RF Test Report

For

Safemo Pte. Ltd.

Test Standards:	FCC Part 15 Subpart C
Product Name:	Smart Battery Cam
Tested Model:	SS131
Additional Model No.:	N/A
Brand Name:	N/A
FCC ID:	2BC5I-SS131
Classification	(DTS) Digital Transmission System
Report No.:	EC2409031RF01
Tested Date:	2024-12-18 to 2025-01-08
Issued Date:	2025-01-11
Prepared By:	Laxy Ruan / Engineer
Approved By:	Tiny Yang / RF Manager

Hunan Ecloud Testing Technology Co., Ltd.

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	2025-01-11	Valid	Original Report

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Summary Of Test Result

FCC Rule	Description	Limit	Result	Remark
15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
-	99% Bandwidth	-	Pass	-
15.247(b)(3)	Output Power	≤ 30dBm	Pass	-
15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
15.247(d)	Conducted Band Edges and Spurious Emission	≤ 20dBc	Pass	-
15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 4.16 dB at 4960 MHz
15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 25.76 dB at 7.329 MHz
15.203 & 15.247(b)	Antenna Requirement	-	Pass	-

1 Test Laboratory

1.1 Test facility

CNAS (accreditation number: L11138)

Hunan Ecloud Testing Technology Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1244 , Test Firm Registration Number: 793308)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

ISED(CAB identifier: CN0012, ISED# :24347)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the Wireless Device Testing Laboratories list of innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements.

A2LA (Certificate Code : 4895.01)

Hunan Ecloud Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

2 General Description

2.1 Applicant

Safemo Pte. Ltd.
61 BUKIT BATOK CRESCENT #05-505,HENG LOONG BUILDING,SINGAPORE

2.2 Manufacturer

Safemo Pte. Ltd.
61 BUKIT BATOK CRESCENT #05-505,HENG LOONG BUILDING,SINGAPORE

2.3 General Description Of EUT

Product	Smart Battery Cam
Model No.	SS131
Additional No.	N/A
Difference Description	N/A
FCC ID	2BC5I-SS131
Power Supply	3.6Vdc From Battery
Modulation Technology	BLE
Modulation Type	GFSK
Operating Frequency	2402MHz~2480MHz
Number Of Channel	40
Max. Output Power	4.59 dBm (0.00288 W)
Antenna Type	PCB Antenna with -3.38dBi gain
HW Version	SS131_C02_V4
SW Version	1.9.10
Sample no.	2409031R-1/4~4/4
Sample Received Date	2024-12-17
I/O Ports	Refer to user's manual

NOTE:

1. The above EUT information is declared by manufacturer. The laboratory is not responsible for the information provided by the manufacturer.
2. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

2.4 Test Location

All tests were performed at:

Building A1, Changsha E Centre, No. 18 Xiangtai Avenue, Liuyang Economic and Technological Development Zone, Hunan, P.R.C.

Telephone: +86 (0) 731 8963 4887 Fax:+86 (0) 731 8963 4887

No tests were sub-contracted.

2.5 Modification of EUT

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

2.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C
- ANSI C63.10-2020
- KDB 558074 D01 15.247 Meas Guidance v05r02

3 Test Configuration of Equipment Under Test

3.1 Descriptions of Test Mode

The transmitter has a maximum peak conducted output power as follows:

Channel	Frequency	Mode	Bluetooth RF Output Power
Ch00	2402MHz	GFSK	4.45
Ch19	2440MHz	GFSK	4.43
Ch39	2480MHz	GFSK	4.59

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

3.2 Test Mode

3.2.1 Antenna Port Conducted Measurement

Summary table of Test Cases	
Test Item	Modulation
	BLE
Conducted Test Cases	Mode 1: CH00_2402 MHz Mode 2: CH19_2440 MHz Mode 3: CH39_2480 MHz

3.2.2 Radiated Emission Test (Below 1GHz)

Radiated	BLE
Test Cases	Mode 1: CH39_2480 MHz

Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type. Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

2. Following channel(s) was (were) selected for the final test as listed above.

3.2.3 Radiated Emission Test (Above 1GHz)

Summary table of Test Cases	
Test Item	**Modulation**
	BLE
Conducted Test Cases	Mode 1: CH00_2402 MHz Mode 2: CH19_2440 MHz Mode 3: CH39_2480 MHz

Note : 1. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

2. Following channel(s) was (were) selected for the final test as listed above.

3. For frequency above 18GHz, the measured value is much lower than the limit, therefore, it is not reflected in the report.

3.2.4 Power Line Conducted Emission Test

AC Conducted Emission	Mode 1 :Adapter + Notebook

3.3 Support Equipment

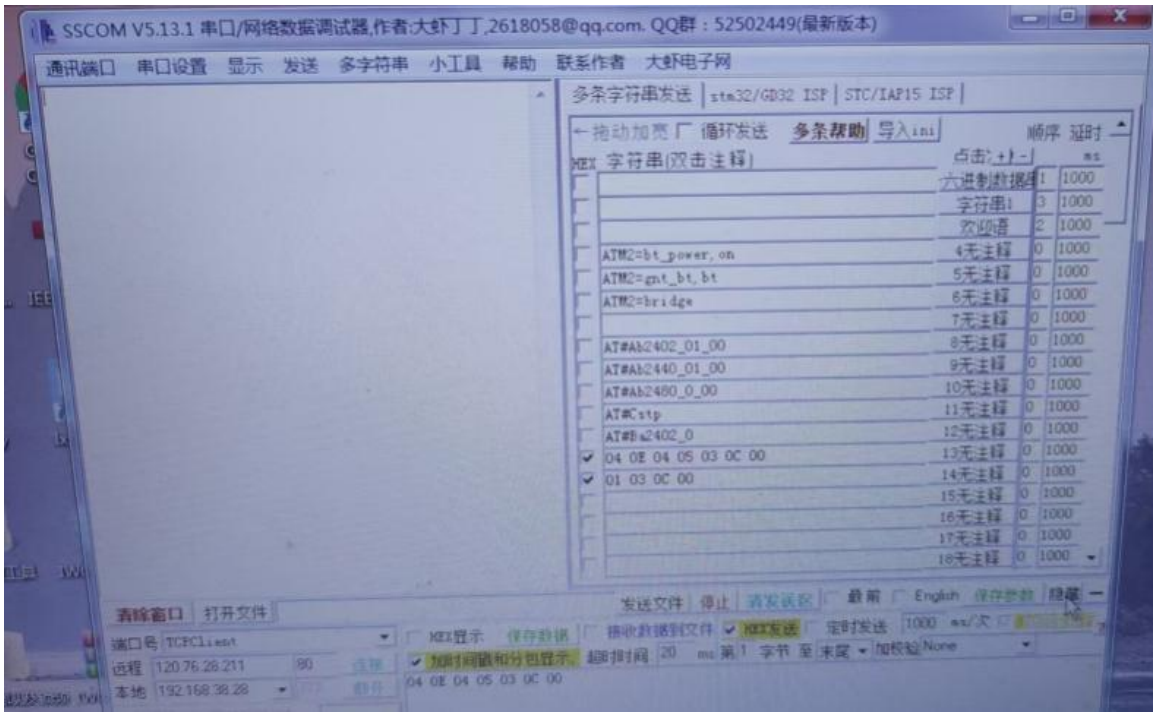
Item	Equipment	Trade Name	Model Name	Serial Number	Note
1.	Notebook	Lenovo	E580	PF-12XLH6	SDoC
2.	Adapter	Xiaomi	MDY-12-EF	TA62212E209292G	SDoC

3.4 Test Setup

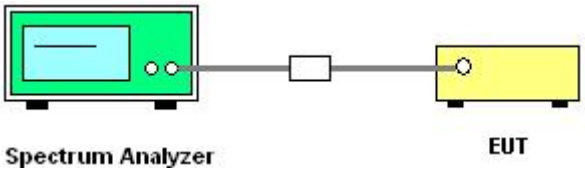
For Bluetooth test items, an engineering test program was provided and enabled to make EUT continuous transmitting and receiving signals.

The following picture is a screenshot of the test software.

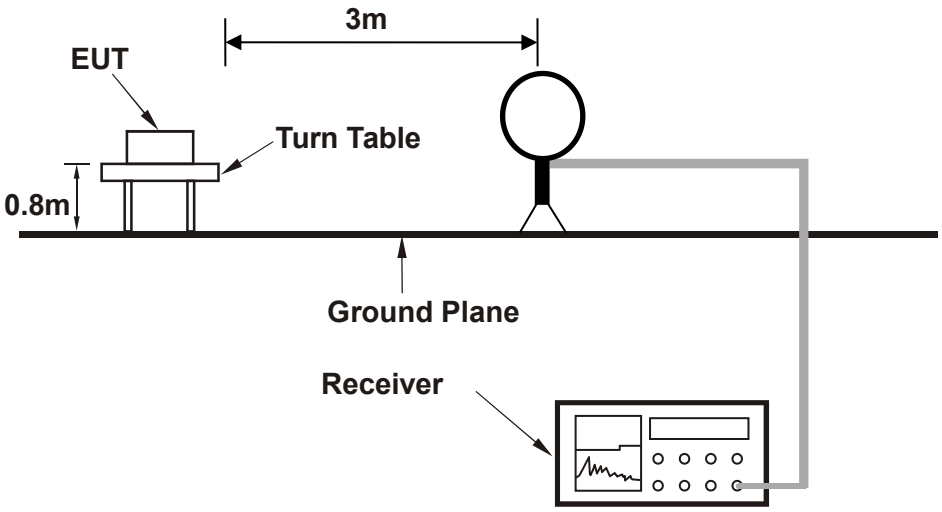
SSCOM V5.13.1



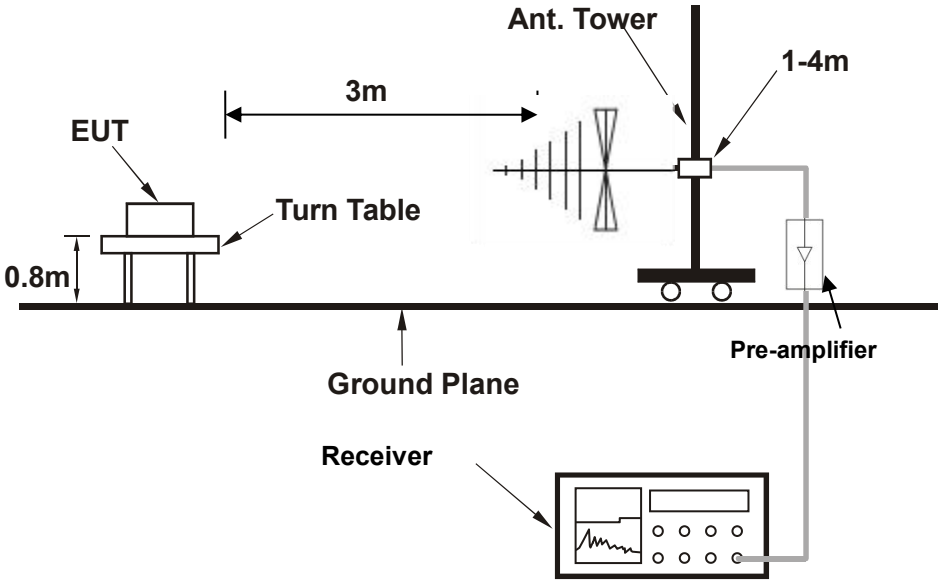
Setup diagram for Conducted Test



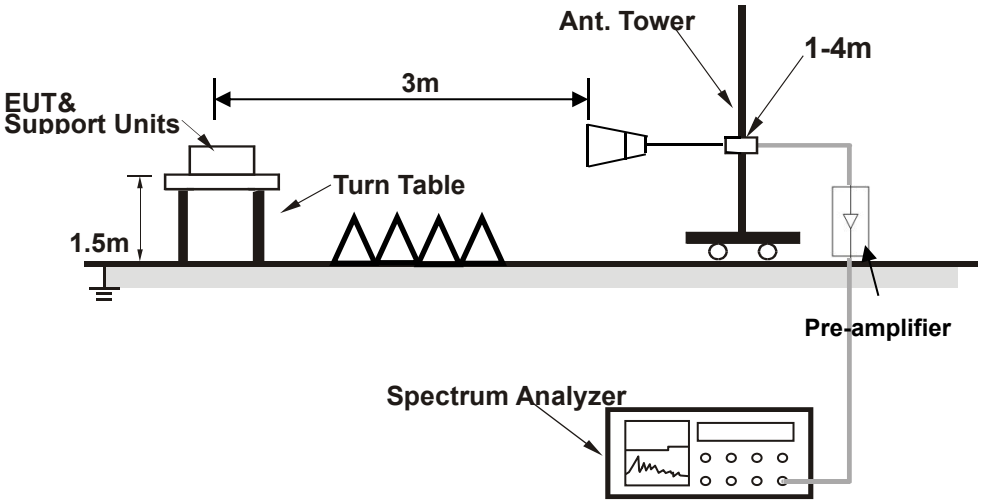
Setup diagram for Radiation(9KHz~30MHz) Test



