Partial FCC Test Report
(Part 27 – LTE Band 4/13/17)

Report No.: RFBBNT-WTW-P21040202A-2

FCC ID: SLE-UC8112A

Test Model: UC-8112A-ME-T-LX

Received Date: Apr. 09, 2021

Test Date: Apr. 22 ~ May 06, 2021 and Aug. 20, 2021

Issued Date: Apr. 20, 2022

Applicant: Moxa Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

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FCC Registration / Designation Number: 788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RFBBNT-WTW-P21040202A-2	Original release	Apr. 20, 2022

1 Certificate of Conformity

Product: Arm-based platform

Brand: MOXA

Test Model: UC-8112A-ME-T-LX

Sample Status: Engineering sample

Applicant: Moxa Inc.

Test Date: Apr. 22 ~ May 06, 2021 and Aug. 20, 2021

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

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

Prepared by : Celine Chou , **Date:** Apr. 20, 2022

Celine Chou / Senior Specialist

Approved by : Jeremy Lin , **Date:** Apr. 20, 2022

Jeremy Lin / Project Engineer

2 Summary of Test Results

LTE Band 4

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50 (d)(4)	Maximum Peak Output Power	N/A	Refer to Note
2.1047	Modulation Characteristics	N/A	Refer to Note
2.1055 27.54	Frequency Stability	N/A	Refer to Note
2.1049	Occupied Bandwidth	N/A	Refer to Note
27.50 (d)(5)	Peak to Average Ratio	N/A	Refer to Note
27.53 (h)	Band Edge Measurements	N/A	Refer to Note
2.1051 27.53 (h)	Conducted Spurious Emissions	N/A	Refer to Note
2.1053 27.53 (h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -19.63dB at 30.97MHz.

Note:

1. This report is a partial report, only test item of radiated spurious emissions below 1GHz test was performed for this report, other test data please refer to SGS report no.: T190304W05-RP.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 13

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50 (b)(10)	Maximum Peak Output Power	N/A	Refer to Note
2.1047	Modulation Characteristics	N/A	Refer to Note
2.1055 27.54	Frequency Stability	N/A	Refer to Note
2.1049	Occupied Bandwidth	N/A	Refer to Note
---	Peak to Average Ratio	N/A	Refer to Note
27.53 (c)(2)(4)	Band Edge Measurements	N/A	Refer to Note
2.1051 27.53 (c)(2)&(f)	Conducted Spurious Emissions	N/A	Refer to Note
2.1053 27.53 (c)(2)&(f)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -8.00dB at 1564.00MHz.

Note:

1. This report is a partial report, only test item of radiated spurious emissions test was performed for this report. Other test data please refer to SGS report no.: T190304W05-RP.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 17

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50 (c)(10)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	N/A	Refer to Note
2.1055 27.54	Frequency Stability	N/A	Refer to Note
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
---	Peak to Average Ratio	Pass	Meet the requirement of limit.
27.53 (g)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53 (g)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53 (g)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -16.96dB at 1422.00MHz.

Note:

1. This report is a partial report, only test item of Maximum Peak Output Power, Occupied Bandwidth, Peak to Average Ratio, Band Edge Measurements, Conducted Spurious Emissions and Radiated Spurious Emissions tests were performed for this report, other test data please refer to SGS report no.: T190304W05-RP.
2. 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, 2020	Dec. 30, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 16, 2020	Sep. 15, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Nov. 03, 2020	Nov. 02, 2021
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Nov. 22, 2020	Nov. 21, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 22, 2020	Nov. 21, 2021
Loop Antenna TESEQ	HLA 6121	45745	Jul. 06, 2020	Jul. 05, 2021
			Jul. 21, 2021	Jul. 20, 2022
Preamplifier Agilent (Below 1GHz)	8447D	2944A10631	Jun. 08, 2020	Jun. 07, 2021
			Jun. 05, 2021	Jun. 04, 2022
Preamplifier KEYSIGHT (Above 1GHz)	83017A	MY53270295	Jun. 08, 2020	Jun. 07, 2021
			Jun. 05, 2021	Jun. 04, 2022
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH4-01	Aug. 16, 2020	Aug. 15, 2021
			Jul. 24, 2021	Jul. 23, 2022
RF Coaxial Cable EMCI	EMC102-KM-KM-3000	150929	Aug. 16, 2020	Aug. 15, 2021
			Jul. 24, 2021	Jul. 23, 2022
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	Aug. 16, 2020	Aug. 15, 2021
			Jul. 24, 2021	Jul. 23, 2022
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Jun. 08, 2020	Jun. 07, 2021
			Jun. 05, 2021	Jun. 04, 2022
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Jun. 08, 2020	Jun. 07, 2021
			Jun. 05, 2021	Jun. 04, 2022
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
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
JFW 20dB attenuation	50HF-020-SMA	NA	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	Arm-based platform		
Brand	MOXA		
Test Model	UC-8112A-ME-T-LX		
Sample Status	Engineering sample		
Power Supply Rating	12Vdc from AC/DC Adapter		
Modulation Type	QPSK, 16QAM		
Operating Frequency	LTE Band 4 (Channel Bandwidth 1.4MHz)	1710.7MHz ~ 1754.3MHz	
	LTE Band 4 (Channel Bandwidth 3MHz)	1711.5MHz ~ 1753.5MHz	
	LTE Band 4 (Channel Bandwidth 5MHz)	1712.5MHz ~ 1752.5MHz	
	LTE Band 4 (Channel Bandwidth 10MHz)	1715.0MHz ~ 1750.0MHz	
	LTE Band 4 (Channel Bandwidth 15MHz)	1717.5MHz ~ 1747.5MHz	
	LTE Band 4 (Channel Bandwidth 20MHz)	1720.0MHz ~ 1745.0MHz	
	LTE Band 13 (Channel Bandwidth 5MHz)	779.5MHz ~ 784.5MHz	
	LTE Band 13 (Channel Bandwidth 10MHz)	782.0MHz	
	LTE Band 17 (Channel Bandwidth 5MHz)	706.5MHz ~ 713.5MHz	
	LTE Band 17 (Channel Bandwidth 10MHz)	709.0MHz ~ 711.0MHz	
Emission Designator		QPSK	16QAM
	LTE Band 17 (Channel Bandwidth: 5 MHz)	4M47G7D	4M46D7W
	LTE Band 17 (Channel Bandwidth: 10 MHz)	8M90G7D	8M89D7W
Max. ERP Power		QPSK	16QAM
	LTE Band 17 (Channel Bandwidth: 5 MHz)	132.739mW (21.23dBm)	105.196mW (20.22dBm)
	LTE Band 17 (Channel Bandwidth: 10 MHz)	121.619mW (20.85dBm)	102.094mW (20.09dBm)
Antenna Type	LTE Band 4	Dipole antenna with 2.0dBi gain	
	LTE Band 13	Dipole antenna with 1.0dBi gain	
	LTE Band 17	Dipole antenna with 1.0dBi gain	
Accessory Device	NA		
Cable Supplied	NA		

Note:

1. This report is prepared for FCC class II permissive change. The difference compared with the original report (SGS report no.: T190304W05-RP) are changing duplexer (Band13), PA (Band17) and Firmware/Software update.

