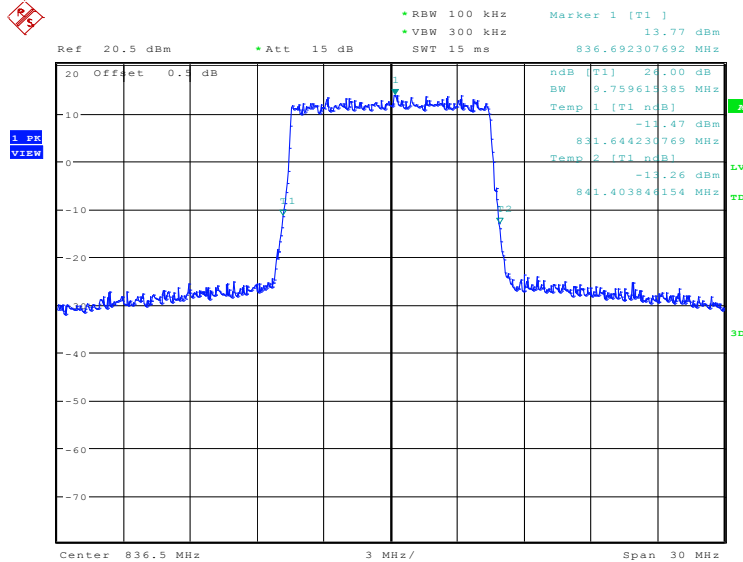
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
836.5	QPSK	16QAM
	9807.69	9759.62

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



Date: 2.DEC.2020 17:47:08

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

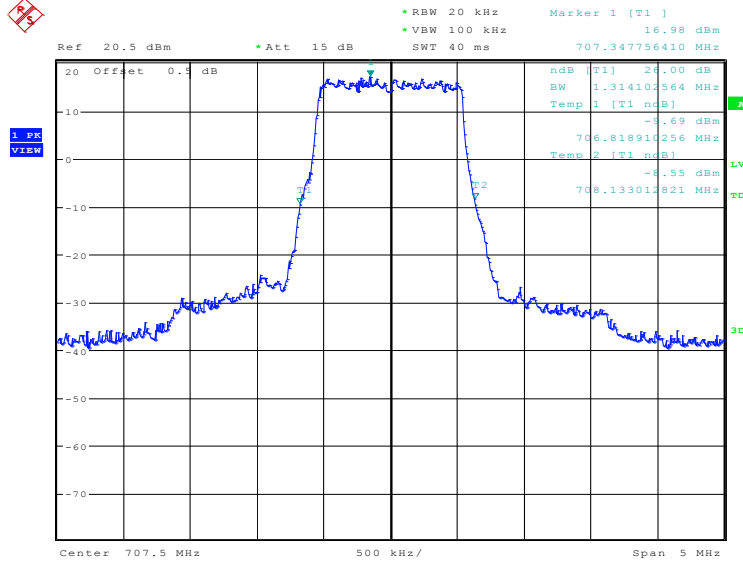


Date: 2.DEC.2020 17:47:47

LTE band 12, 1.4MHz (-26dBc)

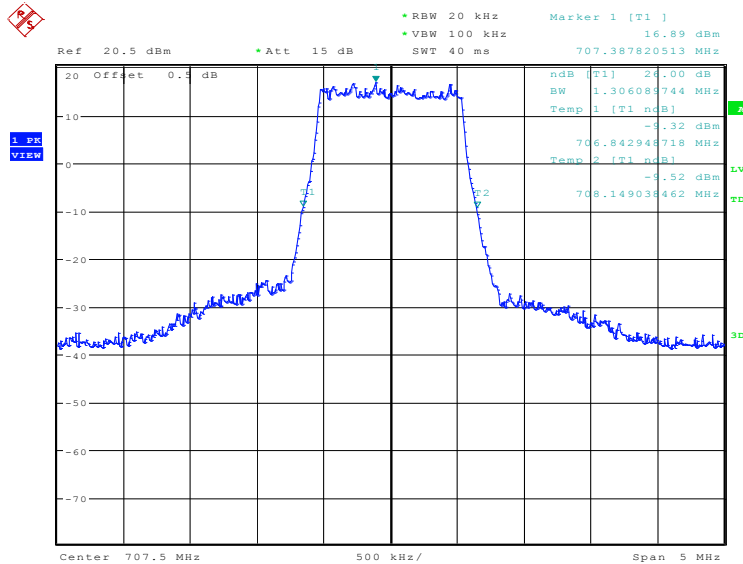
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	707.5	QPSK
1314.10		1306.09

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



Date: 2.DEC.2020 17:48:29

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

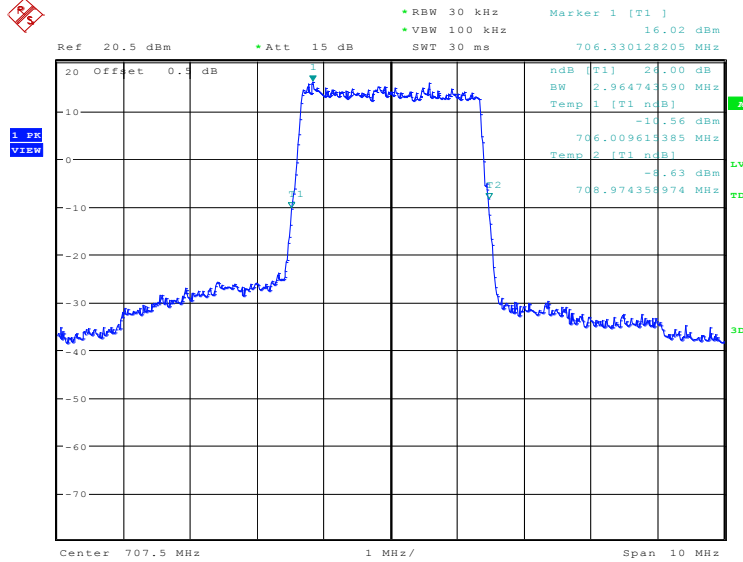


Date: 2.DEC.2020 17:49:08

LTE band 12, 3MHz (-26dBc)

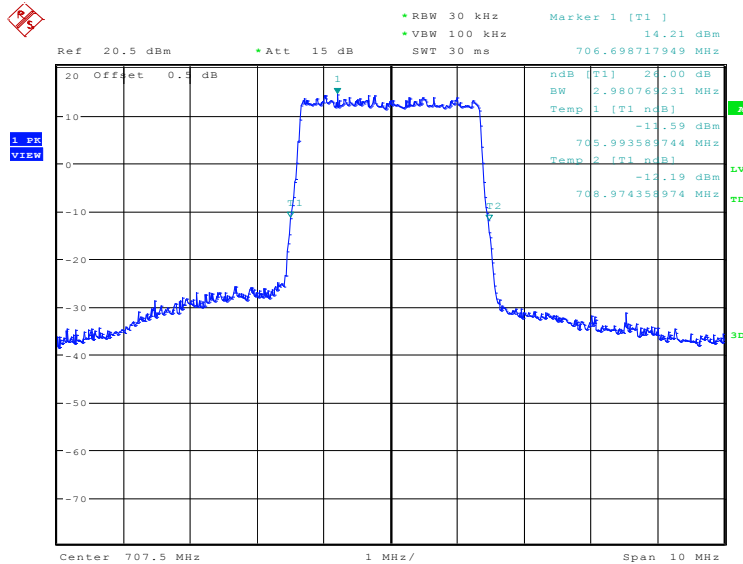
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
707.5	QPSK	16QAM
	2964.74	2980.77

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



Date: 2.DEC.2020 17:49:49

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

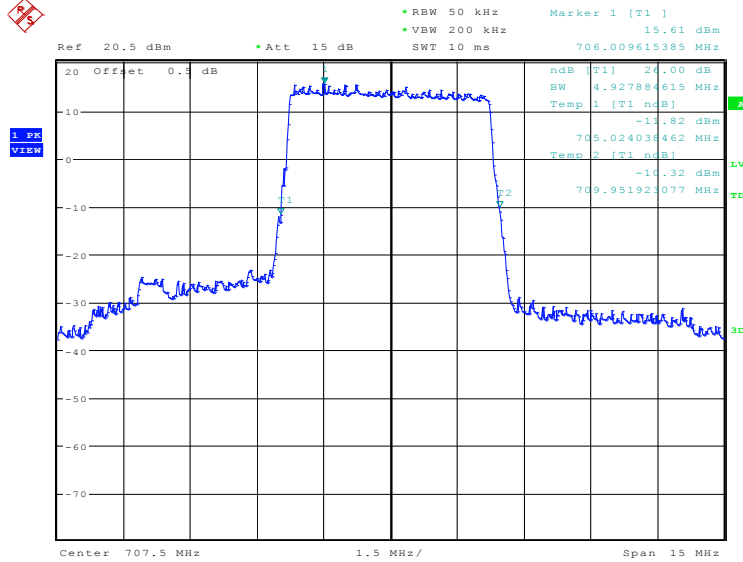


Date: 2.DEC.2020 17:50:28

LTE band 12, 5MHz (-26dBc)

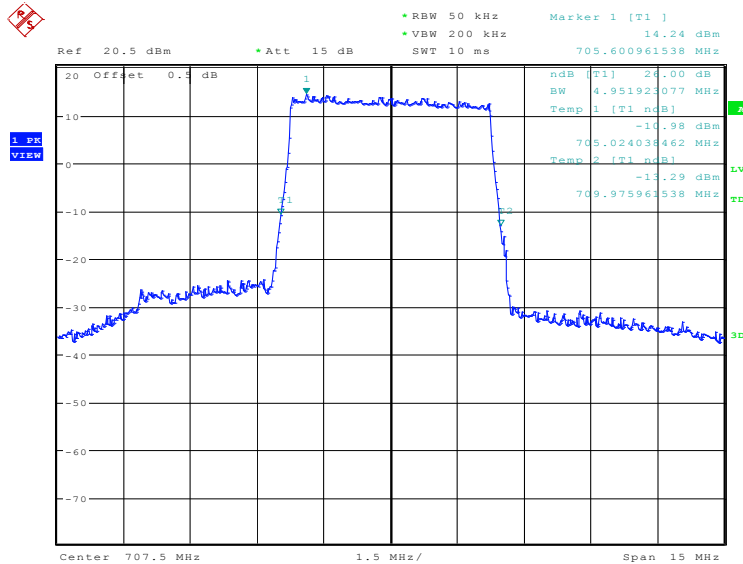
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
707.5	QPSK	16QAM
	4927.88	4951.92

