



FCC TEST REPORT

**Test report
On Behalf of
Feifan Innovation E-commerce (Shenzhen) Co.,Ltd.**

For

USB Wireless Speakerphone

**Model No.: AIRHUG 08, AIRHUG 06, AIRHUG 14, AIRHUG 28,
AIRHUG 29, AIRHUG 30, AIRHUG 31, AIRHUG 32, AIRHUG 33,
AIRHUG 34**

FCC ID: 2A4BG-AIRHUG08

Prepared For : Feifan Innovation E-commerce (Shenzhen) Co.,Ltd.
**602,Complex Building No.3 of Baoyunda Logistics Center,Fuhua
community,Xixiang Street,Baoan District,Shenzhen, China**

Prepared By : Shenzhen HUAK Testing Technology Co., Ltd.
**1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping,
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Date of Test: Feb. 12, 2023 ~ Feb. 22, 2023

Date of Report: Feb. 22, 2023

Report Number: HK2211155118-E



TEST RESULT CERTIFICATION

Applicant's name : Feifan Innovation E-commerce (Shenzhen) Co.,Ltd.
Address : 602,Complex Building No.3 of Baoyunda Logistics Center,Fuhua community,Xixiang Street,Baoan District,Shenzhen, China
Manufacture's Name : Shenzhen Innotrik Technology Co., Ltd.
Address : Room 1302-1307, Building No.13, Qinchengda Paradise, District 22, Lingzhiyuan Community, Xin'an Street, Bao'an District, Shenzhen, China

Product description

Trade Mark: AIRHUG
Product name : USB Wireless Speakerphone
Model and/or type reference : AIRHUG 08, AIRHUG 06, AIRHUG 14, AIRHUG 28, AIRHUG 29, AIRHUG 30, AIRHUG 31, AIRHUG 32, AIRHUG 33, AIRHUG 34
Standards : ANSI C63.10: 2013

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Date of Test :
Date (s) of performance of tests : Feb. 12, 2023 ~ Feb. 22, 2023
Date of Issue : Feb. 22, 2023
Test Result : Pass

Testing Engineer : [Signature]
(Gary Qian)

Technical Manager : [Signature]
(Eden Hu)

Authorized Signatory : [Signature]
(Jason Zhou)



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**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Feb. 22, 2023	Jason Zhou

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Address: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, 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. Information of the Test Laboratory

Shenzhen HUAK Testing Technology Co., Ltd.

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

Testing Laboratory Authorization:

A2LA Accreditation Code is 4781.01.

FCC Designation Number is CN1229.

Canada IC CAB identifier is CN0045.

CNAS Registration Number is L9589.

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:	USB Wireless Speakerphone
Model Name:	AIRHUG 08
Series Model:	AIRHUG 06, AIRHUG 14, AIRHUG 28, AIRHUG 29, AIRHUG 30, AIRHUG 31, AIRHUG 32, AIRHUG 33, AIRHUG 34
Model Difference:	All model's the function, software and electric circuit are the same, only with a product model named different. Test sample model: AIRHUG 08.
FCC ID:	2A4BG-AIRHUG08
Antenna Type:	PCB Antenna
Antenna Gain:	2.61dBi
Operation frequency:	2408-2476MHz
Number of Channels:	18CH
Modulation Type:	GFSK
Power Source:	DC 5V from Adapter or DC 3.7V from battery
Power Rating:	DC 5V from Adapter or DC 3.7V from battery



2.1.1. Carrier Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2408	8	2436	15	2464
2	2412	9	2440	16	2468
3	2416	10	2444	17	2472
4	2420	11	2448	18	2476
5	2424	12	2452		
6	2428	13	2456		
7	2432	14	2460		

2.2. Operation of EUT During Testing

Operating Mode

The mode is used: **Transmitting mode**

Low Channel: 2408MHz

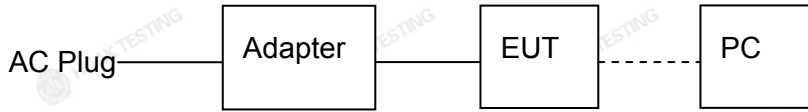
Middle Channel: 2440MHz

High Channel: 2476MHz



2.3. Description of Test Setup

Operation of EUT during conducted and under 1GHz radiation testing:



Operation of EUT Above 1GHz Radiation testing:



Adapter information

Model: HW-059200CHQ

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

Output: 5VDC, 2A

PC information

Model: TP00067A

Input: DC20V, 2.25-3.25A

Output: 5VDC, 0.5A

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****2022 Equipment calibration 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	Feb. 18, 2022	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Feb. 18, 2022	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 18, 2022	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Feb. 18, 2022	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 18, 2022	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Feb. 18, 2022	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Feb. 18, 2022	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Feb. 18, 2022	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Feb. 18, 2022	1 Year
10.	Horn Antenna	Schwarzbeck	9120D	HKE-013	Feb. 18, 2022	1 Year
11.	Pre-amplifier	EMCI	EMC051845S E	HKE-015	Feb. 18, 2022	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Feb. 18, 2022	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	Feb. 18, 2022	1 Year
15.	Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 18, 2022	1 Year
16.	Signal generator	Agilent	N5182A	HKE-029	Feb. 18, 2022	1 Year
17.	Signal Generator	Agilent	83630A	HKE-028	Feb. 18, 2022	1 Year
18.	Shielded room	Shiel Hong	4*3*3	HKE-039	Feb. 18, 2022	3 Year
19.	Hight gain antenna	Schwarzbeck	LB-180400KF	HKE-054	Feb. 18, 2022	1 Year



