FCC RADIO TEST REPORT

FCC ID: 2AR92-ARIA

Product： Bluetooth earphone

Trade Name： xFyro

Model Name： Aria

Serial Model： N/A

Report No.： UNIA19010414FR1-01

Prepared for

Goredpin LLC

1647 Veteran Ave, unit E, Los Angeles, CA 90024

Prepared by

Shenzhen United Testing Technology Co., Ltd.

2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

TEST RESULT CERTIFICATION

Applicant's name .....: Goredpin LLC

Address.....: 1647 Veteran Ave, unit E, Los Angeles, CA 90024

Manufacture's Name.....: Goredpin LLC

Address.....: 1647 Veteran Ave, unit E, Los Angeles, CA 90024

Product description

Product name .....: Bluetooth earphone

Trade Mark.....: xFyro

Model and/or type reference .: Aria

Standards .....: FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013
KDB558074 D01 V05: Guidance for Performing Compliance

This device described above has been tested by Shenzhen United Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test.....: Jan. 03, 2019

Date (s) of performance of tests.....: Jan. 03, 2019 -- Jan. 23, 2019

Date of Issue.....: Jan. 23, 2019

Test Result.....: Pass

Prepared by: Kahn.Yang

Kahn yang/Editor

Reviewer: Sherwin Qia

Sherwin Qian/Supervisor

Approved & Authorized Signer: Liuze

Liuze/Manager

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1 TEST SUMMARY

1 TEST PROCEDURES AND RESULTS

FCC PART 15.247		
FCC Part 15.207	AC Conducted Emission	N/A
FCC Part 15.205/15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge	PASS
FCC Part 15.247(b3)	Maximum Conducted Output Power	PASS
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.203	Antenna Requirement	PASS

2 TEST FACILITY

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

Address : 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

CNAS-LAB Code: L6494

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of testing Laboratories.

Designation Number: CN1227

Test Firm Registration Number: 674885

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files.

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 earphone
Trade Mark	N/A
Model Name	Aria
Serial No.	N/A
Model Difference	N/A
FCC ID	2AR92-ARIA
Antenna Type	Internal antenna
Antenna Gain	0.0 dbi
Frequency Range	2402MHz - 2480MHz
Number of Channels	40
Modulation Type	GFSK
Battery	3.7V 55mAh
Power Source	3.7V from battery
Adapter Model	N/A

2.2 CARRIER FREQUENCY OF CHANNELS

Channel List							
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
01	2402	11	2422	21	2442	31	2462
02	2404	12	2424	22	2444	32	2464
03	2406	13	2426	23	2446	33	2466
04	2408	14	2428	24	2448	34	2468
05	2410	15	2430	25	2450	35	2470
06	2412	16	2432	26	2452	36	2472
07	2414	17	2434	27	2454	37	2474
08	2416	18	2436	28	2456	38	2476
09	2418	19	2438	29	2458	39	2478
10	2420	20	2440	30	2460	40	2480

2.3 OPARATION OF EUT DURING TESTING

Operating Mode
The mode is used: Transmitting mode

Low Channel	2402MHz
Middle Channel	2440MHz
High Channel	2480MHz

2.4 DESCRIPTION OF TEST SETUP

Operation of EUT during Conducted testing:

N/A

Operation of EUT during Radiation and Above1GHz Radiation testing:

EUT

2.5 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
CONDUCTED EMISSIONS TEST					
1	AMN	Schwarzbeck	NNLK8121	8121370	2019.09.09
2	AMN	ETS	3810/2	00020199	2019.09.09
3	EMI TEST RECEIVER	Rohde&Schwarz	ESCI	101210	2019.09.09
4	AAN	TESEQ	T8-Cat6	38888	2019.09.09
RADIATED EMISSION TEST					
1	Horn Antenna	Sunol	DRH-118	A101415	2019.09.29
2	BicoNILog Antenna	Sunol	JB1 Antenna	A090215	2019.09.29
3	PREAMP	HP	8449B	3008A00160	2019.09.09
4	PREAMP	HP	8447D	2944A07999	2019.09.09
5	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2019.09.09
6	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2019.09.28
7	Signal Generator	Agilent	E4421B	MY4335105	2019.09.28
8	Spectrum Analyzer	Agilent	E4407B	MY41440676	2019.09.28
9	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2019.09.28
10	MXA Signal Analyzer	Agilent	N9020A	MY51110104	2019.09.09
11	ANT Tower&Turn table Controller	Champro	EM 1000	60764	2019.09.28
12	Anechoic Chamber	Taihe Maorui	9m*6m*6m	966A0001	2019.09.09
13	Shielding Room	Taihe Maorui	6.4m*4m*3m	643A0001	2019.09.09
14	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2019.03.14
15	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2019.03.14
16	RF power divider	Anritsu	K241B	992289	2019.09.28

17	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2019.09.28
18	Biconical antenna	Schwarzbeck	VHA 9103	91032360	2019.09.08
19	Biconical antenna	Schwarzbeck	VHA 9103	91032361	2019.09.08
20	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2019.09.08
21	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2020.01.12
22	Active Receive Loop Antenna	Schwarzbeck	FMZB 1919B	00023	2019.11.02
23	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170651	2019.03.14
24	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2019.10.24
25	Active Loop Antenna	Com-Power	AL-130R	10160009	2019.05.10
26	Power Meter	KEYSIGHT	N1911A	MY50520168	2019.05.10
27	EMI Test Software	FALA	EZ-EMC	FA-03A	2019.05.10

2.6 Special Accessories

Manufacturer	Description	Model	Serial Number	Certificate
HP	notebook	HP-CQ45	CNU1254XFC	SDOC
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3 TEST CONDITIONS AND RESULTS

3.1 CONDUCTED EMISSIONS TEST

Limit

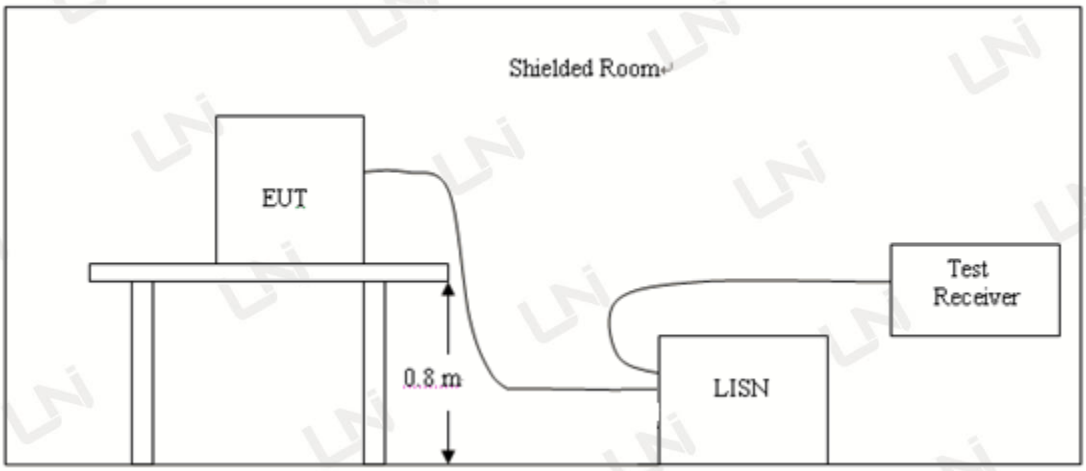
According to FCC CFR Title 47 Part 15 Subpart C Section 15.207, AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus as below:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	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.

Test Setup



Test Procedure

1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. A wooden table with a height of 0.8 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.

