



FCC TEST REPORT

**Test report
On Behalf of
TPV Electronics (Fujian) Co., Ltd.
For
2.4G wireless gaming headset
Model No.: AOC GH401, GH401A, GH401B, GH401R, GH401X,
G03**

FCC ID: 2A2RT-AOCGH401RX

Prepared For : TPV Electronics (Fujian) Co., Ltd.
Shangzheng, Yuanhong Road, Fuqing City, Fujian Province, 350301 China

Prepared By : Shenzhen HUAK Testing Technology Co., Ltd.
1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping,
Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Date of Test: July. 07, 2021 ~Aug. 02, 2021

Date of Report: Aug. 02, 2021

Report Number: HK2107072220-E



TEST RESULT CERTIFICATION

Applicant's name : TPV Electronics (Fujian) Co., Ltd.

Address : Shangzheng, Yuanhong Road, Fuqing City, Fujian Province,
350301 China

Manufacturer's Name..... : Dongguan Desheng Industrial Co., Ltd.

Address : Area A5, Shichong Industrial Park, Shipai Town, Dongguan City,
523000 China

Product description

Trade Mark: AOC

Product name : 2.4G wireless gaming headset

Model and/or type reference : AOC GH401, GH401A, GH401B, GH401R, GH401X, G03

FCC Rules and Regulations Part 15 Subpart C Section 15.249

Standards : ANSI C63.10: 2013

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HUAK Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HUAK Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Date of Test..... :


Date (s) of performance of tests : July. 07, 2021 ~Aug. 02, 2021

Date of Issue..... : Aug. 02, 2021


Test Result : **Pass**

Testing Engineer : 

(Gary Qian)

Technical Manager : 

(Eden Hu)

Authorized Signatory : 

(Jason Zhou)

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.



Table of Contents

Page

1 . TEST SUMMARY	5
2 . GENERAL INFORMATION	6
2.1 General Description of EUT	6
2.2 Operation of EUT During Testing	7
2.3 Description of Test Setup	8
2.4 Measurement Instruments List	9
3 . CONDUCTED EMISSIONS TEST	10
3.1 Conducted Power Line Emission Limit	10
3.2 Test Setup	10
3.3 Test Procedure	10
3.4 Test Result	11
4. RADIATED EMISSION TEST	13
4.1 Radiation Limit	13
4.2 Test Setup	13
4.3 Test Procedure	14
4.4 Test Result	14
5. BAND EDGE	20
5.1 Limits	20
5.2 Test Procedure	20
6. OCCUPIED BANDWIDTH MEASUREMENT	23
6.1 Test Setup	23
6.2 Test Procedure	23
6.3 Measurement Equipment Used	23
6.4 Test Result	23
7. ANTENNA REQUIREMENT	25
8. PHOTOGRAPH OF TEST	26
9. PHOTOS OF THE EUT	28

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Aug. 02, 2021	Jason Zhou

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



1. TEST SUMMARY

1.1 Test Procedures And Results

DESCRIPTION OF TEST	SECTION NUMBER	RESULT
CONDUCTED EMISSIONS TEST	15.207	COMPLIANT
RADIATED EMISSION TEST	15.249(a)/15.209	COMPLIANT
BAND EDGE	15.249(d)/15.205	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	15.215 (c)	COMPLIANT
ANTENNA REQUIREMENT	15.203	COMPLIANT

1.2 Test Facility

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

Address : 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

1.3 Measurement Uncertainty

Measurement Uncertainty

- Conducted Emission Expanded Uncertainty = 2.71dB, k=2
- Radiated emission expanded uncertainty(9kHz-30MHz) = 3.90dB, k=2
- Radiated emission expanded uncertainty(30MHz-1000MHz) = 3.90dB, k=2
- Radiated emission expanded uncertainty(Above 1GHz) = 4.28dB, k=2



2. GENERAL INFORMATION

2.1 General Description of EUT

Equipment	2.4G wireless gaming headset
Model Name	AOC GH401
Serial Model	GH401A, GH401B, GH401R, GH401X, G03
Model Difference	All model's the function, software and electric circuit are the same, only with a product color, appearance and model named different. Test sample model: AOC GH401.
FCC ID	2A2RT-AOCGH401RX
Antenna Type	PCB Antenna
Antenna Gain	0 dBi
Operation frequency	2403-2478MHz
Number of Channels	26CH
Modulation Type	GFSK
Power Source	DC 3.7V from battery or DC 5V, 1A from TYPE-C
Power Rating	DC 3.7V from battery or DC 5V, 1A from TYPE-C



2.1.1 Carrier Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2403	10	2430	19	2457
2	2406	11	2433	20	2460
3	2409	12	2436	21	2463
4	2412	13	2439	22	2466
5	2415	14	2442	23	2469
6	2418	15	2445	24	2472
7	2421	16	2448	25	2475
8	2424	17	2451	26	2478
9	2427	18	2454		

2.2 Operation of EUT During Testing

Operating Mode

The mode is used: **Transmitting mode**

Low Channel: 2403MHz

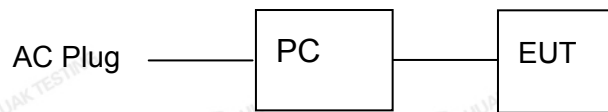
Middle Channel: 2439MHz

High Channel: 2478MHz

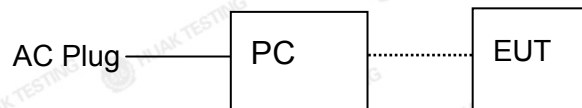


2.3 Description of Test Setup

Operation of EUT during conducted testing:



Operation of EUT during radiation below 1GHz testing:



Operation of EUT during radiation above 1GHz testing



PC information
Model: ThinkPad X220i
Input: 20V, 3.25A/4.5A

The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. The worst case is X position.



