FCC Test Report
(ENDC: n66+Band 5/12/13/30/48/71)

Report No.:	RF200109E02B-13
FCC ID:	2AQ68T99W175
Test Model:	T99W175
Received Date:	Jan. 10, 2020
Test Date:	Feb. 26 ~ May 18, 2020
Issued Date:	May 27, 2020
Applicant:	Hon Lin Technology Co., Ltd.
Address:	11F, No. 32, Jihu Rd., Neihu Dist., Taipei City 114, Taiwan R.O.C.
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF200109E02B-13	Original release	May 27, 2020

1 Certificate of Conformity

Product:	5G WWAN Module
Brand:	Foxconn
Test Model:	T99W175
Sample Status:	Engineering Sample
Applicant:	Hon Lin Technology Co., Ltd.
Test Date:	Feb. 26 ~ May 18, 2020
Standards:	FCC Part 22 FCC Part 27, Subpart H, L, M FCC Part 96

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 : Pettie Chen , **Date:** May 27, 2020

Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** May 27, 2020

Bruce Chen / Senior Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 22 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 22.913 (a)	Effective radiated power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement
22.913 (d)	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
22.917	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 22.917	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -32.2dB at 31.94MHz.

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

Applied Standard: FCC Part 27 & Part 2						
FCC Clause				Test Item	Result	Remarks
LTE B12/ LTE B71	LTE B13	LTE B30	n66			
2.1046 27.50 (c)	2.1046 27.50 (b)	2.1046 27.50 (a)(3)	2.1046 27.50 (d)(4)	Equivalent Isotropically Radiated Power / Equivalent Radiated Power	Pass	Meet the requirement of limit.
----	----	----	2.1047	Modulation Characteristics	Pass	Meet the requirement of limit.
----	----	----	27.50 (d)(5)	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1055 27.54	2.1055 27.54	2.1055 27.54	2.1055 27.54	Frequency Stability Stay with the authorized bands of operation	Pass	Meet the requirement of limit.
2.1049	2.1049	2.1049	2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
2.1051 27.53(g)	2.1051 27.53(c)	2.1051 27.53 (a)(4)	2.1051 27.53(h)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(g)	2.1051 27.53(c)(f)	2.1051 27.53 (a)(4)	2.1051 27.53(h)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(g)	2.1053 27.53(c)(f)	2.1053 27.53 (a)(4)	2.1053 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -7.8dB at 175.50MHz.

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

47 CFR FCC Part 96			
FCC Clause	Test Item	Result	Remarks
2.1046 96.41(b)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1046 96.41(b)	Maximum Power Spectral Density	Pass	Meet the requirement of limit.
96.41(g)	Peak to Average Ration	Pass	Meet the requirement of limit.
2.1049	Emission Bandwidth	Pass	Meet the requirement of limit.
2.1055	Frequency Stability	Pass	Meet the requirement of limit.
2.1051 96.41(e)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 96.41(e)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -3.3dB at 7380.00MHz.

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	3.63 dB
	200MHz ~1000MHz	3.64 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Dec. 31, 2019	Dec. 30, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 23, 2019	Sep. 22, 2020
Spectrum Analyzer KEYSIGHT	N9030B	MY57140953	Jul. 03, 2019	Jul. 02, 2020
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Jan. 18, 2020	Jan. 17, 2021
MXG Vector signal generator Agilent	N5182B	MY53050162	Jan. 14, 2020	Jan. 13, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-158	Nov. 08, 2019	Nov. 07, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Nov. 11, 2019	Nov. 10, 2020
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
Loop Antenna TESEQ	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10631	Jul. 11, 2019	Jul. 10, 2020
Preamplifier KEYSIGHT (Above 1GHz)	83017A	MY53270295	Jun. 11, 2019	Jun. 10, 2020
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH4-01	Aug. 20, 2019	Aug. 19, 2020
RF Coaxial Cable EMCI	EMC102-KM-KM-3000	150929	Aug. 20, 2019	Aug. 19, 2020
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Jul. 11, 2019	Jul. 10, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Jul. 11, 2019	Jul. 10, 2020
Software BV ADT	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Standard Temperature And Humidity Chamber	MHU-225AU	920842	May 31, 2019	May 30, 2020
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
True RMS Clamp Meter Fluke	325	31130711WS	May 21, 2019	May 20, 2020
DC power supply	U8002A	MY56330015	NA	NA

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 4.

3 General Information

3.1 General Description of EUT

Product	5G WWAN Module
Brand	Foxconn
Test Model	T99W175
Sample Status	Engineering Sample
Power Supply Rating	5 Vdc (Host equipment) 3.135Vdc~3.63Vdc (Module)

n66

Modulation Type	$\pi/2$ BPSK, QPSK, 16QAM, 64QAM, 256QAM					
Waveform Type	CP-OFDM, DFT-s-OFDM					
Operating Frequency	n66 (Channel Bandwidth 5MHz)	1712.5MHz ~ 1777.5MHz				
	n66 (Channel Bandwidth 10MHz)	1715.0MHz ~ 1775.0MHz				
	n66 (Channel Bandwidth 15MHz)	1717.5MHz ~ 1772.5MHz				
	n66 (Channel Bandwidth 20MHz)	1720.0MHz ~ 1770.0MHz				
Max. EIRP Power		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
	n66 (Channel Bandwidth 5MHz)	575.440mW (27.60dBm)	537.032mW (27.30dBm)	534.564mW (27.28dBm)	504.661mW (27.03dBm)	280.543mW (24.48dBm)
	n66 (Channel Bandwidth 10MHz)	580.764mW (27.64dBm)	545.758mW (27.37dBm)	534.564mW (27.28dBm)	506.991mW (27.05dBm)	285.102mW (24.55dBm)
	n66 (Channel Bandwidth 15MHz)	584.790mW (27.67dBm)	543.250mW (27.35dBm)	543.250mW (27.35dBm)	508.159mW (27.06dBm)	282.488mW (24.51dBm)
	n66 (Channel Bandwidth 20MHz)	566.239mW (27.53dBm)	545.758mW (27.37dBm)	504.661mW (27.03dBm)	504.661mW (27.03dBm)	285.759mW (24.56dBm)
Emission Designator		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
	n66 (Channel Bandwidth 5MHz)	4M47G7D	4M49G7D	4M49D7W	4M49D7W	4M47D7W
	n66 (Channel Bandwidth 10MHz)	9M13G7D	8M96G7D	8M96D7W	8M96D7W	9M28D7W
	n66 (Channel Bandwidth 15MHz)	13M9G7D	13M5G7D	13M5D7W	13M5D7W	13M9D7W
	n66 (Channel Bandwidth 20MHz)	18M6G7D	18M0G7D	18M0D7W	18M0D7W	18M6D7W

LTE Band

Modulation Type	QPSK, 16QAM, 64QAM, 256QAM		
Operating Frequency	LTE Band 5	Channel Bandwidth 1.4MHz	824.7MHz ~ 848.3MHz
		Channel Bandwidth 3MHz	825.5MHz ~ 847.5MHz
		Channel Bandwidth 5MHz	826.5MHz ~ 846.5MHz
		Channel Bandwidth 10MHz	829.0MHz ~ 844.0MHz
	LTE Band 12	Channel Bandwidth 1.4MHz	699.7MHz ~ 715.3MHz
		Channel Bandwidth 3MHz	700.5MHz ~ 714.5MHz
		Channel Bandwidth 5MHz	701.5MHz ~ 713.5MHz
		Channel Bandwidth 10MHz	704.0MHz ~ 711.0MHz
	LTE Band 13	Channel Bandwidth 5MHz	779.5MHz ~ 784.5MHz
		Channel Bandwidth 10MHz	782.0MHz
	LTE Band 30	Channel Bandwidth 5MHz	2307.5MHz ~ 2312.5MHz
		Channel Bandwidth 10MHz	2310.0MHz
	LTE Band 48	Channel Bandwidth 5MHz	TX: 3552.5MHz ~ 3697.5MHz
			RX: 3552.5MHz ~ 3697.5MHz
		Channel Bandwidth 10MHz	TX: 3555MHz ~ 3695MHz
			RX: 3555MHz ~ 3695MHz
		Channel Bandwidth 15MHz	TX: 3557.5MHz ~ 3692.5MHz
			RX: 3557.5MHz ~ 3692.5MHz
		Channel Bandwidth 20MHz	TX: 3560MHz ~ 3690MHz
			RX: 3560MHz ~ 3690MHz
	LTE Band 71	Channel Bandwidth 5MHz	665.5MHz ~ 695.5MHz
		Channel Bandwidth 10MHz	668.0MHz ~ 693.0MHz
		Channel Bandwidth 15MHz	670.5MHz ~ 690.5MHz
		Channel Bandwidth 20MHz	673.0MHz ~ 688.0MHz

			QPSK	16QAM	64QAM	256QAM
Max. ERP Power	LTE Band 5	Channel Bandwidth 1.4MHz	304.089mW (24.83dBm)	243.220mW (23.86dBm)	194.089mW (22.88dBm)	156.315mW (21.94dBm)
		Channel Bandwidth 3MHz	302.691mW (24.81dBm)	242.661mW (23.85dBm)	191.867mW (22.83dBm)	161.436mW (22.08dBm)
		Channel Bandwidth 5MHz	306.196mW (24.86dBm)	240.436mW (23.81dBm)	193.197mW (22.86dBm)	164.437mW (22.16dBm)
		Channel Bandwidth 10MHz	305.492mW (24.85dBm)	239.883mW (23.80dBm)	193.197mW (22.86dBm)	165.577mW (22.19dBm)
	LTE Band 12	Channel Bandwidth 1.4MHz	351.560mW (25.46dBm)	279.254mW (24.46dBm)	221.820mW (23.46dBm)	171.791mW (22.35dBm)
		Channel Bandwidth 3MHz	351.560mW (25.46dBm)	274.789mW (24.39dBm)	219.786mW (23.42dBm)	171.396mW (22.34dBm)
		Channel Bandwidth 5MHz	346.737mW (25.40dBm)	279.254mW (24.46dBm)	219.786mW (23.42dBm)	172.584mW (22.37dBm)
		Channel Bandwidth 10MHz	347.536mW (25.41dBm)	276.694mW (24.42dBm)	218.776mW (23.40dBm)	169.824mW (22.30dBm)
	LTE Band 13	Channel Bandwidth 5MHz	350.752mW (25.45dBm)	273.527mW (24.37dBm)	221.309mW (23.45dBm)	171.791mW (22.35dBm)
		Channel Bandwidth 10MHz	349.945mW (25.44dBm)	267.917mW (24.28dBm)	221.820mW (23.46dBm)	168.267mW (22.26dBm)
	LTE Band 71	Channel Bandwidth 5MHz	351.560mW (25.46dBm)	278.612mW (24.45dBm)	221.309mW (23.45dBm)	177.011mW (22.48dBm)
		Channel Bandwidth 10MHz	349.945mW (25.44dBm)	278.612mW (24.45dBm)	221.820mW (23.46dBm)	176.604mW (22.47dBm)
		Channel Bandwidth 15MHz	341.979mW (25.34dBm)	276.694mW (24.42dBm)	220.293mW (23.43dBm)	174.582mW (22.42dBm)
		Channel Bandwidth 20MHz	348.337mW (25.42dBm)	277.971mW (24.44dBm)	221.820mW (23.46dBm)	176.604mW (22.47dBm)
Max. EIRP Power	LTE Band 30	Channel Bandwidth 5MHz	208.930 mW/5MHz (23.2dBm /5MHz)	-	-	138.038 mW/5MHz (21.4dBm /5MHz)
		Channel Bandwidth 10MHz	204.174 mW/5MHz (23.1dBm /5MHz)	-	-	154.882 mW/5MHz (21.9dBm /5MHz)
	LTE Band 48	**Per 10M**				
		Channel Bandwidth 5MHz	182.810mW (22.62dBm)	146.893mW (21.67dBm)	115.878mW (20.64dBm)	97.499mW (19.89dBm)
		Channel Bandwidth 10MHz	185.353mW (22.68dBm)	148.252mW (21.71dBm)	118.032mW (20.72dBm)	99.083mW (19.96dBm)
		Channel Bandwidth 15MHz	187.068mW (22.72dBm)	146.218mW (21.65dBm)	117.490mW (20.70dBm)	93.756mW (19.72dBm)
		Channel Bandwidth 20MHz	186.209mW (22.70dBm)	147.571mW (21.69dBm)	117.761mW (20.71dBm)	92.470mW (19.66dBm)
		Full Power (per each BW)				
		Channel Bandwidth 5MHz	182.810mW (22.62dBm)	146.893mW (21.67dBm)	115.878mW (20.64dBm)	97.499mW (19.89dBm)
		Channel Bandwidth 10MHz	185.353mW (22.68dBm)	148.252mW (21.71dBm)	118.032mW (20.72dBm)	99.083mW (19.96dBm)
		Channel Bandwidth 15MHz	184.927mW (22.67dBm)	146.218mW (21.65dBm)	115.345mW (20.62dBm)	97.275mW (19.88dBm)
		Channel Bandwidth 20MHz	186.638mW (22.71dBm)	146.555mW (21.66dBm)	116.413mW (20.66dBm)	95.499mW (19.80dBm)

			QPSK	16QAM	64QAM	256QAM
Emission Designator	LTE Band 5	Channel Bandwidth 1.4MHz	1M09G7D	1M09D7W	1M09D7W	1M09D7W
		Channel Bandwidth 3MHz	2M70G7D	2M70D7W	2M70D7W	2M70D7W
		Channel Bandwidth 5MHz	4M49G7D	4M49D7W	4M50D7W	4M48D7W
		Channel Bandwidth 10MHz	8M96G7D	8M96D7W	8M96D7W	8M96D7W
	LTE Band 12	Channel Bandwidth 1.4MHz	1M09G7D	1M09D7W	1M09D7W	1M08D7W
		Channel Bandwidth 3MHz	2M70G7D	2M69D7W	2M70D7W	2M70D7W
		Channel Bandwidth 5MHz	4M49G7D	4M49D7W	4M49D7W	4M49D7W
		Channel Bandwidth 10MHz	8M96G7D	8M96D7W	8M96D7W	8M96D7W
	LTE Band 13	Channel Bandwidth 5MHz	4M50G7D	4M51D7W	4M51D7W	4M49D7W
		Channel Bandwidth 10MHz	8M98G7D	8M95D7W	8M95D7W	8M94D7W
	LTE Band 30	Channel Bandwidth 5MHz	4M49G7D	4M49D7W	4M49D7W	4M49D7W
		Channel Bandwidth 10MHz	8M95G7D	8M96D7W	8M96D7W	8M95D7W
	LTE Band 48	Channel Bandwidth 5MHz	4M49G7D	4M49D7W	4M50D7W	4M48D7W
		Channel Bandwidth 10MHz	8M96G7D	8M97D7W	8M97D7W	8M96D7W
		Channel Bandwidth 15MHz	13M5G7D	13M5D7W	13M5D7W	13M5D7W
		Channel Bandwidth 20MHz	17M9G7D	17M9D7W	17M9D7W	17M9D7W
	LTE Band 71	Channel Bandwidth 5MHz	4M49G7D	4M49D7W	4M50D7W	4M49D7W
		Channel Bandwidth 10MHz	8M96G7D	8M97D7W	8M97D7W	8M96D7W
		Channel Bandwidth 15MHz	13M5G7D	13M5D7W	13M5D7W	13M5D7W
		Channel Bandwidth 20MHz	17M9G7D	17M9D7W	17M9D7W	17M9D7W
Antenna Type	Refer to Note as below					
Antenna Connector	Refer to Note as below					
Accessory Device	NA					
Cable Supplied	NA					

Output Power / Emission Designator	n66+LTE Band 5		Maximum EIRP / ERP	Sum Bandwidth
		n66	584.790mW (27.67dBm)	23M0D7W
		LTE Band 5 (ERP)	165.577mW (22.19dBm)	
			EIRP / ERP	MAX Sum Bandwidth
		n66	261.818mW (24.18dBm)	27M8D7W
		LTE Band 5 (ERP)	165.577mW (22.19dBm)	
	n66+LTE Band 12		Maximum EIRP / ERP	Sum Bandwidth
		n66	584.790mW (27.67dBm)	18M5D7W
		LTE Band 12 (ERP)	172.584mW (22.37dBm)	
			EIRP / ERP	MAX Sum Bandwidth
		n66	261.818mW (24.18dBm)	27M8D7W
		LTE Band 12 (ERP)	231.739mW (23.65dBm)	
	n66+LTE Band 13		Maximum EIRP / ERP	Sum Bandwidth
		n66	584.790mW (27.67dBm)	18M5D7W
		LTE Band 13 (ERP)	171.791mW (22.35dBm)	
			EIRP / ERP	MAX Sum Bandwidth
		n66	261.818mW (24.18dBm)	27M8D7W
		LTE Band 13 (ERP)	161.065mW (22.07dBm)	
	n66+LTE Band 30		Maximum EIRP	Sum Bandwidth
		n66	584.790mW (27.67dBm)	23M0D7W
		LTE Band 30 (EIRP)	154.882mW (21.90dBm)	
			EIRP	MAX Sum Bandwidth
		n66	261.818mW (24.18dBm)	27M8D7W
		LTE Band 30 (EIRP)	154.882mW (21.90dBm)	
	n66+LTE Band 48		Maximum EIRP	Sum Bandwidth
		n66	584.790mW (27.67dBm)	23M0D7W
		LTE Band 48 (EIRP)	99.083mW (19.96dBm)	
			EIRP	MAX Sum Bandwidth
		n66	261.818mW (24.18dBm)	36M8D7W
		LTE Band 48 (EIRP)	71.945mW (18.57dBm)	
	n66+LTE Band 71		Maximum EIRP / ERP	Sum Bandwidth
		n66	584.790mW (27.67dBm)	18M5D7W
		LTE Band 71 (ERP)	177.011mW (22.48dBm)	
			EIRP / ERP	MAX Sum Bandwidth
		n66	261.818mW (24.18dBm)	36M8D7W
		LTE Band 71 (ERP)	168.655mW (22.27dBm)	

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report of BV CPS report no.: RF200109E02-14 Difference compared with the original report is adding Modulation Type 256QAM by software. In this software changed, will not impact the 5G NR characteristic, therefore all test results are keeping as original report stated. Therefore, the EUT was tested all tests for 256QAM and presented in the test report.

2. There are four Difference HW of T99W175.

Brand	Model	HW
Foxconn	T99W175	1. 3G+LTE+Sub6+eSIM
		2. 3G+LTE+Sub6 only w/o eSIM
		3. 3G+LTE+Sub6+eSIM+GNSS connector
		4. 3G+LTE+Sub6 only+w/o eSIM+GNSS connector

*After pre-testing, “HW: 1. 3G+LTE+Sub6+eSIM” is the worst for the final tests.

3. After pre-testing, “DFT-s-OFDM” is the worst for the final tests.

4. The following antennas were provided to the EUT.

Antenna No.	RF Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range (MHz)	Antenna Type	Connector Type
1		WHA YU	C107-511720-A	4.41	660~803	PCB	I-PEX
2		WHA YU	C107-511721-A	3.81 4.03	791~960 1447.9~1606	PCB	I-PEX
3		WHA YU	C107-511722-A	4.27 5.31	1710~2170 2500~2690	PCB	I-PEX
4		WHA YU	C107-511723-A	2.99 0.92	2300~2400 3500~3700	PCB	I-PEX
5		WHA YU	C107-511724-A	6.45	5150~5925	PCB	I-PEX
6		WHA YU	C107-511725-A	4.89	3400~3700	PCB	I-PEX
7		AVX	5000106-R1-X01	2.91	699~803	Monopole	I-PEX
8		AVX	5000107-R1-X01	2.59	791~960	Monopole	I-PEX
9		AVX	5000108-R1-X01	2.85	1427~1610	Monopole	I-PEX
10		AVX	5000109-R1-X01	2.23 2.94	1710~2200 5150~5925	Monopole	I-PEX
11		AVX	5000110-R1-X01	0.9	2300~2690	Monopole	I-PEX
12		AVX	5000111-R1-X01	0.87	3300~5000	Monopole	I-PEX

Antenna No.	RF Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range (MHz)	Antenna Type	Connector Type
13	Tx1/ Rx1	Ethertronics	5003806	0.4 -1.61 0.39 2.95 1.98 0.38 0.83 2.31	698-821 824-960 1425-1515 1710-2200 2300-2690 3300-4200 4400-5000 5150-5925	PIFA	I-PEX
	Rx2	Ethertronics	5003807	-2.24 -4.52 2.87 2.99 2.93 2.91 2.23 -0.85 -3.04	716-821 824-960 1425-1515 1557-1610 1805-2200 2300-2690 3300-4200 4400-5000 5150-5925	PIFA	I-PEX
	Tx2/ Rx3	Ethertronics	5003806	2.21 2.25 -0.45 2.6	1710-2200 2300-2690 3300-4200 4400-5000	PIFA	I-PEX
	Rx4	Ethertronics	5003700	1.38 2.87 0.6 -2.09	1805-2200 2300-2690 3300-4200 4400-5000	PIFA	I-PEX
14	Ant. 0 (TX/RX)	Master Wave	NA	2.4 2.2 2.9 2.9 2.9 NA	880~960 1020~2170 2545~2595 3565~3600 3900~4000 GPS	PCB	I-PEX
	Ant. 2 (TX/RX)	Master Wave	NA	NA 2.2 2.8 2.9 2.8 NA	880~960 1020~2170 2545~2595 3565~3600 3900~4000 GPS	PCB	I-PEX
	Ant. 1 (RX)	Master Wave	NA	NA 5.3 5.1 4.3 4.5 NA	880~960 1020~2170 2545~2595 3565~3600 3900~4000 GPS	PCB	I-PEX
	Ant. 3 (RX)	Master Wave	NA	1.3 6.8 3.7 6.4 6.2 3.7	880~960 1020~2170 2545~2595 3565~3600 3900~4000 GPS	PCB	I-PEX

*The antenna for the final tests as following table.

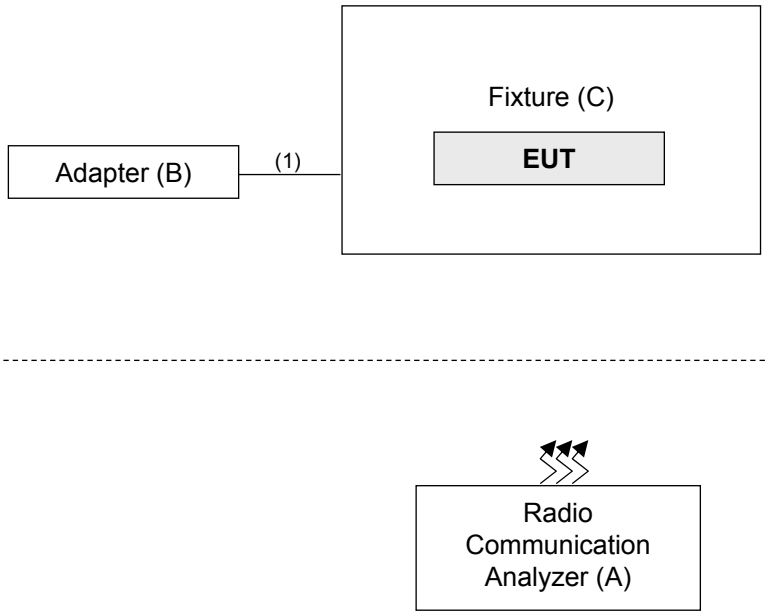
	Band	Antenna
5GNR	66 (15kHz) /5/10/15/20	Antenna 3

	Band	Antenna
LTE	5	Antenna 2
	12	Antenna 1
	13	Antenna 1
	30	Antenna 4
	48	Antenna 4
	71	Antenna 1

5. The EUT supports the following ENDC configuration.

	FCC 5G FR1			ENDC
	Band	SCS	Bandwidth (MHz)	
5GNR	n2	15kHz	5/10/15/20	Band 5/12/13/30/48/66
	n5	15kHz	5/10/15/20	Band 2/7/12/48/66
	n7	15kHz	5/10/15/20	Band 5/12
	n12	15kHz	5/10/15	Band 2/66
	n41	30kHz	20/40/50/60/80/90/100	Band 2/25/26/66/41
	n66	15kHz	5/10/15/20	Band 5/12/13/30/48/71
	n71	15kHz	5/10/15/20	Band 2/7/66

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	-
B.	Adapter	LITEON	PA-1050-39	NA	NA	-
C.	Fixture	NA	NA	NA	NA	Provided by client.

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.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1.5	Y	0	-

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 on Z-plane. Following channel(s) was (were) selected for the final test as listed below.

n66

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	342500 to 355500	342500 (1712.5MHz), 349000 (1745.0MHz), 355500 (1777.5MHz)	5MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	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
		343000 to 355000	343000 (1715.0MHz), 349000 (1745.0MHz), 355000 (1775.0MHz)	10MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	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
		343500 to 354500	343500 (1717.5MHz), 349000 (1745.0MHz), 354500 (1772.5MHz)	15MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	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
		344000 to 354000	344000 (1720.0MHz), 349000 (1745.0MHz), 354000 (1770.0MHz)	20MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	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	344000 to 354000	349000 (1745.0MHz)	20MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	100 RB / 0 RB Offset
-	Frequency Stability	342500 to 355500	342500 (1712.5MHz), 355500 (1777.5MHz)	5MHz	$\pi/2$ BPSK	25 RB / 0 RB Offset
		343000 to 355000	343000 (1715.0MHz), 355000 (1775.0MHz)	10MHz	$\pi/2$ BPSK	52 RB / 0 RB Offset
		343500 to 354500	343500 (1717.5MHz), 354500 (1772.5MHz)	15MHz	$\pi/2$ BPSK	79 RB / 0 RB Offset
		344000 to 354000	344000 (1720.0MHz), 354000 (1770.0MHz)	20MHz	$\pi/2$ BPSK	106 RB / 0 RB Offset
-	Emission Bandwidth	342500 to 355500	342500 (1712.5MHz), 349000 (1745.0MHz), 355500 (1777.5MHz)	5MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	25 RB / 0 RB Offset
		343000 to 355000	343000 (1715.0MHz), 349000 (1745.0MHz), 355000 (1775.0MHz)	10MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	52 RB / 0 RB Offset
		343500 to 354500	343500 (1717.5MHz), 349000 (1745.0MHz), 354500 (1772.5MHz)	15MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	79 RB / 0 RB Offset
		344000 to 354000	344000 (1720.0MHz), 349000 (1745.0MHz), 354000 (1770.0MHz)	20MHz	$\pi/2$ BPSK / QPSK / 16QAM / 64QAM / 256QAM	106 RB / 0 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Band Edge	342500 to 355500	342500 (1712.5MHz), 355500 (1777.5MHz)	5MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		343000 to 355000	343000 (1715.0MHz), 355000 (1775.0MHz)	10MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset 1 RB / 51 RB Offset 52 RB / 0 RB Offset
		343500 to 354500	343500 (1717.5MHz), 354500 (1772.5MHz)	15MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset 1 RB / 78 RB Offset 79 RB / 0 RB Offset
		344000 to 354000	344000 (1720.0MHz), 354000 (1770.0MHz)	20MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset 1 RB / 105 RB Offset 106 RB / 0 RB Offset
-	Peak to Average Ratio	342500 to 355500	342500 (1712.5MHz), 349000 (1745.0MHz), 355500 (1777.5MHz)	5MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
		343000 to 355000	343000 (1715.0MHz), 349000 (1745.0MHz), 355000 (1775.0MHz)	10MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
		343500 to 354500	343500 (1717.5MHz), 349000 (1745.0MHz), 354500 (1772.5MHz)	15MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
		344000 to 354000	344000 (1720.0MHz), 349000 (1745.0MHz), 354000 (1770.0MHz)	20MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
-	Conducted Emission	342500 to 355500	342500 (1712.5MHz), 349000 (1745.0MHz), 355500 (1777.5MHz)	5MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
		343000 to 355000	343000 (1715.0MHz), 349000 (1745.0MHz), 355000 (1775.0MHz)	10MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
		343500 to 354500	343500 (1717.5MHz), 349000 (1745.0MHz), 354500 (1772.5MHz)	15MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
		344000 to 354000	344000 (1720.0MHz), 349000 (1745.0MHz), 354000 (1770.0MHz)	20MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
-	Radiated Emission Below 1GHz	342500 to 355500	349000 (1745.0MHz)	5MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
		344000 to 354000	344000 (1720.0MHz)	20MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	342500 to 355500	342500 (1712.5MHz), 349000 (1745.0MHz), 355500 (1777.5MHz)	5MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
		343000 to 355000	343000 (1715.0MHz), 349000 (1745.0MHz), 355000 (1775.0MHz)	10MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
		343500 to 354500	343500 (1717.5MHz), 349000 (1745.0MHz), 354500 (1772.5MHz)	15MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset
		344000 to 354000	344000 (1720.0MHz), 349000 (1745.0MHz), 354000 (1770.0MHz)	20MHz	$\pi/2$ BPSK	1 RB / 0 RB Offset

Note: The conducted output power for $\pi/2$ BPSK, QPSK, 16QAM, 64QAM and 256QAM, measured value of $\pi/2$ BPSK is higher than QPSK, 16QAM, 64QAM and 256QAM mode. Therefore, only EIRP, Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under $\pi/2$ BPSK, QPSK, 16QAM, 64QAM and 256QAM modes, the other test items were performed under $\pi/2$ BPSK mode only.

