TEST REPORT
No. I19Z62042-WMD03

for

TCL Communication Ltd.

GSM/UMTS/LTE Mobile phone

Model Name: 5002A

FCC ID: 2ACCJH118

with

Hardware Version: PIO

Software Version: v3C77

Issued Date: 2019-12-06

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: cttl_terminals@caict.ac.cn, website: www.caict.ac.cn

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I19Z62042-WMD03	Rev.0	1st edition	2019-12-06

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

CONTENTS

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

Location 3: CTTL (BDA)

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

1.3. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.4. Project data

Testing Start Date: 2019-11-18

Testing End Date: 2019-12-06

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:	TCL Communication Ltd.
Address /Post:	5/F, Building 22E, 22 Science Park East Avenue,Hong Kong Science Park, Shatin, NT, Hong Kong
Contact:	Gong Zhizhou
Email:	zhizhou.gong@tcl.com
Telephone:	0086-755-36611722
Fax:	0086-755-36612000-81722

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address /Post:	5/F, Building 22E, 22 Science Park East Avenue,Hong Kong Science Park, Shatin, NT, Hong Kong
Contact:	Gong Zhizhou
Email:	zhizhou.gong@tcl.com
Telephone:	0086-755-36611722
Fax:	0086-755-36612000-81722

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

3.1. About EUT

Description	GSM/UMTS/LTE Mobile phone
Model Name	5002A
FCC ID	2ACCJH118
Antenna	Embedded
Output power	24.13dBm maximum EIRP measured for LTE Band 7
Extreme vol. Limits	3.5VDC to 4.4VDC (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
UT08a	352070110200042	PIO	v3C77	2019-11-18
UT07a	352070110200059	PIO	v3C77	2019-11-18

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

3.3. Internal Identification of AE used during the test

AE ID*	Description
AE1	Battery
AE2	Battery

AE1

Model	CAB2880001C1
Manufacturer	BYD
Capacitance	3000mAh

AE2

Model	CAB2880000C7
Manufacturer	VK
Capacitance	3000mAh

*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.

Reference	Title	Version
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 ℃, Max. = 35 ℃
Relative humidity	Min. =20 %, Max. = 80 %
Shielding effectiveness	> 110 dB
Electrical insulation	>2 M
Ground system resistance	< 0.5

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 ℃, Max. = 30 ℃
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	>2 M
Ground system resistance	< 1
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

Fully-anechoic chamber FAC-3 (9 meters × 6.5 meters × 4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	>2 M
Ground system resistance	< 4
Site voltage standing-wave ratio (SVSWR)	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 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 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 13

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

LTE Band 17

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

LTE Band 66

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

Terms used in Verdict column

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

7. Test Equipment Utilized

NO.	Description	TYPE	series number	MANUFACTURE	CAL DUE DATE	Calibration interval
1	EMI Antenna	VULB9163	9163-301	Schwarzbeck	2020-02-29	1 year
2	EMI Antenna	3117	00058889	ETS-Lindgren	2020-01-12	1 year
3	EMI Antenna	3117	00119024	ETS-Lindgren	2020-02-25	1 year
4	Universal Radio Communication Tester	CMW500	159082	R&S	2019-12-25	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	2019-12-21	2 year
9	Test Receiver	E4440A	MY48250642	Agilent	2020-03-18	1 year
10	Universal Radio Communication Tester	CMW500	116588	R&S	2019-12-26	1 year
11	Universal Radio Communication Tester	CMW500	143008	R&S	2020-11-26	1 year
12	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 Rhode & Schwarz Digital Radio Communication tester (CMW500) 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	22.23	21.64
		1880.0	22.31	21.31
		1850.7	22.28	21.46
	1 RB low	1909.3	22.26	21.14
		1880.0	22.39	21.43
		1850.7	22.48	21.65
	50% RB mid	1909.3	22.43	21.58
		1880.0	22.48	21.60
		1850.7	22.42	21.42
	100% RB	1909.3	21.38	20.32
		1880.0	21.38	20.48
		1850.7	21.51	20.76
3MHz	1 RB high	1908.5	22.39	21.77
		1880.0	22.44	21.52
		1851.5	22.24	21.31
	1 RB low	1908.5	22.42	21.26
		1880.0	22.40	21.40
		1851.5	22.52	21.54
	50% RB mid	1908.5	21.40	20.79
		1880.0	21.32	20.27
		1851.5	21.41	20.30

		1908.5	21.31	20.57
	100% RB	1880.0	21.33	20.46
		1851.5	21.59	20.58
5MHz	1 RB high	1907.5	22.37	21.28
		1880.0	22.24	21.04
		1852.5	22.22	21.41
	1 RB low	1907.5	22.41	21.23
		1880.0	22.31	21.46
		1852.5	22.41	21.16
	50% RB mid	1907.5	21.62	20.51
		1880.0	21.41	20.52
		1852.5	21.60	20.40
	100% RB	1907.5	21.37	20.49
		1880.0	21.35	20.51
		1852.5	21.56	20.50
10MHz	1 RB high	1905.0	22.29	21.84
		1880.0	22.41	21.38
		1855.0	22.26	21.50
	1 RB low	1905.0	22.42	21.79
		1880.0	22.32	21.31
		1855.0	22.45	21.53
	50% RB mid	1905.0	21.46	20.70
		1880.0	21.37	20.55
		1855.0	21.43	20.61
	100% RB	1905.0	21.37	20.45
		1880.0	21.28	20.44
		1855.0	21.53	20.55
15MHz	1 RB high	1902.5	22.45	21.57
		1880.0	22.30	21.83
		1857.5	22.62	22.00
	1 RB low	1902.5	22.67	21.14
		1880.0	22.36	21.95
		1857.5	22.45	22.22
	50% RB mid	1902.5	21.50	20.59
		1880.0	21.46	20.47
		1857.5	21.41	20.48
	100% RB	1902.5	21.39	20.60
		1880.0	21.32	20.35
		1857.5	21.41	20.42

		1900.0	22.67	21.35
20MHz	1 RB high	1900.0	22.67	21.35
		1880.0	22.14	21.01
		1860.0	22.32	21.38
	1 RB low	1900.0	22.80	21.04
		1880.0	22.05	21.03
		1860.0	22.18	21.05
	50% RB mid	1900.0	21.71	20.78
		1880.0	21.44	20.46
		1860.0	21.49	20.55
	100% RB	1900.0	21.54	20.52
		1880.0	21.40	20.34
		1860.0	21.50	20.46

LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	848.3	22.56	21.44
		836.5	22.72	21.66
		824.7	22.72	21.61
	1 RB low	848.3	22.77	21.33
		836.5	22.57	21.75
		824.7	22.59	21.58
	50% RB mid	848.3	22.81	21.61
		836.5	22.68	21.98
		824.7	22.78	21.57
	100% RB	848.3	21.71	20.41
		836.5	21.77	20.64
		824.7	21.81	20.99
3MHz	1 RB high	847.5	22.66	21.36
		836.5	22.57	21.66
		825.5	22.73	21.60
	1 RB low	847.5	22.64	21.23
		836.5	22.79	21.73
		825.5	22.68	21.87
	50% RB mid	847.5	21.75	20.80
		836.5	21.84	20.57
		825.5	21.83	20.91
	100% RB	847.5	21.65	20.62
		836.5	21.81	20.61
		825.5	21.79	20.68
5MHz	1 RB high	846.5	22.53	21.30
		836.5	22.52	21.16
		826.5	22.72	21.63
	1 RB low	846.5	22.70	21.17
		836.5	22.54	21.21
		826.5	22.34	21.29
	50% RB mid	846.5	21.65	20.67
		836.5	21.78	20.61
		826.5	21.79	20.72
	100% RB	846.5	21.57	20.69
		836.5	21.72	20.65
		826.5	21.69	20.74
10MHz	1 RB high	844.0	22.43	21.28
		836.5	22.45	21.56

		829.0	22.46	21.81
	1 RB low	844.0	22.64	21.01
		836.5	22.64	21.60
		829.0	22.47	21.72
	50% RB mid	844.0	21.67	20.61
		836.5	21.73	20.89
		829.0	21.77	20.72
	100% RB	844.0	21.53	20.67
		836.5	21.63	20.63
		829.0	21.76	20.72

LTE band 7

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
5MHz	1 RB high	2567.5	22.17	21.10
		2535	22.61	21.04
		2502.5	22.11	21.01
	1 RB low	2567.5	22.38	21.01
		2535	22.74	21.09
		2502.5	22.22	21.19
	50% RB mid	2567.5	21.35	20.39
		2535	21.55	20.45
		2502.5	21.49	20.35
	100% RB	2567.5	21.21	20.10
		2535	21.48	20.58
		2502.5	21.30	20.46
10MHz	1 RB high	2565	22.56	21.49
		2535	22.37	21.17
		2505	22.37	21.30
	1 RB low	2565	22.49	21.56
		2535	22.62	21.97
		2505	22.46	21.53
	50% RB mid	2565	21.35	20.28
		2535	21.53	20.66
		2505	21.50	20.38
	100% RB	2565	21.20	20.23
		2535	21.46	20.39
		2505	21.54	20.35
15MHz	1 RB high	2562.5	22.37	21.41
		2535	22.32	21.84
		2507.5	22.43	21.43
	1 RB low	2562.5	22.24	21.65
		2535	22.70	21.06
		2507.5	22.69	22.02
	50% RB mid	2562.5	21.18	20.29
		2535	21.51	20.55
		2507.5	21.49	20.40
	100% RB	2562.5	21.12	20.17
		2535	21.35	20.31
		2507.5	21.38	20.33

20MHz	1 RB high	2560	22.55	21.81
		2535	22.26	21.11
		2510	22.33	21.09
	1 RB low	2560	22.36	21.04
		2535	22.21	21.43
		2510	22.16	21.08
	50% RB mid	2560	21.18	20.38
		2535	21.53	20.54
		2510	21.36	20.44
	100% RB	2560	21.25	20.29
		2535	21.47	20.48
		2510	21.54	20.30

LTE band 13

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
5MHz	1 RB high	784.5	22.88	21.43
		782	22.58	21.92
		779.5	22.79	21.66
	1 RB low	784.5	22.92	21.38
		782	22.64	21.89
		779.5	22.74	21.57
	50% RB mid	784.5	21.87	20.79
		782	22.03	20.93
		779.5	21.95	20.98
	100% RB	784.5	21.78	21.00
		782	21.90	20.92
		779.5	21.93	20.78
10MHz	1 RB high	782.0	22.85	21.71
	1 RB low	782.0	22.74	21.86
	50% RB mid	782.0	21.90	20.81
	100% RB	782.0	21.90	20.89

LTE band 17

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
5MHz	1 RB high	713.5	22.71	21.39
		710.0	22.50	21.81
		706.5	22.99	21.66
	1 RB low	713.5	22.71	21.37
		710.0	22.65	21.50
		706.5	23.02	21.54
	50% RB mid	713.5	21.74	20.71
		710.0	21.86	20.66
		706.5	22.13	20.71
	100% RB	713.5	21.87	20.78
		710.0	21.78	20.71
		706.5	21.99	20.85
10MHz	1 RB high	711	22.61	21.38
		710	22.77	21.73
		709	22.94	21.91
	1 RB low	711	22.77	21.35
		710	22.98	21.87
		709	23.02	21.97
	50% RB mid	711	21.89	20.82
		710	21.88	20.80
		709	21.95	20.94
	100% RB	711	21.80	20.72
		710	21.79	20.77
		709	21.98	20.97

LTE band 66

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	1779.3	22.71	21.62
		1745.0	22.80	21.95
		1710.7	22.63	21.92
	1 RB low	1779.3	22.87	21.55
		1745.0	22.87	21.91
		1710.7	22.73	21.60
	50% RB mid	1779.3	22.91	22.35
		1745.0	22.81	21.87
		1710.7	22.82	21.58
	100% RB	1779.3	21.71	20.90
		1745.0	21.88	21.12
		1710.7	21.81	20.87
3MHz	1 RB high	1778.5	22.97	21.33
		1745.0	22.90	21.81
		1711.5	22.70	21.88
	1 RB low	1778.5	22.83	22.18
		1745.0	23.07	21.93
		1711.5	22.72	21.92
	50% RB mid	1778.5	21.81	20.74
		1745.0	21.90	20.86
		1711.5	21.85	21.04
	100% RB	1778.5	21.78	20.77
		1745.0	21.90	20.67
		1711.5	21.82	21.03
5MHz	1 RB high	1777.5	22.59	21.30
		1745.0	22.57	21.71
		1712.5	22.66	21.43
	1 RB low	1777.5	22.73	21.13
		1745.0	22.65	21.37
		1712.5	22.58	21.23
	50% RB mid	1777.5	21.79	20.88
		1745.0	21.94	20.73
		1712.5	21.91	20.85
	100% RB	1777.5	21.82	20.95
		1745.0	21.90	20.81
		1712.5	21.72	20.82
10MHz	1 RB high	1775.0	23.07	21.89

		1745.0	22.89	21.44
		1715.0	22.86	21.83
	1 RB low	1775.0	23.01	21.89
		1745.0	22.82	21.35
		1715.0	22.66	21.62
	50% RB mid	1775.0	21.76	20.83
		1745.0	21.87	21.06
		1715.0	21.90	20.95
	100% RB	1775.0	21.76	20.76
		1745.0	21.88	20.85
		1715.0	21.73	20.75
15MHz	1 RB high	1772.5	22.72	21.82
		1745.0	22.82	22.27
		1717.5	22.69	22.69
	1 RB low	1772.5	22.75	21.90
		1745.0	22.78	21.24
		1717.5	22.65	22.54
	50% RB mid	1772.5	21.71	20.74
		1745.0	21.84	20.98
		1717.5	21.87	20.94
	100% RB	1772.5	21.73	20.72
		1745.0	21.87	21.01
		1717.5	21.76	20.91
20MHz	1 RB high	1770.0	22.66	21.77
		1745.0	22.64	21.86
		1720.0	22.42	21.19
	1 RB low	1770.0	22.65	21.56
		1745.0	22.62	21.85
		1720.0	22.45	21.16
	50% RB mid	1770.0	21.68	20.74
		1745.0	21.86	20.88
		1720.0	21.95	20.86
	100% RB	1770.0	21.80	20.69
		1745.0	21.85	20.91
		1720.0	21.93	20.97

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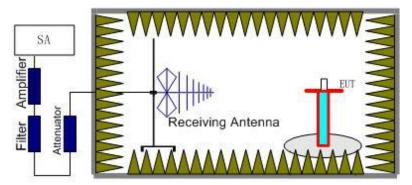
Rule Part 27.50(h)(2) specifies "Mobile stations are limited to 2.0 watts EIRP.".

