

Shenzhen Toby Technology Co., Ltd.

Report No.: TB-FCC158918 Page: 1 of 46

# FCC Radio Test Report FCC ID: 2APB4-FTS20CW

### **Original Grant**

Report No.	TB-FCC158918	
Applicant	Cooper Lighting, LLC	
Equipment Under	est (EUT)	
EUT Name	LED FIXED LUMINAIRE	
Model No.	FTS20CW	
Serial Model No.	FTS20CB	
Brand Name	N/A	
Receipt Date	2018-03-20	
Test Date	2018-03-21 to 2018-03-29	
Issue Date	2018-03-30	
Standards	FCC Part 15: 2016, Subpart C(15.247)	
Test Method	ANSI C63.10: 2013	
Conclusions	PASS	

In the configuration tested, the EUT complied with the standards specified above,

Test/Witness Engineer

Approved& Authorized

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This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

TB-RF-074-1.0



# Contents

CON	FENTS	2
1.	GENERAL INFORMATION ABOUT EUT	5
	1.1 Client Information	5
	1.2 General Description of EUT (Equipment Under Test)	
	1.3 Block Diagram Showing the Configuration of System Tested	6
	1.4 Description of Support Units	6
	1.5 Description of Test Mode	7
	1.6 Description of Test Software Setting	8
	1.7 Measurement Uncertainty	8
	1.8 Test Facility	9
2.	TEST SUMMARY	10
3.	TEST EQUIPMENT	11
4.	CONDUCTED EMISSION TEST	12
	4.1 Test Standard and Limit	
	4.2 Test Setup	
	4.3 Test Procedure	
	4.4 EUT Operating Mode	
	4.5 Test Da5ta	
5.	RADIATED EMISSION TEST	14
	5.1 Test Standard and Limit	
	5.2 Test Setup	
	5.3 Test Procedure	
	5.4 EUT Operating Condition	17
	5.5 Test Data	17
6.	RESTRICTED BANDS REQUIREMENT	18
	6.1 Test Standard and Limit	18
	6.2 Test Setup	18
	6.3 Test Procedure	
	6.4 EUT Operating Condition	
	6.5 Test Data	19
7.	BANDWIDTH TEST	20
	7.1 Test Standard and Limit	
	7.2 Test Setup	
	7.3 Test Procedure	
	7.4 EUT Operating Condition	20
	7.5 Test Data	
8.	PEAK OUTPUT POWER TEST	21
	8.1 Test Standard and Limit	21
	8.2 Test Setup	



	8.3 Test Procedure	21
	8.4 EUT Operating Condition	21
	8.5 Test Data	21
9.	POWER SPECTRAL DENSITY TEST	
	9.1 Test Standard and Limit	
	9.2 Test Setup	
	9.3 Test Procedure	
	9.4 EUT Operating Condition	
	9.5 Test Data	
10.	ANTENNA REQUIREMENT	
	10.1 Standard Requirement	
	10.2 Antenna Connected Construction	
	10.3 Result	
ATT	ACHMENT A RADIATED EMISSION TEST DATA	
	ACHMENT B RESTRICTED BANDS REQUIREMENT TEST DATA	
ATT	ACHMENT C BANDWIDTH TEST DATA	41
	ACHMENT D PEAK OUTPUT POWER TEST DATA	
	ACHMENT E POWER SPECTRAL DENSITY TEST DATA	
,,,,,,,		



Report No.: TB-FCC158918 Page: 4 of 46

# **Revision History**

Report No.	Version	Description	Issued Date
TB-FCC158918	Rev.01	Initial issue of report	2018-03-29
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# 1. General Information about EUT

1.1 Client Information

Applicant	1	Cooper Lighting, LLC
Address		1121 Highway 74 South Peachtree City, GA 30269, USA.
Manufacturer	1	Cooper Lighting, LLC
Address		1121 Highway 74 South Peachtree City, GA 30269, USA.

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	LED FIXED LUMINAIRE	LED FIXED LUMINAIRE		
Models No.	:	FTS20CW, FTS20CB			
Model Difference	-		entical in the same PCB, layout and electrical ce is appearance and color.		
		Operation Frequency:	Bluetooth 4.2(BLE): 2402MHz~2480MHz		
		Number of Channel:	40 channels see note(3)		
Product		RF Output Power:	-1.224dBm Conducted Power		
Description	÷	Antenna Gain:	2dBi Internal Antenna		
		Modulation Type:	GFSK		
	10	Bit Rate of Transmitter:	1Mbps(GFSK)		
Power Supply	•	AC Voltage supplied	MOUL AUGUS		
Power Rating	:	Input: AC 120~277V, 50	/60Hz		
Software Version	:	N/A	TON DUD		
Hardware Version		N/A Please refer to the User's Manual			
Connecting I/O Port(S)					

#### Note:

This Test Report is FCC Part 15.247 for Bluetooth BLE, the test procedure follows the FCC KDB 558074 D01 DTS Means Guidance v04.

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) Antenna information provided by the applicant.
- (3) Channel List:



Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

## 1.3 Block Diagram Showing the Configuration of System Tested

### TX Mode

à	AC Voltage supplied		EUT		
		Cable 1		I	

# 1.4 Description of Support Units

	Equipment Information							
	Name	Model	FCC ID/VOC	Manufacturer	Used "√"			
	1		1					
2			Cable Information					
	Number	Shielded Type	Ferrite Core	Length	Note			
	Cable 1	NO	NO	1.2M	/			



### 1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

For Radiated Test				
Final Test Mode	Description			
Mode 1	TX Mode			
Mode 2	TX Mode (Channel 00/20/39)			

#### Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

BLE Mode: GFSK Modulation Transmitting mode.

- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a portable unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.



### 1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of RF setting.

Test Software Version	56317_InstalluEnergyTools_2_5_0_108 exe		
Frequency	2402 MHz	2440MHz	2480 MHz
BLE GFSK	DEF	DEF	DEF

### 1.7 Measurement Uncertainty

The reported uncertainty of measurement y  $\pm$  U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U <sub>Lab</sub> )
	Level Accuracy:	
Conducted Emission	9kHz~150kHz	±3.42 dB
	150kHz to 30MHz	±3.42 dB
Dedicted Emission	Level Accuracy:	
Radiated Emission	9kHz to 30 MHz	±4.60 dB
Dedicted Emission	Level Accuracy:	1 40 dD
Radiated Emission	30MHz to 1000 MHz	±4.40 dB
Dedicted Emission	Level Accuracy:	
Radiated Emission	Above 1000MHz	±4.20 dB



Report No.: TB-FCC158918 Page: 9 of 46

#### 1.8 Test Facility

The testing was performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at:1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China.

