



FCC TEST REPORT

Test report

On Behalf of

Guangzhou EZVALO Technology Company Limited

For

Puck Pro

Model No.: LR2, LR3, LR4, LR5, LR6, LR7, LR8, LR9, LR10, LR11, LR12, LR13,
LR14, LR15, LR16, LR17, LR18, LR19, LR20

FCC ID: 2AYQN-LR2

Prepared for : Guangzhou EZVALO Technology Company Limited
Unit 1503 and 1504, 15/F, 166 Huangpu Park West Road, Huangpu District,
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Date of Test: Sep. 18, 2023 ~ Sep. 25, 2023

Date of Report: Sep. 25, 2023

Report Number: HK2309204360-E

**TEST RESULT CERTIFICATION**

Applicant's name : Guangzhou EZVALO Technology Company Limited
Address : Unit 1503 and 1504, 15/F, 166 Huangpu Park West Road, Huangpu District, Guangzhou, China
Manufacture's Name : Guangzhou EZVALO Technology Company Limited
Address : Unit 1503 and 1504, 15/F, 166 Huangpu Park West Road, Huangpu District, Guangzhou, China
Product description
Trade Mark: N/A
Product name : Puck Pro
Model and/or type reference : LR2, LR3, LR4, LR5, LR6, LR7, LR8, LR9, LR10, LR11, LR12, LR13, LR14, LR15, LR16, LR17, LR18, LR19, LR20
Standards : FCC Rules and Regulations Part 15 Subpart C Section 15.249
ANSI C63.10: 2013

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Date of Test :
Date (s) of performance of tests : **Sep. 18, 2023 ~ Sep. 25, 2023**
Date of Issue : **Sep. 25, 2023**
Test Result : **Pass**

Testing Engineer :

(Gary Qian)

Technical Manager :

(Eden Hu)

Authorized Signatory :

(Jason Zhou)

**Table of Contents****Page**

1 . TEST SUMMARY	5
2 . GENERAL INFORMATION	6
2.1 General Description of EUT	6
2.2 Carrier Frequency of Channels	7
2.3 Operation of EUT during testing	7
2.4 Description of Test Setup	7
2.5 Description of Support Units	8
2.6 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	18
5.1 Limits	18
5.2 Test Procedure	18
5.3 Test Result	19
6 OCCUPIED BANDWIDTH MEASUREMENT	20
6.1 Test Setup	20
6.2 Test Procedure	20
6.3 Measurement Equipment Used	20
6.4 Test Result	20
7 ANTENNA REQUIREMENT	21
8 PHOTOGRAPH OF TEST	22
8.1 Radiated Emission	22
8.2 Conducted Emission	23
9 PHOTOS OF THE EUT	24



**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Sep. 25, 2023	Jason Zhou



1. TEST SUMMARY

1.1 Test Procedures And Results

DESCRIPTION OF TEST		RESULT
CONDUCTED EMISSIONS TEST	§ 15.207	COMPLIANT
RADIATED EMISSION TEST	§ 15.249 (a) / §15.209	COMPLIANT
BAND EDGE	§ 15.249 (d) / §15.209	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

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	Puck Pro
Model Name	LR2
Serial Model	LR3, LR4, LR5, LR6, LR7, LR8, LR9, LR10, LR11, LR12, LR13, LR14, LR15, LR16, LR17, LR18, LR19, LR20
Model Difference	All model's the function, software and electric circuit are the same, only with model named different. Test sample model: LR2.
FCC ID	2AYQN-LR2
Antenna Type	PCB Antenna
Antenna Gain	-0.58dBi
Equipment	Puck Pro
Operation frequency	2420MHz
Number of Channels	1CH
Modulation Type	GFSK
Power Source	DC 5V from Type-C or DC 3.7V from Battery
Power Rating	DC 5V from Type-C or DC 3.7V from Battery
Firmware Version	V2.0
Hardware Version	V2.0



2.2 Carrier Frequency of Channels

Description of Channel:	
Channel	Frequency (MHz)
1	2420

2.3 Operation of EUT during testing

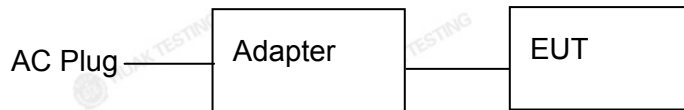
Operating Mode

The mode is used: **Transmitting mode**

Channel1: 2420MHz

2.4 Description of Test Setup

Operation of EUT during conducted testing and radiation 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



2.5 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	Mfr/Brand	Model/Type No.	Specification	Note
1	Puck Pro	N/A	LR2	N/A	EUT
2	Adapter	HUAWEI	HW-100225C00	Input: AC100-240V, 50/60Hz, 0.75A Output: DC5V/2A, 9V/2A, 10V/2.25A MAX	Peripheral
3					

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 (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), 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.

