

TEST REPORT

CERTIFICATE OF CONFORMITY

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

Report No.: RFBUUY-WTW-P25050546

FCC ID: XGB-MWBB0018Product: Wireless MouseBrand: TURTLE BEACH

Model No.: MWBB0018

Received Date: 2025/5/26

Test Date: 2025/6/20 ~ 2025/7/1

Issued Date: 2025/7/15

Applicant: Voyetra Turtle Beach, Inc.

Address: 44 South Broadway, 4th Floor White Plains NY 10601 USA

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

Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan **Test Location:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

FCC Registration / 198487 / TW2021

Designation Number:

Approved by:	Jeremy Lin	, Date:	2025/7/15	
	Jeremy Lin / Project Engineer			

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Prepared by : Annie Chang / Senior Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBUUY-WTW-P25050546	Original release.	2025/7/15

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1 Certificate

Product: Wireless Mouse

Brand: TURTLE BEACH

Test Model: MWBB0018

Sample Status: Engineering sample

Applicant: Voyetra Turtle Beach, Inc.

Test Date: 2025/6/20 ~ 2025/7/1

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

Measurement ANSI C63.10-2013

procedure: KDB 558074 D01 15.247 Meas Guidance v05r02

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

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2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)						
Standard / Clause	Test Item	Result	Remark			
15.247(b)	RF Output Power	Pass	Meet the requirement of limit.			
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.			
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement of limit.			
15.247(d)	Conducted Out of Band Emissions	Pass	Meet the requirement of limit.			
15.207	AC Power Conducted Emissions	Pass	Minimum passing margin is -11.70 dB at 0.48244 MHz			
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -6.7 dB at 33.25 MHz			
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -11.1 dB at 2483.50 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) (±)
RF Output Power	-	1.1 dB
Power Spectral Density	-	1.3 dB
6 dB Bandwidth	-	960 Hz
Conducted Out of Band Emissions	9 kHz ~ 40 GHz	2.7 dB
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.9 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	2.55 dB
Offwanted Emissions below 1 GHZ	30 MHz ~ 1 GHz	5.77 dB
	1 GHz ~ 6 GHz	4.71 dB
Unwanted Emissions above 1 GHz	6 GHz ~ 18 GHz	5.3 dB
	18 GHz ~ 40 GHz	4.98 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.

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3 General Information

3.1 General Description

Product	Wireless Mouse
Brand	TURTLE BEACH
Test Model	MWBB0018
Status of EUT	Engineering sample
Power Supply Rating	3.7Vdc from battery or 5Vdc from host equipment
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	2 Mbps
Operating Frequency	2.404 GHz ~ 2.478 GHz
Number of Channel	38
Output Power	2.317 mW (3.65 dBm)

Note:

1. The EUT uses following accessories.

Item	Specification
USB Cable	Shielded without core, 1.8m
USB to Type-C Adapter	-

- 2. The EUT has black & white, which are electrically identical to each other except for exterior color.
- 3. There are Bluetooth and SRD technology used for the EUT.
- 4. Bluetooth and SRD technology can not transmit at same time.
- 5. 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

The antenna information is listed as below.

The antenna information is noted as scient							
Gain (dBi)	Antenna Type	Connector Type					
2.61	Chip	none					

^{*} Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

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3.3 Channel List

38 channels are provided for BT-LE:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460		
10	2422	20	2442	30	2462		

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3.4 Test Mode Applicability and Tested Channel Detail

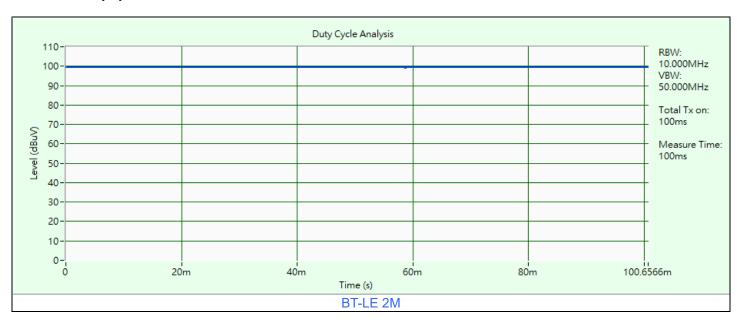
Pre-Scan:	1.For Unwanted Emission above 1 GHz has Battery/ EUT with USB cable(Adapter) mode of power supply. Pre-scan these modes and find the worst case as a representative test condition.
	2.For Unwanted Emission below 1 GHz has Battery/ EUT with USB cable(Adapter)/ EUT with USB cable(NB) mode of power supply. Pre-scan these modes and find the worst case as a representative test condition.
Worst Case:	For Unwanted Emission above 1 GHz EUT with USB cable(Adapter) mode is the worst case of power supply. For Unwanted Emission below 1 GHz EUT with USB cable(Adapter) mode is the worst case of power supply.

