FCC Test Report

(PART 24)

Report No.:	RFBFPJ-WTW-P20090646-1
FCC ID:	SWX-RC7611
Test Model:	RC7611U
Received Date:	Sep. 29, 2020
Test Date:	Nov. 17, 2020 ~ Jan. 04, 2021
Issued Date:	Jan. 07, 2021
Applicant:	Ubiquiti Inc.
Address:	685 Third Avenue, New York, New York 10017 USA
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

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Release Control Record

Issue No.	Description	Date Issued
RFBFPJ-WTW-P20090646-1	Original Release	Jan. 07, 2021

1 Certificate of Conformity

Product: LTE Module

Brand: 

Test Model: RC7611U

Sample Status: Engineering Sample

Applicant: Ubiquiti Inc.

Test Date: Nov. 17, 2020 ~ Jan. 04, 2021

Standards: FCC Part 24, Subpart E

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 : Lena Wang , **Date:** Jan. 07, 2021

Lena Wang / Specialist

Approved by : , **Date:** Jan. 07, 2021

Dylan Chiou / Senior Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	**Test Item**	**Result**	**Remarks**
2.1046 24.232	Effective Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
24.232(d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -28.2 dB at 3760.00 MHz.

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	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 16, 2020	Apr. 15, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2020	Jun. 11, 2021
Spectrum Analyzer KEYSIGHT	N9030B	MY57140953	Jul. 02, 2020	Jul. 01, 2021
MXG Vector signal generator Agilent	N5182B	MY53050162	Jan. 14, 2020	Jan. 13, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Nov. 06, 2020	Nov. 05, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 06, 2020	Nov. 05, 2021
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 24, 2019	Nov. 23, 2020
			Nov. 22, 2020	Nov. 21, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
			Nov. 22, 2020	Nov. 21, 2021
Loop Antenna EMCI	EM-6879	269	Sep. 17, 2020	Sep. 16, 2021
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jun. 08, 2020	Jun. 07, 2021
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 18, 2020	Feb. 17, 2021
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	Jan. 18, 2020	Jan. 17, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Jan. 18, 2020	Jan. 17, 2021
RF signal cable Woken	8D-FB	Cable-CH9-01	Jun. 08, 2020	Jun. 07, 2021
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
True RMS Clamp Meter Fluke	325	31130711WS	Jun. 06, 2020	Jun. 05, 2021
Radio Communication Analyzer Anritsu	MT8820C	6201300640	Jul. 01, 2019	Jun. 30, 2021

Radio Communication Analyzer Anritsu	MT8821C	6201462755	Feb. 13, 2020	Feb. 12, 2021
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 09, 2020	Sep. 08, 2021

Note: 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 9.

3 General Information

3.1 General Description of EUT

Product	LTE Module		
Brand			
Test Model	RC7611U		
Status of EUT	Engineering Sample		
Power Supply Rating	24 Vdc (adapter)		
Modulation Type	LTE	QPSK, 16QAM	
Frequency Range	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz	
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz	
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz	
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz	
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz	
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz	
Max. EIRP Power		QPSK	16QAM
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1702.159 mW (32.31dBm)	1559.553 mW (31.93dBm)
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1798.871 mW (32.55dBm)	1563.148 mW (31.94dBm)
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1862.087 mW (32.70dBm)	1595.879 mW (32.03dBm)
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1794.734 mW (32.54dBm)	1648.162 mW (32.17dBm)
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1958.845 mW (32.92dBm)	1595.879 mW (32.03dBm)
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1949.845 mW (32.90dBm)	1753.881 mW (32.44dBm)
Emission Designator	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1M09D7W	
	LTE Band 2 (Channel Bandwidth: 3 MHz)	2M70G7D	
	LTE Band 2 (Channel Bandwidth: 5 MHz)	4M49G7D	
	LTE Band 2 (Channel Bandwidth: 10 MHz)	8M96G7D	
	LTE Band 2 (Channel Bandwidth: 15 MHz)	13M4D7W	
	LTE Band 2 (Channel Bandwidth: 20 MHz)	18M0D7W	
Antenna Type	Dish Antenna with 16.9 dBi gain		
Accessory Device	Refer to Note as below		
Data Cable Supplied	N/A		

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report to DEKRA report no.: 19B0422R-HPUSP50V00. The difference compared with original report is adding new antenna.

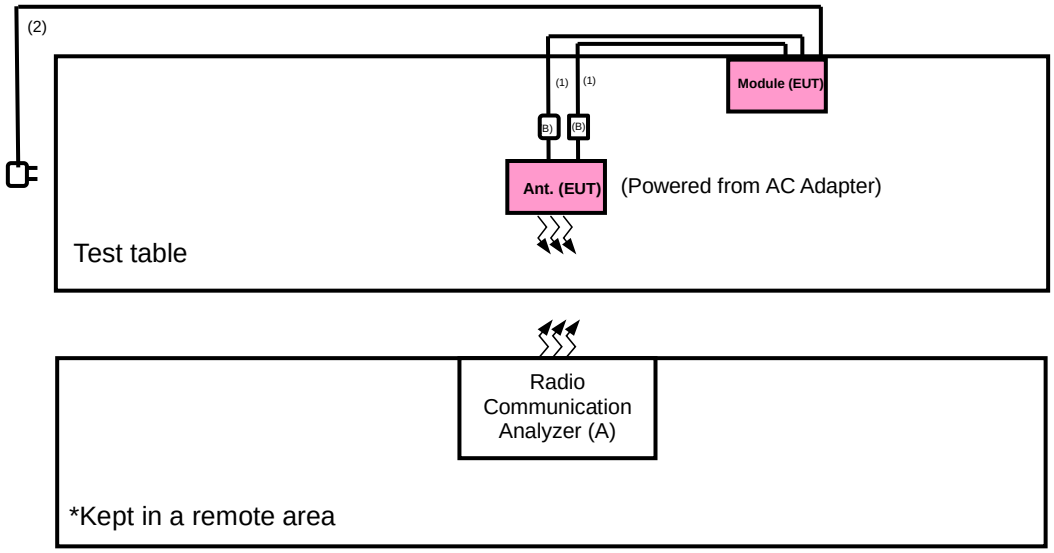
2. The original module supports LTE B2/4/5/12/13/14/25/26/66/71, when use this antenna, the module be disable B13/14/25/26/66/71 by using software, let the module only supports B2/4/5/12. And when use this antenna the power of band 2, 4 are reduced by using software, so retest LTE Band 2, 4 for all test item and recorded. In addition, the antenna gain and the MPE distance have both increased, so RF Exposure needs to be evaluated.
3. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	UBIQUITI	GP-A240-050G	I/P: 100-240 Vac, 50/60 Hz, 0.3 A O/P: 24 Vdc, 0.5 A

4. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
5. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test

<Radiated Emission Test> & <E.I.R.P. 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.

No.	Product	Brand	Model No.	Serial No.	FCC ID
A	Radio Communication Analyzer	Anritsu	MT8821C	6261786083	NA
B	SMA Adapter	N/A	N/A	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	SMA Ipex Cable: 0.3m x2
2.	RJ45 Cable: 10m

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. SMA Adapter and SMA Ipex Cable are provided by Lab.
3. The SMA Ipex cable is support units and Ipex clable loss is 0.8 dBm it was added back to the test results.

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 and antenna ports.

The EUT is designed to be positioned on the X-plane only.

LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	18700 to 19100	18900	20 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
-	Frequency Stability	18607 to 19193	18607, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18615, 19185	3 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18650, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 19125	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 19100	20 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	15 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Band Edge	18607 to 19193	18607	1.4 MHz	QPSK	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
			19193	1.4 MHz	QPSK	1 RB / 5 RB Offset
						6 RB / 0 RB Offset
		18615 to 19185	18615	3 MHz	QPSK	1 RB / 0 RB Offset
						15 RB / 0 RB Offset
			19185	3 MHz	QPSK	1 RB / 14 RB Offset
						15 RB / 0 RB Offset
		18625 to 19175	18625	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			19175	5 MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		18650 to 19150	18650	10 MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			19150	10 MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
		18675 to 19125	18675	15 MHz	QPSK	1 RB / 0 RB Offset
						75 RB / 0 RB Offset
			19125	15 MHz	QPSK	1 RB / 74 RB Offset
						75 RB / 0 RB Offset
		18700 to 19100	18700	20 MHz	QPSK	1 RB / 0 RB Offset
						100 RB / 0 RB Offset
			19100	20 MHz	QPSK	1 RB / 99 RB Offset
						100 RB / 0 RB Offset
-	Conducted	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset

	Emission	18615 to 19185	18615, 18900, 19185	3 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset

Note:

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation. Therefore, only EIRP, modulation characteristics, occupied bandwidth and peak to average ratio items had been tested under QPSK, 16QAM mode, the other items were performed under QPSK mode only.
2. For radiated emission above 1 GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.
3. For radiated emissions below 1 GHz, select the worst radiated emission channel for final testing.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26 deg. C, 58 % RH	120 Vac, 60 Hz	Greg Lin
Modulation Characteristics	26 deg. C, 58 % RH	120 Vac, 60 Hz	Tank Wu
Frequency Stability	26 deg. C, 58 % RH	120 Vac, 60 Hz	Tank Wu
Occupied Bandwidth	26 deg. C, 58 % RH	120 Vac, 60 Hz	Tank Wu
Band Edge	26 deg. C, 58 % RH	120 Vac, 60 Hz	Tank Wu
Peak to Average Ratio	26 deg. C, 58 % RH	120 Vac, 60 Hz	Tank Wu
Conducted Emission	26 deg. C, 58 % RH	120 Vac, 60 Hz	Tank Wu
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Greg Lin, Han Wu

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 24
ANSI 63.26-2015

NOTE: 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
ANSI/TIA/EIA-603-E 2016

NOTE: 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

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

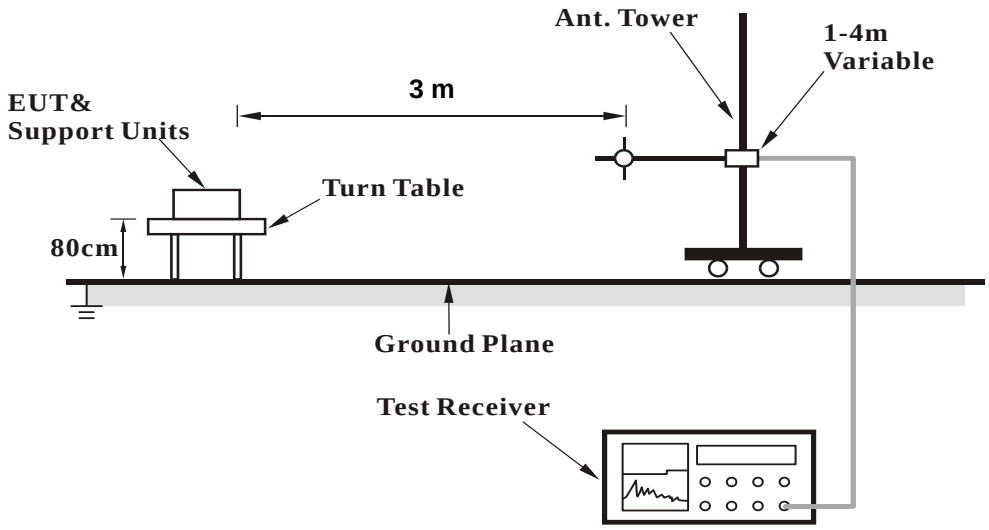
a. All measurements were done at low, middle and high operational frequency range. RBW is 1.4 MHz、5 MHz、10 MHz、15 MHz、 20 MHz for LTE mode, and VBW ≥ 3 x RBW.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15 dB.

Conducted Power Measurement:

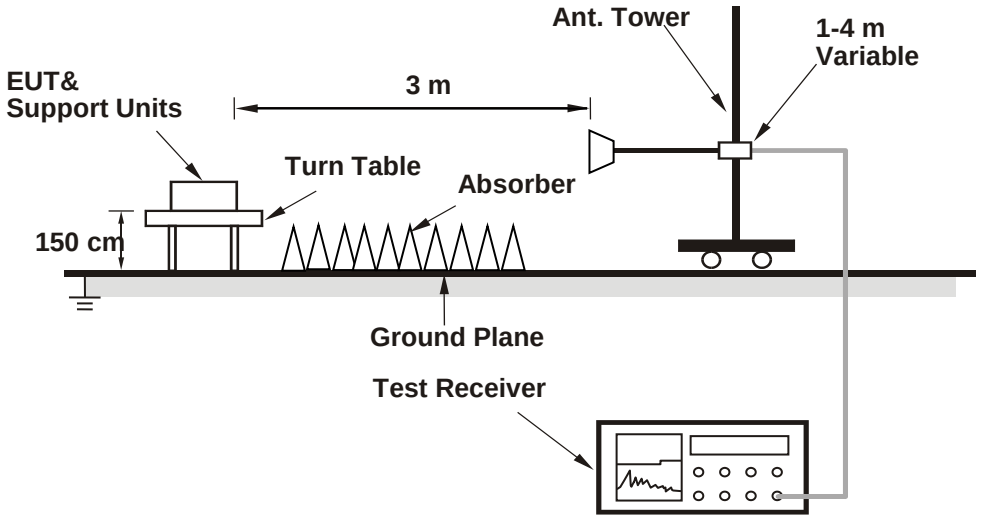
The EUT was set up for the maximum power with LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 Test Setup

EIRP / ERP Measurement:
<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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

Conducted Power Measurement:

4.1.4 Test Results

Conducted Output Power (dBm)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18607	18900	19193
		Frequency (MHz)		1850.7	1880	1909.3
1.4M	QPSK	1	0	15.06	15.22	15.00
		1	2	15.15	15.32	15.18
		1	5	15.22	15.20	15.07
		3	0	15.36	15.39	15.33
		3	1	15.40	15.38	15.39
		3	3	15.34	15.31	15.35
		6	0	15.28	**15.41**	15.40
	16QAM	1	0	14.68	14.71	14.79
		1	2	14.75	14.78	14.77
		1	5	14.62	14.80	14.78
		3	0	14.86	14.62	14.68
		3	1	14.90	14.74	14.90
		3	3	**15.03**	14.83	14.63
		6	0	14.63	14.76	14.97

LTE Band 2						
BW	MCS Index	Channel		18615	18900	19185
		Frequency (MHz)		1851.5	1880	1908.5
3M	QPSK	1	0	15.15	15.39	15.36
		1	7	15.36	15.32	**15.65**
		1	14	15.14	15.22	15.14
		8	0	15.22	15.46	15.35
		8	3	15.28	15.37	15.30
		8	7	15.27	15.48	15.33
		15	0	15.38	15.35	15.25
	16QAM	1	0	14.72	14.93	14.84
		1	7	14.82	14.71	14.93
		1	14	14.59	14.85	14.82
		8	0	14.72	14.98	14.78
		8	3	14.95	14.80	14.64
		8	7	**15.04**	14.94	14.95
		15	0	14.94	14.97	14.83

LTE Band 2						
BW	MCS Index	Channel		18625	18900	19175
		Frequency (MHz)		1852.5	1880	1907.5
5M	QPSK	1	0	15.15	15.24	15.39
		1	12	15.09	15.46	**15.80**
		1	24	15.11	15.30	15.21
		12	0	15.27	15.45	15.34
		12	6	15.39	15.37	15.37
		12	13	15.15	15.34	15.17
		25	0	15.21	15.35	15.36
	16QAM	1	0	14.65	14.96	15.01
		1	12	15.07	15.10	15.11
		1	24	14.64	14.64	14.66
		12	0	14.76	15.01	14.99
		12	6	15.04	15.00	**15.13**
		12	13	14.71	15.06	14.68
		25	0	14.79	14.86	14.72

