

TEST REPORT

On behalf of

GE Lighting

Product Name: Smart Plug

Model No.: CPLGSTDBLW1

FCC ID: PUU-CPLGSTDBLW1C

Prepared For: GE Lighting
1975 Noble Road, Cleveland, OH 44112

Prepared By: Audix Technology (Shanghai) Co., Ltd.
3F and 4F, 34Bldg, 680 Guiping Rd.,
Caohejing Hi-Tech Park,
Shanghai 200233, China

Tel: +86-21-64955500
Fax: +86-21-64955491



File No. : C1D2004076
Report No. : ACI-F20133
Date of Test : 2020.05.08 – 14
Date of Report : 2020.05.15

The statement is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

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TEST REPORT

Applicant : GE Lighting
 EUT Description : Smart Plug
 (A) Model No. : Refer to Sec.2.1
 (B) Power Supply : 120V AC 60Hz
 (C) Test Voltage : 120V/60Hz

Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART C
 AND ANSI C63.10-2013*

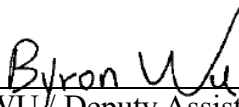
The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.


The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report also shows that the EUT (M/N: Refer to Sec2.1), which was tested is technically compliance with the FCC limits.

This report applies to above tested Sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

Date of Test : 2020.05.08 - 14 Date of Report : 2020.05.15

Producer : 
 JAREY LU / Supervisor

Reviewer : 
 BYRON WU / Deputy Assistant Manager

 For and on behalf of
 Audix Technology (Shanghai) Co., Ltd.

Signatory : 
 Authorized Signature(s) BYRON KWO/Assistant General Manager

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Results	Meets Limit
EMISSION			
Conducted Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.207
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.209(a) 15.205(a)(c)
6 dB Bandwidth Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(a)(2)
Maximum Peak Output Power Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(b)(3)
Emission Limitations Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(d)
Band Edge Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(d)
Power Spectral Density Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(e)
N/A is an abbreviation for Not Applicable.			

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description : Smart Plug

Type of EUT : Production Pre-product Pro-type

Model Number : CPLGSTDBLW1

Radio Tech : BLE 4.2;
IEEE 802.11 b/g/n.

Note: : 802.11n-HT20 only.

Channel Freq. : BLE: 2402MHz-2480MHz;
802.11b/g/n: 2412MHz-2462MHz.

Modulation : BLE: GFSK;
802.11b: DSSS (CCK, DQPSK, DBPSK);
802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK).

Antenna Info. : BT ANT:
Antenna Type: PCB Antenna
Antenna Gain: 1.83 dBi
WLAN ANT:
Antenna Type: PCB Antenna
Antenna Gain: 0.76 dBi
The Antenna was a permanently attached antenna that is comply with 15.203 requirement.

Test Mode : The EUT was set at continuous TX during all the test in the report.

Applicant : GE Lighting
1975 Noble Road, Cleveland, OH 44112

Manufacturer : same as Applicant

Factory #1 : Sichuan Hongrui Electric Co., Ltd
Mianyan Export Processing Zone, Mianyan, Sichuan, China

Factory #1 : VIETNAM CHANGHONG ELECTRIC COMPANY LIMITED
Workshop W4 (Leased by WWWHP), Land plot 4.2B,
Dinh Vu Industrial Zone, Dong Hai 2 Ward,
Hai An District, Haiphong City, VN.

2.2 EUT Specifications Assessed in Current Report

Mode	Modulation	Data Rate(Mbps)
BLE	GFSK	1

Channel List			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
...
...
...
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

2.3 Test Information

The test software “EMI_Test_Tool.exe” was used to control EUT work in TX mode, Set Power and select test channel.

Modulation	data rate (Mbps)	Set_Power	Test Channel		Frequency (MHz)
BLE	1	3.0dbm	Low:	00	2402
		3.0dbm	Middle:	20	2442
		3.0dbm	High:	39	2480

2.4 Supported equipment

Brand : Acer
 Product Name: : Netbook
 Model Name : TravelMate P238 series
 Model Number : N15W8

2.5 Description of Test Facility

Name of Firm : Audix Technology (Shanghai) Co., Ltd.
 Site Location : 3F and 4F, 34Bldg, 680 Guiping Rd.,
 Caohejing Hi-Tech Park,
 Shanghai 200233, China.
 Accredited by NVLAP, Lab Code : 200371-0
 FCC Designation Number : CN5027
 Test Firm Registration Number : 954668

3 CONDUCTED EMISSION TEST

3.1 Test Equipment

The following test equipments are used during the conducted emission test in a shielded room:

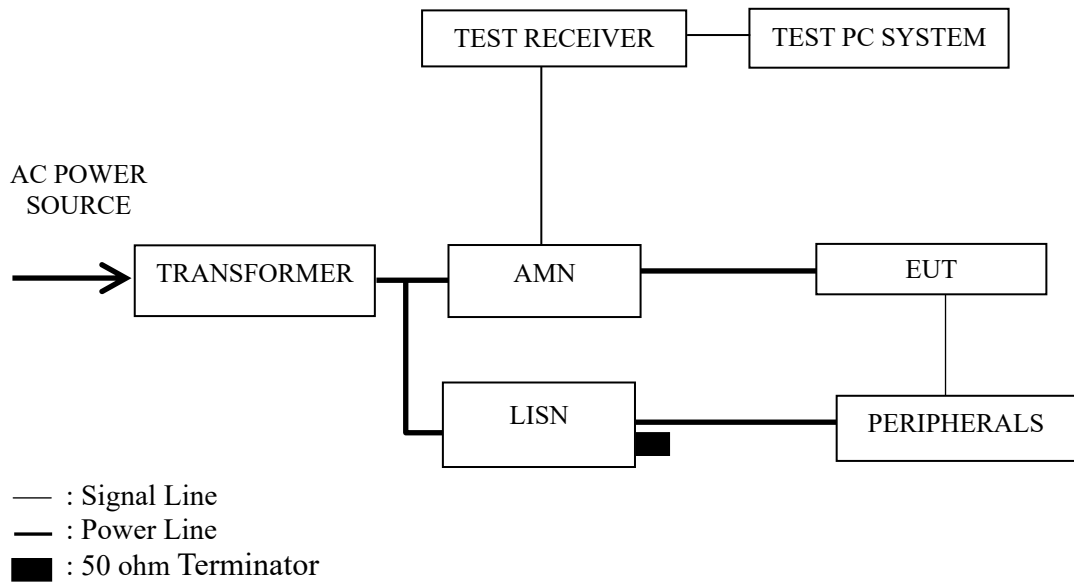
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	101302	Apr 26, 2020	Apr 25, 2021
2.	Artificial Mains Network (AMN)	R&S	ENV4200	100125	Jun 24, 2019	Jun 23, 2020
3.	Software	Audix	E3	6.2009-1-15	--	--

3.2 Block Diagram of Test Setup

3.2.1 EUT & Peripherals



3.2.2 Conducted Disturbance Test Setup



3.3 Conducted Emission Limits (§15.207)

Frequency Range (MHz)	Limits dB(μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56	56~46
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE 1 – The lower limit shall apply at the transition frequencies.
NOTE 2 – The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz~0.50 MHz

3.4 Test Configuration

The EUT (listed in Sec.2.1) was installed as shown on Sec.3.2 to meet FCC requirement and operating in a manner which tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT as shown in Sec. 3.2.

3.5.2 Turn on the power of all equipment.

3.5.3 Turn the EUT on the test mode, and then test.

3.6 Test Procedures

The EUT was placed upon a non-metallic table, which is 0.8 m above the horizontal conducting ground plane and 0.4 m from a vertical reference plane. The EUT was connected to the power mains through an Artificial Mains Network (AMN) to provide a 50 Ω coupling impedance for the measuring equipment. Both sides of AC line (Line & Neutral) were checked to find out the maximum conducted emission according to FCC Part 15 Subpart C and ANSI C63.10: 2013 requirements during conducted disturbance test.

The I.F. bandwidth of Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

Test with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band. (According to KDB 174176 D01 Line Conducted FAQ)

The test modes were done on conducted disturbance test and all the test results are listed in Sec. 3.7

3.7 Test Results

< PASS >

The frequency and amplitude of the highest conducted emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Worst case emission:

No.	Operation	Modulation	Channel	Frequency (MHz)	Data Page
1.	Transmitting	BLE	39	2480	P11
2.	Receiving	BLE	39	2480	P12

NOTE 1 – Level = Read Level + AMN Factor + Cable Loss

NOTE 2 – “QP” means “Quasi-Peak” values

NOTE 3 – The emission levels which not reported are too low against the official limit.

Worst case emission

EUT : Smart Plug Temperature : 22°C
 Model No. : CPLGSTDBLW1 Humidity : 51%RH
 Test Mode : Transmitting Date of Test : 2020.05.08

Polarization	Frequency (MHz)	Meter Reading dB (µV)	AMN Factor (dB/m)	Cable Loss (dB)	Emission Level dB (µV/m)	Limits dB (µV/m)	Margin (dB)	Remark
Line	0.44679	24.56	10.33	0.04	34.93	56.93	22	QP
	0.44679	8.36	10.33	0.04	18.73	46.93	28.2	Average
	0.52934	24.81	10.33	0.04	35.18	56	20.82	QP
	0.52934	12.32	10.33	0.04	22.69	46	23.31	Average
	1.487	24.34	10.3	0.06	34.7	56	21.3	QP
	1.487	11.43	10.3	0.06	21.79	46	24.21	Average
	2.334	24.25	10.3	0.06	34.61	56	21.39	QP
	2.334	11.13	10.3	0.06	21.49	46	24.51	Average
	3.074	23.68	10.3	0.06	34.04	56	21.96	QP
	3.074	14.37	10.3	0.06	24.73	46	21.27	Average
	8.916	23.07	10.29	0.07	33.43	60	26.57	QP
	8.916	8.2	10.29	0.07	18.56	50	31.44	Average
Neutral	0.44679	28.43	10.34	0.04	38.81	56.93	18.12	QP
	0.44679	12.14	10.34	0.04	22.52	46.93	24.41	Average
	0.52934	28.89	10.32	0.04	39.25	56	16.75	QP
	0.52934	16.59	10.32	0.04	26.95	46	19.05	Average
	1.282	28.42	10.32	0.05	38.79	56	17.21	QP
	1.282	15.14	10.32	0.05	25.51	46	20.49	Average
	2.334	27.73	10.32	0.06	38.11	56	17.89	QP
	2.334	14.38	10.32	0.06	24.76	46	21.24	Average
	3.041	27.61	10.33	0.06	38	56	18	QP
	3.041	18.46	10.33	0.06	28.85	46	17.15	Average
	6.698	25	10.33	0.06	35.39	60	24.61	QP
	6.698	10.5	10.33	0.06	20.89	50	29.11	Average

TEST ENGINEER: Jarey

EUT : Smart Plug Temperature : 22°C
 Model No. : CPLGSTDBLW1 Humidity : 51%RH
 Test Mode : Receiving Date of Test : 2020.05.08