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



Date: 2.DEC.2020 17:51:09

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

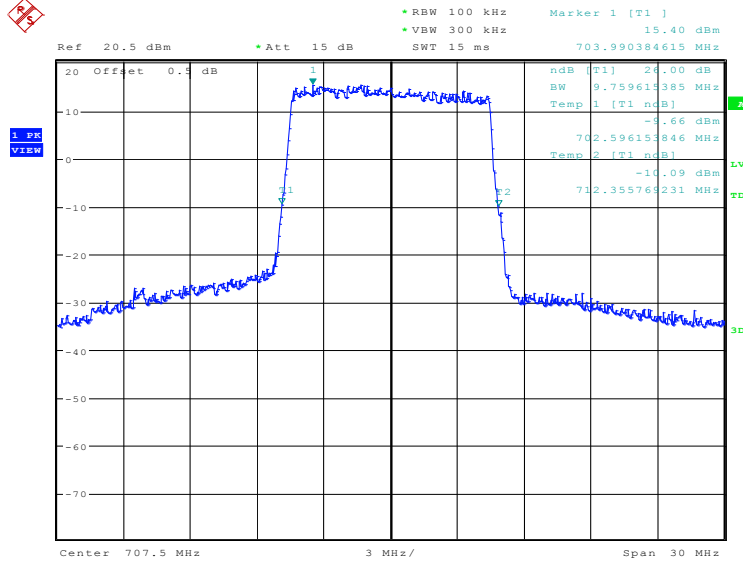


Date: 2.DEC.2020 17:51:48

LTE band 12, 10MHz (-26dBc)

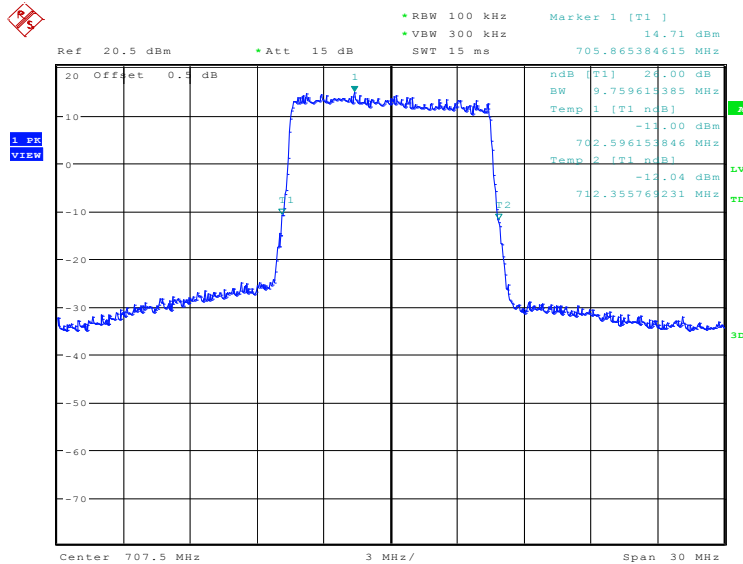
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
707.5	QPSK	16QAM
	9759.62	9759.62

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



Date: 2.DEC.2020 17:52:29

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

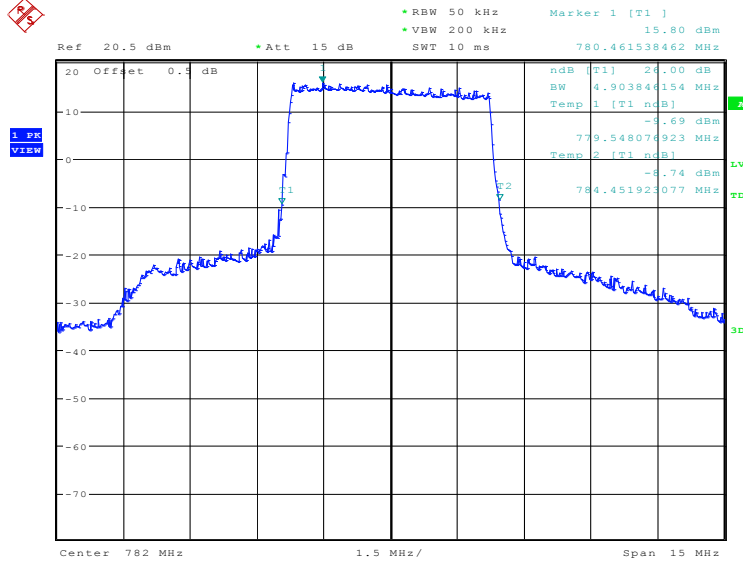


Date: 2.DEC.2020 17:53:08

LTE band 13, 5MHz (-26dBc)

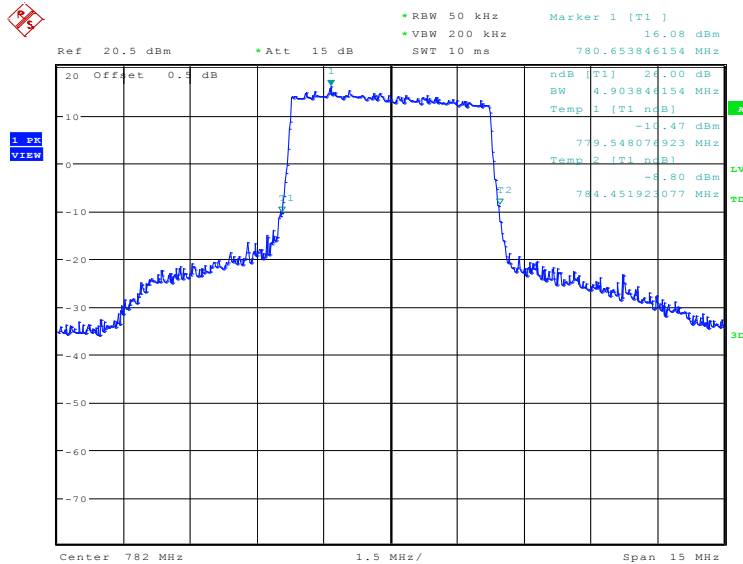
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
782.0	QPSK	16QAM
	4903.85	4903.85

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



Date: 2.DEC.2020 17:53:50

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

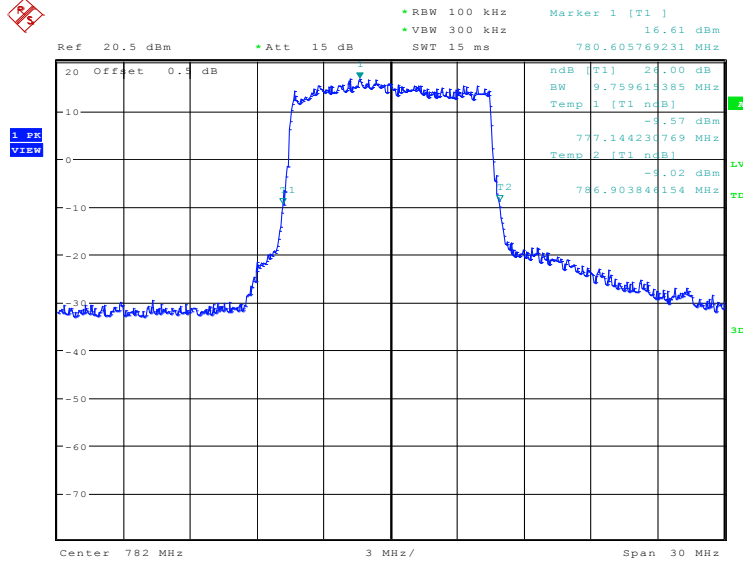


Date: 2.DEC.2020 17:54:30

LTE band 13, 10MHz (-26dBc)

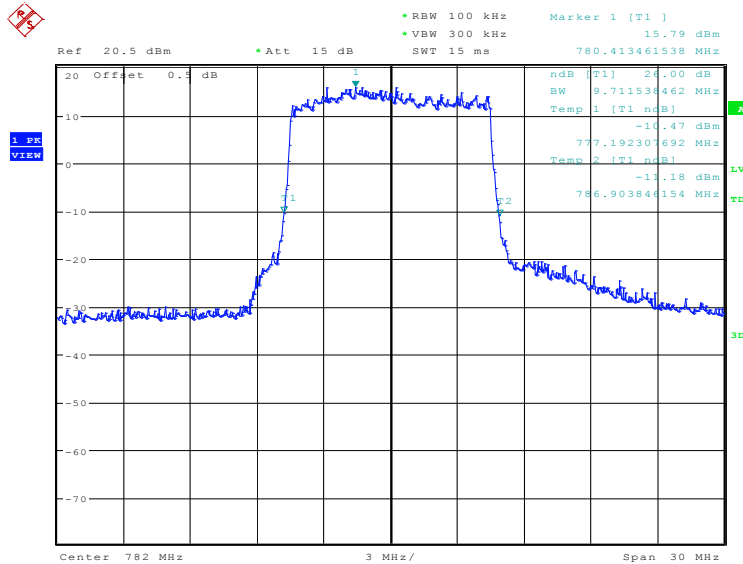
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
782.0	QPSK	16QAM
	9759.62	9711.54