LTE Band 2						
BW	MCS Index	Channel		18650	18900	19150
		Frequency (MHz)		1855	1880	1905
10M	QPSK	1	0	15.29	15.49	15.32
		1	24	15.41	15.63	15.41
		1	49	15.29	15.18	15.19
		25	0	15.30	**15.64**	15.43
		25	12	15.24	15.40	15.51
		25	25	15.43	15.47	15.43
		50	0	15.35	15.43	15.41
	16QAM	1	0	14.90	14.98	14.79
		1	24	15.04	**15.27**	15.02
		1	49	14.80	14.84	14.95
		25	0	14.95	15.03	15.09
		25	12	14.77	15.04	15.12
		25	25	14.82	15.22	14.73
		50	0	14.95	14.99	14.96

LTE Band 2						
BW	MCS Index	Channel		18675	18900	19125
		Frequency (MHz)		1857.5	1880	1902.5
15M	QPSK	1	0	15.20	15.25	15.13
		1	37	15.53	**16.02**	15.19
		1	74	15.20	15.11	15.28
		36	0	15.32	15.62	15.47
		36	19	15.31	15.37	15.44
		36	39	15.49	15.44	15.30
		75	0	15.40	15.46	15.42
	16QAM	1	0	14.87	14.68	14.58
		1	37	15.00	15.12	14.98
		1	74	14.55	14.84	14.95
		36	0	14.95	15.02	14.94
		36	19	15.06	14.83	14.76
		36	39	**15.13**	14.74	14.68
		75	0	15.06	14.75	14.78

LTE Band 2						
BW	MCS Index	Channel		18700	18900	19100
		Frequency (MHz)		1860	1880	1900
20M	QPSK	1	0	15.67	**16.00**	15.91
		1	50	15.27	15.43	15.64
		1	99	15.23	15.16	14.97
		50	0	15.45	15.57	15.48
		50	25	15.70	15.52	15.56
		50	50	15.39	15.52	15.39
		100	0	15.43	15.54	15.46
	16QAM	1	0	15.01	**15.54**	15.40
		1	50	14.74	14.90	14.96
		1	99	14.57	14.59	14.37
		50	0	14.98	14.87	14.86
		50	25	15.10	14.82	14.93
		50	50	14.72	14.85	14.81
		100	0	14.87	14.98	14.85

EIRP Power (dBm)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18607	18900	19193
		Frequency (MHz)		1850.7	1880	1909.3
1.4M	QPSK	1	0	31.96	32.12	31.90
		1	2	32.05	32.22	32.08
		1	5	32.12	32.10	31.97
		3	0	32.26	32.29	32.23
		3	1	32.30	32.28	32.29
		3	3	32.24	32.21	32.25
		6	0	32.18	**32.31**	32.30
	16QAM	1	0	31.58	31.61	31.69
		1	2	31.65	31.68	31.67
		1	5	31.52	31.70	31.68
		3	0	31.76	31.52	31.58
		3	1	31.80	31.64	31.80
		3	3	**31.93**	31.73	31.53
		6	0	31.53	31.66	31.87

LTE Band 2						
BW	MCS Index	Channel		18615	18900	19185
		Frequency (MHz)		1851.5	1880	1908.5
3M	QPSK	1	0	32.05	32.29	32.26
		1	7	32.26	32.22	**32.55**
		1	14	32.04	32.12	32.04
		8	0	32.12	32.36	32.25
		8	3	32.18	32.27	32.20
		8	7	32.17	32.38	32.23
		15	0	32.28	32.25	32.15
	16QAM	1	0	31.62	31.83	31.74
		1	7	31.72	31.61	31.83
		1	14	31.49	31.75	31.72
		8	0	31.62	31.88	31.68
		8	3	31.85	31.70	31.54
		8	7	**31.94**	31.84	31.85
		15	0	31.84	31.87	31.73

*EIRP = Conducted + antenna gain (16.9dBi)

LTE Band 2						
BW	MCS Index	Channel		18625	18900	19175
		Frequency (MHz)		1852.5	1880	1907.5
5M	QPSK	1	0	32.05	32.14	32.29
		1	12	31.99	32.36	**32.70**
		1	24	32.01	32.20	32.11
		12	0	32.17	32.35	32.24
		12	6	32.29	32.27	32.27
		12	13	32.05	32.24	32.07
		25	0	32.11	32.25	32.26
	16QAM	1	0	31.55	31.86	31.91
		1	12	31.97	32.00	32.01
		1	24	31.54	31.54	31.56
		12	0	31.66	31.91	31.89
		12	6	31.94	31.90	**32.03**
		12	13	31.61	31.96	31.58
		25	0	31.69	31.76	31.62

LTE Band 2						
BW	MCS Index	Channel		18650	18900	19150
		Frequency (MHz)		1855	1880	1905
10M	QPSK	1	0	32.19	32.39	32.22
		1	24	32.31	32.53	32.31
		1	49	32.19	32.08	32.09
		25	0	32.20	**32.54**	32.33
		25	12	32.14	32.30	32.41
		25	25	32.33	32.37	32.33
		50	0	32.25	32.33	32.31
	16QAM	1	0	31.80	31.88	31.69
		1	24	31.94	**32.17**	31.92
		1	49	31.70	31.74	31.85
		25	0	31.85	31.93	31.99
		25	12	31.67	31.94	32.02
		25	25	31.72	32.12	31.63
		50	0	31.85	31.89	31.86

*EIRP = Conducted + antenna gain (16.9dBi)

LTE Band 2						
BW	MCS Index	Channel		18675	18900	19125
		Frequency (MHz)		1857.5	1880	1902.5
15M	QPSK	1	0	32.10	32.15	32.03
		1	37	32.43	**32.92**	32.09
		1	74	32.10	32.01	32.18
		36	0	32.22	32.52	32.37
		36	19	32.21	32.27	32.34
		36	39	32.39	32.34	32.20
		75	0	32.30	32.36	32.32
	16QAM	1	0	31.77	31.58	31.48
		1	37	31.90	32.02	31.88
		1	74	31.45	31.74	31.85
		36	0	31.85	31.92	31.84
		36	19	31.96	31.73	31.66
		36	39	**32.03**	31.64	31.58
		75	0	31.96	31.65	31.68

LTE Band 2						
BW	MCS Index	Channel		18700	18900	19100
		Frequency (MHz)		1860	1880	1900
20M	QPSK	1	0	32.57	**32.90**	32.81
		1	50	32.17	32.33	32.54
		1	99	32.13	32.06	31.87
		50	0	32.35	32.47	32.38
		50	25	32.60	32.42	32.46
		50	50	32.29	32.42	32.29
		100	0	32.33	32.44	32.36
	16QAM	1	0	31.91	**32.44**	32.30
		1	50	31.64	31.80	31.86
		1	99	31.47	31.49	31.27
		50	0	31.88	31.77	31.76
		50	25	32.00	31.72	31.83
		50	50	31.62	31.75	31.71
		100	0	31.77	31.88	31.75

*EIRP = Conducted + antenna gain (16.9dBi)

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

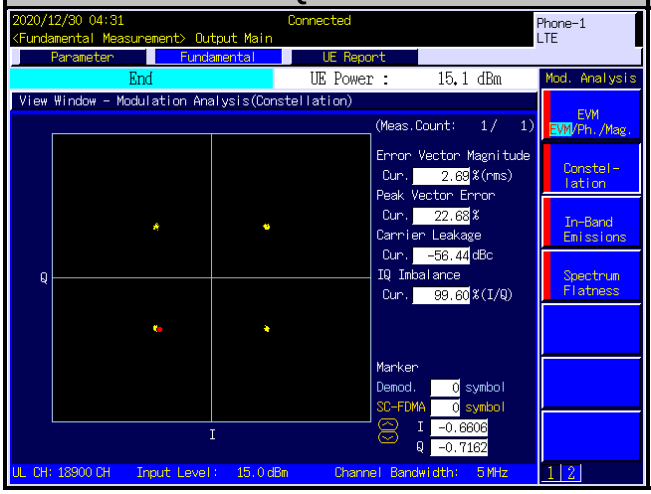
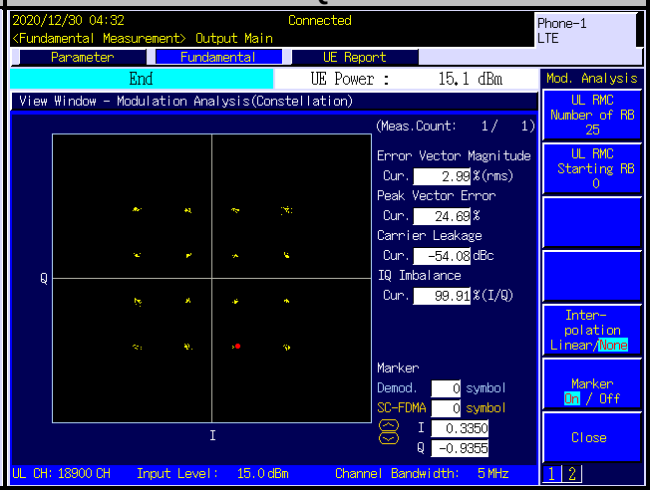
N/A

4.2.2 Test Setup

4.2.3 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.

4.2.4 Test Results

Spectrum Plot of Measurement	
LTE Band 2	
Channel 18900	
QPSK	16QAM
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

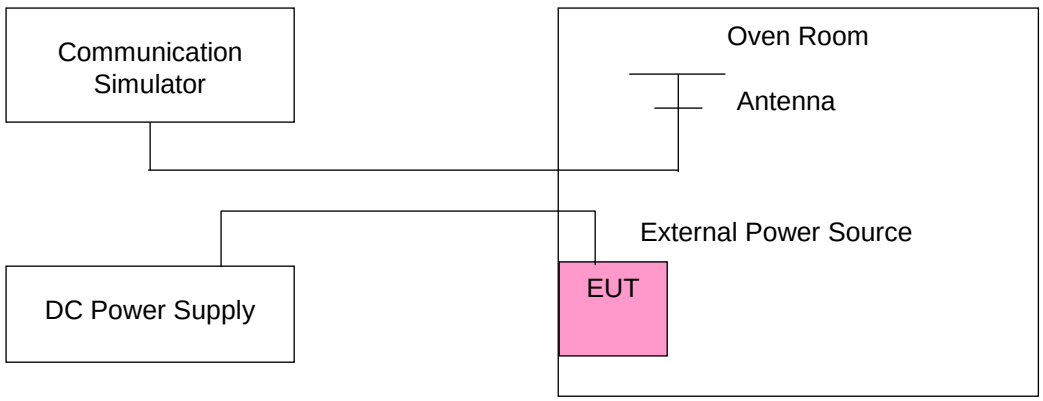
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
138	1850.700004	0.002	1909.300000	0.002
120	1850.700001	0.001	1909.300003	0.002
102	1850.700004	0.002	1909.300002	0.001

Note: The applicant defined the normal working voltage of the adapter is from 138 Vdc to 102 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-10	1850.700002	0.001	1909.300002	0.001
0	1850.700002	0.001	1909.300003	0.002
10	1850.699998	-0.001	1909.299996	-0.002
20	1850.699998	-0.001	1909.299999	-0.001
30	1850.699996	-0.002	1909.299997	-0.002
40	1850.699999	-0.001	1909.299998	-0.001
50	1850.699997	-0.002	1909.299998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
138	1851.500002	0.001	1908.500002	0.001
120	1851.500004	0.002	1908.500001	0.001
102	1851.500003	0.002	1908.500002	0.001

Note: The applicant defined the normal working voltage of the adapter is from 138 Vdc to 102 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-10	1851.500003	0.001	1908.500003	0.002
0	1851.500002	0.001	1908.500004	0.002
10	1851.499997	-0.001	1908.499999	-0.001
20	1851.499998	-0.001	1908.499999	-0.001
30	1851.499996	-0.002	1908.499997	-0.002
40	1851.499997	-0.001	1908.499997	-0.001
50	1851.499997	-0.002	1908.499998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
138	1852.500002	0.001	1907.500002	0.001
120	1852.500004	0.002	1907.500001	0.001
102	1852.500004	0.002	1907.500003	0.002

Note: The applicant defined the normal working voltage of the adapter is from 138 Vdc to 102 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-10	1852.500004	0.002	1907.500004	0.002
0	1852.500004	0.002	1907.500003	0.001
10	1852.499998	-0.001	1907.499998	-0.001
20	1852.499997	-0.002	1907.499998	-0.001
30	1852.499996	-0.002	1907.499997	-0.001
40	1852.499997	-0.002	1907.499998	-0.001
50	1852.499996	-0.002	1907.499996	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
138	1855.000001	0.001	1905.000004	0.002
120	1855.000002	0.001	1905.000002	0.001
102	1855.000001	0.001	1905.000003	0.002

Note: The applicant defined the normal working voltage of the adapter is from 138 Vdc to 102 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-10	1855.000002	0.001	1905.000003	0.002
0	1855.000003	0.002	1905.000002	0.001
10	1854.999997	-0.001	1904.999998	-0.001
20	1854.999998	-0.001	1904.999996	-0.002
30	1854.999997	-0.001	1904.999997	-0.001
40	1854.999998	-0.001	1904.999996	-0.002
50	1854.999996	-0.002	1904.999999	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
138	1857.500001	0.001	1902.500003	0.002
120	1857.500002	0.001	1902.500003	0.002
102	1857.500003	0.001	1902.500003	0.001

Note: The applicant defined the normal working voltage of the adapter is from 138 Vdc to 102 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-10	1857.500003	0.002	1902.500002	0.001
0	1857.500004	0.002	1902.500003	0.001
10	1857.499997	-0.002	1902.499998	-0.001
20	1857.499999	-0.001	1902.499998	-0.001
30	1857.499996	-0.002	1902.499999	-0.001
40	1857.499997	-0.001	1902.499997	-0.001
50	1857.499999	-0.001	1902.499998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
138	1860.000003	0.002	1900.000003	0.001
120	1860.000004	0.002	1900.000003	0.002
102	1860.000003	0.002	1900.000001	0.001

Note: The applicant defined the normal working voltage of the adapter is from 138 Vdc to 102 Vdc.

