TEST REPORT

Report No.	CISRR24112315806
Project No.	CISR241123158
FCC ID	2BMDY-CL8
Applicant	Shenzhen Xin micro Electronics Co., LTD
Address	1205, Tangshang Building, No.35, Guangshen Road, Xingxing Community, Xinqiao Street, Baoan District, Shenzhen, China
Manufacturer	Shenzhen Xin micro Electronics Co., LTD
Address	1205, Tangshang Building, No.35, Guangshen Road, Xingxing Community, Xinqiao Street, Baoan District, Shenzhen, China
Product Name	Helmet Bluetooth Earphones
Trade Mark	N/A
Model/Type reference	CL8
Listed Model(s)	CL8**
Standard	47 CFR Part 15.247
Test date	November 23, 2024 to November 29, 2024
Issue date	December 2, 2024
Test result	**Complied**

Prepared by: Rory Huang

Approved by: Genry Long

The test results relate only to the tested samples.

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1. REPORT VERSION

Version No.	Issue date	Description
00	December 2, 2024	Original

2. TEST DESCRIPTION

No.	Test Item	Standard Requirement	Result
1	Antenna Requirement	47 CFR 15.203	Pass
2	Conducted Emission at AC power line	47 CFR 15.207(a)	Pass
3	6dB Bandwidth	47 CFR 15.247(a)(2)	Pass
4	Maximum Conducted Output Power	47 CFR 15.247(b)(3)	Pass
5	Power Spectral Density	47 CFR 15.247(e)	Pass
6	Conducted band edge and spurious emission	47 CFR 15.247(d), 15.209, 15.205	Pass
7	Radiated band edge emission	47 CFR 15.247(d), 15.209, 15.205	Pass
8	Radiated Spurious Emission (below 1GHz)	47 CFR 15.247(d), 15.209, 15.205	Pass
9	Radiated Spurious Emission (Above 1GHz)	47 CFR 15.247(d), 15.209, 15.205	Pass

Note:

– The measurement uncertainty is not included in the test result.

3. SUMMARY

3.1. Product Description *

Main unit information:	
Product Name:	Helmet Bluetooth Earphones
Trade Mark:	N/A
Model No.:	CL8
Listed Model(s):	CL8**
Power supply:	DC 5V
Hardware version:	YL_AD83D-V1.4
Software version:	Y10_AD6983D_CL8_V02_20240709
Accessory unit (AU) information:	
Battery:	DC 3.7V

3.2. Radio Specification Description *

Modulation type:	GFSK
Operation frequency:	2402MHz to 2480MHz
Channel number:	40
Channel separation:	2MHz
Antenna type:	PCB
Antenna gain:	2.54dBi

Note:

1) *: Since the above information is provided by the applicant relevant results or conclusions of this report are only made for these information , Bangce is not responsible for the authenticity, integrity and results of the information and/or the validity of the conclusion.
2) Operation frequency list as follow:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476

8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.3. Modification of EUT

No modifications are made to the EUT during all test items.

3.4. Deviation from standards

None

3.5. Testing Site

Laboratory Name	Shenzhen Bangce Testing Technology Co., Ltd.
Laboratory Location	101, building 10, Yunli Intelligent Park, Shutianpu community, Matian Street, Guangming District, Shenzhen，Guangdong, China
Contact information	Tel: 86-755-2319 6848, email: service@cis-cn.net Website: http://www.cis-cn.net/
FCC registration number	736346
FCC designation number	CN1372

4. TEST CONFIGURATION

4.1. Test frequency list

Lowest Channel (LCH) (MHz)	Middle Channel (MCH) (MHz)	Highest Channel (HCH) (MHz)
2402	2440	2480

4.2. Descriptions of test mode

No	Test mode	Description
TM1	TX mode	Keep the EUT in continuously transmitting mode with GFSK modulation at lowest, middle and highest channel.
TM2	Link mode	Keep the EUT in Bluetooth linking mode with AE.
TM3	Charging mode	Keep the EUT in charging status

4.3. Support unit used in test configuration

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Item	Equipment name	Trade Name	Model No.
1	Phone	Huawei	NZONE S7
2	Adapter	Guangdong Sangu Technology Co. ltd	SG-0501000AU

4.4. Test sample information

Type	Sample No.
Engineer sample	CISR241123158-S01
Normal sample	CISR241123158-S02

4.5. Environmental conditions

Type	Requirement
Temperature:	15~35°C
Relative Humidity:	25~75%
Air Pressure:	860~1060mbar

4.6. Equipment Used during the Test

Conducted Emission at AC power line						
Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESCI7	100853	2024-01-08	2025-01-07
2	Artificial power network	Schwarzbeck	NSLK8127	8127-01096	2024-01-08	2025-01-07
3	8-wire Impedance Stabilization Network	Schwarzbeck	NTFM 8158	8158-00337	2024-01-08	2025-01-07
4	Artificial power network	Schwarzbeck	ENV216	/	2024-01-08	2025-01-07

Power Spectral Density Emissions in non-restricted frequency bands 6dB Bandwidth Maximum Conducted Output Power						
Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	MXG RF Signal Generator	Agilent	N5181A	MY50145362	2024-01-08	2025-01-07
2	Spectrum analyzer	R&S	FSV-40N	102130	2024-01-08	2025-01-07
3	Vector Signal Generator	Agilent	N5182A	MY50142364	2024-06-14	2025-06-13
4	Power Meter	WCS	WCS-PM	WCSPM230405A	2024-01-08	2025-01-07

Emissions in frequency bands (below 1GHz) Emissions in frequency bands (above 1GHz) Band edge emissions (Radiated)						
Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESCI7	100853	2024-01-08	2025-01-07
2	Amplifier	Tonscend	TAP9K3G40	AP23A8060270	2024-01-08	2025-01-07
3	Prime amplifier	Tonscend	TAP01018050	AP23A8060280	2024-01-08	2025-01-07
4	9*6*6 anechoic chamber	SKET	9.3*6.3*6	N/A	2024-09-02	2027-09-01
5	Spectrum analyzer	Agilent	N9020A	MY50530263	2024-01-08	2025-01-07
6	Spectrum analyzer	R&S	FSV-40N	102130	2024-01-08	2025-01-07
7	Bilog Antenna	Schwarzbeck	VULB 9163	1463	2023-01-09	2025-01-08
8	Horn Antenna	SCHWARZBECK	BBHA 9120 D	2487	2023-01-09	2025-01-08
9	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	2023-01-09	2025-01-08

10	RF Cable	Tonscend	Cable 1	/	2024-01-08	2025-01-07
11	RF Cable	Tonscend	Cable 2	/	2024-01-08	2025-01-07
12	RF Cable	SKET	Cable 3	/	2024-01-08	2025-01-07
13	L.I.S.N.#1	Schwarzbeck	NSLK8127	/	2024-01-08	2025-01-07
14	L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	2024-01-08	2025-01-07
15	Horn Antenna	SCHWARZBECK	BBHA9170	1130	2023-01-09	2025-01-08
16	Preamplifier	Tonscend	TAP18040048	AP21C806126	2024-01-08	2025-01-07
17	Variable-frequency power source	Pinhong	PH1110	/	2024-01-08	2025-01-07
18	6dB Attenuator	SKET	DC-6G	/	/	/
19	Antenna tower	SKT	Bk-4AT-BS	AT2021040101-V1	2024-06-14	2025-06-13

5. TEST RESULTS

5.1. Evaluation Results (Evaluation)

5.1.1. Antenna Requirement

Test Requirement:	Refer to 47 CFR Part 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

5.1.1.1. Test Result

Pass

5.1.1.2. Conclusion:

The EUT antenna is PCB(2.54dBi), the directional gain of the antenna less than 6dBi. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.Antenna structure please refer to the EUT internal photographs antenna photo.

5.2. Radio Spectrum Matter Test Results (RF)

5.2.1. Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(a), Except as shown in paragraphs (b)and (c)of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).
Test Limit:	

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

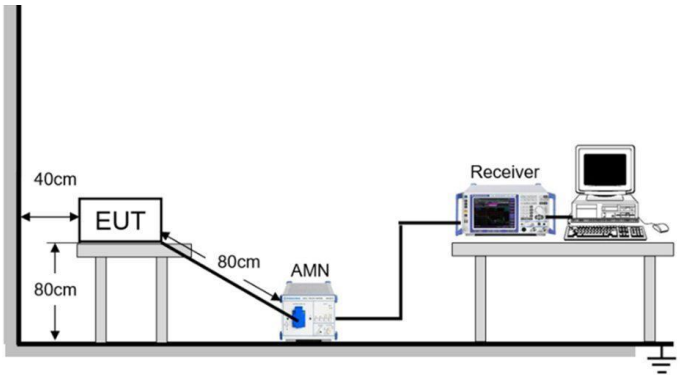
*Decreases with the logarithm of the frequency.

Test Method:	ANSI C63.10-2020 section 6.2
Procedure:	1. The EUT was setup according to ANSI C63.10 requirements. 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. 3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. 4. The peripheral devices are also connected to the main power through a LISN. (Refer to the block diagram of the test setup and photographs) 5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source. 6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. 7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz. 8. During the above scans, the emissions were maximized by cable manipulation.