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. 10, 2020	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 10, 2020	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 10, 2020	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 10, 2020	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 10, 2020	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 10, 2020	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 10, 2020	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 10, 2020	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 10, 2020	1 Year
10.	Horn Antenna	Schwarzbeck	9120D	HKE-013	Dec. 10, 2020	1 Year
11.	Pre-amplifier	EMCI	EMC051845S E	HKE-015	Dec. 10, 2020	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 10, 2020	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JY3120-B Version	HKE-083	N/A	N/A
14.	Power Sensor	Agilent	E9300A	HKE-086	Dec. 10, 2020	1 Year
15.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 10, 2020	1 Year
16.	Signal generator	Agilent	N5182A	HKE-029	Dec. 10, 2020	1 Year
17.	Signal Generator	Agilent	83630A	HKE-028	Dec. 10, 2020	1 Year
18.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 17, 2020	3 Year
19.	Hight gain antenna	Schwarzbeck	LB-180400KF	HKE-054	Dec. 10, 2020	1 Year

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

HUAKE Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3. CONDUCTED EMISSIONS TEST

3.1 Conducted Power Line Emission Limit

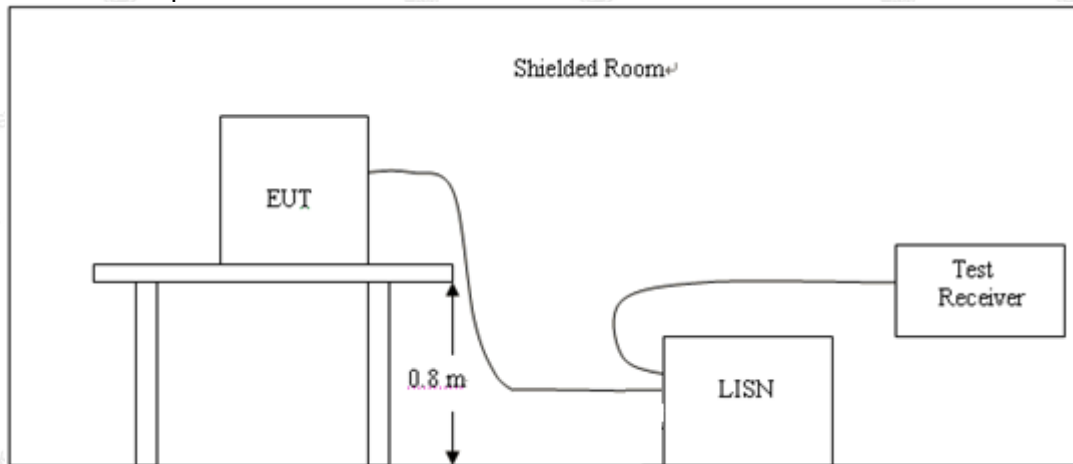
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following.

Frequency (MHz)	Maximum RF Line Voltage (dB μ V)			
	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 0.8 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.