Polarization	Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Line	0.4127	24.73	10.34	0.04	35.11	57.59	22.48	QP
	0.4127	8.37	10.34	0.04	18.75	47.59	28.84	Average
	0.521	24.63	10.33	0.04	35	56	21	QP
	0.521	11.27	10.33	0.04	21.64	46	24.36	Average
	1.31	24.91	10.31	0.05	35.27	56	20.73	QP
	1.31	11.31	10.31	0.05	21.67	46	24.33	Average
	2.133	24.2	10.3	0.06	34.56	56	21.44	QP
	2.133	12.02	10.3	0.06	22.38	46	23.62	Average
	3.041	23.99	10.3	0.06	34.35	56	21.65	QP
	3.041	15.3	10.3	0.06	25.66	46	20.34	Average
	6.878	23.24	10.3	0.06	33.6	60	26.4	QP
	6.878	12.29	10.3	0.06	22.65	50	27.35	Average
Neutral	0.426	28.58	10.34	0.04	38.96	57.33	18.37	QP
	0.426	15.26	10.34	0.04	25.64	47.33	21.69	Average
	0.5671	27.92	10.32	0.05	38.29	56	17.71	QP
	0.5671	16.39	10.32	0.05	26.76	46	19.24	Average
	1.269	28.41	10.32	0.05	38.78	56	17.22	QP
	1.269	16.44	10.32	0.05	26.81	46	19.19	Average
	2.201	27.62	10.32	0.06	38	56	18	QP
	2.201	17.26	10.32	0.06	27.64	46	18.36	Average
	3.074	27.2	10.33	0.06	37.59	56	18.41	QP
	3.074	19.02	10.33	0.06	29.41	46	16.59	Average
	6.878	25.56	10.33	0.06	35.95	60	24.05	QP
	6.878	14.26	10.33	0.06	24.65	50	25.35	Average

TEST ENGINEER: Jarey

4 RADIATED EMISSION TEST

4.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

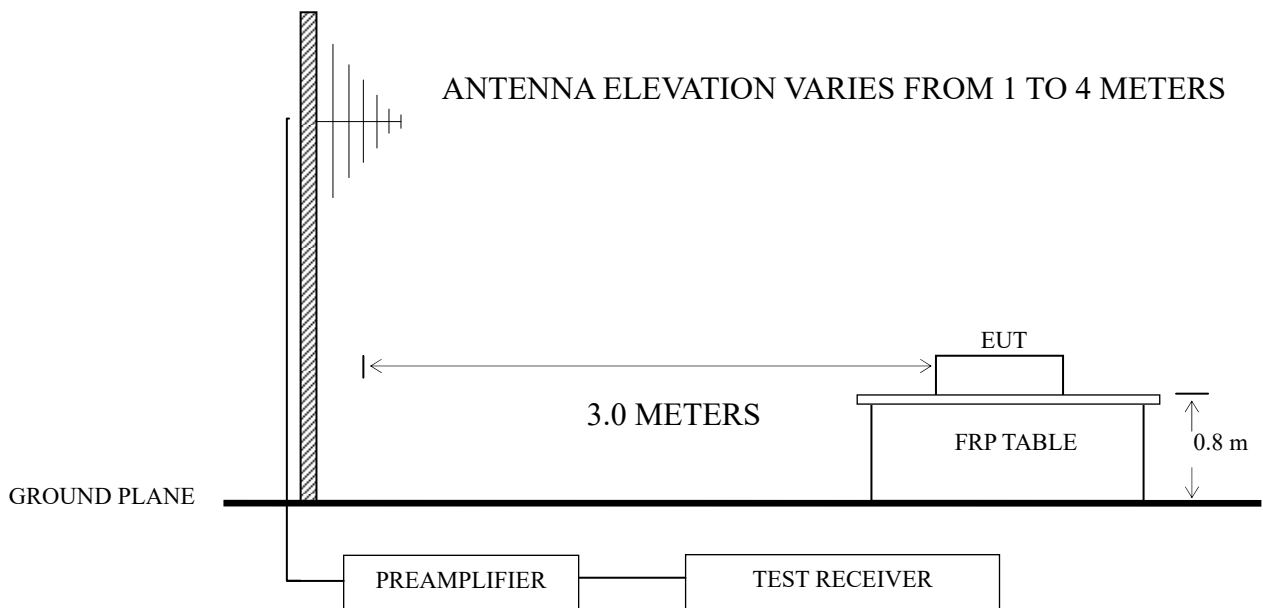
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Preamplifier	Agilent	8447D	2944A10548	Apr 26, 2020	Apr 27, 2021
2.	Preamplifier	HP	8449B	3008A00864	Mar 8, 2020	Mar 7, 2021
3.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Sep 16, 2019	Sep 15, 2020
4.	Test Receiver	R&S	ESCI	101303	Apr 26, 2020	May 25, 2021
5.	Bi-log Antenna	Schwarz beck	VULB 9168+EMC I-N-6-06	708+AT-N06 38	May 17, 2019	May 16, 2020
6.	Horn Antenna	EMCO	3115	9607-4878	Jul 13, 2019	Jul 12, 2020
7.	Horn Antenna	EMCO	3116	00062643	Oct 10, 2019	Oct 09, 2020
8.	Software	Audix	E3	SET00200 9912M295-2	--	--

4.2 Block Diagram of Test Setup

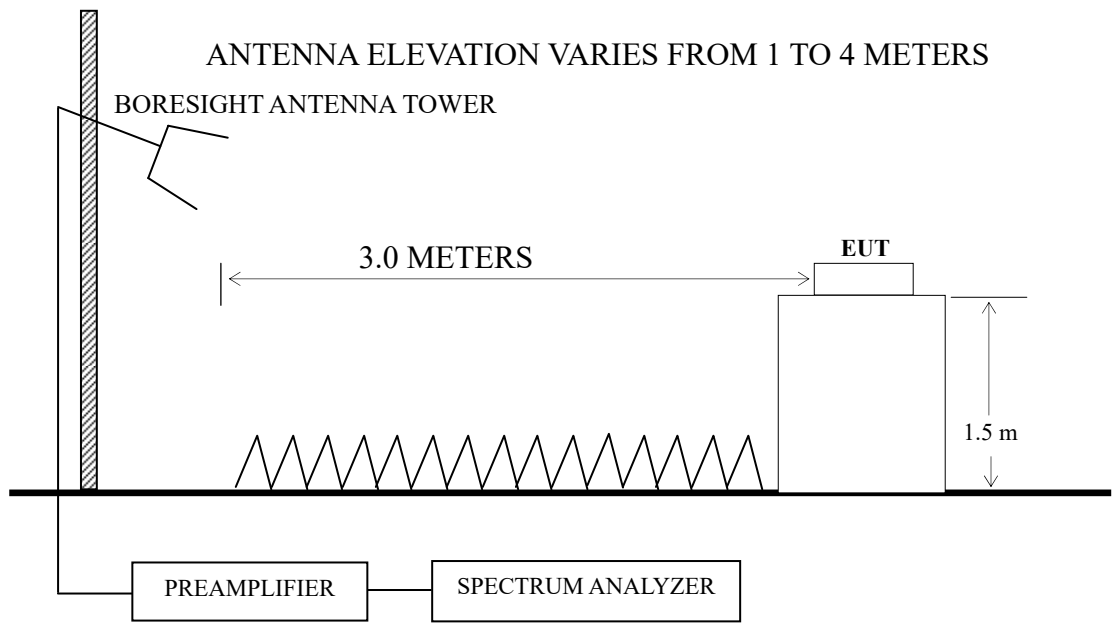
4.2.1 EUT & Peripherals



4.2.2 Below 1GHz



4.2.3 Above 1GHz



4.3 Radiated Emission Limit (§15.209)

Frequency (MHz)	Distance (m)	Field strength limits (µV/m)	
		(µV/m)	dB(µV/m)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0

NOTE 1 - Emission Level dB (µV/m) = 20 log Emission Level (µV/m)

NOTE 2 - The tighter limit applies at the band edges.

NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

NOTE 4 - The limits shown are based on Quasi-peak value detector below or equal to 1GHz and Average value detector above 1GHz.

NOTE 5 - Above 1 GHz, the limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT

4.4 Test Configuration

The EUT (listed in Sec.2.1) and the simulators (listed in Sec.2.2) were installed as shown on Sec.4.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

4.5 Operating Condition of EUT

4.5.1 Setup the EUT as shown in Sec. 4.2.

4.5.2 Turn on the power of all equipment.

4.5.3 Turn the EUT on the test mode, and then test.

4.6 Test Procedures

Radiated emission test applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp is necessary for this measurement. For measurement above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

The EUT was placed on a turntable. Below 1 GHz, the table height is 80 cm above the reference ground plane. Above 1 GHz, the table height is 1.5 m. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) or Horn antenna was used as receiving antenna. Both horizontal and vertical polarizations of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.10: 2013 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESCI was set at 120 kHz from 30MHz to 1000MHz.

The bandwidth of Agilent N9010A was set at 1MHz for above 1GHz.

The frequency range from 30 MHz to 25 GHz (Up to 10th harmonics from fundamental frequency) was checked.

All the test results are listed in Sec.4.7.

4.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Frequency range: below 1G (Worst case emission)

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	BLE	39	2480 MHz	P17
2.	Receiving	BLE	39	2480 MHz	P18

Frequency range: above 1G

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402 MHz	P19
2.			20	2442 MHz	P19
3.			39	2480 MHz	P20
4.	Receiving	BLE	39	2480 MHz	P21

Restricted bands:

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	BLE	Cabinet Emission		P22

Additional Radiated emission (Mixed worst modulation): below 1G

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	BLE	39	2480 MHz	P23
		IEEE 802.11b	1	2412 MHz	

Additional Radiated emission (Mixed worst modulation): above 1G

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	BLE	39	2480 MHz	P23
		IEEE 802.11b	1	2412 MHz	

NOTE 1 – Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

NOTE 2 – “QP” means “Quasi-Peak” values

NOTE 3 – 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

NOTE 4 – The emission levels which not reported are too low against the official limit.

NOTE 5 – The emission levels recorded below is data of EUT configured in Lying direction, for Lying direction was the maximum emission direction during the test. The data of Side & Standing direction are too low against the official limit to be reported.

NOTE 6 – All reading are Quasi-Peak values below or equal to 1GHz, Peak and Average values above 1GHz.

For above 1GHz test, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

NOTE 7 – The frequency range 2310-2390MHz & 2483.5-2500MHz were tested for Restricted bands.

