

FCC Test Report

Report No.: RFBEIH-WTW-P21090617-8

FCC ID: 2AK5B-HB2

Test Model: HB2LW1NA1

Received Date: Sep. 15, 2021

Test Date: Oct. 13 ~ Oct. 14, 2021

Issued Date: Nov. 24, 2021

Applicant: Latch Systems, Inc.

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

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FCC Registration /
Designation Number: 788550 / TW0003



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Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty	5
2.2 Modification Record	5
3 General Information	6
3.1 General Description of EUT	6
3.1.1 Test Mode Applicability and Tested Channel Detail	8
3.2 Description of Support Units	9
3.2.1 Configuration of System under Test	9
3.3 General Description of Applied Standards and References	10
4 Test Types and Results	11
4.1 Radiated Emission Measurement	11
4.1.1 Limits of Radiated Emission Measurement	11
4.1.2 Test Instruments	12
4.1.3 Test Procedures	13
4.1.4 Deviation from Test Standard	14
4.1.5 Test Set Up	15
4.1.6 EUT Operating Conditions	16
4.1.7 Test Results	16
5 Pictures of Test Arrangements.....	23
Appendix – Information of the Testing Laboratories.....	24

Release Control Record

Issue No.	Description	Date Issued
RFBEIH-WTW-P21090617-8	Original Release	Nov. 24, 2021

1 Certificate of Conformity

Product: Hub

Brand: LATCH

Test Model: HB2LW1NA1

Sample Status: Engineering Sample

Applicant: Latch Systems, Inc.

Test Date: Oct. 13 ~ Oct. 14, 2021

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
47 CFR FCC Part 15, Subpart E (Section 15.407)
FCC Part 22, Subpart H
ANSI C63.10: 2013
ANSI C63.26: 2015

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

Prepared by : Lena Wang, **Date:** Nov. 24, 2021
Lena Wang / Specialist

Approved by : Jeremy Lin, **Date:** Nov. 24, 2021
Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart E (Section 15.407) FCC Part 22, Subpart H ANSI C63.10: 2013 ANSI C63.26: 2015			
FCC Clause	Test Item	Result	Remarks
15.205 / 15.209 / 15.247(d) / 2.1053 22.917	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.10 dB at 2390.00 MHz.

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	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Hub		
Brand	LATCH		
Test Model	HB2LW1NA1		
Status of EUT	Engineering Sample		
Power Supply Rating	12.0 Vdc (Adapter)		
Modulation Type	WLAN	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM	
	BT EDR	GFSK, $\pi/4$ -DQPSK, 8DPSK	
	BT LE	GFSK	
	Zigbee	OQPSK	
	WCDMA	BPSK, QPSK	
	LTE	QPSK, 16QAM	
Operating Frequency	WLAN	2412 ~ 2462 MHz 5180 ~ 5240 MHz, 5745 ~ 5825 MHz	
	BT EDR	2402 ~ 2480 MHz	
	BT LE	2402 ~ 2480 MHz	
	Zigbee	2405 ~ 2480 MHz	
	WCDMA	WCDMA Band II	1852.4 ~ 1907.6 MHz
		WCDMA Band V	826.4 ~ 846.6 MHz
	LTE	LTE Band 2	Channel Bandwidth: 1.4 MHz 1850.7 ~ 1909.3 MHz
			Channel Bandwidth: 3 MHz 1851.5 ~ 1908.5 MHz
			Channel Bandwidth: 5 MHz 1852.5 ~ 1907.5 MHz
			Channel Bandwidth: 10 MHz 1855.0 ~ 1905.0 MHz
			Channel Bandwidth: 15 MHz 1857.5 ~ 1902.5 MHz
			Channel Bandwidth: 20 MHz 1860.0 ~ 1900.0 MHz
		LTE Band 4	Channel Bandwidth: 1.4 MHz 1710.7 ~ 1754.3 MHz
			Channel Bandwidth: 3 MHz 1711.5 ~ 1753.5 MHz
			Channel Bandwidth: 5 MHz 1712.5 ~ 1752.5 MHz
			Channel Bandwidth: 10 MHz 1715.0 ~ 1750.0 MHz
			Channel Bandwidth: 15 MHz 1717.5 ~ 1747.5 MHz
			Channel Bandwidth: 20 MHz 1720.0 ~ 1745.0 MHz
		LTE Band 5	Channel Bandwidth: 1.4 MHz 824.7 ~ 848.3 MHz
			Channel Bandwidth: 3 MHz 825.5 ~ 847.5 MHz
			Channel Bandwidth: 5 MHz 826.5 ~ 846.5 MHz
			Channel Bandwidth: 10 MHz 829 ~ 844 MHz
		LTE Band 12	Channel Bandwidth: 1.4 MHz 699.7 ~ 715.3 MHz
			Channel Bandwidth: 3 MHz 700.5 ~ 714.5 MHz
			Channel Bandwidth: 5 MHz 701.5 ~ 713.5 MHz

