

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)

Report No.: RFBDKG-WTW-P22090086

FCC ID: JNZYR0092

Product: Wireless Keyboard

Brand: Logitech

Model No.: YR0092

Received Date: 2022/12/21

Test Date: 2022/12/25 ~ 2023/1/5

Issued Date: 2023/1/30

Applicant: Logitech Far East Ltd.

Address: 7700 Gateway Boulevard Newark California United States

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: _____

May Chen / Manager

, Date: _____

2023/1/30

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Prepared by : Luna Yu / Specialist



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Release Control Record

Issue No.	Description	Date Issued
RFBDKG-WTW-P22090086	Original release.	2023/1/30

1 Certificate

Product: Wireless Keyboard

Brand: Logitech

Test Model: YR0092

Sample Status: Engineering sample

Applicant: Logitech Far East Ltd.

Test Date: 2022/12/25 ~ 2023/1/5

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)

Measurement ANSI C63.10-2013

procedure: 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	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement of limit.
15.247(d)	Conducted Out of Band Emissions	Pass	Meet the requirement of limit.
15.207	AC Power Conducted Emissions	NA	Power supply is 3 Vdc from battery.
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -15.5 dB at 456.11 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -8.7 dB at 2390.00 MHz
15.203	Antenna Requirement	Pass	No antenna connector is used.

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	Specification	Expanded Uncertainty (k=2) (±)
Conducted Out of Band Emissions	9 kHz ~ 40 GHz	2.5 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 Keyboard
Brand	Logitech
Test Model	YR0092
Status of EUT	Engineering sample
Power Supply Rating	3 Vdc from batteries
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	Up to 2 Mbps (Note 2)
Operating Frequency	2.402 GHz ~ 2.480 GHz (Note 2)
Number of Channel	40 (Note 2)
Output Power	BT-LE function: BT-LE 1M: 2.655 mW (4.24 dBm) BT-LE 2M: 2.636 mW (4.21 dBm) logi bolt function: logi bolt-1M: 2.649 mW (4.23 dBm) logi bolt-2M: 2.63 mW (4.20 dBm)

Note:

1. The EUT may have a lot of colors for marketing requirement.
2. 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.
3. This device has BT-LE and logi bolt functions. logi bolt is the same technology as BT-LE then enhancement secure protocol.
4. 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
3.937	2.4~2.4835	Printed monopole 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:	1. 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 / Power Spectral Density	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
6 dB Bandwidth / Conducted Out of Band Emissions	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 1M	0	GFSK	1Mb/s
	logi bolt-1M	0	GFSK	1Mb/s
Unwanted Emissions above 1 GHz	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

3.5 Duty Cycle of Test Signal

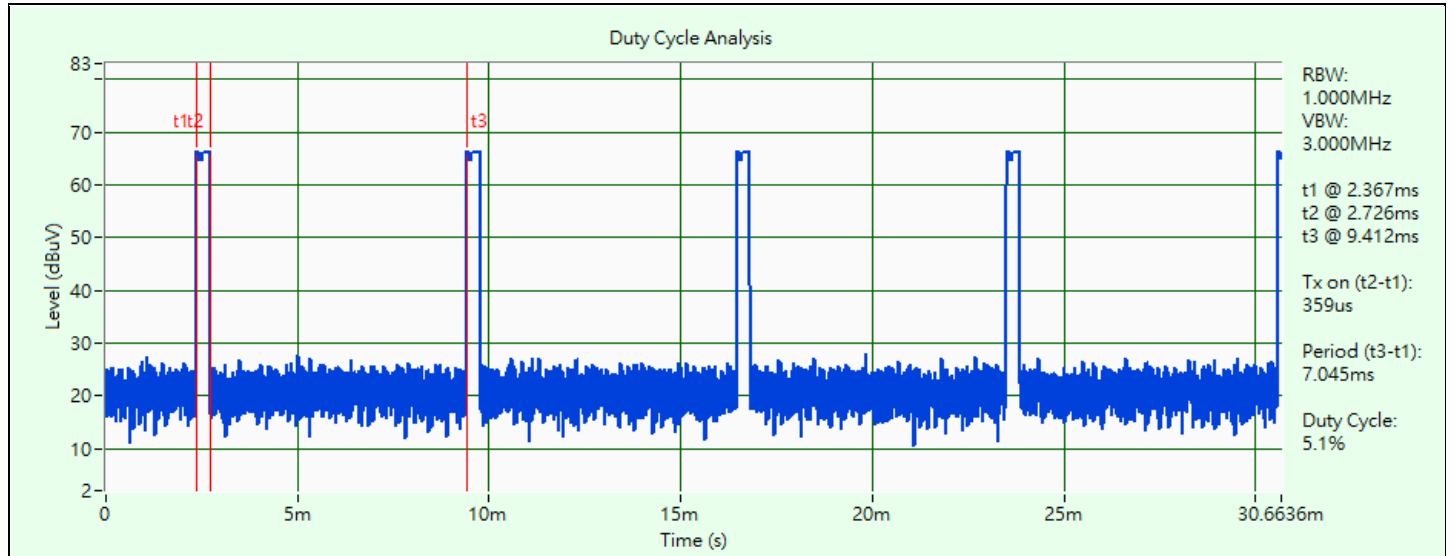
Fundamental frequency:

BT-LE 1M: Duty cycle = $0.359 \text{ ms} / 7.045 \text{ ms} \times 100\% = 5.1\%$, duty factor = $10 * \log (1/\text{Duty cycle}) = 12.93 \text{ dB}$

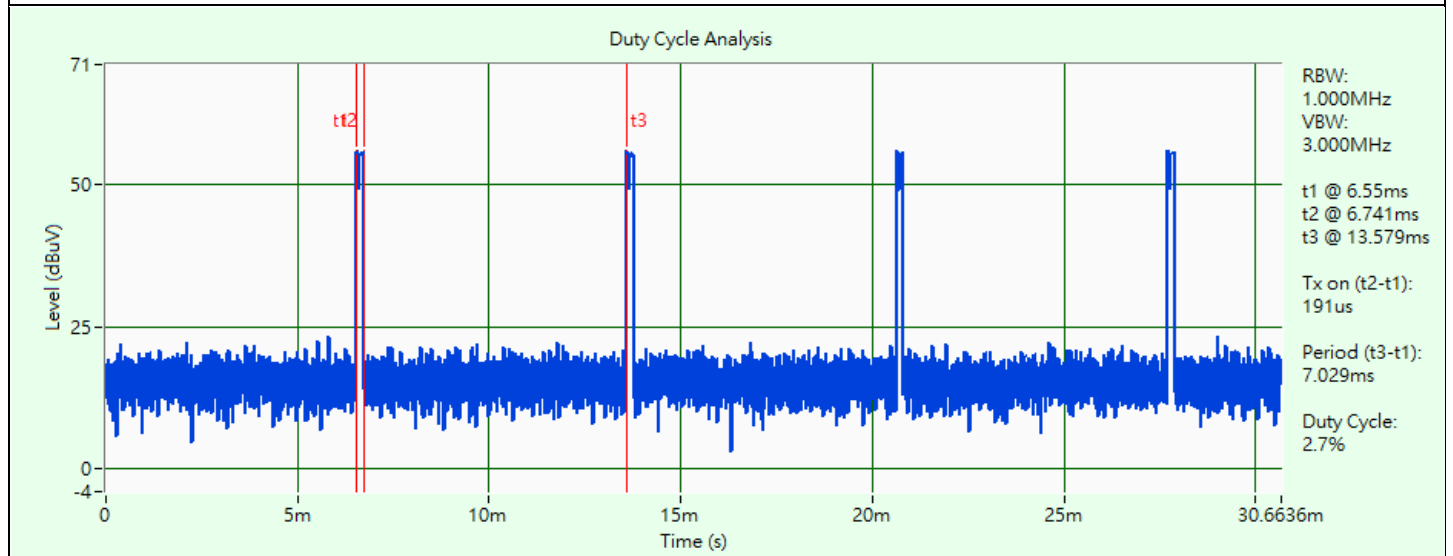
BT-LE 2M: Duty cycle = $0.191 \text{ ms} / 7.029 \text{ ms} \times 100\% = 2.7\%$, duty factor = $10 * \log (1/\text{Duty cycle}) = 15.66 \text{ dB}$

logi bolt-1M: Duty cycle = $0.358 \text{ ms} / 7.068 \text{ ms} \times 100\% = 5.1\%$, duty factor = $10 * \log (1/\text{Duty cycle}) = 12.95 \text{ dB}$

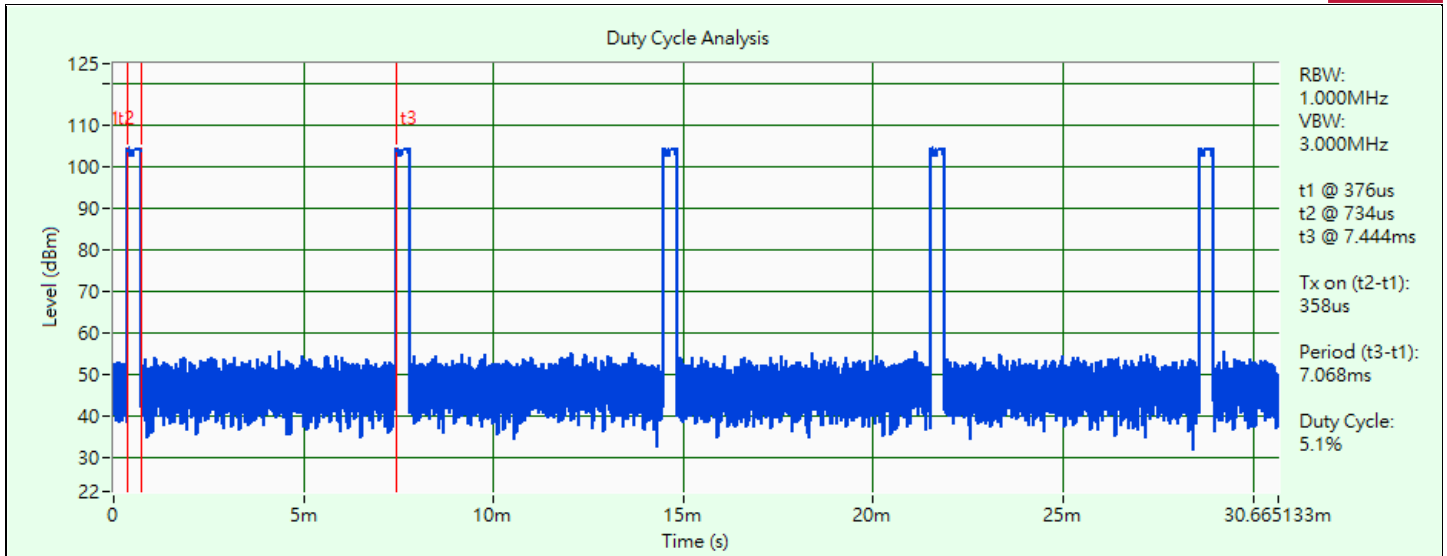
logi bolt-2M: Duty cycle = $0.187 \text{ ms} / 7.067 \text{ ms} \times 100\% = 2.6\%$, duty factor = $10 * \log (1/\text{Duty cycle}) = 15.77 \text{ dB}$



