FCC Test Report

Report No.:	RFBDKG-WTW-P21080002
FCC ID:	JNZYR0082
Test Model:	YR0082
Received Date:	2021/8/2
Test Date:	2021/8/18 ~ 2021/8/26
Issued Date:	2021/9/16
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 / Designation Number:	723255 / TW2022

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RFBDKG-WTW-P21080002	Original release.	2021/9/16

1 Certificate of Conformity

Product:	Wireless keyboard
Brand:	Logitech
Test Model:	YR0082
Sample Status:	Engineering sample
Applicant:	LOGITECH FAR EAST LTD.
Test Date:	2021/8/18 ~ 2021/8/26
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10: 2013

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 EMC characteristics under the conditions specified in this report.

Prepared by : Cherry Chuo , **Date:** 2021/9/16

Cherry Chuo / Specialist

Approved by : , **Date:** 2021/9/16

Clark Lin / Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -17.09 dB at 0.52500 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -7.2 dB at 38.05 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

Note:
1. For 2.4 GHz band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.9 dB
Conducted emissions	-	2.5 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.1 dB
	30MHz ~ 1GHz	5.1 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.1 dB
	18GHz ~ 40GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wireless keyboard
Brand	Logitech
Test Model	YR0082
Status of EUT	Engineering sample
Power Supply Rating	3.7Vdc from battery or 5Vdc from USB interface
Modulation Type	GFSK
Transfer Rate	Up to 2 Mbps (*Note 1)
Operating Frequency	2.402 ~ 2.480 GHz (*Note 1)
Number of Channel	40 (*Note 1)
Output Power	**BT-LE function:** BT-LE 1M: 2.404 mW BT-LE 2M: 2.404 mW **logi bolt function:** logi bolt 1M: 2.404 mW logi bolt 2M: 2.399 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Cable Supplied	USB Cable Type A to Type C cable x 1 (shielded, 1 m)

Note:

1. BT-LE and logi bolt technique supports 1Mbps and 2Mbps data rates, both have been evaluated in this test report. Refer to "**section 3.2 Description of Test Modes**" for more detail specification.
2. This device have BT-LE and logi bolt functions. logi bolt is the same technology as BT-LE and is just a different marketing.
3. The EUT may have a lot of colors for marketing requirement.
4. Depending on device connected to the keyboard, EUT uses either BT-LE or logi bolt technology. BT-LE and logi bolt may not transmit simultaneously.
5. The antenna provided to the EUT, please refer to the following table:

Antenna Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
2.72	2.4~2.4835	Printed Monopole	None

6. The EUT must be supplied with battery and following table:

Brand	Model No.	Spec.
Springpower technology(ShenZhen)Co., Ltd or Logitech	325085 or 533-000204	3.7 Vdc, 1500 mAh, 5.550 Wh

7. The EUT was pre-tested under the following modes:

For Radiated Emission test	
Pre-test Mode	Description
Mode A	**Power from USB adapter**
Mode B	Power from Battery
From the above modes, the worst case was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.	
For AC Power Conducted Emission test	
Pre-test Mode	Description
Mode C	**Power from USB adapter**
Mode D	Power from Laptop
From the above modes, the worst case was found in **Mode C.** Therefore only the test data of the mode was recorded in this report.	

8. 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.
9. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.2 Description of Test Modes

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		●	●

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz

PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

Radiated Emission Test (Above 1GHz):

☒ 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).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	0, 19, 39	GFSK	1
0 to 39	1, 19, 38	GFSK	2

Radiated Emission Test (Below 1GHz):

☒ 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).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	0	GFSK	1

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	0	GFSK	1

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ 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).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	0, 19, 39	GFSK	1
0 to 39	1, 19, 38	GFSK	2

Test Condition:

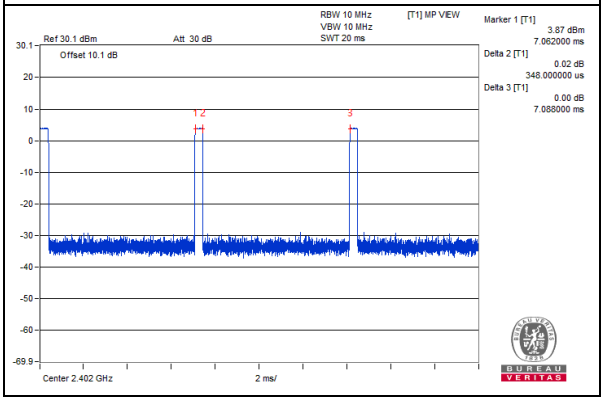
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (System)	TESTED BY
RE≥1G	25deg. C, 75%RH	120Vac, 60Hz	Nelson Teng
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Nelson Teng
PLC	25deg. C, 71%RH	120Vac, 60Hz	Sampson Chen
APCM	25deg. C, 60%RH	120Vac, 60Hz	Kevin Ko

3.3 Duty Cycle of Test Signal

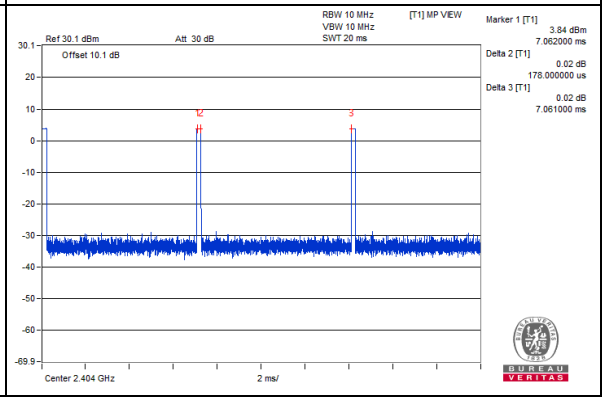
Fundamental frequency:

Duty cycle of test signal is < 98 %, duty factor shall be considered.
BT-LE 1M: Duty cycle = 0.348 ms/7.088 ms = 0.049, Duty factor = 10 * log(1/Duty cycle) = 13.09 dB
BT-LE 2M: Duty cycle = 0.178 ms/7.061 ms = 0.025, Duty factor = 10 * log(1/Duty cycle) = 15.98 dB
logi bolt 1M: Duty cycle = 0.348 ms/7.083 ms = 0.049, Duty factor = 10 * log(1/Duty cycle) = 13.09 dB
logi bolt 2M: Duty cycle = 0.18 ms/7.058 ms = 0.026, Duty factor = 10 * log(1/Duty cycle) = 15.93 dB

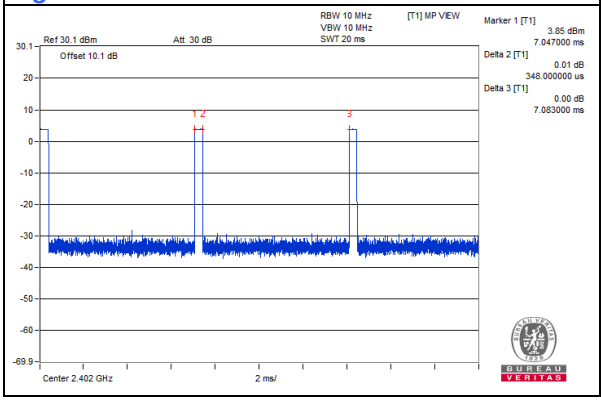
BT-LE 1M



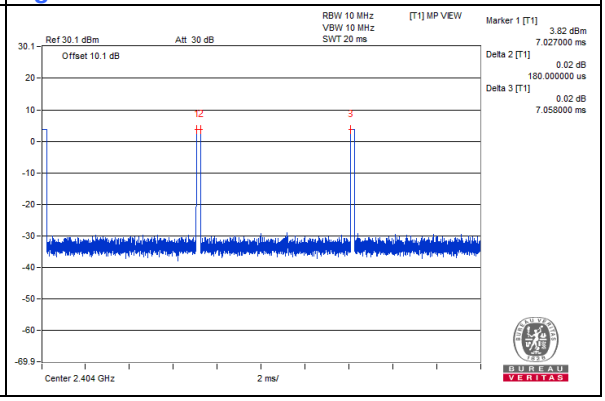
BT-LE 2M



logi bolt 1M



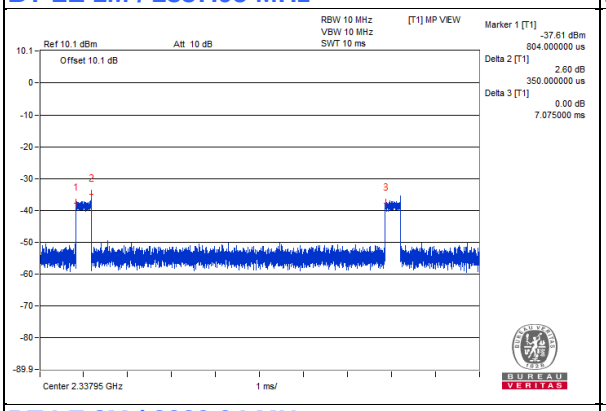
logi bolt 2M



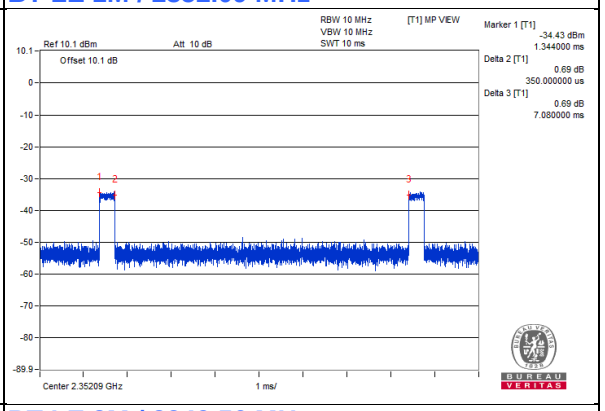
Note: This is highest operational duty cycle.

Unwanted frequency:

