

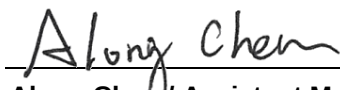
FCC Test Report

FCC ID : NKR-MB20
Product Description : WLAN/BLE module
Model No. : DHSK-MB20
Brand Name : Wistron NeWeb Corporation
Applicant : Wistron NeWeb Corporation
Address : 20 Park Avenue II, Hsinchu Science Park,
Hsinchu 308, Taiwan, R.O.C.
Standard : 47 CFR FCC Part 15.247
Received Date : Apr. 02, 2024
Tested Date : Jul. 15 ~ Jul. 18, 2024

We, International Certification Corporation, would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:

Approved by:



Along Chen / Assistant Manager



Gary Chang / Manager

Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Local Support Equipment List	7
1.3	Test Setup Chart	7
1.4	Test Equipment List and Calibration Data.....	8
1.5	Test Standards	9
1.6	Reference Guidance	9
1.7	Deviation from Test Standard and Measurement Procedure.....	9
1.8	Measurement Uncertainty	10
2	TEST CONFIGURATION.....	11
2.1	Testing Facility	11
2.2	The Worst Test Modes and Channel Details	11
3	TRANSMITTER TEST RESULTS	12
3.1	6dB and Occupied Bandwidth.....	12
3.2	Conducted Output Power	13
3.3	Power Spectral Density	14
3.4	Unwanted Emissions in Restricted Frequency Bands.....	15
3.5	Emissions in non-restricted Frequency Bands.....	17
3.6	AC Power Line Conducted Emissions	18
4	TEST LABORATORY INFORMATION	19
 Appendix A. 6dB and Occupied Bandwidth		
Appendix B. Conducted Output Power		
Appendix C. Power Spectral Density		
Appendix D. Unwanted Emissions into Restricted Frequency Bands		
Appendix E. Emissions in Non-Restricted Frequency Bands		
Appendix F. AC Power Line Conducted Emissions		

Release Record

Report No.	Version	Description	Issued Date
FR380701-02AE	Rev. 01	Initial issue	Aug. 16, 2024

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	[dBuV]: 0.491MHz 31.29 (Margin -14.85dB) - AV	Pass
15.247(d) 15.209	Unwanted Emissions	[dBuV/m at 3m]: 4.96GHz 45.15 (Margin -8.85dB) - QP	Pass
15.247(b)(3)	Conducted Output Power	Power [dBm]: 8.79	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Information

1.1.1 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Product Description	Description
Wistron NeWeb Corporation	DHSK-MB20	81DHSK08.G01	WLAN/BLE module	LED *0, Button*0, level shifter*4, connector*2
		81DHSK08.G02		LED *0, Button*0, level shifter*1, connector*1
		81DHSK08.G03		LED *2, Button*1, level shifter*4, connector*2
✦ Remark: RF PCB layout and RF components of all the above listed models are the same, no change.				

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	Bluetooth Mode	Ch. Freq. (MHz)	Channel Number	Data Rate
2400-2483.5	LE	2402-2480	0-39 [40]	1 Mbps
Note: Bluetooth LE (Low energy) uses GFSK modulation.				

1.1.3 Antenna Details

Ant. No.	Model	Type	Connector	Antenna Gain (dBi)
1	DHSK-MB20_ANT-0	PIFA	No	1.13
2	DHSK-MB20_ANT-1	PIFA	No	0.23

1.1.4 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	5Vdc from host
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1.1.5 Accessories

N/A

1.1.6 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
37	2402	9	2422	18	2442	28	2462
0	2404	10	2424	19	2444	29	2464
1	2406	38	2426	20	2446	30	2466
2	2408	11	2428	21	2448	31	2468
3	2410	12	2430	22	2450	32	2470
4	2412	13	2432	23	2452	33	2472
5	2414	14	2434	24	2454	34	2474
6	2416	15	2436	25	2456	35	2476
7	2418	16	2438	26	2458	36	2478
8	2420	17	2440	27	2460	39	2480

1.1.7 Test Tool and Duty Cycle

Test Tool	RTLBAAPP, version: 5.2.2.59	
Modulation Mode	Duty Cycle Of Test Signal (%)	Duty Factor (dB)
BT-LE(1Mbps)	62.30%	2.06

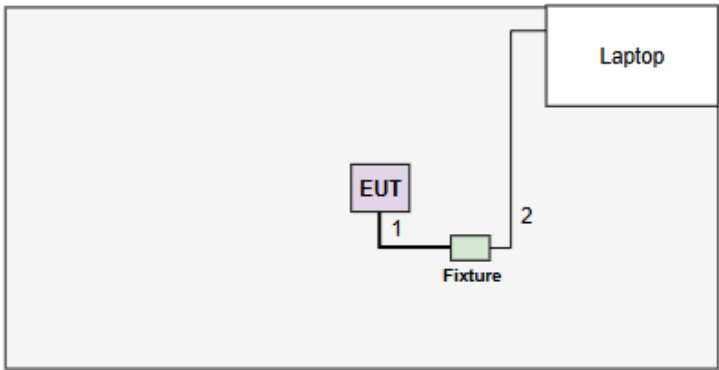
1.1.8 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)		
	2402	2440	2480
BT-LE(1Mbps)	0x2a	0x2a	0x2a

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Laptop	DELL	Latitude E5470	DoC	---
2	Fixture	---	---	---	Provided by applicant.

1.3 Test Setup Chart

Test Setup Diagram	
	
No.	Signal cable / Length (m)
1	Fixture cable, 0.1m non-shielded.
2	USB, 1m shielded.

1.4 Test Equipment List and Calibration Data

Test Item	Radiated Emission below 1GHz test				
Test Site	966 chamber3 / (03CH03-WS)				
Tested Date	Jul. 17, 2024				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Mar. 05, 2024	Mar. 04, 2025
Loop Antenna	R&S	HFH2-Z2	100330	Oct. 31, 2023	Oct. 30, 2024
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Jul. 02, 2024	Jul. 01, 2025
Preamplifier	EMC	EMC02325	980187	Jun. 27, 2024	Jun. 26, 2025
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 03, 2023	Oct. 02, 2024
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Sep. 22, 2023	Sep. 21, 2024
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Sep. 22, 2023	Sep. 21, 2024
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Sep. 22, 2023	Sep. 21, 2024
Measurement Software	Sporton	SENSE-EMI	V5.11	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission above 1GHz test				
Test Site	966 chamber3 / (03CH03-WS)				
Tested Date	Jul. 15, 2024				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101499	Apr. 02, 2024	Apr. 01, 2025
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Dec. 14, 2023	Dec. 13, 2024
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 30, 2023	Oct. 29, 2024
Preamplifier	EMC	EMC118A45SE	980897	Aug. 01, 2023	Jul. 31, 2024
Preamplifier	EMC	EMC184045SE	980903	Jul. 17, 2023	Jul. 16, 2024
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Sep. 22, 2023	Sep. 21, 2024
RF cable-8M	EMC	EMC104-SM-SM-8000	181107	Sep. 22, 2023	Sep. 21, 2024
Attenuator	Pasternack	PE7005-10	10-3	Sep. 27, 2023	Sep. 26, 2024
HIGHPASS FILTER	WI	WHK3.1-18G-10SS	43	Sep. 27, 2023	Sep. 26, 2024
Measurement Software	Sporton	SENSE-15247_FS	V5.11.	NA	NA
Measurement Software	Sporton	SENSE-EMI	V5.11	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Jul. 18, 2024				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101658	Feb. 23, 2024	Feb. 22, 2025
LISN	R&S	ENV216	101579	May. 09, 2024	May. 08, 2025
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 11, 2023	Oct. 10, 2024
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127666	Mar. 05, 2024	Mar. 04, 2025
50 ohm terminal (Support Unit)	NA	50	03	Aug. 08, 2023	Aug. 07, 2024
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Jul. 18, 2024				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101910	Apr. 18, 2024	Apr. 17, 2025
Power Meter	Anritsu	ML2495A	1241002	Nov. 21, 2023	Nov. 20, 2024
Power Sensor	Anritsu	MA2411B	1207366	Nov. 21, 2023	Nov. 20, 2024
Attenuator	Pasternack	PE7005-10	10-2	Oct. 05, 2023	Oct. 04, 2024
Measurement Software	Sporton	SENSE-15247_FS	V5.11	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

47 CFR FCC Part 15.247
ANSI C63.10-2013

1.6 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

1.7 Deviation from Test Standard and Measurement Procedure

None

1.8 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$)).

