

FCC Test Report

Client Name : Jinan USR IOT Technology Limited

Client Address : Floor F1 & Part of Floor F2, Building No.
9, Diya shuang chuang Industrial
Zone, No. 2566, Century Main Road, Gaoxin
District, Jinan, Shandong, China

Product Name : 4G Cellular Router

Report Date : Sept. 16, 2022

Shenzhen Anbotech Compliance Laboratory Limited



Shenzhen Anbotech Compliance Laboratory Limited

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TEST REPORT

Applicant : Jinan USR IOT Technology Limited
Manufacturer : Jinan USR IOT Technology Limited
Product Name : 4G Cellular Router
Model No. : USR-809, USR-M100, USR-M300, USR-G809-43, USR-G809-GNSS,
USR-G809-405, USR-G809c, USR-G809w, USR-G809s, USR-G809m
Trade Mark : **PUSR**[®]
Rating(s) : Input: 12V= 1A

Test Standard(s) : FCC PART 2, FCC Part 22(H), FCC Part 24(E), FCC Part 27(C)

Test Method(s) : ANSI C63.26-2015

KDB 971168 D01 Power Meas License Digital Systems v03r01

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited 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 Shenzhen Anbotek Compliance Laboratory Limited 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 FCC Part 22, FCC Part 24, FCC Part 27 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt

Aug. 12, 2022

Date of Test :

Aug. 12~Sept. 02, 2022

Prepared by :

Tu Tu Hong

(TuTu Hong)

Approved & Authorized Signer :

Kingkong Jin

(Kingkong Jin)



Revision History

Report Version	Description	Issued Date
R00	Original Issue.	Sept. 16, 2022



1. General Information

1.1. Client Information

Applicant	:	Jinan USR IOT Technology Limited
Address	:	Floor F1 & Part of Floor F2,Building No. 9,Diya shuang chuang Industrial Zone,No.2566, Century Main Road,Gaoxin District,Jinan,Shandong, China
Manufacturer	:	Jinan USR IOT Technology Limited
Address	:	Floor F1 & Part of Floor F2,Building No. 9,Diya shuang chuang Industrial Zone,No.2566, Century Main Road,Gaoxin District,Jinan,Shandong, China
Factory	:	Jinan USR IOT Technology Limited
Address	:	Floor F1 & Part of Floor F2,Building No. 9,Diya shuang chuang Industrial Zone,No.2566, Century Main Road,Gaoxin District,Jinan,Shandong, China

1.2. Description of Device (EUT)

Product Name	:	4G Cellular Router
Model No.	:	USR-809, USR-M100, USR-M300, USR-G809-43, USR-G809-GNSS, USR-G809-405, USR-G809c, USR-G809w, USR-G809s, USR-G809m (Note: All samples are the same except the model number & appearance color, so we prepare "USR-809" for test only.)
Trade Mark	:	PUSR®
Test Power Supply	:	AC 120V, 60Hz for Adapter
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Adapter	:	N/A

RF Specification

Support Band	:	☒ FDD Band 2 ☒ FDD Band 4 ☒ FDD Band 5 ☐ FDD Band 7 ☒ FDD Band 12 ☒ FDD Band 13 ☐ FDD Band 14 ☐ FDD Band 17 ☐ FDD Band 25 ☐ FDD Band 26 ☐ TDD Band 38 ☐ TDD Band 41 ☐ FDD Band 66 ☐ FDD Band 71
Transmit Frequency	:	FDD Band 2: 1850.7~1909.3MHz FDD Band 4: 1710.7~1754.3MHz FDD Band 5: 824.7~848.3MHz FDD Band 12: 699.7~715.3MHz FDD Band 13: 779.5~784.5MHz
Receive Frequency	:	FDD Band 2: 1930.7~1989.3MHz FDD Band 4: 2110.7~2154.3MHz FDD Band 5: 869.7~893.3MHz



		FDD Band 12: 729.7~745.3MHz FDD Band 13: 748.5~753.5MHz
Modulation Type	:	QPSK, 16QAM
Power Class	:	Class 3
Antenna Type	:	External Antenna
Antenna Gain(Peak):		FDD Band 2: 4.5 dBi (Provided by customer) FDD Band 4: 4.5 dBi (Provided by customer) FDD Band 5: 4.5 dBi (Provided by customer) FDD Band 12: 4.5 dBi (Provided by customer) FDD Band 13: 4.5 dBi (Provided by customer)
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		



1.3. Auxiliary Equipment Used During Test

Description	Rating(s)
Adapter	Model: ASSA67E-120200 Input: 100-240V~50/60Hz 0.8A Output: DC 12V, 2A 24.0W

1.4. Operation State

Test frequency list:

Band	Frequency (MHz)					
FDD Band 2	Test Frequency ID	Bandwidth [MHz]	N _{UL}	Frequency of Uplink [MHz]	N _{DL}	Frequency of Downlink [MHz]
	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 [1]	18675	1857.5	675	1937.5
	Mid Range	20 [1]	18700	1860	700	1940
		1.4/3/5/10 15 [1]/20 [1]	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 [1]	19125	1902.5	1125	1982.5
		20 [1]	19100	1900	1100	1980
FDD Band 4	Test Frequency ID	Bandwidth [MHz]	N _{UL}	Frequency of Uplink [MHz]	N _{DL}	Frequency of Downlink [MHz]
	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
	Mid Range	20	20050	1720	2050	2120
		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
FDD Band 5	Test Frequency ID	Bandwidth [MHz]	N _{UL}	Frequency of Uplink [MHz]	N _{DL}	Frequency of Downlink [MHz]
	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 [1]	20450	829	2450	874
	Mid Range	1.4/3/5 10 [1]	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 [1]	20600	844	2600	889



FDD Band 12	Test Frequency ID	Bandwidth [MHz]	N _{UL}	Frequency of Uplink [MHz]	N _{DL}	Frequency of Downlink [MHz]
	Low Range	1.4	23017	699.7	5017	729.7
		3	23025	700.5	5025	730.5
		5 [1]	23035	701.5	5035	731.5
	Mid Range	10 [1]	23060	704	5060	734
		1.4/3	23095	707.5	5095	737.5
		5 [1]/10 [1]				
	High Range	1.4	23173	715.3	5173	745.3
		3	23165	714.5	5165	744.5
		5 [1]	23155	713.5	5155	743.5
		10 [1]	23130	711	5130	741

FDD Band 13	Test Frequency ID	Bandwidth [MHz]	N _{UL}	Frequency of Uplink [MHz]	N _{DL}	Frequency of Downlink [MHz]
	Low Range	5 [1]	23205	779.5	5205	748.5
		10 [1]	23230	782	5230	751
	Mid Range	5 [1]/10 [1]	23230	782	5230	751
	High Range	5 [1]	23255	784.5	5255	753.5
		10 [1]	23230	782	5230	751

1.5. Environmental Conditions

Temperature range:	21-25℃
Humidity range:	40-75%
Pressure range:	86-106kPa



1.6. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Oct. 22, 2021	1 Year
2.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Oct. 22, 2021	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI3	101604	Oct. 22, 2021	1Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Oct. 22, 2021	2 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 22, 2021	2 Year
6.	Pre-amplifier	SONOMA	310N	186860	Oct. 22, 2021	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
8.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 22, 2021	1 Year
9.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 22, 2021	1 Year
10.	DC Power Supply	LW	TPR-6420D	374470	Oct. 22, 2021	1 Year
11.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Oct. 22, 2021	1 Year
12.	Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	117888	Oct. 22, 2021	1 Year
13.	Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	104209	Oct. 22, 2021	1 Year
14.	High-Pass Filter	CDKMV	ZHPF-BM1100 -4000-0730	B2015094550	Oct. 22, 2021	1 Year
15.	High-Pass Filter	CDKMV	ZHPF-M3.5 -18G-3834	1307006523	Oct. 22, 2021	1 Year
16.	4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063507	Oct. 22, 2021	1 Year
17.	4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063513	Oct. 22, 2021	1 Year



