FCC Test Report
(Part 27 – LTE B4/B12/B13/B66)

Report No.: RFBFOK-WTW-P22010278-7

FCC ID: RYQSTTM21VAPP

Test Model: STTM21VAPP

Received Date: Feb. 10, 2022

Test Date: Feb. 24 ~ Mar. 02, 2022

Issued Date: Mar. 15, 2022

Applicant: FIH CO., LTD.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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FCC Registration / Designation Number: 788550 / TW0003

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Table of Contents

Release Control Record **4**

1 Certificate of Conformity **5**

2 Summary of Test Results **6**

2.1 Measurement Uncertainty 7
2.2 Test Site and Instruments 8

3 General Information **9**

3.1 General Description of EUT 9
3.2 Configuration of System under Test 12
3.2.1 Description of Support Units 12
3.3 Test Mode Applicability and Tested Channel Detail 13
3.4 EUT Operating Conditions 27
3.5 General Description of Applied Standards and References 27

4 Test Types and Results **28**

4.1 Output Power Measurement 28
4.1.1 Limits of Output Power Measurement 28
4.1.2 Test Procedures 28
4.1.3 Test Setup 28
4.1.4 Test Results 29
4.2 Modulation Characteristics Measurement 47
4.2.1 Limits of Modulation Characteristics 47
4.2.2 Test Procedure 47
4.2.3 Test Setup 47
4.2.4 Test Results 48
4.3 Frequency Stability Measurement 50
4.3.1 Limits of Frequency Stability Measurement 50
4.3.2 Test Procedure 50
4.3.3 Test Setup 50
4.3.4 Test Results 51
4.4 Emission Bandwidth Measurement 69
4.4.1 Limits of Emission Bandwidth Measurement 69
4.4.2 Test Procedure 69
4.4.3 Test Setup 69
4.4.4 Test Result 70
4.5 Channel Edge / Out-of-Band Emissions Measurement 84
4.5.1 Limits of Band Edge / Out-of-Band Emissions Measurement 84
4.5.2 Test Setup 84
4.5.3 Test Procedures 84
4.5.4 Test Results 85
4.6 Peak to Average Ratio 103
4.6.1 Limits of Peak to Average Ratio Measurement 103
4.6.2 Test Setup 103
4.6.3 Test Procedures 103
4.6.4 Test Results 104
4.7 Conducted Spurious Emissions 111
4.7.1 Limits of Conducted Spurious Emissions Measurement 111
4.7.2 Test Setup 111
4.7.3 Test Procedure 111
4.7.4 Test Results 112
4.8 Radiated Emission Measurement 132
4.8.1 Limits of Radiated Emission Measurement 132
4.8.2 Test Procedure 132
4.8.3 Deviation from Test Standard 132
4.8.4 Test Setup 133

4.8.5 Test Results 134
5 Pictures of Test Arrangements 163
Appendix – Information of the Testing Laboratories 164

Release Control Record

Issue No.	Description	Date Issued
RFBFOK-WTW-P22010278-7	Original release	Mar. 15, 2022

1 Certificate of Conformity

Product: 4G cellular phone

Brand: SHARP

Test Model: STTM21VAPP

Applicant: FIH CO., LTD.

Test Date: Feb. 24 ~ Mar. 02, 2022

Standards: FCC Part 27, Subpart C, F, H, L

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Celine Chou , **Date:** Mar. 15, 2022

Celine Chou / Senior Specialist

Approved by : Jeremy. Lin , **Date:** Mar. 15, 2022

Jeremy Lin / Project Engineer

2 Summary of Test Results

For LTE Band 4, B66

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50 (d)	Equivalent Isotropically radiated power	Pass	Meet the requirement of limit.
2.1047	Modulation characteristics	Pass	Meet the requirement
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Emission Bandwidth	Pass	Meet the requirement of limit.
2.1051 27.53 (h)	Out of Band Emission Measurements	Pass	Meet the requirement of limit.
27.50 (d)(5)	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1051 27.53 (h)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53 (h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -37.21dB at 337.49MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

For LTE Band 12

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50 (c)	Equivalent radiated power	Pass	Meet the requirement of limit.
2.1047	Modulation characteristics	Pass	Meet the requirement
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Emission Bandwidth	Pass	Meet the requirement of limit.
2.1051 27.53 (g)	Out of Band Emission Measurements	Pass	Meet the requirement of limit.
--	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1051 27.53 (g)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53 (g)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -37.99dB at 1415.00MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

For LTE Band 13

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50 (b)	Equivalent radiated power	Pass	Meet the requirement of limit.
2.1047	Modulation characteristics	Pass	Meet the requirement
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Emission Bandwidth	Pass	Meet the requirement of limit.
2.1051 27.53 (c)	Out of Band Emission Measurements	Pass	Meet the requirement of limit.
--	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1051 27.53 (c)(f)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53 (c)(f)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -9.20dB at 1564.00MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 03, 2021	Dec. 02, 2022
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022
Broadband Horn Antenna SCHWARZBECK	BBHA 9170	148	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 14, 2021	Nov. 13, 2022
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Oct. 28, 2021	Oct. 27, 2022
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 13, 2021	Apr. 12, 2022
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier EMCI	EMC001340	980201	Sep. 15, 2021	Sep. 14, 2022
Preamplifier EMCI	EMC 012645	980115	Oct. 05, 2021	Oct. 04, 2022
Preamplifier EMCI	EMC 184045	980116	Oct. 05, 2021	Oct. 04, 2022
Preamplifier EMCI	EMC 330H	980112	Oct. 05, 2021	Oct. 04, 2022
Peak Power Analyzer KEYSIGHT	8990B	MY51000485	Jan. 18, 2022	Jan. 17, 2023
Wideband Power Sensor KEYSIGHT	N1923A	MY58020002	Jan. 17, 2022	Jan. 16, 2023
RF Coaxial Cable EMCI	EMC104-SM-SM-800 0	171005	Oct. 05, 2021	Oct. 04, 2022
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000 (140807)	Oct. 05, 2021	Oct. 04, 2022
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 05, 2021	Oct. 04, 2022
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	Jan. 03, 2022	Jan. 02, 2023
True RMS Clamp Meter Fluke	325	31130711WS	Jun. 02, 2021	Jun. 01, 2022
DC power supply Keysight	U8002A	MY56330015	NA	NA
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Feb. 16, 2022	Feb. 15, 2023

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.

3 General Information

3.1 General Description of EUT

Product	4G cellular phone	
Brand	SHARP	
Test Model	STTM21VAPP	
Power Supply Rating	5Vdc from adapter or host equipment 3.85Vdc from battery	
Modulation Type	QPSK, 16QAM	
Operating Frequency	LTE Band 4 (Channel Bandwidth 1.4MHz)	1710.7MHz ~ 1754.3MHz
	LTE Band 4 (Channel Bandwidth 3MHz)	1711.5MHz ~ 1753.5MHz
	LTE Band 4 (Channel Bandwidth 5MHz)	1712.5MHz ~ 1752.5MHz
	LTE Band 4 (Channel Bandwidth 10MHz)	1715.0MHz ~ 1750.0MHz
	LTE Band 4 (Channel Bandwidth 15MHz)	1717.5MHz ~ 1747.5MHz
	LTE Band 4 (Channel Bandwidth 20MHz)	1720.0MHz ~ 1745.0MHz
	LTE Band 12 (Channel Bandwidth 1.4MHz)	699.7MHz ~ 715.3MHz
	LTE Band 12 (Channel Bandwidth 3MHz)	700.5MHz ~ 714.5MHz
	LTE Band 12 (Channel Bandwidth 5MHz)	701.5MHz ~ 713.5MHz
	LTE Band 12 (Channel Bandwidth 10MHz)	704.0MHz ~ 711.0MHz
	LTE Band 13 (Channel Bandwidth 5MHz)	779.5MHz ~ 784.5MHz
	LTE Band 13 (Channel Bandwidth 10MHz)	782.0MHz
	LTE Band 66 (Channel Bandwidth 1.4MHz)	1710.7MHz ~ 1779.3MHz
	LTE Band 66 (Channel Bandwidth 3MHz)	1711.5MHz ~ 1778.5MHz
	LTE Band 66 (Channel Bandwidth 5MHz)	1712.5MHz ~ 1777.5MHz
	LTE Band 66 (Channel Bandwidth 10MHz)	1715.0MHz ~ 1775.0MHz
	LTE Band 66 (Channel Bandwidth 15MHz)	1717.5MHz ~ 1772.5MHz
	LTE Band 66 (Channel Bandwidth 20MHz)	1720.0MHz ~ 1770.0MHz

		QPSK	16QAM
Max. EIRP Power	LTE Band 4 (Channel Bandwidth 1.4MHz)	132.130mW (21.21dBm)	111.686mW (20.48dBm)
	LTE Band 4 (Channel Bandwidth 3MHz)	130.317mW (21.15dBm)	110.917mW (20.45dBm)
	LTE Band 4 (Channel Bandwidth 5MHz)	130.317mW (21.15dBm)	110.408mW (20.43dBm)
	LTE Band 4 (Channel Bandwidth 10MHz)	129.420mW (21.12dBm)	111.944mW (20.49dBm)
	LTE Band 4 (Channel Bandwidth 15MHz)	131.522mW (21.19dBm)	111.173mW (20.46dBm)
	LTE Band 4 (Channel Bandwidth 20MHz)	132.130mW (21.21dBm)	111.944mW (20.49dBm)
	LTE Band 66 (Channel Bandwidth 1.4MHz)	130.617mW (21.16dBm)	108.893mW (20.37dBm)
	LTE Band 66 (Channel Bandwidth 3MHz)	128.529mW (21.09dBm)	106.905mW (20.29dBm)
	LTE Band 66 (Channel Bandwidth 5MHz)	131.220mW (21.18dBm)	109.648mW (20.40dBm)
	LTE Band 66 (Channel Bandwidth 10MHz)	131.220mW (21.18dBm)	110.408mW (20.43dBm)
	LTE Band 66 (Channel Bandwidth 15MHz)	130.317mW (21.15dBm)	109.144mW (20.38dBm)
	LTE Band 66 (Channel Bandwidth 20MHz)	131.522mW (21.19dBm)	111.686mW (20.48dBm)
Max. ERP Power		QPSK	16QAM
	LTE Band 12 (Channel Bandwidth 1.4MHz)	51.168mW (17.09dBm)	42.855mW (16.32dBm)
	LTE Band 12 (Channel Bandwidth 3MHz)	51.050mW (17.08dBm)	43.451mW (16.38dBm)
	LTE Band 12 (Channel Bandwidth 5MHz)	50.933mW (17.07dBm)	43.351mW (16.37dBm)
	LTE Band 12 (Channel Bandwidth 10MHz)	51.523mW (17.12dBm)	43.954mW (16.43dBm)
	LTE Band 13 (Channel Bandwidth 5MHz)	43.652mW (16.40dBm)	36.644mW (15.64dBm)
	LTE Band 13 (Channel Bandwidth 10MHz)	43.853mW (16.42dBm)	37.239mW (15.71dBm)

		QPSK	16QAM
Emission Designator	LTE Band 4 (Channel Bandwidth 1.4MHz)	1M09G7D	1M09D7W
	LTE Band 4 (Channel Bandwidth 3MHz)	2M69G7D	2M69D7W
	LTE Band 4 (Channel Bandwidth 5MHz)	4M50G7D	4M49D7W
	LTE Band 4 (Channel Bandwidth 10MHz)	8M98G7D	8M98D7W
	LTE Band 4 (Channel Bandwidth 15MHz)	13M5G7D	13M5D7W
	LTE Band 4 (Channel Bandwidth 20MHz)	18M0G7D	18M0D7W
	LTE Band 12 (Channel Bandwidth 1.4MHz)	1M09G7D	1M09D7W
	LTE Band 12 (Channel Bandwidth 3MHz)	2M69G7D	2M69D7W
	LTE Band 12 (Channel Bandwidth 5MHz)	4M50G7D	4M50D7W
	LTE Band 12 (Channel Bandwidth 10MHz)	8M99G7D	8M98D7W
	LTE Band 13 (Channel Bandwidth 5MHz)	4M50G7D	4M50D7W
	LTE Band 13 (Channel Bandwidth 10MHz)	8M97G7D	8M97D7W
	LTE Band 66 (Channel Bandwidth 1.4MHz)	1M09G7D	1M09D7W
	LTE Band 66 (Channel Bandwidth 3MHz)	2M69G7D	2M69D7W
	LTE Band 66 (Channel Bandwidth 5MHz)	4M50G7D	4M50D7W
	LTE Band 66 (Channel Bandwidth 10MHz)	8M99G7D	8M98D7W
	LTE Band 66 (Channel Bandwidth 15MHz)	13M5G7D	13M5D7W
	LTE Band 66 (Channel Bandwidth 20MHz)	18M0G7D	18M0D7W
Antenna Type	Refer to note		
Antenna Connector	Refer to note		
Accessory Device	Adapter, Battery		
Cable Supplied	0.95m shielded USB cable without core		

Note:

1. The EUT consumes power from the following Adapter & Battery.

Adapter	
Brand	RTF
Model	RT-C6
Input Power	100-240Vac, 50/60Hz, 0.35A
Output Power	5Vdc, 2A

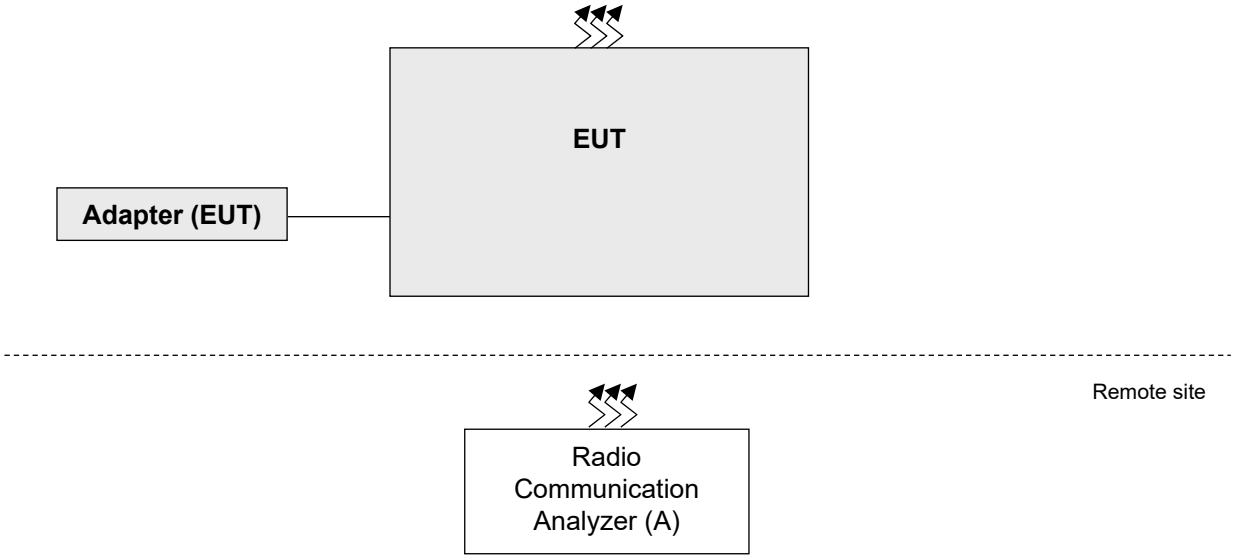
Battery	
Brand	ZHONGSHAN TIANMAO BATTERY CO., LTD.
Model	HE401
Rating	3.85Vdc, 3500mAh

2. The antenna information is listed as below.

No.	Type	Connector	Function	Gain (dBi)					
				B2	B4	B5	B12	B13	B66
Main Ant.	Loop	FIT	TX	1.0	-1.3	-4.8	-2.5	-4.3	-1.3
			RX	1.7	0.5	-6.5	-2.0	-4.3	0.5
Div Ant.	Loop	FIT	RX	-4.8	-2.8	-2.5	-4.6	-5.0	-2.8

* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	NA	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	Radiated Emission
LTE Band 4	X-plane
LTE Band 12	X-plane
LTE Band 13	X-plane
LTE Band 66	X-plane

LTE Band 4

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	19957 to 20393	19957 (1710.7MHz), 20175 (1732.5MHz), 20393 (1754.3MHz)	1.4MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 2 RB Offset 1 RB / 5 RB Offset 3 RB / 0 RB Offset 3 RB / 1 RB Offset 3 RB / 3 RB Offset 6 RB / 0 RB Offset
		19965 to 20385	19965 (1711.5MHz), 20175 (1732.5MHz), 20385 (1753.5MHz)	3MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 7 RB Offset 1 RB / 14 RB Offset 8 RB / 0 RB Offset 8 RB / 3 RB Offset 8 RB / 7 RB Offset 15 RB / 0 RB Offset
		19975 to 20375	19975 (1712.5MHz), 20175 (1732.5MHz), 20375 (1752.5MHz)	5MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 12 RB Offset 1 RB / 24 RB Offset 12 RB / 0 RB Offset 12 RB / 6 RB Offset 12 RB / 13 RB Offset 25 RB / 0 RB Offset
		20000 to 20350	20000 (1715.0MHz), 20175 (1732.5MHz), 20350 (1750.0MHz)	10MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 1 RB / 49 RB Offset 25 RB / 0 RB Offset 25 RB / 12 RB Offset 25 RB / 25 RB Offset 50 RB / 0 RB Offset
		20025 to 20325	20025 (1717.5MHz), 20175 (1732.5MHz), 20325 (1747.5MHz)	15MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 37 RB Offset 1 RB / 74 RB Offset 36 RB / 0 RB Offset 36 RB / 19 RB Offset 36 RB / 39 RB Offset 75 RB / 0 RB Offset
		20050 to 20300	20050 (1720.0MHz), 20175 (1732.5MHz), 20300 (1745.0MHz)	20MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 50 RB Offset 1 RB / 99 RB Offset 50 RB / 0 RB Offset 50 RB / 25 RB Offset 50 RB / 50 RB Offset 100 RB / 0 RB Offset
-	Modulation Characteristics	20050 to 20300	20175 (1732.5MHz)	20MHz	QPSK / 16QAM	100 RB / 0 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Frequency Stability	19957 to 20393	19957 (1710.7MHz), 20393 (1754.3MHz)	1.4MHz	QPSK	6 RB / 0 RB Offset
		19965 to 20385	19965 (1711.5MHz), 20385 (1753.5MHz)	3MHz	QPSK	15 RB / 0 RB Offset
		19975 to 20375	19975 (1712.5MHz), 20375 (1752.5MHz)	5MHz	QPSK	25 RB / 0 RB Offset
		20000 to 20350	20000 (1715.0MHz), 20350 (1750.0MHz)	10MHz	QPSK	50 RB / 0 RB Offset
		20025 to 20325	20025 (1717.5MHz), 20325 (1747.5MHz)	15MHz	QPSK	75 RB / 0 RB Offset
		20050 to 20300	20050 (1720.0MHz), 20300 (1745.0MHz)	20MHz	QPSK	100 RB / 0 RB Offset
-	Emission Bandwidth	19957 to 20393	19957 (1710.7MHz), 20175 (1732.5MHz), 20393 (1754.3MHz)	1.4MHz	QPSK / 16QAM	6 RB / 0RB Offset
		19965 to 20385	19965 (1711.5MHz), 20175 (1732.5MHz), 20385 (1753.5MHz)	3MHz	QPSK / 16QAM	15 RB / 0RB Offset
		19975 to 20375	19975 (1712.5MHz), 20175 (1732.5MHz), 20375 (1752.5MHz)	5MHz	QPSK / 16QAM	25RB / 0RB Offset
		20000 to 20350	20000 (1715.0MHz), 20175 (1732.5MHz), 20350 (1750.0MHz)	10MHz	QPSK / 16QAM	50RB / 0RB Offset
		20025 to 20325	20025 (1717.5MHz), 20175 (1732.5MHz), 20325 (1747.5MHz)	15MHz	QPSK / 16QAM	75 RB / 0 RB Offset
		20050 to 20300	20050 (1720.0MHz), 20175 (1732.5MHz), 20300 (1745.0MHz)	20MHz	QPSK / 16QAM	100 RB / 0 RB Offset
-	Band Edge	19957 to 20393	19957 (1710.7MHz), 20393 (1754.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset 1 RB / 5 RB Offset 6 RB / 0 RB Offset
		19965 to 20385	19965 (1711.5MHz), 20385 (1753.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset 1 RB / 14 RB Offset 15 RB / 0 RB Offset
		19975 to 20375	19975 (1712.5MHz), 20375 (1752.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		20000 to 20350	20000 (1715.0MHz), 20350 (1750.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
		20025 to 20325	20025 (1717.5MHz), 20325 (1747.5MHz)	15MHz	QPSK	1 RB / 0 RB Offset 1 RB / 74 RB Offset 75 RB / 0 RB Offset
		20050 to 20300	20050 (1720.0MHz), 20300 (1745.0MHz)	20MHz	QPSK	1 RB / 0 RB Offset 1 RB / 99 RB Offset 100 RB / 0 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Peak To Average Ratio	19957 to 20393	19957 (1710.7MHz), 20175 (1732.5MHz), 20393 (1754.3MHz)	1.4MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		19965 to 20385	19965 (1711.5MHz), 20175 (1732.5MHz), 20385 (1753.5MHz)	3MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		19975 to 20375	19975 (1712.5MHz), 20175 (1732.5MHz), 20375 (1752.5MHz)	5MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		20000 to 20350	20000 (1715.0MHz), 20175 (1732.5MHz), 20350 (1750.0MHz)	10MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		20025 to 20325	20025 (1717.5MHz), 20175 (1732.5MHz), 20325 (1747.5MHz)	15MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		20050 to 20300	20050 (1720.0MHz), 20175 (1732.5MHz), 20300 (1745.0MHz)	20MHz	QPSK / 16QAM	3 RB / 1 RB Offset
-	Conducted Emission	19957 to 20393	19957 (1710.7MHz), 20175 (1732.5MHz), 20393 (1754.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset
		19965 to 20385	19965 (1711.5MHz), 20175 (1732.5MHz), 20385 (1753.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset
		19975 to 20375	19975 (1712.5MHz), 20175 (1732.5MHz), 20375 (1752.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		20000 to 20350	20000 (1715.0MHz), 20175 (1732.5MHz), 20350 (1750.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset
		20025 to 20325	20025 (1717.5MHz), 20175 (1732.5MHz), 20325 (1747.5MHz)	15MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20050 (1720.0MHz), 20175 (1732.5MHz), 20300 (1745.0MHz)	20MHz	QPSK	3 RB / 1 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission	19957 to 20393	19957 (1710.7MHz), 20175 (1732.5MHz), 20393 (1754.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset
		19975 to 20375	19975 (1712.5MHz), 20175 (1732.5MHz), 20375 (1752.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20050 (1720.0MHz), 20175 (1732.5MHz), 20300 (1745.0MHz)	20MHz	QPSK	3 RB / 1 RB Offset

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 36.521-1 Section 6.6.3.1.4.1, choose the lowest, 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK, 16QAM, and measured value of QPSK is higher than 16QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK and 16QAM modes, the other test items were performed under worse mode according to the maximum output power.

LTE Band 12

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	23017 to 23173	23017 (699.7MHz), 23095 (707.5MHz), 23173 (715.3MHz)	1.4MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 2 RB Offset 1 RB / 5 RB Offset 3 RB / 0 RB Offset 3 RB / 1 RB Offset 3 RB / 3 RB Offset 6 RB / 0 RB Offset
		23025 to 23165	23025 (700.5MHz), 23095 (707.5MHz), 23165 (714.5MHz)	3MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 7 RB Offset 1 RB / 14 RB Offset 8 RB / 0 RB Offset 8 RB / 3 RB Offset 8 RB / 7 RB Offset 15 RB / 0 RB Offset
		23035 to 23155	23035 (701.5MHz), 23095 (707.5MHz), 23155 (713.5MHz)	5MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 12 RB Offset 1 RB / 24 RB Offset 12 RB / 0 RB Offset 12 RB / 6 RB Offset 12 RB / 13 RB Offset 25 RB / 0 RB Offset
		23060 to 23130	23060 (704.0MHz), 23095 (707.5MHz), 23130 (711.0 MHz)	10MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 1 RB / 49 RB Offset 25 RB / 0 RB Offset 25 RB / 12 RB Offset 25 RB / 25 RB Offset 50 RB / 0 RB Offset
-	Modulation Characteristics	23060 to 23130	23095 (707.5MHz)	10MHz	QPSK / 16QAM	50 RB / 0 RB Offset
-	Frequency Stability	23017 to 23173	23017 (699.7MHz), 23173 (715.3MHz)	1.4MHz	QPSK	6 RB / 0 RB Offset
		23025 to 23165	23025 (700.5MHz), 23165 (714.5MHz)	3MHz	QPSK	15 RB / 0 RB Offset
		23035 to 23155	23035 (701.5MHz), 23155 (713.5MHz)	5MHz	QPSK	25 RB / 0 RB Offset
		23060 to 23130	23060 (704.0MHz), 23130 (711.0MHz)	10MHz	QPSK	50 RB / 0 RB Offset
-	Emission Bandwidth	23017 to 23173	23017 (699.7MHz), 23095 (707.5MHz), 23173 (715.3MHz)	1.4MHz	QPSK / 16QAM	6 RB / 0 RB Offset
		23025 to 23165	23025 (700.5MHz), 23095 (707.5MHz), 23165 (714.5MHz)	3MHz	QPSK / 16QAM	15 RB / 0 RB Offset
		23035 to 23155	23035 (701.5MHz), 23095 (707.5MHz), 23155 (713.5MHz)	5MHz	QPSK / 16QAM	25 RB / 0 RB Offset
		23060 to 23130	23060 (704.0MHz), 23095 (707.5MHz), 23130 (711.0MHz)	10MHz	QPSK / 16QAM	50 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Band Edge	23017 to 23173	23017 (699.7MHz), 23173 (715.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset 1 RB / 5 RB Offset 6 RB / 0 RB Offset
		23025 to 23165	23025 (700.5MHz), 23165 (714.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset 1 RB / 14 RB Offset 15 RB / 0 RB Offset
		23035 to 23155	23035 (701.5MHz), 23155 (713.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		23060 to 23130	23060 (704.0MHz), 23130 (711.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
-	Peak to Average Ratio	23017 to 23173	23017 (699.7MHz), 23095 (707.5MHz), 23173 (715.3MHz)	1.4MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		23025 to 23165	23025 (700.5MHz), 23095 (707.5MHz), 23165 (714.5MHz)	3MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		23035 to 23155	23035 (701.5MHz), 23095 (707.5MHz), 23155 (713.5MHz)	5MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		23060 to 23130	23060 (704.0MHz), 23095 (707.5MHz), 23130 (711.0MHz)	10MHz	QPSK / 16QAM	1 RB / 0 RB Offset
-	Conducted Emission	23017 to 23173	23017 (699.7MHz), 23095 (707.5MHz), 23173 (715.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset
		23025 to 23165	23025 (700.5MHz), 23095 (707.5MHz), 23165 (714.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23035 (701.5MHz), 23095 (707.5MHz), 23155 (713.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		23060 to 23130	23060 (704.0MHz), 23095 (707.5MHz), 23130 (711.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission	23017 to 23173	23017 (699.7MHz), 23095 (707.5MHz), 23173 (715.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23035 (701.5MHz), 23095 (707.5MHz), 23155 (713.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		23060 to 23130	23060 (704.0MHz), 23095 (707.5MHz), 23130 (711.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 36.521-1 Section 6.6.3.1.4.1, choose the lowest, 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK, 16QAM, and measured value of QPSK is higher than 16QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK and 16QAM modes, the other test items were performed under worse mode according to the maximum output power.