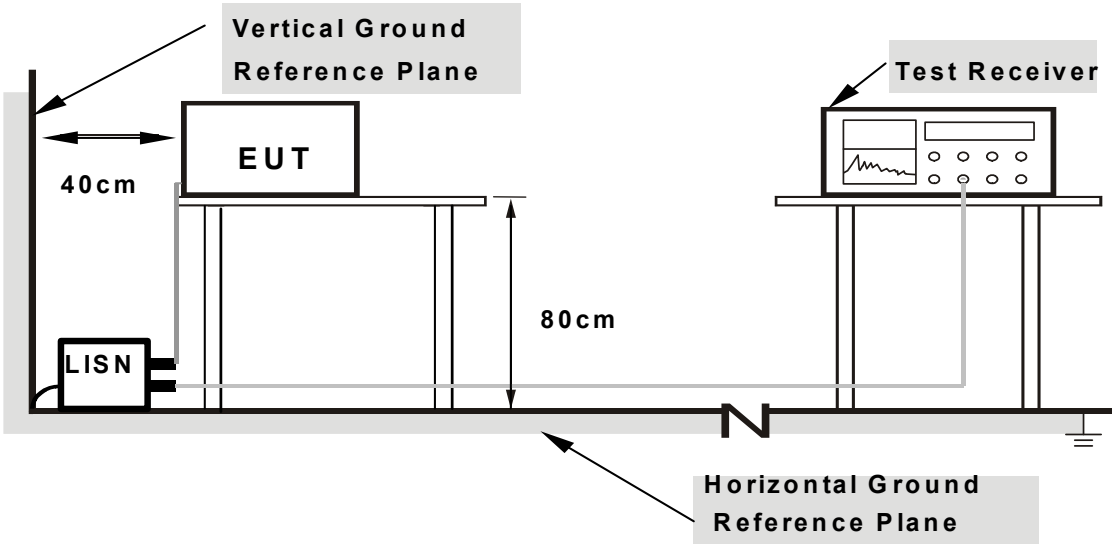
Setup diagram for Radiation(Below 1G) Test



Setup diagram for Radiation(Above1G) Test



Setup diagram for AC Conducted Emission Test



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 5 + 10 = 15 (dB)

For all radiated test items:

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Over Limit (dBμV/m) = Level(dBμV/m) - Limit Level (dBμV/m)

4 Test Result

4.1 6dB and 99% Bandwidth Measurement

4.1.1 Limit of 6dB and 99% Bandwidth

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

4.1.2 Test Procedures

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. Set to the maximum power setting and enable Transmitting the EUT transmit continuously
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz. Set the Video bandwidth (VBW) ≥ [3 × RBW]. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be at least three times the RBW.

4.1.3 Test Result of 6dB Bandwidth

Please refer to Appendix A of this report.

4.1.4 Test Result of 99% Bandwidth

Please refer to Appendix B of this report.

4.2 Output Power Measurement

4.2.1 Limit of Output Power

FCC §15.247 (b)(3)

For systems using digital modulation in the 2400-2483.5 MHz bands: 30dBm.

4.2.2 Test Procedures

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to spectrum analyzer.
3. Set to the maximum power setting and enable Transmitting the EUT transmit continuously.
4. Measure the duty cycle, x, of the transmitter output signal as described in below:
   a. Set the center frequency of the instrument to the center frequency of the transmission.
   b. Set RBW to the largest available Transmitting value.
   c. Set detector = peak
5. Set span to 6MHz.Set RBW=2MHz,VBW=6MHz, Sweep time = auto. Detector = Peak.
6. Allow the sweep to “free run". Allow trace to fully stabilize.
7. Use peak marker function to determine the peak amplitude level.

4.2.3 Test Result of Duty Cycle

Please refer to Appendix G of this report.

4.2.4 Test Result of Output Power

Please refer to Appendix C of this report.

4.3 Power Spectral Density Measurement

4.3.1 Limits of Power Spectral Density

FCC§15.247(e)

The power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

4.3.2 Test Procedure

1. Turn on the EUT and connect it to measurement instrument.
2. Set span to 2MHz.Set RBW= 10 KHz,VBW=30 KHz.
3. Detector = Peak, Sweep time = auto couple, Trace mode = max hold mode. Use the peak marker function to determine the maximum power level.
4. Measure and record the results in the test report. The Result[dBm/3kHz]= Result[dBm/10kHz]-10*log10(10/3).

4.3.3 Test Result of Power Spectral Density

Please refer to Appendix D of this report.

4.4 Conducted Band Edges and Spurious Emission Measurement

4.4.1 Limit of Conducted Band Edges and Spurious Emission

FCC §15.247 (d)

Maximum conducted (peak) output power was used to determine compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).

4.4.2 Test Procedures

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
1. Turn on the EUT and connect it to measurement instrument.
2. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
3. Measure and record the results in the test report.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

4.4.3 Test Result of Conducted Band Edges

Please refer to Appendix E of this report.

4.4.4 Test Result of Conducted Spurious Emission

Please refer to Appendix F of this report.

4.5 Radiated Band Edges and Spurious Emission Measurement

4.5.1 Limit of Radiated Band Edges and Spurious Emission

FCC §15.247 (d)

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

4.5.2 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The measurement distance is 3 meter.
3. 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.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:

   (1)Span shall wide enough to fully capture the emission being measured;

   (2)Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW≥3×RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak

   (3)For average measurement:

   VBW = 10 Hz, when duty cycle is no less than 98 percent.

   VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

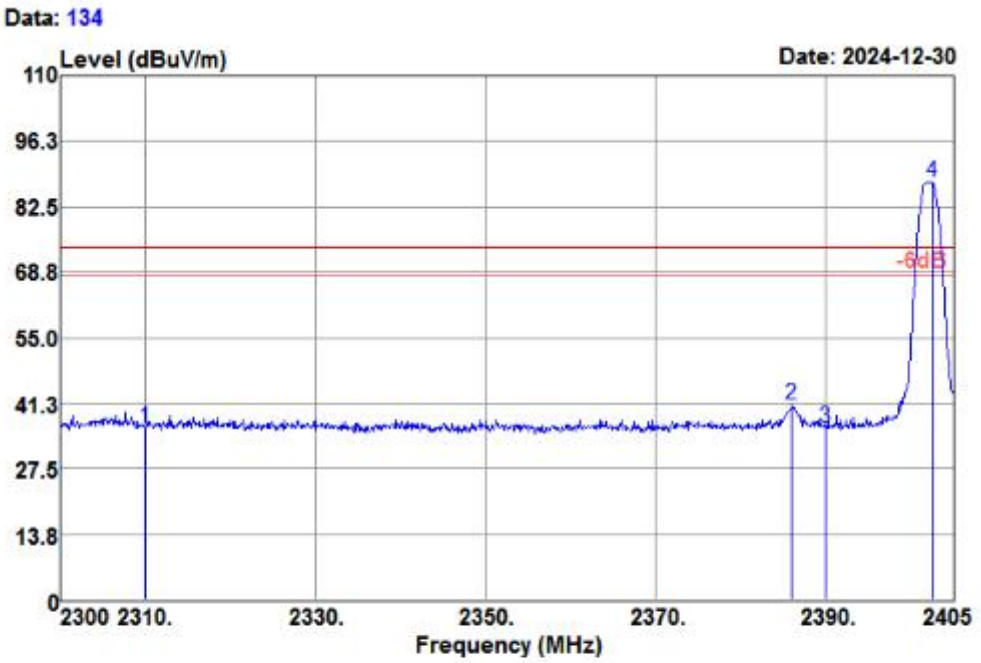
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.5.3 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

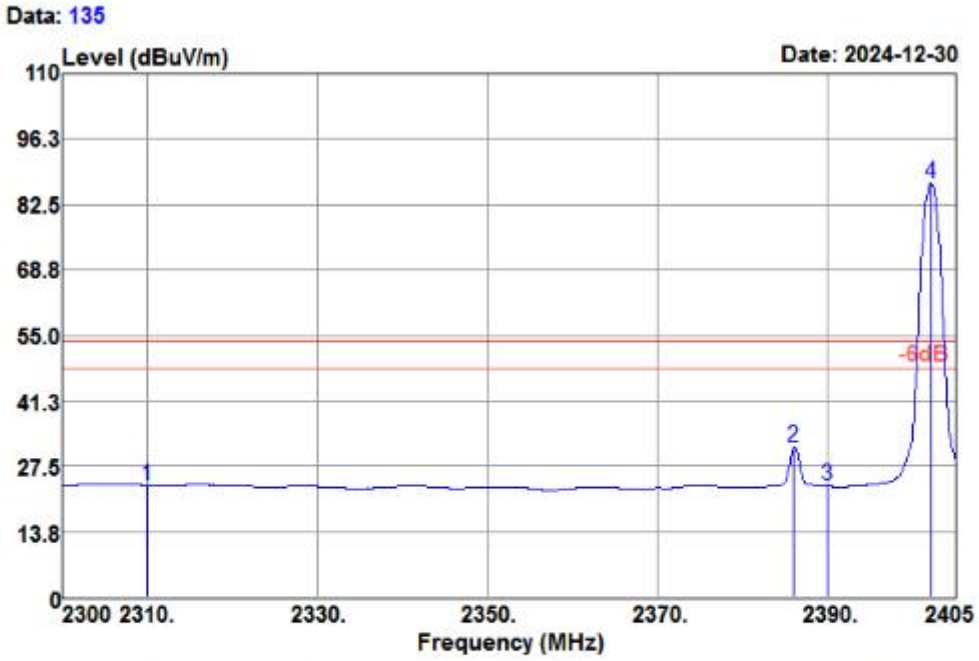
4.5.4 Test Result of Radiated Spurious at Band Edges

Test Mode :	BLE CH00 (2402 MHz)	**Temperature :**	23℃
Test Engineer :	Jack Liu	**Relative Humidity :**	62%
Frequencey Range	2.3GHz~2.405GHz	**Polarization :**	Horizontal



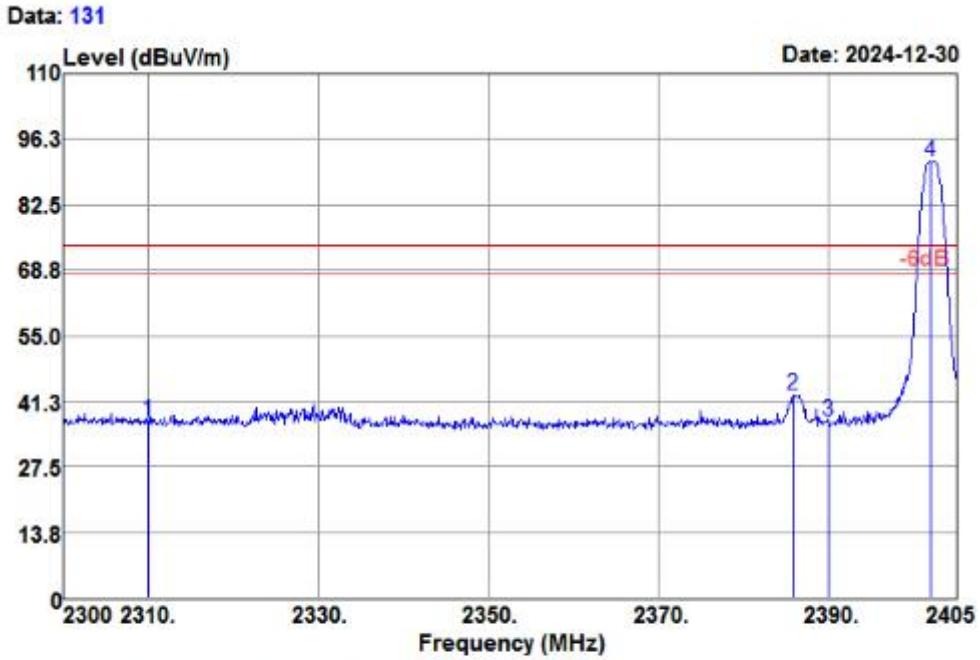
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	40.86	27.46	3.51	35.94	35.89	74.00	-38.11	Peak
2385.995	46.04	27.48	3.57	36.14	40.95	74.00	-33.05	Peak
2390.000	40.96	27.54	3.57	36.15	35.92	74.00	-38.08	Peak
2402.375	92.60	27.70	3.58	36.19	87.69	74.00	13.69	Peak

Test Mode :	BLE CH00 (2402 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	2.3GHz~2.405GHz	Polarization :	Horizontal



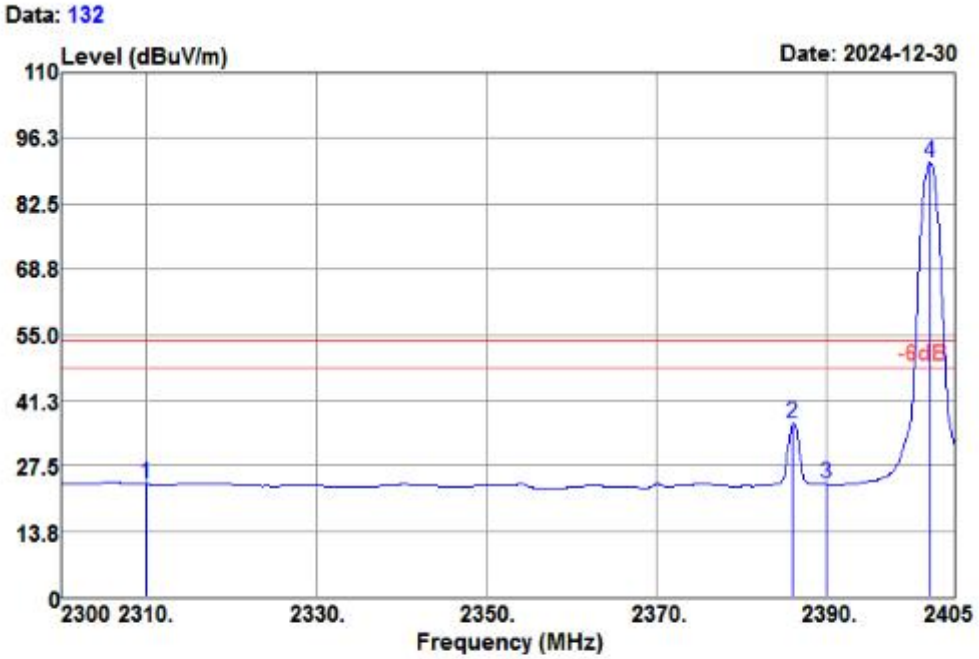
Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2310.000	28.45	27.46	3.51	35.94	23.48	54.00	-30.52	Average
2385.995	36.64	27.48	3.57	36.14	31.55	54.00	-22.45	Average
2390.000	28.30	27.54	3.57	36.15	23.26	54.00	-30.74	Average
2402.060	92.01	27.70	3.58	36.19	87.10	54.00	33.10	Average

