Partial FCC Test Report

(PART 22)

Report No.:	RFBBGM-WTW-P21120256
FCC ID:	WIYLE910C1NF
Test Model:	LE910C1-NF
Received Date:	Nov. 24, 2021
Test Date:	Dec. 07, 2021
Issued Date:	Jan. 10, 2022
Applicant:	CASTLES TECHNOLOGY CO., LTD.
Address:	6F, NO. 207-5, SEC. 3, BEIXIN RD., XINDIAN DISTRICT, NEW TAIPEI CITY 23143, TAIWAN (R. O. C.)
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.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
RFBBGM-WTW-P21120256	Original Release	Jan. 10, 2022

1 Certificate of Conformity

Product:	WCDMA and LTE cellular wireless module
Brand:	CASTLES TECHNOLOGY
Test Model:	LE910C1-NF
Sample Status:	Identical Prototype
Applicant:	CASTLES TECHNOLOGY CO., LTD.
Test Date:	Dec. 07, 2021
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 : Gina Liu , **Date:** Jan. 10, 2022

Gina Liu / Specialist

Approved by : Jeremy Lin , **Date:** Jan. 10, 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.
2.1047	Modulation Characteristics	N/A	Refer to Note
22.913 (d)	Peak to Average Ratio	N/A	Refer to Note
2.1055 22.355	Frequency Stability	N/A	Refer to Note
2.1049	Occupied Bandwidth	N/A	Refer to Note
22.917	Band Edge Measurements	N/A	Refer to Note
2.1051 22.917	Conducted Spurious Emissions	N/A	Refer to Note
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -32.59 dB at 85.29 MHz.

Note:

1. This report is a partial report. Therefore, only test item of Effective Radiated Power and Radiated Spurious Emissions tests were performed for this report. Other testing data please refer to DEKRA report no.: 1980255R-HPUSP17V00-B & 1980255R-HPUSP17V00-C (LTE Module, Brand: Telit, Model: LE910C4-NF, FCC ID: RI7LE910CXNF).
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	**Frequency**	**Expanded Uncertainty (k=2) (±)**
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.91 dB
	200 MHz ~ 1000 MHz	2.93 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.76 dB
	18 GHz ~ 40 GHz	1.77 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver KEYSIGHT	N9038B	MY60180018	Feb. 01, 2021	Jan. 31, 2022
Spectrum Analyzer KEYSIGHT	N9020B	MY60110513	Dec. 21, 2020	Dec. 20, 2021
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 TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier EMCI	EMC330N	980798	Jan. 19, 2021	Jan. 18, 2022
Preamplifier EMCI	EMC118A45SE	980809	Jan. 06, 2021	Jan. 05, 2022
Preamplifier EMCI	EMC184045SE	980786	Jan. 12, 2021	Jan. 11, 2022
RF signal cable EMCI	EMC104-SM-SM-(9000+2000+1000)	201244+ 201232+ 210103	Jan. 12, 2021	Jan. 11, 2022
RF signal cable EMCI	EMCCFD400-NM-NM-(9000+300+500)	201251+ 201249+ 201248	Jan. 12, 2021	Jan. 11, 2022
RF signal cable EMCI	EMC101G-KM-KM-(5000+3000+2000)	201261+201258+201249	Jan. 12, 2021	Jan. 11, 2022
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
Radio Communication Analyzer Anritsu	MT8821C	6201462755	Feb. 07, 2021	Feb. 06, 2022

