



# **TEST REPORT**

Applicant Name : Address: LEEDARSON LIGHTING CO., LTD. Xingda Road, Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China RA230612-33356E-RF-00A 2AB2Q-A800ST-Q1G

Report Number : FCC ID:

Test Standard (s)

FCC PART 15.247

## **Sample Description**

Product Type: Model No.:

Trade Mark: Date Received: Date of Test: Report Date: 11A19060WRGBWxx, 13aSy-A800ST-Q1G-xx\*1 LEEDARSON 2023-06-12 2023-06-14 to 2023-07-07 2023-07-10

11A19060WRGBW01, 13aSy-A800ST-Q1G-xx,

Test Result:

Pass\*

LED Lamp

\* In the configuration tested, the EUT complied with the standards above.

## Prepared and Checked By:

Dave Liang

Dave Liang EMC Engineer

**Approved By:** Candry, Cr

Candy Li EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "\*".

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Version 8: 2023-01-30

Page 1 of 45

FCC-RF

# **TABLE OF CONTENTS**

DOCUMENT REVISION HISTORY	4
GENERAL INFORMATION	
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) Objective Test Methodology Measurement Uncertainty Test Facility	5 5 6
SYSTEM TEST CONFIGURATION	7
DESCRIPTION OF TEST CONFIGURATION	
SUMMARY OF TEST RESULTS	12
TEST EQUIPMENT LIST	
FCC §1.1310 & §2.1091- RF EXPOSURE	14
FCC §15.203 – ANTENNA REQUIREMENT	15
APPLICABLE STANDARD ANTENNA CONNECTOR CONSTRUCTION	
FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS	16
APPLICABLE STANDARD EUT SETUP EMI TEST RECEIVER SETUP TEST PROCEDURE CALCULATION TEST DATA	16 16 17 17
FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS	20
APPLICABLE STANDARD EUT SETUP EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP TEST PROCEDURE FACTOR & MARGIN CALCULATION TEST DATA	20 21 21 21
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH & OCCUPIED BANDWIDTH	27
Applicable Standard Test Procedure Test Data	27
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER	35
Applicable Standard Test Procedure Test Data	35
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE	
APPLICABLE STANDARD TEST PROCEDURE	39

## Report No.: RA230612-33356E-RF-00A

Теят Дата	39
FCC §15.247(e) – POWER SPECTRAL DENSITY	42
APPLICABLE STANDARD	42
Test Procedure	42
TEST DATA	

# **DOCUMENT REVISION HISTORY**

Revision Number	Report Number	Description of Revision	Date of Revision	
0	RA230612-33356E-RF-00A	Original Report	2023-07-10	

# **GENERAL INFORMATION**

Product	LED Lamp				
Tested Model	11A19060WRGBW01				
Multiple Model	13aSy-A800ST-Q1G-xx, 11A19060WRGBWxx, 13aSy-A800ST-Q1G-xx*1 (Where "y" may be "A"-"Z" for different enclosure pattern design; "xx" may be "00" to "99", which designates for different beam angle, color of eyelet contact, package of style, color of enclosure and CCT. *1 means different package.)				
Model Difference	Please refer to DOS letter				
Frequency Range	BLE 1M/2M: 2402-2480MHz				
Maximum Conducted Peak Output Power	BLE: 7.14dBm				
Modulation Technique	GFSK				
Antenna Specification*	1.18dBi (It is provided by the applicant)				
Voltage Range	AC 120V/60Hz				
Sample serial number	CE&RE(below 1G): 26T3-1 RE(above 1G): 26T3-2 RF Conducted Test: 26T3-3 (Assigned by ATC, Shenzhen)				
Sample/EUT Status	Good condition				

## **Product Description for Equipment under Test (EUT)**

## Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

## **Test Methodology**

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## **Measurement Uncertainty**

Para	meter	Uncertainty			
Occupied Char	nnel Bandwidth	5%			
RF output po	wer, conducted	0.71dB			
Unwanted Emi	ssion, conducted	1.6dB			
AC Power Lines C	onducted Emissions	2.74dB			
	30MHz - 1GHz	5.08dB			
Emissions, Radiated	1GHz - 18GHz	4.96dB			
Radiated	18GHz - 26.5GHz	5.16dB			
Temp	erature	1°C			
Hun	nidity	6%			
Supply	voltages	0.4%			

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

## **Test Facility**

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the Floor 1, KuMaKe Building, Dongzhou Community, Guangming Street, Guangming District, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189.

Accredited by American Association for Laboratory Accreditation (A2LA). The Certificate Number is 4297.01.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0016. The Registration Number is 30241.

# SYSTEM TEST CONFIGURATION

## **Description of Test Configuration**

For BLE mode, 40 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
	•••	•••	
	•••	••••	
	•••	•••	
18	2438	38	2478
19	2440	39	2480

EUT was tested with Channel 0, 20 and 39.

#### **EUT Exercise Software**

Software "SSCOM 5.13.1"\* was used during testing and the Power level is 8\*.

## **Special Accessories**

N/A

## **Equipment Modifications**

No modification was made to the EUT tested.

## **Duty Cycle**

Test Mode	Antenna	Channel	TransmissionDuration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T Minimum VBW[kHz]
BLE_1M		2402	0.41	2.00	20.50	2.44
	Ant1	2442	0.41	2.01	20.40	2.44
		2480	0.41	2.00	20.50	2.44
		2402	0.21	2.00	10.50	4.76
BLE_2M	Ant1	2442	0.22	2.01	10.95	4.76
		2480	0.22	2.01	10.95	4.76

				D	LE_IN	L_AII	ι <u>ι_</u> 44	102				
Spect	rum											
Ref L	evel	20.00 0	Bm Offset	11.93 dB	RBW 1	D MHz						( =
Att			dB 👄 SWT		VBW 1							
SGL Co	ount 1	/1	TRG: VI	D								
1Pk Cl												
							M	1[1]				6.75 dBm
10 dBm						M1				D2	1	2.01000 ms
10 ubin						1-	4 D	1[1]		4	<b>-</b>	0.13 dE
U dBm-	T	RG 1.0	00 dBm				-	1		-		410.00 µ
-10 d <mark>8</mark> m	n					-	-			+	-	
-20 d8n	n											
-30 d8m												
50 abii												
-40 d8m	Dathact.	alu-lithead	MARTIN	Canonattheast	trachtrant	Ner	an has been	allabelle also	a philastophia	40	mondition	and to the ball
	weet in	de realite	100 X 200	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1			from a de		200		and the second	a configuration of
-50 dBm	n-+-					+					-	
60 JB												
-60 dBrr	n											
-70 dBm												
, o abii												
CF 2.4		-				)01 pts						 800.0 μs/
Marker		2			10	or pts						000.0 µs/
Type		Trc	X-value	× 1	Y-valu		Func	tion		Euro	ction Result	
M1	Kei	1		.01 ms		dBm	Func	cion		Fun	ction Result	
D1	M1	1		10.0 µs		3 dB						
D2	M1	1		2.0 ms	0.3	1 dB						
	_	_								_		