1.7. Measurement Uncertainty

Maximum measurement uncertainty

Parameter	Uncertainty
RF output power, conducted	±1,5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±1 °C
Humidity	±5 %
DC and low frequency voltages	±3 %
Time	±5 %
Confidence interval: 95%. Confidence factor:k=2	

1.8. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102



2. Summary of Test

2.1. Summary of test result

Description of Test	FCC Rules	Requirements	Result
Conducted Output Power	Part 2.1046 Part 22.913(a) Part 24.232(b) Part 27.50(b) Part 27.50(c) Part 27.50(d) Part 27.50(h)	N/A	Compliance
Peak-Average Ratio	Part 22.913 Part 24.232 Part 27.50	≤13dB	Compliance
Modulation Characteristics	§ 2.1047	Digital modulation	N/A
99% Occupied Bandwidth & 26 dB Bandwidth	Part 2.1049	OBW: No limit EBW: No limit	Compliance
Conducted Spurious Emission	Part 2.1051 Part 22.917 Part 24.238 Part 27.53(c)(f) Part 27.53(g) Part 27.53(h)	≤ -13dBm(LTE Band5) ≤ -13dBm(LTE Band2) Refer to clause 7.1 for LTE Band13 ≤ -13dBm(LTE Band12) ≤ -13dBm(LTE Band4)	Compliance
Band Edge	Part 2.1051 Part 22.917 Part 24.238 Part 27.53(c)(f) Part 27.53(g) Part 27.53(h)	≤ -13dBm (LTE Band5) ≤ -13dBm (LTE Band2) Refer to clause 8.1 for LTE Band13 ≤ -13dBm (LTE Band12) ≤ -13dBm (LTE Band4)	Compliance
Frequency stability VS. temperature	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235 Part 27.54	≤ ±2.5ppm	Compliance



Frequency stability VS. voltage	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235 Part 27.54	$\leq \pm 2.5\text{ppm}$	Compliance
ERP and EIRP	Part 2.1046 Part 22.913(a) Part 24.232(c) Part 27.50(b) Part 27.50(c) Part 27.50(d)	ERP $\leq$ 7W(LTE Band 5) EIRP $\leq$ 2W(LTE Band 2) ERP $\leq$ 3W(LTE Band 13) ERP $\leq$ 3W(LTE Band 12) EIRP $\leq$ 1W(LTE Band 4)	Compliance
Radiated Spurious Emission	Part 2.1053 Part 22.917 Part 24.238 Part 27.53(c)(f) Part 27.53(g) Part 27.53(h)	$\leq -13\text{dBm}$ (LTE Band5) $\leq -13\text{dBm}$ (LTE Band2) Refer to clause 9.1 for LTE Band13 $\leq -13\text{dBm}$ (LTE Band12) $\leq -13\text{dBm}$ (LTE Band4)	Compliance

Note:

1. "N/A" is an abbreviation for Not Applicable.
2. Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

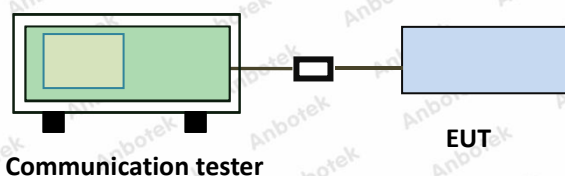


3. Conducted Output Power Test

3.1. Test Standard and Limit

Applicable Standard:	Part 2.1046 Part 22.913(a) Part 24.232(b) Part 27.50(b) Part 27.50(c) Part 27.50(d) Part 27.50(h)
Limit:	N/A

3.2. Test Setup



3.3. Test Procedure

1. The EUT output port was connected to communication tester.
2. Set EUT at maximum power through communication tester.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power.

3.4. Test Data

Pass

Please refer to Appendix A of the Appendix Test Data.

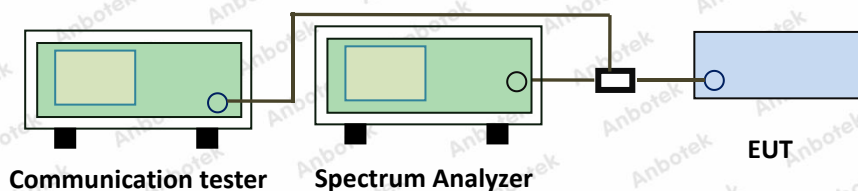


4. Peak-Average Ratio

4.1. Test Standard and Limit

Applicable Standard:	Part 22.913 Part 24.232 Part 27.50
Limit:	≤13dB

4.2. Test Setup



4.3. Test Procedure

According with KDB 971168 D01 Section 5.7:

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Center Frequency = Carrier frequency, RBW > Emission bandwidth of signal.
4. The signal analyzer was set to collect one million samples to generate the CCDF curve.
5. The measurement interval was set depending on the type of signal analyzed.
 - i. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.
 - ii. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power
6. Record the maximum PAPR level associated with a probability of 0.1%.

4.4. Test Data

Pass

Please refer to Appendix B of the Appendix Test Data.



5. Modulation Characteristic

According to FCC § 2.1047, Part 22H, Part 24E, Part 27C there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

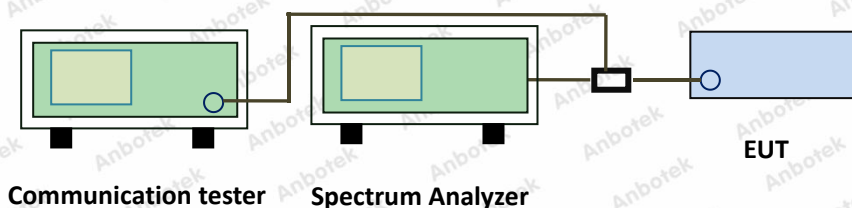


6. 99% Occupied Bandwidth & 26 dB Bandwidth

6.1. Test Standard and Limit

Applicable Standard:	Part 2.1049
Limit:	N/A

6.2. Test Setup



6.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Spectrum analyzer setting as follow:
Center Frequency= Carrier frequency, RBW=1% to 5% of anticipated OBW, VBW= 3 * RBW,
Detector=Peak,
Trace maximum hold.
4. Record the value of 99% Occupied bandwidth and -26dB bandwidth.

6.4. Test Data

Pass

Please refer to Appendix C of the Appendix Test Data.

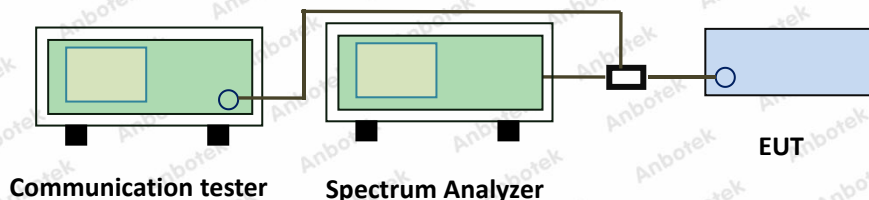


7. Conducted Spurious Emission

7.1. Test Standard and Limit

Applicable Standard:	Part 2.1051 Part 22.917 Part 24.238 Part 27.53(c)(f) Part 27.53(g) Part 27.53(h)
Limit:	$\leq -13\text{dBm}$ (LTE Band 5) $\leq -13\text{dBm}$ (LTE Band 2) $\leq -13\text{dBm}$ (LTE Band 12) $\leq -13\text{dBm}$ (LTE Band 4) For LTE Band 13: (1) 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; (2) For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm.