2023 Equipment calibration 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	Feb. 17, 2023	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Feb. 17, 2023	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Feb. 17, 2023	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Feb. 17, 2023	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Feb. 17, 2023	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Feb. 17, 2023	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Feb. 17, 2023	1 Year
10.	Horn Antenna	Schwarzbeck	9120D	HKE-013	Feb. 17, 2023	1 Year
11.	Pre-amplifier	EMCI	EMC051845S E	HKE-015	Feb. 17, 2023	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Feb. 17, 2023	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	Feb. 17, 2023	1 Year
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3. CONDUCTED EMISSIONS TEST

3.1. Conducted Power Line Emission Limit

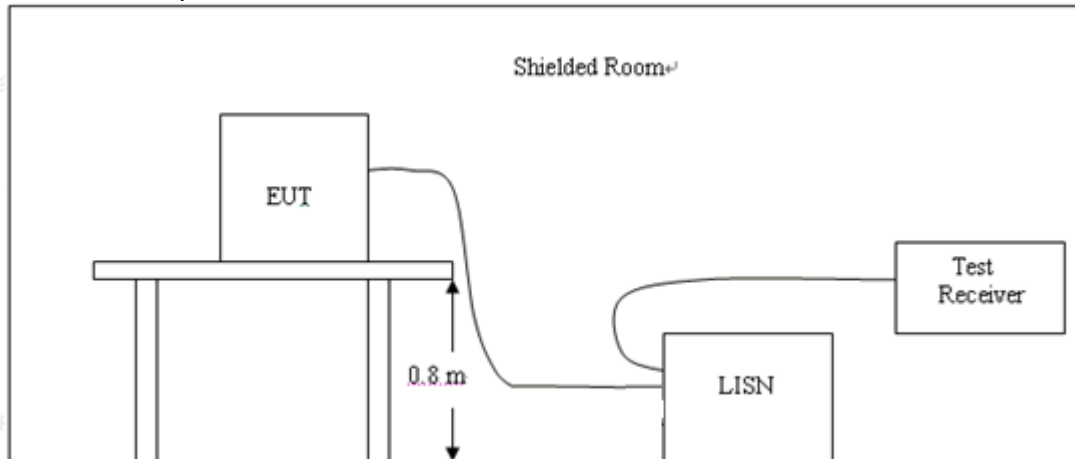
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following.

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

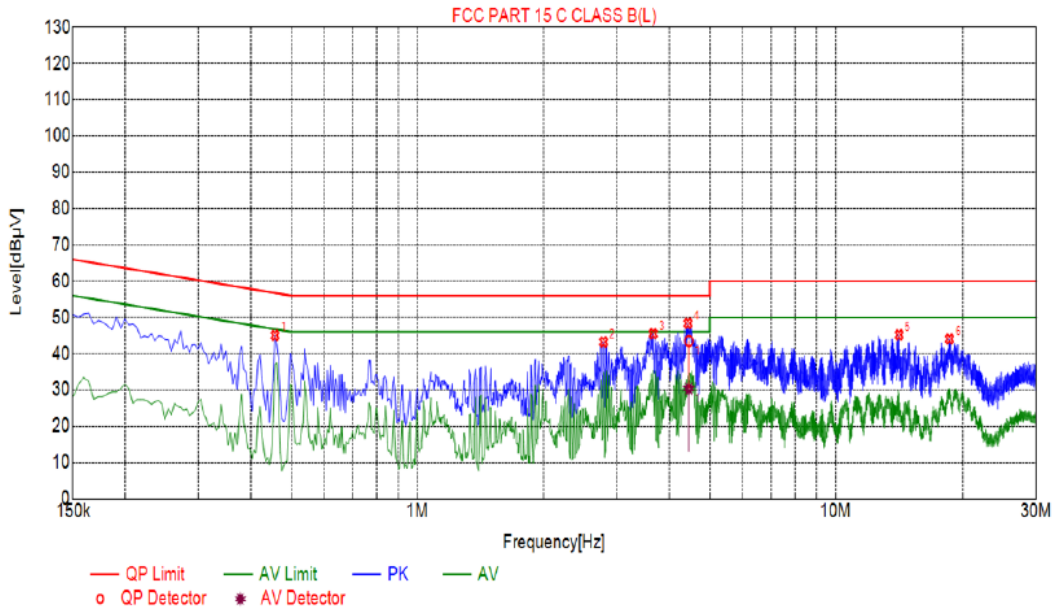
1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
2. Support equipment, if needed, was placed as per ANSI 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

Remark: All modes of GFSK test at Low, Middle, and High channel; 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	0.4560	45.03	20.04	56.77	11.74	24.99	PK	L
2	2.7870	43.23	20.21	56.00	12.77	23.02	PK	L
3	3.6645	45.49	20.25	56.00	10.51	25.24	PK	L
4	4.4340	48.37	20.25	56.00	7.63	28.12	PK	L
5	14.0820	45.18	19.96	60.00	14.82	25.22	PK	L
6	18.6045	44.05	20.05	60.00	15.95	24.00	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	4.4566	20.25	43.49	56.00	12.51	23.24	30.33	46.00	15.67	10.08	L

