Partial FCC Test Report

(PART 24)

Report No.:	RFBBGM-WTW-P22090842-5
FCC ID:	WIYSLM758A
Test Model:	SLM758
Received Date:	Sep. 26, 2022
Test Date:	Oct. 18, 2022
Issued Date:	Nov. 18, 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.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RFBBGM-WTW-P22090842-5	Original Release	Nov. 18, 2022

1 Certificate of Conformity

Product: Smart module

Brand: CASTLES TECHNOLOGY

Test Model: SLM758

Sample Status: Identical Prototype

Applicant: CASTLES TECHNOLOGY CO., LTD.

Test Date: Oct. 18, 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 : Vera Huang , **Date:** Nov. 18, 2022

Vera Huang / Specialist

Approved by : Jeremy Lin , **Date:** Nov. 18, 2022

Jeremy Lin / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	**Test Item**	**Result**	**Remarks**
2.1046 24.232	Equivalent Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	N/A	Refer to Note
24.232(d)	Peak to Average Ratio	N/A	Refer to Note
2.1055 24.235	Frequency Stability	N/A	Refer to Note
2.1049	Occupied Bandwidth	N/A	Refer to Note
24.238	Band Edge Measurements	N/A	Refer to Note
2.1051 24.238	Conducted Spurious Emissions	N/A	Refer to Note
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -31.62 dB at 3900.00 MHz.

Note:

1. This report is a partial report. Therefore, only test item of Equivalent Isotropic Radiated Power and Radiated Spurious Emissions tests were performed for this report. Other testing data please refer to Sporton lab report no.: FG970101A (for WCDMA) and FG970101B (for LTE).
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	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESR3	102579	2022/07/01	2023/06/30
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	2022/04/11	2023/04/10
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	2021/10/29	2022/10/28
HORN Antenna SCHWARZBECK	9120D	209	2021/11/14	2022/11/13
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	2021/11/14	2022/11/13
Loop Antenna TESEQ	HLA 6121	45745	2022/07/27	2023/07/26
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	2022/07/09	2023/07/08
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	2022/03/19	2023/03/18
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH3-01	2022/05/14	2023/05/13
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	2022/07/09	2023/07/08
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104- SM-SM-8000	Cable-CH3-03 (309224+170907)	2022/07/09	2023/07/08
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	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 HwaYa Chamber 3.

3 General Information

3.1 General Description of EUT

Product	Smart module		
Brand	CASTLES TECHNOLOGY		
Test Model	SLM758		
Status of EUT	Identical Prototype		
Power Supply Rating	5.0 Vdc (host equipment)		
Modulation Type	WCDMA	BPSK (Uplink)	
	HSDPA/DC-HSDPA	QPSK (Uplink)	
	HSUPA	QPSK (Uplink)	
	HSPA+	16QAM (16QAM Uplink is not supported)	
	DC-HSDPA	64QAM	
	LTE	QPSK, 16QAM	
Frequency Range	WCDMA Band 2	1852.4 ~ 1907.6 MHz	
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz	
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz	
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz	
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz	
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz	
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz	
Max. EIRP Power	WCDMA	183.950 mW (22.647dBm)	
		QPSK	16QAM
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	151.252 mW (21.797dBm)	122.659 mW (20.887dBm)
	LTE Band 2 (Channel Bandwidth: 3 MHz)	152.300 mW (21.827dBm)	122.096 mW (20.867dBm)
	LTE Band 2 (Channel Bandwidth: 5 MHz)	152.651 mW (21.837dBm)	124.079 mW (20.937dBm)
	LTE Band 2 (Channel Bandwidth: 10 MHz)	153.356 mW (21.857dBm)	122.942 mW (20.897dBm)
	LTE Band 2 (Channel Bandwidth: 15 MHz)	153.709 mW (21.867dBm)	124.079 mW (20.937dBm)
	LTE Band 2 (Channel Bandwidth: 20 MHz)	155.489 mW (21.917dBm)	124.079 mW (20.937dBm)
Antenna Type	Refer to Note as below		
Accessory Device	Refer to Note as below		
Data Cable Supplied	Refer to Note as below		

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report of Sporton lab report no.: FG970101A (for WCDMA) and FG970101B (for LTE). The differences from the original report are adding an End-product (POS Terminal (Brand: CASTLES TECHNOLOGY, Model: S1E2)), changing antenna type & gain, and disable BLE, UNII-2A, UNII-2C function via software. Therefore, only Equivalent Isotropic Radiated Power and Radiated Spurious Emissions tests were verified and recorded in this report. Other testing data please refer to the original Sporton lab report no.: FG970101A (for WCDMA) and FG970101B (for LTE).
2. The EUT was installed in POS Terminal (Brand: CASTLES TECHNOLOGY, Model: S1E2).
3. The POS Terminal contains following accessory devices.