7.2. Test Setup



7.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Spectrum analyzer setting as follow:
Below 1GHz, RBW=100KHz, VBW = 300KHz, Detector=Peak, Sweep time= Auto
Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peak, Sweep time= Auto
Scan frequency range up to 10th harmonic.
4. Record the test plot.

7.4. Test Data

Pass

Please refer to Appendix E of the Appendix Test Data.

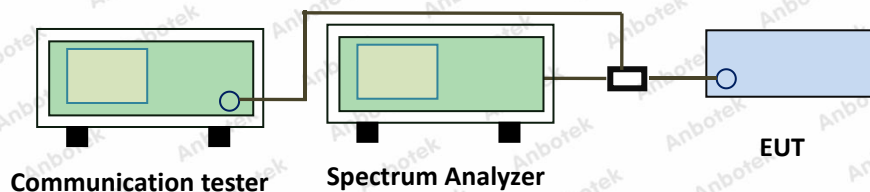


8. Band Edge

8.1. Test Standard and Limit

Applicable Standard:	Part 2.1051 Part 22.917 Part 24.238 Part 27.53(c)(f) Part 27.53(g) Part 27.53(h)
Limit:	$\leq -13\text{dBm}$ (LTE Band 5) $\leq -13\text{dBm}$ (LTE Band 2) $\leq -13\text{dBm}$ (LTE Band 12) $\leq -13\text{dBm}$ (LTE Band 4) For LTE Band 13: (1) 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; (2) 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.

8.2. Test Setup



8.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. The band edges of low and high channels were measured.
4. Spectrum analyzer setting as follow:
RBW=3KHz, VBW = 10KHz, Sweep time= Auto
5. Record the test plot.



8.4. Test Data

Pass

Please refer to Appendix D of the Appendix Test Data.

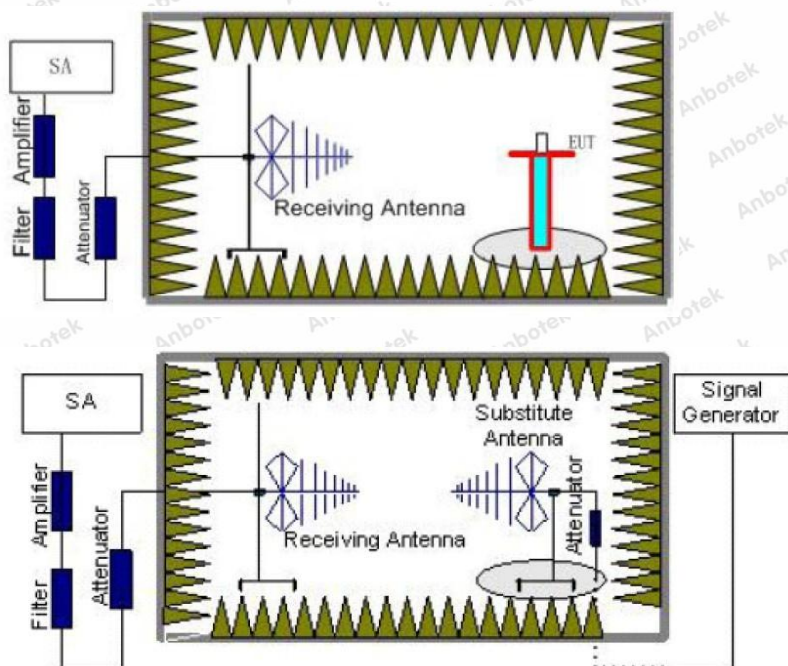


9. Radiated Spurious Emission

9.1. Test Standard and Limit

Applicable Standard:	Part 2.1053 Part 22.917 Part 24.238 Part 27.53(c)(f) Part 27.53(g) Part 27.53(h)
Limit:	$\leq -13\text{dBm}$ (LTE Band 5) $\leq -13\text{dBm}$ (LTE Band 2) $\leq -13\text{dBm}$ (LTE Band 12) $\leq -13\text{dBm}$ (LTE Band 4) For LTE Band 13: (1) 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; (2) For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm.

9.2. Test Setup



9.3. Test Procedure

1. Place the EUT in the center of the turntable.
 - a) For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
 - b) For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.
2. Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.
3. The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
4. Receiver or Spectrum set as follow:
Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto
Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto
5. Each emission under consideration shall be evaluated:
 - a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
 - b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
 - c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
 - d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
 - e) Record the measured emission amplitude level and frequency
6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
10. For each emission that was detected and measured in the initial test
 - a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
 - b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
 - c) Record the output power level of the signal generator when equivalence is achieved in step b).
11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.



12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:

$$P_e = P_s(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

where

P_e = equivalent emission power in dBm

P_s = source (signal generator) power in dBm

NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.

13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:

$$\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB.}$$

If necessary, the antenna gain can be calculated from calibrated antenna factor information

14. Provide the complete measurement results as a part of the test report.

9.4. Test Data

Pass

Please to see the following pages

LTE Band 2								
Bandwidth	Channel	Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
			Polarization	reading (dBm)	factor (dB)	Level (dBm)		
1.4MHz	Low	3701.40	Vertical	-49.29	13.21	-36.08	-13.00	PASS
		5552.10	V	-56.45	16.61	-39.84		
		7402.80	V	-58.79	18.03	-40.76		
		3701.40	Horizontal	-50.19	13.21	-36.98	-13.00	PASS
		5552.10	H	-57.30	16.61	-40.69		
		7402.80	H	-59.51	18.03	-41.48		
	Mid	3760.00	Vertical	-47.76	12.36	-35.40	-13.00	PASS
		5640.00	V	-56.23	17.03	-39.20		
		7520.00	V	-58.01	17.85	-40.16		
		3760.00	Horizontal	-48.52	12.36	-36.16	-13.00	PASS
		5640.00	H	-57.05	17.03	-40.02		
		7520.00	H	-58.70	17.85	-40.85		
	High	3818.60	Vertical	-47.03	12.78	-34.25	-13.00	PASS
		5727.90	V	-56.01	17.86	-38.15		
		7637.20	V	-57.72	18.56	-39.16		
		3818.60	Horizontal	-48.54	12.78	-35.76	-13.00	PASS
		5727.90	H	-57.50	17.86	-39.64		