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	± 34.130 Hz
Conducted power	± 0.808 dB
Power density	± 0.583 dB
Conducted emission	± 2.715 dB
AC conducted emission	± 2.92 dB
Unwanted Emission ≤ 1 GHz	± 3.96 dB
Unwanted Emission > 1 GHz	± 4.51 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	CO01-WS, TH01-WS
Address of Test Site	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)
Test Site	03CH03-WS
Address of Test Site	No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- ISED#: 10807C
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Test Configuration
AC Power Line Conducted Emissions	BT-LE(1Mbps)	2480	---
Unwanted Emissions $\leq$ 1GHz	BT-LE(1Mbps)	2480	---
Unwanted Emissions $>$ 1GHz Conducted Output Power 6dB bandwidth Power spectral density	BT-LE(1Mbps)	2402, 2440, 2480	---

3 Transmitter Test Results

3.1 6dB and Occupied Bandwidth

3.1.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

3.1.2 Test Procedures

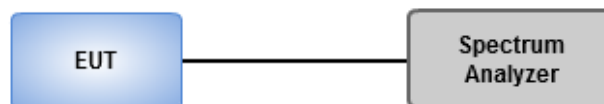
6dB Bandwidth

1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

Occupied Bandwidth

1. Set resolution bandwidth (RBW) = 1% ~ 5 % of OBW, Video bandwidth = 3 x RBW
2. Detector = Sample, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Use the OBW measurement function of spectrum analyzer to measure the occupied bandwidth.

3.1.3 Test Setup



3.1.4 Test Results

Ambient Condition	26°C / 63%	Tested By	Akun Chung
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Refer to Appendix A.

3.2 Conducted Output Power

3.2.1 Limit of Conducted Output Power

Conducted power shall not exceed 1Watt.

Antenna gain $\leq 6\text{dBi}$, no any corresponding reduction is in output power limit.

3.2.2 Test Procedures

A broadband RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

3.2.3 Test Setup



3.2.4 Test Results

Ambient Condition	26°C / 63%	Tested By	Akun Chung
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Refer to Appendix B.

3.3 Power Spectral Density

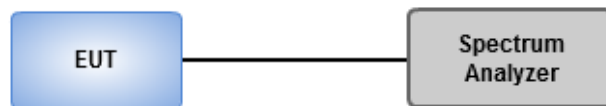
3.3.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

3.3.2 Test Procedures

1. Set the RBW = 3 kHz, VBW = 10 kHz.
2. Detector = Peak, Sweep time = auto couple.
3. Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

3.3.3 Test Setup



3.3.4 Test Results

Ambient Condition	26°C / 63%	Tested By	Akun Chung
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Refer to Appendix C.

3.4 Unwanted Emissions in Restricted Frequency Bands

3.4.1 Limit of Unwanted Emissions in Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Quasi-Peak value is measured for frequency below 1GHz except for 9~90 kHz, 110~490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.4.2 Test Procedures

1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

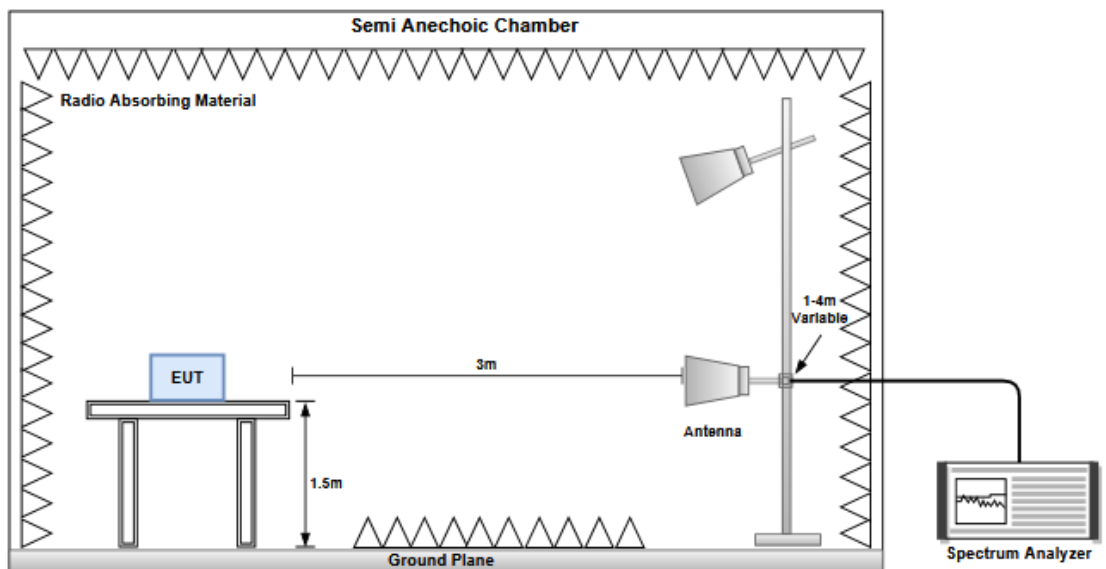
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.4.3 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



3.4.4 Test Results

Ambient Condition	25-26°C / 63-64%	Tested By	Allen Lee / Brad Wu
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Refer to Appendix D.

3.5 Emissions in non-restricted Frequency Bands

3.5.1 Emissions in non-restricted frequency bands limit

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

3.5.2 Test Procedures

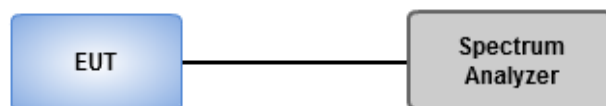
Reference level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

Emission level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

3.5.3 Test Setup



3.5.4 Test Results

Ambient Condition	26°C / 63%	Tested By	Akun Chung
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Refer to Appendix E.

3.6 AC Power Line Conducted Emissions

3.6.1 Limit of AC Power Line Conducted Emissions

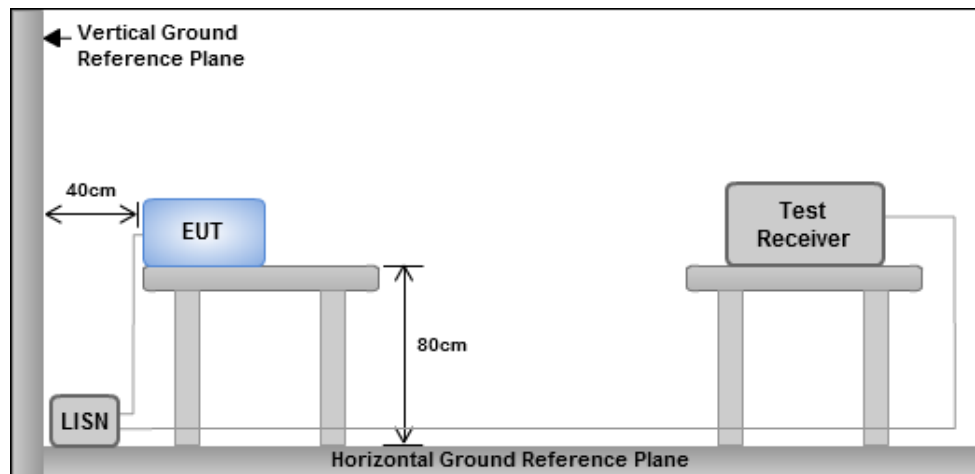
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

3.6.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V/60Hz

3.6.3 Test Setup



- Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.6.4 Test Results

Refer to Appendix F.