**2.6 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	Feb. 17, 2023	1 Year
2.	Receiver	R&S	ESR-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
15.	Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	1 Year
16.	Signal generator	Agilent	N5182A	HKE-029	Feb. 17, 2023	1 Year
17.	Signal Generator	Agilent	83630A	HKE-028	Feb. 17, 2023	1 Year
18.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 09, 2021	3 Year
19.	High gain antenna	Schwarzbeck	LB-180400KF	HKE-054	Feb. 17, 2023	1 Year
20.	10dB Attenuator	Schwarzbeck	VTSD9561F	HKE-153	Feb. 17, 2023	1 Year



3. CONDUCTED EMISSIONS TEST

3.1 Conducted Power Line Emission Limit

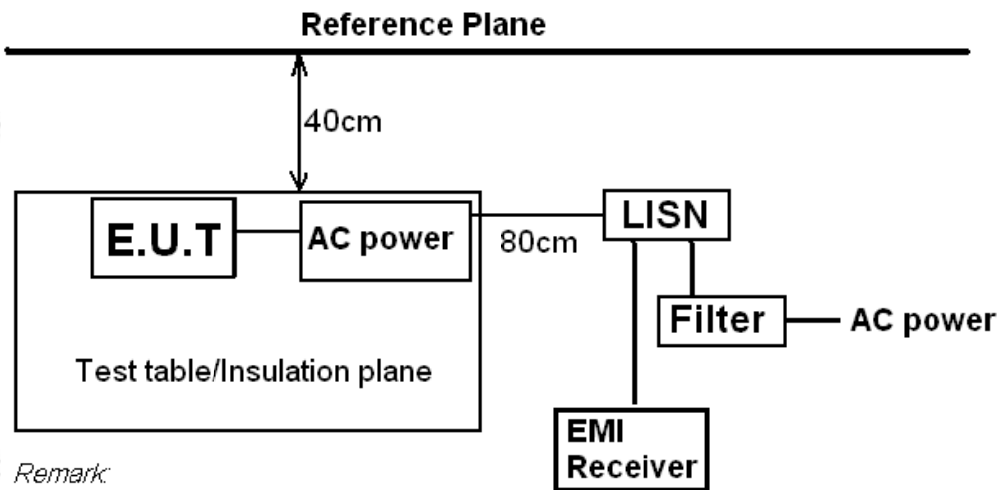
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage (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



Remark:

E.U.T: Equipment Under Test

LISN: Line Impedance Stabilization Network

Test table height=0.8m

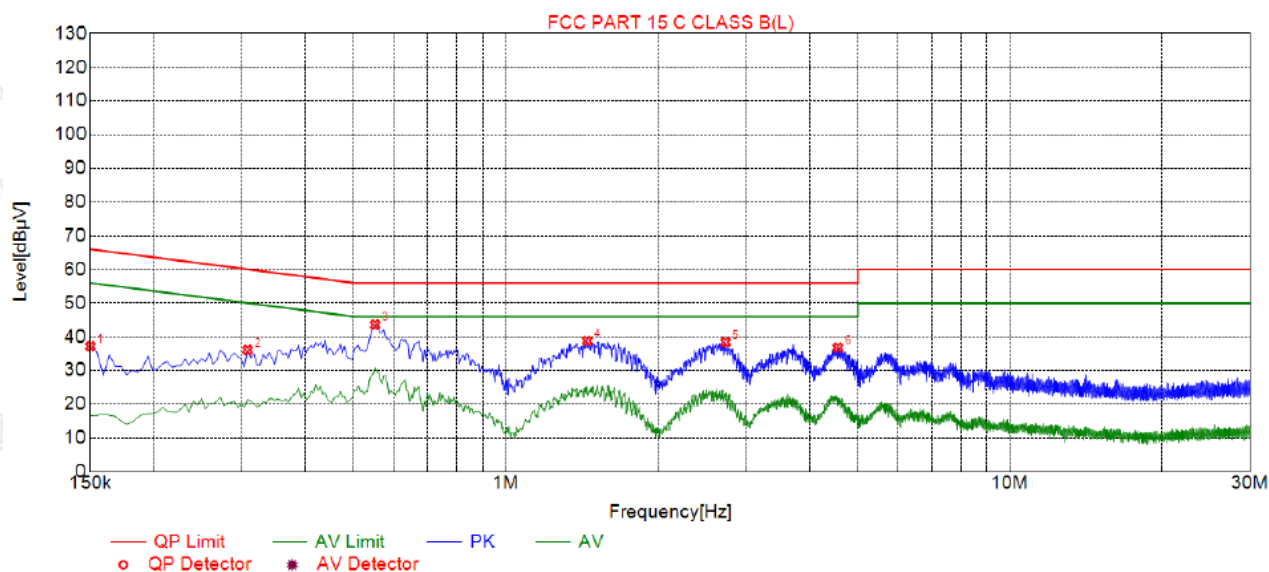
3.3 Test Procedure

- 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 / 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

Test Specification: Line



Suspected List

NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Reading [dBμV]	Detector	Type
1	0.1500	37.17	20.03	66.00	28.83	17.14	PK	L
2	0.3075	36.10	20.05	60.04	23.94	16.05	PK	L
3	0.5505	43.59	20.06	56.00	12.41	23.53	PK	L
4	1.4505	38.81	20.10	56.00	17.19	18.71	PK	L
5	2.7285	38.40	20.21	56.00	17.60	18.19	PK	L
6	4.5600	36.81	20.25	56.00	19.19	16.56	PK	L

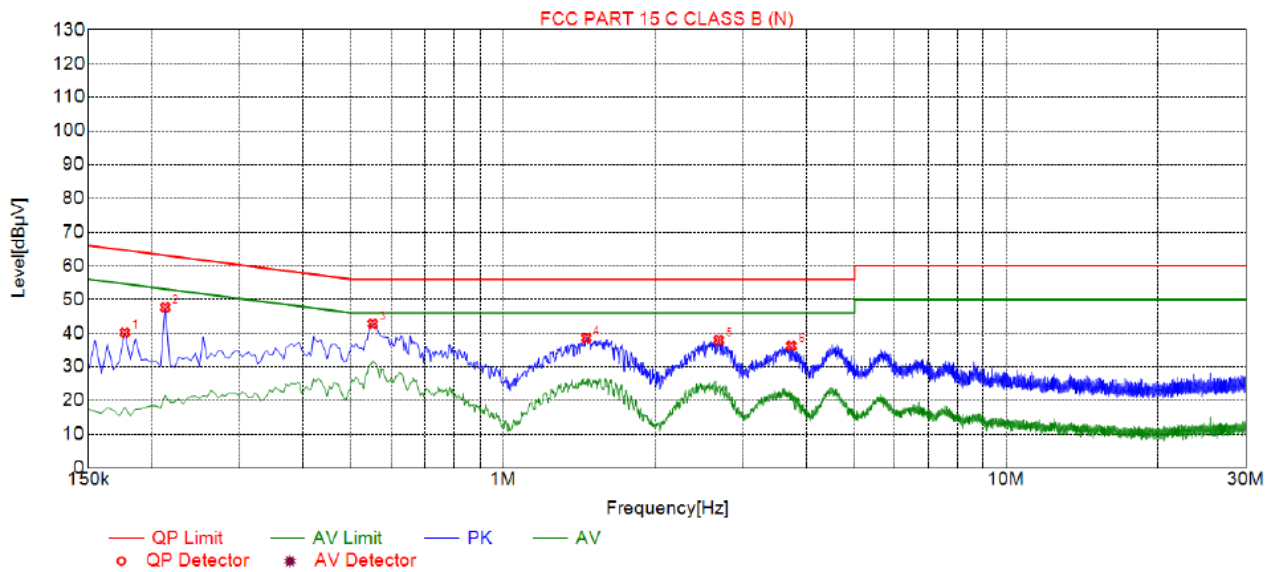
Remark: Margin = Limit – Level

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	0.1770	40.15	20.05	64.63	24.48	20.10	PK	N
2	0.2130	47.67	20.05	63.09	15.42	27.62	PK	N
3	0.5505	42.79	20.06	56.00	13.21	22.73	PK	N
4	1.4640	38.59	20.10	56.00	17.41	18.49	PK	N
5	2.6835	37.95	20.21	56.00	18.05	17.74	PK	N
6	3.7410	36.24	20.25	56.00	19.76	15.99	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