		7637.20	H	-59.09	18.56	-40.53		
3MHz	Low	3703.00	Vertical	-46.29	12.78	-33.51	-13.00	PASS
		5554.50	V	-52.73	16.69	-36.04		
		7406.00	V	-55.80	18.18	-37.62		
		3703.00	Horizontal	-46.72	12.78	-33.94	-13.00	PASS
		5554.50	H	-54.17	16.69	-37.48		
		7406.00	H	-57.58	18.18	-39.40		
	Mid	3760.00	Vertical	-44.24	12.79	-31.45	-13.00	PASS
		5640.00	V	-50.82	16.72	-34.10		
		7520.00	V	-53.72	18.22	-35.50		
		3760.00	Horizontal	-45.01	12.79	-32.22	-13.00	PASS
		5640.00	H	-53.00	16.72	-36.28		
		7520.00	H	-56.24	18.22	-38.02		
	High	3817.00	Vertical	-42.49	12.93	-29.56	-13.00	PASS
		5725.50	V	-49.74	17.01	-32.73		
		7634.00	V	-53.02	18.41	-34.61		
		3817.00	Horizontal	-43.34	12.93	-30.41	-13.00	PASS
		5725.50	H	-51.91	17.01	-34.90		
		7634.00	H	-54.01	18.41	-35.60		
5MHz	Low	3705.00	Vertical	-40.78	13.25	-27.53	-13.00	PASS
		5557.50	V	-46.24	16.59	-29.65		
		7410.00	V	-50.42	18.12	-32.30		
		3705.00	Horizontal	-45.20	13.25	-31.95	-13.00	PASS
		5557.50	H	-54.24	16.59	-37.65		
		7410.00	H	-55.07	18.12	-36.95		
	Mid	3760.00	Vertical	-40.83	12.31	-28.52	-13.00	PASS
		5640.00	V	-48.63	17.14	-31.49		
		7520.00	V	-51.85	17.96	-33.89		
		3760.00	Horizontal	-46.55	12.31	-34.24	-13.00	PASS
		5640.00	H	-56.35	17.14	-39.21		
		7520.00	H	-56.10	17.96	-38.14		
	High	3815.00	Vertical	-43.79	12.77	-31.02	-13.00	PASS
		5722.50	V	-51.09	17.82	-33.27		
		7630.00	V	-54.01	18.59	-35.42		
		3815.00	Horizontal	-48.80	12.77	-36.03	-13.00	PASS
		5722.50	H	-58.69	17.82	-40.87		



		7630.00	H	-57.99	18.59	-39.40		
10MHz	Low	3710.00	Vertical	-41.95	12.59	-29.36	-13.00	PASS
		5565.00	V	-48.98	16.61	-32.37		
		7420.00	V	-52.69	18.35	-34.34		
		3710.00	Horizontal	-51.16	12.59	-38.57	-13.00	PASS
		5565.00	H	-59.22	16.61	-42.61		
		7420.00	H	-59.75	18.35	-41.40		
	Mid	3760.00	Vertical	-44.04	12.71	-31.33	-13.00	PASS
		5640.00	V	-50.67	16.65	-34.02		
		7520.00	V	-54.60	18.27	-36.33		
		3760.00	Horizontal	-52.58	12.71	-39.87	-13.00	PASS
		5640.00	H	-61.20	16.65	-44.55		
		7520.00	H	-61.20	18.27	-42.93		
	High	3810.00	Vertical	-44.97	12.91	-32.06	-13.00	PASS
		5715.00	V	-52.90	17.23	-35.67		
		7620.00	V	-56.83	18.59	-38.24		
		3810.00	Horizontal	-51.21	12.91	-38.30	-13.00	PASS
		5715.00	H	-60.87	17.23	-43.64		
		7620.00	H	-60.30	18.59	-41.71		

15MHz	Low	3715.00	Vertical	-43.93	13.21	-30.72	-13.00	PASS
		5572.50	V	-51.11	16.65	-34.46		
		7430.00	V	-55.24	18.29	-36.95		
		3715.00	Horizontal	-52.78	13.21	-39.57	-13.00	PASS
		5572.50	H	-61.48	16.65	-44.83		
		7430.00	H	-61.01	18.29	-42.72		
	Mid	3760.00	Vertical	-44.06	12.39	-31.67	-13.00	PASS
		5640.00	V	-52.54	17.18	-35.36		
		7520.00	V	-55.78	17.99	-37.79		
		3760.00	Horizontal	-50.76	12.39	-38.37	-13.00	PASS
		5640.00	H	-60.76	17.18	-43.58		
		7520.00	H	-60.00	17.99	-42.01		
	High	3805.00	Vertical	-43.54	12.86	-30.68	-13.00	PASS
		5707.50	V	-51.40	17.89	-33.51		
		7610.00	V	-54.64	18.69	-35.95		



20MHz		3805.00	Horizontal	-52.80	12.86	-39.94	-13.00	PASS
		5707.50	H	-64.02	17.89	-46.13		
		7610.00	H	-63.32	18.69	-44.63		
	Low	3720.00	Vertical	-44.81	12.57	-32.24	-13.00	PASS
		5580.00	V	-51.88	16.59	-35.29		
		7440.00	V	-55.96	18.67	-37.29		
		3720.00	Horizontal	-52.95	12.57	-40.38	-13.00	PASS
		5580.00	H	-63.14	16.59	-46.55		
		7440.00	H	-63.65	18.67	-44.98		
	Mid	3760.00	Vertical	-45.33	12.76	-32.57	-13.00	PASS
		5640.00	V	-52.29	16.69	-35.60		
		7520.00	V	-55.96	18.38	-37.58		
		3760.00	Horizontal	-53.43	12.76	-40.67	-13.00	PASS
		5640.00	H	-63.48	16.69	-46.79		
		7520.00	H	-63.58	18.38	-45.20		
	High	3800.00	Vertical	-44.40	12.97	-31.43	-13.00	PASS
		5700.00	V	-51.26	17.19	-34.07		
		7600.00	V	-54.76	18.28	-36.48		
		3800.00	Horizontal	-53.95	12.97	-40.98	-13.00	PASS
		5700.00	H	-64.27	17.19	-47.08		
		7600.00	H	-63.73	18.28	-45.45		

LTE Band 4								
Bandwidth	Channel	Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
			Polarization	reading (dBm)	factor (dB)	Level (dBm)		
1.4MHz	Low	3421.40	Vertical	-47.18	12.89	-34.29	-13.00	PASS
		5132.10	V	-55.20	15.86	-39.34		
		6842.80	V	-58.73	18.92	-39.81		
		3421.40	Horizontal	-47.95	12.89	-35.06	-13.00	PASS
		5132.10	H	-55.93	15.86	-40.07		
		6842.80	H	-59.35	18.92	-40.43		
	Mid	3465.00	Vertical	-46.20	12.49	-33.71	-13.00	PASS
		5197.50	V	-54.50	15.71	-38.79		
		6930.00	V	-57.56	18.26	-39.30		



3MHz		3465.00	Horizontal	-46.84	12.49	-34.35	-13.00	PASS
		5197.50	H	-55.21	15.71	-39.50		
		6930.00	H	-58.14	18.26	-39.88		
	High	3508.60	Vertical	-45.73	13.01	-32.72	-13.00	PASS
		5262.90	V	-53.78	15.89	-37.89		
		7017.20	V	-57.11	18.67	-38.44		
		3508.60	Horizontal	-46.55	13.01	-33.54	-13.00	PASS
		5262.90	H	-54.62	15.89	-38.73		
		7017.20	H	-57.82	18.67	-39.15		
	Low	3423.00	Vertical	-46.70	12.74	-33.96	-13.00	PASS
		5134.50	V	-54.68	15.68	-39.00		
		6846.00	V	-58.13	18.59	-39.54		
		3423.00	Horizontal	-47.27	12.74	-34.53	-13.00	PASS
		5134.50	H	-55.97	15.68	-40.29		
		6846.00	H	-58.93	18.59	-40.34		
3MHz	Mid	3465.00	Vertical	-47.75	12.49	-35.26	-13.00	PASS
		5197.50	V	-56.19	15.89	-40.30		
		6930.00	V	-59.20	18.66	-40.54		
		3465.00	Horizontal	-49.51	12.49	-37.02	-13.00	PASS
		5197.50	H	-57.93	15.89	-42.04		
		6930.00	H	-61.04	18.66	-42.38		
	High	3507.00	Vertical	-49.57	13.44	-36.13	-13.00	PASS
		5260.50	V	-56.98	15.89	-41.09		
		7014.00	V	-59.68	18.39	-41.29		
		3507.00	Horizontal	-51.66	13.44	-38.22	-13.00	PASS
		5260.50	H	-59.29	15.89	-43.40		
		7014.00	H	-61.76	18.39	-43.37		