Test Mode :	BLE CH00 (2402 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	2.3GHz~2.405GHz	Polarization :	Vertical



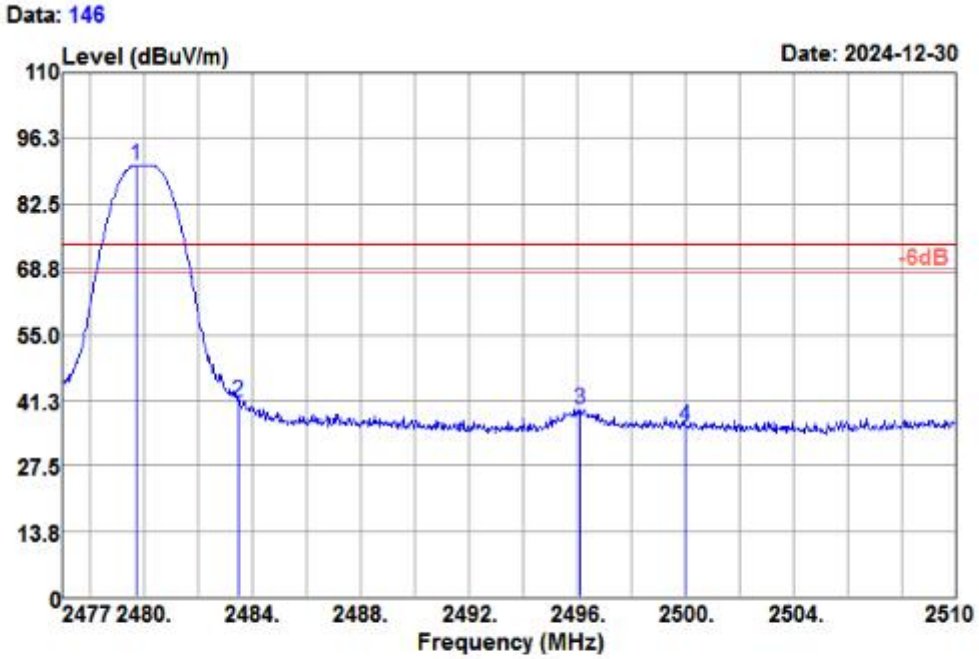
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	42.11	27.46	3.51	35.94	37.14	74.00	-36.86	Peak
2385.785	47.75	27.47	3.57	36.14	42.65	74.00	-31.35	Peak
2390.000	42.06	27.54	3.57	36.15	37.02	74.00	-36.98	Peak
2401.850	96.56	27.70	3.58	36.18	91.66	74.00	17.66	Peak

Test Mode :	BLE CH00 (2402 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	2.3GHz~2.405GHz	Polarization :	Vertical



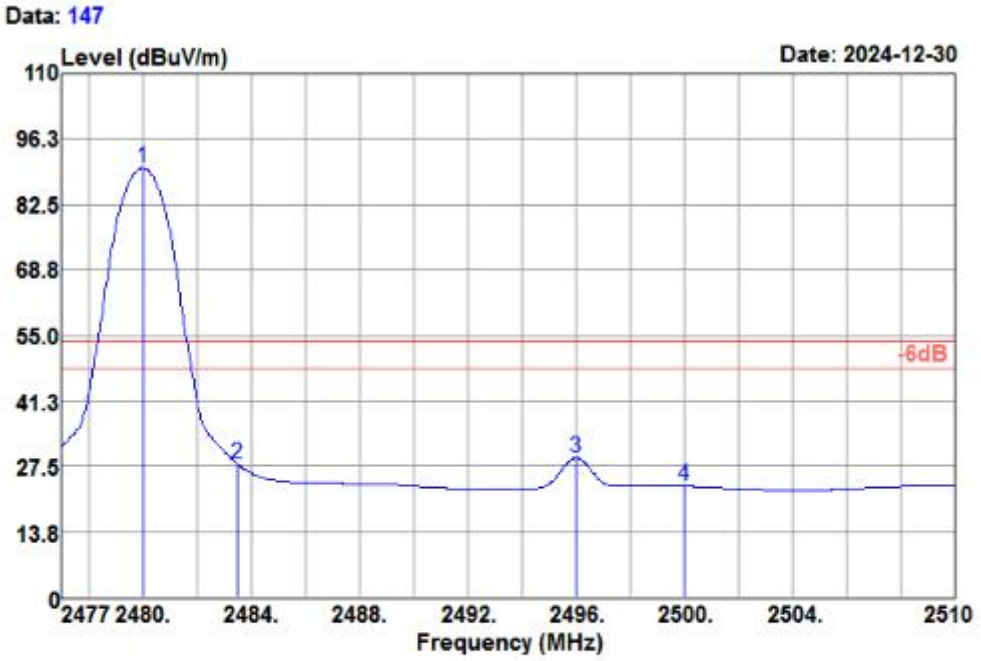
Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2310.000	28.56	27.46	3.51	35.94	23.59	54.00	-30.41	Average
2385.995	41.50	27.48	3.57	36.14	36.41	54.00	-17.59	Average
2390.000	28.59	27.54	3.57	36.15	23.55	54.00	-30.45	Average
2402.060	96.18	27.70	3.58	36.19	91.27	54.00	37.27	Average

Test Mode :	BLE CH39 (2480 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	2.477GHz~2.51GHz	Polarization :	Horizontal



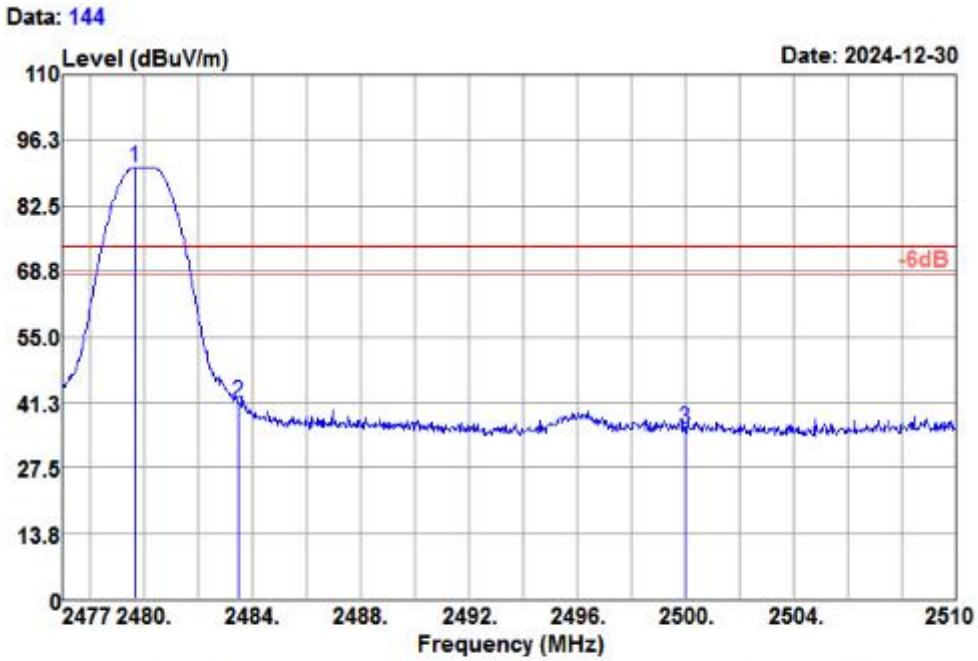
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2479.739	95.84	27.52	3.64	36.40	90.60	74.00	16.60	Peak
2483.500	46.10	27.50	3.64	36.41	40.83	74.00	-33.17	Peak
2496.107	44.73	27.42	3.65	36.44	39.36	74.00	-34.64	Peak
2500.000	41.00	27.40	3.65	36.45	35.60	74.00	-38.40	Peak

Test Mode :	BLE CH39 (2480 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	2.477GHz~2.51GHz	Polarization :	Horizontal



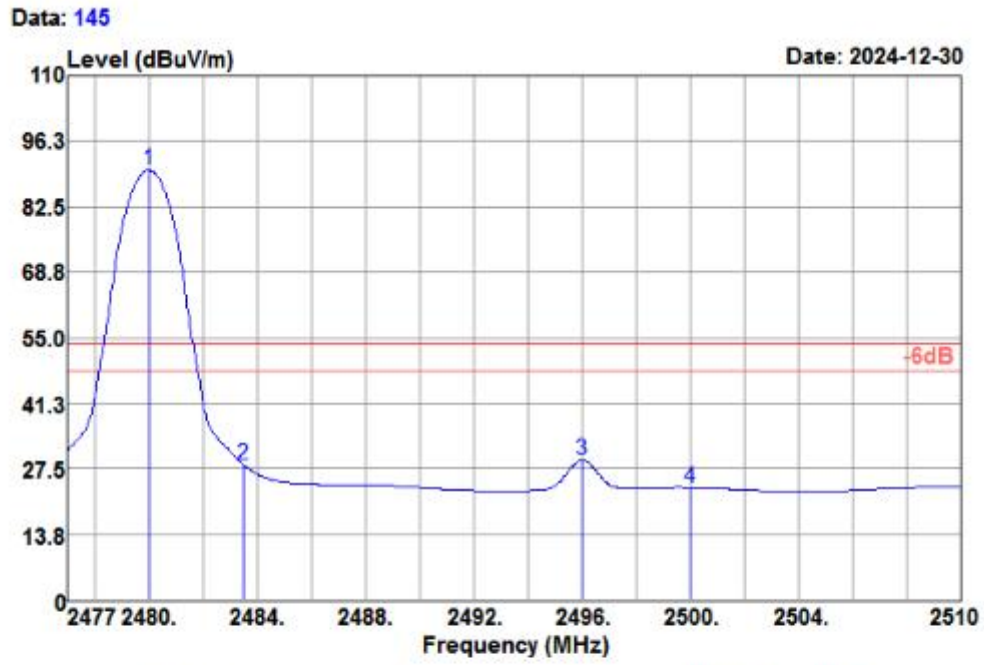
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2480.003	95.35	27.52	3.64	36.40	90.11	54.00	36.11	Average
2483.500	33.25	27.50	3.64	36.41	27.98	54.00	-26.02	Average
2496.008	34.58	27.42	3.65	36.44	29.21	54.00	-24.79	Average
2500.000	28.71	27.40	3.65	36.45	23.31	54.00	-30.69	Average

Test Mode :	BLE CH39 (2480 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	2.477GHz~2.51GHz	Polarization :	Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2479.706	95.85	27.52	3.63	36.40	90.60	74.00	16.60	Peak
2483.500	46.38	27.50	3.64	36.41	41.11	74.00	-32.89	Peak
2500.000	41.09	27.40	3.65	36.45	35.69	74.00	-38.31	Peak

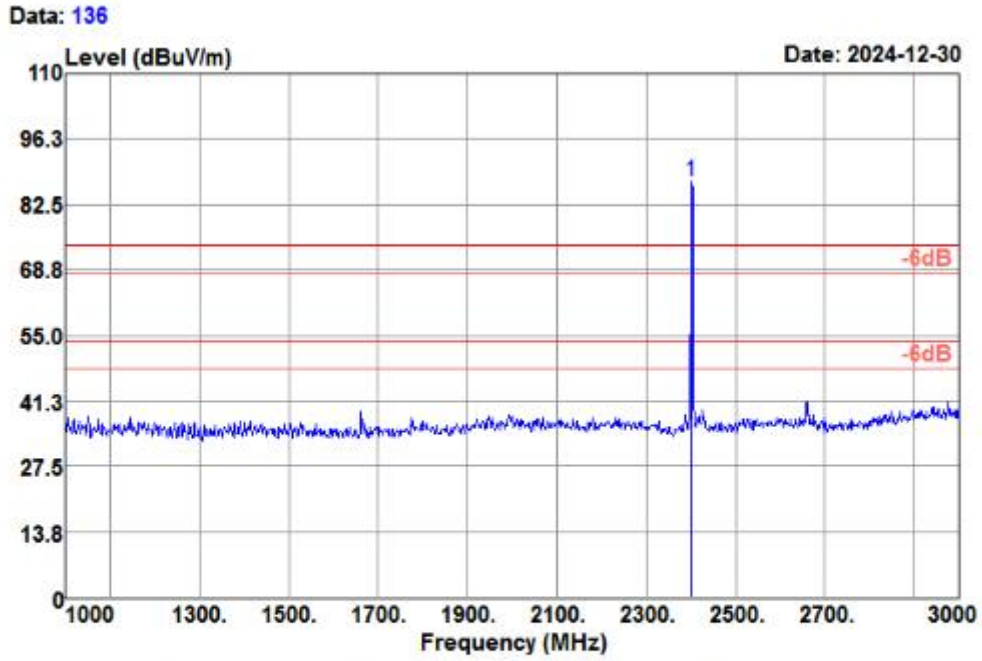
Test Mode :	BLE CH39 (2480 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	2.477GHz~2.51GHz	Polarization :	Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2480.003	95.43	27.52	3.64	36.40	90.19	54.00	36.19	Average
2483.500	33.60	27.50	3.64	36.41	28.33	54.00	-25.67	Average
2496.008	34.61	27.42	3.65	36.44	29.24	54.00	-24.76	Average
2500.000	28.92	27.40	3.65	36.45	23.52	54.00	-30.48	Average