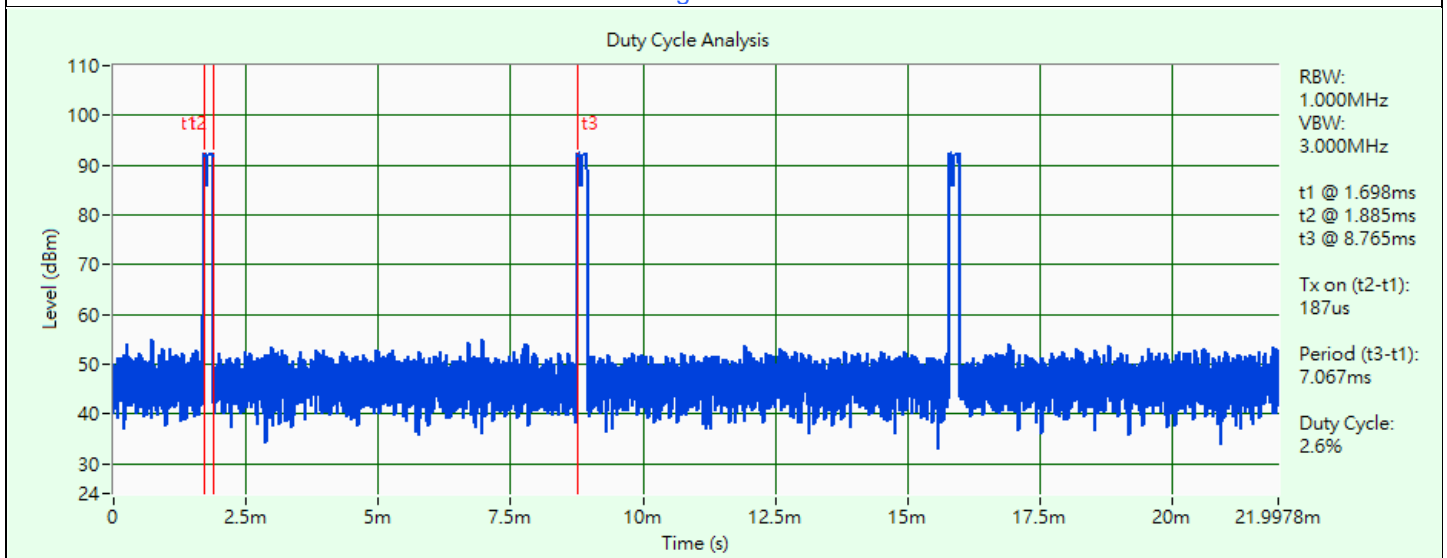
BT-LE 1M



BT-LE 2M

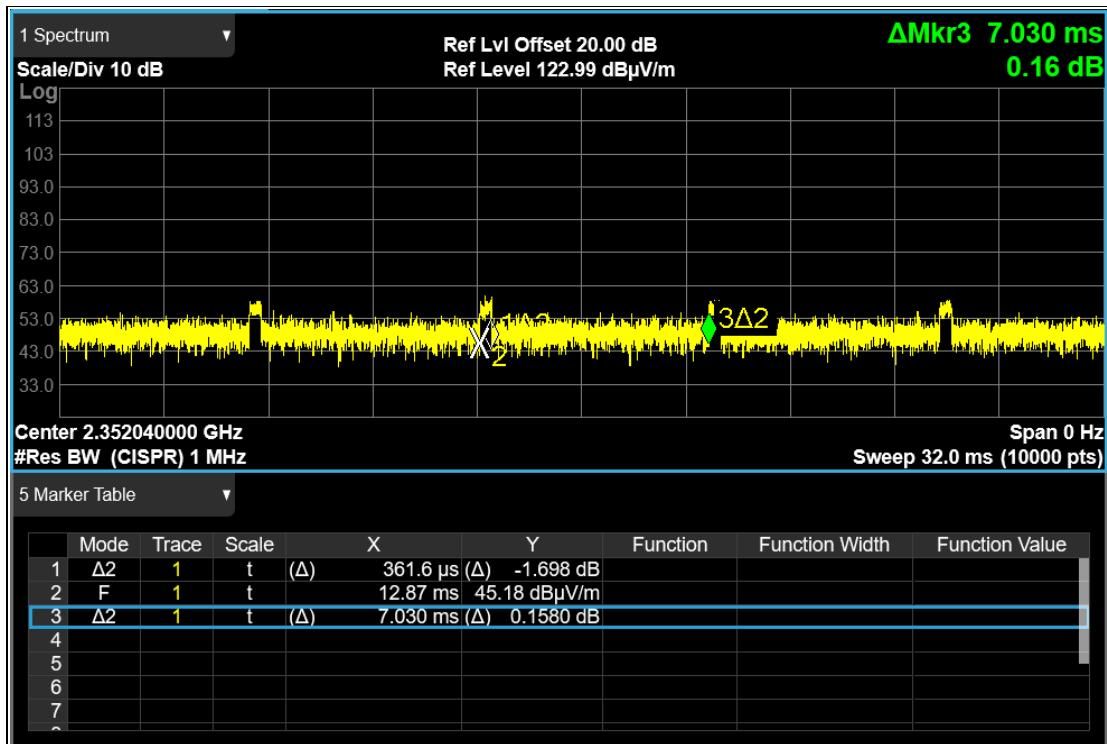


logi bolt-1M

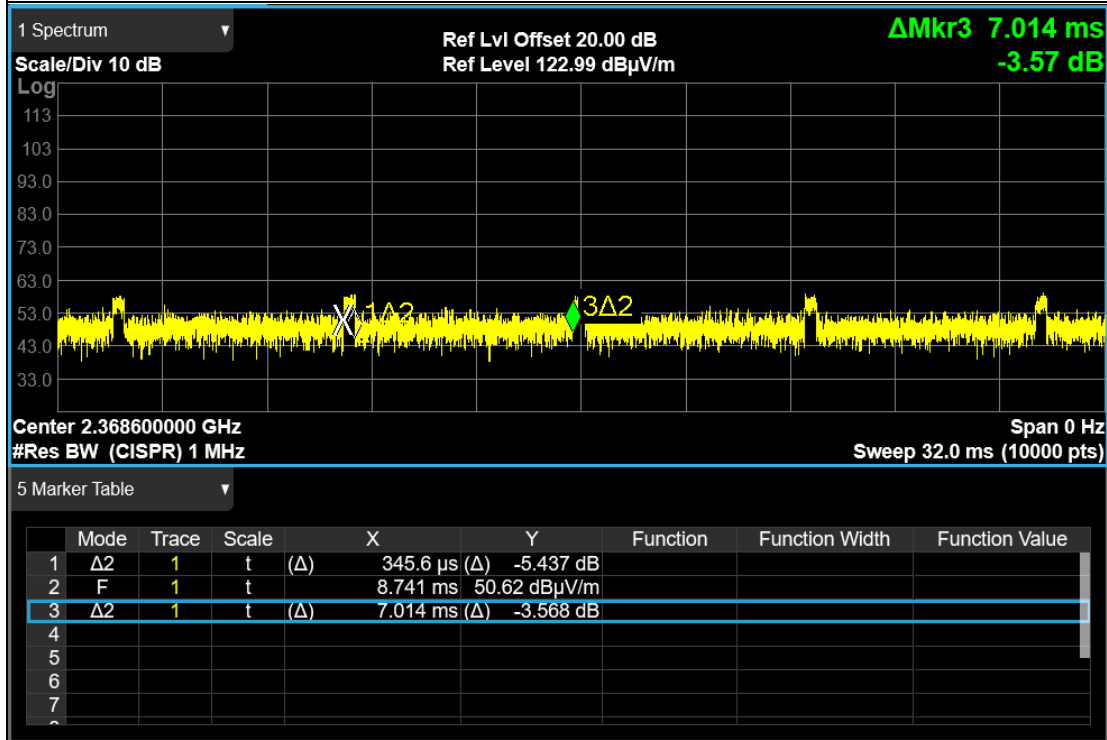


logi bolt-2M

Unwanted frequency:



BT-LE 1M / 2352.04 MHz



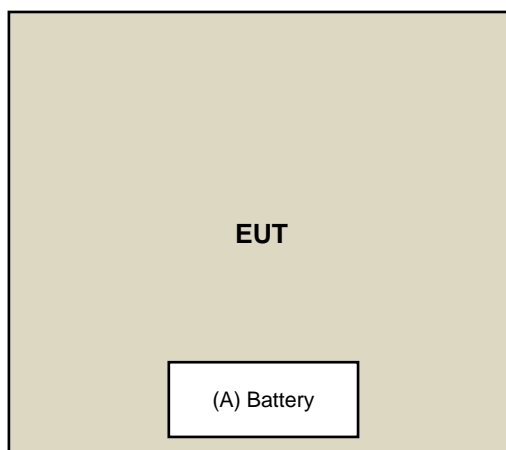
BT-LE 1M / 2368.6 MHz

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.

Operation Description	
◆	BLE1M TX Modulated on channel 2402MHz
◆	BLE1M TX Modulated on channel 2440MHz
◆	BLE1M TX Modulated on channel 2480MHz
◆	BLE2M TX Modulated on channel 2404MHz
◆	BLE2M TX Modulated on channel 2440MHz
◆	BLE2M TX Modulated 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*2	Energizer	AAA	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
Power Meter Anritsu	ML2495A	1529002	2022/6/22	2023/6/21
Pulse Power Sensor Anritsu	MA2411B	1726434	2022/6/22	2023/6/21
Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	2022/4/5	2023/4/4
Software	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room 2.
2. Tested Date: 2022/12/25

4.2 Power Spectral Density

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	2022/4/5	2023/4/4
Software	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Spectrum Analyzer Keysight	N9020B	MY60112409	2022/3/11	2023/3/10

Notes:

1. The test was performed in Oven room 2.
2. Tested Date: 2022/12/25

4.3 6 dB Bandwidth

Refer to section 4.2 to get information of the instruments.

4.4 Conducted Out of Band Emissions

Refer to section 4.2 to get information of the instruments.

4.5 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
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	2022/9/14	2023/9/13
LOOP ANTENNA Electro-Metrics	EM-6879	264	2022/3/18	2023/3/17
Pre_Amplifier Agilent	8447D	2944A10636	2022/3/19	2023/3/18
Pre_Amplifier Mini-Circuits	ZFL-1000VH2	QA0838008	2022/10/4	2023/10/3
RF Coaxial Cable COMMATE/PEWC	8D	966-3-2	2022/2/26	2023/2/25
		966-3-3	2022/2/26	2023/2/25
		966-4-1	2022/3/8	2023/3/7
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-001	2022/1/6	2023/1/5
		LOOPCAB-002	2022/12/19	2023/12/18
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A
Spectrum Analyzer KEYSIGHT	N9030B	MY57142938	2022/4/26	2023/4/25
Test Receiver KEYSIGHT	N9038A	MY59050100	2022/6/20	2023/6/19
Trilog Broadband Antenna Schwarzbeck	VULB 9168	9168-361	2022/10/21	2023/10/20

Notes:

1. The test was performed in 966 Chamber No. 3.
2. Tested Date: 2023/1/5

4.6 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 9170	9170-739	2022/11/13	2023/11/12
	BBHA9120-D	9120D-406	2022/11/13	2023/11/12
Pre_Amplifier EMCI	EMC12630SE	980384	2022/12/28	2023/12/27
	EMC184045SE	980387	2022/12/28	2023/12/27
RF Cable EMCI	EMC104-SM-SM-6000	210201	2022/5/10	2023/5/9
RF Cable-Frequency range: 1- 40GHz EMCI	EMC102-KM-KM-1200	160924	2022/1/10	2023/1/9
RF Coaxial Cable EMCI	EMC-KM-KM-4000	200214	2022/3/8	2023/3/7
	EMC104-SM-SM-1500	180504	2022/4/25	2023/4/24
	EMC104-SM-SM-2000	180601	2022/6/6	2023/6/5
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A
Spectrum Analyzer KEYSIGHT	N9030B	MY57142938	2022/4/26	2023/4/25
Test Receiver KEYSIGHT	N9038A	MY59050100	2022/6/20	2023/6/19

Notes:

1. The test was performed in 966 Chamber No. 3.
2. Tested Date: 2023/1/3 ~ 2023/1/5

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 Power Spectral Density

The Maximum of Power Spectral Density Measurement is 8 dBm in any 3 kHz.

5.3 6 dB Bandwidth

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

5.4 Conducted Out of Band Emissions

Below 20 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

5.5 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).

5.6 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

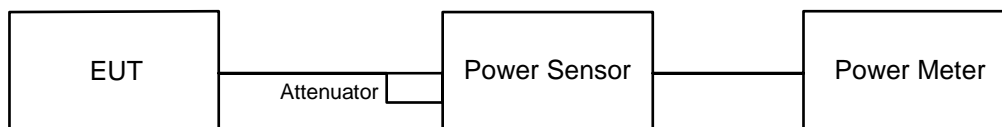
Notes:

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:

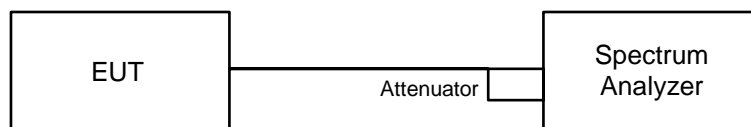
A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

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 Power Spectral Density

6.2.1 Test Setup



6.2.2 Test Procedure

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to: 3 kHz.
- d. Set the VBW $\geq 3 \times$ RBW.
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. Use the peak marker function to determine the maximum amplitude level within the RBW.

6.3 6 dB Bandwidth

6.3.1 Test Setup

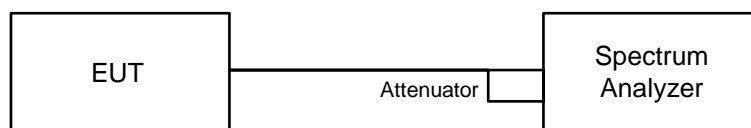


6.3.2 Test Procedure

- Set resolution bandwidth (RBW) = 100 kHz.
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.4 Conducted Out of Band Emissions

6.4.1 Test Setup



6.4.2 Test Procedure

MEASUREMENT PROCEDURE REF

- Set the RBW = 100 kHz.
- Set the VBW ≥ 300 kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

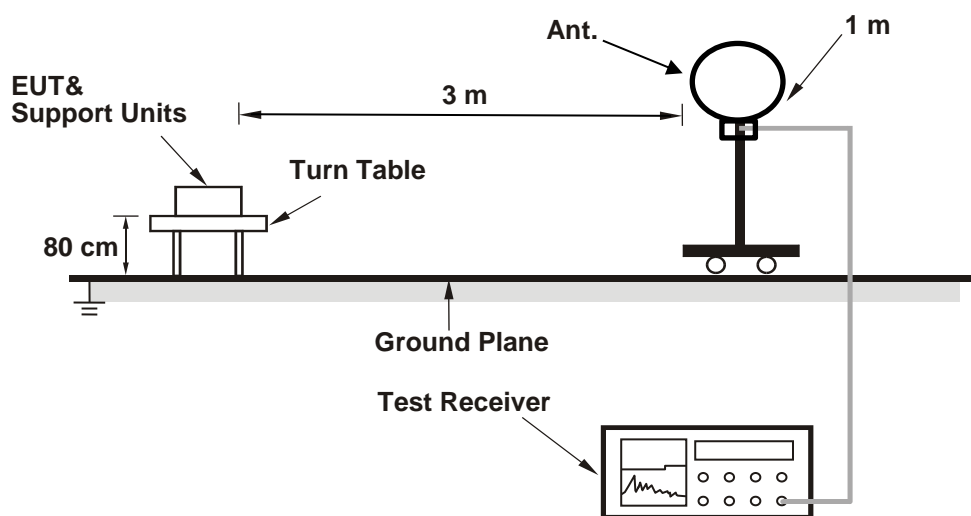
MEASUREMENT PROCEDURE OOB

- Set RBW = 100 kHz.
- Set VBW ≥ 300 kHz.
- Detector = peak.
- Sweep = auto couple.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

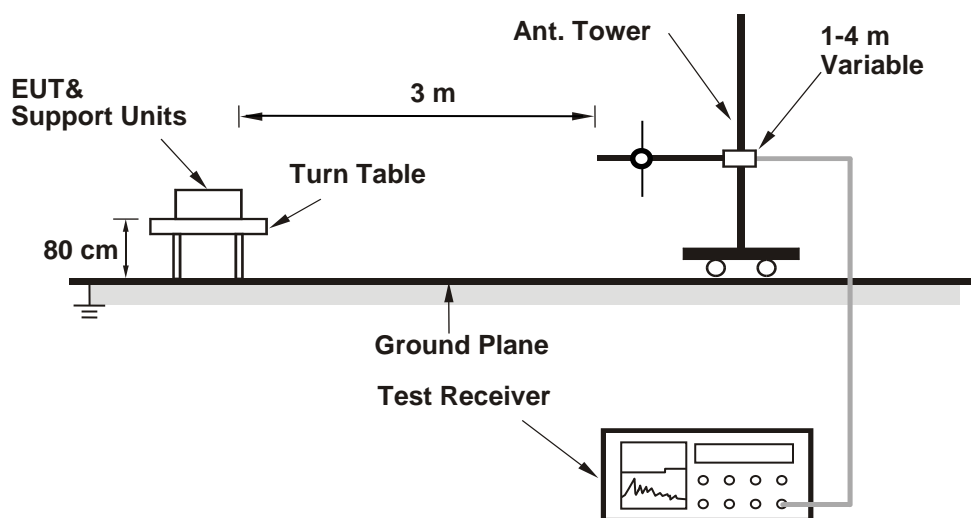
6.5 Unwanted Emissions below 1 GHz

6.5.1 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).