5MHz	Low	3425.00	Vertical	-47.41	12.87	-34.54	-13.00	PASS
		5137.50	V	-55.77	15.85	-39.92		
		6850.00	V	-58.63	18.93	-39.70		
		3425.00	Horizontal	-50.45	12.87	-37.58	-13.00	PASS
		5137.50	H	-59.85	15.85	-44.00		
		6850.00	H	-61.79	18.93	-42.86		
	Mid	3465.00	Vertical	-47.49	12.47	-35.02	-13.00	PASS



		5197.50	V	-55.17	15.7	-39.47		PASS
		6930.00	V	-58.41	18.29	-40.12		
		3465.00	Horizontal	-50.61	12.47	-38.14		
		5197.50	H	-59.25	15.7	-43.55		
		6930.00	H	-60.94	18.29	-42.65		
		3505.00	Vertical	-47.62	13.29	-34.33		
	High	5257.50	V	-55.96	15.86	-40.10	-13.00	PASS
		7010.00	V	-58.15	18.63	-39.52		
		3505.00	Horizontal	-50.98	13.29	-37.69		
		5257.50	H	-58.99	15.86	-43.13		
		7010.00	H	-60.92	18.63	-42.29		
		3430.00	Vertical	-45.83	12.72	-33.11		
10MHz	Low	5145.00	V	-56.45	15.61	-40.84	-13.00	PASS
		6860.00	V	-57.69	18.62	-39.07		
		3430.00	Horizontal	-50.67	12.72	-37.95		
		5145.00	H	-58.98	15.61	-43.37		
		6860.00	H	-61.12	18.62	-42.50		
		3465.00	Vertical	-45.71	12.41	-33.30	-13.00	PASS
	Mid	5197.50	V	-56.94	15.92	-41.02		
		6930.00	V	-58.23	18.63	-39.60		
		3465.00	Horizontal	-50.57	12.41	-38.16		
		5197.50	H	-59.46	15.92	-43.54		
		6930.00	H	-61.29	18.63	-42.66		
	High	3500.00	Vertical	-46.97	13.41	-33.56	-13.00	PASS
		5250.00	V	-56.85	15.59	-41.26		
		7000.00	V	-58.14	18.31	-39.83		
		3500.00	Horizontal	-51.77	13.41	-38.36		
		5250.00	H	-59.32	15.59	-43.73		
		7000.00	H	-61.13	18.31	-42.82		

15MHz	Low	3435.00	Vertical	-47.14	12.89	-34.25	-13.00	PASS
		5152.50	V	-56.42	15.86	-40.56		
		6870.00	V	-59.33	18.95	-40.38		
		3435.00	Horizontal	-50.28	12.89	-37.39		
		5152.50	H	-60.50	15.86	-44.64		



	Mid	6870.00	H	-60.08	18.95	-41.13	-13.00	PASS
		3465.00	Vertical	-48.33	12.49	-35.84		
		5197.50	V	-54.80	15.73	-39.07		
		6930.00	V	-60.09	18.31	-41.78	-13.00	PASS
		3465.00	Horizontal	-48.65	12.49	-36.16		
		5197.50	H	-61.37	15.73	-45.64		
	High	6930.00	H	-58.49	18.31	-40.18	-13.00	PASS
		3495.00	Vertical	-50.33	13.32	-37.01		
		5242.50	V	-53.89	15.88	-38.01		
		6990.00	V	-59.42	18.65	-40.77	-13.00	PASS
		3495.00	Horizontal	-48.36	13.32	-35.04		
		5242.50	H	-59.35	15.88	-43.47		
20MHz	Low	6990.00	H	-58.29	18.65	-39.64	-13.00	PASS
		3440.00	Vertical	-48.03	12.74	-35.29		
		5160.00	V	-53.27	15.65	-37.62		
		6880.00	V	-59.08	18.64	-40.44	-13.00	PASS
		3440.00	Horizontal	-48.89	12.74	-36.15		
		5160.00	H	-60.00	15.65	-44.35		
	Mid	6880.00	H	-58.54	18.64	-39.90	-13.00	PASS
		3465.00	Vertical	-48.01	12.44	-35.57		
		5197.50	V	-53.68	15.93	-37.75		
		6930.00	V	-59.20	18.64	-40.56	-13.00	PASS
		3465.00	Horizontal	-48.77	12.44	-36.33		
		5197.50	H	-60.46	15.93	-44.53		
	High	6930.00	H	-60.33	18.64	-41.69	-13.00	PASS
		3490.00	Vertical	-50.16	13.43	-36.73		
		5235.00	V	-54.30	15.61	-38.69		
		6980.00	V	-59.76	18.34	-41.42	-13.00	PASS
		3490.00	Horizontal	-50.57	13.43	-37.14		
		5235.00	H	-60.34	15.61	-44.73		
		6980.00	H	-60.76	18.34	-42.42		



LTE Band 5								
Bandwidth	Channel	Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
			Polarization	reading (dBm)	factor (dB)	Level (dBm)		
1.4MHz	Low	1649.40	Vertical	-43.23	7.29	-35.94	-13.00	PASS
		2474.10	V	-52.80	9.41	-43.39		
		3298.80	V	-56.79	12.69	-44.10		
		1649.40	Horizontal	-44.98	7.29	-37.69	-13.00	PASS
		2474.10	H	-54.86	9.41	-45.45		
		3298.80	H	-58.66	12.69	-45.97		
	Mid	1673.00	Vertical	-42.74	7.32	-35.42	-13.00	PASS
		2509.50	V	-52.29	9.39	-42.90		
		3346.00	V	-56.31	12.78	-43.53		
		1673.00	Horizontal	-44.48	7.32	-37.16	-13.00	PASS
		2509.50	H	-54.34	9.39	-44.95		
		3346.00	H	-58.28	12.78	-45.50		
	High	1696.60	Vertical	-42.16	7.33	-34.83	-13.00	PASS
		2544.90	V	-51.88	9.46	-42.42		
		3393.20	V	-55.78	12.71	-43.07		
		1696.60	Horizontal	-42.42	7.33	-35.09	-13.00	PASS
		2544.90	H	-51.64	9.46	-42.18		
		3393.20	H	-56.21	12.71	-43.50		
3MHz	Low	1651.00	Vertical	-41.11	7.36	-33.75	-13.00	PASS
		2476.50	V	-50.92	9.51	-41.41		
		3302.00	V	-54.93	12.72	-42.21		
		1651.00	Horizontal	-41.74	7.36	-34.38	-13.00	PASS
		2476.50	H	-51.02	9.51	-41.51		
		3302.00	H	-55.65	12.72	-42.93		
	Mid	1673.00	Vertical	-40.63	7.41	-33.22	-13.00	PASS
		2509.50	V	-50.43	9.52	-40.91		
		3346.00	V	-54.47	12.73	-41.74		
		1673.00	Horizontal	-40.84	7.41	-33.43	-13.00	PASS
		2509.50	H	-50.26	9.52	-40.74		
		3346.00	H	-54.93	12.73	-42.20		
	High	1695.00	Vertical	-39.57	7.52	-32.05	-13.00	PASS