LTE Band 5

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	20407 to 20643	20407(824.7MHz), 20525(836.5MHz), 20643(848.3MHz)	1.4MHz	256QAM	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
		20415 to 20635	20415(825.5MHz), 20525(836.5MHz), 20635(847.5MHz)	3MHz	256QAM	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
		20425 to 20625	20425(826.5MHz), 20525(836.5MHz), 20625(846.5MHz)	5MHz	256QAM	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
		20450 to 20600	20450(829.0MHz), 20525(836.5MHz), 20600(844.0MHz)	10MHz	256QAM	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
-	Frequency Stability	20407 to 20643	20407(824.7MHz), 20643(848.3MHz)	1.4MHz	256QAM	6 RB / 0 RB Offset
		20415 to 20635	20415(825.5MHz), 20635(847.5MHz)	3MHz	256QAM	15 RB / 0 RB Offset
		20425 to 20625	20425(826.5MHz), 20625(846.5MHz)	5MHz	256QAM	25 RB / 0 RB Offset
		20450 to 20600	20450(829.0MHz), 20600(844.0MHz)	10MHz	256QAM	50 RB / 0 RB Offset
-	Occupied Bandwidth	20407 to 20643	20407(824.7MHz), 20525(836.5MHz), 20643(848.3MHz)	1.4MHz	256QAM	6 RB / 0RB Offset
		20415 to 20635	20415(825.5MHz), 20525(836.5MHz), 20635(847.5MHz)	3MHz	256QAM	15 RB / 0RB Offset
		20425 to 20625	20425(826.5MHz), 20525(836.5MHz), 20625(846.5MHz)	5MHz	256QAM	25RB / 0RB Offset
		20450 to 20600	20450(829.0MHz), 20525(836.5MHz), 20600(844.0MHz)	10MHz	256QAM	50RB / 0RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Band Edge	20407 to 20643	20407(824.7MHz), 20643(848.3MHz)	1.4MHz	256QAM	1 RB / 0 RB Offset 1 RB / 5 RB Offset 6 RB / 0 RB Offset
		20415 to 20635	20415(825.5MHz), 20635(847.5MHz)	3MHz	256QAM	1 RB / 0 RB Offset 1 RB / 14 RB Offset 15 RB / 0 RB Offset
		20425 to 20625	20425(826.5MHz), 20625(846.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		20450 to 20600	20450(829.0MHz), 20600(844.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
-	Peak to Average Ratio	20407 to 20643	20407(824.7MHz), 20525(836.5MHz), 20643(848.3MHz)	1.4MHz	256QAM	3 RB / 1 RB Offset
		20415 to 20635	20415(825.5MHz), 20525(836.5MHz), 20635(847.5MHz)	3MHz	256QAM	1 RB / 0 RB Offset
		20425 to 20625	20425(826.5MHz), 20525(836.5MHz), 20625(846.5MHz)	5MHz	256QAM	1 RB / 12 RB Offset
		20450 to 20600	20450(829.0MHz), 20525(836.5MHz), 20600(844.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Conducted Emission	20407 to 20643	20407(824.7MHz), 20525(836.5MHz), 20643(848.3MHz)	1.4MHz	256QAM	3 RB / 1 RB Offset
		20415 to 20635	20415(825.5MHz), 20525(836.5MHz), 20635(847.5MHz)	3MHz	256QAM	1 RB / 0 RB Offset
		20425 to 20625	20425(826.5MHz), 20525(836.5MHz), 20625(846.5MHz)	5MHz	256QAM	1 RB / 12 RB Offset
		20450 to 20600	20450(829.0MHz), 20525(836.5MHz), 20600(844.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Radiated Emission Below 1GHz	20450 to 20600	20525(836.5MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	20407 to 20643	20407(824.7MHz), 20525(836.5MHz), 20643(848.3MHz)	1.4MHz	256QAM	1 RB / 0 RB Offset
		20425 to 20625	20425(826.5MHz), 20525(836.5MHz), 20625(846.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset
		20450 to 20600	20450(829.0MHz), 20525(836.5MHz), 20600(844.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset

Note: For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5MHz & highest channel bandwidth for final test.

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	256QAM	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	256QAM	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	256QAM	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(707.5 MHz), 23130(711.0 MHz)	10MHz	256QAM	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
-	Frequency Stability	23017 to 23173	23017(699.7MHz), 23173(715.3MHz)	1.4MHz	256QAM	6 RB / 0 RB Offset
		23025 to 23165	23025(700.5MHz), 23165(714.5MHz)	3MHz	256QAM	15 RB / 0 RB Offset
		23035 to 23155	23035(701.5MHz), 23155(713.5MHz)	5MHz	256QAM	25 RB / 0 RB Offset
		23060 to 23130	23060(704.0MHz), 23130(711.0MHz)	10MHz	256QAM	50 RB / 0 RB Offset
-	Emission Bandwidth	23017 to 23173	23017(699.7MHz), 23095(707.5MHz), 23173(715.3MHz)	1.4MHz	256QAM	6 RB / 0 RB Offset
		23025 to 23165	23025(700.5MHz), 23095(707.5MHz), 23165(714.5MHz)	3MHz	256QAM	15 RB / 0 RB Offset
		23035 to 23155	23035(701.5MHz), 23095(707.5MHz), 23155(713.5MHz)	5MHz	256QAM	25 RB / 0 RB Offset
		23060 to 23130	23060(704.0MHz), 23095(707.5MHz), 23130(711.0MHz)	10MHz	256QAM	50 RB / 0 RB Offset
-	Band Edge	23017 to 23173	23017(699.7MHz), 23173(715.3MHz)	1.4MHz	256QAM	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	256QAM	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	256QAM	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	256QAM	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Peak to Average Ratio	23017 to 23173	23017(699.7MHz), 23095(707.5MHz), 23173(715.3MHz)	1.4MHz	256QAM	1 RB / 0 RB Offset
		23025 to 23165	23025(700.5MHz), 23095(707.5MHz), 23165(714.5MHz)	3MHz	256QAM	1 RB / 0 RB Offset
		23035 to 23155	23035(701.5MHz), 23095(707.5MHz), 23155(713.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset
		23060 to 23130	23060(704.0MHz), 23095(707.5MHz), 23130(711.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Conducted Emission	23017 to 23173	23017(699.7MHz), 23095(707.5MHz), 23173(715.3MHz)	1.4MHz	256QAM	1 RB / 0 RB Offset
		23025 to 23165	23025(700.5MHz), 23095(707.5MHz), 23165(714.5MHz)	3MHz	256QAM	1 RB / 0 RB Offset
		23035 to 23155	23035(701.5MHz), 23095(707.5MHz), 23155(713.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset
		23060 to 23130	23060(704.0MHz), 23095(707.5MHz), 23130(711.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Radiated Emission Below 1GHz	23017 to 23173	23130(711.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	23017 to 23173	23017(699.7MHz), 23095(707.5MHz), 23173(715.3MHz)	1.4MHz	256QAM	1 RB / 0 RB Offset
		23035 to 23155	23035(701.5MHz), 23095(707.5MHz), 23155(713.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset
		23060 to 23130	23060(704.0MHz), 23095(707.5MHz), 23130(711.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset

Note: For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the 1.4MHz & highest channel bandwidth for final test.

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	256QAM	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	256QAM	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
-	Frequency Stability	23205 to 23255	23205(779.5MHz), 23255(784.5MHz)	5MHz	256QAM	25 RB / 0 RB Offset
		23230	23230(782.0MHz),	10MHz	256QAM	50 RB / 0 RB Offset
-	Emission Bandwidth	23205 to 23255	23205(779.5MHz), 23230(782.0MHz), 23255(784.5MHz)	5MHz	256QAM	25 RB / 0 RB Offset
		23230	23230(782.0MHz)	10MHz	256QAM	50 RB / 0 RB Offset
-	Band Edge	23205 to 23255	23205(779.5MHz), 23255(784.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		23230	23230(782.0MHz)	10MHz	256QAM	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	256QAM	1 RB / 0 RB Offset
		23230	23230(782.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Conducted Emission	23205 to 23255	23205(779.5MHz), 23230(782.0MHz), 23255(784.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset
		23230	23230(782.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Radiated Emission Below 1GHz	23205 to 23255	23230(782.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	23205 to 23255	23205(779.5MHz), 23230(782.0MHz), 23255(784.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset
		23230	23230(782.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset

Note: For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the 5MHz & highest channel bandwidth for final test.

LTE Band 30

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	EIRP	27685 to 27735	27685 (2307.5MHz), 27710 (2310.0MHz), 27735 (2312.5MHz)	5MHz	256QAM	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
		27710	27710 (2310.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Frequency Stability	27685 to 27735	27685 (2307.5MHz), 27735 (2312.5MHz)	5MHz	256QAM	25 RB / 0 RB Offset
		27710	27710 (2310.0MHz)	10MHz	256QAM	50 RB / 0 RB Offset
-	Emission Bandwidth	27685 to 27735	27685 (2307.5MHz), 27710 (2310.0MHz), 27735 (2312.5MHz)	5MHz	256QAM	25 RB / 0 RB Offset
		27710	27710 (2310.0MHz)	10MHz	256QAM	50 RB / 0 RB Offset
-	Emission Mask	27685 to 27735	27685 (2307.5MHz), 27735 (2312.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset 25 RB / 0 RB Offset
		27710	27710 (2310.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
-	Conducted Emission	27685 to 27735	27685 (2307.5MHz), 27710 (2310.0MHz), 27735 (2312.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset
		27710	27710 (2310.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Radiated Emission Below 1GHz	27710	27710 (2310.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	27685 to 27735	27685 (2307.5MHz), 27710 (2310.0MHz), 27735 (2312.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset
		27710	27710 (2310.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset

LTE Band 48

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Maximum Output Power	55265 to 56715	55265 (3552.5MHz), 55990 (3625.0MHz), 56715 (3697.5MHz)	5MHz	256QAM	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
	55290 to 56690	55290 (3555.0MHz), 55990 (3625.0MHz), 56690 (3695.0MHz)	10MHz	256QAM	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
	55315 to 56665	55315 (3557.5MHz), 55990 (3625.0MHz), 56665 (3692.5MHz)	15MHz	256QAM	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
	55340 to 56640	55340 (3560.0MHz), 55990 (3625.0MHz), 56640 (3690.0MHz)	20MHz	256QAM	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
Frequency Stability	55265 to 56715	55265 (3552.5MHz), 56715 (3697.5MHz)	5MHz	256QAM	25 RB / 0 RB Offset
	55290 to 56690	55290 (3555.0MHz), 56690 (3695.0MHz)	10MHz	256QAM	50 RB / 0 RB Offset
	55315 to 56665	55315 (3557.5MHz), 56665 (3692.5MHz)	15MHz	256QAM	75 RB / 0 RB Offset
	55340 to 56640	55340 (3560.0MHz), 56640 (3690.0MHz)	20MHz	256QAM	100 RB / 0 RB Offset
Occupied Bandwidth	55265 to 56715	55265 (3552.5MHz), 55990 (3625.0MHz), 56715 (3697.5MHz)	5MHz	256QAM	25 RB / 0 RB Offset
	55290 to 56690	55290 (3555.0MHz), 55990 (3625.0MHz), 56690 (3695.0MHz)	10MHz	256QAM	50 RB / 0 RB Offset
	55315 to 56665	55315 (3557.5MHz), 55990 (3625.0MHz), 56665 (3692.5MHz)	15MHz	256QAM	75 RB / 0 RB Offset
	55340 to 56640	55340 (3560.0MHz), 55990 (3625.0MHz), 56640 (3690.0MHz)	20MHz	256QAM	100 RB / 0 RB Offset
Peak to Average Ratio	55265 to 56715	55265 (3552.5MHz), 55990 (3625.0MHz), 56715 (3697.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset
	55290 to 56690	55290 (3555.0MHz), 55990 (3625.0MHz), 56690 (3695.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
	55315 to 56665	55315 (3557.5MHz), 55990 (3625.0MHz), 56665 (3692.5MHz)	15MHz	256QAM	1 RB / 0 RB Offset
	55340 to 56640	55340 (3560.0MHz), 55990 (3625.0MHz), 56640 (3690.0MHz)	20MHz	256QAM	1 RB / 0 RB Offset

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Conducted Emission	55265 to 56715	55265 (3552.5MHz), 55990 (3625.0MHz), 56715 (3697.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset
	55290 to 56690	55290 (3555.0MHz), 55990 (3625.0MHz), 56690 (3695.0MHz)	10MHz	256QAM	1 RB / 0 RB Offset
	55315 to 56665	55315 (3557.5MHz), 55990 (3625.0MHz), 56665 (3692.5MHz)	15MHz	256QAM	1 RB / 0 RB Offset
	55340 to 56640	55340 (3560.0MHz), 55990 (3625.0MHz), 56640 (3690.0MHz)	20MHz	256QAM	1 RB / 0 RB Offset
Radiated Emission Below 1GHz	55340 to 56640	56640 (3690.0MHz)	20MHz	256QAM	1 RB / 0 RB Offset
Radiated Emission Above 1GHz	55265 to 56715	55265 (3552.5MHz), 55990 (3625.0MHz), 56715 (3697.5MHz)	5MHz	256QAM	1 RB / 0 RB Offset
	55340 to 56640	55340 (3560.0MHz), 55990 (3625.0MHz), 56640 (3690.0MHz)	20MHz	256QAM	1 RB / 0 RB Offset

Note: For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5MHz & highest channel bandwidth for final test.

LTE Band 71

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	133147 to 133447	133147 (665.5MHz), 133297 (680.5MHz), 133447 (695.5MHz)	5 MHz	256QAM	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
		133172 to 133422	133172 (668.0MHz), 133297 (680.5MHz), 133422 (693.0MHz)	10 MHz	256QAM	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
		133197 to 133397	133197 (670.5MHz), 133297 (680.5MHz), 133397 (690.5MHz)	15 MHz	256QAM	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
		133222 to 133372	133222 (673.0MHz), 133297 (680.5MHz), 133372 (688.0MHz)	20 MHz	256QAM	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	133222 to 133372	133297 (680.5MHz)	20 MHz	256QAM	100 RB / 0 RB Offset
-	Frequency Stability	133147 to 133447	133147 (665.5MHz), 133447 (695.5MHz)	5 MHz	256QAM	25 RB / 0 RB Offset
		133172 to 133422	133172 (668.0MHz), 133422 (693.0MHz)	10 MHz	256QAM	50 RB / 0 RB Offset
		133197 to 133397	133197 (670.5MHz), 133397 (690.5MHz)	15 MHz	256QAM	75 RB / 0 RB Offset
		133222 to 133372	133222 (673.0MHz), 133372 (688.0MHz)	20 MHz	256QAM	100 RB / 0 RB Offset
-	Emission Bandwidth	133147 to 133447	133147 (665.5MHz), 133297 (680.5MHz), 133447 (695.5MHz)	5 MHz	256QAM	6 RB / 0 RB Offset
		133172 to 133422	133172 (668.0MHz), 133297 (680.5MHz), 133422 (693.0MHz)	10 MHz	256QAM	15 RB / 0 RB Offset
		133197 to 133397	133197 (670.5MHz), 133297 (680.5MHz), 133397 (690.5MHz)	15 MHz	256QAM	25 RB / 0 RB Offset
		133222 to 133372	133222 (673.0MHz), 133297 (680.5MHz), 133372 (688.0MHz)	20 MHz	256QAM	50 RB / 0 RB Offset
-	Band Edge	133147 to 133447	133147 (665.5MHz), 133447 (695.5MHz)	5 MHz	256QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		133172 to 133422	133172 (668.0MHz), 133422 (693.0MHz)	10 MHz	256QAM	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
		133197 to 133397	133197 (670.5MHz), 133397 (690.5MHz)	15 MHz	256QAM	1 RB / 0 RB Offset 1 RB / 74 RB Offset 75 RB / 0 RB Offset
		133222 to 133372	133222 (673.0MHz), 133372 (688.0MHz)	20 MHz	256QAM	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	133147 to 133447	133147 (665.5MHz), 133297 (680.5MHz), 133447 (695.5MHz)	5 MHz	256QAM	1 RB / 0 RB Offset
		133172 to 133422	133172 (668.0MHz), 133297 (680.5MHz), 133422 (693.0MHz)	10 MHz	256QAM	1 RB / 0 RB Offset
		133197 to 133397	133197 (670.5MHz), 133297 (680.5MHz), 133397 (690.5MHz)	15 MHz	256QAM	1 RB / 0 RB Offset
		133222 to 133372	133222 (673.0MHz), 133297 (680.5MHz), 133372 (688.0MHz)	20 MHz	256QAM	1 RB / 0 RB Offset
-	Conducted Emission	133147 to 133447	133147 (665.5MHz), 133297 (680.5MHz), 133447 (695.5MHz)	5 MHz	256QAM	1 RB / 0 RB Offset
		133172 to 133422	133172 (668.0MHz), 133297 (680.5MHz), 133422 (693.0MHz)	10 MHz	256QAM	1 RB / 0 RB Offset
		133197 to 133397	133197 (670.5MHz), 133297 (680.5MHz), 133397 (690.5MHz)	15 MHz	256QAM	1 RB / 0 RB Offset
		133222 to 133372	133222 (673.0MHz), 133297 (680.5MHz), 133372 (688.0MHz)	20 MHz	256QAM	1 RB / 0 RB Offset
-	Radiated Emission Below 1GHz	133147 to 133447	133447 (695.5MHz)	5 MHz	256QAM	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	133147 to 133447	133147 (665.5MHz), 133297 (680.5MHz), 133447 (695.5MHz)	5 MHz	256QAM	1 RB / 0 RB Offset
		133222 to 133372	133222 (673.0MHz), 133297 (680.5MHz), 133372 (688.0MHz)	20 MHz	256QAM	1 RB / 0 RB Offset

Note: For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the 5MHz & highest channel bandwidth for final test.

Test Condition:

Test Item	Environmental Conditions	Input Power (system)	Tested By
ERP / EIRP	25deg. C, 70%RH	5Vdc	James Yang
Frequency Stability	24deg. C, 64%RH	5Vdc	James Yang
Occupied Bandwidth	24deg. C, 64%RH	5Vdc	James Yang
Band Edge	24deg. C, 64%RH	5Vdc	James Yang
Peak To Average Ratio	24deg. C, 64%RH	5Vdc	James Yang
Conducted Emission	24deg. C, 64%RH	5Vdc	James Yang
Radiated Emission	22deg. C, 68%RH 24deg. C, 64%RH	120Vac, 60Hz	Greg Lin Match Tsui

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 22

FCC 47 CFR Part 27

FCC 47 CFR Part 96

ANSI/TIA/EIA-603-D-2010

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

KDB 971168 D02 Misc Rev Approv License Devices v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

KDB 940660 D01 Part 96 CBRS Eqpt v02

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 n66:
Mobile / Portable station are limited to 1 watts e.i.r.p.

For LTE Band 5:
Mobile / Portable station are limited to 7 watts e.r.p.

For LTE Band 12, LTE Band 13, LTE Band 71:
Control and mobile stations in the 698-746 MHz, 746-757 MHz, 787-788 MHz and 805-806 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, 746-757 MHz,787-788 MHz and 805-806 MHz band are limited to 3 watts ERP.

For LTE Band 30:
For mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth.

For LTE Band 48:

Device		Maximum Output Power (dBm/10 MHz)
☒	End User Device	23
☐	Category A CBSD	30
☐	Category B CBSD	47

4.1.2 Test Procedures

Conducted Power Measurement:

The EUT was set up for the maximum power with WCDMA, 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

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:
ERP or EIRP = P_{Meas} + G_T
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:

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.4 Test Results

Conducted Output Power (dBm)

n66						
BW	MCS Index	Channel		342500	349000	355500
		Frequency (MHz)		1712.5	1745	1777.5
5M	$\pi/2$ BPSK	1	0	23.21	22.97	**23.33**
		1	12	23.18	22.94	23.16
		1	24	23.11	23.01	23.22
		12	0	22.94	22.77	22.71
		12	6	23.11	23.03	22.73
		12	13	22.86	23.10	22.93
		25	0	22.97	23.13	22.83
	QPSK	1	0	22.84	23.00	22.95
		1	12	22.83	22.99	22.96
		1	24	22.86	**23.03**	22.83
		12	0	22.72	22.66	22.88
		12	6	22.80	22.66	22.84
		12	13	22.78	22.82	22.87
		25	0	22.68	22.88	22.79
	16QAM	1	0	22.81	22.70	22.97
		1	12	**23.01**	22.94	22.94
		1	24	22.75	22.70	22.73
		12	0	22.53	22.51	22.62
		12	6	22.77	22.80	22.60
		12	13	22.67	22.64	22.82
		25	0	22.53	22.69	22.53
	64QAM	1	0	22.53	22.37	22.47
		1	12	22.32	22.31	**22.76**
		1	24	22.43	22.54	22.30
		12	0	22.56	22.45	22.27
		12	6	22.17	22.38	22.43
		12	13	22.20	22.15	22.16
		25	0	22.53	22.16	22.39
	256QAM	1	0	19.63	20.01	**20.21**
		1	12	20.00	19.94	19.78
		1	24	19.84	20.04	19.87
		12	0	19.39	19.59	19.87
		12	6	19.62	19.23	19.41
		12	13	19.95	19.27	19.52
		25	0	19.77	19.74	19.17

n66						
BW	MCS Index	Channel		343000	349000	355000
		Frequency (MHz)		1715	1745	1775
10M	$\pi/2$ BPSK	1	0	**23.37**	22.95	23.32
		1	26	23.12	23.21	22.97
		1	51	23.24	23.32	23.01
		26	0	23.02	22.96	23.07
		26	13	22.78	23.01	23.15
		26	26	23.04	23.03	22.77
		52	0	23.02	23.04	22.90
	QPSK	1	0	22.80	23.01	22.83
		1	26	22.94	22.86	22.87
		1	51	**23.10**	22.93	23.09
		26	0	22.68	22.84	22.63
		26	13	22.65	22.78	22.66
		26	26	22.81	22.76	22.71
		52	0	22.69	22.79	22.68
	16QAM	1	0	**23.01**	22.83	22.77
		1	26	22.70	22.74	22.74
		1	51	22.71	22.78	22.96
		26	0	22.88	22.70	22.57
		26	13	22.83	22.53	22.89
		26	26	22.88	22.84	22.72
		52	0	22.74	22.54	22.64
	64QAM	1	0	22.67	22.40	22.76
		1	26	22.64	22.50	22.75
		1	51	**22.78**	22.68	22.58
		26	0	22.41	22.33	22.41
		26	13	22.24	22.50	22.28
		26	26	22.36	22.43	22.15
		52	0	22.21	22.36	22.51
	256QAM	1	0	20.17	19.97	20.15
		1	26	**20.28**	20.24	19.95
		1	51	20.11	20.02	19.96
		26	0	19.79	19.79	19.96
		26	13	19.45	19.72	19.34
		26	26	19.27	19.96	19.74
		52	0	19.68	19.29	19.78

n66						
BW	MCS Index	Channel		343500	349000	354500
		Frequency (MHz)		1717.5	1745	1772.5
15M	$\pi/2$ BPSK	1	0	22.96	22.95	23.32
		1	39	22.97	23.33	**23.40**
		1	78	23.38	22.98	23.01
		39	0	22.95	23.04	23.07
		39	19	23.02	22.88	23.16
		39	40	23.17	22.84	22.92
		79	0	23.02	22.94	23.07
	QPSK	1	0	22.93	22.99	22.93
		1	39	22.85	22.92	22.88
		1	78	22.81	22.99	**23.08**
		39	0	22.90	22.67	22.60
		39	19	22.67	22.80	22.87
		39	40	22.73	22.80	22.86
		79	0	22.90	22.87	22.83
	16QAM	1	0	22.92	22.76	22.98
		1	39	22.87	22.79	23.04
		1	78	**23.08**	22.76	22.85
		39	0	22.75	22.65	22.88
		39	19	22.80	22.83	22.66
		39	40	22.71	22.78	22.81
		79	0	22.55	22.53	22.54
	64QAM	1	0	22.32	22.75	**22.79**
		1	39	22.75	22.52	22.55
		1	78	22.34	22.52	22.43
		39	0	22.44	22.10	22.54
		39	19	22.20	22.39	22.53
		39	40	22.60	22.36	22.37
		79	0	22.49	22.11	22.16
	256QAM	1	0	19.65	19.94	19.97
		1	39	19.99	20.15	19.64
		1	78	**20.24**	19.88	19.79
		39	0	19.75	19.89	19.67
		39	19	19.93	19.82	19.17
		39	40	19.56	19.31	19.77
		79	0	19.55	19.19	19.85

n66						
BW	MCS Index	Channel		344000	349000	132575
		Frequency (MHz)		1720	1745	1770
20M	$\pi/2$ BPSK	1	0	22.97	23.13	22.91
		1	53	23.16	23.00	22.97
		1	105	23.02	**23.26**	23.23
		50	0	23.07	22.74	22.75
		50	25	22.82	22.92	23.17
		50	50	22.78	22.80	23.01
		106	0	22.99	22.75	22.88
	QPSK	1	0	**23.08**	23.03	23.02
		1	53	22.96	22.88	22.98
		1	105	23.05	22.99	22.82
		50	0	22.79	22.83	22.77
		50	25	22.67	22.84	22.84
		50	50	22.67	22.89	22.76
		106	0	22.59	22.80	22.74
	16QAM	1	0	**23.10**	22.95	22.74
		1	53	22.70	22.95	22.85
		1	105	22.92	22.89	22.82
		50	0	22.78	22.76	22.60
		50	25	22.79	22.83	22.86
		50	50	22.70	22.56	22.61
		106	0	22.88	22.50	22.80
	64QAM	1	0	22.33	22.70	22.58
		1	53	**22.76**	22.65	22.75
		1	105	22.35	22.64	22.59
		50	0	22.57	22.29	22.31
		50	25	22.12	22.37	22.25
		50	50	22.26	22.57	22.51
		106	0	22.44	22.41	22.23
	256QAM	1	0	19.71	19.85	20.05
		1	53	19.90	20.27	19.86
		1	105	**20.29**	19.66	19.63
		50	0	19.72	19.96	19.20
		50	25	19.19	19.46	19.73
		50	50	19.32	19.63	19.81
		106	0	19.20	19.73	19.91

