

Partial FCC Test Report

(PART 27)

Report No.: RFBHDI-WTW-P21120081-10

FCC ID: 2ATM8EG25G

Test Model: EG25-G MINIPCIE

Received Date: Dec. 24, 2021

Test Date: Jan. 19 ~ Mar. 29, 2022

Issued Date: Apr. 22, 2022

Applicant: Hawkeye Tech Co., Ltd.

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**FCC Registration /
Designation Number:** 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RFBHDI-WTW-P21120081-10	Original Release	Apr. 22, 2022

1 Certificate of Conformity

Product: LTE Module

Brand: Hawkeye Tech Co., Ltd.

Test Model: EG25-G MINIPCIE

Sample Status: Engineering Sample

Applicant: Hawkeye Tech Co., Ltd.

Test Date: Jan. 19 ~ Mar. 29, 2022

Standards: FCC Part 27, Subpart C, H, 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 : Lena Wang , Date: Apr. 22, 2022
Lena Wang / Specialist

Approved by : Jeremy Lin , Date: Apr. 22, 2022
Jeremy Lin / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2					
FCC Clause			Test Item	Result	Remarks
WCDMA B4 / LTE B4	LTE B12	LTE B13			
2.1046 27.50(d)	2.1046 27.50(c)	2.1046 27.50(b)	Equivalent Isotropically radiated power / Effective radiated power	Pass	Meet the requirement of limit.
2.1047	2.1047	2.1047	Modulation characteristics	N/A	Refer to note
2.1055 27.54	2.1055 27.54	2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	2.1049	2.1049	Emission Bandwidth	N/A	Refer to note
2.1051 27.53(h)	2.1051 27.53(g)	2.1051 27.53(c)	Out of Band Emission Measurements	N/A	Refer to note
27.50(d)(5)	--	--	Peak To Average Ratio	N/A	Refer to note
2.1051 27.53(h)	2.1051 27.53(g)	2.1051 27.53(c)(f)	Conducted Spurious Emissions	N/A	Refer to note
2.1053 27.53(h)	2.1053 27.53(g)	2.1053 27.53(c)(f)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -29.34 dB at 30.97 MHz.

Note:

1. This report is a partial report. Therefore, only test item of Effective Radiated Power / Effective Isotropic Radiated Power and Radiated Spurious Emissions tests were performed for this report. Other testing data please refer to SGS report no.: HR/2019/1001601 for module (Brand: Quectel, Model: EG25-G MINIPCIE).
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	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Spectrum Analyzer Agilent	N9010A	MY52220207	Jan. 06, 2022	Jan. 05, 2023
Test Receiver Agilent	N9038A	MY51210203	Sep. 22, 2021	Sep. 21, 2022
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 14, 2021	Nov. 13, 2022
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Oct. 28, 2021	Oct. 27, 2022
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 13, 2021	Apr. 12, 2022
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 25, 2021	Nov. 24, 2022
Preamplifier EMCI	EMC 012645	980115	Oct. 05, 2021	Oct. 04, 2022
Preamplifier EMCI	EMC 330H	980112	Oct. 05, 2021	Oct. 04, 2022
RF Coaxial Cable EMCI	EMC104-SM-SM- 8000	171005	Oct. 05, 2021	Oct. 04, 2022
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM- 1000(140807)	Oct. 05, 2021	Oct. 04, 2022
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 05, 2021	Oct. 04, 2022
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA
Radio Communication Analyzer Anritsu	MT8820C	6201010284	Dec. 24, 2021	Dec. 23, 2022

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

2. The test was performed in HwaYa Chamber 10.

3 General Information

3.1 General Description of EUT

Product	LTE Module		
Brand	Hawkeye Tech Co., Ltd.		
Test Model	EG25-G MINIPCI-E		
Status of EUT	Engineering Sample		
Power Supply Rating	48Vdc (Adapter and PoE)		
Modulation Type	WCDMA	QPSK	
	LTE	QPSK, 16QAM	
Frequency Range	WCDMA	1712.4 ~ 1752.6 MHz	
	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	1710.7 ~ 1754.3 MHz	
	LTE Band 4 (Channel Bandwidth: 3 MHz)	1711.5 ~ 1753.5 MHz	
	LTE Band 4 (Channel Bandwidth: 5 MHz)	1712.5 ~ 1752.5 MHz	
	LTE Band 4 (Channel Bandwidth: 10 MHz)	1715.0 ~ 1750.0 MHz	
	LTE Band 4 (Channel Bandwidth: 15 MHz)	1717.5 ~ 1747.5 MHz	
	LTE Band 4 (Channel Bandwidth: 20 MHz)	1720.0 ~ 1745.0 MHz	
	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	699.7 ~ 715.3 MHz	
	LTE Band 12 (Channel Bandwidth: 3 MHz)	700.5 ~ 714.5 MHz	
	LTE Band 12 (Channel Bandwidth: 5 MHz)	701.5 ~ 713.5 MHz	
	LTE Band 12 (Channel Bandwidth: 10 MHz)	704.0 ~ 711.0 MHz	
	LTE Band 13 (Channel Bandwidth: 5 MHz)	779.5 ~ 784.5 MHz	
	LTE Band 13 (Channel Bandwidth: 10 MHz)	782.0 MHz	
Max. ERP Power		QPSK	16QAM
	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	129.122 mW (21.11dBm)	92.257 mW (19.65dBm)
	LTE Band 12 (Channel Bandwidth: 3 MHz)	121.060 mW (20.83dBm)	99.770 mW (19.99dBm)
	LTE Band 12 (Channel Bandwidth: 5 MHz)	127.350 mW (21.05dBm)	95.940 mW (19.82dBm)
	LTE Band 12 (Channel Bandwidth: 10 MHz)	128.529 mW (21.09dBm)	94.624 mW (19.76dBm)
	LTE Band 13 (Channel Bandwidth: 5 MHz)	142.233 mW (21.53dBm)	108.643 mW (20.36dBm)
	LTE Band 13 (Channel Bandwidth: 10 MHz)	148.252 mW (21.71dBm)	110.408 mW (20.43dBm)
Max. EIRP Power	WCDMA	338.844 mW (25.30dBm)	
		QPSK	16QAM
	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	256.448 mW (24.09dBm)	199.067 mW (22.99dBm)
	LTE Band 4 (Channel Bandwidth: 3 MHz)	266.073 mW (24.25dBm)	205.589 mW (23.13dBm)
	LTE Band 4 (Channel Bandwidth: 5 MHz)	260.615 mW (24.16dBm)	205.116 mW (23.12dBm)
	LTE Band 4 (Channel Bandwidth: 10 MHz)	270.396 mW (24.32dBm)	209.411 mW (23.21dBm)
	LTE Band 4 (Channel Bandwidth: 15 MHz)	285.102 mW (24.55dBm)	218.273 mW (23.39dBm)
	LTE Band 4 (Channel Bandwidth: 20 MHz)	292.415 mW (24.66dBm)	220.293 mW (23.43dBm)
Antenna Type	Dipole Antenna		
Antenna Gain	WCDMA	1.7 dBi	