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



Date: 2.DEC.2020 17:55:11

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



Date: 2.DEC.2020 17:55:50

A.6 Band Edge Compliance

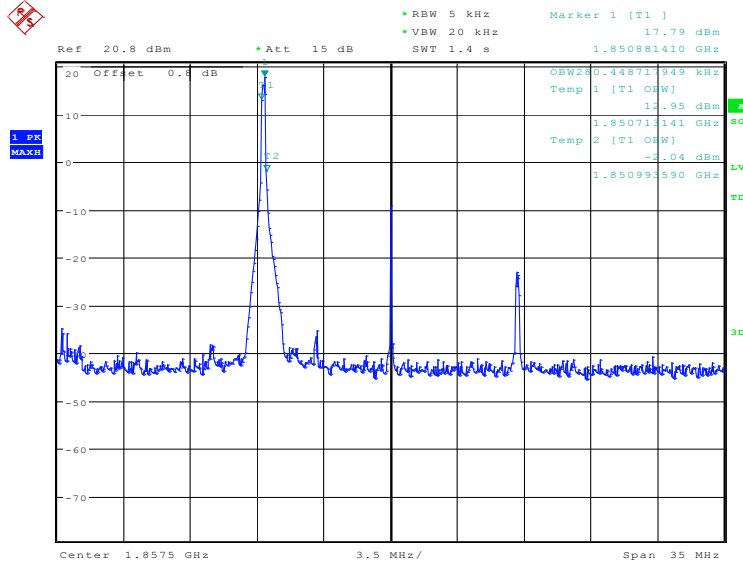
A.6.1 Measurement limit

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

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

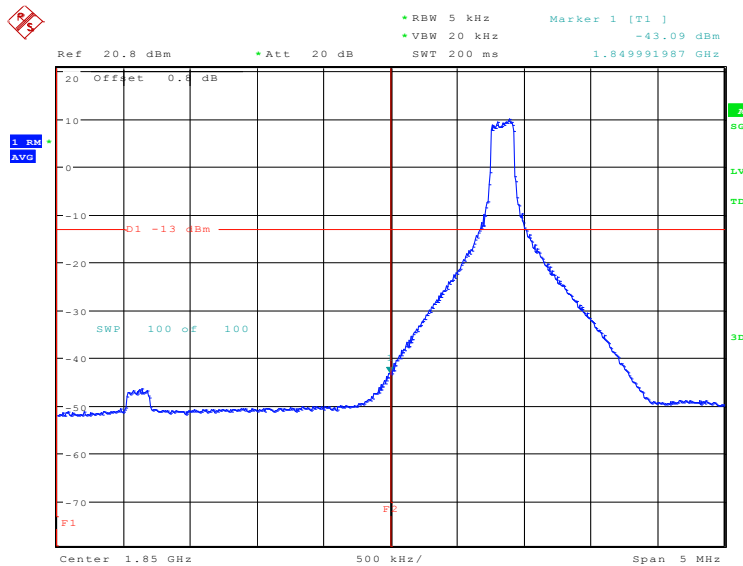
Part 27.53(g) states for operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$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