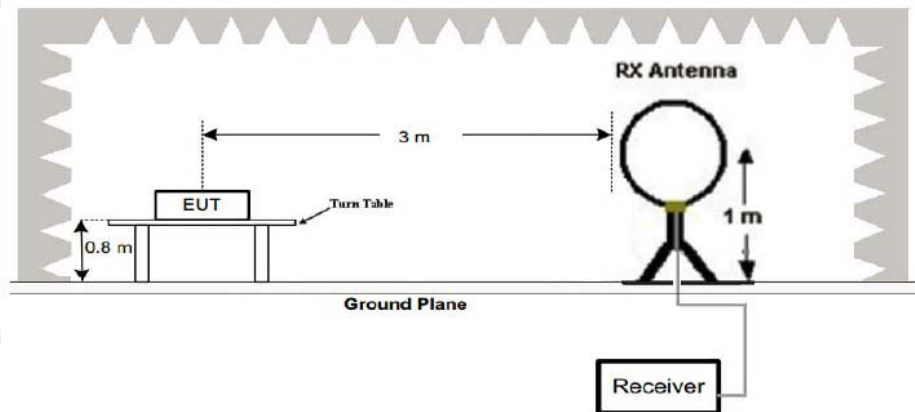
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
30-88	3	40	100
88-216	3	43.5	150
216-960	3	46	200
Above 960	3	54	500

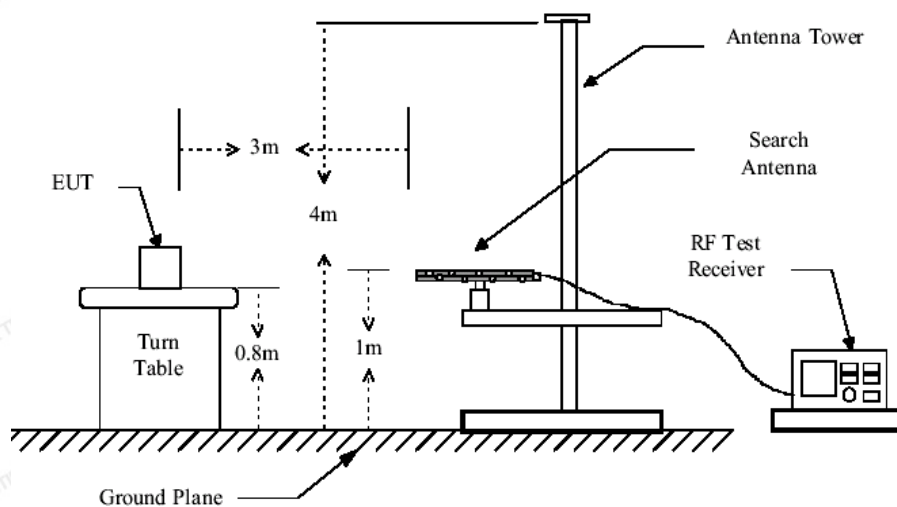
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

