

**CFR 47 PART 2
CFR 47 PART 22 H
CFR 47 PART 24 E
CFR 47 PART 27
CFR 47 PART 90
RSS-130, RSS-132, RSS-133, RSS-139, RSS-140**

TEST REPORT

For

LTE Cat1-bis module

MODEL NUMBER: GC02S1-NA2

REPORT NUMBER: 4791792510.2-5-RF-1

ISSUE DATE: October 9, 2025

**FCC ID: 2AAGMGC02SA
IC ID: 12732A-GC02SA**

Prepared for

**SEQUANS COMMUNICATIONS
55 Boulevard Charles de Gaulle, 92700 Colombes, France**

Prepared by

**UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch
Room 101, Building 2, No.4, Information Road, Songshan Lake, Dongguan, Guangdong, China**

**Tel: +86 769 22038881
Fax: +86 769 33244054
Website: www.ul.com**

Revision History

Rev.	Issue Date	Revisions	Revised By
V0	October 9, 2025	Initial Issue	\

Note:

1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < CFR 47 PART 22 H, CFR 47 PART 24 E, CFR 47 PART 27, CFR 47 PART 90, RSS-130, RSS-132, RSS-133, RSS-139, RSS-140 > when < Simple Acceptance > decision rule is applied
3. This is a report based on original report of FCC ID: 2AAGMGC02SA, IC ID: 12732A-GC02SA, spot check is performed for conducted power, occupied bandwidth, band-edge and radiated spurious emission.

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	6
4.1. MEASURING INSTRUMENT CALIBRATION.....	6
4.2. MEASUREMENT UNCERTAINTY	6
5. EQUIPMENT UNDER TEST	7
5.1. DESCRIPTION OF EUT.....	7
5.2. TEST CHANNEL CONFIGURATION	7
5.3. MAXIMUM AVERAGE OUTPUT POWER.....	11
5.4. WORST-CASE CONFIGURATION AND MODE	11
5.5. DESCRIPTION OF AVAILABLE ANTENNAS	12
5.7. DESCRIPTION OF TEST SETUP	13
6. MEASURING INSTRUMENT AND SOFTWARE USED.....	14
7. ANTENNA TERMINAL TEST RESULTS	15
7.1. EFFECTIVE (ISOTROPIC) RADIATED POWER OF TRANSMITTER.....	15
7.2. OCCUPIED BANDWIDTH.....	19
7.3. BAND EDGE EMISSIONS	20
8. RADIATED SPURIOUS EMISSIONS.....	22
8.1.1. LTE Band 25	27

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: SEQUANS COMMUNICATIONS
Address: 55 Boulevard Charles de Gaulle, 92700 Colombes, France

Manufacturer Information

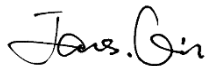
Company Name: SEQUANS COMMUNICATIONS
Address: 55 Boulevard Charles de Gaulle, 92700 Colombes, France

EUT Information

EUT Name: LTE Cat1-bis module
Model: GC02S1-NA2
Brand: \
Sample Received Date: June 1, 2025
Sample Status: Normal
Sample ID: 8564055-2
Date of Tested: June 5, 2025 ~ October 9, 2025

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 PART 22 H	PASS
CFR 47 PART 24 E	PASS
CFR 47 PART 27	PASS
CFR 47 PART 90	PASS
RSS-130, RSS-132, RSS-133, RSS-139, RSS-140	PASS

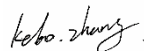
Prepared By:



James Qin

Project Engineer

Checked By:



Kebo Zhang

Operations Leader

Approved By:



Stephen Guo

Operations Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26-2015, 971168 D01 Power Meas License Digital Systems v03r01, 971168 D02 Misc Rev Approv License Devices v02r01, 412172 D01 v01r01 Determining ERP and EIRP, CFR 47 Part 2, Part 22 H, Part 24 E, Part 27, PART 90, RSS-130, RSS-132, RSS-133, RSS-139, RSS-140.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	A2LA (Certificate No.: 4102.01) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. FCC (FCC Designation No.: CN1187) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules ISED (Company No.: 21320) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046. VCCI (Registration No.: C-20202, G-20240, R-20248 and T-20202) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the membership No. is 3793. Facility Name: Chamber E, the VCCI registration No. is G-20240 and R-20248 Shielding Room F, the VCCI registration No. is C-20202 and T-20202
---------------------------	--

Note 1: All tests measurement facilities use to collect the measurement data are located Room 101, Building 2, No.4, Information Road, Songshan Lake, Dongguan, Guangdong, China

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

Note 3: For below 30 MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30 MHz had been correlated to measurements performed on an OFS.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Conduction emission	3.62 dB
Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz)	2.2 dB
Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz)	4.00 dB
Radiated Emission (Included Fundamental Emission) (1 GHz to 40 GHz)	5.78 dB (1 GHz-18 GHz)
	5.23dB (18 GHz-26 GHz)
	5.64 dB (26 GHz-40 GHz)
Bandwidth	1.1 %
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name:	LTE Cat1-bis module
Model:	GC02S1-NA2
Description:	The EUT is a moduel with LTE Cat1bis wireless technology.

5.2. TEST CHANNEL CONFIGURATION

General note: only the bandwidth marked with ☒ is supported.