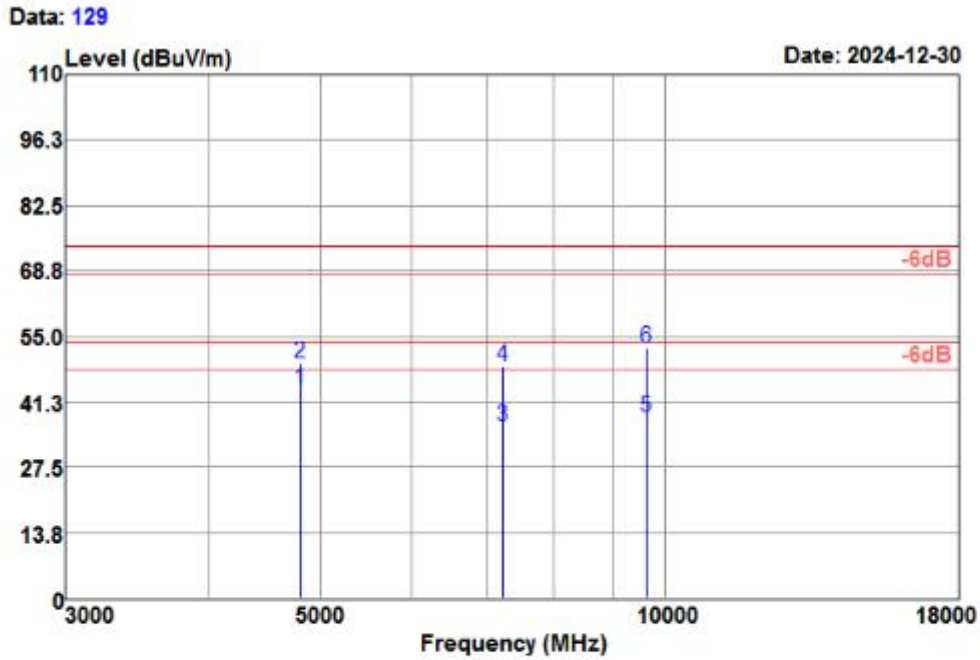
4.5.5 Test Result of Radiated Spurious Emission (1GHz ~ 10th Harmonic)

Test Mode :	BLE CH00 (2402 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	1GHz~3GHz	Polarization :	Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2402.000	92.21	27.70	3.58	36.19	87.30	74.00	13.30	Peak

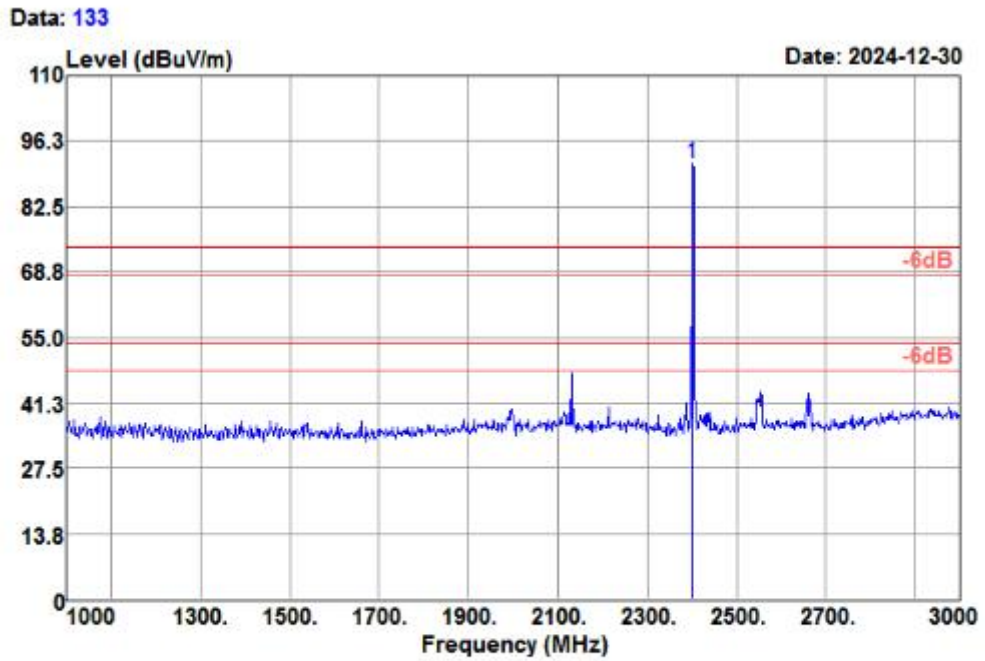
Test Mode :	BLE CH00 (2402 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	3GHz~18GHz	Polarization :	Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4804.000	42.11	32.42	5.35	36.12	43.76	54.00	-10.24	Average
4804.000	47.54	32.42	5.35	36.12	49.19	74.00	-24.81	Peak
7206.000	27.44	36.58	6.48	34.36	36.14	54.00	-17.86	Average
7206.000	39.92	36.58	6.48	34.36	48.62	74.00	-25.38	Peak
9608.000	26.10	38.74	7.34	34.17	38.01	54.00	-15.99	Average
9608.000	40.81	38.74	7.34	34.17	52.72	74.00	-21.28	Peak

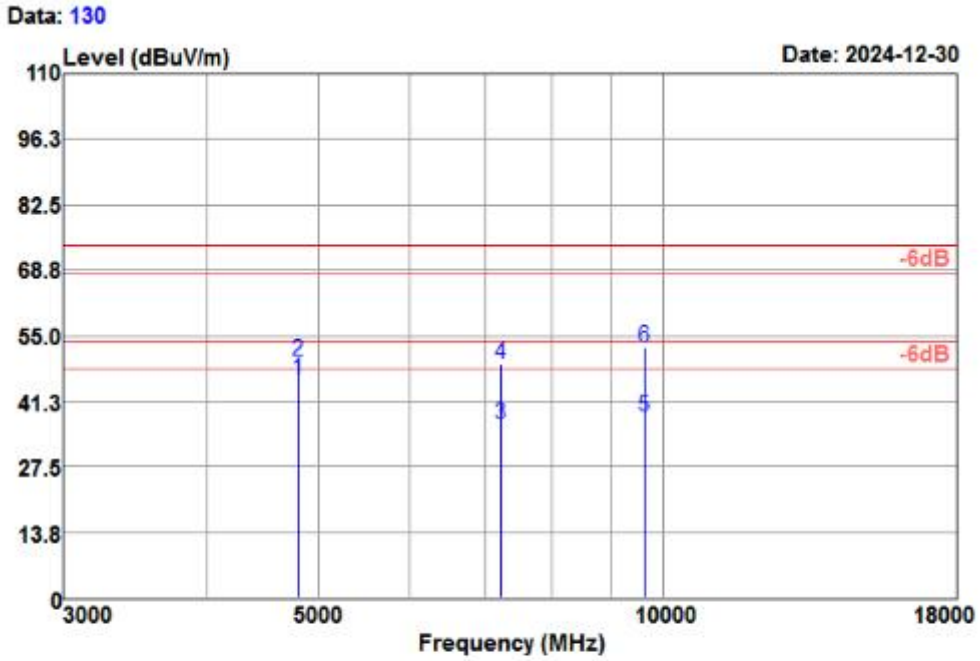
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	BLE CH00 (2402 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	1GHz~3GHz	Polarization :	Vertical



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2402.000	96.45	27.70	3.58	36.19	91.54	74.00	17.54	Peak

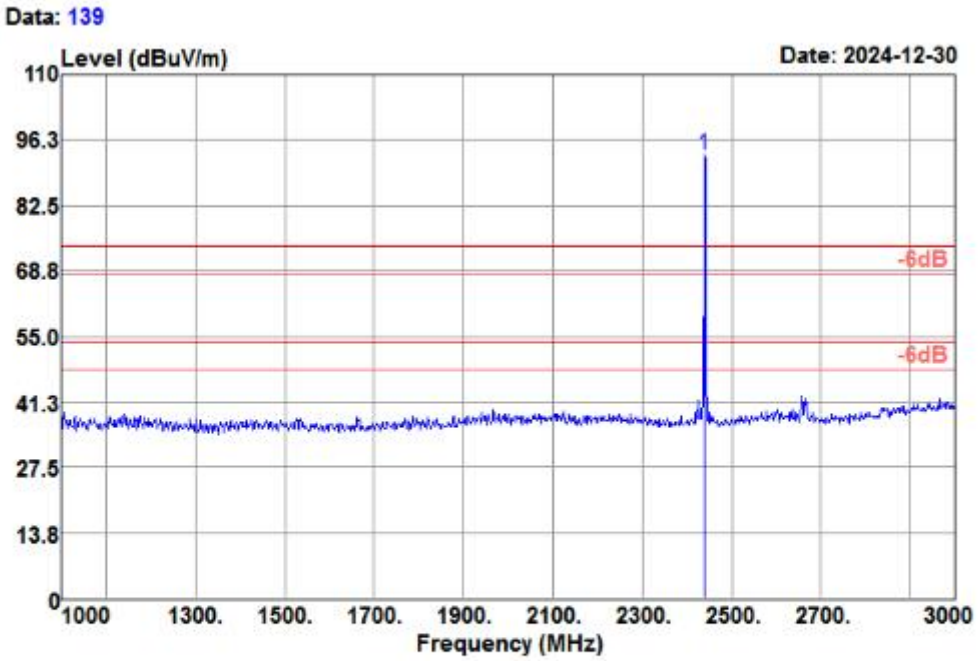
Test Mode :	BLE CH00 (2402 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	3GHz~18GHz	Polarization :	Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4804.000	44.13	32.42	5.35	36.12	45.78	54.00	-8.22	Average
4804.000	47.88	32.42	5.35	36.12	49.53	74.00	-24.47	Peak
7206.000	27.78	36.58	6.48	34.36	36.48	54.00	-17.52	Average
7206.000	40.39	36.58	6.48	34.36	49.09	74.00	-24.91	Peak
9608.000	26.14	38.74	7.34	34.17	38.05	54.00	-15.95	Average
9608.000	40.63	38.74	7.34	34.17	52.54	74.00	-21.46	Peak

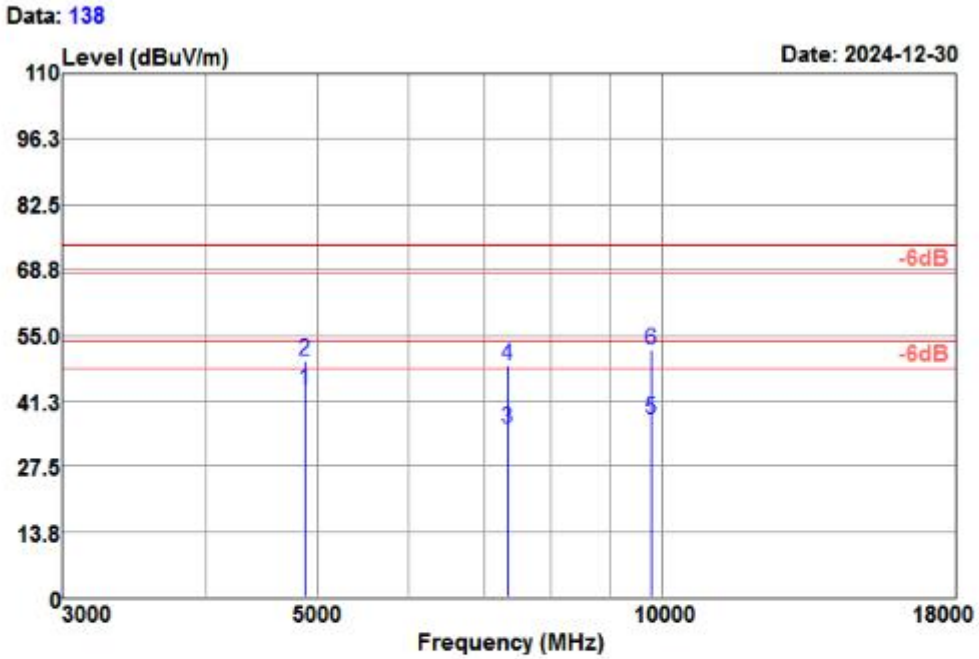
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	BLE CH19 (2440 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	1GHz~3GHz	Polarization :	Horizontal



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2440.000	97.99	27.70	3.61	36.29	93.01	74.00	19.01	Peak