At the time of testing, the following bodies accredited the Laboratory:

#### **CNAS (L5813)**

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

#### A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.

#### IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

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Report No.: TB-FCC158918 10 of 46 Page:

# 2. Test Summary

Standard Section		Track Harris	MID	
FCC	IC	Test Item	Judgment	Remark
15.203		Antenna Requirement	PASS	N/A
15.207(a)	RSS-GEN 7.2.4	Conducted Emission	PASS	N/A
15.205&15.247(d)	RSS-GEN 7.2.2	Band-Edge & Unwanted Emissions into Restricted Frequency	PASS	N/A
15.247(a)(2)	RSS 247 5.2 (1)	6dB Bandwidth	PASS	N/A
15.247(b)(3)	RSS 247 5.4 (4)	Conducted Max Output Power	PASS	N/A
15.247(e)	RSS 247 5.2 (2)	Power Spectral Density	PASS	N/A
15.205, 15.209&15.247(d)	RSS 247 5.5	Transmitter Radiated Spurious &Unwanted Emissions into Restricted Frequency	PASS	N/A



# 3. Test Equipment

<b>Conducted Emiss</b>	ion Test				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 20, 2017	Jul. 19, 2018
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jul. 20, 2017	Jul. 19, 2018
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 20, 2017	Jul. 19, 2018
LISN	Rohde & Schwarz	ENV216	101131	Jul. 20, 2017	Jul. 19, 2018
Radiation Emissio	on Test	-	-	-	-
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 20, 2017	Jul. 19, 2018
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 20, 2017	Jul. 19, 2018
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar.16, 2018	Mar. 15, 2019
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar.16, 2018	Mar. 15, 2019
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar.16, 2018	Mar. 15, 2019
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar.16, 2018	Mar. 15, 2019
Loop Antenna	Laplace instrument	RF300	0701	Mar.16, 2018	Mar. 15, 2019
Pre-amplifier	Sonoma	310N	185903	Mar.16, 2018	Mar. 15, 2019
Pre-amplifier	HP	8449B	3008A00849	Mar.16, 2018	Mar. 15, 2019
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar.16, 2018	Mar. 15, 2019
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna Conducte	ed Emission				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 20, 2017	Jul. 19, 2018
Spectrum Analyzer	Rohde & Schwarz	ESCI	100010/007	Jul. 20, 2017	Jul. 19, 2018
MXA Signal Analyzer	Agilent	N9020A	MY49100060	Oct. 26, 2017	Oct. 25, 2018
Vector Signal Generator	Agilent	N5182A	MY50141294	Oct. 26, 2017	Oct. 25, 2018
Analog Signal Generator	Agilent	N5181A	MY50141953	Oct. 26, 2017	Oct. 25, 2018
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO26	Oct. 26, 2017	Oct. 25, 2018
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO29	Oct. 26, 2017	Oct. 25, 2018
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO31	Oct. 26, 2017	Oct. 25, 2018
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO33	Oct. 26, 2017	Oct. 25, 2018



# 4. Conducted Emission Test

- 4.1 Test Standard and Limit
  - 4.1.1Test Standard FCC Part 15.207
  - 4.1.2 Test Limit

Eroquonov	Maximum RF Line Voltage (dBμV)		
Frequency	Quasi-peak Level	Average Level	
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *	
500kHz~5MHz	56	46	
5MHz~30MHz	60	50	

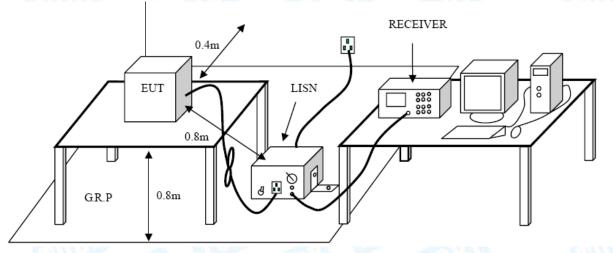
Notes:

(1) \*Decreasing linearly with logarithm of the frequency.

(2) The lower limit shall apply at the transition frequencies.

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2 Test Setup



### 4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.



I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9 kHz, and the test frequency band is from 0.15MHz to 30MHz.

4.4 EUT Operating Mode

Please refer to the description of test mode.

4.5 Test Da5ta

Please refer to the Attachment A.



# 5. Radiated Emission Test

- 5.1 Test Standard and Limit
  - 5.1.1 Test Standard
    - FCC Part 15.247(d)
  - 5.1.2 Test Limit

#### Radiated Emission Limits (9kHz~1000MHz)

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

#### Radiated Emission Limit (Above 1000MHz)

Frequency	Distance Met	ers(at 3m)
(MHz)	Peak (dBuV/m)	Average (dBuV/m)
Above 1000	74	54

#### Note:

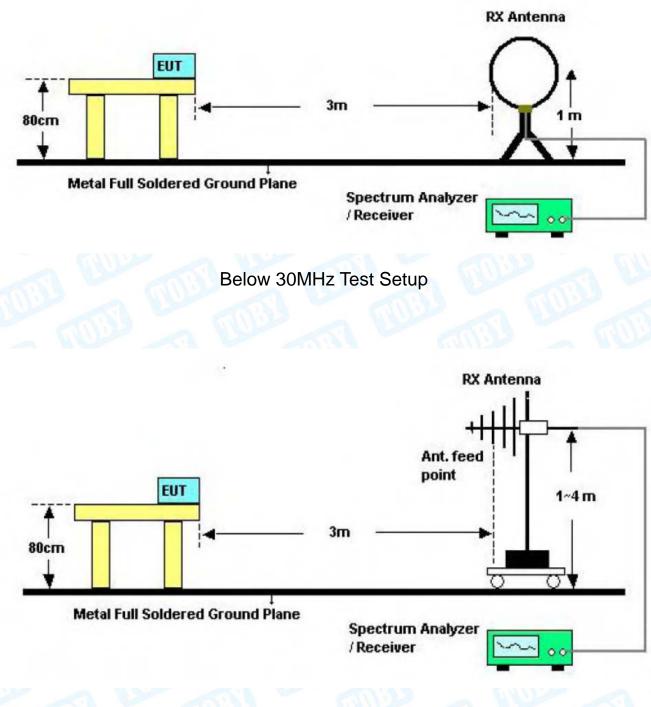
(1) The tighter limit applies at the band edges.

(2) Emission Level (dBuV/m)=20log Emission Level (uV/m)



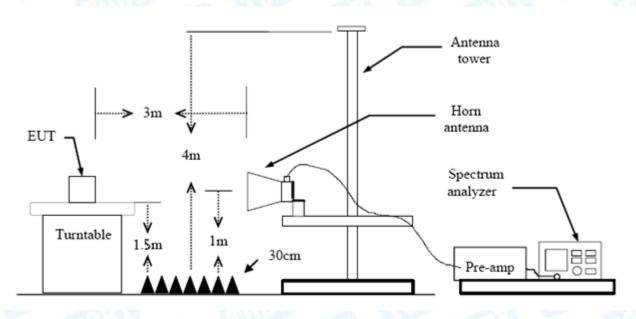
Report No.: TB-FCC158918 Page: 15 of 46

5.2 Test Setup



Below 1000MHz Test Setup





Above 1GHz Test Setup

### 5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) 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.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.



Report No.: TB-FCC158918 Page: 17 of 46

### 5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

Please refer to the Attachment B.

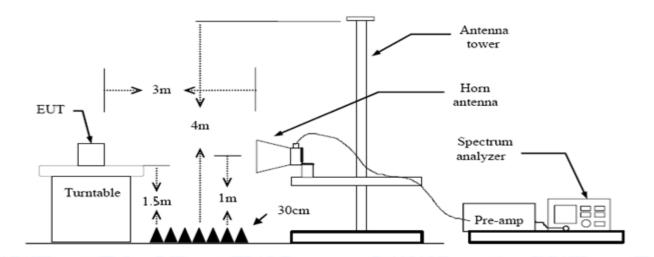


# 6. Restricted Bands Requirement

- 6.1 Test Standard and Limit
  - 6.1.1 Test Standard
    - FCC Part 15.247(d) FCC Part 15.205
  - 6.1.2 Test Limit

Restricted Frequency	Distance Meters(at 3m)	
Band (MHz)	Peak (dBuV/m)	Average (dBuV/m)
2310 ~2390	74	54
2483.5 ~2500	74	54

### 6.2 Test Setup



### 6.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) 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.

- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

6.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values. Please refer to the Attachment C.

