

# TEST REPORT

**Product Name : W4G Stick**  
**Model Number : G1-W4G-ST, S1-W4G-ST**  
**FCC ID : 2AWE8-S1-W4G**

Prepared for : Ginlong Technologies Co.,Ltd.  
Address : No.57 Jintong Road,Binhai Industrial Park,Xiangshan  
Ningbo,Zhejiang 315712 P.R.China

Prepared by : EMTEK (SHENZHEN) CO., LTD.  
Address : Bldg 69, Majialong Industry Zone, Nanshan District,  
Shenzhen, Guangdong, China

Tel: (0755) 26954280  
Fax: (0755) 26954282

Report Number : ENS2209290160W00204R  
Date(s) of Tests : November 14, 2022 to December 5, 2022  
Date of Issue : December 7, 2022

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## Modified Information

Version	Report No.	Revision Date	Summary
Ver.1.0	ENS2209290160W00204R	/	Original Report

## 1 TEST RESULT CERTIFICATION

Applicant : Ginlong Technologies Co.,Ltd.  
Address : No.57 Jintong Road,Binhai Industrial Park,Xiangshan Ningbo,Zhejiang 315712  
P.R.China  
Manufacturer : Ginlong Technologies Co.,Ltd.  
Address : No.57 Jintong Road,Binhai Industrial Park,Xiangshan Ningbo,Zhejiang 315712  
P.R.China  
Product Name : W4G Stick  
Model Number : G1-W4G-ST, S1-W4G-ST  
(Note: The only difference in models is the model's name, all other information is the same. The main test model applied for this report is G1-W4G-ST)  
Trademark : solis


### Measurement Procedure Used:


APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 2 , Subpart J FCC 47 CFR Part 22, Subpart H FCC 47 CFR Part 24, Subpart E FCC 47 CFR Part 27 FCC 47 CFR Part 90	<b>PASS</b>


The device described above is tested by EMTEK (Shenzhen) Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and EMTEK (Shenzhen) Co., Ltd. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the above table standards requirement.

This report applies to above tested sample only and shall not be reproduced in part without written approval of EMTEK (Shenzhen) Co., Ltd.

Date of Test : November 14, 2022 to December 5, 2022

Prepared by :   
Una Yu/Editor

Reviewer :   
Joe Xia/Supervisor

Approved & Authorized Signer :   
Lisa Wang/Manager

## 2 EUT TECHNICAL DESCRIPTION

<b>Product Name:</b>	W4G Stick	
<b>Model Number:</b>	G1-W4G-ST, S1-W4G-ST (Note: The only difference in models is the model's name, all other information is the same. The main test model applied for this report is G1-W4G-ST)	
<b>Operation Band:</b>	LTE B2/B4/B5/B12/B13/B14/B66/B71	
<b>Modulation:</b>	QPSK/16QAM for LTE	
<b>Operating Frequency Range(s):</b>	LTE Band 2: Tx: 1850-1910MHz, Rx: 1930-1990MHz LTE Band 4: Tx: 1710-1755MHz, Rx: 2110-2155MHz LTE Band 5: Tx: 824-849MHz, Rx: 875-885MHz LTE Band 12: Tx: 699-716MHz, Rx: 729-746MHz LTE Band 13: Tx: 777-787MHz, Rx: 746-756MHz LTE Band 14: Tx: 788-798MHz, Rx: 758-768MHz LTE Band 66: Tx/Rx: 1710-1780MHz LTE Band 71: Tx/Rx: 663-698MHz	
<b>Supported Channel Bandwidth:</b>	LTE Band2	<input checked="" type="checkbox"/> 1.4MHz, <input checked="" type="checkbox"/> 3MHz, <input checked="" type="checkbox"/> 5MHz, <input checked="" type="checkbox"/> 10MHz, <input checked="" type="checkbox"/> 15MHz, <input checked="" type="checkbox"/> 20MHz
	LTE Band4	<input checked="" type="checkbox"/> 1.4MHz, <input checked="" type="checkbox"/> 3MHz, <input checked="" type="checkbox"/> 5MHz, <input checked="" type="checkbox"/> 10MHz, <input checked="" type="checkbox"/> 15MHz, <input checked="" type="checkbox"/> 20MHz
	LTE Band5	<input checked="" type="checkbox"/> 1.4MHz, <input checked="" type="checkbox"/> 3MHz, <input checked="" type="checkbox"/> 5MHz, <input checked="" type="checkbox"/> 10MHz
	LTE Band12	<input checked="" type="checkbox"/> 1.4MHz, <input checked="" type="checkbox"/> 3MHz, <input checked="" type="checkbox"/> 5MHz, <input checked="" type="checkbox"/> 10MHz
	LTE Band13	<input checked="" type="checkbox"/> 5MHz, <input checked="" type="checkbox"/> 10MHz
	LTE Band14	<input checked="" type="checkbox"/> 5MHz, <input checked="" type="checkbox"/> 10MHz
	LTE Band66	<input checked="" type="checkbox"/> 1.4MHz, <input checked="" type="checkbox"/> 3MHz, <input checked="" type="checkbox"/> 5MHz, <input checked="" type="checkbox"/> 10MHz, <input checked="" type="checkbox"/> 15MHz, <input checked="" type="checkbox"/> 20MHz
	LTE Band71	<input checked="" type="checkbox"/> 5MHz, <input checked="" type="checkbox"/> 10MHz, <input checked="" type="checkbox"/> 15MHz, <input checked="" type="checkbox"/> 20MHz
<b>Antenna Type:</b>	FPC Antenna	
<b>Antenna Gain:</b>	LTE Band 2: 2.56dBi LTE Band 4: 2.56dBi LTE Band 5: 2.56dBi LTE Band 12: 2.56dBi LTE Band 13: 2.56dBi LTE Band 14: 2.56dBi LTE Band 66: 2.56dBi LTE Band 71: 2.56dBi	

<b>Power Supply</b>	DC 5V
<b>Temperature Extreme Range:</b>	-30°C ~ 65°C

**Note:** for more details, please refer to the user's manual of the EUT.



### 3 SUMMARY OF TEST RESULT

#### 3.1 TEST ITEMS

FCC Rule	Test Parameter	Verdict	Remark
2.1046	RF Power Output	PASS	
22.913, 24.232, 27.50, 90.635	Equivalent (Isotropic) Radiated Power	PASS	
2.1047	Modulation Characteristics	PASS	
2.1049	Occupied Bandwidth	PASS	
2.1051, 22.917, 24.238, 27.53, 90.691	Out of Band Emissions at Antenna Terminals	PASS	
	Band Edge Compliance	PASS	
2.1053, 22.917, 24.238, 27.53, 90.691	Field Strength of Spurious Radiation	PASS	
2.1055, 22.355, 24.235, 27.54, 90.213	Frequency Stability versus Temperature	PASS	
	Frequency Stability versus Voltage	PASS	
24.232, 27.50	Peak to Average Ratio	PASS	
Note: N/A means that not applicable.			

#### RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2AWE8-S1-W4G filing to comply with FCC 47 CFR Part 2, 22(H), 24(E), 27, 90.

#### Remark:

The 2G/3G/4G antenna of test samples have two type antennas, the difference as below table, only the worst data of Quectel supplier are shown in the report.