Worst case emission < 1GHz

EUT : Smart Plug Temperature : 22°C
 Model No. : CPLGSTDBLW1 Humidity : 51%RH
 Test Mode : Transmitting Date of Test : 2020.05.08 - 14

Polarization	Frequency (MHz)	Meter Reading dB (µV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (µV/m)	Limits dB (µV/m)	Margin (dB)	Remark
Horizontal	33.445	27.62	18.4	0.69	27.62	19.09	40	20.91	QP
	47.994	24.43	17.8	0.79	27.6	15.42	40	24.58	QP
	56.593	25.13	17.99	0.86	27.6	16.38	40	23.62	QP
	149.486	24.86	20.17	1.37	27.25	19.15	43.5	24.35	QP
	324.456	23.43	21.15	2.03	26.98	19.63	46	26.37	QP
	654.232	24.67	26.77	2.82	28.06	26.2	46	19.8	QP
Vertical	33.893	45.3	18.4	0.69	27.62	36.77	40	3.23	QP
	55.805	36.06	18.5	0.85	27.6	27.81	40	12.19	QP
	140.342	34.16	19.6	1.33	27.3	27.79	43.5	15.71	QP
	311.087	23.62	20.84	1.99	26.89	19.56	46	26.44	QP
	441.743	24.3	23.1	2.33	27.72	22.01	46	23.99	QP
	752.743	25.03	28.19	2.99	28	28.21	46	17.79	QP

TEST ENGINEER: Jarey

EUT : Smart Plug Temperature : 22°C
 Model No. : CPLGSTDBLW1 Humidity : 51%RH
 Test Mode : Receiving Date of Test : 2020.05.08 - 14

Polarization	Frequency (MHz)	Meter Reading dB (µV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (µV/m)	Limits dB (µV/m)	Margin (dB)	Remark
Horizontal	35.875	26.21	18.5	0.71	27.62	17.8	40	22.2	QP
	56.593	26.75	17.99	0.86	27.6	18	40	22	QP
	136.939	25.36	18.94	1.32	27.33	18.29	43.5	25.21	QP
	169.005	23.59	20.27	1.45	27.14	18.17	43.5	25.33	QP
	419.108	24.25	22.37	2.29	27.59	21.32	46	24.68	QP
	758.041	23.31	28.24	3.01	27.99	26.57	46	19.43	QP
Vertical	33.917	44.97	18.4	0.69	27.62	36.44	40	3.56	QP
	56.197	36.31	18.33	0.85	27.6	27.89	40	12.11	QP
	137.42	34.21	19.05	1.32	27.32	27.26	43.5	16.24	QP
	324.456	25.06	21.15	2.03	26.98	21.26	46	24.74	QP
	547.098	24.35	24.5	2.57	28	23.42	46	22.58	QP
	737.071	24.77	27.84	2.97	28.03	27.55	46	18.45	QP

TEST ENGINEER: Jarey

Radiated Emission > 1GHz

EUT : Smart Plug Temperature : 22°C
 Model No. : CPLGSTDBLW1 Humidity : 51%RH
 Test Mode : Transmitting Date of Test : 2020.05.08 - 14

BLE CH2402MHz

Polarization	Frequency (MHz)	Meter Reading dB (µV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (µV/m)	Limits dB (µV/m)	Margin (dB)	Remark
Horizontal	2260	43.19	28.92	5.09	36.88	40.32	74	33.68	Peak
	3646	41.83	31.78	6.53	36.53	43.61	74	30.39	Peak
	4804	40.82	33.14	7.56	36.5	45.02	74	28.98	Peak
	4804	36.45	33.14	7.56	36.5	40.65	54	13.35	Average
	6013	39.1	35.01	8.79	36.6	46.3	74	27.7	Peak
	7264	41.37	35.96	9.84	37.19	49.98	74	24.02	Peak
	8776	39.44	36.62	10.37	35.62	50.81	74	23.19	Peak
Vertical	2233	43.47	28.84	5.05	36.89	40.47	74	33.53	Peak
	3412	42.53	31.12	6.28	36.55	43.38	74	30.62	Peak
	4804	40.63	33.14	7.56	36.5	44.83	74	29.17	Peak
	4804	36.42	33.14	7.56	36.5	40.62	54	13.38	Average
	6265	38.93	35.21	9.05	36.79	46.4	74	27.6	Peak
	7570	40.69	36.13	9.96	37.07	49.71	74	24.29	Peak
	9109	39.18	36.86	10.55	35.28	51.31	74	22.69	Peak

BLE CH2442MHz

Polarization	Frequency (MHz)	Meter Reading dB (µV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (µV/m)	Limits dB (µV/m)	Margin (dB)	Remark
Horizontal	2107	43.45	28.45	4.9	36.95	39.85	74	34.15	Peak
	3358	42.62	30.98	6.23	36.56	43.27	74	30.73	Peak
	4884	41.09	33.25	7.62	36.5	45.46	74	28.54	Peak
	4884	37.29	33.25	7.62	36.5	41.66	54	12.34	Average
	6193	38.81	35.16	8.97	36.73	46.21	74	27.79	Peak
	7336	40.74	36	9.88	37.16	49.46	74	24.54	Peak
	8920	39.27	36.74	10.45	35.39	51.07	74	22.93	Peak
Vertical	2035	43.96	28.22	4.82	36.98	40.02	74	33.98	Peak
	3304	42.68	30.85	6.18	36.57	43.14	74	30.86	Peak
	4884	39.89	33.25	7.62	36.5	44.26	74	29.74	Peak
	4884	36.79	33.25	7.62	36.5	41.16	54	12.84	Average
	6292	39.29	35.23	9.14	36.81	46.85	74	27.15	Peak
	7615	40.59	36.15	10	37.06	49.68	74	24.32	Peak
	9019	39.6	36.82	10.45	35.29	51.58	74	22.42	Peak

BLE CH2480MHz

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	2170	42.7	28.65	4.97	36.92	39.4	74	34.6	Peak
	4051	41.29	32.79	6.9	36.5	44.48	74	29.52	Peak
	4960	40.52	33.34	7.67	36.5	45.03	74	28.97	Peak
	4960	37.34	33.34	7.67	36.5	41.85	54	12.15	Average
	6364	38.15	35.29	9.14	36.87	45.71	74	28.29	Peak
	7867	39.48	36.25	10.08	36.96	48.85	74	25.15	Peak
	9163	38.4	36.89	10.55	35.26	50.58	74	23.42	Peak
Vertical	2134	43.25	28.53	4.94	36.94	39.78	74	34.22	Peak
	3358	42.33	30.98	6.23	36.56	42.98	74	31.02	Peak
	4960	41.93	33.34	7.67	36.5	46.44	74	27.56	Peak
	4960	37.5	33.34	7.67	36.5	42.01	54	11.99	Average
	6175	39.17	35.14	8.97	36.73	46.55	74	27.45	Peak
	7624	40.92	36.15	10	37.05	50.02	74	23.98	Peak
	9028	40.07	36.82	10.45	35.29	52.05	74	21.95	Peak

TEST ENGINEER: Jarey

EUT : Smart Plug Temperature : 22°C
 Model No. : CPLGSTDBLW1 Humidity : 51%RH
 Test Mode : Receiving Date of Test : 2020.05.08 - 14

Polarization	Frequency (MHz)	Meter Reading dB (µV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (µV/m)	Limits dB (µV/m)	Margin (dB)	Remark
Horizontal	2341	42.79	29.15	5.17	36.84	40.27	74	33.73	Peak
	3907	40.25	32.51	6.79	36.51	43.04	74	30.96	Peak
	5302	38.48	33.88	8.08	36.53	43.91	74	30.09	Peak
	6814	38.73	35.66	9.58	37.18	46.79	74	27.21	Peak
	8092	39.04	36.32	10.16	36.76	48.76	74	25.24	Peak
	9001	38.27	36.8	10.45	35.29	50.23	74	23.77	Peak
Vertical	2332	43.27	29.13	5.17	36.85	40.72	74	33.28	Peak
	3790	41.95	32.19	6.69	36.52	44.31	74	29.69	Peak
	5203	39.02	33.74	7.91	36.52	44.15	74	29.85	Peak
	6814	39.62	35.66	9.58	37.18	47.68	74	26.32	Peak
	7777	40.54	36.22	10.04	36.99	49.81	74	24.19	Peak
	8974	39.32	36.78	10.45	35.3	51.25	74	22.75	Peak

TEST ENGINEER: Jarey

Emissions in restricted frequency bands:

EUT : Smart Plug Temperature : 22°C
 Model No. : CPLGSTDBLW1 Humidity : 51%RH
 Test Mode : Transmitting Date of Test : 2020.05.08 - 14

BLE

Polarization	Frequency (MHz)	Meter Reading dB (µV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (µV/m)	Limits dB (µV/m)	Margin (dB)	Remark
Horizontal	2334.2	43.47	29.13	5.17	36.85	40.92	74	33.08	Peak
	2334.2	31.33	29.13	5.17	36.85	28.78	54	25.22	Average
	2362.6	44.28	29.21	5.21	36.84	41.86	74	32.14	Peak
	2362.6	32.03	29.21	5.21	36.84	29.61	54	24.39	Average
	2388.5	51.09	29.29	5.25	36.82	48.81	74	25.19	Peak
	2388.5	37.9	29.29	5.25	36.82	35.62	54	18.38	Average
	2483.5	41.67	29.56	5.32	36.79	39.76	74	34.24	Peak
	2483.5	35.38	29.56	5.32	36.79	33.47	54	20.53	Average
	2489.2	46.1	29.58	5.36	36.79	44.25	74	29.75	Peak
	2489.2	34.12	29.58	5.36	36.79	32.27	54	21.73	Average
	2495.5	45.18	29.58	5.36	36.78	43.34	74	30.66	Peak
2495.5	33.32	29.58	5.36	36.78	31.48	54	22.52	Average	
Vertical	2331.8	43.86	29.13	5.17	36.85	41.31	74	32.69	Peak
	2331.8	31.43	29.13	5.17	36.85	28.88	54	25.12	Average
	2361	44.08	29.21	5.21	36.84	41.66	74	32.34	Peak
	2361	30.44	29.21	5.21	36.84	28.02	54	25.98	Average
	2388.8	50.56	29.29	5.25	36.82	48.28	74	25.72	Peak
	2388.8	37.12	29.29	5.25	36.82	34.84	54	19.16	Average
	2483.5	43.59	29.56	5.32	36.79	41.68	74	32.32	Peak
	2483.5	34.44	29.56	5.32	36.79	32.53	54	21.47	Average
	2489.4	43.93	29.58	5.36	36.79	42.08	74	31.92	Peak
	2489.4	31.44	29.58	5.36	36.79	29.59	54	24.41	Average
	2495.3	43.03	29.58	5.36	36.78	41.19	74	32.81	Peak
2495.3	31.42	29.58	5.36	36.78	29.58	54	24.42	Average	

TEST ENGINEER: Jarey

Additional Radiated emission (Mixed worst modulation):

EUT : Smart Plug Temperature : 22°C
 Model No. : CPLGSTDBLW1 Humidity : 51%RH
 Test Mode : Transmitting Date of Test : 2020.05.08 - 14

Below 1G

Polarization	Frequency (MHz)	Meter Reading dB (µV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (µV/m)	Limits dB (µV/m)	Margin (dB)	Remark
Horizontal	36.381	25.75	18.46	0.71	27.62	17.3	40	22.7	QP
	65.573	25	17.47	0.92	27.6	15.79	40	24.21	QP
	123.7	27.65	17.42	1.25	27.41	18.91	43.5	24.59	QP
	187.1	28.33	17.64	1.51	27.06	20.42	43.5	23.08	QP
	410.38	24.75	22.23	2.26	27.54	21.7	46	24.3	QP
	750.11	22.94	28.13	2.99	28	26.06	46	19.94	QP
Vertical	33.917	45.16	18.4	0.69	27.62	36.63	40	3.37	QP
	55.609	35.31	18.37	0.85	27.6	26.93	40	13.07	QP
	142.32	33.57	19.73	1.34	27.3	27.34	43.5	16.16	QP
	289	24.16	19.75	1.92	26.82	19.01	46	26.99	QP
	457.51	24.22	23.1	2.37	27.8	21.89	46	24.11	QP
	739.66	24.57	27.9	2.97	28.03	27.41	46	18.59	QP

Above 1G

Polarization	Frequency (MHz)	Meter Reading dB (µV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (µV/m)	Limits dB (µV/m)	Margin (dB)	Remark
Horizontal	4824	46.32	33.15	7.56	36.5	50.53	74	23.47	Peak
	4824	43.37	33.15	7.56	36.5	47.58	54	6.42	Average
	1828	49.76	27.39	4.57	37.11	44.61	74	29.39	Peak
	3916	45.42	32.54	6.79	36.51	48.24	74	25.76	Peak
	5914	43.83	34.87	8.7	36.59	50.81	74	23.19	Peak
	7408	43.91	36.05	9.92	37.13	52.75	74	21.25	Peak
	8668	42.61	36.54	10.37	35.8	53.72	74	20.28	Peak
Vertical	4824	47.04	33.15	7.56	36.5	51.25	74	22.75	Peak
	4824	45.7	33.15	7.56	36.5	49.91	54	4.09	Average
	1954	48.26	27.92	4.72	37.03	43.87	74	30.13	Peak
	4042	44.44	32.79	6.9	36.5	47.63	74	26.37	Peak
	5887	43.67	34.81	8.7	36.59	50.59	74	23.41	Peak
	7156	43.68	35.9	9.8	37.23	52.15	74	21.85	Peak
	8533	42.51	36.44	10.33	36.03	53.25	74	20.75	Peak

TEST ENGINEER: Jarey

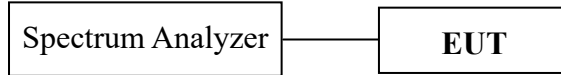
5 6 dB BANDWIDTH MEASUREMENT

5.1 Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Sep 16, 2019	Sep 15, 2020

5.2 Block Diagram of Test Setup



5.3 Specification Limits (§15.247(a)(2))

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

5.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

5.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with settings: RBW = 100kHz, VBW $\geq 3 \times$ RBW.