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



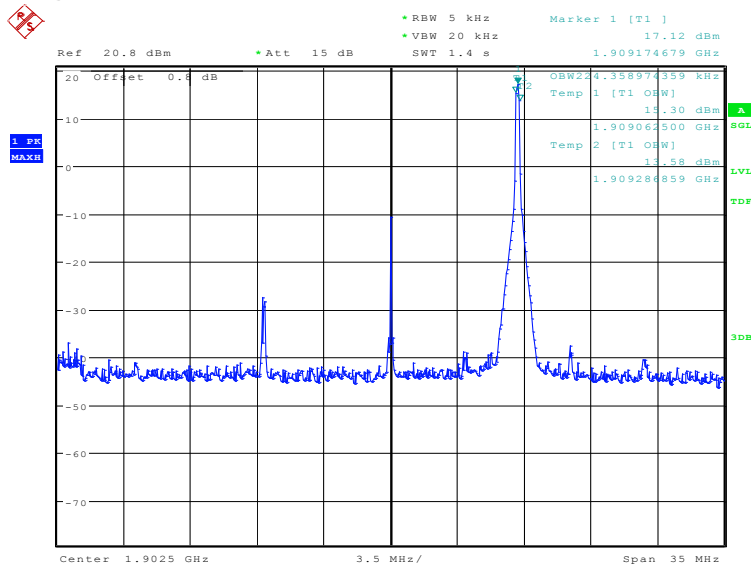
Date: 29.DEC.2020 13:23:19

LOW BAND EDGE BLOCK-1RB-low_offset



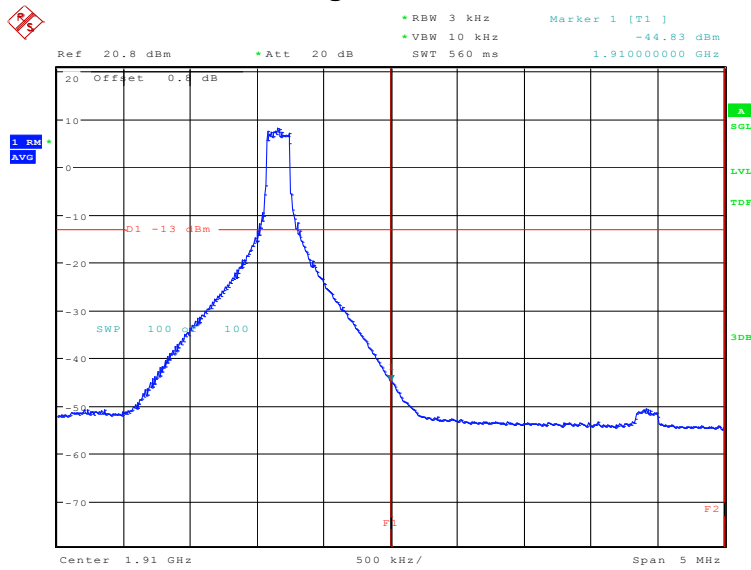
Date: 29.DEC.2020 13:24:32

OBW: 1RB-high_offset



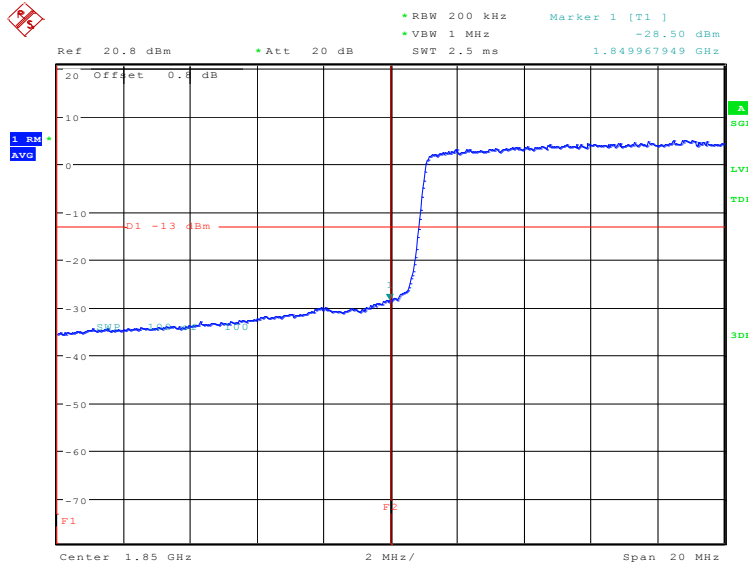
Date: 29.DEC.2020 11:19:11

HIGH BAND EDGE BLOCK-1RB-high_offset



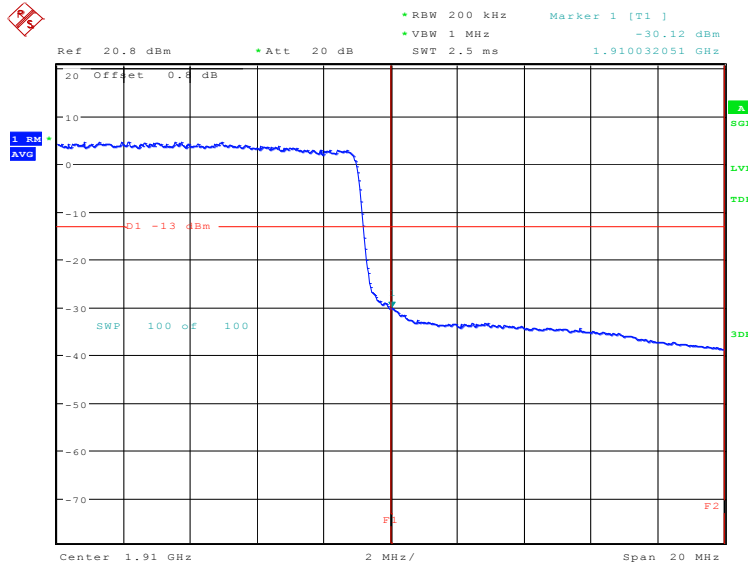
Date: 29.DEC.2020 11:20:24

LOW BAND EDGE BLOCK-20MHz-100%RB



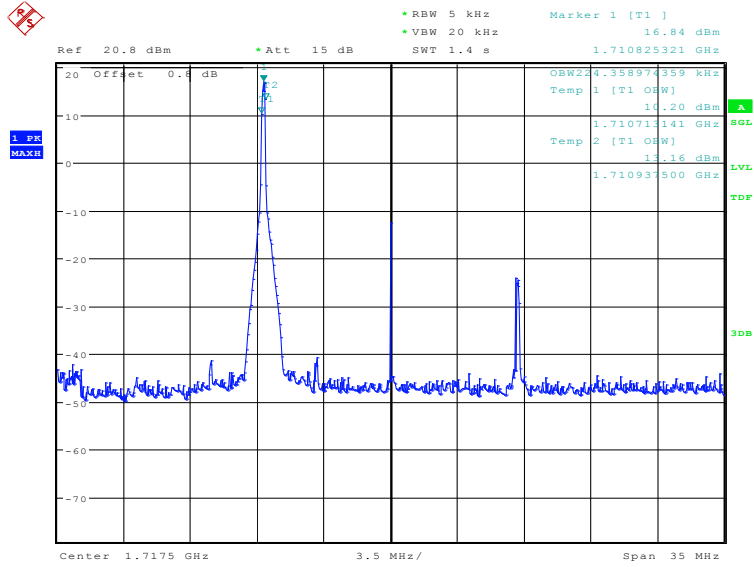
Date: 29.DEC.2020 11:14:11

HIGH BAND EDGE BLOCK-20MHz-100%RB



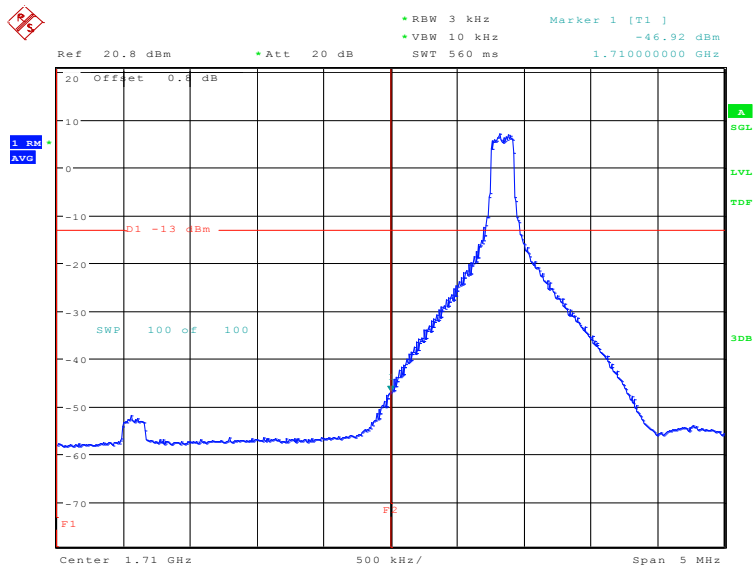
Date: 2.DEC.2020 17:58:12

LTE band 4
OBW: 1RB-low_offset



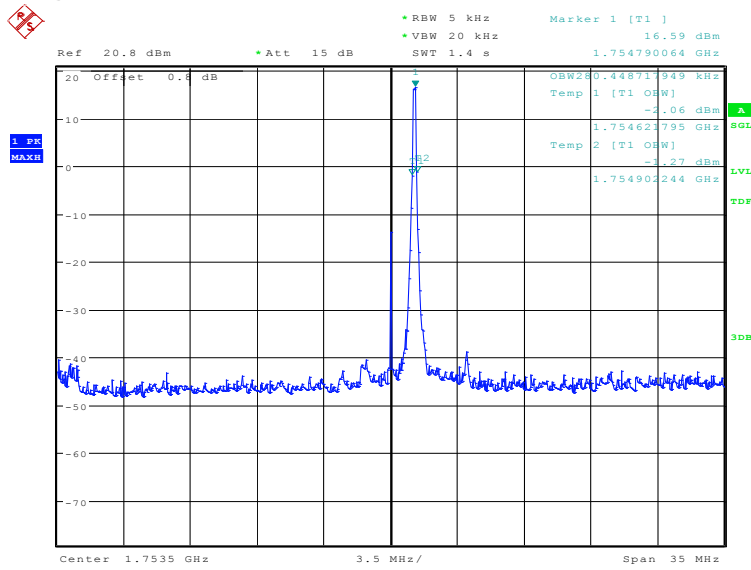
Date: 29.DEC.2020 11:21:00

LOW BAND EDGE BLOCK-1RB-low_offset



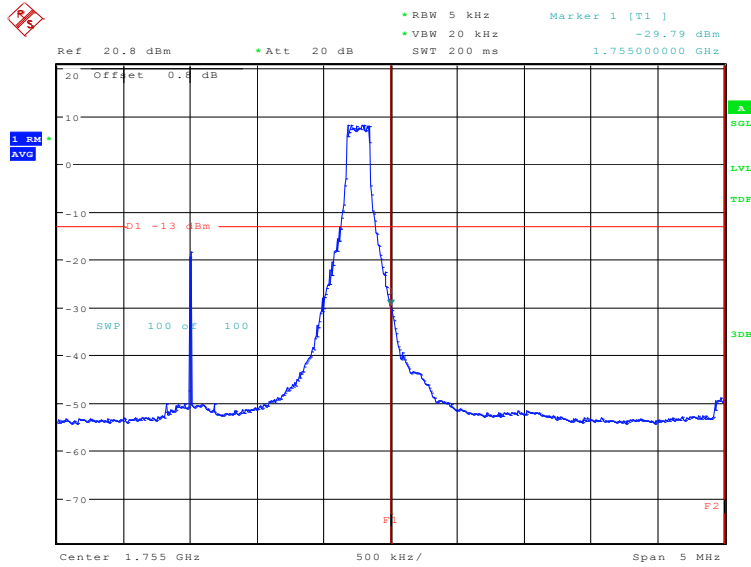
Date: 29.DEC.2020 11:22:13

OBW: 1RB-high_offset



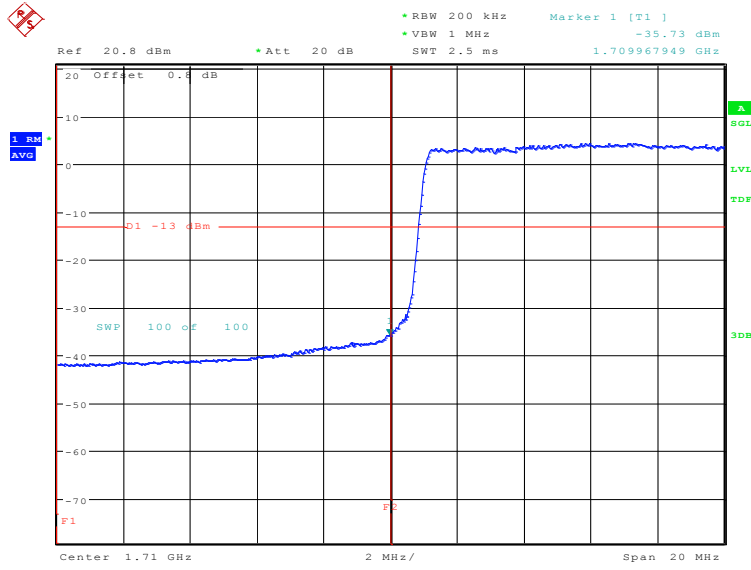
Date: 29.DEC.2020 11:23:27

HIGH BAND EDGE BLOCK-1RB-high_offset



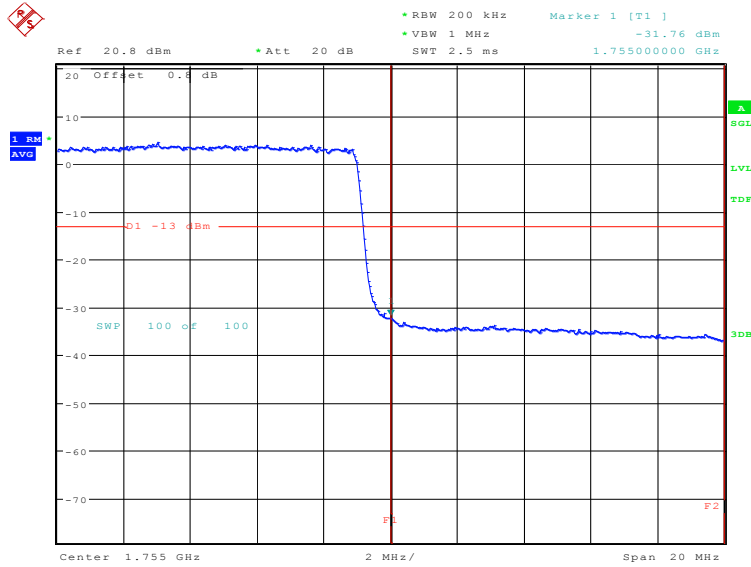
Date: 29.DEC.2020 11:24:40

LOW BAND EDGE BLOCK-20MHz-100%RB



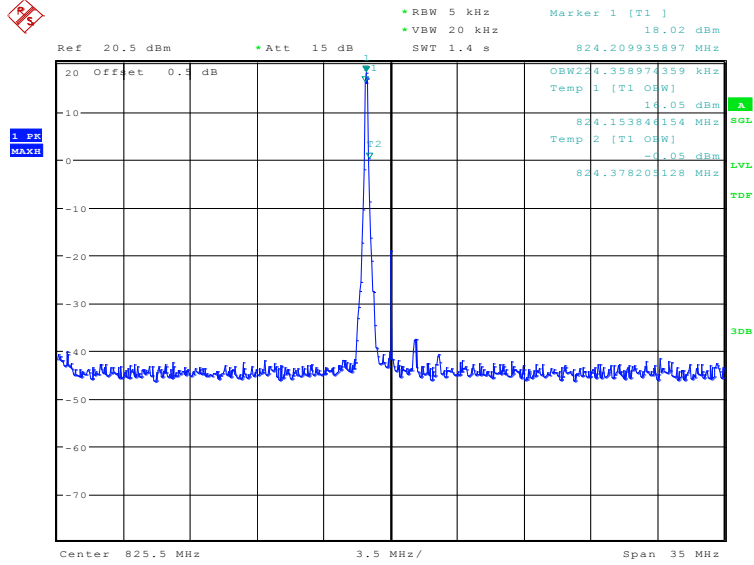
Date: 2.DEC.2020 17:59:34

