FCC TEST REPORT

Product Name:	Turbox-T95
Trade Mark:	TURBOX™
Model No.:	T95G-NA
Report Number:	200801051RFM-1
Test Standards:	FCC 47 CFR Part 24 FCC 47 CFR Part 27
FCC ID:	2AOHHT95GNA
Test Result:	PASS
Date of Issue:	August 23, 2021

Prepared for:

Thundercomm Technology Co., Ltd.
Building 4, No. 99, Data Valley Middle Road Xiantao District, Yubei District, Chongqing

Prepared by:

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Prepared by: Gavin Xu — Project Engineer

Reviewed by: Henry Lu — Team Leader

Approved by: Kevin Liang — Assistant Manager

Date: August 23, 2021

Version

Version No.	Date	Description
V1.0	August 23, 2021	Original

CONTENTS

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Thundercomm Technology Co., Ltd.
Address of Applicant:	Building 4, No. 99, Data Valley Middle Road Xiantao District, Yubei District, Chongqing
Manufacturer:	Thundercomm Technology Co., Ltd.
Address of Manufacturer:	Building 4, No. 99, Data Valley Middle Road Xiantao District, Yubei District, Chongqing

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Turbox-T95	
Model No.:	T95G-NA	
Trade Mark:	TURBOX™	
DUT Stage:	Production Unit	
EUT Supports Function:	E-UTRA Bands:	FDD Band 2/ Band 4/Band 12
Sample Received Date:	August 4, 2020	
Sample Tested Date:	August 4, 2020 to December 31, 2020	

1.2.2 Description of Accessories

None.

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	LTE	
Type of Modulation:	LTE Band 2/4/12	BPSK,QPSK
Category	NB1	
Deployment	stand-alone	
Sub-carrier spacing	3.75KHz, 15KHz	
Ntones	single, multi-tone	
Antenna Type:	External Antenna	
Antenna Gain:	LTE Band 2:	50 ohm terminal (0dBi)
	LTE Band 4:	50 ohm terminal (0dBi)
	LTE Band 12:	50 ohm terminal (0dBi)
Normal Test Voltage:	3.8 Vdc	
Extreme Test Voltage:	3.3 to 4.3Vdc	
Extreme Test Temperature:	-30 ℃ to +75 ℃	

Summary of Results:								
Bands	Sub-carrier spacing (KHz)	Modulation	Frequency Range (MHz)	Max RF Output Power (dBm)		EIRP/ERP (W)	99% BW (kHz)	Emission Designator
				Conducted (Average)	ERP/EIRP (Average)			
2	3.75	BPSK	1850.7-1909.3	24.66	24.66	0.29242	56.705	56K7G7D
		QPSK		24.74	24.74	0.29785	62.011	62K0G7D
	15	BPSK	1851.5-1908.5	23.86	23.86	0.24322	126.12	126KG7D
		QPSK		24.12	24.12	0.25823	118.82	119KG7D
4	3.75	BPSK	1710.7-1754.3	24.11	24.11	0.25763	54.636	54K6G7D
		QPSK		24.09	24.09	0.25645	61.897	61K9G7D
	15	BPSK	1711.5-1753.5	23.61	23.61	0.22961	153.85	154KG7D
		QPSK		23.70	23.70	0.23442	125.92	126KG7D
12	3.75	BPSK	699.7-715.3	23.61	23.61	0.22961	59.991	60K0G7D
		QPSK		23.65	23.65	0.23174	66.553	66K6G7D
	15	BPSK	700.5-714.5	23.80	23.80	0.23988	122.37	122KG7D
		QPSK		23.94	23.94	0.24774	128.47	128KG7D

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested independently

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
50 ohm terminal	N/A	N/A	N/A	UnionTrust
Notebook	Lenovo	B40-80	MP12NEQ6	UnionTrust
Mouse	DELL	MS111	CN-011D3V-738	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.3 Meter	UnionTrust

1.5 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.6 TEST FACILITY

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

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.7 DEVIATION FROM STANDARDS

None.

1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated spurious emissions 30MHz-1GHz	± 4.9 dB
4	Radiated spurious emissions 1GHz-18GHz	± 4.8 dB
5	Radiated spurious emissions 18GHz-40GHz	± 5.1 dB
6	Occupied Bandwidth	± 1.86 %
7	DC Supply Voltages	± 0.68 %
8	Temperature	± 0.62 °C
9	Humidity	± 3.9 %
10	Conducted spurious emissions	± 2.7 dB
11	DC Supply Voltages	± 0.68 %
12	AC Supply Voltages	± 1.2 %
13	Radio Frequency	± 6.5 x 10^{-8}
14	RF Power, Conducted	± 0.9 dB

2. TEST SUMMARY

FCC 47 CFR Part 24 Test Cases (Band 2)			
Test Item	**Test Requirement**	**Test Method**	**Result**
Equivalent Isotropic Radiated Power (EIRP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 24.232(d)	KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 24.238(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 24.238(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

FCC 47 CFR Part 27 Test Cases (LTE Band 4)			
Test Item	**Test Requirement**	**Test Method**	**Result**
Equivalent Isotropic Radiated Power (EIRP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(d)(4)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(d)(4)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5)	KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(h)(1)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

FCC 47 CFR Part 27 Test Cases (LTE Band 12)			
Test Item	**Test Requirement**	**Test Method**	**Result**
Effective Radiated Power (ERP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(c)(10)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(c)(10)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5)	KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) FCC 47 CFR Part 27.53(g)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(g)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(g)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(g)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
☒	Receiver	R&S	ESIB26	100114	Nov. 24, 2019	Nov. 23, 2020
					Nov. 18, 2020	Nov. 17, 2021
☐	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
☒	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2019	Nov. 23, 2020
					Nov. 10, 2020	Nov. 9, 2021
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May. 30, 2020	May. 29, 2021
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
☒	Wideband Radio Communication Tester	R&S	CMW500	120932	Jul. 20, 2020	Jul. 19, 2021
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

RF Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Nov. 24, 2019	Nov. 23, 2020
					Nov. 18, 2020	Nov. 17, 2021
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 24, 2019	Nov. 23, 2020
					Nov. 10, 2020	Nov. 9, 2021
☒	Wideband Radio Communication Tester	R&S	CMW500	120932	Jul. 20, 2020	Jul. 19, 2021
☒	DC Source	KIKUSUI	PWR400L	LK003024	Sep. 09, 2019	Sep. 08, 2020
					Sep. 09, 2020	Sep. 08, 2021
☒	Temp & Humidity chamber	Votisch	VT4002	58566133290 020	May 11, 2020	May 10, 2021

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.8	20 to 75
TL/VL	-30	3.3	20 to 75
TH/VL	+75	3.3	20 to 75
TL/VH	-30	4.3	20 to 75
TH/VH	+75	4.3	20 to 75

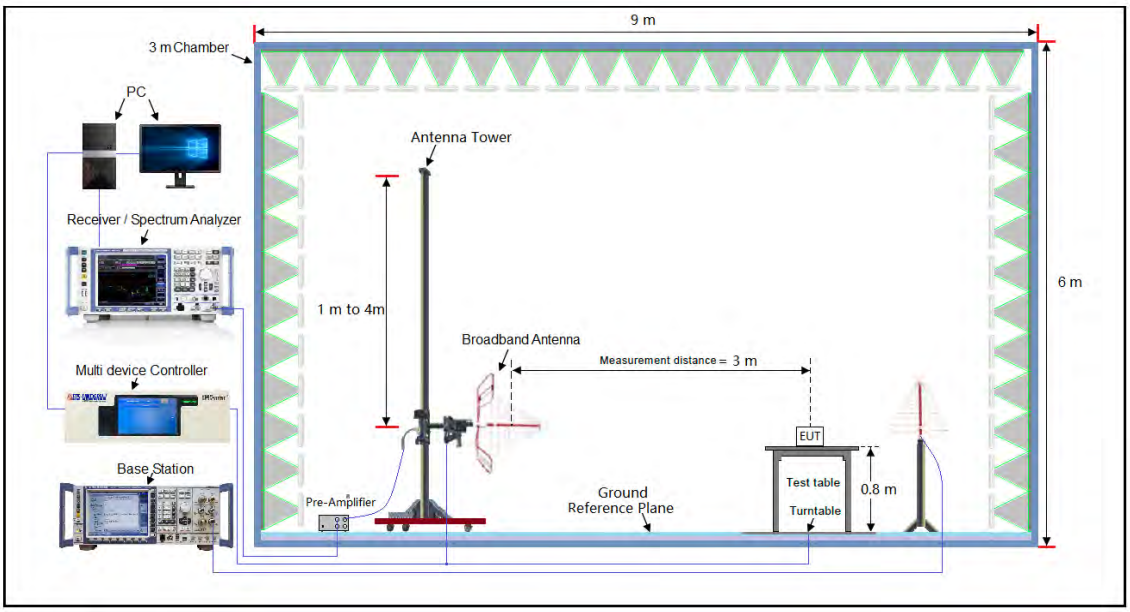
Remark:

1) The EUT just work in such extreme temperature of -30 ℃ to +75 °C and the extreme voltage of 3.3 V to 4.3V, so here the EUT is tested in the temperature of -30 ℃ to +75 °C and the voltage of 3.3 V to 4.3V.
2) VN: Normal Voltage; TN: Normal Temperature;
TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

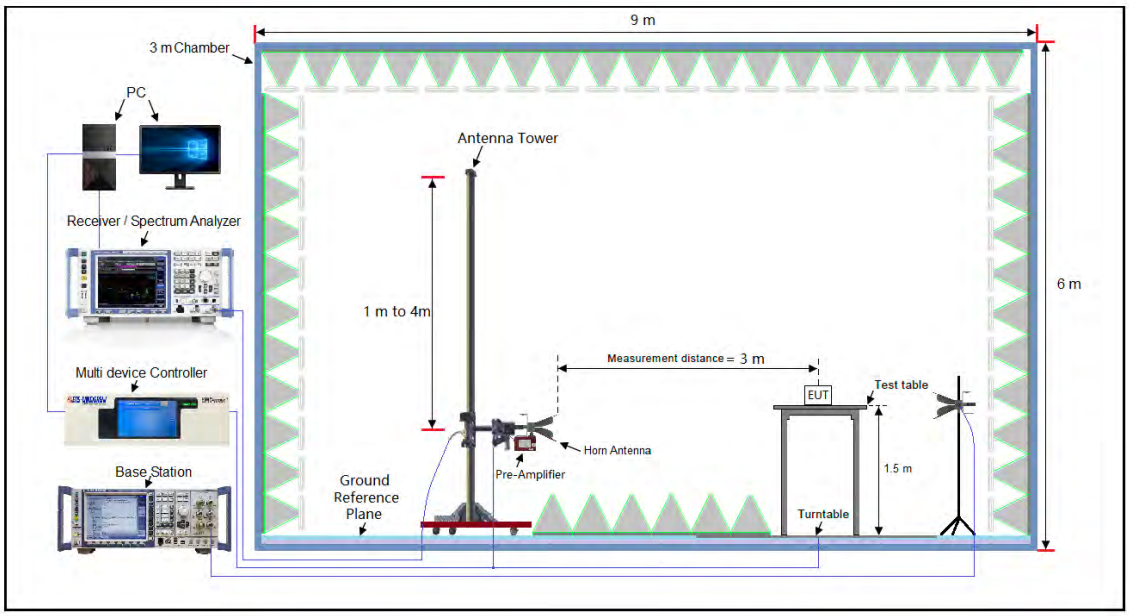
4.2 TEST SETUP

4.2.1 For Radiated Emissions test setup

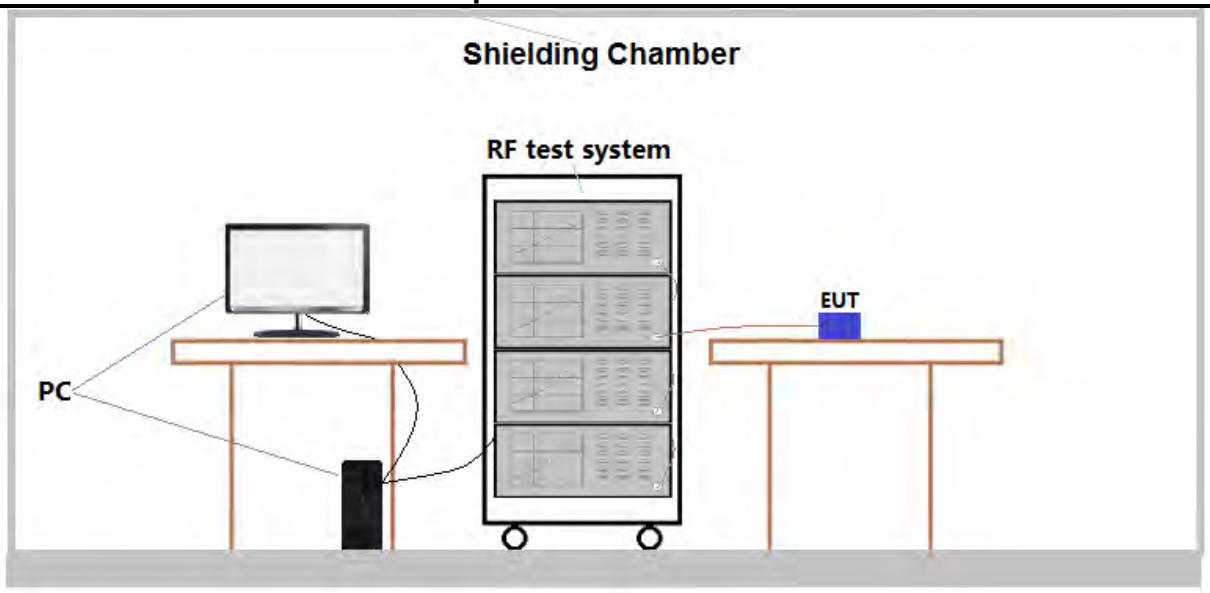
Radiated Emissions 30MHz to 1GHz Test setup



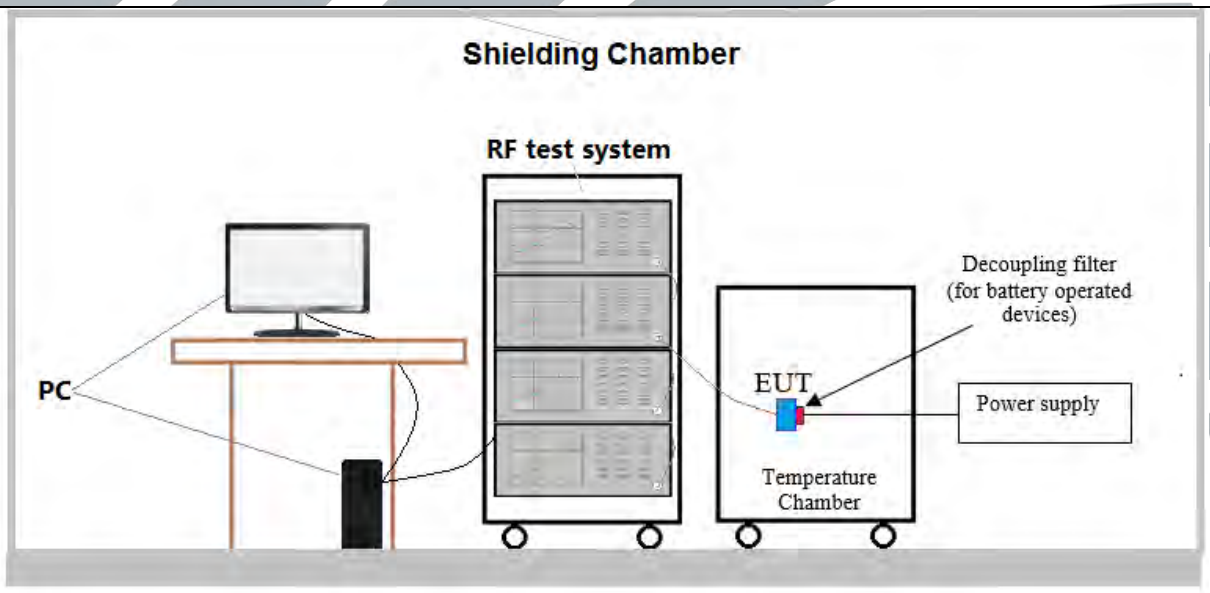
Radiated Emissions Above 1GHz Test setup



4.2.2 For Conducted RF test setup



Normal Environment



Extreme Environment

4.3 TEST CHANNELS

Band	Test Frequency ID	Sub-carrier spacing (KHz)	Number [UL]	Frequency of Uplink (MHz)
LTE Band 2 TX: 1850-1910MHz	Low Range	3.75 or 15	18601	1850.1
	Middle Range	3.75 or 15	18900	1880
	High Range	3.75 or 15	19199	1909.9
LTE Band 4 TX: 1710-1755MHz	Low Range	3.75 or 15	19951	1710.1
	Middle Range	3.75 or 15	20175	1732.5
	High Range	3.75 or 15	20399	1754.9
LTE Band 12 TX: 699-716MHz	Low Range	3.75 or 15	23011	699.1
	Middle Range	3.75 or 15	23095	707.5
	High Range	3.75 or 15	23179	715.9

4.4 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. Only the worst case data were recorded in this test report.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X/Y/Z axis, and antenna ports.
The worst case was found when positioned as the table below.