The 6 dB bandwidth is defined as the total spectrum the power of which is lower than peak power minus 6 dB .

The test procedure is defined in ANSI C63.10-2013 (the 11.8.2 Measurement Procedure “Option 2” was used).

5.6 Test Results

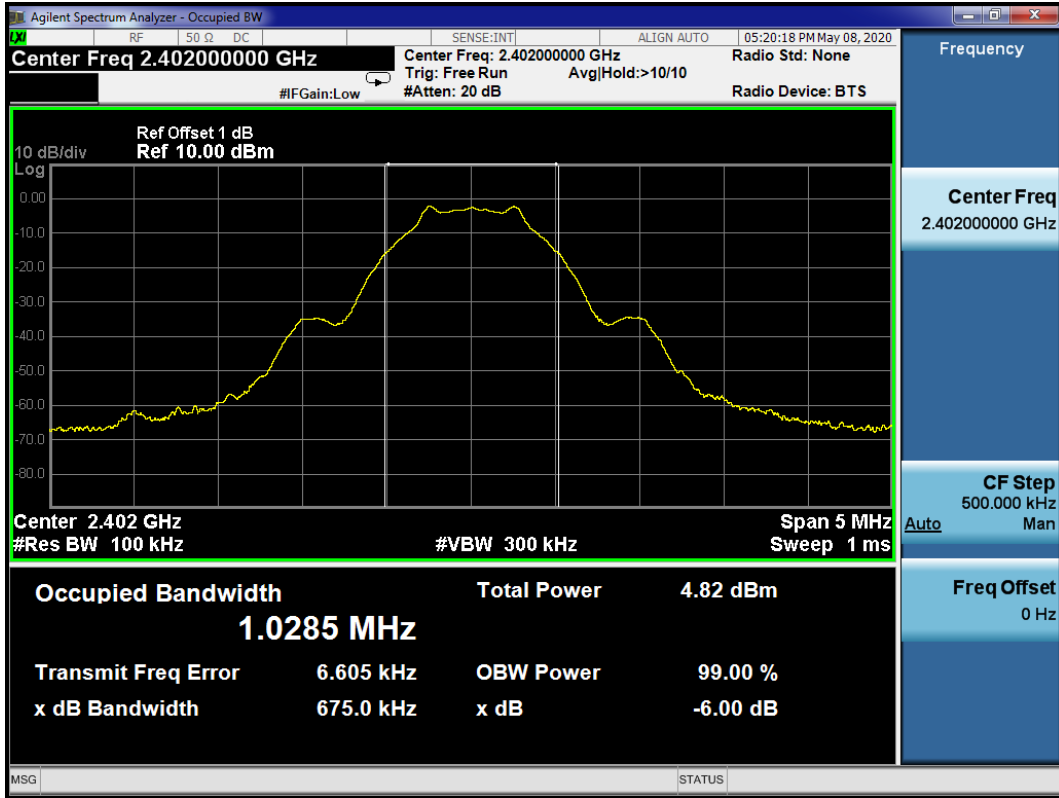
PASSED.

All the test results are attached in next pages.

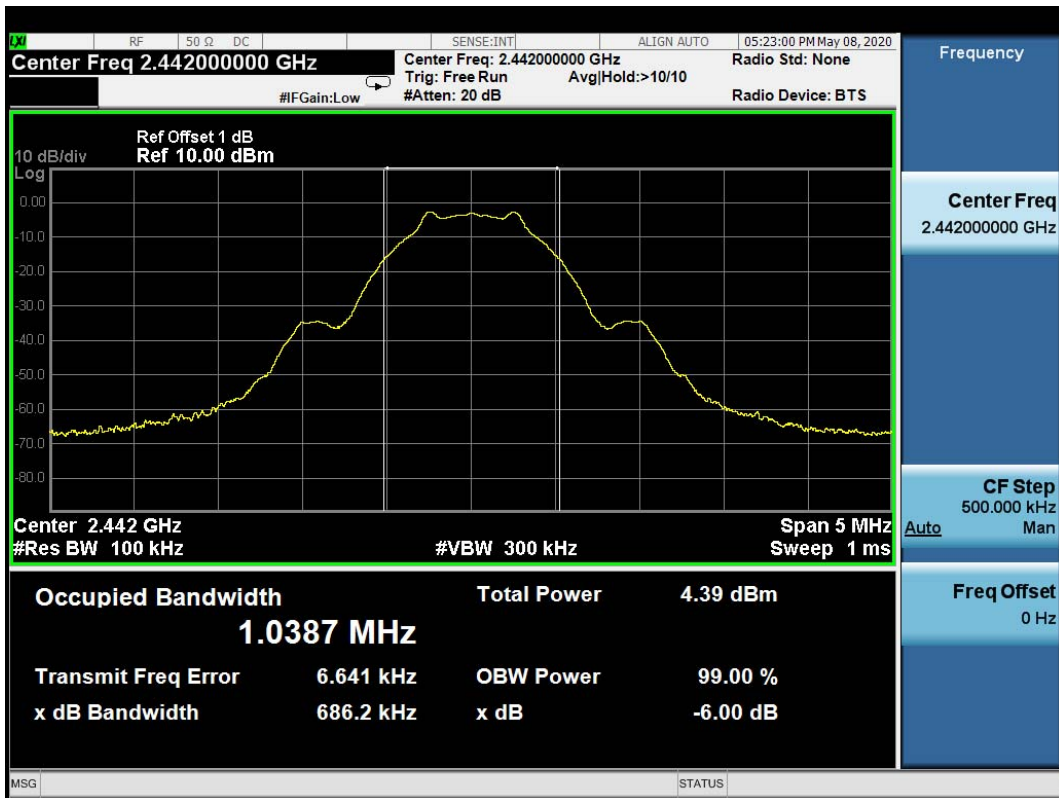
(Test Date: 2020.05.08 Temperature: 23°C Humidity: 51 %)

Modulation	Channel	Frequency (MHz)	6dB Bandwidth (kHz)	Limit
BLE	00	2402	675	500 kHz
	20	2442	686.2	500 kHz
	39	2480	696	500 kHz

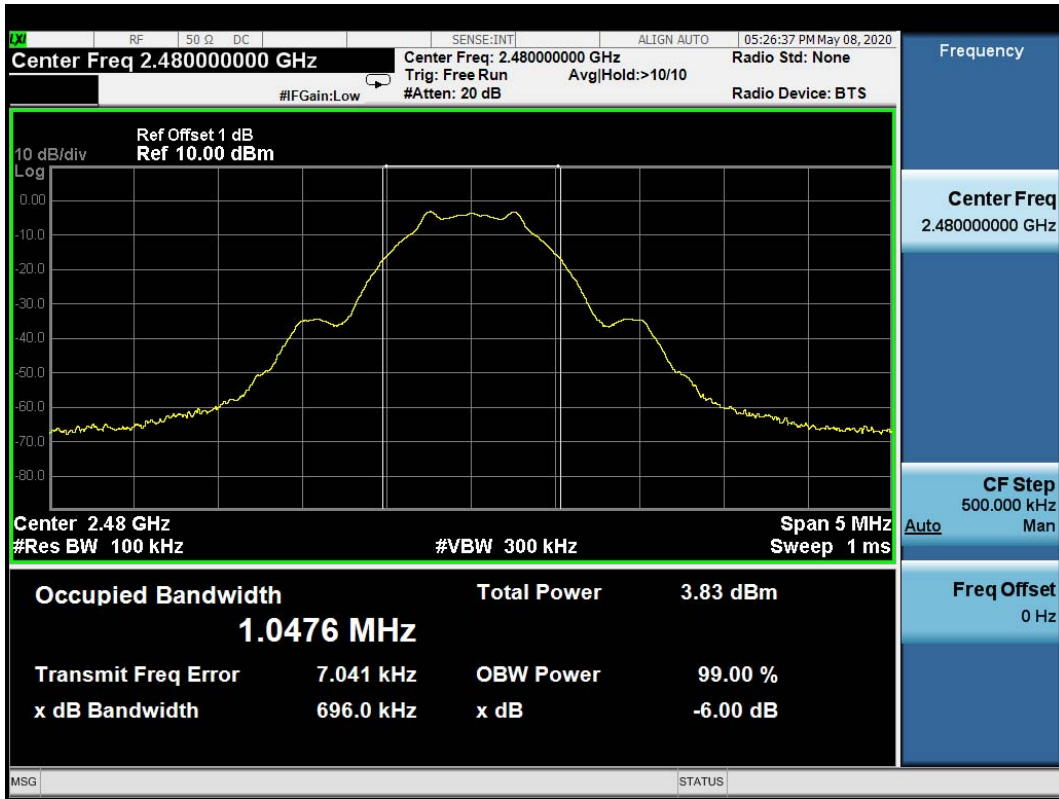
BLE CH2402MHz



BLE CH2442MHz



BLE CH2480MHz



6 MAXIMUM PEAK OUTPUT POWER MEASUREMENT

6.1 Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Sep 16, 2019	Sep 15, 2020

6.2 Block Diagram of Test Setup

The Same as Section. 5.2.

6.3 Specification Limits ((§15.247(b)(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5 MHz is: 1 Watt. (30 dBm)

6.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

6.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

The following procedure can be used when the maximum available RBW of the instrument is less than the DTS bandwidth:

- a) Set the RBW = 1 MHz.
- b) Set the VBW \geq [3 RBW].
- c) Set the span \geq [1.5 DTS bandwidth].
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth

The test procedure is defined in ANSI C63.10-2013 (11.9.1.2 Measurement Procedure “ Integrated band power method” was used).

6.6 Test Results

PASSED.

All the test results are listed below.