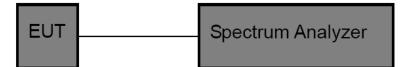


# 7. Bandwidth Test

- 7.1 Test Standard and Limit
  - 7.1.1 Test Standard
    - FCC Part 15.247 (a)(2)
  - 7.1.2 Test Limit

FCC	Part 15 Subpart C(15.247)	/RSS-247
Test Item	Limit	Frequency Range(MHz)
Bandwidth	>=500 KHz (6dB bandwidth)	2400~2483.5

7.2 Test Setup



### 7.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
- (3)Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:100 kHz, and Video Bandwidth:300 kHz, Detector: Peak, Sweep Time set auto.

### 7.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

7.5 Test Data

Please refer to the Attachment D.



# 8. Peak Output Power Test

- 8.1 Test Standard and Limit
  - 8.1.1 Test Standard
    - FCC Part 15.247 (b)(3)
  - 8.1.2 Test Limit

FCC Par	t 15 Subpart C(15.247)/RS	S-247
Test Item	Limit	Frequency Range(MHz)
Peak Output Power	1 Watt or 30 dBm	2400~2483.5

### 8.2 Test Setup



### 8.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement is according to section 9.1.1 of KDB 558074 D01 DTS Meas Guidance v04.

- (1) Set the RBW≥DTS Bandwidth
- (2) Set VBW≥3\*RBW
- (3) Set Span≥3\*RBW
- (4) Sweep time=auto
- (5) Detector= peak
- (6) Trace mode= maxhold.
- (7) Allow trace to fully stabilize, and then use peak marker function to determine the peak amplitude level.

### 8.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

### 8.5 Test Data

Please refer to the Attachment E.

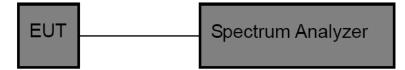


# 9. Power Spectral Density Test

- 9.1 Test Standard and Limit
  - 9.1.1 Test Standard
    - FCC Part 15.247 (e)
  - 9.1.2 Test Limit

FC	C Part 15 Subpart C(15.2	47)
Test Item	Limit	Frequency Range(MHz)
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5

### 9.2 Test Setup



### 9.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v04.

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Set analyser center frequency to DTS channel center frequency.
- (3) Set the span to 1.5 times the DTS bandwidth.
- (4) Set the RBW to: 3 kHz
- (5) Set the VBW to: 10 kHz
- (6) Detector: peak
- (7) Sweep time: auto
- (8) Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

### 9.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

#### 9.5 Test Data

Please refer to the Attachment F.



## 10. Antenna Requirement

#### 10.1 Standard Requirement

#### 10.1.1 Standard

FCC Part 15.203

#### 10.1.2 Requirement

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.

#### 10.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 2dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

#### 10.3 Result

The EUT antenna is a Internal Antenna. It complies with the standard requirement.

Antenna Type	
Permanent attached antenna	
Unique connector antenna	Non and
Professional installation antenna	a Close

# **Attachment A-- Conducted Emission Test Data**

emperature:	<b>25</b> ℃	Re	ative Humidity	/: 5	5%	1 Star
fest Voltage:	AC 120V/60 Hz	-		61	132	
Ferminal:	Line	A WAY		C.		1192
fest Mode:	TX GFSK Mode	2402 MHz	60000		2 1	No.
Remark:	Only worse case	is reported		ar		
80.0 dBuV 30	Mar	MM Mar Mar Mar			OP: AVG:	peak
20 0.150	0.5	(MHz)	5			30.000
0.150	0.5 Reading Freq. Level	(MHz) Correct Factor	Measure-	mit	Over	30.000
0.150 No. Mk. F	Reading	Correct	Measure- ment Li	mit BuV	Over dB	30.000 Detector
0.150 No. Mk. F	Reading Freq. Level	Correct Factor	Measure- ment Li dBuV d	BuV		
0.150 No. Mk. F 1 * 0.4	Reading Freq. Level MHz dBuV	Correct Factor dB	Measure- ment Li dBuV d 45.60 56	BuV 6.95	dB	Detector QP
0.150 No. Mk. F 1 * 0.4 2 0.4	Reading Freq. Level MHz dBuV 4460 36.00	Correct Factor dB 9.60	Measure- ment Li dBuV di 45.60 56 31.35 46	BuV 6.95 6.95	dB -11.35	Detector
0.150 No. Mk. F 1 * 0.4 2 0.4 3 0.6	Reading     Freq.   Level     MHz   dBuV     4460   36.00     4460   21.75	Correct Factor dB 9.60 9.60	Measurement   Li     dBuV   di     45.60   56     31.35   46     42.80   56	BuV 6.95 6.95 6.00	dB -11.35 -15.60	Detector QP AVC
0.150 No. Mk. F 1 * 0.4 2 0.4 3 0.6 4 0.6	Reading     Freq.   Level     MHz   dBuV     4460   36.00     4460   21.75     6700   33.19	Correct Factor dB 9.60 9.60 9.61	Measurement Li   dBuV dl   45.60 56   31.35 46   42.80 56   28.44 46	BuV 5.95 5.95 5.00 5.00	dB -11.35 -15.60 -13.20	Detector QP AVC QP
0.150 No. Mk. F 1 * 0.4 2 0.4 3 0.6 4 0.6 5 1.3	Reading     Freq.   Level     MHz   dBuV     4460   36.00     4460   21.75     6700   33.19     6700   18.83	Correct Factor dB 9.60 9.60 9.61 9.61	Measurement   Li     dBuV   dl     45.60   56     31.35   46     42.80   56     28.44   46     37.15   56	BuV 3.95 3.95 3.00 3.00 3.00	dB -11.35 -15.60 -13.20 -17.56	Detector QP AVG QP AVG
0.150 No. Mk. F 1 * 0.4 2 0.4 3 0.6 4 0.6 5 1.3 6 1.3	Reading     Freq.   Level     MHz   dBuV     4460   36.00     4460   21.75     6700   33.19     6700   18.83     3660   27.55	Correct Factor dB 9.60 9.60 9.61 9.61 9.60	Measurement   Li     dBuV   dl     45.60   56     31.35   46     42.80   56     28.44   46     37.15   56     26.68   46	BuV 5.95 5.95 5.00 5.00 5.00 5.00	dB -11.35 -15.60 -13.20 -17.56 -18.85	Detector QP AVG QP AVG
0.150 No. Mk. F 1 * 0.4 2 0.4 3 0.6 4 0.6 5 1.5 6 1.5 7 1.5	Reading     Freq.   Level     MHz   dBuV     4460   36.00     4460   21.75     6700   33.19     6700   18.83     3660   27.55     3660   17.08	Correct Factor dB 9.60 9.60 9.61 9.61 9.60 9.60	Measurement Li   dBuV dl   45.60 56   31.35 46   42.80 56   28.44 46   37.15 56   26.68 46   39.37 56	BuV 5.95 5.95 5.00 5.00 5.00 5.00 5.00	dB -11.35 -15.60 -13.20 -17.56 -18.85 -19.32	Detector QP AVG QP AVG QP AVG
0.150 No. Mk. F 1 * 0.4 2 0.4 3 0.6 4 0.6 5 1.5 6 1.5 7 1.5 8 1.5	Reading Level     MHz   dBuV     4460   36.00     4460   21.75     6700   33.19     6700   18.83     3660   27.55     3660   17.08     5660   29.76	Correct Factor dB 9.60 9.61 9.61 9.60 9.60 9.61	Measurement Li   dBuV dl   45.60 56   31.35 46   42.80 56   28.44 46   37.15 56   26.68 46   39.37 56   27.00 46	BuV 3.95 3.95 3.00 3.00 3.00 3.00 3.00 3.00 3.00	dB -11.35 -15.60 -13.20 -17.56 -17.56 -18.85 -19.32 -16.63	Detector QP AVG QP AVG QP AVG
0.150 No. Mk. F 1 * 0.4 2 0.4 3 0.6 4 0.6 5 1.5 6 1.5 7 1.5 8 1.5 9 3.5	Reading     Freq.   Level     MHz   dBuV     4460   36.00     4460   21.75     6700   33.19     6700   18.83     3660   27.55     3660   17.08     5660   29.76     5660   17.39	Correct Factor dB 9.60 9.61 9.61 9.60 9.60 9.60 9.61 9.61	Measurement Li   dBuV d   45.60 56   31.35 46   42.80 56   28.44 46   37.15 56   26.68 46   39.37 56   27.00 46   38.76 56	BuV 3.95 3.95 3.00 3.00 3.00 3.00 3.00 3.00 3.00 3.00	dB -11.35 -15.60 -13.20 -17.56 -18.85 -19.32 -19.32 -16.63 -19.00	Detector QP AVG QP AVG QP AVG QP AVG
0.150 No. Mk. F 1 * 0.4 2 0.4 3 0.6 4 0.6 5 1.5 6 1.5 7 1.5 8 1.5 9 3.7 10 3.7	Reading     Freq.   Level     MHz   dBuV     4460   36.00     4460   21.75     6700   33.19     6700   18.83     3660   27.55     3660   17.08     5660   29.76     5660   17.39     1260   29.11	Correct Factor dB 9.60 9.61 9.61 9.60 9.60 9.60 9.61 9.61 9.61 9.65	Measurement Li   dBuV d   45.60 56   31.35 46   42.80 56   28.44 46   37.15 56   26.68 46   39.37 56   27.00 46   38.76 56   28.93 46	BuV 5.95 5.95 5.00 5.00 5.00 5.00 5.00 5.00	dB -11.35 -15.60 -13.20 -17.56 -18.85 -19.32 -16.63 -19.00 -17.24	Detector QP AVG QP AVG QP AVG QP AVG



