FCC TEST REPORT

Test report
On Behalf of
Dongguan Esmooth Acoustic Technology Co., Ltd.
For
Bluetooth Speaker
Model No.: X1, X1-01, X1-02, X1-03

FCC ID: 2AMQI-X1

Prepared for :	**Dongguan Esmooth Acoustic Technology Co., Ltd.** **Xinzhou Industrial Zone, Xinhe Community, Wanjing District, Dongguan City, Guangdong Province, China 523061**
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China**
Date of Test:	**Dec. 10, 2018 ~ Dec. 21, 2018**
Date of Report:	**Dec. 21, 2018**
Report Number:	**HK1812141952-E**

TEST RESULT CERTIFICATION

Applicant's name ..... :	Dongguan Esmooth Acoustic Technology Co., Ltd.
Address ..... :	Xinzhou Industrial Zone, Xinhe Community, Wanjing District, Dongguan City, Guangdong Province, China 523061
Manufacture's Name..... :	Dongguan Esmooth Acoustic Technology Co., Ltd.
Address ..... :	Xinzhou Industrial Zone, Xinhe Community, Wanjing District, Dongguan City, Guangdong Province, China 523061
Product description	
Trade Mark:	INOPERA
Product name ..... :	Bluetooth Speaker
Model and/or type reference :	X1, X1-01, X1-02, X1-03
Standards ..... :	FCC Rules and Regulations Part 15 Subpart C Section 15.249 ANSI C63.10: 2013

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Date of Test ..... :	
Date (s) of performance of tests ..... :	Dec. 10, 2018 ~ Dec. 21, 2018
Date of Issue..... :	Dec. 21, 2018
Test Result..... :	**Pass**

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

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1. TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	RESULT
CONDUCTED EMISSIONS TEST	COMPLIANT
RADIATED EMISSION TEST	COMPLIANT
BAND EDGE	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
ANTENNA REQUIREMENT	COMPLIANT

1.2 TEST FACILITY

Test Firm : Shenzhen HUAK Testing Technology Co., Ltd.

Address 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

1.3 MEASUREMENT UNCERTAINTY

Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	=	4.06dB, k=2

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Bluetooth Speaker
Model Name	X1
Serial Model Name	X1-01, X1-02, X1-03
Model Difference	All model's the function, software and electric circuit are the same, only different in the model name. Test sample model: X1.
FCC ID	**2AMQI-X1**
Antenna Type	PCB Antenna
Antenna Gain	0 dBi
BT Operation frequency	2402-2480MHz
Number of Channels	79CH
Modulation Type	GFSK, π/4DQPSK, 8DPSK
Power Source	DC 3.7V From Battery or DC5V From USB
Power Rating	DC 3.7V From Battery or DC5V From USB

2.1.1 Carrier Frequency of Channels

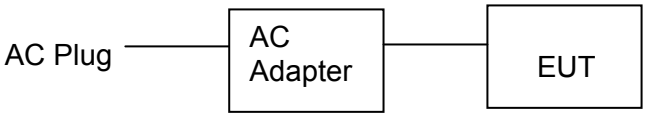
Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

2.2 Operation of EUT during testing

Operating Mode
The mode is used: **Transmitting mode**
Low Channel: 2402MHz
Middle Channel: 2441MHz
High Channel: 2480MHz

2.3 DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing:



Operation of EUT during Radiation and Above1GHz Radiation testing:

- Adapter information

  Model: HW-051000CHQ

  Input: 100-240V~, 50/60Hz, 0.5A

  Output: 5VDC, 1A

2.4 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 28, 2017	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 28, 2017	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 28, 2017	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 28, 2017	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 28, 2017	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2017	1 Year
10.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 28, 2017	1 Year
11.	Pre-amplifier	EMCI	EMC051845 SE	HKE-015	Dec. 28, 2017	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2017	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 28, 2017	N/A
14.	Power Sensor	Agilent	E9300A	HKE-086	Dec. 28, 2017	1 Year
15.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year
16.	Signal generator	Agilent	N5182A	HKE-029	Dec. 28, 2017	1 Year
17.	Signal Generator	Agilent	83630A	HKE-028	Dec. 28, 2017	1 Year
18.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 28, 2017	3 Year

3. CONDUCTED EMISSIONS TEST

3.1 Conducted Power Line Emission Limit

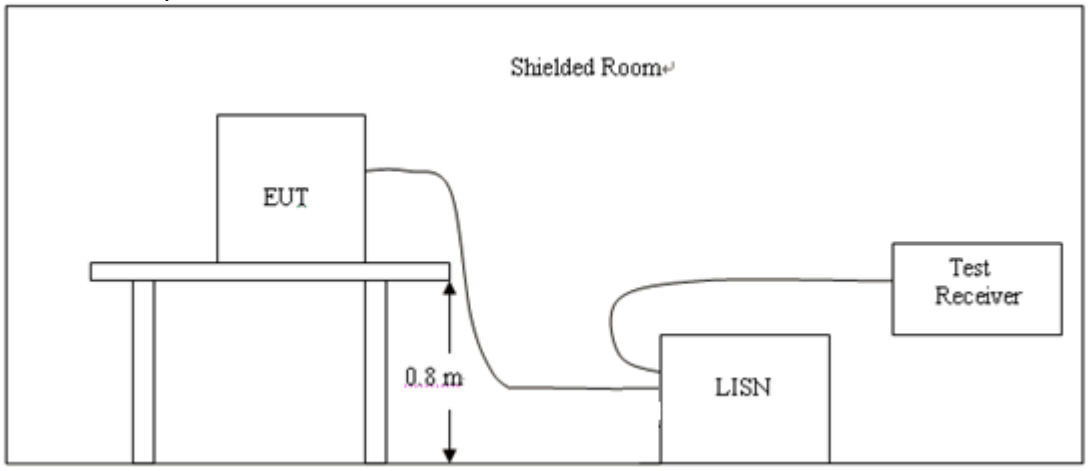
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 Test Setup



