Variant FCC Test Report
(Part 24)

Report No.:	RFBEKK-WTW-P20080111A-2
FCC ID:	2AARN-DLWPH-8M
Test Model:	DLWPH-8M-RW
Series Model:	DLWPH-8M
Received Date:	Dec. 22, 2021
Test Date:	Jan. 11 ~ Mar. 29, 2022
Issued Date:	Mar. 30, 2022
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-P20080111A-2	Original Release	Mar. 30, 2022

1 Certificate of Conformity

Product:	EV charging system module 4G with WI-FI
Brand:	Phihong Technology Co., Ltd.
Test Model:	DLWPH-8M-RW
Series Model:	DLWPH-8M
Sample Status:	Engineering Sample
Applicant:	PHIHONG TECHNOLOGY CO. LTD.
Test Date:	Jan. 11 ~ Mar. 29, 2022
Standards:	FCC Part 24, Subpart E

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

Prepared by : Lena Wang , **Date:** Mar. 30, 2022

Lena Wang / Specialist

Approved by : Jeremy Lin , **Date:** Mar. 30, 2022

Jeremy Lin / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Equivalent Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	N/A	Refer to note
24.232(d)	Peak to Average Ratio	N/A	Refer to note
2.1055 24.235	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	N/A	Refer to note
24.238	Band Edge Measurements	N/A	Refer to note
2.1051 24.238	Conducted Spurious Emissions	N/A	Refer to note
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -24.8 dB at 51.34 MHz.

Note:

1. This report is a partial report, only test item of Equivalent Isotropic Radiated Power, Radiated Spurious Emissions and Frequency Stability test was performed for this report. Other testing data please refer to original report.
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	3.86 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 ROHDE & SCHWARZ	ESCI	100424	Dec. 30, 2021	Dec. 29, 2022
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 15, 2021	Sep. 14, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Nov. 01, 2021	Oct. 31, 2022
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Oct. 26, 2021	Oct. 25, 2022
Preamplifier Agilent (Below 1GHz)	8447D	2944A10631	Jun. 05, 2021	Jun. 04, 2022
Preamplifier KEYSIGHT (Above 1GHz)	83017A	MY53270295	Jun. 05, 2021	Jun. 04, 2022
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH4-01	Jul. 24, 2021	Jul. 23, 2022
RF Coaxial Cable EMCI	EMC102-KM-KM-3000	150929	Jul. 24, 2021	Jul. 23, 2022
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	Jul. 24, 2021	Jul. 23, 2022
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Jun. 05, 2021	Jun. 04, 2022
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Jun. 05, 2021	Jun. 04, 2022
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	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	EV charging system module 4G with WI-FI		
Brand	Phihong Technology Co., Ltd.		
Test Model	DLWPH-8M-RW		
Series Model	DLWPH-8M		
Model Difference	Refer to Note as below		
Sample Status	Engineering Sample		
Power Supply Rating	5Vdc (for DC power supply or host equipment)		
Modulation Type	WCDMA: BPSK, QPSK HSDPA: BPSK HSUPA: QPSK LTE: QPSK, 16QAM		
Operating Frequency	WCDMA Band 2	1852.4~1907.6MHz	
	LTE Band 2 (Channel Bandwidth 1.4MHz)	1850.7~1909.3MHz	
	LTE Band 2 (Channel Bandwidth 3MHz)	1851.5~1908.5MHz	
	LTE Band 2 (Channel Bandwidth 5MHz)	1852.5~1907.5MHz	
	LTE Band 2 (Channel Bandwidth 10MHz)	1855.0~1905.0MHz	
	LTE Band 2 (Channel Bandwidth 15MHz)	1857.5~1902.5MHz	
	LTE Band 2 (Channel Bandwidth 20MHz)	1860.0~1900.0MHz	
Max. EIRP Power	WCDMA Band 2	248.313mW (23.95dBm)	
		QPSK	16QAM
	LTE Band 2 (Channel Bandwidth 1.4MHz)	276.058mW (24.41dBm)	226.464mW (23.55dBm)
	LTE Band 2 (Channel Bandwidth 3MHz)	279.254mW (24.46dBm)	219.280mW (23.41dBm)
	LTE Band 2 (Channel Bandwidth 5MHz)	283.139mW (24.52dBm)	218.273mW (23.39dBm)
	LTE Band 2 (Channel Bandwidth 10MHz)	279.898mW (24.47dBm)	229.615mW (23.61dBm)
	LTE Band 2 (Channel Bandwidth 15MHz)	277.971mW (24.44dBm)	221.820mW (23.46dBm)
	LTE Band 2 (Channel Bandwidth 20MHz)	291.743mW (24.65dBm)	228.034mW (23.58dBm)
Antenna Type	Refer to Note as below		
Antenna Connector	Refer to Note as below		
Accessory Device	NA		
Cable Supplied	NA		

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report to BV CPS report no. RFBEKK-WTW-P20080111-2. The difference compared with original report is changing the motherboard design and adding external antenna, therefore only Equivalent Isotropic Radiated Power, Radiated Spurious Emissions and Frequency Stability tests had been performed and recorded in this report.
2. All models are listed as below.

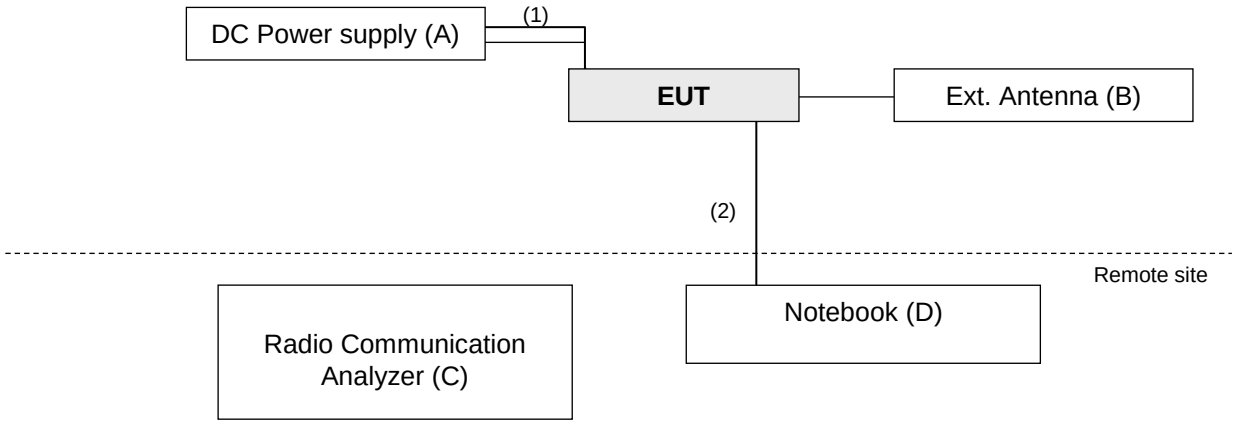
Brand	Model	Difference of WLAN Antenna type
Phihong Technology Co., Ltd.	DLWPH-8M	internal antenna
	DLWPH-8M-RW	external antenna