LTE Band 13

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	23205 to 23255	23205 (779.5MHz), 23230 (782.0MHz), 23255 (784.5MHz)	5MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 12 RB Offset 1 RB / 24 RB Offset 12 RB / 0 RB Offset 12 RB / 6 RB Offset 12 RB / 13 RB Offset 25 RB / 0 RB Offset
		23230	23230 (782.0MHz)	10MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 1 RB / 49 RB Offset 25 RB / 0 RB Offset 25 RB / 12 RB Offset 25 RB / 25 RB Offset 50 RB / 0 RB Offset
-	Modulation Characteristics	23230	23230 (782.0MHz),	10MHz	QPSK / 16QAM	50 RB / 0 RB Offset
-	Frequency Stability	23205 to 23255	23205 (779.5MHz), 23255 (784.5MHz)	5MHz	QPSK	25 RB / 0 RB Offset
		23230	23230 (782.0MHz),	10MHz	QPSK	50 RB / 0 RB Offset
-	Emission Bandwidth	23205 to 23255	23205 (779.5MHz), 23230 (782.0MHz), 23255 (784.5MHz)	5MHz	QPSK / 16QAM	25 RB / 0 RB Offset
		23230	23230 (782.0MHz)	10MHz	QPSK / 16QAM	50 RB / 0 RB Offset
-	Band Edge	23205 to 23255	23205 (779.5MHz), 23255 (784.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		23230	23230 (782.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
-	Peak to Average Ratio	23205 to 23255	23205 (779.5MHz), 23230 (782.0MHz), 23255 (784.5MHz)	5MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		23230	23230 (782.0MHz)	10MHz	QPSK / 16QAM	1 RB / 0 RB Offset
-	Conducted Emission	23205 to 23255	23205 (779.5MHz), 23230 (782.0MHz), 23255 (784.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		23230	23230 (782.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission	23205 to 23255	23205 (779.5MHz), 23230 (782.0MHz), 23255 (784.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		23230	23230 (782.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 36.521-1 Section 6.6.3.1.4.1, choose the 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK, 16QAM, and measured value of QPSK is higher than 16QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK and 16QAM modes, the other test items were performed under worse mode according to the maximum output power.

LTE Band 66

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	131979 to 132665	131979 (1710.7MHz), 132322 (1745.0MHz), 132665 (1779.3MHz)	1.4MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 2 RB Offset 1 RB / 5 RB Offset 3 RB / 0 RB Offset 3 RB / 1 RB Offset 3 RB / 3 RB Offset 6 RB / 0 RB Offset
		131987 to 132657	131987 (1711.5MHz), 132322 (1745.0MHz), 132657 (1778.5MHz)	3MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 7 RB Offset 1 RB / 14 RB Offset 8 RB / 0 RB Offset 8 RB / 3 RB Offset 8 RB / 7 RB Offset 15 RB / 0 RB Offset
		131997 to 132647	131997 (1712.5MHz), 132322 (1745.0MHz), 132647 (1777.5MHz)	5MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 12 RB Offset 1 RB / 24 RB Offset 12 RB / 0 RB Offset 12 RB / 6 RB Offset 12 RB / 13 RB Offset 25 RB / 0 RB Offset
		132022 to 132622	132022 (1715.0MHz), 132322 (1745.0MHz), 132622 (1775.0MHz)	10MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 1 RB / 49 RB Offset 25 RB / 0 RB Offset 25 RB / 12 RB Offset 25 RB / 25 RB Offset 50 RB / 0 RB Offset
		132047 to 132597	132047 (1717.5MHz), 132322 (1745.0MHz), 132597 (1772.5MHz)	15MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 37 RB Offset 1 RB / 74 RB Offset 36 RB / 0 RB Offset 36 RB / 19 RB Offset 36 RB / 39 RB Offset 75 RB / 0 RB Offset
		132072 to 132572	132072 (1720.0MHz), 132322 (1745.0MHz), 132572 (1770.0MHz)	20MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 50 RB Offset 1 RB / 99 RB Offset 50 RB / 0 RB Offset 50 RB / 25 RB Offset 50 RB / 50 RB Offset 100 RB / 0 RB Offset
-	Modulation Characteristics	132072 to 132572	132322 (1745.0MHz)	20MHz	QPSK / 16QAM	100 RB / 0 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Frequency Stability	131979 to 132665	131979 (1710.7MHz), 132665 (1779.3MHz)	1.4MHz	QPSK	6 RB / 0 RB Offset
		131987 to 132657	131987 (1711.5MHz), 132657 (1778.5MHz)	3MHz	QPSK	15 RB / 0 RB Offset
		131997 to 132647	131997 (1712.5MHz), 132647 (1777.5MHz)	5MHz	QPSK	25 RB / 0 RB Offset
		132022 to 132622	132022 (1715.0MHz), 132622 (1775.0MHz)	10MHz	QPSK	50 RB / 0 RB Offset
		132047 to 132597	132047 (1717.5MHz), 132597 (1772.5MHz)	15MHz	QPSK	75 RB / 0 RB Offset
		132072 to 132572	132072 (1720.0MHz), 132572 (1770.0MHz)	20MHz	QPSK	100 RB / 0 RB Offset
-	Emission Bandwidth	131979 to 132665	131979 (1710.7MHz), 132322 (1745.0MHz), 132665 (1779.3MHz)	1.4MHz	QPSK / 16QAM	6 RB / 0 RB Offset
		131987 to 132657	131987 (1711.5MHz), 132322 (1745.0MHz), 132657 (1778.5MHz)	3MHz	QPSK / 16QAM	15 RB / 0 RB Offset
		131997 to 132647	131997 (1712.5MHz), 132322 (1745.0MHz), 132647 (1777.5MHz)	5MHz	QPSK / 16QAM	25 RB / 0 RB Offset
		132022 to 132622	132022 (1715.0MHz), 132322 (1745.0MHz), 132622 (1775.0MHz)	10MHz	QPSK / 16QAM	50 RB / 0 RB Offset
		132047 to 132597	132047 (1717.5MHz), 132322 (1745.0MHz), 132597 (1772.5MHz)	15MHz	QPSK / 16QAM	75 RB / 0 RB Offset
		132072 to 132572	132072 (1720.0MHz), 132322 (1745.0MHz), 132572 (1770.0MHz)	20MHz	QPSK / 16QAM	100 RB / 0 RB Offset
-	Band Edge	131979 to 132665	131979 (1710.7MHz), 132665 (1779.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset 1 RB / 5 RB Offset 6 RB / 0 RB Offset
		131987 to 132657	131987 (1711.5MHz), 132657 (1778.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset 1 RB / 14 RB Offset 15 RB / 0 RB Offset
		131997 to 132647	131997 (1712.5MHz), 132647 (1777.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		132022 to 132622	132022 (1715.0MHz), 132622 (1775.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
		132047 to 132597	132047 (1717.5MHz), 132597 (1772.5MHz)	15MHz	QPSK	1 RB / 0 RB Offset 1 RB / 74 RB Offset 75 RB / 0 RB Offset
		132072 to 132572	132072 (1720.0MHz), 132572 (1770.0MHz)	20MHz	QPSK	1 RB / 0 RB Offset 1 RB / 99 RB Offset 100 RB / 0 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Peak to Average Ratio	131979 to 132665	131979 (1710.7MHz), 132322 (1745.0MHz), 132665 (1779.3MHz)	1.4MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		131987 to 132657	131987 (1711.5MHz), 132322 (1745.0MHz), 132657 (1778.5MHz)	3MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		131997 to 132647	131997 (1712.5MHz), 132322 (1745.0MHz), 132647 (1777.5MHz)	5MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		132022 to 132622	132022 (1715.0MHz), 132322 (1745.0MHz), 132622 (1775.0MHz)	10MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		132047 to 132597	132047 (1717.5MHz), 132322 (1745.0MHz), 132597 (1772.5MHz)	15MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		132072 to 132572	132072 (1720.0MHz), 132322 (1745.0MHz), 132572 (1770.0MHz)	20MHz	QPSK / 16QAM	3 RB / 0 RB Offset
-	Conducted Emission	131979 to 132665	131979 (1710.7MHz), 132322 (1745.0MHz), 132665 (1779.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset
		131987 to 132657	131987 (1711.5MHz), 132322 (1745.0MHz), 132657 (1778.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset
		131997 to 132647	131997 (1712.5MHz), 132322 (1745.0MHz), 132647 (1777.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		132022 to 132622	132022 (1715.0MHz), 132322 (1745.0MHz), 132622 (1775.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset
		132047 to 132597	132047 (1717.5MHz), 132322 (1745.0MHz), 132597 (1772.5MHz)	15MHz	QPSK	1 RB / 0 RB Offset
		132072 to 132572	132072 (1720.0MHz), 132322 (1745.0MHz), 132572 (1770.0MHz)	20MHz	QPSK	3 RB / 0 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission	131979 to 132665	131979 (1710.7MHz), 132322 (1745.0MHz), 132665 (1779.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset
		131997 to 132647	131997 (1712.5MHz), 132322 (1745.0MHz), 132647 (1777.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		132072 to 132572	132072 (1720.0MHz), 132322 (1745.0MHz), 132572 (1770.0MHz)	20MHz	QPSK	3 RB / 0 RB Offset

Note:
1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 36.521-1 Section 6.6.3.1.4.1, choose the lowest, 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK, 16QAM, and measured value of QPSK is higher than 16QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK and 16QAM modes, the other test items were performed under worse mode according to the maximum output power.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP / ERP	25deg. C, 60%RH	3.85Vdc	James Yang
Modulation Characteristics	25deg. C, 60%RH	3.85Vdc	James Yang
Frequency Stability	25deg. C, 60%RH	3.85Vdc	James Yang
Occupied Bandwidth	25deg. C, 60%RH	3.85Vdc	James Yang
Band Edge	25deg. C, 60%RH	3.85Vdc	James Yang
Peak To Average Ratio	25deg. C, 60%RH	3.85Vdc	James Yang
Conducted Emission	25deg. C, 60%RH	3.85Vdc	James Yang
Radiated Emission	19deg. C, 65%RH 21deg. C, 71%RH	120Vac, 60Hz	Thomas Cheng Vincent Chen

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and References:

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

For LTE Band 4, LTE Band 66:
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.

For LTE Band 12:
Control and mobile stations in the 698-746 MHz band are limited to 30 watts ERP.
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.

For LTE Band 13:
Control stations and mobile stations in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands and fixed stations transmitting in the 787-788 MHz and 805-806 MHz bands are limited to 30 watts ERP.
Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

4.1.2 Test Procedures

Conducted Power Measurement:

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.

Maximum EIRP / ERP

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$EIRP = P_{Meas} + G_T$

$ERP = P_{Meas} + G_T - 2.15$

where

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

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)

4.1.3 Test Setup

Conducted Power Measurement:

4.1.4 Test Results

Conducted Output Power (dBm)

LTE Band 4						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20050	20175	20300
		Frequency (MHz)		1720	1732.5	1745
20M	QPSK	1	0	22.20	22.51	22.28
		1	50	22.02	22.32	22.07
		1	99	22.01	22.25	22.01
		50	0	21.25	21.55	21.30
		50	25	21.24	21.54	21.29
		50	50	21.21	21.51	21.26
		100	0	21.25	21.55	21.30
20M	16QAM	1	0	21.49	21.79	21.54
		1	50	21.33	21.63	21.38
		1	99	21.23	21.53	21.28
		50	0	20.27	20.57	20.32
		50	25	20.25	20.55	20.30
		50	50	20.21	20.51	20.26
		100	0	20.26	20.56	20.31
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20025	20175	20325
		Frequency (MHz)		1717.5	1732.5	1747.5
15M	QPSK	1	0	22.15	22.49	22.28
		1	37	22.02	22.25	22.05
		1	74	22.01	22.15	22.01
		36	0	21.17	21.50	21.23
		36	19	21.19	21.47	21.26
		36	39	21.20	21.44	21.25
		75	0	21.22	21.54	21.26
15M	16QAM	1	0	21.45	21.76	21.51
		1	37	21.25	21.54	21.32
		1	74	21.20	21.46	21.26
		36	0	20.20	20.54	20.26
		36	19	20.25	20.55	20.30
		36	39	20.21	20.50	20.25
		75	0	20.21	20.56	20.24

LTE Band 4						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20000	20175	20350
		Frequency (MHz)		1715	1732.5	1750
10M	QPSK	1	0	22.10	22.42	22.23
		1	24	22.08	22.27	22.21
		1	49	22.01	22.18	22.01
		25	0	21.19	21.52	21.21
		25	12	21.20	21.44	21.21
		25	25	21.20	21.50	21.24
		50	0	21.24	21.53	21.23
10M	16QAM	1	0	21.43	21.79	21.46
		1	24	21.26	21.57	21.36
		1	49	21.23	21.48	21.19
		25	0	20.17	20.49	20.23
		25	12	20.21	20.53	20.26
		25	25	20.17	20.50	20.16
		50	0	20.18	20.49	20.29
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19975	20175	20375
		Frequency (MHz)		1712.5	1732.5	1752.5
5M	QPSK	1	0	22.15	22.45	22.23
		1	12	22.13	22.25	22.15
		1	24	22.01	22.23	22.01
		12	0	21.15	21.47	21.30
		12	6	21.17	21.44	21.19
		12	13	21.21	21.51	21.17
		25	0	21.25	21.50	21.30
5M	16QAM	1	0	21.40	21.73	21.49
		1	12	21.27	21.60	21.34
		1	24	21.13	21.48	21.25
		12	0	20.22	20.57	20.22
		12	6	20.20	20.54	20.22
		12	13	20.18	20.46	20.21
		25	0	20.23	20.56	20.21

LTE Band 4						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19965	20175	20385
		Frequency (MHz)		1711.5	1732.5	1753.5
3M	QPSK	1	0	22.13	22.45	22.23
		1	7	22.03	22.26	22.11
		1	14	22.01	22.24	22.01
		8	0	21.20	21.47	21.27
		8	3	21.23	21.52	21.27
		8	7	21.16	21.42	21.16
		15	0	21.21	21.53	21.30
3M	16QAM	1	0	21.41	21.75	21.46
		1	7	21.33	21.59	21.38
		1	14	21.20	21.50	21.22
		8	0	20.23	20.48	20.26
		8	3	20.16	20.54	20.29
		8	7	20.16	20.42	20.19
		15	0	20.22	20.51	20.22
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19957	20175	20393
		Frequency (MHz)		1710.7	1732.5	1754.3
1.4M	QPSK	1	0	22.13	22.46	22.13
		1	2	22.05	22.29	22.01
		1	5	22.01	22.06	22.01
		3	0	22.08	22.44	22.21
		3	1	22.10	22.51	22.09
		3	3	22.05	22.48	22.17
		6	0	21.21	21.47	21.22
1.4M	16QAM	1	0	21.31	21.78	21.39
		1	2	21.19	21.55	21.26
		1	5	21.07	21.35	21.20
		3	0	21.23	21.36	21.24
		3	1	21.20	21.40	21.15
		3	3	21.10	21.31	21.14
		6	0	20.16	20.43	20.17

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23060	23095	23130
		Frequency (MHz)		704	707.5	711
10M	QPSK	1	0	21.69	21.77	21.68
		1	24	21.58	21.66	21.57
		1	49	21.54	21.62	21.53
		25	0	20.71	20.79	20.70
		25	12	20.70	20.78	20.69
		25	25	20.67	20.75	20.66
		50	0	20.68	20.76	20.67
10M	16QAM	1	0	21.00	21.08	20.99
		1	24	20.97	21.05	20.96
		1	49	20.90	20.98	20.89
		25	0	19.71	19.79	19.70
		25	12	19.63	19.71	19.62
		25	25	19.70	19.78	19.69
		50	0	19.67	19.75	19.66
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23035	23095	23155
		Frequency (MHz)		701.5	707.5	713.5
5M	QPSK	1	0	21.68	21.72	21.61
		1	12	21.53	21.56	21.53
		1	24	21.47	21.58	21.43
		12	0	20.67	20.74	20.69
		12	6	20.61	20.68	20.69
		12	13	20.60	20.65	20.57
		25	0	20.61	20.70	20.60
5M	16QAM	1	0	20.95	21.02	20.89
		1	12	20.94	20.96	20.87
		1	24	20.86	20.98	20.83
		12	0	19.67	19.69	19.68
		12	6	19.58	19.68	19.60
		12	13	19.70	19.78	19.69
		25	0	19.63	19.73	19.63

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23025	23095	23165
		Frequency (MHz)		700.5	707.5	714.5
3M	QPSK	1	0	21.69	21.73	21.60
		1	7	21.55	21.62	21.53
		1	14	21.52	21.60	21.45
		8	0	20.64	20.74	20.62
		8	3	20.66	20.76	20.64
		8	7	20.59	20.67	20.63
		15	0	20.63	20.71	20.64
3M	16QAM	1	0	20.92	20.98	20.90
		1	7	20.92	21.03	20.93
		1	14	20.85	20.93	20.82
		8	0	19.67	19.70	19.62
		8	3	19.60	19.67	19.54
		8	7	19.62	19.75	19.67
		15	0	19.65	19.75	19.61
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23017	23095	23173
		Frequency (MHz)		699.7	707.5	715.3
1.4M	QPSK	1	0	21.68	21.74	21.55
		1	2	21.36	21.46	21.46
		1	5	21.43	21.50	21.50
		3	0	21.62	21.62	21.68
		3	1	21.57	21.63	21.45
		3	3	21.48	21.69	21.59
		6	0	20.53	20.67	20.42
1.4M	16QAM	1	0	20.79	20.97	20.89
		1	2	20.91	20.84	20.86
		1	5	20.74	20.86	20.73
		3	0	20.56	20.67	20.55
		3	1	20.53	20.57	20.48
		3	3	20.57	20.73	20.59
		6	0	19.53	19.74	19.50

LTE Band 13						
BW	MCS Index	RB Size	RB Offset	Low		
		Channel		23230		
		Frequency (MHz)		782		
10M	QPSK	1	0	22.87		
		1	24	22.75		
		1	49	22.69		
		25	0	21.88		
		25	12	21.74		
		25	25	21.7		
		50	0	21.83		
10M	16QAM	1	0	22.16		
		1	24	22.03		
		1	49	21.94		
		25	0	20.88		
		25	12	20.76		
		25	25	20.72		
		50	0	20.95		
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23205	23230	23255
		Frequency (MHz)		779.5	782	784.5
5M	QPSK	1	0	22.79	22.85	22.77
		1	12	22.69	22.73	22.73
		1	24	22.67	22.60	22.67
		12	0	21.79	21.79	21.84
		12	6	21.69	21.69	21.68
		12	13	21.68	21.67	21.66
		25	0	21.83	21.75	21.80
5M	16QAM	1	0	22.07	22.08	22.09
		1	12	21.99	21.99	22.02
		1	24	21.87	21.85	21.91
		12	0	20.82	20.82	20.87
		12	6	20.74	20.72	20.75
		12	13	20.69	20.71	20.66
		25	0	20.89	20.88	20.92

LTE Band 66						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		132072	132322	132572
		Frequency (MHz)		1720	1745	1770
20M	QPSK	1	0	22.22	22.49	22.24
		1	50	22.14	22.25	22.18
		1	99	22.08	22.22	22.15
		50	0	21.31	21.58	21.33
		50	25	21.20	21.47	21.22
		50	50	21.17	21.44	21.19
		100	0	21.14	21.41	21.16
20M	16QAM	1	0	21.51	21.78	21.53
		1	50	21.30	21.57	21.32
		1	99	21.28	21.55	21.30
		50	0	20.18	20.45	20.20
		50	25	20.14	20.41	20.16
		50	50	20.10	20.37	20.12
		100	0	20.12	20.39	20.14
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		132047	132322	132597
		Frequency (MHz)		1717.5	1745	1772.5
15M	QPSK	1	0	22.20	22.45	22.16
		1	37	22.13	22.22	22.16
		1	74	22.03	22.18	22.14
		36	0	21.24	21.55	21.24
		36	19	21.15	21.46	21.19
		36	39	21.15	21.44	21.15
		75	0	21.08	21.39	21.08
15M	16QAM	1	0	21.48	21.68	21.45
		1	37	21.24	21.53	21.31
		1	74	21.18	21.51	21.23
		36	0	20.15	20.40	20.10
		36	19	20.05	20.40	20.14
		36	39	20.07	20.31	20.04
		75	0	20.09	20.38	20.11

LTE Band 66						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		132022	132322	132622
		Frequency (MHz)		1715	1745	1775
10M	QPSK	1	0	22.22	22.48	22.17
		1	24	22.06	22.15	22.08
		1	49	22.06	22.21	22.11
		25	0	21.31	21.48	21.23
		25	12	21.18	21.44	21.18
		25	25	21.16	21.34	21.13
		50	0	21.06	21.32	21.10
10M	16QAM	1	0	21.49	21.73	21.46
		1	24	21.20	21.50	21.23
		1	49	21.24	21.49	21.28
		25	0	20.13	20.43	20.17
		25	12	20.13	20.37	20.10
		25	25	20.03	20.32	20.10
		50	0	20.10	20.34	20.12
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		131997	132322	132647
		Frequency (MHz)		1712.5	1745	1777.5
5M	QPSK	1	0	22.12	22.48	22.15
		1	12	22.12	22.23	22.14
		1	24	22.02	22.21	22.05
		12	0	21.31	21.58	21.32
		12	6	21.16	21.44	21.18
		12	13	21.13	21.37	21.12
		25	0	21.13	21.33	21.06
5M	16QAM	1	0	21.42	21.70	21.43
		1	12	21.26	21.51	21.28
		1	24	21.27	21.54	21.24
		12	0	20.15	20.44	20.19
		12	6	20.06	20.32	20.12
		12	13	20.07	20.37	20.12
		25	0	20.05	20.34	20.13

LTE Band 66						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		131987	132322	132657
		Frequency (MHz)		1711.5	1745	1778.5
3M	QPSK	1	0	22.14	22.39	22.04
		1	7	22.11	22.22	22.03
		1	14	22.09	22.16	22.01
		8	0	21.08	21.39	21.27
		8	3	21.01	21.25	21.19
		8	7	21.08	21.29	21.11
		15	0	21.06	21.32	21.07
3M	16QAM	1	0	21.42	21.59	21.44
		1	7	21.22	21.45	21.21
		1	14	21.17	21.42	21.20
		8	0	20.10	20.41	20.10
		8	3	20.08	20.35	20.01
		8	7	20.05	20.20	20.05
		15	0	20.01	20.32	20.10
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		131979	132322	132665
		Frequency (MHz)		1710.7	1745	1779.3
1.4M	QPSK	1	0	22.01	22.42	22.12
		1	2	22.02	22.22	22.03
		1	5	22.01	22.06	22.03
		3	0	22.17	22.46	22.17
		3	1	22.19	22.44	22.15
		3	3	22.11	22.33	22.09
		6	0	22.05	21.29	21.05
1.4M	16QAM	1	0	21.47	21.67	21.45
		1	2	21.14	21.52	21.15
		1	5	21.19	21.42	21.17
		3	0	21.07	21.26	21.04
		3	1	21.05	21.36	21.09
		3	3	21.03	21.30	21.04
		6	0	20.08	20.26	20.08

EIRP / ERP Power (dBm)

LTE Band 4						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20050	20175	20300
		Frequency (MHz)		1720	1732.5	1745
20M	QPSK	1	0	20.90	21.21	20.98
		1	50	20.72	21.02	20.77
		1	99	20.71	20.95	20.71
		50	0	19.95	20.25	20.00
		50	25	19.94	20.24	19.99
		50	50	19.91	20.21	19.96
		100	0	19.95	20.25	20.00
20M	16QAM	1	0	20.19	20.49	20.24
		1	50	20.03	20.33	20.08
		1	99	19.93	20.23	19.98
		50	0	18.97	19.27	19.02
		50	25	18.95	19.25	19.00
		50	50	18.91	19.21	18.96
		100	0	18.96	19.26	19.01
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20025	20175	20325
		Frequency (MHz)		1717.5	1732.5	1747.5
15M	QPSK	1	0	20.85	21.19	20.98
		1	37	20.72	20.95	20.75
		1	74	20.71	20.85	20.71
		36	0	19.87	20.20	19.93
		36	19	19.89	20.17	19.96
		36	39	19.90	20.14	19.95
		75	0	19.92	20.24	19.96
15M	16QAM	1	0	20.15	20.46	20.21
		1	37	19.95	20.24	20.02
		1	74	19.90	20.16	19.96
		36	0	18.90	19.24	18.96
		36	19	18.95	19.25	19.00
		36	39	18.91	19.20	18.95
		75	0	18.91	19.26	18.94

*EIRP = Conducted + antenna gain (-1.3 dBi)

LTE Band 4						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20000	20175	20350
		Frequency (MHz)		1715	1732.5	1750
10M	QPSK	1	0	20.80	21.12	20.93
		1	24	20.78	20.97	20.91
		1	49	20.71	20.88	20.71
		25	0	19.89	20.22	19.91
		25	12	19.90	20.14	19.91
		25	25	19.90	20.20	19.94
		50	0	19.94	20.23	19.93
10M	16QAM	1	0	20.13	20.49	20.16
		1	24	19.96	20.27	20.06
		1	49	19.93	20.18	19.89
		25	0	18.87	19.19	18.93
		25	12	18.91	19.23	18.96
		25	25	18.87	19.20	18.86
		50	0	18.88	19.19	18.99
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19975	20175	20375
		Frequency (MHz)		1712.5	1732.5	1752.5
5M	QPSK	1	0	20.85	21.15	20.93
		1	12	20.83	20.95	20.85
		1	24	20.71	20.93	20.71
		12	0	19.85	20.17	20.00
		12	6	19.87	20.14	19.89
		12	13	19.91	20.21	19.87
		25	0	19.95	20.20	20.00
5M	16QAM	1	0	20.10	20.43	20.19
		1	12	19.97	20.30	20.04
		1	24	19.83	20.18	19.95
		12	0	18.92	19.27	18.92
		12	6	18.90	19.24	18.92
		12	13	18.88	19.16	18.91
		25	0	18.93	19.26	18.91

*EIRP = Conducted + antenna gain (-1.3 dBi)

LTE Band 4						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19965	20175	20385
		Frequency (MHz)		1711.5	1732.5	1753.5
3M	QPSK	1	0	20.83	21.15	20.93
		1	7	20.73	20.96	20.81
		1	14	20.71	20.94	20.71
		8	0	19.90	20.17	19.97
		8	3	19.93	20.22	19.97
		8	7	19.86	20.12	19.86
		15	0	19.91	20.23	20.00
3M	16QAM	1	0	20.11	20.45	20.16
		1	7	20.03	20.29	20.08
		1	14	19.90	20.20	19.92
		8	0	18.93	19.18	18.96
		8	3	18.86	19.24	18.99
		8	7	18.86	19.12	18.89
		15	0	18.92	19.21	18.92
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19957	20175	20393
		Frequency (MHz)		1710.7	1732.5	1754.3
1.4M	QPSK	1	0	20.83	21.16	20.83
		1	2	20.75	20.99	20.71
		1	5	20.71	20.76	20.71
		3	0	20.78	21.14	20.91
		3	1	20.80	21.21	20.79
		3	3	20.75	21.18	20.87
		6	0	19.91	20.17	19.92
1.4M	16QAM	1	0	20.01	20.48	20.09
		1	2	19.89	20.25	19.96
		1	5	19.77	20.05	19.90
		3	0	19.93	20.06	19.94
		3	1	19.90	20.10	19.85
		3	3	19.80	20.01	19.84
		6	0	18.86	19.13	18.87