	LTE Band 4	1.7 dBi
	LTE Band 12	0.3 dBi
	LTE Band 13	0.3 dBi
Accessory Device	N/A	
Data Cable Supplied	N/A	

Note:

1. The EUT was installed in a specific End-product.

Product	Brand	Model	FCC ID
veeaHub	veeaHub	VHH09-4GL	2ARXKVHE09-4GL

2. The End-product contains following accessory devices.

Product	Brand	Model	Description
Adapter	EDAC Power Electronics Co., Ltd.	EA1062SGR-480	I/P: 100-240 Vac, 50/60 Hz, 2.5A O/P: 48 Vdc, 1.35 A 1.2m DC cable with 1 core

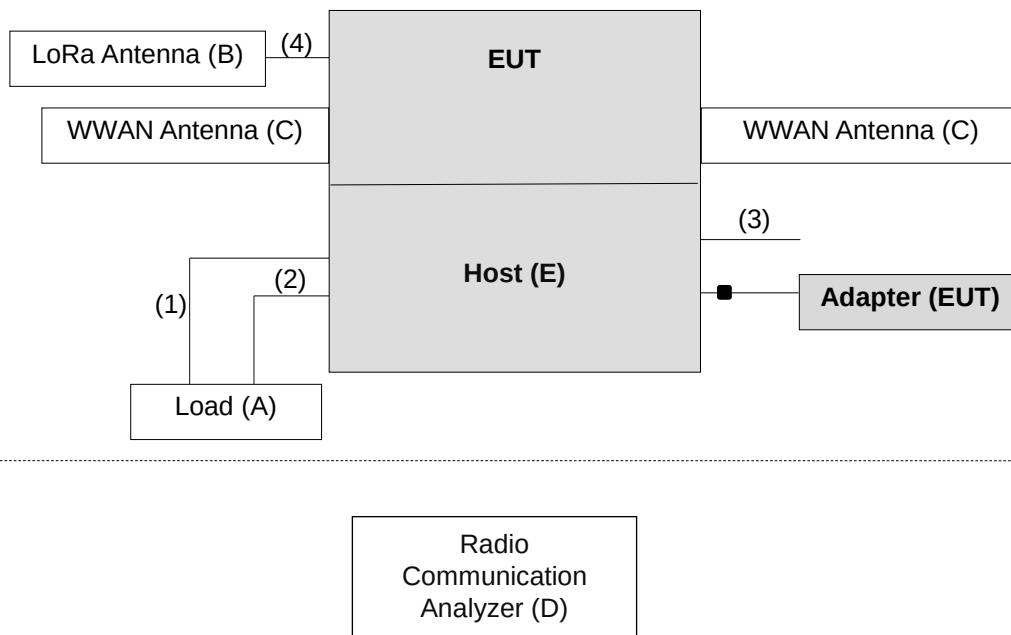
3. The End-product use following devices (Support unit).

Product	Brand	Model	Description
PoE	N/A	APOE02-WM	O/P: 48 Vdc

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

3.2 Configuration of System under Test

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



3.2.1 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Load	NA	NA	NA	NA	-
B.	LoRa Antenna	PCTEL	MFB9155NF	NA	NA	Provided by manufacturer
C.	WWAN Antenna	2J	2J2124W -C315N	NA	NA	Provided by manufacturer
D.	Radio Communication Analyzer	Anritsu	MT8820C	6201010284	NA	-
E.	veeaHub		VHE09XXXXX (X=A-Z, 0-9, blank or "-")	NA	2ARXKVHE09-4GL	Provided by manufacturer

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN cable	1	0.4	N	0	RJ45, Cat5e
2.	LAN cable	1	0.4	N	0	RJ45, Cat5e
3.	RS232 cable	1	0.4	Y	0	-
4.	Coaxial cable	1	1.5	Y	0	-

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, antenna degree 90° and 180°, 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
WCDMA	X-plane
LTE Band 12	X-plane

