TEST REPORT

CERTIFICATE OF CONFORMITY

Standard:	**47 CFR FCC Part 15, Subpart C (Section 15.247)** **ANSI C63.10-2013**
Report No.:	RFBDKG-WTW-P21110121
FCC ID:	JNZVR0031
Model No.:	VR0031
Received Date:	2021/11/3
Test Date:	2021/12/17 ~ 2022/1/14
Issued Date:	2022/2/9
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

Approved by: _____ , **Date:** 2022/2/9

Clark Lin / Technical Manager

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Prepared by : Cherry Chuo / Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBDKG-WTW-P21110121	Original release.	2022/2/9

1 Certificate

Product:	Luminare
Brand:	Logitech
Test Model:	VR0031
Sample Status:	Engineering sample
Applicant:	Logitech Far East Ltd.
Test Date:	2021/12/17 ~ 2022/1/14
Standard:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10-2013
Measurement 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)	6dB 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	Pass	Minimum passing margin is -11.65 dB at 0.54063 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -4.0 dB at 46.73 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -4.0 dB at 2355.00 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
AC Power Conducted Emissions	150 kHz ~ 30 MHz	1.9 dB
Unwanted Emissions below 1 GHz	30 MHz ~ 1 GHz	5.1 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	5.1 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	Luminare
Brand	Logitech
Test Model	VR0031
Status of EUT	Engineering sample
Power Supply Rating	5 Vdc from USB interface
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	Up to 2 Mbps (*Note 1)
Operating Frequency	2402 ~ 2480 MHz (*Note 1)
Number of Channel	40 (*Note 1)
Output Power	**BT-LE 1M:** 2.35 mW **BT-LE 2M:** 2.323 mW
Accessory Device	NA
Cable Supplied	USB cable x 1 (Shielded, 1.9 m)

Note:

1. BT-LE supports 1Mbps and 2Mbps data rates, both have been evaluated in this test report. Refer to "**section 3.3 Description of Test Modes**" for more detail specification.
2. 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.

Brand	Model	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
Suike Electronics	99PC-IMOLA-TI-SK03	3.76749	2.4~2.4835	PCB printed	None

*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.

3.3 Channel List

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. For AC Conducted Emission items:with Adapter/ with Laptop. Pre-scan these modes and find the worst case as a representative test condition. 2. EUT can be used in the following ways: X/ Y/ Z. Pre-scan in these ways and find the worst case as a representative test condition.
Worst Case:	Z-plane

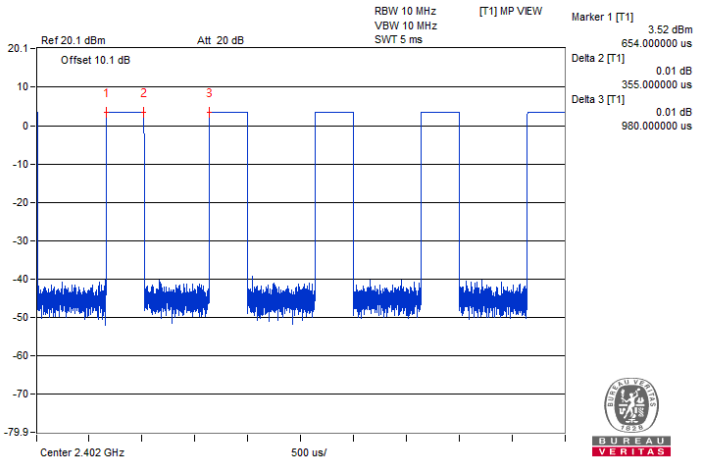
Following channel(s) was (were) selected for the final test as listed below:

Test Item	EUT Configure Mode	Mode	Tested Channel	Modulation	Data Rate Parameter
AC Power Conducted Emissions	B	BT-LE 1M	0	GFSK	1Mb/s
Unwanted Emissions below 1 GHz	B	BT-LE 1M	0	GFSK	1Mb/s
Unwanted Emissions above 1 GHz	A	BT-LE 1M	0, 19, 39	GFSK	1Mb/s
		BT-LE 2M	1, 19, 38	GFSK	2Mb/s
RF Output Power \ 6dB Bandwidth \ Power Spectral Density \ Conducted Out of Band Emissions	C	BT-LE 1M	0, 19, 39	GFSK	1Mb/s
		BT-LE 2M	1, 19, 38	GFSK	2Mb/s
EUT Configure Mode:	A	With Laptop			
	B	With Adapter			
	C	Antenna Port			

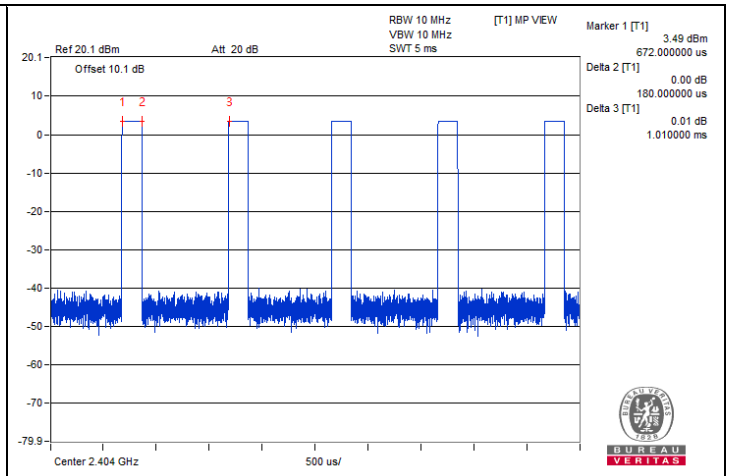
3.5 Duty Cycle of Test Signal

Duty cycle of test signal is >= 98 %, duty factor is not required.
Duty cycle of test signal is < 98 %, duty factor shall be considered.

BT-LE 1M: Duty cycle = 0.355 ms / 0.98 ms = 36.2 %, duty factor = 10 * log (1/Duty cycle) = 4.41 dB
BT-LE 2M: Duty cycle = 0.18 ms / 1.01 ms = 17.8 %, duty factor = 10 * log (1/Duty cycle) = 7.49 dB



BT-LE 1M



BT-LE 2M

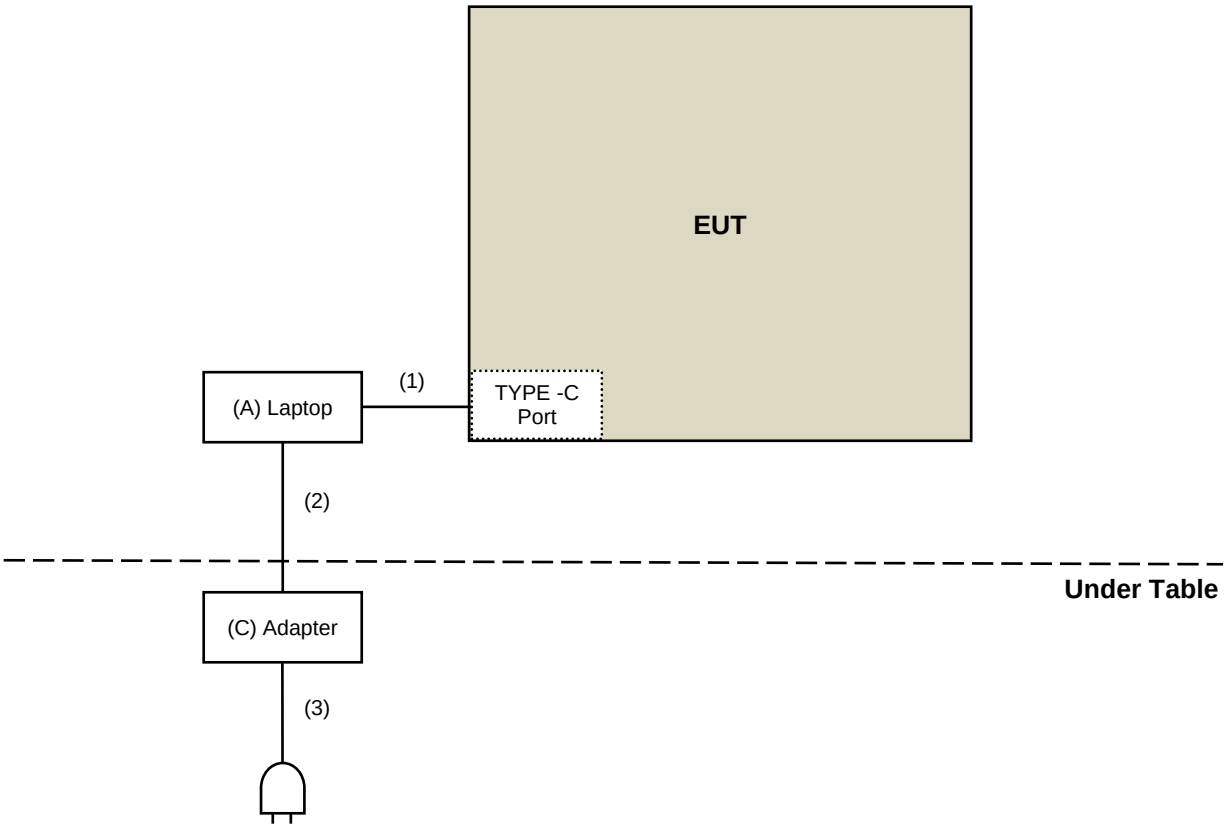
3.6 Test Program Used and Operation Descriptions

Controlling software (NumberLock) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

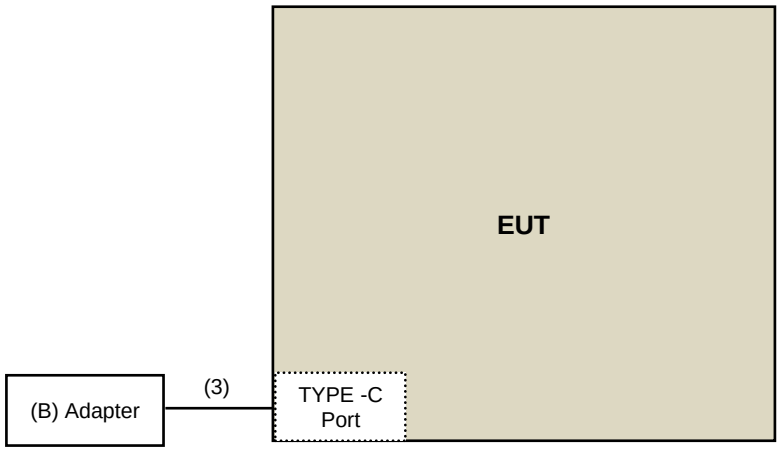
Test Item	Test Program Used and Operation Descriptions
Unwanted Emissions / RF Output Power / Power Spectral Density / 6dB Bandwidth	◆ BLE1M TX Modulated low duty 2402MHz ◆ BLE1M TX Modulated low duty 2440MHz ◆ BLE1M TX Modulated low duty 2480MHz ◆ BLE2M TX Modulated low duty 2404MHz ◆ BLE2M TX Modulated low duty 2440MHz ◆ BLE2M TX Modulated low duty 2478MHz

