



# TEST REPORT

## No. I19Z62195-WMD03

for

**Xiaomi Communications Co., Ltd.**

**Mobile Phone**

**Model Name: M2001J2G/ M2001J1G**

**FCC ID: 2AFZZJAG**

with

**Hardware Version: P2.2**

**Software Version: MIUI 11**

**Issued Date: 2020-02-20**

**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](mailto:ctl_terminals@caict.ac.cn), website: [www.caict.ac.cn](http://www.caict.ac.cn)



## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I19Z62195-WMD03	Rev.0	1 <sup>st</sup> edition	2020-02-20

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 17025:2005 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: 2019-12-19  
Testing End Date: 2020-02-20

### 1.5. Signature



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**Dong Yuan**  
**(Prepared this test report)**



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**Zhou Yu**  
**(Reviewed this test report)**



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



## **2. Client Information**

### **2.1. Applicant Information**

Company Name: Xiaomi Communications Co., Ltd.  
Address /Post: #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District,  
Beijing, China, 100085  
Contact: jiaoxiaogang  
Email: mi-compliance@xiaomi.com  
Telephone: 010-60606666-8088  
Fax: 010-60606666-1101

### **2.2. Manufacturer Information**

Company Name: Xiaomi Communications Co., Ltd.  
Address /Post: #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District,  
Beijing, China, 100085  
Contact: jiaoxiaogang  
Email: mi-compliance@xiaomi.com  
Telephone: 010-60606666-8088  
Fax: 010-60606666-1101

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

#### **3.1. About EUT**

Description	Mobile Phone
Model Name	M2001J2G/ M2001J1G
FCC ID	2AFZZJAG
Antenna	Embedded
Conducted Output power	23.06dBm maximum measured for LTE Band 4
Extreme vol. Limits	3.6VDC to 4.4VDC (nominal: 3.85VDC)
Extreme temp. Tolerance	0°C to +40°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**

<b>EUT ID*</b>	<b>IMEI</b>	<b>HW Version</b>	<b>SW Version</b>	<b>Date of receipt</b>
UT11a	860211040037592	P2.2	MIUI 11	2019-12-19
UT18a	860211040038830	P2.2	MIUI 11	2019-12-20
UT21a	860211040039614	P2.2	MIUI 11	2019-12-20

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

#### **3.3. Internal Identification of AE used during the test**

<b>AE ID*</b>	<b>Description</b>
AE1	Battery
AE1	
Model	Li-ion
Manufacturer	
Capacitance	4680mAh

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

## 4. Reference Documents

### 4.1. Reference Documents for testing

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

<b>Reference</b>	<b>Title</b>	<b>Version</b>
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-18 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-18 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-18 Edition
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI/TIA-102.CAAA -E	DIGITAL C4FMCQPSK TRANSCEIVER MEASUREMENT METHODS	2016
ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB 971168 D01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS	v03r01



## 5. LABORATORY ENVIRONMENT

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

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

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

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	>2 MΩ
Ground system resistance	< 1 Ω
Site voltage standing-wave ratio ( $S_{VSWR}$ )	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 MHz

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

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	>2 MΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	<± 3.5 dB, 3 m distance
Site voltage standing-wave ratio ( $S_{VSWR}$ )	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

## 6. SUMMARY OF TEST RESULT

### 6.1. Summary of test results

#### LTE Band 2

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

#### LTE Band 4

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

#### LTE Band 5

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

**LTE Band 7**

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

**LTE Band 38**

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

## Terms used in Verdict column

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

The model M2001J1G is a variant product of M2001J2G, According to the customer declaration and evaluation, all the test results are derived from M2001J2G.

## 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, 64QAM and 256QAM 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. Complete testing was carried out on the worst case antenna port which was established as being the highest output power from all the measured ports unless otherwise stated. This antenna port was LAT. The test results shown in the following sections represent the worst case emission.

## 7. Test Equipment Utilized

NO.	Description	TYPE	series number	MANUFACTURE	CAL DUE DATE	Calibration interval
1	EMI Antenna	VULB9163	9163-235	Schwarzbeck	2020-02-29	1 year
2	EMI Antenna	3117	00058889	ETS-Lindgren	2020-11-18	3 years
3	EMI Antenna	3117	00119024	ETS-Lindgren	2020-02-25	3 years
4	Universal Radio Communication Tester	CMW500	159082	R&S	2020-12-24	1 year
5	Spectrum Analyzer	FSU26	200030	R&S	2020-06-03	1 year
6	EMI Antenna	9117	167	Schwarzbeck	2020-05-27	1 year
7	Signal Generator	N5183A	MY49060052	Agilent	2020-06-24	1 year
8	Climate chamber	SH-242	93008556	ESPEC	2020-12-21	3 year
9	Test Receiver	E4440A	MY48250642	Agilent	2020-03-18	1 year
10	Universal Radio Communication Tester	CMW500	143008	R&S	2020-11-26	1 year
11	Power Amplifier	5S1G4	0341863	AR	/	
12	Radio Communication Analyzer	MT8821C	6201763159	Anritsu	2020-07-23	1 year

## **ANNEX A: MEASUREMENT RESULTS**

### **A.1 OUTPUT POWER**

#### **A.1.1 Summary**

During the process of testing, the EUT was controlled via Rhode & Schwarz Universal Radio Communication Tester (CMW500) or Anritsu Radio Communication Analyzer (MT8821C) 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	64QAM	256QAM
1.4MHz	1 RB high	1909.3	22.37	21.60	20.63	17.19
		1880.0	22.41	21.77	20.80	17.36
		1850.7	22.41	21.47	20.50	17.06
	1 RB low	1909.3	22.44	21.52	20.55	17.11
		1880.0	22.33	21.79	20.82	17.38
		1850.7	22.37	21.47	20.50	17.06
	50% RB mid	1909.3	22.38	21.54	20.57	17.13
		1880.0	22.43	21.68	20.71	17.27
		1850.7	22.43	21.65	20.68	17.24
	100% RB	1909.3	21.45	20.57	19.60	16.16
		1880.0	21.44	20.35	19.38	15.94
		1850.7	21.46	20.62	19.65	16.21
3MHz	1 RB high	1908.5	22.50	21.40	20.43	16.71
		1880.0	22.54	21.92	20.95	17.23
		1851.5	22.49	21.57	20.60	16.88
	1 RB low	1908.5	22.39	21.35	20.38	16.66
		1880.0	22.44	21.82	20.85	17.13
		1851.5	22.44	21.56	20.59	16.87
	50% RB mid	1908.5	21.54	20.65	19.68	17.10
		1880.0	21.54	20.62	19.65	17.07
		1851.5	21.57	20.63	19.66	17.08

	100% RB	1908.5	21.55	20.58	19.61	17.03
		1880.0	21.53	20.59	19.62	17.04
		1851.5	21.54	20.53	19.56	16.98
5MHz	1 RB high	1907.5	22.63	21.75	20.78	17.37
		1880.0	22.55	22.09	21.12	17.71
		1852.5	22.58	21.72	20.75	17.34
	1 RB low	1907.5	22.47	21.60	20.63	17.22
		1880.0	22.42	21.96	20.99	17.58
		1852.5	22.48	21.56	20.59	17.18
	50% RB mid	1907.5	21.58	20.65	19.68	16.98
		1880.0	21.56	20.73	19.76	17.06
		1852.5	21.63	20.67	19.70	17.00
	100% RB	1907.5	21.47	20.51	19.54	16.84
		1880.0	21.57	20.60	19.63	16.93
		1852.5	21.58	20.54	19.57	16.87
10MHz	1 RB high	1905.0	22.46	21.61	20.64	16.91
		1880.0	22.49	21.93	20.96	17.23
		1855.0	22.40	21.57	20.60	16.87
	1 RB low	1905.0	22.49	21.52	20.55	16.82
		1880.0	22.48	21.89	20.92	17.19
		1855.0	22.36	21.54	20.57	16.84
	50% RB mid	1905.0	21.60	20.59	19.62	16.91
		1880.0	21.56	20.61	19.64	16.93
		1855.0	21.63	20.72	19.75	17.04
	100% RB	1905.0	21.56	20.52	19.55	16.84
		1880.0	21.59	20.62	19.65	16.94
		1855.0	21.62	20.65	19.68	16.97
15MHz	1 RB high	1902.5	22.59	21.69	20.72	17.09
		1880.0	22.71	22.11	21.14	17.31
		1857.5	22.71	22.14	21.17	17.34
	1 RB low	1902.5	22.69	21.74	20.77	16.94
		1880.0	22.71	22.16	21.19	17.36
		1857.5	22.76	21.99	21.02	17.19
	50% RB mid	1902.5	21.81	20.81	19.84	17.32
		1880.0	21.80	20.88	19.91	17.39
		1857.5	21.80	20.81	19.84	17.32
	100% RB	1902.5	21.78	20.78	19.81	17.29
		1880.0	21.75	20.81	19.84	17.32
		1857.5	21.78	20.79	19.82	17.30

20MHz	1 RB high	1900.0	22.69	22.35	21.38	17.56
		1880.0	22.68	22.37	21.40	17.58
		1860.0	22.61	22.14	21.17	17.35
	1 RB low	1900.0	22.68	22.23	21.26	17.44
		1880.0	22.65	22.40	21.43	17.61
		1860.0	22.68	22.16	21.19	17.37
	50% RB mid	1900.0	21.77	20.81	19.84	17.25
		1880.0	21.81	20.83	19.86	17.27
		1860.0	21.83	20.81	19.84	17.25
	100% RB	1900.0	21.77	20.82	19.85	17.26
		1880.0	21.76	20.77	19.80	17.21
		1860.0	21.80	20.81	19.84	17.25

**LTE band 4**

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)			
			QPSK	16QAM	64QAM	256QAM
1.4MHz	1 RB high	1754.3	22.41	22.24	20.71	17.61
		1732.5	22.48	21.57	20.09	16.94
		1710.7	22.43	21.70	20.21	17.07
	1 RB low	1754.3	22.42	22.26	20.73	17.63
		1732.5	22.39	21.48	20.01	16.85
		1710.7	22.44	21.70	20.21	17.07
	50% RB mid	1754.3	22.46	22.17	20.65	17.54
		1732.5	22.48	21.75	20.26	17.12
		1710.7	22.50	21.73	20.24	17.19
	100% RB	1754.3	21.55	20.82	19.39	16.98
		1732.5	21.52	20.74	19.32	16.86
		1710.7	21.53	20.83	19.40	17.01
3MHz	1 RB high	1753.5	22.98	22.37	20.83	17.23
		1732.5	22.63	21.65	20.16	16.51
		1711.5	22.54	21.47	20.00	16.33
	1 RB low	1753.5	22.41	22.27	20.74	17.13
		1732.5	22.44	21.56	20.08	16.42
		1711.5	22.40	21.50	20.02	16.36
	50% RB mid	1753.5	21.66	21.08	19.63	17.20
		1732.5	21.64	20.70	19.28	16.82
		1711.5	21.63	20.84	19.41	16.96
	100% RB	1753.5	21.63	20.98	19.54	17.10
		1732.5	21.63	20.61	19.20	16.73
		1711.5	21.61	20.75	19.33	16.87
5MHz	1 RB high	1752.5	22.80	22.20	20.68	17.26
		1732.5	22.64	22.23	20.70	17.28
		1712.5	22.51	21.76	20.27	16.85
	1 RB low	1752.5	22.59	22.03	20.52	17.10
		1732.5	22.47	22.06	20.55	17.13
		1712.5	22.50	21.76	20.27	16.85
	50% RB mid	1752.5	21.81	21.03	19.59	17.12
		1732.5	21.69	20.85	19.42	16.94
		1712.5	21.75	20.78	19.35	16.87
	100% RB	1752.5	21.76	20.97	19.53	17.06
		1732.5	21.65	20.75	19.32	16.84
		1712.5	21.70	20.70	19.28	16.79
10MHz	1 RB high	1750	22.88	21.84	20.34	17.30
		1732.5	22.51	22.04	20.53	17.50



	1 RB low	1715	22.49	21.55	20.07	17.01
		1750	22.63	21.69	20.20	17.15
		1732.5	22.48	21.96	20.45	17.42
	50% RB mid	1715	22.42	21.48	20.01	16.94
		1750	21.83	20.91	19.47	17.00
		1732.5	21.70	20.75	19.33	16.84
	100% RB	1715	21.70	20.79	19.36	16.88
		1750	21.82	20.85	19.42	16.94
		1732.5	21.67	20.71	19.29	16.80
15MHz	1 RB high	1715	21.71	20.72	19.30	16.81
		1750	21.82	20.85	19.42	16.94
		1732.5	21.67	20.71	19.29	16.80
	1 RB low	1747.5	22.99	22.47	20.93	17.48
		1732.5	22.75	21.80	20.30	16.81
		1717.5	22.71	22.09	20.57	17.10
	50% RB mid	1747.5	22.95	22.33	20.80	17.34
		1732.5	22.77	21.85	20.35	16.86
		1717.5	22.65	22.13	20.61	17.14
	100% RB	1747.5	22.03	21.04	19.60	17.29
		1732.5	21.83	20.87	19.44	17.12
		1717.5	21.79	20.88	19.45	17.13
20MHz	1 RB high	1747.5	22.02	21.00	19.56	17.25
		1732.5	21.83	20.87	19.44	17.12
		1717.5	21.79	20.90	19.47	17.15
	1 RB low	1745	23.06	22.58	21.03	17.43
		1732.5	22.83	22.25	20.72	17.10
		1720	22.91	22.32	20.79	17.17
	50% RB mid	1745	22.79	22.32	20.79	17.17
		1732.5	22.65	22.15	20.63	17.00
		1720	22.57	22.20	20.68	17.05
	100% RB	1745	22.06	21.10	19.65	17.26
		1732.5	21.87	20.84	19.41	17.00
		1720	21.77	20.87	19.44	17.03
	1 RB high	1745	22.03	21.09	19.64	17.25
		1732.5	21.85	20.85	19.42	17.01
		1720	21.82	20.85	19.42	17.01

**LTE band 5**

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)			
			QPSK	16QAM	64QAM	256QAM
1.4MHz	1 RB high	848.3	22.49	21.90	21.39	17.63
		836.5	22.56	21.59	21.09	17.32
		824.7	22.42	21.72	21.22	17.45
	1 RB low	848.3	22.49	21.96	21.46	17.69
		836.5	22.55	21.56	21.06	17.29
		824.7	22.52	21.66	21.16	17.39
	50% RB mid	848.3	22.60	21.90	21.39	17.63
		836.5	22.55	21.85	21.34	17.58
		824.7	22.55	21.68	21.18	17.41
	100% RB	848.3	21.54	20.46	19.99	17.22
		836.5	21.61	20.78	20.30	17.15
		824.7	21.60	20.74	20.26	17.23
3MHz	1 RB high	847.5	22.59	21.51	21.02	16.98
		836.5	22.60	22.03	21.52	17.50
		825.5	22.52	21.66	21.16	17.13
	1 RB low	847.5	22.57	21.62	21.13	17.09
		836.5	22.60	22.07	21.56	17.54
		825.5	22.57	21.73	21.23	17.20
	50% RB mid	847.5	21.72	20.81	20.33	17.49
		836.5	21.72	20.80	20.32	17.48
		825.5	21.73	20.79	20.31	17.47
	100% RB	847.5	21.67	20.65	20.18	17.33
		836.5	21.72	20.76	20.28	17.44
		825.5	21.73	20.70	20.22	17.38
5MHz	1 RB high	846.5	22.68	21.86	21.35	17.51
		836.5	22.74	21.79	21.29	17.44
		826.5	22.60	22.14	21.63	17.79
	1 RB low	846.5	22.77	21.90	21.39	17.55
		836.5	22.71	21.82	21.32	17.47
		826.5	22.64	22.18	21.67	17.83
	50% RB mid	846.5	21.74	20.79	20.31	17.34
		836.5	21.69	20.78	20.30	17.33
		826.5	21.77	20.91	20.42	17.46
	100% RB	846.5	21.76	20.71	20.23	17.26
		836.5	21.69	20.73	20.25	17.28
		826.5	21.76	20.81	20.33	17.36
10MHz	1 RB high	844.0	22.57	22.06	21.55	17.98
		836.5	22.45	21.71	21.21	17.63

		829.0	22.63	21.57	21.07	17.49
	1 RB low	844.0	22.62	22.10	21.59	18.02
		836.5	22.48	21.61	21.11	17.53
		829.0	22.51	21.73	21.23	17.65
	50% RB mid	844.0	21.68	20.74	20.26	17.39
		836.5	21.74	20.78	20.30	17.43
		829.0	21.77	20.80	20.32	17.45
	100% RB	844.0	21.68	20.73	20.25	17.38
		836.5	21.61	20.70	20.22	17.35
		829.0	21.74	20.70	20.22	17.35

**LTE band 7**

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)			
			QPSK	16QAM	64QAM	256QAM
5MHz	1 RB high	2567.5	22.66	21.88	20.80	17.15
		2535	22.61	22.15	21.05	17.42
		2502.5	22.74	21.89	20.80	17.16
	1 RB low	2567.5	22.69	21.85	20.77	17.12
		2535	22.62	22.13	21.02	17.40
		2502.5	22.65	21.74	20.66	17.01
	50% RB mid	2567.5	21.72	20.81	19.77	16.97
		2535	21.70	20.85	19.82	17.01
		2502.5	21.81	20.87	19.83	17.03
	100% RB	2567.5	21.75	20.76	19.73	16.92
		2535	21.71	20.78	19.74	16.94
		2502.5	21.81	20.76	19.73	16.92
10MHz	1 RB high	2565	22.67	21.45	20.39	17.14
		2535	22.66	22.09	20.99	17.78
		2505	22.53	21.72	20.64	17.41
	1 RB low	2565	22.49	21.63	20.55	17.32
		2535	22.61	22.05	20.96	17.74
		2505	22.54	21.69	20.61	17.38
	50% RB mid	2565	21.74	20.78	19.74	16.88
		2535	21.70	20.71	19.68	16.81
		2505	21.82	20.96	19.92	17.06
	100% RB	2565	21.70	20.75	19.72	16.85
		2535	21.67	20.75	19.72	16.85
		2505	21.77	20.84	19.81	16.94
15MHz	1 RB high	2562.5	22.53	21.35	20.29	16.45
		2535	22.91	22.28	21.17	17.38
		2507.5	22.96	22.27	21.16	17.37
	1 RB low	2562.5	22.77	21.76	20.68	16.86
		2535	22.89	22.31	21.20	17.41
		2507.5	22.93	22.36	21.24	17.46
	50% RB mid	2562.5	21.89	20.90	19.86	17.13
		2535	21.92	20.96	19.92	17.19
		2507.5	22.04	21.03	19.98	17.26
	100% RB	2562.5	21.85	20.89	19.85	17.12
		2535	21.86	20.94	19.89	17.17
		2507.5	21.99	20.99	19.94	17.22

20MHz	1 RB high	2560	22.61	21.98	20.88	16.91
		2535	22.89	22.32	21.21	17.25
		2510	22.90	22.46	21.34	17.39
	1 RB low	2560	22.79	22.37	21.26	17.30
		2535	22.92	22.25	21.14	17.18
		2510	22.89	22.62	21.50	17.55
	50% RB mid	2560	21.87	20.92	19.88	17.07
		2535	21.90	20.91	19.87	17.06
		2510	22.00	21.07	20.02	17.22
	100% RB	2560	21.88	20.88	19.84	17.03
		2535	21.92	20.89	19.85	17.04
		2510	22.03	21.06	20.01	17.21

**LTE band 38**

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)			
			QPSK	16QAM	64QAM	256QAM
5MHz	1 RB high	2617.5	22.61	21.64	20.69	16.90
		2595.0	22.74	21.72	20.77	16.98
		2572.5	22.64	21.55	20.61	16.81
	1 RB low	2617.5	22.47	21.57	20.63	16.83
		2595.0	22.59	21.58	20.64	16.84
		2572.5	22.23	21.51	20.57	16.77
	50% RB mid	2617.5	21.72	20.74	19.83	17.16
		2595.0	21.77	20.71	19.80	17.13
		2572.5	21.32	20.58	19.68	17.00
	100% RB	2617.5	21.68	20.68	19.78	17.10
		2595.0	21.72	20.72	19.82	17.14
		2572.5	21.28	20.48	19.58	16.90
10MHz	1 RB high	2615.0	22.60	21.66	20.72	16.76
		2595.0	22.64	21.73	20.78	16.83
		2575.0	22.50	21.59	20.65	16.69
	1 RB low	2615.0	22.53	21.59	20.65	16.69
		2595.0	22.56	21.69	20.74	16.79
		2575.0	22.34	21.56	20.62	16.66
	50% RB mid	2615.0	21.72	20.71	19.81	17.13
		2595.0	21.76	20.75	19.84	17.17
		2575.0	21.54	20.62	19.72	17.04
	100% RB	2615.0	21.73	20.71	19.81	17.13
		2595.0	21.77	20.81	19.90	17.23
		2575.0	21.54	20.56	19.66	16.98
15MHz	1 RB high	2612.5	22.80	21.74	20.79	17.03
		2595.0	22.93	21.89	20.94	17.18
		2577.5	22.78	21.79	20.84	17.08
	1 RB low	2612.5	22.76	21.77	20.82	17.06
		2595.0	22.80	21.87	20.91	17.16
		2577.5	22.78	21.77	20.82	17.06
	50% RB mid	2612.5	21.87	20.83	19.92	17.25
		2595.0	21.97	20.92	20.01	17.34
		2577.5	21.89	20.94	20.02	17.36
	100% RB	2612.5	21.86	20.84	19.93	17.26
		2595.0	21.94	21.03	20.11	17.45
		2577.5	21.91	20.91	19.99	17.33

20MHz	1 RB high	2610.0	22.86	21.74	20.79	17.07
		2595.0	22.85	22.01	21.05	17.34
		2580.0	22.83	21.76	20.81	17.09
	1 RB low	2610.0	22.85	21.70	20.76	17.03
		2595.0	22.74	21.97	21.01	17.30
		2580.0	22.71	21.76	20.81	17.09
	50% RB mid	2610.0	21.93	20.98	20.07	17.40
		2595.0	21.97	21.01	20.09	17.43
		2580.0	21.92	20.91	19.99	17.33
	100% RB	2610.0	21.95	20.95	20.04	17.37
		2595.0	21.99	20.97	20.05	17.39
		2580.0	21.92	20.90	19.98	17.32

### A.1.3 Radiated

#### A.1.3.1 Description

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

Rule Part 22.913(a) specifies "Mobile stations are limited to 2.0 watts EIRP."