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	1312 to 1513	1312, 1413, 1513	WCDMA
-	Radiated Emission	1312 to 1513	1413	WCDMA

LTE Band 4

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	19957 to 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM	1 RB / 3 RB Offset
		19965 to 20385	19965, 20175, 20385	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5 MHz	QPSK, 16QAM	1 RB / 24 RB Offset
		20000 to 20350	20000, 20175, 20350	10 MHz	QPSK, 16QAM	1 RB / 49 RB Offset
		20025 to 20325	20025, 20175, 20325	15 MHz	QPSK, 16QAM	1 RB / 37 RB Offset
		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK, 16QAM	1 RB / 49 RB Offset
-	Radiated Emission	20050 to 20300	20300	20 MHz	QPSK	1 RB / 50 RB Offset

Note:

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation and RB configurations according to Module report worst maximum output power.
2. For radiated emission, select the worst radiated emission channel for final testing.

LTE Band 12

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	1 RB / 5 RB Offset
		23025 to 23165	23025, 23095, 23165	3 MHz	QPSK, 16QAM	1 RB / 7 RB Offset
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK, 16QAM	1 RB / 12 RB Offset
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK, 16QAM	1 RB / 49 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation and RB configurations according to Module report worst maximum output power.

LTE Band 13

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset

Note: 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	Vincent Chen
Radiated Emission	21 deg. C, 73 % RH	120 Vac, 60 Hz	Vincent Chen

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards and references

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

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

ANSI 63.26-2015

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

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI/TIA/EIA-603-E 2016

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. (For band 4)

Portable stations (hand-held devices) operating in the 746-757 MHz, 776-788 MHz and 805-806 MHz band are limited to 3 watts ERP (For band 13)

Portable stations (hand-held device) operating in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP. (For band 12)

4.1.2 Test Procedures

Conducted Power Measurement:

- The EUT was set up for the maximum power with WCDMA and 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:

$$\text{EIRP} = P_{\text{Meas}} + G_T$$

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

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)

Band	WCDMA IV		
Channel	1312	1413	1513
Frequency (MHz)	1712.4	1732.6	1752.6
RMC 12.2K	23.54	23.60	23.55
HSDPA Subtest-1	22.95	22.91	22.96
HSUPA Subtest-1	22.42	22.40	22.46

LTE Band 4						
BW	MCS Index	Channel		19957	20175	20393
		Frequency (MHz)		1710.7	1732.5	1754.3
1.4M	QPSK	1	0	22.27	22.17	22.19
		1	2	22.25	22.32	22.39
		1	5	22.32	22.23	22.35
		3	0	22.29	22.13	22.17
		3	1	22.35	22.23	22.28
		3	3	22.35	22.18	22.21
		6	0	21.45	21.29	21.22
	16QAM	1	0	21.28	21.24	21.25
		1	2	21.22	21.24	21.29
		1	5	21.10	21.22	21.13
		3	0	20.93	21.13	20.95
		3	1	21.00	21.23	20.99
		3	3	20.93	21.20	20.90
		6	0	19.86	20.14	19.77

LTE Band 4						
BW	MCS Index	Channel		19965	20175	20385
		Frequency (MHz)		1711.5	1732.5	1753.5
3M	QPSK	1	0	22.44	22.32	22.16
		1	7	22.55	22.44	22.35
		1	14	22.46	22.32	22.27
		8	0	21.41	21.39	21.38
		8	3	21.38	21.40	21.38
		8	7	21.25	21.37	21.45
		15	0	21.24	21.38	21.36
	16QAM	1	0	21.26	21.21	21.12
		1	7	21.43	21.35	21.35
		1	14	21.26	21.15	21.12
		8	0	20.15	20.02	19.97
		8	3	20.44	20.42	20.36
		8	7	20.44	20.38	20.27
		15	0	20.34	20.34	20.32
BW	MCS Index	Channel		19975	20175	20375
		Frequency (MHz)		1712.5	1732.5	1752.5
5M	QPSK	1	0	22.32	22.25	22.30
		1	12	22.45	22.45	22.46
		1	24	22.24	22.33	22.36
		12	0	21.13	21.31	21.27
		12	6	21.13	21.42	21.39
		12	13	20.99	21.31	21.37
		25	0	20.94	21.28	21.32
	16QAM	1	0	21.27	21.21	21.23
		1	12	21.38	21.31	21.42
		1	24	21.17	21.12	21.27
		12	0	20.51	20.45	20.59
		12	6	20.31	20.34	20.47
		12	13	19.95	20.09	20.31
		25	0	20.09	20.27	20.51

LTE Band 4						
BW	MCS Index	Channel		20000	20175	20350
		Frequency (MHz)		1715	1732.5	1750
10M	QPSK	1	0	22.46	22.42	22.44
		1	24	22.55	22.61	22.62
		1	49	22.17	22.26	22.14
		25	0	21.27	21.34	21.25
		25	12	21.31	21.41	21.22
		25	25	21.24	21.29	21.04
		50	0	21.23	21.35	21.17
	16QAM	1	0	21.43	21.33	21.35
		1	24	21.39	21.46	21.51
		1	49	21.28	21.26	21.28
		25	0	20.34	20.32	20.35
		25	12	20.35	20.42	20.49
		25	25	20.28	20.33	20.38
		50	0	20.29	20.35	20.32
BW	MCS Index	Channel		20025	20175	20325
		Frequency (MHz)		1717.5	1732.5	1747.5
15M	QPSK	1	0	22.47	22.43	22.54
		1	37	22.71	22.75	22.85
		1	74	22.33	22.34	22.49
		36	0	21.30	21.34	21.40
		36	19	21.27	21.41	21.48
		36	39	21.04	21.30	21.44
		75	0	21.08	21.35	21.46
	16QAM	1	0	21.38	21.32	21.46
		1	37	21.60	21.53	21.69
		1	74	21.50	21.39	21.50
		36	0	20.28	20.21	20.33
		36	19	20.45	20.34	20.54
		36	39	20.48	20.32	20.42
		75	0	20.44	20.39	20.54