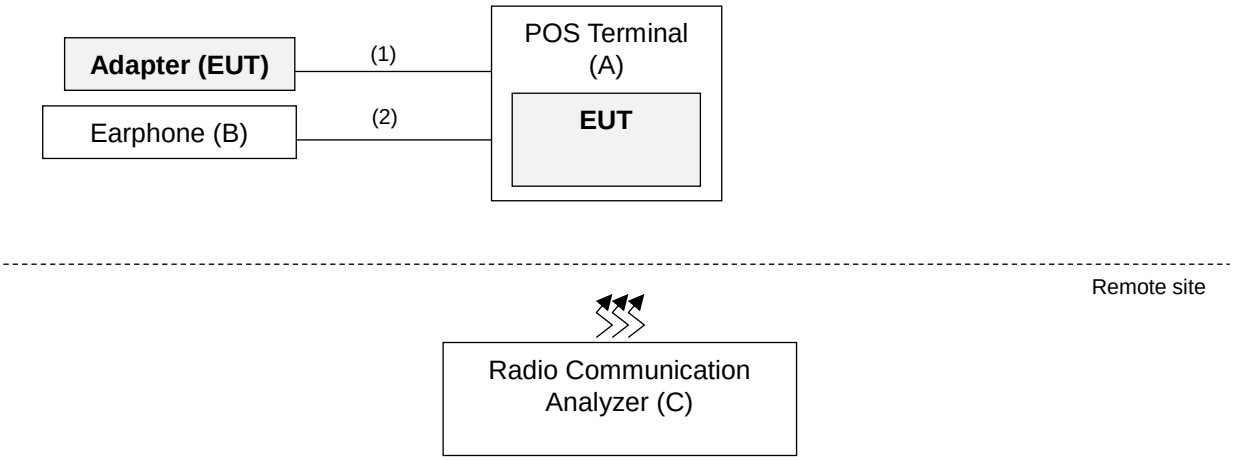
Product	Brand	Model	Description
Adapter	CASTLES TECHNOLOGY	1A52-UB52A	I/P: 100-240 Vac, 50-60 Hz, 0.3 A O/P: 5 Vdc, 2 A
Battery	CASTLES TECHNOLOGY	S1E	3.75 Vdc
USB Cable	N/A	N/A	2m shielded cable w/o core

4. The antenna information of POS Terminal is listed as below.

Ant. Type	PIFA antenna									
Band	WCDMA			LTE						
	II	IV	V	2	4	5	7	12	13	17
Gain (dBi)	0.077	-6.906	-0.985	0.077	-6.906	-0.985	2.622	-1.054	-0.031	-1.054

5. Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.
6. 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.
7. BT & WWAN & NFC (FCC ID: WIYS1E2001) technology can transmit at same time.
8. WLAN 2.4G & WWAN & NFC (FCC ID: WIYS1E2001) technology can transmit at same time.
9. WLAN 5G & WWAN & NFC (FCC ID: WIYS1E2001) technology can transmit at same time.

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	POS Terminal	CASTLES TECHNOLOGY	S1E2	N/A	N/A
B	Earphone	APPLE	MB77PFEB	N/A	N/A
C	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	N/A

Note: Items C acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Cable	1	2	Y	0	Provided by client
2.	Audio Cable	1	1.2	N	0	Provided by Lab

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 Y-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
-	EIRP	9262 to 9538	9262, 9400, 9538	WCDMA, HSDPA, HSUPA
-	Radiated Emission	9262 to 9538	9400	WCDMA

LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	RB #
-	EIRP	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 Half Full
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 Half Full
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 Half Full
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 Half Full
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 Half Full
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 Half Full
-	Radiated Emission	18700 to 19100	19100	20 MHz	QPSK	1

Note: For radiated emissions, select the worst radiated emission channel for final testing.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25 deg. C, 65 % RH	120 Vac, 60 Hz	Wayne Lin
Radiated Emission	23 deg. C, 67 % RH	120 Vac, 60 Hz	Adair Peng