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

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

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

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

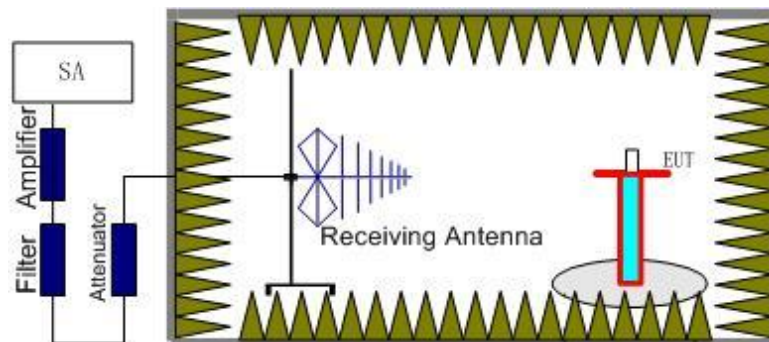
Rule Part 27.50(a)(3) specifies "For mobile and portable stations transmitting in the 2305–2315 MHz band or the 2350–2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards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

Rule Part 90.635(b) specifies "The maximum output power of the transmitter for mobile stations is 100 watts(50dBm)".

#### A.1.3.2 Method of Measurement

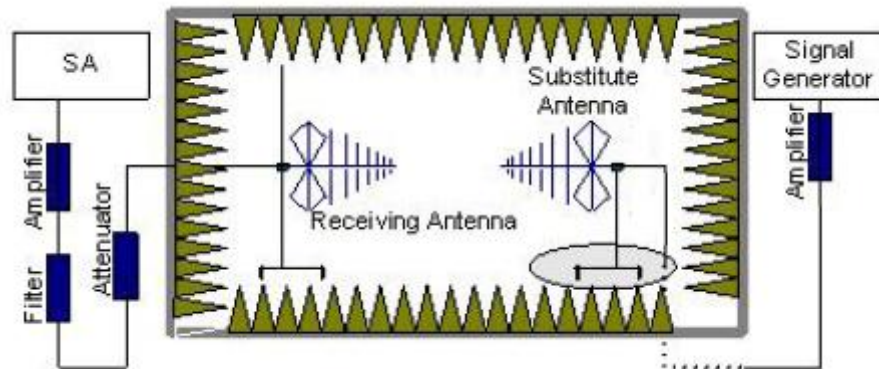
The measurements procedures in TIA-603E-2016 are used.

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 transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as ( $P_r$ ).
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. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna. The cable loss ( $P_{cl}$ ), the substitution antenna Gain ( $G_a$ ) and the amplifier Gain ( $P_{Ag}$ ) should be recorded after test.

The measurement results are obtained as described below:

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

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

### A.1.3.3 Measurement result

#### LTE Band 2- EIRP (Gain:-0.15dBi)

Limits: ≤33dBm (2W)

Bandwidth	RB size/offset	Frequency (MHz)	Radiated Power (dBm)			
			QPSK	16QAM	64QAM	256QAM
1.4MHz	1 RB high	1909.3	22.22	21.45	20.48	17.04
		1880.0	22.26	21.62	20.65	17.21
		1850.7	22.26	21.32	20.35	16.91
	1 RB low	1909.3	22.29	21.37	20.40	16.96
		1880.0	22.18	21.64	20.67	17.23
		1850.7	22.22	21.32	20.35	16.91
	50% RB mid	1909.3	22.23	21.39	20.42	16.98
		1880.0	22.28	21.53	20.56	17.12
		1850.7	22.28	21.50	20.53	17.09
	100% RB	1909.3	21.30	20.42	19.45	16.01
		1880.0	21.29	20.20	19.23	15.79
		1850.7	21.31	20.47	19.50	16.06
3MHz	1 RB high	1908.5	22.35	21.25	20.28	16.56
		1880.0	22.39	21.77	20.80	17.08
		1851.5	22.34	21.42	20.45	16.73
	1 RB low	1908.5	22.24	21.20	20.23	16.51
		1880.0	22.29	21.67	20.70	16.98
		1851.5	22.29	21.41	20.44	16.72
	50% RB mid	1908.5	21.39	20.50	19.53	16.95
		1880.0	21.39	20.47	19.50	16.92
		1851.5	21.42	20.48	19.51	16.93
	100% RB	1908.5	21.40	20.43	19.46	16.88
		1880.0	21.38	20.44	19.47	16.89
		1851.5	21.39	20.38	19.41	16.83
5MHz	1 RB high	1907.5	22.48	21.60	20.63	17.22
		1880.0	22.40	21.94	20.97	17.56
		1852.5	22.43	21.57	20.60	17.19
	1 RB low	1907.5	22.32	21.45	20.48	17.07
		1880.0	22.27	21.81	20.84	17.43
		1852.5	22.33	21.41	20.44	17.03
	50% RB mid	1907.5	21.43	20.50	19.53	16.83
		1880.0	21.41	20.58	19.61	16.91
		1852.5	21.48	20.52	19.55	16.85
	100% RB	1907.5	21.32	20.36	19.39	16.69
		1880.0	21.42	20.45	19.48	16.78

		1852.5	21.43	20.39	19.42	16.72
10MHz	1 RB high	1905.0	22.31	21.46	20.49	16.76
		1880.0	22.34	21.78	20.81	17.08
		1855.0	22.25	21.42	20.45	16.72
	1 RB low	1905.0	22.34	21.37	20.40	16.67
		1880.0	22.33	21.74	20.77	17.04
		1855.0	22.21	21.39	20.42	16.69
	50% RB mid	1905.0	21.45	20.44	19.47	16.76
		1880.0	21.41	20.46	19.49	16.78
		1855.0	21.48	20.57	19.60	16.89
	100% RB	1905.0	21.41	20.37	19.40	16.69
		1880.0	21.44	20.47	19.50	16.79
		1855.0	21.47	20.50	19.53	16.82
15MHz	1 RB high	1902.5	22.44	21.54	20.57	16.94
		1880.0	22.56	21.96	20.99	17.16
		1857.5	22.56	21.99	21.02	17.19
	1 RB low	1902.5	22.54	21.59	20.62	16.79
		1880.0	22.56	22.01	21.04	17.21
		1857.5	22.61	21.84	20.87	17.04
	50% RB mid	1902.5	21.66	20.66	19.69	17.17
		1880.0	21.65	20.73	19.76	17.24
		1857.5	21.65	20.66	19.69	17.17
	100% RB	1902.5	21.63	20.63	19.66	17.14
		1880.0	21.60	20.66	19.69	17.17
		1857.5	21.63	20.64	19.67	17.15
20MHz	1 RB high	1900.0	22.54	22.20	21.23	17.41
		1880.0	22.53	22.22	21.25	17.43
		1860.0	22.46	21.99	21.02	17.20
	1 RB low	1900.0	22.53	22.08	21.11	17.29
		1880.0	22.50	22.25	21.28	17.46
		1860.0	22.53	22.01	21.04	17.22
	50% RB mid	1900.0	21.62	20.66	19.69	17.10
		1880.0	21.66	20.68	19.71	17.12
		1860.0	21.68	20.66	19.69	17.10
	100% RB	1900.0	21.62	20.67	19.70	17.11
		1880.0	21.61	20.62	19.65	17.06
		1860.0	21.65	20.66	19.69	17.10

**LTE Band 4- EIRP (Gain:-0.76dBi)**
**Limits:** ≤30dBm (1W)

Bandwidth	RB size/offset	Frequency (MHz)	Radiated Power (dBm)			
			QPSK	16QAM	64QAM	256QAM
1.4MHz	1 RB high	1754.3	21.65	21.48	19.95	16.85
		1732.5	21.72	20.81	19.33	16.18
		1710.7	21.67	20.94	19.45	16.31
	1 RB low	1754.3	21.66	21.50	19.97	16.87
		1732.5	21.63	20.72	19.25	16.09
		1710.7	21.68	20.94	19.45	16.31
	50% RB mid	1754.3	21.70	21.41	19.89	16.78
		1732.5	21.72	20.99	19.50	16.36
		1710.7	21.74	20.97	19.48	16.43
	100% RB	1754.3	20.79	20.06	18.63	16.22
		1732.5	20.76	19.98	18.56	16.10
		1710.7	20.77	20.07	18.64	16.25
3MHz	1 RB high	1753.5	22.22	21.61	20.07	16.47
		1732.5	21.87	20.89	19.40	15.75
		1711.5	21.78	20.71	19.24	15.57
	1 RB low	1753.5	21.65	21.51	19.98	16.37
		1732.5	21.68	20.80	19.32	15.66
		1711.5	21.64	20.74	19.26	15.60
	50% RB mid	1753.5	20.90	20.32	18.87	16.44
		1732.5	20.88	19.94	18.52	16.06
		1711.5	20.87	20.08	18.65	16.20
	100% RB	1753.5	20.87	20.22	18.78	16.34
		1732.5	20.87	19.85	18.44	15.97
		1711.5	20.85	19.99	18.57	16.11
5MHz	1 RB high	1752.5	22.04	21.44	19.92	16.50
		1732.5	21.88	21.47	19.94	16.52
		1712.5	21.75	21.00	19.51	16.09
	1 RB low	1752.5	21.83	21.27	19.76	16.34
		1732.5	21.71	21.30	19.79	16.37
		1712.5	21.74	21.00	19.51	16.09
	50% RB mid	1752.5	21.05	20.27	18.83	16.36
		1732.5	20.93	20.09	18.66	16.18
		1712.5	20.99	20.02	18.59	16.11
	100% RB	1752.5	21.00	20.21	18.77	16.30
		1732.5	20.89	19.99	18.56	16.08
		1712.5	20.94	19.94	18.52	16.03
10MHz	1 RB high	1750	22.12	21.08	19.58	16.54

		1732.5	21.75	21.28	19.77	16.74
		1715	21.73	20.79	19.31	16.25
	1 RB low	1750	21.87	20.93	19.44	16.39
		1732.5	21.72	21.20	19.69	16.66
		1715	21.66	20.72	19.25	16.18
	50% RB mid	1750	21.07	20.15	18.71	16.24
		1732.5	20.94	19.99	18.57	16.08
		1715	20.94	20.03	18.60	16.12
	100% RB	1750	21.06	20.09	18.66	16.18
		1732.5	20.91	19.95	18.53	16.04
		1715	20.95	19.96	18.54	16.05
	15MHz	1 RB high	1747.5	22.23	21.71	20.17
1732.5			21.99	21.04	19.54	16.05
1717.5			21.95	21.33	19.81	16.34
1 RB low		1747.5	22.19	21.57	20.04	16.58
		1732.5	22.01	21.09	19.59	16.10
		1717.5	21.89	21.37	19.85	16.38
50% RB mid		1747.5	21.27	20.28	18.84	16.53
		1732.5	21.07	20.11	18.68	16.36
		1717.5	21.03	20.12	18.69	16.37
100% RB		1747.5	21.26	20.24	18.80	16.49
		1732.5	21.07	20.11	18.68	16.36
		1717.5	21.03	20.14	18.71	16.39
20MHz	1 RB high	1745	22.30	21.82	20.27	16.67
		1732.5	22.07	21.49	19.96	16.34
		1720	22.15	21.56	20.03	16.41
	1 RB low	1745	22.03	21.56	20.03	16.41
		1732.5	21.89	21.39	19.87	16.24
		1720	21.81	21.44	19.92	16.29
	50% RB mid	1745	21.30	20.34	18.89	16.50
		1732.5	21.11	20.08	18.65	16.24
		1720	21.01	20.11	18.68	16.27
	100% RB	1745	21.27	20.33	18.88	16.49
		1732.5	21.09	20.09	18.66	16.25
		1720	21.06	20.09	18.66	16.25

**LTE Band 5- ERP(Gain:-2.4dBi)**
**Limits:** ≤38.45dBm (7W)

Bandwidth	RB size/offset	Frequency (MHz)	Radiated Power (dBm)			
			QPSK	16QAM	64QAM	256QAM
1.4MHz	1 RB high	848.3	20.09	19.50	18.99	15.23
		836.5	20.16	19.19	18.69	14.92
		824.7	20.02	19.32	18.82	15.05
	1 RB low	848.3	20.09	19.56	19.06	15.29
		836.5	20.15	19.16	18.66	14.89
		824.7	20.12	19.26	18.76	14.99
	50% RB mid	848.3	20.20	19.50	18.99	15.23
		836.5	20.15	19.45	18.94	15.18
		824.7	20.15	19.28	18.78	15.01
	100% RB	848.3	19.14	18.06	17.59	14.82
		836.5	19.21	18.38	17.90	14.75
		824.7	19.20	18.34	17.86	14.83
3MHz	1 RB high	847.5	20.19	19.11	18.62	14.58
		836.5	20.20	19.63	19.12	15.10
		825.5	20.12	19.26	18.76	14.73
	1 RB low	847.5	20.17	19.22	18.73	14.69
		836.5	20.20	19.67	19.16	15.14
		825.5	20.17	19.33	18.83	14.80
	50% RB mid	847.5	19.32	18.41	17.93	15.09
		836.5	19.32	18.40	17.92	15.08
		825.5	19.33	18.39	17.91	15.07
	100% RB	847.5	19.27	18.25	17.78	14.93
		836.5	19.32	18.36	17.88	15.04
		825.5	19.33	18.30	17.82	14.98
5MHz	1 RB high	846.5	20.28	19.46	18.95	15.11
		836.5	20.34	19.39	18.89	15.04
		826.5	20.20	19.74	19.23	15.39
	1 RB low	846.5	20.37	19.50	18.99	15.15
		836.5	20.31	19.42	18.92	15.07
		826.5	20.24	19.78	19.27	15.43
	50% RB mid	846.5	19.34	18.39	17.91	14.94
		836.5	19.29	18.38	17.90	14.93
		826.5	19.37	18.51	18.02	15.06
	100% RB	846.5	19.36	18.31	17.83	14.86
		836.5	19.29	18.33	17.85	14.88
		826.5	19.36	18.41	17.93	14.96
10MHz	1 RB high	844.0	20.17	19.66	19.15	15.58

		836.5	20.05	19.31	18.81	15.23
		829.0	20.23	19.17	18.67	15.09
	1 RB low	844.0	20.22	19.70	19.19	15.62
		836.5	20.08	19.21	18.71	15.13
		829.0	20.11	19.33	18.83	15.25
	50% RB mid	844.0	19.28	18.34	17.86	14.99
		836.5	19.34	18.38	17.90	15.03
		829.0	19.37	18.40	17.92	15.05
	100% RB	844.0	19.28	18.33	17.85	14.98
		836.5	19.21	18.30	17.82	14.95
		829.0	19.34	18.30	17.82	14.95

**LTE Band 7- EIRP(Gain:-0.47dBi)**
**Limits:** ≤33 dBm (2W)

Bandwidth	RB size/offset	Frequency (MHz)	Radiated Power (dBm)			
			QPSK	16QAM	64QAM	256QAM
5MHz	1 RB high	2567.5	22.19	21.41	20.33	16.68
		2535	22.14	21.68	20.58	16.95
		2502.5	22.27	21.42	20.33	16.69
	1 RB low	2567.5	22.22	21.38	20.30	16.65
		2535	22.15	21.66	20.55	16.93
		2502.5	22.18	21.27	20.19	16.54
	50% RB mid	2567.5	21.25	20.34	19.30	16.50
		2535	21.23	20.38	19.35	16.54
		2502.5	21.34	20.40	19.36	16.56
	100% RB	2567.5	21.28	20.29	19.26	16.45
		2535	21.24	20.31	19.27	16.47
		2502.5	21.34	20.29	19.26	16.45
10MHz	1 RB high	2565	22.20	20.98	19.92	16.67
		2535	22.19	21.62	20.52	17.31
		2505	22.06	21.25	20.17	16.94
	1 RB low	2565	22.02	21.16	20.08	16.85
		2535	22.14	21.58	20.49	17.27
		2505	22.07	21.22	20.14	16.91
	50% RB mid	2565	21.27	20.31	19.27	16.41
		2535	21.23	20.24	19.21	16.34
		2505	21.35	20.49	19.45	16.59
	100% RB	2565	21.23	20.28	19.25	16.38
		2535	21.20	20.28	19.25	16.38
		2505	21.30	20.37	19.34	16.47
15MHz	1 RB high	2562.5	22.06	20.88	19.82	15.98
		2535	22.44	21.81	20.70	16.91
		2507.5	22.49	21.80	20.69	16.90
	1 RB low	2562.5	22.30	21.29	20.21	16.39
		2535	22.42	21.84	20.73	16.94
		2507.5	22.46	21.89	20.77	16.99
	50% RB mid	2562.5	21.42	20.43	19.39	16.66
		2535	21.45	20.49	19.45	16.72
		2507.5	21.57	20.56	19.51	16.79
	100% RB	2562.5	21.38	20.42	19.38	16.65
		2535	21.39	20.47	19.42	16.70
		2507.5	21.52	20.52	19.47	16.75



20MHz	1 RB high	2560	22.14	21.51	20.41	16.44
		2535	22.42	21.85	20.74	16.78
		2510	22.43	21.99	20.87	16.92
	1 RB low	2560	22.32	21.90	20.79	16.83
		2535	22.45	21.78	20.67	16.71
		2510	22.42	22.15	21.03	17.08
	50% RB mid	2560	21.40	20.45	19.41	16.60
		2535	21.43	20.44	19.40	16.59
		2510	21.53	20.60	19.55	16.75
	100% RB	2560	21.41	20.41	19.37	16.56
		2535	21.45	20.42	19.38	16.57
		2510	21.56	20.59	19.54	16.74

**LTE Band 38- EIRP(Gain: -0.47dBi)**
**Limits:** ≤33dBm (2W)

Bandwidth	RB size/offset	Frequency (MHz)	Radiated Power (dBm)			
			QPSK	16QAM	64QAM	256QAM
5MHz	1 RB high	2617.5	22.14	21.17	20.22	16.43
		2595.0	22.27	21.25	20.30	16.51
		2572.5	22.17	21.08	20.14	16.34
	1 RB low	2617.5	22.00	21.10	20.16	16.36
		2595.0	22.12	21.11	20.17	16.37
		2572.5	21.76	21.04	20.10	16.30
	50% RB mid	2617.5	21.25	20.27	19.36	16.69
		2595.0	21.30	20.24	19.33	16.66
		2572.5	20.85	20.11	19.21	16.53
	100% RB	2617.5	21.21	20.21	19.31	16.63
		2595.0	21.25	20.25	19.35	16.67
		2572.5	20.81	20.01	19.11	16.43
10MHz	1 RB high	2615.0	22.13	21.19	20.25	16.29
		2595.0	22.17	21.26	20.31	16.36
		2575.0	22.03	21.12	20.18	16.22
	1 RB low	2615.0	22.06	21.12	20.18	16.22
		2595.0	22.09	21.22	20.27	16.32
		2575.0	21.87	21.09	20.15	16.19
	50% RB mid	2615.0	21.25	20.24	19.34	16.66
		2595.0	21.29	20.28	19.37	16.70
		2575.0	21.07	20.15	19.25	16.57
	100% RB	2615.0	21.26	20.24	19.34	16.66
		2595.0	21.30	20.34	19.43	16.76
		2575.0	21.07	20.09	19.19	16.51
15MHz	1 RB high	2612.5	22.33	21.27	20.32	16.56
		2595.0	22.46	21.42	20.47	16.71
		2577.5	22.31	21.32	20.37	16.61
	1 RB low	2612.5	22.29	21.30	20.35	16.59
		2595.0	22.33	21.40	20.44	16.69
		2577.5	22.31	21.30	20.35	16.59
	50% RB mid	2612.5	21.40	20.36	19.45	16.78
		2595.0	21.50	20.45	19.54	16.87
		2577.5	21.42	20.47	19.55	16.89
	100% RB	2612.5	21.39	20.37	19.46	16.79
		2595.0	21.47	20.56	19.64	16.98
		2577.5	21.44	20.44	19.52	16.86

20MHz	1 RB high	2610.0	22.39	21.27	20.32	16.60
		2595.0	22.38	21.54	20.58	16.87
		2580.0	22.36	21.29	20.34	16.62
	1 RB low	2610.0	22.38	21.23	20.29	16.56
		2595.0	22.27	21.50	20.54	16.83
		2580.0	22.24	21.29	20.34	16.62
	50% RB mid	2610.0	21.46	20.51	19.60	16.93
		2595.0	21.50	20.54	19.62	16.96
		2580.0	21.45	20.44	19.52	16.86
	100% RB	2610.0	21.48	20.48	19.57	16.90
		2595.0	21.52	20.50	19.58	16.92
		2580.0	21.45	20.43	19.51	16.85

Note: Expanded measurement uncertainty is  $U = 2.84$  dB,  $k = 2$ .

## **A.2 EMISSION LIMIT**

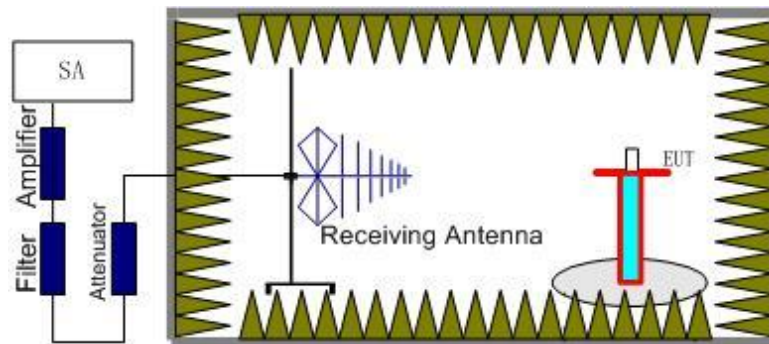
### **A.2.1 Measurement Method**

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

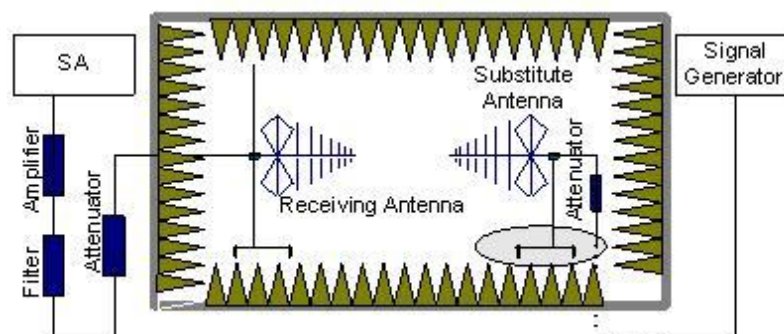
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and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

#### **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:  
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,  $ERP = EIRP - 2.15dB$ .