Antenna	Type	Max Antenna Gain	Supplier
1	FPC	2.56 dBi	Quectel
2	FPC	0 dBi	Surbaner

## 4 TEST METHODOLOGY

### 4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2 , Subpart J

FCC 47 CFR Part 22H

FCC 47 CFR Part 24E

FCC 47 CFR Part 27

KDB971168 D01:v02r02

ANSI/TIA-603-D-2010

ANSI C63.26:2015

### 4.2 MEASUREMENT EQUIPMENT USED

#### For Spurious Emissions Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde & Schwarz	ESU 26	100154	2022/5/14	1Year
Spectrum Analyzer	Rohde & Schwarz	FSV40	100967	2022/5/14	1Year
Pre-Amplifie	Lunar EM	LNA30M3G-25	J1010000007 0	2022/5/14	1Year
Pre-Amplifier	HP	8447F	2944A07999	2022/5/14	1Year
Pre-Amplifie	SKET	LNPA_0118G-45	SK20190518 01	2022/5/14	1Year
Pre-Amplifie	Lunar EM	LNA1G18-48	J1011131010 001	2022/5/14	1Year
Loop Antenna	Schwarzbeck	FMZB1519	1519-012	2021/6/12	2 Year
Bilog Antenna	Schwarzbeck	VULB9163	659	2021/8/22	2 Year
Bilog Antenna	Schwarzbeck	VULB9163	712	2021/7/5	2 Year
Horn antenna	Schwarzbeck	BBHA9120D	9120D-1177	2021/6/12	2 Year
Horn antenna	Schwarzbeck	BBHA9170	9170-399	2021/6/12	2 Year
Wideband Radio Communication Tester	R&S	CMW500	140822	2022/5/15	1Year
Thermometer	Hegao	HTC-1	\	2022/5/17	1Year

#### For Other Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
5G Wireless Test Platform	KEYSIGHT	E7515B	MY60101197	2022/9/17	1Year
Wideband Radio Communication Tester	R&S	CMW500	147366	2022/5/14	1Year
Signal Analyzer	KEYSIGHT	N9010B	MY60240204	2022/9/26	1Year
Vector Signal Generator	KEYSIGHT	N5182B	MY59100922	2022/9/26	1Year
Analog Signal Generator	KEYSIGHT	N5173B	MY59100520	2022/9/30	1Year
DC Power Supply	KEYSIGHT	E3642A	MY60266212	2022/9/26	1Year
RF Control Unit	Tonscend	JS0806-1	20H8060306	N/A	N/A
Band Reject Filter Group	Tonscend	JS0806-F	20H8060310	N/A	N/A
Thermometer	Hegao	HTC-1	\	2022/5/17	1Year



### 4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition. The CMU200 and CMW500 used to control the EUT staying in continuous transmitting and receiving mode for testing.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

During all testing, EUT is in link mode with base station emulator at maximum power level.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

#### ■ Test Mode and system config

Configure the CMW500 call box to support all LTE tests in respect to the 3GPP 36.521.

UE term. Conn: User defined Channels.

Exp. Nominal Power Mode: According to UL Power Control Settings.

RS EPRE: -75.0 dBm/15kHz Full Cell BW Power: -50.2 dBm.

PSS Power Offset = SSS Power Offset = PBCH Power Offset = PCFICH Power Offset = PDCCH Power Offset = 0.0 dB.

PHICH Power Offset = -12 dB.

OCNG ON.

PDSCH Power Offset PA: 0 dB, Power Ratio Index PB: 0 (rhoB/rhoA: 1).

Active TPC Setup: Max Power.

Security Settings: Authentication OFF, NAS Security OFF, AS Security OFF.

Integrity Algorithm: NULL.

Milenage OFF.

Configure the desired channel, BW, resource block allocation and modulation.

Connect to test set.

Set CMW500 TPC Setup to Max Power (Up power control command).

According to 3GPP 36.521, V9.1.0., the output power level for Power Class 3 LTE is to be 23.0dBm + 2.7dB. The lower limit is shifted down by the MPR amount allowed for certain configurations. Maximum Power Reduction (MPR) is allowed due to higher order modulation and transmit bandwidth configurations. These MPR levels reduce the lower limit of each output power by the either 1 or 2dB per 3GPP 36.521.

Modulation	Channel bandwidth / Transmission bandwidth configuration[RB]						MPR (dB)
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3

Modulation	CA bandwidth Class B and C							MPR (dB)
	25 RB + 50 RB	50 RB + 50 RB	25 RB + 100 RB	50 RB + 100 RB	75 RB + 75 RB	75 RB + 100 RB	100 RB + 100 RB	
QPSK	> 8 and ≤25	> 12 and ≤50	> 8 and ≤25	> 12 and ≤50	> 16 and ≤75	> 16 and ≤75	> 18 and ≤100	≤ 1
QPSK	> 25	> 50	> 25	> 50	> 75	> 75	> 100	≤ 1
16 QAM	≤8	≤12	≤8	≤12	≤16	≤16	≤18	≤ 2
16 QAM	> 8 and ≤25	> 12 and ≤50	> 8 and ≤25	> 12 and ≤50	> 16 and ≤75	> 16 and ≤75	> 18 and ≤100	≤ 2
16 QAM	> 25	> 50	> 25	> 50	> 75	> 75	> 100	≤ 3

Modulation	CA bandwidth Class B and C							MPR (dB)
	25 RB + 50 RB	50 RB + 50 RB	25 RB + 100 RB	50 RB + 100 RB	75 RB + 75 RB	75 RB + 100 RB	100 RB + 100 RB	
64 QAM	8 and allocation wholly contained within a single CC	12 and allocation wholly contained within a single CC	8 and allocation wholly contained within a single CC	12 and allocation wholly contained within a single CC	16 and allocation wholly contained within a single CC	16 and allocation wholly contained within a single CC	18 and allocation wholly contained within a single CC	≤ 2
64 QAM	> 8 or allocation extends across two CC's	> 12 or allocation extends across two CC's	> 8 or allocation extends across two CC's	> 12 or allocation extends across two CC's	> 16 or allocation extends across two CC's	> 16 or allocation extends across two CC's	> 18 or allocation extends across two CC's	≤ 3

## ■ Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Ambient	VL	7.2V
	VN	6.48V
	VH	7.92V
<b>NOTE:</b> VL= Lower Extreme Test Voltage. VN= Nominal Voltage. VH= Upper Extreme Test Voltage. TN= Normal Temperature.		

## ■ Test Channel and Frequency

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 2	1.4MHz	TX	Channel 18607 1850.7 MHz	Channel 18900 1880 MHz	Channel 19193 1909.3 MHz
		RX	Channel 607 1930.7 MHz	Channel 900 1960 MHz	Channel 1193 1989.3 MHz
	3MHz	TX	Channel 18615 1851.5 MHz	Channel 18900 1880 MHz	Channel 19185 1908.5 MHz
		RX	Channel 615 1931.5 MHz	Channel 900 1960 MHz	Channel 1185 1988.5 MHz
	5MHz	TX	Channel 18625 1852.5 MHz	Channel 18900 1880 MHz	Channel 19175 1907.5 MHz
		RX	Channel 625 1932.5 MHz	Channel 900 1960 MHz	Channel 1175 1987.5 MHz
	10MHz	TX	Channel 18650 1855 MHz	Channel 18900 1880 MHz	Channel 19150 1905 MHz
		RX	Channel 650 1935 MHz	Channel 900 1960 MHz	Channel 1150 1985 MHz
	15MHz	TX	Channel 18675 1857.5 MHz	Channel 18900 1880 MHz	Channel 19125 1902.5 MHz
		RX	Channel 675 1937.5 MHz	Channel 900 1960 MHz	Channel 1125 1982.5 MHz
	20MHz	TX	Channel 18700 1860 MHz	Channel 18900 1880 MHz	Channel 19100 1900 MHz
		RX	Channel 700 1940 MHz	Channel 900 1960 MHz	Channel 1100 1980 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 4	1.4MHz	TX	Channel 19957 1710.7 MHz	Channel 20175 1732.5 MHz	Channel 20393 1754.3 MHz
		RX	Channel 1975 2112.5 MHz	Channel 2175 2132.5MHz	Channel 2375 2152.5 MHz
	3MHz	TX	Channel 19965 1711.5 MHz	Channel 20175 1732.5 MHz	Channel 20385 1753.5 MHz
		RX	Channel 2000 2115 MHz	Channel 2175 2132.5MHz	Channel 2350 2150 MHz
	5MHz	TX	Channel 19975	Channel 20175	Channel 20375
			1712.5 MHz	1732.5 MHz	1752.5 MHz

