FCC Test Report

Product Name	OCCSensaBLE Basic
Model No.	Basic
FCC ID.	2ARX9-OCCBASIC

Applicant	Open Platform Systems LLC
Address	108 West 33rd St, Garden City Idaho United States, 83714

Date of Receipt	Mar. 15, 2019
Issued Date	Apr. 25, 2019
Report No.	1930243R-RFUSP01V00
Report Version	V1.0

Testing Laboratory
3023

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
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Test Report

Issued Date: Apr. 25, 2019
Report No.: 1930243R-RFUSP01V00

Product Name	OCCSensaBLE Basic
Applicant	Open Platform Systems LLC
Address	108 West 33rd St, Garden City Idaho United States, 83714
Manufacturer	Open Platform Systems LLC
Model No.	Basic
FCC ID.	2ARX9-OCCBASIC
EUT Rated Voltage	DC 12V
EUT Test Voltage	DC 12V
Trade Name	OCCSensaBLE
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v05
Test Result	Complied

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Tested By : Jason Tuan

(Engineer / Jason Tuan)

Approved By :

(Director / Vincent Lin)

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Attachment 1: EUT Test Photographs
Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	OCCSensaBLE Basic
Trade Name	OCCSensaBLE
Model No.	Basic
FCC ID.	2ARX9-OCCBASIC
Frequency Range	2402 – 2480MHz
Channel Number	V4.2: 40CH
Type of Modulation	V4.2: GFSK(1Mbps)
Antenna Type	PCB Antenna
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Texas Instruments	DN0007	PCB Antenna	3.3dBi for 2.4GHz

Note: The antenna of EUT is conforming to FCC 15.203.

Center Frequency of Each Channel: (For V4.2)

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

Note:

1. The EUT is an OCCSensaBLE Basic with a built-in Bluetooth V4.2 transceiver.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit - BLE (GFSK)

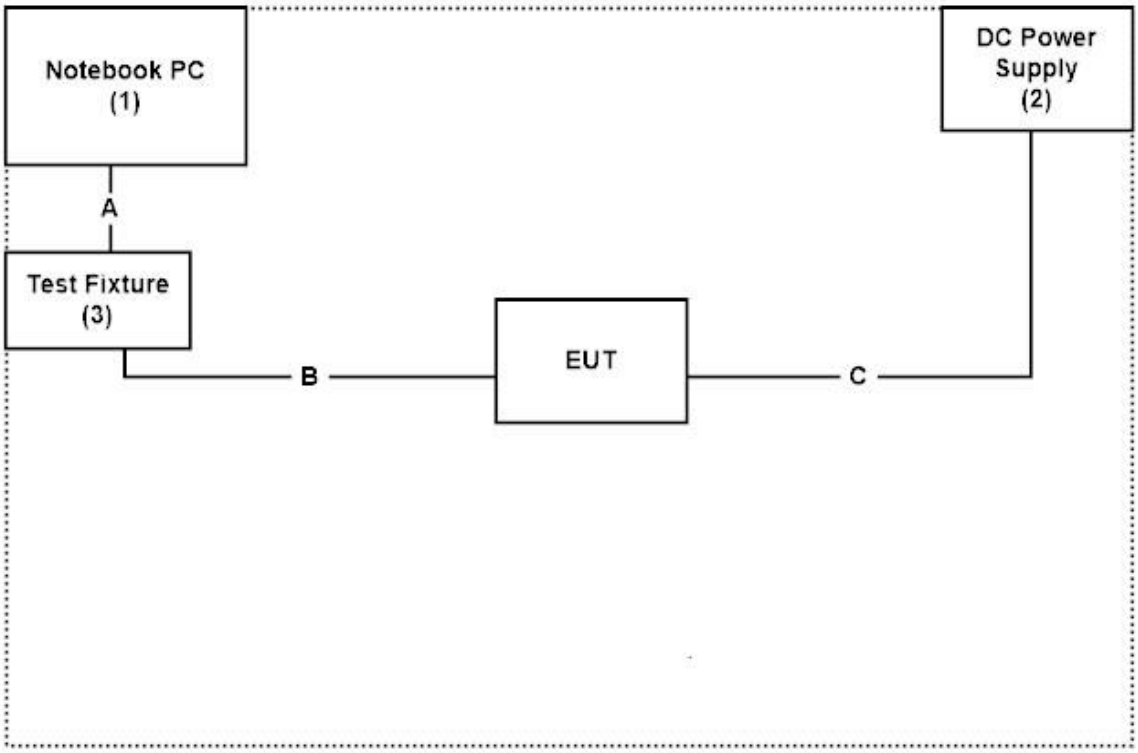
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	Latitude 5580	GDZN7H2	Non-Shielded, 0.8m
2	DC Power Supply	Topward	6303D	743452	Non-Shielded, 1.8m
3	Test Fixture	N/A	N/A	N/A	N/A

Signal Cable Type		Signal cable Description
A	USB Cable	Non-Shielded, 0.2m
B	Signal Cable	Non-Shielded, 0.1m
C	Power Cable	Non-Shielded, 1.5m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Execute software ” Smart RF studio7 v.2.11.0” on the Notebook PC.
3. Configure the test mode, the test channel, and the data rate.
4. Press “OK” to start the continuous Transmit.
5. Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	30-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:
http://www.dekra.com.tw/english/about/certificates.aspx?bval=5
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en.aspx

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Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd
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TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW3023

1.7. List of Test Equipment

For Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
	Temperature Chamber	WIT GROUP	TH-1S-B	EQ-201-00146	2019/2/26	2020/2/25
X	Spectrum Analyzer	Agilent	N9010A	MY53470892	2018/09/27	2019/09/26
X	Peak Power Analyzer	Keysight	8990B	MY51000410	2018/08/01	2019/07/31
X	Wideband Power Sensor	Keysight	N1923A	MY56080003	2018/07/25	2019/07/24
X	Wideband Power Sensor	Keysight	N1923A	MY56080004	2018/07/25	2019/07/24
X	EMI Test Receiver	R&S	ESCS 30	100369	2018/11/19	2019/11/18
X	LISN	R&S	ENV216	101105	2019/03/30	2020/03/29
X	LISN	R&S	ESH3-Z5	836679/014	2019/04/02	2020/04/01
X	Coaxial Cable	DEKRA	RG 400	LC018-RG	2018/06/21	2019/06/20

For Radiated measurements /Site3/CB8

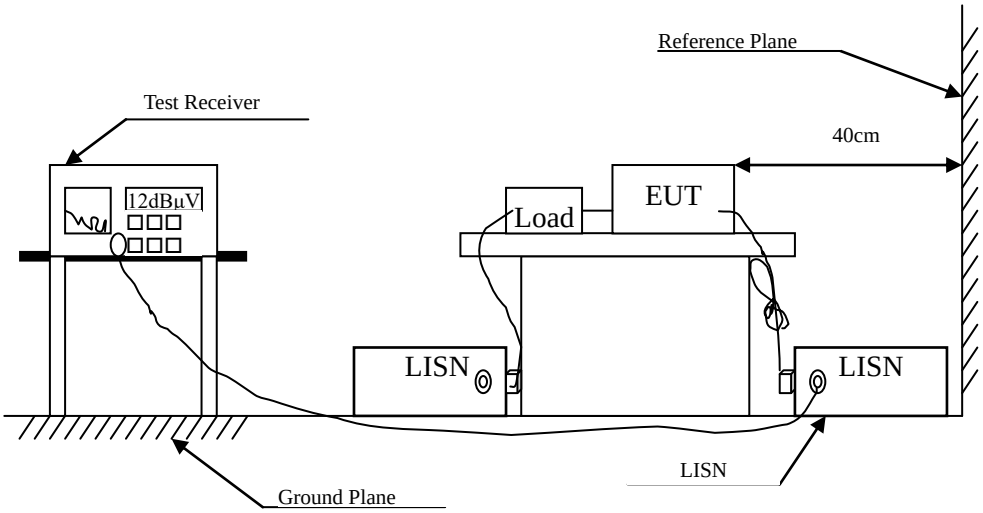
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Spectrum Analyzer	R&S	FSP40	100170	2019/3/11	2020/3/10
X	Loop Antenna	Teseq	HLA6121	37133	2018/10/13	2019/10/12
X	Bilog Antenna	Schaffner Chase	CBL6112B	2707	2018/06/24	2019/06/23
X	Coaxial Cable	DEKRA	RG 214	LC003-RG	2018/06/14	2019/06/13
X	Pre-Amplifier	Jet-Power	JPA-10M1G33	170101000330010	2018/06/14	2019/06/13
X	Horn Antenna	ETS-Lindgren	3117	00135205	2018/05/03	2019/05/02
X	Horn Antenna	SCHWARZBECK	9120D	576	2018/12/18	2019/12/17
X	Pre-Amplifier	EMCI	EMC012630SE	980210	2019/04/10	2020/04/09
X	Horn Antenna	Com-Power	AH-840	101043	2019/01/19	2020/01/18
X	Amplifier + Cable	EMCI	EMC184045SE	980370	2019/3/21	2020/3/20
X	Filter	MICRO-TRONICS	BRM50702	G270	2018/08/06	2019/08/05
X	Filter	MICRO-TRONICS	BRM50716	G196	2018/08/06	2019/08/05

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version :QuieTek EMI 2.0 V2.1.113.

2. Conducted Emission

2.1. Test Setup



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2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2014; tested to DTS test procedure of FCC KDB-558074 for compliance to FCC 47CFR Subpart C requirements.

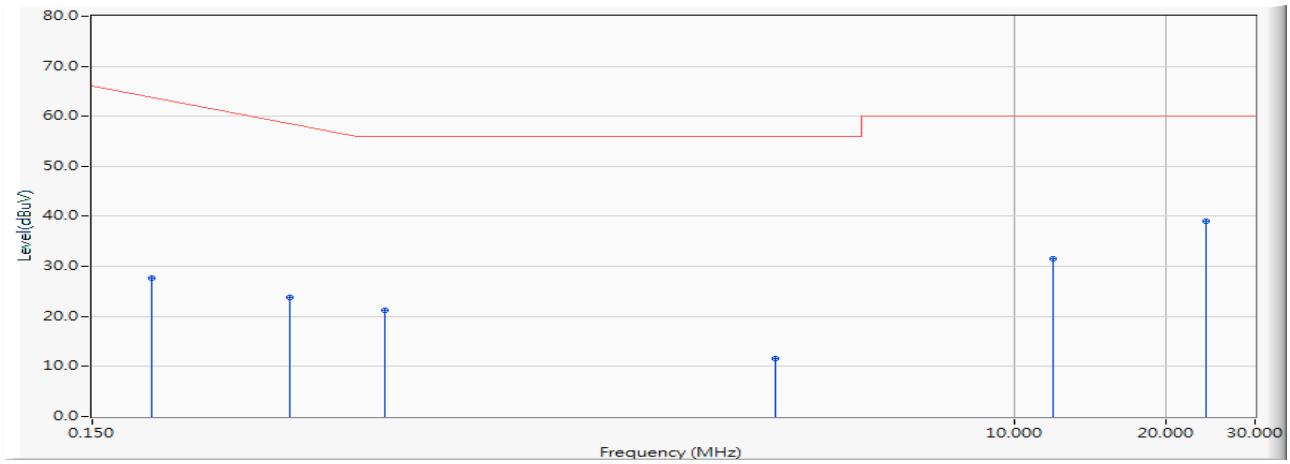
2.4. Uncertainty

± 2.26 dB

2.5. Test Result of Conducted Emission

Product	:	OCCSensaBLE Basic
Test Item	:	Conducted Emission Test
Power Line	:	Line 1
Test date	:	2019/04/01
Test Mode	:	Mode 1: Transmit - BLE (GFSK) (2440MHz)

Line1



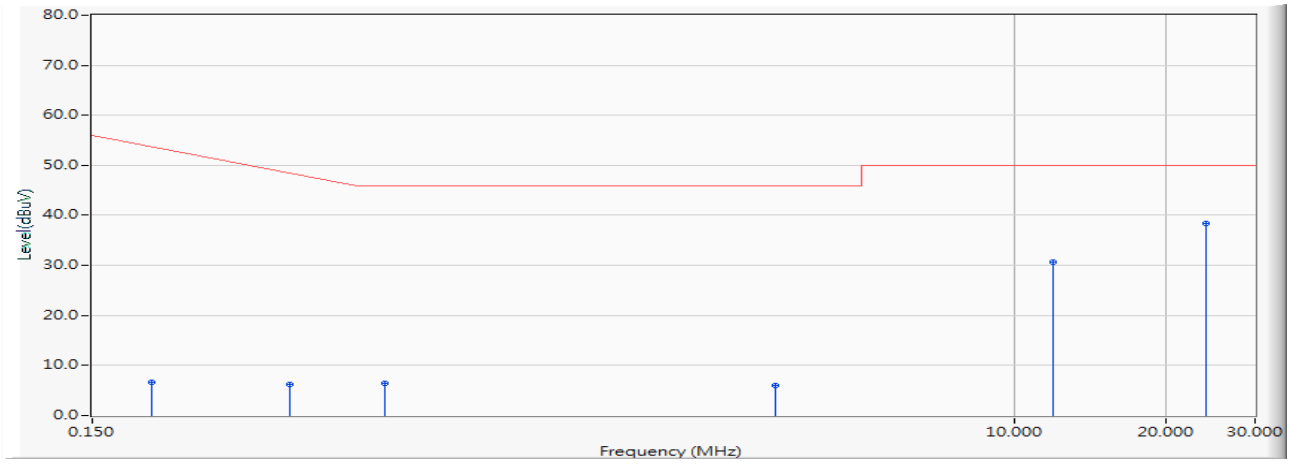
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.197	9.658	18.000	27.658	-36.999	64.657	QUASIPEAK
2		0.369	9.665	14.160	23.825	-35.918	59.743	QUASIPEAK
3		0.568	9.673	11.480	21.153	-34.847	56.000	QUASIPEAK
4		3.365	9.786	1.780	11.566	-44.434	56.000	QUASIPEAK
5		11.974	10.013	21.520	31.533	-28.467	60.000	QUASIPEAK
6	*	23.955	10.187	28.840	39.027	-20.973	60.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product	:	OCCSensaBLE Basic
Test Item	:	Conducted Emission Test
Power Line	:	Line 1
Test date	:	2019/04/01
Test Mode	:	Mode 1: Transmit - BLE (GFSK) (2440MHz)