Frequency Error vs. Temperature

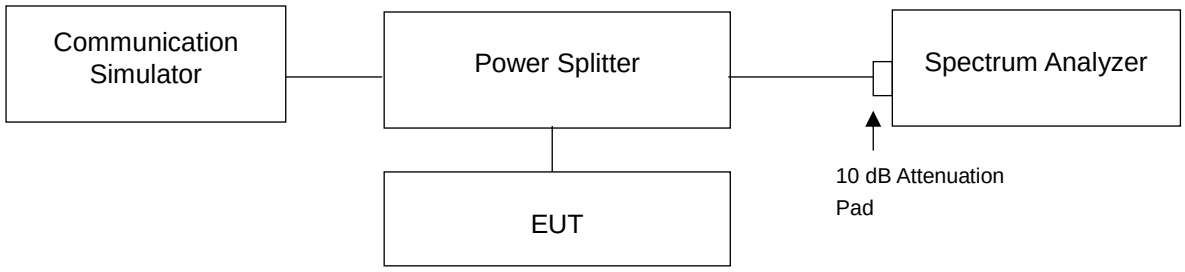
Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-10	1860.000002	0.001	1900.000004	0.002
0	1860.000001	0.001	1900.000002	0.001
10	1859.999998	-0.001	1899.999996	-0.002
20	1859.999999	-0.001	1899.999999	-0.001
30	1859.999999	-0.001	1899.999999	-0.001
40	1859.999998	-0.001	1899.999999	-0.001
50	1859.999998	-0.001	1899.999996	-0.002

4.4 Occupied Bandwidth Measurement

4.4.1 Test Procedure

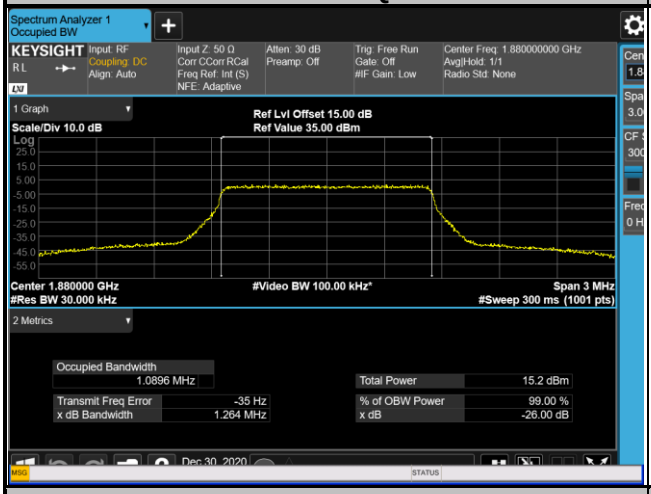
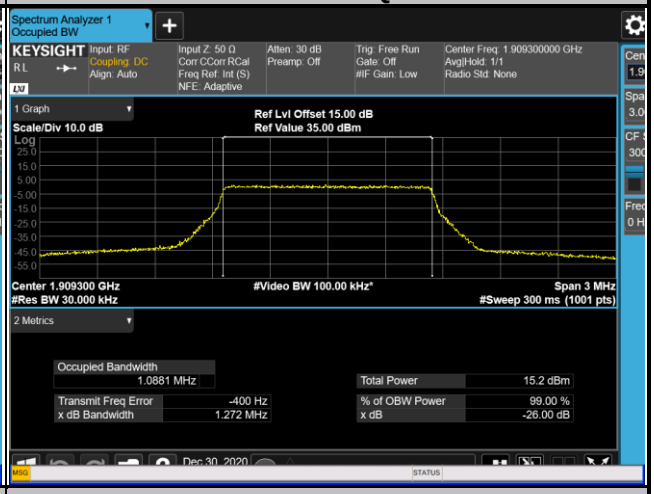
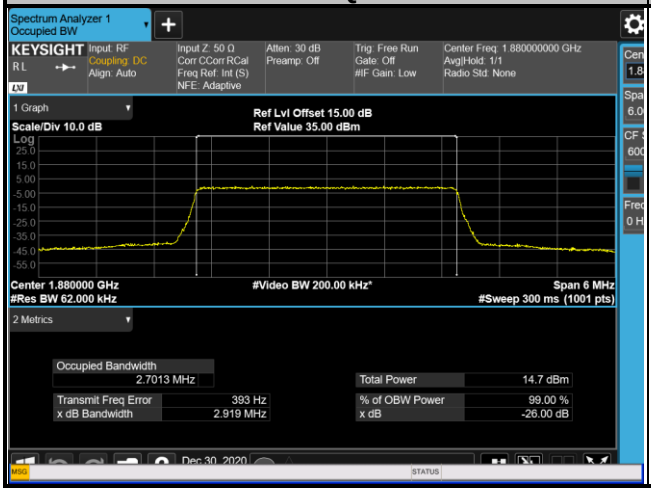
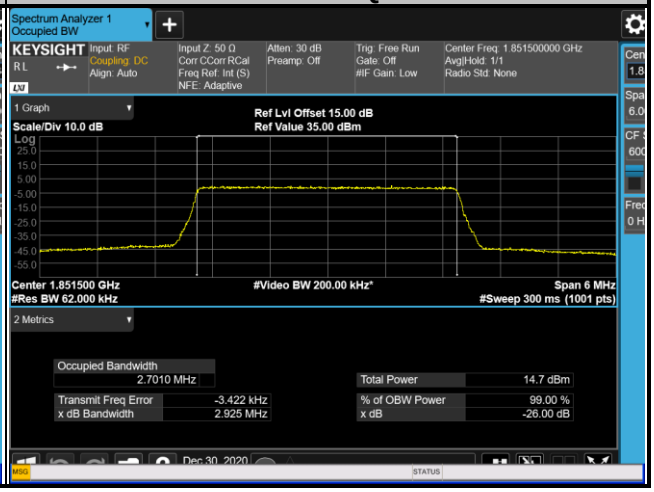
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function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

4.4.2 Test Setup

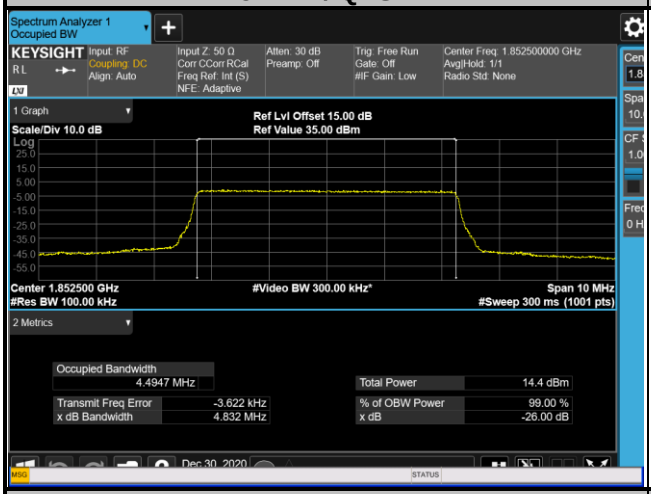
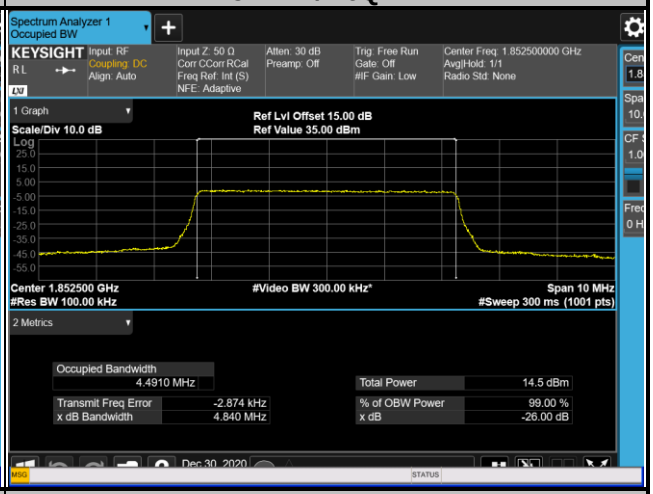
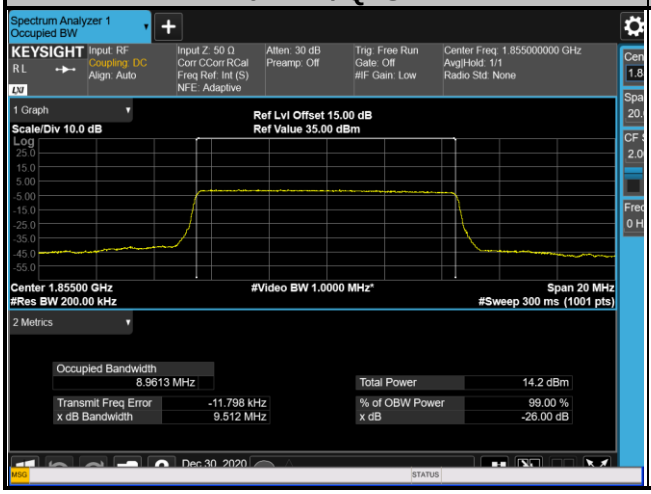
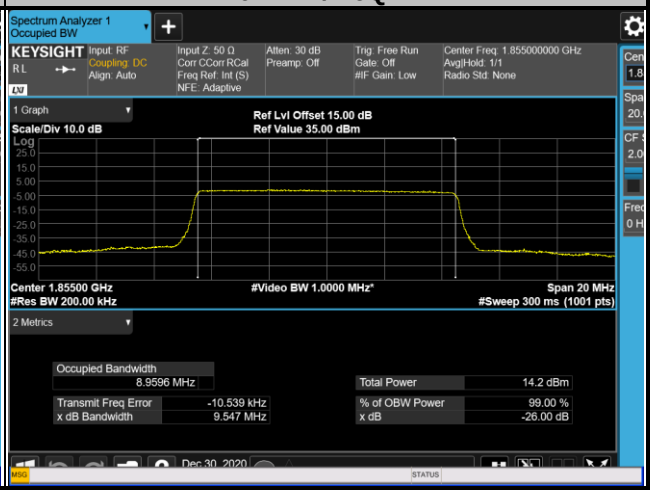


4.4.3 Test Result

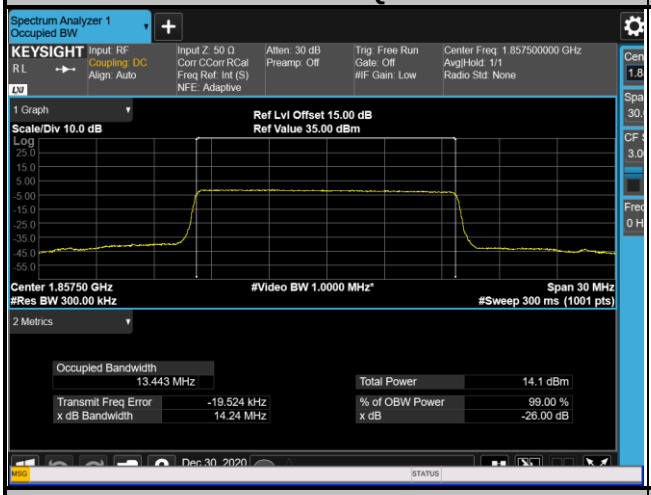
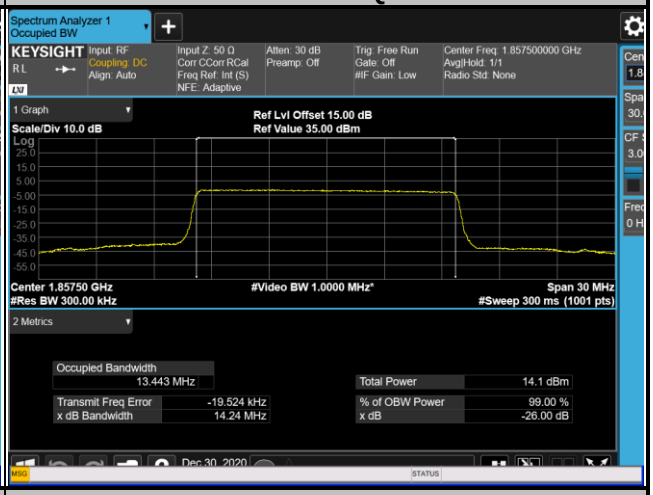
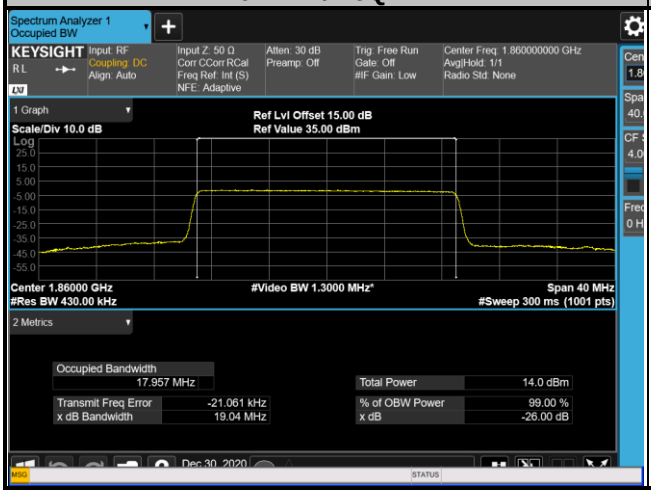
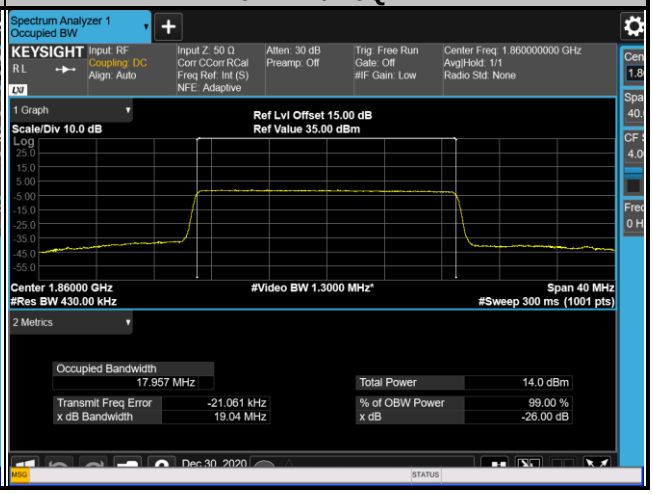
LTE Band 2					
Channel Bandwidth: 1.4 MHz					
Channel	**Frequency (MHz)**	**99 % Occupied Bandwidth (MHz)**		**26 dB Bandwidth (MHz)**	
		QPSK	**16QAM**	**QPSK**	**16QAM**
18607	1850.7	1.09	1.09	1.25	1.26
18900	1880.0	1.09	1.09	1.26	1.26
19193	1909.3	1.09	1.09	1.26	1.27
Channel Bandwidth: 3 MHz					
Channel	**Frequency (MHz)**	**99 % Occupied Bandwidth (MHz)**		**26 dB Bandwidth (MHz)**	
		QPSK	**16QAM**	**QPSK**	**16QAM**
18615	1851.5	2.70	2.70	2.92	2.93
18900	1880.0	2.70	2.70	2.92	2.92
19185	1908.5	2.70	2.70	2.92	2.92

Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	**26 dB Bandwidth**
1.4 MHz / 16QAM	**1.4 MHz / 16QAM**
	
3 MHz / QPSK	**3 MHz / 16QAM**
	

LTE Band 2					
Channel Bandwidth: 5 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18625	1852.5	4.49	4.49	4.83	4.84
18900	1880.0	4.49	4.49	4.80	4.84
19175	1907.5	4.48	4.49	4.80	4.82
Channel Bandwidth: 10 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18650	1855.0	8.96	8.96	9.51	9.55
18900	1880.0	8.94	8.95	9.50	9.53
19150	1905.0	8.92	8.92	9.48	9.49

Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
5 MHz / QPSK	5 MHz / 16QAM
	
10 MHz / QPSK	10 MHz / 16QAM
	

LTE Band 2					
Channel Bandwidth: 15 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18675	1857.5	13.44	13.44	14.23	14.24
18900	1880.0	13.40	13.39	14.21	14.21
19125	1902.5	13.39	13.40	14.19	14.19
Channel Bandwidth: 20 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18700	1860.0	17.96	17.96	19.03	19.04
18900	1880.0	17.82	17.83	18.96	18.97
19100	1900.0	17.92	17.91	18.99	18.99

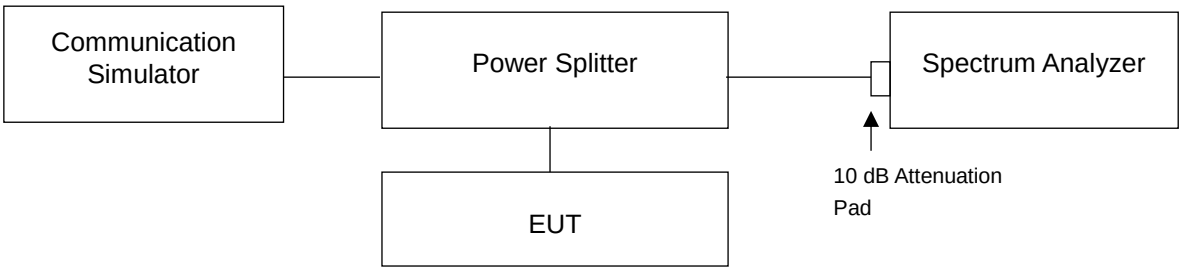
Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
15 MHz / 16QAM	15 MHz / 16QAM
	
20 MHz / 16QAM	20 MHz / 16QAM
	

4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

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.