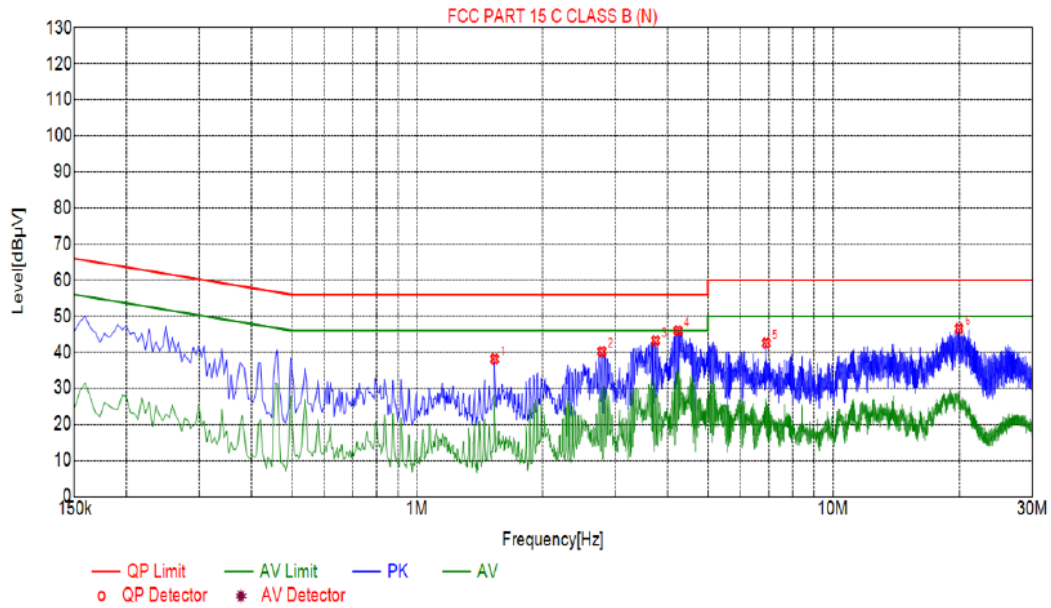
Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor



Test Specification: Neutral



Suspected List								
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Type
1	1.5360	38.10	20.11	56.00	17.90	17.99	PK	N
2	2.7825	40.17	20.21	56.00	15.83	19.96	PK	N
3	3.7455	43.23	20.25	56.00	12.77	22.98	PK	N
4	4.2405	45.97	20.25	56.00	10.03	25.72	PK	N
5	6.9135	42.53	20.20	60.00	17.47	22.33	PK	N
6	19.9770	46.56	20.10	60.00	13.44	26.46	PK	N

Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor

4. RADIATED EMISSION TEST

4.1. Radiation Limit

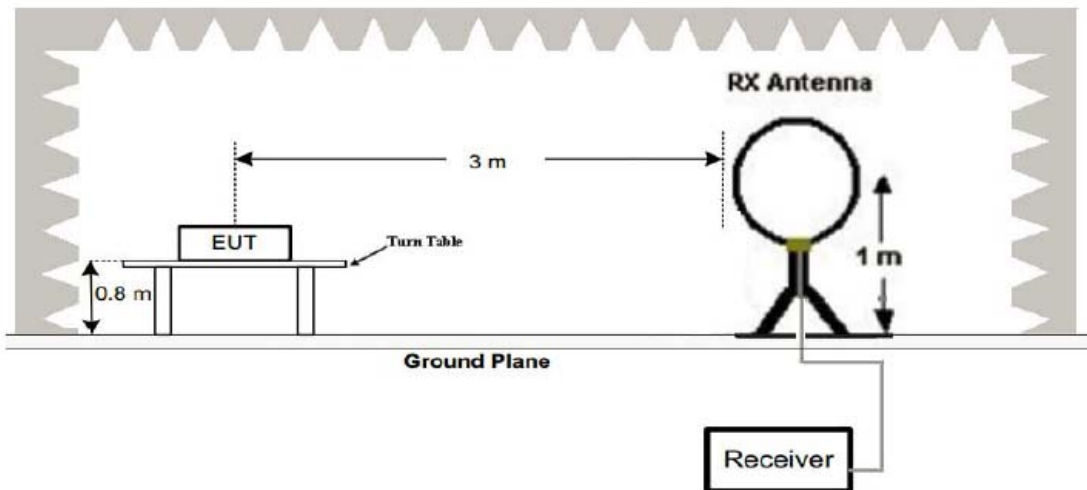
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

