FCC Test Report
(Part 90)

Report No.:	RFBEKK-WTW-P20080111-4
FCC ID:	2AARN-DLWPH-8M
Test Model:	DLWPH-8M
Series Model:	DLWPH-8M-RW
Received Date:	Aug. 06, 2020
Test Date:	Sep. 03, 2020 ~ Oct. 14, 2020
Issued Date:	Oct. 21, 2020
Applicant:	PHIHONG TECHNOLOGY CO. LTD.
Address:	No.568, Fu Xing 3rd Rd., Guishan, Tao Yuan Hsien, 333 Taiwan
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
RFBEKK-WTW-P20080111-4	Original Release	Oct. 21, 2020

1 Certificate of Conformity

Product:	EV charging system module 4G with WI-FI
Brand:	Phihong Technology Co., Ltd.
Test Model:	DLWPH-8M
Series Model:	DLWPH-8M-RW
Sample Status:	Engineering Sample
Applicant:	PHIHONG TECHNOLOGY CO. LTD.
Test Date:	Sep. 03, 2020 ~ Oct. 14, 2020
Standards:	FCC Part 90, Subpart I, R

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:** Oct. 21, 2020

Lena Wang / Specialist

Approved by : , **Date:** Oct. 21, 2020

Dylan Chiou / Senior Project Engineer

2 Summary of Test Results

LTE Band 14

Applied Standard: FCC Part 90 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 90.542 (a)	Effective Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
2.1055 90.539 (e)	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth (*)	Pass	Meet the requirement of limit.
90.210 (n) & (b)	Emission Masks	Pass	Meet the requirement of limit.
2.1051 90.543 (e) (2) & (3)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 90.543 (c) & (f)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 90.543 (c) & (f)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -7.10 dB at 1581.00 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	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 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.	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. 08, 2019	Nov. 07, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 07, 2019	Nov. 06, 2020
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
Loop Antenna EMCI	EM-6879	269	Sep. 18, 2019	Sep. 17, 2020
			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. 18, 2019	Sep. 17, 2020
			Sep. 09, 2020	Sep. 08, 2021
DC Power Supply Topward	33010D	807748	NA	NA

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	EV charging system module 4G with WI-FI		
Brand	Phihong Technology Co., Ltd.		
Test Model	DLWPH-8M		
Series Model	DLWPH-8M-RW		
Model Difference	Refer to Note as below		
Sample Status	Engineering Sample		
Power Supply Rating	10Vdc~35Vdc (for DC power supply)		
Modulation Type	QPSK, 16QAM		
Operating Frequency	LTE Band 14 (Channel Bandwidth 5MHz)	790.5MHz ~ 795.5MHz	
	LTE Band 14 (Channel Bandwidth 10MHz)	793MHz	
Max. ERP Power		QPSK	16QAM
	LTE Band 14 (Channel Bandwidth 5MHz)	72.946mW (18.63dBm)	53.580mW (17.29dBm)
	LTE Band 14 (Channel Bandwidth 10MHz)	68.391mW (18.35dBm)	60.395mW (17.81dBm)
Emission Designator		QPSK	16QAM
	LTE Band 14 (Channel Bandwidth 5MHz)	4M49G7D	4M49D7W
	LTE Band 14 (Channel Bandwidth 10MHz)	8M94G7D	8M94D7W
Antenna Type	Refer to Note as below		
Antenna Connector	Refer to Note as below		
Accessory Device	NA		
Cable Supplied	NA		

Note:

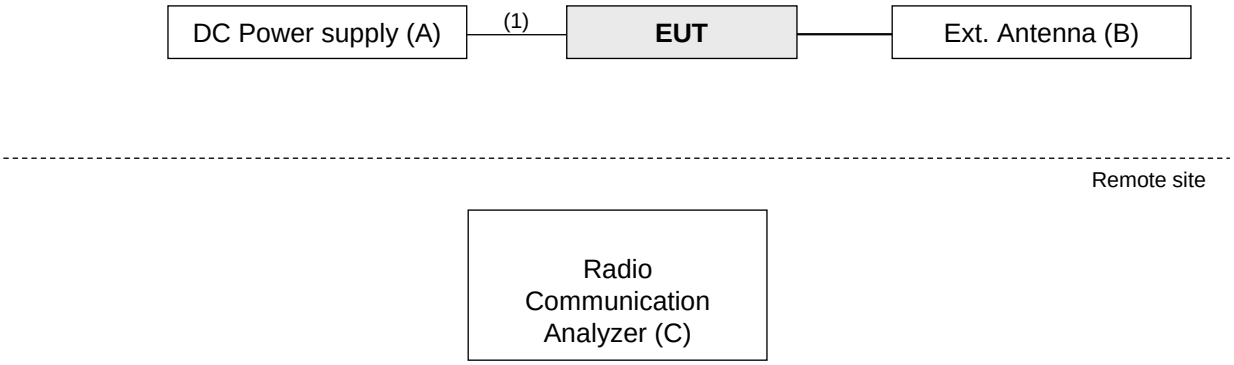
1. All models are listed as below.

Brand	Model	Difference of WLAN Antenna type
Phihong Technology Co., Ltd.	DLWPH-8M	internal antenna
	DLWPH-8M-RW	external antenna

2. The following antennas were provided to the EUT.

Brand	Model	Antenna Gain(dBi)	Antenna Type	Connector Type
Gortec	DR0727-4201BSM	-3.11	PCB	SMA Male

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	33010D	807748	NA	-
B.	Ext. Antenna	Gortec	DR0727-4201BSM	NA	NA	Provided by client
C.	Radio Communication Analyzer	Anritsu	MT8821C	6201462755	NA	-

Note:

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

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

3.3 Test Mode Applicability and Tested Channel Detail

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

LTE Band 14

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	23305 to 23355	23305(790.5MHz), 23330(793.0MHz), 23355(795.5MHz)	5MHz	QPSK / 16QAM	1 RB / 12 RB Offset
		23330	23330(793.0MHz)	10MHz	QPSK / 16QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	23330	23330(793.0MHz)	10MHz	QPSK / 16QAM	50RB / 0RB Offset
-	Frequency Stability	23305 to 23355	23305(790.5MHz), 23355(795.5MHz)	5MHz	QPSK	25RB / 0RB Offset
		23330	23330(793.0MHz)	10MHz	QPSK	50RB / 0RB Offset
-	Occupied Bandwidth	23305 to 23355	23305(790.5MHz), 23330(793.0MHz), 23355(795.5MHz)	5MHz	QPSK / 16QAM	25RB / 0RB Offset
		23330	23330(793.0MHz)	10MHz	QPSK / 16QAM	50RB / 0RB Offset
-	Emission Mask	23305 to 23355	23305(790.5MHz), 23330(793.0MHz), 23355(795.5MHz)	5MHz	QPSK	25RB / 0RB Offset
		23330	23330(793.0MHz)	10MHz	QPSK	50RB / 0RB Offset
-	Band Edge	23305 to 23355	23305(790.5MHz), 23355(795.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB /24 RB Offset 25RB / 0RB Offset
		23330	23330(793.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50RB / 0RB Offset
-	Conducted Emission	23305 to 23355	23305(790.5MHz), 23330(793.0MHz), 23355(795.5MHz)	5MHz	QPSK	1 RB / 12 RB Offset
		23330	23330(793.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission below 1GHz	23305 to 23355	23305(790.5MHz)	5MHz	QPSK	1 RB / 12 RB Offset
-	Radiated Emission above 1GHz	23305 to 23355	23305(790.5MHz), 23330(793.0MHz), 23355(795.5MHz)	5MHz	QPSK	1 RB / 12 RB Offset
		23330	23330(793.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

Note:

1. The conducted output power for QPSK and 16QAM, measured value of QPSK is higher than 16QAM mode. Therefore, only ERP, Modulation characteristics and occupied bandwidth items had been tested under QPSK and 16QAM modes, the other test items were performed under QPSK mode only.
2. For radiated emission below 1GHz, select the worst radiated emission (above 1GHz) channel for final testing.
3. For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5MHz & highest channel bandwidth for final test.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP	25deg. C, 70%RH	120Vac, 60Hz	Tank Wu
Modulation characteristics	24deg. C, 64%RH	120Vac, 60Hz	Tank Wu
Frequency Stability	24deg. C, 64%RH	120Vac, 60Hz	Tank Wu
Occupied Bandwidth	24deg. C, 64%RH	120Vac, 60Hz	Tank Wu
Emission Mask	24deg. C, 64%RH	120Vac, 60Hz	Tank Wu
Band Edge	24deg. C, 64%RH	120Vac, 60Hz	Tank Wu
Conducted Emission	24deg. C, 64%RH	120Vac, 60Hz	Tank Wu
Radiated Emission	23deg. C, 66%RH 23deg. C, 67%RH	120Vac, 60Hz	Noah Chang, 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:

Test Standard:

FCC 47 CFR Part 2
FCC 47 CFR Part 90
ANSI 63.26-2015

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

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01
KDB 971168 D02 Misc Rev Approv License Devices v02r01
ANSI/TIA/EIA-603-E 2016

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

LTE Band 14:
Control stations and mobile stations transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 30 watts ERP.
Portable stations (hand-held devices) transmitting in the 758-768 MHz band and the 788-798 MHz 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.

ERP or EIRP = PMeas + GT

Where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as PMeas, e.g., dBm or dBW)
PMeas measured transmitter output power or PSD, in dBm or dBW
GT gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

4.1.3 Test Setup

Conducted Power Measurement:

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

4.1.4 Test Results

Conducted Output Power (dBm)

LTE Band 14						
BW	MCS Index	Channel		23305	23330	23355
		Frequency (MHz)		790.5	793	795.5
5M	QPSK	1	0	23.48	23.74	23.77
		1	12	23.69	**23.89**	23.66
		1	24	23.53	23.59	23.82
		12	0	22.94	22.75	22.79
		12	6	22.99	22.85	22.88
		12	13	22.77	22.84	22.78
		25	0	22.85	22.86	22.90
	16QAM	1	0	**22.55**	22.37	22.51
		1	12	22.51	22.18	22.38
		1	24	22.45	22.24	22.48
		12	0	21.71	21.64	21.93
		12	6	21.76	21.72	21.93
		12	13	21.75	21.61	21.83
		25	0	21.85	21.75	21.89

LTE Band 14				
BW	MCS Index	Channel		23330
		Frequency (MHz)		793
10M	QPSK	1	0	**23.61**
		1	24	23.58
		1	49	23.53
		25	0	22.89
		25	12	22.86
		25	25	22.74
		50	0	22.78
	16QAM	1	0	22.95
		1	24	**23.07**
		1	49	22.74
		25	0	21.87
		25	12	21.83
		25	25	21.68
		50	0	21.79

ERP Power (dBm)

LTE Band 14						
BW	MCS Index	Channel		23305	23330	23355
		Frequency (MHz)		790.5	793	795.5
5M	QPSK	1	0	18.22	18.48	18.51
		1	12	18.43	**18.63**	18.40
		1	24	18.27	18.33	18.56
		12	0	17.68	17.49	17.53
		12	6	17.73	17.59	17.62
		12	13	17.51	17.58	17.52
		25	0	17.59	17.60	17.64
	16QAM	1	0	**17.29**	17.11	17.25
		1	12	17.25	16.92	17.12
		1	24	17.19	16.98	17.22
		12	0	16.45	16.38	16.67
		12	6	16.50	16.46	16.67
		12	13	16.49	16.35	16.57
		25	0	16.59	16.49	16.63

LTE Band 14				
BW	MCS Index	Channel		23330
		Frequency (MHz)		793
10M	QPSK	1	0	**18.35**
		1	24	18.32
		1	49	18.27
		25	0	17.63
		25	12	17.60
		25	25	17.48
		50	0	17.52
	16QAM	1	0	17.69
		1	24	**17.81**
		1	49	17.48
		25	0	16.61
		25	12	16.57
		25	25	16.42
		50	0	16.53

*ERP = Conducted + antenna gain (-3.11dBi)-2.15

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

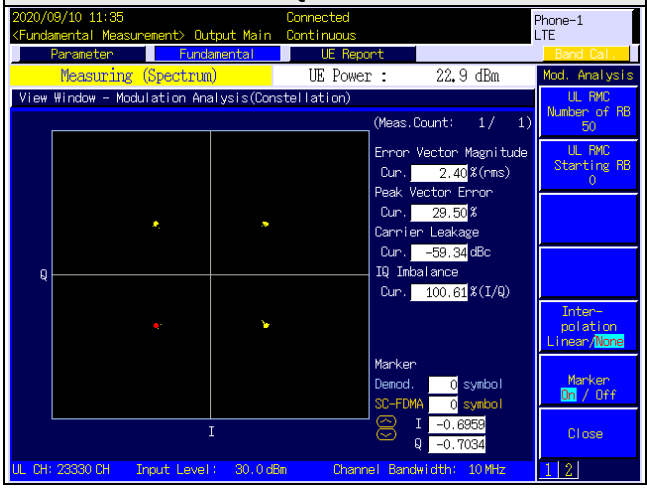
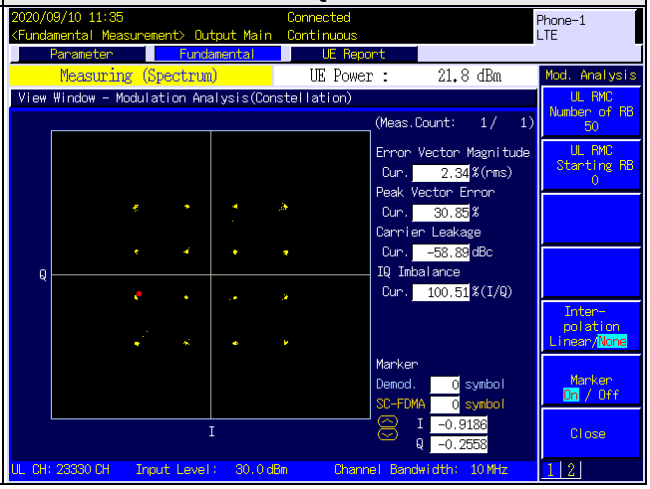
N/A

4.2.2 Test Procedure

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

4.2.3 Test Setup

4.2.4 Test Results

LTE Band 14	
Spectrum Plot of Measurement Value	
Channel: 23330 / Frequency (MHz): 793.0MHz	
QPSK	16QAM
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

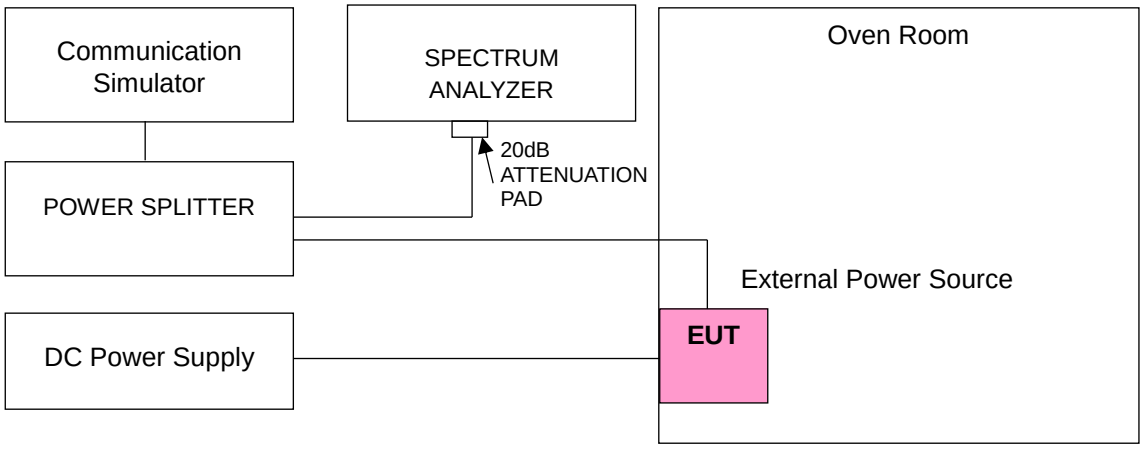
LTE Band 14:
The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked.

