TEST REPORT

CERTIFICATE OF CONFORMITY

Standard:	**47 CFR FCC Part 15, Subpart C (Section 15.247)**
Report No.:	RFBEIH-WTW-P25030743-1
FCC ID:	P27-TMOG5SE
Product:	T-Mobile 5G Gateway
Brand:	T-Mobile
Model No.:	TMO-G5SE
Received Date:	2025/4/1
Test Date:	2025/4/18 ~ 2025/5/16
Issued Date:	2025/6/11
Applicant:	Sercomm Corp.
Address:	8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C.
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(1):	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
Test Location(2):	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
FCC Registration / Designation Number:	Test Location: 788550 / TW0003 for Test Location(1) 198487 / TW2021 for Test Location(2)

Approved by: Jeremy Lin , **Date:** 2025/6/11

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
RFBEIH-WTW-P25030743-1	Original release.	2025/6/11

1 Certificate

Product:	T-Mobile 5G Gateway
Brand:	T-Mobile
Test Model:	TMO-G5SE
Sample Status:	Engineering sample
Applicant:	Sercomm Corp.
Test Date:	2025/4/18 ~ 2025/5/16
Standard:	47 CFR FCC Part 15, Subpart C (Section 15.247)
Measurement procedure:	ANSI C63.10-2013 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 (a)(1)	RF Output Power	Pass	Meet the requirement of limit.
15.247(a)(1) (iii)	Number of Hopping Frequency Used	Pass	Meet the requirement of limit.
15.247(a)(1) (iii)	Dwell Time on Each Channel	Pass	Meet the requirement of limit.
15.247(a)(1)	Hopping Channel Separation	Pass	Meet the requirement of limit.
15.247(a)(1)	20 dB Bandwidth	-	Refer to Note 1
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 -7.11 dB at 0.42200 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -2.7 dB at 959.26 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -7.8 dB at 2483.50 MHz
15.203	Antenna Requirement	Pass	Antenna connector is U.FL not a standard connector.

Notes:

1. If the Frequency Hopping System operating in 2400-2483.5 MHz band and the output power less than 125 mW. The hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of hopping channel whichever is greater.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Measurement	Specification	Expanded Uncertainty (k=2) (±)
RF Output Power	-	1.1 dB
Dwell Time on Each Channel	-	2.18 %
Hopping Channel Separation	-	390 Hz
20 dB Bandwidth	-	960 Hz
Conducted Out of Band Emissions	9 kHz ~ 40 GHz	2.7 dB
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.90 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	2.55 dB
	30 MHz ~ 1 GHz	5.77 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 6 GHz	4.71 dB
	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.

3 General Information

3.1 General Description

Product	T-Mobile 5G Gateway
Brand	T-Mobile
Test Model	TMO-G5SE
Status of EUT	Engineering sample
Power Supply Rating	20Vdc, 3.0A, 60W
Modulation Type	GFSK
Modulation Technology	FHSS
Transfer Rate	125k, 500k, 1M, 2M
Operating Frequency	2.402 GHz ~ 2.48 GHz
Number of Channel	40
Output Power	65.163 mW (18.14 dBm)

Note:

1. The EUT uses following accessories.

Item	Brand	Model	Specification
Adapter 1	MASS POWER	PD065E-D1C0AVU	AC Input : 100-240V, 50/60Hz, 1.5A DC Output : 5.0V, 3.0A or 9.0V, 3.0A or 12.0V, 3.0A or 15.0, 3.0A or 20.0V, 3.0A DC Cable : 1.8m non-shielded
Adapter 2	MOSO	P30-V3000R200-060Q0-US	AC Input : 100-240V, 50/60Hz, 1.7A DC Output : 5V, 3A or 9V, 3A or 12V, 3A or 15, 3A or 20V, 3A DC Cable : 1.8m non-shielded
Adapter 3	Sercomm	PU60W200ULW18-ECY-00	AC Input : 100-240V, 50/60Hz, 1.3A DC Output : 5.0V, 3.0A, 15W or 9.0V, 3.0A, 27W or 12.0V, 3.0A, 36W or 15.0, 3.0A, 45W or 20.0V, 3.0A, 60W DC Cable : 1.8m non-shielded

2. Two Bluetooth modules provided to the EUT, please refer to the following table:

No.	Model	Function
1	EFR32BG21A020F512IM32	BT-LE
2	EFR32MG21A020F512IM32	BT-LE, Zigbee, Thread, Matter

3. There are Bluetooth, Zigbee, Thread, Matter, WWAN (WCDMA/LTE/5G NR) and WLAN (2.4 GHz/ 5 GHz/ 6 GHz) technology used for the EUT.

4. Simultaneously transmission combination.

Combination	Technology					
1	WLAN (2.4 GHz)	WLAN (5 GHz)	WLAN (6 GHz)	WWAN	BT-LE (EFR32BG21A020F512IM32)	Zigbee (EFR32MG21A020F512IM32)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.						

5. The EUT support OFDMA but doesn't support Partial RU mode.
6. Contains Module FCC ID: P27-TMOG5SEM
7. 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.

Function	Antenna Gain (dBi)	Antenna Type	Connector Type
BT-LE	5.01	Dipole	U.FL

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

3.3 Channel List

40 channels are provided for BT-LE (125K, 500K, 1M):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
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	39	2480

38 channels are provided for BT-LE (2M):

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		

3.4 Test Mode Applicability and Tested Channel Detail

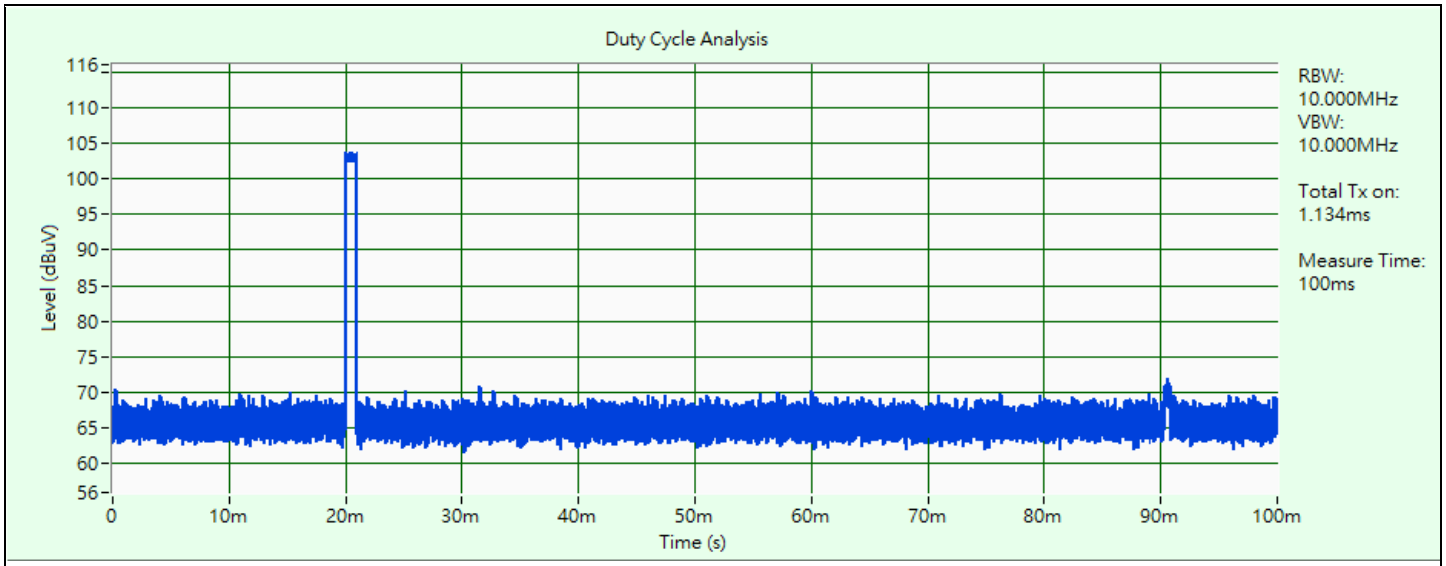
Pre-Scan:	1. EUT has PD065E-D1C0AVU/ P30-V3000R200-060Q0-US/ PU60W200ULW18-ECY-00 adpter mode of power supply.Pre-scan these modes and find the worst charging case as a representative test condition.
Worst Case:	1. PD065E-D1C0AVU/ P30-V3000R200-060Q0-US/ PU60W200ULW18-ECY-00 adapter worse condition: PD065E-D1C0AVU.

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

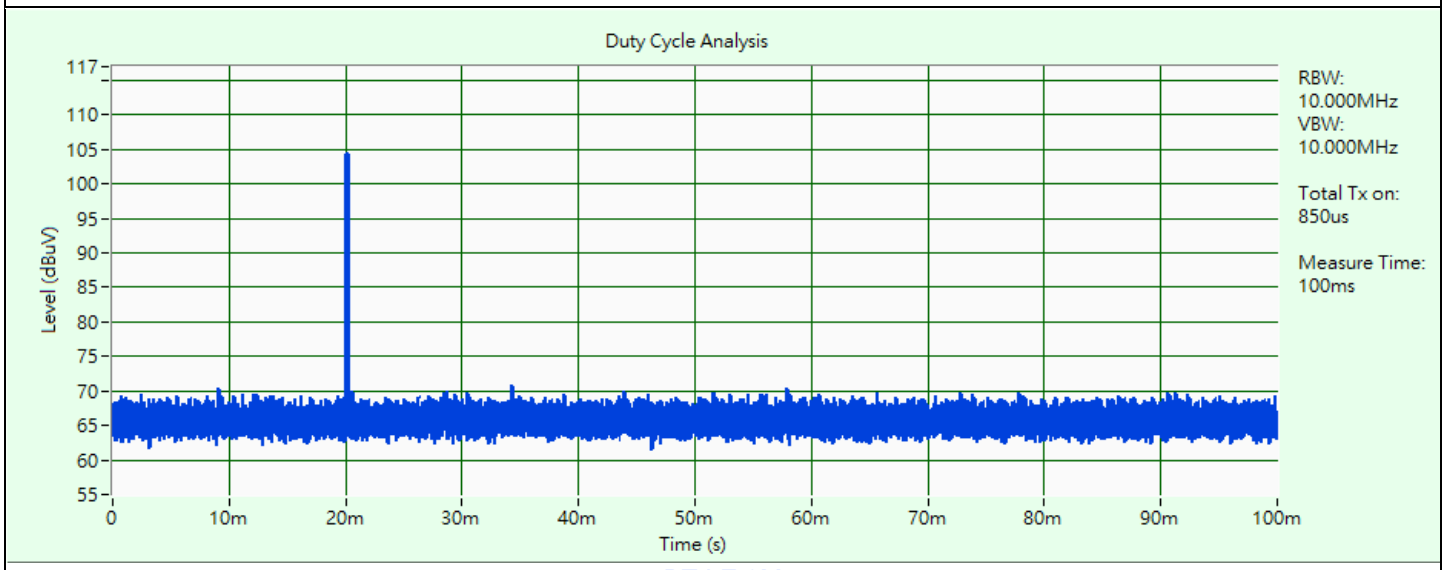
Test Item	Mode	Tested Channel	Modulation	Data Rate Parameter
RF Output Power	1MBaud PHY	0, 19, 39	GFSK	125kb/s
				500kb/s
				1Mb/s
	2MBaud PHY	1, 19, 38		2Mb/s
Number of Hopping Frequency Used	1MBaud PHY	Hopping	GFSK	1Mb/s
	2MBaud PHY	Hopping	GFSK	2Mb/s
Dwell Time on Each Channel	1MBaud PHY	Hopping	GFSK	1Mb/s
	2MBaud PHY	Hopping	GFSK	2Mb/s
Hopping Channel Separation / 20 dB Bandwidth	1MBaud PHY	0, 19, 39	GFSK	1Mb/s
	2MBaud PHY	1, 19, 38	GFSK	2Mb/s
Conducted Out of Band Emissions	1MBaud PHY	Hopping 0, 39	GFSK	1Mb/s
	2MBaud PHY	Hopping 1, 38	GFSK	2Mb/s
AC Power Conducted Emissions	2MBaud PHY	19	GFSK	2Mb/s
Unwanted Emissions below 1 GHz	2MBaud PHY	19	GFSK	2Mb/s
Unwanted Emissions above 1 GHz	1MBaud PHY	0, 19, 39	GFSK	1Mb/s
	2MBaud PHY	1, 19, 38	GFSK	2Mb/s
Note: About 1MBaud(1Mbps & 125kbps & 500kbps). After pre-tested, 1MBaud with 1Mbps transfer rate was the worst case and chosen for the final test.				