3.7 Connection Diagram of EUT and Peripheral Devices

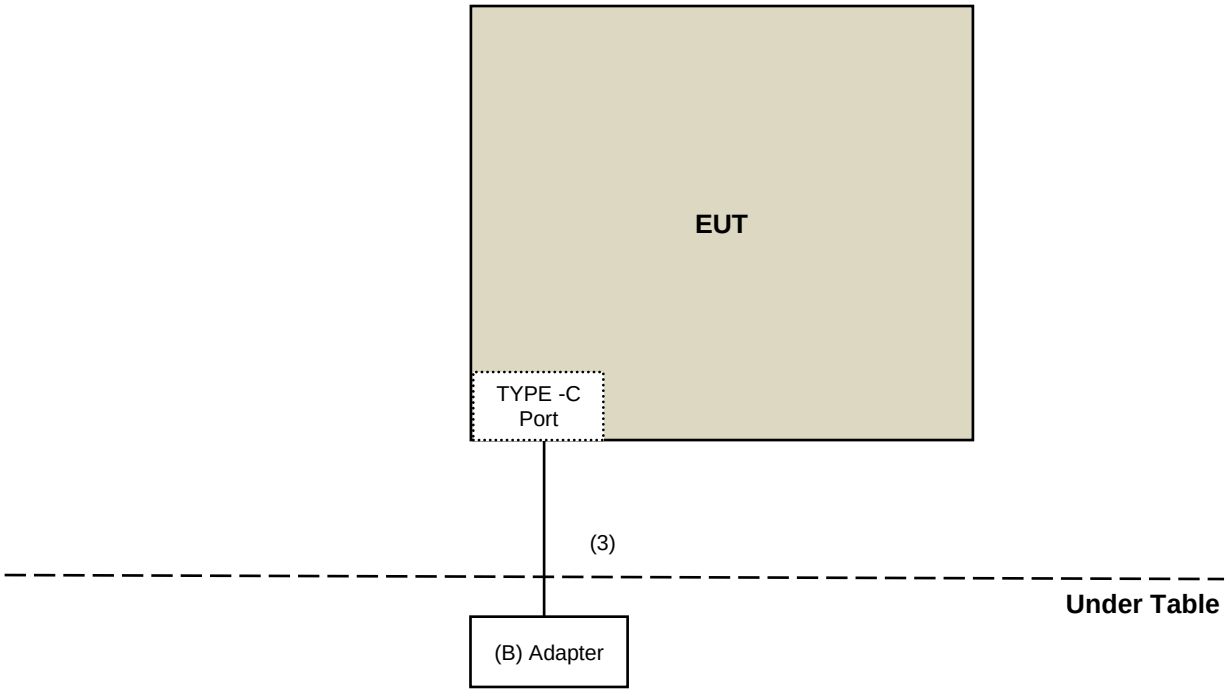
Mode A
For Unwanted Emissions above 1 GHz



Mode B
For AC Power Conducted Emissions



Mode B
For Unwanted Emissions below 1 GHz



3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Laptop	Lenovo	20U5S01X00 L14	PF-28LKK7	NA	Provided by Lab
B	USB Adapter	XLAOMI	MDY-09-ET	NA	NA	Provided by Lab
C	Adapter	Lenovo	ADLX45YLC3D	NA	NA	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB Cable	1	1.9	Yes	0	Supplied by applicant
2	DC Cable	1	1.8	No	0	Provided by Lab
3	AC Cable	1	1	No	0	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
Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	2021/4/13	2022/4/12
Power Meter Anritsu	ML2495A	1529002	2021/6/21	2022/6/20
Pulse Power Sensor Anritsu	MA2411B	1339443	2021/5/31	2022/5/30
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA
Spectrum Analyzer R&S	FSV40	101516	2021/3/8	2022/3/7

Notes:

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

4.2 Power Spectral Density

Refer to section 4.1 to get information of the instruments.

4.3 6dB Bandwidth

Refer to section 4.1 to get information of the instruments.

4.4 Conducted Out of Band Emissions

Refer to section 4.1 to get information of the instruments.

4.5 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohms Terminator	50	3	2021/10/27	2022/10/26
Fixed attenuator STI	STI02-2200-10	005	2021/8/27	2022/8/26
LISN R&S	ESH3-Z5	848773/004	2021/10/29	2022/10/28
LISN R & S	ESH3-Z5	835239/001	2021/3/26	2022/3/25
RF Coaxial Cable JYEBO	5D-FB	COCCAB-001	2021/9/25	2022/9/24
Software BVADT	BVADT_Cond_V7.3.7.4	NA	NA	NA
Test Receiver R&S	ESCS 30	847124/029	2021/10/13	2022/10/12

Notes:

1. The test was performed in Conduction 1
2. Tested Date: 2021/12/17

4.6 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Bilog Antenna Schwarzbeck	VULB 9168	9168-0842	2021/10/26	2022/10/25
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	2021/1/11	2022/1/10
Pre_Amplifier EMCI	EMC330N	980538	2021/4/26	2022/4/25
RF Coaxial Cable COMMATE/PEWC	8D	966-5-1	2021/4/26	2022/4/25
		966-5-2	2021/4/26	2022/4/25
		966-5-3	2021/4/26	2022/4/25
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Spectrum Analyzer KEYSIGHT	N9030B	MY57141948	2021/5/21	2022/5/20
Test Receiver R&S	ESR3	102528	2021/3/2	2022/3/1

Notes:

1. The test was performed in 966 Chamber No. 5.
2. Tested Date: 2021/12/17

4.7 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-1819	2021/11/14	2022/11/13
	BBHA 9170	BBHA9170519	2021/11/14	2022/11/13
Pre_Amplifier EMCI	EMC12630SE	980509	2021/4/26	2022/4/25
	EMC184045SE	980387	2022/1/10	2023/1/9
RF cable (40GHz) EMCI	EMC-KM-KM-4000	200214	2021/3/10	2022/3/9
RF Cable-Frequency range: 1-40GHz EMCI	EMC102-KM-KM-1200	160924	2022/1/10	2023/1/9
RF Coaxial Cable EMCI	EMC104-SM-SM-1500	180503	2021/4/26	2022/4/25
	EMC104-SM-SM-2000	180501	2021/4/26	2022/4/25
	EMC104-SM-SM-6000	180506	2021/4/26	2022/4/25
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Spectrum Analyzer KEYSIGHT	N9030B	MY57141948	2021/5/21	2022/5/20
Test Receiver R&S	ESR3	102528	2021/3/2	2022/3/1

Notes:

1. The test was performed in 966 Chamber No. 5.
2. Tested Date: 2022/1/13 ~ 2022/1/14

5 Limits of Test Items

5.1 RF Output Power

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

5.2 Power Spectral Density

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

5.3 6dB Bandwidth

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

5.4 Conducted Out of Band Emissions

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

5.5 AC Power Conducted Emissions

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

Notes:

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.

5.6 Unwanted Emissions below 1 GHz

Radiated emissions up to 1GHz 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

Notes:

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

5.7 Unwanted Emissions above 1 GHz

Radiated emissions above 1GHz 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)
Above 960	500	3

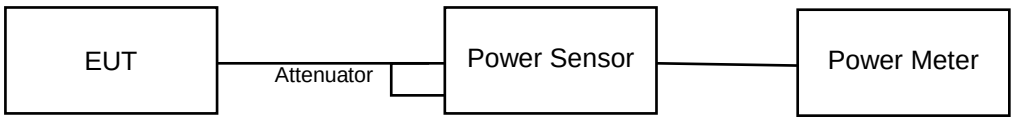
Notes:

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 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.

6 Test Arrangements

6.1 RF Output Power

6.1.1 Test Setup



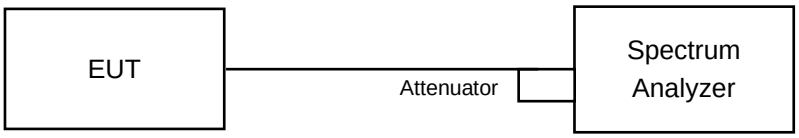
6.1.2 Test Procedure

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.

Averge 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

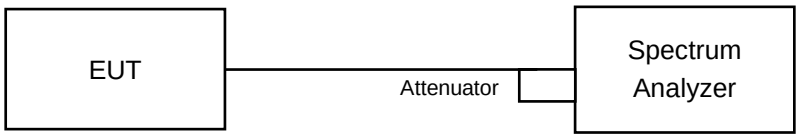


6.2.2 Test Procedure

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 ≤ 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.

6.3 6dB Bandwidth

6.3.1 Test Setup

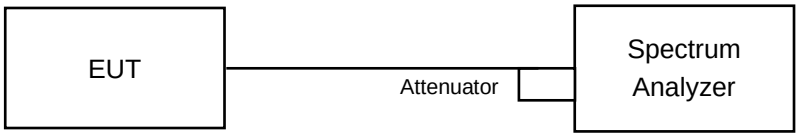


6.3.2 Test Procedure

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.

6.4 Conducted Out of Band Emissions

6.4.1 Test Setup



6.4.2 Test Procedure

MEASUREMENT PROCEDURE REF

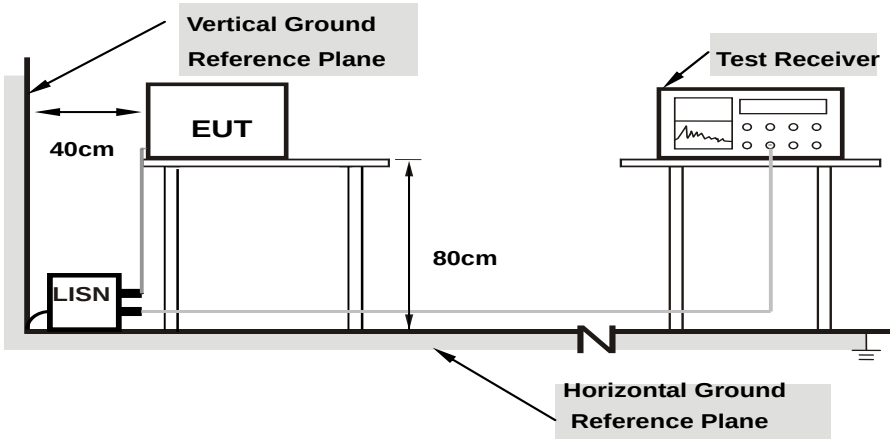
a. Set the RBW = 100 kHz.
b. Set the VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep time = auto couple.
e. Trace mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

a. Set RBW = 100 kHz.
b. Set VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep = auto couple.
e. Trace Mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum amplitude level.

6.5 AC Power Conducted Emissions

6.5.1 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).

6.5.2 Test Procedure

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/ 50 uH of coupling impedance for the measuring instrument.