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20407	20525	20643
		Frequency (MHz)		824.7	836.5	848.3
1.4M	256QAM	1	0	19.90	20.13	20.16
		1	2	20.23	19.76	19.78
		1	5	20.01	19.87	19.75
		3	0	19.82	19.83	20.18
		3	1	19.98	19.74	20.02
		3	3	19.86	19.95	20.05
		6	0	20.13	20.00	**20.28**
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20415	20525	20635
		Frequency (MHz)		825.5	836.5	847.5
3M	256QAM	1	0	**20.42**	20.25	19.85
		1	7	20.04	20.35	19.69
		1	14	19.83	20.38	20.31
		8	0	20.27	20.39	19.86
		8	3	19.66	19.90	19.86
		8	7	19.67	20.31	20.23
		15	0	19.70	19.88	19.64
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20425	20525	20625
		Frequency (MHz)		826.5	836.5	846.5
5M	256QAM	1	0	20.14	19.58	20.02
		1	12	19.67	19.70	20.05
		1	24	20.34	20.31	19.98
		12	0	19.92	20.36	19.47
		12	6	19.80	20.48	20.04
		12	13	20.44	19.54	20.19
		25	0	20.31	**20.50**	20.02
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20450	20525	20600
		Frequency (MHz)		829	836.5	844
10M	256QAM	1	0	19.79	19.89	20.05
		1	24	19.81	**20.53**	19.99
		1	49	20.25	19.86	19.54
		25	0	20.40	20.42	19.67
		25	12	19.83	19.97	19.74
		25	25	20.33	19.53	20.24
		50	0	19.73	20.45	19.70

LTE Band 12						
BW	MCS Index	Channel		23017	23095	23173
		Frequency (MHz)		699.7	707.5	715.3
1.4M	256QAM	1	0	19.42	19.37	19.27
		1	2	**20.09**	19.86	19.67
		1	5	19.41	20.02	19.64
		3	0	19.41	19.26	19.63
		3	1	19.75	19.93	19.36
		3	3	19.82	19.42	19.32
		6	0	19.91	19.67	19.42
BW	MCS Index	Channel		23025	23095	23165
		Frequency (MHz)		700.5	707.5	714.5
3M	256QAM	1	0	19.50	19.61	19.11
		1	7	19.67	19.40	19.92
		1	14	20.04	19.71	19.89
		8	0	19.46	19.81	19.40
		8	3	**20.08**	19.70	19.46
		8	7	19.99	19.66	19.14
		15	0	19.39	19.95	19.37
BW	MCS Index	Channel		23035	23095	23155
		Frequency (MHz)		701.5	707.5	713.5
5M	256QAM	1	0	19.96	19.71	19.92
		1	12	19.41	19.95	19.94
		1	24	19.43	19.69	19.98
		12	0	19.59	19.70	19.39
		12	6	19.86	19.58	19.13
		12	13	**20.11**	19.97	19.69
		25	0	19.83	19.35	19.44
BW	MCS Index	Channel		23060	23095	23130
		Frequency (MHz)		704	707.5	711
10M	256QAM	1	0	19.33	19.74	19.65
		1	24	19.66	19.56	19.32
		1	49	19.80	20.04	19.79
		25	0	19.73	19.58	19.48
		25	12	19.94	**20.04**	19.18
		25	25	19.86	19.61	19.25
		50	0	19.40	19.91	19.43

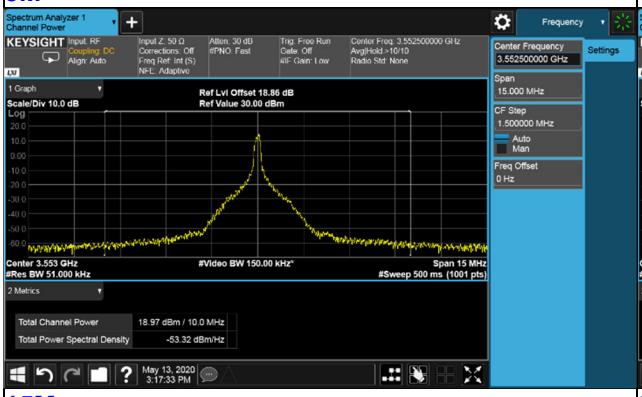
LTE Band 13						
BW	MCS Index	Channel		23205	23230	23255
		Frequency (MHz)		779.5	782	784.5
5M	256QAM	1	0	**20.09**	20.03	19.20
		1	12	19.44	19.27	19.28
		1	24	19.93	19.39	19.97
		12	0	19.42	19.36	19.20
		12	6	19.65	20.03	19.39
		12	13	19.59	19.48	19.44
		25	0	19.48	20.01	19.28
BW	MCS Index	Channel		23230		
		Frequency (MHz)		782		
10M	256QAM	1	0	**20.00**		
		1	24	19.49		
		1	49	19.39		
		25	0	19.68		
		25	12	19.64		
		25	25	19.26		
		50	0	19.81		

LTE Band 30						
BW	MCS Index	Channel		27685	27710	27735
		Frequency (MHz)		2307.5	2310	2312.5
5M	256QAM	1	0	19.24	**19.46**	19.18
		1	12	19.25	19.40	19.32
		1	24	19.06	19.17	19.08
		12	0	19.34	19.01	19.28
		12	6	19.35	19.19	19.18
		12	13	19.23	19.39	19.39
		25	0	19.10	19.39	19.37
BW	MCS Index	Channel		27710		
		Frequency (MHz)		2310		
10M	256QAM	1	0	**19.46**		
		1	24	19.15		
		1	49	19.09		
		25	0	19.42		
		25	12	19.27		
		25	25	19.24		
		50	0	19.16		

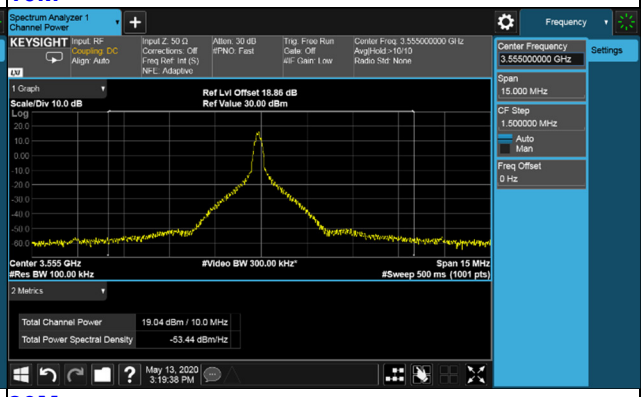
Note: LTE Band 30 measurement results are in dBm/5MHz.

LTE Band 48 (Per 10M)						
BW	MCS Index	Channel		55265	55990	56715
		Frequency (MHz)		3552.5	3625	3697.5
5M	256QAM	1	0	18.70	18.41	18.74
		1	12	**18.97**	18.68	18.66
		1	24	18.15	18.46	18.73
		12	0	17.74	17.92	17.93
		12	6	17.78	17.48	18.01
		12	13	18.26	18.31	17.78
		25	0	18.20	17.95	18.22
BW	MCS Index	Channel		55290	55990	56690
		Frequency (MHz)		3555	3625	3695
10M	256QAM	1	0	18.36	18.75	18.60
		1	24	**19.04**	18.86	18.28
		1	49	19.02	18.37	18.49
		25	0	17.78	18.04	17.69
		25	12	17.72	17.90	17.94
		25	25	18.06	17.89	18.04
		50	0	18.43	18.03	17.82
BW	MCS Index	Channel		55315	55990	56665
		Frequency (MHz)		3557.5	3625	3692.5
15M	256QAM	1	0	18.47	18.67	18.46
		1	37	18.02	**18.80**	18.26
		1	74	18.51	18.61	18.56
		36	0	18.31	17.68	17.34
		36	19	17.65	17.25	17.42
		36	39	17.79	17.66	17.31
		75	0	17.18	18.08	17.52
BW	MCS Index	Channel		55340	55990	56640
		Frequency (MHz)		3560	3625	3690
20M	256QAM	1	0	**18.74**	17.90	18.60
		1	50	18.48	18.38	18.28
		1	99	18.07	18.15	18.31
		50	0	17.41	17.41	17.47
		50	25	17.91	17.27	17.69
		50	50	17.66	18.24	17.91
		100	0	17.61	17.84	17.43

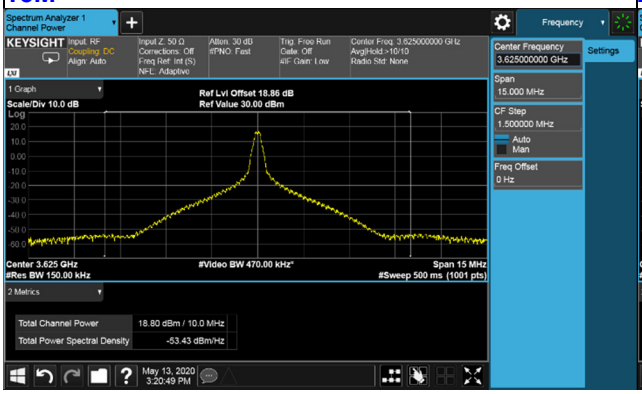
5M



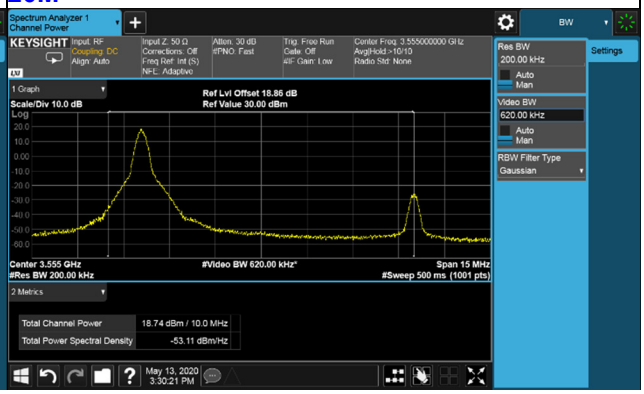
10M



15M

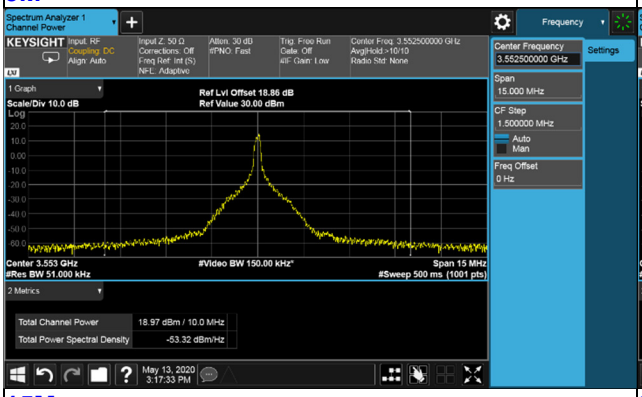


20M

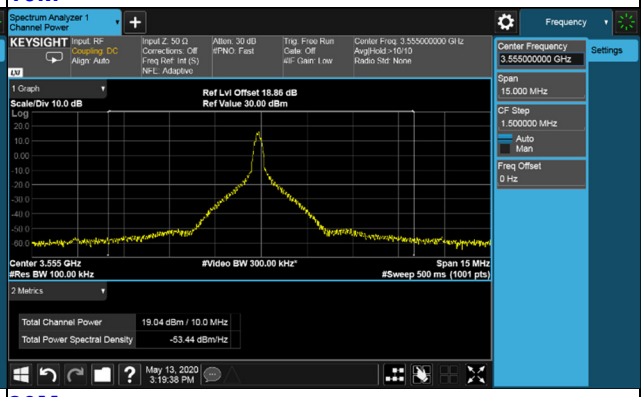


LTE Band 48 (Full Power)						
BW	MCS Index	Channel		55265	55990	56715
		Frequency (MHz)		3552.5	3625	3697.5
5M	256QAM	1	0	18.70	18.41	18.74
		1	12	**18.97**	18.68	18.66
		1	24	18.15	18.46	18.73
		12	0	17.74	17.92	17.93
		12	6	17.78	17.48	18.01
		12	13	18.26	18.31	17.78
		25	0	18.20	17.95	18.22
BW	MCS Index	Channel		55290	55990	56690
		Frequency (MHz)		3555	3625	3695
10M	256QAM	1	0	18.36	18.75	18.60
		1	24	**19.04**	18.86	18.28
		1	49	19.02	18.37	18.49
		25	0	17.78	18.04	17.69
		25	12	17.72	17.90	17.94
		25	25	18.06	17.89	18.04
		50	0	18.43	18.03	17.82
BW	MCS Index	Channel		55315	55990	56665
		Frequency (MHz)		3557.5	3625	3692.5
15M	256QAM	1	0	18.65	18.89	18.75
		1	37	18.24	**18.96**	18.41
		1	74	18.88	18.85	18.69
		36	0	18.41	17.95	17.48
		36	19	17.88	17.42	17.70
		36	39	17.96	17.97	17.68
		75	0	17.47	18.46	17.90
BW	MCS Index	Channel		55340	55990	56640
		Frequency (MHz)		3560	3625	3690
20M	256QAM	1	0	**18.88**	18.23	18.84
		1	50	18.65	18.67	18.45
		1	99	18.46	18.51	18.70
		50	0	17.51	17.69	17.87
		50	25	18.25	17.67	18.09
		50	50	17.90	18.34	18.02
		100	0	17.89	18.18	17.65

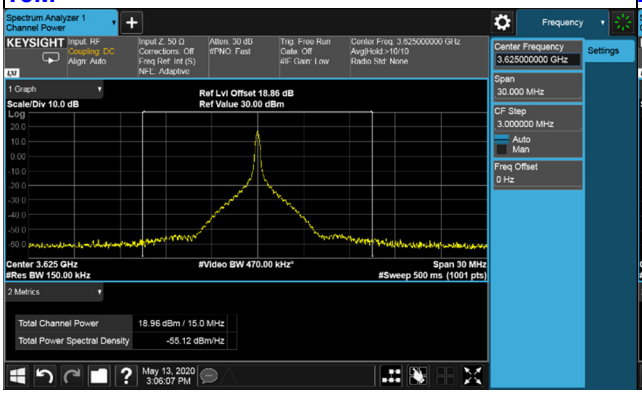
5M



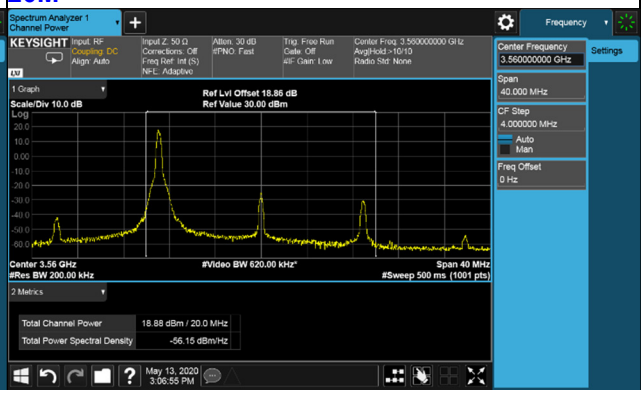
10M



15M



20M



LTE Band 71						
BW	MCS Index	Channel		133147	133297	133447
		Frequency (MHz)		665.5	680.5	695.5
5M	256QAM	1	0	19.52	19.75	19.82
		1	12	**20.22**	19.54	19.77
		1	24	19.97	19.98	19.87
		12	0	19.83	19.56	19.93
		12	6	19.98	19.91	20.09
		12	13	19.79	19.57	19.82
		25	0	19.90	19.57	20.21
BW	MCS Index	Channel		133172	133297	133422
		Frequency (MHz)		668	680.5	693
10M	256QAM	1	0	19.61	**20.21**	20.20
		1	24	20.06	20.06	19.96
		1	49	19.75	19.99	20.20
		25	0	19.67	19.99	20.08
		25	12	20.17	19.47	19.93
		25	25	19.71	19.60	20.14
		50	0	19.94	19.96	20.12
BW	MCS Index	Channel		133197	133297	133397
		Frequency (MHz)		670.5	680.5	690.5
15M	256QAM	1	0	19.78	20.03	19.71
		1	37	19.91	19.99	20.10
		1	74	19.60	20.03	20.16
		36	0	19.62	20.07	19.77
		36	19	19.95	19.96	19.85
		36	39	**20.16**	19.53	19.77
		75	0	19.62	19.53	20.15
BW	MCS Index	Channel		133222	133297	133372
		Frequency (MHz)		673	680.5	688
20M	256QAM	1	0	19.52	20.02	19.83
		1	50	20.21	19.48	19.85
		1	99	19.72	19.92	19.93
		50	0	19.91	20.09	**20.21**
		50	25	19.74	20.10	20.03
		50	50	19.94	19.56	20.01
		100	0	19.97	19.73	20.01

EIRP Power (dBm)

n66						
BW	MCS Index	Channel		342500	349000	355500
		Frequency (MHz)		1712.5	1745	1777.5
5M	$\pi/2$ BPSK	1	0	27.48	27.24	**27.60**
		1	12	27.45	27.21	27.43
		1	24	27.38	27.28	27.49
		12	0	27.21	27.04	26.98
		12	6	27.38	27.30	27.00
		12	13	27.13	27.37	27.20
		25	0	27.24	27.40	27.10
	QPSK	1	0	27.11	27.27	27.22
		1	12	27.10	27.26	27.23
		1	24	27.13	**27.30**	27.10
		12	0	26.99	26.93	27.15
		12	6	27.07	26.93	27.11
		12	13	27.05	27.09	27.14
		25	0	26.95	27.15	27.06
	16QAM	1	0	27.08	26.97	27.24
		1	12	**27.28**	27.21	27.21
		1	24	27.02	26.97	27.00
		12	0	26.80	26.78	26.89
		12	6	27.04	27.07	26.87
		12	13	26.94	26.91	27.09
		25	0	26.80	26.96	26.80
	64QAM	1	0	26.80	26.64	26.74
		1	12	26.59	26.58	**27.03**
		1	24	26.70	26.81	26.57
		12	0	26.83	26.72	26.54
		12	6	26.44	26.65	26.70
		12	13	26.47	26.42	26.43
		25	0	26.80	26.43	26.66
	256QAM	1	0	23.90	24.28	**24.48**
		1	12	24.27	24.21	24.05
		1	24	24.11	24.31	24.14
		12	0	23.66	23.86	24.14
		12	6	23.89	23.50	23.68
		12	13	24.22	23.54	23.79
		25	0	24.04	24.01	23.44

*EIRP = Conducted + antenna gain (4.27dBi)

n66						
BW	MCS Index	Channel		343000	349000	355000
		Frequency (MHz)		1715	1745	1775
10M	$\pi/2$ BPSK	1	0	**27.64**	27.22	27.59
		1	12	27.39	27.48	27.24
		1	24	27.51	27.59	27.28
		12	0	27.29	27.23	27.34
		12	6	27.05	27.28	27.42
		12	13	27.31	27.30	27.04
		25	0	27.29	27.31	27.17
	QPSK	1	0	27.07	27.28	27.10
		1	12	27.21	27.13	27.14
		1	24	**27.37**	27.20	27.36
		12	0	26.95	27.11	26.90
		12	6	26.92	27.05	26.93
		12	13	27.08	27.03	26.98
		25	0	26.96	27.06	26.95
	16QAM	1	0	**27.28**	27.10	27.04
		1	12	26.97	27.01	27.01
		1	24	26.98	27.05	27.23
		12	0	27.15	26.97	26.84
		12	6	27.10	26.80	27.16
		12	13	27.15	27.11	26.99
		25	0	27.01	26.81	26.91
	64QAM	1	0	26.94	26.67	27.03
		1	12	26.91	26.77	27.02
		1	24	**27.05**	26.95	26.85
		12	0	26.68	26.60	26.68
		12	6	26.51	26.77	26.55
		12	13	26.63	26.70	26.42
		25	0	26.48	26.63	26.78
	256QAM	1	0	24.44	24.24	24.42
		1	12	**24.55**	24.51	24.22
		1	24	24.38	24.29	24.23
		12	0	24.06	24.06	24.23
		12	6	23.72	23.99	23.61
		12	13	23.54	24.23	24.01
		25	0	23.95	23.56	24.05

*EIRP = Conducted + antenna gain (4.27dBi)

n66						
BW	MCS Index	Channel		343500	349000	354500
		Frequency (MHz)		1717.5	1745	1772.5
15M	$\pi/2$ BPSK	1	0	27.23	27.22	27.59
		1	39	27.24	27.60	**27.67**
		1	78	27.65	27.25	27.28
		39	0	27.22	27.31	27.34
		39	19	27.29	27.15	27.43
		39	40	27.44	27.11	27.19
		79	0	27.29	27.21	27.34
	QPSK	1	0	27.20	27.26	27.20
		1	39	27.12	27.19	27.15
		1	78	27.08	27.26	**27.35**
		39	0	27.17	26.94	26.87
		39	19	26.94	27.07	27.14
		39	40	27.00	27.07	27.13
		79	0	27.17	27.14	27.10
	16QAM	1	0	27.19	27.03	27.25
		1	39	27.14	27.06	27.31
		1	78	**27.35**	27.03	27.12
		39	0	27.02	26.92	27.15
		39	19	27.07	27.10	26.93
		39	40	26.98	27.05	27.08
		79	0	26.82	26.80	26.81
	64QAM	1	0	26.59	27.02	**27.06**
		1	39	27.02	26.79	26.82
		1	78	26.61	26.79	26.70
		39	0	26.71	26.37	26.81
		39	19	26.47	26.66	26.80
		39	40	26.87	26.63	26.64
		79	0	26.76	26.38	26.43
	256QAM	1	0	23.92	24.21	24.24
		1	39	24.26	24.42	23.91
		1	78	**24.51**	24.15	24.06
		39	0	24.02	24.16	23.94
		39	19	24.20	24.09	23.44
		39	40	23.83	23.58	24.04
		79	0	23.82	23.46	24.12

*EIRP = Conducted + antenna gain (4.27dBi)

n66						
BW	MCS Index	Channel		344000	349000	132575
		Frequency (MHz)		1720	1745	1770
20M	$\pi/2$ BPSK	1	0	27.24	27.40	27.18
		1	53	27.43	27.27	27.24
		1	105	27.29	**27.53**	27.50
		50	0	27.34	27.01	27.02
		50	25	27.09	27.19	27.44
		50	50	27.05	27.07	27.28
		106	0	27.26	27.02	27.15
	QPSK	1	0	**27.37**	27.22	27.01
		1	53	26.97	27.22	27.12
		1	105	27.19	27.16	27.09
		50	0	27.05	27.03	26.87
		50	25	27.06	27.10	27.13
		50	50	26.97	26.83	26.88
		106	0	27.15	26.77	27.07
	16QAM	1	0	26.60	26.97	26.85
		1	53	**27.03**	26.92	27.02
		1	105	26.62	26.91	26.86
		50	0	26.84	26.56	26.58
		50	25	26.39	26.64	26.52
		50	50	26.53	26.84	26.78
		106	0	26.71	26.68	26.50
	64QAM	1	0	26.60	26.97	26.85
		1	53	**27.03**	26.92	27.02
		1	105	26.62	26.91	26.86
		50	0	26.84	26.56	26.58
		50	25	26.39	26.64	26.52
		50	50	26.53	26.84	26.78
		106	0	26.71	26.68	26.50
	256QAM	1	0	23.98	24.12	24.32
		1	53	24.17	24.54	24.13
		1	105	**24.56**	23.93	23.90
		50	0	23.99	24.23	23.47
		50	25	23.46	23.73	24.00
		50	50	23.59	23.90	24.08
		106	0	23.47	24.00	24.18

*EIRP = Conducted + antenna gain (4.27dBi)

LTE Band 48 (Per 10M)						
BW	MCS Index	Channel		55265	55990	56715
		Frequency (MHz)		3552.5	3625	3697.5
5M	256QAM	1	0	19.62	19.33	19.66
		1	12	**19.89**	19.60	19.58
		1	24	19.07	19.38	19.65
		12	0	18.66	18.84	18.85
		12	6	18.70	18.40	18.93
		12	13	19.18	19.23	18.70
		25	0	19.12	18.87	19.14
BW	MCS Index	Channel		55290	55990	56690
		Frequency (MHz)		3555	3625	3695
10M	256QAM	1	0	19.28	19.67	19.52
		1	24	**19.96**	19.78	19.20
		1	49	19.94	19.29	19.41
		25	0	18.70	18.96	18.61
		25	12	18.64	18.82	18.86
		25	25	18.98	18.81	18.96
		50	0	19.35	18.95	18.74
BW	MCS Index	Channel		55315	55990	56665
		Frequency (MHz)		3557.5	3625	3692.5
15M	256QAM	1	0	19.39	19.59	19.38
		1	37	18.94	**19.72**	19.18
		1	74	19.43	19.53	19.48
		36	0	19.23	18.60	18.26
		36	19	18.57	18.17	18.34
		36	39	18.71	18.58	18.23
		75	0	18.10	19.00	18.44
BW	MCS Index	Channel		55340	55990	56640
		Frequency (MHz)		3560	3625	3690
20M	256QAM	1	0	**19.66**	18.82	19.52
		1	50	19.40	19.30	19.20
		1	99	18.99	19.07	19.23
		50	0	18.33	18.33	18.39
		50	25	18.83	18.19	18.61
		50	50	18.58	19.16	18.83
		100	0	18.53	18.76	18.35

*EIRP = Conducted + antenna gain (0.92dBi)

LTE Band 48 (Full Power)						
BW	MCS Index	Channel		55265	55990	56715
		Frequency (MHz)		3552.5	3625	3697.5
5M	256QAM	1	0	19.62	19.33	19.66
		1	12	**19.89**	19.60	19.58
		1	24	19.07	19.38	19.65
		12	0	18.66	18.84	18.85
		12	6	18.70	18.40	18.93
		12	13	19.18	19.23	18.70
		25	0	19.12	18.87	19.14
BW	MCS Index	Channel		55290	55990	56690
		Frequency (MHz)		3555	3625	3695
10M	256QAM	1	0	19.28	19.67	19.52
		1	24	**19.96**	19.78	19.20
		1	49	19.94	19.29	19.41
		25	0	18.70	18.96	18.61
		25	12	18.64	18.82	18.86
		25	25	18.98	18.81	18.96
		50	0	19.35	18.95	18.74
BW	MCS Index	Channel		55315	55990	56665
		Frequency (MHz)		3557.5	3625	3692.5
15M	256QAM	1	0	19.57	19.81	19.67
		1	37	19.16	**19.88**	19.33
		1	74	19.80	19.77	19.61
		36	0	19.33	18.87	18.40
		36	19	18.80	18.34	18.62
		36	39	18.88	18.89	18.60
		75	0	18.39	19.38	18.82
BW	MCS Index	Channel		55340	55990	56640
		Frequency (MHz)		3560	3625	3690
20M	256QAM	1	0	**19.80**	19.15	19.76
		1	50	19.57	19.59	19.37
		1	99	19.38	19.43	19.62
		50	0	18.43	18.61	18.79
		50	25	19.17	18.59	19.01
		50	50	18.82	19.26	18.94
		100	0	18.81	19.10	18.57

*EIRP = Conducted + antenna gain (0.92dBi)

ERP Power (dBm)