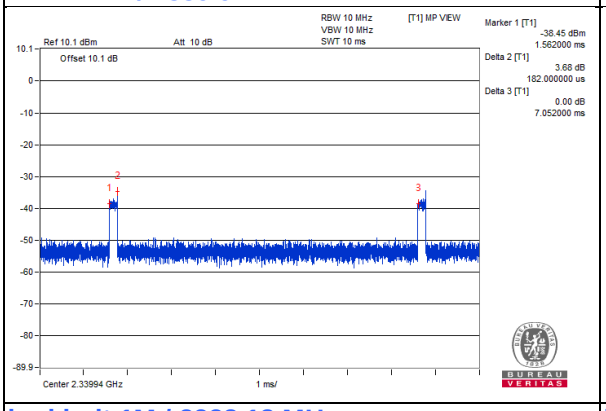
BT-LE 1M / 2337.95 MHz



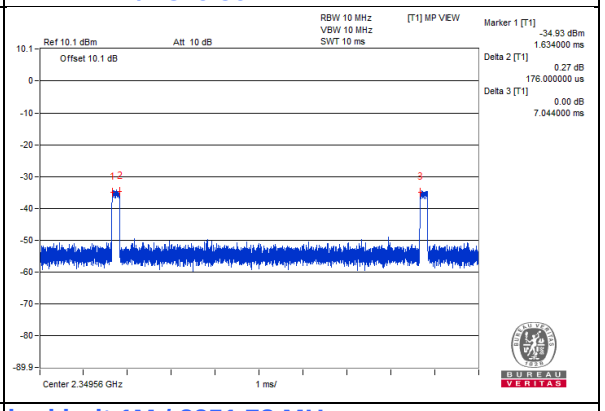
BT-LE 1M / 2352.09 MHz



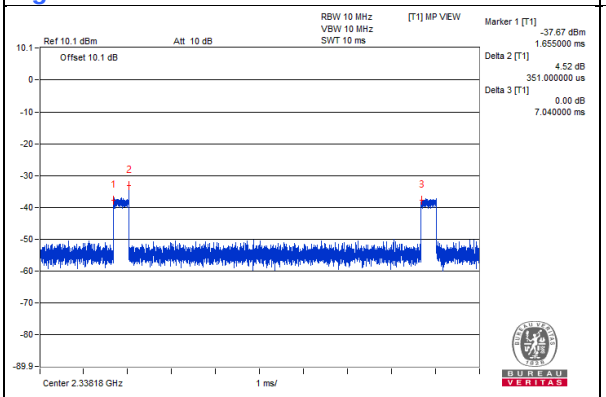
BT-LE 2M / 2339.94 MHz



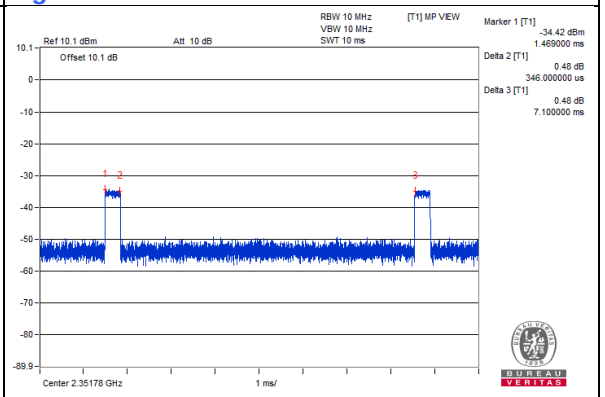
BT-LE 2M / 2349.56 MHz



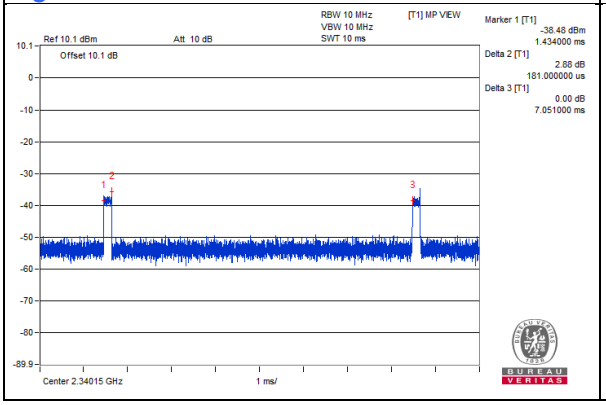
logi bolt 1M / 2338.18 MHz



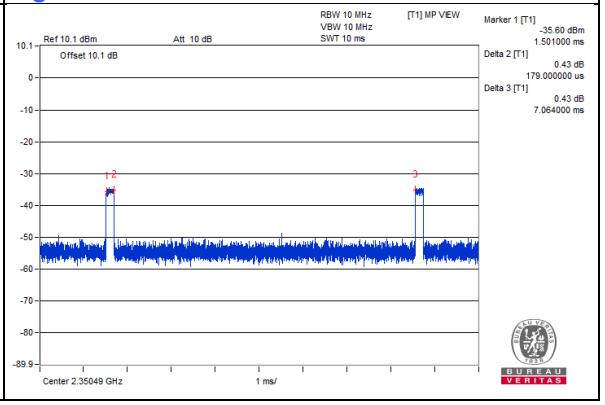
logi bolt 1M / 2351.78 MHz



logi bolt 2M / 2340.15 MHz



logi bolt 2M / 2350.49 MHz



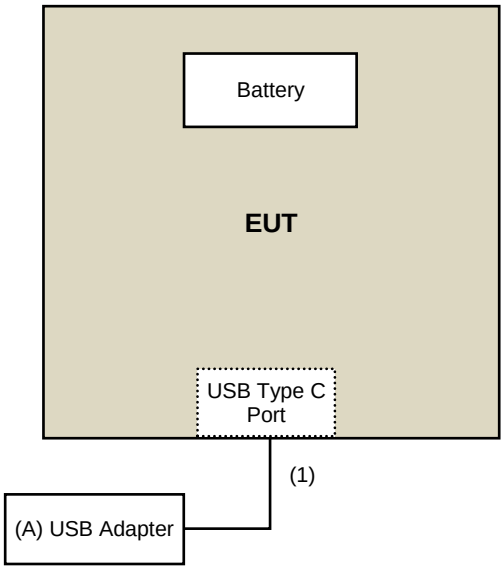
3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	USB Adapter	ASUS	EXA1205UA	NA	NA	Provided by Lab

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Type A to Type C Cable	1	1	Yes	0	Supplied by client

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

Test Standard:

FCC Part 15, Subpart C (15.247)

ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 15.247 Meas Guidance v05r02

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB 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

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, 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 20dB under any condition of modulation.

4.1.2 Test Instruments

For Radiated Emission test:

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Test Receiver R&S	ESR3	102528	2021/3/2	2022/3/1
Spectrum Analyzer KEYSIGHT	N9030B	MY57141948	2021/5/21	2022/5/20
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA
Pre_Amplifier EMCI	EMC001340	980142	2021/5/24	2022/5/23
LOOP ANTENNA Electro-Metrics	EM-6879	264	2021/3/5	2022/3/4
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-001	2021/1/7	2022/1/6
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-002	2021/1/7	2022/1/6
Pre_Amplifier EMCI	EMC330N	980538	2021/4/26	2022/4/25
Bilog Antenna Schwarzbeck	VULB 9168	9168-0842	2020/11/3	2021/11/2
RF Coaxial Cable COMMATE/PEWC	8D	966-5-1	2021/4/26	2022/4/25
RF Coaxial Cable COMMATE/PEWC	8D	966-5-2	2021/4/26	2022/4/25
RF Coaxial Cable COMMATE/PEWC	8D	966-5-3	2021/4/26	2022/4/25
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	2021/1/11	2022/1/10
Broad-Band Horn Antenna Schwarzbeck	BBHA 9120D	9120D-1819	2020/11/22	2021/11/21
Pre_Amplifier EMCI	EMC12630SE	980509	2021/4/26	2022/4/25
RF Coaxial Cable EMCI	EMC104-SM-SM-1500	180503	2021/4/26	2022/4/25
RF Coaxial Cable EMCI	EMC104-SM-SM-2000	180501	2021/4/26	2022/4/25
RF Coaxial Cable EMCI	EMC104-SM-SM-6000	180506	2021/4/26	2022/4/25
Pre_Amplifier EMCI	EMC184045SE	980387	2021/1/11	2022/1/10
SHF-EHF Horn Schwarzbeck	BBHA 9170	BBHA9170519	2020/11/22	2021/11/21
RF Cable-Frequency range: 1-40GHz EMCI	EMC102-KM-KM-1200	160924	2021/1/11	2022/1/10
RF cable (40GHz) EMCI	EMC-KM-KM-4000	200214	2021/3/10	2022/3/9

Note: 1. The test was performed in 966 Chamber No. 5.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: 2021/8/18 ~ 2021/8/26

For other test items

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Spectrum Analyzer R&S	FSV40	101516	2021/3/8	2022/3/7
Power Meter Anritsu	ML2495A	1529002	2021/6/21	2022/6/20
Pulse Power Sensor Anritsu	MA2411B	1339443	2021/5/31	2022/5/30
Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	2021/4/13	2022/4/12
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

Note: 1. The test was performed in Oven room 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: 2021/8/18

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

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

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average 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.

Note:

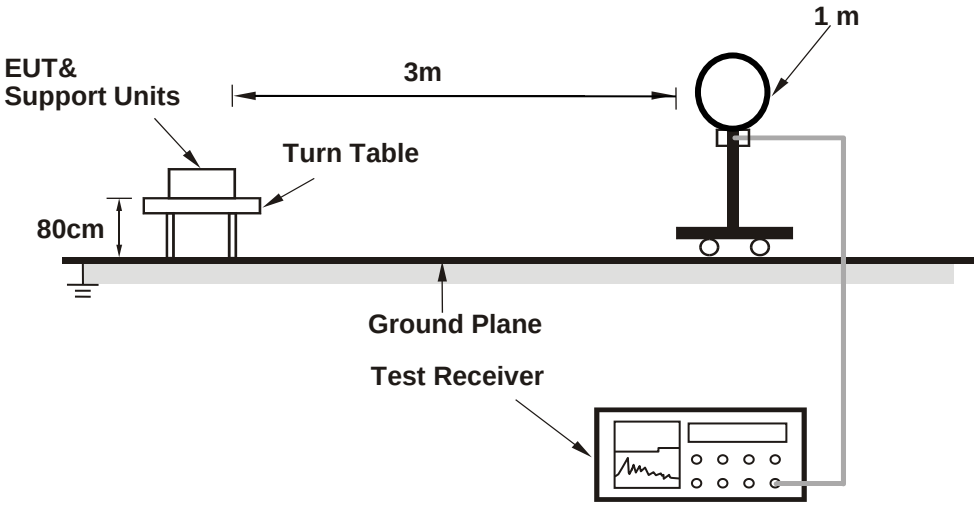
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

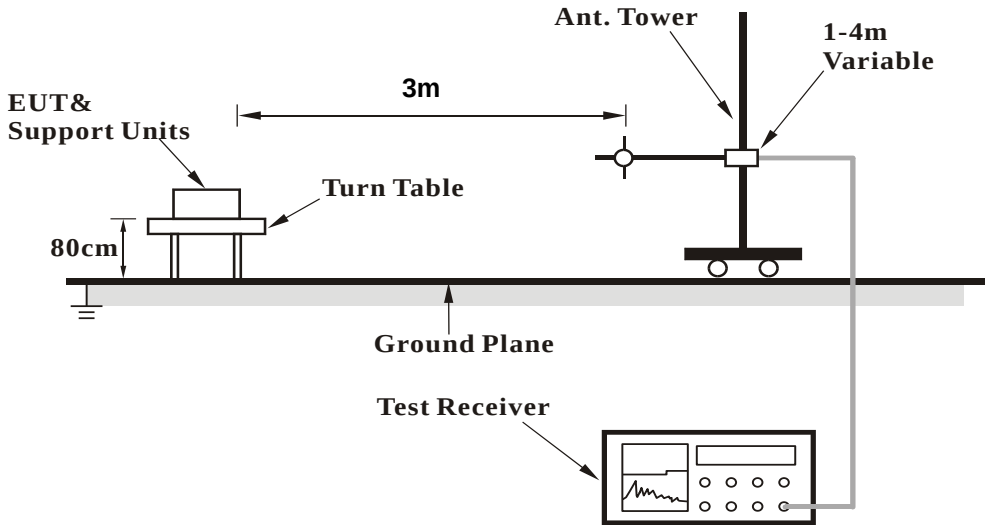
No deviation.

4.1.5 Test Setup

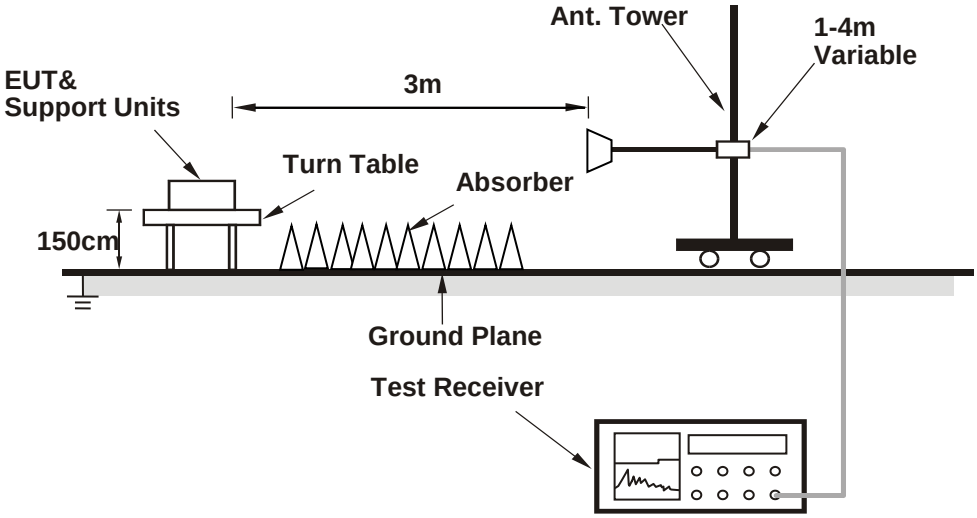
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

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

- 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

4.1.7 Test Results

Above 1GHz Data:

RF Mode	TX BT_LE-1M	**Channel**	CH 0：2402 MHz
Frequency Range	1GHz ~ 25GHz	**Detector Function**	Peak (PK) Average (AV)

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	2337.93	58.6 PK	74.0	-15.4	1.15 H	87	61.2	-2.6
2	2337.93	32.4 AV	54.0	-21.6	1.15 H	87	35.0	-2.6
3	*2402.00	102.0 PK			1.15 H	87	104.7	-2.7
4	*2402.00	75.8 AV			1.15 H	87	78.5	-2.7
5	4804.00	45.6 PK	74.0	-28.4	1.02 H	54	43.8	1.8
6	4804.00	19.4 AV	54.0	-34.6	1.02 H	54	17.6	1.8
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	2337.93	60.2 PK	74.0	-13.8	3.78 V	230	62.8	-2.6
2	2337.93	34.0 AV	54.0	-20.0	3.78 V	230	36.6	-2.6
3	*2402.00	99.8 PK			3.78 V	230	102.5	-2.7
4	*2402.00	73.6 AV			3.78 V	230	76.3	-2.7
5	4804.00	44.0 PK	74.0	-30.0	1.13 V	276	42.2	1.8
6	4804.00	17.8 AV	54.0	-36.2	1.13 V	276	16.0	1.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.348 ms / 7.088 ms) = -26.2 dB
   Please see section 3.3 for plotted duty.

RF Mode	TX BT_LE-1M	Channel	CH 19：2440 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	101.9 PK			1.27 H	88	104.6	-2.7
2	*2440.00	75.7 AV			1.27 H	88	78.4	-2.7
3	4880.00	45.7 PK	74.0	-28.3	1.02 H	61	44.0	1.7
4	4880.00	19.5 AV	54.0	-34.5	1.02 H	61	17.8	1.7
5	7320.00	53.3 PK	74.0	-20.7	1.01 H	32	46.0	7.3
6	7320.00	27.1 AV	54.0	-26.9	1.01 H	32	19.8	7.3
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	100.2 PK			2.66 V	100	102.9	-2.7
2	*2440.00	74.0 AV			2.66 V	100	76.7	-2.7
3	4880.00	43.4 PK	74.0	-30.6	1.19 V	287	41.7	1.7
4	4880.00	17.2 AV	54.0	-36.8	1.19 V	287	15.5	1.7
5	7320.00	54.8 PK	74.0	-19.2	1.07 V	202	47.5	7.3
6	7320.00	28.6 AV	54.0	-25.4	1.07 V	202	21.3	7.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.348 ms / 7.088 ms) = -26.2 dB
   Please see section 3.3 for plotted duty.