Femperature:	<b>25</b> ℃		Relative H	umidity:	55%	(III)
Fest Voltage:	AC 120V/60	Hz	- 641			ALC: N
Ferminal:	Neutral		81	Im	132	
Fest Mode:	TX GFSK Mo	de 2402 MHz				6RL
Remark:	Only worse c	ase is reported		2		
80.0 dBuV					QP: AVG:	
30	MMM	W WWW WWW	We want and a second	China Maran Marakat	WWWWWW mmmwmm	AVG
-20 0.150	0.5 Readin	(MHz) Ig Correct	5 Measure-			30.000
No. Mk. F	req. Level	Factor	ment	Limit	Over	
Ν	/Hz dBuV	dB	dBuV	dBuV	dB	Detector
1 0.4	060 32.73	9.58	42.31	57.73	-15.42	QP
2 0.4	060 19.26	9.58	28.84	47.73	-18.89	AVG
3 0.6	30.96	9.59	40.55	56.00	-15.45	QP
4 0.6	700 16.26	9.59	25.85	46.00	-20.15	AVG
	380 31.75		41.35		-14.65	
	3380 16.81		26.41		-19.59	
	580 30.48		40.08		-15.92	QP
	580 16.38		25.98		-20.02	AVG
	2540 30.29	9.62	39.91	56.00	-16.09	QP
9 2.2				40.00	47.00	AVG
	2540 19.15	9.62	28.77	46.00	-17.23	AVC
10 2.2			28.77 39.51		-17.23	QP



Temperature:	<b>25℃</b>	Relative Humidity: 55%	
Test Voltage:	AC 240V/60 Hz	a automa l	
Terminal:	Line	any any	
Test Mode:	TX GFSK Mode 2402 MI	Hz	23
Remark:	Only worse case is report	rted	
80.0 dBuV 30 -20 0.150	0.5 (M	СР: AVG:	peak AVG
0.150	U.5 (M	Hzj 5	30.000
No. Mk. Fi	Reading Corre		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1700	40.12	0.09	40.21	64.96	-24.75	QP
2		0.1700	31.62	0.09	31.71	54.96	-23.25	AVG
3		0.2540	34.78	0.08	34.86	61.62	-26.76	QP
4		0.2540	23.20	0.08	23.28	51.62	-28.34	AVG
5	*	0.4740	34.05	0.06	34.11	56.44	-22.33	QP
6		0.4740	20.30	0.06	20.36	46.44	-26.08	AVG
7		1.4460	33.20	0.05	33.25	56.00	-22.75	QP
8		1.4460	22.99	0.05	23.04	46.00	-22.96	AVG
9		2.3860	32.60	0.06	32.66	56.00	-23.34	QP
10		2.3860	23.28	0.06	23.34	46.00	-22.66	AVG
11		4.1380	30.59	0.06	30.65	56.00	-25.35	QP
12		4.1380	21.45	0.06	21.51	46.00	-24.49	AVG



est Voltage: erminal: est Mode:	AC 240V/60 Hz	GUL	
est Mode:	Neutral		133
	TX GFSK Mode 2402 MHz		
emark:	Only worse case is reported		2 194
80.0 dBuV 30 ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0.5 (MHz)	и и и и и и и и и и и и и и и и и и и	OP:

			Reading	Correct	Measure-		-	
No.	Mk.	Freq.	Level	Factor	ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1700	40.17	0.06	40.23	64.96	-24.73	QP
2		0.1700	31.77	0.06	31.83	54.96	-23.13	AVG
3		0.2540	34.78	0.04	34.82	61.62	-26.80	QP
4		0.2540	23.72	0.04	23.76	51.62	-27.86	AVG
5		0.4700	33.95	0.02	33.97	56.51	-22.54	QP
6		0.4700	21.99	0.02	22.01	46.51	-24.50	AVG
7		0.6340	31.96	0.01	31.97	56.00	-24.03	QP
8		0.6340	19.47	0.01	19.48	46.00	-26.52	AVG
9	*	1.3619	34.83	0.01	34.84	56.00	-21.16	QP
10		1.3619	24.04	0.01	24.05	46.00	-21.95	AVG
11		2.3179	30.82	0.02	30.84	56.00	-25.16	QP
12		2.3179	20.54	0.02	20.56	46.00	-25.44	AVG



# **Attachment B-- Radiated Emission Test Data**

#### 9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB Below the permissible value has no need to be reported.

#### 30MHz~1GHz

				2.11.1.1		
Temperature:	<b>25℃</b>		<b>Relative Hum</b>	nidity:	55%	
Test Voltage:	AC 120V/60H	ΗZ	3		den	
Ant. Pol.	Horizontal					147
Test Mode:	BLE TX 2402	2 Mode		S. Land	12	
Remark:	Only worse c	ase is reported	and a	6	IND	-
80.0 dBu∀/m						
30		× *		hummer		
30.000 40 50		(MHz)	300	400 500	600 700	1000.000
No. Mk. F	req. Lev	-	Measure- ment	Limit	Over	
N	/Hz dBu	V dB/m	dBuV/m	dBuV/m	dB	Detector
1 36.	5092 39.2	22 -17.46	21.76	40.00	-18.24	QP
2 59.4	4405 50.6	64 -23.92	26.72	40.00	-13.28	QP
3 66.	0342 48.7	77 -23.41	25.36	40.00	-14.64	QP
4 80.9	9275 45.1	14 -22.69	22.45	40.00	-17.55	QP