5.2.1.1. E.U.T. Operation

Operating Environment:					
Temperature:	22.2 °C	Humidity:	56.4 %	Atmospheric Pressure:	103 kPa
Pre test mode:	TM3				
Final test mode:	TM3				

5.2.1.2. Test Setup Diagram



5.2.1.3. Test Result

Pass

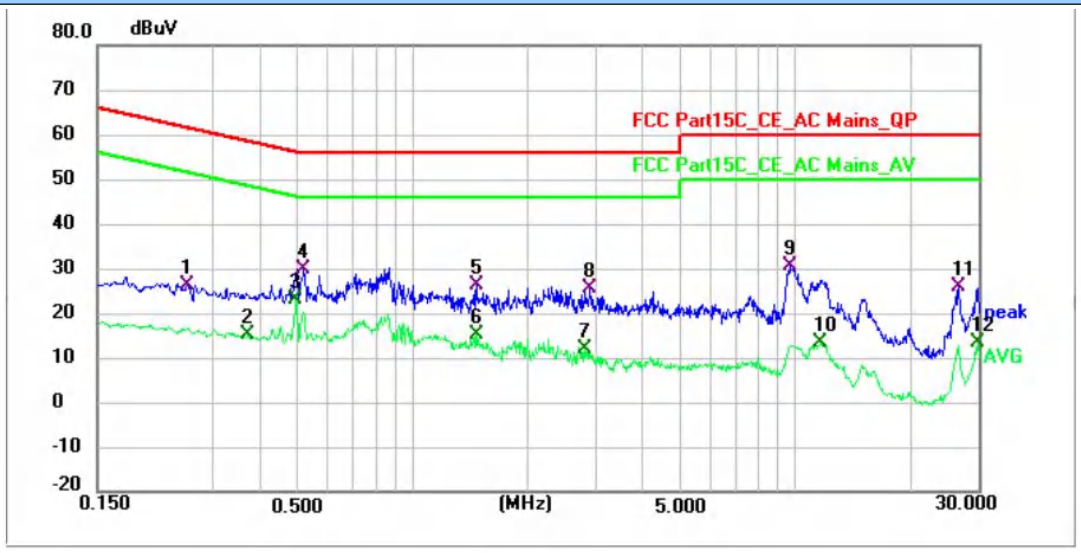
5.2.1.4. Test Data

Note:

Have pre-scan all test mode, found TM3 mode which it was worst case, so only show the worst case's data on this report.

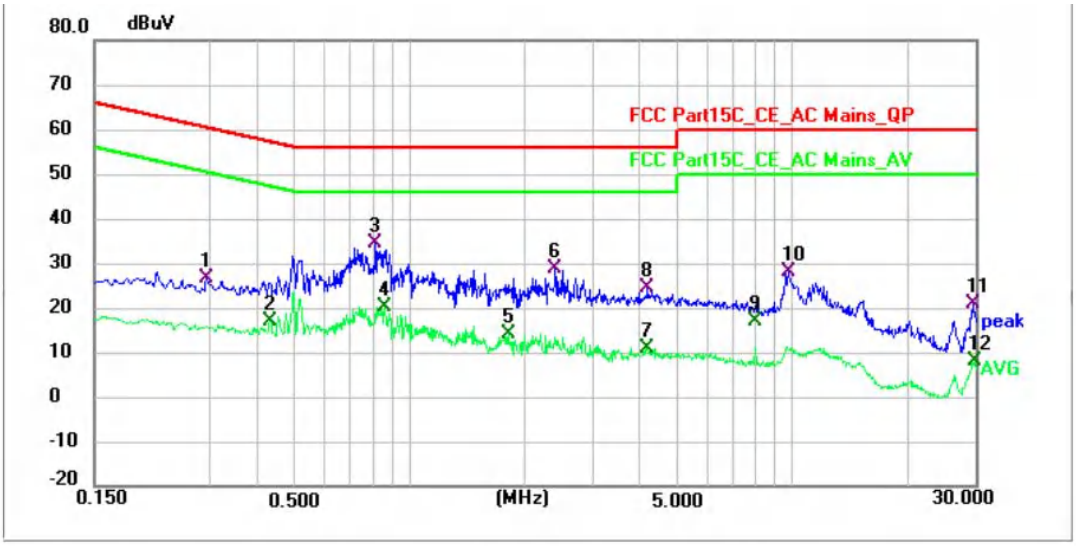
The BT function of this product does not work in charging mode, so only the charging mode(TM3) is tested

Mode3 / Line: Line



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.258	25.86	0.33	26.19	61.50	-35.31	QP	P	
2	0.370	14.81	0.32	15.13	48.50	-33.37	AVG	P	
3 *	0.494	22.49	0.37	22.86	46.10	-23.24	AVG	P	
4	0.518	29.57	0.37	29.94	56.00	-26.06	QP	P	
5	1.466	25.63	0.56	26.19	56.00	-29.81	QP	P	
6	1.466	14.79	0.56	15.35	46.00	-30.65	AVG	P	
7	2.834	11.09	0.94	12.03	46.00	-33.97	AVG	P	
8	2.902	24.72	0.95	25.67	56.00	-30.33	QP	P	
9	9.666	26.91	3.52	30.43	60.00	-29.57	QP	P	
10	11.682	8.83	4.48	13.31	50.00	-36.69	AVG	P	
11	26.610	20.93	5.00	25.93	60.00	-34.07	QP	P	
12	29.906	8.53	4.72	13.25	50.00	-36.75	AVG	P	

Mode3 / Line: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.294	26.40	0.35	26.75	60.41	-33.66	QP	P	
2	0.430	16.67	0.35	17.02	47.25	-30.23	AVG	P	
3 *	0.814	33.88	0.42	34.30	56.00	-21.70	QP	P	
4	0.862	19.89	0.42	20.31	46.00	-25.69	AVG	P	
5	1.810	13.53	0.65	14.18	46.00	-31.82	AVG	P	
6	2.406	27.87	0.82	28.69	56.00	-27.31	QP	P	
7	4.178	9.53	1.46	10.99	46.00	-35.01	AVG	P	
8	4.182	22.83	1.46	24.29	56.00	-31.71	QP	P	
9	8.002	14.08	3.06	17.14	50.00	-32.86	AVG	P	
10	9.766	24.42	3.55	27.97	60.00	-32.03	QP	P	
11	29.542	15.94	4.83	20.77	60.00	-39.23	QP	P	
12	29.930	3.33	4.78	8.11	50.00	-41.89	AVG	P	

Note:
1). Result = Reading +Correct (Insertion Loss + Cable Loss + Attenuator Factor)
2). Margin = Result - Limit

5.2.2. 6dB Bandwidth

Test Requirement:	47 CFR 15.247(a)(2)
Test Limit:	Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	ANSI C63.10-2020, section 11.8
Procedure:	11.8.1 Option 1 The steps for the first option are as follows: a) Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz. b) Set the VBW ≥ [3 × RBW]. c) Detector = peak. d) Trace mode = max-hold. e) Sweep = No faster than coupled (auto) time. f) Allow the trace to stabilize. g) Measure the maximum width of the emission by placing two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−6 dB down amplitude". If a marker is below this "−6 dB down amplitude" value, then it shall be as close as possible to this value. 11.8.2 Option 2 The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

5.2.2.1. E.U.T. Operation

Operating Environment:					
Temperature:	23.1 °C	Humidity:	55.4 %	Atmospheric Pressure:	103 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

5.2.2.2. Test Setup Diagram

5.2.2.3. Test Result

Pass

5.2.2.4. Test Data

Please Refer to Appendix for Details.

5.2.3. Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(3)
Test Limit:	Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Method:	ANSI C63.10-2020 section 11.9.1
Procedure:	ANSI C63.10-2020, section 11.9.1 Maximum peak conducted output power

5.2.3.1. E.U.T. Operation

Operating Environment:					
Temperature:	23.1 °C	Humidity:	55.4 %	Atmospheric Pressure:	103 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

5.2.3.2. Test Setup Diagram

5.2.3.3. Test Result

Pass

5.2.3.4. Test Data

Please Refer to Appendix for Details.

5.2.4. Power Spectral Density

Test Requirement:	47 CFR 15.247(e)
Test Limit:	Refer to 47 CFR 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Method:	ANSI C63.10-2020, section 11.10
Procedure:	ANSI C63.10-2020, section 11.10, Maximum power spectral density level in the fundamental emission

5.2.4.1. E.U.T. Operation

Operating Environment:					
Temperature:	23.1 °C	Humidity:	55.4 %	Atmospheric Pressure:	103 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

5.2.4.2. Test Setup Diagram

5.2.4.3. Test Result

Pass

5.2.4.4. Test Data

Please Refer to Appendix for Details.

5.2.5. Conducted band edge and spurious emission

Test Requirement:	47 CFR 15.247(d), 15.209, 15.205
Test Limit:	Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	ANSI C63.10-2020 section 11.11
Procedure:	ANSI C63.10-2020 Section 11.11.1, Section 11.11.2, Section 11.11.3

5.2.5.1. E.U.T. Operation

Operating Environment:					
Temperature:	23.1 °C	Humidity:	55.4 %	Atmospheric Pressure:	103 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

5.2.5.2. Test Setup Diagram

5.2.5.3. Test Result

Pass

5.2.5.4. Test Data

Please Refer to Appendix for Details.