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards and references

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

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

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

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

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

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

Conducted Power Measurement:

4.1.4 Test Results

Conducted Output Power (dBm)

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	22.21	22.45	22.57
HSDPA Subtest-1	21.27	21.53	21.64
HSDPA Subtest-2	21.25	21.22	21.62
HSDPA Subtest-3	20.85	21.18	21.21
HSDPA Subtest-4	20.78	21.14	21.2
DC-HSDPA Subtest-1	21.15	21.17	21.59
DC-HSDPA Subtest-2	21.07	21.09	21.55
DC-HSDPA Subtest-3	20.72	21.09	21.16
DC-HSDPA Subtest-4	20.67	21.01	21.13
HSUPA Subtest-1	21.24	21.47	21.62
HSUPA Subtest-2	19.35	19.56	19.71
HSUPA Subtest-3	20.35	20.56	20.68
HSUPA Subtest-4	19.42	19.64	19.72
HSUPA Subtest-5	21.3	21.5	21.6

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	21.53	21.54	21.66
		1	2	21.31	21.43	21.54
		1	5	21.42	21.45	21.36
		3	0	21.51	21.72	21.66
		3	1	21.52	21.64	21.57
		3	3	21.39	21.54	21.67
		6	0	20.52	20.63	20.63
	16QAM	1	0	20.7	20.65	20.77
		1	2	20.56	20.72	20.62
		1	5	20.53	20.62	20.59
		3	0	20.68	20.78	20.81
		3	1	20.42	20.68	20.6
		3	3	20.41	20.52	20.56
		6	0	19.55	19.53	19.78
BW	MCS Index	Channel		18615	18900	19185
		Frequency (MHz)		1851.5	1880	1908.5
3M	QPSK	1	0	21.57	21.66	21.75
		1	7	21.42	21.55	21.56
		1	14	21.47	21.47	21.48
		8	0	20.61	20.78	20.79
		8	3	20.74	20.73	20.77
		8	7	20.55	20.64	20.63
		15	0	20.58	20.69	20.8
	16QAM	1	0	20.77	20.75	20.79
		1	7	20.73	20.74	20.77
		1	14	20.61	20.68	20.63
		8	0	19.82	19.83	19.9
		8	3	19.59	19.71	19.75
		8	7	19.53	19.58	19.69
		15	0	19.7	19.65	19.83

LTE Band 2						
BW	MCS Index	Channel		18625	18900	19175
		Frequency (MHz)		1852.5	1880	1907.5
5M	QPSK	1	0	21.54	21.72	21.76
		1	12	21.38	21.48	21.6
		1	24	21.54	21.49	21.45
		12	0	20.7	20.7	20.84
		12	6	20.67	20.7	20.75
		12	13	20.48	20.59	20.68
		25	0	20.63	20.63	20.72
	16QAM	1	0	20.74	20.73	20.86
		1	12	20.63	20.76	20.72
		1	24	20.65	20.69	20.68
		12	0	19.73	19.88	19.87
		12	6	19.54	19.63	19.7
		12	13	19.49	19.57	19.68
		25	0	19.63	19.65	19.8
BW	MCS Index	Channel		18650	18900	19150
		Frequency (MHz)		1855	1880	1905
10M	QPSK	1	0	21.57	21.74	21.78
		1	24	21.4	21.5	21.61
		1	49	21.45	21.51	21.46
		25	0	20.63	20.73	20.82
		25	12	20.71	20.76	20.73
		25	25	20.52	20.64	20.67
		50	0	20.67	20.64	20.81
	16QAM	1	0	20.74	20.73	20.82
		1	24	20.69	20.69	20.77
		1	49	20.58	20.65	20.72
		25	0	19.77	19.83	19.95
		25	12	19.56	19.67	19.71
		25	25	19.49	19.57	19.64
		50	0	19.68	19.7	19.76