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
RF Output Power	А	BT-LE 2M	1, 19, 38	GFSK	2Mb/s
Power Spectral Density	А	BT-LE 2M	1, 19, 38	GFSK	2Mb/s
6 dB Bandwidth / Conducted Out of Band Emissions	А	BT-LE 2M	1, 19, 38	GFSK	2Mb/s
AC Power Conducted Emissions	А	BT-LE 2M	1	GFSK	2Mb/s
AC Power Conducted Emissions	В	Charging	-	-	-
Unwanted Emissions below 1 GHz	А	BT-LE 2M	1	GFSK	2Mb/s
Unwanted Emissions above 1 GHz	Α	BT-LE 2M	1, 19, 38	GFSK	2Mb/s
ELIT Configure Mode:	А		EUT with USB	cable(Adapter)	
EUT Configure Mode:	В		EUT with US	B cable(NB)	

3.5 Duty Cycle of Test Signal

BT-LE 2M: Duty cycle = 100 ms / 100 ms x 100% = 100.0%



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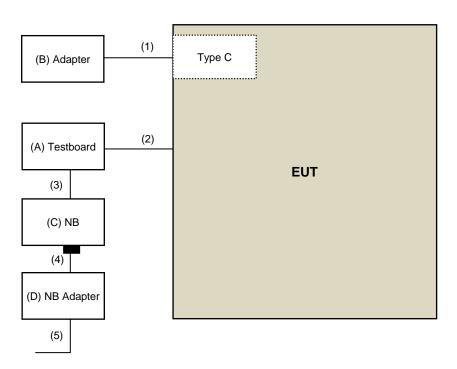


3.6 Test Program Used and Operation Descriptions

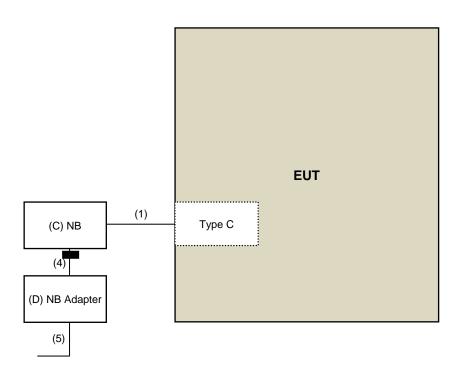
Controlling software (RF_Test_tool_v1.0.0.8) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.7 Connection Diagram of EUT and Peripheral Devices

Mode A



Mode B



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3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
Α	Testboard	N/A	N/A	N/A	N/A	Supplied by applicant
В	Adapter	Belkin	WCB007dq	N/A	N/A	Provided by Lab
С	NB	Dell	P90F	N/A	N/A	Provided by Lab
D	NB Adapter	Dell	LA65NS2-01	N/A	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB cable	1	1.8	Y	0	Supplied by applicant
2	DC cable	1	0.15	N	0	Supplied by applicant
3	USB A-A	1	1	N	0	Provided by Lab
4	DC cable	1	1.9	N	1	Provided by Lab
5	AC cable	1	8.0	N	0	Provided by Lab

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4 Test Instruments

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

4.1 RF Output Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Fixed Attenuator Solvang Technology	STI02-3310-10	STI02-3310-10_013	2025/5/23	2026/5/22
Pulse Power Sensor Anritsu	MA2411B	0738404	2025/5/20	2026/5/19
RF Power Meter Anritsu	ML2495A	0842014	2025/5/20	2026/5/19
USB Wideband Power Sensor Keysight	U2021XA	MY55050005/ MY55190004/ MY55190007 /MY55210005	2024/7/29	2025/7/28

Notes:

1. The test was performed in LK - Oven

2. Tested Date: 2025/6/30

4.2 Power Spectral Density

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Fixed Attenuator Solvang Technology	STI02-3310-10	STI02-3310-10_013	2025/5/23	2026/5/22
PXA Signal Analyzer Keysight	N9030A	MY54490260	2024/7/17	2025/7/16
Signal Analyzer R&S	FSV40	101042	2024/9/12	2025/9/11
Software	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in LK - Oven

2. Tested Date: 2025/6/30

4.3 6 dB Bandwidth

Refer to section 4.2 to get the tested date and information of the instruments.

4.4 Conducted Out of Band Emissions

Refer to section 4.2 to get the tested date and information of the instruments.