3.5 Duty Cycle of Test Signal

BT-LE 1M: Duty cycle = 1.134 ms / 100 ms x 100% = 1.1%
BT-LE 2M: Duty cycle = 0.85 ms / 100 ms x 100% = 0.9%



BT-LE 1M

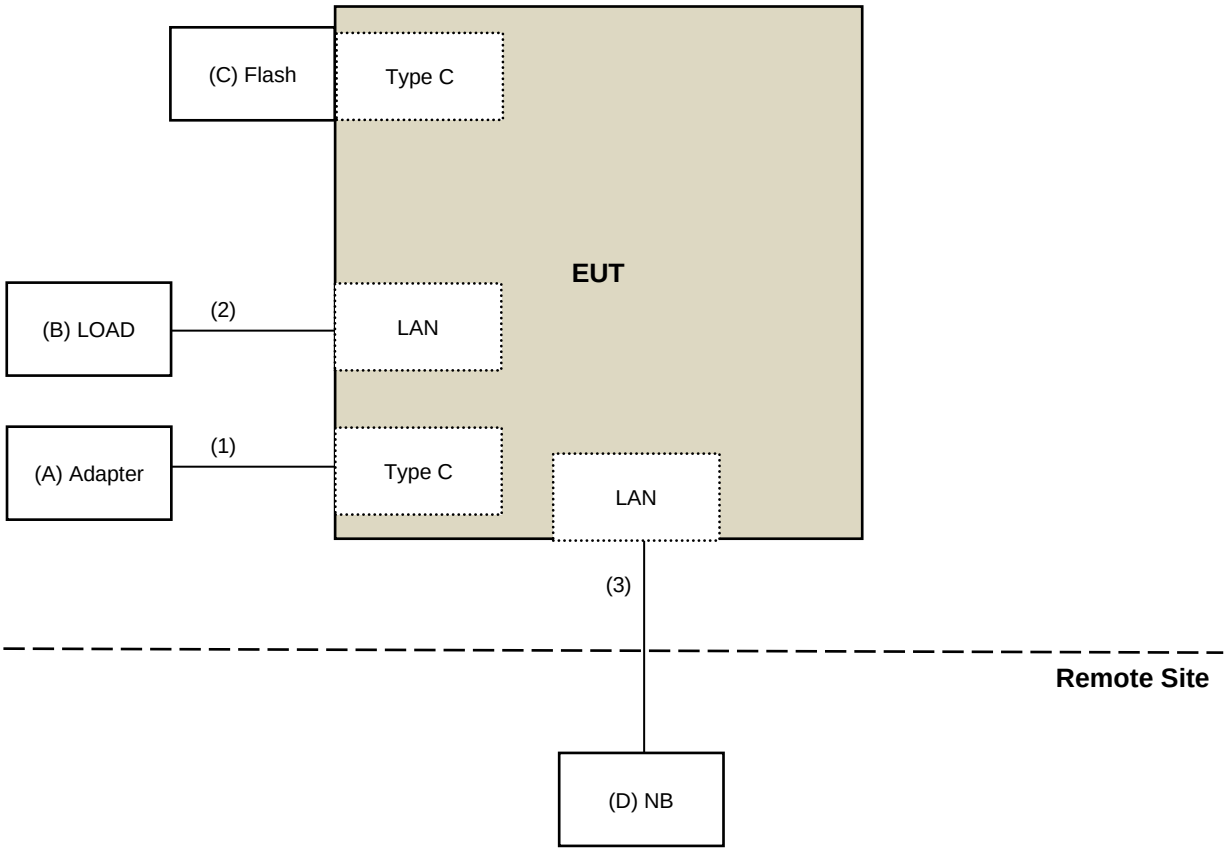


BT-LE 2M

3.6 Test Program Used and Operation Descriptions

Controlling software (Tera Term v4.8) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.7 Connection Diagram of EUT and Peripheral Devices



3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Adapter	MASSPOWER	PD065E-D1C0AVU	N/A	N/A	Supplied by applicant
B	LOAD	BV	BV	N/A	N/A	Provided by Lab
C	Flash	SanDisk	32GB	N/A	N/A	Provided by Lab
D	NB	Lenovo	IdeaPad 5 15ITL05	N/A	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	DC cable	1	1.8	N	0	Supplied by applicant
2	LAN cable	1	0.9	N	0	Provided by Lab
3	LAN cable	1	10	N	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
Fixed Attenuator Solvang Technology	STI02-3310-10	STI02-3310-10_013	2024/6/19	2025/6/18
Pulse Power Sensor Anritsu	MA2411B	1339443	2024/5/24	2025/5/23
RF Power Meter Anritsu	ML2495A	1529002	2024/6/7	2025/6/6
USB Wideband Power Sensor Keysight	U2021XA	U2021XA_001	2024/6/7	2025/6/6

Notes:

1. The test was performed in LK - Oven
2. Tested Date: 2025/4/30

4.2 Number of Hopping Frequency Used

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Fixed Attenuator Solvang Technology	STI02-3310-10	STI02-3310-10_013	2024/6/19	2025/6/18
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: 2025/4/30

4.3 Dwell Time on Each Channel

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

4.4 Hopping Channel Separation

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

4.5 20 dB Bandwidth

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

4.6 Conducted Out of Band Emissions

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

4.7 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal resistance	E1-011279	04	2024/11/28	2025/11/27
	E1-011280	05	2024/11/28	2025/11/27
	E1-011311	09	2024/11/28	2025/11/27
DC-LISN Schwarzbeck	NNBM 8126G	8126G-069	2024/11/5	2025/11/4
EMI Test Receiver R&S	ESCI	100613	2024/11/25	2025/11/24
Fixed Attenuator Mini-Circuits	HAT-10+	PAD-COND1-01	2025/1/5	2026/1/4
LISN R&S	ENV216	101826	2025/3/24	2026/3/23
	ESH3-Z5	100311	2024/9/5	2025/9/4
RF Coaxial Cable Woken	5D-FB	Cable-cond1-01	2025/1/5	2026/1/4
Software BVADT	BVADT_Cond_ V7.4.1.0	N/A	N/A	N/A
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2024/8/28	2025/8/27

Notes:

1. The test was performed in HY - Conduction 1.
2. Tested Date: 2025/4/18

4.8 Unwanted Emissions below 1 GHz

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 Schwarzbeck	CDNE-M2	00097	2024/5/28	2025/5/27
	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
Signal Analyzer R&S	FSV40	101544	2024/6/20	2025/6/19
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:

1. The test was performed in Linkou 966 Chamber 6 (CH 6).
2. Tested Date: 2025/5/16

4.9 Unwanted Emissions above 1 GHz

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	2024/5/24	2025/5/23
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	2024/10/18	2025/10/17
		BBHA9170190	2024/11/10	2025/11/9
MXE EMI Receiver Agilent	N9038A	MY50010158	2024/10/11	2025/10/10
Notch Filter Micro-Tronics	BRC50703-01	010	2024/5/24	2025/5/23
	BRM17690	005	2024/5/24	2025/5/23
Preamplifier EMCI	EMC0126545	980076	2025/2/14	2026/2/13
	EMC184045B	980175	2024/8/25	2025/8/24
		980235	2025/2/14	2026/2/13
Preamplifier HP	8449B	3008A01201	2025/2/14	2026/2/13
RF Coaxial Cable EMCI	EMC104	190801	2024/7/5	2025/7/4
		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
		101544	2024/6/20	2025/6/19
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: 2025/5/15 ~ 2025/5/16

5 Limits of Test Items

5.1 RF Output Power

The Maximum Output Power Measurement is 125 mW (21 dBm).

5.2 Number of Hopping Frequency Used

At least 15 channels frequencies, and should be equally spaced.

5.3 Dwell Time on Each Channel

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

5.4 Hopping Channel Separation

At least 25 kHz or two-third of 20 dB hopping channel bandwidth (whichever is greater).

5.5 20 dB Bandwidth

Maximum bandwidth is not specified.

5.6 Conducted Out of Band Emissions

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

5.7 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.

5.8 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).