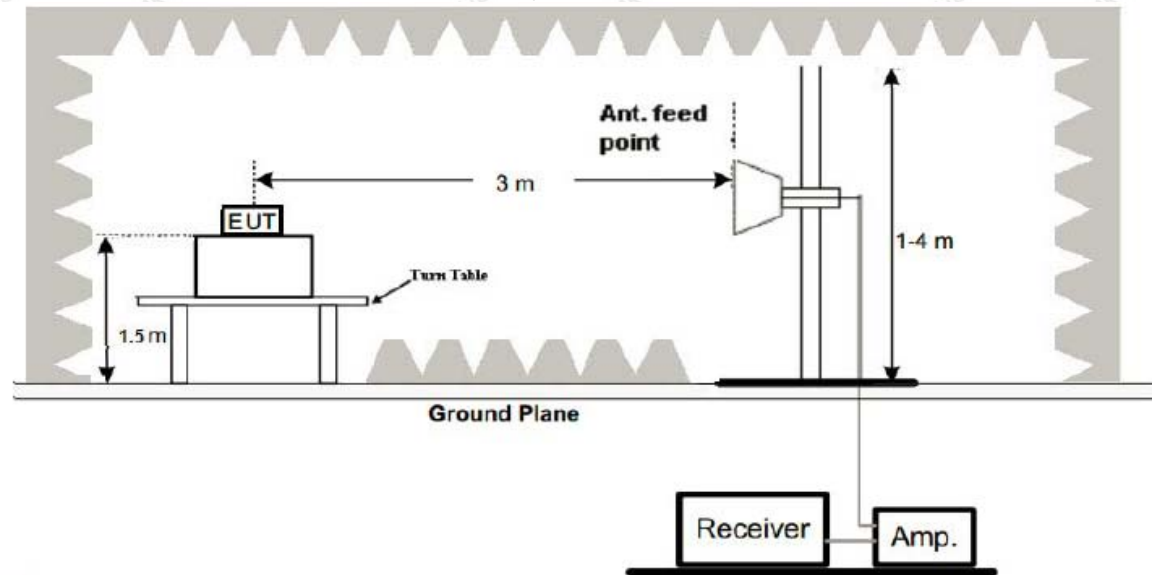
4.2 Test Setup

(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.

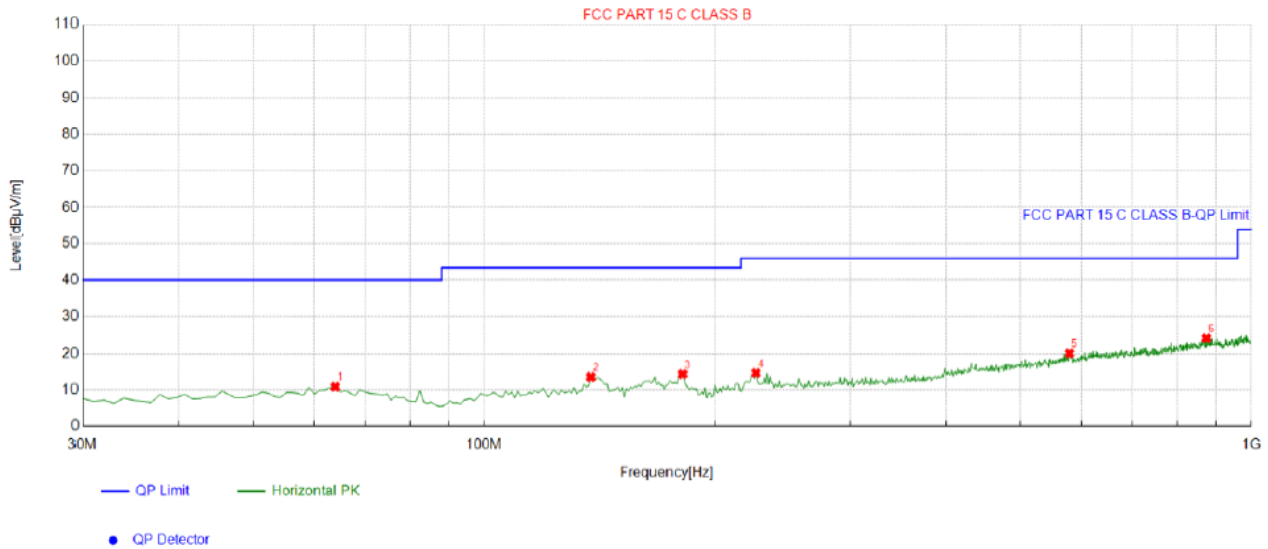
4.4 Test Result

PASS



Below 1GHz Test Results:

Antenna polarity: H

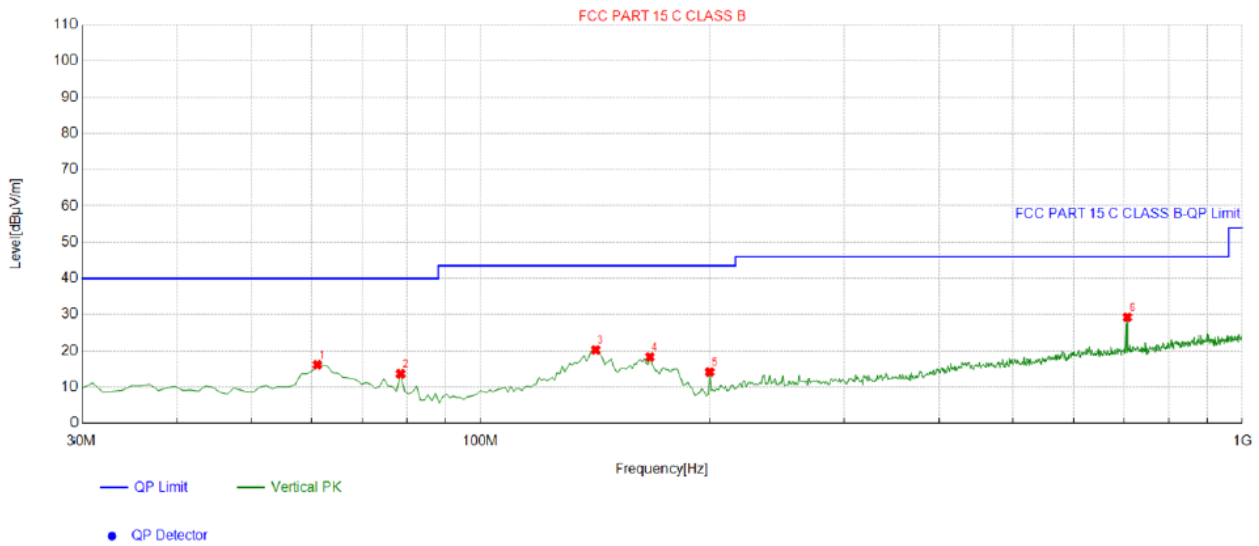


Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	63.983984	-14.68	25.52	10.84	40.00	29.16	100	167	Horizontal
2	137.77777	-17.79	31.26	13.47	43.50	30.03	100	225	Horizontal
3	181.47147	-16.93	31.19	14.26	43.50	29.24	100	327	Horizontal
4	226.13613	-13.99	28.55	14.56	46.00	31.44	100	186	Horizontal
5	579.56957	-5.58	25.66	20.08	46.00	25.92	100	285	Horizontal
6	873.77377	-1.01	25.24	24.23	46.00	21.77	100	93	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	61.071071	-14.27	30.41	16.14	40.00	23.86	100	73	Vertical
2	78.548549	-17.29	30.97	13.68	40.00	26.32	100	338	Vertical
3	141.66166	-18.11	38.38	20.27	43.50	23.23	100	340	Vertical
4	166.90690	-16.93	35.24	18.31	43.50	25.19	100	359	Vertical
5	199.91992	-15.27	29.41	14.14	43.50	29.36	100	324	Vertical
6	706.76676	-3.60	32.89	29.29	46.00	16.71	100	249	Vertical

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

Remark:

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



Above 1 GHz Test Results:

CH Middle (2420MHz)

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2420	99.74	-5.71	94.03	114	-19.97	peak
2420	79.62	-5.71	73.91	94	-20.09	AVG
4840	58.74	-3.51	55.23	74	-18.77	peak
4840	40.65	-3.51	37.14	54	-16.86	AVG
7260	50.79	-0.82	49.97	74	-24.03	peak
7260	36.36	-0.82	35.54	54	-18.46	AVG

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

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2420	98.72	-5.71	93.01	114	-20.99	peak
2420	77.14	-5.71	71.43	94	-22.57	AVG
4840	54.16	-3.51	50.65	74	-23.35	peak
4840	35.25	-3.51	31.74	54	-22.26	AVG
7260	47.82	-0.82	47	74	-27	peak
7260	32.16	-0.82	31.34	54	-22.66	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.



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 (2420MHz)

Horizontal (Worst case)

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2310	56.19	-5.81	50.38	74	-23.62	peak
2310	/	-5.81	/	54	/	AVG
2390	56.41	-5.84	50.57	74	-23.43	peak
2390	/	-5.84	/	54	/	AVG
2400	57.42	-5.84	51.58	74	-22.42	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	54.16	-5.81	48.35	74	-25.65	peak
2310	/	-5.81	/	54	/	AVG
2390	56.38	-5.84	50.54	74	-23.46	peak
2390	/	-5.84	/	54	/	AVG
2400	55.14	-5.84	49.3	74	-24.7	peak
2400	/	-5.84	/	54	/	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						



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= 20KHz. VBW= 62 KHz, Span=3MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