		RX	Channel 1975	Channel 2175	Channel 2375
			2112.5 MHz	2132.5MHz	2152.5 MHz
	10MHz	TX	Channel 20000	Channel 20175	Channel 20350
			1715 MHz	1732.5 MHz	1750 MHz
		RX	Channel 2000	Channel 2175	Channel 2350
			2115 MHz	2132.5MHz	2150 MHz
	15MHz	TX	Channel 20025	Channel 20175	Channel 20325
			1717.5 MHz	1732.5 MHz	1747.5 MHz
		RX	Channel 2025	Channel 2175	Channel 2325
			2117.5 MHz	2132.5MHz	2147.5 MHz
	20MHz	TX	Channel 20050	Channel 20175	Channel 20300
			1720 MHz	1732.5 MHz	1745 MHz
		RX	Channel 2050	Channel 2175	Channel 2300
			2120 MHz	2132.5MHz	2145 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 5	1.4MHz	TX	Channel 20407	Channel 20525	Channel 20643
			824.7 MHz	836.5 MHz	848.3 MHz
		RX	Channel 2407	Channel 2525	Channel 2643
			869.7 MHz	881.5 MHz	893.3 MHz
	3MHz	TX	Channel 20415	Channel 20525	Channel 20635
			825.5 MHz	836.5 MHz	847.5 MHz
		RX	Channel 2415	Channel 2525	Channel 2635
			870.5 MHz	881.5 MHz	892.5 MHz
	5MHz	TX	Channel 20425	Channel 20525	Channel 20625
			826.5 MHz	836.5 MHz	846.5 MHz
		RX	Channel 2425	Channel 2525	Channel 2625
			871.5 MHz	881.5 MHz	891.5 MHz
	10MHz	TX	Channel 20450	Channel 20525	Channel 20600
			829 MHz	836.5 MHz	844 MHz
		RX	Channel 2450	Channel 2525	Channel 2600
			874 MHz	881.5 MHz	889 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 12	1.4MHz	TX	Channel 23017	Channel 23095	Channel 23173
			699.7 MHz	707.5 MHz	715.3 MHz
		RX	Channel 5017	Channel 5095	Channel 5173
			729.7 MHz	737.5 MHz	745.3 MHz
	3MHz	TX	Channel 23025	Channel 23095	Channel 23165
			700.5 MHz	707.5 MHz	714.5 MHz
		RX	Channel 5025	Channel 5095	Channel 5165
			730.5 MHz	737.5 MHz	744.5 MHz
	5MHz	TX	Channel 23035	Channel 23095	Channel 23155
			701.5 MHz	707.5 MHz	713.5 MHz
		RX	Channel 5035	Channel 5095	Channel 5155
			731.5 MHz	737.5 MHz	743.5 MHz
	10MHz	TX	Channel 23060	Channel 23095	Channel 23130
			704 MHz	707.5 MHz	711 MHz
		RX	Channel 5060	Channel 5095	Channel 5130
			734 MHz	737.5 MHz	741 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 13	5MHz	TX	Channel 23025	Channel 23230	Channel 23255
			779.5 MHz	782 MHz	784.5 MHz
		RX	Channel 5205	Channel 5230	Channel 5255
			748.5 MHz	751 MHz	753.5 MHz
	10MHz	TX	Channel 23230	Channel 23230	Channel 23230
			782 MHz	782 MHz	782 MHz
		RX	Channel 5230	Channel 5230	Channel 5230
			751 MHz	751 MHz	751 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 14	5MHz	TX	Channel 23305	Channel 23330	Channel 23355
			790.5 MHz	793 MHz	795.5 MHz
		RX	Channel 5305	Channel 5330	Channel 5355
			760.5 MHz	763 MHz	765.5 MHz
	10MHz	TX	Channel 23330	Channel 23330	Channel 23330
			793MHz	793 MHz	793 MHz
		RX	Channel 5330	Channel 5330	Channel 5330
			763MHz	763 MHz	763 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band66	1.4MHz	TX	Channel 131979	Channel 132322	Channel 132665
			1710.7 MHz	1745 MHz	1779.3 MHz
		RX	Channel 66443	Channel 66786	Channel 67329
			2110.7 MHz	2145MHz	2199.3 MHz
	3MHz	TX	Channel 131987	Channel 132322	Channel 132657
			1711.5 MHz	1745 MHz	1778.5MHz
		RX	Channel 66451	Channel 66786	Channel 67121
			2111.5 MHz	2145MHz	2198.5MHz
	5MHz	TX	Channel 131997	Channel 132322	Channel 132647
			1712.5 MHz	1745 MHz	1777.5 MHz

	10MHz	RX	Channel 66461	Channel 66786	Channel 67311
			2112.5 MHz	2145MHz	2197.5 MHz
		TX	Channel 132022	Channel 132322	Channel 132622
			1715 MHz	1745 MHz	1775 MHz
	15MHz	RX	Channel 66486	Channel 66786	Channel 67286
			2115 MHz	2145MHz	2195 MHz
		TX	Channel 132047	Channel 132322	Channel 132597
			1717.5 MHz	1745 MHz	1772.5 MHz
	20MHz	RX	Channel 66511	Channel 66786	Channel 67261
			2117.5 MHz	2145MHz	2192.5 MHz
		TX	Channel 132072	Channel 132322	Channel 132572
			1720 MHz	1745 MHz	1770 MHz
		RX	Channel 66536	Channel 66786	Channel 67236
			2120 MHz	2145MHz	2190 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band71	1.4MHz	TX	Channel 133147	Channel 133297	Channel 133447
			665.5 MHz	680.5 MHz	695.5 MHz
		RX	Channel 68611	Channel 68761	Channel 68911
			619.5 MHz	634.5 MHz	649.5 MHz
	3MHz	TX	Channel 133172	Channel 133297	Channel 133422
			668 MHz	680.5 MHz	693 MHz
		RX	Channel 68636	Channel 68761	Channel 68886
			622 MHz	634.5 MHz	647 MHz
	5MHz	TX	Channel 133197	Channel 133297	Channel 133397
			670.5 MHz	680.5 MHz	690.5 MHz
		RX	Channel 68661	Channel 68761	Channel 68861
			624.5 MHz	634.5 MHz	644.5 MHz
	10MHz	TX	Channel 133222	Channel 133297	Channel 133372
			673 MHz	680.5 MHz	688 MHz
		RX	Channel 68686	Channel 68761	Channel 68836
			627 MHz	634.5 MHz	642 MHz
	15MHz	TX	Channel 133147	Channel 133297	Channel 133447
			665.5 MHz	680.5 MHz	695.5 MHz
		RX	Channel 68611	Channel 68761	Channel 68911
			619.5 MHz	634.5 MHz	649.5 MHz
	20MHz	TX	Channel 133172	Channel 133297	Channel 133422
			668 MHz	680.5 MHz	693 MHz
		RX	Channel 68636	Channel 68761	Channel 68886
			622 MHz	634.5 MHz	647 MHz

## 5 FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at:

Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.26 and CISPR Publication 22.