Test Result

Not application to this device, which is power by battery

3.2 RADIATED EMISSION TEST

Radiation Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

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)

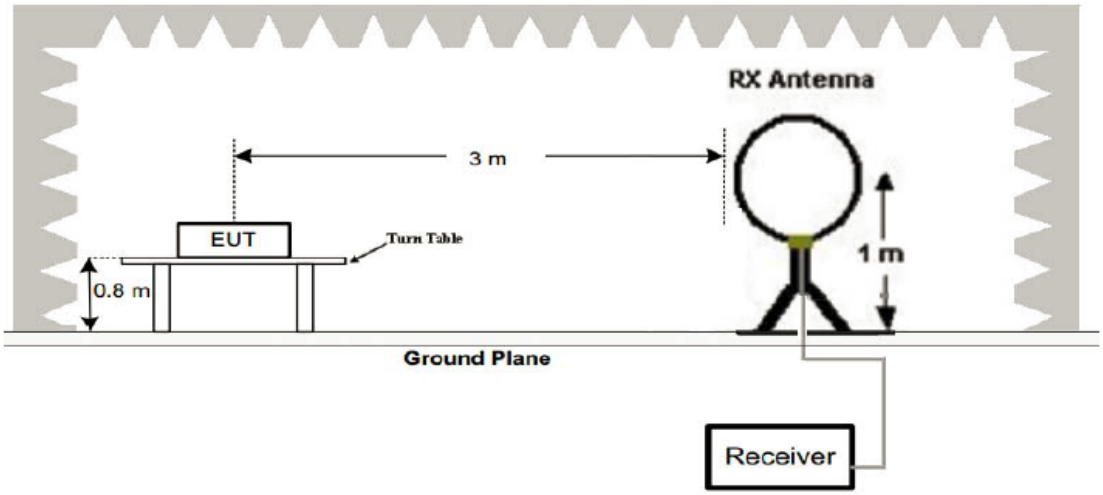
Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in table below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission

Radiated emission limits

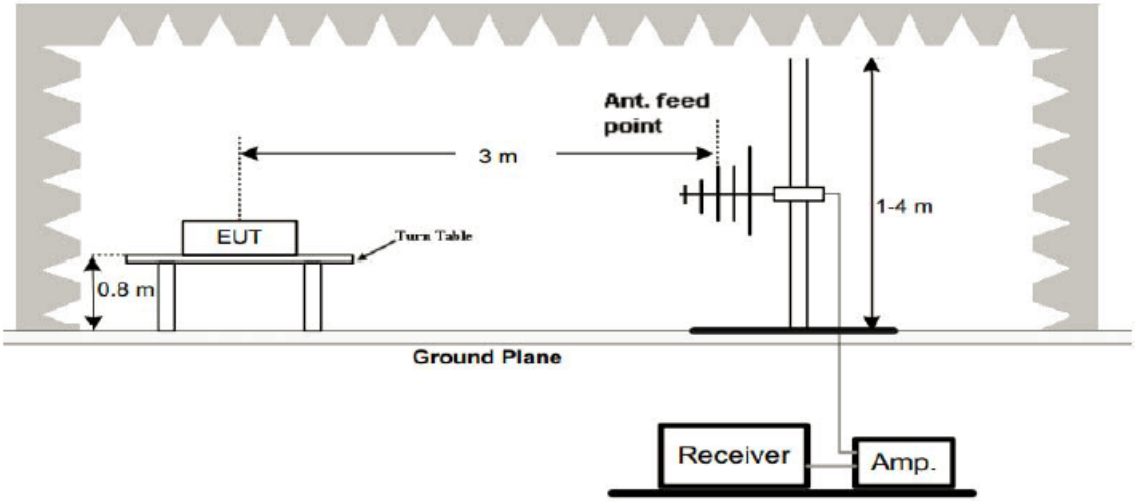
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

Test Setup

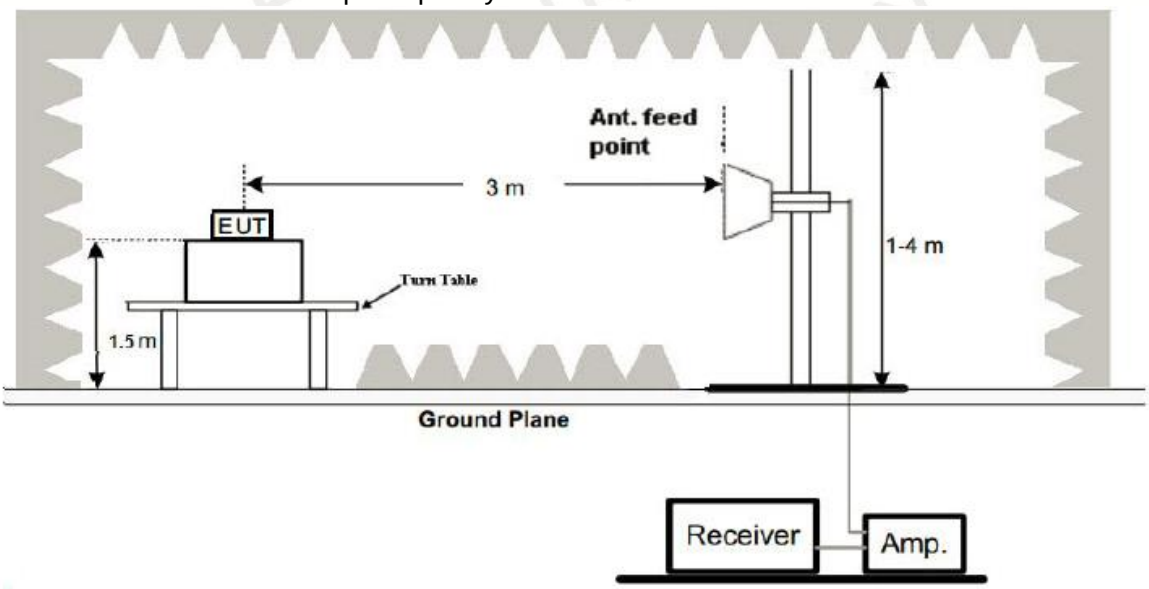
1. Radiated Emission Test-Up Frequency Below 30MHz



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



3. Radiated Emission Test-Up Frequency Above 1GHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Bilog Antenna	3
1GHz-18GHz	Horn Antenna	3
18GHz-25GHz	Horn Anternna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	PK/AV/QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	PK/AV/QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

Test Result

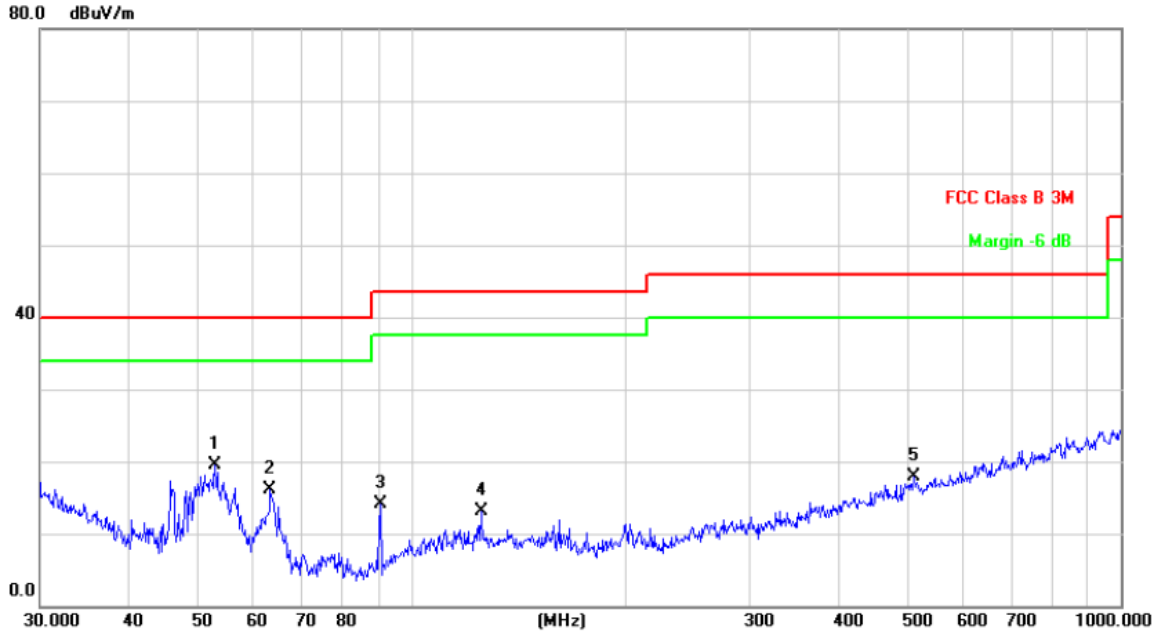
---PASS---

Remark:
1. All the test modes completed for test. The worst case of Radiated Emission is Middle channel, the test data of this mode was reported.
2. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, and test data recorded in this report.
3. Radiated emission test from 9KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9KHz to 30MHz and not recorded in this report.