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

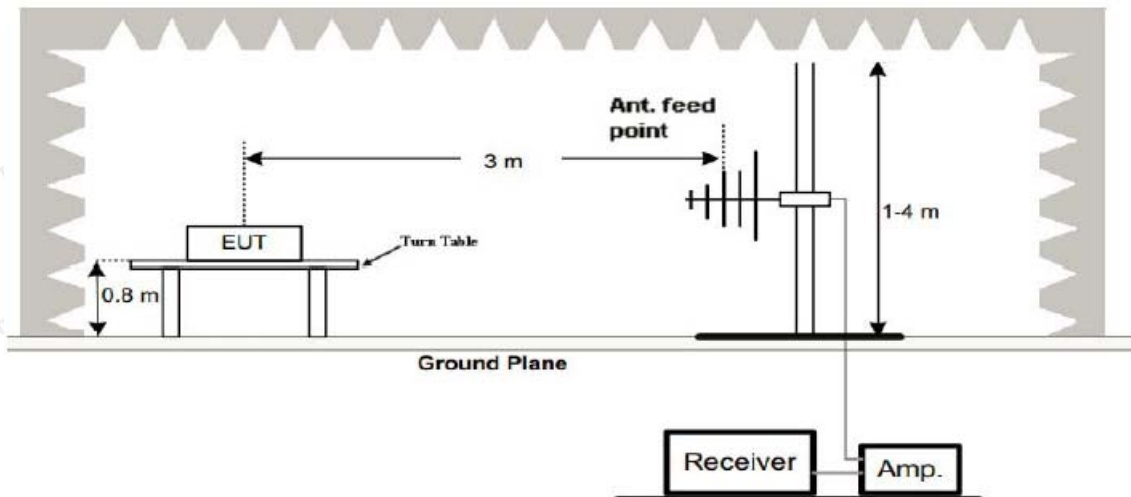
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2. Test Setup

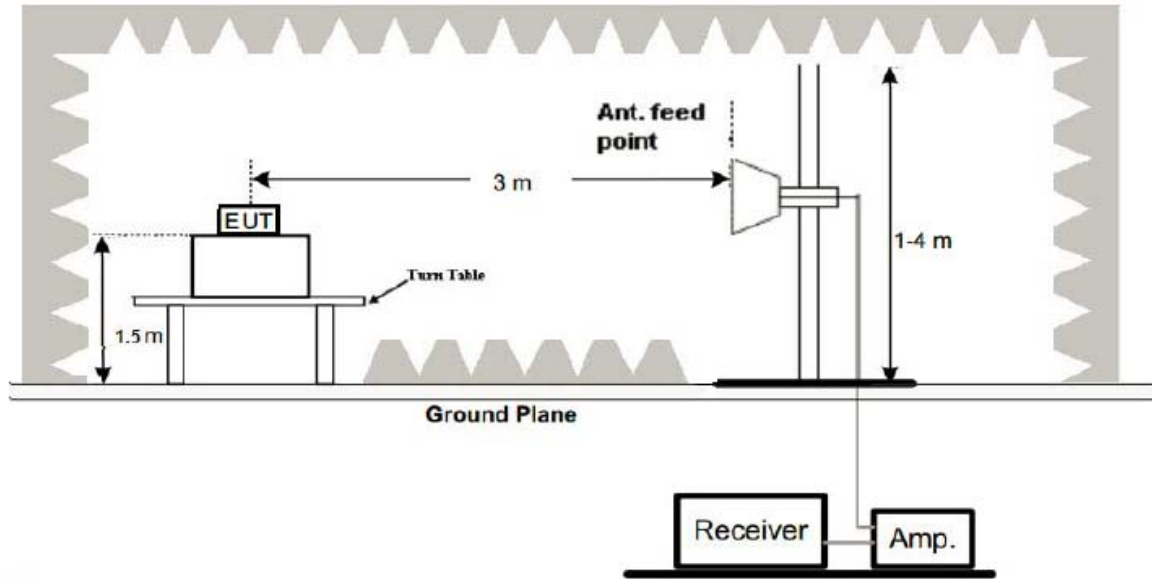
(1) Radiated Emission Test-Up Frequency Below 30MHz



(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 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

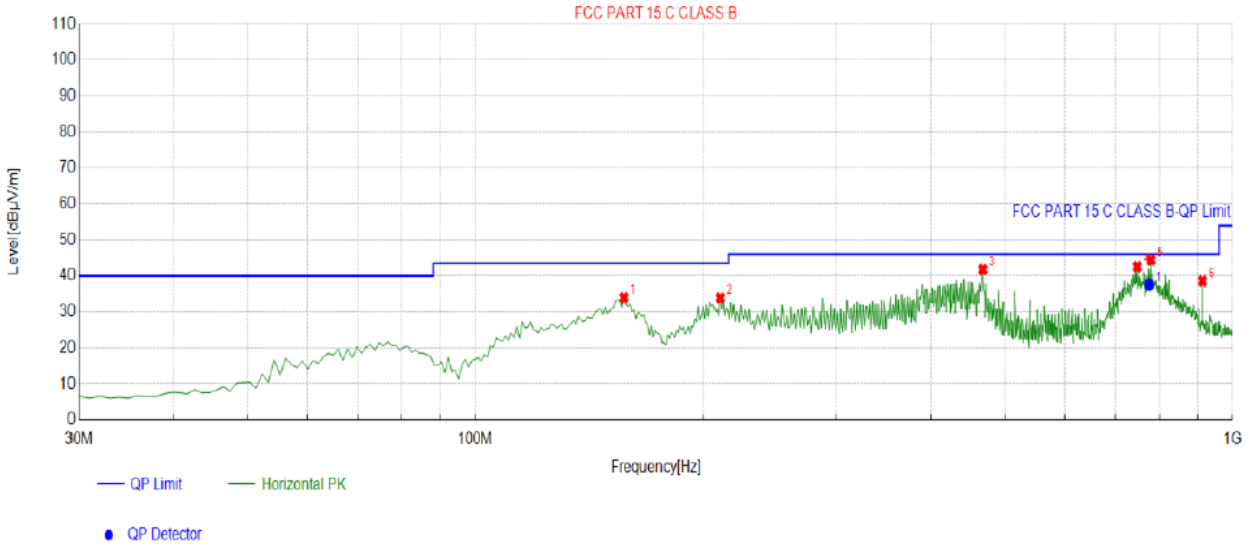
PASS

All the test modes completed for test. The worst case of Radiated Emission is CH 01(DC 12V); the test data of this mode was reported.



