

# TEST REPORT

## CERTIFICATE OF CONFORMITY

**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
**Report No.:** RFBDKG-WTW-P21090703C  
**FCC ID:** JNZMR0094  
**Product:** Wireless Mouse  
**Brand:** Logitech  
**Model No.:** MR0094  
**Received Date:** 2025/6/18  
**Test Date:** 2025/6/20 ~ 2025/7/14  
**Issued Date:** 2025/7/22

**Applicant:** LOGITECH FAR EAST LTD.

**Address:** #2 Creation Rd. 4, Science-Based Ind. Park Hsinchu Taiwan, R.O.C.

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan

**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan

**FCC Registration /** 723255 / TW2022

**Designation Number:**

**Approved by:** \_\_\_\_\_, **Date:** 2025/7/22  
May Chen / Manager

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Prepared by: Phoenix Huang / Specialist

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## Release Control Record

Issue No.	Description	Date Issued
RFBDKG-WTW-P21090703C	Original release.	2025/7/22

## 1 Certificate

**Product:** Wireless Mouse  
**Brand:** Logitech  
**Test Model:** MR0094  
**Sample Status:** Engineering sample  
**Applicant:** LOGITECH FAR EAST LTD.  
**Test Date:** 2025/6/20 ~ 2025/7/14  
**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
**Measurement procedure:** ANSI C63.10-2013  
KDB 558074 D01 15.247 Meas Guidance v05r02

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.

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
Standard / Clause	Test Item	Result	Remark
15.247(b)	RF Output Power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	N/A	Refer to Note 1 below
15.247(a)(2)	6 dB Bandwidth	N/A	Refer to Note 1 below
15.247(d)	Conducted Out of Band Emissions	N/A	Refer to Note 1 below
15.207	AC Power Conducted Emissions	N/A	Refer to Note 1 below
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -14.1 dB at 58.35 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -7.9 dB at 2483.50 MHz
15.203	Antenna Requirement	Pass	No antenna connector is used.

Note:

1. Only RF Output Power and Unwanted Emissions test items were performed for this addendum. The others testing data refer to original test report.
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	Specification	Expanded Uncertainty (k=2) (±)
RF Output Power	-	1.1 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.1 dB
	30 MHz ~ 1 GHz	5.4 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	5.0 dB
	18 GHz ~ 40 GHz	5.3 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

### 2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

### 3 General Information

#### 3.1 General Description

Product	Wireless Mouse
Brand	Logitech
Test Model	MR0094
Status of EUT	Engineering sample
Power Supply Rating	1.5 Vdc from battery
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	2 Mbps (*Note 1)
Operating Frequency	2.402 GHz ~ 2.48 GHz (*Note 1)
Number of Channel	40 (*Note 1)
Output Power	<b>BT-LE 1M:</b> 6.745 mW (8.29 dBm) <b>BT-LE 2M:</b> 6.776 mW (8.31 dBm) <b>logi bolt 1M:</b> 6.653 mW (8.23 dBm) <b>logi bolt 2M:</b> 6.683 mW (8.25 dBm)

Note:

- BT-LE technique supports 1Mbps and 2Mbps data rates, both have been evaluated in this test report. Refer to “**section 3.3 Channel List**” for more detail specification.
- This report is prepared for FCC class II permissive change. The difference compared with the Report No.: RFBDKG-WTW-P21090703A as the following:
  - ◆ The layout of roller board was adjusted because the CPTH hole is much bigger than PTH, and delete three ESD diodes to have more space.
  - ◆ Unmount filter capacitor C7.
  - ◆ Changed the applicant’s address.
- According to above conditions, only RF Output Power and Unwanted Emissions test items need to be performed. And all data were verified to meet the requirements.
- The EUT may have a lot of colors for marketing requirement.
- This device has BT-LE and logi bolt functions. logi bolt is the same technology as BT-LE then enhancement secure protocol.
- There are two types of EUT as shown below:

Type	Description
A	Left-Hand use
B	Right-Hand use

- 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.

### 3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
-0.1	2.4~2.4835	Ceramic antenna	none

\* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.



### 3.3 Channel List

#### BT-LE, logi bolt channels:

RF Channel	RF Center Frequency	Channel Index	Channels Type for BT 5.x		Channels Type for BT 4.x
			Maximum Data Rate 2Mbps	Maximum Data Rate 1Mbps	Maximum Data Rate 1Mbps
0	2402 MHz	37		●	●
1	2404 MHz	0	●		●
2	2406 MHz	1	●		●
3	2408 MHz	2	●		●
4	2410 MHz	3	●		●
5	2412 MHz	4	●		●
6	2414 MHz	5	●		●
7	2416 MHz	6	●		●
8	2418 MHz	7	●		●
9	2420 MHz	8	●		●
10	2422 MHz	9	●		●
11	2424 MHz	10	●		●
12	2426 MHz	38		●	●
13	2428 MHz	11	●		●
14	2430 MHz	12	●		●
15	2432 MHz	13	●		●
16	2434 MHz	14	●		●
17	2436 MHz	15	●		●
18	2438 MHz	16	●		●
19	2440 MHz	17	●		●
20	2442 MHz	18	●		●
21	2444 MHz	19	●		●
22	2446 MHz	20	●		●
23	2448 MHz	21	●		●
24	2450 MHz	22	●		●
25	2452 MHz	23	●		●
26	2454 MHz	24	●		●
27	2456 MHz	25	●		●
28	2458 MHz	26	●		●
29	2460 MHz	27	●		●
30	2462 MHz	28	●		●
31	2464 MHz	29	●		●
32	2466 MHz	30	●		●
33	2468 MHz	31	●		●
34	2470 MHz	32	●		●
35	2472 MHz	33	●		●
36	2474 MHz	34	●		●
37	2476 MHz	35	●		●
38	2478 MHz	36	●		●
39	2480 MHz	39		●	●

### 3.4 Test Mode Applicability and Tested Channel Detail

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

Test Item	Mode	Tested Channel	Modulation	Data Rate Parameter
RF Output Power	BT-LE 1M	0, 19, 39	GFSK	1Mb/s
	BT-LE 2M	1, 19, 38	GFSK	2Mb/s
	logi bolt 1M	0, 19, 39	GFSK	1Mb/s
	logi bolt 2M	1, 19, 38	GFSK	2Mb/s
Unwanted Emissions below 1 GHz	BT-LE 2M	38	GFSK	2Mb/s
	logi bolt 1M	39	GFSK	1Mb/s
Unwanted Emissions above 1 GHz	BT-LE 2M	38	GFSK	2Mb/s
	logi bolt 1M	39	GFSK	1Mb/s

Note: In the original report, the worst case was found in Right-Hand sample. Therefore only the test data of the these sample was recorded in this report.