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corporation (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

Linkou

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou
District, New Taipei City, Taiwan
(R.O.C.)

Kwei Shan

Tel: 886-3-271-8666

No.3-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)
No.2-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

Kwei Shan Site II

Tel: 886-3-271-8640

No.14-1, Lane 19, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666

Fax: 886-3-318-0155

Email: ICC_Service@icertifi.com.tw

==END==

**Summary**

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
BT-LE(1Mbps)	660k	1.032M	1M03F1D	650k	1.018M

Max-N dB = Maximum 6dB down bandwidth; Max-OBW = Maximum 99% occupied bandwidth;

Min-N dB = Minimum 6dB down bandwidth; Min-OBW = Minimum 99% occupied bandwidth

Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	656.25k	1.018M
2440MHz	Pass	500k	650k	1.032M
2480MHz	Pass	500k	660k	1.027M

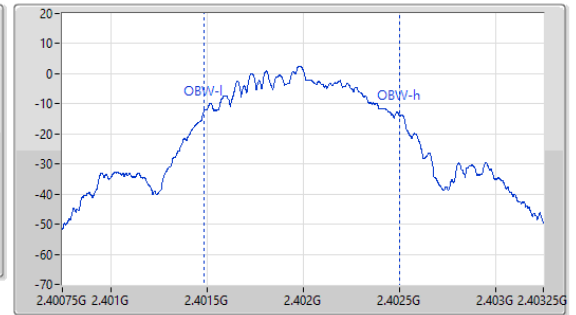
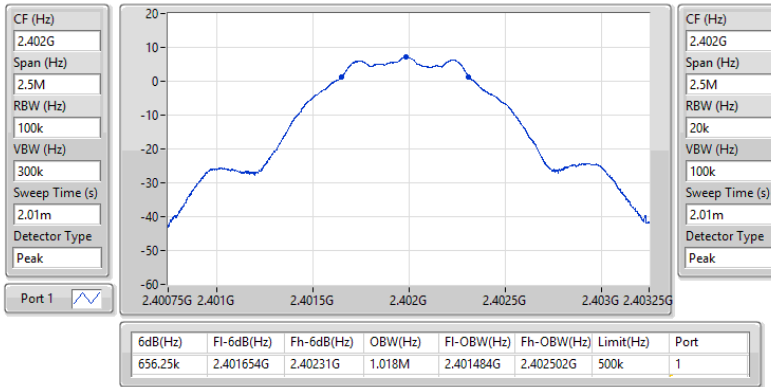
Port X-N dB = Port X 6dB down bandwidth;

Port X-OBW = Port X 99% occupied bandwidth

2.4-2.4835GHz_BT-LE(1Mbps)

EBW-DTS

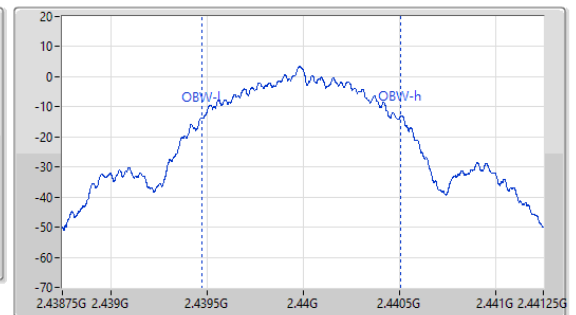
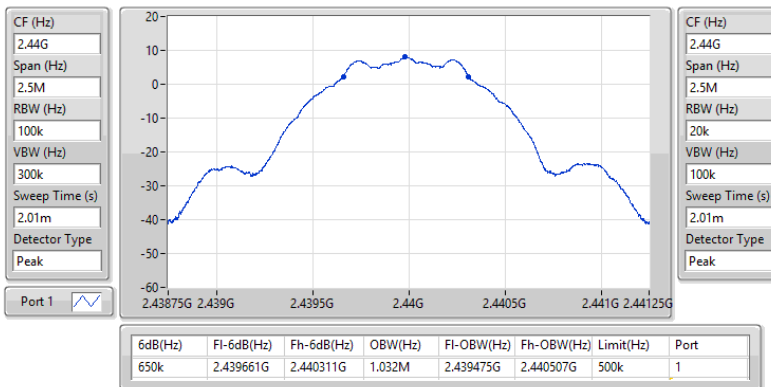
2402MHz



2.4-2.4835GHz_BT-LE(1Mbps)

EBW-DTS

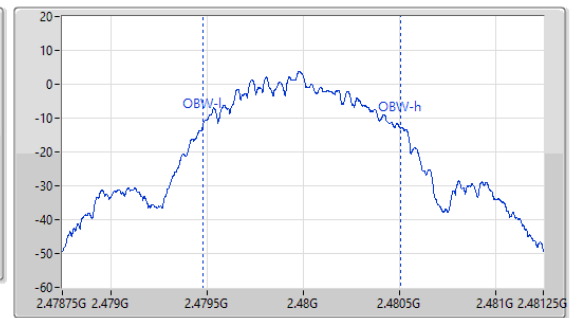
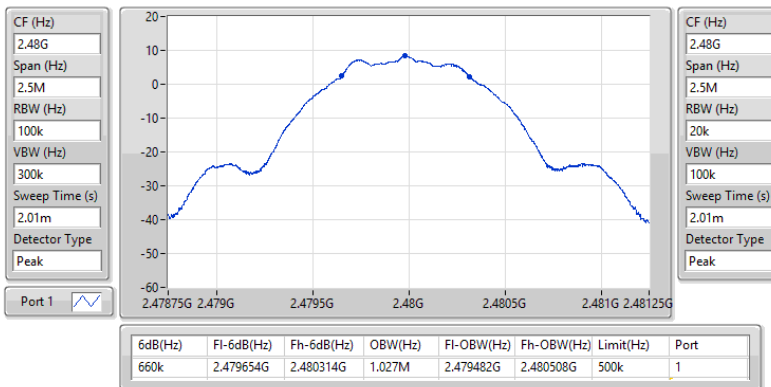
2440MHz



2.4-2.4835GHz_BT-LE(1Mbps)

EBW-DTS

2480MHz





Conducted Output Power (Peak)

Appendix B.1

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	8.79	0.00757

Result

Mode	Result	Antenna Gain (dBi)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
BT-LE(1Mbps)	-	-	-	-	-	-
2402MHz	Pass	1.13	8.41	30.00	9.54	36.00
2440MHz	Pass	1.13	8.46	30.00	9.59	36.00
2480MHz	Pass	1.13	8.79	30.00	9.92	36.00



Conducted Output Power (Average)

Appendix B.2

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	8.59	0.00723

Result

Mode	Result	Antenna Gain (dBi)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
BT-LE(1Mbps)	-	-	-	-	-	-
2402MHz	Pass	1.13	8.19	-	9.32	-
2440MHz	Pass	1.13	8.22	-	9.35	-
2480MHz	Pass	1.13	8.59	-	9.72	-

Note: Average power is for reference only.

