FCC Test Report
(Spot Check: Part 22 – GSM, WCDMA B5, LTE B5)

Report No.:	RFBGTL-WTW-P22020477-6
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
Address:	2-13-1 Iida Hachihonmatsu Higashi-hiroshima City, Hiroshima 730-0192, Japan
Manufacturer:	Sharp Corporation
Address:	1 Takumi-cho, Sakai-ku, Sakai City, Osaka 590-8522, Japan
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 (1):	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 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

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RFBGTL-WTW-P22020477-6	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 22, Subpart H

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 22 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 22.913 (a)	Effective radiated power	Pass	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -36.60dB at 41.64MHz.

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	824.2MHz ~ 848.8MHz		
	WCDMA Band 5	826.4MHz ~ 846.6MHz		
	LTE Band 5 (Channel Bandwidth 1.4MHz)	824.7MHz ~ 848.3MHz		
	LTE Band 5 (Channel Bandwidth 3MHz)	825.5MHz ~ 847.5MHz		
	LTE Band 5 (Channel Bandwidth 5MHz)	826.5MHz ~ 846.5MHz		
	LTE Band 5 (Channel Bandwidth 10MHz)	829.0MHz ~ 844.0MHz		
Max. ERP Power	GSM	322.107mW (25.08dBm)		
	GPRS	317.687mW (25.02dBm)		
	WCDMA Band 5	46.881mW (16.71dBm)		
		QPSK	16QAM	64QAM
	LTE Band 5 (Channel Bandwidth 1.4MHz)	38.019mW (15.80dBm)	34.119mW (15.33dBm)	25.704mW (14.10dBm)
	LTE Band 5 (Channel Bandwidth 3MHz)	37.931mW (15.79dBm)	34.119mW (15.33dBm)	25.527mW (14.07dBm)
	LTE Band 5 (Channel Bandwidth 5MHz)	38.107mW (15.81dBm)	33.963mW (15.31dBm)	25.468mW (14.06dBm)
	LTE Band 5 (Channel Bandwidth 10MHz)	47.863mW (16.80dBm)	38.726mW (15.88dBm)	31.915mW (15.04dBm)
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-P22020475-6. 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.

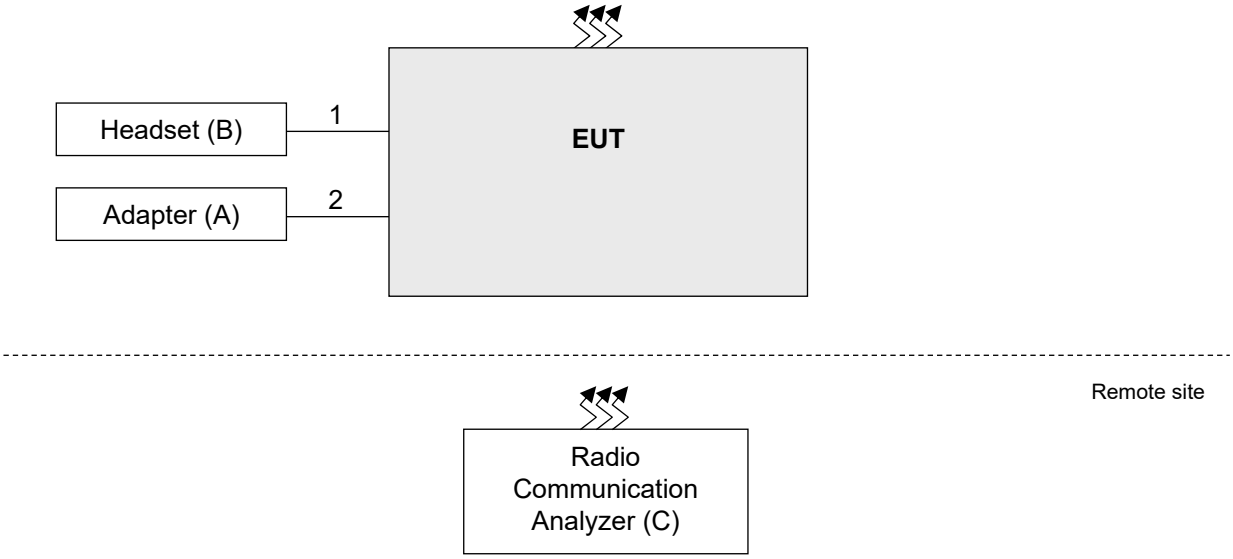
Product	Brand	Model	Description
Adapter (Support unit)	Salom	XN-2QC25	Input: 100-240Vac, 50/60Hz, 0.2A Output: 5.0Vdc, 800mA
Battery	-	-	3.87Vdc, Rated 4870mAh (18.9Wh), Typ. 5000mAh (19.4Wh)
Headset (Support unit)	Ambibio	AB-HI02JS	-
USB cable (Support unit)	Luxshare-ICT	L6KU2007-CS-H	0.95m shielded 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 5	Z-plane
LTE Band 5	Z-plane