HIGH BAND EDGE BLOCK-20MHz-100%RB



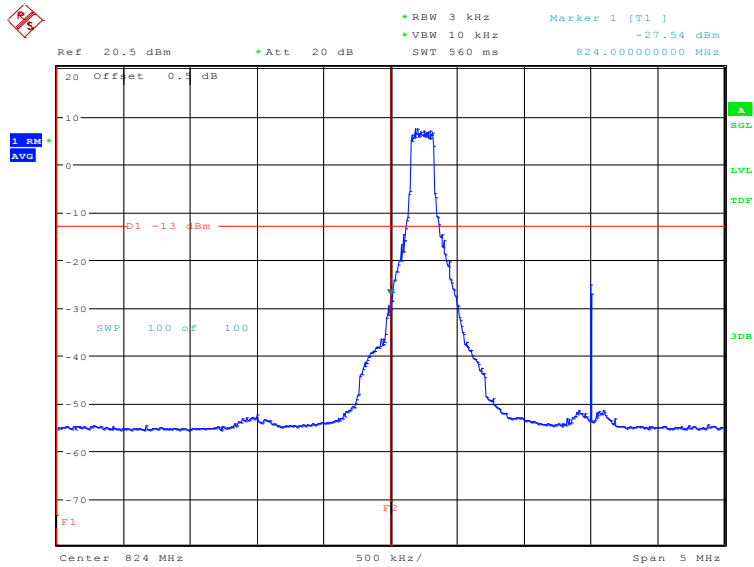
Date: 2.DEC.2020 18:00:54

LTE band 5
OBW: 1RB-low_offset



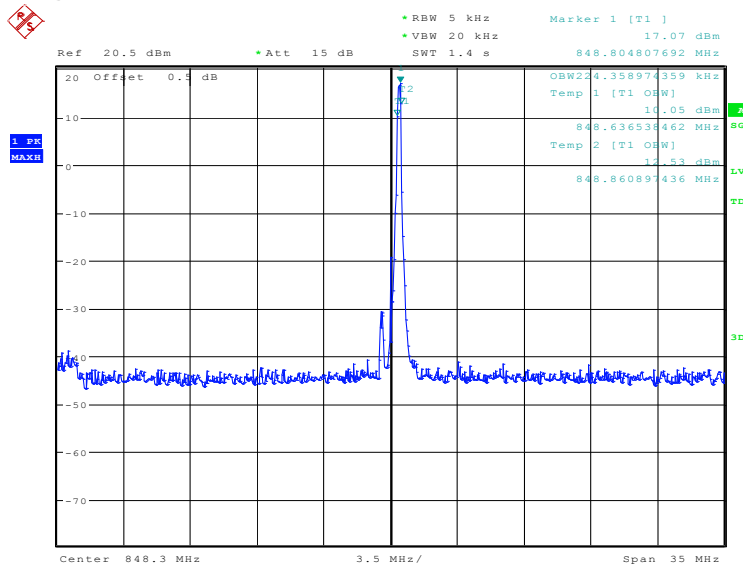
Date: 29.DEC.2020 11:25:15

LOW BAND EDGE BLOCK-1RB-low_offset



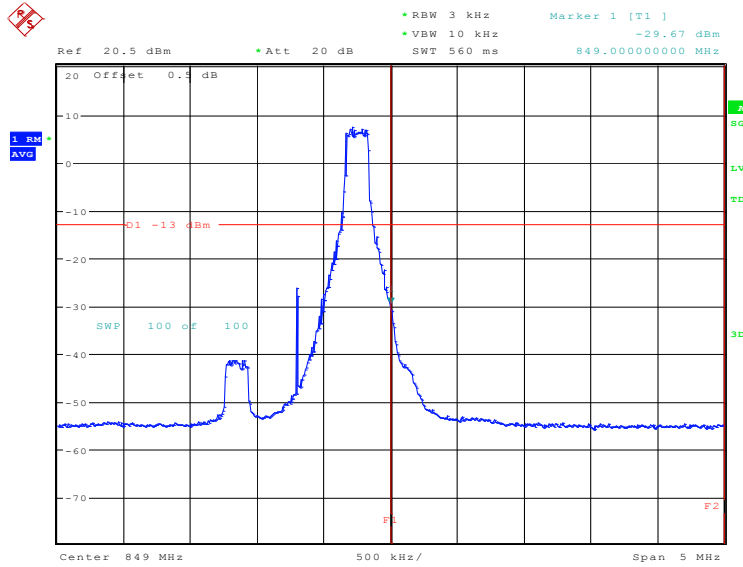
Date: 29.DEC.2020 11:26:28

OBW: 1RB-high_offset



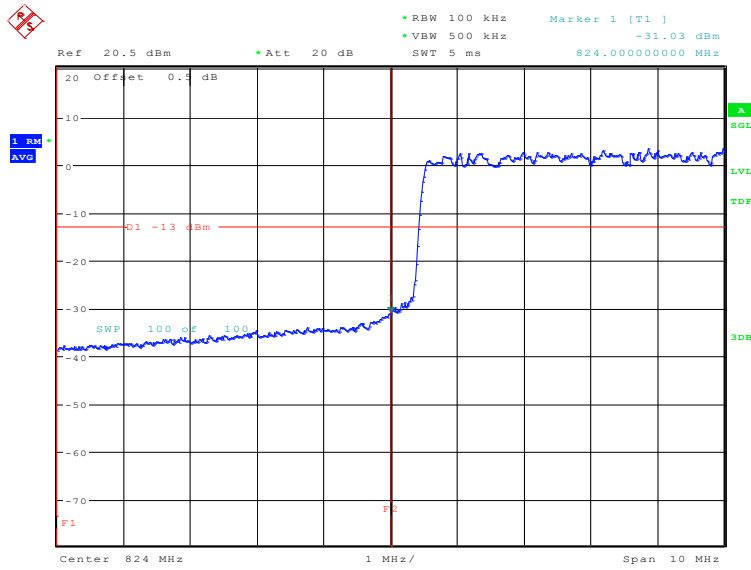
Date: 29.DEC.2020 11:27:42

HIGH BAND EDGE BLOCK-1RB-high_offset



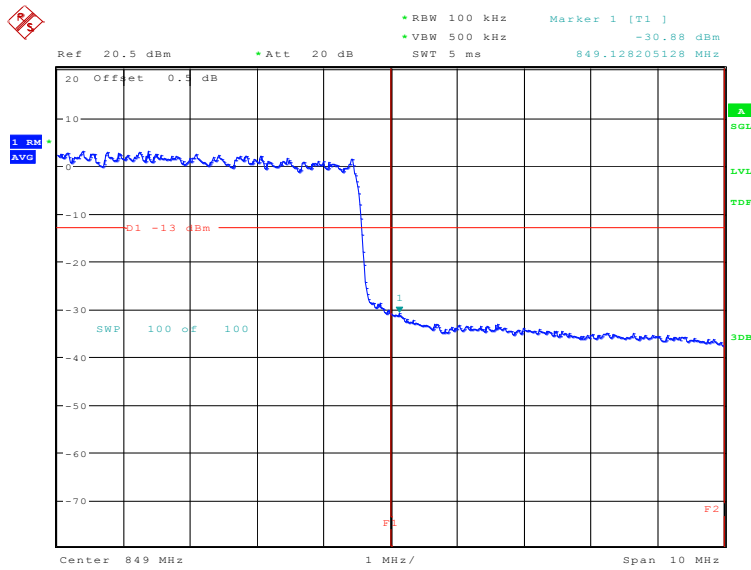
Date: 29.DEC.2020 11:28:55

LOW BAND EDGE BLOCK-10MHz-100%RB



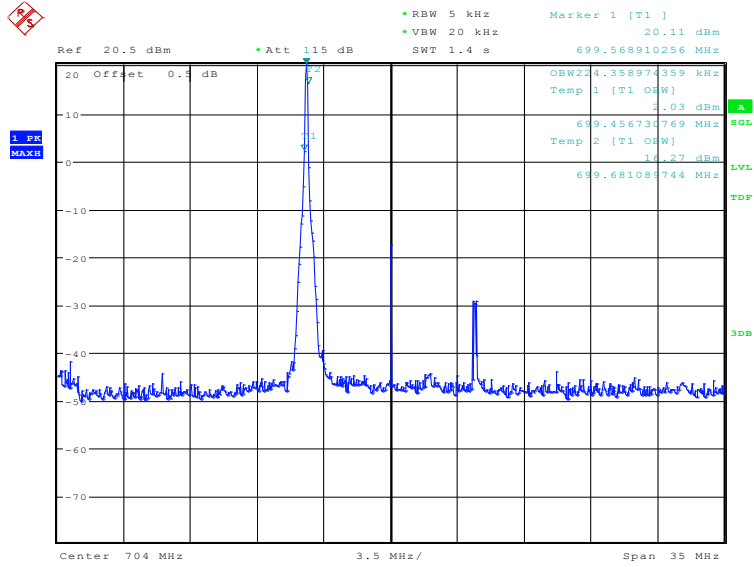
Date: 2.DEC.2020 18:03:04

HIGH BAND EDGE BLOCK-10MHz-100%RB



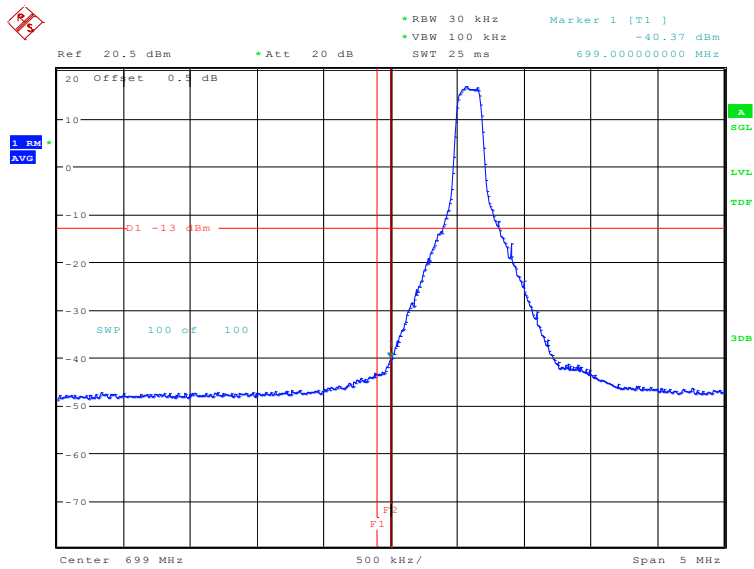
Date: 2.DEC.2020 18:04:24

LTE band 12
OBW: 1RB-low_offset



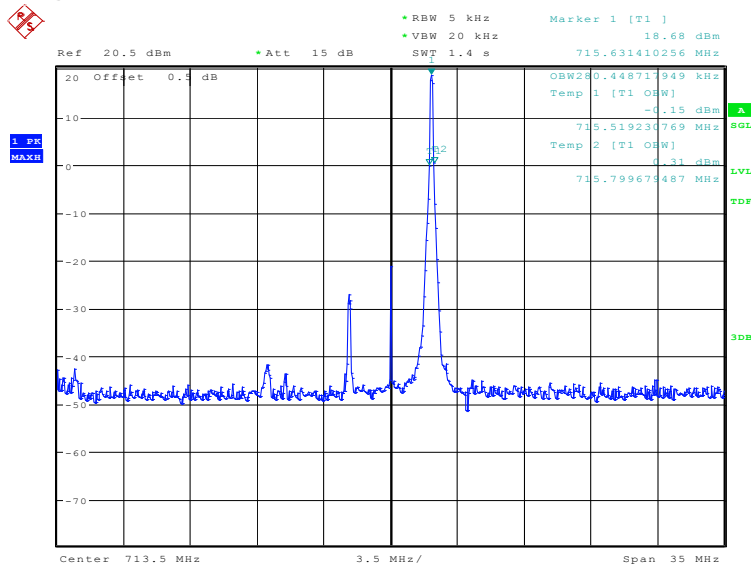
Date: 29.DEC.2020 11:29:34

LOW BAND EDGE BLOCK-1RB-low_offset



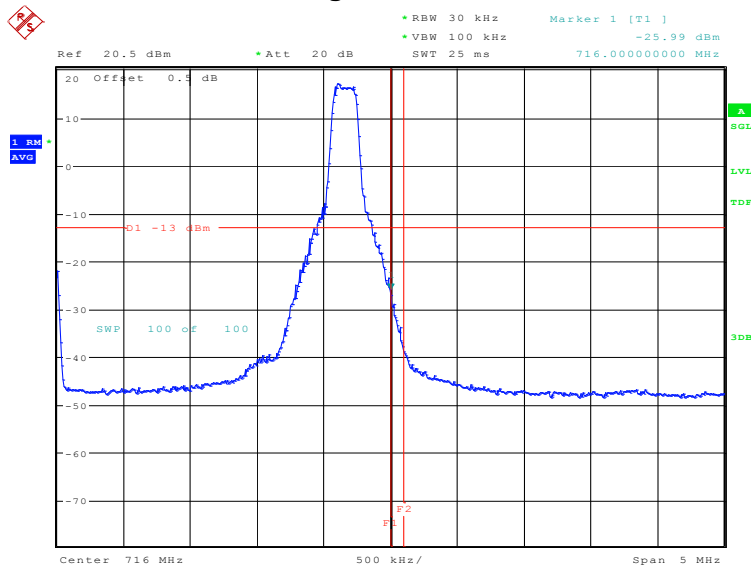
Date: 29.DEC.2020 11:29:47

OBW: 1RB-high_offset



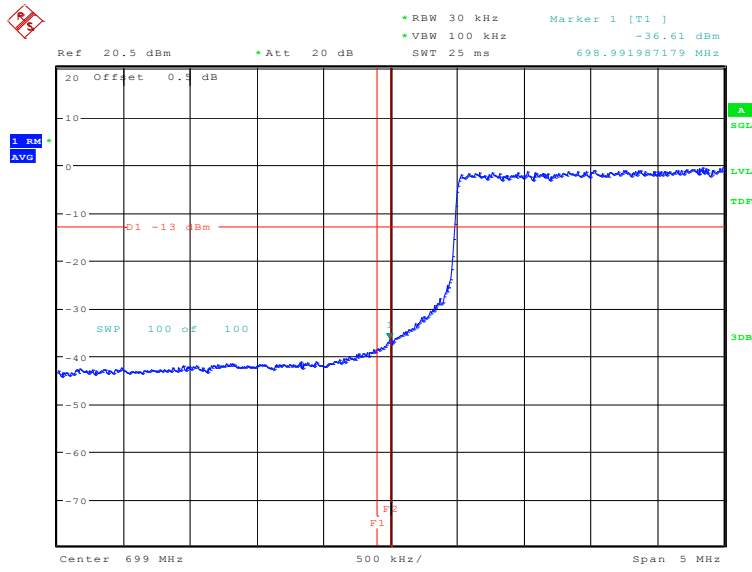
Date: 29.DEC.2020 11:31:00

HIGH BAND EDGE BLOCK-1RB-high_offset



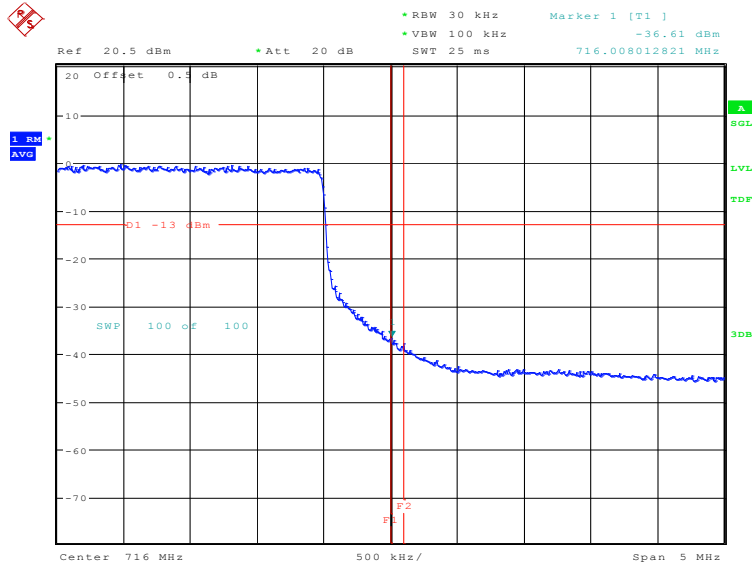
Date: 29.DEC.2020 11:31:13

LOW BAND EDGE BLOCK-10MHz-100%RB