(Test Date: 2020.05.08 Temperature: 23°C Humidity: 51 %)

Modulation	Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit
BLE	00	2402	-2.063	30 dBm
	20	2442	-2.467	30 dBm
	39	2480	-3.069	30 dBm

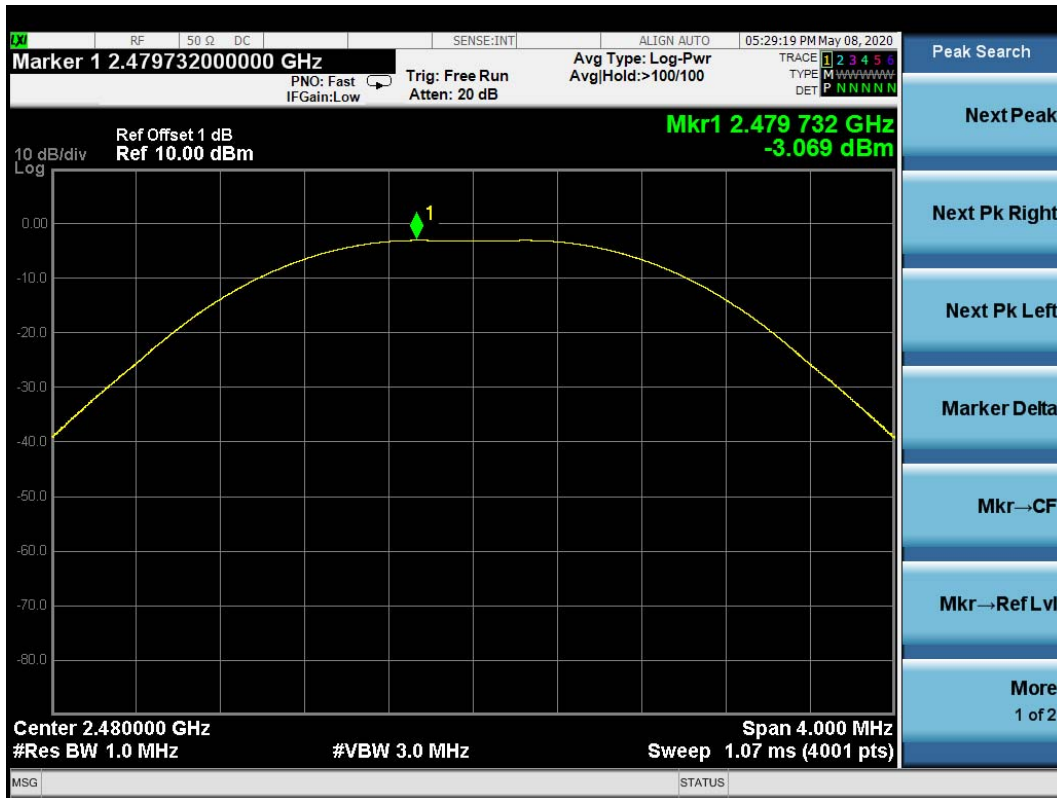
BLE CH2402MHz



BLE CH2442MHz



BLE CH2480MHz



7 EMISSION LIMITATIONS MEASUREMENT

7.1 Test Equipment

The following test equipment was used during the emission limitations test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Sep 16, 2019	Sep 15, 2020

7.2 Block Diagram of Test Setup

The Same as Section. 5.2.

7.3 Specification Limits (§15.247(d))

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)). (※This test result attaching to Section. 3.7)

7.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

7.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to ≥ 1.5 times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW $\geq [3 \times \text{RBW}]$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Establish an emission level by using the following procedure:

- a) Set the center frequency and span to encompass frequency range to be measured.

- b) Set the RBW = 100 kHz.
 - c) Set the VBW $\geq [3 \times \text{RBW}]$.
 - d) Detector = peak.
 - e) Sweep time = auto couple.
 - f) Trace mode = max hold.
 - g) Allow trace to fully stabilize.
 - h) Use the peak marker function to determine the maximum amplitude level.
- Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

Scan up through 10th harmonic.

The test procedure is defined in ANSI C63.10-2013 (11.11.2 Reference level measurement and 11.11.3 Emission level measurement was used).

7.6 Test Results

PASSED.

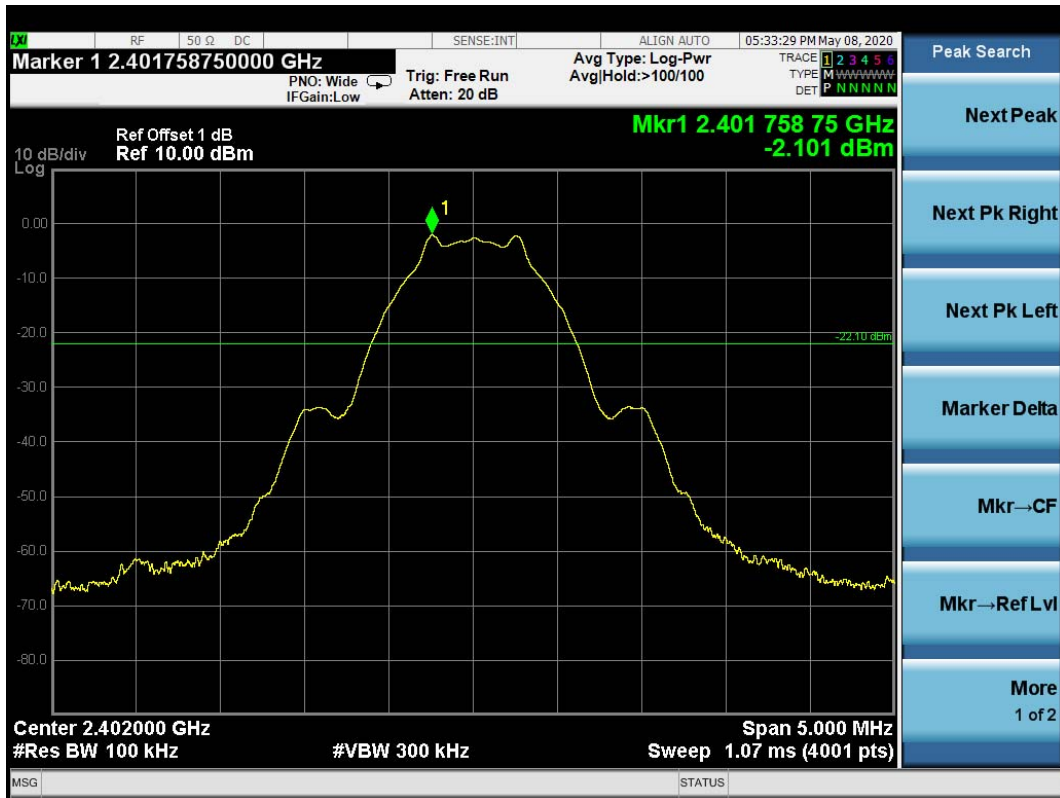
The test data was attached in the next pages.

(Test Date: 2020.05.08 Temperature: 23°C Humidity: 51 %)

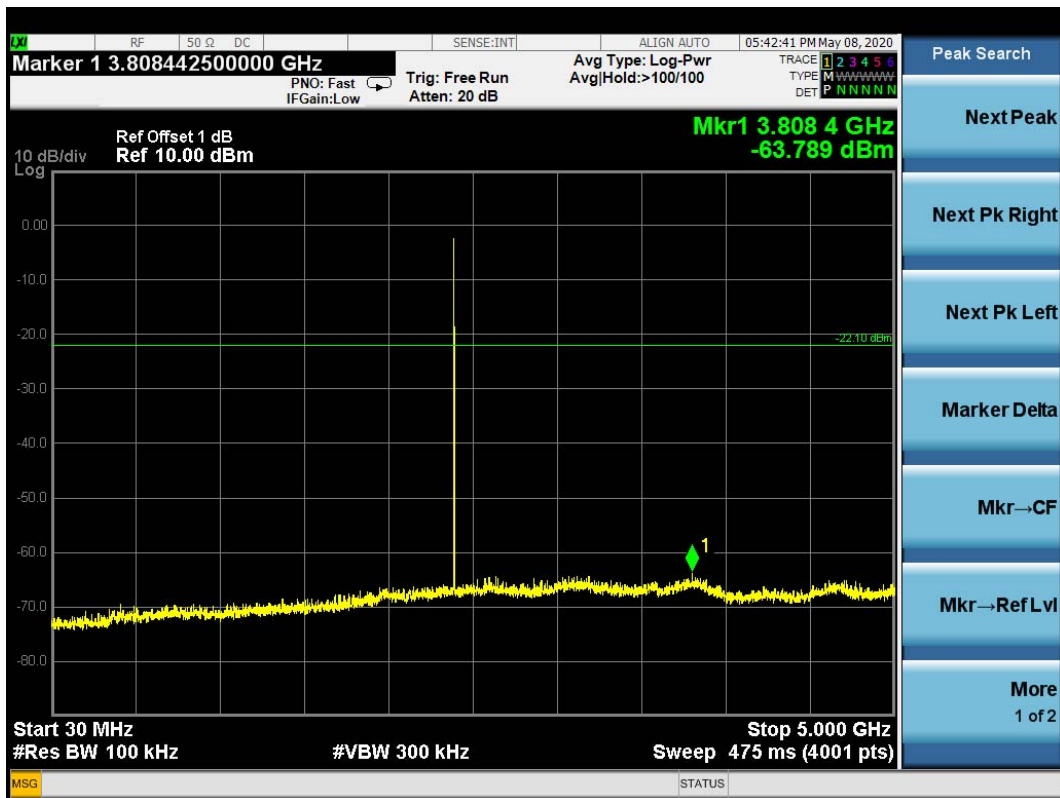
Modulation	Channel	Frequency (MHz)	Data Page
BLE	00	2402	P35-36
	20	2442	P37-38
	39	2480	P39-40