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

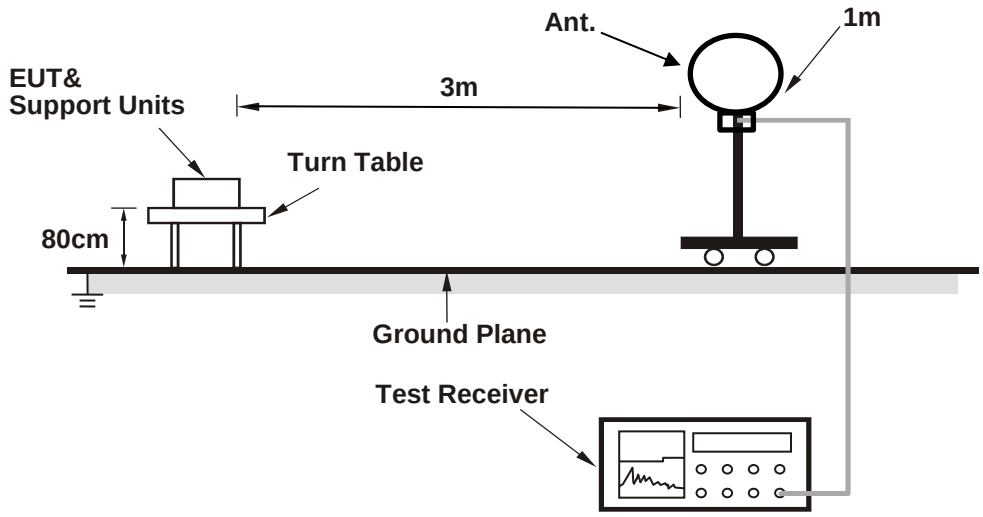
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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

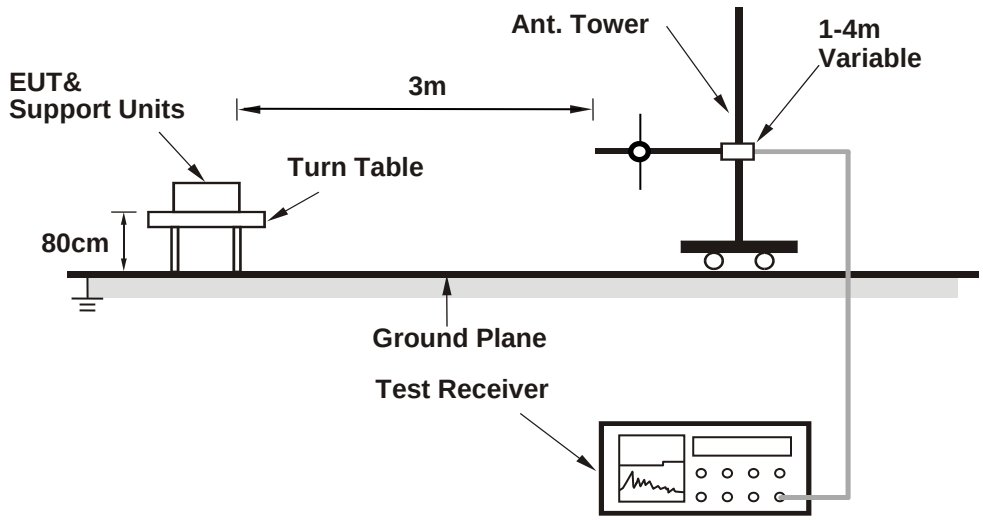
6.6 Unwanted Emissions below 1 GHz

6.6.1 Test Setup

For Radiated emission below 30MHz



For Radiated emission above 30MHz



6.6.2 Test Procedure

For Radiated emission below 30MHz

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.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated emission above 30MHz

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.

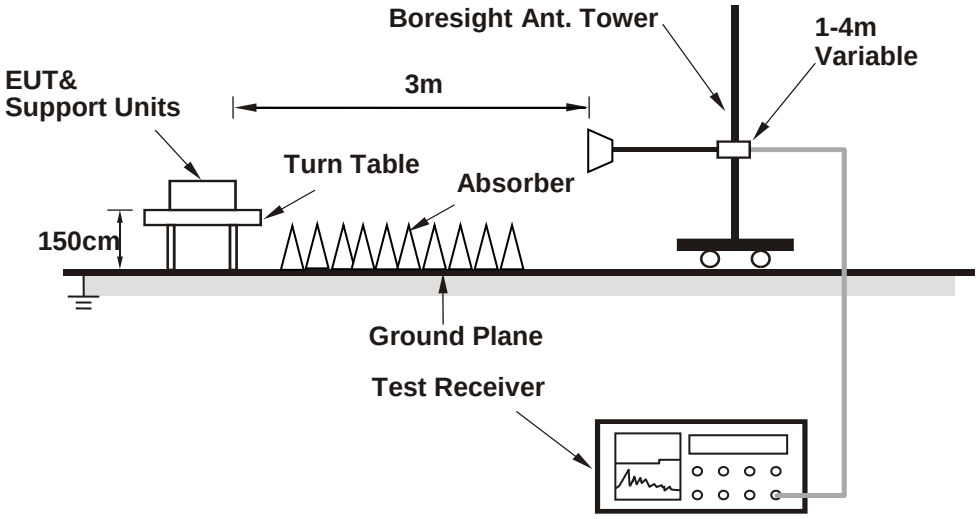
Notes:

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

6.7 Unwanted Emissions above 1 GHz

6.7.1 Test Setup

For Radiated emission above 1GHz



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

6.7.2 Test Procedure

a. 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.

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 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:

1. 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.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
3. 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:	5 Vdc	Environmental Conditions	23 °C, 62 % RH	Tested By	Eric Peng

For Peak Power

BT-LE 1M

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	2.35	3.71	30	Pass
19	2440	2.061	3.14	30	Pass
39	2480	1.679	2.25	30	Pass

Note: The antenna gain is 3.76749 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	2.323	3.66	30	Pass
19	2440	2.046	3.11	30	Pass
38	2478	1.69	2.28	30	Pass

Note: The antenna gain is 3.76749 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	2.291	3.60
19	2440	2.009	3.03
39	2480	1.633	2.13

BT-LE 2M

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2404	2.07	3.16
19	2440	1.82	2.60
38	2478	1.503	1.77

7.2 Power Spectral Density

Input Power:	5 Vdc	Environmental Conditions	23 °C, 62 % RH	Tested By	Eric Peng

BT-LE 1M

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
0	2402	0.88	8.00	Pass
19	2440	0.07	8.00	Pass
39	2480	-0.93	8.00	Pass

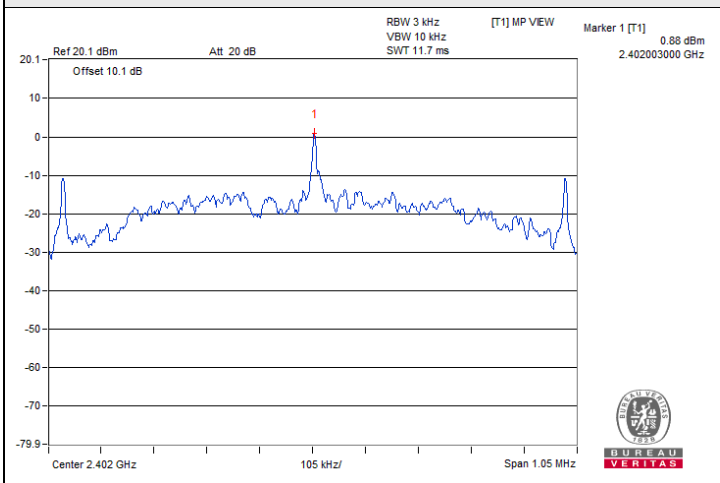
Note: The antenna gain is 3.76749 dBi < 6 dBi, so the power density limit shall not be reduced.

BT-LE 2M

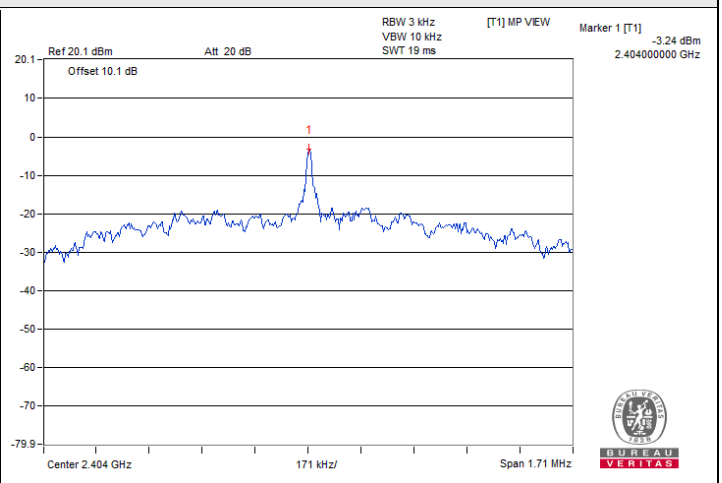
Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
1	2404	-3.24	8.00	Pass
19	2440	-3.70	8.00	Pass
38	2478	-4.73	8.00	Pass

Note: The antenna gain is 3.76749 dBi < 6 dBi, so the power density limit shall not be reduced.

Spectrum Plot of Maximum Value



BT-LE 1M : CH 0



BT-LE 2M : CH 1

7.3 6dB Bandwidth

Input Power:	5 Vdc	Environmental Conditions	23 °C, 62 % RH	Tested By	Eric Peng

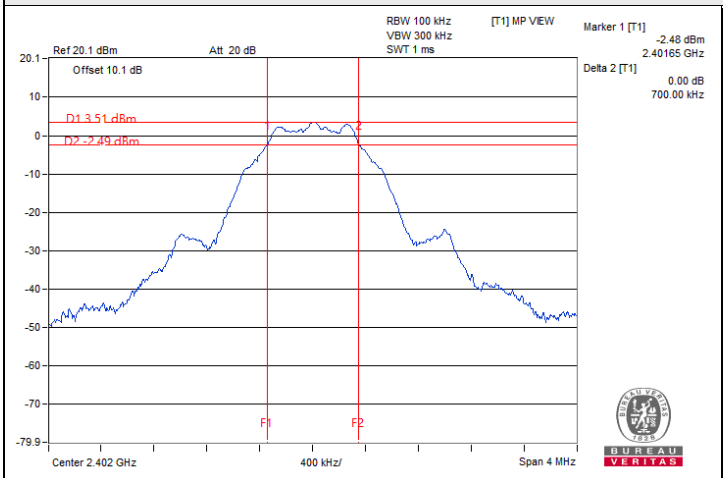
BT-LE 1M

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
0	2402	0.7	0.5	Pass
19	2440	0.72	0.5	Pass
39	2480	0.71	0.5	Pass