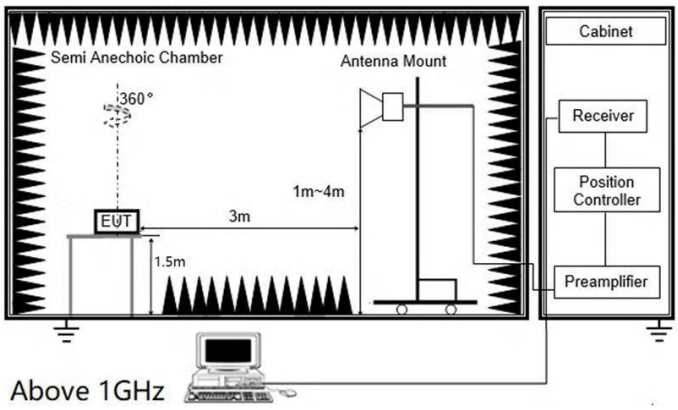
5.2.6. Radiated band edge emission

<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.10</td></tr>
<tr><td>Procedure:</td><td>1. EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find themaximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.
5. Use the following spectrum analyzer settings:
a) Span shall wide enough to fully capture the emission being measured
b) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement
For average measurement: use duty cycle correction factor method (DCCF), Averager level = Peak level + DCCF</td></tr>
</table>

5.2.6.1. E.U.T. Operation

Operating Environment:					
Temperature:	22.5 °C	Humidity:	55.5 %	Atmospheric Pressure:	103 kPa
Pre test mode:	TM1, TM2, TM3				
Final test mode:	TM1, TM2, TM3				

5.2.6.2. Test Setup Diagram



5.2.6.3. Test Result

Pass

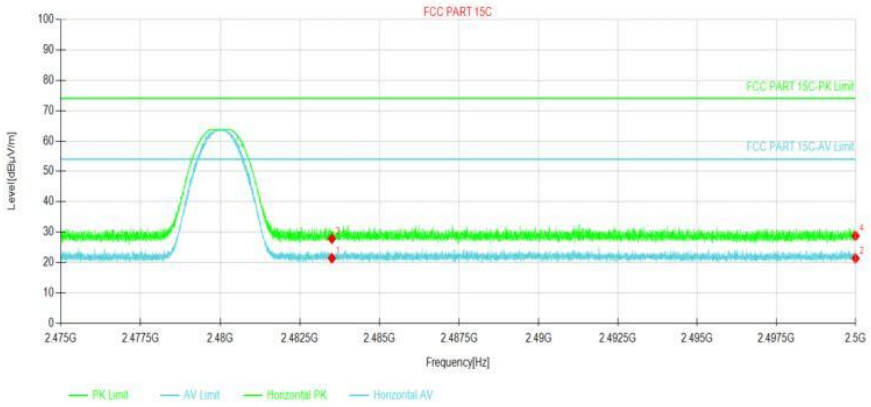
5.2.6.4. Test Data

Note:

1) Level= Reading + Factor; Factor =Antenna Factor+ Cable Loss- Preamp Factor
2) Margin = Limit - Level
3) Average measurement was not performed if peak level is lower than average limit
4) The other emission levels were very low against the limit.

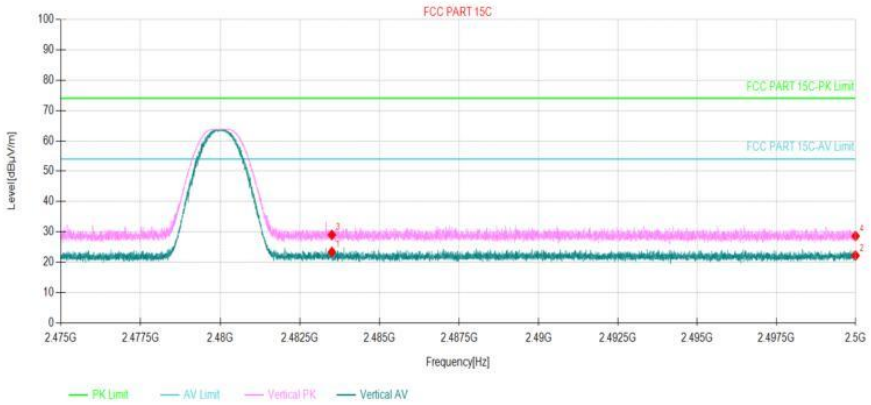
Have pre-scan all test mode, found TM1 mode which it was worst case, so only show the worst case's data on this report.

Mode1 / Polarization: Horizontal / CH: L



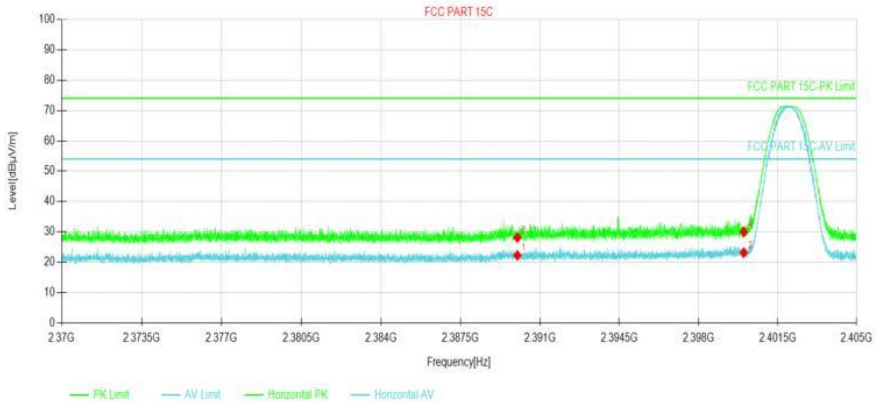
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Polarity	Verdict
1	2483.5	38.42	21.40	-17.02	54.00	32.60	Horizontal	PASS
2	2500	38.30	21.38	-16.92	54.00	32.62	Horizontal	PASS
3	2483.5	44.86	27.84	-17.02	74.00	46.16	Horizontal	PASS
4	2500	45.71	28.79	-16.92	74.00	45.21	Horizontal	PASS

Mode1 / Polarization: Vertical / CH: L



Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Polarity	Verdict
1	2483.5	40.42	23.40	-17.02	54.00	30.60	Vertical	PASS
2	2500	39.14	22.22	-16.92	54.00	31.78	Vertical	PASS
3	2483.5	46.04	29.02	-17.02	74.00	44.98	Vertical	PASS
4	2500	45.56	28.64	-16.92	74.00	45.36	Vertical	PASS

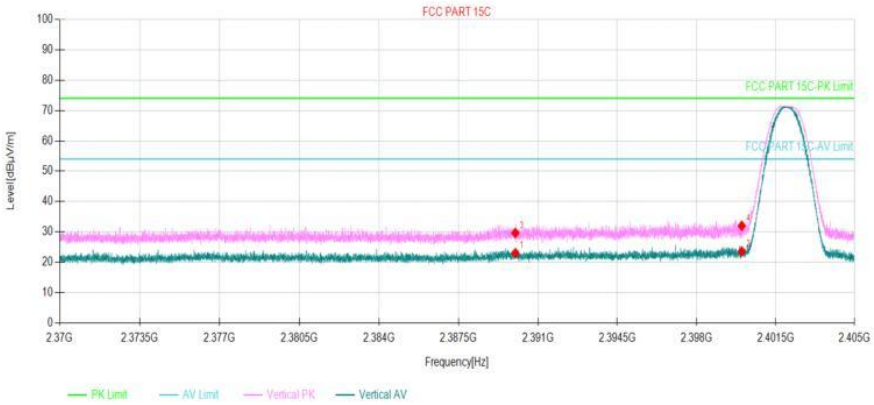
Mode1 / Polarization: Horizontal / CH: H



Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	2390.00	39.83	22.28	-17.55	54.00	31.72	Horizontal	PASS
2	2400.00	40.72	23.19	-17.53	54.00	30.81	Horizontal	PASS
3	2390.00	45.68	28.13	-17.55	74.00	45.87	Horizontal	PASS
4	2400.00	47.58	30.05	-17.53	74.00	43.95	Horizontal	PASS

Mode1 / Polarization: Vertical / CH: H



Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	2390.00	40.56	23.01	-17.55	54.00	30.99	Vertical	PASS
2	2400.00	41.11	23.58	-17.53	54.00	30.42	Vertical	PASS
3	2390.00	47.21	29.66	-17.55	74.00	44.34	Vertical	PASS
4	2400.00	49.55	32.02	-17.53	74.00	41.98	Vertical	PASS

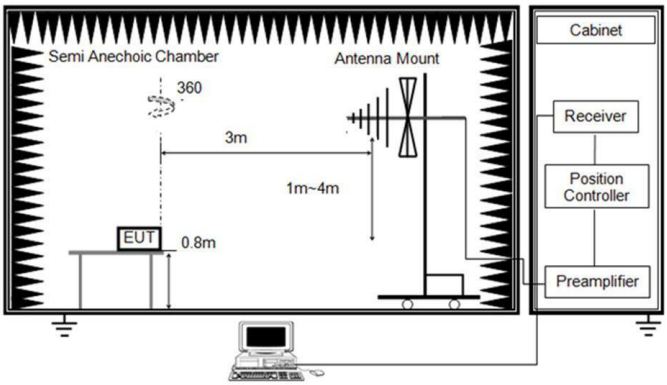
5.2.7. Radiated Spurious Emission (below 1GHz)

<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.6.4</td></tr>
<tr><td>Procedure:</td><td>1. The EUT was setup and tested according to ANSI C63.10.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
a) Span shall wide enough to fully capture the emission being measured;
b) RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.</td></tr>
</table>

5.2.7.1. E.U.T. Operation

Operating Environment:					
Temperature:	22.5 °C	Humidity:	55.5 %	Atmospheric Pressure:	103 kPa
Pre test mode:	TM1, TM2, TM3				
Final test mode:	TM1, TM2, TM3				

5.2.7.2. Test Setup Diagram



Below 1 GHz and above 30 MHz

5.2.7.3. Test Result

Pass

5.2.7.4. Test Data

Note:

1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
2) Margin = Limit – Level
3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.
4) The other emission levels were very low against the limit.
5) This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.