Below 1GHz Test Results:

Temperature:	25℃	Relative Humidity:	48%
Test Date:	Jan .04, 2019	Pressure:	1030hPa
Test Voltage:	DC 3.7V from battery	Polarization:	Horizontal / Vertical

Polarization:	Horizontal

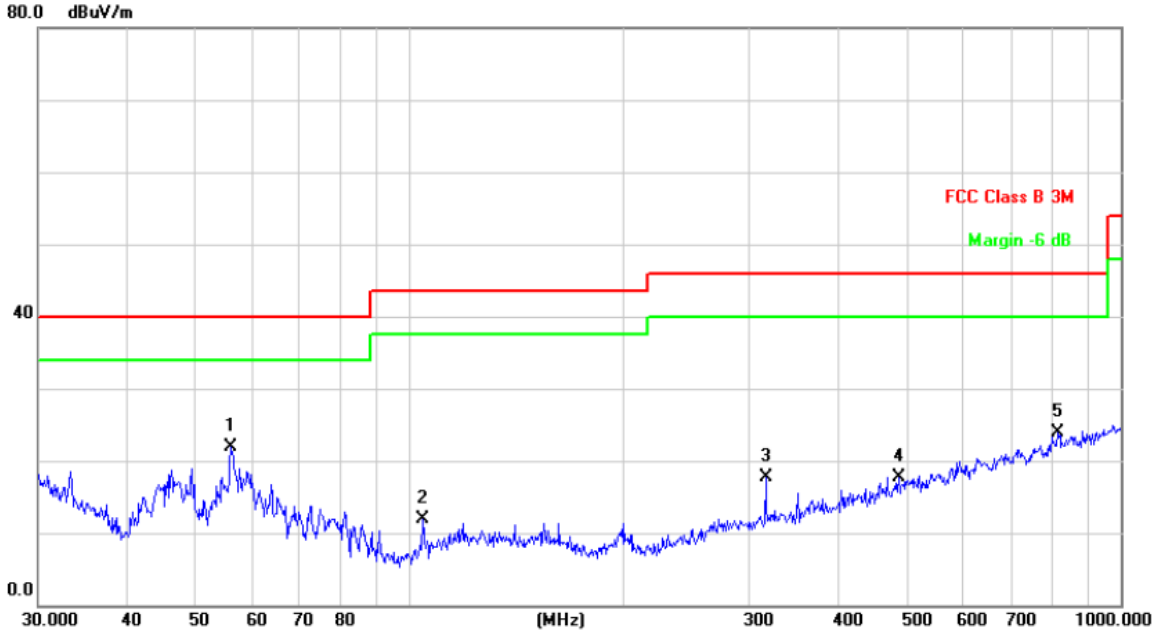


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	52.9453	38.35	-18.91	19.44	40.00	-20.56	peak			
2		63.3132	35.08	-18.88	16.20	40.00	-23.80	peak			
3		90.5374	31.37	-17.21	14.16	43.50	-29.34	peak			
4		125.4457	25.32	-12.29	13.03	43.50	-30.47	peak			
5		510.0436	24.08	-6.27	17.81	46.00	-28.19	peak			

Remark: Absolute Level= Reading Level+ Factor, Margin= Absolute Level – Limit
Factor=Ant. Factor + Cable Loss – Pre-amplifier

Temperature:	25℃	Relative Humidity:	48%
Test Date:	Aug. 30, 2018	Pressure:	1030hPa
Test Voltage:	3.7V from battery	Polarization:	Vertical

Polarization:	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	56.0007	40.73	-18.88	21.85	40.00	-18.15	peak			
2		104.1701	26.51	-14.67	11.84	43.50	-31.66	peak			
3		316.5889	28.43	-10.65	17.78	46.00	-28.22	peak			
4		487.3150	24.27	-6.47	17.80	46.00	-28.20	peak			
5		815.9678	24.60	-0.66	23.94	46.00	-22.06	peak			

Remark: Absolute Level= Reading Level+ Factor, Margin= Absolute Level – Limit
Factor=Ant. Factor + Cable Loss – Pre-amplifier

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)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4804	58.41	-3.64	54.77	74	19.23	PK
4804	43.38	-3.64	39.74	54	14.26	AV
7206	54.86	-0.95	53.91	74	20.09	PK
7206	41.52	-0.95	40.57	54	13.43	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin= Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4804	57.05	-3.64	53.41	74	20.59	PK
4804	44.86	-3.64	41.22	54	12.78	AV
7206	55.06	-0.95	54.11	74	19.89	PK
7206	44.14	-0.95	43.19	54	10.81	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin= Absolute Level – Limit						

CH Middle (2440MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4880	58.37	-3.51	54.86	74	19.14	PK
4880	46.04	-3.51	42.53	54	11.47	AV
7320	54.77	-0.82	53.95	74	20.05	PK
7320	43.79	-0.82	42.97	54	11.03	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin= Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4880	58.41	-3.51	54.90	74	19.10	PK
4880	45.00	-3.51	41.49	54	12.51	AV
7320	54.70	-0.82	53.88	74	20.12	PK
7320	40.37	-0.82	39.55	54	14.45	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin= Absolute Level – Limit						

CH High (2480MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4960.00	58.38	-3.43	54.95	74	19.05	PK
4960.00	43.48	-3.43	40.05	54	13.95	AV
7440.00	54.63	-0.75	53.88	74	20.12	PK
7440.00	43.83	-0.75	43.08	54	10.92	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin= Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4960.00	58.48	-3.43	55.05	74	18.95	PK
4960.00	45.67	-3.43	42.24	54	11.76	AV
7440.00	54.96	-0.75	54.21	74	19.79	PK
7440.00	40.40	-0.75	39.65	54	14.35	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin= Absolute Level – Limit						

Remark：
(1) Measuring frequencies from 1 GHz to the 25 GHz.
(2) Factor = Antenna Factor + Cable Loss – Pre-amplifier.
(3) Margin= Limits –Emission Level
(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) 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.
(6) All modes of operation were investigated and the worst-case emissions are reported.

3.3 BAND EDGE

Limits

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

Test Procedure

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. RBW 1MHz VBW 3MHz peak detector is for PK value; RBW 1MHz VBW 10Hz peak detector is for AV value .

Test Result

---PASS---

Radiated Band Edge Test:

Operation Mode: TX CH Low (2402MHz)

Horizontal (Worst case):

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2332.4	59.77	-5.8	53.97	74	20.03	PK
2332.4	37.14	-5.8	31.34	54	22.66	AV
2390	59.34	-5.84	53.50	74	20.50	PK
2390	40.08	-5.84	34.24	54	19.76	AV
2400	68.15	-5.84	62.31	74	11.69	PK
2400	44.10	-5.84	38.26	54	15.74	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2332.4	61.47	-5.8	55.67	74	18.33	PK
2332.4	37.37	-5.8	31.57	54	22.43	AV
2390	59.27	-5.84	53.43	74	20.57	PK
2390	39.80	-5.84	33.96	54	20.04	AV
2400	66.84	-5.84	61.00	74	13.00	PK
2400	44.80	-5.84	38.96	54	15.04	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: TX CH High (2480MHz)

Horizontal (Worst case):

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	61.03	-5.65	55.38	74	18.62	PK
2483.5	37.84	-5.65	32.19	54	21.81	AV
2500	56.93	-5.72	51.21	74	22.79	PK
2500	41.00	-5.72	35.28	54	18.72	AV
2539.57	67.85	-5.75	62.10	74	11.90	PK
2539.57	45.14	-5.75	39.39	54	14.61	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	59.67	-5.65	54.02	74	19.98	PK
2483.5	38.03	-5.65	32.38	54	21.62	AV
2500	57.10	-5.72	51.38	74	22.62	PK
2500	39.41	-5.72	33.69	54	20.31	AV
2539.57	66.55	-5.75	60.80	74	13.20	PK
2539.57	44.98	-5.75	39.23	54	14.77	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

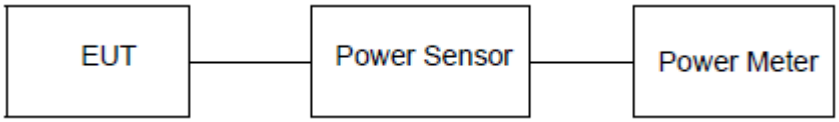
3.4 CONDUCTED OUTPUT POWER

Limit

The Maximum Peak Output Power Measurement is 30dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.