BLE 1M Ant1 2402

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#### BLE\_1M\_Ant1\_2442

Spect	rum									
Ref L	evel	15.00 d	Bm Offset	11.93 dB 🧉	RBW 10 MH	łz				
👄 Att			dB 👄 SWT	8 ms 🦷	VBW 10 MH	łz				
SGL Co		/1	TRG: VI	D						
●1Pk Cl	r₩									
10 dBm	_		M1			M	1[1]			6.10 dBm
				-	4		1[1]		<sup>0.0</sup>	0000000 s 0.34 dB
0 dBm-	T	RG 0.50	0 dBm				L[ L]			410.00 µs
10.10									1 1	100.000.000
-10 dBn										
-20 dBr	n									
-30 dBn	n				<u> </u>					
-40 d <b>B</b> (	Purp	Arry and	water water	a a garden live	mannahana	Dirdrighter		all the second sec	(another a	and a comparison of the
-50 dBr	n									
-60 dBn	n									
-70 dBn	n									
-80 dBm										
CF 2.4	42 G⊦	z			1001	pts				800.0 µs/
Marker						1 -				
Type M1	Ref	Trc 1	X-value	9 0.0 s	Y-value 6.10 dBr	Func	tion	Fun	ction Result	
D1	M1		41	LO.O µs	0.34 di					
D2	M1			.01 ms	0.32 di					
_		1					iondy (		440	7.07.2023
L		1							- Harrison	

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Spectri Ref Le							_	80				
	vel 1											
Att		5.00 dt	Bm Offset	11.93 dE	3 🖷 RBW 10 M	1Hz						
		20	dB 👄 SWT	8 ms	5 🖶 VBW 10 M	1Hz						
SGL Cou	unt 1/	1	TRG: VI	D								
∋1Pk Clrv	w											
10 dBm-						1	M)	1[1]				6.02 dBm
TO UBIII-				1	1		1		C	2		2.00000 ms
0 dBm	тр	G 0.20	0 dBm			1	` D1	1[1]		* ·		0.15 dE
		0.20										410.00 µs
-10 dBm-	_			·					-			
-20 d <mark>8</mark> m-				<u> </u>					+			
-30 dBm-	-								-			
10 -					and a set as a			- Call				1.
-40 UQUE	which we	- And the second se	all proposed	malloup	almanananala	1	white a	ratal and a state of the	Burner	)	whitehouseholde	en and the other of the
-50 dBm-												
-60 dBm-	_					<u> </u>						
-70 dBm-									+			
-80 dBm-			_						-			
CF 2.48	GHz				100:	l pts						800.0 µs/
Marker												
Type	Ref	Trc	X-value	• I	Y-value		Funct	tion	Function Result			
M1		1		2.0 ms	6.02 dt							
D1	M1	1		10.0 µs	0.15							
D2	M1	1		2.0 ms	0.09	dB						
								e ad v	1000		430	07.07.2023

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#### BLE\_2M\_Ant1\_2402

Spect	rum											
Ref L	evel	15.00 d	Bm Offset	11.93 dB	RBW 10 M	1Hz						
👄 Att		20	dB 👄 SWT	8 ms	● VBW 10 M	1Hz						
SGL Co	unt 1,	/1	TRG: \	ID								
●1Pk Cl	rw											
10 dBm	-							1[1]	M	1 D1		6.84 dBm 4.00000 ms
0 dBm-	TF	RG 1.00	0 dBm				D1	[1]		+		0.10 dB 210.00 µs
-10 dBm	<u>-</u>									+		
-20 dBm	<u>-</u>									+		
-30 dBm										+		
-4 <b>0,d</b> 80	turburk	Mathend	tradingetted to	the support	www.white.uppwirek	Η	hautalarn	mensions	struitzer	hip	hillyfrantary	and the property of the second
-50 dBm	1					$\vdash$						
-60 dBm	°					$\vdash$						
-70 dBm						$\vdash$						
-80 dBm	<del>ا –</del> ۱								+			
CF 2.4	02 GH	z			100:	l pt	s					800.0 µs/
Marker												
Туре	Ref Trc X-value			Y-value		Funct	tion		Fund	tion Result	<u>نا</u>	
M1		1		4.0 ms	6.84 de							
D1 D2	M1 M1	1	2	2.0 ms	0.10							
		1					]	eady	000		4,40	07.07.2023

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					BLE_2M	_An	t1_2442			
Specti	rum									
Ref Le	evel	15.00	dBm Offs	et 11.93 d	B 🖷 RBW 10	MHz				(
Att			dB 👄 SWT		s - VBW 10					
SGL Co	unt 1			: VID						
IPk Cli		-								
-	_						M1[1]		1.9	7 dBm
10 dBm-			-	23		M		D2	2.000	
	-		00 10-				D1[1]	<b>↑</b>		.01 dB
0 dBm-		G U.5	00 dBm			+++				.00 µs
-10 dBm						++		_		
-20 dBm	-					++				
-30 dBm	-									
-401dBr	(nulph	4 prov	anderine	upper unitarile	Man Manual Contract	WH AF	uhuwahutahutahuta	fabrica Hills report	monutiveneralitie	Manualth
-50 dBm						+				
-60 dBm	-					+			+	
-70 dBm						+			+	
-80 dBm						+				
CF 2.44	12 GH	z			10	01 pts			800.0	) µs/
Marker										
Type	Ref	Trc	X-va	lue	Y-value		Function	Fu	nction Result	
M1		1		2.0 ms	1.97					
D1	M1	1		220.0 µs	-42.0					
D2	M1	1		2.01 ms	4.3	8 dB				
							Ready		40	123

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#### BLE\_2M\_Ant1\_2480

Specti	rum											
Ref Le	evel	15.00 d	Bm Offset	t 11.93 dB	RBW 10	MHz						
Att		20	dB 👄 SWT	8 ms	■ VBW 10	MHz						
SGL Co	unt 1,	/1	TRG: \	/ID								
●1Pk Cl	rw											
10 dBm-	-				-		C		D2	-	1	0.52 dBm .99000 ms
0 dBm-	TF	RG 0.30	0 dBm	+			D1	[1]	, Ť			5.64 dB 220.00 µs
-10 dBm	1-		+ + +									
-20 dBm	<u>-</u>									++-		
-30 dBm	1									++-		
-40, d80	- tandarda	educera	duration 4	of the second second	and a superior	-	whotelerundu	antaiwettytta	mound	the	talmentworke	quantum contra
-50 dBm	<u>+</u>					+						
-60 dBm	1					+						
-70 dBm	1					+						
-80 dBm												
CF 2.48	B GHz				100	1 pt:	s					800.0 µs/
Marker											_	
Type M1	Ref	Trc 1	X-valı	1.99 ms	<u>Y-value</u> 0.52 d	Dm	Functi	on	F	unctio	on Result	
D1	M1	1		220.0 µs	5.64							
D2	M1	1		2.01 ms	5.46							
		][					Re	ady			KA .	7.07.2023

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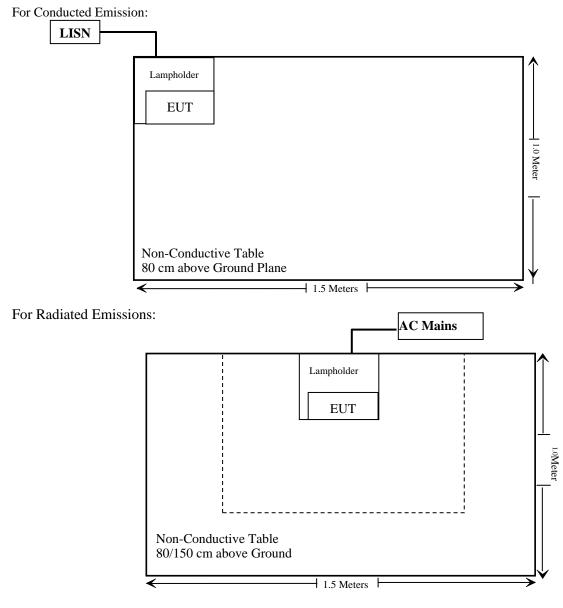
## Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	Lampholder	/	/

## External I/O Cable

Cable Description	Length (m)	From Port	То
AC Cable	1.5	LISN/AC Mains	Lampholder

## **Block Diagram of Test Setup**



Note: the support table edge was flush with the center of turntable.

# SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310 & §2.1091	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207(a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Emission Bandwidth & Occupied Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant

# **TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date			
Conducted Emissions Test								
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2022/11/25	2023/11/24			
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2022/11/25	2023/11/24			
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2022/12/07	2023/12/06			
Unknown	RF Coaxial Cable	No.17	N0350	2022/11/25	2023/11/24			
	Conducted E	mission Test Soft	tware: e3 191218 (	V9)				
		Radiated Emiss	ions Test					
Rohde & Schwarz	Test Receiver	ESR	102725	2022/11/25	2023/11/24			
Rohde & Schwarz	Spectrum Analyzer	FSV40	101949	2022/11/25	2023/11/24			
SONOMA INSTRUMENT	Amplifier	310 N	186131	2022/11/08	2023/11/07			
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2022/11/08	2023/11/07			
Quinstar	Amplifier	QLW-184055 36-J0	15964001002	2022/11/08	2023/11/07			
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05			
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2022/11/30	2025/11/29			
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2022/12/26	2025/12/25			
Wainwright	High Pass Filter	WHKX3.6/18 G-10SS	5	2022/11/25	2023/11/24			
Unknown	RF Coaxial Cable	No.10	N050	2022/11/25	2023/11/24			
Unknown	RF Coaxial Cable	No.11	N1000	2022/11/25	2023/11/24			
Unknown	RF Coaxial Cable	No.12	N040	2022/11/25	2023/11/24			
Unknown	RF Coaxial Cable	No.13	N300	2022/11/25	2023/11/24			
Unknown	RF Coaxial Cable	No.14	N800	2022/11/25	2023/11/24			
Unknown	RF Coaxial Cable	No.15	N600	2022/11/25	2023/11/24			
Unknown	RF Coaxial Cable	No.16	N650	2022/11/25	2023/11/24			
	Radiated Er	nission Test Soft	ware: e3191218 (V	(9)				
		RF Conducte	d Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2022/11/25	2023/11/24			
Rohde & Schwarz Open Switch Control Un		OSP120 + OSP-B157	101244 + 100866	2022/11/25	2023/11/24			
WEINSCHEL	10dB Attenuator	5324	AU 3842	2022/11/25	2023/11/24			
Unknown	RF Coaxial Cable	No.33	RF-03	Each	time			

\* **Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

# FCC §1.1310 & §2.1091- RF EXPOSURE

#### **Applicable Standard**

According to KDB 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.4 – MPE-Based Exemption:

An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

Table to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R <sup>2</sup> .
1.34-30	3,450 R <sup>2</sup> /f <sup>2</sup> .
30-300	3.83 R <sup>2</sup> .
300-1,500	0.0128 R <sup>2</sup> f.
1,500-100,000	19.2R <sup>2</sup> .

f = frequency in MHz;

R = minimum separation distance from the body of a nearby person (appropriate units, e.g., m);

#### **Test result**

For worst case:

Mode	Frequency Range	-	o Output wer	Antenr	na Gain	E	RP	Evaluation Distance	MPE-Based Exemption
Mode	(MHz)	(dBm)	( <b>mW</b> )	(dBi)	(dBd)	(dBm)	(W)	(cm)	Threshold (W)
BLE 1M/2M	2402-2480	7.5	5.62	1.18	-0.97	6.53	0.0045	20	0.768

Note 1: The tune-up power was declared by the applicant. Note 2: 0dBd=2.15dBi.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

#### **Result:** Compliant.

# FCC §15.203 – ANTENNA REQUIREMENT

## **Applicable Standard**

According to § 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.
- c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### Antenna Connector Construction

The EUT has one internal antenna arrangement, which was permanently attached and the antenna gain is 1.18 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

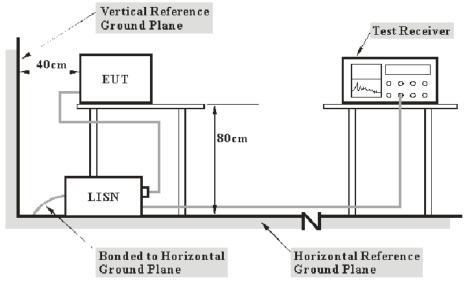
Result: Compliant.

# FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

## **Applicable Standard**

FCC §15.207(a)

## **EUT Setup**



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

The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

## **EMI Test Receiver Setup**

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

#### **Test Procedure**

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

## Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit Level = Read Level + Factor

## **Test Data**

#### **Environmental Conditions**

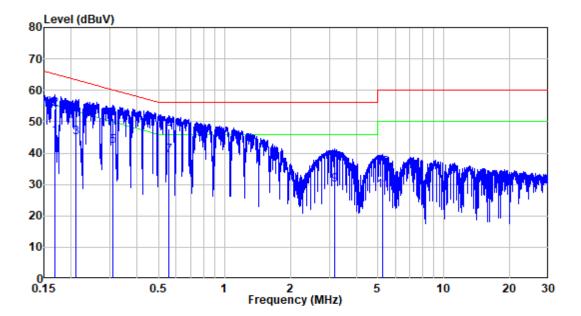
Temperature:	23°C
Relative Humidity:	48%
ATM Pressure:	101.0 kPa

The testing was performed by Jerry Wu on 2023-06-14.

EUT operation mode: BLE Transmitting (worst case BLE 2M low channel)

**Test Result:** Please refer to the below plots:

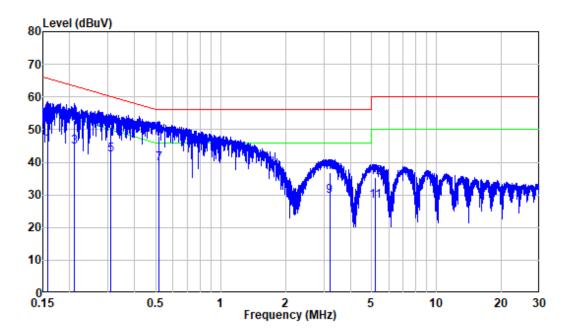
## AC 120V/60 Hz, Line



Site	:	Shielding Room
Condition	:	Line
Job No.	:	RA230612-33356E-RF
Mode	:	BLE Transmitting
Power	:	AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.168	10.34	35.02	45.36	55.05	-9.69	Average
2	0.168	10.34	43.83	54.17	65.05	-10.88	QP
3	0.210	10.30	34.75	45.05	53.19	-8.14	Average
4	0.210	10.30	42.71	53.01	63.19	-10.18	QP
5	0.311	10.42	31.81	42.23	49.95	-7.72	Average
6	0.311	10.42	40.50	50.92	59.95	-9.03	QP
7	0.558	10.60	28.78	39.38	46.00	-6.62	Average
8	0.558	10.60	37.16	47.76	56.00	-8.24	QP
9	3.179	10.50	19.28	29.78	46.00	-16.22	Average
10	3.179	10.50	26.40	36.90	56.00	-19.10	QP
11	5.232	10.56	17.43	27.99	50.00	-22.01	Average
12	5.232	10.56	24.68	35.24	60.00	-24.76	QP -

## AC 120V/60 Hz, Neutral



Site :	Shielding Room
Condition:	Neutral
Job No. :	RA230612-33356E-RF
Mode :	BLE Transmitting
Power :	AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.159	10.28	35.03	45.31	55.54	-10.23	Average
2	0.159	10.28	43.92	54.20	65.54	-11.34	QP
3	0.211	10.30	34.31	44.61	53.17	-8.56	Average
4	0.211	10.30	42.68	52.98	63.17	-10.19	QP
5	0.311	10.37	31.84	42.21	49.95	-7.74	Average
6	0.311	10.37	40.41	50.78	59.95	-9.17	QP
7	0.517	10.47	28.98	39.45	46.00	-6.55	Average
8	0.517	10.47	37.47	47.94	56.00	-8.06	QP
9	3.194	10.53	19.18	29.71	46.00	-16.29	Average
10	3.194	10.53	26.35	36.88	56.00	-19.12	QP
11	5.180	10.51	17.45	27.96	50.00	-22.04	Average
12	5.180	10.51	24.70	35.21	60.00	-24.79	QP