		2542.50	V	-49.31	9.46	-39.85		
		3390.00	V	-53.54	12.81	-40.73		
		1695.00	Horizontal	-40.08	7.52	-32.56		
		2542.50	H	-49.39	9.46	-39.93	-13.00	PASS
		3390.00	H	-54.32	12.81	-41.51		

5MHz	Low	1653.00	Vertical	-37.50	7.61	-29.89		
		2479.50	V	-48.00	9.49	-38.51	-13.00	PASS
		3306.00	V	-51.82	12.86	-38.96		
		1653.00	Horizontal	-40.69	7.61	-33.08		
		2479.50	H	-49.91	9.49	-40.42	-13.00	PASS
		3306.00	H	-54.78	12.86	-41.92		
	Mid	1673.00	Vertical	-38.00	7.72	-30.28		
		2509.50	V	-48.41	9.53	-38.88	-13.00	PASS
		3346.00	V	-52.14	12.84	-39.30		
		1673.00	Horizontal	-40.95	7.72	-33.23		
		2509.50	H	-50.07	9.53	-40.54	-13.00	PASS
		3346.00	H	-54.88	12.84	-42.04		
	High	1693.00	Vertical	-38.55	7.79	-30.76		
		2539.50	V	-48.85	9.53	-39.32	-13.00	PASS
		3386.00	V	-52.60	12.89	-39.71		
		1693.00	Horizontal	-40.12	7.79	-32.33		
		2539.50	H	-49.23	9.53	-39.70	-13.00	PASS
		3386.00	H	-54.21	12.89	-41.32		
10MHz	Low	1658.00	Vertical	-37.96	7.81	-30.15		
		2487.00	V	-48.36	9.56	-38.80	-13.00	PASS
		3316.00	V	-52.18	12.91	-39.27		
		1658.00	Horizontal	-40.84	7.81	-33.03		
		2487.00	H	-49.91	9.56	-40.35	-13.00	PASS
		3316.00	H	-54.79	12.91	-41.88		
	Mid	1673.00	Vertical	-38.50	7.83	-30.67		
		2509.50	V	-48.88	9.59	-39.29	-13.00	PASS
		3346.00	V	-52.67	12.94	-39.73		
		1673.00	Horizontal	-41.05	7.83	-33.22		
		2509.50	H	-50.09	9.59	-40.50	-13.00	PASS
		3346.00	H	-54.97	12.94	-42.03		



	High	1688.00	Vertical	-38.79	7.89	-30.90	-13.00	PASS
		2532.00	V	-49.12	9.62	-39.50		
		3376.00	V	-52.89	12.96	-39.93		
		1688.00	Horizontal	-41.29	7.89	-33.40	-13.00	PASS
		2532.00	H	-50.29	9.62	-40.67		
		3376.00	H	-55.13	12.96	-42.17		

LTE Band 12								
Bandwidth	Channel	Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
			Polarization	reading (dBm)	factor (dB)	Level (dBm)		
1.4MHz	Low	1399.40	Vertical	-39.98	4.21	-35.77	-13.00	PASS
		2099.10	V	-48.52	9.12	-39.40		
		2798.80	V	-51.80	11.36	-40.44		
		1399.40	Horizontal	-41.31	4.21	-37.10	-13.00	PASS
		2099.10	H	-49.77	9.12	-40.65		
		2798.80	H	-52.87	11.36	-41.51		
	Mid	1415.00	Vertical	-39.03	4.26	-34.77	-13.00	PASS
		2122.50	V	-47.61	9.15	-38.46		
		2830.00	V	-50.94	11.39	-39.55		
		1415.00	Horizontal	-40.14	4.26	-35.88	-13.00	PASS
		2122.50	H	-48.81	9.15	-39.66		
		2830.00	H	-51.96	11.39	-40.57		
	High	1430.60	Vertical	-37.35	4.29	-33.06	-13.00	PASS
		2145.90	V	-46.01	9.11	-36.90		
		2861.20	V	-49.38	11.31	-38.07		
		1430.60	Horizontal	-39.57	4.29	-35.28	-13.00	PASS
		2145.90	H	-48.21	9.11	-39.10		
		2861.20	H	-51.40	11.31	-40.09		
3MHz	Low	1401.00	Vertical	-36.28	4.32	-31.96	-13.00	PASS
		2101.50	V	-42.93	9.16	-33.77		
		2802.00	V	-47.14	11.35	-35.79		
		1401.00	Horizontal	-36.89	4.32	-32.57	-13.00	PASS
		2101.50	H	-45.05	9.16	-35.89		
		2802.00	H	-49.76	11.35	-38.41		



	Mid	1415.00	Vertical	-33.16	4.26	-28.90	-13.00	PASS
		2122.50	V	-40.04	9.15	-30.89		
		2830.00	V	-44.03	11.39	-32.64		
		1415.00	Horizontal	-34.28	4.26	-30.02	-13.00	PASS
		2122.50	H	-43.25	9.15	-34.10		
		2830.00	H	-47.75	11.39	-36.36		
	High	1429.00	Vertical	-30.52	4.42	-26.10	-13.00	PASS
		2143.50	V	-38.11	9.25	-28.86		
		2858.00	V	-42.77	11.46	-31.31		
		1429.00	Horizontal	-31.76	4.42	-27.34	-13.00	PASS
		2143.50	H	-41.31	9.25	-32.06		
		2858.00	H	-44.22	11.46	-32.76		

5MHz	Low	1403.00	Vertical	-27.22	4.13	-23.09	-13.00	PASS
		2104.50	V	-33.36	9.06	-24.30		
		2806.00	V	-39.16	11.27	-27.89		
		1403.00	Horizontal	-33.76	4.13	-29.63	-13.00	PASS
		2104.50	H	-45.19	9.06	-36.13		
		2806.00	H	-46.03	11.27	-34.76		
	Mid	1415.00	Vertical	-28.82	4.26	-24.56	-13.00	PASS
		2122.50	V	-36.18	9.15	-27.03		
		2830.00	V	-41.64	11.39	-30.25		
		1415.00	Horizontal	-37.29	4.26	-33.03	-13.00	PASS
		2122.50	H	-47.59	9.15	-38.44		
		2830.00	H	-47.91	11.39	-36.52		
	High	1427.00	Vertical	-32.49	4.22	-28.27	-13.00	PASS
		2140.50	V	-38.83	9.16	-29.67		
		2854.00	V	-43.84	11.32	-32.52		
		1427.00	Horizontal	-39.91	4.22	-35.69	-13.00	PASS
		2140.50	H	-50.07	9.16	-40.91		
		2854.00	H	-49.72	11.32	-38.40		
10MHz	Low	1408.00	Vertical	-30.09	4.29	-25.80	-13.00	PASS
		2112.00	V	-37.53	9.19	-28.34		
		2816.00	V	-42.27	11.35	-30.92		
		1408.00	Horizontal	-43.75	4.29	-39.46	-13.00	PASS
		2112.00	H	-52.68	9.19	-43.49		



	Mid	2816.00	H	-52.72	11.35	-41.37	-13.00	PASS
		1415.00	Vertical	-32.98	4.26	-28.72		
		2122.50	V	-39.94	9.15	-30.79		
		2830.00	V	-45.26	11.39	-33.87	-13.00	PASS
		1415.00	Horizontal	-45.65	4.26	-41.39		
		2122.50	H	-55.51	9.15	-46.36		
	High	2830.00	H	-55.03	11.39	-43.64	-13.00	PASS
		1422.00	Vertical	-34.17	4.36	-29.81		
		2133.00	V	-42.50	9.27	-33.23		
		2844.00	V	-48.09	11.39	-36.70	-13.00	PASS
		1422.00	Horizontal	-43.42	4.36	-39.06		
		2133.00	H	-54.28	9.27	-45.01		
		2844.00	H	-53.22	11.39	-41.83		