Test Result

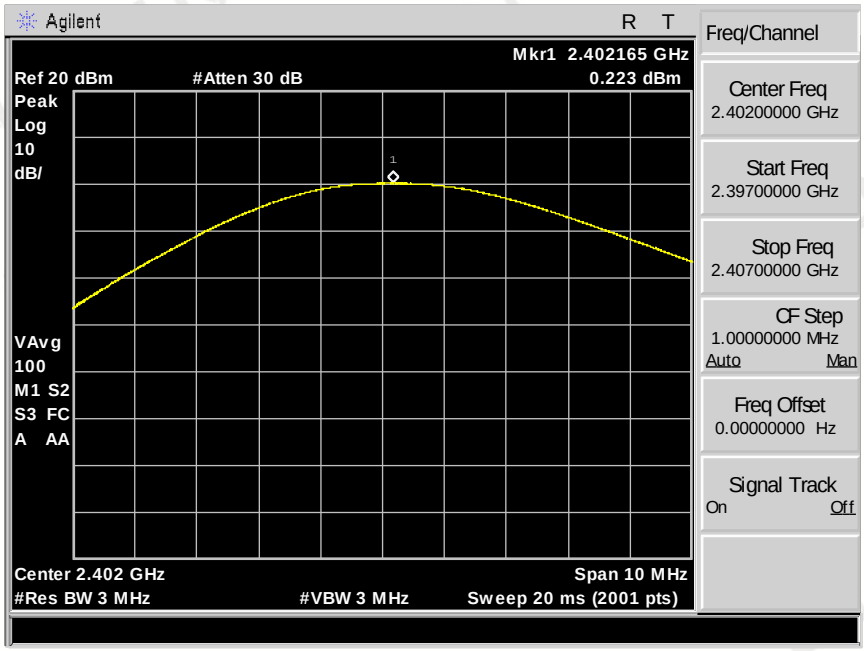
---PASS---

Type	Channel	PK Output power (dBm)	Limit (dBm)	Result
GFSK	00	0.223	30.00	Pass
	19	1.001		
	39	1.098		

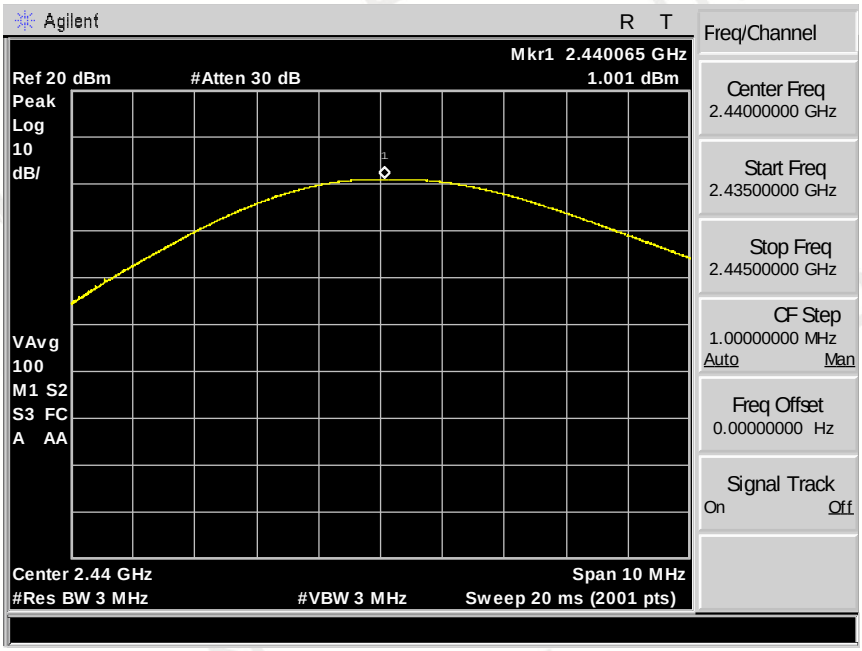
Note: 1.The test results including the cable lose.

GFSK Modulation

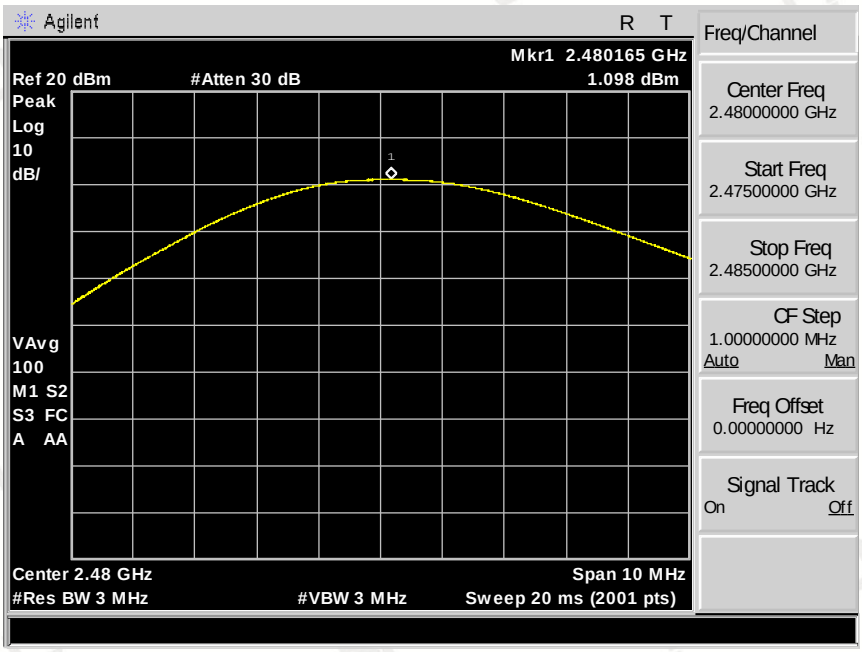
CH00



CH19


Agilent
R T
Mkr1 2.440065 GHz
Ref 20 dBm
#Atten 30 dB
1.001 dBm
Peak
Log
10
dB/
VAvg
100
M1 S2
S3 FC
A AA
Center 2.44 GHz
Span 10 MHz
#Res BW 3 MHz
#VBW 3 MHz
Sweep 20 ms (2001 pts)
Freq/Channel
Center Freq
2.44000000 GHz
Start Freq
2.43500000 GHz
Stop Freq
2.44500000 GHz
CF Step
1.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off

CH39


Agilent
R T
Mkr1 2.480165 GHz
Ref 20 dBm
#Atten 30 dB
1.098 dBm
Peak
Log
10
dB/
VAvg
100
M1 S2
S3 FC
A AA
Center 2.48 GHz
Span 10 MHz
#Res BW 3 MHz
#VBW 3 MHz
Sweep 20 ms (2001 pts)
Freq/Channel
Center Freq
2.48000000 GHz
Start Freq
2.47500000 GHz
Stop Freq
2.48500000 GHz
CF Step
1.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off

3.5 POWER SPECTRAL DENSITY

Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to theantenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure

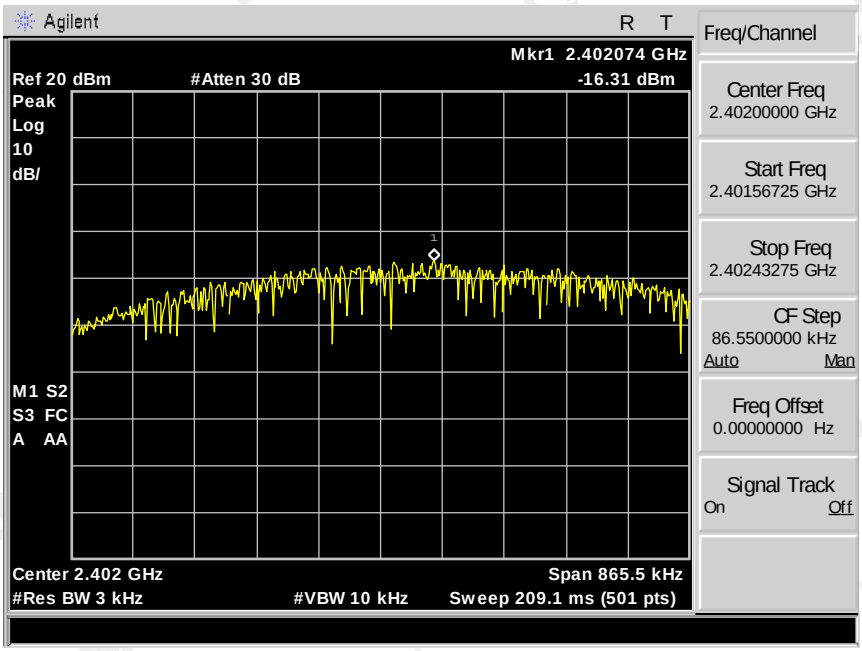
1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW ≥ 3 kHz.
3. Set the VBW ≥ 3× RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