6.5.2 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

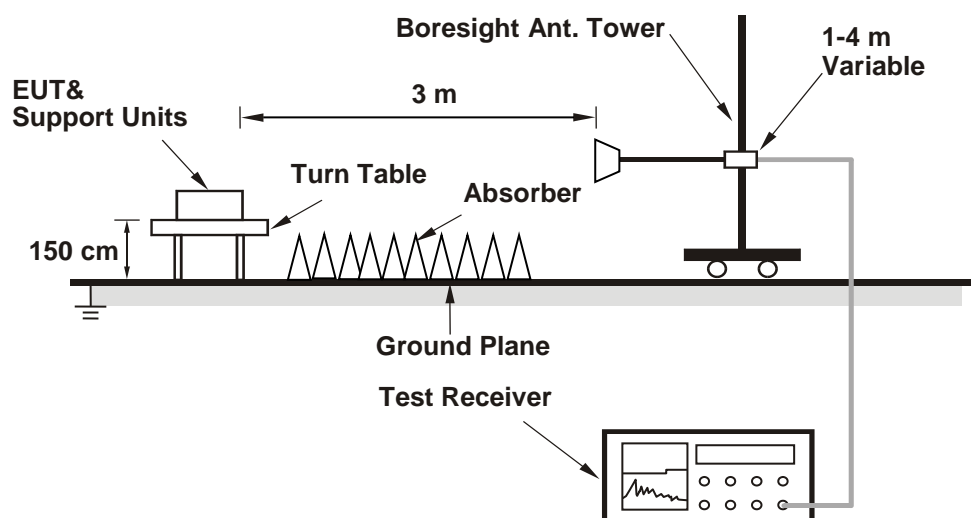
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the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

6.6 Unwanted Emissions above 1 GHz

6.6.1 Test Setup



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

6.6.2 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 system 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.
- According to ANSI C63.10 section 6.6.4 and 4.1.4.2.2. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor. 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:	3 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Katina Lu
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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	2.655	4.24	30	Pass
19	2440	2.649	4.23	30	Pass
39	2480	2.636	4.21	30	Pass

Note: The antenna gain is 3.937 dBi < 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	2.636	4.21	30	Pass
19	2440	2.636	4.21	30	Pass
38	2478	2.624	4.19	30	Pass

Note: The antenna gain is 3.937 dBi < 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	2.649	4.23	30	Pass
19	2440	2.642	4.22	30	Pass
39	2480	2.63	4.20	30	Pass

Note: The antenna gain is 3.937 dBi < 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	2.63	4.20	30	Pass
19	2440	2.63	4.20	30	Pass
38	2478	2.618	4.18	30	Pass

Note: The antenna gain is 3.937 dBi < 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	2.588	4.13
19	2440	2.582	4.12
39	2480	2.57	4.10

BT-LE 2M

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2404	2.57	4.10
19	2440	2.57	4.10
38	2478	2.559	4.08

logi bolt-1M

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	2.582	4.12
19	2440	2.576	4.11
39	2480	2.564	4.09

logi bolt-2M

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2404	2.564	4.09
19	2440	2.564	4.09
38	2478	2.553	4.07

7.2 Power Spectral Density

Input Power:	3 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Katina Lu
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BT-LE 1M

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
0	2402	0.58	8	Pass
19	2440	0.80	8	Pass
39	2480	0.71	8	Pass

Note: The antenna gain is 3.937 dBi < 6 dBi, so the power density limit shall not be reduced.

BT-LE 2M

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
1	2404	-3.80	8	Pass
19	2440	-3.67	8	Pass
38	2478	-3.49	8	Pass

Note: The antenna gain is 3.937 dBi < 6 dBi, so the power density limit shall not be reduced.

logi bolt-1M

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
0	2402	0.58	8	Pass
19	2440	0.50	8	Pass
39	2480	0.68	8	Pass

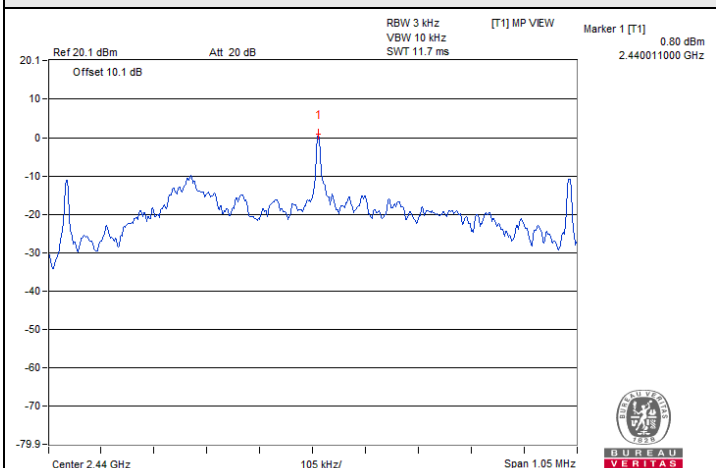
Note: The antenna gain is 3.937 dBi < 6 dBi, so the power density limit shall not be reduced.

logi bolt-2M

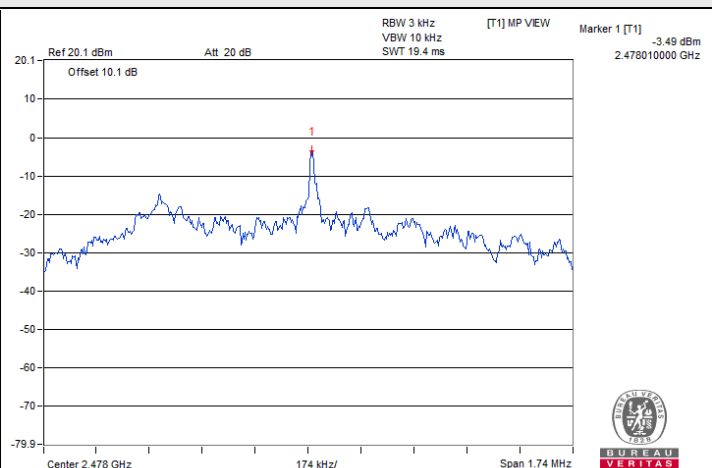
Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
1	2404	-4.05	8	Pass
19	2440	-3.78	8	Pass
38	2478	-3.12	8	Pass

Note: The antenna gain is 3.937 dBi < 6 dBi, so the power density limit shall not be reduced.

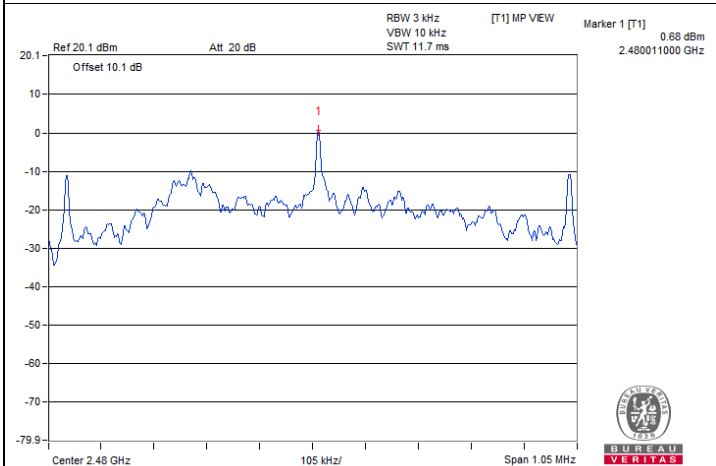
Spectrum Plot of Maximum Value



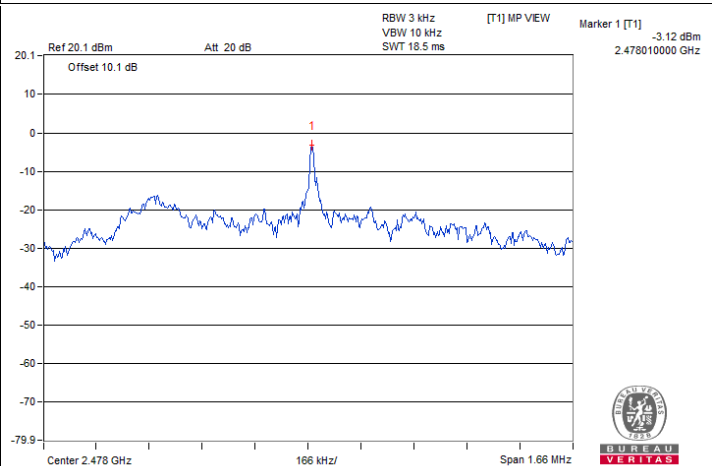
BT-LE 1M : CH 19



BT-LE 2M : CH 38



logi bolt-1M : CH 39



logi bolt-2M : CH 38

7.3 6 dB Bandwidth

Input Power:	3 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Katina Lu
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BT-LE 1M

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
0	2402	0.69	0.5	Pass
19	2440	0.7	0.5	Pass
39	2480	0.71	0.5	Pass

BT-LE 2M

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	2404	1.15	0.5	Pass
19	2440	1.16	0.5	Pass
38	2478	1.16	0.5	Pass

logi bolt-1M

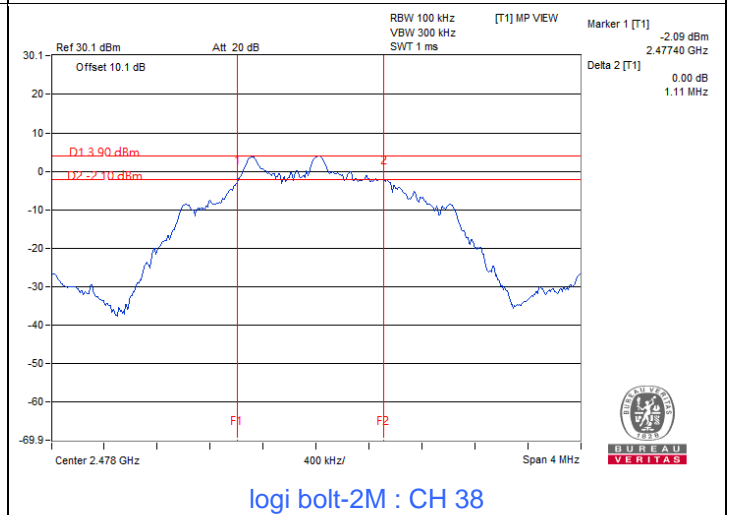
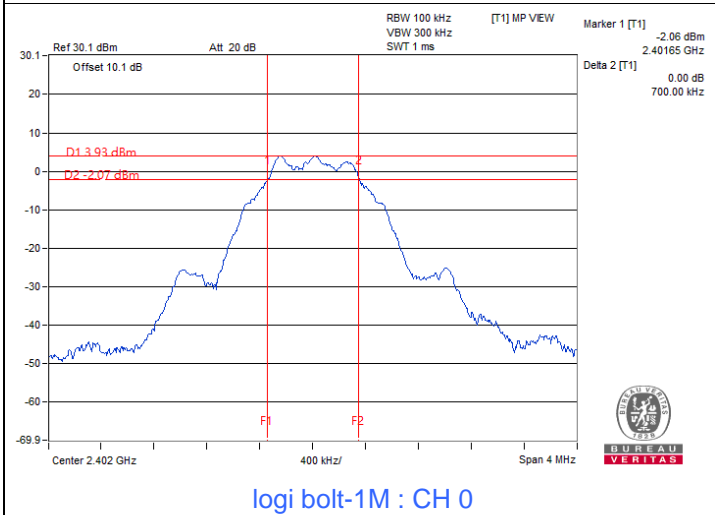
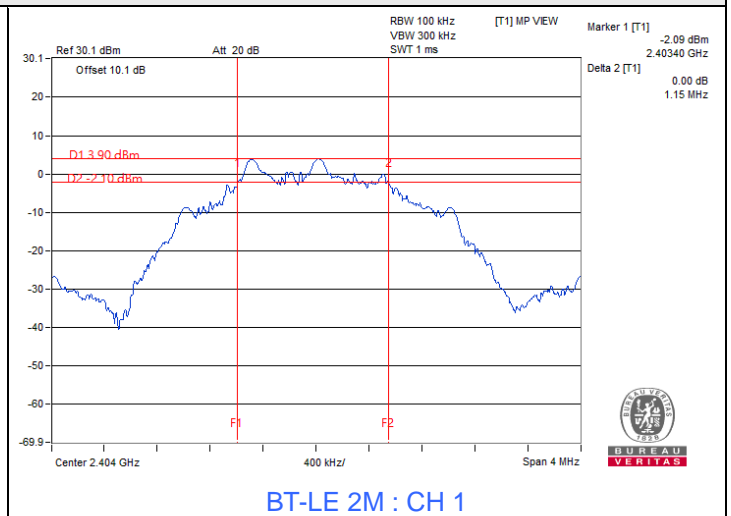
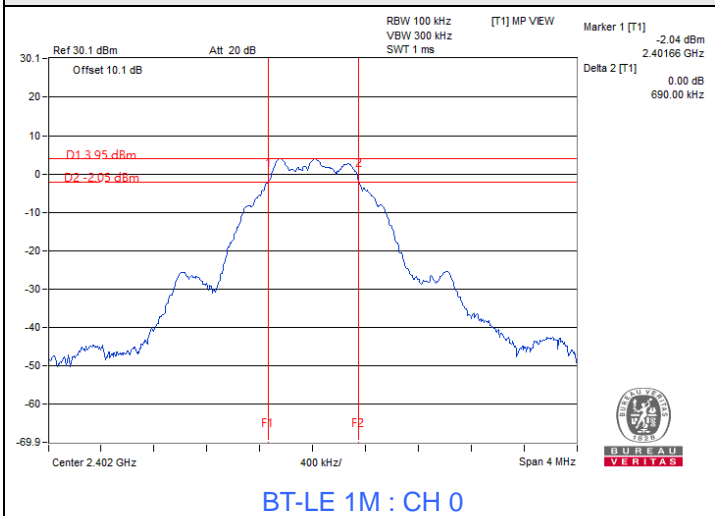
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
0	2402	0.7	0.5	Pass
19	2440	0.7	0.5	Pass
39	2480	0.7	0.5	Pass

logi bolt-2M

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	2404	1.15	0.5	Pass
19	2440	1.13	0.5	Pass
38	2478	1.11	0.5	Pass