Rule Part 27.50(c) specifies "Portable stations (hand-held de-vices) are limited to 3 watts ERP.".
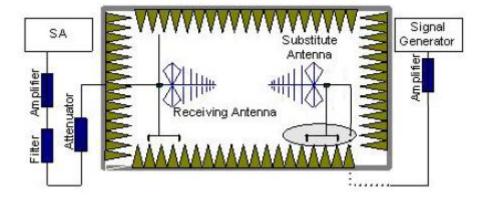
A.1.3.2 Method of Measurement

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 rms 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. 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:

   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

Limits: ≤33dBm (2W)

LTE Band 2_1.4MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.70	-24.27	2.92	43.75	4.87	21.43	33.00	11.57	H
1880.00	-23.51	2.85	43.75	4.82	22.21	33.00	10.79	H
1909.30	-23.47	2.87	43.77	4.76	22.19	33.00	10.81	H

LTE Band 2_3MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1851.50	-24.47	2.87	43.75	4.87	21.28	33.00	11.72	H
1880.00	-23.85	2.85	43.75	4.82	21.87	33.00	11.13	H
1908.50	-23.93	2.89	43.78	4.76	21.72	33.00	11.28	H

LTE Band 2_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.50	-24.43	2.87	43.75	4.87	21.32	33.00	11.68	H
1880.00	-23.73	2.85	43.75	4.82	21.99	33.00	11.01	H
1907.50	-23.87	2.84	43.77	4.77	21.83	33.00	11.17	H

LTE Band 2_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1855.00	-24.34	2.88	43.74	4.86	21.38	33.00	11.62	H
1880.00	-23.68	2.85	43.75	4.82	22.04	33.00	10.96	H
1905.00	-24.16	2.87	43.77	4.77	21.51	33.00	11.49	H

LTE Band 2_15MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1857.50	-24.34	2.87	43.75	4.86	21.40	33.00	11.60	H
1880.00	-23.74	2.85	43.75	4.82	21.98	33.00	11.02	H
1902.50	-24.54	2.86	43.77	4.78	21.15	33.00	11.85	H

LTE Band 2_20 MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1860.00	-24.35	2.86	43.75	4.85	21.39	33.00	11.61	H
1880.00	-23.69	2.85	43.75	4.82	22.03	33.00	10.97	H
1900.00	-24.25	2.87	43.77	4.78	21.43	33.00	11.57	H

LTE Band 2_1.4MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.70	-25.07	2.92	43.75	4.87	20.63	33.00	12.37	H
1880.00	-24.63	2.85	43.75	4.82	21.09	33.00	11.91	H
1909.30	-24.48	2.87	43.77	4.76	21.18	33.00	11.82	H

LTE Band 2_3MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1851.50	-25.55	2.87	43.75	4.87	20.20	33.00	12.80	H
1880.00	-24.83	2.85	43.75	4.82	20.89	33.00	12.11	H
1908.50	-24.56	2.89	43.78	4.76	21.09	33.00	11.91	H

LTE Band 2_5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.50	-25.02	2.87	43.75	4.87	20.73	33.00	12.27	H
1880.00	-24.90	2.85	43.75	4.82	20.82	33.00	12.18	H
1907.50	-24.70	2.84	43.77	4.77	21.00	33.00	12.00	H

LTE Band 2_10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1855.00	-24.97	2.88	43.74	4.86	20.75	33.00	12.25	H
1880.00	-24.76	2.85	43.75	4.82	20.96	33.00	12.04	H
1905.00	-24.91	2.87	43.77	4.77	20.76	33.00	12.24	H

LTE Band 2_15MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1857.50	-25.18	2.87	43.75	4.86	20.56	33.00	12.44	H
1880.00	-24.87	2.85	43.75	4.82	20.85	33.00	12.15	H
1902.50	-25.48	2.86	43.77	4.78	20.21	33.00	12.79	H

LTE Band 2_20 MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1860.00	-24.87	2.86	43.75	4.85	20.87	33.00	12.13	H
1880.00	-24.41	2.85	43.75	4.82	21.31	33.00	11.69	V
1900.00	-25.68	2.87	43.77	4.78	20.00	33.00	13.00	H

LTE Band 5- ERP

Limits: ≤38.45dBm (7W)

LTE Band 5_1.4MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
824.70	-20.73	2.26	45.79	0.95	2.15	21.60	38.45	16.85	H
836.50	-20.27	2.26	45.66	0.82	2.15	21.80	38.45	16.65	H
848.30	-20.99	2.27	45.55	0.80	2.15	20.94	38.45	17.51	H

LTE Band 5_3MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
825.50	-20.79	2.26	45.79	0.94	2.15	21.53	38.45	16.92	H
836.50	-20.46	2.26	45.66	0.82	2.15	21.61	38.45	16.84	H
847.50	-21.24	2.27	45.56	0.81	2.15	20.71	38.45	17.74	H

LTE Band 5_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.50	-20.77	2.25	45.77	0.93	2.15	21.53	38.45	16.92	H
836.50	-20.47	2.26	45.66	0.82	2.15	21.60	38.45	16.85	H
846.50	-21.23	2.26	45.56	0.82	2.15	20.74	38.45	17.71	H

LTE Band 5_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
829.00	-20.74	2.13	45.74	0.90	2.15	21.62	38.45	16.83	H
836.50	-20.41	2.26	45.66	0.82	2.15	21.66	38.45	16.79	H
844.00	-21.13	2.26	45.59	0.82	2.15	20.87	38.45	17.58	H

LTE Band 5_1.4MHz_16QAM

Frequency (MHz)	P_Mea (dBm)	P_cl (dB)	P_Ag (dB)	G_a (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
824.70	-21.45	2.26	45.79	0.95	2.15	20.88	38.45	17.57	H
836.50	-20.96	2.26	45.66	0.82	2.15	21.11	38.45	17.34	H
848.30	-22.01	2.27	45.55	0.80	2.15	19.92	38.45	18.53	H

LTE Band 5_3MHz_16QAM

Frequency (MHz)	P_Mea (dBm)	P_cl (dB)	P_Ag (dB)	G_a (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
825.50	-21.59	2.26	45.79	0.94	2.15	20.73	38.45	17.72	H
836.50	-21.40	2.26	45.66	0.82	2.15	20.67	38.45	17.78	H
847.50	-22.15	2.27	45.56	0.81	2.15	19.80	38.45	18.65	H

LTE Band 5_5MHz_16QAM

Frequency (MHz)	P_Mea (dBm)	P_cl (dB)	P_Ag (dB)	G_a (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.50	-21.75	2.25	45.77	0.93	2.15	20.55	38.45	17.90	H
836.50	-21.38	2.26	45.66	0.82	2.15	20.69	38.45	17.76	H
846.50	-21.89	2.26	45.56	0.82	2.15	20.08	38.45	18.37	H

LTE Band 5_10MHz_16QAM

Frequency (MHz)	P_Mea (dBm)	P_cl (dB)	P_Ag (dB)	G_a (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
829.00	-21.55	2.13	45.74	0.90	2.15	20.81	38.45	17.64	H
836.50	-21.16	2.26	45.66	0.82	2.15	20.91	38.45	17.54	H
844.00	-21.90	2.26	45.59	0.82	2.15	20.10	38.45	18.35	H

LTE Band 7- EIRP

Limits: ≤33 dBm (2W)

LTE Band 7_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2502.50	-26.37	3.58	45.68	6.10	21.83	33.00	11.17	H
2535.00	-23.86	3.63	44.82	6.16	23.49	33.00	9.51	H
2567.50	-23.46	3.65	44.92	6.22	24.03	33.00	8.97	H

LTE Band 7_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2505.00	-26.35	3.59	45.64	6.11	21.81	33.00	11.19	H
2535.00	-23.92	3.63	44.82	6.16	23.43	33.00	9.57	H
2565.00	-23.54	3.65	44.97	6.22	24.00	33.00	9.00	H

LTE Band 7_15MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2507.50	-25.74	3.59	44.92	6.11	21.70	33.00	11.30	H
2535.00	-23.83	3.63	44.82	6.16	23.52	33.00	9.48	H
2562.50	-24.13	3.65	45.67	6.21	24.10	33.00	8.90	H

LTE Band 7_20MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2510.00	-25.95	3.58	45.36	6.12	21.95	33.00	11.05	H
2535.00	-23.82	3.63	44.82	6.16	23.53	33.00	9.47	H
2560.00	-24.42	3.64	45.98	6.21	24.13	33.00	8.87	H

LTE Band 7_5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2502.50	-27.36	3.58	45.68	6.10	20.84	33.00	12.16	H
2535.00	-24.61	3.63	44.82	6.16	22.74	33.00	10.26	H
2567.50	-24.40	3.65	44.92	6.22	23.09	33.00	9.91	H

LTE Band 7_10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2505.00	-26.87	3.59	45.64	6.11	21.29	33.00	11.71	H
2535.00	-25.04	3.63	44.82	6.16	22.31	33.00	10.69	H
2565.00	-24.45	3.65	44.97	6.22	23.09	33.00	9.91	H

LTE Band 7_15MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2507.50	-27.13	3.59	44.92	6.11	20.31	33.00	12.69	H
2535.00	-25.09	3.63	44.82	6.16	22.26	33.00	10.74	H
2562.50	-24.88	3.65	45.67	6.21	23.35	33.00	9.65	H

LTE Band 7_20MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2510.00	-27.16	3.58	45.36	6.12	20.74	33.00	12.26	H
2535.00	-24.58	3.63	44.82	6.16	22.77	33.00	10.23	H
2560.00	-25.49	3.64	45.98	6.21	23.06	33.00	9.94	H

LTE Band 13- ERP

Limits: ≤34.77 dBm (3W)

LTE Band 13_5MHz_QPSK

Frequency (MHz)	P$_{Mea}$ (dBm)	P$_{cl}$ (dB)	P$_{Ag}$ (dB)	G$_a$ (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
779.50	-23.23	2.01	45.64	0.04	2.15	18.29	34.77	16.48	V
782.00	-22.99	2.01	45.65	0.09	2.15	18.59	34.77	16.18	V
784.50	-22.72	2.01	45.67	0.16	2.15	18.95	34.77	15.82	V

LTE Band 13_10MHz_QPSK

Frequency (MHz)	P$_{Mea}$ (dBm)	P$_{cl}$ (dB)	P$_{Ag}$ (dB)	G$_a$ (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
782.00	-23.23	2.01	45.65	0.09	2.15	18.35	34.77	16.42	V

LTE Band 13_5MHz_16QAM

Frequency (MHz)	P$_{Mea}$ (dBm)	P$_{cl}$ (dB)	P$_{Ag}$ (dB)	G$_a$ (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
779.50	-24.05	2.01	45.64	0.04	2.15	17.47	34.77	17.30	V
782.00	-23.95	2.01	45.65	0.09	2.15	17.63	34.77	17.14	V
784.50	-23.78	2.01	45.67	0.16	2.15	17.89	34.77	16.88	V

LTE Band 13_10MHz_16QAM

Frequency (MHz)	P$_{Mea}$ (dBm)	P$_{cl}$ (dB)	P$_{Ag}$ (dB)	G$_a$ (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
782.00	-24.10	2.01	45.65	0.09	2.15	17.48	34.77	17.29	V

LTE Band 17 - ERP

Limits: ≤34.77dBm (3W)

LTE Band 17_5MHz_QPSK

Frequency	P$_{Mea}$	P$_{cl}$	P$_{Ag}$	G$_a$	Correction	ERP	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	(dB)	(dBi)	(dB)	(dBm)	(dBm)	(dB)	
706.50	-26.96	1.91	45.53	0.66	2.15	15.17	34.77	19.60	H
710.00	-27.15	1.92	45.68	0.54	2.15	15.00	34.77	19.77	H
713.50	-26.42	1.92	45.22	0.50	2.15	15.23	34.77	19.54	H

LTE Band 17_10MHz_QPSK

Frequency	P$_{Mea}$	P$_{cl}$	P$_{Ag}$	G$_a$	Correction	ERP	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	(dB)	(dBi)	(dB)	(dBm)	(dBm)	(dB)	
709.00	-26.80	1.92	45.64	0.57	2.15	15.34	34.77	19.43	H
710.00	-27.12	1.92	45.68	0.54	2.15	15.03	34.77	19.74	H
711.00	-26.84	1.92	45.19	0.53	2.15	14.81	34.77	19.96	H

LTE Band 17_5MHz_16QAM

Frequency	P$_{Mea}$	P$_{cl}$	P$_{Ag}$	G$_a$	Correction	ERP	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	(dB)	(dBi)	(dB)	(dBm)	(dBm)	(dB)	
706.50	-28.00	1.91	45.53	0.66	2.15	14.13	34.77	20.64	H
710.00	-28.21	1.92	45.68	0.54	2.15	13.94	34.77	20.83	H
713.50	-27.53	1.92	45.22	0.50	2.15	14.12	34.77	20.65	H

LTE Band 17_10MHz_16QAM

Frequency	P$_{Mea}$	P$_{cl}$	P$_{Ag}$	G$_a$	Correction	ERP	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	(dB)	(dBi)	(dB)	(dBm)	(dBm)	(dB)	
709.00	-27.78	1.92	45.64	0.57	2.15	14.36	34.77	20.41	H
710.00	-28.39	1.92	45.68	0.54	2.15	13.76	34.77	21.01	H
711.00	-27.59	1.92	45.19	0.53	2.15	14.06	34.77	20.71	H

LTE Band 66- EIRP

Limits: ≤30dBm (1W)

LTE Band 66_1.4MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.70	-33.11	3.17	44.10	5.12	19.28	30.00	10.72	V
1745.00	-32.08	3.68	44.16	5.06	20.82	30.00	9.18	V
1779.30	-30.39	3.04	44.03	5.00	21.68	30.00	8.32	V

LTE Band 66_3MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1711.50	-33.54	3.40	44.10	5.12	19.08	30.00	10.92	V
1745.00	-32.34	3.68	44.16	5.06	20.56	30.00	9.44	H
1778.50	-30.75	3.04	44.03	5.00	21.32	30.00	8.68	V

LTE Band 66_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.50	-26.60	3.66	44.10	5.12	18.96	30.00	11.04	V
1745.00	-24.91	3.68	44.16	5.06	20.63	30.00	9.37	H
1777.50	-24.48	3.04	44.04	5.00	21.52	30.00	8.48	V

LTE Band 66_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.00	-26.64	3.56	44.10	5.11	19.01	30.00	10.99	V
1745.00	-24.89	3.68	44.16	5.06	20.65	30.00	9.35	H
1775.00	-24.52	3.05	44.05	5.01	21.48	30.00	8.52	V

LTE Band 66_15MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1717.50	-26.31	3.47	44.11	5.11	19.44	30.00	10.56	V
1745.00	-24.85	3.68	44.16	5.06	20.69	30.00	9.31	V
1772.50	-25.37	3.05	44.06	5.01	20.65	30.00	9.35	V

LTE Band 66_20MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.00	-25.84	3.37	44.11	5.10	20.00	30.00	10.00	V
1745.00	-24.65	3.68	44.16	5.06	20.89	30.00	9.11	V
1770.00	-25.26	3.05	44.07	5.01	20.78	30.00	9.22	V

LTE Band 66_1.4MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.70	-33.91	3.17	44.10	5.12	18.48	30.00	11.52	V
1745.00	-32.94	3.68	44.16	5.06	19.96	30.00	10.04	V
1779.30	-31.41	3.04	44.03	5.00	20.66	30.00	9.34	V