Test Configuration

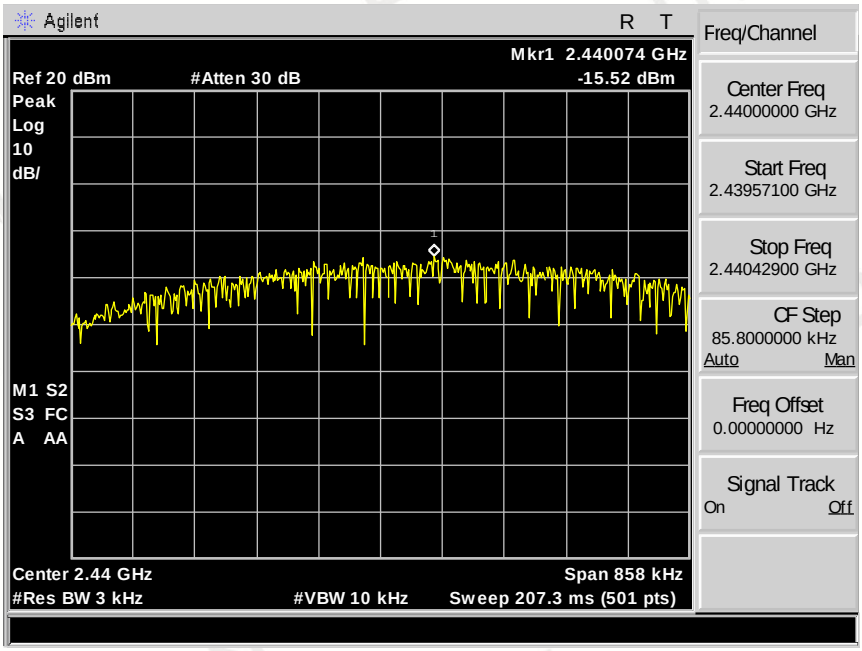
Test Results

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
GFSK	00	-16.31	8.00	Pass
	19	-15.52		
	39	-15.44		

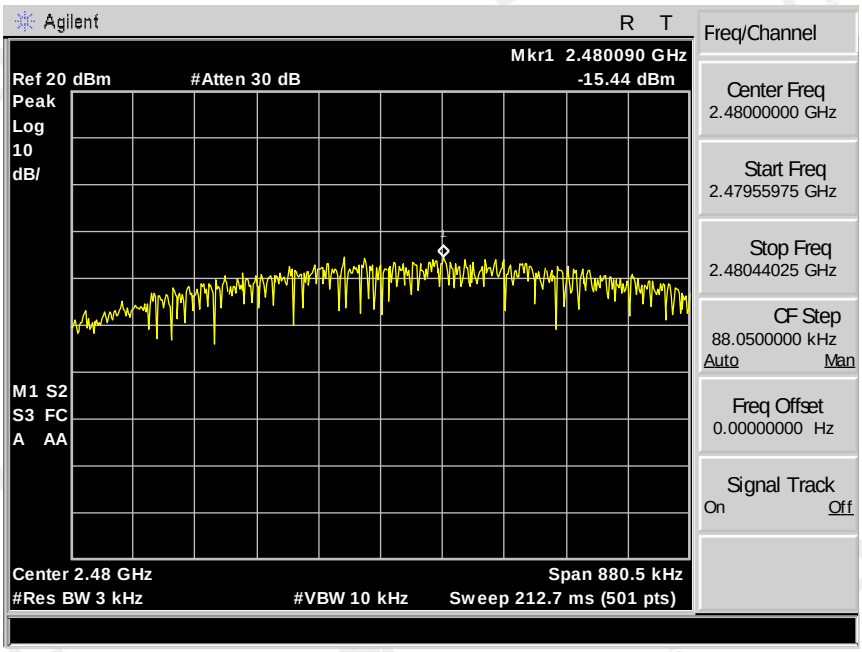
Test plot as follows:



CH00



CH19



CH39

3.6 OCCUPIED BANDWIDTH MEASUREMENT

Test Setup

FCC Part15(15.247), Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.247(a)(2)	6dB BW	2400-2483.5	PASS

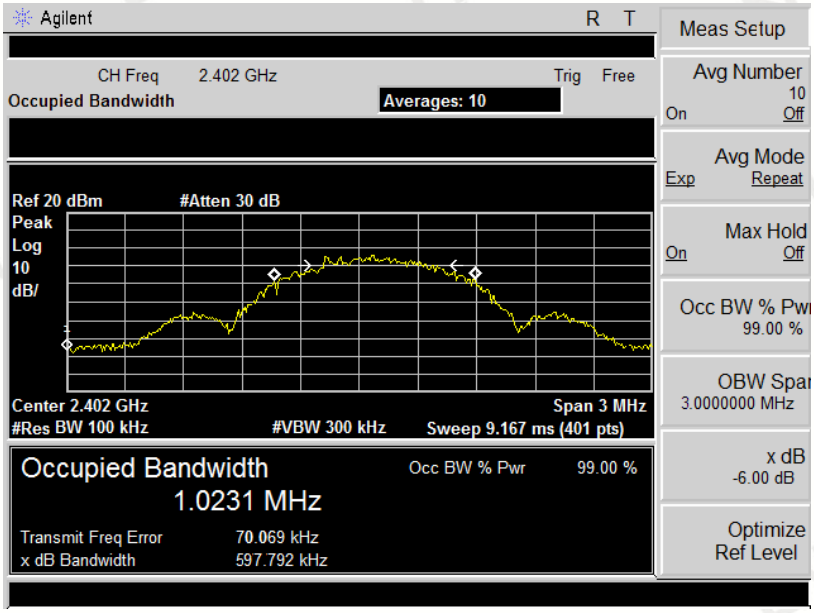
Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. RBW=100KHz, VBW=300KHz, Span=3MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector.

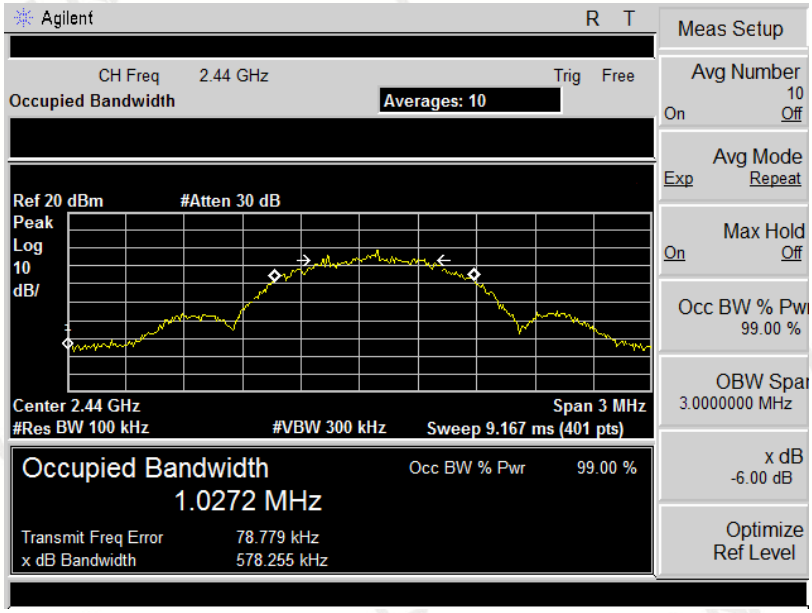
Test Result

---PASS---

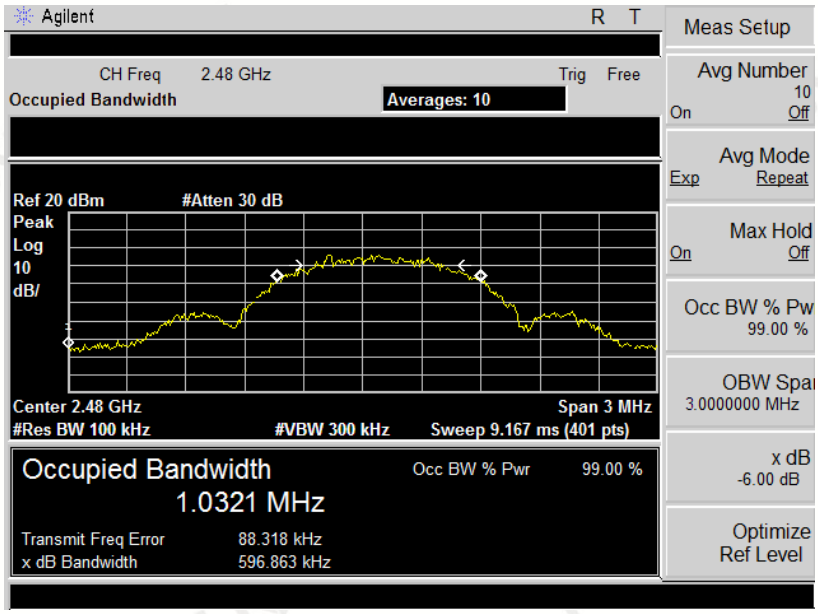
Modulation	Channel	-6dB bandwidth (MHz)	Limit (KHz)	Result
GFSK	CH00	0.597792	N/A	Pass
	CH19	0.578255		
	CH39	0.596863		



