



# CFR 47 FCC PART 15 SUBPART C TEST REPORT

For

**Smart Ceiling insert Fan** 

MODEL NUMBER: BF1112, BF1112\*\*\*\*

REPORT NUMBER: 4791253455-1-RF-1

ISSUE DATE: April 19, 2024

**FCC ID: 2AB2Q-BF1112** 

Prepared for

LEEDARSON LIGHTING CO., LTD
Xingda Road, Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China

Prepared by

UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch

Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, 523808, People's Republic of China

> Tel: +86 769 22038881 Fax: +86 769 33244054 Website: www.ul.com



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# **Revision History**

Rev.	Issue Date	Revisions	Revised By
V0	April 19, 2024	Initial Issue	



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# **Summary of Test Results**

Test Item	Clause	Limit/Requirement	Result
Antenna Requirement	N/A	FCC Part 15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	ANSI C63.10-2013, Clause 6.2	FCC Part 15.207	Pass
Conducted Output Power	ANSI C63.10-2013, Clause 11.9.1.3	FCC Part 15.247 (b)(3)	Pass
6dB Bandwidth and 99% Occupied Bandwidth	ANSI C63.10-2013, Clause 11.8.1	FCC Part 15.247 (a)(2)	Pass
Power Spectral Density	ANSI C63.10-2013, Clause 11.10.2	FCC Part 15.247 (e)	Pass
Conducted Band edge and spurious emission	ANSI C63.10-2013, Clause 11.11	FCC Part 15.247(d)	Pass
Radiated Band edge and Spurious Emission	ANSI C63.10-2013, Clause 11.12 & Clause 11.13	FCC Part 15.247 (d) FCC Part 15.205/15.209	Pass
Duty Cycle	ANSI C63.10-2013, Clause 11.6	None; for reporting purposes only.	Pass

<sup>\*</sup>This test report is only published to and used by the applicant, and it is not for evidence purpose in China.

<sup>\*</sup>The measurement result for the sample received is <Pass> according to <CFR 47 FCC PART 15 SUBPART C> when <Simple Acceptance> decision rule is applied.



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# 1. ATTESTATION OF TEST RESULTS

**Applicant Information** 

Company Name: LEEDARSON LIGHTING CO., LTD

Address: Xingda Road, Xingtai Industrial Zone, Changtai County,

Zhangzhou, Fujian, China

**Manufacturer Information** 

Company Name: LEEDARSON LIGHTING CO., LTD

Address: Xingda Road, Xingtai Industrial Zone, Changtai County,

Zhangzhou, Fujian, China

**EUT Information** 

**Operations Manager** 

EUT Name: Smart Ceiling insert Fan

Model: BF1112 Series Model: BF1112\*\*\*\*

Model Difference: "\*" in the model represents any letter or number,

representing different colors, surface treatment processes,

sales channels

Brand: COMMERCIAL ELECTRIC

Sample Received Date: March 28, 2024

Sample Status: Normal Sample ID: 7065254

Date of Tested: March 28, 2024 to April 19, 2024

APPLICABLE STANDARDS				
STANDARD TEST RESULTS				
CFR 47 FCC PART 15 SUBPART C	Pass			

Prepared By:	Checked By:
Tamny . Huang	Danny Grany
Fanny Huang	Denny Huang
Engineer Project Associate	Senior Project Engineer
Approved By:	
Stephen Emo	
Stephen Guo	



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# 2. TEST METHODOLOGY

All tests were performed in accordance with the standard CFR 47 FCC PART 15 SUBPART C , KDB 558074 D01 15.247 Meas Guidance v05r02, 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, ANSI C63.10-2013..

# 3. FACILITIES AND ACCREDITATION

	A2LA (Certificate No.: 4102.01)			
	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.			
	has been assessed and proved to be in compliance with A2LA.			
	FCC (FCC Designation No.: CN1187)			
	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.			
	Has been recognized to perform compliance testing on equipment subject			
	to the Commission's Declaration of Conformity (DoC) and Certification			
	rules			
	ISED (Company No.: 21320)			
Accreditation	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.			
Certificate has been registered and fully described in a report filed with ISED				
The Company Number is 21320 and the test lab Conformity Assessm				
	Body Identifier (CABID) is CN0046.			
	VCCI (Registration No.: G-20192, C-20153, T-20155 and R-20202)			
	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.			
	has been assessed and proved to be in compliance with VCCI, the			
	Membership No. is 3793.			
	Facility Name:			
	Chamber D, the VCCI registration No. is G-20192 and R-20202			
	Shielding Room B, the VCCI registration No. is C-20153 and T-20155			

# Note 1:

All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, 523808, People's Republic of China.

#### Note 2:

The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

#### Note 3:

For below 30 MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30 MHz had been correlated to measurements performed on an OFS.



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# 4. CALIBRATION AND UNCERTAINTY

# 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

# 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Conduction emission	3.62 dB
Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz)	2.2 dB
Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz)	4.00 dB
Radiated Emission	5.78 dB (1 GHz ~ 18 GHz)
(Included Fundamental Emission) (1 GHz to 26 GHz)	5.23 dB (18 GHz ~ 26 GHz)
Duty Cycle	±0.028%
DTS and 99% Occupied Bandwidth	±0.0196%
Maximum Conducted Output Power	±0.686 dB
Maximum Power Spectral Density Level	±0.743 dB
Conducted Band-edge Compliance	±1.328 dB
Conducted Unwanted Emissions In Non-restricted	±0.746 dB (9 kHz ~ 1 GHz)
Frequency Bands	±1.328dB (1 GHz ~ 26 GHz)

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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# 5. EQUIPMENT UNDER TEST

# 5.1. DESCRIPTION OF EUT

EUT Name Smart Ceiling insert Fan	
Model	BF1112
Series Model	BF1112****
Model Difference	"*" in the model represents any letter or number, representing different colors, surface treatment processes, sales channels.

Frequency Range:	2402 MHz to 2480 MHz
Type of Modulation:	GFSK
Data Rates:	1Mbps/2Mbps
Normal Test Voltage:	AC 120 V, 60 Hz

# 5.2. CHANNEL LIST

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

# 5.3. MAXIMUM POWER

Test Mode	Frequency (MHz)	Channel Number	Maximum Peak Output Power (dBm)	Maximum EIRP (dBm)
LE 1M	2402 ~ 2480	0-39[40]	7.32	10.75
LE 2M	2402 ~ 2480	0-39[40]	7.31	10.74



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# 5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency		
LE 1M	CH 0(Low Channel), CH 20(MID Channel), CH 39(High Channel)	2402 MHz, 2442 MHz, 2480 MHz		
LE 2M	CH 0(Low Channel), CH 20(MID Channel), CH 39(High Channel)	2402 MHz, 2442 MHz, 2480 MHz		

# 5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band						
Test Softwar	e Version	sscom5.13.1				
Modulation Transmit		Test Software setting value				
Туре	Antenna Number	CH 0	CH 20	CH 39		
GFSK(1Mbps)	1	default	default	default		
GFSK(2Mbps)	1	default	default	default		

# 5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	2402-2480	Internal antenna	3.43

Test Mode	Transmit and Receive Mode	Description			
LE 1M	⊠1TX, 1RX	Antenna 1 can be used as transmitting/receivin antenna.			
LE 2M	LE 2M  \( \times 1TX, 1RX \) Antenna 1 can be used as transmitting/receiving antenna.				
Note: 1.BT&BLE&WIFI 2.4G can transmit simultaneously. (declared by client)					

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# 5.7. SUPPORT UNITS FOR SYSTEM TEST

# **SUPPORT EQUIPMENT**

Item	Equipment	Brand Name	Model Name	Remark
1	PC	Lenovo	E42-80	/
2	UART	/	/	/

#### **I/O CABLES**

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	/	/	1.0	/

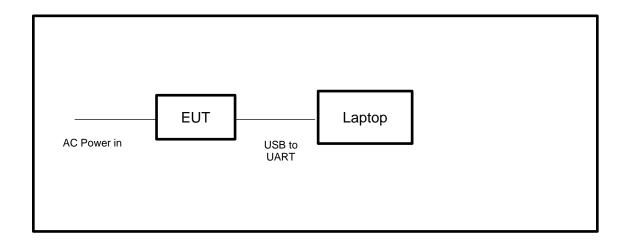
#### **ACCESSORIES**

Item	Accessory	Brand Name	Model Name	Description
1	/	/	/	/

# **TEST SETUP**

The EUT can work in engineering mode with a software through a Laptop.

# **SETUP DIAGRAM FOR TESTS**





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# 6. MEASURING EQUIPMENT AND SOFTWARE USED

R&S TS 8997 Test System									
Equipment		Manu	factur	er Model	No.	Serial No.	Last (	Cal.	Due. Date
Power sensor, Power M	leter	R	R&S	OSP1	20	100921	Mar.25,	2024	Mar.24,2025
Vector Signal General	tor	R	R&S	SMBV′	100A	261637	Oct.12,	2023	Oct.11, 2024
Signal Generator		R	R&S	SMB1	00A	178553	Oct.12,	2023	Oct.11, 2024
Signal Analyzer		R	R&S	FSV	40	101118	Oct.12,	2023	Oct.11, 2024
				Softwa	are				
Description			Mar	ufacturer		Nam	е		Version
For R&S TS 8997 Test	Syste	em	Rohde	& Schwa	rz	EMC	32		10.60.10
			Tons	end RF To	est S	ystem			
Equipment	Man	ufactu	rer M	odel No.	S	Serial No.	Last (	Cal.	Due. Date
Wideband Radio Communication Tester		R&S	C	MW500		155523	Oct.12,	2023	Oct.11, 2024
Wireless Connectivity Tester		R&S	C	MW270	120	1.0002N75- 102	Sep.25,	2023	Sep.24, 2024
PXA Signal Analyzer	Ke	eysight	t I	N9030A	MY	′55410512	Oct.12,	2023	Oct.11, 2024
MXG Vector Signal Generator	Ke	eysight	t	N5182B	MY	′56200284	Oct.12,	2023	Oct.11, 2024
MXG Vector Signal Generator	Ke	eysight	t	N5172B	MY	′56200301	Oct.12,	2023	Oct.11, 2024
DC power supply	Ke	eysight	t	E3642A	MY	′55159130	Oct.12,	2023	Oct.11, 2024
Temperature & Humidity Chamber	SAI	OOM	D SC	-80-CC-2		2088	Oct.12,	2023	Oct.11, 2024
Attenuator	А	Aglient 84		8495B	28	14a12853	Oct.12,	2023	Oct.11, 2024
RF Control Unit	То	nscend JS0806-		S0806-2	23E	380620666	Mar.25,	2024	Mar.24,2025
Software									
Description		Manuf	facture	r	Name				Version
Tonsend SRD Test System Tonse			send	JS1	120-	3 RF Test S	ystem		V3.2.22



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	Conducted Emissions						
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date		
EMI Test Receiver	R&S	ESR3	101961	Oct.13, 2023	Oct.12, 2024		
Two-Line V- Network	R&S	ENV216	101983	Oct.13, 2023	Oct.12, 2024		
Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Oct.13, 2023	Oct.12, 2024		
Software							
Description			Manufacturer	Name	Version		
Test Software	for Conducted	Emissions	Farad	EZ-EMC	Ver. UL-3A1		

	Radiated Emissions						
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date		
MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Oct.12, 2023	Oct.11, 2024		
Hybrid Log Periodic Antenna	TDK	HLP-3003C	130959	Aug.02, 2021	Aug.01, 2024		
Preamplifier	HP	8447D	2944A09099	Oct.12, 2023	Oct.11, 2024		
EMI Measurement Receiver	R&S	ESR26	101377	Oct.12, 2023	Oct.11, 2024		
Horn Antenna	TDK	HRN-0118	130940	July 20, 2021	July 19, 2024		
Preamplifier	TDK	PA-02-0118	TRS-305- 00067	Oct.12, 2023	Oct.11, 2024		
Horn Antenna	Schwarzbeck	BBHA9170	697	July 20, 2021	July 19, 2024		
Preamplifier	TDK	PA-02-2	TRS-307- 00003	Oct.12, 2023	Oct.11, 2024		
Preamplifier	TDK	PA-02-3	TRS-308- 00002	Oct.12, 2023	Oct.11, 2024		
Loop antenna	Schwarzbeck	1519B	00008	Dec.14, 2021	Dec.13, 2024		
Preamplifier	TDK	PA-02-001- 3000	TRS-302- 00050	Oct.12, 2023	Oct.11, 2024		
High Pass Filter	Wi	WHKX10- 2700-3000- 18000-40SS	23	Oct.12, 2023	Oct.11, 2024		
Band Reject Filter	Wainwright	WRCJV8- 2350-2400- 2483.5- 2533.5-40SS	4	Oct.12, 2023	Oct.11, 2024		
Software							
[	Description		Manufacturer	Name	Version		
Test Software	for Radiated E	missions	Farad	EZ-EMC	Ver. UL-3A1		



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Other Instrument						
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date	
Temperature humidity probe	OMEGA	ITHX-SD-5	18470007	Oct.21, 2023	Oct.20, 2024	
Barometer	Yiyi	Baro	N/A	Oct.19, 2023	Oct.18, 2024	
Attenuator	Agilent	8495B	2814a12853	Oct.12, 2023	Oct.11, 2024	



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# 7. ANTENNA PORT TEST RESULTS

# 7.1. CONDUCTED OUTPUT POWER

#### **LIMITS**

CFR 47 FCC Part15 (15.247) Subpart C					
Section	Frequency Range (MHz)				
CFR 47 FCC 15.247(b)(3)	Peak Conduct Output Power	1 watt or 30 dBm	2400-2483.5		

## **TEST PROCEDURE**

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).

