

FCC Test Report

**Test report
On Behalf of
CHAMPION GAMES LLC
For
Laser Tag
Model No.: SH-001**

FCC ID: 2BP86-SH-001

**Prepared For : CHAMPION GAMES LLC
1013 CENTRE RD STE 403S Wilmington, Delaware 19805 United States**

**Prepared By : Shenzhen HUAKE 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: Mar. 28, 2025~Apr. 24, 2025

Date of Report: Apr. 24, 2025

Report Number: HK2503281562-E

Test Result Certification

Applicant's name : CHAMPION GAMES LLC
Address : 1013 CENTRE RD STE 403S Wilmington, Delaware 19805
United States
Manufacturer's Name : CHAMPION GAMES LLC
Address : 1013 CENTRE RD STE 403S Wilmington, Delaware 19805
United States

Product description

Trade Mark: N/A
Product name : Laser Tag
Model and/or type reference : SH-001
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 HUAKE Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HUAKE 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.

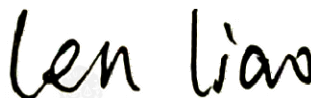
Date of Test.....:

Date (s) of performance of tests : Mar. 28, 2025~Apr. 24, 2025

Date of Issue.....: Apr. 24, 2025

Test Result : **Pass**

Testing Engineer



Len Liao

Technical Manager



Sliver Wan

Authorized Signatory



Jason Zhou



Table of Contents

Page

1 . Test Summary	5
1.1 . Test Procedures and Results	5
1.2 . Information of the Test Laboratory	5
1.3 . Measurement Uncertainty	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 . Description of Support Units	9
2.5 . Measurement Instruments List	10
3 . Conducted Emissions Test	11
3.1. Conducted Power Line Emission Limit	11
3.2. Test Setup	11
3.3. Test Procedure	11
3.4. Test Result	12
4. Radiated Emission Test	14
4.1. Radiation Limit	14
4.2. Test Setup	14
4.3. Test Procedure	15
4.4. Test Result	15
5. Band Edge	21
5.1. Limits	21
5.2. Test Procedure	21
5.3. Test Result	22
6. Occupied Bandwidth Measurement	24
6.1. Test Setup	24
6.2. Test Procedure	24
6.3. Measurement Equipment Used	24
6.4. Test Result	24
7. Antenna Requirement	26
8. Photograph of Test	27
9. Photos of the EUT	29

**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Apr. 24, 2025	Jason Zhou

1. Test Summary

1.1. Test Procedures and Results

DESCRIPTION OF TEST	SECTION NUMBER	RESULT
AC POWER LINE CONDUCTED EMISSION	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 HUAKE 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:	Laser Tag
Model Name:	SH-001
Series Models:	N/A
Model Difference:	N/A
FCC ID:	2BP86-SH-001
Antenna Type:	PCB Antenna
Antenna Gain:	0.8dBi
Operation frequency:	2405-2475MHz
Number of Channels:	71CH
Modulation Type:	GFSK
Power Source:	DC 5V From Charging Stand or DC 3.7V From Battery
Power Rating:	DC 5V From Charging Stand or DC 3.7V From Battery
Note: 1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2. Antenna gain Refer to the antenna specifications. 3. The cable loss data is obtained from the supplier. 4. The test results in the report only apply to the tested sample.	

2.1.1. Carrier Frequency of Channels

Description of Channel:					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405	25	2429	49	2453
2	2406	26	2430	50	2454
3	2407	27	2431	51	2455
4	2408	28	2432	52	2456
5	2409	29	2433	53	2457
6	2410	30	2434	54	2458
7	2411	31	2435	55	2459
8	2412	32	2436	56	2460
9	2413	33	2437	57	2461
10	2414	34	2438	58	2462
11	2415	35	2439	59	2463
12	2416	36	2440	60	2464
13	2417	37	2441	61	2465
14	2418	38	2442	62	2466
15	2419	39	2443	63	2467
16	2420	40	2444	64	2468
17	2421	41	2445	65	2469
18	2422	42	2446	66	2470
19	2423	43	2447	67	2471
20	2424	44	2448	68	2472
21	2425	45	2449	69	2473
22	2426	46	2450	70	2474
23	2427	47	2451	71	2475
24	2428	48	2452		

2.2. Operation of EUT During Testing

Operating Mode

The mode is used: **Transmitting mode**

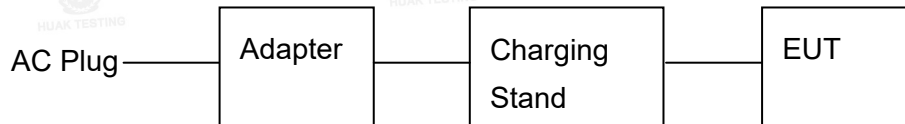
Low Channel: 2405MHz

Middle Channel: 2440MHz

High Channel: 2475MHz

2.3. Description of Test Setup

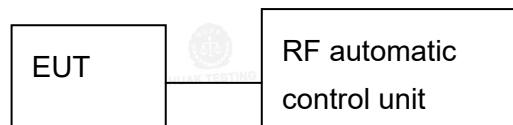
Operation of EUT during AC conducted testing:



Operation of EUT during radiation testing:



Operation of EUT during RF conducted testing:



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. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Trade Mark	Model/Type No.	Specification	Remark
1	Laser Tag	N/A	SH-001	N/A	EUT
2	Charging Stand	N/A	N/A	N/A	Accessory
3	Adapter	N/A	LX12E-050200-AU	Input: 100-240V, 50/60Hz, 0.35A Output: 5V, 2A	Accessory

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. For conducted measurements (Occupied Bandwidth), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