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20407	20525	20643
		Frequency (MHz)		824.7	836.5	848.3
1.4M	256QAM	1	0	21.56	21.79	21.82
		1	2	21.89	21.42	21.44
		1	5	21.67	21.53	21.41
		3	0	21.48	21.49	21.84
		3	1	21.64	21.40	21.68
		3	3	21.52	21.61	21.71
		6	0	21.79	21.66	**21.94**
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20415	20525	20635
		Frequency (MHz)		825.5	836.5	847.5
3M	256QAM	1	0	**22.08**	21.91	21.51
		1	7	21.70	22.01	21.35
		1	14	21.49	22.04	21.97
		8	0	21.93	22.05	21.52
		8	3	21.32	21.56	21.52
		8	7	21.33	21.97	21.89
		15	0	21.36	21.54	21.30
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20425	20525	20625
		Frequency (MHz)		826.5	836.5	846.5
5M	256QAM	1	0	21.80	21.24	21.68
		1	12	21.33	21.36	21.71
		1	24	22.00	21.97	21.64
		12	0	21.58	22.02	21.13
		12	6	21.46	22.14	21.70
		12	13	22.10	21.20	21.85
		25	0	21.97	**22.16**	21.68
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20450	20525	20600
		Frequency (MHz)		829	836.5	844
10M	256QAM	1	0	21.45	21.55	21.71
		1	24	21.47	**22.19**	21.65
		1	49	21.91	21.52	21.20
		25	0	22.06	22.08	21.33
		25	12	21.49	21.63	21.40
		25	25	21.99	21.19	21.90
		50	0	21.39	22.11	21.36

*ERP = Conducted + antenna gain (3.81dBi)-2.15

LTE Band 12						
BW	MCS Index	Channel		23017	23095	23173
		Frequency (MHz)		699.7	707.5	715.3
1.4M	256QAM	1	0	21.68	21.63	21.53
		1	2	**22.35**	22.12	21.93
		1	5	21.67	22.28	21.90
		3	0	21.67	21.52	21.89
		3	1	22.01	22.19	21.62
		3	3	22.08	21.68	21.58
		6	0	22.17	21.93	21.68
BW	MCS Index	Channel		23025	23095	23165
		Frequency (MHz)		700.5	707.5	714.5
3M	256QAM	1	0	21.76	21.87	21.37
		1	7	21.93	21.66	22.18
		1	14	22.30	21.97	22.15
		8	0	21.72	22.07	21.66
		8	3	**22.34**	21.96	21.72
		8	7	22.25	21.92	21.40
		15	0	21.65	22.21	21.63
BW	MCS Index	Channel		23035	23095	23155
		Frequency (MHz)		701.5	707.5	713.5
5M	256QAM	1	0	22.22	21.97	22.18
		1	12	21.67	22.21	22.20
		1	24	21.69	21.95	22.24
		12	0	21.85	21.96	21.65
		12	6	22.12	21.84	21.39
		12	13	**22.37**	22.23	21.95
		25	0	22.09	21.61	21.70
BW	MCS Index	Channel		23060	23095	23130
		Frequency (MHz)		704	707.5	711
10M	256QAM	1	0	21.59	22.00	21.91
		1	24	21.92	21.82	21.58
		1	49	22.06	22.30	22.05
		25	0	21.99	21.84	21.74
		25	12	22.20	**22.30**	21.44
		25	25	22.12	21.87	21.51
		50	0	21.66	22.17	21.69

*ERP = Conducted + antenna gain (4.41dBi)-2.15

LTE Band 13						
BW	MCS Index	Channel		23205	23230	23255
		Frequency (MHz)		779.5	782	784.5
5M	256QAM	1	0	**22.35**	22.29	21.46
		1	12	21.70	21.53	21.54
		1	24	22.19	21.65	22.23
		12	0	21.68	21.62	21.46
		12	6	21.91	22.29	21.65
		12	13	21.85	21.74	21.70
		25	0	21.74	22.27	21.54
BW	MCS Index	Channel		23230		
		Frequency (MHz)		782		
10M	256QAM	1	0	**22.26**		
		1	24	21.75		
		1	49	21.65		
		25	0	21.94		
		25	12	21.90		
		25	25	21.52		
		50	0	22.07		

*ERP = Conducted + antenna gain (4.41dBi)-2.15

LTE Band 71						
BW	MCS Index	Channel		133147	133297	133447
		Frequency (MHz)		665.5	680.5	695.5
5M	256QAM	1	0	21.78	22.01	22.08
		1	12	**22.48**	21.80	22.03
		1	24	22.23	22.24	22.13
		12	0	22.09	21.82	22.19
		12	6	22.24	22.17	22.35
		12	13	22.05	21.83	22.08
		25	0	22.16	21.83	22.47
BW	MCS Index	Channel		133172	133297	133422
		Frequency (MHz)		668	680.5	693
10M	256QAM	1	0	21.87	**22.47**	22.46
		1	24	22.32	22.32	22.22
		1	49	22.01	22.25	22.46
		25	0	21.93	22.25	22.34
		25	12	22.43	21.73	22.19
		25	25	21.97	21.86	22.40
		50	0	22.20	22.22	22.38
BW	MCS Index	Channel		133197	133297	133397
		Frequency (MHz)		670.5	680.5	690.5
15M	256QAM	1	0	22.04	22.29	21.97
		1	37	22.17	22.25	22.36
		1	74	21.86	22.29	22.42
		36	0	21.88	22.33	22.03
		36	19	22.21	22.22	22.11
		36	39	**22.42**	21.79	22.03
		75	0	21.88	21.79	22.41
BW	MCS Index	Channel		133222	133297	133372
		Frequency (MHz)		673	680.5	688
20M	256QAM	1	0	21.78	22.28	22.09
		1	50	22.47	21.74	22.11
		1	99	21.98	22.18	22.19
		50	0	22.17	22.35	**22.47**
		50	25	22.00	22.36	22.29
		50	50	22.20	21.82	22.27
		100	0	22.23	21.99	22.27

*ERP = Conducted + antenna gain (4.41dBi)-2.15

Modulation Type: QPSK

LTE Band 30, Channel Bandwidth: 5MHz

Mode		TX channel 27685					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2307.50	-20.7	20.7	-0.1	20.6	23.97	-3.37
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2307.50	-21.6	21.5	-0.1	21.4	23.97	-2.57

Mode		TX channel 27710					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2310.00	-21.4	20.0	-0.1	19.9	23.97	-4.07
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2310.00	-22.3	20.8	-0.1	20.7	23.97	-3.27

Mode		TX channel 27735					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2312.50	-21.2	20.2	-0.1	20.1	23.97	-3.87
Antenna Polarity & Test Distance: Vertical at 3 m							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2312.50	-21.9	21.2	-0.1	21.1	23.97	-2.87

Note: EIRP (dBm) = S.G Power Value (dBm) - Correction Factor (dB).

LTE Band 30, Channel Bandwidth: 10MHz

Mode		TX channel 27710					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2310.00	-20.8	20.6	-0.1	20.5	23.97	-3.47
Antenna Polarity & Test Distance: Vertical at 3 m							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2310.00	-21.1	22.0	-0.1	21.9	23.97	-2.07

Note: EIRP (dBm) = S.G Power Value (dBm) - Correction Factor (dB).

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

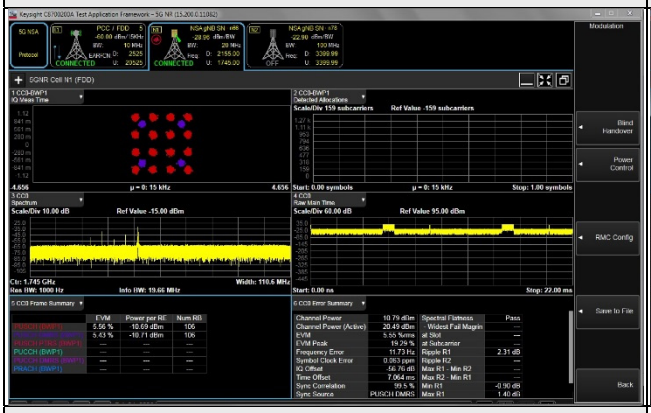
N/A

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

n66	
Spectrum Plot of Measurement Value	
Channel: 349000 / Frequency (MHz): 1745.0 MHz	
$\pi/2$ BPSK	QPSK
	
16QAM	64QAM
	
256QAM	
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

For LTE Band 5
1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

For LTE Band 12, LTE Band 13, LTE Band 30, LTE Band 71
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℃.

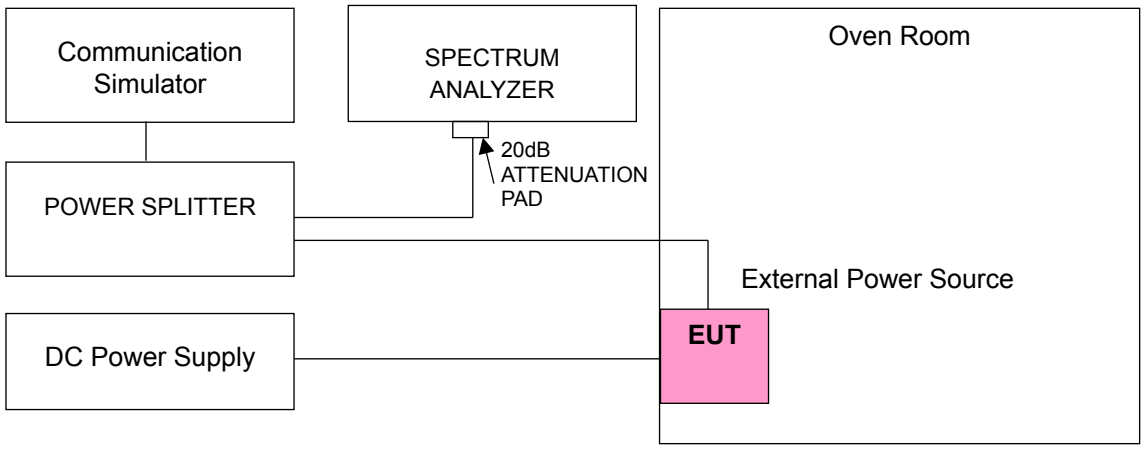
For LTE Band 48
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency band.

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 (Volts)	n66			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	1712.500001	0.001	1777.500004	0.002
5	1712.500002	0.001	1777.500002	0.001
5.75	1712.500002	0.001	1777.500004	0.002

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	n66			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1712.500002	0.001	1777.500001	0.001
-20	1712.500003	0.002	1777.500003	0.002
-10	1712.500003	0.002	1777.500002	0.001
0	1712.500002	0.001	1777.500001	0.001
10	1712.500002	0.001	1777.500003	0.002
20	1712.499998	-0.001	1777.499999	-0.001
30	1712.499996	-0.002	1777.499998	-0.001
40	1712.499999	-0.001	1777.499999	-0.001
50	1712.499996	-0.002	1777.499998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	n66			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	1715.000001	0.001	1775.000004	0.002
5	1715.000002	0.001	1775.000001	0.001
5.75	1715.000003	0.002	1775.000001	0.001

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	n66			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1715.000002	0.001	1775.000003	0.002
-20	1715.000001	0.001	1775.000003	0.002
-10	1715.000003	0.002	1775.000002	0.001
0	1715.000003	0.001	1775.000003	0.002
10	1715.000001	0.001	1775.000001	0.001
20	1714.999998	-0.001	1774.999997	-0.002
30	1714.999997	-0.002	1774.999997	-0.002
40	1714.999997	-0.002	1774.999998	-0.001
50	1714.999997	-0.002	1774.999999	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	n66			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	1717.500002	0.001	1772.500004	0.002
5	1717.500001	0.001	1772.500002	0.001
5.75	1717.500002	0.001	1772.500002	0.001

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	n66			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1717.500004	0.002	1772.500002	0.001
-20	1717.500004	0.002	1772.500001	0.001
-10	1717.500001	0.001	1772.500001	0.001
0	1717.500001	0.001	1772.500003	0.002
10	1717.500004	0.002	1772.500001	0.001
20	1717.499997	-0.002	1772.499997	-0.002
30	1717.499996	-0.002	1772.499998	-0.001
40	1717.499996	-0.002	1772.499996	-0.002
50	1717.499997	-0.002	1772.499997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	n66			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	1720.000002	0.001	1770.000004	0.002
5	1720.000002	0.001	1770.000004	0.002
5.75	1720.000003	0.002	1770.000003	0.002

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	n66			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1720.000004	0.002	1770.000002	0.001
-20	1720.000003	0.002	1770.000004	0.002
-10	1720.000001	0.001	1770.000003	0.002
0	1720.000001	0.001	1770.000002	0.001
10	1720.000001	0.001	1770.000003	0.001
20	1719.999997	-0.002	1769.999998	-0.001
30	1719.999999	-0.001	1769.999998	-0.001
40	1719.999996	-0.002	1769.999997	-0.002
50	1719.999996	-0.002	1769.999999	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 5			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	824.700002	0.002	848.300001	0.001
5	824.700002	0.002	848.300004	0.005
5.75	824.700002	0.002	848.300003	0.004

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 5			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	824.700004	0.004	848.300003	0.004
-20	824.700003	0.004	848.300001	0.001
-10	824.700003	0.004	848.300002	0.002
0	824.700002	0.003	848.300003	0.004
10	824.700003	0.004	848.300002	0.002
20	824.699996	-0.005	848.299999	-0.001
30	824.699997	-0.003	848.299998	-0.003
40	824.699997	-0.004	848.299998	-0.003
50	824.699998	-0.002	848.299997	-0.004

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 5			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	825.500002	0.002	847.500004	0.004
5	825.500001	0.002	847.500001	0.001
5.75	825.500002	0.003	847.500003	0.004

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 5			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	825.500003	0.004	847.500001	0.002
-20	825.500001	0.001	847.500003	0.004
-10	825.500002	0.002	847.500003	0.003
0	825.500001	0.001	847.500003	0.004
10	825.500002	0.003	847.500002	0.002
20	825.499999	-0.002	847.499998	-0.002
30	825.499997	-0.003	847.499999	-0.001
40	825.499997	-0.004	847.499997	-0.003
50	825.499998	-0.003	847.499999	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 5			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	826.500002	0.002	846.500001	0.001
5	826.500001	0.002	846.500001	0.001
5.75	826.500003	0.003	846.500002	0.002

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 5			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	826.500002	0.003	846.500004	0.005
-20	826.500002	0.003	846.500003	0.004
-10	826.500004	0.004	846.500003	0.003
0	826.500001	0.001	846.500003	0.004
10	826.500001	0.001	846.500003	0.004
20	826.499998	-0.003	846.499999	-0.001
30	826.499997	-0.004	846.499997	-0.004
40	826.499997	-0.003	846.499998	-0.003
50	826.499996	-0.004	846.499998	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 5			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	829.000002	0.003	844.000004	0.005
5	829.000002	0.002	844.000004	0.005
5.75	829.000001	0.001	844.000004	0.004

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 5			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	829.000003	0.003	844.000002	0.003
-20	829.000002	0.003	844.000003	0.004
-10	829.000003	0.004	844.000003	0.003
0	829.000004	0.005	844.000002	0.002
10	829.000003	0.003	844.000002	0.002
20	828.999997	-0.004	843.999999	-0.001
30	828.999997	-0.003	843.999996	-0.004
40	828.999998	-0.002	843.999998	-0.003
50	828.999997	-0.003	843.999997	-0.004

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	699.700003	0.004	715.300004	0.005
5	699.700003	0.005	715.300002	0.002
5.75	699.700003	0.005	715.300004	0.005

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

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	699.700002	0.002	715.300004	0.005
-20	699.700001	0.001	715.300004	0.005
-10	699.700003	0.004	715.300003	0.004
0	699.700003	0.004	715.300003	0.004
10	699.700003	0.004	715.300002	0.003
20	699.699996	-0.005	715.299999	-0.002
30	699.699997	-0.005	715.299998	-0.002
40	699.699998	-0.002	715.299997	-0.004
50	699.699999	-0.002	715.299997	-0.005

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	700.500003	0.004	714.500002	0.002
5	700.500002	0.003	714.500003	0.004
5.75	700.500001	0.002	714.500002	0.002

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

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	700.500001	0.002	714.500003	0.004
-20	700.500004	0.005	714.500002	0.003
-10	700.500004	0.005	714.500003	0.004
0	700.500002	0.003	714.500002	0.003
10	700.500004	0.006	714.500004	0.005
20	700.499997	-0.004	714.499999	-0.002
30	700.499997	-0.005	714.499998	-0.003
40	700.499998	-0.003	714.499998	-0.003
50	700.499998	-0.002	714.499997	-0.004

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	701.500001	0.002	713.500003	0.004
5	701.500004	0.006	713.500004	0.005
5.75	701.500003	0.004	713.500004	0.005

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	701.500003	0.004	713.500002	0.003
-20	701.500002	0.003	713.500002	0.003
-10	701.500002	0.003	713.500002	0.002
0	701.500004	0.006	713.500002	0.003
10	701.500002	0.003	713.500003	0.004
20	701.499997	-0.005	713.499999	-0.001
30	701.499998	-0.003	713.499996	-0.005
40	701.499996	-0.006	713.499996	-0.005
50	701.499998	-0.003	713.499997	-0.004

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	704.000001	0.002	711.000003	0.005
5	704.000004	0.005	711.000004	0.006
5.75	704.000003	0.004	711.000004	0.005

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	704.000002	0.003	711.000003	0.005
-20	704.000003	0.004	711.000001	0.002
-10	704.000002	0.003	711.000002	0.002
0	704.000001	0.002	711.000001	0.002
10	704.000001	0.002	711.000003	0.005
20	703.999998	-0.004	710.999996	-0.006
30	703.999996	-0.005	710.999998	-0.002
40	703.999999	-0.002	710.999997	-0.004
50	703.999999	-0.002	710.999997	-0.004

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 13			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	779.500003	0.004	784.500003	0.004
5	779.500003	0.003	784.500003	0.004
5.75	779.500004	0.005	784.500002	0.003

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 13			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	779.500001	0.002	784.500001	0.002
-20	779.500001	0.001	784.500001	0.002
-10	779.500002	0.002	784.500003	0.003
0	779.500001	0.002	784.500001	0.001
10	779.500001	0.002	784.500004	0.005
20	779.499998	-0.003	784.499999	-0.001
30	779.499999	-0.001	784.499997	-0.003
40	779.499998	-0.003	784.499998	-0.002
50	779.499999	-0.001	784.499997	-0.003

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 13	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
4.25	782.000002	0.003
5	782.000001	0.001
5.75	782.000004	0.005

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 13	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
-30	782.000003	0.004
-20	782.000002	0.003
-10	782.000004	0.005
0	782.000002	0.003
10	782.000003	0.004
20	781.999996	-0.005
30	781.999998	-0.002
40	781.999998	-0.003
50	781.999996	-0.005

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 30			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	2307.500001	0.001	2312.500003	0.001
5	2307.500002	0.001	2312.500004	0.002
5.75	2307.500002	0.001	2312.500004	0.002

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 30			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	2307.500003	0.001	2312.500004	0.002
-20	2307.500001	0.000	2312.500004	0.002
-10	2307.500001	0.000	2312.500004	0.002
0	2307.500003	0.001	2312.500003	0.001
10	2307.500003	0.001	2312.500004	0.002
20	2307.499998	-0.001	2312.499997	-0.001
30	2307.499996	-0.002	2312.499999	-0.001
40	2307.499998	-0.001	2312.499997	-0.001
50	2307.499998	-0.001	2312.499997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 30	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
4.25	2310.000003	0.001
5	2310.000002	0.001
5.75	2310.000002	0.001

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 30	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
-30	2310.000002	0.001
-20	2310.000002	0.001
-10	2310.000002	0.001
0	2310.000001	0.001
10	2310.000003	0.001
20	2309.999998	-0.001
30	2309.999996	-0.002
40	2309.999998	-0.001
50	2309.999999	0.000

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 48			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	3652.500002	0.001	3697.500002	0.001
5	3652.500003	0.001	3697.500004	0.001
5.75	3652.500003	0.001	3697.500002	0.000

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 48			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	3652.500001	0.000	3697.500001	0.000
-20	3652.500003	0.001	3697.500002	0.001
-10	3652.500003	0.001	3697.500001	0.000
0	3652.500001	0.000	3697.500002	0.001
10	3652.500003	0.001	3697.500004	0.001
20	3652.499999	0.000	3697.499997	-0.001
30	3652.499998	-0.001	3697.499997	-0.001
40	3652.499998	0.000	3697.499997	-0.001
50	3652.499998	-0.001	3697.499997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 48			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	3555.000001	0.000	3695.000001	0.000
5	3555.000002	0.001	3695.000003	0.001
5.75	3555.000002	0.001	3695.000003	0.001

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 48			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	3555.000004	0.001	3695.000003	0.001
-20	3555.000003	0.001	3695.000002	0.001
-10	3555.000002	0.001	3695.000003	0.001
0	3555.000003	0.001	3695.000002	0.001
10	3555.000003	0.001	3695.000003	0.001
20	3554.999998	-0.001	3694.999998	0.000
30	3554.999999	0.000	3694.999998	0.000
40	3554.999998	-0.001	3694.999996	-0.001
50	3554.999996	-0.001	3694.999997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 48			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	3557.500002	0.000	3692.500002	0.001
5	3557.500002	0.001	3692.500003	0.001
5.75	3557.500003	0.001	3692.500003	0.001

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 48			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	3557.500003	0.001	3692.500002	0.001
-20	3557.500004	0.001	3692.500003	0.001
-10	3557.500003	0.001	3692.500004	0.001
0	3557.500003	0.001	3692.500002	0.000
10	3557.500004	0.001	3692.500004	0.001
20	3557.499999	0.000	3692.499998	-0.001
30	3557.499996	-0.001	3692.499997	-0.001
40	3557.499998	-0.001	3692.499997	-0.001
50	3557.499997	-0.001	3692.499997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 48			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	3560.000001	0.000	3690.000001	0.000
5	3560.000001	0.000	3690.000004	0.001
5.75	3560.000003	0.001	3690.000004	0.001

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 48			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	3560.000002	0.001	3690.000004	0.001
-20	3560.000003	0.001	3690.000003	0.001
-10	3560.000002	0.001	3690.000003	0.001
0	3560.000002	0.001	3690.000001	0.000
10	3560.000004	0.001	3690.000002	0.001
20	3559.999999	0.000	3689.999998	0.000
30	3559.999997	-0.001	3689.999998	-0.001
40	3559.999999	0.000	3689.999998	0.000
50	3559.999998	-0.001	3689.999997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 71			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	665.500002	0.003	695.500003	0.004
5	665.500003	0.004	695.500004	0.006
5.75	665.500001	0.002	695.500003	0.004

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 71			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	665.500002	0.003	695.500002	0.002
-20	665.500002	0.003	695.500002	0.003
-10	665.500003	0.005	695.500004	0.006
0	665.500001	0.002	695.500003	0.004
10	665.500001	0.002	695.500003	0.004
20	665.499998	-0.002	695.499999	-0.002
30	665.499996	-0.006	695.499997	-0.004
40	665.499997	-0.004	695.499998	-0.003
50	665.499999	-0.002	695.499997	-0.004

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 71			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	668.000003	0.004	693.000004	0.005
5	668.000003	0.005	693.000003	0.005
5.75	668.000001	0.002	693.000001	0.002

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 71			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	668.000003	0.004	693.000001	0.002
-20	668.000002	0.003	693.000004	0.005
-10	668.000003	0.004	693.000001	0.002
0	668.000001	0.002	693.000003	0.004
10	668.000003	0.004	693.000003	0.004
20	667.999996	-0.006	692.999999	-0.002
30	667.999996	-0.006	692.999998	-0.003
40	667.999998	-0.003	692.999999	-0.002
50	667.999999	-0.002	692.999999	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 71			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	670.500003	0.004	690.500001	0.002
5	670.500004	0.006	690.500004	0.005
5.75	670.500002	0.003	690.500003	0.004

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 71			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	670.500003	0.004	690.500004	0.006
-20	670.500003	0.004	690.500001	0.002
-10	670.500003	0.005	690.500004	0.005
0	670.500002	0.003	690.500002	0.003
10	670.500002	0.003	690.500001	0.002
20	670.499999	-0.002	690.499997	-0.004
30	670.499998	-0.003	690.499998	-0.003
40	670.499999	-0.002	690.499998	-0.003
50	670.499999	-0.002	690.499997	-0.004

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 71			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.25	673.000003	0.004	688.000001	0.002
5	673.000002	0.003	688.000001	0.002
5.75	673.000003	0.004	688.000001	0.002

Note: The applicant defined the normal working voltage is from 4.25Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 71			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	673.000002	0.002	688.000002	0.002
-20	673.000002	0.003	688.000002	0.003
-10	673.000002	0.002	688.000003	0.004
0	673.000002	0.003	688.000001	0.001
10	673.000003	0.004	688.000003	0.004
20	672.999997	-0.005	687.999997	-0.005
30	672.999999	-0.002	687.999999	-0.002
40	672.999999	-0.002	687.999998	-0.003
50	672.999997	-0.005	687.999998	-0.002

4.4 Occupied Bandwidth Measurement

4.4.1 Test Procedure

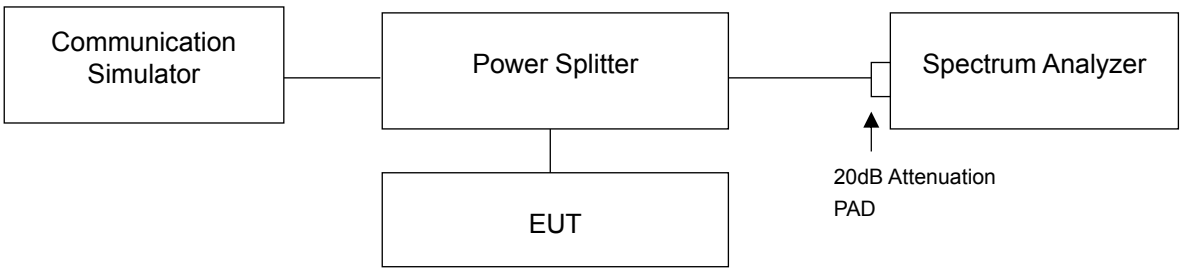
For LTB Band 5:
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

For n66, LTB Band 12, LTB Band 13, LTB Band 30:
The occupied bandwidth (OBW), 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.