Spectrum Plot of Minimum Value





7.4 Conducted Out of Band Emissions

Input Power:	3 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Katina Lu
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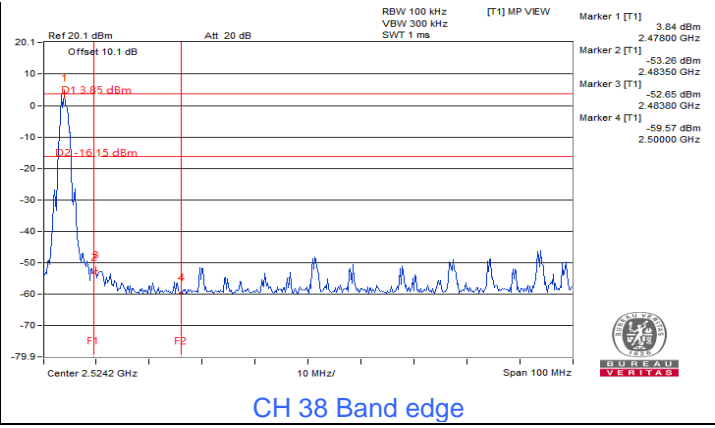
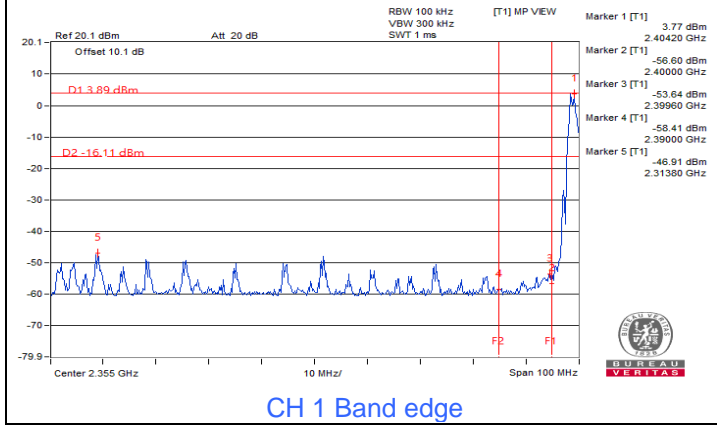
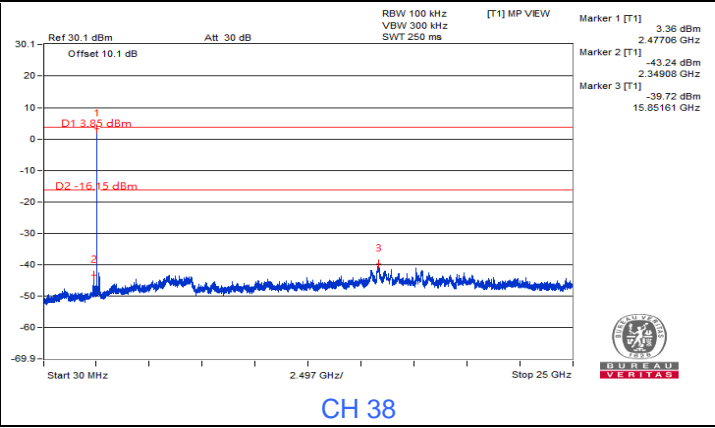
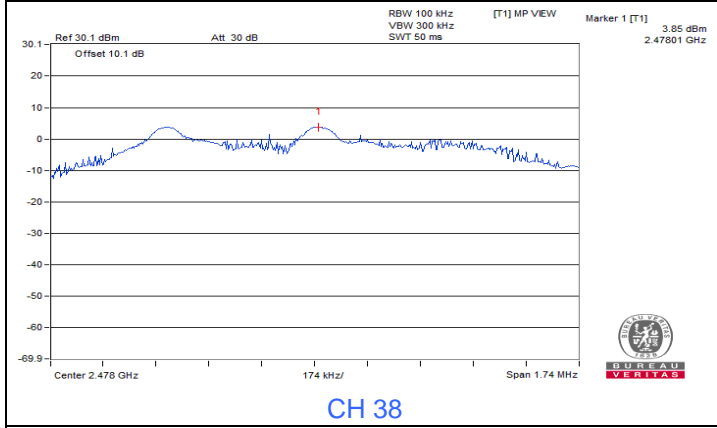
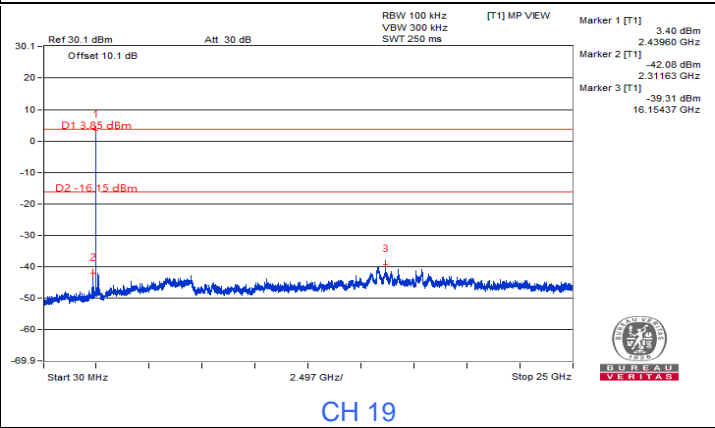
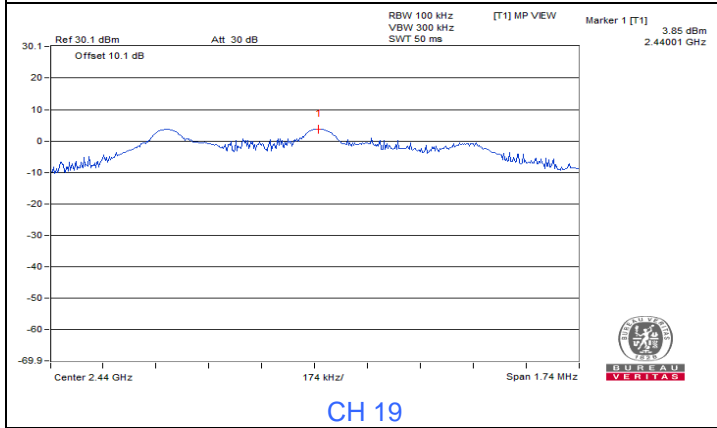
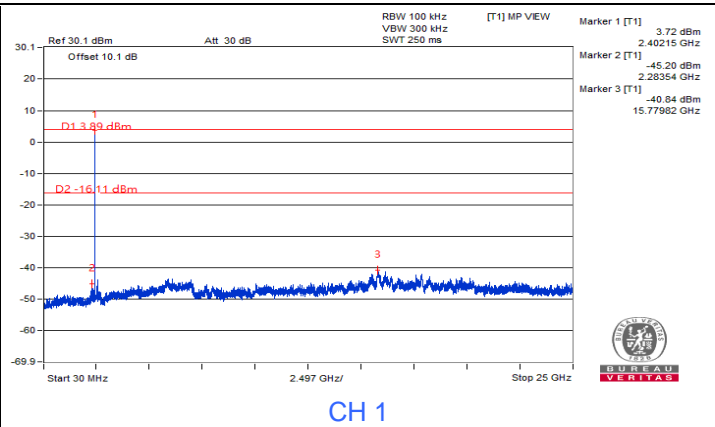
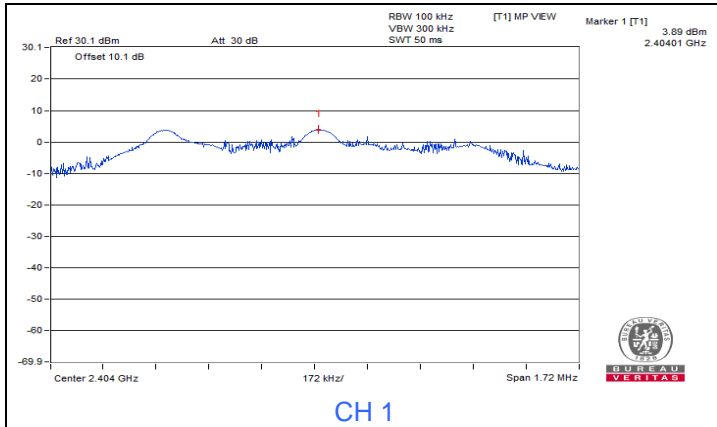
BT-L1 1M





BUREAU VERITAS

BT-LE 2M





logi bolt-1M





BUREAU VERITAS

logi bolt-2M



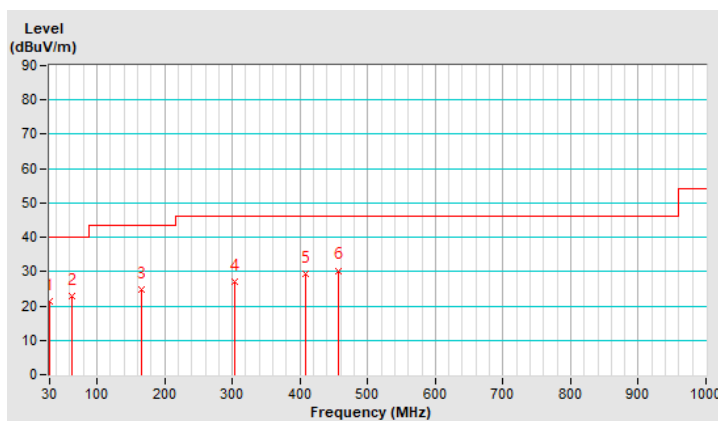
7.5 Unwanted Emissions below 1 GHz

RF Mode	BT-LE 1M	Channel	CH 0 : 2402 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	30.04	21.2 QP	40.0	-18.8	1.00 H	115	30.4	-9.2
2	62.44	23.0 QP	40.0	-17.0	1.00 H	346	32.1	-9.1
3	166.36	24.8 QP	43.5	-18.7	1.00 H	79	33.4	-8.6
4	303.33	27.1 QP	46.0	-18.9	1.00 H	271	34.6	-7.5
5	408.18	29.5 QP	46.0	-16.5	1.00 H	72	34.5	-5.0
6	456.06	30.3 QP	46.0	-15.7	1.00 H	71	33.9	-3.6

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 emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

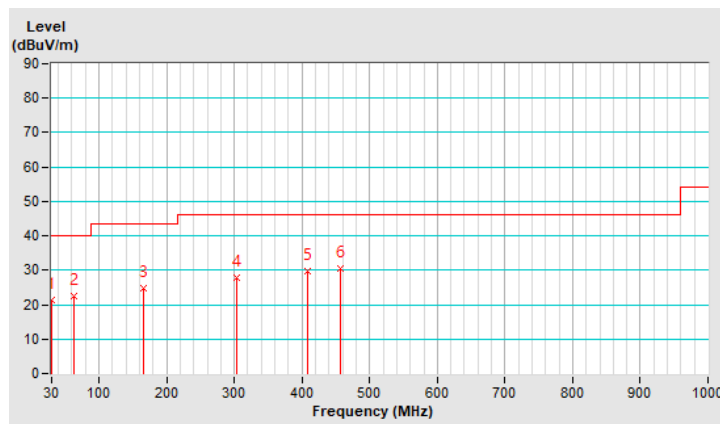


RF Mode	BT-LE 1M	Channel	CH 0 : 2402 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	30.09	21.2 QP	40.0	-18.8	1.00 V	360	30.4	-9.2
2	62.37	22.6 QP	40.0	-17.4	1.50 V	243	31.7	-9.1
3	166.24	24.6 QP	43.5	-18.9	1.00 V	66	33.2	-8.6
4	303.32	27.8 QP	46.0	-18.2	1.50 V	256	35.3	-7.5
5	408.04	29.7 QP	46.0	-16.3	1.00 V	73	34.7	-5.0
6	456.11	30.5 QP	46.0	-15.5	1.00 V	47	34.1	-3.6

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 emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

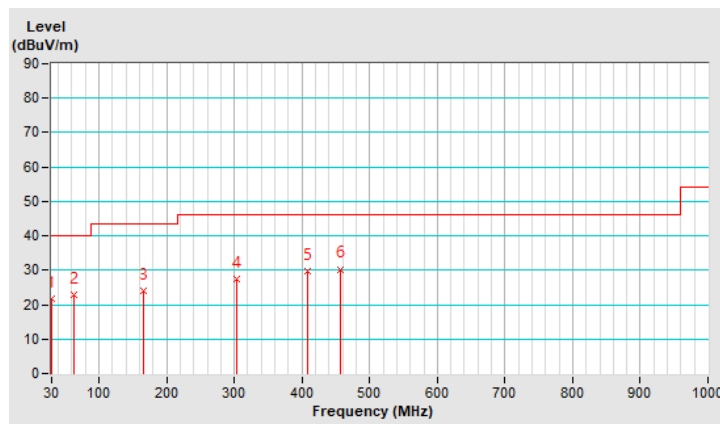


RF Mode	logi bolt-1M	Channel	CH 0 : 2402 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	30.14	21.6 QP	40.0	-18.4	1.00 H	102	30.8	-9.2
2	62.27	22.7 QP	40.0	-17.3	1.00 H	345	31.9	-9.2
3	166.14	24.0 QP	43.5	-19.5	1.00 H	91	32.6	-8.6
4	303.32	27.3 QP	46.0	-18.7	1.00 H	281	34.8	-7.5
5	408.08	29.6 QP	46.0	-16.4	1.00 H	81	34.6	-5.0
6	456.11	30.3 QP	46.0	-15.7	1.00 H	64	33.9	-3.6

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 emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

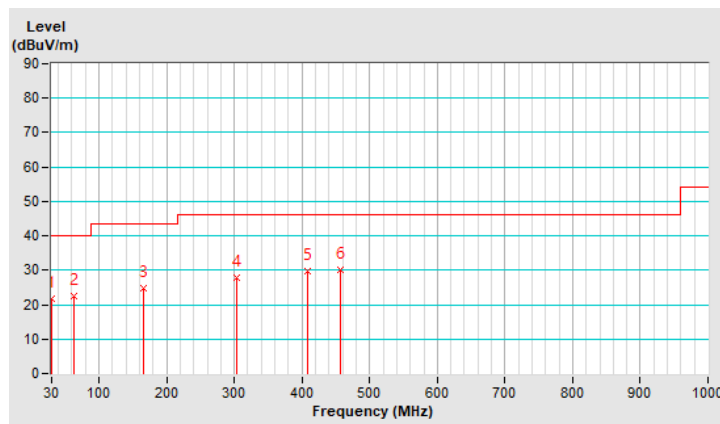


RF Mode	logi bolt-1M	Channel	CH 0 : 2402 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	30.13	21.7 QP	40.0	-18.3	1.00 V	360	30.9	-9.2
2	62.31	22.6 QP	40.0	-17.4	1.50 V	230	31.8	-9.2
3	166.11	24.7 QP	43.5	-18.8	1.00 V	59	33.3	-8.6
4	303.28	27.9 QP	46.0	-18.1	1.50 V	246	35.4	-7.5
5	408.17	29.7 QP	46.0	-16.3	1.00 V	71	34.7	-5.0
6	456.13	30.0 QP	46.0	-16.0	1.00 V	57	33.6	-3.6

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 emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



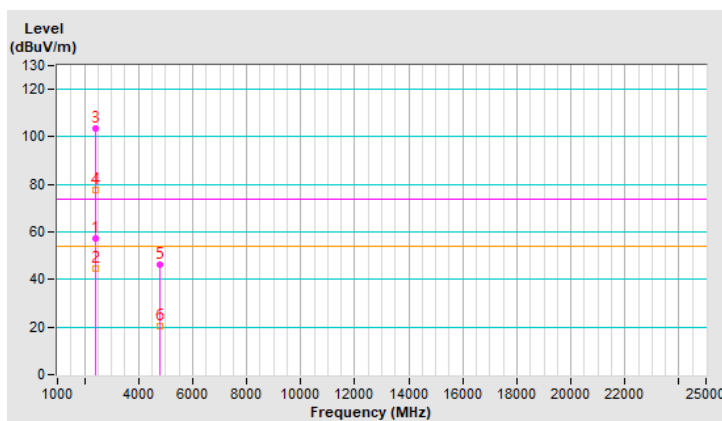
7.6 Unwanted Emissions above 1 GHz

RF Mode	BT-LE 1M	Channel	CH 0 : 2402 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	57.5 PK	74.0	-16.5	1.21 H	186	58.4	-0.9
2	2390.00	44.8 AV	54.0	-9.2	1.21 H	186	45.7	-0.9
3	*2402.00	103.7 PK			1.21 H	186	104.5	-0.8
4	*2402.00	77.8 AV			1.21 H	186	78.6	-0.8
5	4804.00	46.4 PK	74.0	-27.6	1.13 H	194	42.5	3.9
6	4804.00	20.5 AV	54.0	-33.5	1.13 H	194	16.6	3.9

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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.359 \text{ ms} / 7.045 \text{ ms}) = -25.9 \text{ dB}$

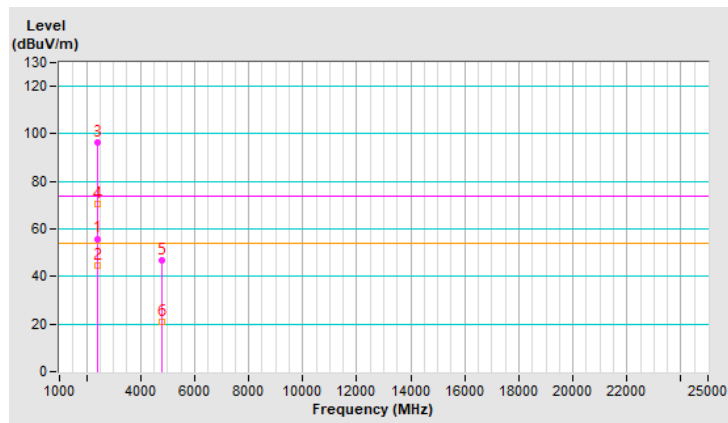


RF Mode	BT-LE 1M	Channel	CH 0 : 2402 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	55.9 PK	74.0	-18.1	2.29 V	280	56.8	-0.9
2	2390.00	44.4 AV	54.0	-9.6	2.29 V	280	45.3	-0.9
3	*2402.00	96.6 PK			2.29 V	280	97.4	-0.8
4	*2402.00	70.7 AV			2.29 V	280	71.5	-0.8
5	4804.00	47.0 PK	74.0	-27.0	1.38 V	297	43.1	3.9
6	4804.00	21.1 AV	54.0	-32.9	1.38 V	297	17.2	3.9