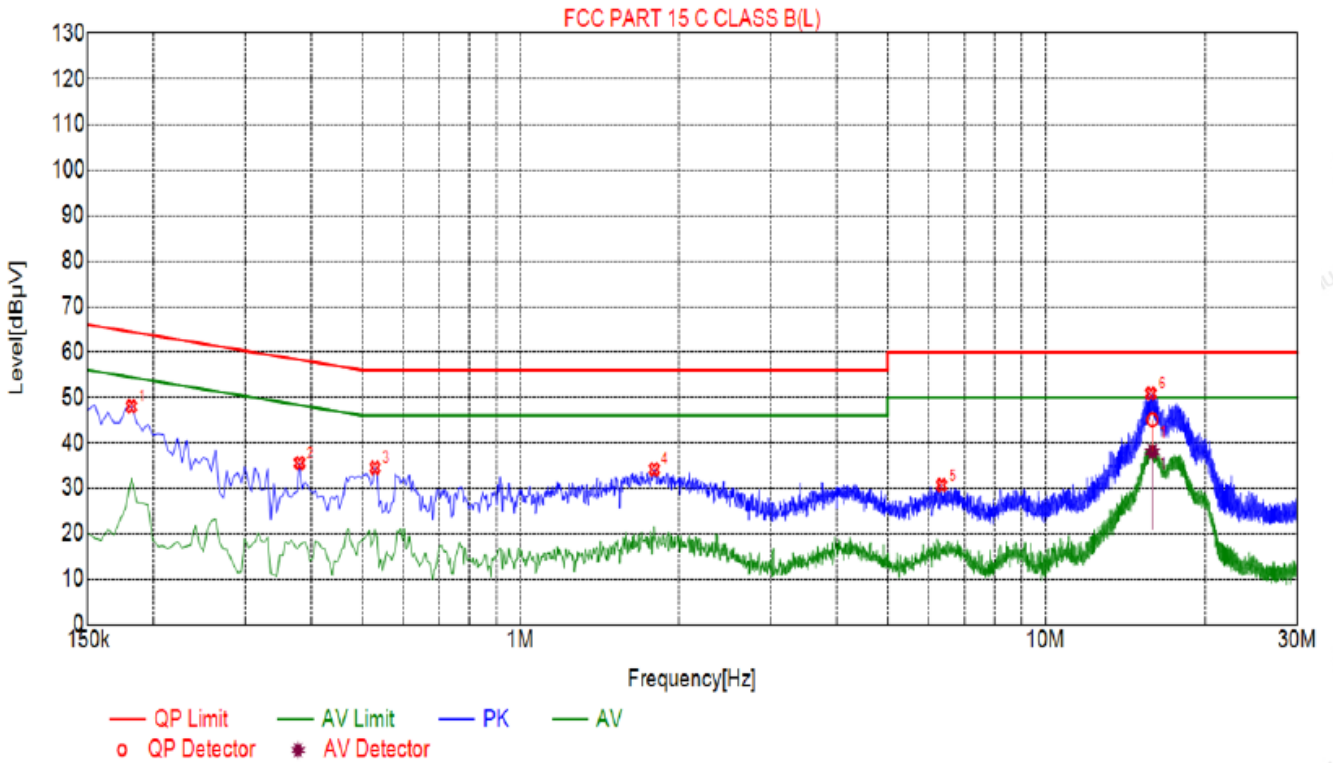


3.4 Test Result

PASS

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

Test Specification: Line



Suspected List								
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Type
1	0.1815	48.02	20.06	64.42	16.40	27.96	PK	L
2	0.3795	35.54	20.05	58.29	22.75	15.49	PK	L
3	0.5280	34.50	20.04	56.00	21.50	14.46	PK	L
4	1.7970	34.14	20.14	56.00	21.86	14.00	PK	L
5	6.3465	30.65	20.22	60.00	29.35	10.43	PK	L
6	15.7785	50.83	19.97	60.00	9.17	30.86	PK	L

Final Data List											
NO.	Freq. [MHz]	Correction factor[dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	QP Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	AV Reading [dBµV]	Type
1	15.8767	19.98	45.05	60.00	14.95	25.07	38.04	50.00	11.96	18.06	L

Remark: Margin = Limit – Level

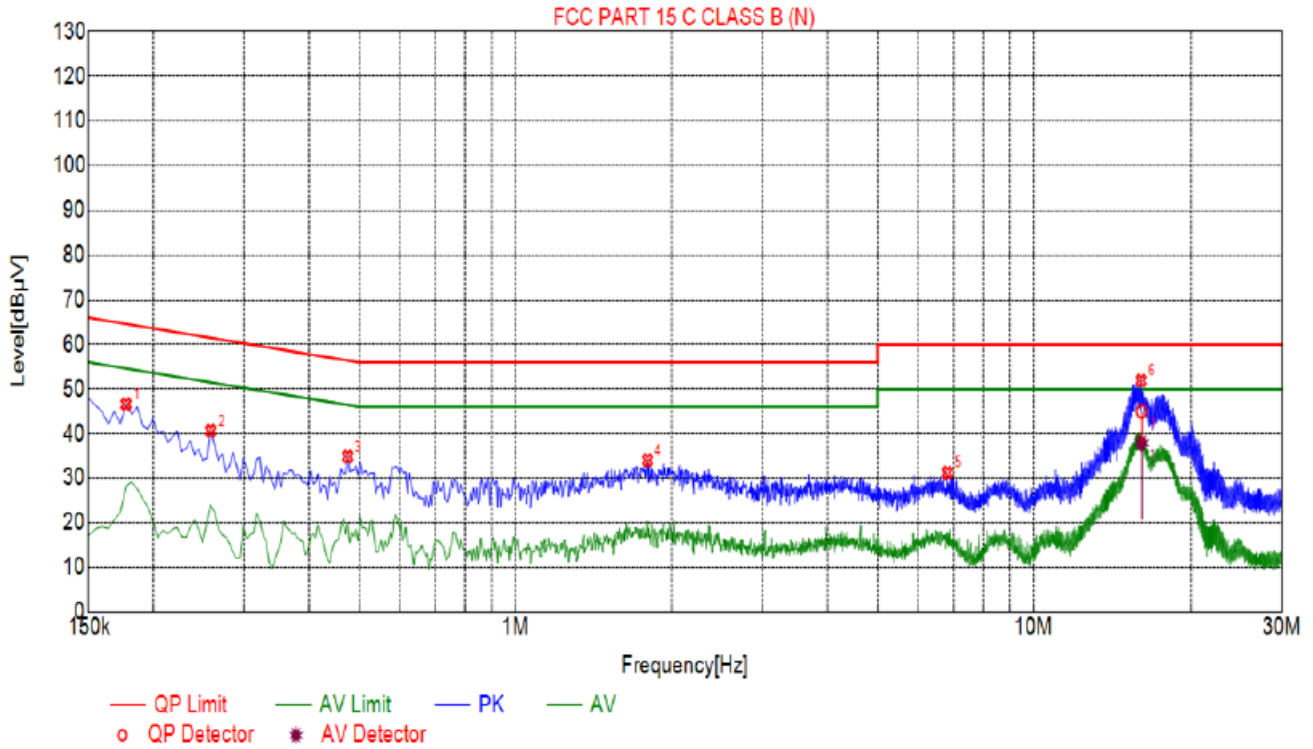
Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.



Test Specification: Neutral



Suspected List								
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Type
1	0.1770	46.62	20.05	64.63	18.01	26.57	PK	N
2	0.2580	40.66	20.04	61.50	20.84	20.62	PK	N
3	0.4740	34.88	20.04	56.44	21.56	14.84	PK	N
4	1.7970	34.04	20.14	56.00	21.96	13.90	PK	N
5	6.8235	31.24	20.20	60.00	28.76	11.04	PK	N
6	16.0305	51.91	19.98	60.00	8.09	31.93	PK	N

Final Data List											
NO.	Freq. [MHz]	Correction factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	QP Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	AV Reading [dBµV]	Type
1	16.0616	19.98	45.00	60.00	15.00	25.02	37.90	50.00	12.10	17.92	N

Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

4. RADIATED EMISSION TEST

4.1 Radiation Limit

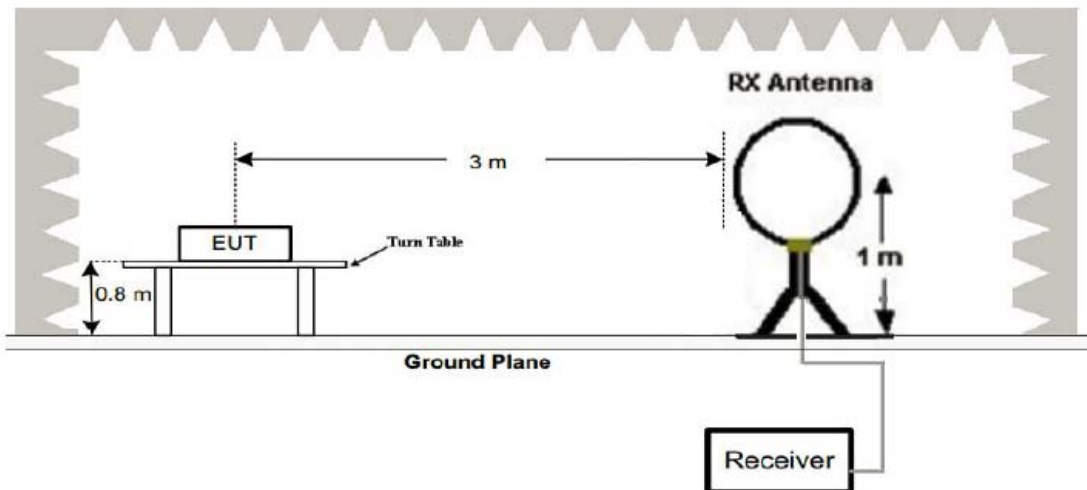
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
0.009-0.490	300	20log 2400/F (kHz)	2400/F (kHz)
0.490-1.705	30	20log 24000/F (kHz)	24000/F (kHz)
1.705-30	30	20log 30	30
30-88	3	40	100
88-216	3	43.5	150
216-960	3	46	200
Above 960	3	54	500

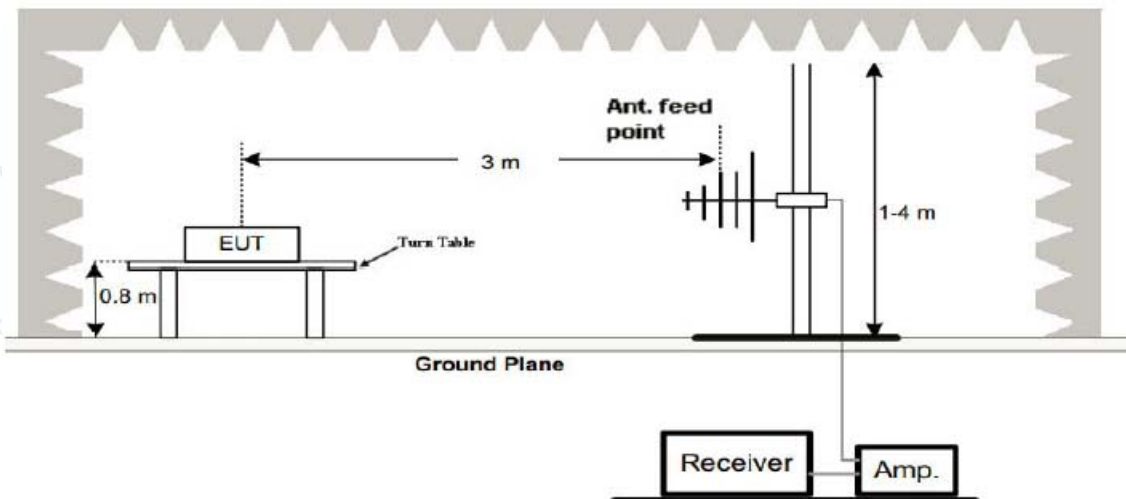
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2 Test Setup

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

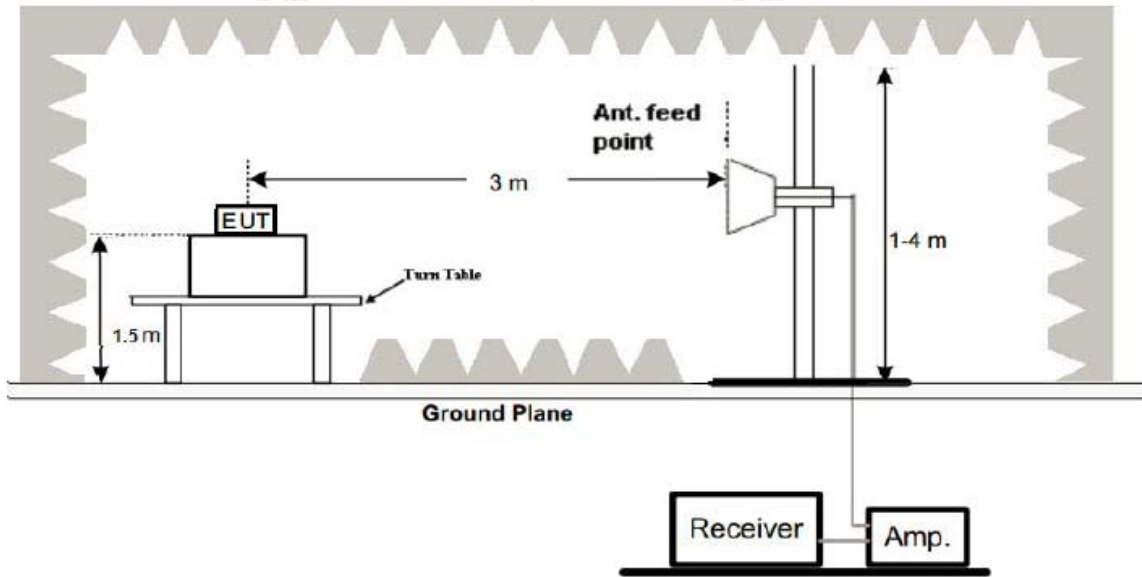


(2) Radiated Emission Test-Up Frequency 30MHz~1GHz





(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 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