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 14			
	Channel Bandwidth: 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
12	790.500001	0.002	795.500003	0.004
10	790.500001	0.002	795.500001	0.002
35	790.500002	0.002	795.500002	0.002

Note: The applicant defined the normal working voltage is from 10Vdc to 35Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 14			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	790.500001	0.002	795.500003	0.004
-30	790.500001	0.002	795.500002	0.003
-20	790.500002	0.003	795.500002	0.003
-10	790.500004	0.005	795.500002	0.002
0	790.500004	0.005	795.500003	0.003
10	790.500001	0.001	795.500003	0.004
20	790.499999	-0.001	795.499998	-0.003
30	790.499996	-0.005	795.499997	-0.003
40	790.499997	-0.004	795.499998	-0.003
50	790.499996	-0.005	795.499997	-0.003
60	790.499997	-0.004	795.499998	-0.003
70	790.499996	-0.005	795.499998	-0.003
80	790.499997	-0.004	795.499998	-0.003
85	790.499998	-0.002	795.499998	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 14	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
12	793.000004	0.005
10	793.000004	0.005
35	793.000003	0.004

Note: The applicant defined the normal working voltage is from 10Vdc to 35Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 14	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
-40	793.000002	0.003
-30	793.000004	0.005
-20	793.000002	0.002
-10	793.000003	0.004
0	793.000002	0.003
10	793.000003	0.003
20	792.999999	-0.002
30	792.999998	-0.002
40	792.999999	-0.002
50	792.999999	-0.002
60	792.999999	-0.002
70	792.999998	-0.002
80	792.999997	-0.004
85	792.999998	-0.003

4.4 Occupied Bandwidth Measurement

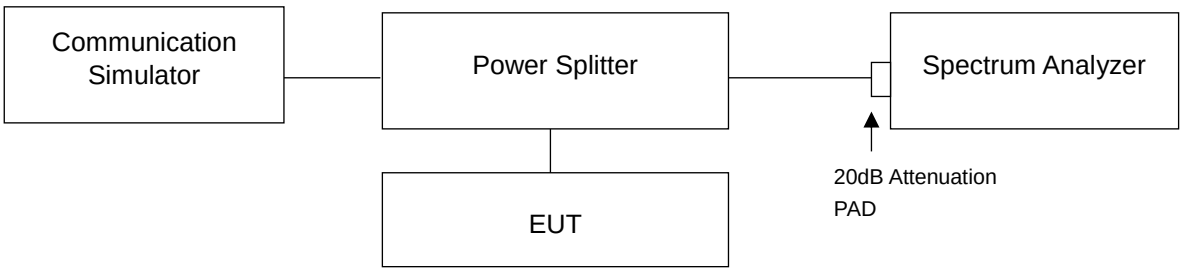
4.4.1 Limits of Occupied Bandwidth Measurement

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.4.2 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW = 100kHz and VBW = 300kHz (Channel Bandwidth: 5MHz), RBW = 200kHz and VBW = 1MHz (Channel Bandwidth: 10MHz). The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

4.4.3 Test Setup

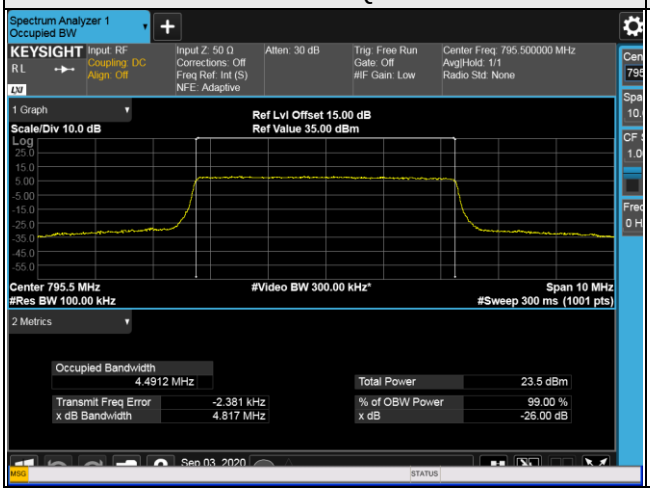
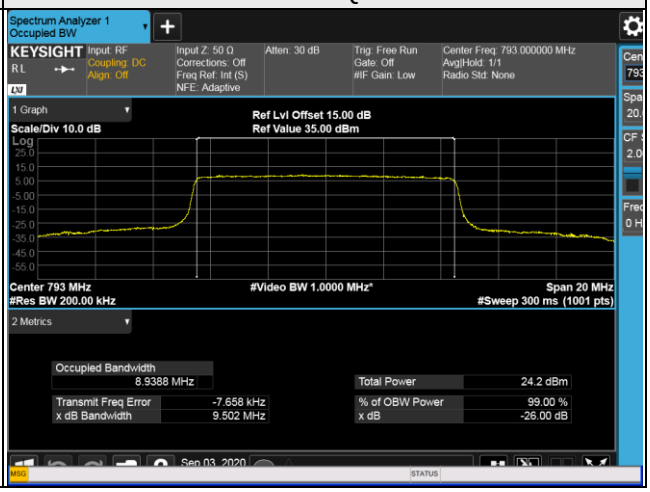


4.4.4 Test Result

Occupied Bandwidth

LTE Band 14, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
23305	790.5	4.49	4.49
23330	793	4.48	4.49
23355	795.5	4.49	4.49

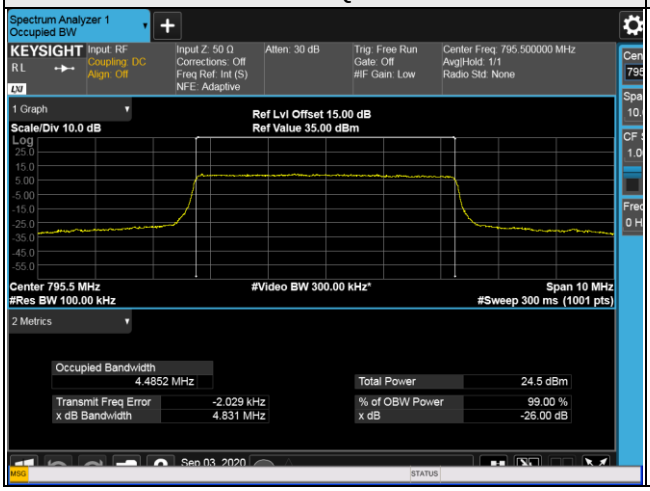
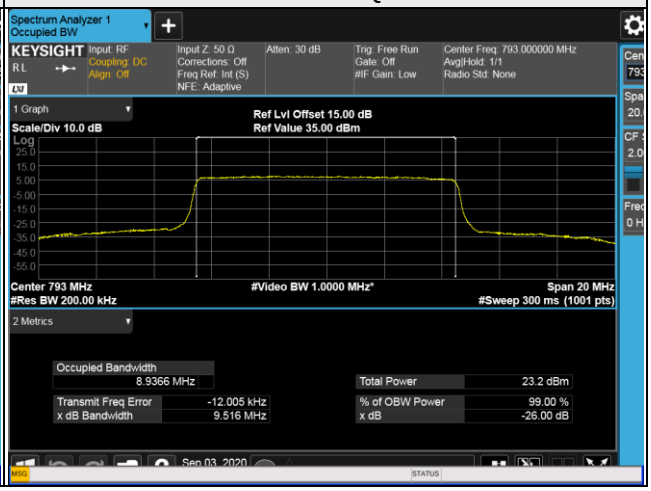
LTE Band 14, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM
23330	793	8.94	8.94

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

26dB Bandwidth

LTE Band 14, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
23305	790.5	4.82	4.80
23330	793	4.80	4.81
23355	795.5	4.83	4.82

LTE Band 14, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	
		QPSK	16QAM
23330	793	9.50	9.52