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.359 \text{ ms} / 7.045 \text{ ms}) = -25.9 \text{ dB}$



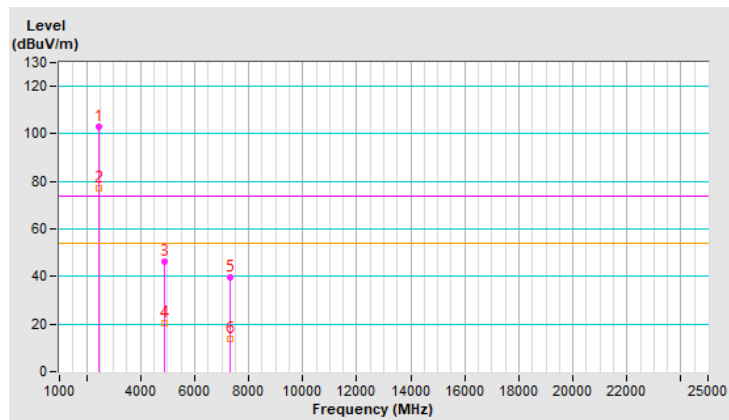
RF Mode	BT-LE 1M	Channel	CH 19 : 2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	*2440.00	103.0 PK			1.26 H	181	103.7	-0.7
2	*2440.00	77.1 AV			1.26 H	181	77.8	-0.7
3	4880.00	46.3 PK	74.0	-27.7	1.13 H	201	42.5	3.8
4	4880.00	20.4 AV	54.0	-33.6	1.13 H	201	16.6	3.8
5	7320.00	39.4 PK	74.0	-34.6	1.11 H	113	29.0	10.4
6	7320.00	13.5 AV	54.0	-40.5	1.11 H	113	3.1	10.4

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.359 \text{ ms} / 7.045 \text{ ms}) = -25.9 \text{ dB}$

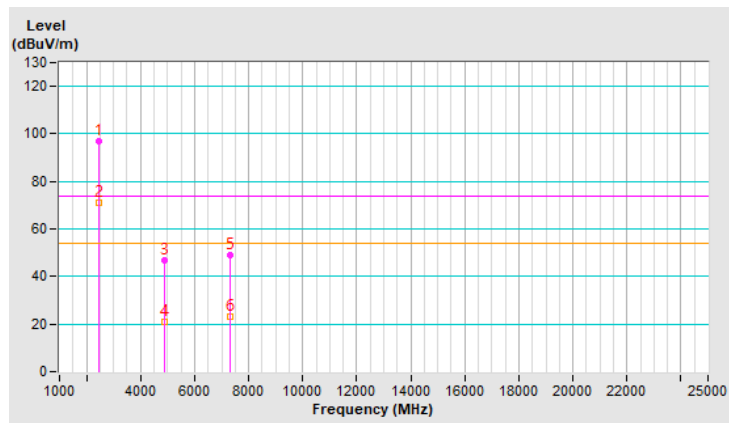


RF Mode	BT-LE 1M	Channel	CH 19 : 2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	*2440.00	96.7 PK			2.32 V	293	97.4	-0.7
2	*2440.00	70.8 AV			2.32 V	293	71.5	-0.7
3	4880.00	46.9 PK	74.0	-27.1	1.36 V	282	43.1	3.8
4	4880.00	21.0 AV	54.0	-33.0	1.36 V	282	17.2	3.8
5	7320.00	49.1 PK	74.0	-24.9	1.18 V	342	38.7	10.4
6	7320.00	23.2 AV	54.0	-30.8	1.18 V	342	12.8	10.4

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(0.359 \text{ ms} / 7.045 \text{ ms}) = -25.9 \text{ dB}$

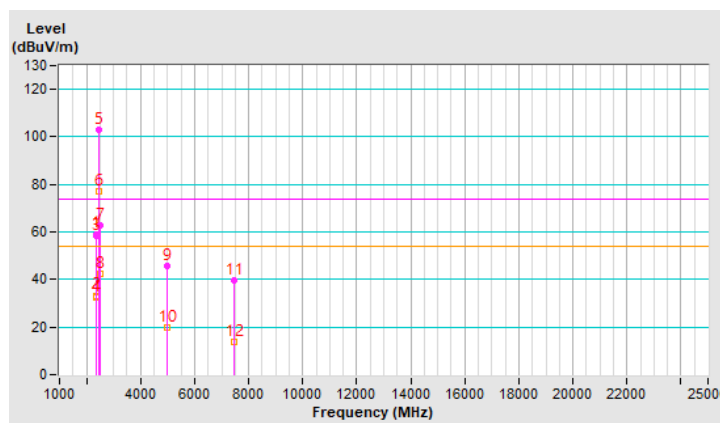


RF Mode	BT-LE 1M	Channel	CH 39 : 2480 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	2352.04	59.2 PK	74.0	-14.8	1.35 H	169	59.9	-0.7
2	2352.04	33.3 AV	54.0	-20.7	1.35 H	169	34.0	-0.7
3	2368.60	58.5 PK	74.0	-15.5	1.35 H	169	59.3	-0.8
4	2368.60	32.6 AV	54.0	-21.4	1.35 H	169	33.4	-0.8
5	*2480.00	103.0 PK			1.35 H	169	103.7	-0.7
6	*2480.00	77.1 AV			1.35 H	169	77.8	-0.7
7	2483.50	62.7 PK	74.0	-11.3	1.35 H	169	63.5	-0.8
8	2483.50	42.2 AV	54.0	-11.8	1.35 H	169	43.0	-0.8
9	4960.00	45.9 PK	74.0	-28.1	1.16 H	211	41.9	4.0
10	4960.00	20.0 AV	54.0	-34.0	1.16 H	211	16.0	4.0
11	7440.00	39.7 PK	74.0	-34.3	1.16 H	122	29.1	10.6
12	7440.00	13.8 AV	54.0	-40.2	1.16 H	122	3.2	10.6

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.359 \text{ ms} / 7.045 \text{ ms}) = -25.9 \text{ dB}$

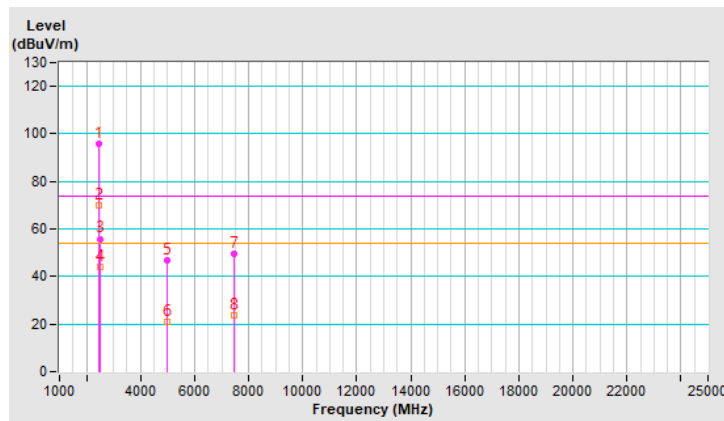


RF Mode	BT-LE 1M	Channel	CH 39 : 2480 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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			4.00 V	286	96.4	-0.7
2	*2480.00	69.8 AV			4.00 V	286	70.5	-0.7
3	2483.50	55.9 PK	74.0	-18.1	4.00 V	286	56.7	-0.8
4	2483.50	44.3 AV	54.0	-9.7	4.00 V	286	45.1	-0.8
5	4960.00	46.6 PK	74.0	-27.4	1.40 V	293	42.6	4.0
6	4960.00	20.7 AV	54.0	-33.3	1.40 V	293	16.7	4.0
7	7440.00	49.4 PK	74.0	-24.6	1.20 V	332	38.8	10.6
8	7440.00	23.5 AV	54.0	-30.5	1.20 V	332	12.9	10.6

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.359 \text{ ms} / 7.045 \text{ ms}) = -25.9 \text{ dB}$



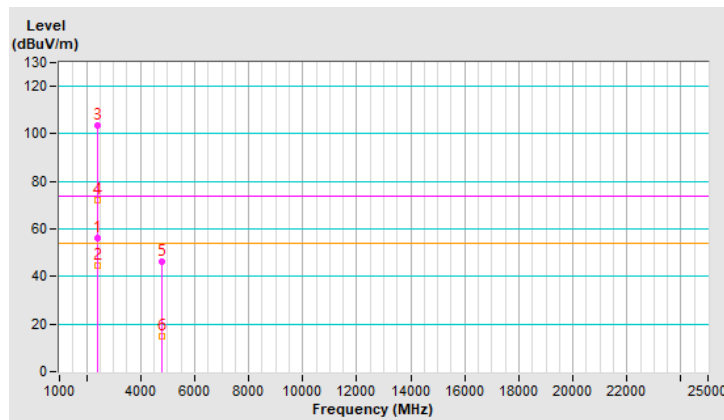
RF Mode	BT-LE 2M	Channel	CH 1 : 2404 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	56.3 PK	74.0	-17.7	1.19 H	188	57.2	-0.9
2	2390.00	44.5 AV	54.0	-9.5	1.19 H	188	45.4	-0.9
3	*2404.00	103.3 PK			1.19 H	188	104.1	-0.8
4	*2404.00	72.0 AV			1.19 H	188	72.8	-0.8
5	4808.00	46.1 PK	74.0	-27.9	1.10 H	200	42.2	3.9
6	4808.00	14.8 AV	54.0	-39.2	1.10 H	200	10.9	3.9

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.191 \text{ ms} / 7.029 \text{ ms}) = -31.3 \text{ dB}$

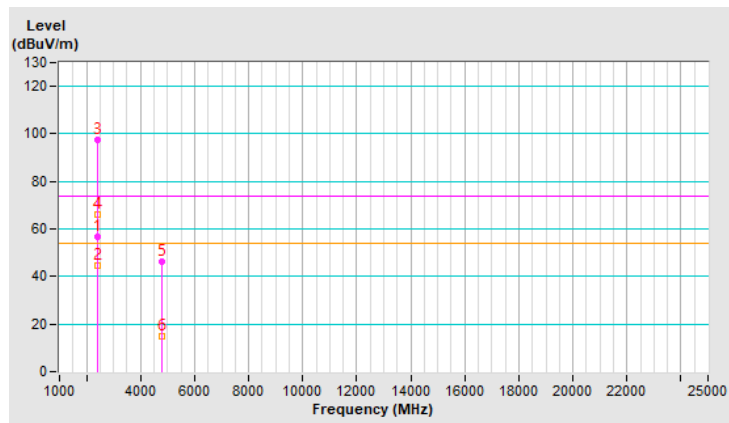


RF Mode	BT-LE 2M	Channel	CH 1 : 2404 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	56.5 PK	74.0	-17.5	2.32 V	282	57.4	-0.9
2	2390.00	44.8 AV	54.0	-9.2	2.32 V	282	45.7	-0.9
3	*2404.00	97.3 PK			2.32 V	282	98.1	-0.8
4	*2404.00	66.0 AV			2.32 V	282	66.8	-0.8
5	4808.00	46.4 PK	74.0	-27.6	1.46 V	288	42.5	3.9
6	4808.00	15.1 AV	54.0	-38.9	1.46 V	288	11.2	3.9

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.191 \text{ ms} / 7.029 \text{ ms}) = -31.3 \text{ dB}$



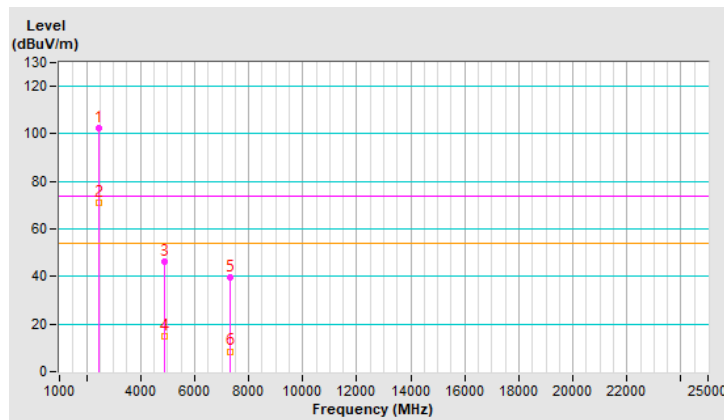
RF Mode	BT-LE 2M	Channel	CH 19 : 2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	*2440.00	102.5 PK			1.25 H	180	103.2	-0.7
2	*2440.00	71.2 AV			1.25 H	180	71.9	-0.7
3	4880.00	46.3 PK	74.0	-27.7	1.08 H	217	42.5	3.8
4	4880.00	15.0 AV	54.0	-39.0	1.08 H	217	11.2	3.8
5	7320.00	39.8 PK	74.0	-34.2	1.09 H	115	29.4	10.4
6	7320.00	8.5 AV	54.0	-45.5	1.09 H	115	-1.9	10.4

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.191 \text{ ms} / 7.029 \text{ ms}) = -31.3 \text{ dB}$

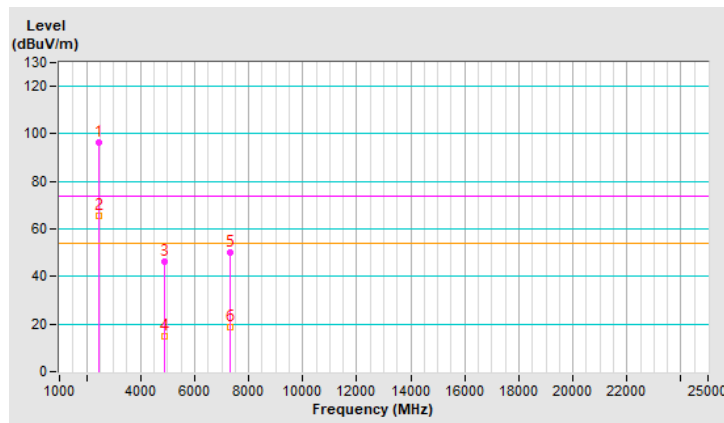


RF Mode	BT-LE 2M	Channel	CH 19 : 2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	*2440.00	96.6 PK			2.28 V	306	97.3	-0.7
2	*2440.00	65.3 AV			2.28 V	306	66.0	-0.7
3	4880.00	46.4 PK	74.0	-27.6	1.45 V	282	42.6	3.8
4	4880.00	15.1 AV	54.0	-38.9	1.45 V	282	11.3	3.8
5	7320.00	49.9 PK	74.0	-24.1	1.21 V	336	39.5	10.4
6	7320.00	18.6 AV	54.0	-35.4	1.21 V	336	8.2	10.4

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.191 \text{ ms} / 7.029 \text{ ms}) = -31.3 \text{ dB}$