2.5. Measurement Instruments List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	L.I.S.N.	R&S	ENV216	HKE-002	2025/02/19	1 Year
2	L.I.S.N.	R&S	ENV216	HKE-059	2025/02/19	1 Year
3	EMI Test Receiver	R&S	ESR	HKE-005	2025/02/19	1 Year
4	Spectrum analyzer	Agilent	N9020A	HKE-025	2025/02/19	1 Year
5	Spectrum analyzer	R&S	FSV3044	HKE-126	2025/02/19	1 Year
6	Preamplifier	EMCI	EMC051845S	HKE-006	2025/02/19	1 Year
7	Preamplifier	Schwarzbeck	BBV 9743	HKE-016	2025/02/19	1 Year
8	Preamplifier	A.H. Systems	SAS-574	HKE-182	2025/02/19	1 Year
9	6d Attenuator	Pasternack	6db	HKE-184	2025/02/19	1 Year
10	EMI Test Receiver	Rohde & Schwarz	ESR-7	HKE-010	2025/02/19	1 Year
11	Broadband Antenna	Schwarzbeck	VULB9168	HKE-167	2024/02/21	2 Year
12	Loop Antenna	COM-POWER FMZB 1519 012 May 11, 2016 1 Year	AL-130R	HKE-014	2024/02/21	2 Year
13	Horn Antenna	Schwarzbeck	9120D	HKE-013	2024/02/21	2 Year
14	EMI Test Software	Tonscend	JS32-CE 2.5.0.6	HKE-081	/	/
15	EMI Test Software	Tonscend	JS32-RE 5.0.0	HKE-082	/	/
16	RF Automatic control unit	Tonscend	JS0806-2	HKE-060	2025/02/19	1 Year
17	High pass filter unit	Tonscend	JS0806-F	HKE-055	2025/02/19	1 Year
18	Wireless Communication Test Set	R&S	CMU200	HKE-026	2025/02/19	1 Year
19	Wireless Communication Test Set	R&S	CMW500	HKE-027	2025/02/19	1 Year
20	High-low temperature chamber	Guangke	HT-80L	HKE-118	2024/06/10	1 Year
21	Temperature and humidity meter	Boyang	HTC-1	HKE-075	2024/06/10	1 Year
22	RF Test Software	Tonscend	JS1120-3 Version V3.5.39	HKE-083	/	/
23	10dB Attenuator	Schwarzbeck	VTSD9561F	HKE-153	2025/02/19	1 Year
24	RSE Test Software	Tonscend	JS36-RSE 5. 0.0	HKE-184	/	/

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 15 days only. The document is issued by Shenzhen HUAKE Testing Technology Co., Ltd., this document cannot be reproduced except in full with our prior written permission.

3. Conducted Emissions Test

3.1. Conducted Power Line Emission Limit

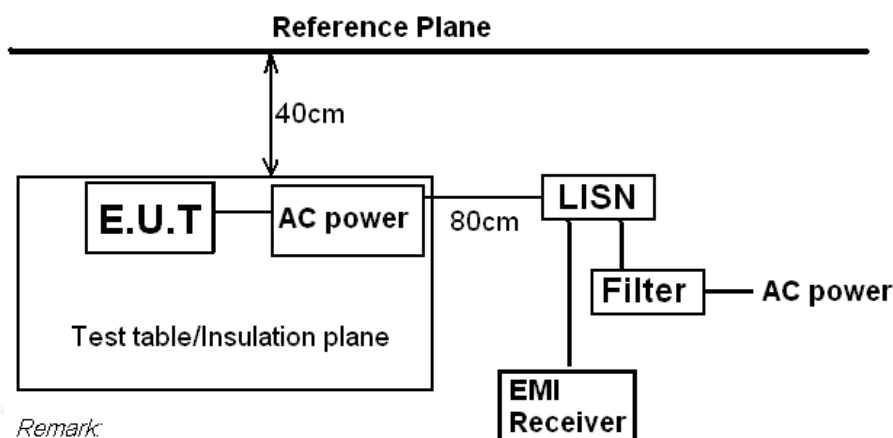
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following.

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



Remark:

E.U.T: Equipment Under Test

LISN: Line Impedance Stabilization Network

Test table height=0.8m

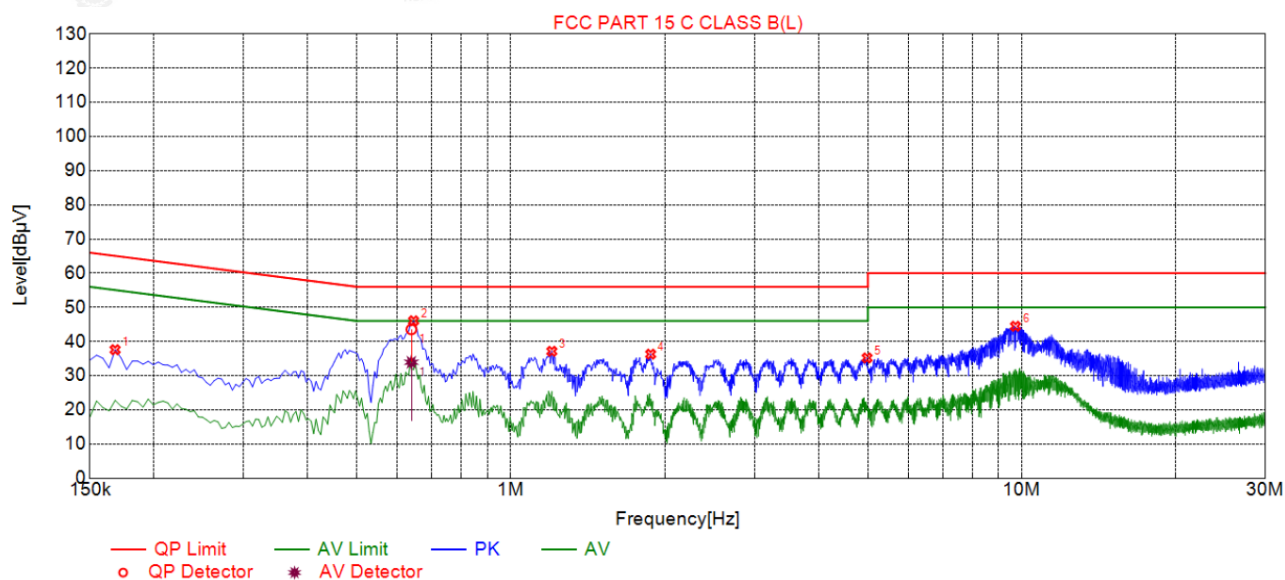
3.3. Test Procedure

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 / keyboard 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 / keyboard 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 / keyboard.
7. Analyzer / keyboard scanned from 150 KHz to 30MHz for emissions in each of the test modes.

