

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)
Report No.: RFBARR-WTW-P22120081S-6
FCC ID: RAS-MT7922A22M
Product: 2TX 11ax (WiFi6E) BW160 + BT/BLE Combo Card
Brand: MediaTek
Model No.: MT7922A22M
Received Date: 2024/9/26
Test Date: 2024/11/6 ~ 2024/11/23
Issued Date: 2024/12/5
Applicant: MediaTek Inc.
Address: No. 1, Dusing 1st Rd., Hsinchu Science Park, Hsinchu City, 30078 Taiwan
Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory
Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / 723255 / TW2022
Designation Number:

Approved by:



, Date:

2024/12/5

Wen Yu / Assistant Manager

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Prepared by : Phoenix Huang / Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBARR-WTW-P22120081S-6	Original release.	2024/12/5

1 Certificate

Product: 2TX 11ax (WiFi6E) BW160 + BT/BLE Combo Card

Brand: MediaTek

Test Model: MT7922A22M

Sample Status: Engineering sample

Applicant: MediaTek Inc.

Test Date: 2024/11/6 ~ 2024/11/23

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

Measurement ANSI C63.10-2013

procedure: KDB 558074 D01 15.247 Meas Guidance v05r02

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

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
Standard / Clause	Test Item	Result	Remark
15.247(b)	RF Output Power	N/A	Refer to Note 1 below
15.247(e)	Power Spectral Density	N/A	Refer to Note 1 below
15.247(a)(2)	6 dB Bandwidth	N/A	Refer to Note 1 below
15.247(d)	Conducted Out of Band Emissions	N/A	Refer to Note 1 below
15.207	AC Power Conducted Emissions	Pass	Minimum passing margin is -14.51 dB at 0.18180 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -5.4 dB at 298.69 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -5.3 dB at 2483.50 MHz
15.203	Antenna Requirement	Pass	Antenna connector is i-pex(MHF), RP SMA PLUG, R-SMA, IPEX-4L or IPEX not a standard connector.

Note:

1. AC Power Conducted Emissions and Unwanted Emissions were performed for this addendum. The others testing data refer to original test report.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Parameter	Specification	Uncertainty (±)
AC Power Conducted Emissions	150 kHz ~ 30 MHz	1.9 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.1 dB
	30 MHz ~ 1 GHz	5.1 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	5.0 dB
	18 GHz ~ 40 GHz	5.3 dB

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

2.2 Supplementary Information

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

3 General Information

3.1 General Description

Product	2TX 11ax (WiFi6E) BW160 + BT/BLE Combo Card
Brand	MediaTek
Test Model	MT7922A22M
Status of EUT	Engineering sample
Power Supply Rating	3.3 Vdc from host equipment
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	Up to 2 Mbps
Operating Frequency	2.402 GHz ~ 2.480 GHz
Number of Channel	40

Note:

1. This report is prepared for FCC class II permissive change. The difference compared with the Report No.: RFBARR-WTW-P21030485Z-2 as the following:
 - ◆ Add Monopole antennas (Refer to section 3.2).
2. According to above conditions and there is no increase in authorized power level, only AC Power Conducted Emissions and Unwanted Emissions test need to be performed. And all data are verified to meet the requirements.
3. There are Bluetooth and WLAN (2.4 GHz & 5 GHz & 5.9 GHz & 6 GHz) technology used for the EUT.
4. The equipment support 2 types of M.2 form factor A-E Key and E Key.
5. Simultaneously transmission combination.

Combination.	Technology	
1	WLAN (5 GHz)	Bluetooth
2	WLAN (6 GHz)	Bluetooth
3	WLAN (5.9 GHz)	Bluetooth

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

6. 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.

Original								
Antenna Set	RF Chain NO.	Brand	Model	Antenna Net Gain(dBi)	Frequency Range (GHz)	Antenna Type	Connector Type	Cable Length (mm)
1	Chain0	PSA	RFMTA340718EMLB302	3.18	2.4~2.4835	PIFA	ipex(MHF)	200
				4.92	5.15~5.895			
	Chain1	PSA	RFMTA340718EMLB302	3.18	2.4~2.4835			
				4.92	5.15~5.895			
2	Chain0	PSA	RFMTA311020EMMB301	1.71	2.4~2.4835	PIFA	ipex(MHF)	200
				4.82	5.15~5.895			
				4.76	5.925~6.425			
				4.29	6.425~6.525			
				4.61	6.525~6.875			
				4.09	6.875~7.125			
	Chain1	PSA	RFMTA311020EMMB301	1.71	2.4~2.4835			
				4.82	5.15~5.895			
				4.76	5.925~6.425			
				4.29	6.425~6.525			
				4.61	6.525~6.875			
				4.09	6.875~7.125			
3	Chain0	Cortec	AN2450-4902BRS	2.42	2.4~2.4835	Dipole	R-SMA	150
				3.87	5.15~5.895			
	Chain1	Cortec	AN2450-4902BRS	2.42	2.4~2.4835			
				3.87	5.15~5.895			
4	Chain0	VSO	JR2Q00340-1	1.62	2.4~2.4835	Dipole	RP SMA PLUG	40
				3.2	5.15~5.895			
				3.93	5.925~6.425			
				3.61	6.425~6.525			
				3.61	6.525~6.875			
				3.14	6.875~7.125			
	Chain1	VSO	JR2Q00340-1	1.62	2.4~2.4835			
				3.2	5.15~5.895			
				3.93	5.925~6.425			
				3.61	6.425~6.525			
				3.61	6.525~6.875			
				3.14	6.875~7.125			
5	Chain0	MSI	WA-P-LE-02-045 (Main)	2.24	2.4~2.4835	PIFA	IPEX-4L	190
				2.68	5.15~5.895			
				3.01	5.925~6.425			
				-1.23	6.425~6.525			
				-1.96	6.525~6.875			
				-3.68	6.875~7.125			
	Chain1	MSI	WA-P-LE-02-046 (Aux)	-2.96	2.4~2.4835	PIFA	IPEX-4L	325
				1.16	5.15~5.895			
				0.99	5.925~6.425			
				-2.31	6.425~6.525			
				-2.54	6.525~6.875			
				-7.44	6.875~7.125			

Antenna Set	RF Chain NO.	Brand	Model	Antenna Net Gain(dBi)	Frequency Range (GHz)	Antenna Type	Connector Type	Cable Length (mm)
6	Chain0	PSA	RFPCA460632IMMB701	-13.2	5.925~6.425	Dipole	IPEX	320
				-13.67	6.425~6.525			
				-13.67	6.525~6.875			
				-13.09	6.875~7.125			
	Chain1	PSA	RFPCA460632IMMB701	-13.2	5.925~6.425	Dipole	IPEX	
				-13.67	6.425~6.525			
				-13.67	6.525~6.875			
				-13.09	6.875~7.125			
7	Chain0	PSA	RFMTA421230IMMB701	-13.92	5.925~6.425	PIFA	IPEX	300
				-13.91	6.425~6.525			
				-13.91	6.525~6.875			
				-14.46	6.875~7.125			
	Chain1	PSA	RFMTA421230IMMB701	-13.92	5.925~6.425	PIFA	IPEX	
				-13.91	6.425~6.525			
				-13.91	6.525~6.875			
				-14.46	6.875~7.125			

Newly

Antenna Set	RF Chain NO.	Brand	Model	Antenna Net Gain(dBi)	Frequency Range (GHz)	Antenna Type	Connector Type	Cable Length (mm)				
8	Chain0	HongBo	260-25105	3.1	2.4~2.4835	Monopole	ipex(MHF)	486				
				3.33	5.15~5.895							
				4.23	5.925~6.425							
				4.22	6.425~6.525							
				4.01	6.525~6.875							
					3.07	6.875~7.125						
					3.1	2.4~2.4835				Monopole	ipex(MHF)	486
					3.33	5.15~5.895						
					4.23	5.925~6.425						
					4.22	6.425~6.525						
4.01	6.525~6.875											
9	Chain0	HongBo	260-25106	4.91	5.15~5.895	Monopole	ipex(MHF)	350				
				4.73	5.925~6.425							
				4.29	6.425~6.525							
				4.58	6.525~6.875							
				4.09	6.875~7.125							
					4.91	5.15~5.895	Monopole	ipex(MHF)	350			
					4.73	5.925~6.425						
					4.29	6.425~6.525						
					4.58	6.525~6.875						
					4.09	6.875~7.125						

Note: Above Monopole antennas, Antenna Set. 8 was selected for the final test of Bluetooth.