### 5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab. : **Accredited by CNAS**  
The Certificate Registration Number is L2291  
The Laboratory has been assessed and proved to be in compliance with  
CNAS-CL01 (identical to ISO/IEC 17025:2017)

**Accredited by FCC**

Designation Number: CN1204

Test Firm Registration Number: 882943

**Accredited by A2LA**

The Certificate Number is 4321.01

**Accredited by Industry Canada**

The Conformity Assessment Body Identifier is CN0008

Name of Firm

: EMTEK (SHENZHEN) CO., LTD.

Site Location

: Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China



## 6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
RF Power Output	$\pm 1.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$
All emission, radiated	$\pm 3\text{dB}$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 0.5^{\circ}\text{C}$
Humidity	$\pm 3\%$

Measurement Uncertainty for a level of Confidence of 95%.

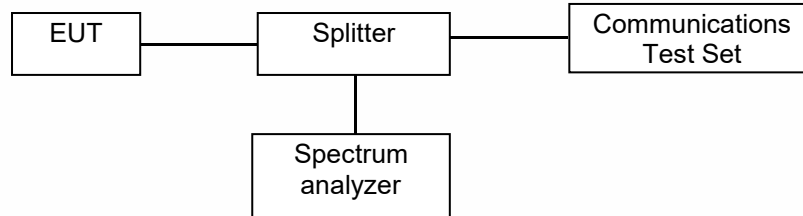




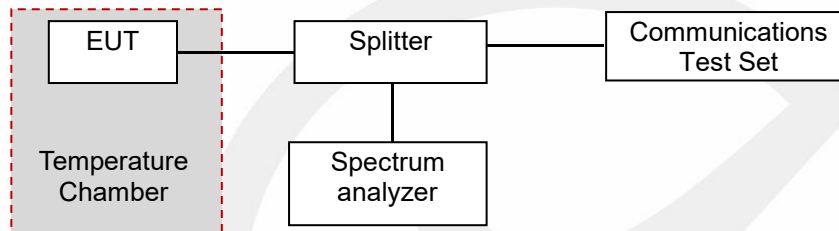
## 7 SETUP OF EQUIPMENT UNDER TEST

### 7.1 RADIO FREQUENCY TEST SETUP 1

The sample component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



### 7.2 RADIO FREQUENCY TEST SETUP 2



### 7.3 RADIO FREQUENCY TEST SETUP 3

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.26-2015 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

Above 30MHz:

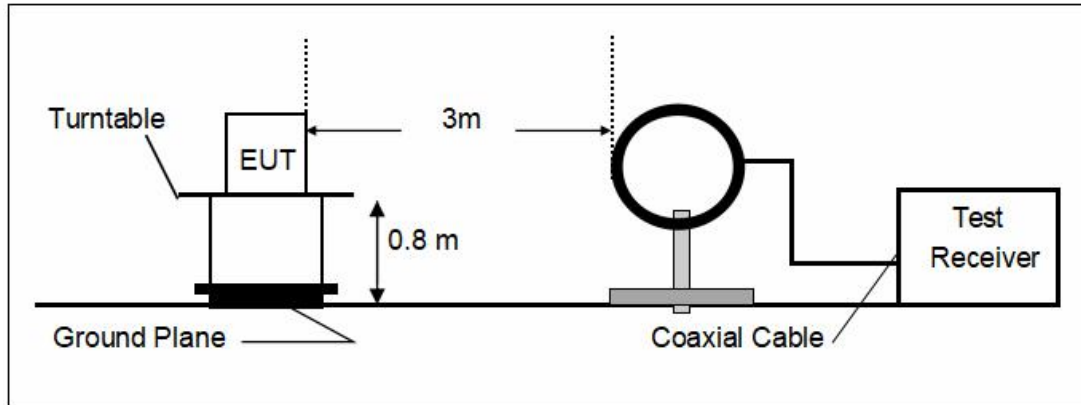
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:

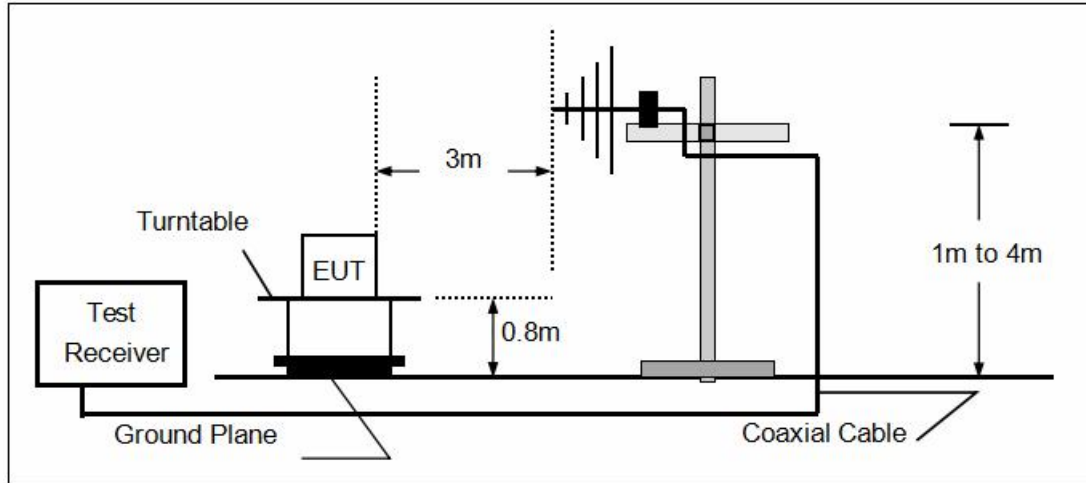
(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

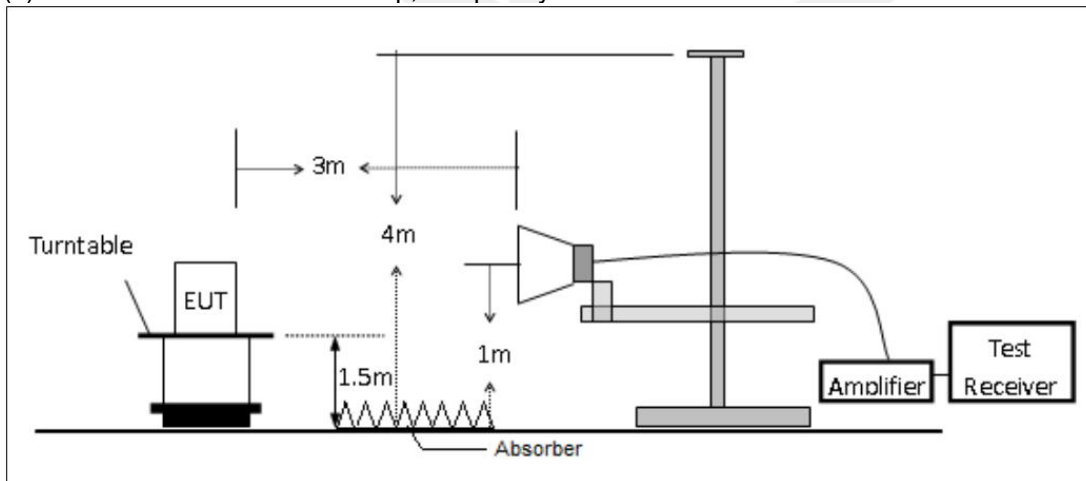
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz



#### 7.4 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number

**Notes:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. Unless otherwise denoted as EUT in 'Remark' column, device(s) used in tested system is a support equipment.