Below 1GHz Test Results:

Antenna polarity: H



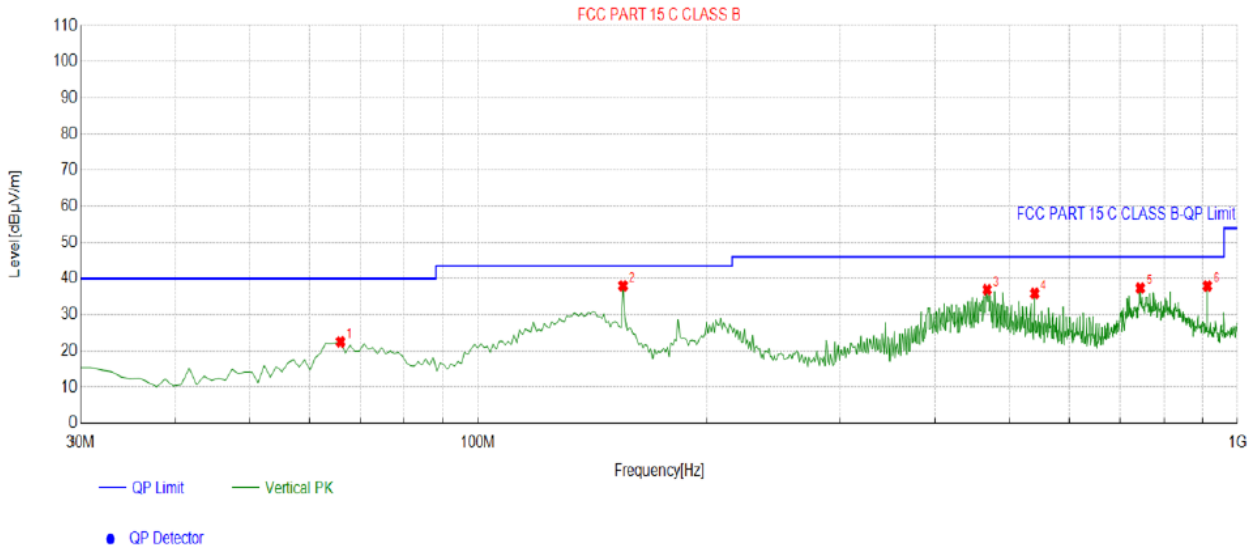
Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	157.1972	-18.07	52.03	33.96	43.50	9.54	100	296	Horizontal
2	210.6006	-14.58	48.51	33.93	43.50	9.57	100	15	Horizontal
3	467.9079	-8.11	49.87	41.76	46.00	4.24	100	338	Horizontal
4	748.5185	-2.95	45.48	42.53	46.00	3.47	100	214	Horizontal
5	780.5606	-2.34	46.71	44.37	46.00	1.63	100	349	Horizontal
6	912.6126	-0.68	39.28	38.60	46.00	7.40	100	26	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	775.9520	-2.34	39.87	37.53	46.00	8.47	200	0.3	Horizontal

Remark: Factor = Cable loss + Antenna factor – Preamplifier; 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	65.9259	-15.14	37.71	22.57	40.00	17.43	100	120	Vertical
2	155.2553	-18.45	56.51	38.06	43.50	5.44	100	226	Vertical
3	467.9079	-8.11	45.09	36.98	46.00	9.02	100	106	Vertical
4	540.7307	-6.51	42.42	35.91	46.00	10.09	100	213	Vertical
5	744.6346	-2.93	40.32	37.39	46.00	8.61	100	239	Vertical
6	912.6126	-0.68	38.69	38.01	46.00	7.99	100	359	Vertical

Remark: Factor = Cable loss + Antenna factor – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

Harmonics and Spurious Emissions

Frequency Range (9 kHz-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 (2408MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2408	99.86	-5.84	94.02	114	-19.98	peak
2408	85.25	-5.84	79.41	94	-14.59	AVG
4816	56.13	-3.64	52.49	74	-21.51	peak
4816	42.17	-3.64	38.53	54	-15.47	AVG
7224	53.19	-0.95	52.24	74	-21.76	peak
7224	38.74	-0.95	37.79	54	-16.21	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2408	102.58	-5.84	96.74	114	-17.26	peak
2408	84.37	-5.84	78.53	94	-15.47	AVG
4816	55.03	-3.64	51.39	74	-22.61	peak
4816	43.67	-3.64	40.03	54	-13.97	AVG
7224	54.16	-0.95	53.21	74	-20.79	peak
7224	43.22	-0.95	42.27	54	-11.73	AVG