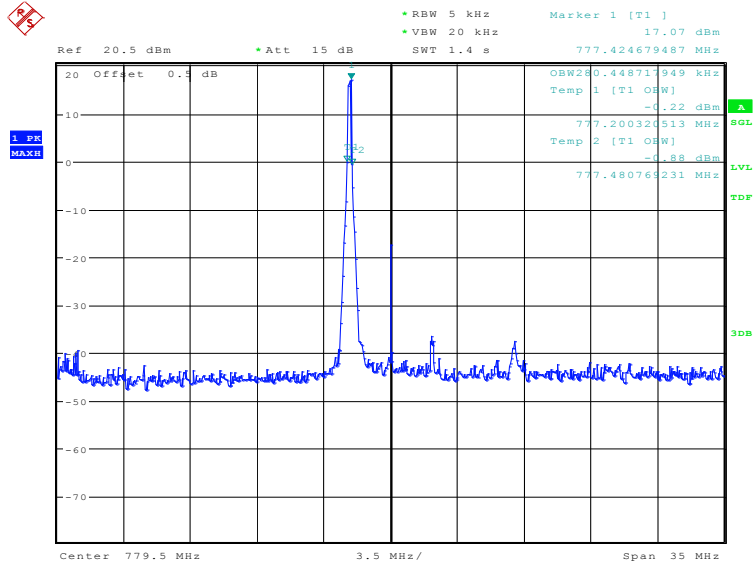
Date: 2.DEC.2020 18:05:46

HIGH BAND EDGE BLOCK-10MHz-100%RB



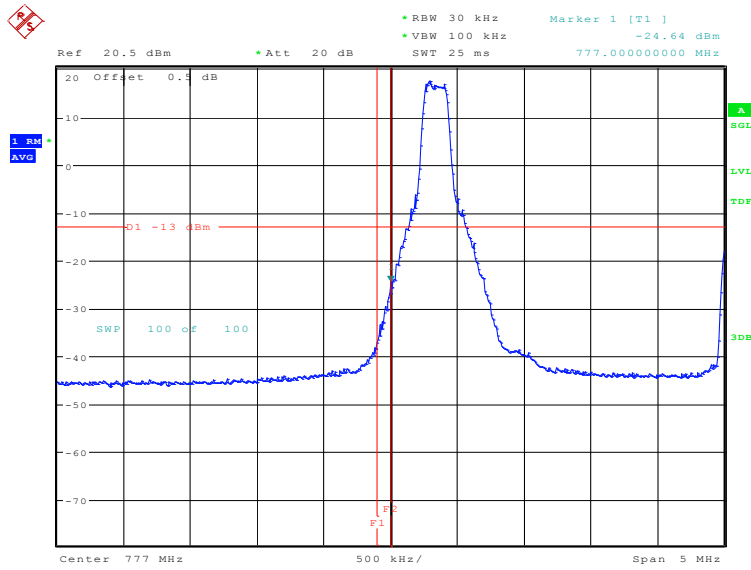
Date: 2.DEC.2020 18:07:06

LTE band 13
OBW: 1RB-low_offset

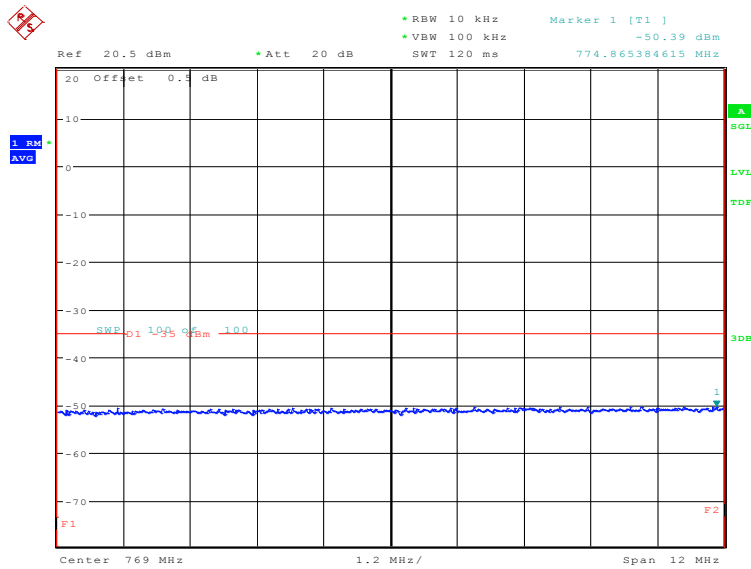


Date: 29.DEC.2020 11:54:35

LOW BAND EDGE BLOCK-1RB-low_offset

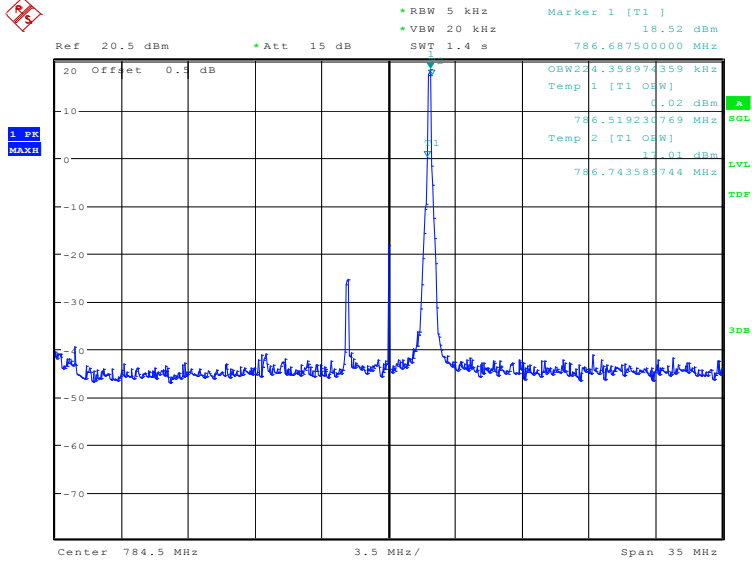


Date: 29.DEC.2020 11:54:48



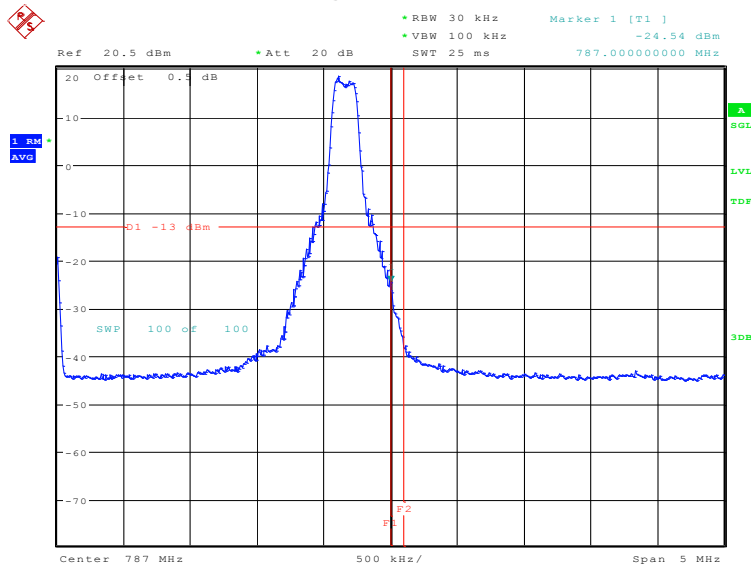
Date: 29.DEC.2020 11:55:21

OBW: 1RB-high_offset

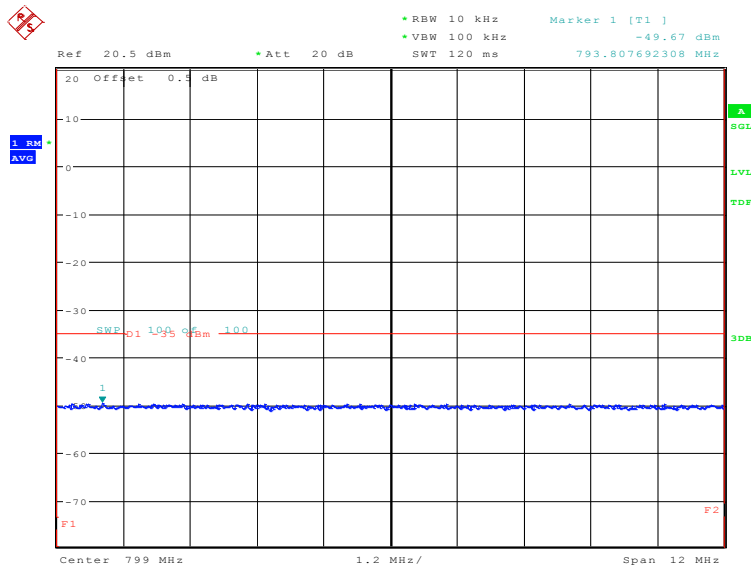


Date: 29.DEC.2020 11:56:50

HIGH BAND EDGE BLOCK-1RB-high_offset

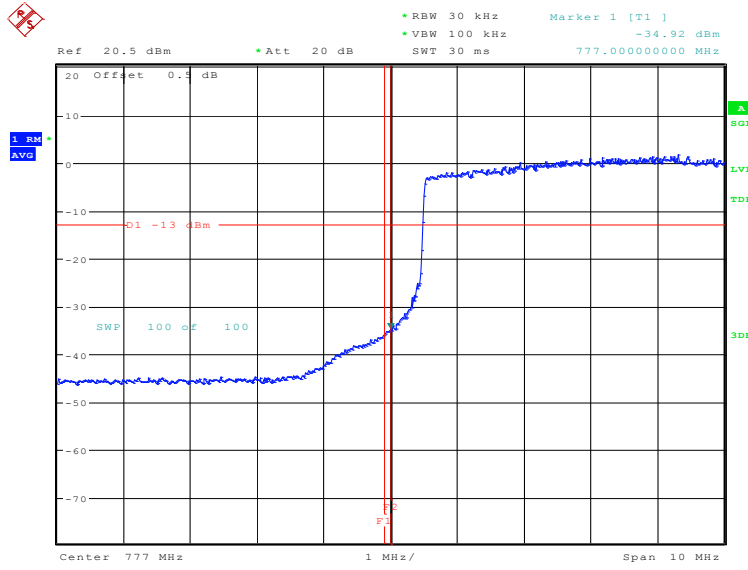


Date: 29.DEC.2020 11:57:03

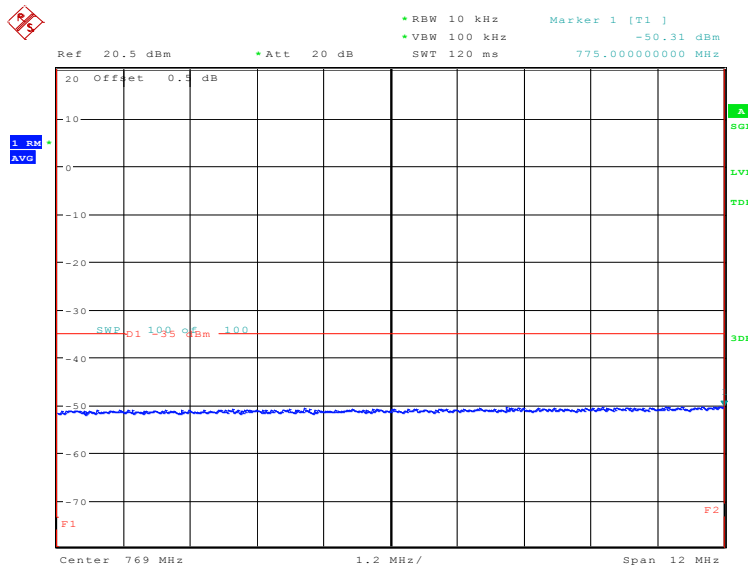


Date: 29.DEC.2020 11:57:40

LOW BAND EDGE BLOCK-10MHz-100%RB

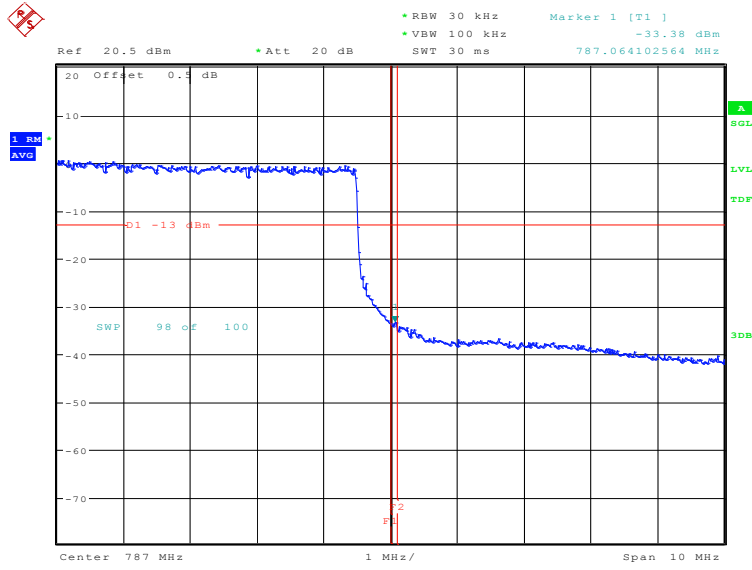


Date: 3.DEC.2020 08:12:37

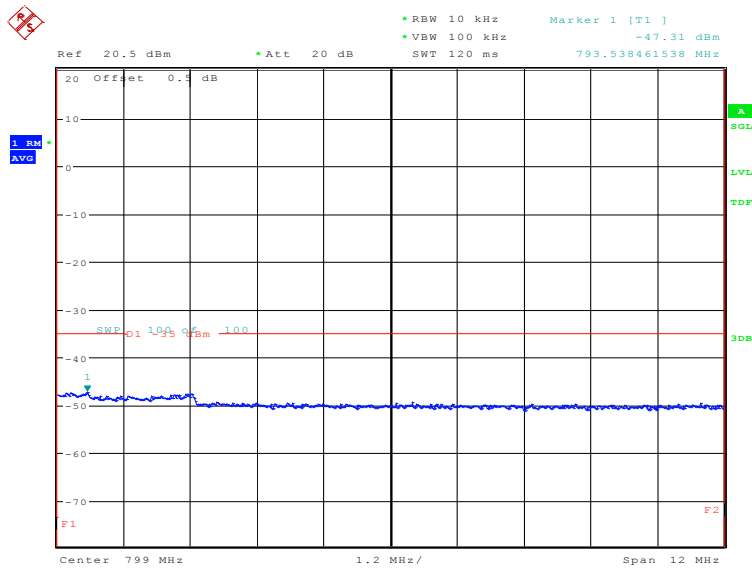


Date: 3.DEC.2020 08:13:15

HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 3.DEC.2020 08:15:15



Date: 3.DEC.2020 08:15:44

A.7 Conducted Spurious Emission

A.7.1 Measurement Method

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

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