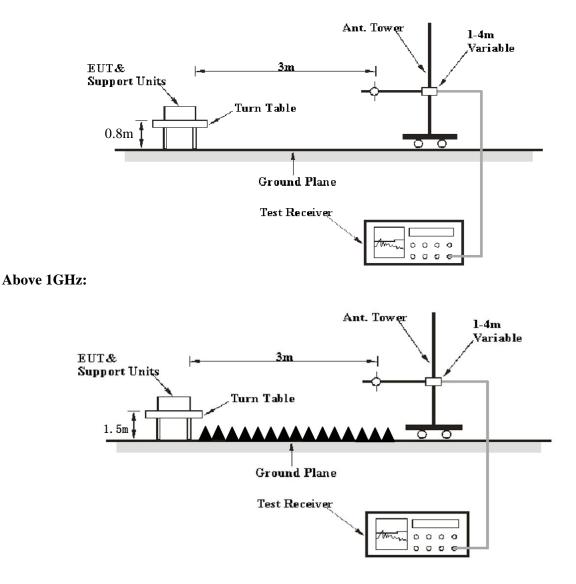
# FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS

#### **Applicable Standard**

FCC §15.205; §15.209; §15.247(d)

#### **EUT Setup**

Below 1 GHz:



The radiated emission performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, FCC 15.247 limits.

## EMI Test Receiver & Spectrum Analyzer Setup

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
	1MHz	3 MHz	/	РК
Above 1 GHz	1MHz	10 Hz <sup>Note 1</sup>	/	Average
	1MHz	$> 1/T^{Note 2}$	/	Average

Note 1: when duty cycle is no less than 98%

Note 2: when duty cycle is less than 98%

If the maximized peak measured value complies with the limit, then it is unnecessary to perform an QP/Average measurement

#### **Test Procedure**

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

## Factor & Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit/Margin = Level / Corrected Amplitude – Limit Level / Corrected Amplitude = Read Level + Factor

## **Test Data**

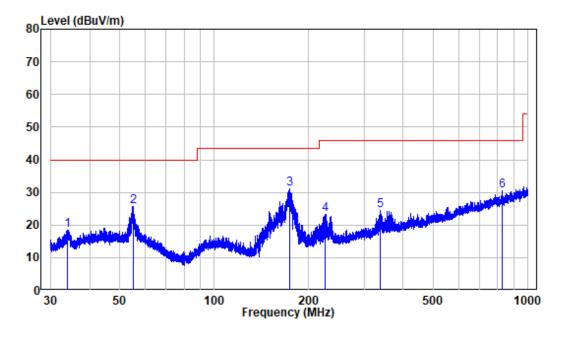
#### **Environmental Conditions**

Temperature:	23-25 °C
Relative Humidity:	55-57%
ATM Pressure:	101.0 kPa

The testing was performed by Jason Liu and Jeef Huang on 2023-06-14.

EUT operation mode: BLE Transmitting

## Below 1GHz: (worst case, BLE 2M Low Channel)

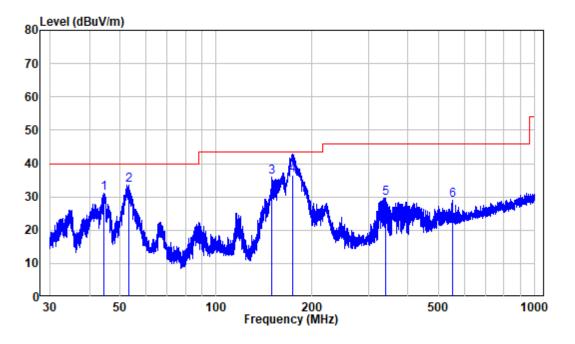


## Horizontal

Site :	chamber
Condition:	3m HORIZONTAL
Job No. :	RA230612-33356E-RF
Test Mode:	BLE Transmitting

	Freq	Factor			Limit Line		Remark
-	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	33.992	-11.85	30.38	18.53	40.00	-21.47	Peak
2	55.124	-10.27	36.06	25.79	40.00	-14.21	Peak
3	173.966	-13.18	44.41	31.23	43.50	-12.27	Peak
4	225.209	-11.25	34.50	23.25	46.00	-22.75	Peak
5	338.104	-7.50	31.85	24.35	46.00	-21.65	Peak
6	826.044	0.06	30.33	30.39	46.00	-15.61	Peak





Site : chamber Condition: 3m VERTICAL Job No. : RA230612-33356E-RF Test Mode: BLE Transmitting

	Freq	Factor			Limit Line		Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	44.470	-9.91	40.86	30.95	40.00	-9.05	Peak
2	53.178	-10.20	43.73	33.53	40.00	-6.47	Peak
3	149.224	-15.31	51.17	35.86	43.50	-7.64	Peak
4	174.119	-13.17	49.70	36.53	43.50	-6.97	QP
5	339.440	-7.45	37.18	29.73	46.00	-16.27	Peak
6	551.190	-4.05	33.00	28.95	46.00	-17.05	Peak

#### Above 1GHz:

Frequency	Rece	iver	Turntable Angle	Rx An	tenna	Factor	Absolute	Limit	Margin	
(MHz)	Reading (dBuV)	PK/AV	Degree	Height (m)	Polar (H/V)	(dB/m)	Level (dBuV/m)	(dBuV/m)	(dB)	
			BL	E 1M, Lov	w Channe	el				
2310	48.65	PK	170	1.8	Н	-10.32	38.33	74	-35.67	
2310	50.48	PK	319	2.1	V	-10.32	40.16	74	-33.84	
2390	57.93	PK	330	2.1	Н	-10.62	47.31	74	-26.69	
2390	59.55	PK	321	1.8	V	-10.62	48.93	74	-25.07	
4804	53.94	PK	84	2.2	Н	-5.58	48.36	74	-25.64	
4804	54.7	PK	272	1.4	V	-5.58	49.12	74	-24.88	
			BLE	1M, Mide	dle Chan	nel				
4884	51.12	PK	207	1.2	Н	-5.23	45.89	74	-28.11	
4884	52.21	PK	339	2.2	V	-5.23	46.98	74	-27.02	
			BL	E 1M, Hig	h Chann	el				
2483.5	67.37	PK	64	1.0	Н	-10.46	56.91	74	-17.09	
2483.5	47.66	AV	64	1.0	Н	-10.46	37.2	54	-16.8	
2483.5	56.24	PK	327	2.0	V	-10.46	45.78	74	-28.22	
2500	49.9	PK	322	1.0	Н	-10.32	39.58	74	-34.42	
2500	49.36	PK	308	2.1	V	-10.32	39.04	74	-34.96	
4960	52.88	PK	22	1.3	Н	-4.90	47.98	74	-26.02	
4960	45.89	PK	195	1.5	V	-4.90	40.99	74	-33.01	
			BL	E 2M, Lov	w Channe	el				
2310	48.67	PK	170	1.8	Н	-10.32	38.35	74	-35.65	
2310	49.12	PK	319	2.1	V	-10.32	38.8	74	-35.2	
2390	59.35	PK	330	2.1	Н	-10.62	48.73	74	-25.27	
2390	52.5	PK	321	1.8	V	-10.62	41.88	74	-32.12	
4804	51.3	PK	84	2.2	Н	-5.58	45.72	74	-28.28	
4804	56.79	PK	272	1.4	V	-5.58	51.21	74	-22.79	
			BLE	2M, Mide	ile Chan	nel				
4884	50.04	PK	207	1.2	Н	-5.23	44.81	74	-29.19	
4884	52.19	PK	339	2.2	V	-5.23	46.96	74	-27.04	
			BL	E 2M, Hig	h Chann	el				
2483.5	69.59	PK	64	1.0	Н	-10.46	59.13	74	-14.87	
2483.5	46.53	AV	64	1.0	Н	-10.46	36.07	54	-17.93	
2483.5	59.17	РК	327	2.0	V	-10.46	48.71	74	-25.29	
2500	53.69	PK	322	1.0	Н	-10.32	43.37	74	-30.63	
2500	47.6	РК	308	2.1	V	-10.32	37.28	74	-36.72	
4960	49.83	РК	22	1.3	Н	-4.90	44.93	74	-29.07	
4960	53.65	PK	195	1.5	V	-4.90	48.75	74	-25.25	