Band	Test Frequency ID	Bandwidth [MHz]	NUL	Frequency of Uplink [MHz]	NDL	Frequency of Downlink [MHz]
Band 2	Low Range	☐1.4	18607	1850.7	607	1930.7
		☐3	18615	1851.5	615	1931.5
		☒5	18625	1852.5	625	1932.5
		☒10	18650	1855	650	1935
		☒15	18675	1857.5	675	1937.5
		☒20	18700	1860	700	1940
	Mid Range	☐1.4/☐3/☒5/☒10/☒15/☒20	18900	1880	900	1960
	High Range	☐1.4	19193	1909.3	1193	1989.3
		☐3	19185	1908.5	1185	1988.5
		☒5	19175	1907.5	1175	1987.5
		☒10	19150	1905	1150	1985
		☒15	19125	1902.5	1125	1982.5
		☒20	19100	1900	1100	1980

Band	Test Frequency ID	Bandwidth [MHz]	NUL	Frequency of Uplink [MHz]	NDL	Frequency of Downlink [MHz]
Band 4	Low Range	☐1.4	19957	1710.7	1957	2110.7
		☐3	19965	1711.5	1965	2111.5
		☒5	19975	1712.5	1975	2112.5
		☒10	20000	1715	2000	2115
		☒15	20025	1717.5	2025	2117.5
		☒20	20050	1720	2050	2120
	Mid Range	☐1.4/☐3/☒5/☒10/☒15/☒20	20175	1732.5	2175	2132.5
	High Range	☐1.4	20393	1754.3	2393	2154.3
		☐3	20385	1753.5	2385	2153.5
		☒5	20375	1752.5	2375	2152.5
		☒10	20350	1750	2350	2150
		☒15	20325	1747.5	2325	2147.5
		☒20	20300	1745	2300	2145

Band	Test Frequency ID	Bandwidth [MHz]	NUL	Frequency of Uplink [MHz]	NDL	Frequency of Downlink [MHz]
Band 5	Low Range	□1.4	20407	824.7	2407	869.7
		□3	20415	825.5	2415	870.5
		☒5	20425	826.5	2425	871.5
		☒10	20450	829	2450	874
	Mid Range	□1.4/ □3/☒5/☒10	20525	836.5	2525	881.5
	High Range	□1.4	20643	848.3	2643	893.3
		□3	20635	847.5	2635	892.5
		☒5	20625	846.5	2625	891.5
		☒10	20600	844	2600	889

Band	Test Frequency ID	Bandwidth [MHz]	NUL	Frequency of Uplink [MHz]	NDL	Frequency of Downlink [MHz]
Band 12	Low Range	□1.4	23017	699.7	5017	729.7
		□3	23025	700.5	5025	730.5
		☒5	23035	701.5	5035	731.5
		☒10	23060	704	5060	734
	Mid Range	□1.4/□3/☒5/☒10	23095	707.5	5095	737.5
	High Range	□1.4	23173	715.3	5173	745.3
		□3	23165	714.5	5165	744.5
		☒5	23155	713.5	5155	743.5
		☒10	23130	711	5130	741

Band	Test Frequency ID	Bandwidth [MHz]	NUL	Frequency of Uplink [MHz]	NDL	Frequency of Downlink [MHz]
Band 13	Low Range	☒5	23205	779.5	5205	748.5
		☒10	23230	782	5230	751
	Mid Range	☒5/☒10	23230	782	5230	751
	High Range	☒5	23255	784.5	5255	753.5
		☒10	23230	782	5230	751

Band	Test Frequency ID	Bandwidth [MHz]	NUL	Frequency of Uplink [MHz]	NDL	Frequency of Downlink [MHz]
Band 14	Low Range	☒5	23305	790.5	5305	760.5
		☒10	23330	793	5330	763
	Mid Range	☒5/☒10	23330	793	5330	763
	High Range	☒5	23355	795.5	5355	765.5

		☒10	23330	793	5330	763
--	--	-----	-------	-----	------	-----

Band	Test Frequency ID	Bandwidth [MHz]	NUL	Frequency of Uplink [MHz]	NDL	Frequency of Downlink [MHz]
Band 17	Low Range	☒5	23755	706.5	5755	736.5
		☒10	23780	709	5780	739
	Mid Range	☒5/☒10	23790	710	5790	740
	High Range	☒5	23825	713.5	5825	743.5
		☒10	23800	711	5800	741

Band	Test Frequency ID	Bandwidth [MHz]	NUL	Frequency of Uplink [MHz]	NDL	Frequency of Downlink [MHz]
Band 25	Low Range	☐1.4	26047	1850.7	8047	1930.7
		☐3	26055	1851.5	8055	1931.5
		☒5	26065	1852.5	8065	1932.5
		☒10	26090	1855	8090	1935
		☒15	26115	1857.5	8115	1937.5
		☒20	26140	1860	8140	1940
	Mid Range	☐1.4/☐3/☒5/☒10/☒15/☒20	26365	1882.5	8365	1962.5
	High Range	☐1.4	26683	1914.3	8683	1994.3
		☐3	26675	1913.5	8675	1993.5
		☒5	26665	1912.5	8665	1992.5
		☒10	26640	1910	8640	1990
		☒15	26615	1907.5	8615	1987.5
		☒20	26590	1905	8590	1985

Band	Test Frequency ID	Bandwidth [MHz]	NUL	Frequency of Uplink [MHz]	NDL	Frequency of Downlink [MHz]
Band 66	Low Range	☐1.4	131979	1710.7	66443	2110.7
		☐3	131987	1711.5	66451	2111.5
		☒5	131997	1712.5	66461	2112.5
		☒10	132022	1715	66486	2115
		☒15	132047	1717.5	66511	2117.5
		☒20	132072	1720	66536	2120
	Mid Range Tx ¹	☐1.4/☐3/☒5/☒10/☒15/☒20	132322	1745	66786	2145
	Mid Range	☐1.4/☐3/☒5/☒10/☒15/☒20	132422	1755	66886	2155
	Paired High Range ²	☐1.4	132665	1779.3	67129	2179.3
		☐3	132657	1778.5	67121	2178.5
		☒5	132647	1777.5	67111	2177.5
		☒10	132622	1775	67086	2175

		☒ 15	132597	1772.5	67061	2172.5
		☒ 20	132572	1770	67036	2170
	High Range ³	☐ 1.4	NA	NA	67329	2199.3
		☐ 3	NA	NA	67321	2198.5
		☒ 5	NA	NA	67311	2197.5
		☒ 10	NA	NA	67286	2195
		☒ 15	NA	NA	67261	2192.5
		☒ 20	NA	NA	67236	2190

Note 1:Applicable for transmitter testing.

Note 2:Applicable if UL is configured on the CC.

Note 3:Applicable if no UL is configured on the CC.