### A.2.2 Measurement Limit

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

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

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



### **A.2.3 Measurement Results**

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

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

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3685.02	-56.15	6.46	8.46	-54.15	-13.00	41.15	V
5583.02	-57.13	7.22	10.58	-53.77	-13.00	40.77	H
7415.01	-54.78	8.16	12.10	-50.84	-13.00	37.84	H
9210.01	-54.63	8.95	13.23	-50.35	-13.00	37.35	V
11121.01	-52.15	9.74	13.18	-48.71	-13.00	35.71	V
12958.01	-49.27	10.48	13.47	-46.28	-13.00	33.28	H

**LTE Band 2, 1.4MHz, QPSK, Channel 18900**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3795.02	-56.90	6.15	8.61	-54.44	-13.00	41.44	H
5675.02	-56.12	7.28	10.56	-52.84	-13.00	39.84	H
7557.01	-55.13	8.15	12.25	-51.03	-13.00	38.03	H
9449.01	-54.79	9.28	13.37	-50.70	-13.00	37.70	V
11312.01	-51.23	10.00	13.14	-48.09	-13.00	35.09	H
13156.01	-47.86	10.69	13.72	-44.83	-13.00	31.83	H

**LTE Band 2, 1.4MHz, QPSK, Channel 19193**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3841.02	-56.71	6.07	8.68	-54.10	-13.00	41.10	H
5773.02	-55.95	7.23	10.55	-52.63	-13.00	39.63	H
7687.01	-54.21	8.37	12.35	-50.23	-13.00	37.23	V
9556.01	-54.10	9.34	13.34	-50.10	-13.00	37.10	H
11458.01	-51.65	9.92	13.11	-48.46	-13.00	35.46	H
13354.01	-47.85	10.57	14.00	-44.42	-13.00	31.42	V

**LTE Band 4, 1.4MHz QPSK, Channel 19957**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3376.02	-57.22	5.34	7.90	-54.66	-13.00	41.66	H
5111.02	-57.00	6.80	10.06	-53.74	-13.00	40.74	H
6838.01	-54.76	7.84	11.41	-51.19	-13.00	38.19	V
8513.01	-55.02	8.65	13.00	-50.67	-13.00	37.67	V
10293.01	-52.33	9.62	13.02	-48.93	-13.00	35.93	V
11993.01	-50.42	10.08	13.00	-47.50	-13.00	34.50	H

**LTE Band 4, 1.4MHz, QPSK, Channel 20175**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3503.02	-57.31	5.53	8.20	-54.64	-13.00	41.64	H
5158.02	-56.73	6.89	10.12	-53.50	-13.00	40.50	V
6967.01	-54.40	8.04	11.56	-50.88	-13.00	37.88	V
8661.01	-54.10	8.41	13.03	-49.48	-13.00	36.48	V
10408.01	-51.30	9.79	13.06	-48.03	-13.00	35.03	H
12155.01	-48.89	10.19	13.06	-46.02	-13.00	33.02	V

**LTE Band 4, 1.4MHz, QPSK, Channel 20393**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3521.02	-57.31	5.56	8.23	-54.64	-13.00	41.64	H
5288.02	-56.66	6.99	10.30	-53.35	-13.00	40.35	H
7008.01	-54.55	8.29	11.61	-51.23	-13.00	38.23	H
8761.01	-55.00	8.54	13.05	-50.49	-13.00	37.49	H
10536.01	-52.14	9.52	13.11	-48.55	-13.00	35.55	V
12296.01	-49.68	10.00	13.12	-46.56	-13.00	33.56	H



**LTE Band 5, 1.4MHz, QPSK, Channel 20407**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1647.01	-59.58	3.56	5.24	2.15	-60.05	-13.00	47.05	V
2468.00	-53.16	4.59	6.00	2.15	-53.90	-13.00	40.90	V
3297.02	-55.37	5.29	7.71	2.15	-55.10	-13.00	42.10	V
4116.02	-55.30	6.04	9.02	2.15	-54.47	-13.00	41.47	H
4950.01	-54.94	6.69	9.85	2.15	-53.93	-13.00	40.93	V
5775.01	-53.99	7.23	10.54	2.15	-52.83	-13.00	39.83	V

**LTE Band 5, 1.4MHz, QPSK, Channel 20525**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1674.01	-58.40	3.58	5.19	2.15	-58.94	-13.00	45.94	H
2501.00	-53.51	4.63	6.10	2.15	-54.19	-13.00	41.19	H
3340.02	-54.73	5.31	7.82	2.15	-54.37	-13.00	41.37	H
4182.02	-55.00	6.17	9.08	2.15	-54.24	-13.00	41.24	H
5022.01	-55.02	6.57	9.93	2.15	-53.81	-13.00	40.81	H
5843.01	-54.02	7.21	10.53	2.15	-52.85	-13.00	39.85	H

**LTE Band 5, 1.4MHz, QPSK, Channel 20643**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1709.01	-59.56	3.61	5.12	2.15	-60.20	-13.00	47.20	V
2538.00	-52.04	4.66	6.17	2.15	-52.68	-13.00	39.68	H
3388.02	-55.59	5.35	7.93	2.15	-55.16	-13.00	42.16	V
4228.02	-55.83	6.26	9.13	2.15	-55.11	-13.00	42.11	V
5085.01	-54.46	6.73	10.02	2.15	-53.32	-13.00	40.32	V
5935.01	-53.65	7.47	10.51	2.15	-52.76	-13.00	39.76	V

**LTE Band 7, 5 MHz, QPSK, Channel 20775**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5019.02	-57.95	6.57	9.93	-54.59	-25.00	29.59	H
7518.01	-55.11	8.32	12.21	-51.22	-25.00	26.22	H
10015.01	-52.58	9.22	12.91	-48.89	-25.00	23.89	H
12494.01	-50.36	10.19	13.20	-47.35	-25.00	22.35	H
15033.00	-45.69	11.26	13.98	-42.97	-25.00	17.97	V
17531.00	-43.64	12.84	14.94	-41.54	-25.00	16.54	V

**LTE Band 7, 5 MHz, QPSK, Channel 21100**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5081.02	-57.19	6.72	10.01	-53.90	-25.00	28.90	H
7602.01	-54.68	7.98	12.28	-50.38	-25.00	25.38	H
10141.01	-52.03	9.40	12.96	-48.47	-25.00	23.47	V
12657.01	-49.01	10.37	13.29	-46.09	-25.00	21.09	H
15204.00	-46.29	11.39	13.88	-43.80	-25.00	18.80	V
17755.00	-44.22	12.49	15.26	-41.45	-25.00	16.45	H

**LTE Band 7, 5 MHz, QPSK, Channel 21425**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5152.02	-56.90	6.89	10.11	-53.68	-25.00	28.68	V
7694.01	-54.69	8.40	12.36	-50.73	-25.00	25.73	V
10267.01	-52.88	9.53	13.01	-49.40	-25.00	24.40	V
12821.01	-49.43	10.71	13.39	-46.75	-25.00	21.75	V
15401.00	-45.93	11.39	13.76	-43.56	-25.00	18.56	H
17983.00	-43.75	12.90	15.58	-41.07	-25.00	16.07	H

**LTE Band 38, 5MHz, QPSK, Channel 37775**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5123.02	-56.53	6.84	10.07	-53.30	-25.00	28.30	V
7683.01	-54.67	8.35	12.35	-50.67	-25.00	25.67	H
10307.01	-51.38	9.65	13.02	-48.01	-25.00	23.01	V
12842.01	-49.36	10.66	13.41	-46.61	-25.00	21.61	H
15450.00	-45.49	11.46	13.73	-43.22	-25.00	18.22	V
17986.00	-43.13	12.90	15.58	-40.45	-25.00	15.45	V

**LTE Band 38, 5MHz, QPSK, Channel 38000**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
6517.02	-55.14	7.51	11.02	-51.63	-25.00	26.63	V
7819.01	-54.83	8.31	12.46	-50.68	-25.00	25.68	H
10385.01	-50.94	9.78	13.05	-47.67	-25.00	22.67	V
13009.01	-48.73	10.51	13.51	-45.73	-25.00	20.73	H
15555.00	-45.06	11.51	13.70	-42.87	-25.00	17.87	V
16879.00	-41.99	12.02	13.75	-40.26	-25.00	15.26	V

**LTE Band 38, 5MHz, QPSK, Channel 38225**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
6532.02	-55.65	7.53	11.04	-52.14	-25.00	27.14	H
7834.01	-54.28	8.33	12.47	-50.14	-25.00	25.14	V
10480.01	-52.12	9.68	13.09	-48.71	-25.00	23.71	H
13081.01	-48.10	10.85	13.61	-45.34	-25.00	20.34	V
15734.00	-45.84	11.63	13.70	-43.77	-25.00	18.77	V
16987.00	-42.25	12.32	13.79	-40.78	-25.00	15.78	H

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

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3661.02	-56.23	6.51	8.43	-54.31	-13.00	41.31	H
5555.02	-42.91	7.19	10.59	-39.51	-13.00	26.51	V
7414.01	-54.73	8.16	12.10	-50.79	-13.00	37.79	V
9252.01	-54.91	9.04	13.25	-50.70	-13.00	37.70	H
11100.01	-52.15	9.84	13.18	-48.81	-13.00	35.81	H
13003.01	-49.17	10.48	13.50	-46.15	-13.00	33.15	V

**LTE Band 2, 1.4MHz, QPSK, Channel 18900**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3809.02	-57.13	6.11	8.63	-54.61	-13.00	41.61	H
5642.02	-38.28	7.27	10.57	-34.98	-13.00	21.98	V
7486.01	-55.12	8.36	12.18	-51.30	-13.00	38.30	H
9409.01	-54.56	9.08	13.35	-50.29	-13.00	37.29	H
11313.01	-50.75	10.00	13.14	-47.61	-13.00	34.61	H
13128.01	-48.07	10.81	13.68	-45.20	-13.00	32.20	H

**LTE Band 2, 1.4MHz, QPSK, Channel 19193**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3787.02	-57.33	6.18	8.60	-54.91	-13.00	41.91	H
5730.02	-44.86	7.29	10.55	-41.60	-13.00	28.60	V
7625.01	-55.05	8.09	12.30	-50.84	-13.00	37.84	V
9581.01	-53.14	9.25	13.32	-49.07	-13.00	36.07	H
11493.01	-51.44	9.83	13.10	-48.17	-13.00	35.17	H
13414.01	-48.37	10.58	14.08	-44.87	-13.00	31.87	V

**LTE Band 4, 1.4MHz QPSK, Channel 19957**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3381.02	-57.76	5.35	7.91	-55.20	-13.00	42.20	V
5135.02	-45.17	6.86	10.09	-41.94	-13.00	28.94	V
6870.01	-55.17	7.80	11.44	-51.53	-13.00	38.53	H
8586.01	-54.77	8.52	13.02	-50.27	-13.00	37.27	V
10313.01	-52.43	9.66	13.03	-49.06	-13.00	36.06	H
11925.01	-49.75	10.40	13.01	-47.14	-13.00	34.14	H

**LTE Band 4, 1.4MHz, QPSK, Channel 20175**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3491.02	-57.56	5.50	8.18	-54.88	-13.00	41.88	H
5202.02	-39.56	6.96	10.18	-36.34	-13.00	23.34	H
6934.01	-55.28	7.79	11.52	-51.55	-13.00	38.55	V
8666.01	-54.32	8.40	13.03	-49.69	-13.00	36.69	H
10422.01	-52.16	9.77	13.07	-48.86	-13.00	35.86	H
12141.01	-50.11	10.23	13.06	-47.28	-13.00	34.28	V

**LTE Band 4, 1.4MHz, QPSK, Channel 20393**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3510.02	-57.96	5.54	8.21	-55.29	-13.00	42.29	H
5265.02	-46.22	6.99	10.27	-42.94	-13.00	29.94	V
7040.01	-55.05	8.24	11.65	-51.64	-13.00	38.64	V
8741.01	-55.51	8.48	13.05	-50.94	-13.00	37.94	H
10562.01	-51.89	9.42	13.11	-48.20	-13.00	35.20	H
12324.01	-50.18	10.10	13.13	-47.15	-13.00	34.15	H

**LTE Band 5, 1.4MHz, QPSK, Channel 20407**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1649.01	-59.89	3.56	5.23	2.15	-60.37	-13.00	47.37	H
2475.00	-49.56	4.60	6.03	2.15	-50.28	-13.00	37.28	V
3305.02	-55.15	5.29	7.73	2.15	-54.86	-13.00	41.86	H
4137.02	-56.60	6.06	9.04	2.15	-55.77	-13.00	42.77	V
4954.01	-55.17	6.68	9.85	2.15	-54.15	-13.00	41.15	H
5772.01	-54.85	7.23	10.55	2.15	-53.68	-13.00	40.68	V

**LTE Band 5, 1.4MHz, QPSK, Channel 20525**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1674.01	-59.58	3.58	5.19	2.15	-60.12	-13.00	47.12	H
2510.00	-48.59	4.63	6.12	2.15	-49.25	-13.00	36.25	V
3351.02	-54.41	5.32	7.84	2.15	-54.04	-13.00	41.04	H
4185.02	-55.65	6.17	9.09	2.15	-54.88	-13.00	41.88	V
5006.01	-56.26	6.59	9.91	2.15	-55.09	-13.00	42.09	H
5848.01	-53.74	7.23	10.53	2.15	-52.59	-13.00	39.59	H

**LTE Band 5, 1.4MHz, QPSK, Channel 20643**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1686.01	-59.37	3.59	5.17	2.15	-59.94	-13.00	46.94	H
2545.00	-47.53	4.66	6.18	2.15	-48.16	-13.00	35.16	V
3389.02	-56.10	5.35	7.93	2.15	-55.67	-13.00	42.67	V
4235.02	-55.55	6.25	9.14	2.15	-54.81	-13.00	41.81	H
5102.01	-55.51	6.78	10.04	2.15	-54.40	-13.00	41.40	H
5939.01	-54.19	7.47	10.51	2.15	-53.30	-13.00	40.30	V

**LTE Band 7, 5 MHz, QPSK, Channel 20775**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5018.02	-57.25	6.57	9.93	-53.89	-25.00	28.89	V
7511.01	-47.75	8.35	12.21	-43.89	-25.00	18.89	V
10026.01	-52.55	9.25	12.91	-48.89	-25.00	23.89	H
12512.01	-49.53	10.21	13.21	-46.53	-25.00	21.53	H
15018.00	-46.31	11.24	13.99	-43.56	-25.00	18.56	V
17522.00	-43.52	12.81	14.93	-41.40	-25.00	16.40	H

**LTE Band 7, 5 MHz, QPSK, Channel 21100**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5087.02	-58.07	6.74	10.02	-54.79	-25.00	29.79	H
7609.01	-44.09	8.01	12.29	-39.81	-25.00	14.81	V
10155.01	-53.01	9.37	12.96	-49.42	-25.00	24.42	H
12669.01	-49.92	10.35	13.30	-46.97	-25.00	21.97	H
15215.00	-46.52	11.38	13.87	-44.03	-25.00	19.03	V
17741.00	-44.95	12.41	15.24	-42.12	-25.00	17.12	V

**LTE Band 7, 5 MHz, QPSK, Channel 21425**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5133.02	-57.48	6.86	10.09	-54.25	-25.00	29.25	H
7706.01	-45.68	8.42	12.36	-41.74	-25.00	16.74	V
10275.01	-53.21	9.56	13.01	-49.76	-25.00	24.76	V
12834.01	-50.53	10.68	13.40	-47.81	-25.00	22.81	H
15414.00	-46.68	11.41	13.75	-44.34	-25.00	19.34	V
17962.00	-42.74	12.89	15.55	-40.08	-25.00	15.08	H

**LTE Band 38, 5MHz, QPSK, Channel 37775**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5134.02	-57.31	6.86	10.09	-54.08	-25.00	29.08	H
7723.01	-48.27	8.39	12.38	-44.28	-25.00	19.28	H
10308.01	-52.16	9.66	13.02	-48.80	-25.00	23.80	H
12840.01	-49.98	10.66	13.40	-47.24	-25.00	22.24	V
15451.00	-45.36	11.47	13.73	-43.10	-25.00	18.10	V
17990.00	-44.35	12.90	15.59	-41.66	-25.00	16.66	H

**LTE Band 38, 5MHz, QPSK, Channel 38000**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
6454.02	-55.48	7.55	10.95	-52.08	-25.00	27.08	H
7788.01	-53.33	8.30	12.43	-49.20	-25.00	24.20	H
10375.01	-51.31	9.76	13.05	-48.02	-25.00	23.02	H
13009.01	-49.55	10.51	13.51	-46.55	-25.00	21.55	V
15553.00	-46.03	11.51	13.70	-43.84	-25.00	18.84	H
16839.00	-42.79	12.07	13.74	-41.12	-25.00	16.12	V

**LTE Band 38, 5MHz, QPSK, Channel 38225**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
6513.02	-55.94	7.51	11.02	-52.43	-25.00	27.43	H
7856.01	-51.51	8.37	12.48	-47.40	-25.00	22.40	V
10450.01	-51.85	9.73	13.08	-48.50	-25.00	23.50	H
13113.01	-48.36	10.88	13.66	-45.58	-25.00	20.58	H
15691.00	-46.27	11.60	13.70	-44.17	-25.00	19.17	V
16991.00	-42.03	12.34	13.80	-40.57	-25.00	15.57	V

Note: The maximum value of expanded measurement uncertainty for this test item is  $U = 5.16$  dB,  $k = 2$ .



## **A.3 FREQUENCY STABILITY**

### **A.3.1 Method of Measurement**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER and Anritsu MT8821C Radio Communication Analyzer.

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 or MT8821C, and in a simulated call on middle channel for LTE band 2,4,5,7,38, 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 between 3.4VDC and 4.4VDC, with a nominal voltage of 3.8VDC. 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 <sub>L</sub> (MHz)	F <sub>H</sub> (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	1850.913	1909.119		
50				3.64	0.0019
40				1.56	0.0008
30				3.13	0.0017
10				2.40	0.0013
0				14.79	0.0079
-10				4.02	0.0021
-20				0.70	0.0004
-30				19.04	0.0101

##### Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F <sub>L</sub> (MHz)	F <sub>H</sub> (MHz)	Offset(Hz)	Frequency error(ppm)
3.6	20	1850.913	1909.119	4.03	0.0021
4.4				3.87	0.0021

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

##### Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	F <sub>L</sub> (MHz)	F <sub>H</sub> (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	1710.865	1754.135		
50				0.39	0.0002
40				0.04	0.0000
30				-0.20	0.0001
10				3.33	0.0019
0				-1.72	0.0010
-10				4.12	0.0024
-20				18.08	0.0104
-30				17.24	0.0100

##### Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	F <sub>L</sub> (MHz)	F <sub>H</sub> (MHz)	Offset(Hz)	Frequency error(ppm)
3.6	20	1710.865	1754.135	-1.20	0.0007
4.4				22.53	0.0130

**LTE Band 5, 10MHz bandwidth QPSK (worst case of all bandwidths)**
**Frequency Error vs Temperature**

Temperature(°C)	Voltage(V)	F <sub>L</sub> (MHz)	F <sub>H</sub> (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	824.433	848.567		
50				-2.09	0.0025
40				-5.02	0.0060
30				6.05	0.0072
10				0.09	0.0001
0				0.43	0.0005
-10				-0.16	0.0002
-20				5.29	0.0063
-30				-5.71	0.0068

**Frequency Error vs Voltage**

Voltage(V)	Temperature(°C)	F <sub>L</sub> (MHz)	F <sub>H</sub> (MHz)	Offset(Hz)	Frequency error(ppm)
3.6	20	824.433	848.567	8.21	0.0098
4.4				-5.56	0.0066

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

Temperature(°C)	Voltage(V)	F <sub>L</sub> (MHz)	F <sub>H</sub> (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	2500.641	2569.311		
50				-1.78	0.0008
40				2.30	0.0010
30				28.74	0.0124
10				5.08	0.0022
0				-0.96	0.0004
-10				4.02	0.0017
-20				25.46	0.0110
-30				4.36	0.0019

**Frequency Error vs Voltage**

Voltage(V)	Temperature(°C)	F <sub>L</sub> (MHz)	F <sub>H</sub> (MHz)	Offset(Hz)	Frequency error(ppm)
3.6	20	2500.641	2569.311	2.17	0.0009
4.4				26.85	0.0115

**LTE Band 38, 20MHz bandwidth QPSK (worst case of all bandwidths)**

**Frequency Error vs Temperature**

Temperature(°C)	Voltage(V)	F <sub>L</sub> (MHz)	F <sub>H</sub> (MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	2570.321	2619.663		
50				-6.21	0.0024
40				-11.06	0.0043
30				1.63	0.0006
10				-6.47	0.0025
0				-3.76	0.0014
-10				-0.97	0.0004
-20				-2.66	0.0010
-30				-4.16	0.0016

**Frequency Error vs Voltage**

Voltage(V)	Temperature(°C)	F <sub>L</sub> (MHz)	F <sub>H</sub> (MHz)	Offset(Hz)	Frequency error(ppm)
3.6	20	2570.321	2619.663	-8.46	0.0033
4.4				-8.11	0.0031