LTE Band 66_3MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1711.50	-34.19	3.40	44.10	5.12	18.43	30.00	11.57	V
1745.00	-33.29	3.68	44.16	5.06	19.61	30.00	10.39	H
1778.50	-31.61	3.04	44.03	5.00	20.46	30.00	9.54	V

LTE Band 66_5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.50	-27.17	3.66	44.10	5.12	18.39	30.00	11.61	V
1745.00	-25.94	3.68	44.16	5.06	19.60	30.00	10.40	H
1777.50	-25.39	3.04	44.04	5.00	20.61	30.00	9.39	V

LTE Band 66_10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.00	-27.52	3.56	44.10	5.11	18.13	30.00	11.87	V
1745.00	-25.76	3.68	44.16	5.06	19.78	30.00	10.22	H
1775.00	-25.30	3.05	44.05	5.01	20.70	30.00	9.30	V

LTE Band 66_15MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1717.50	-27.22	3.47	44.11	5.11	18.53	30.00	11.47	V
1745.00	-25.87	3.68	44.16	5.06	19.67	30.00	10.33	H
1772.50	-26.27	3.05	44.06	5.01	19.75	30.00	10.25	V

LTE Band 66_20MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.00	-26.74	3.37	44.11	5.10	19.10	30.00	10.90	V
1745.00	-25.17	3.68	44.16	5.06	20.37	30.00	9.63	V
1770.00	-26.31	3.05	44.07	5.01	19.73	30.00	10.27	V

Peak EIRP(dBm) = P_{Mea}(-24.42dBm) - G_a (-6.21dBi) - P_{Ag} (-45.98dB) - P_{cl} (3.64dB) = 24.13dBm

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

A.2 EMISSION LIMIT
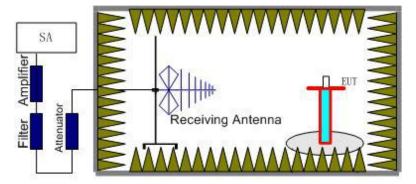
A.2.1 Measurement Method

The measurements procedures in TIA-603E-2016 are used. This measurement is carried out in fully-anechoic chamber FAC-3.
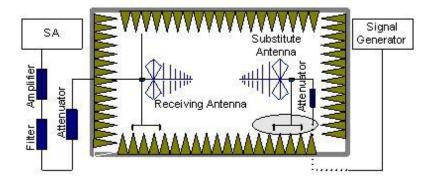
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 2,5,7,13,17,66.

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, an 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 that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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

10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands 2,5,7,13,17,66. 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 2,5,7,13,17,66 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 evaluated frequency range 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
3702.02	-53.35	6.42	8.48	-51.29	-13.00	38.29	H
5558.02	-46.35	7.19	10.59	-42.95	-13.00	29.95	H
7410.01	-50.93	8.14	12.09	-46.98	-13.00	33.98	H
9264.01	-52.04	9.07	13.26	-47.85	-13.00	34.85	H
11140.01	-52.19	9.66	13.17	-48.68	-13.00	35.68	V
12945.01	-49.30	10.49	13.47	-46.32	-13.00	33.32	H

LTE Band 2, 1.4MHz, QPSK, Channel 18900

Frequency (MHz)	P~Mea~ (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.02	-50.39	6.26	8.56	-48.09	-13.00	35.09	H
5645.02	-46.43	7.27	10.57	-43.13	-13.00	30.13	H
7526.01	-49.00	8.28	12.22	-45.06	-13.00	32.06	H
9411.01	-50.94	9.09	13.35	-46.68	-13.00	33.68	H
11244.01	-51.18	9.66	13.15	-47.69	-13.00	34.69	H
13148.01	-47.62	10.73	13.71	-44.64	-13.00	31.64	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	-51.06	6.08	8.65	-48.49	-13.00	35.49	H
5731.02	-42.47	7.29	10.55	-39.21	-13.00	26.21	H
7641.01	-44.61	8.16	12.31	-40.46	-13.00	27.46	H
9555.01	-49.39	9.34	13.34	-45.39	-13.00	32.39	H
11462.01	-50.13	9.91	13.11	-46.93	-13.00	33.93	H
13371.01	-48.55	10.57	14.02	-45.10	-13.00	32.10	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	-54.57	3.57	5.23	2.15	-55.06	-13.00	42.06	V
2474.00	-52.63	4.60	6.02	2.15	-53.36	-13.00	40.36	H
3299.02	-49.87	5.29	7.72	2.15	-49.59	-13.00	36.59	H
4127.02	-46.77	6.04	9.03	2.15	-45.93	-13.00	32.93	H
4953.01	-47.26	6.68	9.85	2.15	-46.24	-13.00	33.24	H
5779.01	-48.43	7.22	10.54	2.15	-47.26	-13.00	34.26	H

LTE Band 5, 1.4MHz, QPSK, Channel 20525

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.01	-57.19	3.58	5.19	2.15	-57.73	-13.00	44.73	H
2510.00	-49.07	4.63	6.12	2.15	-49.73	-13.00	36.73	H
3346.02	-53.04	5.31	7.83	2.15	-52.67	-13.00	39.67	H
4185.02	-48.68	6.17	9.09	2.15	-47.91	-13.00	34.91	H
5022.01	-50.56	6.57	9.93	2.15	-49.35	-13.00	36.35	H
5858.01	-51.66	7.26	10.53	2.15	-50.54	-13.00	37.54	H

LTE Band 5, 1.4MHz, QPSK, Channel 20643

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1697.01	-57.84	3.60	5.15	2.15	-58.44	-13.00	45.44	H
2545.00	-43.39	4.66	6.18	2.15	-44.02	-13.00	31.02	H
3394.02	-49.48	5.36	7.95	2.15	-49.04	-13.00	36.04	H
4245.02	-40.97	6.24	9.15	2.15	-40.21	-13.00	27.21	H
5094.01	-46.19	6.76	10.03	2.15	-45.07	-13.00	32.07	H
5942.01	-46.75	7.47	10.51	2.15	-45.86	-13.00	32.86	H

LTE Band 7, 5 MHz, QPSK, Channel 20775

Frequency (MHz)	P$_{Mea}$ (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5011.02	-44.74	6.58	9.92	-41.40	-25.00	16.40	H
7513.01	-43.62	8.34	12.21	-39.75	-25.00	14.75	H
10026.01	-51.25	9.25	12.91	-47.59	-25.00	22.59	H
12496.01	-50.03	10.18	13.20	-47.01	-25.00	22.01	H
14995.00	-45.96	11.21	14.00	-43.17	-25.00	18.17	H
17501.00	-42.77	12.73	14.90	-40.60	-25.00	15.60	H

LTE Band 7, 5 MHz, QPSK, Channel 21100

Frequency (MHz)	P$_{Mea}$ (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5075.02	-43.76	6.70	10.01	-40.45	-25.00	15.45	H
7611.01	-43.65	8.02	12.29	-39.38	-25.00	14.38	H
10155.01	-52.84	9.37	12.96	-49.25	-25.00	24.25	H
12690.01	-49.52	10.31	13.31	-46.52	-25.00	21.52	H
15216.00	-46.02	11.38	13.87	-43.53	-25.00	18.53	V
17730.00	-44.14	12.35	15.22	-41.27	-25.00	16.27	H

LTE Band 7, 5 MHz, QPSK, Channel 21425

Frequency (MHz)	P$_{Mea}$ (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5140.02	-40.79	6.87	10.10	-37.56	-25.00	12.56	H
7708.01	-43.50	8.42	12.37	-39.55	-25.00	14.55	H
10281.01	-51.92	9.58	13.01	-48.49	-25.00	23.49	H
12856.01	-48.76	10.62	13.41	-45.97	-25.00	20.97	H
15400.00	-45.61	11.39	13.76	-43.24	-25.00	18.24	V
17976.00	-44.35	12.90	15.57	-41.68	-25.00	16.68	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
1556.01	-60.14	3.47	5.40	2.15	-60.36	-13.00	47.36	H
2339.00	-53.92	4.44	5.62	2.15	-54.89	-13.00	41.89	H
3119.02	-43.79	5.38	7.29	2.15	-44.03	-13.00	31.03	H
3890.02	-55.72	6.10	8.75	2.15	-55.22	-13.00	42.22	H
4682.02	-43.11	6.49	9.58	2.15	-42.17	-13.00	29.17	H
5462.01	-43.58	6.92	10.55	2.15	-42.10	-13.00	29.10	H

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
1552.01	-60.82	3.46	5.41	2.15	-61.02	-13.00	48.02	H
2346.00	-54.57	4.45	5.64	2.15	-55.53	-13.00	42.53	H
3129.02	-45.98	5.40	7.31	2.15	-46.22	-13.00	33.22	H
3924.02	-55.98	6.12	8.79	2.15	-55.46	-13.00	42.46	V
4697.02	-44.00	6.50	9.60	2.15	-43.05	-13.00	30.05	H
5480.01	-44.21	6.98	10.57	2.15	-42.77	-13.00	29.77	H

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
1554.01	-61.14	3.47	5.40	2.15	-61.36	-13.00	48.36	H
2354.00	-53.31	4.46	5.66	2.15	-54.26	-13.00	41.26	H
3139.02	-50.50	5.38	7.33	2.15	-50.70	-13.00	37.70	H
3930.02	-55.69	6.12	8.80	2.15	-55.16	-13.00	42.16	V
4712.02	-46.84	6.51	9.61	2.15	-45.89	-13.00	32.89	H
5497.01	-46.02	7.05	10.60	2.15	-44.62	-13.00	31.62	H

LTE Band 17, 5MHz, QPSK, Channel 23755

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1414.01	-44.37	3.25	5.05	2.15	-44.72	-13.00	31.72	H
2120.00	-46.24	4.21	4.96	2.15	-47.64	-13.00	34.64	H
2812.00	-52.39	4.93	6.66	2.15	-52.81	-13.00	39.81	H
3537.02	-55.50	5.69	8.25	2.15	-55.09	-13.00	42.09	H
4230.02	-55.78	6.26	9.13	2.15	-55.06	-13.00	42.06	H
4950.01	-50.71	6.69	9.85	2.15	-49.70	-13.00	36.70	H

LTE Band 17, 5MHz, QPSK, Channel 23790

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1420.01	-41.92	3.26	5.08	2.15	-42.25	-13.00	29.25	H
2131.00	-49.85	4.22	4.99	2.15	-51.23	-13.00	38.23	H
2853.00	-51.21	4.96	6.74	2.15	-51.58	-13.00	38.58	V
3551.02	-55.34	5.83	8.27	2.15	-55.05	-13.00	42.05	H
4265.02	-55.28	6.23	9.17	2.15	-54.49	-13.00	41.49	H
4977.01	-50.13	6.64	9.88	2.15	-49.04	-13.00	36.04	H

LTE Band 17, 5MHz, QPSK, Channel 23825

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1427.01	-44.33	3.27	5.12	2.15	-44.63	-13.00	31.63	H
2141.00	-52.35	4.24	5.02	2.15	-53.72	-13.00	40.72	H
2855.00	-51.69	4.96	6.74	2.15	-52.06	-13.00	39.06	H
3569.02	-55.72	6.02	8.30	2.15	-55.59	-13.00	42.59	H
4286.02	-52.02	6.21	9.19	2.15	-51.19	-13.00	38.19	H
5001.01	-44.27	6.60	9.90	2.15	-43.12	-13.00	30.12	H

LTE Band 66, 1.4MHz QPSK, Channel 131979

Frequency (MHz)	P$_{Mea}$ (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3422.02	-45.71	5.38	8.01	-43.08	-13.00	30.08	V
5137.02	-46.71	6.86	10.09	-43.48	-13.00	30.48	H
6848.01	-42.06	7.83	11.42	-38.47	-13.00	25.47	H
8559.01	-48.82	8.57	13.01	-44.38	-13.00	31.38	H
10247.01	-52.30	9.46	13.00	-48.76	-13.00	35.76	V
11994.01	-49.50	10.08	13.00	-46.58	-13.00	33.58	V

LTE Band 66, 1.4MHz, QPSK, Channel 132322

Frequency (MHz)	P$_{Mea}$ (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3490.02	-54.27	5.50	8.18	-51.59	-13.00	38.59	H
5239.02	-51.16	7.00	10.23	-47.93	-13.00	34.93	H
6984.01	-44.21	8.17	11.58	-40.80	-13.00	27.80	H
8729.01	-49.45	8.45	13.05	-44.85	-13.00	31.85	H
10468.01	-51.84	9.70	13.09	-48.45	-13.00	35.45	H
12214.01	-49.56	10.05	13.09	-46.52	-13.00	33.52	H

LTE Band 66, 1.4MHz, QPSK, Channel 132665

Frequency (MHz)	P$_{Mea}$ (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3559.02	-48.37	5.92	8.28	-46.01	-13.00	33.01	V
5342.02	-48.97	6.95	10.38	-45.54	-13.00	32.54	H
7122.01	-42.06	8.16	11.75	-38.47	-13.00	25.47	H
8902.01	-50.73	8.85	13.08	-46.50	-13.00	33.50	H
10660.01	-51.86	9.30	13.13	-48.03	-13.00	35.03	H
12441.01	-49.64	10.33	13.18	-46.79	-13.00	33.79	H

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.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE Bands 2,5,7,13,17,66, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the center channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 ℃increments from -30℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.5VDC 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, 1.4MHz bandwidth (worst case of all bandwidths)
Frequency Error vs Voltage

Voltage (V)	Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
35		-8.30	-28.95	0.0044	0.0154
3.8	20	-6.15	-28.81	0.0033	0.0153
4.4		-8.33	-27.75	0.0044	0.0148

Frequency Error vs Temperature

Temperature (℃)	Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
50		-7.42	-27.34	0.0039	0.0145
40		-7.98	-28.35	0.0042	0.0151
30		-6.62	-28.51	0.0035	0.0152
20		-8.54	-28.34	0.0045	0.0151
10	3.8	-9.70	-28.04	0.0052	0.0149
0		-7.34	-30.71	0.0039	0.0163
-10		-9.56	-29.10	0.0051	0.0155
-20		-8.28	-28.27	0.0044	0.0150
-30		-8.53	-28.27	0.0045	0.0150

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

Voltage (V)	Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
35		-3.49	19.73	0.0042	0.0236
3.8	20	-3.23	18.77	0.0039	0.0224
4.4		2.29	20.06	0.0027	0.0240

Frequency Error vs Temperature

Temperature (℃)	Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
50		-2.96	18.80	0.0035	0.0225
40		-4.42	19.81	0.0053	0.0237
30		-2.59	18.27	0.0031	0.0218
20		-2.90	20.14	0.0035	0.0241
10	3.8	-2.32	19.00	0.0028	0.0227
0		-4.01	20.13	0.0048	0.0241
-10		-4.29	19.10	0.0051	0.0228
-20		-2.92	20.18	0.0035	0.0241
-30		-3.45	20.17	0.0041	0.0241