LTE Band 13								
Bandwidth	Channel	Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
			Polarization	reading (dBm)	factor (dB)	Level (dBm)		
5MHz	Low	1559.00	Vertical	-59.49	4.98	-54.51	-40.00	PASS
		2338.50	V	-49.15	9.12	-40.03	-13.00	
		3118.00	V	-53.17	12.46	-40.71	-13.00	
		1559.00	Horizontal	-60.60	4.98	-55.62	-40.00	PASS
		2338.50	H	-50.19	9.12	-41.07	-13.00	
		3118.00	H	-54.06	12.46	-41.60	-13.00	
	Mid	1564.00	Vertical	-58.71	5.03	-53.68	-40.00	PASS
		2346.00	V	-48.44	9.19	-39.25	-13.00	
		3128.00	V	-52.44	12.47	-39.97	-13.00	
		1564.00	Horizontal	-59.63	5.03	-54.60	-40.00	PASS
		2346.00	H	-49.44	9.19	-40.25	-13.00	
		3128.00	H	-53.29	12.47	-40.82	-13.00	
	High	1569.00	Vertical	-57.35	5.09	-52.26	-40.00	PASS
		2353.50	V	-47.17	9.22	-37.95	-13.00	
		3138.00	V	-51.27	12.53	-38.74	-13.00	
		1569.00	Horizontal	-59.19	5.09	-54.10	-40.00	PASS
		2353.50	H	-49.00	9.22	-39.78	-13.00	
		3138.00	H	-52.95	12.53	-40.42	-13.00	



10MHz	Mid	1564.00	Vertical	-56.37	5.03	-51.34	-40.00	PASS
		2346.00	V	-44.54	9.19	-35.35	-13.00	
		3128.00	V	-49.31	12.47	-36.84	-13.00	
		1564.00	Horizontal	-56.88	5.03	-51.85	-40.00	PASS
		2346.00	H	-46.30	9.19	-37.11	-13.00	
		3128.00	H	-51.49	12.47	-39.02	-13.00	

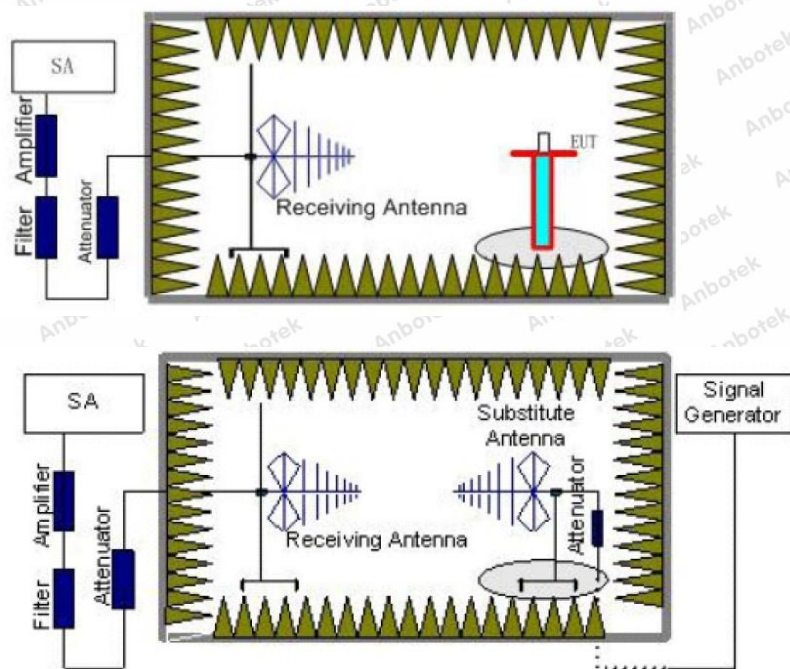


10. ERP and EIRP

10.1. Test Standard and Limit

Applicable Standard:	Part 2.1046 Part 22.913(a) Part 24.232(c) Part 27.50(b) Part 27.50(c) Part 27.50(d)
Limit:	$ERP \leq 7W(38.45dBm)$ (LTE Band 5) $EIRP \leq 2W(33.00dBm)$ (LTE Band 2) $ERP \leq 3W(34.77dBm)$ (LTE Band 13) $ERP \leq 3W(34.77dBm)$ (LTE Band 12) $EIRP \leq 1W(30.00dBm)$ (LTE Band 4)

10.2. Test Setup



10.3. Test Procedure

1. Place the EUT in the center of the turntable.

- For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
- For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.



2. Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.
3. The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
4. Receiver or Spectrum set as follow:
Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto
Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto
5. Each emission under consideration shall be evaluated:
 - a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
 - b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
 - c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
 - d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
 - e) Record the measured emission amplitude level and frequency
6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
10. For each emission that was detected and measured in the initial test
 - a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
 - b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
 - c) Record the output power level of the signal generator when equivalence is achieved in step b).
11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.
12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:
$$Pe = Ps(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

where

Pe = equivalent emission power in dBm

Ps = source (signal generator) power in dBm

NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.



13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:

$$\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB.}$$

If necessary, the antenna gain can be calculated from calibrated antenna factor information

14. Provide the complete measurement results as a part of the test report.

10.4. Test Data

Pass

Please to see the following pages

LTE Band 2						
Bandwidth	Modulation	Channel	EIRP (dBm)		Limit (dBm)	Result
			Vertical	Horizontal		
1.4MHz	QPSK	Low	22.24	19.53	33.00	PASS
		Mid	22.59	19.43		
		High	22.55	19.61		
	16QAM	Low	18.03	15.81		PASS
		Mid	18.54	16.14		
		High	18.28	16.54		
3MHz	QPSK	Low	21.72	18.55	33.00	PASS
		Mid	22.26	19.40		
		High	21.99	19.21		
	16QAM	Low	19.41	17.23		PASS
		Mid	19.30	16.86		
		High	18.34	16.87		
5MHz	QPSK	Low	23.97	20.69	33.00	PASS
		Mid	24.29	20.40		
		High	24.62	20.68		
	16QAM	Low	19.97	16.92		PASS
		Mid	20.19	17.15		
		High	19.83	17.44		
10MHz	QPSK	Low	23.89	20.88	33.00	PASS
		Mid	24.20	20.59		
		High	24.51	21.09		
	16QAM	Low	19.88	17.22		PASS
		Mid	20.11	17.58		
		High	19.75	17.75		
15MHz	QPSK	Low	23.15	19.73	33.00	PASS
		Mid	23.66	20.41		



20MHz	16QAM	High	23.70	20.49	33.00	PASS
		Low	21.02	18.45		
		Mid	20.66	18.12		
		High	19.62	17.92		
	QPSK	Low	23.54	20.08		PASS
		Mid	24.26	20.88		
		High	24.30	20.88		
	16QAM	Low	21.58	19.23		PASS
		Mid	21.15	18.51		
		High	20.08	18.12		