## **A.4 OCCUPIED BANDWIDTH**

### **A.4.1 Occupied Bandwidth Results**

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

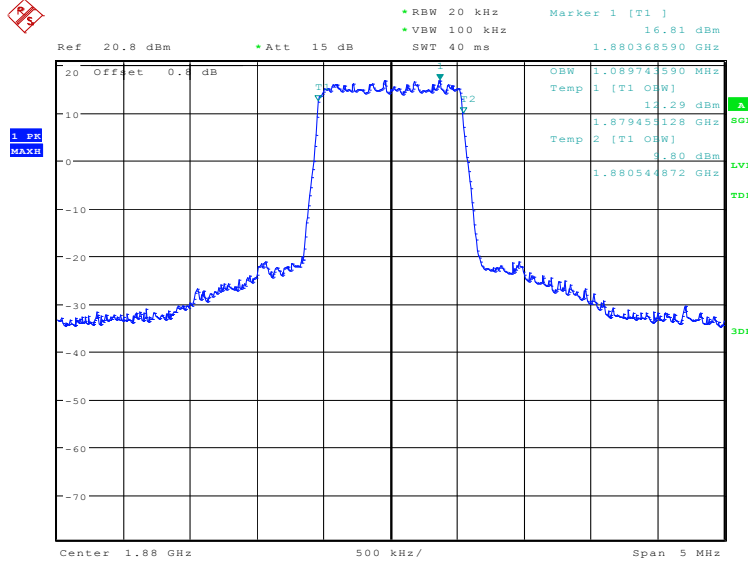
The measurement method is from ANSI C63.26:

- 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%)

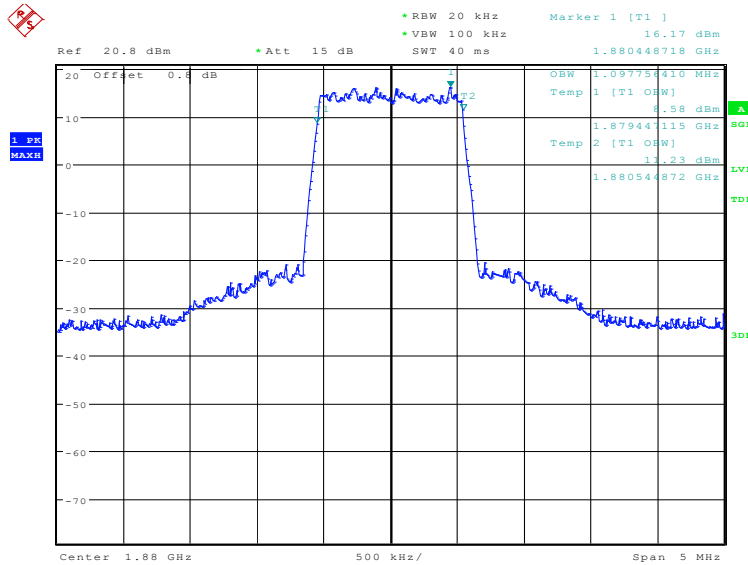
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
1880.0	1089.74	1097.76	1089.74	1089.74

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



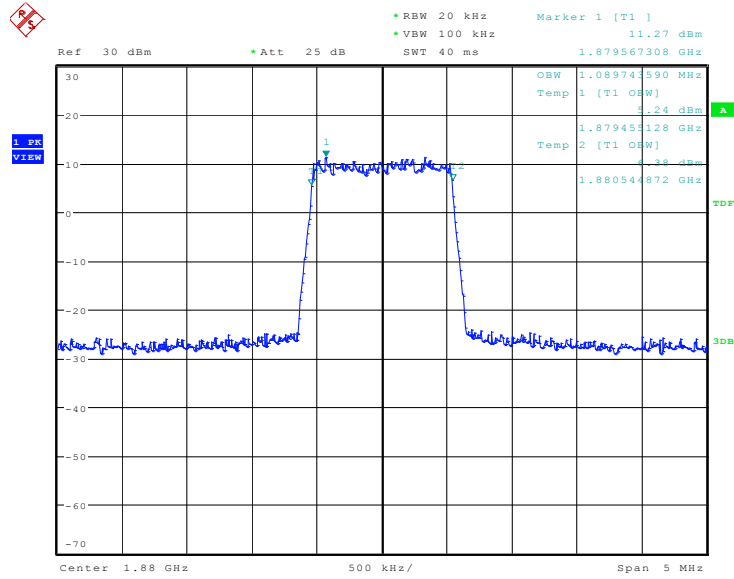
Date: 31.DEC.2019 12:07:54

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



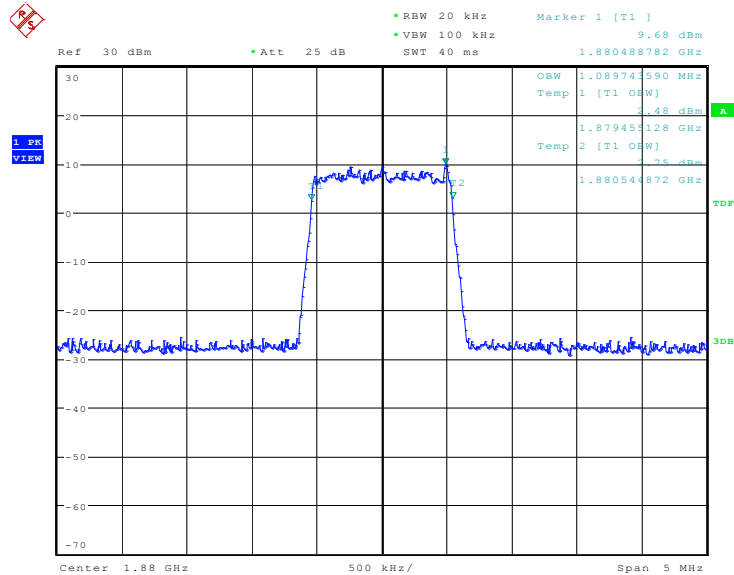
Date: 31.DEC.2019 12:09:18

### LTE band 2, 1.4MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 15:53:37

### LTE band 2, 1.4MHz Bandwidth, 256QAM (99% BW)

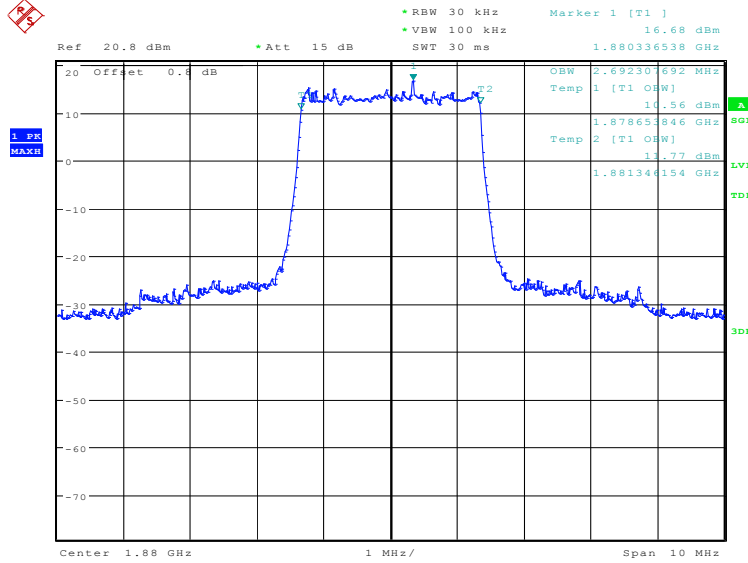


Date: 20.JAN.2020 10:05:08

### LTE band 2, 3MHz (99%)

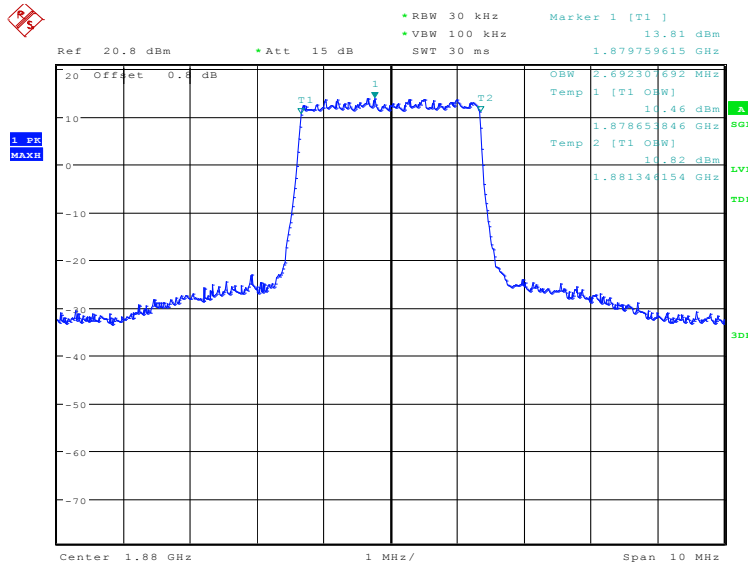
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
1880.0	2692.31	2692.31	2708.33	2692.31

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



Date: 31.DEC.2019 12:10:44

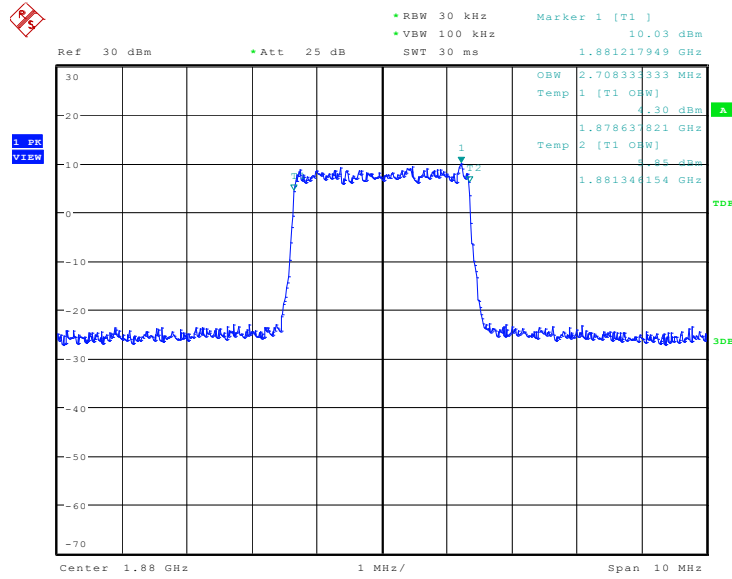
### LTE band 2, 3MHz Bandwidth, 16QAM (99% BW)



Date: 31.DEC.2019 12:12:08

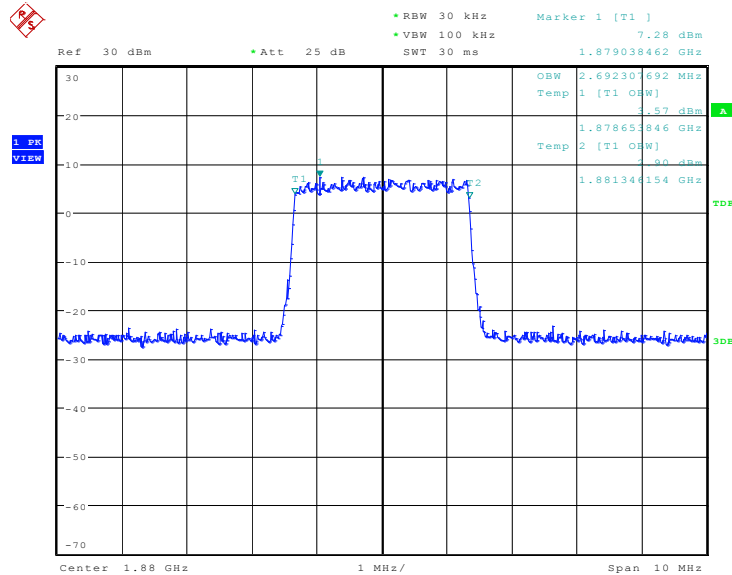


### LTE band 2, 3MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 15:54:38

### LTE band 2, 3MHz Bandwidth, 256QAM (99% BW)

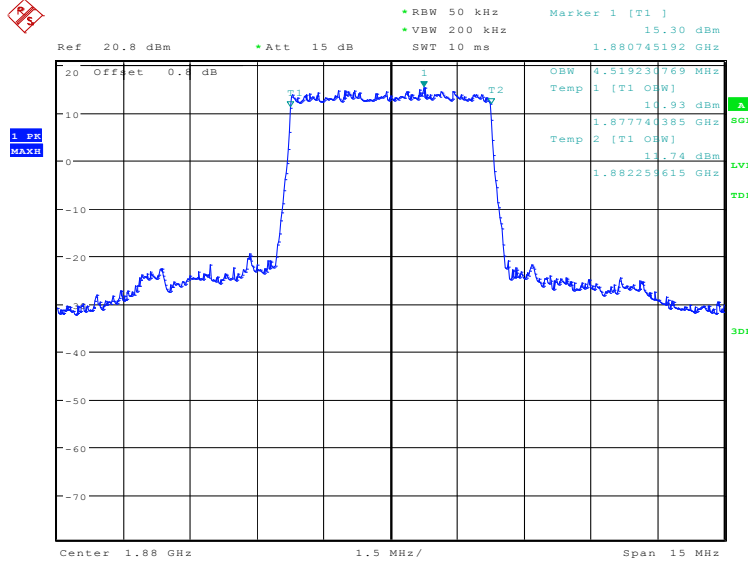


Date: 20.JAN.2020 10:09:24

### LTE band 2, 5MHz (99%)

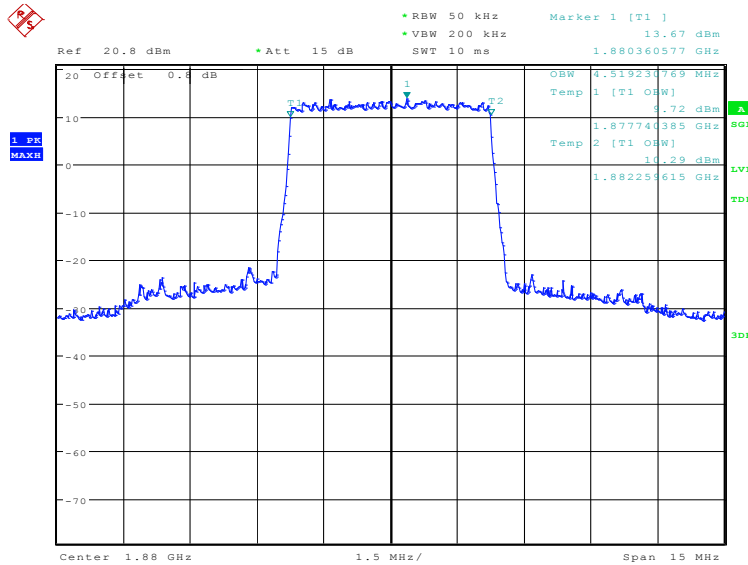
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
1880.0	4519.23	4519.23	4471.15	4495.19

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



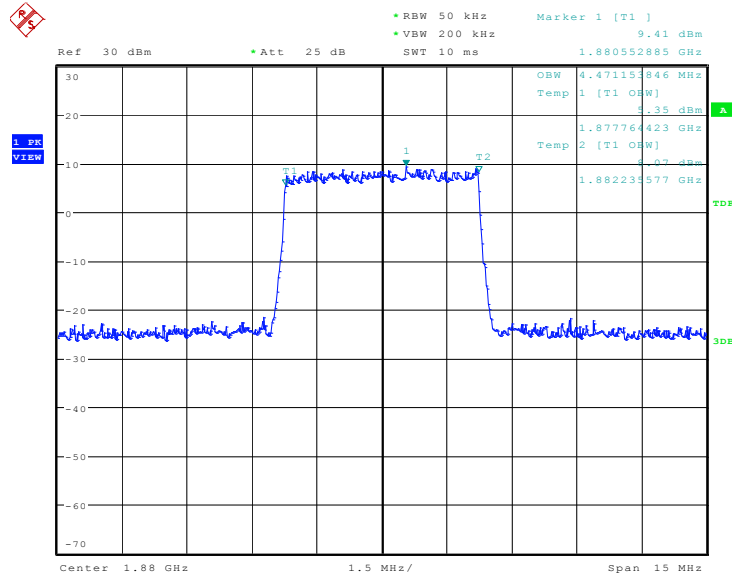
Date: 31.DEC.2019 12:13:34

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



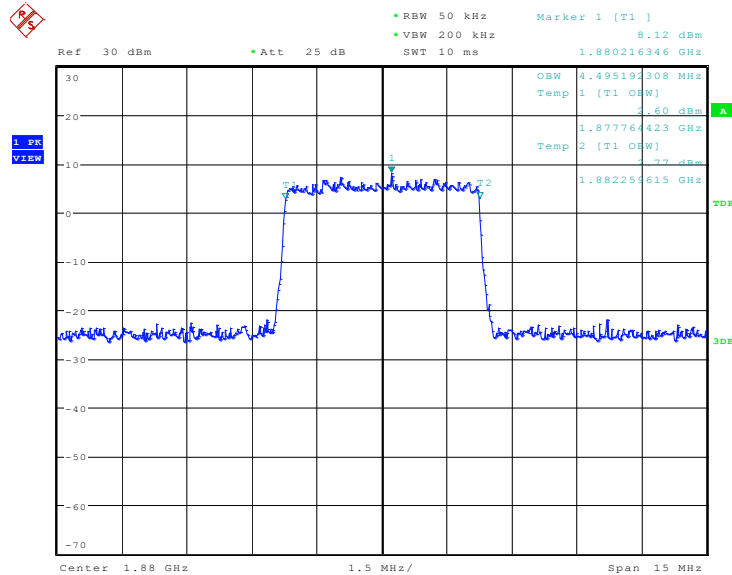
Date: 31.DEC.2019 12:14:58

### LTE band 2, 5MHz Bandwidth,64QAM (99% BW)



Date: 7.JAN.2020 15:55:36

### LTE band 2, 5MHz Bandwidth,256QAM (99% BW)

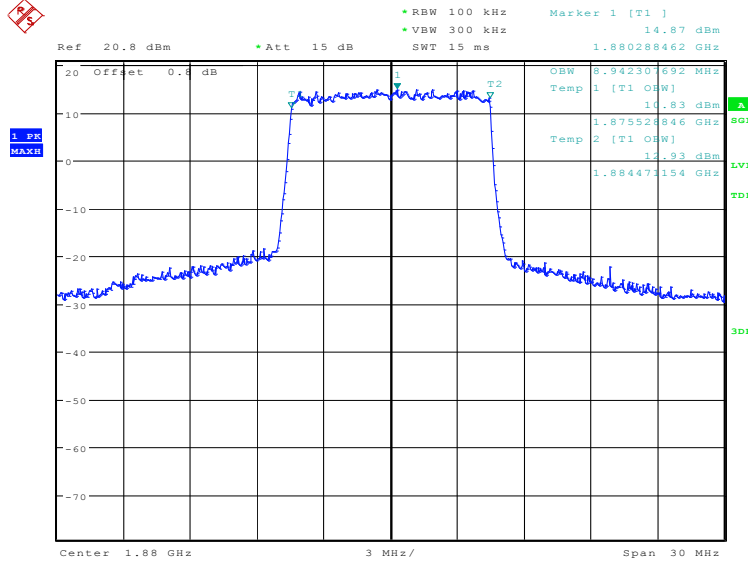


Date: 20.JAN.2020 10:10:58

### LTE band 2, 10MHz (99%)

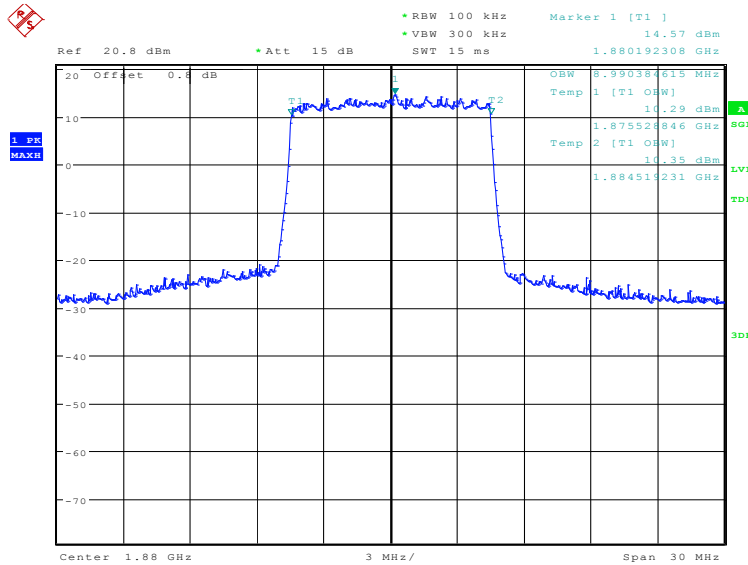
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
1880.0	8942.31	8990.38	8990.38	8990.38