*EIRP = Conducted + antenna gain (-1.3 dBi)

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23060	23095	23130
		Frequency (MHz)		704	707.5	711
10M	QPSK	1	0	17.04	17.12	17.03
		1	24	16.93	17.01	16.92
		1	49	16.89	16.97	16.88
		25	0	16.06	16.14	16.05
		25	12	16.05	16.13	16.04
		25	25	16.02	16.10	16.01
		50	0	16.03	16.11	16.02
10M	16QAM	1	0	16.35	16.43	16.34
		1	24	16.32	16.40	16.31
		1	49	16.25	16.33	16.24
		25	0	15.06	15.14	15.05
		25	12	14.98	15.06	14.97
		25	25	15.05	15.13	15.04
		50	0	15.02	15.10	15.01
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23035	23095	23155
		Frequency (MHz)		701.5	707.5	713.5
5M	QPSK	1	0	17.03	17.07	16.96
		1	12	16.88	16.91	16.88
		1	24	16.82	16.93	16.78
		12	0	16.02	16.09	16.04
		12	6	15.96	16.03	16.04
		12	13	15.95	16.00	15.92
		25	0	15.96	16.05	15.95
5M	16QAM	1	0	16.30	16.37	16.24
		1	12	16.29	16.31	16.22
		1	24	16.21	16.33	16.18
		12	0	15.02	15.04	15.03
		12	6	14.93	15.03	14.95
		12	13	15.05	15.13	15.04
		25	0	14.98	15.08	14.98

*ERP = Conducted + antenna gain (-2.5 dBi) - 2.15

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23025	23095	23165
		Frequency (MHz)		700.5	707.5	714.5
3M	QPSK	1	0	17.04	17.08	16.95
		1	7	16.90	16.97	16.88
		1	14	16.87	16.95	16.80
		8	0	15.99	16.09	15.97
		8	3	16.01	16.11	15.99
		8	7	15.94	16.02	15.98
		15	0	15.98	16.06	15.99
3M	16QAM	1	0	16.27	16.33	16.25
		1	7	16.27	16.38	16.28
		1	14	16.20	16.28	16.17
		8	0	15.02	15.05	14.97
		8	3	14.95	15.02	14.89
		8	7	14.97	15.10	15.02
		15	0	15.00	15.10	14.96
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23017	23095	23173
		Frequency (MHz)		699.7	707.5	715.3
1.4M	QPSK	1	0	17.03	17.09	16.90
		1	2	16.71	16.81	16.81
		1	5	16.78	16.85	16.85
		3	0	16.97	16.97	17.03
		3	1	16.92	16.98	16.80
		3	3	16.83	17.04	16.94
		6	0	15.88	16.02	15.77
1.4M	16QAM	1	0	16.14	16.32	16.24
		1	2	16.26	16.19	16.21
		1	5	16.09	16.21	16.08
		3	0	15.91	16.02	15.90
		3	1	15.88	15.92	15.83
		3	3	15.92	16.08	15.94
		6	0	14.88	15.09	14.85

*ERP = Conducted + antenna gain (-2.5 dBi) - 2.15

LTE Band 13						
BW	MCS Index	RB Size	RB Offset	Low		
		Channel		23230		
		Frequency (MHz)		782		
10M	QPSK	1	0	16.42		
		1	24	16.30		
		1	49	16.24		
		25	0	15.43		
		25	12	15.29		
		25	25	15.25		
		50	0	15.38		
10M	16QAM	1	0	15.71		
		1	24	15.58		
		1	49	15.49		
		25	0	14.43		
		25	12	14.31		
		25	25	14.27		
		50	0	14.50		
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23205	23230	23255
		Frequency (MHz)		779.5	782	784.5
5M	QPSK	1	0	16.34	16.40	16.32
		1	12	16.24	16.28	16.28
		1	24	16.22	16.15	16.22
		12	0	15.34	15.34	15.39
		12	6	15.24	15.24	15.23
		12	13	15.23	15.22	15.21
		25	0	15.38	15.30	15.35
5M	16QAM	1	0	15.62	15.63	15.64
		1	12	15.54	15.54	15.57
		1	24	15.42	15.40	15.46
		12	0	14.37	14.37	14.42
		12	6	14.29	14.27	14.30
		12	13	14.24	14.26	14.21
		25	0	14.44	14.43	14.47

*ERP = Conducted + antenna gain (-4.3 dBi) - 2.15

LTE Band 66						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		132072	132322	132572
		Frequency (MHz)		1720	1745	1770
20M	QPSK	1	0	20.92	21.19	20.94
		1	50	20.84	20.95	20.88
		1	99	20.78	20.92	20.85
		50	0	20.01	20.28	20.03
		50	25	19.90	20.17	19.92
		50	50	19.87	20.14	19.89
		100	0	19.84	20.11	19.86
20M	16QAM	1	0	20.21	20.48	20.23
		1	50	20.00	20.27	20.02
		1	99	19.98	20.25	20.00
		50	0	18.88	19.15	18.90
		50	25	18.84	19.11	18.86
		50	50	18.80	19.07	18.82
		100	0	18.82	19.09	18.84
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		132047	132322	132597
		Frequency (MHz)		1717.5	1745	1772.5
15M	QPSK	1	0	20.90	21.15	20.86
		1	37	20.83	20.92	20.86
		1	74	20.73	20.88	20.84
		36	0	19.94	20.25	19.94
		36	19	19.85	20.16	19.89
		36	39	19.85	20.14	19.85
		75	0	19.78	20.09	19.78
15M	16QAM	1	0	20.18	20.38	20.15
		1	37	19.94	20.23	20.01
		1	74	19.88	20.21	19.93
		36	0	18.85	19.10	18.80
		36	19	18.75	19.10	18.84
		36	39	18.77	19.01	18.74
		75	0	18.79	19.08	18.81

*EIRP = Conducted + antenna gain (-1.3 dBi)

LTE Band 66						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		132022	132322	132622
		Frequency (MHz)		1715	1745	1775
10M	QPSK	1	0	20.92	21.18	20.87
		1	24	20.76	20.85	20.78
		1	49	20.76	20.91	20.81
		25	0	20.01	20.18	19.93
		25	12	19.88	20.14	19.88
		25	25	19.86	20.04	19.83
		50	0	19.76	20.02	19.80
10M	16QAM	1	0	20.19	20.43	20.16
		1	24	19.90	20.20	19.93
		1	49	19.94	20.19	19.98
		25	0	18.83	19.13	18.87
		25	12	18.83	19.07	18.80
		25	25	18.73	19.02	18.80
		50	0	18.80	19.04	18.82
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		131997	132322	132647
		Frequency (MHz)		1712.5	1745	1777.5
5M	QPSK	1	0	20.82	21.18	20.85
		1	12	20.82	20.93	20.84
		1	24	20.72	20.91	20.75
		12	0	20.01	20.28	20.02
		12	6	19.86	20.14	19.88
		12	13	19.83	20.07	19.82
		25	0	19.83	20.03	19.76
5M	16QAM	1	0	20.12	20.40	20.13
		1	12	19.96	20.21	19.98
		1	24	19.97	20.24	19.94
		12	0	18.85	19.14	18.89
		12	6	18.76	19.02	18.82
		12	13	18.77	19.07	18.82
		25	0	18.75	19.04	18.83

*EIRP = Conducted + antenna gain (-1.3 dBi)

LTE Band 66						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		131987	132322	132657
		Frequency (MHz)		1711.5	1745	1778.5
3M	QPSK	1	0	20.84	21.09	20.74
		1	7	20.81	20.92	20.73
		1	14	20.79	20.86	20.71
		8	0	19.78	20.09	19.97
		8	3	19.71	19.95	19.89
		8	7	19.78	19.99	19.81
		15	0	19.76	20.02	19.77
3M	16QAM	1	0	20.12	20.29	20.14
		1	7	19.92	20.15	19.91
		1	14	19.87	20.12	19.90
		8	0	18.80	19.11	18.80
		8	3	18.78	19.05	18.71
		8	7	18.75	18.90	18.75
		15	0	18.71	19.02	18.80
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		131979	132322	132665
		Frequency (MHz)		1710.7	1745	1779.3
1.4M	QPSK	1	0	20.71	21.12	20.82
		1	2	20.72	20.92	20.73
		1	5	20.71	20.76	20.73
		3	0	20.87	21.16	20.87
		3	1	20.89	21.14	20.85
		3	3	20.81	21.03	20.79
		6	0	20.75	19.99	19.75
1.4M	16QAM	1	0	20.17	20.37	20.15
		1	2	19.84	20.22	19.85
		1	5	19.89	20.12	19.87
		3	0	19.77	19.96	19.74
		3	1	19.75	20.06	19.79
		3	3	19.73	20.00	19.74
		6	0	18.78	18.96	18.78

*EIRP = Conducted + antenna gain (-1.3 dBi)

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

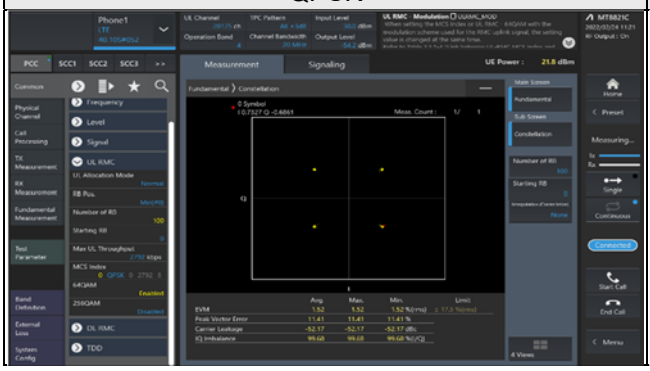
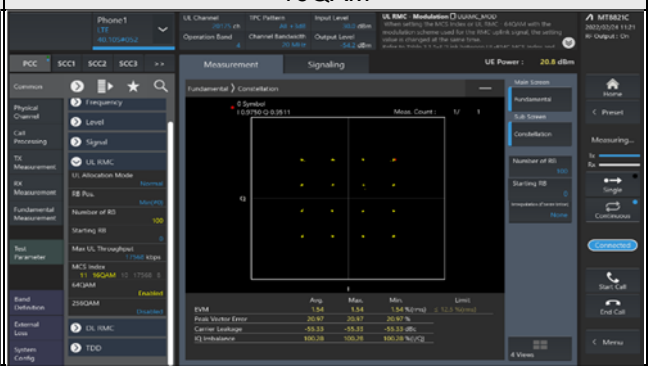
N/A

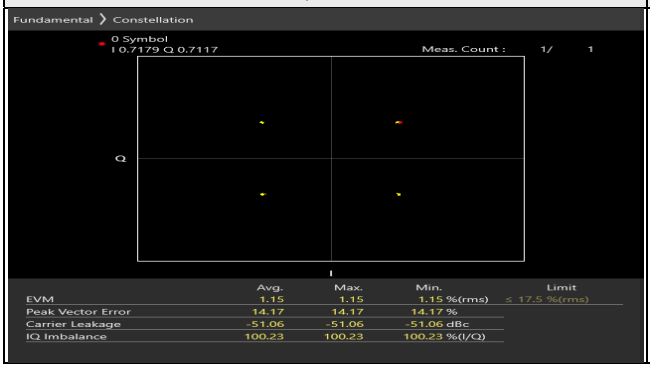
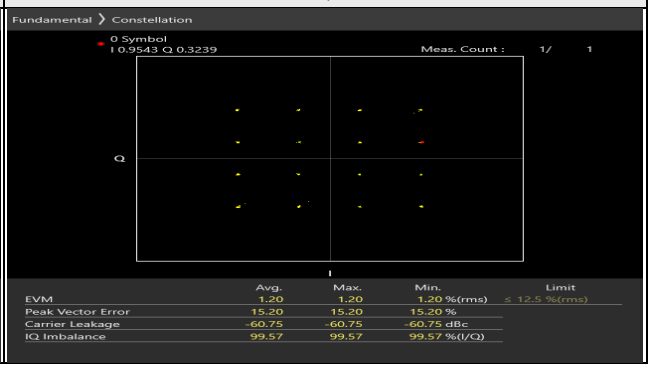
4.2.2 Test Procedure

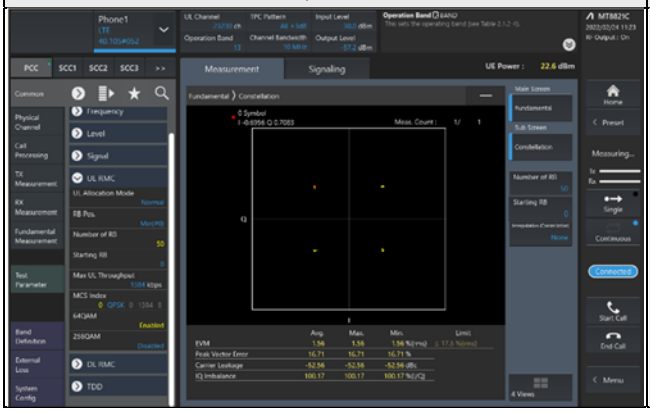
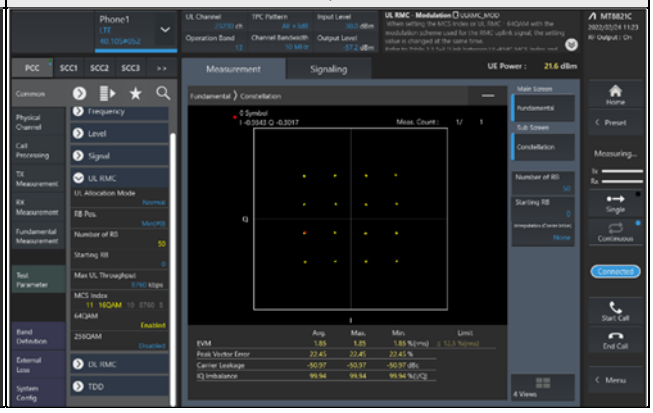
Connect the EUT to Communication Simulator via the antenna connector, The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

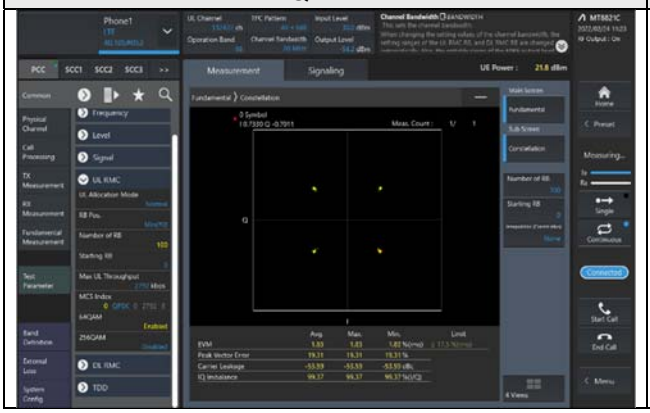
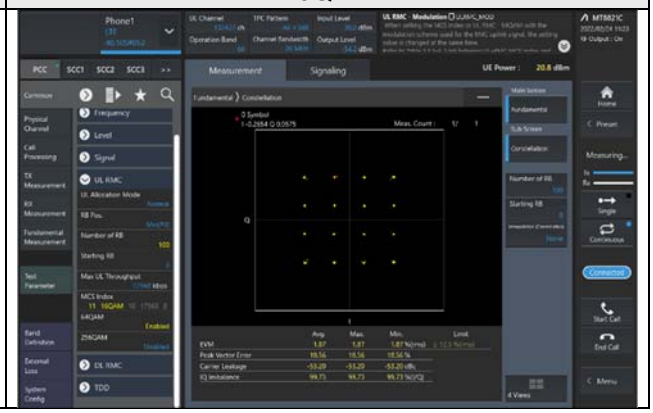
4.2.3 Test Setup

4.2.4 Test Results

LTE Band 4	
Spectrum Plot of Measurement Value	
Channel: 20175 / Frequency (MHz): 1732.5MHz	
QPSK	16QAM
	

LTE Band 12	
Spectrum Plot of Measurement Value	
Channel: 23095 / Frequency (MHz): 707.5MHz	
QPSK	16QAM
	

LTE Band 13	
Spectrum Plot of Measurement Value	
Channel: 23230 / Frequency (MHz): 782.0MHz	
QPSK	16QAM
	

LTE Band 66	
Spectrum Plot of Measurement Value	
Channel: 132322 / Frequency (MHz): 1745.0MHz	
QPSK	16QAM
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT -30℃ ~ 50℃.

4.3.2 Test Procedure

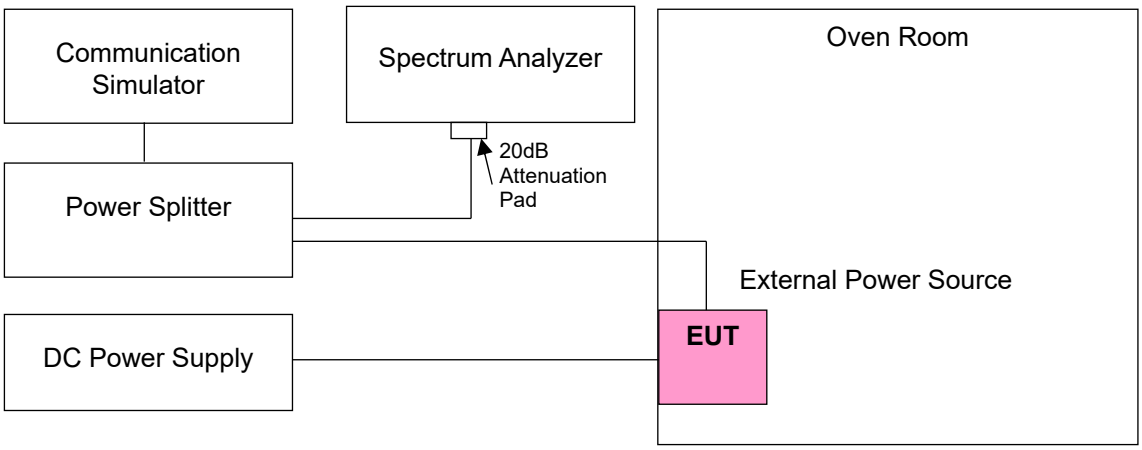
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

Note: The frequency error was recorded frequency error from the communication simulator.

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1710.700001	0.001	1754.300036	0.021
3.30	1710.700004	0.002	1754.300022	0.013
4.43	1710.700003	0.002	1754.300038	0.022

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700003	0.002	1754.300038	0.022
-20	1710.700003	0.002	1754.300026	0.015
-10	1710.700001	0.001	1754.300029	0.017
0	1710.700002	0.001	1754.300026	0.015
10	1710.700003	0.002	1754.300018	0.010
20	1710.699996	-0.002	1754.299970	-0.017
30	1710.699998	-0.001	1754.299965	-0.020
40	1710.699997	-0.002	1754.299976	-0.014
50	1710.699997	-0.002	1754.299969	-0.018

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1711.500036	0.021	1753.500036	0.021
3.30	1711.500021	0.012	1753.500025	0.014
4.43	1711.500027	0.016	1753.500032	0.018

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1711.500014	0.008	1753.500012	0.007
-20	1711.500012	0.007	1753.500029	0.017
-10	1711.500040	0.023	1753.500010	0.006
0	1711.500038	0.022	1753.500016	0.009
10	1711.500033	0.019	1753.500024	0.014
20	1711.499979	-0.012	1753.499966	-0.019
30	1711.499973	-0.016	1753.499977	-0.013
40	1711.499970	-0.018	1753.499968	-0.018
50	1711.499976	-0.014	1753.499967	-0.019

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1712.500026	0.015	1752.500027	0.015
3.30	1712.500022	0.013	1752.500026	0.015
4.43	1712.500018	0.011	1752.500022	0.013

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1712.500037	0.022	1752.500035	0.020
-20	1712.500033	0.019	1752.500014	0.008
-10	1712.500012	0.007	1752.500025	0.014
0	1712.500027	0.016	1752.500035	0.020
10	1712.500014	0.008	1752.500025	0.014
20	1712.499973	-0.016	1752.499965	-0.020
30	1712.499990	-0.006	1752.499975	-0.014
40	1712.499970	-0.018	1752.499981	-0.011
50	1712.499974	-0.015	1752.499980	-0.011

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1715.000033	0.019	1750.000040	0.023
3.30	1715.000025	0.015	1750.000025	0.014
4.43	1715.000025	0.015	1750.000020	0.011

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1715.000023	0.013	1750.000027	0.015
-20	1715.000040	0.023	1750.000013	0.007
-10	1715.000024	0.014	1750.000012	0.007
0	1715.000015	0.009	1750.000027	0.015
10	1715.000035	0.020	1750.000029	0.017
20	1714.999986	-0.008	1749.999989	-0.006
30	1714.999975	-0.015	1749.999962	-0.022
40	1714.999987	-0.008	1749.999976	-0.014
50	1714.999963	-0.022	1749.999987	-0.007

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 15MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1717.500021	0.012	1747.500015	0.009
3.30	1717.500010	0.006	1747.500040	0.023
4.43	1717.500011	0.006	1747.500040	0.023

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 15MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1717.500040	0.023	1747.500020	0.011
-20	1717.500010	0.006	1747.500039	0.022
-10	1717.500022	0.013	1747.500038	0.022
0	1717.500039	0.023	1747.500023	0.013
10	1717.500025	0.015	1747.500036	0.021
20	1717.499990	-0.006	1747.499979	-0.012
30	1717.499969	-0.018	1747.499985	-0.009
40	1717.499968	-0.019	1747.499978	-0.013
50	1717.499962	-0.022	1747.499969	-0.018

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1720.000026	0.015	1745.000029	0.017
3.30	1720.000024	0.014	1745.000029	0.017
4.43	1720.000032	0.019	1745.000035	0.020

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1720.000039	0.023	1745.000013	0.007
-20	1720.000023	0.013	1745.000040	0.023
-10	1720.000038	0.022	1745.000034	0.019
0	1720.000010	0.006	1745.000035	0.020
10	1720.000040	0.023	1745.000040	0.023
20	1719.999981	-0.011	1744.999978	-0.013
30	1719.999972	-0.016	1744.999964	-0.021
40	1719.999987	-0.008	1744.999988	-0.007
50	1719.999966	-0.020	1744.999971	-0.017

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 12			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	699.700011	0.016	715.300010	0.014
3.30	699.700035	0.050	715.300035	0.049
4.43	699.700018	0.026	715.300016	0.022

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	699.700012	0.017	715.300029	0.041
-20	699.700012	0.017	715.300013	0.018
-10	699.700021	0.030	715.300029	0.041
0	699.700016	0.023	715.300033	0.046
10	699.700012	0.017	715.300037	0.052
20	699.699987	-0.019	715.299977	-0.032
30	699.699969	-0.044	715.299982	-0.025
40	699.699966	-0.049	715.299988	-0.017
50	699.699970	-0.043	715.299968	-0.045

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 12			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	700.500038	0.054	714.500027	0.038
3.30	700.500029	0.041	714.500024	0.034
4.43	700.500029	0.041	714.500026	0.036

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	700.500018	0.026	714.500015	0.021
-20	700.500026	0.037	714.500010	0.014
-10	700.500025	0.036	714.500023	0.032
0	700.500033	0.047	714.500035	0.049
10	700.500013	0.019	714.500018	0.025
20	700.499987	-0.019	714.499974	-0.036
30	700.499981	-0.027	714.499969	-0.043
40	700.499980	-0.029	714.499984	-0.022
50	700.499980	-0.029	714.499966	-0.048

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 12			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	701.500024	0.034	713.500022	0.031
3.30	701.500014	0.020	713.500029	0.041
4.43	701.500022	0.031	713.500016	0.022

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	701.500015	0.021	713.500014	0.020
-20	701.500030	0.043	713.500020	0.028
-10	701.500015	0.021	713.500032	0.045
0	701.500039	0.056	713.500024	0.034
10	701.500036	0.051	713.500035	0.049
20	701.499979	-0.030	713.499988	-0.017
30	701.499979	-0.030	713.499983	-0.024
40	701.499967	-0.047	713.499975	-0.035
50	701.499990	-0.014	713.499986	-0.020

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 12			
	Channel Bandwidth 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	704.000020	0.028	711.000027	0.038
3.30	704.000022	0.031	711.000022	0.031
4.43	704.000020	0.028	711.000039	0.055

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12			
	Channel Bandwidth 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	704.000020	0.028	711.000028	0.039
-20	704.000025	0.036	711.000025	0.035
-10	704.000012	0.017	711.000037	0.052
0	704.000028	0.040	711.000017	0.024
10	704.000020	0.028	711.000028	0.039
20	703.999962	-0.054	710.999990	-0.014
30	703.999971	-0.041	710.999968	-0.045
40	703.999977	-0.033	710.999960	-0.056
50	703.999982	-0.026	710.999978	-0.031

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 13			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	779.500023	0.030	784.500040	0.051
3.30	779.500036	0.046	784.500040	0.051
4.43	779.500012	0.015	784.500020	0.025

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 13			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	779.500040	0.051	784.500033	0.042
-20	779.500031	0.040	784.500032	0.041
-10	779.500017	0.022	784.500027	0.034
0	779.500013	0.017	784.500030	0.038
10	779.500018	0.023	784.500038	0.048
20	779.499965	-0.045	784.499966	-0.043
30	779.499990	-0.013	784.499971	-0.037
40	779.499983	-0.022	784.499990	-0.013
50	779.499982	-0.023	784.499965	-0.045

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 13	
	Channel Bandwidth 10MHz	
	Frequency (MHz)	Frequency Error (ppm)
3.85	782.000037	0.047
3.30	782.000027	0.035
4.43	782.000040	0.051

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 13	
	Channel Bandwidth 10MHz	
	Frequency (MHz)	Frequency Error (ppm)
-30	782.000033	0.042
-20	782.000010	0.013
-10	782.000013	0.017
0	782.000029	0.037
10	782.000013	0.017
20	781.999986	-0.018
30	781.999980	-0.026
40	781.999962	-0.049
50	781.999977	-0.029

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 66			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1710.700033	0.019	1779.300012	0.007
3.30	1710.700021	0.012	1779.300016	0.009
4.43	1710.700037	0.022	1779.300033	0.019

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700040	0.023	1779.300018	0.010
-20	1710.700016	0.009	1779.300030	0.017
-10	1710.700026	0.015	1779.300027	0.015
0	1710.700020	0.012	1779.300030	0.017
10	1710.700020	0.012	1779.300023	0.013
20	1710.699978	-0.013	1779.299960	-0.022
30	1710.699984	-0.009	1779.299978	-0.012
40	1710.699979	-0.012	1779.299969	-0.017
50	1710.699987	-0.008	1779.299989	-0.006

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 66			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1711.500026	0.015	1778.500012	0.007
3.30	1711.500026	0.015	1778.500013	0.007
4.43	1711.500011	0.006	1778.500031	0.017

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1711.500016	0.009	1778.500029	0.016
-20	1711.500017	0.010	1778.500015	0.008
-10	1711.500033	0.019	1778.500038	0.021
0	1711.500040	0.023	1778.500012	0.007
10	1711.500011	0.006	1778.500012	0.007
20	1711.499990	-0.006	1778.499964	-0.020
30	1711.499965	-0.020	1778.499986	-0.008
40	1711.499967	-0.019	1778.499961	-0.022
50	1711.499969	-0.018	1778.499980	-0.011

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 66			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1712.500029	0.017	1777.500011	0.006
3.30	1712.500021	0.012	1777.500034	0.019
4.43	1712.500040	0.023	1777.500035	0.020

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1712.500023	0.013	1777.500023	0.013
-20	1712.500026	0.015	1777.500032	0.018
-10	1712.500036	0.021	1777.500015	0.008
0	1712.500022	0.013	1777.500019	0.011
10	1712.500040	0.023	1777.500027	0.015
20	1712.499972	-0.016	1777.499961	-0.022
30	1712.499983	-0.010	1777.499977	-0.013
40	1712.499976	-0.014	1777.499981	-0.011
50	1712.499988	-0.007	1777.499985	-0.008

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 66			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1715.000023	0.013	1775.000011	0.006
3.30	1715.000019	0.011	1775.000035	0.020
4.43	1715.000030	0.017	1775.000033	0.019

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1715.000014	0.008	1775.000030	0.017
-20	1715.000028	0.016	1775.000021	0.012
-10	1715.000025	0.015	1775.000027	0.015
0	1715.000038	0.022	1775.000039	0.022
10	1715.000028	0.016	1775.000015	0.008
20	1714.999989	-0.006	1774.999966	-0.019
30	1714.999960	-0.023	1774.999987	-0.007
40	1714.999978	-0.013	1774.999983	-0.010
50	1714.999977	-0.013	1774.999970	-0.017

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 66			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1717.500010	0.006	1772.500014	0.008
3.30	1717.500032	0.019	1772.500012	0.007
4.43	1717.500031	0.018	1772.500014	0.008

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1717.500037	0.022	1772.500017	0.010
-20	1717.500019	0.011	1772.500027	0.015
-10	1717.500034	0.020	1772.500036	0.020
0	1717.500037	0.022	1772.500022	0.012
10	1717.500020	0.012	1772.500039	0.022
20	1717.499979	-0.012	1772.499969	-0.017
30	1717.499975	-0.015	1772.499980	-0.011
40	1717.499980	-0.012	1772.499981	-0.011
50	1717.499973	-0.016	1772.499975	-0.014

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 66			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1720.000025	0.015	1770.000025	0.014
3.30	1720.000020	0.012	1770.000029	0.016
4.43	1720.000017	0.010	1770.000028	0.016

Note: The applicant defined the normal working voltage is from 3.30Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1720.000019	0.011	1770.000020	0.011
-20	1720.000033	0.019	1770.000029	0.016
-10	1720.000015	0.009	1770.000021	0.012
0	1720.000010	0.006	1770.000031	0.018
10	1720.000011	0.006	1770.000018	0.010
20	1719.999970	-0.017	1769.999969	-0.018
30	1719.999990	-0.006	1769.999972	-0.016
40	1719.999989	-0.006	1769.999988	-0.007
50	1719.999986	-0.008	1769.999965	-0.020

4.4 Emission Bandwidth Measurement

4.4.1 Limits of Emission Bandwidth Measurement

According to FCC 2.1049, the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 % of the total mean power radiated by a given emission.

