FCC TEST REPORT

Product	:	Mobile Phone
Trade mark	:	MI
Model/Type reference	:	MDG2
Report Number	:	170615001RFM-3
Date of Issue	:	July 12, 2017
FCC ID	:	2AFZZ-XMSG2
Test Standards	:	FCC 47 CFR Part 27 FCC 47 CFR Part 2 Subpart J
Test result	:	PASS

Prepared for:

Xiaomi Communications Co., Ltd.
The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China

Prepared by:

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Approved by:	Billy Li Technical Director	Date:	July 12, 2017

Version

Version No.	Date	Description
V1.0	July 12, 2017	Original

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1 General Information

1.1 Client Information

Applicant:	Xiaomi Communications Co., Ltd.
Address of Applicant:	The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China
Manufacturer:	Xiaomi Communications Co., Ltd.
Address of Manufacturer:	The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China

1.2 General Description of EUT

Product Name:	Mobile Phone	
Model No.(EUT):	MDG2	
Add. Mode No.:	N/A	
Trade Mark:	MI	
EUT Supports Radios application:	GSM850/1900 WCDMA Band II/Band V LTE FDD Band 4 /Band 5 /Band 7 LTE TDD Band 38 Wlan 2400MHz-2483.5MHz 802.11b/g/n(HT20&HT40) Wlan 5150MHz-5350MHz, 5470MHz-5725MHz, 5725MHz-5850MHz support 802.11a/n/ac Bluetooth V3.0+EDR&Bluetooth V4.0 BLE GPS, Glonass	
Power Supply:	AC Adapter1	Model: MDY-08-EZ Input: 100-240V~50/60Hz 0.35A MAX Output: 5.0 V ⎓ 2.0 A Manufacturer: Dongguan Aohai Power Technology Co., Ltd.
	AC Adapter2	Model: MDY-08-EZ Input: 100-240V~50/60Hz 0.35A MAX Output: 5.0 V ⎓ 2.0 A Manufacturer: Jangsu Chenyang Electron Co., Ltd.
	Battery	Model: BN31 Brand: MI Rated Voltage: 3.85Vdc Battery Capacity: 3000mAh(Li-on Rechargeable)
USB Micro-C Plug Cable:	100 cm(Shielded without ferrite)	
USB Changing Cable:	100 cm(Shielded without ferrite)	
Sample Received Date:	June 10, 2017	
Sample tested Date:	June 10, 2017 ~ July 12, 2017	

1.3 Product Specification subjective to this standard

Support Networks:	LTE Band 4/ Band 7/Band 38
Type of Modulation:	QPSK, 16QAM, 64QAM(DL)
IEMI:	SIM1: 865181030006425
	SIM2: 865181030006433
Type of Antenna:	PIFA Antenna
Antenna Gain:	Band 4: 1.63dBi
	Band 7: 2.86dBi

	Band 38: 2.84dBi
Sample Type:	Portable device
Normal Test voltage:	3.85Vdc
Extreme Test voltage:	3.4 to 4.4Vdc
Software Version:	QL1515-tissot
Hardware Version:	P3A

Summary of Results:

LTE Band	Bandwidth (MHz)	Frequency Range (MHz)	Max RF Output Power (dBm)		Type of Emission	
			Conducted (Average)	EIRP (Average)	QPSK	16QAM
Band 4	1.4	1710.7-1754.3	22.78	19.32	1M3G7D	1M1W7D
	3	1711.5-1753.5	22.79	18.88	2M7G7D	2M7W7D
	5	1712.5-1752.5	22.82	19.45	4M5G7D	4M5W7D
	10	1715-1750	22.86	19.14	9M0G7D	9M0W7D
	15	1717.5-1747.5	22.92	18.57	13M5G7D	13M5W7D
	20	1720-1745	22.06	19.12	17M9G7D	17M9W7D
Band 7	5	2502.5-2567.5	22.76	19.02	4M5G7D	4M5W7D
	10	2505-2565	22.17	19.01	8M9G7D	8M9W7D
	15	2507.5-2562.5	22.23	19.32	13M5G7D	13M5W7D
	20	2510-2560	22.89	19.12	18M0G7D	18M0W7D
Band 38	5	2572.5-2617.5	22.65	19.22	4M5G7D	4M5W7D
	10	2575.0-2615.0	22.69	19.21	8M9G7D	9M0W7D
	15	2577.5-2612.5	22.72	19.02	13M5G7D	13M5W7D
	20	2580.0-2610.0	22.79	19.15	18M0G7D	18M0W7D

1.4 Description of Support Units

The EUT has been tested with associated equipment below.

1) Cable

Cable No.	Description	Connector Type	Cable Type/Length	Supplied by
1	Antenna Cable	SMA	30cm	UnionTrust

1.5 Test Location

All tests were performed at:

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New 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/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

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: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

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 (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	3.8 dB
2	Conducted emission 150KHz-30MHz	3.4 dB
3	Radiated emission 9KHz-30MHz	4.9
4	Radiated emission 30MHz-1GHz	4.7 dB
5	Radiated emission 1GHz-18GHz	5.1 dB
6	Radiated emission 18GHz-26GHz	5.2 dB
7	Radiated emission 26GHz-40GHz	5.2 dB

2 Test Summary

Applied Standard: FCC Part 27 & Part 2 (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/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(d)(4)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5)	KDB 971168 D01v02r02	PASS
99%&26dB Occupied Bandwidth	FCC 47 CFR Part 2.1049(h) FCC 47 CFR Part 27.53(h)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(h)(1)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(h)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(h)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS

Applied Standard: FCC Part 27 & Part 2 (LTE Band 7)			
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(h)(2)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(h)(2)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5)	KDB 971168 D01v02r02	PASS
99%&26dB Occupied Bandwidth	FCC 47 CFR Part 2.1049(h) FCC 47 CFR Part 27.53(m)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(m)(4)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(m)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(m)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS

Applied Standard: FCC Part 27 & Part 2 (LTE Band 38)			
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/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(c)(10)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5)	KDB 971168 D01v02r02	PASS
99%&26dB Occupied Bandwidth	FCC 47 CFR Part 2.1049(h) FCC 47 CFR Part 27.53(g)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(g)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(g)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(g)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS

3 Equipment List

3M Semi/full-anechoic Chamber						
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. 20, 2015	Dec. 19, 2018
☐	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Dec. 22, 2016	Dec. 22, 2017
☒	Receiver	R&S	ESIB26	100114	Dec. 22, 2016	Dec. 22, 2017
☒	Communication test set	R&S	CMW500	130805	08-10-2016	08-09-2017
☐	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Dec. 22, 2016	Dec. 22, 2017
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	Jun. 24, 2015	Jun. 23, 2018
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Jul. 24, 2015	Jul. 23, 2018
☒	Preamplifier	HP	8447F	2805A02960	Dec. 22, 2016	Dec. 22, 2017
☒	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	Dec. 30, 2016	Dec. 30, 2017
☐	Horn Antenna	ETS-LINDGREN	3117	00164202	Jul. 24, 2015	Jul. 23, 2018
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	Dec. 30, 2016	Dec. 30, 2017
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	Jul. 28, 2015	Jul. 27, 2018
☐	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Jul. 29, 2015	Jul. 28, 2018
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☐	Band rejection filter (5150MHz~5880MHz)	micro-tronics	BRM50716	G1868	Jun. 21, 2017	Jun. 20, 2018
☐	Band rejection filter (2400MHz~2500MHz)	micro-tronics	BRM50702	G248	Jun. 15, 2017	Jun. 14, 2018
☒	Highpass Filter (1.2GHz~18GHz)	Micro-Tronics	HPM50108	G552	Jan. 19, 2017	Jan. 19, 2018
☐	Highpass Filter (3GHz~18GHz)	Micro-Tronics	HPM50117	G005	Jan. 30, 2017	Jan. 30, 2018

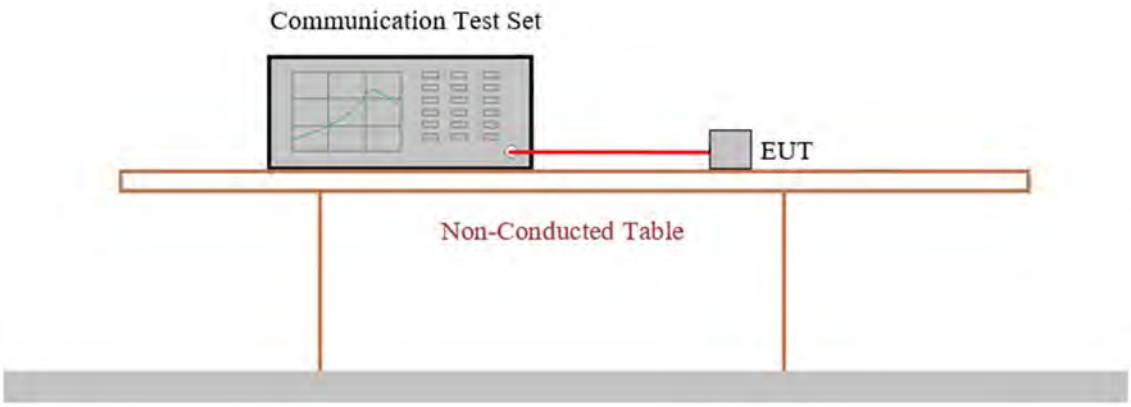
Conducted RF test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☑	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Dec. 22, 2016	Dec. 22, 2017
☐	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Dec. 22, 2016	Dec. 22, 2017
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Dec. 22, 2016	Dec. 22, 2017

☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430023	Dec. 22, 2016	Dec. 22, 2017
☒	DC Source	KIKUSUI	PWR400L	LK003024	09-21-2016	09-20-2017
☒	Temp & Humidity chamber	Ispec	GL(U)04KA(W)	1692H201P3	09-21-2016	09-20-2017
☒	Communication test set	R&S	CMW500	130805	08-10-2016	08-09-2017

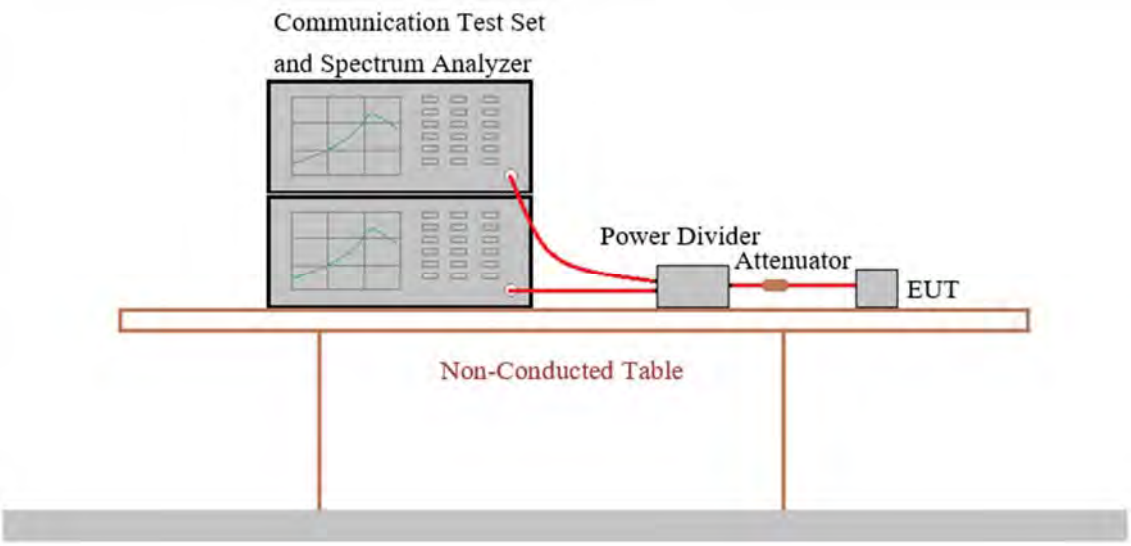
4 Test Requirement

4.1 Test setup

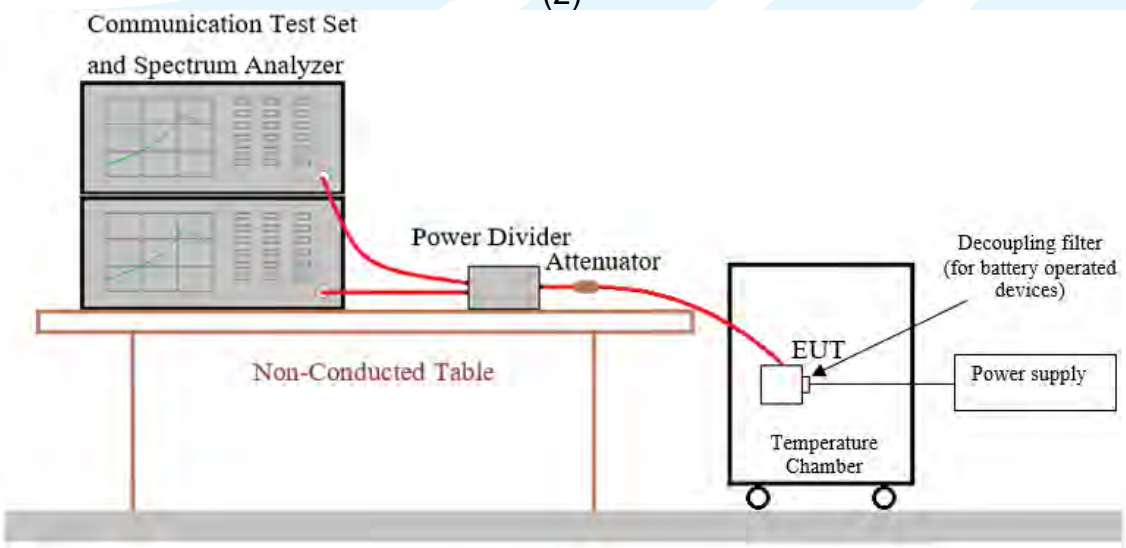
4.1.1 For Conducted test setup



(1)