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



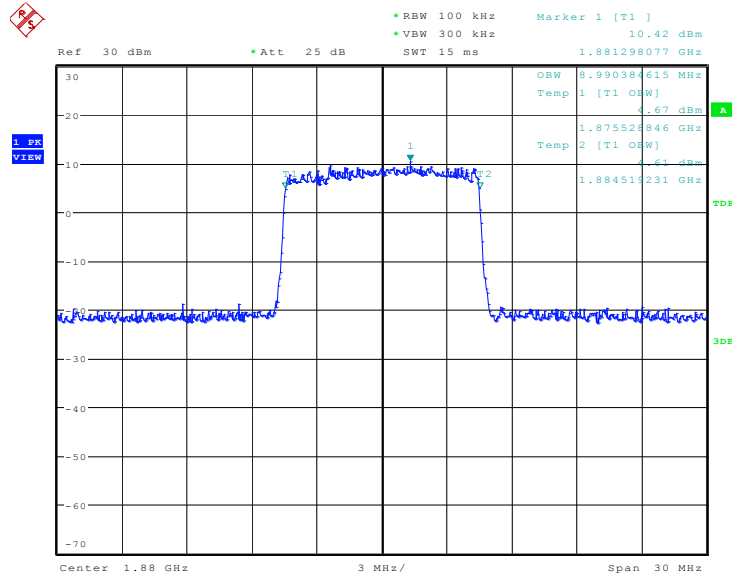
Date: 31.DEC.2019 12:16:25

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



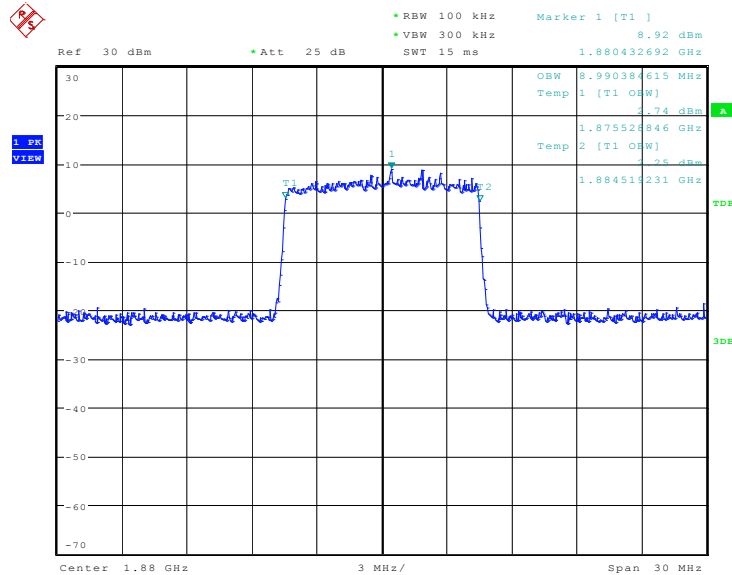
Date: 31.DEC.2019 12:17:49

### LTE band 2, 10MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 15:56:34

### LTE band 2, 10MHz Bandwidth, 256QAM (99% BW)

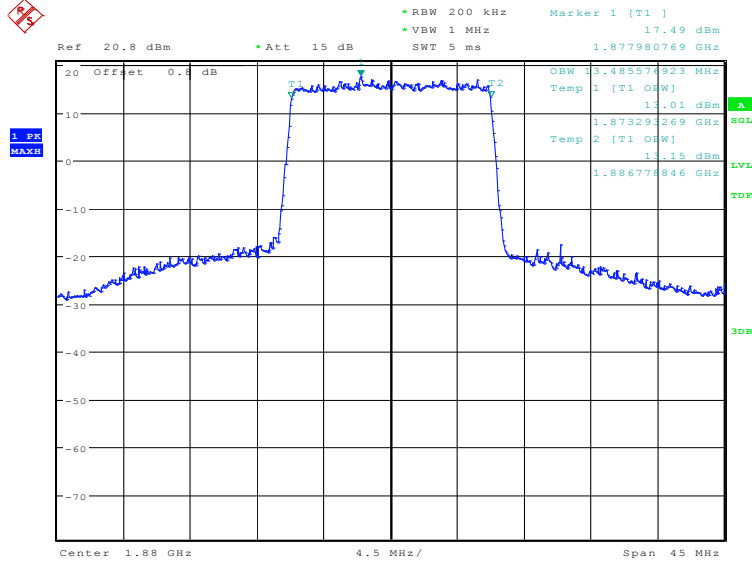


Date: 20.JAN.2020 10:12:13

### LTE band 2, 15MHz (99%)

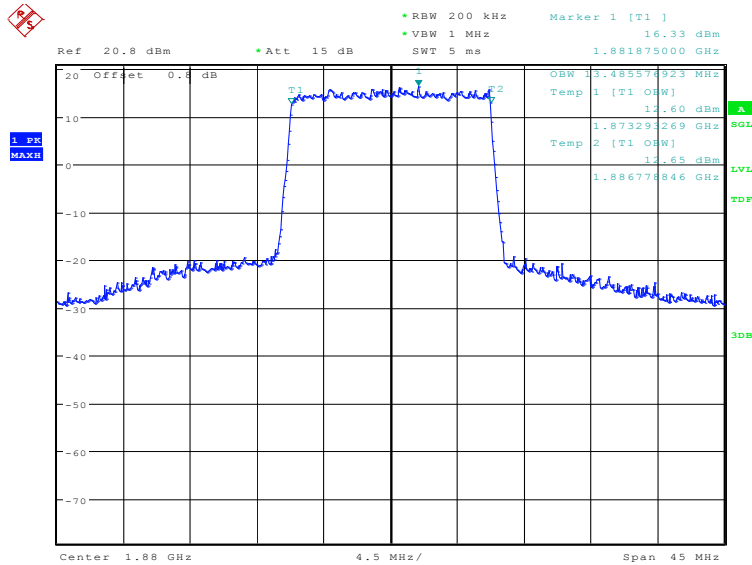
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
1880.0	13485.58	13485.58	13485.58	13485.58

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



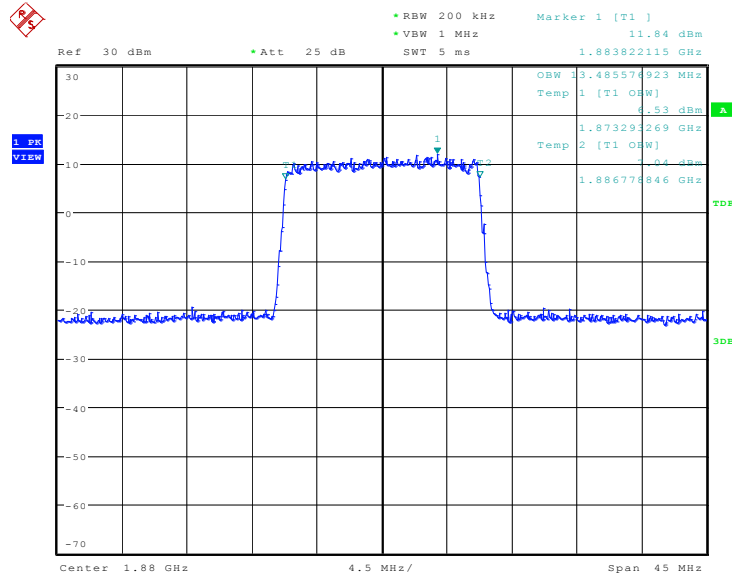
Date: 31.DEC.2019 12:19:15

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



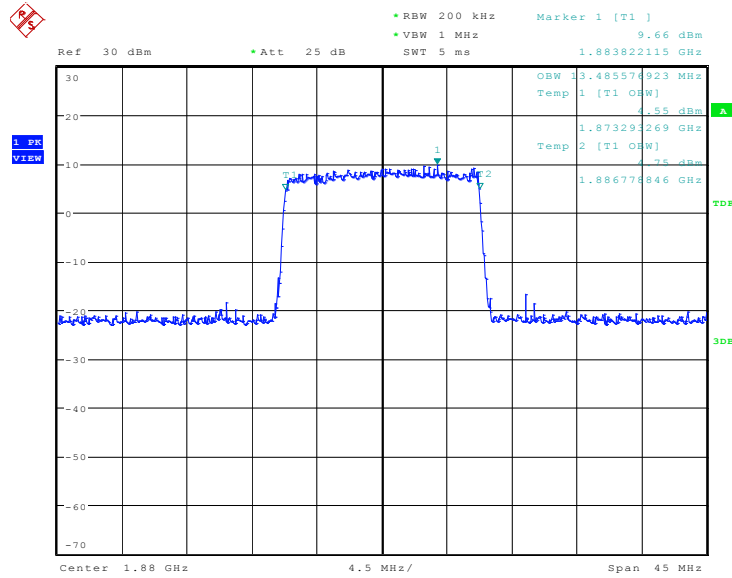
Date: 31.DEC.2019 12:20:39

### LTE band 2, 15MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 15:57:36

### LTE band 2, 15MHz Bandwidth, 256QAM (99% BW)

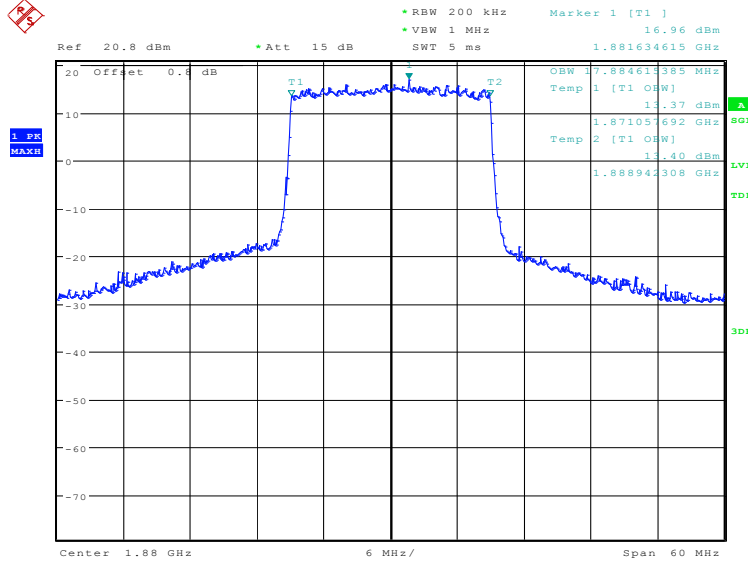


Date: 20.JAN.2020 10:13:47

### LTE band 2, 20MHz (99%)

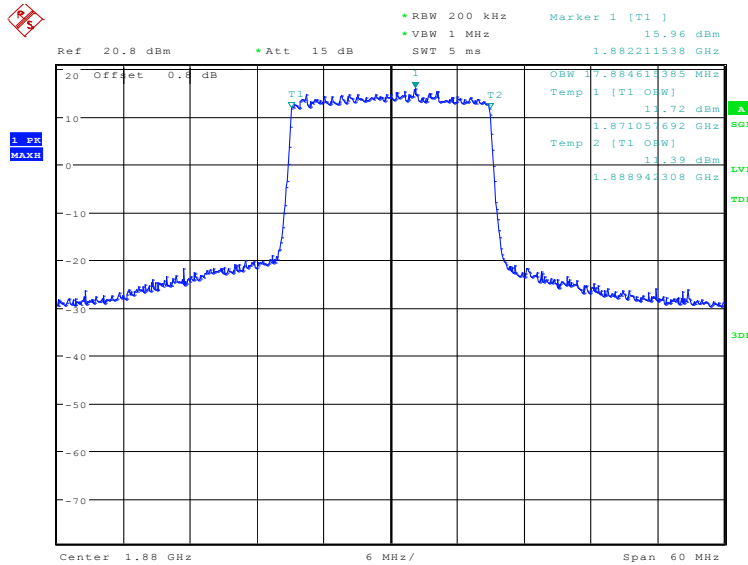
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
1880.0	17884.62	17884.62	17980.77	17980.77

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



Date: 31.DEC.2019 12:22:05

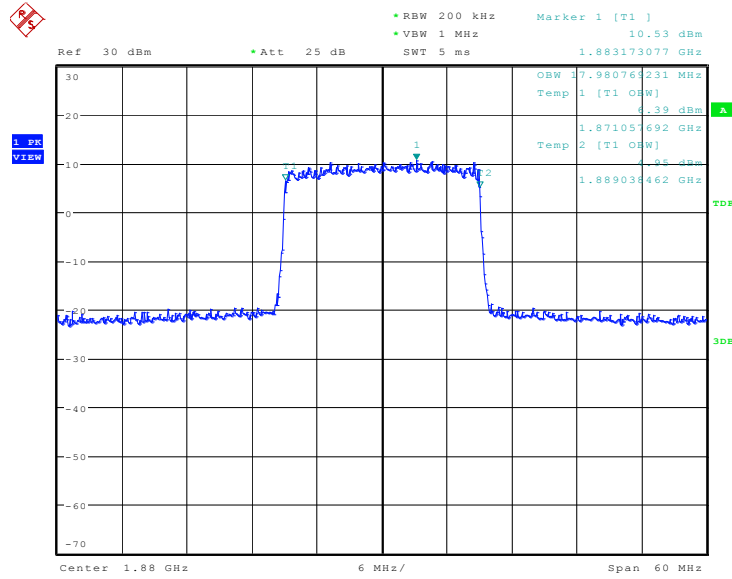
### LTE band 2, 20MHz Bandwidth, 16QAM (99% BW)



Date: 31.DEC.2019 12:23:29

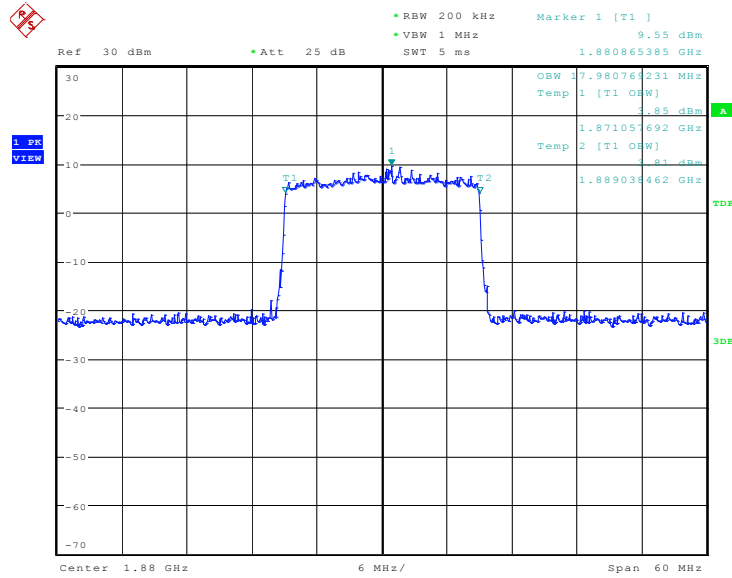


### LTE band 2, 20MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 15:58:40

### LTE band 2, 20MHz Bandwidth, 256QAM (99% BW)

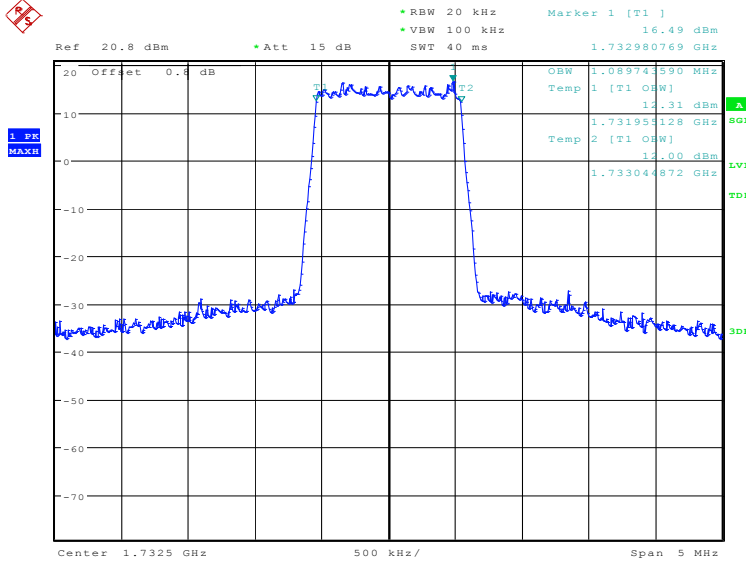


Date: 20.JAN.2020 10:15:25

### LTE band 4, 1.4MHz (99%)

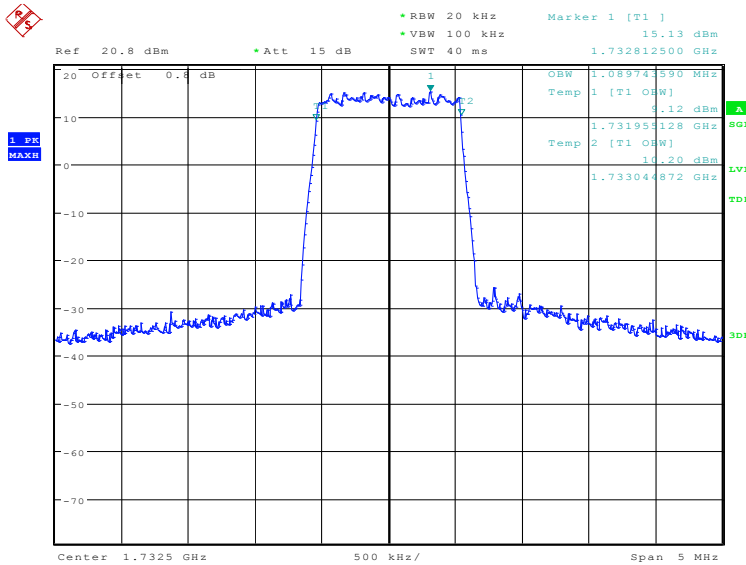
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
1732.5	QPSK	16QAM	64QAM	256QAM
	1089.74	1089.74	1089.74	1089.74

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



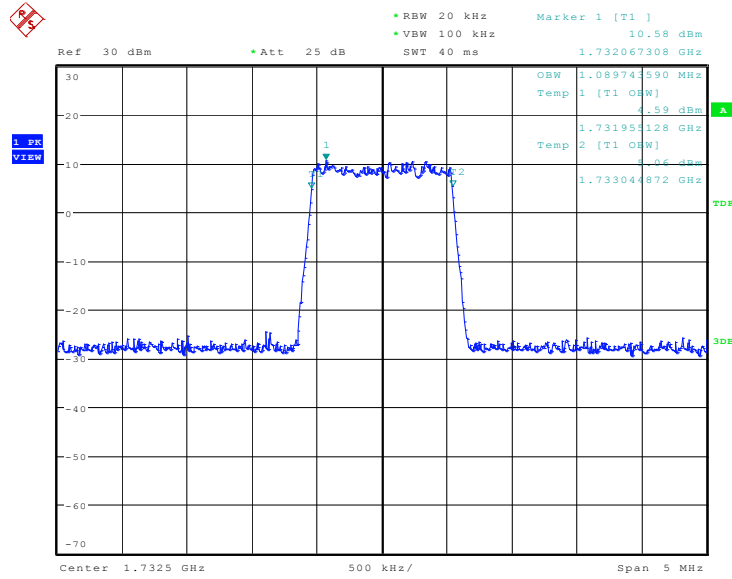
Date: 2.JAN.2020 09:33:08

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



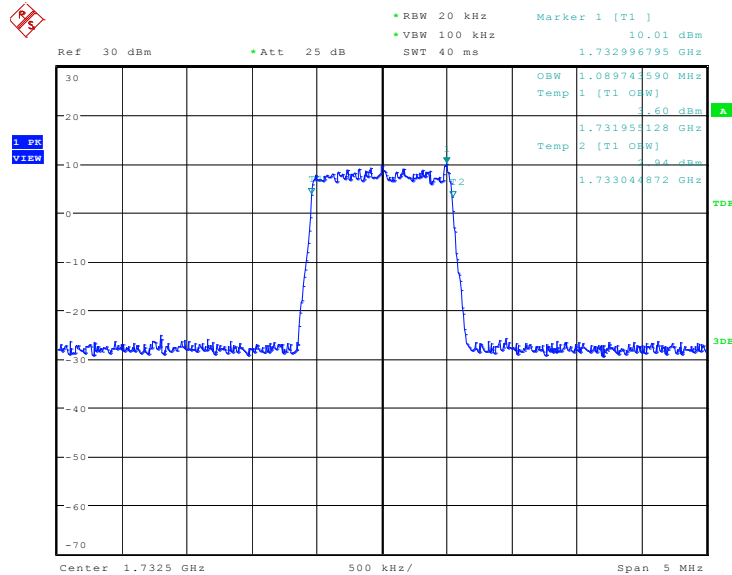
Date: 2.JAN.2020 09:34:32

### LTE band 4, 1.4MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 16:29:34

### LTE band 4, 1.4MHz Bandwidth, 256QAM (99% BW)

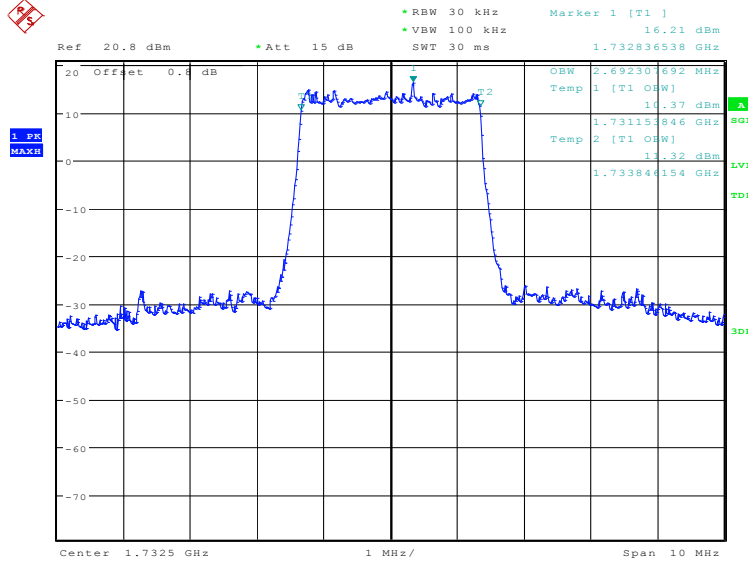


Date: 20.JAN.2020 10:20:20

### LTE band 4, 3MHz (99%)

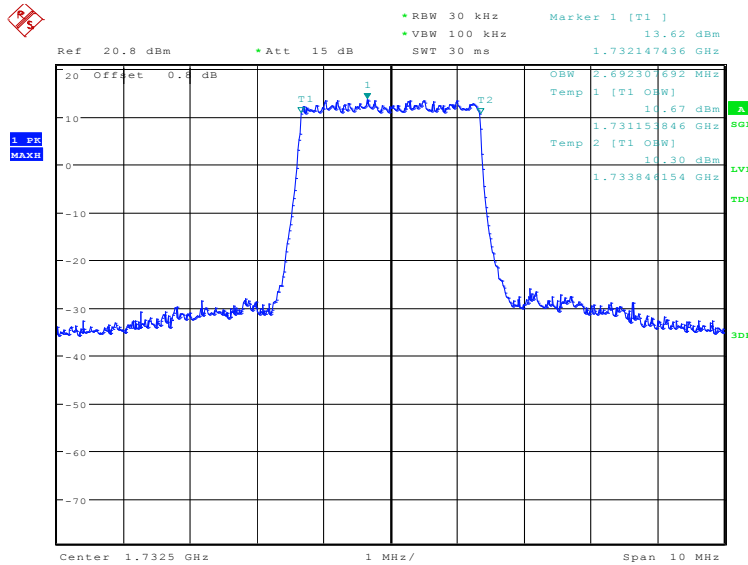
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
1732.5	2692.31	2692.31	2692.31	2692.31