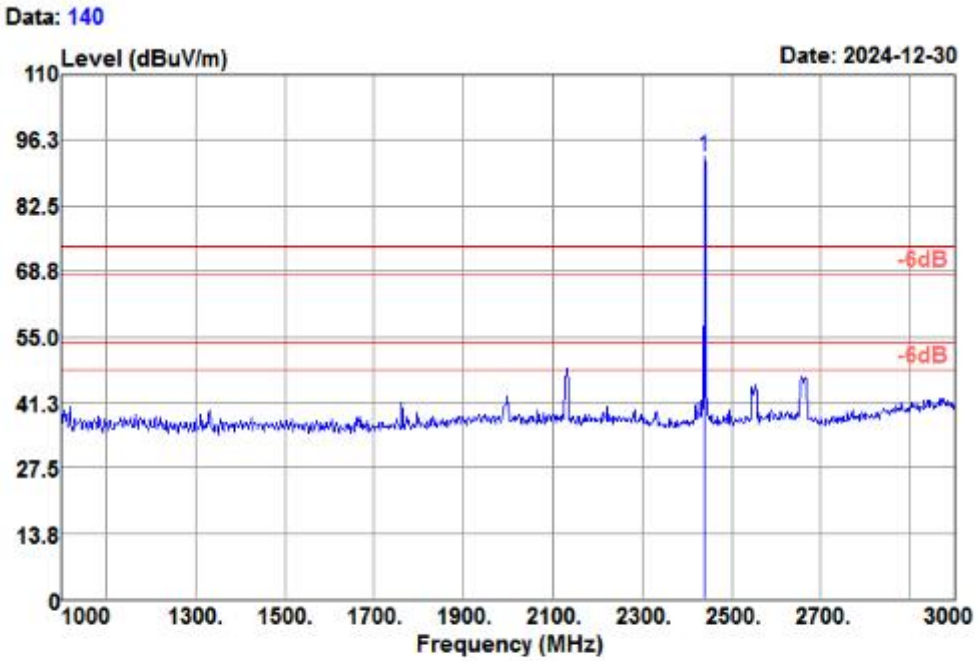
Test Mode :	BLE CH19 (2440 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	3GHz~18GHz	Polarization :	Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4880.000	41.40	32.76	5.41	36.11	43.46	54.00	-10.54	Average
4880.000	47.66	32.76	5.41	36.11	49.72	74.00	-24.28	Peak
7320.000	26.79	36.58	6.52	34.40	35.49	54.00	-18.51	Average
7320.000	40.02	36.58	6.52	34.40	48.72	74.00	-25.28	Peak
9760.000	26.12	38.24	7.39	34.42	37.33	54.00	-16.67	Average
9760.000	40.88	38.24	7.39	34.42	52.09	74.00	-21.91	Peak

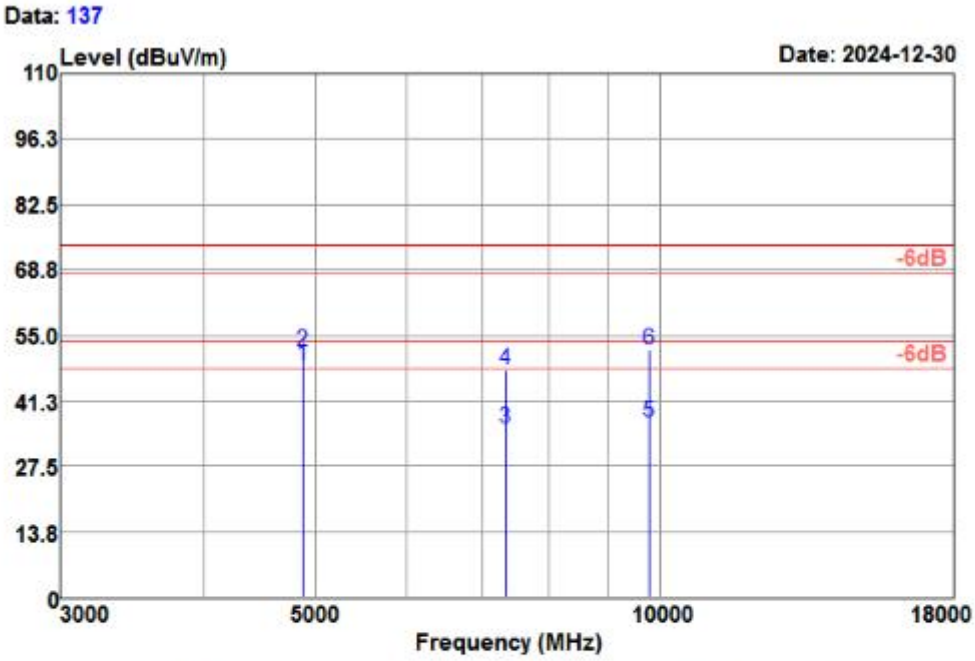
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	BLE CH19 (2440 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	1GHz~3GHz	Polarization :	Vertical



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2440.000	97.67	27.70	3.61	36.29	92.69	74.00	18.69	Peak

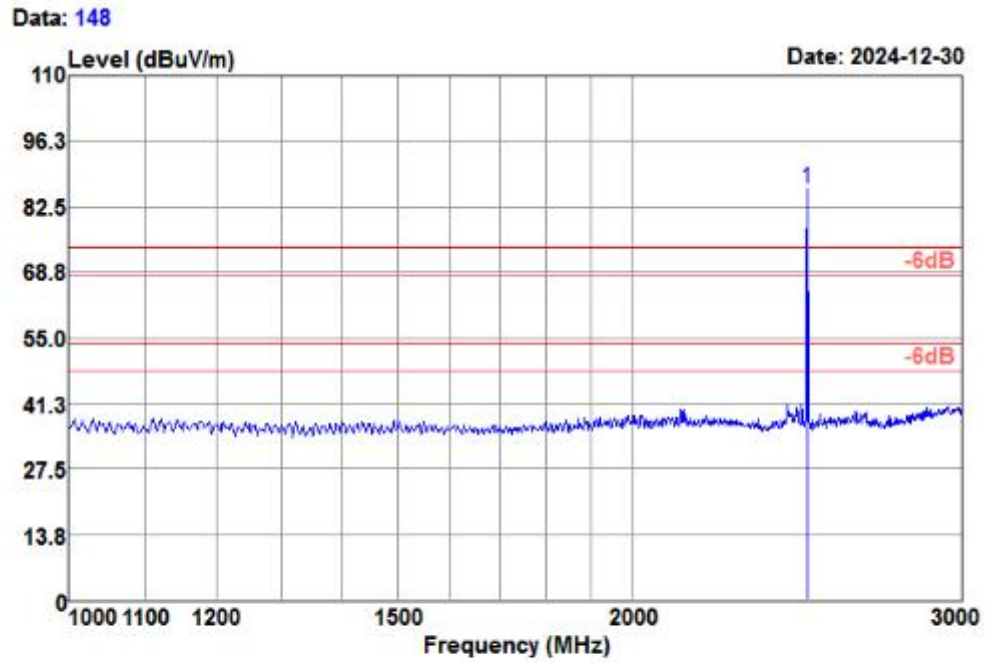
Test Mode :	BLE CH19 (2440 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	3GHz~18GHz	Polarization :	Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4880.000	46.67	32.76	5.41	36.11	48.73	54.00	-5.27	Average
4880.000	49.57	32.76	5.41	36.11	51.63	74.00	-22.37	Peak
7320.000	26.57	36.58	6.52	34.40	35.27	54.00	-18.73	Average
7320.000	38.87	36.58	6.52	34.40	47.57	74.00	-26.43	Peak
9760.000	25.41	38.24	7.39	34.42	36.62	54.00	-17.38	Average
9760.000	40.76	38.24	7.39	34.42	51.97	74.00	-22.03	Peak

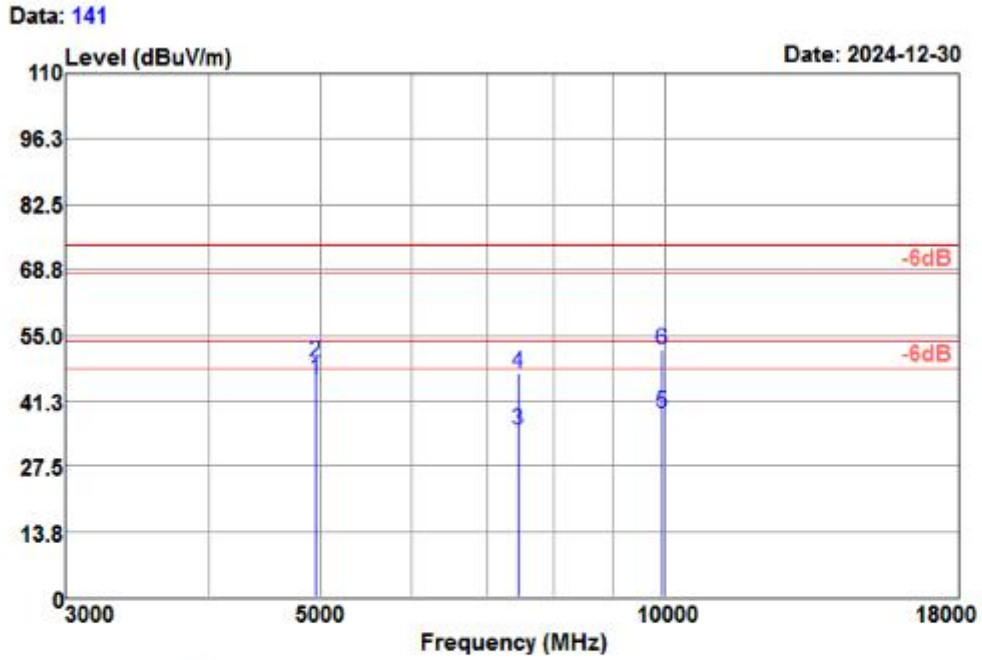
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	BLE CH39 (2480 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	1GHz~3GHz	Polarization :	Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2480.000	91.58	27.52	3.64	36.40	86.34	74.00	12.34	Peak

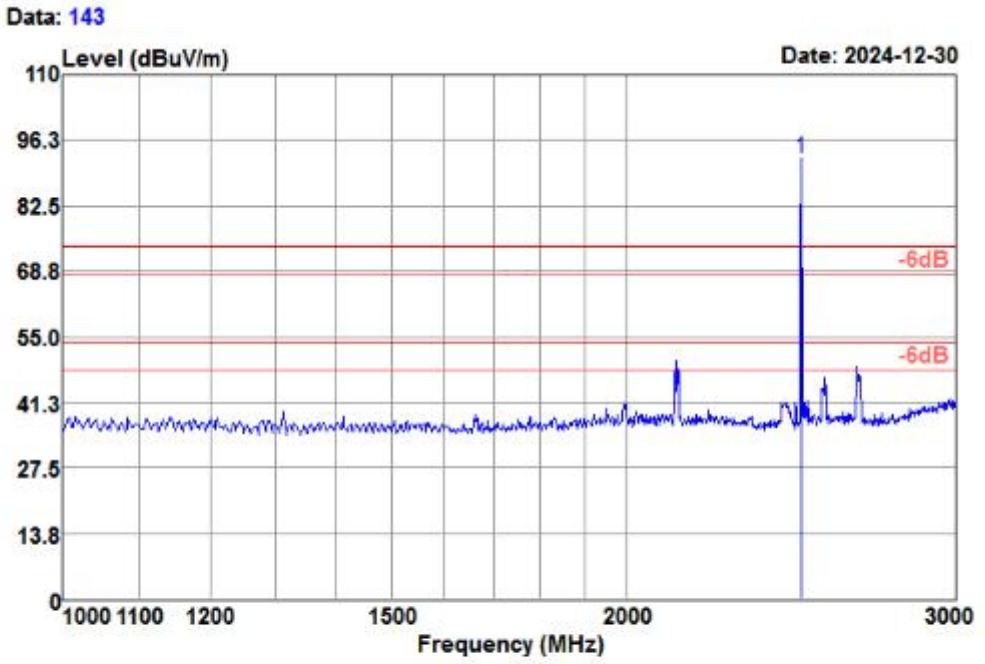
Test Mode :	BLE CH39 (2480 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	3GHz~18GHz	Polarization :	Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4960.000	43.67	32.70	5.48	36.10	45.75	54.00	-8.25	Average
4960.000	47.33	32.70	5.48	36.10	49.41	74.00	-24.59	Peak
7440.000	26.40	36.40	6.56	34.43	34.93	54.00	-19.07	Average
7440.000	38.56	36.40	6.56	34.43	47.09	74.00	-26.91	Peak
9920.000	27.40	38.54	7.44	34.67	38.71	54.00	-15.29	Average
9920.000	40.61	38.54	7.44	34.67	51.92	74.00	-22.08	Peak