3. The following antennas were provided to the EUT. (New antenna is marked in gray)

Brand	Model	Antenna Gain(dBi)	Antenna Type	Connector Type
Gortec	DR0727-4201BSM	1.47	PCB	SMA Male
Aristotle	RFA-LTE-JP187-79B300	4.54	PCB	SMA PLUG

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.

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	JIN YIH TECHNOLOGY CO., LTD.	ODP3033	ODP30332027416	NA	-
B.	Ext. Antenna	Aristotle	RFA-LTE-JP187-79B300	NA	NA	Provided by client
C.	Notebook	DELL	E5430	2RL3YW1	NA	-
D.	Radio Communication Analyzer	Anritsu	MT8821C	6201462755	NA	-

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Power cable	1	2	N	0	-
2.	LAN Cable	1	5	Y	0	Provided by client

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:

WCDMA Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	9262 to 9538	9262 (1852.4MHz), 9400 (1880.0MHz), 9538 (1907.6MHz)	WCDMA, HSDPA, HSUPA
-	Frequency Stability	9262 to 9538	9262 (1852.4MHz), 9538 (1907.6MHz)	WCDMA
-	Radiated Emission Below 1GHz	9262 to 9538	9538 (1907.6MHz)	WCDMA
-	Radiated Emission Above 1GHz	9262 to 9538	9262 (1852.4MHz), 9400 (1880.0MHz), 9538 (1907.6MHz)	WCDMA

Note:

1. This device was tested under all modulations. The worst case of conducted output power was found in WCDMA modulation. Therefore, only EIRP had been tested under WCDMA, HSDPA and HSUPA mode, the other items were performed under WCDMA mode only.
2. For radiated emission below 1GHz, select the worst radiated emission (above 1GHz) channel for final testing.

LTE Band 2

EUT Configure Mode	Test item	Available channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	18607 to 19193	18607 (1850.70MHz), 18900 (1880.00MHz), 19193 (1909.30MHz)	1.4MHz	QPSK / 16QAM	3 RB / 1 RB Offset
		18615 to 19185	18615 (1851.50MHz), 18900 (1880.00MHz), 19185 (1908.50MHz)	3MHz	QPSK / 16QAM	1 RB / 7 RB Offset
		18625 to 19175	18625 (1852.50MHz), 18900 (1880.00MHz), 19175 (1907.50MHz)	5MHz	QPSK / 16QAM	1 RB / 24 RB Offset
		18650 to 19150	18650 (1855.00MHz), 18900 (1880.00MHz), 19150 (1905.00MHz)	10MHz	QPSK / 16QAM	1 RB / 24 RB Offset
		18675 to 19125	18675 (1857.50MHz), 18900 (1880.00MHz), 19125 (1902.50MHz)	15MHz	QPSK / 16QAM	1 RB / 37 RB Offset
		18700 to 19100	18700 (1860.00MHz), 18900 (1880.00MHz), 19100 (1900.00MHz)	20MHz	QPSK / 16QAM	1 RB / 50 RB Offset
-	Frequency Stability	18607 to 19193	18607 (1850.70MHz), 19193 (1909.30MHz)	1.4MHz	QPSK	5 RB / 0 RB Offset
		18615 to 19185	18615 (1851.50MHz), 19185 (1908.50MHz)	3MHz	QPSK	15 RB / 0 RB Offset
		18625 to 19175	18625 (1852.50MHz), 19175 (1907.50MHz)	5MHz	QPSK	25 RB / 0 RB Offset
		18650 to 19150	18650 (1855.00MHz), 19150 (1905.00MHz)	10MHz	QPSK	50 RB / 0 RB Offset
		18675 to 19125	18675 (1857.50MHz), 19125 (1902.50MHz)	15MHz	QPSK	75 RB / 0 RB Offset
		18700 to 19100	18700 (1860.00MHz), 19100 (1900.00MHz)	20MHz	QPSK	100 RB / 0 RB Offset
-	Radiated Emission Below 1GHz	18700 to 19100	18900 (1880.00MHz)	20MHz	QPSK	1 RB / 24 RB Offset
-	Radiated Emission Above 1GHz	18607 to 19193	18607 (1850.70MHz), 18900 (1880.00MHz), 19193 (1909.30MHz)	1.4MHz	QPSK	3 RB / 1 RB Offset
		18625 to 19175	18625 (1852.50MHz), 18900 (1880.00MHz), 19175 (1907.50MHz)	5MHz	QPSK	1 RB / 24 RB Offset
		18700 to 19100	18700 (1860.00MHz), 18900 (1880.00MHz), 19100 (1900.00MHz)	20MHz	QPSK	1 RB / 50 RB Offset

Note:

1. For radiated emission below 1GHz, select the worst radiated emission (above 1GHz) channel for final testing.
2. 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.
3. The conducted output power for QPSK and 16QAM, measured value of QPSK is higher than 16QAM mode. Therefore, only EIRP, had been tested under QPSK and 16QAM modes, the other test items were performed under QPSK mode only.