3.4. Test Result

Remark: All modes are tested; only the worst result of 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	0.1680	37.60	19.62	65.06	27.46	17.98	PK	L
2	0.6450	46.06	19.71	56.00	9.94	26.35	PK	L
3	1.2030	37.14	19.85	56.00	18.86	17.29	PK	L
4	1.8780	36.30	20.10	56.00	19.70	16.20	PK	L
5	4.9830	35.19	20.39	56.00	20.81	14.80	PK	L
6	9.7260	44.46	21.09	60.00	15.54	23.37	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	0.6386	19.71	43.55	56.00	12.45	23.84	33.93	46.00	12.07	14.22	L

Remark: Margin = Limit – Level

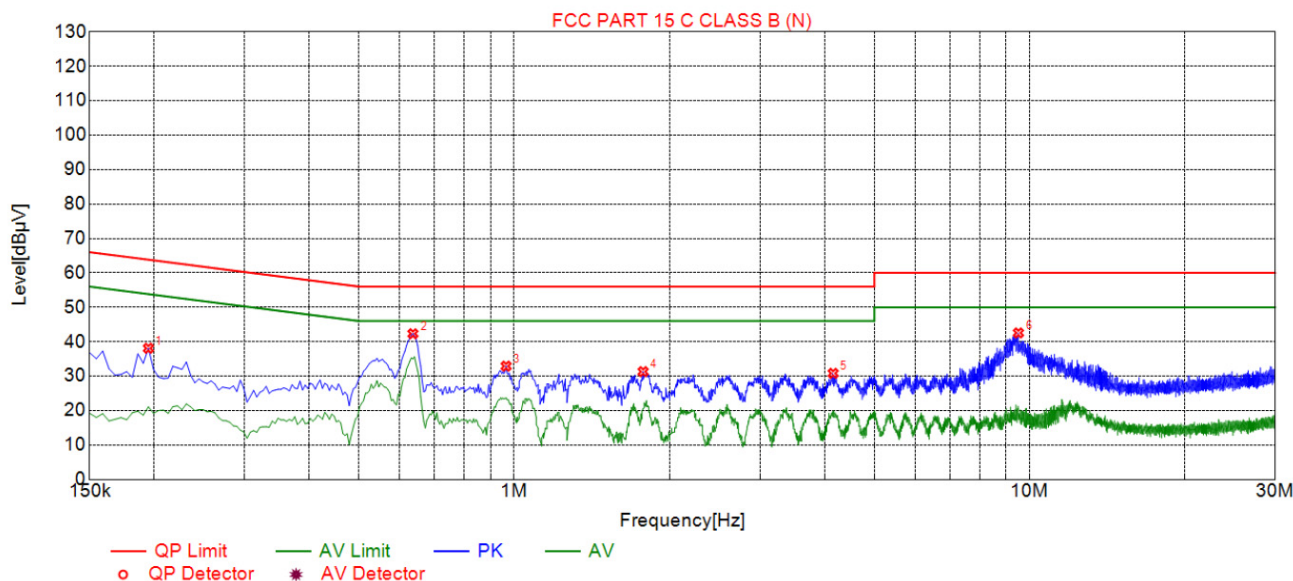
Correction factor = Cable lose + LISN insertion loss

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 15 days only. The document is issued by Shenzhen HUAKE Testing Technology Co., Ltd., this document cannot be reproduced except in full with our prior written permission.

Shenzhen HUAKE Testing Technology Co., Ltd. Tel.: +86-0755-2302 9901 E-mail: info@huak.com Web.: www.huak.com
Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Test Specification: Neutral



Suspected List

NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Reading [dBμV]	Detector	Type
1	0.1950	38.10	19.63	63.82	25.72	18.47	PK	N
2	0.6360	42.32	19.75	56.00	13.68	22.57	PK	N
3	0.9645	32.90	19.76	56.00	23.10	13.14	PK	N
4	1.7790	31.31	19.92	56.00	24.69	11.39	PK	N
5	4.1595	30.82	20.17	56.00	25.18	10.65	PK	N
6	9.5190	42.55	20.89	60.00	17.45	21.66	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

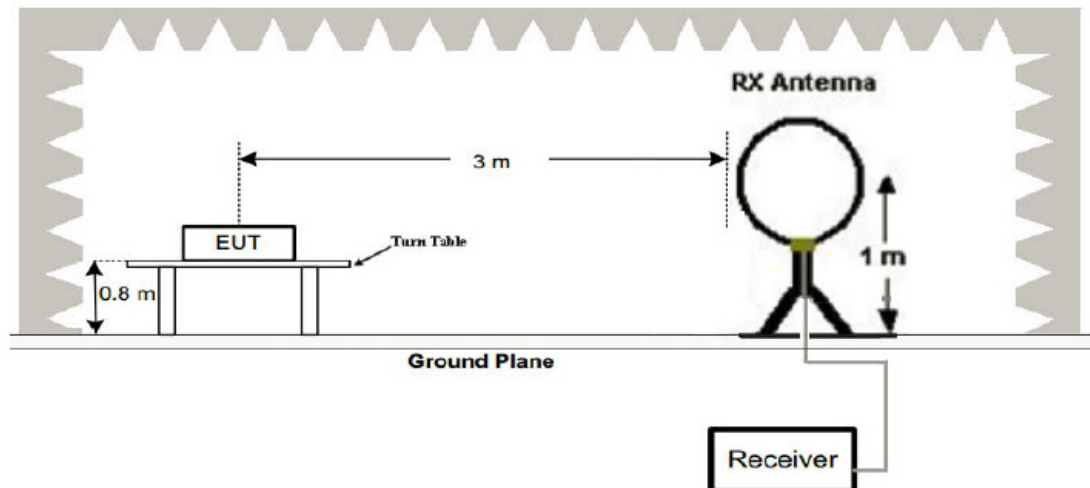
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