Note:

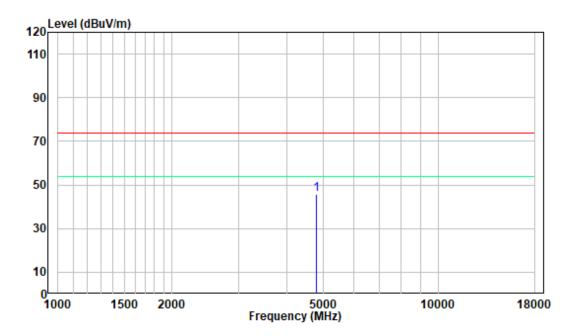
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor Absolute Level (Corrected Amplitude) = Factor + Reading Margin = Absolute Level - Limit The other spurious emission which is in the noise floor level was not recorded.

For above 1GHz, when the test result of peak was 20dB below to the limit of peak, which can be compliant to the average limit, just peak value was recorded.

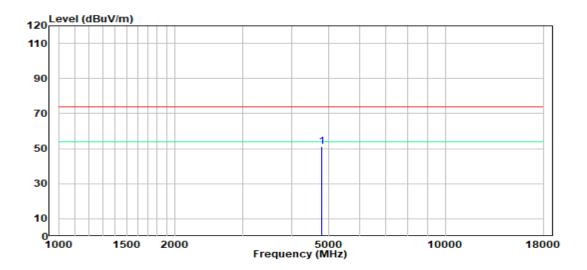
## 1 GHz - 18 GHz: (Pre-Scan plots)

#### (worst case, BLE 2M Low Channel)

Horizontal

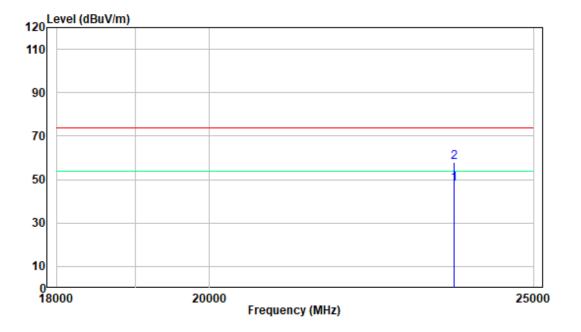


Vertical

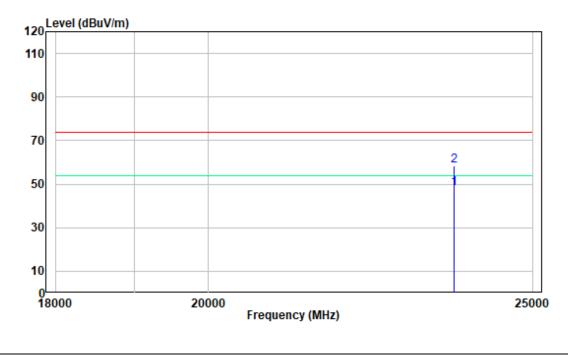


## 18-25GHz: (Pre-Scan plots) (worst case, BLE 2M Low Channel)





Vertical



Version 8: 2023-01-30

# FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH & OCCUPIED BANDWIDTH

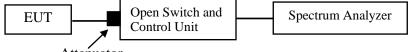
## Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

## **Test Procedure**

According to ANSI C63.10-2013, section 11.8 and section 6.9

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- 3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
- 4. Repeat above procedures until all frequencies measured were complete.



Attenuator

## **Test Data**

#### **Environmental Conditions**

Temperature:	26°C
<b>Relative Humidity:</b>	44%
ATM Pressure:	100.19 kPa

The testing was performed by Matt Liang on 2023-07-07.

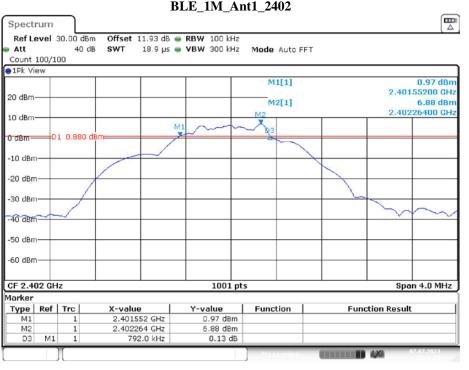
EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the below plots.

Test Mode	Antenna	Channel	DTS BW [MHz]	Limit[MHz]	Verdict
		2402	0.79	0.5	PASS
BLE_1M	Ant1	2442	0.73	0.5	PASS
		2480	0.70	0.5	PASS
		2402	1.15	0.5	PASS
BLE_2M	Ant1	2442	1.16	0.5	PASS
		2480	1.15	0.5	PASS

Test Mode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
	Ant1	2402	1.443	2401.1928	2402.6354	PASS
BLE_1M		2442	1.287	2441.2488	2442.5355	PASS
		2480	1.223	2479.3007	2480.5235	PASS
		2402	2.126	2400.9091	2403.0350	PASS
BLE_2M	Ant1	2442	2.066	2440.9690	2443.0350	PASS
		2480	2.058	2478.9770	2481.0350	PASS

#### 6 dB EMISSION BANDWIDTH



Date: 7.JUL.2023 10:21:15

#### BLE\_1M\_Ant1\_2442

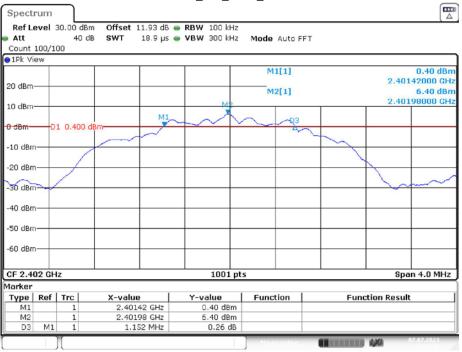


Date: 7.JUL.2023 10:22:17

				]	BLE_1	lM_An	nt1_24	80			
Spectrur	n	٦									
Ref Leve	el 30.	00 dBm	Offset 1	1.93 dB	RBW	100 kHz					( =
Att		40 dB	SWT	18.9 µs	VBW	300 kHz	Mode	Auto FFT			
Count 100	/100										
∋1Pk View	-										
							M	1[1]			0.52 dBm
00 ID										2.47	965600 GHz
20 dBm							M	2[1]			6.15 dBm
10 -10							M2			2.48	026000 GHz
10 dBm							X				
0 40		- 150 di			MI	~~~~~	~ \Q3				
0 dBm		0.150 de	sin				72				
-10 dBm-				_						1	
-10 ubm—				10							
-20 dBm											
-20 ubiii-			/						m		
-30 dBm-											
-50 0011											
-40 dBm-	~	$\checkmark$									$\sim$
TO GDIT										1	
-50 dBm—											
00 00111										1	
-60 dBm—											
										1	
CF 2.48 G						1001 pt:	-			Pn	an 4.0 MHz
GF 2.48 G Marker	112					1001 pt	3			ър	an 4.0 MHZ
	e I T	rc	X-value		Y-va	alue I	Fund	tion 1	Fue	ction Resu	•
Type Re M1	<u>n 1</u>	1	2.4796			.52 dBm	Func	lion	Fun	ction Resu	n.
M2		1		26 GHz		.15 dBm					
	/1	1		.0 kHz		-0.28 dB					
	7						·				07 07 2022
	Л						Mee			1,20	