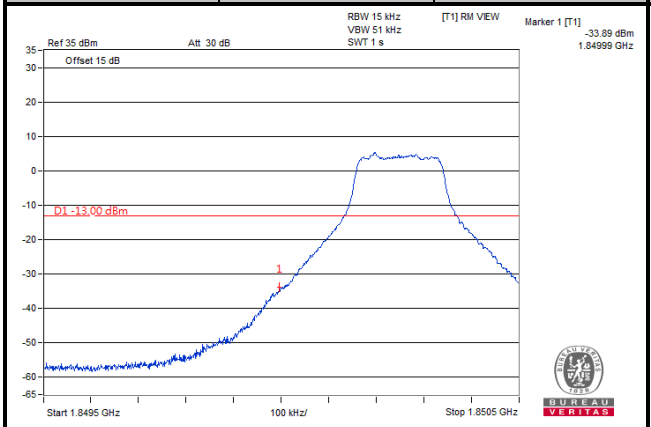
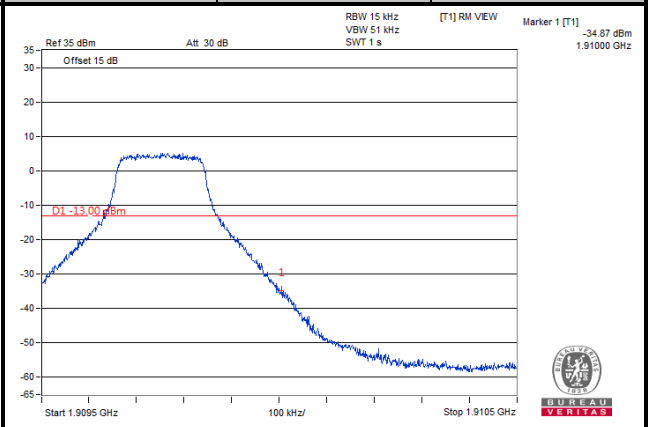
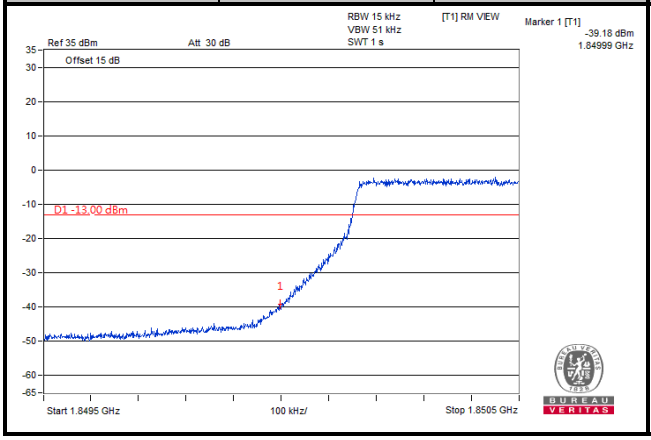
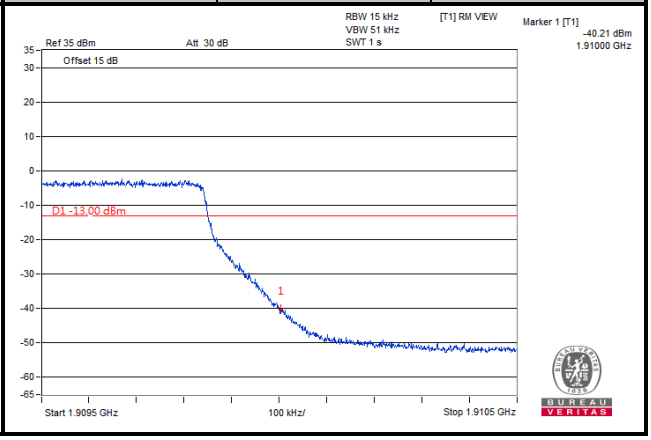
4.5.2 Test Setup

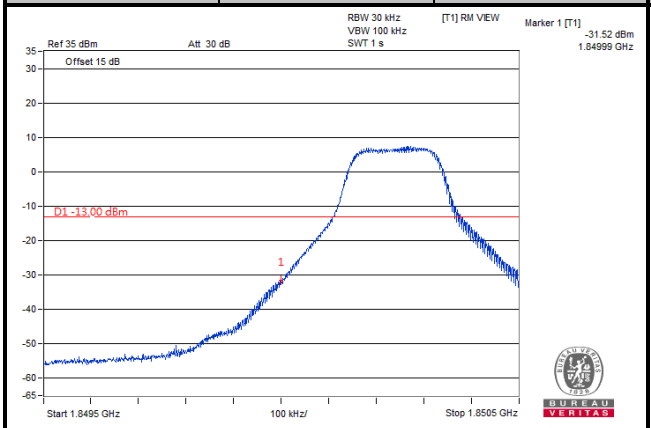
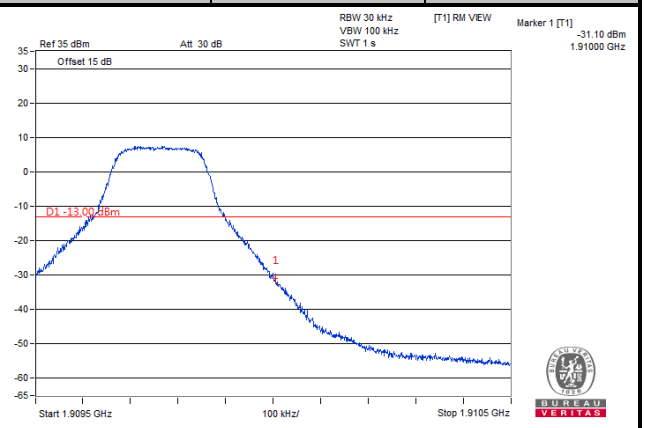
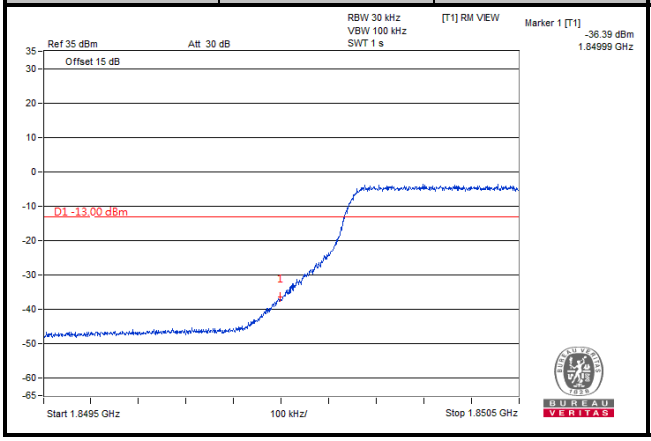
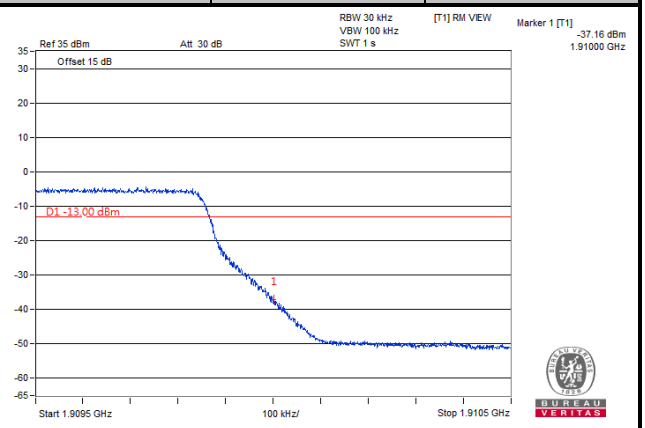


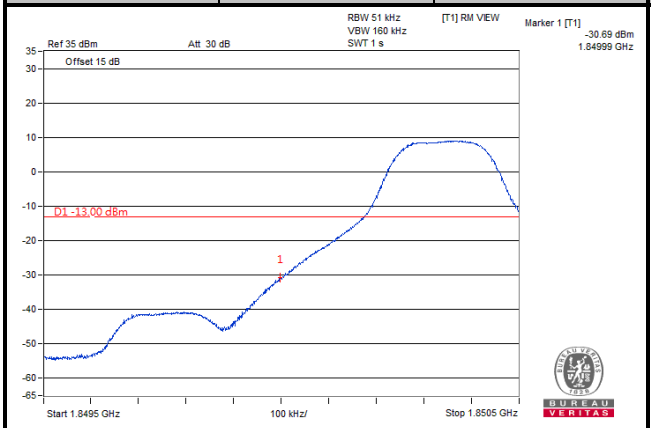
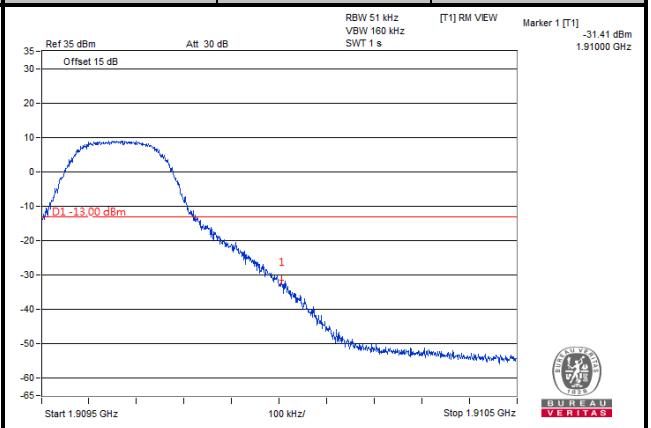
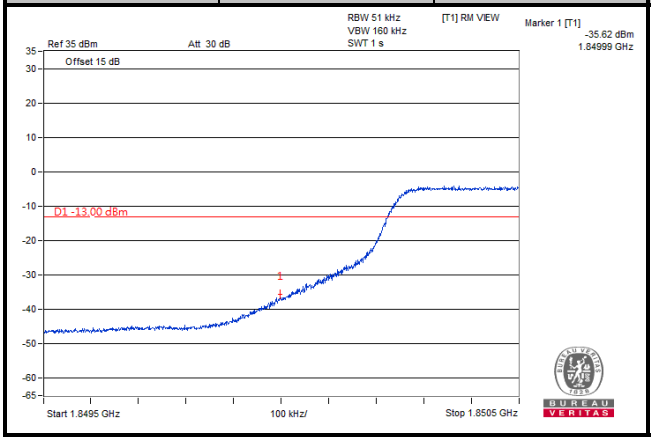
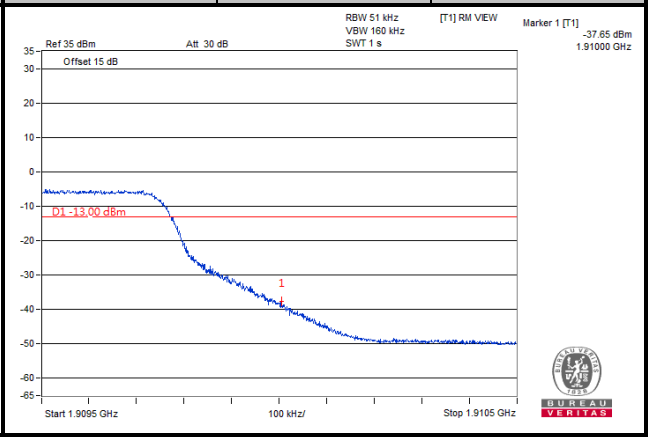
4.5.3 Test Procedures

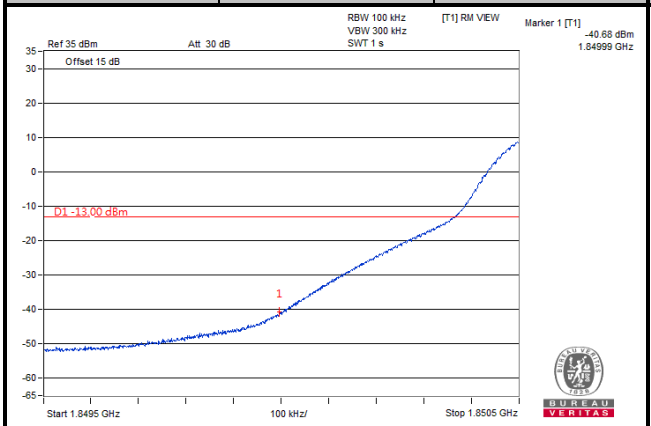
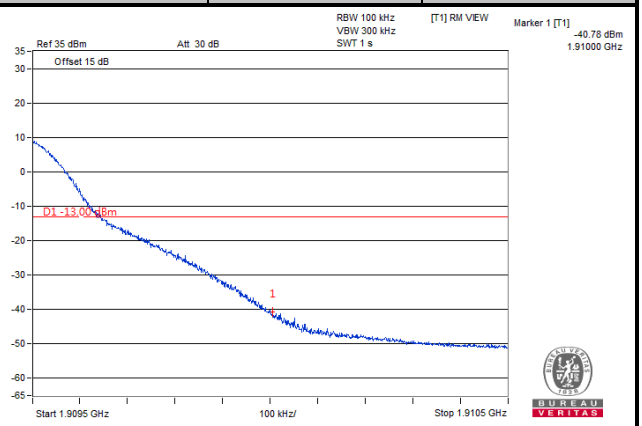
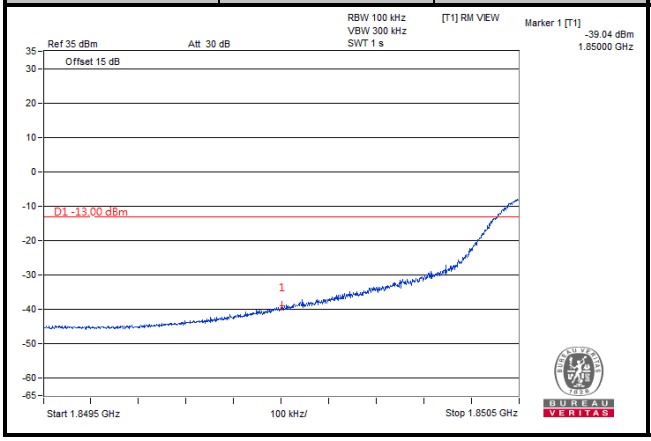
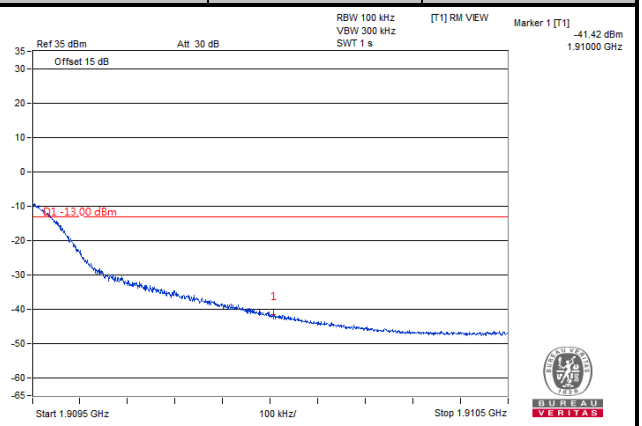
a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 15 kHz and VB of the spectrum is 51 kHz (LTE Bandwidth 1.4 MHz).
c. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 3 MHz).
d. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 51 kHz and VB of the spectrum is 160 kHz (LTE Bandwidth 5 MHz).
e. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 10 MHz).
f. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 150 kHz and VB of the spectrum is 470 kHz (LTE Bandwidth 15 MHz).
g. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 200 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 20 MHz).
h. Record the max trace plot into the test report.