LTE Band 7, 10MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
35		-9.80	-14.36	0.0039	0.0057
3.8	20	-14.53	-11.64	0.0057	0.0046
4.4		9.44	-12.03	0.0037	0.0047

Frequency Error vs Temperature

Temperature (℃)	Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
50		-8.21	-12.26	0.0032	0.0048
40		-9.27	-12.90	0.0037	0.0051
30		-6.17	-12.87	0.0024	0.0051
20		-10.90	-9.23	0.0043	0.0036
10	3.8	-9.96	-13.23	0.0039	0.0052
0		-8.37	-12.09	0.0033	0.0048
-10		-7.54	-11.00	0.0030	0.0043
-20		-7.45	-10.61	0.0029	0.0042
-30		-6.22	-13.50	0.0025	0.0053

LTE Band 13, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
35		12.25	18.41	0.0157	0.0235
3.8	20	13.26	17.05	0.0170	0.0218
4.4		11.39	17.50	0.0146	0.0224

Frequency Error vs Temperature

Temperature (℃)	Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
50		11.49	17.15	0.0147	0.0219
40		11.43	17.12	0.0146	0.0219
30		10.73	18.27	0.0137	0.0234
20		11.17	17.37	0.0143	0.0222
10	3.8	11.93	17.28	0.0153	0.0221
0		11.14	16.82	0.0142	0.0215
-10		10.63	17.37	0.0136	0.0222
-20		10.21	17.77	0.0131	0.0227
-30		10.37	19.00	0.0133	0.0243

LTE Band 17, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
35		2.09	-10.30	0.0029	0.0145
3.8	20	-2.47	-10.37	0.0035	0.0146
4.4		2.88	-10.53	0.0041	0.0148

Frequency Error vs Temperature

Temperature (℃)	Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
50		1.93	-9.56	0.0027	0.0135
40		2.25	-11.03	0.0032	0.0155
30		-2.96	-11.62	0.0042	0.0164
20		-2.23	-11.86	0.0031	0.0167
10		-1.76	-11.89	0.0025	0.0167
0	3.8	2.39	-11.73	0.0034	0.0165
-10		2.66	-10.86	0.0037	0.0153
-20		-2.82	-12.52	0.0040	0.0176
-30		1.76	-11.13	0.0025	0.0157

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

Frequency Error vs Voltage

Voltage (V)	Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
35		-8.85	-27.61	0.0051	0.0158
3.8	20	-4.49	-28.18	0.0026	0.0161
4.4		-7.48	-26.65	0.0043	0.0153

Frequency Error vs Temperature

Temperature (℃)	Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
		QPSK	16QAM	QPSK	16QAM
50		-8.85	-27.61	0.0051	0.0158
40		-4.49	-28.18	0.0026	0.0161
30		-7.48	-26.65	0.0043	0.0153
20		-7.41	-26.08	0.0042	0.0149
10		-7.00	-26.22	0.0040	0.0150
0	3.8	-9.27	-27.14	0.0053	0.0156
-10		-8.61	-27.48	0.0049	0.0157
-20		-9.88	-27.35	0.0057	0.0157
-30		-6.95	-25.69	0.0040	0.0147

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 extreme and mid frequencies of the US Cellular/PCS frequency bands. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

The measurement method is from ANSI C63.26:

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts.

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

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

d) Set the detection mode to peak, and the trace mode to max-hold.
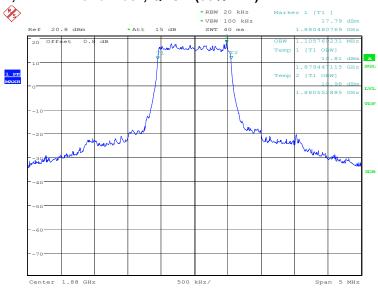
LTE band 2, 1.4MHz (99%)
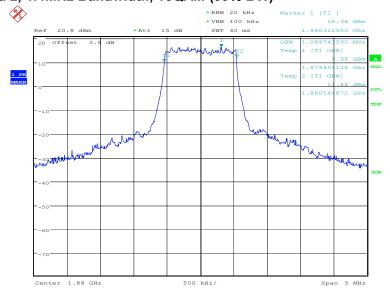
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
1880.0	1105.77	1089.74

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

Date: 18.NOV.2019 18:12:27

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

Date: 18.NOV.2019 18:13:51
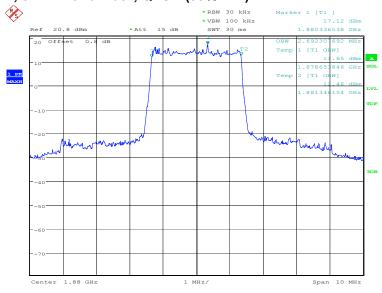
LTE band 2, 3MHz (99%)
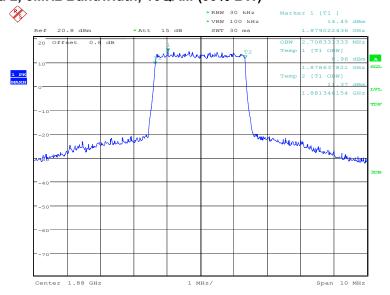
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
1880.0	2692.31	2708.33

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

Date: 18.NOV.2019 18:15:17

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

Date: 18.NOV.2019 18:16:42
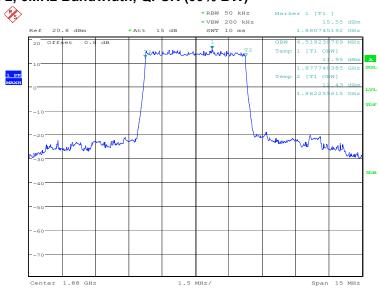
LTE band 2, 5MHz (99%)
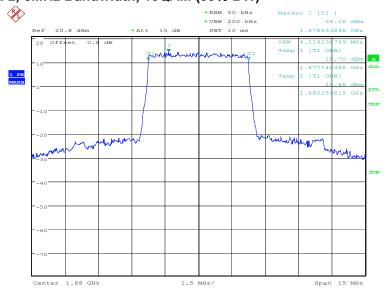
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
1880.0	4519.23	4519.23

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

Date: 18.NOV.2019 18:18:08

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

Date: 18.NOV.2019 18:19:32
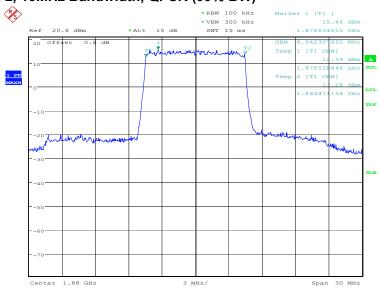
LTE band 2, 10MHz (99%)

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

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

Date: 18.NOV.2019 18:20:58

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

Date: 18.NOV.2019 18:22:23
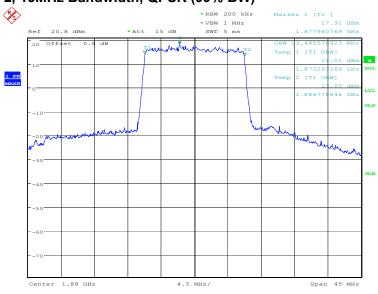
LTE band 2, 15MHz (99%)
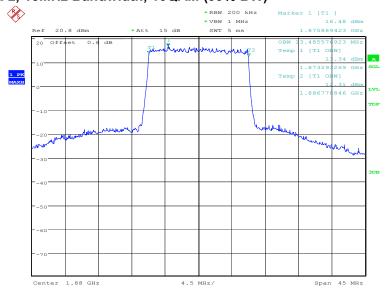
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
1880.0	13485.58	13485.58

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

Date: 18.NOV.2019 18:23:50

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

Date: 18.NOV.2019 18:25:14
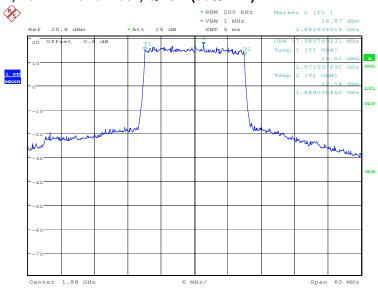
LTE band 2, 20MHz (99%)
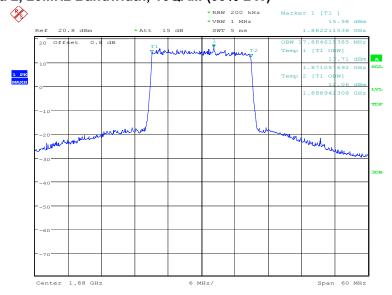
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
1880.0	17980.77	17884.62

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

Date: 18.NOV.2019 18:26:40

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

Date: 18.NOV.2019 18:28:05
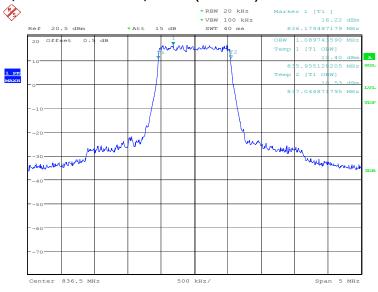
LTE band 5, 1.4MHz (99%)

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

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

Date: 18.NOV.2019 18:30:32

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

Date: 18.NOV.2019 18:31:57
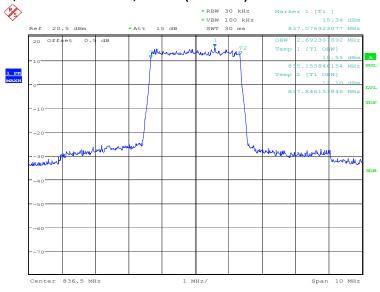
LTE band 5, 3MHz (99%)

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

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

Date: 18.NOV.2019 18:33:23

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

Date: 18.NOV.2019 18:34:47
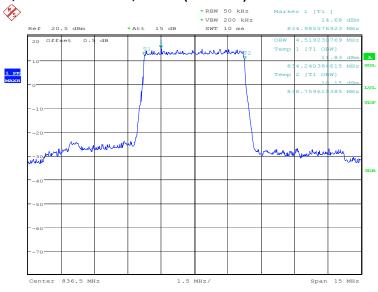
LTE band 5, 5MHz (99%)

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

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

Date: 18.NOV.2019 18:36:13

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

Date: 18.NOV.2019 18:37:38
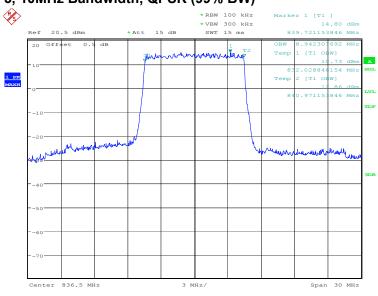
LTE band 5, 10MHz (99%)
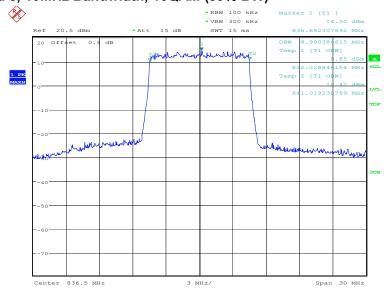
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
836.5	QPSK	16QAM
	8942.31	8990.38

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

Date: 18.NOV.2019 18:39:04

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

Date: 18.NOV.2019 18:40:28
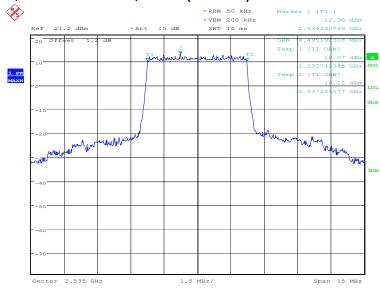
LTE band 7, 5MHz (99%)
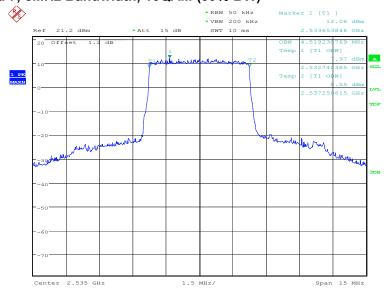
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
2535.0	4495.19	4519.23

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

Date: 18.NOV.2019 18:41:56

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

Date: 18.NOV.2019 18:43:20
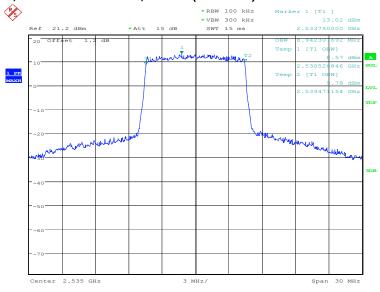
LTE band 7, 10MHz (99%)
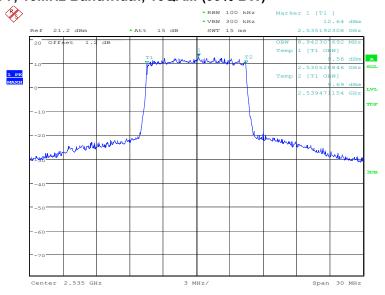
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
2535.0	8942.31	8942.31

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

Date: 18.NOV.2019 18:44:46

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

Date: 18.NOV.2019 18:46:11
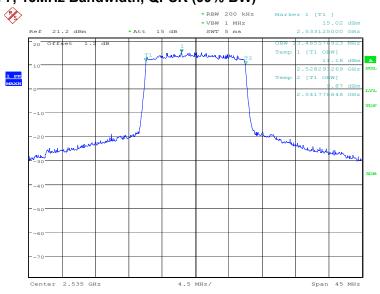
LTE band 7, 15MHz (99%)
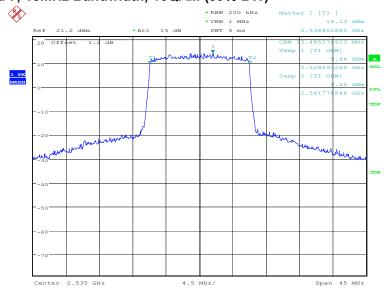
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
2535.0	13485.58	13485.58

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

Date: 18.NOV.2019 18:47:37

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

Date: 18.NOV.2019 18:49:01
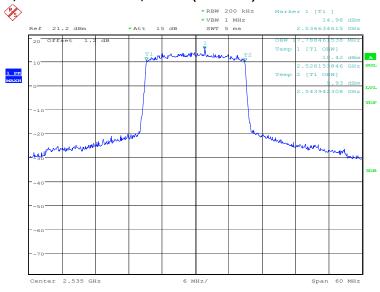
LTE band 7, 20MHz (99%)
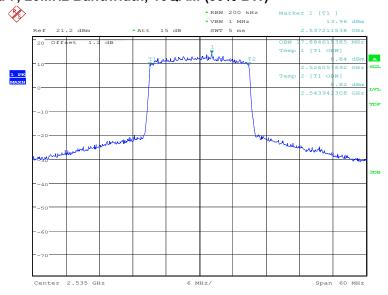
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
2535.0	17788.46	17884.62

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

Date: 18.NOV.2019 18:50:27

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

Date: 18.NOV.2019 18:51:52
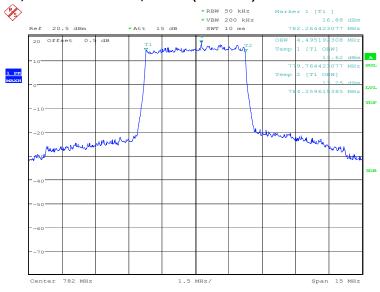
LTE band 13, 5MHz (99%)