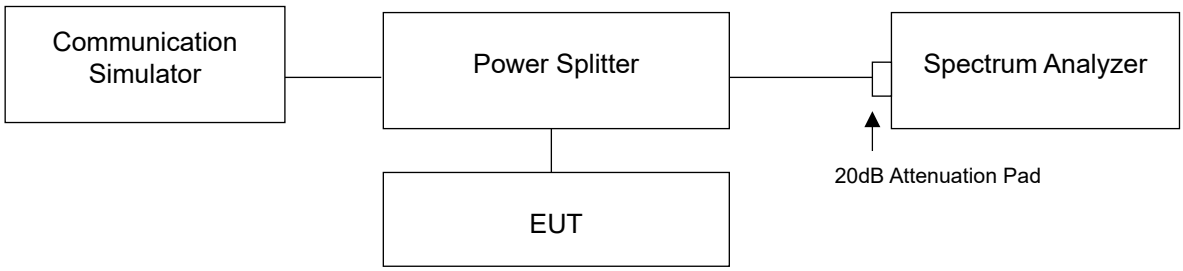
4.4.2 Test Procedure

For the 26dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
f) Determine the following reference values: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
g) Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
h) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
i) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

4.4.3 Test Setup



4.4.4 Test Result

Occupied Bandwidth

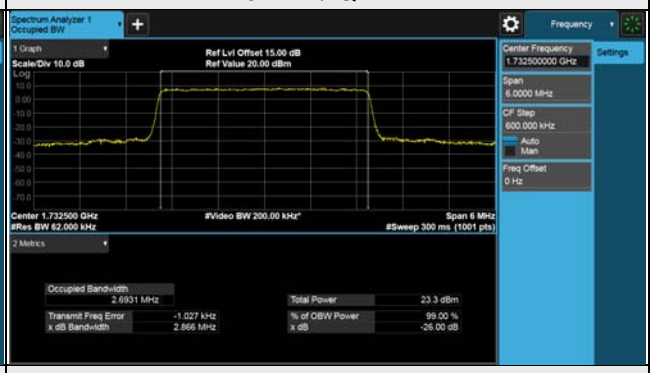
LTE Band 4, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
19957	1710.7	1.09	1.09
20175	1732.5	1.09	1.09
20393	1754.3	1.09	1.09
LTE Band 4, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
19965	1711.5	2.69	2.69
20175	1732.5	2.69	2.69
20385	1753.5	2.69	2.69
LTE Band 4, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
19975	1712.5	4.49	4.49
20175	1732.5	4.49	4.49
20375	1752.5	4.50	4.49
LTE Band 4, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
20000	1715.0	8.98	8.98
20175	1732.5	8.98	8.98
20350	1750.0	8.98	8.98
LTE Band 4, Channel Bandwidth 15MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
20025	1717.5	13.47	13.46
20175	1732.5	13.47	13.47
20325	1747.5	13.47	13.45

LTE Band 4, Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
20050	1720.0	17.95	17.97
20175	1732.5	17.97	17.98
20300	1745.0	17.93	17.94

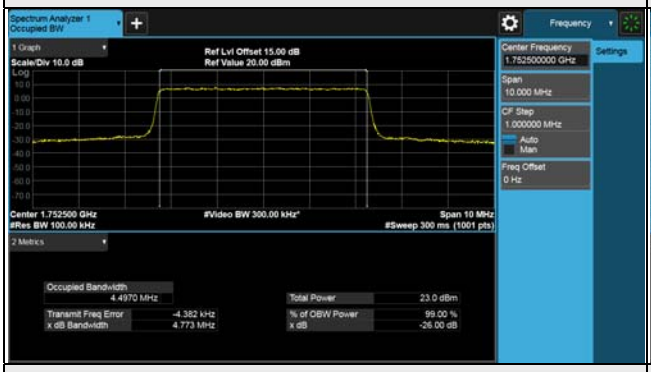
Spectrum Plot of Worst Value

1.4MHz / QPSK

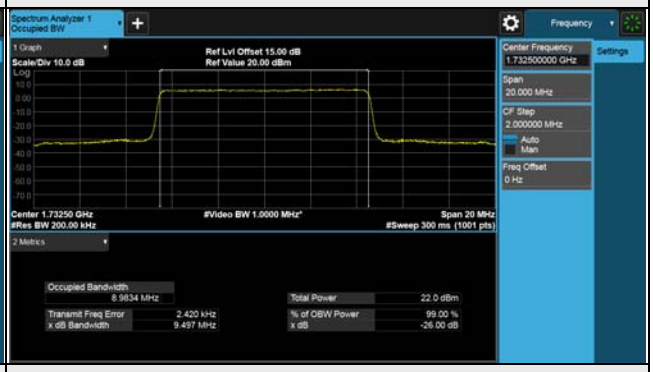
3MHz / QPSK



5MHz / QPSK



10MHz / 16QAM



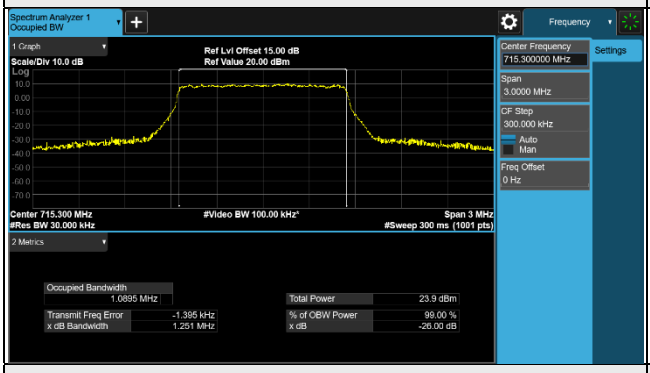
15MHz / QPSK

20MHz / 16QAM

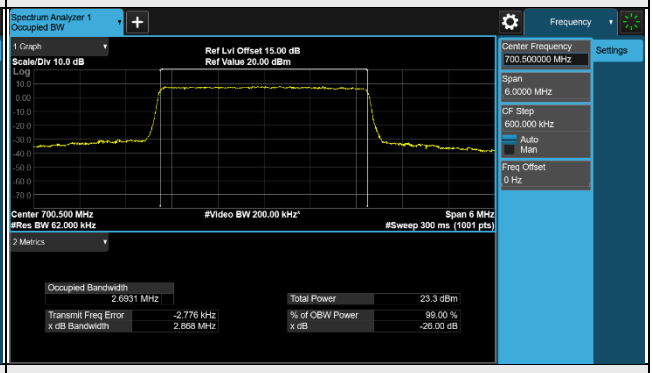
LTE Band 12, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
23017	699.7	1.09	1.09
23095	707.5	1.09	1.09
23173	715.3	1.09	1.09
LTE Band 12, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
23025	700.5	2.69	2.69
23095	707.5	2.69	2.69
23165	714.5	2.69	2.69
LTE Band 12, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
23035	701.5	4.50	4.50
23095	707.5	4.50	4.49
23155	713.5	4.50	4.49
LTE Band 12, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
23060	704.0	8.99	8.98
23095	707.5	8.97	8.97
23130	711.0	8.97	8.97

Spectrum Plot of Worst Value

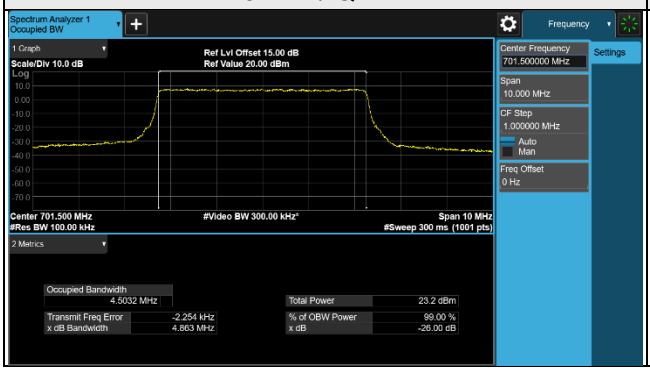
1.4MHz / QPSK



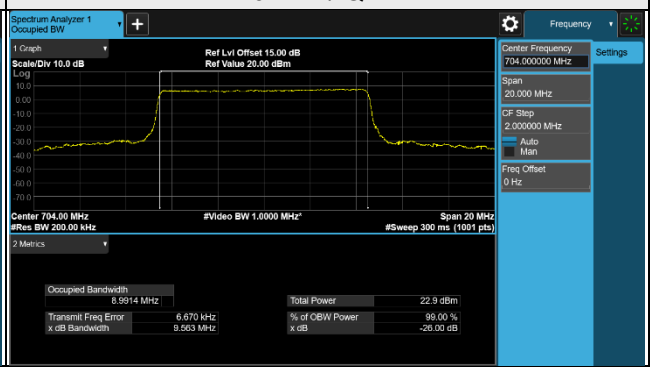
3MHz / QPSK



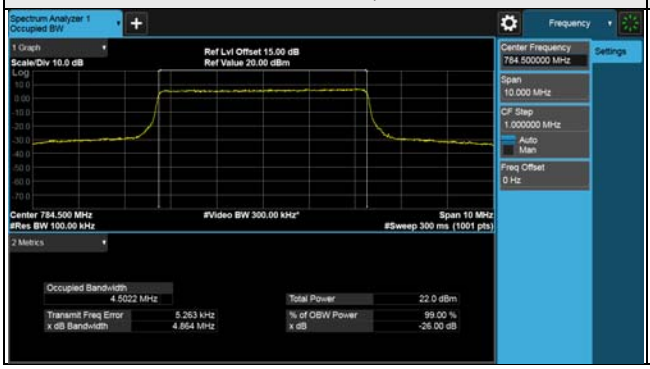
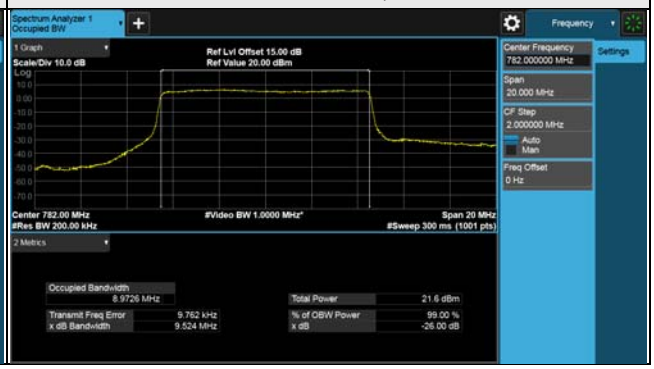
5MHz / QPSK



10MHz / QPSK



LTE Band 13, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
23205	779.5	4.48	4.48
23230	782.0	4.50	4.50
23255	784.5	4.50	4.50
LTE Band 13, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
23230	782.0	8.97	8.97

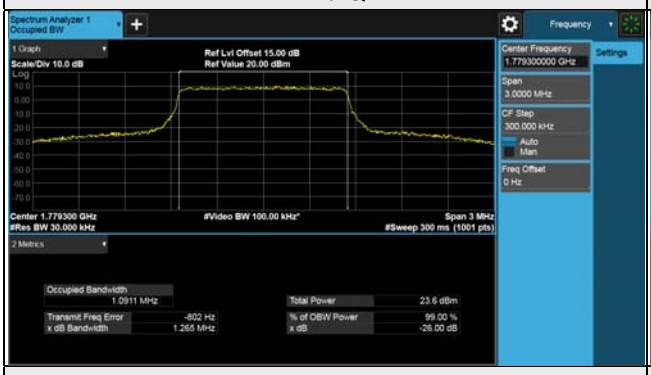
Spectrum Plot of Worst Value	
5MHz / 16QAM	10MHz / 16QAM
	

LTE Band 66, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
131979	1710.7	1.09	1.09
132322	1745.0	1.09	1.09
132665	1779.3	1.09	1.09
LTE Band 66, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
131987	1711.5	2.69	2.69
132322	1745.0	2.69	2.69
132657	1778.5	2.69	2.69
LTE Band 66, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
131997	1712.5	4.50	4.49
132322	1745.0	4.49	4.49
132647	1777.5	4.50	4.50
LTE Band 66, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
132022	1715.0	8.98	8.98
132322	1745.0	8.98	8.98
132622	1775.0	8.99	8.98
LTE Band 66, Channel Bandwidth 15MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
132047	1717.5	13.47	13.46
132322	1745.0	13.45	13.45
132597	1772.5	13.47	13.45

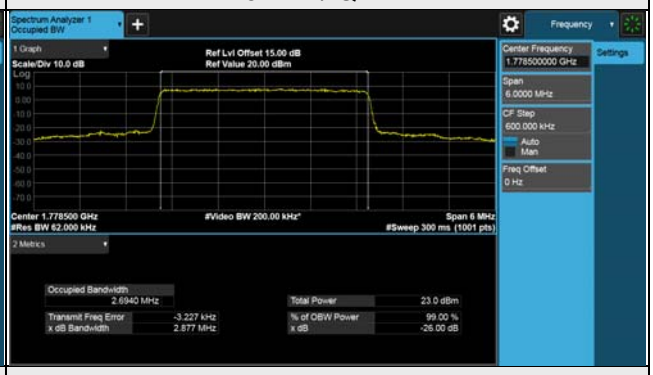
LTE Band 66, Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
132072	1720.0	17.95	17.97
132322	1745.0	17.94	17.95
132572	1770.0	17.94	17.95

Spectrum Plot of Worst Value

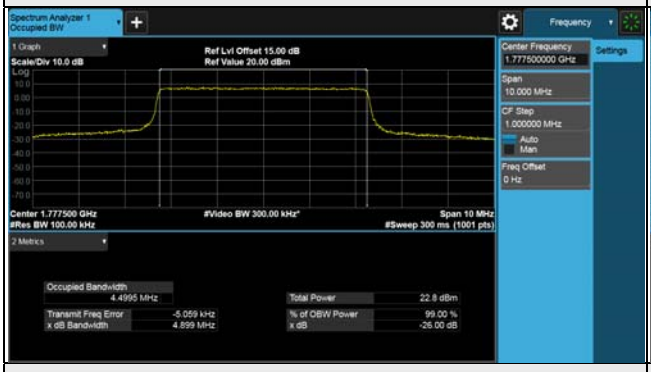
1.4MHz / QPSK



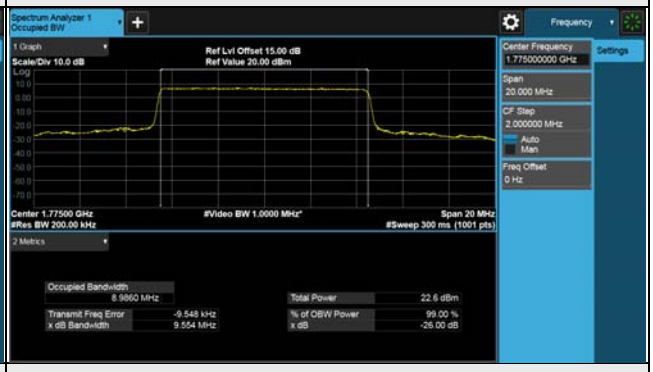
3MHz / QPSK



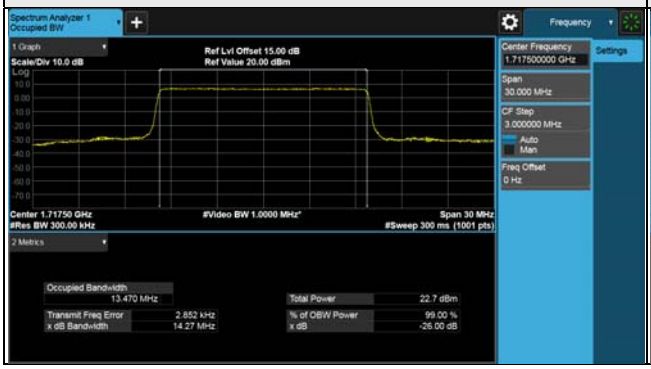
5MHz / QPSK



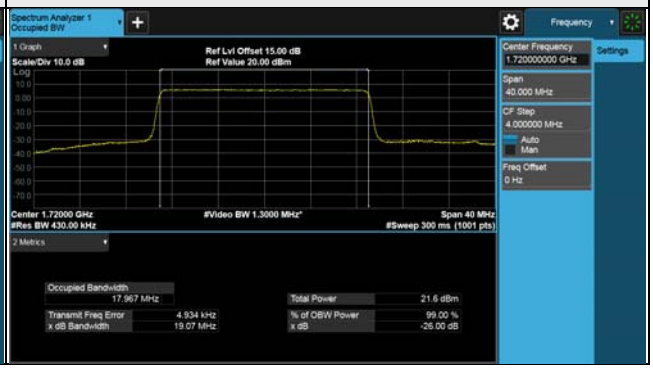
10MHz / QPSK



15MHz / QPSK



20MHz / 16QAM



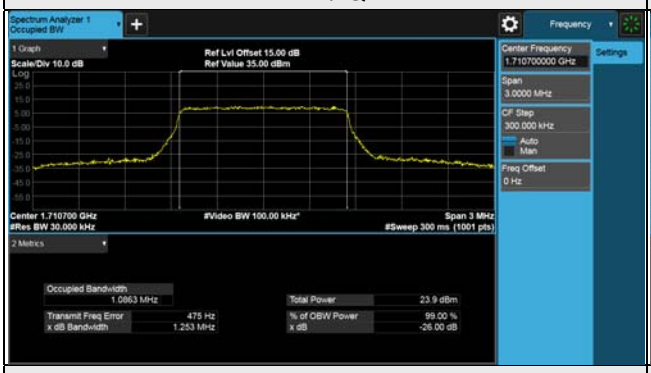
26dB Bandwidth

LTE Band 4, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
19957	1710.7	1.25	1.24
20175	1732.5	1.25	1.25
20393	1754.3	1.25	1.24
LTE Band 4, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
19965	1711.5	2.86	2.86
20175	1732.5	2.87	2.87
20385	1753.5	2.87	2.88
LTE Band 4, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
19975	1712.5	4.78	4.77
20175	1732.5	4.77	4.78
20375	1752.5	4.77	4.77
LTE Band 4, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
20000	1715.0	9.50	9.50
20175	1732.5	9.50	9.50
20350	1750.0	9.51	9.51
LTE Band 4, Channel Bandwidth 15MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
20025	1717.5	14.23	14.23
20175	1732.5	14.22	14.23
20325	1747.5	14.23	14.24

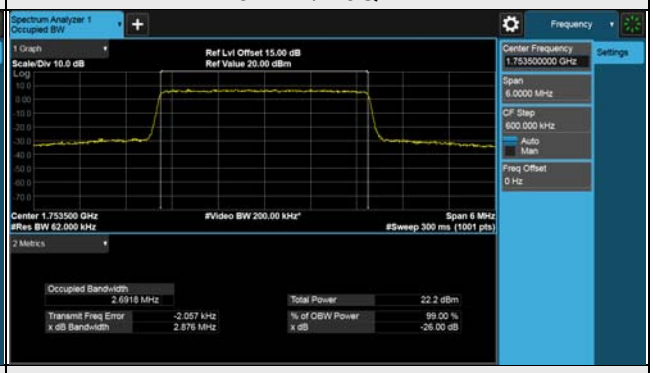
LTE Band 4, Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
20050	1720.0	19.03	19.03
20175	1732.5	19.04	19.03
20300	1745.0	19.03	19.03

Spectrum Plot of Worst Value

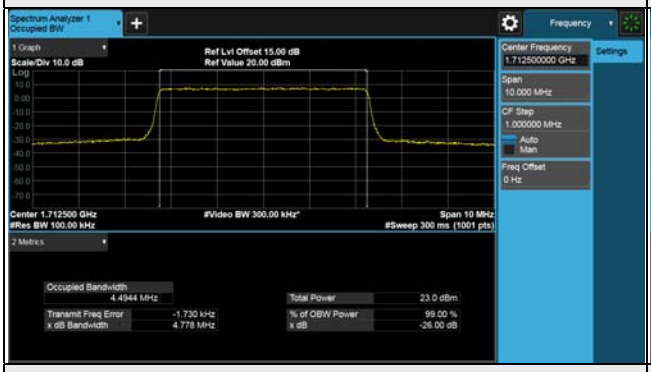
1.4MHz / QPSK



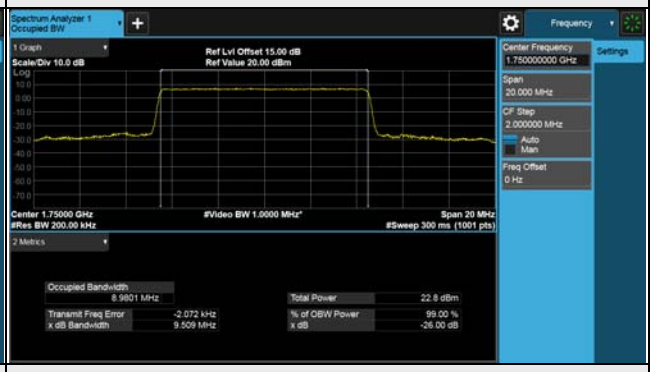
3MHz / 16QAM



5MHz / QPSK



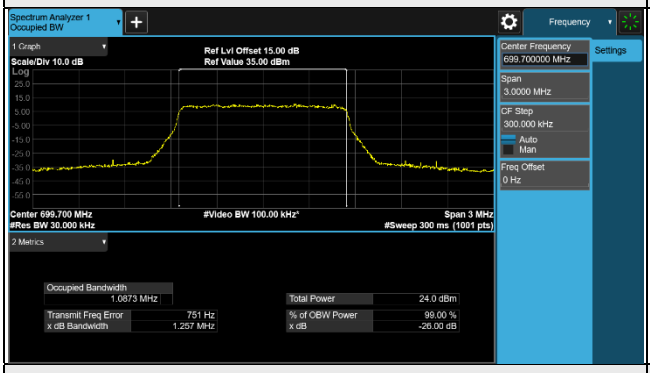
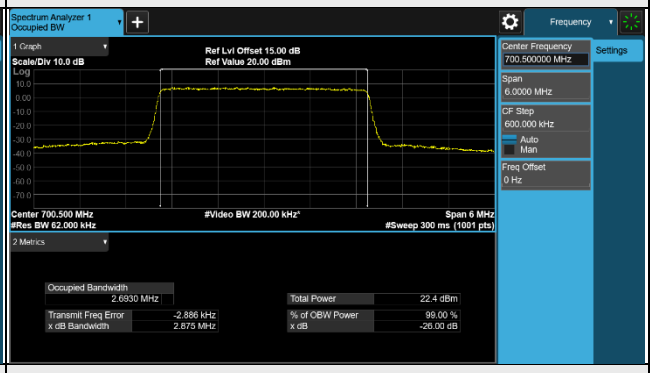
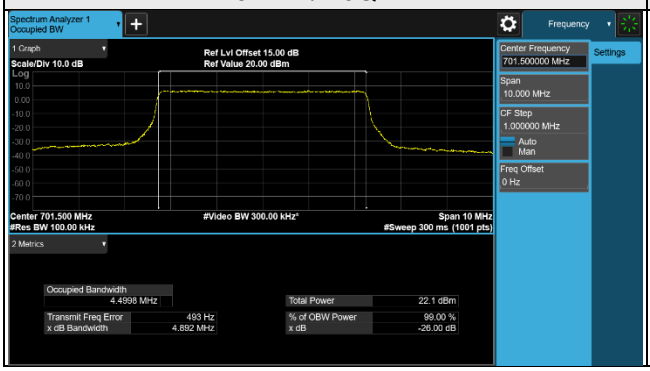
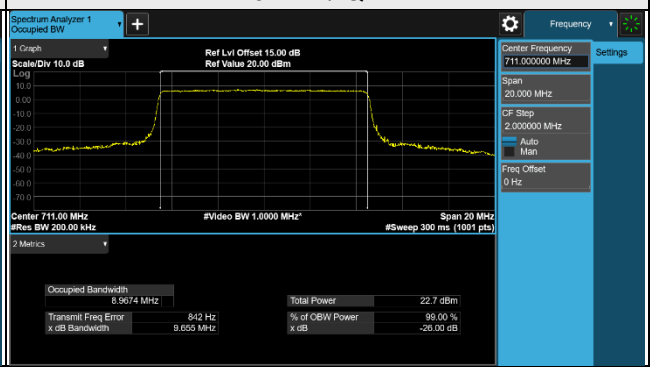
10MHz / QPSK