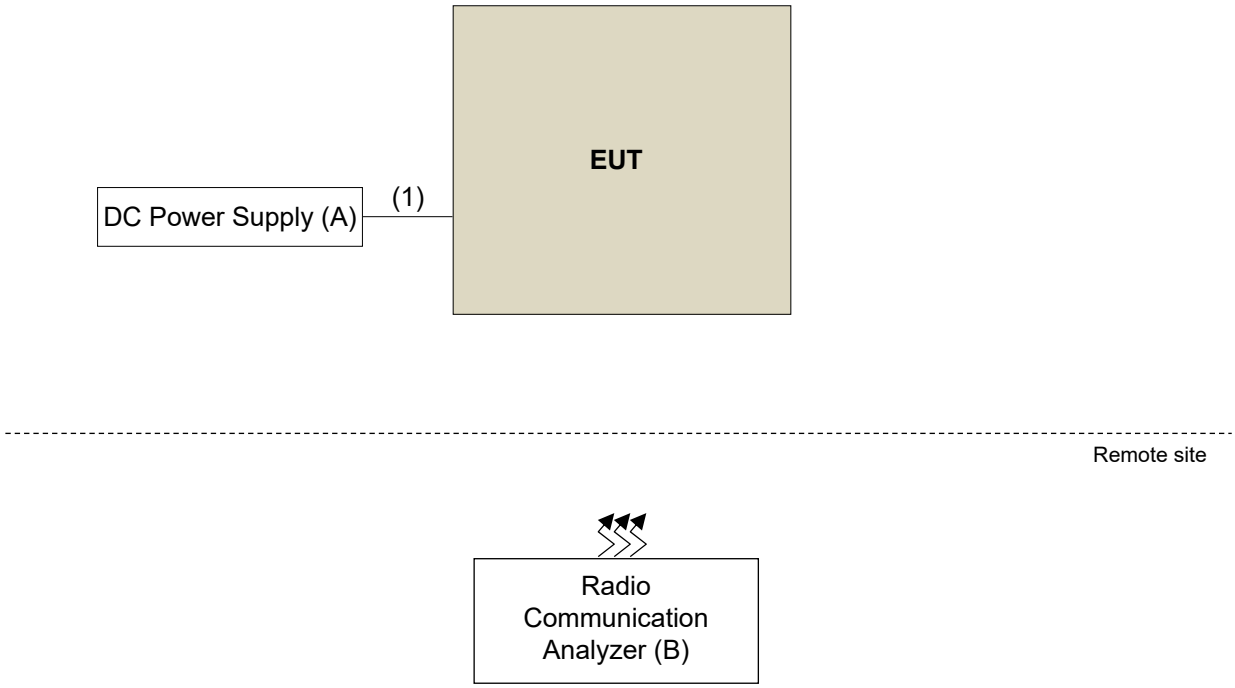
   For change in duplexer and PA, it is meet section III. D of KDB 178919 D01 v06 requirements,

   - The new chip component is pin-for-pin compatible.
   - The new chip has the same basic function as the old chip.
   - No change in radio parameters has occurred.

   For Firmware/Software update, it is not impact in RF characteristics, for more detail please refer to operation description exhibit.

   After engineering judgement, for LTE Band 4, only test item of radiated spurious emissions below 1GHz test was performed for this report. For LTE Band 13, only test item of radiated spurious emissions test was performed for this report. For LTE Band 17, only test item of Maximum Peak Output Power, Occupied Bandwidth, Peak to Average Ratio, Band Edge Measurements, Conducted Spurious Emissions and Radiated Spurious Emissions tests were performed for this report. Other testing data please refer to original test report.
2. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
3. 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



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.	DC Power Supply	Topward	6306D	809760	NA	-
B.	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	NA	-

Note:

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

3.3 Test Mode Applicability and Tested Channel Detail

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

Band	Radiated Emission
LTE Band 4	X-plane
LTE Band 13	X-plane
LTE Band 17	X-plane

LTE Band 4

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission Below 1GHz	19957 to 20393	20393 (1754.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset

Note: Above test condition was according to original report worst case.

LTE Band 13

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

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the 5MHz & highest channel bandwidth for final test.
3. According to original report worst case, radiated emission test was performed under QPSK mode only.

LTE Band 17

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	23755 to 23825	23755 (706.5MHz), 23790 (710.0MHz), 23825 (713.5MHz)	5MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 12 RB Offset 1 RB / 24 RB Offset 12 RB / 0 RB Offset 12 RB / 6 RB Offset 12 RB / 13 RB Offset 25 RB / 0 RB Offset
		23780 to 23800	23780 (709.0MHz), 23790 (710.0MHz), 23800 (711.0MHz)	10MHz	QPSK / 16QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 1 RB / 49 RB Offset 25 RB / 0 RB Offset 25 RB / 12 RB Offset 25 RB / 25 RB Offset 50 RB / 0 RB Offset
-	Emission Bandwidth	23755 to 23825	23755 (706.5MHz), 23790 (710.0MHz), 23825 (713.5MHz)	5MHz	QPSK / 16QAM	25 RB / 0 RB Offset
		23780 to 23800	23780 (709.0MHz), 23790 (710.0MHz), 23800 (711.0MHz)	10MHz	QPSK / 16QAM	50 RB / 0 RB Offset
-	Band Edge	23755 to 23825	23755 (706.5MHz), 23825 (713.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		23780 to 23800	23780 (709.0MHz), 23800 (711.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
-	Peak to Average Ratio	23755 to 23825	23755 (706.5MHz), 23790 (710.0MHz), 23825 (713.5MHz)	5MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		23780 to 23800	23780 (709.0MHz), 23790 (710.0MHz), 23800 (711.0MHz)	10MHz	QPSK / 16QAM	1 RB / 0 RB Offset
-	Conducted Emission	23755 to 23825	23755 (706.5MHz), 23790 (710.0MHz), 23825 (713.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		23780 to 23800	23780 (709.0MHz), 23790 (710.0MHz), 23800 (711.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission Below 1GHz	23780 to 23800	23800 (711.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission above 1GHz	23755 to 23825	23755 (706.5MHz), 23790 (710.0MHz), 23825 (713.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		23780 to 23800	23780 (709.0MHz), 23790 (710.0MHz), 23800 (711.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

Note:
1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the 5MHz & highest channel bandwidth for final test.
3. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP / EIRP	25 deg. C, 65 % RH	120 Vac, 60 Hz	Greg Lin
Occupied Bandwidth	25 deg. C, 65 % RH	120 Vac, 60 Hz	Greg Lin
Band Edge	25 deg. C, 65 % RH	120 Vac, 60 Hz	Greg Lin
Peak to Average Ratio	25 deg. C, 65 % RH	120 Vac, 60 Hz	Greg Lin
Conducted Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Greg Lin
Radiated Emission	22 deg. C, 68 %RH	120Vac, 60Hz	Greg Lin

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards and References

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

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Control and mobile stations in the 698-746 MHz band are limited to 30 watts ERP.
Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

4.1.2 Test Procedures

Conducted Power Measurement:

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

Maximum EIRP / ERP

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

$EIRP = P_{Meas} + G_T$

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

where

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

P_{Meas} measured transmitter output power or PSD, in dBm or dBW

G_T gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

4.1.3 Test Setup

Conducted Power Measurement:

4.1.4 Test Results

Conducted Output Power (dBm)

LTE Band 17						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23780	23790	23800
		Frequency (MHz)		709	710	711
10M	QPSK	1	0	22.00	21.93	21.94
		1	24	21.99	21.92	21.99
		1	49	21.94	21.96	21.96
		25	0	21.60	21.77	21.86
		25	12	21.91	21.82	21.70
		25	25	21.72	21.58	21.35
		50	0	21.73	21.69	21.66
	16QAM	1	0	21.24	21.20	21.22
		1	24	21.19	21.22	21.13
		1	49	21.16	21.17	21.12
		25	0	20.60	20.66	20.66
		25	12	20.75	20.63	20.52
		25	25	20.61	20.36	20.37
		50	0	20.55	20.50	20.56
5M	QPSK	1	0	22.37	22.38	22.35
		1	12	22.36	22.35	22.05
		1	24	22.22	22.35	22.27
		12	0	21.48	21.91	21.35
		12	6	21.69	21.82	21.24
		12	13	21.88	21.76	21.15
		25	0	21.71	21.81	21.35
	16QAM	1	0	21.37	21.33	21.34
		1	12	21.28	21.27	21.30
		1	24	21.28	21.36	21.34
		12	0	20.36	20.78	20.18
		12	6	20.53	20.79	20.18
		12	13	20.75	20.65	20.21
		25	0	20.54	20.63	20.17