3.3 Test Procedure

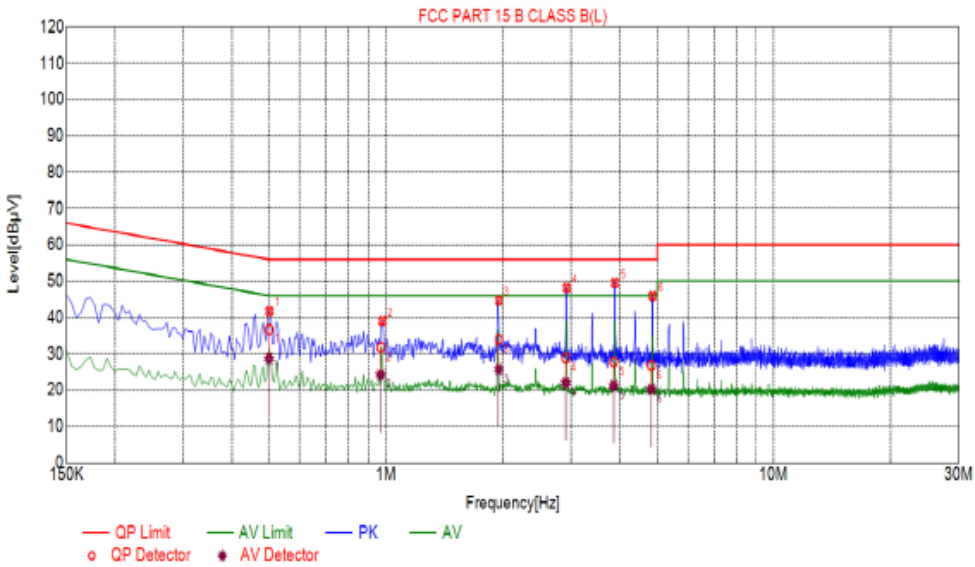
1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.1 meters is used and is placed on the ground plane as per ANSI C63.10.
2, Support equipment, if needed, was placed as per ANSI C63.10.
3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5, All support equipments received AC power from a second LISN, if any.
6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

3.4 Test Result

PASS

All the test modes completed for test. only the worst result of 8DPSK High Channel was reported as below:

Test Specification: Line



Suspected List

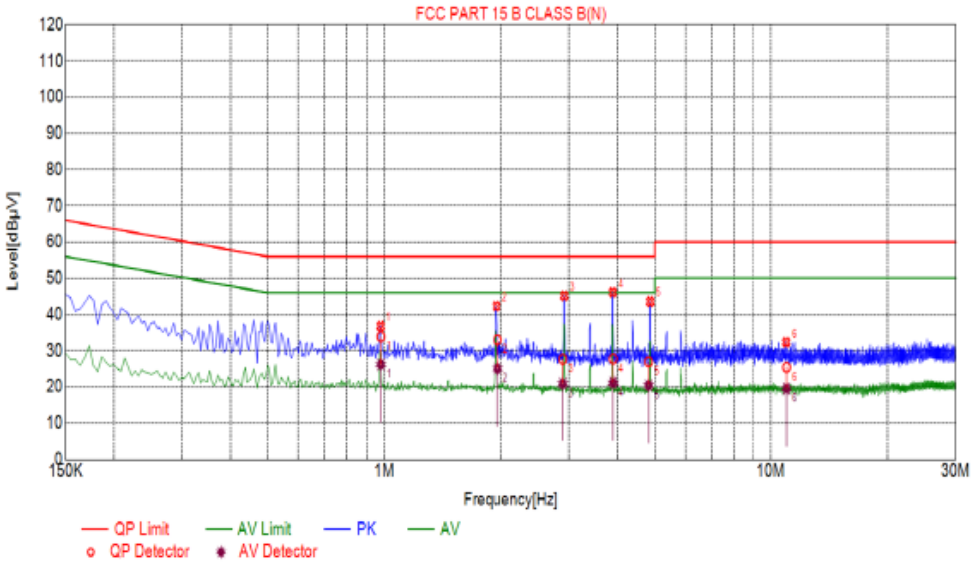
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector
1	0.5010	41.73	10.04	56.00	14.27	PK
2	0.9780	39.04	10.06	56.00	16.96	PK
3	1.9545	44.66	10.14	56.00	11.34	PK
4	2.9265	48.19	10.21	56.00	7.81	PK
5	3.8940	49.58	10.25	56.00	6.42	PK
6	4.8660	45.90	10.26	56.00	10.10	PK

Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]
1	0.5001	10.04	36.74	56.00	19.26	28.72	46.00	17.28
2	0.9682	10.06	31.85	56.00	24.15	24.19	46.00	21.81
3	1.9535	10.14	33.96	56.00	22.04	25.74	46.00	20.26
4	2.9110	10.21	28.81	56.00	27.19	22.00	46.00	24.00
5	3.8633	10.25	27.86	56.00	28.14	21.22	46.00	24.78
6	4.8297	10.26	26.76	56.00	29.24	20.25	46.00	25.75

Remark: Transd = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level

Test Specification: Neutral



Suspected List						
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector
1	0.9780	36.80	10.06	56.00	19.20	PK
2	1.9500	42.29	10.14	56.00	13.71	PK
3	2.9220	45.17	10.21	56.00	10.83	PK
4	3.8985	45.10	10.25	56.00	9.90	PK
5	4.8660	43.57	10.26	56.00	12.43	PK
6	10.9635	32.39	10.01	60.00	27.61	PK

Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]
1	0.9790	10.06	33.90	56.00	22.10	26.20	46.00	19.80
2	1.9633	10.14	32.99	56.00	23.01	25.10	46.00	20.90
3	2.8965	10.21	27.73	56.00	28.27	20.93	46.00	25.07
4	3.9062	10.25	27.82	56.00	28.18	21.15	46.00	24.85
5	4.8209	10.26	26.97	56.00	29.03	20.43	46.00	25.57
6	10.9854	10.01	25.47	60.00	34.53	19.54	50.00	30.46

Remark: Transd = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level

4 RADIATED EMISSION TEST

4.1 Radiation Limit

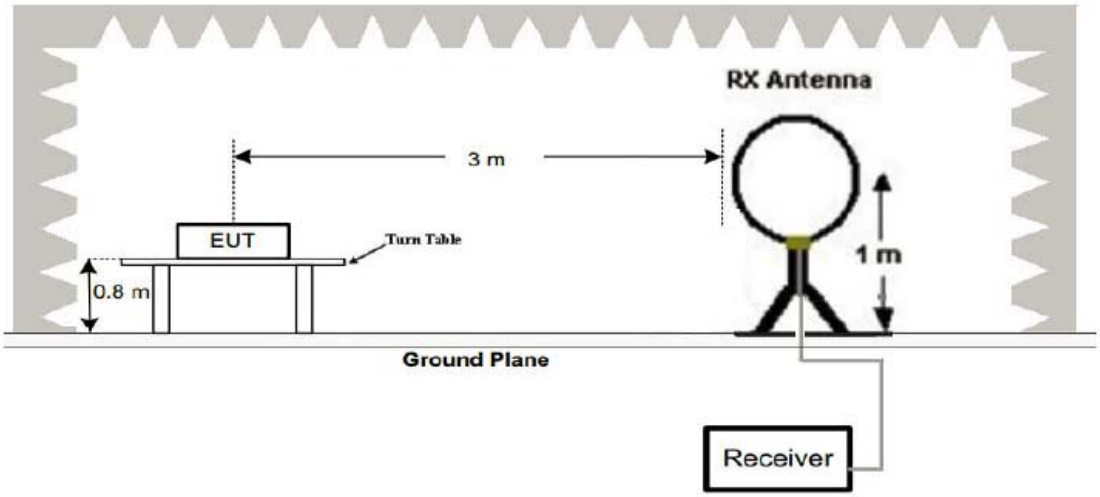
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