Measure peak emission level, the indicated level is the peak output power, after any corrections for external attenuators and cables.

#### **TEST SETUP**



#### **TEST ENVIRONMENT**

Temperature	23.2℃	Relative Humidity	54%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V 60Hz

#### **TEST DATE / ENGINEER**

Test Date	April 10, 2024	Test By	Walker Yuan
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### **TEST RESULTS**

Please refer to section "Test Data" - Appendix C

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# 7.2. 6DB BANDWIDTH AND 99% OCCUPIED BANDWIDTH

# **LIMITS**

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(a)(2)	6 dB Bandwidth	≥ 500 kHz	2400-2483.5
ISED RSS-Gen Clause 6.7	99 % Occupied Bandwidth	For reporting purposes only.	2400-2483.5

## **TEST PROCEDURE**

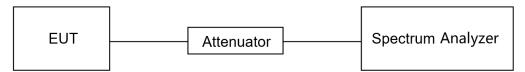
Refer to ANSI C63.10-2013 clause 11.8 for DTS bandwidth and clause 6.9 for Occupied Bandwidth.

Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Frequency Span	For 6 dB Bandwidth: Enough to capture all products of the modulation carrier emission For 99 % Occupied Bandwidth: Between 1.5 times and 5.0 times the OBW
Detector	Peak
IRRW/	For 6 dB Bandwidth: 100 kHz For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth
1\/R\/\/	For 6 dB Bandwidth: ≥3 x RBW For 99 % Occupied Bandwidth: ≥3 x RBW
Trace	Max hold
Sweep	Auto couple

- a) Use the 99 % power bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.
- b) Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

# **TEST SETUP**





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# **TEST ENVIRONMENT**

Temperature	23.2℃	Relative Humidity	54%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V 60Hz

# **TEST DATE / ENGINEER**

Test Date	April 10, 2024	Test By	Walker Yuan
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# **TEST RESULTS**

Please refer to section "Test Data" - Appendix A&B



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# 7.3. POWER SPECTRAL DENSITY

#### **LIMITS**

	CFR 47 FCC Part15 (15.2	247) Subpart C	
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC §15.247 (e)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

# **TEST PROCEDURE**

Refer to ANSI C63.10-2013 clause 11.10.2.

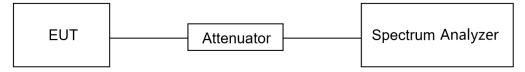
Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	3 kHz ≤ RBW ≤ 100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### **TEST SETUP**





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# **TEST ENVIRONMENT**

Temperature	<b>23.2</b> ℃	Relative Humidity	54%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V 60Hz

# **TEST DATE / ENGINEER**

Test Date	April 10, 2024	Test By	Walker Yuan
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# **TEST RESULTS**

Please refer to section "Test Data" - Appendix D



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# 7.4. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

#### **LIMITS**

CFR 47 FCC Part15 (15.247) Subpart C		
Section Test Item Limit		
CFR 47 FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

#### **TEST PROCEDURE**

Refer to ANSI C63.10-2013 clause 11.11 and 11.13.

Connect the EUT to the spectrum analyzer and use the following settings for reference level measurement:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD

Change the settings for emission level measurement:

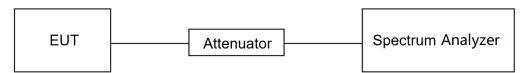
Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
measurement points	≥span/RBW
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11.



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# **TEST SETUP**



# **TEST ENVIRONMENT**

Temperature	23.2℃	Relative Humidity	54%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V 60Hz

# **TEST DATE / ENGINEER**

		•	
	4 11 40 0004		347 11 37
Test Date	April 10, 2024	Test Bv	Walker Yuan
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# **TEST RESULTS**

Please refer to section "Test Data" - Appendix E&F



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# 7.5. DUTY CYCLE

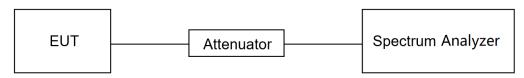
# **LIMITS**

None; for reporting purposes only.

# **TEST PROCEDURE**

Refer to ANSI C63.10-2013 clause 11.6 Zero – Span Spectrum Analyzer method.

# **TEST SETUP**



# **TEST ENVIRONMENT**

Temperature	23.2℃	Relative Humidity	54%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V 60Hz

# **TEST DATE / ENGINEER**

Test Date	April 10, 2024	Test Bv	Walker Yuan
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# **TEST RESULTS**

Please refer to section "Test Data" - Appendix G



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# 8. RADIATED TEST RESULTS

# **LIMITS**

Please refer to CFR 47 FCC §15.205 and §15.209.

Radiation Disturbance Test Limit for FCC (Class B) (9 kHz ~ 1 GHz)

Emissions radiated outside of the specified frequency bands above 30 MHz				
Frequency Range Field Strength Limit		Field Streng		
(MHz)	(MHz) (uV/m) at 3 m		at 3 m	
			eak	
30 - 88	100	40		
88 - 216	150	43.5		
216 - 960	200	46		
Above 960	500	54		
Above 1000	500	Peak	Average	
		74	54	

FCC Emissions radiated outside of the specified frequency bands below 30 MHz			
Frequency (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	



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FCC Restricted bands of operation refer to FCC §15.205 (a):

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
<sup>1</sup> 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	( <sup>2</sup> )
13.36-13.41			

Note: <sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

#### **TEST PROCEDURE**

Below 30 MHz

The setting of the spectrum analyzer

RBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
Sweep	Auto

- 1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.
- 2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.
- 3. The EUT was placed on a turntable with 80 cm above ground.
- 4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m height antenna tower.
- 5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.
- 6. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak and average detector mode remeasured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak and average detector and reported.
- 7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.

<sup>&</sup>lt;sup>2</sup>Above 38.6c



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8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of  $377\Omega$ . For example, the measurement frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to Y-51.5 = Z dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.



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#### Below 1 GHz and above 30 MHz

The setting of the spectrum analyzer

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

- 1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.
- 2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 3. The EUT was placed on a turntable with 80 cm above ground.
- 4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- 5. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.



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#### Above 1 GHz

The setting of the spectrum analyzer

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

- 1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.6.
- 2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 3. The EUT was placed on a turntable with 1.5 m above ground.
- 4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- 5. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
- 6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.5. ON TIME AND DUTY CYCLE.

Note 1: The manufacturer has recommended that the EUT only be used in the desktop (horizontal) orientation; therefore, all radiated testing was performed in desktop orientation.



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# For Restricted Bandedge:

#### Note:

- 1. Measurement = Reading Level + Correct Factor.
- 2. If the peak values are less than the average limit of 54 dBuV/m, the average result is deemed to comply with average limit.
- 3. PK=Peak: Peak detector.
- 4. AV=Average: VBW=1/Ton, where: Ton is the transmitting duration.
- 5. For the transmitting duration, please refer to clause 7.5.
- 6. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.
- 7. Both horizontal and vertical have been tested, only the worst data was recorded in the report.
- 8. All modes have been tested, but only the worst data was recorded in the report.

# For Radiate Spurious emission (9 kHz ~ 30 MHz):

#### Note:

- 1. Measurement = Reading Level + Correct Factor.
- 2. If the peak values are less than the QP limit, the QP result is deemed to comply with QP limit.
- 3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.
- 4. All modes have been tested, but only the worst data was recorded in the report.
- 5.  $dBuA/m = dBuV/m 20Log10[120\pi] = dBuV/m 51.5$

# For Radiate Spurious Emission (30 MHz ~ 1 GHz):

#### Note:

- 1. Result Level = Read Level + Correct Factor.
- 2. If the peak values are less than the QP limit, the QP result is deemed to comply with QP limit.
- 3. All modes have been tested, but only the worst data was recorded in the report.

# For Radiate Spurious Emission (1 GHz ~ 3 GHz):

#### Note:

- 1. Measurement = Reading Level + Correct Factor.
- 2. If the peak values are less than the average limit of 54 dBuV/m, the average result is deemed to comply with average limit.
- 3. Peak: Peak detector.
- 4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
- 5. For the transmitting duration, please refer to clause 7.5.
- 6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
- 7. Proper operation of the transmitter prior to adding the filter to the measurement chain.
- 8. All modes have been tested, but only the worst data was recorded in the report.

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For Radiate Spurious Emission (3 GHz ~ 18 GHz):

#### Note:

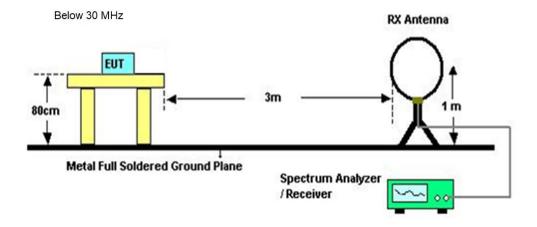
- 1. Peak Result = Reading Level + Correct Factor.
- 2. If the peak values are less than the average limit of 54 dBuV/m, the average result is deemed to comply with average limit.
- 3. Peak: Peak detector.
- 4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
- 5. For the transmitting duration, please refer to clause 7.5.
- 6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
- 7. Proper operation of the transmitter prior to adding the filter to the measurement chain.
- 8. All modes have been tested, but only the worst data was recorded in the report.

For Radiate Spurious emission (18 GHz ~ 26 GHz):

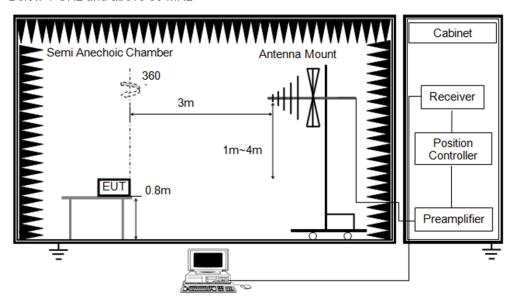
#### Note:

- 1. Measurement = Reading Level + Correct Factor.
- 2. If the peak values are less than the average limit of 54 dBuV/m, the average result is deemed to comply with average limit.
- 3. Peak: Peak detector.
- 4. All modes have been tested, but only the worst data was recorded in the report.