CH00


Agilent
R T
Meas Setup
CH Freq 2.44 GHz
Trig Free
Occupied Bandwidth
Averages: 10
Avg Number
10
On Off
Avg Mode
Exp Repeat
Ref 20 dBm #Atten 30 dB
Peak
Log
10
dB/
Max Hold
On Off
Occ BW % Pwr
99.00 %
OBW Span
3.0000000 MHz
Center 2.44 GHz
Span 3 MHz
#Res BW 100 kHz #VBW 300 kHz Sweep 9.167 ms (401 pts)
Occupied Bandwidth
Occ BW % Pwr 99.00 %
1.0272 MHz
x dB
-6.00 dB
Transmit Freq Error 78.779 kHz
x dB Bandwidth 578.255 kHz
Optimize
Ref Level

CH19


Agilent
R T
Meas Setup
CH Freq 2.48 GHz
Trig Free
Occupied Bandwidth
Averages: 10
Avg Number
10
On Off
Avg Mode
Exp Repeat
Ref 20 dBm #Atten 30 dB
Peak
Log
10
dB/
Max Hold
On Off
Occ BW % Pwr
99.00 %
OBW Span
3.0000000 MHz
Center 2.48 GHz
Span 3 MHz
#Res BW 100 kHz #VBW 300 kHz Sweep 9.167 ms (401 pts)
Occupied Bandwidth
Occ BW % Pwr 99.00 %
1.0321 MHz
x dB
-6.00 dB
Transmit Freq Error 88.318 kHz
x dB Bandwidth 596.863 kHz
Optimize
Ref Level

CH39

3.7 OUT-OF BAND EMISSIONS

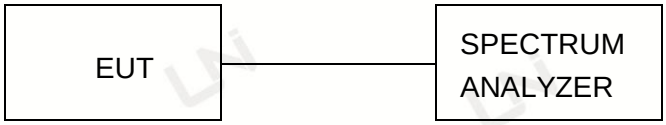
Limit

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 con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies 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.

Test Procedure

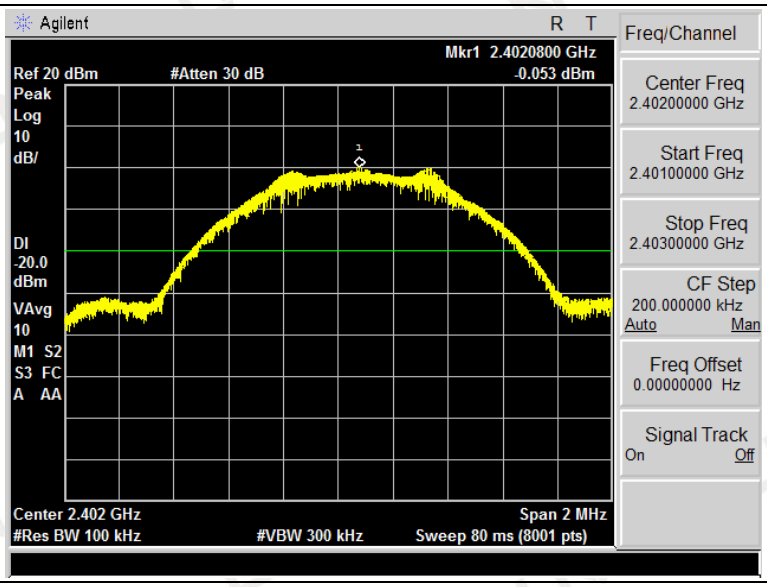
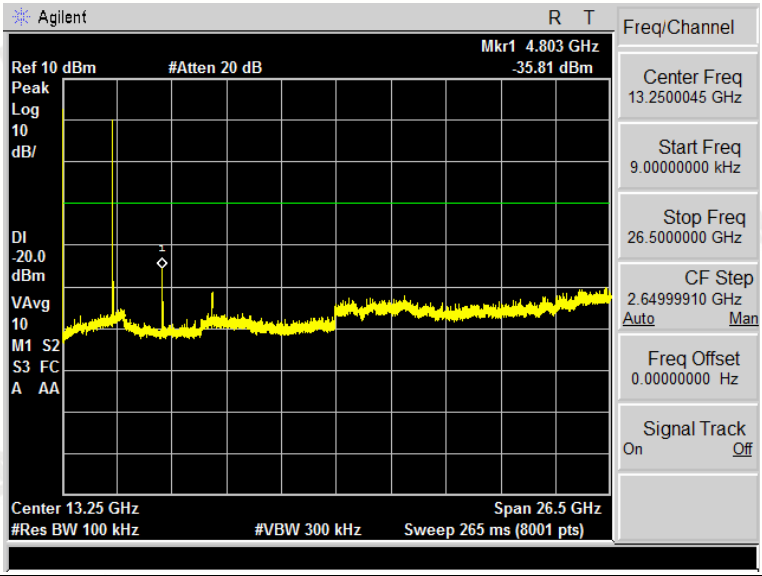
Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

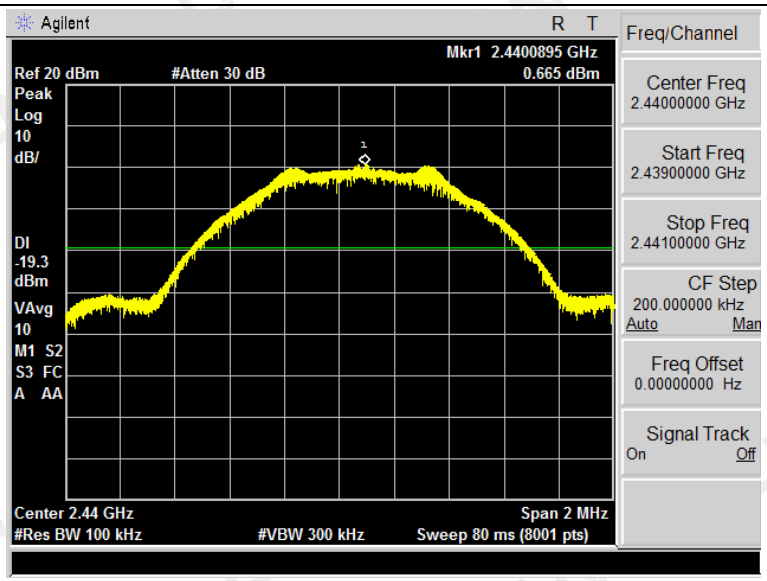
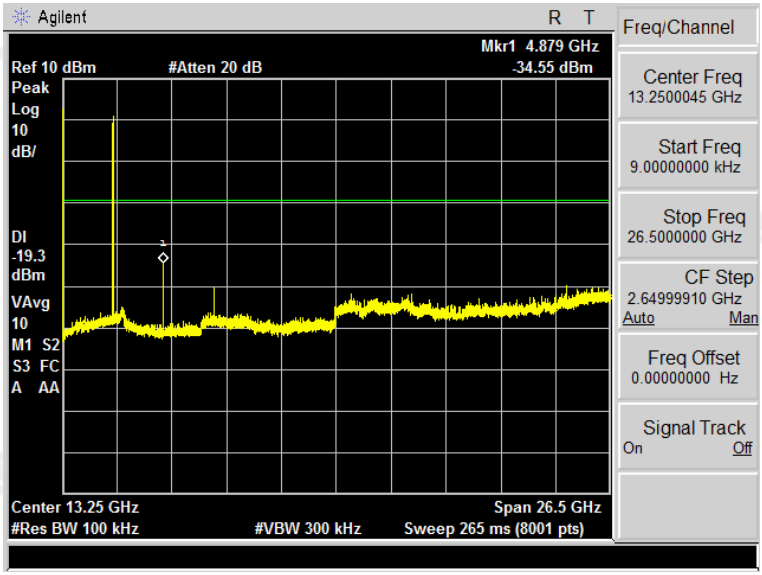
Test Configuration