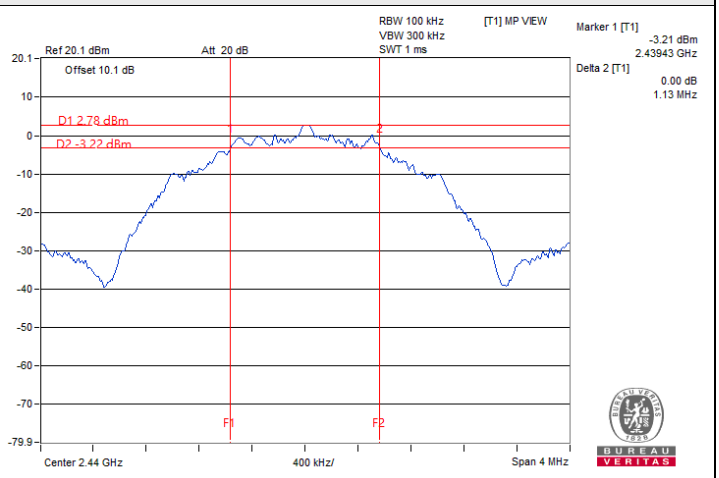
BT-LE 2M

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

Spectrum Plot of Minimum Value



BT-LE 1M : CH 0

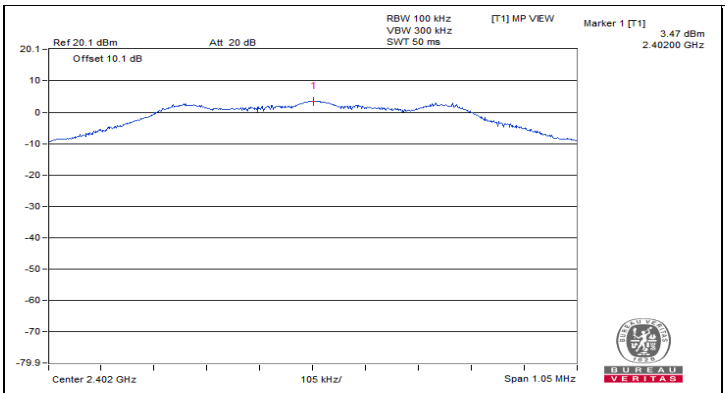


BT-LE 2M : CH 19

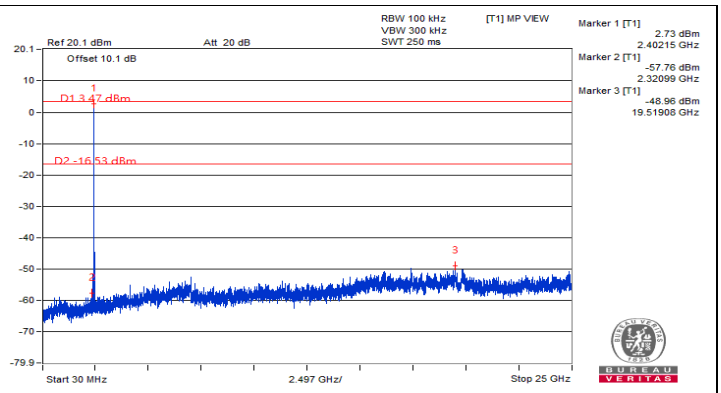
7.4 Conducted Out of Band Emissions

Input Power:	5 Vdc	Environmental Conditions	23 °C, 62 % RH	Tested By	Eric Peng

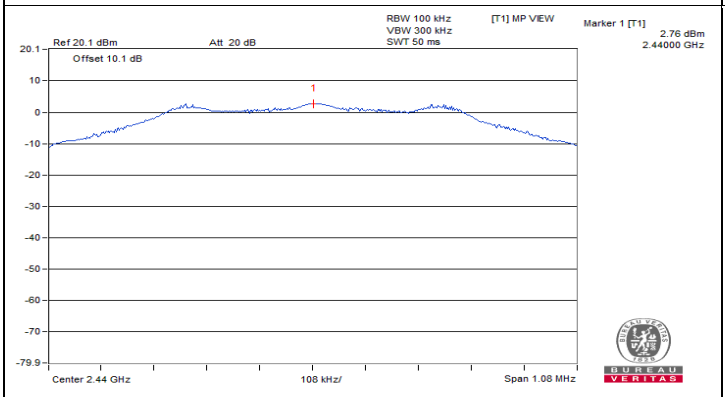
BT-LE 1M



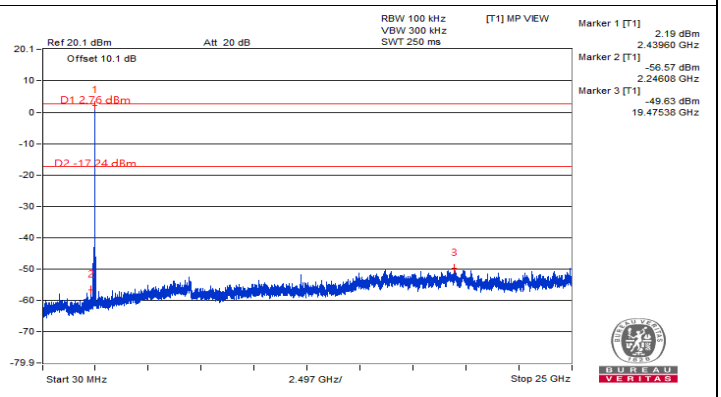
CH 0



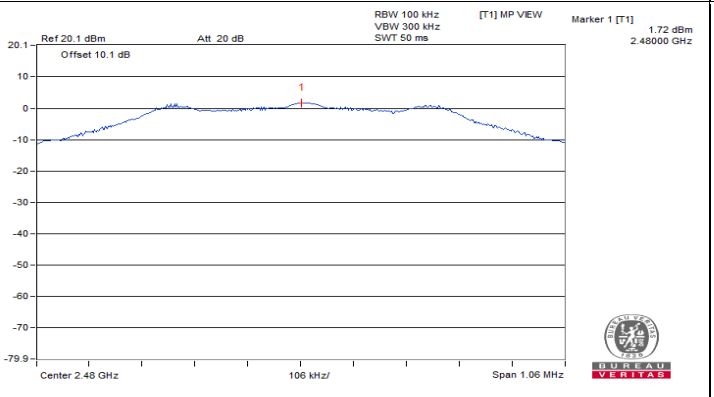
CH 0



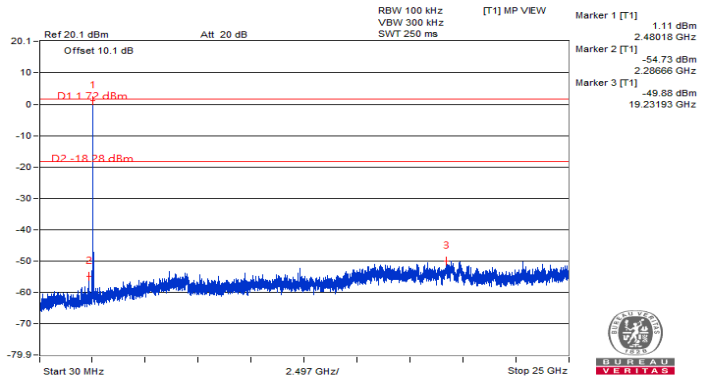
CH 19



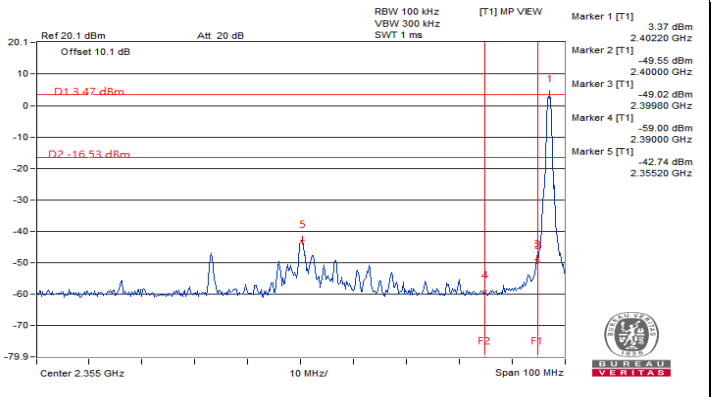
CH 19



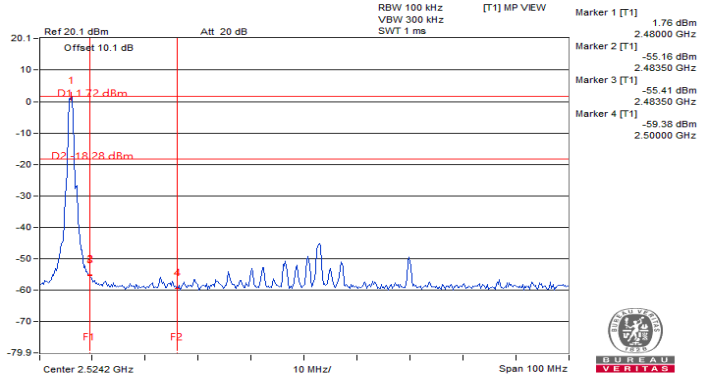
CH 39



CH 39

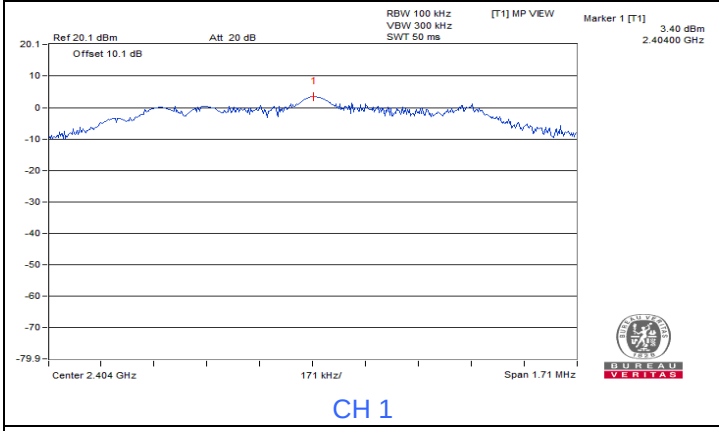


CH 0 Band edge

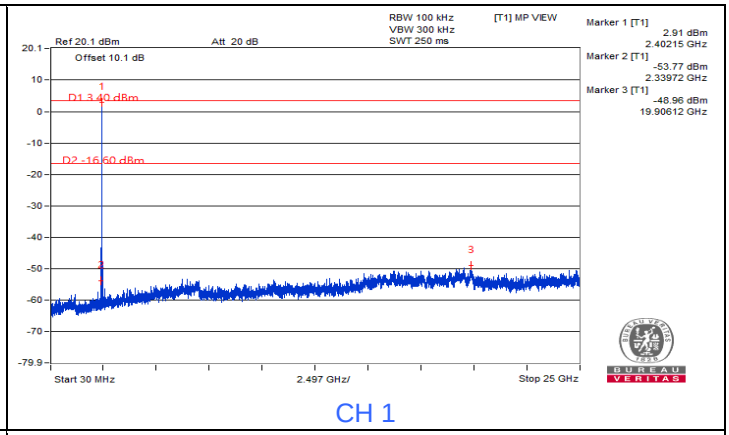


CH 39 Band edge

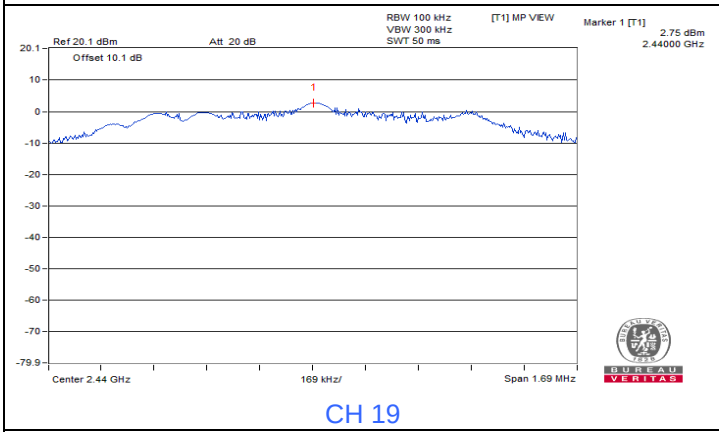
BT-LE 2M



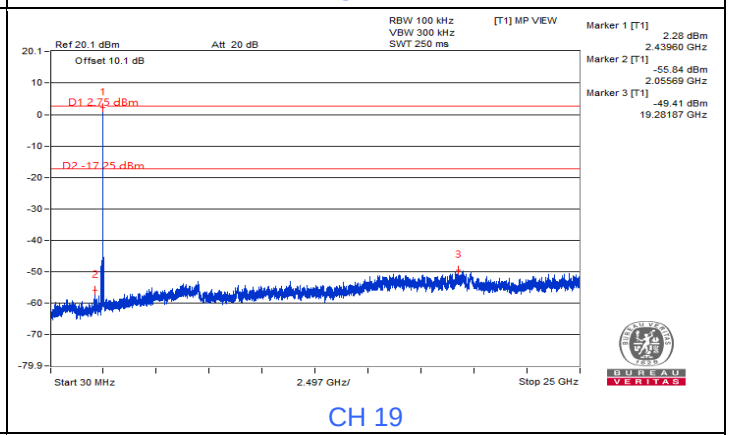
CH 1



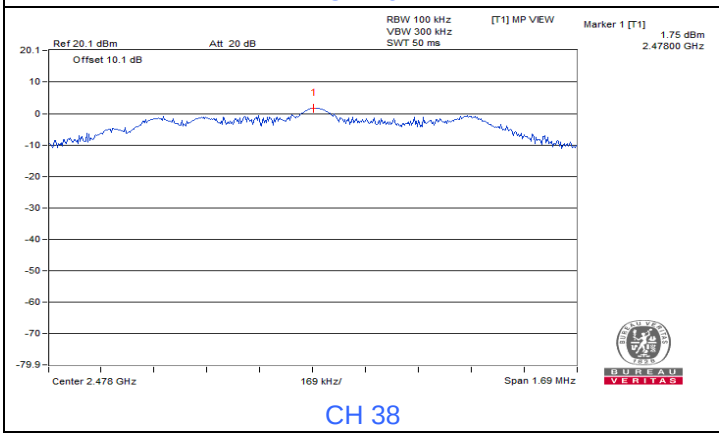
CH 1



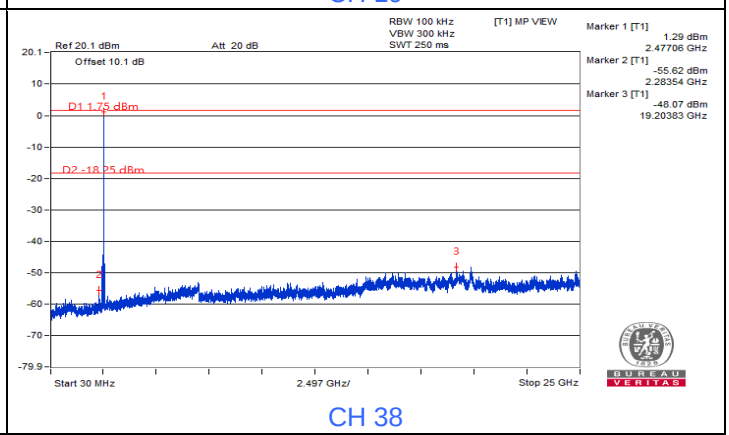
CH 19



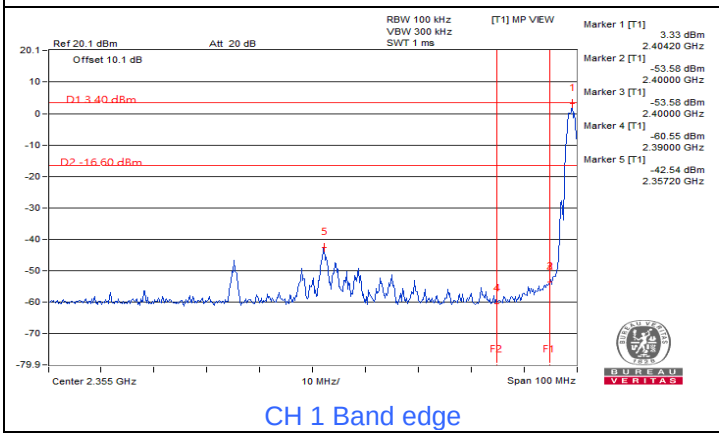
CH 19



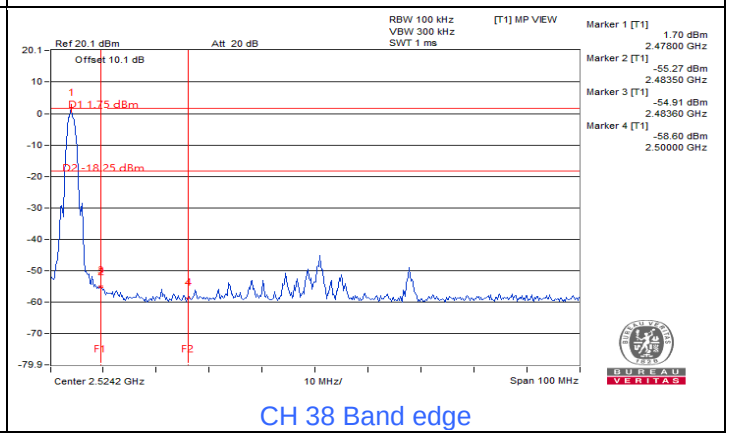
CH 38



CH 38



CH 1 Band edge



CH 38 Band edge

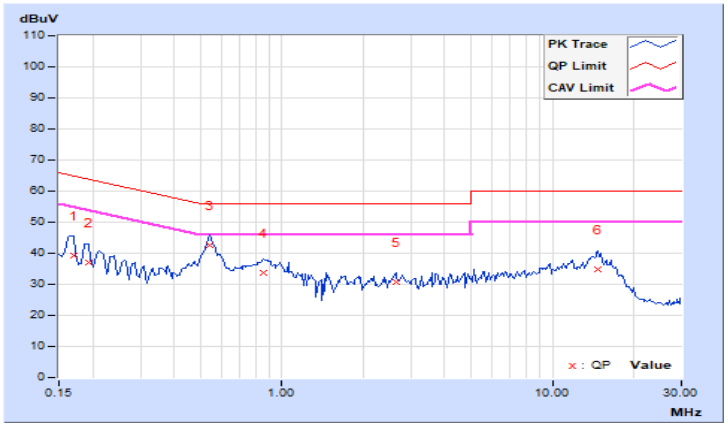
7.5 AC Power Conducted Emissions

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
Input Power (System)	120Vac, 60Hz	**Environmental Conditions**	25 °C, 66 % RH
Tested By	Sampson Chen		

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	0.16953	10.07	29.24	19.23	39.31	29.30	64.98	54.98	-25.67	-25.68
2	0.19297	10.08	26.95	17.35	37.03	27.43	63.91	53.91	-26.88	-26.48
3	0.54063	10.12	32.39	22.07	42.51	32.19	56.00	46.00	-13.49	-13.81
4	0.85703	10.14	23.56	13.45	33.70	23.59	56.00	46.00	-22.30	-22.41
5	2.65234	10.26	20.30	10.89	30.56	21.15	56.00	46.00	-25.44	-24.85
6	14.70703	11.16	23.75	15.85	34.91	27.01	60.00	50.00	-25.09	-22.99

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

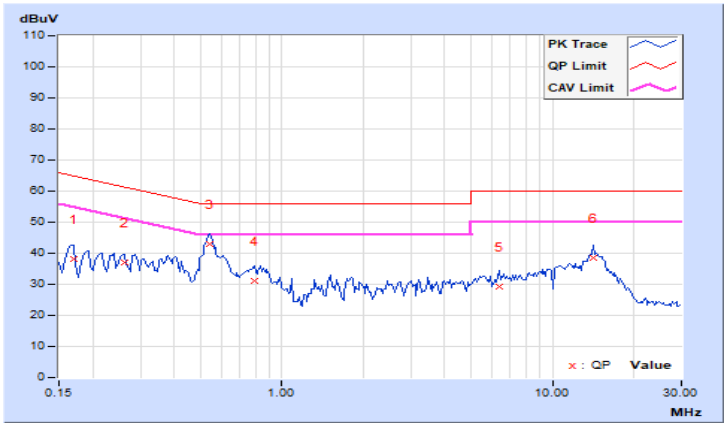


RF Mode	TX BT-LE 1M	**Channel**	CH 0：2402 MHz
Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power (System)	120Vac, 60Hz	**Environmental Conditions**	25 °C, 66 % RH