5.9 Unwanted Emissions above 1 GHz

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

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

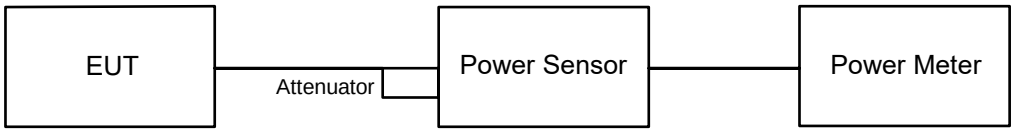
Notes:

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

6 Test Arrangements

6.1 RF Output Power

6.1.1 Test Setup



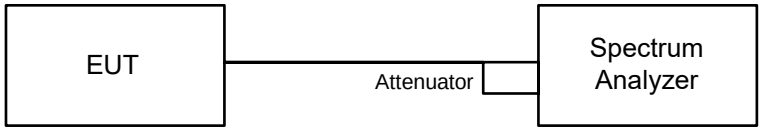
6.1.2 Test Procedure

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

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

6.2 Number of Hopping Frequency Used

6.2.1 Test Setup

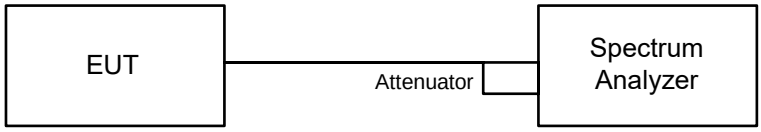


6.2.2 Test Procedure

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. Set the SA Sweep time = Auto, Detector function = Peak.
d. Set the SA trace on Max hold mode and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
e. Set the SA on View mode and then plot the result on SA screen.
f. Repeat above procedures until all frequencies measured were complete.

6.3 Dwell Time on Each Channel

6.3.1 Test Setup

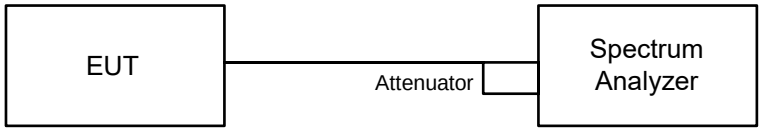


6.3.2 Test Procedure

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
e. Repeat above procedures until all different time-slot modes have been completed.

6.4 Hopping Channel Separation

6.4.1 Test Setup

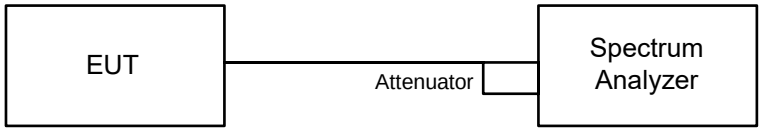


6.4.2 Test Procedure

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
c. Set the SA Sweep time = Auto, Detector function = Peak.
d. Set the SA trace on Max hold mode and record the separation of two adjacent channels.
e. Measure the frequency difference of these two adjacent channels by SA marker-delta function. And then plot the result on SA screen.
f. Repeat above procedures until all frequencies measured were complete.

6.5 20 dB Bandwidth

6.5.1 Test Setup

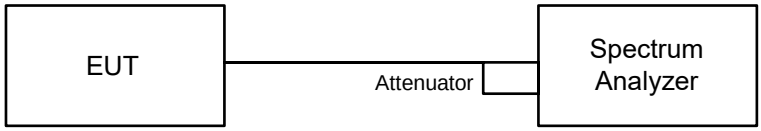


6.5.2 Test Procedure

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
c. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
d. Repeat above procedures until all frequencies measured were complete.

6.6 Conducted Out of Band Emissions

6.6.1 Test Setup



6.6.2 Test Procedure

MEASUREMENT PROCEDURE REF

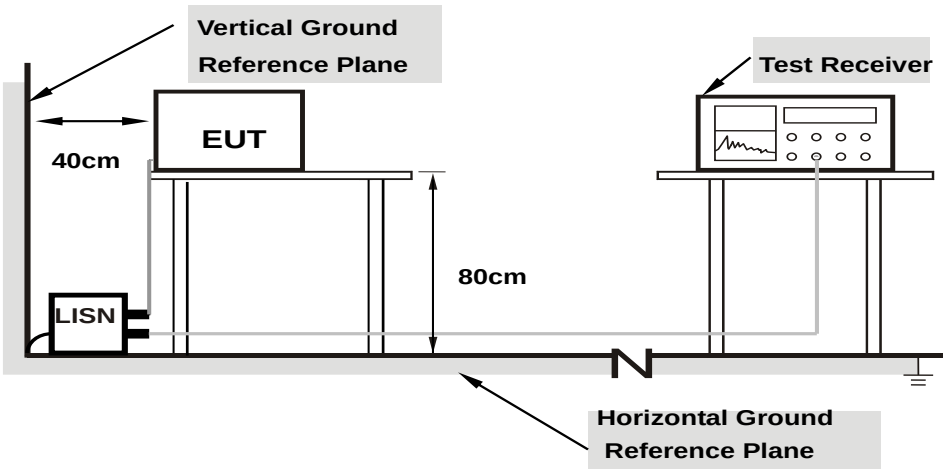
a. Set the RBW = 100 kHz.
b. Set the VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep time = auto couple.
e. Trace mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

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.

6.7 AC Power Conducted Emissions

6.7.1 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).

6.7.2 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.

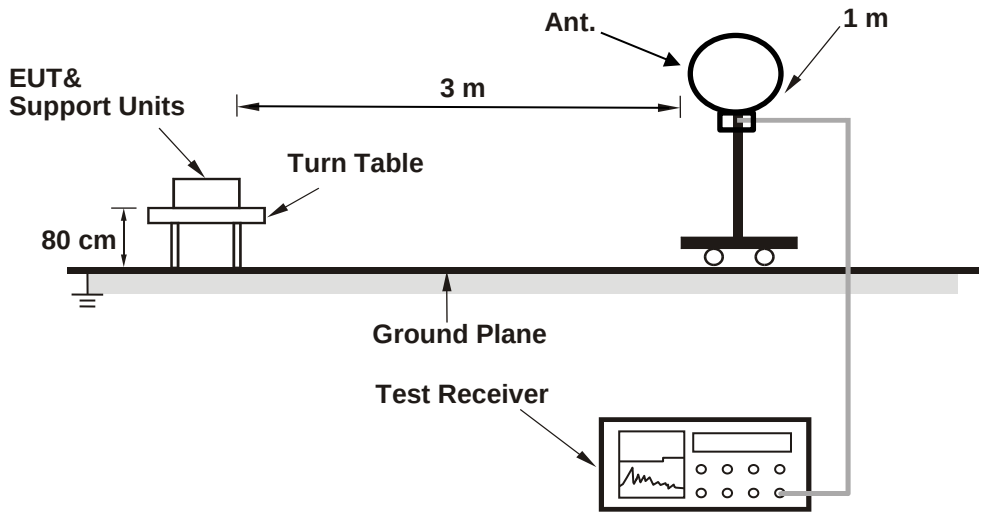
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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.

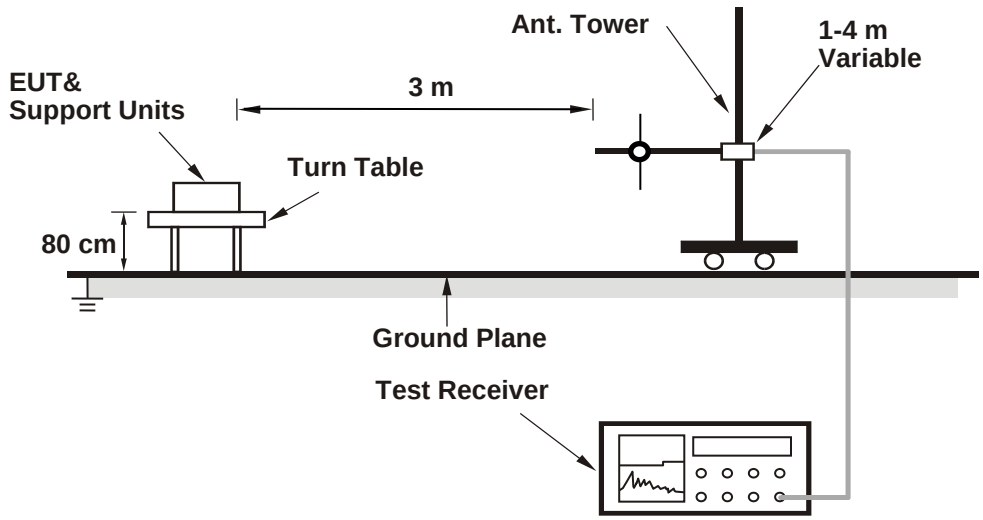
6.8 Unwanted Emissions below 1 GHz

6.8.1 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).

6.8.2 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.

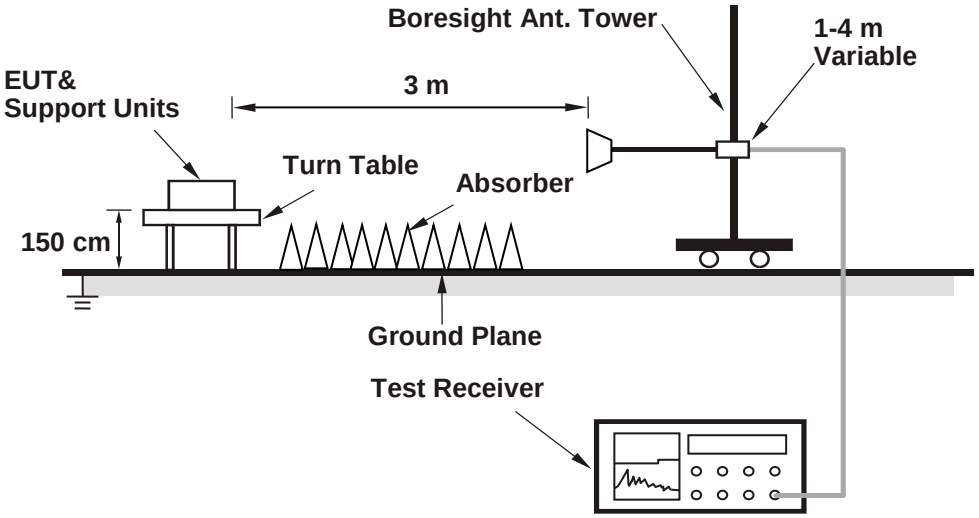
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

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.

6.9 Unwanted Emissions above 1 GHz

6.9.1 Test Setup



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

6.9.2 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) and Average detection (AV) at frequency above 1 GHz.
2. According to ANSI C63.10 section 6.6.4 and 4.1.4.2.2. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor. For duty cycle correction factor values, see the Test Signal Duty Cycle section in this report.
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:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 76% RH	Tested By:	Waydi Tuan

For Peak Power

BT-LE 1M

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	55.463	17.44	21	Pass
19	2440	64.417	18.09	21	Pass
39	2480	43.551	16.39	21	Pass

Note: The antenna gain is 5.01 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	58.479	17.67	21	Pass
19	2440	65.163	18.14	21	Pass
38	2478	50.816	17.06	21	Pass

Note: The antenna gain is 5.01 dBi < 6 dBi, so the output power limit shall not be reduced.

BT-LE 125k

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	23.823	13.77	21	Pass
19	2440	22.439	13.51	21	Pass
39	2480	23.281	13.67	21	Pass

Note: The antenna gain is 5.01 dBi < 6 dBi, so the output power limit shall not be reduced.