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4.5 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal resistance	0900510	E1-011284	2024/9/16	2025/9/15
LYNICS	0900510	E1-011285	2024/9/25	2025/9/24
Coupling / Decoupling Network	CDNE-M2	00097	2025/5/28	2026/5/27
Schwarzbeck	CDNE-M3	00091	2025/3/20	2026/3/19
Diode Pulse Limiter Schwarzbeck	VTSD 9561 F-N	01422	2025/5/2	2026/5/1
EMI Test Receiver R&S	ESR3	102413	2025/1/22	2026/1/21
Fixed Attenuator EMEC	EM-ATT30002602NN	N/A	2025/3/21	2026/3/20
Fixed Attenuator STI	STI02-2200-10	NO.3	2024/10/19	2025/10/18
High Voltage Probe Schwarzbeck	TK9420	00982	2024/12/6	2025/12/5
	450UDE ME	114005	2025/5/2	2026/5/1
Highpass filter	150HPF-ME	114006	2025/5/2	2026/5/1
EMCI	150HPF-MF	113009	2025/5/2	2026/5/1
LISN	ENV216	101196	2025/5/19	2026/5/18
R&S	ESH3-Z5	100220	2024/11/21	2025/11/20
	NINII IX 0404	8121-00759	2024/8/20	2025/8/19
LISN	NNLK 8121	8121-808	2025/4/23	2026/4/22
Schwarzbeck	1111111 0 4 0 0	00624	2024/10/9	2025/10/8
	NNLK 8129	8129229	2024/10/14	2025/10/13
RF Coaxial Cable PEWC	5D-FB	Cable-CO3-01	2024/9/12	2025/9/11
Software BVADT	Cond_V7.4.1.0	N/A	N/A	N/A

Notes:

1. The test was performed in Linkou Conduction 3.

2. Tested Date: 2025/6/20

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Unwanted Emissions below 1 GHz 4.6

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Bi_Log Antenna Schwarzbeck	VULB 9168	137	2024/10/9	2025/10/8
Coupling / Decoupling Network	CDNE-M2	00097	2025/5/28	2026/5/27
Schwarzbeck	CDNE-M3	00091	2025/3/20	2026/3/19
MXE EMI Receiver Agilent	N9038A	MY50010158	2024/10/11	2025/10/10
Preamplifier Agilent	8447D	2944A11064	2025/2/14	2026/2/13
Preamplifier EMCI	EMC001340	980269	2024/6/25	2025/6/24
Radiating Loop Antenna TESEQ	RLA 6120-20	80002	2024/7/30	2025/7/29
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2024/6/25	2025/6/24
Software BVADT	Radiated_V8.7.08	N/A	N/A	N/A
Tower ADT	AT100	0306	N/A	N/A
Turn Table ADT	TT100	0306	N/A	N/A

Notes:

The test was performed in Linkou 966 Chamber 6 (CH 6).
 Tested Date: 2025/6/21

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Unwanted Emissions above 1 GHz 4.7

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Boresight antenna tower fixture BV	BAF-02	6	N/A	N/A
High Pass Filter Wainwright	WHK 3.1/18G-10SS	SN 8	2025/5/22	2026/5/21
Horn Antenna EMCO	3115	00028257	2024/11/10	2025/11/9
Horn Antenna ETS-Lindgren	3117-PA	00215857	2024/11/10	2025/11/9
Horn Antenna Schwarzbeck	BBHA 9170	212 BBHA9170190	2024/10/18 2024/11/10	2025/10/17 2025/11/9
MXE EMI Receiver Agilent	N9038A	MY50010158	2024/10/11	2025/10/10
Notch Filter	BRC50703-01	010	2025/5/22	2026/5/21
Micro-Tronics	BRM17690	005	2025/5/22	2026/5/21
	EMC0126545	980076	2025/2/14	2026/2/13
Preamplifier EMCI	EMC40404ED	980175	2024/8/25	2025/8/24
EMCI	EMC184045B	980235	2025/2/14	2026/2/13
Preamplifier HP	8449B	3008A01201	2025/2/14	2026/2/13
RF Coaxial Cable	EN40404	190801	2024/7/5	2025/7/4
EMCI	EMC104	190804	2024/7/5	2025/7/4
RF Coaxial Cable EMEC	EM102-KMKM-100	02	2024/7/5	2025/7/4
RF Coaxial Cable HUBER+SUHNER	SF-104	Cable-CH6-01	2024/7/5	2025/7/4
Signal Analyzer R&S	FSV40	101042	2024/9/12	2025/9/11
Software BVADT	Radiated_V7.7.1.1.1	N/A	N/A	N/A
Tower ADT	AT100	0306	N/A	N/A
Turn Table ADT	TT100	0306	N/A	N/A

Notes:

- 1. The test was performed in Linkou 966 Chamber 6 (CH 6). 2. Tested Date: $2025/6/20 \sim 2025/7/1$



5 Limits of Test Items

5.1 RF Output Power

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

5.2 Power Spectral Density

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

5.3 6 dB Bandwidth

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

5.4 Conducted Out of Band Emissions

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

5.5 AC Power Conducted Emissions

Frequency (MHz)	Conducted Limit (dBuV)		
Frequency (Miriz)	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 0.50 MHz.