## 8 TEST REQUIREMENTS

### 8.1 RF POWER OUTPUT

#### 8.1.1 Conformance Limit

No limit requirement.

#### 8.1.2 Test Configuration

Test according to clause 7.1 radio frequency test setup 1.

#### 8.1.3 Test Procedure

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the ARFCN range, power control level set to Max power. The frequency band is set as selected frequency. the RF output of the transmitter was connected to base station simulator.

Set EUT at maximum average power by base station simulator.

Set RBW = 1-5% of the OBW, not to exceed 1 MHz.

Set VBW  $\geq 3 \times$  RBW.

Number of points in sweep  $\geq 2 \times$  span / RBW. (This gives bin-to-bin spacing  $\leq$  RBW/2, so that narrowband signals are not lost between frequency bins.)

Sweep time = auto.

Detector = RMS (power averaging).

Set sweep trigger to "free run".

Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.

Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

Add  $10 \log(1/x)$ , where  $x$  is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add  $10 \log(1/0.25) = 6$  dB if the duty cycle is a constant 25%.

Measure lowest, middle, and highest channels for each bandwidth and different modulation.

Measure and record the results in the test report.

#### 8.1.4 Test Results

**PASS**

Please refer to FCC 4G Appendix Band.

## 8.2 EFFECTIVE (ISOTROPIC) RADIATED POWER

### 8.2.1 Conformance Limit

LTE BAND2 (25)	FCC Part 24.232
Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.	
LTE BAND4(66)	FCC Part 27.50
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 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.	
LTE BAND5 (26)	FCC Part 22.913, Part 90.635
According to Part 22.913(a) the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts; According to Part 90.635(b), the maximum output power of the transmitter for mobile stations is 100 watts (20 dBw);	
LTE BAND7	FCC Part 27.50
Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.	
LTE BAND12	FCC Part 27.50
Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.	
LTE BAND13	FCC Part 27.50
Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP	
LTE BAND17	FCC Part 27.50
Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP	
LTE BAND30	FCC Part 27.50
Mobile and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards.	
LTE BAND41	FCC Part 27.50
Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.	

### 8.2.2 Test Configuration

Test according to clause 7.3 radio frequency test setup 3.

### 8.2.3 Test Procedure

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR\_MAX\_CCH is set to the maximum value supported by the Power Class of the Mobile under test.

The instrument must have an available measurement/resolution bandwidth that is equal to or exceeds the OBW. If this capability is available, then the following procedure can be used to determine the total peak output power.

- Set the RBW  $\geq$  OBW.
- Set VBW  $\geq 3 \times$  RBW.
- Set span  $\geq 2 \times$  RBW.
- Sweep time = auto couple.
- Detector = peak.

- f) Ensure that the number of measurement points  $\geq \text{span/RBW}$ .
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the peak amplitude level.

The EUT was placed on a turn table which is 0.8m above ground plane. Maximum procedure was performed on the six highest emissions to ensure EUT compliance. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. Repeat above procedures until all frequency measured was complete.

A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.

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).

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 (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antennapolarization.

A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna.

The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.

The measurement results are obtained as described below:

Power(EIRP)=PMea- PAg - Pcl - Ga.

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.

ERP can be calculated from EIRP by subtracting the gain of the dipole.

ERP = EIRP -2.15dBi.

## 8.2.4 Test Results

**PASS**

Please refer to FCC 4G Appendix Band.

### **8.3 MODULATION CHARACTERISTICS**

#### **8.3.1 Conformance Limit**

No limit requirement.

#### **8.3.2 Test Configuration**

Test according to clause 7.1 radio frequency test setup 1.

#### **8.3.3 Test Procedure**

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR\_MAX\_CCH is set to the maximum value supported by the Power Class of the Mobile under test, The frequency band is set as selected frequency, test method was according to 3GPP TS 51.010 and 3GPP TS 34.121. and 3GPP2 C.S0011/TIA-98-E for 1XRTT, and 3GPP2 C.S0033-0/tia-866 for Rel.0 and 3GPP2 C.S0033-A for Rev.A The waveform quality and constellation of the was tested.

#### **8.3.4 Test Results**

**PASS**

Please refer to FCC 4G Appendix Band.



## 8.4 OCCUPIED BANDWIDTH

### 8.4.1 Conformance Limit

No limit requirement.

### 8.4.2 Test Configuration

Test according to clause 7.1 radio frequency test setup 1.

### 8.4.3 Test Procedure

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR\_MAX\_CCH is set to the maximum value supported by the Power Class of the Mobile under test.

#### ■ 99% Occupied bandwidth

The following procedure shall be used for measuring (99 %) power bandwidth.

- 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 (i.e., two to five times the OBW).
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
- c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least  $10\log(\text{OBW} / \text{RBW})$  below the reference level.
- d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.
- e) Set the detection mode to peak, and the trace mode to max hold.
- f) Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.
- h) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

#### ■ 26 dB Occupied bandwidth

The reference value is the highest level of the spectral envelope of the modulated signal.

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
- b) The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
- c) Set the reference level of the instrument as required to prevent the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least  $10\log(\text{OBW} / \text{RBW})$  below the reference level.
- d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.
- e) The dynamic range of the spectrum analyzer at the selected RBW shall be at least 10 dB below the target “-X dB down” 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 value).
- f) Set the detection mode to peak, and the trace mode to max hold.
- g) Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- h) Determine the “-X dB down amplitude” as equal to (Reference Value – X). Alternatively, this calculation can be performed by the analyzer by using the marker-delta function.



- i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB down amplitude” determined in step g). If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
- j) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

#### 8.4.4 Test Results

**PASS**

Please refer to FCC 4G Appendix Band.



## 8.5 BAND EDGE COMPLIANCE

### 8.5.1 Conformance Limit

LTE BAND5 (26)	FCC Part 22.917, Part 90.691
$\leq -13$ dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	
LTE BAND2 (25)	FCC Part 24.238
$\leq -13$ dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	
LTE BAND4(66)	FCC Part 27.53(h)
$\leq -13$ dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	
LTE BAND7 (41)	FCC Part 27.53(m)

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

LTE BAND12	FCC Part 27.53(g)
$\leq -13$ dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	
LTE BAND13	FCC Part 27.53(c)
$\leq -13$ dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	
LTE BAND30	FCC Part 27.53(a)

By a factor of not less than:  $43 + 10 \log (P)$  dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log (P)$  dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than  $61 + 10 \log (P)$  dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than  $67 + 10 \log (P)$  dB on all frequencies between 2328 and 2337 MHz

By a factor of not less than  $43 + 10 \log (P)$  dB on all frequencies between 2300 and 2305 MHz,  $55 + 10 \log (P)$  dB on all frequencies between 2296 and 2300 MHz,  $61 + 10 \log (P)$  dB on all frequencies between 2292 and 2296 MHz,  $67 + 10 \log (P)$  dB on all frequencies between 2288 and 2292 MHz, and  $70 + 10 \log (P)$  dB below 2288 MHz

### 8.5.2 Test Configuration

Test according to clause 7.1 radio frequency test setup 1.

### 8.5.3 Test Procedure

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR\_MAX\_CCH is set to the maximum value supported by the Power Class of the Mobile under test.

Spectrum Analyzer is set as below:  
 SET RBW  $\geq 1\%$  of Emission BW.  
 SET VBW about three times of RBW.  
 Detector: RMS.  
 Trace mode= max hold.