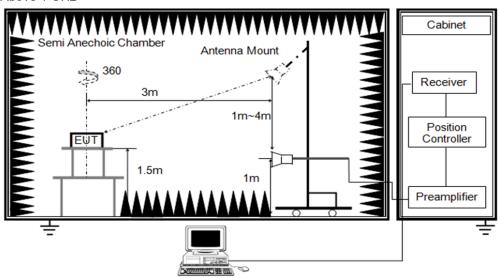
#### **TEST SETUP**



Below 1 GHz and above 30 MHz



Above 1 GHz



# **TEST ENVIRONMENT**

Temperature	23.5℃	Relative Humidity	55%
Atmosphere Pressure	101kPa	Test Voltage	

# **TEST DATE / ENGINEER**

Test Date	April 17, 2024	lTest Bv	Mason Wang
. ooi Baio	, .p ,		massii mang

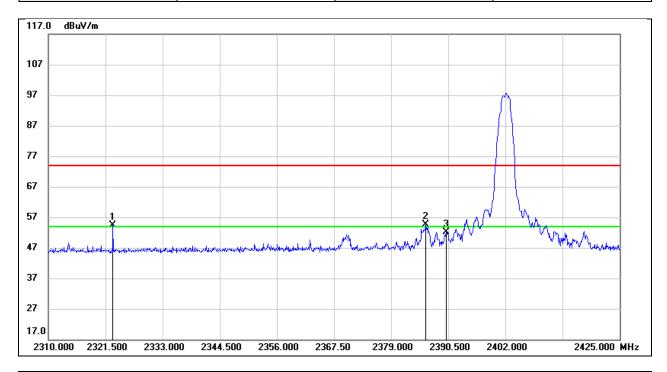
# **TEST RESULTS**



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# 8.1. RESTRICTED BANDEDGE

Test Mode:	BLE 1M PK	Frequency(MHz):	2402
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz

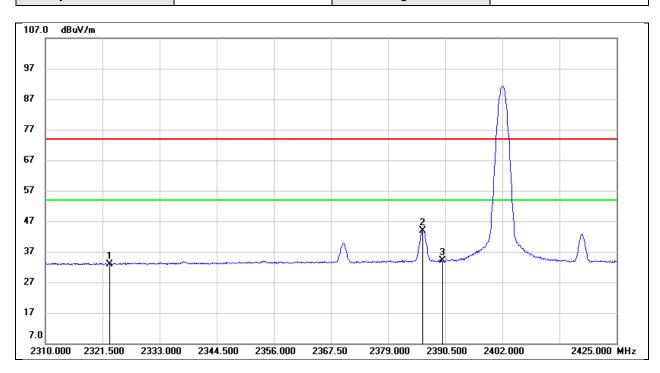


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2322.995	21.72	32.56	54.28	74.00	-19.72	peak
2	2386.015	21.66	32.90	54.56	74.00	-19.44	peak
3	2390.000	19.26	32.92	52.18	74.00	-21.82	peak



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Test Mode:	BLE 1M AV	Frequency(MHz):	2402
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz

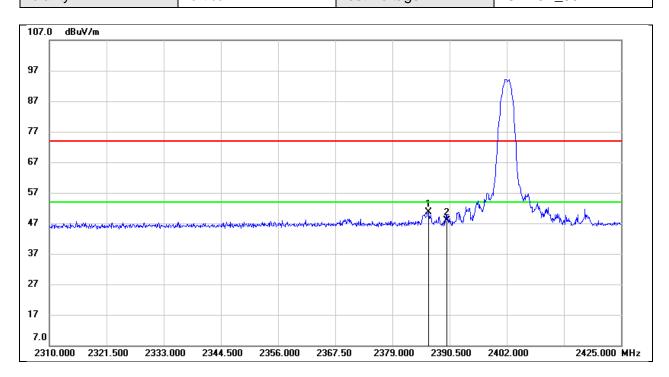


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2322.995	0.32	32.56	32.88	54.00	-21.12	AVG
2	2386.015	11.05	32.90	43.95	54.00	-10.05	AVG
3	2390.000	1.25	32.92	34.17	54.00	-19.83	AVG



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Test Mode: BLE 1M PK Frequency(MHz): 2402
Polarity: Vertical Test Voltage: AC 120V\_60Hz

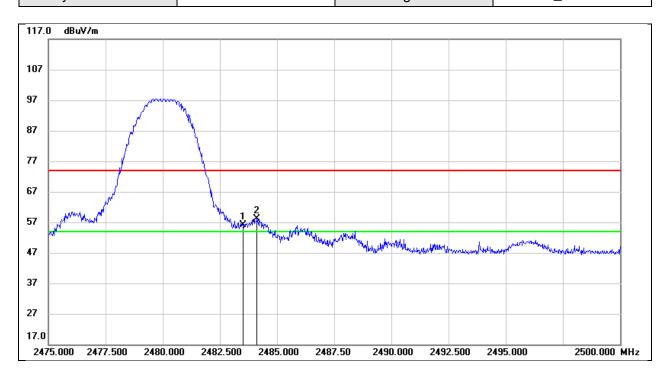


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2386.245	17.80	32.90	50.70	74.00	-23.30	peak
2	2390.000	15.08	32.92	48.00	74.00	-26.00	peak



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Test Mode: BLE 1M PK Frequency(MHz): 2480
Polarity: Horizontal Test Voltage: AC 120V\_60Hz

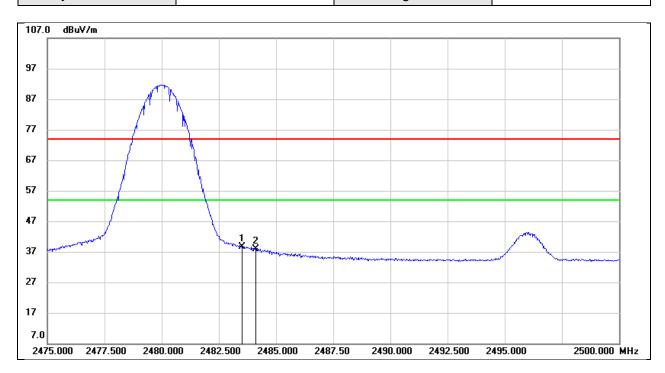


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	23.13	32.94	56.07	74.00	-17.93	peak
2	2484.125	25.25	32.94	58.19	74.00	-15.81	peak



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Test Mode:	BLE 1M AV	Frequency(MHz):	2480
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz

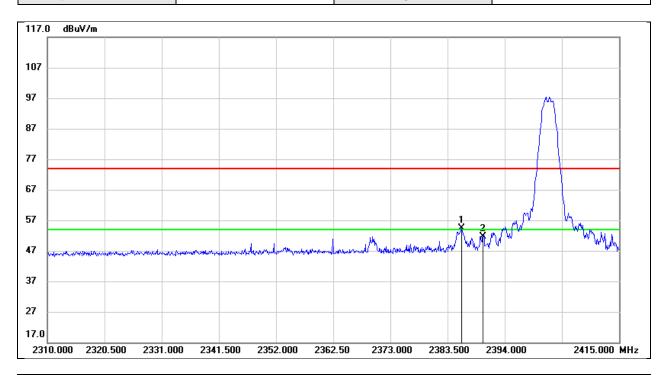


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	5.62	32.94	38.56	54.00	-15.44	AVG
2	2484.125	4.93	32.94	37.87	54.00	-16.13	AVG



REPORT NO.: 4791253455-1-RF-1 Page 36 of 90

Test Mode: BLE 2M PK Frequency(MHz): 2402
Polarity: Horizontal Test Voltage: AC 120V\_60Hz

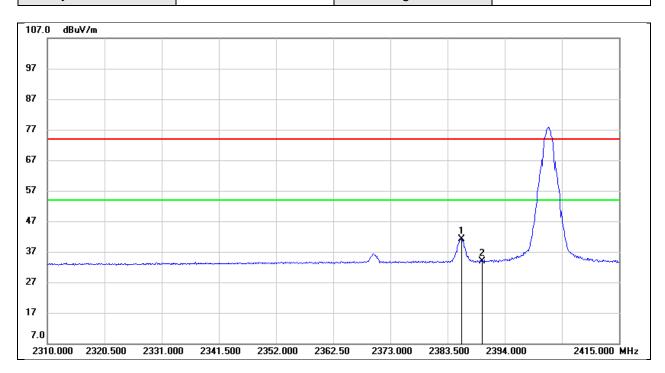


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2386.020	21.43	32.90	54.33	74.00	-19.67	peak
2	2390.000	18.76	32.92	51.68	74.00	-22.32	peak



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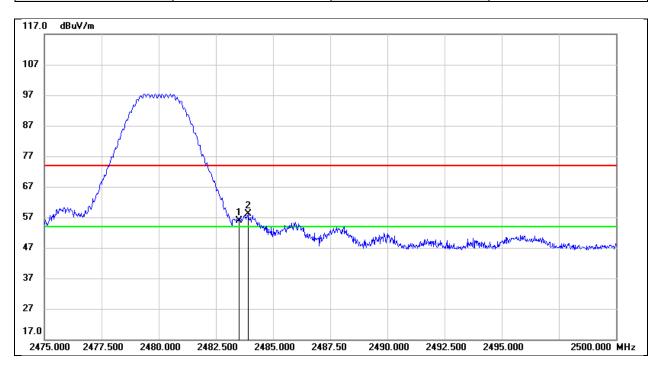
Test Mode:	BLE 2M AV	Frequency(MHz):	2402
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2386.020	8.21	32.90	41.11	54.00	-12.89	AVG
2	2390.000	0.92	32.92	33.84	54.00	-20.16	AVG



Test Mode:	BLE 2M PK	Frequency(MHz):	2480
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz

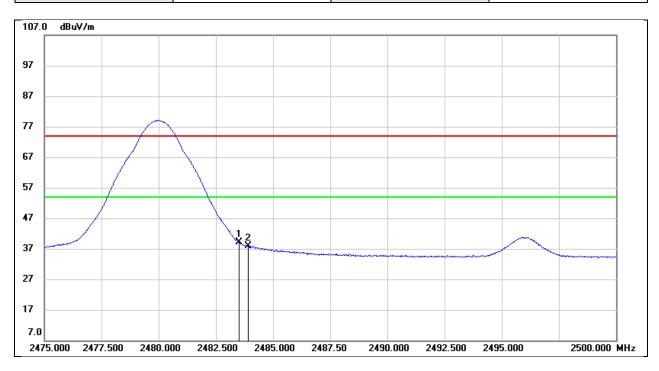


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	23.02	32.94	55.96	74.00	-18.04	peak
2	2483.900	25.09	32.94	58.03	74.00	-15.97	peak



Frequency(MHz): Test Mode: BLE 2M AV 2480 AC 120V\_60Hz Polarity: Test Voltage: Horizontal

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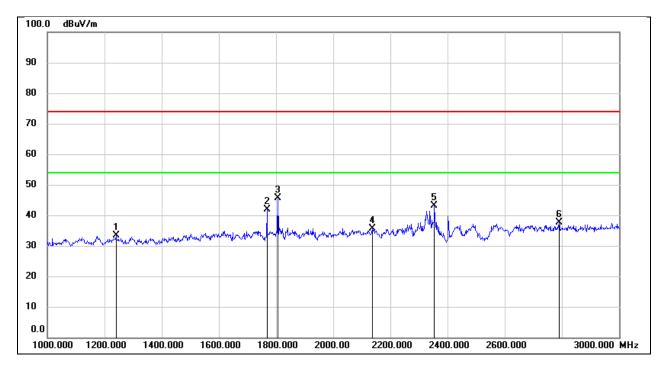
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	6.10	32.94	39.04	54.00	-14.96	AVG
2	2483.900	4.84	32.94	37.78	54.00	-16.22	AVG



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# 8.2. SPURIOUS EMISSIONS(1 GHZ~3 GHZ)

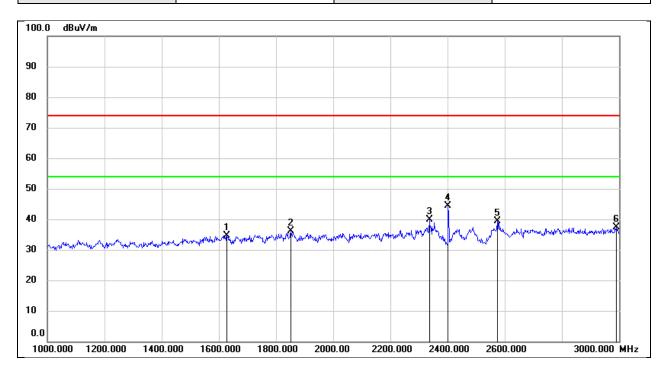
Test Mode:	BLE 1M	Frequency(MHz):	2402
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1240.000	45.85	-12.59	33.26	74.00	-40.74	peak
2	1768.000	52.24	-10.39	41.85	74.00	-32.15	peak
3	1806.000	55.86	-10.24	45.62	74.00	-28.38	peak
4	2136.000	44.92	-9.27	35.65	74.00	-38.35	peak
5	2354.000	50.77	-7.74	43.03	74.00	-30.97	peak
6	2790.000	44.43	-6.85	37.58	74.00	-36.42	peak



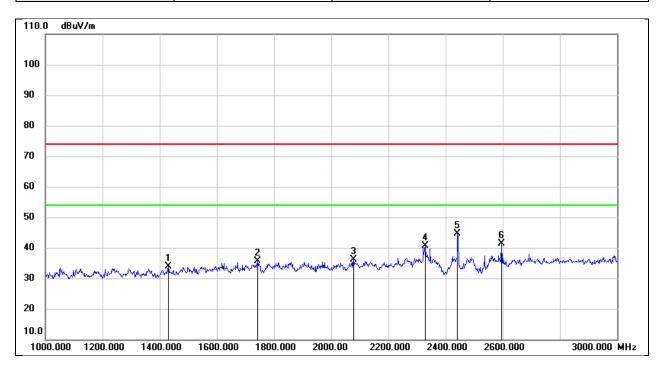
Test Mode:	BLE 1M	Frequency(MHz):	2402
Polarity:	Vertical	Test Voltage:	AC 120V_60Hz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1628.000	45.60	-11.04	34.56	74.00	-39.44	peak
2	1852.000	46.24	-10.21	36.03	74.00	-37.97	peak
3	2336.000	47.83	-7.87	39.96	74.00	-34.04	peak
4	2402.000	51.89	-7.40	44.49	/	/	fundamental
5	2574.000	46.93	-7.64	39.29	74.00	-34.71	peak
6	2990.000	43.21	-5.94	37.27	74.00	-36.73	peak