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

3.3 Channel List

BT-LE channels:

RF Channel	RF Center Frequency	Channel Index	Channels Type for BT 5.x		Channels Type for BT 4.x
			Maximum Data Rate 2 Mbps	Maximum Data Rate 1 Mbps	Maximum Data Rate 1 Mbps
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. EUT's Monopole antenna can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition. 2. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
Worst Case:	1. EUT's Monopole antenna worst condition: X-axis

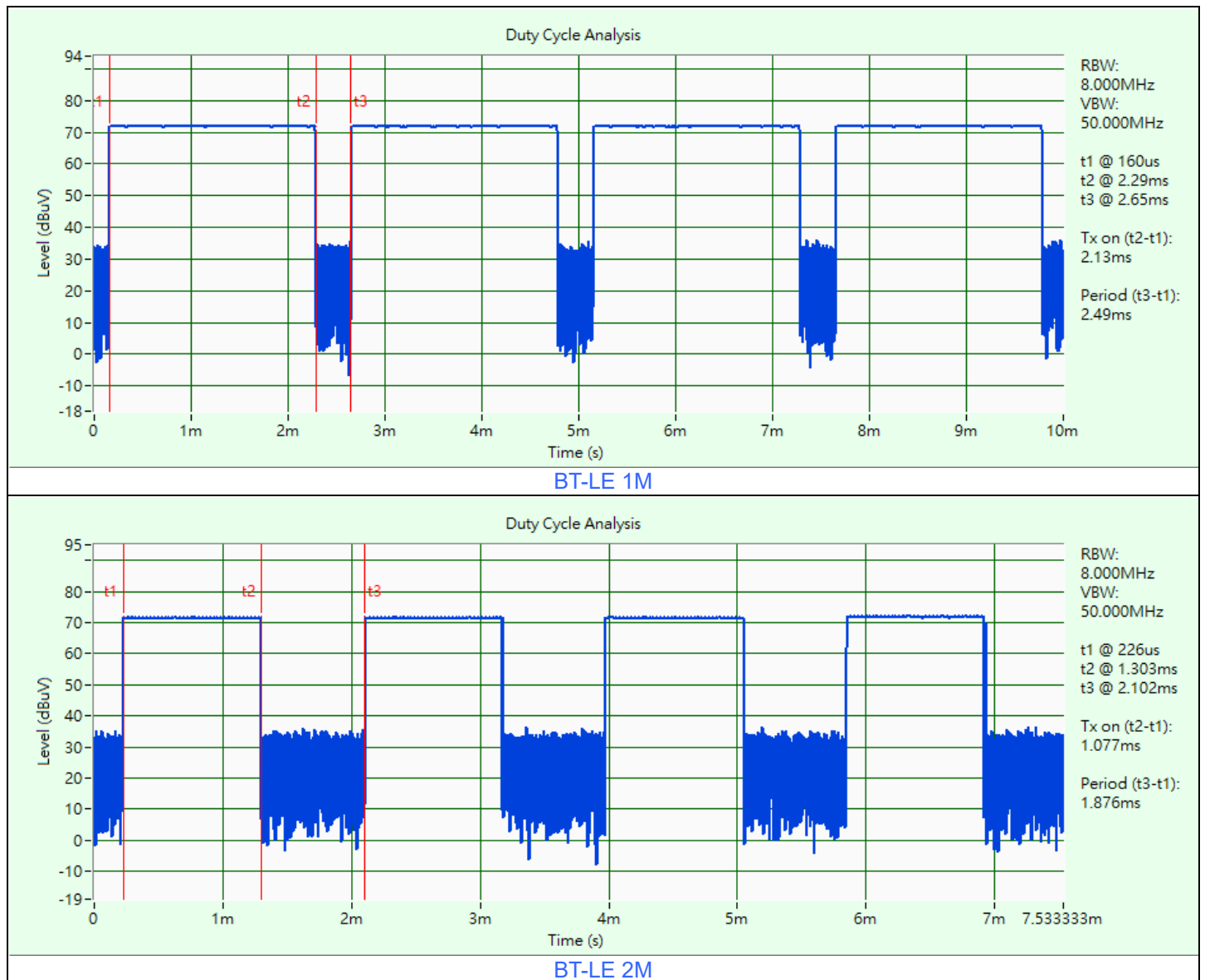
Following channel(s) was (were) selected for the final test as listed below:

Test Item	Mode	Tested Channel	Modulation	Data Rate Parameter
AC Power Conducted Emissions	BT-LE 1M	0	GFSK	1Mb/s
Unwanted Emissions below 1 GHz	BT-LE 1M	0	GFSK	1Mb/s
Unwanted Emissions above 1 GHz	BT-LE 1M	0, 19, 39	GFSK	1Mb/s
	BT-LE 2M	1, 19, 38	GFSK	2Mb/s
Note: The worst types of M.2 form is A-E Key. This evaluation condition is determined by referring to the evaluation results of the original report.				

3.5 Duty Cycle of Test Signal

BT-LE 1M: Duty cycle = 2.13 ms / 2.49 ms x 100% = 85.5%, duty factor = $10 \cdot \log(1/\text{Duty cycle}) = 0.68 \text{ dB}$

BT-LE 2M: Duty cycle = 1.077 ms / 1.876 ms x 100% = 57.4%, duty factor = $10 \cdot \log(1/\text{Duty cycle}) = 2.41 \text{ dB}$