Line1



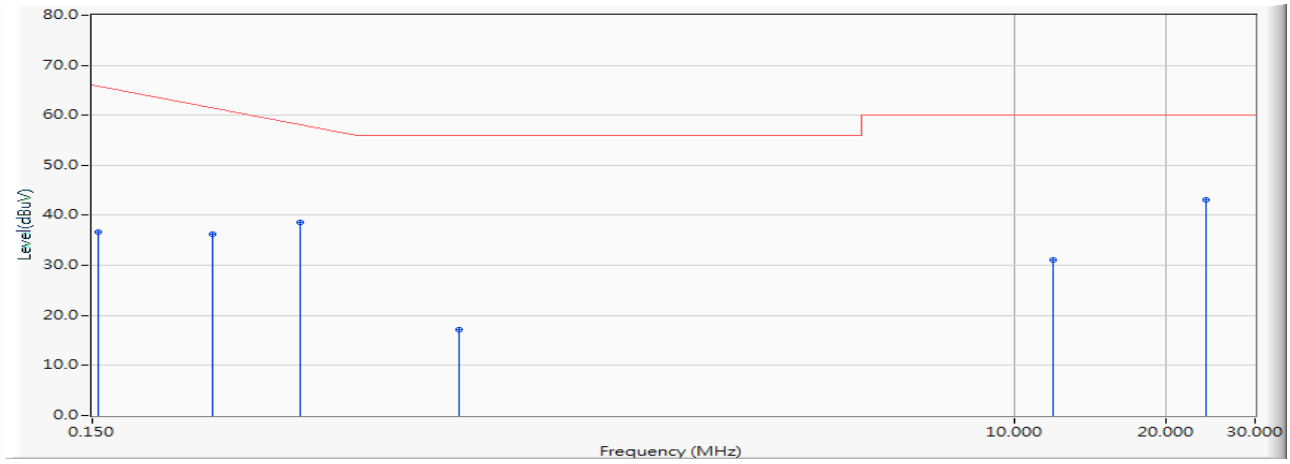
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.197	9.658	-3.020	6.638	-48.019	54.657	AVERAGE
2		0.369	9.665	-3.540	6.125	-43.618	49.743	AVERAGE
3		0.568	9.673	-3.150	6.523	-39.477	46.000	AVERAGE
4		3.365	9.786	-3.810	5.976	-40.024	46.000	AVERAGE
5		11.974	10.013	20.670	30.683	-19.317	50.000	AVERAGE
6	*	23.955	10.187	28.250	38.437	-11.563	50.000	AVERAGE

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product	:	OCCSensaBLE Basic
Test Item	:	Conducted Emission Test
Power Line	:	Line 2
Test date	:	2019/04/01
Test Mode	:	Mode 1: Transmit - BLE (GFSK) (2440MHz)

Line2



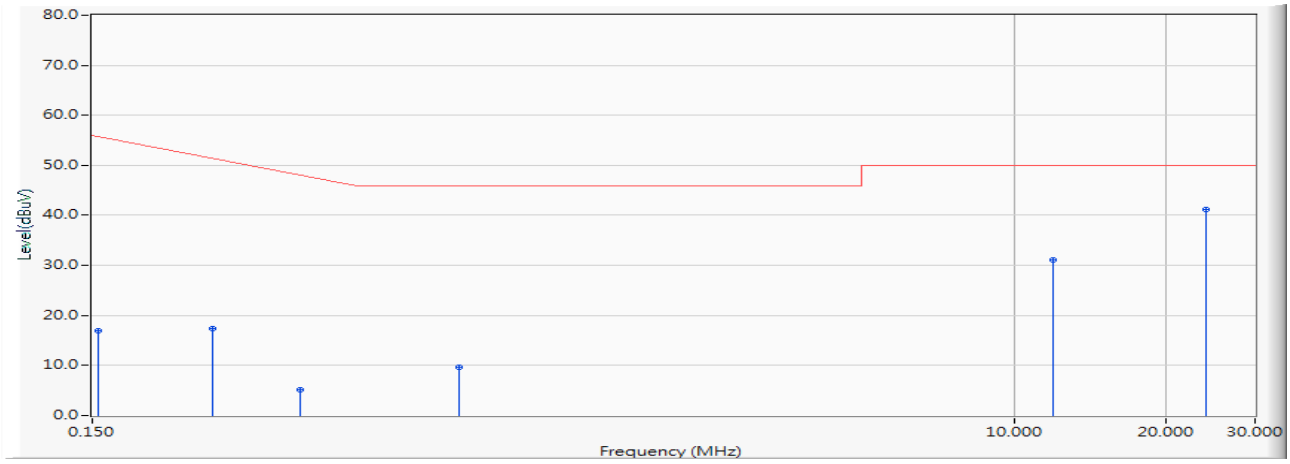
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.154	9.696	27.000	36.696	-29.190	65.886	QUASIPEAK
2		0.259	9.690	26.660	36.350	-26.536	62.886	QUASIPEAK
3		0.388	9.696	28.980	38.676	-20.524	59.200	QUASIPEAK
4		0.798	9.722	7.540	17.262	-38.738	56.000	QUASIPEAK
5		11.974	10.113	21.060	31.173	-28.827	60.000	QUASIPEAK
6	*	23.955	10.397	32.720	43.117	-16.883	60.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product	:	OCCSensaBLE Basic
Test Item	:	Conducted Emission Test
Power Line	:	Line 2
Test date	:	2019/04/01
Test Mode	:	Mode 1: Transmit - BLE (GFSK) (2440MHz)

Line2



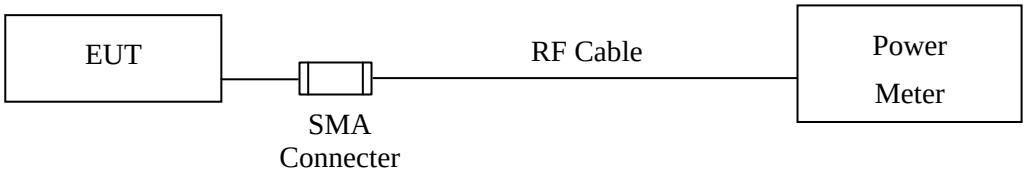
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.154	9.696	7.200	16.896	-38.990	55.886	AVERAGE
2		0.259	9.690	7.580	17.270	-35.616	52.886	AVERAGE
3		0.388	9.696	-4.530	5.166	-44.034	49.200	AVERAGE
4		0.798	9.722	-0.110	9.612	-36.388	46.000	AVERAGE
5		11.974	10.113	21.050	31.163	-18.837	50.000	AVERAGE
6	*	23.955	10.397	30.810	41.207	-8.793	50.000	AVERAGE

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

3.1. Test Setup



3.2. Limit

The maximum peak power shall be less 1Watt.

3.3. Test Procedure

Tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 section 9.1.3 PKPM1 Peak power meter method.

3.4. Uncertainty

± 1.19 dB

3.5. Test Result of Peak Power Output

Product : OCCSensaBLE Basic
Test Item : Peak Power Output
Test Site : No.3 OATS
Test date : 2019/04/25
Test Mode : Mode 1: Transmit - BLE (GFSK)

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	3.11	1 Watt= 30 dBm	Pass
Channel 19	2440.00	-2.04	1 Watt= 30 dBm	Pass
Channel 39	2480.00	-6.00	1 Watt= 30 dBm	Pass

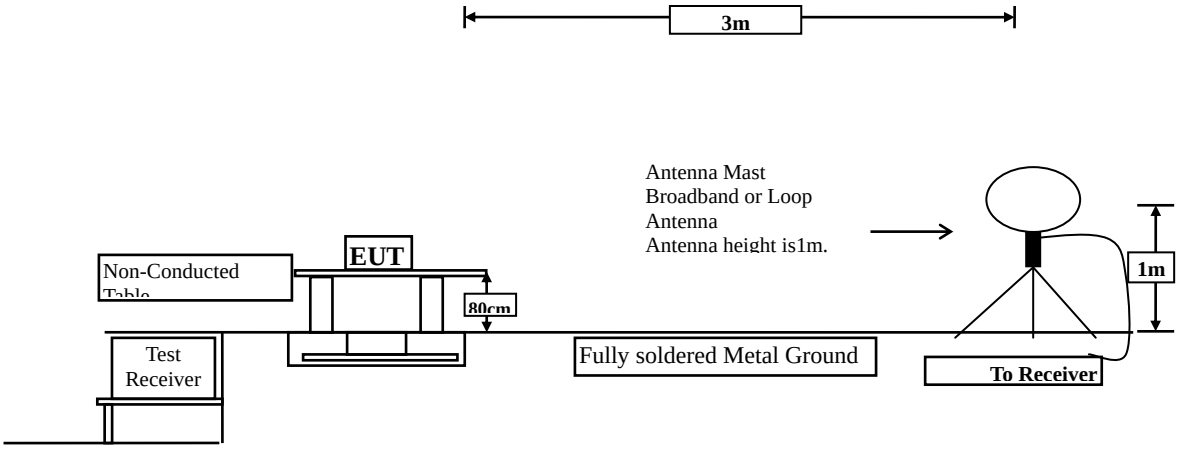
Note:

1. Measurement Value =Reading value on power meter + cable loss

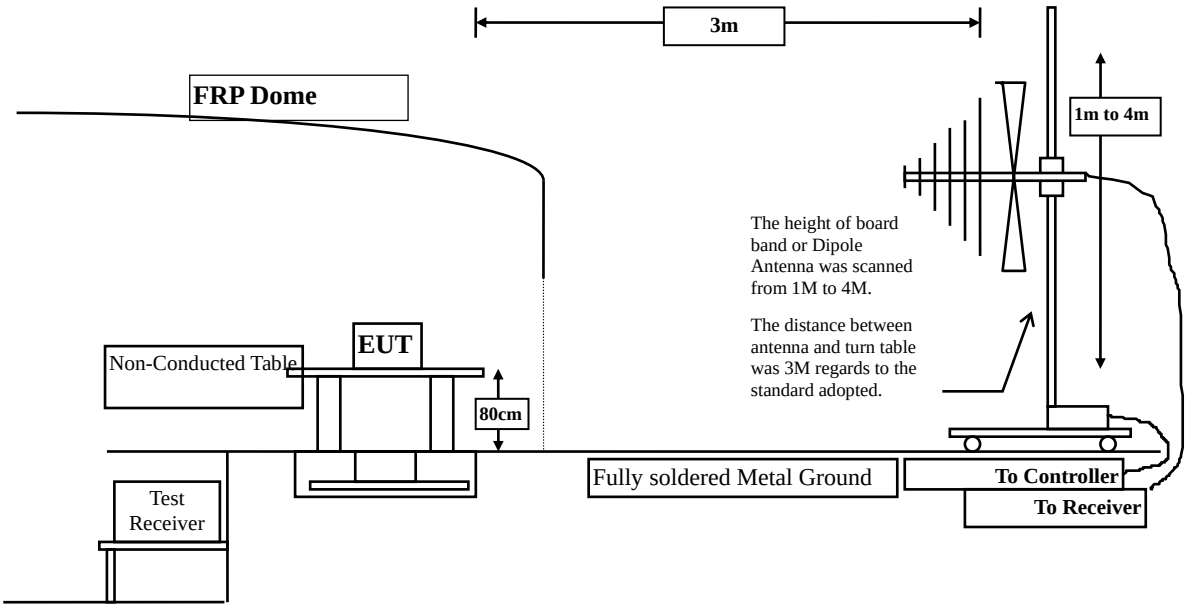
4. Radiated Emission

4.1. Test Setup

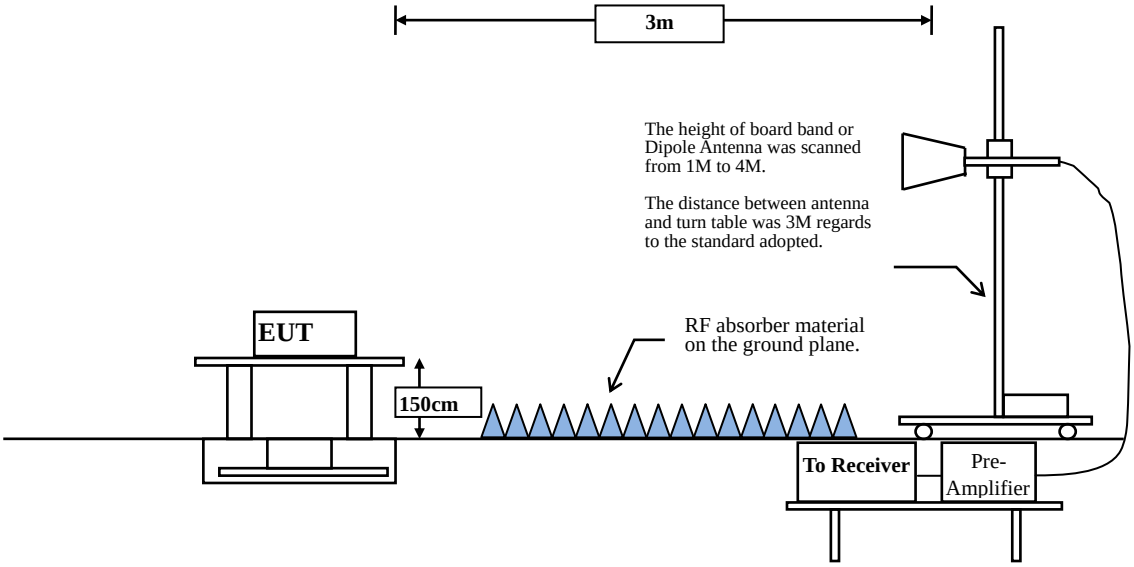
Under 30MHz



Below 1GHz



Above 1GHz



4.2. Limits

➢ **General Radiated Emission Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: 1. RF Voltage (dBμV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

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.