ERP Power (dBm)

LTE Band 17						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23780	23790	23800
		Frequency (MHz)		709	710	711
10M	QPSK	1	0	20.85	20.78	20.79
		1	24	20.84	20.77	20.84
		1	49	20.79	20.81	20.81
		25	0	20.45	20.62	20.71
		25	12	20.76	20.67	20.55
		25	25	20.57	20.43	20.20
		50	0	20.58	20.54	20.51
	16QAM	1	0	20.09	20.05	20.07
		1	24	20.04	20.07	19.98
		1	49	20.01	20.02	19.97
		25	0	19.45	19.51	19.51
		25	12	19.60	19.48	19.37
		25	25	19.46	19.21	19.22
		50	0	19.40	19.35	19.41
5M	QPSK	1	0	21.22	21.23	21.20
		1	12	21.21	21.20	20.90
		1	24	21.07	21.20	21.12
		12	0	20.33	20.76	20.20
		12	6	20.54	20.67	20.09
		12	13	20.73	20.61	20.00
		25	0	20.56	20.66	20.20
	16QAM	1	0	20.22	20.18	20.19
		1	12	20.13	20.12	20.15
		1	24	20.13	20.21	20.19
		12	0	19.21	19.63	19.03
		12	6	19.38	19.64	19.03
		12	13	19.60	19.50	19.06
		25	0	19.39	19.48	19.02

Note: ERP (dBm) = Conducted Output Power (dBm) + Anteanna Gain (dBi) – 2.15.

4.2 Emission Bandwidth Measurement

4.2.1 Limits of Emission Bandwidth Measurement

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

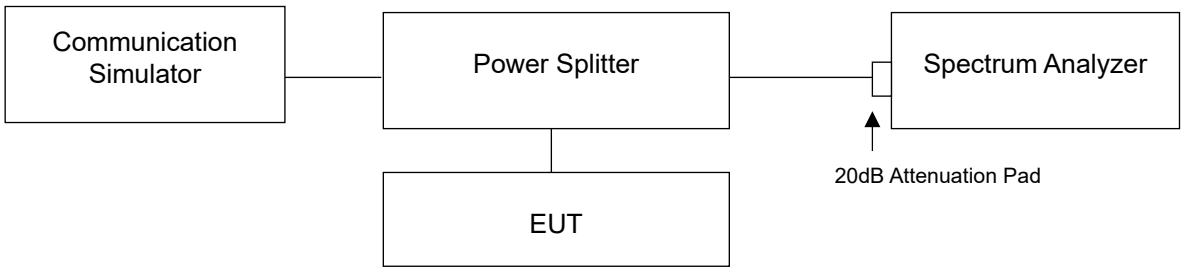
4.2.2 Test Procedure

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

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

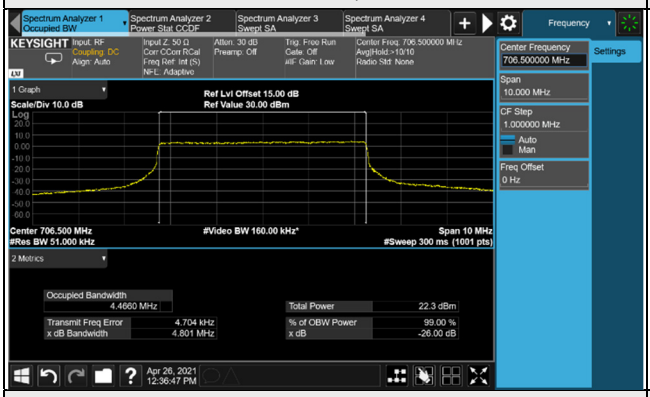
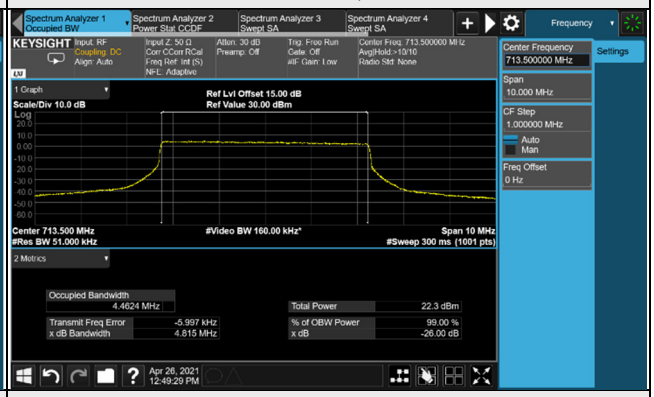
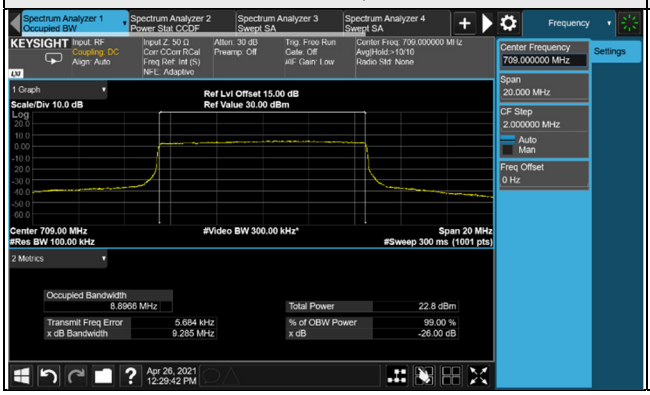
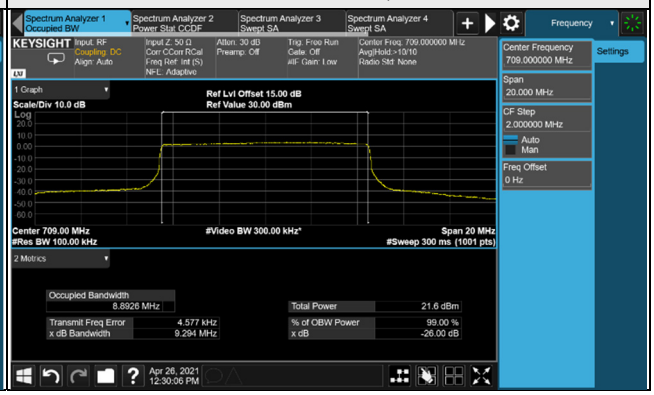
For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

4.2.3 Test Setup



4.2.4 Test Result

LTE Band 17					
Channel Bandwidth: 5 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
23755	706.5	4.47	4.45	4.80	4.80
23790	710.0	4.46	4.45	4.79	4.77
23825	713.5	4.46	4.46	4.82	4.77
Channel Bandwidth: 10 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
23780	709.0	8.90	8.89	9.29	9.29
23790	710.0	8.89	8.89	9.28	9.28
23800	711.0	8.89	8.89	9.28	9.28

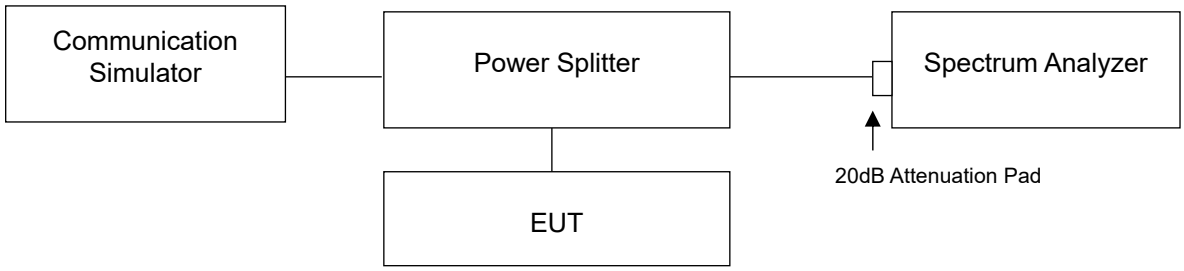
Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
5 MHz / QPSK	5 MHz / QPSK
	