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

2. The test was performed in WM Chamber 9.

3 General Information

3.1 General Description of EUT

Product	WCDMA and LTE cellular wireless module	
Brand	CASTLES TECHNOLOGY	
Test Model	LE910C1-NF	
Status of EUT	Identical Prototype	
Power Supply Rating	5.0 Vdc (host equipment) 3.7 Vdc (Battery)	
Modulation Type	WCDMA	QPSK
	LTE	QPSK, 16QAM
Frequency Range	WCDMA	826.4 ~ 846.6 MHz
	LTE 5 (Channel Bandwidth: 1.4 MHz)	824.7 ~ 848.3 MHz
	LTE 5 (Channel Bandwidth: 3 MHz)	825.5 ~ 847.5 MHz
	LTE 5 (Channel Bandwidth: 5 MHz)	826.5 ~ 846.5 MHz
	LTE 5 (Channel Bandwidth: 10 MHz)	829 ~ 844 MHz
Max. ERP Power	WCDMA	148.252 mW (21.71dBm)
	LTE 5 (Channel Bandwidth: 1.4 MHz)	138.357 mW (21.41dBm)
	LTE 5 (Channel Bandwidth: 3 MHz)	137.721 mW (21.39dBm)
	LTE 5 (Channel Bandwidth: 5 MHz)	139.959 mW (21.46dBm)
	LTE 5 (Channel Bandwidth: 10 MHz)	142.233 mW (21.53dBm)
Antenna Type	Dipole Antenna with 0.37 dBi gain	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

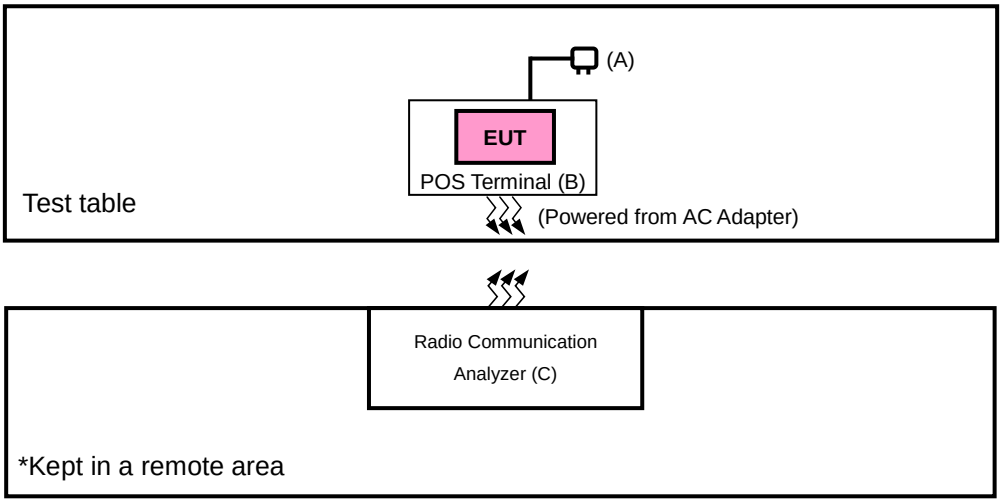
Note:

1. The EUT was installed in POS Terminal (Brand: CASTLES TECHNOLOGY, Model: VEGA3000).
2. The EUT contains following accessory devices.

Product	Brand	Model	Description
USB Cable	CHANG YANG ELECTRON CO., LTD.	CY-AS-HK0059	1 m
AC adapter	CASTLES TECHNOLOGY	1A52-UB52A	AC input : 100-240V~0.3A 50-60Hz DC output : 5V 2A 10W
Battery	CASTLES TECHNOLOGY	V3M2	3.7V, 3100mAh, 11.47Wh

3. 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.
4. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test



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.

No.	Product	Brand	Model No.	Serial No.	FCC ID
A.	Adapter	CASTLES TECHNOLOGY	1A52-UB52A	N/A	N/A
B.	POS Terminal	CASTLES TECHNOLOGY	VEGA3000	N/A	N/A
C.	Radio Communication Analyzer	Anritsu	MT8821C	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A-B was 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

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	4132 to 4233	4132, 4182, 4233	WCDMA
-	Radiated Emission	4132 to 4233	4233	WCDMA

LTE Band 5

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	20407 to 20643	20407, 20525, 20643	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20415 to 20635	20415, 20525, 20635	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20425 to 20625	20425, 20525, 20625	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20450 to 20600	20450, 20525, 20600	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Radiated Emission	20450 to 20600	20600	10 MHz	QPSK	1 RB / 0 RB Offset

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP	23 deg. C, 65 % RH	120 Vac, 60 Hz	Raymond Lee, Greg Lin
Radiated Emission	23 deg. C, 65 % RH	120 Vac, 60 Hz	Raymond Lee, Greg Lin

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards and references

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

Test Standard:
FCC 47 CFR Part 2
FCC 47 CFR Part 22
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 7 watts e.r.p.