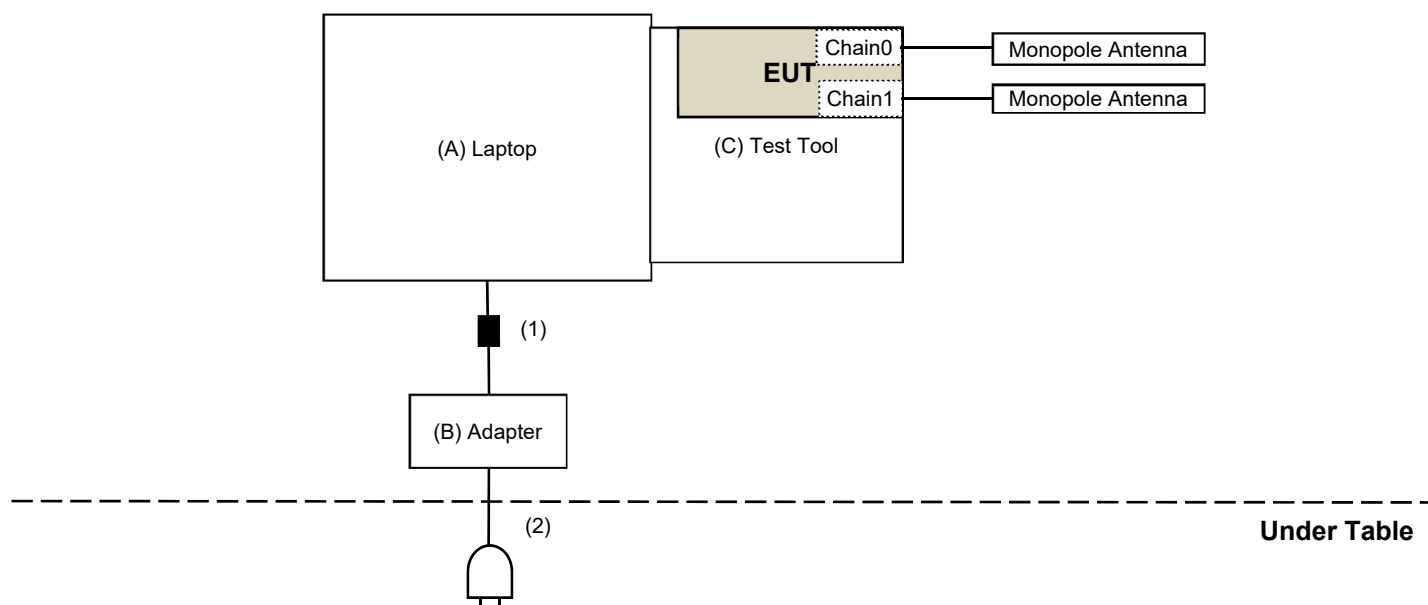


3.6 Test Program Used and Operation Descriptions

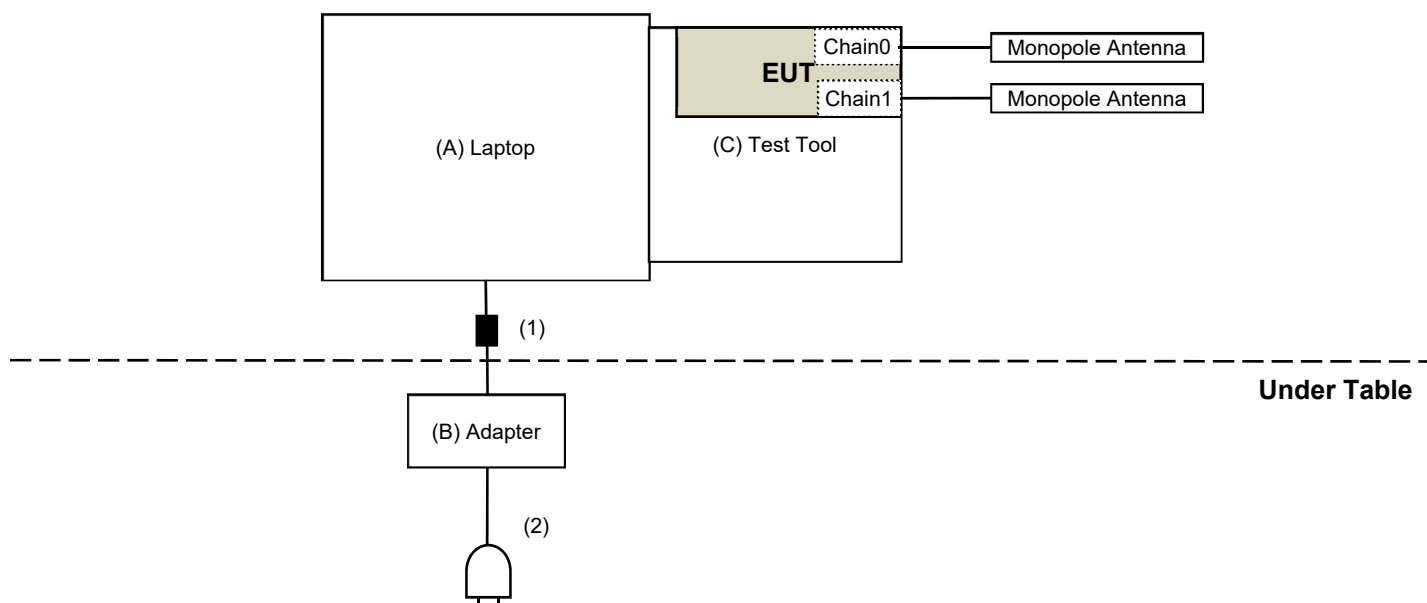
Controlling software (QATool_Ulv2.55) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.7 Connection Diagram of EUT and Peripheral Devices

For AC Power Conducted Emission test



For Unwanted Emission test



3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Laptop	Lenovo	L440	R907JXDG	N/A	Provided by Lab
B	Adapter	Lenovo	ADLX45NCC3A	N/A	N/A	Provided by Lab
C	Test Tool	MediaTek	MTK1849	N/A	N/A	Supplied by applicant

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	DC Cable	1	1.8	No	1	Provided by Lab
2	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 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal resistance Telegartner	50 ohm	3	2024/11/1	2025/10/31
EMI Test Receiver R&S	ESCS 30	100375	2024/5/20	2025/5/19
Fixed Attenuator STI	STI02-2200-10	005	2024/2/19	2025/2/18
LISN R&S	ESH3-Z5	835239/001	2024/4/3	2025/4/2
		848773/004	2024/10/7	2025/10/6
RF Coaxial Cable JYEBAO	5D-FB	COCCAB-001	2024/2/19	2025/2/18
Software BVADT	BVADT_Cond_V7.3.7.4	N/A	N/A	N/A

Notes:

1. The test was performed in Conduction 1
2. Tested Date: 2024/11/19 ~ 2024/11/20

4.2 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-0942	2024/10/14	2025/10/13
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	N/A	N/A
Fixed Attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-01	2024/5/16	2025/5/15
Loop Antenna TESEQ	HLA 6121	63620	2024/10/17	2025/10/16
MXA Signal Analyzer Keysight	N9020B	MY60112410	2024/3/13	2025/3/12
MXE EMI Receiver Keysight	N9038A	MY59050100	2024/6/19	2025/6/18
Preamplifier EMCI	EMC330N	980852	2024/2/17	2025/2/16
	EMC001340	980142	2024/2/19	2025/2/18
RF Coaxial Cable JYEBAO	5D-FB	LOOPCAB-001	2024/2/19	2025/2/18
		LOOPCAB-002	2024/2/19	2025/2/18
RF Coaxial Cable PEWC	8D	966-6-1	2024/5/16	2025/5/15
		966-6-2	2024/5/16	2025/5/15
		966-6-3	2024/5/16	2025/5/15
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The test was performed in 966 Chamber No. 6.
2. Tested Date: 2024/11/6

4.3 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	N/A	N/A
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-2035	2024/11/10	2025/11/9
	BBHA 9170	BBHA9170519	2024/11/10	2025/11/9
MXA Signal Analyzer Keysight	N9020B	MY60112410	2024/3/13	2025/3/12
MXE EMI Receiver Keysight	N9038A	MY59050100	2024/6/19	2025/6/18
Preamplifier EMCI	EMC12630SE	980385	2024/6/1	2025/5/31
	EMC184045SE	980387	2024/8/8	2025/8/7
RF Coaxial Cable EMCI	EMC104-SM-SM-1300	210205	2024/6/1	2025/5/31
	EMC104-SM-SM-2000	210203	2024/6/1	2025/5/31
	EMC104-SM-SM-8000	221015	2024/6/1	2025/5/31
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The test was performed in 966 Chamber No. 6.
2. Tested Date: 2024/11/13 ~ 2024/11/23

5 Limits of Test Items

5.1 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 0.50 MHz.