Band	Mode	Antenna Port	Worst-case axis positioning
LTE Band 2	1TX	Chain 0	Z axis
LTE Band 4	1TX	Chain 0	Z axis
LTE Band 12	1TX	Chain 0	Z axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.5 PRE-SCAN

Pre-scan under all rate at lowest middle and highest channel, find the transmitter power as below.

4.5.1 LTE Band 2

LTE Band 2 Maximum Average Power (dBm)					
Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel		
			18601/1850.1	18900/1880.0	19199/1909.9
BPSK	3.75	1@0	24.66	24.47	24.58
		1@47	24.58	24.49	24.38
	15	1@0	23.18	22.91	23.41
		1@11	23.86	23.46	23.55
QPSK	3.75	1@0	24.70	24.68	24.58
		1@47	24.74	24.67	24.48
	15	1@0	23.83	23.53	23.58
		1@11	23.72	23.44	23.46
	15	12@0	24.12	23.78	23.51

4.5.2 LTE Band 4

LTE Band 4 Maximum Average Power (dBm)					
Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel		
			19951/1710.1	20175/1732.5	20399/1754.9
BPSK	3.75	1@0	24.11	23.61	23.57
		1@47	23.95	23.44	23.46
	15	1@0	23.51	23.27	23.61
		1@11	23.22	23.23	23.14
QPSK	3.75	1@0	24.09	23.64	23.68
		1@47	24.02	23.80	23.64
	15	1@0	23.21	23.24	23.18
		1@11	23.07	23.03	23.05
	15	12@0	23.70	23.53	23.70

4.5.3 LTE Band 12

LTE Band 12 Maximum Average Power (dBm)					
Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel		
			23011/699.1	23095/707.5	23179/715.9
BPSK	3.75	1@0	23.20	23.40	23.61
		1@47	23.02	23.46	23.46
	15	1@0	21.29	22.66	22.45
		1@11	23.60	23.71	23.80
QPSK	3.75	1@0	23.20	23.10	23.65
		1@47	23.19	23.10	23.64
	15	1@0	23.68	23.70	23.94
		1@11	23.53	23.69	23.82
	15	12@0	22.22	23.45	23.36

Pre-scan all bandwidth and RB, find worse case mode are chosen to the report, the LTE worse case mode applicability and tested channel detail as below:

Item	Band	Sub-carrier spacing (KHz)		Modulation		Channel		
		3.75	15	BPSK	QPSK	L	M	H
ERP/EIRP	2	☒	☒	☒	☒	☒	☒	☒
	4	☒	☒	☒	☒	☒	☒	☒
	12	☒	☒	☒	☒	☒	☒	☒
Conducted output power	2	☒	☒	☒	☒	☒	☒	☒
	4	☒	☒	☒	☒	☒	☒	☒
	12	☒	☒	☒	☒	☒	☒	☒
99%&26dB Bandwidth	2	☒	☒	☒	☒	☒	☒	☒
	4	☒	☒	☒	☒	☒	☒	☒
	12	☒	☒	☒	☒	☒	☒	☒
peak-to-average ratio	2	☒	☒	☒	☒	☐	☒	☐
	4	☒	☒	☒	☒	☐	☒	☐
	12	☒	☒	☒	☒	☐	☒	☐

Item	Band	Sub-carrier spacing (KHz)		Modulation		Channel		
		3.75	15	BPSK	QPSK	L	M	H
Band Edge at antenna terminals	2	☒	☒	☒	☒	☒	☐	☒
	4	☒	☒	☒	☒	☒	☐	☒
	12	☒	☒	☒	☒	☒	☐	☒
Spurious emissions at antenna terminals	2	☐	☒	☐	☒	☒	☒	☒
	4	☐	☒	☐	☒	☒	☒	☒
	12	☐	☒	☐	☒	☒	☒	☒
Field strength of spurious radiation	2	☐	☒	☐	☒	☒	☒	☒
	4	☐	☒	☐	☒	☒	☒	☒
	12	☐	☒	☐	☒	☒	☒	☒
Frequency stability	2	☐	☒	☐	☒	☐	☒	☐
	4	☐	☒	☐	☒	☐	☒	☐
	12	☐	☒	☐	☒	☐	☒	☐

Remark:
The mark "☒" means is chosen for testing; The mark "☐" means is not chosen for testing;
The mark "-" means is not supported bandwidth

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 27	Miscellaneous Wireless Communications Services
3	FCC 47 CFR Part 24	Personal Communications Services
4	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
5	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v03r01

5.2 ERP OR EIRP

Test Requirement: FCC 47 CFR Part 2.1046(a)
LTE Band 2: FCC 47 CFR Part 24.232(c)
LTE Band 4: FCC 47 CFR Part 27.50(d)(4)
LTE Band 12: FCC 47 CFR Part 27.50(c)(10)

Test Method: KDB 971168 D01v03r01 Section 5.6 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 24.232(c):
Mobile and portable stations are limited to 2 watts EIRP.

FCC 47 CFR Part 27.50(d)(4):
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.

FCC 47 CFR Part 27.50(c)(10):
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.

Test Procedure:

$$\textbf{ERP or EIRP} = P_{Meas} + G_T - L_C$$

where:
ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;
G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

Test Setup: Refer to section 4.2.1 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

5.2.1 LTE Band 2

LTE Band 2 Maximum EIRP (dBm) Standalone							
Channel	Frequency(MHz)	Modulation	Sub-carrier spacing (KHz)	Ntones	EIRP(dBm)	Limit(dBm)	Result
18601	1850.1	BPSK	3.75	1@0	24.66	33.01	Pass
		QPSK	3.75	1@47	24.74	33.01	Pass
		BPSK	15	1@11	23.86	33.01	Pass
		QPSK	15	12@0	24.12	33.01	Pass
18900	1880	BPSK	3.75	1@47	24.49	33.01	Pass
		QPSK	3.75	1@0	24.68	33.01	Pass
		BPSK	15	1@11	23.46	33.01	Pass
		QPSK	15	12@0	23.78	33.01	Pass
19199	1909.9	BPSK	3.75	1@0	24.58	33.01	Pass
		QPSK	3.75	1@0	24.58	33.01	Pass
		BPSK	15	1@11	23.55	33.01	Pass
		QPSK	15	1@0	23.58	33.01	Pass

5.2.2 LTE Band 4

LTE Band 4 Maximum EIRP (dBm) Standalone							
Channel	Frequency(MHz)	Modulation	Sub-carrier spacing (KHz)	Ntones	EIRP(dBm)	Limit(dBm)	Result
19951	1710.1	BPSK	3.75	1@0	24.11	30.00	Pass
		QPSK	3.75	1@0	24.09	30.00	Pass
		BPSK	15	1@0	23.51	30.00	Pass
		QPSK	15	12@0	23.70	30.00	Pass
20175	1732.5	BPSK	3.75	1@0	23.61	30.00	Pass
		QPSK	3.75	1@47	23.80	30.00	Pass
		BPSK	15	1@0	23.27	30.00	Pass
		QPSK	15	12@0	23.53	30.00	Pass
20399	1754.9	BPSK	3.75	1@0	23.57	30.00	Pass
		QPSK	3.75	1@0	23.68	30.00	Pass
		BPSK	15	1@0	23.61	30.00	Pass
		QPSK	15	12@0	23.70	30.00	Pass

5.2.3 LTE Band 12

LTE Band 12 Maximum ERP (dBm) Standalone							
Channel	Frequency(MHz)	Modulation	Sub-carrier spacing (KHz)	Ntones	ERP(dBm)	Limit(dBm)	Result
23011	699.1	BPSK	3.75	1@0	23.20	34.77	Pass
		QPSK	3.75	1@0	23.20	34.77	Pass
		BPSK	15	1@11	23.60	34.77	Pass
		QPSK	15	1@0	23.68	34.77	Pass
23095	707.5	BPSK	3.75	1@47	23.46	34.77	Pass
		QPSK	3.75	1@0	23.10	34.77	Pass
		BPSK	15	1@11	23.71	34.77	Pass
		QPSK	15	1@0	23.70	34.77	Pass
23179	715.9	BPSK	3.75	1@0	23.61	34.77	Pass
		QPSK	3.75	1@0	23.65	34.77	Pass
		BPSK	15	1@11	23.80	34.77	Pass
		QPSK	15	1@0	23.94	34.77	Pass

5.3 CONDUCTED OUTPUT POWER

Test Requirement:	FCC 47 CFR Part 2.1046(a) **LTE Band 2:** FCC 47 CFR Part 24.232(c) **LTE Band 4:** FCC 47 CFR Part 27.50(d)(4) **LTE Band 12:** FCC 47 CFR Part 27.50(c)(10)
Test Method:	KDB 971168 D01v03r01 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 24.232(c):
Mobile and portable stations are limited to 2 watts EIRP.

FCC 47 CFR Part 27.50(d)(4):
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.

FCC 47 CFR Part 27.50(c)(10):
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.

Test Procedure:
The EUT was set up for the maximum power with LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup:	Refer to section 4.2.2 for details.
Instruments Used:	Refer to section 3 for details
Test Mode:	Link mode
Test Results:	Pass
Test Data:	The full result refer to section 4.5 for details.

5.4 PEAK-TO-AVERAGE RATIO

Test Requirement:	**LTE Band 2:** FCC 47 CFR Part 24.232(d) **LTE Band 4:** FCC 47 CFR Part 27.50(d)(5) **LTE Band 12:** FCC 47 CFR Part 27.50(d)(5)
Test Method:	KDB 971168 D01v03r01 Section 5.7
Limit:	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

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

a) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth
b) Set the number of counts to a value that stabilizes the measured CCDF curve
c) Record the maximum PAPR level associated with a probability of 0.1 %

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

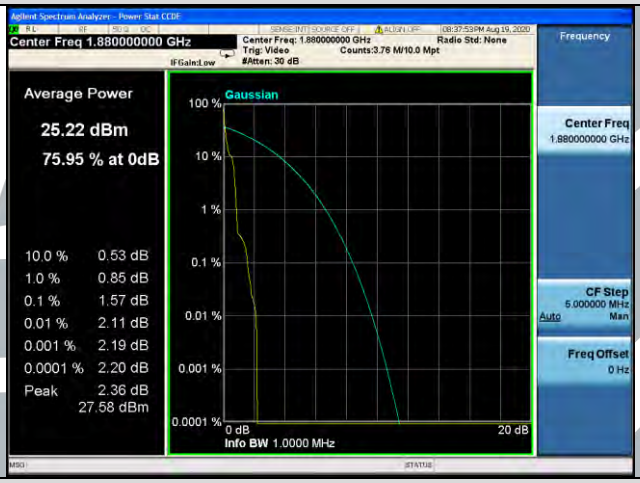
Test Setup:	Refer to section 4.2.2 for details.
Instruments Used:	Refer to section 3 for details
Test Mode:	Link mode
Test Results:	Pass
Test Data:	See table below

5.4.1 LTE Band 2

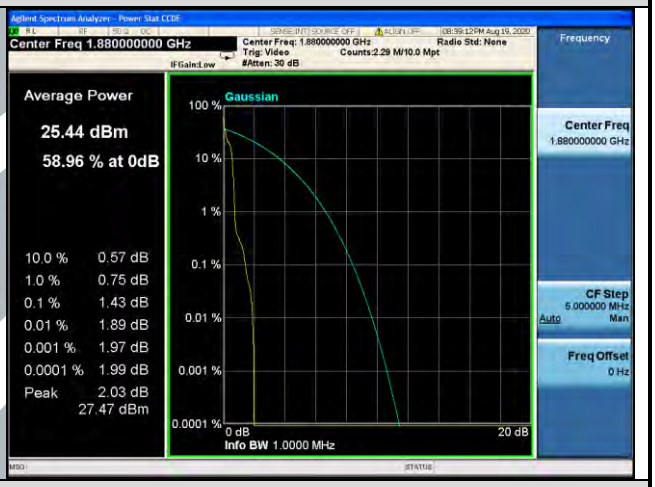
LTE Band 2 Peak-to-average ratio (dB)					
Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	PAPR(dB)	Limit (dB)	Result
BPSK	3.75	18900/1880.0	1.57	13	Pass
QPSK	3.75	18900/1880.0	1.43	13	Pass
BPSK	15	18900/1880.0	1.23	13	Pass
QPSK	15	18900/1880.0	1.26	13	Pass

LTE Band 2_Middle channel

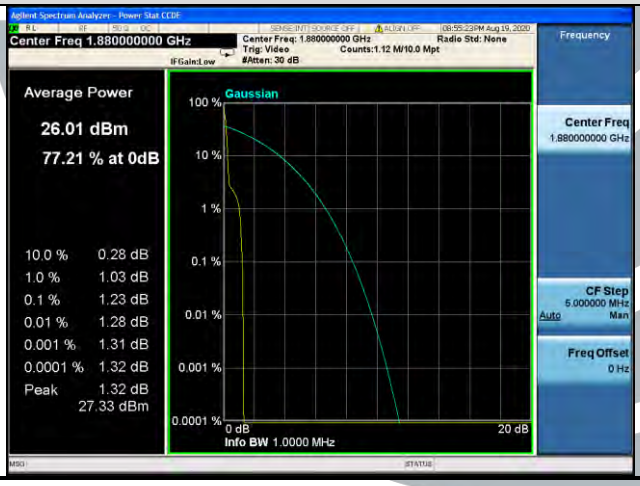
3.75KHz Sub-carrier spacing, BPSK



3.75KHz Sub-carrier spacing, QPSK



15KHz Sub-carrier spacing, BPSK



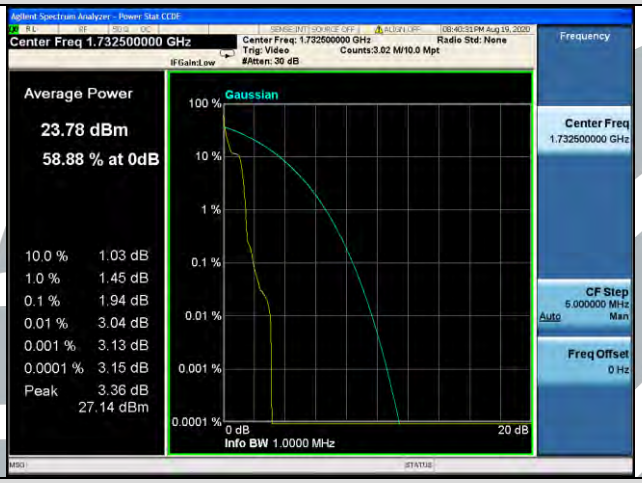
15KHz Sub-carrier spacing, QPSK

5.4.2 LTE Band 4

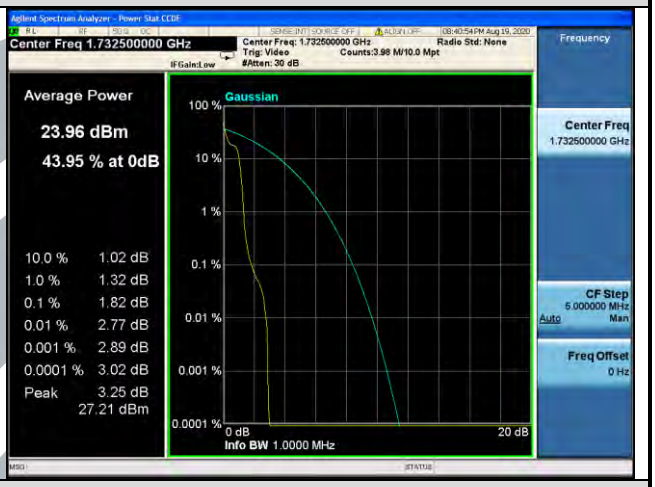
LTE Band 4 Peak-to-average ratio (dB)					
Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	PAPR(dB)	Limit (dB)	Result
BPSK	3.75	20175/1732.5	1.94	13	Pass
QPSK	3.75	20175/1732.5	1.82	13	Pass
BPSK	15	20175/1732.5	2.76	13	Pass
QPSK	15	20175/1732.5	2.97	13	Pass