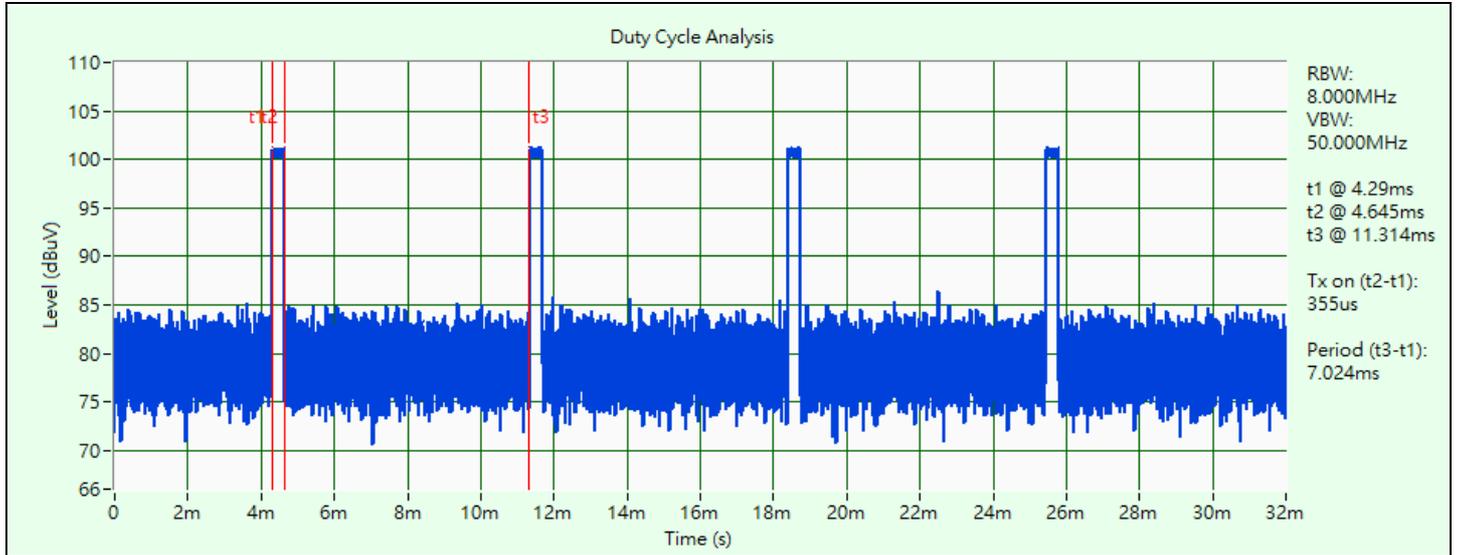
### 3.5 Duty Cycle of Test Signal

**BT-LE 1M:** Duty cycle = 0.355 ms / 7.024 ms x 100% = 5.1%

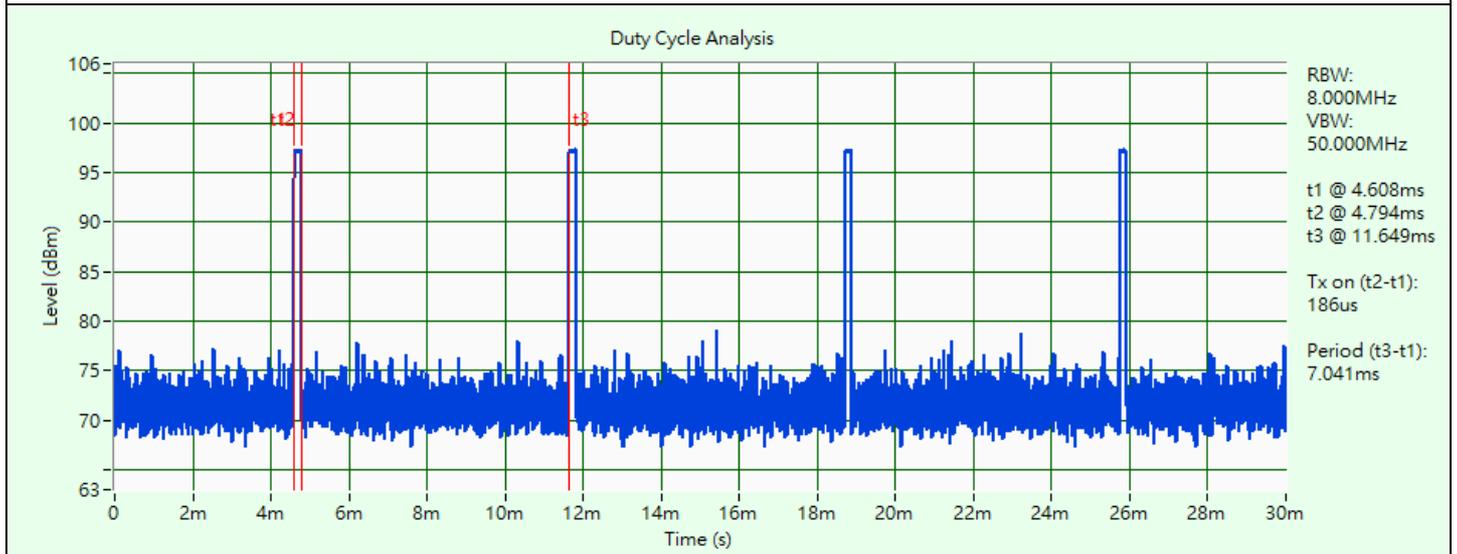
**BT-LE 2M:** Duty cycle = 0.186 ms / 7.041 ms x 100% = 2.6%