**Summary**

Mode	PD (dBm/3kHz)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-7.28

Result

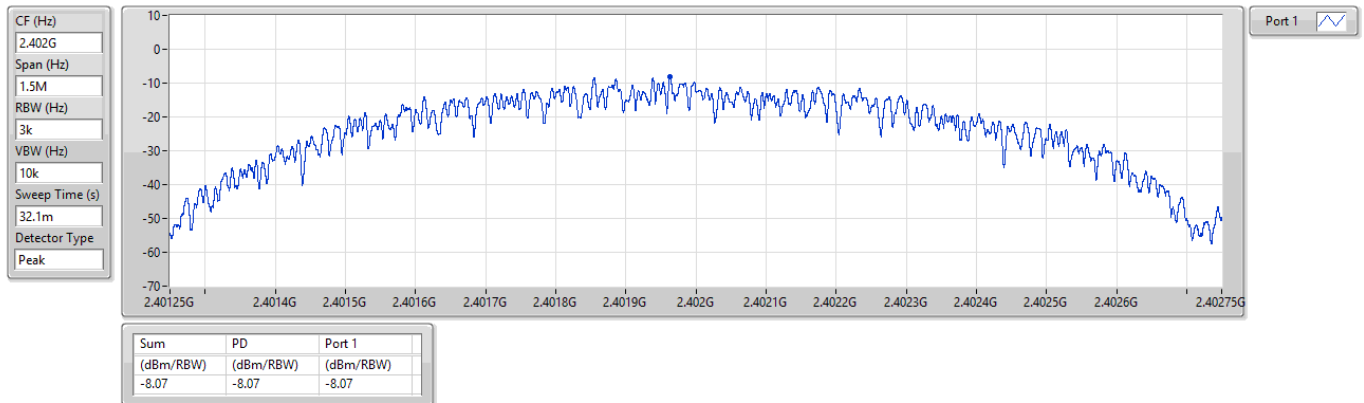
Mode	Result	Antenna Gain (dBi)	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	1.13	-8.07	8.00
2440MHz	Pass	1.13	-8.41	8.00
2480MHz	Pass	1.13	-7.28	8.00



2.4-2.4835GHz_BT-LE(1Mbps)

PSD

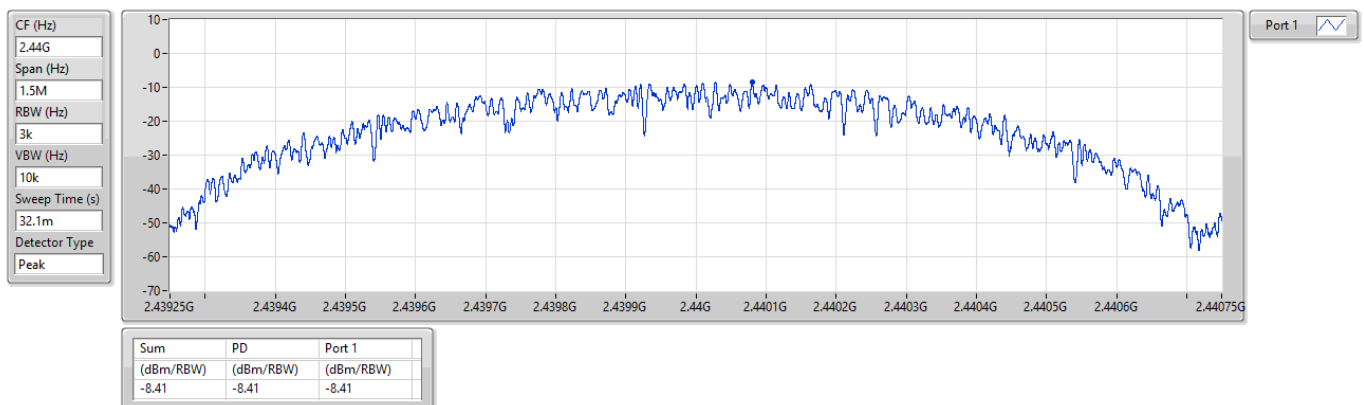
2402MHz



2.4-2.4835GHz_BT-LE(1Mbps)

PSD

2440MHz

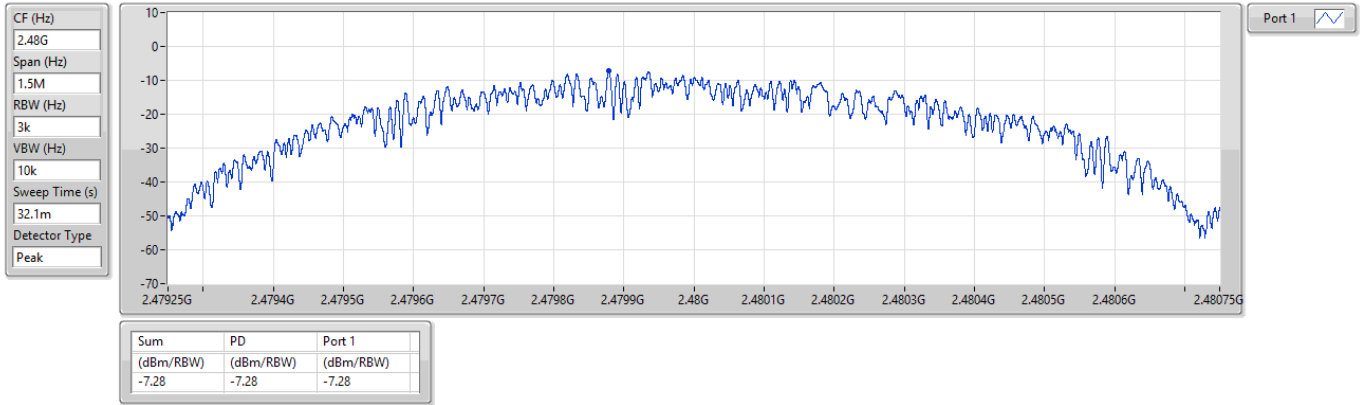




2.4-2.4835GHz_BT-LE(1Mbps)

PSD

2480MHz





Summary

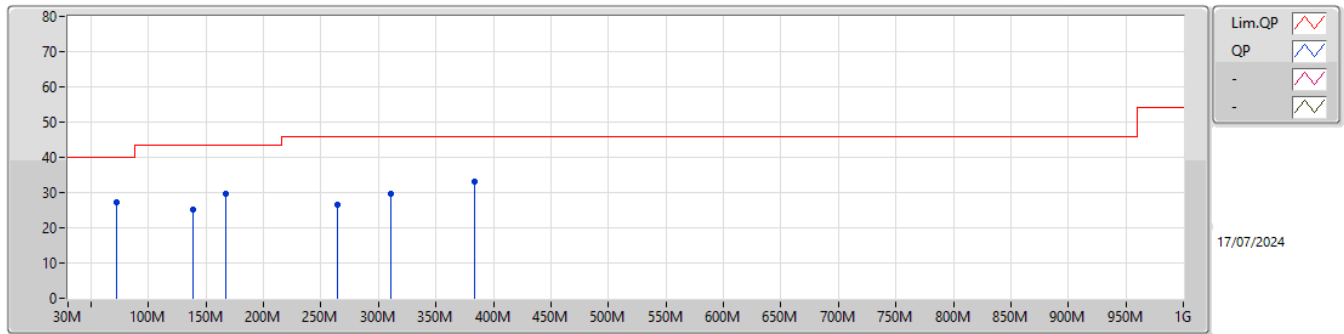
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	PK	71.9M	27.33	40.00	-12.67	Horizontal