Tested By	Sampson Chen		

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	0.16953	10.06	28.17	17.35	38.23	27.41	64.98	54.98	-26.75	-27.57
2	0.26328	10.09	26.81	15.32	36.90	25.41	61.33	51.33	-24.43	-25.92
3	**0.54063**	**10.11**	**33.00**	**24.24**	**43.11**	**34.35**	**56.00**	**46.00**	**-12.89**	**-11.65**
4	0.79453	10.12	20.87	12.88	30.99	23.00	56.00	46.00	-25.01	-23.00
5	6.36719	10.47	18.84	10.18	29.31	20.65	60.00	50.00	-30.69	-29.35
6	14.14844	10.93	27.43	17.71	38.36	28.64	60.00	50.00	-21.64	-21.36

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



7.6 Unwanted Emissions below 1 GHz

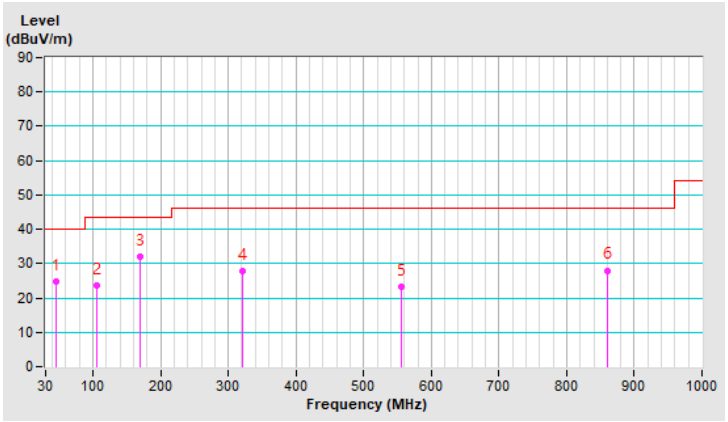
BT-LE_1M

RF Mode	TX BT-LE 1M	**Channel**	CH 0：2402 MHz
Frequency Range	9kHz ~ 1GHz	**Detector Function**	Quasi-Peak (QP)
Input Power (System)	120Vac, 60Hz	**Environmental Conditions**	25 °C, 65 % 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	44.84	24.8 QP	40.0	-15.2	2.00 H	296	37.6	-12.8
2	105.76	23.5 QP	43.5	-20.0	3.00 H	266	39.9	-16.4
3	170.41	32.0 QP	43.5	-11.5	2.00 H	88	45.3	-13.3
4	320.38	27.7 QP	46.0	-18.3	3.00 H	1	39.4	-11.7
5	555.43	23.2 QP	46.0	-22.8	1.00 H	35	29.8	-6.6
6	861.09	28.0 QP	46.0	-18.0	2.00 H	360	29.8	-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 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.

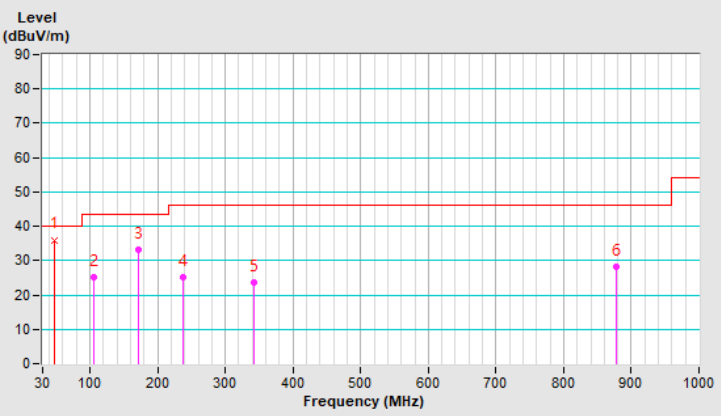


RF Mode	TX BT-LE 1M	**Channel**	CH 0：2402 MHz
Frequency Range	9kHz ~ 1GHz	**Detector Function**	Quasi-Peak (QP)
Input Power (System)	120Vac, 60Hz	**Environmental Conditions**	25 °C, 65 % RH
Tested By	Nelson Teng		

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	**46.73**	**36.0 QP**	**40.0**	**-4.0**	**1.00 V**	**233**	**48.8**	**-12.8**
2	106.34	25.0 QP	43.5	-18.5	1.00 V	304	41.3	-16.3
3	171.09	33.2 QP	43.5	-10.3	1.00 V	138	46.4	-13.2
4	237.11	25.3 QP	46.0	-20.7	1.00 V	360	39.9	-14.6
5	342.84	23.7 QP	46.0	-22.3	2.00 V	277	35.0	-11.3
6	877.82	28.1 QP	46.0	-17.9	3.00 V	35	29.7	-1.6

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.