**logi bolt 1M:** Duty cycle = 0.355 ms / 7.053 ms x 100% = 5.0%

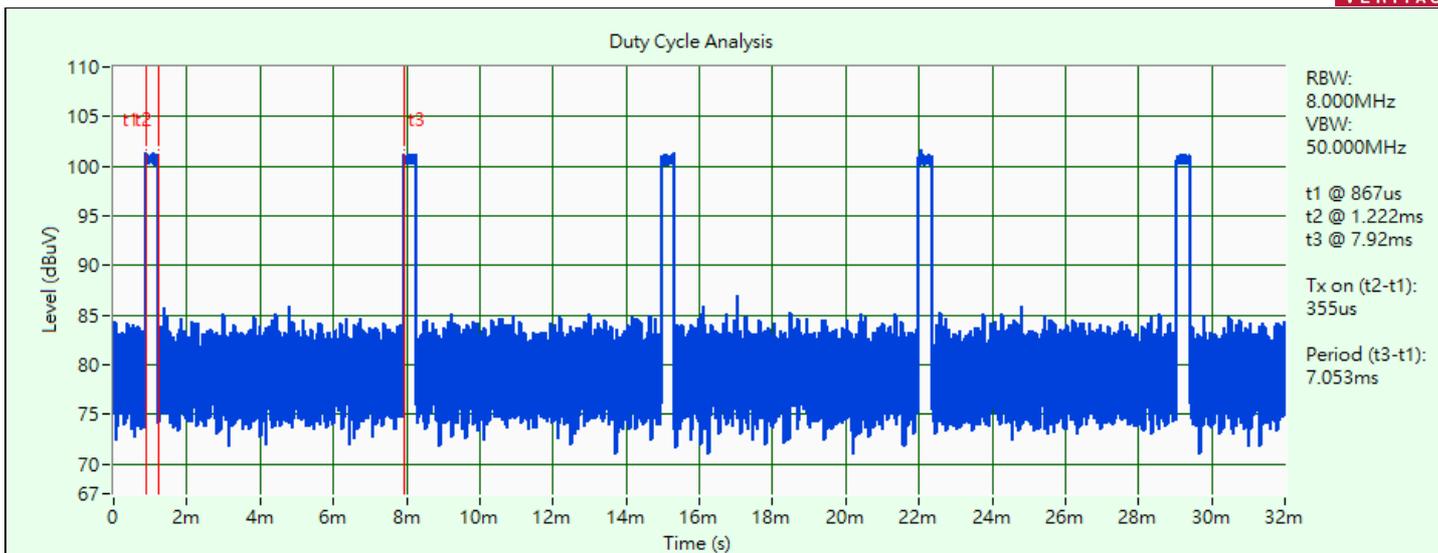
**logi bolt 2M:** Duty cycle = 0.186 ms / 7.021 ms x 100% = 2.6%



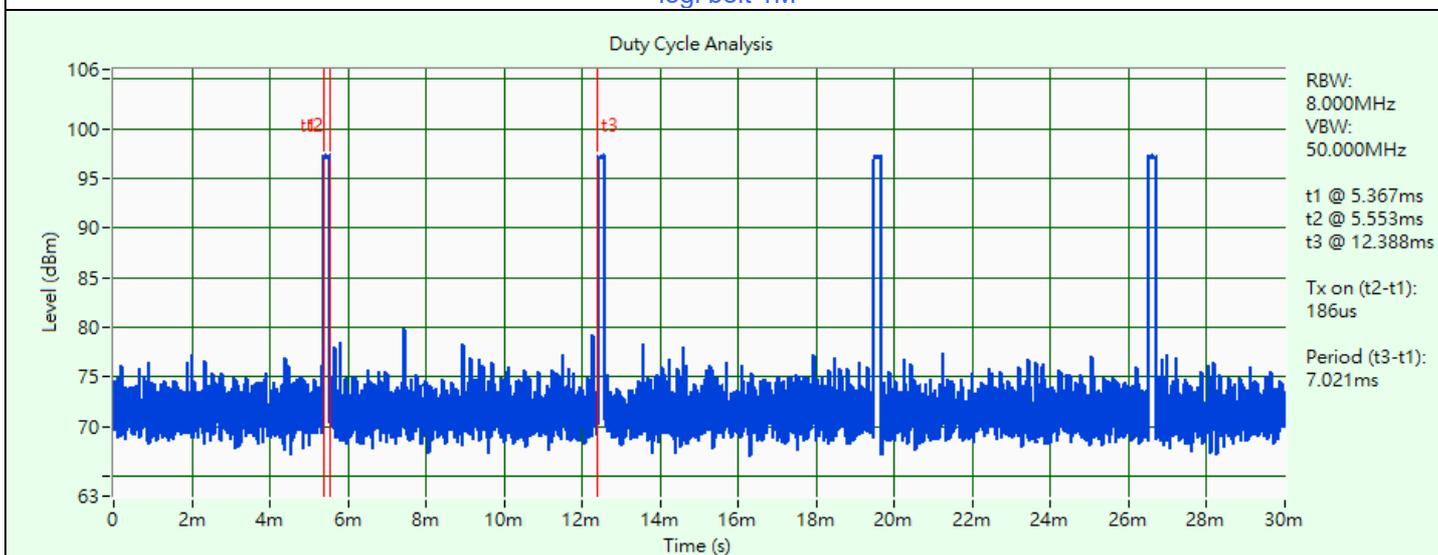
BT-LE 1M



BT-LE 2M



logi bolt 1M



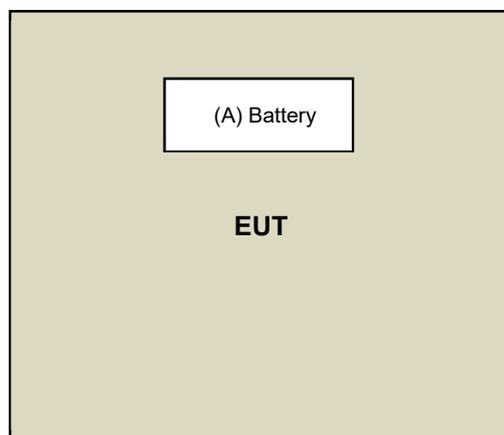
logi bolt 2M

### 3.6 Test Program Used and Operation Descriptions

Controlling software (RF Sample with Receiver [Number Lock]) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

Test Item	Operation Description
RF Output Power / Unwanted Emissions below 1 GHz / Unwanted Emissions above 1 GHz	BLE1M TX Modulated low duty cycle on channel 2402MHz BLE1M TX Modulated low duty cycle on channel 2440MHz BLE1M TX Modulated low duty cycle on channel 2480MHz BLE2M TX Modulated low duty cycle on channel 2404MHz BLE2M TX Modulated low duty cycle on channel 2440MHz BLE2M TX Modulated low duty cycle on channel 2478MHz