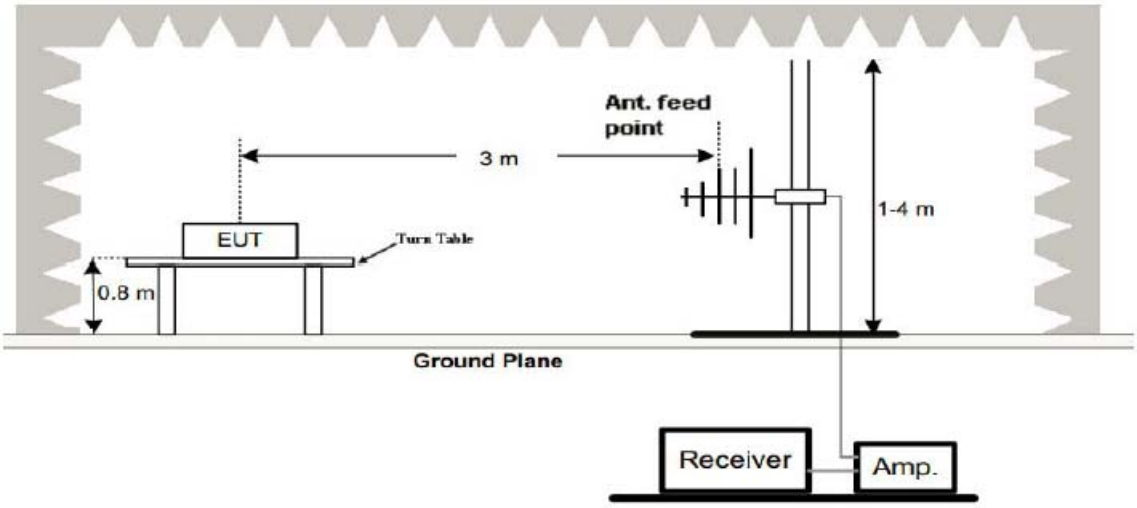
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2 Test Setup

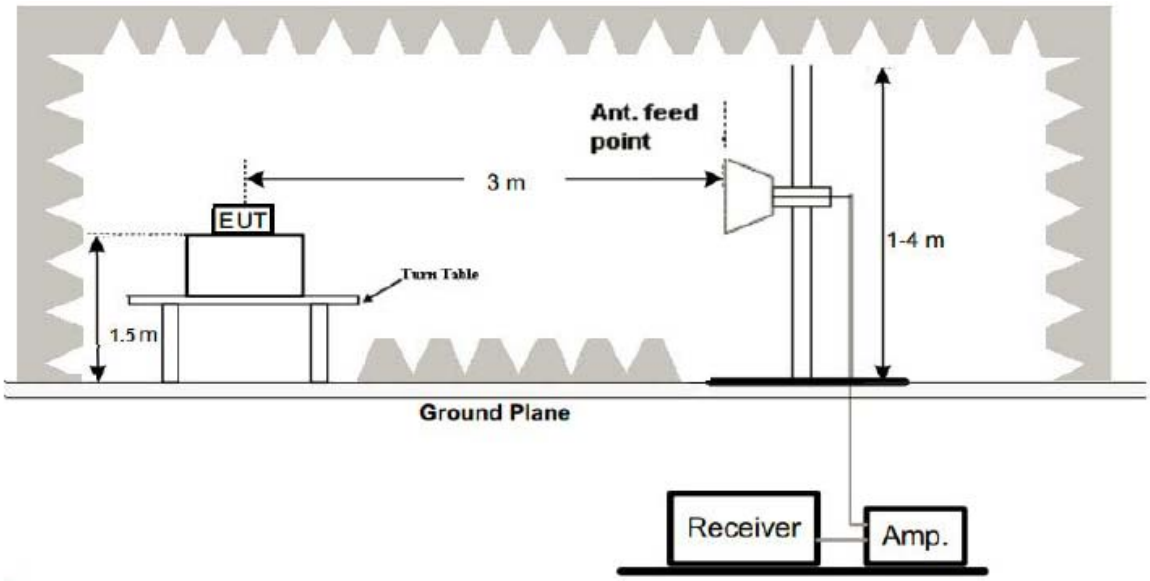
（1）Radiated Emission Test-Up Frequency Below 30MHz



（2）Radiated Emission Test-Up Frequency 30MHz~1GHz



（3）Radiated Emission Test-Up Frequency Above 1GHz



4.3 Test Procedure

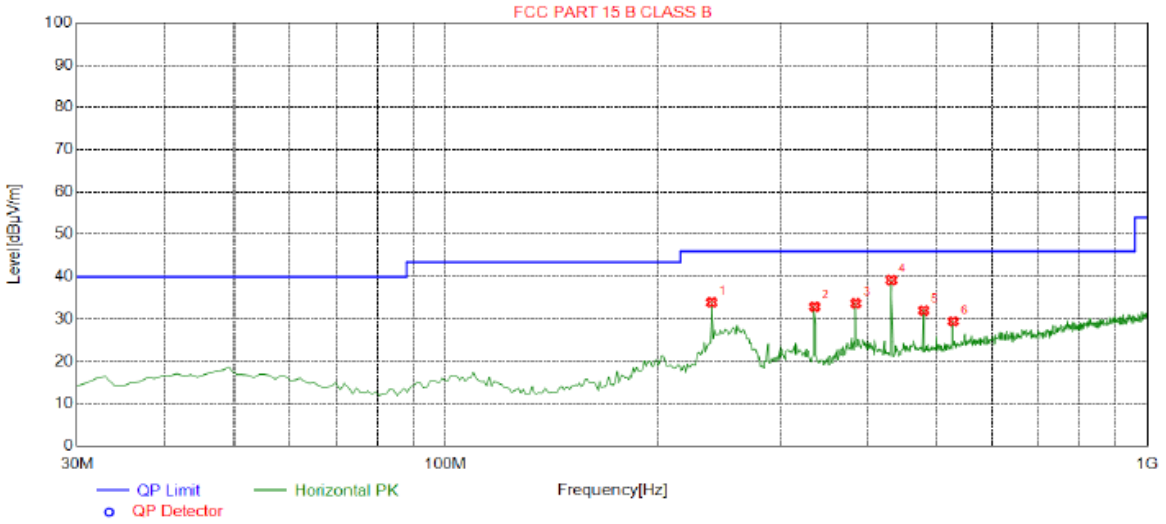
1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

Note:
For battery operated equipment, the equipment tests shall be performed using a new battery.