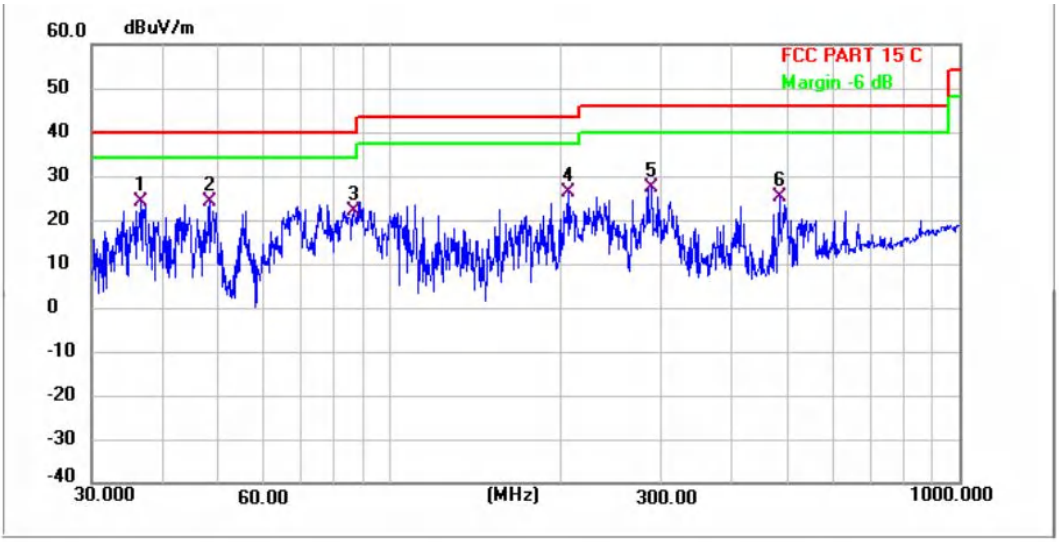
For 9 kHz ~ 30 MHz

The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

For 30 MHz ~ 1000 MHz

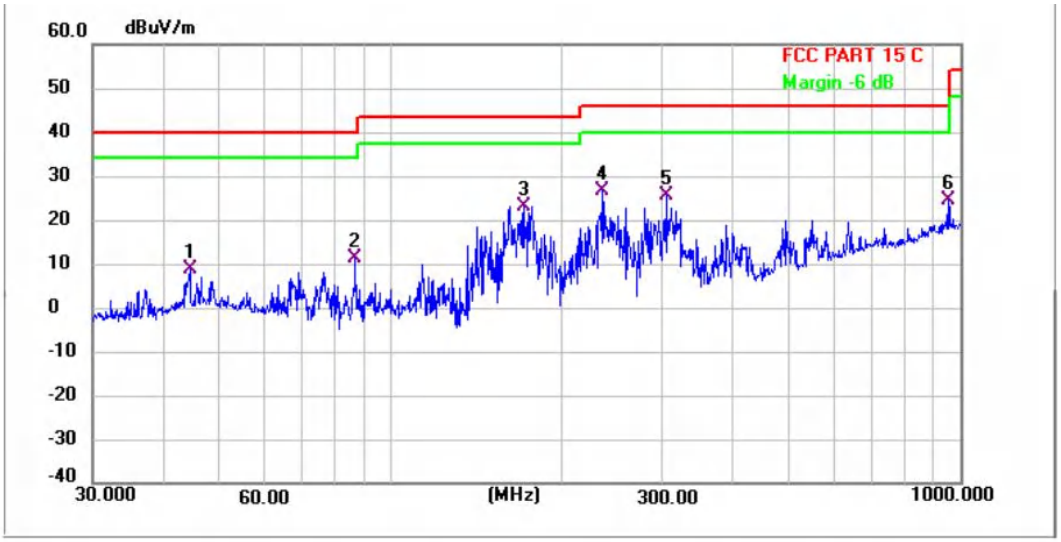
Have pre-scan all test mode, found TM1 mode which it was worst case, so only show the worst case's data on this report.

Mode1 / Polarization: Horizontal / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	36.509	55.52	-31.55	23.97	40.00	-16.03	QP	100	107	P	
2	48.332	53.13	-29.19	23.94	40.00	-16.06	QP	100	7	P	
3	86.503	55.89	-33.76	22.13	40.00	-17.87	QP	100	81	P	
4	205.675	56.01	-29.63	26.38	43.50	-17.12	QP	100	168	P	
5	289.002	54.73	-27.47	27.26	46.00	-18.74	QP	100	330	P	
6	483.909	47.65	-22.40	25.25	46.00	-20.75	QP	100	188	P	

Mode1 / Polarization: Vertical / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	44.431	38.14	-29.50	8.64	40.00	-31.36	QP	100	297	P	
2	86.807	45.11	-33.73	11.38	40.00	-28.62	QP	100	311	P	
3	171.393	55.17	-32.06	23.11	43.50	-20.39	QP	100	250	P	
4 *	235.816	55.61	-28.96	26.65	46.00	-19.35	QP	100	72	P	
5	304.610	52.46	-27.03	25.43	46.00	-20.57	QP	100	224	P	
6	952.094	38.40	-13.99	24.41	46.00	-21.59	QP	100	297	P	

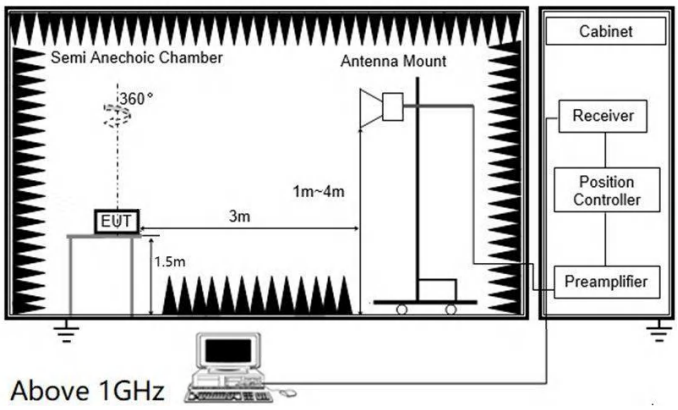
5.2.8. Radiated Spurious Emission (Above 1GHz)

<table>
<tr><td>Test Requirement:</td><td>In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.6.4</td></tr>
<tr><td>Procedure:</td><td>1. The EUT was setup and tested according to ANSI C63.10.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
a) Span shall wide enough to fully capture the emission being measured;
b) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement
For average measurement: use duty cycle correction factor method (DCCF)Averager level = Peak level + DCCF</td></tr>
</table>

5.2.8.1. E.U.T. Operation

Operating Environment:					
Temperature:	22.5 °C	Humidity:	55.5 %	Atmospheric Pressure:	103 kPa
Pre test mode:	TM1, TM2, TM3				
Final test mode:	TM1, TM2, TM3				

5.2.8.2. Test Setup Diagram



5.2.8.3. Test Result

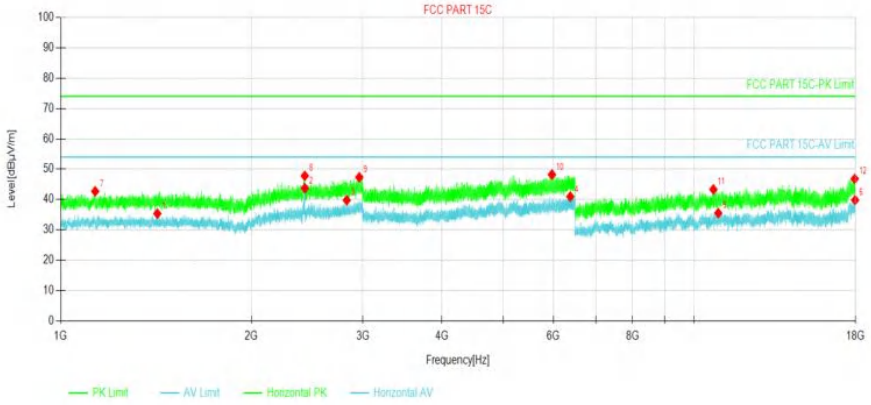
Pass

5.2.8.4. Test Data

For 1 GHz ~ 25 GHz

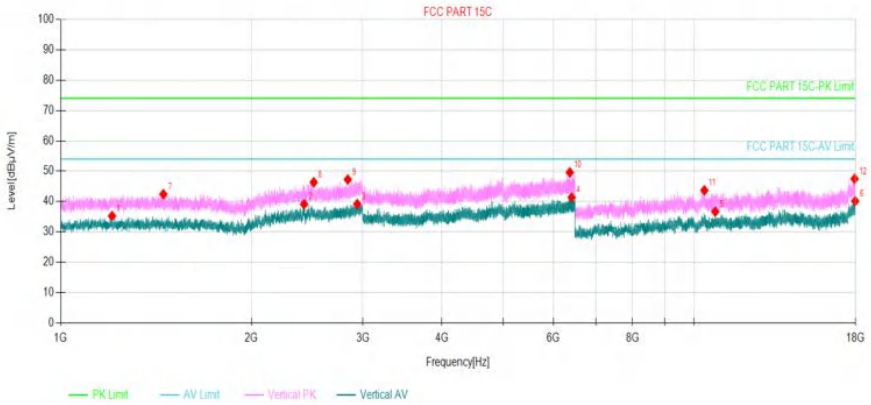
Have pre-scan all test mode, found TM1 mode which it was worst case, so only show the worst case's data on this report.