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

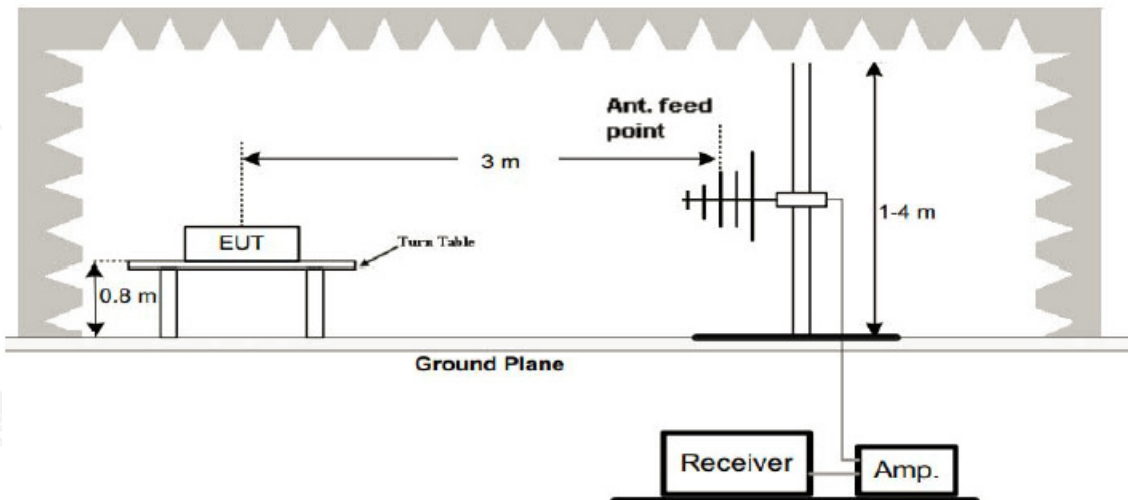
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2. Test Setup

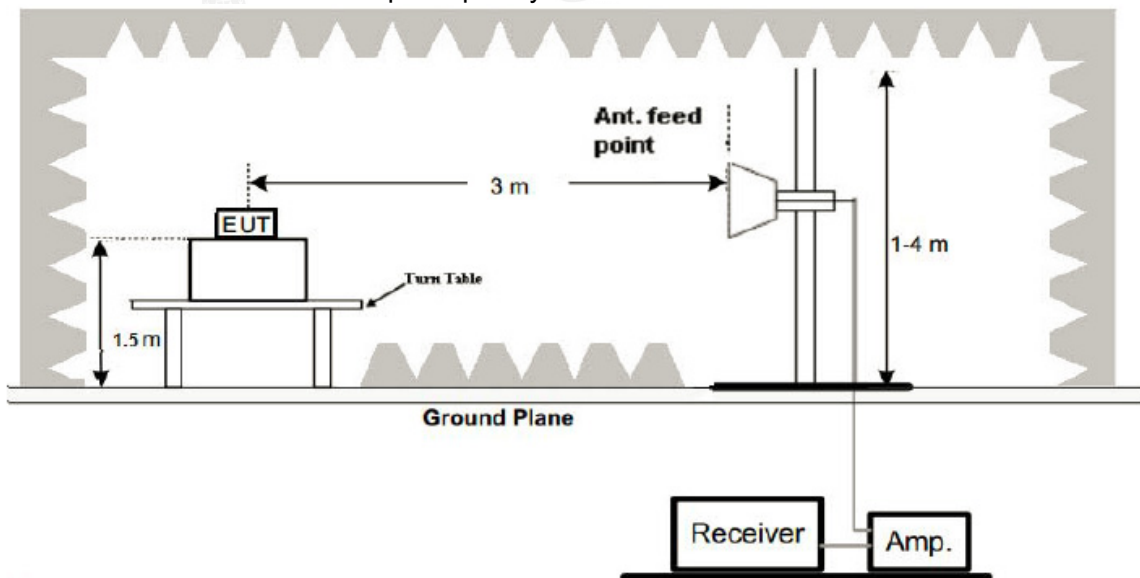
(1) Radiated Emission Test-Up Frequency Below 30MHz



(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.

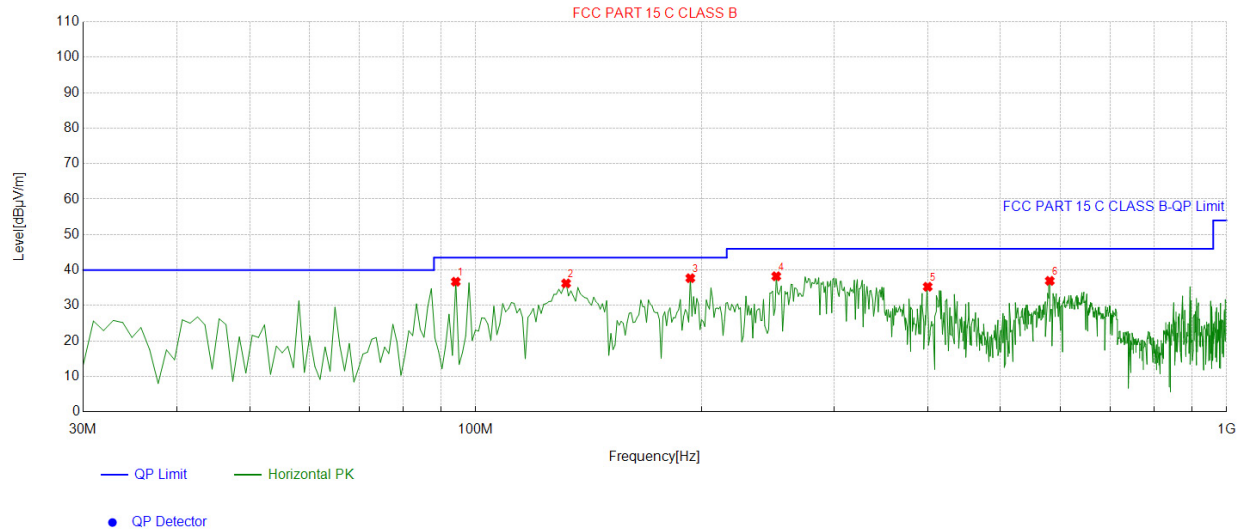
4.4. Test Result

PASS

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

Below 1GHz Test Results:

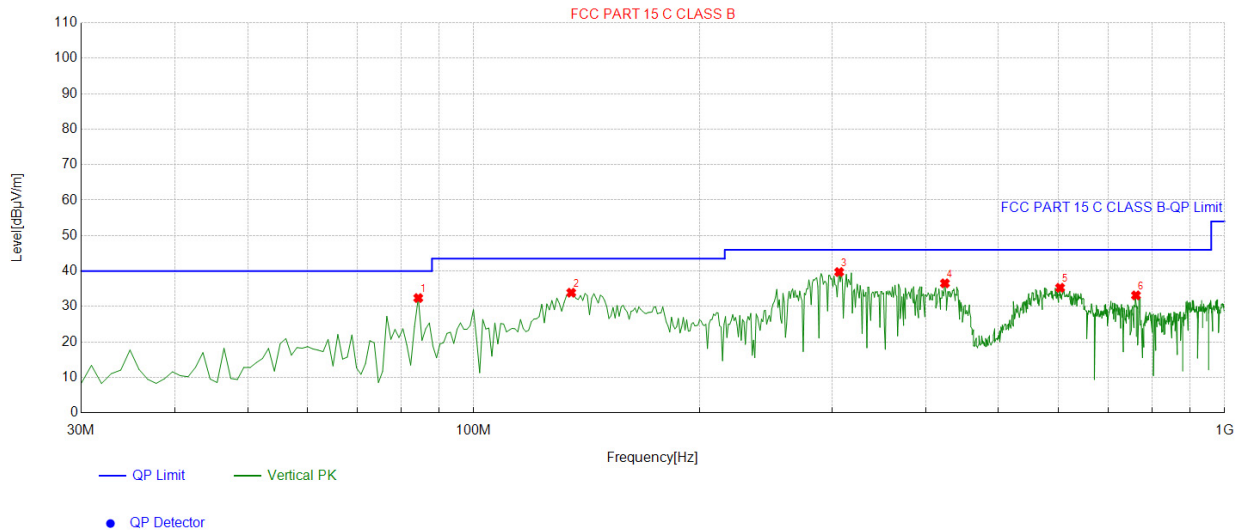
Antenna polarity: H



Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	94.084	-15.78	52.49	36.71	43.50	6.79	100	142	Horizontal
2	131.952	-17.33	53.57	36.24	43.50	7.26	100	207	Horizontal
3	193.123	-15.59	53.30	37.71	43.50	5.79	100	114	Horizontal
4	251.381	-13.49	51.74	38.25	46.00	7.75	100	131	Horizontal
5	399.940	-9.84	45.13	35.29	46.00	10.71	100	233	Horizontal
6	581.512	-5.80	42.75	36.95	46.00	9.05	100	210	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – 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	84.374	-17.88	50.27	32.39	40.00	7.61	100	338	Vertical
2	134.865	-17.77	51.66	33.89	43.50	9.61	100	14	Vertical
3	306.727	-11.89	51.61	39.72	46.00	6.28	100	1	Vertical
4	424.214	-8.89	45.43	36.54	46.00	9.46	100	241	Vertical
5	603.844	-5.14	40.42	35.28	46.00	10.72	100	178	Vertical
6	762.112	-4.77	37.92	33.15	46.00	12.85	100	164	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – 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 (2405MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2405.00	98.24	-5.84	92.4	114	21.6	peak
2405.00	79.84	-5.84	74	94	20	AVG
4810.00	52.01	-3.64	48.37	74	25.63	peak
4810.00	42.18	-3.64	38.54	54	15.46	AVG
7215.00	50.32	-0.95	49.37	74	24.63	peak
7215.00	40.66	-0.95	39.71	54	14.29	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2405.00	99.81	-5.84	93.97	114	20.03	peak
2405.00	81.09	-5.84	75.25	94	18.75	AVG
4810.00	52.06	-3.64	48.42	74	25.58	peak
4810.00	42.49	-3.64	38.85	54	15.15	AVG
7215.00	50.17	-0.95	49.22	74	24.78	peak
7215.00	40.84	-0.95	39.89	54	14.11	AVG

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

CH Middle (2440MHz)

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2440.00	103.19	-5.71	97.48	114	16.52	peak
2440.00	72.22	-5.71	66.51	94	27.49	AVG
4880.00	53.56	-3.51	50.05	74	23.95	peak
4880.00	45.92	-3.51	42.41	54	11.59	AVG
7320.00	52.95	-0.82	52.13	74	21.87	peak
7320.00	42.11	-0.82	41.29	54	12.71	AVG
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit-Level.						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2440.00	104.33	-5.71	98.62	114	15.38	peak
2440.00	79.88	-5.71	74.17	94	19.83	AVG
4880.00	51.57	-3.51	48.06	74	25.94	peak
4880.00	41.86	-3.51	38.35	54	15.65	AVG
7320.00	50.13	-0.82	49.31	74	24.69	peak
7320.00	40.53	-0.82	39.71	54	14.29	AVG
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit-Level.						

CH High (2475MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2475.00	102.16	-5.65	96.51	114	17.49	peak
2475.00	74.15	-5.65	68.5	94	25.5	AVG
4950.00	52.16	-3.43	48.73	74	25.27	peak
4950.00	41.62	-3.43	38.19	54	15.81	AVG
7425.00	50.68	-0.75	49.93	74	24.07	peak
7425.00	40.78	-0.75	40.03	54	13.97	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2475.00	101.76	-5.65	96.11	114	17.89	peak
2475.00	77.92	-5.65	72.27	94	21.73	AVG
4950.00	52.81	-3.43	49.38	74	24.62	peak
4950.00	41.71	-3.43	38.28	54	15.72	AVG
7425.00	51.35	-0.75	50.6	74	23.4	peak
7425.00	40.41	-0.75	39.66	54	14.34	AVG

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

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 keyboard 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 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. 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 1MHz and VBW to 3MHz, to measure the conducted peak band edge.