Test Condition:

Test Item	Environmental Conditions	Input Power (system)	Tested By
EIRP	22deg. C, 69%RH	120Vac, 60Hz	Rex Wang
Frequency Stability	24deg. C, 64%RH	120Vac, 60Hz	James Yang
Radiated Emission	23deg. C, 66%RH	120Vac, 60Hz	Titan Hsu

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards and References

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

Test Standard:
FCC 47 CFR Part 2
FCC 47 CFR Part 24
ANSI 63.26-2015

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

References Test Guidance:
KDB 971168 D01 Power Meas License Digital Systems v03r01
ANSI/TIA/EIA-603-E 2016

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts EIRP.

4.1.2 Test Procedures

Conducted Power Measurement:

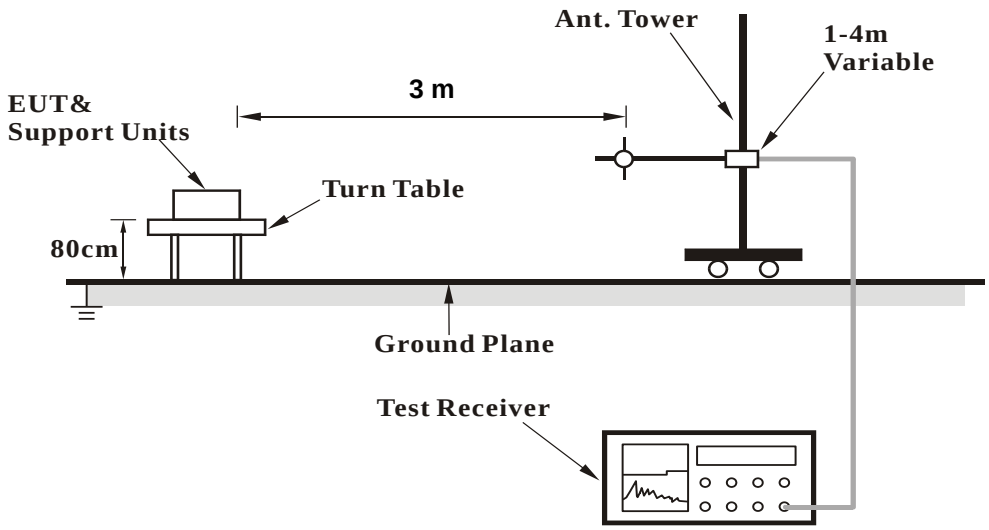
The EUT was set up for the maximum power with WCDMA and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Radiated Power EIRP / ERP Measurement:

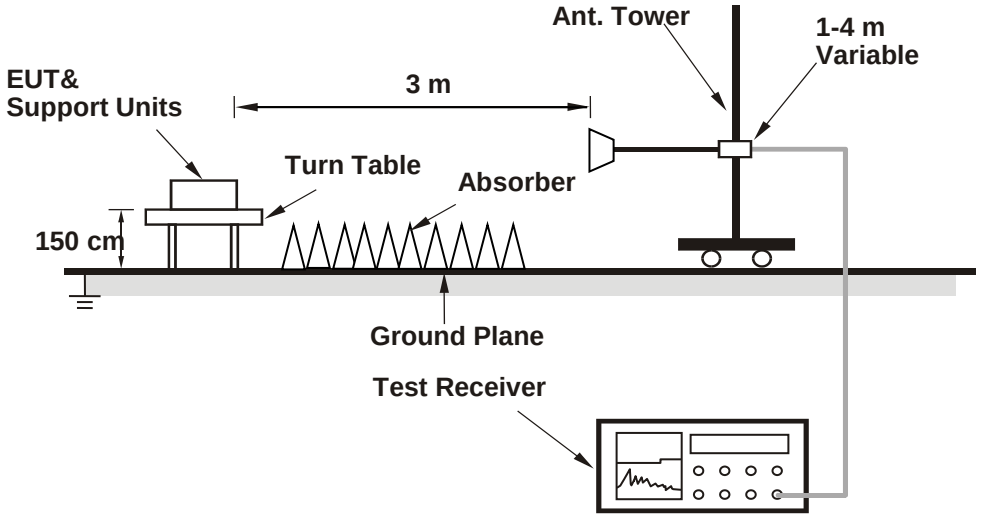
a. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 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.

4.1.3 Test Setup

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



<Radiated Emission above 1 GHz>



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

Conducted Power Measurement:

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

4.1.4 Test Results

EIRP Power (dBm)

WCDMA Band 2, Channel Bandwidth 1.4MHz

Mode	TX channel 9262, 9400, 9538

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	1852.40	22.88	33.00	-10.12	1.56 H	102	87.94	-65.06
2	1880.00	22.92	33.00	-10.08	1.54 H	104	87.78	-64.86
3	1907.60	22.96	33.00	-10.04	1.58 H	105	87.66	-64.70
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	1852.40	23.95	33.00	-9.05	1.19 V	278	89.01	-65.06
2	1880.00	23.94	33.00	-9.06	1.15 V	280	88.80	-64.86
3	1907.60	23.91	33.00	-9.09	1.20 V	275	88.61	-64.70

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.

Modulation Type: QPSK

LTE Band 2, Channel Bandwidth 1.4MHz

Mode	TX channel 18607, 18900, 19193

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	1850.70	22.05	33.00	-10.95	3.35 H	125	87.12	-65.07
2	1880.00	22.65	33.00	-10.35	3.36 H	126	87.51	-64.86
3	1909.30	22.39	33.00	-10.61	3.35 H	127	87.08	-64.69
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	1850.70	24.41	33.00	-8.95	2.77 V	195	89.48	-65.07
2	1880.00	24.25	33.00	-8.75	2.80 V	200	89.11	-64.86
3	1909.30	24.22	33.00	-8.78	2.81 V	198	88.91	-64.69

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 2, Channel Bandwidth 3MHz

Mode	TX channel 18615, 18900, 19185							
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	1851.50	22.88	33.00	-10.12	3.41 H	125	87.94	-65.06
2	1880.00	22.73	33.00	-10.27	3.32 H	124	87.59	-64.86
3	1908.50	22.61	33.00	-10.39	3.41 H	125	87.30	-64.69
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	1851.50	24.36	33.00	-8.64	2.85 V	197	89.42	-65.06
2	1880.00	24.25	33.00	-8.75	2.79 V	197	89.11	-64.86
3	1908.50	24.46	33.00	-8.54	2.83 V	200	89.15	-64.69