\*:Maximum data x:Over limit !:over margin

142.8243

256.5211

5

6

Emission Level= Read Level+ Correct Factor

59.80

45.70

-21.11

-16.92

38.69

28.78

43.50

46.00

-4.81

-17.22

QP

QP



Гетр	perature:	2	5℃						Re	ative	Hu	mid	ity:		55	%			
Test `	Voltage:	A	C 12	20V	/60	HZ					54	30			2	2			20
Ant.	Pol.	V	ertic	al			1	1			6		1	2					~
Test	Mode:	В	LE	TX 2	240	2 M	ode		22		1	2		U	2		A	1	
Rema	ark:	C	only	wor	se	case	e is re	eporte	d	m	11				2				
80.0	dBuV/m																		_
30			, z	3			M	4 , M	5	- F J	Vm,					Han	gin 6	dB	
					V	\w						year 	<b>W</b> <sup>1</sup>	φ					
-20					V	W						y.ur							
-20 30.0	000 40	50	60	70 8	V 10			(MHz	)			γ 00	40		500	600	700	100	
30.0				R	ea	ding		orrec	t	Mea	3	00	40	0	500			100	DO. 00
30.0	000 40 0. Mk.	50 Free		R					t	Mea: me	3 sure ent	00		0	500	600 Ove		100	DO. 00
30.0			<b>q</b> .	R	ea Lev			orrec	t	Mea: me	31 SUITE	00	40	o nit	500		ər		
30.0	o. Mk.	Free	<b>1</b> .	R	ea Lev	vel uV		Correct Facto	r r	Mea: me dBu	3 sure ent	00	40 Lim dBu	o nit	500	Ove	er I		ecto
30.0 No	). Mk. ! 5	Free	q. : 30	R	ea Lev dB 58.	vel uV	-:	Correct Facto dB/m	r ?	Meas me dBu 34	3 sure ent iV/m	00	40 Lim dBu 40	o nit ıV/n	500	Ove dB	er 3 D1	Det	ecto P
30.0 No	). Mk. ! 5 * 6	Frec MHz 1.843	4. : 30	R	ea Le dB 58.	vel uV .81		Correct Facto dB/m 23.82	r ?	Meas me dBu 34 35	sure ent V/m .99	00	40 Lim dBu 40	• • • • • •	500	О∨€ dВ -5.(	er 5 01 78	Det	ecto P P
30.0 No 1 2	0. Mk. 1 5 * 6 7	Frec MHz 1.843 3.091	1. 30 16 26	R	ea Le\ dB 58. 58.	vel uV .81 .88		Correct Facto dB/m 23.82 23.66	r P	Mea: me dBu 34 35 33	sure ent V/m .99 .22	00	40 Lim dBu 40 40	0 11 1V/n .00	500	Ove dB -5.0	er 5 01 78 52	Det Q Q	ecto P P
30.0 No 1 2 3	0. Mk. 1 5 * 6 7 15	Frec MHz 1.843 3.091 9.242	4. 30 16 26 44	R	dB 58. 56.	vel uV .81 .88 .25		Correct Facto dB/m 23.82 23.66 22.77	r P	Mea: me dBu 34 35 33 37	<sup>3</sup> sure ent .99 .22 .48	00	40 Lim dBu 40 40 40 40	0 nit .00 .00	500	Ove dB -5.( -4.7 -6.(	er 01 78 52 35	Det Q Q	ecto P P P

\*:Maximum data x:Over limit !:over margin

# TOBY

### Above 1GHz

Tem	perature:	<b>25</b> ℃			Relative Hu	umidity:	55%
<b>Fest</b>	Voltage:	AC 120	V/60HZ			-	
Ant.	Pol.	Horizon	tal	(all)		119	
ſest	Mode:	BLE Mo	de TX 240	2 MHz		5	1000
Rem	ark:		ort for the e ed limit.	mission v	hich more th	an 10 dB	below the
110.0	dBuV/m						
						(RF) FCC	PART 15C (PEAK)
	1					(BF) FC	C PART 15C (AVG)
50	2						
	×						
-10							
10	00.000 3550.00	6100.00 86	50.00 11200	0.00 13750.0	0 16300.00 18	850.00 2140	10.00 26500.00 M

No	Mk.	Freq.			Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4804.698	43.60	13.44	57.04	74.00	-16.96	peak
2	*	4805.655	30.06	13.46	43.52	54.00	-10.48	AVG



lem	peratur	e:	<b>25℃</b>				Rela	tive Hu	midity:	55%	
Test	t Voltage	e:	AC 1	120V	/60HZ	30		241	1.10		A Real
۹nt.	Pol.		Verti	ical	1 Sec	1	12		100	132	
fest	Mode:		BLE	Mod	le TX 2	402 MH	z	-			63
Rem	nark:				t for the	emissio	on which	more th	nan 10 dE	3 below tl	ne
110.0	) dBuV/m					1	i				
									(RF) FCC	C PART 15C (F	PEAK)
		2									
		X							(RF) FC	CC PART 15C	(AVG)
50		1 X									
-10	00.000 3550		6100.00	8650	00 11	200.00 13	750.00 163	300.00 18	3850.00 214	00.00	26500.00 1

No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.366	30.22	13.44	43.66	54.00	-10.34	AVG
2		4805.124	43.69	13.45	57.14	74.00	-16.86	peak



emperature:	25°	C		Relative Hum	idity:	55%
est Voltage:	AC	120V/60Hz	Ζ	- AUD	2	
nt. Pol.	Ho	rizontal			In	182
est Mode:	BL	E Mode TX	2442 MHz		6	-
emark:		report for the scribed limi		which more than	10 dB	below the
110.0 dBu¥/m						
					(BE) ECC	PART 15C (PEAK)
					(11) 1 00	
	1 X				(RF) FCI	C PART 15C (AVG)
50	2					
	×					
-10						

No.	Mk.	Freq.			Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4883.240	43.53	13.91	57.44	74.00	-16.56	peak
2	*	4884.753	29.66	13.92	43.58	54.00	-10.42	AVG



Tem	perature:	<b>25</b> ℃			Relative Hu	midity:	55%		
Test	Voltage:	AC 1	20V/60HZ	30	19				
Ant.	Pol.	Vertic	al	-	51	100	133		
Test	Mode:	BLE I	Mode TX 2	442 MHz	/				
Rem	ark:		Io report for the emission which more than 10 dB below the prescribed limit.						
110.0	dBuV/m								
						(RF) FCC	PART 15C (PEAK)		
-									
	2	ו ג				(RF) FCC	PART 15C (AVG)		
50		2							
-									
-									
-10									
L	00.000 3550.00	6100.00	8650.00 11	200.00 13750.	00 16300.00 188	50.00 2140	0.00 26500.00		

No.	Mk.	Freq.			Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4881.854	43.96	13.90	57.86	74.00	-16.14	peak
2	*	4882.552	31.23	13.90	45.13	54.00	-8.87	AVG



emperatu	ire:	<b>25</b> ℃		- <u></u>	Relative Hu	midity:	55%		
est Volta	ge:	AC 120\	C 120V/60HZ						
Ant. Pol.		Horizont	rizontal						
est Mode	:	BLE Mod	LE Mode TX 2480 MHz						
Remark:			o report for the emission which more than 10 dB below the rescribed limit.						
110.0 dBu¥/n	n								
						(RF) FCC I	PART 15C (PEAK		
	1 X					(RF) FCC	PART 15C (AVG		
50	2 X								
	^								
-10									
1000.000 35	550.00 6	100.00 865	0.00 11200.00	13750.00	16300.00 188	50.00 21400	0.00 2		

