

FCC Test Report

(Spot Check: Part 24 – GSM, WCDMA B2, LTE B2)

Report No.: RFBGTL-WTW-P22020477-7

FCC ID: APYHRO00315

Received Date: Feb. 19, 2022

Test Date: May 04 ~ May 11, 2022

Issued Date: May 30, 2022

Applicant: SHARP Corporation Mobile Communication BU

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Manufacturer: Sharp Corporation

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

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33383, TAIWAN

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

Test Location (2): No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

**FCC Registration /
Designation Number:** 281270 / TW0032



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Release Control Record

Issue No.	Description	Date Issued
RFBGTL-WTW-P22020477-7	Original release	May 30, 2022

1 Certificate of Conformity

Product: Smart Phone

Brand: SHARP

Sample Status: Engineering sample

Applicant: SHARP Corporation Mobile Communication BU

Manufacturer: Sharp Corporation

Test Date: May 04 ~ May 11, 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 : Celine Chou , **Date:** May 30, 2022
Celine Chou / Senior Specialist

Approved by : Jeremy Lin , **Date:** May 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	Effective Isotropically Radiated Power	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -33.70dB at 36.79MHz.

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	3.00 dB
	30MHz ~ 200MHz	2.91 dB
	200MHz ~ 1000MHz	2.93 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038B	MY60180018	Feb. 18, 2022	Feb. 17, 2023
Spectrum Analyzer KEYSIGHT	N9020B	MY60110513	Dec. 24, 2021	Dec. 23, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-1214	Oct. 27, 2021	Oct. 26, 2022
HORN Antenna RF SPIN	DRH18-E	210101A18E	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	9170-1049	Nov. 14, 2021	Nov. 13, 2022
Loop Antenna EMCI	EM-6879	269	Sep. 16, 2021	Sep. 15, 2022
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier EMCI	EMC330N	980798	Jan. 17, 2022	Jan. 16, 2023
Preamplifier EMCI	EMC118A45SE	980809	Dec. 30, 2021	Dec. 29, 2022
Preamplifier EMCI	EMC184045SE	980786	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC104-SM-SM-(9000+3000+1000)	201244+ 201232+ 210103	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMCCFD400-NM-NM-(9000+3000+500)	201251+ 201249+ 201248	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC101G-KM-KM-(5000+3000+2000)	201261+201258+201255	Jan. 17, 2022	Jan. 16, 2023
Software BV ADT	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower Max-Full	MFA-515BSN	NA	NA	NA
Turn Table Max-Full	MFT-201SS	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208676	NA	NA
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	Jan. 03, 2022	Jan. 02, 2023
True RMS Clamp Meter Fluke	325	31130711WS	Jun. 02, 2021	Jun. 01, 2022
DC power supply Keysight	U8002A	MY56330015	NA	NA
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Feb. 16, 2022	Feb. 15, 2023

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 WM Chamber 9.

3 General Information

3.1 General Description of EUT

Product	Smart Phone			
Brand	SHARP			
Sample Status	Engineering sample			
Power Supply Rating	3.87Vdc (Battery) 5Vdc (Adapter)			
Modulation Type	GSM, GPRS: GMSK WCDMA: BPSK, QPSK HSDPA: BPSK HSUPA: QPSK LTE: QPSK, 16QAM, 64QAM			
Operating Frequency	GSM, GPRS	1850.2MHz ~ 1909.8MHz		
	WCDMA Band 2	1852.4MHz ~ 1907.6MHz		
	LTE Band 2 (Channel Bandwidth 1.4MHz)	1850.7MHz ~ 1909.3MHz		
	LTE Band 2 (Channel Bandwidth 3MHz)	1851.5MHz ~ 1908.5MHz		
	LTE Band 2 (Channel Bandwidth 5MHz)	1852.5MHz ~ 1907.5MHz		
	LTE Band 2 (Channel Bandwidth 10MHz)	1855.0MHz ~ 1905.0MHz		
	LTE Band 2 (Channel Bandwidth 15MHz)	1857.5MHz ~ 1902.5MHz		
	LTE Band 2 (Channel Bandwidth 20MHz)	1860.0MHz ~ 1900.0MHz		
Max. EIRP Power	GSM	517.607mW (27.14dBm)		
	GPRS	505.825mW (27.04dBm)		
	WCDMA Band 2	102.094mW (20.09dBm)		
		QPSK	16QAM	64QAM
	LTE Band 2 (Channel Bandwidth 1.4MHz)	78.705mW (18.96dBm)	62.806mW (17.98dBm)	50.582mW (17.04dBm)
	LTE Band 2 (Channel Bandwidth 3MHz)	78.163mW (18.93dBm)	64.121mW (18.07dBm)	51.050mW (17.08dBm)
	LTE Band 2 (Channel Bandwidth 5MHz)	76.913mW (18.86dBm)	60.117mW (17.79dBm)	48.306mW (16.84dBm)
	LTE Band 2 (Channel Bandwidth 10MHz)	76.560mW (18.84dBm)	61.944mW (17.92dBm)	49.317mW (16.93dBm)
	LTE Band 2 (Channel Bandwidth 15MHz)	75.858mW (18.80dBm)	60.814mW (17.84dBm)	48.641mW (16.87dBm)
	LTE Band 2 (Channel Bandwidth 20MHz)	103.753mW (20.16dBm)	82.414mW (19.16dBm)	66.222mW (18.21dBm)
Antenna Type	Refer to note			
Antenna Connector	Refer to note			
Accessory Device	Refer to note			
Cable Supplied	NA			