Date: 7.JUL.2023 10:23:05

#### BLE\_2M\_Ant1\_2402



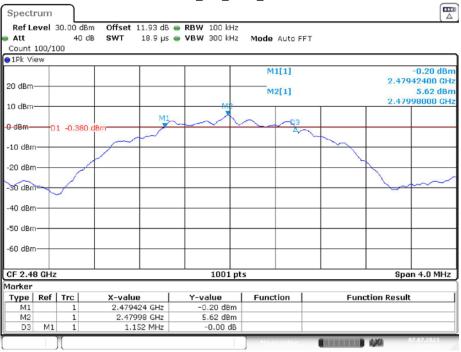
Date: 7.JUL.2023 10:24:10

		L	DLL_2WL_AU	lt1_4774		
Spectrum						
Ref Level	30.00 dB	m Offset 11.93 dB	RBW 100 kHz			
Att	40 d			Mode Auto FFT		
Count 100/	100					
1Pk View						
				M1[1]		-0.02 dBn
						2.44142000 GH
20 dBm				M2[1]		5.89 dBn
10 dBm			140			2.44197600 GH
10 dBm			X			
0 dBm	01 -0.110	dPm M1				
	0.110	ubili		4		
-10 dBm		~			m	
10 0.011						
-20 dBm	1					
	1					
-30 dBm	1				++	
					1 1	
-40 dBm						
					1 1	
-50 dBm					+ +	
					1 1	
-60 dBm					++	
CF 2.442 G	Hz		1001 pt:	5		Span 4.0 MHz
/larker						
Type   Ref	Trc	X-value	Y-value	Function	Funct	ion Result
M1	1	2.44142 GHz	-0.02 dBm			
M2	1	2.441976 GHz	5.89 dBm			
D3 M1	l 1	1.156 MHz	0.20 dB			
	1			Manguring		07.07.2023

BLE 2M Ant1 2442

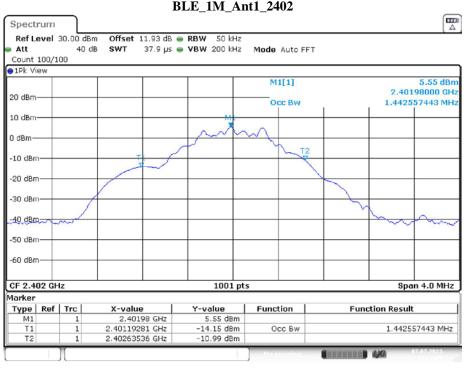
Date: 7.JUL.2023 10:25:11

#### BLE\_2M\_Ant1\_2480



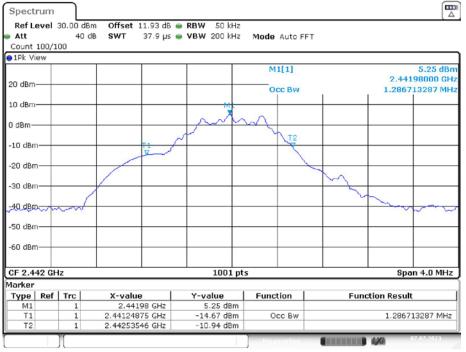
Date: 7.JUL.2023 10:25:56

#### **OCCUPIED BANDWIDTH**



Date: 7.JUL.2023 10:21:21

#### BLE\_1M\_Ant1\_2442



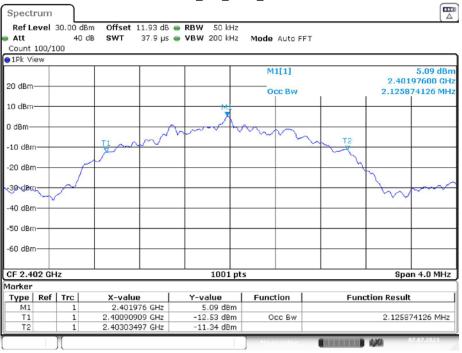
Date: 7.JUL.2023 10:22:23

		1		111_2400		
Spectrum						
Ref Level	30.00 dB	m Offset 11.93 dB	RBW 50 kHz			(
Att	40 c	iB SWT 37.9 μs (	VBW 200 kHz	Mode Auto FF	т	
Count 100/1	100					
1Pk View						
				M1[1]		5.09 dBn
						2.47998000 GH
20 dBm				Occ Bw		1.222777223 MHz
10 dBm						
10 dBm			1			
0 dBm			non	$\sim$		
o ubiii			and a	1.70		
-10 dBm		7. (	~	T2		
10 0.0111		8				
-20 dBm						
				10		
-30 dBm					- V-	
-40 dBm-	Auro	A				
-50 dBm						
-60 dBm						
CF 2.48 GH	z		1001 pt:	s		Span 4.0 MHz
Marker						
Type   Ref	Trc	X-value	Y-value	Function	Fund	ction Result
M1	1	2.47998 GHz	5.09 dBm			
Τ1	1	2.4793007 GHz	-14.81 dBm	Occ Bw		1.222777223 MHz
T2	1	2.48052348 GHz	-10.32 dBm			
1	1			Measuripe	CONTRACTOR OF T	07.07.2023
				)	State of Sta	10:23:10

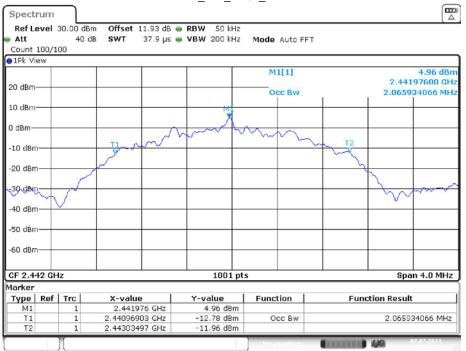
BLE 1M Ant1 2480

Date: 7.JUL.2023 10:23:11

#### BLE\_2M\_Ant1\_2402



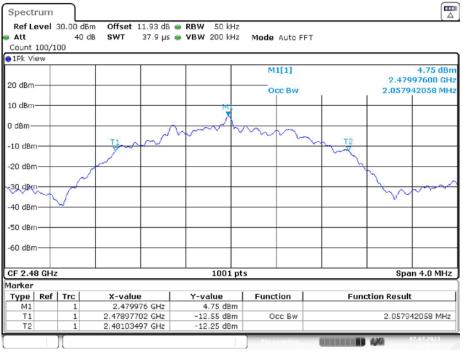
Date: 7.JUL.2023 10:24:16



BLE 2M Ant1 2442

Date: 7.JUL.2023 10:25:17

#### BLE\_2M\_Ant1\_2480



Date: 7.JUL.2023 10:26:02

# FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

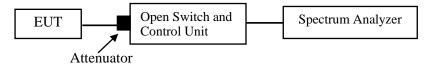
## Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

## **Test Procedure**

According to ANSI C63.10-2013, section 11.9.1.1

- 1. Place the EUT on a bench and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
- 3. Add a correction factor to the display.