(2)



(3)

4.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

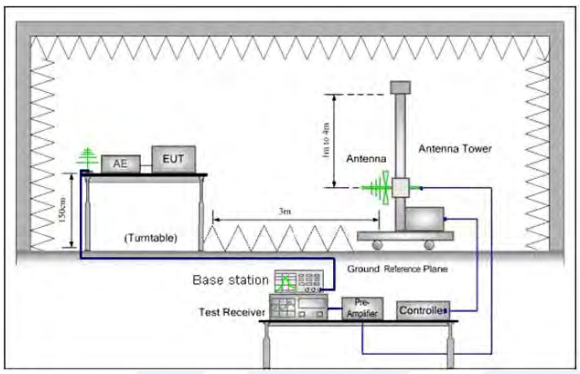


Figure 1. 30MHz to 1GHz

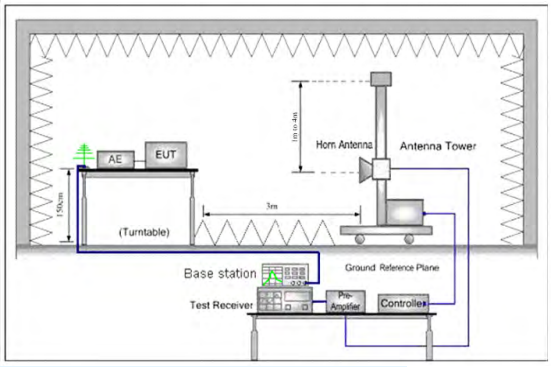


Figure 2. Above 1GHz

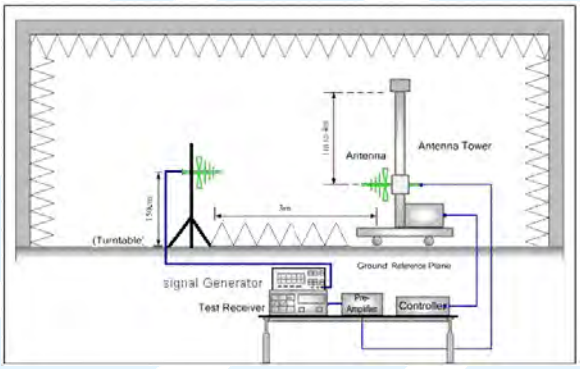


Figure 3. 30MHz to 1GHz

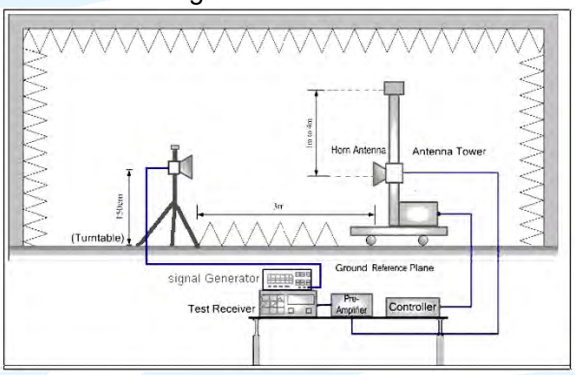


Figure 4. Above 1GHz

4.2 Test Environment

Operating Environment:	
Temperature:	24.3 °C
Humidity:	58 % RH
Atmospheric Pressure:	100.29kpa

4.3 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. It was powered by a 3.85Vdc rechargeable Li-on battery. 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	**Worst-case Orientation**	
	ERP or EIRP	**Radiated Emission**
LTE Band 4	X axis	X axis
LTE Band 7	X axis	X axis
LTE Band 38	X axis	X axis
LTE Band 40	X axis	X 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.

4.4 Test Condition

4.4.1 Test channel

Test Mode	Test Frequency ID	Bandwidth (MHz)	Number [UL]	Frequency of Uplink (MHz)	Number [DL]	Frequency of Downlink (MHz)
LTE band 4 TX:1710-1755MHz RX:2110–255MHz	Low Range	1.4	19957	1710.7	1957	2110.7
		3	19965	1711.5	1965	2111.5
		5	19975	1712.5	1975	2112.5
		10	20000	1715	2000	2115
		15	20025	1717.5	2025	2117.5
		20	20050	1720	2050	2120
	Middle Range	1.4/3/5/10/15/20	20175	1732.5	2175	2132.5
	High Range	1.4	20393	1754.3	2393	2154.3
		3	20385	1753.5	2385	2153.5
		5	20375	1752.5	2375	2152.5
		10	20350	1750	2350	2150
		15	20325	1747.5	2325	2147.5
		20	20300	1745	2300	2145
LTE band 7 TX:2500-2570MHz RX:2620-2690MHz	Low Range	5	20775	2502.5	2775	2622.5
		10	20800	2505	2800	2625
		15	20825	2507.5	2825	2627.5
		20	20850	2510	2850	2630
	Middle Range	5/10/15/20	21100	2535	3100	2655
	High Range	5	21425	2567.5	3425	2652.5
		10	21400	2565	3400	2685
		15	21375	2562.5	3375	2647.5
		20	21350	2560	3350	2645
LTE band 38 TX:2570-2620MHz RX:2570–2620MHz	Low Range	5	3775	2572.5	3775	2572.5
		10	37800	2575.0	37800	2575.0
		15	37825	2577.5	37825	2577.5
		20	37850	2580.0	37850	2580.0
	Middle Range	1.4/3/5/10	38000	2595	38000	2595
	High Range	5	38225	2617.5	38225	2617.5
		10	38200	2615	38200	2615
		15	38175	1612.5	38175	1612.5
		20	38150	1610	38150	1610

4.4.2 Pre-scan

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

LTE Band 4

Channel	RB Configuration		Average Power [dBm]		Channel	RB Configuration		Average Power [dBm]	
	Size	Offset	QPSK	16QAM		Size	Offset	QPSK	16QAM
Channel Bandwidth: 1.4 MHz					**Channel Bandwidth: 3 MHz**				
LCH	1	0	22.66	22.24	LCH	1	0	22.67	22.25
	1	2	22.75	22.28		1	7	22.76	22.29
	1	5	22.76	22.27		1	14	22.77	22.28
	3	0	22.64	22.23		8	0	21.79	20.81
	3	1	22.73	22.27		8	3	21.75	20.75
	3	3	22.74	22.26		8	7	21.80	20.74
	6	0	21.87	20.84		15	0	21.88	20.85
MCH	1	0	22.61	22.27	MCH	1	0	22.62	22.28
	1	2	22.69	22.30		1	7	22.70	22.31
	1	5	22.78	22.29		1	14	22.79	22.30
	3	0	22.59	22.26		8	0	21.81	20.82
	3	1	22.67	22.29		8	3	21.79	20.85
	3	3	22.76	22.28		8	7	21.83	20.84
	6	0	21.89	20.86		15	0	21.90	20.87
HCH	1	0	22.67	22.15	HCH	1	0	22.68	22.16
	1	2	22.71	22.20		1	7	22.72	22.21
	1	5	22.77	22.27		1	14	22.78	22.28
	3	0	22.65	22.14		8	0	21.80	20.81
	3	1	22.69	22.19		8	3	21.78	20.75
	3	3	22.75	22.26		8	7	21.82	20.77
	6	0	21.73	20.77		15	0	21.74	20.78
Channel Bandwidth: 5 MHz					**Channel Bandwidth: 10 MHz**				
LCH	1	0	22.70	22.28	LCH	1	0	22.74	22.32
	1	12	22.79	22.32		1	24	22.83	22.36
	1	24	22.80	22.31		1	49	22.84	22.35
	12	0	21.82	20.84		25	0	21.86	20.88
	12	6	21.78	20.78		25	12	21.82	20.82
	12	13	21.83	20.77		25	25	21.87	20.81
	25	0	21.91	20.88		50	0	21.95	20.92
MCH	1	0	22.65	22.31	MCH	1	0	22.69	22.35
	1	12	22.73	22.34		1	24	22.77	22.38
	1	24	22.82	22.33		1	49	22.86	22.37
	12	0	21.84	20.85		25	0	21.88	20.89
	12	6	21.82	20.88		25	12	21.86	20.92
	12	13	21.86	20.87		25	25	21.90	20.91
	25	0	21.93	20.90		50	0	21.97	20.94
HCH	1	0	22.71	22.19	HCH	1	0	22.75	22.23
	1	12	22.75	22.24		1	24	22.79	22.28
	1	24	22.81	22.31		1	49	22.85	22.35

	12	0	21.83	20.84		25	0	21.87	20.88
	12	6	21.81	20.78		25	12	21.85	20.82
	12	13	21.85	20.80		25	25	21.89	20.84
	25	0	21.77	20.81		50	0	21.81	20.85
Channel Bandwidth: 15 MHz					**Channel Bandwidth: 20 MHz**				
LCH	1	0	22.80	22.38	LCH	1	0	22.83	22.41
	1	37	22.89	22.42		1	50	22.92	22.45
	1	74	22.90	22.41		1	99	22.93	22.44
	37	0	21.92	20.94		50	0	21.95	20.97
	37	19	21.88	20.88		50	25	21.91	20.91
	37	39	21.93	20.87		50	50	21.96	20.90
	75	0	22.01	20.98		100	0	22.04	21.01
MCH	1	0	22.75	22.41	MCH	1	0	22.78	22.44
	1	37	22.83	22.44		1	50	22.86	22.47
	1	74	22.92	22.43		1	99	**22.95**	22.46
	37	0	21.94	20.95		50	0	21.97	20.98
	37	19	21.92	20.98		50	25	21.95	21.01
	37	39	21.96	20.97		50	50	21.99	21.00
	75	0	22.03	21.00		100	0	22.06	21.03
HCH	1	0	22.81	22.29	HCH	1	0	22.84	22.32
	1	37	22.85	22.34		1	50	22.88	22.37
	1	74	22.91	22.41		1	99	22.94	22.44
	37	0	21.93	20.94		50	0	21.96	20.97
	37	19	21.91	20.88		50	25	21.94	20.91
	37	39	21.95	20.90		50	50	21.98	20.93
	75	0	21.87	20.91		100	0	21.90	20.94

LTE Band 7

Channel	RB Configuration		Average Power [dBm]		Channel	RB Configuration		Average Power [dBm]	
	Size	Offset	QPSK	16QAM		Size	Offset	QPSK	16QAM
Channel Bandwidth: 5 MHz					**Channel Bandwidth: 10 MHz**				
LCH	1	0	22.64	22.08	LCH	1	0	22.68	22.12
	1	12	22.76	22.09		1	24	22.80	22.13
	1	24	22.56	21.94		1	49	22.60	21.98
	12	0	21.76	20.72		25	0	21.80	20.76
	12	6	21.77	20.80		25	12	21.81	20.84
	12	13	21.78	20.80		25	25	21.82	20.84
	25	0	21.88	20.88		50	0	21.92	20.92
MCH	1	0	22.53	22.04	MCH	1	0	22.57	22.08
	1	12	22.54	22.13		1	24	22.58	22.17
	1	24	22.42	21.94		1	49	22.46	21.98
	12	0	21.57	20.64		25	0	21.61	20.68
	12	6	21.59	20.62		25	12	21.63	20.66
	12	13	21.67	20.63		25	25	21.71	20.67
	25	0	21.54	20.57		50	0	21.58	20.61
HCH	1	0	22.57	21.81	HCH	1	0	22.61	21.85
	1	12	22.75	21.82		1	24	22.79	21.86
	1	24	22.39	22.00		1	49	22.43	22.04
	12	0	21.59	20.58		25	0	21.63	20.62
	12	6	21.61	20.67		25	12	21.65	20.71
	12	13	21.62	20.57		25	25	21.66	20.61
	25	0	21.57	20.54		50	0	21.61	20.58
Channel Bandwidth: 15 MHz					**Channel Bandwidth: 20 MHz**				
LCH	1	0	22.74	22.18	LCH	1	0	22.77	22.21
	1	37	22.86	22.19		1	50	**22.89**	22.22
	1	74	22.66	22.04		1	99	22.69	22.07
	37	0	21.86	20.82		50	0	21.89	20.85
	37	19	21.87	20.90		50	25	21.90	20.93
	37	39	21.88	20.90		50	50	21.91	20.93
	75	0	21.98	20.98		100	0	22.01	21.01
MCH	1	0	22.63	22.14	MCH	1	0	22.66	22.17
	1	37	22.64	22.23		1	50	22.67	22.26
	1	74	22.52	22.04		1	99	22.55	22.07
	37	0	21.67	20.74		50	0	21.70	20.77
	37	19	21.69	20.72		50	25	21.72	20.75
	37	39	21.77	20.73		50	50	21.80	20.76
	75	0	21.64	20.67		100	0	21.67	20.70
HCH	1	0	22.67	21.91	HCH	1	0	22.70	21.94
	1	37	22.85	21.92		1	50	22.88	21.95
	1	74	22.49	22.10		1	99	22.52	22.13
	37	0	21.69	20.68		50	0	21.72	20.71
	37	19	21.71	20.77		50	25	21.74	20.80
	37	39	21.72	20.67		50	50	21.75	20.70
	75	0	21.67	20.64		100	0	21.70	20.67