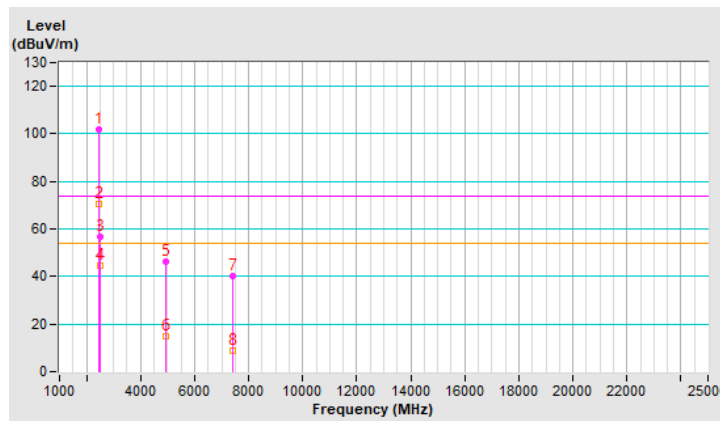
RF Mode	BT-LE 2M	Channel	CH 38 : 2478 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	101.9 PK			1.14 H	187	102.6	-0.7
2	*2478.00	70.6 AV			1.14 H	187	71.3	-0.7
3	2483.50	56.6 PK	74.0	-17.4	1.14 H	187	57.4	-0.8
4	2483.50	44.8 AV	54.0	-9.2	1.14 H	187	45.6	-0.8
5	4956.00	46.0 PK	74.0	-28.0	1.04 H	212	42.0	4.0
6	4956.00	14.7 AV	54.0	-39.3	1.04 H	212	10.7	4.0
7	7434.00	40.0 PK	74.0	-34.0	1.09 H	111	29.4	10.6
8	7434.00	8.7 AV	54.0	-45.3	1.09 H	111	-1.9	10.6

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.191 \text{ ms} / 7.029 \text{ ms}) = -31.3 \text{ dB}$

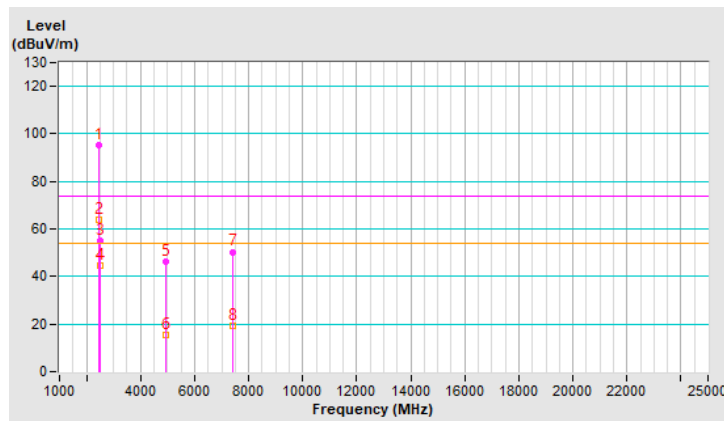


RF Mode	BT-LE 2M	Channel	CH 38 : 2478 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	95.3 PK			3.95 V	283	96.0	-0.7
2	*2478.00	64.0 AV			3.95 V	283	64.7	-0.7
3	2483.50	55.3 PK	74.0	-18.7	3.95 V	283	56.1	-0.8
4	2483.50	44.6 AV	54.0	-9.4	3.95 V	283	45.4	-0.8
5	4956.00	46.5 PK	74.0	-27.5	1.50 V	267	42.5	4.0
6	4956.00	15.2 AV	54.0	-38.8	1.50 V	267	11.2	4.0
7	7434.00	50.4 PK	74.0	-23.6	1.26 V	321	39.8	10.6
8	7434.00	19.1 AV	54.0	-34.9	1.26 V	321	8.5	10.6

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.191 \text{ ms} / 7.029 \text{ ms}) = -31.3 \text{ dB}$



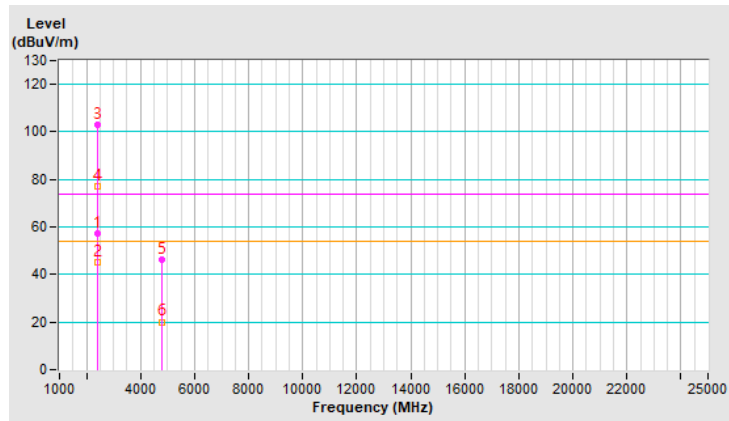
RF Mode	logi bolt-1M	Channel	CH 0 : 2402 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	57.1 PK	74.0	-16.9	1.27 H	178	58.0	-0.9
2	2390.00	45.1 AV	54.0	-8.9	1.27 H	178	46.0	-0.9
3	*2402.00	103.0 PK			1.27 H	178	103.8	-0.8
4	*2402.00	77.1 AV			1.27 H	178	77.9	-0.8
5	4804.00	46.0 PK	74.0	-28.0	1.15 H	195	42.1	3.9
6	4804.00	20.1 AV	54.0	-33.9	1.15 H	195	16.2	3.9

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.358 \text{ ms} / 7.068 \text{ ms}) = -25.9 \text{ dB}$

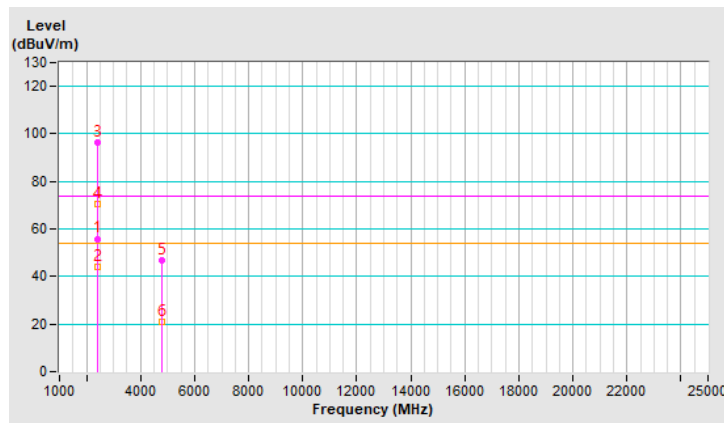


RF Mode	logi bolt-1M	Channel	CH 0 : 2402 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	55.9 PK	74.0	-18.1	2.26 V	278	56.8	-0.9
2	2390.00	44.2 AV	54.0	-9.8	2.26 V	278	45.1	-0.9
3	*2402.00	96.6 PK			2.26 V	278	97.4	-0.8
4	*2402.00	70.7 AV			2.26 V	278	71.5	-0.8
5	4804.00	46.8 PK	74.0	-27.2	1.35 V	296	42.9	3.9
6	4804.00	20.9 AV	54.0	-33.1	1.35 V	296	17.0	3.9

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.358 \text{ ms} / 7.068 \text{ ms}) = -25.9 \text{ dB}$



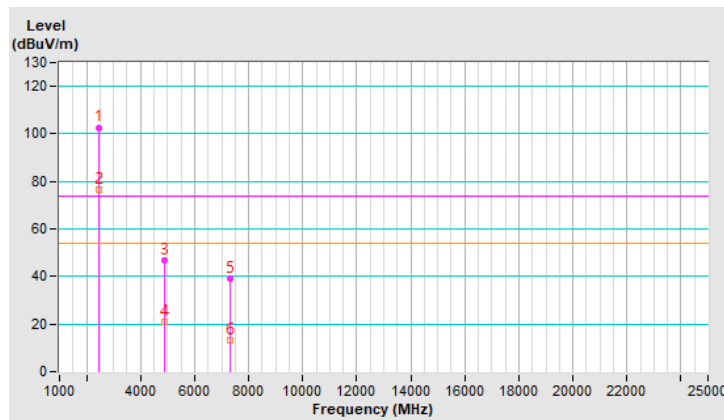
RF Mode	logi bolt-1M	Channel	CH 19 : 2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	*2440.00	102.7 PK			1.27 H	177	103.4	-0.7
2	*2440.00	76.8 AV			1.27 H	177	77.5	-0.7
3	4880.00	46.8 PK	74.0	-27.2	1.14 H	196	43.0	3.8
4	4880.00	20.9 AV	54.0	-33.1	1.14 H	196	17.1	3.8
5	7320.00	39.1 PK	74.0	-34.9	1.06 H	107	28.7	10.4
6	7320.00	13.2 AV	54.0	-40.8	1.06 H	107	2.8	10.4

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.358 \text{ ms} / 7.068 \text{ ms}) = -25.9 \text{ dB}$

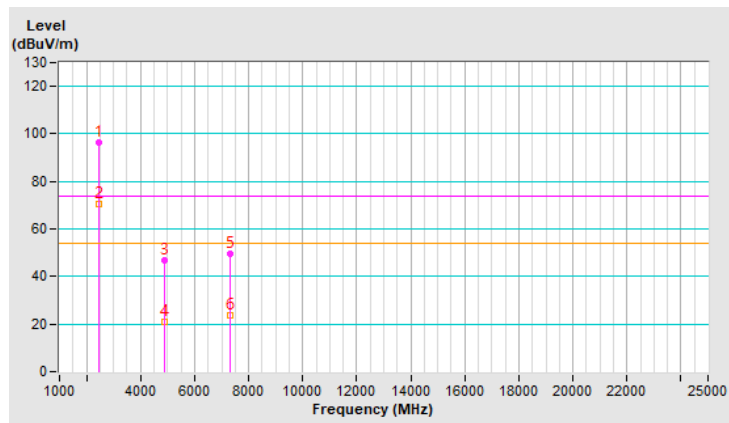


RF Mode	logi bolt-1M	Channel	CH 19 : 2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	*2440.00	96.6 PK			2.36 V	300	97.3	-0.7
2	*2440.00	70.7 AV			2.36 V	300	71.4	-0.7
3	4880.00	46.6 PK	74.0	-27.4	1.34 V	287	42.8	3.8
4	4880.00	20.7 AV	54.0	-33.3	1.34 V	287	16.9	3.8
5	7320.00	49.5 PK	74.0	-24.5	1.12 V	357	39.1	10.4
6	7320.00	23.6 AV	54.0	-30.4	1.12 V	357	13.2	10.4

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.358 \text{ ms} / 7.068 \text{ ms}) = -25.9 \text{ dB}$



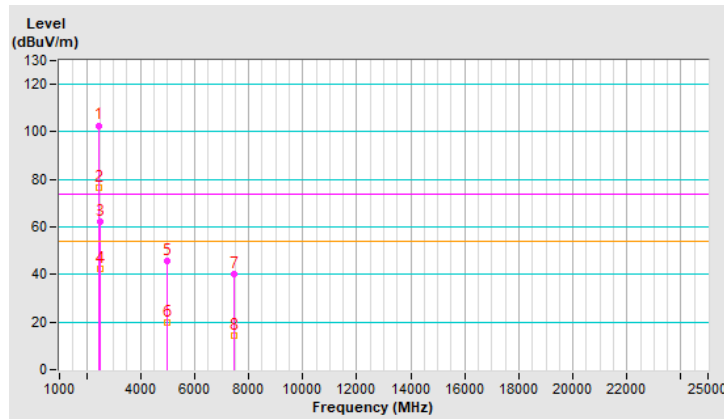
RF Mode	logi bolt-1M	Channel	CH 39 : 2480 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	102.7 PK			1.38 H	155	103.4	-0.7
2	*2480.00	76.8 AV			1.38 H	155	77.5	-0.7
3	2483.50	62.4 PK	74.0	-11.6	1.38 H	155	63.2	-0.8
4	2483.50	42.5 AV	54.0	-11.5	1.38 H	155	43.3	-0.8
5	4960.00	45.9 PK	74.0	-28.1	1.21 H	198	41.9	4.0
6	4960.00	20.0 AV	54.0	-34.0	1.21 H	198	16.0	4.0
7	7440.00	40.0 PK	74.0	-34.0	1.15 H	128	29.4	10.6
8	7440.00	14.1 AV	54.0	-39.9	1.15 H	128	3.5	10.6

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.358 \text{ ms} / 7.068 \text{ ms}) = -25.9 \text{ dB}$

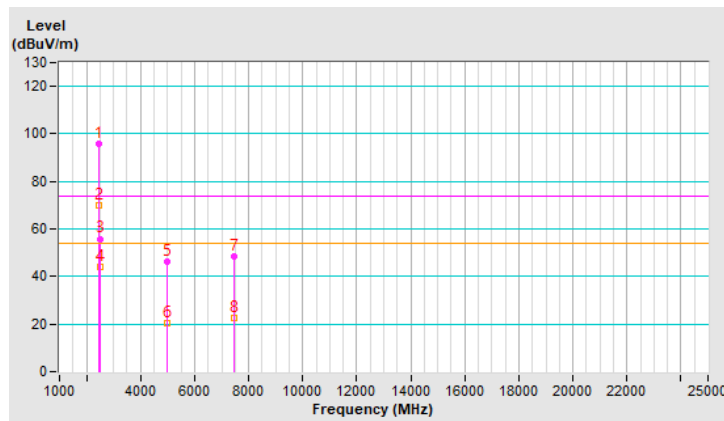


RF Mode	logi bolt-1M	Channel	CH 39 : 2480 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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			3.91 V	297	96.4	-0.7
2	*2480.00	69.8 AV			3.91 V	297	70.5	-0.7
3	2483.50	55.9 PK	74.0	-18.1	3.91 V	297	56.7	-0.8
4	2483.50	44.2 AV	54.0	-9.8	3.91 V	297	45.0	-0.8
5	4960.00	46.1 PK	74.0	-27.9	1.53 V	264	42.1	4.0
6	4960.00	20.2 AV	54.0	-33.8	1.53 V	264	16.2	4.0
7	7440.00	48.6 PK	74.0	-25.4	1.22 V	318	38.0	10.6
8	7440.00	22.7 AV	54.0	-31.3	1.22 V	318	12.1	10.6

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.358 \text{ ms} / 7.068 \text{ ms}) = -25.9 \text{ dB}$

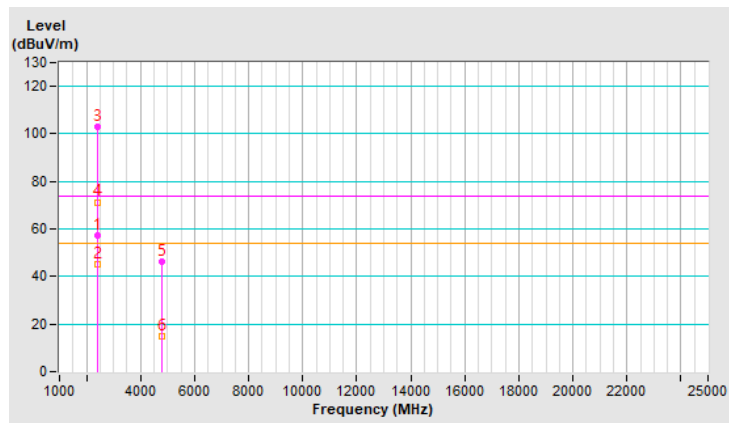


RF Mode	logi bolt-2M	Channel	CH 1 : 2404 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	57.1 PK	74.0	-16.9	1.22 H	185	58.0	-0.9
2	2390.00	45.3 AV	54.0	-8.7	1.22 H	185	46.2	-0.9
3	*2404.00	102.8 PK			1.22 H	185	103.6	-0.8
4	*2404.00	71.3 AV			1.22 H	185	72.1	-0.8
5	4808.00	46.1 PK	74.0	-27.9	1.14 H	204	42.2	3.9
6	4808.00	14.6 AV	54.0	-39.4	1.14 H	204	10.7	3.9