5.2 Unwanted Emissions below 1 GHz

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

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

Notes:

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

5.3 Unwanted Emissions above 1 GHz

Radiated emissions above 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Other emissions:

- (1) For Peak conducted power limits shall be at least 20 dB below the highest level of the desired power:
- (2) For RMS averaging conducted power limits shall be at least 30 dB below the highest level of the desired power:

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

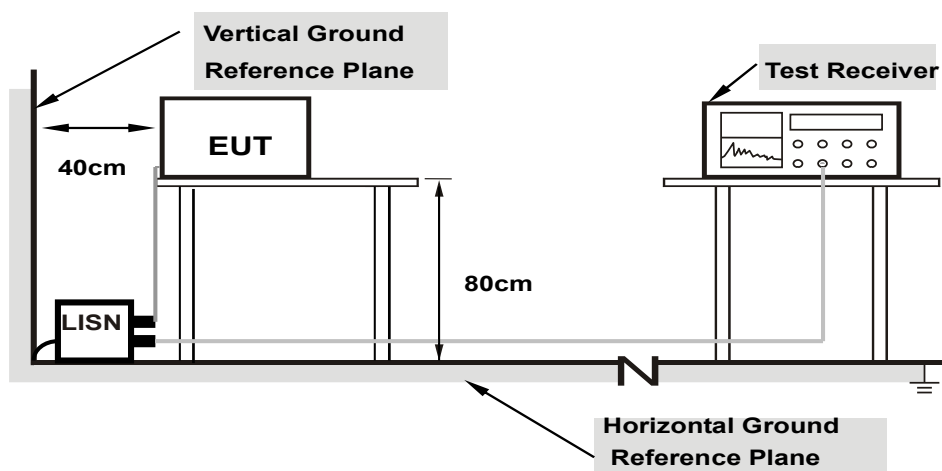
Notes:

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

6 Test Arrangements

6.1 AC Power Conducted Emissions

6.1.1 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).

6.1.2 Test Procedure

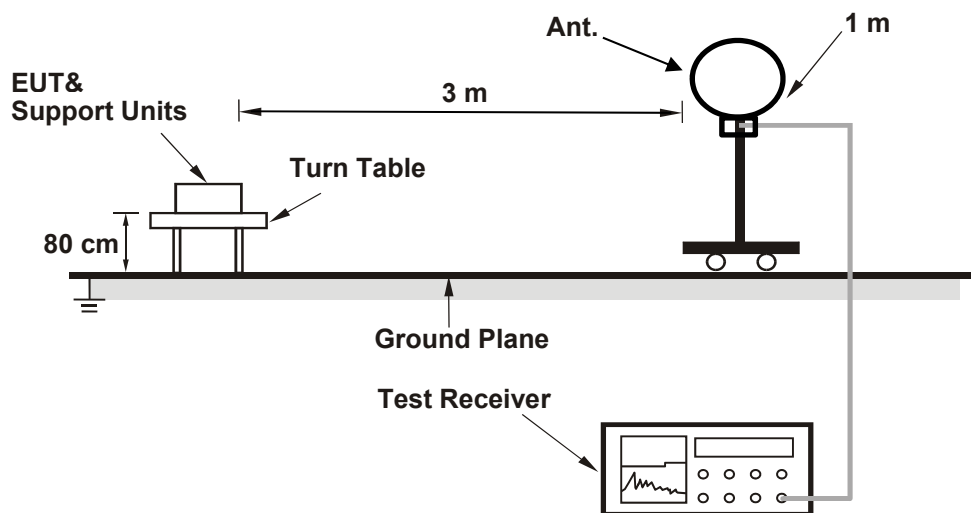
- The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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.

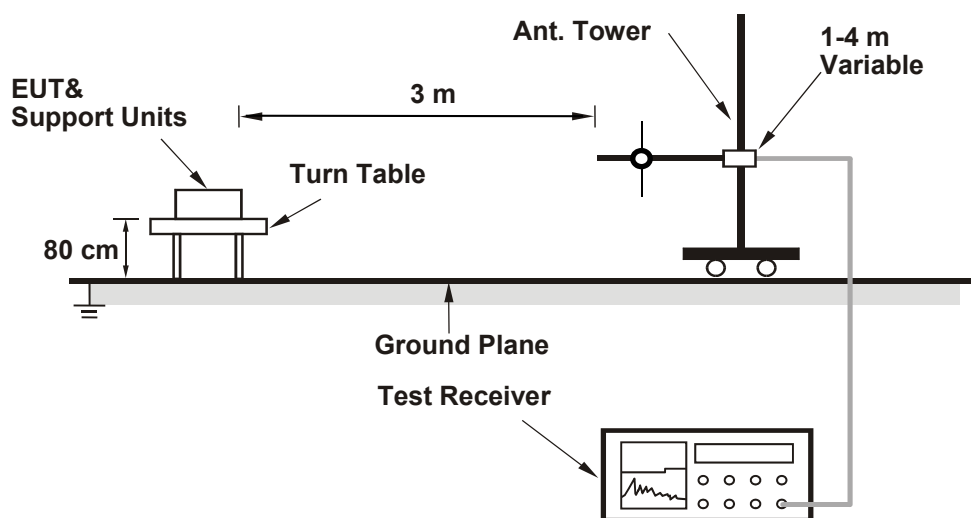
6.2 Unwanted Emissions below 1 GHz

6.2.1 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



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

6.2.2 Test Procedure

For Radiated emission below 30 MHz

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

Notes:

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

For Radiated emission above 30 MHz

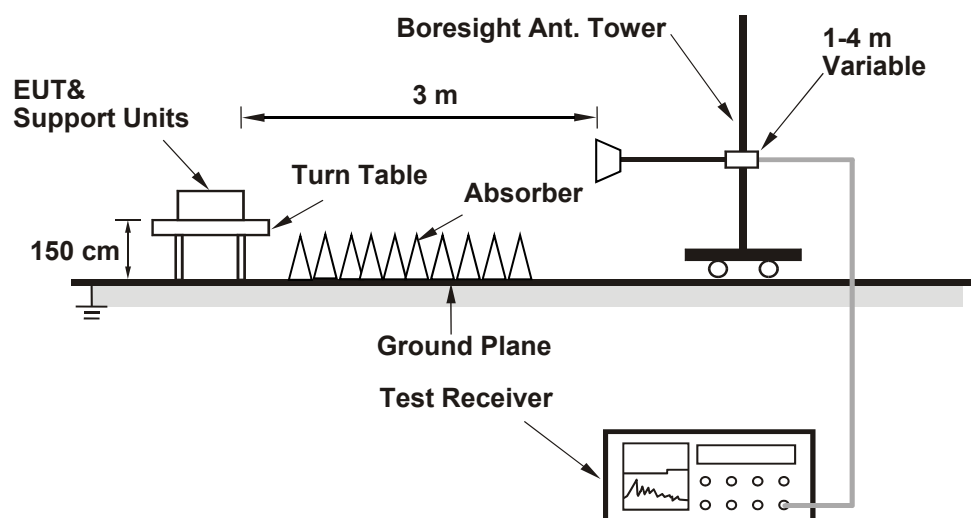
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the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

Notes:

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

6.3 Unwanted Emissions above 1 GHz

6.3.1 Test Setup



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

6.3.2 Test Procedure

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver/spectrum analyzer was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Notes:

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

7 Test Results of Test Item

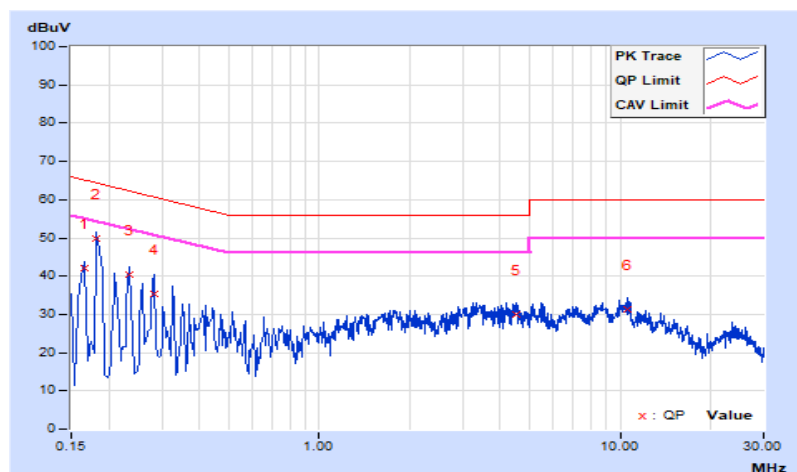
7.1 AC Power Conducted Emissions

RF Mode	BT-LE 1M	Channel	CH 0 : 2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75 % RH
Tested By	Greg Lin		

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	0.16579	9.67	32.48	11.83	42.15	21.50	65.17	55.17	-23.02	-33.67
2	0.18180	9.66	40.23	23.45	49.89	33.11	64.40	54.40	-14.51	-21.29
3	0.23400	9.67	30.81	11.07	40.48	20.74	62.31	52.31	-21.83	-31.57
4	0.28200	9.67	25.81	7.61	35.48	17.28	60.76	50.76	-25.28	-33.48
5	4.53400	9.79	20.28	11.43	30.07	21.22	56.00	46.00	-25.93	-24.78
6	10.58200	9.88	21.47	13.04	31.35	22.92	60.00	50.00	-28.65	-27.08

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

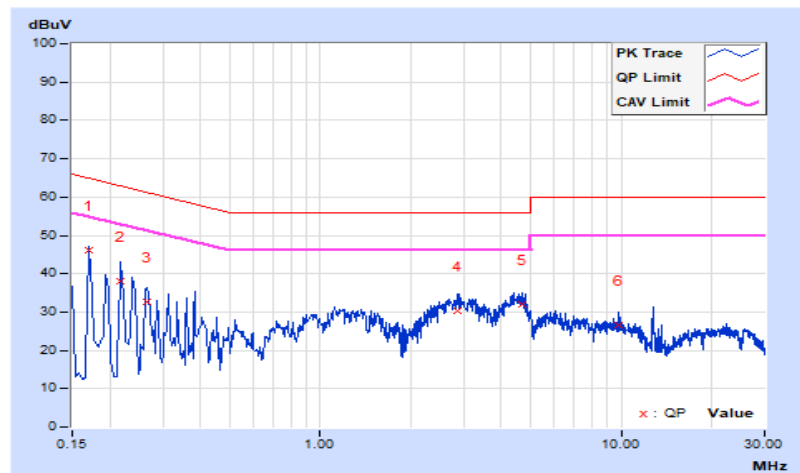


RF Mode	BT-LE 1M	Channel	CH 0 : 2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75 % RH
Tested By	Greg Lin		

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	0.17000	9.64	36.64	16.14	46.28	25.78	64.96	54.96	-18.68	-29.18
2	0.21800	9.66	28.41	8.02	38.07	17.68	62.89	52.89	-24.82	-35.21
3	0.26600	9.67	22.83	6.15	32.50	15.82	61.24	51.24	-28.74	-35.42
4	2.85000	9.77	20.62	13.20	30.39	22.97	56.00	46.00	-25.61	-23.03
5	4.70600	9.80	22.26	10.91	32.06	20.71	56.00	46.00	-23.94	-25.29
6	9.82200	9.94	16.63	11.33	26.57	21.27	60.00	50.00	-33.43	-28.73

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



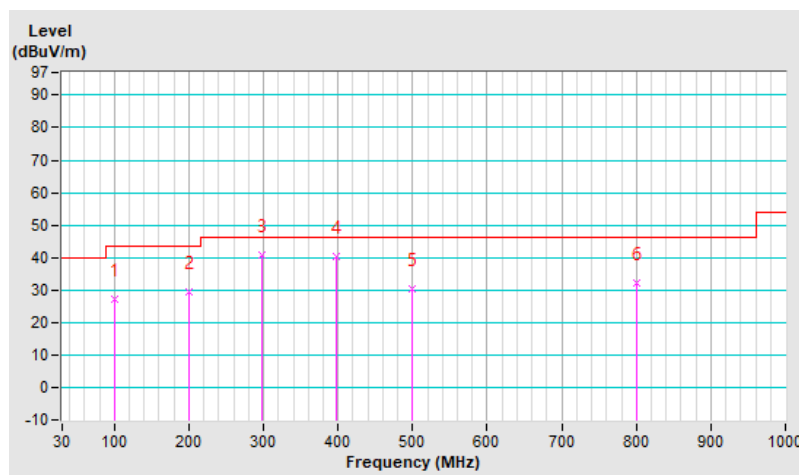
7.2 Unwanted Emissions below 1 GHz

RF Mode	BT-LE 1M	Channel	CH 0 : 2402 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	21 °C, 67 % RH
Tested By	Greg Lin		

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	99.84	27.4 QP	43.5	-16.1	1.50 H	55	45.0	-17.6
2	199.75	29.3 QP	43.5	-14.2	1.25 H	164	45.7	-16.4
3	298.69	40.6 QP	46.0	-5.4	1.00 H	70	53.0	-12.4
4	398.60	40.2 QP	46.0	-5.8	1.25 H	263	50.0	-9.8
5	498.51	30.4 QP	46.0	-15.6	1.00 H	152	38.1	-7.7
6	800.18	32.0 QP	46.0	-14.0	1.50 H	63	34.0	-2.0

Remarks:

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

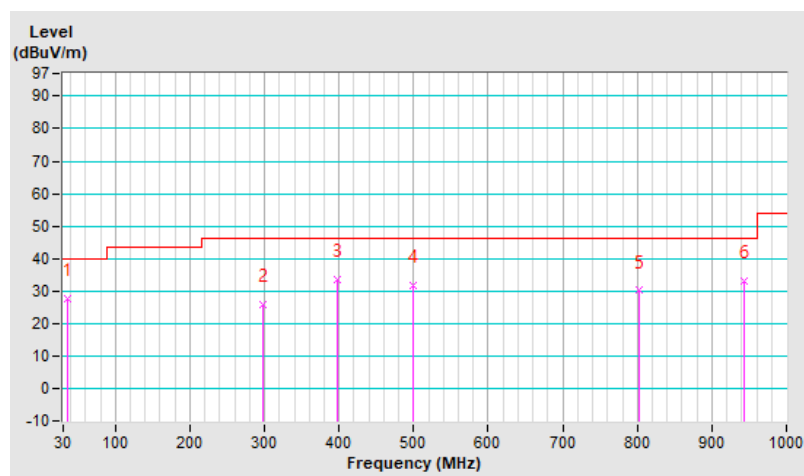


RF Mode	BT-LE 1M	Channel	CH 0 : 2402 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	21 °C, 67 % RH
Tested By	Greg Lin		