LTE Band 38

Channel	RB Configuration		Average Power [dBm]		Channel	RB Configuration		Average Power [dBm]	
	Size	Offset	QPSK	16QAM		Size	Offset	QPSK	16QAM
Channel Bandwidth: 5 MHz					**Channel Bandwidth: 10 MHz**				
LCH	1	0	22.50	21.21	LCH	1	0	22.54	21.25
	1	12	22.57	21.40		1	24	22.61	21.44
	1	24	22.65	21.53		1	49	22.69	21.57
	12	0	21.59	20.65		25	0	21.63	20.69
	12	6	21.67	20.69		25	12	21.71	20.73
	12	13	21.70	20.71		25	25	21.74	20.75
	25	0	21.73	20.69		50	0	21.77	20.73
MCH	1	0	22.16	21.20	MCH	1	0	22.20	21.24
	1	12	22.29	21.42		1	24	22.33	21.46
	1	24	22.48	21.41		1	49	22.52	21.45
	12	0	21.46	20.38		25	0	21.50	20.42
	12	6	21.59	20.34		25	12	21.63	20.38
	12	13	21.69	20.49		25	25	21.73	20.53
	25	0	21.72	20.67		50	0	21.76	20.71
HCH	1	0	22.56	21.60	HCH	1	0	22.60	21.64
	1	12	22.59	21.74		1	24	22.63	21.78
	1	24	22.61	21.52		1	49	22.65	21.56
	12	0	21.51	20.51		25	0	21.55	20.55
	12	6	21.27	20.49		25	12	21.31	20.53
	12	13	21.55	20.50		25	25	21.59	20.54
	25	0	21.54	20.51		50	0	21.58	20.55
Channel Bandwidth: 15 MHz					**Channel Bandwidth: 20 MHz**				
LCH	1	0	22.57	21.28	LCH	1	0	22.64	21.35
	1	37	22.64	21.47		1	50	22.71	21.54
	1	74	22.72	21.60		1	99	**22.79**	21.67
	37	0	21.66	20.72		50	0	21.73	20.79
	37	19	21.74	20.76		50	25	21.81	20.83
	37	39	21.77	20.78		50	50	21.84	20.85
	75	0	21.80	20.76		100	0	21.87	20.83
MCH	1	0	22.23	21.27	MCH	1	0	22.30	21.34
	1	37	22.36	21.49		1	50	22.43	21.56
	1	74	22.55	21.48		1	99	22.62	21.55
	37	0	21.53	20.45		50	0	21.60	20.52
	37	19	21.66	20.41		50	25	21.73	20.48
	37	39	21.76	20.56		50	50	21.83	20.63
	75	0	21.79	20.74		100	0	21.86	20.81
HCH	1	0	22.63	21.67	HCH	1	0	22.70	21.74
	1	37	22.66	21.81		1	50	22.73	21.88
	1	74	22.68	21.59		1	99	22.75	21.66
	37	0	21.58	20.58		50	0	21.65	20.65
	37	19	21.34	20.56		50	25	21.41	20.63
	37	39	21.62	20.57		50	50	21.69	20.64
	75	0	21.61	20.58		100	0	21.68	20.65

4.4.3 Test mode

Pre-scan all mode and data rates and positions, find worse case mode are chosen to the report, the worse mode applicability and tested channel detail as below:

Item	band	Bandwidth(MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
EIRP	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	7	-	-	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	38	-	-	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
Conducted output power	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
	7	-	-	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
	38	-	-	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
99%&26dB Occupied Bandwidth	4	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
	7	-	-	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
	38	-	-	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
peak-to-average ratio	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☒	☒
	7	-	-	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☒	☒
	38	-	-	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☒	☒
Band Edge at antenna terminals	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
	7	-	-	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
	38	-	-	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
Spurious emissions at antenna terminals	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	7	-	-	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	38	-	-	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
Field strength of spurious radiation	4	☒	☒	☒	☒	☒	☒	☒	☐	☒	☐	☐	☐	☒	☐
	7	-	-	☒	☒	☒	☒	☒	☐	☒	☐	☐	☐	☒	☐
	38	-	-	☒	☒	☒	☒	☒	☐	☒	☐	☐	☐	☒	☐
Frequency stability	4	☒	☒	☒	☒	☒	☒	☒	☐	☐	☐	☒	☐	☒	☐
	7	-	-	☒	☒	☒	☒	☒	☐	☐	☐	☒	☐	☒	☐
	38	-	-	☒	☒	☒	☒	☒	☐	☐	☐	☒	☐	☒	☐

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

Reference documents for testing:

No.	Identity	Document Title
1	FCC 47 CFR Part 27	Miscellaneous Wireless Communications Services
2	FCC 47 CFR Part 2 Subpart J	Frequency allocations and radio treaty matters; general rules and regulations
3	ANSI/TIA/EIA-603-D 2010	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
4	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v02r02

5.1 Radiated Power (ERP & EIRP)

Test Requirement: FCC 47 CFR Part 2.1046(a)
LTE Band 4: FCC 47 CFR Part 27.50(d)(4)
LTE Band 7 & Band 41: FCC 47 CFR Part 27.50(h)(2)

Test Method: KDB 971168 D01v02r02 & ANSI/TIA/EIA-603-D 2010

Limit: **FCC 47 CFR Part 27.50(a)(3):** For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

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(h)(2): Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

Test Procedure: Test procedure as below:

1) The EUT was powered ON and placed on a 1.5m high table at a 3 meter fully Anechoic Chamber. The antenna of the transmitter was extended to its maximum length. Modulation mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.
2) The EUT was set 3 meters (above 18GHz the distance is 1 meter) away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
4) Steps 1) to 3) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
5) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.
6) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the

receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 3) is obtained for this set of conditions.

7) The output power into the substitution antenna was then measured.
8) Steps 6) and 7) were repeated with both antennas polarized.
9) Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)
EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)
EIRP=ERP+2.15dB

where:
Pg is the generator output power into the substitution antenna.

10) Test the EUT in the lowest channel, the middle channel the Highest channel
11) The radiation measurements are performed in X, Y, Z axis positioning for EUT operation mode, and found the X axis positioning which it is worse case.
12) Repeat above procedures until all frequencies measured was complete.

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Peak	100kHz	300kHz	Peak
Above 1GHz	Peak	1MHz	3MHz	Peak

Test Setup: Refer to section 4.1.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data:

LTE Band 4

Channel	Frequency (MHz)	EIRP (dBm)		Limit (dBm)	Result	Antenna Polaxis.
		QPSK; RB:1	16QAM; RB:1			
LTE Band 4; Bandwidth 1.4MHz						
19957	1710.7	19.32	18.56	30.00	Pass	H
		13.21	11.29	30.00	Pass	V
20175	1732.5	18.89	16.88	30.00	Pass	H
		12.79	11.43	30.00	Pass	V
20393	1754.3	19.22	18.36	30.00	Pass	H
		12.54	10.87	30.00	Pass	V
LTE Band 4; Bandwidth 3MHz						
19965	1711.5	18.43	17.66	30.00	Pass	H
		12.29	11.07	30.00	Pass	V
20175	1732.5	17.92	17.32	30.00	Pass	H
		12.67	11.18	30.00	Pass	V
20385	1753.5	18.88	17.92	30.00	Pass	H
		13.06	12.15	30.00	Pass	V
LTE Band 4; Bandwidth 5MHz						
19975	1712.5	20.13	19.08	30.00	Pass	H
		13.32	12.18	30.00	Pass	V
20175	1732.5	19.45	18.05	30.00	Pass	H
		12.22	11.3	30.00	Pass	V
20375	1752.5	20.11	19.22	30.00	Pass	H
		13.44	12.32	30.00	Pass	V
LTE Band 4; Bandwidth 10MHz						
20000	1715	18.87	17.92	30.00	Pass	H
		11.43	10.67	30.00	Pass	V
20175	1732.5	19.03	18.17	30.00	Pass	H
		12.34	11.31	30.00	Pass	V
20350	1750	19.14	18.33	30.00	Pass	H
		13.22	12.54	30.00	Pass	V
LTE Band 4; Bandwidth 15MHz						
20025	1717.5	18.45	17.91	30.00	Pass	H
		12.80	11.77	30.00	Pass	V
20175	1732.5	18.54	17.68	30.00	Pass	H
		12.55	11.92	30.00	Pass	V
20325	1747.5	18.57	17.44	30.00	Pass	H
		13.02	11.83	30.00	Pass	V
LTE Band 4; Bandwidth 20MHz						
20050	1720	19.12	17.98	30.00	Pass	H
		13.76	12.55	30.00	Pass	V
20175	1732.5	18.88	17.34	30.00	Pass	H
		12.97	11.48	30.00	Pass	V
20300	1745	18.87	17.39	30.00	Pass	H
		12.66	11.45	30.00	Pass	V

LTE Band 7

Channel	Frequency (MHz)	EIRP (dBm)		Limit (dBm)	Result	Antenna Polaxis.
		QPSK; RB:1	16QAM; RB:1			
LTE Band 7; Bandwidth 5MHz						
20775	2502.5	18.45	17.32	33.01	Pass	H
		12.89	10.32	33.01	Pass	V
21100	2535	18.65	17.73	33.01	Pass	H
		11.77	11.04	33.01	Pass	V
21425	2567.5	19.02	17.97	33.01	Pass	H
		13.44	12.24	33.01	Pass	V
LTE Band 7; Bandwidth 10MHz						
20800	2505	18.65	17.32	33.01	Pass	H
		12.56	11.45	33.01	Pass	V
21100	2535	19.01	18.55	33.01	Pass	H
		13.73	12.47	33.01	Pass	V
21400	2565	18.88	17.95	33.01	Pass	H
		12.72	11.05	33.01	Pass	V
LTE Band 7; Bandwidth 15MHz						
20825	2507.5	19.32	18.32	33.01	Pass	H
		14.30	12.68	33.01	Pass	V
21100	2535	18.89	17.79	33.01	Pass	H
		13.19	11.77	33.01	Pass	V
21375	2562.5	18.92	18.06	33.01	Pass	H
		13.78	12.04	33.01	Pass	V
LTE Band 7; Bandwidth 20MHz						
20850	2510	19.12	18.76	33.01	Pass	H
		13.56	12.28	33.01	Pass	V
21100	2535	19.01	18.57	33.01	Pass	H
		13.55	12.23	33.01	Pass	V
21350	2560	18.90	17.43	33.01	Pass	H
		13.26	11.87	33.01	Pass	V

LTE Band 38

Channel	Frequency (MHz)	EIRP (dBm)		Limit (dBm)	Result	Antenna Polaxis.
		QPSK; RB:1	16QAM; RB:1			
LTE Band 38; Bandwidth 5MHz						
37775	2572.5	18.89	18.02	33.01	Pass	H
		13.54	12.28	33.01	Pass	V
38000	2595	19.22	18.43	33.01	Pass	H
		13.37	12.09	33.01	Pass	V
38225	2617.5	18.99	17.87	33.01	Pass	H
		12.79	11.42	33.01	Pass	V
LTE Band 38; Bandwidth 10MHz						
37800	2575	19.21	18.69	33.01	Pass	H
		13.55	12.61	33.01	Pass	V
38000	2595	18.94	17.93	33.01	Pass	H
		12.66	11.74	33.01	Pass	V
38200	2615	18.77	17.85	33.01	Pass	H
		13.34	12.46	33.01	Pass	V
LTE Band 38; Bandwidth 15MHz						
37825	2577.5	19.02	18.33	33.01	Pass	H
		13.43	12.79	33.01	Pass	V
38000	2595	18.87	17.39	33.01	Pass	H
		13.17	12.89	33.01	Pass	V
38175	2612.5	18.88	17.69	33.01	Pass	H
		13.65	12.19	33.01	Pass	V
LTE Band 38; Bandwidth 20MHz						
37850	2580	19.15	18.79	33.01	Pass	H
		14.02	12.43	33.01	Pass	V
38000	2595	19.04	18.16	33.01	Pass	H
		13.44	11.97	33.01	Pass	V
38150	2610	18.92	17.86	33.01	Pass	H
		13.27	11.48	33.01	Pass	V

5.2 Conducted Output Power

Test Requirement:	FCC 47 CFR Part 2.1046(a) **LTE Band 4:** FCC 47 CFR Part 27.50(d)(4) **LTE Band 7 & Band 38:** FCC 47 CFR Part 27.50(h)(2)
Test Method:	KDB 971168 D01v02r02 & ANSI/TIA/EIA-603-D 2010
Limit:	**FCC 47 CFR Part 27.50(a)(3):** For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off. **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(h)(2):** Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.
Test Procedure:	The EUT was set up for the maximum power with WCDMA, CDMA, and 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 4.1.1(1) for details.
Instruments Used:	Refer to section 3 for details
Test Mode:	Link mode
Test Results:	Pass
Test Data:	The full result can be also refer to section 4.4.2 for details.