5.6 Unwanted Emissions below 1 GHz

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

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

Notes:

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

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5.7 Unwanted Emissions above 1 GHz

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

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

Notes:

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

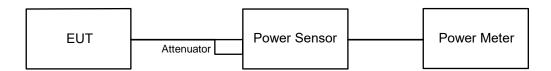
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6 Test Arrangements

6.1 RF Output Power

6.1.1 Test Setup



6.1.2 Test Procedure

Peak Power:

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

Average Power:

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

6.2 Power Spectral Density

6.2.1 Test Setup



6.2.2 Test Procedure

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to: 3 kHz.
- d. Set the VBW ≥ 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.

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6.3 6 dB Bandwidth

6.3.1 Test Setup



6.3.2 Test Procedure

- a. Set resolution bandwidth (RBW) = 100 kHz.
- 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

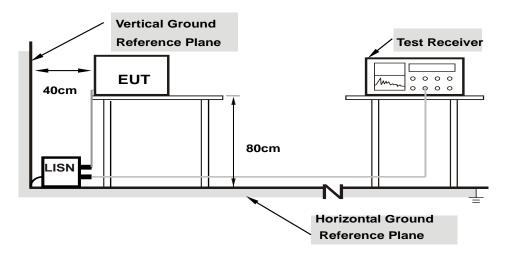
- a. Set RBW = 100 kHz.
- b. Set VBW ≥ 300 kHz.
- c. Detector = peak.
- d. Sweep = auto couple.
- e. Trace Mode = max hold.
- f. Allow trace to fully stabilize.
- g. Use the peak marker function to determine the maximum amplitude level.

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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 on a 0.8 meter to the top of table and 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.

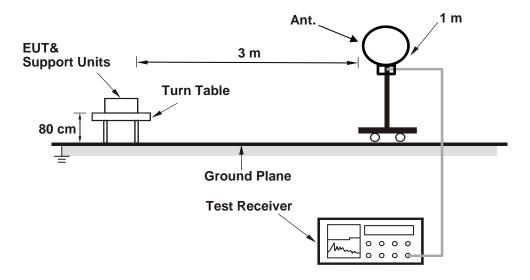
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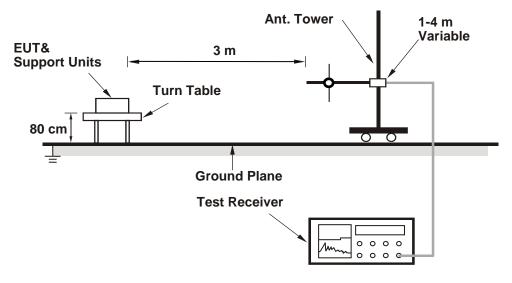
6.6 Unwanted Emissions below 1 GHz

6.6.1 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



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



6.6.2 Test Procedure

For Radiated emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

Notes:

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

For Radiated emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

Notes:

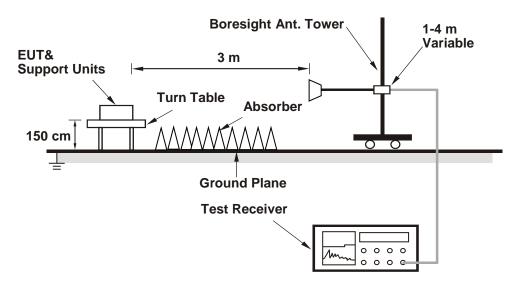
- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
- 2. All modes of operation were investigated and the worst-case emissions are reported.

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6.7 Unwanted Emissions above 1 GHz

6.7.1 Test Setup



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/spectrum analyzer was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Notes:

- 1. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
- 2. For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10 Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1 GHz.
- 3. All modes of operation were investigated and the worst-case emissions are reported.

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7 Test Results of Test Item

7.1 RF Output Power

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 76% RH	Tested By:	Waydi Tuan
--------------	----------------	---------------------------	--------------	------------	------------

For Peak Power

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
1	2404	2.317	3.65	30	Pass
19	2440	2.307	3.63	30	Pass
38	2478	2.291	3.60	30	Pass

Note: The antenna gain is 2.61 dBi <= 6 dBi, so the output power limit shall not be reduced.