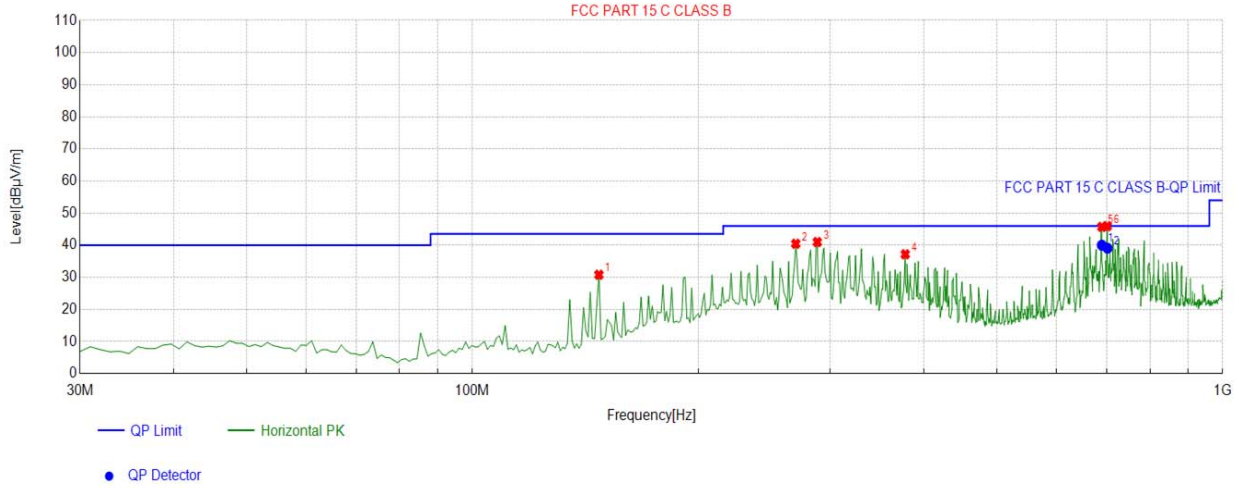
PASS

All the test modes completed for test. The worst case of Radiated Emission is CH 01; the test data of this mode was reported.



Below 1GHz Test Results:

Antenna polarity: H



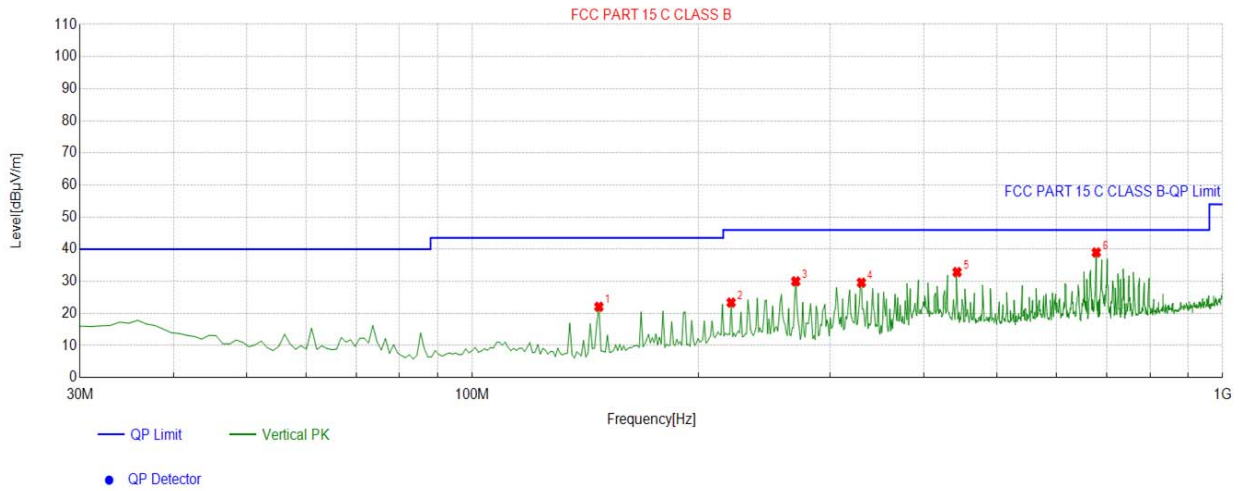
Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	147.4875	-19.00	49.79	30.79	43.50	12.71	100	165	Horizontal
2	269.8298	-13.66	54.10	40.44	46.00	5.56	100	357	Horizontal
3	288.2783	-12.91	53.88	40.97	46.00	5.03	100	0	Horizontal
4	377.6076	-10.87	48.03	37.16	46.00	8.84	100	165	Horizontal
5	690.2603	-5.21	50.92	45.71	46.00	0.29	100	129	Horizontal
6	701.9119	-5.03	50.96	45.93	46.00	0.07	100	145	Horizontal

Final Data List									
NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBµV/m]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	690.1807	-5.21	45.22	40.01	46.00	5.99	160	127.1	Horizontal
2	702.3178	-5.03	44.10	39.07	46.00	6.93	140	137.8	Horizontal

Remark: Factor = Cable loss + Antenna factor – Pre-amplifier; Level = Reading + Factor; Margin = Limit – Level



Antenna polarity: V



Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	147.4875	-19.00	41.06	22.06	43.50	21.44	100	346	Vertical
2	221.2813	-14.53	37.89	23.36	46.00	22.64	100	286	Vertical
3	269.8298	-13.66	43.64	29.98	46.00	16.02	100	120	Vertical
4	330.0300	-11.59	41.16	29.57	46.00	16.43	100	124	Vertical
5	442.6627	-9.31	42.17	32.86	46.00	13.14	100	151	Vertical
6	678.6086	-4.84	43.82	38.98	46.00	7.02	100	108	Vertical

Remark: Factor = Cable loss + Antenna factor – Pre-amplifier; Level = Reading + Factor; Margin = Limit – Level

Harmonics and Spurious Emissions

Frequency Range (9kHz-30MHz)

Frequency (MHz)	Level@3m (dBµV/m)	Limit@3m (dBµV/m)
--	--	--
--	--	--
--	--	--
--	--	--

Note: 1. Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor.