LTE Band 2						
BW	MCS Index	Channel		18675	18900	19125
		Frequency (MHz)		1857.5	1880	1902.5
15M	QPSK	1	0	21.54	21.71	21.79
		1	37	21.4	21.54	21.59
		1	74	21.52	21.49	21.45
		36	0	20.62	20.76	20.79
		36	19	20.64	20.74	20.72
		36	39	20.48	20.59	20.72
		75	0	20.64	20.73	20.81
	16QAM	1	0	20.75	20.76	20.86
		1	37	20.64	20.71	20.79
		1	74	20.66	20.63	20.64
		36	0	19.74	19.81	19.88
		36	19	19.63	19.68	19.66
		36	39	19.53	19.51	19.63
		75	0	19.69	19.72	19.79
BW	MCS Index	Channel		18700	18900	19100
		Frequency (MHz)		1860	1880	1900
20M	QPSK	1	0	21.63	21.75	**21.84**
		1	50	21.48	21.58	21.66
		1	99	21.54	21.54	21.55
		50	0	20.71	20.79	20.84
		50	25	20.74	20.77	20.77
		50	50	20.57	20.65	20.73
		100	0	20.67	20.73	20.81
	16QAM	1	0	20.71	20.77	20.86
		1	50	20.73	20.76	20.81
		1	99	20.67	20.7	20.72
		50	0	19.83	19.9	19.96
		50	25	19.63	19.73	19.75
		50	50	19.59	19.61	19.69
		100	0	19.7	19.75	19.83

EIRP Power (dBm)

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	22.287	22.527	**22.647**
HSDPA Subtest-1	21.347	21.607	21.717
HSDPA Subtest-2	21.327	21.297	21.697
HSDPA Subtest-3	20.927	21.257	21.287
HSDPA Subtest-4	20.857	21.217	21.277
DC-HSDPA Subtest-1	21.227	21.247	21.667
DC-HSDPA Subtest-2	21.147	21.167	21.627
DC-HSDPA Subtest-3	20.797	21.167	21.237
DC-HSDPA Subtest-4	20.747	21.087	21.207
HSUPA Subtest-1	21.317	21.547	21.697
HSUPA Subtest-2	19.427	19.637	19.787
HSUPA Subtest-3	20.427	20.637	20.757
HSUPA Subtest-4	19.497	19.717	19.797
HSUPA Subtest-5	21.377	21.577	21.677

*EIRP = Conducted + antenna gain (0.077dBi)

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	21.607	21.617	21.737
		1	2	21.387	21.507	21.617
		1	5	21.497	21.527	21.437
		3	0	21.587	**21.797**	21.737
		3	1	21.597	21.717	21.647
		3	3	21.467	21.617	21.747
		6	0	20.597	20.707	20.707
	16QAM	1	0	20.777	20.727	20.847
		1	2	20.637	20.797	20.697
		1	5	20.607	20.697	20.667
		3	0	20.757	20.857	**20.887**
		3	1	20.497	20.757	20.677
		3	3	20.487	20.597	20.637
		6	0	19.627	19.607	19.857
BW	MCS Index	Channel		18615	18900	19185
		Frequency (MHz)		1851.5	1880	1908.5
3M	QPSK	1	0	21.647	21.737	**21.827**
		1	7	21.497	21.627	21.637
		1	14	21.547	21.547	21.557
		8	0	20.687	20.857	20.867
		8	3	20.817	20.807	20.847
		8	7	20.627	20.717	20.707
		15	0	20.657	20.767	20.877
	16QAM	1	0	20.847	20.827	**20.867**
		1	7	20.807	20.817	20.847
		1	14	20.687	20.757	20.707
		8	0	19.897	19.907	19.977
		8	3	19.667	19.787	19.827
		8	7	19.607	19.657	19.767
		15	0	19.777	19.727	19.907

*EIRP = Conducted + antenna gain (0.077dBi)

LTE Band 2						
BW	MCS Index	Channel		18625	18900	19175
		Frequency (MHz)		1852.5	1880	1907.5
5M	QPSK	1	0	21.617	21.797	**21.837**
		1	12	21.457	21.557	21.677
		1	24	21.617	21.567	21.527
		12	0	20.777	20.777	20.917
		12	6	20.747	20.777	20.827
		12	13	20.557	20.667	20.757
		25	0	20.707	20.707	20.797
	16QAM	1	0	20.817	20.807	**20.937**
		1	12	20.707	20.837	20.797
		1	24	20.727	20.767	20.757
		12	0	19.807	19.957	19.947
		12	6	19.617	19.707	19.777
		12	13	19.567	19.647	19.757
		25	0	19.707	19.727	19.877
BW	MCS Index	Channel		18650	18900	19150
		Frequency (MHz)		1855	1880	1905
10M	QPSK	1	0	21.647	21.817	**21.857**
		1	24	21.477	21.577	21.687
		1	49	21.527	21.587	21.537
		25	0	20.707	20.807	20.897
		25	12	20.787	20.837	20.807
		25	25	20.597	20.717	20.747
		50	0	20.747	20.717	20.887
	16QAM	1	0	20.817	20.807	**20.897**
		1	24	20.767	20.767	20.847
		1	49	20.657	20.727	20.797
		25	0	19.847	19.907	20.027
		25	12	19.637	19.747	19.787
		25	25	19.567	19.647	19.717
		50	0	19.757	19.777	19.837