For Average Power

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2404	2.128	3.28
19	2440	2.123	3.27
38	2478	2.028	3.07

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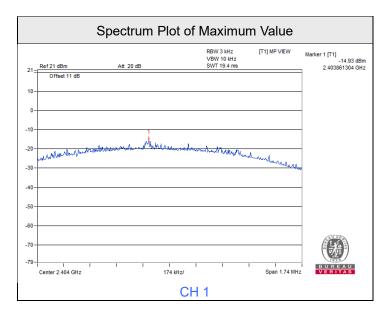


7.2 Power Spectral Density

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 76% RH	Tested By:	Waydi Tuan
--------------	----------------	---------------------------	--------------	------------	------------

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
1	2404	-14.93	8	Pass
19	2440	-15.02	8	Pass
38	2478	-15.27	8	Pass

Note: The antenna gain is 2.61 dBi <= 6 dBi, so the power density limit shall not be reduced.

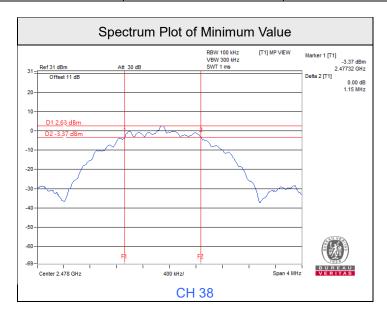




7.3 6 dB Bandwidth

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 76% RH	Tested By:	Waydi Tuan
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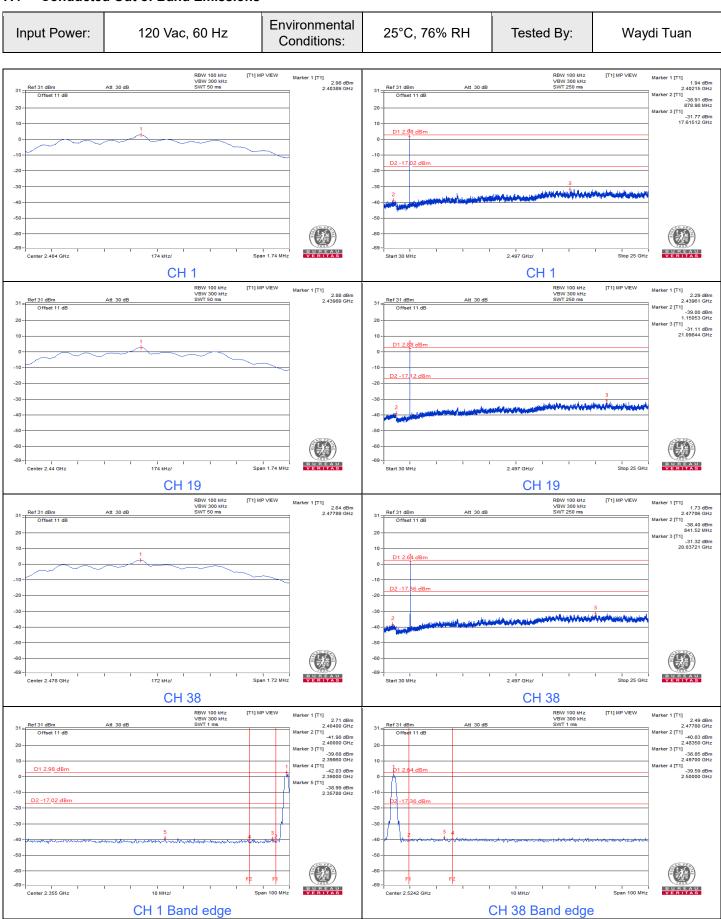
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	2404	1.16	0.5	Pass
19	2440	1.16	0.5	Pass
38	2478	1.15	0.5	Pass



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7.4 Conducted Out of Band Emissions





7.5 AC Power Conducted Emissions

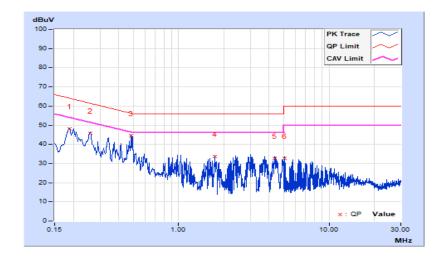
Mode A

RF Mode	BT-LE 2M	Channel	CH 1: 2404 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Jed Wu		

	Phase Of Power : Line (L)									
No	Frequency	Correction Factor		Reading Value (dBuV)		n Level uV)		mit suV)		gin B)
	(MHz)	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18903	10.21	37.87	27.38	48.08	37.59	64.08	54.08	-16.00	-16.49
2	0.25797	10.22	35.64	24.20	45.86	34.42	61.50	51.50	-15.64	-17.08
3	0.48244	10.23	34.37	21.05	44.60	31.28	56.30	46.30	-11.70	-15.02
4	1.74370	10.33	23.25	9.82	33.58	20.15	56.00	46.00	-22.42	-25.85
5	4.36407	10.55	22.00	8.94	32.55	19.49	56.00	46.00	-23.45	-26.51
6	5.08213	10.64	21.88	7.84	32.52	18.48	60.00	50.00	-27.48	-31.52