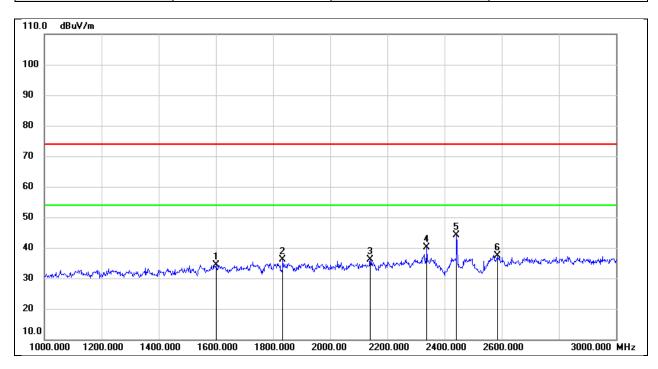
Test Mode:	BLE 1M	Frequency(MHz):	2442
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz



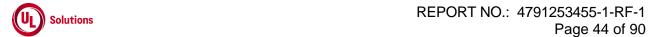
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1430.000	46.08	-12.21	33.87	74.00	-40.13	peak
2	1742.000	46.23	-10.51	35.72	74.00	-38.28	peak
3	2078.000	45.77	-9.64	36.13	74.00	-37.87	peak
4	2330.000	48.56	-7.92	40.64	74.00	-33.36	peak
5	2442.000	52.08	-7.44	44.64	/	/	fundamental
6	2596.000	49.01	-7.67	41.34	74.00	-32.66	peak



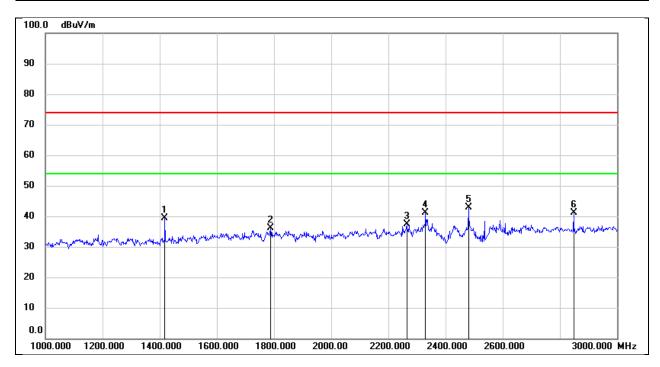
Test Mode:	BLE 1M	Frequency(MHz):	2442
Polarity:	Vertical	Test Voltage:	AC 120V_60Hz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1600.000	45.67	-11.17	34.50	74.00	-39.50	peak
2	1834.000	46.40	-10.22	36.18	74.00	-37.82	peak
3	2140.000	45.28	-9.25	36.03	74.00	-37.97	peak
4	2338.000	48.04	-7.85	40.19	74.00	-33.81	peak
5	2442.000	51.51	-7.44	44.07	/	1	fundamental
6	2584.000	45.11	-7.65	37.46	74.00	-36.54	peak



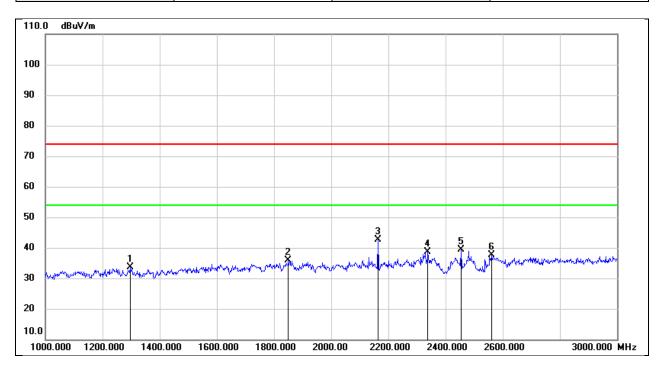
Test Mode:	BLE 1M	Frequency(MHz):	2480
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1418.000	51.61	-12.29	39.32	74.00	-34.68	peak
2	1788.000	46.45	-10.30	36.15	74.00	-37.85	peak
3	2264.000	45.78	-8.41	37.37	74.00	-36.63	peak
4	2330.000	48.93	-7.92	41.01	74.00	-32.99	peak
5	2480.000	50.25	-7.47	42.78	/	/	fundamental
6	2848.000	47.76	-6.58	41.18	74.00	-32.82	peak



Test Mode:	BLE 1M	Frequency(MHz):	2480
Polarity:	Vertical	Test Voltage:	AC 120V_60Hz



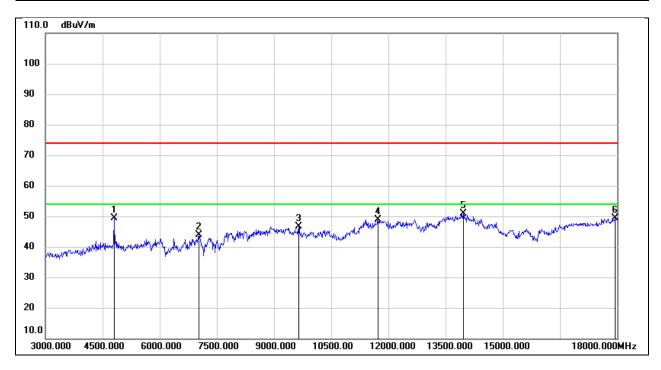
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1296.000	46.05	-12.53	33.52	74.00	-40.48	peak
2	1850.000	46.05	-10.21	35.84	74.00	-38.16	peak
3	2164.000	51.85	-9.10	42.75	74.00	-31.25	peak
4	2338.000	46.55	-7.85	38.70	74.00	-35.30	peak
5	2454.000	46.75	-7.45	39.30	74.00	-34.70	peak
6	2562.000	45.27	-7.62	37.65	74.00	-36.35	peak



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8.3. SPURIOUS EMISSIONS(3 GHZ~18 GHZ)

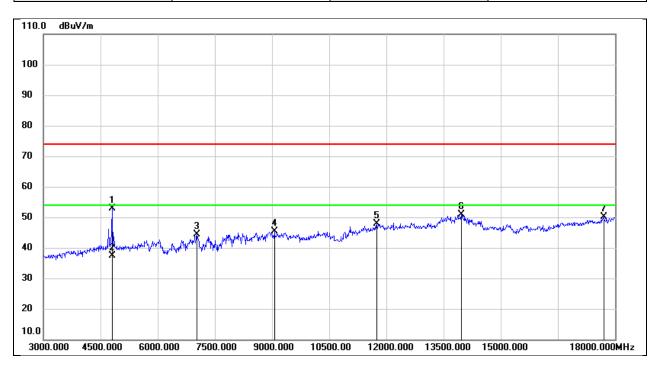
Test Mode:	BLE 1M	Frequency(MHz):	2402
Polarity:	Horizontal	Test Voltage:	AC 120V 60Hz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4800.000	48.86	0.46	49.32	74.00	-24.68	peak
2	7020.000	36.50	7.37	43.87	74.00	-30.13	peak
3	9645.000	35.43	11.17	46.60	74.00	-27.40	peak
4	11730.000	31.48	17.41	48.89	74.00	-25.11	peak
5	13965.000	28.17	22.74	50.91	74.00	-23.09	peak
6	17940.000	22.83	26.61	49.44	74.00	-24.56	peak



Test Mode:	BLE 1M	Frequency(MHz):	2402
Polarity:	Vertical	Test Voltage:	AC 120V_60Hz

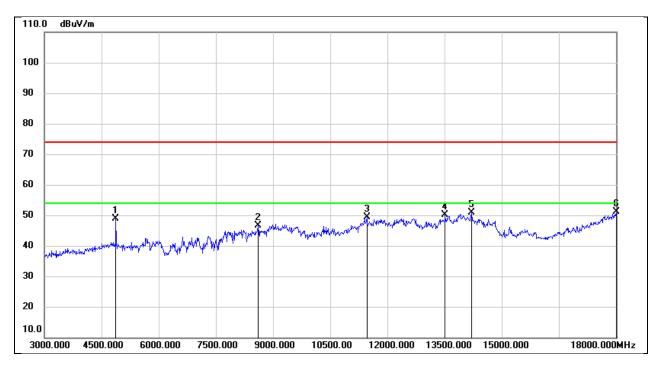


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4800.000	52.46	0.46	52.92	74.00	-21.08	peak
2	4800.000	36.94	0.46	37.40	54.00	-16.60	AVG
3	7020.000	37.03	7.37	44.40	74.00	-29.60	peak
4	9060.000	34.60	10.82	45.42	74.00	-28.58	peak
5	11745.000	30.45	17.47	47.92	74.00	-26.08	peak
6	13965.000	28.17	22.74	50.91	74.00	-23.09	peak
7	17700.000	24.89	25.17	50.06	74.00	-23.94	peak



Test Mode: BLE 1M Frequency(MHz): 2442

Polarity: Horizontal Test Voltage: AC 120V\_60Hz

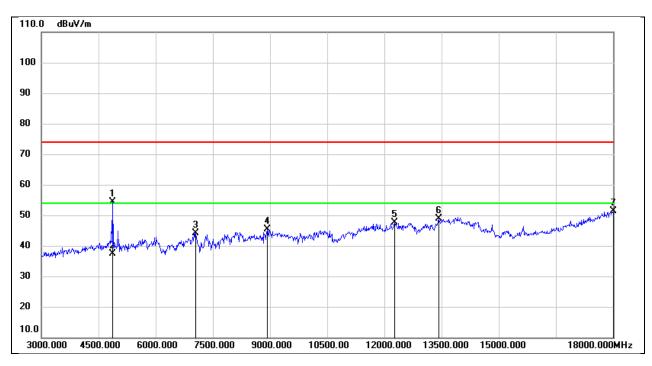


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4875.000	48.28	0.61	48.89	74.00	-25.11	peak
2	8610.000	37.88	8.71	46.59	74.00	-27.41	peak
3	11460.000	32.58	16.74	49.32	74.00	-24.68	peak
4	13515.000	28.43	21.69	50.12	74.00	-23.88	peak
5	14205.000	28.78	22.13	50.91	74.00	-23.09	peak
6	18000.000	24.25	26.83	51.08	74.00	-22.92	peak



Test Mode: BLE 1M Frequency(MHz): 2442

Polarity: Vertical Test Voltage: AC 120V\_60Hz

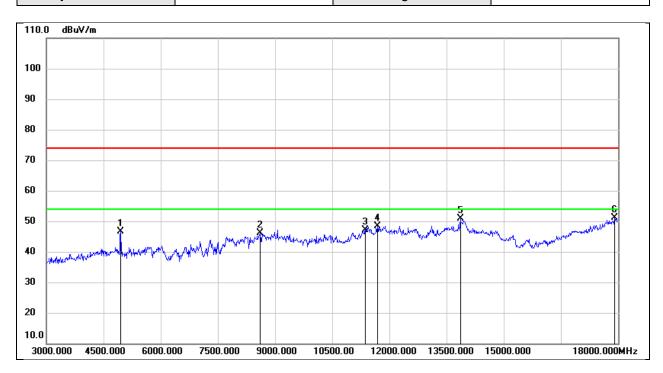


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4875.000	53.65	0.61	54.26	74.00	-19.74	peak
2	4875.000	36.69	0.61	37.30	54.00	-16.70	AVG
3	7050.000	36.91	7.19	44.10	74.00	-29.90	peak
4	8925.000	35.14	10.14	45.28	74.00	-28.72	peak
5	12270.000	29.13	18.55	47.68	74.00	-26.32	peak
6	13425.000	27.37	21.52	48.89	74.00	-25.11	peak
7	18000.000	24.51	26.83	51.34	74.00	-22.66	peak



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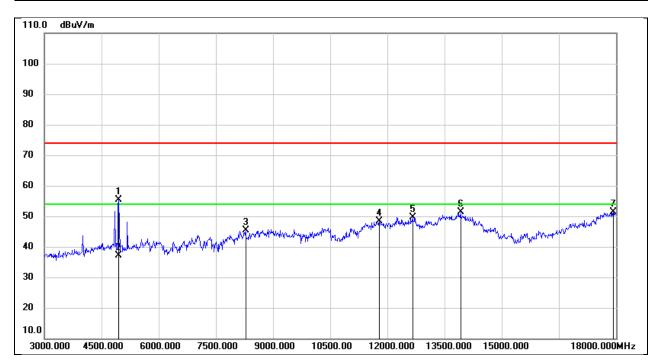
Test Mode:	BLE 1M	Frequency(MHz):	2480
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4950.000	45.98	0.74	46.72	74.00	-27.28	peak
2	8610.000	37.42	8.71	46.13	74.00	-27.87	peak
3	11370.000	30.89	16.36	47.25	74.00	-26.75	peak
4	11685.000	31.09	17.28	48.37	74.00	-25.63	peak
5	13860.000	28.21	22.68	50.89	74.00	-23.11	peak
6	17910.000	24.51	26.50	51.01	74.00	-22.99	peak