## **Test Data**

## **Environmental Conditions**

Temperature:	26℃
Relative Humidity:	44%
ATM Pressure:	100.19 kPa

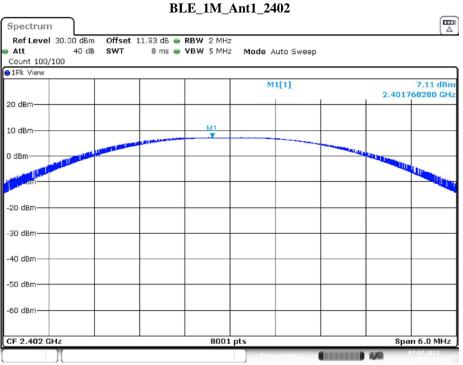
The testing was performed by Matt Liang on 2023-07-07.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the below plots.

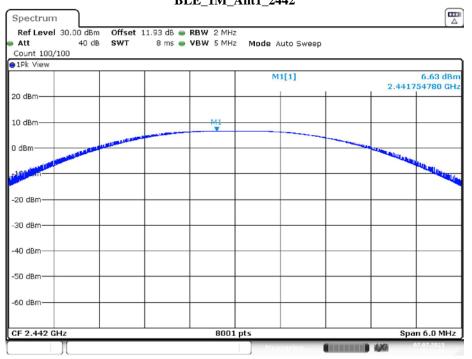
Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
		2402	7.11	<=30	PASS
BLE_1M	Ant1	2442	6.63	<=30	PASS
		2480	6.41	<=30	PASS
BLE_2M	Ant1	2402	7.14	<=30	PASS
		2442	6.66	<=30	PASS
		2480	6.38	<=30	PASS

Version 8: 2023-01-30

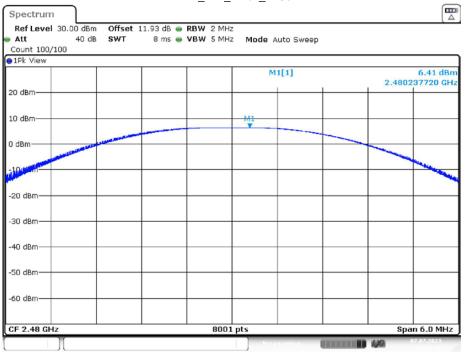


Date: 7.JUL.2023 10:21:27

BLE\_1M\_Ant1\_2442



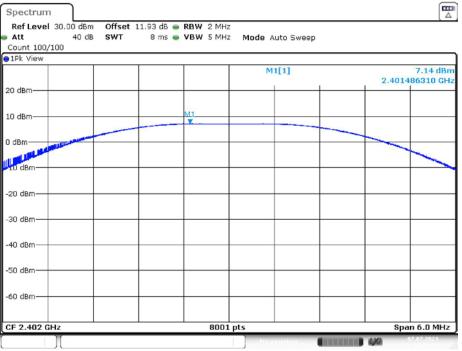
Date: 7.JUL.2023 10:22:29



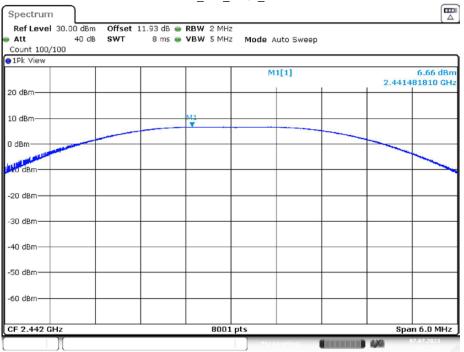
BLE\_1M\_Ant1\_2480

Date: 7.JUL.2023 10:23:16

#### BLE\_2M\_Ant1\_2402



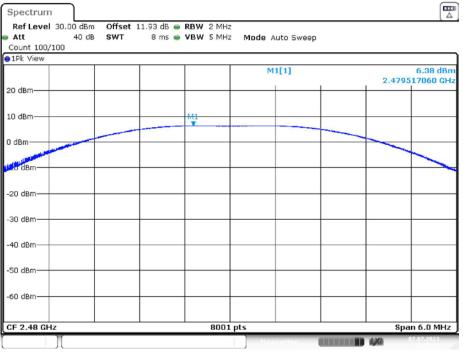
Date: 7.JUL.2023 10:24:22



BLE\_2M\_Ant1\_2442

Date: 7.JUL.2023 10:25:23

#### BLE\_2M\_Ant1\_2480



Date: 7.JUL.2023 10:26:08

# FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

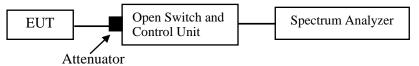
## Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

#### **Test Procedure**

According to ANSI C63.10-2013, section 11.11

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- 3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5. Repeat above procedures until all measured frequencies were complete.



## **Test Data**

#### **Environmental Conditions**

Temperature:	26°C
Relative Humidity:	44%
ATM Pressure:	100.19 kPa

The testing was performed by Matt Liang on 2023-07-07.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the below plots.

Spectru	m								
Ref Lev	el 20.00	dBm Offse	t 11.93 dB	• RBW 100 kHz					( -
Att	3	OdB SWT	132.7 µs 🕯	<b>VBW</b> 300 kHz	Mode Au	uto FFT			
●1Pk View									
					M1[:	1]			6.86 dBr
10 dBm-	_		_						22540 GH
					M2[:	1]			46.56 dBr
0 dBm								2.40	
-10 dBm—									
	D1 -13	.140 dBm	-	+ +					
-20 dBm—									+++
-30 dBm—									
								M	
-40 dBm—			_				1000		ma A
~58\68m~	James en	e el marina	- march		سلمسيسما	Mas	MB	alm med	×
			~					an anna fadaine - Shina	
-60 dBm—	-			-					
-70 dBm—									
Start 2.3	5 GHz			691 pt	s			Stop :	2.405 GHz
Marker									
Type   R	ef   Trc	X-va	lue	Y-value	Functio	n	Fund	tion Result	
M1	1	2.40	2254 GHz	6.86 dBm					
M2	1		2.4 GHz	-46.56 dBm					
M3	1	0.000	2.39 GHz	-49.44 dBm					
M4	1	2.399	92609 GHz	-37.75 dBm					
					Measu	ring		4,40	7.07.2023

BLE 1M Ant1 Low 2402

Date: 7.JUL.2023 10:21:42

## BLE\_1M\_Ant1\_High\_2480

	_	DI		_iiigii_240	U	
Spectrum						
Ref Level	20.00 dB	m Offset 11.93 de	6 👄 RBW 100 kHz			
Att	30 d	B SWT 1.1 ms	5 👄 VBW 300 kHz	Mode Auto S	Sweep	
●1Pk View						
				M1[1]		6.11 dBn
10 dBm	M1					2.480250 GH
	A			M2[1]		-39.73 dBn 2.483500 GH
0 dBm	-					2.40000 011
10 10-	Д					
-10 dBm	1 -13.89	0 dBm				
-20 dBm						
	1.1					
-30 dBm						
1	L M2	M4	MB			
-40 dBm	Ww			mound	put a contention	and the second second
-50 dBm		4 9 9	1 2 2 2	0 1 0 1		
-60 dBm						
-70 dBm						
Start 2.47 0			691 pts	-		Stop 2.55 GHz
Aarker	1112		091 pt:	>		atop 2.00 GH2
	Trc	X-value	Y-value	Function	Fun	ction Result
M1	1	2.48025 GHz	6.11 dBm			
	1	2.4835 GHz	-39.73 dBm			
M2						
M2 M3 M4	1	2.5 GHz 2.495971 GHz	-43.33 dBm -40.43 dBm			