5.3. MAXIMUM AVERAGE OUTPUT POWER

Conducted power is remeasured and compared with the value in the original report, they are on the same level, so the conducted power can levered from the original report.

5.4. WORST-CASE CONFIGURATION AND MODE

During all testing, EUT is in link mode with base station emulator at maximum power level. The worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on QPSK, 16QAM. All testing was performed using QPSK and 16QAM modulations to represent the worst case.

The radiated spurious emissions measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT was investigated in three orthogonal orientations X,Y and Z. It was determined that X orientation was the worst-case.

Radiated spurious emissions were investigated below 30 MHz, 30 MHz - 1 GHz and above 1 GHz. There are no emissions found on below 1GHz and above 18 GHz, the emissions between 1 GHz – 18 GHz are tested at the low, mid, high channel and the worse configuration.

Test Items	Worst case test configuration			
Description	Modulation	Channel	Bandwidth (MHz)	RB Configuration
Radiated Spurious Emissions	QPSK	L, M, H	Maximum BW	RB size=1, RB Location= Low

5.5. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Band	Antenna Type	MAX Antenna Gain (dBi)
Ant0	LTE Band 2	EXTERNAL	2.4
Ant0	LTE Band 4	EXTERNAL	2.4
Ant0	LTE Band 5	EXTERNAL	1.5
Ant0	LTE Band 12	EXTERNAL	1.9
Ant0	LTE Band 13	EXTERNAL	1.5
Ant0	LTE Band 14	EXTERNAL	1.5
Ant0	LTE Band 17	EXTERNAL	1.9
Ant0	LTE Band 25	EXTERNAL	2.4
Ant0	LTE Band 66	EXTERNAL	2.4

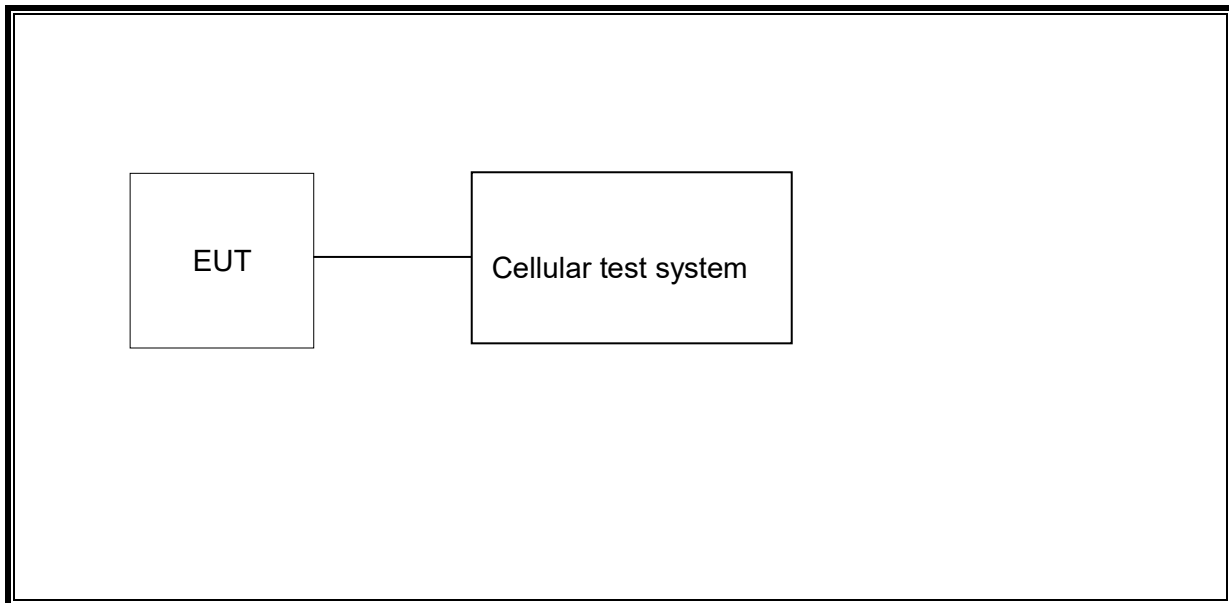
The antenna gain is smaller than the maximum allowed gain listed in the original FCC ID: 2AAGMGC02SA, IC ID: 12732A-GC02SA report No: 75461RRF.001, 75461RRF.002, 75461RRF.003, so the EIRP won't exceed the limit.

Band	Transmit and Receive Mode	Description
LTE Band 2	☒ 1TX, 1RX	The antenna can be used as transmitting/receiving antenna
LTE Band 4	☒ 1TX, 1RX	The antenna can be used as transmitting/receiving antenna
LTE Band 5	☒ 1TX, 1RX	The antenna can be used as transmitting/receiving antenna
LTE Band 12	☒ 1TX, 1RX	The antenna can be used as transmitting/receiving antenna
LTE Band 13	☒ 1TX, 1RX	The antenna can be used as transmitting/receiving antenna
LTE Band 14	☒ 1TX, 1RX	The antenna can be used as transmitting/receiving antenna
LTE Band 17	☒ 1TX, 1RX	The antenna can be used as transmitting/receiving antenna
LTE Band 25	☒ 1TX, 1RX	The antenna can be used as transmitting/receiving antenna
LTE Band 66	☒ 1TX, 1RX	The antenna can be used as transmitting/receiving antenna