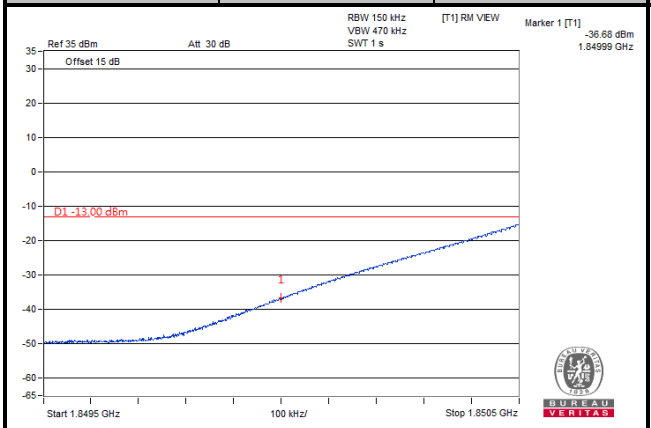
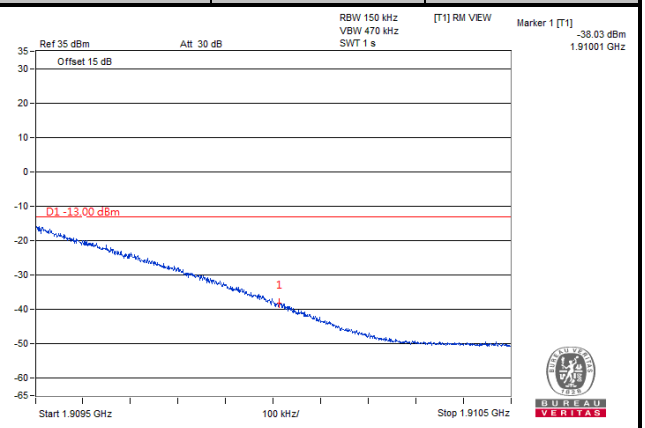
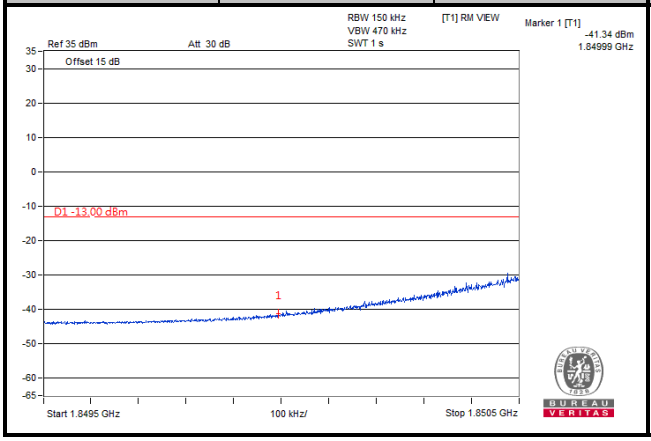
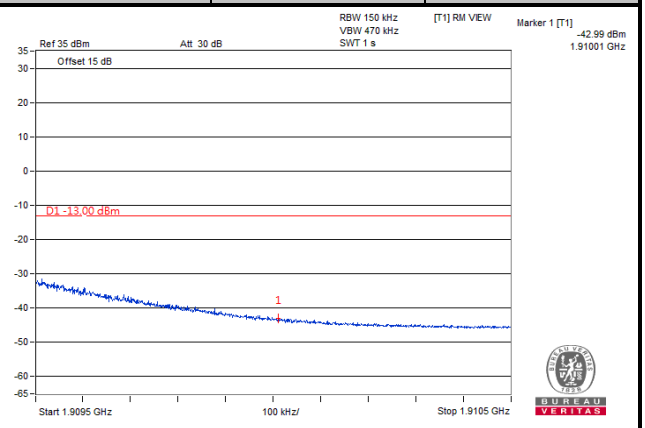
4.5.4 Test Results

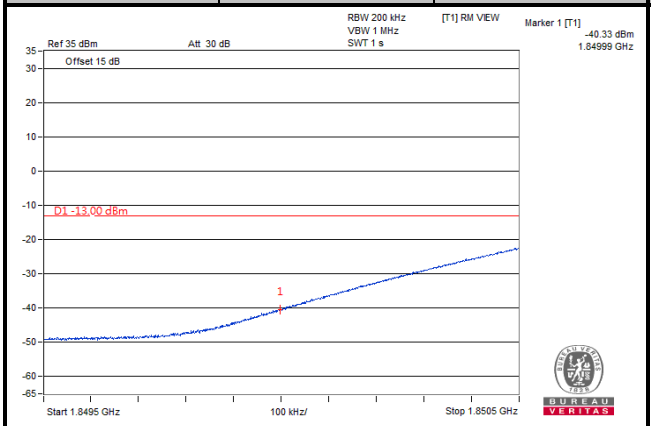
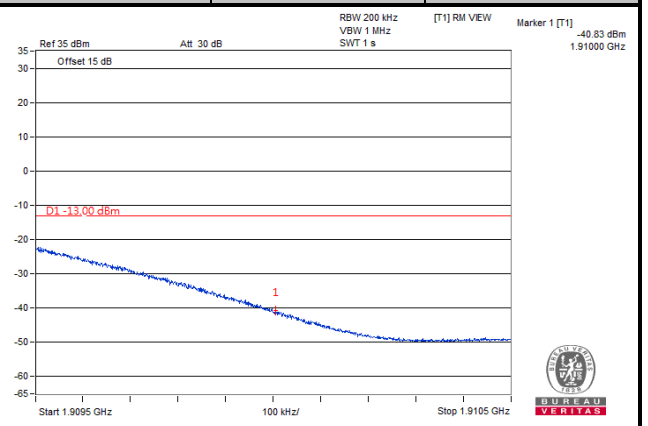
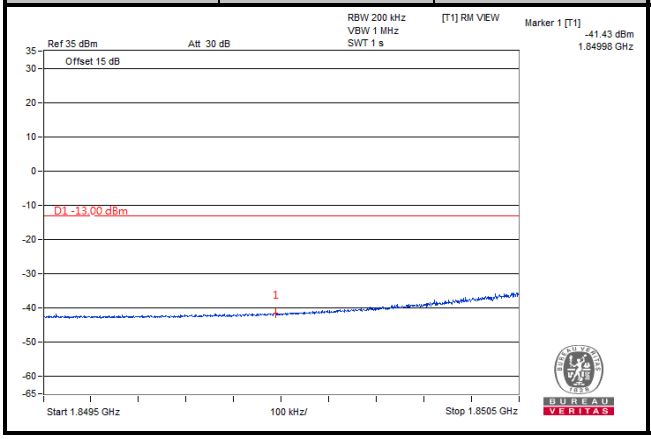
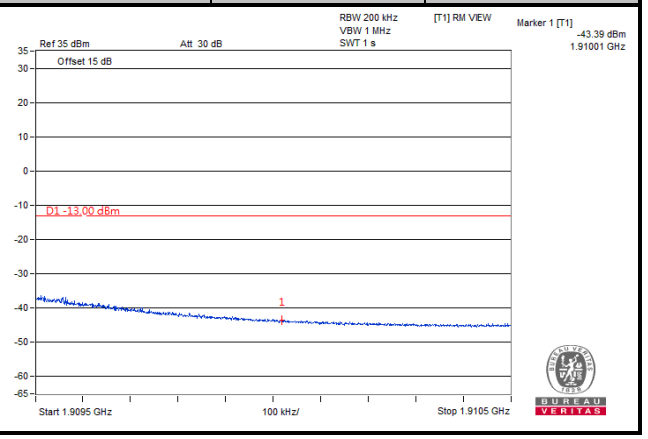
LTE Band 2					
Channel Bandwidth: 1.4 MHz					
Channel	18607	1 RB	Channel	19193	1 RB
					
Channel	18607	6 RB	Channel	19193	6 RB
					

LTE Band 2					
Channel Bandwidth: 3 MHz					
Channel	18615	1 RB	Channel	19185	1 RB
					
Channel	18615	15 RB	Channel	19185	15 RB
					

LTE Band 2					
Channel Bandwidth: 5 MHz					
Channel	18625	1 RB	Channel	19175	1 RB
					
Channel	18625	25 RB	Channel	19175	25 RB
					

LTE Band 2					
Channel Bandwidth: 10 MHz					
Channel	18650	1 RB	Channel	19150	1 RB
					
Channel	18650	50 RB	Channel	19150	50 RB
					

LTE Band 2					
Channel Bandwidth: 15 MHz					
Channel	18675	1 RB	Channel	19125	1 RB
					
Channel	18675	75 RB	Channel	19125	75 RB
					

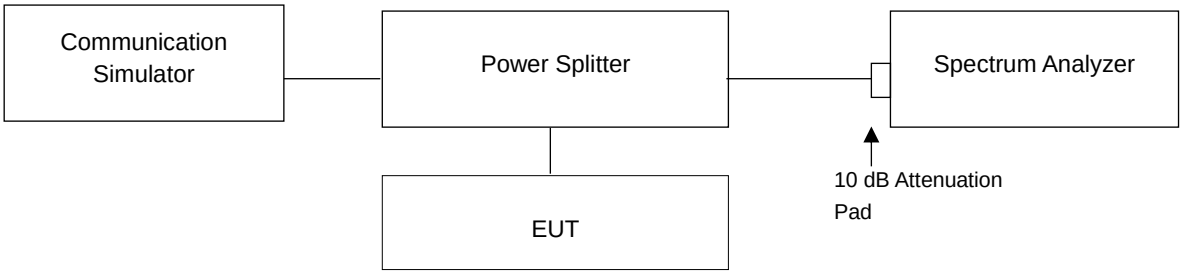
LTE Band 2					
Channel Bandwidth: 20 MHz					
Channel	18700	1 RB	Channel	19100	1 RB
					
Channel	18700	100 RB	Channel	19100	100 RB
					

4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.6.2 Test Setup



4.6.3 Test Procedures

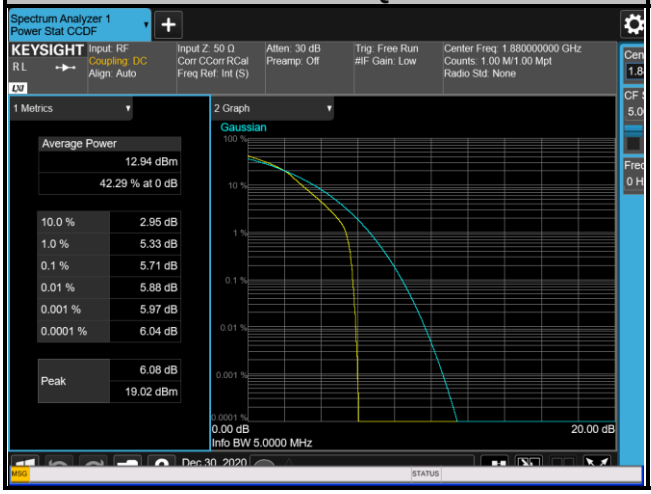
1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.6.4 Test Results

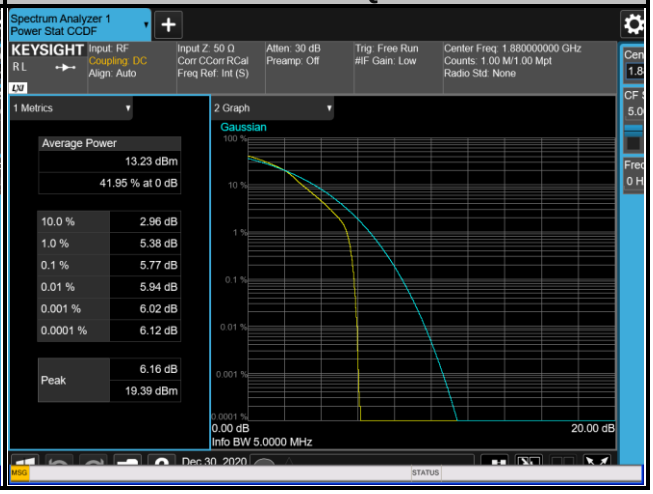
LTE Band 2							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	4.90	5.62	18615	1851.5	4.91	5.64
18900	1880.0	4.98	5.71	18900	1880.0	5.01	5.77
19193	1909.3	4.82	5.55	19185	1908.5	4.88	5.62

Spectrum Plot of Worst Value

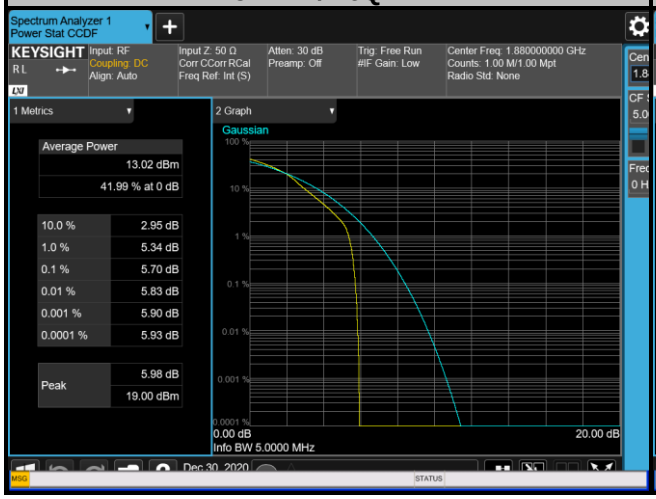
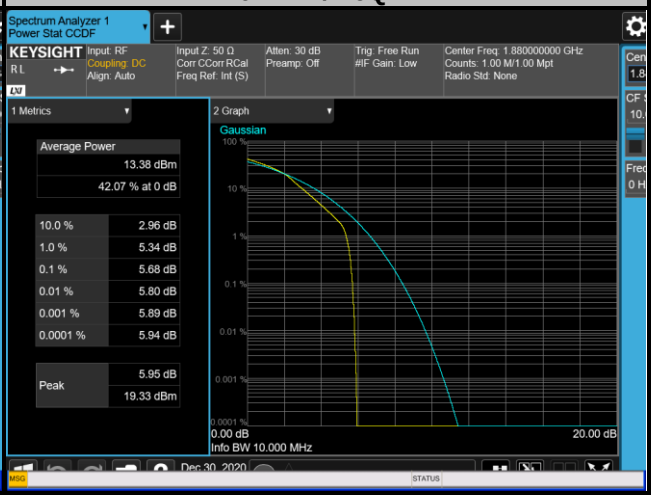
1.4 MHz / 16QAM