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement.



Above 1 GHz Test Results:

CH Low (2403MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2403	107.89	-5.84	102.05	114	-11.95	peak
2403	87.18	-5.84	81.34	94	-12.66	AVG
4806	58.25	-3.64	54.61	74	-19.39	peak
4806	47.76	-3.64	44.12	54	-9.88	AVG
7209	54.84	-0.95	53.89	74	-20.11	peak
7209	42.18	-0.95	41.23	54	-12.77	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
2403	110.41	-5.84	104.57	114	-9.43	peak
2403	83.81	-5.84	77.97	94	-16.03	AVG
4806	56.08	-3.64	52.44	74	-21.56	peak
4806	45.35	-3.64	41.71	54	-12.29	AVG
7209	54.03	-0.95	53.08	74	-20.92	peak
7209	41.98	-0.95	41.03	54	-12.97	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



CH Middle (2439MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2439	107.31	-5.71	101.6	114	-12.4	peak
2439	80.42	-5.71	74.71	94	-19.29	AVG
4878	55.27	-3.51	51.76	74	-22.24	peak
4878	46.44	-3.51	42.93	54	-11.07	AVG
7317	56.13	-0.82	55.31	74	-18.69	peak
7317	41.57	-0.82	40.75	54	-13.25	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
2439	103.72	-5.71	98.01	114	-15.99	peak
2439	84.21	-5.71	78.5	94	-15.5	AVG
4878	55.79	-3.51	52.28	74	-21.72	peak
4878	46.96	-3.51	43.45	54	-10.55	AVG
7317	55.41	-0.82	54.59	74	-19.41	peak
7317	42.04	-0.82	41.22	54	-12.78	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



CH High (2478MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2478	105.39	-5.65	99.74	114	-14.26	peak
2478	82.42	-5.65	76.77	94	-17.23	AVG
4956	54.32	-3.43	50.89	74	-23.11	peak
4956	44.67	-3.43	41.24	54	-12.76	AVG
7434	55.41	-0.75	54.66	74	-19.34	peak
7434	41.29	-0.75	40.54	54	-13.46	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
2478	105.93	-5.65	100.28	114	-13.72	peak
2478	81.96	-5.65	76.31	94	-17.69	AVG
4956	55.44	-3.43	52.01	74	-21.99	peak
4956	45.29	-3.43	41.86	54	-12.14	AVG
7434	55.27	-0.75	54.52	74	-19.48	peak
7434	39.33	-0.75	38.58	54	-15.42	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) The emissions are attenuated more than 20dB below the permissible limits are not record in the report.
- (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

Radiated Band Edge Test:

Operation Mode: TX CH Low (2403MHz)

Horizontal (Worst case)

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
2310	57.63	-5.81	51.82	74	-22.18	peak
2310	/	-5.81	/	54	/	AVG
2390	55.19	-5.84	49.35	74	-24.65	peak
2390	/	-5.84	/	54	/	AVG
2400	54.33	-5.84	48.49	74	-25.51	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
2310	56.49	-5.81	50.68	74	-23.32	peak
2310	/	-5.81	/	54	/	AVG
2390	54.76	-5.84	48.92	74	-25.08	peak
2390	/	-5.84	/	54	/	AVG
2400	54.28	-5.84	48.44	74	-25.56	peak
2400	/	-5.84	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High (2478MHz)
Horizontal (Worst case)

Frequency (MHz)	Reading Result (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
2483.50	56.81	-5.65	51.16	74	-22.84	peak
2483.50	/	-5.65	/	54	/	AVG
2500.00	54.69	-5.65	49.04	74	-24.96	peak
2500.00	/	-5.65	/	54	/	AVG
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
2483.50	56.77	-5.65	51.12	74	-22.88	peak
2483.50	/	-5.65	/	54	/	AVG
2500.00	54.25	-5.65	48.6	74	-25.4	peak
2500.00	/	-5.65	/	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= 39KHz. VBW= 120 KHz, Span=8MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector.

6.3 Measurement Equipment Used

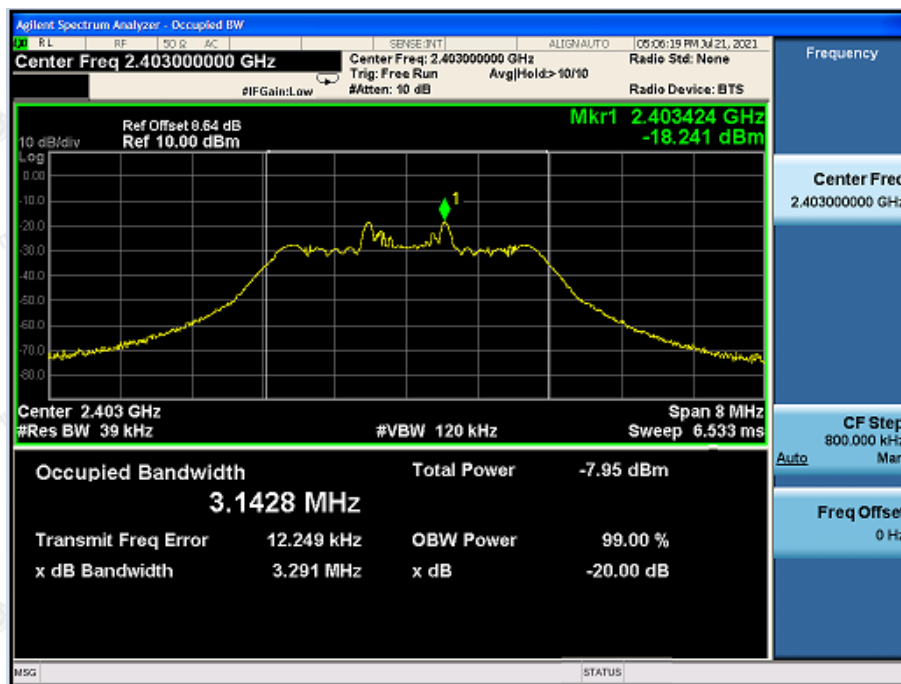
Same as Radiated Emission Measurement

6.4 Test Result

PASS

Frequency	20dB Bandwidth (MHz)	Result
2403 MHz	3.291	PASS
2439 MHz	3.505	PASS
2478 MHz	3.339	PASS