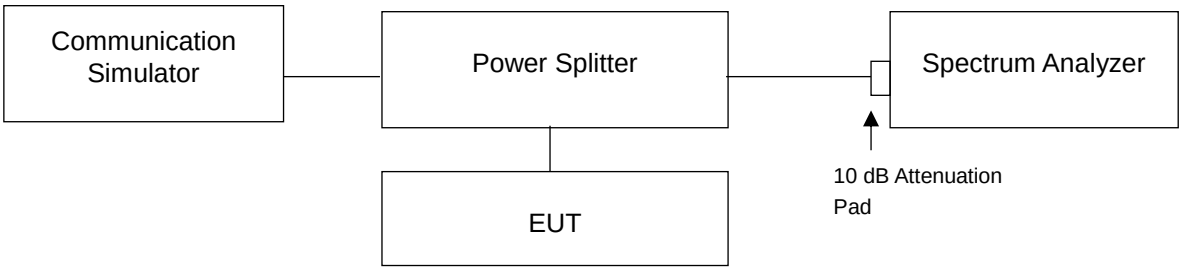
Spectrum Plot of Worst Value	
5MHz / QPSK	10MHz / 16QAM
	

4.5 Emission Mask Measurement

4.5.1 Limits of Emission Mask Measurement

LTE Band 14:
According to FCC part 90.210 (b) shall be tested the emission mask. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:
(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

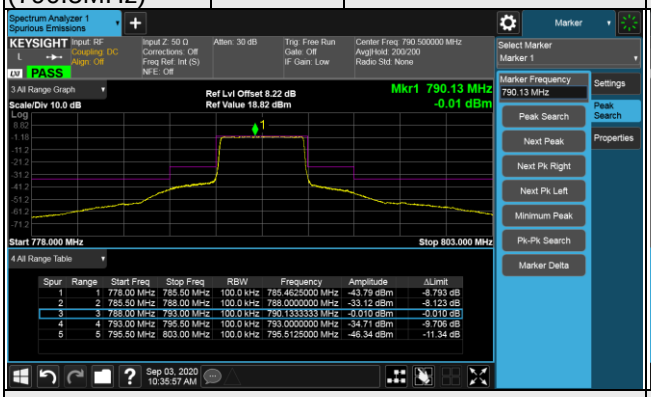
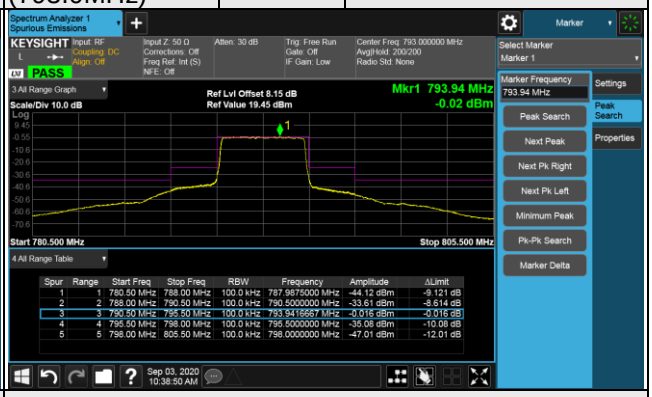
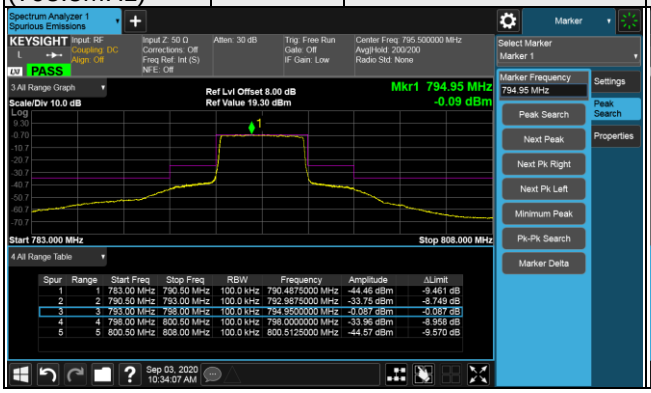
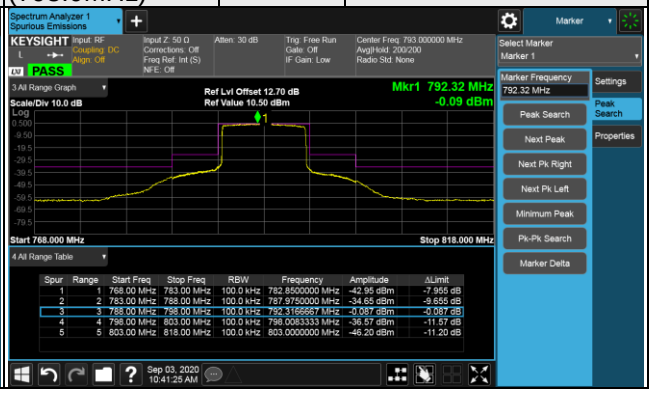
4.5.2 Test Setup



4.5.3 Test Procedures

a. The measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
b. Record the test plot.

4.5.4 Test Results

LTE Band 14					
Channel Bandwidth: 5MHz			Channel Bandwidth: 5MHz		
Channel 23305 (790.5MHz)	QPSK	Full RB	Channel 23330 (793.0MHz)	QPSK	Full RB
					
Channel Bandwidth: 5MHz			Channel Bandwidth: 10MHz		
Channel 23355 (795.5MHz)	QPSK	Full RB	Channel 23330 (793.0MHz)	QPSK	Full RB
					