5.3. Test Result

PASS

Radiated Band Edge Test:

Operation Mode: TX CH Low (2405MHz)

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2310	55.32	-5.81	49.51	74	24.49	peak
2310	/	-5.81	/	54	/	AVG
2390	54.19	-5.84	48.35	74	25.65	peak
2390	/	-5.84	/	54	/	AVG
2400	52.09	-5.84	46.25	74	27.75	peak
2400	/	-5.84	/	54	/	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2310	54.19	-5.81	48.38	74	25.62	peak
2310	/	-5.81	/	54	/	AVG
2390	53.26	-5.84	47.42	74	26.58	peak
2390	/	-5.84	/	54	/	AVG
2400	51.77	-5.84	45.93	74	28.07	peak
2400	/	-5.84	/	54	/	AVG

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

Operation Mode: TX CH High (2475MHz)
Horizontal

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.50	53.26	-5.65	47.61	74	26.39	peak
2483.50	/	-5.65	/	54	/	AVG
2500.00	51.48	-5.65	45.83	74	28.17	peak
2500.00	/	-5.65	/	54	/	AVG
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit-Level.						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.50	53.42	-5.65	47.77	74	26.23	peak
2483.50	/	-5.65	/	54	/	AVG
2500.00	52.08	-5.65	46.43	74	27.57	peak
2500.00	/	-5.65	/	54	/	AVG
Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit-Level.						
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= 20 KHz. VBW=62 KHz, Span=3MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector.

6.3. Measurement Equipment Used

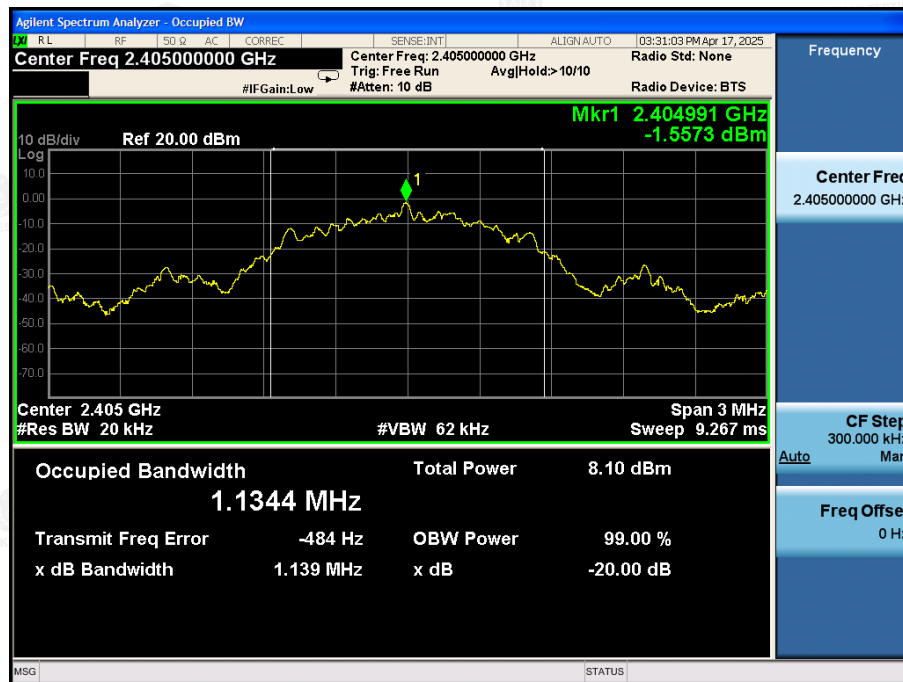
Same as Radiated Emission Measurement

6.4. Test Result

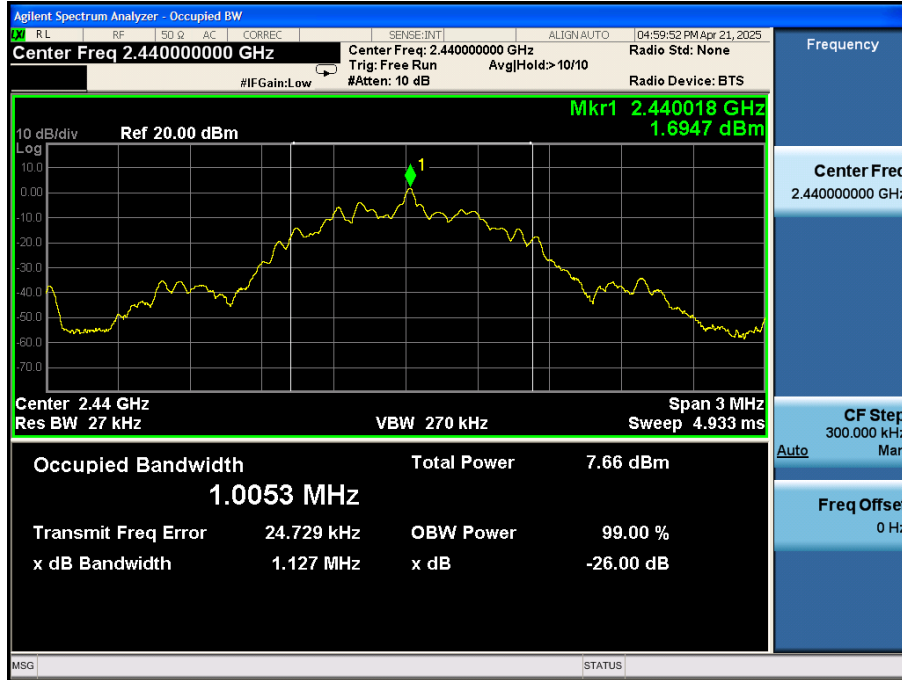
PASS

Frequency	20dB Bandwidth (MHz)	Result
2405 MHz	1.139	PASS
2440 MHz	1.127	PASS
2475 MHz	1.166	PASS