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



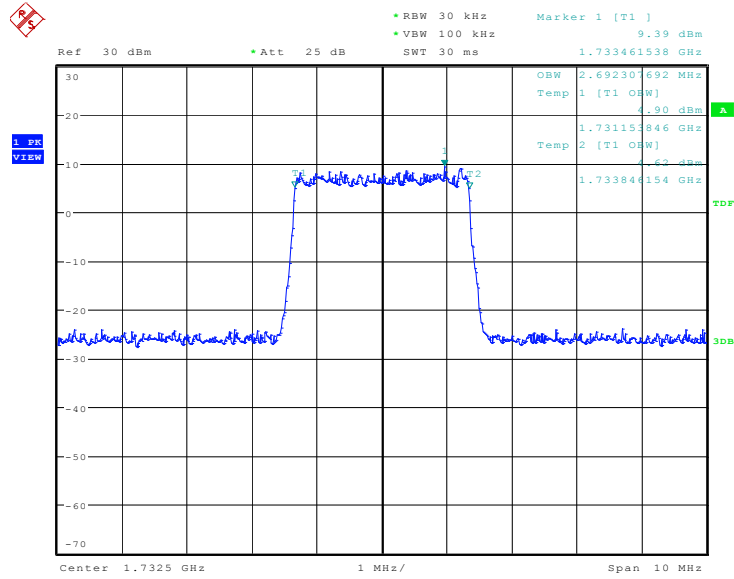
Date: 2.JAN.2020 09:35:58

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



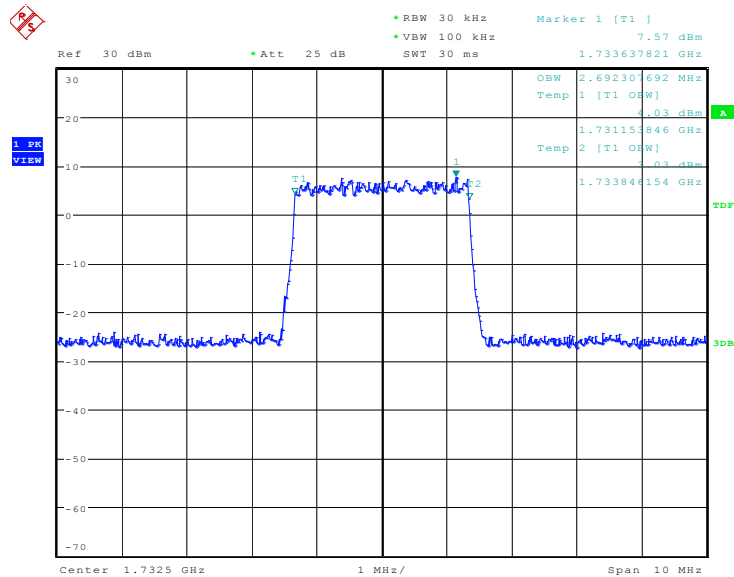
Date: 2.JAN.2020 09:37:22

### LTE band 4, 3MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 16:30:32

### LTE band 4, 3MHz Bandwidth, 256QAM (99% BW)

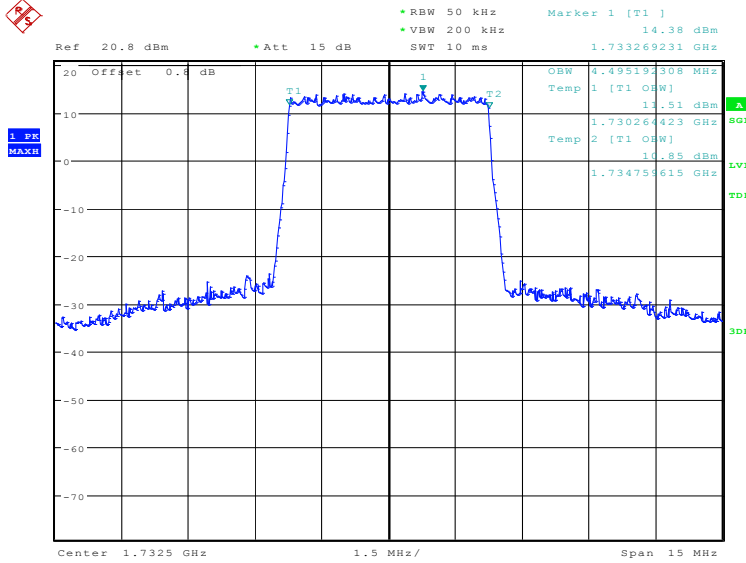


Date: 20.JAN.2020 10:21:35

### LTE band 4, 5MHz (99%)

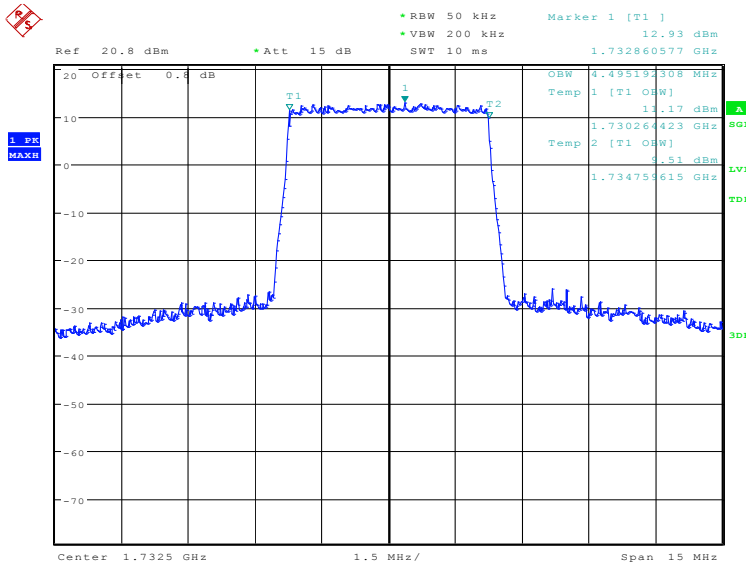
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
1732.5	4495.19	4495.19	4495.19	4495.19

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



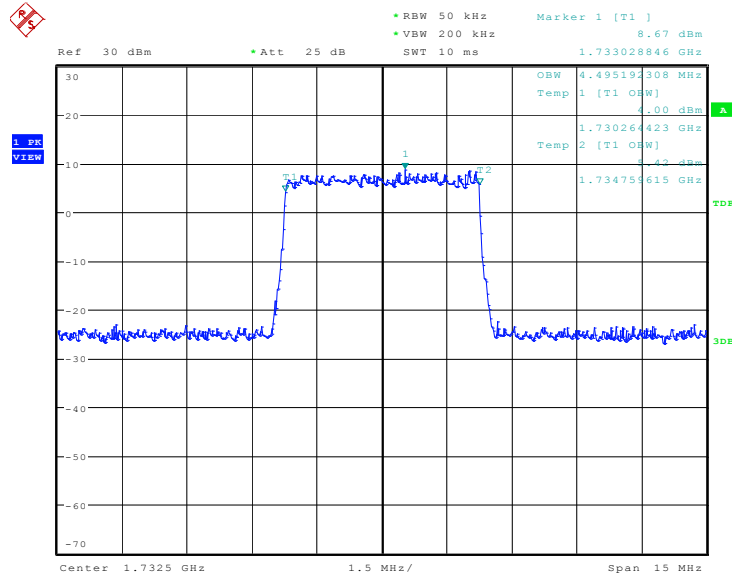
Date: 2.JAN.2020 09:38:49

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



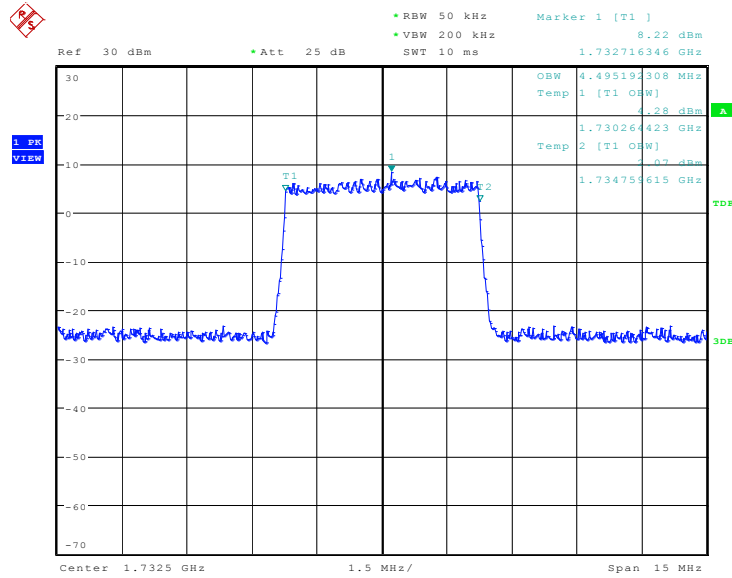
Date: 2.JAN.2020 09:40:13

### LTE band 4, 5MHz Bandwidth,64QAM (99% BW)



Date: 7.JAN.2020 16:31:32

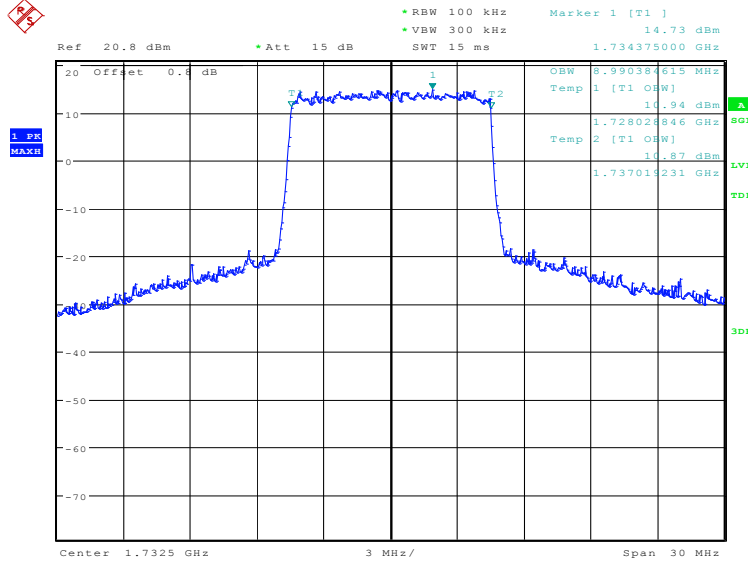
### LTE band 4, 5MHz Bandwidth,256QAM (99% BW)



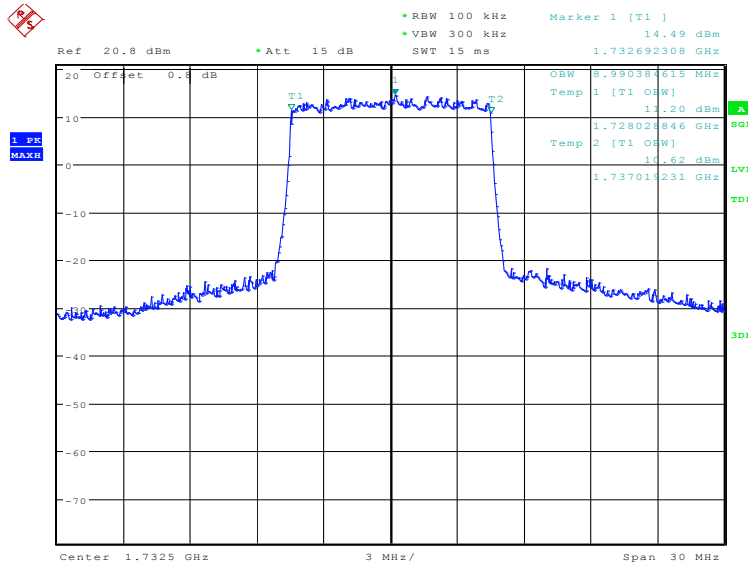
Date: 20.JAN.2020 10:23:35

**LTE band 4, 10MHz (99%)**

Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
1732.5	8990.38	8990.38	8990.38	9038.46

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


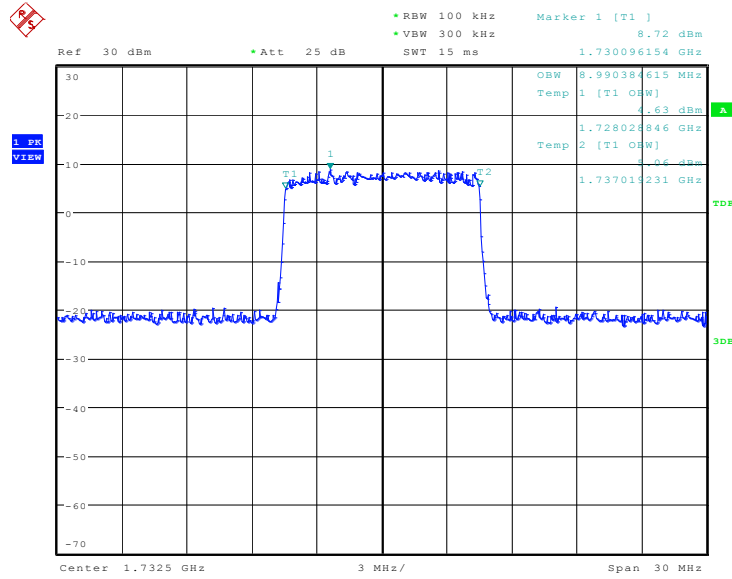
Date: 2.JAN.2020 09:41:39

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


Date: 2.JAN.2020 09:43:03

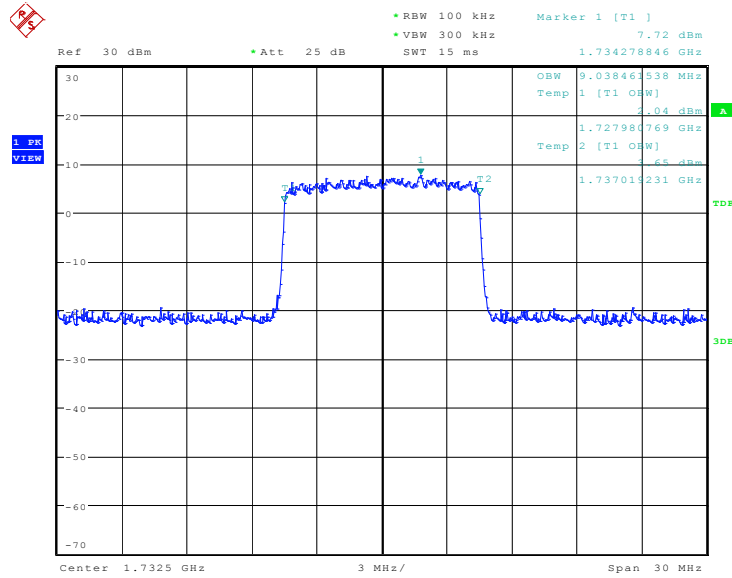


### LTE band 4, 10MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 16:32:43

### LTE band 4, 10MHz Bandwidth, 256QAM (99% BW)

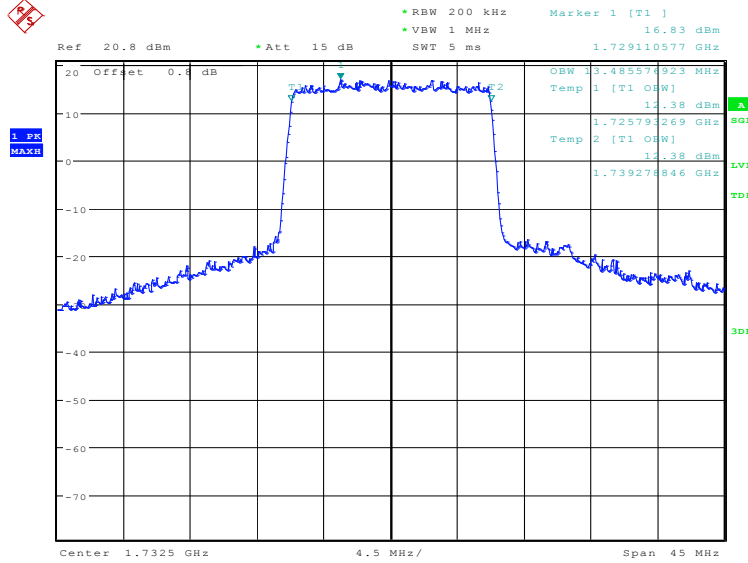


Date: 20.JAN.2020 10:25:10

### LTE band 4, 15MHz (99%)

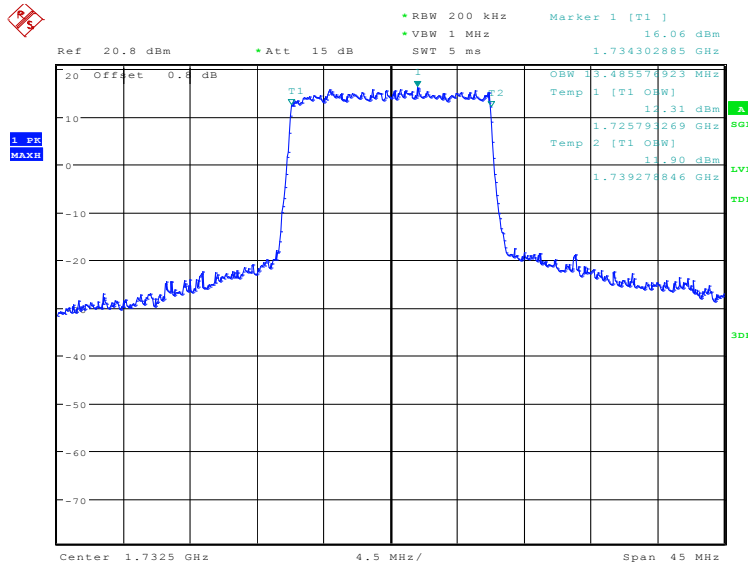
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
1732.5	13485.58	13485.58	13485.58	13485.58

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



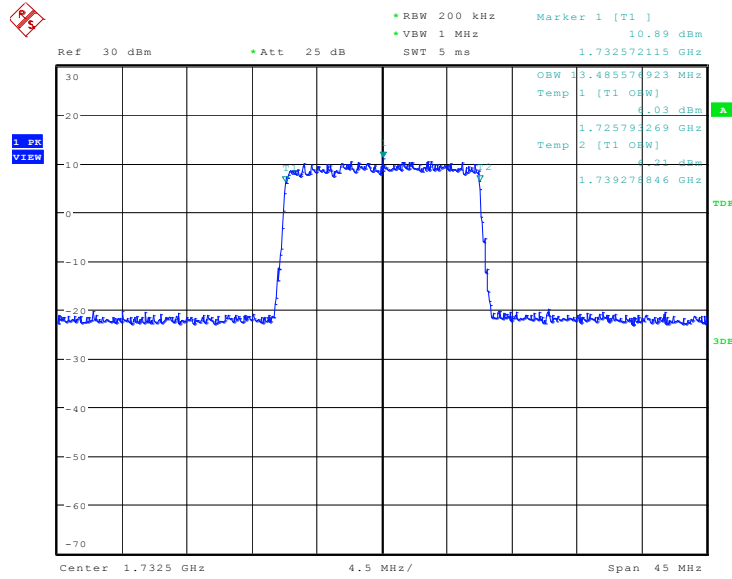
Date: 2.JAN.2020 09:44:30

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



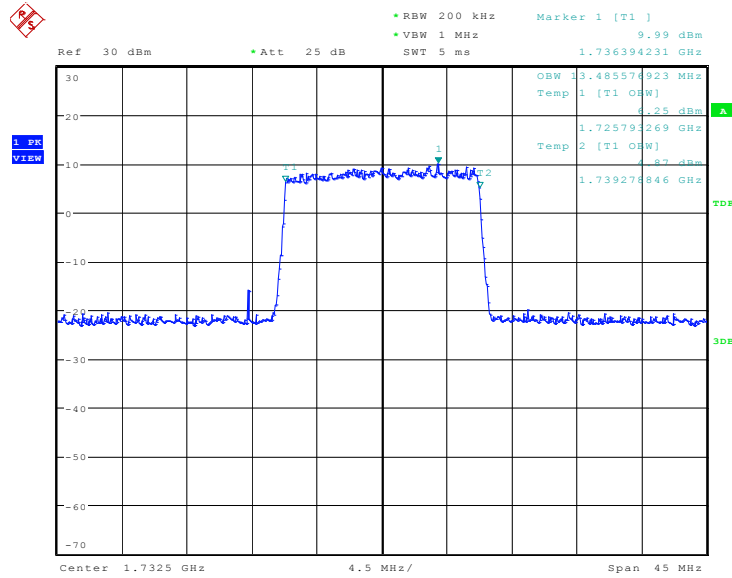
Date: 2.JAN.2020 09:45:54

### LTE band 4, 15MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 16:34:23

### LTE band 4, 15MHz Bandwidth, 256QAM (99% BW)

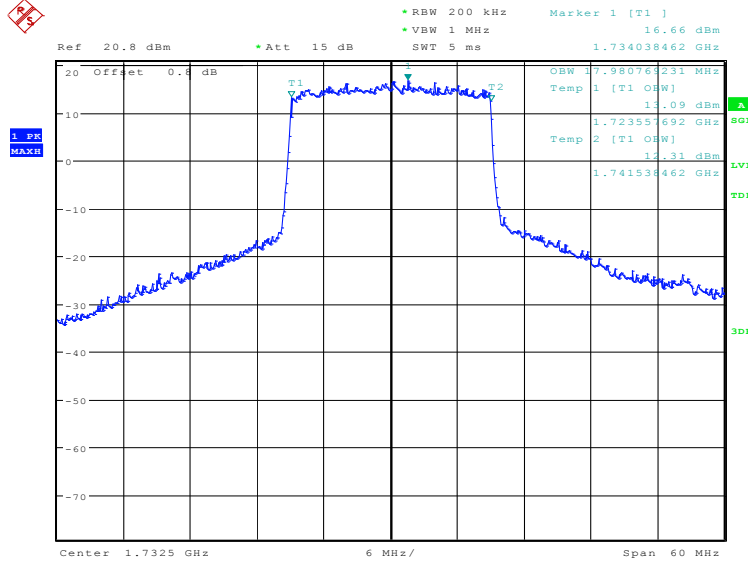


Date: 20.JAN.2020 10:26:41

### LTE band 4, 20MHz (99%)

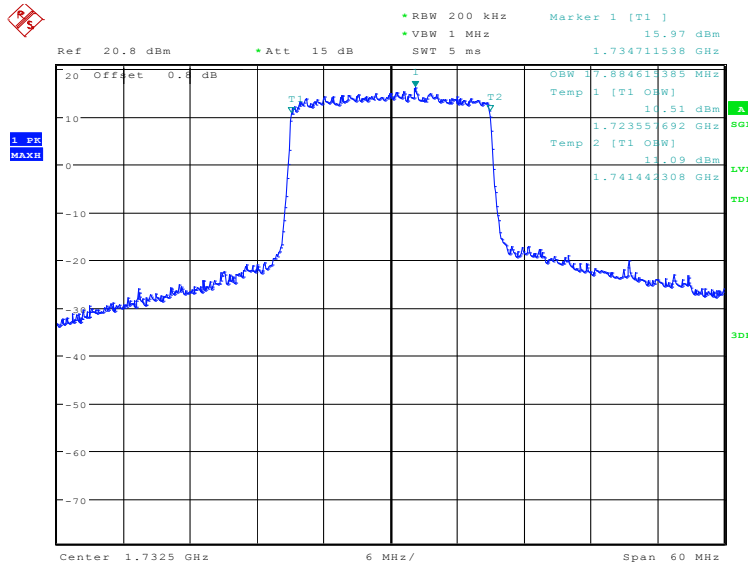
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
1732.5	17980.77	17884.62	17980.77	17980.77