Mode1 / Polarization: Horizontal / CH: L



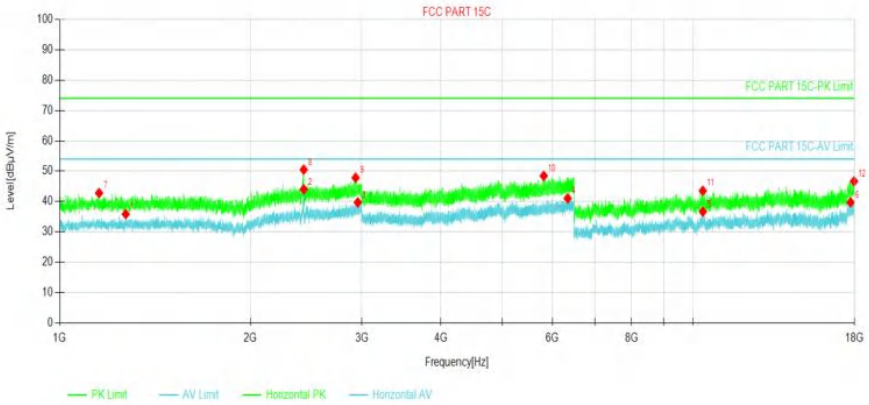
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1421.2	32.37	35.36	2.99	54.00	18.64	Horizontal	PASS
2	2429.2	36.52	43.73	7.21	54.00	10.27	Horizontal	PASS
3	2829.6	31.16	39.79	8.63	54.00	14.21	Horizontal	PASS
4	6379.25	34.58	40.98	6.40	54.00	13.02	Horizontal	PASS
5	10925.2	30.83	35.53	4.70	54.00	18.47	Horizontal	PASS
6	17970.1	26.48	39.82	13.34	54.00	14.18	Horizontal	PASS
7	1133.6	41.40	42.72	1.32	74.00	31.28	Horizontal	PASS
8	2429	40.61	47.82	7.21	74.00	26.18	Horizontal	PASS
9	2962	37.69	47.34	9.65	74.00	26.66	Horizontal	PASS
10	5967.3	43.11	48.25	5.14	74.00	25.75	Horizontal	PASS
11	10733.1	38.77	43.36	4.59	74.00	30.64	Horizontal	PASS
12	17943.6	33.68	46.85	13.17	74.00	27.15	Horizontal	PASS

Mode1 / Polarization: Vertical / CH: L



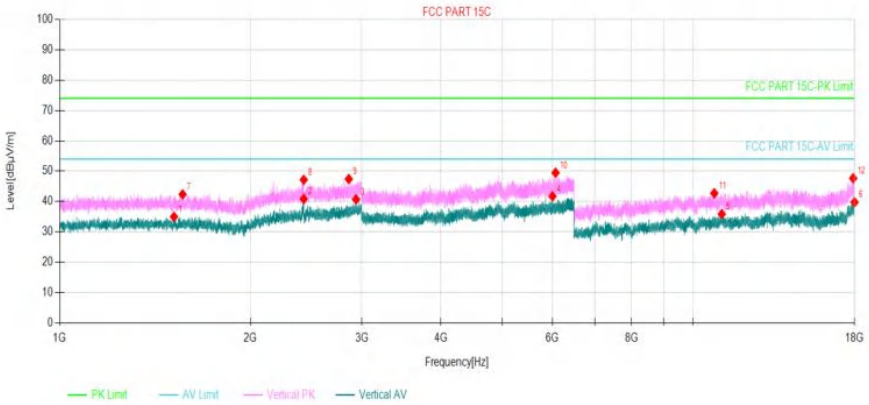
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1205.4	33.45	35.25	1.80	54.00	18.75	Vertical	PASS
2	2423.2	31.96	39.12	7.16	54.00	14.88	Vertical	PASS
3	2940.2	29.72	39.18	9.46	54.00	14.82	Vertical	PASS
4	6412.85	34.84	41.37	6.53	54.00	12.63	Vertical	PASS
5	10807.9	31.82	36.70	4.88	54.00	17.30	Vertical	PASS
6	17973.5	26.78	40.14	13.36	54.00	13.86	Vertical	PASS
7	1452.6	39.33	42.42	3.09	74.00	31.58	Vertical	PASS
8	2509.6	38.67	46.36	7.69	74.00	27.64	Vertical	PASS
9	2840.8	38.55	47.26	8.71	74.00	26.74	Vertical	PASS
10	6367.7	43.27	49.59	6.32	74.00	24.41	Vertical	PASS
11	10389.3	39.57	43.71	4.14	74.00	30.29	Vertical	PASS
12	17935.6	34.38	47.50	13.12	74.00	26.50	Vertical	PASS

Mode1 / Polarization: Horizontal / CH: M



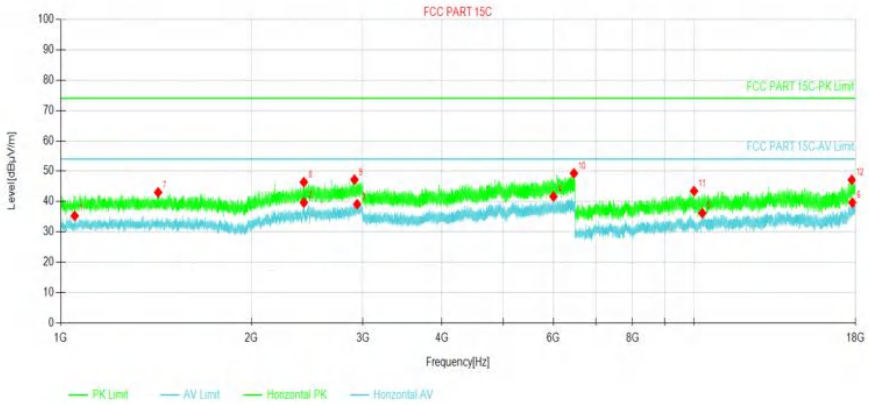
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1271.6	33.65	35.87	2.22	54.00	18.13	Horizontal	PASS
2	2429	36.82	44.03	7.21	54.00	9.97	Horizontal	PASS
3	2956.6	30.12	39.72	9.60	54.00	14.28	Horizontal	PASS
4	6341.8	34.91	41.06	6.15	54.00	12.94	Horizontal	PASS
5	10367.4	32.53	36.69	4.16	54.00	17.31	Horizontal	PASS
6	17737.8	27.44	39.74	12.30	54.00	14.26	Horizontal	PASS
7	1154	41.34	42.80	1.46	74.00	31.20	Horizontal	PASS
8	2428.8	43.31	50.52	7.21	74.00	23.48	Horizontal	PASS
9	2933.4	38.45	47.85	9.40	74.00	26.15	Horizontal	PASS
10	5814	43.85	48.46	4.61	74.00	25.54	Horizontal	PASS
11	10366.3	39.38	43.55	4.17	74.00	30.45	Horizontal	PASS
12	17963.2	33.38	46.68	13.30	74.00	27.32	Horizontal	PASS

Mode1 / Polarization: Vertical / CH: M



Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1515.4	31.77	35.00	3.23	54.00	19.00	Vertical	PASS
2	2429	33.67	40.88	7.21	54.00	13.12	Vertical	PASS
3	2937.6	31.29	40.73	9.44	54.00	13.27	Vertical	PASS
4	6000.55	36.47	41.74	5.27	54.00	12.26	Vertical	PASS
5	11105.7	31.08	35.90	4.82	54.00	18.10	Vertical	PASS
6	17997.7	26.28	39.80	13.52	54.00	14.20	Vertical	PASS
7	1563.6	39.14	42.37	3.23	74.00	31.63	Vertical	PASS
8	2428.8	39.97	47.18	7.21	74.00	26.82	Vertical	PASS
9	2861	38.56	47.41	8.85	74.00	26.59	Vertical	PASS
10	6067.75	44.14	49.49	5.35	74.00	24.51	Vertical	PASS
11	10805.6	37.85	42.73	4.88	74.00	31.27	Vertical	PASS
12	17910.3	34.73	47.69	12.96	74.00	26.31	Vertical	PASS

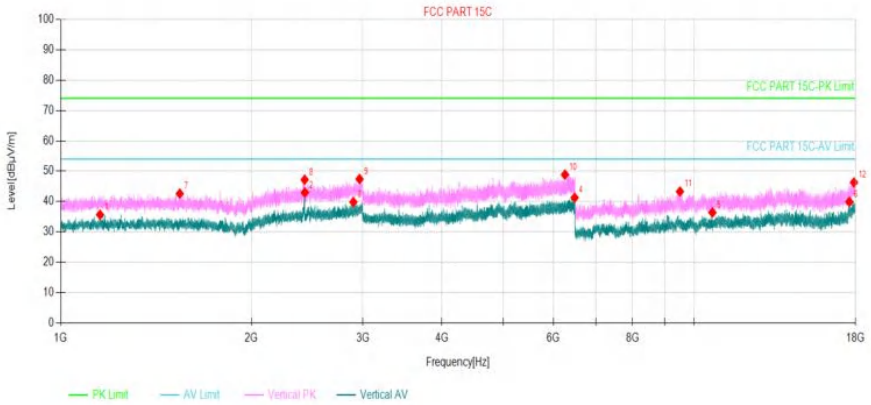
Mode1 / Polarization: Horizontal / CH: H



Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1052.2	34.77	35.28	0.51	54.00	18.72	Horizontal	PASS
2	2421.2	32.51	39.66	7.15	54.00	14.34	Horizontal	PASS
3	2938.6	29.67	39.12	9.45	54.00	14.88	Horizontal	PASS
4	6000.55	36.40	41.67	5.27	54.00	12.33	Horizontal	PASS
5	10308.8	31.97	36.20	4.23	54.00	17.80	Horizontal	PASS
6	17798.7	26.50	39.62	13.12	54.00	14.38	Horizontal	PASS
7	1425.2	40.02	43.03	3.01	74.00	30.97	Horizontal	PASS
8	2421	39.25	46.40	7.15	74.00	27.60	Horizontal	PASS
9	2910.2	38.01	47.22	9.21	74.00	26.78	Horizontal	PASS
10	6462.9	42.77	49.30	6.53	74.00	24.70	Horizontal	PASS
11	10002.9	40.25	43.47	3.22	74.00	30.53	Horizontal	PASS
12	17755.0	34.61	47.14	12.53	74.00	26.86	Horizontal	PASS