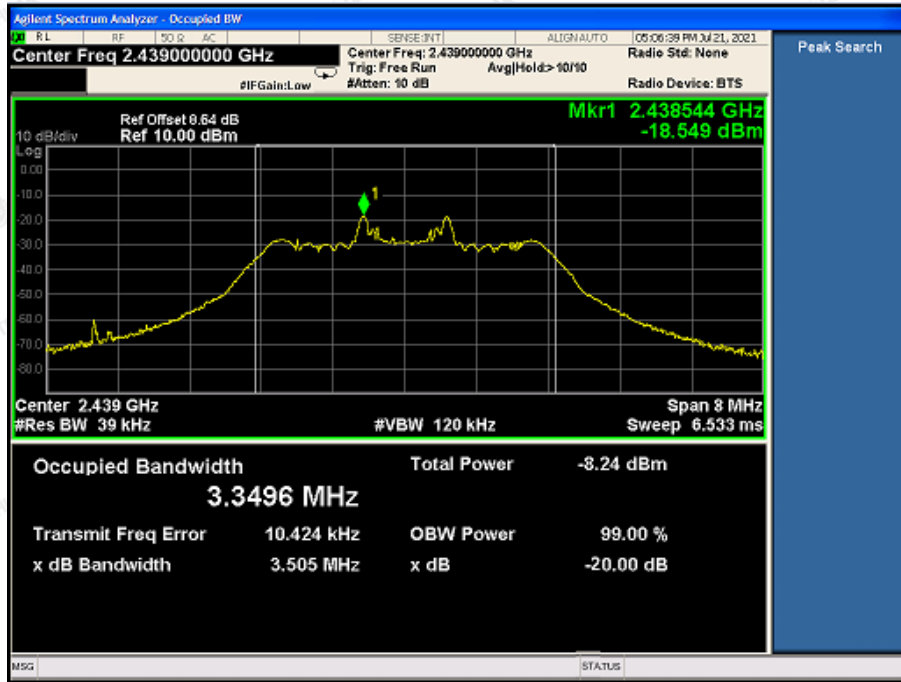
CH: 2403MHz



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.



CH: 2439MHz



CH: 2478MHz



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

7. ANTENNA REQUIREMENT

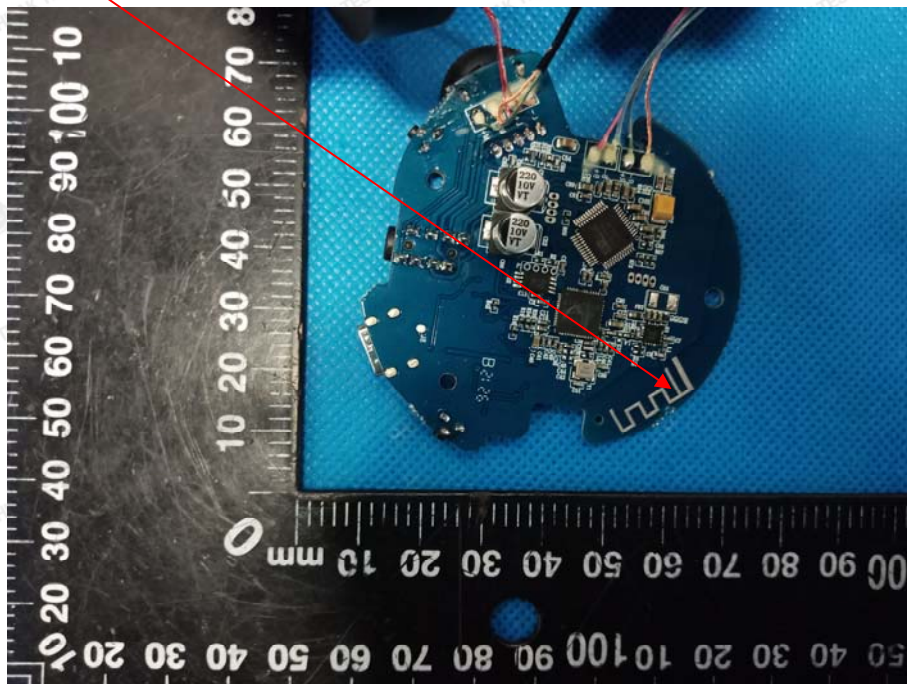
Standard Applicable

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, which permanently attached. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 0dBi.