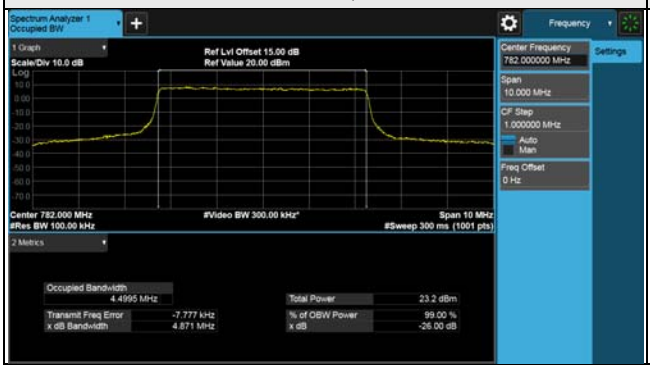
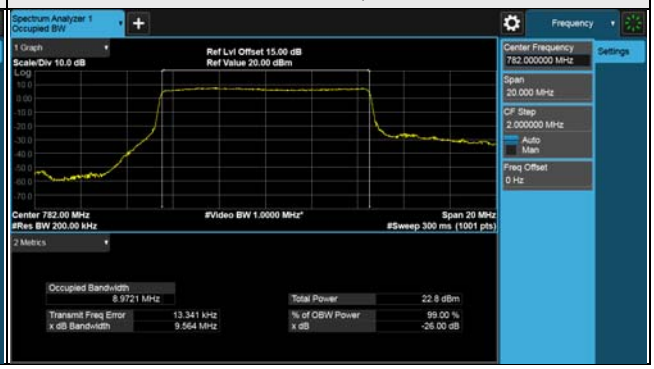
15MHz / 16QAM

20MHz / QPSK

LTE Band 12, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
23017	699.7	1.26	1.24
23095	707.5	1.26	1.24
23173	715.3	1.25	1.24
LTE Band 12, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
23025	700.5	2.87	2.88
23095	707.5	2.87	2.87
23165	714.5	2.87	2.88
LTE Band 12, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
23035	701.5	4.86	4.89
23095	707.5	4.85	4.86
23155	713.5	4.85	4.86
LTE Band 12, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
23060	704.0	9.56	9.56
23095	707.5	9.52	9.52
23130	711.0	9.66	9.52

Spectrum Plot of Worst Value	
1.4MHz / QPSK	3MHz / 16QAM
	
5MHz / 16QAM	10MHz / QPSK
	

LTE Band 13, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
23205	779.5	4.80	4.82
23230	782.0	4.87	4.87
23255	784.5	4.86	4.86
LTE Band 13, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
23230	782.0	9.56	9.52

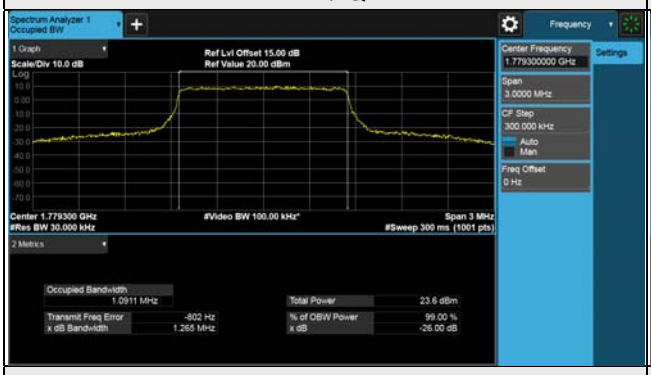
Spectrum Plot of Worst Value	
5MHz / QPSK	10MHz / QPSK
	

LTE Band 66, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
131979	1710.7	1.25	1.24
132322	1745.0	1.24	1.25
132665	1779.3	1.27	1.26
LTE Band 66, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
131987	1711.5	2.87	2.88
132322	1745.0	2.88	2.87
132657	1778.5	2.88	2.87
LTE Band 66, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
131997	1712.5	4.87	4.88
132322	1745.0	4.89	4.89
132647	1777.5	4.90	4.87
LTE Band 66, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
132022	1715.0	9.58	9.54
132322	1745.0	9.59	9.53
132622	1775.0	9.55	9.56
LTE Band 66, Channel Bandwidth 15MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
132047	1717.5	14.27	14.28
132322	1745.0	14.27	14.31
132597	1772.5	14.27	14.28

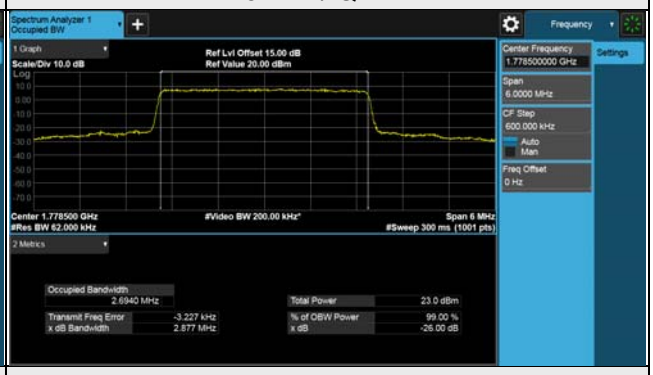
LTE Band 66, Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
132072	1720.0	19.06	19.07
132322	1745.0	19.03	19.03
132572	1770.0	19.05	19.05

Spectrum Plot of Worst Value

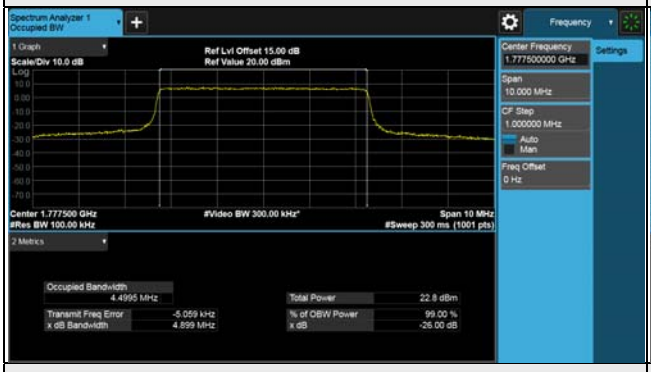
1.4MHz / QPSK



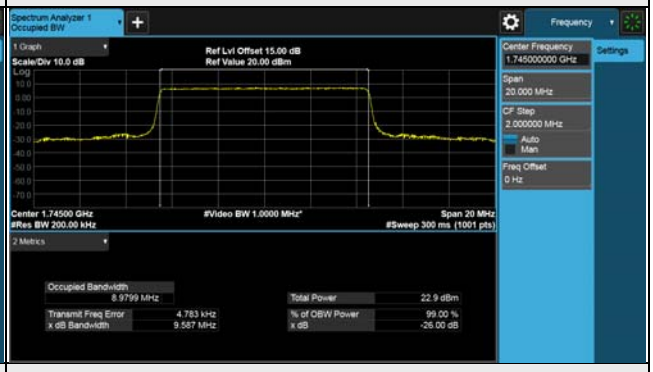
3MHz / QPSK



5MHz / QPSK

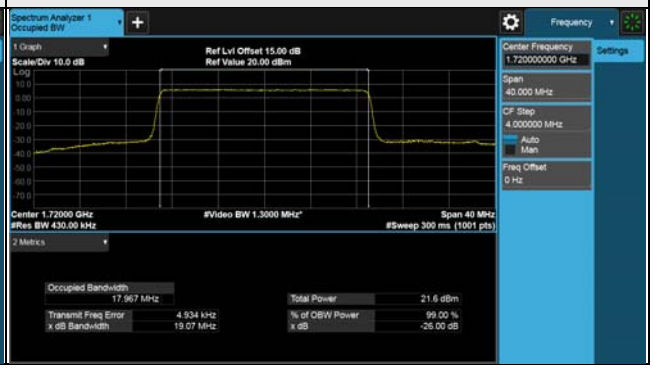


10MHz / QPSK



15MHz / 16QAM

20MHz / 16QAM



4.5 Channel Edge / Out-of-Band Emissions Measurement

4.5.1 Limits of Band Edge / Out-of-Band Emissions Measurement

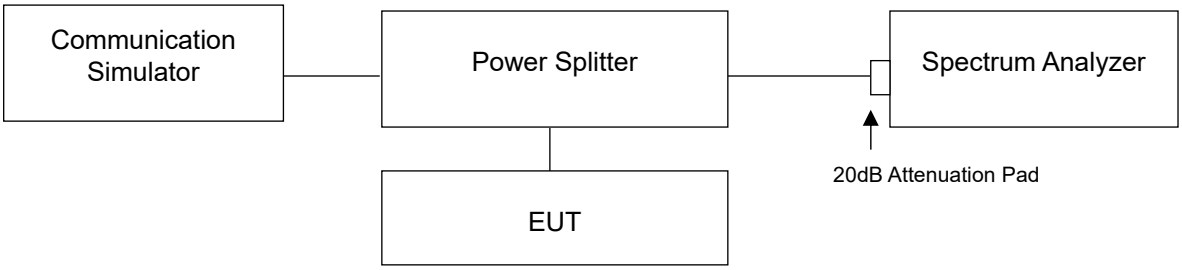
For LTE Band 4, LTE Band 66:
According to FCC 27.53(h), for operations in the 1695-1710MHz, 1710-1755MHz, 1755-1780 MHz, 1915-1920MHz, 1995-2000 MHz, 2000-2020MHz, 2110-2155MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P) dB. 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.

For LTE Band 12:
According to FCC 27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. 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.

For LTE Band 13:
According to FCC 27.53(c)(2), for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB. Compliance 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.

According to 27.53(c)(4), on all frequencies between 763-775MHz and 793-805MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations

4.5.2 Test Setup

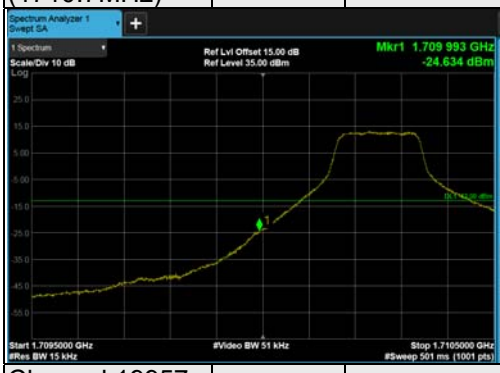
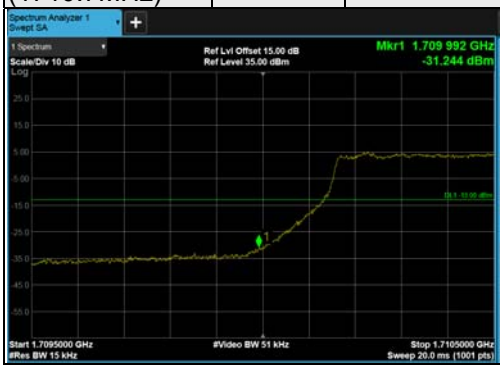
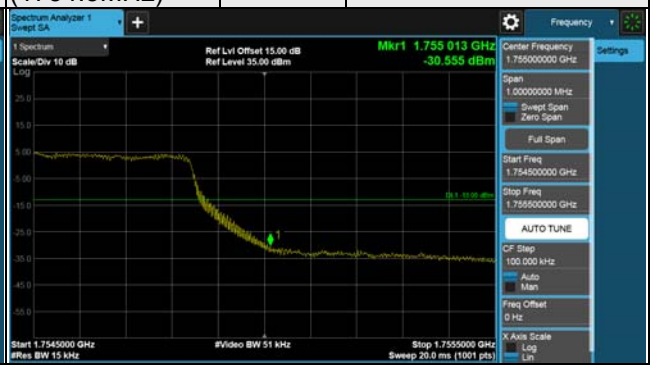


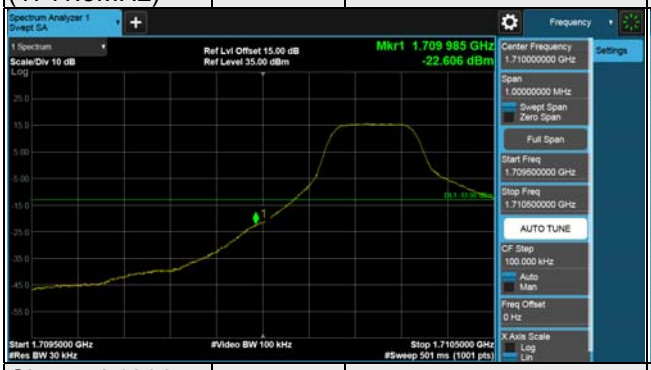
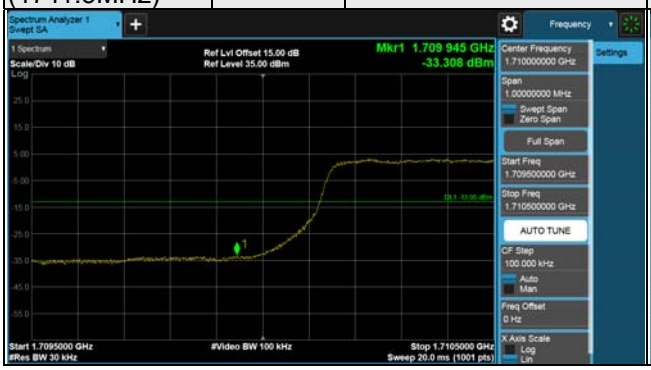
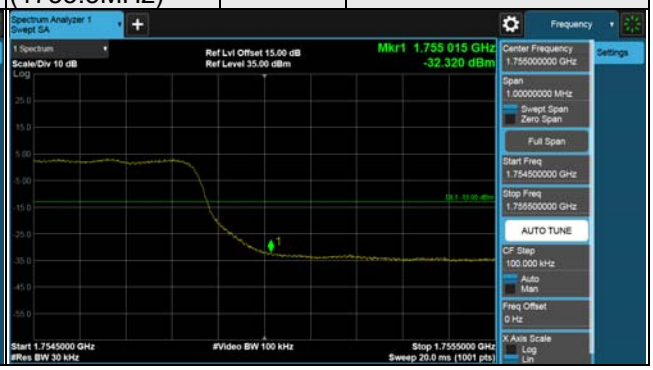
4.5.3 Test Procedures

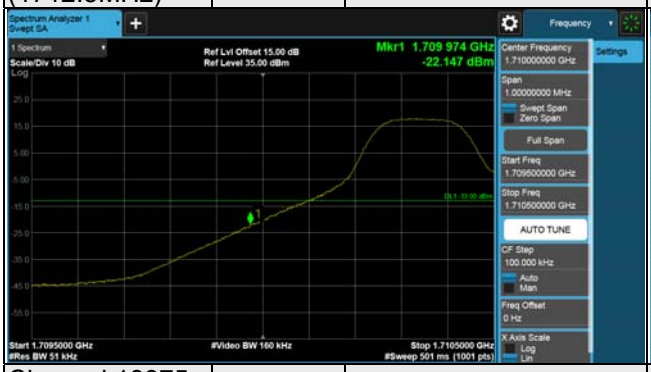
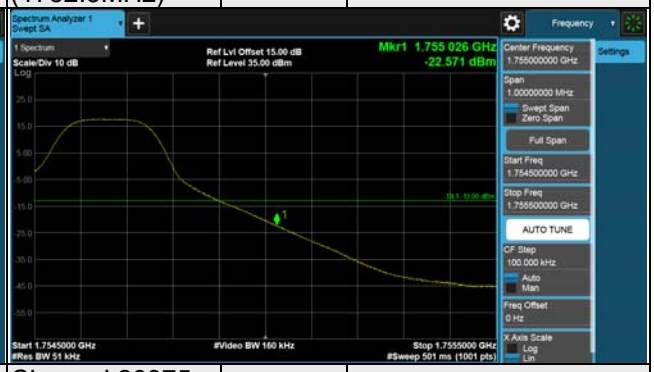
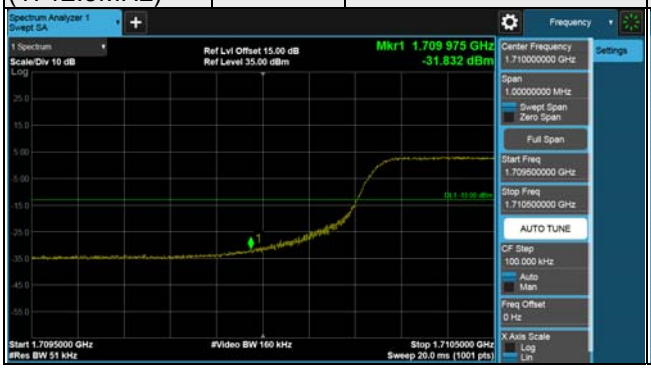
a. The EUT was set up for the rated peak power. The power was measured with Spectrum Analyzer. Band edge measurements were done at 2 channels: low and high operational frequency range.
b. Measurement refer to ANSI C63.26 section 5.7.2 and FCC Part 27 section 27.53.
c. Record the max trace plot into the test report.

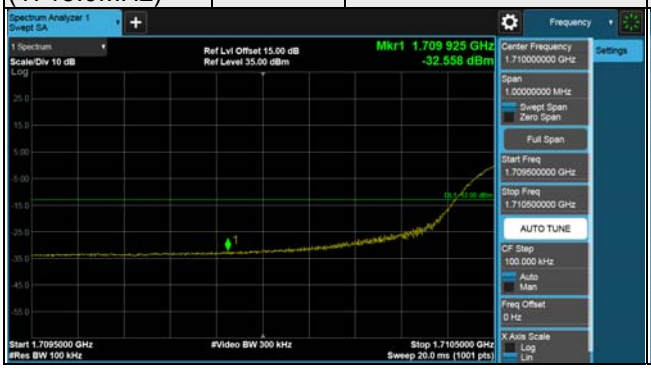
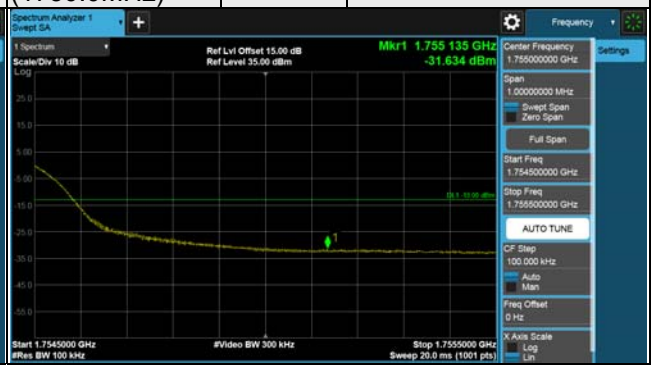
4.5.4 Test Results

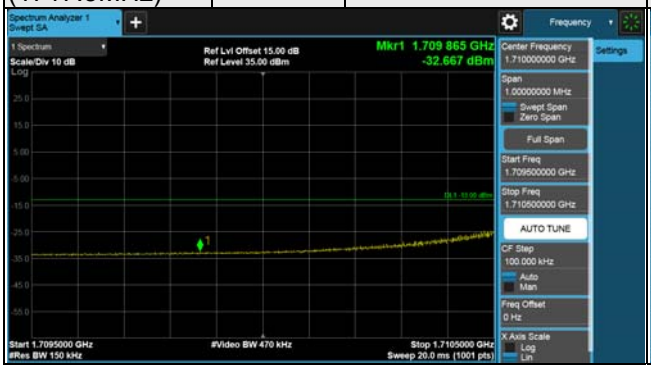
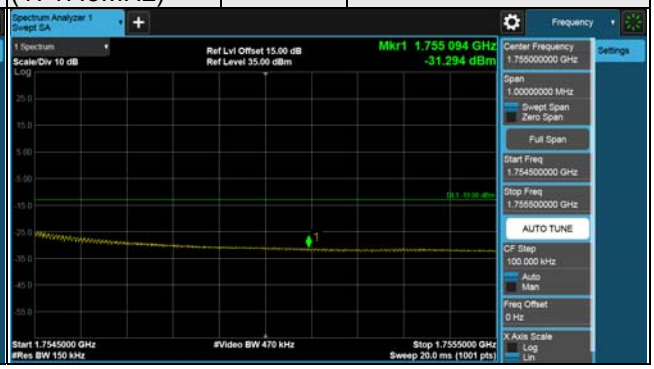
Band Edge

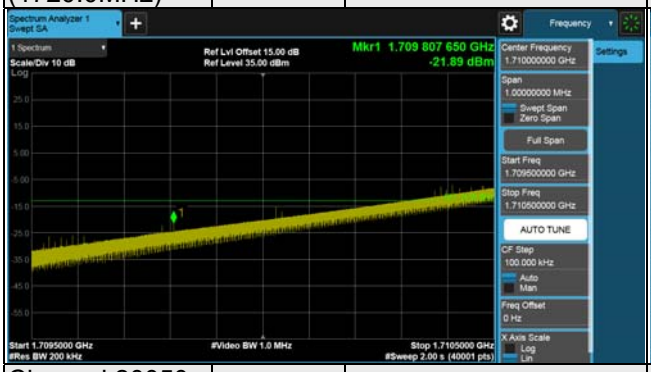
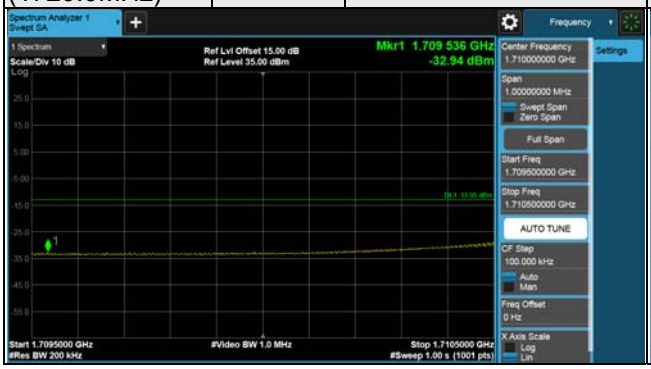
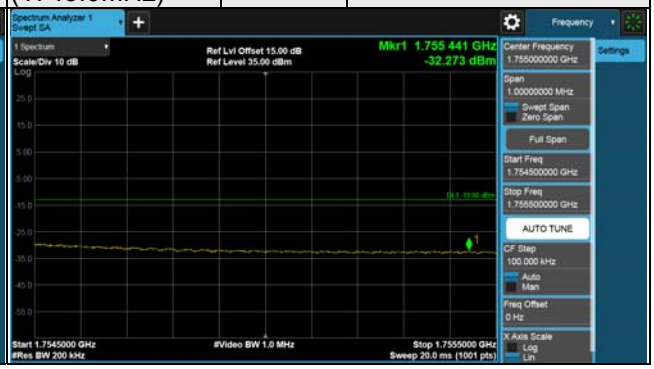
LTE Band 4, Channel Bandwidth 1.4MHz					
Channel 19957 (1710.7MHz)	QPSK	1 RB / 0 RB Offset	Channel 20393 (1754.3MHz)	QPSK	1 RB / 5 RB Offset
					
Channel 19957 (1710.7MHz)	QPSK	6 RB / 0 RB Offset	Channel 20393 (1754.3MHz)	QPSK	6 RB / 0 RB Offset
					

LTE Band 4, Channel Bandwidth 3MHz					
Channel 19965 (1711.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 20385 (1753.5MHz)	QPSK	1 RB / 14 RB Offset
					
Channel 19965 (1711.5MHz)	QPSK	15 RB / 0 RB Offset	Channel 20385 (1753.5MHz)	QPSK	15 RB / 0 RB Offset
					

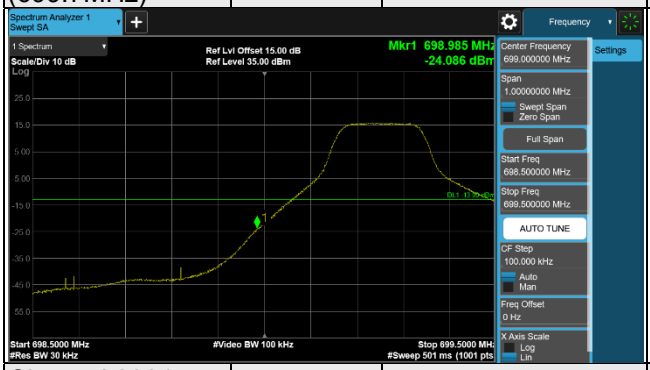
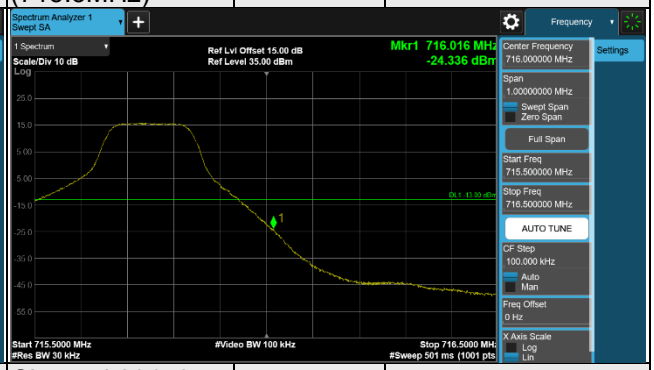
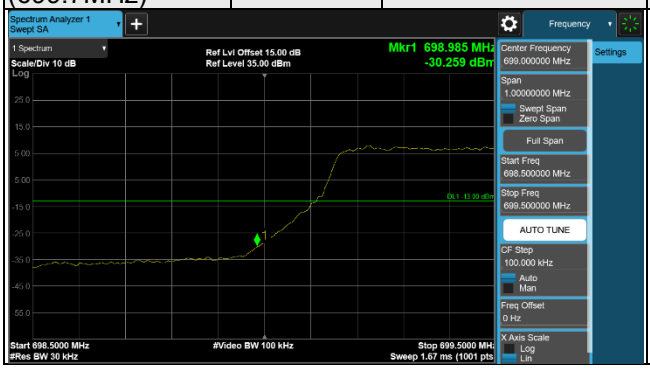
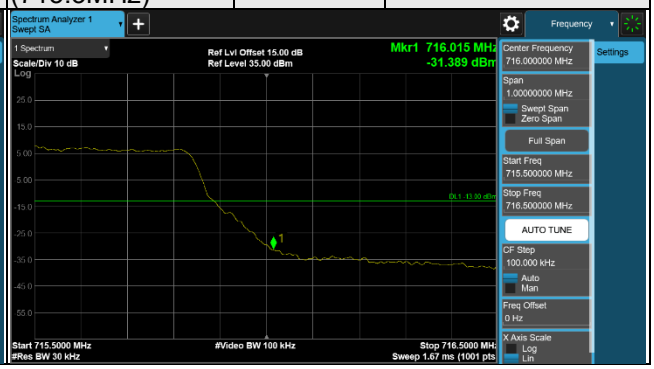
LTE Band 4, Channel Bandwidth 5MHz					
Channel 19975 (1712.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 20375 (1752.5MHz)	QPSK	1 RB / 24 RB Offset
					
Channel 19975 (1712.5MHz)	QPSK	25 RB / 0 RB Offset	Channel 20375 (1752.5MHz)	QPSK	25 RB / 0 RB Offset
					