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



CH Middle (2440MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
2440	103.49	-5.71	97.78	114	-16.22	peak
2440	77.39	-5.71	71.68	94	-22.32	AVG
4880	56.34	-3.51	52.83	74	-21.17	peak
4880	43.15	-3.51	39.64	54	-14.36	AVG
7320	55.02	-0.82	54.2	74	-19.8	peak
7320	40.02	-0.82	39.2	54	-14.8	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
2440	102	-5.71	96.29	114	-17.71	peak
2440	83.46	-5.71	77.75	94	-16.25	AVG
4880	54.16	-3.51	50.65	74	-23.35	peak
4880	45.23	-3.51	41.72	54	-12.28	AVG
7320	52.92	-0.82	52.1	74	-21.9	peak
7320	38.97	-0.82	38.15	54	-15.85	AVG

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



CH High (2476MHz)

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
2476	102.35	-5.65	96.7	114	-17.3	peak
2476	82.49	-5.65	76.84	94	-17.16	AVG
4952	56.12	-3.43	52.69	74	-21.31	peak
4952	43.96	-3.43	40.53	54	-13.47	AVG
7428	54.16	-0.75	53.41	74	-20.59	peak
7428	41.25	-0.75	40.5	54	-13.5	AVG

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

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
2476	101.35	-5.65	95.7	114	-18.3	peak
2476	81.36	-5.65	75.71	94	-18.29	AVG
4952	58.42	-3.43	54.99	74	-19.01	peak
4952	41.02	-3.43	37.59	54	-16.41	AVG
7428	52.76	-0.75	52.01	74	-21.99	peak
7428	38.91	-0.75	38.16	54	-15.84	AVG

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

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 ANSIC63.10 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 1MHz and VBM to 3MHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.



5.3. Test Result

PASS

Radiated Band Edge Test:

Operation Mode: TX CH Low (2408MHz)

Horizontal (Worst case)

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
2310	52.03	-5.81	46.22	74	-27.78	peak
2310	/	-5.81	/	54	/	AVG
2390	51.37	-5.84	45.53	74	-28.47	peak
2390	/	-5.84	/	54	/	AVG
2400	53.19	-5.84	47.35	74	-26.65	peak
2400	/	-5.84	/	54	/	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
2310	52.49	-5.81	46.68	74	-27.32	peak
2310	/	-5.81	/	54	/	AVG
2390	54.62	-5.84	48.78	74	-25.22	peak
2390	/	-5.84	/	54	/	AVG
2400	55.28	-5.84	49.44	74	-24.56	peak
2400	/	-5.84	/	54	/	AVG

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



Operation Mode: TX CH High (2476MHz)

Horizontal (Worst case)

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.50	52.31	-5.65	46.66	74	-27.34	peak
2483.50	/	-5.65	/	54	/	AVG
2500.00	54.17	-5.65	48.52	74	-25.48	peak
2500.00	/	-5.65	/	54	/	AVG

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

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.50	54.02	-5.65	48.37	74	-25.63	peak
2483.50	/	-5.65	/	54	/	AVG
2500.00	54.29	-5.65	48.64	74	-25.36	peak
2500.00	/	-5.65	/	54	/	AVG

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

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Remark:

1. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
2. In restricted bands of operation, the spurious emissions below the permissible value more than 20dB.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



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=43KHz. 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

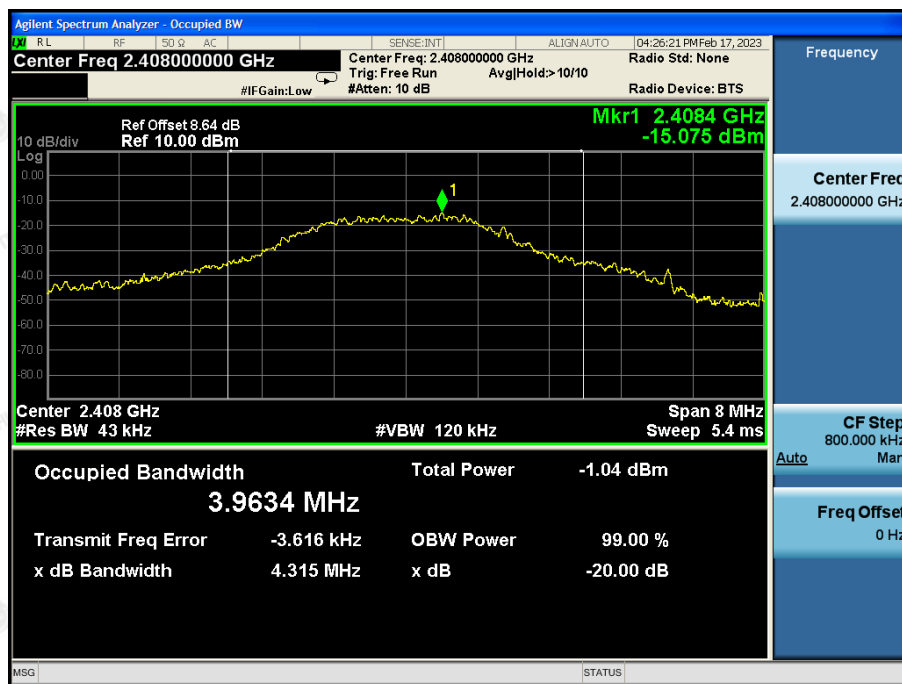
Same as Radiated Emission Measurement

6.4. Test Result

PASS

Frequency	20dB Bandwidth (MHz)	Result
2408 MHz	4.315	PASS
2440 MHz	4.145	PASS
2476 MHz	4.108	PASS