4.4 Test Result

PASS
All the test modes completed for test. only the worst result of 8DPSK Low Channel was reported as below:

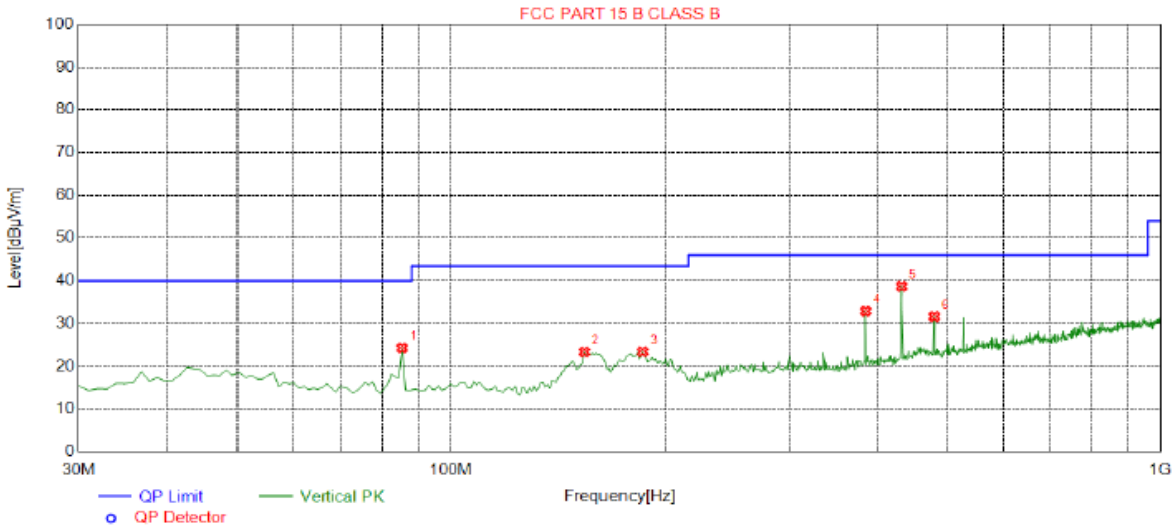
Below 1GHz Test Results:
Antenna polarity: H



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	239.520	33.98	-13.88	46.00	12.02	100	28	Horizontal
2	335.550	32.94	-11.62	46.00	13.06	100	34	Horizontal
3	384.050	33.73	-10.75	46.00	12.27	100	130	Horizontal
4	431.580	39.24	-9.78	46.00	6.76	100	226	Horizontal
5	480.080	32.05	-8.45	46.00	13.95	100	149	Horizontal
6	528.580	29.47	-7.49	46.00	16.53	100	114	Horizontal

Remark: Transd = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level

Antenna polarity: V



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	85.2900	24.29	-18.20	40.00	15.71	100	73	Vertical
2	154.160	23.36	-18.64	43.50	20.14	100	158	Vertical
3	186.170	23.42	-16.33	43.50	20.08	100	184	Vertical
4	384.050	32.94	-10.75	46.00	13.06	100	174	Vertical
5	431.580	38.71	-9.78	46.00	7.29	100	161	Vertical
6	480.080	31.64	-8.45	46.00	14.36	100	41	Vertical

Remark: Transd = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level

Remark：
(1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
(2) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
(3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

Above 1 GHz Test Results:

CH Low (2402MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2402	109.42	-5.81	103.61	114.00	-10.39	peak
2402	84.76	-5.81	78.95	94.00	-15.05	AVG
4804	55.64	-3.65	51.99	74.00	-22.01	peak
4804	46.83	-3.65	43.18	54.00	-10.82	AVG
7206	55.61	-0.95	54.66	74.00	-19.34	peak
7206	40.85	-0.95	39.90	54.00	-14.10	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2402	109.97	-5.81	104.16	114.00	-9.84	peak
2402	84.45	-5.81	78.64	94.00	-15.36	AVG
4804	55.95	-3.65	52.30	74.00	-21.70	peak
4804	45.55	-3.65	41.90	54.00	-12.10	AVG
7206	55.12	-0.95	54.17	74.00	-19.83	peak
7206	42.34	-0.95	41.39	54.00	-12.61	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

CH Middle (2441MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2441.00	109.69	-5.73	103.96	114.00	-10.04	peak
2441.00	85.39	-5.73	79.66	94.00	-14.34	AVG
4882.00	53.86	-3.54	50.32	74.00	-23.68	peak
4882.00	46.26	-3.54	42.72	54.00	-11.28	AVG
7323.00	55.72	-0.81	54.91	74.00	-19.09	peak
7323.00	39.38	-0.81	38.57	54.00	-15.43	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2441.00	112.98	-5.73	107.25	114.00	-6.75	peak
2441.00	86.16	-5.73	80.43	94.00	-13.57	AVG
4882.00	55.26	-3.54	51.72	74.00	-22.28	peak
4882.00	46.67	-3.54	43.13	54.00	-10.87	AVG
7323.00	55.10	-0.81	54.29	74.00	-19.71	peak
7323.00	40.76	-0.81	39.95	54.00	-14.05	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

CH High (2480MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2480	110.90	-5.63	105.27	114.00	-8.73	peak
2480	83.91	-5.63	78.28	94.00	-15.72	AVG
4960	55.22	-3.43	51.79	74.00	-22.21	peak
4960	43.44	-3.44	40.00	54.00	-14.00	AVG
7440	55.48	-0.77	54.71	74.00	-19.29	peak
7440	40.37	-0.77	39.60	54.00	-14.40	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2480	109.12	-5.63	103.49	114.00	-10.51	peak
2480	81.91	-5.63	76.28	94.00	-17.72	AVG
4960	55.59	-3.43	52.16	74.00	-21.84	peak
4960	44.84	-3.44	41.40	54.00	-12.60	AVG
7440	54.11	-0.77	53.34	74.00	-20.66	peak
7440	36.43	-0.77	35.66	54.00	-18.34	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Remark：
(1) Measuring frequencies from 1 GHz to the 25 GHz。
(2) “F” denotes fundamental frequency; “H” denotes spurious frequency. “E” denotes band edge frequency.
(3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
(4) Data of measurement within this frequency range shown “--- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak
detection at frequency above 1GHz.
(6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.
(7)All modes of operation were investigated and the worst-case emissions are reported.