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 2, Channel Bandwidth 5MHz

Mode	TX channel 18625, 18900, 19175							
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	1852.50	22.16	33.00	-10.84	3.37 H	129	87.22	-65.06
2	1880.00	22.61	33.00	-10.39	3.37 H	130	87.47	-64.86
3	1907.50	21.97	33.00	-11.03	3.39 H	127	86.67	-64.70
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	1852.50	24.52	33.00	-8.48	2.84 V	200	89.58	-65.06
2	1880.00	24.18	33.00	-8.82	2.77 V	199	89.04	-64.86
3	1907.50	24.26	33.00	-8.74	2.86 V	200	88.96	-64.70

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 2, Channel Bandwidth 10MHz

Mode	TX channel 18650, 18900, 19150							
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	1855.00	22.38	33.00	-10.62	3.41 H	130	87.41	-65.03
2	1880.00	22.34	33.00	-10.66	3.33 H	128	87.20	-64.86
3	1905.00	22.14	33.00	-10.86	3.33 H	130	86.84	-64.70
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	1855.00	24.42	33.00	-8.58	2.87 V	195	89.45	-65.03
2	1880.00	24.33	33.00	-8.67	2.79 V	194	89.19	-64.86
3	1905.00	24.47	33.00	-8.53	2.86 V	199	89.17	-64.70

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 2, Channel Bandwidth 15MHz

Mode	TX channel 18675, 18900, 19125							
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	1857.50	22.03	33.00	-10.97	3.36 H	126	87.05	-65.02
2	1880.00	22.68	33.00	-10.32	3.41 H	124	87.54	-64.86
3	1902.50	22.42	33.00	-10.58	3.37 H	123	87.14	-64.72
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	1857.50	24.44	33.00	-8.56	2.84 V	196	89.46	-65.02
2	1880.00	24.33	33.00	-8.67	2.80 V	198	89.19	-64.86
3	1902.50	24.24	33.00	-8.76	2.85 V	195	88.96	-64.72

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 2, Channel Bandwidth 20MHz

Mode	TX channel 18675, 18900, 19125

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	1860.00	22.07	33.00	-10.93	3.39 H	126	87.07	-65.00
2	1880.00	22.42	33.00	-10.58	3.34 H	131	87.28	-64.86
3	1900.00	22.08	33.00	-10.92	3.35 H	127	86.81	-64.73
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	1860.00	24.24	33.00	-8.76	2.81 V	193	89.24	-65.00
2	1880.00	24.65	33.00	-8.35	2.82 V	202	89.51	-64.86
3	1900.00	24.62	33.00	-8.38	2.86 V	193	89.35	-64.73

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) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Modulation Type: 16QAM

LTE Band 2, Channel Bandwidth 1.4MHz

Mode	TX channel 18607, 18900, 19193							
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	1850.70	20.94	33.00	-12.06	3.36 H	123	86.01	-65.07
2	1880.00	21.69	33.00	-11.31	3.31 H	125	86.55	-64.86
3	1909.30	21.21	33.00	-11.79	3.39 H	122	85.90	-64.69
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	1850.70	23.55	33.00	-9.45	2.86 V	194	88.62	-65.07
2	1880.00	23.17	33.00	-9.83	2.84 V	195	88.03	-64.86
3	1909.30	23.36	33.00	-9.64	2.86 V	196	88.05	-64.69

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 2, Channel Bandwidth 3MHz

Mode	TX channel 18615, 18900, 19185							
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	1851.50	21.93	33.00	-11.07	3.34 H	123	86.99	-65.06
2	1880.00	21.62	33.00	-11.38	3.41 H	125	86.48	-64.86
3	1908.50	21.64	33.00	-11.36	3.36 H	129	86.33	-64.69
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	1851.50	23.41	33.00	-9.59	2.80 V	199	88.47	-65.06
2	1880.00	23.26	33.00	-9.74	2.87 V	193	88.12	-64.86
3	1908.50	23.26	33.00	-9.74	2.80 V	194	87.95	-64.69

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 2, Channel Bandwidth 5MHz

Mode	TX channel 18625, 18900, 19175

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	1852.50	21.05	33.00	-11.95	3.42 H	123	86.11	-65.06
2	1880.00	21.79	33.00	-11.21	3.36 H	129	86.65	-64.86
3	1907.50	20.83	33.00	-12.17	3.37 H	128	85.53	-64.70
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	1852.50	23.33	33.00	-9.67	2.85 V	196	88.39	-65.06
2	1880.00	23.22	33.00	-9.78	2.86 V	196	88.08	-64.86
3	1907.50	23.39	33.00	-9.61	2.87 V	196	88.09	-64.70

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 2, Channel Bandwidth 10MHz

Mode	TX channel 18650, 18900, 19150

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	1855.00	21.36	33.00	-11.64	3.38 H	125	86.39	-65.03
2	1880.00	21.29	33.00	-11.71	3.42 H	123	86.15	-64.86
3	1905.00	21.22	33.00	-11.78	3.33 H	127	85.92	-64.70
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	1855.00	23.49	33.00	-9.51	2.85 V	196	88.52	-65.03
2	1880.00	23.38	33.00	-9.62	2.84 V	199	88.24	-64.86
3	1905.00	23.61	33.00	-9.39	2.82 V	196	88.31	-64.70

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 2, Channel Bandwidth 15MHz

Mode	TX channel 18675, 18900, 19125

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	1857.50	21.16	33.00	-11.84	3.40 H	129	86.18	-65.02
2	1880.00	21.56	33.00	-11.44	3.37 H	128	86.42	-64.86
3	1902.50	21.21	33.00	-11.79	3.31 H	124	85.93	-64.72
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	1857.50	23.46	33.00	-9.54	2.82 V	194	88.48	-65.02
2	1880.00	23.27	33.00	-9.71	2.84 V	200	88.13	-64.86
3	1902.50	23.27	33.00	-9.73	2.82 V	198	87.99	-64.72