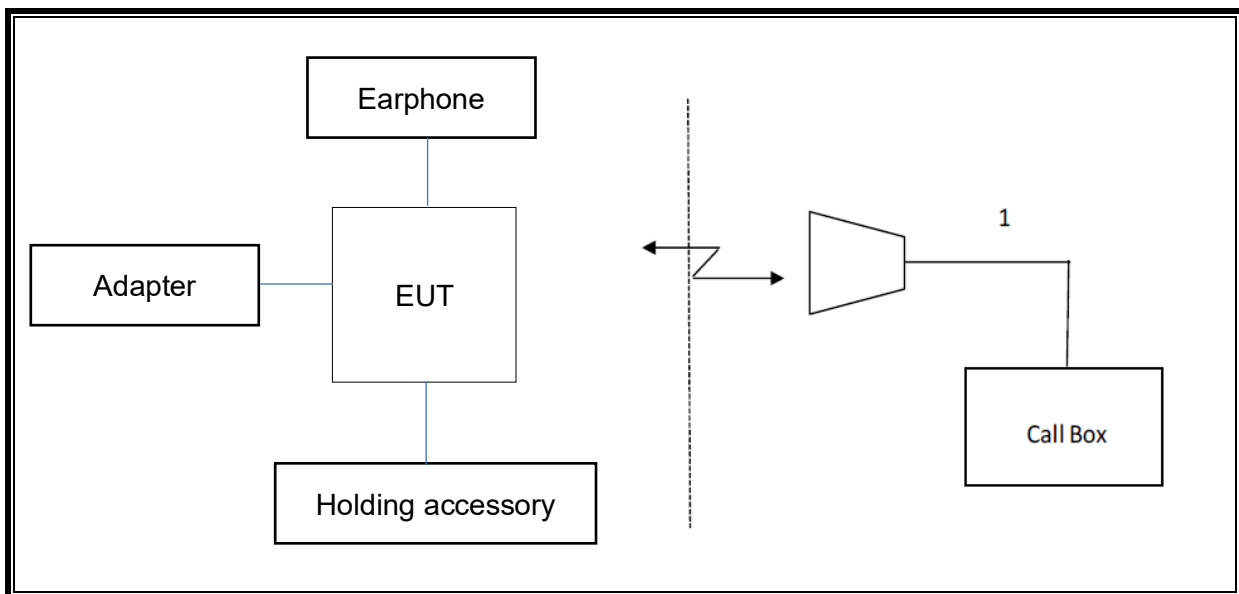
Note: The value of the antenna gain was declared by customer.

5.7. DESCRIPTION OF TEST SETUP

Conducted



Radiated



6. MEASURING INSTRUMENT AND SOFTWARE USED

Antenna Terminal Test						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☒	Spectrum Analyzer	R&S	FSV40	S422060001	Sep.28, 2024	Sep.27, 2025
☒	Wideband Radio Communication Tester	R&S	CMW500	155523	Nov.01, 2024	Oct.31, 2025
☒	DC Power Supply	Array	3662A	A1512015	Sep.28, 2024	Sep.27, 2025
Software						
Used	Description		Manufacturer	Name		Version
☒	Tonsend Cellular Test System		Tonsend	JS1120 RF Auto Test System		3.1.46
Radiated Test						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☒	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Sep.28, 2024	Sep.27, 2025
☒	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130959	Dec.13, 2024	Dec.12, 2027
☒	Preamplifier	HP	8447D	2944A09099	Sep.28, 2024	Sep.27, 2025
☒	EMI Measurement Receiver	R&S	ESR26	101377	Sep.28, 2024	Sep.27, 2025
☒	Horn Antenna	TDK	HRN-0118	130939	Dec.12, 2024	Dec.11, 2027
☒	Preamplifier	TDK	PA-02-0118	TRS-305-00067	Sep.28, 2024	Sep.27, 2025
☒	Preamplifier	TDK	PA-02-2	TRS-307-00003	Sep.28, 2024	Sep.27, 2025
☒	Loop antenna	Schwarzbeck	1519B	00008	Dec.09, 2024	Dec.08, 2027
☒	High Pass Filter	Wi	WHKX10-2700-3000-18000-40SS	23	/	/
Software						
Used	Description		Manufacturer	Name		Version
☒	Test Software for Radiated disturbance		Farad	EZ-EMC		Ver. UL-3A1

7. ANTENNA TERMINAL TEST RESULTS

7.1. EFFECTIVE (ISOTROPIC) RADIATED POWER OF TRANSMITTER

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50
RSS-130, RSS-132, RSS-133, RSS-139, RSS-140

LIMITS

22.913(a) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
24.232(c) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.
27.50(c) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.
27.50(d) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watts EIRP.
27.50(h) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.
In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

TEST PROCEDURE

Refer to ANSI C63.26:2015 and KDB 971168 D01 Section 5.6

$ERP/EIRP = P_{Meas} + GT - LC$

where:

ERP or EIRP = effective or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas} , typically dBW or dBm);

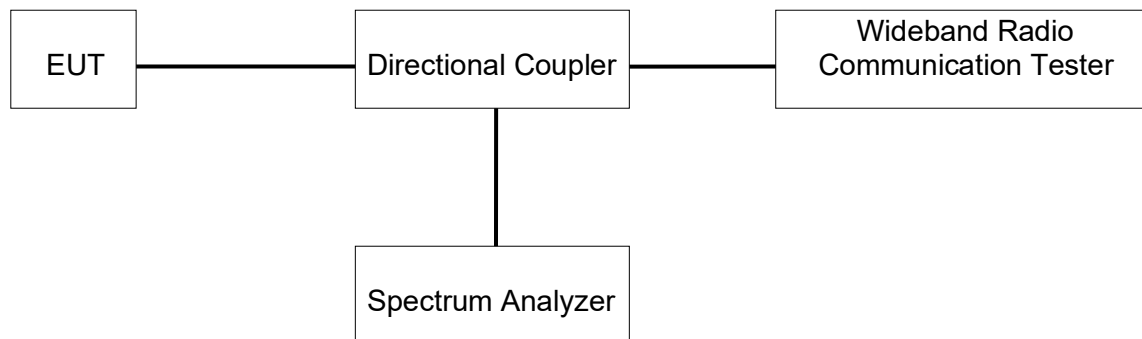
P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

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

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

The transmitter has a maximum output powers as follows and maximum ERP/EIRP is tabulated in section 5.3.