*EIRP = Conducted + antenna gain (0.077dBi)

LTE Band 2						
BW	MCS Index	Channel		18675	18900	19125
		Frequency (MHz)		1857.5	1880	1902.5
15M	QPSK	1	0	21.617	21.787	**21.867**
		1	37	21.477	21.617	21.667
		1	74	21.597	21.567	21.527
		36	0	20.697	20.837	20.867
		36	19	20.717	20.817	20.797
		36	39	20.557	20.667	20.797
		75	0	20.717	20.807	20.887
	16QAM	1	0	20.827	20.837	**20.937**
		1	37	20.717	20.787	20.867
		1	74	20.737	20.707	20.717
		36	0	19.817	19.887	19.957
		36	19	19.707	19.757	19.737
		36	39	19.607	19.587	19.707
		75	0	19.767	19.797	19.867
BW	MCS Index	Channel		18700	18900	19100
		Frequency (MHz)		1860	1880	1900
20M	QPSK	1	0	21.707	21.827	**21.917**
		1	50	21.557	21.657	21.737
		1	99	21.617	21.617	21.627
		50	0	20.787	20.867	20.917
		50	25	20.817	20.847	20.847
		50	50	20.647	20.727	20.807
		100	0	20.747	20.807	20.887
	16QAM	1	0	20.787	20.847	**20.937**
		1	50	20.807	20.837	20.887
		1	99	20.747	20.777	20.797
		50	0	19.907	19.977	20.037
		50	25	19.707	19.807	19.827
		50	50	19.667	19.687	19.767
		100	0	19.777	19.827	19.907

*EIRP = Conducted + antenna gain (0.077dBi)

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:

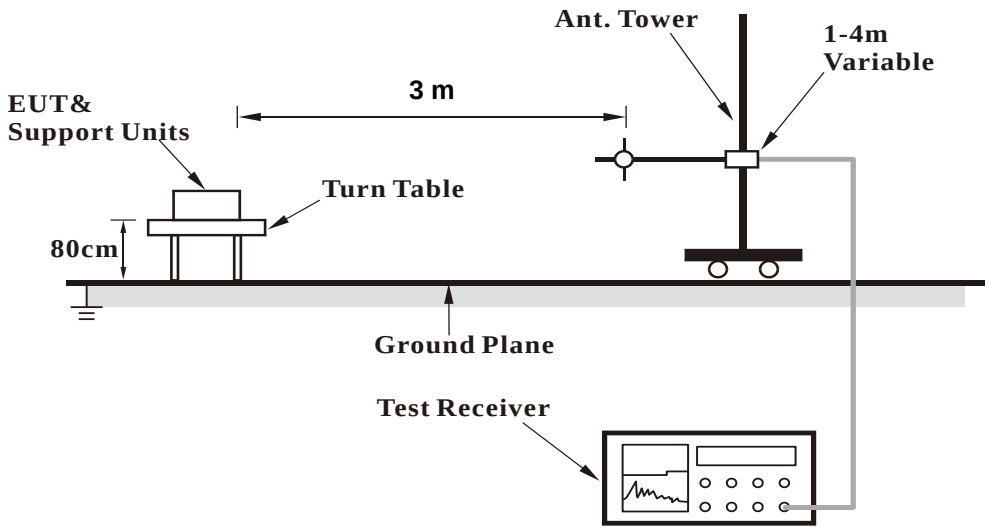
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.2.3 Deviation from Test Standard