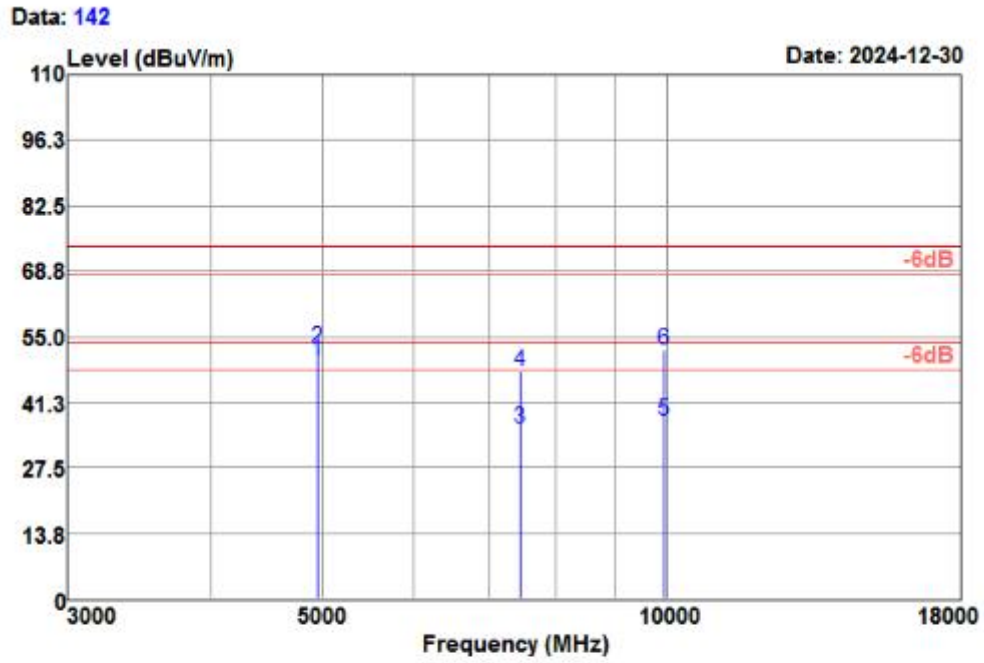
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	BLE CH39 (2480 MHz)	**Temperature :**	23℃
Test Engineer :	Jack Liu	**Relative Humidity :**	62%
Frequencey Range	1GHz~3GHz	**Polarization :**	Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2480.000	97.70	27.52	3.64	36.40	92.46	74.00	18.46	Peak

Test Mode :	BLE CH39 (2480 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	3GHz~18GHz	Polarization :	Vertical

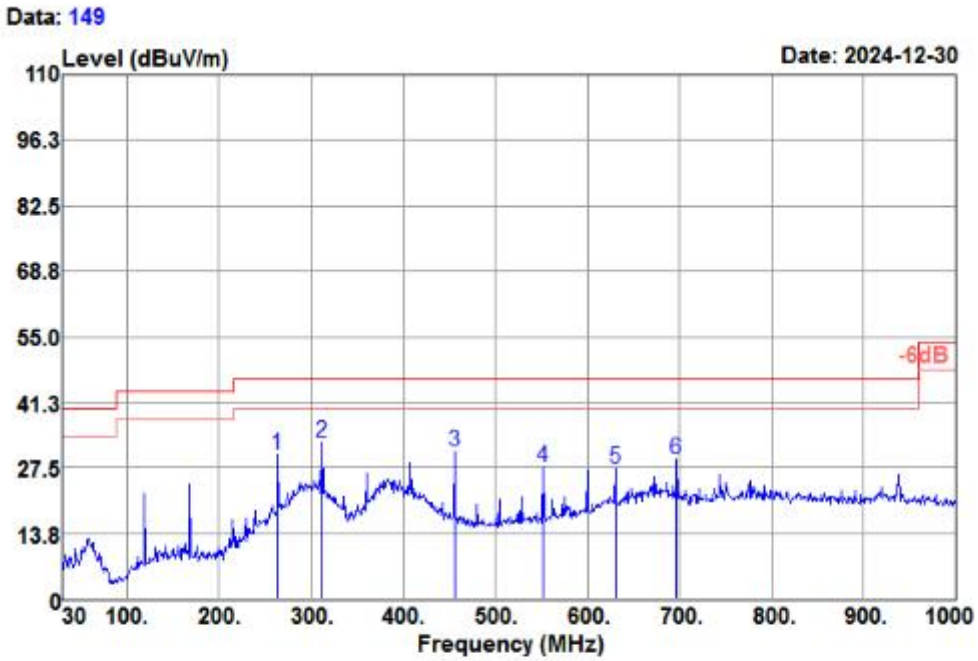


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4960.000	47.76	32.70	5.48	36.10	49.84	54.00	-4.16	Average
4960.000	50.63	32.70	5.48	36.10	52.71	74.00	-21.29	Peak
7440.000	27.30	36.40	6.56	34.43	35.83	54.00	-18.17	Average
7440.000	39.32	36.40	6.56	34.43	47.85	74.00	-26.15	Peak
9920.000	26.16	38.54	7.44	34.67	37.47	54.00	-16.53	Average
9920.000	40.91	38.54	7.44	34.67	52.22	74.00	-21.78	Peak

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

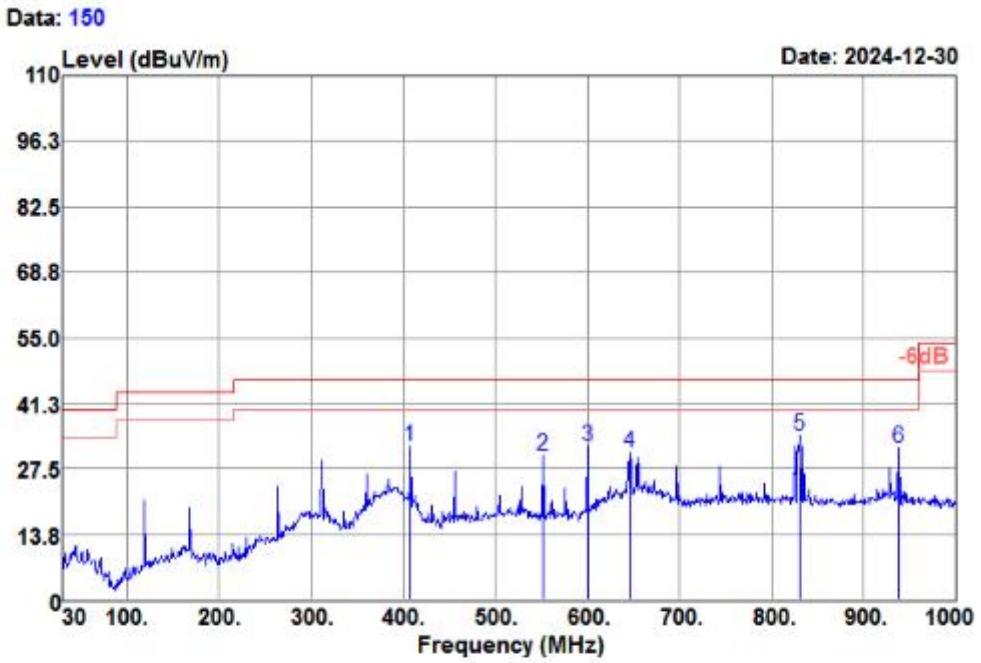
4.5.6 Test Result of Radiated Spurious Emission (30MHz ~ 1GHz)

Test Mode :	BLE CH39 (2480 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	30MHz~1GHz	Polarization :	Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
263.770	47.65	12.09	3.11	32.50	30.35	46.00	-15.65	Peak
312.270	48.15	13.74	3.42	32.51	32.80	46.00	-13.20	Peak
455.830	42.30	16.99	4.21	32.66	30.84	46.00	-15.16	Peak
551.860	37.23	18.42	4.67	32.70	27.62	46.00	-18.38	Peak
630.430	34.63	20.19	5.02	32.70	27.14	46.00	-18.86	Peak
696.390	35.69	20.84	5.31	32.70	29.14	46.00	-16.86	Peak

Test Mode :	BLE CH39 (2480 MHz)	Temperature :	23℃
Test Engineer :	Jack Liu	Relative Humidity :	62%
Frequencey Range	30MHz~1GHz	Polarization :	Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
408.300	44.99	15.69	3.95	32.61	32.02	46.00	-13.98	Peak
551.860	39.68	18.42	4.67	32.70	30.07	46.00	-15.93	Peak
600.360	40.27	19.72	4.88	32.70	32.17	46.00	-13.83	Peak
645.950	38.01	20.48	5.09	32.70	30.88	46.00	-15.12	Peak
831.220	39.01	22.36	5.79	32.87	34.29	46.00	-11.71	Peak
937.920	35.79	23.76	5.87	33.46	31.96	46.00	-14.04	Peak

4.6 AC Conducted Emission Measurement

4.6.1 Limit of AC Conducted Emission

FCC §15.207

For equipment 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.

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

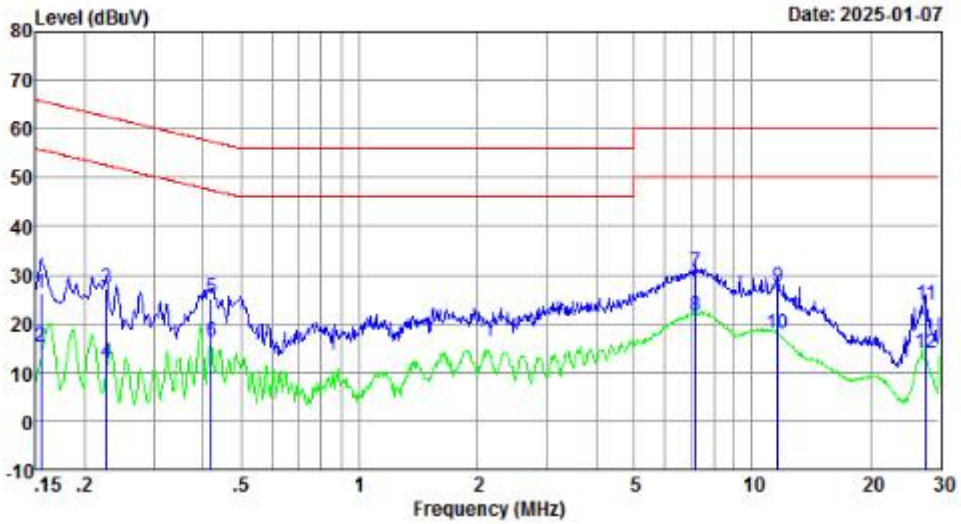
*Decreases with the logarithm of the frequency.

4.6.2 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

4.6.3 Test Result of AC Conducted Emission

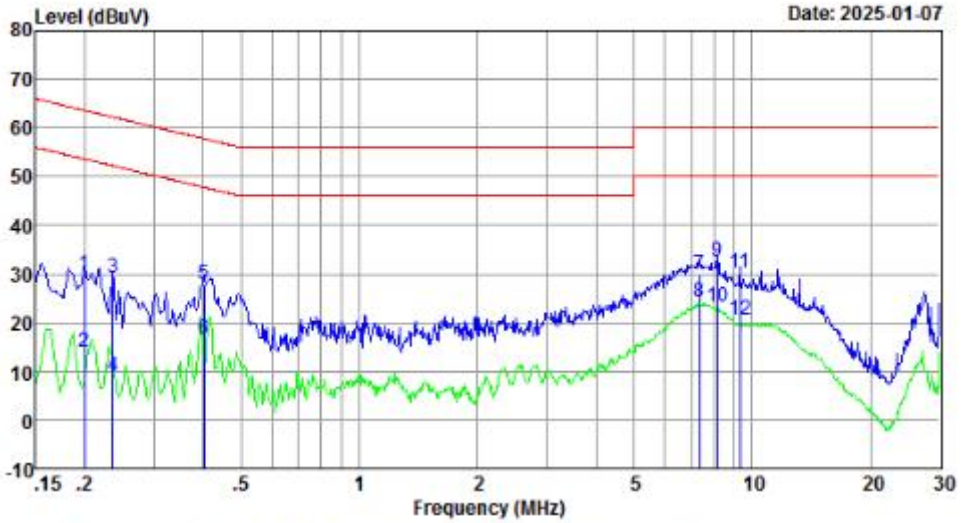
Test Mode :	Mode 1	Temperature :	21℃
Test Engineer :	Jack Liu	Relative Humidity :	54%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	Adapter + Notebook		



Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	Result level dBuV	Limit level dBuV	Over limit dB	Remark
0.155	16.61	9.67	0.01	26.29	65.74	-39.45	QP
0.155	5.61	9.67	0.01	15.29	55.74	-40.45	Average
0.227	17.40	9.70	0.02	27.12	62.57	-35.45	QP
0.227	2.20	9.70	0.02	11.92	52.57	-40.65	Average
0.419	15.30	9.74	0.02	25.06	57.46	-32.40	QP
0.419	6.40	9.74	0.02	16.16	47.46	-31.30	Average
7.175	20.40	9.89	0.07	30.36	60.00	-29.64	QP
7.175	11.60	9.89	0.07	21.56	50.00	-28.44	Average
11.621	17.50	9.97	0.09	27.56	60.00	-32.44	QP
11.621	7.80	9.97	0.09	17.86	50.00	-32.14	Average
27.708	13.60	10.12	0.14	23.86	60.00	-36.14	QP
27.708	3.50	10.12	0.14	13.76	50.00	-36.24	Average

Result Level= Reading Level + LISN Factor + Cable Loss

Test Mode :	Mode 1	Temperature :	21℃
Test Engineer :	Jack Liu	Relative Humidity :	54%
Test Voltage :	120Vac / 60Hz	Phase :	NEUTRAL
Function Type :	Adapter + Notebook		



Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	Result level dBuV	Limit level dBuV	Over limit dB	Remark
0.200	20.20	9.59	0.01	29.80	63.62	-33.82	QP
0.200	4.40	9.59	0.01	14.00	53.62	-39.62	Average
0.235	19.50	9.59	0.02	29.11	62.26	-33.15	QP
0.235	-0.80	9.59	0.02	8.81	52.26	-43.45	Average
0.402	18.20	9.59	0.02	27.81	57.81	-30.00	QP
0.402	7.10	9.59	0.02	16.71	47.81	-31.10	Average
7.329	20.10	9.77	0.07	29.94	60.00	-30.06	QP
7.329	14.40	9.77	0.07	24.24	50.00	-25.76	Average
8.148	22.60	9.80	0.07	32.47	60.00	-27.53	QP
8.148	13.50	9.80	0.07	23.37	50.00	-26.63	Average
9.302	20.40	9.83	0.08	30.31	60.00	-29.69	QP
9.302	10.80	9.83	0.08	20.71	50.00	-29.29	Average

Result Level= Reading Level + LISN Factor + Cable Loss

4.7 Antenna Requirements

4.7.1 Standard Applicable

According to antenna requirement of §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. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

4.7.2 Antenna Connected Construction

An PCB antenna design is used.