### 3.7 Connection Diagram of EUT and Peripheral Devices



### 3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Battery*1	TOSHIBA	AA	N/A	N/A	Provided by Lab

## 4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1 RF Output Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Fixed Attenuator Woken	00800A1K01A-20	00800A1K01A-20-02	2025/5/23	2026/5/22
Pulse Power Sensor Anritsu	MA2411B	1726434	2025/5/28	2026/5/27
RF Power Meter Anritsu	ML2495A	1529002	2025/6/3	2026/6/2

Notes:

1. The test was performed in Oven room 2.
2. Tested Date: 2025/7/1

### 4.2 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-361	2024/10/8	2025/10/7
Fix tool for Boresight antenna tower BV	FBA-01	FBA_SIP01	N/A	N/A
Fixed Attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	2025/2/8	2026/2/7
Loop Antenna TESEQ	HLA 6121	63620	2024/10/17	2025/10/16
MXE EMI Receiver Agilent	N9038A	MY50010156	2025/6/5	2026/6/4
Preamplifier EMCI	EMC330N	980852	2025/2/8	2026/2/7
	EMC001340	980142	2025/2/17	2026/2/16
RF Coaxial Cable PEWC	8D	001	2025/2/8	2026/2/7
		966-3-2	2025/2/8	2026/2/7
		966-3-3	2025/2/8	2026/2/7
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The test was performed in 966 Chamber No. 3.
2. Tested Date: 2025/6/23

### 4.3 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	N/A	N/A
Fix tool for Boresight antenna tower BV	FBA-01	FBA_SIP01	N/A	N/A
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-406	2024/11/10	2025/11/9
	BBHA 9170	9170-739	2024/11/10	2025/11/9
MXE EMI Receiver Agilent	N9038A	MY50010156	2025/6/5	2026/6/4
Preamplifier EMCI	EMC12630SE	980384	2025/1/14	2026/1/13
	EMC184045SE	980387	2024/8/8	2025/8/7
PXA Signal Analyzer Keysight	N9030B	MY57141948	2025/5/20	2026/5/19
RF Coaxial Cable EMCI	EMC102-KM-KM-1200	160924	2025/1/24	2026/1/23
	EMC102-KM-KM-4000	200214	2025/1/24	2026/1/23
	EMC104-SM-SM-1500	180504	2025/1/18	2026/1/17
	EMC104-SM-SM-2000	180601	2025/1/18	2026/1/17
	EMC104-SM-SM-6000	210201	2025/1/18	2026/1/17
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The test was performed in 966 Chamber No. 3.
2. Tested Date: 2025/6/20 ~ 2025/7/14

## 5 Limits of Test Items

### 5.1 RF Output Power

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)

### 5.2 Unwanted Emissions below 1 GHz

Radiated emissions up to 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

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

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

### 5.3 Unwanted Emissions above 1 GHz

Radiated emissions above 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
Above 960	500	3

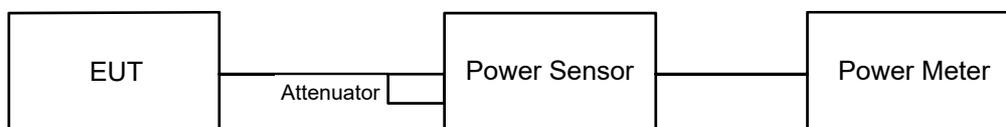
Notes:

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.

## 6 Test Arrangements

### 6.1 RF Output Power

#### 6.1.1 Test Setup



#### 6.1.2 Test Procedure

##### Peak Power:

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

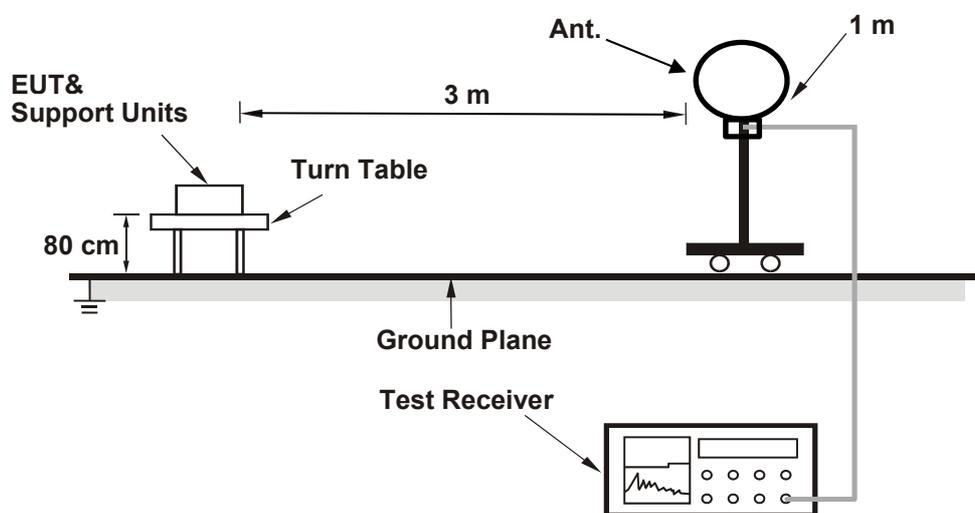
##### Average Power:

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

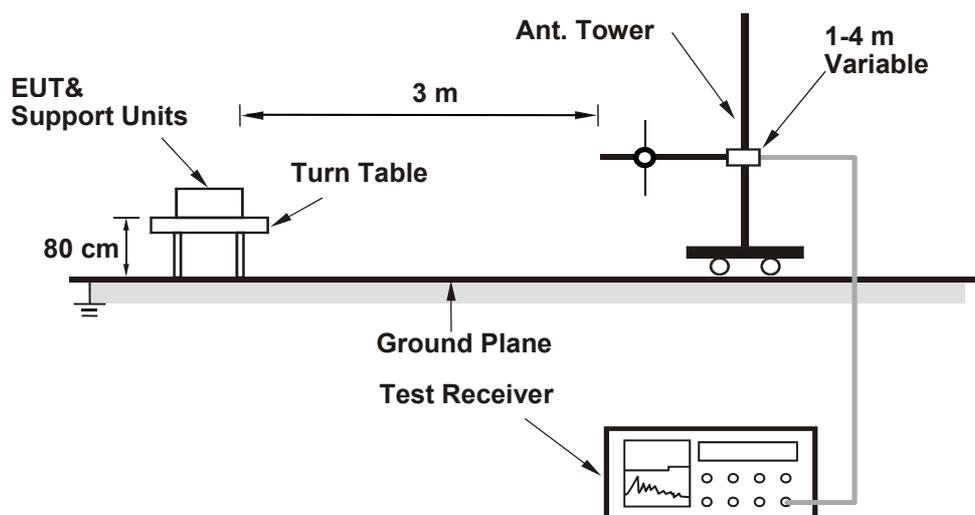
## 6.2 Unwanted Emissions below 1 GHz

### 6.2.1 Test Setup

#### For Radiated emission below 30 MHz



#### For Radiated emission above 30 MHz



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

## 6.2.2 Test Procedure

### 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 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. 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, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.