4.1.2 Test Procedures

Conducted Power Measurement:

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

Maximum EIRP / ERP

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$EIRP = P_{Meas} + G_T$

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

where

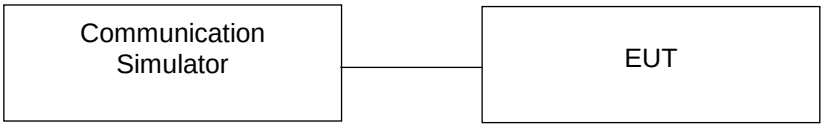
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

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

EIRP / ERP / Conducted Power Measurement:



4.1.4 Test Results

Conducted Output Power (dBm)

Band	WCDMA V		
Channel	4132	4182	4233
Frequency (MHz)	826.4	836.4	846.6
RMC 12.2K	23.49	23.23	23.08
HSDPA Subtest-1	22.44	22.43	22.29
HSDPA Subtest-2	22.4	22.48	22.29
HSDPA Subtest-3	21.92	21.93	21.84
HSDPA Subtest-4	22	21.94	21.83
DC-HSDPA Subtest-1	21.74	21.63	21.59
DC-HSDPA Subtest-2	21.6	21.78	21.49
DC-HSDPA Subtest-3	21.22	21.23	21.14
DC-HSDPA Subtest-4	21.3	21.32	21.03
HSUPA Subtest-1	22.06	21.85	22.45
HSUPA Subtest-2	20.49	20.47	20.41
HSUPA Subtest-3	21	21.25	21.09
HSUPA Subtest-4	20.48	20.38	20.28
HSUPA Subtest-5	22.5	22.41	22.4

LTE Band 5

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20450	20525	20600				Channel		20425	20525	20625	
		Frequency (MHz)		829.0	836.5	844.0				Frequency (MHz)		826.5	836.5	846.5	
10M	QPSK	1	0	23.31	23.13	23.16	0	5M	QPSK	1	0	23.24	23.13	23.11	0
		1	24	23.24	23.06	23.09	0			1	12	23.19	22.98	23.08	0
		1	49	23.05	22.87	22.9	0			1	24	23.02	22.78	22.87	0
		25	0	22.41	22.23	22.26	1			12	0	22.34	22.21	22.17	1
		25	12	22.28	22.1	22.13	1			12	6	22.22	22.07	22.07	1
		25	25	22.21	22.03	22.06	1			12	13	22.21	21.95	21.99	1
		50	0	22.22	22.04	22.07	1			25	0	22.14	22.04	21.97	1
	16QAM	1	0	22.09	21.91	21.94	1		16QAM	1	0	22.01	21.82	21.89	1
		1	24	22.24	22.06	22.09	1			1	12	22.14	22.03	22.09	1
		1	49	21.95	21.77	21.8	1			1	24	21.85	21.73	21.74	1
		25	0	21.46	21.28	21.31	2			12	0	21.44	21.18	21.27	2
		25	12	21.33	21.15	21.18	2			12	6	21.29	21.05	21.13	2
		25	25	21.27	21.09	21.12	2			12	13	21.2	21.06	21.03	2
		50	0	21.29	21.11	21.14	2			25	0	21.26	21.11	21.12	2
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20415	20525	20635				Channel		20407	20525	20643	
		Frequency (MHz)		825.5	836.5	847.5				Frequency (MHz)		824.7	836.5	848.3	
3M	QPSK	1	0	23.17	22.94	23.06	0	1.4M	QPSK	1	0	23.19	22.98	23.07	0
		1	7	23.09	22.81	23	0			1	2	23.09	22.93	23	0
		1	14	22.84	22.73	22.73	0			1	5	22.9	22.69	22.62	0
		8	0	22.27	22.23	22.2	1			3	0	22.35	22.05	22.12	0
		8	3	22.16	22.03	22.08	1			3	1	22.16	22.02	21.96	0
		8	7	22.1	21.89	21.95	1			3	3	22.12	21.99	21.91	0
		15	0	22.09	21.99	21.97	1			6	0	22.03	21.89	21.79	1
	16QAM	1	0	21.89	21.85	21.75	1		16QAM	1	0	21.96	21.75	21.77	1
		1	7	22.2	21.94	22.03	1			1	2	22.08	21.91	21.88	1
		1	14	21.86	21.58	21.58	1			1	5	21.88	21.65	21.74	1
		8	0	21.45	21.14	21.2	2			3	0	21.37	21.1	21.18	1
		8	3	21.18	20.98	21.06	2			3	1	21.21	21	20.94	1
		8	7	21.18	21.02	20.99	2			3	3	21.17	20.93	20.94	1
		15	0	21.07	20.86	20.94	2			6	0	21.18	20.91	21.04	2