BT-LE 500k

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	23.067	13.63	21	Pass
19	2440	22.699	13.56	21	Pass
39	2480	23.442	13.70	21	Pass

Note: The antenna gain is 5.01 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	54.702	17.38
19	2440	63.973	18.06
39	2480	42.17	16.25

BT-LE 2M

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2404	57.412	17.59
19	2440	64.565	18.10
38	2478	50.003	16.99

BT-LE 125k

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	23.496	13.71
19	2440	22.233	13.47
39	2480	22.856	13.59

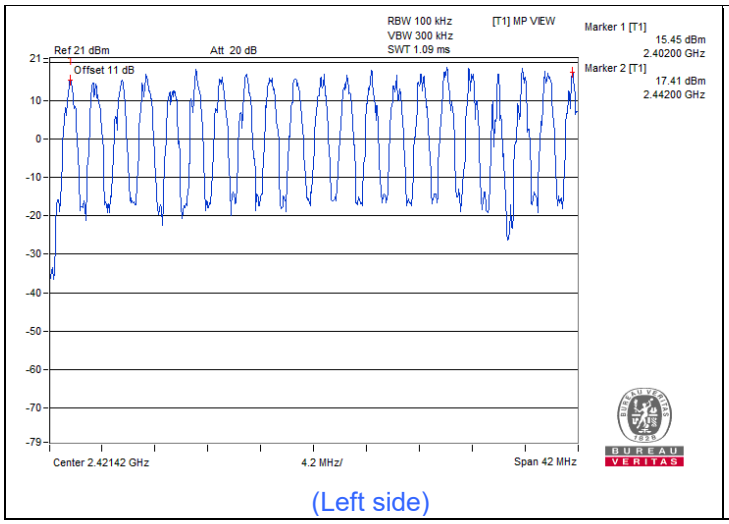
BT-LE 500k

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	22.699	13.56
19	2440	22.491	13.52
39	2480	23.121	13.64

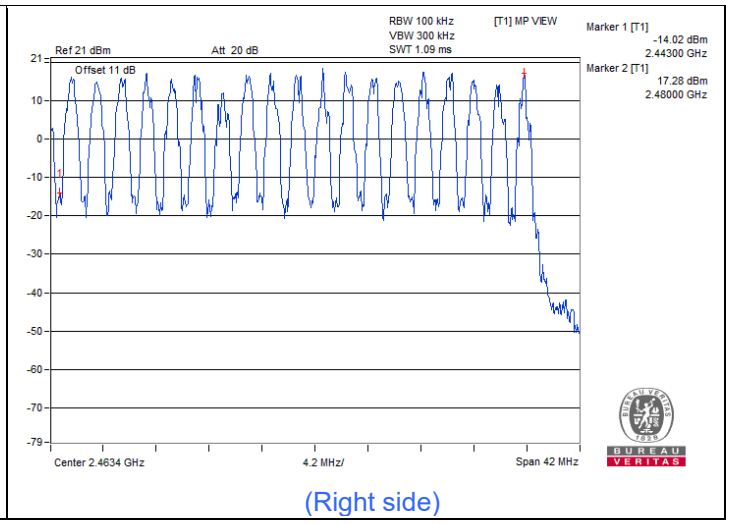
7.2 Number of Hopping Frequency Used

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

BT-LE 1M



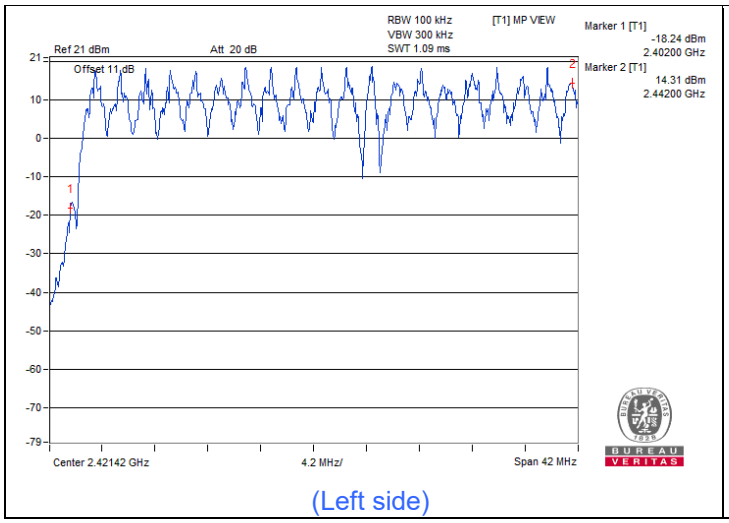
(Left side)



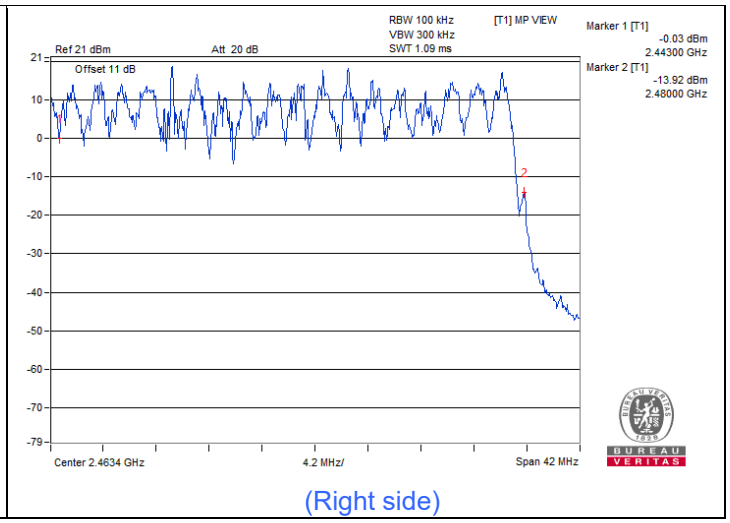
(Right side)

Note: There are 40 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

BT-LE 2M



(Left side)



(Right side)

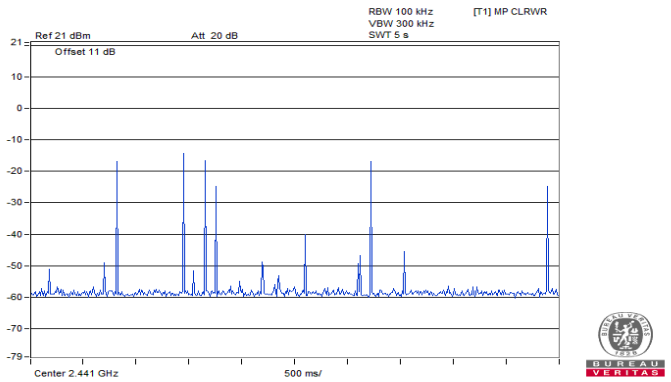
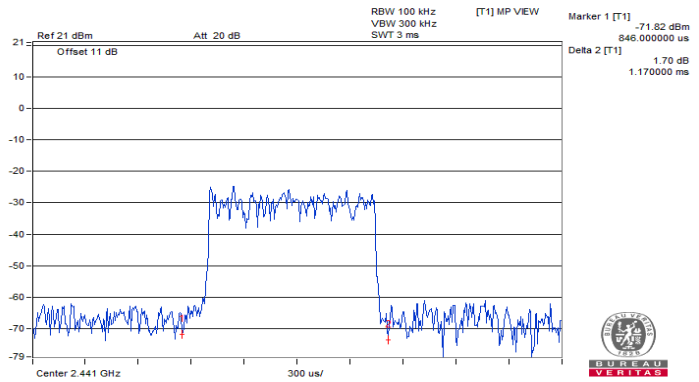
Note: There are 38 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

7.3 Dwell Time on Each Channel

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

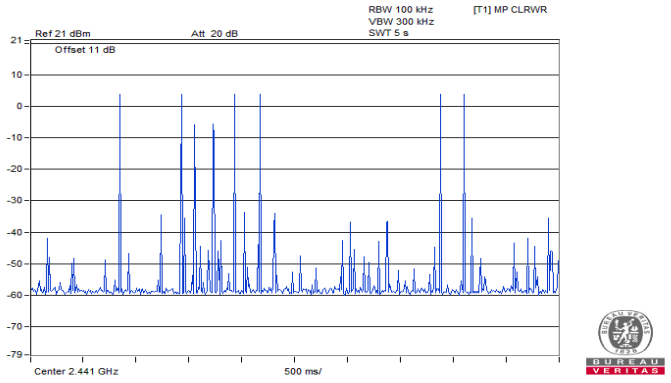
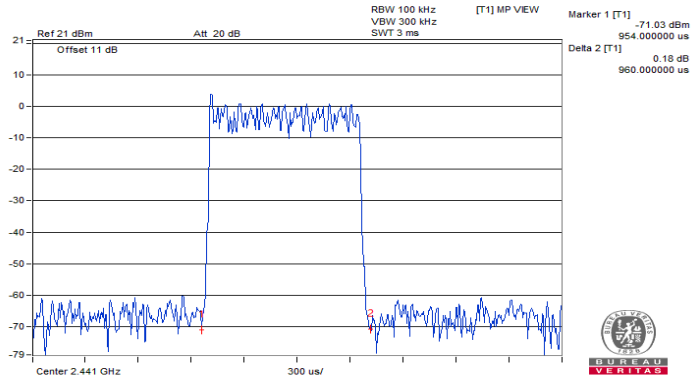
BT-LE 1M

Mode	Number of transmission in 16 sec	Length of transmission time (msec)	Dwell Time (msec)	Limit (msec)	Test Result
FHSS	6 (times / 5 sec) * 3.2 = 20 times	1.17	23.4	400	Pass

Spectrum plots of Dwell Time	
	
BT-LE 1M FHSS	BT-LE 1M FHSS

BT-LE 2M

Mode	Number of transmission in 15.2 sec	Length of transmission time (msec)	Dwell Time (msec)	Limit (msec)	Test Result
FHSS	8 (times / 5 sec) * 3.04 = 25 times	0.96	24	400	Pass

Spectrum plots of Dwell Time	
	
BT-LE 2M FHSS	BT-LE 2M FHSS

7.4 Hopping Channel Separation

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

BT-LE 1M

Channel	Frequency (MHz)	Hopping Channel Separation (MHz)	Minimum Limit (MHz)	Test Result
0	2402	2.01	0.73	Pass
19	2440	2.00	0.74	Pass
39	2480	2.00	0.74	Pass

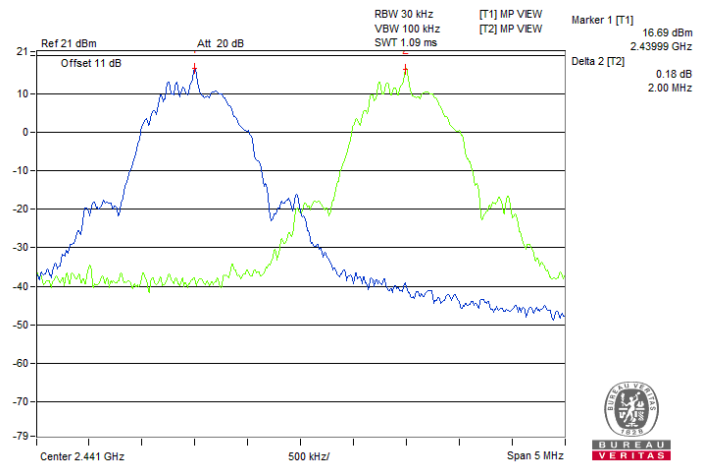
Note: The minimum limit is two-third 20dB bandwidth.