### 8.5.4 Test Results

**PASS**

Please refer to FCC 4G Appendix Band.

## 8.6 OUT OF BAND EMISSIONS AT ANTENNA TERMINALS

### 8.6.1 Conformance Limit

LTE BAND2 (25)

FCC Part 24.238

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

LTE BAND4(66)

FCC Part 27.53(h)

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

LTE BAND5(26)

FCC Part 22.917

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

LTE BAND7 (41)

FCC Part 27.53(m)

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

LTE BAND12

FCC Part 27.53(g)

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

LTE BAND13

FCC Part 27.53(c)

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

LTE BAND30

FCC Part 27.53(a)

By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log(P)$  dB above 2365 MHz.

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.

### 8.6.2 Test Configuration

Test according to clause 7.1 radio frequency test setup 1.

### 8.6.3 Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer  
Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector.  
A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR\_MAX\_CCH is set to the maximum value supported by the Power Class of the Mobile under test.

Spectrum Analyzer is set as below:

9kHz~150kHz, RBW = 1KHz, VBW  $\geq 3 \times$  RBW.

150kHz~30MHz, RBW = 10KHz, VBW  $\geq 3 \times$  RBW.

30MHz~1GHz, RBW = 100 kHz, VBW = 300 kHz. Above 1GHz, RBW = 1 MHz, VBW = 3 MHz.

Detector: Peak.

Trace mode= max hold.

#### 8.6.4 Test Results

**PASS**

Please refer to FCC 4G Appendix Band.



## 8.7 FIELD STRENGTH OF SPURIOUS RADIATION

### 8.7.1 Conformance Limit

LTE BAND2 (25)

FCC Part 24.238

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

LTE BAND4(66)

FCC Part 27.53(h)

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

LTE BAND5(26)

FCC Part 22.917

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

LTE BAND7 (41)

FCC Part 27.53(m)

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

LTE BAND12

FCC Part 27.53(g)

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

LTE BAND13

FCC Part 27.53(c)

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

LTE BAND30

FCC Part 27.53(a)

By a factor of not less than  $43 + 10 \log(P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log(P)$  dB above 2365 MHz.

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.

### 8.7.2 Test Configuration

Test according to clause 7.3 radio frequency test setup 3.

### 8.7.3 Test Procedure

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR\_MAX\_CCH is set to the maximum value supported by the Power Class of the Mobile under test.

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. 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. 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. 100 kHz or 1 percent of emission bandwidth, as

specified). 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, then the following procedure can be used to determine spurious emission.

- RBW = 1 MHz for  $f \geq 1$  GHz(1GHz to 25GHz), 100 kHz for  $f < 1$  GHz(30MHz to 1GHz), 200Hz for  $f < 150$ KHz(9KHz to 150KHz), 9KHz for  $f < 30$ MHz(150KHz to 30KHz).
- Set VBW  $\geq 3 \times$  RBW.
- Set span wide enough to fully capture the emission being measured.
- Sweep time = auto couple.
- Detector = peak.
- Ensure that the number of measurement points  $\geq$  span/RBW.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the peak amplitude level.

Step1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.

Step2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.

Step3. The table was rotated 360 degrees to determine the position of the highest spurious emission.

Step4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.

Step5. Make the measurement with the spectrum analyzer's RBW , VBW , taking the record of maximum spurious emission.

Step6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.

Step7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.

Step8. Taking the record of output power at antenna port.

Step9. Repeat step 7 to step 8 for another polarization.

Step10. Emission level (dBm) = output power + substitution Gain.

#### 8.7.4 Test Results

#### PASS

All modes have been tested, and the worst result recorded was report as below:

##### ■ Spurious Emission below 30MHz (9KHz to 30MHz)

Temperature:	23.8℃	Test By:	ZXR
Humidity:	39%		
Test mode:	TX Mode		

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m) PK	Limit 3m(dBuV/m) PK	Over(dB) PK
--	--	--	--	--

Note: Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



■ Spurious Emission Above 30MHz (30MHz to 1 GHz)

Temperature: 25℃		Mode		LTE Band 2		
Humidity: 60%						
Air Pressure 106kPa						
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
71.8576	V	100	-54.26	-13.00	41.26	PASS
84.1287	V	100	-55.74	-13.00	42.74	PASS
129.527	V	100	-41.31	-13.00	28.31	PASS
184.9652	V	100	-57.63	-13.00	44.63	PASS
505.0813	V	100	-57.78	-13.00	44.78	PASS
986.6618	V	100	-51.70	-13.00	38.70	PASS
70.9845	H	100	-51.51	-13.00	38.51	PASS
133.9407	H	100	-42.41	-13.00	29.41	PASS
186.7598	H	100	-48.19	-13.00	35.19	PASS
231.3336	H	100	-52.26	-13.00	39.26	PASS
601.7466	H	100	-55.26	-13.00	42.26	PASS
987.3409	H	100	-49.83	-13.00	36.83	PASS

Temperature: 25℃		Mode		LTE Band 4		
Humidity: 60%						
Air Pressure 106kPa						
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
32.3766	V	100	-60.78	-13.00	47.78	PASS
73.4097	V	100	-54.89	-13.00	41.89	PASS
134.2317	V	100	-41.31	-13.00	28.31	PASS
187.9239	V	100	-57.20	-13.00	44.20	PASS
512.5021	V	100	-57.99	-13.00	44.99	PASS
984.4307	V	100	-51.21	-13.00	38.21	PASS
70.742	H	100	-52.02	-13.00	39.02	PASS
131.8551	H	100	-42.13	-13.00	29.13	PASS
187.6814	H	100	-50.71	-13.00	37.71	PASS
229.0054	H	100	-52.12	-13.00	39.12	PASS
777.2769	H	100	-53.50	-13.00	40.50	PASS
980.599	H	100	-50.20	-13.00	37.20	PASS

Temperature:	25°C	Mode		LTE Band 5		
Humidity:	60%					
Air Pressure	106kPa					
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
72.1001	V	100	-54.32	-13.00	41.32	PASS
132.4856	V	100	-40.56	-13.00	27.56	PASS
186.8568	V	100	-57.88	-13.00	44.88	PASS
273.3367	V	100	-61.72	-13.00	48.72	PASS
507.2154	V	100	-57.58	-13.00	44.58	PASS
966.9213	V	100	-50.68	-13.00	37.68	PASS
71.0816	H	100	-51.13	-13.00	38.13	PASS
132.8251	H	100	-42.29	-13.00	29.29	PASS
186.7113	H	100	-48.91	-13.00	35.91	PASS
229.733	H	100	-52.44	-13.00	39.44	PASS
602.4741	H	100	-55.04	-13.00	42.04	PASS
989.669	H	100	-50.49	-13.00	37.49	PASS

Temperature:	25°C	Mode		LTE Band 12		
Humidity:	60%					
Air Pressure	106kPa					
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
32.4736	V	100	-59.21	-13.00	46.21	PASS
70.9845	V	100	-53.49	-13.00	40.49	PASS
133.5527	V	100	-41.26	-13.00	28.26	PASS
184.1892	V	100	-59.21	-13.00	46.21	PASS
356.6638	V	100	-59.66	-13.00	46.66	PASS
982.2481	V	100	-51.80	-13.00	38.80	PASS
71.1301	H	100	-51.05	-13.00	38.05	PASS
130.9335	H	100	-42.77	-13.00	29.77	PASS
187.5359	H	100	-50.51	-13.00	37.51	PASS
227.9869	H	100	-52.89	-13.00	39.89	PASS
785.7163	H	100	-53.10	-13.00	40.10	PASS
985.3038	H	100	-50.66	-13.00	37.66	PASS