ERP Power (dBm)

Band	WCDMA V		
Channel	4132	4182	4233
Frequency (MHz)	826.4	836.4	846.6
RMC 12.2K	21.71	21.45	21.3
HSDPA Subtest-1	20.66	20.65	20.51
HSDPA Subtest-2	20.62	20.7	20.51
HSDPA Subtest-3	20.14	20.15	20.06
HSDPA Subtest-4	20.22	20.16	20.05
DC-HSDPA Subtest-1	19.96	19.85	19.81
DC-HSDPA Subtest-2	19.82	20	19.71
DC-HSDPA Subtest-3	19.44	19.45	19.36
DC-HSDPA Subtest-4	19.52	19.54	19.25
HSUPA Subtest-1	20.28	20.07	20.67
HSUPA Subtest-2	18.71	18.69	18.63
HSUPA Subtest-3	19.22	19.47	19.31
HSUPA Subtest-4	18.7	18.6	18.5
HSUPA Subtest-5	20.72	20.63	20.62

LTE Band 5

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20450	20525	20600				Channel		20425	20525	20625	
		Frequency (MHz)		829.0	836.5	844.0				Frequency (MHz)		826.5	836.5	846.5	
10M	QPSK	1	0	21.53	21.35	21.38	0	5M	QPSK	1	0	21.46	21.35	21.33	0
		1	24	21.46	21.28	21.31	0			1	12	21.41	21.2	21.3	0
		1	49	21.27	21.09	21.12	0			1	24	21.24	21	21.09	0
		25	0	20.63	20.45	20.48	1			12	0	20.56	20.43	20.39	1
		25	12	20.5	20.32	20.35	1			12	6	20.44	20.29	20.29	1
		25	25	20.43	20.25	20.28	1			12	13	20.43	20.17	20.21	1
		50	0	20.44	20.26	20.29	1			25	0	20.36	20.26	20.19	1
	16QAM	1	0	20.31	20.13	20.16	1		16QAM	1	0	20.23	20.04	20.11	1
		1	24	20.46	20.28	20.31	1			1	12	20.36	20.25	20.31	1
		1	49	20.17	19.99	20.02	1			1	24	20.07	19.95	19.96	1
		25	0	19.68	19.5	19.53	2			12	0	19.66	19.4	19.49	2
		25	12	19.55	19.37	19.4	2			12	6	19.51	19.27	19.35	2
		25	25	19.49	19.31	19.34	2			12	13	19.42	19.28	19.25	2
		50	0	19.51	19.33	19.36	2			25	0	19.48	19.33	19.34	2
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20415	20525	20635				Channel		20407	20525	20643	
		Frequency (MHz)		825.5	836.5	847.5				Frequency (MHz)		824.7	836.5	848.3	
3M	QPSK	1	0	21.39	21.16	21.28	0	1.4M	QPSK	1	0	21.41	21.2	21.29	0
		1	7	21.31	21.03	21.22	0			1	2	21.31	21.15	21.22	0
		1	14	21.06	20.95	20.95	0			1	5	21.12	20.91	20.84	0
		8	0	20.49	20.45	20.42	1			3	0	20.57	20.27	20.34	0
		8	3	20.38	20.25	20.3	1			3	1	20.38	20.24	20.18	0
		8	7	20.32	20.11	20.17	1			3	3	20.34	20.21	20.13	0
		15	0	20.31	20.21	20.19	1			6	0	20.25	20.11	20.01	1
	16QAM	1	0	20.11	20.07	19.97	1		16QAM	1	0	20.18	19.97	19.99	1
		1	7	20.42	20.16	20.25	1			1	2	20.3	20.13	20.1	1
		1	14	20.08	19.8	19.8	1			1	5	20.1	19.87	19.96	1
		8	0	19.67	19.36	19.42	2			3	0	19.59	19.32	19.4	1
		8	3	19.4	19.2	19.28	2			3	1	19.43	19.22	19.16	1
		8	7	19.4	19.24	19.21	2			3	3	19.39	19.15	19.16	1
		15	0	19.29	19.08	19.16	2			6	0	19.4	19.13	19.26	2