LTE Band 4

Channel	RB Configuration		Average Power [dBm]		Channel	RB Configuration		Average Power [dBm]	
	Size	Offset	QPSK	16QAM		Size	Offset	QPSK	16QAM
Channel Bandwidth: 1.4 MHz					**Channel Bandwidth: 3 MHz**				
LCH	1	2	22.75	22.28	LCH	1	7	22.76	22.29
MCH	1	5	22.78	22.29	MCH	1	14	22.79	22.30
HCH	1	2	22.77	22.27	HCH	1	7	22.78	22.28
Channel Bandwidth: 5 MHz					**Channel Bandwidth: 10 MHz**				
LCH	1	24	22.80	22.31	LCH	1	49	22.84	22.35
MCH	1	24	22.82	22.34	MCH	1	49	22.86	22.38
HCH	1	24	22.81	22.31	HCH	1	49	22.85	22.35
Channel Bandwidth: 15 MHz					**Channel Bandwidth: 20 MHz**				
LCH	1	74	22.90	22.41	LCH	1	99	22.93	22.44
MCH	1	74	22.92	22.43	MCH	1	99	22.95	22.46
HCH	1	74	22.91	22.41	HCH	1	99	22.94	22.44

LTE Band 7

Channel	RB Configuration		Average Power [dBm]		Channel	RB Configuration		Average Power [dBm]	
	Size	Offset	QPSK	16QAM		Size	Offset	QPSK	16QAM
Channel Bandwidth: 5 MHz					**Channel Bandwidth: 10 MHz**				
LCH	1	12	22.76	22.09	LCH	1	24	22.80	22.13
MCH	1	12	22.54	22.13	MCH	1	24	22.58	22.17
HCH	1	12	22.75	21.82	HCH	1	24	22.79	22.04
Channel Bandwidth: 15 MHz					**Channel Bandwidth: 20 MHz**				
LCH	1	37	22.86	22.19	LCH	1	50	22.89	22.22
MCH	1	37	22.64	22.23	MCH	1	50	22.67	22.26
HCH	1	37	22.85	21.92	HCH	1	50	22.88	21.95

LTE Band 38

Channel	RB Configuration		Average Power [dBm]		Channel	RB Configuration		Average Power [dBm]	
	Size	Offset	QPSK	16QAM		Size	Offset	QPSK	16QAM
Channel Bandwidth: 5 MHz					**Channel Bandwidth: 10 MHz**				
LCH	1	24	22.65	21.53	LCH	1	49	22.69	21.57
MCH	1	24	22.48	21.41	MCH	1	49	22.52	21.45
HCH	1	24	22.61	21.52	HCH	1	49	22.65	21.56
Channel Bandwidth: 15 MHz					**Channel Bandwidth: 20 MHz**				
LCH	1	74	22.72	21.60	LCH	1	99	22.79	21.67
MCH	1	74	22.55	21.48	MCH	1	99	22.62	21.55
HCH	1	74	22.68	21.59	HCH	1	99	22.75	21.66

5.3 Peak-to-average ratio

Test Requirement: FCC 47 CFR Part 27.50(d)(5)

Test Method: KDB 971168 D01v02r02

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 4.1.1(1) for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: The full result can be also refer to section 4.4.2 for details.

LTE Band 4

Channel	RB Configuration		Modulation	
	Size	Offset	QPSK	16QAM
LTE Band 4_ Channel Bandwidth: 20 MHz				
LCH	1	0	4.32	4.96
	100	0	4.64	5.62
MCH	1	0	4.35	5.28
	100	0	4.90	5.80
HCH	1	0	4.52	5.33
	100	0	4.81	5.77

The test plot as follows:

LTE Band 4_RB:1	
QPSK	**16QAM**
LCH	
MCH	
HCH	

LTE Band 4_RB:100	
QPSK	**16QAM**
LCH	
MCH	
HCH	

LTE Band 7

Channel	RB Configuration		Modulation	
	Size	Offset	QPSK	16QAM
LTE Band 7_ Channel Bandwidth: 20 MHz				
LCH	1	0	3.16	3.97
	100	0	4.49	5.45
MCH	1	0	3.22	3.88
	100	0	4.72	5.62
HCH	1	0	3.19	4.09
	100	0	4.52	5.36

The test plot as follows:

LTE Band 7_RB:1

QPSK	16QAM
LCH	
MCH	

HCH

LTE Band 7_RB:100

QPSK	**16QAM**

LCH

MCH

HCH

Spectrum
Ref Level 30.00 dBm Offset 12.00 dB RBW 20 MHz
Att 30 dB AQT 1.6 ms Input 1 AC
SGL
1Sa Clrw
CF 2.56 GHz
Mean Pwr + 20.00 dB
Complementary Cumulative Distribution Function
Samples: 100000
Mean Peak Crest 10% 1% 0.1% 0.01%
Trace 1 23.07 dBm 28.13 dBm 5.06 dB 2.41 dB 3.91 dB 4.52 dB 4.87 dB
Ready
Date: 11.JUL.2017 14:23:22

Spectrum
Ref Level 30.00 dBm Offset 12.00 dB RBW 20 MHz
Att 30 dB AQT 1.6 ms Input 1 AC
SGL
1Sa Clrw
CF 2.56 GHz
Mean Pwr + 20.00 dB
Complementary Cumulative Distribution Function
Samples: 100000
Mean Peak Crest 10% 1% 0.1% 0.01%
Trace 1 22.18 dBm 28.22 dBm 6.04 dB 3.01 dB 4.70 dB 5.36 dB 5.77 dB
Ready
Date: 11.JUL.2017 14:24:07

LTE Band 38

Channel	RB Configuration		Modulation	
	Size	Offset	QPSK	16QAM
LTE Band 38_ Channel Bandwidth: 20 MHz				
LCH	1	0	4.46	5.13
	100	0	4.61	5.57
MCH	1	0	4.20	5.28
	100	0	4.67	6.57
HCH	1	0	4.78	5.10
	100	0	4.93	5.88

The test plot as follows:

LTE Band 38_RB:1	
QPSK	**16QAM**
LCH	
MCH	
HCH	

LTE Band 38_RB:100	
QPSK	**16QAM**
LCH	
MCH	
HCH	

5.4 99%&26dB Occupied Bandwidth

Test Requirement: FCC 47 CFR Part 2.1049(h)

Test Method: ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02

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 4.1.1(2) for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

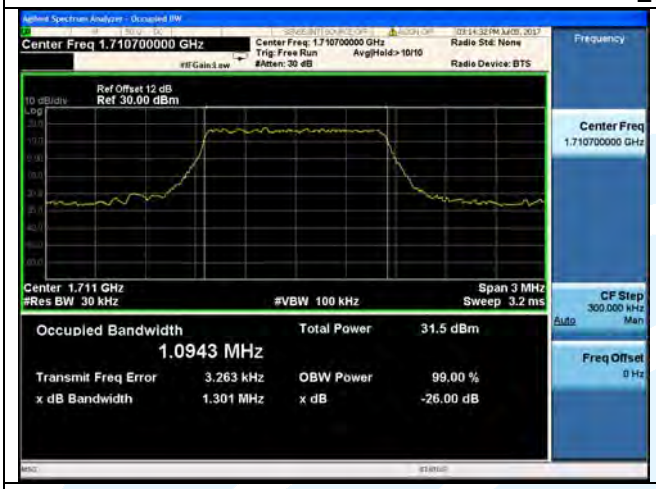
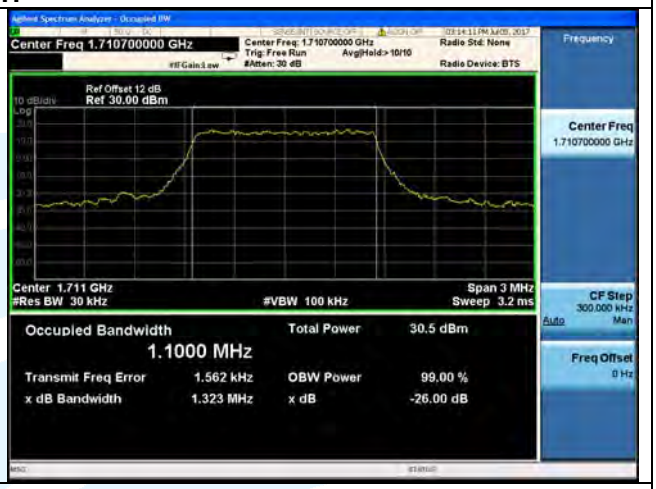
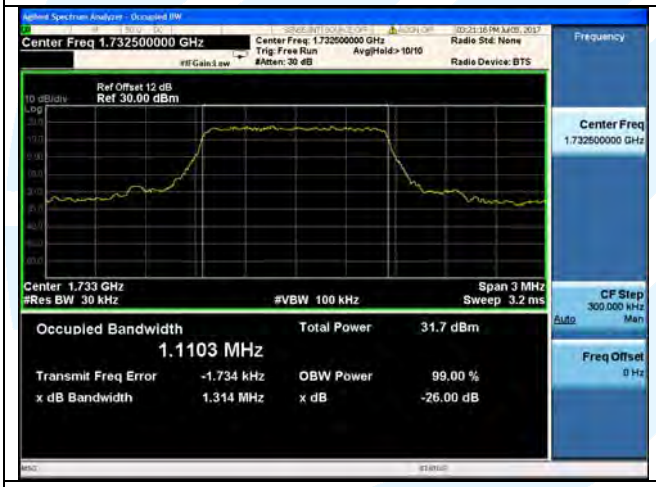
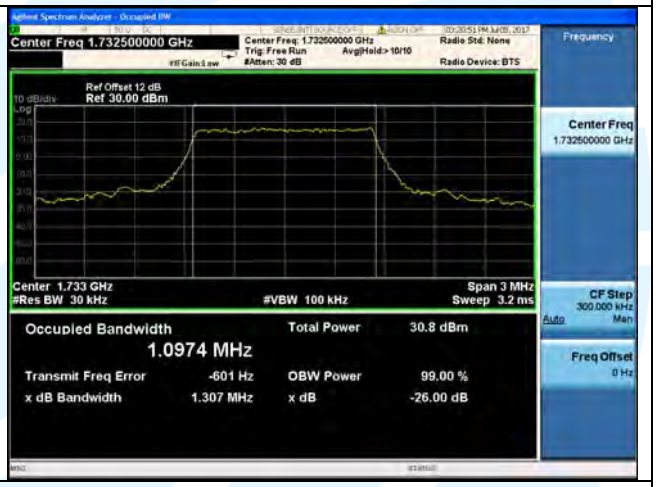
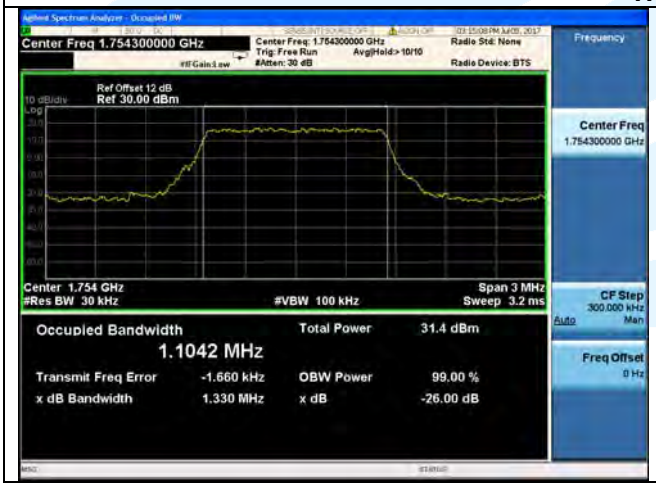
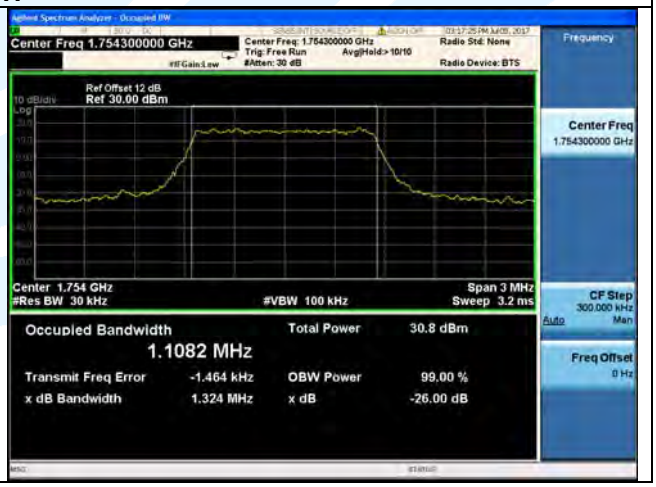
Test Results: Pass

Test Data:

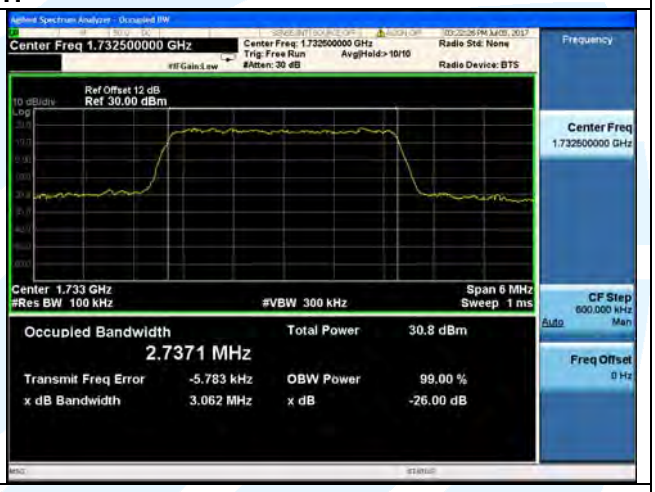
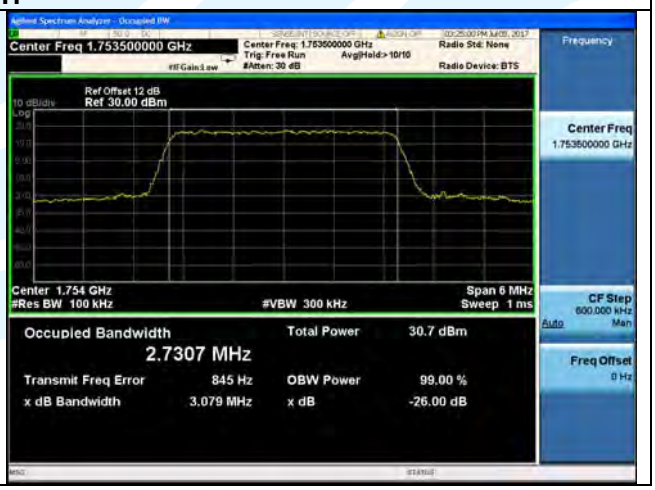
LTE Band 4