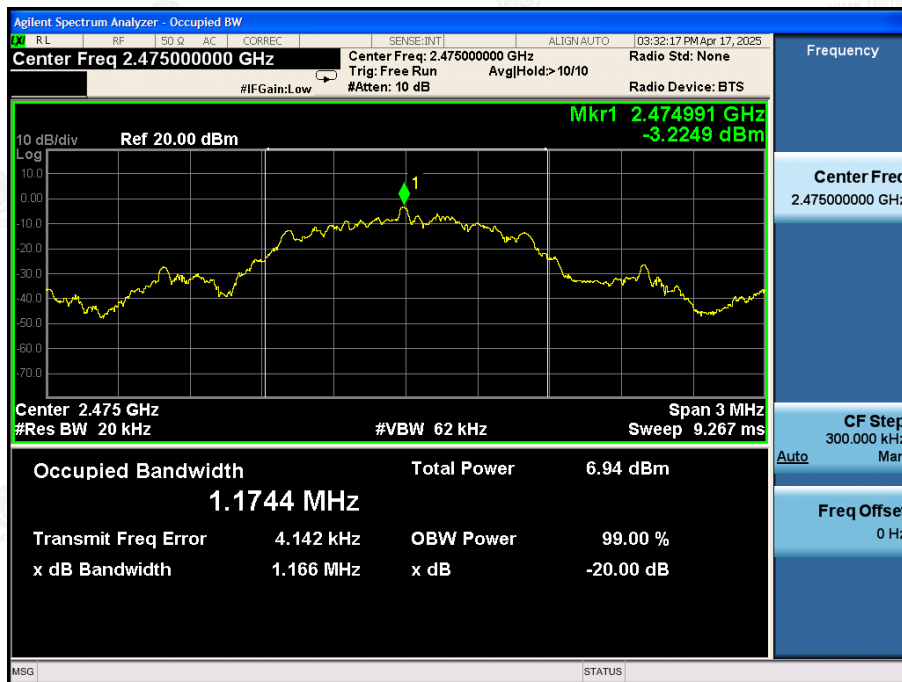
CH: 2405MHz



CH: 2440MHz



CH: 2475MHz



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 15 days only. The document is issued by Shenzhen HUAKE Testing Technology Co., Ltd., this document cannot be reproduced except in full with our prior written permission.

Shenzhen HUAKE Testing Technology Co., Ltd. Tel.: +86-0755-2302 9901 E-mail: info@huak.com Web.: www.huak.com
 Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

7. Antenna Requirement

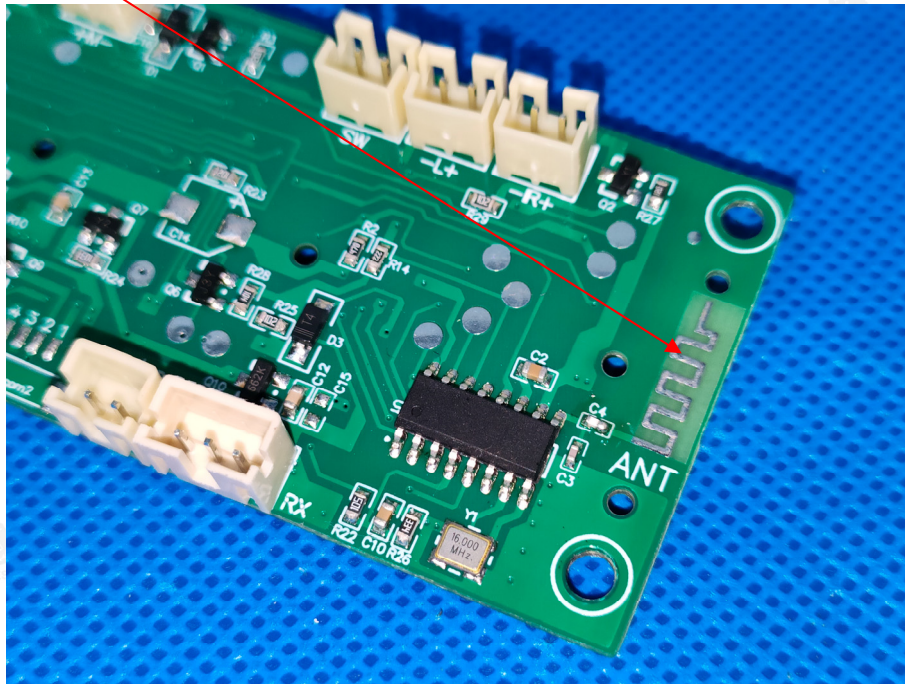
Standard Applicable

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

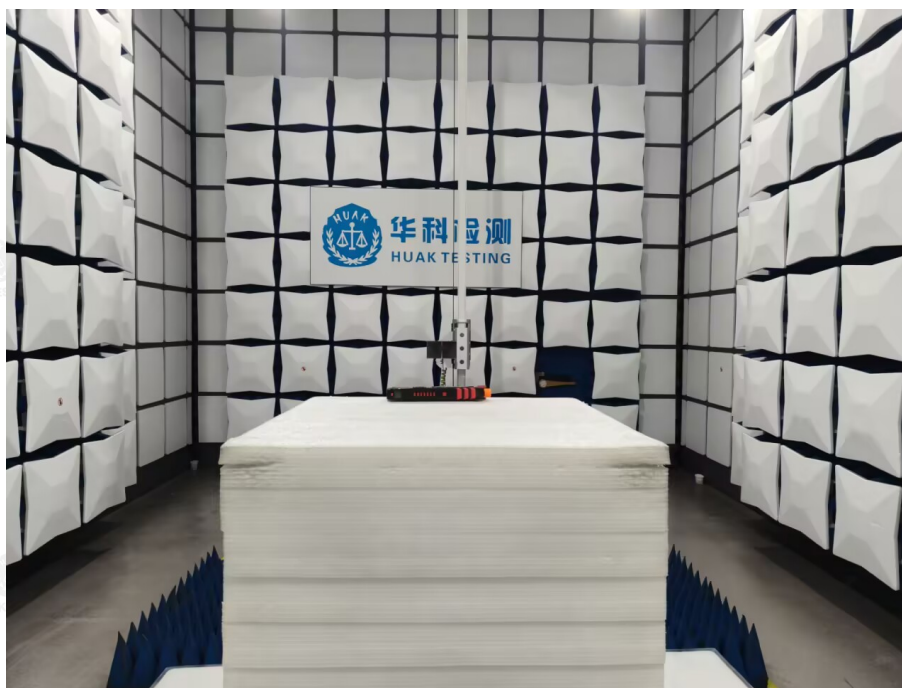
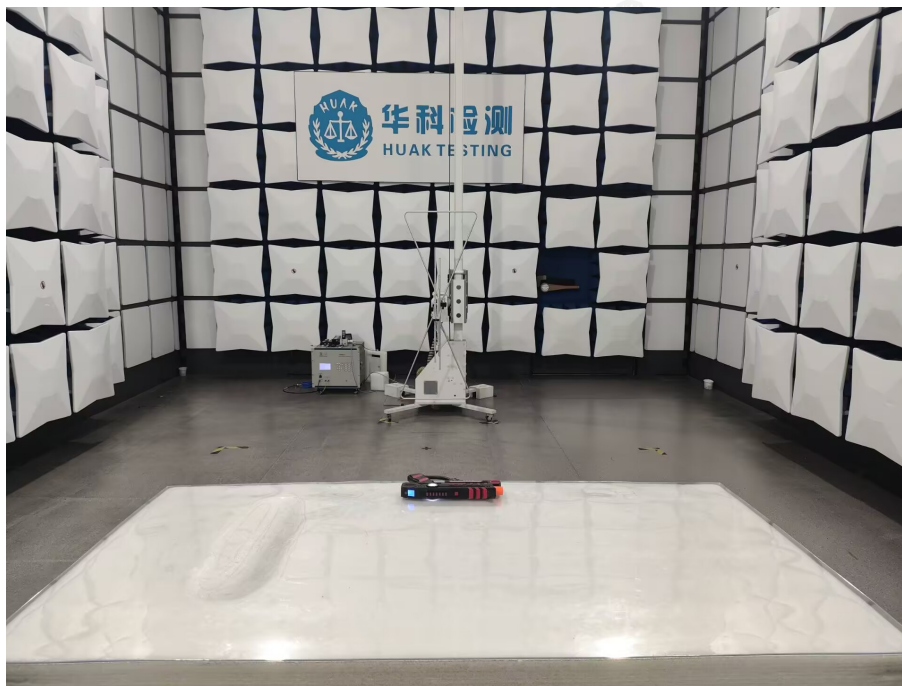
The antenna used in this product is a PCB Antenna, which permanently attached. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 0.8dBi.