LTE Band 4_Middle channel

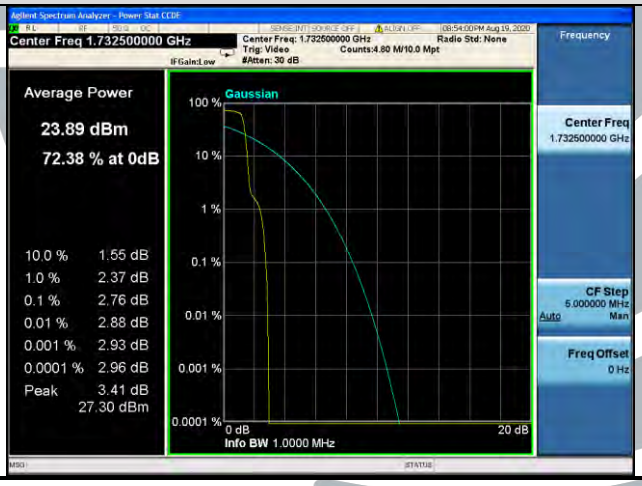
3.75KHz Sub-carrier spacing, BPSK



3.75KHz Sub-carrier spacing, QPSK



15KHz Sub-carrier spacing, BPSK



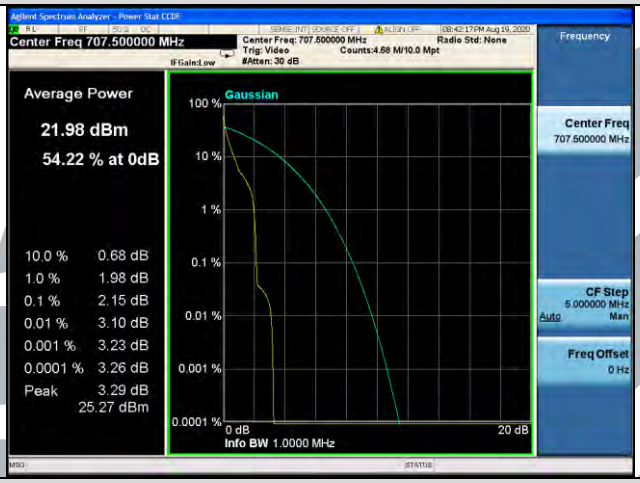
15KHz Sub-carrier spacing, QPSK

5.4.3 LTE Band 12

LTE Band 12 Peak-to-average ratio (dB)					
Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	PAPR(dB)	Limit (dB)	Result
BPSK	3.75	23095/707.5	2.15	13	Pass
QPSK	3.75	23095/707.5	2.14	13	Pass
BPSK	15	23095/707.5	1.84	13	Pass
QPSK	15	23095/707.5	1.83	13	Pass

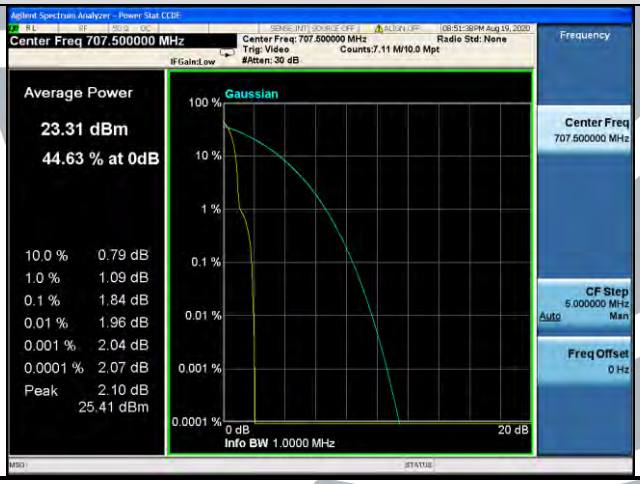
LTE Band 12_Middle channel

3.75KHz Sub-carrier spacing, BPSK

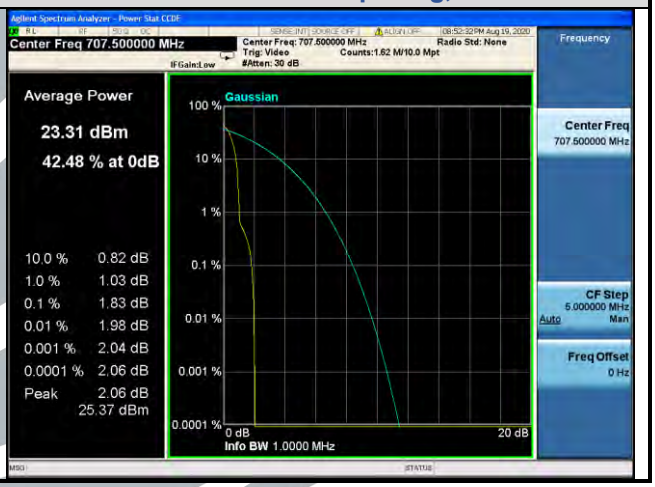


3.75KHz Sub-carrier spacing, QPSK

15KHz Sub-carrier spacing, BPSK



15KHz Sub-carrier spacing, QPSK



5.5 99%&26DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 2.1049(h)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01 Section 4

Limit: No Limit, for reporting purposes only.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

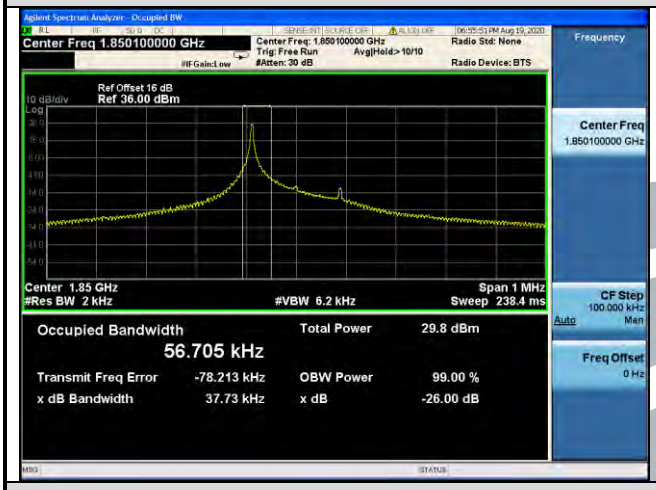
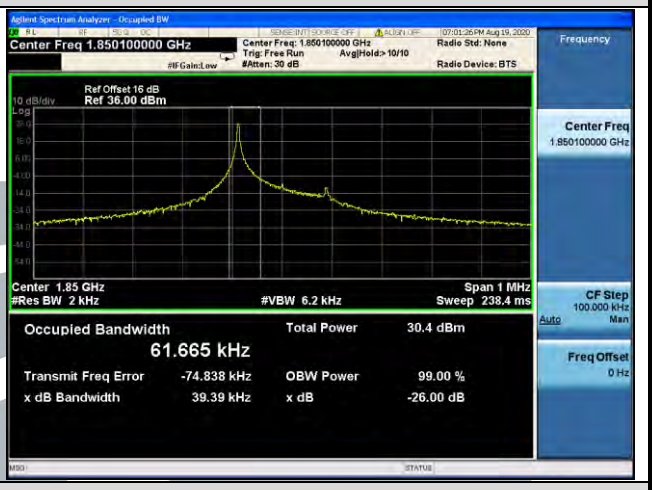
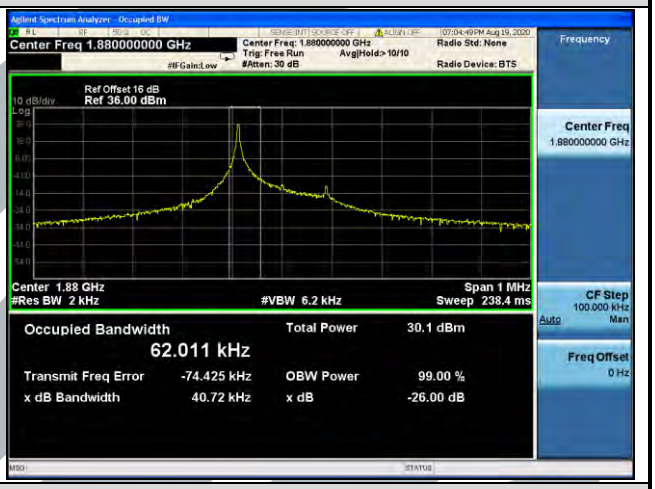
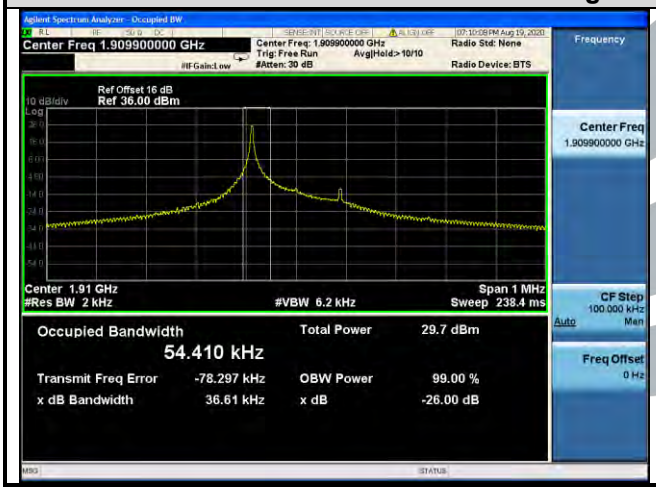
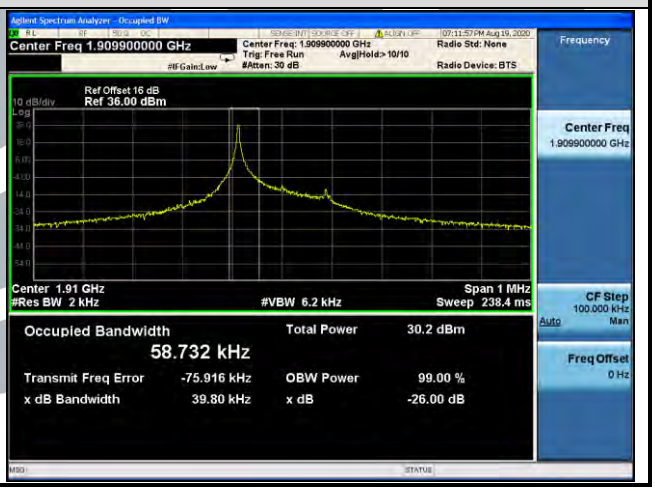
Test Mode: Link mode

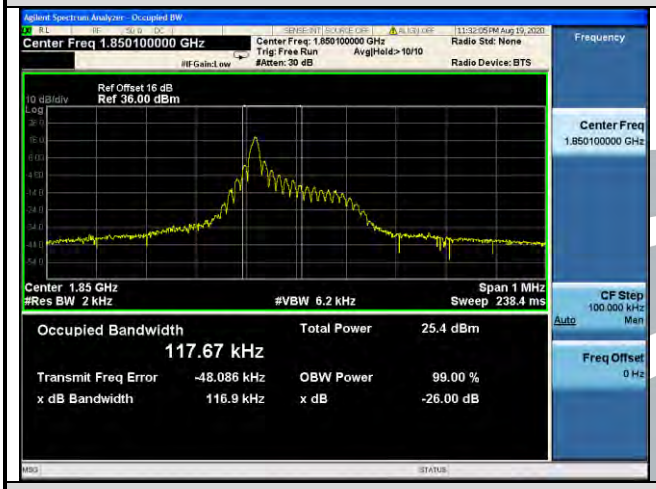
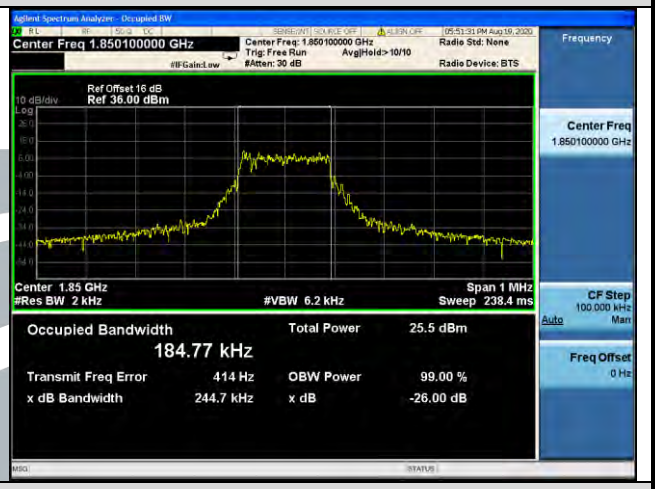
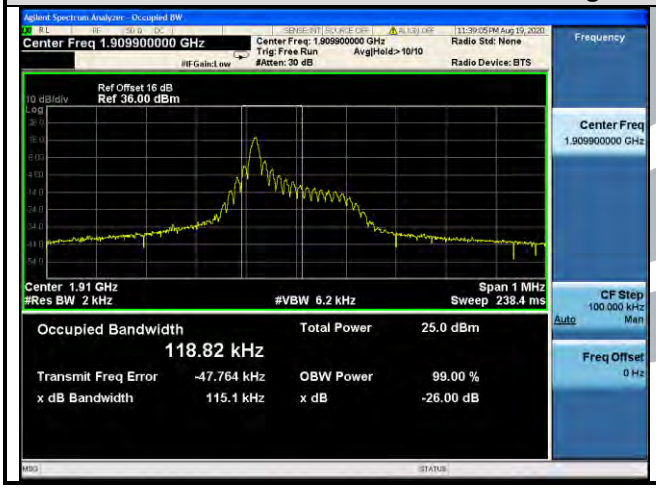
Test Results: Pass

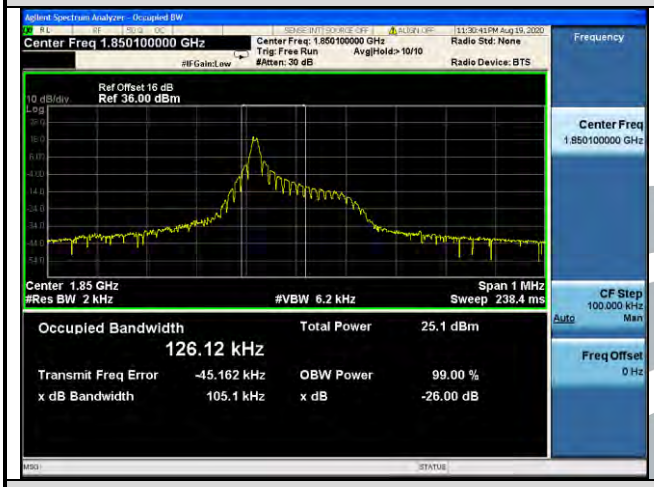
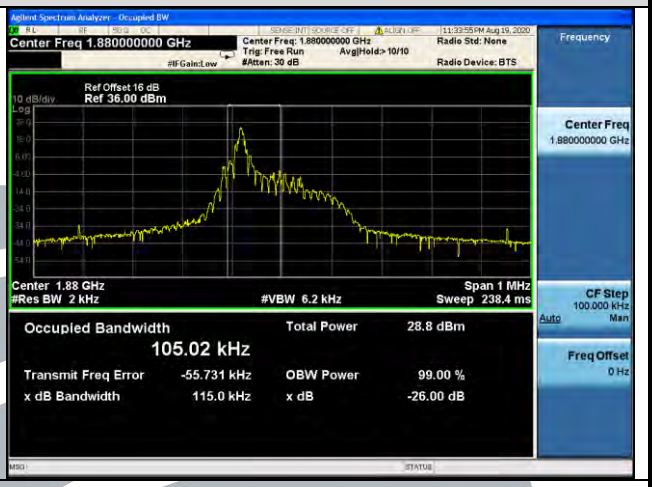
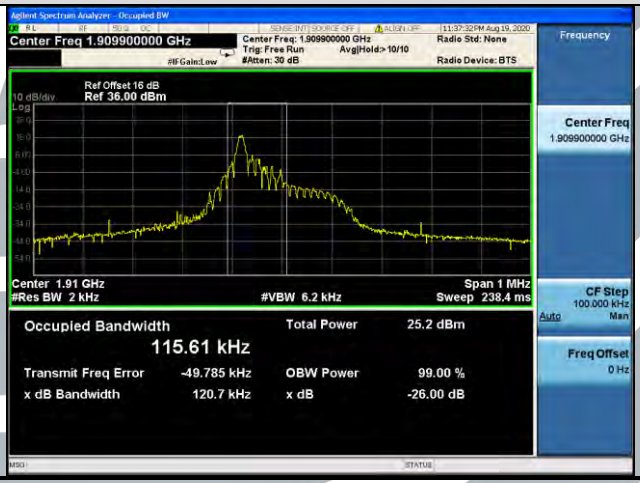
Test Data: See table below