			Channel Bandwidth: 10 MHz	704.0 ~ 711.0 MHz
		LTE Band 13	Channel Bandwidth: 5 MHz	779.5 ~ 784.5 MHz
			Channel Bandwidth: 10 MHz	782.0 MHz
Antenna Type	Refer to Note as below			
Accessory Device	Refer to Note as below			
Data Cable Supplied	N/A			

Note:

- The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	APD	WB-24J12FU	I/P: 100-240 Vac, 50/60 Hz, 0.7 A O/P: 12 Vdc, 2 A 1.5m non shielded, without core

- The antenna information is listed as below.

Antenna Type		Dipole				
Band		BT	Zigbee	WLAN		
		2402-2480 MHz	2405-2480 MHz	2412-2462MHz	5180-5240MHz	5745-5825MHz
Gain	Ant. 4	--	--	2.5	3.3	2.5
	Ant. 5		--	3.2	3.1	2.4
	Ant. 6	3.3	--	--	--	--
	Ant. 7	--	3.4	--	--	--

Antenna Type		PIFA						
Band		WCDMA		LTE				
		2	5	2	4	5	12	13
Gain	Ant. 1 (Main)	2.3	1.3	2.3	2.8	1.3	1.1	1.1
	Ant. 2 (Div, Rx only)	2.6	2.5	2.6	2.8	2.5	2.8	2.8

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

3.1.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To		Description
	RE $\geq$ 1G	RE<1G	
-	√	√	-

Where **RE $\geq$ 1G:** Radiated Emission above 1 GHz **RE<1G:** Radiated Emission below 1 GHz

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. “-” means no effect.

Radiated Emission Test

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, and antenna ports. The worst case was found as following channel(s) was (were) selected for the final test as listed below:

EUT Config. Mode	Mode
-	WLAN 2.4G+Zigbee + BT + WCDMA

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Rex Wang

3.2 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.