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 2, Channel Bandwidth 20MHz

Mode	TX channel 18675, 18900, 19125

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	1860.00	21.12	33.00	-11.88	3.32 H	125	86.12	-65.00
2	1880.00	21.25	33.00	-11.75	3.36 H	124	86.11	-64.86
3	1900.00	21.28	33.00	-11.72	3.38 H	124	86.01	-64.73
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	1860.00	23.36	33.00	-9.64	2.82 V	200	88.36	-65.00
2	1880.00	23.58	33.00	-9.42	2.77 V	194	88.44	-64.86
3	1900.00	23.49	33.00	-9.51	2.86 V	198	88.22	-64.73

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) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stabiliity Measurement

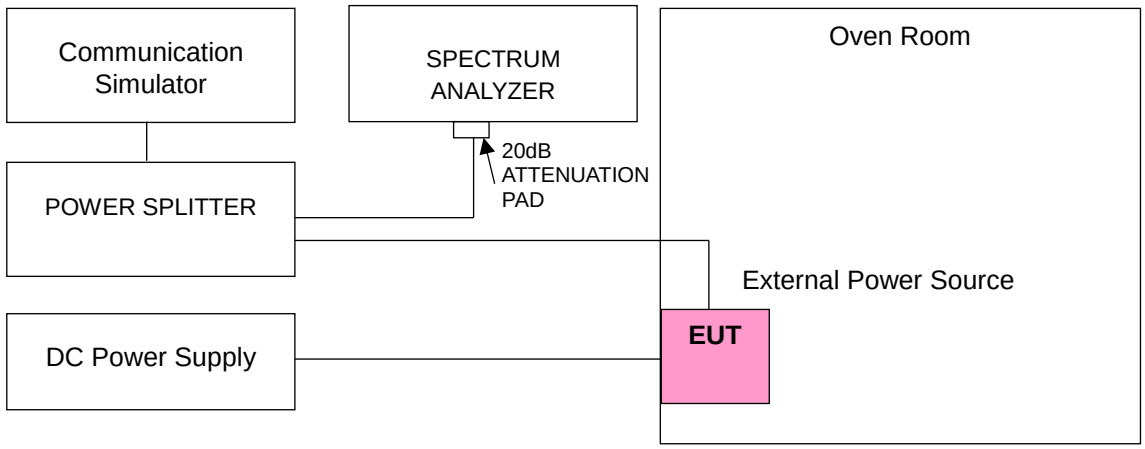
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.2.2 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.

4.2.3 Conducted Setup



4.2.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	WCDMA Band 2			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
5	1852.400003	0.001	1907.600004	0.002
4.25	1852.400004	0.002	1907.600003	0.001
5.75	1852.400002	0.001	1907.600001	0.001

Note: The applicant defined the normal working voltage is from 5Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	WCDMA Band 2			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	1852.400002	0.001	4.200000	0.001
-30	1852.400001	0.001	2.800000	0.001
-20	1852.400003	0.002	1.300000	0.002
-10	1852.400002	0.001	3.100000	0.001
0	1852.400003	0.002	3.300000	0.002
10	1852.400002	0.001	1.300000	0.002
20	1852.399997	-0.002	-2.600000	-0.002
30	1852.399998	-0.001	-2.100000	-0.002
40	1852.399997	-0.002	-3.600000	-0.001
50	1852.399998	-0.001	-2.200000	-0.001
60	1852.399999	-0.001	-4.000000	-0.001
70	1852.399997	-0.002	-3.100000	-0.001
80	1852.399999	-0.001	-3.800000	-0.001
85	1852.399998	-0.001	-3.000000	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
5	1850.700001	0.001	1909.300000	0.001
4.3	1850.700004	0.002	1909.300003	0.001
5.75	1850.700001	0.001	1909.300004	0.002

Note: The applicant defined the normal working voltage is from 5Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	1850.700001	0.001	1909.300002	0.001
-30	1850.700002	0.001	1909.300001	0.001
-20	1850.700002	0.001	1909.300003	0.001
-10	1850.700001	0.001	1909.300004	0.002
0	1850.700002	0.001	1909.300002	0.001
10	1850.700002	0.001	1909.300001	0.001
20	1850.699999	-0.001	1909.299997	-0.002
30	1850.699996	-0.002	1909.299996	-0.002
40	1850.699998	-0.001	1909.299998	-0.001
50	1850.699999	-0.001	1909.299999	-0.001
60	1850.699998	-0.001	1909.299999	-0.001
70	1850.699999	-0.001	1909.299998	-0.001
80	1850.699997	-0.002	1909.299998	-0.001
85	1850.699999	-0.001	1909.299998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
5	1851.500001	0.001	1908.500002	0.001
4.25	1851.500002	0.001	1908.500003	0.002
5.75	1851.500003	0.002	1908.500002	0.001

Note: The applicant defined the normal working voltage is from 5Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	1851.500004	0.002	1908.500001	0.001
-30	1851.500002	0.001	1908.500003	0.001
-20	1851.500001	0.001	1908.500002	0.001
-10	1851.500003	0.002	1908.500004	0.002
0	1851.500001	0.001	1908.500003	0.002
10	1851.500003	0.001	1908.500003	0.001
20	1851.499997	-0.001	1908.499997	-0.001
30	1851.499998	-0.001	1908.499996	-0.002
40	1851.499999	-0.001	1908.499996	-0.002
50	1851.499999	-0.001	1908.499998	-0.001
60	1851.499998	-0.001	1908.499999	-0.001
70	1851.499998	-0.001	1908.499998	-0.001
80	1851.499998	-0.001	1908.499996	-0.002
85	1851.499999	-0.001	1908.499997	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
5	1852.500002	0.001	1907.500001	0.001
4.25	1852.500001	0.001	1907.500001	0.001
5.75	1852.500003	0.002	1907.500003	0.001