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



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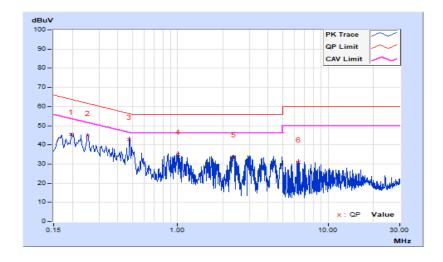


			VERITAS
RF Mode	BT-LE 2M	Channel	CH 1: 2404 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Jed Wu		

	Phase Of Power : Neutral (N)									
No	Frequency	Correction Factor		Reading Value (dBuV)		n Level uV)		nit uV)		rgin B)
	(MHz)	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19693	10.24	35.24	19.31	45.48	29.55	63.74	53.74	-18.26	-24.19
2	0.25169	10.25	34.45	20.45	44.70	30.70	61.70	51.70	-17.00	-21.00
3	0.47852	10.26	32.60	18.83	42.86	29.09	56.36	46.36	-13.50	-17.27
4	1.00452	10.29	24.72	15.17	35.01	25.46	56.00	46.00	-20.99	-20.54
5	2.36946	10.41	23.11	7.86	33.52	18.27	56.00	46.00	-22.48	-27.73
6	6.36885	10.85	20.22	6.98	31.07	17.83	60.00	50.00	-28.93	-32.17

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



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Mode B

Frequency Range	115() kHz ~ 3() MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	1120 Vac 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Jed Wu		

	Phase Of Power : Line (L)									
No	Frequency	Correction Factor		Reading Value (dBuV)		n Level uV)		nit uV)	Maı (d	gin B)
	(MHz)	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18122	10.21	40.33	19.98	50.54	30.19	64.43	54.43	-13.89	-24.24
2	0.22822	10.21	34.59	14.40	44.80	24.61	62.51	52.51	-17.71	-27.90
3	0.32208	10.22	28.66	12.90	38.88	23.12	59.65	49.65	-20.77	-26.53
4	0.48244	10.23	20.52	13.21	30.75	23.44	56.30	46.30	-25.55	-22.86
5	14.18303	11.88	23.77	18.20	35.65	30.08	60.00	50.00	-24.35	-19.92
6	27.94193	14.13	11.85	7.95	25.98	22.08	60.00	50.00	-34.02	-27.92

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





			VERITAS
Eroguenov Bongo	150 kHz ~ 30 MHz	Detector Function &	Quasi-Peak (QP) /
Frequency Range	130 KHZ ~ 30 WHZ	Resolution Bandwidth	Average (AV), 9 kHz
Innut Dower	120 Vac 60 Hz	Environmental	25 °C, 75% RH
Input Power	120 Vac, 60 Hz	Conditions	25 C, 75% KH
Tested By	Jed Wu		

			Р	hase Of P	ower : Neu	ıtral (N)				
No	Frequency	Correction Factor		g Value uV)		n Level uV)		nit uV)		gin B)
	(MHz)	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15464	10.24	39.75	18.36	49.99	28.60	65.75	55.75	-15.76	-27.15
2	0.48244	10.26	22.85	15.10	33.11	25.36	56.30	46.30	-23.19	-20.94
3	0.58995	10.27	17.32	10.17	27.59	20.44	56.00	46.00	-28.41	-25.56
4	3.41761	10.50	15.39	10.38	25.89	20.88	56.00	46.00	-30.11	-25.12
5	14.60542	12.13	21.86	15.62	33.99	27.75	60.00	50.00	-26.01	-22.25
6	27.32399	14.48	17.06	13.03	31.54	27.51	60.00	50.00	-28.46	-22.49

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



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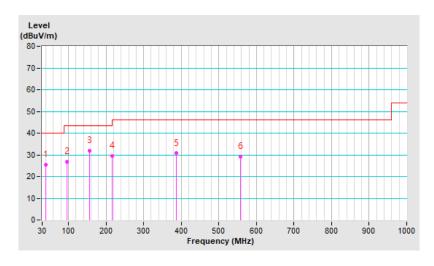
7.6 Unwanted Emissions below 1 GHz

RF Mode	BT-LE 2M	Channel	CH 1: 2404 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120 kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Jed Wu		