### For Radiated emission above 30 MHz

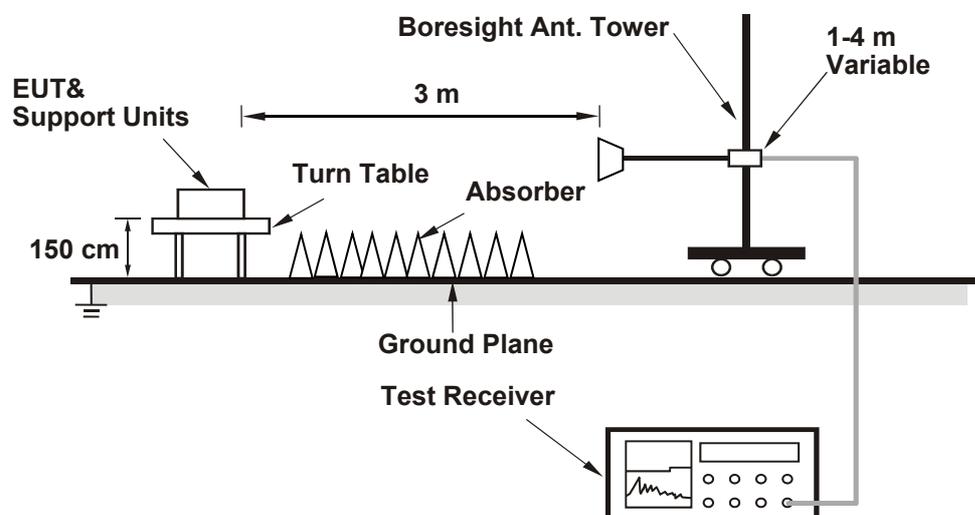
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the 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.

#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

## 6.3 Unwanted Emissions above 1 GHz

### 6.3.1 Test Setup



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

### 6.3.2 Test Procedure

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver/spectrum analyzer was set to peak and average detects 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.

#### Notes:

- 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 (AV) at frequency above 1 GHz.
- For fundamental and harmonic signal measurement, according to KDB 558074 D01 15.247 Meas Guidance v05r02 section 8.1(c)(3). The spectrum analyzer settings meet the requirements of 11.12.2.4 in ANSI C63.10 for making a Peak measurement, the average value = Peak value + duty cycle correction factor. The duty cycle measurement refers to FCC 47 CFR Part 15C section 15.35 (c). For duty cycle correction factor values, see the Test Signal Duty Cycle section in this report.
- All modes of operation were investigated and the worst-case emissions are reported.

## 7 Test Results of Test Item

### 7.1 RF Output Power

Input Power:	1.5 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Vanness Huang
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#### For Peak Power

##### BT-LE 1M

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	6.622	8.21	30	Pass
19	2440	6.714	8.27	30	Pass
39	2480	6.745	8.29	30	Pass

Note: The antenna gain is -0.1 dBi  $\leq$  6 dBi, so the output power limit shall not be reduced.

##### BT-LE 2M

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
1	2404	6.699	8.26	30	Pass
19	2440	6.73	8.28	30	Pass
38	2478	6.776	8.31	30	Pass

Note: The antenna gain is -0.1 dBi  $\leq$  6 dBi, so the output power limit shall not be reduced.

##### logi bolt 1M

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	6.427	8.08	30	Pass
19	2440	6.561	8.17	30	Pass
39	2480	6.653	8.23	30	Pass

Note: The antenna gain is -0.1 dBi  $\leq$  6 dBi, so the output power limit shall not be reduced.

##### logi bolt 2M

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
1	2404	6.531	8.15	30	Pass
19	2440	6.577	8.18	30	Pass
38	2478	6.683	8.25	30	Pass

Note: The antenna gain is -0.1 dBi  $\leq$  6 dBi, so the output power limit shall not be reduced.

**For Average Power**

**BT-LE 1M**

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	6.577	8.18
19	2440	6.668	8.24
39	2480	6.714	8.27

**BT-LE 2M**

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2404	6.653	8.23
19	2440	6.683	8.25
38	2478	6.73	8.28

**logi bolt 1M**

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	6.397	8.06
19	2440	6.516	8.14
39	2480	6.622	8.21

**logi bolt 2M**

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2404	6.501	8.13
19	2440	6.531	8.15
38	2478	6.637	8.22

## 7.2 Unwanted Emissions below 1 GHz

### BT-LE

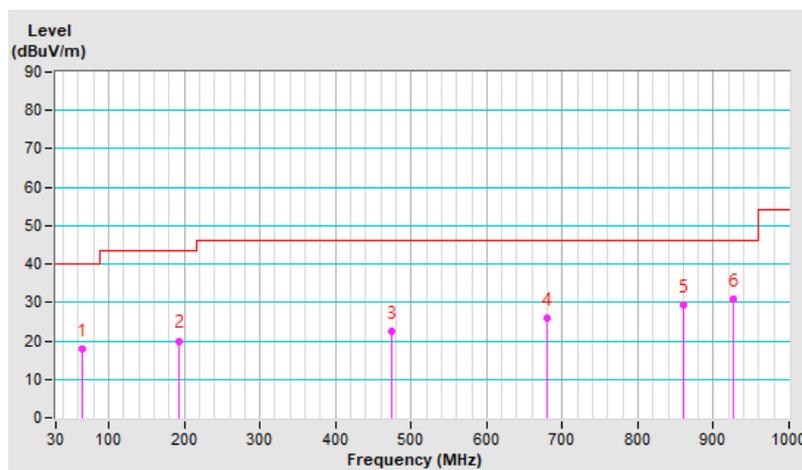
<b>RF Mode</b>	BT-LE 2M	<b>Channel</b>	CH 38 : 2478 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	QP: RB=120 kHz, DET=Quasi-Peak
<b>Input Power</b>	1.5 Vdc	<b>Environmental Conditions</b>	23 °C, 65% RH
<b>Tested By</b>	Vanness Huang		