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



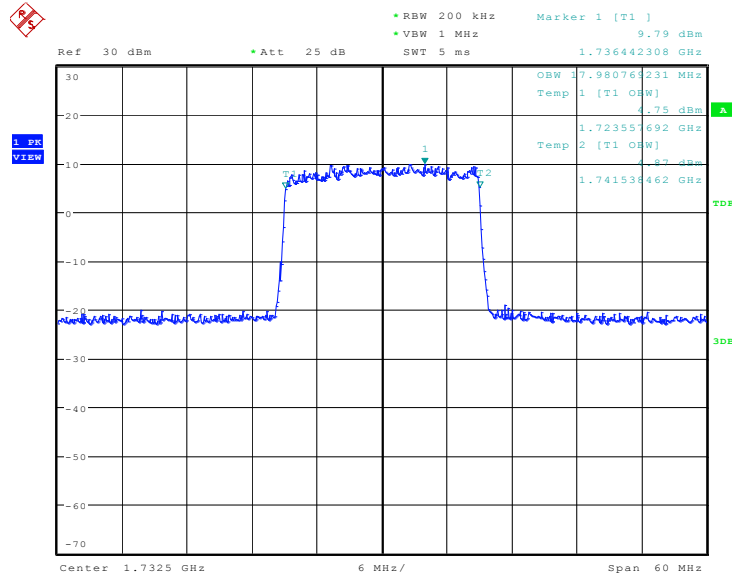
Date: 2.JAN.2020 09:47:20

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



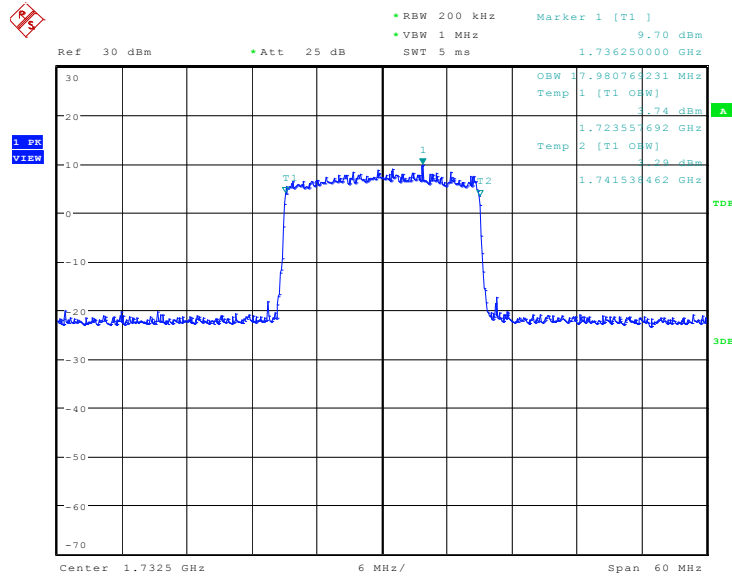
Date: 2.JAN.2020 09:48:45

### LTE band 4, 20MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 16:35:20

### LTE band 4, 20MHz Bandwidth, 256QAM (99% BW)

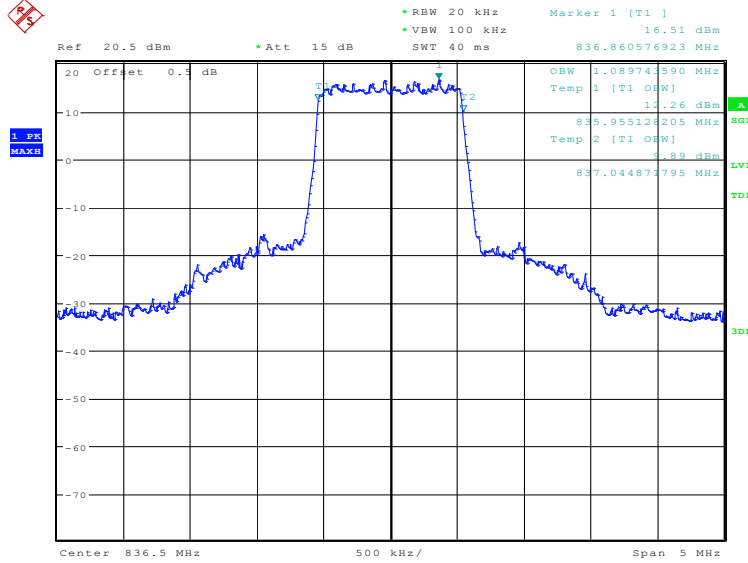


Date: 20.JAN.2020 10:28:35

### LTE band 5, 1.4MHz (99%)

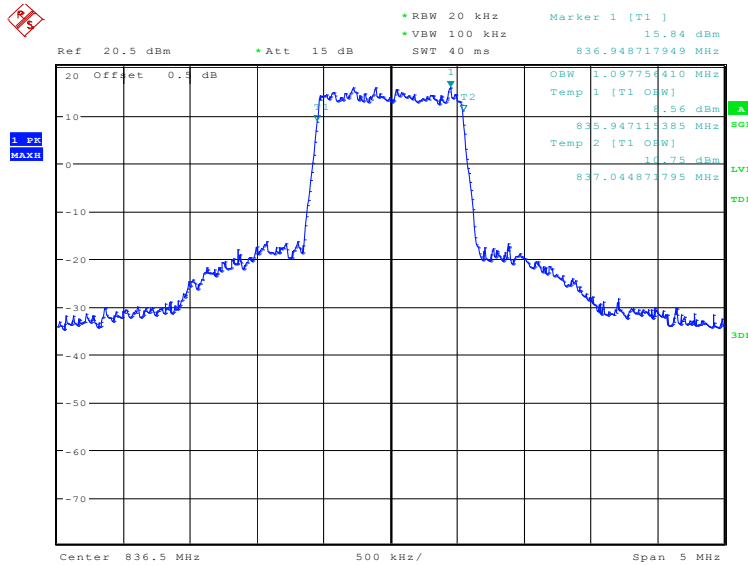
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
836.5	QPSK	16QAM	64QAM	256QAM
	1089.74	1097.76	1089.74	1089.74

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



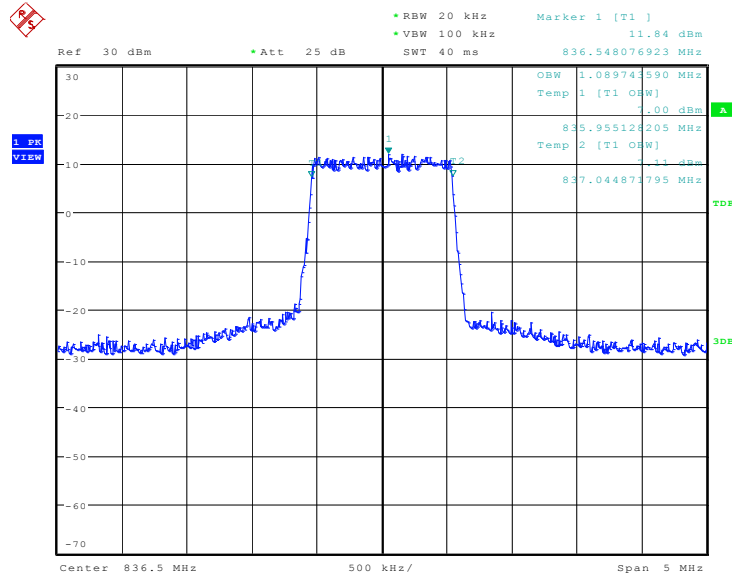
Date: 2.JAN.2020 10:59:11

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



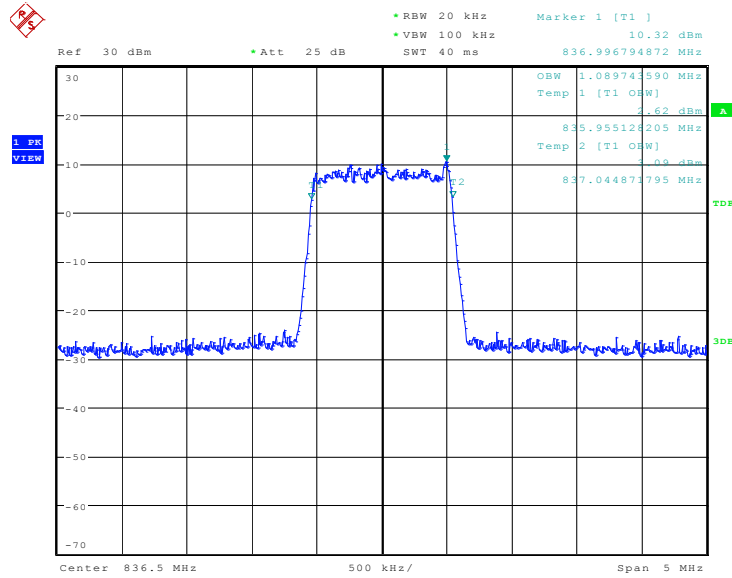
Date: 2.JAN.2020 11:00:35

### LTE band 5, 1.4MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 16:42:58

### LTE band 5, 1.4MHz Bandwidth, 256QAM (99% BW)

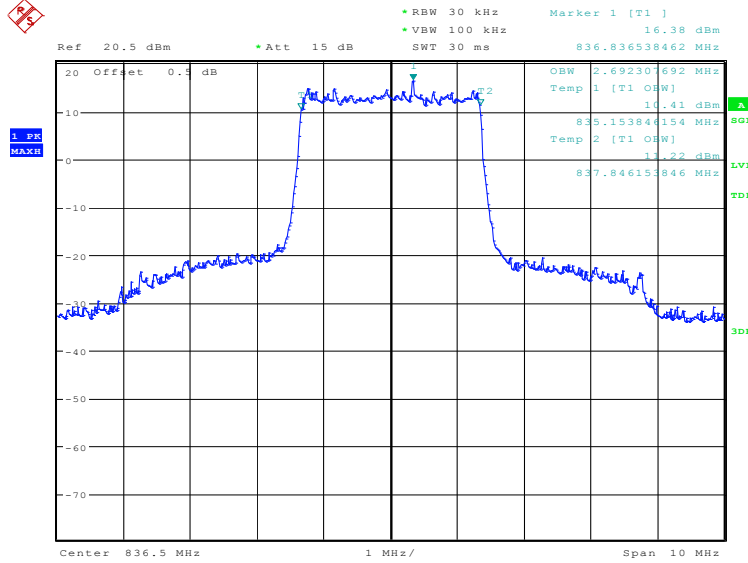


Date: 20.JAN.2020 10:32:52

### LTE band 5, 3MHz (99%)

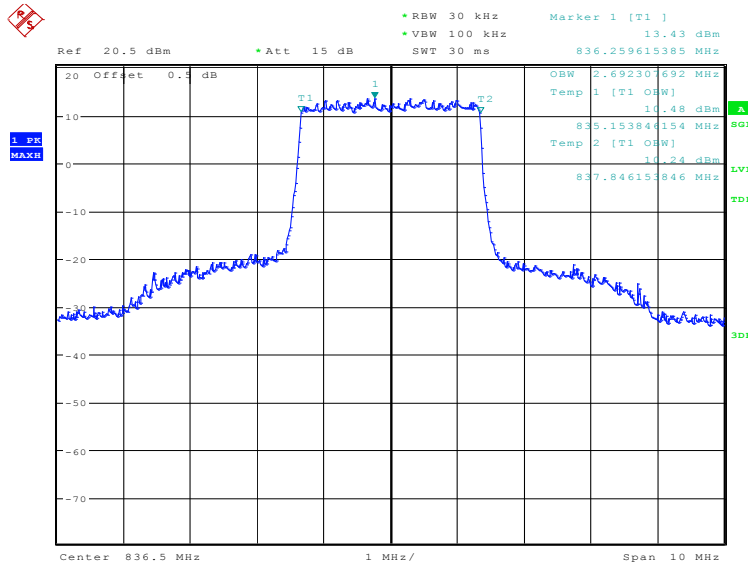
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
836.5	2692.31	2692.31	2692.31	2692.31

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



Date: 2.JAN.2020 11:02:01

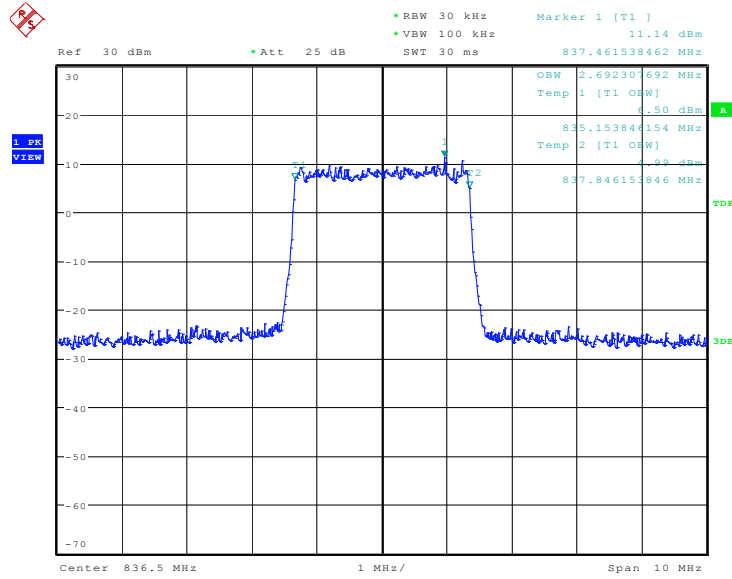
### LTE band 5, 3MHz Bandwidth, 16QAM (99% BW)



Date: 2.JAN.2020 11:03:25

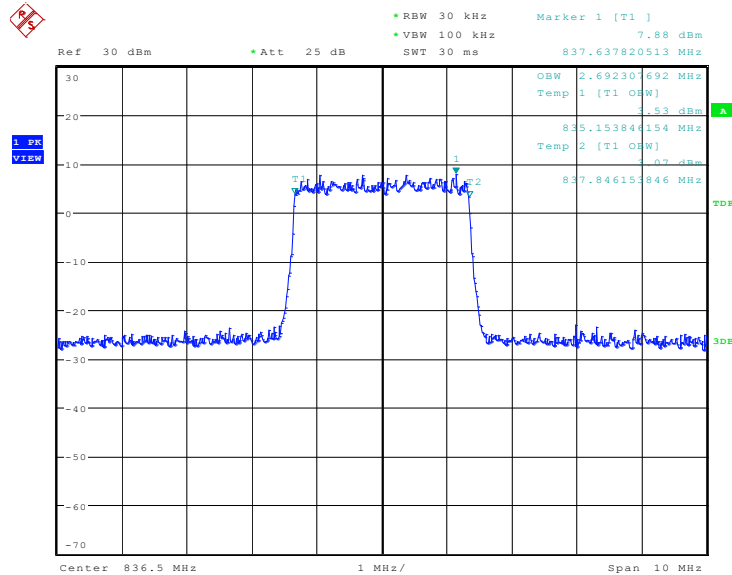


### LTE band 5, 3MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 16:44:19

### LTE band 5, 3MHz Bandwidth, 256QAM (99% BW)

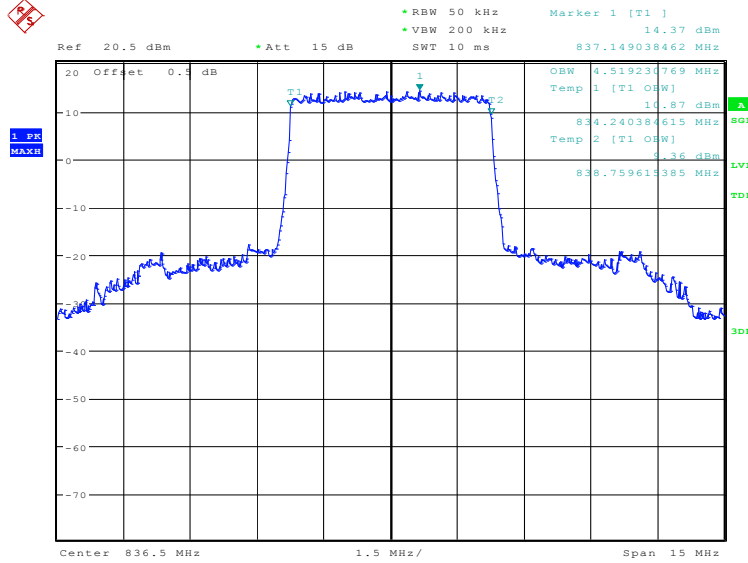


Date: 20.JAN.2020 10:34:22

### LTE band 5, 5MHz (99%)

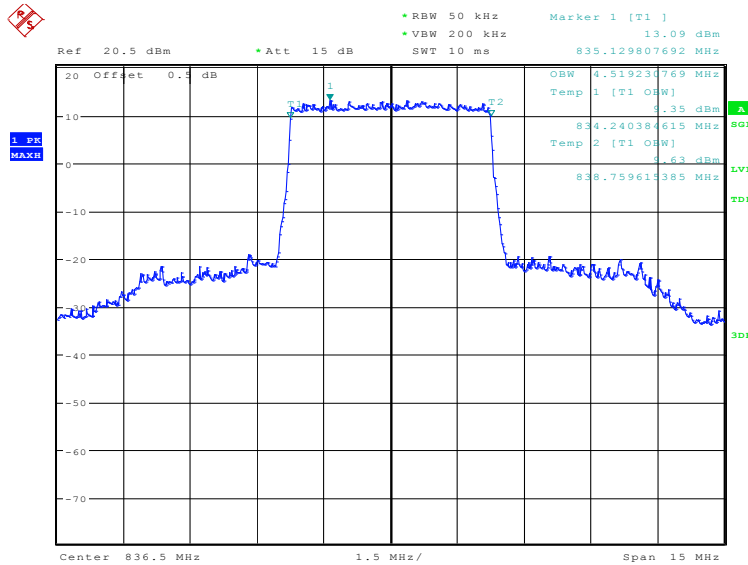
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
836.5	4519.23	4519.23	4495.19	4495.19