For LTE Band 4						
Channel	RB Configuration		26 dB BW (MHz)		99% BW (MHz)	
	Size	Offset	QPSK	16QAM	QPSK	16QAM
Channel Bandwidth: 1.4 MHz						
LCH	6	0	1.301	1.323	1.094	1.100
MCH	6	0	1.314	1.110	1.307	1.097
HCH	6	0	1.330	1.104	1.324	1.108
Channel Bandwidth: 3 MHz						
LCH	15	0	3.067	3.064	2.748	2.738
MCH	15	0	3.070	3.062	2.746	2.737
HCH	15	0	3.066	3.079	2.739	2.731
Channel Bandwidth: 5 MHz						
LCH	25	0	4.987	5.023	4.514	4.516
MCH	25	0	5.012	4.986	4.524	4.508
HCH	25	0	5.056	4.996	4.520	4.525
Channel Bandwidth: 10 MHz						
LCH	50	0	9.937	9.881	8.986	8.969
MCH	50	0	9.944	9.007	9.007	9.018
HCH	50	0	9.960	9.881	9.003	9.016
Channel Bandwidth: 15 MHz						
LCH	75	0	14.650	14.700	13.440	13.430
MCH	75	0	14.690	14.710	13.458	13.479
HCH	75	0	14.800	14.740	13.504	13.476
Channel Bandwidth: 20 MHz						
LCH	100	0	19.500	19.560	17.964	17.925
MCH	100	0	19.520	19.590	17.988	17.996
HCH	100	0	19.550	19.610	17.973	17.987

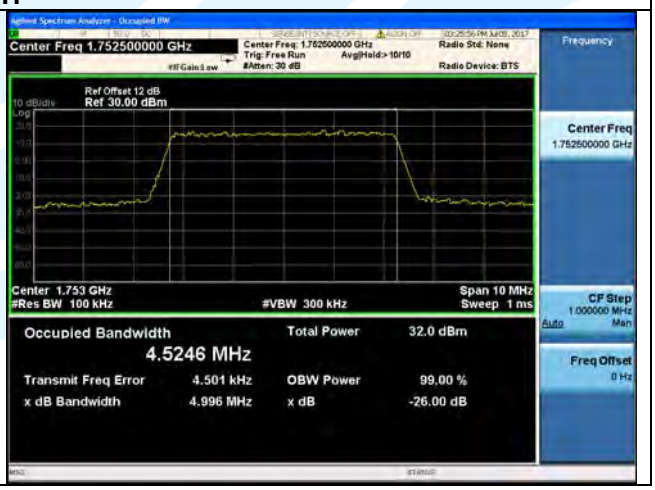
The test plot as follows:

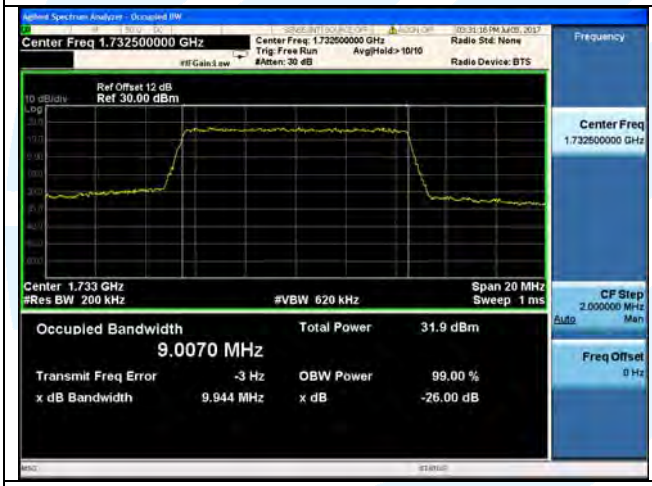
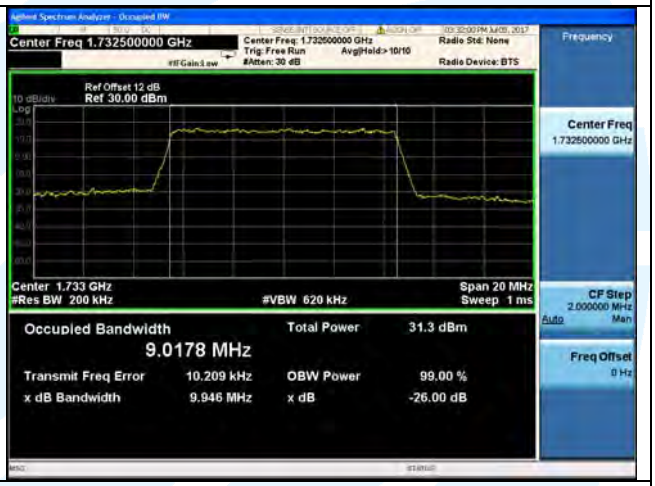
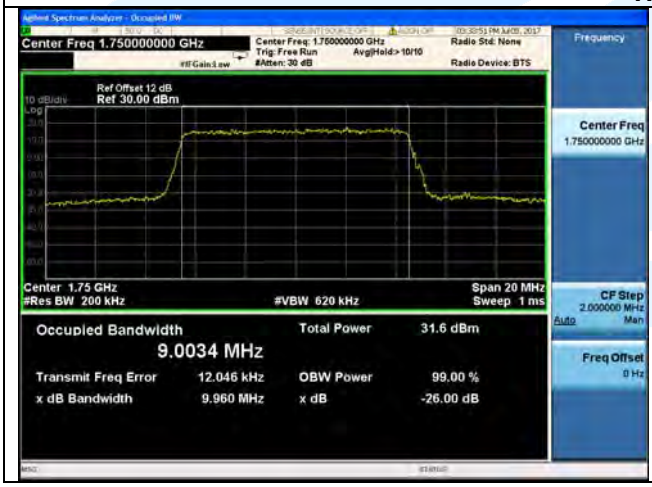
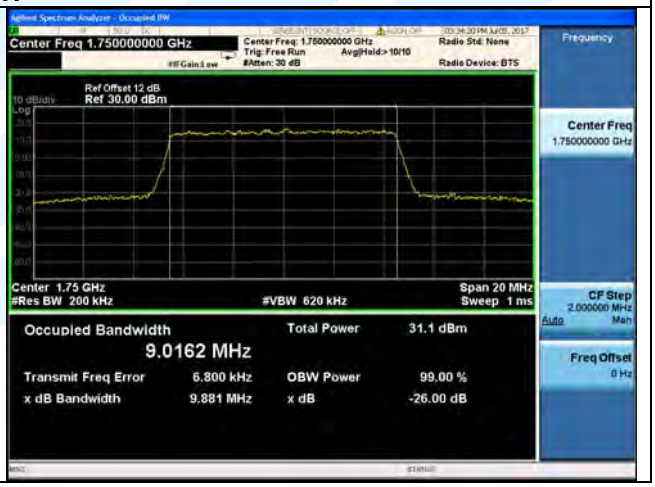
LTE Band 4 _Channel Bandwidth: 1.4 MHz_6RB#0	
QPSK	**16QAM**
LCH	
	
MCH	
	
HCH	
	

LTE Band 4 _ Channel Bandwidth: 3 MHz_15RB#0

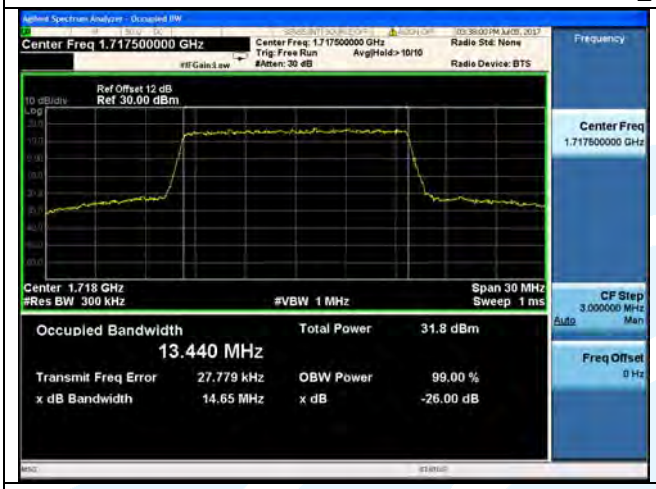
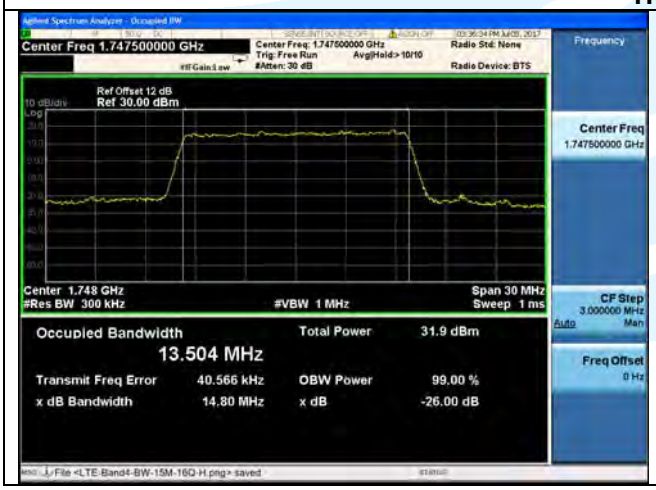
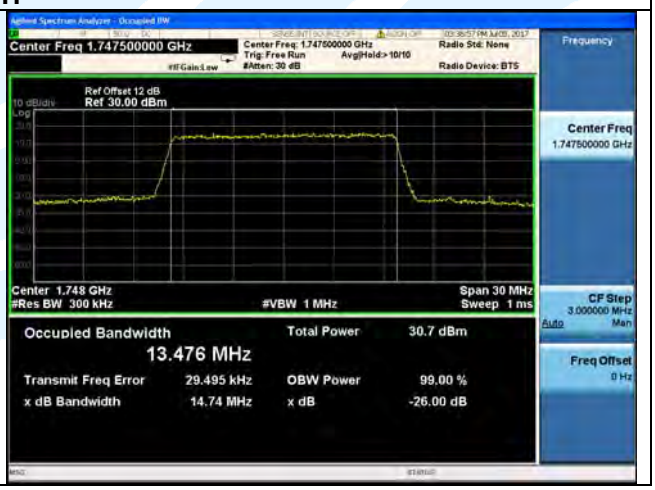
QPSK	16QAM
LCH	
MCH	
	
HCH	
	

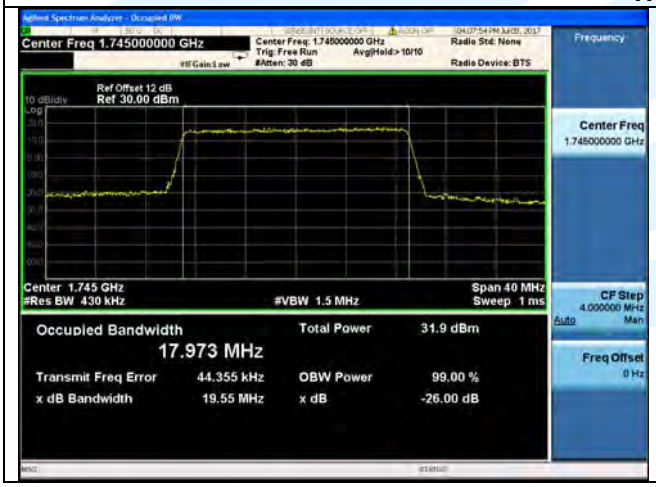
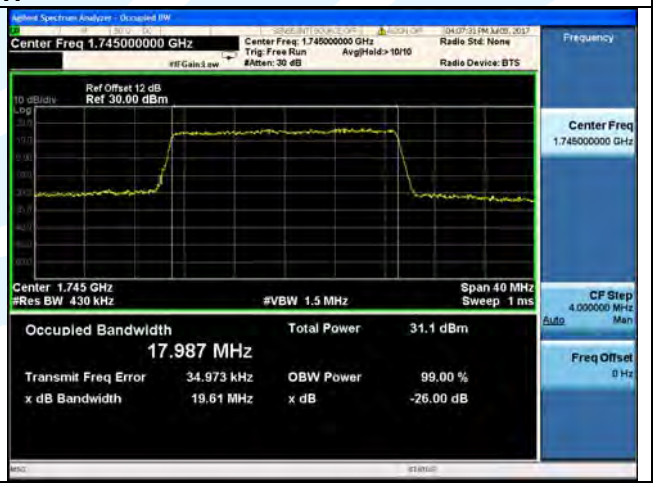
LTE Band 4 _ Channel Bandwidth: 5 MHz _25RB#0