LTE Band 4						
BW	MCS Index	Channel		20050	20175	20300
		Frequency (MHz)		1720	1732.5	1745
20M	QPSK	1	0	22.52	22.64	22.56
		1	50	22.69	22.69	22.96
		1	99	22.08	22.32	22.21
		50	0	21.07	21.35	21.28
		50	25	21.15	21.39	21.33
		50	50	20.93	21.29	21.19
		100	0	21.05	21.40	21.38
	16QAM	1	0	21.47	21.32	21.53
		1	50	21.63	21.54	21.73
		1	99	21.37	21.24	21.38
		50	0	20.35	20.27	20.50
		50	25	20.28	20.29	20.56
		50	50	20.13	20.17	20.49
		100	0	20.06	20.17	20.44

LTE Band 12						
BW	MCS Index	Channel		23017	23095	23173
		Frequency (MHz)		699.7	707.5	715.3
1.4M	QPSK	1	0	22.71	22.56	22.73
		1	2	22.93	22.79	22.96
		1	5	22.87	22.73	22.86
		3	0	21.33	21.28	21.39
		3	1	21.47	21.38	21.45
		3	3	21.49	21.39	21.50
		6	0	21.46	21.31	21.41
	16QAM	1	0	21.34	21.22	21.29
		1	2	21.49	21.41	21.50
		1	5	21.19	21.21	21.31
		3	0	20.47	20.47	20.58
		3	1	20.45	20.54	20.75
		3	3	20.34	20.43	20.74
		6	0	20.26	20.33	20.58
BW	MCS Index	Channel		23025	23095	23165
		Frequency (MHz)		700.5	707.5	714.5
3M	QPSK	1	0	22.45	22.15	22.55
		1	7	22.68	22.27	22.43
		1	14	22.43	22.28	22.39
		8	0	22.08	22.04	22.44
		8	3	22.17	22.10	22.40
		8	7	22.21	22.19	22.36
		15	0	21.19	21.20	21.46
	16QAM	1	0	21.53	21.18	21.61
		1	7	21.84	21.35	21.74
		1	14	21.64	21.31	21.81
		8	0	21.50	21.14	21.62
		8	3	21.59	21.31	21.74
		8	7	21.40	21.21	21.55
		15	0	20.26	20.33	20.58

LTE Band 12						
BW	MCS Index	Channel		23035	23095	23155
		Frequency (MHz)		701.5	707.5	713.5
5M	QPSK	1	0	22.52	22.22	22.55
		1	12	22.90	22.68	22.86
		1	24	22.43	22.34	22.61
		12	0	21.27	21.21	21.54
		12	6	21.71	21.70	22.06
		12	13	21.37	21.35	21.72
		25	0	21.42	21.35	21.67
	16QAM	1	0	21.35	21.18	21.24
		1	12	21.67	21.46	21.56
		1	24	21.46	21.26	21.38
		12	0	20.15	20.05	20.13
		12	6	20.39	20.36	20.54
		12	13	20.12	20.16	20.35
		25	0	20.10	20.24	20.36
BW	MCS Index	Channel		23060	23095	23130
		Frequency (MHz)		704	707.5	711
10M	QPSK	1	0	22.67	22.36	22.31
		1	24	22.94	22.73	22.64
		1	49	22.71	22.47	22.39
		25	0	21.49	21.30	21.13
		25	12	21.59	21.44	21.23
		25	25	21.60	21.40	21.23
		50	0	21.53	21.32	21.08
	16QAM	1	0	21.25	21.12	21.17
		1	24	21.61	21.44	21.54
		1	49	21.15	21.06	21.18
		25	0	20.38	20.24	20.34
		25	12	20.42	20.37	20.43
		25	25	20.36	20.35	20.40
		50	0	20.17	20.18	20.23

LTE Band 13						
BW	MCS Index	Channel		23205	23230	23255
		Frequency (MHz)		779.5	782	784.5
5M	QPSK	1	0	23.25	23.13	23.09
		1	12	23.38	23.29	23.32
		1	24	23.04	23.02	23.03
		12	0	22.04	22.14	22.07
		12	6	22.10	22.28	22.24
		12	13	21.91	22.13	22.03
		25	0	21.69	22.03	22.02
	16QAM	1	0	22.17	22.09	22.14
		1	12	22.21	22.11	22.10
		1	24	21.94	21.99	22.03
		12	0	20.96	21.04	21.08
		12	6	21.05	21.24	21.24
		12	13	20.77	21.02	21.01
		25	0	20.84	21.07	21.08
BW	MCS Index	Channel		23230		
		Frequency (MHz)		782		
10M	QPSK	1	0	23.18		
		1	24	23.56		
		1	49	23.37		
		25	0	22.27		
		25	12	22.22		
		25	25	22.17		
		50	0	22.08		
	16QAM	1	0	21.91		
		1	24	22.28		
		1	49	21.95		
		25	0	21.18		
		25	12	21.00		
		25	25	21.02		
		50	0	21.06		