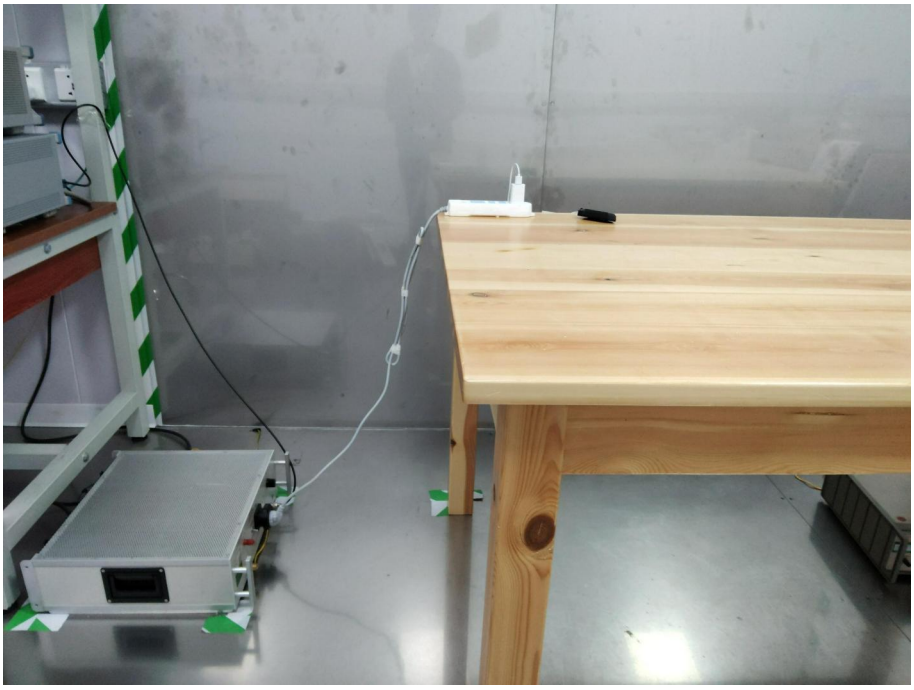
Mode1 / Polarization: Vertical / CH: H



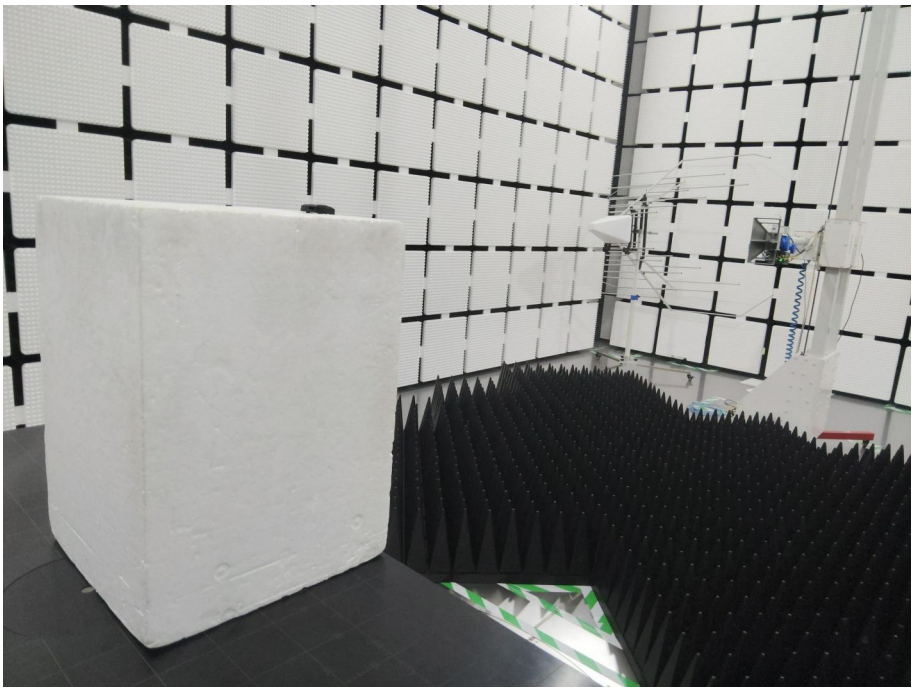
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	1153.8	34.21	35.67	1.46	54.00	18.33	Vertical	PASS
2	2429.8	35.80	43.01	7.21	54.00	10.99	Vertical	PASS
3	2899	30.73	39.84	9.11	54.00	14.16	Vertical	PASS
4	6479	34.76	41.29	6.53	54.00	12.71	Vertical	PASS
5	10696.3	31.96	36.40	4.44	54.00	17.60	Vertical	PASS
6	17597.5	27.37	39.91	12.54	54.00	14.09	Vertical	PASS
7	1541.8	39.38	42.61	3.23	74.00	31.39	Vertical	PASS
8	2428	40.01	47.21	7.20	74.00	26.79	Vertical	PASS
9	2964.4	37.75	47.42	9.67	74.00	26.58	Vertical	PASS
10	6258.15	43.09	48.87	5.78	74.00	25.13	Vertical	PASS
11	9504.95	40.13	43.30	3.17	74.00	30.70	Vertical	PASS
12	17896.5	33.41	46.31	12.90	74.00	27.69	Vertical	PASS

6. TEST SETUP PHOTOS

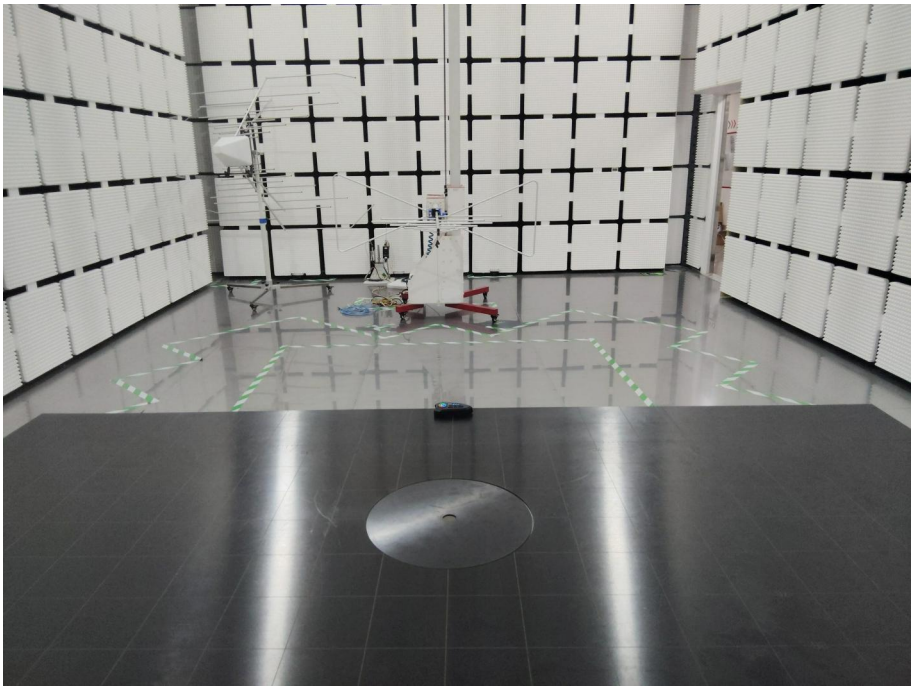
Conducted Emission at AC power line



Radiated Spurious Emission (Above 1GHz)