QPSK	16QAM
LCH	
MCH	
HCH	
	

LTE Band 4 _ Channel Bandwidth: 10 MHz _50RB#0	
QPSK	**16QAM**
LCH	
MCH	
	
HCH	
	

LTE Band 4 _ Channel Bandwidth: 15 MHz_75RB#0

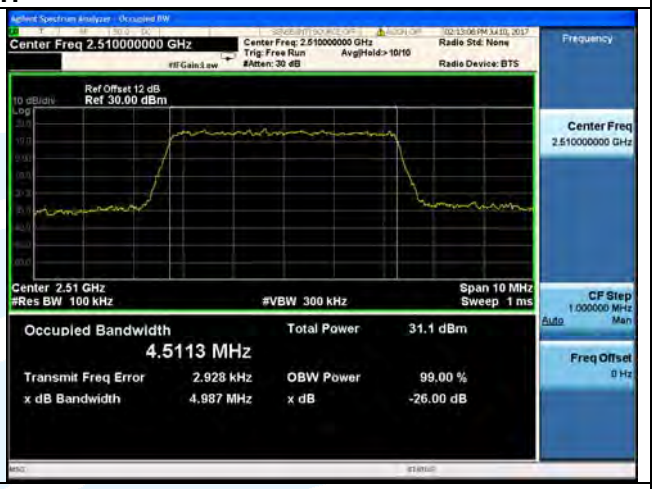
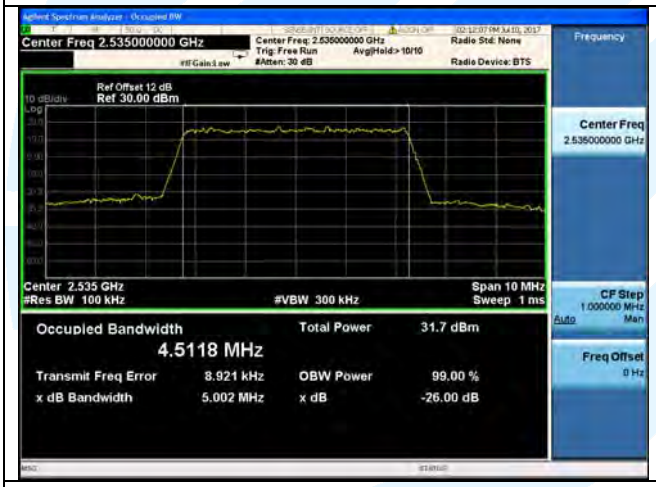
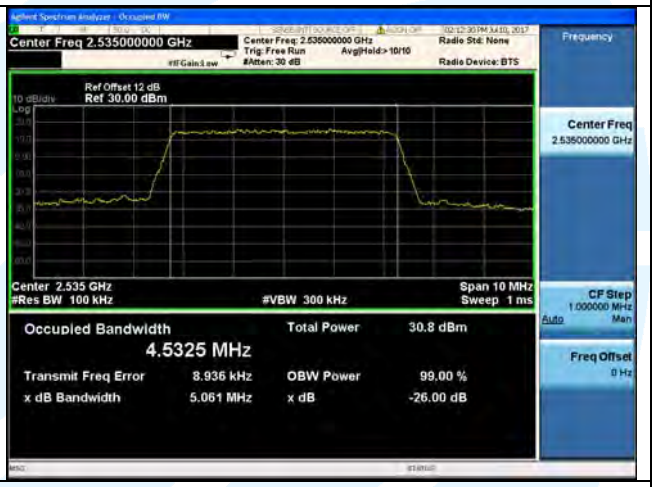
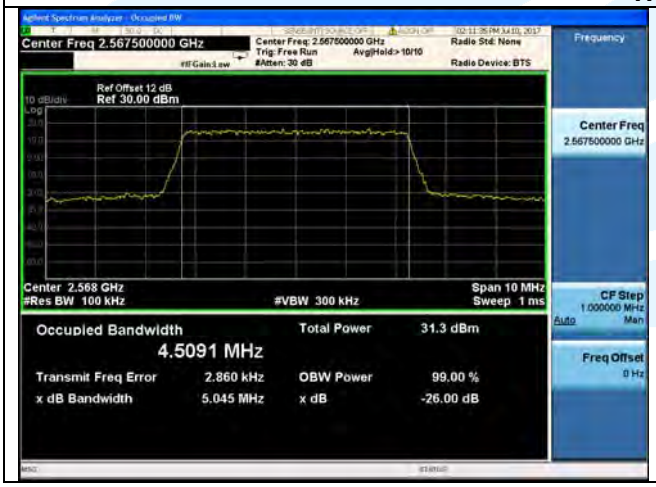
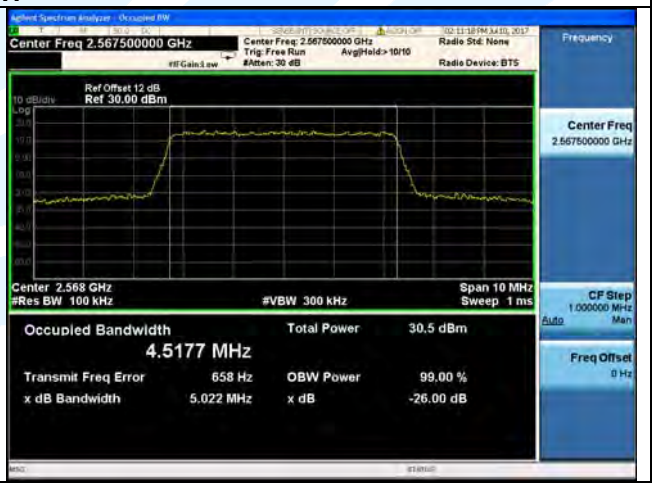
QPSK	16QAM
LCH	
	
MCH	
HCH	
	

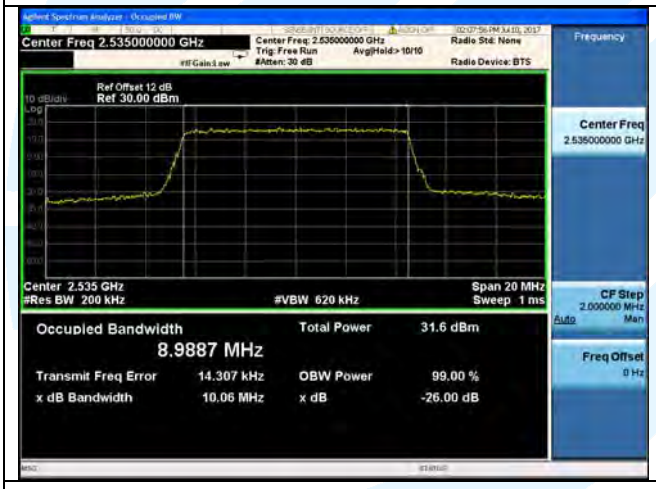
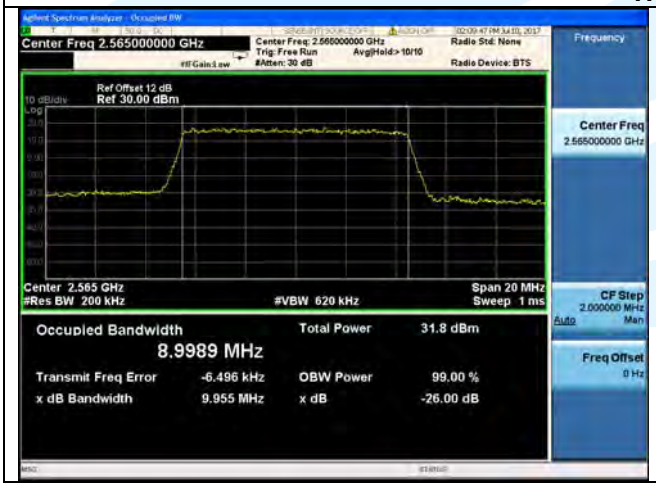
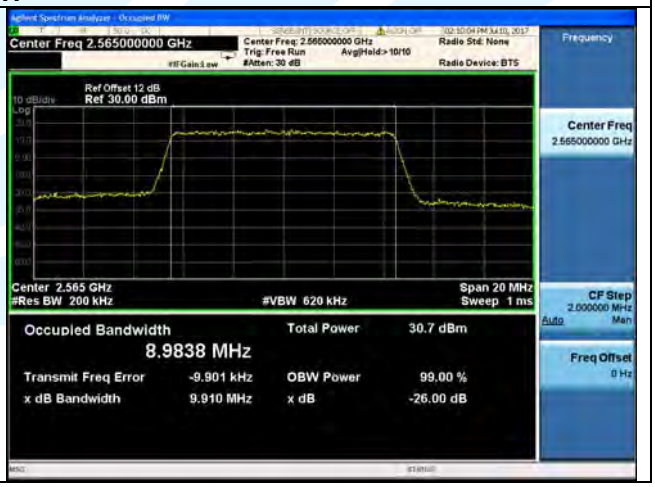
LTE Band 4 _ Channel Bandwidth: 20 MHz _100RB#0	
QPSK	**16QAM**
LCH	
MCH	
HCH	
	

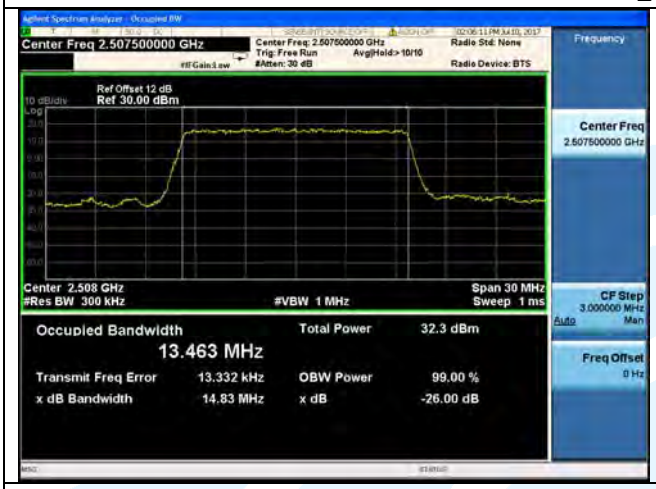
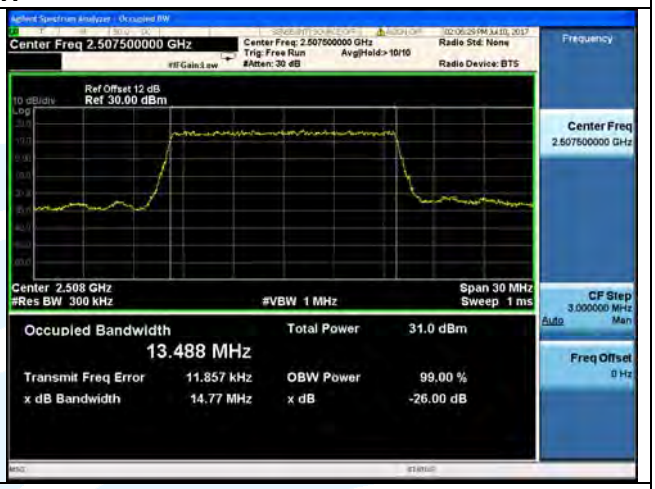
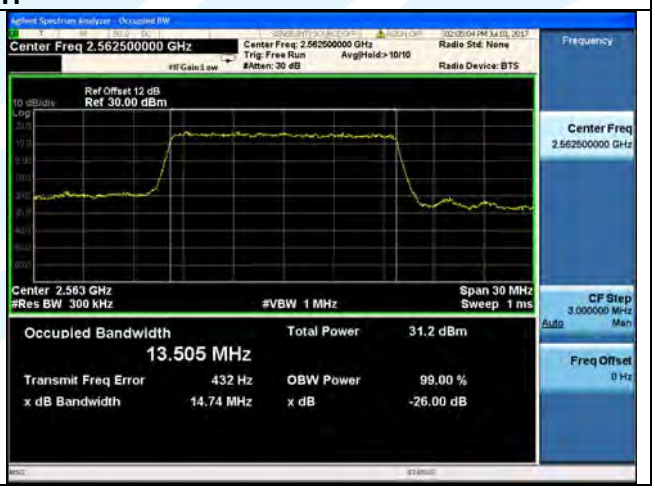
LTE Band 7

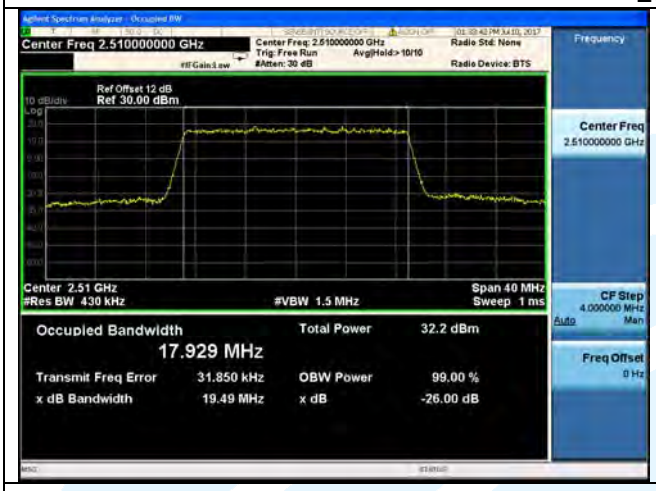
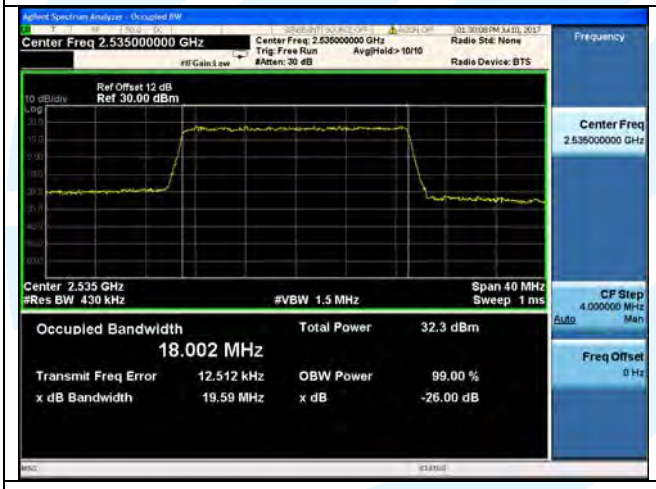
For LTE Band 7						
Channel	RB Configuration		26 dB BW (MHz)		99% BW (MHz)	
	Size	Offset	QPSK	16QAM	QPSK	16QAM
Channel Bandwidth: 5 MHz						
LCH	25	0	5.007	4.987	4.531	4.511
MCH	25	0	5.002	5.061	4.512	4.533
HCH	25	0	5.045	5.022	4.509	4.518
Channel Bandwidth: 10 MHz						
LCH	50	0	9.848	9.967	8.975	8.988
MCH	50	0	10.060	9.877	8.989	8.998
HCH	50	0	9.955	9.910	8.999	8.984
Channel Bandwidth: 15 MHz						
LCH	75	0	14.830	14.770	13.463	13.488
MCH	75	0	14.840	14.740	13.498	13.494
HCH	75	0	14.740	14.740	13.462	13.505
Channel Bandwidth: 20 MHz						
LCH	100	0	19.490	19.490	17.929	17.952
MCH	100	0	19.590	19.700	18.002	18.041
HCH	100	0	19.630	19.620	18.019	17.986