EIRP Power(dBm)

Band	WCDMA IV		
Channel	1312	1413	1513
Frequency (MHz)	1712.4	1732.6	1752.6
RMC 12.2K	25.24	25.30	25.25
HSDPA Subtest-1	24.65	24.61	24.66
HSUPA Subtest-1	24.12	24.10	24.16

*EIRP = Conducted + antenna gain (1.7dBi)

LTE Band 4						
BW	MCS Index	Channel		19957	20175	20393
		Frequency (MHz)		1710.7	1732.5	1754.3
1.4M	QPSK	1	0	23.97	23.87	23.89
		1	2	23.95	24.02	24.09
		1	5	24.02	23.93	24.05
		3	0	23.99	23.83	23.87
		3	1	24.05	23.93	23.98
		3	3	24.05	23.88	23.91
		6	0	23.15	22.99	22.92
	16QAM	1	0	22.98	22.94	22.95
		1	2	22.92	22.94	22.99
		1	5	22.80	22.92	22.83
		3	0	22.63	22.83	22.65
		3	1	22.70	22.93	22.69
		3	3	22.63	22.90	22.60
		6	0	21.56	21.84	21.47
BW	MCS Index	Channel		19965	20175	20385
		Frequency (MHz)		1711.5	1732.5	1753.5
3M	QPSK	1	0	24.14	24.02	23.86
		1	7	24.25	24.14	24.05
		1	14	24.16	24.02	23.97
		8	0	23.11	23.09	23.08
		8	3	23.08	23.10	23.08
		8	7	22.95	23.07	23.15
		15	0	22.94	23.08	23.06
	16QAM	1	0	22.96	22.91	22.82
		1	7	23.13	23.05	23.05
		1	14	22.96	22.85	22.82
		8	0	21.85	21.72	21.67
		8	3	22.14	22.12	22.06
		8	7	22.14	22.08	21.97
		15	0	22.04	22.04	22.02

*EIRP = Conducted + antenna gain (1.7dBi)

LTE Band 4						
BW	MCS Index	Channel		19975	20175	20375
		Frequency (MHz)		1712.5	1732.5	1752.5
5M	QPSK	1	0	24.02	23.95	24.00
		1	12	24.15	24.15	24.16
		1	24	23.94	24.03	24.06
		12	0	22.83	23.01	22.97
		12	6	22.83	23.12	23.09
		12	13	22.69	23.01	23.07
		25	0	22.64	22.98	23.02
	16QAM	1	0	22.97	22.91	22.93
		1	12	23.08	23.01	23.12
		1	24	22.87	22.82	22.97
		12	0	22.21	22.15	22.29
		12	6	22.01	22.04	22.17
		12	13	21.65	21.79	22.01
		25	0	21.79	21.97	22.21
BW	MCS Index	Channel		20000	20175	20350
		Frequency (MHz)		1715	1732.5	1750
10M	QPSK	1	0	24.16	24.12	24.14
		1	24	24.25	24.31	24.32
		1	49	23.87	23.96	23.84
		25	0	22.97	23.04	22.95
		25	12	23.01	23.11	22.92
		25	25	22.94	22.99	22.74
		50	0	22.93	23.05	22.87
	16QAM	1	0	23.13	23.03	23.05
		1	24	23.09	23.16	23.21
		1	49	22.98	22.96	22.98
		25	0	22.04	22.02	22.05
		25	12	22.05	22.12	22.19
		25	25	21.98	22.03	22.08
		50	0	21.99	22.05	22.02

*EIRP = Conducted + antenna gain (1.7dBi)

LTE Band 4						
BW	MCS Index	Channel		20025	20175	20325
		Frequency (MHz)		1717.5	1732.5	1747.5
15M	QPSK	1	0	24.17	24.13	24.24
		1	37	24.41	24.45	24.55
		1	74	24.03	24.04	24.19
		36	0	23.00	23.04	23.10
		36	19	22.97	23.11	23.18
		36	39	22.74	23.00	23.14
		75	0	22.78	23.05	23.16
	16QAM	1	0	23.08	23.02	23.16
		1	37	23.30	23.23	23.39
		1	74	23.20	23.09	23.20
		36	0	21.98	21.91	22.03
		36	19	22.15	22.04	22.24
		36	39	22.18	22.02	22.12
		75	0	22.14	22.09	22.24
BW	MCS Index	Channel		20050	20175	20300
		Frequency (MHz)		1720	1732.5	1745
20M	QPSK	1	0	24.22	24.34	24.26
		1	50	24.39	24.39	24.66
		1	99	23.78	24.02	23.91
		50	0	22.77	23.05	22.98
		50	25	22.85	23.09	23.03
		50	50	22.63	22.99	22.89
		100	0	22.75	23.10	23.08
	16QAM	1	0	23.17	23.02	23.23
		1	50	23.33	23.24	23.43
		1	99	23.07	22.94	23.08
		50	0	22.05	21.97	22.20
		50	25	21.98	21.99	22.26
		50	50	21.83	21.87	22.19
		100	0	21.76	21.87	22.14

*EIRP = Conducted + antenna gain (1.7dBi)

ERP Power (dBm)