RF Mode	TX BT_LE-1M	Channel	CH 39：2480 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	2352.09	61.8 PK	74.0	-12.2	1.26 H	81	64.5	-2.7
2	2352.09	35.6 AV	54.0	-18.4	1.26 H	81	38.3	-2.7
3	*2480.00	101.3 PK			1.26 H	81	104.1	-2.8
4	*2480.00	75.1 AV			1.26 H	81	77.9	-2.8
5	2483.50	64.5 PK	74.0	-9.5	1.26 H	81	67.3	-2.8
6	2483.50	38.3 AV	54.0	-15.7	1.26 H	81	41.1	-2.8
7	4960.00	45.3 PK	74.0	-28.7	1.00 H	63	43.3	2.0
8	4960.00	19.1 AV	54.0	-34.9	1.00 H	63	17.1	2.0
9	7440.00	53.5 PK	74.0	-20.5	1.00 H	23	45.9	7.6
10	7440.00	27.3 AV	54.0	-26.7	1.00 H	23	19.7	7.6
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	2352.09	60.8 PK	74.0	-13.2	2.69 V	99	63.5	-2.7
2	2352.09	34.6 AV	54.0	-19.4	2.69 V	99	37.3	-2.7
3	*2480.00	100.1 PK			2.69 V	99	102.9	-2.8
4	*2480.00	73.9 AV			2.69 V	99	76.7	-2.8
5	2483.50	63.5 PK	74.0	-10.5	2.69 V	99	66.3	-2.8
6	2483.50	37.3 AV	54.0	-16.7	2.69 V	99	40.1	-2.8
7	4960.00	43.5 PK	74.0	-30.5	1.14 V	282	41.5	2.0
8	4960.00	17.3 AV	54.0	-36.7	1.14 V	282	15.3	2.0
9	7440.00	55.0 PK	74.0	-19.0	1.11 V	212	47.4	7.6
10	7440.00	28.8 AV	54.0	-25.2	1.11 V	212	21.2	7.6

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.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.348 ms / 7.088 ms) = -26.2 dB
   Please see section 3.3 for plotted duty.

RF Mode	TX BT_LE-2M	Channel	CH 1：2404 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	2339.94	59.3 PK	74.0	-14.7	1.16 H	90	61.9	-2.6
2	2339.94	27.3 AV	54.0	-26.7	1.16 H	90	29.9	-2.6
3	*2404.00	102.0 PK			1.16 H	90	104.7	-2.7
4	*2404.00	70.0 AV			1.16 H	90	72.7	-2.7
5	4808.00	45.8 PK	74.0	-28.2	1.06 H	74	44.0	1.8
6	4808.00	13.8 AV	54.0	-40.2	1.06 H	74	12.0	1.8
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	2339.94	58.0 PK	74.0	-16.0	2.70 V	107	60.6	-2.6
2	2339.94	26.0 AV	54.0	-28.0	2.70 V	107	28.6	-2.6
3	*2404.00	100.5 PK			2.70 V	107	103.2	-2.7
4	*2404.00	68.5 AV			2.70 V	107	71.2	-2.7
5	4808.00	43.2 PK	74.0	-30.8	1.09 V	288	41.4	1.8
6	4808.00	11.2 AV	54.0	-42.8	1.09 V	288	9.4	1.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.178 ms / 7.061 ms) = -32.0 dB
   Please see section 3.3 for plotted duty.

RF Mode	TX BT_LE-2M	Channel	CH 19：2440 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	102.3 PK			1.23 H	87	105.0	-2.7
2	*2440.00	70.3 AV			1.23 H	87	73.0	-2.7
3	4880.00	45.4 PK	74.0	-28.6	1.05 H	70	43.7	1.7
4	4880.00	13.4 AV	54.0	-40.6	1.05 H	70	11.7	1.7
5	7320.00	53.3 PK	74.0	-20.7	1.03 H	37	46.0	7.3
6	7320.00	21.3 AV	54.0	-32.7	1.03 H	37	14.0	7.3
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	100.4 PK			2.72 V	109	103.1	-2.7
2	*2440.00	68.4 AV			2.72 V	109	71.1	-2.7
3	4880.00	44.0 PK	74.0	-30.0	1.08 V	269	42.3	1.7
4	4880.00	12.0 AV	54.0	-42.0	1.08 V	269	10.3	1.7
5	7320.00	55.4 PK	74.0	-18.6	1.15 V	216	48.1	7.3
6	7320.00	23.4 AV	54.0	-30.6	1.15 V	216	16.1	7.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.178 ms / 7.061 ms) = -32.0 dB
   Please see section 3.3 for plotted duty.

RF Mode	TX BT_LE-2M	Channel	CH 38：2478 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	2349.56	60.7 PK	74.0	-13.3	1.27 H	80	63.4	-2.7
2	2349.56	28.7 AV	54.0	-25.3	1.27 H	80	31.4	-2.7
3	*2478.00	101.0 PK			1.27 H	80	103.8	-2.8
4	*2478.00	69.0 AV			1.27 H	80	71.8	-2.8
5	2483.50	60.5 PK	74.0	-13.5	1.27 H	80	63.3	-2.8
6	2483.50	28.5 AV	54.0	-25.5	1.27 H	80	31.3	-2.8
7	4956.00	45.8 PK	74.0	-28.2	1.03 H	67	43.9	1.9
8	4956.00	13.8 AV	54.0	-40.2	1.03 H	67	11.9	1.9
9	7434.00	53.2 PK	74.0	-20.8	1.03 H	11	45.7	7.5
10	7434.00	21.2 AV	54.0	-32.8	1.03 H	11	13.7	7.5
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	2349.56	61.0 PK	74.0	-13.0	2.71 V	101	63.7	-2.7
2	2349.56	29.0 AV	54.0	-25.0	2.71 V	101	31.7	-2.7
3	*2478.00	100.2 PK			2.71 V	101	103.0	-2.8
4	*2478.00	68.2 AV			2.71 V	101	71.0	-2.8
5	2483.50	60.3 PK	74.0	-13.7	2.71 V	101	63.1	-2.8
6	2483.50	28.3 AV	54.0	-25.7	2.71 V	101	31.1	-2.8
7	4956.00	43.5 PK	74.0	-30.5	1.00 V	0	41.6	1.9
8	4956.00	11.5 AV	54.0	-42.5	1.00 V	0	9.6	1.9
9	7434.00	55.3 PK	74.0	-18.7	1.00 V	0	47.8	7.5
10	7434.00	23.3 AV	54.0	-30.7	1.00 V	0	15.8	7.5

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.
5. " * ": Fundamental frequency.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.178 ms / 7.061 ms) = -32.0 dB
   Please see section 3.3 for plotted duty.

RF Mode	TX logi bolt 1M	Channel	CH 0：2402 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	2338.18	57.9 PK	74.0	-16.1	1.16 H	84	60.5	-2.6
2	2338.18	31.7 AV	54.0	-22.3	1.16 H	84	34.3	-2.6
3	*2402.00	101.6 PK			1.16 H	84	104.3	-2.7
4	*2402.00	75.4 AV			1.16 H	84	78.1	-2.7
5	4804.00	45.5 PK	74.0	-28.5	1.02 H	64	43.7	1.8
6	4804.00	19.3 AV	54.0	-34.7	1.02 H	64	17.5	1.8
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	2338.18	60.1 PK	74.0	-13.9	3.80 V	236	62.7	-2.6
2	2338.18	33.9 AV	54.0	-20.1	3.80 V	236	36.5	-2.6
3	*2402.00	99.0 PK			3.80 V	236	101.7	-2.7
4	*2402.00	72.8 AV			3.80 V	236	75.5	-2.7
5	4804.00	43.9 PK	74.0	-30.1	1.08 V	291	42.1	1.8
6	4804.00	17.7 AV	54.0	-36.3	1.08 V	291	15.9	1.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.348 ms / 7.083 ms) = -26.2 dB
   Please see section 3.3 for plotted duty.

RF Mode	TX logi bolt 1M	Channel	CH 19：2440 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	101.3 PK			1.27 H	88	104.0	-2.7
2	*2440.00	75.1 AV			1.27 H	88	77.8	-2.7
3	4880.00	45.3 PK	74.0	-28.7	1.03 H	55	43.6	1.7
4	4880.00	19.1 AV	54.0	-34.9	1.03 H	55	17.4	1.7
5	7320.00	53.1 PK	74.0	-20.9	1.05 H	28	45.8	7.3
6	7320.00	26.9 AV	54.0	-27.1	1.05 H	28	19.6	7.3
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	99.8 PK			2.64 V	107	102.5	-2.7
2	*2440.00	73.6 AV			2.64 V	107	76.3	-2.7
3	4880.00	42.9 PK	74.0	-31.1	1.18 V	302	41.2	1.7
4	4880.00	16.7 AV	54.0	-37.3	1.18 V	302	15.0	1.7
5	7320.00	54.7 PK	74.0	-19.3	1.04 V	198	47.4	7.3
6	7320.00	28.5 AV	54.0	-25.5	1.04 V	198	21.2	7.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.348 ms / 7.083 ms) = -26.2 dB
   Please see section 3.3 for plotted duty.

RF Mode	TX logi bolt 1M	Channel	CH 39：2480 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	2351.78	61.6 PK	74.0	-12.4	1.29 H	69	64.3	-2.7
2	2351.78	35.4 AV	54.0	-18.6	1.29 H	69	38.1	-2.7
3	*2480.00	101.1 PK			1.29 H	69	103.9	-2.8
4	*2480.00	74.9 AV			1.29 H	69	77.7	-2.8
5	2483.50	64.1 PK	74.0	-9.9	1.29 H	69	66.9	-2.8
6	2483.50	37.9 AV	54.0	-16.1	1.29 H	69	40.7	-2.8
7	4960.00	45.2 PK	74.0	-28.8	1.08 H	78	43.2	2.0
8	4960.00	19.0 AV	54.0	-35.0	1.08 H	78	17.0	2.0
9	7440.00	53.7 PK	74.0	-20.3	1.01 H	34	46.1	7.6
10	7440.00	27.5 AV	54.0	-26.5	1.01 H	34	19.9	7.6
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	2351.78	60.2 PK	74.0	-13.8	2.65 V	94	62.9	-2.7
2	2351.78	34.0 AV	54.0	-20.0	2.65 V	94	36.7	-2.7
3	*2480.00	99.7 PK			2.65 V	94	102.5	-2.8
4	*2480.00	73.5 AV			2.65 V	94	76.3	-2.8
5	2483.50	63.2 PK	74.0	-10.8	2.65 V	94	66.0	-2.8
6	2483.50	37.0 AV	54.0	-17.0	2.65 V	94	39.8	-2.8
7	4960.00	43.3 PK	74.0	-30.7	1.17 V	273	41.3	2.0
8	4960.00	17.1 AV	54.0	-36.9	1.17 V	273	15.1	2.0
9	7440.00	55.0 PK	74.0	-19.0	1.13 V	219	47.4	7.6
10	7440.00	28.8 AV	54.0	-25.2	1.13 V	219	21.2	7.6

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.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.348 ms / 7.083 ms) = -26.2 dB
   Please see section 3.3 for plotted duty.

RF Mode	TX logi bolt 2M	Channel	CH 1：2404 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	2340.15	59.1 PK	74.0	-14.9	1.13 H	93	61.7	-2.6
2	2340.15	27.2 AV	54.0	-26.8	1.13 H	93	29.8	-2.6
3	*2404.00	101.5 PK			1.13 H	93	104.2	-2.7
4	*2404.00	69.6 AV			1.13 H	93	72.3	-2.7
5	4808.00	45.6 PK	74.0	-28.4	1.09 H	77	43.8	1.8
6	4808.00	13.7 AV	54.0	-40.3	1.09 H	77	11.9	1.8
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	2340.15	58.0 PK	74.0	-16.0	2.76 V	100	60.6	-2.6
2	2340.15	26.1 AV	54.0	-27.9	2.76 V	100	28.7	-2.6
3	*2404.00	100.3 PK			2.76 V	100	103.0	-2.7
4	*2404.00	68.4 AV			2.76 V	100	71.1	-2.7
5	4808.00	43.1 PK	74.0	-30.9	1.05 V	298	41.3	1.8
6	4808.00	11.2 AV	54.0	-42.8	1.05 V	298	9.4	1.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.18 ms / 7.058 ms) = -31.9 dB
   Please see section 3.3 for plotted duty.

RF Mode	TX logi bolt 2M	Channel	CH 19：2440 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	102.0 PK			1.23 H	87	104.7	-2.7
2	*2440.00	70.1 AV			1.23 H	87	72.8	-2.7
3	4880.00	45.7 PK	74.0	-28.3	1.00 H	70	44.0	1.7
4	4880.00	13.8 AV	54.0	-40.2	1.00 H	70	12.1	1.7
5	7320.00	53.1 PK	74.0	-20.9	1.04 H	26	45.8	7.3
6	7320.00	21.2 AV	54.0	-32.8	1.04 H	26	13.9	7.3
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	99.8 PK			2.72 V	109	102.5	-2.7
2	*2440.00	67.9 AV			2.72 V	109	70.6	-2.7
3	4880.00	44.2 PK	74.0	-29.8	1.06 V	258	42.5	1.7
4	4880.00	12.3 AV	54.0	-41.7	1.06 V	258	10.6	1.7
5	7320.00	54.4 PK	74.0	-19.6	1.17 V	231	47.1	7.3
6	7320.00	22.5 AV	54.0	-31.5	1.17 V	231	15.2	7.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.18 ms / 7.058 ms) = -31.9 dB
   Please see section 3.3 for plotted duty.