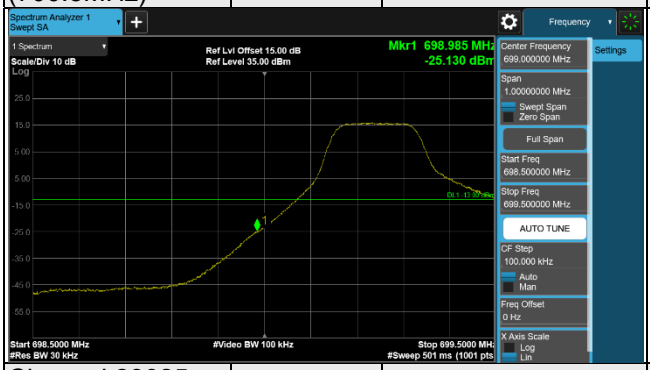
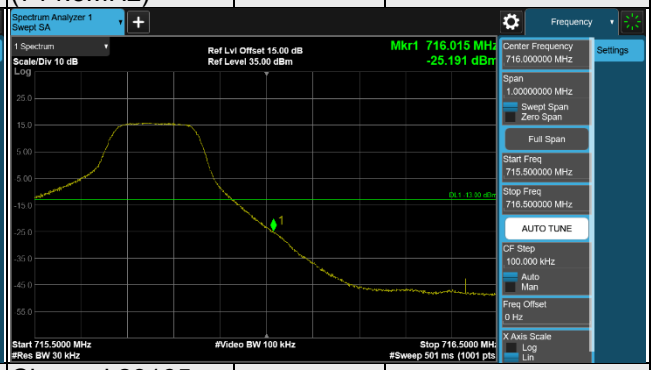
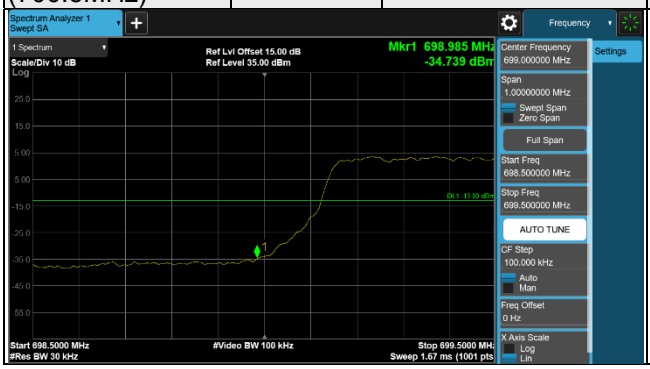
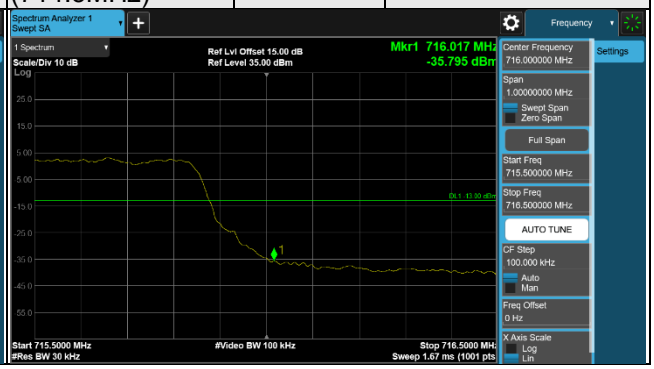
LTE Band 4, Channel Bandwidth 10MHz					
Channel 20000 (1715.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 20350 (1750.0MHz)	QPSK	1 RB / 49 RB Offset
Channel 20000 (1715.0MHz)	QPSK	50 RB / 0 RB Offset	Channel 20350 (1750.0MHz)	QPSK	50 RB / 0 RB Offset
					

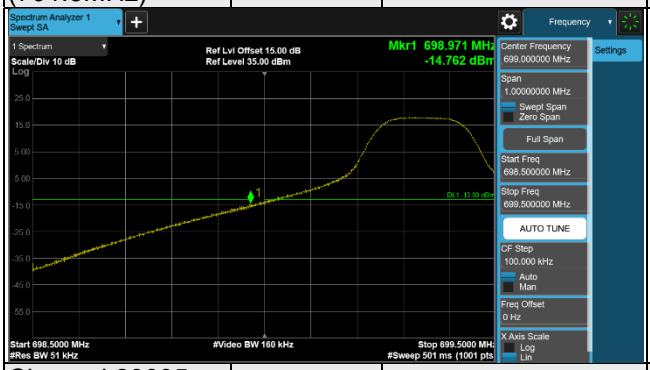
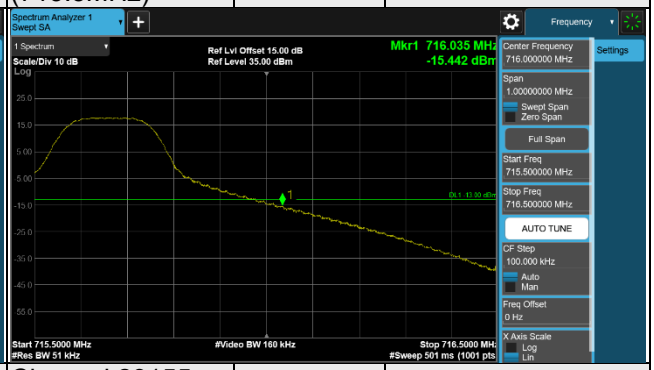
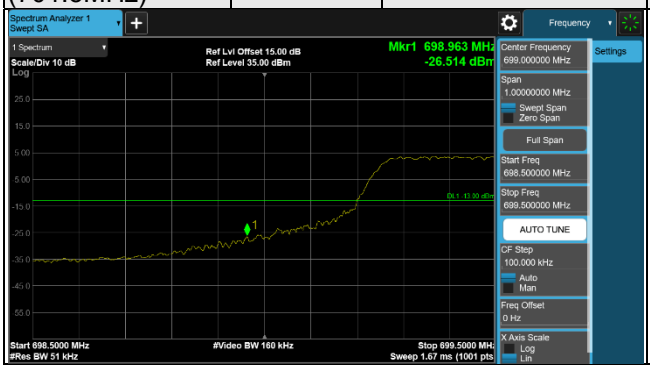
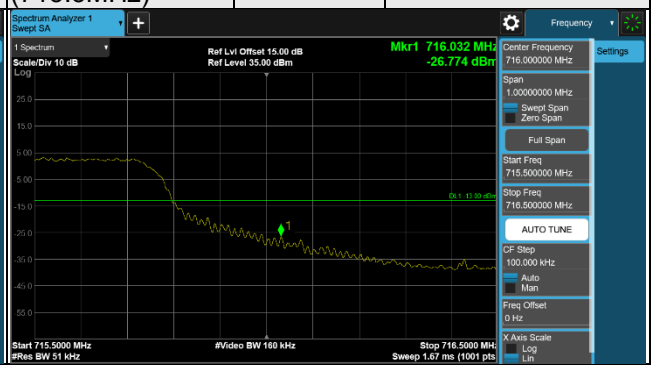
LTE Band 4, Channel Bandwidth 15MHz					
Channel 20025 (1717.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 20325 (1747.5MHz)	QPSK	1 RB / 74 RB Offset
Channel 20025 (1717.5MHz)	QPSK	75 RB / 0 RB Offset	Channel 20325 (1747.5MHz)	QPSK	75 RB / 0 RB Offset
					

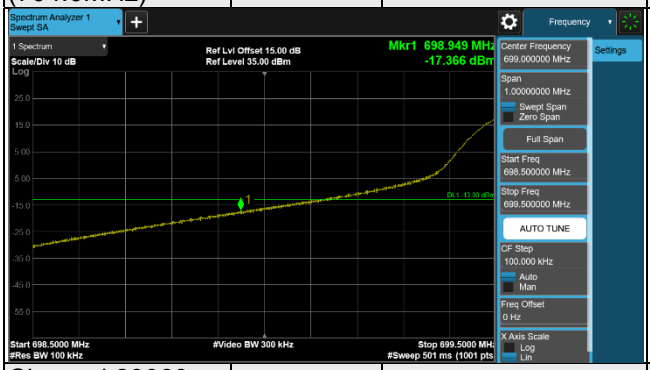
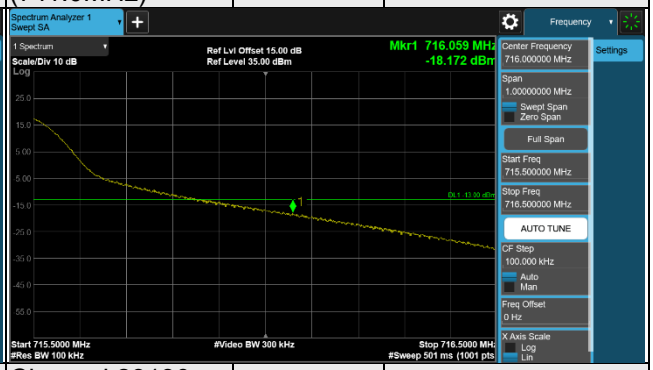
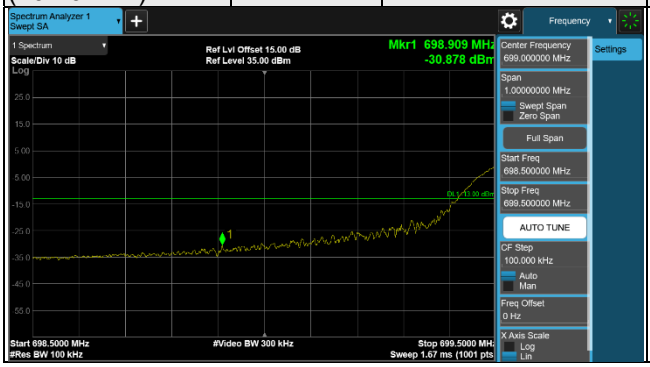
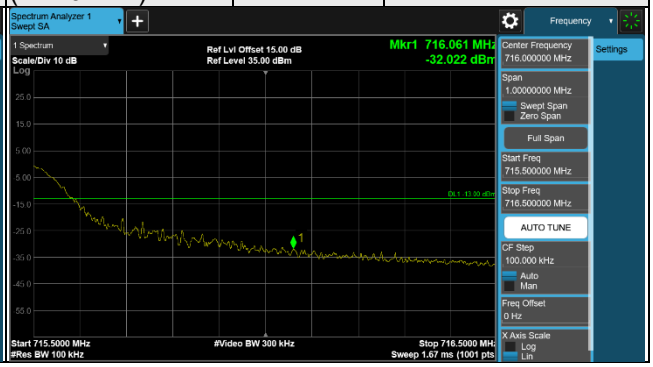
LTE Band 4, Channel Bandwidth 20MHz					
Channel 20050 (1720.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 20300 (1745.0MHz)	QPSK	1 RB / 99 RB Offset
					
Channel 20050 (1720.0MHz)	QPSK	100 RB / 0 RB Offset	Channel 20300 (1745.0MHz)	QPSK	100 RB / 0 RB Offset
					

Band Edge

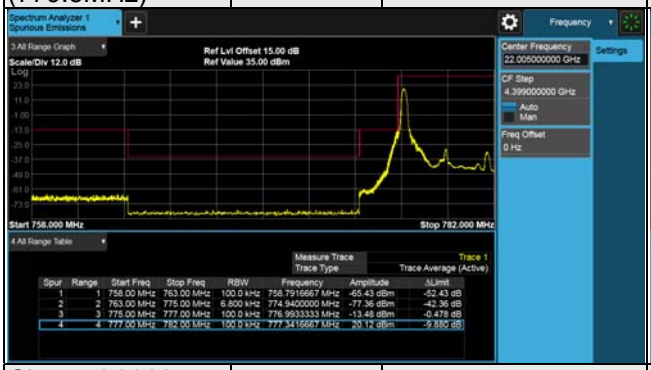
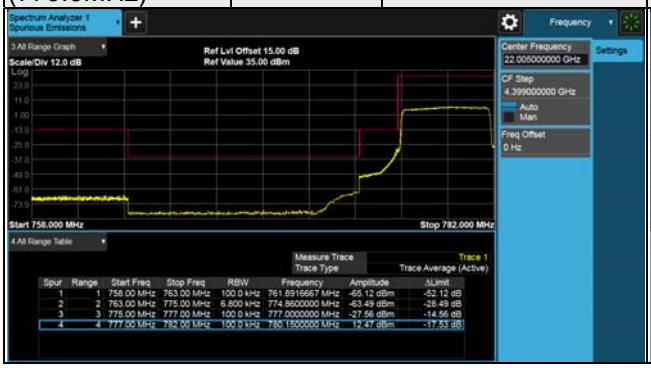
LTE Band 12, Channel Bandwidth 1.4MHz					
Channel 23017 (699.7MHz)	QPSK	1 RB / 0 RB Offset	Channel 23173 (715.3MHz)	QPSK	1 RB / 5 RB Offset
					
Channel 23017 (699.7MHz)	QPSK	6 RB / 0 RB Offset	Channel 23173 (715.3MHz)	QPSK	6 RB / 0 RB Offset
					

LTE Band 12, Channel Bandwidth 3MHz					
Channel 23025 (700.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 23165 (714.5MHz)	QPSK	1 RB / 14RB Offset
					
Channel 23025 (700.5MHz)	QPSK	15 RB / 0 RB Offset	Channel 23165 (714.5MHz)	QPSK	15 RB / 0 RB Offset
					

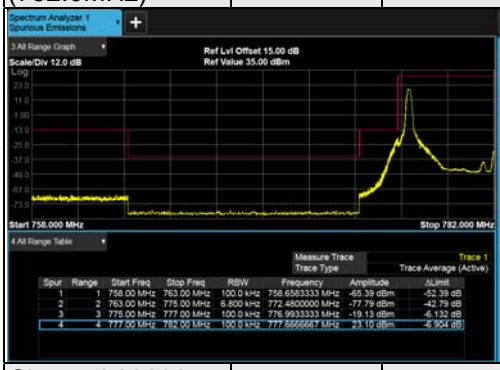
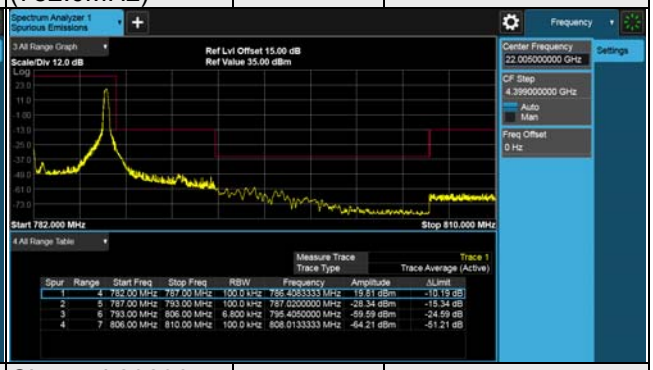
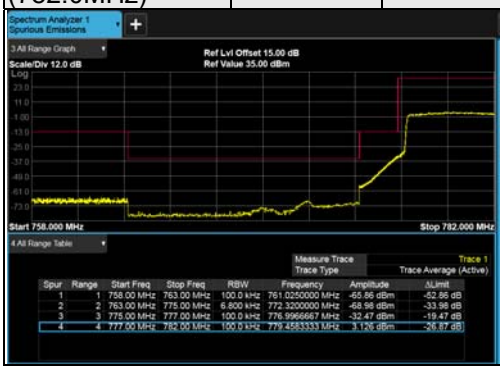
LTE Band 12, Channel Bandwidth 5MHz					
Channel 23035 (701.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 23155 (713.5MHz)	QPSK	1 RB / 24RB Offset
					
Channel 23035 (701.5MHz)	QPSK	25 RB / 0 RB Offset	Channel 23155 (713.5MHz)	QPSK	25 RB / 0 RB Offset
					

LTE Band 12, Channel Bandwidth 10MHz					
Channel 23060 (704.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 23130 (711.0MHz)	QPSK	1 RB / 24RB Offset
					
Channel 23060 (704.0MHz)	QPSK	50 RB / 0 RB Offset	Channel 23130 (711.0MHz)	QPSK	25 RB / 0 RB Offset
					

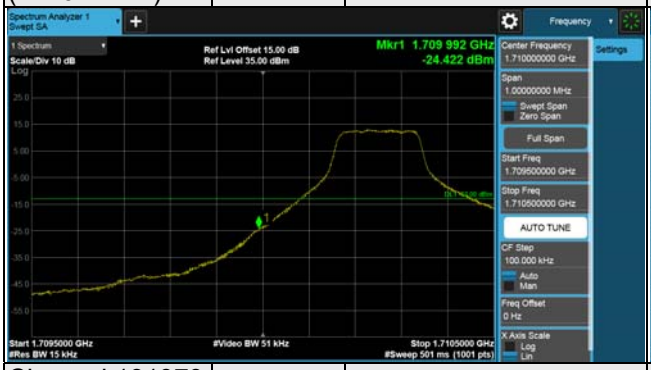
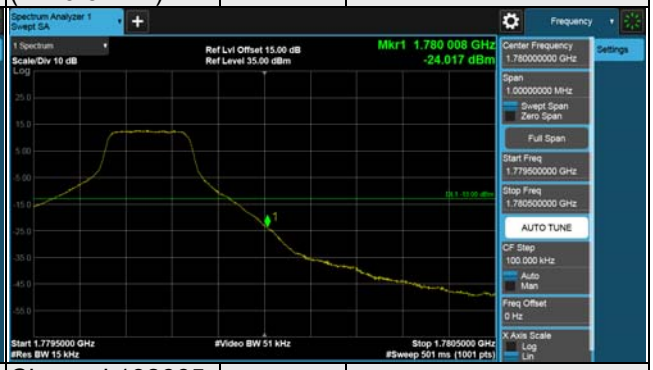
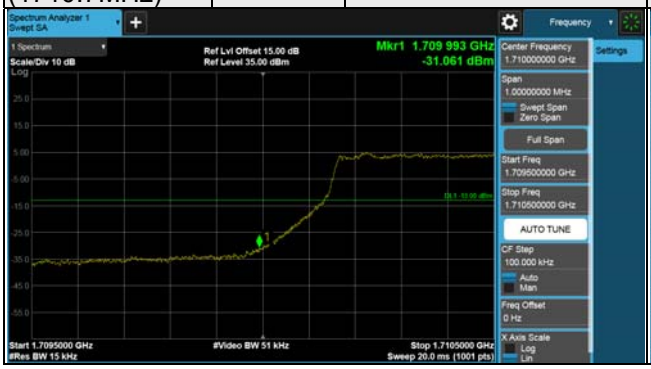
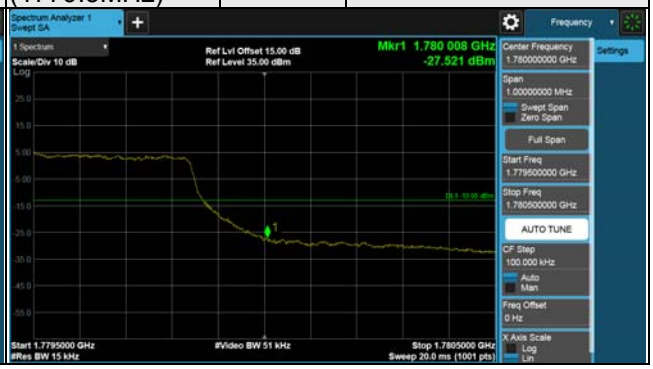
Emission Mask

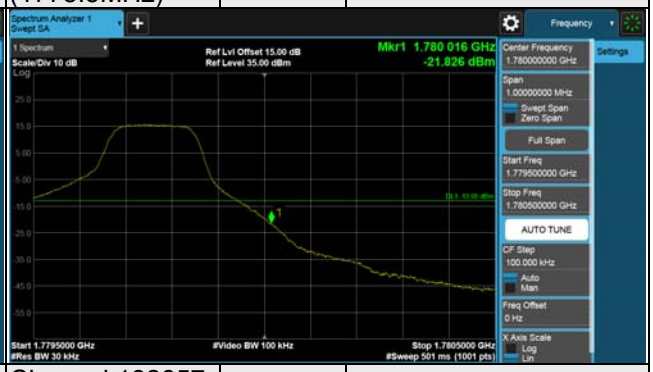
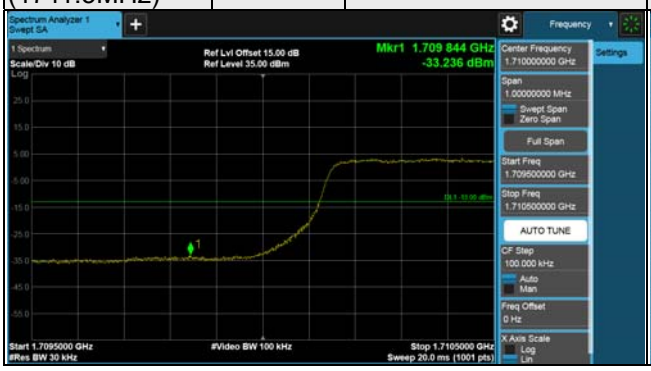
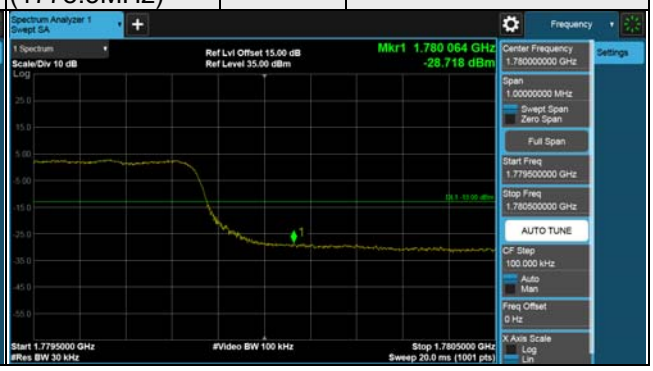
LTE Band 13, Channel Bandwidth 5MHz					
Channel 23205 (779.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 23255 (784.5MHz)	QPSK	1 RB / 24 RB Offset
					
Channel 23205 (779.5MHz)	QPSK	25 RB / 0 RB Offset	Channel 23255 (784.5MHz)	QPSK	25 RB / 0 RB Offset
					

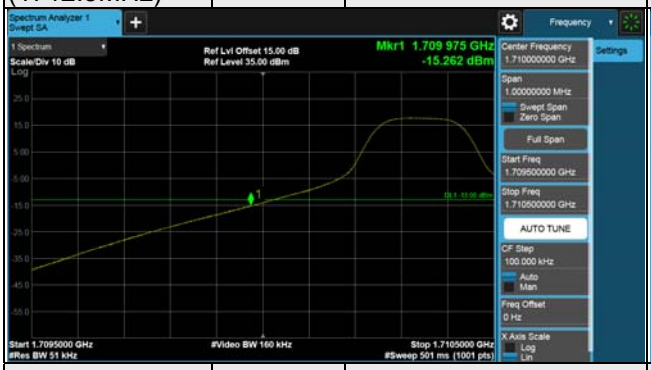
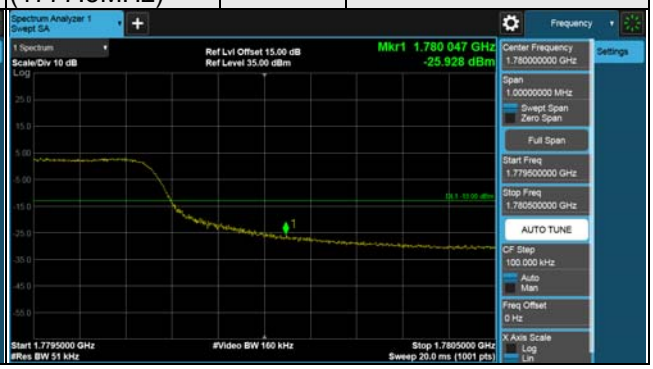
For the 763-775MHz and 793-805MHz band, the FCC limit is 65+10log(P[watt]) in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 6.8 kHz was used instead to show compliance, and the correction factor is compensated at the spectrum. By using a 10 kHz bandwidth on the spectrum analyzer.

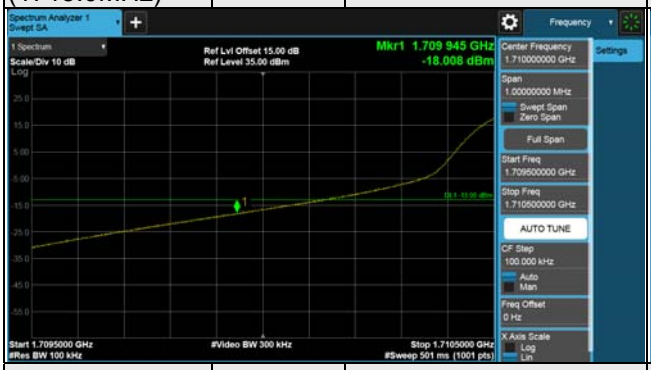
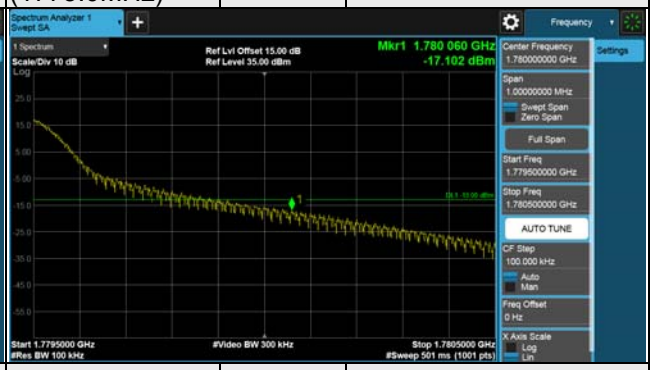
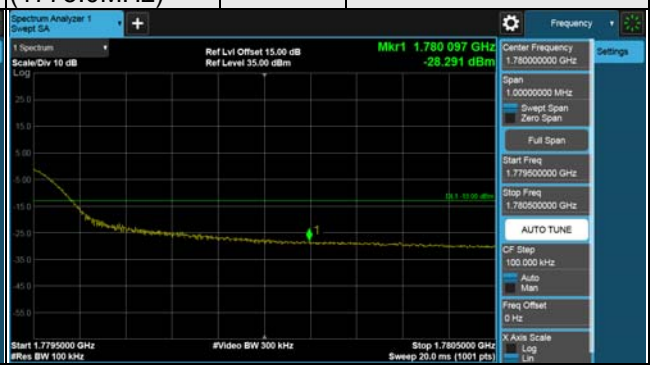
LTE Band 13, Channel Bandwidth 10MHz					
Channel 23230 (782.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 23230 (782.0MHz)	QPSK	1 RB / 49 RB Offset
					
Channel 23230 (782.0MHz)	QPSK	50 RB / 0 RB Offset	Channel 23230 (782.0MHz)	QPSK	50 RB / 0 RB Offset
					

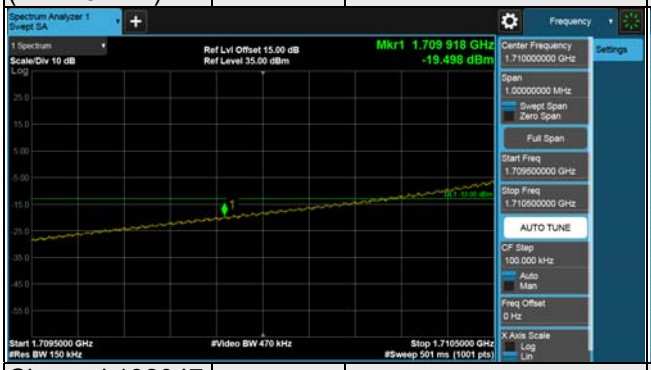
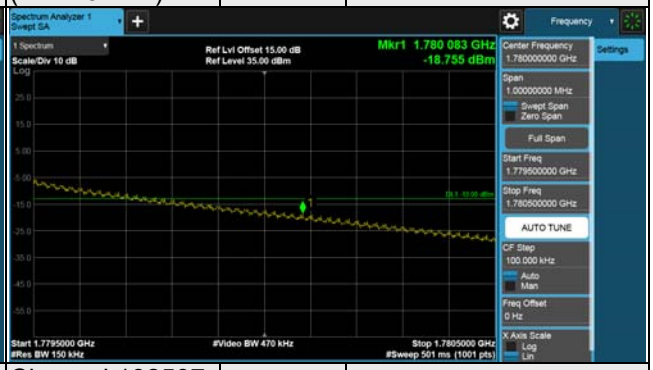
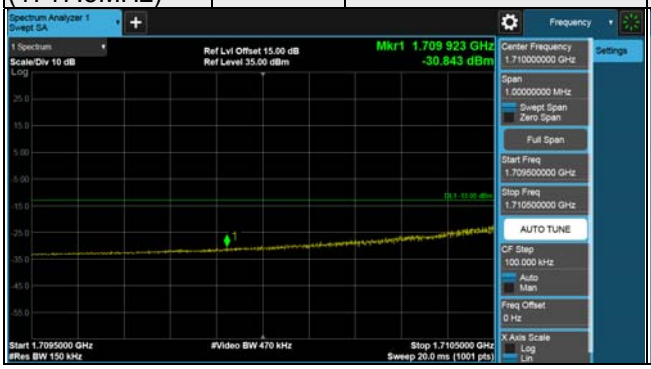
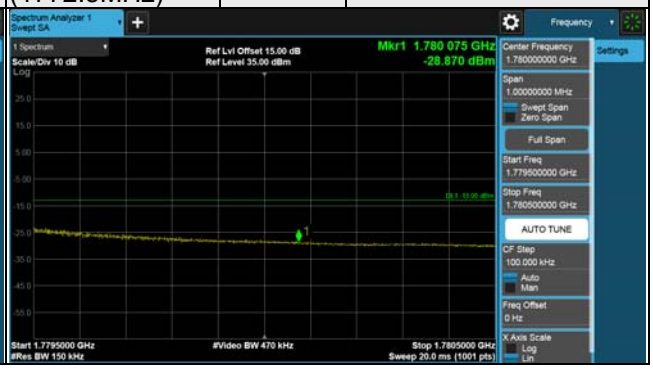
For the 763-775MHz and 793-805MHz band, the FCC limit is 65+10log(P[watt]) in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 6.8 kHz was used instead to show compliance, and the correction factor is compensated at the spectrum. By using a 10 kHz bandwidth on the spectrum analyzer.