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

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

Date: 18.NOV.2019 18:54:06

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

Date: 18.NOV.2019 18:55:31
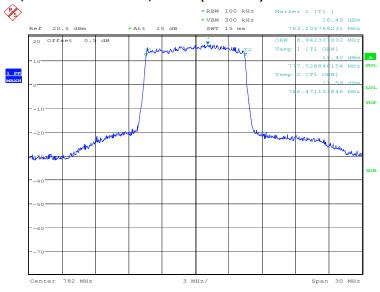
LTE band 13, 10MHz (99%)
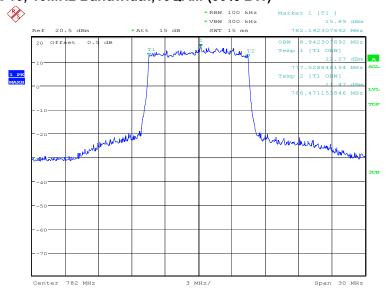
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
782.0	QPSK	16QAM
	8942.31	8942.31

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

Date: 18.NOV.2019 18:56:57

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

Date: 18.NOV.2019 18:58:21
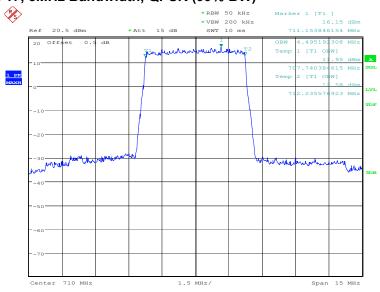
LTE band 17, 5MHz(99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW) (kHz)	
	QPSK	16QAM
710.0	4495.19	4495.19

LTE band 17, 5MHz Bandwidth, QPSK (99% BW)

Date: 18.NOV.2019 18:59:49

### LTE band 17, 5MHz Bandwidth,16QAM (99% BW)


Date: 18.NOV.2019 19:01:13
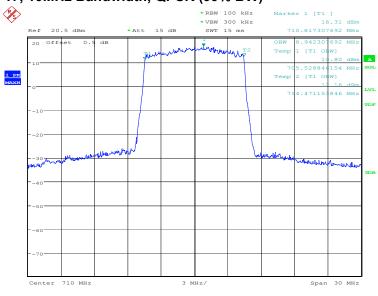
LTE band 17, 10MHz(99% BW)
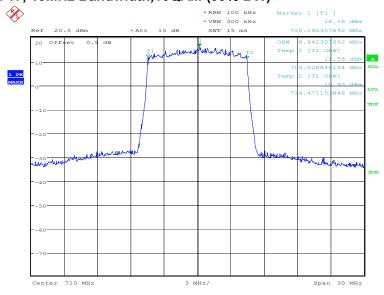
Frequency(MHz)	Occupied Bandwidth (99% BW) (kHz)	
710.0	QPSK	16QAM
	8942.31	8942.31

LTE band 17, 10MHz Bandwidth, QPSK (99% BW)

Date: 18.NOV.2019 19:02:39

**LTE band 17, 10MHz Bandwidth,16QAM (99% BW)**

Date: 18.NOV.2019 19:04:04
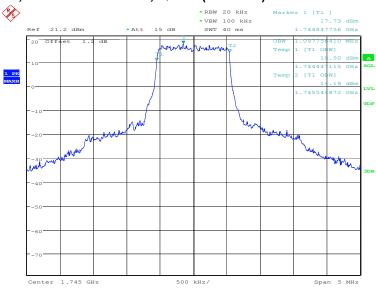
LTE band 66, 1.4MHz (99%)
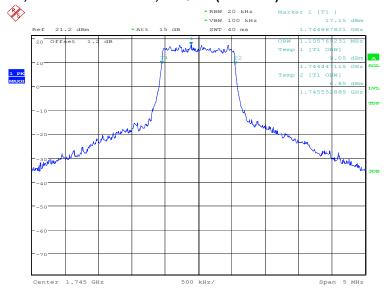
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1745.0	QPSK	16QAM
	1097.76	1105.77

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

Date: 18.NOV.2019 19:05:32

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

Date: 18.NOV.2019 19:06:57
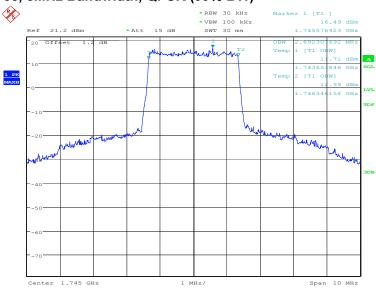
LTE band 66, 3MHz (99%)
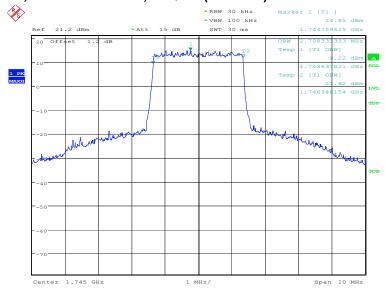
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
1745.0	2692.31	2708.33

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

Date: 18.NOV.2019 19:08:23

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

Date: 18.NOV.2019 19:09:47
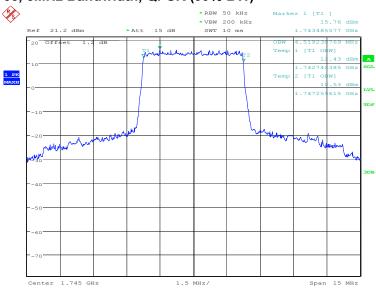
LTE band 66, 5MHz (99%)
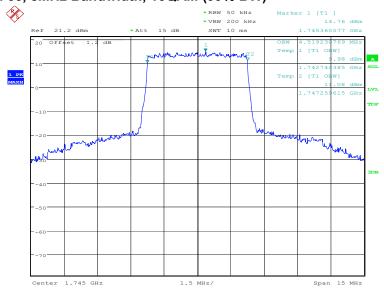
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1745.0	QPSK	16QAM
	4519.23	4519.23

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

Date: 18.NOV.2019 19:11:13

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

Date: 18.NOV.2019 19:12:38
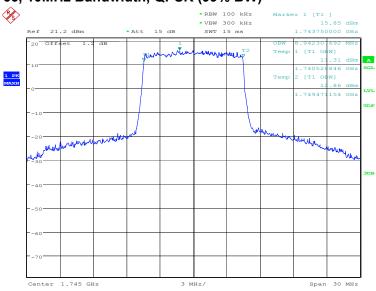
LTE band 66, 10MHz (99%)
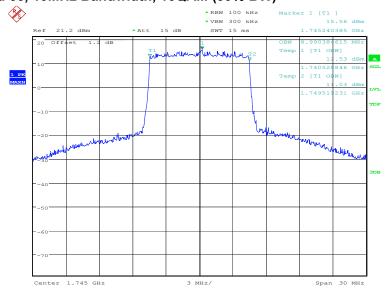
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
1745.0	8942.31	8990.38

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

Date: 18.NOV.2019 19:14:04

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

Date: 18.NOV.2019 19:15:29
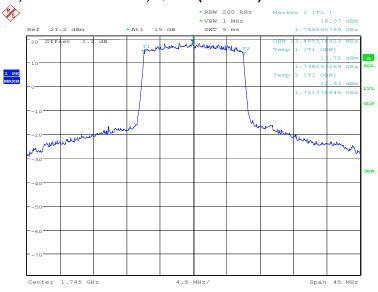
LTE band 66, 15MHz (99%)
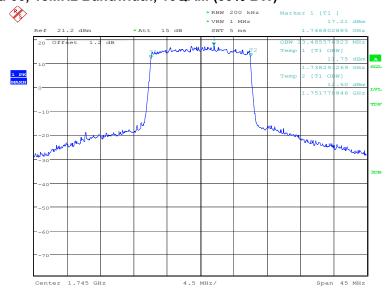
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
1745.0	QPSK	16QAM
	13485.58	13485.58

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

Date: 18.NOV.2019 19:16:55

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

Date: 18.NOV.2019 19:18:20
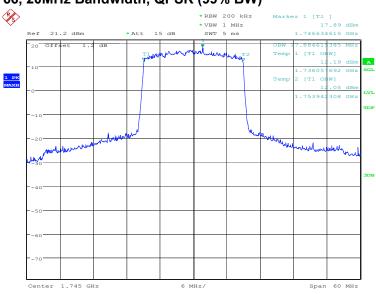
LTE band 66, 20MHz (99%)
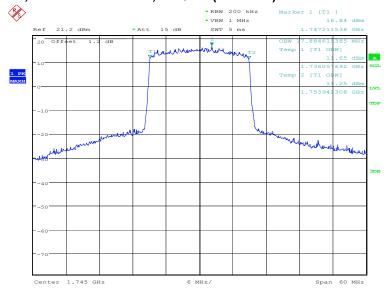
Frequency(MHz)	Occupied Bandwidth (99%) (kHz)	
	QPSK	16QAM
1745.0	17884.62	17884.62

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

Date: 18.NOV.2019 19:19:46

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

Date: 18.NOV.2019 19:21:10

A.5   EMISSION BANDWIDTH

A.5.1Emission Bandwidth Results

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

The measurement method is from ANSI C63.26:

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

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

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

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

e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
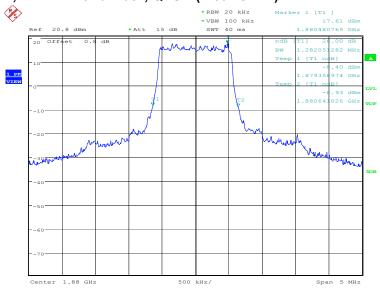
LTE band 2, 1.4MHz (-26dBc)
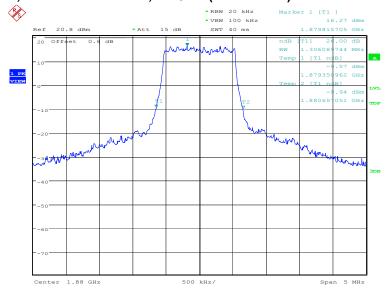
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
1880.0	1282.05	1306.09

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

Date: 18.NOV.2019 19:23:11

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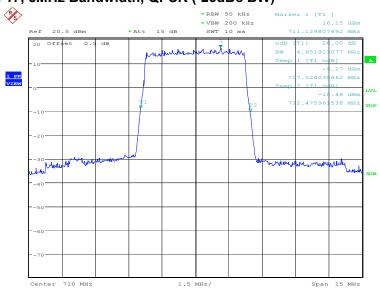

Date: 18.NOV.2019 19:24:35
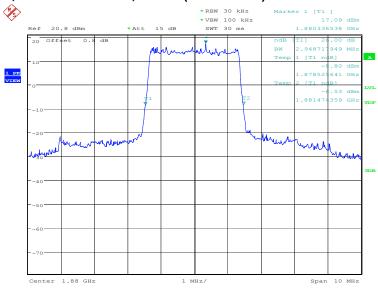
LTE band 2, 3MHz (-26dBc)
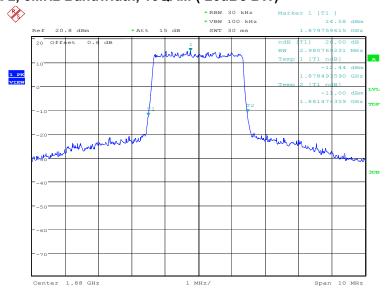
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1880.0	QPSK	16QAM
	2948.72	2980.77

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

Date: 18.NOV.2019 19:26:02

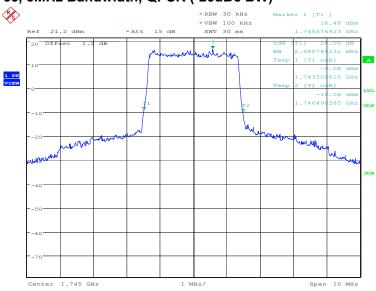**LTE band 2, 3MHz Bandwidth, 16QAM (-26dBc BW)**

Date: 18.NOV.2019 19:27:27
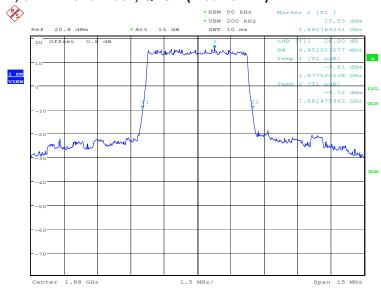
LTE band 2, 5MHz (-26dBc)
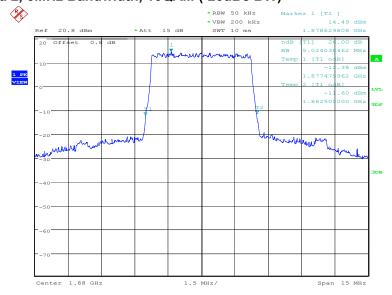
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
1880.0	4951.92	5024.04

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

Date: 18.NOV.2019 19:28:53

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

Date: 18.NOV.2019 19:30:18
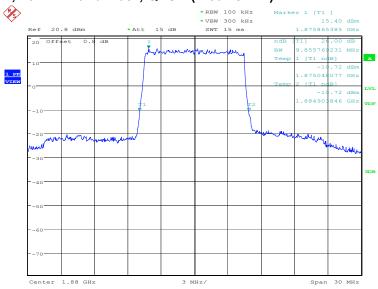
LTE band 2, 10MHz (-26dBc)
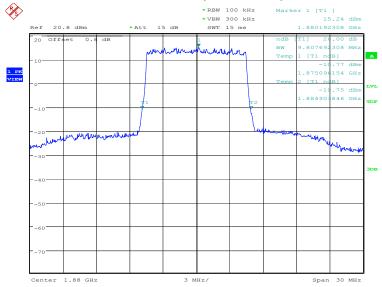
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
1880.0	9855.77	9807.69

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

Date: 18.NOV.2019 19:31:45

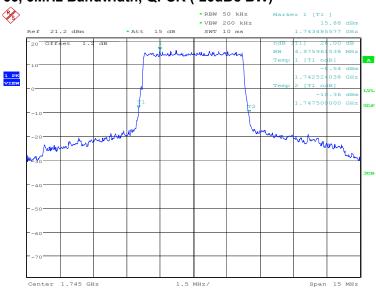### LTE band 2, 10MHz Bandwidth, 16QAM (-26dBc BW)

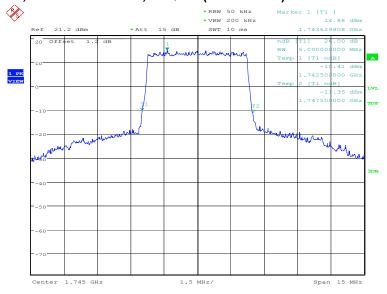Date: 18.NOV.2019 19:33:09
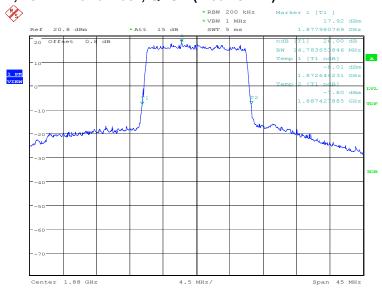
LTE band 2, 15MHz (-26dBc)
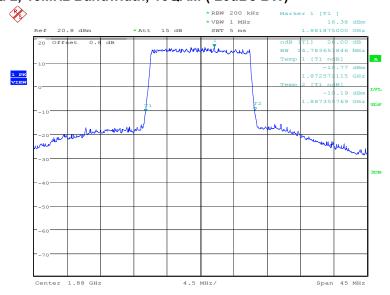
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
1880.0	14783.65	14783.65