LTE Band 4						
Bandwidth	Modulation	Channel	EIRP (dBm)		Limit (dBm)	Result
			Vertical	Horizontal		
1.4MHz	QPSK	Low	22.45	20.60	30.00	PASS
		Mid	22.96	21.04		
		High	23.04	20.71		
	16QAM	Low	19.83	18.68		PASS
		Mid	20.27	19.16		
		High	20.21	18.99		
3MHz	QPSK	Low	22.94	20.60	30.00	PASS
		Mid	22.86	20.75		
		High	22.67	20.53		
	16QAM	Low	20.16	19.19		PASS
		Mid	20.52	18.56		
		High	20.55	19.23		
5MHz	QPSK	Low	23.64	21.22	30.00	PASS
		Mid	23.93	21.64		
		High	23.98	21.35		
	16QAM	Low	20.72	19.12		PASS
		Mid	21.05	20.21		
		High	20.86	19.33		
10MHz	QPSK	Low	23.13	21.04	30.00	PASS
		Mid	23.52	21.44		
		High	23.57	21.11		
	16QAM	Low	20.34	19.03		PASS
		Mid	20.72	19.46		



		High	20.58	19.24		
15MHz	QPSK	Low	23.66	20.97	30.00	PASS
		Mid	23.44	21.11		
		High	23.23	20.91		
	16QAM	Low	20.69	19.45		PASS
		Mid	20.99	19.19		
		High	20.94	19.43		
20MHz	QPSK	Low	23.72	21.04	30.00	PASS
		Mid	23.72	21.23		
		High	23.47	20.98		
	16QAM	Low	20.67	19.54		PASS
		Mid	21.25	19.11		
		High	21.23	19.62		

LTE Band 5						
Bandwidth	Modulation	Channel	ERP (dBm)		Limit (dBm)	Result
			Vertical	Horizontal		
1.4MHz	QPSK	Low	22.83	21.61	38.45	PASS
		Mid	23.41	21.90		
		High	23.36	21.90		
	16QAM	Low	19.72	18.51		PASS
		Mid	19.88	19.16		
		High	19.96	18.78		
3MHz	QPSK	Low	24.85	20.74	38.45	PASS
		Mid	24.31	20.97		
		High	23.54	20.67		
	16QAM	Low	19.54	19.57		PASS
		Mid	19.86	18.74		
		High	19.95	18.43		
5MHz	QPSK	Low	24.09	21.22	38.45	PASS
		Mid	23.79	21.46		
		High	23.05	20.98		
	16QAM	Low	20.60	19.62		PASS
		Mid	20.38	19.84		
		High	20.28	19.66		
10MHz	QPSK	Low	23.96	21.26	38.45	PASS



	16QAM	Mid	23.67	21.51		PASS
		High	22.97	21.01		
		Low	20.62	18.98		
		Mid	20.88	19.68		
		High	21.04	19.34		

LTE Band 12						
Bandwidth	Modulation	Channel	ERP (dBm)		Limit (dBm)	Result
			Vertical	Horizontal		
1.4MHz	QPSK	Low	21.84	19.28	34.77	PASS
		Mid	21.98	19.17		
		High	22.10	19.28		
	16QAM	Low	18.58	16.40		PASS
		Mid	18.84	16.62		
		High	18.79	16.90		
3MHz	QPSK	Low	21.44	18.52	34.77	PASS
		Mid	21.72	19.14		
		High	21.67	18.97		
	16QAM	Low	19.64	17.49		PASS
		Mid	19.43	17.17		
		High	18.84	17.15		
5MHz	QPSK	Low	23.18	20.18	34.77	PASS
		Mid	23.30	19.92		
		High	23.70	20.11		
	16QAM	Low	20.09	17.26		PASS
		Mid	20.12	17.40		
		High	19.99	17.60		
10MHz	QPSK	Low	23.12	20.33	34.77	PASS
		Mid	23.23	20.07		
		High	23.62	20.42		
	16QAM	Low	20.01	17.49		PASS
		Mid	20.06	17.74		
		High	19.93	17.84		



LTE Band 13						
Bandwidth	Modulation	Channel	ERP (dBm)		Limit (dBm)	Result
			Vertical	Horizontal		
5MHz	QPSK	Low	21.01	19.42	34.77	PASS
		Mid	21.18	19.38		
		High	20.91	19.42		
	16QAM	Low	19.57	18.15		PASS
		Mid	19.80	18.26		
		High	19.46	18.37		
10MHz	QPSK	Mid	20.83	19.09	34.77	PASS
	16QAM	Mid	21.06	19.37		

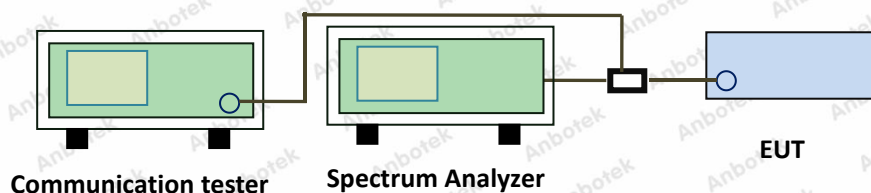


11. Frequency stability VS Voltage measurement

11.1. Test Standard and Limit

Applicable Standard:	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235 Part 27.54
Limit:	$\leq \pm 2.5\text{ppm}$

11.2. Test Setup



11.3. Test Procedure

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. The EUT output port was connected to communication tester.
3. The EUT was placed inside the temperature chamber at 25°C.
4. The power supply voltage to the EUT was varied $\pm 15\%$ of the nominal value measured at the input to the EUT.
5. Record the maximum frequency change.

11.4. Test Data

Pass

Please refer to Appendix F of the Appendix Test Data.

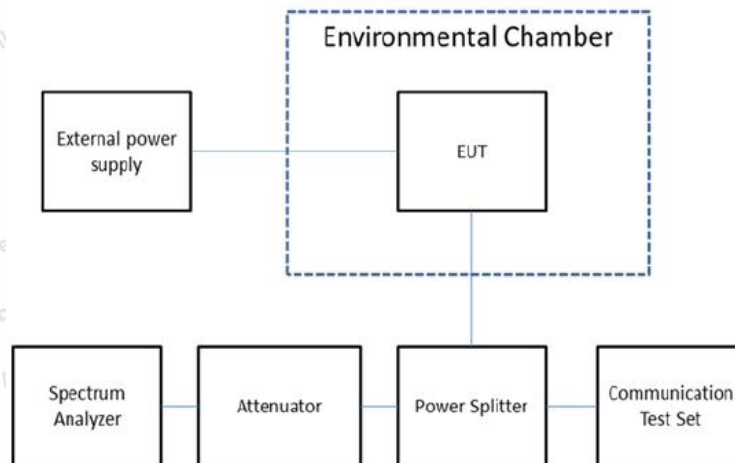


12. Frequency stability VS Temperature measurement

12.1. Test Standard and Limit

Applicable Standard:	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235 Part 27.54
Limit:	$\leq \pm 2.5\text{ppm}$

12.2. Test Setup



12.3. Test Procedure

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. The EUT output port was connected to communication tester.
3. The EUT was placed inside the temperature chamber.
4. Turn EUT off and set the chamber temperature to -30°C . After the temperature stabilized for approximately 30 minutes recorded the frequency.
5. Repeat step 4 measure with 10°C increased per stage until the highest temperature of $+50^{\circ}\text{C}$ reached.

12.4. Test Data

Pass

Please refer to Appendix G of the Appendix Test Data.



APPENDIX I -- TEST SETUP PHOTOGRAPH

Please refer to separated files Appendix I -- Test Setup Photograph

APPENDIX II -- EXTERNAL PHOTOGRAPH

Please refer to separated files Appendix II -- External Photograph

APPENDIX III -- INTERNAL PHOTOGRAPH

Please refer to separated files Appendix III -- Internal Photograph

----- End of Report -----