Antenna

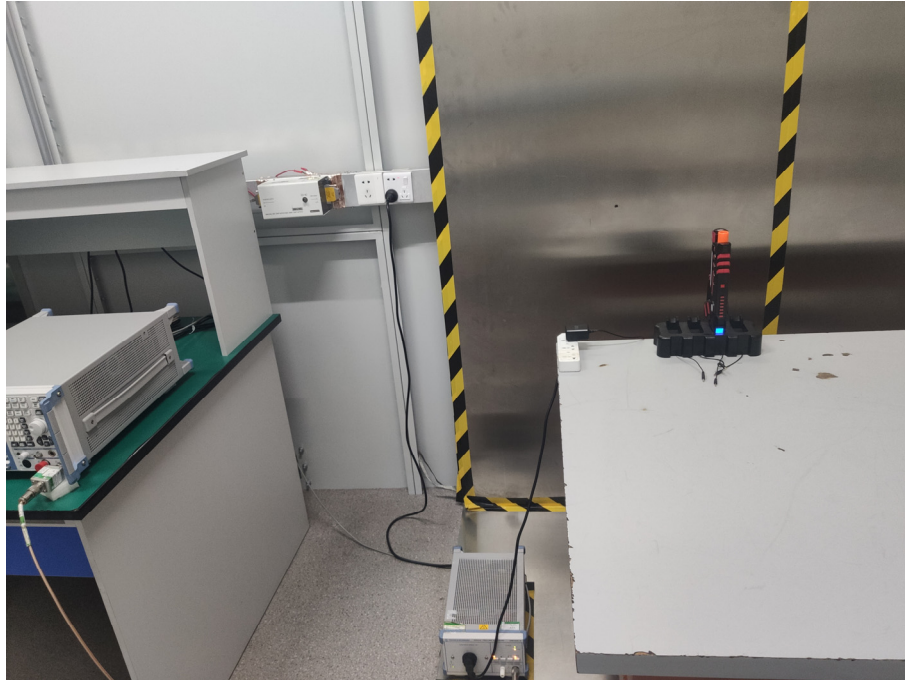


8. Photograph of Test

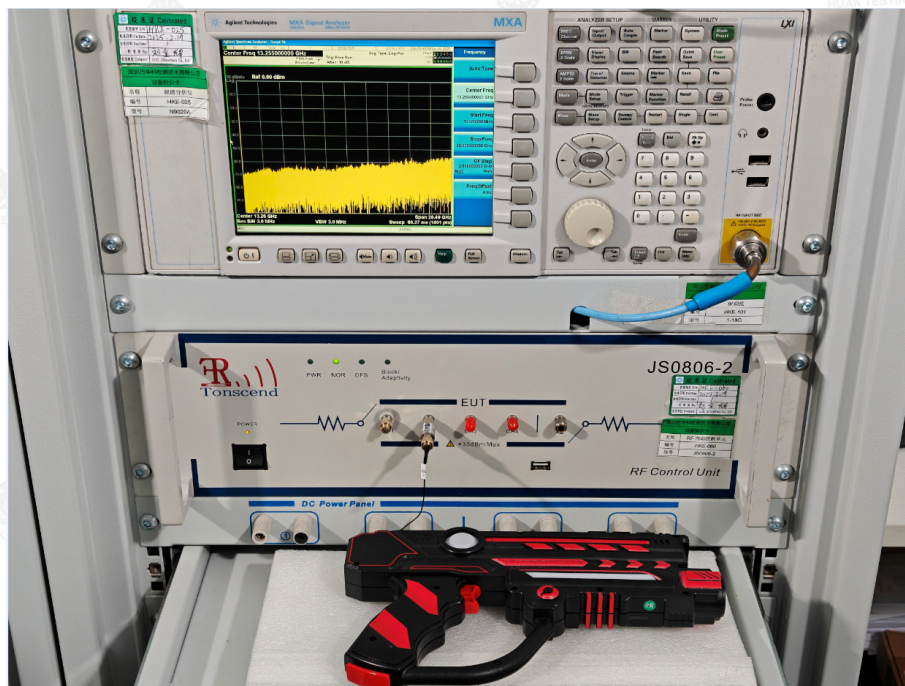
Radiated Emission



AC Conducted Emission



RF 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 15 days only. The document is issued by Shenzhen HUAKE Testing Technology Co., Ltd., this document cannot be reproduced except in full with our prior written permission.

Shenzhen HUAKE Testing Technology Co., Ltd. Tel.: +86-0755-2302 9901 E-mail: info@huak.com Web.: www.huak.com
 Add.: 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-----