7.7 Unwanted Emissions above 1 GHz

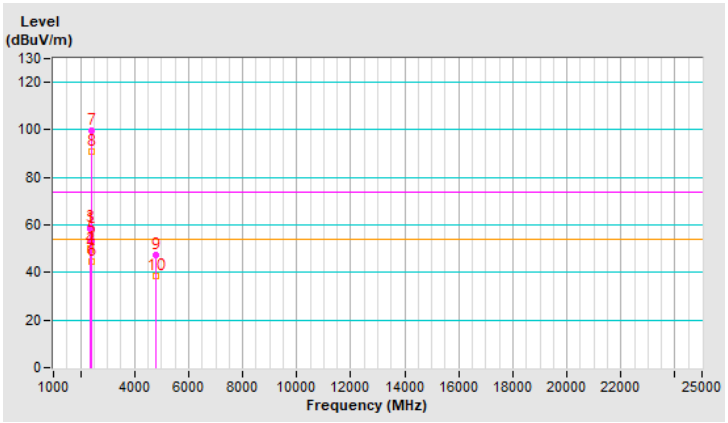
BT-LE_1M

RF Mode	TX BT-LE 1M	**Channel**	CH 0：2402 MHz
Frequency Range	1GHz ~ 25GHz	**Detector Function**	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	**Environmental Conditions**	25 °C, 66 % RH
Tested By	Sampson Chen		

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	2338.00	58.2 PK	74.0	-15.8	1.09 H	219	60.8	-2.6
2	2338.00	49.4 AV	54.0	-4.6	1.09 H	219	52.0	-2.6
3	2355.00	58.8 PK	74.0	-15.2	1.09 H	219	61.5	-2.7
4	**2355.00**	**50.0 AV**	**54.0**	**-4.0**	**1.09 H**	**219**	**52.7**	**-2.7**
5	2390.00	53.7 PK	74.0	-20.3	1.09 H	219	56.4	-2.7
6	2390.00	44.5 AV	54.0	-9.5	1.09 H	219	47.2	-2.7
7	*2402.00	99.7 PK			1.09 H	219	102.4	-2.7
8	*2402.00	90.9 AV			1.09 H	219	93.6	-2.7
9	4804.00	47.2 PK	74.0	-26.8	1.01 H	323	45.7	1.5
10	4804.00	38.4 AV	54.0	-15.6	1.01 H	323	36.9	1.5

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 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(Duty cycle) = 20 log(0.355 ms / 0.98 ms) = -8.8 dB for plotted duty.

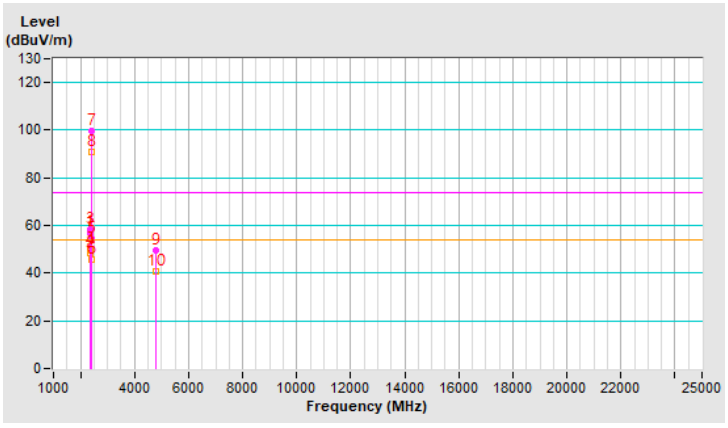


RF Mode	TX BT-LE 1M	Channel	CH 0：2402 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 66 % RH
Tested By	Sampson Chen		

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	2338.00	57.0 PK	74.0	-17.0	2.51 V	262	59.6	-2.6
2	2338.00	48.2 AV	54.0	-5.8	2.51 V	262	50.8	-2.6
3	2355.00	58.2 PK	74.0	-15.8	2.51 V	262	60.9	-2.7
4	2355.00	49.4 AV	54.0	-4.6	2.51 V	262	52.1	-2.7
5	2390.00	54.4 PK	74.0	-19.6	2.54 V	262	57.1	-2.7
6	2390.00	45.7 AV	54.0	-8.3	2.54 V	262	48.4	-2.7
7	*2402.00	99.9 PK			2.51 V	262	102.6	-2.7
8	*2402.00	91.1 AV			2.51 V	262	93.8	-2.7
9	4804.00	49.7 PK	74.0	-24.3	1.39 V	269	48.2	1.5
10	4804.00	40.9 AV	54.0	-13.1	1.39 V	269	39.4	1.5

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 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(Duty cycle) = 20 log(0.355 ms / 0.98 ms) = -8.8 dB for plotted duty.

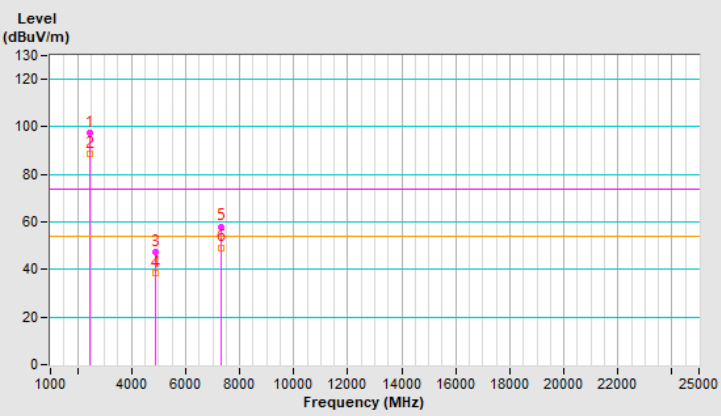


RF Mode	TX BT-LE 1M	Channel	CH 19：2440 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 66 % RH
Tested By	Sampson Chen		

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	97.7 PK			1.06 H	221	100.5	-2.8
2	*2440.00	88.9 AV			1.06 H	221	91.7	-2.8
3	4880.00	47.5 PK	74.0	-26.5	1.06 H	322	46.0	1.5
4	4880.00	38.7 AV	54.0	-15.3	1.06 H	322	37.2	1.5
5	7320.00	58.1 PK	74.0	-15.9	1.41 H	272	50.9	7.2
6	7320.00	49.3 AV	54.0	-4.7	1.41 H	272	42.1	7.2

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 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(Duty cycle) = 20 log(0.355 ms / 0.98 ms) = -8.8 dB for plotted duty.

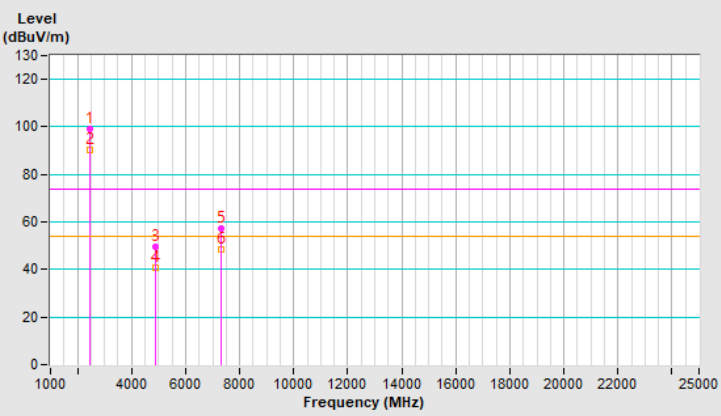


RF Mode	TX BT-LE 1M	Channel	CH 19：2440 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 66 % RH
Tested By	Sampson Chen		

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	99.2 PK			2.41 V	261	102.0	-2.8
2	*2440.00	90.4 AV			2.41 V	261	93.2	-2.8
3	4880.00	49.5 PK	74.0	-24.5	1.31 V	275	48.0	1.5
4	4880.00	40.7 AV	54.0	-13.3	1.31 V	275	39.2	1.5
5	7320.00	57.4 PK	74.0	-16.6	1.12 V	284	50.2	7.2
6	7320.00	48.6 AV	54.0	-5.4	1.12 V	284	41.4	7.2

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 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(Duty cycle) = 20 log(0.355 ms / 0.98 ms) = -8.8 dB for plotted duty.

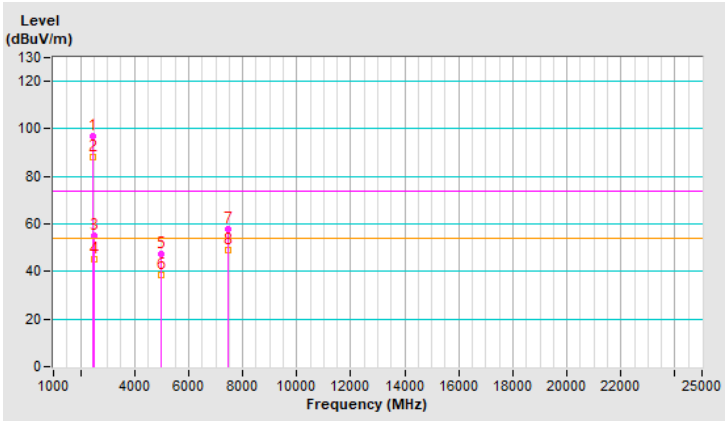


RF Mode	TX BT-LE 1M	Channel	CH 39：2480 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 66 % RH
Tested By	Sampson Chen		

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	96.8 PK			1.06 H	218	99.7	-2.9
2	*2480.00	88.0 AV			1.06 H	218	90.9	-2.9
3	2483.50	54.9 PK	74.0	-19.1	1.06 H	218	57.8	-2.9
4	2483.50	45.3 AV	54.0	-8.7	1.06 H	218	48.2	-2.9
5	4960.00	47.4 PK	74.0	-26.6	1.04 H	309	45.7	1.7
6	4960.00	38.6 AV	54.0	-15.4	1.04 H	309	36.9	1.7
7	7440.00	58.0 PK	74.0	-16.0	1.36 H	269	50.4	7.6
8	7440.00	49.2 AV	54.0	-4.8	1.36 H	269	41.6	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 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(Duty cycle) = 20 log(0.355 ms / 0.98 ms) = -8.8 dB for plotted duty.

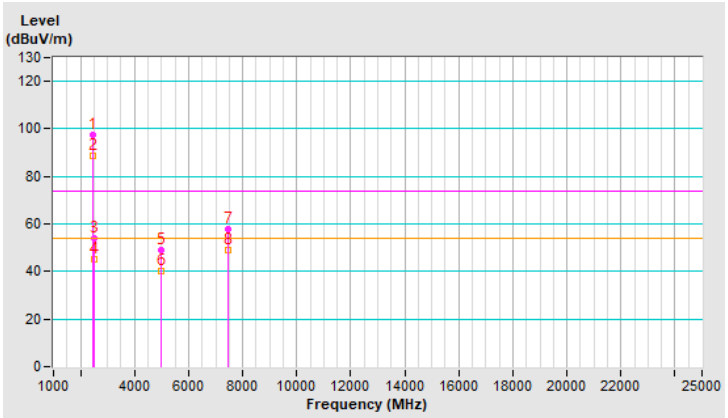


RF Mode	TX BT-LE 1M	Channel	CH 39：2480 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 66 % RH
Tested By	Sampson Chen		

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	97.5 PK			2.39 V	262	100.4	-2.9
2	*2480.00	88.7 AV			2.39 V	262	91.6	-2.9
3	2483.50	54.1 PK	74.0	-19.9	2.39 V	262	57.0	-2.9
4	2483.50	45.0 AV	54.0	-9.0	2.39 V	262	47.9	-2.9
5	4960.00	49.2 PK	74.0	-24.8	1.33 V	280	47.5	1.7
6	4960.00	40.4 AV	54.0	-13.6	1.33 V	280	38.7	1.7
7	7440.00	57.7 PK	74.0	-16.3	1.18 V	286	50.1	7.6
8	7440.00	48.9 AV	54.0	-5.1	1.18 V	286	41.3	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 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(Duty cycle) = 20 log(0.355 ms / 0.98 ms) = -8.8 dB for plotted duty.