Temperature:	25°C	Mode		LTE Band 13		
Humidity:	60%					
Air Pressure	106kPa					
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
33.5407	V	100	-60.95	-13.00	47.95	PASS
68.6564	V	100	-54.09	-13.00	41.09	PASS
133.4557	V	100	-40.36	-13.00	27.36	PASS
184.5287	V	100	-60.39	-13.00	47.39	PASS
517.8374	V	100	-58.19	-13.00	45.19	PASS
984.8672	V	100	-51.71	-13.00	38.71	PASS
72.0516	H	100	-51.28	-13.00	38.28	PASS
132.5826	H	100	-42.82	-13.00	29.82	PASS
189.573	H	100	-50.70	-13.00	37.70	PASS
230.994	H	100	-52.70	-13.00	39.70	PASS
607.7609	H	100	-54.02	-13.00	41.02	PASS
980.405	H	100	-49.98	-13.00	36.98	PASS

Temperature:	25℃	Mode		LTE Band 14		
Humidity:	60%					
Air Pressure	106kPa					
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
70.5965	V	100	-53.36	-13.00	40.36	PASS
101.7836	V	100	-58.32	-13.00	45.32	PASS
133.3587	V	100	-41.73	-13.00	28.73	PASS
209.944	V	100	-52.79	-13.00	39.79	PASS
496.9328	V	100	-57.16	-13.00	44.16	PASS
988.8444	V	100	-51.50	-13.00	38.50	PASS
71.1786	H	100	-50.30	-13.00	37.30	PASS
103.3357	H	100	-53.54	-13.00	40.54	PASS
132.0491	H	100	-43.52	-13.00	30.52	PASS
187.5844	H	100	-52.10	-13.00	39.10	PASS
231.3336	H	100	-51.67	-13.00	38.67	PASS
979.144	H	100	-51.16	-13.00	38.16	PASS

Temperature:	25°C	Mode		LTE Band 66		
Humidity:	60%					
Air Pressure	106kPa					
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
33.9287	V	100	-61.02	-13.00	48.02	PASS
70.6935	V	100	-54.36	-13.00	41.36	PASS
133.0677	V	100	-41.09	-13.00	28.09	PASS
186.8083	V	100	-57.90	-13.00	44.90	PASS
504.3052	V	100	-57.59	-13.00	44.59	PASS
947.1809	V	100	-51.60	-13.00	38.60	PASS
71.2756	H	100	-50.53	-13.00	37.53	PASS
102.1716	H	100	-53.38	-13.00	40.38	PASS
132.7766	H	100	-42.62	-13.00	29.62	PASS
186.9053	H	100	-51.92	-13.00	38.92	PASS
230.315	H	100	-52.13	-13.00	39.13	PASS
980.9385	H	100	-51.39	-13.00	38.39	PASS

Temperature:	25°C	Mode		LTE Band 71		
Humidity:	60%					
Air Pressure	106kPa					
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
32.4736	V	100	-60.37	-13.00	47.37	PASS
72.4396	V	100	-54.19	-13.00	41.19	PASS
132.3401	V	100	-39.14	-13.00	26.14	PASS
189.573	V	100	-57.97	-13.00	44.97	PASS
698.5089	V	100	-56.00	-13.00	43.00	PASS
986.9043	V	100	-51.54	-13.00	38.54	PASS
70.645	H	100	-50.01	-13.00	37.01	PASS
103.0447	H	100	-52.88	-13.00	39.88	PASS
133.8437	H	100	-43.02	-13.00	30.02	PASS
188.2149	H	100	-51.56	-13.00	38.56	PASS
230.7515	H	100	-51.99	-13.00	38.99	PASS
978.8044	H	100	-50.92	-13.00	37.92	PASS

- Note: (1) Emission Level= Reading Level+ Correct Factor +Cable Loss.  
 (2) Correct Factor= Ant\_F + Cab\_L - Preamp.  
 (3) The reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

■ Spurious Emission Above 1GHz (1GHz to 10<sup>th</sup> harmonics)

Temperature: 25°C		Mode		LTE Band 2		
Humidity: 60%						
Air Pressure 106kPa						
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
10059.4119	V	1000	-29.94	-13.00	16.94	PASS
11467.2935	V	1000	-28.88	-13.00	15.88	PASS
13436.2873	V	1000	-28.94	-13.00	15.94	PASS
14575.5151	V	1000	-24.01	-13.00	11.01	PASS
16823.3647	V	1000	-23.65	-13.00	10.65	PASS
17908.1816	V	1000	-19.95	-13.00	6.95	PASS
10090.018	H	1000	-30.02	-13.00	17.02	PASS
11450.2901	H	1000	-29.60	-13.00	16.60	PASS
13426.0852	H	1000	-29.15	-13.00	16.15	PASS
14813.5627	H	1000	-24.88	-13.00	11.88	PASS
16809.762	H	1000	-21.20	-13.00	8.20	PASS
17979.5959	H	1000	-18.22	-13.00	5.22	PASS

Temperature: 25°C		Mode		LTE Band 4		
Humidity: 60%						
Air Pressure 106kPa						
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
9651.3303	V	1000	-31.07	-13.00	18.07	PASS
11491.0982	V	1000	-28.91	-13.00	15.91	PASS
13181.2362	V	1000	-28.96	-13.00	15.96	PASS
14602.7205	V	1000	-22.78	-13.00	9.78	PASS
16782.5565	V	1000	-23.48	-13.00	10.48	PASS
17860.5721	V	1000	-19.79	-13.00	6.79	PASS
8899.78	H	1000	-30.85	-13.00	17.85	PASS
10324.6649	H	1000	-29.89	-13.00	16.89	PASS
11477.4955	H	1000	-28.66	-13.00	15.66	PASS
12419.4839	H	1000	-29.39	-13.00	16.39	PASS
14616.3233	H	1000	-24.91	-13.00	11.91	PASS
17955.7912	H	1000	-16.01	-13.00	3.01	PASS

Temperature:	25℃	Mode		LTE Band 5		
Humidity:	60%					
Air Pressure	106kPa					
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
7447.6895	V	1000	-36.31	-13.00	23.31	PASS
8886.1772	V	1000	-30.63	-13.00	17.63	PASS
10137.6275	V	1000	-29.47	-13.00	16.47	PASS
11494.4989	V	1000	-28.58	-13.00	15.58	PASS
14568.7137	V	1000	-23.38	-13.00	10.38	PASS
17925.185	V	1000	-19.98	-13.00	6.98	PASS
10001.6003	H	1000	-30.60	-13.00	17.60	PASS
11504.7009	H	1000	-29.56	-13.00	16.56	PASS
13371.6743	H	1000	-28.05	-13.00	15.05	PASS
14725.145	H	1000	-24.08	-13.00	11.08	PASS
16840.3681	H	1000	-21.79	-13.00	8.79	PASS
17884.3769	H	1000	-18.26	-13.00	5.26	PASS

Temperature:	25℃	Mode		LTE Band 12		
Humidity:	60%					
Air Pressure	106kPa					
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
8070.014	V	1000	-35.71	-13.00	22.71	PASS
9022.2044	V	1000	-30.33	-13.00	17.33	PASS
11338.0676	V	1000	-29.20	-13.00	16.20	PASS
14660.5321	V	1000	-24.22	-13.00	11.22	PASS
16785.9572	V	1000	-22.91	-13.00	9.91	PASS
17867.3735	V	1000	-20.83	-13.00	7.83	PASS
9049.4099	H	1000	-30.69	-13.00	17.69	PASS
10331.4663	H	1000	-30.16	-13.00	17.16	PASS
11494.4989	H	1000	-27.95	-13.00	14.95	PASS
14524.5049	H	1000	-24.37	-13.00	11.37	PASS
16792.7586	H	1000	-20.90	-13.00	7.90	PASS
17608.9218	H	1000	-19.04	-13.00	6.04	PASS