5 BAND EDGE

5.1 Limits

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.2 Test Procedure

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 100KHz and VBM to 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBW to 300 KHz, to measure the conducted peak band edge.

5.3 Test Result

PASS

All the test modes completed for test. The worst case of Band Edge is GFSK; the test data of this mode was reported.

Radiated Band Edge Test:

Operation Mode: TX CH Low (2402MHz)

Horizontal (Worst case)

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2390	57.1	-5.81	51.29	74	-22.71	peak
2390	/	-5.81	/	54	/	AVG
2400	52.56	-5.84	46.72	74	-27.28	peak
2400	/	-5.84	/	54	/	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2390	52.58	-5.81	46.77	74	-27.23	peak
2390	/	-5.81	/	54	/	AVG
2400	50.33	-5.84	44.49	74	-29.51	peak
2400	/	-5.84	/	54	/	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: TX CH High (2480MHz)

Horizontal (Worst case)

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.50	60.36	-5.81	54.55	74	-19.45	peak
2483.50	/	-5.81	/	54	/	AVG
2500.00	54.33	-6.06	48.27	74	-25.73	peak
2500.00	/	-6.06	/	54	/	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.50	57.04	-5.81	51.23	74	-22.77	peak
2483.50	/	-5.81	/	54	/	AVG
2500.00	52.85	-6.06	46.79	74	-27.21	peak
2500.00	/	-6.06	/	54	/	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						
Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.						

6 OCCUPIED BANDWIDTH MEASUREMENT

6.1 Test Setup

Same as Radiated Emission Measurement

6.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Based on ANSI C63.10 section 6.9.2: RBW= 30KHz. VBW= 100 KHz, Span=2MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

6.3 Measurement Equipment Used

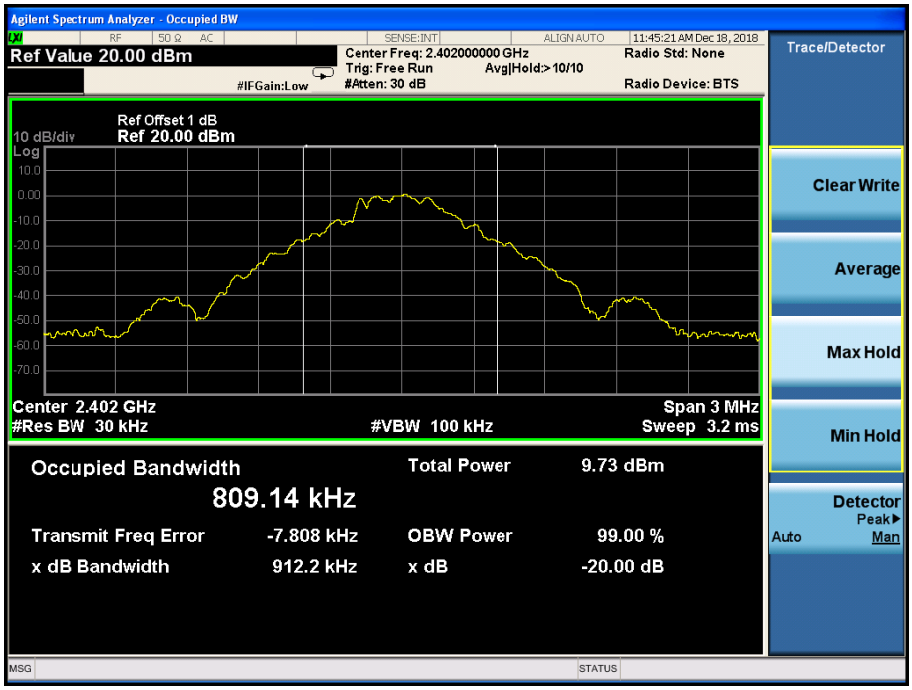
Same as Radiated Emission Measurement

6.4 Test Result

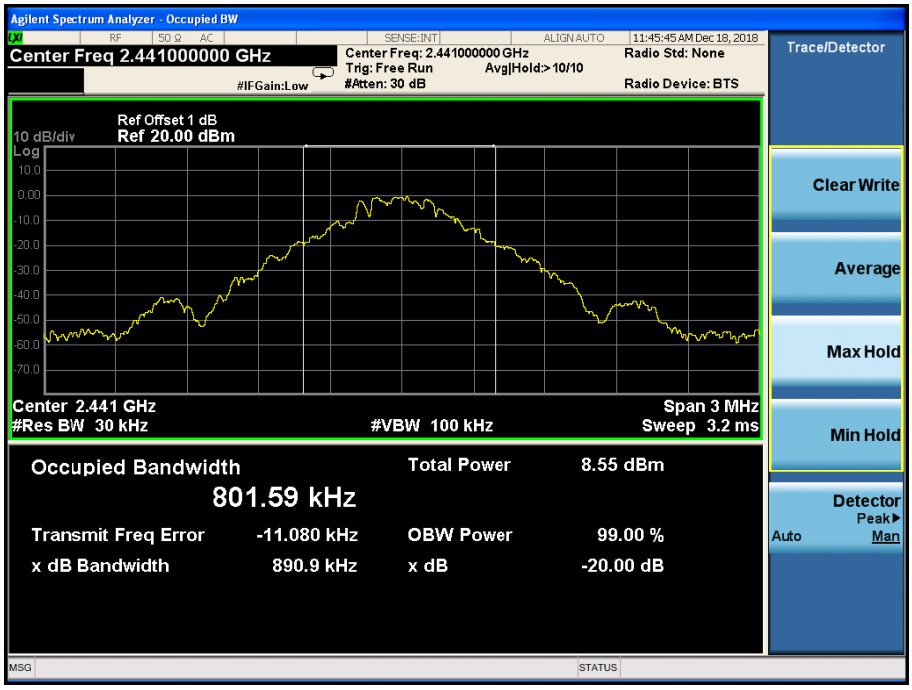
Test Mode	Frequency	20dB Bandwidth (MHz)	Result
GFSK	2402 MHz	0.9122	**PASS**
	2441 MHz	0.8909	**PASS**
	2480 MHz	0.9246	**PASS**
π/4DQPSK	2402 MHz	1.278	**PASS**
	2441 MHz	1.241	**PASS**
	2480 MHz	1.280	**PASS**
8DPSK	2402 MHz	1.267	**PASS**
	2441 MHz	1.239	**PASS**
	2480 MHz	1.264	**PASS**