LTE Band 12						
BW	MCS Index	Channel		23017	23095	23173
		Frequency (MHz)		699.7	707.5	715.3
1.4M	QPSK	1	0	20.86	20.71	20.88
		1	2	21.08	20.94	21.11
		1	5	21.02	20.88	21.01
		3	0	19.48	19.43	19.54
		3	1	19.62	19.53	19.60
		3	3	19.64	19.54	19.65
		6	0	19.61	19.46	19.56
	16QAM	1	0	19.49	19.37	19.44
		1	2	19.64	19.56	19.65
		1	5	19.34	19.36	19.46
		3	0	18.62	18.62	18.73
		3	1	18.60	18.69	18.90
		3	3	18.49	18.58	18.89
		6	0	18.41	18.48	18.73
BW	MCS Index	Channel		23025	23095	23165
		Frequency (MHz)		700.5	707.5	714.5
3M	QPSK	1	0	20.60	20.30	20.70
		1	7	20.83	20.42	20.58
		1	14	20.58	20.43	20.54
		8	0	20.23	20.19	20.59
		8	3	20.32	20.25	20.55
		8	7	20.36	20.34	20.51
		15	0	19.34	19.35	19.61
	16QAM	1	0	19.68	19.33	19.76
		1	7	19.99	19.50	19.89
		1	14	19.79	19.46	19.96
		8	0	19.65	19.29	19.77
		8	3	19.74	19.46	19.89
		8	7	19.55	19.36	19.70
		15	0	18.41	18.48	18.73

*ERP = Conducted + antenna gain (0.3dBi)-2.15

LTE Band 12						
BW	MCS Index	Channel		23035	23095	23155
		Frequency (MHz)		701.5	707.5	713.5
5M	QPSK	1	0	20.67	20.37	20.70
		1	12	21.05	20.83	21.01
		1	24	20.58	20.49	20.76
		12	0	19.42	19.36	19.69
		12	6	19.86	19.85	20.21
		12	13	19.52	19.50	19.87
		25	0	19.57	19.50	19.82
	16QAM	1	0	19.50	19.33	19.39
		1	12	19.82	19.61	19.71
		1	24	19.61	19.41	19.53
		12	0	18.30	18.20	18.28
		12	6	18.54	18.51	18.69
		12	13	18.27	18.31	18.50
		25	0	18.25	18.39	18.51
BW	MCS Index	Channel		23060	23095	23130
		Frequency (MHz)		704	707.5	711
10M	QPSK	1	0	20.82	20.51	20.46
		1	24	21.09	20.88	20.79
		1	49	20.86	20.62	20.54
		25	0	19.64	19.45	19.28
		25	12	19.74	19.59	19.38
		25	25	19.75	19.55	19.38
		50	0	19.68	19.47	19.23
	16QAM	1	0	19.40	19.27	19.32
		1	24	19.76	19.59	19.69
		1	49	19.30	19.21	19.33
		25	0	18.53	18.39	18.49
		25	12	18.57	18.52	18.58
		25	25	18.51	18.50	18.55
		50	0	18.32	18.33	18.38

*ERP = Conducted + antenna gain (0.3dBi)-2.15

LTE Band 13						
BW	MCS Index	Channel		23205	23230	23255
		Frequency (MHz)		779.5	782	784.5
5M	QPSK	1	0	21.40	21.28	21.24
		1	12	21.53	21.44	21.47
		1	24	21.19	21.17	21.18
		12	0	20.19	20.29	20.22
		12	6	20.25	20.43	20.39
		12	13	20.06	20.28	20.18
		25	0	19.84	20.18	20.17
	16QAM	1	0	20.32	20.24	20.29
		1	12	20.36	20.26	20.25
		1	24	20.09	20.14	20.18
		12	0	19.11	19.19	19.23
		12	6	19.20	19.39	19.39
		12	13	18.92	19.17	19.16
		25	0	18.99	19.22	19.23
BW	MCS Index	Channel		23230		
		Frequency (MHz)		782		
10M	QPSK	1	0	21.33		
		1	24	21.71		
		1	49	21.52		
		25	0	20.42		
		25	12	20.37		
		25	25	20.32		
		50	0	20.23		
	16QAM	1	0	20.06		
		1	24	20.43		
		1	49	20.10		
		25	0	19.33		
		25	12	19.15		
		25	25	19.17		
		50	0	19.21		

*ERP = Conducted + antenna gain (0.3dBi)-2.15

4.2 Radiated Emission Measurement

4.2.1 Limits of Radiated Emission Measurement

- a. The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB. The limit of emission is equal to -13 dBm.
- b. For operations in the 775-788 MHz, emissions in the band 1559-1610MHz shall be limited to -70 dBW/MHz (EIRP). The limit of emissions is equal to -40 dBm.

4.2.2 Test Procedure

- a. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. 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.
- c. Following C63.26 section 5.5 and 5.2.7.
 $EIRP (dBm) = E (dB\mu V/m) + 20\log (D) - 104.8$; where D is the measurement distance (in the far field region) in m.
 $ERP (dBm) = E (dB\mu V/m) + 20\log (D) - 104.8 - 2.15$; where D is the measurement distance (in the far field region) in m.