No	. Mk.	Freq.			Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4959.156	44.11	14.36	58.47	74.00	-15.53	peak
2	*	4960.382	30.79	14.36	45.15	54.00	-8.85	AVG



Cemperature:	<b>25</b> ℃			Relative Hu	midity:	55%				
est Voltage:	AC 120	C 120V/60HZ								
Ant. Pol.	Vertical	A Second	-		(m)					
fest Mode:	BLE M	ode TX 248	0 MHz			-				
Remark:		ort for the e bed limit.	mission w	hich more tha	an 10 dB	below the				
110.0 dBuV/m										
					(RF) FCC	PART 15C (PEAK)				
1 ×					(RF) FCC	PART 15C (AVG)				
502										
-10										

No.	Mk.	Freq.	-		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4959.337	44.00	14.36	58.36	74.00	-15.64	peak
2	*	4960.254	30.75	14.36	45.11	54.00	-8.89	AVG



# **Attachment C-- Restricted Bands Requirement Test Data**

Temperature:	: <b>25</b> ℃			Relative Hu	umidity:	55%		
Test Voltage:	AC 120	C 120V/60HZ						
Ant. Pol.	Horizon	tal			28	19 ~	25	
Test Mode:	BLE Mo	de TX 2402	2 MHz	3. 62	-01			
Remark:	N/A		CUD	2				
100.0 dBuV/m								
						3 X		
						4		
					(RF) FCC I	PART 15C (PEAK)		
						PART 15C (AVG)		
50						PART IDC (AVD)		
						_ /   \	(	
					2		<u></u>	
0.0								
2312.000 2322.0	0 2332.00	2342.00 235	52.00 2362	.00 2372.00	2382.00 2392.	.00 24	12.00	
		Reading	Correc			_		
No. Mk.	Freq.	Level	Facto	or ment	Limit	Over		
	MHz	dBuV	dB/m	dBuV/m	n dBuV/m	n dB	De	
1 2	390.000	49.78	0.77	50.55	5 74.00	-23.45	p	
2 2	390.000	32.52	0.77	33.29	54.00	-20.71	-	
	401.800	94.89	0.82	95.71	Fundament	al Frequency	p	
3 X 24	401.000	04.00	0.02		i unuament	arriequency		



emperature:	<b>25</b> ℃			Relative Hu	midity:	55%	
est Voltage:	AC 12	20V/60HZ		10 -	0000	-	A CONTRACT
nt. Pol.	Vertic	al		21	1	680	
est Mode:	BLE	Node TX 24	402 MHz				<b>A</b>
emark:	N/A	1900			12	2	100
100.0 dBu¥/m						3	
						×	
						2	{
					(RF) FC	C PART 15C (F	PEAKJ
					(75)		
					(HF)†	CC PART 15C	
50							
					2		
					X		
0.0							
2312.000 2322.00	2332.00	2342.00 2	2352.00 2362.	00 2372.00	2382.00 23	92.00	2412.00 M

No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	51.97	0.77	52.74	74.00	-21.26	peak
2		2390.000	32.93	0.77	33.70	54.00	-20.30	AVG
3	Х	2401.800	95.69	0.82	96.51	Fundamental	Frequency	peak
4	*	2402.100	84.43	0.82	85.25	Fundamental	Frequency	AVG



Temperature:	<b>25</b> ℃	Relative Humidity:	55%				
Fest Voltage:	AC 120V/60HZ						
Ant. Pol.	Horizontal						
ſest Mode:	BLE Mode TX 2480 MH	) MHz					
Remark:	N/A						
100.0dBuV/m							
1 ×							
2							
Ň		(RF) FCC	PART 15C (PEAK)				
3 X			PART 15C (AVG)				
50 4							
0.0							

Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
X	2479.700	89.69	1.15	90.84	- Fundamental	Frequency	peak
ł	2480.000	79.50	1.15	80.65	- Fundamental	Frequency	AVG
	2483.500	56.22	1.17	57.39	74.00	-16.61	peak
	2483.500	44.86	1.17	46.03	54.00	-7.97	AVG
	<b>X</b>	MHz X 2479.700	Mk.   Freq.   Level     MHz   dBuV     X   2479.700   89.69     2480.000   79.50     2483.500   56.22	Mk.   Freq.   Level   Factor     MHz   dBuV   dB/m     X   2479.700   89.69   1.15     2480.000   79.50   1.15     2483.500   56.22   1.17	Mk.   Freq.   Level   Factor   ment     MHz   dBuV   dB/m   dBuV/m     X   2479.700   89.69   1.15   90.84     2480.000   79.50   1.15   80.65     2483.500   56.22   1.17   57.39	Mk.   Freq.   Level   Factor   ment   Limit     MHz   dBuV   dB/m   dBuV/m   dBuV/m   dBuV/m     X   2479.700   89.69   1.15   90.84   Fundamental     2480.000   79.50   1.15   80.65   Fundamental     2483.500   56.22   1.17   57.39   74.00	Mk.   Freq.   Level   Factor   ment   Limit   Over     MHz   dBuV   dB/m   dBuV/m   dBuV/m   dB     X   2479.700   89.69   1.15   90.84   Fundamental Frequency     2480.000   79.50   1.15   80.65   Fundamental Frequency     2483.500   56.22   1.17   57.39   74.00   -16.61



Femperature:	<b>25°</b> ℃		R	elative Hum	nidity:	55%	
Fest Voltage:	AC 120	V/60HZ	3	- 611	1000		
Ant. Pol.	Vertical	199	-		61	132	~
Fest Mode:	BLE Mo	de TX 248	0 MHz				
Remark:	N/A	2023		110	2	A 199	
100.0 dBu¥/m							
×							
2 X							
					(RF) FCC	C PART 15C (PEAK)	_
3 X							
					(RF) FC	C PART 15C (AVG)	
50 ×							
-M	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	·····					
0.0	2490.00	2500.00 2510	.00 2520.00	2530.00 2	540.00 255	i0.00 2570.0	

No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	Х	2479.700	94.01	1.15	95.16	- Fundamental	Freauencv	peak
2	×	2479.900	83.11	1.15	84.26	Fundamental	Frequency	AVG
3		2483.500	59.54	1.17	60.71	74.00	-13.29	peak
4		2483.500	48.45	1.17	49.62	54.00	-4.38	AVG