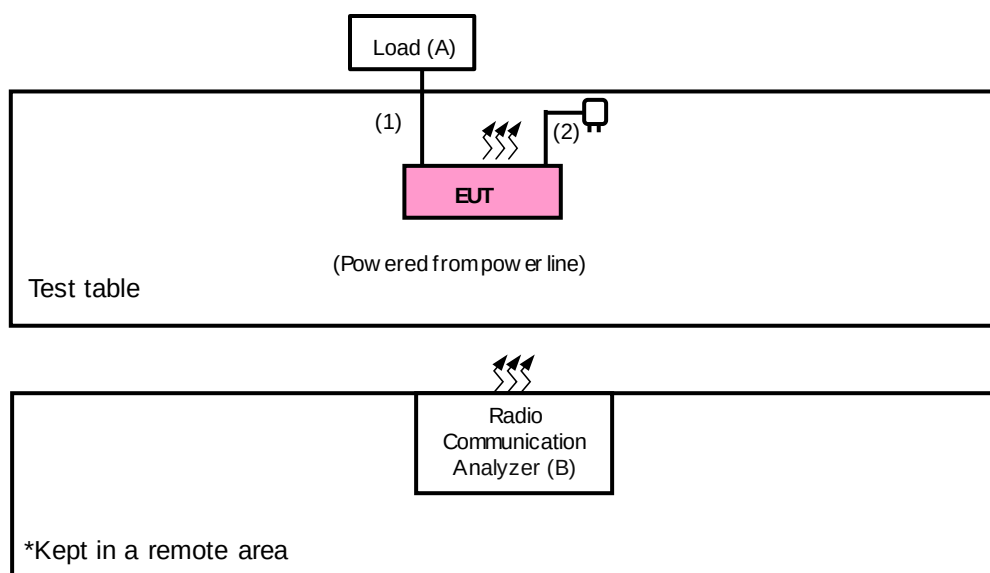
No.	Product	Brand	Model No.	Serial No.	FCC ID
A	Load	N/A	N/A	N/A	N/A
B	Radio Communication Analyzer	Anritsu	MT8820C	6201300640	N/A

No.	Signal Cable Description Of The Above Support Units
1.	LAN Cable: 3m
2.	DC Output Cable: 1.5m

Note:

1. All power cords of the above support units are non-shielded (1.8m).

3.2.1 Configuration of System under Test



3.3 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 Part 15, Subpart C (15.247)

FCC Part 15, Subpart E (15.407)

FCC 47 CFR Part 2

FCC 47 CFR Part 22

ANSI C63.26-2015

ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 Meas Guidance v05r02

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI/TIA/EIA-603-E 2016

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

4 Test Types and Results

4.1 Radiated Emission Measurement

4.1.1 Limits of Radiated Emission Measurement

For WLAN

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

For WCDMA 5

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.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 09, 2021	Apr. 08, 2022
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 10, 2021	Jun. 09, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 06, 2020	Nov. 05, 2021
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 22, 2020	Nov. 21, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 22, 2020	Nov. 21, 2021
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jun. 05, 2021	Jun. 04, 2022
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 17, 2021	Feb. 16, 2022
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM- SM8000	CABLE-CH9-02 (248780+171006)	Jan. 16, 2021	Jan. 15, 2022
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9- (250795/4)	Jan. 16, 2021	Jan. 15, 2022
RF signal cable Woken	8D-FB	Cable-CH9-01	Jun. 05, 2021	Jun. 04, 2022
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower & Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
True RMS Clamp Meter Fluke	325	31130711WS	Jun. 02, 2021	Jun. 01, 2022
Radio Communication Analyzer Anritsu	MT8820C	6201300640	Aug. 26, 2021	Aug. 25, 2023

Note: 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 9.

4.1.3 Test Procedures

For WLAN, Zigbee and BT

For Radiated Emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10 Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection at frequency above 1GHz. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor. The duty cycle correction factor refer to Chapter 3.3 of the BV CPS report no RFBEIH-WTW-P21090617-5. (only for BT)
5. All modes of operation were investigated and the worst-case emissions are reported.

For WWAN

- a. Substitution method is used for E.I.R.P measurement. 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
 - $EIRP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m.
 - $ERP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8 - 2.15$; where D is the measurement distance (in the far field region) in m.