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

Date: 18.NOV.2019 19:34:36

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

Date: 18.NOV.2019 19:36:01
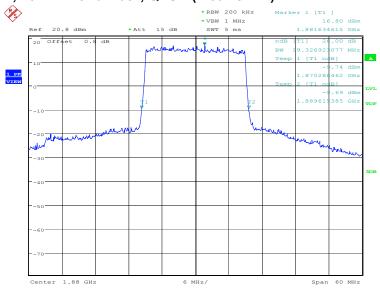
LTE band 2, 20MHz (-26dBc)
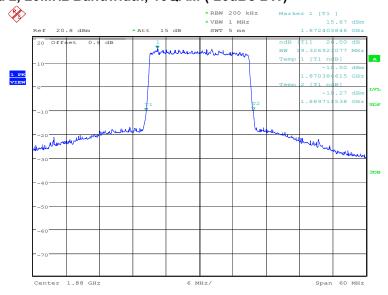
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
1880.0	19326.92	19326.92

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

Date: 18.NOV.2019 19:37:27

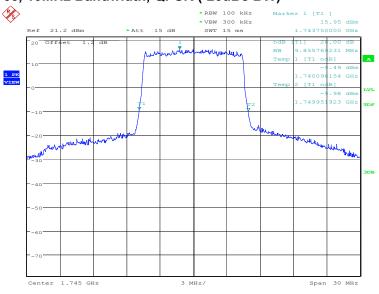## LTE band 2, 20MHz Bandwidth, 16QAM (-26dBc BW)

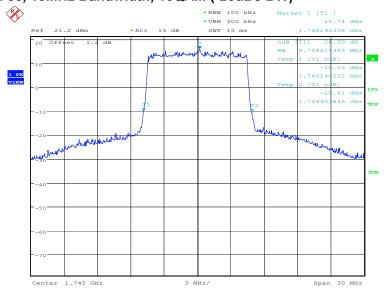Date: 18.NOV.2019 19:38:52
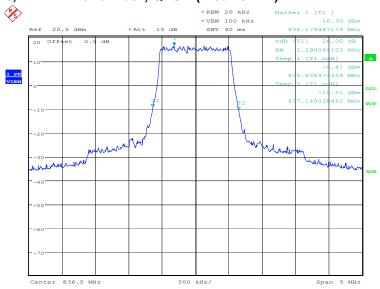
LTE band 5, 1.4MHz (-26dBc)
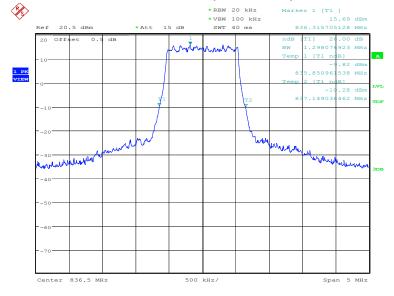
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
836.5	1290.06	1298.08

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

Date: 18.NOV.2019 19:41:22

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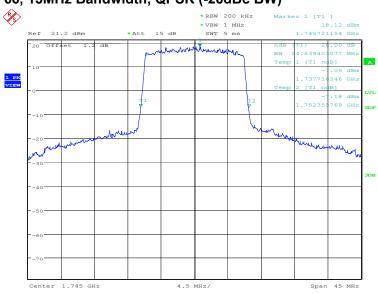

Date: 18.NOV.2019 19:42:47
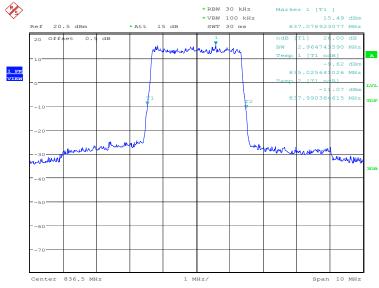
LTE band 5, 3MHz (-26dBc)
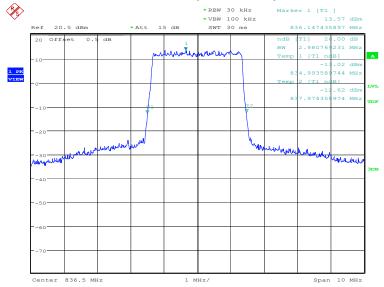
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
836.5	2964.74	2980.77

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

Date: 18.NOV.2019 19:44:13

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

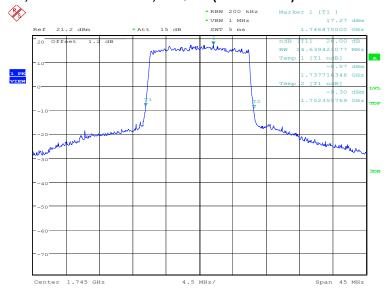
Date: 18.NOV.2019 19:45:38
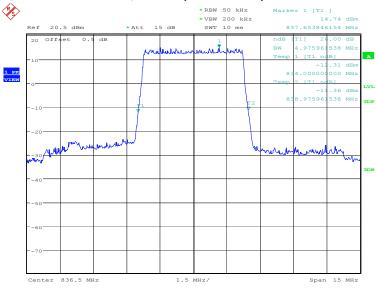
LTE band 5, 5MHz (-26dBc)
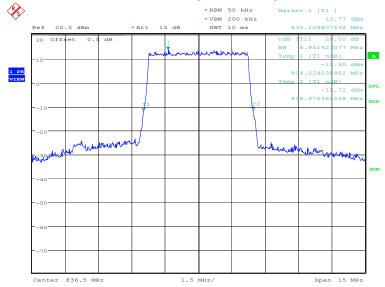
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
836.5	4975.96	4951.92

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

Date: 18.NOV.2019 19:47:04

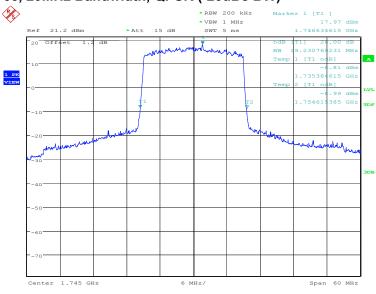**LTE band 5, 5MHz Bandwidth, 16QAM (-26dBc BW)**

Date: 18.NOV.2019 19:48:29
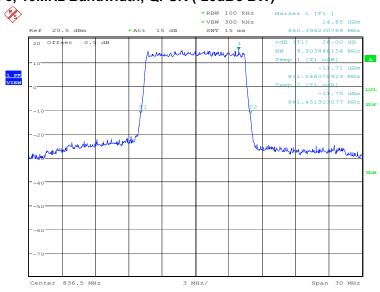
LTE band 5, 10MHz (-26dBc)
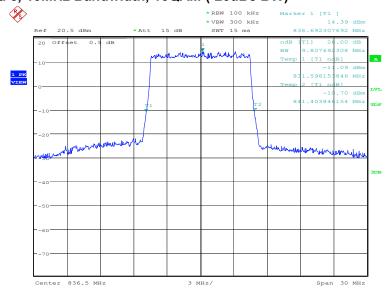
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
836.5	9903.85	9807.69

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

Date: 18.NOV.2019 19:49:55

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

Date: 18.NOV.2019 19:51:20
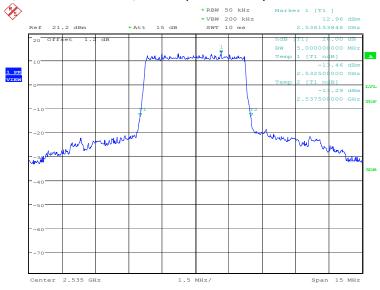
LTE band 7, 5MHz (-26dBc)
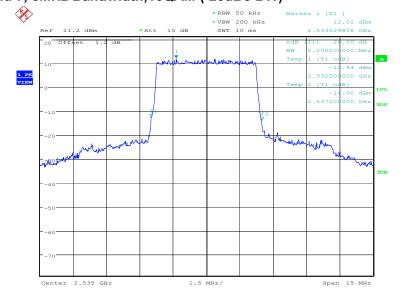
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
2535.0	5000.00	5000.00

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

Date: 18.NOV.2019 19:52:48

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

Date: 18.NOV.2019 19:54:13
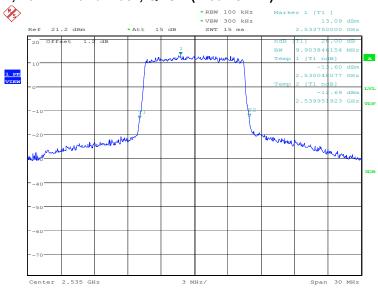
LTE band 7, 10MHz (-26dBc)
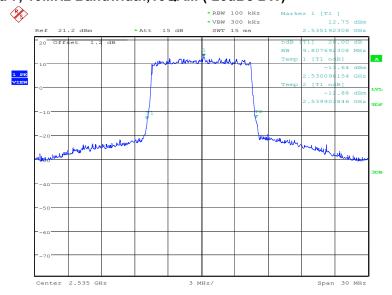
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
2535.0	9903.85	9807.69

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

Date: 18.NOV.2019 19:55:39

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

Date: 18.NOV.2019 19:57:04
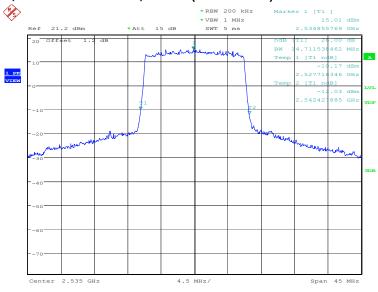
LTE band 7, 15MHz (-26dBc)
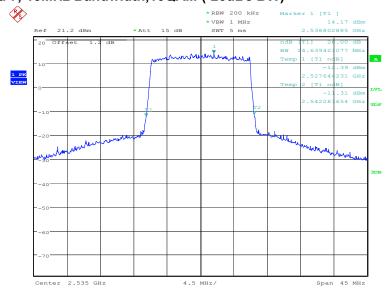
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
2535.0	QPSK	16QAM
	14711.54	14639.42

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

Date: 18.NOV.2019 19:58:31

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

Date: 18.NOV.2019 19:59:56
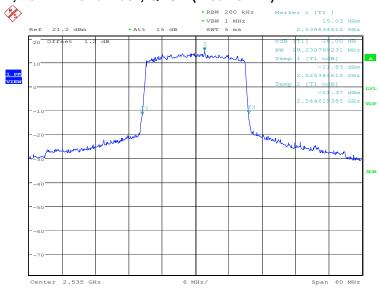
LTE band 7, 20MHz (-26dBc)
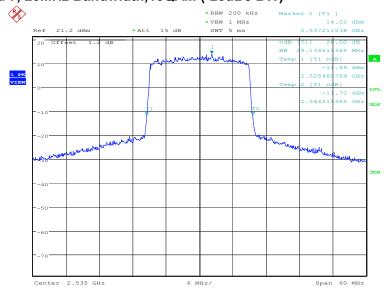
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
2535.0	QPSK	16QAM
	19230.77	19134.62

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

Date: 18.NOV.2019 20:01:22

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

Date: 18.NOV.2019 20:02:47
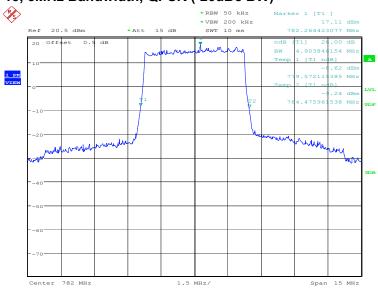
LTE band 13, 5MHz (-26dBc)
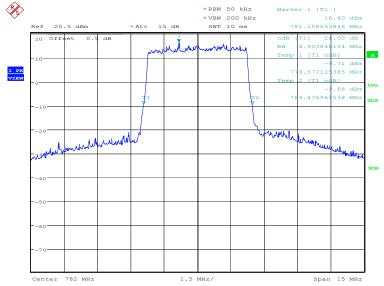
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
782.0	4903.85	4903.85

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

Date: 18.NOV.2019 20:05:04

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

Date: 18.NOV.2019 20:06:29
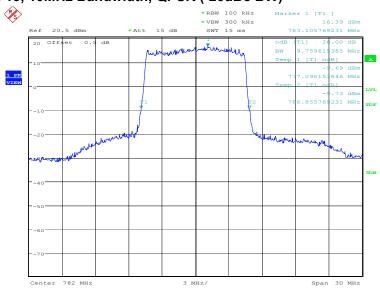
LTE band 13, 10MHz (-26dBc)
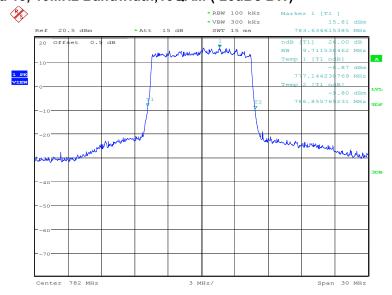
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
782.0	9759.62	9711.54

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

Date: 18.NOV.2019 20:07:56

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

Date: 18.NOV.2019 20:09:21

LTE band 17, 5MHz (-26dBc)
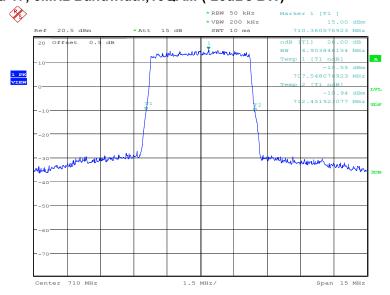
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
710.0	4951.92	4903.85

LTE band 17, 5MHz Bandwidth, QPSK (-26dBc BW)

Date: 18.NOV.2019 20:10:48

LTE band 17, 5MHz Bandwidth,16QAM (-26dBc BW)

Date: 18.NOV.2019 20:12:13
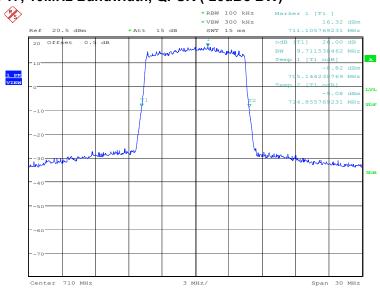
LTE band 17, 10MHz (-26dBc)
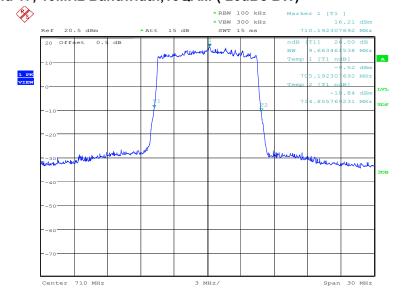
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
710.0	9711.54	9663.46

LTE band 17, 10MHz Bandwidth, QPSK (-26dBc BW)

Date: 18.NOV.2019 20:13:40

LTE band 17, 10MHz Bandwidth,16QAM (-26dBc BW)

Date: 18.NOV.2019 20:15:05
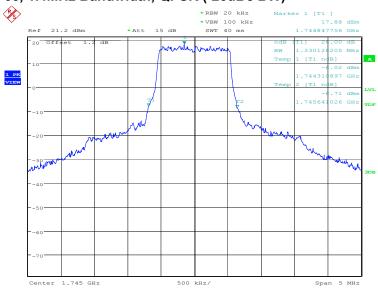
LTE band 66, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
1745.0	1330.13	1322.12

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

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

LTE band 66, 3MHz (-26dBc)
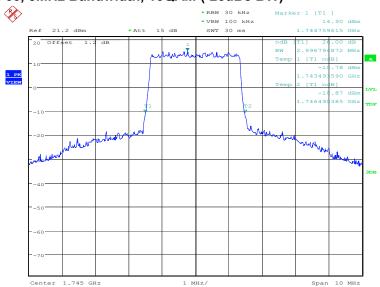
Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
1745.0	QPSK	16QAM
	2980.77	2996.79

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

Date: 18.NOV.2019 20:19:28

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

Date: 18.NOV.2019 20:20:53

LTE band 66, 5MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
1745.0	4975.96	5000.00

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

Date: 18.NOV.2019 20:22:20

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

Date: 18.NOV.2019 20:23:45

LTE band 66, 10MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
1745.0	9855.77	9759.62

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

Date: 18.NOV.2019 20:25:12

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

Date: 18.NOV.2019 20:26:37

LTE band 66, 15MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc) (kHz)	
	QPSK	16QAM
1745.0	14639.42	14639.42

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

Date: 18.NOV.2019 20:28:03

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

Date: 18.NOV.2019 20:29:28

LTE band 66, 20MHz (-26dBc)

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

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

Date: 18.NOV.2019 20:30:55

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

Date: 18.NOV.2019 20:32:20

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.