TEST SETUP



TEST ENVIRONMENT

Temperature	23.5°C	Relative Humidity	66.1%
Atmosphere Pressure	101kPa	Test Voltage	DC 5 V

RESULTS

LTE BAND 5:

Bandwidth (MHz)	Modulation	RB size	RB offset	AVERAGE POWER (original)			AVERAGE POWER (verification)		
				Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.
				20450	20525	20600	20450	20525	20600
				Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)
				829.00	836.50	844.00	829.00	836.50	844.00
10	QPSK	1	0	22.32	22.75	22.61	22.05	22.45	22.50
		1	24	22.40	22.64	22.57	22.06	22.19	22.18
		1	49	22.37	22.65	22.31	21.90	22.39	22.21
		25	0	21.29	21.50	21.33	21.03	21.01	20.96
		25	12	21.34	21.44	21.42	21.18	21.27	21.13
		25	25	21.29	21.43	21.26	20.93	21.10	21.07
		50	0	21.17	21.36	21.23	20.72	21.14	20.77
	16QAM	1	0	21.43	21.39	21.43	21.15	20.91	21.08
		1	24	21.51	21.37	21.49	21.22	20.87	21.31
		1	49	21.47	21.39	21.20	21.36	21.09	21.04
		25	0	20.29	20.47	20.32	19.81	20.10	20.06
		25	12	20.34	20.43	20.36	20.10	20.26	20.01
		25	25	20.32	20.45	20.25	20.06	20.18	20.02
		50	0	*	*	*	*	*	*

LTE BAND 12:

Bandwidth (MHz)	Modulation	RB size	RB offset	AVERAGE POWER (original)			AVERAGE POWER (verification)		
				Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.
				23060	23095	23130	23060	23095	23130
				Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)
				704.00	707.50	711.00	704.00	707.50	711.00
10	QPSK	1	0	22.31	22.24	22.68	22.05	21.88	22.48
		1	24	22.19	22.40	22.93	21.72	22.09	22.48
		1	49	22.30	22.49	22.19	22.01	22.30	21.85
		25	0	21.14	21.12	21.65	20.68	21.00	21.52
		25	12	21.12	21.28	21.75	20.66	21.16	21.53
		25	25	21.24	21.37	21.44	21.07	21.07	21.24
		50	0	21.21	21.32	21.28	20.99	20.99	20.97
	16QAM	1	0	21.43	21.29	21.59	21.30	21.12	21.31
		1	24	21.31	21.48	21.94	21.11	21.13	21.60
		1	49	21.44	21.58	21.24	20.99	21.19	20.97
		25	0	20.05	20.02	20.51	19.65	19.60	20.06
		25	12	20.03	20.20	20.63	19.87	19.94	20.24
		25	25	20.17	20.30	20.29	19.68	20.05	19.89
		50	0	22.06	22.41	22.49	21.91	21.96	22.01

LTE BAND 13:

Bandwidth (MHz)	Modulation	RB size	RB offset	AVERAGE POWER (original)			AVERAGE POWER (verification)		
				Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.
				23205	23230	23255	23205	23230	23255
				Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)
				779.50	782.00	784.50	779.50	782.00	784.50
5	QPSK	1	0	22.77	\	22.71	22.28	\	22.57
		1	12	23.23	\	22.63	23.00	\	22.37
		1	24	23.22	\	22.82	22.76	\	22.67
		12	0	21.97	\	21.53	21.78	\	21.34
		12	6	22.15	\	21.51	21.94	\	21.05
		12	13	22.24	\	21.54	22.03	\	21.05
		25	0	22.12	\	21.51	21.87	\	21.23
	16QAM	1	0	21.86	\	21.67	21.63	\	21.22
		1	12	22.35	\	21.56	21.97	\	21.14
		1	24	22.32	\	21.83	21.97	\	21.47
		12	0	20.84	\	20.43	20.48	\	20.28
		12	6	20.99	\	20.42	20.71	\	20.03
		12	13	21.12	\	20.50	20.63	\	20.39
		25	0	21.06	\	20.51	20.59	\	20.24

LTE BAND 14:

Bandwidth (MHz)	Modulation	RB size	RB offset	AVERAGE POWER (original)			AVERAGE POWER (verification)		
				Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.
				23305	23330	23355	23305	23330	23355
				Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)
				790.50	793.00	795.50	790.50	793.00	795.50
5	QPSK	1	0	23.07	\	22.66	22.72	\	22.22
		1	12	22.98	\	22.55	22.86	\	22.35
		1	24	22.52	\	22.56	22.26	\	22.15
		12	0	21.95	\	21.45	21.48	\	21.07
		12	6	21.90	\	21.33	21.51	\	20.90
		12	13	21.83	\	21.41	21.48	\	21.26
		25	0	21.87	\	21.34	21.51	\	21.05
	16QAM	1	0	22.10	\	21.61	21.74	\	21.36
		1	12	22.03	\	21.50	21.82	\	21.11
		1	24	21.62	\	21.53	21.19	\	21.08
		12	0	20.89	\	20.37	20.63	\	20.00
		12	6	20.82	\	20.27	20.63	\	20.11
		12	13	20.74	\	20.35	20.52	\	20.08
		25	0	20.78	\	20.36	20.59	\	19.90

LTE BAND 25:

Bandwidth (MHz)	Modulation	RB size	RB offset	AVERAGE POWER (original)			AVERAGE POWER (verification)		
				Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.
				26115	26365	26615	26115	26365	26615
				Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)
				1857.50	1882.50	1907.50	1857.50	1882.50	1907.50
15	QPSK	1	0	22.04	22.21	22.60	21.54	22.09	22.47
		1	38	21.93	22.65	22.46	21.72	22.37	22.06
		1	74	21.73	22.49	22.09	21.34	22.21	21.70
		36	0	20.91	21.35	21.49	20.72	20.92	21.21
		36	18	20.93	21.65	21.43	20.63	21.26	20.96
		36	37	20.92	21.25	21.38	20.67	21.05	21.17
		75	0	20.88	21.15	20.61	20.72	21.04	20.22
	16QAM	1	0	20.67	21.13	21.67	20.43	20.81	21.24
		1	38	20.99	21.53	21.63	20.68	21.41	21.46
		1	74	20.89	21.48	21.25	20.48	21.12	20.80
		36	0	19.94	19.86	20.00	19.63	19.72	19.57
		36	18	19.92	20.44	20.41	19.76	19.97	20.04
		36	37	19.97	20.61	20.41	19.68	20.39	20.04
		75	0	*	*	*	*	*	*