BT-LE 2M

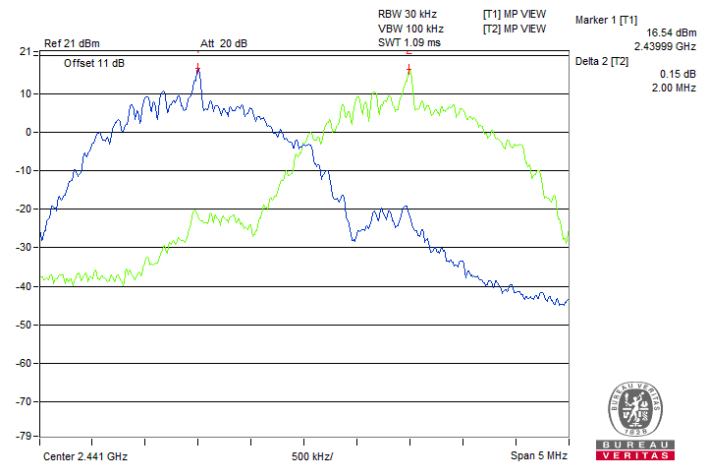
Channel	Frequency (MHz)	Hopping Channel Separation (MHz)	Minimum Limit (MHz)	Test Result
1	2404	2.01	1.4	Pass
19	2440	2.00	1.39	Pass
38	2478	2.00	1.39	Pass

Note: The minimum limit is two-third 20dB bandwidth.

Spectrum Plot of Minimum Value



BT-LE 1M : CH 19



BT-LE 2M : CH 19

7.5 20 dB Bandwidth

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

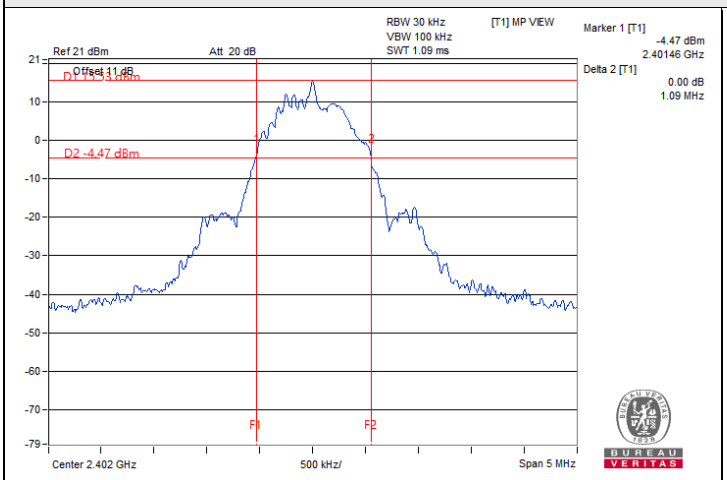
BT-LE 1M

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	1.09
19	2440	1.1
39	2480	1.1

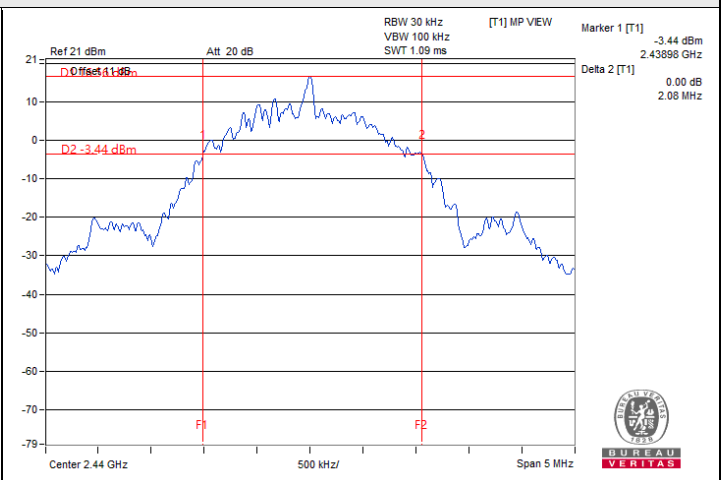
BT-LE 2M

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
1	2404	2.09
19	2440	2.08
38	2478	2.08

Spectrum Plot of Minimum Value



BT-LE 1M : CH 0

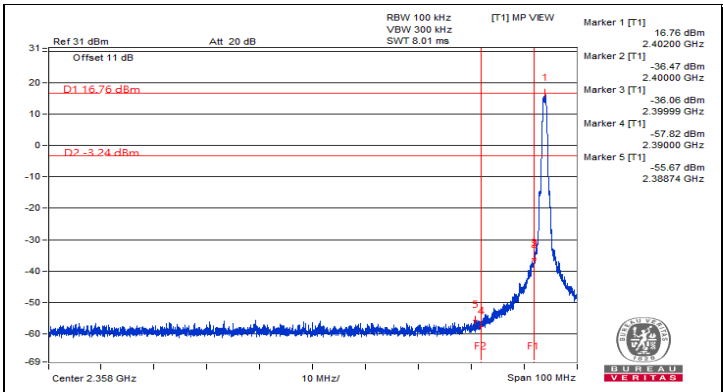


BT-LE 2M : CH 19

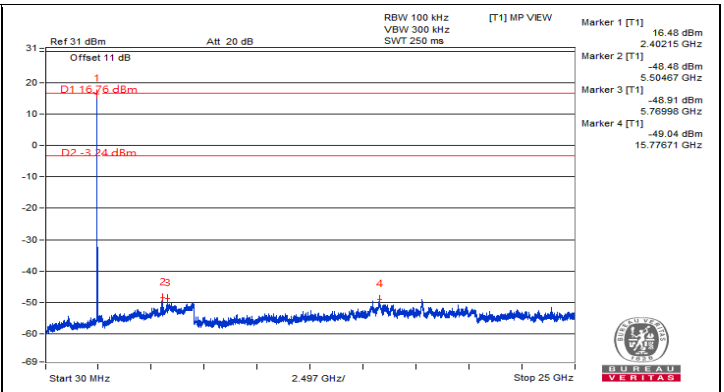
7.6 Conducted Out of Band Emissions

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

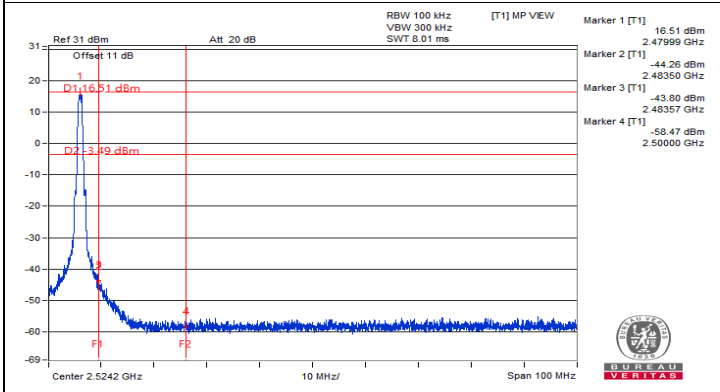
BT-LE 1M



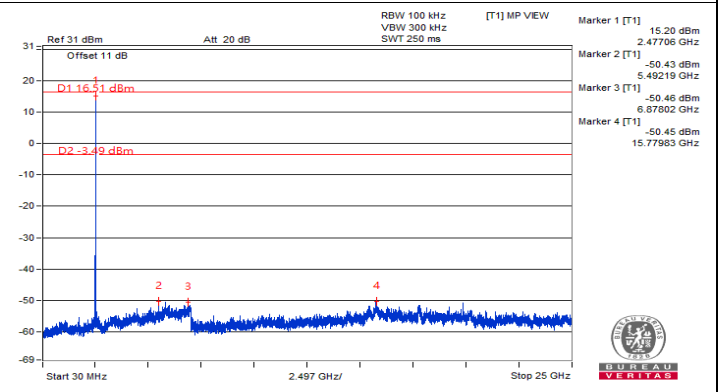
Hopping disabled (Low Channel)



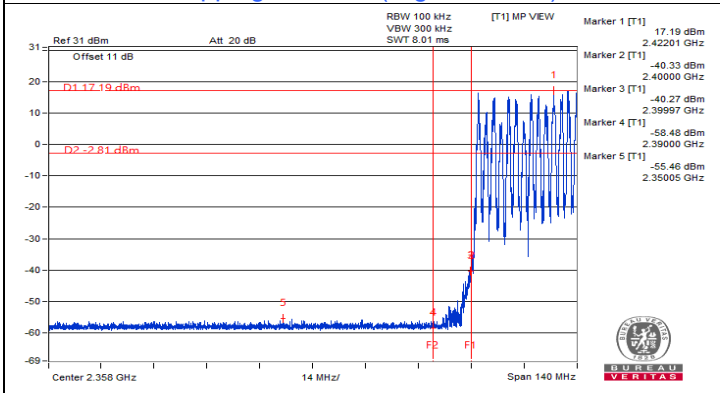
Hopping disabled (Low Channel)



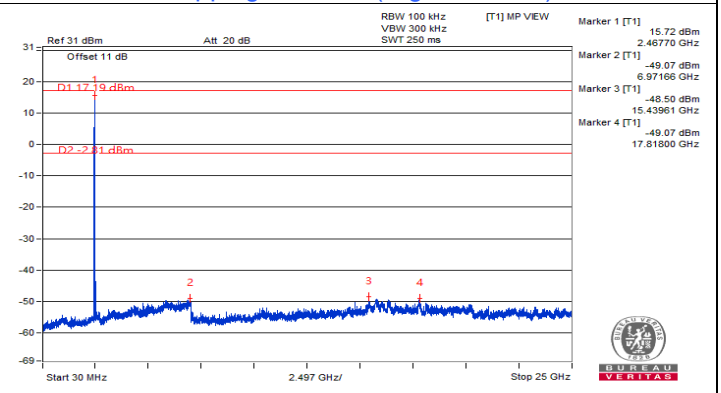
Hopping disabled (High Channel)