According to KDB 971168, a relaxation of the reference bandwidth is often provided for measurements within a specified frequency range at the edge of the authorized frequency block/band. This is often implemented by permitting the use of a narrower RBW (typically limited to a minimum RBW of 1% of the OBW) for measuring the out-of-band emissions without a requirement to integrate the result over the full reference bandwidth.

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 that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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

A.6.2 Measurement result

Only the worst case result is given below

LTE band 2

OBW: 1RB-low_offset

Date: 4.DEC.2019 17:36:53

LOW BAND EDGE BLOCK-1RB-low_offset
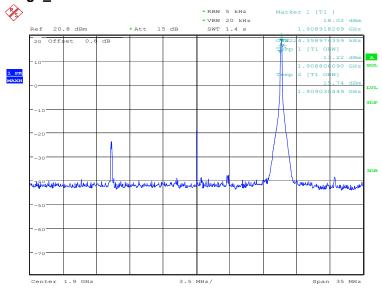
Date: 4.DEC.2019 17:38:32

OBW: 1RB-high_offset
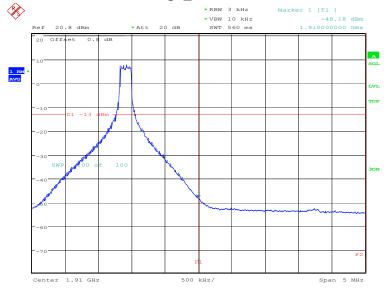
Date: 4.DEC.2019 17:41:46

HIGH BAND EDGE BLOCK-1RB-high_offset
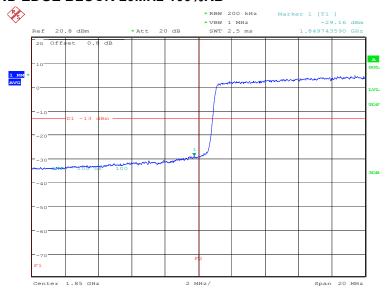
Date: 4.DEC.2019 17:43:24

LOW BAND EDGE BLOCK-20MHz-100%RB
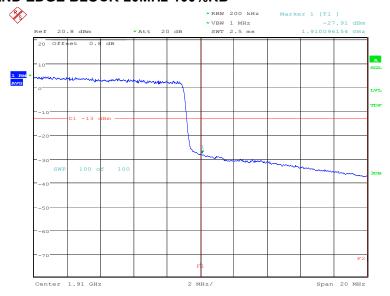
Date: 4.DEC.2019 17:40:26

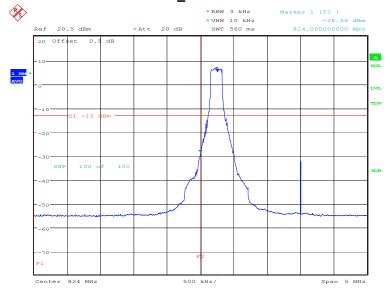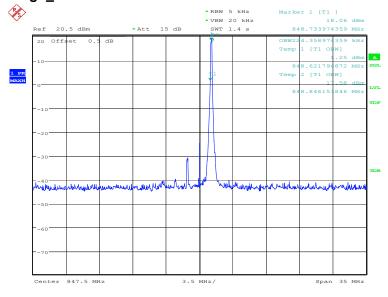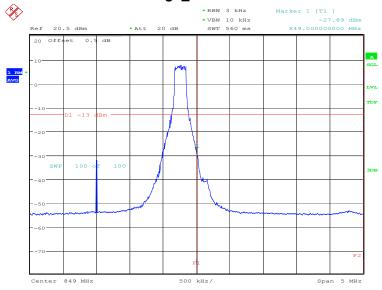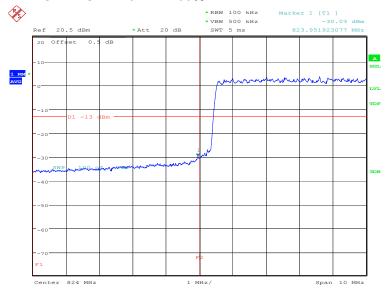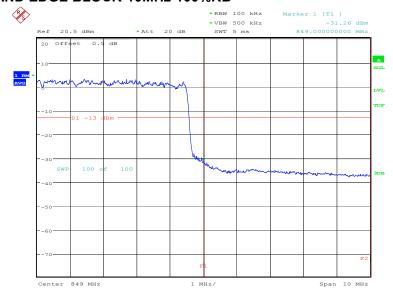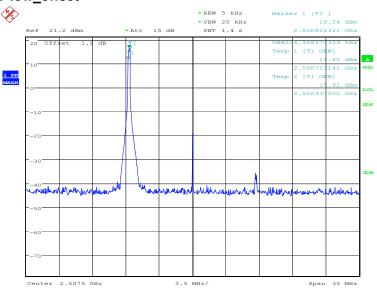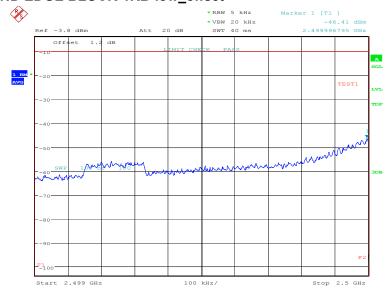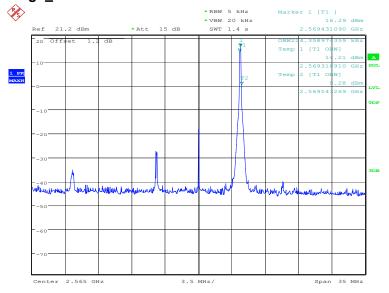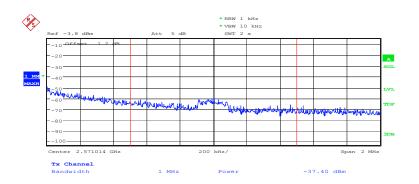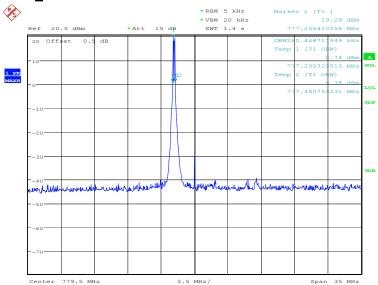## HIGH BAND EDGE BLOCK-20MHz-100%RB
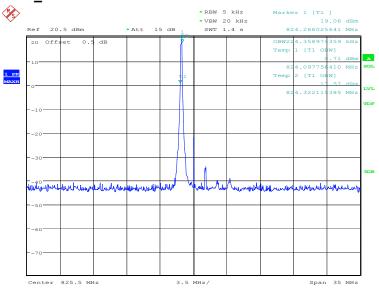
Date: 4.DEC.2019 17:45:16

LTE band 5
OBW: 1RB-low_offset

Date: 4.DEC.2019 17:47:25

LOW BAND EDGE BLOCK-1RB-low_offset

Date: 4.DEC.2019 17:49:04

OBW: 1RB-high_offset

Date: 4.DEC.2019 17:52:57

HIGH BAND EDGE BLOCK-1RB-high_offset

Date: 4.DEC.2019 17:54:35

LOW BAND EDGE BLOCK-10MHz-100%RB

Date: 4.DEC.2019 17:50:58

HIGH BAND EDGE BLOCK-10MHz-100%RB

Date: 4.DEC.2019 17:56:29

LTE band 7
OBW: 1RB-low_offset

Date: 4.DEC.2019 17:57:52

LOW BAND EDGE BLOCK-1RB-low_offset
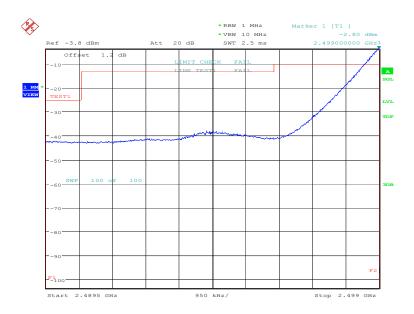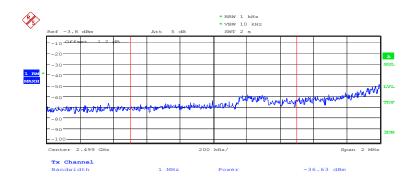
Date: 4.DEC.2019 17:59:38
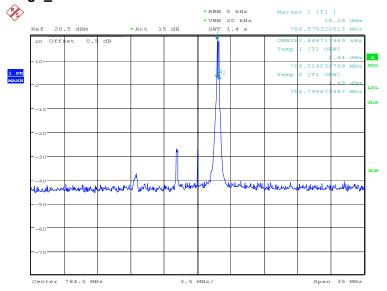
Date: 4.DEC.2019 18:01:20

Date: 4.DEC.2019 18:01:32

OBW: 1RB-high_offset
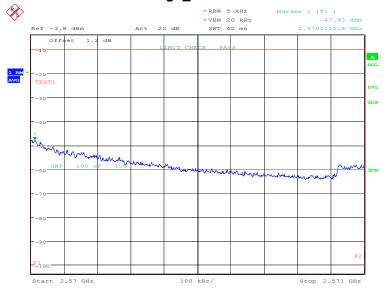
Date: 4.DEC.2019 18:07:11
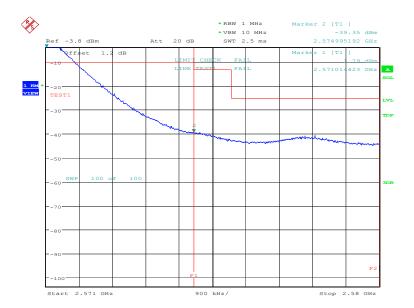
HIGH BAND EDGE BLOCK-1RB-high_offset

Date: 4.DEC.2019 18:08:57

```
RBW 1 MHz          Marker 2 [T1 ]
VBW 10 MHz                    -39.35 dBm
Ref -3.8 dBm        Att  20 dB    SWT 2.5 ms        2.574995192 GHz
Offset  1.2 dB                          Marker 1 [T1 ]
-10              LIMIT CHECK   FAIL              1.79 dBm
                 LINE TEST1    FAIL          2.571014423 GHz
-20
TEST1
-30
-40
-50
SWP   100 of   100
-60
-70
-80
-90
-100                    F1                                    F2
Start 2.571 GHz          900 kHz/          Stop 2.58 GHz
```

Date: 4.DEC.2019 18:10:42


```
RBW 1 kHz
VBW 10 kHz
Ref -3.8 dBm        Att  5 dB     SWT 2 s
-10  Offset  1.2 dB
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 2.571014 GHz      200 kHz/          Span 2 MHz
Tx Channel
Bandwidth          1 MHz      Power          -37.40 dBm
```

Date: 4.DEC.2019 18:10:54
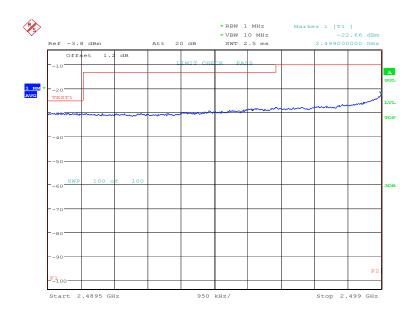
LOW BAND EDGE BLOCK-20MHz-100%RB

Date: 4.DEC.2019 18:03:30
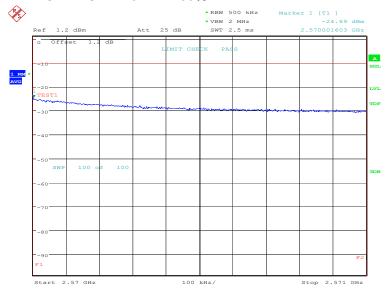
Date: 4.DEC.2019 18:05:10
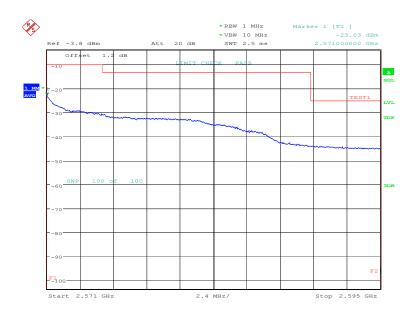
HIGH BAND EDGE BLOCK-20MHz-100%RB

Date: 4.DEC.2019 18:12:52

Date: 4.DEC.2019 18:14:32

LTE band 13
OBW: 1RB-low_offset

Center 779.5 MHz   3.5 MHz/   Span 35 MHz
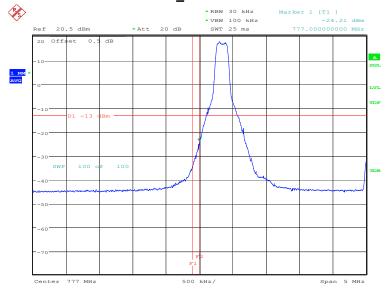
Date: 4.DEC.2019 18:16:43
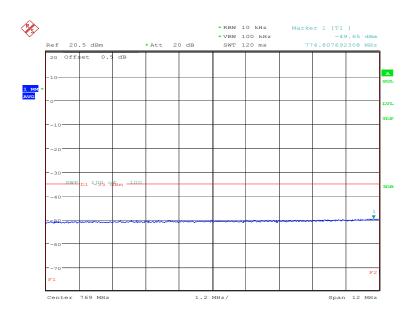
LOW BAND EDGE BLOCK-1RB-low_offset