LTE BAND 66:

Bandwidth (MHz)	Modulation	RB size	RB offset	AVERAGE POWER (original)			AVERAGE POWER (verification)		
				Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.
				131997	132322	132647	131997	132322	132647
				Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)	Freq. (MHz)
				1712.50	1745.00	1777.50	1712.50	1745.00	1777.50
5	QPSK	1	0	22.94	22.61	22.14	22.79	22.33	21.84
		1	12	22.86	22.60	22.13	22.53	22.15	21.65
		1	24	22.79	22.64	22.02	22.35	22.38	21.70
		12	0	21.78	21.60	21.10	21.44	21.12	20.88
		12	6	21.74	21.58	21.08	21.42	21.16	20.89
		12	13	21.69	21.64	21.12	21.49	21.41	20.86
		25	0	21.69	21.61	21.07	21.39	21.45	20.97
	16QAM	1	0	21.75	21.66	21.24	21.35	21.35	20.91
		1	12	21.69	21.67	21.23	21.54	21.39	21.13
		1	24	21.64	21.75	21.19	21.22	21.32	20.87
		12	0	20.68	20.63	20.05	20.57	20.45	19.68
		12	6	20.63	20.59	20.07	20.53	20.28	19.58
		12	13	20.65	20.66	20.10	20.35	20.24	19.87
		25	0	20.68	20.67	20.09	20.30	20.45	19.93

7.2. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

RSS-130, RSS-132, RSS-133, RSS-139, RSS-140

LIMITS

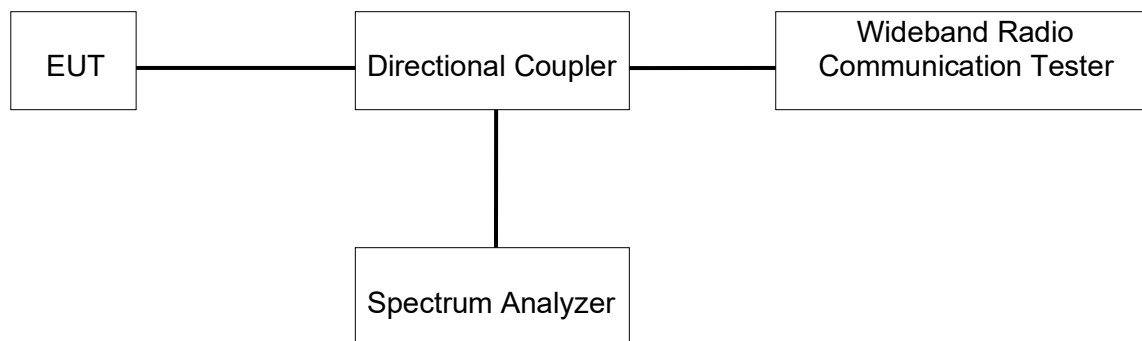
For reporting purposes only.

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

(Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01)

TEST SETUP



TEST ENVIRONMENT

Temperature	23.5°C	Relative Humidity	66.1%
Atmosphere Pressure	101kPa	Test Voltage	DC 5 V

RESULTS

There is no limit required and power is the same for low, middle and high channel, therefore, only middle channel was tested.

Please refer to Appendix LTE.

7.3. BAND EDGE EMISSIONS

RULE PART(S)

FCC §2.1051, §22.917, §24.238, §27.53
RSS-130, RSS-132, RSS-133, RSS-139, RSS-140

LIMITS

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.

TEST PROCEDURE

Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01

The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power.

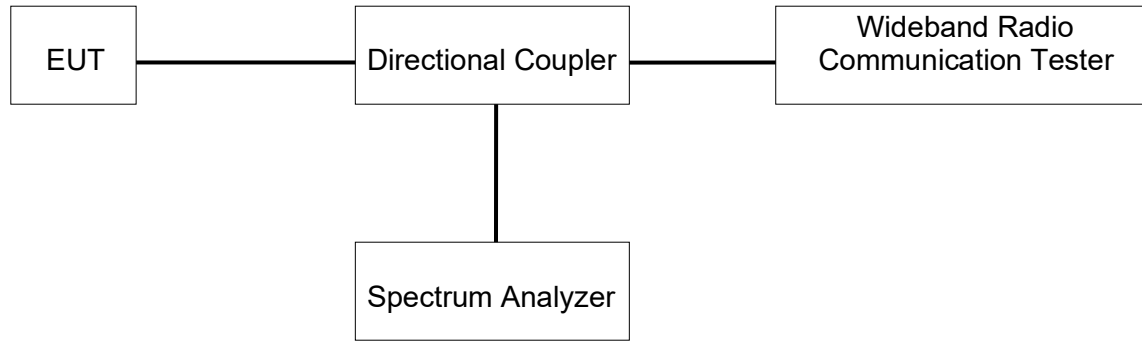
The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

- a) Set the RBW = 1 ~ 5 % of OBW (Typically limited to a minimum RBW of 1% of the OBW)
- b) Set VBW $\geq 3 \times$ RBW;
- c) Set span ≥ 1.5 times the OBW;
- d) Sweep time = Auto;
- e) Detector = RMS;
- f) Ensure that the number of measurement points $\geq 2 \times$ Span/RBW;
- g) Trace mode = Average (100);

Test procedure for LTE Band 7/38/41

(m)(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). 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. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

TEST SETUP



TEST ENVIRONMENT

Temperature	23.5°C	Relative Humidity	66.1%
Atmosphere Pressure	101kPa	Test Voltage	DC 5 V

RESULTS

Please refer to Appendix LTE.

8. RADIATED SPURIOUS EMISSIONS

LIMIT

FCC §2.1051 and §22.917. RSS-132 Clause 5.5.

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.

In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz. At P_o transmitting power, the specified minimum attenuation becomes $43 + 10 \log(P_o)$, and the level in dBm relative to P_o becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log(P_o \text{ in mW}) - 30] = -13 \text{ dBm}$$

FCC §2.1051 and §24.238. RSS-133, Clause 6.5.