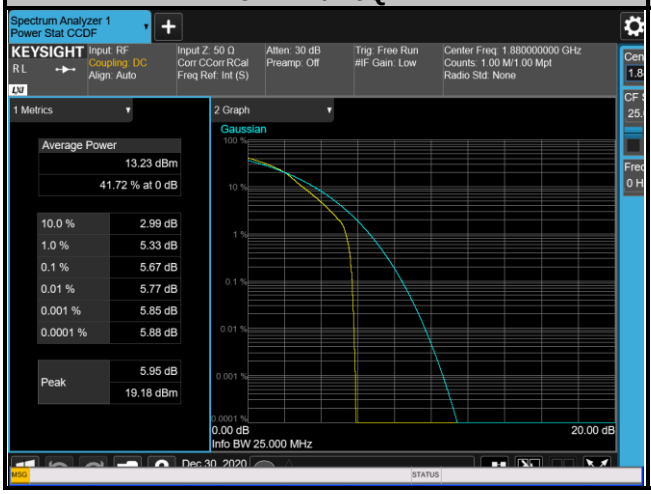
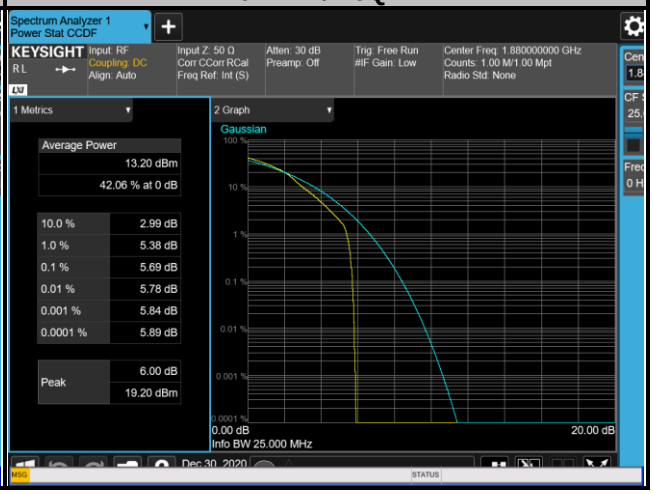
3 MHz / 16QAM



LTE Band 2							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	4.83	5.57	18650	1855.0	4.80	5.59
18900	1880.0	4.93	5.70	18900	1880.0	4.95	5.68
19175	1907.5	4.86	5.62	19150	1905.0	4.89	5.66

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

LTE Band 2							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	4.78	5.53	18700	1860.0	4.78	5.52
18900	1880.0	4.93	5.67	18900	1880.0	4.91	5.69
19125	1902.5	4.81	5.60	19100	1900.0	4.76	5.50

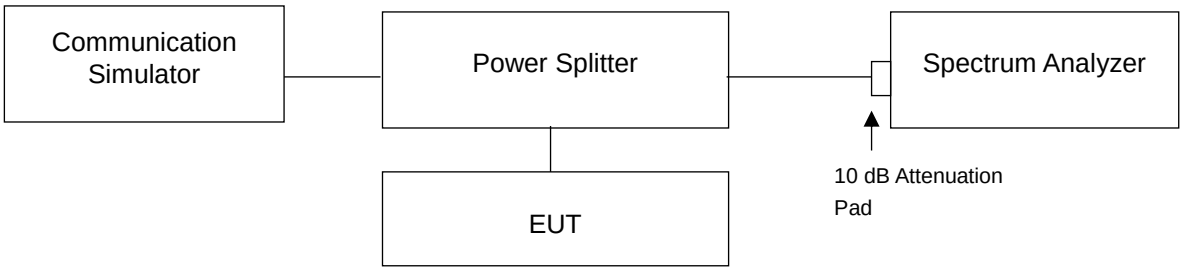
Spectrum Plot of Worst Value	
15 MHz / 16QAM	20 MHz / 16QAM
	

4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

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

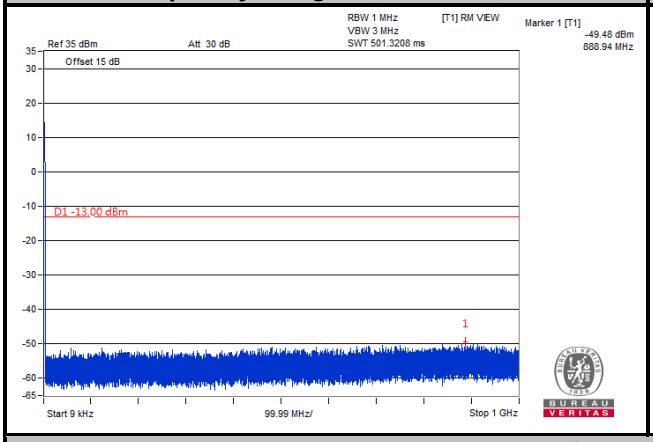
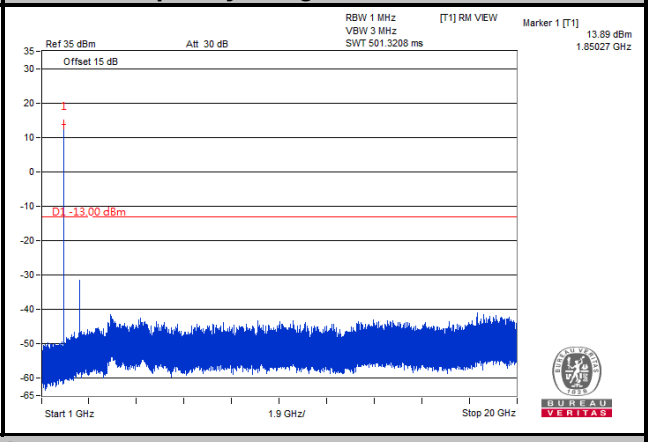
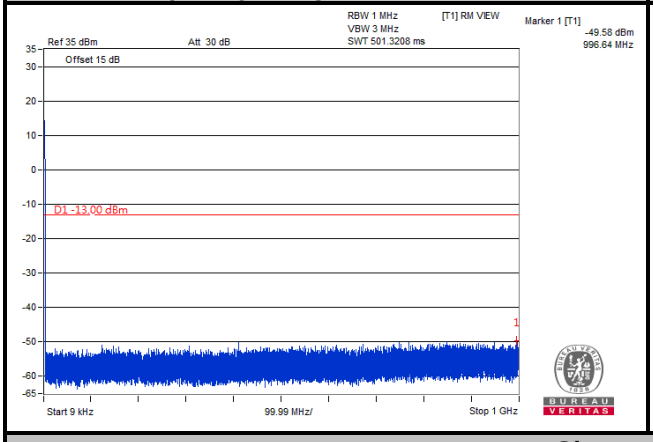
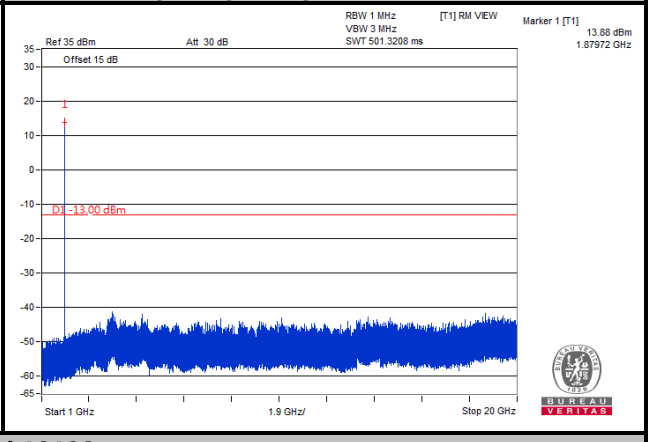
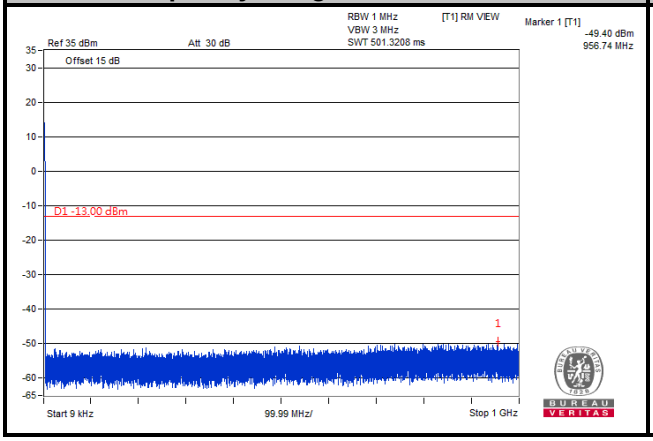
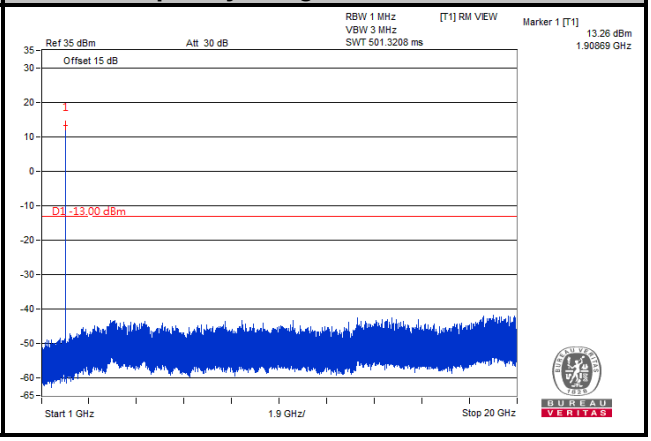
4.7.2 Test Setup



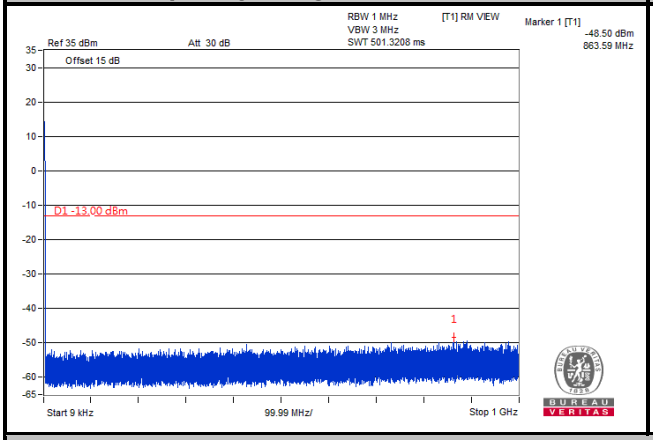
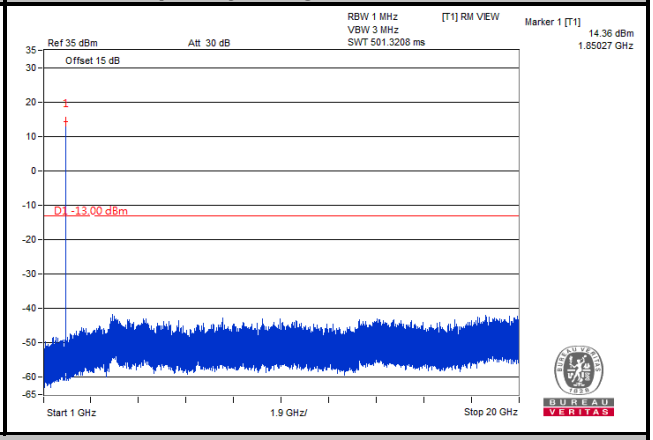
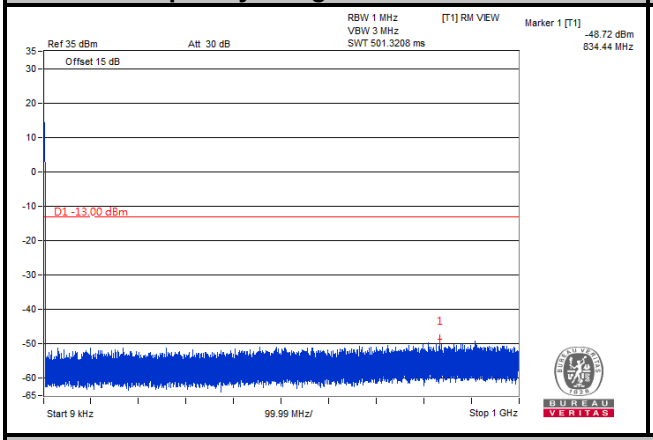
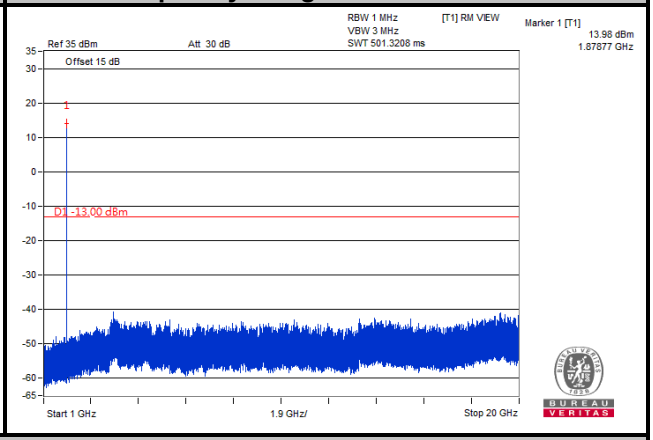
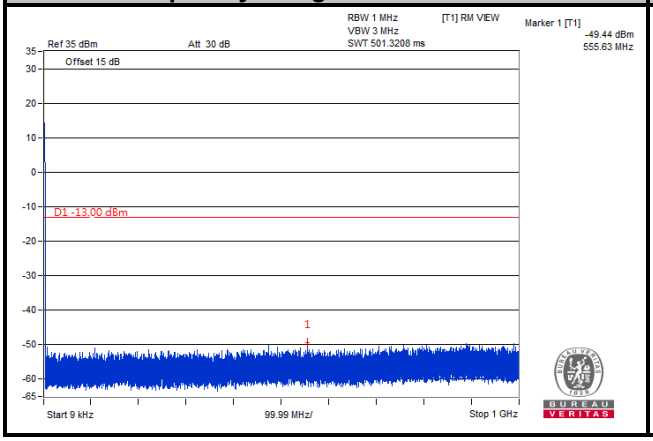
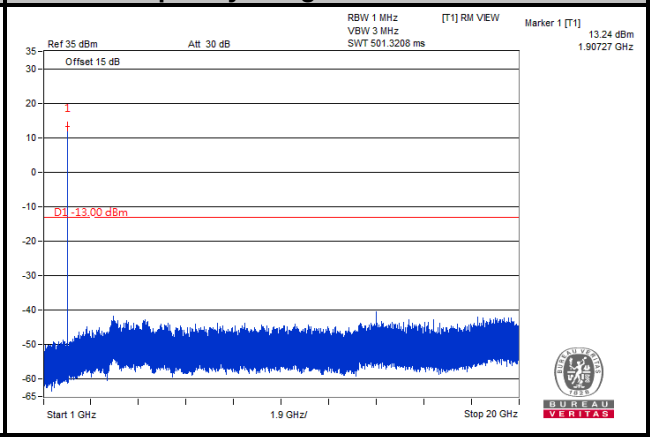
4.7.3 Test Procedure

a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
b. Measuring frequency range is from 9 kHz to 1 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz is used for conducted emission measurement.
c. Measuring frequency range is from 1 GHz to 20 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz is used for conducted emission measurement.