5.5.1 LTE Band 2

LTE Band 2								
Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(kHz) for low/mid/high channel					
			18601/1850.1		18900/1880.0		19199/1909.9	
			99% (KHz)	-26dBc (KHz)	99% (KHz)	-26dBc (KHz)	99% (KHz)	-26dBc (KHz)
BPSK	3.75	1@0	56.705	37.73	55.436	37.97	54.410	36.61
QPSK	3.75	1@0	61.665	39.39	62.011	40.72	58.732	39.80
BPSK	15	1@0	126.12	105.10	105.02	115.00	115.61	120.70
QPSK	15	1@0	117.67	116.9	119.02	104.10	118.82	115.10
QPSK	15	12@0	184.77	244.7	186.45	252.5	186.60	252.2

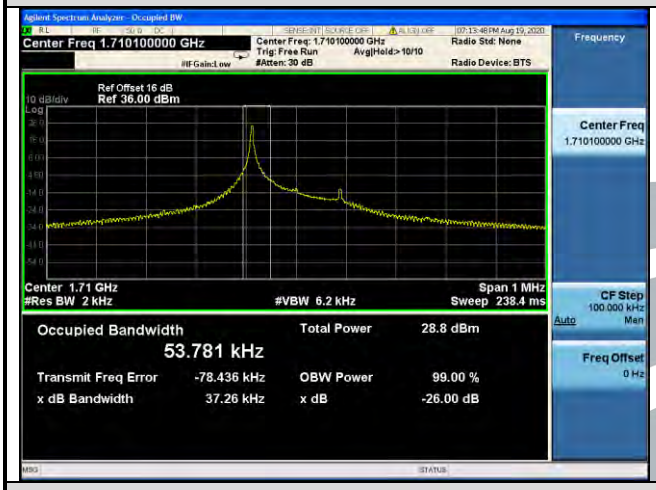
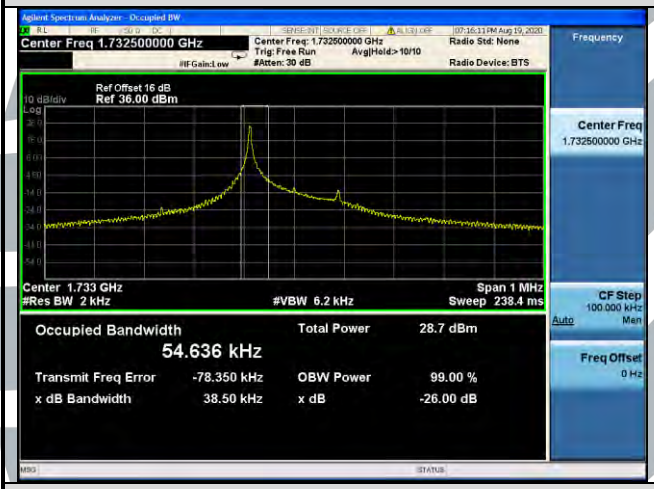
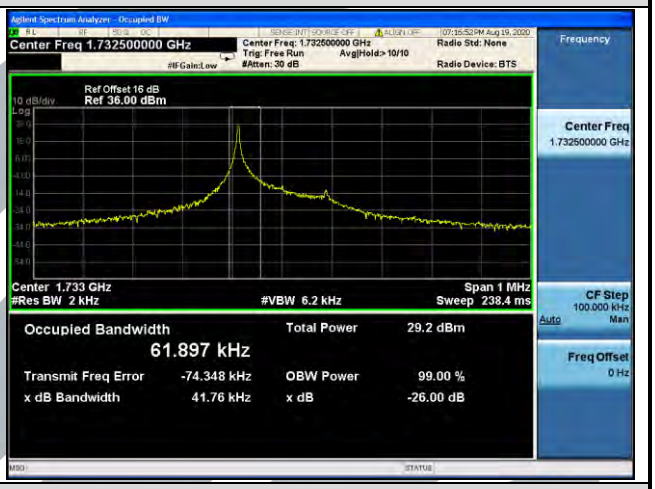
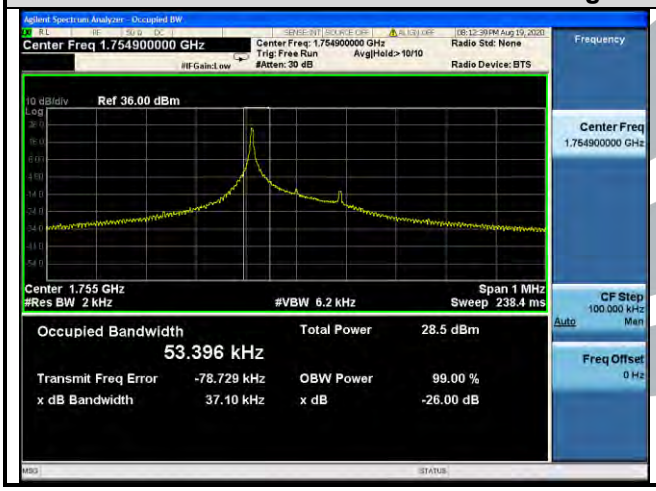
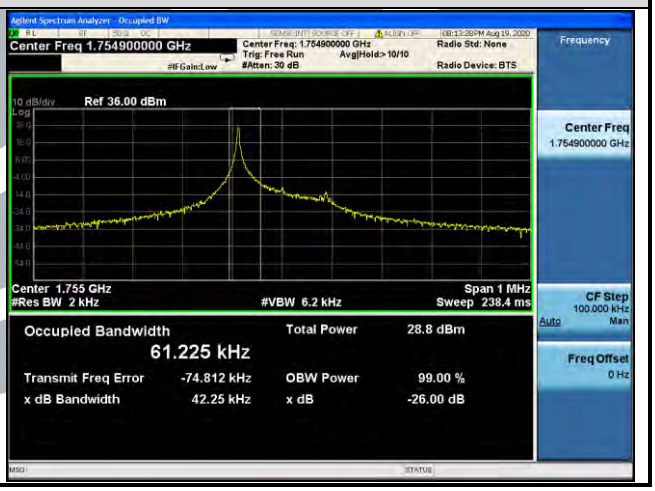
LTE Band 2	
3.75KHz Sub-carrier spacing, Ntones1@0_BPSK	3.75KHz Sub-carrier spacing, Ntones1@0_QPSK
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

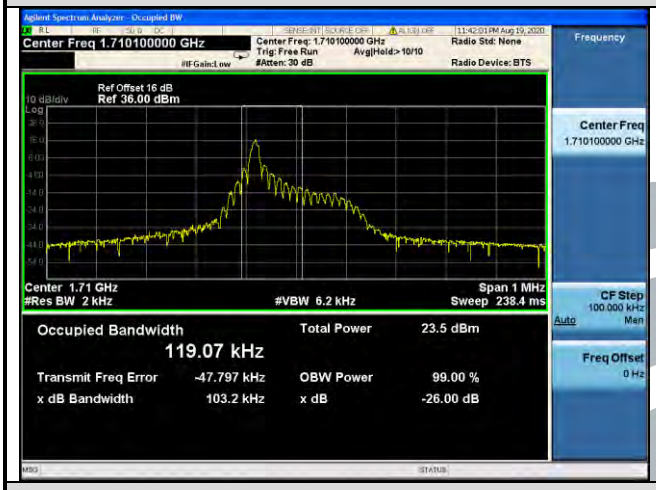
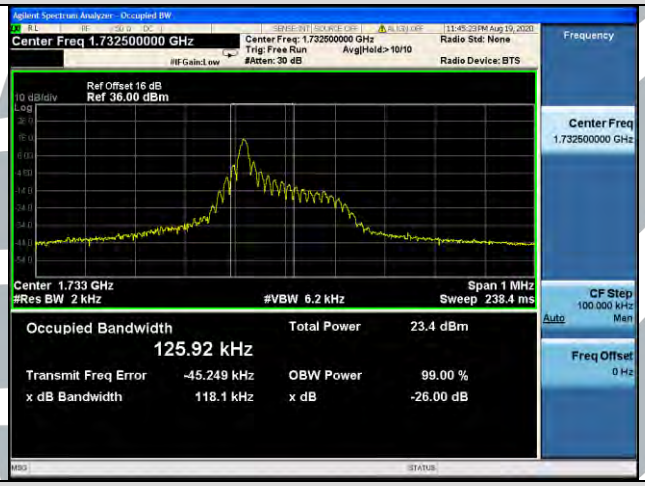
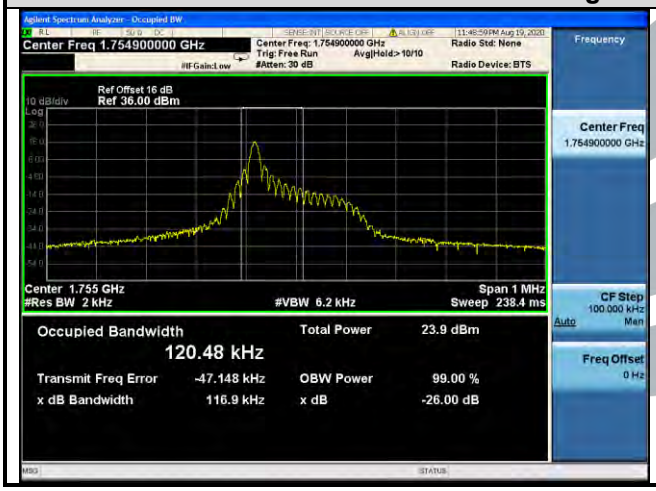
LTE Band 2	
15KHz Sub-carrier spacing, Ntones1@0_QPSK	15KHz Sub-carrier spacing, Ntones12@0_QPSK
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

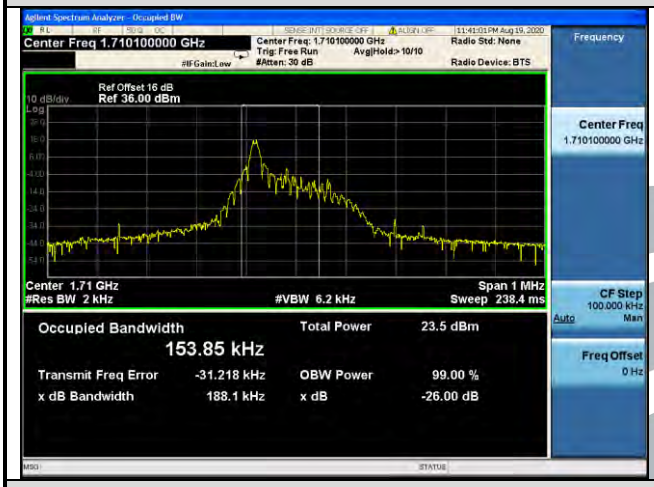
LTE Band 2	
15KHz Sub-carrier spacing, Ntones1@0_BPSK	
Lowest Channel	**Middle Channel**
	
Highest Channel	
	N/A

5.5.2 LTE Band 4

LTE Band 4								
Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
			19951/1710.1		20175/1732.5		20399/1754.9	
			99% (KHz)	-26dBc (KHz)	99% (KHz)	-26dBc (KHz)	99% (KHz)	-26dBc (KHz)
BPSK	3.75	1@0	53.781	37.26	54.636	38.50	53.396	37.10
QPSK	3.75	1@0	56.095	38.45	61.897	41.76	61.225	42.25
BPSK	15	1@0	153.85	188.10	125.49	105.20	124.46	106.00
QPSK	15	1@0	119.07	103.20	125.92	118.10	120.48	116.90
QPSK	15	12@0	186.98	256.5	186.68	255.7	190.44	249.8

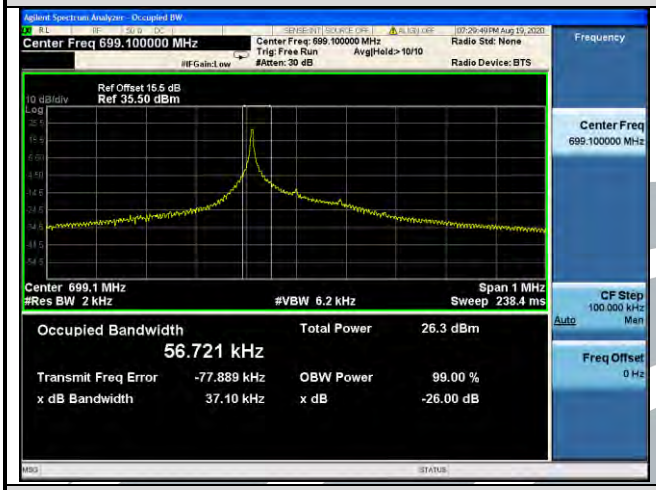
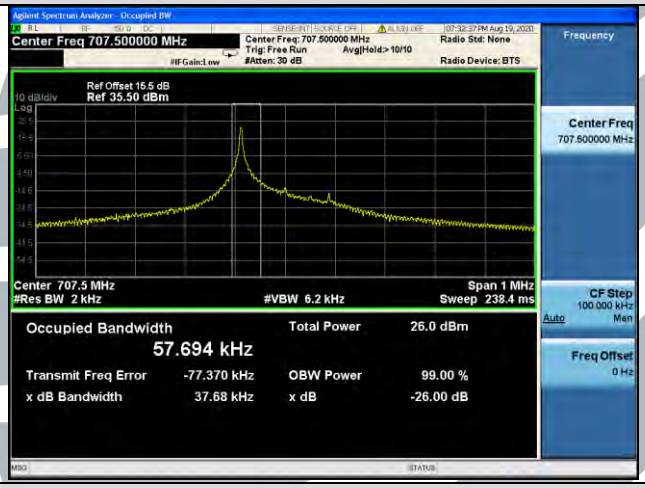
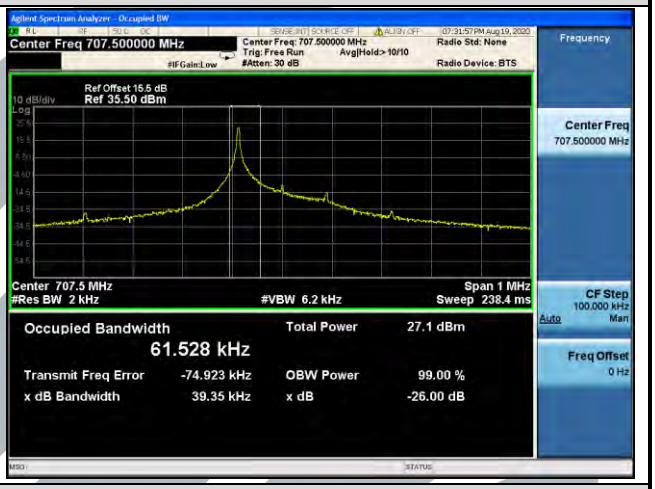
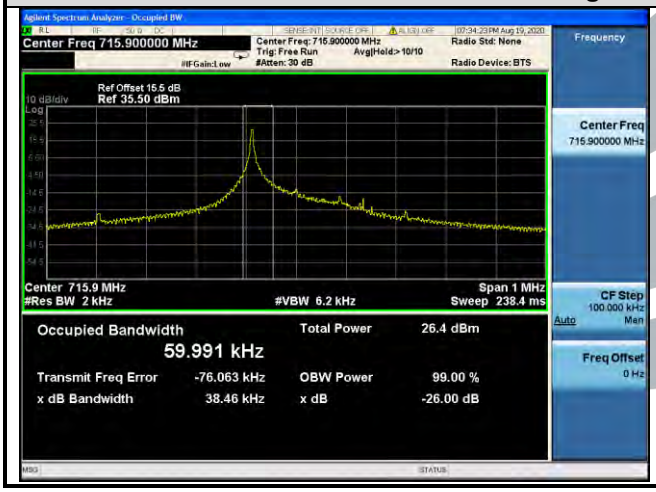
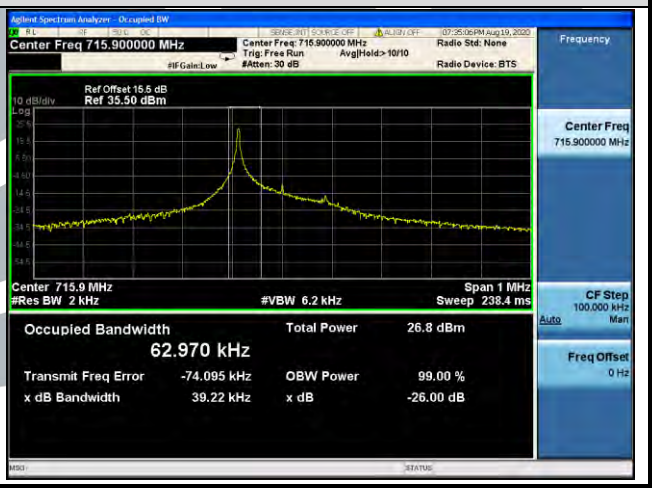
LTE Band 4	
3.75KHz Sub-carrier spacing, Ntones1@0_BPSK	3.75KHz Sub-carrier spacing, Ntones1@0_QPSK
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