Unwanted Emissions into Restricted Frequency Bands Below 1GHz

Appendix D.1

Mode 1



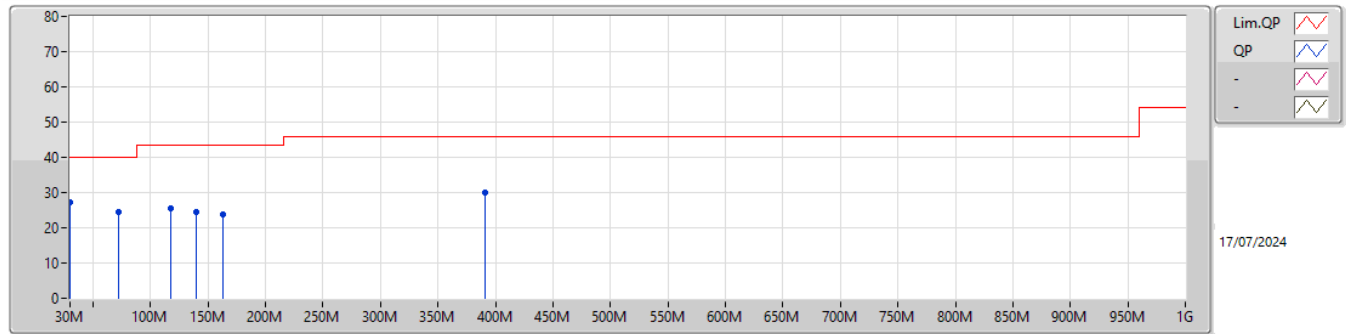
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB/m)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB/m)	CL (dB)	PA (dB)		
PK	71.9M	27.33	40.00	-12.67	-11.12	3	Horizontal	-	-	-	38.45	16.11	0.82	28.05		
PK	138.5M	25.10	43.50	-18.40	-9.09	3	Horizontal	-	-	-	34.19	17.80	1.19	28.08		
PK	167.7M	29.80	43.50	-13.70	-8.87	3	Horizontal	-	-	-	38.67	17.90	1.33	28.10		
PK	264M	26.60	46.00	-19.40	-9.37	3	Horizontal	-	-	-	35.97	17.06	1.74	28.17		
PK	310.5M	29.67	46.00	-16.33	-7.72	3	Horizontal	-	-	-	37.39	18.52	1.94	28.18		
PK	383.8M	33.11	46.00	-12.89	-5.59	3	Horizontal	-	-	-	38.70	20.18	2.25	28.02		



Unwanted Emissions into Restricted Frequency Bands Below 1GHz

Appendix D.1

Mode 1



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB/m)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB/m)	CL (dB)	PA (dB)		
PK	30M	27.11	40.00	-12.89	-9.82	3	Vertical	-	-	-	36.93	17.70	0.48	28.00		
PK	71.7M	24.35	40.00	-15.65	-11.11	3	Vertical	-	-	-	35.46	16.13	0.81	28.05		
PK	117.1M	25.48	43.50	-18.02	-10.95	3	Vertical	-	-	-	36.43	15.99	1.12	28.06		
PK	140.1M	24.65	43.50	-18.85	-8.98	3	Vertical	-	-	-	33.63	17.90	1.20	28.08		
PK	163.5M	23.67	43.50	-19.83	-8.64	3	Vertical	-	-	-	32.31	18.15	1.31	28.10		
PK	390.5M	29.94	46.00	-16.06	-5.43	3	Vertical	-	-	-	35.37	20.31	2.27	28.01		



**Unwanted Emissions into Restricted Frequency Bands
Above 1GHz**

Appendix D.2

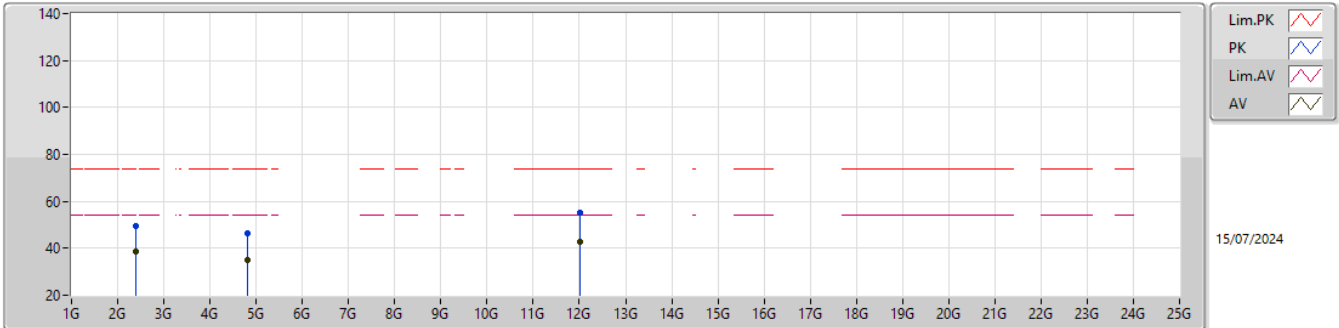
Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	4.96G	45.15	54.00	-8.85	3	Vertical	192.2	1.03	-



2.4-2.4835GHz_BT-LE(1Mbps)

2402MHz_TX

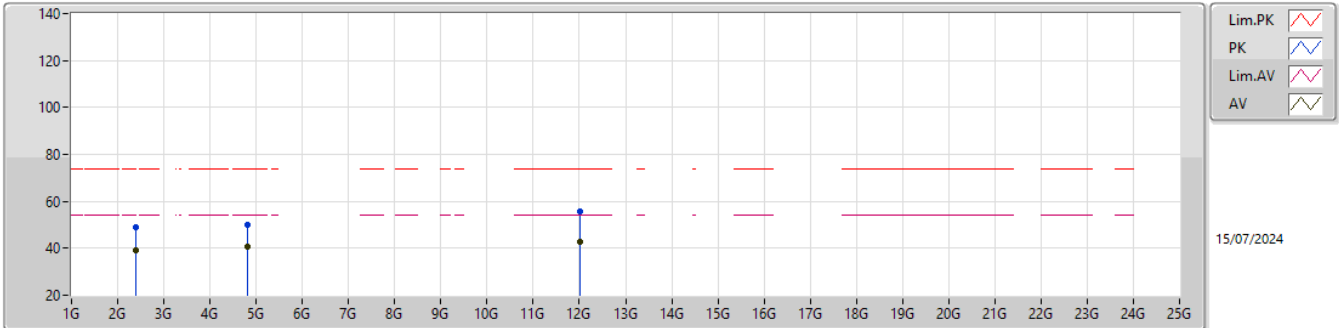


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB/m)	CL (dB)	PA (dB)			
AV	2.39G	38.76	54.00	-15.24	42.39	3	Horizontal	17.9	2.12	-	27.70	5.15	36.48			
PK	2.39G	49.29	74.00	-24.71	52.92	3	Horizontal	17.9	2.12	-	27.70	5.15	36.48			
AV	4.804G	34.91	54.00	-19.09	34.84	3	Horizontal	319.3	1.03	-	31.51	6.83	38.27			
PK	4.804G	46.43	74.00	-27.57	46.36	3	Horizontal	319.3	1.03	-	31.51	6.83	38.27			
AV	12.01G	42.81	54.00	-11.19	35.11	3	Horizontal	247	1.03	-	39.22	10.73	42.25			
PK	12.01G	55.42	74.00	-18.58	47.72	3	Horizontal	247	1.03	-	39.22	10.73	42.25			



2.4-2.4835GHz_BT-LE(1Mbps)