4.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

VBW ≥ 3 x RBW.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
BLE	100	--	--	10

Note: Duty Cycle Refer to Section 9

4.4. Uncertainty

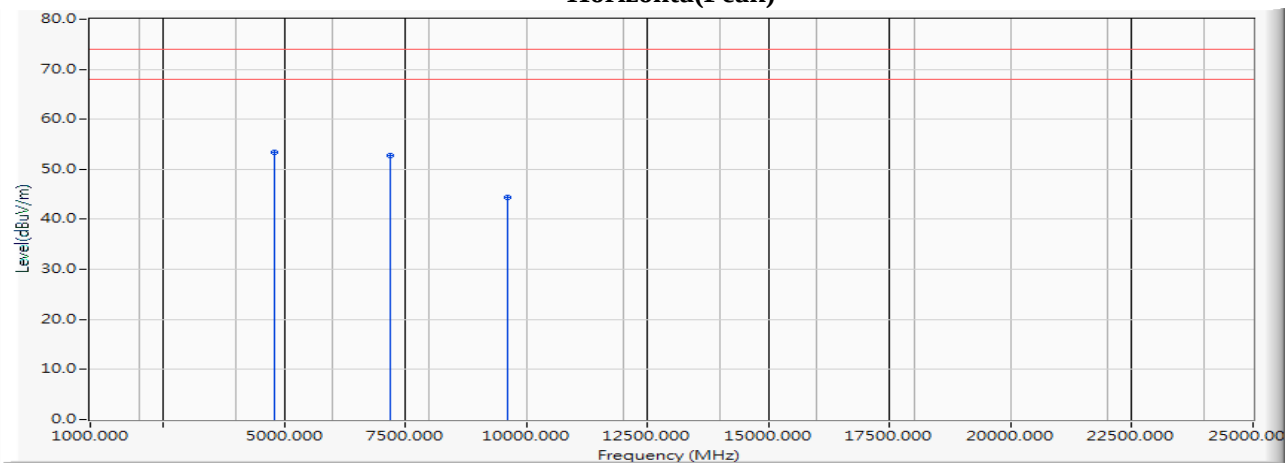
± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

4.5. Test Result of Radiated Emission

Product : OCCSensaBLE Basic
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test date : 2019/04/25
Test Mode : Mode 1: Transmit - BLE (GFSK)(2402MHz)

Horizonta(Peak)



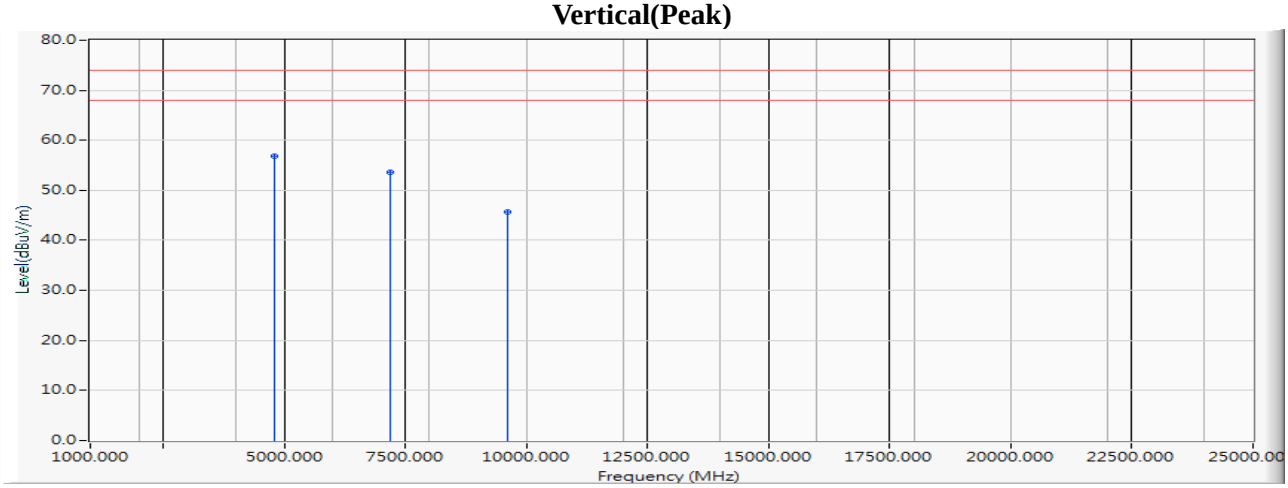
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	4804.000	5.787	47.664	53.451	-20.549	74.000	PEAK
2		7206.000	10.333	42.521	52.854	-21.146	74.000	PEAK
3		9608.000	13.713	30.620	44.333	-29.667	74.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report..

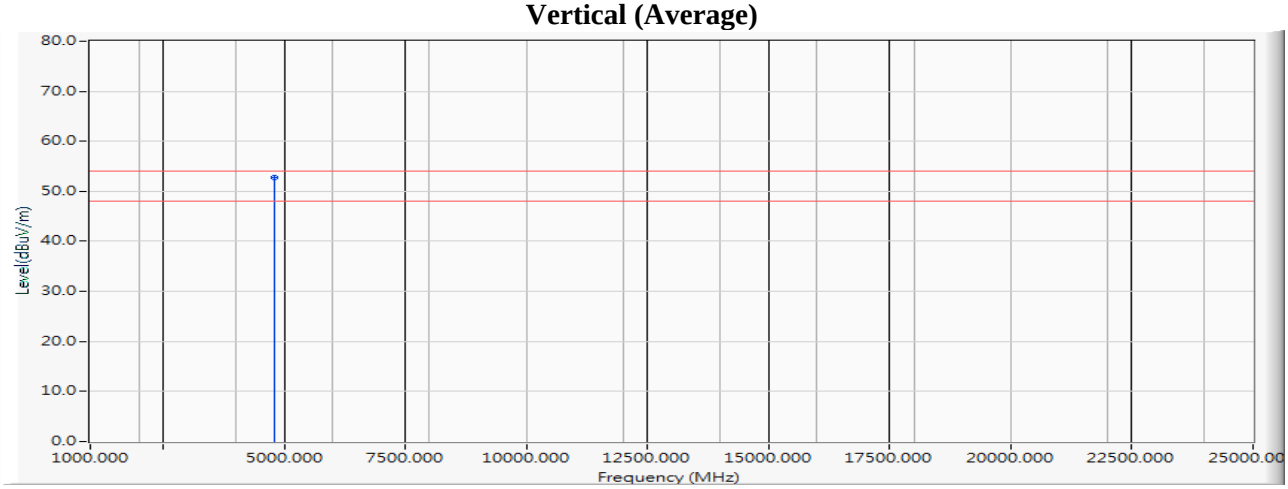
Product : OCCSensaBLE Basic
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test date : 2019/04/25
Test Mode : Mode 1: Transmit - BLE (GFSK)(2402MHz)

Vertical(Peak)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	4804.000	5.787	51.055	56.842	-17.158	74.000	PEAK
2		7206.000	10.333	43.251	53.584	-20.416	74.000	PEAK
3		9608.000	13.713	31.957	45.670	-28.330	74.000	PEAK

Vertical (Average)



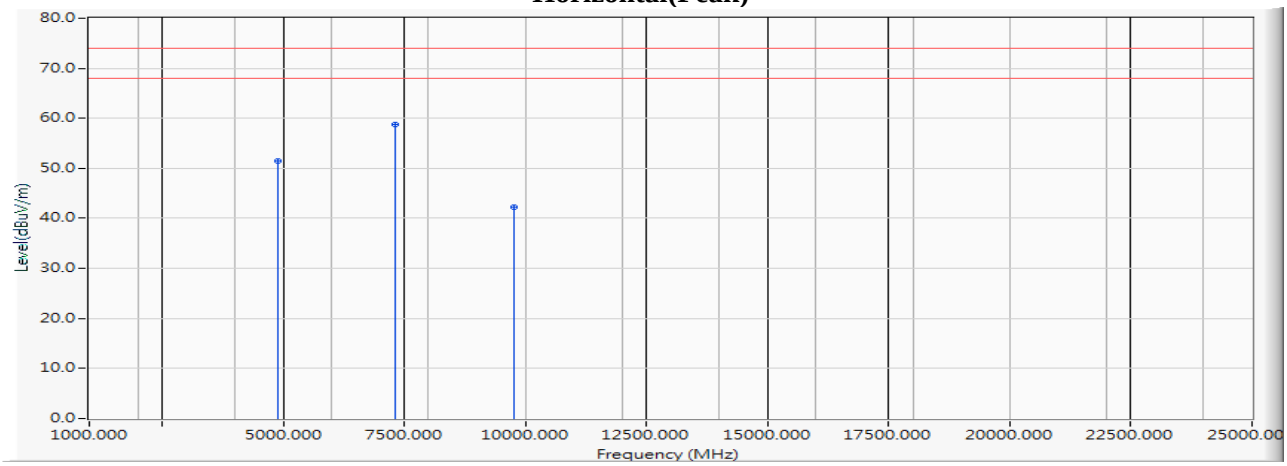
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	4804.000	5.787	46.895	52.682	-1.318	54.000	AVERAGE

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report..

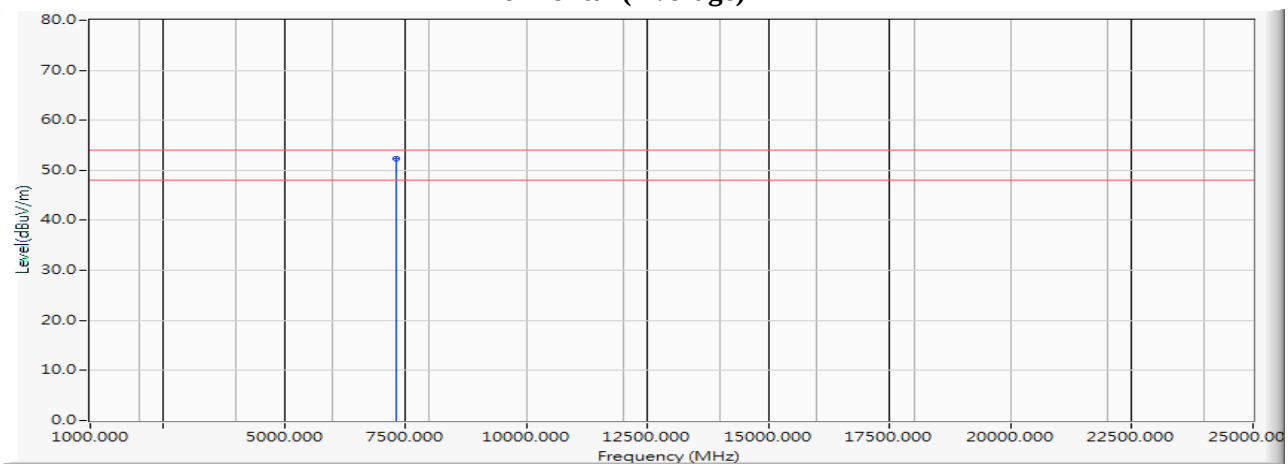
Product	:	OCCSensaBLE Basic
Test Item	:	Harmonic Radiated Emission
Test Site	:	No.3 OATS
Test date	:	2019/04/25
Test Mode	:	Mode 1: Transmit - BLE (GFSK) (2440MHz)

Horizontal(Peak)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4880.000	5.907	45.524	51.432	-22.568	74.000	PEAK
2	*	7320.000	10.400	48.392	58.793	-15.207	74.000	PEAK
3		9760.000	14.113	28.083	42.196	-31.804	74.000	PEAK

Horizontal (Average)



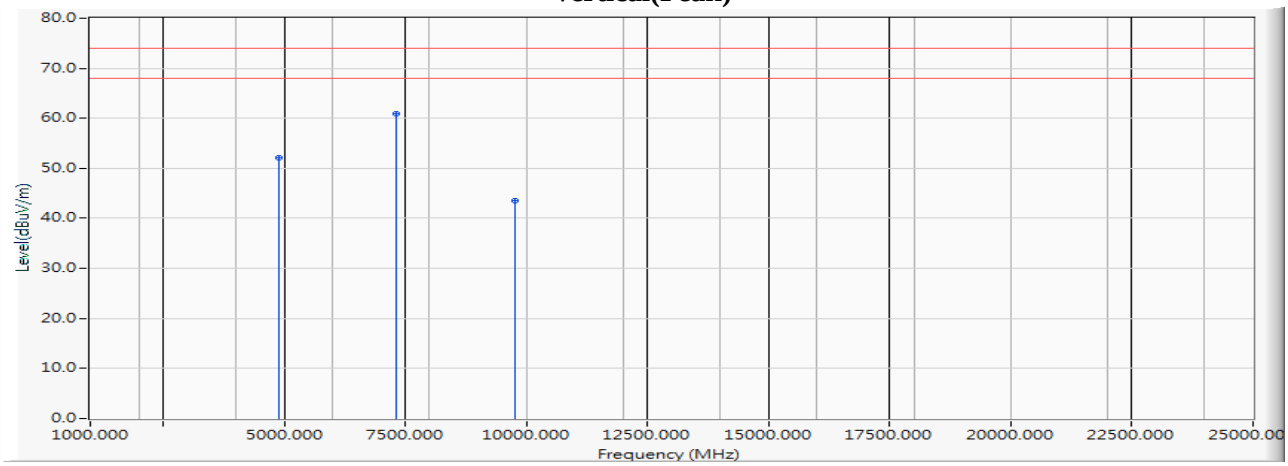
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	7320.000	10.400	41.902	52.303	-1.697	54.000	AVERAGE