Note:

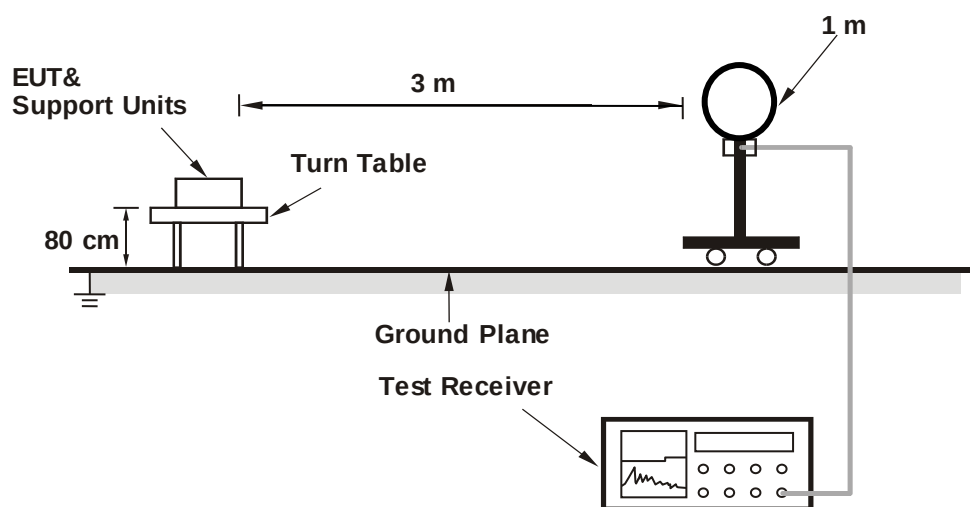
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.1.4 Deviation from Test Standard

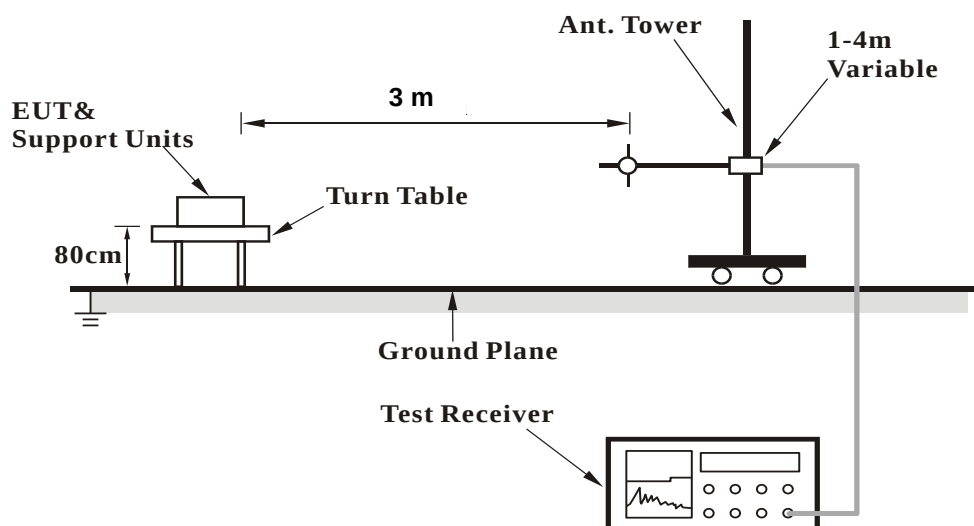
No deviation.

4.1.5 Test Set Up

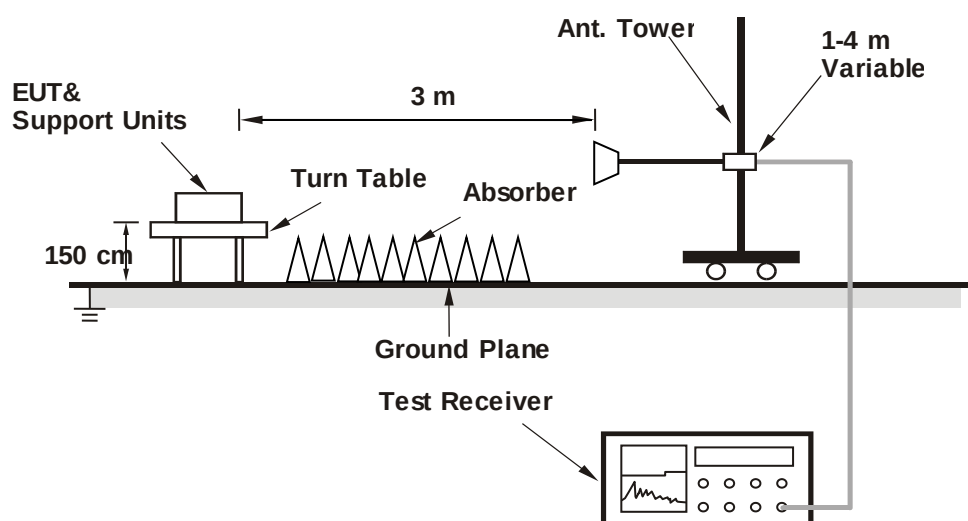
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