2402MHz_TX

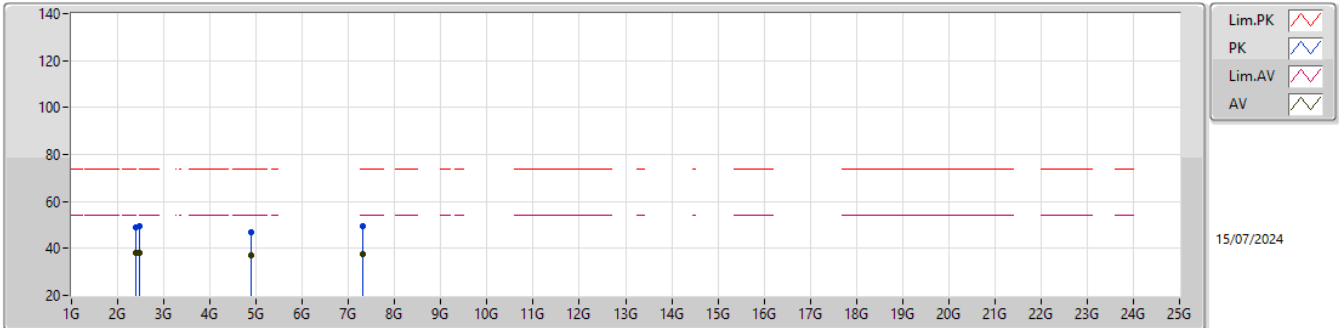


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB/m)	CL (dB)	PA (dB)				
AV	2.39G	38.95	54.00	-15.05	42.58	3	Vertical	283.5	1.03	-	27.70	5.15	36.48				
PK	2.39G	49.13	74.00	-24.87	52.76	3	Vertical	283.5	1.03	-	27.70	5.15	36.48				
AV	4.804G	40.70	54.00	-13.30	40.63	3	Vertical	188.8	1.03	-	31.51	6.83	38.27				
PK	4.804G	49.81	74.00	-24.19	49.74	3	Vertical	188.8	1.03	-	31.51	6.83	38.27				
AV	12.01G	42.93	54.00	-11.07	35.23	3	Vertical	153	1.03	-	39.22	10.73	42.25				
PK	12.01G	55.56	74.00	-18.44	47.86	3	Vertical	153	1.03	-	39.22	10.73	42.25				



2.4-2.4835GHz_BT-LE(1Mbps)

2440MHz_TX

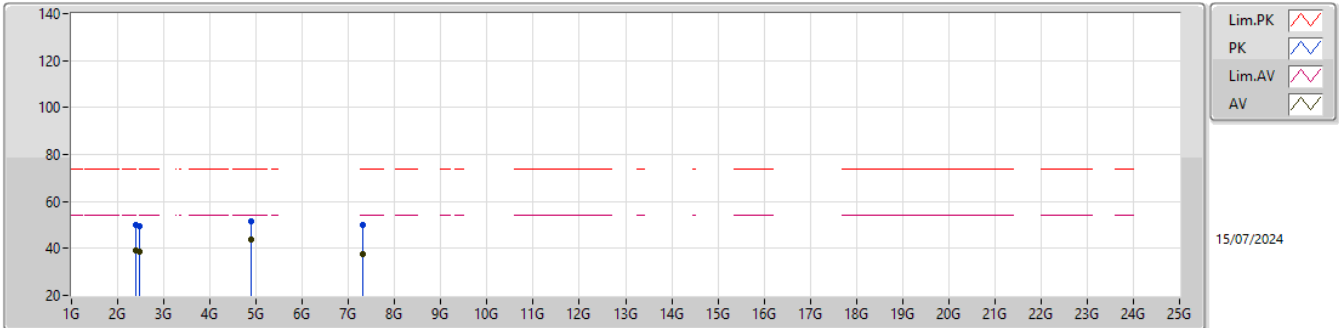


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB/m)	CL (dB)	PA (dB)			
AV	2.39G	38.34	54.00	-15.66	41.97	3	Horizontal	26.5	1.87	-	27.70	5.15	36.48			
PK	2.39G	49.06	74.00	-24.94	52.69	3	Horizontal	26.5	1.87	-	27.70	5.15	36.48			
AV	2.4835G	38.20	54.00	-15.80	42.13	3	Horizontal	26.5	1.87	-	27.46	5.18	36.57			
PK	2.4835G	49.72	74.00	-24.28	53.65	3	Horizontal	26.5	1.87	-	27.46	5.18	36.57			
AV	4.88G	37.26	54.00	-16.74	37.23	3	Horizontal	317.9	1.03	-	31.48	6.87	38.32			
PK	4.88G	46.91	74.00	-27.09	46.88	3	Horizontal	317.9	1.03	-	31.48	6.87	38.32			
AV	7.32G	37.78	54.00	-16.22	32.41	3	Horizontal	253	1.03	-	36.40	8.20	39.23			
PK	7.32G	49.46	74.00	-24.54	44.09	3	Horizontal	253	1.03	-	36.40	8.20	39.23			



2.4-2.4835GHz_BT-LE(1Mbps)

2440MHz_TX

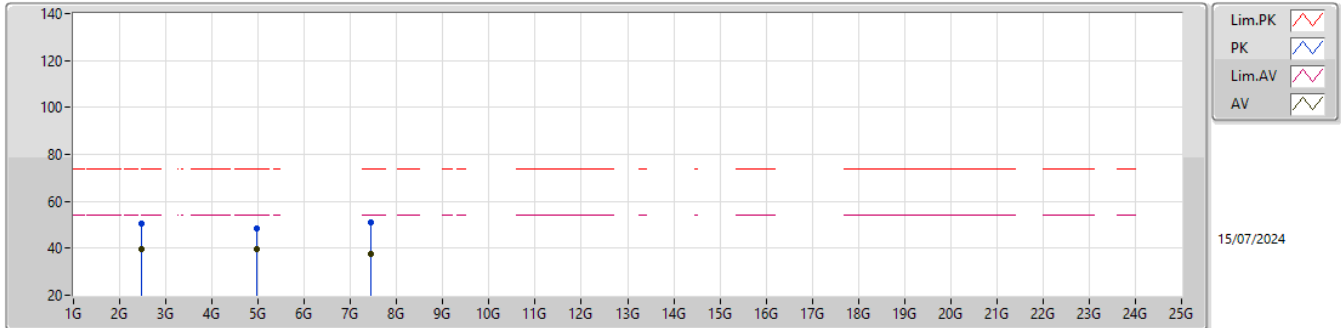


Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA			
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB/m)	(dB)	(dB)			
AV	2.39G	39.33	54.00	-14.67	42.96	3	Vertical	267.5	1.03	-	27.70	5.15	36.48			
PK	2.39G	50.06	74.00	-23.94	53.69	3	Vertical	267.5	1.03	-	27.70	5.15	36.48			
AV	2.4835G	38.55	54.00	-15.45	42.48	3	Vertical	267.5	1.03	-	27.46	5.18	36.57			
PK	2.4835G	49.45	74.00	-24.55	53.38	3	Vertical	267.5	1.03	-	27.46	5.18	36.57			
AV	4.88G	43.85	54.00	-10.15	43.82	3	Vertical	193.2	1.03	-	31.48	6.87	38.32			
PK	4.88G	51.37	74.00	-22.63	51.34	3	Vertical	193.2	1.03	-	31.48	6.87	38.32			
AV	7.32G	37.82	54.00	-16.18	32.45	3	Vertical	263	1.03	-	36.40	8.20	39.23			
PK	7.32G	49.76	74.00	-24.24	44.39	3	Vertical	263	1.03	-	36.40	8.20	39.23			



2.4-2.4835GHz_BT-LE(1Mbps)