GSM Mode

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	128 to 251	128 (824.2MHz), 189 (836.4MHz), 251 (848.8MHz)	GSM, GPRS
-	Radiated Emission	128 to 251	189 (836.4MHz)	GSM

WCDMA Band 5

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Radiated Emission	4132 to 4233	4182 (836.4MHz)	WCDMA

LTE Band 5

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM	1 Half Full
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM	1 Half Full
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM	1 Half Full
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM	1 Half Full
-	Radiated Emission	20450 to 20600	20525 (836.5MHz)	10MHz	QPSK	1

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP	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 22

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 7 watts e.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:

$EIRP = P_{Meas} + G_T$

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

where

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

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

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

4.1.3 Test Setup

Conducted Power Measurement:

4.1.4 Test Results

Conducted Output Power (dBm)

Band	GSM 850		
Channel	128	189	251
Frequency	824.2	836.4	848.8
GSM	31.84	32.03	31.99
GPRS 1Tx Slot	31.75	31.97	31.92
GPRS 2Tx Slot	29.83	30.03	29.97
GPRS 3Tx Slot	28.35	28.51	28.46
GPRS 4Tx Slot	27.31	27.48	27.46

Band	WCDMA V		
TX Channel	4132	4182	4233
Rx Channel	4357	4407	4458
Frequency	826.4	836.4	846.6
RMC 12.2K	23.47	23.66	23.61
HSDPA Subtest-1	22.50	22.67	22.38
HSDPA Subtest-2	22.59	22.66	22.57
HSDPA Subtest-3	22.07	22.18	21.94
HSDPA Subtest-4	22.12	22.19	22.04
HSUPA Subtest-1	22.42	22.58	22.41
HSUPA Subtest-2	20.44	20.62	20.38
HSUPA Subtest-3	21.49	21.64	21.48
HSUPA Subtest-4	20.61	20.65	20.44
HSUPA Subtest-5	22.47	22.57	22.39

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20450	20525	20600
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	23.58	23.75	23.66
		1	24	23.65	23.69	23.64
		1	49	23.53	23.63	23.47
		25	0	22.55	22.94	22.55
		25	12	22.57	22.57	22.52
		25	25	22.56	22.56	22.55
		50	0	22.54	22.55	22.53
10M	16QAM	1	0	22.57	22.68	22.71
		1	24	22.78	22.83	22.76
		1	49	22.69	22.77	22.68
		25	0	21.84	21.95	21.74
		25	12	21.74	21.63	21.68
		25	25	21.56	21.61	21.47
		50	0	21.50	21.59	21.43
10M	64QAM	1	0	21.90	21.95	21.95
		1	24	21.96	21.88	21.94
		1	49	21.98	21.99	21.95
		25	0	20.52	20.62	20.52
		25	12	20.57	20.58	20.50
		25	25	20.57	20.57	20.50
		50	0	20.46	20.55	20.38

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20425	20525	20625
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	22.61	22.76	22.56
		1	12	22.56	22.68	22.45
		1	24	22.54	22.60	22.43
		12	0	21.56	21.62	21.38
		12	6	21.57	21.49	21.30
		12	13	21.64	21.50	21.50
		25	0	21.48	21.53	21.56
5M	16QAM	1	0	22.24	22.26	22.22
		1	12	22.17	22.18	22.00
		1	24	21.95	22.20	22.04
		12	0	20.54	20.60	20.52
		12	6	20.63	20.59	20.44
		12	13	20.62	20.52	20.46
		25	0	20.40	20.47	20.39
5M	64QAM	1	0	20.96	20.98	20.88
		1	12	21.01	21.01	20.85
		1	24	20.99	20.94	20.88
		12	0	19.47	19.59	19.42
		12	6	19.52	19.45	19.51
		12	13	19.49	19.47	19.53
		25	0	19.40	19.58	19.31