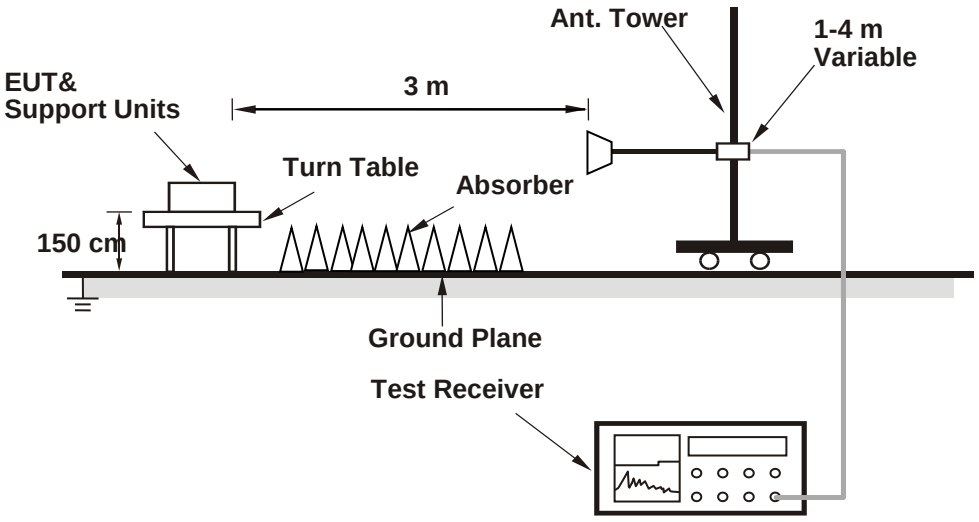
No deviation.

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

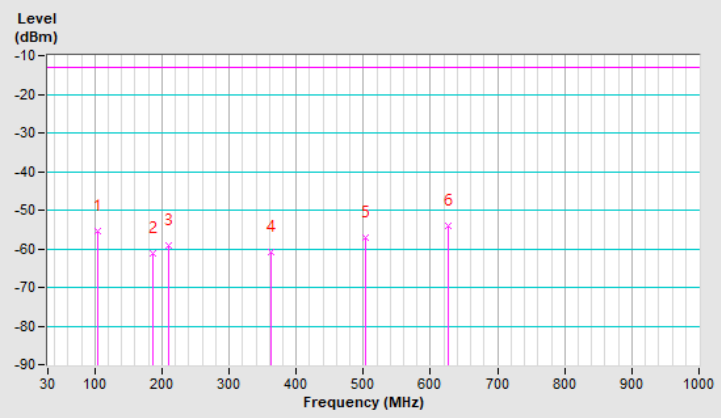
WCDMA Band 2

RF Mode	TX WCDMA Band II	Channel	CH 9400：1880 MHz
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	104.69	-55.41	-13.00	-42.41	1.00 H	67	52.72	-108.13
2	186.17	-61.24	-13.00	-48.24	1.50 H	148	44.92	-106.16
3	210.42	-59.22	-13.00	-46.22	1.00 H	75	47.40	-106.62
4	362.71	-60.74	-13.00	-47.74	1.50 H	20	40.29	-101.03
5	502.39	-56.97	-13.00	-43.97	1.00 H	185	40.80	-97.77
6	625.58	-54.15	-13.00	-41.15	1.00 H	187	41.05	-95.20

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

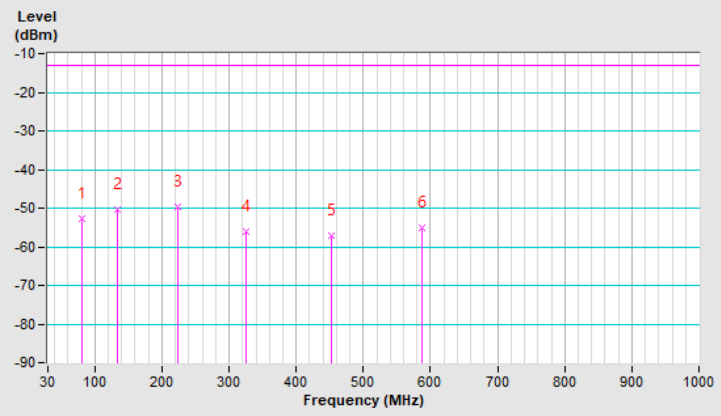


RF Mode	TX WCDMA Band II	Channel	CH 9400：1880 MHz
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	81.41	-52.67	-13.00	-39.67	2.00 V	19	56.48	-109.15
2	133.79	-50.41	-13.00	-37.41	2.00 V	131	54.65	-105.06
3	224.00	-49.75	-13.00	-36.75	1.00 V	131	56.75	-106.50
4	325.85	-56.22	-13.00	-43.22	1.00 V	131	45.23	-101.45
5	452.92	-57.05	-13.00	-44.05	1.50 V	131	41.60	-98.65
6	587.75	-54.93	-13.00	-41.93	1.00 V	317	40.95	-95.88