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



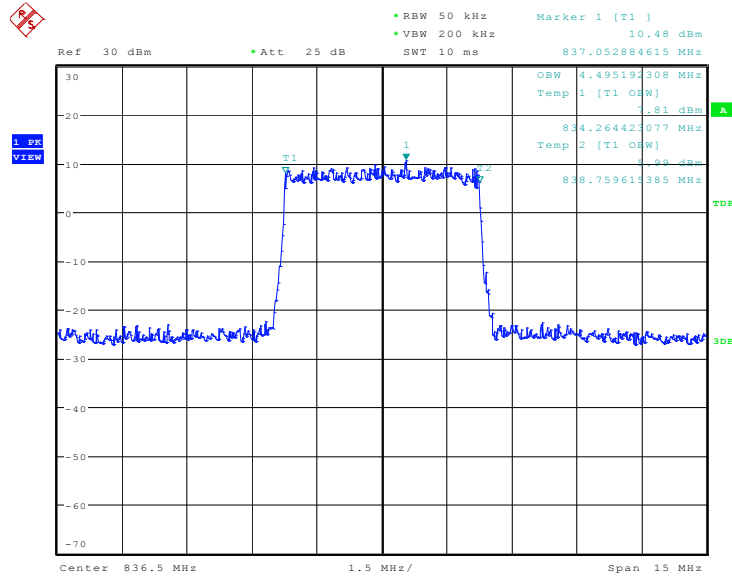
Date: 2.JAN.2020 11:04:51

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



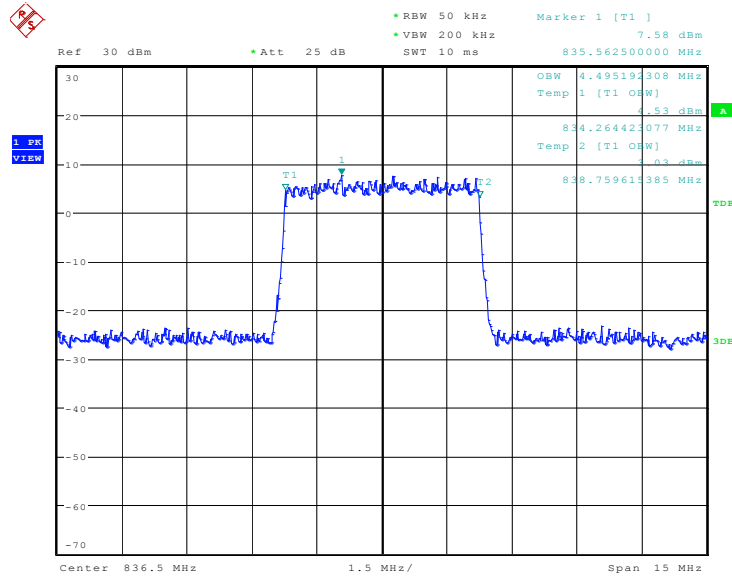
Date: 2.JAN.2020 11:06:16

### LTE band 5, 5MHz Bandwidth,64QAM (99% BW)



Date: 7.JAN.2020 16:45:16

### LTE band 5, 5MHz Bandwidth,256QAM (99% BW)

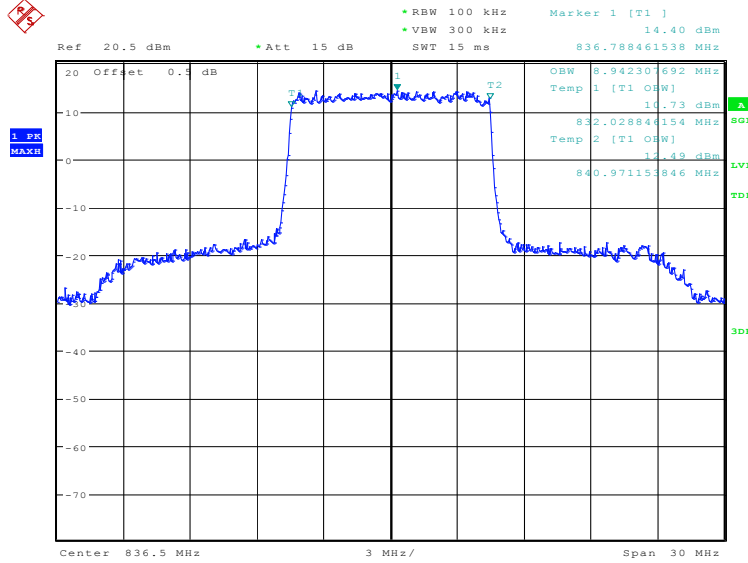


Date: 20.JAN.2020 10:35:38

### LTE band 5, 10MHz (99%)

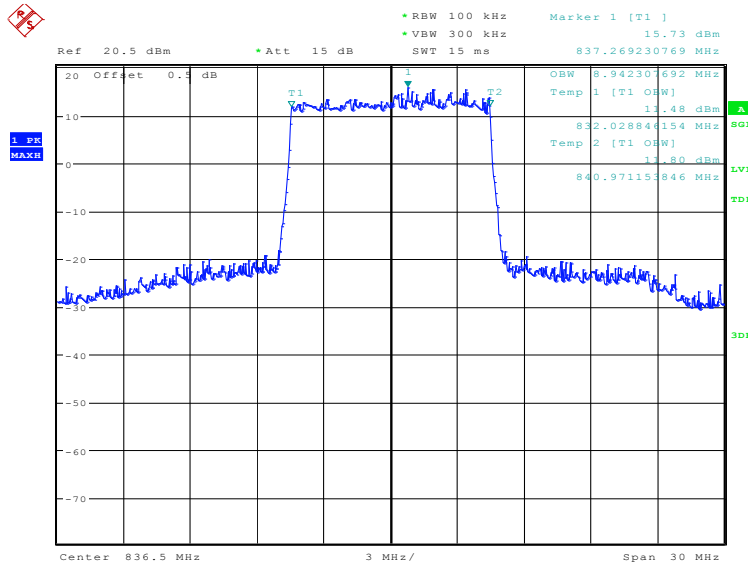
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
836.5	8942.31	8942.31	8942.31	9038.46

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



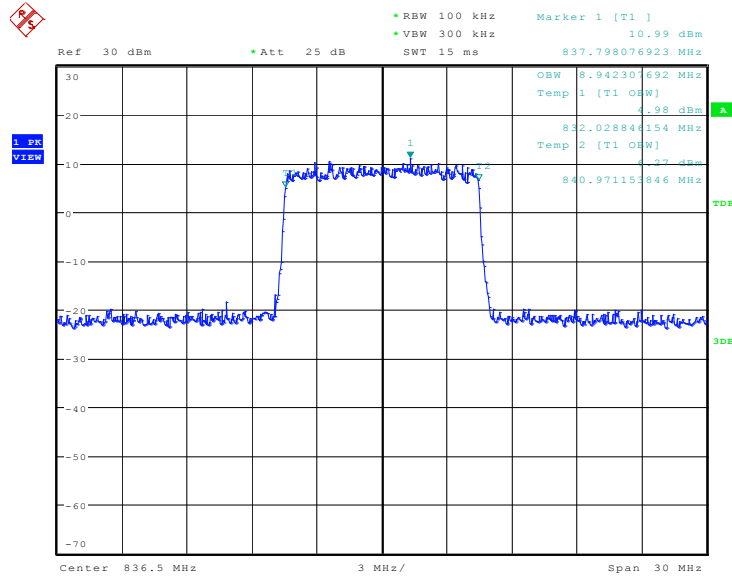
Date: 2.JAN.2020 11:07:42

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



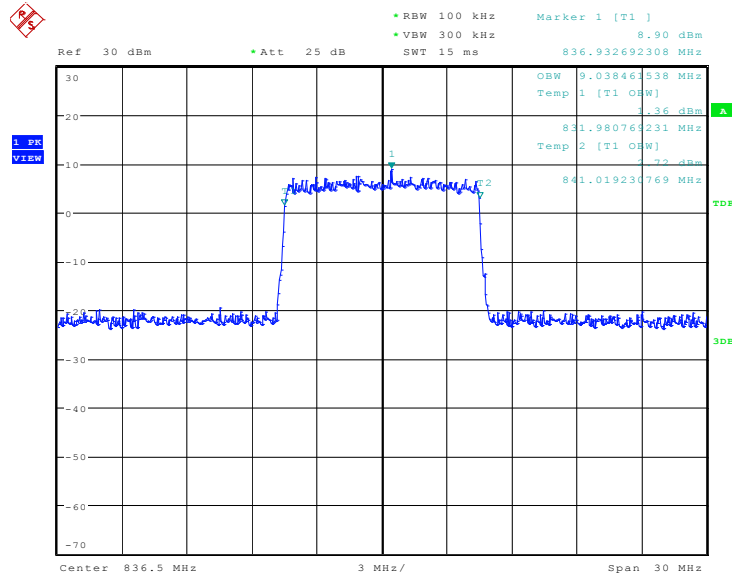
Date: 2.JAN.2020 11:09:05

### LTE band 5, 10MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 16:46:12

### LTE band 5, 10MHz Bandwidth, 256QAM (99% BW)

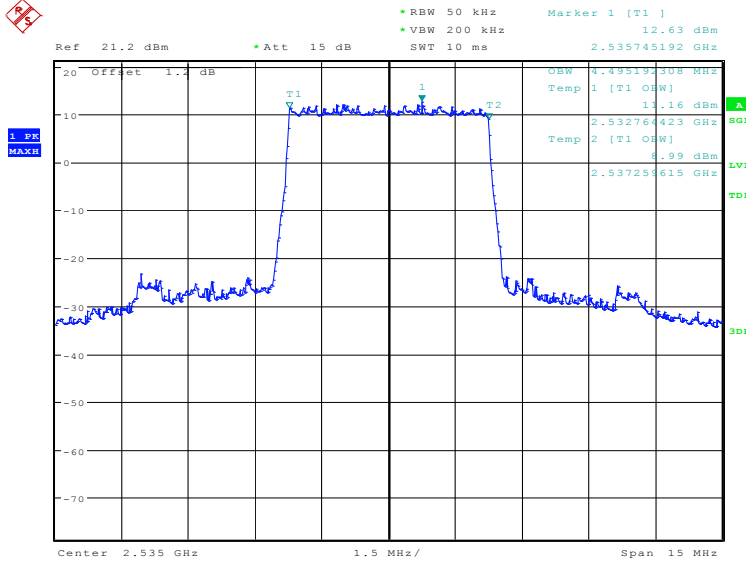


Date: 20.JAN.2020 10:37:07

### LTE band 7, 5MHz (99%)

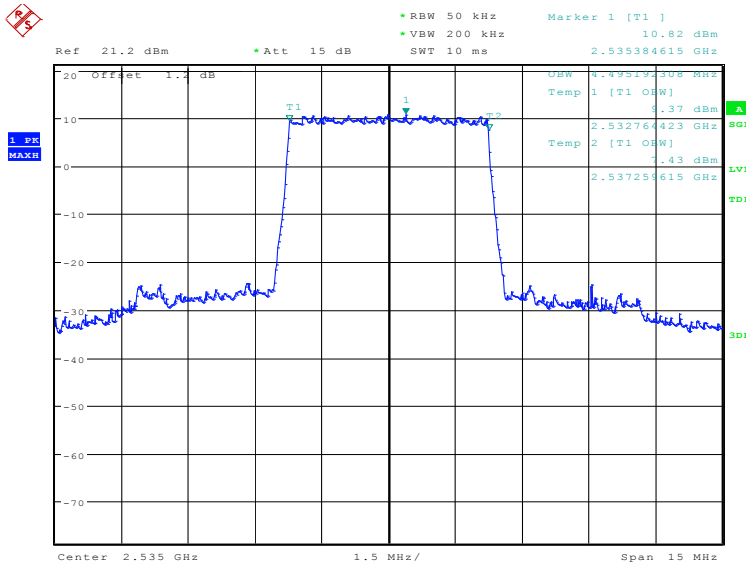
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
2535.0	4495.19	4495.19	4495.19	4519.23

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



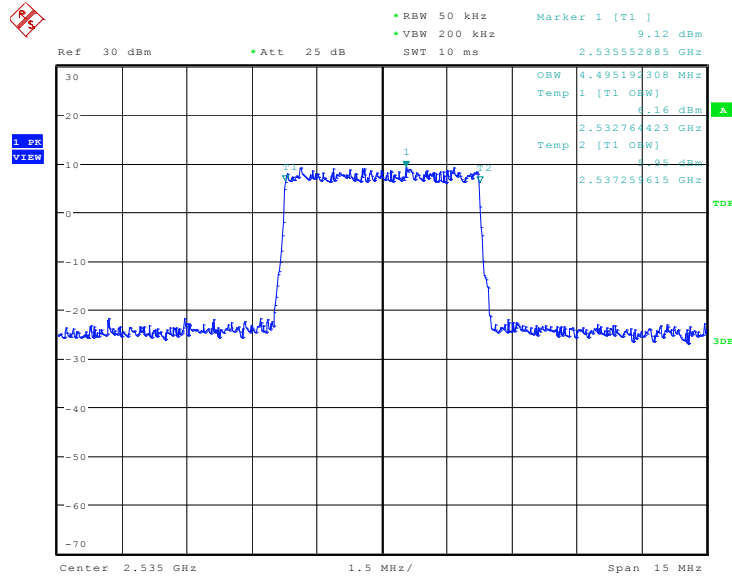
Date: 2.JAN.2020 12:15:11

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



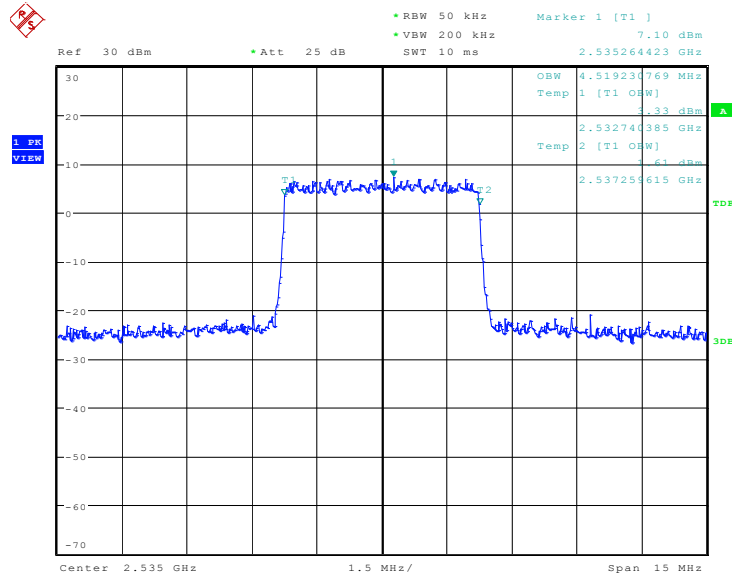
Date: 2.JAN.2020 12:16:35

### LTE band 7, 5MHz Bandwidth,64QAM (99% BW)



Date: 7.JAN.2020 16:53:05

### LTE band 7, 5MHz Bandwidth,256QAM (99% BW)

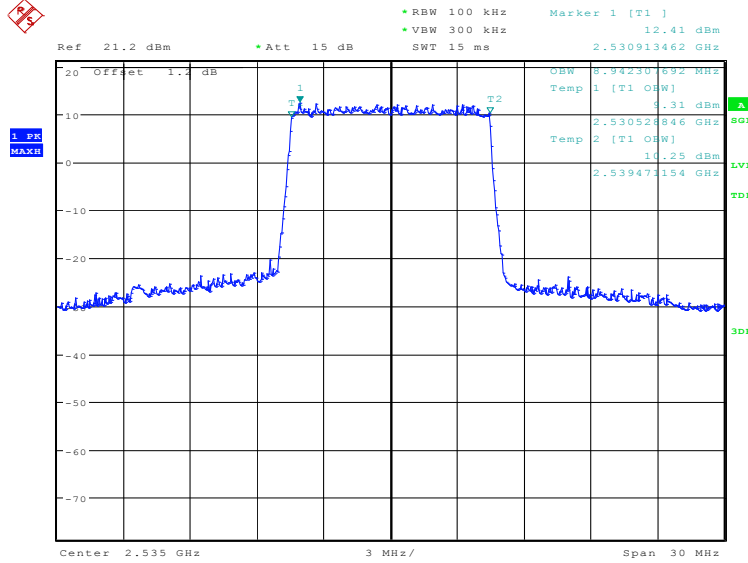


Date: 20.JAN.2020 10:41:05

### LTE band 7, 10MHz (99%)

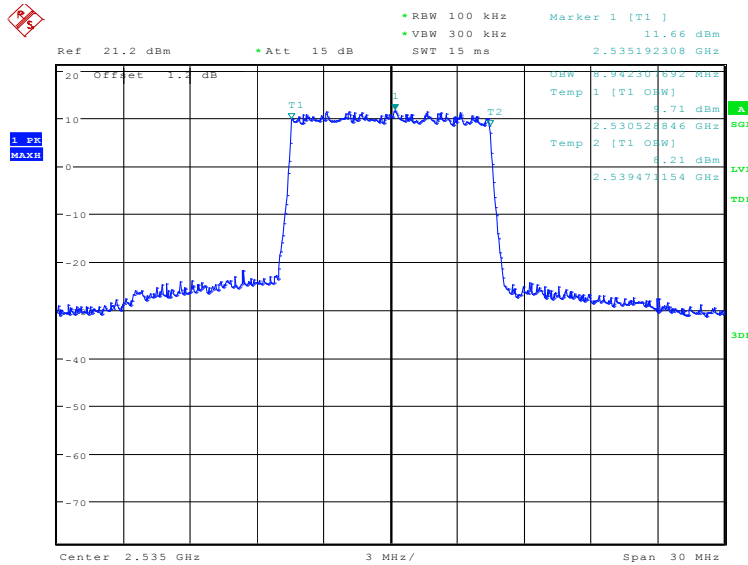
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
2535.0	8942.31	8942.31	8942.31	9038.46

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



Date: 2.JAN.2020 12:18:01

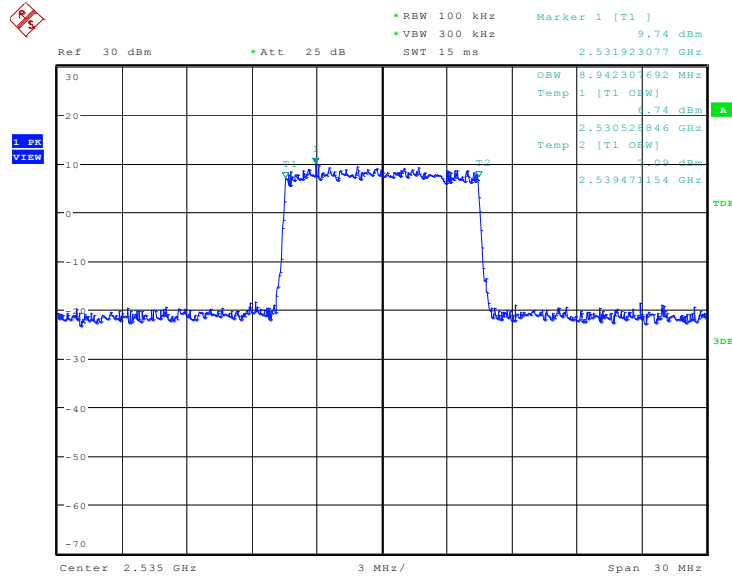
### LTE band 7, 10MHz Bandwidth, 16QAM (99% BW)



Date: 2.JAN.2020 12:19:26

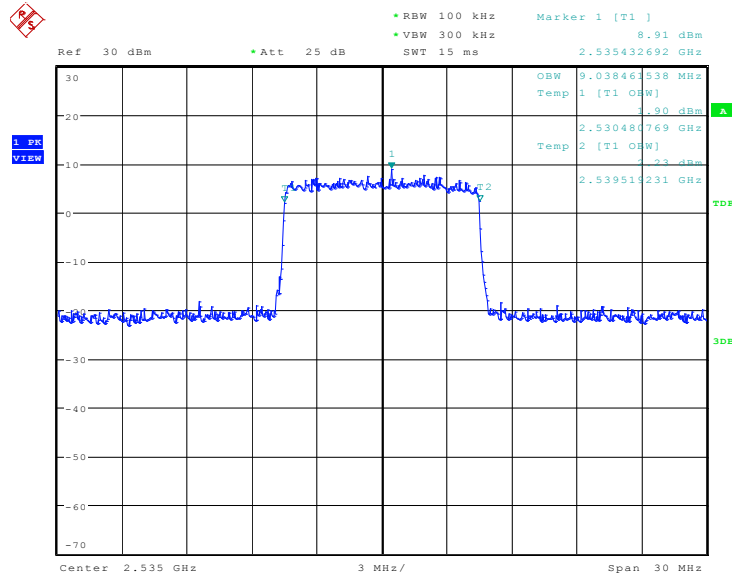


### LTE band 7, 10MHz Bandwidth, 64QAM (99% BW)



Date: 7.JAN.2020 16:54:04

### LTE band 7, 10MHz Bandwidth, 256QAM (99% BW)

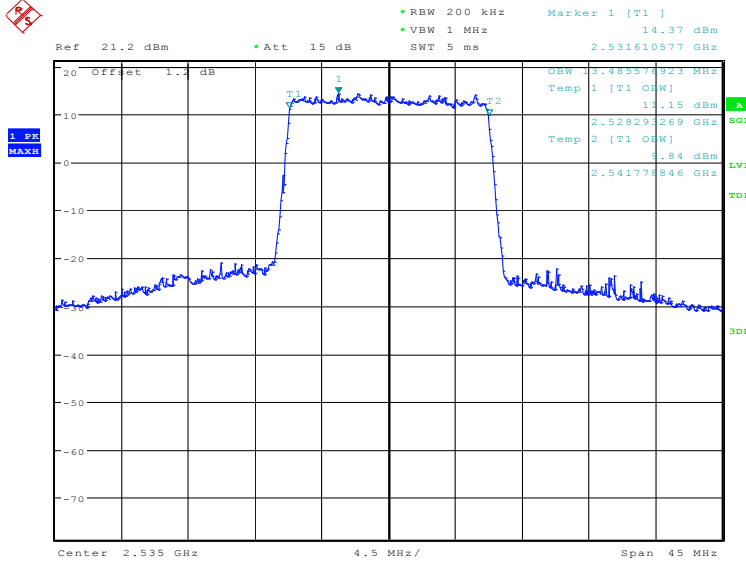


Date: 20.JAN.2020 10:42:26

### LTE band 7, 15MHz (99%)

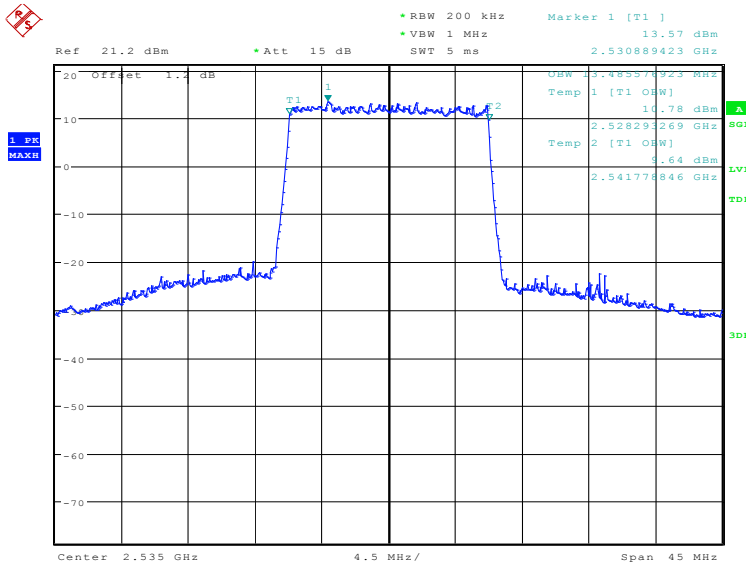
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)			
	QPSK	16QAM	64QAM	256QAM
2535.0	13485.58	13485.58	13485.58	13557.69

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



Date: 2.JAN.2020 12:20:52

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



Date: 2.JAN.2020 12:22:16