4.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	Keysight	N9010A	MY56070788	2024/12/17	2025/12/16	Conducted
10dB Attenuator	MCLI	FAS-8-10	1693	2024/7/5	2025/7/4	Conducted
Test Software	Tonscend	JS1120-3	V3.5.39	N/A	N/A	Conducted

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV30	103728	2024/12/17	2025/12/16	Radiation
EMI Test Receiver	R&S	ESR3	102144	2024/12/17	2025/12/16	Radiation
Amplifier	Sonoma	310	363917	2024/12/17	2025/12/16	Radiation
Amplifier	Schwarzbeck	BBV 9718	327	2024/12/17	2025/12/16	Radiation
Amplifier	Narda	TTA1840-35-HG	2034380	2024/12/24	2025/12/23	Radiation
Loop Antenna	Schwarzbeck	FMZB 1519 B	00051	2023/2/12	2026/2/11	Radiation
Broadband Antenna	Schwarzbeck	VULB 9168	9168-757	2023/9/17	2026/9/16	Radiation
Horn Antenna	Schwarzbeck	BBHA 9120 D	01677	2024/1/30	2027/1/29	Radiation
Horn Antenna	COM-POWER	AH-1840	101117	2024/1/31	2027/1/30	Radiation
Test Software	Audix	E3	6.111221a	N/A	N/A	Radiation
Filter	Micro-Tronics	BRM 50702	G266	N/A	N/A	Radiation

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
LISN	R&S	ENV216	102125	2024/12/17	2025/12/16	Conducted
LISN	R&S	ENV432	101327	2024/12/17	2025/12/16	Conducted
EMI Test Receiver	R&S	ESR3	102143	2024/12/17	2025/12/16	Conducted
EMI Test Software	Audix	E3	N/A	N/A	N/A	Conducted

N/A: No Calibration Required

6 Uncertainty of Evaluation

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	±3.02 dB
Radiated emissions	30MHz ~ 1GHz	±5.67 dB
	1GHz ~ 18GHz	±5.16 dB
	18GHz ~ 40GHz	±5.18 dB

MEASUREMENT	UNCERTAINTY
Occupied Channel Bandwidth	±99.44 Hz
RF output power, conducted	±0.80 dB
Power density, conducted	±2.02dB
Emissions, conducted	±2.02dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

7 Setup Photographs

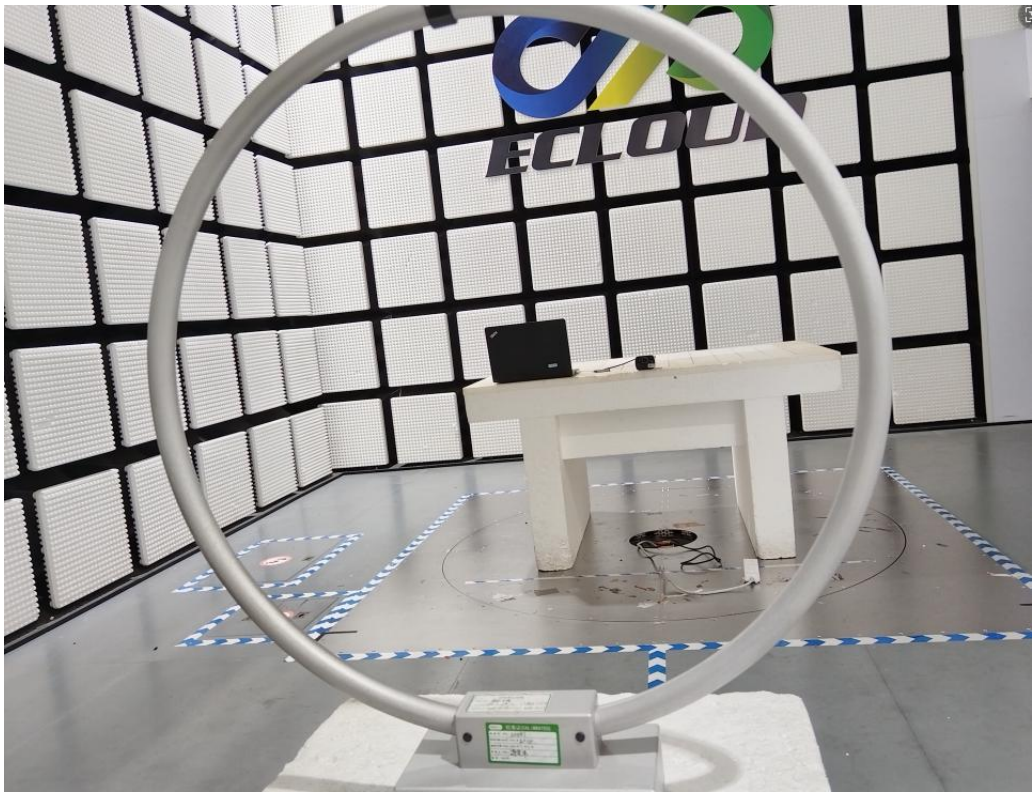


Fig. 1 Radiated emission setup photo(Below 30MHz)

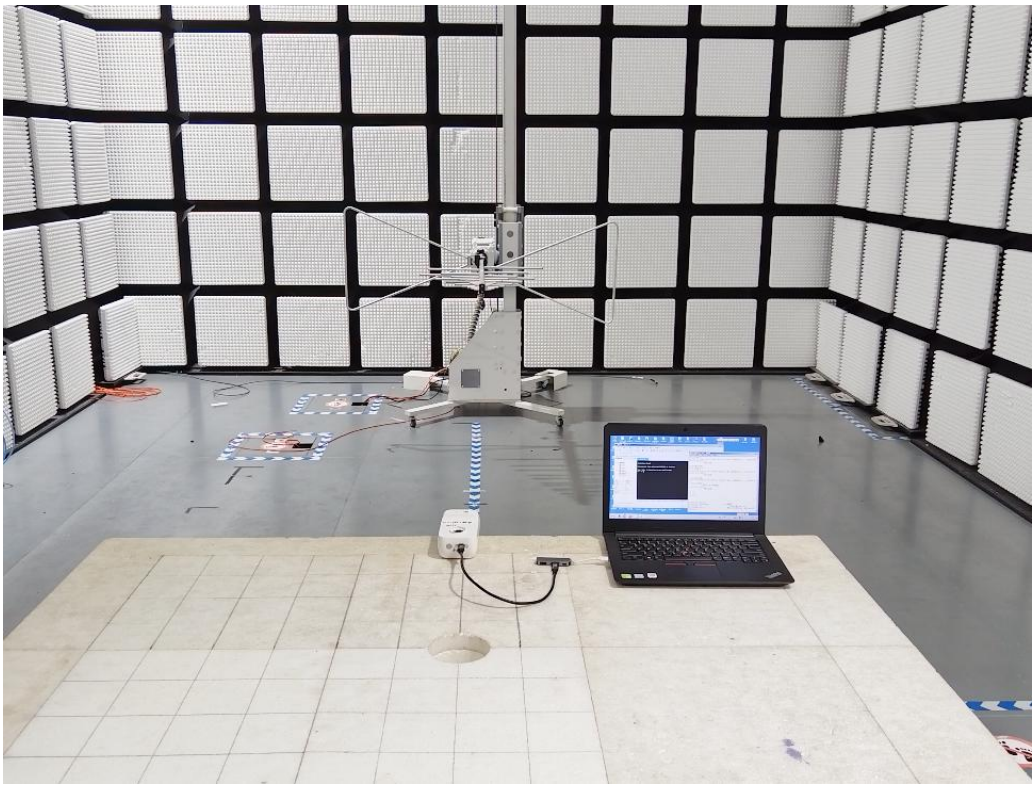


Fig. 2 Radiated emission setup photo(30MHz-1GHz)

Fig. 3 Radiated emission setup photo(Above 1GHz)

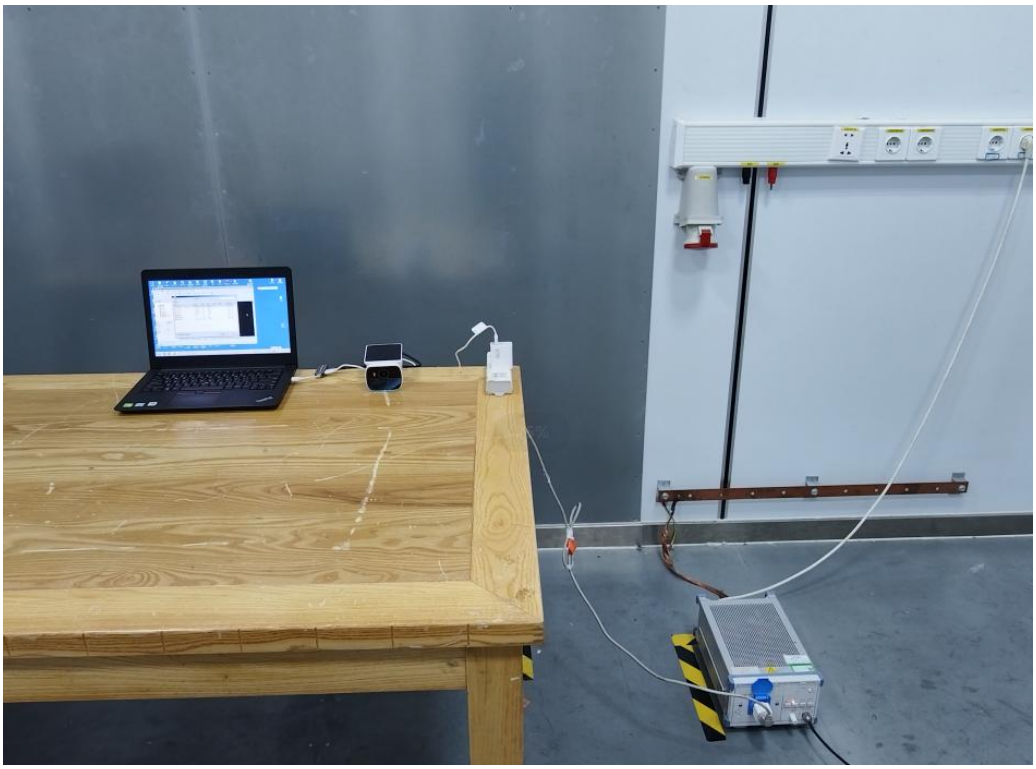
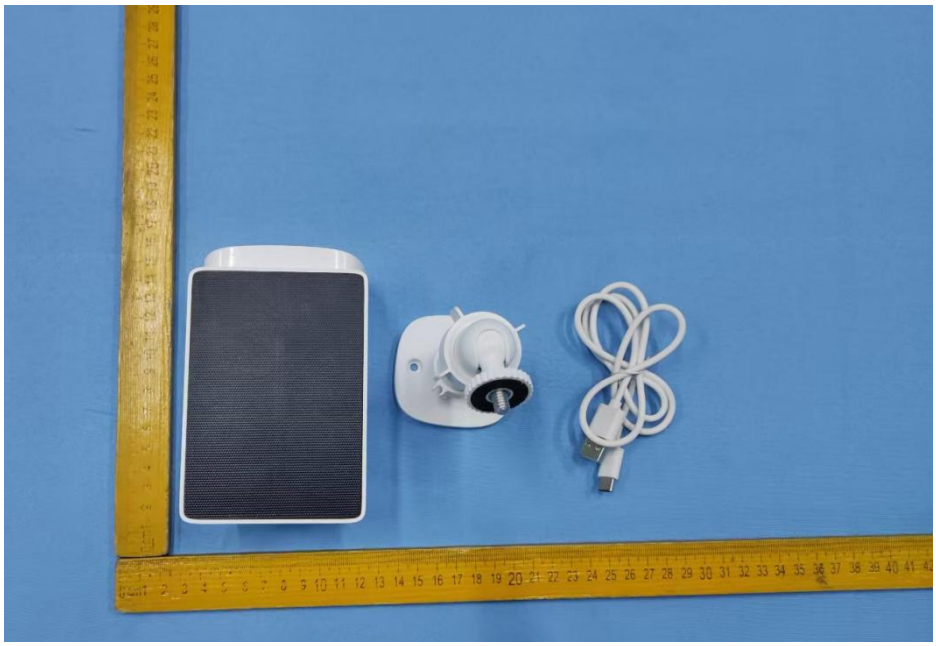