Remarks:

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



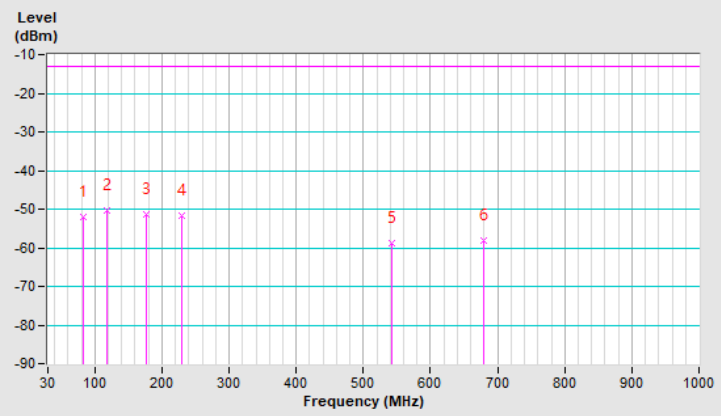
LTE Band 2, Channel Bandwidth: 20MHz

RF Mode	TX LTE Band II-20MHz	Channel	CH 19100：1900 MHz
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	83.35	-52.01	-13.00	-39.01	1.50 H	17	57.43	-109.44
2	117.30	-50.25	-13.00	-37.25	1.00 H	244	56.51	-106.76
3	177.44	-51.31	-13.00	-38.31	1.00 H	27	53.80	-105.11
4	228.85	-51.76	-13.00	-38.76	2.00 H	27	54.46	-106.22
5	542.16	-58.77	-13.00	-45.77	1.00 H	27	38.25	-97.02
6	678.93	-58.27	-13.00	-45.27	2.00 H	135	36.38	-94.65

Remarks:

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

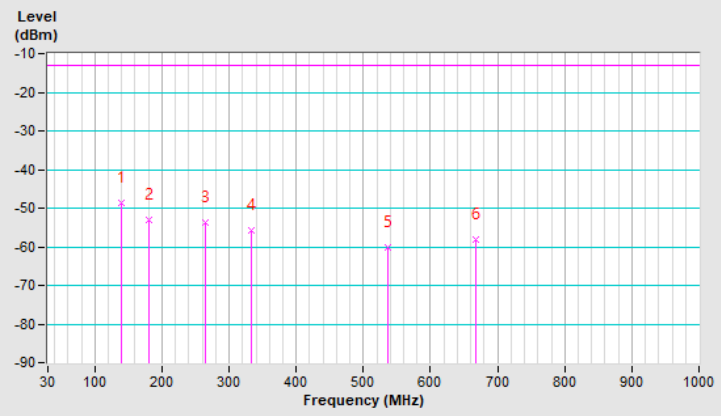


RF Mode	TX LTE Band II-20MHz	Channel	CH 19100：1900 MHz
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	139.61	-48.67	-13.00	-35.67	1.00 V	63	55.99	-104.66
2	180.35	-53.00	-13.00	-40.00	2.00 V	63	52.48	-105.48
3	264.74	-53.73	-13.00	-40.73	1.00 V	63	49.84	-103.57
4	333.61	-55.62	-13.00	-42.62	1.00 V	147	45.68	-101.30
5	537.31	-60.27	-13.00	-47.27	1.50 V	343	36.86	-97.13
6	668.26	-58.23	-13.00	-45.23	1.00 V	99	36.60	-94.83

Remarks:

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



Above 1GHz
WCDMA Band 2

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-46.58	-13.00	-33.58	2.75 H	263	46.65	-93.23
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	-44.71	-13.00	-31.71	1.63 V	187	48.52	-93.23

Remarks:

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

LTE Band 2, Channel Bandwidth 20MHz

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3900.00	-46.52	-13.00	-33.52	2.99 H	237	46.21	-92.73
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	**3900.00**	**-44.62**	**-13.00**	**-31.62**	**1.53 V**	**224**	**48.11**	**-92.73**

Remarks:

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

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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