		Α	ntenna Polari	ty & Test Dist	ance : Horizoi	ntal 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	40.09	25.5 QP	40.0	-14.5	1.45 H	348	34.9	-9.4
2	96.25	26.9 QP	43.5	-16.6	1.28 H	204	40.4	-13.5
3	155.86	31.9 QP	43.5	-11.6	1.76 H	248	39.8	-7.9
4	215.61	29.6 QP	43.5	-13.9	1.38 H	164	39.5	-9.9
5	387.06	30.7 QP	46.0	-15.3	1.12 H	357	34.4	-3.7
6	557.78	29.2 QP	46.0	-16.8	1.08 H	345	29.6	-0.4

Remarks:

- 1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- 2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) Pre-Amplifier Factor(dB)
- 3. Margin value = Emission Level Limit value
- 4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
- 5. The frequency range 9 kHz \sim 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



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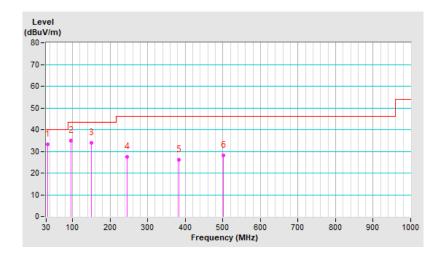


			VERITAS
RF Mode	BT-LE 2M	Channel	CH 1: 2404 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120 kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Jed Wu		

		,	Antenna Pola	rity & Test Dis	stance : Vertic	al 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	33.25	33.3 QP	40.0	-6.7	1.47 V	47	43.7	-10.4
2	96.11	35.0 QP	43.5	-8.5	1.58 V	257	48.6	-13.6
3	150.91	34.0 QP	43.5	-9.5	1.63 V	360	41.8	-7.8
4	246.21	27.6 QP	46.0	-18.4	1.89 V	129	35.5	-7.9
5	383.47	26.2 QP	46.0	-19.8	1.23 V	94	29.9	-3.7
6	501.76	28.3 QP	46.0	-17.7	1.05 V	240	29.6	-1.3

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



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7.7 Unwanted Emissions above 1 GHz

RF Mode	BT-LE 2M	Channel	CH 1: 2404 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25.5 °C, 74.3% RH
Tested By	Jed Wu		

Antenna Polarity & Test Distance: Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	53.7 PK	74.0	-20.3	1.25 H	28	54.9	-1.2
2	2390.00	41.0 AV	54.0	-13.0	1.25 H	28	42.2	-1.2
3	*2404.00	98.2 PK			1.25 H	28	99.3	-1.1
4	*2404.00	95.7 AV			1.25 H	28	96.8	-1.1
5	4808.00	48.0 PK	74.0	-26.0	1.22 H	316	40.8	7.2
6	4808.00	36.4 AV	54.0	-17.6	1.22 H	316	29.2	7.2
			Antenna Pola	rity & Test Dis	stance : Vertic	al at 3 m		
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	53.5 PK	74.0	-20.5	3.99 V	117	54.7	-1.2
2	2390.00	40.8 AV	54.0	-13.2	3.99 V	117	42.0	-1.2
3	*2404.00	97.7 PK			3.99 V	117	98.8	-1.1
4	*2404.00	95.2 AV			3.99 V	117	96.3	-1.1
5	4808.00	47.5 PK	74.0	-26.5	1.35 V	214	40.3	7.2
6	4808.00	36.0 AV	54.0	-18.0	1.35 V	214	28.8	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, the limit was restricted at the RF Output Power.

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			VERTIAS
RF Mode	BT-LE 2M	Channel	CH 19: 2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25.5 °C, 74.3% RH
Tested By	Jed Wu		

		A	ntenna Polari	ty & Test Dist	ance : Horizor	ntal 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	99.4 PK			1.26 H	12	100.3	-0.9
2	*2440.00	96.9 AV			1.26 H	12	97.8	-0.9
3	4880.00	49.4 PK	74.0	-24.6	1.24 H	300	41.7	7.7
4	4880.00	37.9 AV	54.0	-16.1	1.24 H	300	30.2	7.7
			Antenna Pola	rity & Test Dis	stance : Vertic	al 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	98.9 PK			3.98 V	101	99.8	-0.9
2	*2440.00	96.4 AV			3.98 V	101	97.3	-0.9
3	4880.00	49.0 PK	74.0	-25.0	1.34 V	198	41.3	7.7
4	4880.00	37.5 AV	54.0	-16.5	1.34 V	198	29.8	7.7

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.
- 5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.