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	35.82	27.6 QP	40.0	-12.4	1.50 V	14	41.7	-14.1
2	298.69	26.0 QP	46.0	-20.0	1.00 V	120	38.4	-12.4
3	398.60	33.6 QP	46.0	-12.4	1.25 V	45	43.4	-9.8
4	499.48	31.9 QP	46.0	-14.1	1.25 V	235	39.5	-7.6
5	802.12	30.1 QP	46.0	-15.9	1.00 V	171	32.1	-2.0
6	943.74	33.0 QP	46.0	-13.0	1.50 V	264	32.9	0.1

Remarks:

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



7.3 Unwanted Emissions above 1 GHz

RF Mode	BT-LE 1M	Channel	CH 0 : 2402 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=1 kHz, DET=Peak
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	24 °C, 65 % RH
Tested By	Edison Lee		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.1 PK	74.0	-16.9	2.44 H	351	25.0	32.1
2	2390.00	46.7 AV	54.0	-7.3	2.44 H	351	14.6	32.1
3	*2402.00	111.1 PK			2.44 H	351	79.0	32.1
4	*2402.00	110.3 AV			2.44 H	351	78.2	32.1
5	4804.00	47.6 PK	74.0	-26.4	4.00 H	32	44.7	2.9
6	4804.00	40.6 AV	54.0	-13.4	4.00 H	32	37.7	2.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.0 PK	74.0	-17.0	3.77 V	48	24.9	32.1
2	2390.00	46.5 AV	54.0	-7.5	3.77 V	48	14.4	32.1
3	*2402.00	107.5 PK			3.77 V	48	75.4	32.1
4	*2402.00	106.8 AV			3.77 V	48	74.7	32.1
5	4804.00	47.4 PK	74.0	-26.6	2.18 V	122	44.5	2.9
6	4804.00	39.7 AV	54.0	-14.3	2.18 V	122	36.8	2.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.

RF Mode	BT-LE 1M	Channel	CH 19 : 2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=1 kHz, DET=Peak
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	24 °C, 65 % RH
Tested By	Edison Lee		

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	111.6 PK			2.58 H	351	79.4	32.2
2	*2440.00	110.8 AV			2.58 H	351	78.6	32.2
3	4880.00	47.9 PK	74.0	-26.1	3.93 H	47	44.5	3.4
4	4880.00	40.6 AV	54.0	-13.4	3.93 H	47	37.2	3.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2440.00	107.2 PK			3.69 V	51	75.0	32.2
2	*2440.00	106.5 AV			3.69 V	51	74.3	32.2
3	4880.00	47.5 PK	74.0	-26.5	2.23 V	129	44.1	3.4
4	4880.00	40.0 AV	54.0	-14.0	2.23 V	129	36.6	3.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.

RF Mode	BT-LE 1M	Channel	CH 39 : 2480 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=1 kHz, DET=Peak
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	24 °C, 65 % RH
Tested By	Edison Lee		

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	112.2 PK			2.52 H	346	79.7	32.5
2	*2480.00	111.3 AV			2.52 H	346	78.8	32.5
3	2483.50	59.4 PK	74.0	-14.6	2.52 H	346	26.9	32.5
4	2483.50	48.2 AV	54.0	-5.8	2.52 H	346	15.7	32.5
5	4960.00	48.2 PK	74.0	-25.8	3.99 H	35	44.8	3.4
6	4960.00	40.4 AV	54.0	-13.6	3.99 H	35	37.0	3.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	107.5 PK			3.51 V	32	75.0	32.5
2	*2480.00	106.7 AV			3.51 V	32	74.2	32.5
3	2483.50	57.9 PK	74.0	-16.1	3.51 V	32	25.4	32.5
4	2483.50	47.5 AV	54.0	-6.5	3.51 V	32	15.0	32.5
5	4960.00	47.7 PK	74.0	-26.3	2.22 V	130	44.3	3.4
6	4960.00	40.0 AV	54.0	-14.0	2.22 V	130	36.6	3.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.

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=1 kHz, DET=Peak
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	24 °C, 65 % RH
Tested By	Edison Lee		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.8 PK	74.0	-16.2	2.38 H	351	25.7	32.1
2	2390.00	47.0 AV	54.0	-7.0	2.38 H	351	14.9	32.1
3	*2404.00	111.0 PK			2.38 H	351	78.9	32.1
4	*2404.00	108.8 AV			2.38 H	351	76.7	32.1
5	4808.00	47.9 PK	74.0	-26.1	4.00 H	39	44.9	3.0
6	4808.00	37.5 AV	54.0	-16.5	4.00 H	39	34.5	3.0
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	56.6 PK	74.0	-17.4	3.79 V	51	24.5	32.1
2	2390.00	46.4 AV	54.0	-7.6	3.79 V	51	14.3	32.1
3	*2404.00	107.7 PK			3.79 V	51	75.6	32.1
4	*2404.00	105.5 AV			3.79 V	51	73.4	32.1
5	4808.00	47.4 PK	74.0	-26.6	2.18 V	121	44.4	3.0
6	4808.00	37.3 AV	54.0	-16.7	2.18 V	121	34.3	3.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.

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=1 kHz, DET=Peak
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	24 °C, 65 % RH
Tested By	Edison Lee		

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	111.4 PK			2.33 H	355	79.2	32.2
2	*2440.00	109.4 AV			2.33 H	355	77.2	32.2
3	4880.00	48.7 PK	74.0	-25.3	3.98 H	42	45.3	3.4
4	4880.00	38.1 AV	54.0	-15.9	3.98 H	42	34.7	3.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2440.00	108.2 PK			3.70 V	52	76.0	32.2
2	*2440.00	106.0 AV			3.70 V	52	73.8	32.2
3	4880.00	48.4 PK	74.0	-25.6	2.26 V	129	45.0	3.4
4	4880.00	37.9 AV	54.0	-16.1	2.26 V	129	34.5	3.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.

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=1 kHz, DET=Peak
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	24 °C, 65 % RH
Tested By	Edison Lee		

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	112.0 PK			2.54 H	349	79.7	32.3
2	*2478.00	109.6 AV			2.54 H	349	77.3	32.3
3	2483.50	58.1 PK	74.0	-15.9	2.54 H	349	25.6	32.5
4	2483.50	48.0 AV	54.0	-6.0	2.54 H	349	15.5	32.5
5	4956.00	48.1 PK	74.0	-25.9	4.00 H	36	44.7	3.4
6	4956.00	38.0 AV	54.0	-16.0	4.00 H	36	34.6	3.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2478.00	107.3 PK			3.57 V	29	75.0	32.3
2	*2478.00	105.0 AV			3.57 V	29	72.7	32.3
3	2483.50	57.7 PK	74.0	-16.3	3.57 V	29	25.2	32.5
4	2483.50	48.7 AV	54.0	-5.3	3.57 V	29	16.2	32.5
5	4956.00	47.8 PK	74.0	-26.2	2.22 V	131	44.4	3.4
6	4956.00	37.6 AV	54.0	-16.4	2.22 V	131	34.2	3.4