10 MHz / QPSK	10 MHz / 16QAM
	

4.3 Channel Edge / Out-of-Band Emissions Measurement

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

For LTE Band 17:
According to FCC 27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

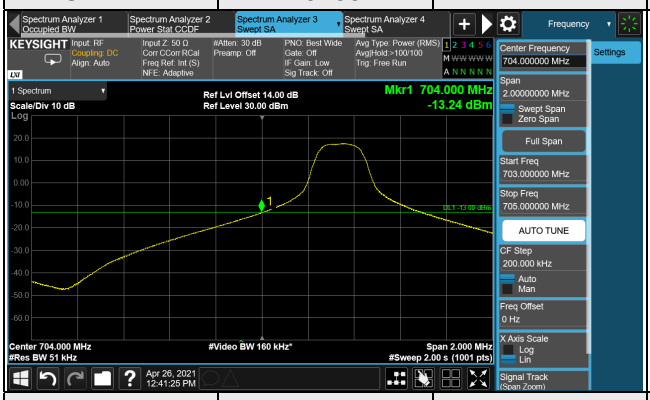
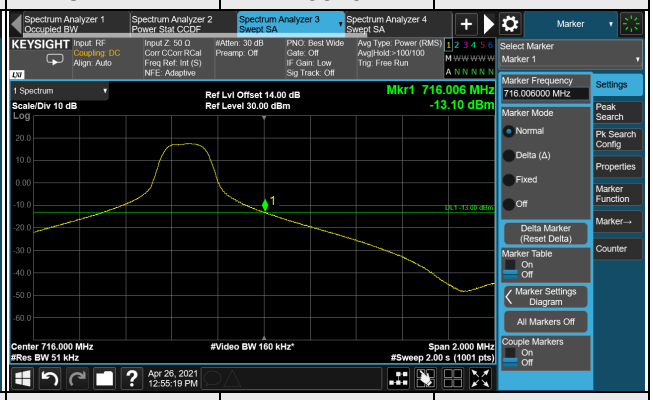
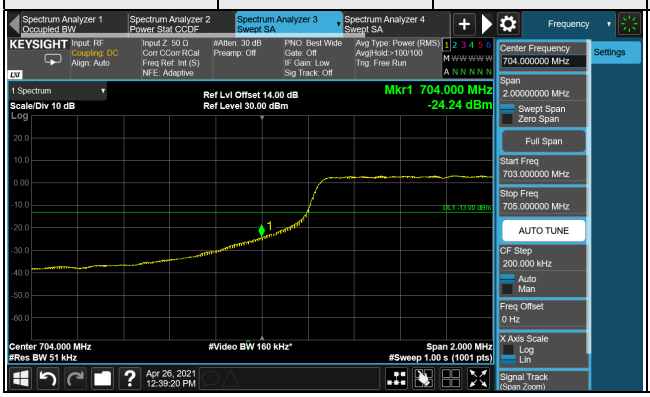
4.3.2 Test Setup

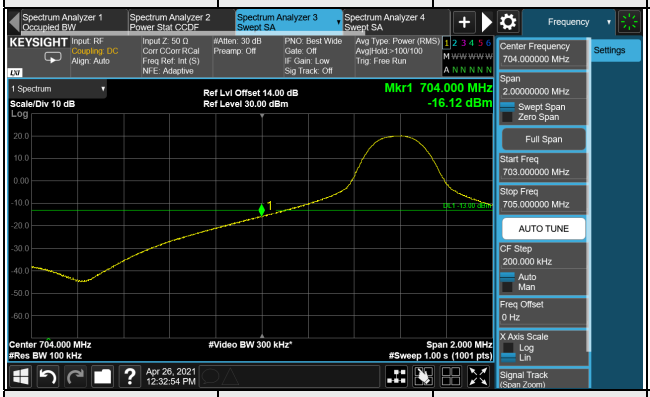
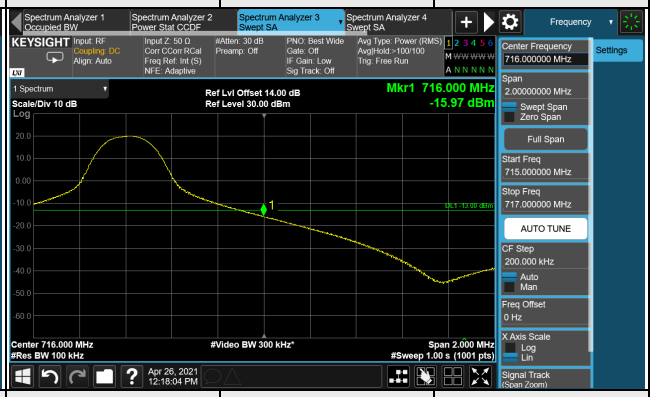
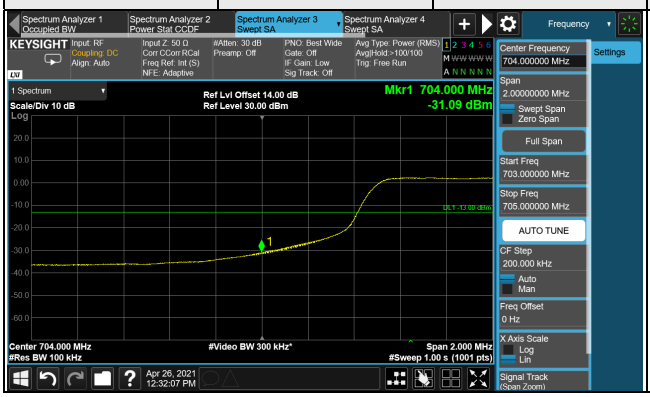
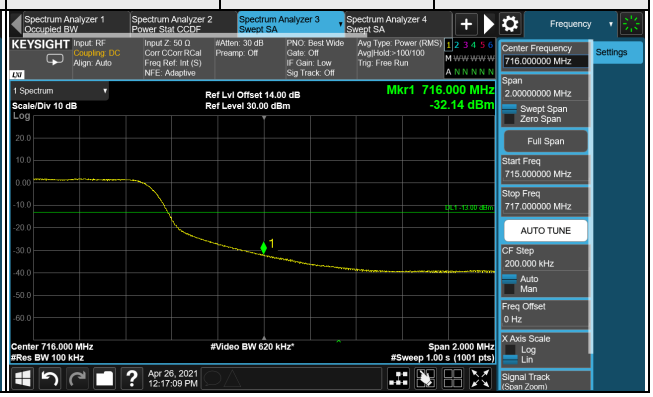


4.3.3 Test Procedures

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

4.3.4 Test Results

LTE Band 17					
Channel Bandwidth: 5 MHz					
Channel	23755	1 RB	Channel	23825	1 RB
					
Channel	23755	25 RB	Channel	23825	25 RB
					

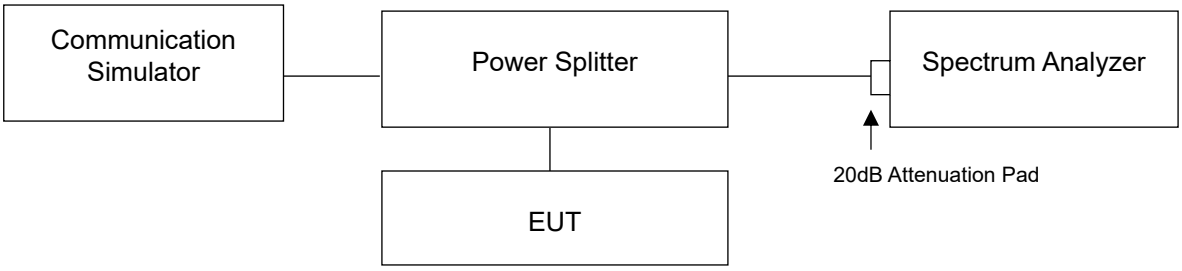
LTE Band 17					
Channel Bandwidth: 10 MHz					
Channel	23780	1 RB	Channel	23800	1 RB
					