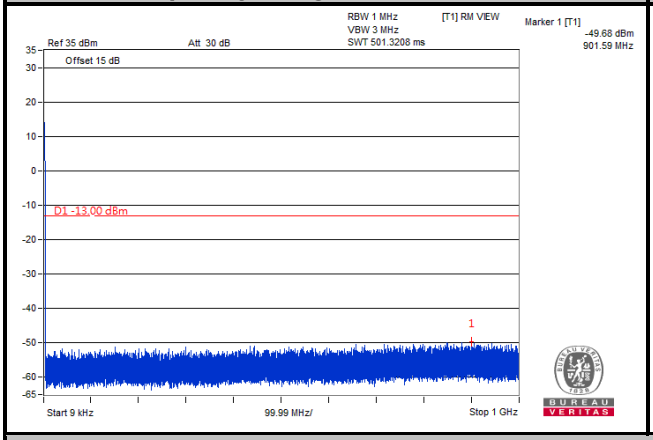
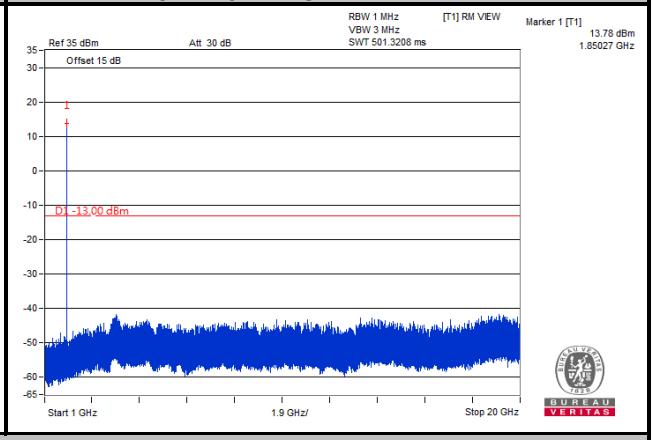
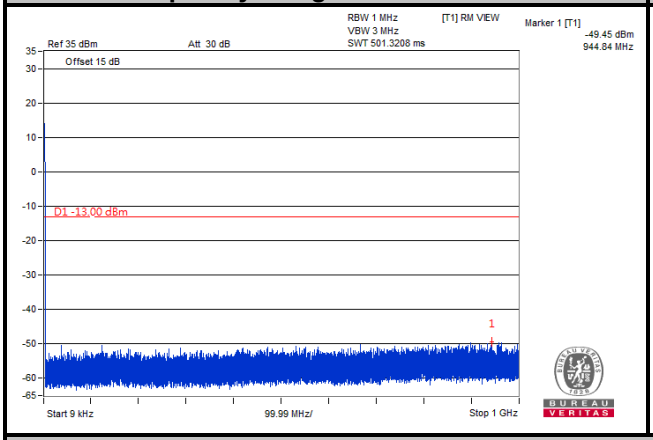
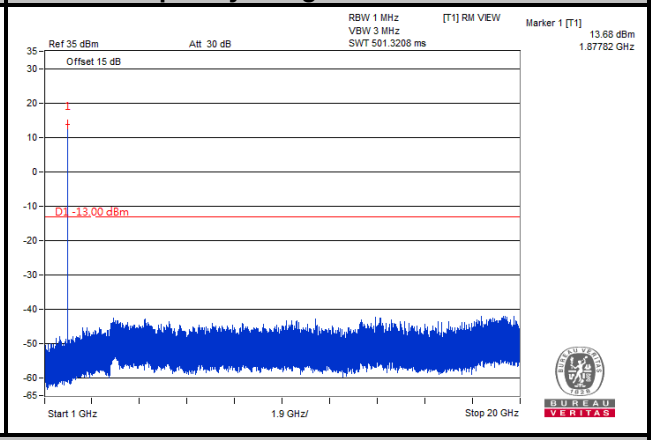
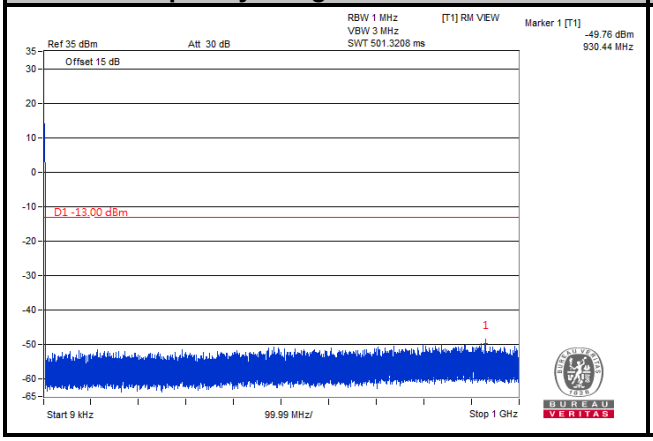
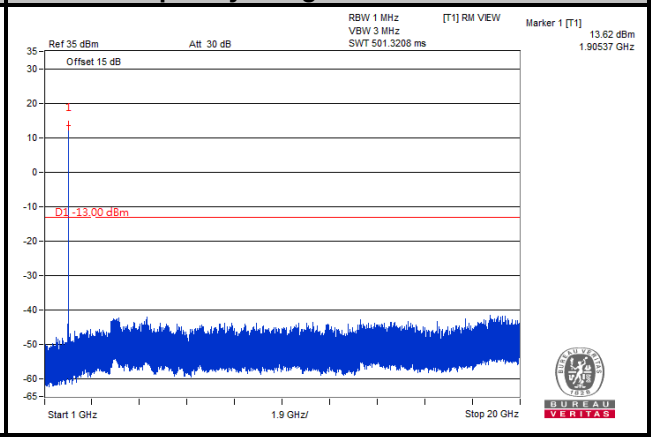
4.7.4 Test Results

LTE Band 2	
Channel Bandwidth: 1.4 MHz	
Channel 18607	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 19193	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	

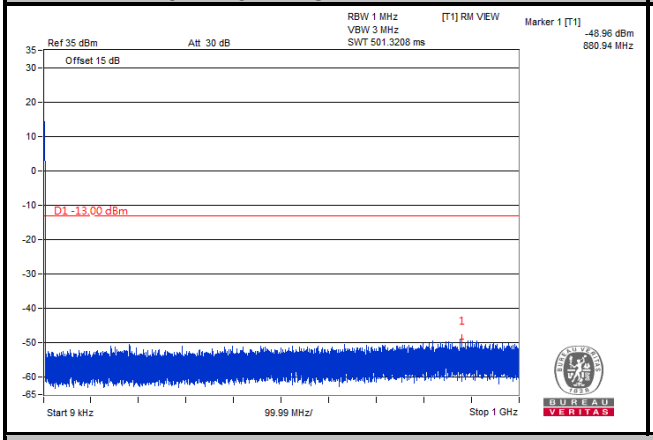
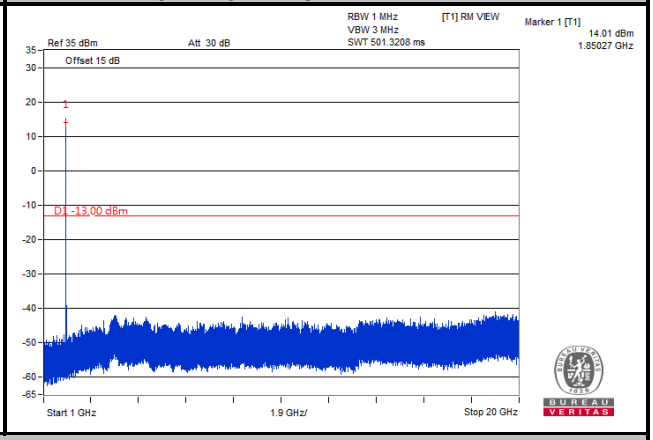
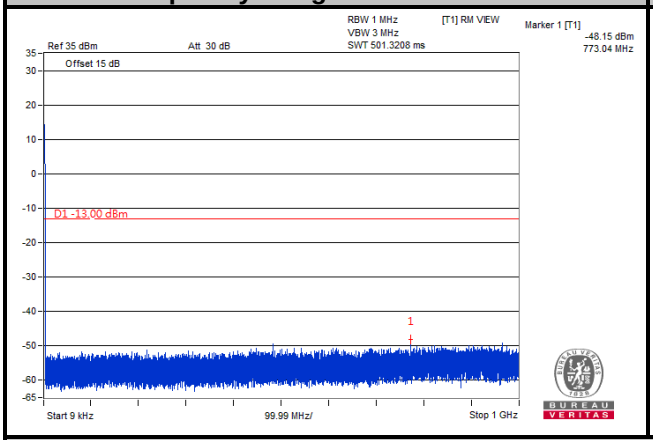
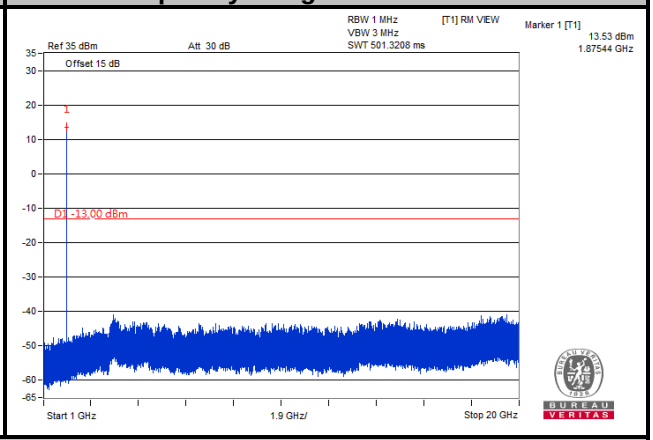
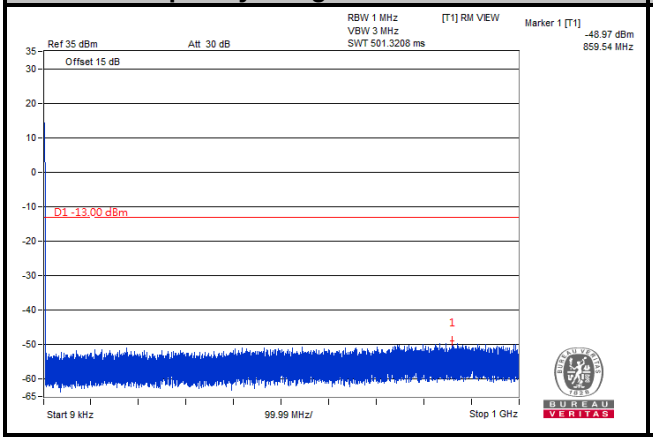
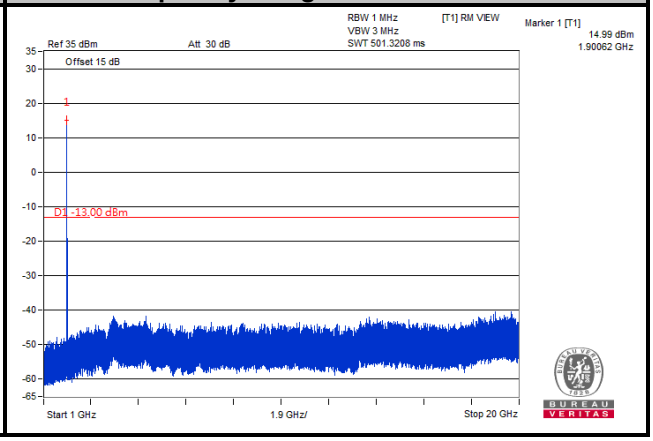
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 3 MHz	
Channel 18615	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 19185	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	

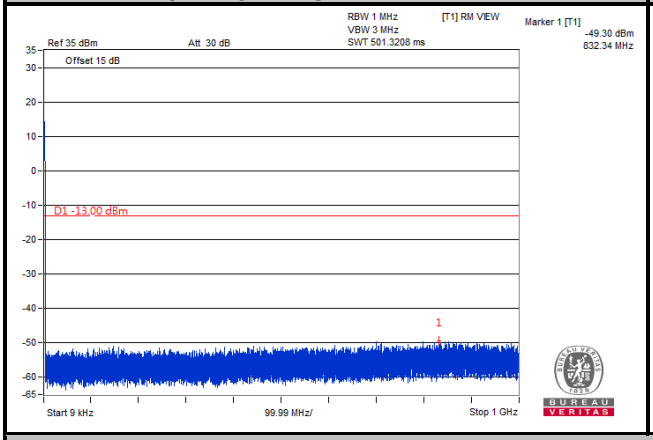
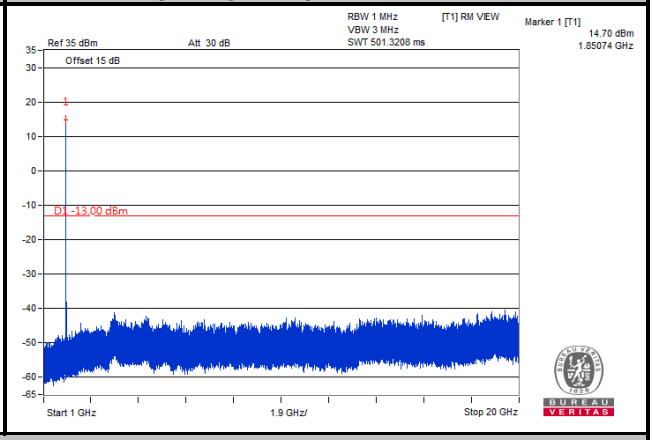
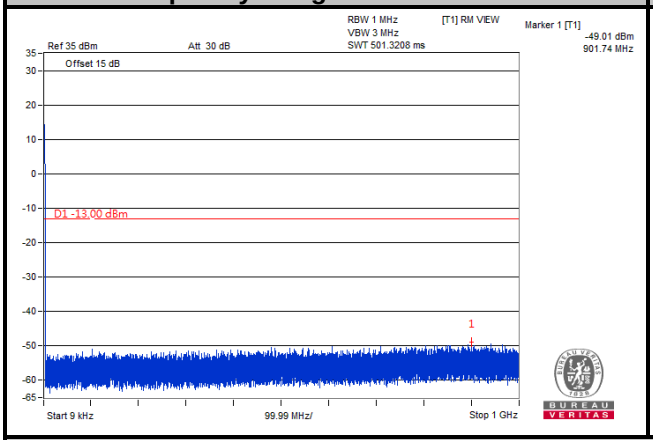
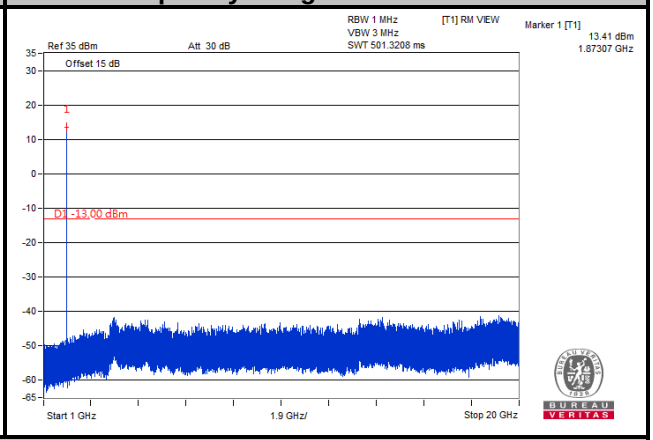
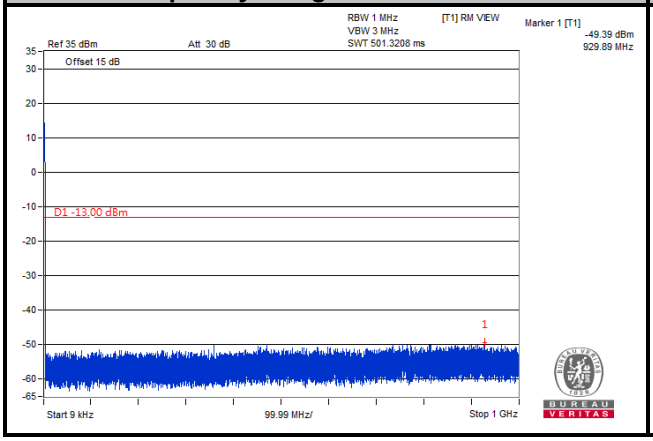
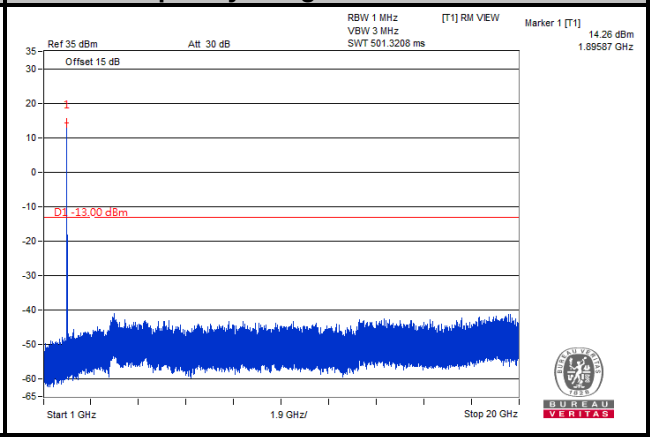
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 5 MHz	
Channel 18625	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 19175	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	