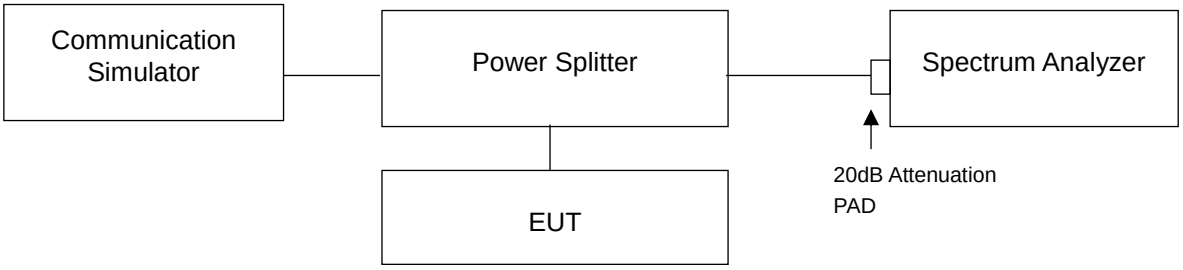
4.6 Band Edge Measurement

4.6.1 Limits of Band Edge Measurement

(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

(2) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

4.6.2 Test Setup



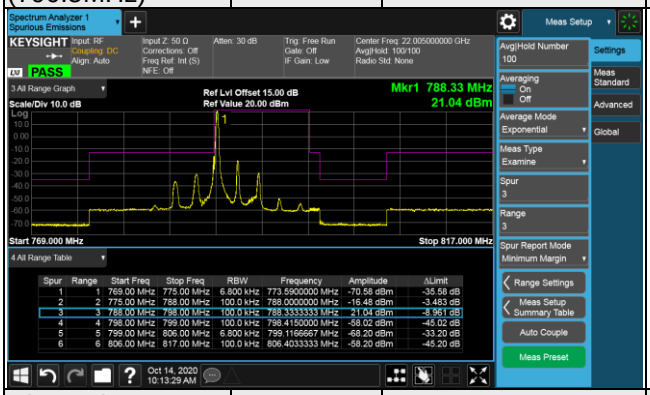
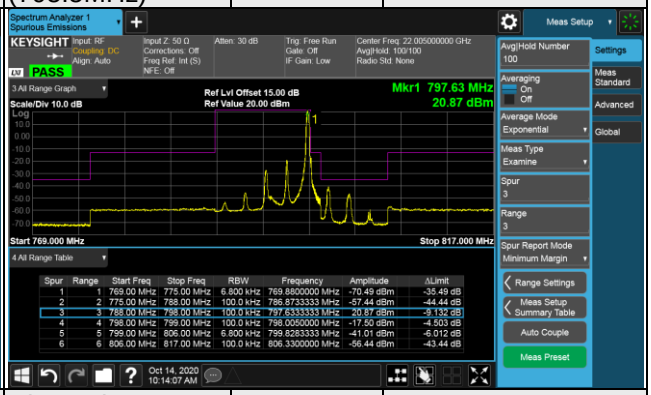
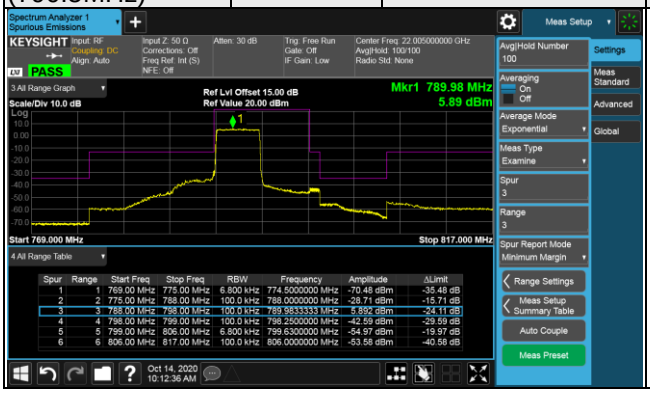
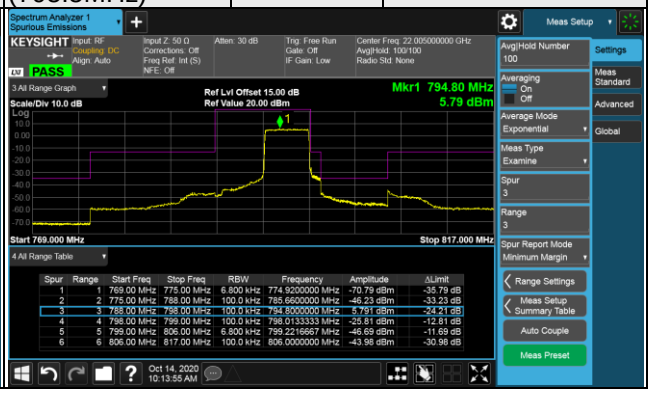
4.6.3 Test Procedures

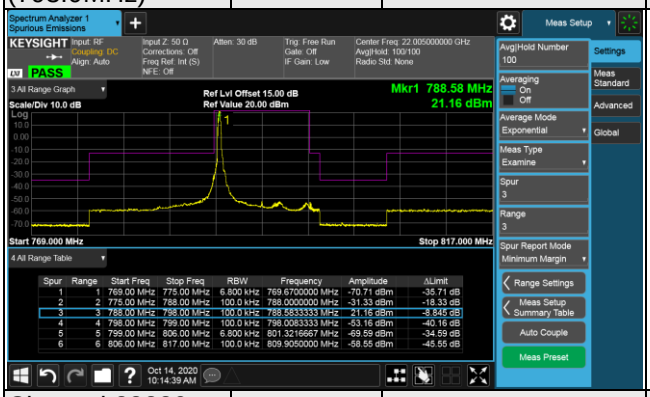
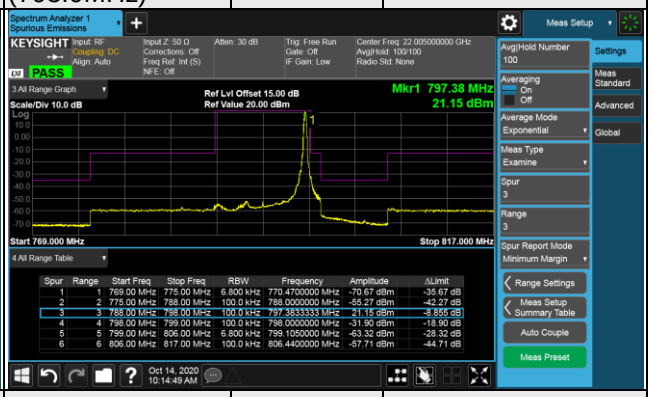
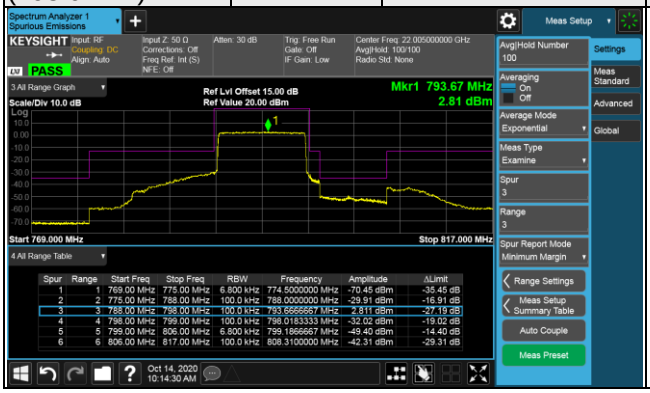
a. All measurements were done at low and high operational frequency range.

b. The band edge measurement used the power splitter via EUT RF power connector between signal generator and spectrum analyzer. This splitter loss, attenuator loss and cable loss are the worst loss 21 dB in the transmitted path track. Measurement method refers to FCC part 90.543 (e).

c. Record the max trace plot into the test report.

4.6.4 Test Results

LTE Band 14, Channel Bandwidth 5MHz					
Channel 23305 (790.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 23355 (795.5MHz)	QPSK	1 RB / 24 RB Offset
					
Channel 23305 (790.5MHz)	QPSK	25 RB / 0 RB Offset	Channel 23355 (795.5MHz)	QPSK	25 RB / 0 RB Offset
					

LTE Band 14, Channel Bandwidth 10MHz					
Channel 23330 (793.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 23330 (793.0MHz)	QPSK	1 RB / 49 RB Offset
					
Channel 23330 (793.0MHz)	QPSK	50 RB / 0 RB Offset			
					

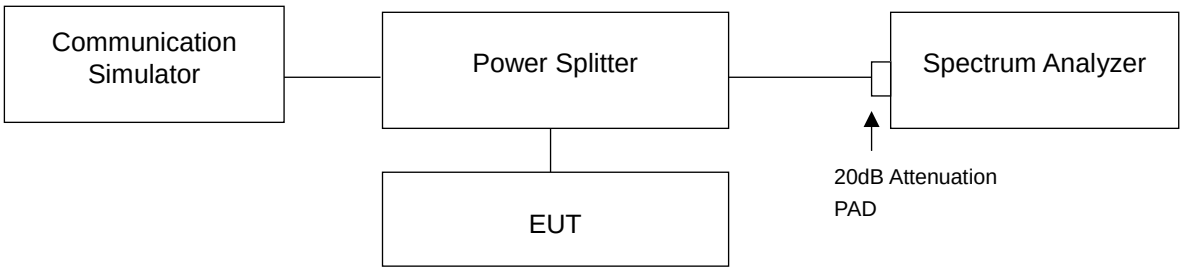
4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 $\log_{10}$(P) dB. The limit of emission equal to –13dBm.

For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to −70 dBW/MHz. The limit of emissions is equal to -40 dBm.