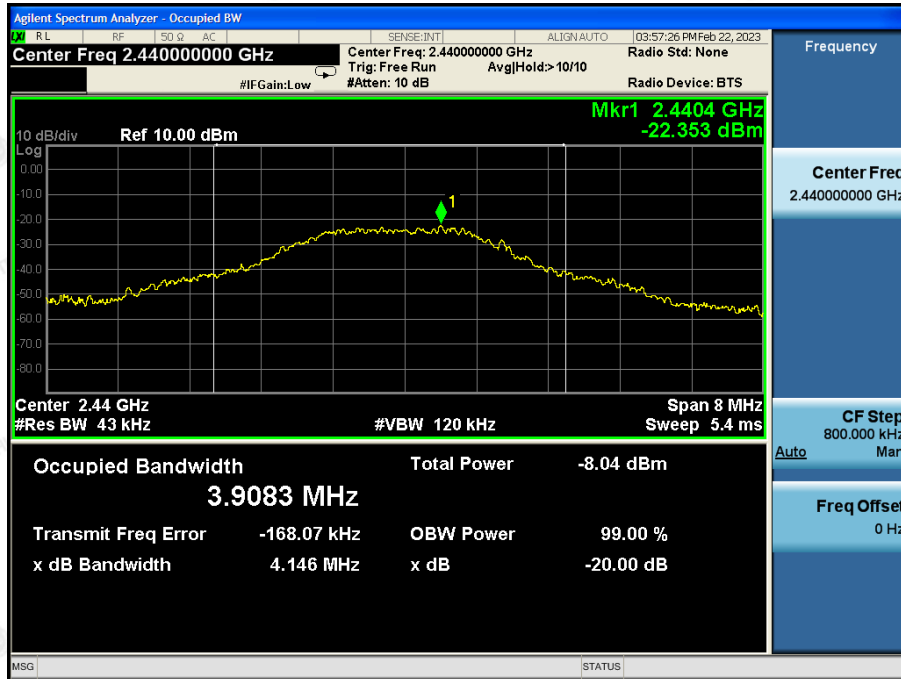
CH: 2408MHz



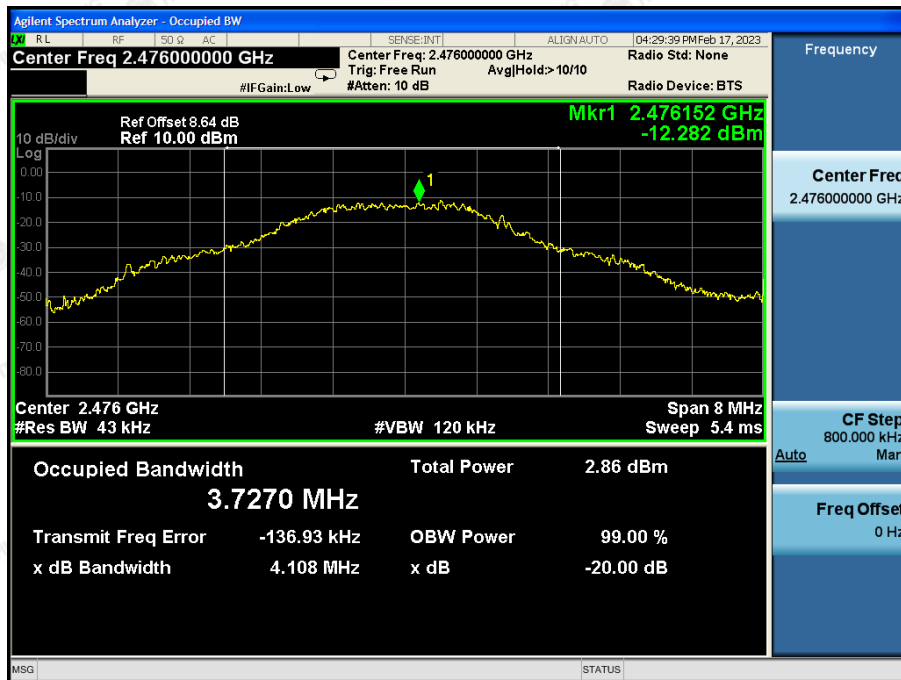
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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