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

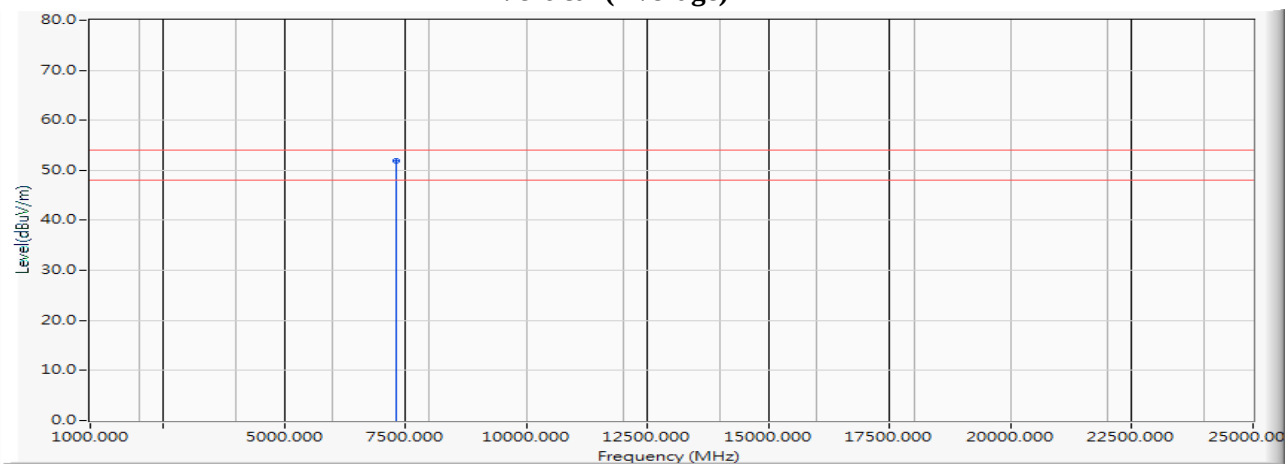
Product : OCCSensaBLE Basic
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test date : 2019/04/25
Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Vertical(Peak)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4880.000	5.907	46.152	52.060	-21.940	74.000	PEAK
2	*	7320.000	10.400	50.502	60.903	-13.097	74.000	PEAK
3		9760.000	14.113	29.475	43.588	-30.412	74.000	PEAK

Vertical (Average)



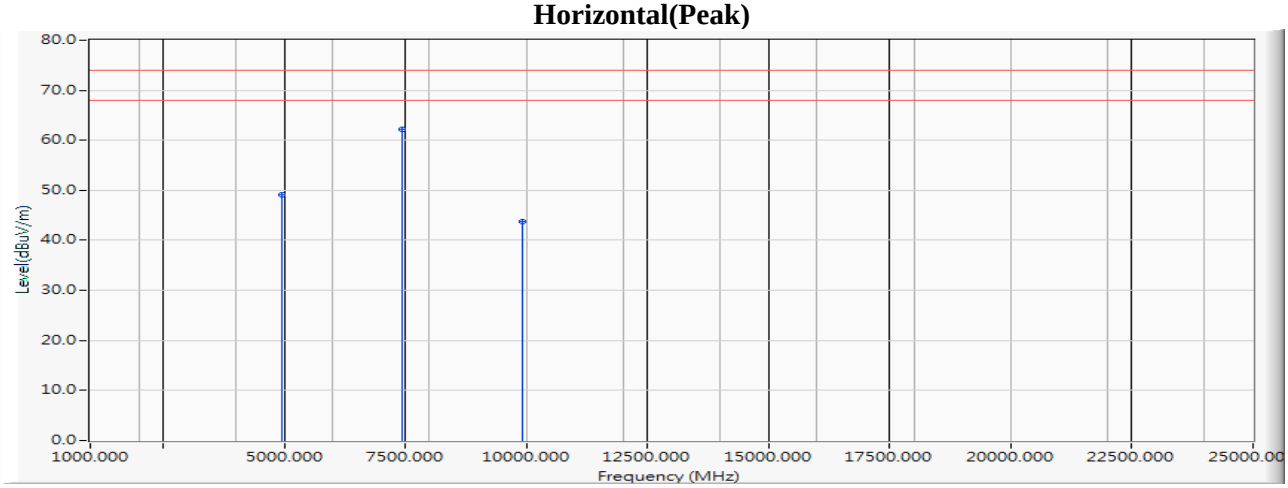
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	7320.000	10.400	41.482	51.883	-2.117	54.000	AVERAGE

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

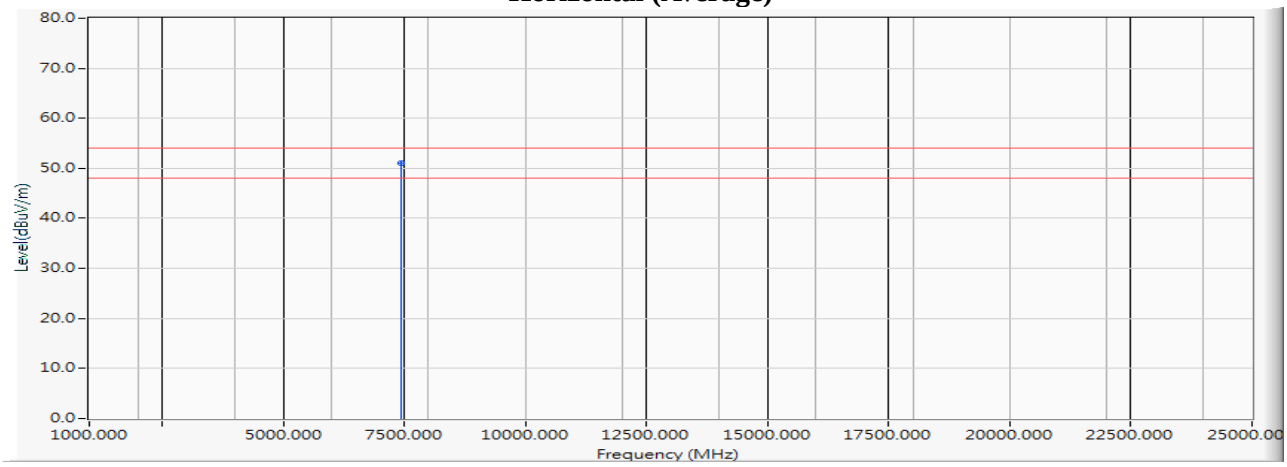
Product : OCCSensaBLE Basic
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test date : 2019/04/25
Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

Horizontal(Peak)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4960.000	6.008	43.037	49.045	-24.955	74.000	PEAK
2	*	7440.000	10.485	51.732	62.217	-11.783	74.000	PEAK
3		9920.000	14.146	29.560	43.706	-30.294	74.000	PEAK

Horizontal (Average)



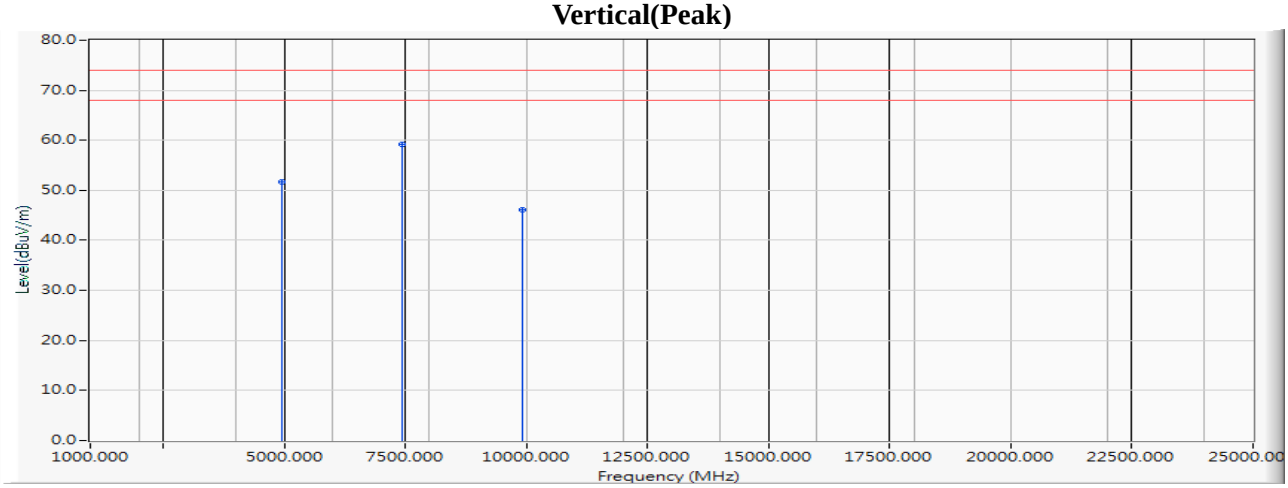
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	7440.000	10.485	40.503	50.988	-3.012	54.000	AVERAGE

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

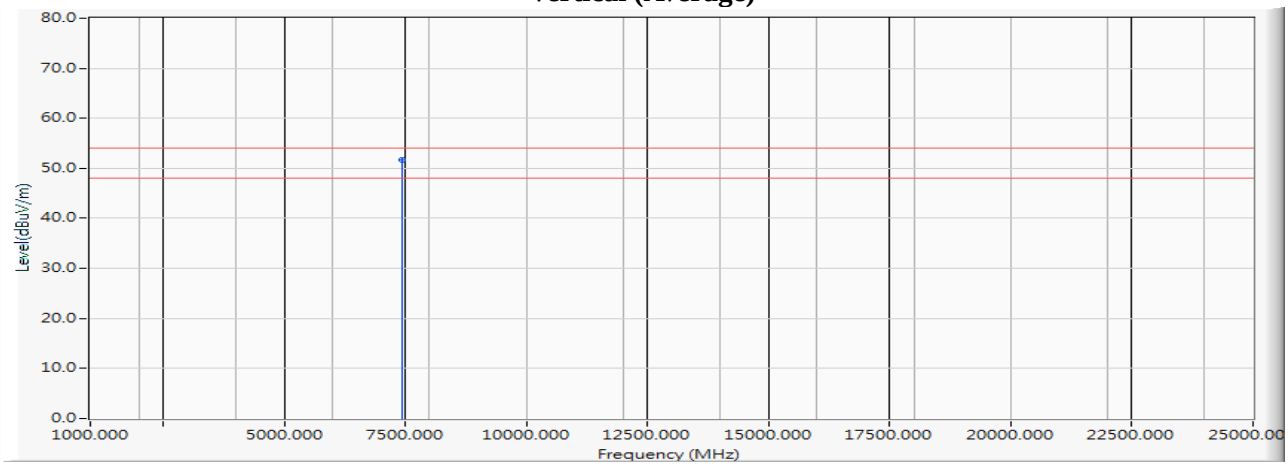
Product : OCCSensaBLE Basic
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test date : 2019/04/25
Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

Vertical(Peak)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4960.000	6.008	45.704	51.712	-22.288	74.000	PEAK
2	*	7440.000	10.485	48.692	59.177	-14.823	74.000	PEAK
3		9920.000	14.146	32.062	46.208	-27.792	74.000	PEAK

Vertical (Average)



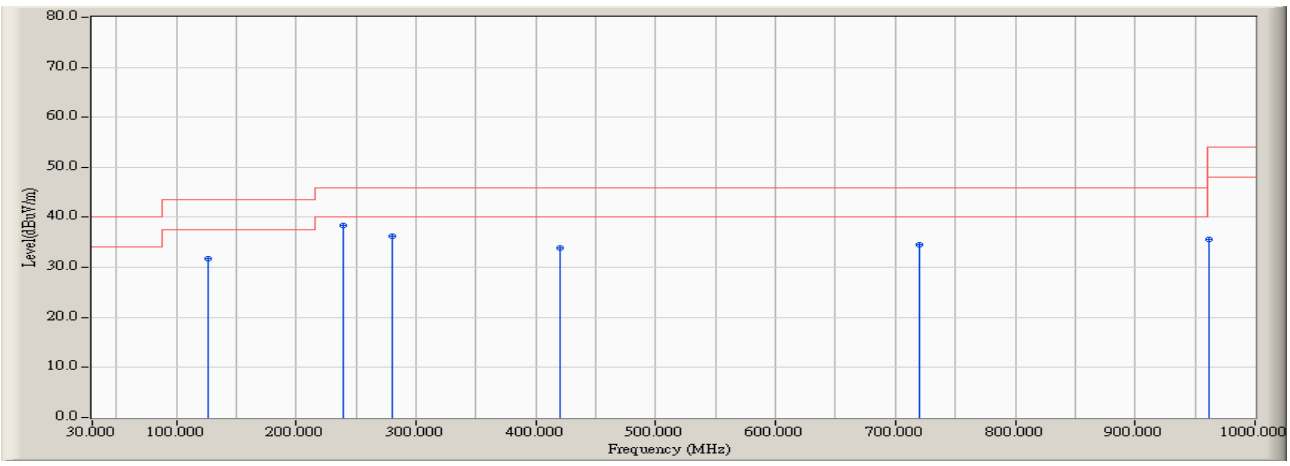
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	7440.000	10.485	41.232	51.717	-2.283	54.000	AVERAGE