6.3 Measurement Equipment Used

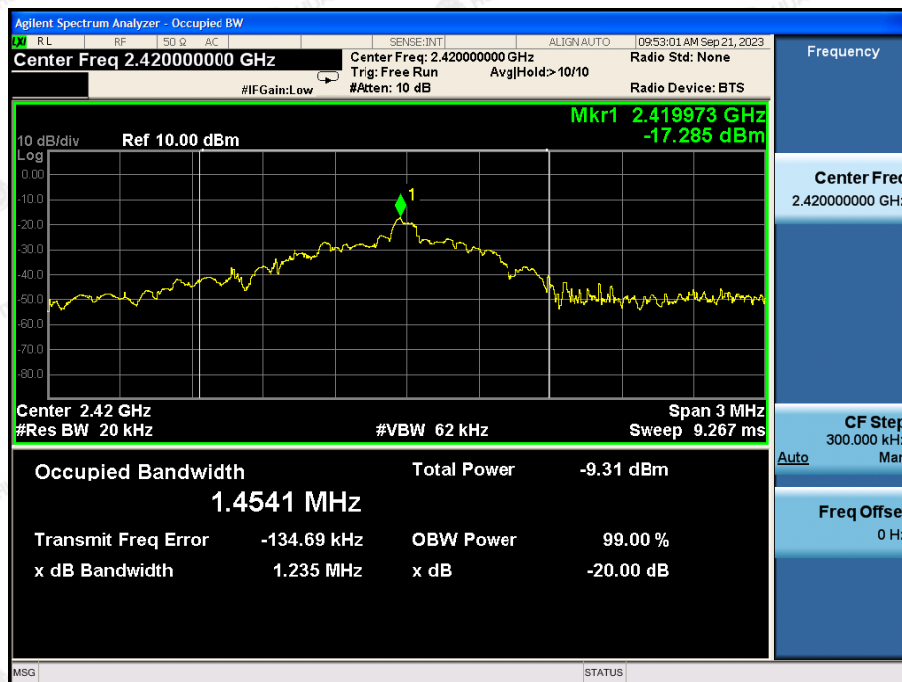
Same as Radiated Emission Measurement

6.4 Test Result

PASS

Frequency	20dB Bandwidth (MHz)	Result
2420 MHz	1.235	PASS

CH: 2420MHz





7 ANTENNA REQUIREMENT

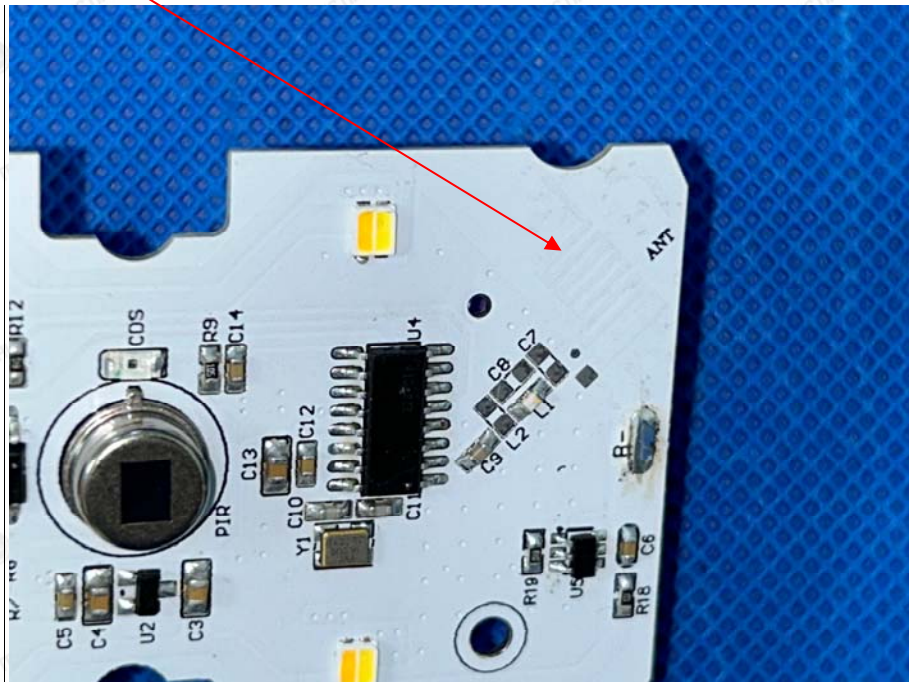
Standard Applicable

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 -0.58dBi .