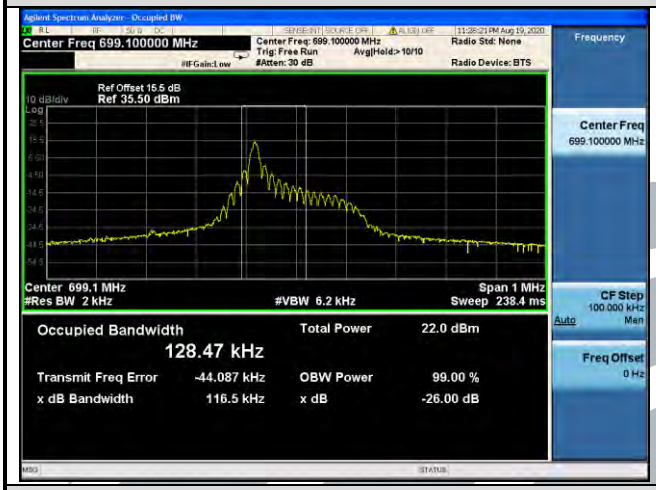
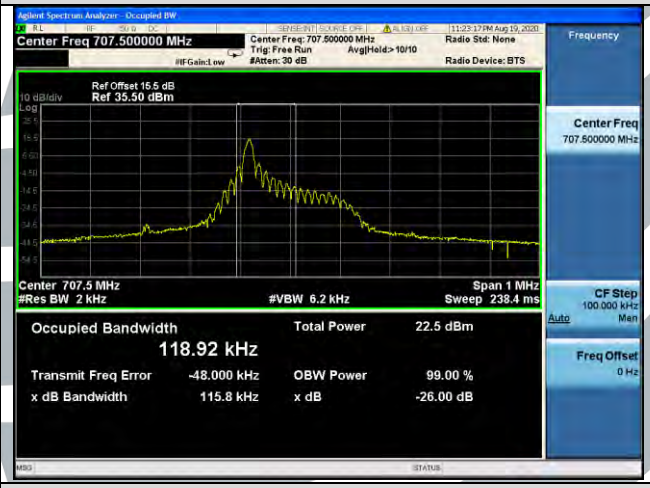
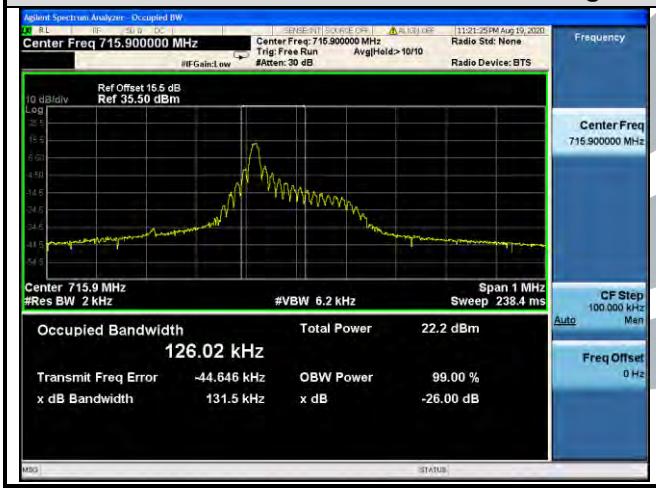
LTE Band 4	
15KHz Sub-carrier spacing, Ntones1@0_QPSK	15KHz Sub-carrier spacing, Ntones12@0_QPSK
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

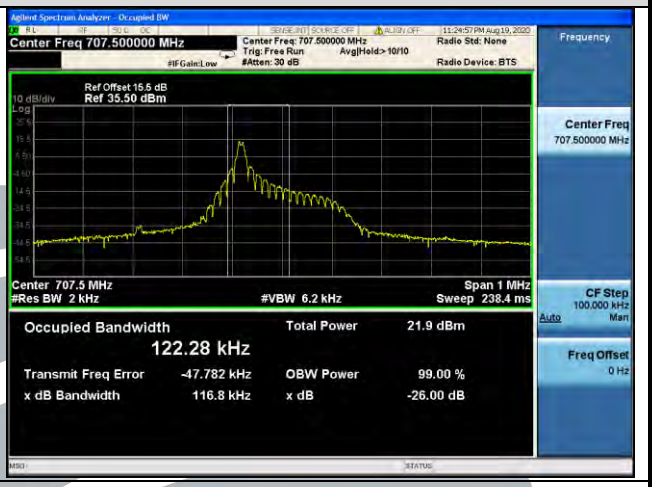
LTE Band 4	
15KHz Sub-carrier spacing, Ntones1@0_BPSK	
Lowest Channel	**Middle Channel**
	
Highest Channel	
	N/A

5.5.1 LTE Band 12

LTE Band 12								
Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
			23011/699.1		23095/707.5		23179/715.9	
			99% (KHz)	-26dBc (KHz)	99% (KHz)	-26dBc (KHz)	99% (KHz)	-26dBc (KHz)
BPSK	3.75	1@0	56.721	37.10	57.694	37.68	59.991	38.46
QPSK	3.75	1@0	66.553	41.93	61.528	39.35	62.970	39.22
BPSK	15	1@0	120.73	116.80	122.28	116.80	122.37	106.60
QPSK	15	1@0	128.47	116.50	118.92	115.80	126.02	131.50
QPSK	15	12@0	185.75	249.2	188.80	250.5	184.94	245.4

LTE Band 12	
3.75KHz Sub-carrier spacing, Ntones1@0_BPSK	3.75KHz Sub-carrier spacing, Ntones1@0_QPSK
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

LTE Band 12	
15KHz Sub-carrier spacing, Ntones1@0_QPSK	15KHz Sub-carrier spacing, Ntones12@0_QPSK
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

LTE Band 12	
15KHz Sub-carrier spacing, Ntones1@0_BPSK	
Lowest Channel	**Middle Channel**
	
Highest Channel	
	N/A

5.6 BAND EDGE AT ANTENNA TERMINALS

Test Requirement: **LTE Band 2:** FCC 47 CFR Part 24.238(a)
LTE Band 4: FCC 47 CFR Part 27.53(h)(1)
LTE Band 12: FCC 47 CFR Part 27.53(g)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

FCC 47 CFR Part 24.238(a), 27.53(h)(1):

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13 dBm.

FCC 47 CFR Part 27.53(g):

For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.
For each band edge measurement:

1) Set the spectrum analyzer span to include the block edge frequency.
2) Set a marker to point the corresponding band edge frequency in each test case.
3) Set display line at -13 dBm
4) Set resolution bandwidth to at least 1% of emission bandwidth.
5) Set spectrum analyzer with RMS detector.
6) Record the max trace plot into the test report

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

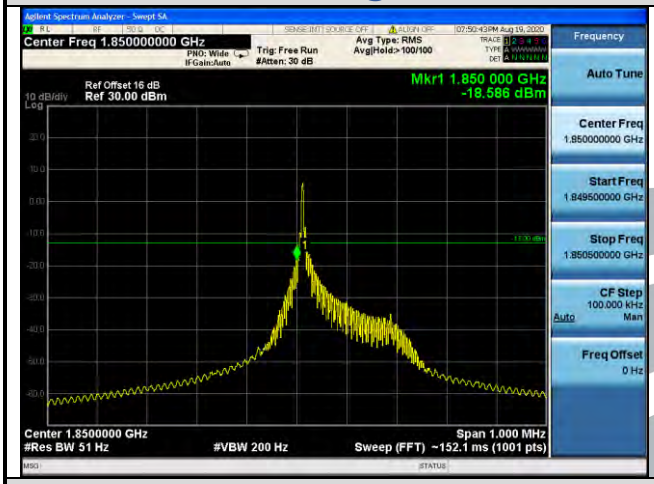
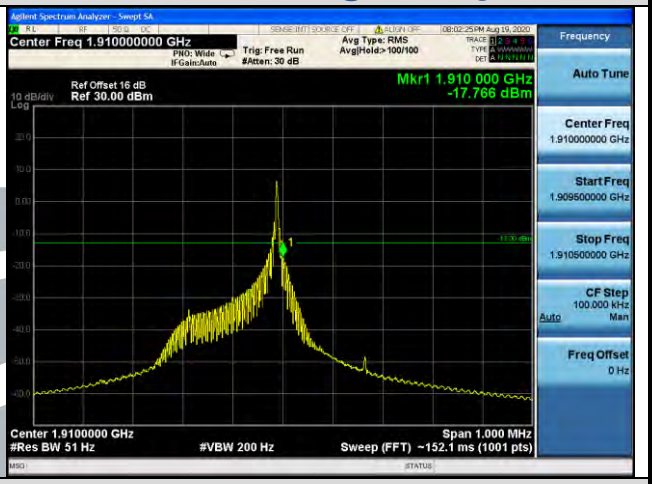
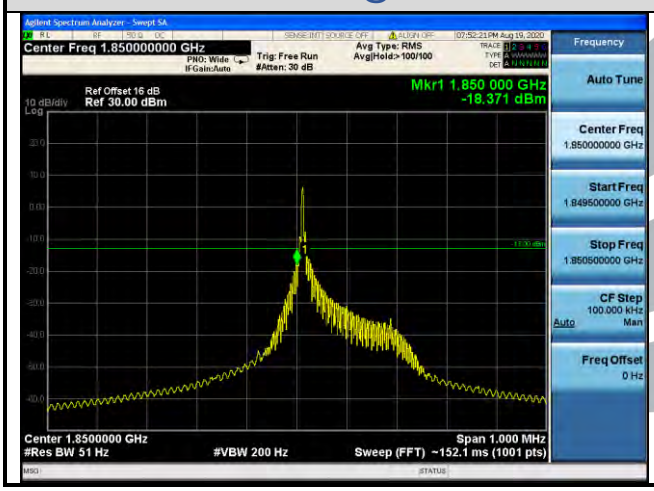
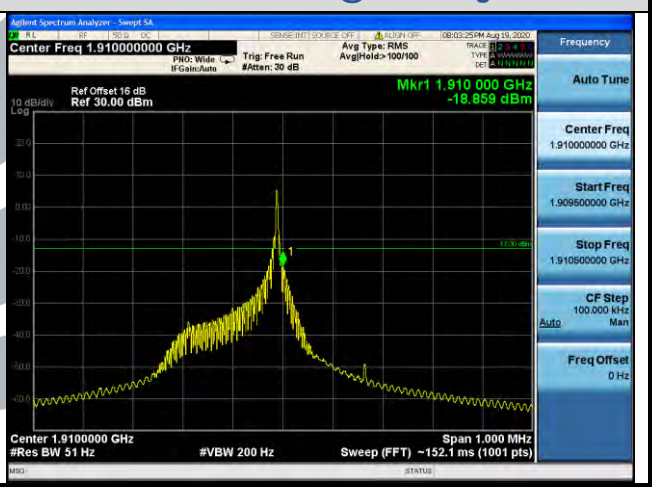
Test Setup: Refer to section 4.2.2 for details.

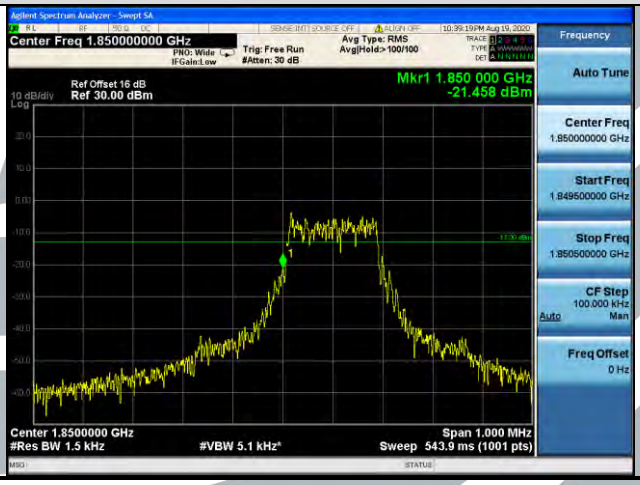
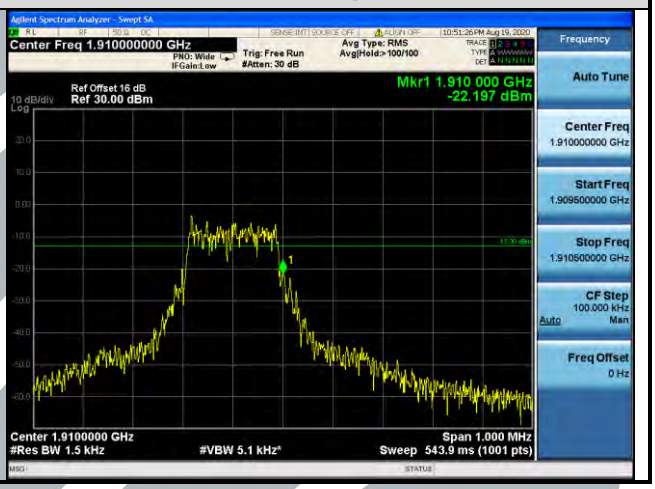
Instruments Used: Refer to section 3 for details