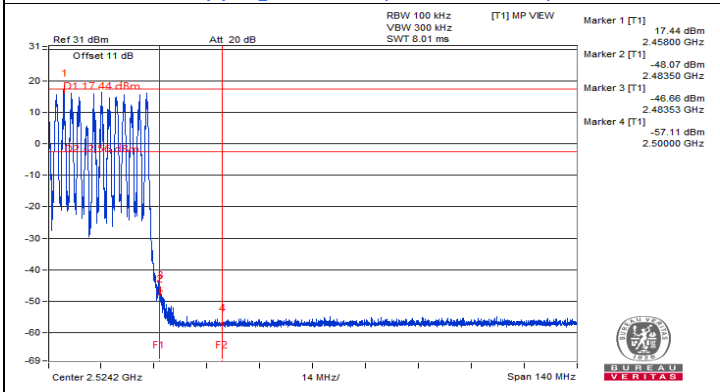
Hopping disabled (High Channel)



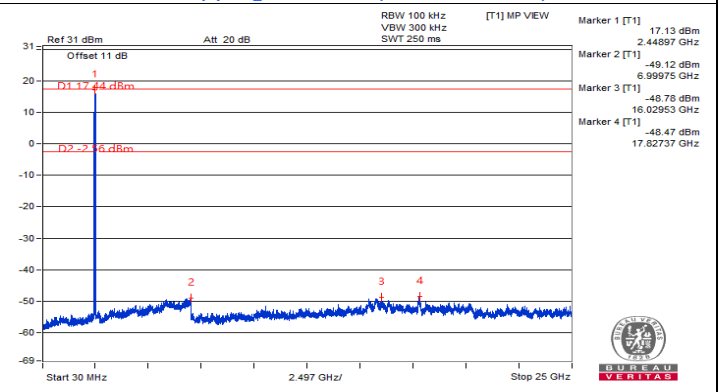
Hopping enabled (Low Channel)



Hopping enabled (Low Channel)

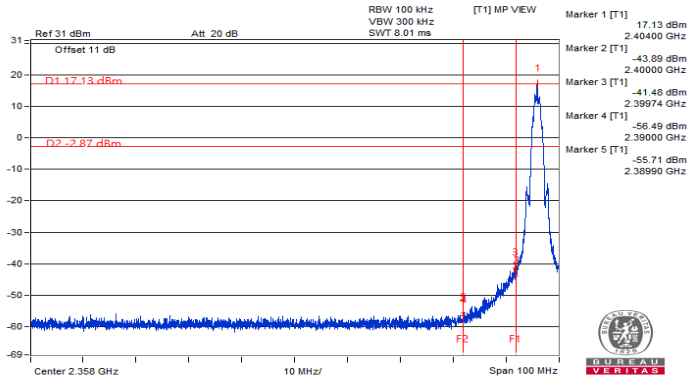


Hopping enabled (High Channel)

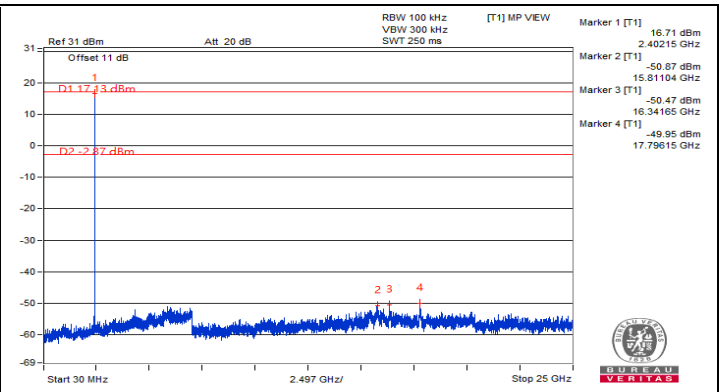


Hopping enabled (High Channel)

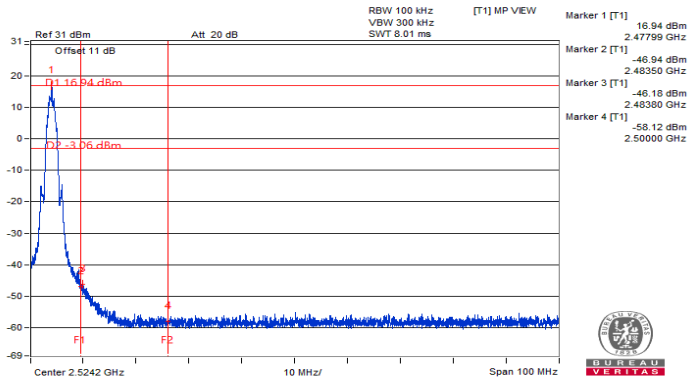
BT-LE 2M



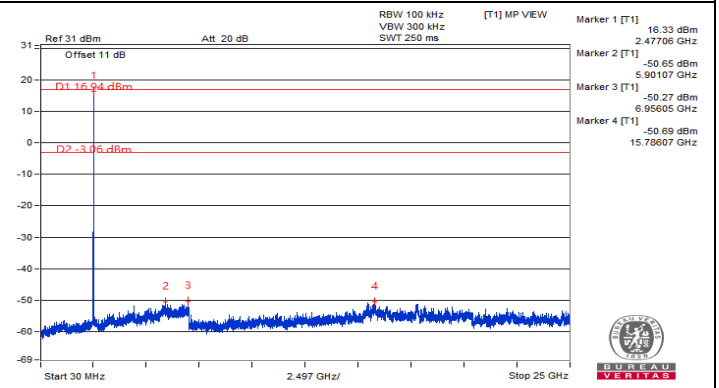
Hopping disabled (Low Channel)



Hopping disabled (Low Channel)



Hopping disabled (High Channel)



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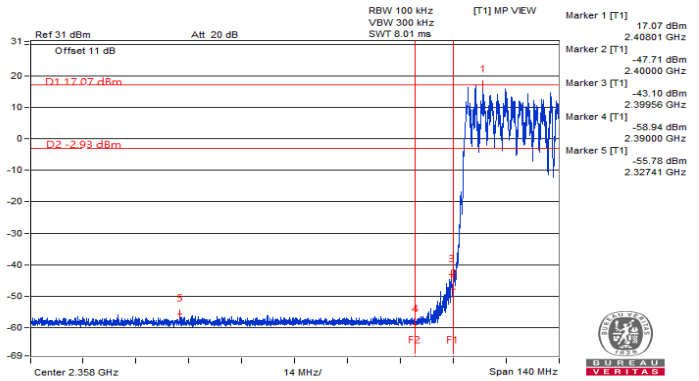

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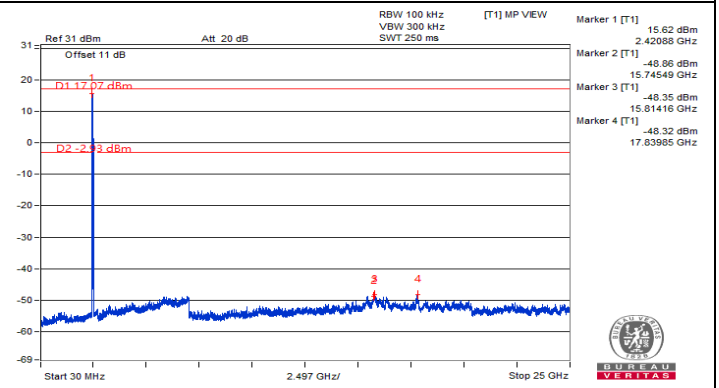

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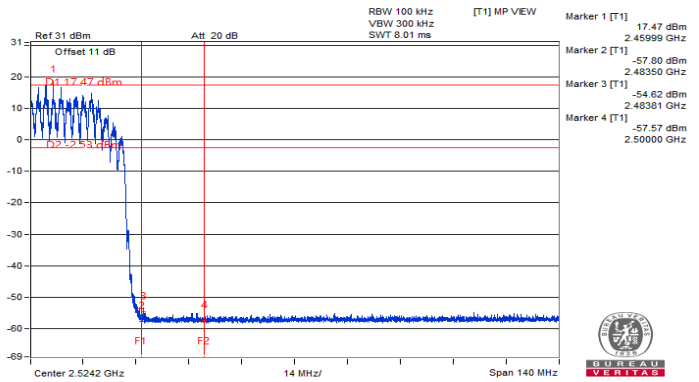
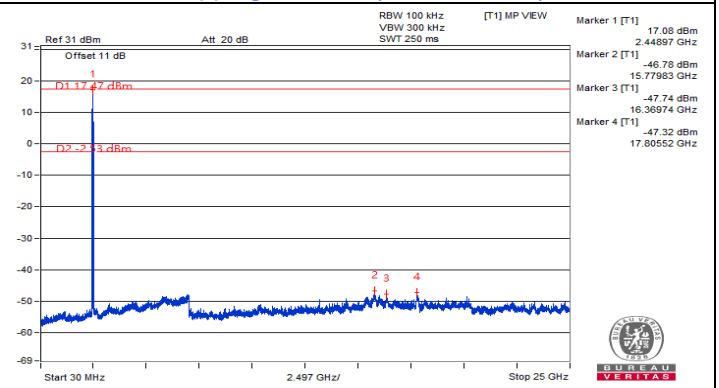


Hopping enabled (High Channel)



Hopping enabled (High Channel)

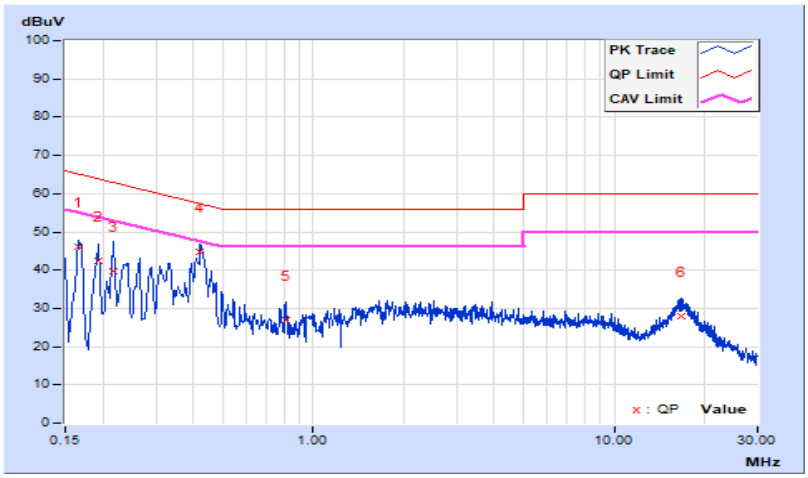
7.7 AC Power Conducted Emissions

RF Mode	BT-LE 2M	**Channel**	CH 19：2440 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**	20 °C, 68 % RH
Tested By	Edison Lee		