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20415	20525	20635
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	22.51	22.74	22.61
		1	7	22.67	22.62	22.63
		1	14	22.48	22.72	22.49
		8	0	21.55	21.65	21.44
		8	3	21.55	21.58	21.49
		8	7	21.49	21.54	21.48
		15	0	21.39	21.51	21.51
3M	16QAM	1	0	22.21	22.26	22.28
		1	7	22.18	22.17	22.02
		1	14	22.08	22.11	22.05
		8	0	20.51	20.62	20.54
		8	3	20.52	20.69	20.46
		8	7	20.63	20.53	20.42
		15	0	20.44	20.44	20.42
3M	64QAM	1	0	21.02	20.96	20.85
		1	7	20.97	20.98	20.83
		1	14	20.92	20.93	21.00
		8	0	19.52	19.67	19.42
		8	3	19.50	19.53	19.46
		8	7	19.52	19.55	19.44
		15	0	19.41	19.50	19.32

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20407	20525	20643
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	22.55	22.75	22.56
		1	2	22.64	22.63	22.61
		1	5	22.40	22.70	22.54
		3	0	22.56	22.61	22.54
		3	1	22.64	22.47	22.44
		3	3	22.59	22.60	22.50
		6	0	21.53	21.47	21.50
1.4M	16QAM	1	0	22.16	22.26	22.28
		1	2	22.08	22.12	21.99
		1	5	21.97	22.07	22.03
		3	0	21.58	21.63	21.62
		3	1	21.63	21.69	21.54
		3	3	21.63	21.60	21.42
		6	0	20.41	20.49	20.33
1.4M	64QAM	1	0	21.04	20.99	20.85
		1	2	20.99	21.05	20.81
		1	5	21.02	21.00	20.88
		3	0	20.46	20.58	20.37
		3	1	20.49	20.53	20.47
		3	3	20.55	20.46	20.50
		6	0	19.33	19.51	19.27

ERP Power (dBm)

Band	GSM 850		
Channel	128	189	251
Frequency	824.2	836.4	848.8
GSM	24.89	25.08	25.04
GPRS 1Tx Slot	24.80	25.02	24.97
GPRS 2Tx Slot	22.88	23.08	23.02
GPRS 3Tx Slot	21.40	21.56	21.51
GPRS 4Tx Slot	20.36	20.53	20.51

*ERP = Conducted + antenna gain (-4.80dBi) - 2.15

Band	WCDMA V		
TX Channel	4132	4182	4233
Rx Channel	4357	4407	4458
Frequency	826.4	836.4	846.6
RMC 12.2K	16.52	16.71	16.66
HSDPA Subtest-1	15.55	15.72	15.43
HSDPA Subtest-2	15.64	15.71	15.62
HSDPA Subtest-3	15.12	15.23	14.99
HSDPA Subtest-4	15.17	15.24	15.09
HSUPA Subtest-1	15.47	15.63	15.46
HSUPA Subtest-2	13.49	13.67	13.43
HSUPA Subtest-3	14.54	14.69	14.53
HSUPA Subtest-4	13.66	13.70	13.49
HSUPA Subtest-5	15.52	15.62	15.44

*ERP = Conducted + antenna gain (-4.80dBi) - 2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20450	20525	20600
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	16.63	16.80	16.71
		1	24	16.70	16.74	16.69
		1	49	16.58	16.68	16.52
		25	0	15.60	15.99	15.60
		25	12	15.62	15.62	15.57
		25	25	15.61	15.61	15.60
		50	0	15.59	15.60	15.58
10M	16QAM	1	0	15.62	15.73	15.76
		1	24	15.83	15.88	15.81
		1	49	15.74	15.82	15.73
		25	0	14.89	15.00	14.79
		25	12	14.79	14.68	14.73
		25	25	14.61	14.66	14.52
		50	0	14.55	14.64	14.48
10M	64QAM	1	0	14.95	15.00	15.00
		1	24	15.01	14.93	14.99
		1	49	15.03	15.04	15.00
		25	0	13.57	13.67	13.57
		25	12	13.62	13.63	13.55
		25	25	13.62	13.62	13.55
		50	0	13.51	13.60	13.43