2480MHz_TX

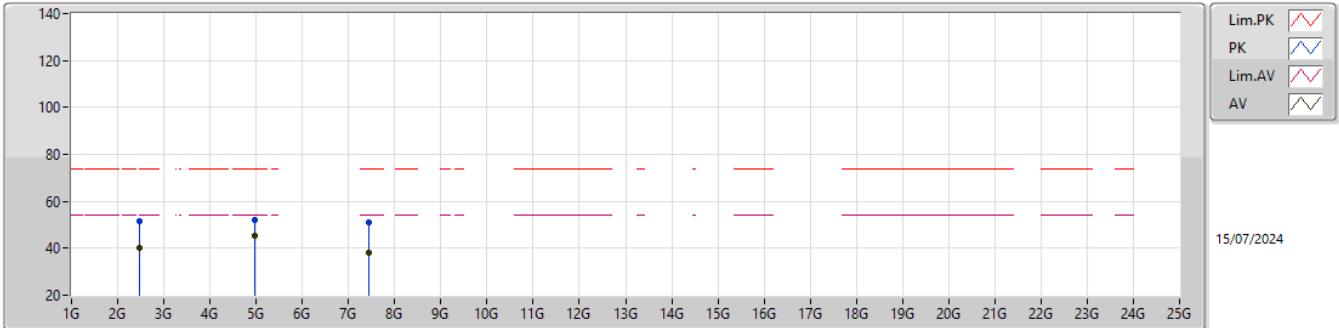


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB/m)	CL (dB)	PA (dB)			
AV	2.4835G	39.59	54.00	-14.41	43.52	3	Horizontal	32	2.29	-	27.46	5.18	36.57			
PK	2.4835G	50.59	74.00	-23.41	54.52	3	Horizontal	32	2.29	-	27.46	5.18	36.57			
AV	4.96G	39.47	54.00	-14.53	39.38	3	Horizontal	318.6	1.03	-	31.54	6.92	38.37			
PK	4.96G	48.32	74.00	-25.68	48.23	3	Horizontal	318.6	1.03	-	31.54	6.92	38.37			
AV	7.44G	37.33	54.00	-16.67	32.03	3	Horizontal	147	1.03	-	36.40	8.26	39.36			
PK	7.44G	50.83	74.00	-23.17	45.53	3	Horizontal	147	1.03	-	36.40	8.26	39.36			



2.4-2.4835GHz_BT-LE(1Mbps)

2480MHz_TX



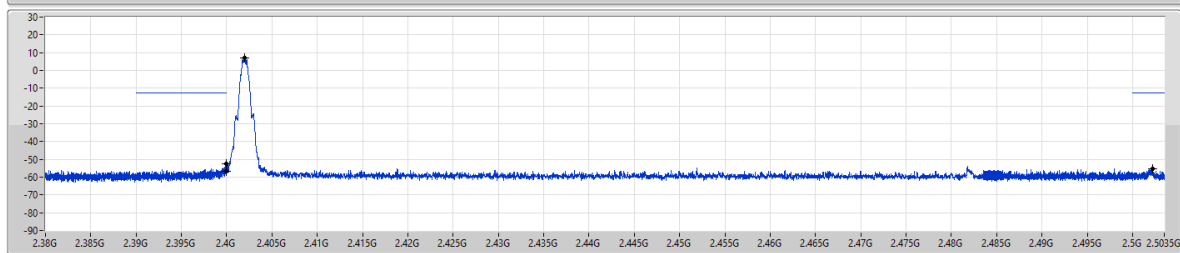
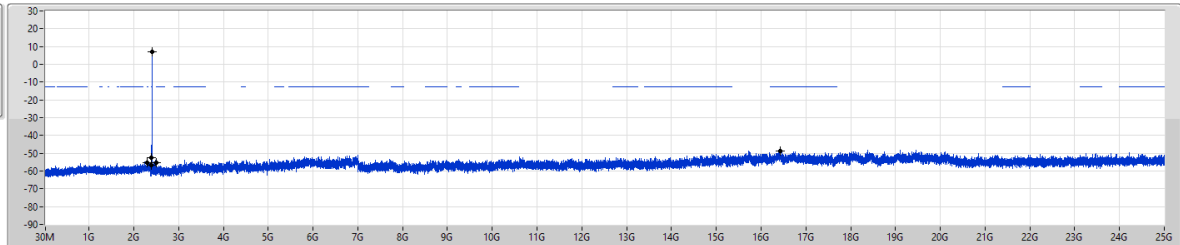
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB/m)	CL (dB)	PA (dB)			
AV	2.4835G	40.25	54.00	-13.75	44.18	3	Vertical	261.4	1.03	-	27.46	5.18	36.57			
PK	2.4835G	51.31	74.00	-22.69	55.24	3	Vertical	261.4	1.03	-	27.46	5.18	36.57			
AV	4.96G	45.15	54.00	-8.85	45.06	3	Vertical	192.2	1.03	-	31.54	6.92	38.37			
PK	4.96G	52.09	74.00	-21.91	52.00	3	Vertical	192.2	1.03	-	31.54	6.92	38.37			
AV	7.44G	38.11	54.00	-15.89	32.81	3	Vertical	231	1.03	-	36.40	8.26	39.36			
PK	7.44G	50.99	74.00	-23.01	45.69	3	Vertical	231	1.03	-	36.40	8.26	39.36			

2.4-2.4835GHz_BT-LE(1Mbps)

CSEndB-DTS

2402MHz

RBW (Hz)
100k
VBW (Hz)
300k
Detector
Peak



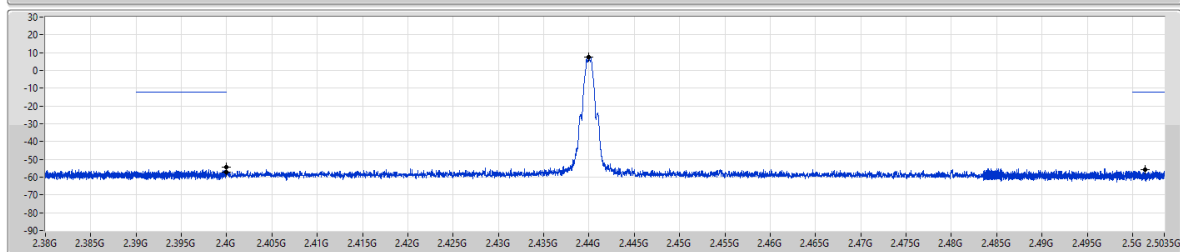
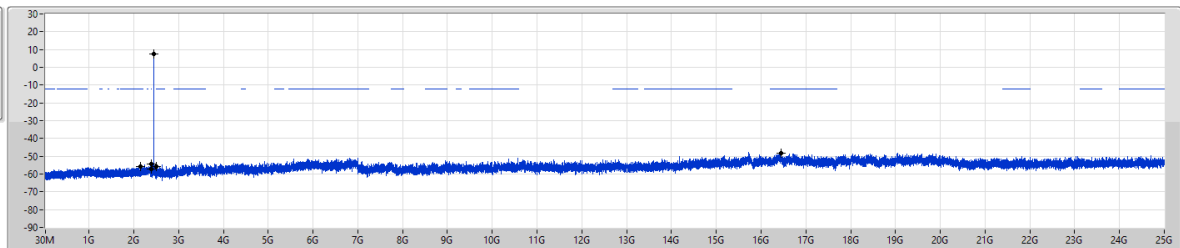
Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40198G	7.15	-12.85	2.30216G	-55.26	2.39995G	-52.71	2.4G	-56.53	2.50223G	-55.14	16.43375G	-48.53	1

2.4-2.4835GHz_BT-LE(1Mbps)

CSEndB-DTS

2440MHz

RBW (Hz)
100k
VBW (Hz)
300k
Detector
Peak



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.43999G	7.64	-12.36	2.14618G	-55.89	2.39993G	-54.19	2.4G	-57.37	2.50136G	-55.89	16.43868G	-48.37	1