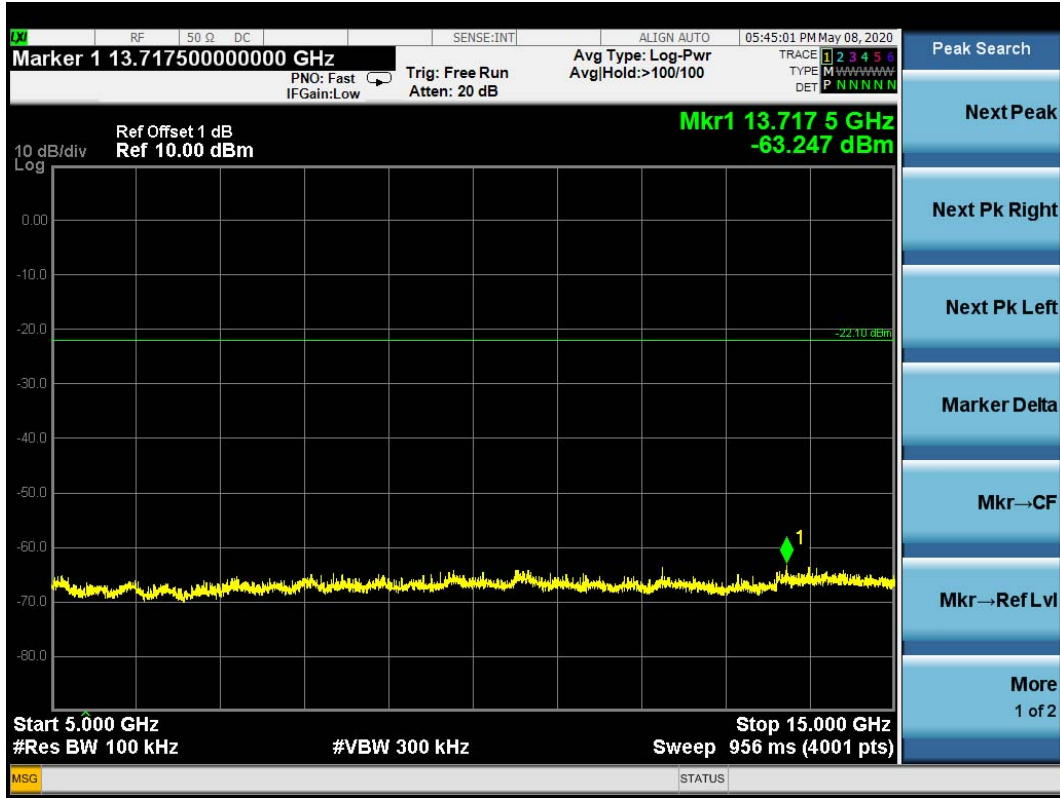
BLE CH2402MHz

Reference level



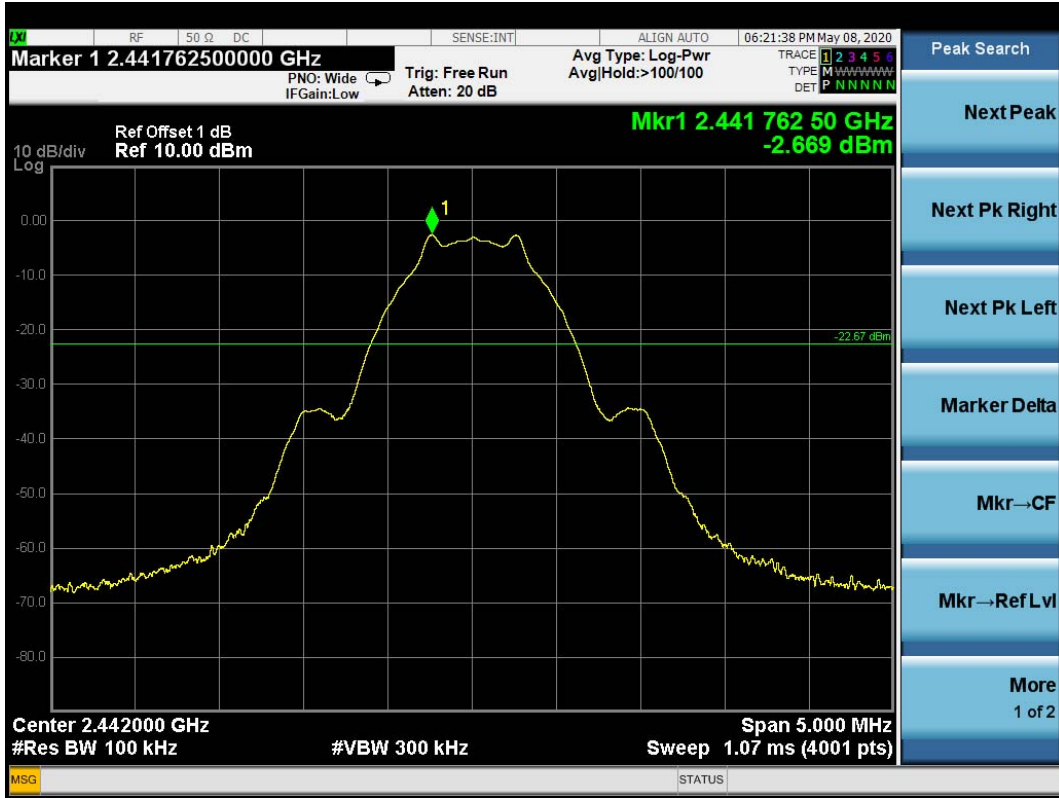
Emission level



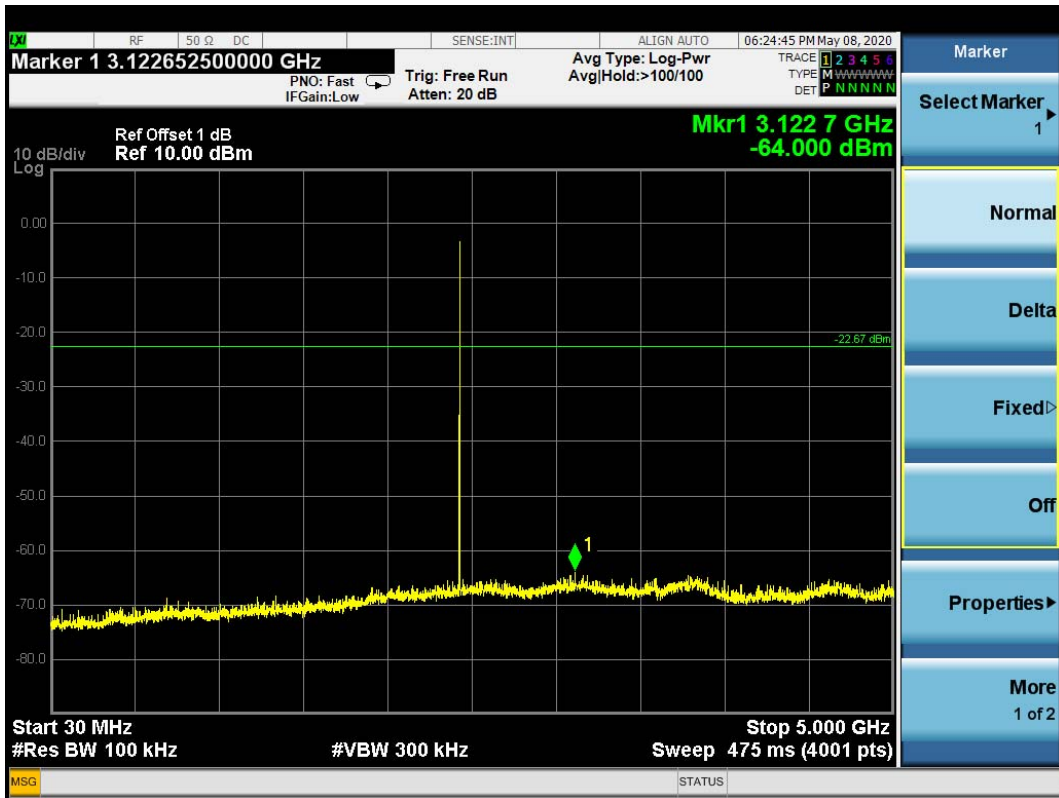


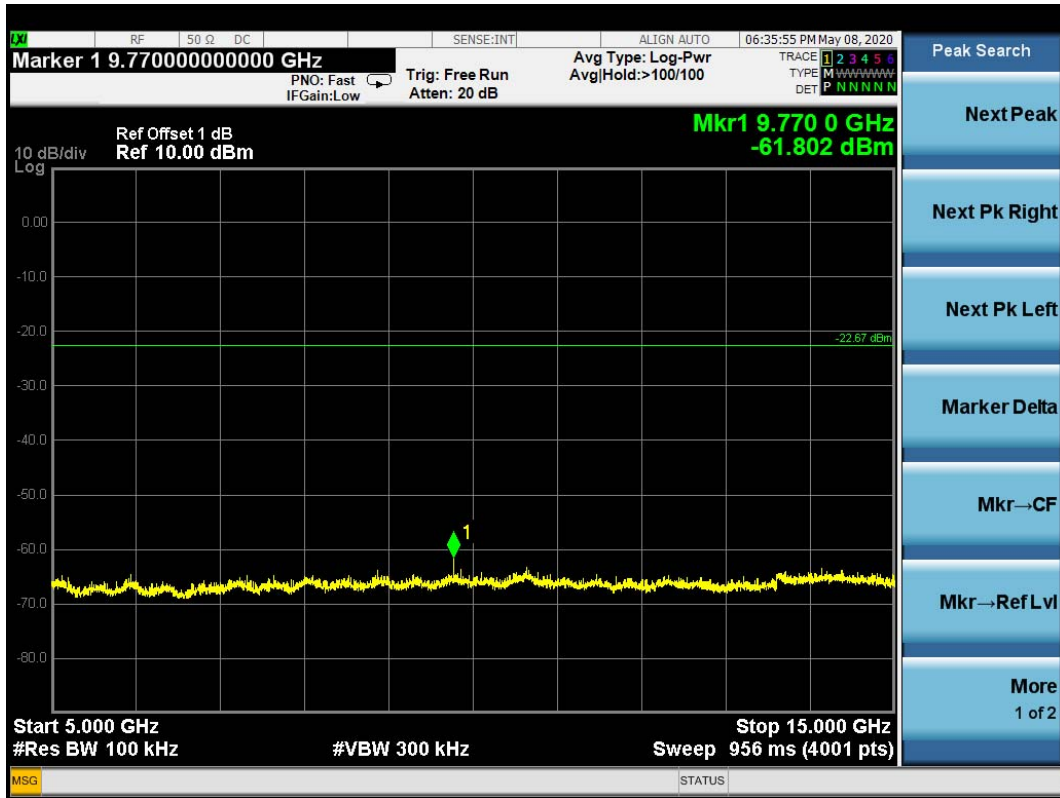
BLE CH2442MHz

Reference level



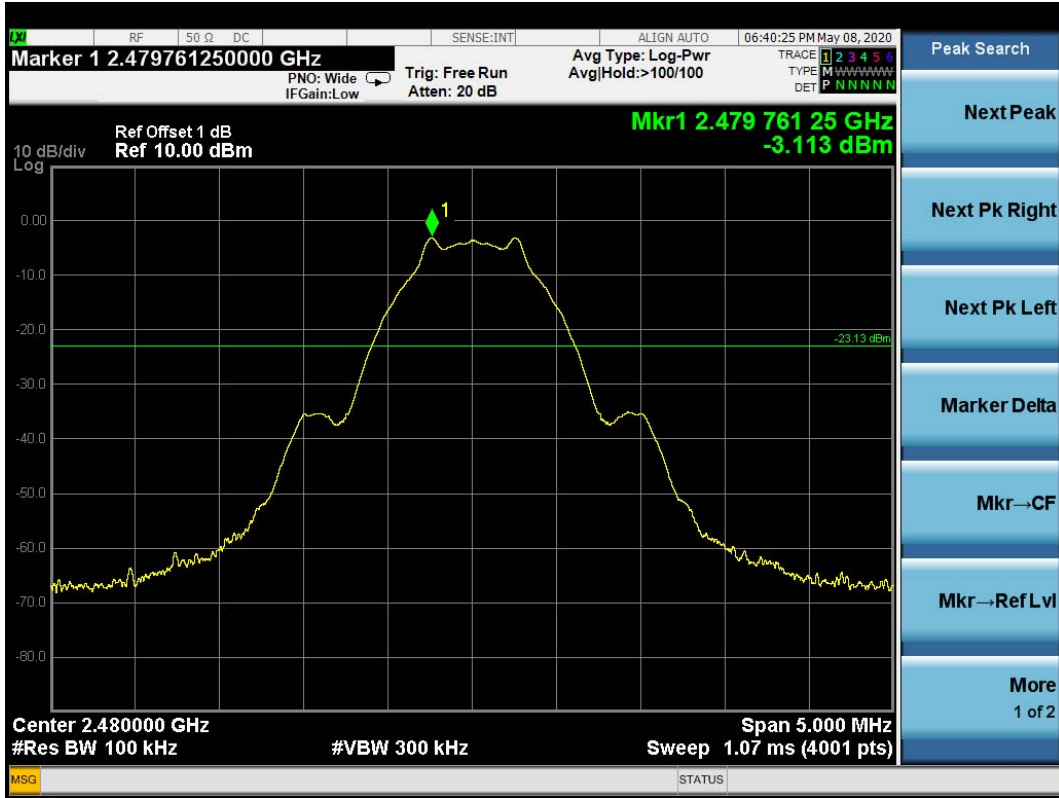
Emission level



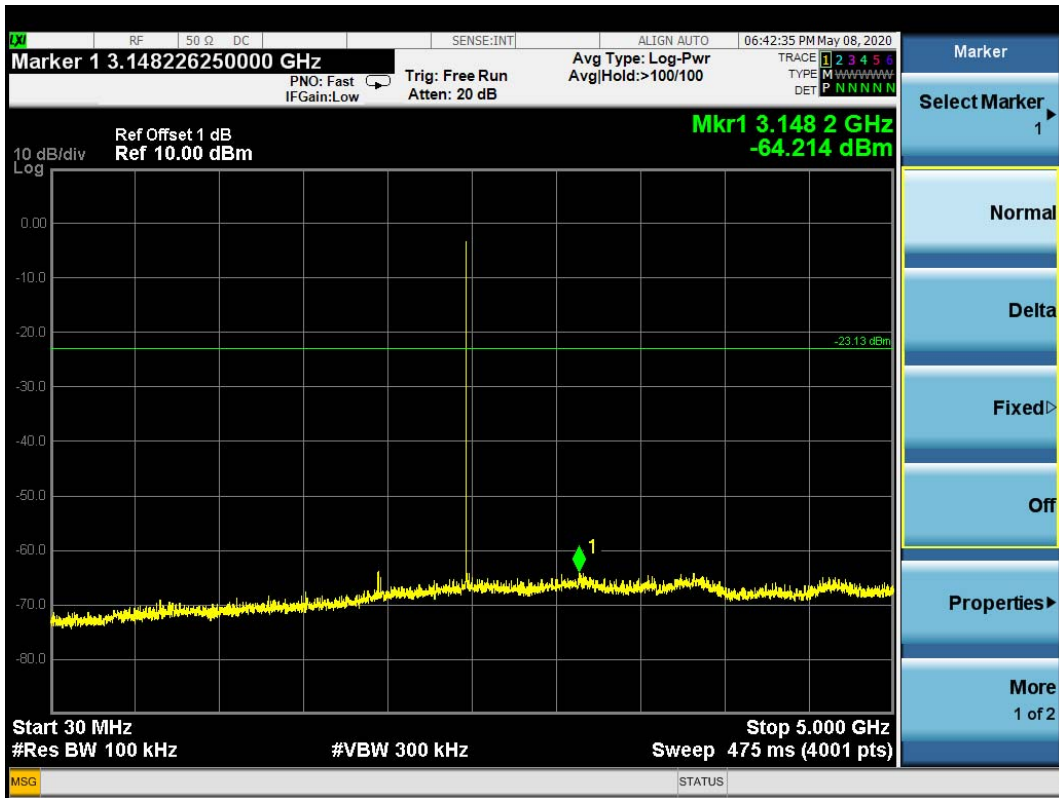


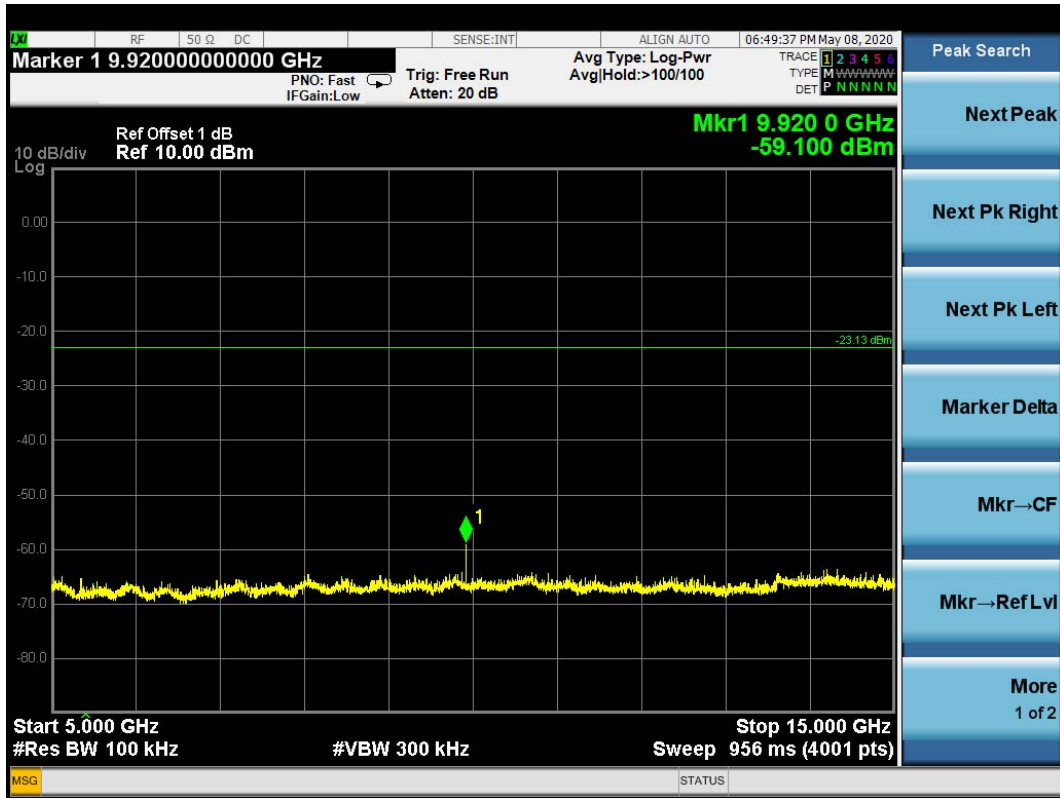
BLE CH2480MHz

Reference level



Emission level





8 BAND EDGES MEASUREMENT

8.1 Test Equipment

The following test equipment was used during the band edges measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Sep 16, 2019	Sep 15, 2020

8.2 Block Diagram of Test Setup

The Same as section. 5.2.

8.3 Specification Limits (§15.247(d))

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.

8.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