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.187 \text{ ms} / 7.067 \text{ ms}) = -31.5 \text{ dB}$

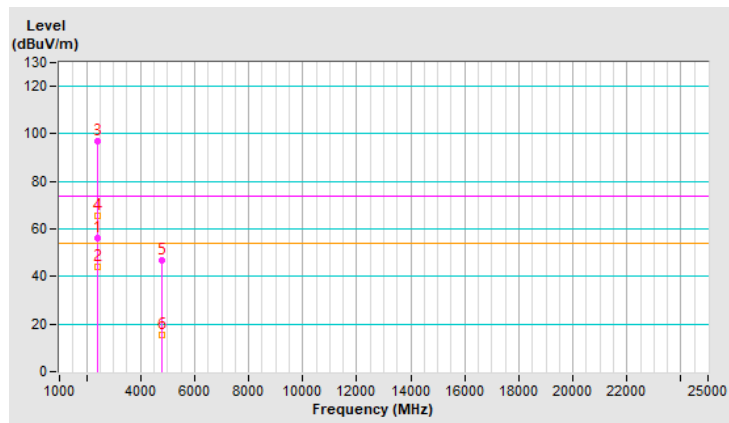


RF Mode	logi bolt-2M	Channel	CH 1 : 2404 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	56.3 PK	74.0	-17.7	2.38 V	280	57.2	-0.9
2	2390.00	44.1 AV	54.0	-9.9	2.38 V	280	45.0	-0.9
3	*2404.00	96.9 PK			2.38 V	280	97.7	-0.8
4	*2404.00	65.4 AV			2.38 V	280	66.2	-0.8
5	4808.00	46.7 PK	74.0	-27.3	1.42 V	273	42.8	3.9
6	4808.00	15.2 AV	54.0	-38.8	1.42 V	273	11.3	3.9

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.187 \text{ ms} / 7.067 \text{ ms}) = -31.5 \text{ dB}$



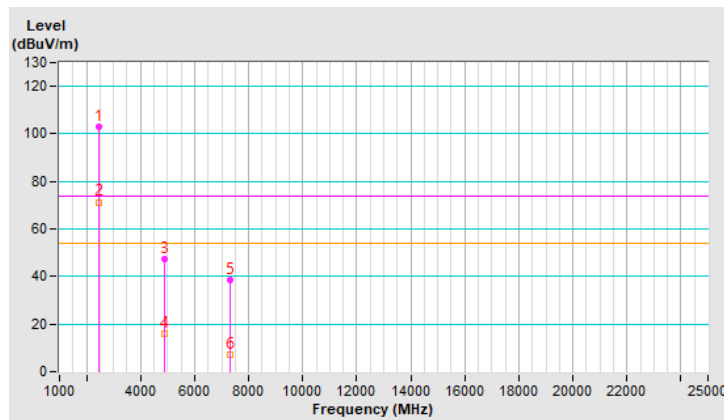
RF Mode	logi bolt-2M	Channel	CH 19 : 2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	*2440.00	102.8 PK			1.23 H	177	103.5	-0.7
2	*2440.00	71.3 AV			1.23 H	177	72.0	-0.7
3	4880.00	47.4 PK	74.0	-26.6	1.13 H	200	43.6	3.8
4	4880.00	15.9 AV	54.0	-38.1	1.13 H	200	12.1	3.8
5	7320.00	38.7 PK	74.0	-35.3	1.01 H	96	28.3	10.4
6	7320.00	7.2 AV	54.0	-46.8	1.01 H	96	-3.2	10.4

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.187 \text{ ms} / 7.067 \text{ ms}) = -31.5 \text{ dB}$

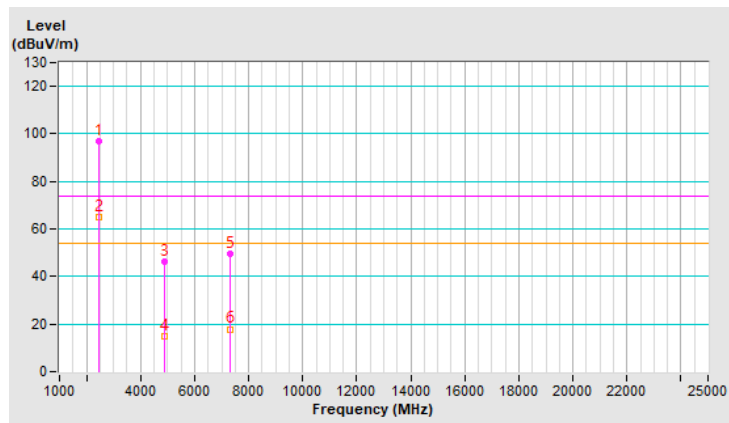


RF Mode	logi bolt-2M	Channel	CH 19 : 2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	*2440.00	96.7 PK			2.31 V	302	97.4	-0.7
2	*2440.00	65.2 AV			2.31 V	302	65.9	-0.7
3	4880.00	46.1 PK	74.0	-27.9	1.36 V	300	42.3	3.8
4	4880.00	14.6 AV	54.0	-39.4	1.36 V	300	10.8	3.8
5	7320.00	49.4 PK	74.0	-24.6	1.13 V	358	39.0	10.4
6	7320.00	17.9 AV	54.0	-36.1	1.13 V	358	7.5	10.4

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.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.187 \text{ ms} / 7.067 \text{ ms}) = -31.5 \text{ dB}$

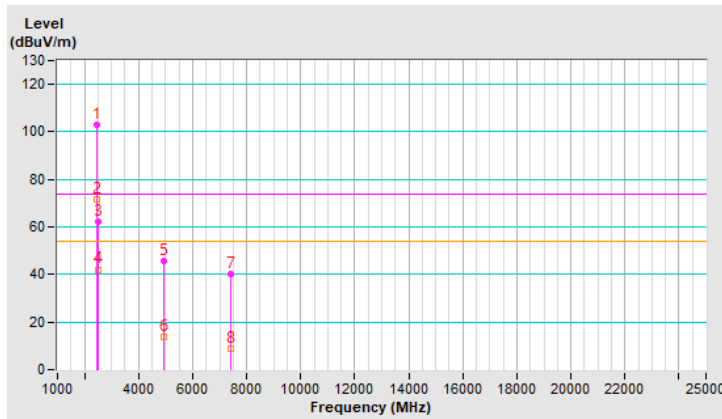


RF Mode	logi bolt-2M	Channel	CH 38 : 2478 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

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	103.1 PK			1.35 H	157	103.8	-0.7
2	*2478.00	71.6 AV			1.35 H	157	72.3	-0.7
3	2483.50	62.2 PK	74.0	-11.8	1.35 H	157	63.0	-0.8
4	2483.50	42.1 AV	54.0	-11.9	1.35 H	157	42.9	-0.8
5	4956.00	45.5 PK	74.0	-28.5	1.23 H	195	41.5	4.0
6	4956.00	14.0 AV	54.0	-40.0	1.23 H	195	10.0	4.0
7	7434.00	40.3 PK	74.0	-33.7	1.19 H	121	29.7	10.6
8	7434.00	8.8 AV	54.0	-45.2	1.19 H	121	-1.8	10.6

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.187 \text{ ms} / 7.067 \text{ ms}) = -31.5 \text{ dB}$

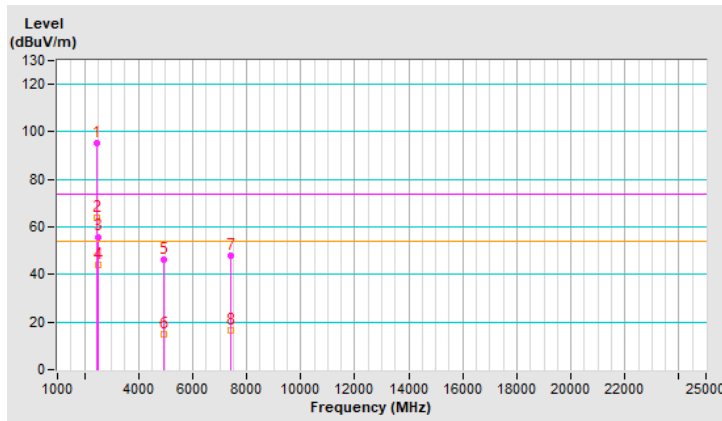


RF Mode	logi bolt-2M	Channel	CH 38 : 2478 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz
Input Power	3 Vdc	Environmental Conditions	25°C, 75% RH
Tested By	Nelson Teng		

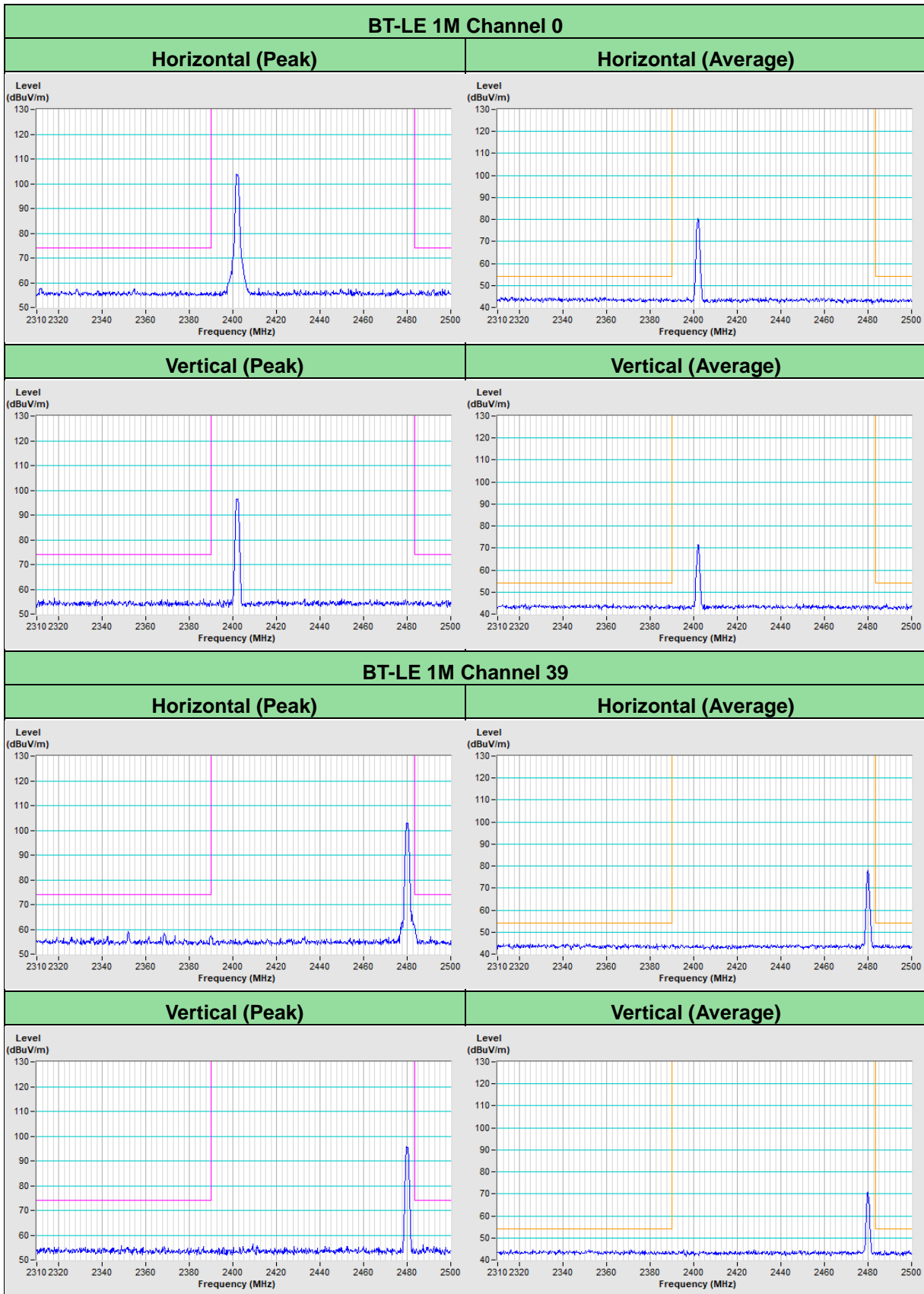
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2478.00	95.3 PK			3.92 V	282	96.0	-0.7
2	*2478.00	63.8 AV			3.92 V	282	64.5	-0.7
3	2483.50	55.9 PK	74.0	-18.1	3.92 V	282	56.7	-0.8
4	2483.50	44.0 AV	54.0	-10.0	3.92 V	282	44.8	-0.8
5	4956.00	46.5 PK	74.0	-27.5	1.53 V	278	42.5	4.0
6	4956.00	15.0 AV	54.0	-39.0	1.53 V	278	11.0	4.0
7	7434.00	47.9 PK	74.0	-26.1	1.27 V	324	37.3	10.6
8	7434.00	16.4 AV	54.0	-37.6	1.27 V	324	5.8	10.6

Remarks:

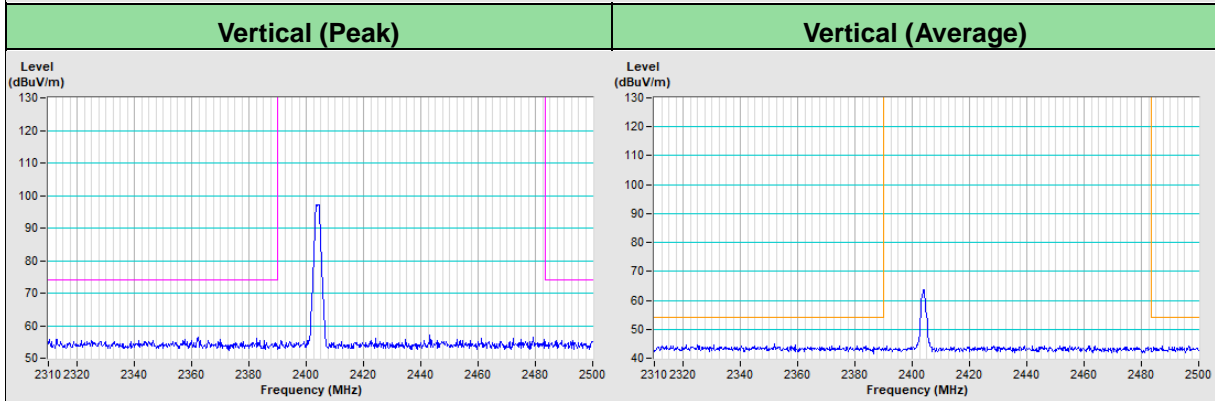
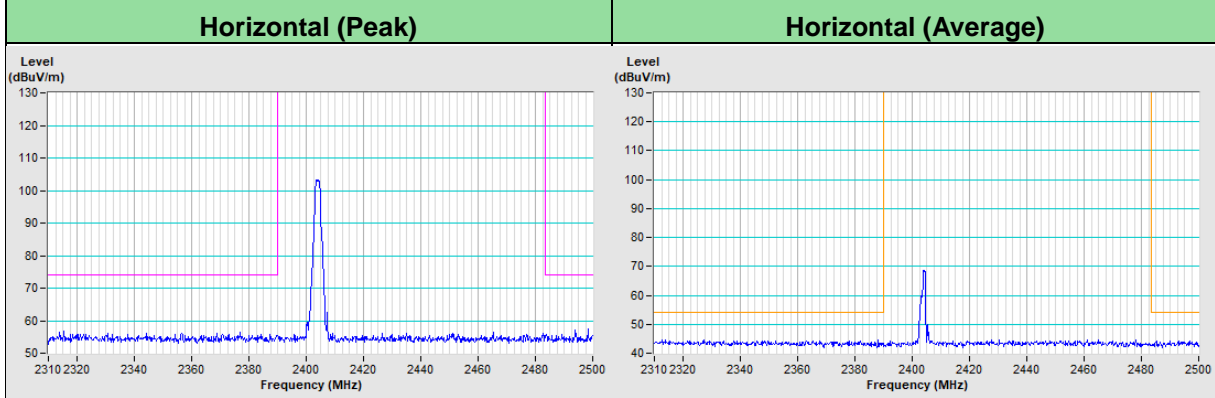
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.187 \text{ ms} / 7.067 \text{ ms}) = -31.5 \text{ dB}$