Channel	23780	50 RB	Channel	23800	50 RB
					

4.4 Peak to Average Ratio

4.4.1 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

4.4.2 Test Setup



4.4.3 Test Procedures

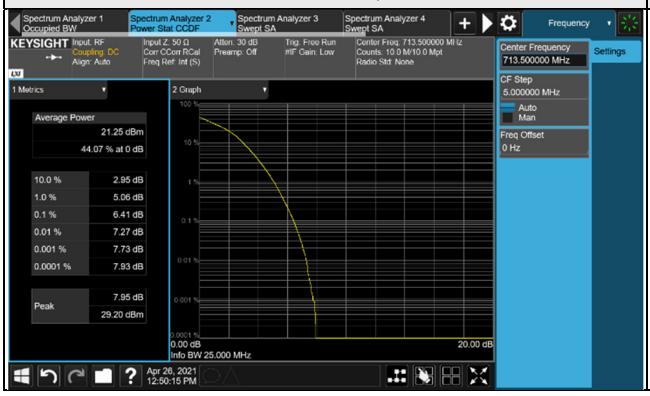
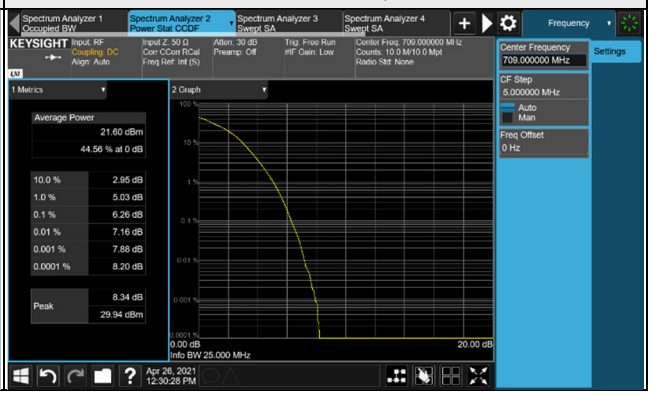
a. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;

b. Set the number of counts to a value that stabilizes the measured CCDF curve;

c. Record the maximum PAPR level associated with a probability of 0.1%.

4.4.4 Test Results

LTE Band 17							
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
23755	706.5	5.72	6.40	23780	709.0	5.58	6.26
23790	710.0	5.62	6.32	23790	710.0	5.52	6.26
23825	713.5	5.77	6.41	23800	711.0	5.51	6.24

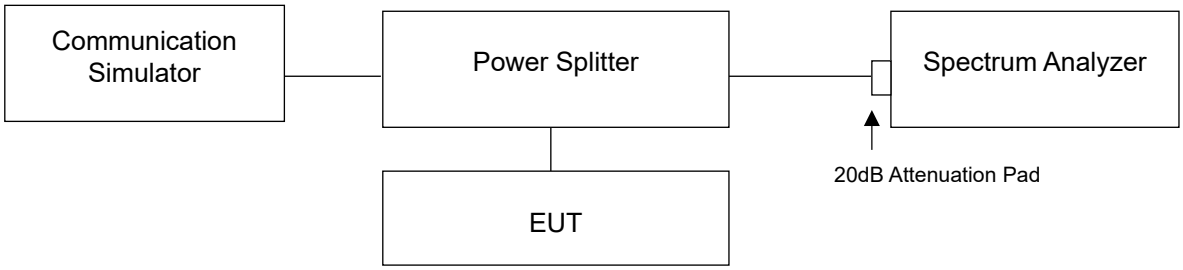
Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

4.5 Conducted Spurious Emissions

4.5.1 Limits of Conducted Spurious Emissions Measurement

For LTE Band 17:
According to FCC 27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. The limit of emissions is equal to -13 dBm.

4.5.2 Test Setup



4.5.3 Test Procedure

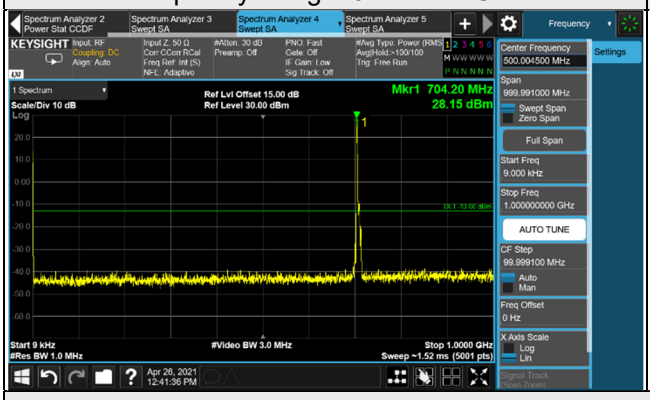
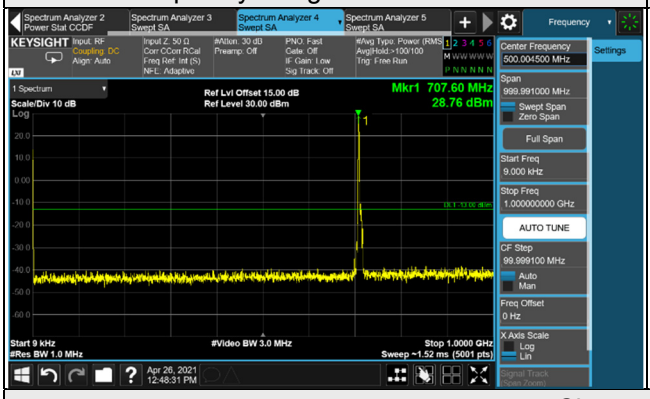
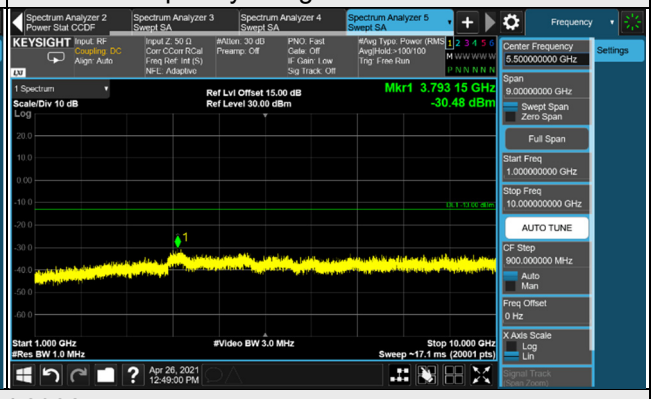
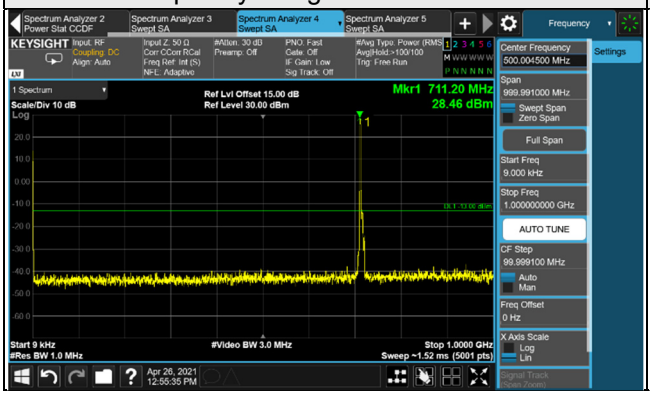
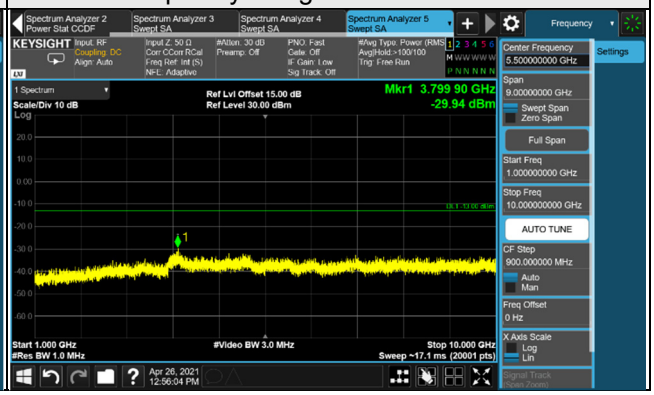
a. All measurements were done at low, middle and high channels operational frequency range.

b. Measuring frequency range is from 9kHz to 1GHz. 20dB attenuation pad is connected with spectrum. RBW=100kHz and VBW=300kHz are used for LTE Band 12, LTE Band 13 and LTE Band 17 conducted emission measurement.