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Correction

Factor

(dB/m)

			VERITAS
RF Mode	BT-LE 2M	Channel	CH 38: 2478 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25.5 °C, 74.3% RH
Tested By	Jed Wu		

Antenna Polarity & Test Distance : Horizontal at 3 m

Margin

(dB)

Antenna

Height

(m)

Table

Angle

(Degree)

Raw

Value

(dBuV)

		(0.1 -			(/	(()	(***=*****)
1	*2478.00	99.3 PK			1.63 H	11	100.0	-0.7
2	*2478.00	96.7 AV			1.63 H	11	97.4	-0.7
3	2483.50	53.9 PK	74.0	-20.1	1.63 H	11	54.4	-0.5
4	2483.50	42.9 AV	54.0	-11.1	1.63 H	11	43.4	-0.5
5	4956.00	49.2 PK	74.0	-24.8	1.61 H	301	41.4	7.8
6	4956.00	37.7 AV	54.0	-16.3	1.61 H	301	29.9	7.8
			Antenna Pola	rity & Test Dis	stance : Vertic	al at 3 m		
		Emission			Antenna	Table	Raw	Correction
No	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (m)	Angle (Degree)	Value (dBuV)	Factor (dB/m)
No		Level		_	Height	Angle	Value	Factor
No 1 2	(MHz)	Level (dBuV/m)		_	Height (m)	Angle (Degree)	Value (dBuV)	Factor (dB/m)
1	(MHz) *2478.00	Level (dBuV/m) 98.8 PK		_	Height (m) 3.61 V	Angle (Degree)	Value (dBuV) 99.5	Factor (dB/m) -0.7
1 2	*2478.00 *2478.00	Level (dBuV/m) 98.8 PK 96.3 AV	(dBuV/m)	(dB)	Height (m) 3.61 V 3.61 V	Angle (Degree) 100 100	Value (dBuV) 99.5 97.0	Factor (dB/m) -0.7 -0.7
1 2 3	*2478.00 *2478.00 2483.50	Level (dBuV/m) 98.8 PK 96.3 AV 53.6 PK	(dBuV/m) 74.0	(dB) -20.4	Height (m) 3.61 V 3.61 V 3.61 V	Angle (Degree) 100 100	Value (dBuV) 99.5 97.0 54.1	Factor (dB/m) -0.7 -0.7 -0.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)

Limit

(dBuV/m)

- 2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) Pre-Amplifier Factor(dB)
- 3. Margin value = Emission Level Limit value

Emission

Level

(dBuV/m)

Frequency

(MHz)

No

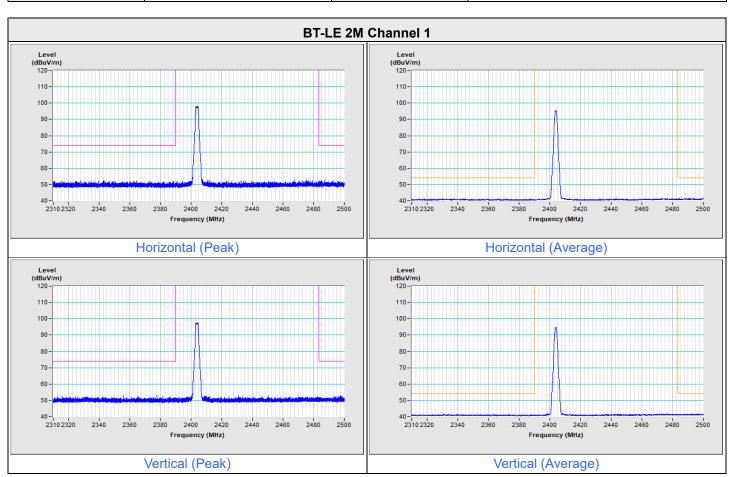
- 4. The other emission levels were very low against the limit.
- 5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.

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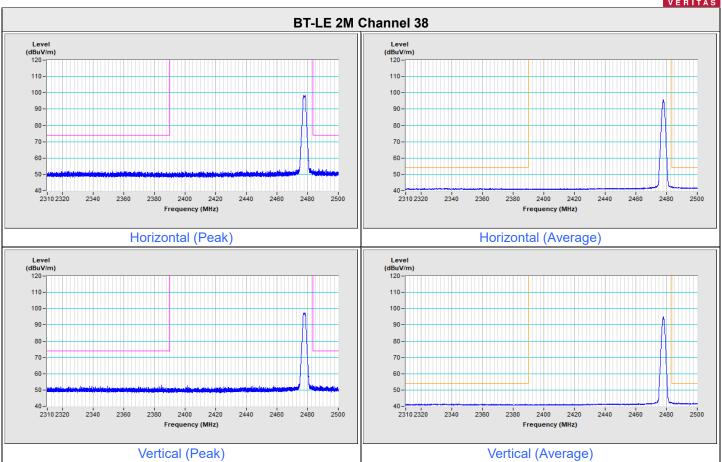


Plot of Band Edge

Frequency Range 2.31 GHz ~ 2.5 GHz Detector Function & Bandwidth PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak









8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

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9 Information of the Testing Laboratories

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

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Web Site: http://ee.bureauveritas.com.tw

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

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