The power of emissions shall be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log(P)$ dB. P in watts.

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

At P_o transmitting power, the specified minimum attenuation becomes $43 + 10 \log(P_o)$, and the level in dBm relative to P_o becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log(P_o \text{ in mW}) - 30] = -13 \text{ dBm}$$

FCC §27.53 (c):

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. Compliance is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

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. Compliance is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

FCC §27.53 (f):

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC §27.53 (g):

For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater.

RSS-130, Clause 4.7.1:

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} P$ (watts), dB.

RSS-130, Clause 4.7.2:

The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least $65 + 10 \log_{10} p(\text{watts})$, dB, for mobile and portable equipment.

The e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

FCC §27.53 (h), RSS-139, Clause 6.6:

According to specification, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

FCC § 90.543 (e) & (f):

Transmitters operating in 758-768 MHz and 788-798 MHz bands must meet the emission limitations in (e) of this section.

(e) For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations.

(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.

(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + $10 \log (P)$ dB.

(4) Compliance with the provisions of paragraphs (e) (1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(5) Compliance with the provisions of paragraph (e) (3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

(f) For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

RSS-140 Clause 4.4:

The power of any unwanted emission outside the bands 758-768 MHz and 788-798 MHz shall be attenuated below the transmitter output power P in dBW as follows, where p is the transmitter output power in watts:

a) For any frequency between 769-775 MHz and 799-806 MHz:

- i) $76 + 10 \log (p)$, dB in a 6.25 kHz band for fixed and base station equipment.
- ii) $65 + 10 \log (p)$, dB in a 6.25 kHz band for mobile and portable/hand-held equipment

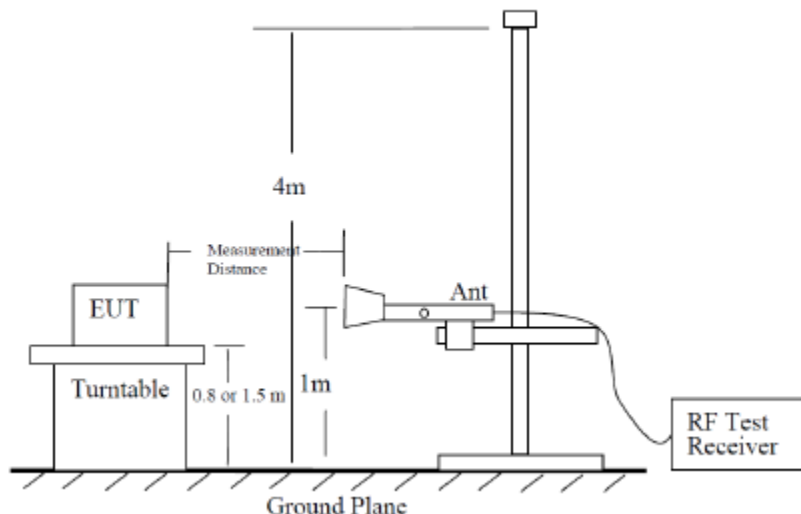
b) For any frequency between 775-788 MHz, above 806 MHz, and below 758 MHz:

$43 + 10 \log (p)$, dB in a bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency bands 758-768 MHz and 788-798 MHz, a resolution bandwidth of 30 kHz may be employed.

In addition, the equivalent isotropically radiated power (e.i.r.p.) of all emissions, including harmonics in the band 1559-1610 MHz, shall not exceed -70 dBW/MHz for wideband emissions, and -80 dBW/kHz for discrete emissions of less than 700 Hz bandwidth.

TEST PROCEDURE

Following the test configuration shown below, radiated emissions measured directly from the EUT and convert the measured field strength or received power to ERP or EIRP, as required, for comparison to the applicable limits. As stated in section 5.5.1 of ANSI C63.26-2015. The field strength measurement method by using a test site validated to the requirement of ANSI C63.4 is an alternative method to the substitution measurement.



Radiated Power Measurement Calculation According to ANSI C63.26-2015

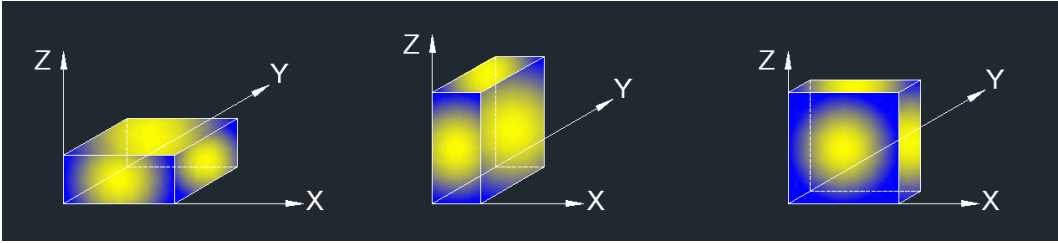
- $E \text{ (dB}\mu\text{V/m)} = \text{Measured amplitude level (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}.$
- $E \text{ (dB}\mu\text{V/m)} = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}.$
- $E \text{ (dB}\mu\text{V/m)} = \text{EIRP (dBm)} - 20\log(D) + 104.8$, where D is the measurement distance (in the far field region) in m.
- $\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$, where D is the measurement distance (in the far field region) in m.

So, from d)

The measuring distance is at 3m, then $20 \cdot \log(3) = 9.5424$

Then, $\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 9.5424 - 104.8 = E \text{ (dB}\mu\text{V/m)} - 95.2576$

X axis, Y axis, Z axis:



Note: The EUT was investigated in three orthogonal orientations X/Y/Z on LTE antenna to determine the worst-case orientation. X orientation is finally determined the worst.