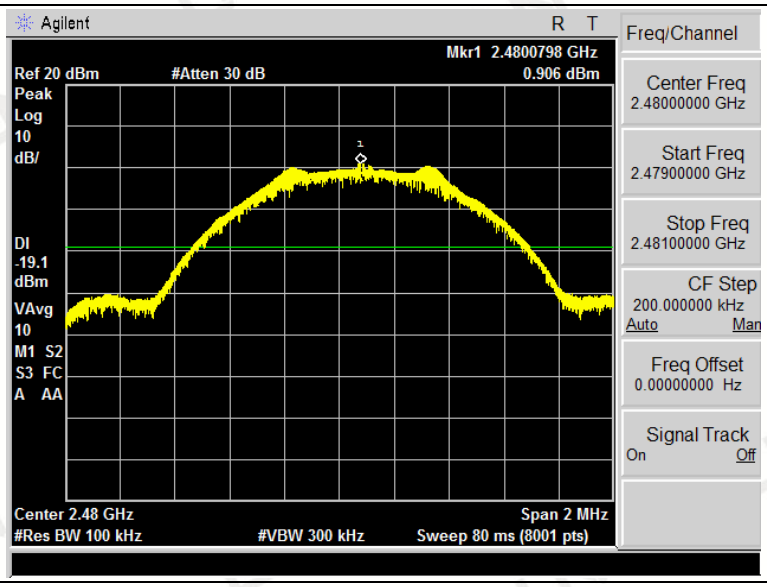
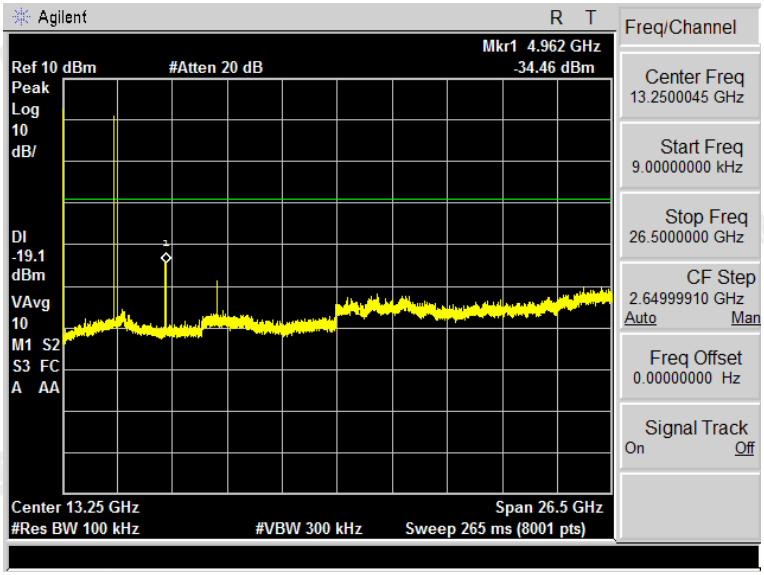


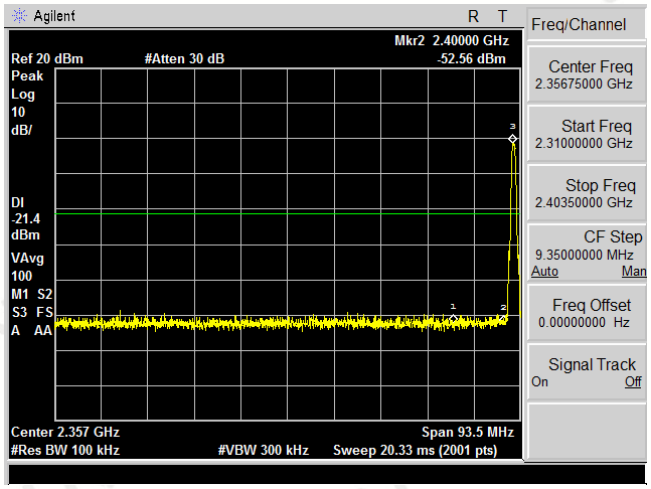
Test Results

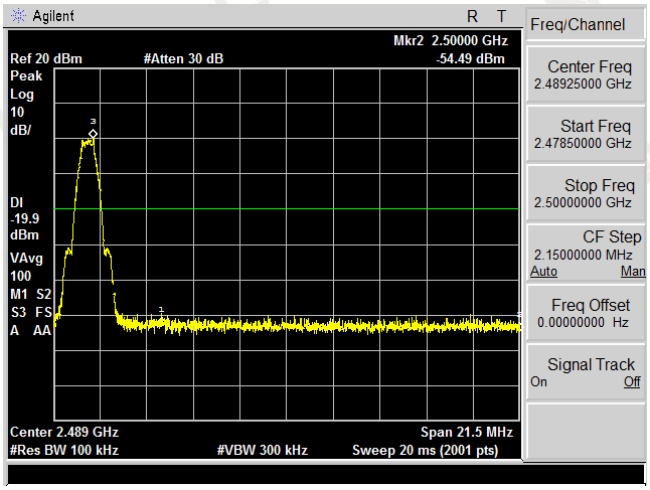
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data.

GFSK--2402MHz	
	Reference Level
	
	30MHz-25GHz

GFSK--2440MHz	
	Reference Level
	
	30MHz-25GHz

GFSK--2480MHz	
	Reference Level
	
	30MHz-25GHz



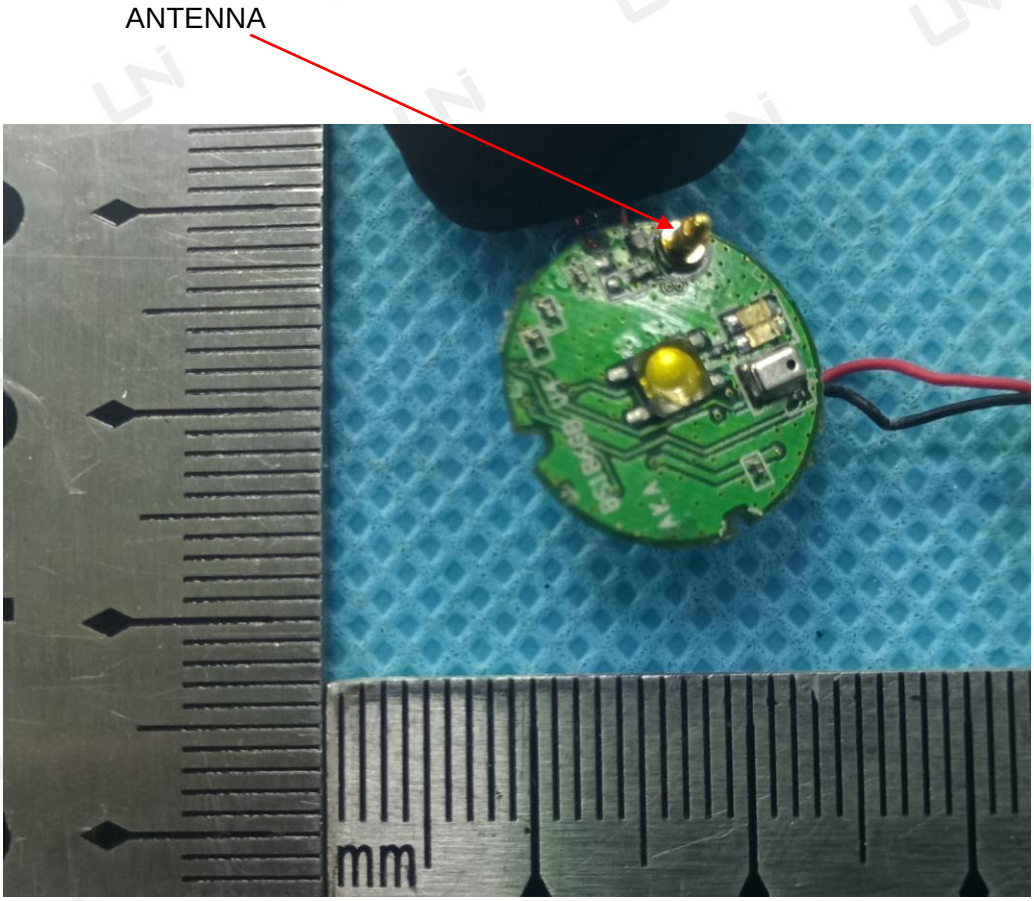


Left Band edge				Right Band edge			
Frequency(MHz)	Bandedge(dBm)	limit(dBm)	Results	Frequency(MHz)	Bandedge(dBm)	limit(dBm)	Results
2390	-52.24	-21.4	Pass	2483.5	-53.07	-19.9	Pass
2400	-52.56	-21.4	Pass	2500	-54.49	-19.9	Pass

3.8 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.

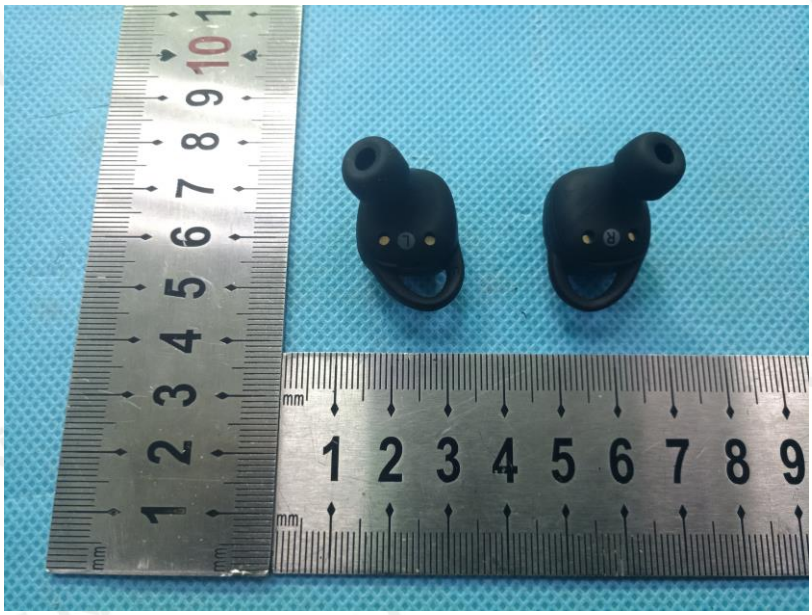
Antenna Connected Construction
The antenna used in this product is an Integral Antenna, the directional gains of antenna used for transmitting is 0.00dBi.