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	0.16600	9.69	36.28	21.16	45.97	30.85	65.16	55.16	-19.19	-24.31
2	0.19400	9.71	32.74	19.89	42.45	29.60	63.86	53.86	-21.41	-24.26
3	0.21800	9.71	30.01	18.26	39.72	27.97	62.89	52.89	-23.17	-24.92
4	**0.42200**	**9.72**	**34.91**	**30.58**	**44.63**	**40.30**	**57.41**	**47.41**	**-12.78**	**-7.11**
5	0.80980	9.77	17.32	10.72	27.09	20.49	56.00	46.00	-28.91	-25.51
6	16.72600	10.04	17.90	13.21	27.94	23.25	60.00	50.00	-32.06	-26.75

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

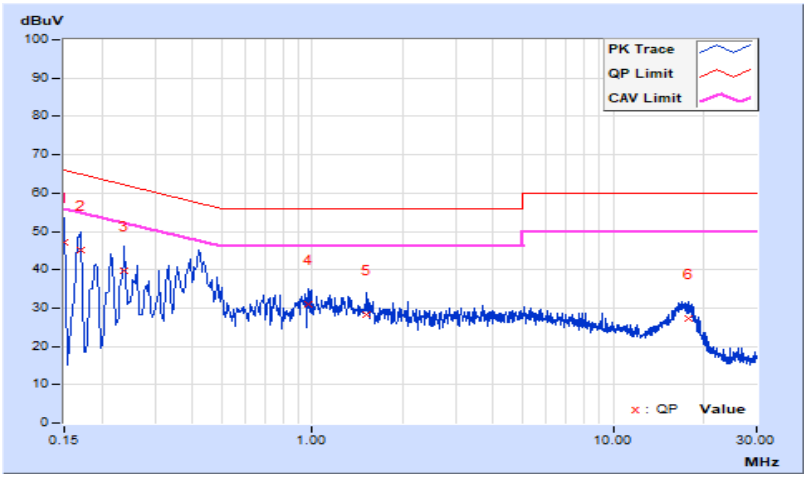


RF Mode	BT-LE 2M	Channel	CH 19：2440 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	20 °C, 68 % RH
Tested By	Edison Lee		

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	0.15000	9.66	37.55	20.31	47.21	29.97	66.00	56.00	-18.79	-26.03
2	0.16977	9.66	35.32	20.46	44.98	30.12	64.97	54.97	-19.99	-24.85
3	0.23800	9.67	30.02	19.83	39.69	29.50	62.17	52.17	-22.48	-22.67
4	0.96600	9.81	21.01	15.14	30.82	24.95	56.00	46.00	-25.18	-21.05
5	1.52200	9.81	18.48	13.32	28.29	23.13	56.00	46.00	-27.71	-22.87
6	17.89800	10.23	16.89	12.32	27.12	22.55	60.00	50.00	-32.88	-27.45

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



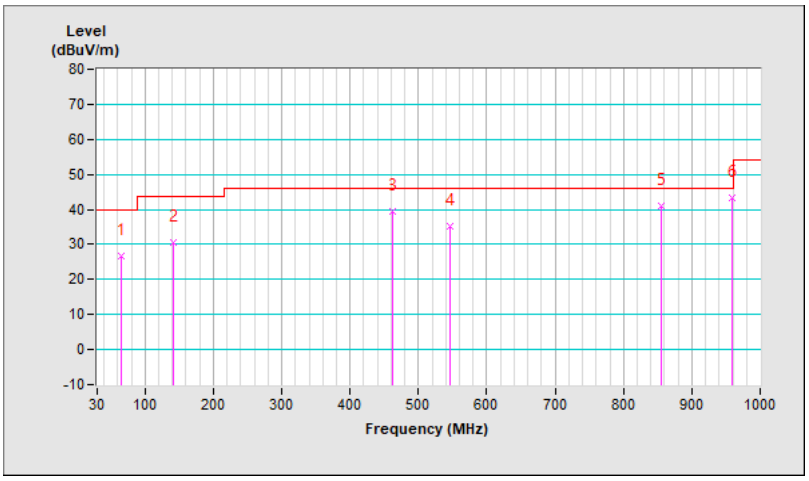
7.8 Unwanted Emissions below 1 GHz

RF Mode	BT-LE 2M	**Channel**	CH 19：2440 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**	25.2 °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	65.89	26.6 QP	40.0	-13.4	1.23 H	22	36.3	-9.7
2	140.58	30.4 QP	43.5	-13.1	1.15 H	180	38.7	-8.3
3	462.62	39.3 QP	46.0	-6.7	1.46 H	191	41.1	-1.8
4	547.01	35.2 QP	46.0	-10.8	1.78 H	46	35.7	-0.5
5	854.50	40.8 QP	46.0	-5.2	1.96 H	214	34.5	6.3
6	**959.26**	**43.3 QP**	**46.0**	**-2.7**	**1.53 H**	**311**	**35.0**	**8.3**

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 ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

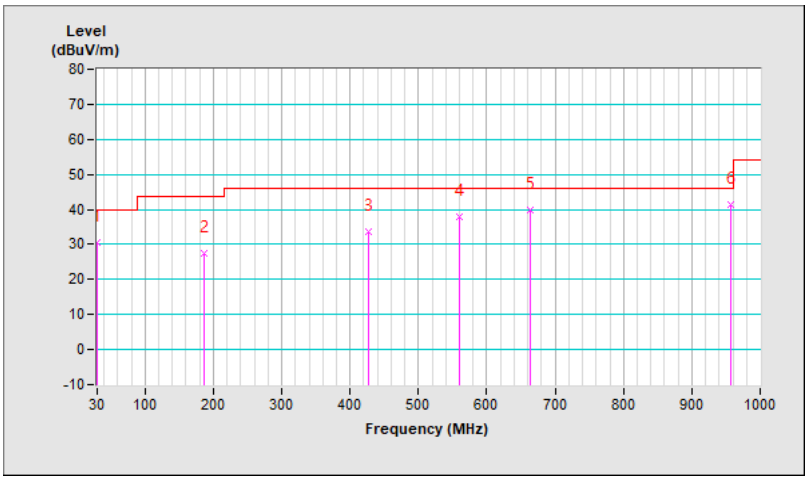


RF Mode	BT-LE 2M	Channel	CH 19：2440 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120 kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25.2 °C, 74.3 % RH
Tested By	Jed Wu		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.00	30.6 QP	40.0	-9.4	1.89 V	272	41.0	-10.4
2	186.17	27.4 QP	43.5	-16.1	1.73 V	216	36.8	-9.4
3	426.73	33.6 QP	46.0	-12.4	1.52 V	209	36.0	-2.4
4	559.62	38.0 QP	46.0	-8.0	1.46 V	263	38.1	-0.1
5	664.38	39.7 QP	46.0	-6.3	1.05 V	287	37.4	2.3
6	956.35	41.5 QP	46.0	-4.5	1.12 V	140	33.1	8.4

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 ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



7.9 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=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	25.2 °C, 76.8 % 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	52.7 PK	74.0	-21.3	1.11 H	103	53.9	-1.2
2	2390.00	41.5 AV	54.0	-12.5	1.11 H	103	42.7	-1.2
3	*2402.00	109.1 PK			1.11 H	103	110.2	-1.1
4	*2402.00	70.2 AV			1.11 H	103	71.3	-1.1
5	4804.00	50.4 PK	74.0	-23.6	1.68 H	302	43.2	7.2
6	4804.00	11.5 AV	54.0	-42.5	1.68 H	302	4.3	7.2
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	53.1 PK	74.0	-20.9	1.24 V	289	54.3	-1.2
2	2390.00	41.9 AV	54.0	-12.1	1.24 V	289	43.1	-1.2
3	*2402.00	114.2 PK			1.24 V	289	115.3	-1.1
4	*2402.00	75.3 AV			1.24 V	289	76.4	-1.1
5	4804.00	50.9 PK	74.0	-23.1	1.19 V	47	43.7	7.2
6	4804.00	12.0 AV	54.0	-42.0	1.19 V	47	4.8	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.
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(1.134 ms / 100 ms) = -38.9 dB

RF Mode	BT-LE 1M	Channel	CH 19：2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	25.2 °C, 76.8 % 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	*2440.00	109.9 PK			1.35 H	69	110.8	-0.9
2	*2440.00	71.0 AV			1.35 H	69	71.9	-0.9
3	4880.00	51.4 PK	74.0	-22.6	1.83 H	314	43.7	7.7
4	4880.00	12.5 AV	54.0	-41.5	1.83 H	314	4.8	7.7
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	114.9 PK			1.64 V	266	115.8	-0.9
2	*2440.00	76.0 AV			1.64 V	266	76.9	-0.9
3	4880.00	52.0 PK	74.0	-22.0	1.31 V	59	44.3	7.7
4	4880.00	13.1 AV	54.0	-40.9	1.31 V	59	5.4	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.
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(1.134 ms / 100 ms) = -38.9 dB

RF Mode	BT-LE 1M	Channel	CH 39：2480 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	25.2 °C, 76.8 % 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	*2480.00	108.9 PK			2.78 H	70	109.4	-0.5
2	*2480.00	70.0 AV			2.78 H	70	70.5	-0.5
3	2483.50	60.9 PK	74.0	-13.1	2.78 H	70	61.4	-0.5
4	2483.50	22.0 AV	54.0	-32.0	2.78 H	70	22.5	-0.5
5	4960.00	51.3 PK	74.0	-22.7	3.31 H	233	43.5	7.8
6	4960.00	12.4 AV	54.0	-41.6	3.31 H	233	4.6	7.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	113.8 PK			3.46 V	254	114.3	-0.5
2	*2480.00	74.9 AV			3.46 V	254	75.4	-0.5
3	**2483.50**	**66.2 PK**	**74.0**	**-7.8**	**3.46 V**	**254**	**66.7**	**-0.5**
4	2483.50	27.3 AV	54.0	-26.7	3.46 V	254	27.8	-0.5
5	4960.00	52.1 PK	74.0	-21.9	2.99 V	78	44.3	7.8
6	4960.00	13.2 AV	54.0	-40.8	2.99 V	78	5.4	7.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(1.134 ms / 100 ms) = -38.9 dB

RF Mode	BT-LE 2M	Channel	CH 1：2404 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	25.2 °C, 76.8 % 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	52.9 PK	74.0	-21.1	1.41 H	104	54.1	-1.2
2	2390.00	41.9 AV	54.0	-12.1	1.41 H	104	43.1	-1.2
3	*2404.00	110.0 PK			1.41 H	104	111.1	-1.1
4	*2404.00	68.6 AV			1.41 H	104	69.7	-1.1
5	4808.00	51.0 PK	74.0	-23.0	1.85 H	314	43.8	7.2
6	4808.00	9.6 AV	54.0	-44.4	1.85 H	314	2.4	7.2
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	53.3 PK	74.0	-20.7	1.66 V	271	54.5	-1.2
2	2390.00	42.3 AV	54.0	-11.7	1.66 V	271	43.5	-1.2
3	*2404.00	114.8 PK			1.66 V	271	115.9	-1.1
4	*2404.00	73.4 AV			1.66 V	271	74.5	-1.1
5	4808.00	51.6 PK	74.0	-22.4	1.65 V	54	44.4	7.2
6	4808.00	10.2 AV	54.0	-43.8	1.65 V	54	3.0	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.
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(0.85 ms / 100 ms) = -41.4 dB