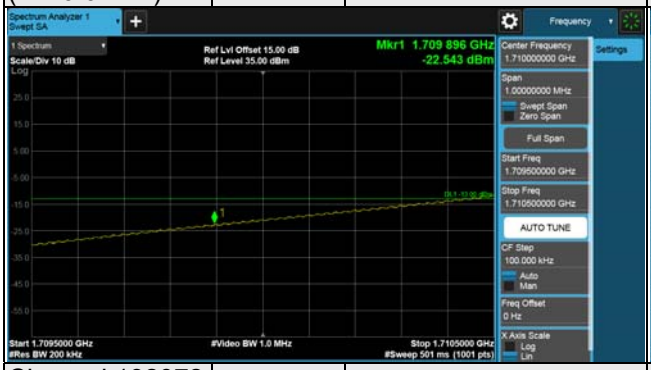
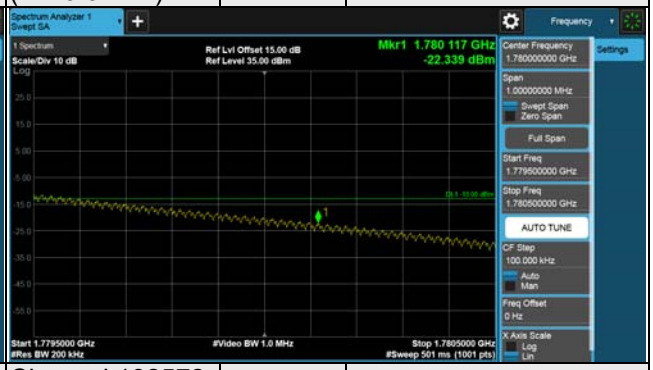
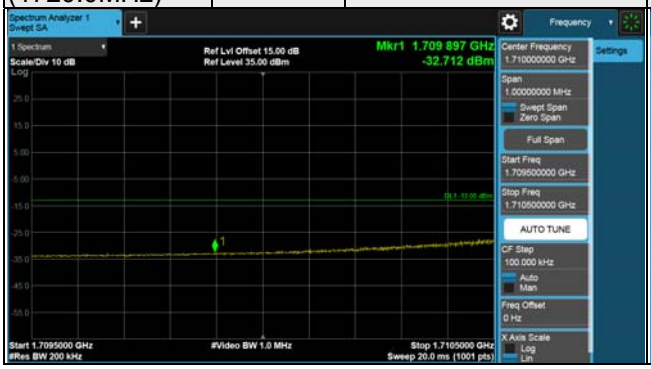
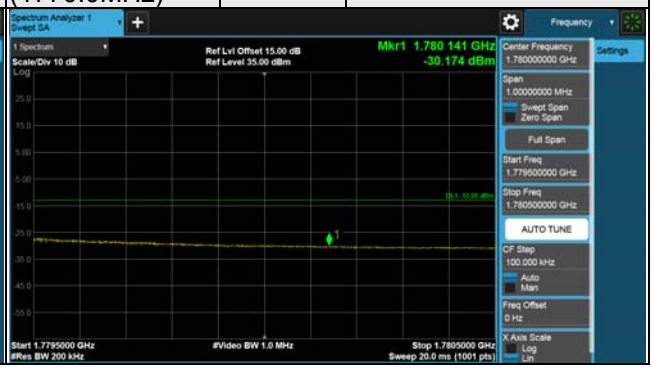
LTE Band 66, Channel Bandwidth: 1.4MHz					
Channel 131979 (1710.7MHz)	QPSK	1 RB / 0 RB Offset	Channel 132665 (1779.3MHz)	QPSK	1 RB / 5 RB Offset
					
Channel 131979 (1710.7MHz)	QPSK	6 RB / 0 RB Offset	Channel 132665 (1779.3MHz)	QPSK	6 RB / 0 RB Offset
					

LTE Band 66, Channel Bandwidth: 3MHz					
Channel 131987 (1711.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 132657 (1778.5MHz)	QPSK	1 RB / 14 RB Offset
					
Channel 131987 (1711.5MHz)	QPSK	15 RB / 0 RB Offset	Channel 132657 (1778.5MHz)	QPSK	15 RB / 0 RB Offset
					

LTE Band 66, Channel Bandwidth: 5MHz					
Channel 131997 (1712.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 132647 (1777.5MHz)	QPSK	1 RB / 24 RB Offset
					
Channel 131997 (1712.5MHz)	QPSK	25 RB / 0 RB Offset	Channel 132647 (1777.5MHz)	QPSK	25 RB / 0 RB Offset
					

LTE Band 66, Channel Bandwidth: 10MHz					
Channel 132022 (1715.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 132622 (1775.0MHz)	QPSK	1 RB / 49 RB Offset
					
Channel 132022 (1715.0MHz)	QPSK	50 RB / 0 RB Offset	Channel 132622 (1775.0MHz)	QPSK	50 RB / 0 RB Offset
					

LTE Band 66, Channel Bandwidth: 15MHz					
Channel 132047 (1717.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 132597 (1772.5MHz)	QPSK	1 RB / 74 RB Offset
					
Channel 132047 (1717.5MHz)	QPSK	75 RB / 0 RB Offset	Channel 132597 (1772.5MHz)	QPSK	75 RB / 0 RB Offset
					

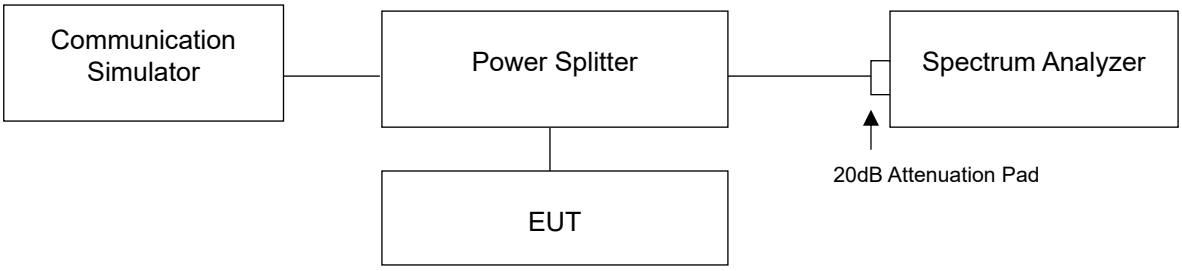
LTE Band 66, Channel Bandwidth: 20MHz					
Channel 132072 (1720.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 132572 (1770.0MHz)	QPSK	1 RB / 99 RB Offset
					
Channel 132072 (1720.0MHz)	QPSK	100 RB / 0 RB Offset	Channel 132572 (1770.0MHz)	QPSK	100 RB / 0 RB Offset
					

4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

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

4.6.2 Test Setup



4.6.3 Test Procedures

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%.

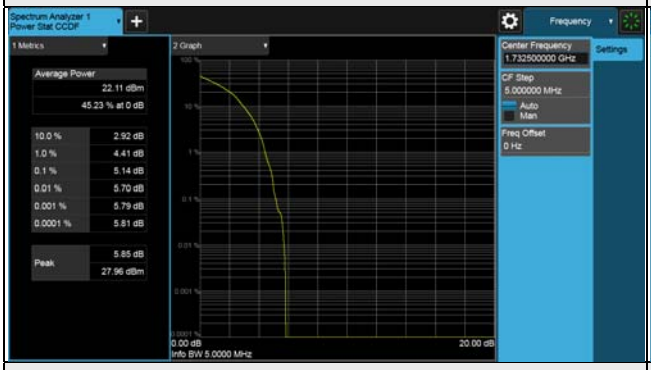
4.6.4 Test Results

LTE Band 4, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
19957	1710.7	3.86	4.94
20175	1732.5	4.09	5.14
20393	1754.3	3.88	5.00
LTE Band 4, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
19965	1711.5	3.81	4.84
20175	1732.5	4.08	5.06
20385	1753.5	3.88	4.90
LTE Band 4, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
19975	1712.5	3.86	4.86
20175	1732.5	4.12	5.17
20375	1752.5	3.93	4.93
LTE Band 4, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20000	1715.0	3.82	4.71
20175	1732.5	4.13	5.14
20350	1750.0	3.86	5.00
LTE Band 4, Channel Bandwidth 15MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20025	1717.5	3.86	4.89
20175	1732.5	4.19	5.11
20325	1747.5	3.87	5.06

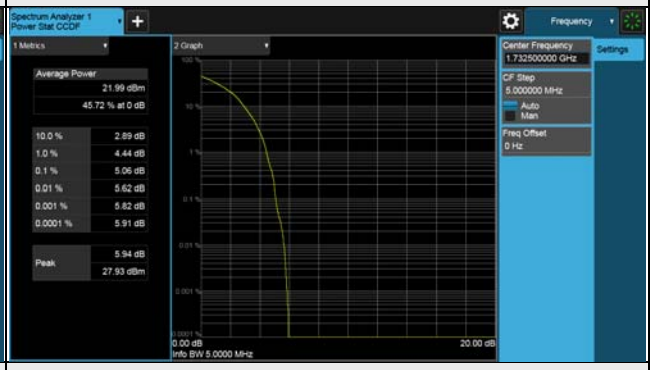
LTE Band 4, Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20050	1720.0	3.93	5.03
20175	1732.5	4.30	5.30
20300	1745.0	4.00	5.11

Spectrum Plot of Worst Value

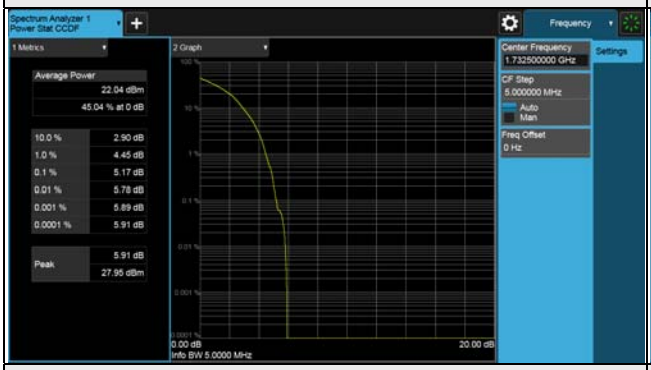
1.4MHz / 16QAM



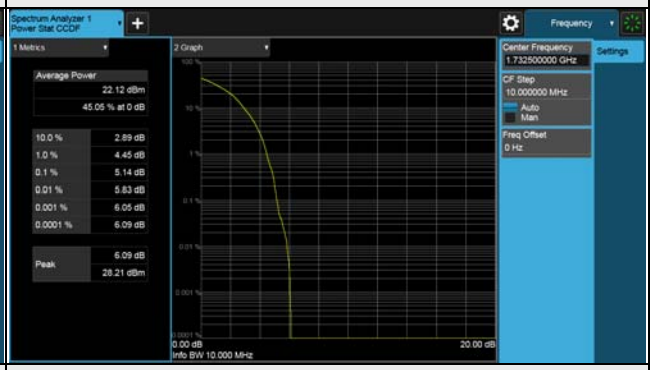
3MHz / 16QAM



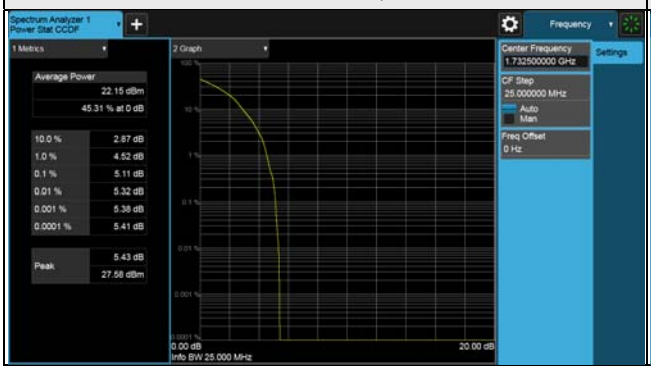
5MHz / 16QAM



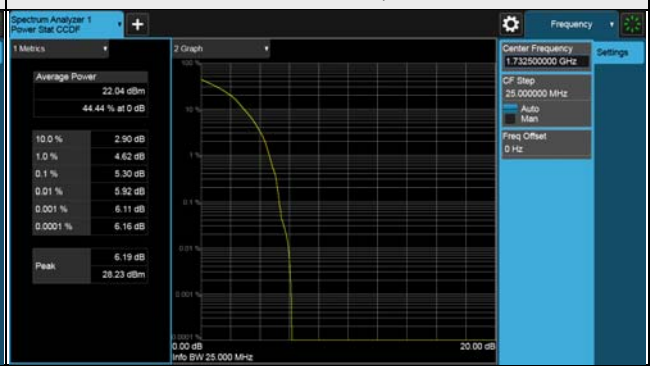
10MHz / 16QAM



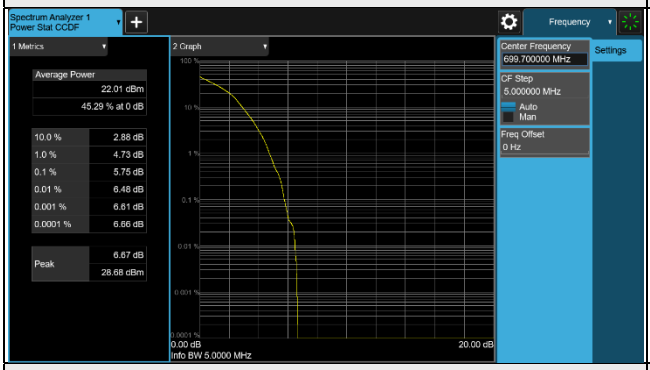
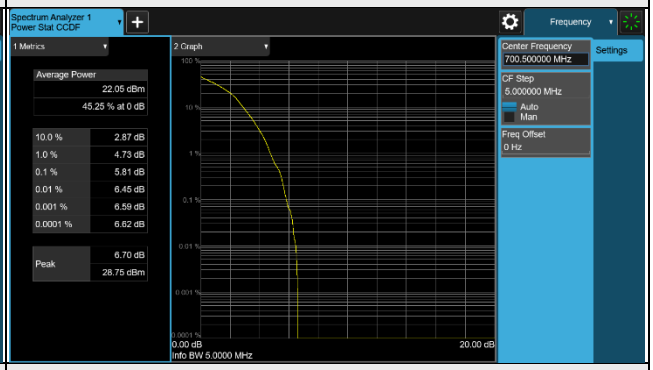
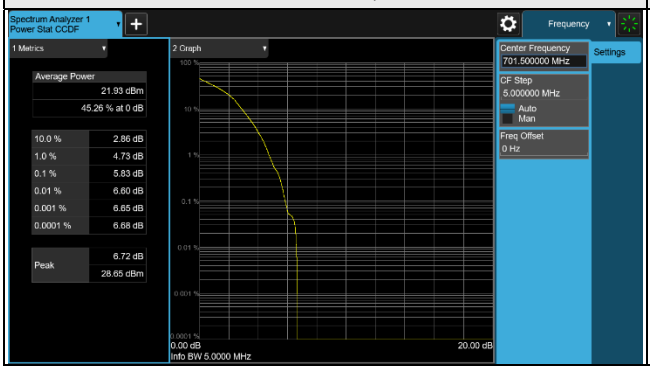
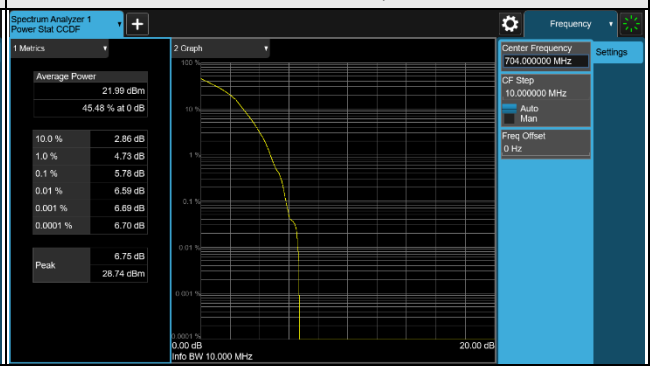
15MHz / 16QAM



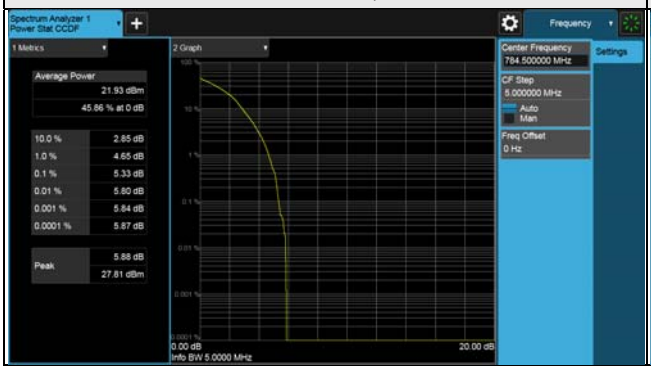
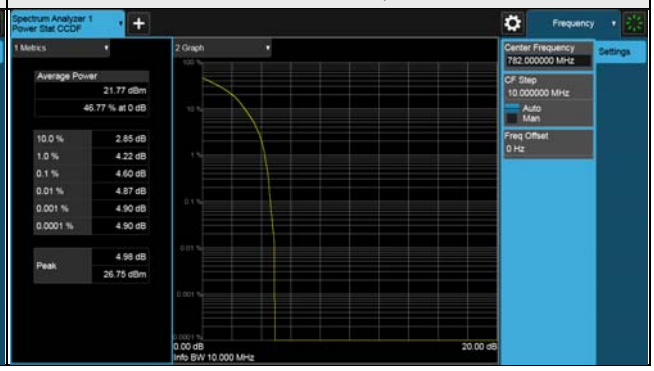
20MHz / 16QAM



LTE Band 12, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23017	699.7	4.82	5.75
23095	707.5	4.36	5.57
23173	715.3	4.58	5.60
LTE Band 12, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23025	700.5	4.70	5.81
23095	707.5	4.39	5.52
23165	714.5	4.59	5.67
LTE Band 12, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23035	701.5	4.77	5.83
23095	707.5	4.53	5.51
23155	713.5	4.51	5.54
LTE Band 12, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23060	704.0	4.73	5.78
23095	707.5	4.56	5.60
23130	711.0	4.41	5.50

Spectrum Plot of Worst Value	
1.4MHz / 16QAM	3MHz / 16QAM
	
5MHz / 16QAM	10MHz / 16QAM
	

LTE Band 13, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23205	779.5	3.60	4.52
23230	782.0	4.15	5.16
23255	784.5	4.35	5.33
LTE Band 13, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23230	782.0	3.59	4.60

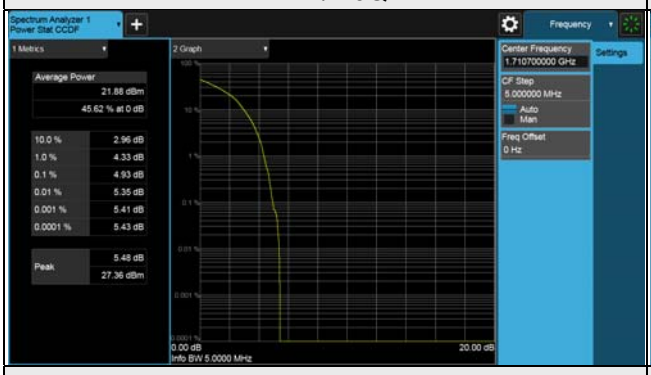
Spectrum Plot of Worst Value	
5MHz / 16QAM	10MHz / 16QAM
	

LTE Band 66, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
131979	1710.7	3.83	4.93
132322	1745.0	3.87	4.91
132665	1779.3	3.36	4.48
LTE Band 66, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
131987	1711.5	3.81	4.81
132322	1745.0	3.80	4.90
132657	1778.5	3.37	4.48
LTE Band 66, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
131997	1712.5	3.87	4.94
132322	1745.0	3.90	5.01
132647	1777.5	3.44	4.46
LTE Band 66, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
132022	1715.0	3.83	4.84
132322	1745.0	3.86	5.10
132622	1775.0	3.41	4.47
LTE Band 66, Channel Bandwidth 15MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
132047	1717.5	3.88	4.95
132322	1745.0	3.88	4.92
132597	1772.5	3.57	4.57

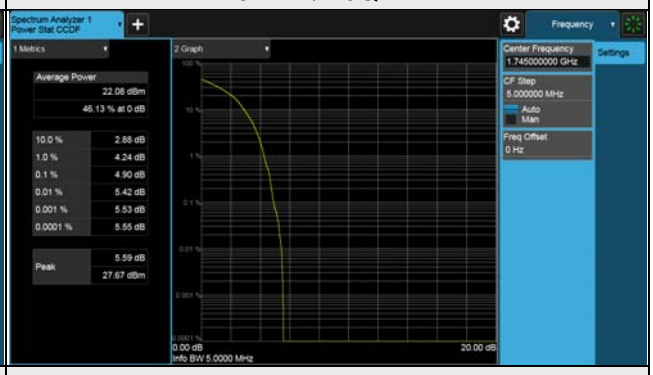
LTE Band 66, Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
132072	1720.0	3.95	5.19
132322	1745.0	4.03	5.10
132572	1770.0	3.81	4.94

Spectrum Plot of Worst Value

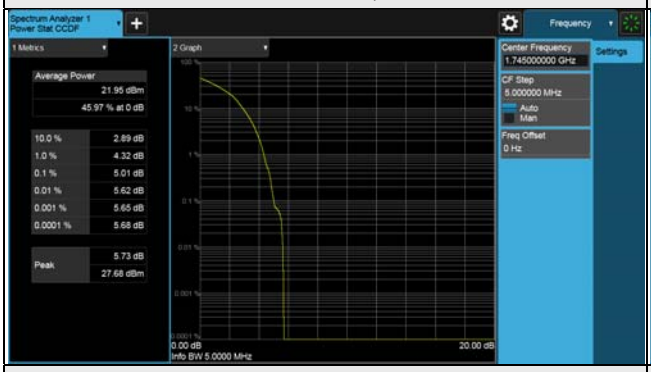
1.4MHz / 16QAM



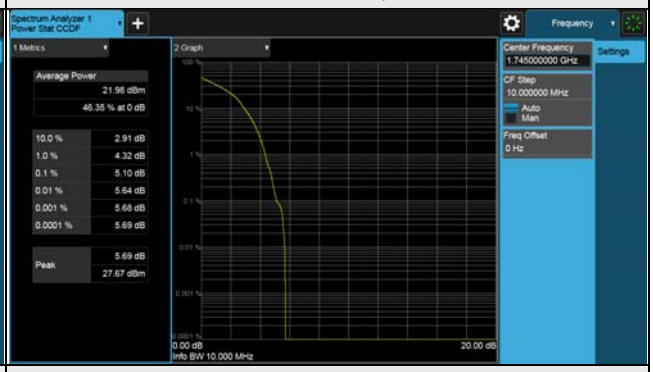
3MHz / 16QAM



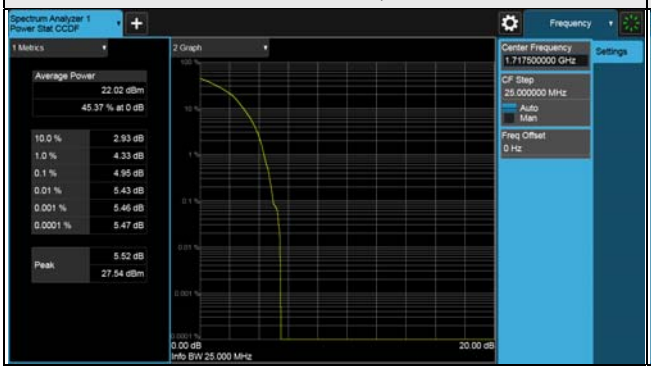
5MHz / 16QAM



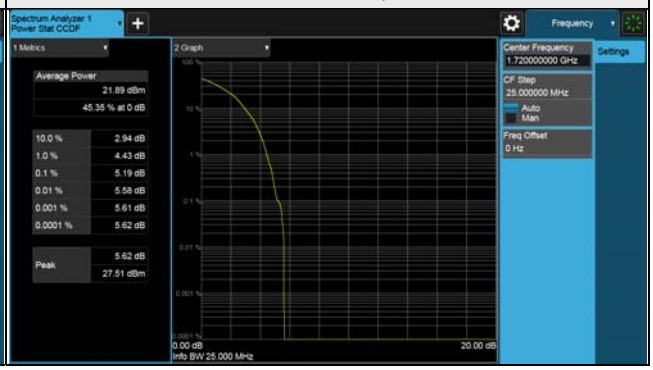
10MHz / 16QAM



15MHz / 16QAM



20MHz / 16QAM



4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

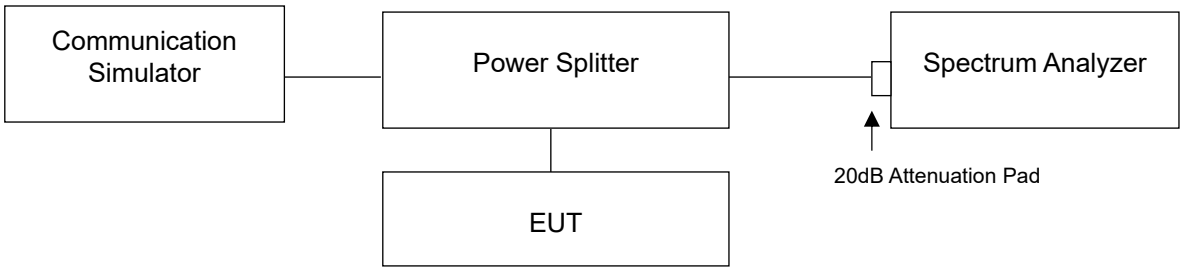
For LTE Band 4, LTE Band 66:
According to FCC 27.53(h), for operations in the 1695-1710MHz, 1710-1755MHz, 1755-1780 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P) dB.