Note:

1. This report is a supplementary report to the original BV CPS report no.: RFBGTL-WTW-P22020475-7. Exhibit prepared for FCC Spot Check Verification report, the format, test items and amount of spot-check test data are decided by applicant's engineering judgment, for more details please refer to declaration letter exhibit. Radiated emission and output power verification worst test refer to original report.
2. There are differences between FCC ID: APYHRO00314 & FCC ID: APYHRO00315:

FCC ID	APYHRO00314	APYHRO00315
FM Radio	Supports	Doesn't support

3. The EUT uses following devices.

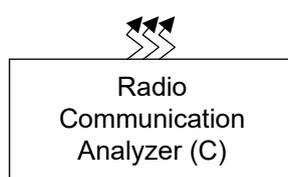
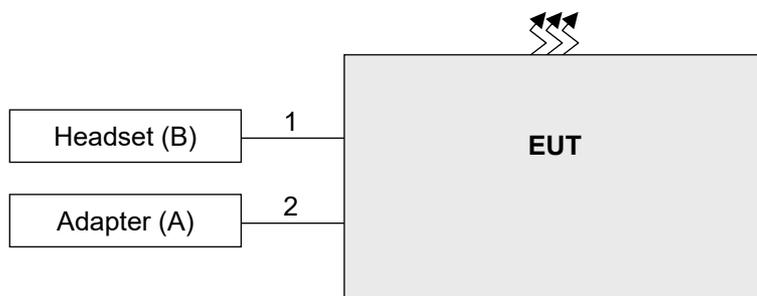
Product	Brand	Model	Description
Adapter (Support unit)	Salom	XN-2QC25	Input: 100-240Vac, 50/60Hz, 0.2A Output: 5.0Vdc, 800mA
Battery	-	-	3.87Vdc, Rated 4870mAh (18.9Wh), Typ. 5000mAh (19.4Wh)
Headset (Support unit)	Ambibio	AB-HI02JS	-
USB cable (Support unit)	Luxshare-ICT	L6KU2007-CS-H	0.95m shielded cable without core

4. The antenna information is listed as below.

Ant. No.	Type	Connector	Gain (dBi)										
			GSM 850	GSM 1900	WCDMA B2 / LTE B2	WCDMA B4 / LTE B4	WCDMA B5 / LTE B5	LTE B7	LTE B12	LTE B13	LTE B17	LTE B38	LTE B41
1	PIFA	IPEX	-	-2.9	-2.9	-4.9	-	-1.8	-	-	-	-1.9	-1.9
3	PIFA	IPEX	-4.8	-	-	-	-4.8	-	-5.6	-5.3	-5.6	-	-

* 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.	Adapter	Salom	XN-2QC25	N/A	N/A	Provided by client
B.	Headset	Ambibio	AB-HI02JS	N/A	N/A	Provided by client
C.	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	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	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Earphone Cable	1	1.1	N	0	Provided by client
2.	USB Cable	1	1	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 as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	Radiated Emission
GSM	Z-plane
WCDMA Band 2	Z-plane
LTE Band 2	Z-plane

GSM Mode

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Modulation
-	EIRP	512 to 810	512 (1850.2MHz), 661 (1880.0MHz), 810 (1909.8MHz)	GSM, GPRS
-	Radiated Emission	512 to 810	661 (1880.0MHz)	GSM

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
-	Radiated Emission	9262 to 9538	9400 (1880.0MHz)	WCDMA

LTE Band 2

EUT Configure Mode	Test item	Available channel	Tested Channel	Channel Bandwidth	Modulation	RB #
-	EIRP	18607 to 19193	18607 (1850.7MHz), 18900 (1880.0MHz), 19193 (1909.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM	1 Half Full
		18615 to 19185	18615 (1851.5MHz), 18900 (1880.0MHz), 19185 (1908.5MHz)	3MHz	QPSK / 16QAM / 64QAM	1 Half Full
		18625 to 19175	18625 (1852.5MHz), 18900 (1880.0MHz), 19175 (1907.5MHz)	5MHz	QPSK / 16QAM / 64QAM	1 Half Full
		18650 to 19150	18650 (1855.0MHz), 18900 (1880.0MHz), 19150 (1905.0MHz)	10MHz	QPSK / 16QAM / 64QAM	1 Half Full
		18675 to 19125	18675 (1857.5MHz), 18900 (1880.0MHz), 19125 (1902.5MHz)	15MHz	QPSK / 16QAM / 64QAM	1 Half Full
		18700 to 19100	18700 (1860.0MHz), 18900 (1880.0MHz), 19100 (1900.0MHz)	20MHz	QPSK / 16QAM / 64QAM	1 Half Full
-	Radiated Emission	18700 to 19100	18900 (1880.0MHz)	20MHz	QPSK	1