Note: The applicant defined the normal working voltage is from 5Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	1852.500001	0.001	1907.500001	0.001
-30	1852.500003	0.002	1907.500002	0.001
-20	1852.500002	0.001	1907.500003	0.002
-10	1852.500003	0.002	1907.500004	0.002
0	1852.500001	0.001	1907.500003	0.002
10	1852.500003	0.002	1907.500003	0.001
20	1852.499997	-0.002	1907.499996	-0.002
30	1852.499999	-0.001	1907.499996	-0.002
40	1852.499997	-0.002	1907.499999	-0.001
50	1852.499997	-0.002	1907.499997	-0.002
60	1852.499996	-0.002	1907.499996	-0.002
70	1852.499998	-0.001	1907.499996	-0.002
80	1852.499998	-0.001	1907.499996	-0.002
85	1852.499996	-0.002	1907.499997	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
5	1855.000002	0.001	1905.000003	0.002
4.25	1855.000001	0.001	1905.000002	0.001
5.75	1855.000002	0.001	1905.000002	0.001

Note: The applicant defined the normal working voltage is from 5Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	1855.000003	0.001	1905.000002	0.001
-30	1855.000001	0.001	1905.000003	0.002
-20	1855.000001	0.001	1905.000003	0.001
-10	1855.000003	0.002	1905.000003	0.001
0	1855.000004	0.002	1905.000002	0.001
10	1855.000001	0.001	1905.000002	0.001
20	1854.999997	-0.002	1904.999997	-0.002
30	1854.999998	-0.001	1904.999999	-0.001
40	1854.999998	-0.001	1904.999997	-0.002
50	1854.999997	-0.002	1904.999998	-0.001
60	1854.999998	-0.001	1904.999997	-0.002
70	1854.999998	-0.001	1904.999998	-0.001
80	1854.999996	-0.002	1904.999998	-0.001
85	1854.999997	-0.002	1904.999997	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
5	1857.500002	0.001	1902.500002	0.001
4.25	1857.500003	0.001	1902.500004	0.002
5.75	1857.500004	0.002	1902.500002	0.001

Note: The applicant defined the normal working voltage is from 5Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	1857.500004	0.002	1902.500001	0.001
-30	1857.500002	0.001	1902.500004	0.002
-20	1857.500003	0.001	1902.500002	0.001
-10	1857.500001	0.001	1902.500002	0.001
0	1857.500001	0.001	1902.500003	0.002
10	1857.500002	0.001	1902.500002	0.001
20	1857.499998	-0.001	1902.499998	-0.001
30	1857.499998	-0.001	1902.499999	-0.001
40	1857.499996	-0.002	1902.499997	-0.002
50	1857.499999	-0.001	1902.499999	-0.001
60	1857.499997	-0.002	1902.499999	-0.001
70	1857.499998	-0.001	1902.499997	-0.002
80	1857.499997	-0.001	1902.499998	-0.001
85	1857.499998	-0.001	1902.499999	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
5	1860.000004	0.002	1900.000004	0.002
4.25	1860.000003	0.001	1900.000002	0.001
5.75	1860.000003	0.002	1900.000004	0.002

Note: The applicant defined the normal working voltage is from 5Vdc to 5.75Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	1860.000004	0.002	1900.000004	0.002
-30	1860.000002	0.001	1900.000004	0.002
-20	1860.000003	0.002	1900.000003	0.002
-10	1860.000003	0.002	1900.000001	0.001
0	1860.000002	0.001	1900.000002	0.001
10	1860.000003	0.002	1900.000003	0.001
20	1859.999997	-0.002	1899.999997	-0.002
30	1859.999997	-0.002	1899.999996	-0.002
40	1859.999997	-0.002	1899.999997	-0.002
50	1859.999998	-0.001	1899.999998	-0.001
60	1859.999997	-0.001	1899.999998	-0.001
70	1859.999998	-0.001	1899.999997	-0.002
80	1859.999998	-0.001	1899.999999	-0.001
85	1859.999996	-0.002	1899.999998	-0.001

4.3 Radiated Emission Measurement

4.3.1 Limits of Radiated Emission Measurement

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

4.3.2 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 1 MHz/3 MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:

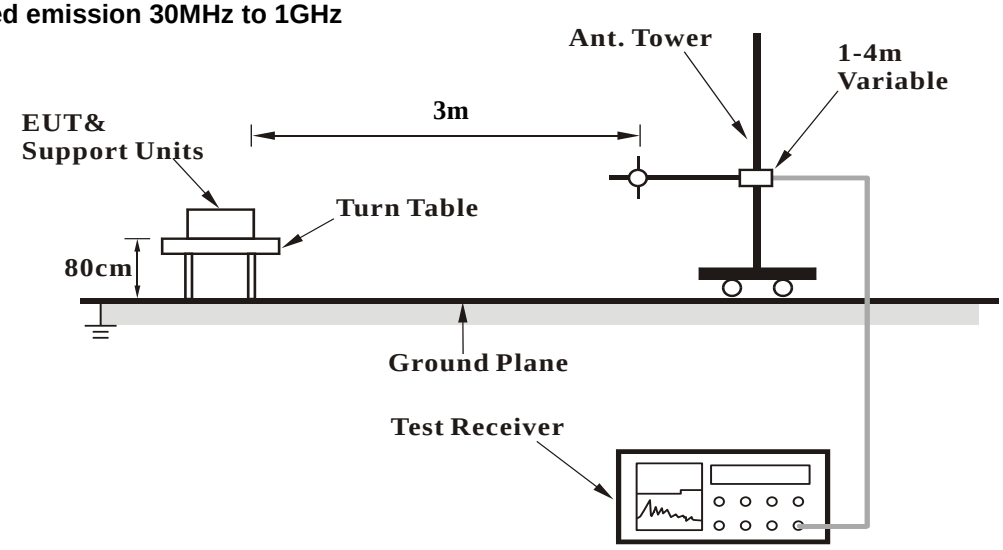
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.3.3 Deviation from Test Standard