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

4.1.6 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

9 kHz ~ 30 MHz Data:

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

Above 1GHz Data

WLAN 2.4G + Zigbee + BT + WCDMA Band 5

FREQUENCY RANGE	1GHz ~ 25GHz	DETECTOR FUNCTION	Peak (PK) Average (AV)
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Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	69.10 PK	74.00	-4.90	3.87 H	128	35.40	33.70
2	2390.00	53.90 AV	54.00	-0.10	3.87 H	128	20.20	33.70
3	#2405.00	113.50 PK			3.87 H	128	79.80	33.70
4	#2405.00	109.40 AV			3.87 H	128	75.70	33.70
5	#2437.00	110.10 PK			2.48 H	31	76.50	33.60
6	#2437.00	100.00 AV			2.48 H	31	66.40	33.60
7	#2480.00	102.30 PK			2.71 H	20	68.60	33.70
8	#2480.00	71.70 AV			2.71 H	20	38.00	33.70
9	2483.50	64.20 PK	74.00	-9.80	2.48 H	31	30.50	33.70
10	2483.50	52.30 AV	54.00	-1.70	2.48 H	31	18.60	33.70
11	4810.00	50.70 PK	74.00	-23.30	1.07 H	127	43.30	7.40
12	4810.00	39.10 AV	54.00	-14.90	1.07 H	127	31.70	7.40
13	4874.00	48.60 PK	74.00	-25.40	2.52 H	138	41.30	7.30
14	4874.00	34.90 AV	54.00	-19.10	2.52 H	138	27.60	7.30
15	4960.00	48.90 PK	74.00	-25.10	1.23 H	342	41.30	7.60
16	4960.00	18.30 AV	54.00	-35.70	1.23 H	342	10.70	7.60

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	63.30 PK	74.00	-10.70	1.04 V	280	29.60	33.70
2	2390.00	48.70 AV	54.00	-5.30	1.04 V	280	15.00	33.70
3	#2405.00	107.00 PK			1.04 V	280	73.30	33.70
4	#2405.00	102.90 AV			1.04 V	280	69.20	33.70
5	#2437.00	117.80 PK			1.71 V	358	84.20	33.60
6	#2437.00	107.90 AV			1.71 V	358	74.30	33.60
7	#2480.00	95.10 PK			3.70 V	128	61.40	33.70
8	#2480.00	64.50 AV			3.70 V	128	30.80	33.70
9	2483.50	68.30 PK	74.00	-5.70	1.71 V	358	34.60	33.70
10	2483.50	51.00 AV	54.00	-3.00	1.71 V	358	17.30	33.70
11	4810.00	51.80 PK	74.00	-22.20	1.95 V	38	44.40	7.40
12	4810.00	40.30 AV	54.00	-13.70	1.95 V	38	32.90	7.40
13	4874.00	48.80 PK	74.00	-25.20	1.99 V	263	41.50	7.30
14	4874.00	35.10 AV	54.00	-18.90	1.99 V	263	27.80	7.30
15	4960.00	48.80 PK	74.00	-25.20	3.70 V	128	41.20	7.60
16	4960.00	18.20 AV	54.00	-35.80	3.70 V	128	10.60	7.60