Test Mode: Link mode

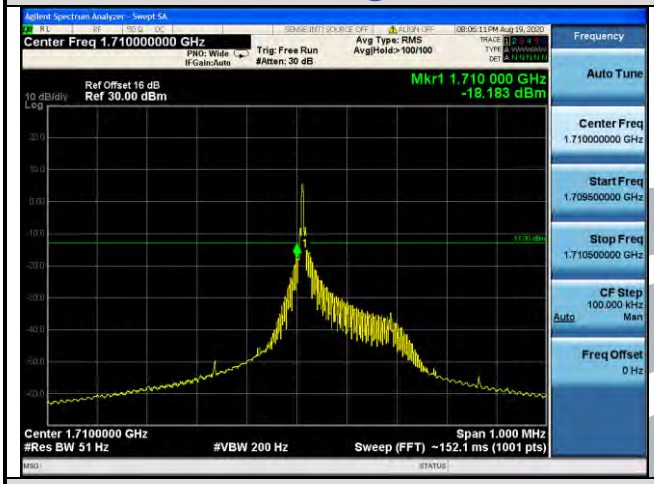
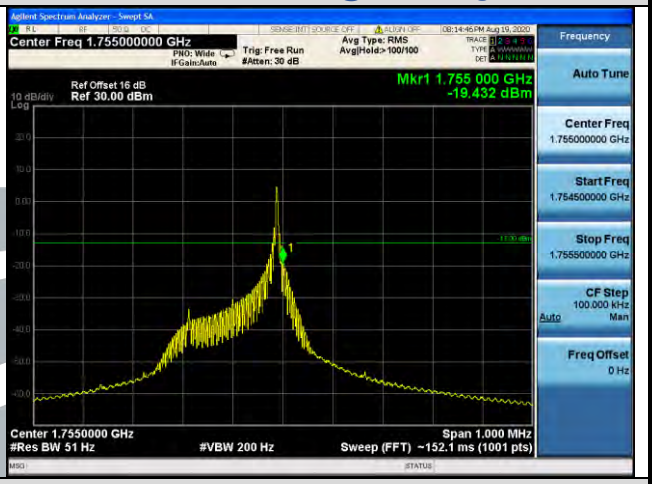
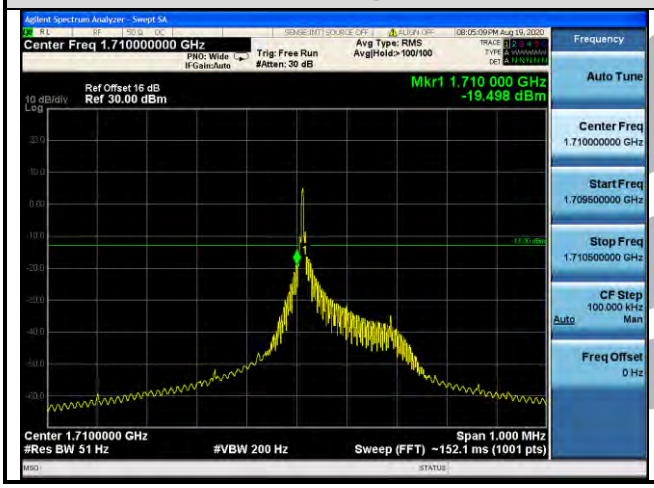
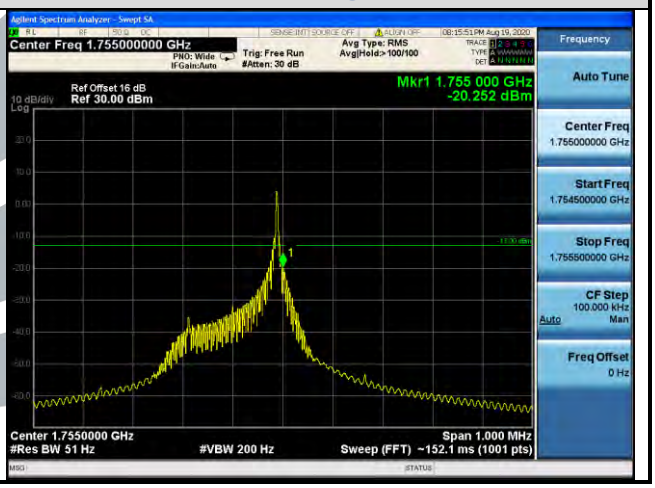
Test Results: Pass

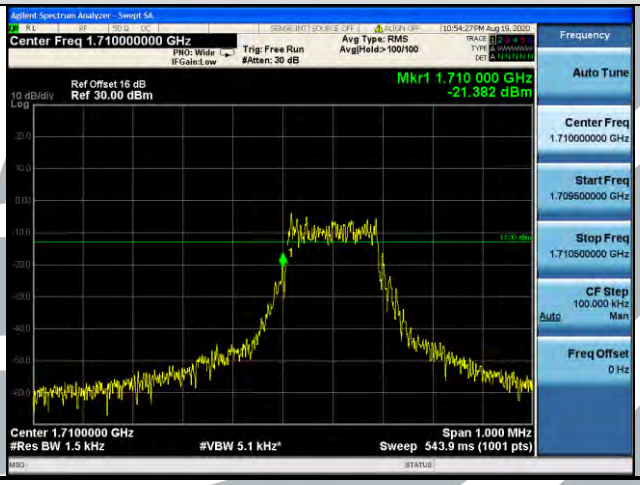
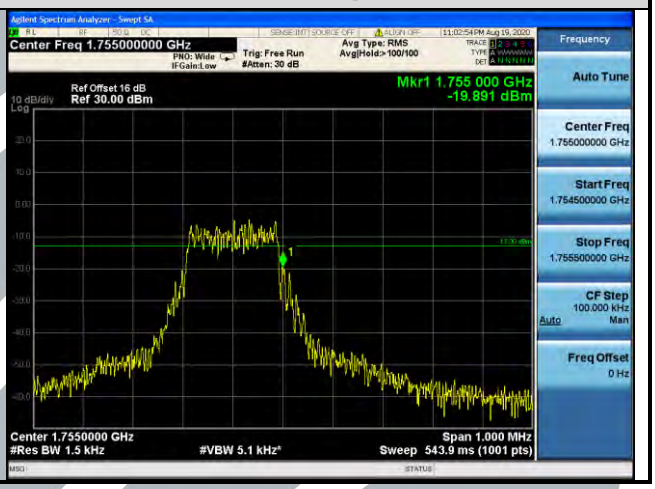
5.6.1 LTE Band 2

LTE Band 2	
BPSK 3.75kHz 1@0 CH-Low	BPSK 3.75kHz 1@47 CH-High
	
BPSK 15kHz 1@0 CH-Low	BPSK 15kHz 1@11 CH-High
	
QPSK 3.75kHz 1@0 CH-Low	QPSK 3.75kHz 1@47 CH-High
	

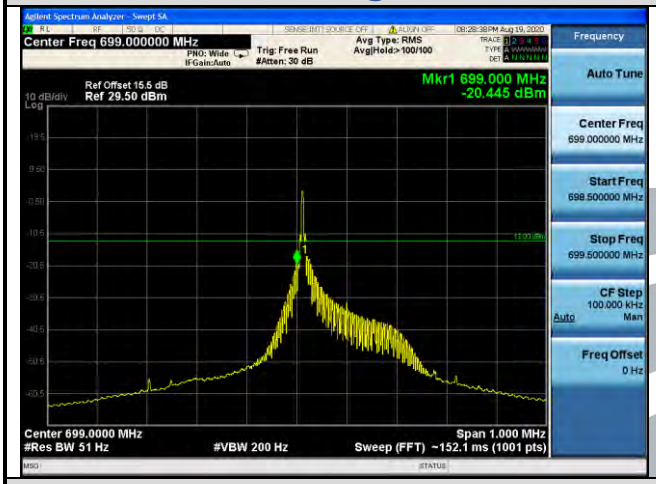
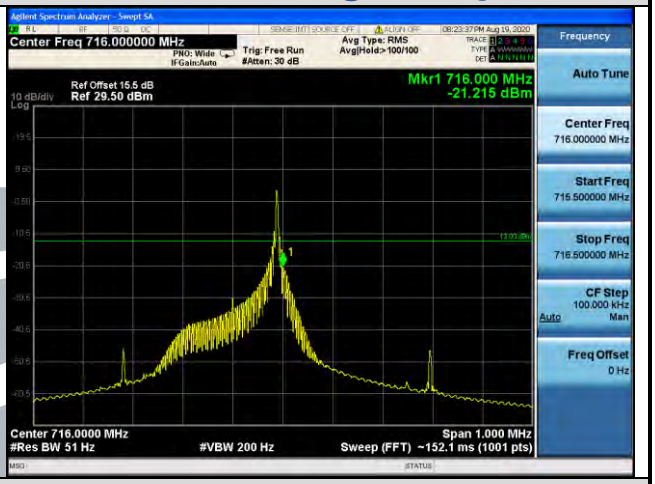
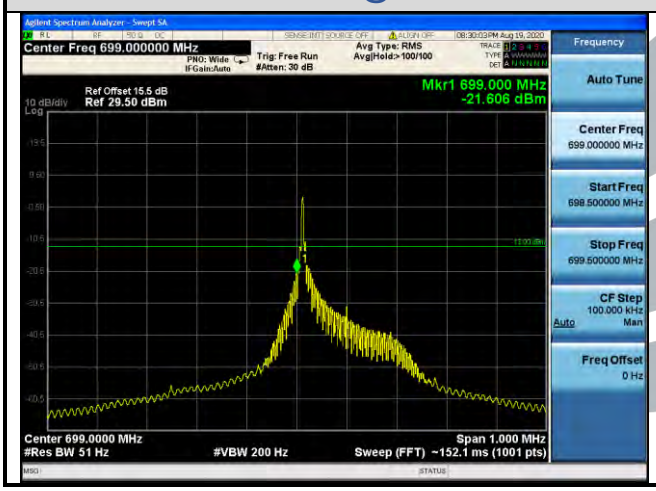
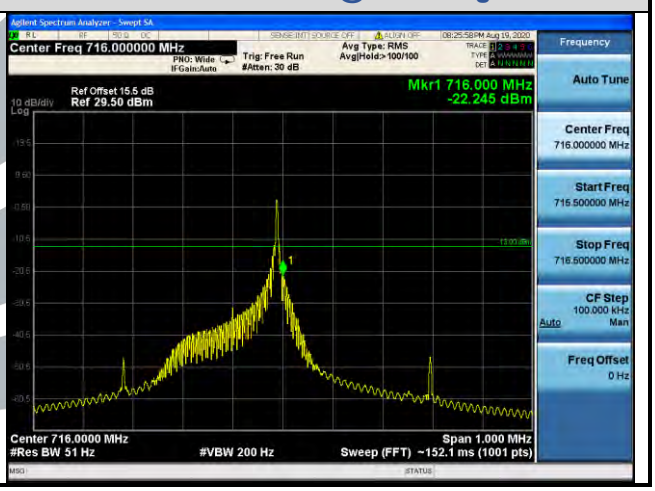
QPSK 15kHz 1@0 CH-Low	QPSK 15kHz 1@11 CH-High
	
QPSK 15kHz 12@0 CH-Low	**QPSK 15kHz 12@0 CH-High**
	

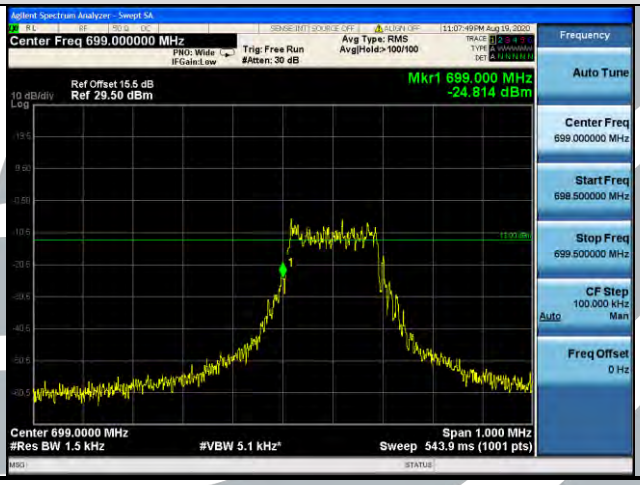
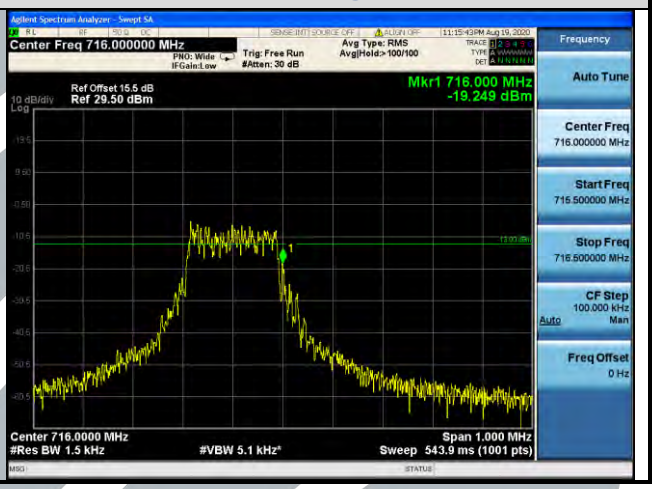
5.6.2 LTE Band 4

LTE Band 4	
BPSK 3.75kHz 1@0 CH-Low	BPSK 3.75kHz 1@47 CH-High
	
BPSK 15kHz 1@0 CH-Low	BPSK 15kHz 1@11 CH-High
	
QPSK 3.75kHz 1@0 CH-Low	QPSK 3.75kHz 1@47 CH-High
	

QPSK 15kHz 1@0 CH-Low	QPSK 15kHz 1@11 CH-High
	
QPSK 15kHz 12@0 CH-Low	**QPSK 15kHz 12@0 CH-High**
	

5.6.3 LTE Band 12

LTE Band 12	
BPSK 3.75kHz 1@0 CH-Low	BPSK 3.75kHz 1@47 CH-High
	
BPSK 15kHz 1@0 CH-Low	BPSK 15kHz 1@11 CH-High
	
QPSK 3.75kHz 1@0 CH-Low	QPSK 3.75kHz 1@47 CH-High
	

QPSK 15kHz 1@0 CH-Low	QPSK 15kHz 1@11 CH-High
	
QPSK 15kHz 12@0 CH-Low	**QPSK 15kHz 12@0 CH-High**
	

5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement: **LTE Band 2:** FCC 47 CFR Part 24.238(a)
LTE Band 4: FCC 47 CFR Part 27.53(h)
LTE Band 12: FCC 47 CFR Part 27.53(g)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

FCC 47 CFR Part 24.238(a), 27.53(h)(1), 27.53(g):

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13 dBm.

Test Procedure:

The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range. b. Measuring frequency range is from 30 MHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

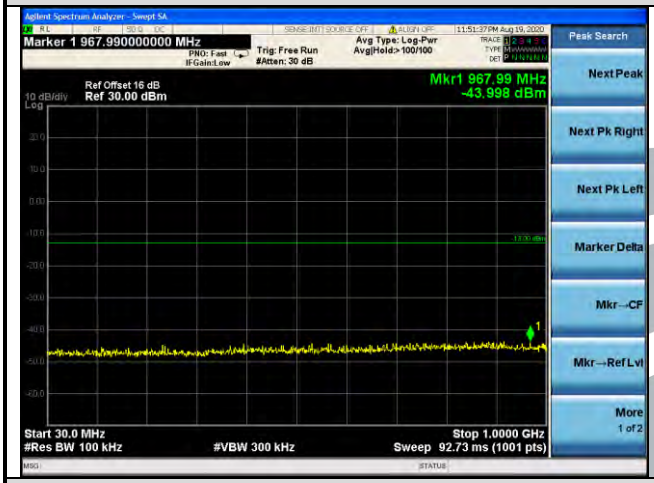
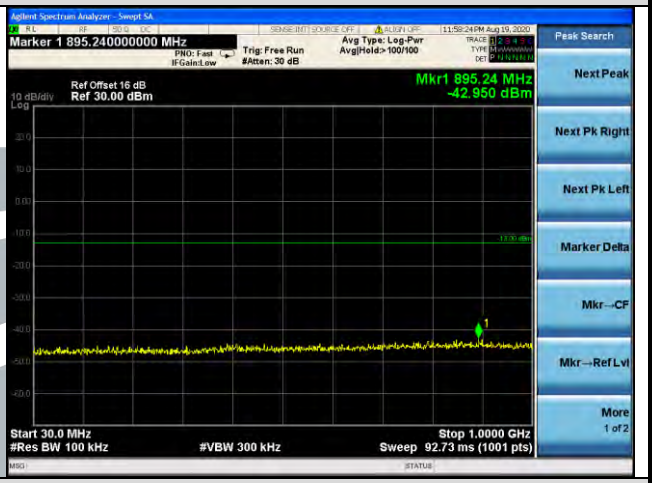
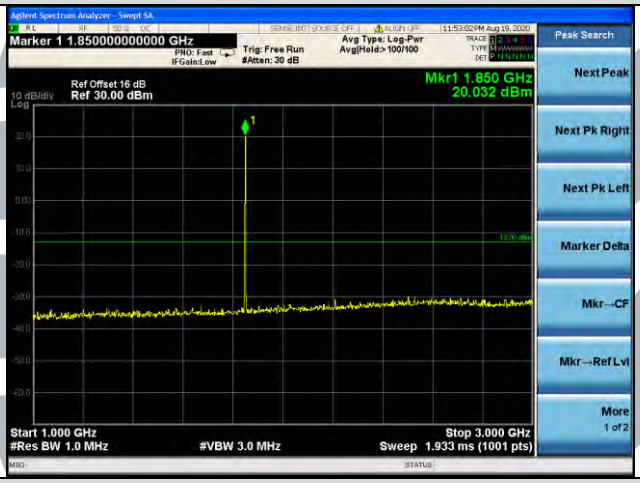
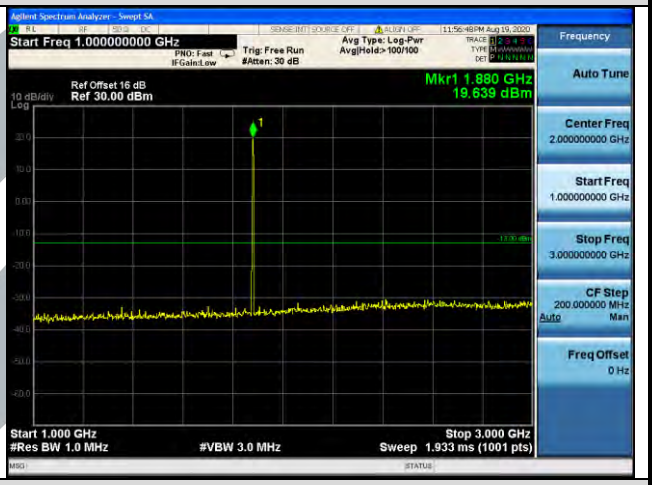
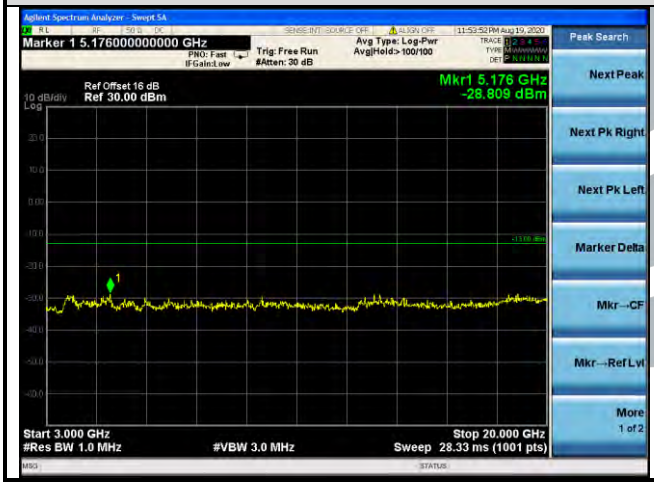
Test Setup: Refer to section 4.2.2 for details.