RF Mode	TX logi bolt 2M	Channel	CH 38：2478 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	2350.49	60.5 PK	74.0	-13.5	1.27 H	80	63.2	-2.7
2	2350.49	28.6 AV	54.0	-25.4	1.27 H	80	31.3	-2.7
3	*2478.00	100.4 PK			1.27 H	80	103.2	-2.8
4	*2478.00	68.5 AV			1.27 H	80	71.3	-2.8
5	2483.50	60.3 PK	74.0	-13.7	1.27 H	80	63.1	-2.8
6	2483.50	28.4 AV	54.0	-25.6	1.27 H	80	31.2	-2.8
7	4956.00	45.6 PK	74.0	-28.4	1.00 H	64	43.7	1.9
8	4956.00	13.7 AV	54.0	-40.3	1.00 H	64	11.8	1.9
9	7434.00	52.7 PK	74.0	-21.3	1.00 H	14	45.2	7.5
10	7434.00	20.8 AV	54.0	-33.2	1.00 H	14	13.3	7.5
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	2350.49	60.4 PK	74.0	-13.6	2.71 V	101	63.1	-2.7
2	2350.49	28.5 AV	54.0	-25.5	2.71 V	101	31.2	-2.7
3	*2478.00	99.6 PK			2.71 V	101	102.4	-2.8
4	*2478.00	67.7 AV			2.71 V	101	70.5	-2.8
5	2483.50	59.7 PK	74.0	-14.3	2.71 V	101	62.5	-2.8
6	2483.50	27.8 AV	54.0	-26.2	2.71 V	101	30.6	-2.8
7	4956.00	42.8 PK	74.0	-31.2	1.05 V	258	40.9	1.9
8	4956.00	10.9 AV	54.0	-43.1	1.05 V	258	9.0	1.9
9	7434.00	54.8 PK	74.0	-19.2	1.20 V	207	47.3	7.5
10	7434.00	22.9 AV	54.0	-31.1	1.20 V	207	15.4	7.5

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.
5. " * ": Fundamental frequency.
6. The average value is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.18 ms / 7.058 ms) = -31.9 dB
   Please see section 3.3 for plotted duty.

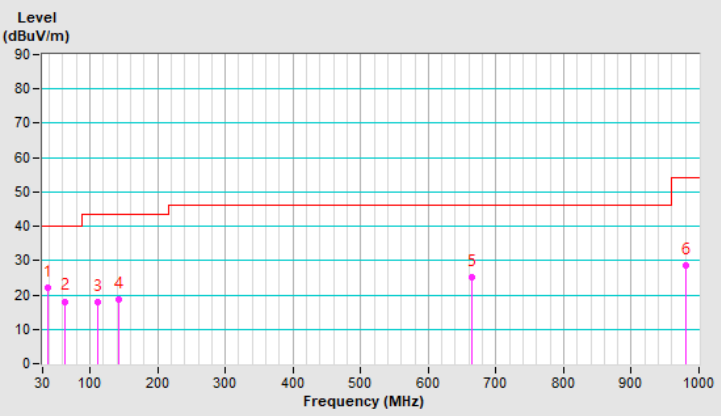
Below 1GHz Data:

RF Mode	TX BT_LE-1M	Channel	CH 0：2402 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	38.34	22.2 QP	40.0	-17.8	2.00 H	236	35.6	-13.4
2	62.06	18.1 QP	40.0	-21.9	3.00 H	196	31.9	-13.8
3	112.11	17.8 QP	43.5	-25.7	2.00 H	360	33.5	-15.7
4	141.94	18.6 QP	43.5	-24.9	3.00 H	274	31.6	-13.0
5	663.59	25.1 QP	46.0	-20.9	3.00 H	46	29.6	-4.5
6	981.04	28.5 QP	54.0	-25.5	1.00 H	212	28.9	-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 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

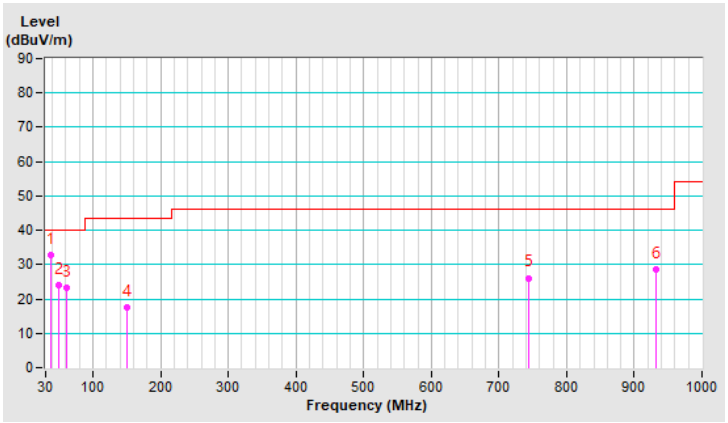


RF Mode	TX BT_LE-1M	Channel	CH 0：2402 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	**38.05**	**32.8 QP**	**40.0**	**-7.2**	**1.50 V**	**196**	**46.3**	**-13.5**
2	48.82	24.1 QP	40.0	-15.9	1.00 V	230	36.8	-12.7
3	61.33	23.1 QP	40.0	-16.9	1.50 V	360	36.8	-13.7
4	150.92	17.6 QP	43.5	-25.9	1.50 V	172	30.3	-12.7
5	744.10	26.1 QP	46.0	-19.9	2.00 V	209	29.0	-2.9
6	931.81	28.7 QP	46.0	-17.3	1.00 V	94	29.3	-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 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

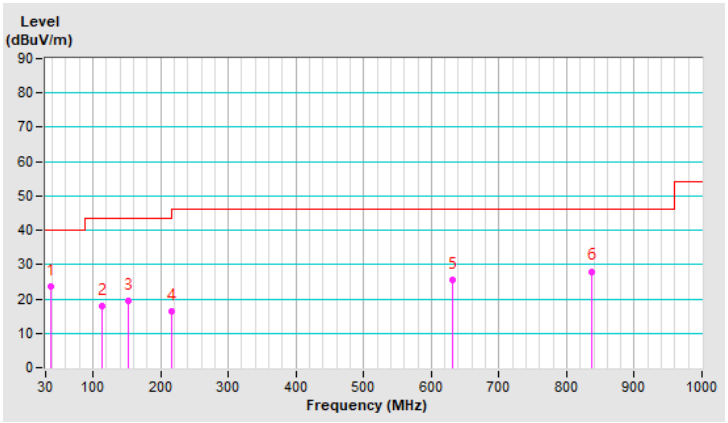


RF Mode	TX logi bolt 1M	Channel	CH 0：2402 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	38.10	23.5 QP	40.0	-16.5	3.00 H	254	37.0	-13.5
2	112.99	17.8 QP	43.5	-25.7	3.00 H	223	33.4	-15.6
3	152.91	19.5 QP	43.5	-24.0	2.50 H	236	32.2	-12.7
4	215.96	16.3 QP	43.5	-27.2	1.50 H	245	32.4	-16.1
5	631.62	25.5 QP	46.0	-20.5	2.00 H	85	30.3	-4.8
6	837.23	28.0 QP	46.0	-18.0	2.00 H	328	30.0	-2.0

Remarks:

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

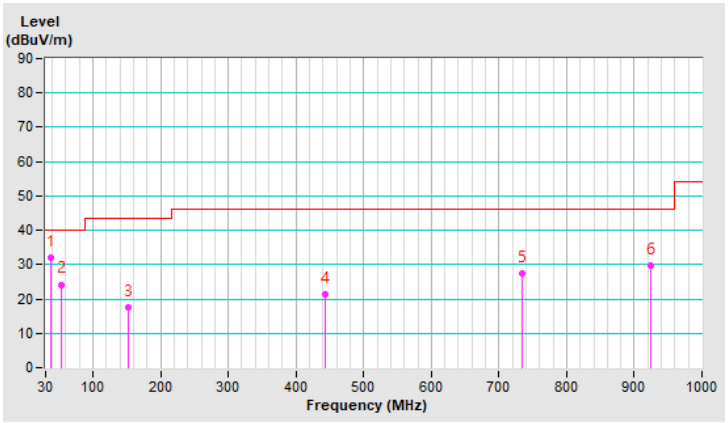


RF Mode	TX logi bolt 1M	Channel	CH 0：2402 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	38.25	31.9 QP	40.0	-8.1	1.50 V	200	45.3	-13.4
2	54.20	24.2 QP	40.0	-15.8	1.00 V	289	37.2	-13.0
3	153.05	17.6 QP	43.5	-25.9	3.00 V	360	30.3	-12.7
4	442.90	21.4 QP	46.0	-24.6	1.00 V	180	29.8	-8.4
5	733.87	27.3 QP	46.0	-18.7	2.00 V	121	30.6	-3.3
6	925.31	29.8 QP	46.0	-16.2	2.50 V	302	30.5	-0.7

Remarks:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1.The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Test Receiver R&S	ESCS 30	847124/029	2020/10/20	2021/10/19
LISN R&S	ESH3-Z5	848773/004	2020/10/27	2021/10/26
LISN R & S	ESH3-Z5	835239/001	2021/3/26	2022/3/25
50 ohms Terminator	50	3	2020/10/26	2021/10/25
RF Coaxial Cable JYEBO	5D-FB	COCCAB-001	2020/9/26	2021/9/25
Fixed attenuator STI	STI02-2200-10	005	2020/8/29	2021/8/28
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note: 1. The test was performed in Conduction 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: 2021/8/20

4.2.3 Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

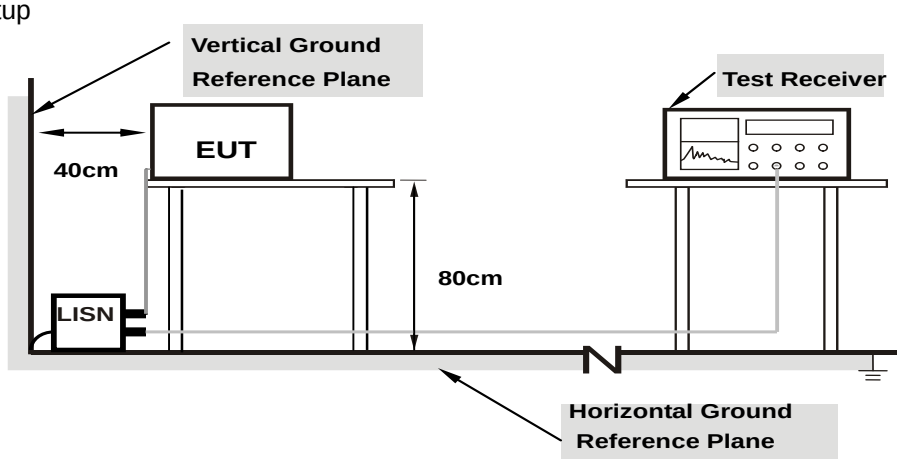
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

a. Placed the EUT on the testing table.

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

◆ BLE1M TX Modulated on channel 2402MHz

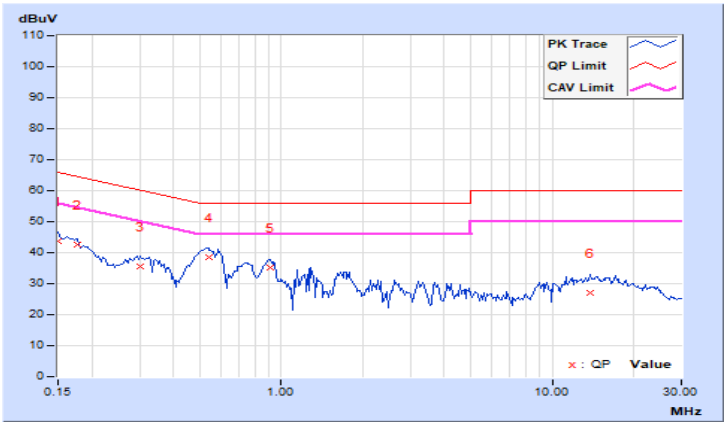
4.2.7 Test Results

RF Mode	TX BT_LE-1M	Channel	CH 0：2402 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.97	33.82	23.22	43.79	33.19	66.00	56.00	-22.21	-22.81
2	0.17734	9.99	32.54	20.73	42.53	30.72	64.61	54.61	-22.08	-23.89
3	0.30234	10.02	25.40	14.60	35.42	24.62	60.18	50.18	-24.76	-25.56
4	0.54063	10.04	28.62	17.04	38.66	27.08	56.00	46.00	-17.34	-18.92
5	0.91563	10.06	25.00	14.62	35.06	24.68	56.00	46.00	-20.94	-21.32
6	13.73828	10.99	16.20	8.81	27.19	19.80	60.00	50.00	-32.81	-30.20

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

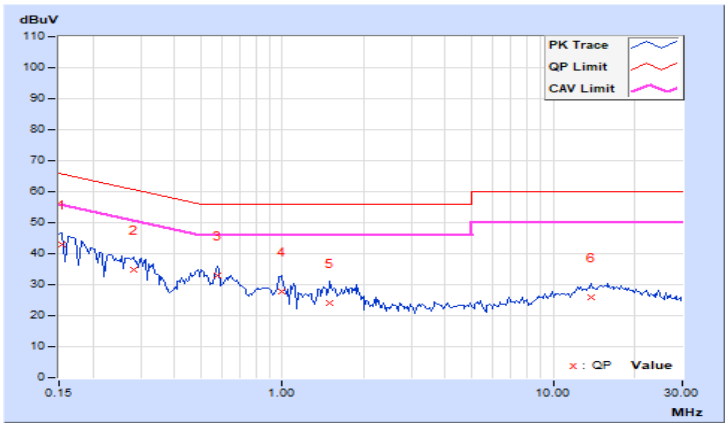


RF Mode	TX BT_LE-1M	Channel	CH 0：2402 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.95	32.99	13.15	42.94	23.10	65.79	55.79	-22.85	-32.69
2	0.28281	10.01	24.82	11.18	34.83	21.19	60.73	50.73	-25.90	-29.54
3	0.57578	10.03	22.92	12.77	32.95	22.80	56.00	46.00	-23.05	-23.20
4	0.98984	10.06	17.80	5.77	27.86	15.83	56.00	46.00	-28.14	-30.17
5	1.50391	10.10	13.98	3.41	24.08	13.51	56.00	46.00	-31.92	-32.49
6	13.89844	10.83	15.20	5.69	26.03	16.52	60.00	50.00	-33.97	-33.48