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 is equal to -13 dBm.

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

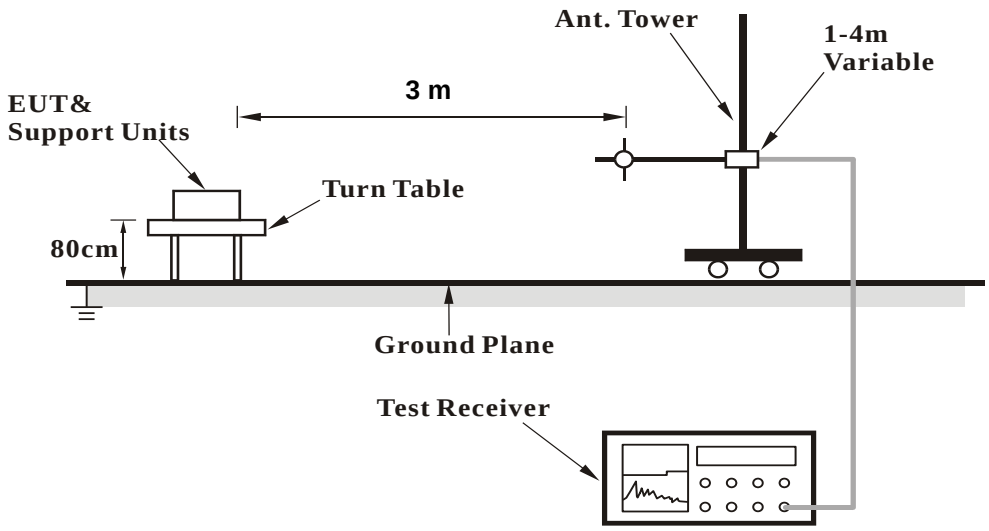
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.2.3 Deviation from Test Standard

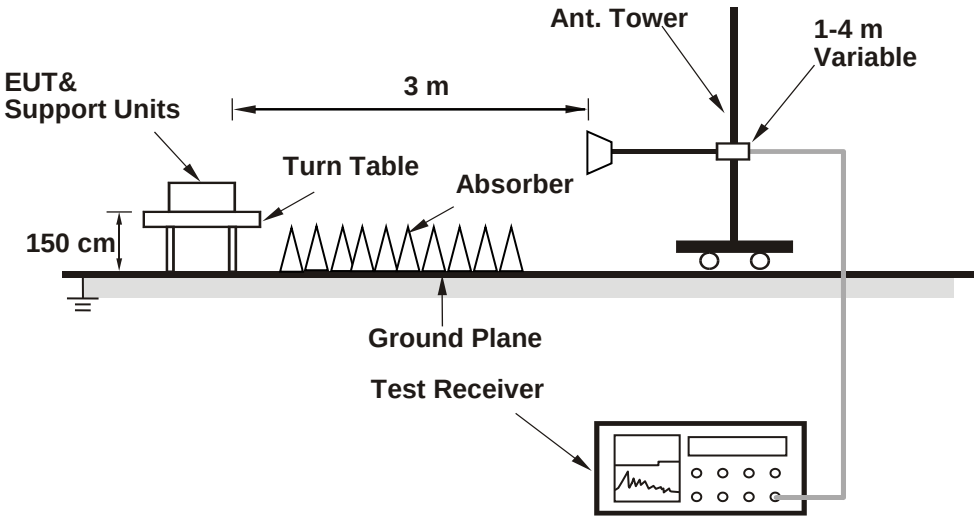
No deviation.