TEST ENVIRONMENT

Temperature	23.8°C	Relative Humidity	64%
Atmosphere Pressure	101kPa	Test Voltage	DC 5 V

RESULTS

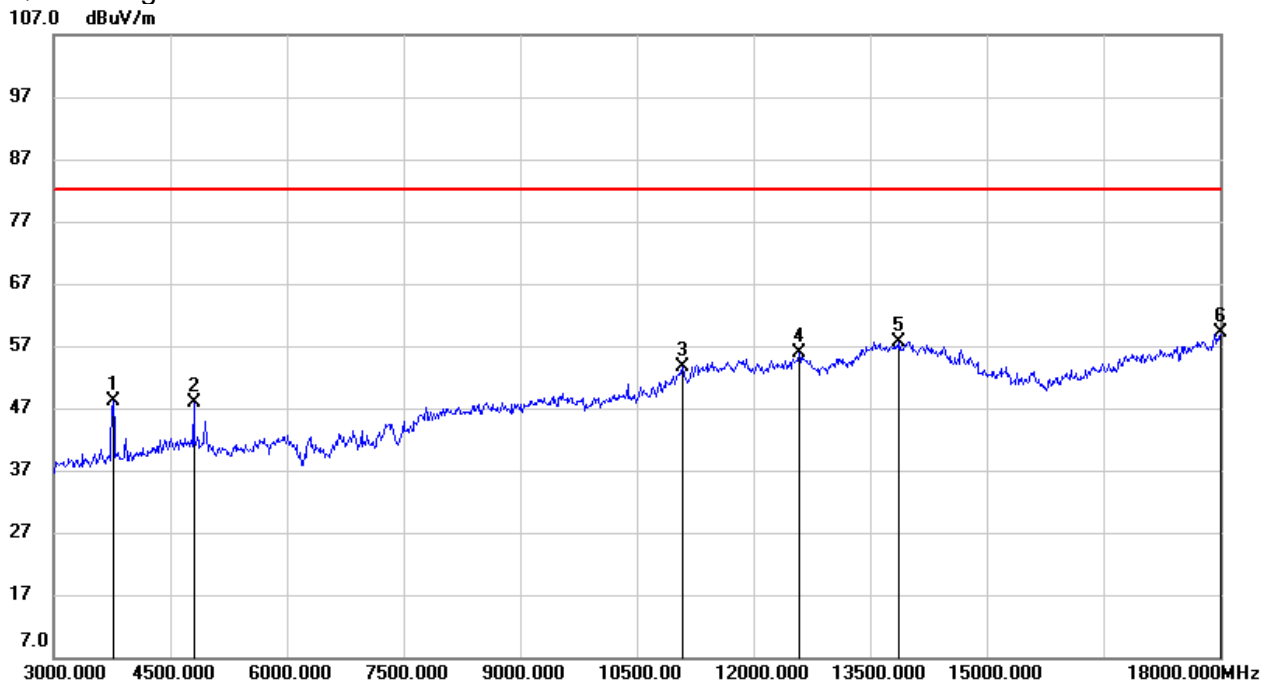
8.1.1. LTE Band 25

Note: by comparing the antenna gain of the new antenna and the gain value on the original report, only the higher gain band is selected of verification. LTE band 25 are finally determined.

QPSK-Largest bandwidth-Low Channel- Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3720.000	51.29	-3.23	48.06	82.25	-34.19	peak
2	4845.000	44.46	0.68	45.14	82.25	-37.11	peak
3	11355.000	37.38	17.40	54.78	82.25	-27.47	peak
4	11715.000	36.83	18.23	55.06	82.25	-27.19	peak
5	13605.000	34.97	23.01	57.98	82.25	-24.27	peak
6	17985.000	30.28	28.41	58.69	82.25	-23.56	peak

QPSK-Largest bandwidth-Low Channel-Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3720.000	49.82	-3.23	46.59	82.25	-35.66	peak
2	7890.000	39.85	7.87	47.72	82.25	-34.53	peak
3	11085.000	36.76	16.74	53.50	82.25	-28.75	peak
4	11820.000	35.95	18.47	54.42	82.25	-27.83	peak
5	13965.000	33.98	23.96	57.94	82.25	-24.31	peak
6	18000.000	29.51	28.54	58.05	82.25	-24.20	peak

QPSK-Largest bandwidth-Mid Channel- Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3765.000	51.14	-3.11	48.03	82.25	-34.22	peak
2	4800.000	47.30	0.57	47.87	82.25	-34.38	peak
3	11085.000	36.82	16.74	53.56	82.25	-28.69	peak
4	12585.000	36.20	19.69	55.89	82.25	-26.36	peak
5	13875.000	34.15	23.59	57.74	82.25	-24.51	peak
6	18000.000	30.51	28.54	59.05	82.25	-23.20	peak

QPSK-Largest bandwidth- Mid Channel-Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4800.000	50.47	0.57	51.04	82.25	-31.21	peak
2	11055.000	36.93	16.60	53.53	82.25	-28.72	peak
3	12555.000	35.58	19.69	55.27	82.25	-26.98	peak
4	13245.000	34.76	21.80	56.56	82.25	-25.69	peak
5	13635.000	34.43	23.05	57.48	82.25	-24.77	peak
6	17970.000	29.72	28.27	57.99	82.25	-24.26	peak

QPSK-Largest bandwidth-High Channel- Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3810.000	52.40	-2.97	49.43	82.25	-32.82	peak
2	4845.000	45.36	0.68	46.04	82.25	-36.21	peak
3	11730.000	36.40	18.26	54.66	82.25	-27.59	peak
4	13545.000	34.89	22.91	57.80	82.25	-24.45	peak
5	13845.000	34.62	23.45	58.07	82.25	-24.18	peak
6	17775.000	31.97	26.63	58.60	82.25	-23.65	peak

QPSK-Largest bandwidth- High Channel-Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3810.000	51.33	-2.97	48.36	82.25	-33.89	peak
2	7245.000	47.93	6.86	54.79	82.25	-27.46	peak
3	11040.000	37.38	16.53	53.91	82.25	-28.34	peak
4	12750.000	35.82	19.97	55.79	82.25	-26.46	peak
5	13875.000	34.12	23.59	57.71	82.25	-24.54	peak
6	17985.000	30.50	28.41	58.91	82.25	-23.34	peak

Note: Limit= -13dBm+95.25=82.25 dBuV/m

END OF REPORT