For LTE Band 12:
According to FCC 27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. The limit of emissions is equal to -13 dBm.

For LTE Band 13:
According to FCC 27.53(c)(2), for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB. The limit of emissions is equal to -13 dBm.

According to FCC 27.53(f), for operations in the 775-788 MHz, emissions in the band 1559-1610MHz shall be limited to -70 dBW/MHz (EIRP). The limit of emissions is equal to -40 dBm.

4.7.2 Test Setup

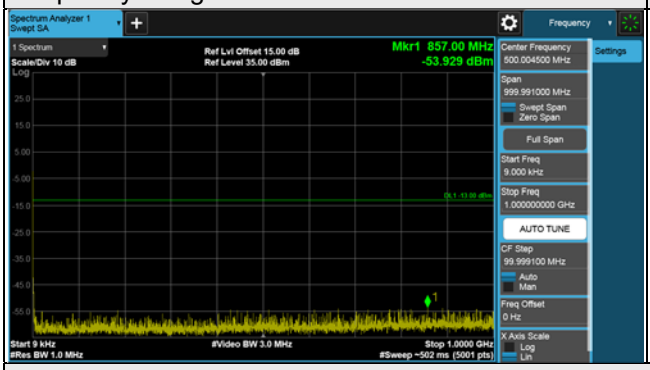
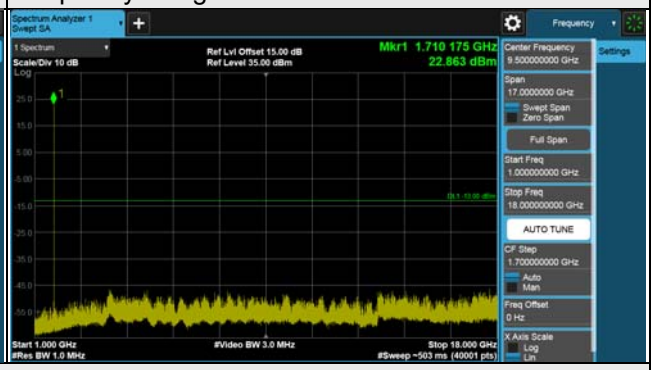
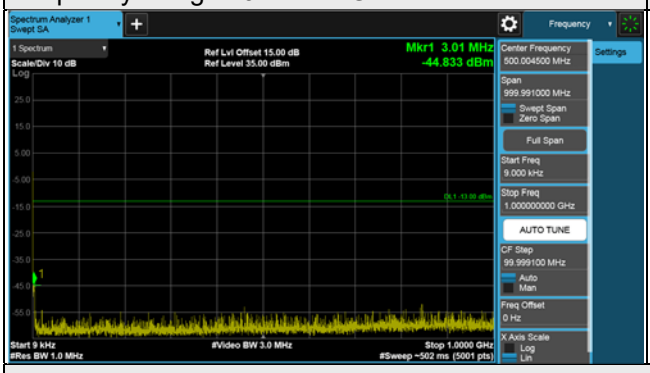
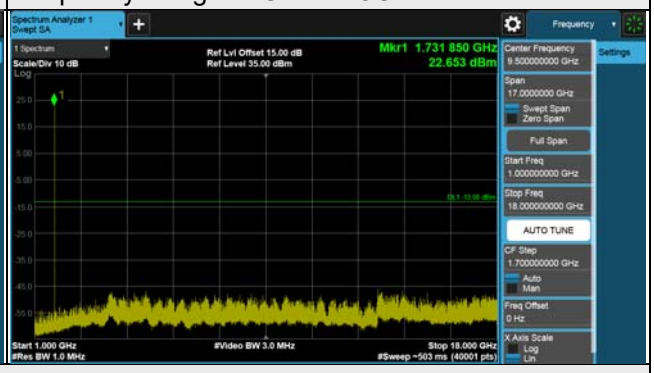
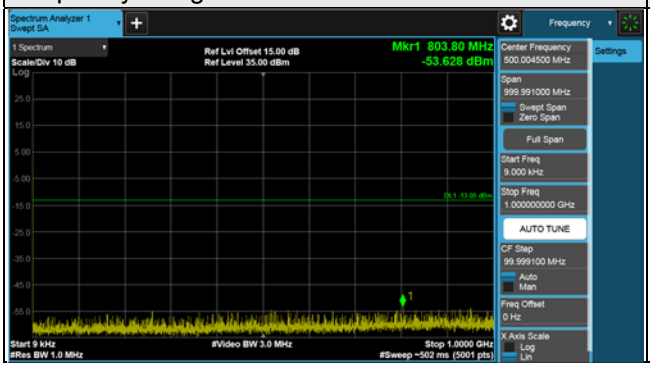
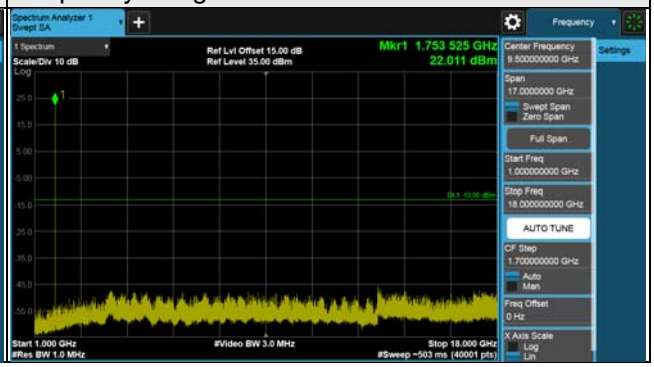


4.7.3 Test Procedure

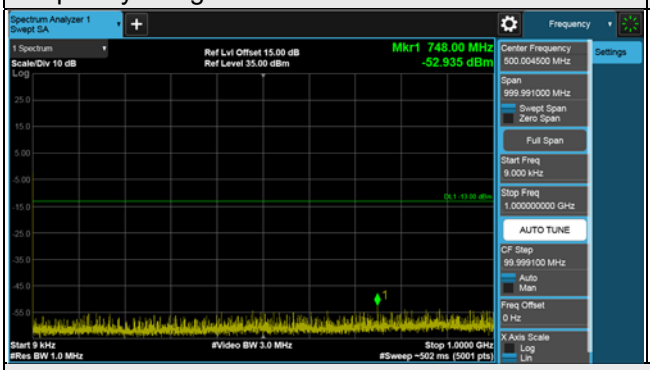
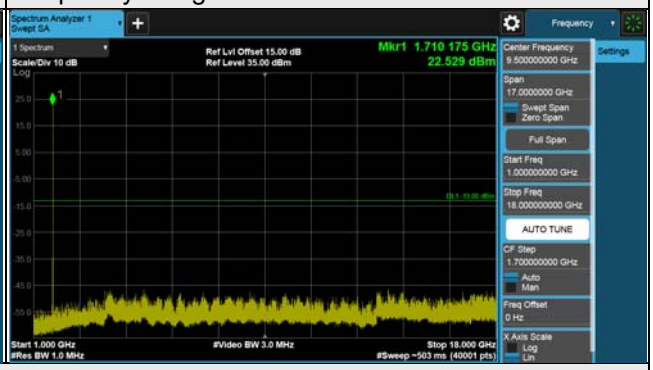
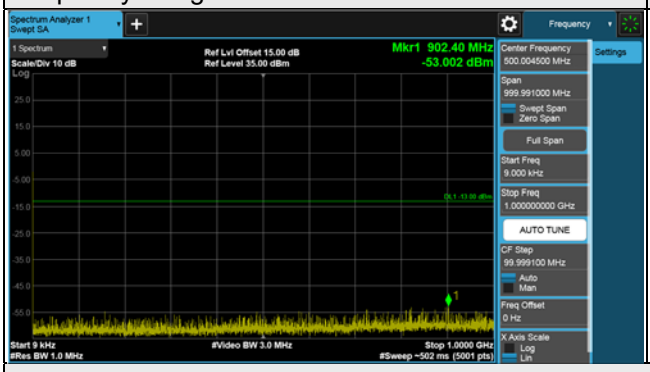
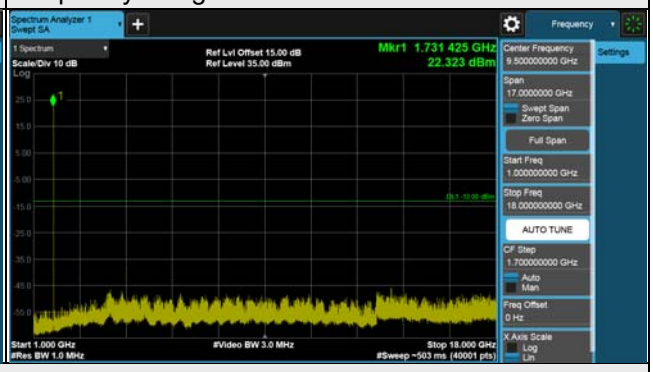
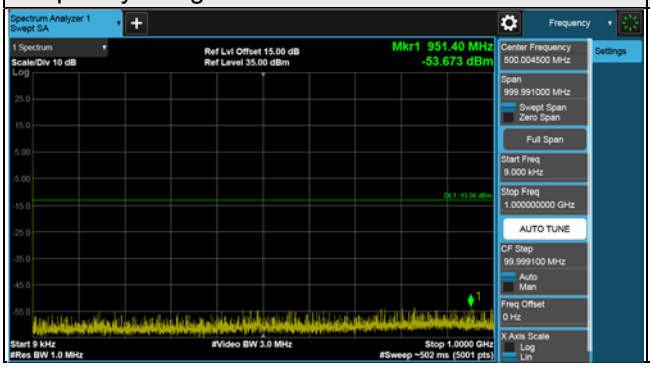
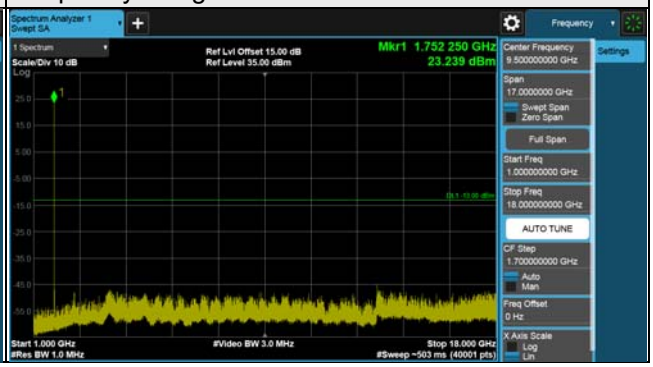
a. All measurements were done at low, middle and high channels operational frequency range.

b. Measuring frequency range is from 9kHz to 8GHz / 9GHz / 20GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

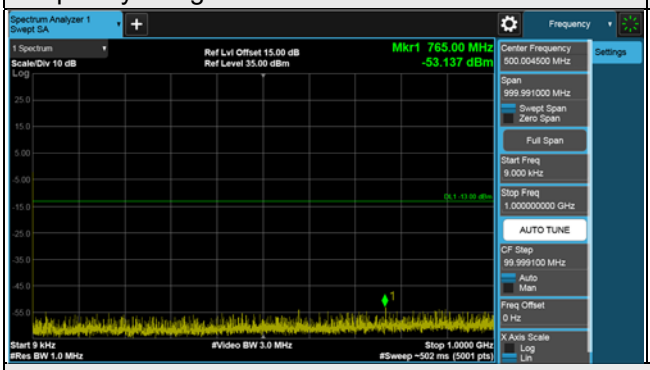
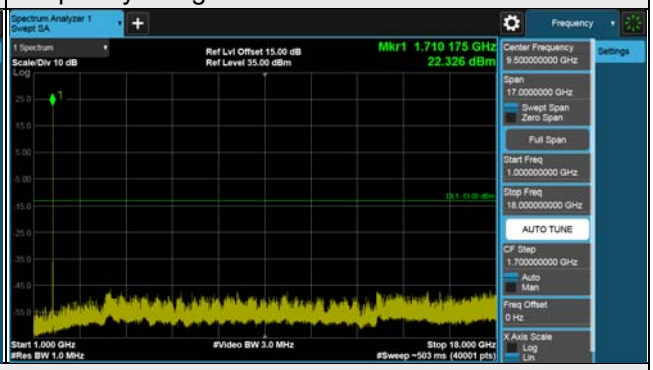
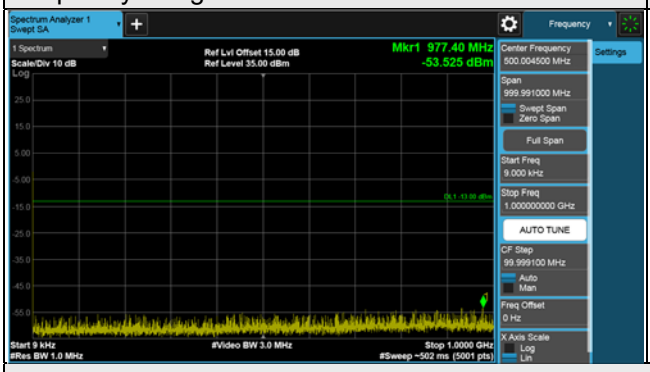
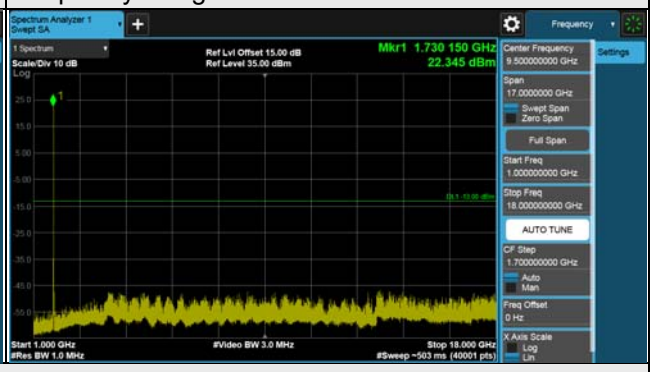
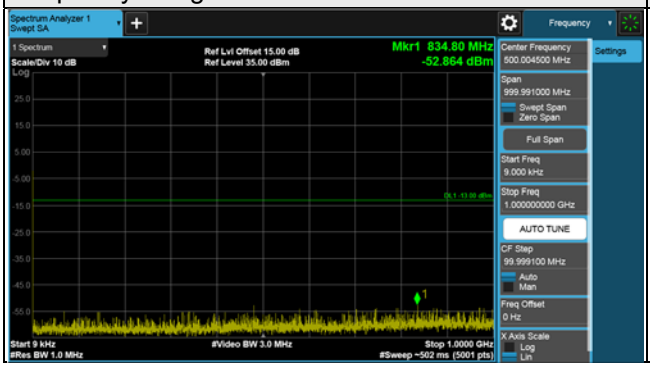
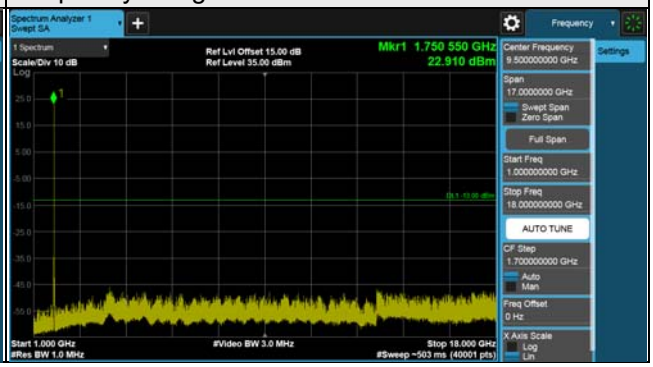
4.7.4 Test Results

LTE Band 4, Channel Bandwidth 1.4MHz	
Channel 19957 (1710.7MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	
Channel 20175 (1732.5MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	
Channel 20393 (1754.3MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	

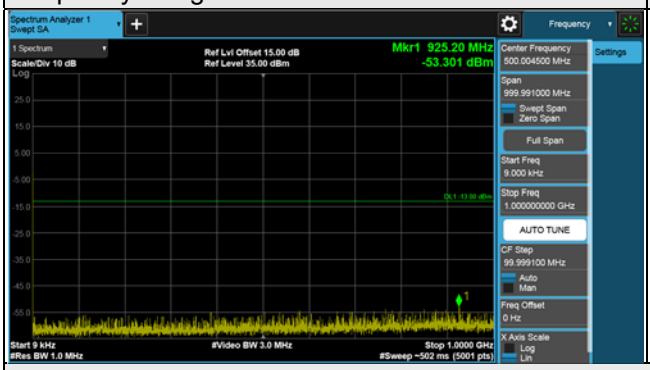
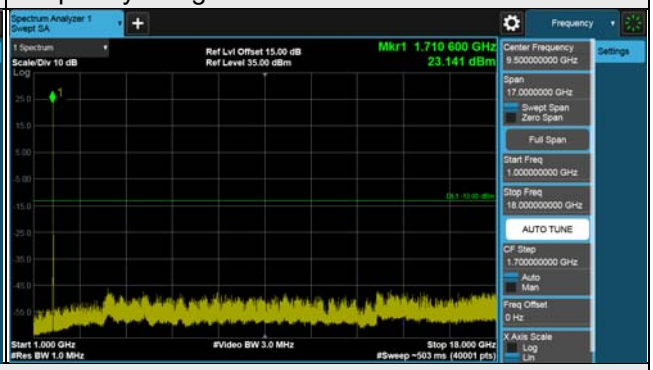
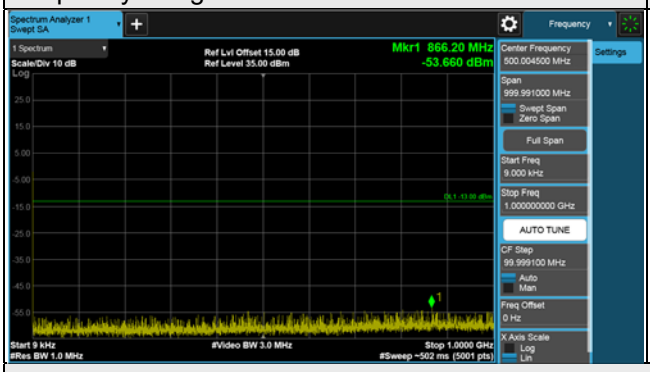
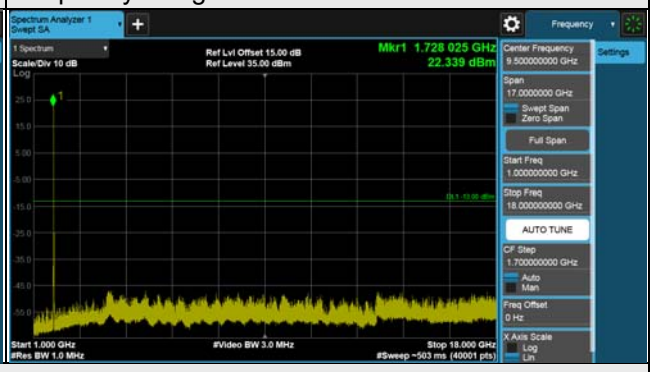
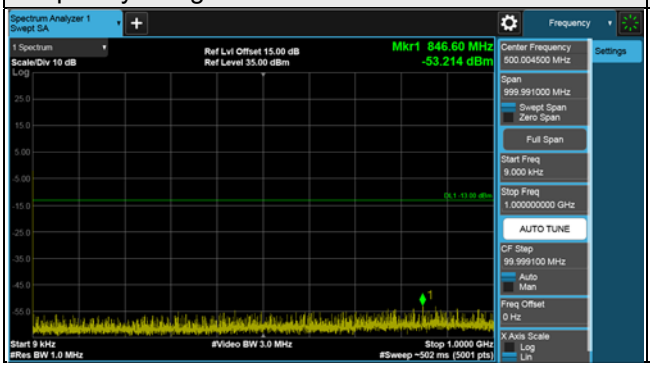
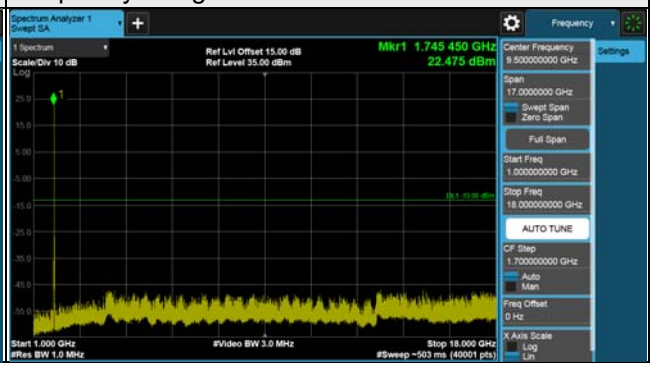
*The 9kHz signal over the limit is from Spectrum.

LTE Band 4, Channel Bandwidth 3MHz	
Channel 19965 (1711.5MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	
Channel 20175 (1732.5MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	
Channel 20385 (1753.5MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	

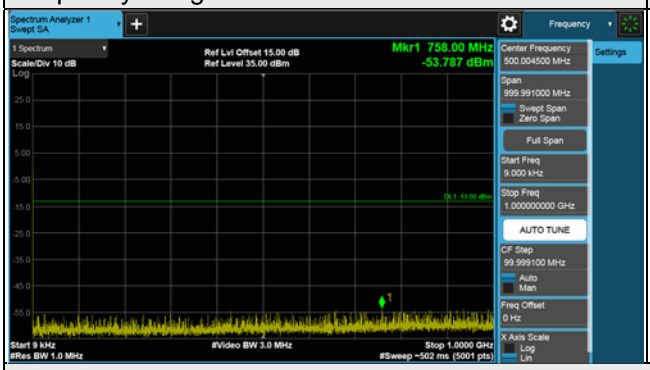
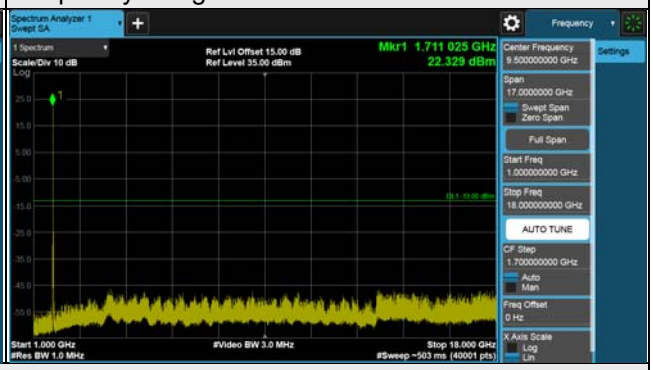
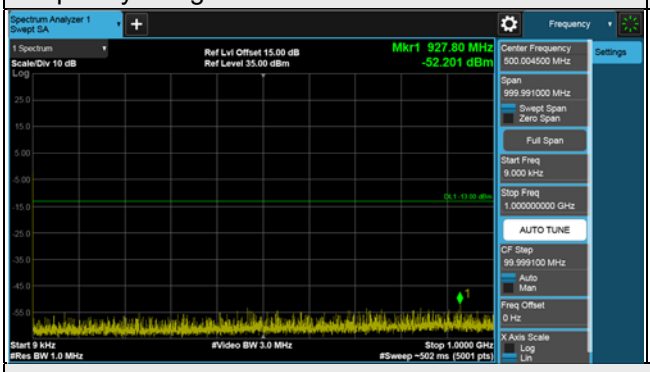
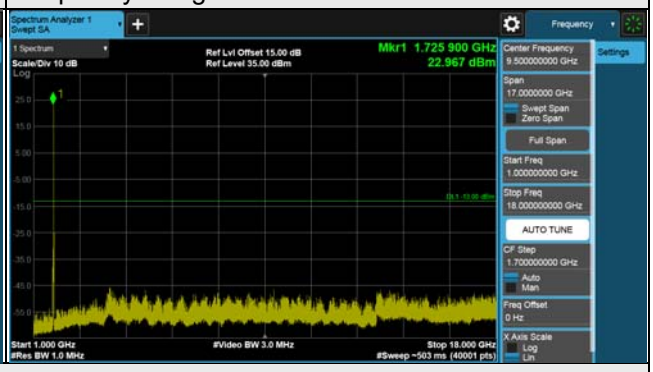
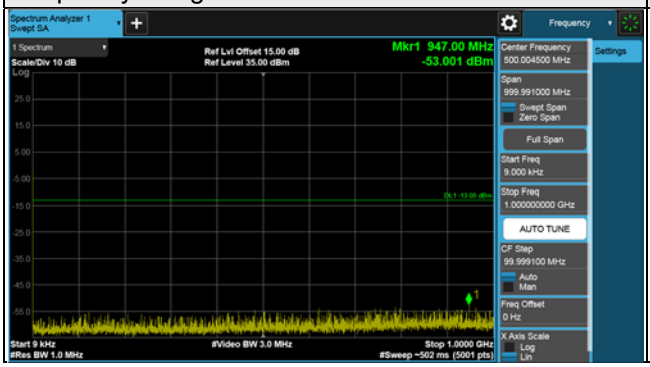
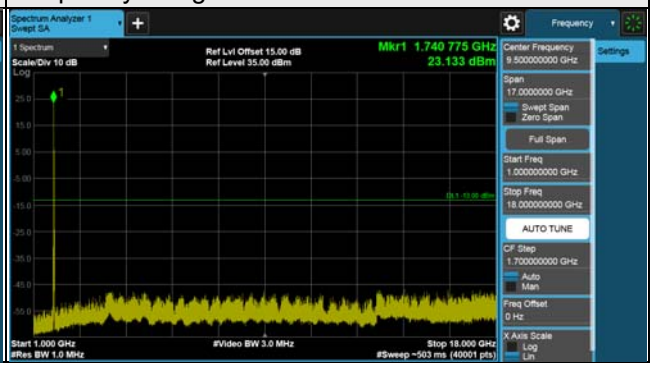
*The 9kHz signal over the limit is from Spectrum.

LTE Band 4, Channel Bandwidth 5MHz	
Channel 19975 (1712.5MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	
Channel 20175 (1732.5MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	
Channel 20375 (1752.5MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	

*The 9kHz signal over the limit is from Spectrum.

LTE Band 4, Channel Bandwidth 10MHz	
Channel 20000 (1715.0MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	
Channel 20175 (1732.5MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	
Channel 20350 (1750.0MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	

*The 9kHz signal over the limit is from Spectrum.

LTE Band 4, Channel Bandwidth 15MHz	
Channel 20025 (1717.5MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	
Channel 20175 (1732.5MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	
Channel 20325 (1747.5MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 18GHz
	

*The 9kHz signal over the limit is from Spectrum.