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25deg. C, 60%RH	3.87Vdc	Willy Cheng
Radiated Emission	27deg. C, 66%RH	120Vac, 60Hz	Tim 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 24

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

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

4.1.2 Test Procedures

Conducted Power Measurement:

The EUT was set up for the maximum power with GSM, 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:

$$\text{EIRP} = P_{\text{Meas}} + G_{\text{T}}$$

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

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	GSM 1900		
Channel	512	661	810
Frequency	1850.2	1880	1909.8
GSM	29.81	30.04	29.79
GPRS 1Tx Slot	29.69	29.94	29.67
GPRS 2Tx Slot	27.89	27.79	27.87
GPRS 3Tx Slot	26.27	26.28	26.25
GPRS 4Tx Slot	24.93	25.07	24.97

Band	WCDMA II		
TX Channel	9262	9400	9538
Rx Channel	9662	9800	9938
Frequency	1852.4	1880	1907.6
RMC 12.2K	22.95	22.99	22.92
HSDPA Subtest-1	21.92	21.97	21.95
HSDPA Subtest-2	21.77	21.79	21.73
HSDPA Subtest-3	21.61	21.58	21.71
HSDPA Subtest-4	21.78	21.54	21.76
HSUPA Subtest-1	22.26	22.03	22.14
HSUPA Subtest-2	20.27	20.07	20.11
HSUPA Subtest-3	21.07	21.09	21.05
HSUPA Subtest-4	20.17	20.01	20.04
HSUPA Subtest-5	22.07	22.03	22.08

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18700	18900	19100
		Frequency (MHz)		1860	1880	1900
20M	QPSK	1	0	22.94	23.06	22.77
		1	50	22.92	23.04	22.78
		1	99	22.87	22.97	22.87
		50	0	21.45	21.52	21.33
		50	25	21.37	21.48	21.34
		50	50	21.36	21.47	21.28
		100	0	21.37	21.45	21.30
20M	16QAM	1	0	21.94	22.06	21.83
		1	50	21.94	21.99	21.84
		1	99	21.78	21.93	21.66
		50	0	20.50	20.61	20.39
		50	25	20.40	20.58	20.32
		50	50	20.45	20.57	20.35
		100	0	20.38	20.52	20.28
20M	64QAM	1	0	21.04	21.11	20.90
		1	50	20.98	21.04	20.92
		1	99	20.87	20.96	20.84
		50	0	19.46	19.57	19.35
		50	25	19.42	19.55	19.27
		50	50	19.35	19.52	19.28
		100	0	19.47	19.49	19.29

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18675	18900	19125
		Frequency (MHz)		1857.5	1880	1902.5
15M	QPSK	1	0	21.57	21.63	21.61
		1	37	21.63	21.70	21.43
		1	74	21.52	21.61	21.58
		36	0	20.06	20.22	20.00
		36	19	20.08	20.11	19.99
		36	39	20.06	20.14	19.98
		75	0	19.99	20.13	19.93
15M	16QAM	1	0	20.60	20.74	20.46
		1	37	20.59	20.62	20.54
		1	74	20.45	20.58	20.28
		36	0	19.19	19.27	19.10
		36	19	19.01	19.22	19.01
		36	39	19.09	19.24	19.02
		75	0	19.02	19.22	18.98
15M	64QAM	1	0	19.68	19.77	19.60
		1	37	19.61	19.72	19.62
		1	74	19.56	19.62	19.55
		36	0	18.16	18.22	17.96
		36	19	18.12	18.24	17.90
		36	39	18.00	18.21	17.99
		75	0	18.18	18.17	17.96

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18650	18900	19150
		Frequency (MHz)		1855	1880	1905
10M	QPSK	1	0	21.55	21.61	21.59
		1	24	21.74	21.66	21.40
		1	49	21.55	21.58	21.65
		25	0	20.03	20.31	20.10
		25	12	20.13	20.19	20.00
		25	25	20.15	20.12	19.95
		50	0	20.00	20.09	20.04
10M	16QAM	1	0	20.66	20.82	20.42
		1	24	20.65	20.66	20.59
		1	49	20.52	20.65	20.35
		25	0	19.16	19.38	19.21
		25	12	18.98	19.18	19.08
		25	25	19.09	19.20	19.08
		50	0	19.07	19.21	18.94
10M	64QAM	1	0	19.76	19.83	19.63
		1	24	19.62	19.78	19.70
		1	49	19.59	19.64	19.64
		25	0	18.19	18.29	18.06
		25	12	18.21	18.26	17.93
		25	25	18.03	18.29	17.95
		50	0	18.15	18.18	18.01