*ERP = Conducted + antenna gain (-4.80dBi) - 2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20425	20525	20625
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	15.66	15.81	15.61
		1	12	15.61	15.73	15.50
		1	24	15.59	15.65	15.48
		12	0	14.61	14.67	14.43
		12	6	14.62	14.54	14.35
		12	13	14.69	14.55	14.55
		25	0	14.53	14.58	14.61
5M	16QAM	1	0	15.29	15.31	15.27
		1	12	15.22	15.23	15.05
		1	24	15.00	15.25	15.09
		12	0	13.59	13.65	13.57
		12	6	13.68	13.64	13.49
		12	13	13.67	13.57	13.51
		25	0	13.45	13.52	13.44
5M	64QAM	1	0	14.01	14.03	13.93
		1	12	14.06	14.06	13.90
		1	24	14.04	13.99	13.93
		12	0	12.52	12.64	12.47
		12	6	12.57	12.50	12.56
		12	13	12.54	12.52	12.58
		25	0	12.45	12.63	12.36

*ERP = Conducted + antenna gain (-4.80dBi) - 2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20415	20525	20635
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	15.56	15.79	15.66
		1	7	15.72	15.67	15.68
		1	14	15.53	15.77	15.54
		8	0	14.60	14.70	14.49
		8	3	14.60	14.63	14.54
		8	7	14.54	14.59	14.53
		15	0	14.44	14.56	14.56
3M	16QAM	1	0	15.26	15.31	15.33
		1	7	15.23	15.22	15.07
		1	14	15.13	15.16	15.10
		8	0	13.56	13.67	13.59
		8	3	13.57	13.74	13.51
		8	7	13.68	13.58	13.47
		15	0	13.49	13.49	13.47
3M	64QAM	1	0	14.07	14.01	13.90
		1	7	14.02	14.03	13.88
		1	14	13.97	13.98	14.05
		8	0	12.57	12.72	12.47
		8	3	12.55	12.58	12.51
		8	7	12.57	12.60	12.49
		15	0	12.46	12.55	12.37

*ERP = Conducted + antenna gain (-4.80dBi) - 2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20407	20525	20643
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	15.60	15.80	15.61
		1	2	15.69	15.68	15.66
		1	5	15.45	15.75	15.59
		3	0	15.61	15.66	15.59
		3	1	15.69	15.52	15.49
		3	3	15.64	15.65	15.55
		6	0	14.58	14.52	14.55
1.4M	16QAM	1	0	15.21	15.31	15.33
		1	2	15.13	15.17	15.04
		1	5	15.02	15.12	15.08
		3	0	14.63	14.68	14.67
		3	1	14.68	14.74	14.59
		3	3	14.68	14.65	14.47
		6	0	13.46	13.54	13.38
1.4M	64QAM	1	0	14.09	14.04	13.90
		1	2	14.04	14.10	13.86
		1	5	14.07	14.05	13.93
		3	0	13.51	13.63	13.42
		3	1	13.54	13.58	13.52
		3	3	13.60	13.51	13.55
		6	0	12.38	12.56	12.32

*ERP = Conducted + antenna gain (-4.80dBi) - 2.15

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
   - EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.
   - ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

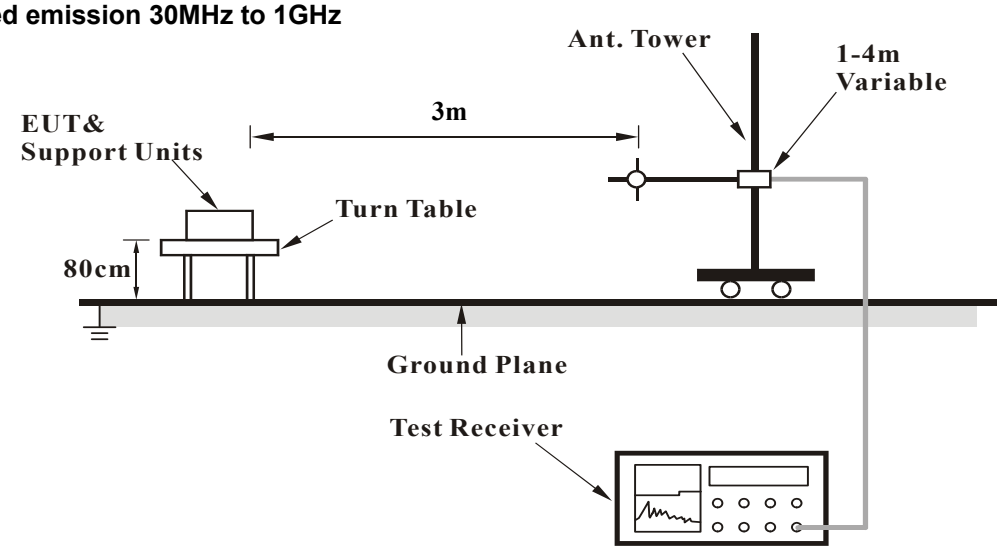
Note:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
   The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.2.3 Deviation from Test Standard