For LTB Band 48:
Occupied Bandwidth:
All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

26dBc Bandwidth:
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW =51 kHz (5 MHz bandwidth), 100 kHz (10 MHz bandwidth), 150 kHz (15 MHz bandwidth), 200 kHz (20 MHz bandwidth). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

4.4.2 Test Setup

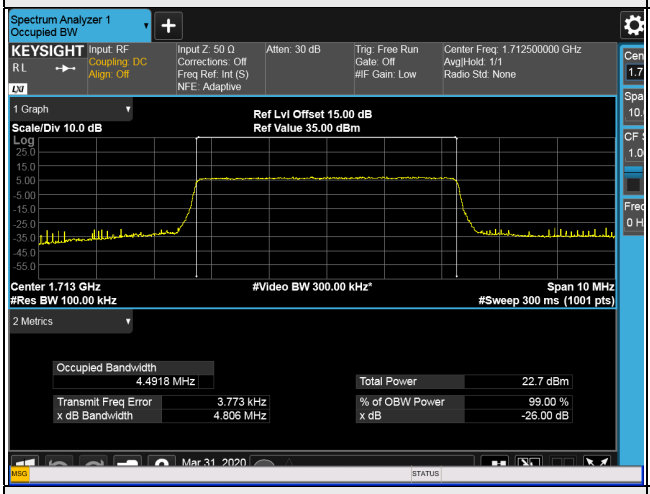
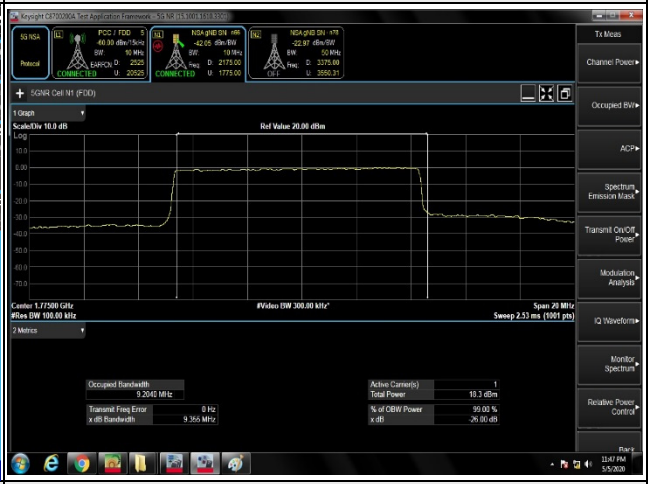


4.4.3 Test Result

Occupied Bandwidth

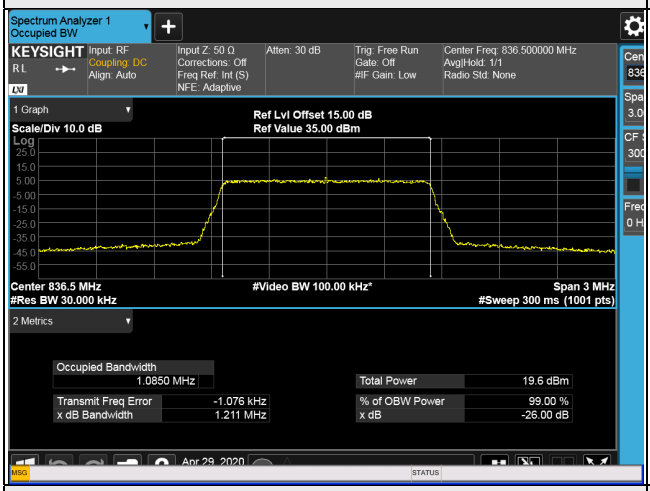
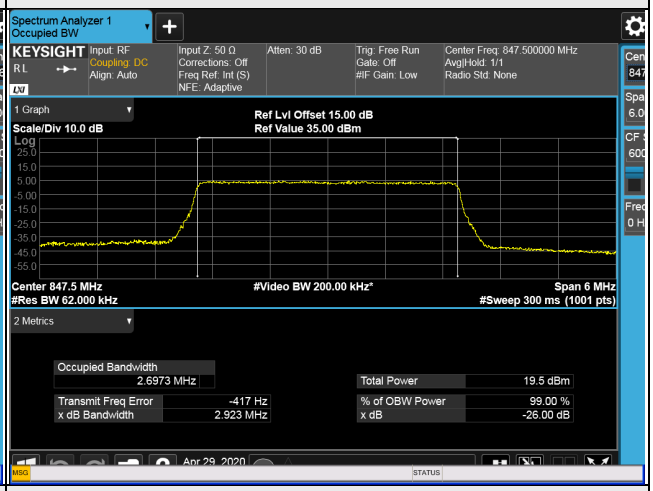
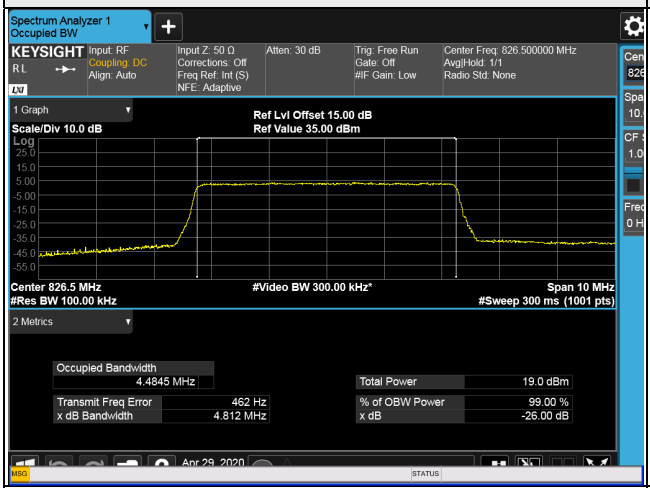
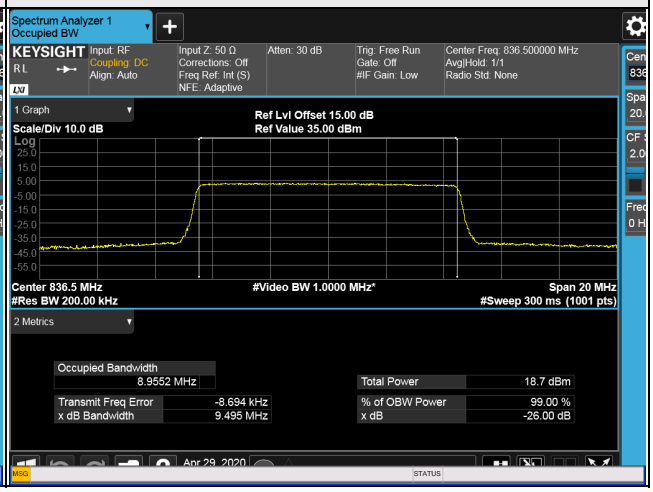
n66

n66, Channel Bandwidth 5MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
342500	1712.5	4.4683	4.4854	4.4885	4.4918	4.4674
349000	1745.0	4.4654	4.4875	4.4874	4.4908	4.4666
355500	1777.5	4.4684	4.4864	4.4879	4.4875	4.4686
n66, Channel Bandwidth 10MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
343000	1715.0	9.1297	8.9592	8.9582	8.9557	9.1757
349000	1745.0	9.1748	8.9615	8.9618	8.9564	9.2008
355000	1775.0	9.1784	8.9561	8.9621	8.9568	9.2040
n66, Channel Bandwidth 15MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
343500	1717.5	13.940	13.447	13.438	13.433	13.930
349000	1745.0	13.990	13.468	13.459	13.458	14.000
354500	1772.5	14.053	13.477	13.468	13.464	14.100
n66, Channel Bandwidth 20MHz						
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
344000	1720.0	18.592	17.903	17.911	17.909	18.583
349000	1745.0	18.751	17.953	17.973	17.971	18.804
354000	1770.0	18.818	17.980	18.003	18.001	18.839

Spectrum Plot of Worst Value	
5MHz / 64QAM	10MHz / 256QAM
	
15MHz / 256QAM	20MHz / 256QAM
	

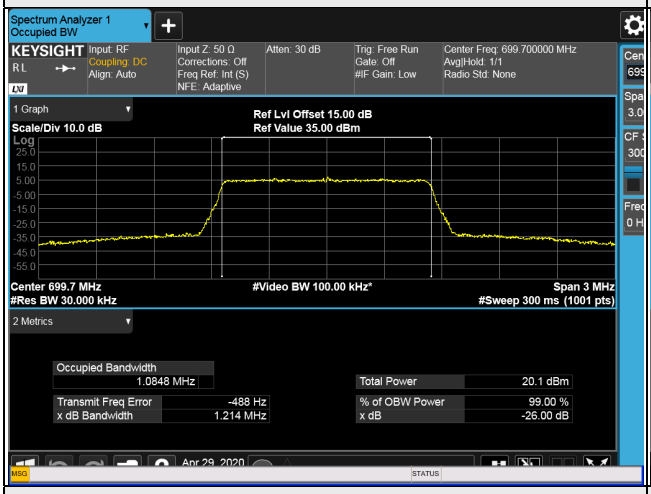
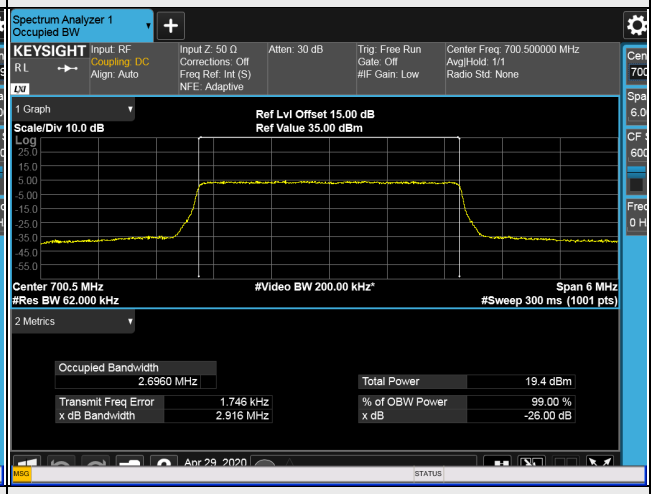
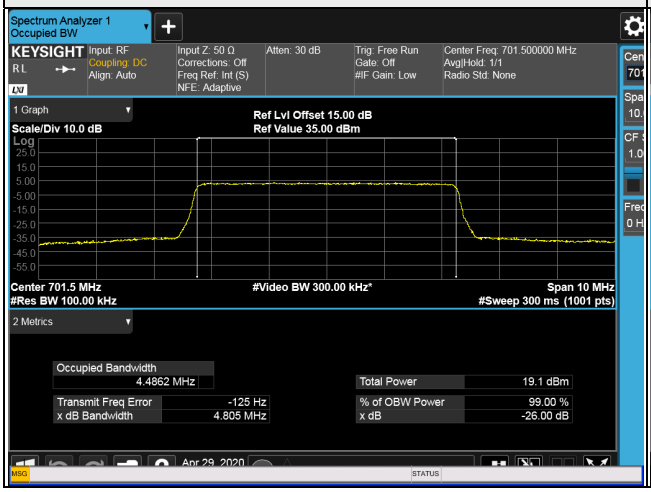
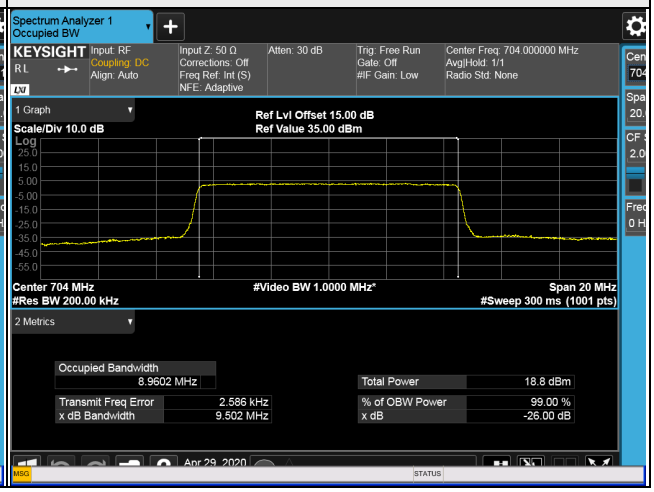
LTE Band 5

LTE Band 5, Channel Bandwidth 1.4MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
20407	824.7	1.08
20525	836.5	1.09
20643	848.3	1.08
LTE Band 5, Channel Bandwidth 3MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
20415	825.5	2.70
20525	836.5	2.70
20635	847.5	2.70
LTE Band 5, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
20425	826.5	4.48
20525	836.5	4.48
20625	846.5	4.48
LTE Band 5, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
20450	829.0	8.95
20525	836.5	8.96
20600	844.0	8.94

Spectrum Plot of Worst Value	
1.4MHz / 256QAM	3MHz / 256QAM
	
5MHz / 256QAM	10MHz / 256QAM
	

LTE Band 12

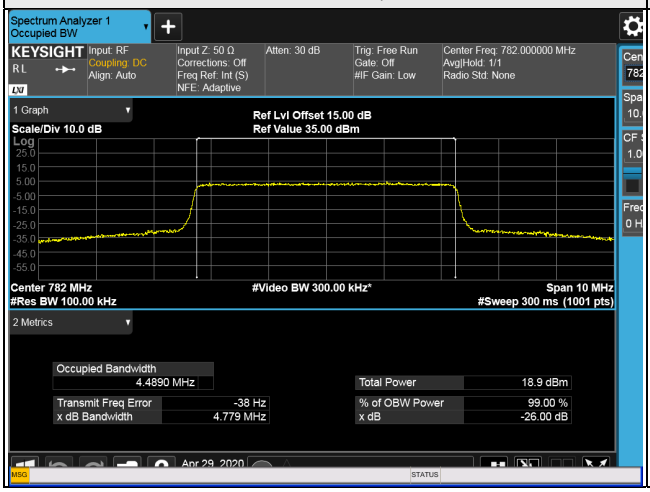
LTE Band 12, Channel Bandwidth 1.4MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
23017	699.7	1.08
23095	707.5	1.08
23173	715.3	1.08
LTE Band 12, Channel Bandwidth 3MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
23025	700.5	2.70
23095	707.5	2.69
23165	714.5	2.70
LTE Band 12, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
23035	701.5	4.49
23095	707.5	4.48
23155	713.5	4.48
LTE Band 12, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
23060	704.0	8.96
23095	707.5	8.95
23130	711.0	8.94

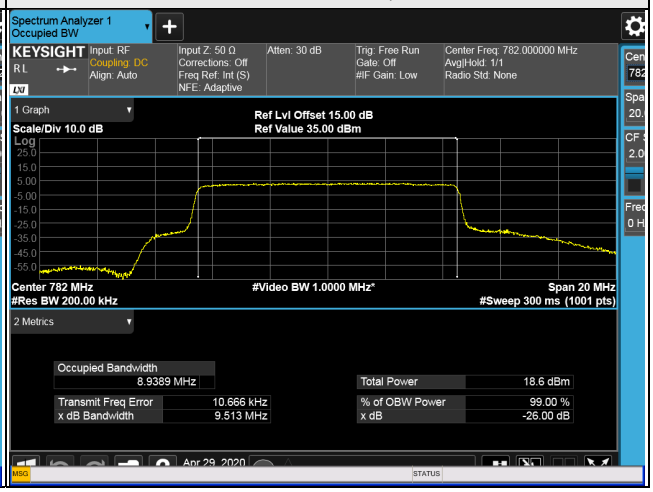
Spectrum Plot of Worst Value	
1.4MHz / 256QAM	3MHz / 256QAM
	
5MHz / 256QAM	10MHz / 256QAM
	

LTE Band 13

LTE Band 13, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
23205	779.5	4.48
23230	782.0	4.49
23255	784.5	4.48
LTE Band 13, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
23230	782.0	8.94

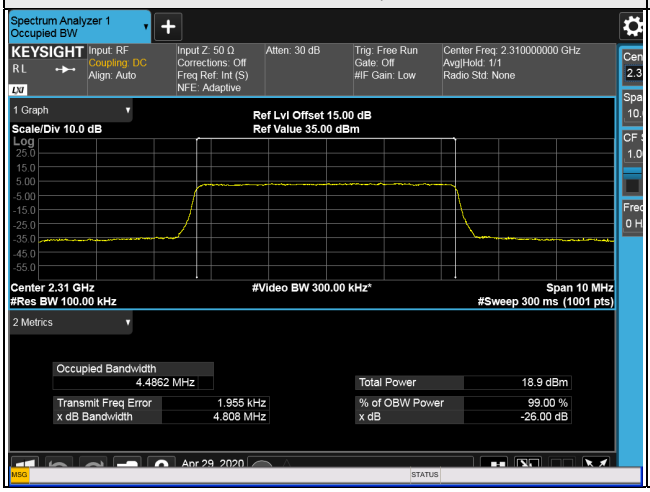
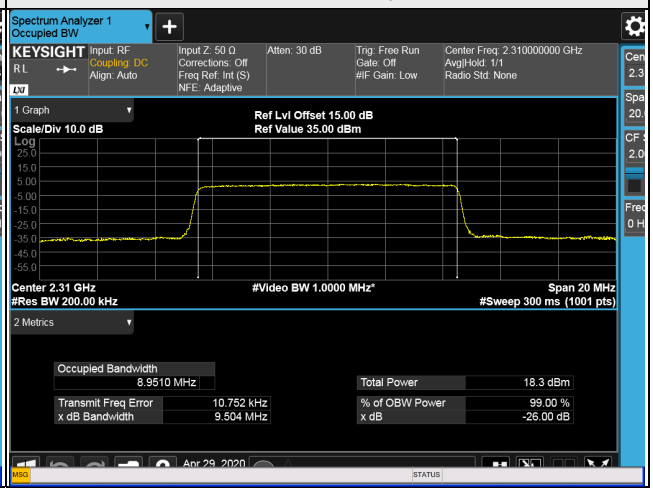
Spectrum Plot of Worst Value	
5MHz / 256QAM	10MHz / 256QAM





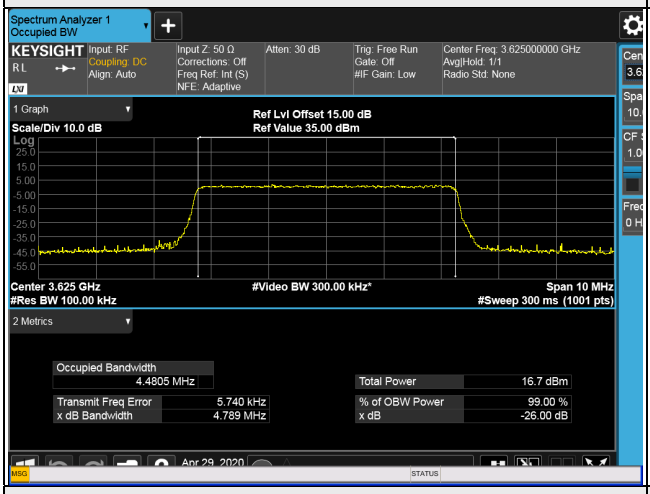
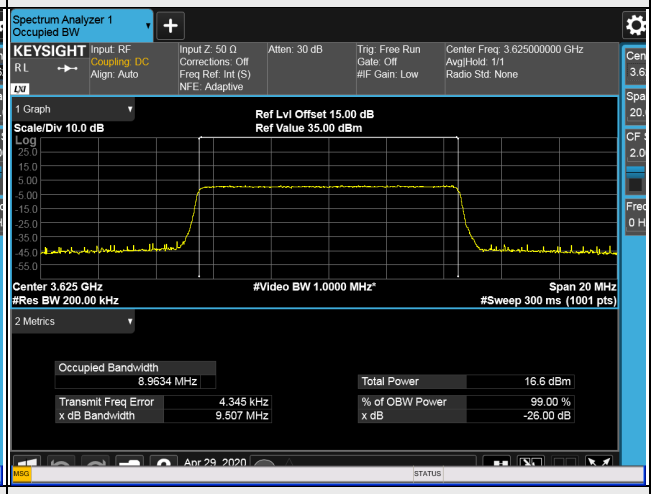
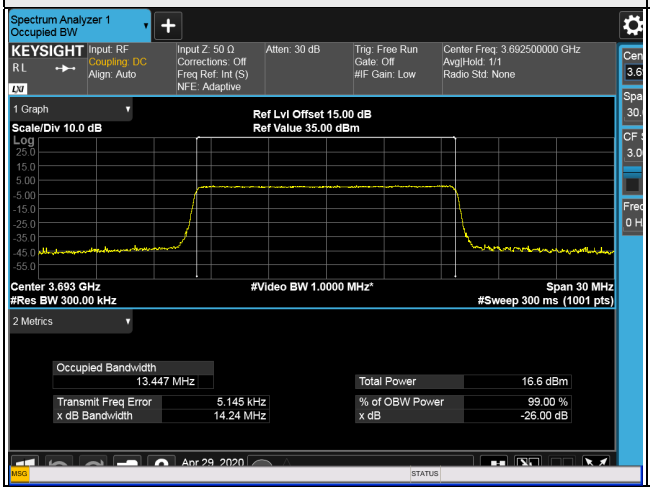
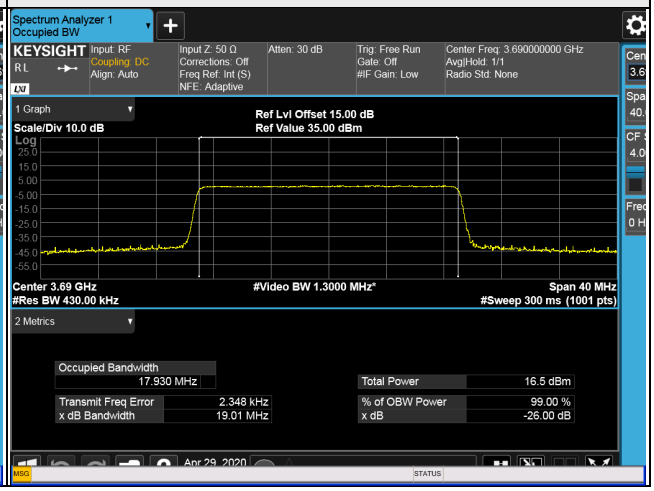
LTE Band 30

LTE Band 30, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
27685	2307.5	4.49
27710	2310	4.49
27735	2312.5	4.48
LTE Band 30, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
27710	2310	8.95

Spectrum Plot of Worst Value	
5MHz / 256QAM	10MHz / 256QAM
	

LTE Band 48

LTE Band 48, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
55265	3552.5	4.48
55990	3625.0	4.48
56715	3697.5	4.48
LTE Band 48, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
55290	3555.0	8.96
55990	3625.0	8.96
56690	3695.0	8.96
LTE Band 48, Channel Bandwidth 15MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
55315	3557.5	13.45
55990	3625.0	13.44
56665	3692.5	13.45
LTE Band 48, Channel Bandwidth 20MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
55340	3560.0	17.93
55990	3625.0	17.93
56640	3690.0	17.93

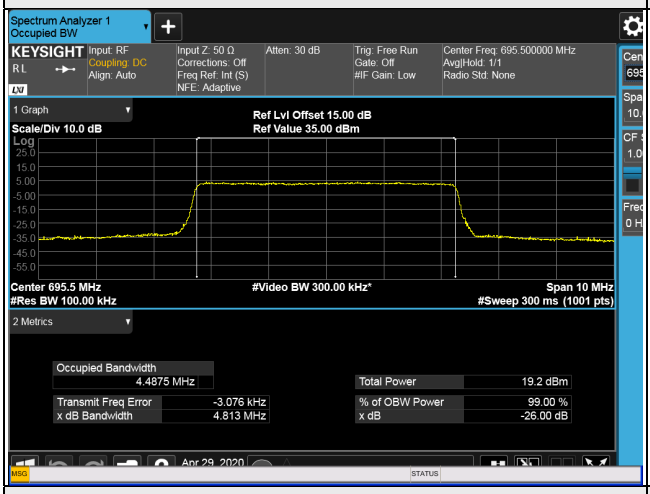
Spectrum Plot of Worst Value	
5MHz / 256QAM	10MHz / 256QAM
	
15MHz / 256QAM	20MHz / 256QAM
	

LTE Band 71

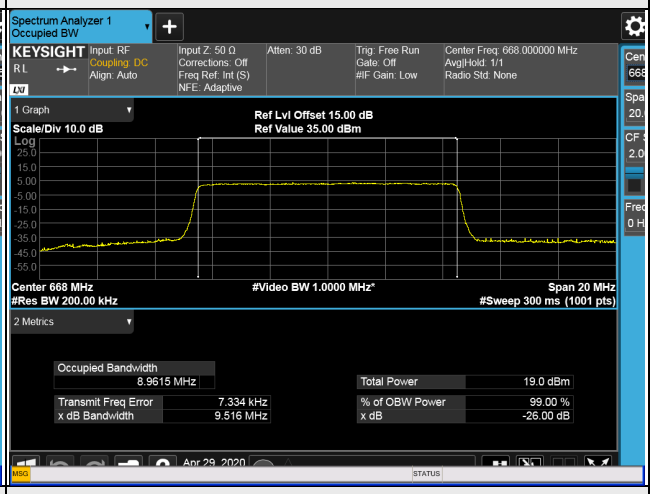
LTE Band 71, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
133147	665.5	4.49
133297	680.5	4.48
133447	695.5	4.49
LTE Band 71, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
133172	668	8.96
133297	680.5	8.96
133422	693	8.95
LTE Band 71, Channel Bandwidth 15MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
133197	670.5	13.45
133297	680.5	13.44
133397	690.5	13.43
LTE Band 71, Channel Bandwidth 20MHz		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		256QAM
133222	673	17.91
133297	680.5	17.91
133372	688	17.92

Spectrum Plot of Worst Value

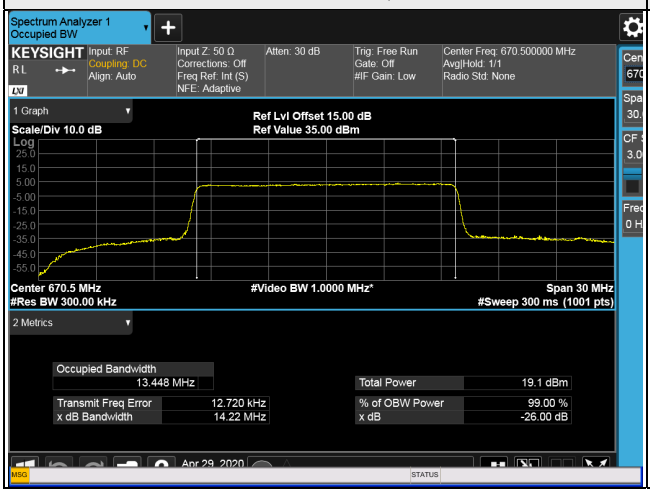
5MHz / 256QAM



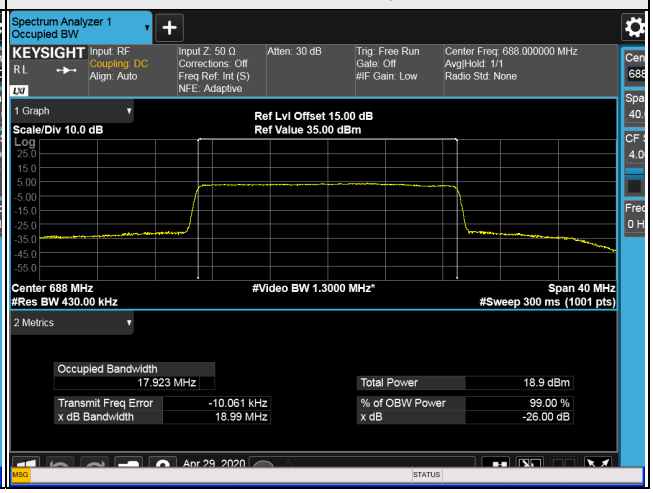
10MHz / 256QAM



15MHz / 256QAM



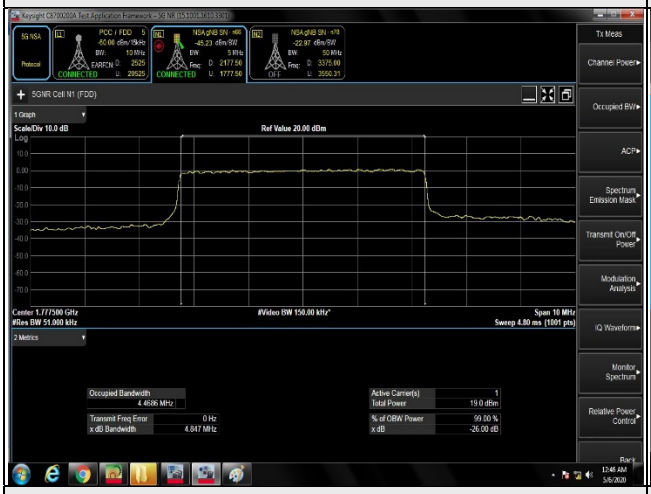
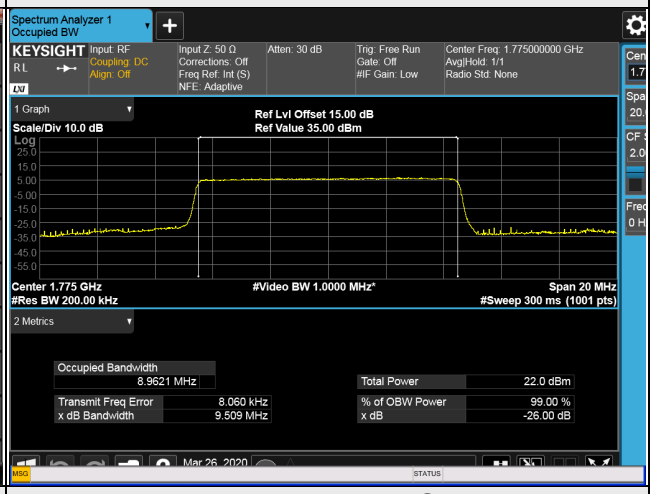
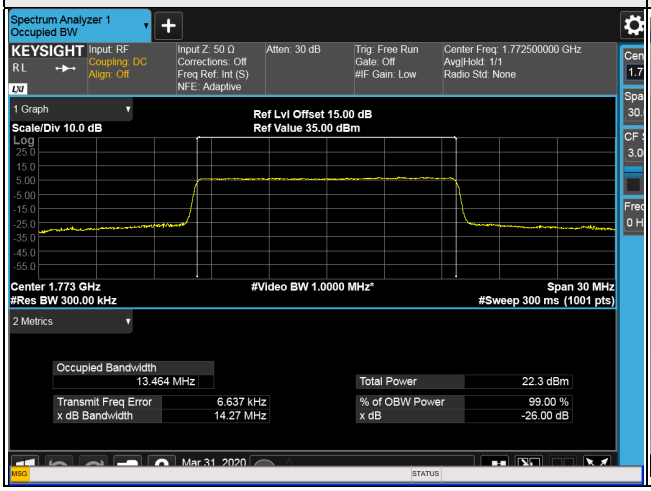
20MHz / 256QAM