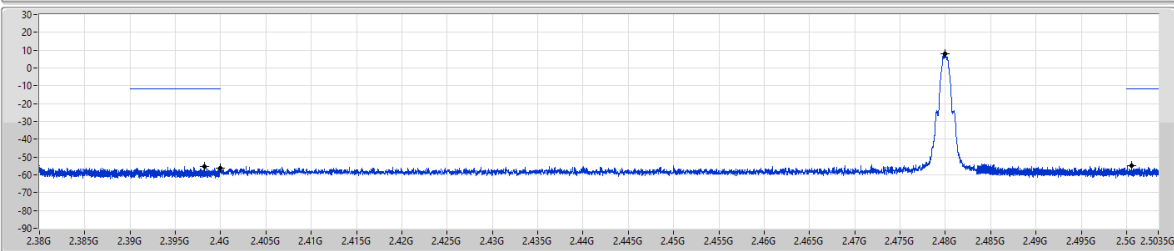
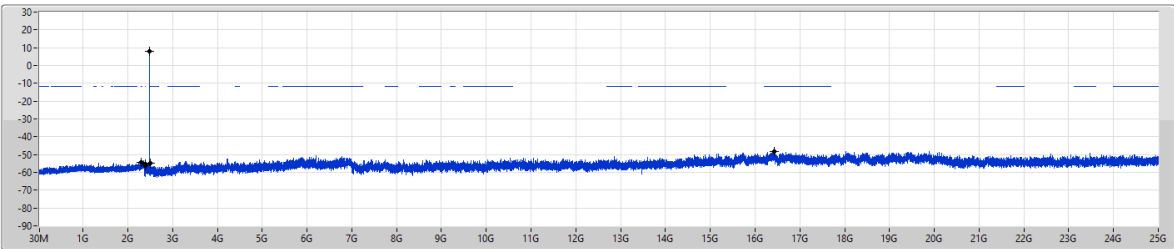
2.4-2.4835GHz_BT-LE(1Mbps)

CSEndB-DTS

2480MHz

RBW (Hz)
100k
VBW (Hz)
300k
Detector
Peak

Port 1



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.47999G	8.12	-11.88	2.30274G	-54.53	2.39817G	-55.17	2.4G	-56.28	2.50054G	-55.05	16.4218G	-48.48	1

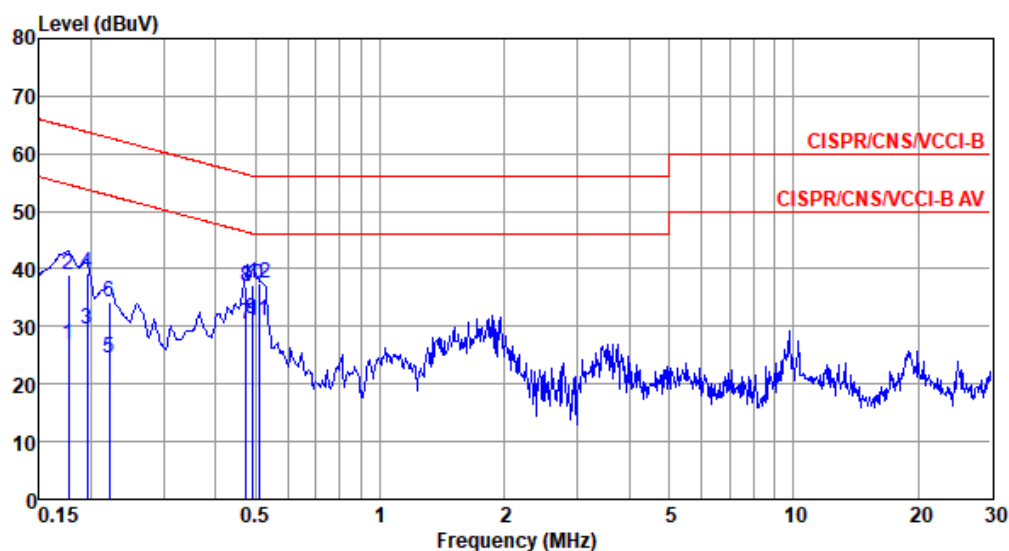


Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Power Phase	Line		

Test by : Joe Liao_AK

Temperature: 26°C

Humidity: 63%



	Freq MHz	Level dBUV	Limit Line dBUV	Over Limit dB	Read Level dBUV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.177	27.01	54.64	-27.63	17.29	9.65	0.07	0.00	Average
2	0.177	38.86	64.64	-25.78	29.14	9.65	0.07	0.00	QP
3	0.195	29.57	53.80	-24.23	19.86	9.65	0.06	0.00	Average
4	0.195	39.19	63.80	-24.61	29.48	9.65	0.06	0.00	QP
5	0.222	24.54	52.74	-28.20	14.83	9.65	0.06	0.00	Average
6	0.222	34.30	62.74	-28.44	24.59	9.65	0.06	0.00	QP
7	0.474	30.28	46.45	-16.17	20.56	9.64	0.08	0.00	Average
8	0.474	36.78	56.45	-19.67	27.06	9.64	0.08	0.00	QP
9*	0.491	31.29	46.14	-14.85	21.57	9.64	0.08	0.00	Average
10	0.491	37.23	56.14	-18.91	27.51	9.64	0.08	0.00	QP
11	0.510	30.93	46.00	-15.07	21.21	9.64	0.08	0.00	Average
12	0.510	37.56	56.00	-18.44	27.84	9.64	0.08	0.00	QP

Note 1: Level (dBUV) = Read Level (dBUV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).

2: Over Limit (dB) = Level (dBUV) - Limit Line (dBUV).

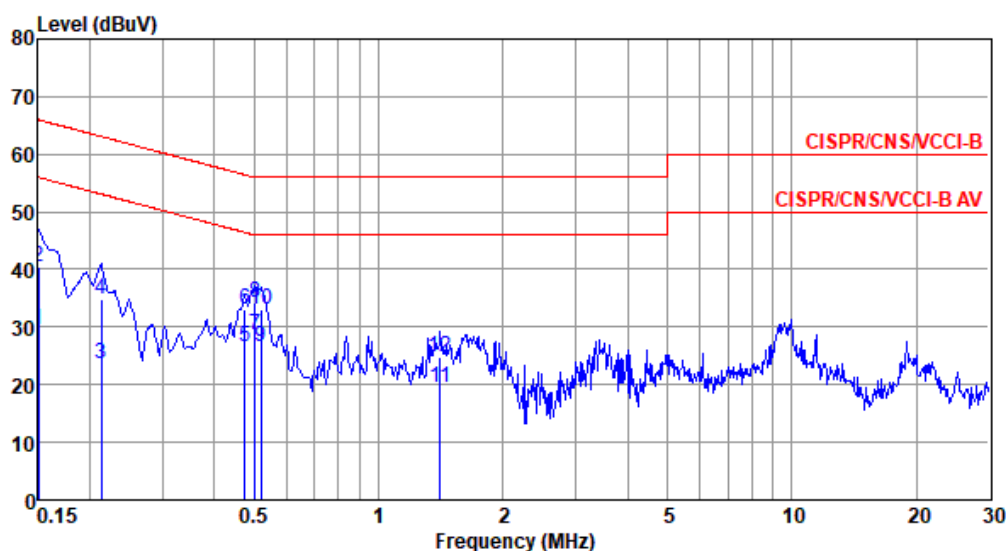


Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Power Phase	Neutral		

Test by : Joe Liao_AK

Temperature: 26°C

Humidity: 63%



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.150	29.63	56.00	-26.37	19.89	9.66	0.08	0.00	Average
2	0.150	40.41	66.00	-25.59	30.67	9.66	0.08	0.00	QP
3	0.213	23.74	53.10	-29.36	14.03	9.65	0.06	0.00	Average
4	0.213	34.93	63.10	-28.17	25.22	9.65	0.06	0.00	QP
5	0.474	26.60	46.45	-19.85	16.88	9.64	0.08	0.00	Average
6	0.474	32.92	56.45	-23.53	23.20	9.64	0.08	0.00	QP
7*	0.502	28.70	46.00	-17.30	18.98	9.64	0.08	0.00	Average
8	0.502	34.37	56.00	-21.63	24.65	9.64	0.08	0.00	QP
9	0.518	26.61	46.00	-19.39	16.89	9.64	0.08	0.00	Average
10	0.518	33.07	56.00	-22.93	23.35	9.64	0.08	0.00	QP
11	1.411	19.57	46.00	-26.43	9.82	9.65	0.10	0.00	Average
12	1.411	24.66	56.00	-31.34	14.91	9.65	0.10	0.00	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).

2: Over Limit (dB) = Level (dBuV) - Limit Line (dBuV).