The test plot as follows:

LTE Band 7 _ Channel Bandwidth: 5 MHz_25RB#0	
QPSK	**16QAM**
LCH	
	
MCH	
	
HCH	
	

LTE Band 7 _ Channel Bandwidth: 10 MHz_50RB#0	
QPSK	**16QAM**
LCH	
MCH	
	
HCH	
	

LTE Band 7 _ Channel Bandwidth: 15 MHz_75RB#0	
QPSK	**16QAM**
LCH	
	
MCH	
HCH	
	

LTE Band 7 _ Channel Bandwidth: 20 MHz_100RB#0	
QPSK	**16QAM**
LCH	
	
MCH	
	
HCH	

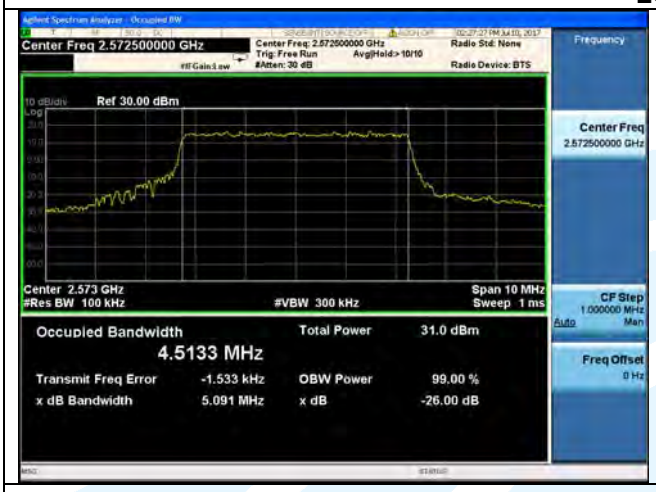
LTE Band 38

For LTE Band 38						
Channel	RB Configuration		26 dB BW (MHz)		99% BW (MHz)	
	Size	Offset	QPSK	16QAM	QPSK	16QAM
Channel Bandwidth: 5 MHz						
LCH	25	0	5.091	4.970	4.513	4.499
MCH	25	0	5.004	5.001	4.507	4.508
HCH	25	0	5.082	5.009	4.505	4.513
Channel Bandwidth: 10 MHz						
LCH	50	0	9.883	9.804	8.974	8.957
MCH	50	0	9.775	9.762	8.992	8.971
HCH	50	0	9.948	9.845	8.995	9.005
Channel Bandwidth: 15 MHz						
LCH	75	0	14.680	15.400	13.461	13.521
MCH	75	0	15.800	15.420	13.504	13.493
HCH	75	0	15.480	14.970	13.458	13.503
Channel Bandwidth: 20 MHz						
LCH	100	0	20.62	20.29	18.003	17.946
MCH	100	0	20.260	21.390	17.964	18.004
HCH	100	0	19.920	19.720	18.008	17.966

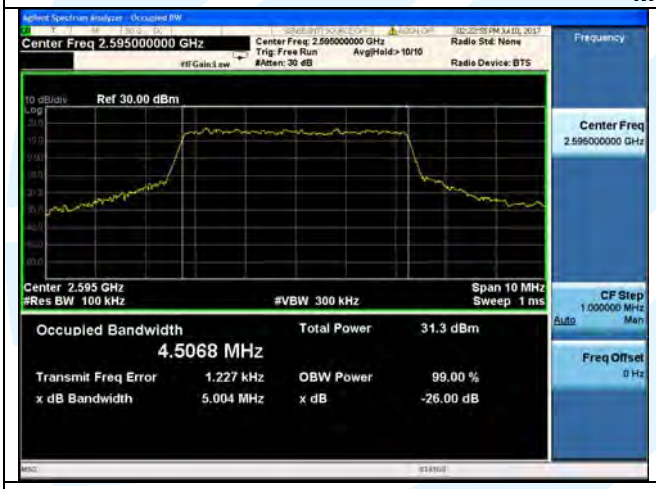
LTE Band 38_ Channel Bandwidth: 5 MHz_25RB#0

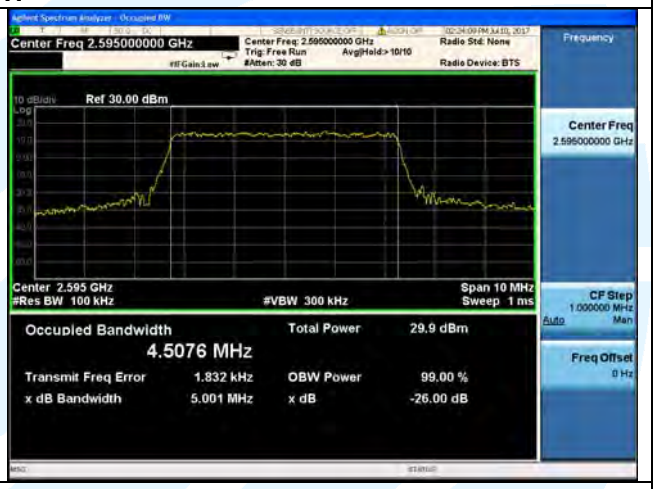
QPSK	16QAM

LCH

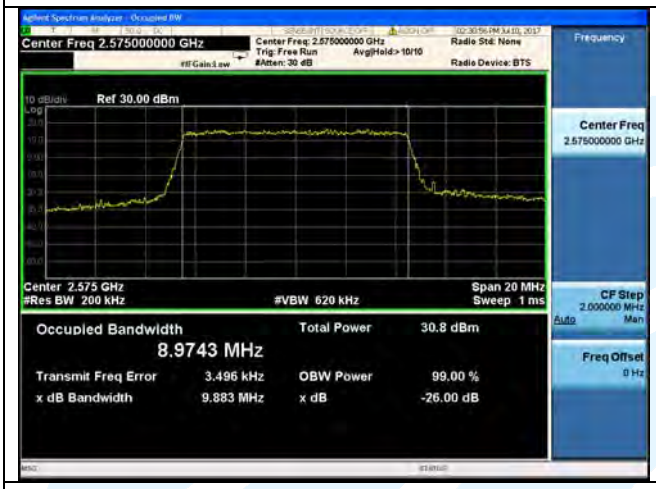


MCH

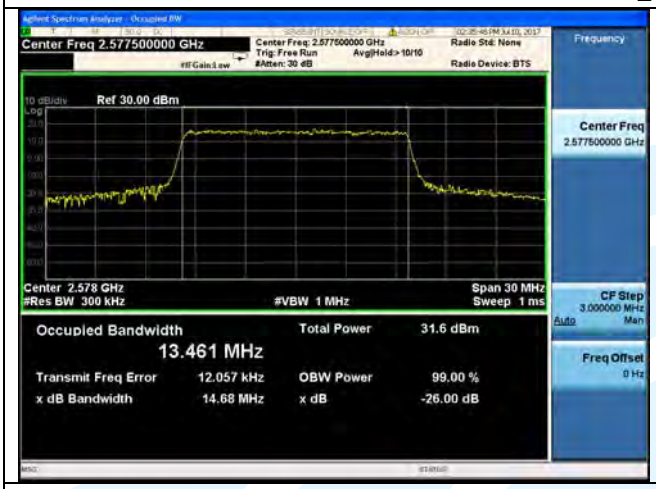
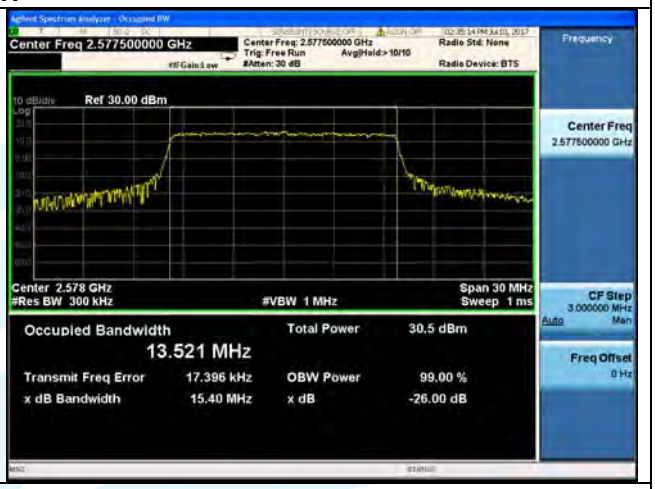


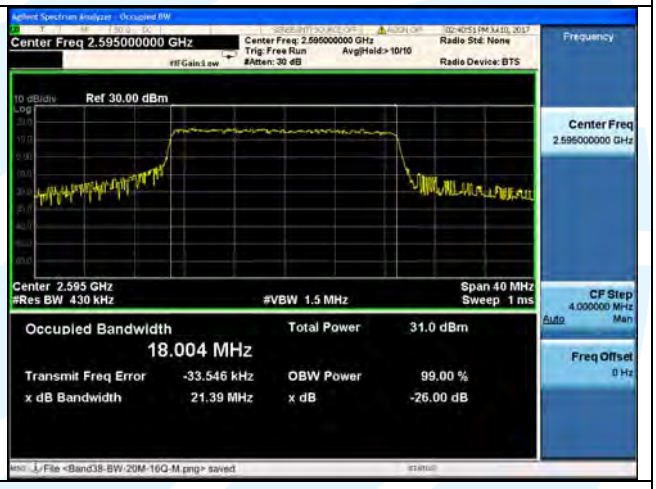


HCH

LTE Band 38_ Channel Bandwidth: 10 MHz_50RB#0	
QPSK	**16QAM**
LCH	
	
MCH	
HCH	

LTE Band 38 _ Channel Bandwidth: 15 MHz_75RB#0

QPSK	16QAM
LCH	
	
MCH	
HCH	

LTE Band 38 _ Channel Bandwidth: 20 MHz_100RB#0	
QPSK	**16QAM**
LCH	
MCH	
	
HCH	

5.5 Band Edge at antenna terminals

Test Requirement: **LTE Band 4:** FCC 47 CFR Part 27.53(h)(1)
LTE Band 7 & Band 41: FCC 47 CFR Part 27.53(m)(4)

Test Method: ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02

Limit: **FCC 47 CFR Part 27.53(a)(4):** For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:
(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;
(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;
(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

FCC 47 CFR Part 27.53(h)(1): Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB. The emission limit equal to –13 dBm.

FCC 47 CFR Part 27.53(h)(3): Measurement procedure. (i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.
(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

FCC 47 CFR Part 27.53(m)(4): For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

FCC 47 CFR Part 27.53(m)(6): Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

Test 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.

Such as:

a) The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 3 kHz and VB of the spectrum is 10 kHz (GSM/GPRS/EDGE).
b) The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is100 kHz and VB of the spectrum is 300 kHz (WCDMA).
c) The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 20 kHz and VB of the spectrum is 20 kHz (LTE Bandwidth 1.4 MHz).
d) The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 30 kHz (LTE Bandwidth 3 MHz).
e) The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 51 kHz and VB of the spectrum is 51 kHz (LTE Bandwidth 5 MHz)
f) The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 10 MHz)

5) 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 4.1.1(2) for details.