26dB Bandwidth

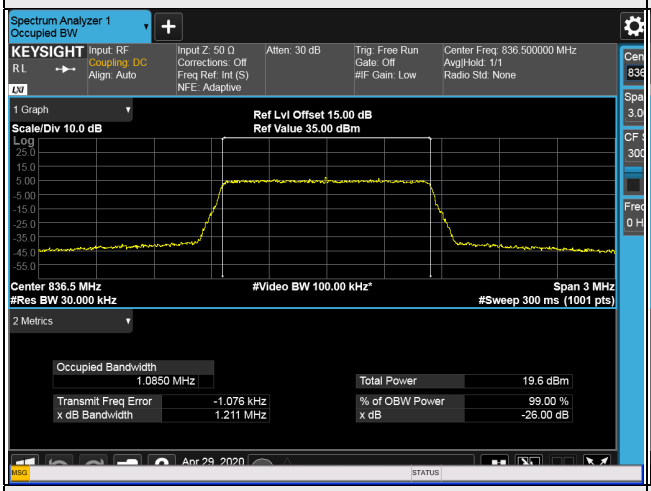
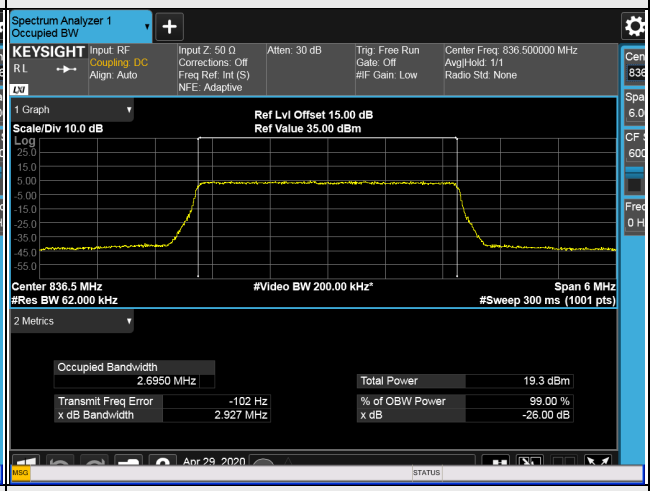
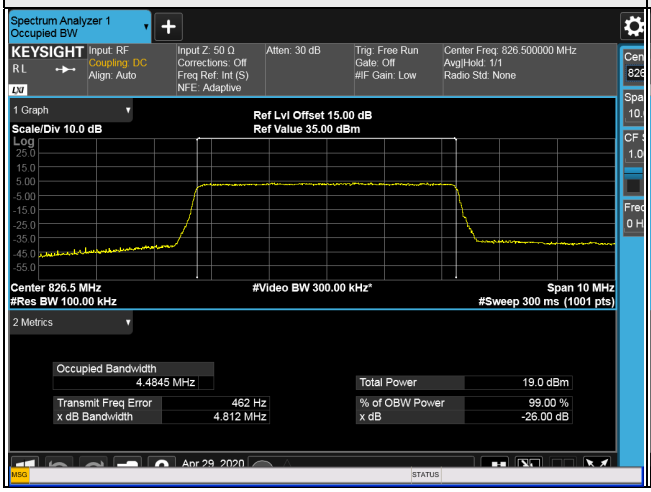
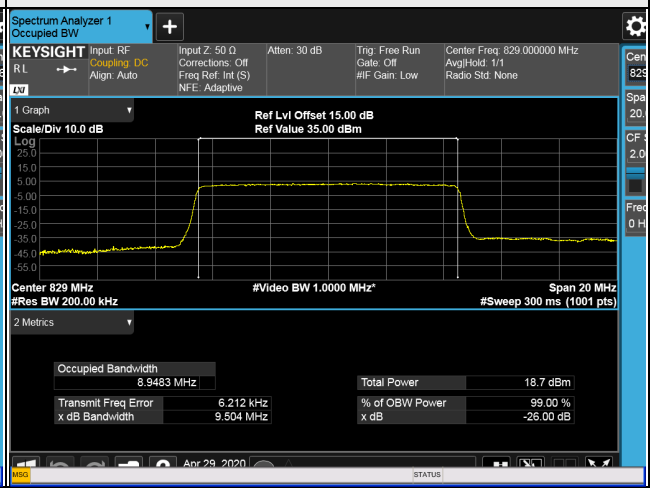
n66

n66, Channel Bandwidth 5MHz						
Channel	Frequency (MHz)	26dB Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
342500	1712.5	4.819	4.785	4.809	4.806	4.740
349000	1745.0	4.765	4.800	4.796	4.803	4.735
355500	1777.5	4.836	4.802	4.803	4.796	4.847
n66, Channel Bandwidth 10MHz						
Channel	Frequency (MHz)	26dB Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
343000	1715.0	9.265	9.499	9.506	9.488	9.302
349000	1745.0	9.275	9.492	9.501	9.503	9.298
355000	1775.0	9.272	9.497	9.509	9.502	9.355
n66, Channel Bandwidth 15MHz						
Channel	Frequency (MHz)	26dB Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
343500	1717.5	13.89	14.24	14.24	14.21	13.89
349000	1745.0	13.91	14.26	14.24	14.24	13.90
354500	1772.5	14.00	14.26	14.27	14.27	16.99
n66, Channel Bandwidth 20MHz						
Channel	Frequency (MHz)	26dB Bandwidth (MHz)				
		$\pi/2$ BPSK	QPSK	16QAM	64QAM	256QAM
344000	1720.0	18.51	19.05	19.03	19.02	18.48
349000	1745.0	27.27	19.02	19.02	19.05	18.51
354000	1770.0	27.12	19.10	19.09	19.11	18.99

Spectrum Plot of Worst Value	
5MHz / 256QAM	10MHz / 16QAM
	
15MHz / 64QAM	20MHz / $\pi/2$ BPSK
	

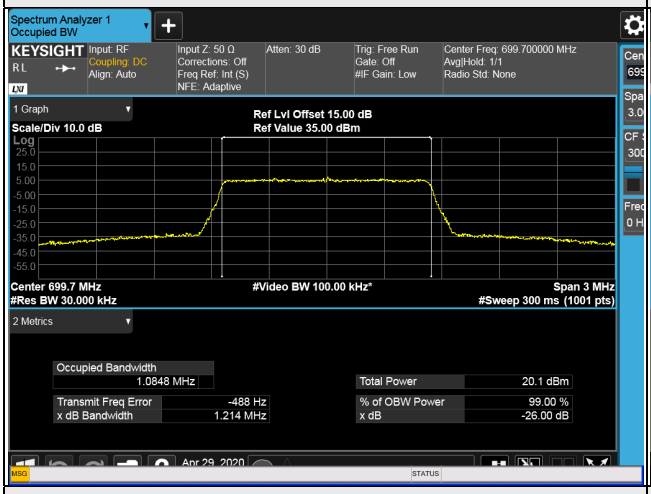
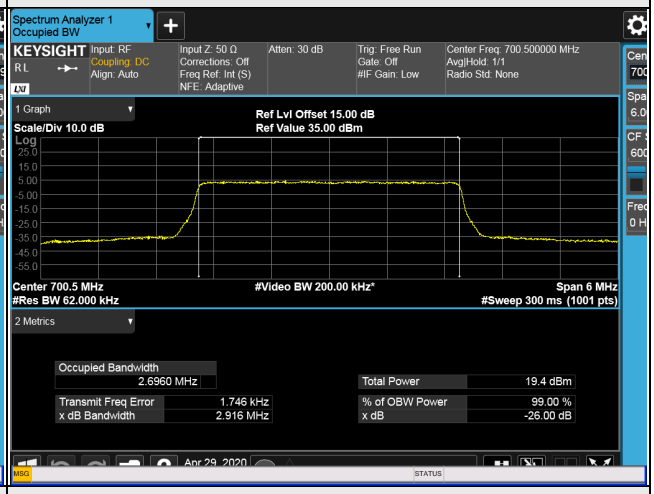
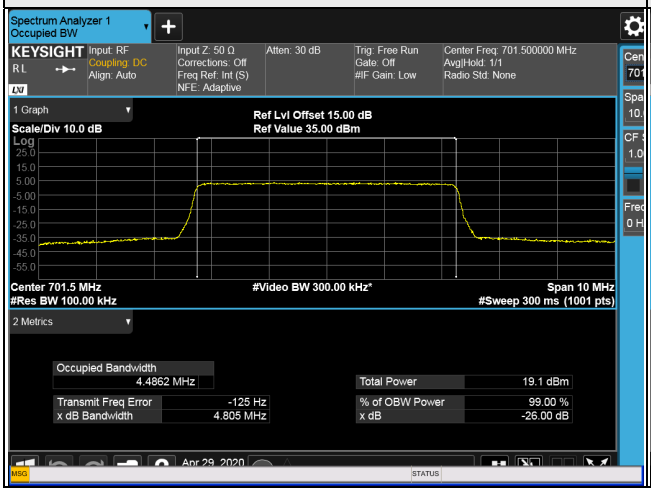
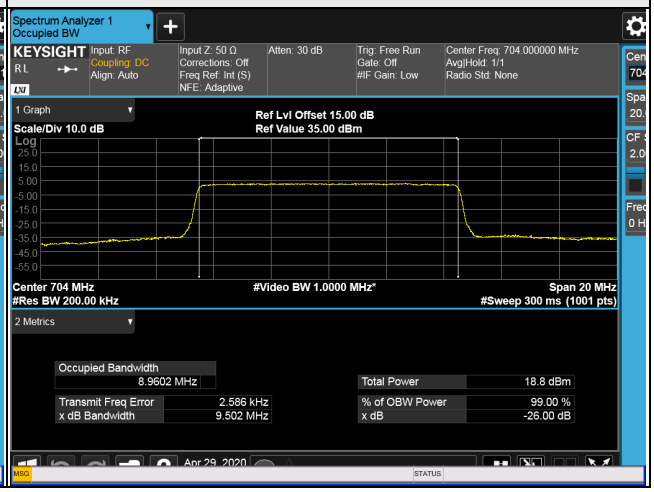
LTE Band 5

LTE Band 5, Channel Bandwidth 1.4MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
20407	824.7	1.21
20525	836.5	1.21
20643	848.3	1.20
LTE Band 5, Channel Bandwidth 3MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
20415	825.5	2.91
20525	836.5	2.93
20635	847.5	2.92
LTE Band 5, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
20425	826.5	4.81
20525	836.5	4.79
20625	846.5	4.79
LTE Band 5, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
20450	829.0	9.50
20525	836.5	9.50
20600	844.0	9.49

Spectrum Plot of Worst Value	
1.4MHz / 256QAM	3MHz / 256QAM
	
5MHz / 256QAM	10MHz / 256QAM
	

LTE Band 12

LTE Band 12, Channel Bandwidth 1.4MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
23017	699.7	1.21
23095	707.5	1.21
23173	715.3	1.21
LTE Band 12, Channel Bandwidth 3MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
23025	700.5	2.92
23095	707.5	2.91
23165	714.5	2.90
LTE Band 12, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
23035	701.5	4.81
23095	707.5	4.80
23155	713.5	4.80
LTE Band 12, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
23060	704.0	9.50
23095	707.5	9.50
23130	711.0	9.49

Spectrum Plot of Worst Value	
1.4MHz / 256QAM	3MHz / 256QAM
	
5MHz / 256QAM	10MHz / 256QAM
	

LTE Band 13

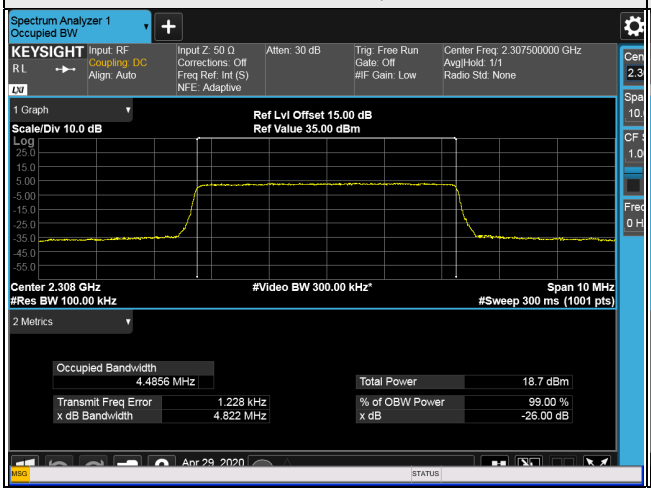
LTE Band 13, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
23205	779.5	4.81
23230	782.0	4.78
23255	784.5	4.79
LTE Band 13, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
23230	782.0	9.51

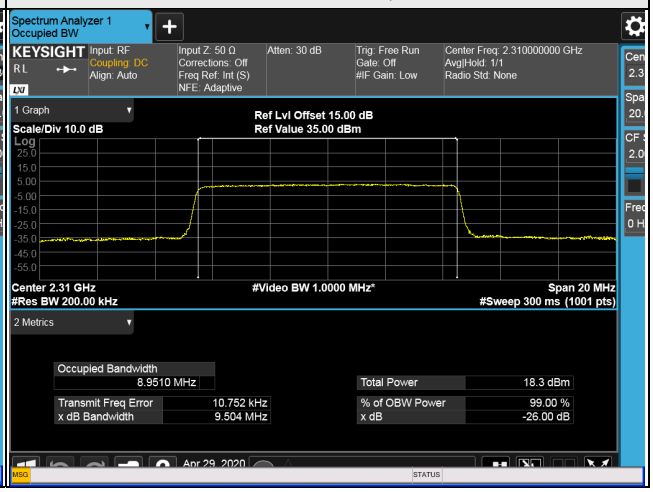
Spectrum Plot of Worst Value	
5MHz / 256QAM	10MHz / 256QAM

LTE Band 30

LTE Band 30, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
27685	2307.5	4.82
27710	2310	4.81
27735	2312.5	4.80
LTE Band 30, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
27710	2310	9.50

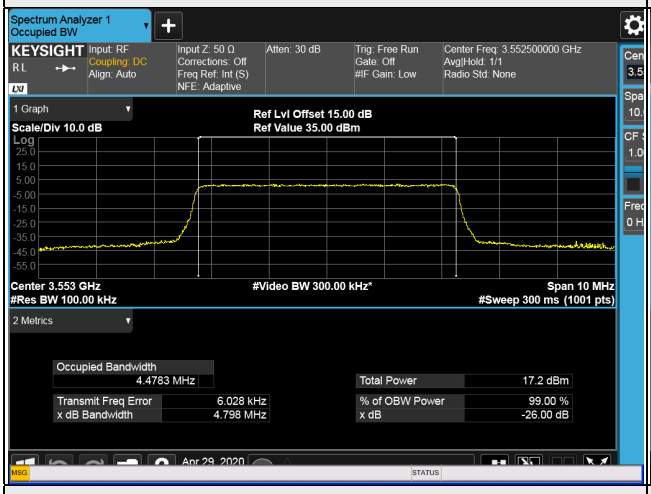
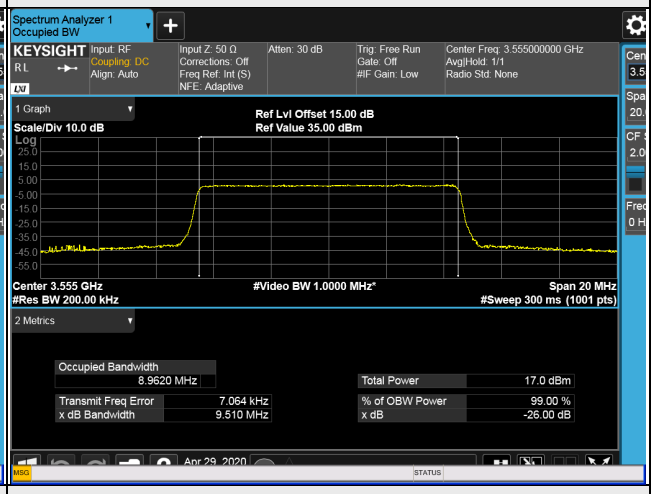
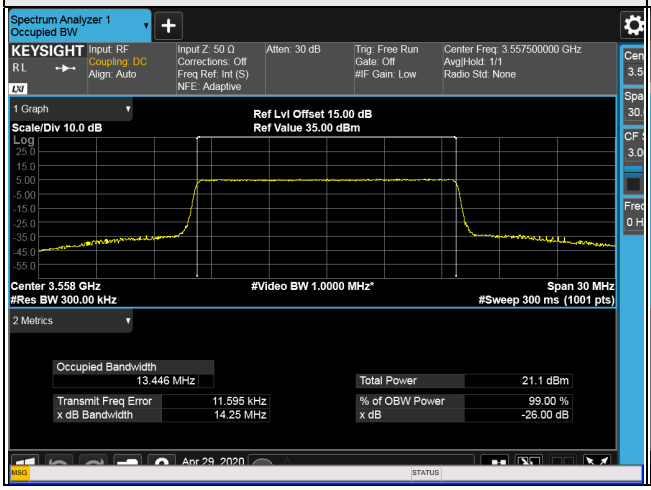
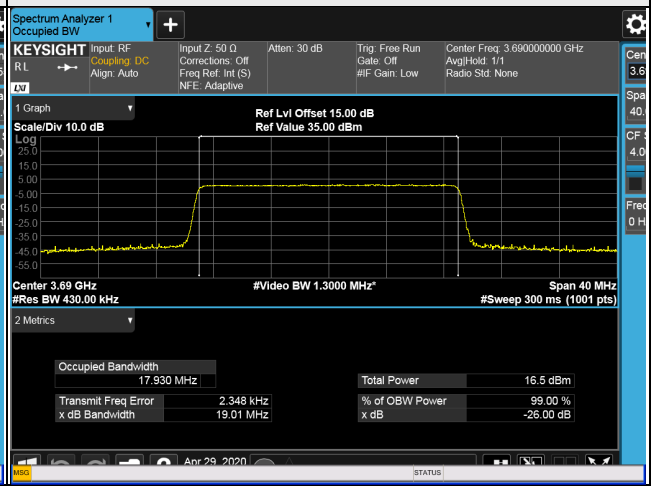
Spectrum Plot of Worst Value	
5MHz / 256QAM	10MHz / 256QAM





LTE Band 48

LTE Band 48, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
55265	3552.5	4.80
55990	3625.0	4.79
56715	3697.5	4.77
LTE Band 48, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
55290	3555.0	9.51
55990	3625.0	9.51
56690	3695.0	9.49
LTE Band 48, Channel Bandwidth 15MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
55315	3557.5	14.25
55990	3625.0	14.24
56665	3692.5	14.24
LTE Band 48, Channel Bandwidth 20MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
55340	3560.0	19.01
55990	3625.0	18.99
56640	3690.0	19.01

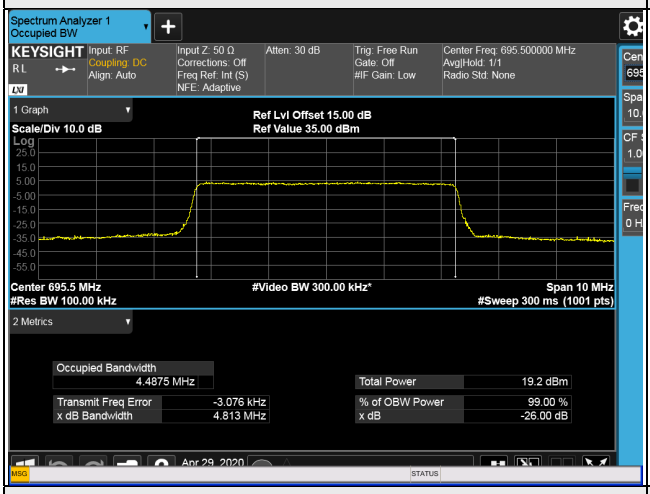
Spectrum Plot of Worst Value	
5MHz / 256QAM	10MHz / 256QAM
	
15MHz / 256QAM	20MHz / 256QAM
	

LTE Band 71

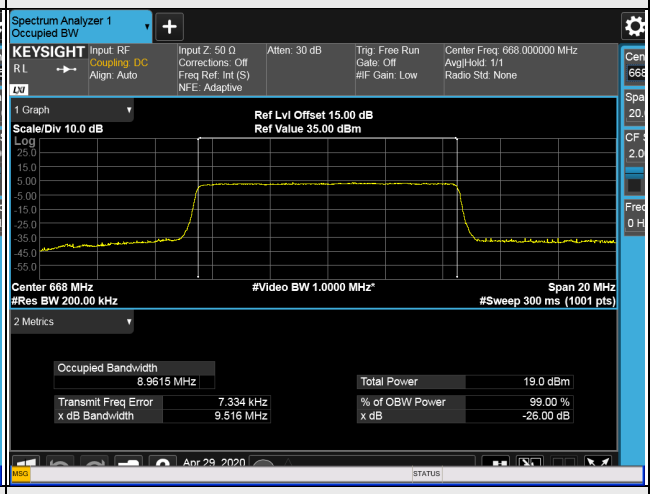
LTE Band 71, Channel Bandwidth 5MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
133147	665.5	4.81
133297	680.5	4.81
133447	695.5	4.81
LTE Band 71, Channel Bandwidth 10MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
133172	668	9.52
133297	680.5	9.51
133422	693	9.50
LTE Band 71, Channel Bandwidth 15MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
133197	670.5	14.22
133297	680.5	14.25
133397	690.5	14.23
LTE Band 71, Channel Bandwidth 20MHz		
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		256QAM
133222	673	18.99
133297	680.5	19.00
133372	688	18.99

Spectrum Plot of Worst Value

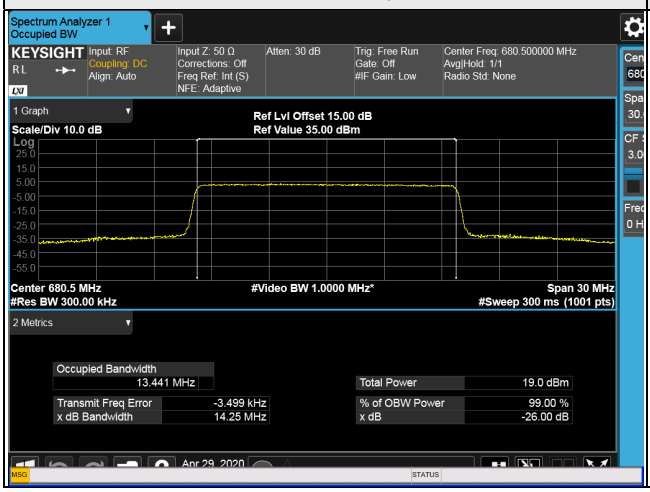
5MHz / 256QAM



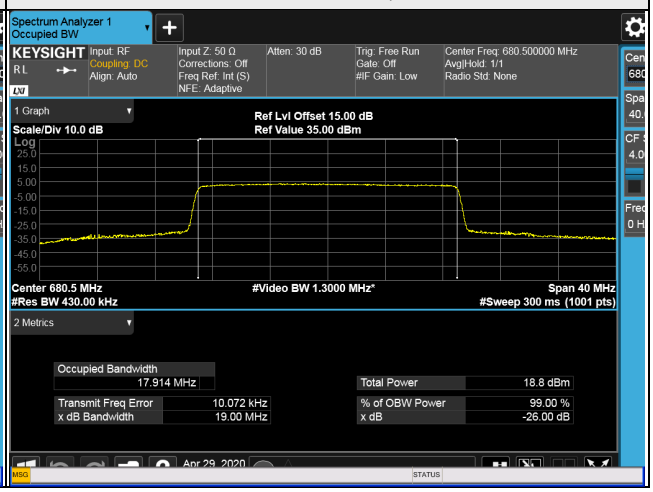
10MHz / 256QAM



15MHz / 256QAM



20MHz / 256QAM



4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

For n66
According to FCC 27.53(h) for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P) dB.

For LTE Band 5
Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

For LTE Band 12, 71
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.

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.