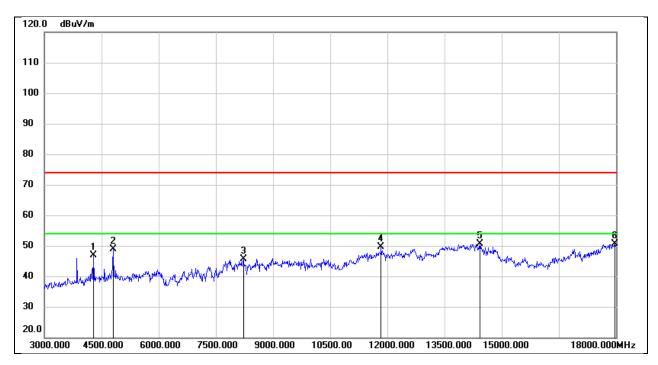
Test Mode:	BLE 1M	Frequency(MHz):	2480
Polarity:	Vertical	Test Voltage:	AC 120V_60Hz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4950.000	54.55	0.74	55.29	74.00	-18.71	peak
2	4950.000	36.36	0.74	37.10	54.00	-16.90	AVG
3	8280.000	36.80	8.46	45.26	74.00	-28.74	peak
4	11790.000	30.89	17.60	48.49	74.00	-25.51	peak
5	12660.000	31.13	18.49	49.62	74.00	-24.38	peak
6	13920.000	28.67	22.71	51.38	74.00	-22.62	peak
7	17925.000	24.85	26.55	51.40	74.00	-22.60	peak



Test Mode:	BLE 2M	Frequency(MHz):	2402
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz

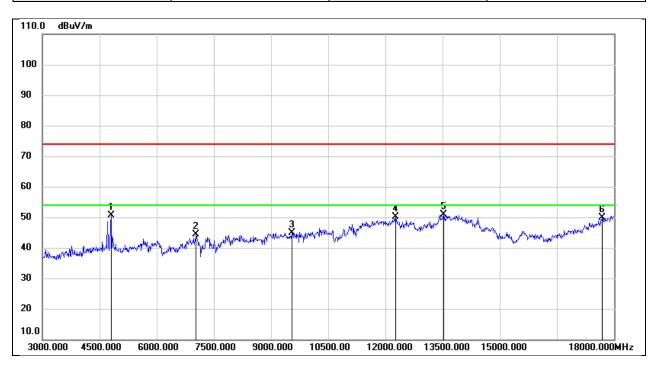


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4290.000	48.25	-1.31	46.94	74.00	-27.06	peak
2	4800.000	48.41	0.46	48.87	74.00	-25.13	peak
3	8220.000	36.91	8.76	45.67	74.00	-28.33	peak
4	11835.000	31.92	17.79	49.71	74.00	-24.29	peak
5	14430.000	29.69	20.86	50.55	74.00	-23.45	peak
6	17970.000	23.86	26.72	50.58	74.00	-23.42	peak



Test Mode: BLE 2M Frequency(MHz): 2402

Polarity: Vertical Test Voltage: AC 120V\_60Hz

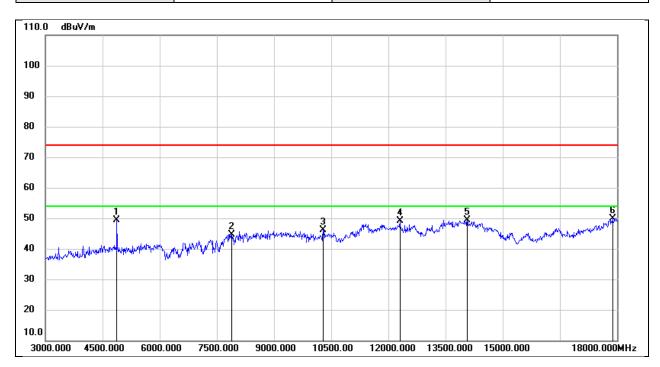


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4800.000	50.27	0.46	50.73	74.00	-23.27	peak
2	7035.000	37.10	7.28	44.38	74.00	-29.62	peak
3	9540.000	34.04	10.90	44.94	74.00	-29.06	peak
4	12270.000	31.55	18.55	50.10	74.00	-23.90	peak
5	13530.000	29.16	21.68	50.84	74.00	-23.16	peak
6	17685.000	24.98	25.02	50.00	74.00	-24.00	peak



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Test Mode:	BLE 2M	Frequency(MHz):	2442
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz

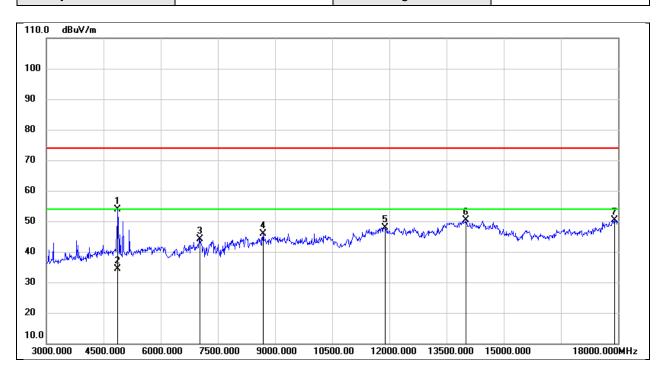


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4875.000	48.81	0.61	49.42	74.00	-24.58	peak
2	7890.000	37.37	7.29	44.66	74.00	-29.34	peak
3	10290.000	33.23	12.93	46.16	74.00	-27.84	peak
4	12300.000	30.60	18.65	49.25	74.00	-24.75	peak
5	14070.000	26.82	22.55	49.37	74.00	-24.63	peak
6	17880.000	23.37	26.39	49.76	74.00	-24.24	peak



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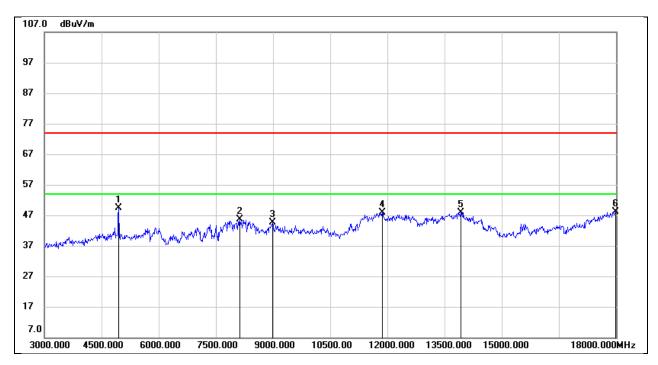
Test Mode:	BLE 2M	Frequency(MHz):	2442
Polarity:	Vertical	Test Voltage:	AC 120V_60Hz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4875.000	53.36	0.61	53.97	74.00	-20.03	peak
2	4875.000	33.89	0.61	34.50	54.00	-19.50	AVG
3	7020.000	36.86	7.37	44.23	74.00	-29.77	peak
4	8685.000	37.27	8.60	45.87	74.00	-28.13	peak
5	11895.000	29.93	18.04	47.97	74.00	-26.03	peak
6	14010.000	27.71	22.73	50.44	74.00	-23.56	peak
7	17910.000	23.95	26.50	50.45	74.00	-23.55	peak



Test Mode:	BLE 2M	Frequency(MHz):	2480
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz

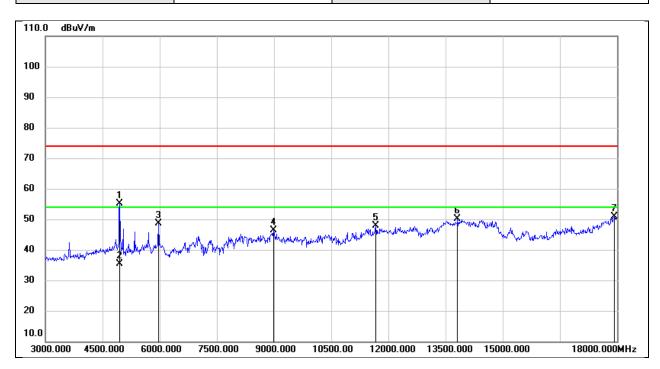


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4950.000	48.74	0.74	49.48	74.00	-24.52	peak
2	8130.000	37.41	8.21	45.62	74.00	-28.38	peak
3	8985.000	33.68	10.97	44.65	74.00	-29.35	peak
4	11865.000	29.99	17.91	47.90	74.00	-26.10	peak
5	13920.000	25.23	22.71	47.94	74.00	-26.06	peak
6	17985.000	21.28	26.77	48.05	74.00	-25.95	peak



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Test Mode:	BLE 2M	Frequency(MHz):	2480
Polarity:	Vertical	Test Voltage:	AC 120V_60Hz

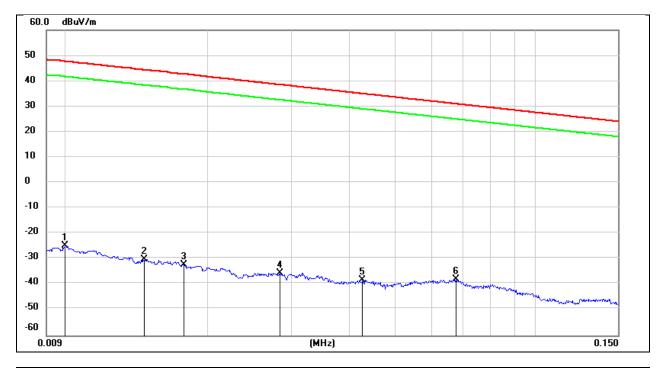


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4950.000	54.50	0.74	55.24	74.00	-18.76	peak
2	4950.000	34.66	0.74	35.40	54.00	-18.60	AVG
3	5970.000	45.56	2.99	48.55	74.00	-25.45	peak
4	8985.000	35.29	10.97	46.26	74.00	-27.74	peak
5	11670.000	30.66	17.24	47.90	74.00	-26.10	peak
6	13815.000	27.46	22.65	50.11	74.00	-23.89	peak
7	17925.000	24.39	26.55	50.94	74.00	-23.06	peak

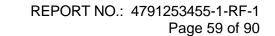
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# 8.4. SPURIOUS EMISSIONS(9 KHZ~30 MHZ)

Test Mode:	BLE 1M	Frequency(MHz):	2402
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz



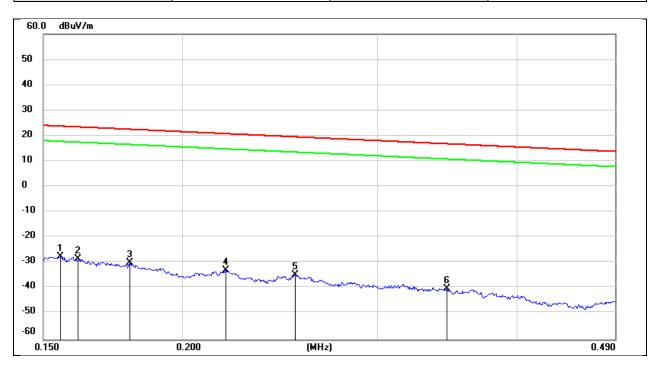
No.	Frequency	Reading	Correct	FCC	FCC Limit	ISED	ISED	Margin	Remark
				Result		Result	Limit		
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.0100	76.72	-101.40	-24.68	47.60	-76.18	-3.90	-72.28	peak
2	0.0146	71.14	-101.37	-30.23	44.31	-81.73	-7.19	-74.54	peak
3	0.0177	69.07	-101.35	-32.28	42.64	-83.78	-8.86	-74.92	peak
4	0.0284	65.86	-101.38	-35.52	38.54	-87.02	-12.96	-74.06	peak
5	0.0427	63.14	-101.45	-38.31	34.99	-89.81	-16.51	-73.30	peak
6	0.0675	63.64	-101.56	-37.92	31.02	-89.42	-20.48	-68.94	peak