8.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. Set RBW of Test Receiver to 100kHz and VBW to 300kHz with suitable frequency span including 100kHz bandwidth from band edge.

The test procedure is defined in ANSI C63.10-2013 (11.11.3 Emission level measurement was used).

8.6 Test Results

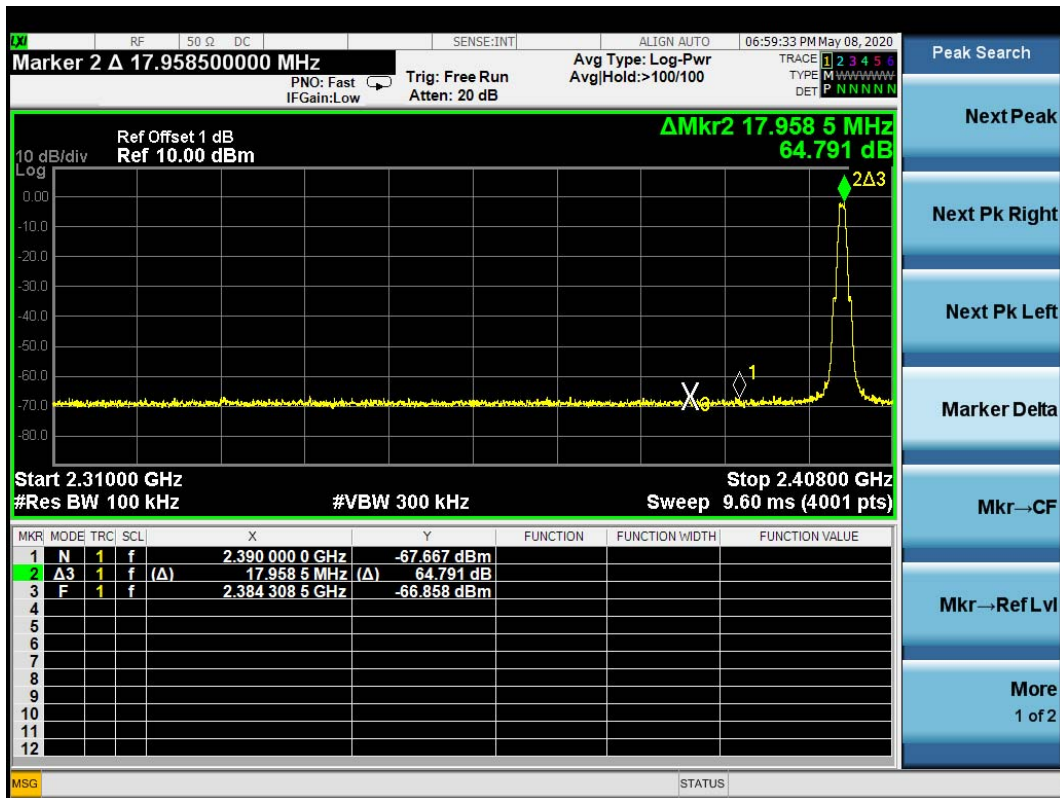
PASSED.

All the test results are attached in next pages.

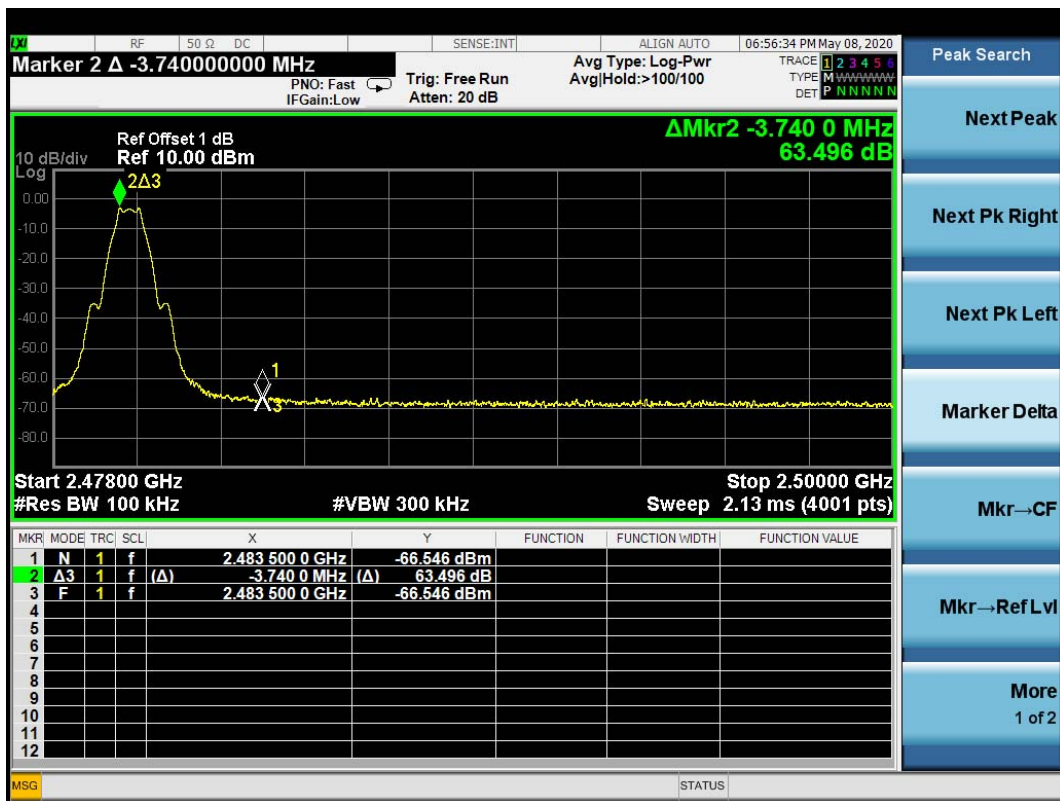
(Test Date: 2020.05.08 Temperature: 23°C Humidity: 51 %)

Modulation	Location	Channel	Frequency (MHz)	Delta Marker (dB)	Result
BLE	Below Band Edge	00	2402	64.791	More than 20 dB below the highest level of the desired power
	Upper Band Edge	39	2480	63.496	

BLE CH2402MHz (Below Edge 2390 MHz)



BLE CH2480MHz (Upper Edge 2483.5 MHz)



9 POWER SPECTRAL DENSITY MEASUREMENT

9.1 Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Sep 16, 2019	Sep 15, 2020

9.2 Block Diagram of Test Setup

The Same as section 5.2.