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	OCCSensaBLE Basic
Test Item	:	General Radiated Emission
Test Site	:	No.3 OATS
Test date	:	2019/04/24
Test Mode	:	Mode 1: Transmit - BLE (GFSK) (2440MHz)

Horizontal



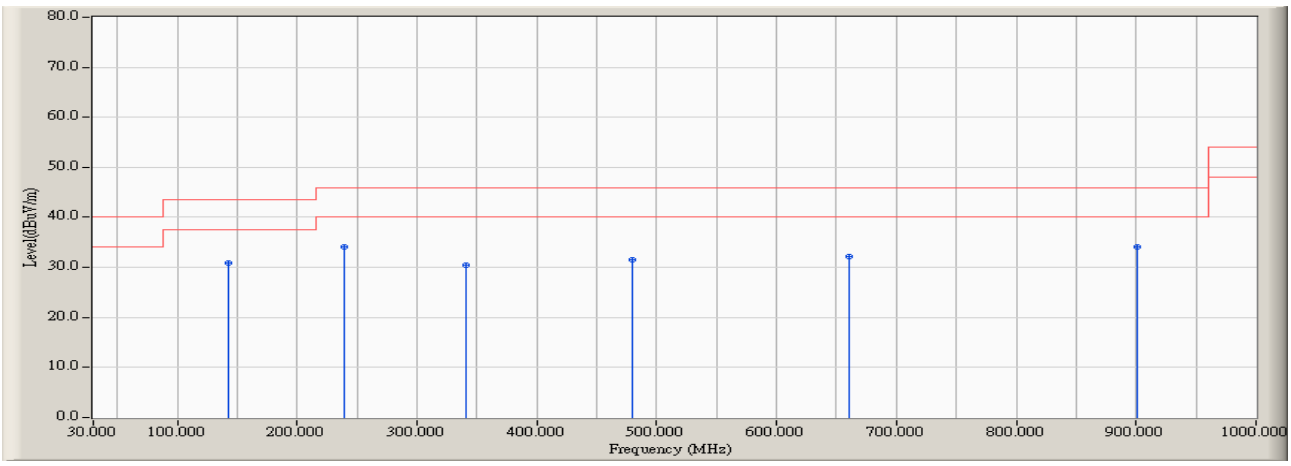
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		127.000	-0.672	32.353	31.681	-11.819	43.500	QUASIPEAK
2	*	239.520	-0.317	38.691	38.374	-7.626	46.000	QUASIPEAK
3		280.260	1.185	35.096	36.281	-9.719	46.000	QUASIPEAK
4		419.940	5.294	28.671	33.965	-12.035	46.000	QUASIPEAK
5		720.640	9.717	24.841	34.558	-11.442	46.000	QUASIPEAK
6		961.200	13.053	22.638	35.691	-18.309	54.000	QUASIPEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	OCCSensaBLE Basic
Test Item	:	General Radiated Emission
Test Site	:	No.3 OATS
Test date	:	2019/04/24
Test Mode	:	Mode 1: Transmit - BLE (GFSK) (2440MHz)

Vertical



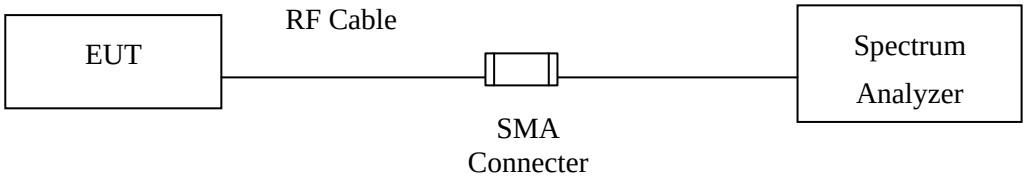
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		142.520	-1.332	32.256	30.924	-12.576	43.500	QUASIPEAK
2	*	239.520	-0.317	34.373	34.056	-11.944	46.000	QUASIPEAK
3		340.400	3.081	27.442	30.523	-15.477	46.000	QUASIPEAK
4		480.080	6.322	25.162	31.484	-14.516	46.000	QUASIPEAK
5		660.500	9.183	22.891	32.074	-13.926	46.000	QUASIPEAK
6		901.060	12.124	21.892	34.016	-11.984	46.000	QUASIPEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

5. RF Antenna Conducted Test

5.1. Test Setup



5.2. Limits

According to FCC Section 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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.3. Test Procedure

The EUT was tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

5.4. Uncertainty

± 1.20dB

5.5. Test Result of RF Antenna Conducted Test

Product	:	OCCSensaBLE Basic
Test Item	:	RF Antenna Conducted Test
Test Site	:	No.3 OATS
Test date	:	2019/02/14
Test Mode	:	Mode 1: Transmit - BLE (GFSK)

Figure Channel 00:

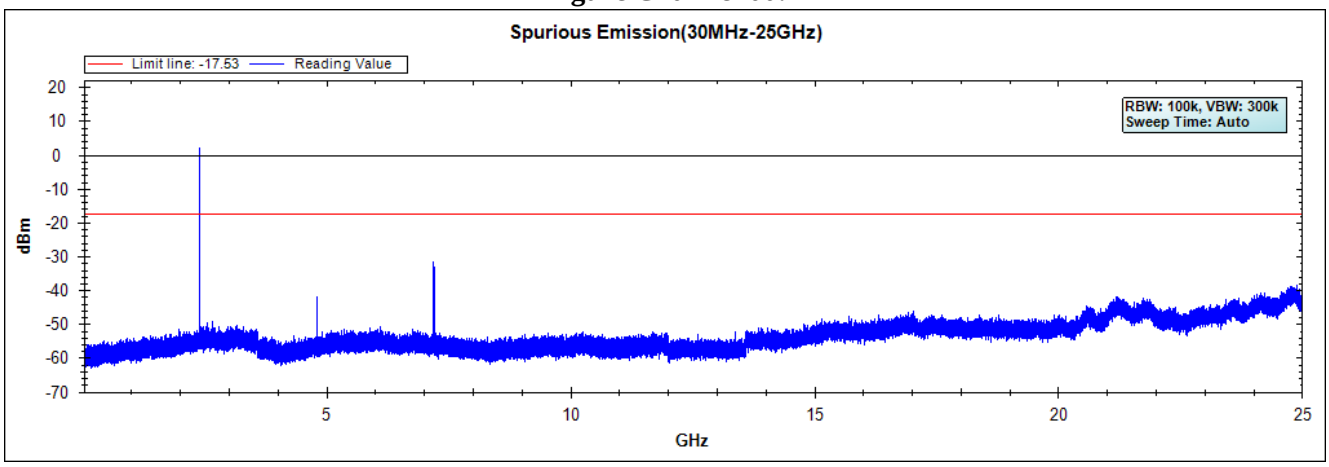


Figure Channel 19:

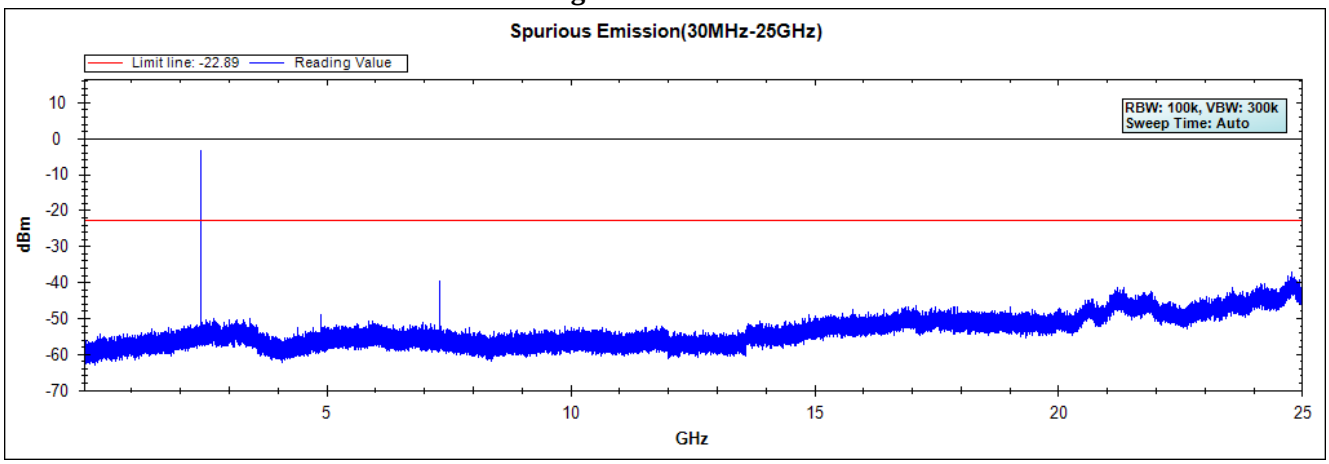
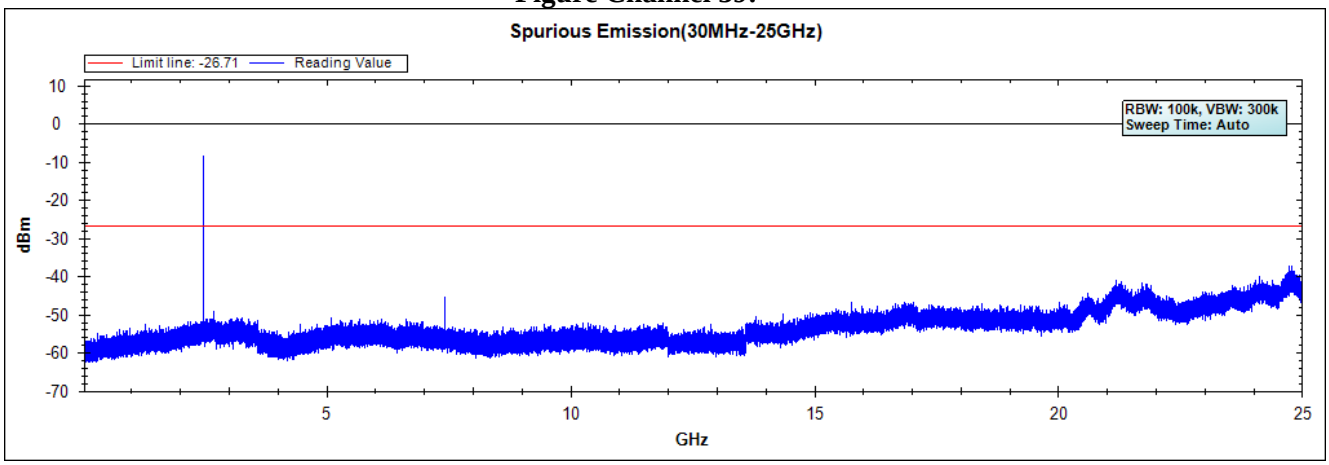


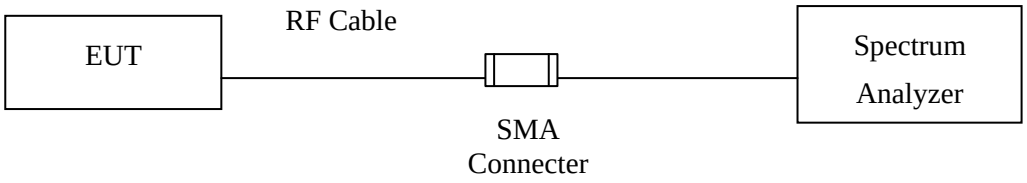
Figure Channel 39:



6. Band Edge

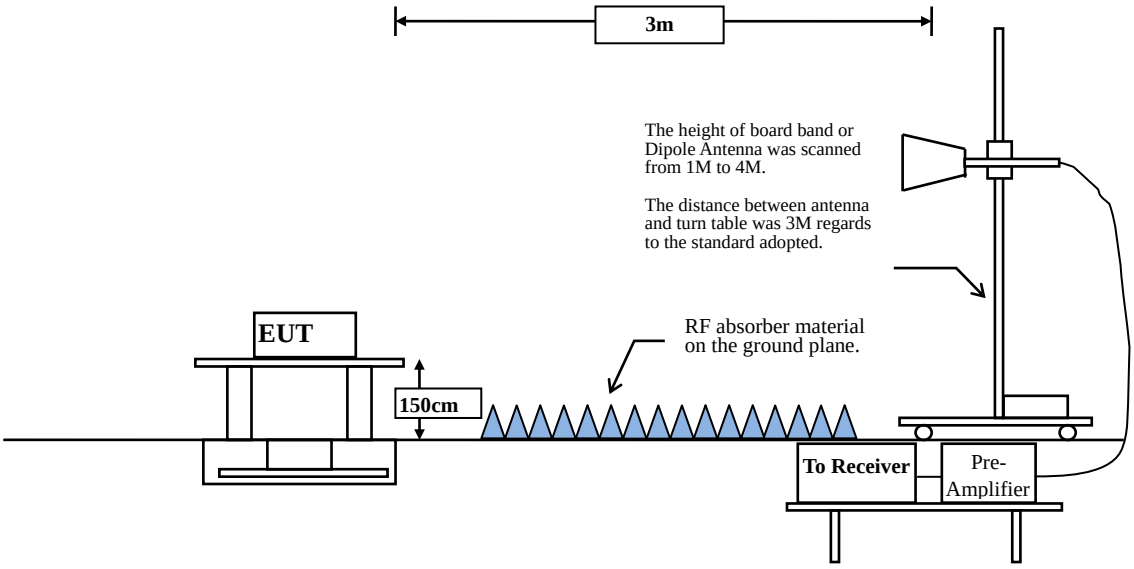
6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:

Above 1GHz



6.2. Limit

According to FCC Section 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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.
The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

RBW and VBW Parameter setting:

According to KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

VBW ≥ 3 x RBW.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
BLE	100	--	--	10

Note: Duty Cycle Refer to Section 9

6.4. Uncertainty

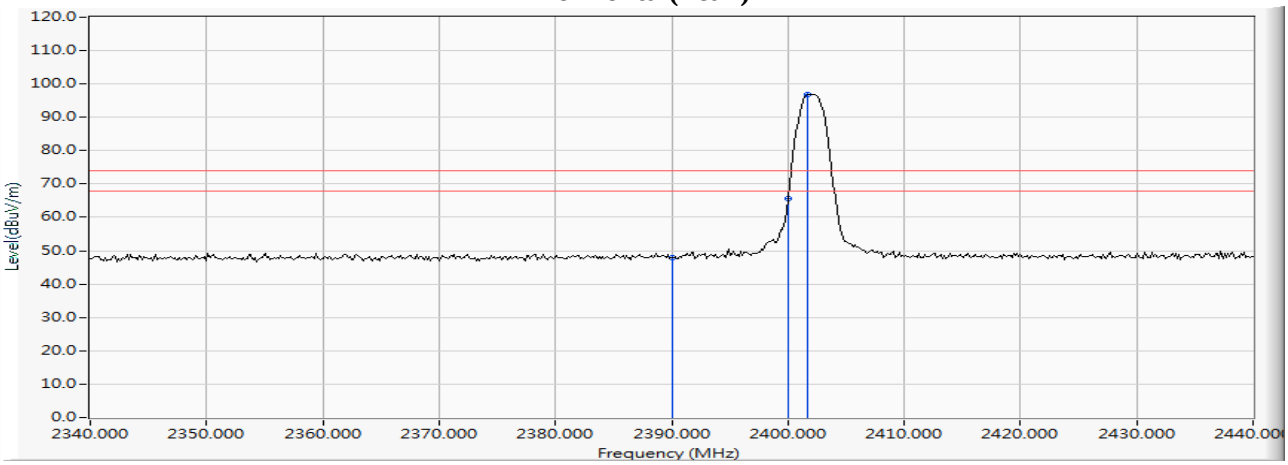
± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

6.5. Test Result of Band Edge

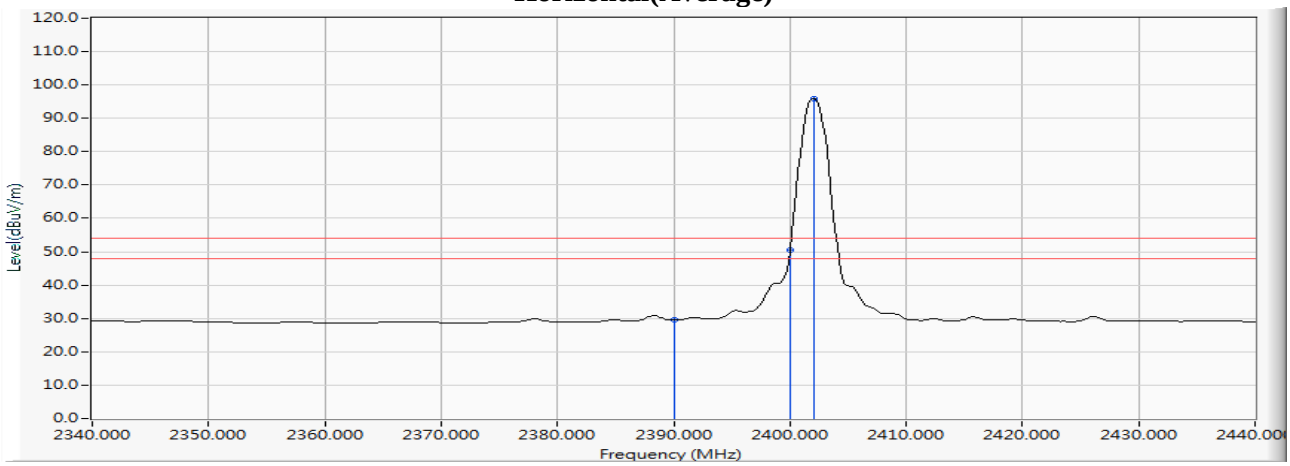
Product : OCCSensaBLE Basic
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2019/04/22
Test Mode : Mode 1: Transmit - BLE (GFSK) (2402MHz)

Horizontal(Peak)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2390.000	6.474	41.560	48.035	-25.965	74.000	PEAK
2		2400.000	6.528	59.146	65.674	-8.326	74.000	PEAK
3	*	2401.739	6.539	90.259	96.798	--	--	PEAK

Horizontal(Average)



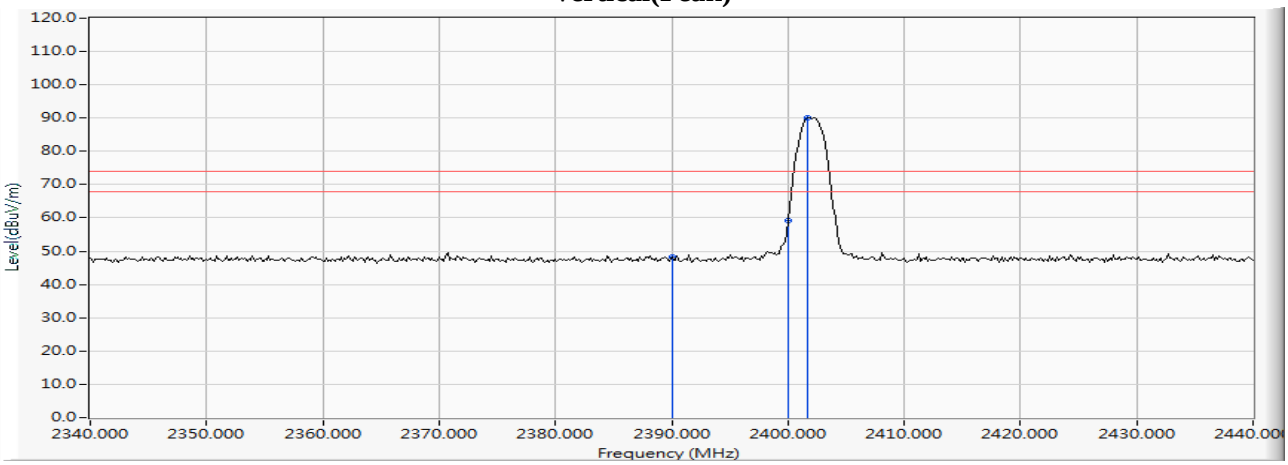
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2390.000	6.474	23.071	29.546	-24.454	54.000	AVERAGE
2		2400.000	6.528	44.119	50.647	-3.353	54.000	AVERAGE
3	*	2402.029	6.540	89.482	96.022	--	--	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

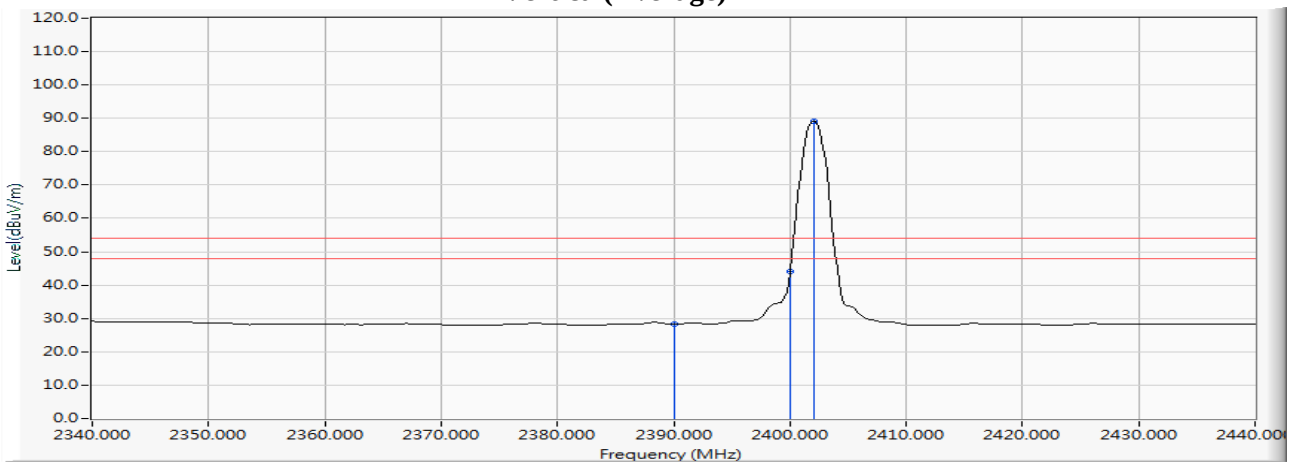
Product : OCCSensaBLE Basic
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2019/04/22
Test Mode : Mode 1: Transmit - BLE (GFSK) (2402MHz)

Vertical(Peak)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2390.000	5.880	42.314	48.195	-25.805	74.000	PEAK
2		2400.000	5.879	53.436	59.315	-14.685	74.000	PEAK
3	*	2401.739	5.883	84.105	89.988	--	--	PEAK

Vertical(Average)



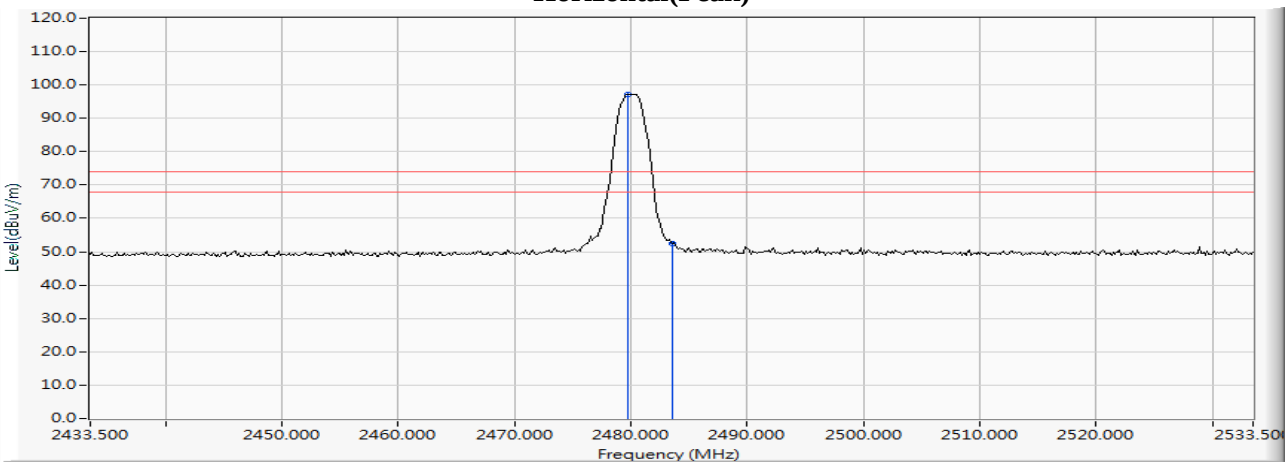
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2390.000	5.880	22.497	28.378	-25.622	54.000	AVERAGE
2		2400.000	5.879	38.145	44.024	-9.976	54.000	AVERAGE
3	*	2402.029	5.884	83.277	89.161	--	--	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

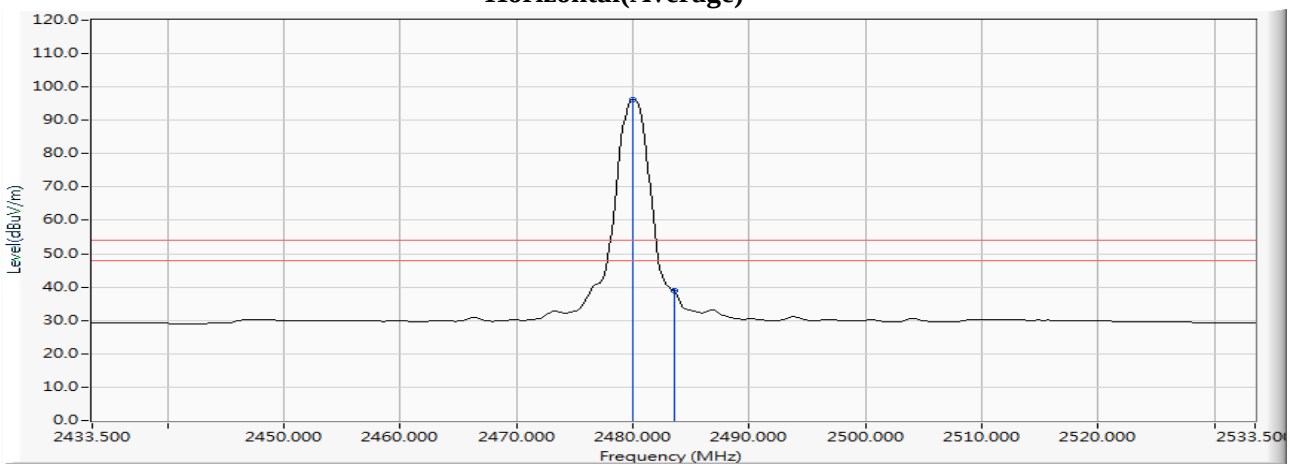
Product	:	OCCSensaBLE Basic
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2019/04/22
Test Mode	:	Mode 1: Transmit - BLE (GFSK) (2480MHz)