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18625	18900	19175
		Frequency (MHz)		1852.5	1880	1907.5
5M	QPSK	1	0	21.45	21.58	21.52
		1	12	21.58	21.76	21.26
		1	24	21.36	21.70	21.52
		12	0	19.88	20.28	20.00
		12	6	19.92	20.09	19.85
		12	13	19.88	20.09	19.86
		25	0	19.87	20.13	19.82
5M	16QAM	1	0	20.44	20.68	20.40
		1	12	20.52	20.69	20.49
		1	24	20.35	20.55	20.22
		12	0	19.08	19.36	19.11
		12	6	18.91	19.18	18.96
		12	13	18.92	19.28	18.92
		25	0	18.92	19.23	18.91
5M	64QAM	1	0	19.61	19.74	19.56
		1	12	19.49	19.74	19.65
		1	24	19.38	19.69	19.44
		12	0	18.00	18.20	17.91
		12	6	18.03	18.26	17.82
		12	13	17.92	18.26	17.87
		25	0	18.03	18.25	17.94

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18615	18900	19185
		Frequency (MHz)		1851.5	1880	1908.5
3M	QPSK	1	0	21.55	21.67	21.62
		1	7	21.61	21.83	21.53
		1	14	21.60	21.81	21.65
		8	0	20.12	20.36	20.12
		8	3	20.08	20.22	20.12
		8	7	20.18	20.35	20.11
		15	0	20.06	20.32	20.11
3M	16QAM	1	0	20.69	20.97	20.55
		1	7	20.66	20.82	20.70
		1	14	20.42	20.80	20.34
		8	0	19.26	19.38	19.29
		8	3	19.13	19.40	19.07
		8	7	19.12	19.45	19.18
		15	0	19.08	19.36	19.11
3M	64QAM	1	0	19.76	19.98	19.64
		1	7	19.72	19.86	19.76
		1	14	19.62	19.74	19.63
		8	0	18.19	18.40	18.01
		8	3	18.16	18.46	18.08
		8	7	18.03	18.44	18.07
		15	0	18.29	18.30	18.00

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18607	18900	19193
		Frequency (MHz)		1850.7	1880	1909.3
1.4M	QPSK	1	0	21.48	21.64	21.55
		1	2	21.59	21.86	21.40
		1	5	21.46	21.77	21.57
		3	0	21.06	21.27	21.07
		3	1	20.97	21.19	21.02
		3	3	21.00	21.19	21.05
		6	0	20.00	20.25	19.96
1.4M	16QAM	1	0	20.48	20.88	20.49
		1	2	20.53	20.67	20.60
		1	5	20.36	20.70	20.33
		3	0	20.12	20.38	20.03
		3	1	19.92	20.32	20.09
		3	3	20.08	20.28	19.99
		6	0	19.00	19.28	19.06
1.4M	64QAM	1	0	19.55	19.94	19.63
		1	2	19.52	19.87	19.61
		1	5	19.42	19.74	19.57
		3	0	19.14	19.34	18.95
		3	1	19.03	19.31	18.96
		3	3	18.94	19.23	18.96
		6	0	18.05	18.30	17.96

EIRP Power (dBm)

Band	GSM 1900		
Channel	512	661	810
Frequency	1850.2	1880	1909.8
GSM	26.91	27.14	26.89
GPRS 1Tx Slot	26.79	27.04	26.77
GPRS 2Tx Slot	24.99	24.89	24.97
GPRS 3Tx Slot	23.37	23.38	23.35
GPRS 4Tx Slot	22.03	22.17	22.07

*EIRP = Conducted + antenna gain (-2.90dBi)

Band	WCDMA II		
TX Channel	9262	9400	9538
Rx Channel	9662	9800	9938
Frequency	1852.4	1880	1907.6
RMC 12.2K	20.05	20.09	20.02
HSDPA Subtest-1	19.02	19.07	19.05
HSDPA Subtest-2	18.87	18.89	18.83
HSDPA Subtest-3	18.71	18.68	18.81
HSDPA Subtest-4	18.88	18.64	18.86
HSUPA Subtest-1	19.36	19.13	19.24
HSUPA Subtest-2	17.37	17.17	17.21
HSUPA Subtest-3	18.17	18.19	18.15
HSUPA Subtest-4	17.27	17.11	17.14
HSUPA Subtest-5	19.17	19.13	19.18

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18700	18900	19100
		Frequency (MHz)		1860	1880	1900
20M	QPSK	1	0	20.04	20.16	19.87
		1	50	20.02	20.14	19.88
		1	99	19.97	20.07	19.97
		50	0	18.55	18.62	18.43
		50	25	18.47	18.58	18.44
		50	50	18.46	18.57	18.38
		100	0	18.47	18.55	18.40
20M	16QAM	1	0	19.04	19.16	18.93
		1	50	19.04	19.09	18.94
		1	99	18.88	19.03	18.76
		50	0	17.60	17.71	17.49
		50	25	17.50	17.68	17.42
		50	50	17.55	17.67	17.45
		100	0	17.48	17.62	17.38
20M	64QAM	1	0	18.14	18.21	18.00
		1	50	18.08	18.14	18.02
		1	99	17.97	18.06	17.94
		50	0	16.56	16.67	16.45
		50	25	16.52	16.65	16.37
		50	50	16.45	16.62	16.38
		100	0	16.57	16.59	16.39