Date: 4.DEC.2019 18:18:22
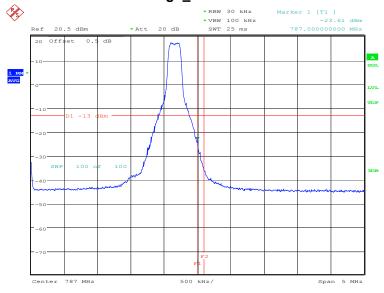

Date: 4.DEC.2019 18:20:00
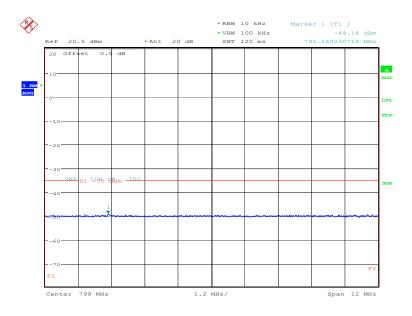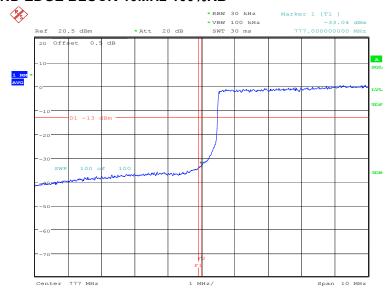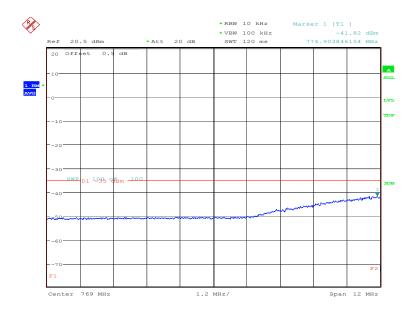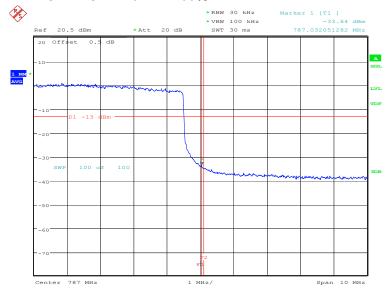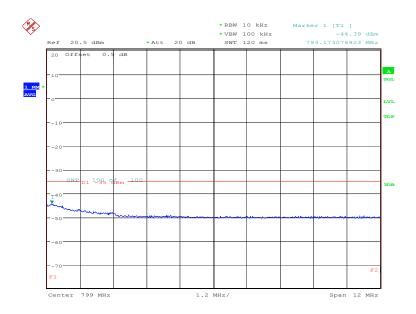
OBW: 1RB-high_offset

Date: 4.DEC.2019 18:25:30

HIGH BAND EDGE BLOCK-1RB-high_offset

Date: 4.DEC.2019 18:27:09

Date: 4.DEC.2019 18:28:47

LOW BAND EDGE BLOCK-10MHz-100%RB

Date: 4.DEC.2019 18:21:54

Date: 4.DEC.2019 18:23:31

HIGH BAND EDGE BLOCK-10MHz-100%RB


```
                                          * RBW  30 kHz        Marker 1 [T1 ]
                                          * VBW  100 kHz                -33.64 dBm
      Ref   20.5 dBm        * Att  20 dB   SWT  30 ms         787.032051282 MHz

      20  Offset   0.5 dB
     -10                                                                        A
                                                                                SGL
  1 RM *
  AVG                                                                           LVL

                                                                                TDF
     -10   D1 -13 dBm
     -20
     -30                                                                        3DB
          SWP   100 of   100
     -40
     -50
     -60
     -70
                                    F2
                                    F1
      Center  787 MHz          1 MHz/              Span  10 MHz
```
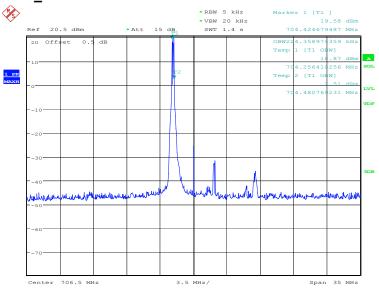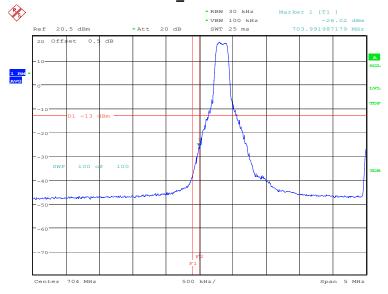
Date: 4.DEC.2019 18:30:41


```
                                          * RBW  10 kHz        Marker 1 [T1 ]
                                          * VBW  100 kHz                -44.39 dBm
      Ref   20.5 dBm        * Att  20 dB   SWT  120 ms        793.173076923 MHz

      20  Offset   0.5 dB
      10                                                                         A
                                                                                SGL
  1 RM *
  AVG                                                                           LVL
       0
                                                                                TDF
     -10
     -20
     -30                                                                        3DB
          SWP  100 of  100
     -40   D1 -35 dBm
     -50
     -60
     -70                                                                    F2
          F1
      Center  799 MHz          1.2 MHz/            Span  12 MHz
```

Date: 4.DEC.2019 18:32:19

LTE band 17
OBW: 1RB-low_offset

Date: 4.DEC.2019 18:34:19
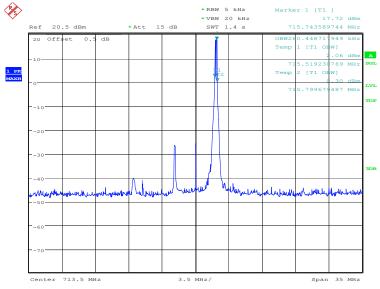
LOW BAND EDGE BLOCK-1RB-low_offset
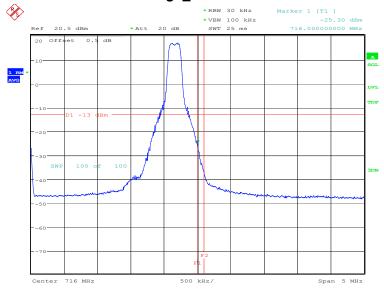

Date: 4.DEC.2019 18:35:57

OBW: 1RB-high_offset

Date: 4.DEC.2019 18:39:51
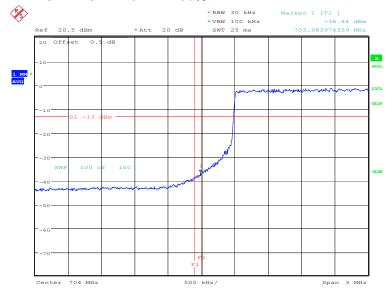
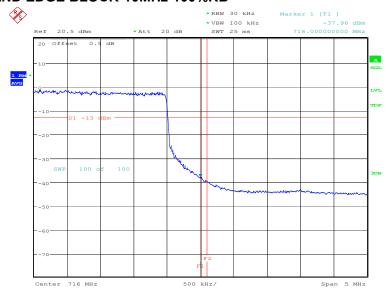## HIGH BAND EDGE BLOCK-1RB-high_offset

Date: 4.DEC.2019 18:41:29

LOW BAND EDGE BLOCK-10MHz-100%RB

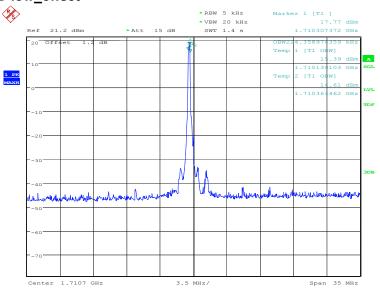Date: 4.DEC.2019 18:37:52

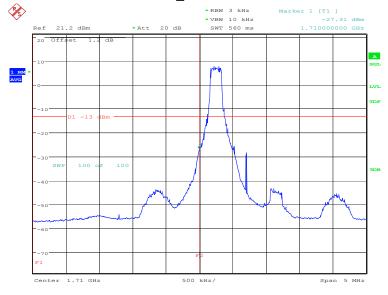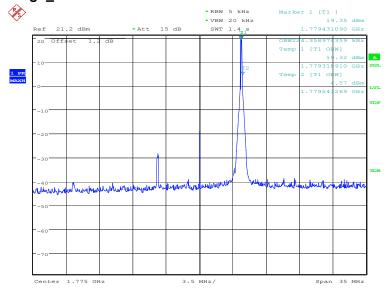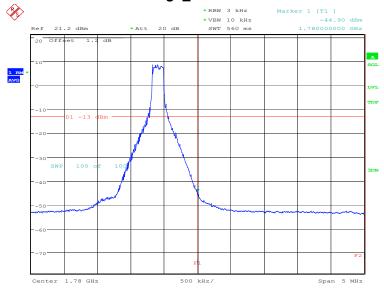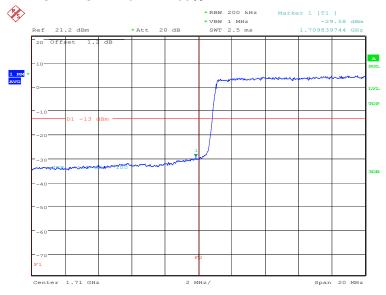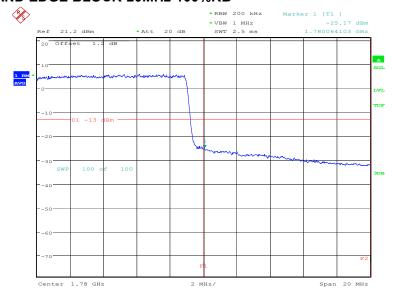## HIGH BAND EDGE BLOCK-10MHz-100%RB

Date: 4.DEC.2019 18:43:24

LTE band 66
OBW: 1RB-low_offset

Date: 4.DEC.2019 18:45:24

LOW BAND EDGE BLOCK-1RB-low_offset

Date: 4.DEC.2019 18:47:02

OBW: 1RB-high_offset

Date: 4.DEC.2019 18:50:57

HIGH BAND EDGE BLOCK-1RB-high_offset

Date: 4.DEC.2019 18:52:35

LOW BAND EDGE BLOCK-20MHz-100%RB

Date: 4.DEC.2019 18:48:58

HIGH BAND EDGE BLOCK-20MHz-100%RB

Date: 4.DEC.2019 18:54:30

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. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
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.

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 that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.
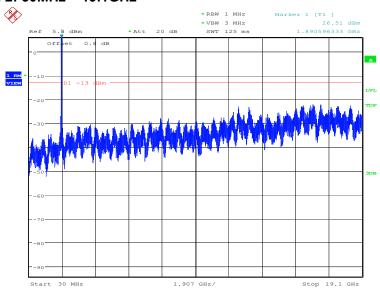
Part 27.53(c) states for operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.
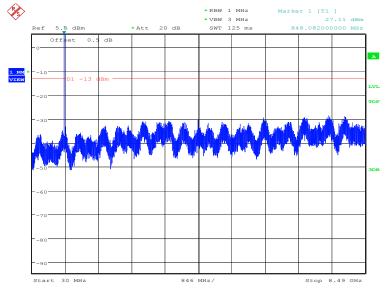
A. 7.2 Measurement result
Only the worst case result is given below

LTE band 2: 30MHz – 19.1GHz

Date: 4.DEC.2019 18:55:31

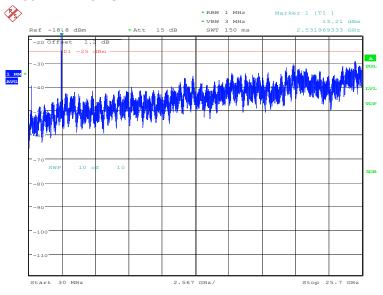### LTE band 5: 30MHz – 8.49GHz

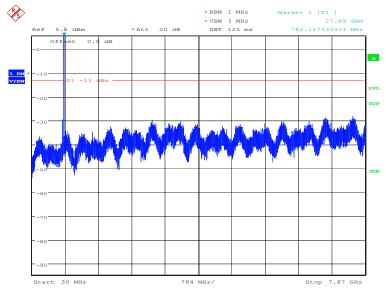Date: 4.DEC.2019 18:56:47

LTE band 7: 30MHz – 25.7GHz

Date: 4.DEC.2019 18:58:00
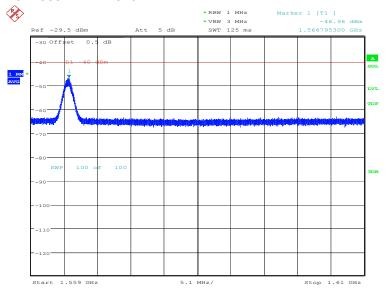
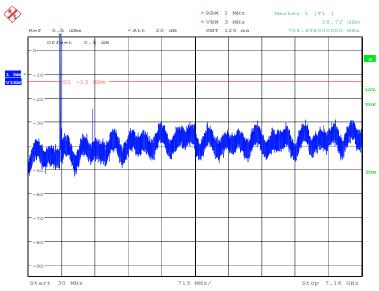## LTE band 13: 30MHz – 7.87GHz

Date: 4.DEC.2019 18:58:27

LTE band 13: 1559MHz – 1610MHz

Date: 4.DEC.2019 18:59:01
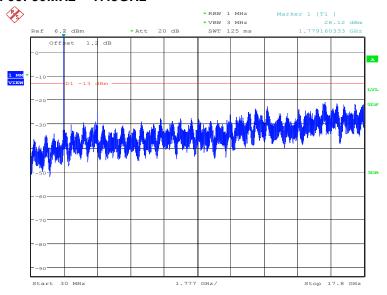
LTE band 17: 30MHz – 7.16GHz

Date: 4.DEC.2019 18:59:29

LTE band 66: 30MHz – 17.8GHz

Date: 4.DEC.2019 18:59:57

A.8 PEAK-TO-AVERAGE POWER RATIO

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

According to KDB 971168 5.7.1:

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

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

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

d) Set the measurement interval to 1 ms

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

A.8.1 Measurement limit

not exceed 13 dB

A.8.2 Measurement results

LTE band 2, 20MHz

Frequency(MHz)	PAPR(dB)	
	QPSK	16QAM
1880.0	6.70	7.44

LTE band 7, 20MHz

Frequency(MHz)	PAPR(dB)	
	QPSK	16QAM
2535.0	6.73	7.44

LTE band 13, 10MHz

Frequency(MHz)	PAPR(dB)	
	QPSK	16QAM
782.0	5.22	6.09

LTE band 17, 10MHz

Frequency(MHz)	PAPR(dB)	
	QPSK	16QAM
710.0	5.19	6.19

LTE band 66, 20MHz

Frequency(MHz)	PAPR(dB)	
	QPSK	16QAM
1745.0	6.54	7.28

ANNEX B: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP ®

Certificate of Accreditation to ISO/IEC 17025:2005

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 17025:2005.
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).*

2019-09-26 through 2020-09-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program

END OF REPORT