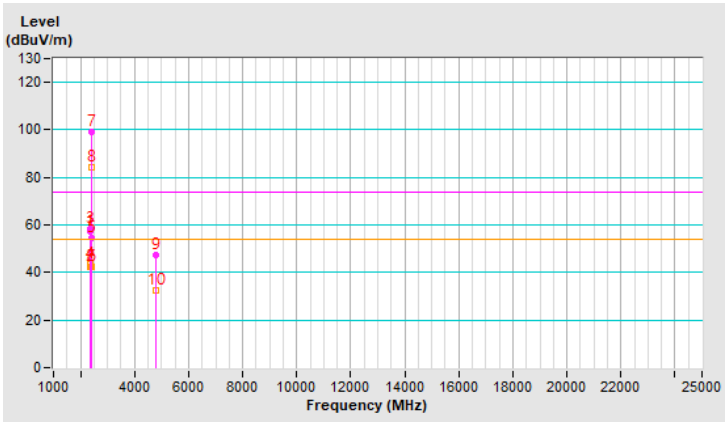
BTLE_2M

RF Mode	TX BT-LE 2M	Channel	CH 1：2404 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 66 % RH
Tested By	Sampson Chen		

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	2340.00	57.4 PK	74.0	-16.6	1.03 H	219	60.0	-2.6
2	2340.00	42.4 AV	54.0	-11.6	1.03 H	219	45.0	-2.6
3	2357.00	58.3 PK	74.0	-15.7	1.03 H	219	61.0	-2.7
4	2357.00	43.3 AV	54.0	-10.7	1.03 H	219	46.0	-2.7
5	2390.00	54.3 PK	74.0	-19.7	1.03 H	219	57.0	-2.7
6	2390.00	42.2 AV	54.0	-11.8	1.03 H	219	44.9	-2.7
7	*2404.00	99.3 PK			1.03 H	219	102.0	-2.7
8	*2404.00	84.3 AV			1.03 H	219	87.0	-2.7
9	4808.00	47.6 PK	74.0	-26.4	1.11 H	310	46.1	1.5
10	4808.00	32.6 AV	54.0	-21.4	1.11 H	310	31.1	1.5

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 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(Duty cycle) = 20 log(0.18 ms / 1.01 ms) = -15.0 dB for plotted duty.

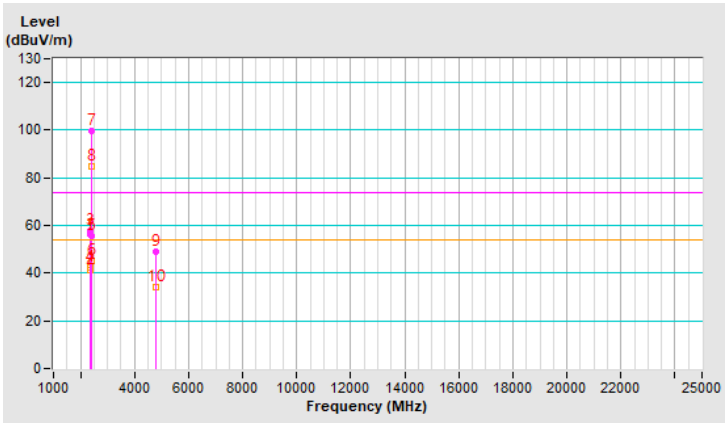


RF Mode	TX BT-LE 2M	Channel	CH 1：2404 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 66 % RH
Tested By	Sampson Chen		

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	2340.00	56.3 PK	74.0	-17.7	2.44 V	261	58.9	-2.6
2	2340.00	41.3 AV	54.0	-12.7	2.44 V	261	43.9	-2.6
3	2357.00	57.6 PK	74.0	-16.4	2.44 V	261	60.3	-2.7
4	2357.00	42.6 AV	54.0	-11.4	2.44 V	261	45.3	-2.7
5	2390.00	55.5 PK	74.0	-18.5	2.44 V	261	58.2	-2.7
6	2390.00	45.0 AV	54.0	-9.0	2.44 V	261	47.7	-2.7
7	*2404.00	99.7 PK			2.44 V	261	102.4	-2.7
8	*2404.00	84.7 AV			2.44 V	261	87.4	-2.7
9	4808.00	48.9 PK	74.0	-25.1	1.26 V	269	47.4	1.5
10	4808.00	33.9 AV	54.0	-20.1	1.26 V	269	32.4	1.5

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 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(Duty cycle) = 20 log(0.18 ms / 1.01 ms) = -15.0 dB for plotted duty.

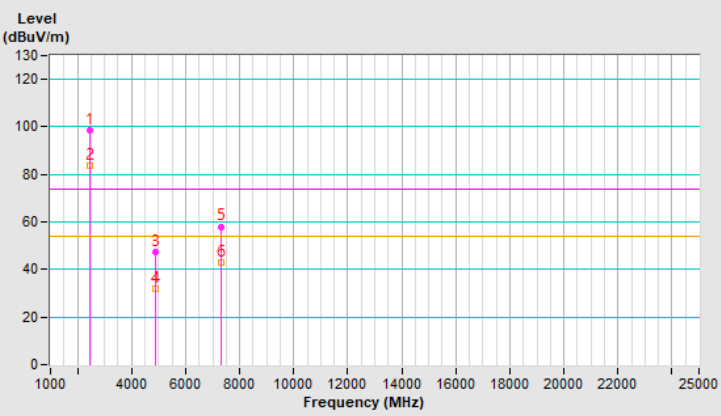


RF Mode	TX BT-LE 2M	Channel	CH 19：2440 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 66 % RH
Tested By	Sampson Chen		

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	98.6 PK			1.05 H	219	101.4	-2.8
2	*2440.00	83.6 AV			1.05 H	219	86.4	-2.8
3	4880.00	47.1 PK	74.0	-26.9	1.04 H	319	45.6	1.5
4	4880.00	32.1 AV	54.0	-21.9	1.04 H	319	30.6	1.5
5	7320.00	58.1 PK	74.0	-15.9	1.43 H	276	50.9	7.2
6	7320.00	43.1 AV	54.0	-10.9	1.43 H	276	35.9	7.2

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 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(Duty cycle) = 20 log(0.18 ms / 1.01 ms) = -15.0 dB for plotted duty.

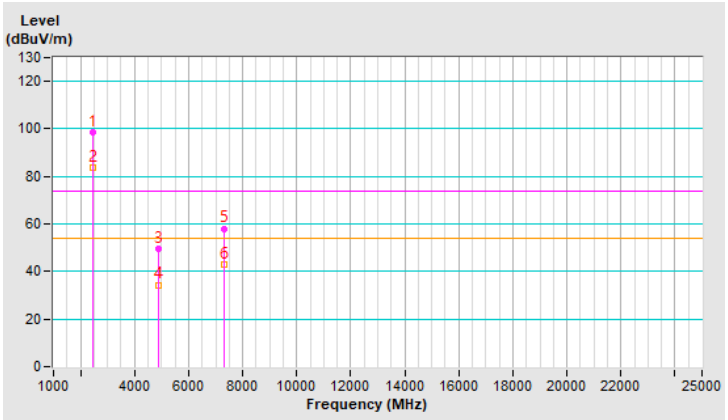


RF Mode	TX BT-LE 2M	Channel	CH 19：2440 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 66 % RH
Tested By	Sampson Chen		

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	98.8 PK			2.40 V	261	101.6	-2.8
2	*2440.00	83.8 AV			2.40 V	261	86.6	-2.8
3	4880.00	49.4 PK	74.0	-24.6	1.31 V	276	47.9	1.5
4	4880.00	34.4 AV	54.0	-19.6	1.31 V	276	32.9	1.5
5	7320.00	58.1 PK	74.0	-15.9	1.13 V	292	50.9	7.2
6	7320.00	43.1 AV	54.0	-10.9	1.13 V	292	35.9	7.2

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 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(Duty cycle) = 20 log(0.18 ms / 1.01 ms) = -15.0 dB for plotted duty.

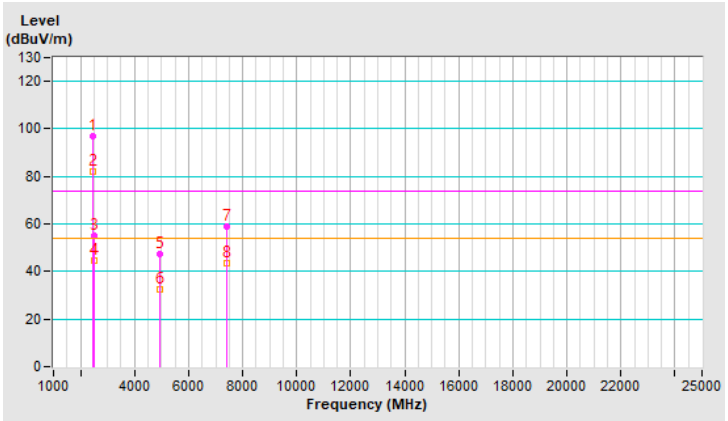


RF Mode	TX BT-LE 2M	Channel	CH 38：2478 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 66 % RH
Tested By	Sampson Chen		

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	97.1 PK			1.10 H	219	100.0	-2.9
2	*2478.00	82.1 AV			1.10 H	219	85.0	-2.9
3	2483.50	55.3 PK	74.0	-18.7	1.10 H	219	58.2	-2.9
4	2483.50	44.8 AV	54.0	-9.2	1.10 H	219	47.7	-2.9
5	4956.00	47.5 PK	74.0	-26.5	1.01 H	312	45.8	1.7
6	4956.00	32.5 AV	54.0	-21.5	1.01 H	312	30.8	1.7
7	7434.00	58.7 PK	74.0	-15.3	1.40 H	266	51.2	7.5
8	7434.00	43.7 AV	54.0	-10.3	1.40 H	266	36.2	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 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(Duty cycle) = 20 log(0.18 ms / 1.01 ms) = -15.0 dB for plotted duty.

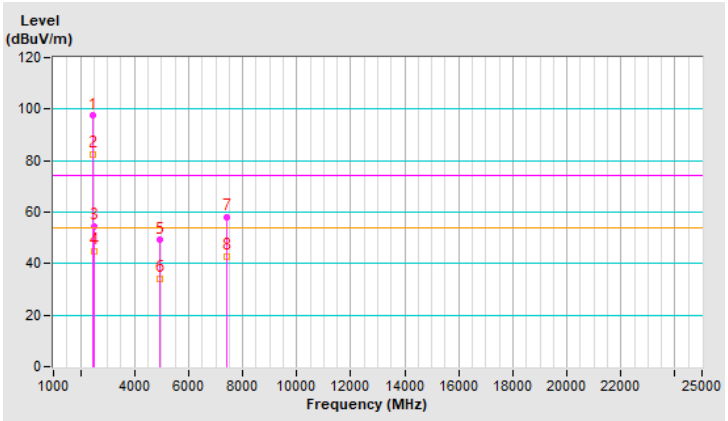


RF Mode	TX BT-LE 2M	Channel	CH 38：2478 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 66 % RH
Tested By	Sampson Chen		

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	97.4 PK			2.35 V	260	100.3	-2.9
2	*2478.00	82.4 AV			2.35 V	260	85.3	-2.9
3	2483.50	54.4 PK	74.0	-19.6	2.35 V	260	57.3	-2.9
4	2483.50	45.0 AV	54.0	-9.0	2.35 V	260	47.9	-2.9
5	4956.00	49.1 PK	74.0	-24.9	1.30 V	277	47.4	1.7
6	4956.00	34.1 AV	54.0	-19.9	1.30 V	277	32.4	1.7
7	7434.00	57.9 PK	74.0	-16.1	1.15 V	272	50.4	7.5
8	7434.00	42.9 AV	54.0	-11.1	1.15 V	272	35.4	7.5

Remarks:

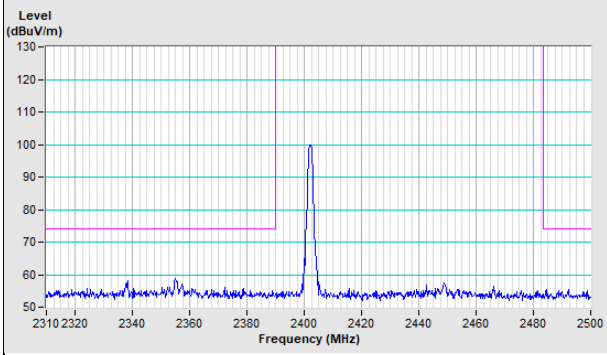
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The average value 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(Duty cycle) = 20 log(0.18 ms / 1.01 ms) = -15.0 dB for plotted duty.