#### 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	64.10	18.0 QP	40.0	-22.0	1.00 H	56	32.0	-14.0
2	193.32	20.0 QP	43.5	-23.5	1.00 H	120	35.5	-15.5
3	473.34	22.5 QP	46.0	-23.5	1.00 H	128	30.1	-7.6
4	679.15	25.8 QP	46.0	-20.2	2.00 H	212	29.1	-3.3
5	860.42	29.4 QP	46.0	-16.6	2.00 H	265	29.7	-0.3
6	926.50	30.7 QP	46.0	-15.3	1.00 H	128	30.1	0.6

#### 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 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

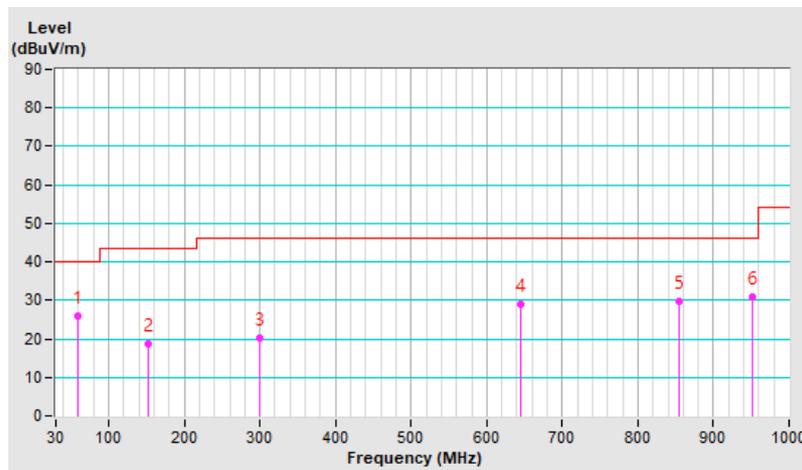


<b>RF Mode</b>	BT-LE 2M	<b>Channel</b>	CH 38 : 2478 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	QP: RB=120 kHz, DET=Quasi-Peak
<b>Input Power</b>	1.5 Vdc	<b>Environmental Conditions</b>	23 °C, 65% RH
<b>Tested By</b>	Vanness Huang		

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	58.35	25.9 QP	40.0	-14.1	2.00 V	256	39.1	-13.2
2	152.07	18.6 QP	43.5	-24.9	1.00 V	127	31.2	-12.6
3	300.27	20.1 QP	46.0	-25.9	1.00 V	223	32.1	-12.0
4	644.37	29.1 QP	46.0	-16.9	2.00 V	137	33.0	-3.9
5	853.65	29.8 QP	46.0	-16.2	2.00 V	98	30.4	-0.6
6	950.75	30.7 QP	46.0	-15.3	1.00 V	233	29.8	0.9

**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 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



**logi bolt**

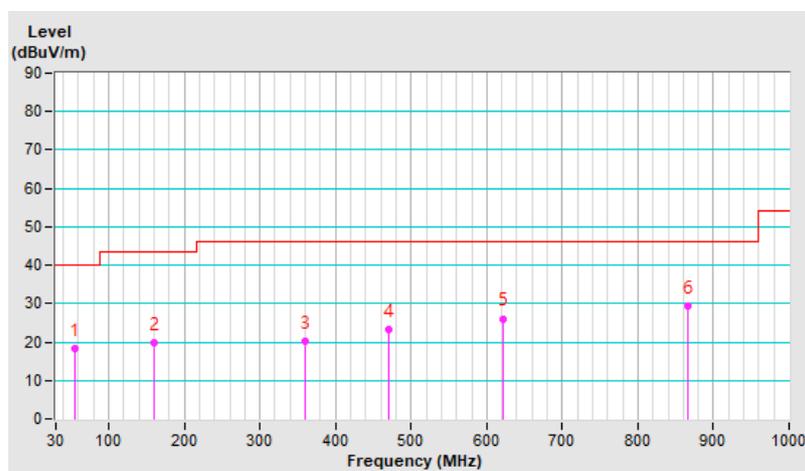
<b>RF Mode</b>	logi bolt 1M	<b>Channel</b>	CH 39 : 2480 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	QP: RB=120 kHz, DET=Quasi-Peak
<b>Input Power</b>	1.5 Vdc	<b>Environmental Conditions</b>	23 °C, 65% RH
<b>Tested By</b>	Vanness Huang		

**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	55.20	18.2 QP	40.0	-21.8	1.00 H	28	31.1	-12.9
2	160.83	19.9 QP	43.5	-23.6	2.00 H	45	32.7	-12.8
3	359.63	20.1 QP	46.0	-25.9	1.00 H	57	30.9	-10.8
4	469.48	23.1 QP	46.0	-22.9	1.00 H	102	30.7	-7.6
5	621.77	26.1 QP	46.0	-19.9	1.00 H	97	30.2	-4.1
6	865.27	29.4 QP	46.0	-16.6	1.00 H	78	29.9	-0.5

**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 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

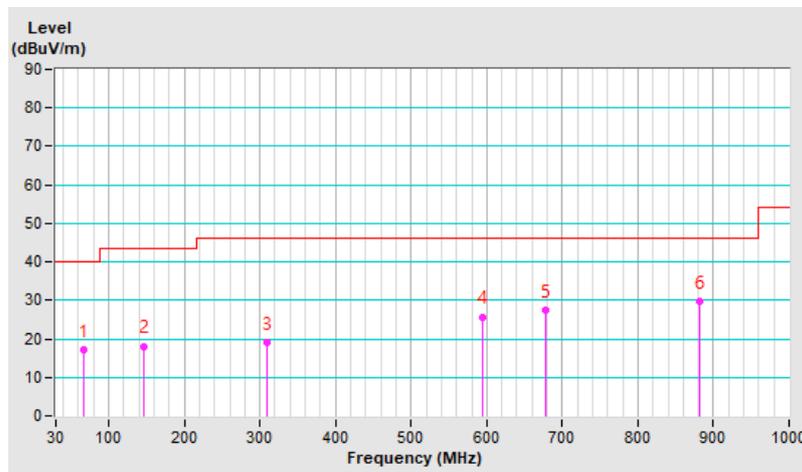


<b>RF Mode</b>	logi bolt 1M	<b>Channel</b>	CH 39 : 2480 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	QP: RB=120 kHz, DET=Quasi-Peak
<b>Input Power</b>	1.5 Vdc	<b>Environmental Conditions</b>	23 °C, 65% RH
<b>Tested By</b>	Vanness Huang		