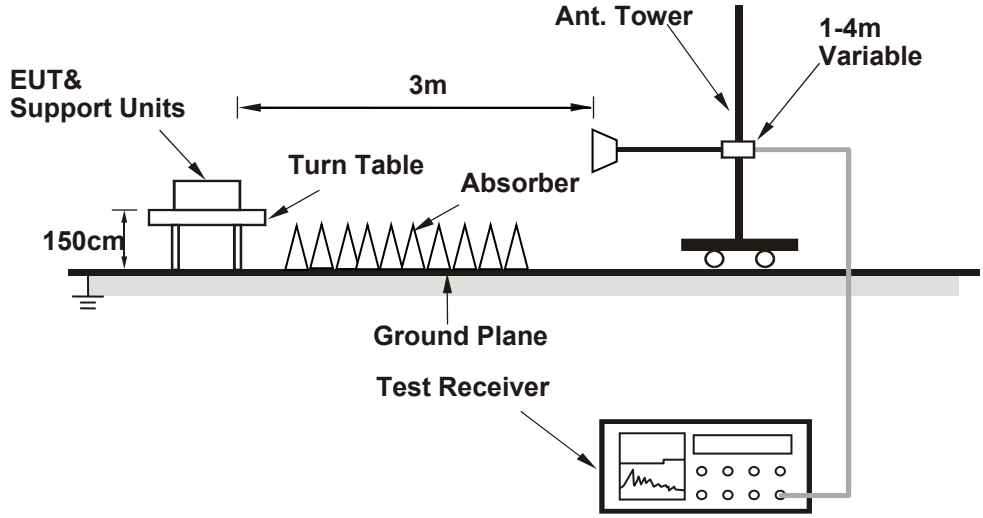
No deviation.

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

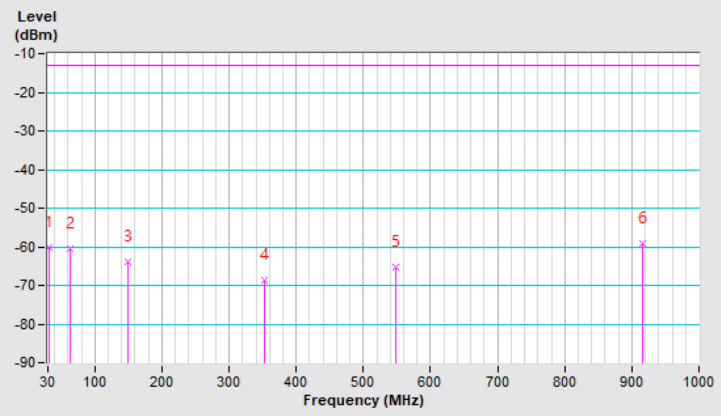
GSM

Mode	TX channel 189 (836.4MHz)	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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	32.91	-60.10	-13.00	-47.10	2.00 H	89	51.80	-111.90
2	62.98	-60.50	-13.00	-47.50	2.50 H	290	51.20	-111.70
3	148.34	-63.80	-13.00	-50.80	2.50 H	58	46.90	-110.70
4	352.04	-68.80	-13.00	-55.80	1.01 H	325	39.90	-108.70
5	547.98	-65.20	-13.00	-52.20	1.51 H	278	39.40	-104.60
6	915.61	-59.20	-13.00	-46.20	2.00 H	18	39.50	-98.70

Remarks:

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

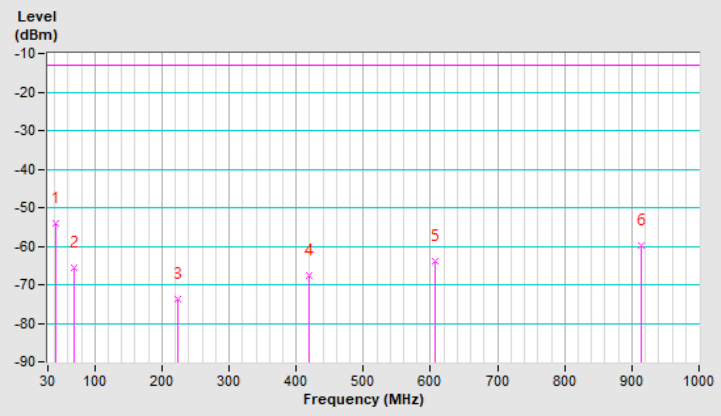


Mode	TX channel 189 (836.4MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	42.61	-54.00	-13.00	-41.00	2.49 V	136	56.80	-110.80
2	68.80	-65.50	-13.00	-52.50	2.49 V	141	47.20	-112.70
3	223.03	-73.70	-13.00	-60.70	2.49 V	1	40.20	-113.90
4	418.97	-67.70	-13.00	-54.70	2.49 V	21	39.30	-107.00
5	606.18	-64.00	-13.00	-51.00	2.49 V	29	38.80	-102.80
6	914.64	-59.80	-13.00	-46.80	2.49 V	80	38.90	-98.70

Remarks:

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



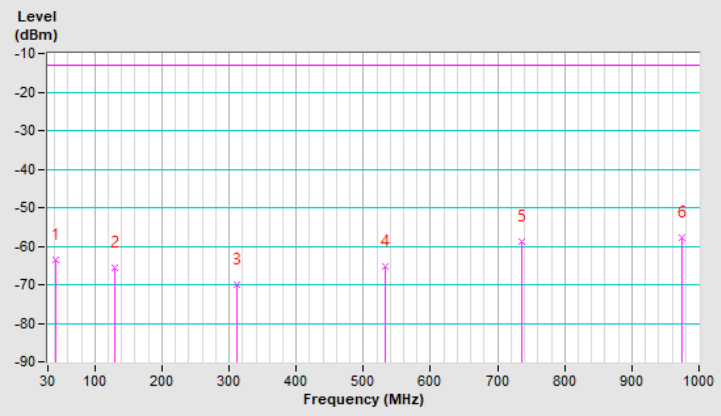
WCDMA

Mode	TX channel 4182 (836.4MHz)	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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	41.64	-63.60	-13.00	-50.60	2.49 H	117	47.30	-110.90
2	129.91	-65.50	-13.00	-52.50	1.50 H	287	46.30	-111.80
3	312.27	-70.00	-13.00	-57.00	2.49 H	2	39.60	-109.60
4	533.43	-65.40	-13.00	-52.40	1.50 H	341	39.40	-104.80
5	736.16	-58.70	-13.00	-45.70	2.49 H	2	42.20	-100.90
6	974.78	-57.80	-13.00	-44.80	1.50 H	247	39.90	-97.70

Remarks:

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

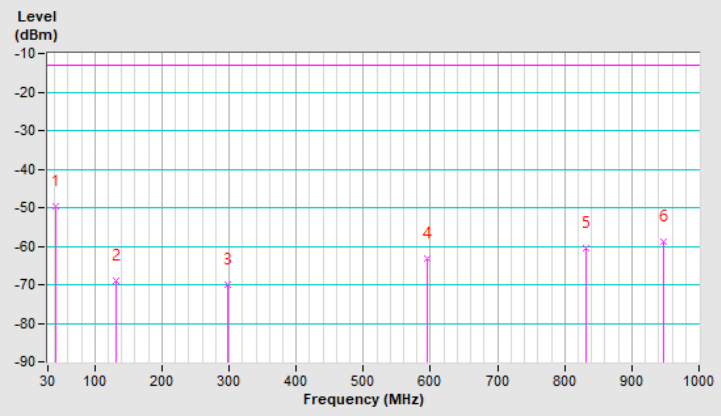


Mode	TX channel 4182 (836.4MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	**41.64**	**-49.60**	**-13.00**	**-36.60**	**1.51 V**	**39**	**61.30**	**-110.90**
2	131.85	-69.00	-13.00	-56.00	1.51 V	278	42.70	-111.70
3	297.72	-70.10	-13.00	-57.10	1.51 V	113	39.90	-110.00
4	595.51	-63.30	-13.00	-50.30	2.50 V	164	39.60	-102.90
5	831.22	-60.60	-13.00	-47.60	1.51 V	244	39.10	-99.70
6	946.65	-58.80	-13.00	-45.80	2.50 V	139	39.10	-97.90