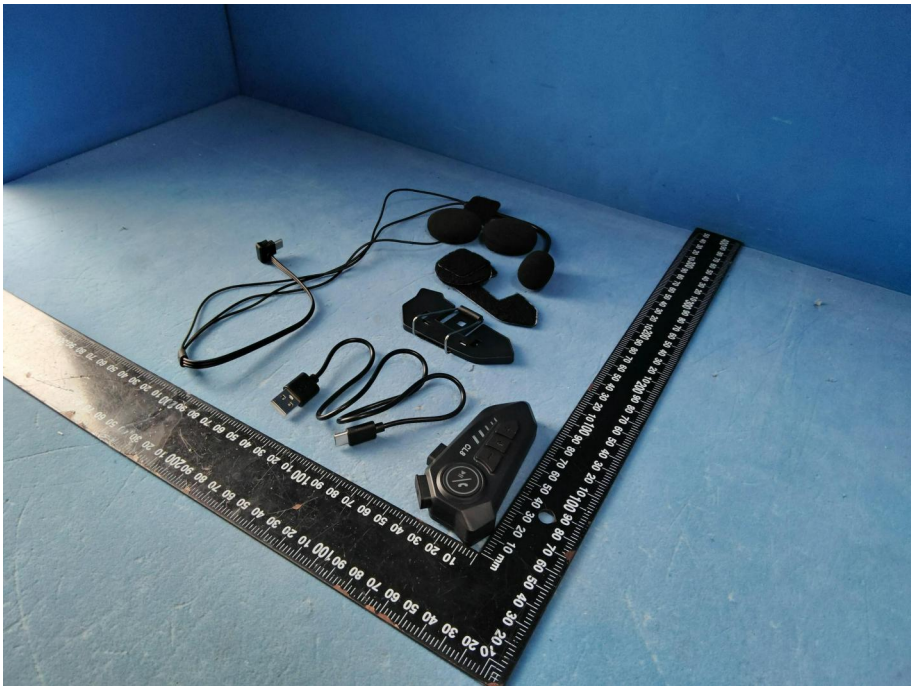


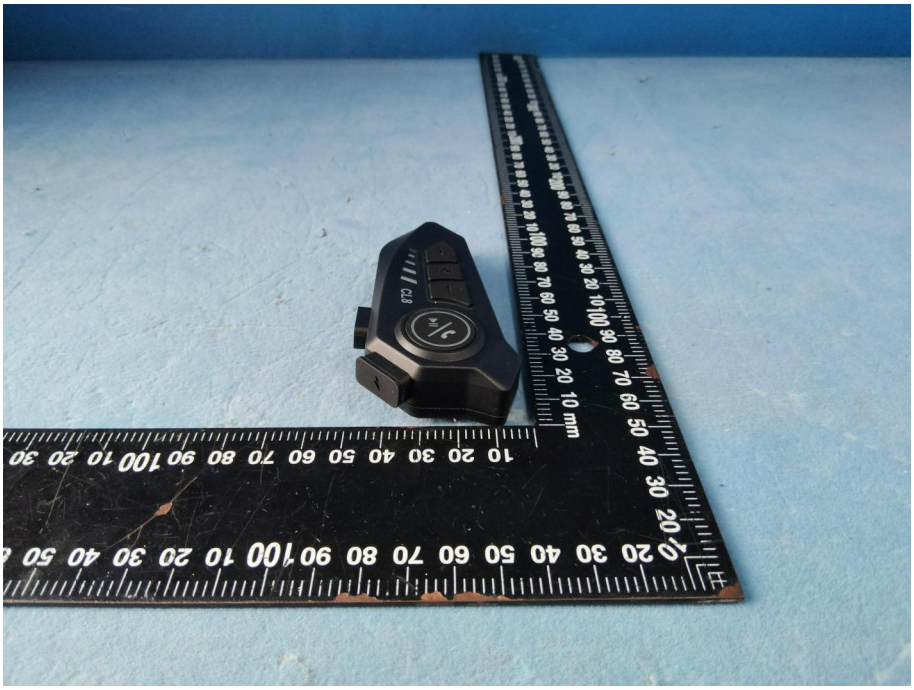
Radiated Spurious Emission (below 1GHz)