### (2) Conducted Test

	<b>25</b> ℃		Relative Humidity:	55%
Voltage:	AC 120V/60HZ			
Mode:	BLE Mode TX 2	402MHz / BL	E Mode TX 2480M	Hz
ark:	The EUT is prog	ramed in co	ntinuously transmitt	ing mode
Keysight Spectrum A		CENCEJINE		
	2.356000000 GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	09:05:30 AM Mar 23, 2018 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN
Ref	IFGain:Lo	W Atten: 30 dB	Μ	kr1 2.402 0 GHz
10 dB/div Rel	f 23.61 dBm			-2.717 dBm
3.61				∳ <sup>1</sup>
-6.39				-22.74 dBm
-26.4				
-46.4	and the second		4	
-56,4 Went-workshow		494 di fi		1/2012/10/2012/2019/10/10/10/10/10/10/10/10/10/10/10/10/10/
Start 2.30600 #Res BW 100		#VBW 300 kHz	Sweep	Stop 2.40600 GHz 9.600 ms (1001 pts)
MKR MODE TRC SCL	X	Y FUNCTION 2.717 dBm	-	CTION VALUE
2 N 1 f 3 N 1 f 4 N 1 f	2.400 0 GHz -5 2.390 0 GHz -5	1.070 dBm 5.502 dBm 4.007 dBm		
				E
8 9 10				
		m		•
MSG		m	STATUS	•
Keysight Spectrum A	50 Ω AC	m SENSE:INT	ALIGN AUTO	09:11:02 AM Mar 23, 2018
Keysight Spectrum A		t 😱 Trig: Free Run		
Msg Msg W R R Center Freq 2	2.526000000 GHz PNO: Fas IFGain:Lor	t 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	09:11:02 AM Mar 23, 2018 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN Ikr1 2.480 0 GHz
Msg Msg W R R Center Freq 2	50 Ω AC 2.526000000 GHz PNO: Fas	t 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	09:11:02 AM Mar23, 2018 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N
MSG MSG MSG MSG MSG Keysight Spectrum A RF Center Freq 2 10 dB/div Ref 13 6 3 61 1 1	2.526000000 GHz PNO: Fas IFGain:Lor	t 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	09:11:02 AM Mar 23, 2018 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN Ikr1 2.480 0 GHz
MSG MSG MSG MSG Keysight Spectrum A RF Center Freq 2 10 dB/div Ref 10 dB/div Ref 13 6 13 6	2.526000000 GHz PNO: Fas IFGain:Lor	t 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	09:11:02 AM Mar 23, 2018 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN Ikr1 2.480 0 GHz
MSG MSG MSG MSG MSG MSG MSG MSG	2.526000000 GHz PN0: Fas IFGain:Lo Offset 3.61 dB f 23.61 dBm	t 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	09:11:02:44 War 23:20:15 TRACE  ] 2:3:4:5 TYPE PI MANNIN DET PINNINN Ikr1 2:480 0 GHz -1.882 dBm
Image: Keysight Spectrum A   I	2.526000000 GHz PN0: Fas IFGain:Lo Offset 3.61 dB f 23.61 dBm	t Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	09:11:02:44 War 23:20:15 TRACE  ] 2:3:4:5 TYPE PI MANNIN DET PINNINN Ikr1 2:480 0 GHz -1.882 dBm
Keysight Spectrum /     MSG     MR     Center Freq 2     10 dB/div     13 6     3 61     -6.39     -16.4     -26.4     -66.4	2.526000000 GHz PN0: Fas IFGain:Lo Offset 3.61 dB f 23.61 dBm	t Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	09:11:02 M M 473 2015 TRACE [] 2 3 4 5 6 TYPE M 45 6 DET P NUMMEN LKr1 2.480 0 GHz -1.882 dBm -21:00 dbm
Image: Section of the section of t	2.526000000 GHz PN0: Fas IFGain:Lo f 0ffset 3.61 dB f 23.61 dBm	t Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 M	09:11:02 M M 473 2015 TRACE [] 2 3 4 5 6 TYPE M 45 6 DET P NUMMEN LKr1 2.480 0 GHz -1.882 dBm -21:00 dbm
Keysight Spectrum A     MSC   PF     Center Freq 2   PF     O dB/div   Ref     10 dB/div   Ref	2.526000000 GHz PN0: Fas IFGain: Lo Offset 3.61 dB f 23.61 dBm 4 4 4 GHz KHz	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 M	09:11:02 AM JAR 23 2015 TRACE 12:3:4:5: TYPE MANNANA DET P NNNNN Ikr1 2.480 0 GHz -1.882 dBm -21:88 dBm -21:88 dBm Stop 2.57600 GHz
Keysight Spectrum /     MSG     MSG <td>2.526000000 GHz 2.526000000 GHz PN0: Fas IFGain:Lor Offset 3.61 dB f 23.61 dBm 4 4 4 4 6 GHz KHz X 2.480 0 GHz 2.480 0 GHz 2.480 0 GHz 2.500 0 GHz 2.500 0 GHz</td> <td>Trig: Free Run Atten: 30 dB     ************************************</td> <td>ALIGN AUTO Avg Type: Log-Pwr Avg Hold:&gt;100/100 M</td> <td>09:11:02 AM JAR 23:2015 TRACE [] 2:3:4:5: TYPE [] 2:3:4:5: TYPE [] 2:3:4:5: DET P NNNNN Ikr1 2:480 0 GHz -1.882 dBm -21:88 dBm -21:88 dBm Stop 2:57600 GHz 9.600 ms (1001 pts)</td>	2.526000000 GHz 2.526000000 GHz PN0: Fas IFGain:Lor Offset 3.61 dB f 23.61 dBm 4 4 4 4 6 GHz KHz X 2.480 0 GHz 2.480 0 GHz 2.480 0 GHz 2.500 0 GHz 2.500 0 GHz	Trig: Free Run Atten: 30 dB     ************************************	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 M	09:11:02 AM JAR 23:2015 TRACE [] 2:3:4:5: TYPE [] 2:3:4:5: TYPE [] 2:3:4:5: DET P NNNNN Ikr1 2:480 0 GHz -1.882 dBm -21:88 dBm -21:88 dBm Stop 2:57600 GHz 9.600 ms (1001 pts)
Image: Sector of the secto	2.526000000 GHz 2.526000000 GHz PN0: Fas IFGain:Lor Offset 3.61 dB f 23.61 dBm 4 4 4 4 6 GHz KHz X 2.480 0 GHz 2.480 0 GHz 2.480 0 GHz 2.500 0 GHz 2.500 0 GHz	Trig: Free Run Atten: 30 dB     # Participan Street Run Atten: 30 dB     # Participan Street Run Atten: 30 dB     # Participan Street Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 M	09:11:02 AM JAR 23:2015 TRACE [] 2:3:4:5: TYPE [] 2:3:4:5: TYPE [] 2:3:4:5: DET P NNNNN Ikr1 2:480 0 GHz -1.882 dBm -21:88 dBm -21:88 dBm Stop 2:57600 GHz 9.600 ms (1001 pts)
Image: Sector of the secto	2.526000000 GHz 2.526000000 GHz PN0: Fas IFGain:Lor Offset 3.61 dB f 23.61 dBm 4 4 4 4 6 GHz KHz X 2.480 0 GHz 2.480 0 GHz 2.480 0 GHz 2.500 0 GHz 2.500 0 GHz	Trig: Free Run Atten: 30 dB     ************************************	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 M	09:11:02 AM JAR 23:2015 TRACE [] 2:3:4:5: TYPE [] 2:3:4:5: TYPE [] 2:3:4:5: DET P NNNNN Ikr1 2:480 0 GHz -1.882 dBm -21:88 dBm -21:88 dBm Stop 2:57600 GHz 9.600 ms (1001 pts)

# Attachment D-- Bandwidth Test Data

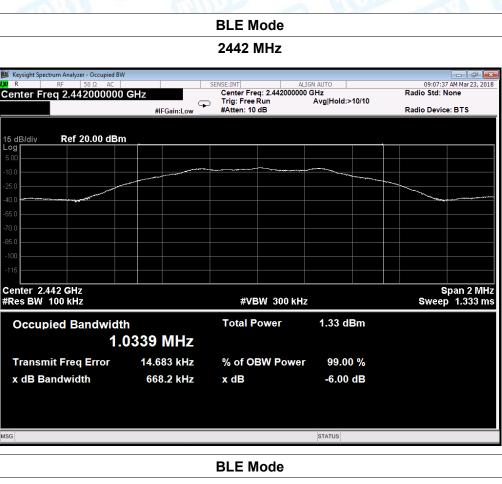
Temperature:	<b>25℃</b>		<b>Relative Humidity:</b>	55%	
Test Voltage:	AC 1	20V/60HZ		CIII C	
Test Mode:	BLE	TX Mode			
Channel frequency		6dB Bandwidth	99% Bandwidth	Limit	
(MHz)		(kHz)	(kHz)	(kHz)	
2402	402 665.3		1034.6		
2442		2442 668.2		>=500	
2480		703.6	1043.7	_	
				÷	