Remarks:

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



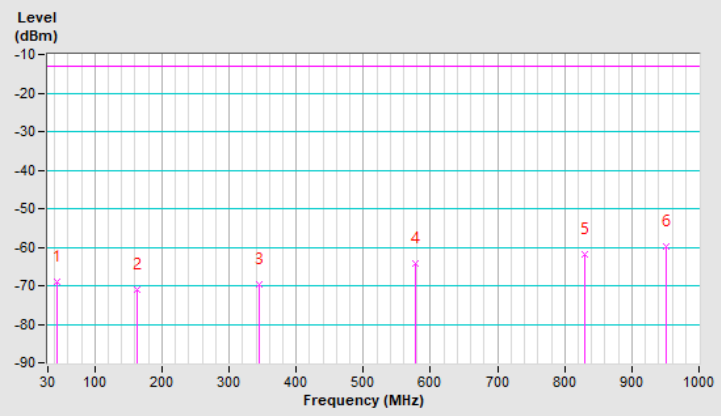
LTE Band 5 (Channel Bandwidth 10MHz)

Mode	TX channel 20525 (836.5MHz)	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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	43.58	-68.90	-13.00	-55.90	2.49 H	18	41.90	-110.80
2	163.86	-70.90	-13.00	-57.90	2.49 H	276	39.80	-110.70
3	345.25	-69.50	-13.00	-56.50	1.50 H	155	39.40	-108.90
4	577.08	-64.30	-13.00	-51.30	1.50 H	43	39.30	-103.60
5	829.28	-61.70	-13.00	-48.70	1.50 H	328	38.10	-99.80
6	951.50	-59.90	-13.00	-46.90	1.50 H	147	38.10	-98.00

Remarks:

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

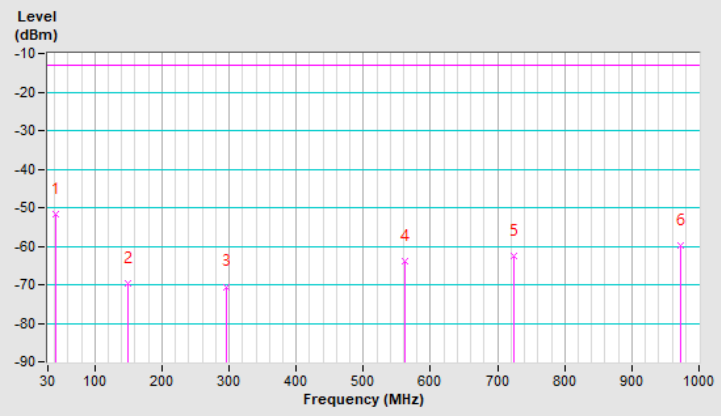


Mode	TX channel 20525 (836.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	42.61	-51.60	-13.00	-38.60	1.51 V	8	59.20	-110.80
2	148.34	-69.60	-13.00	-56.60	1.51 V	102	41.10	-110.70
3	296.75	-70.50	-13.00	-57.50	1.51 V	81	39.50	-110.00
4	562.53	-63.90	-13.00	-50.90	2.50 V	44	40.20	-104.10
5	723.55	-62.70	-13.00	-49.70	2.50 V	230	38.50	-101.20
6	971.87	-59.80	-13.00	-46.80	1.51 V	135	38.00	-97.80

Remarks:

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



Above 1GHz

GSM

Mode	TX channel 189 (836.4MHz)	Frequency Range	1GHz ~ 10GHz
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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1672.80	-50.70	-13.00	-37.70	1.54 H	217	53.30	-104.00
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1672.80	-49.70	-13.00	-36.70	2.41 V	12	54.30	-104.00

Remarks:

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

WCDMA

Mode	TX channel 4182 (836.4MHz)	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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1672.80	-58.10	-13.00	-45.10	1.34 H	277	45.90	-104.00
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1672.80	-57.00	-13.00	-44.00	1.78 V	206	47.00	-104.00

Remarks:

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

LTE Band 5 (Channel Bandwidth 10MHz)

Mode	TX channel 20525 (836.5MHz)	Frequency Range	1GHz ~ 9GHz
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)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-60.20	-13.00	-47.20	1.67 H	244	43.80	-104.00
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-58.50	-13.00	-45.50	1.52 V	147	45.50	-104.00

Remarks:

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

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

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

Lin Kou EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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