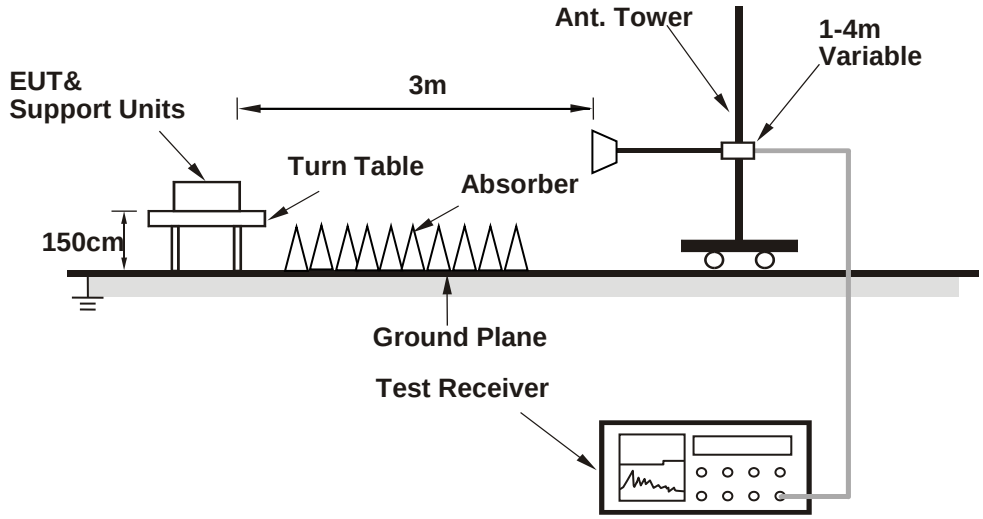
No deviation.

4.3.4 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).

4.3.5 Test Results

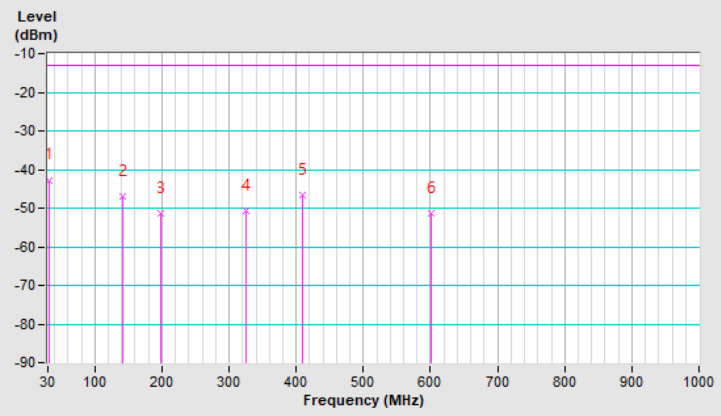
Below 1GHz
WCDMA Band 2

RF Mode	TX WCDMA Band II	Channel	CH 9538：1907.6 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	31.94	-42.7	-13.0	-29.7	1.00 H	5	62.9	-105.6
2	140.58	-47.0	-13.0	-34.0	1.50 H	6	57.5	-104.5
3	198.78	-51.2	-13.0	-38.2	1.50 H	186	55.8	-107.0
4	324.88	-50.7	-13.0	-37.7	1.00 H	121	51.5	-102.2
5	410.24	-46.5	-13.0	-33.5	1.50 H	97	54.6	-101.1
6	600.36	-51.2	-13.0	-38.2	1.00 H	277	46.2	-97.4

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.

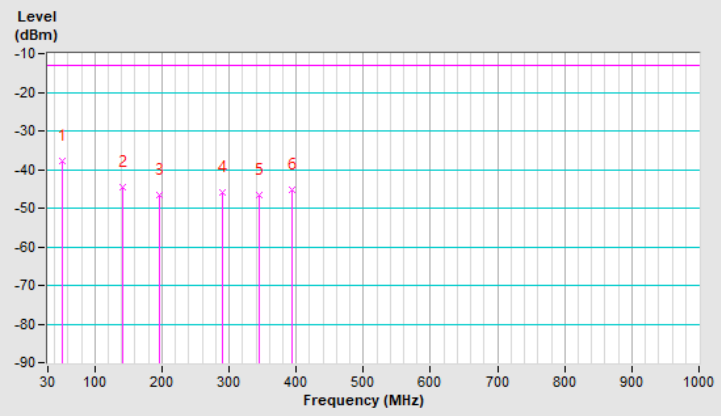


RF Mode	TX WCDMA Band II	Channel	CH 9538：1907.6 MHz
Frequency Range	30MHz ~ 1GHz		

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	**51.34**	**-37.8**	**-13.0**	**-24.8**	**1.00 V**	**31**	**66.0**	**-103.8**
2	140.58	-44.7	-13.0	-31.7	1.00 V	53	59.8	-104.5
3	196.84	-46.6	-13.0	-33.6	1.00 V	51	60.3	-106.9
4	289.96	-45.8	-13.0	-32.8	1.00 V	264	57.4	-103.2
5	344.28	-46.7	-13.0	-33.7	1.50 V	282	55.4	-102.1
6	392.78	-45.1	-13.0	-32.1	1.00 V	52	56.2	-101.3

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.



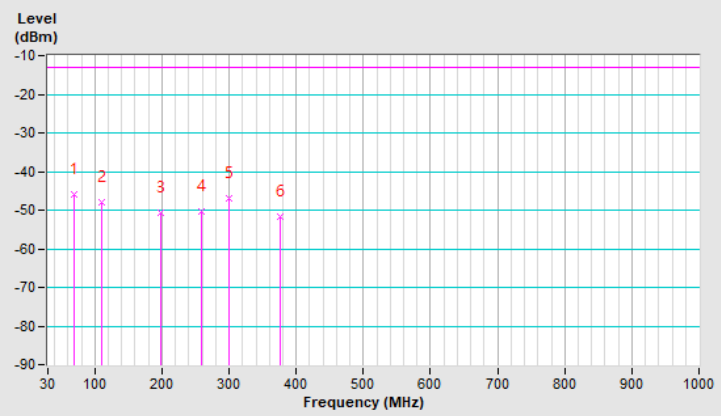
LTE Band 2

RF Mode	TX LTE Band II-20MHz	Channel	CH 18900：1880 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	68.80	-45.9	-13.0	-32.9	1.00 H	289	60.0	-105.9
2	109.54	-47.8	-13.0	-34.8	1.00 H	247	59.6	-107.4
3	198.78	-50.8	-13.0	-37.8	1.50 H	163	56.2	-107.0
4	258.92	-50.4	-13.0	-37.4	1.00 H	247	54.0	-104.4
5	299.66	-46.9	-13.0	-33.9	1.00 H	52	55.9	-102.8
6	375.32	-51.8	-13.0	-38.8	1.00 H	253	49.8	-101.6

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.