NOTE:

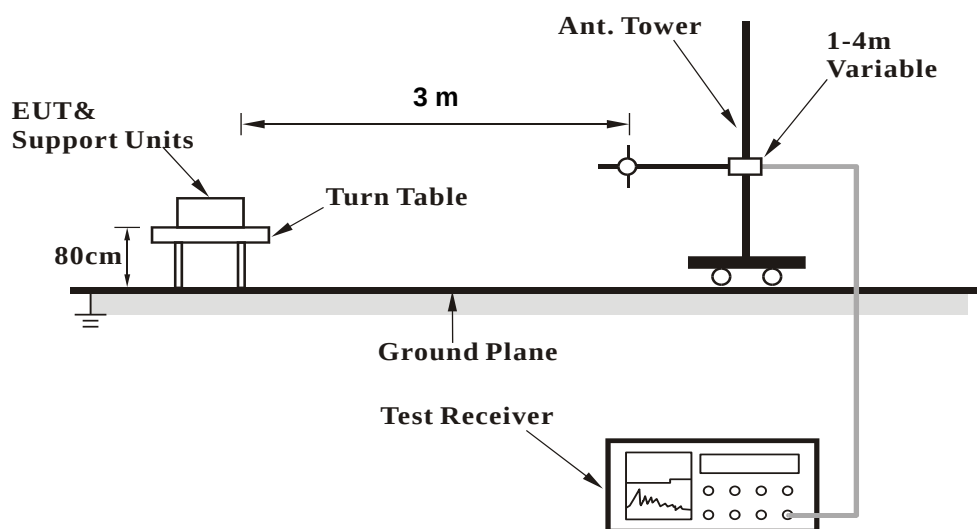
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.
2. 9 kHz ~ 30 MHz Data:
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.2.3 Deviation from Test Standard

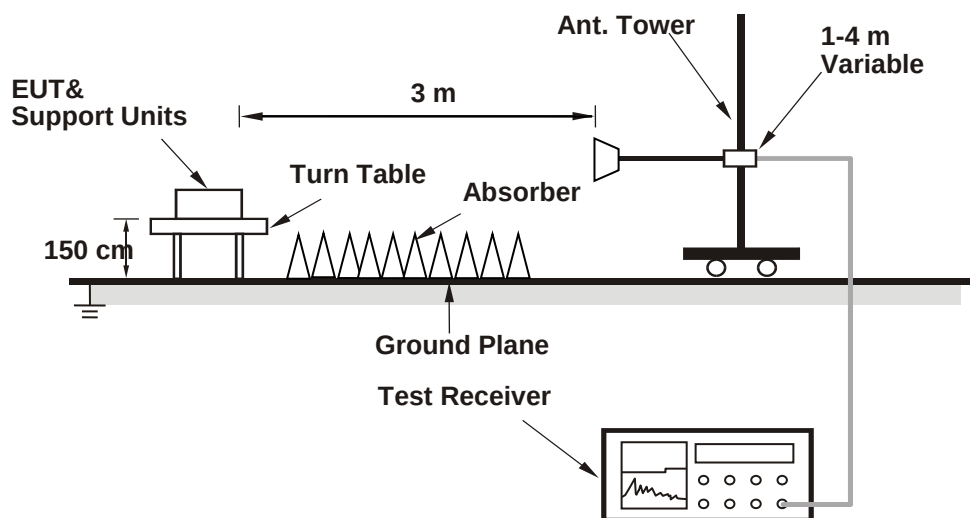
No deviation.

4.2.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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

4.2.5 Test Results

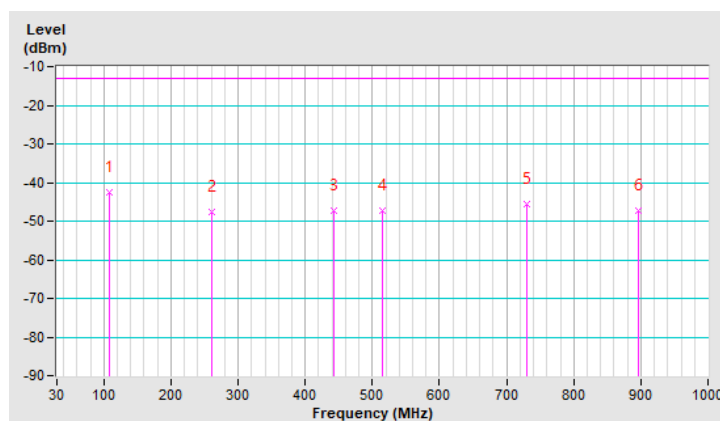
Below 1GHz

RF Mode	TX WCDMA Band IV	Channel	CH 1413 : 1732.6 MHz
Frequency Range	30MHz ~ 1GHz		

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	107.60	-42.41	-13.00	-29.41	1.69 H	260	68.24	-110.65
2	259.89	-47.53	-13.00	-34.53	2.32 H	58	61.94	-109.47
3	443.22	-47.40	-13.00	-34.40	1.77 H	239	55.30	-102.70
4	514.03	-47.45	-13.00	-34.45	1.05 H	104	53.66	-101.11
5	729.37	-45.62	-13.00	-32.62	2.12 H	264	50.90	-96.52
6	897.18	-47.13	-13.00	-34.13	1.09 H	71	46.60	-93.73

Remarks:

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

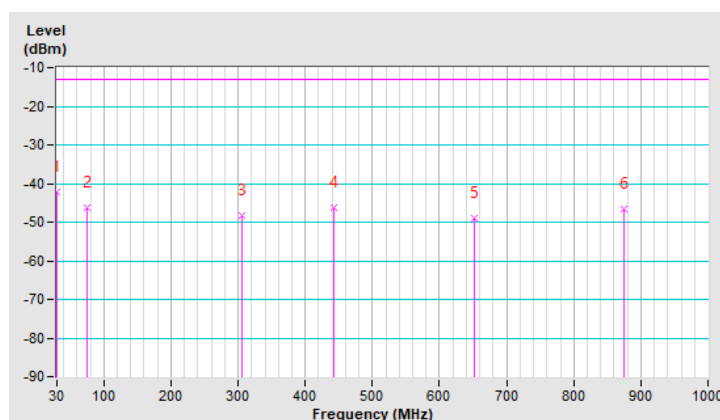


RF Mode	TX WCDMA Band IV	Channel	CH 1413 : 1732.6 MHz
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical 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	-42.34	-13.00	-29.34	1.65 V	281	67.24	-109.58
2	75.59	-46.36	-13.00	-33.36	3.25 V	332	65.27	-111.63
3	305.48	-48.33	-13.00	-35.33	2.27 V	2	58.77	-107.10
4	443.22	-46.32	-13.00	-33.32	1.05 V	2	56.38	-102.70
5	651.77	-49.01	-13.00	-36.01	3.32 V	285	48.81	-97.82
6	874.87	-46.53	-13.00	-33.53	1.88 V	329	47.34	-93.87

Remarks:

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

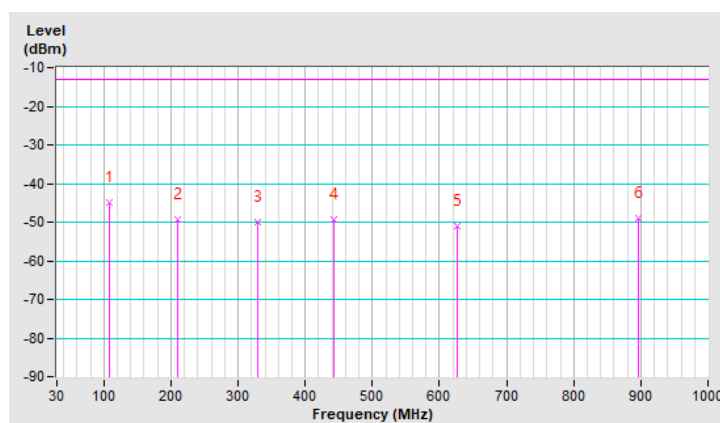


RF Mode	TX LTE Band IV - 20MHz	Channel	CH 20300 : 1745MHz
Frequency Range	30MHz ~ 1GHz		

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	107.60	-44.98	-13.00	-31.98	1.20 H	250	67.82	-112.80
2	209.45	-49.39	-13.00	-36.39	2.04 H	86	64.26	-113.65
3	329.73	-49.90	-13.00	-36.90	1.96 H	236	58.39	-108.29
4	442.25	-49.44	-13.00	-36.44	2.32 H	252	55.41	-104.85
5	625.58	-51.03	-13.00	-38.03	1.41 H	176	49.21	-100.24
6	896.21	-49.03	-13.00	-36.03	2.25 H	77	46.86	-95.89

Remarks:

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

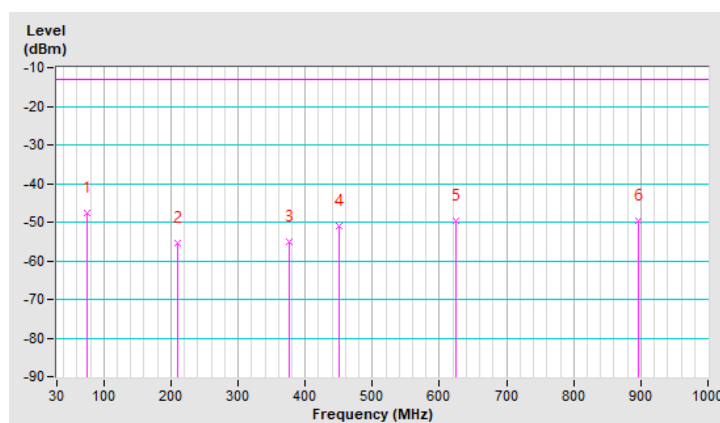


RF Mode	TX LTE Band IV - 20MHz	Channel	CH 20300 : 1745MHz
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical 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	75.59	-47.48	-13.00	-34.48	1.63 V	146	66.30	-113.78
2	209.45	-55.26	-13.00	-42.26	2.28 V	148	58.39	-113.65
3	375.32	-55.07	-13.00	-42.07	1.74 V	94	52.01	-107.08
4	450.01	-51.08	-13.00	-38.08	1.59 V	7	53.72	-104.80
5	624.61	-49.81	-13.00	-36.81	2.30 V	272	50.46	-100.27
6	896.21	-49.83	-13.00	-36.83	1.04 V	0	46.06	-95.89

Remarks:

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



Above 1GHz

RF Mode	TX WCDMA Band IV	Channel	CH 1413 : 1732.6 MHz
Frequency Range	1GMHz ~ 18GHz		

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	3465.20	-55.85	-13.00	-42.85	1.54 H	227	60.47	-116.32
Antenna Polarity & Test Distance : Vertical 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	3465.20	-55.46	-13.00	-42.46	3.12 V	221	60.86	-116.32

Remarks:

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

RF Mode	TX LTE Band IV-20MHz	Channel	CH 20300 : 1745 MHz
Frequency Range	1GMHz ~ 18GHz		

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	3490.00	-59.72	-13.00	-46.72	1.78 H	245	56.44	-116.16
Antenna Polarity & Test Distance : Vertical 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	3490.00	-59.09	-13.00	-46.09	3.10 V	210	57.07	-116.16

Remarks:

1. $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2. $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. $Margin\ value = EIRP - Limit\ value$
4. The other EIRP 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 according to ISO/IEC 17025.

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

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

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