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18675	18900	19125
		Frequency (MHz)		1857.5	1880	1902.5
15M	QPSK	1	0	18.67	18.73	18.71
		1	37	18.73	18.80	18.53
		1	74	18.62	18.71	18.68
		36	0	17.16	17.32	17.10
		36	19	17.18	17.21	17.09
		36	39	17.16	17.24	17.08
		75	0	17.09	17.23	17.03
15M	16QAM	1	0	17.70	17.84	17.56
		1	37	17.69	17.72	17.64
		1	74	17.55	17.68	17.38
		36	0	16.29	16.37	16.20
		36	19	16.11	16.32	16.11
		36	39	16.19	16.34	16.12
		75	0	16.12	16.32	16.08
15M	64QAM	1	0	16.78	16.87	16.70
		1	37	16.71	16.82	16.72
		1	74	16.66	16.72	16.65
		36	0	15.26	15.32	15.06
		36	19	15.22	15.34	15.00
		36	39	15.10	15.31	15.09
		75	0	15.28	15.27	15.06

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18650	18900	19150
		Frequency (MHz)		1855	1880	1905
10M	QPSK	1	0	18.65	18.71	18.69
		1	24	18.84	18.76	18.50
		1	49	18.65	18.68	18.75
		25	0	17.13	17.41	17.20
		25	12	17.23	17.29	17.10
		25	25	17.25	17.22	17.05
		50	0	17.10	17.19	17.14
10M	16QAM	1	0	17.76	17.92	17.52
		1	24	17.75	17.76	17.69
		1	49	17.62	17.75	17.45
		25	0	16.26	16.48	16.31
		25	12	16.08	16.28	16.18
		25	25	16.19	16.30	16.18
		50	0	16.17	16.31	16.04
10M	64QAM	1	0	16.86	16.93	16.73
		1	24	16.72	16.88	16.80
		1	49	16.69	16.74	16.74
		25	0	15.29	15.39	15.16
		25	12	15.31	15.36	15.03
		25	25	15.13	15.39	15.05
		50	0	15.25	15.28	15.11

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18625	18900	19175
		Frequency (MHz)		1852.5	1880	1907.5
5M	QPSK	1	0	18.55	18.68	18.62
		1	12	18.68	18.86	18.36
		1	24	18.46	18.80	18.62
		12	0	16.98	17.38	17.10
		12	6	17.02	17.19	16.95
		12	13	16.98	17.19	16.96
		25	0	16.97	17.23	16.92
5M	16QAM	1	0	17.54	17.78	17.50
		1	12	17.62	17.79	17.59
		1	24	17.45	17.65	17.32
		12	0	16.18	16.46	16.21
		12	6	16.01	16.28	16.06
		12	13	16.02	16.38	16.02
		25	0	16.02	16.33	16.01
5M	64QAM	1	0	16.71	16.84	16.66
		1	12	16.59	16.84	16.75
		1	24	16.48	16.79	16.54
		12	0	15.10	15.30	15.01
		12	6	15.13	15.36	14.92
		12	13	15.02	15.36	14.97
		25	0	15.13	15.35	15.04

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18615	18900	19185
		Frequency (MHz)		1851.5	1880	1908.5
3M	QPSK	1	0	18.65	18.77	18.72
		1	7	18.71	18.93	18.63
		1	14	18.70	18.91	18.75
		8	0	17.22	17.46	17.22
		8	3	17.18	17.32	17.22
		8	7	17.28	17.45	17.21
		15	0	17.16	17.42	17.21
3M	16QAM	1	0	17.79	18.07	17.65
		1	7	17.76	17.92	17.80
		1	14	17.52	17.90	17.44
		8	0	16.36	16.48	16.39
		8	3	16.23	16.50	16.17
		8	7	16.22	16.55	16.28
		15	0	16.18	16.46	16.21
3M	64QAM	1	0	16.86	17.08	16.74
		1	7	16.82	16.96	16.86
		1	14	16.72	16.84	16.73
		8	0	15.29	15.50	15.11
		8	3	15.26	15.56	15.18
		8	7	15.13	15.54	15.17
		15	0	15.39	15.40	15.10

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18607	18900	19193
		Frequency (MHz)		1850.7	1880	1909.3
1.4M	QPSK	1	0	18.58	18.74	18.65
		1	2	18.69	18.96	18.50
		1	5	18.56	18.87	18.67
		3	0	18.16	18.37	18.17
		3	1	18.07	18.29	18.12
		3	3	18.10	18.29	18.15
		6	0	17.10	17.35	17.06
1.4M	16QAM	1	0	17.58	17.98	17.59
		1	2	17.63	17.77	17.70
		1	5	17.46	17.80	17.43
		3	0	17.22	17.48	17.13
		3	1	17.02	17.42	17.19
		3	3	17.18	17.38	17.09
		6	0	16.10	16.38	16.16
1.4M	64QAM	1	0	16.65	17.04	16.73
		1	2	16.62	16.97	16.71
		1	5	16.52	16.84	16.67
		3	0	16.24	16.44	16.05
		3	1	16.13	16.41	16.06
		3	3	16.04	16.33	16.06
		6	0	15.15	15.40	15.06

*EIRP = Conducted + antenna gain (-2.90dBi)

4.2 Radiated Emission Measurement

4.2.1 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 .