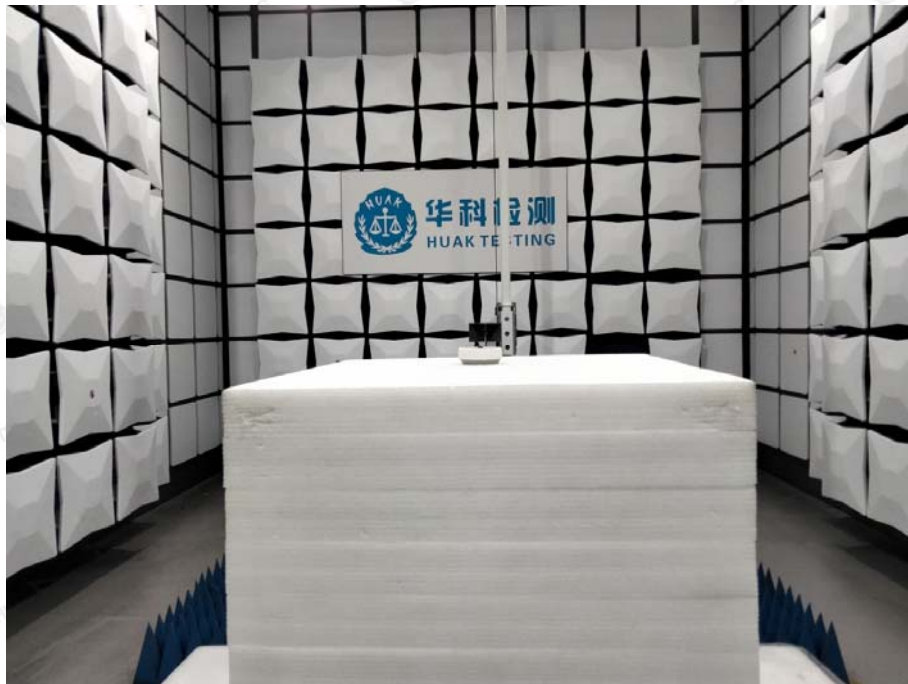
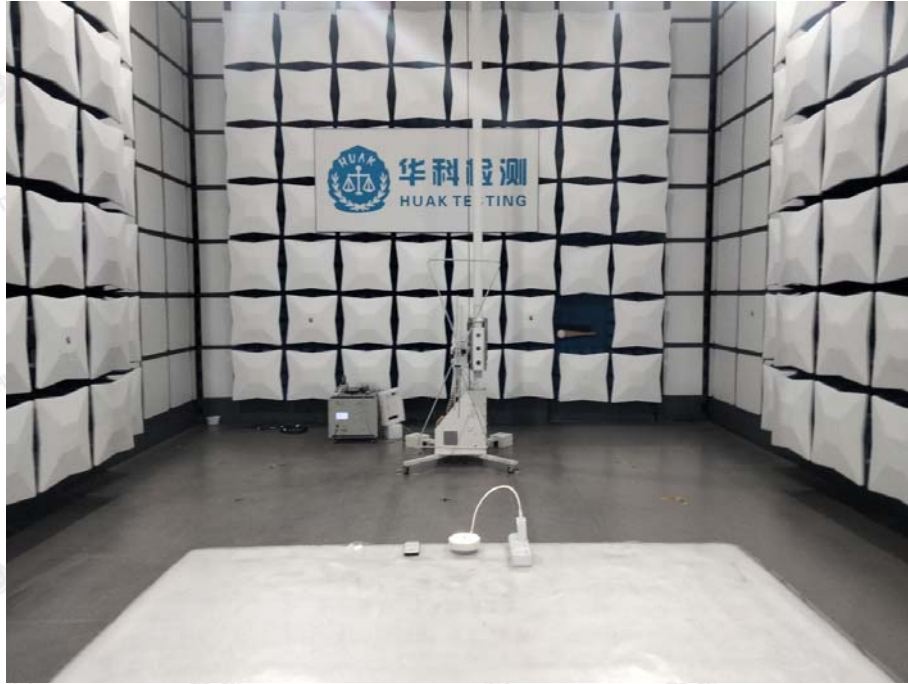
ANTENNA





8 PHOTOGRAPH OF TEST

8.1 Radiated Emission





8.2 Conducted Emission





9 PHOTOS OF THE EUT

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

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