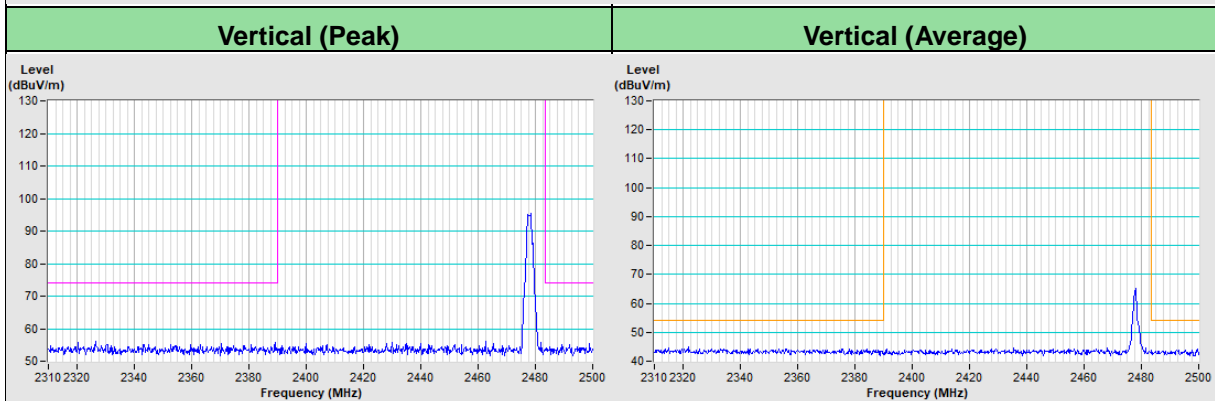
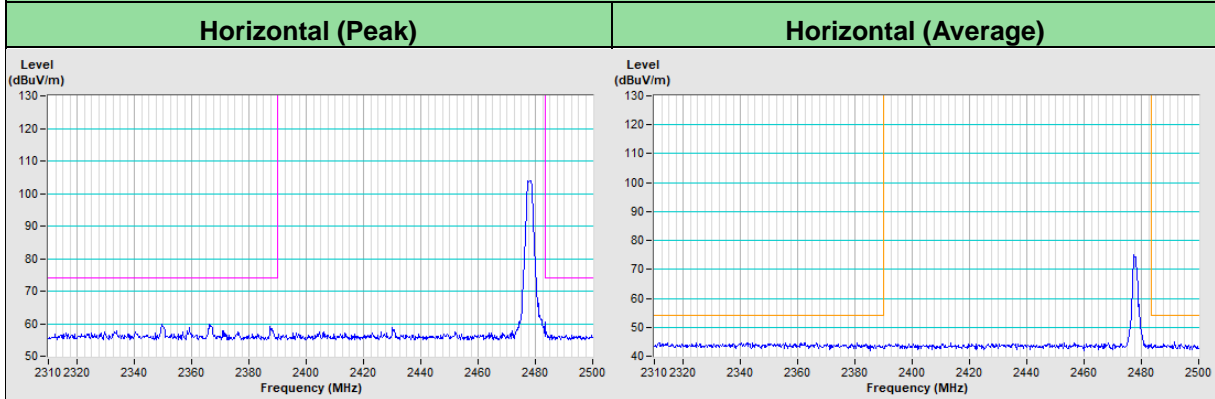
Plot of Band Edge



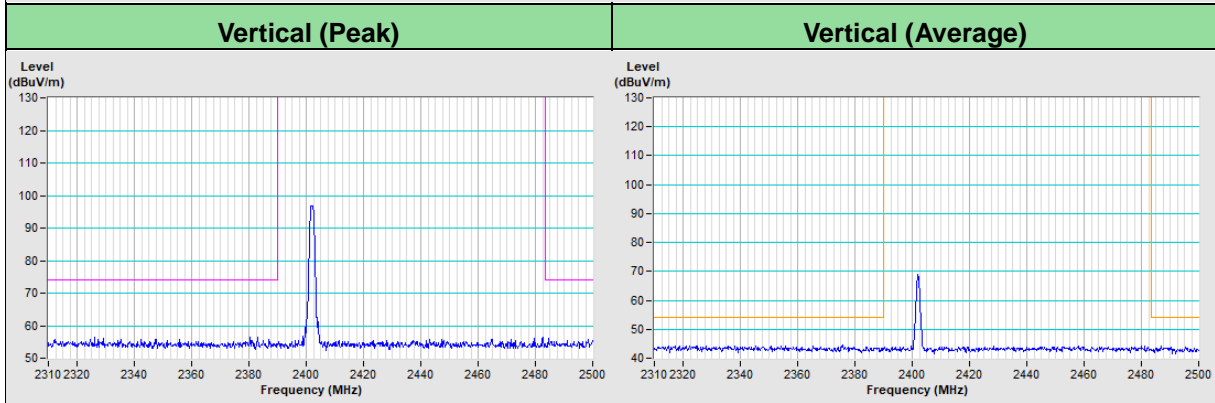
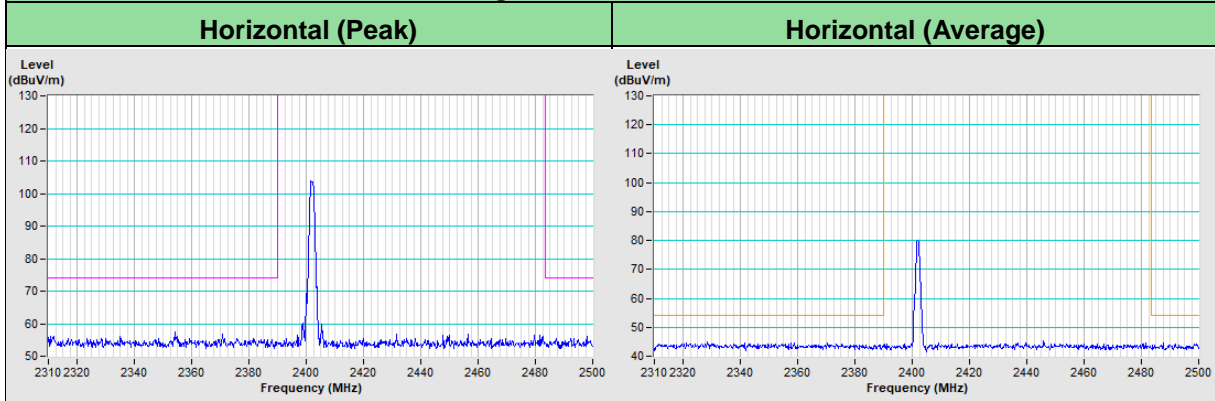
BT-LE 2M Channel 1



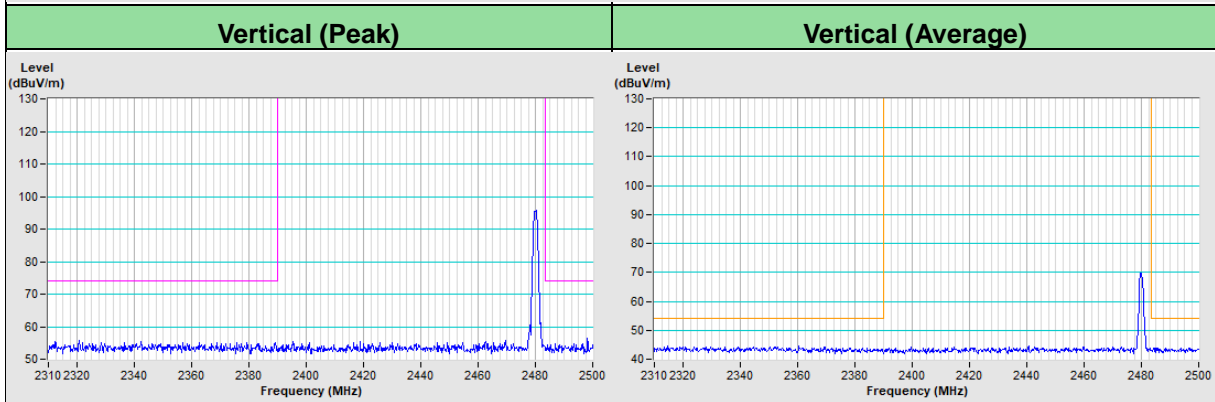
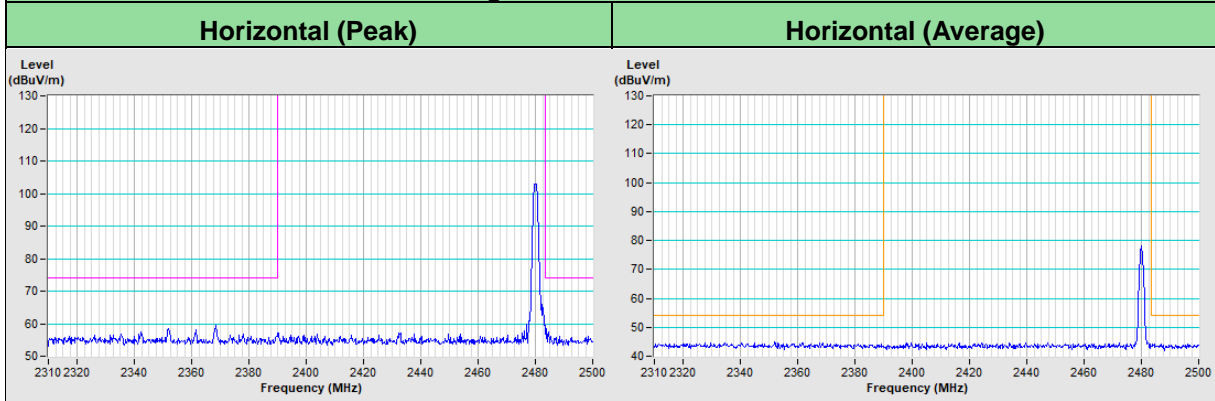
BT-LE 2M Channel 38

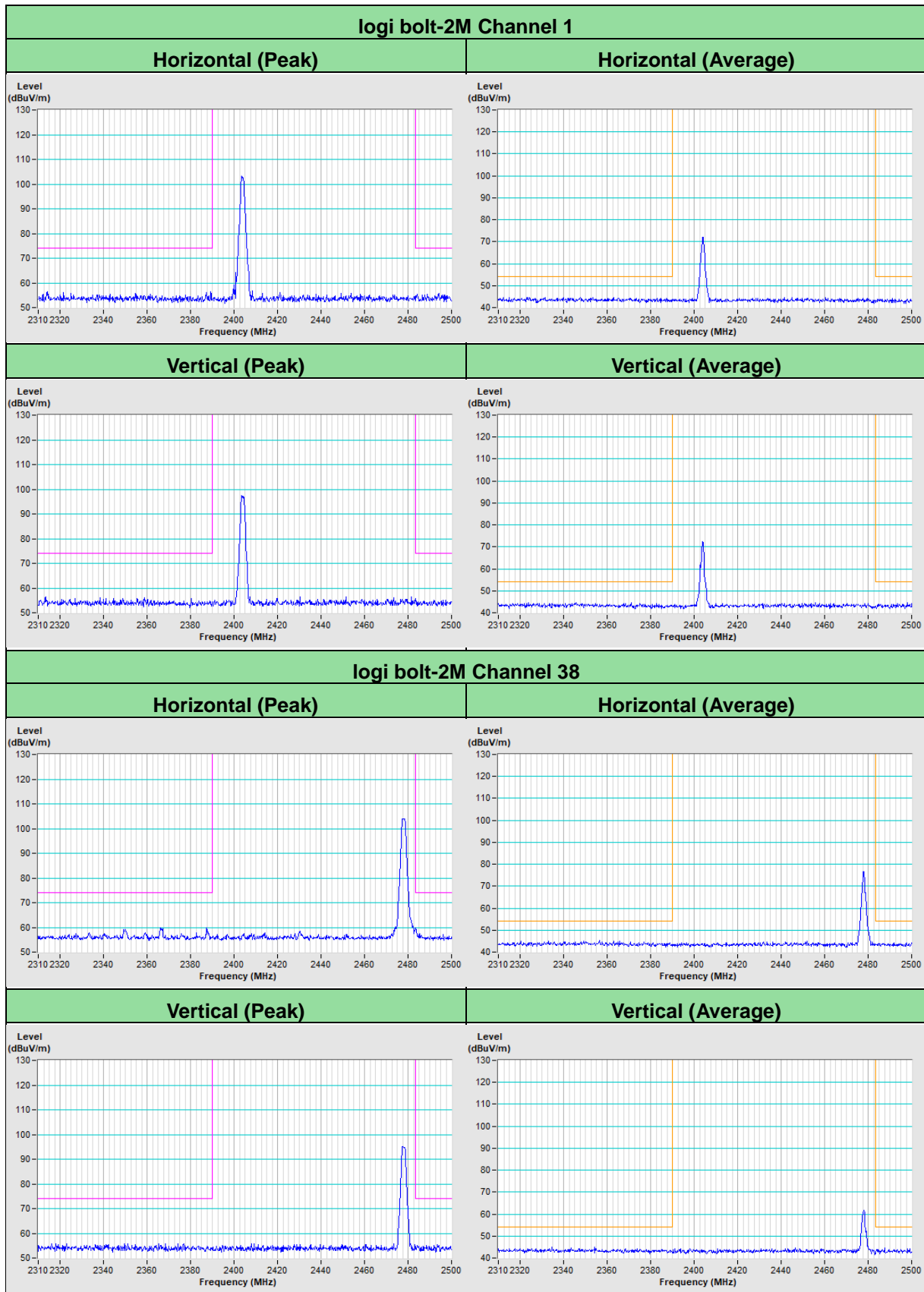


logi bolt-1M Channel 0



logi bolt-1M Channel 39





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.

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

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@bureauveritas.com

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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