Test Mode: BLE 1M Frequency(MHz): 2402

Polarity: Horizontal Test Voltage: AC 120V\_60Hz

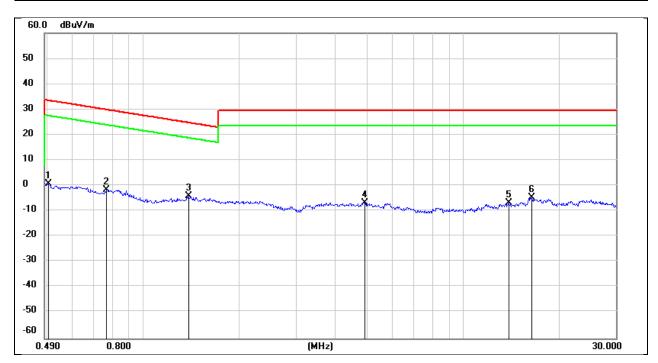


No.	Frequency	Reading	Correct	FCC	FCC Limit	ISED	ISED	Margin	Remark
				Result		Result	Limit		
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.1554	74.27	-101.65	-27.38	23.77	-78.88	-27.73	-51.15	peak
2	0.1612	73.37	-101.65	-28.28	23.46	-79.78	-28.04	-51.74	peak
3	0.1794	71.77	-101.68	-29.91	22.53	-81.41	-28.97	-52.44	peak
4	0.2190	68.77	-101.75	-32.98	20.79	-84.48	-30.71	-53.77	peak
5	0.2530	67.14	-101.80	-34.66	19.54	-86.16	-31.96	-54.20	peak
6	0.3462	61.74	-101.90	-40.16	16.81	-91.66	-34.69	-56.97	peak





Test Mode:	BLE 1M	Frequency(MHz):	2402
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz

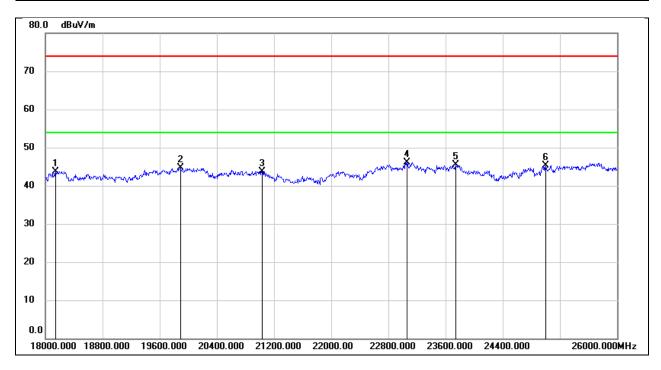


No.	Frequency	Reading	Correct	FCC	FCC Limit	ISED	ISED	Margin	Remark
				Result		Result	Limit		
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.5039	62.93	-62.07	0.86	33.56	-50.64	-17.94	-32.70	peak
2	0.7641	60.42	-62.12	-1.70	29.94	-53.20	-21.56	-31.64	peak
3	1.3810	57.97	-62.10	-4.13	24.80	-55.63	-26.70	-28.93	peak
4	4.9165	54.88	-61.48	-6.60	29.54	-58.10	-21.96	-36.14	peak
5	13.8871	54.10	-60.97	-6.87	29.54	-58.37	-21.96	-36.41	peak
6	16.3959	56.17	-60.96	-4.79	29.54	-56.29	-21.96	-34.33	peak

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8.5. SPURIOUS EMISSIONS(18 GHZ~26 GHZ)

Test Mode:	BLE 1M	Frequency(MHz):	2402	
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz	



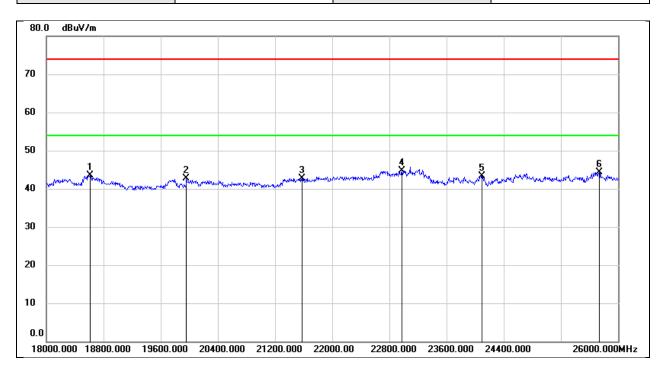
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	18144.000	49.27	-5.48	43.79	74.00	-30.21	peak
2	19888.000	50.07	-5.36	44.71	74.00	-29.29	peak
3	21032.000	48.65	-4.87	43.78	74.00	-30.22	peak
4	23064.000	49.49	-3.42	46.07	74.00	-27.93	peak
5	23744.000	48.65	-3.20	45.45	74.00	-28.55	peak
6	25000.000	47.36	-2.10	45.26	74.00	-28.74	peak



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Test Mode: BLE 1M Frequency(MHz): 2402

Polarity: Vertical Test Voltage: AC 120V\_60Hz



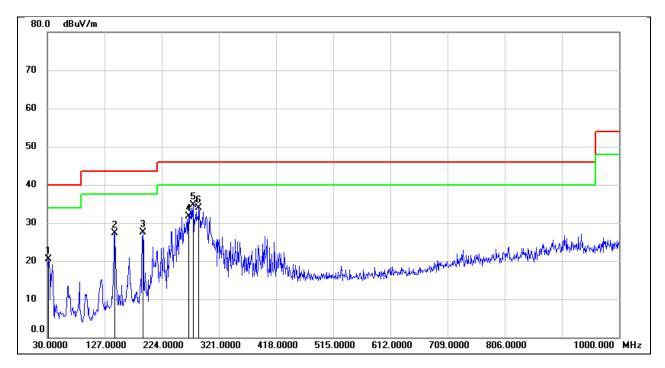
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	18616.000	48.89	-5.34	43.55	74.00	-30.45	peak
2	19960.000	48.06	-5.42	42.64	74.00	-31.36	peak
3	21576.000	47.25	-4.58	42.67	74.00	-31.33	peak
4	22976.000	48.26	-3.46	44.80	74.00	-29.20	peak
5	24096.000	46.11	-2.78	43.33	74.00	-30.67	peak
6	25736.000	44.94	-0.68	44.26	74.00	-29.74	peak



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# 8.6. SPURIOUS EMISSIONS(30 MHZ~1 GHZ)

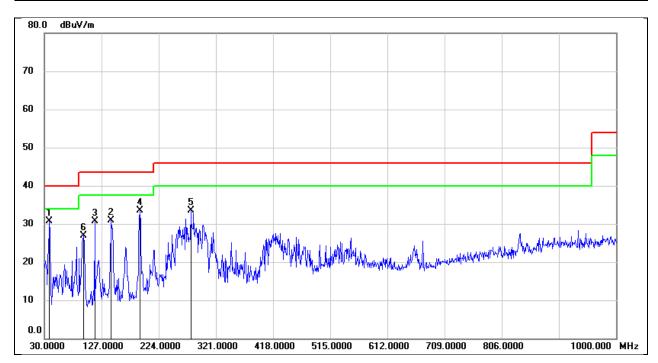
Test Mode:	BLE 1M	Frequency(MHz):	2402
Polarity:	Horizontal	Test Voltage:	AC 120V_60Hz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	31.9400	34.19	-13.62	20.57	40.00	-19.43	QP
2	144.4600	41.08	-13.84	27.24	43.50	-16.26	QP
3	191.9900	39.74	-12.18	27.56	43.50	-15.94	QP
4	269.5900	45.21	-13.56	31.65	46.00	-14.35	QP
5	277.3500	47.79	-13.10	34.69	46.00	-11.31	QP
6	287.0500	46.34	-12.49	33.85	46.00	-12.15	QP



Test Mode:	BLE 1M	Frequency(MHz):	2402
Polarity:	Vertical	Test Voltage:	AC 120V_60Hz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	38.7300	45.35	-14.71	30.64	40.00	-9.36	QP
2	143.4900	44.71	-13.89	30.82	43.50	-12.68	QP
3	115.3600	46.09	-15.37	30.72	43.50	-12.78	QP
4	191.9900	45.69	-12.18	33.51	43.50	-9.99	QP
5	278.3200	46.56	-13.05	33.51	46.00	-12.49	QP
6	96.9300	43.58	-16.76	26.82	43.50	-16.68	QP



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## 9. ANTENNA REQUIREMENT

## **REQUIREMENT**

Please refer to FCC part 15.203

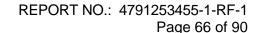
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC part 15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### **DESCRIPTION**

**Pass** 





## 10. AC POWER LINE CONDUCTED EMISSION

#### **LIMITS**

Please refer to CFR 47 FCC §15.207 (a).

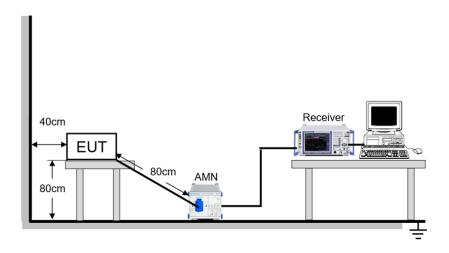
FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

#### **TEST PROCEDURE**

The EUT is put on a table of non-conducting material that is 80 cm high. The vertical conducting wall of shielding is located 40 cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9 kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

#### **TEST SETUP**



#### **TEST ENVIRONMENT**

Temperature	<b>24.6</b> ℃	Relative Humidity	57%
Atmosphere Pressure	101kPa	Test Voltage	AC 120 V, 60 Hz

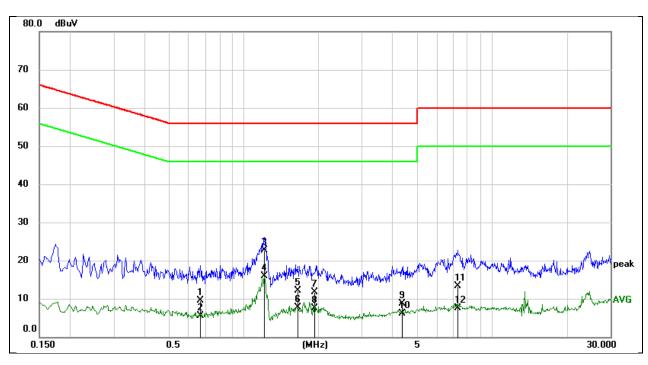
### **TEST DATE / ENGINEER**

Test Date	April 18, 2024	Test By	Wite Chen
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**TEST RESULTS** 

Test Mode:	BLE 1M	Frequency(MHz):	2402
Line:	Line		



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.6730	-0.45	10.03	9.58	56.00	-46.42	QP
2	0.6730	-4.43	10.03	5.60	46.00	-40.40	AVG
3	1.2090	12.90	9.87	22.77	56.00	-33.23	QP
4	1.2090	5.95	9.87	15.82	46.00	-30.18	AVG
5	1.6620	2.07	9.97	12.04	56.00	-43.96	QP
6	1.6620	-2.27	9.97	7.70	46.00	-38.30	AVG
7	1.9339	1.72	10.03	11.75	56.00	-44.25	QP
8	1.9339	-2.44	10.03	7.59	46.00	-38.41	AVG
9	4.3268	-1.71	10.34	8.63	56.00	-47.37	QP
10	4.3268	-4.33	10.34	6.01	46.00	-39.99	AVG
11	7.2812	2.88	10.43	13.31	60.00	-46.69	QP
12	7.2812	-2.94	10.43	7.49	50.00	-42.51	AVG

## Note:

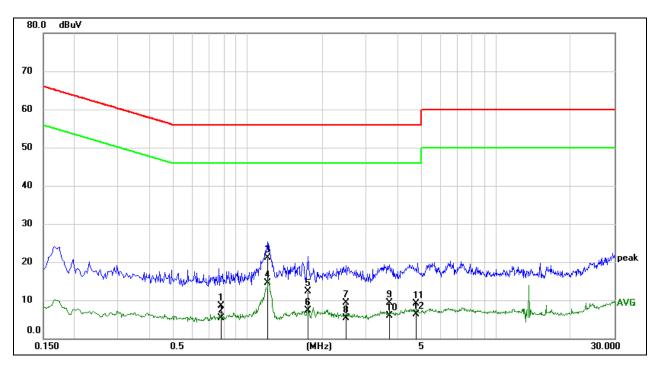
- 1. Result = Reading + Correct Factor.
- 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
- 3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).
- 4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

Note: All the modes have been tested, only the worst data was recorded in the report.



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Test Mode:	BLE 1M	Frequency(MHz):	2402
Line:	Neutral		



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.7793	-1.49	9.98	8.49	56.00	-47.51	QP
2	0.7793	-4.75	9.98	5.23	46.00	-40.77	AVG
3	1.2090	11.20	9.87	21.07	56.00	-34.93	QP
4	1.2090	4.60	9.87	14.47	46.00	-31.53	AVG
5	1.7438	2.28	9.99	12.27	56.00	-43.73	QP
6	1.7438	-2.68	9.99	7.31	46.00	-38.69	AVG
7	2.4967	-0.73	10.11	9.38	56.00	-46.62	QP
8	2.4967	-4.74	10.11	5.37	46.00	-40.63	AVG
9	3.7367	-1.03	10.29	9.26	56.00	-46.74	QP
10	3.7367	-4.48	10.29	5.81	46.00	-40.19	AVG
11	4.7803	-1.21	10.36	9.15	56.00	-46.85	QP
12	4.7803	-3.96	10.36	6.40	46.00	-39.60	AVG

#### Note:

- 1. Result = Reading + Correct Factor.
- 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
- 3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).
- 4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

Note: All the modes have been tested, only the worst data was recorded in the report.