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	66.96	17.1 QP	40.0	-22.9	2.00 V	201	31.5	-14.4
2	147.10	18.1 QP	43.5	-25.4	1.00 V	27	30.5	-12.4
3	309.68	19.1 QP	46.0	-26.9	1.00 V	98	30.7	-11.6
4	593.89	25.7 QP	46.0	-20.3	1.00 V	88	30.8	-5.1
5	678.42	27.4 QP	46.0	-18.6	1.00 V	97	30.7	-3.3
6	880.93	29.6 QP	46.0	-16.4	1.00 V	58	30.0	-0.4

**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 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



### 7.3 Unwanted Emissions above 1 GHz

#### BT-LE

<b>RF Mode</b>	BT-LE 2M	<b>Channel</b>	CH 38 : 2478 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
<b>Input Power</b>	1.5 Vdc	<b>Environmental Conditions</b>	25 °C, 75% RH
<b>Tested By</b>	Vanness Huang		

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	*2478.00	101.5 PK			1.26 H	67	104.0	-2.5
2	*2478.00	69.9 AV			1.26 H	67	72.4	-2.5
3	2483.50	57.0 PK	74.0	-17.0	1.26 H	67	59.6	-2.6
<b>4</b>	<b>2483.50</b>	<b>46.1 AV</b>	<b>54.0</b>	<b>-7.9</b>	<b>1.26 H</b>	<b>67</b>	<b>48.7</b>	<b>-2.6</b>
5	4956.00	51.5 PK	74.0	-22.5	1.22 H	288	49.6	1.9
6	4956.00	19.9 AV	54.0	-34.1	1.22 H	288	18.0	1.9
7	7434.00	55.2 PK	74.0	-18.8	1.32 H	334	47.8	7.4
8	7434.00	23.6 AV	54.0	-30.4	1.32 H	334	16.2	7.4

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	*2478.00	96.7 PK			3.81 V	247	99.2	-2.5
2	*2478.00	65.1 AV			3.81 V	247	67.6	-2.5
3	2483.50	56.0 PK	74.0	-18.0	3.81 V	247	58.6	-2.6
4	2483.50	45.7 AV	54.0	-8.3	3.81 V	247	48.3	-2.6
5	4956.00	49.4 PK	74.0	-24.6	1.13 V	360	47.5	1.9
6	4956.00	17.8 AV	54.0	-36.2	1.13 V	360	15.9	1.9
7	7434.00	54.3 PK	74.0	-19.7	2.22 V	300	46.9	7.4
8	7434.00	22.7 AV	54.0	-31.3	2.22 V	300	15.3	7.4

#### Remarks:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.
- The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:  
 $20 \log(\text{Duty cycle}) = 20 \log(0.186 \text{ ms} / 7.041 \text{ ms}) = -31.6 \text{ dB}$

**logi bolt**

<b>RF Mode</b>	logi bolt 1M	<b>Channel</b>	CH 39 : 2480 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
<b>Input Power</b>	1.5 Vdc	<b>Environmental Conditions</b>	25 °C, 75% RH
<b>Tested By</b>	Vanness Huang		

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	*2480.00	99.2 PK			1.18 H	76	101.7	-2.5
2	*2480.00	73.2 AV			1.18 H	76	75.7	-2.5
3	2483.50	56.3 PK	74.0	-17.7	1.18 H	76	58.9	-2.6
4	2483.50	45.7 AV	54.0	-8.3	1.18 H	76	48.3	-2.6
5	4960.00	51.2 PK	74.0	-22.8	1.18 H	278	49.3	1.9
6	4960.00	25.2 AV	54.0	-28.8	1.18 H	278	23.3	1.9
7	7440.00	55.2 PK	74.0	-18.8	1.31 H	318	47.8	7.4
8	7440.00	29.2 AV	54.0	-24.8	1.31 H	318	21.8	7.4

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	*2480.00	95.7 PK			3.68 V	246	98.2	-2.5
2	*2480.00	69.7 AV			3.68 V	246	72.2	-2.5
3	2483.50	56.1 PK	74.0	-17.9	3.68 V	246	58.7	-2.6
4	2483.50	45.3 AV	54.0	-8.7	3.68 V	246	47.9	-2.6
5	4960.00	49.4 PK	74.0	-24.6	1.13 V	360	47.5	1.9
6	4960.00	23.4 AV	54.0	-30.6	1.13 V	360	21.5	1.9
7	7440.00	54.3 PK	74.0	-19.7	2.19 V	307	46.9	7.4
8	7440.00	28.3 AV	54.0	-25.7	2.19 V	307	20.9	7.4