4.2.2 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
 - $\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m.
 - $\text{ERP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8 - 2.15$; where D is the measurement distance (in the far field region) in m.

Note:

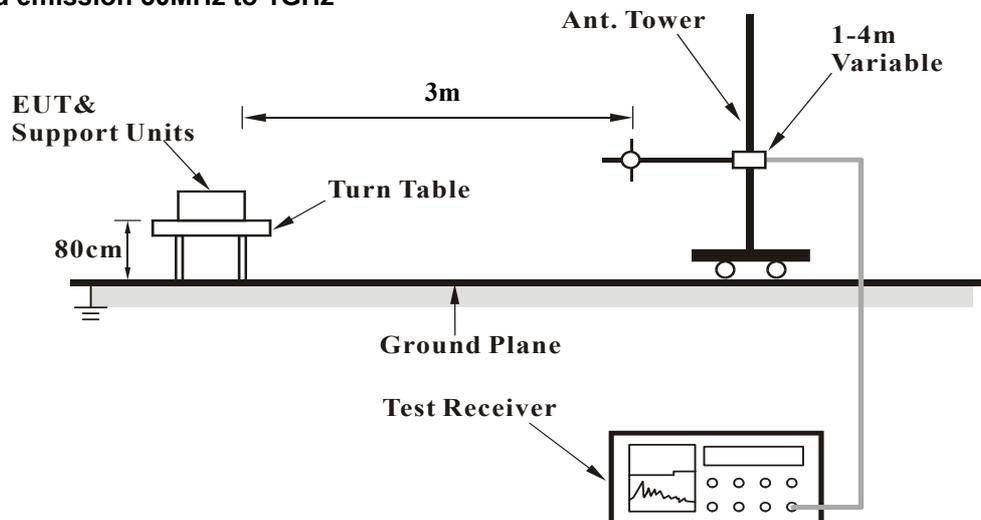
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.2.3 Deviation from Test Standard

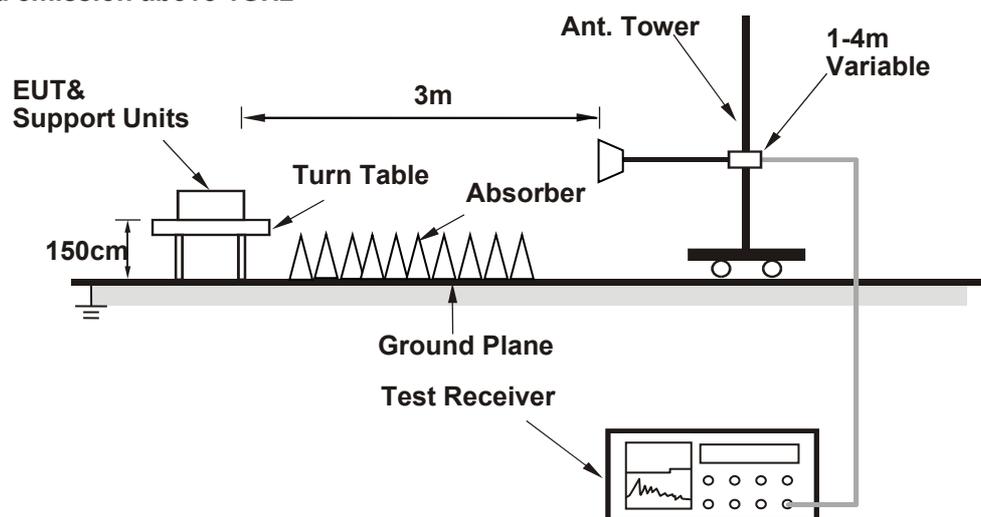
No deviation.

4.2.4 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).