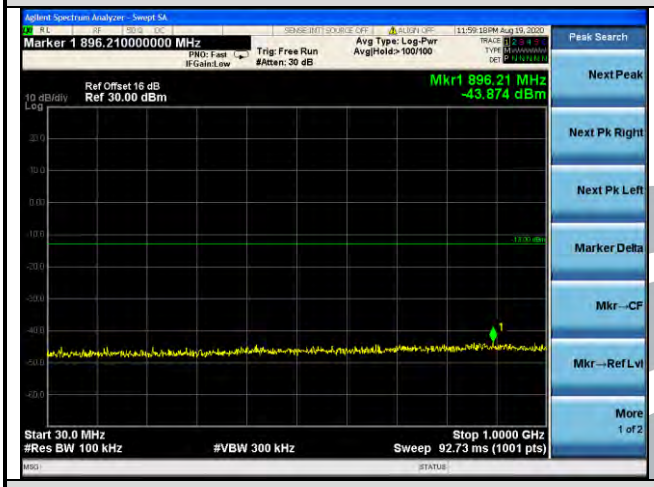
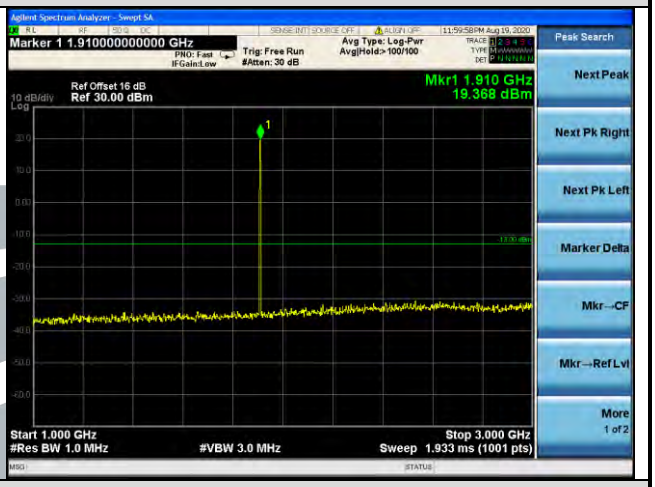
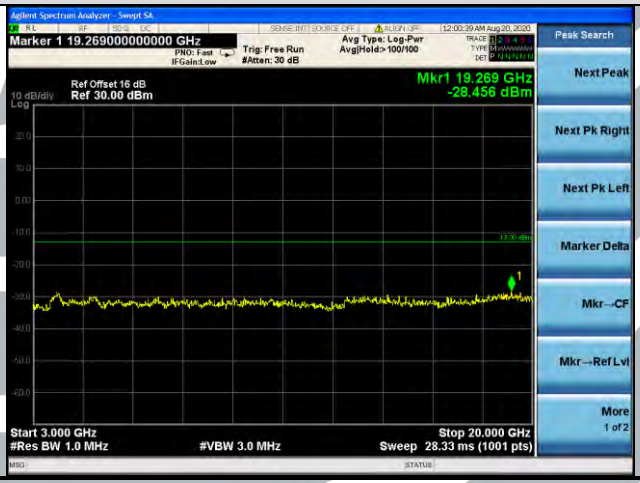
Instruments Used: Refer to section 3 for details

Test Mode: Link mode

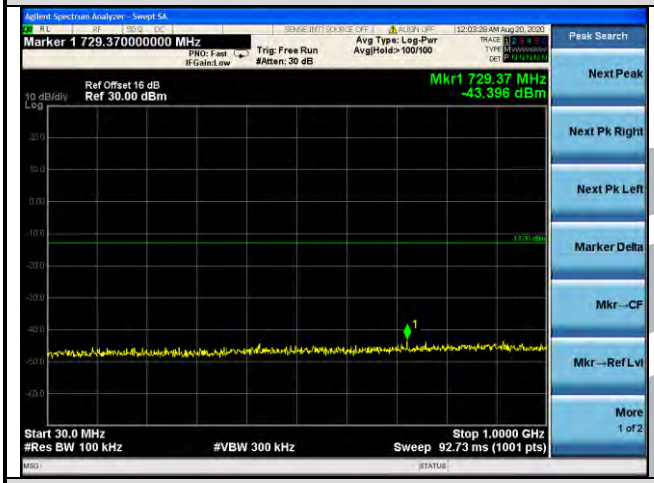
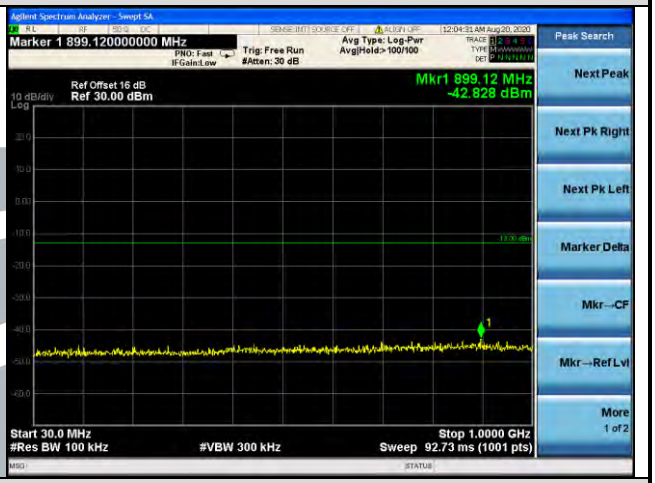
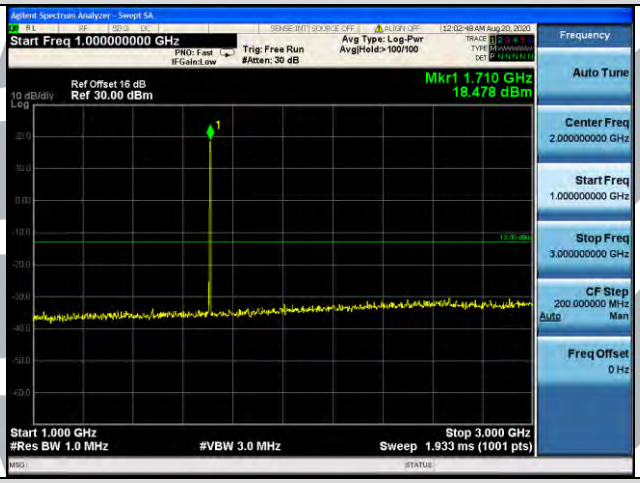
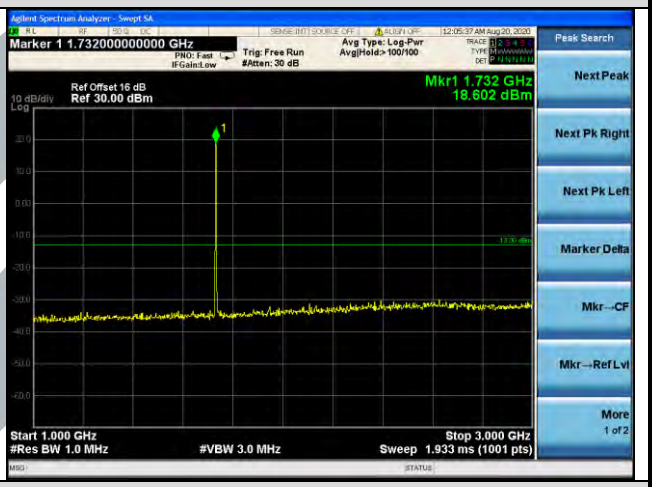
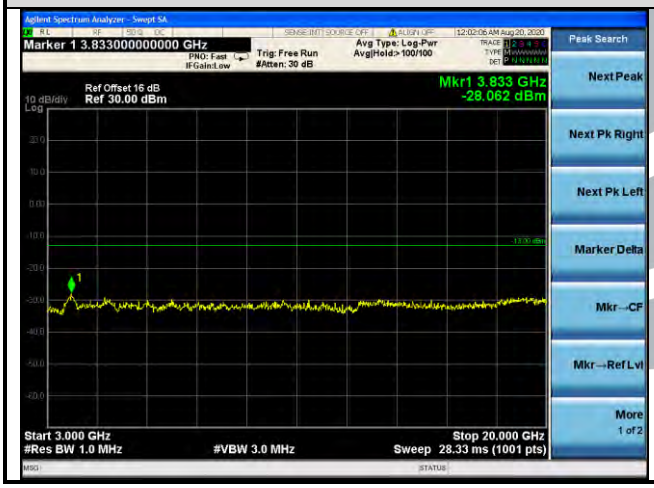
Test Results: Pass

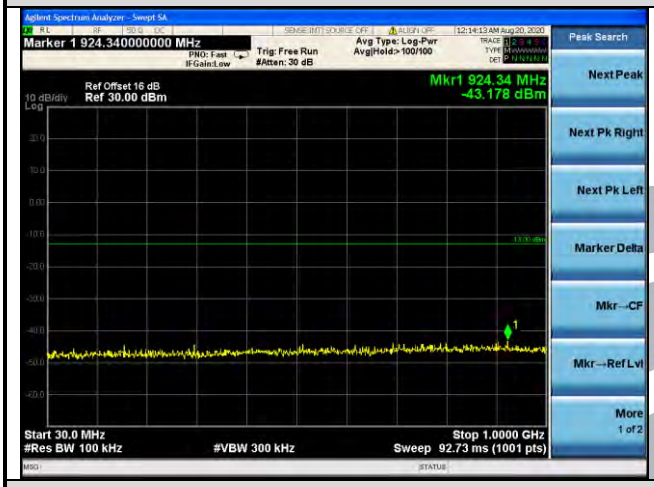
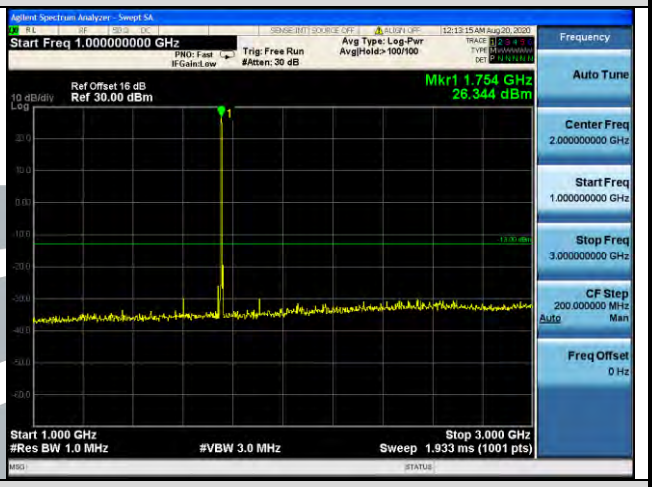
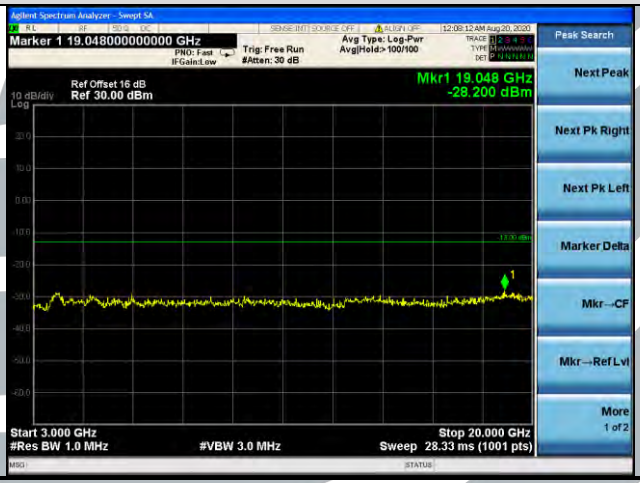
5.7.1 LTE Band 2

LTE Band 2	
Lowest Channel	**Middle Channel**
30MHz-1GHz	
	
1GHz-3GHz	
	
3GHz-20GHz	
	

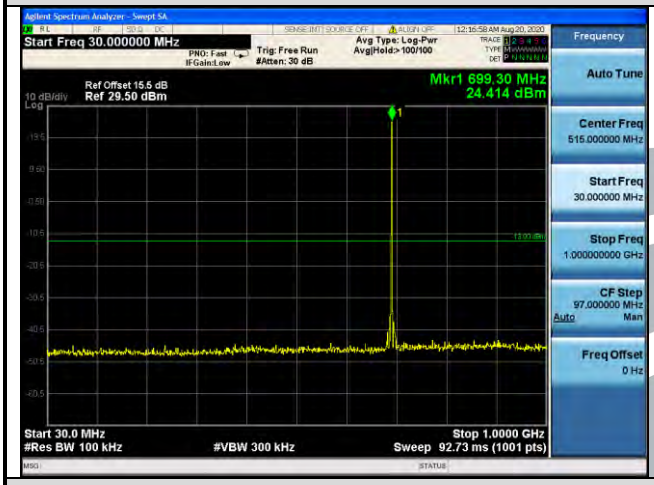
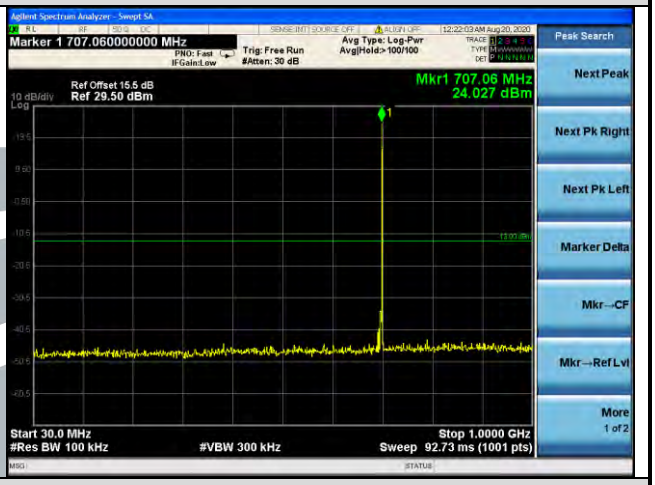
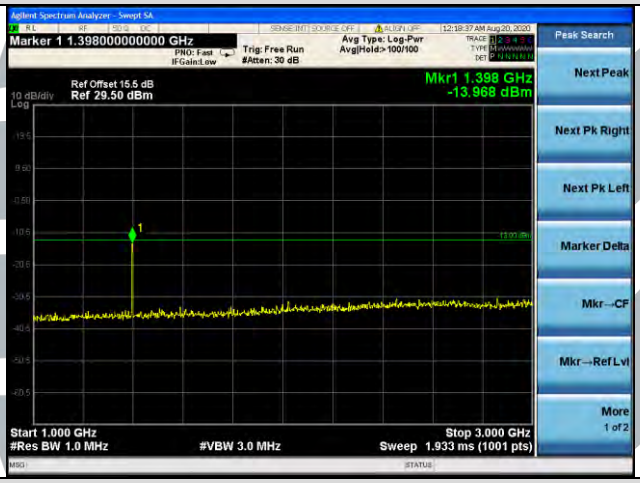
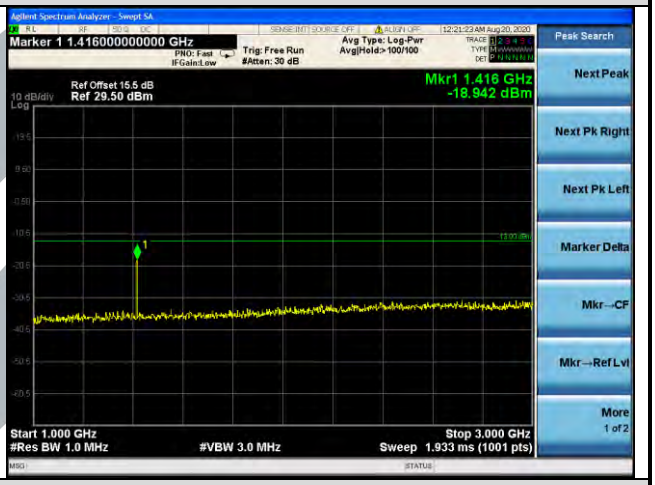
LTE Band 2	
Highest Channel	
30MHz-1GHz	1GHz-3GHz
	