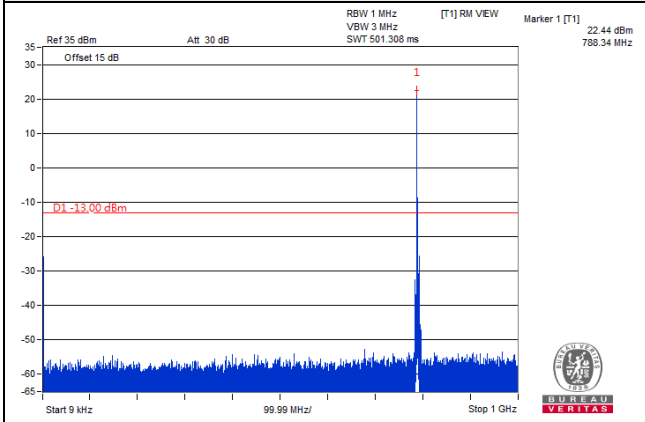
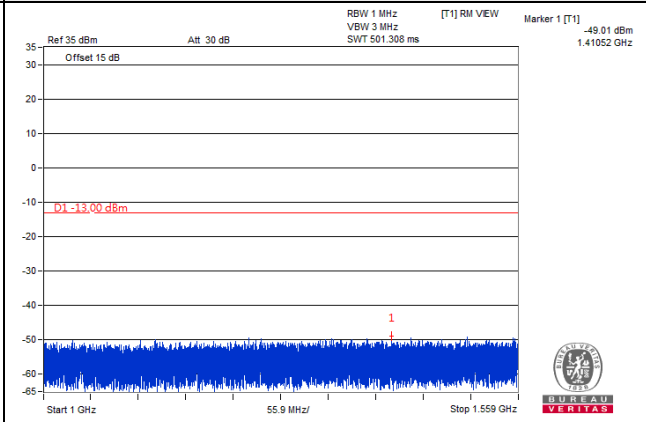
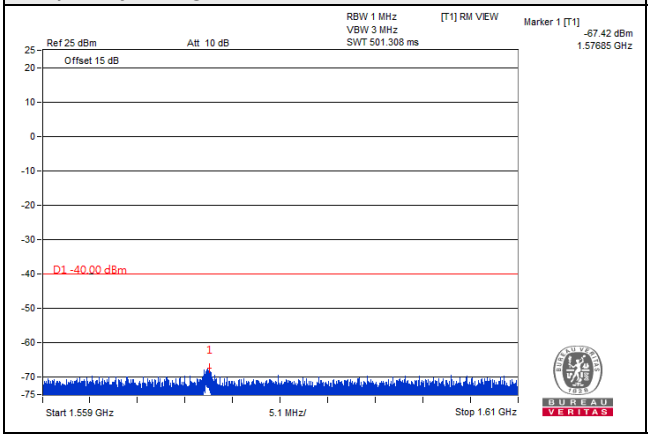
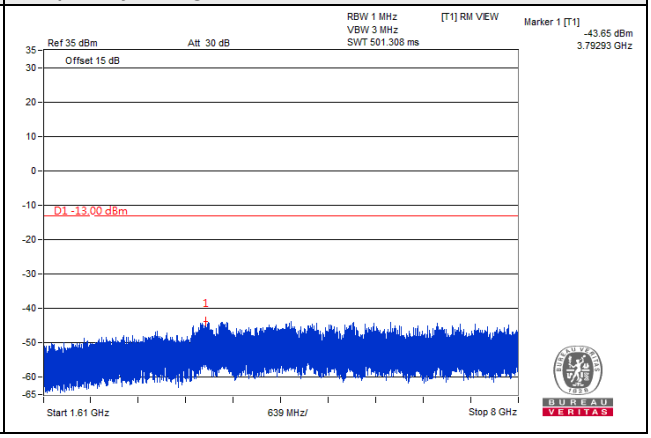
4.7.2 Test Setup

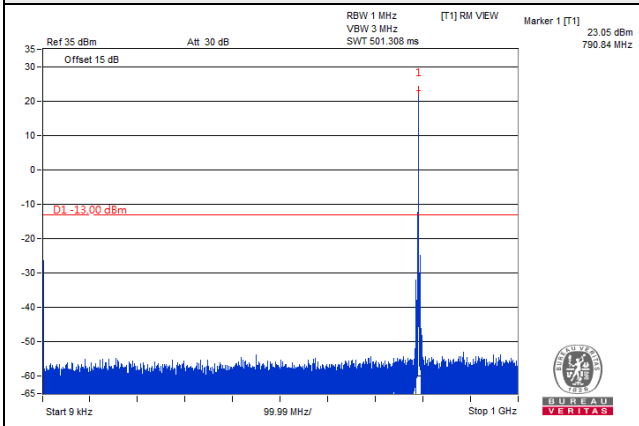
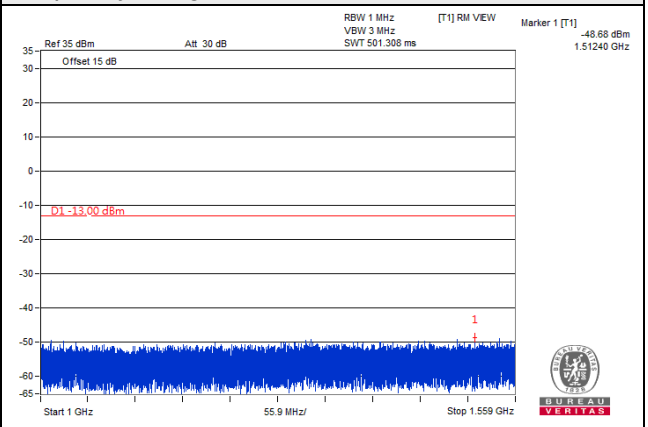
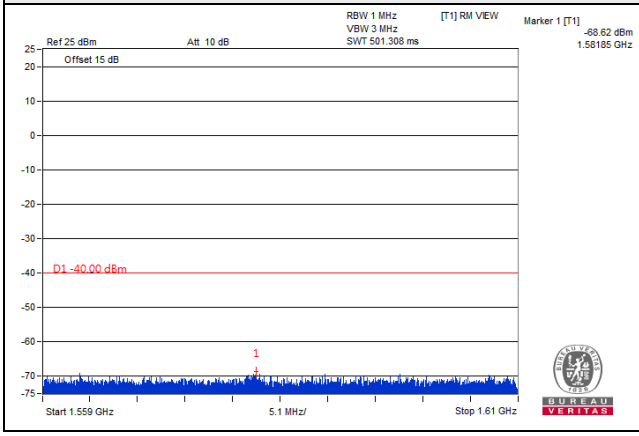
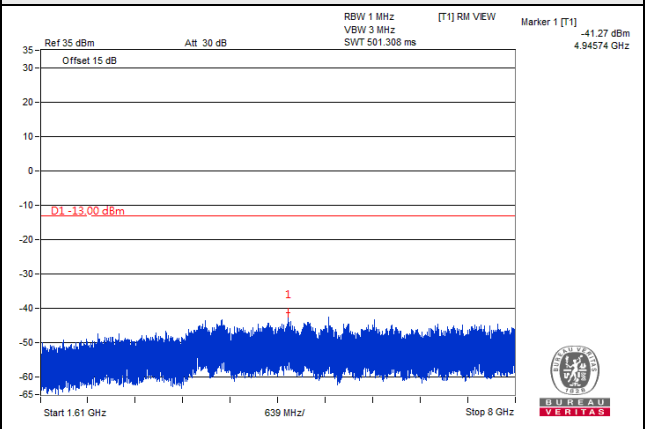