9.3 Specification Limits (§15.247(e))

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band.

9.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

9.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq [3 \times \text{RBW}]$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

The test procedure is defined in ANSI C63.10-2013 (11.10.2 Measurement Procedure “Method PKPSD (peak PSD)” was used).

9.6 Test Results

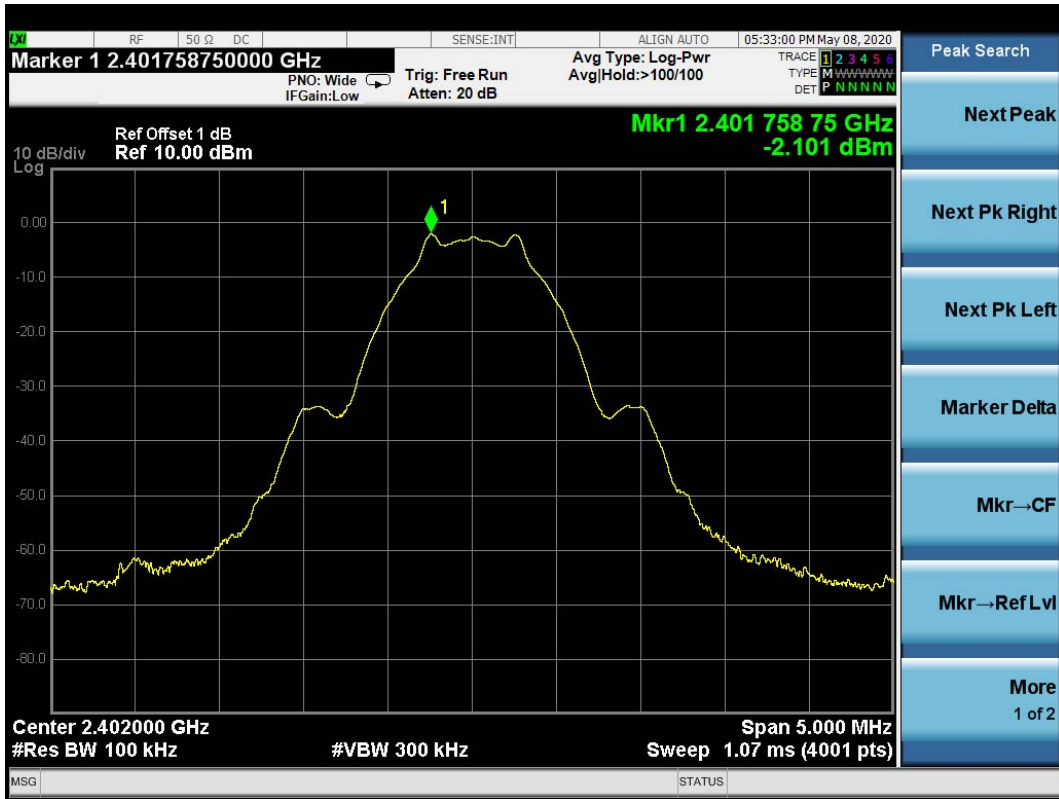
PASSED.

All the test results are attached in next pages.

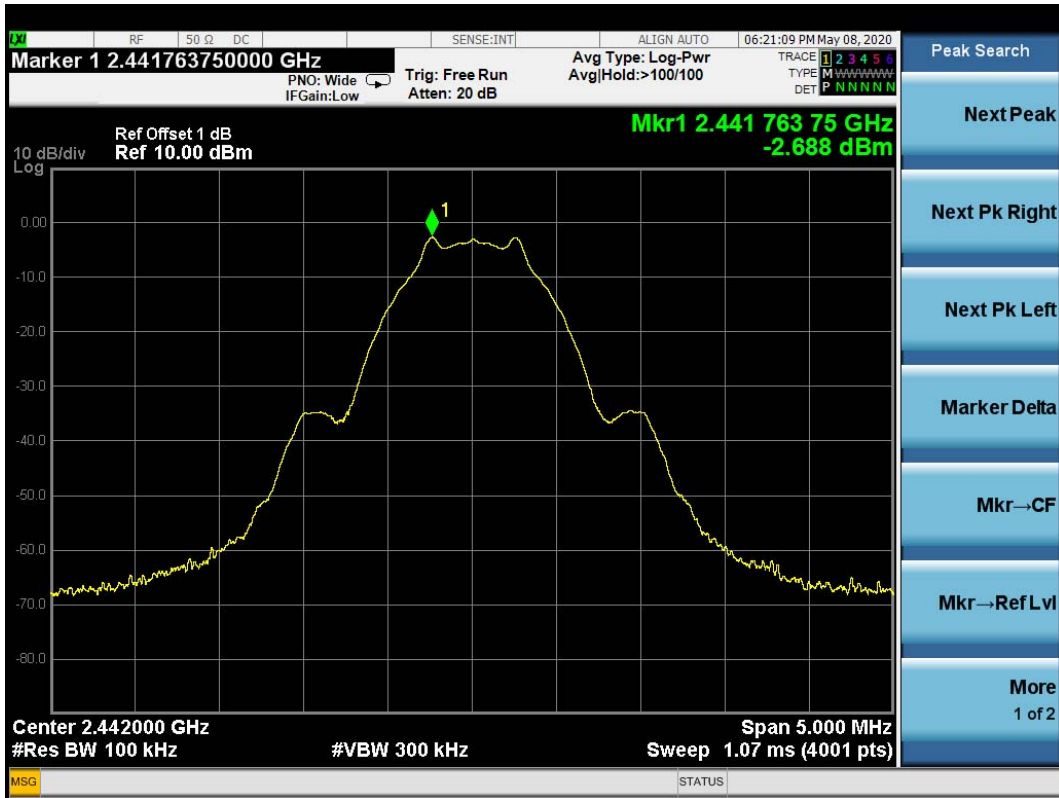
(Test Date: 2020.05.08 Temperature: 23°C Humidity: 51 %)

Modulation	Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit
BLE	00	2402	-2.101	8 dBm
	20	2442	-2.688	8 dBm
	39	2480	-3.25	8 dBm

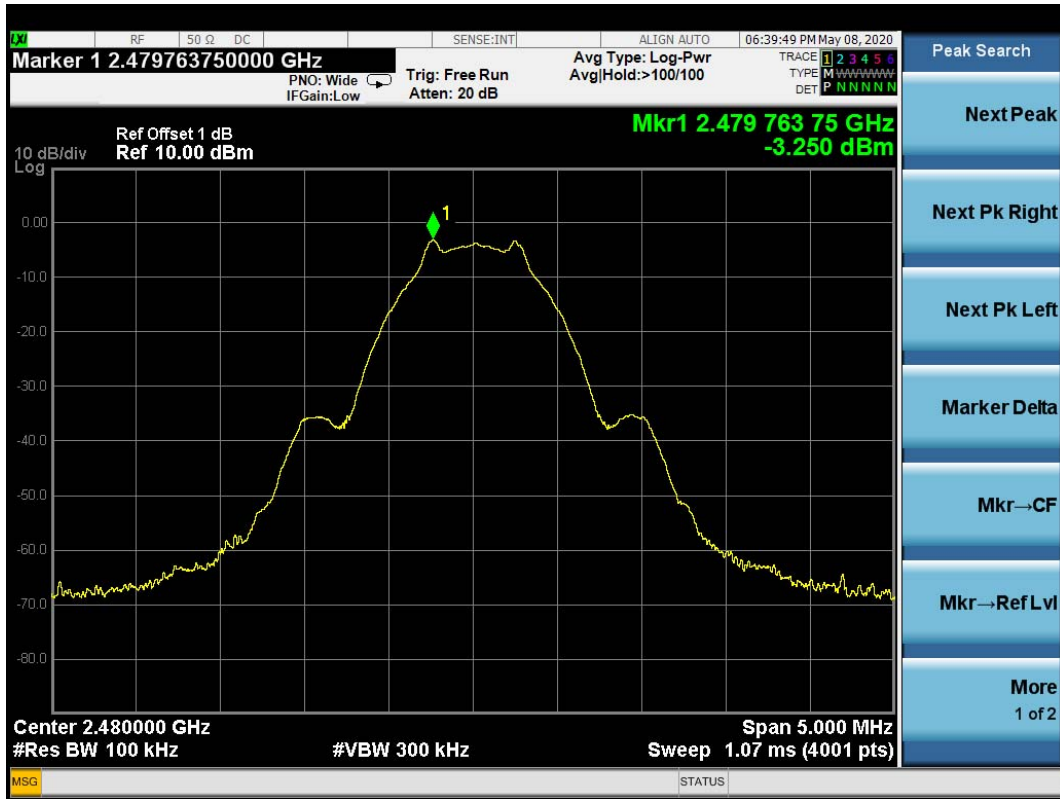
BLE CH2402 MHz



BLE CH2442 MHz



BLE CH2480 MHz



10 DEVIATION TO TEST SPECIFICATIONS

None.

11 MEASUREMENT UNCERTAINTY LIST

The measurement uncertainty was estimated for test on the EUT according to CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage of K=2. The uncertainties value is not used in determining the PASS/FAIL results.

Test Items/Facilities	Frequency/Equipment/Unit	Uncertainty
Conducted Emission No.1 Shielded Room	9kHz~150kHz	±3.8dB
	150kHz~30MHz	±3.4dB
Conducted Emission No.3 Shielded Room	150kHz~30MHz	±3.4dB
Radiated Emission	30MHz~200MHz, Horizontal	±4.5dB
	30MHz~200MHz, Vertical	±4.5dB
	200MHz~1000MHz, Horizontal	±4.6dB
	200MHz~1000MHz, Vertical	±5.7dB
	1GHz~6GHz	±6.0dB
	6GHz~18GHz	±5.7dB
Output Power Test	50MHz~18GHz	0.77dB
Power Density Test	9kHz~6GHz	1.08dB
RF Frequency Test	9kHz~40GHz	6×10^{-4}
Bandwidth Test	9kHz~6GHz	1.5×10^{-3}
RF Radiated Power Test	30MHz~1000MHz	3.06dB
Conducted Output Power Test	50MHz~18GHz	0.83dB
AC Voltage(<10kHz) Test	120V~230V	0.04%
DC Power Test	0V~30V	0.4%
Temperature	-40°C~+100°C	0.52°C
Humidity	30%~95%	2.6%