Date: 7.JUL.2023 10:23:31

Att	ever	20.00 dB 30 c		<ul> <li>RBW 100 kHz</li> <li>VBW 300 kHz</li> </ul>	Mode Auto		
1Pk Vi	ew.	30 0	ab <b>3</b> 441 132.7µs	- VDW 300 KH2	MOUE AULU I		
					M1[1]		6.28 dBr
10 dBm·							2.4020150 GH
20 00111					M2[1]		-26.67 dB
0 dBm—							2.400000 GH
10 10-							
10 dBm	D	1 -13.72	0 d8m				
-20 dBm							
							1
-30 dBm							- N N
-40 dBm							al
10 ubii	·					MB	1
-50 dBn	nate	man the	marken and a second and	Man man man a	mond and and and and and and and and and a	Wedge Elsendar	My Marken
60 ID							
-60 dBm							
-70 dBm							
Start 2	.35 G	Hz		691 pt	s		Stop 2.405 GHz
1arker							
Туре	Ref	Trc	X-value	Y-value	Function	Functio	on Result
M1		1	2.402015 GHz	6.28 dBm			
M2		1	2.4 GHz	-26.60 dBm			
MЗ		1	2.39 GHz 2.3999783 GHz	-49.39 dBm -26.97 dBm			

BLE 2M Ant1 Low 2402

Date: 7.JUL.2023 10:24:36

BLE\_2M\_Ant1\_High\_2480

		-			8				_
Spectrum									
Ref Level	20.00 dBr	n Offset 11.93	dB 👄 RBW	100 kHz					
Att	30 di	B SWT 1.1	ms 👄 VBW	300 kHz	Mode /	Auto Swee	эр		
1Pk View									
10 dBm	M1				M1				5.67 dBn 180010 GHa
	X				M2	[1]			-41.42 dBn #83500 GH:
0 dBm	1			+				2.	183300 GH
-10 dBm-	<u> </u>			-+					
	1 -14.330	) dBm							
-20 dBm									
-30 dBm —	VM	4							
-40 dBm	M2M4		M3						
-40 dBm	Uhr	for more the	wenterman	union	manun	multiple	amound	water water	mendowe
-50 dBm-									
-60 dBm		<u> </u>		-+			+	+	
-70 dBm				-+					
Start 2.47 0	Hz			691 pts	;		1	Sto	2.55 GHz
Aarker									
	Trc	X-value	Y-v	alue	Functi	on I	Fur	nction Resul	t
M1	1	2.48001 GH		5.67 dBm					-
M2	1	2.4835 GH	z -4:	1.42 dBm					
M3	1	2.5 GH	z -43	3.45 dBm					
M4	1	2.485072 GH	z -39	9.81 dBm					
1	1			1	Moas	uring		1446	07.07.2023
								- April	

Date: 7.JUL.2023 10:26:23

# FCC §15.247(e) – POWER SPECTRAL DENSITY

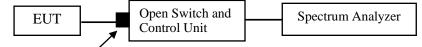
#### **Applicable Standard**

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

## **Test Procedure**

According to ANSI C63.10-2013, section 11.10.2

- 1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
- 2. Set the RBW to:  $3kHz \le RBW \le 100 kHz$ .
- 3. Set the VBW  $\geq$  3×RBW.
- 4. Set the span to 1.5 times the DTS bandwidth.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level within the RBW.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Attenuator

## **Test Data**

#### **Environmental Conditions**

Temperature:	26°C		
<b>Relative Humidity:</b>	44%		
ATM Pressure:	100.19 kPa		

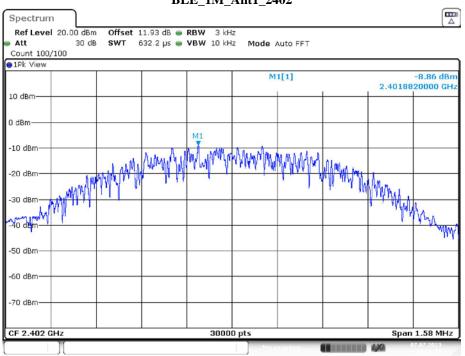
The testing was performed by Matt Liang on 2023-07-07.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the below table and plots.

Test Mode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
		2402	-8.86	<=8	PASS
BLE_1M	Ant1	2442	-9.62	<=8	PASS
		2480	-9.91	<=8	PASS
	Ant1	2402	-12.41	<=8	PASS
BLE_2M		2442	-12.77	<=8	PASS
		2480	-13.13	<=8	PASS

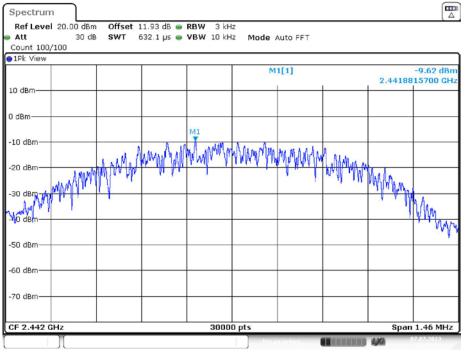
Version 8: 2023-01-30



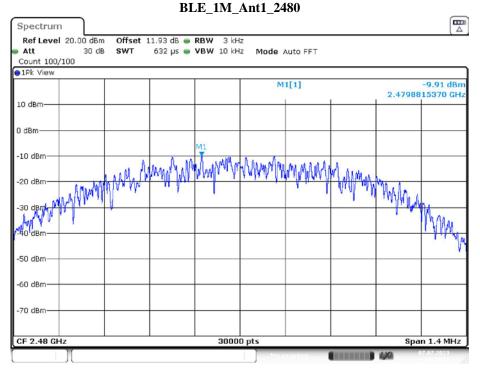
BLE\_1M\_Ant1\_2402

Date: 7.JUL.2023 10:21:33

#### BLE\_1M\_Ant1\_2442

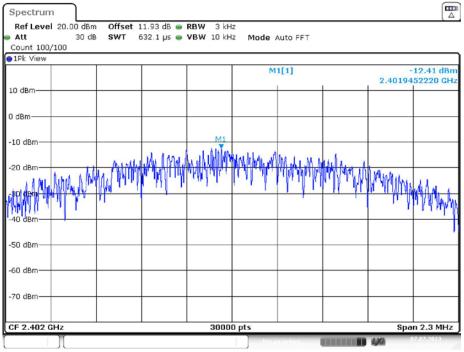


Date: 7.JUL.2023 10:22:35

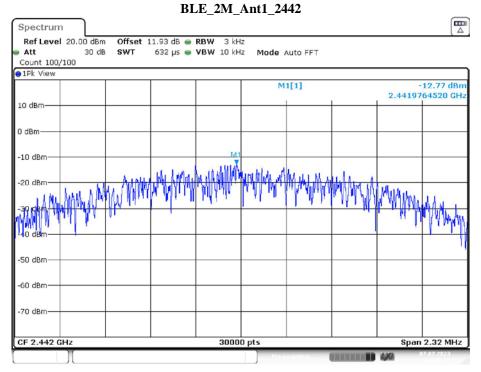


Date: 7.JUL.2023 10:23:23

#### BLE\_2M\_Ant1\_2402

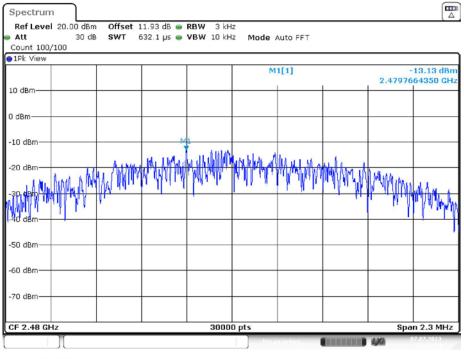


Date: 7.JUL.2023 10:24:28



Date: 7.JUL.2023 10:25:29

#### BLE\_2M\_Ant1\_2480



Date: 7.JUL.2023 10:26:14

#### \*\*\*\*\* END OF REPORT \*\*\*\*\*

Version 8: 2023-01-30