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

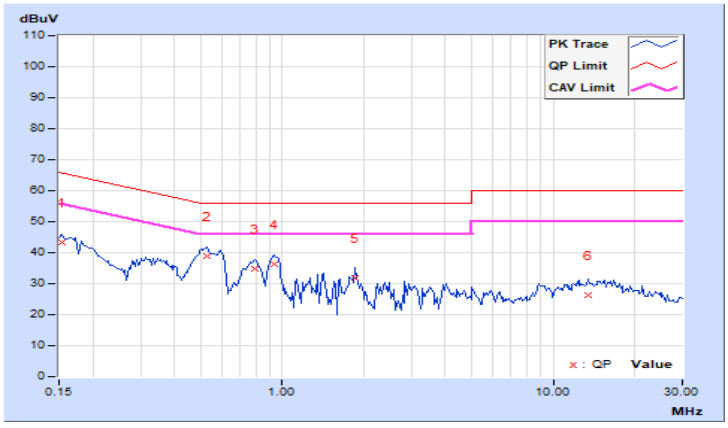


RF Mode	TX logi bolt 1M	Channel	CH 0：2402 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.97	33.41	19.98	43.38	29.95	65.79	55.79	-22.41	-25.84
2	**0.52500**	**10.04**	**28.87**	**17.76**	**38.91**	**27.80**	**56.00**	**46.00**	**-17.09**	**-18.20**
3	0.79063	10.06	24.66	13.96	34.72	24.02	56.00	46.00	-21.28	-21.98
4	0.93516	10.07	26.12	15.57	36.19	25.64	56.00	46.00	-19.81	-20.36
5	1.85547	10.11	21.58	12.45	31.69	22.56	56.00	46.00	-24.31	-23.44
6	13.46484	10.97	15.16	7.96	26.13	18.93	60.00	50.00	-33.87	-31.07

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

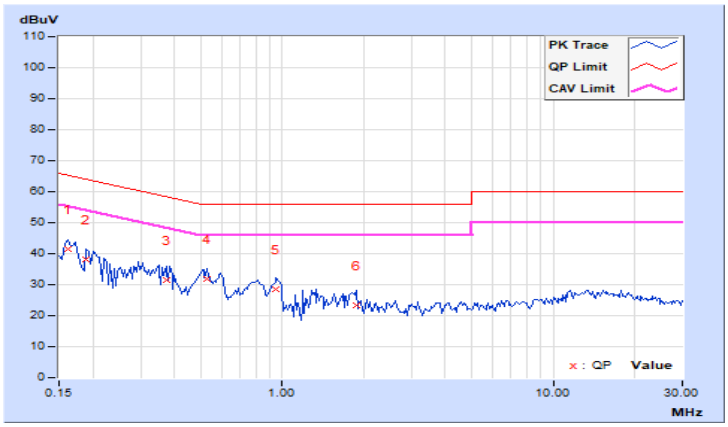


RF Mode	TX logi bolt 1M	Channel	CH 0：2402 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.96	31.53	13.55	41.49	23.51	65.38	55.38	-23.89	-31.87
2	0.18906	9.99	28.30	13.74	38.29	23.73	64.08	54.08	-25.79	-30.35
3	0.37266	10.02	21.62	10.15	31.64	20.17	58.44	48.44	-26.80	-28.27
4	0.52891	10.03	21.66	12.08	31.69	22.11	56.00	46.00	-24.31	-23.89
5	0.94688	10.06	18.52	7.97	28.58	18.03	56.00	46.00	-27.42	-27.97
6	1.87109	10.12	13.38	2.83	23.50	12.95	56.00	46.00	-32.50	-33.05

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

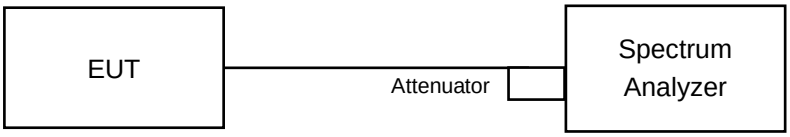


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. 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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

- 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

4.3.7 Test Results

BT-LE 1M

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	0.68	0.5	Pass
19	2440	0.66	0.5	Pass
39	2480	0.7	0.5	Pass

BT-LE 2M

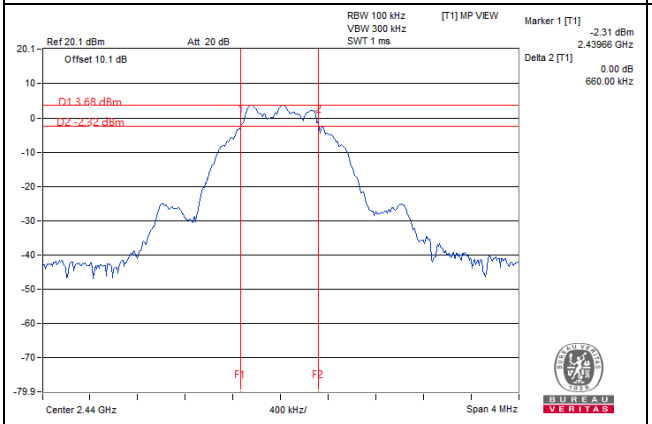
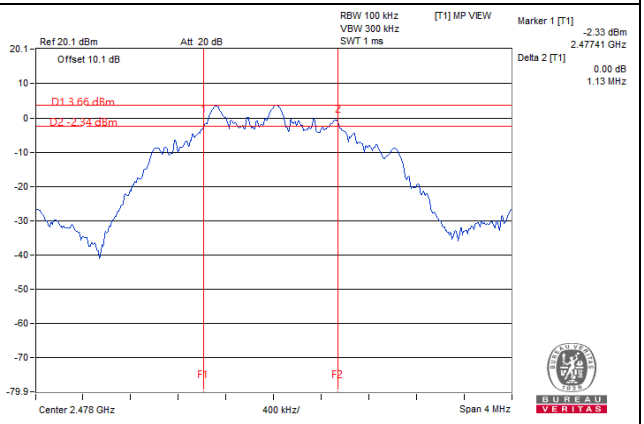
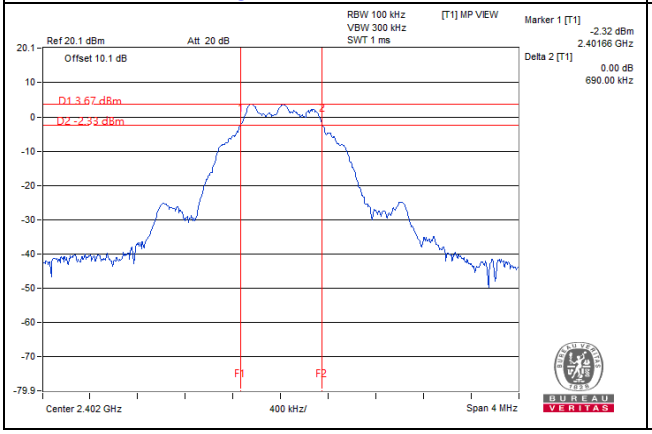
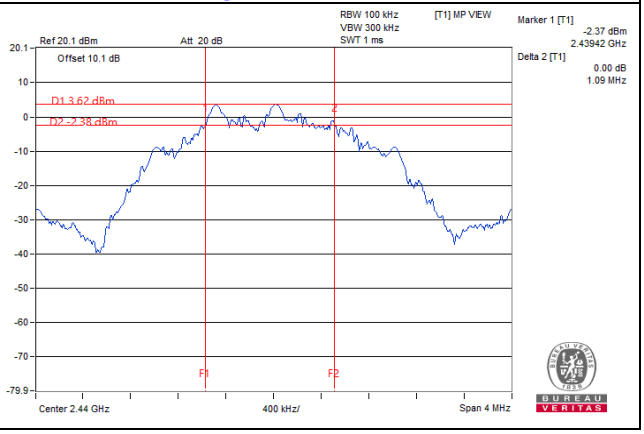
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2404	1.16	0.5	Pass
19	2440	1.14	0.5	Pass
38	2478	1.13	0.5	Pass

logi bolt 1M

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	0.69	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)	Pass / Fail
1	2404	1.14	0.5	Pass
19	2440	1.09	0.5	Pass
38	2478	1.14	0.5	Pass

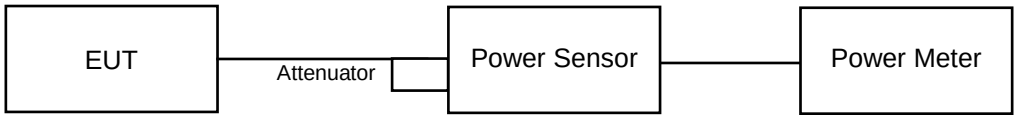
Spectrum Plot of Worst Value	
BT-LE 1M / CH 19	**BT-LE 2M / CH 38**
	
logi bolt 1M / CH 0	**logi bolt 2M / CH 19**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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 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.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

- 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

4.4.7 Test Results

FOR PEAK POWER

BT-LE 1M

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	2.404	3.81	30	Pass
19	2440	2.393	3.79	30	Pass
39	2480	2.382	3.77	30	Pass

BT-LE 2M

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2404	2.404	3.81	30	Pass
19	2440	2.393	3.79	30	Pass
38	2478	2.388	3.78	30	Pass

logi bolt 1M

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	2.404	3.81	30	Pass
19	2440	2.399	3.80	30	Pass
39	2480	2.388	3.78	30	Pass

logi bolt 2M

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2404	2.399	3.80	30	Pass
19	2440	2.393	3.79	30	Pass
38	2478	2.393	3.79	30	Pass

FOR AVERAGE POWER

BT-LE 1M

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	2.382	3.77
19	2440	2.371	3.75
39	2480	2.36	3.73

BT-LE 2M

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2404	2.382	3.77
19	2440	2.377	3.76
38	2478	2.36	3.73

logi bolt 1M

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	2.377	3.76
19	2440	2.371	3.75
39	2480	2.366	3.74

logi bolt 2M

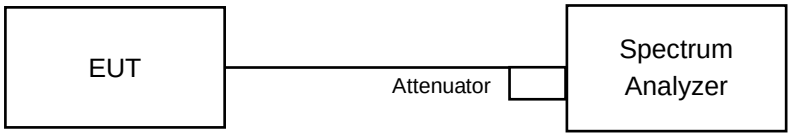
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2404	2.382	3.77
19	2440	2.371	3.75
38	2478	2.355	3.72

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 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 ≤ RBW ≤ 100 kHz.
d. Set the VBW ≥ 3 × 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.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

- 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

4.5.7 Test Results

BT-LE 1M

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	2402	0.28	8	Pass
19	2440	0.34	8	Pass
39	2480	0.12	8	Pass

BT-LE 2M

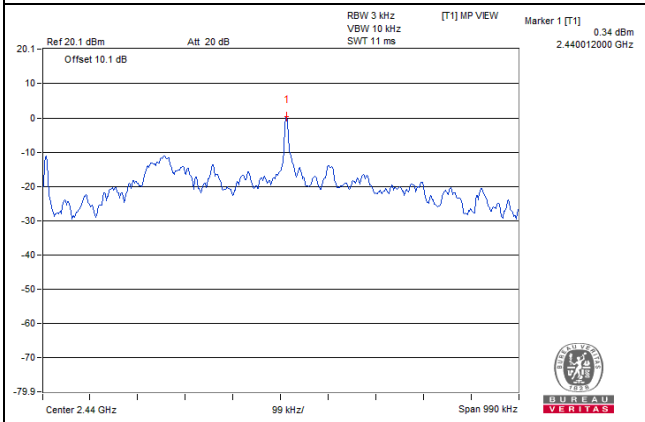
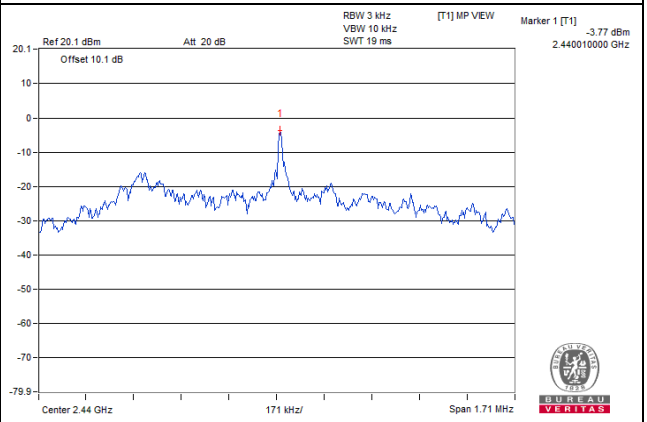
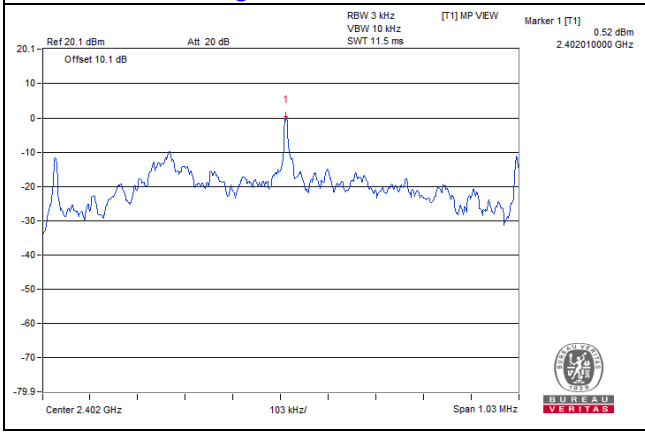
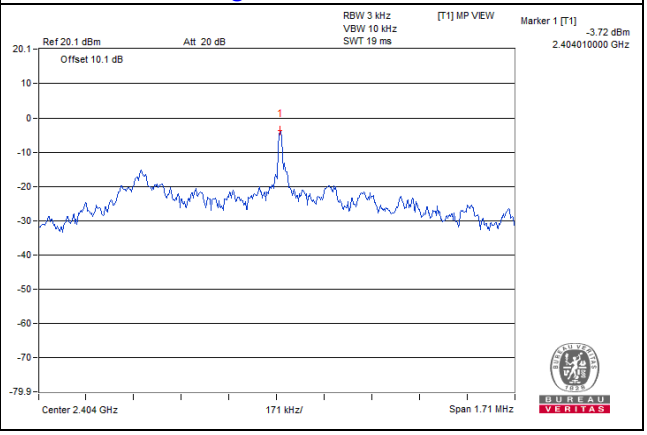
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2404	-4.05	8	Pass
19	2440	-3.77	8	Pass
38	2478	-4.09	8	Pass

logi bolt 1M

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	2402	0.52	8	Pass
19	2440	0.13	8	Pass
39	2480	0.29	8	Pass

logi bolt 2M

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2404	-3.72	8	Pass
19	2440	-3.88	8	Pass
38	2478	-4.04	8	Pass