CH: 2440MHz



CH: 2476MHz



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7. ANTENNA REQUIREMENT

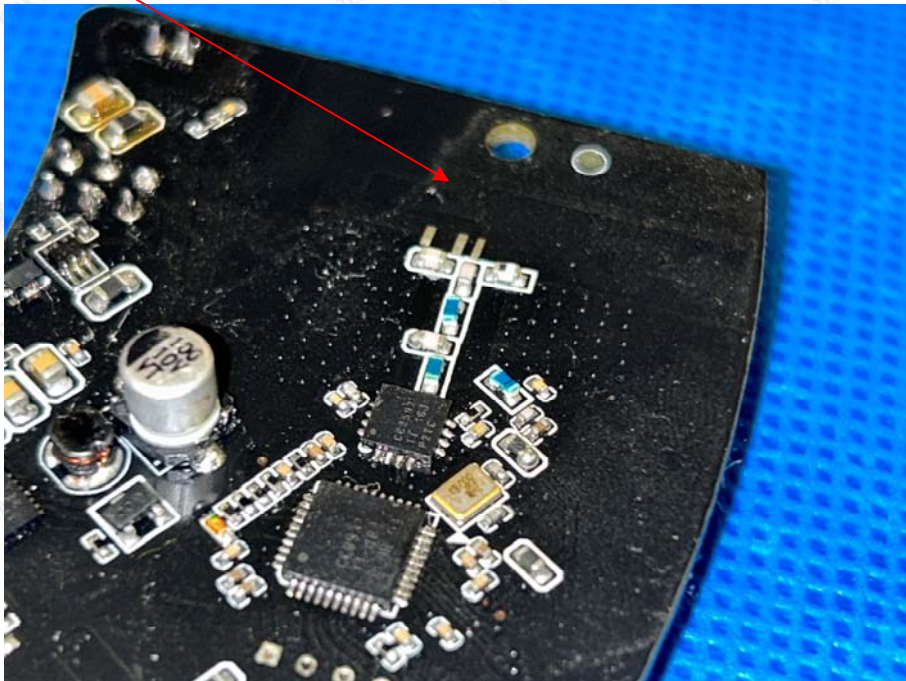
Standard Applicable

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 have non-standard antenna jack. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 2.61dBi.

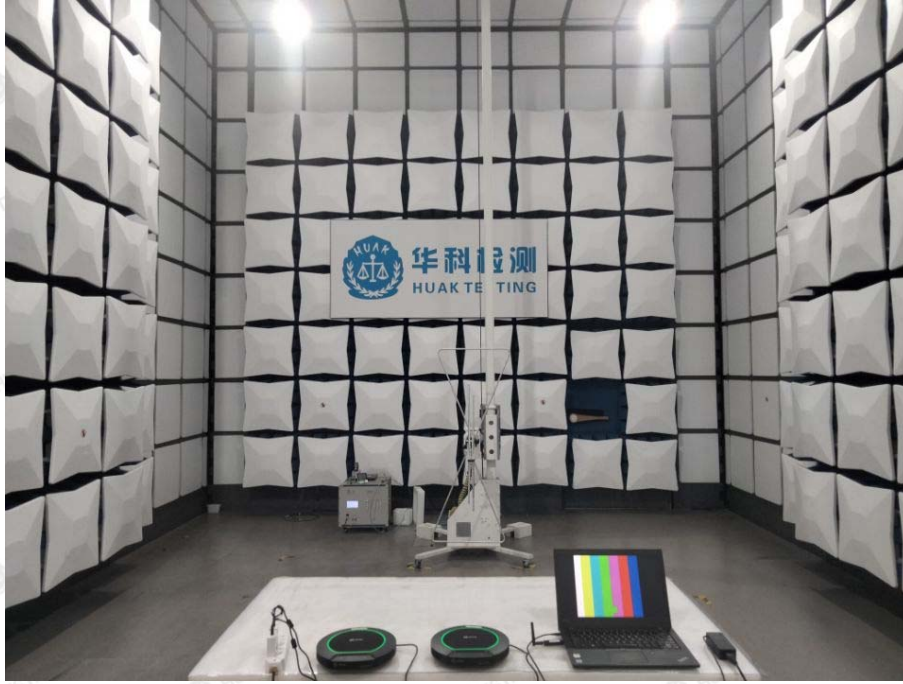
ANTENNA





8. PHOTOGRAPH OF TEST

Radiated Emission



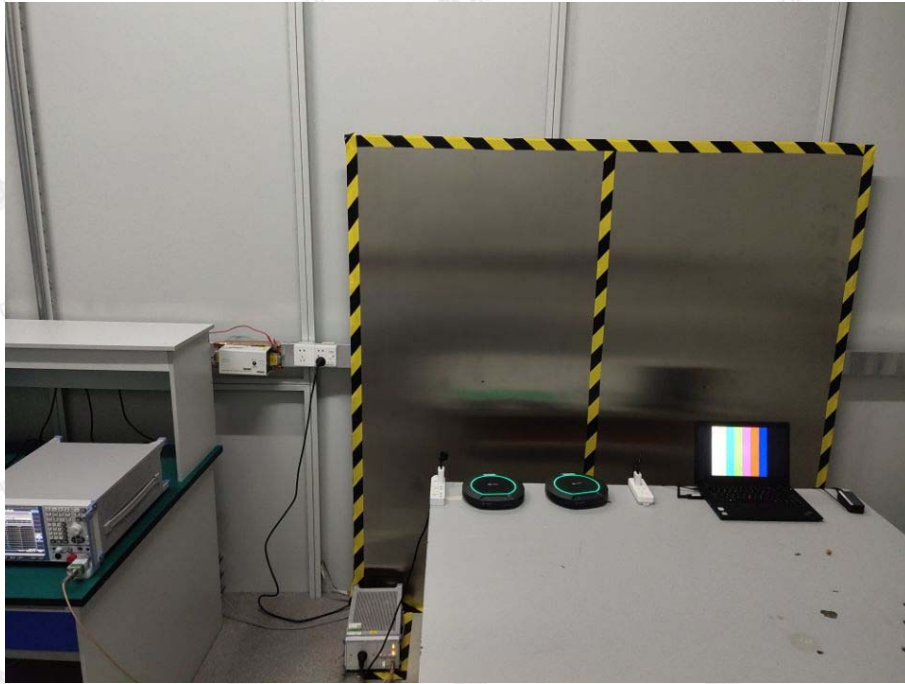
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

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Conducted Emission



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9. PHOTOS OF THE EUT

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

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

QUALIFICATION