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

For LTE Band 30

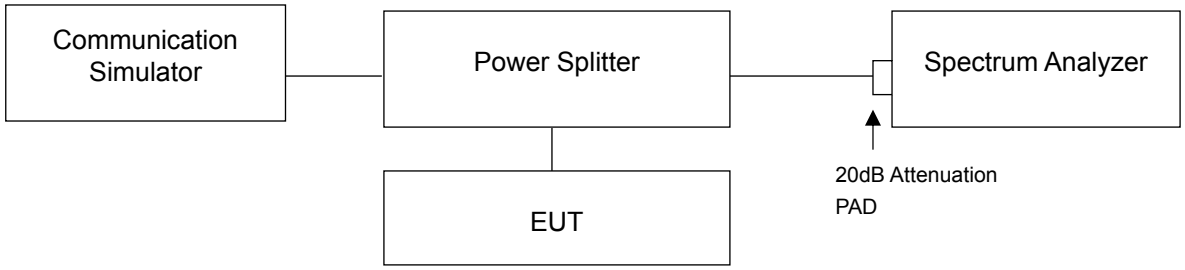
According to FCC 27.53(a) (4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

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

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

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

4.5.2 Test Setup

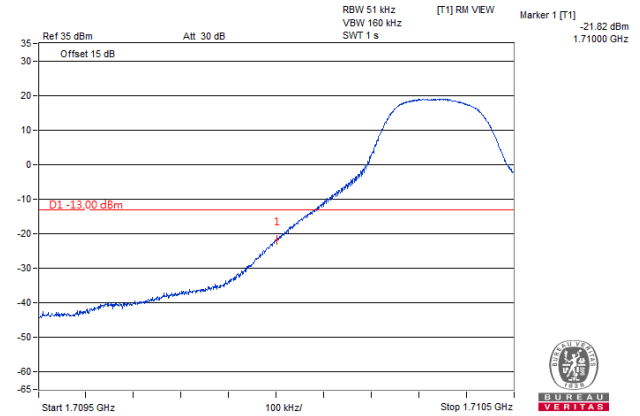
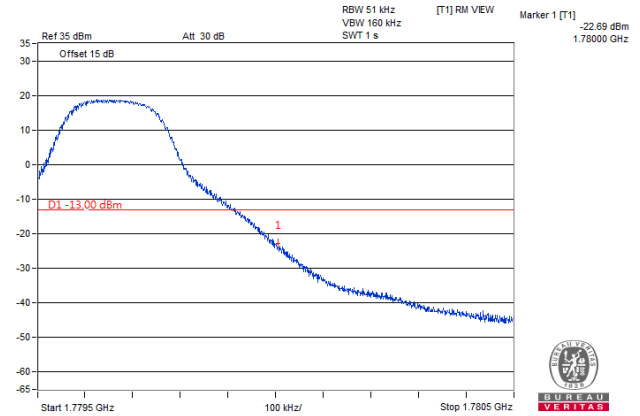
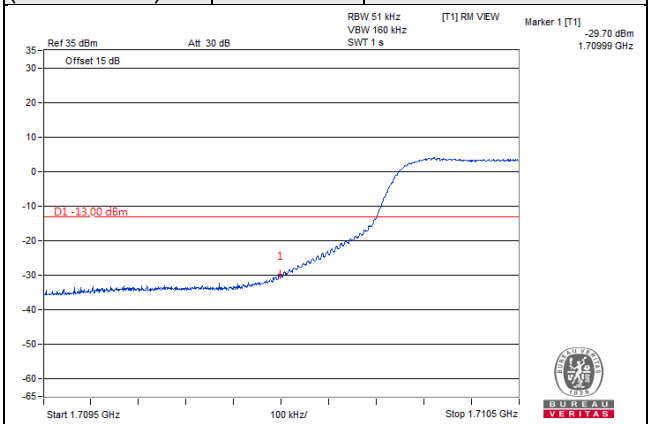
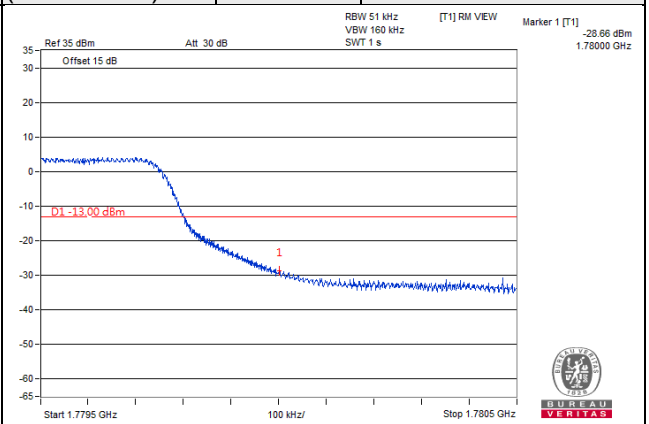


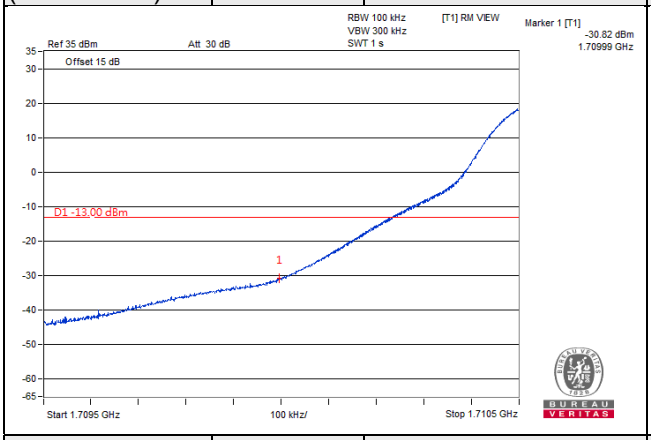
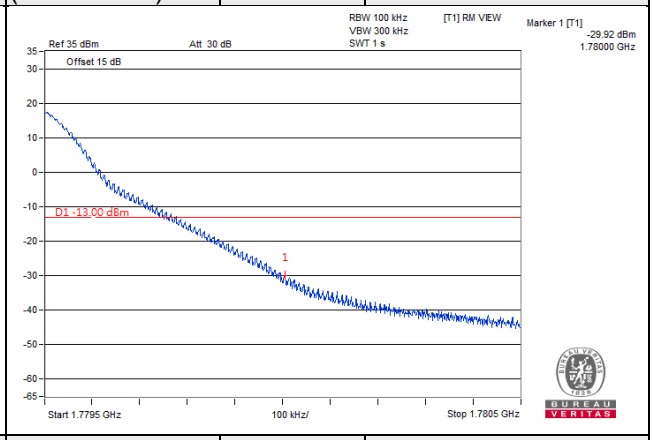
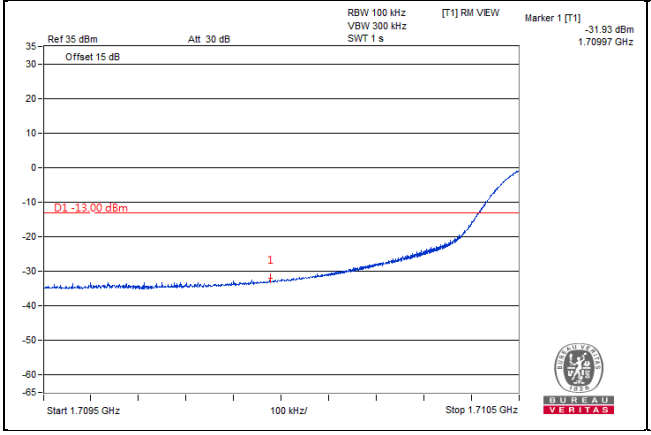
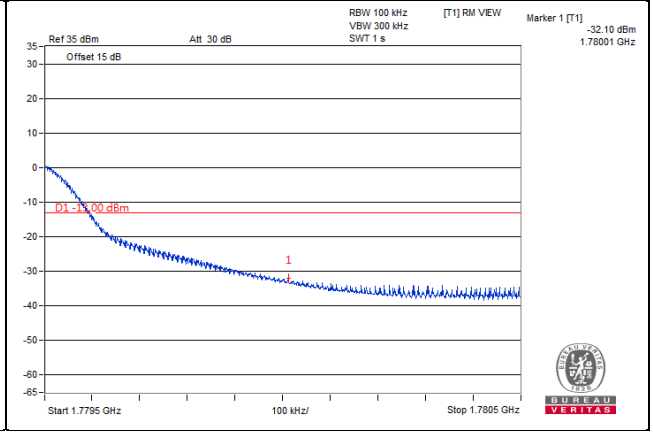
4.5.3 Test Procedures

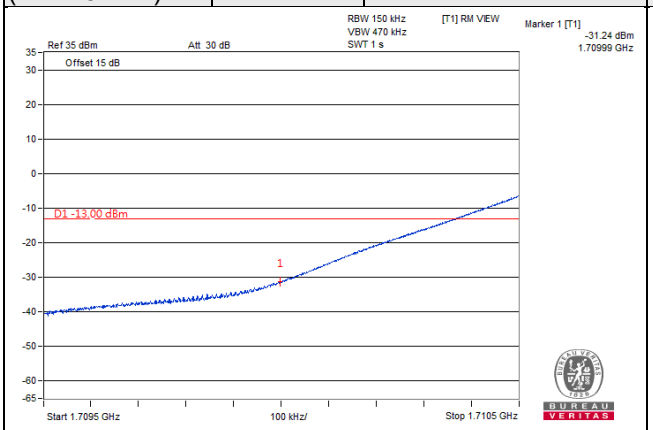
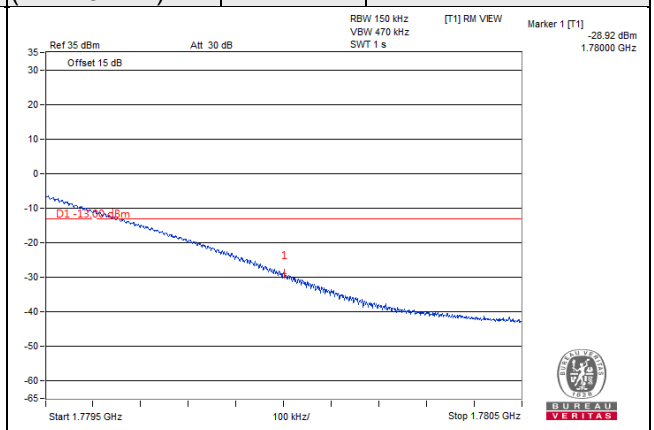
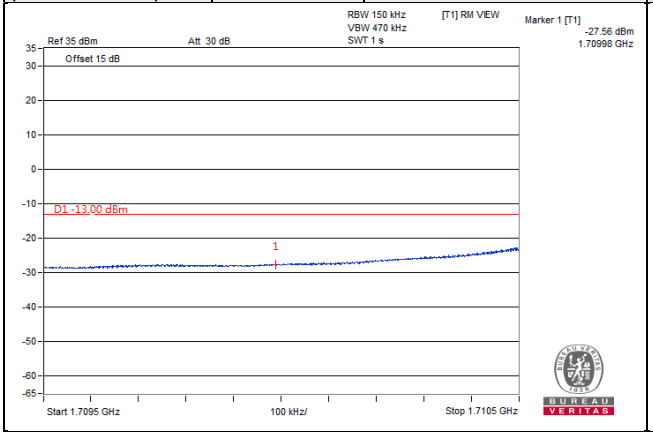
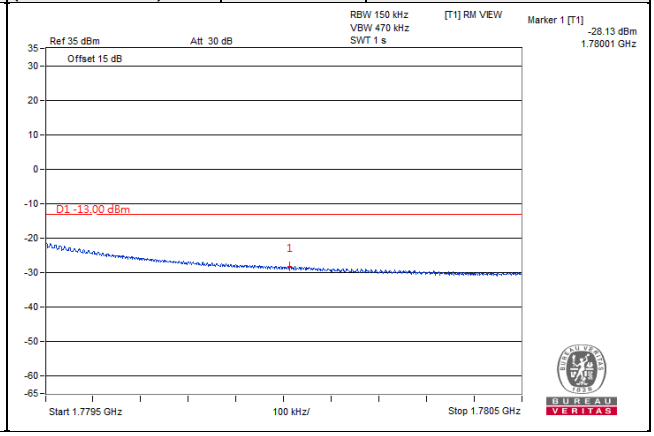
a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 15kHz and VB of the spectrum is 51kHz (LTE Channel Bandwidth 1.4MHz).
c. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 30kHz and VB of the spectrum is 100kHz (LTE Channel Bandwidth 3MHz).
d. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (LTE Channel Bandwidth 5MHz).
e. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (LTE Channel Bandwidth 10MHz).
f. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 150kHz and VB of the spectrum is 470kHz (LTE Channel Bandwidth 15MHz).
g. Record the max trace plot into the test report.

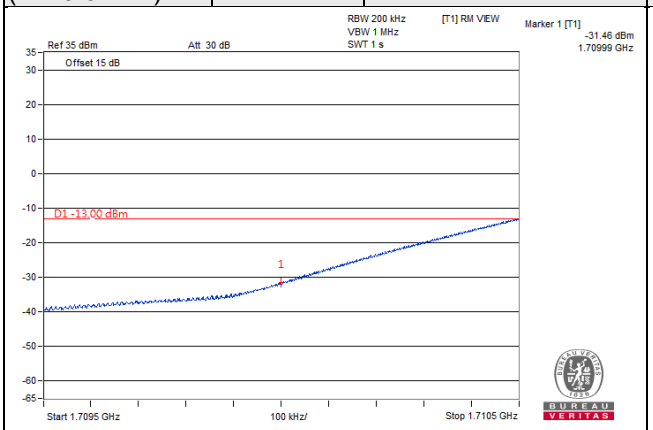
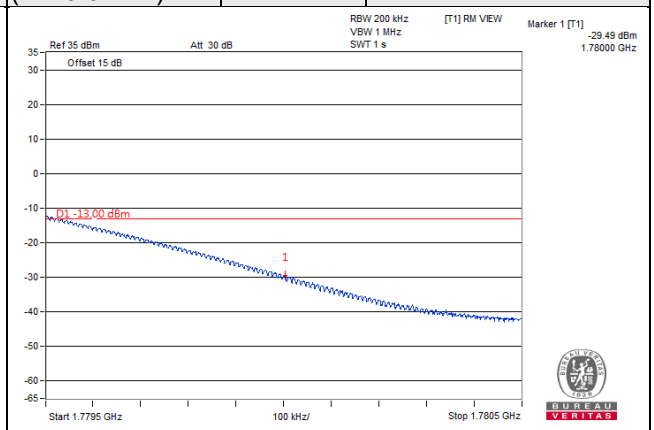
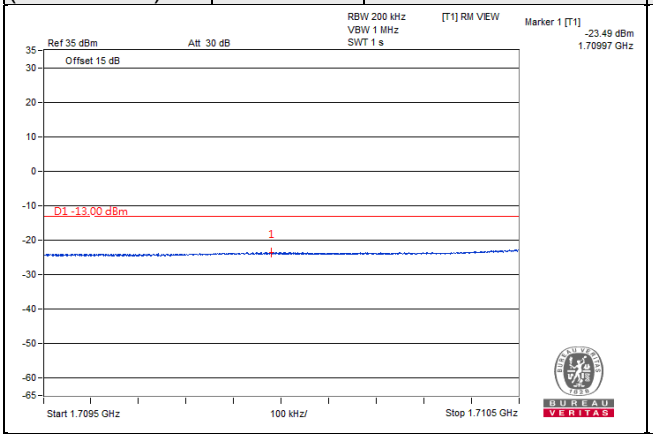
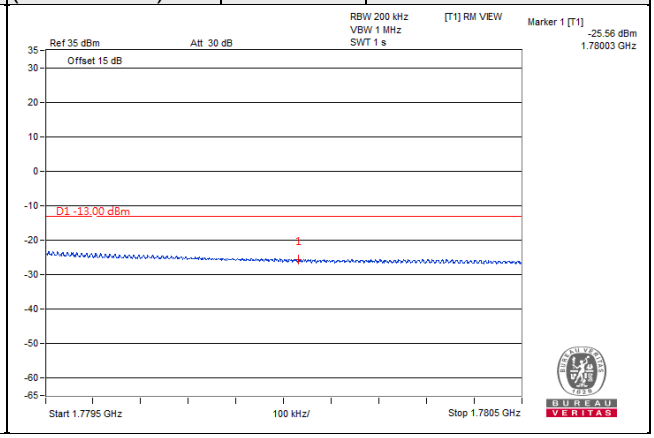
4.5.4 Test Results

n66
Band edge:

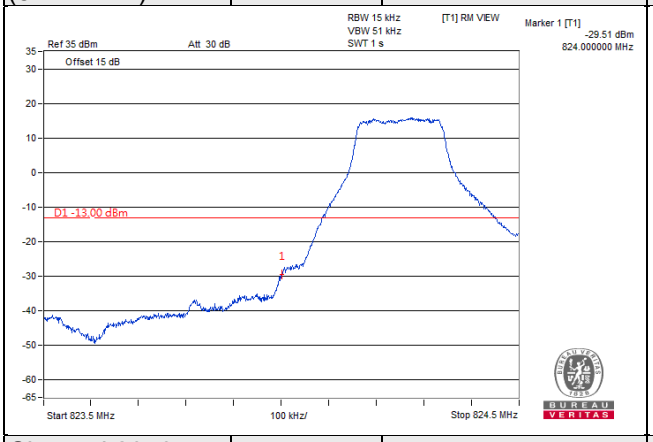
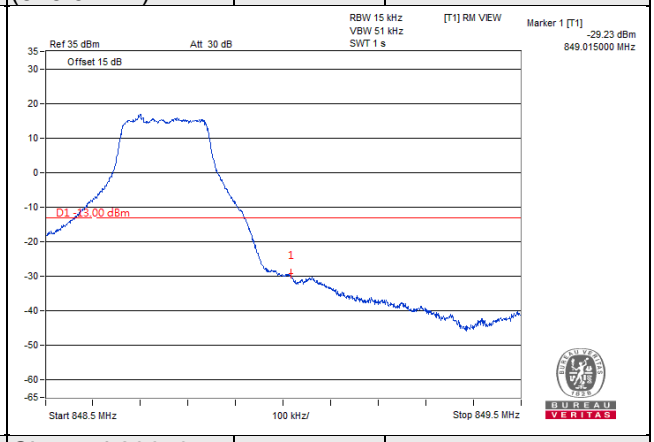
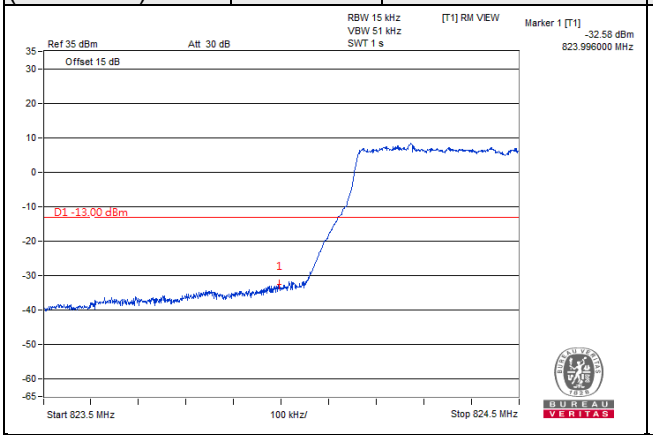
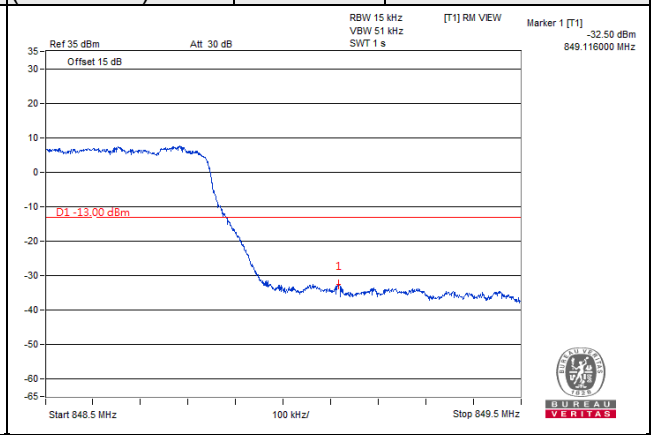
Channel Bandwidth: 5MHz					
Channel 342500 (1712.5MHz)	$\pi/2$ BPSK	1 RB / 0 RB Offset	Channel 355500 (1777.5MHz)	$\pi/2$ BPSK	1 RB / 24 RB Offset
					
Channel 342500 (1712.5MHz)	$\pi/2$ BPSK	25 RB / 0 RB Offset	Channel 355500 (1777.5MHz)	$\pi/2$ BPSK	25 RB / 0 RB Offset
					

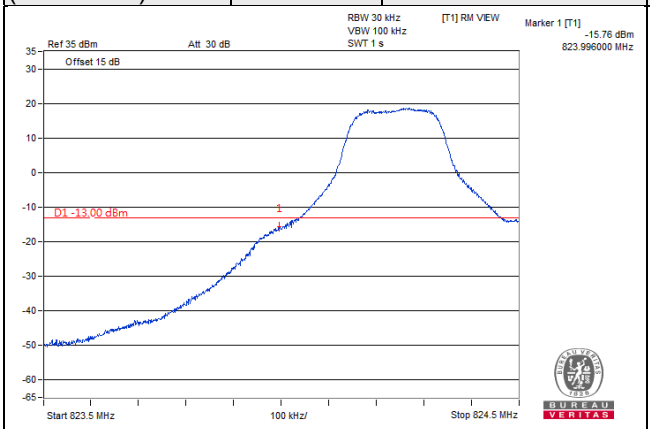
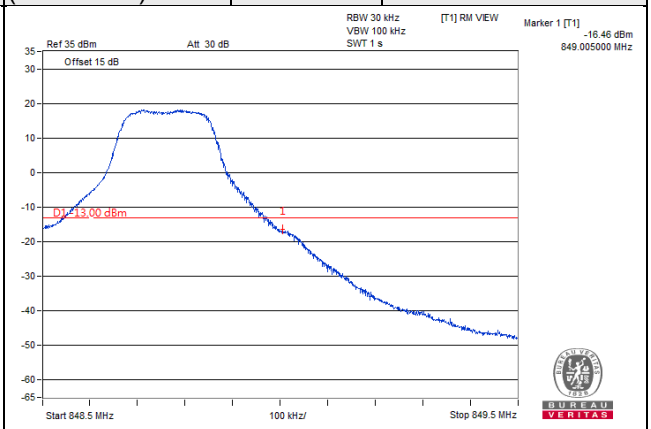
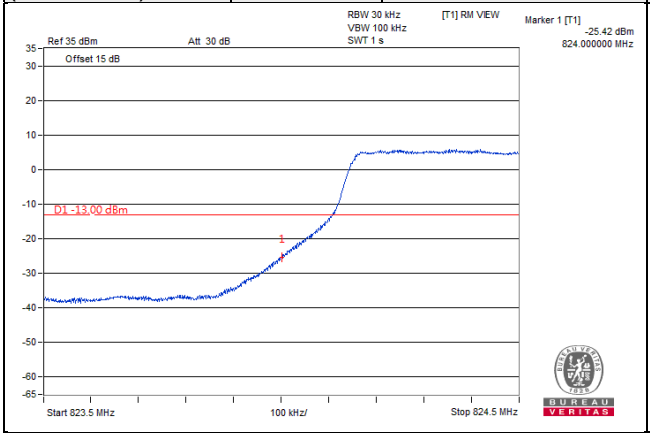
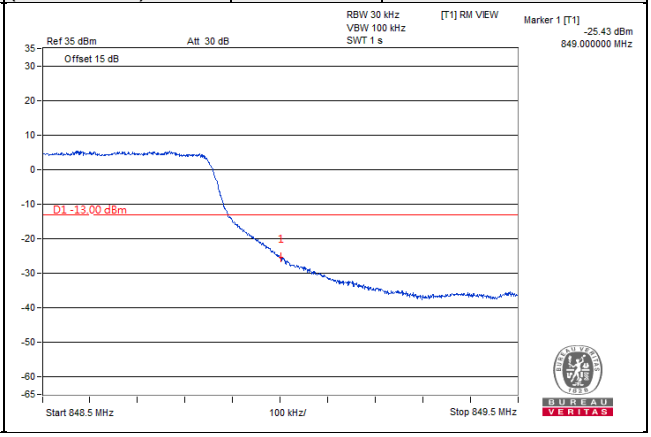
Channel Bandwidth: 10MHz					
Channel 343000 (1715.0MHz)	$\pi/2$ BPSK	1 RB / 0 RB Offset	Channel 355000 (1775.0MHz)	$\pi/2$ BPSK	1 RB / 49 RB Offset
					
Channel 343000 (1715.0MHz)	$\pi/2$ BPSK	50 RB / 0 RB Offset	Channel 355000 (1775.0MHz)	$\pi/2$ BPSK	50 RB / 0 RB Offset
					

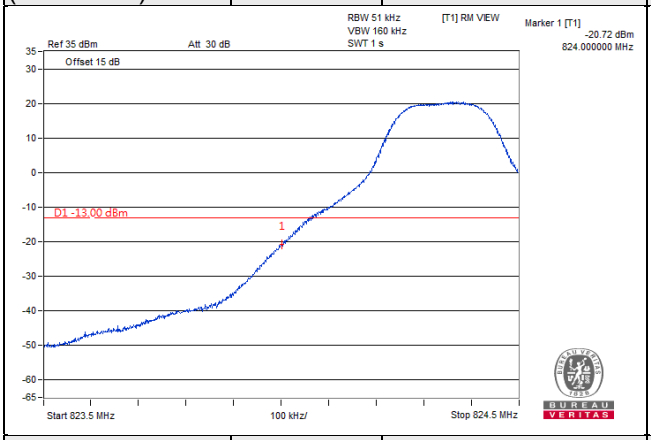
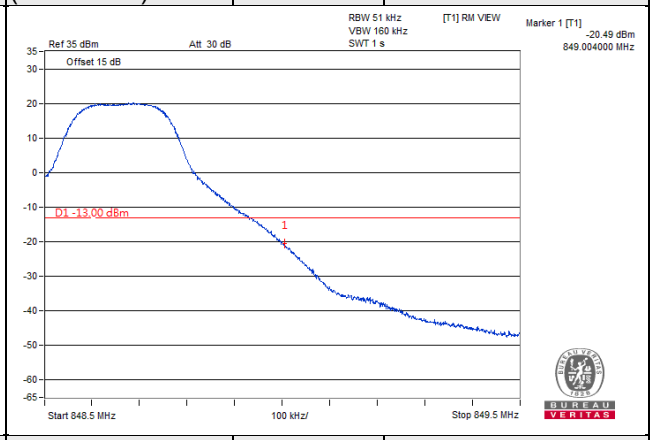
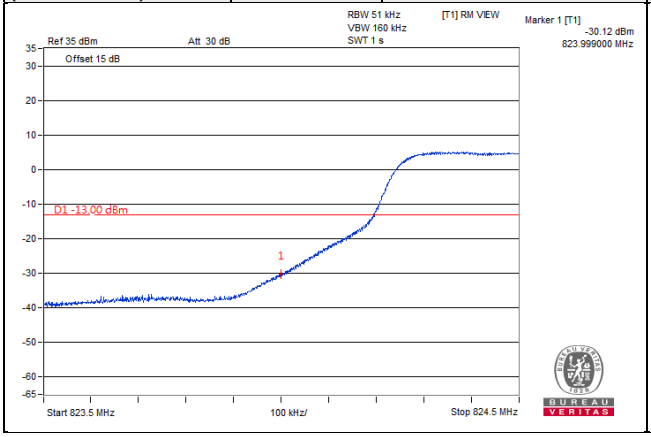
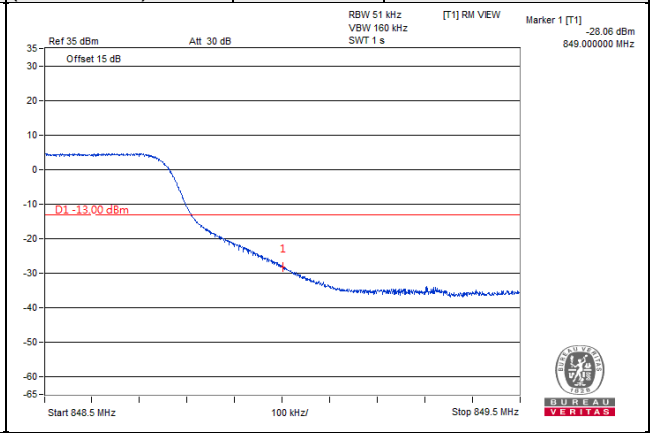
Channel Bandwidth: 15MHz					
Channel 343500 (1717.5MHz)	$\pi/2$ BPSK	1 RB / 0 RB Offset	Channel 354500 (1772.5MHz)	$\pi/2$ BPSK	1 RB / 74 RB Offset
					
Channel 343500 (1717.5MHz)	$\pi/2$ BPSK	75 RB / 0 RB Offset	Channel 354500 (1772.5MHz)	$\pi/2$ BPSK	75 RB / 0 RB Offset
					