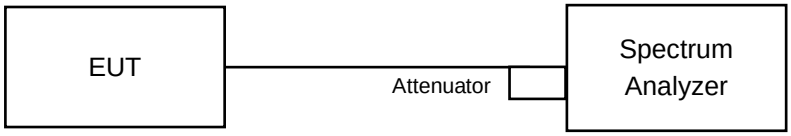
Spectrum Plot of Worst Value	
BT-LE 1M / CH 19	**BT-LE 2M / CH 19**
	
logi bolt 1M / CH 0	**logi bolt 2M / CH 1**
	

4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

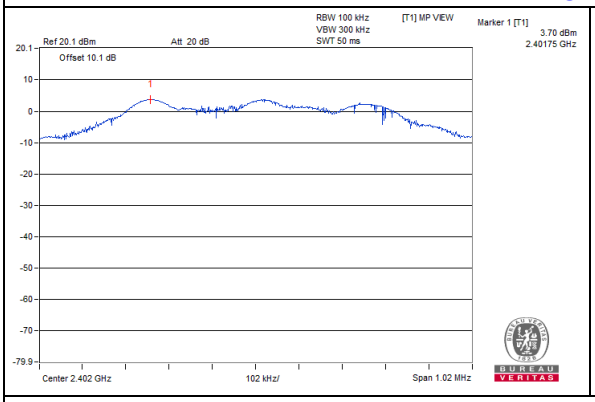
- BLE1M TX Modulated on channel 2402MHz
- BLE1M TX Modulated on channel 2440MHz
- BLE1M TX Modulated on channel 2480MHz
- BLE2M TX Modulated on channel 2404MHz
- BLE2M TX Modulated on channel 2440MHz
- BLE2M TX Modulated on channel 2478MHz

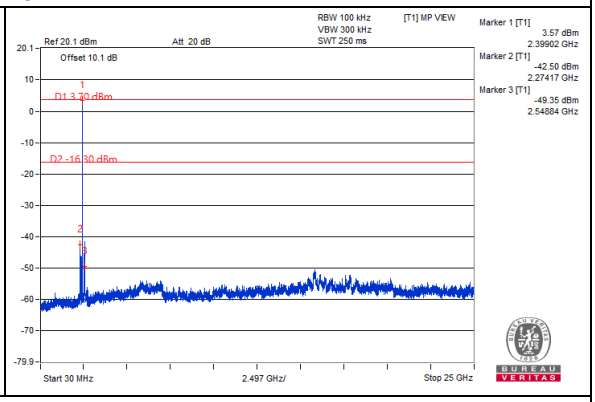
4.6.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