A. 7.2 Measurement Limit

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

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

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

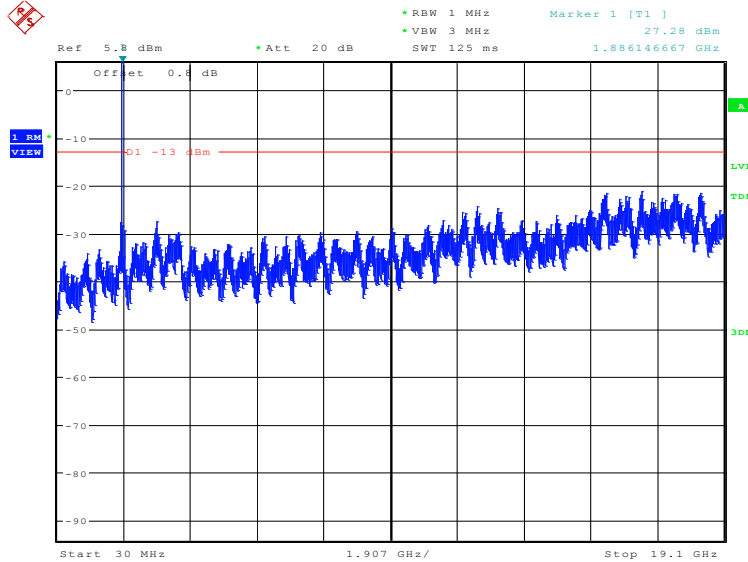
Part 27.53(g) states for operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$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

A. 7.3 Measurement result

Only the worst case result is given below

LTE band 2: 30MHz – 19.1GHz

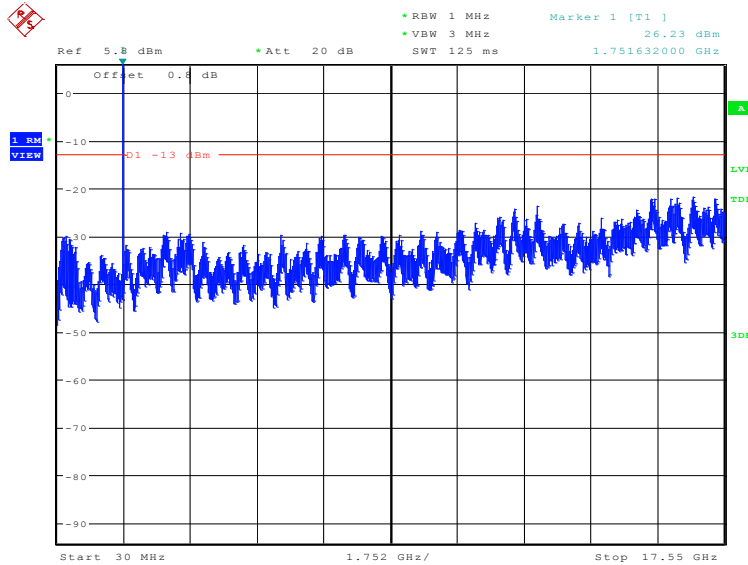
NOTE: peak above the limit line is the carrier frequency.



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LTE band 4: 30MHz – 17.55GHz

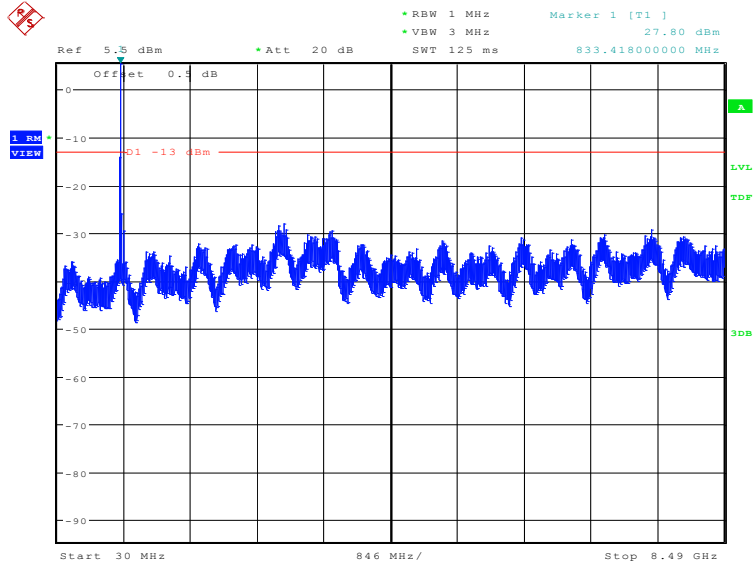
NOTE: peak above the limit line is the carrier frequency.



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LTE band 5: 30MHz – 8.49GHz

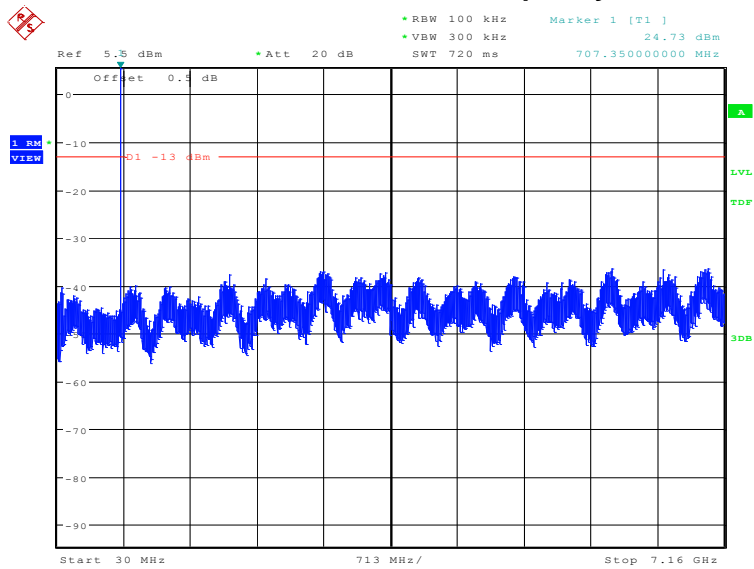
NOTE: peak above the limit line is the carrier frequency.



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LTE band 12: 30MHz – 7.16GHz

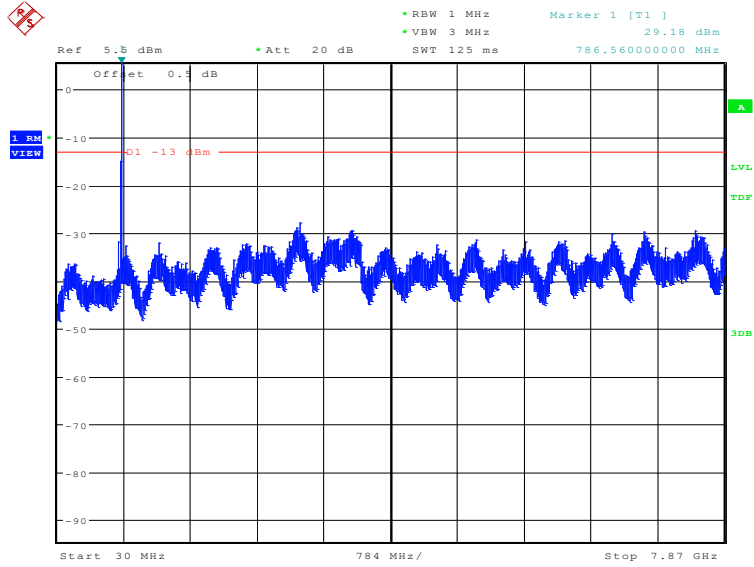
NOTE: peak above the limit line is the carrier frequency.