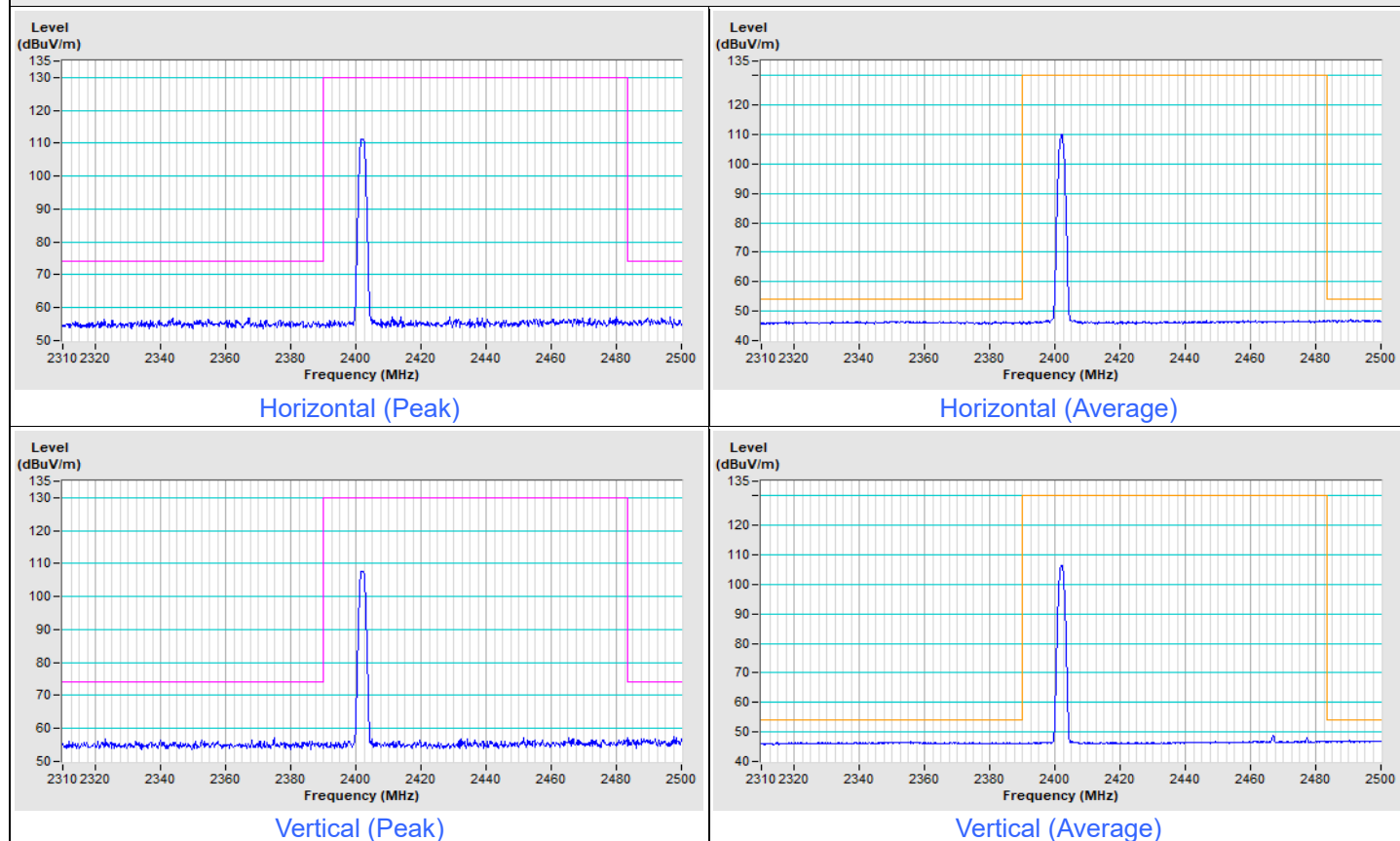
Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.

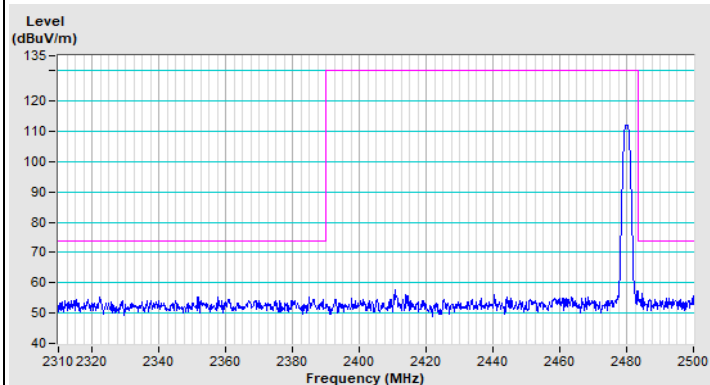
Plot of Band Edge

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=1 kHz, DET=Peak
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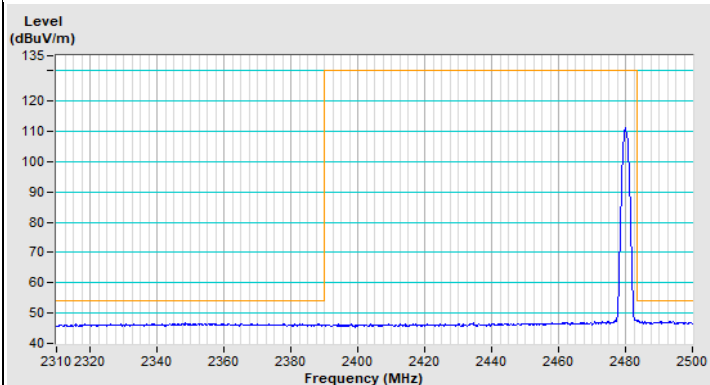
BT-LE 1M Channel 0



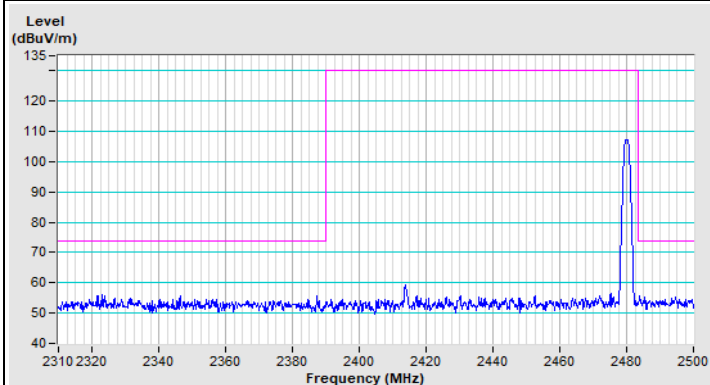
BT-LE 1M Channel 39



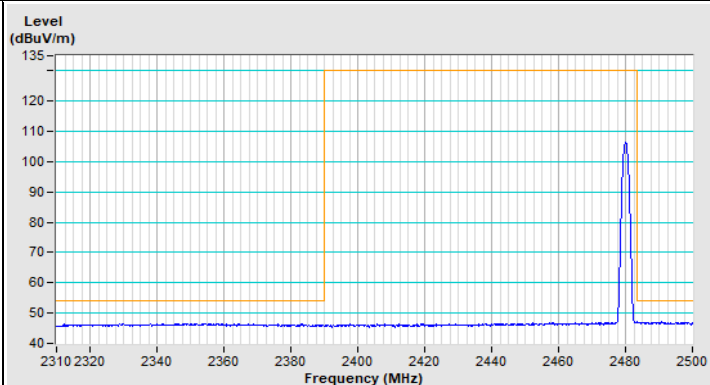
Horizontal (Peak)



Horizontal (Average)