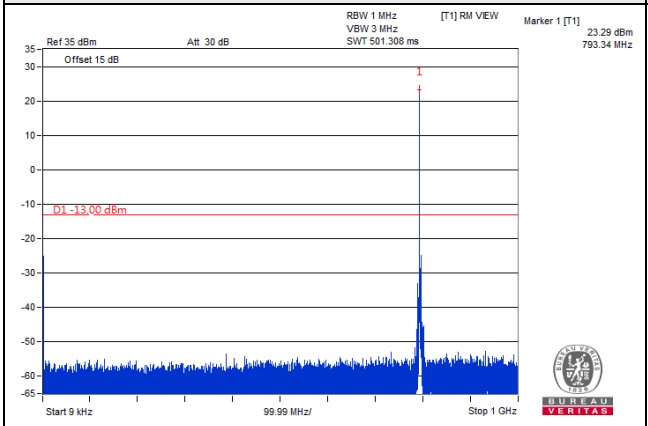
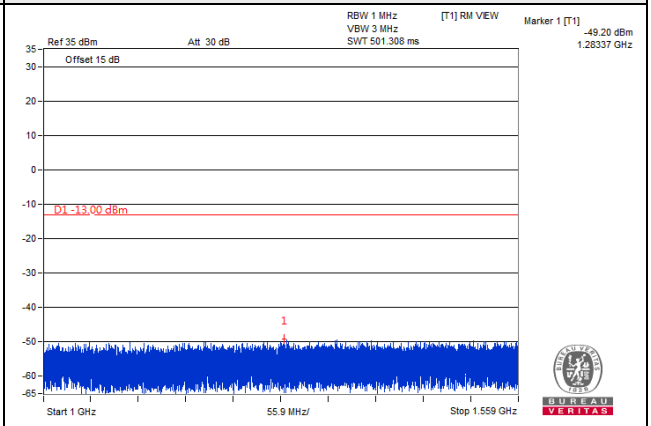
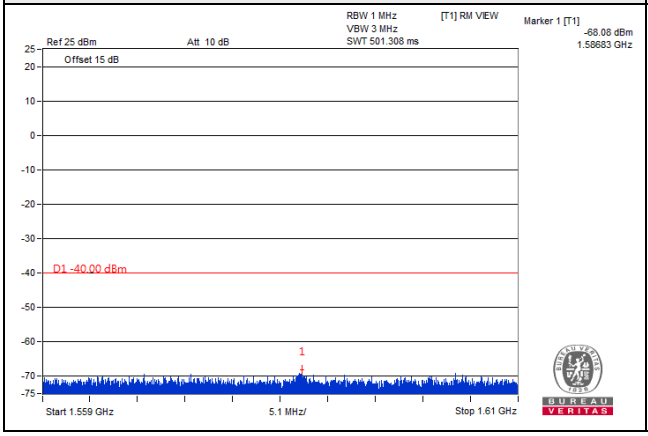
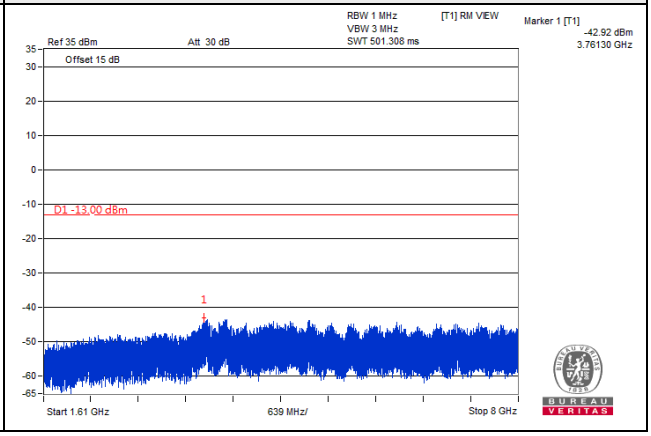
4.7.3 Test Procedure

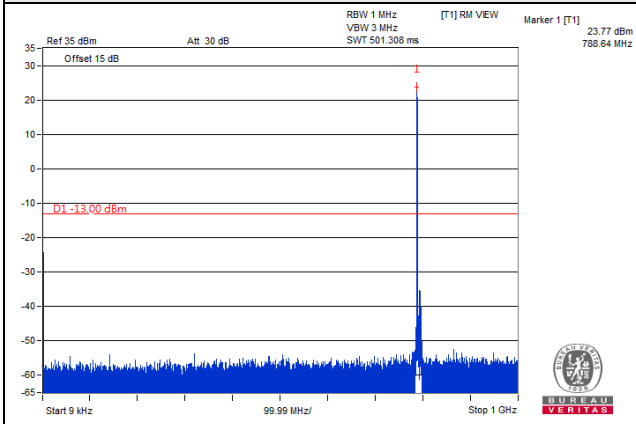
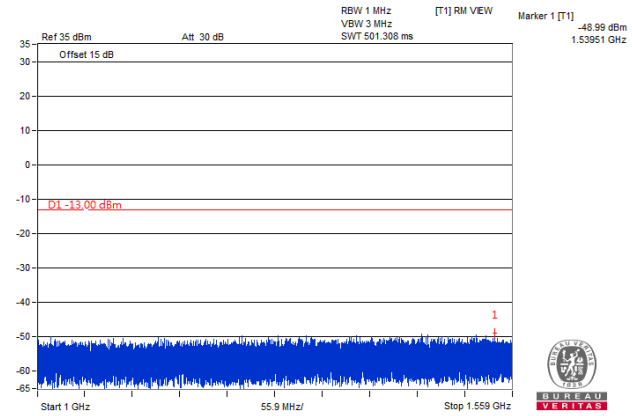
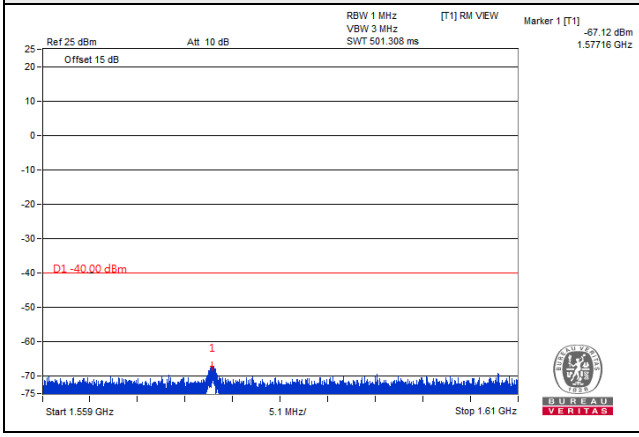
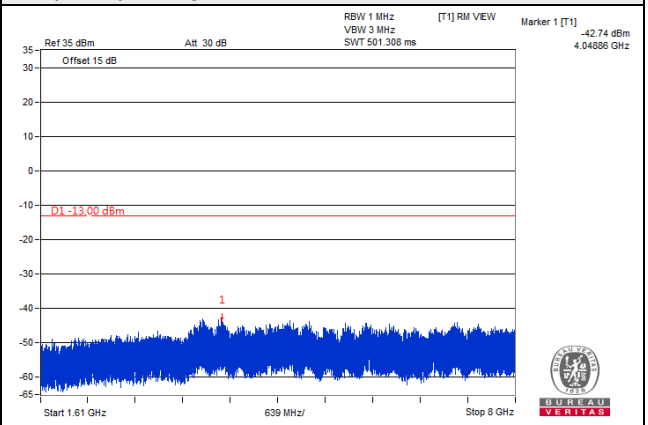
a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with Agilent Spectrum Analyzer.
b. The conducted spurious emission used the power splitter via EUT RF power connector between signal generator and spectrum analyzer.
c. When the spectrum scanned from 9 kHz to 8GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz are used for conducted emission measurement.

4.7.4 Test Results

LTE Band 14, Channel Band width: 5MHz	
Channel 23305 (790.5MHz)	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~1.559GHz
	
Frequency Range : 1.559GHz~1.61GHz	Frequency Range : 1.61GHz~8GHz
	

LTE Band 14, Channel Band width: 5MHz	
Channel 23330 (793.0MHz)	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~1.559GHz
	
Frequency Range : 1.559GHz~1.61GHz	Frequency Range : 1.61GHz~8GHz
	

LTE Band 14, Channel Band width: 5MHz	
Channel 23355 (795.5MHz)	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~1.559GHz
	
Frequency Range : 1.559GHz~1.61GHz	Frequency Range : 1.61GHz~8GHz
	

LTE Band 14, Channel Band width: 10MHz	
Channel 23330 (793.0MHz)	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~1.559GHz
	
Frequency Range : 1.559GHz~1.61GHz	Frequency Range : 1.61GHz~8GHz
	

4.8 Radiated Emission Measurement

4.8.1 Limits of Radiated Emission Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 $\log_{10}$(P) dB. The limit of emission equal to –13dBm.

For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to −70 dBW/MHz. The limit of emissions is equal to -40 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 0.8m (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 1m to 4m 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 - 2.15dBi.