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. "#": For BT fundamental frequency 2480 MHz. The average value of fundamental and harmonic frequency is: Average value = Peak value + 20 log(Duty cycle) Where the Duty cycle correction factor is calculated from following formula:

$$20 \log(\text{Duty cycle}) = 20 \log(2.937 \text{ ms} / 100 \text{ ms}) = -30.6 \text{ dB}$$

Mode		WLAN 2.4G + Zigbee + BT + WCDMA Band 5						
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	-43.00	-13.00	-30.00	2.95 H	126	58.96	-101.96
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	-41.34	-13.00	-28.34	1.92 V	218	60.62	-101.96

REMARKS:

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

Below 1GHz Data

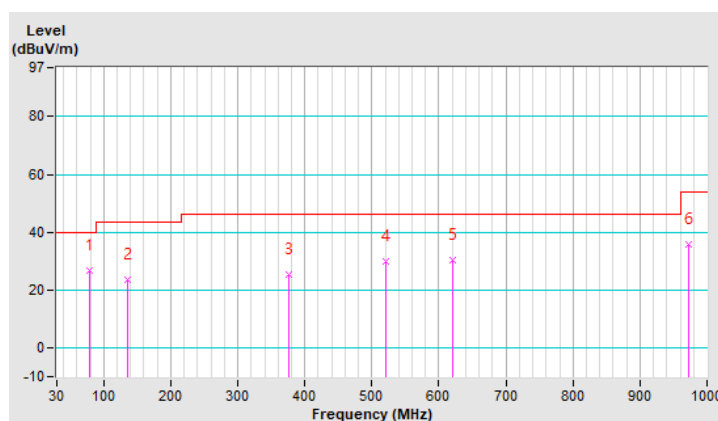
WLAN 2.4G + Zigbee + BT + WCDMA Band 5

FREQUENCY RANGE	30MHz ~ 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)
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Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	79.47	26.50 QP	40.00	-13.50	1.25 H	319	39.80	-13.30
2	135.73	23.70 QP	43.50	-19.80	1.00 H	239	33.30	-9.60
3	375.32	25.30 QP	46.00	-20.70	1.50 H	211	30.40	-5.10
4	521.79	30.00 QP	46.00	-16.00	1.00 H	205	31.90	-1.90
5	619.76	30.30 QP	46.00	-15.70	2.00 H	168	30.20	0.10
6	972.84	35.70 QP	54.00	-18.30	1.00 H	194	29.10	6.60

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

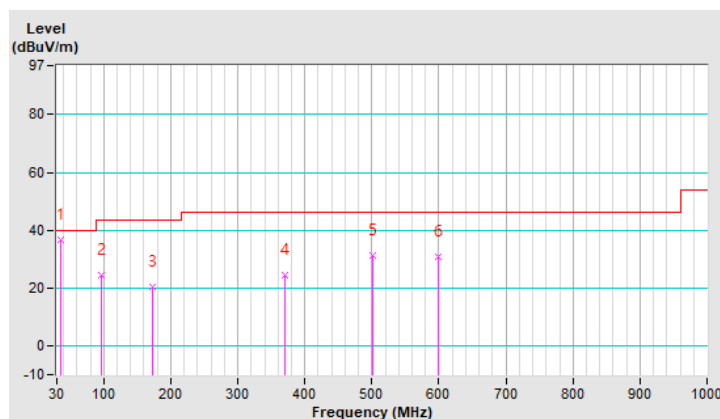


FREQUENCY RANGE	30MHz ~ 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)
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Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	36.79	36.60 QP	40.00	-3.40	2.00 V	125	46.50	-9.90
2	95.96	24.30 QP	43.50	-19.20	1.00 V	125	38.50	-14.20
3	172.59	20.40 QP	43.50	-23.10	1.50 V	9	29.50	-9.10
4	369.50	24.50 QP	46.00	-21.50	1.25 V	164	29.80	-5.30
5	500.45	31.40 QP	46.00	-14.60	1.00 V	6	33.60	-2.20
6	599.39	30.70 QP	46.00	-15.30	1.50 V	201	30.90	-0.20