Temperature:	25℃	Mode		LTE Band 13		
Humidity:	60%					
Air Pressure	106kPa					
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
8879.3759	V	1000	-30.37	-13.00	17.37	PASS
11497.8996	V	1000	-28.38	-13.00	15.38	PASS
13402.2805	V	1000	-27.53	-13.00	14.53	PASS
14623.1246	V	1000	-24.13	-13.00	11.13	PASS
16796.1592	V	1000	-23.00	-13.00	10.00	PASS
17897.9796	V	1000	-19.90	-13.00	6.90	PASS
8974.5949	H	1000	-30.92	-13.00	17.92	PASS
11531.9064	H	1000	-28.86	-13.00	15.86	PASS
12796.9594	H	1000	-28.18	-13.00	15.18	PASS
14762.5525	H	1000	-24.58	-13.00	11.58	PASS
16813.1626	H	1000	-21.49	-13.00	8.49	PASS
17857.1714	H	1000	-18.25	-13.00	5.25	PASS

Temperature:	25℃	Mode		LTE Band 14		
Humidity:	60%					
Air Pressure	106kPa					
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
8909.982	V	1000	-30.67	-13.00	17.67	PASS
11518.3037	V	1000	-28.96	-13.00	15.96	PASS
12790.158	V	1000	-28.67	-13.00	15.67	PASS
14663.9328	V	1000	-24.39	-13.00	11.39	PASS
16775.7552	V	1000	-22.78	-13.00	9.78	PASS
17948.9898	V	1000	-19.79	-13.00	6.79	PASS
7910.182	H	1000	-35.91	-13.00	22.91	PASS
8994.999	H	1000	-30.62	-13.00	17.62	PASS
11528.5057	H	1000	-28.91	-13.00	15.91	PASS
14507.5015	H	1000	-25.07	-13.00	12.07	PASS
16775.7552	H	1000	-20.53	-13.00	7.53	PASS
17853.7708	H	1000	-18.18	-13.00	5.18	PASS

Temperature: 25°C		Mode		LTE Band 66		
Humidity: 60%						
Air Pressure 106kPa						
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
8947.3895	V	1000	-31.02	-13.00	18.02	PASS
9896.1792	V	1000	-29.71	-13.00	16.71	PASS
11470.6941	V	1000	-28.58	-13.00	15.58	PASS
14653.7307	V	1000	-23.54	-13.00	10.54	PASS
16806.3613	V	1000	-23.47	-13.00	10.47	PASS
17874.1748	V	1000	-19.74	-13.00	6.74	PASS
8916.7834	H	1000	-30.42	-13.00	17.42	PASS
11504.7009	H	1000	-29.07	-13.00	16.07	PASS
12786.7574	H	1000	-28.03	-13.00	15.03	PASS
14646.9294	H	1000	-24.42	-13.00	11.42	PASS
16802.9606	H	1000	-21.30	-13.00	8.30	PASS
17840.168	H	1000	-18.60	-13.00	5.60	PASS

Temperature: 25°C		Mode		LTE Band 71		
Humidity: 60%						
Air Pressure 106kPa						
Frequency (MHz)	Antenna Polarization	RBW (kHz)	Emission level (dBm)	Limit (dBm)	Over (dB)	Verdict
10426.6853	V	1000	-29.45	-13.00	16.45	PASS
11511.5023	V	1000	-29.28	-13.00	16.28	PASS
13422.6845	V	1000	-27.31	-13.00	14.31	PASS
14578.9158	V	1000	-24.25	-13.00	11.25	PASS
16823.3647	V	1000	-23.16	-13.00	10.16	PASS
17965.9932	V	1000	-19.83	-13.00	6.83	PASS
11491.0982	H	1000	-29.18	-13.00	16.18	PASS
12786.7574	H	1000	-28.52	-13.00	15.52	PASS
13572.3145	H	1000	-28.39	-13.00	15.39	PASS
14595.9192	H	1000	-24.40	-13.00	11.40	PASS
16799.5599	H	1000	-21.88	-13.00	8.88	PASS
17863.9728	H	1000	-18.29	-13.00	5.29	PASS

Note:(1) Emission Level= Reading Level+ Correct Factor +Cable Loss.

(2) Correct Factor= Ant\_F + Cab\_L - Preamp.

(3) The reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

## **8.8 FREQUENCY STABILITY**

### **8.8.1 Conformance Limit**

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5\text{ppm}$ ) of the center frequency.

### **8.8.2 Test Configuration**

Test according to clause 7.2 conducted emission test setup2.

### **8.8.3 Test Procedure**

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the ARFCN range, power control level set to Max power. MS TXPWR\_MAX\_CCH is set to the maximum value supported by the Power Class of the Mobile under test.

EUT was placed at temperature chamber and connected to an external power supply.

Temperature and voltage condition shall be tested to confirm frequency stability.

(a) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than  $10^\circ$  centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(b) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 95 to 105 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.

### **8.8.4 Test Results**

**PASS**

Please refer to FCC 4G Appendix Band.



## 8.9 PEAK TO AVERAGE RATIO

### 8.9.1 Conformance Limit

LTE BAND2 (25)

FCC Part 24.232

Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

LTE BAND4(7)(30)(41)(66)

FCC Part 27.50

Equipment employed must be authorized in accordance with the provisions of §24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 8.9.2 Test Configuration

Test according to clause 7.1 conducted emission test setup1.

### 8.9.3 Test Procedure

The EUT was connected to Spectrum Analyzer and Base Station via power divider.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set the number of counts to a value that stabilizes the measured CCDF curve.

Set the measurement interval to 1 ms.

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

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

b) Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth.

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

d) Set the measurement interval as follows.

1) for continuous transmissions, set to 1 ms.

2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.

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

### 8.9.4 Test Results

**PASS**

Please refer to FCC 4G Appendix Band.



Detail of factor for radiated emission:

Frequency(MHz)	Ant F(dB)	Cab L(dB)	Preamp(dB)	Correct Factor(dB)
0.009	20.6	0.03	\	20.63
0.15	20.7	0.1	\	20.8
1	20.9	0.15	\	21.05
10	20.1	0.28	\	20.38
30	18.8	0.45	\	19.25
30	11.7	0.62	27.9	-15.58
100	12.5	1.02	27.8	-14.28
300	12.9	1.91	27.5	-12.69
600	19.2	2.92	27	-4.88
800	21.1	3.54	26.6	-1.96
1000	22.3	4.17	26.2	0.27
1000	25.6	1.76	41.4	-14.04
3000	28.9	3.27	43.2	-11.03
5000	31.1	4.2	44.6	-9.3
8000	36.2	5.95	44.7	-2.55
10000	38.4	6.3	43.9	0.8
12000	38.5	7.14	42.3	3.34
15000	40.2	8.15	41.4	6.95
18000	45.4	9.02	41.3	13.12
18000	37.9	1.81	47.9	-8.19
21000	37.9	1.95	48.7	-8.85
25000	39.3	2.01	42.8	-1.49
28000	39.6	2.16	46.0	-4.24
31000	41.2	2.24	44.5	-1.06
34000	41.5	2.29	46.6	-2.81
37000	43.8	2.30	46.4	-0.3
40000	43.2	2.50	42.2	3.5

--- End of Report ---