4.2.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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

4.2.5 Test Results

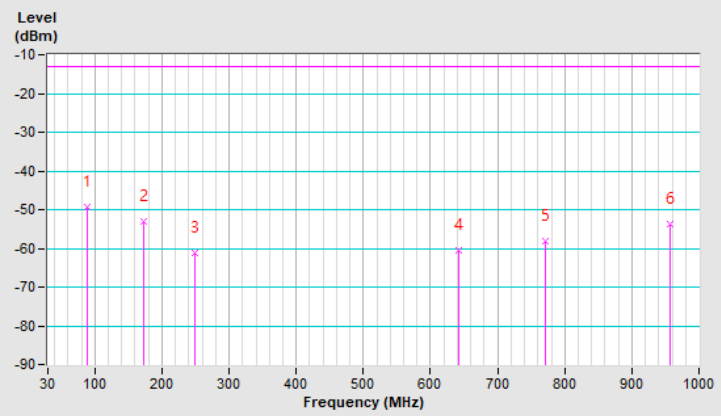
Below 1GHz
WCDMA Band 5

Mode	TX channel 4233 (846.6MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Raymond Lee		

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	88.20	-49.46	-13.00	-36.46	1.50 H	158	71.86	-121.32
2	173.56	-52.95	-13.00	-39.95	1.00 H	259	63.36	-116.31
3	248.25	-61.20	-13.00	-48.20	2.00 H	18	55.63	-116.83
4	642.07	-60.54	-13.00	-47.54	1.00 H	99	46.80	-107.34
5	771.08	-58.30	-13.00	-45.30	2.00 H	177	47.22	-105.52
6	957.32	-53.73	-13.00	-40.73	1.00 H	207	49.39	-103.12

Remarks:

1. ERP(dBm) = Raw Value(dBuV/m) + 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.

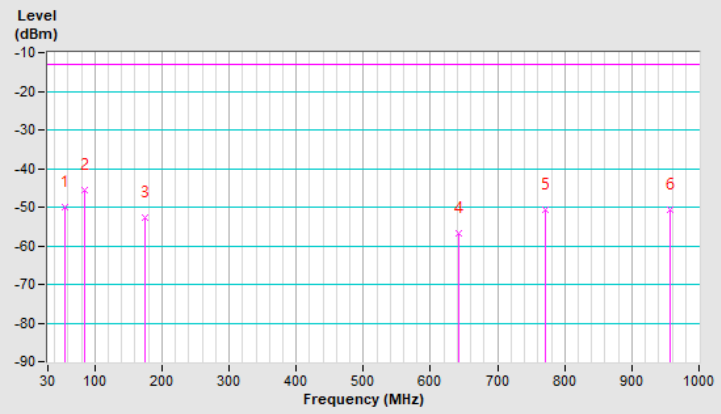


Mode	TX channel 4233 (846.6MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Raymond Lee		

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	55.22	-50.15	-13.00	-37.15	1.49 V	211	66.08	-116.23
2	85.29	-45.59	-13.00	-32.59	1.00 V	287	75.65	-121.24
3	174.53	-52.88	-13.00	-39.88	1.00 V	284	63.52	-116.40
4	642.07	-56.76	-13.00	-43.76	1.00 V	156	50.58	-107.34
5	771.08	-50.51	-13.00	-37.51	1.49 V	313	55.01	-105.52
6	956.35	-50.62	-13.00	-37.62	1.00 V	302	52.52	-103.14

Remarks:

1. ERP(dBm) = Raw Value(dBuV/m) + 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.



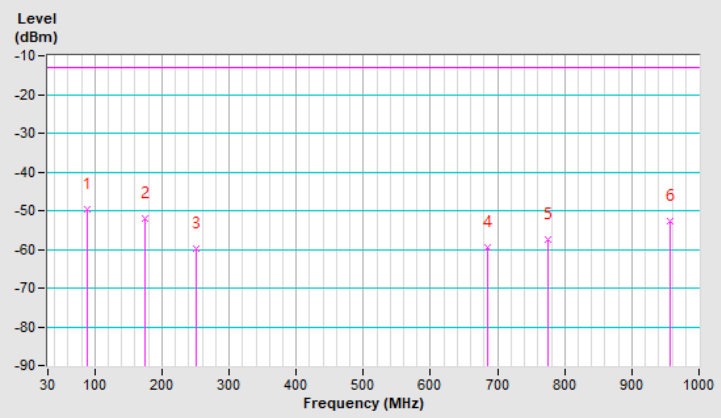
LTE Band 5, Channel Bandwidth: 10MHz

Mode	TX channel 20600 (844.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Raymond Lee		

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	88.20	-49.59	-13.00	-36.59	1.00 H	162	71.73	-121.32
2	174.53	-51.97	-13.00	-38.97	1.50 H	215	64.43	-116.40
3	251.16	-59.77	-13.00	-46.77	1.00 H	169	56.99	-116.76
4	684.75	-59.64	-13.00	-46.64	2.00 H	112	47.30	-106.94
5	774.96	-57.47	-13.00	-44.47	1.50 H	194	48.04	-105.51
6	956.35	-52.68	-13.00	-39.68	1.00 H	113	50.46	-103.14

Remarks:

1. ERP(dBm) = Raw Value(dBuV/m) + 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.

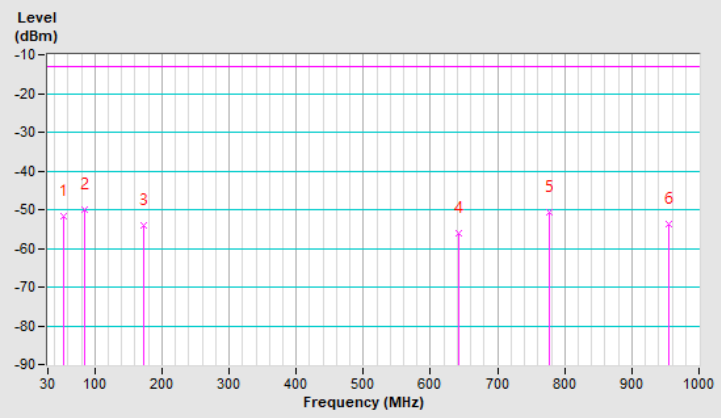


Mode	TX channel 20600 (844.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Raymond Lee		

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	54.25	-51.80	-13.00	-38.80	2.00 V	249	64.39	-116.19
2	84.32	-49.94	-13.00	-36.94	1.00 V	255	71.22	-121.16
3	173.56	-54.11	-13.00	-41.11	1.50 V	247	62.20	-116.31
4	642.07	-56.20	-13.00	-43.20	1.00 V	18	51.14	-107.34
5	777.87	-50.66	-13.00	-37.66	1.50 V	317	54.72	-105.38
6	955.38	-53.61	-13.00	-40.61	1.00 V	253	49.57	-103.18

Remarks:

1. ERP(dBm) = Raw Value(dBuV/m) + 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
WCDMA Band 5

Mode	TX channel 4233 (846.6MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	1693.20	-56.33	-13.00	-43.33	1.84 H	24	47.36	-103.69
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	1693.20	-54.13	-13.00	-41.13	1.63 V	256	49.56	-103.69

Remarks:

1. ERP(dBm) = Raw Value(dBuV/m) + 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 20600 (844.0MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	1688.00	-51.34	-13.00	-38.34	1.53 H	9	52.34	-103.68
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	1688.00	-48.40	-13.00	-35.40	1.63 V	231	55.28	-103.68

Remarks:

1. ERP(dBm) = Raw Value(dBuV/m) + 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 according to ISO/IEC 17025.

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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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