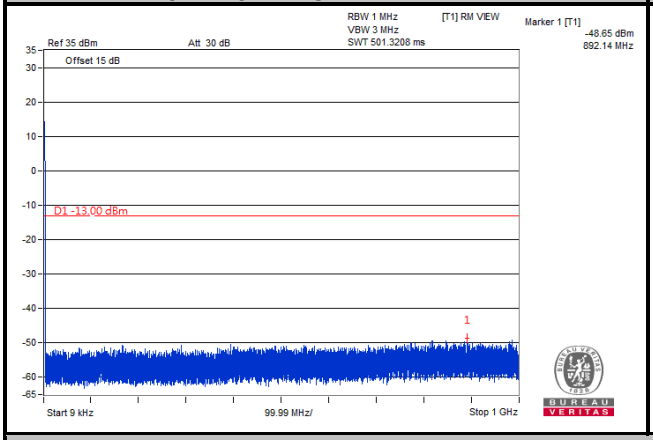
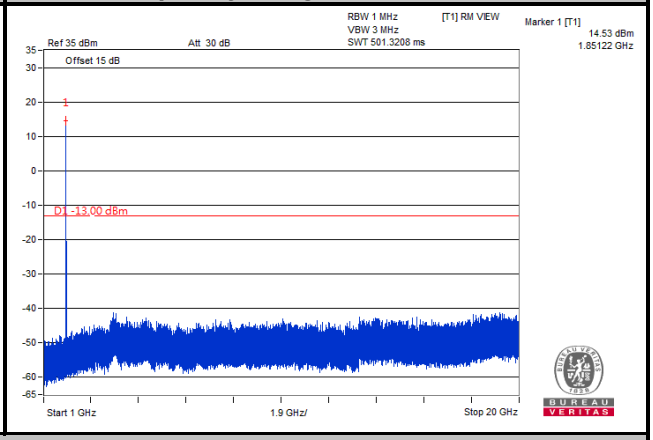
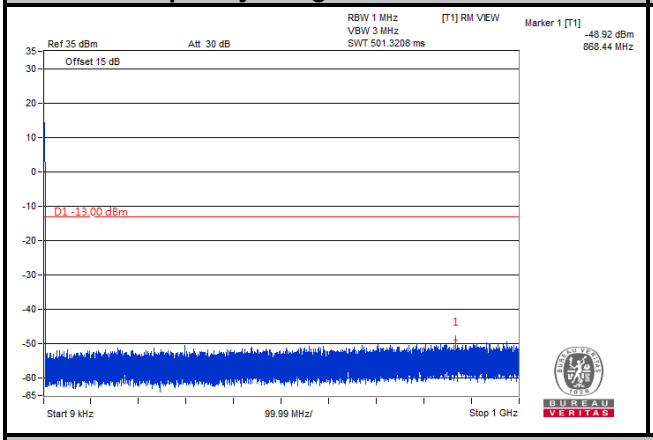
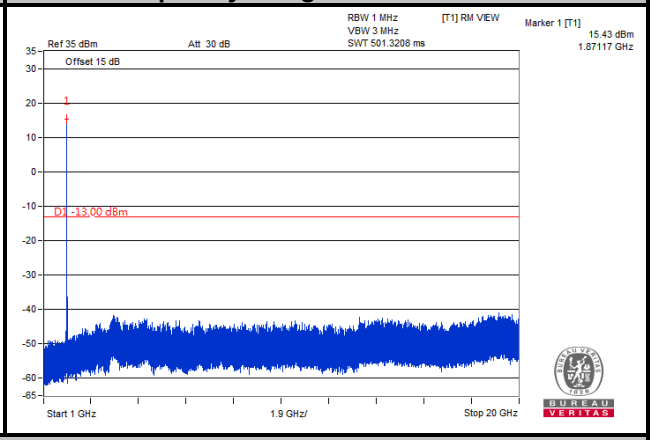
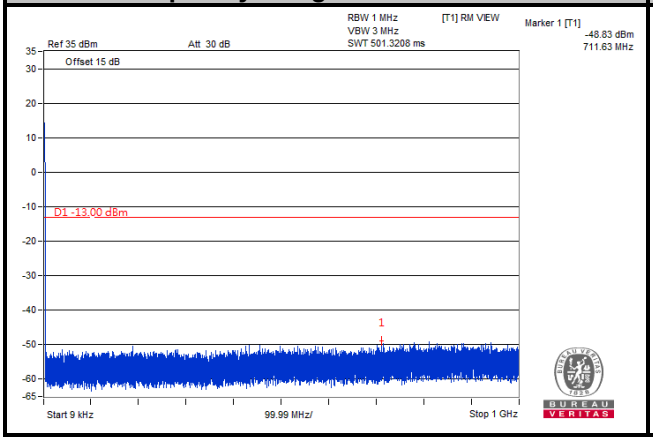
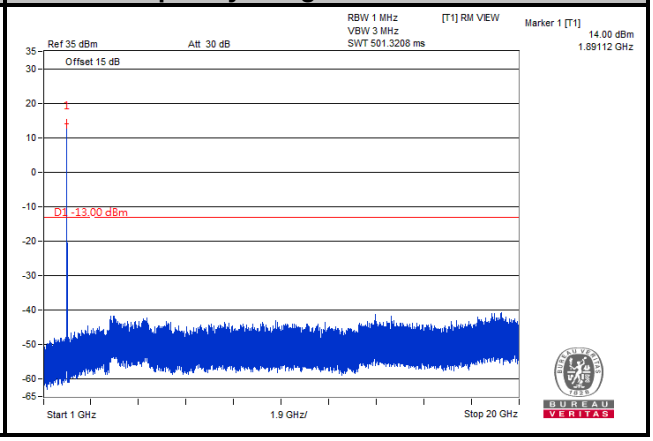
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 10 MHz	
Channel 18650	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 19150	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	

Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 15 MHz	
Channel 18675	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 19125	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	

Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 20 MHz	
Channel 18700	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	
Channel 19100	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 20 GHz
	

Note: The signal over the limit in 9 kHz is from spectrum analyzer.

4.8 Radiated Emission Measurement

4.8.1 Limits of Radiated Emission Measurement

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

4.8.2 Test Procedure

a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
b. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
c. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15 dB.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:

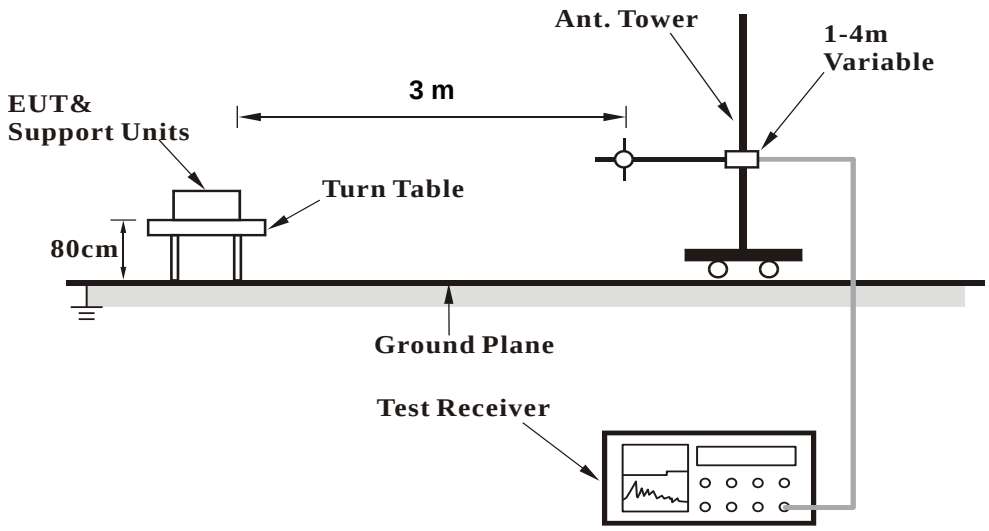
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.8.3 Deviation from Test Standard

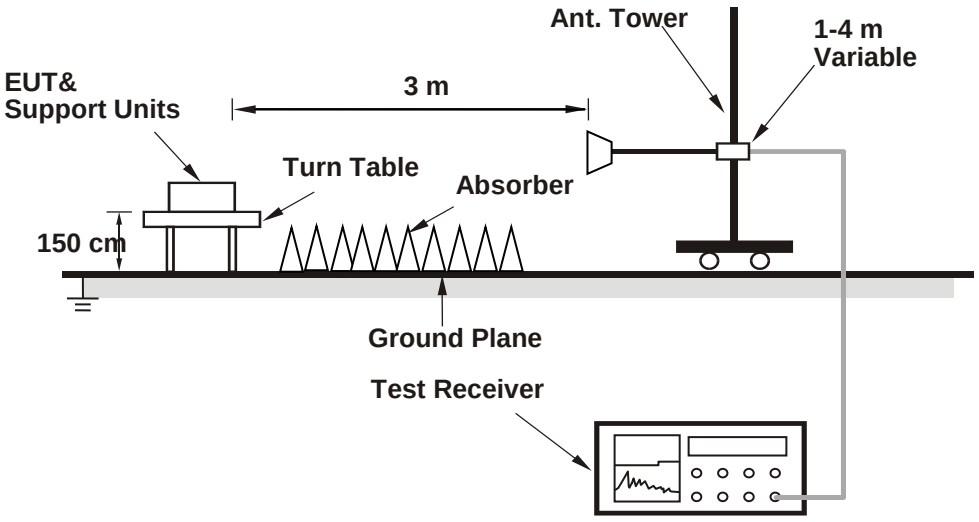
No deviation.

4.8.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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

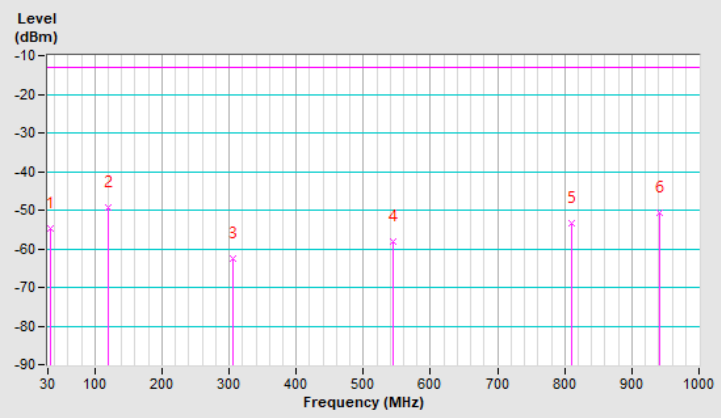
4.8.5 Test Results

Below 1GHz

LTE Band 2, Channel Bandwidth: 20MHz

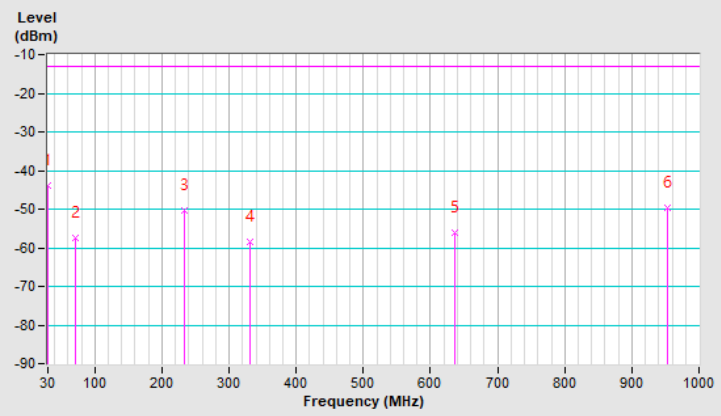
Mode	TX channel 18900 (1880.00MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	33.88	-54.9	-13.0	-41.9	1.00 H	106	50.5	-105.4
2	119.24	-49.4	-13.0	-36.4	1.25 H	216	56.7	-106.1
3	305.48	-62.4	-13.0	-49.4	1.25 H	210	39.5	-101.9
4	544.10	-58.0	-13.0	-45.0	1.00 H	138	39.2	-97.2
5	809.88	-53.3	-13.0	-40.3	1.50 H	16	38.8	-92.1
6	941.80	-50.8	-13.0	-37.8	1.00 H	49	38.8	-89.6



Mode	TX channel 18900 (1880.00MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.00	-43.9	-13.0	-30.9	1.50 V	305	61.7	-105.6
2	70.74	-57.5	-13.0	-44.5	1.00 V	26	48.7	-106.2
3	233.70	-50.5	-13.0	-37.5	1.25 V	80	54.7	-105.2
4	330.70	-58.5	-13.0	-45.5	1.25 V	75	42.8	-101.3
5	635.28	-56.1	-13.0	-43.1	1.00 V	332	39.0	-95.1
6	953.44	-49.8	-13.0	-36.8	1.50 V	5	39.5	-89.3



Above 1GHz
LTE Band 2, Channel Bandwidth 1.4MHz

Mode	TX channel 18607 (1850.70MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3701.40	-45.7	-13.0	-32.7	1.62 H	14	50.3	-96.0
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3701.40	-42.1	-13.0	-29.1	1.93 V	356	53.9	-96.0

Mode	TX channel 18900 (1880.00MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-47.4	-13.0	-34.4	1.69 H	13	48.5	-95.9
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-45.2	-13.0	-32.2	1.86 V	354	50.7	-95.9

Mode	TX channel 19193 (1909.30MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3818.60	-49.2	-13.0	-36.2	1.27 H	31	46.6	-95.8
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3818.60	-46.6	-13.0	-33.6	1.91 V	352	49.2	-95.8

LTE Band 2, Channel Bandwidth 5MHz

Mode	TX channel 18625 (1852.50MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3705.00	-46.8	-13.0	-33.8	1.27 H	32	49.2	-96.0
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3705.00	-42.1	-13.0	-29.1	1.98 V	354	53.9	-96.0

Mode	TX channel 18900 (1880.00MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-46.7	-13.0	-33.7	1.76 H	14	49.2	-95.9
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-44.5	-13.0	-31.5	1.91 V	355	51.4	-95.9

Mode	TX channel 19175 (1907.50MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3815.00	-47.2	-13.0	-34.2	1.97 H	16	48.6	-95.8
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3815.00	-46.4	-13.0	-33.4	1.97 V	354	49.4	-95.8

LTE Band 2, Channel Bandwidth 20MHz

Mode	TX channel 18700 (1860.00MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3720.00	-46.1	-13.0	-33.1	1.40 H	32	49.9	-96.0
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3720.00	-42.0	-13.0	-29.0	1.92 V	353	54.0	-96.0

Mode	TX channel 18900 (1880.00MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-45.3	-13.0	-32.3	1.39 H	30	50.6	-95.9
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	**3760.00**	**-41.2**	**-13.0**	**-28.2**	**1.98 V**	**354**	**54.7**	**-95.9**

Mode	TX channel 19100 (1900.00MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3800.00	-45.8	-13.0	-32.8	1.34 H	31	50.0	-95.8
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3800.00	-42.4	-13.0	-29.4	1.96 V	353	53.4	-95.8

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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