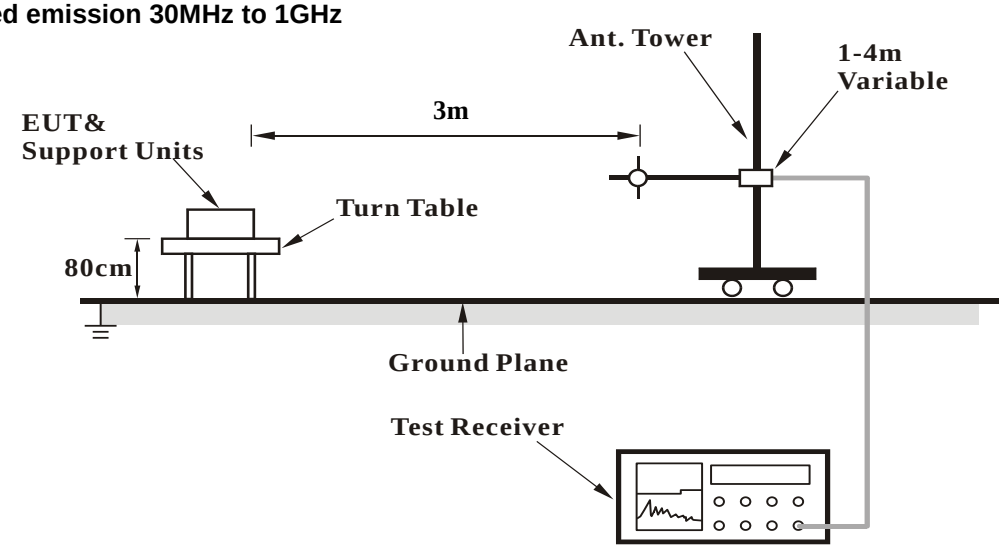
NOTE:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
   The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.8.3 Deviation from Test Standard

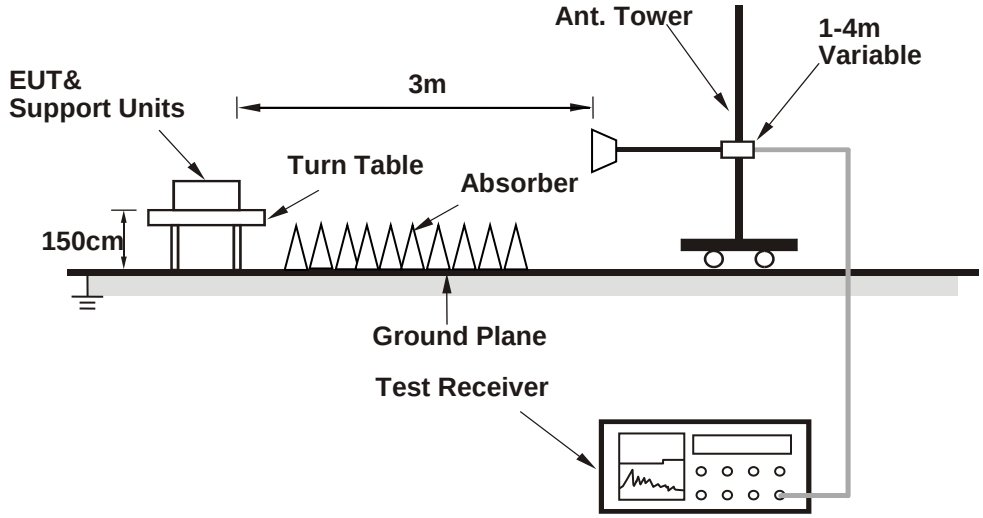
No deviation.

4.8.4 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).

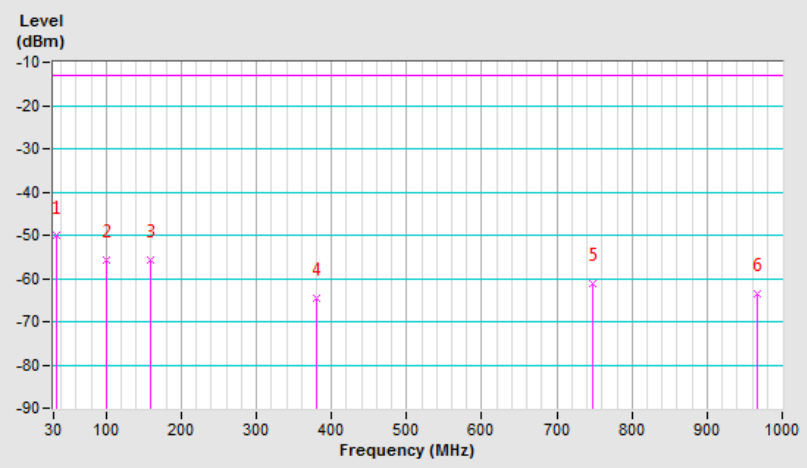
4.8.5 Test Results

Below 1GHz

LTE Band 14, Channel Bandwidth: 5MHz

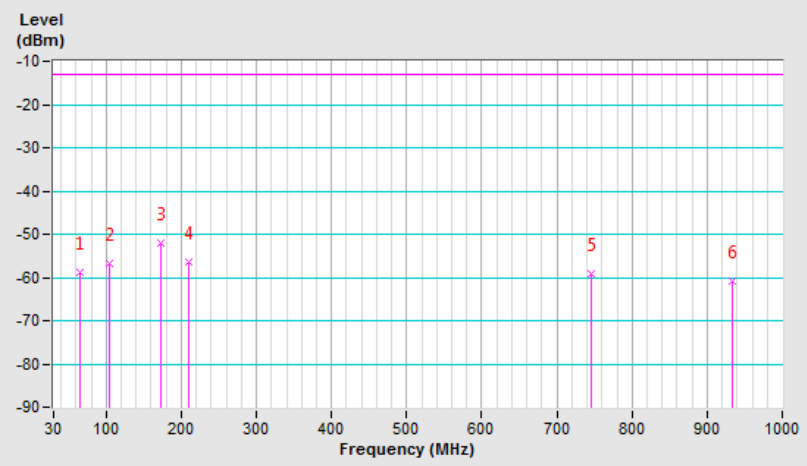
Mode	TX channel 23305 (790.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	33.88	-50.90	-38.50	-11.70	-50.20	-13.00	-37.20
2	99.84	-46.20	-56.80	0.90	-55.90	-13.00	-42.90
3	159.98	-48.30	-56.20	0.40	-55.80	-13.00	-42.80
4	379.20	-61.50	-70.00	5.30	-64.70	-13.00	-51.70
5	747.80	-62.60	-65.80	4.70	-61.10	-13.00	-48.10
6	967.02	-68.70	-67.30	3.90	-63.40	-13.00	-50.40



Mode	TX channel 23305 (790.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	64.92	-49.80	-52.60	-6.30	-58.90	-13.00	-45.90
2	103.72	-49.00	-57.60	0.70	-56.90	-13.00	-43.90
3	173.56	-49.60	-54.00	2.10	-51.90	-13.00	-38.90
4	210.42	-52.80	-61.70	5.40	-56.30	-13.00	-43.30
5	745.86	-62.70	-63.90	4.70	-59.20	-13.00	-46.20
6	934.04	-67.30	-64.70	3.90	-60.80	-13.00	-47.80



Above 1GHz

LTE Band 14, Channel Bandwidth: 5MHz

Mode	TX channel 23305 (790.5MHz)	Frequency Range	1 ~ 10GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1581.00	-60.00	-50.00	1.20	-48.80	-40.00	-8.80
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	**1581.00**	**-57.50**	**-48.30**	**1.20**	**-47.10**	**-40.00**	**-7.10**

Mode	TX channel 23330 (793.0MHz)	Frequency Range	1 ~ 10GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1586.00	-60.10	-50.00	1.10	-48.90	-40.00	-8.90
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1586.00	-57.60	-48.30	1.10	-47.20	-40.00	-7.20

Mode	TX channel 23355 (795.5MHz)	Frequency Range	1 ~ 10GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1591.00	-60.20	-50.10	1.10	-49.00	-40.00	-9.00
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1591.00	-57.90	-48.60	1.10	-47.50	-40.00	-7.50

LTE Band 14, Channel Bandwidth: 10MHz

Mode	TX channel 23330 (793.0MHz)	Frequency Range	1 ~ 10GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1586.00	-59.90	-49.80	1.10	-48.70	-40.00	-8.70
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1586.00	-57.70	-48.40	1.10	-47.30	-40.00	-7.30

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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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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