4.2.5 Test Results

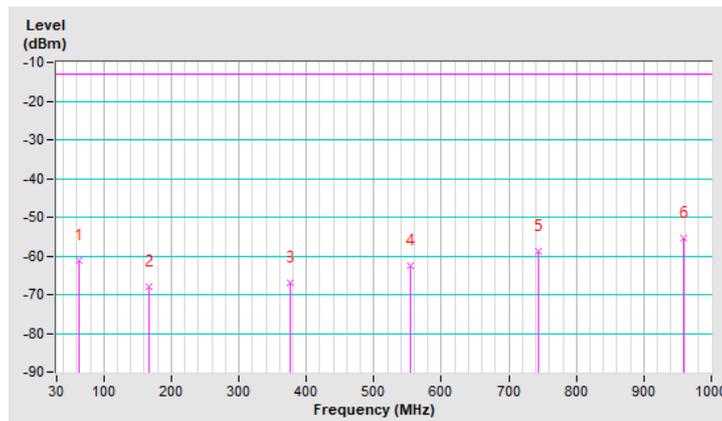
Below 1GHz
GSM

Mode	TX channel 661 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

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	63.95	-61.20	-13.00	-48.20	1.23 H	204	48.20	-109.40
2	166.77	-67.80	-13.00	-54.80	1.52 H	147	40.90	-108.70
3	376.29	-66.80	-13.00	-53.80	1.66 H	231	39.00	-105.80
4	554.77	-62.50	-13.00	-49.50	1.02 H	158	39.70	-102.20
5	743.92	-58.90	-13.00	-45.90	1.79 H	21	39.60	-98.50
6	958.29	-55.50	-13.00	-42.50	2.13 H	140	40.10	-95.60

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.

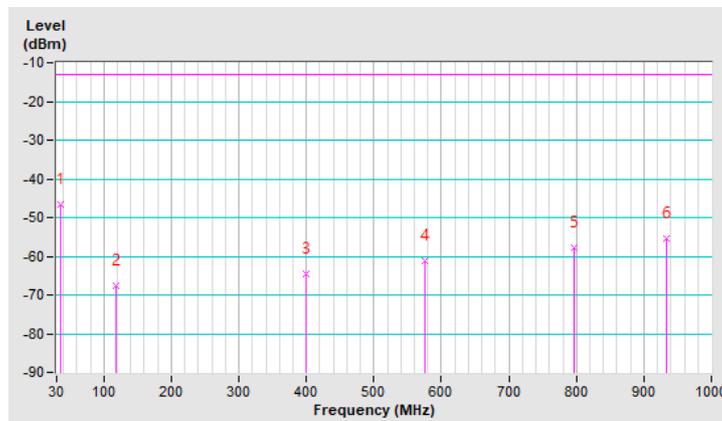


Mode	TX channel 661 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	36.79	-46.70	-13.00	-33.70	1.51 V	18	62.50	-109.20
2	118.27	-67.60	-13.00	-54.60	1.51 V	322	43.10	-110.70
3	400.54	-64.50	-13.00	-51.50	1.51 V	18	40.80	-105.30
4	575.14	-61.20	-13.00	-48.20	1.51 V	16	40.30	-101.50
5	797.27	-57.70	-13.00	-44.70	1.51 V	258	40.40	-98.10
6	934.04	-55.50	-13.00	-42.50	1.51 V	26	40.40	-95.90

Remarks:

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



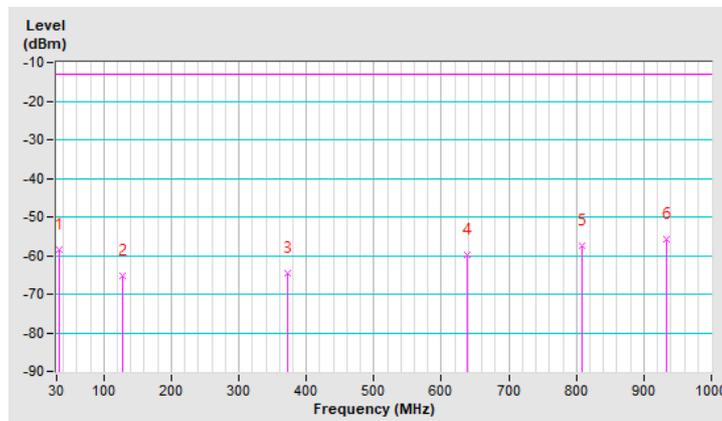
WCDMA

Mode	TX channel 9400 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	33.88	-58.60	-13.00	-45.60	1.51 H	91	51.00	-109.60
2	127.97	-65.20	-13.00	-52.20	2.50 H	248	44.70	-109.90
3	371.44	-64.70	-13.00	-51.70	2.50 H	117	41.20	-105.90
4	638.19	-59.90	-13.00	-46.90	1.51 H	18	40.20	-100.10
5	808.91	-57.60	-13.00	-44.60	2.50 H	137	40.40	-98.00
6	933.07	-55.60	-13.00	-42.60	2.50 H	62	40.30	-95.90

Remarks:

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

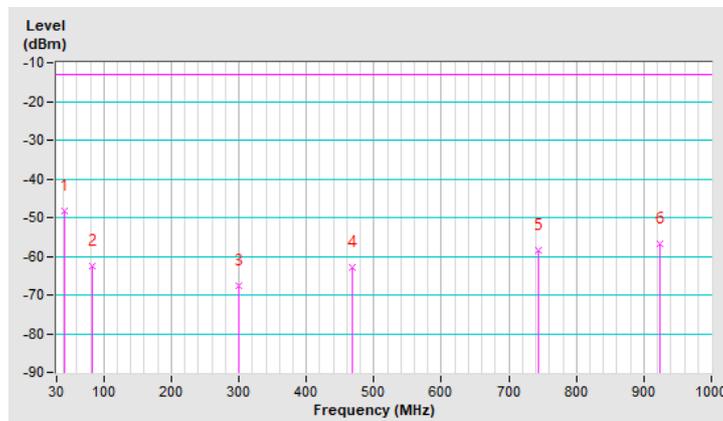


Mode	TX channel 9400 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	42.61	-48.30	-13.00	-35.30	1.50 V	196	60.30	-108.60
2	82.38	-62.50	-13.00	-49.50	1.50 V	16	51.30	-113.80
3	300.63	-67.60	-13.00	-54.60	1.50 V	214	40.10	-107.70
4	468.44	-63.00	-13.00	-50.00	2.49 V	107	40.50	-103.50
5	742.95	-58.40	-13.00	-45.40	2.49 V	289	40.20	-98.60
6	924.34	-56.70	-13.00	-43.70	2.49 V	134	39.50	-96.20

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.



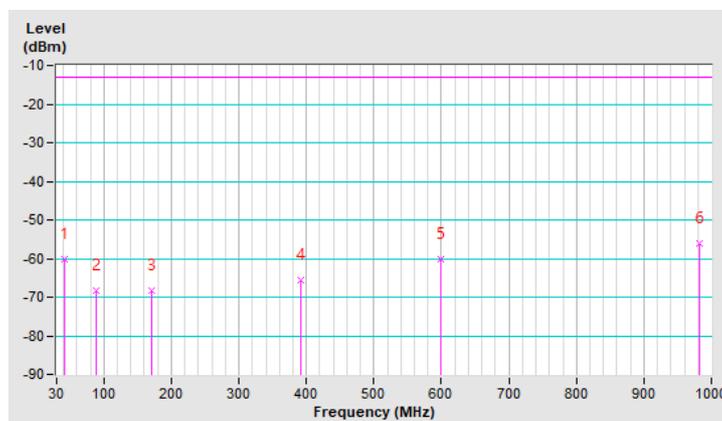
LTE Band 2 (Channel Bandwidth 20MHz)

Mode	TX channel 18900 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

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	41.64	-60.10	-13.00	-47.10	1.50 H	113	48.60	-108.70
2	88.20	-68.30	-13.00	-55.30	2.49 H	161	45.80	-114.10
3	171.62	-68.40	-13.00	-55.40	2.49 H	234	40.50	-108.90
4	390.84	-65.60	-13.00	-52.60	1.50 H	112	39.90	-105.50
5	599.39	-60.20	-13.00	-47.20	2.49 H	348	40.40	-100.60
6	981.57	-56.10	-13.00	-43.10	2.49 H	17	39.50	-95.60

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.

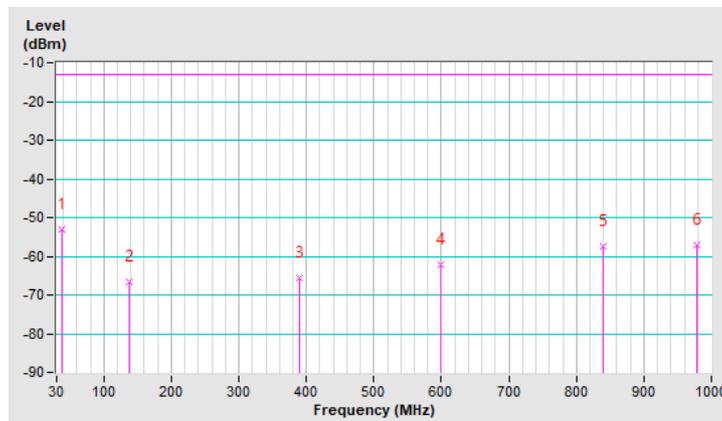


Mode	TX channel 18900 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	37.76	-53.10	-13.00	-40.10	1.51 V	187	55.90	-109.00
2	137.67	-66.70	-13.00	-53.70	1.51 V	38	42.20	-108.90
3	388.90	-65.50	-13.00	-52.50	1.51 V	72	40.00	-105.50
4	599.39	-62.20	-13.00	-49.20	1.51 V	173	38.40	-100.60
5	839.95	-57.60	-13.00	-44.60	1.51 V	346	39.70	-97.30
6	978.66	-57.20	-13.00	-44.20	1.51 V	15	38.30	-95.50

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.



Above 1GHz

GSM

Mode	TX channel 661 (1880.0MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

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	-50.70	-13.00	-37.70	1.86 H	234	44.70	-95.40
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	-49.40	-13.00	-36.40	1.25 V	144	46.00	-95.40

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.

WCDMA Band 2

Mode	TX channel 9400 (1880.0MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

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	-48.30	-13.00	-35.30	1.25 H	114	47.10	-95.40
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	-47.10	-13.00	-34.10	1.69 V	247	48.30	-95.40

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.

LTE Band 2 (Channel Bandwidth 20MHz)

Mode	TX channel 18900 (1880.0MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

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	-51.30	-13.00	-38.30	1.50 H	132	44.10	-95.40
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	-48.70	-13.00	-35.70	1.51 V	109	46.70	-95.40

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 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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