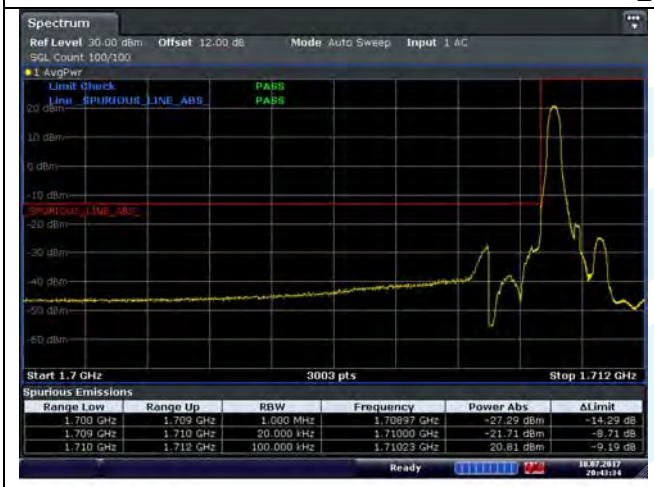
Instruments Used: Refer to section 3 for details

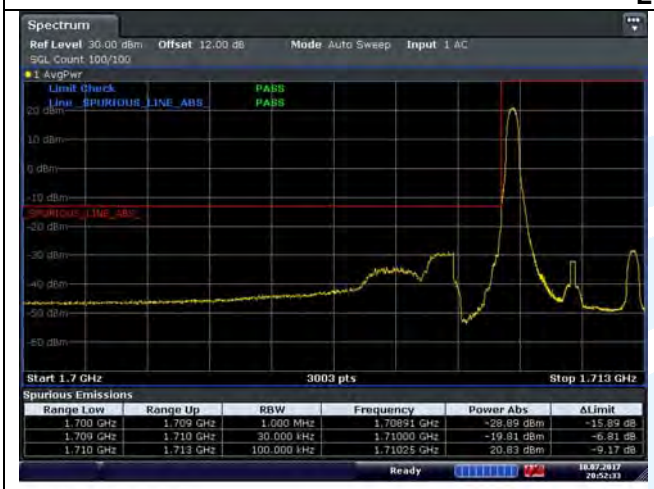
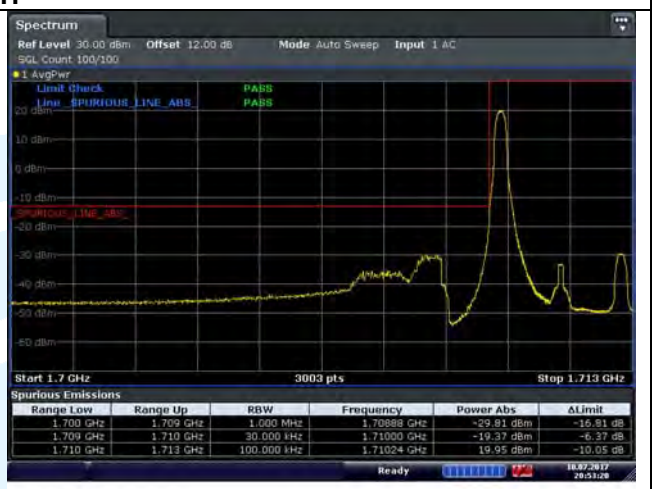
Test Mode: Link mode

Test Results: Pass

The test plot as follows:

LTE Band 4

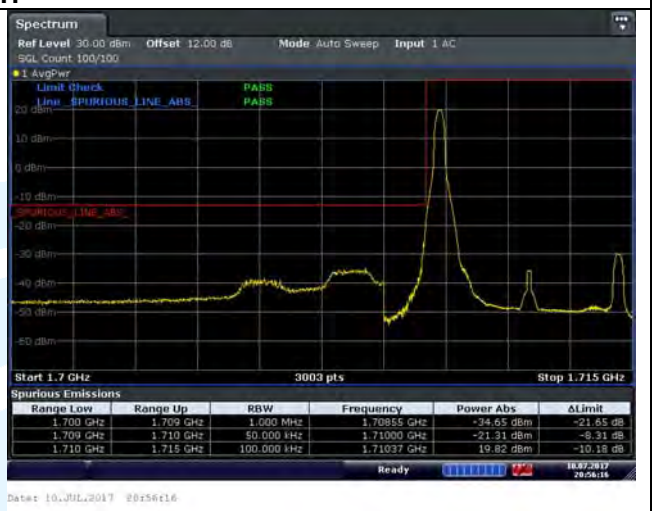
LTE_ Band 4_Channel Bandwidth: 1.4 MHz_1RB#0	
QPSK	**16QAM**
LCH	
	
HCH	

LTE_ Band 4_Channel Bandwidth: 3 MHz_1RB#0	
QPSK	**16QAM**
LCH	
	
HCH	

LTE_ Band 4_Channel Bandwidth: 5 MHz_1RB#0

QPSK	16QAM

LCH

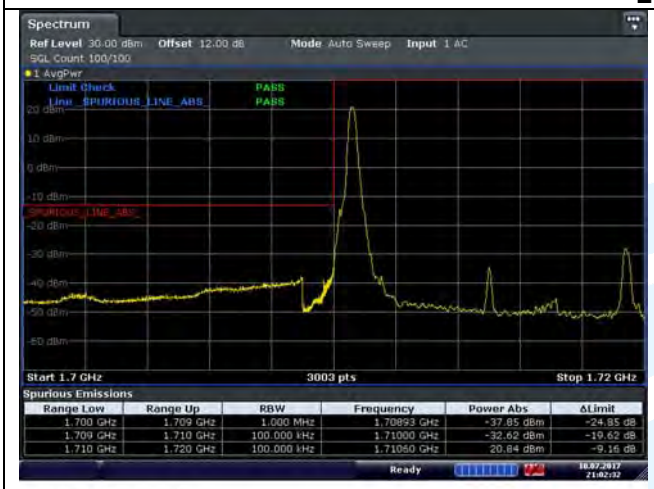


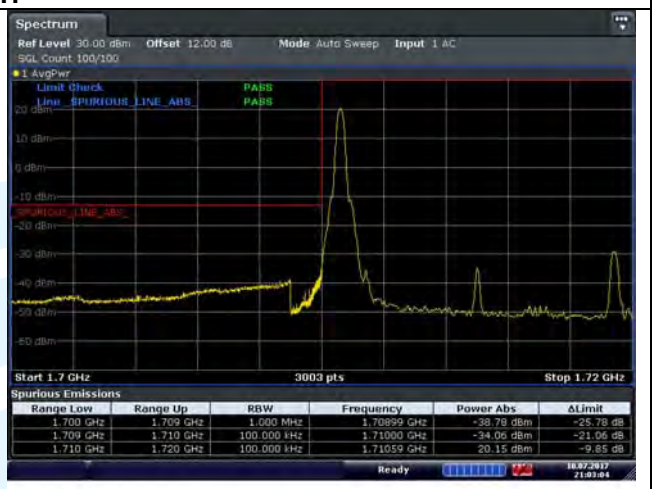
HCH

LTE_ Band 4_Channel Bandwidth: 10 MHz_1RB#0

QPSK	16QAM

LCH





HCH

LTE_ Band 4_Channel Bandwidth: 15 MHz_1RB#0

QPSK	16QAM

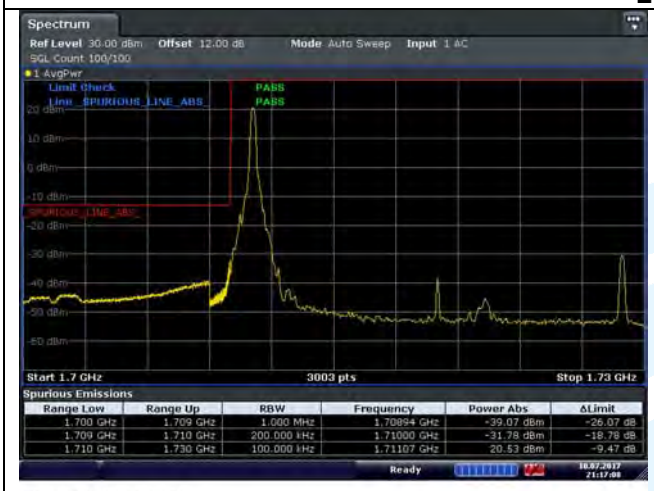
LCH

HCH

LTE_ Band 4_Channel Bandwidth: 20 MHz_1RB#0

QPSK	16QAM

LCH



HCH

LTE_ Band 4_Channel Bandwidth: 1.4 MHz_6RB#0

QPSK	16QAM

LCH

HCH

LTE_ Band 4_Channel Bandwidth: 3 MHz_15RB#0

QPSK	16QAM

LCH

HCH

LTE_ Band 4_Channel Bandwidth: 5 MHz_25RB#0

QPSK	16QAM

LCH

HCH

LTE_ Band 4_Channel Bandwidth: 10 MHz_50RB#0

QPSK	16QAM

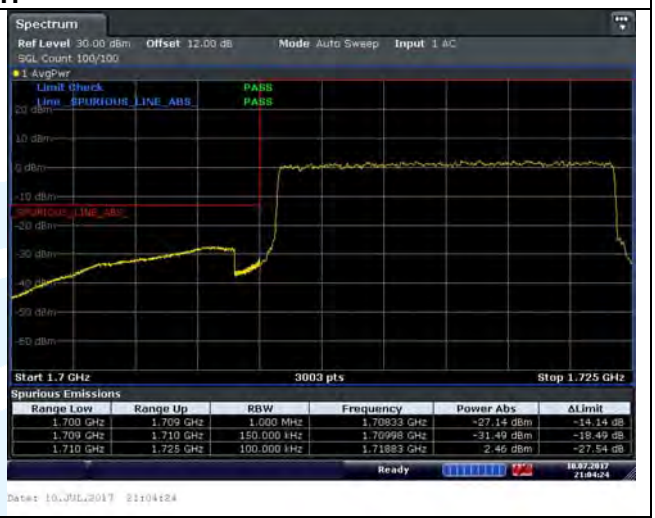
LCH

HCH

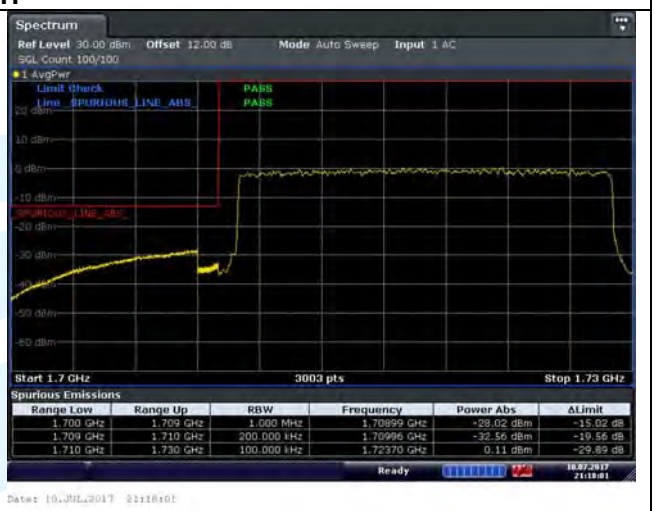
LTE_ Band 4_Channel Bandwidth: 15 MHz_75RB#0

QPSK	16QAM

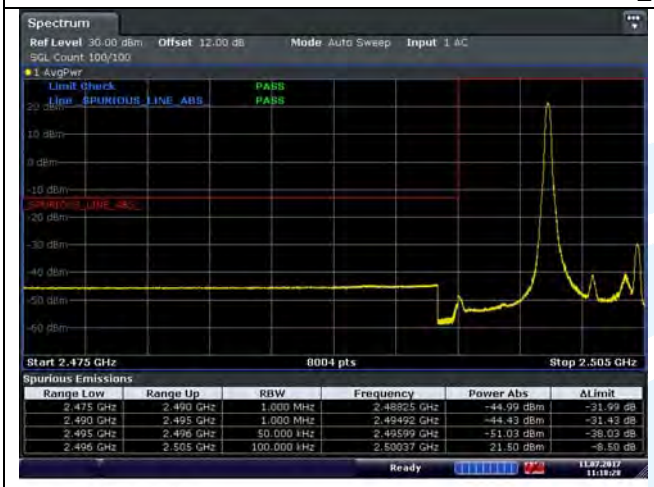
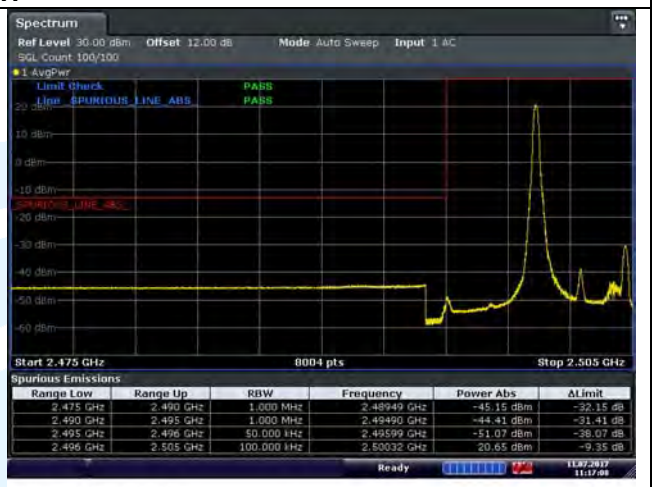
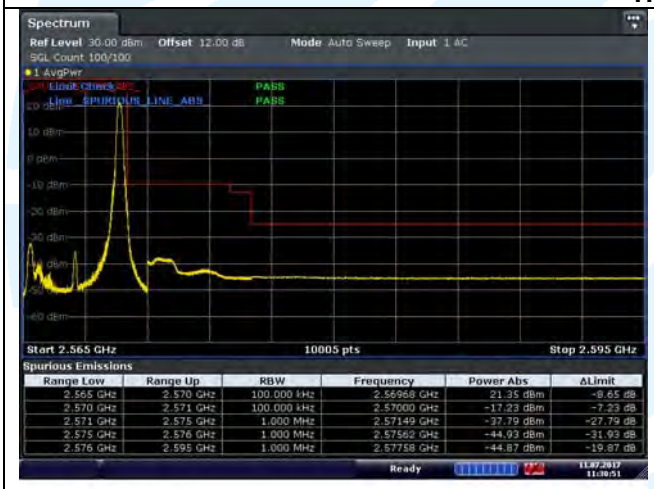
LCH



HCH

LTE_ Band 4_Channel Bandwidth: 20 MHz_100RB#0	
QPSK	**16QAM**
LCH	
	
HCH	

LTE Band 7

LTE_ Band 7_Channel Bandwidth: 5 MHz_1RB#0	
QPSK	**16QAM**
LCH	
	
HCH	
	

LTE_ Band 7_Channel Bandwidth: 10 MHz_1RB#0

QPSK	16QAM

LCH

HCH