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# 11. TEST DATA

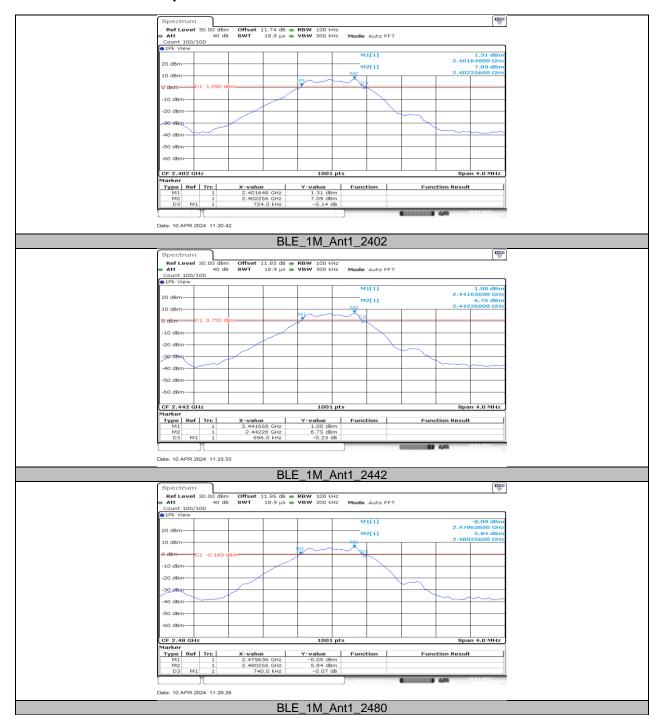
# 11.1. APPENDIX A: DTS BANDWIDTH

# 11.1.1. Test Result

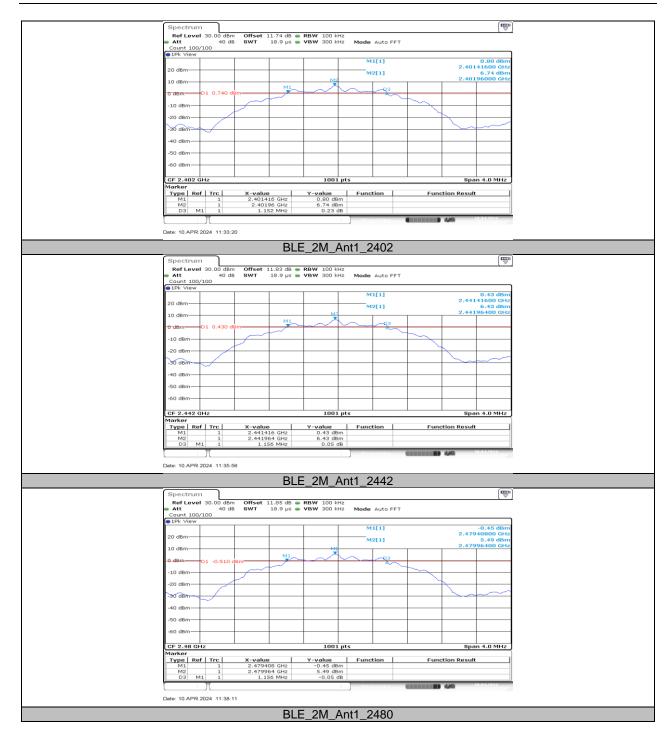
Test Mode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
		2402	0.72	2401.65	2402.37	≥0.5	PASS
BLE_1M	Ant1	2442	0.70	2441.66	2442.35	≥0.5	PASS
	2480	0.74	2479.64	2480.38	≥0.5	PASS	
		2402	1.15	2401.42	2402.57	≥0.5	PASS
BLE_2M	Ant1	2442	1.16	2441.42	2442.57	≥0.5	PASS
		2480	1.16	2479.41	2480.56	≥0.5	PASS



# 11.1.2. Test Graphs









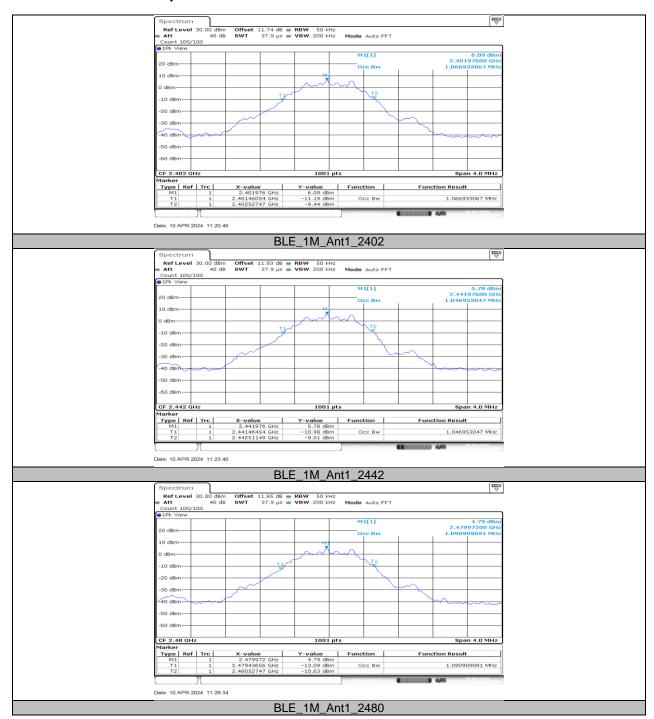
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# 11.2. APPENDIX B: OCCUPIED CHANNEL BANDWIDTH 11.2.1. Test Result

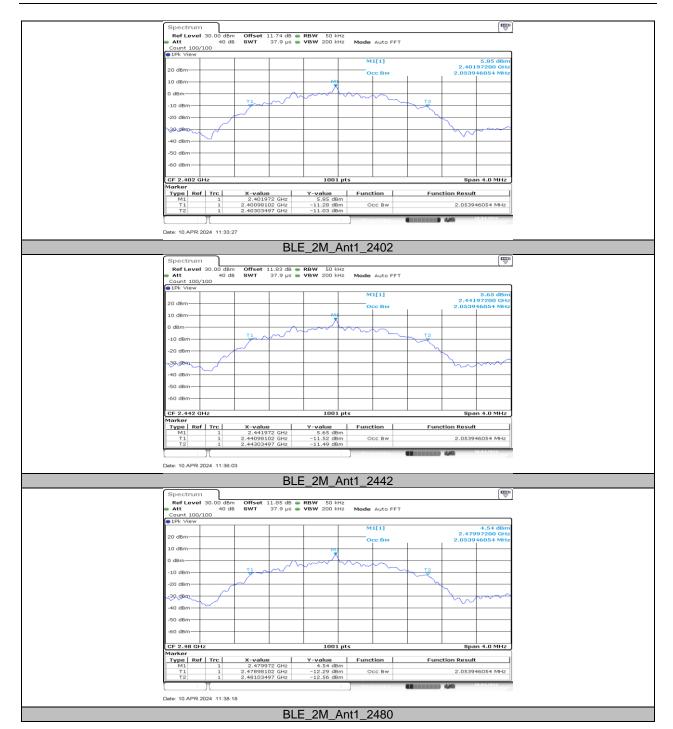
Test Mode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
		2402	1.067	2401.4605	2402.5275	PASS
BLE_1M	Ant1	2442	1.047	2441.4645	2442.5115	PASS
	2480	1.091	2479.4366	2480.5275	PASS	
		2402	2.054	2400.9810	2403.0350	PASS
BLE_2M	Ant1	2442	2.054	2440.9810	2443.0350	PASS
		2480	2.054	2478.9810	2481.0350	PASS



#### 11.2.2. Test Graphs









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# 11.3. APPENDIX C: MAXIMUM CONDUCTED OUTPUT POWER 11.3.1. Test Result

Test Mode	Antenna	Frequency[MHz]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402 7.32		≤30	PASS
		2442	6.98	≤30	PASS
		2480	6.12	≤30	PASS
BLE_2M	Ant1	2402	7.31	≤30	PASS
		2442	6.95	≤30	PASS
		2480	6.13	≤30	PASS



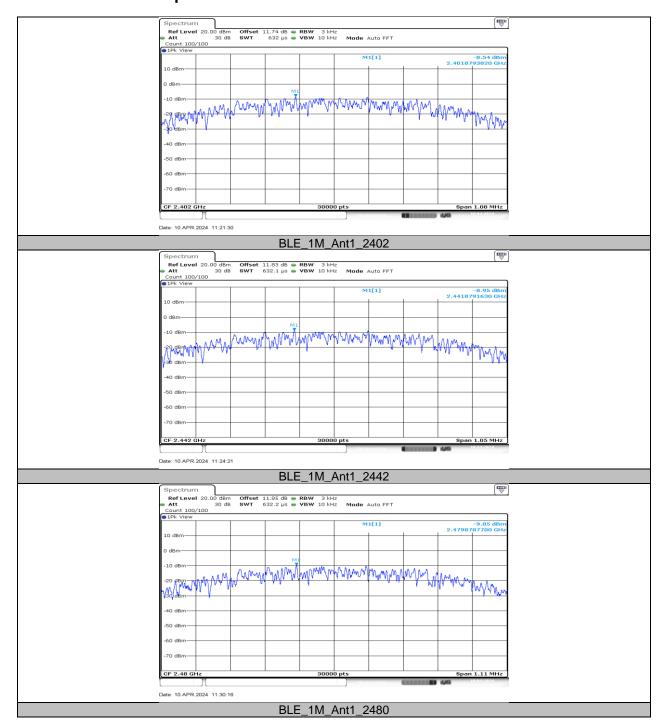
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## 11.4. APPENDIX D: MAXIMUM POWER SPECTRAL DENSITY 11.4.1. Test Result

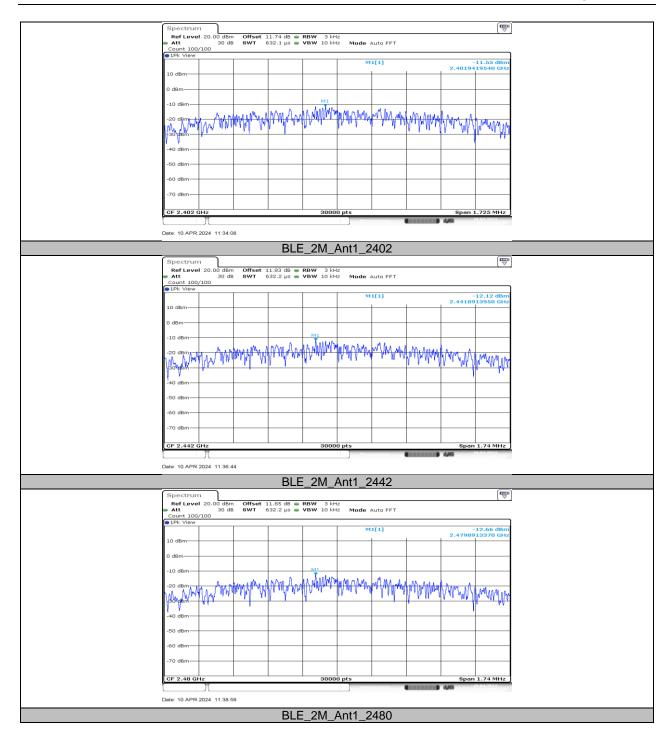
Test Mode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict	
BLE_1M	Ant1	2402	-8.54	≤8.00	PASS	
		2442	-8.95	≤8.00	PASS	
		2480	-9.85	≤8.00	PASS	
BLE_2M	Ant1	2402	-11.55	≤8.00	PASS	
		Ant1 2442		-12.12	≤8.00	PASS
		2480	-12.66	≤8.00	PASS	