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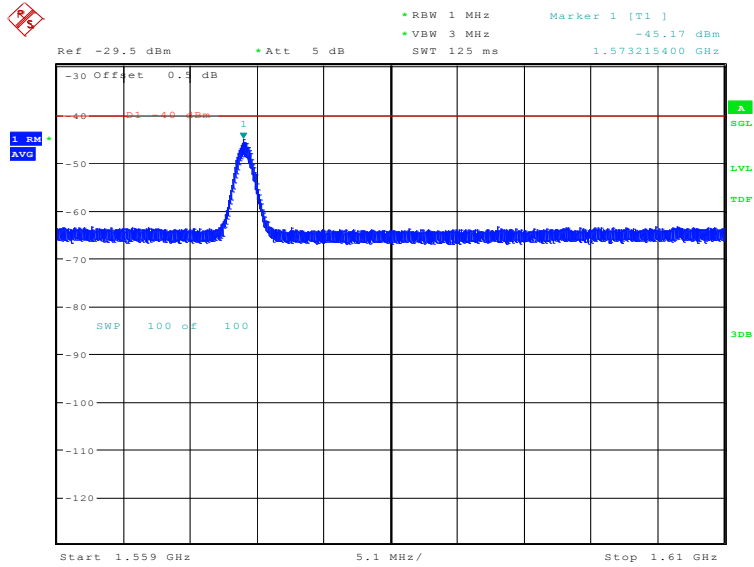
LTE band 13: 30MHz – 7.87GHz

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



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LTE band 13: 1559MHz – 1610MHz



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A.8 Peak-to-Average Power Ratio

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

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

LTE band 2, 20MHz

Frequency(MHz)	PAPR(dB)	
1880.0	QPSK	16QAM
	6.73	7.31

LTE band 4, 20MHz

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

LTE band 12,10MHz

Frequency(MHz)	PAPR(dB)	
707.5	QPSK	16QAM
	5.38	6.35

LTE band 13,10MHz

Frequency(MHz)	PAPR(dB)	
782.0	QPSK	16QAM
	5.03	5.93

Annex B: Accreditation Certificate

**United States Department of Commerce
National Institute of Standards and Technology**

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Electromagnetic Compatibility & Telecommunications

*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).*

2020-09-29 through 2021-09-30
Effective Dates




For the National Voluntary Laboratory Accreditation Program

END OF REPORT