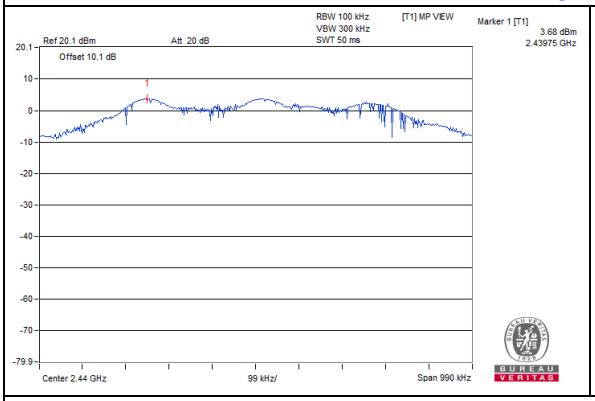
BT-LE 1M

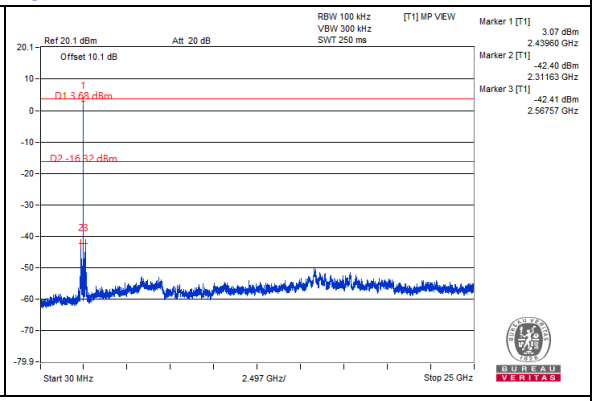
CH 0



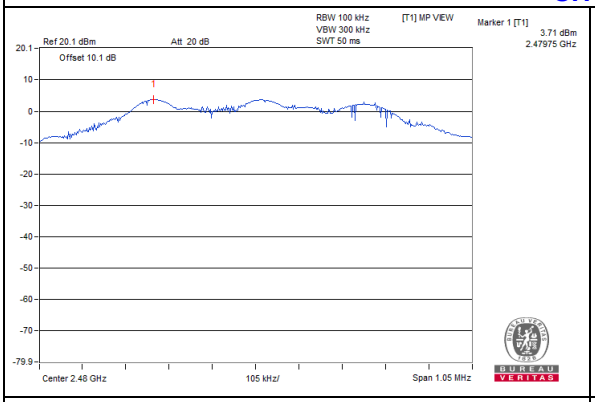


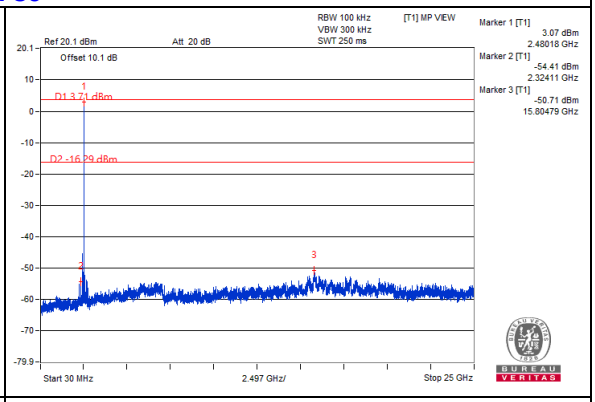
CH 19



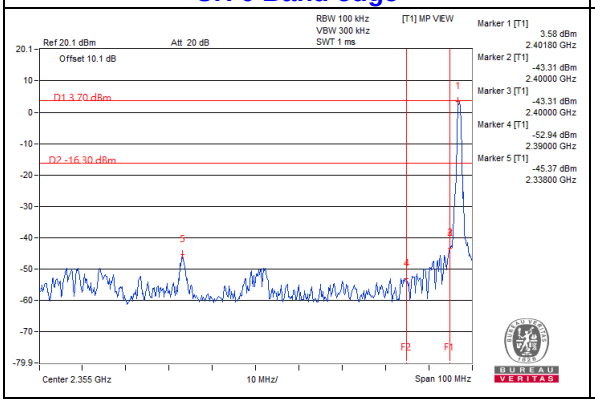


CH 39

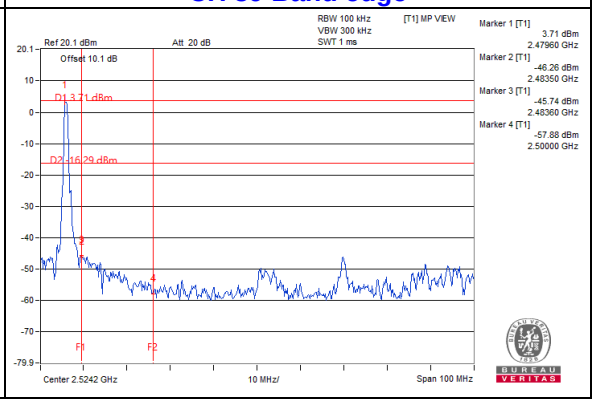




CH 0 Band edge

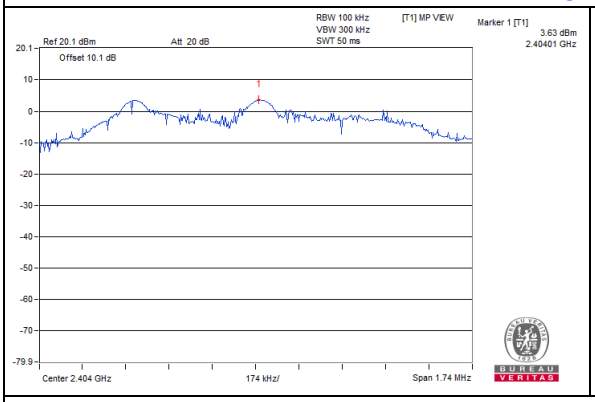


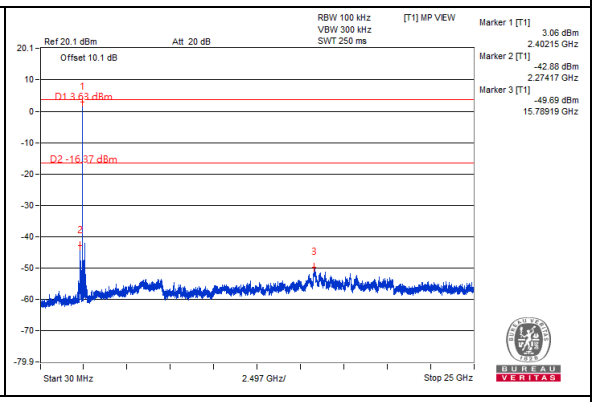
CH 39 Band edge



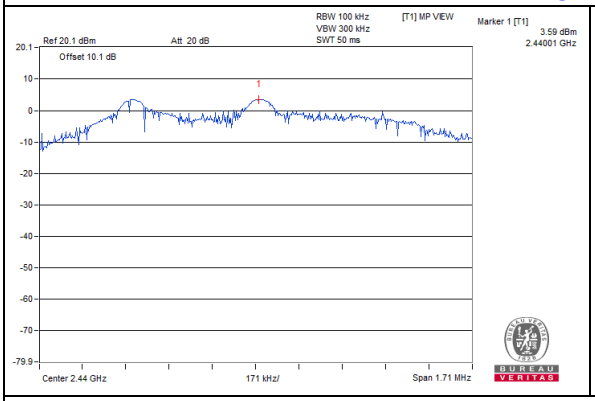
BT-LE 2M

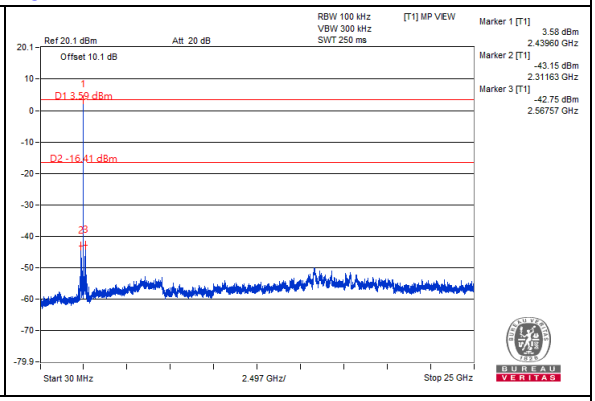
CH 1



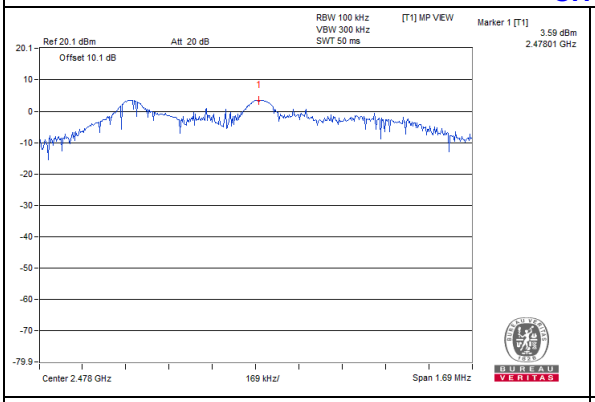


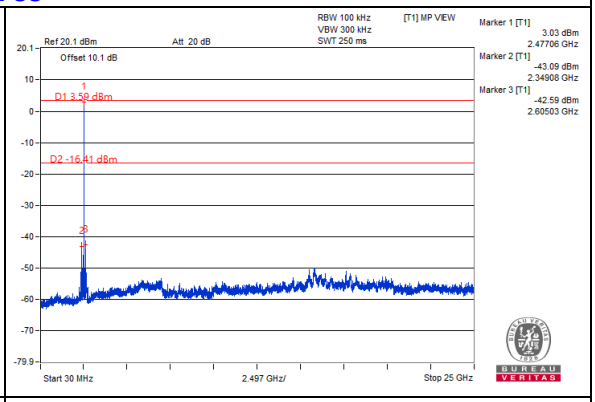
CH 19



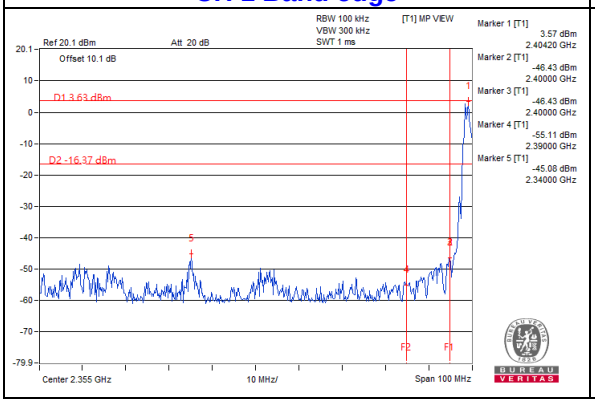


CH 38

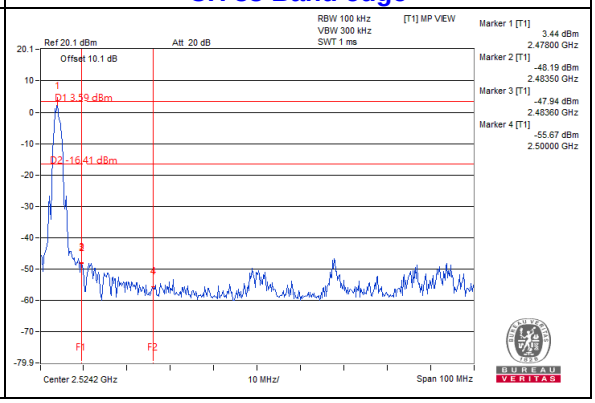




CH 1 Band edge

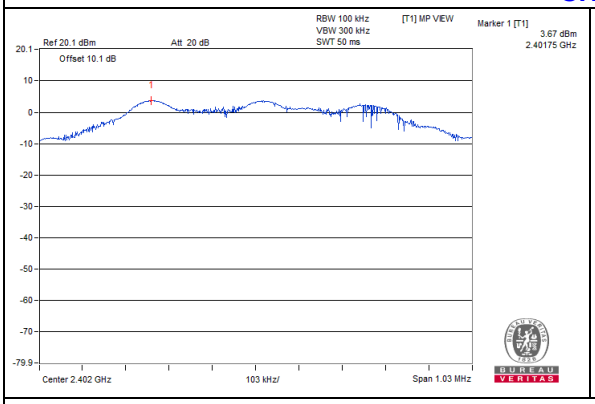


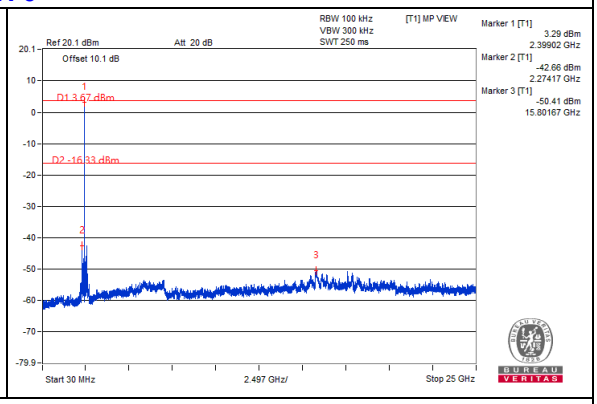
CH 38 Band edge



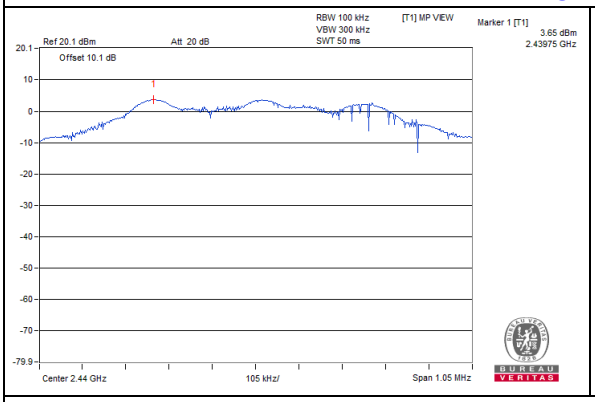
logi bolt 1M

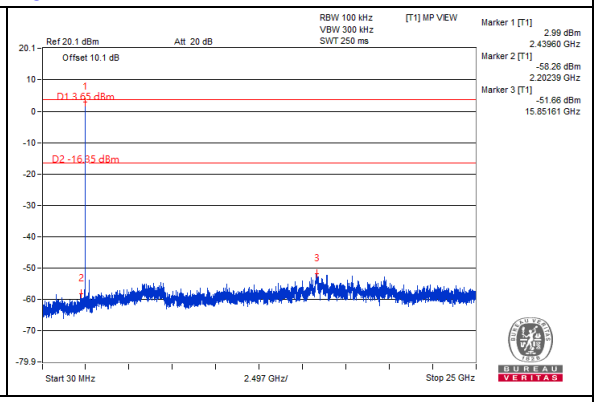
CH 0



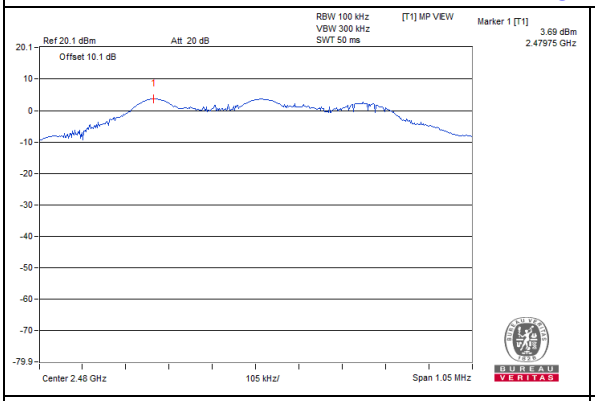


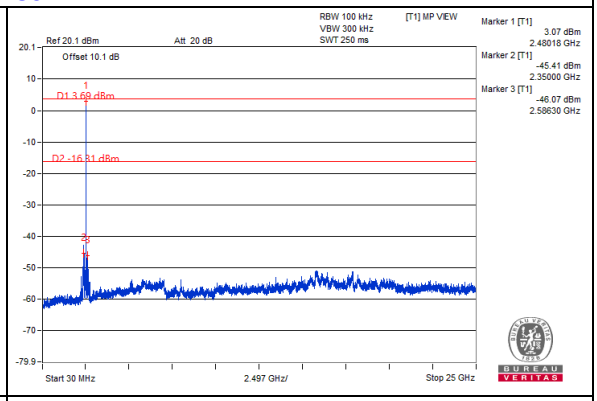
CH 19



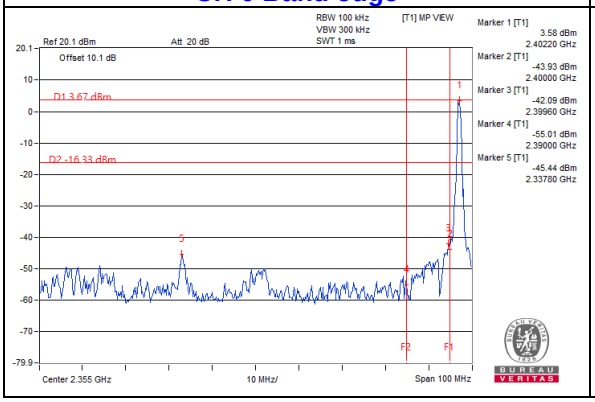


CH 39

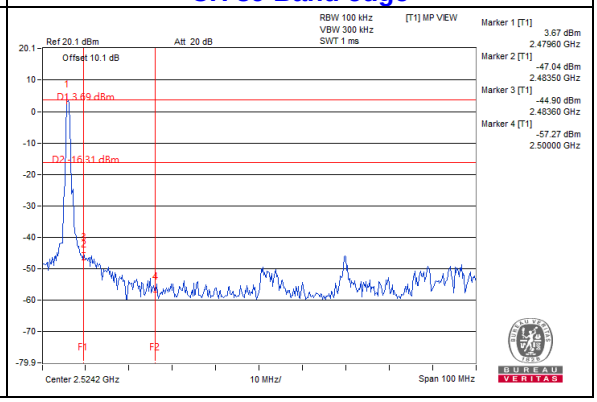




CH 0 Band edge

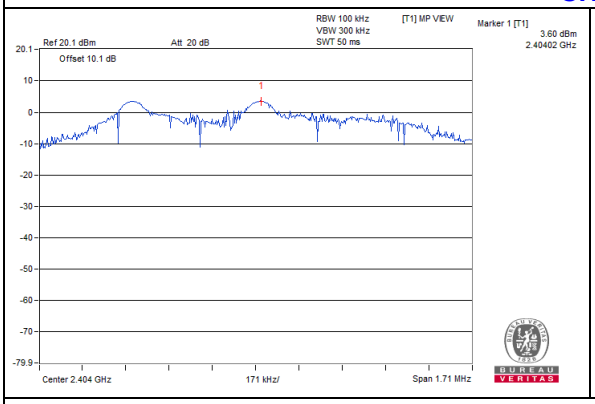


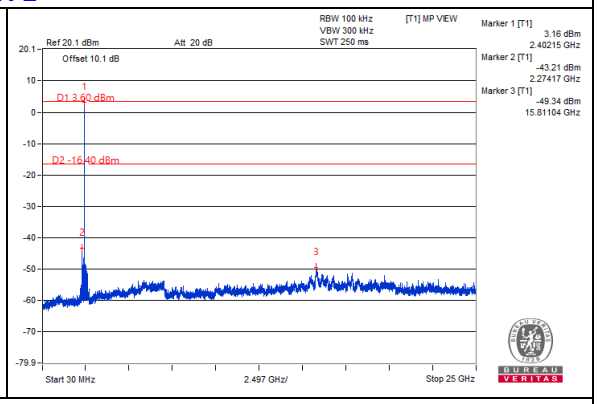
CH 39 Band edge



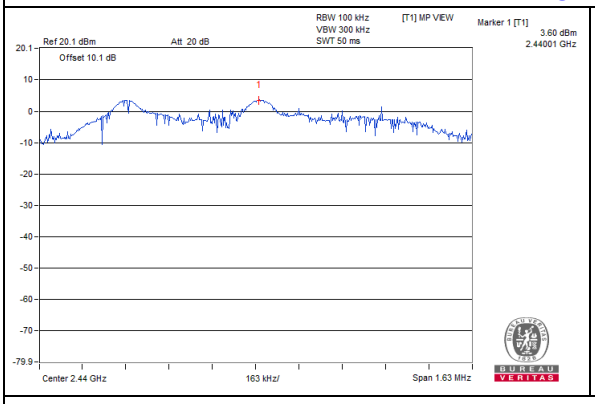
logi bolt 2M

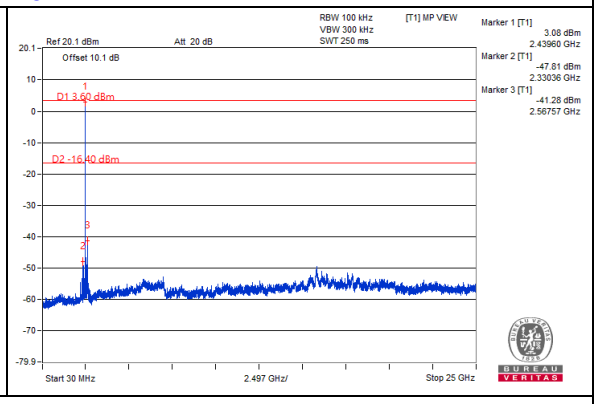
CH 1



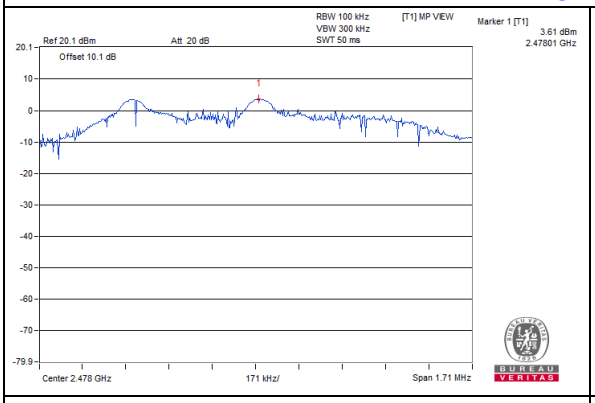


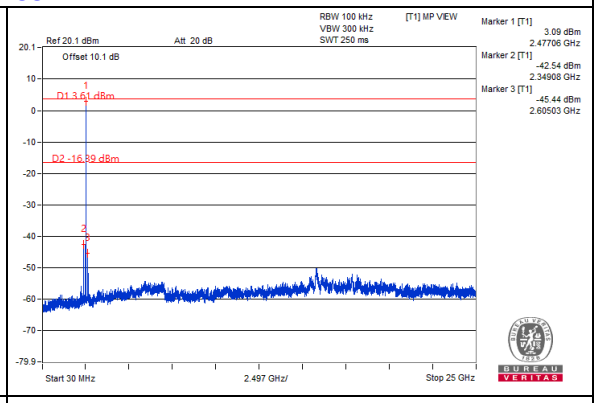
CH 19



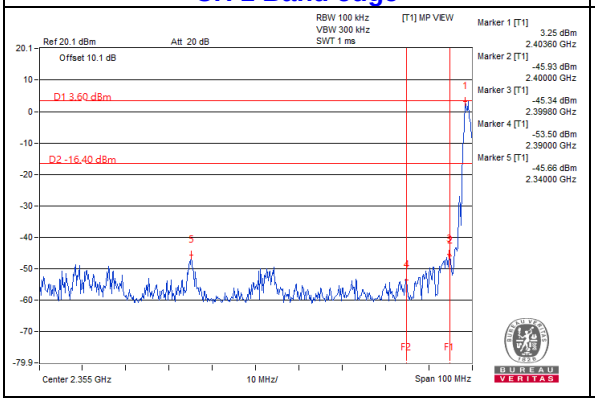