#### BLE Mode

#### 2402 MHz





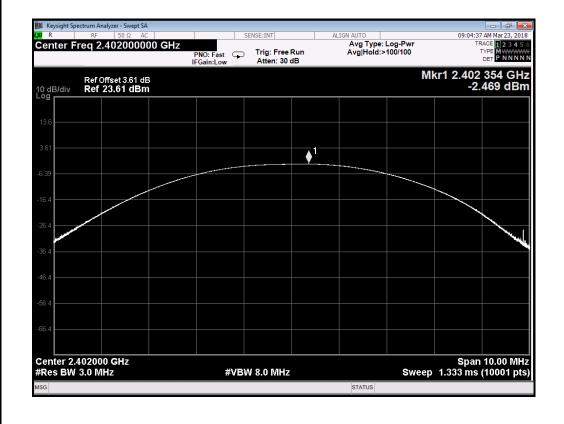


#### 2480 MHz

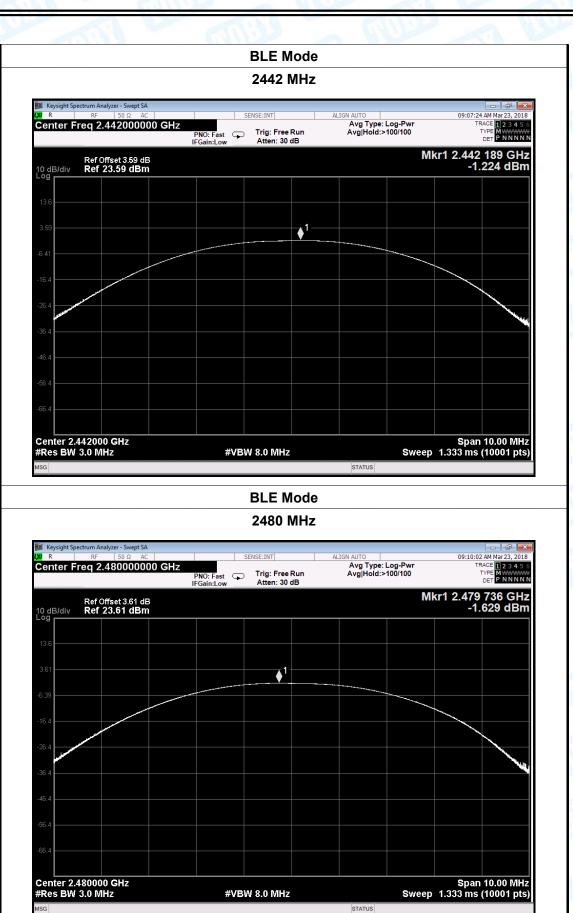
Keysight Spectrum Analyzer - Occupied BW R RF 50 Ω AC	1	SENSE:INT ALL	GN AUTO	09:10:15 AM Mar 23, 201
Center Freg 2.480000000	GHz	Center Freq: 2.48000000	GHz	Radio Std: None
	#IEGain:Low	Trig: Free Run #Atten: 10 dB	Avg Hold:>10/10	Radio Device: BTS
	#IFGall:Low	#Atten: To db		Radio Device. D 13
dB/div Ref 20.00 dBm	<u> </u>			
.00				
).0		·		
5.0			and the second s	~
).0				and the second s
5.0				
).0				
i.0				
00				
15				
enter 2.48 GHz Res BW 100 kHz		#VBW 300 kHz		Span 2 MH Sweep 1.333 m
		#VEW JOURNZ		Sweep 1.555 m
<b>Occupied Bandwidt</b>	h	Total Power	0.90 dBm	
	0437 MHz			
Transmit Freq Error	10.915 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	703.6 kHz	x dB	-6.00 dB	
3			STATUS	

# **Attachment E-- Peak Output Power Test Data**

Temperature:	mperature: 25°C		Relative Humidity:	55%	
Test Voltage:	AC 120V/	60HZ	200	Can Can	
Test Mode:	BLE TX Mode				
Channel frequer	ncy (MHz)	Test Result (dBm)		Limit (dBm)	
2402		-2.469			
2442		-1.22	4	30	
2480		-1.629			
		BLE M	ode		
		2402 N	Hz		





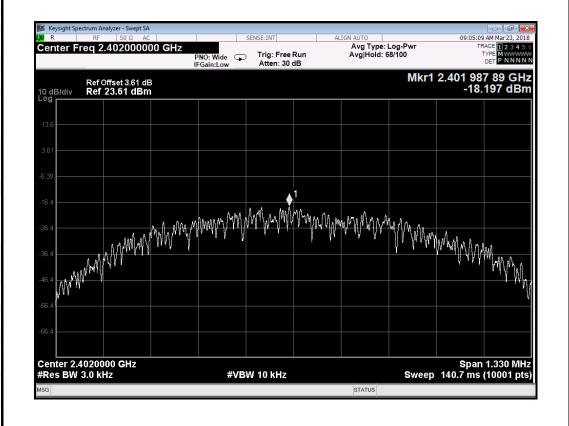


# **Attachment F-- Power Spectral Density Test Data**

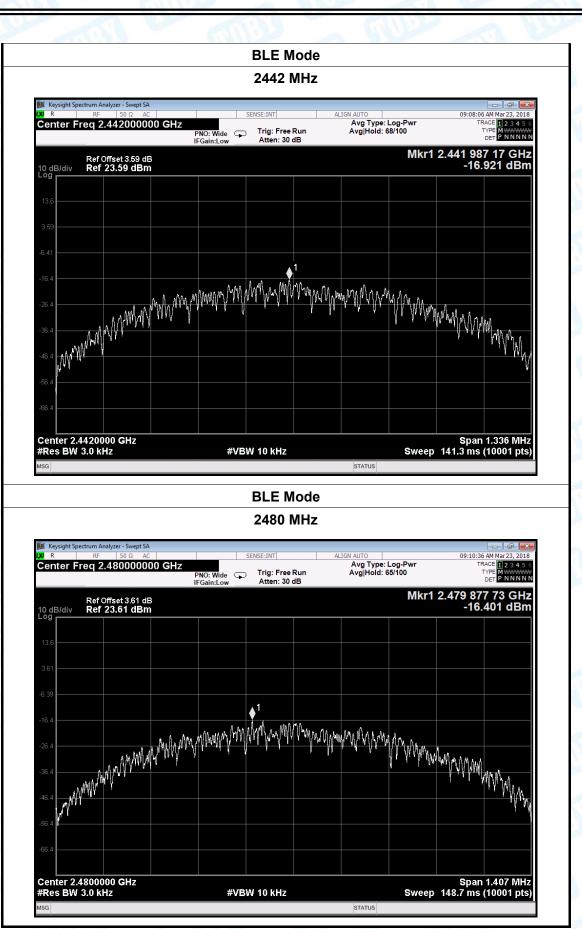
TOBY

Temperature:	<b>25</b> ℃		Relative H	lumidity:	55%	
Test Voltage:	AC 120V	V/60HZ				
Test Mode:	BLE TX N	K Mode				100
Channel Frequency (MHz)		Power Density (dBm/3kHz)		Lim	it	Result
				(dBm/3	(dBm/3kHz)	
2402		-18.19	)7			
2442 2480		-16.92	21	8	8 P/	
		-16.401				
		BLE Mo	ode			
		0.400 M				

2402 MHz







-----END OF REPORT-----