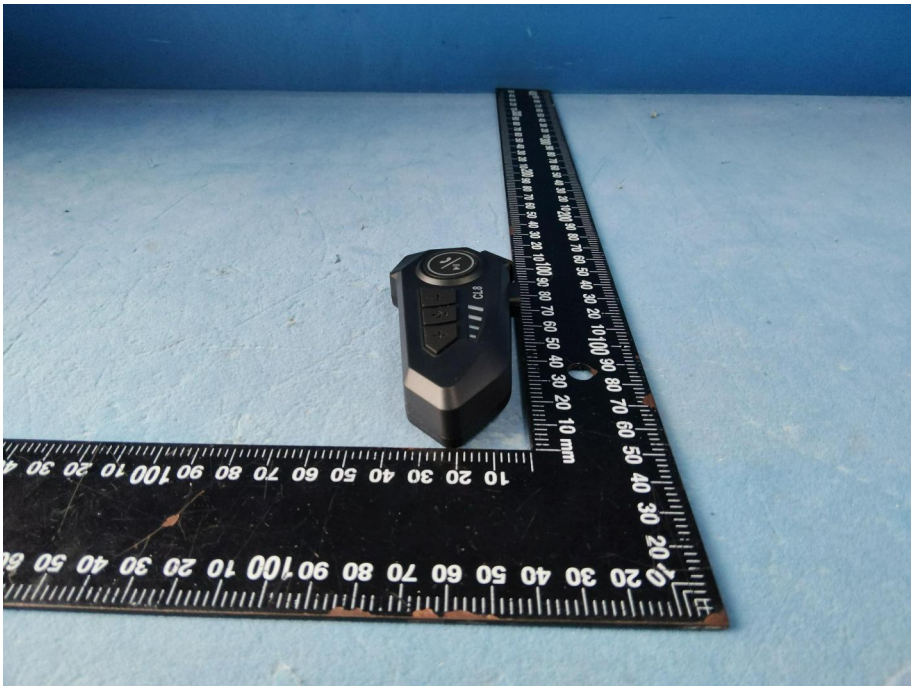


7. EXTERNAL AND INTERNAL PHOTOS

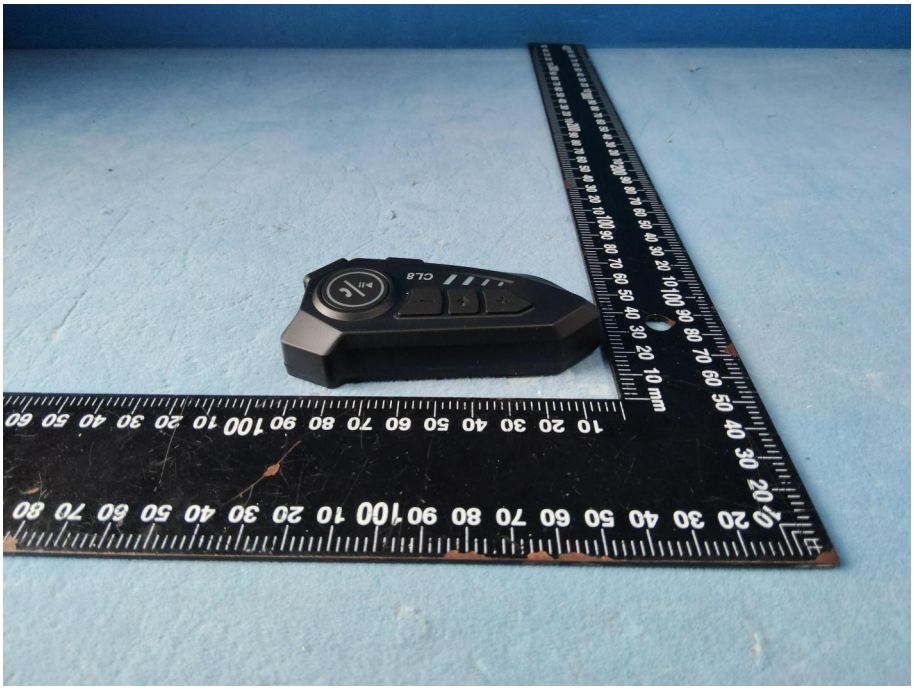
7.1. External Photos



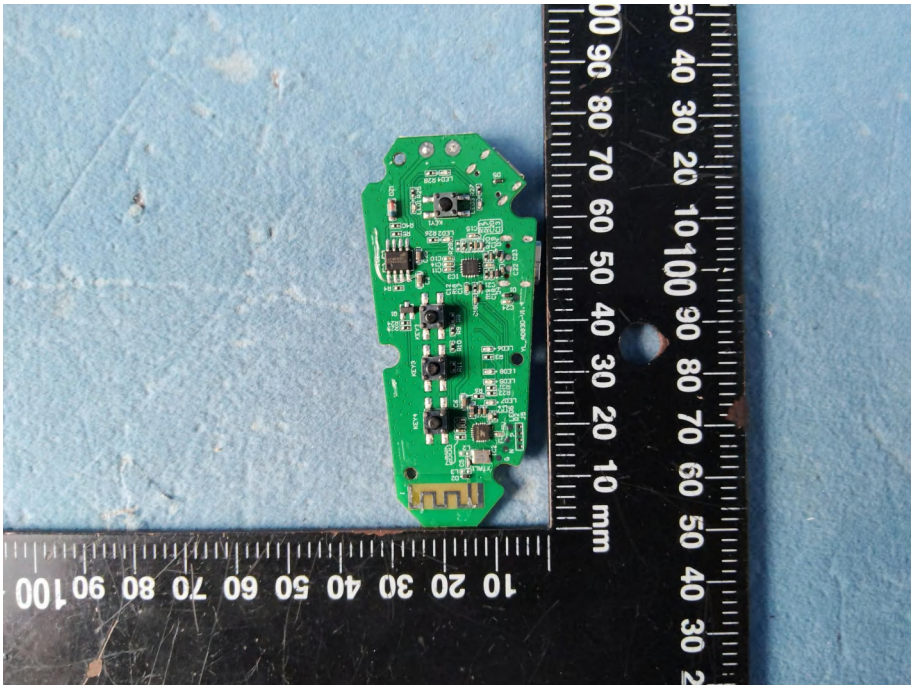


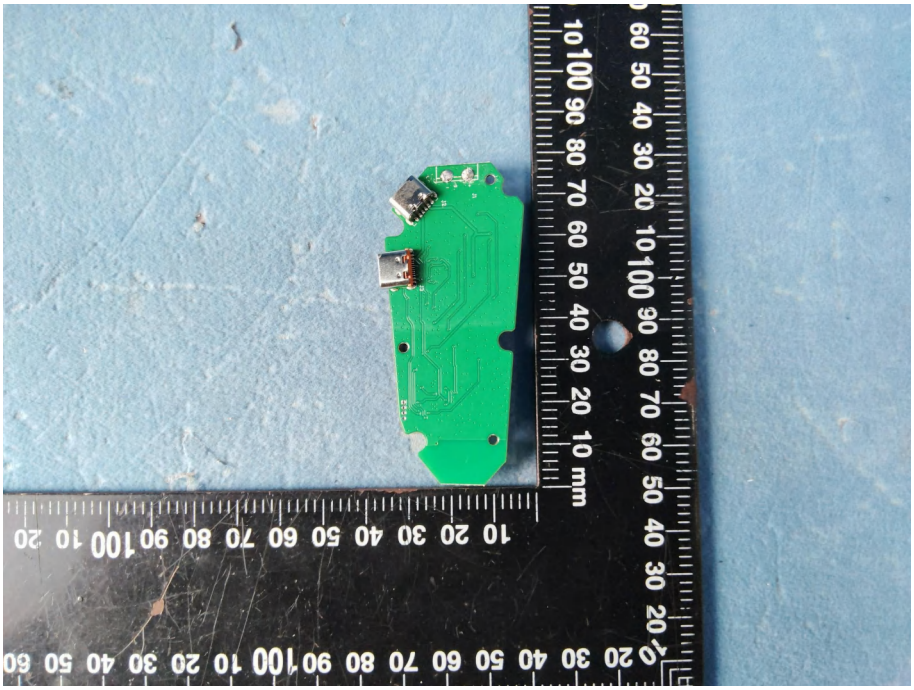

CL3

CL8

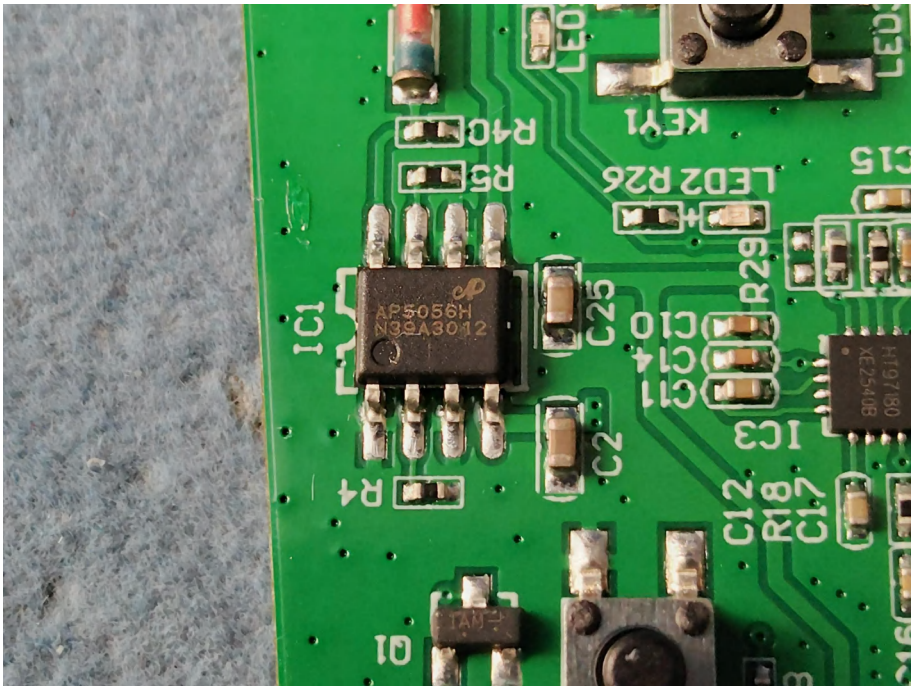

CL8

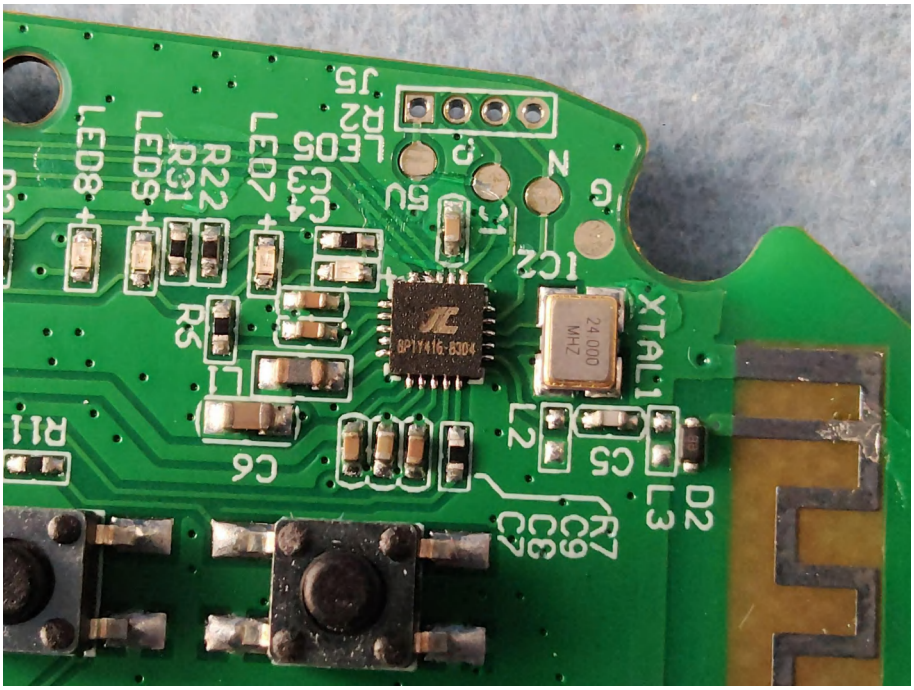
7.2. Internal Photos

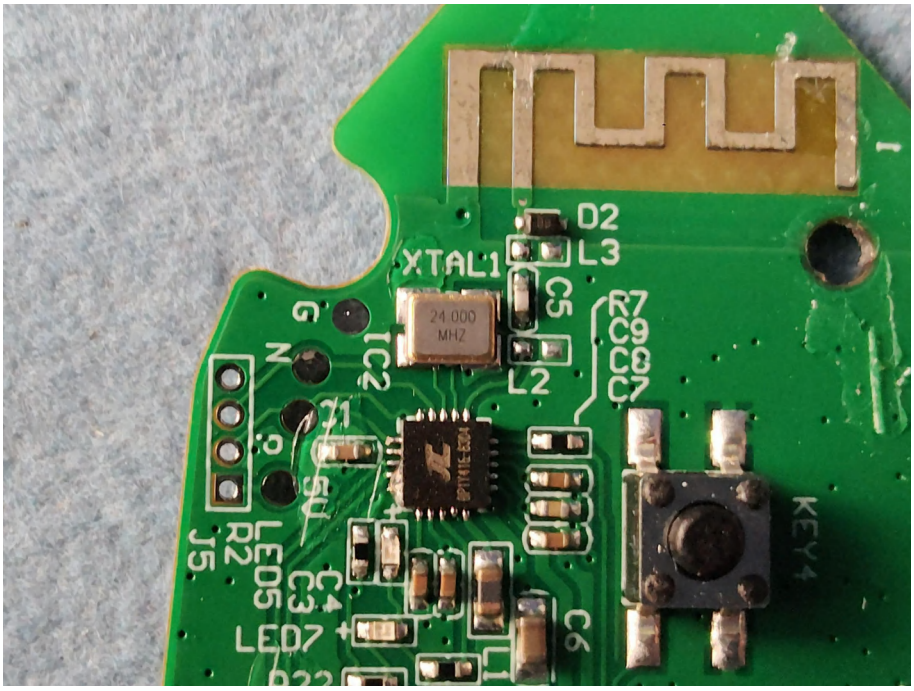


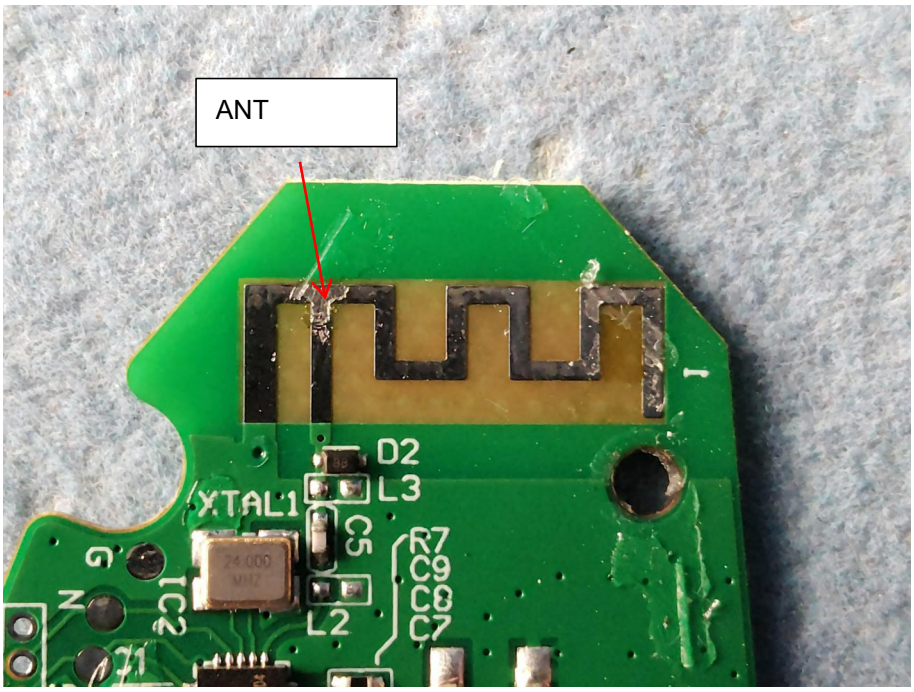


- SX 802035PL
500mAh 1.85Wh
+ 3.7V 240814ACK114


AP5056H
N39A3012
IC1
C25
C2
R4
R5
R40
KEY1
LED2 R26
R29
C10
C14
C11
IC3
C12
R18
C17
Q1


J5
R2
LED5
C3
C4
LED7
R22
R31
LED9
LED8
R5
L1
R11
C6
5U
C1
N
G
IC2
XTAL1
24.000
MHZ
L2
C5
L3
D2
R7
C9
C8
C7


D2
L3
XTAL1
C5
24.000
MHZ
R7
C9
C8
C7
L2
G
N
IC2
C1
5U
J5
R2
LED5
C3
C4
LED7
C6
KEY4



------End of the report-----