Test Mode: GFSK

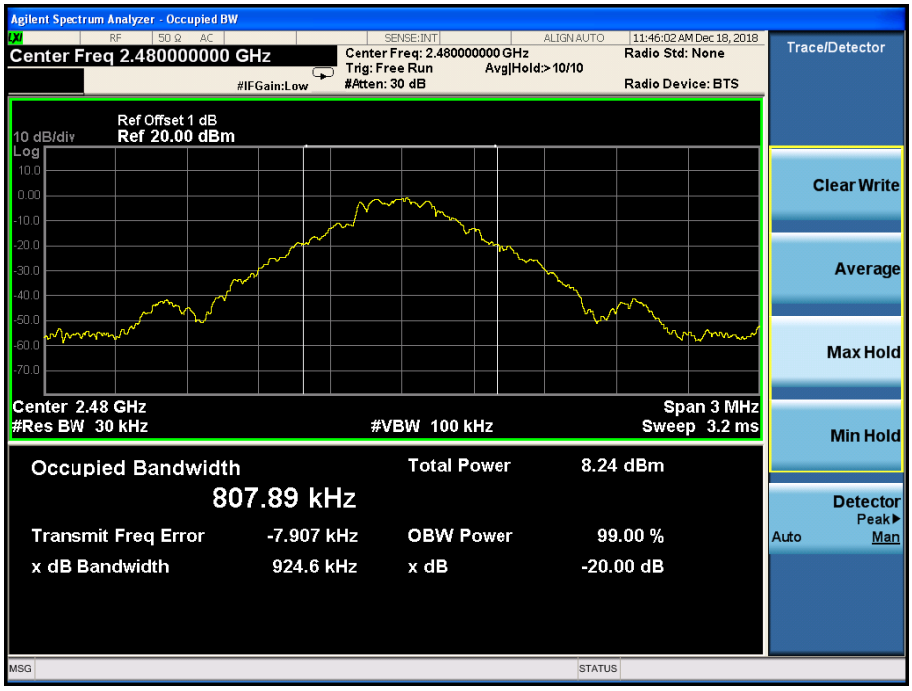
CH: 2402MHz



CH: 2441MHz

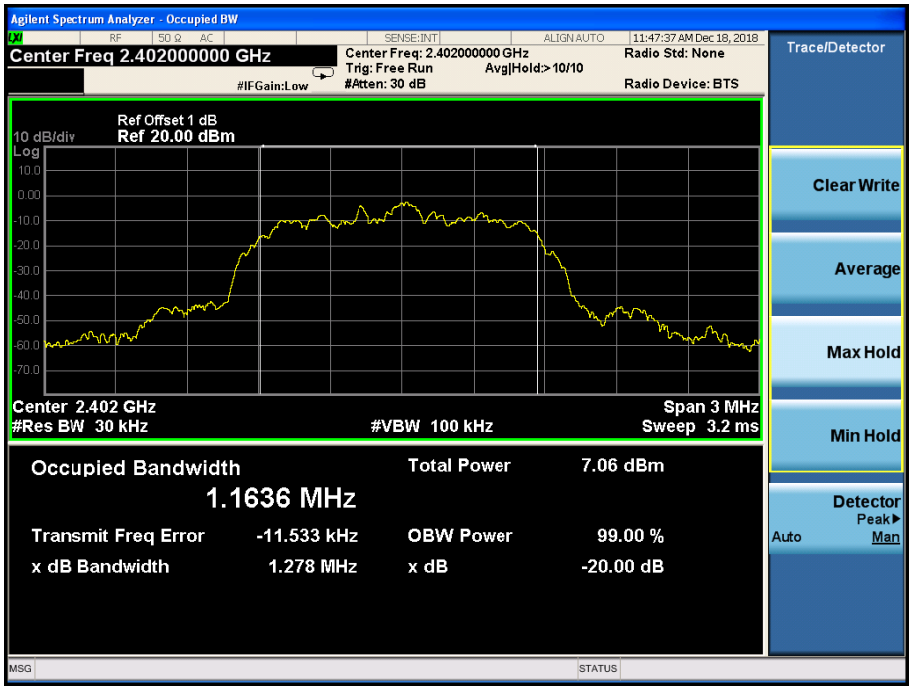


CH: 2480MHz

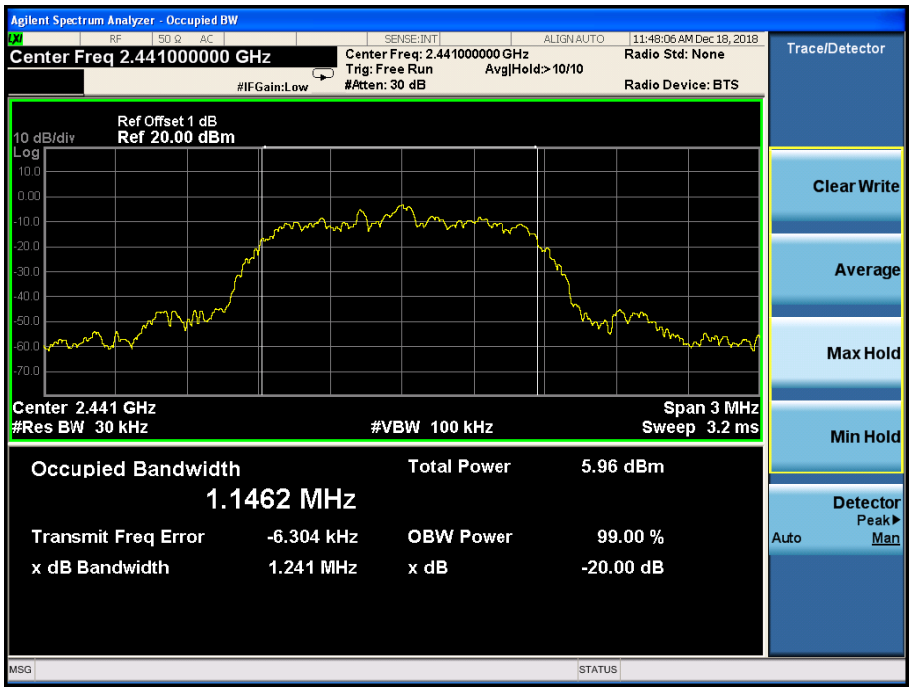


Test Mode: π /4DQPSK

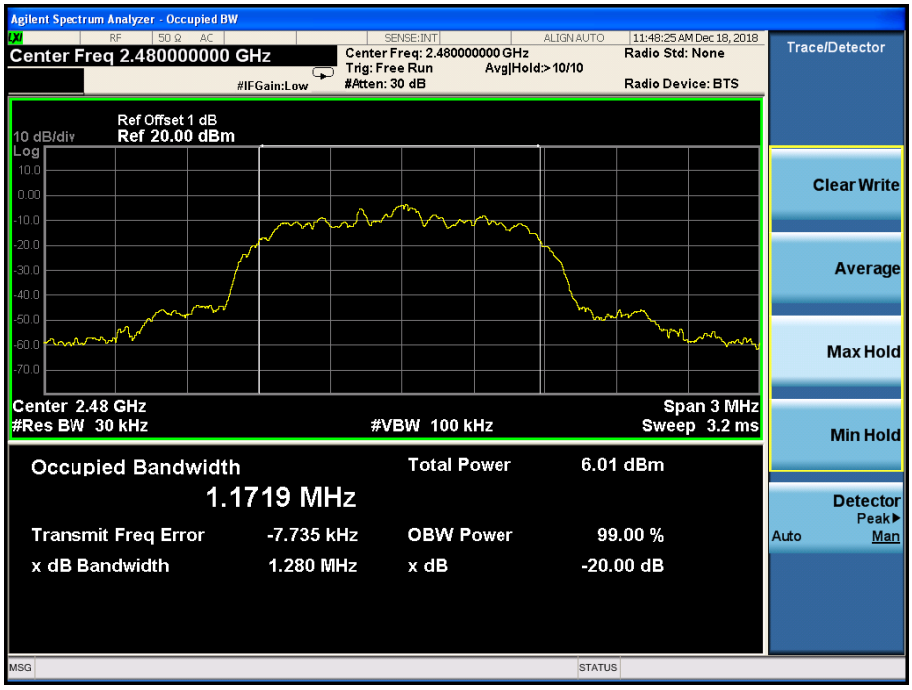
CH: 2402MHz



CH: 2441MHz

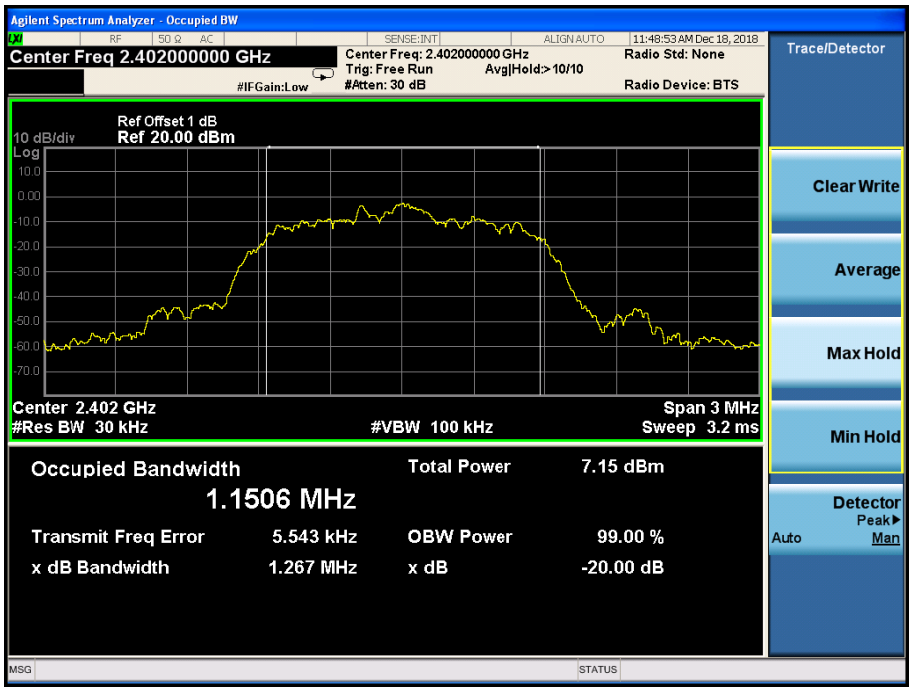


CH: 2480MHz

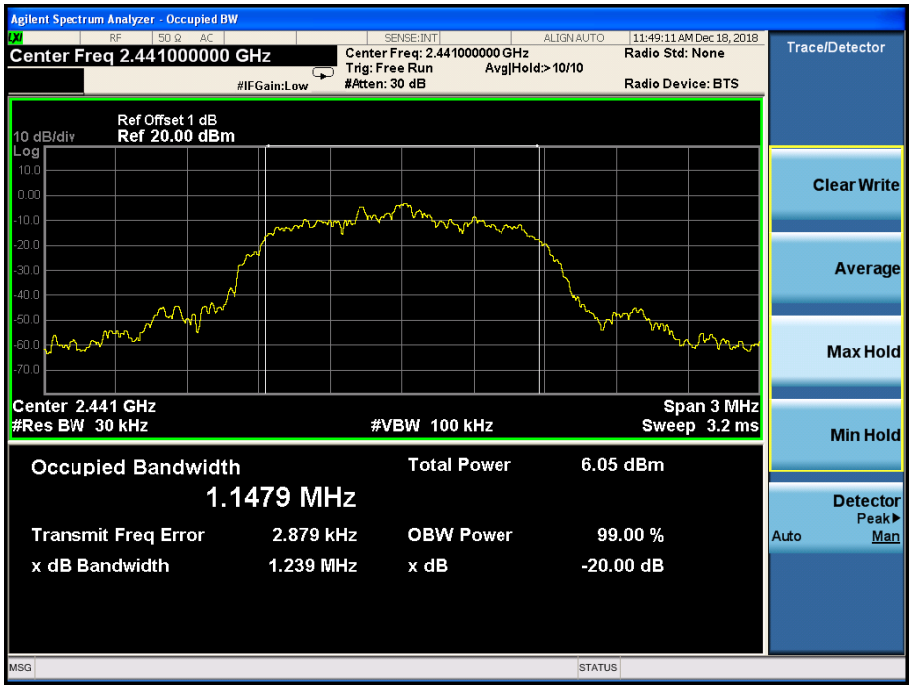


Test Mode: 8DPSK

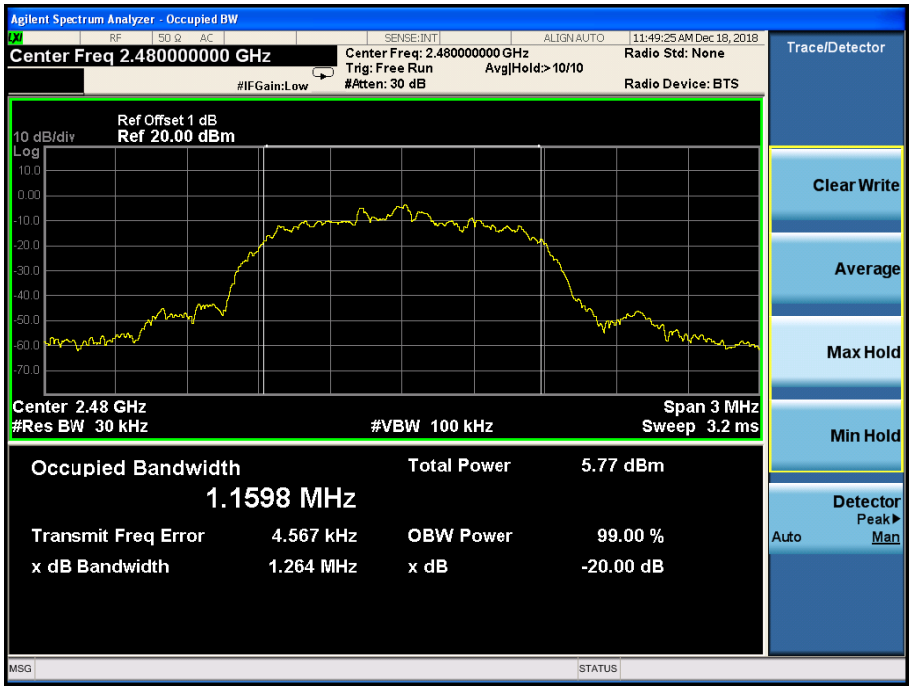