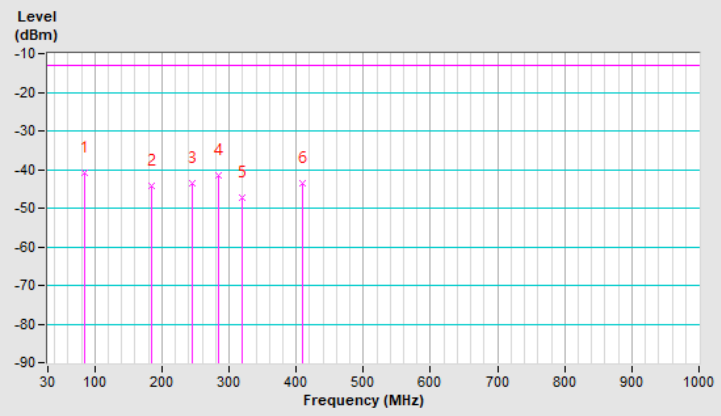


RF Mode	TX LTE Band II-20MHz	Channel	CH 18900：1880 MHz
Frequency Range	30MHz ~ 1GHz		

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	84.32	-41.0	-13.0	-28.0	1.00 V	53	68.3	-109.3
2	185.20	-44.2	-13.0	-31.2	1.50 V	51	61.9	-106.1
3	245.34	-43.5	-13.0	-30.5	1.50 V	48	61.5	-105.0
4	284.14	-41.4	-13.0	-28.4	1.50 V	49	61.8	-103.2
5	319.06	-47.3	-13.0	-34.3	1.00 V	58	55.2	-102.5
6	410.24	-43.5	-13.0	-30.5	1.50 V	58	57.6	-101.1

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.



Above 1GHz
WCDMA Band 2

RF Mode	TX WCDMA Band II	Channel	CH 9262：1852.4 MHz
Frequency Range	1GMHz ~ 20GHz		

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	3704.80	-49.34	-13.00	-36.34	1.55 H	28	38.02	-87.36
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	3704.80	-48.14	-13.00	-35.14	1.66 V	258	39.22	-87.36

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.

RF Mode	TX WCDMA Band II	Channel	CH 9400：1880 MHz
Frequency Range	1GMHz ~ 20GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-49.11	-13.00	-36.11	1.55 H	15	38.15	-87.26
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	3760.00	-47.91	-13.00	-34.91	1.62 V	251	39.35	-87.26

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.

RF Mode	TX WCDMA Band II	Channel	CH 9538：1907.6 MHz
Frequency Range	1GMHz ~ 20GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3815.20	-49.00	-13.00	-36.00	1.58 H	25	38.05	-87.05
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	3815.20	-47.53	-13.00	-34.53	1.61 V	254	39.52	-87.05

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 2

RF Mode	TX LTE Band II-1.4MHz	Channel	CH 18607：1850.7 MHz
Frequency Range	1GMHz ~ 20GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3701.40	-49.20	-13.00	-36.20	1.50 H	19	38.17	-87.37
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	3701.40	-47.98	-13.00	-34.98	1.58 V	253	39.39	-87.37

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.

RF Mode	TX LTE Band II-1.4MHz	Channel	CH 18900：1880 MHz
Frequency Range	1GMHz ~ 20GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-49.82	-13.00	-36.82	1.44 H	20	37.44	-87.26
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	3760.00	-47.63	-13.00	-34.63	1.56 V	249	39.63	-87.26

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.

RF Mode	TX LTE Band II-1.4MHz	Channel	CH 19193：1909.3 MHz
Frequency Range	1GMHz ~ 20GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3818.60	-49.35	-13.00	-36.35	1.52 H	25	37.68	-87.03
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	3818.60	-47.96	-13.00	-34.96	1.62 V	248	39.07	-87.03

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.

RF Mode	TX LTE Band II-5MHz	Channel	CH 18625：1852.5 MHz
Frequency Range	1GMHz ~ 20GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3705.00	-50.03	-13.00	-37.03	1.48 H	21	37.33	-87.36
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	3705.00	-47.72	-13.00	-34.72	1.59 V	249	39.64	-87.36

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.

RF Mode	TX LTE Band II-5MHz	Channel	CH 18900：1880 MHz
Frequency Range	1GMHz ~ 20GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-48.84	-13.00	-35.84	1.50 H	24	38.42	-87.26
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	3760.00	-47.55	-13.00	-34.55	1.59 V	248	39.71	-87.26

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.

RF Mode	TX LTE Band II-5MHz	Channel	CH 19175：1907.5 MHz
Frequency Range	1GMHz ~ 20GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3815.00	-48.91	-13.00	-35.91	1.51 H	18	38.15	-87.06
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	3815.00	-47.59	-13.00	-34.59	1.55 V	251	39.47	-87.06

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.

RF Mode	TX LTE Band II-20MHz	Channel	CH 18700：1860 MHz
Frequency Range	1GMHz ~ 20GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3720.00	-49.85	-13.00	-36.85	1.53 H	18	37.48	-87.33
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	3720.00	-48.59	-13.00	-35.59	1.56 V	247	38.74	-87.33

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.

RF Mode	TX LTE Band II-20MHz	Channel	CH 18900：1880 MHz
Frequency Range	1GMHz ~ 20GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-48.94	-13.00	-35.94	1.50 H	24	38.32	-87.26
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	3760.00	-47.49	-13.00	-34.49	1.56 V	247	39.77	-87.26

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.

RF Mode	TX LTE Band II-20MHz	Channel	CH 19100：1900 MHz
Frequency Range	1GMHz ~ 20GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3800.00	-49.24	-13.00	-36.24	1.50 H	18	37.94	-87.18
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	3800.00	-48.32	-13.00	-35.32	1.63 V	251	38.86	-87.18

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.

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

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