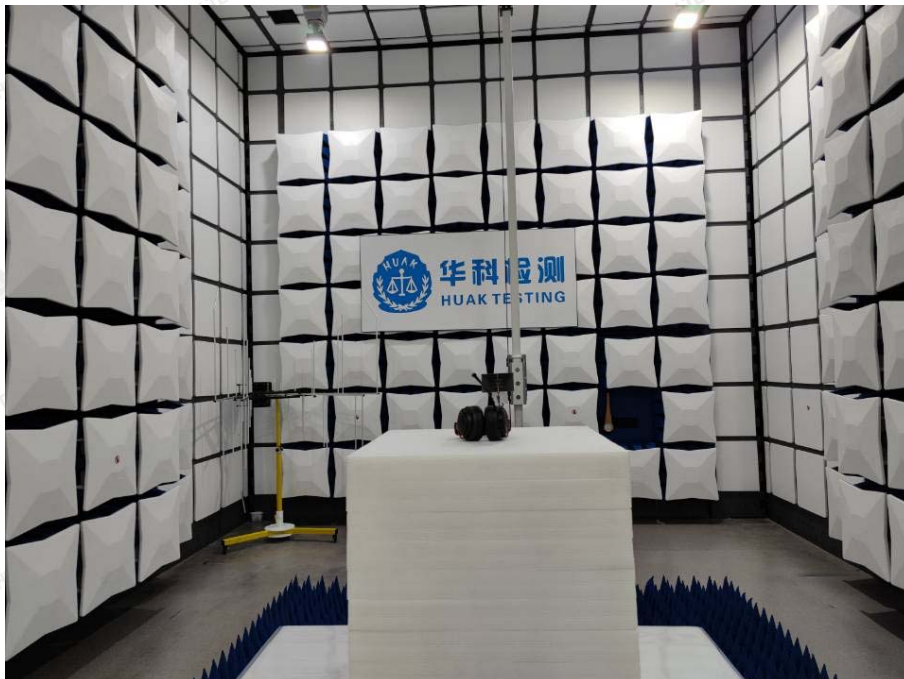
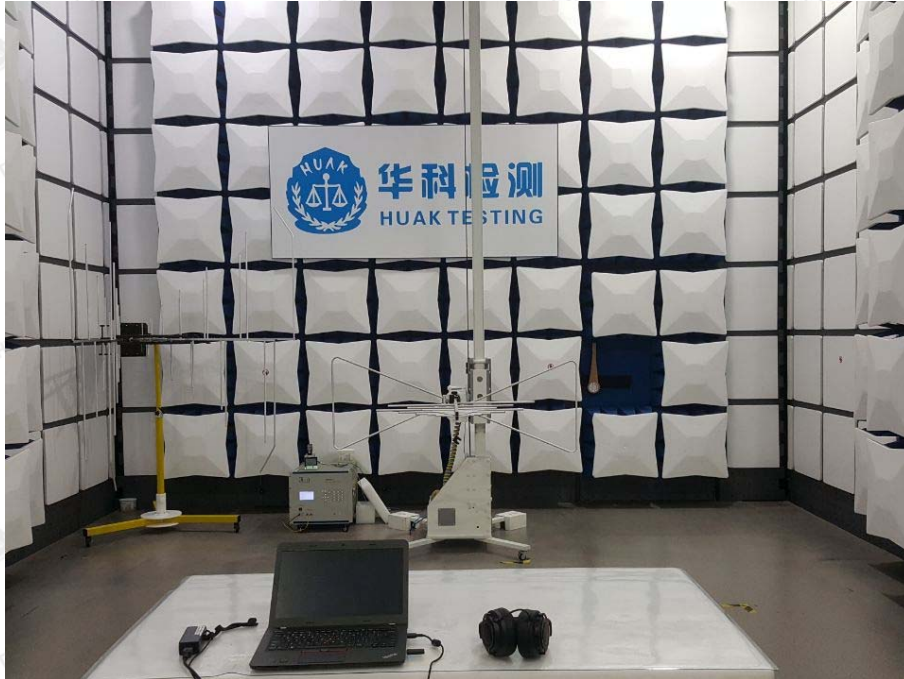
ANTENNA





8. PHOTOGRAPH OF TEST

Radiated Emission



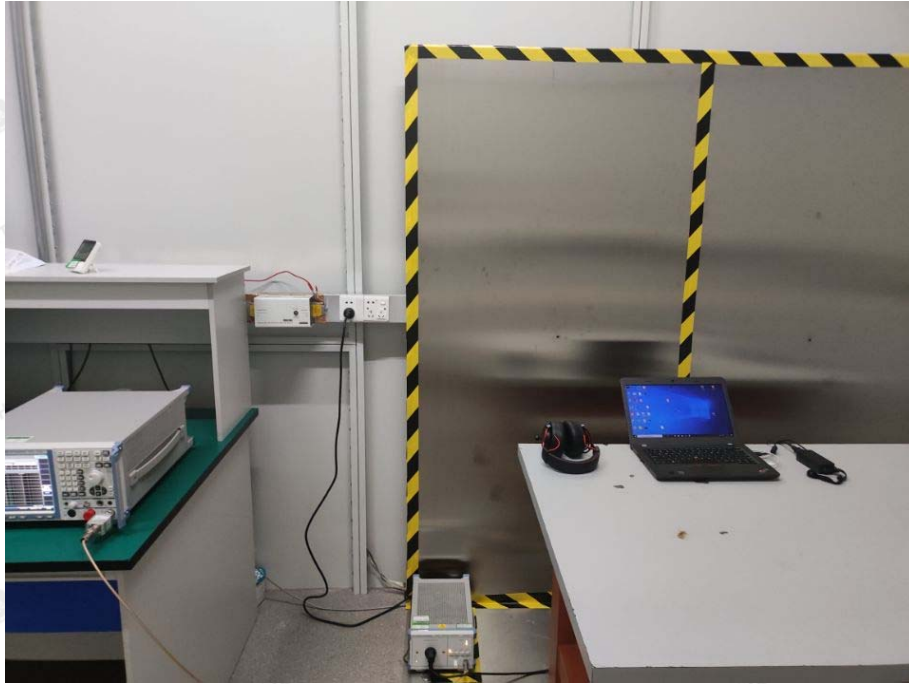
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



Conducted Emission



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



9. PHOTOS OF THE EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos.

-----End of test report-----