CH 38

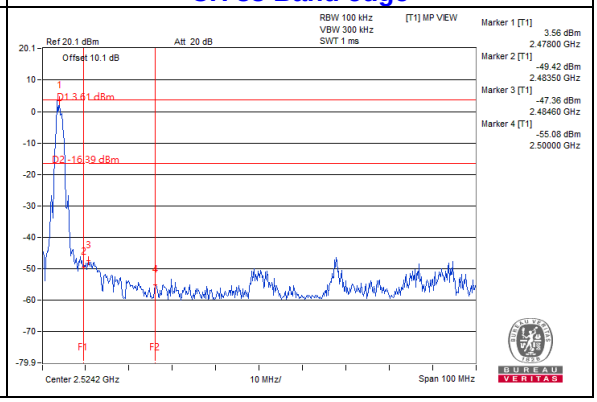




CH 1 Band edge



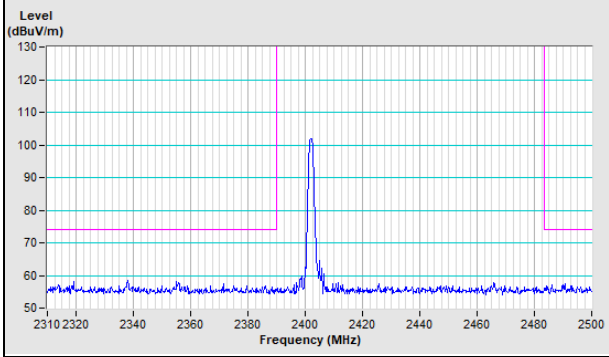
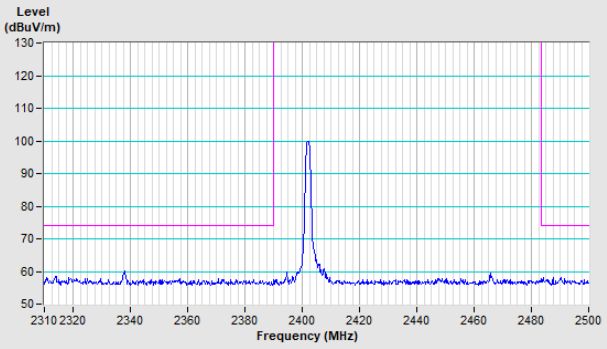
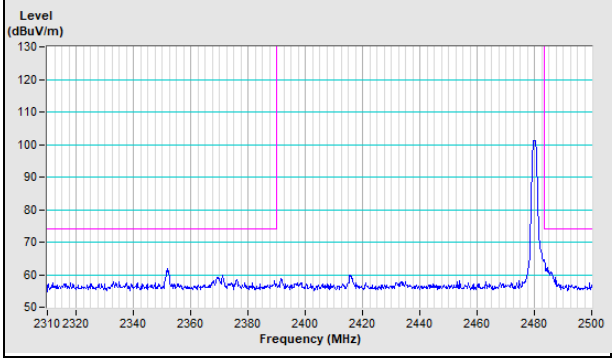
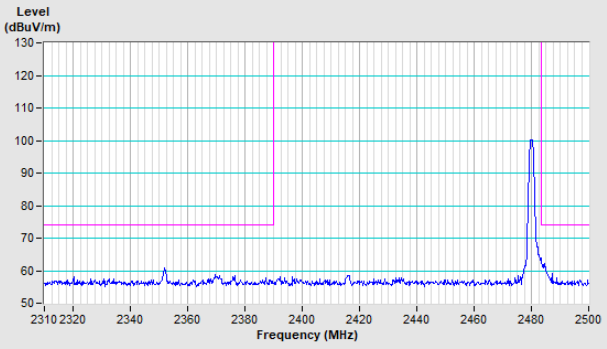
CH 38 Band edge

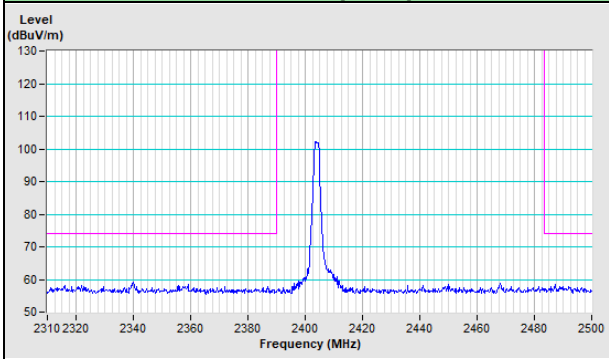
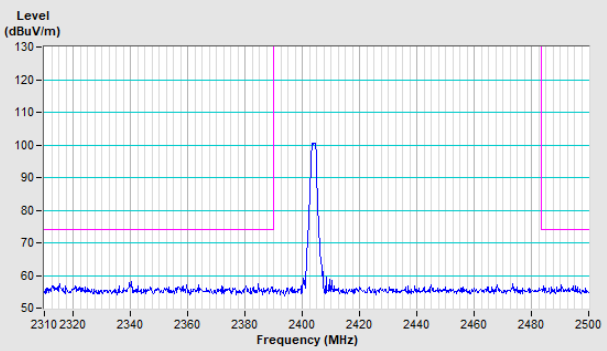
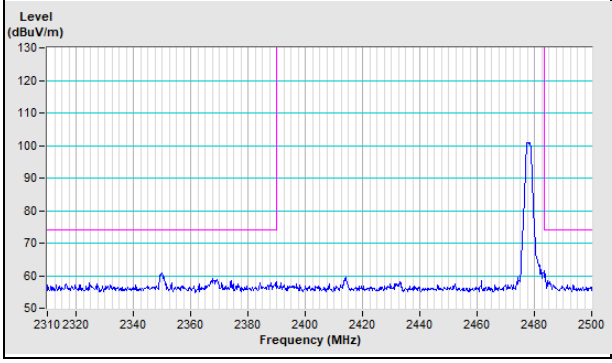
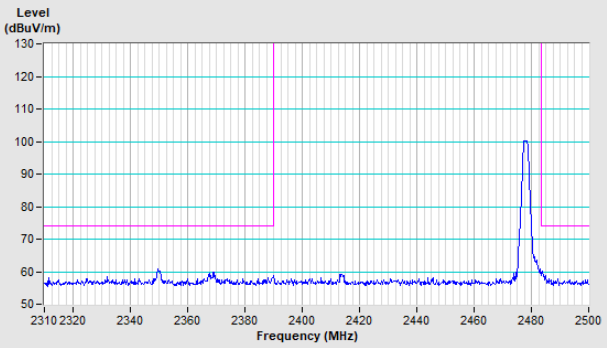


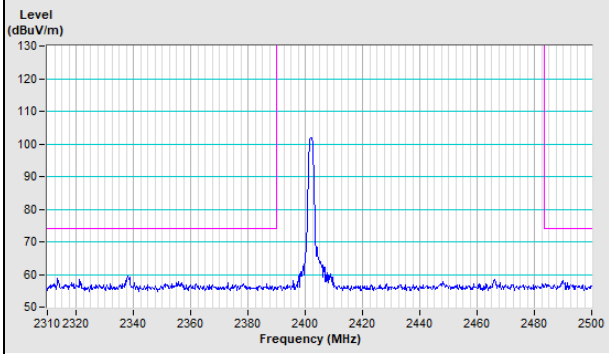
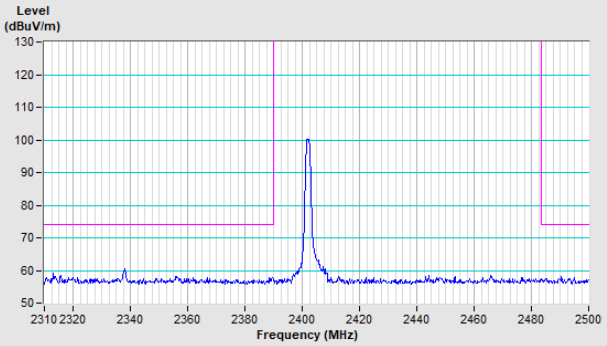
5 Pictures of Test Arrangements

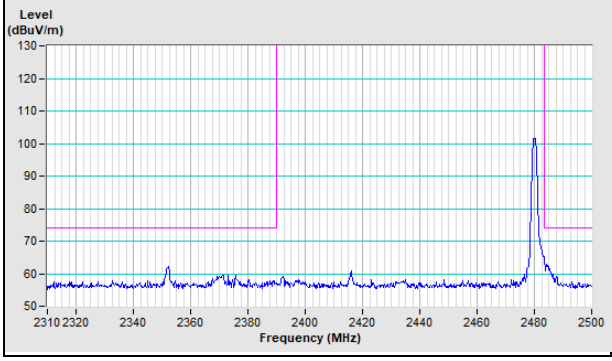
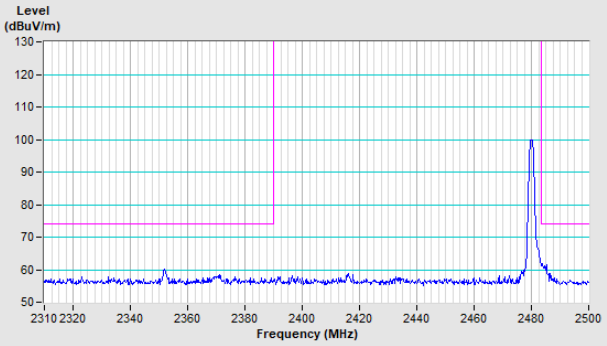
Please refer to the attached file (Test Setup Photo).

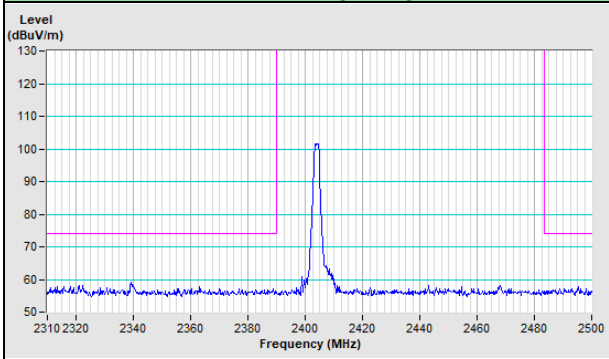
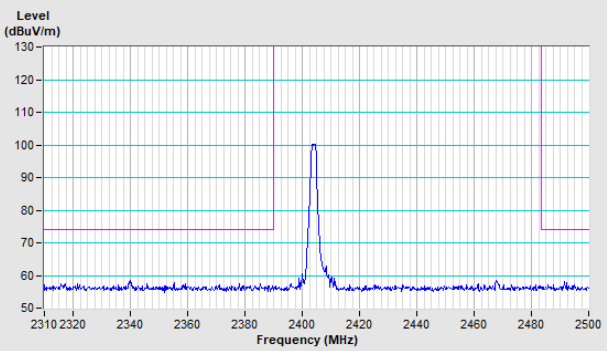
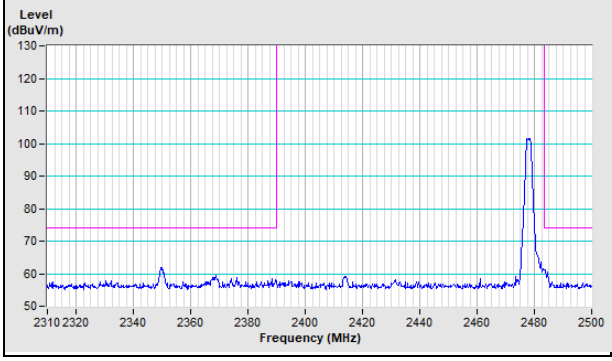
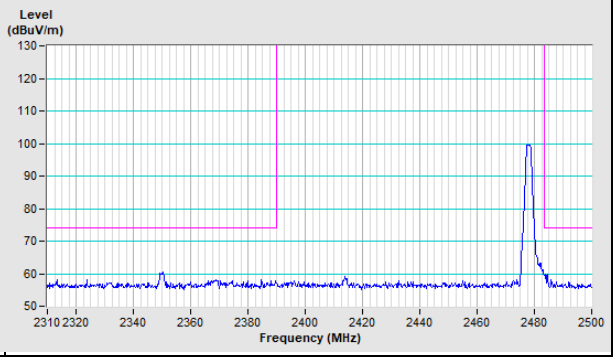
Annex A - Band-Edge Measurement

BT_LE-1M Channel 0	
Horizontal (Peak)	**Vertical (Peak)**
	
BT_LE-1M Channel 39	
Horizontal (Peak)	**Vertical (Peak)**
	

BT_LE-2M Channel 1	
Horizontal (Peak)	**Vertical (Peak)**
	
BT_LE-2M Channel 38	
Horizontal (Peak)	**Vertical (Peak)**
	

logi bolt 1M Channel 0	
Horizontal (Peak)	**Vertical (Peak)**
	

logi bolt 1M Channel 39	
Horizontal (Peak)	**Vertical (Peak)**
	

logi bolt 2M Channel 1	
Horizontal (Peak)	**Vertical (Peak)**
	
logi bolt 2M Channel 38	
Horizontal (Peak)	**Vertical (Peak)**
	

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

--- END ---