CH: 2402MHz



CH: 2441MHz



CH: 2480MHz


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
11:49:25 AM Dec 18, 2018
Trace/Detector
Ref Offset 1 dB
10 dB/div
Ref 20.00 dBm
Log
Clear Write
Average
Max Hold
Min Hold
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
Occupied Bandwidth
1.1598 MHz
Total Power 5.77 dBm
Transmit Freq Error 4.567 kHz
OBW Power 99.00 %
x dB Bandwidth 1.264 MHz
x dB -20.00 dB
Detector
Peak
Auto
Man
MSG
STATUS

7 ANTENNA REQUIREMENT

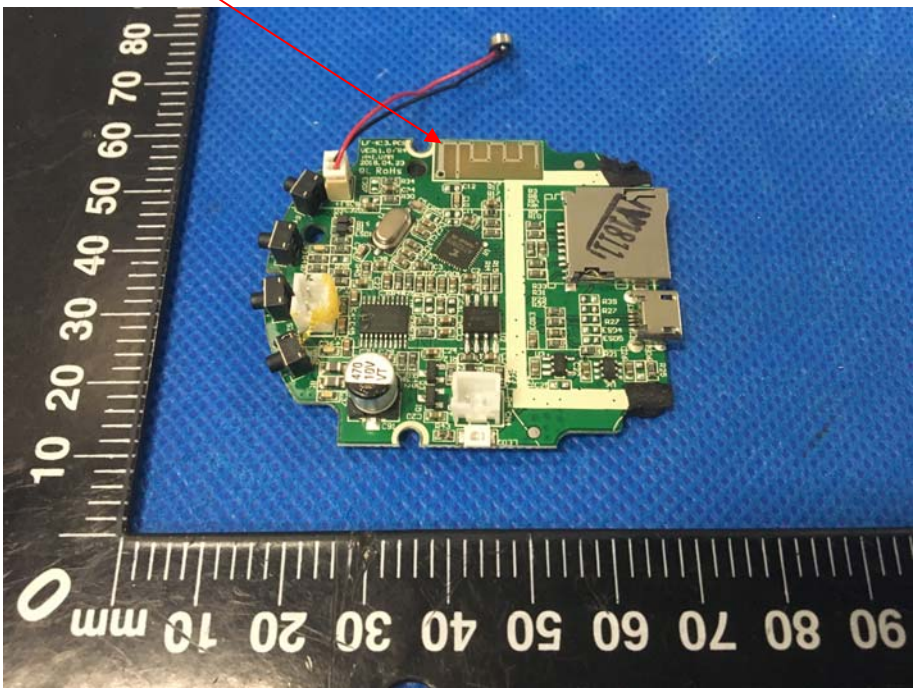
Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Connected Construction

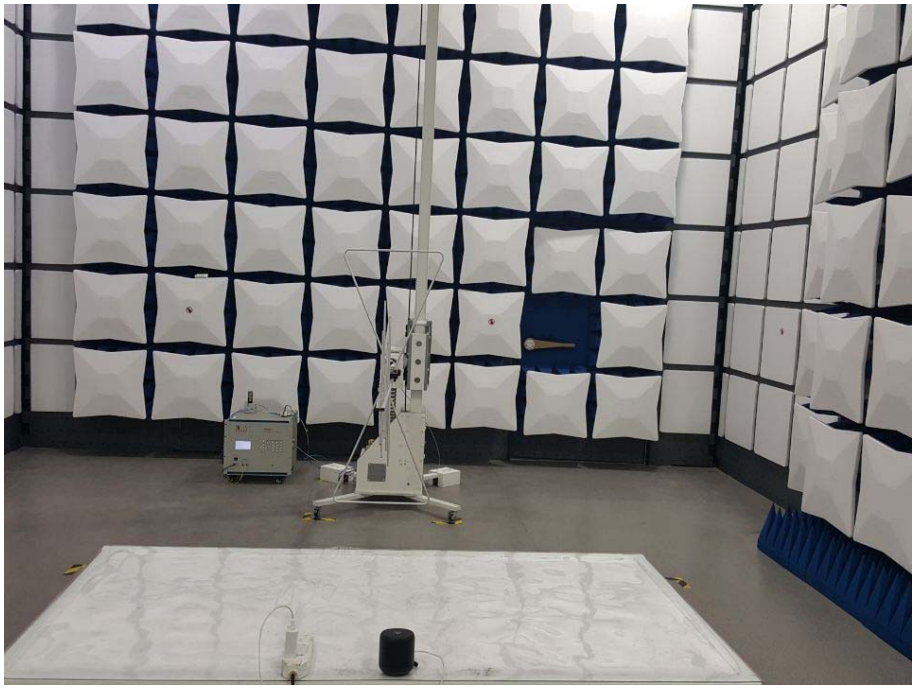
The antenna used in this product is a PCB Antenna, The directional gains of antenna used for transmitting is 0dBi.

ANTENNA



8 PHOTOGRAPH OF TEST

8.1 Radiated Emission



8.2 Conducted Emission