3GHz-20GHz	
	N/A

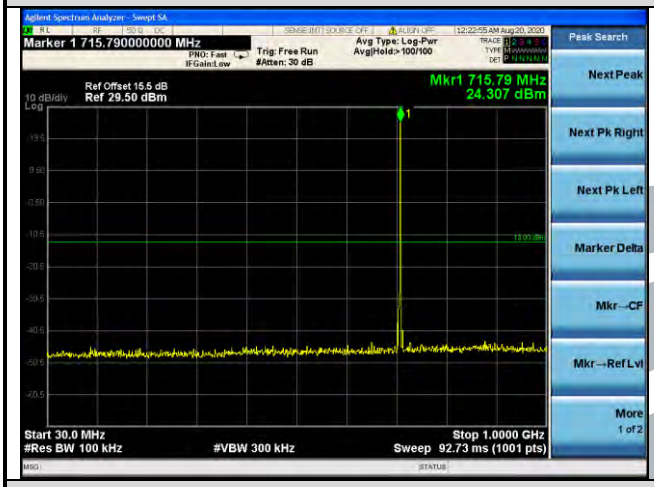
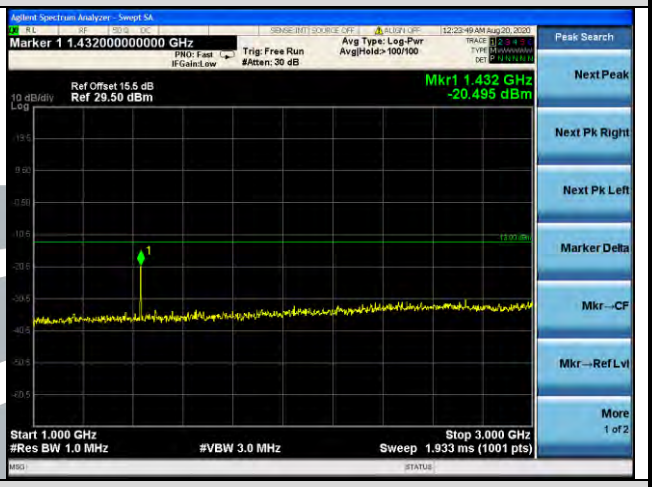
5.7.2 LTE Band 4

LTE Band 4	
Lowest Channel	**Middle Channel**
30MHz-1GHz	
	
1GHz-3GHz	
	
3GHz-20GHz	
	

LTE Band 4	
Highest Channel	
30MHz-1GHz	1GHz-3GHz
	
3GHz-20GHz	
	N/A

5.7.3 LTE Band 12

LTE Band 12	
Lowest Channel	**Middle Channel**
30MHz-1GHz	
	
1GHz-3GHz	
	
3GHz-20GHz	
	

LTE Band 12	
Highest Channel	
30MHz-1GHz	1GHz-3GHz
	
3GHz-20GHz	
	N/A

Remark:

1) All the above radiation data, the fundamental frequency is not marked, it may exceed the limit, please ignore it.

5.8 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: **LTE Band 2:** FCC 47 CFR Part 24.238(a)
LTE Band 4: FCC 47 CFR Part 27.53(h)
LTE Band 12: FCC 47 CFR Part 27.53(g)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009 MHz-30 MHz	Peak	10 kHz	30 KHz	Peak
30 MHz-1 GHz	Quasi-peak	100 kHz	300 KHz	Peak
Above 1 GHz	Peak	1 MHz	3 MHz	Peak

Limits:

FCC 47 CFR Part 24.238(a), 27.53(h)(1), 27.53(g):

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13 dBm.

Test Setup: Refer to section 4.2.1 for details.

Test Procedures: KDB 971168 D01v03r01 Section 7

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

5.8.1 LTE Band 2

LTE Band 2_ QPSK							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	48.141	-95.71	18.85	-76.86	-13.00	-63.86	Horizontal
2	96.161	-87.15	19.74	-67.41	-13.00	-54.41	Horizontal
3	144.277	-81.14	20.38	-60.76	-13.00	-47.76	Horizontal
4	3700.200	-57.22	15.20	-42.02	-13.00	-29.02	Horizontal
5	5550.300	-68.86	17.46	-51.40	-13.00	-38.40	Horizontal
6	48.044	-99.50	18.37	-81.13	-13.00	-68.13	Vertical
7	144.277	-97.95	20.38	-77.57	-13.00	-64.57	Vertical
8	873.014	-101.12	38.71	-62.41	-13.00	-49.41	Vertical
9	3700.200	-62.93	14.94	-47.99	-13.00	-34.99	Vertical
10	5550.300	-67.95	17.26	-50.69	-13.00	-37.69	Vertical
Middle Channel							
1	96.161	-87.42	19.74	-67.68	-13.00	-54.68	Horizontal
2	144.277	-81.61	20.38	-61.23	-13.00	-48.23	Horizontal
3	946.257	-101.42	40.98	-60.44	-13.00	-47.44	Horizontal
4	3760.000	-61.82	15.35	-46.47	-13.00	-33.47	Horizontal
5	5640.000	-68.24	17.75	-50.49	-13.00	-37.49	Horizontal
6	33.298	-101.01	25.23	-75.78	-13.00	-62.78	Vertical
7	558.121	-100.76	34.25	-66.51	-13.00	-53.51	Vertical
8	909.102	-100.67	39.54	-61.13	-13.00	-48.13	Vertical
9	3760.000	-61.82	15.10	-46.72	-13.00	-33.72	Vertical
10	5640.000	-68.93	17.55	-51.38	-13.00	-38.38	Vertical
Highest Channel							
1	96.161	-87.34	19.74	-67.60	-13.00	-54.60	Horizontal
2	144.277	-81.72	20.38	-61.34	-13.00	-48.34	Horizontal
3	933.742	-100.87	40.57	-60.30	-13.00	-47.30	Horizontal
4	3819.800	-62.59	15.51	-47.08	-13.00	-34.08	Horizontal
5	5729.700	-67.18	18.04	-49.14	-13.00	-36.14	Horizontal
6	32.910	-100.85	25.48	-75.37	-13.00	-62.37	Vertical
7	144.277	-98.65	20.38	-78.27	-13.00	-65.27	Vertical
8	634.176	-99.18	34.15	-65.03	-13.00	-52.03	Vertical
9	3819.800	-62.19	15.27	-46.92	-13.00	-33.92	Vertical
10	5729.700	-67.45	17.84	-49.61	-13.00	-36.61	Vertical

5.8.2 LTE Band 4

LTE Band 4_ QPSK							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	96.161	-87.34	19.74	-67.60	-13.00	-54.60	Horizontal
2	144.277	-81.64	20.38	-61.26	-13.00	-48.26	Horizontal
3	972.643	-100.82	40.84	-59.98	-13.00	-46.98	Horizontal
4	3420.200	-57.74	14.67	-43.07	-13.00	-30.07	Horizontal
5	5130.300	-68.41	16.75	-51.66	-13.00	-38.66	Horizontal
6	34.365	-101.82	24.55	-77.27	-13.00	-64.27	Vertical
7	545.413	-99.16	33.96	-65.20	-13.00	-52.20	Vertical
8	977.300	-99.78	39.95	-59.83	-13.00	-46.83	Vertical
9	3420.200	-63.53	14.37	-49.16	-13.00	-36.16	Vertical
10	5130.300	-68.13	16.40	-51.73	-13.00	-38.73	Vertical
Middle Channel							
1	96.161	-87.22	19.74	-67.48	-13.00	-54.48	Horizontal
2	144.277	-81.53	20.38	-61.15	-13.00	-48.15	Horizontal
3	958.383	-99.83	41.00	-58.83	-13.00	-45.83	Horizontal
4	3465.000	-61.44	14.69	-46.75	-13.00	-33.75	Horizontal
5	5197.500	-67.79	16.86	-50.93	-13.00	-37.93	Horizontal
6	144.277	-98.21	20.38	-77.83	-13.00	-64.83	Vertical
7	591.201	-100.64	34.13	-66.51	-13.00	-53.51	Vertical
8	960.420	-101.36	39.73	-61.63	-13.00	-48.63	Vertical
9	3465.000	-56.30	14.39	-41.91	-13.00	-28.91	Vertical
10	5197.500	-66.87	16.54	-50.33	-13.00	-37.33	Vertical
Highest Channel							
1	96.161	-87.33	19.74	-67.59	-13.00	-54.59	Horizontal
2	144.277	-81.93	20.38	-61.55	-13.00	-48.55	Horizontal
3	931.899	-100.45	40.51	-59.94	-13.00	-46.94	Horizontal
4	3509.800	-62.46	14.73	-47.73	-13.00	-34.73	Horizontal
5	5264.700	-66.07	16.96	-49.11	-13.00	-36.11	Horizontal
6	144.277	-98.02	20.38	-77.64	-13.00	-64.64	Vertical
7	575.971	-101.14	34.59	-66.55	-13.00	-53.55	Vertical
8	942.473	-100.60	39.62	-60.98	-13.00	-47.98	Vertical
9	3509.800	-60.83	14.43	-46.40	-13.00	-33.40	Vertical
10	5264.700	-67.38	16.66	-50.72	-13.00	-37.72	Vertical

5.8.3 LTE Band 12

LTE Band 12_ QPSK							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	96.161	-84.72	19.74	-64.98	-13.00	-51.98	Horizontal
2	144.277	-80.70	20.38	-60.32	-13.00	-47.32	Horizontal
3	964.786	-88.78	40.93	-47.85	-13.00	-34.85	Horizontal
4	1398.200	-65.19	8.64	-56.55	-13.00	-43.55	Horizontal
5	2097.300	-68.67	13.09	-55.58	-13.00	-42.58	Horizontal
6	159.799	-91.10	21.24	-69.86	-13.00	-56.86	Vertical
7	554.046	-89.11	34.16	-54.95	-13.00	-41.95	Vertical
8	939.175	-89.31	39.63	-49.68	-13.00	-36.68	Vertical
9	1398.200	-67.74	8.82	-58.92	-13.00	-45.92	Vertical
10	2097.300	-68.97	12.89	-56.08	-13.00	-43.08	Vertical
Middle Channel							
1	96.161	-85.93	19.74	-66.19	-13.00	-53.19	Horizontal
2	144.277	-80.91	20.38	-60.53	-13.00	-47.53	Horizontal
3	955.958	-89.28	41.03	-48.25	-13.00	-35.25	Horizontal
4	1415.000	-65.45	8.65	-56.80	-13.00	-43.80	Horizontal
5	2122.500	-66.94	13.16	-53.78	-13.00	-40.78	Horizontal
6	97.422	-91.47	19.84	-71.63	-13.00	-58.63	Vertical
7	282.807	-90.89	25.86	-65.03	-13.00	-52.03	Vertical
8	978.173	-89.30	39.97	-49.33	-13.00	-36.33	Vertical
9	1415.000	-68.76	8.83	-59.93	-13.00	-46.93	Vertical
10	2122.500	-69.69	12.96	-56.73	-13.00	-43.73	Vertical
Highest Channel							
1	96.258	-84.16	19.74	-64.42	-13.00	-51.42	Horizontal
2	144.277	-80.90	20.38	-60.52	-13.00	-47.52	Horizontal
3	978.173	-89.75	40.85	-48.90	-13.00	-35.90	Horizontal
4	1431.800	-66.76	8.65	-58.11	-13.00	-45.11	Horizontal
5	2147.700	-67.51	13.23	-54.28	-13.00	-41.28	Horizontal
6	32.813	-92.28	25.54	-66.74	-13.00	-53.74	Vertical
7	344.506	-90.30	28.23	-62.07	-13.00	-49.07	Vertical
8	563.262	-89.65	34.36	-55.29	-13.00	-42.29	Vertical
9	1431.800	-68.74	8.84	-59.90	-13.00	-46.90	Vertical
10	2147.700	-68.96	13.03	-55.93	-13.00	-42.93	Vertical

5.9 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235 & FCC 47 CFR Part 27.54,

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limits:

FCC 47 CFR Part 24.235, FCC 47 CFR Part 27.54

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Setup: Refer to section 4.2.2 for details.

Test Procedures:

1) Use CMW 500 or CMU 200 with Frequency Error measurement capability.
   a) Temp. = −30° to + 50°C
   b) Voltage =low voltage, 3.3 Vdc, Normal, 3.8 Vdc and High voltage, 4.3 Vdc.
2) Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

3) Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

Equipment Used: Refer to section 3 for details.

Test Result: Pass

5.9.1 LTE Band 2

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
LTE Band 2							
QPSK	18900 / 1880.0	VL	TN	-7.20	-0.0042	N/A	Pass
		VN		-5.35	-0.0031		Pass
		VH		-8.11	-0.0047		Pass
		VN	50	8.34	0.0048		Pass
			40	8.42	0.0049		Pass
			30	6.11	0.0035		Pass
			20	-6.45	-0.0037		Pass
			10	-5.32	-0.0031		Pass
			0	-5.87	-0.0034		Pass
			-10	-7.11	-0.0041		Pass
			-20	-6.32	-0.0036		Pass
			-30	-3.89	-0.0022		Pass

5.9.2 LTE Band 4

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
LTE Band 4							
QPSK	20175 / 1732.5	VL	TN	6.47	0.0037	N/A	Pass
		VN		4.75	0.0027		Pass
		VH		4.82	0.0028		Pass
		VN	50	8.64	0.0050		Pass
			40	8.92	0.0051		Pass
			30	7.02	0.0041		Pass
			20	6.43	0.0037		Pass
			10	-6.22	-0.0036		Pass
			0	-7.32	-0.0042		Pass
			-10	-7.45	-0.0043		Pass
			-20	-8.24	-0.0048		Pass
			-30	-3.77	-0.0022		Pass

5.9.3 LTE Band 12

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Result
	(MHz)	(Vdc)	(℃)	(Hz)	(ppm)	(ppm)	
LTE Band 12							
QPSK	23095 / 707.5	VL	TN	-6.72	-0.0095	N/A	Pass
		VN		-6.35	-0.0090		Pass
		VH		-7.73	-0.0109		Pass
		VN	50	-5.44	-0.0077		Pass
			40	-4.82	-0.0068		Pass
			30	-5.56	-0.0079		Pass
			20	-5.53	-0.0078		Pass
			10	-6.28	-0.0089		Pass
			0	3.43	0.0048		Pass
			-10	6.16	0.0087		Pass
			-20	-2.33	-0.0033		Pass
			-30	-4.13	-0.0058		Pass

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***