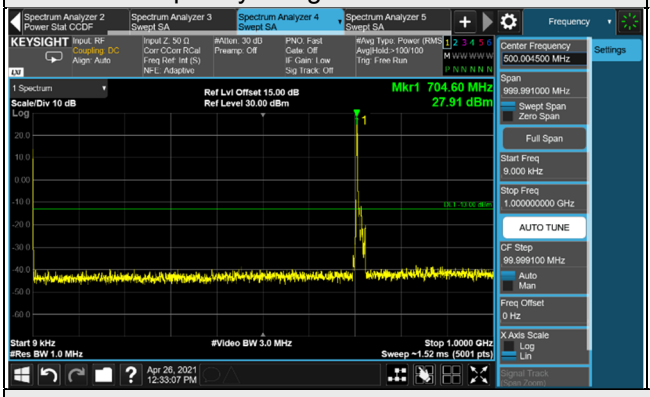
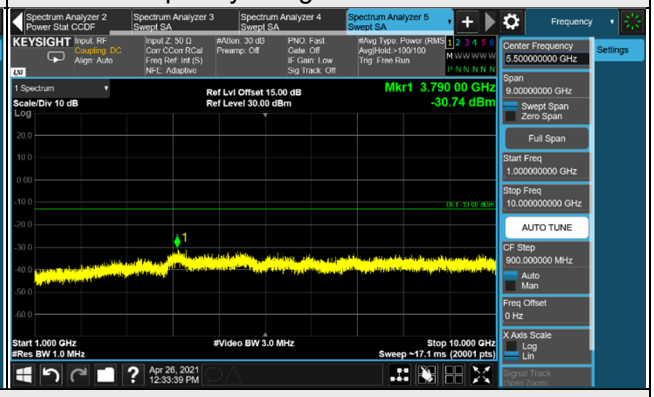
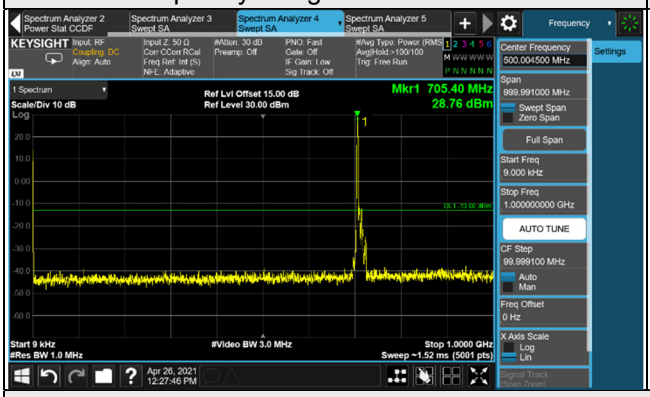
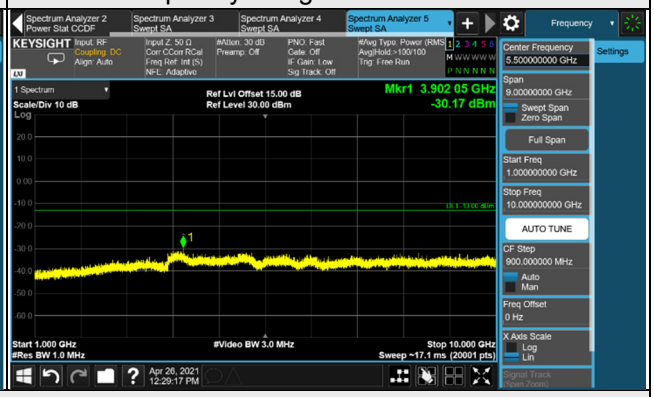
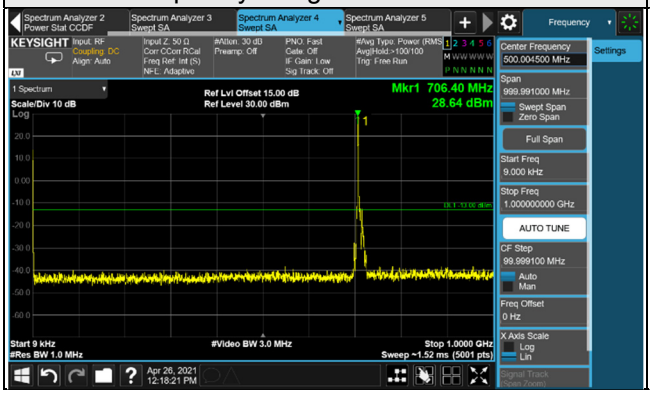
c. Measuring frequency range is from 9kHz to 1GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for WCDMA / HSDPA / HSUPA, LTE Band 4, LTE Band 7, LTE Band 38 and LTE Band 41 conducted emission measurement.

d. Measuring frequency range is from 1GHz to 8GHz / 18GHz / 20GHz / 26GHz / 27GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

4.5.4 Test Results

LTE Band 17	
Channel Bandwidth: 5 MHz	
Channel 23755	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Channel 23790	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Channel 23825	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	

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

LTE Band 17	
Channel Bandwidth: 10 MHz	
Channel 23780	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Channel 23790	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Channel 23800	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	

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

4.6 Radiated Emission Measurement

4.6.1 Limits of Radiated Emission Measurement

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

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

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

For LTE Band 17:
According to FCC 27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. The limit of emissions is equal to -13 dBm.

4.6.2 Test Procedure

a. In the semi-anechoic chamber, EUT placed on the 0.8m (below or equal 1GHz) and/or 1.5m (above 1GHz) 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 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
d. Following C63.26 section 5.5 and 5.2.7
   - EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.
   - ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

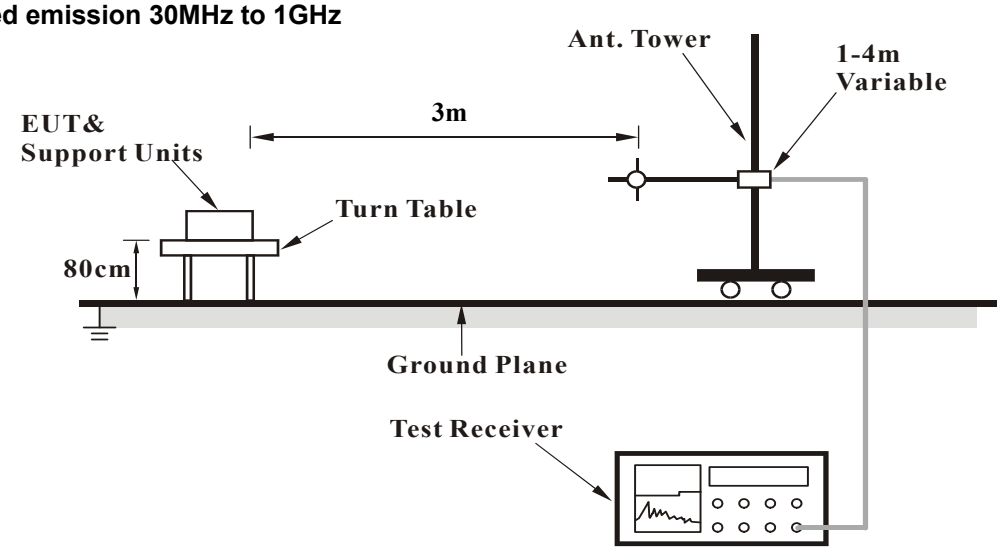
Note:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
   The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.6.3 Deviation from Test Standard