### 11.4.2. Test Graphs









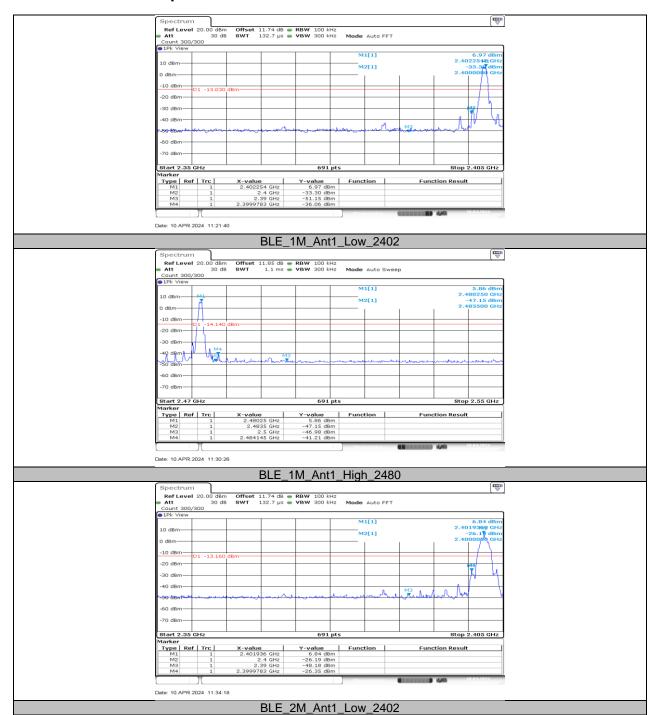
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## 11.5. APPENDIX E: BAND EDGE MEASUREMENTS 11.5.1. Test Result

Test Mode	Antenna	ChName	Frequency [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	6.97	-36.06	≤-13.03	PASS
		High	2480	5.86	-41.21	≤-14.14	PASS
BLE_2M	Ant1	Low	2402	6.84	-26.35	≤-13.16	PASS
		High	2480	5.58	-39.92	≤-14.42	PASS



#### 11.5.2. Test Graphs









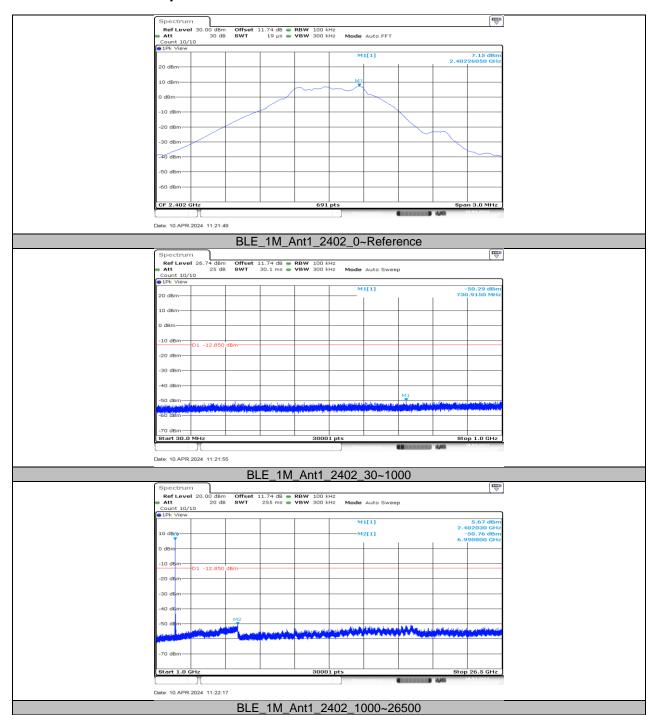
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## 11.6. APPENDIX F: CONDUCTED SPURIOUS EMISSION 11.6.1. Test Result

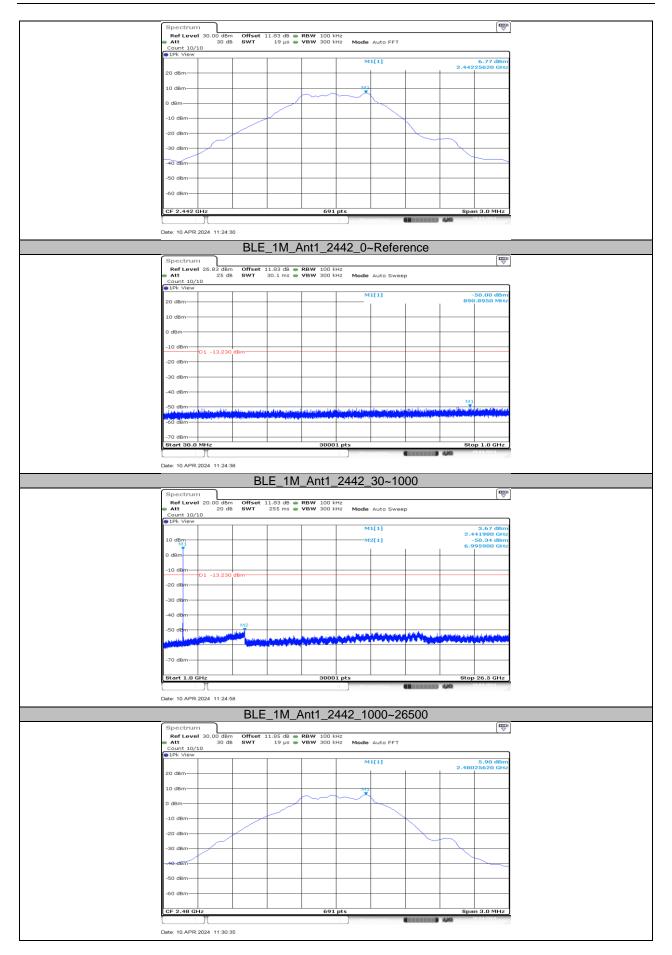
Test Mode	Antenna	Frequency[MHz]	FreqRange Result[dBm]		Limit[dBm]	Verdict
		2402	Reference	7.15		PASS
			30~1000	-50.29	≤-12.85	PASS
			1000~26500	-50.76	≤-12.85	PASS
			Reference	6.77		PASS
BLE_1M	Ant1	2442	30~1000	-50	≤-13.23	PASS
			1000~26500	-50.34	≤-13.23	PASS
		2480	Reference	5.90		PASS
			30~1000	-50.09	≤-14.1	PASS
			1000~26500	-50.34	≤-14.1	PASS
BLE_2M		2402	Reference	6.79		PASS
			30~1000	-49.71	≤-13.21	PASS
			1000~26500	-50.44	≤-13.21	PASS
	Ant1	2442	Reference	6.42		PASS
			30~1000	-50.1	≤-13.58	PASS
			1000~26500	-50.26	≤-13.58	PASS
		2480	Reference	5.55		PASS
			30~1000	-50.1	≤-14.45	PASS
			1000~26500	-50.29	≤-14.45	PASS



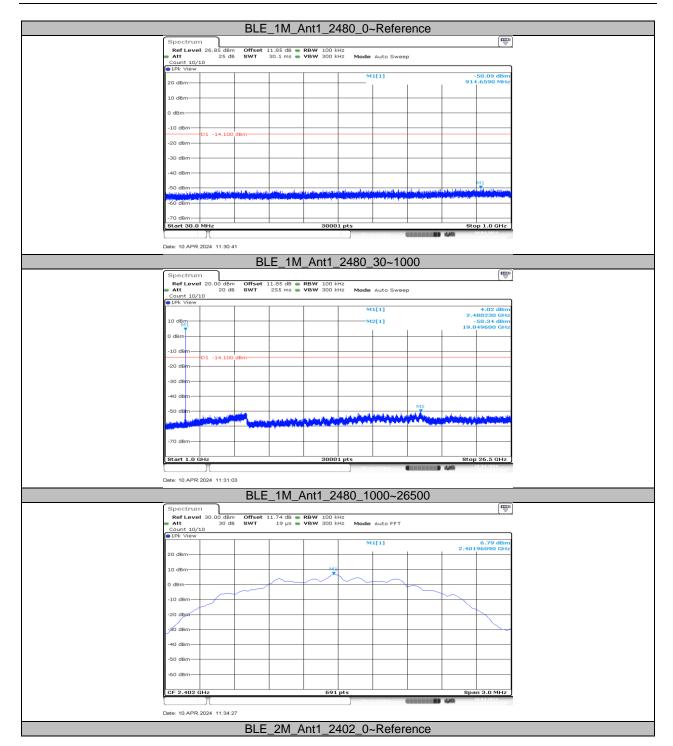
### 11.6.2. Test Graphs



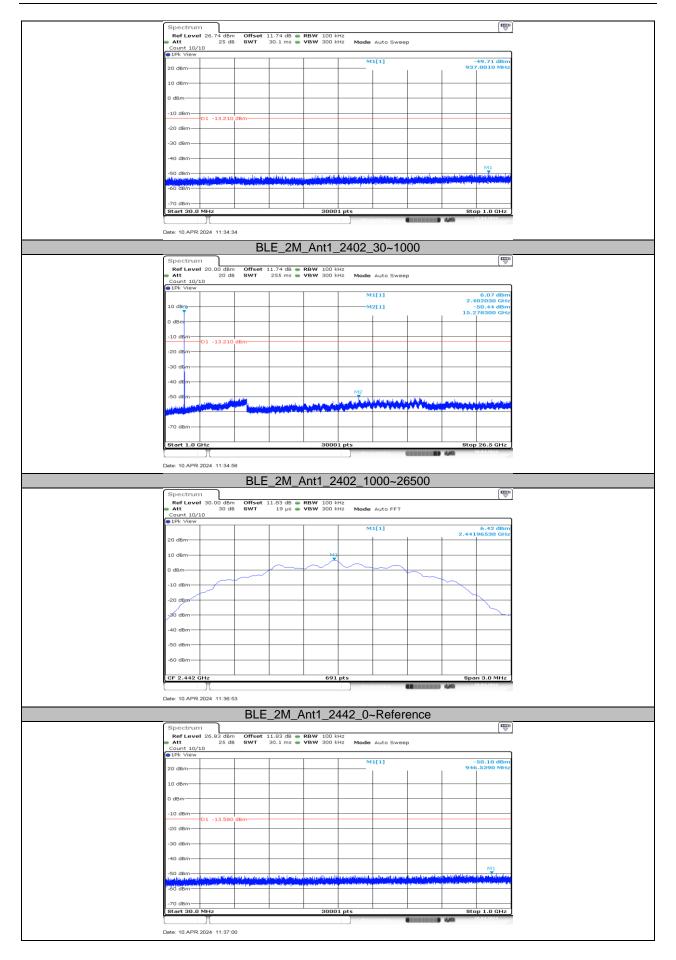




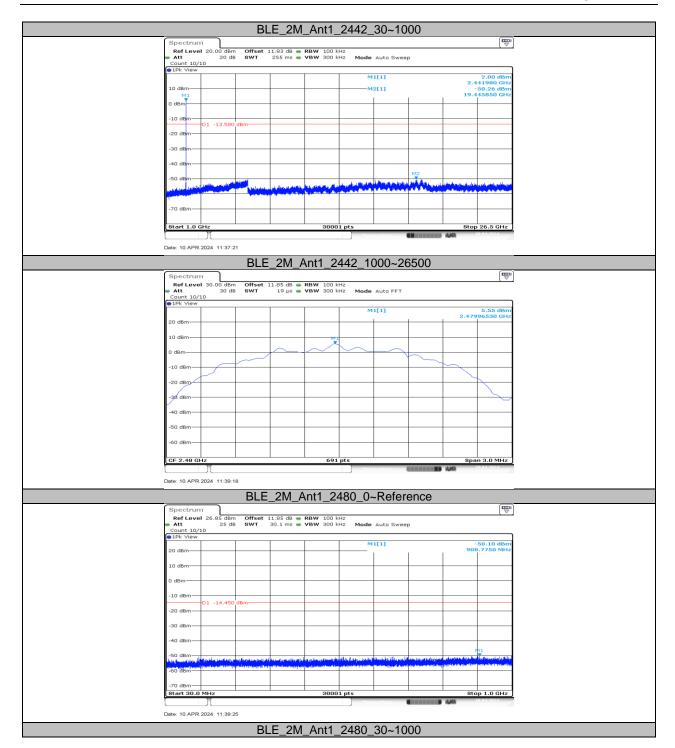




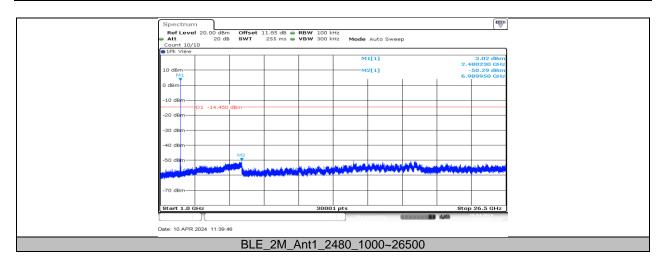














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# 11.7. APPENDIX G: DUTY CYCLE 11.7.1. Test Result

Test Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
BLE_1M	0.4	2	0.2000	20.00	6.99	2.50	3
BLE_2M	0.21	2	0.1050	10.50	9.79	4.76	5

Note:

Duty Cycle Correction Factor=10log (1/x).

Where: x is Duty Cycle (Linear)

Where: T is On Time

If that calculated VBW is not available on the analyzer then the next higher value should be used.



### 11.7.2. Test Graphs



**END OF REPORT**