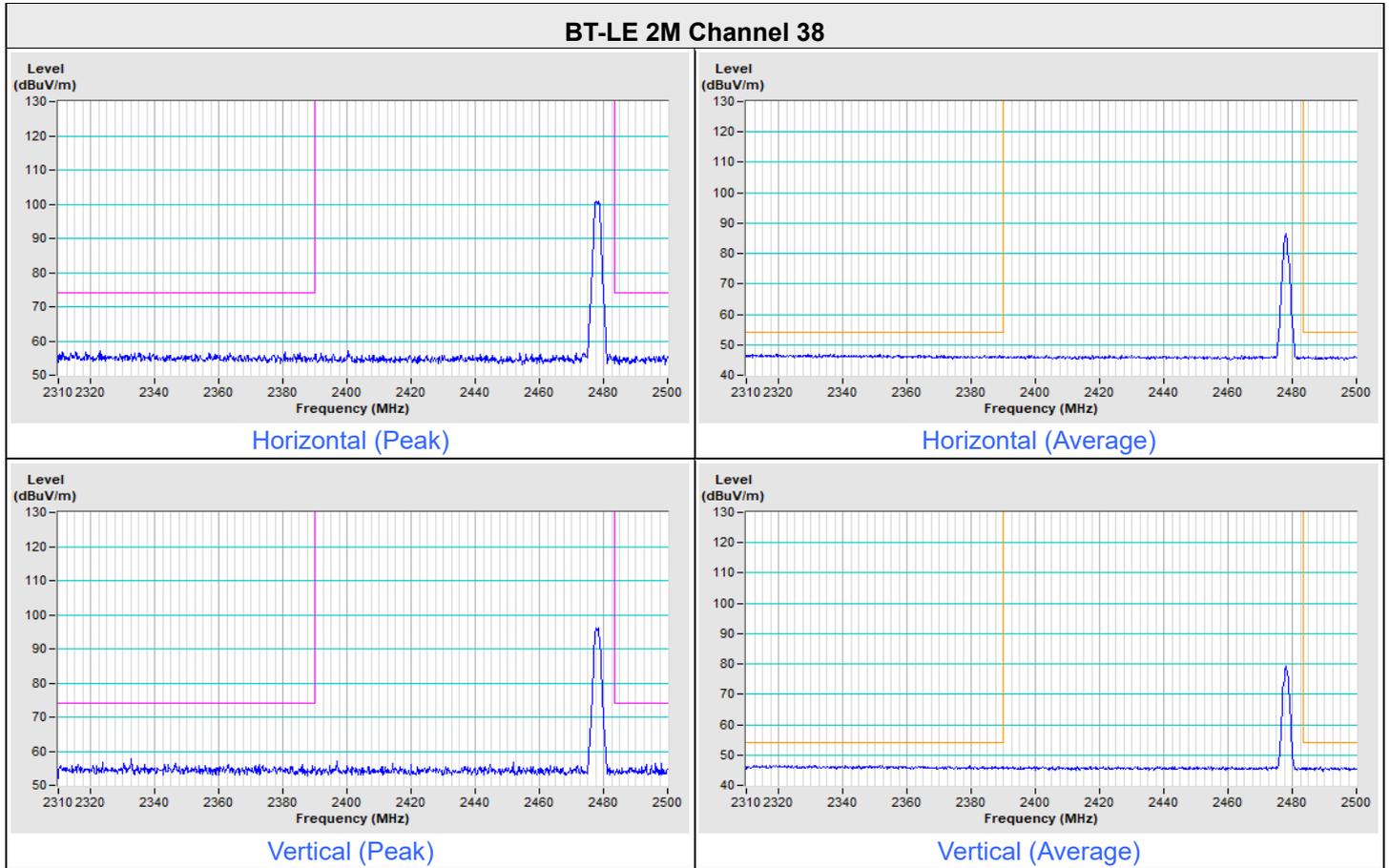
**Remarks:**

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.
- The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:  
 $20 \log(\text{Duty cycle}) = 20 \log(0.355 \text{ ms} / 7.053 \text{ ms}) = -26.0 \text{ dB}$

### Plot of Band Edge

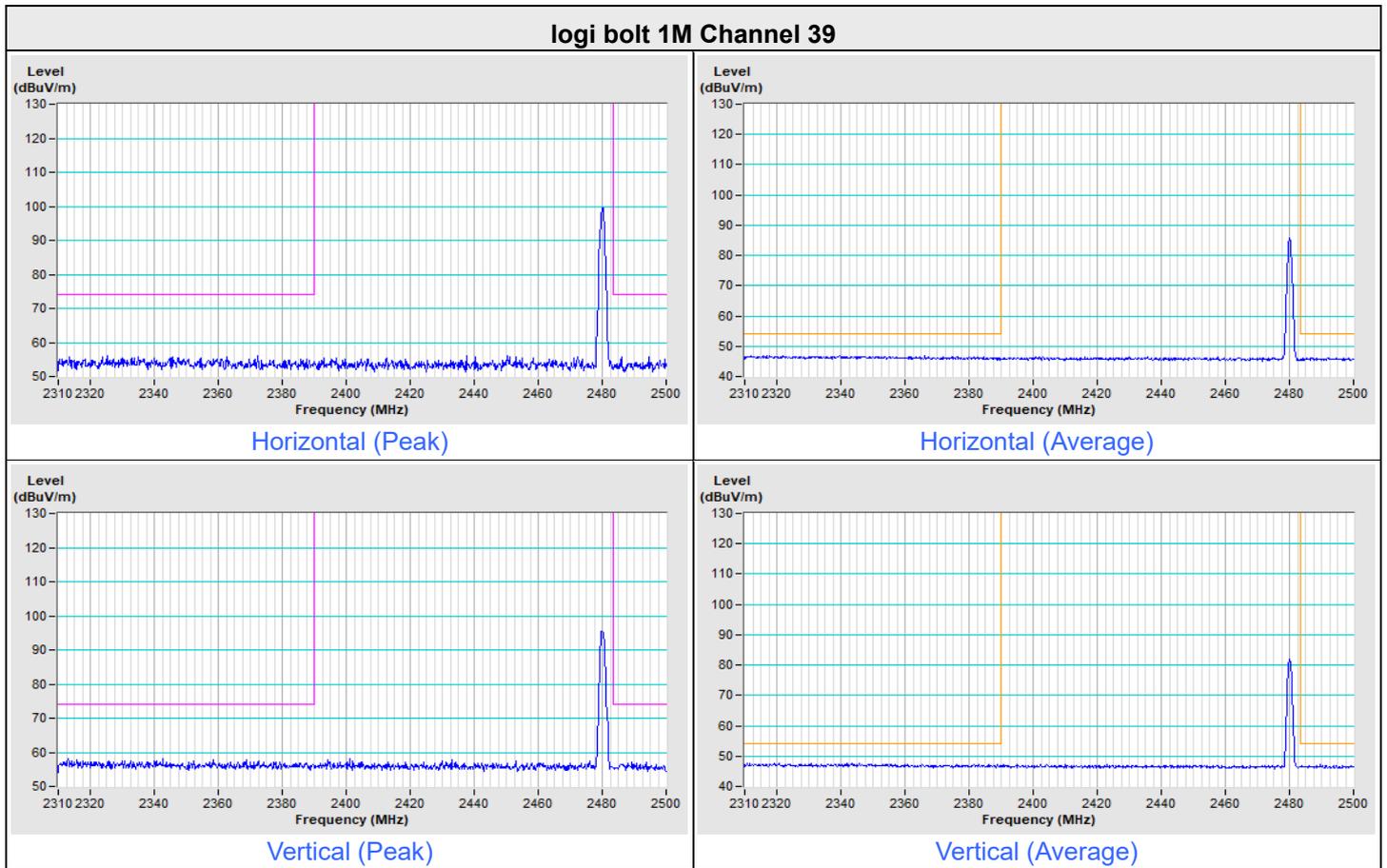
#### BT-LE

Frequency Range	2.31 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
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logi bolt

Frequency Range	2.31 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
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## 8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

## 9 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:** <http://ee.bureauveritas.com.tw>

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

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