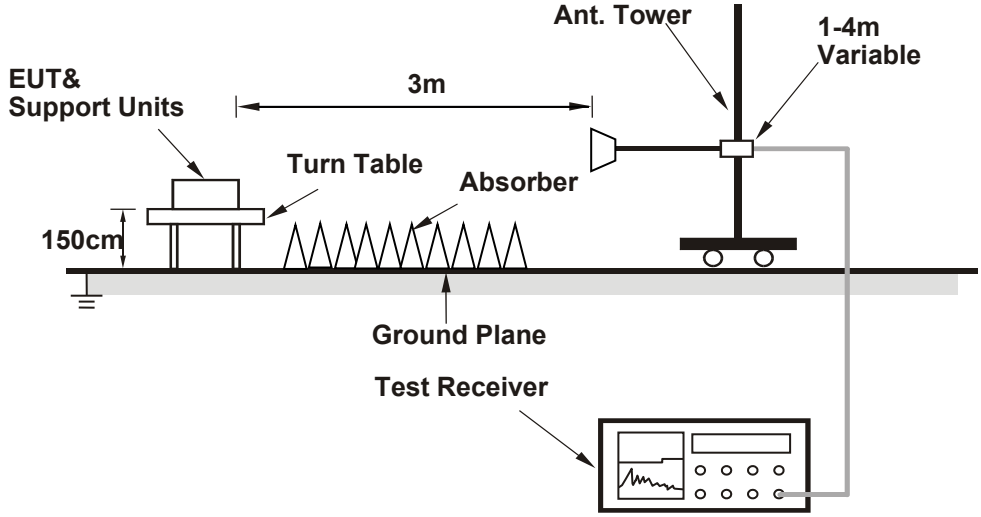
No deviation.

4.6.4 Test Setup

For radiated emission 30MHz to 1GHz



For radiated emission above 1GHz



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

4.6.5 Test Results

Below 1GHz

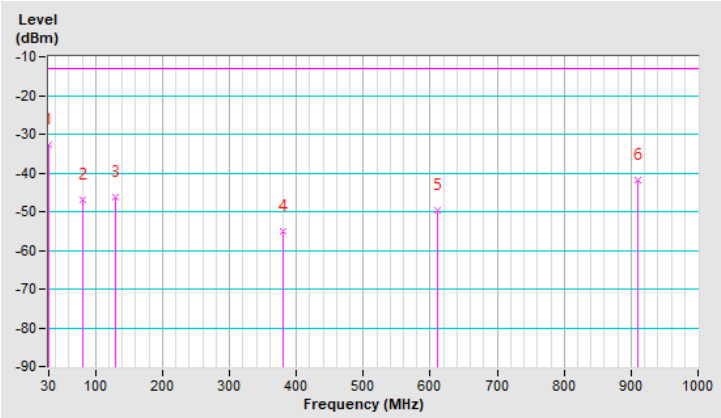
LTE Band 4, Channel Bandwidth 1.4MHz

Mode	TX channel 20393 (1754.3MHz)	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	**30.97**	**-32.63**	**-13.00**	**-19.63**	**1.25 H**	**30**	**73.10**	**-105.73**
2	80.44	-47.11	-13.00	-34.11	1.00 H	260	61.70	-108.81
3	128.94	-46.30	-13.00	-33.30	1.00 H	162	59.14	-105.44
4	380.17	-54.92	-13.00	-41.92	1.50 H	321	45.32	-100.24
5	611.03	-49.79	-13.00	-36.79	1.00 H	131	45.53	-95.32
6	909.79	-41.88	-13.00	-28.88	1.00 H	292	47.48	-89.36

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

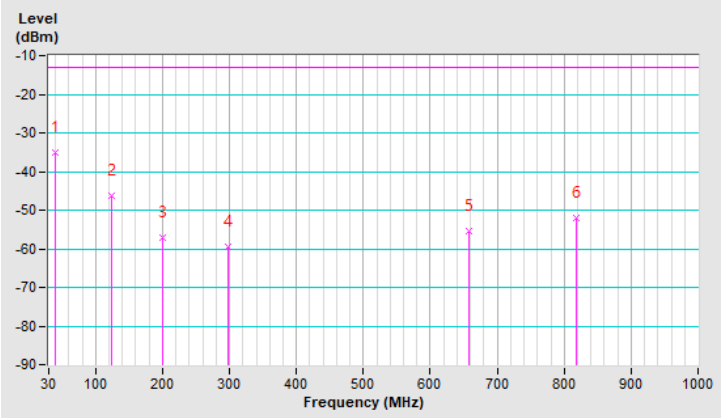


Mode	TX channel 20393 (1754.3MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	40.67	-35.21	-13.00	-22.21	1.50 V	27	69.52	-104.73
2	123.12	-46.28	-13.00	-33.28	1.25 V	259	59.65	-105.93
3	199.75	-56.98	-13.00	-43.98	1.50 V	148	49.68	-106.66
4	297.72	-59.50	-13.00	-46.50	1.00 V	157	42.54	-102.04
5	658.56	-55.31	-13.00	-42.31	1.00 V	272	39.35	-94.66
6	818.61	-52.02	-13.00	-39.02	1.25 V	359	39.51	-91.53

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.



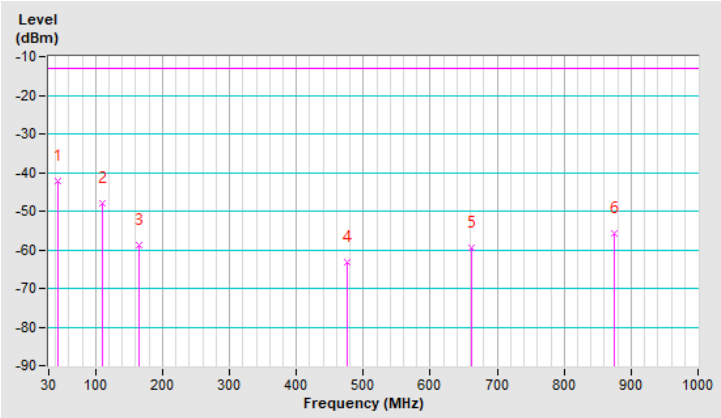
LTE Band 13, Channel Bandwidth 5MHz

Mode	TX channel 23230 (782.0MHz)	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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	44.55	-42.33	-13.00	-29.33	1.50 H	136	64.20	-106.53
2	110.51	-48.11	-13.00	-35.11	1.25 H	142	61.26	-109.37
3	165.80	-58.72	-13.00	-45.72	1.00 H	148	47.40	-106.12
4	476.20	-63.16	-13.00	-50.16	1.25 H	197	36.99	-100.15
5	662.44	-59.66	-13.00	-46.66	1.50 H	9	37.09	-96.75
6	874.87	-55.68	-13.00	-42.68	1.00 H	8	36.81	-92.49