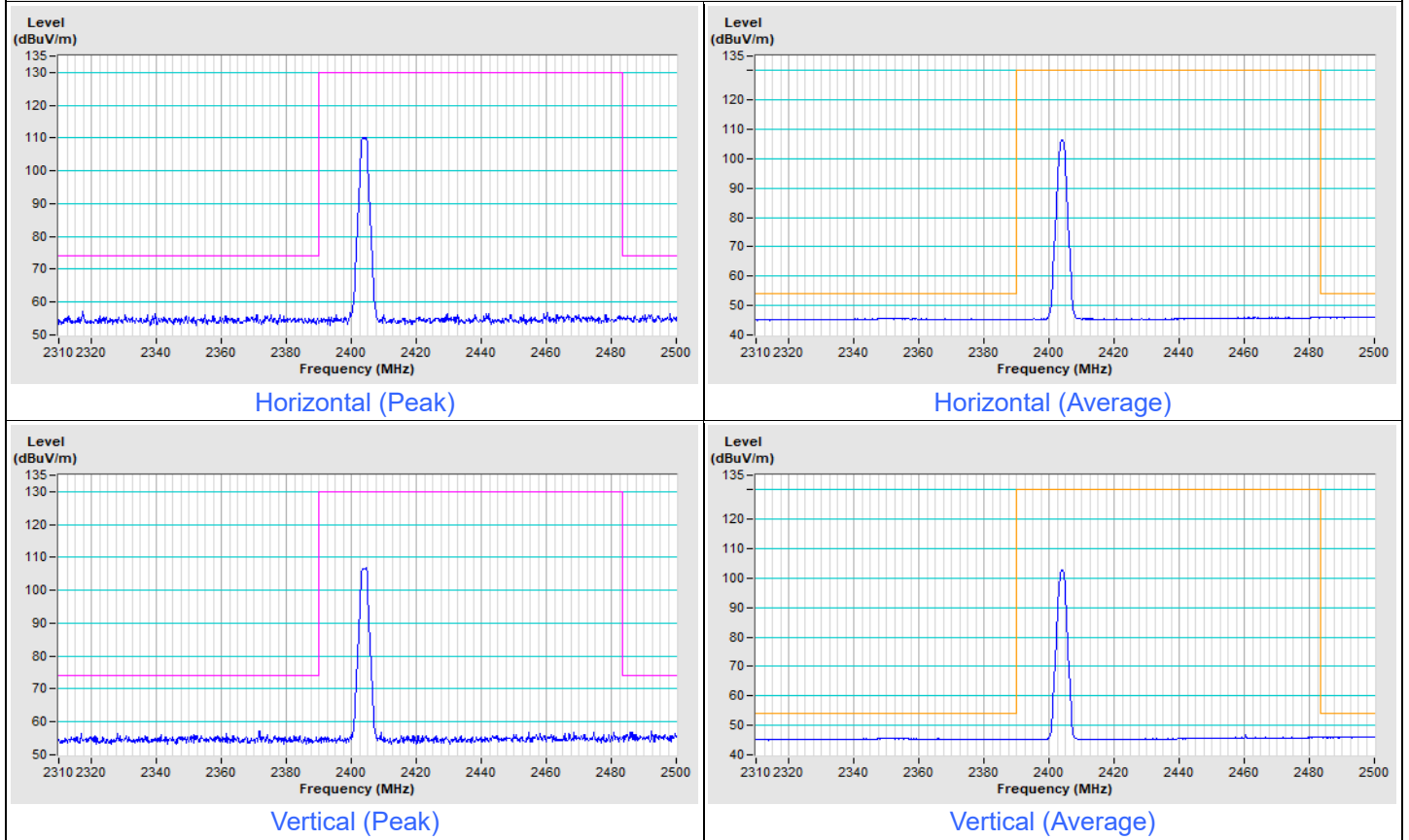
Vertical (Peak)



Vertical (Average)

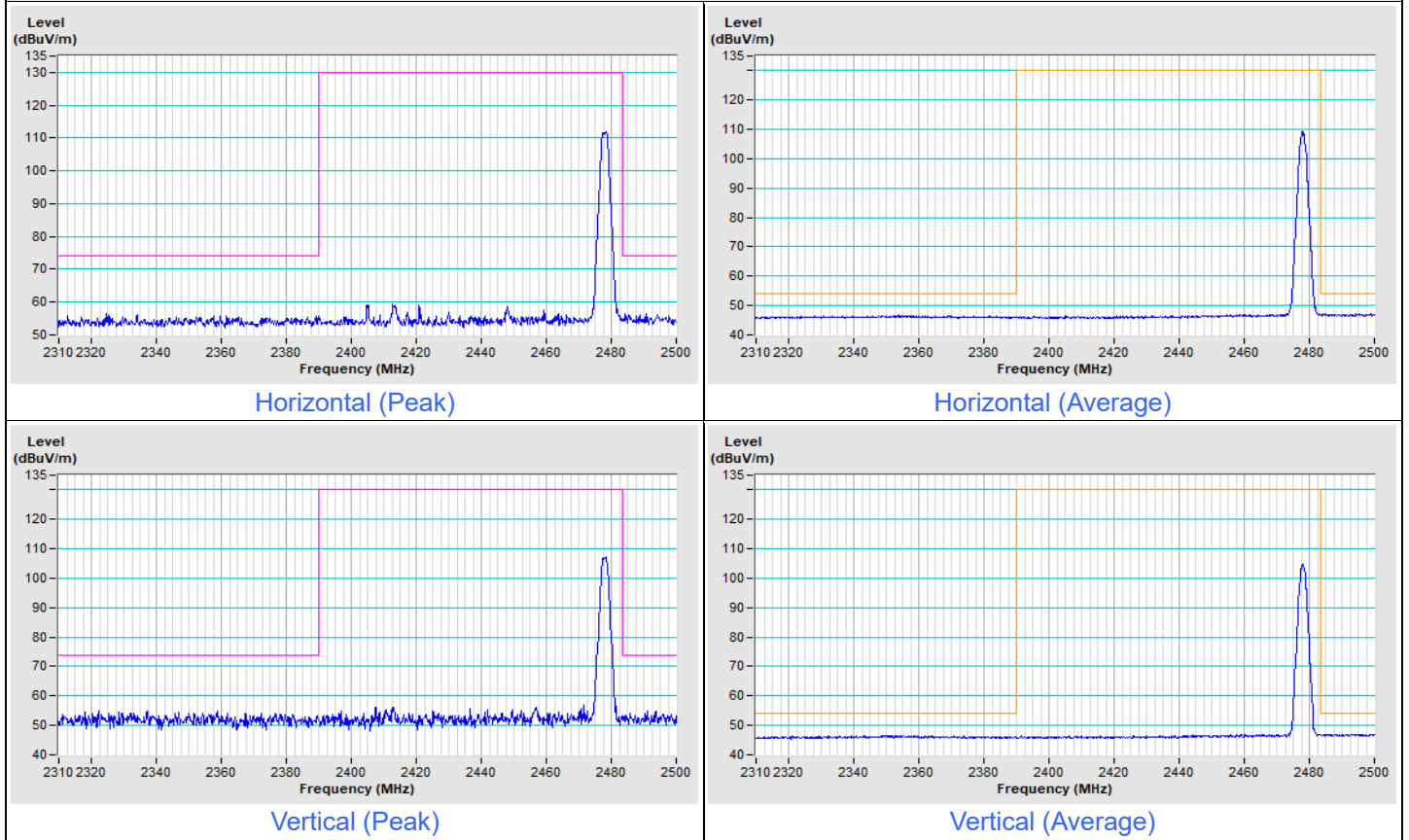
Frequency Range	2.31 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=1 kHz, DET=Peak
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BT-LE 2M Channel 1



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=1 kHz, DET=Peak
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BT-LE 1M Channel 38



8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

9 Information of the Testing Laboratories

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

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

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