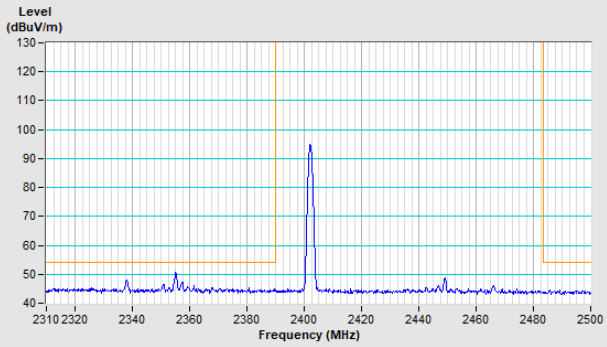
Plot of Band Edge_1M

BT-LE 1M Channel 0

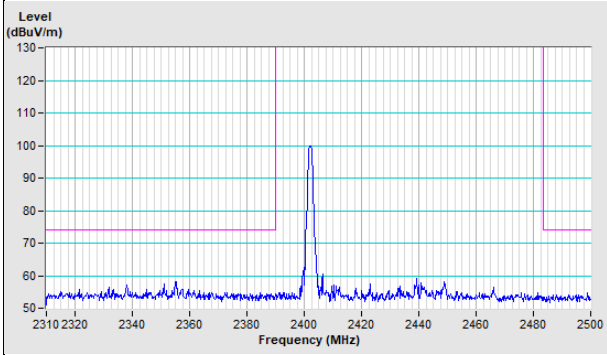
Horizontal (Peak)



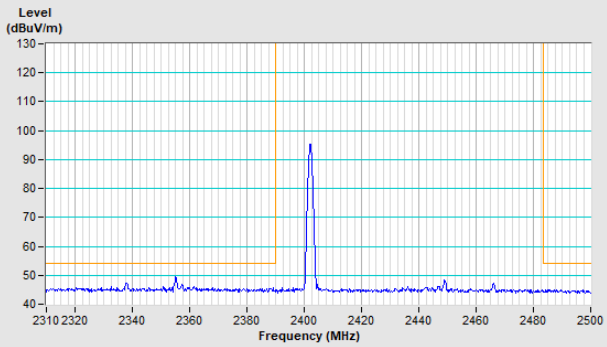
Horizontal (Average)



Vertical (Peak)

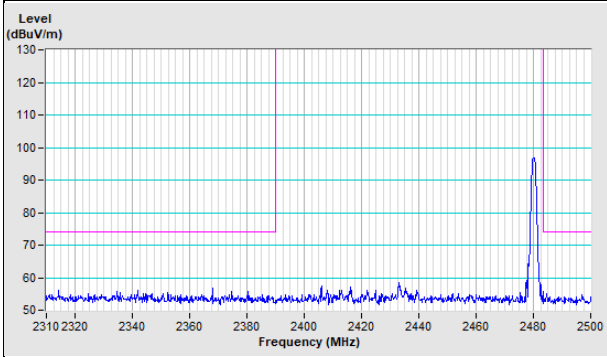


Vertical (Average)

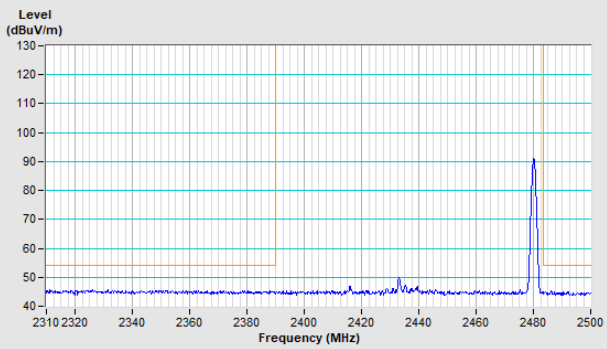


BT-LE 1M Channel 39

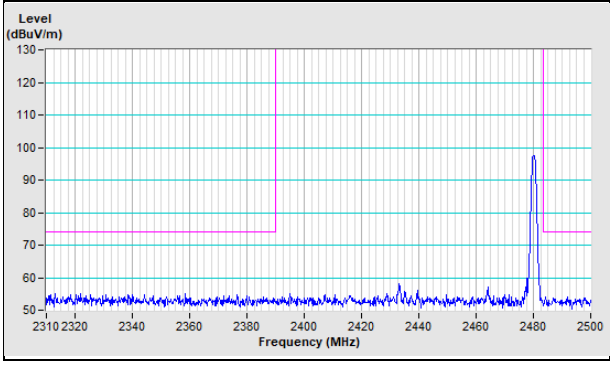
Horizontal (Peak)



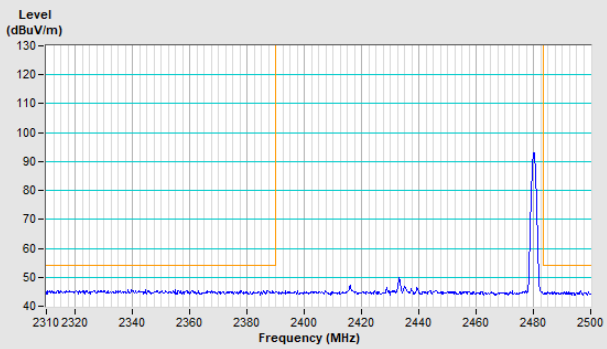
Horizontal (Average)



Vertical (Peak)



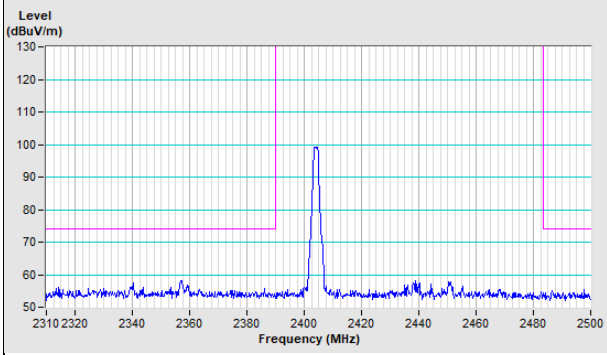
Vertical (Average)



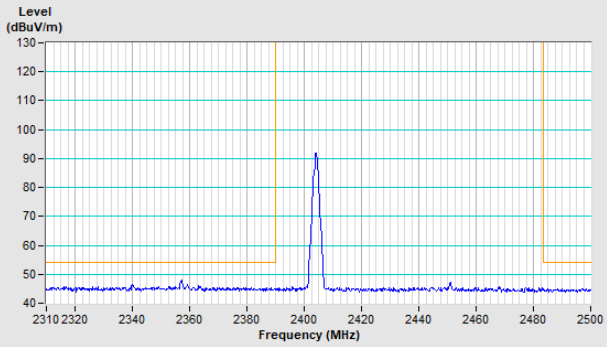
Plot of Band Edge_2M

BT-LE 2M Channel 1

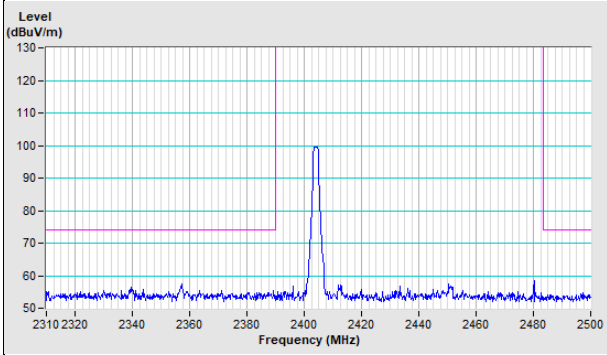
Horizontal (Peak)



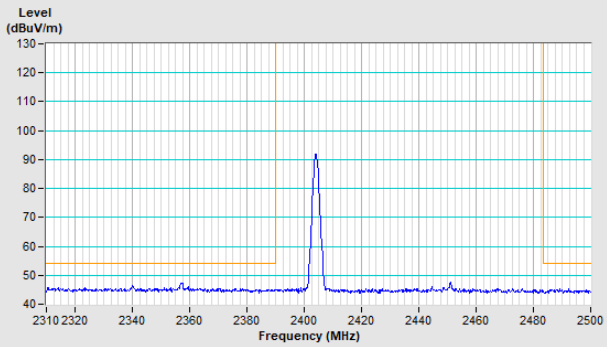
Horizontal (Average)



Vertical (Peak)

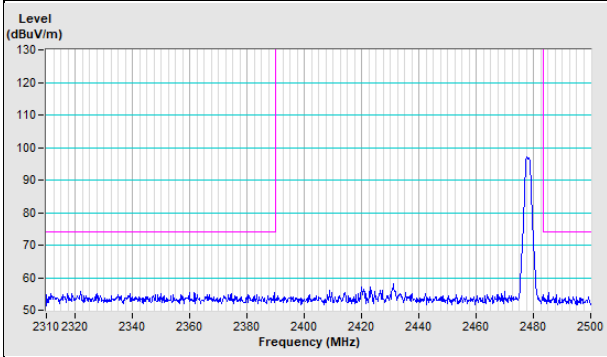


Vertical (Average)

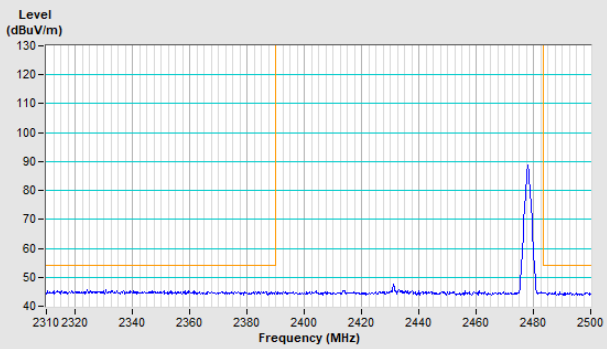


BT-LE 2M Channel 38

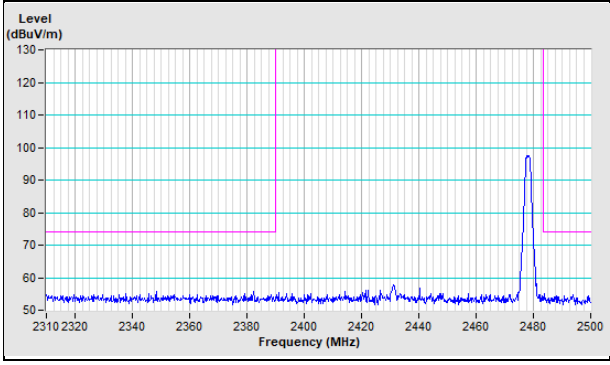
Horizontal (Peak)



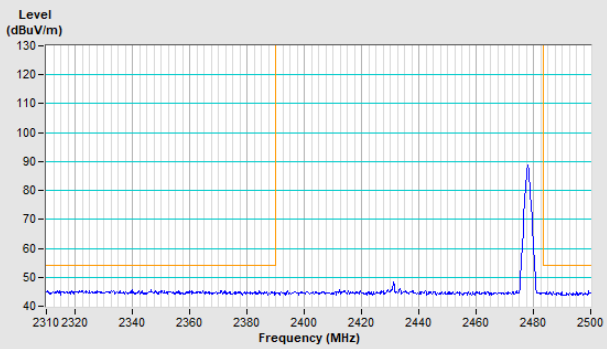
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



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:

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

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