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

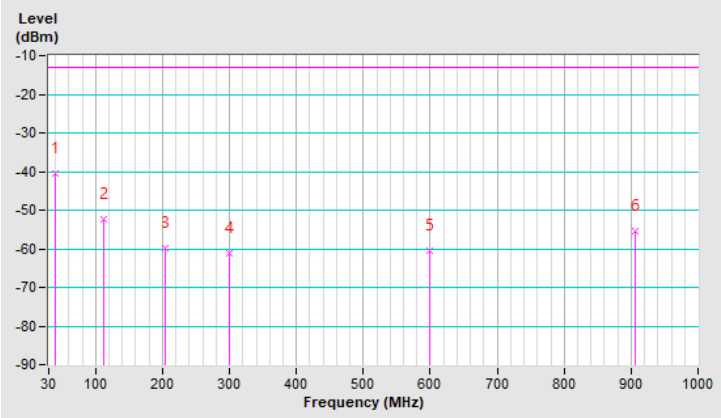


Mode	TX channel 23230 (782.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	40.67	-40.59	-13.00	-27.59	1.00 V	133	66.29	-106.88
2	112.45	-52.47	-13.00	-39.47	1.25 V	168	56.66	-109.13
3	203.63	-59.86	-13.00	-46.86	1.50 V	173	48.89	-108.75
4	299.66	-61.20	-13.00	-48.20	1.25 V	168	42.92	-104.12
5	598.42	-60.50	-13.00	-47.50	1.00 V	49	37.13	-97.63
6	905.91	-55.26	-13.00	-42.26	1.50 V	338	36.39	-91.65

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.



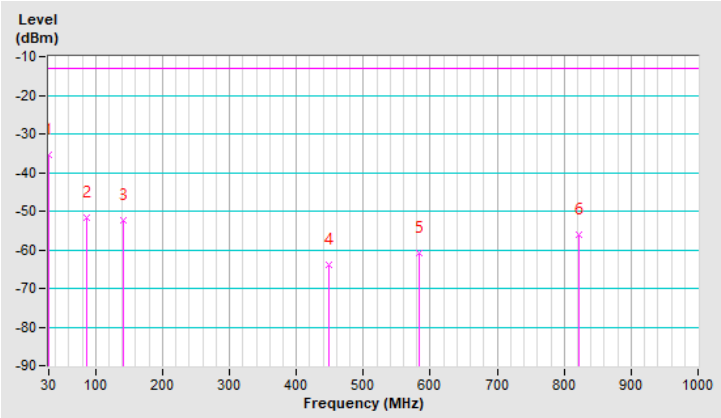
LTE Band 17, Channel Bandwidth 10MHz

Mode	TX channel 23800 (711.0MHz)	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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	**30.00**	**-35.26**	**-13.00**	**-22.26**	**1.25 H**	**200**	**72.37**	**-107.63**
2	87.23	-51.66	-13.00	-38.66	1.50 H	19	60.32	-111.98
3	141.55	-52.26	-13.00	-39.26	1.00 H	127	54.21	-106.47
4	449.04	-63.81	-13.00	-50.81	1.25 H	27	36.78	-100.59
5	583.87	-60.74	-13.00	-47.74	1.00 H	132	37.27	-98.01
6	821.52	-56.01	-13.00	-43.01	1.25 H	4	37.57	-93.58

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

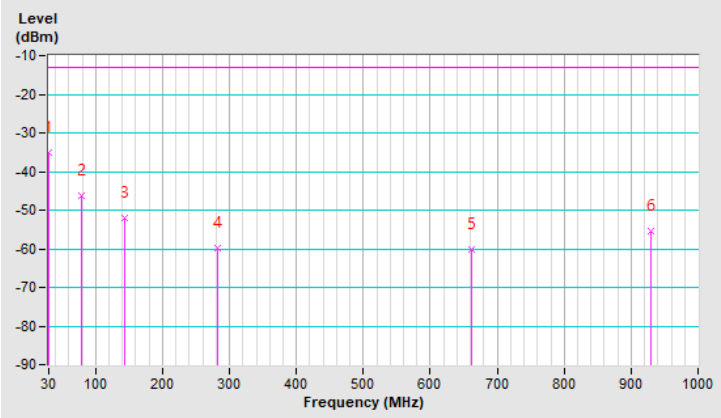


Mode	TX channel 23800 (711.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.00	-35.16	-13.00	-22.16	1.00 V	118	72.47	-107.63
2	79.47	-46.30	-13.00	-33.30	1.50 V	149	64.37	-110.67
3	143.49	-51.95	-13.00	-38.95	1.25 V	34	54.35	-106.30
4	282.20	-59.78	-13.00	-46.78	1.25 V	7	44.85	-104.63
5	661.47	-60.07	-13.00	-47.07	1.25 V	91	36.71	-96.78
6	930.16	-55.52	-13.00	-42.52	1.50 V	97	35.54	-91.06

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.



Above 1GHz

LTE Band 13, Channel Bandwidth 5MHz

Mode	TX channel 23205 (779.5MHz)	Frequency Range	1GHz ~ 8GHz
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	1559.00	-48.10	-40.00	-8.10	2.05 H	103	51.80	-99.90
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	1559.00	-51.10	-40.00	-11.10	1.32 V	48	48.80	-99.90

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 23230 (782.0MHz)	Frequency Range	1GHz ~ 8GHz
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	**1564.00**	**-48.00**	**-40.00**	**-8.00**	**2.06 H**	**103**	**51.90**	**-99.90**
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	1564.00	-51.10	-40.00	-11.10	1.28 V	52	48.80	-99.90

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 23255 (784.5MHz)	Frequency Range	1GHz ~ 8GHz
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	1569.00	-48.10	-40.00	-8.10	2.02 H	107	51.90	-100.00
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	1569.00	-51.20	-40.00	-11.20	1.31 V	53	48.80	-100.00

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

LTE Band 13, Channel Bandwidth 10MHz

Mode	TX channel 23230 (782.0MHz)	Frequency Range	1GHz ~ 8GHz
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	1564.00	-48.10	-40.00	-8.10	2.12 H	109	51.80	-99.90
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	1564.00	-51.00	-40.00	-11.00	1.26 V	53	48.90	-99.90

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

LTE Band 17, Channel Bandwidth 5MHz

Mode	TX channel 23755 (706.5MHz)	Frequency Range	1GHz ~ 18GHz
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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1413.00	-35.18	-13.00	-22.18	1.54 H	66	69.89	-105.07
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1413.00	-32.88	-13.00	-19.88	1.46 V	89	72.19	-105.07

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 23790 (710.0MHz)	Frequency Range	1GHz ~ 18GHz
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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1420.00	-35.31	-13.00	-22.31	1.51 H	62	69.75	-105.06
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1420.00	-32.88	-13.00	-19.88	1.51 V	92	72.18	-105.06

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 23825 (713.5MHz)	Frequency Range	1GHz ~ 18GHz
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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1427.00	-35.11	-13.00	-22.11	1.57 H	68	69.94	-105.05
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1427.00	-33.33	-13.00	-20.33	1.43 V	85	71.72	-105.05

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

LTE Band 17, Channel Bandwidth 10MHz

Mode	TX channel 23780 (709.0MHz)	Frequency Range	1GHz ~ 18GHz
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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1418.00	-35.27	-13.00	-22.27	1.58 H	67	69.79	-105.06
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1418.00	-33.18	-13.00	-20.18	1.58 V	67	71.88	-105.06

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 23790 (710.0MHz)	Frequency Range	1GHz ~ 18GHz
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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1420.00	-35.29	-13.00	-22.29	1.56 H	63	69.77	-105.06
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1420.00	-32.94	-13.00	-19.94	1.42 V	93	72.12	-105.06

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 23800 (711.0MHz)	Frequency Range	1GHz ~ 18GHz
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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1422.00	-35.08	-13.00	-22.08	1.59 H	62	69.97	-105.05
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	**1422.00**	**-32.69**	**-13.00**	**-19.69**	**1.41 V**	**94**	**72.36**	**-105.05**

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

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 and approved 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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