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

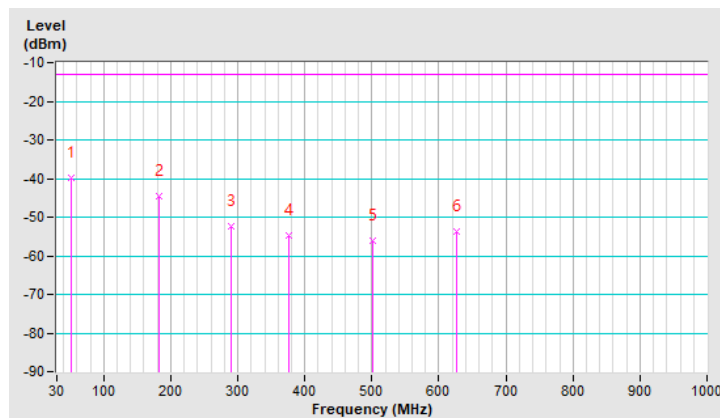


FREQUENCY RANGE	30MHz ~ 1GHz	MODE	WLAN 2.4G + Zigbee + BT + WCDMA Band 5
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Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	51.34	-39.74	-13.00	-26.74	1.00 H	144	66.57	-106.31
2	183.26	-44.43	-13.00	-31.43	1.25 H	345	63.36	-107.79
3	290.93	-52.37	-13.00	-39.37	1.50 H	274	52.01	-104.38
4	375.32	-54.89	-13.00	-41.89	1.00 H	195	47.63	-102.52
5	500.45	-55.95	-13.00	-42.95	2.00 H	277	43.75	-99.70
6	625.58	-53.75	-13.00	-40.75	1.00 H	231	43.38	-97.13

Remarks:

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

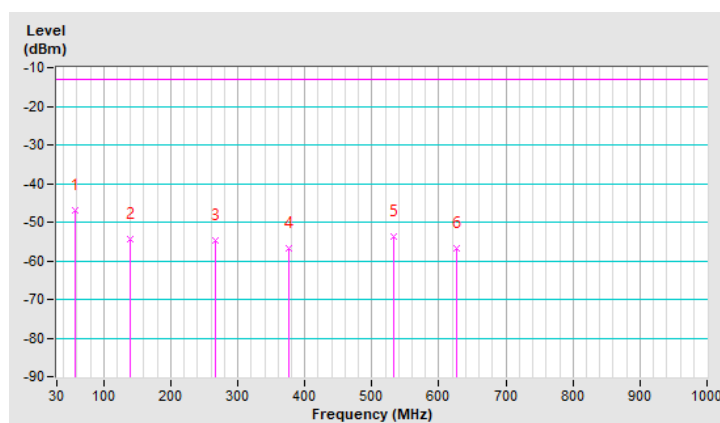


FREQUENCY RANGE	30MHz ~ 1GHz	MODE	WLAN 2.4G + Zigbee + BT + WCDMA Band 5
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Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	58.13	-47.11	-13.00	-34.11	1.25 V	353	59.65	-106.76
2	139.61	-54.50	-13.00	-41.50	1.00 V	251	52.09	-106.59
3	265.71	-54.86	-13.00	-41.86	1.50 V	310	50.55	-105.41
4	375.32	-56.74	-13.00	-43.74	1.00 V	106	45.78	-102.52
5	532.46	-53.86	-13.00	-40.86	1.28 V	296	45.27	-99.13
6	625.58	-56.72	-13.00	-43.72	1.00 V	172	40.41	-97.13

Remarks:

1. $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2. $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
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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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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