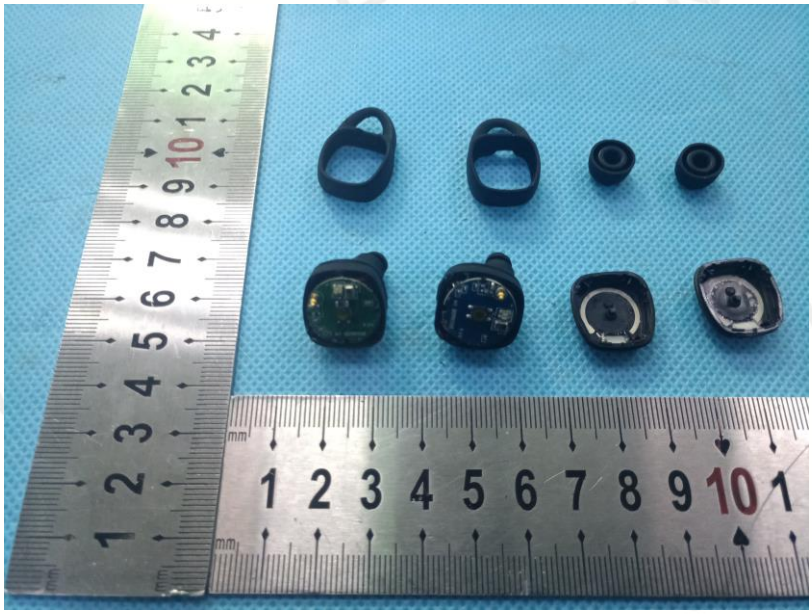
4 PHOTOGRAPH OF TEST

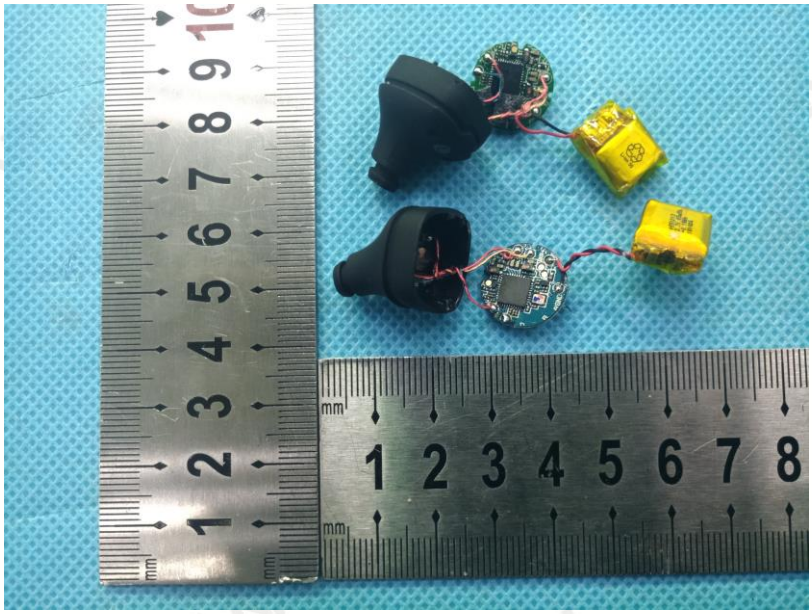
5 PHOTOGRAPH OF EUT

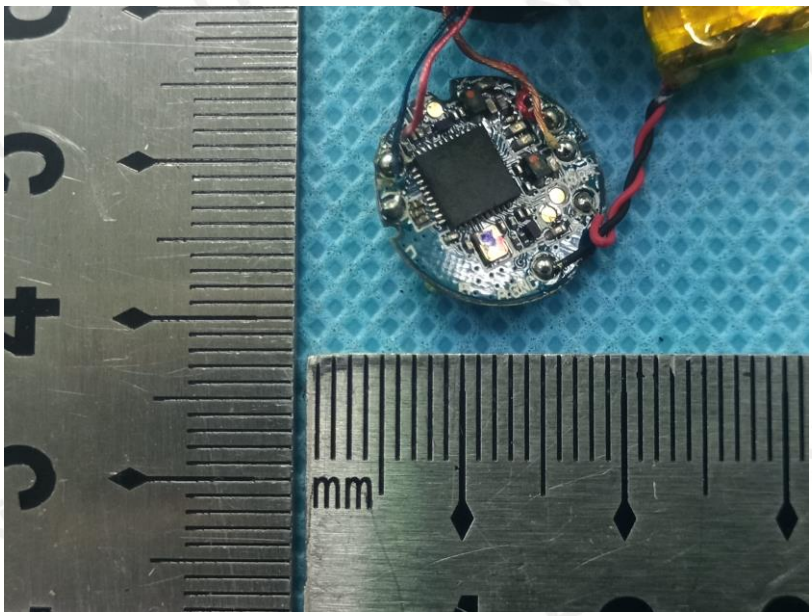
External Photos

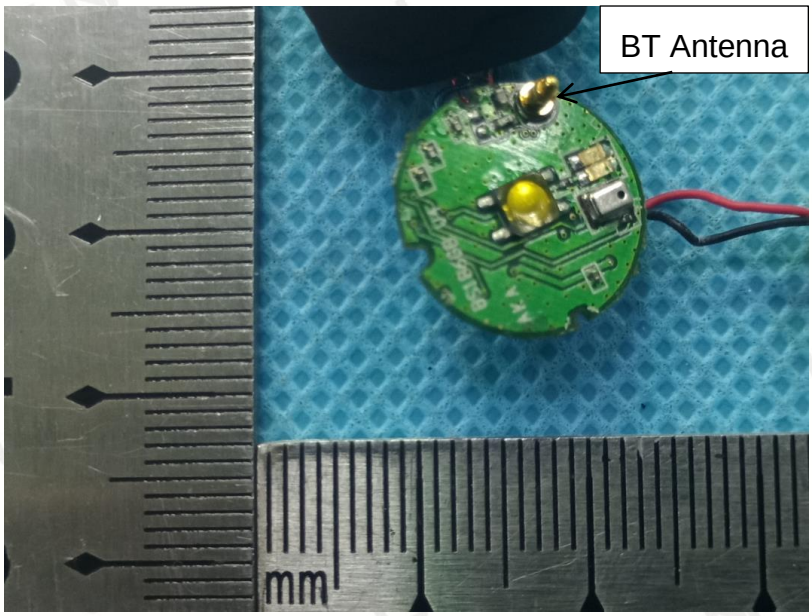


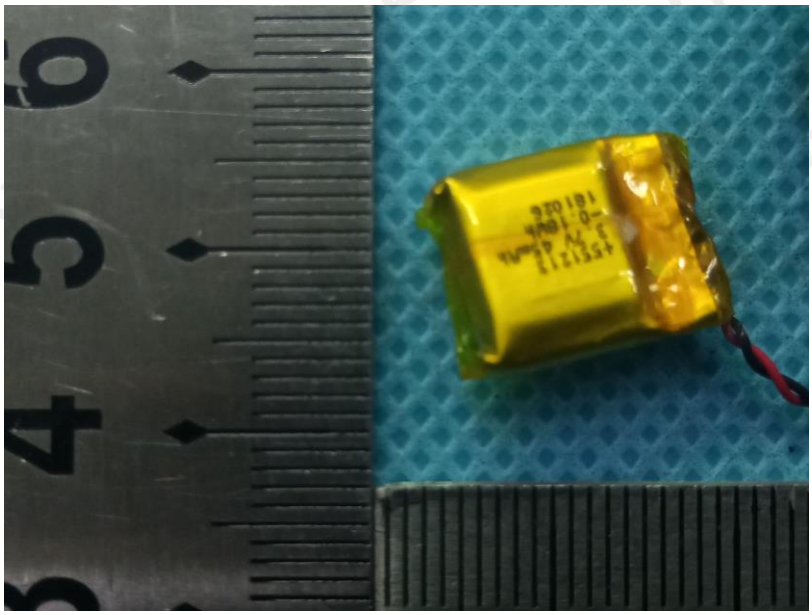
Internal Photos











********** End of Report **********