RF Mode	BT-LE 2M	Channel	CH 19：2440 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	25.2 °C, 76.8 % 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	*2440.00	109.6 PK			1.26 H	90	110.5	-0.9
2	*2440.00	68.2 AV			1.26 H	90	69.1	-0.9
3	4880.00	51.1 PK	74.0	-22.9	1.78 H	293	43.4	7.7
4	4880.00	9.7 AV	54.0	-44.3	1.78 H	293	2.0	7.7
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	114.6 PK			1.55 V	272	115.5	-0.9
2	*2440.00	73.2 AV			1.55 V	272	74.1	-0.9
3	4880.00	51.7 PK	74.0	-22.3	1.39 V	34	44.0	7.7
4	4880.00	10.3 AV	54.0	-43.7	1.39 V	34	2.6	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.
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(0.85 ms / 100 ms) = -41.4 dB

RF Mode	BT-LE 2M	Channel	CH 38：2478 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	25.2 °C, 76.8 % 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	*2478.00	109.0 PK			2.82 H	69	109.7	-0.7
2	*2478.00	67.6 AV			2.82 H	69	68.3	-0.7
3	2483.50	59.9 PK	74.0	-14.1	2.82 H	69	60.4	-0.5
4	2483.50	18.5 AV	54.0	-35.5	2.82 H	69	19.0	-0.5
5	4956.00	51.6 PK	74.0	-22.4	3.50 H	277	43.8	7.8
6	4956.00	10.2 AV	54.0	-43.8	3.50 H	277	2.4	7.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2478.00	114.0 PK			3.29 V	229	114.7	-0.7
2	*2478.00	72.6 AV			3.29 V	229	73.3	-0.7
3	2483.50	64.5 PK	74.0	-9.5	3.29 V	229	65.0	-0.5
4	2483.50	23.1 AV	54.0	-30.9	3.29 V	229	23.6	-0.5
5	4956.00	52.1 PK	74.0	-21.9	3.26 V	54	44.3	7.8
6	4956.00	10.7 AV	54.0	-43.3	3.26 V	54	2.9	7.8

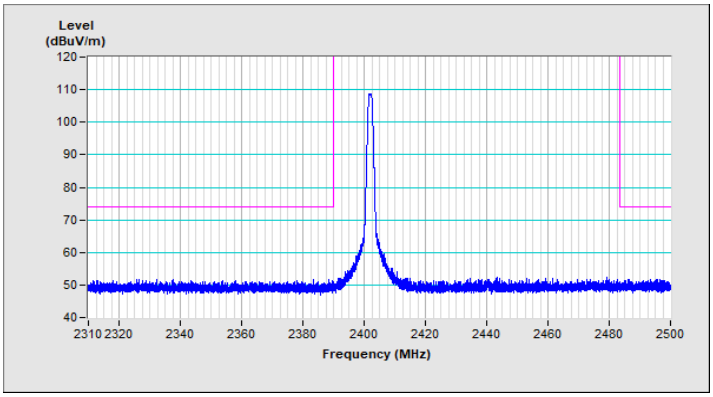
Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.85 ms / 100 ms) = -41.4 dB

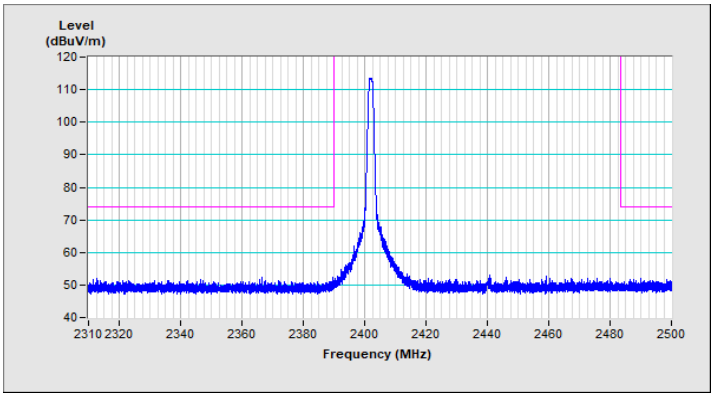
Plot of Band Edge

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

BT-LE 1M Channel 0

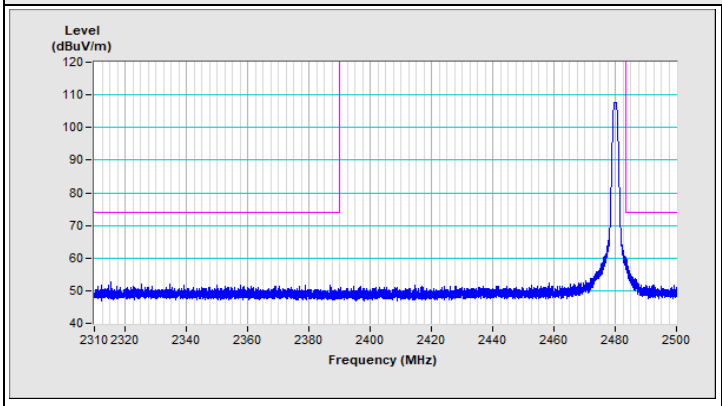


Horizontal (Peak)

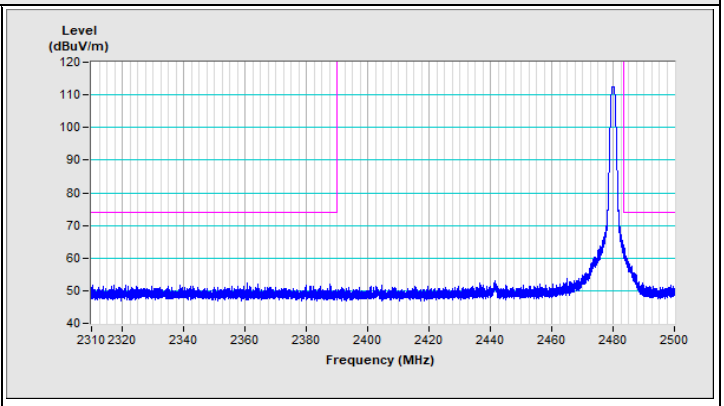


Vertical (Peak)

BT-LE 1M Channel 39



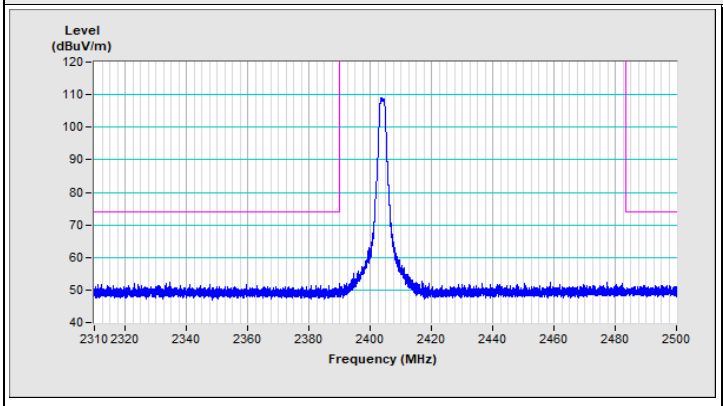
Horizontal (Peak)



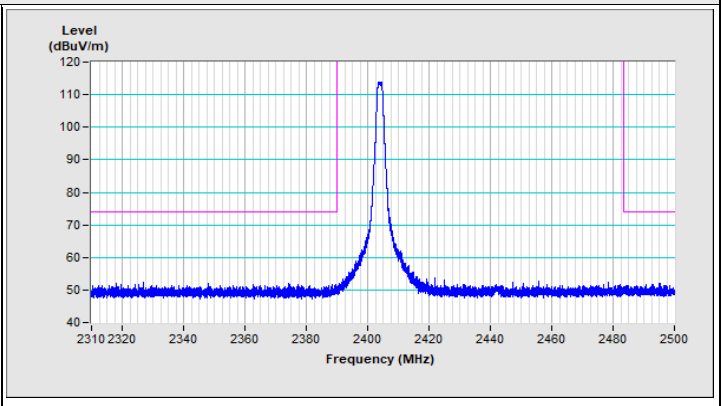
Vertical (Peak)

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

BT-LE 2M Channel 1

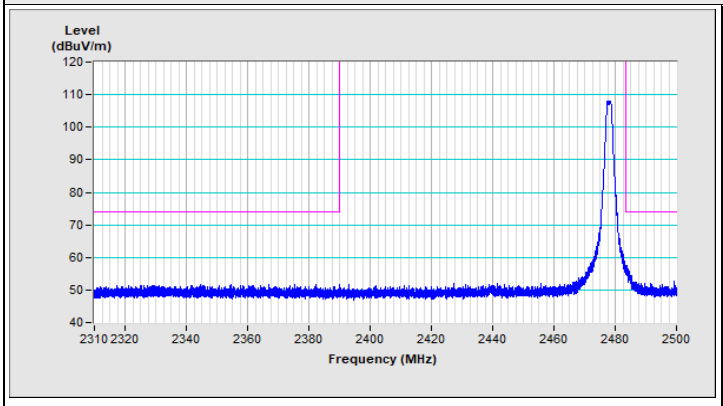


Horizontal (Peak)

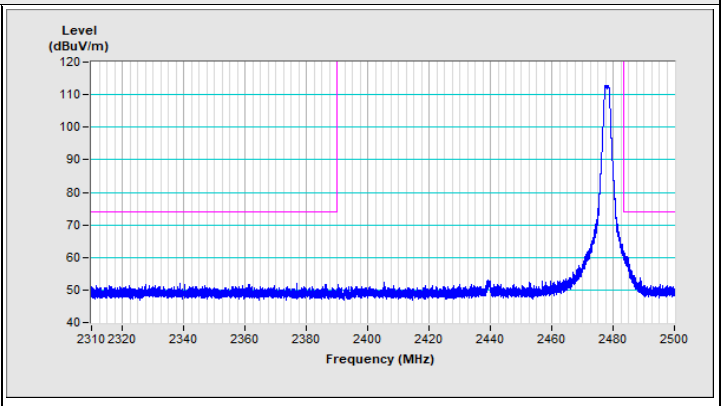


Vertical (Peak)

BT-LE 2M Channel 38



Horizontal (Peak)



Vertical (Peak)

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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