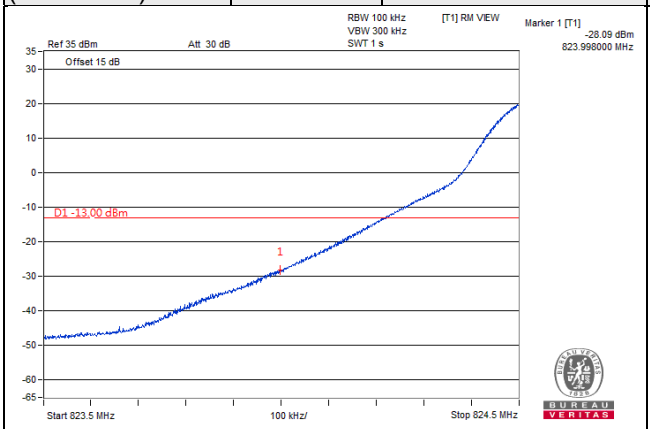
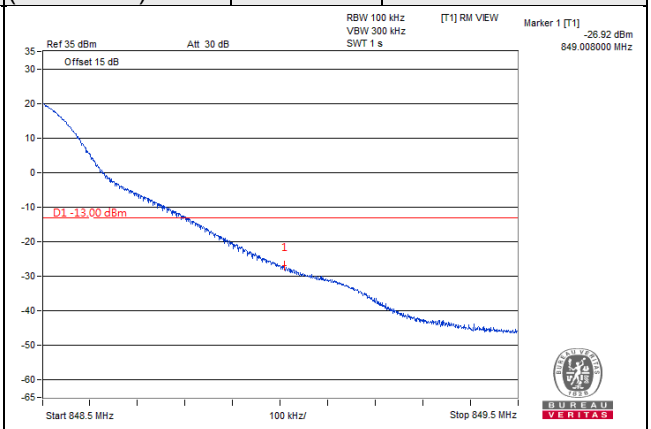
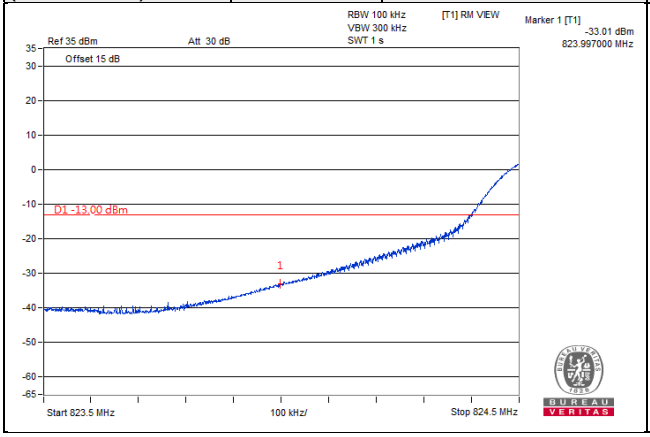
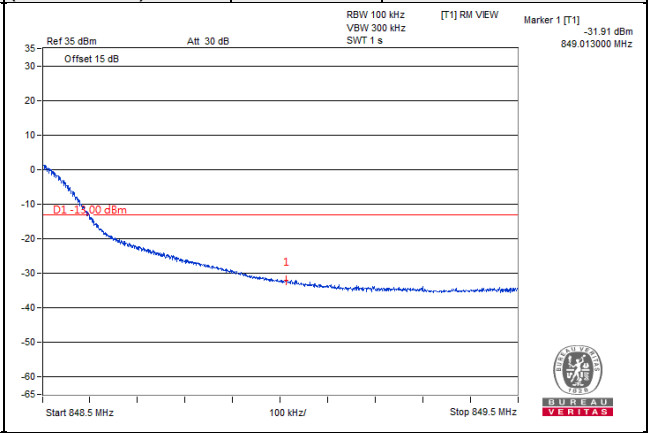
Channel Bandwidth: 20MHz					
Channel 344000 (1720.0MHz)	$\pi/2$ BPSK	1 RB / 0 RB Offset	Channel 354000 (1770.0MHz)	$\pi/2$ BPSK	1 RB / 99 RB Offset
					
Channel 344000 (1720.0MHz)	$\pi/2$ BPSK	100 RB / 0 RB Offset	Channel 354000 (1770.0MHz)	$\pi/2$ BPSK	100 RB / 0 RB Offset
					

LTE Band 5

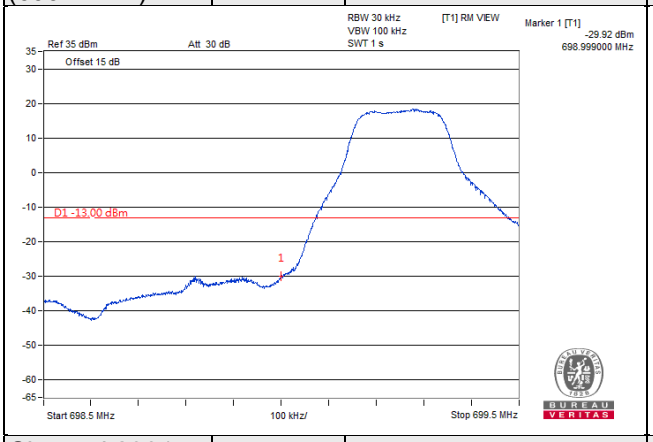
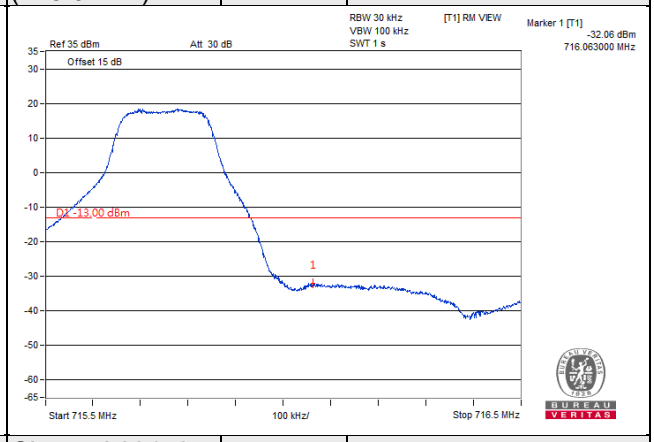
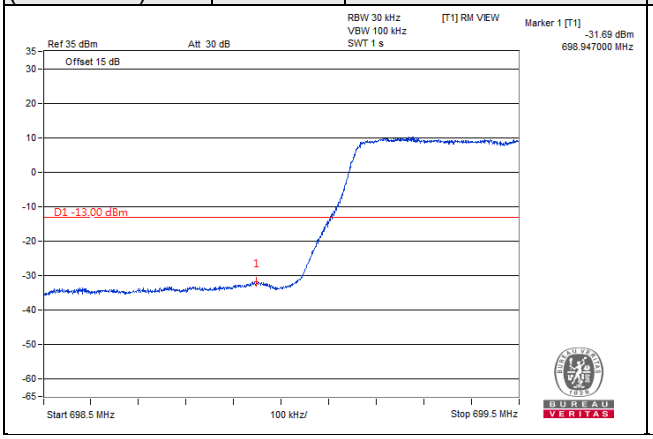
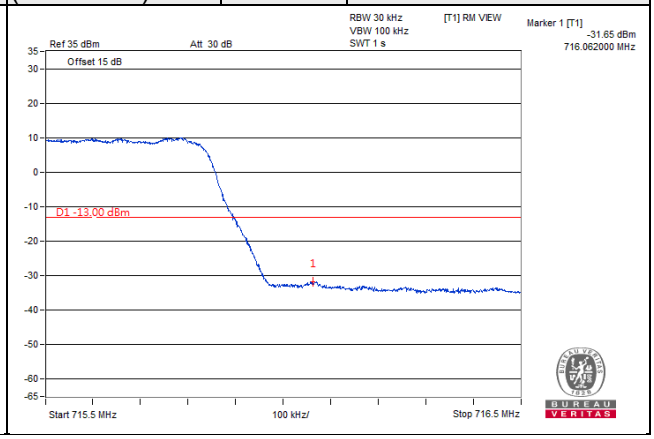
Channel Bandwidth 1.4MHz					
Channel 20407 (824.7MHz)	256QAM	1 RB / 0 RB Offset	Channel 20643 (848.3MHz)	256QAM	1 RB / 5 RB Offset
					
Channel 20407 (824.7MHz)	256QAM	6 RB / 0 RB Offset	Channel 20643 (848.3MHz)	256QAM	6 RB / 0 RB Offset
					

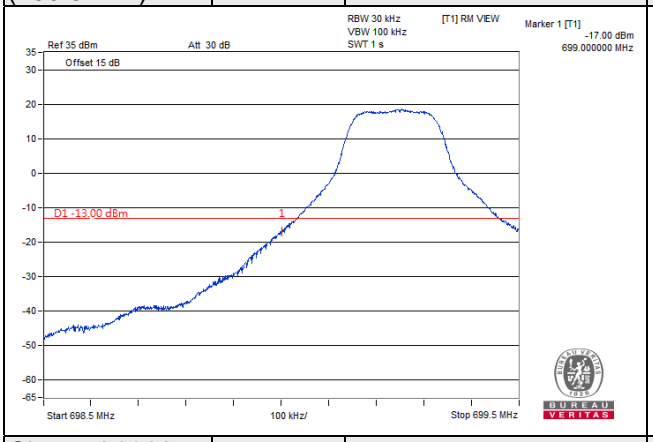
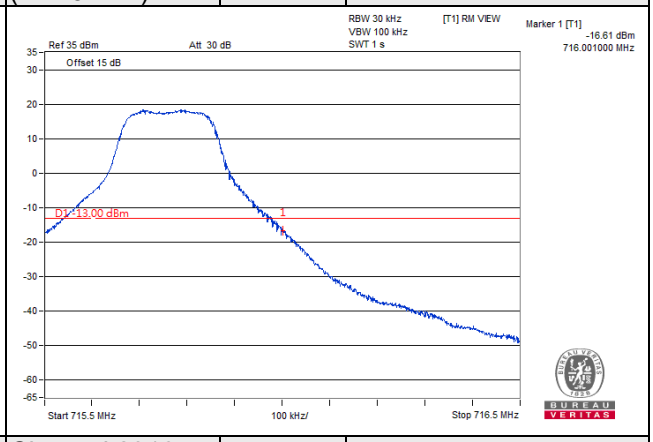
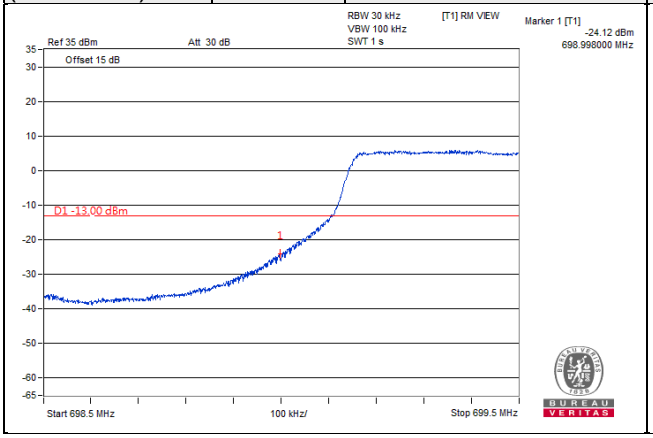
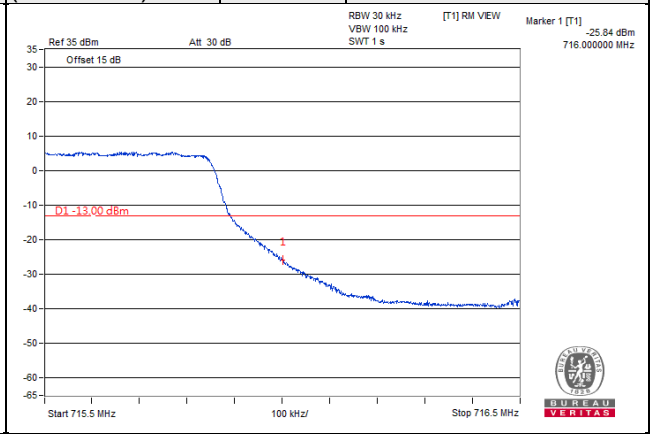
Channel Bandwidth 3MHz					
Channel 20415 (825.5MHz)	256QAM	1 RB / 0 RB Offset	Channel 20635 (847.5MHz)	256QAM	1 RB / 14 RB Offset
					
Channel 20415 (825.5MHz)	256QAM	15 RB / 0 RB Offset	Channel 20635 (847.5MHz)	256QAM	15 RB / 0 RB Offset
					

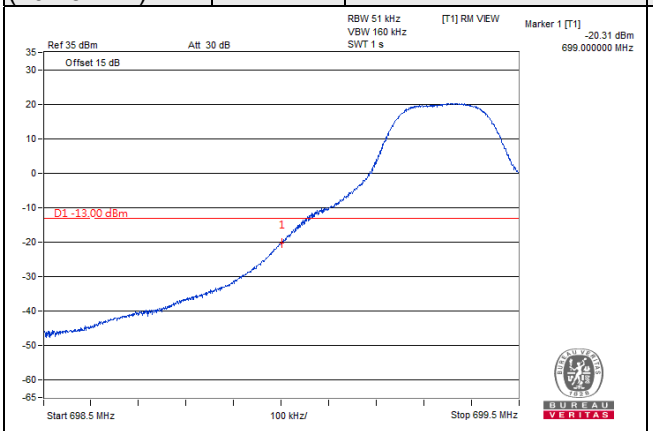
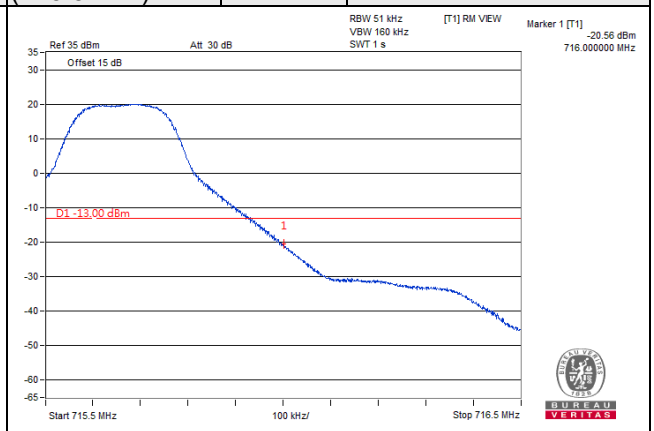
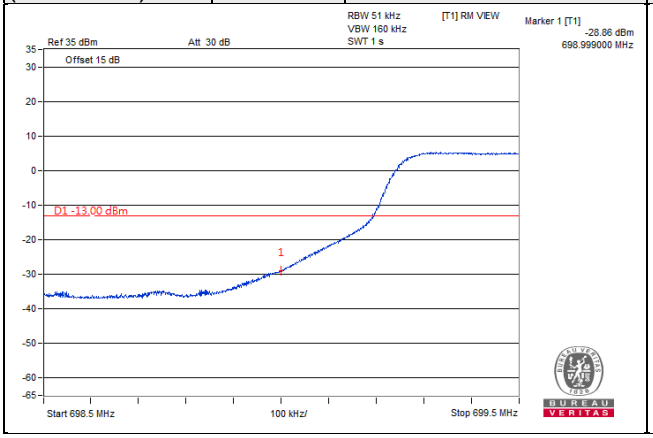
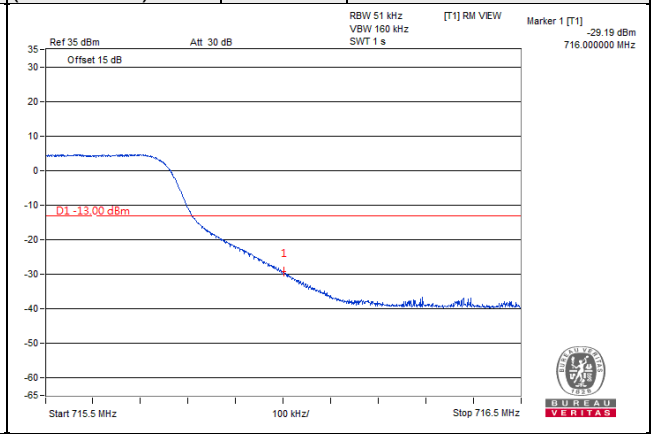
Channel Bandwidth 5MHz					
Channel 20425 (826.5MHz)	256QAM	1 RB / 0 RB Offset	Channel 20625 (846.5MHz)	256QAM	1 RB / 24 RB Offset
					
Channel 20425 (826.5MHz)	256QAM	25 RB / 0 RB Offset	Channel 20625 (846.5MHz)	256QAM	25 RB / 0 RB Offset
					

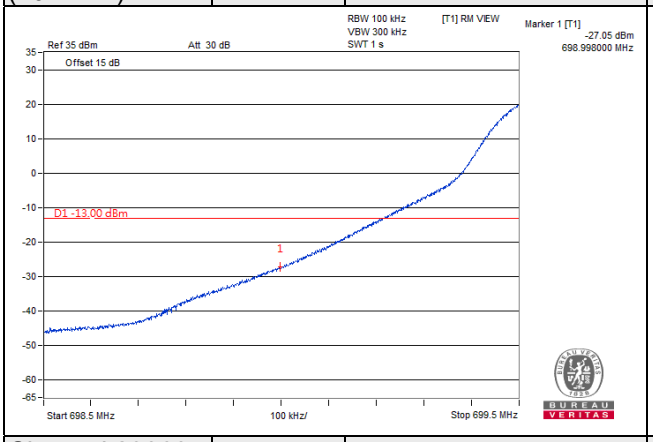
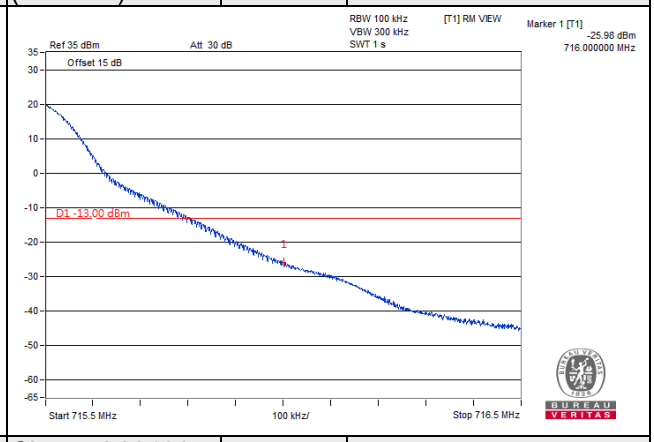
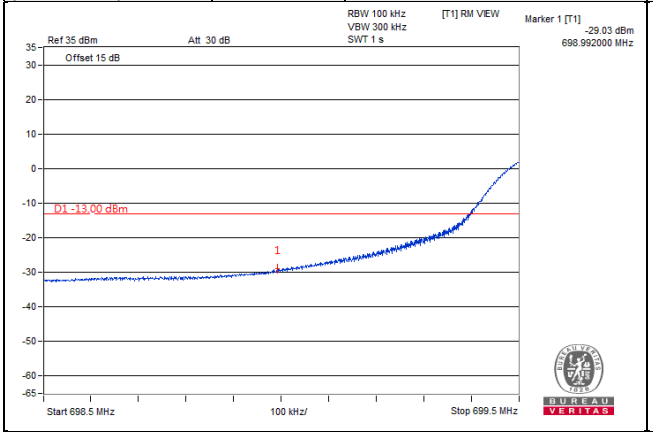
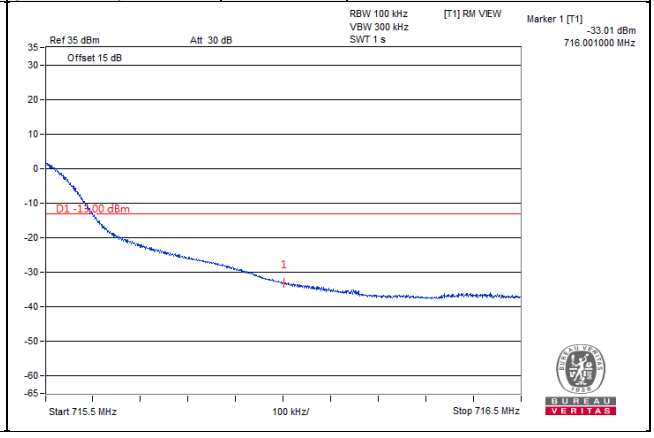
Channel Bandwidth 10MHz					
Channel 20450 (829.0MHz)	256QAM	1 RB / 0 RB Offset	Channel 20600 (844.0MHz)	256QAM	1 RB / 49 RB Offset
					
Channel 20450 (829.0MHz)	256QAM	50 RB / 0 RB Offset	Channel 20600 (844.0MHz)	256QAM	50 RB / 0 RB Offset
					

LTE Band 12

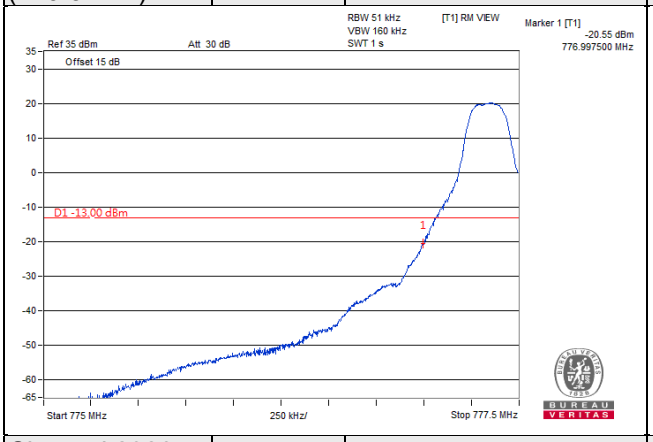
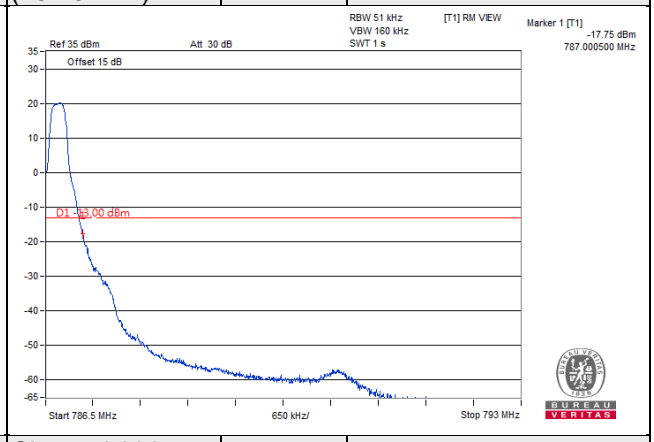
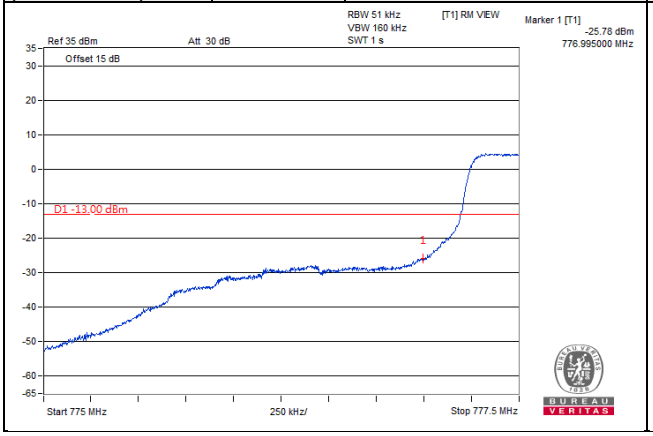
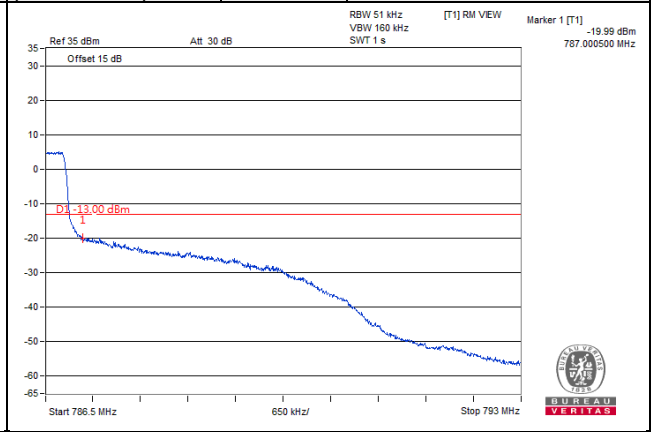
Channel Bandwidth: 1.4MHz					
Channel 23017 (699.7MHz)	256QAM	1 RB / 0 RB Offset	Channel 23173 (715.3MHz)	256QAM	1 RB / 5 RB Offset
					
Channel 23017 (699.7MHz)	256QAM	6 RB / 0 RB Offset	Channel 23173 (715.3MHz)	256QAM	6 RB / 0 RB Offset
					

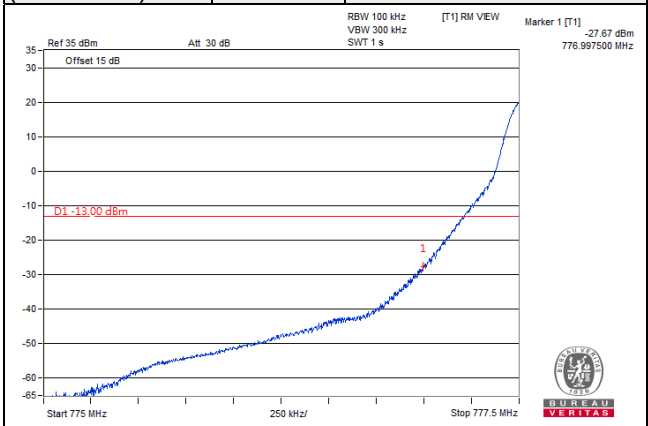
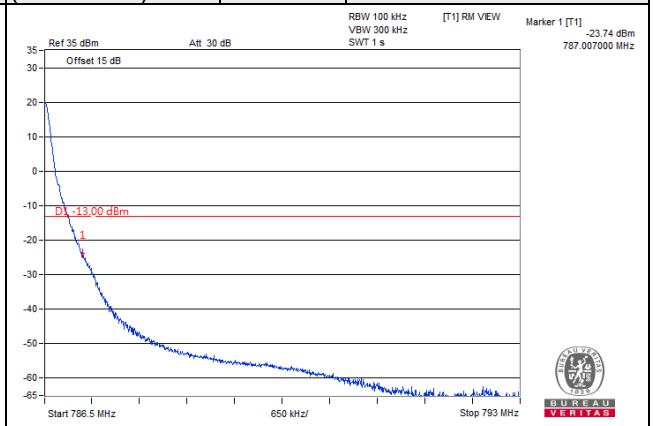
Channel Bandwidth: 3MHz					
Channel 23025 (700.5MHz)	256QAM	1 RB / 0 RB Offset	Channel 23165 (714.5MHz)	256QAM	1 RB / 14RB Offset
					
Channel 23025 (700.5MHz)	256QAM	15 RB / 0 RB Offset	Channel 23165 (714.5MHz)	256QAM	15 RB / 0 RB Offset
					

Channel Bandwidth: 5MHz					
Channel 23035 (701.5MHz)	256QAM	1 RB / 0 RB Offset	Channel 23155 (713.5MHz)	256QAM	1 RB / 24RB Offset
					
Channel 23035 (701.5MHz)	256QAM	25 RB / 0 RB Offset	Channel 23155 (713.5MHz)	256QAM	25 RB / 0 RB Offset
					

Channel Bandwidth: 10MHz					
Channel 23060 (704MHz)	256QAM	1 RB / 0 RB Offset	Channel 23130 (711MHz)	256QAM	1 RB / 24RB Offset
					
Channel 23060 (704MHz)	256QAM	50 RB / 0 RB Offset	Channel 23130 (711MHz)	256QAM	25 RB / 0 RB Offset
					

LTE Band 13

Channel Bandwidth: 5MHz					
Channel 23205 (779.5MHz)	256QAM	1 RB / 0 RB Offset	Channel 23255 (784.5MHz)	256QAM	1 RB / 24 RB Offset
					
Channel 23205 (779.5MHz)	256QAM	25 RB / 0 RB Offset	Channel 23255 (784.5MHz)	256QAM	25 RB / 0 RB Offset
					

Channel Bandwidth: 10MHz					
Channel 23230 (782.0MHz)	256QAM	1 RB / 0 RB Offset	Channel 23230 (782.0MHz)	256QAM	1 RB / 49 RB Offset
					
Channel 23230 (782.0MHz)	256QAM	50 RB / 0 RB Offset	Channel 23230 (782.0MHz)	256QAM	50 RB / 0 RB Offset