Horizontal(Peak)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2479.732	7.084	90.175	97.258	--	--	PEAK
2		2483.500	7.110	45.263	52.373	-21.627	74.000	PEAK

Horizontal(Average)



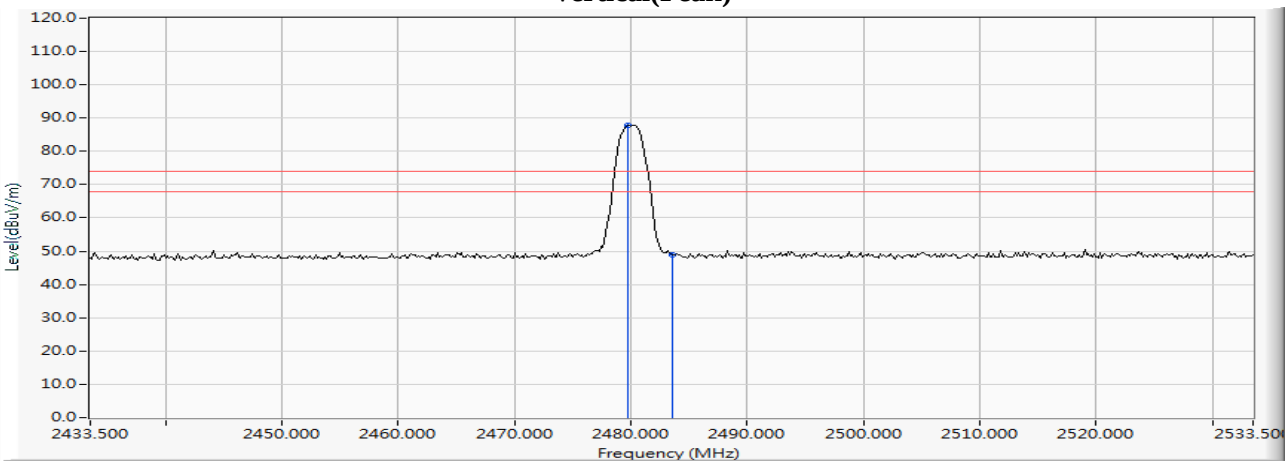
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2480.022	7.086	89.268	96.353	--	--	AVERAGE
2		2483.500	7.110	31.731	38.841	-15.159	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

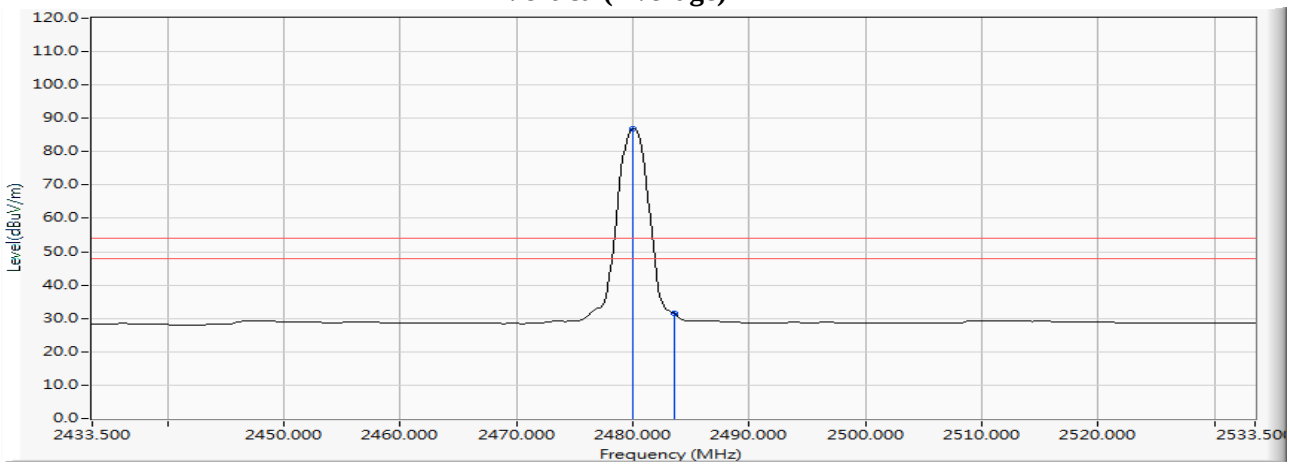
Product	:	OCCSensaBLE Basic
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2019/04/22
Test Mode	:	Mode 1: Transmit - BLE (GFSK) (2480MHz)

Vertical(Peak)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2479.732	6.340	81.395	87.735	--	--	PEAK
2		2483.500	6.363	42.663	49.026	-24.974	74.000	PEAK

Vertical(Average)



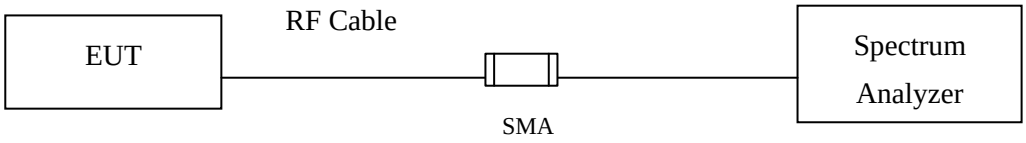
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2480.022	6.342	80.481	86.823	--	--	AVERAGE
2		2483.500	6.363	25.225	31.588	-22.412	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

7. 6dB Bandwidth

7.1. Test Setup



7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

7.3. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 1-5% of the emission bandwidth, VBW≥3*RBW

7.4. Uncertainty

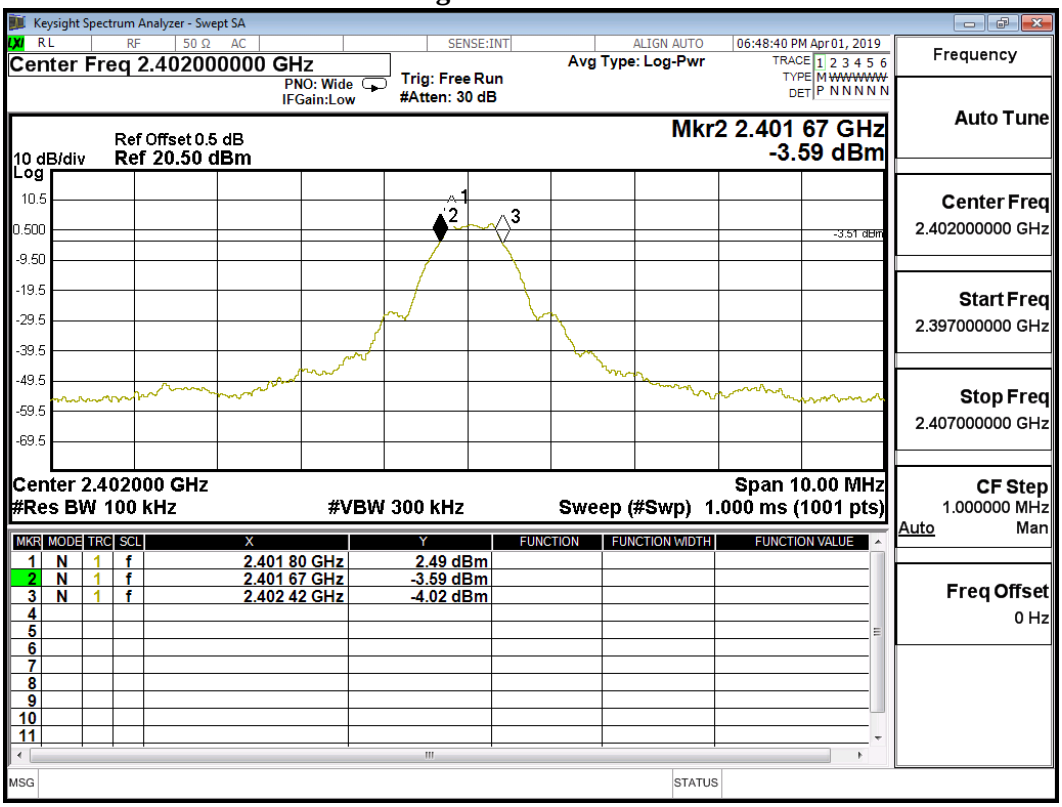
± 283Hz

7.5. Test Result of 6dB Bandwidth

Product : OCCSensaBLE Basic
Test Item : 6dB Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - BLE (GFSK) (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	750	>500	Pass

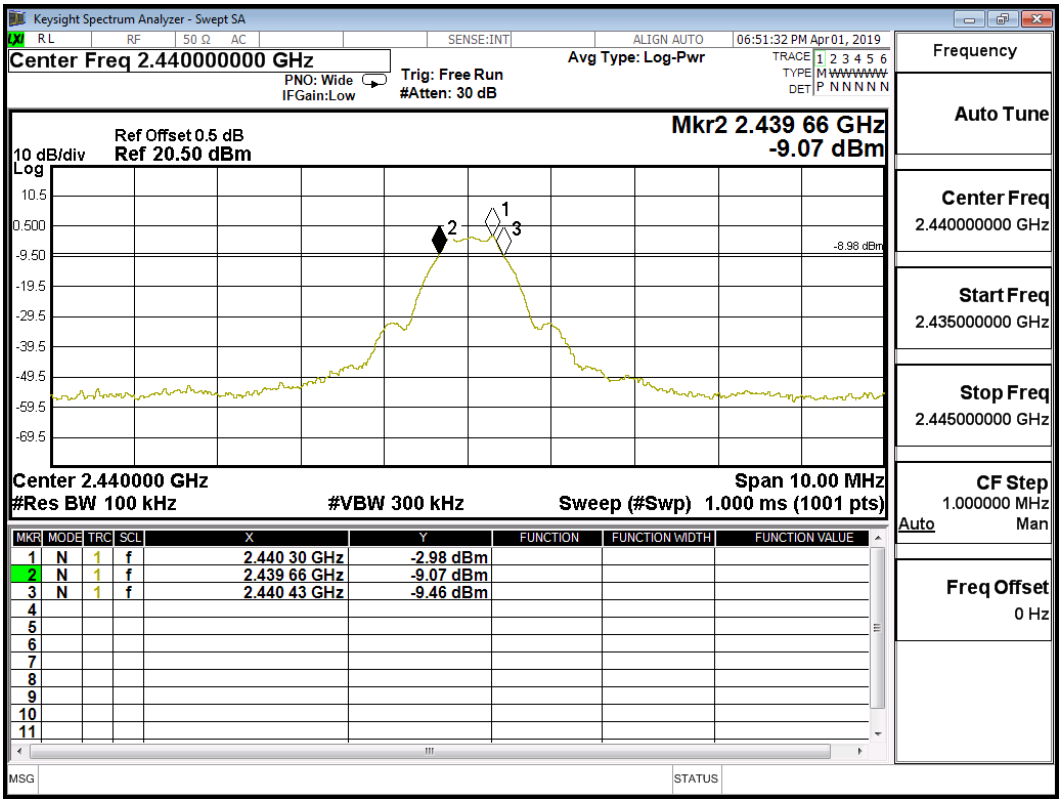
Figure Channel 00:



Product : OCCSensaBLE Basic
Test Item : 6dB Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
19	2440	770	>500	Pass

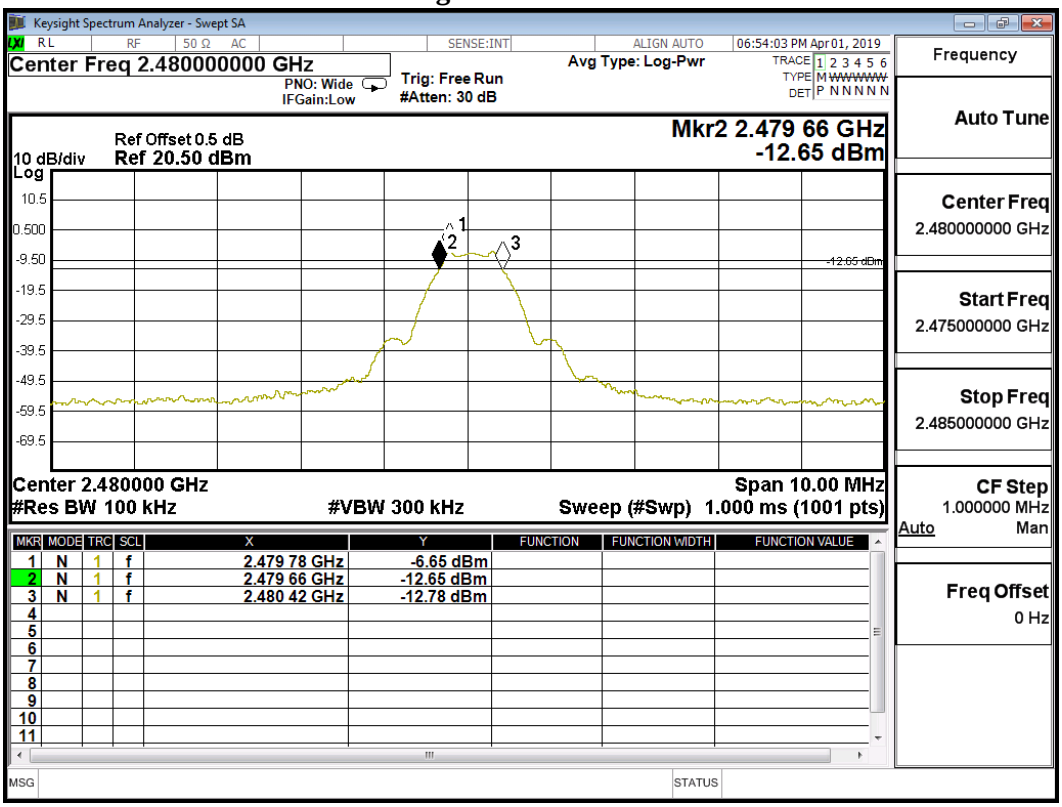
Figure Channel 19:



Product : OCCSensaBLE Basic
Test Item : 6dB Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

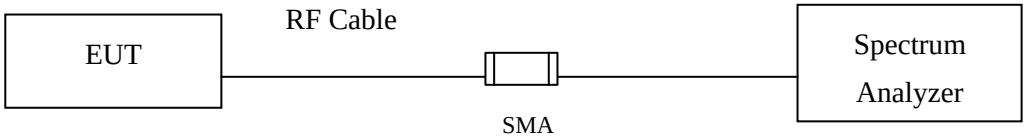
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2480	760	>500	Pass

Figure Channel 39:



8. Power Density

8.1. Test Setup



8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013, the maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

8.4. Uncertainty

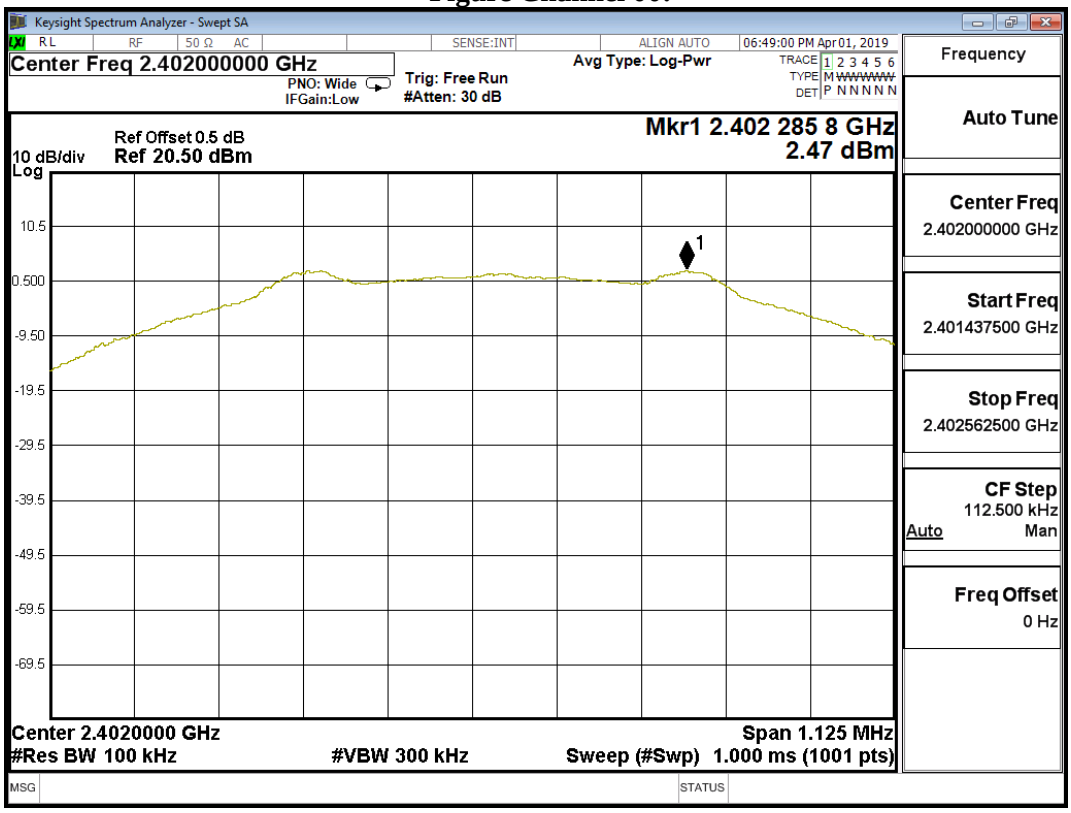
± 1.20 dB

8.5. Test Result of Power Density

Product : OCCSensaBLE Basic
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - BLE (GFSK) (2402MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
00	2402	2.47	≦8dBm	Pass

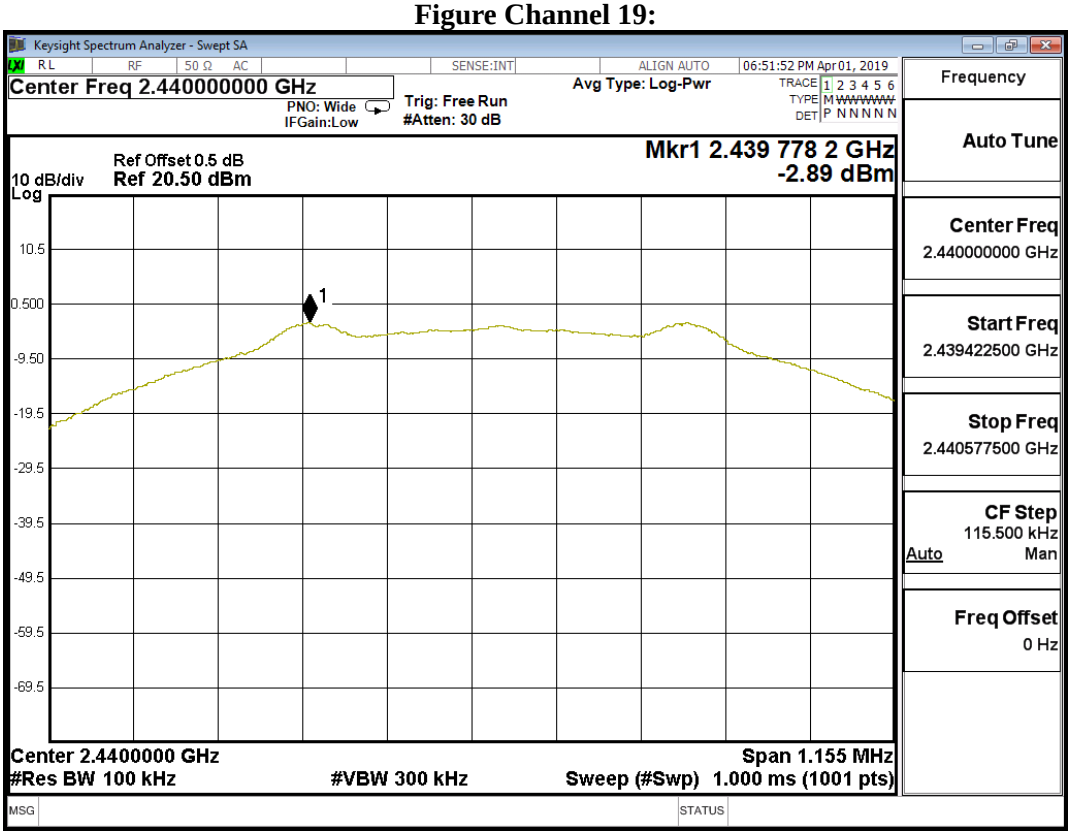
Figure Channel 00:



Product : OCCSensaBLE Basic
Test Item : Power Density Data
Test Site : No.3OATS
Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
19	2440	-2.89	≦8dBm	Pass

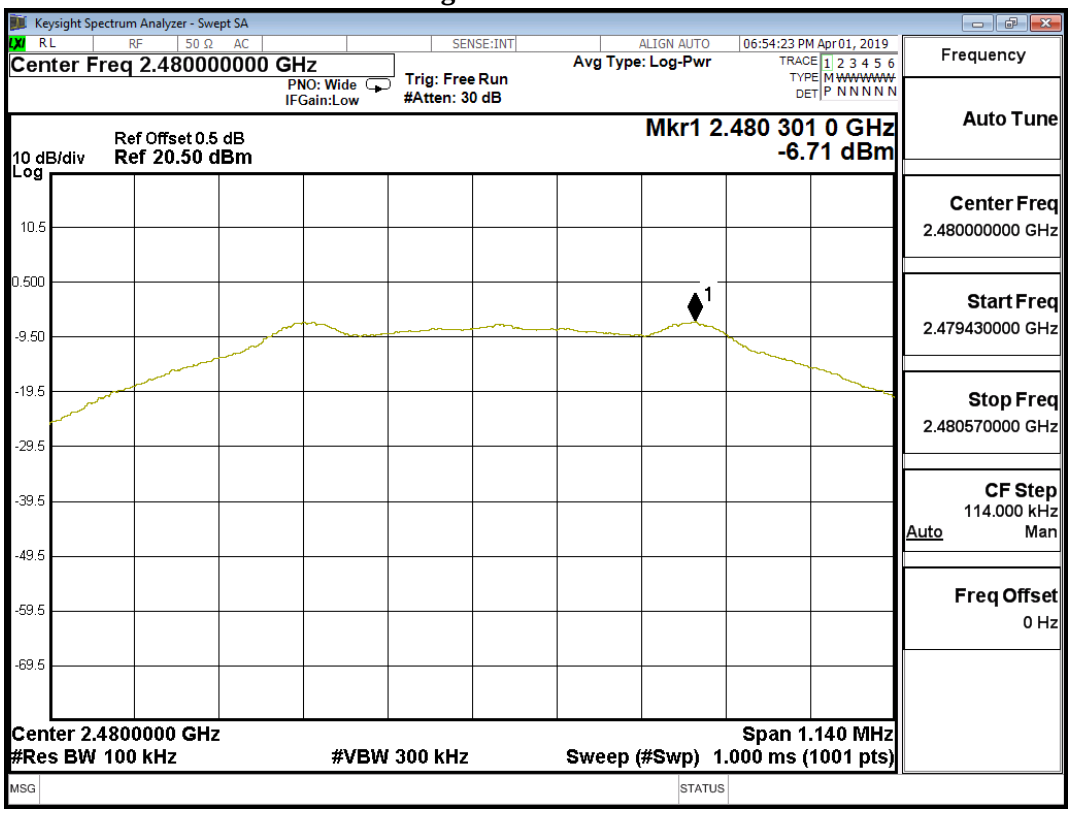
Figure Channel 19:



Product : OCCSensaBLE Basic
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

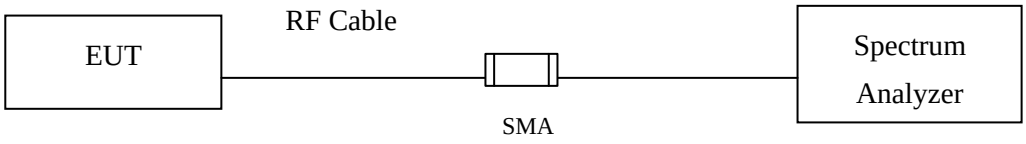
Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
39	2480	-6.71	≦8dBm	Pass

Figure Channel 39:



9. Duty Cycle

9.1. Test Setup



9.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

9.3. Uncertainty

± 2.31msec

9.4. Test Result of Duty Cycle

Product : OCCSensaBLE Basic
Test Item : Duty Cycle
Test Mode : Mode 1: Transmit - BLE (GFSK)

Duty Cycle Formula:

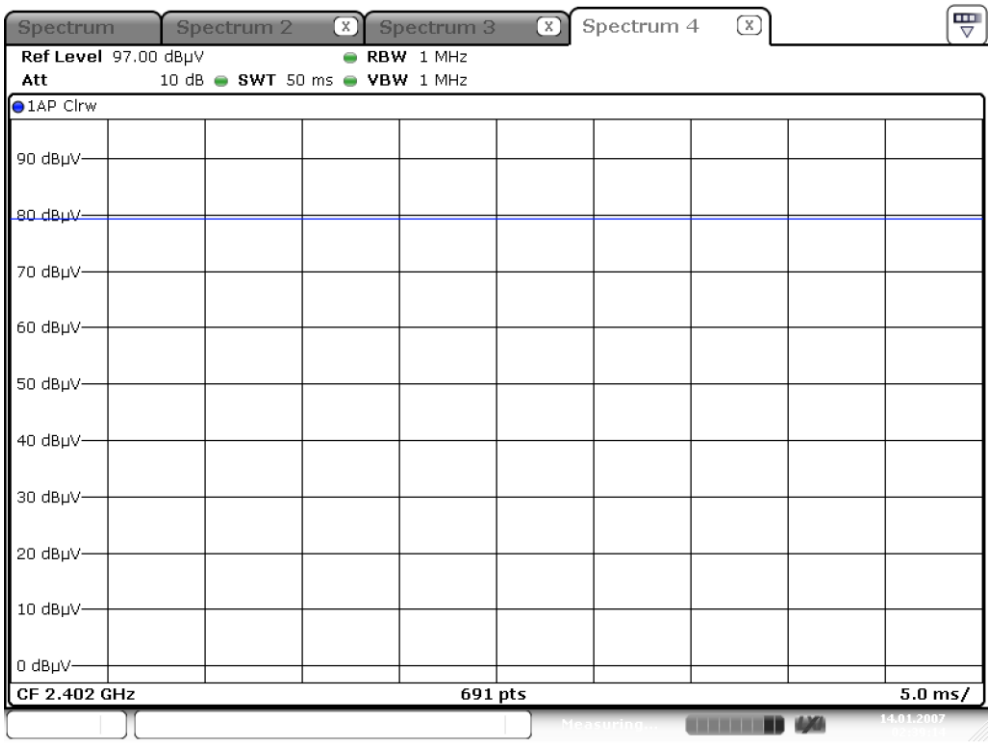
Duty Cycle = Ton / (Ton + Toff)

Duty Factor = 10 Log (1/Duty Cycle)

Results:

Mode	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
BLE	100.00	--	--	10

BLE



Date: 14.JAN.2007 02:39:15

10. EMI Reduction Method During Compliance Testing

No modification was made during testing.