Fig. 4 Power line conducted emission setup photo

8 EUT Photographs

External Photos



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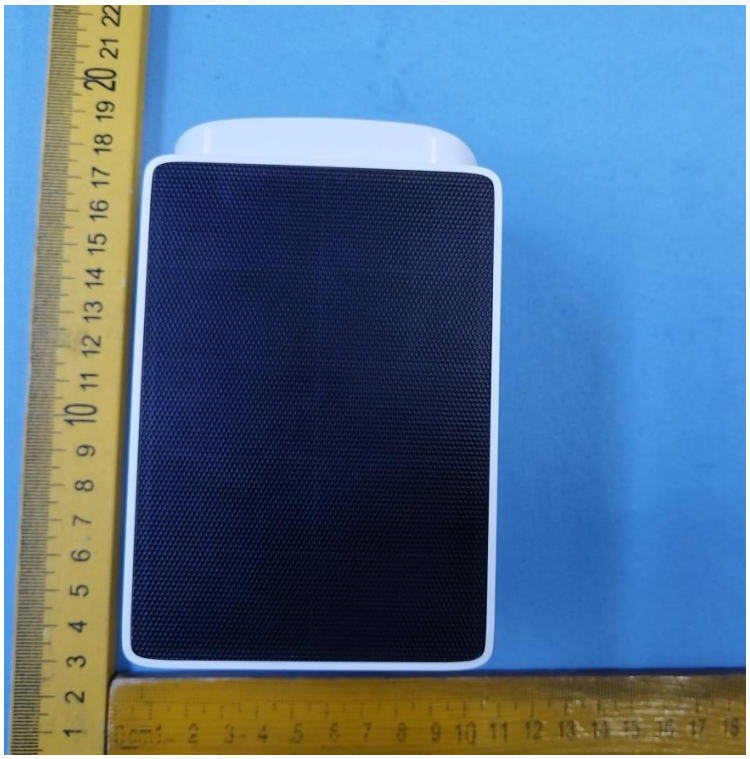
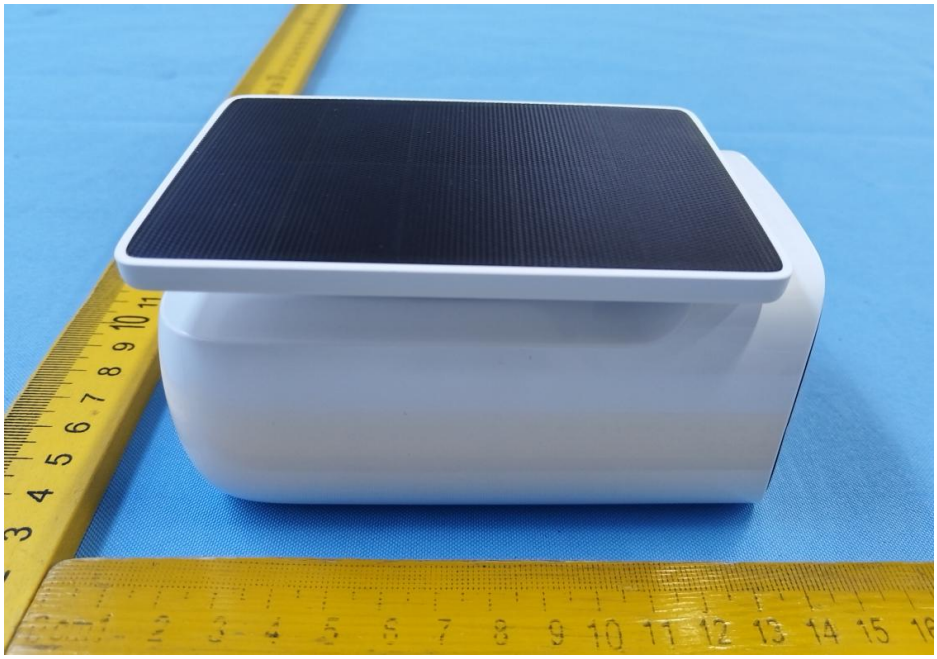


<Fig.2>

<Fig.3>

<Fig.4>



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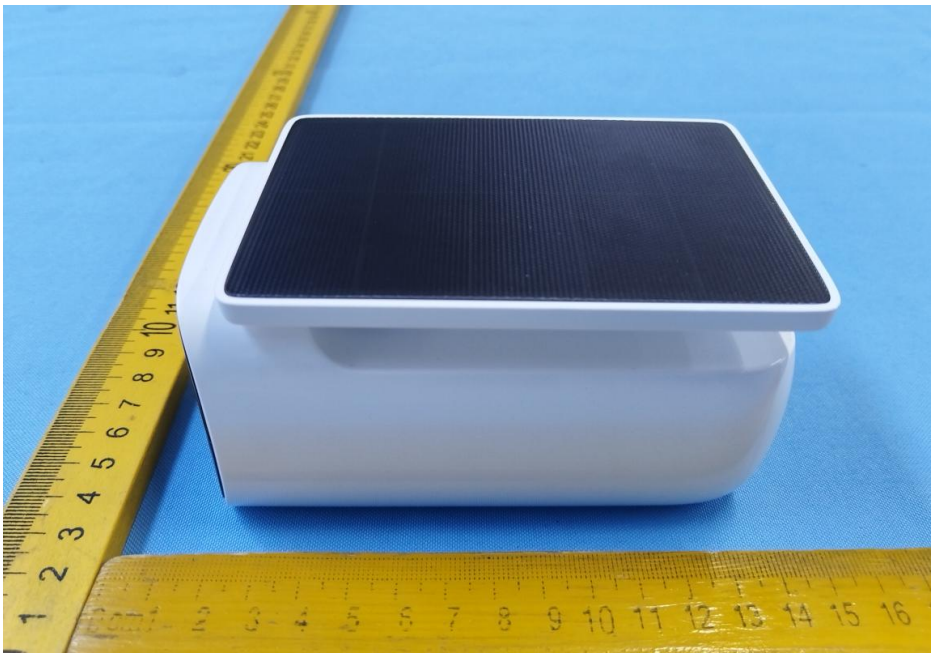
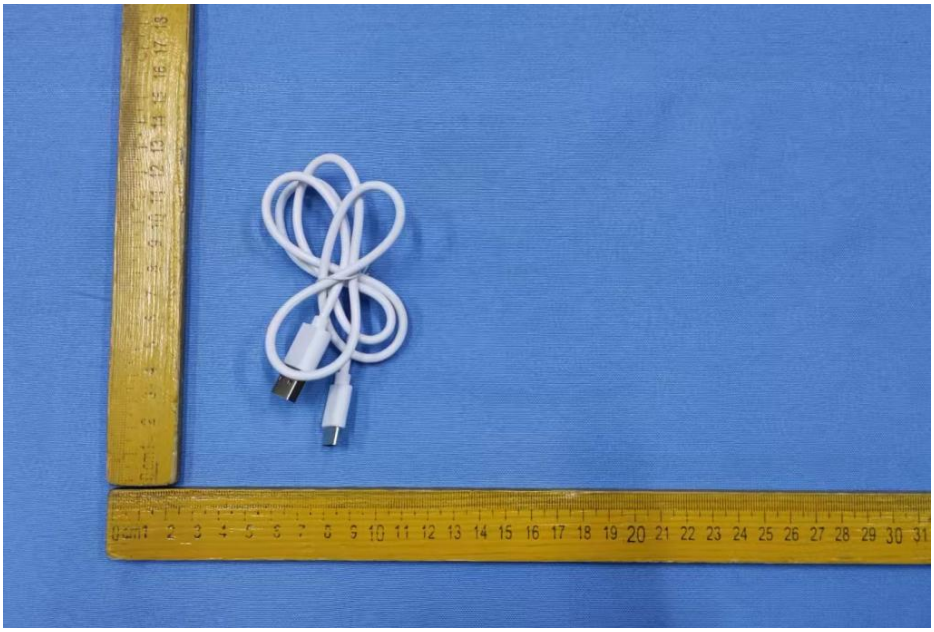


<Fig.6>

<Fig.7>



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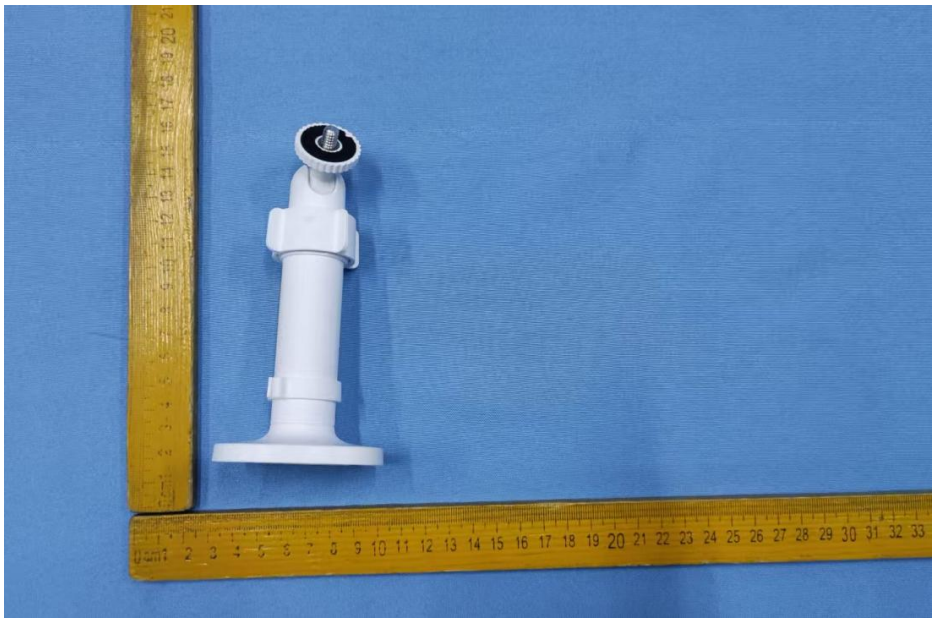

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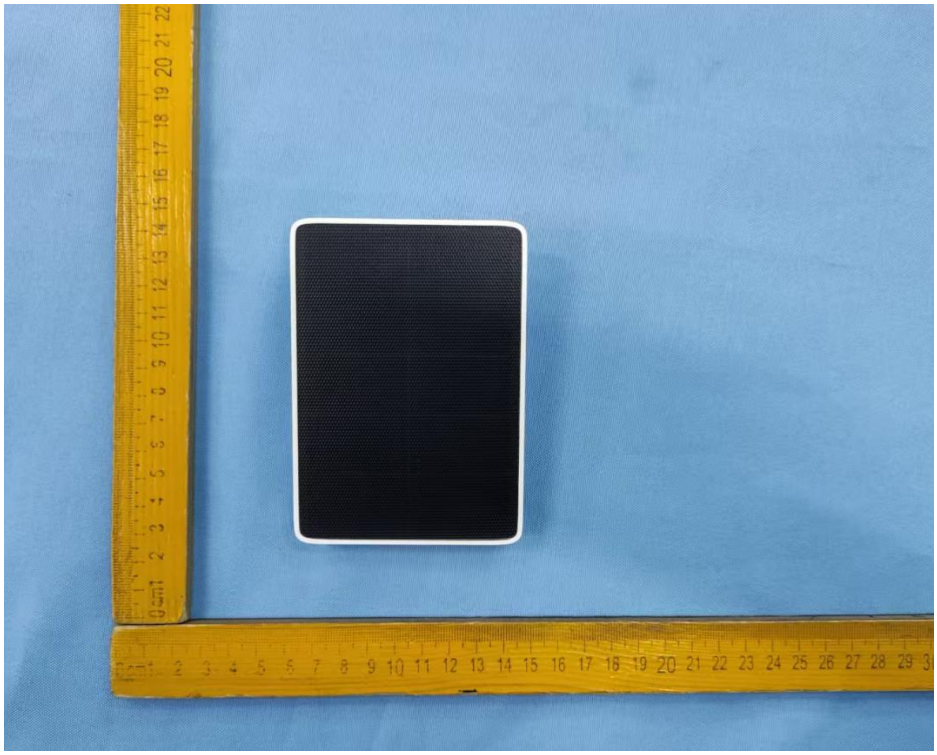

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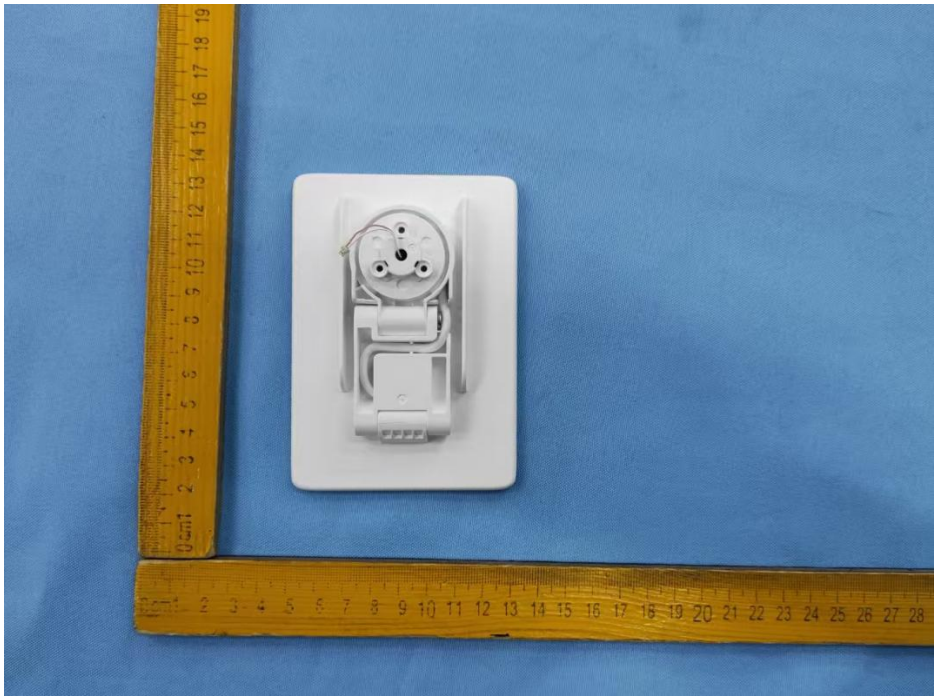
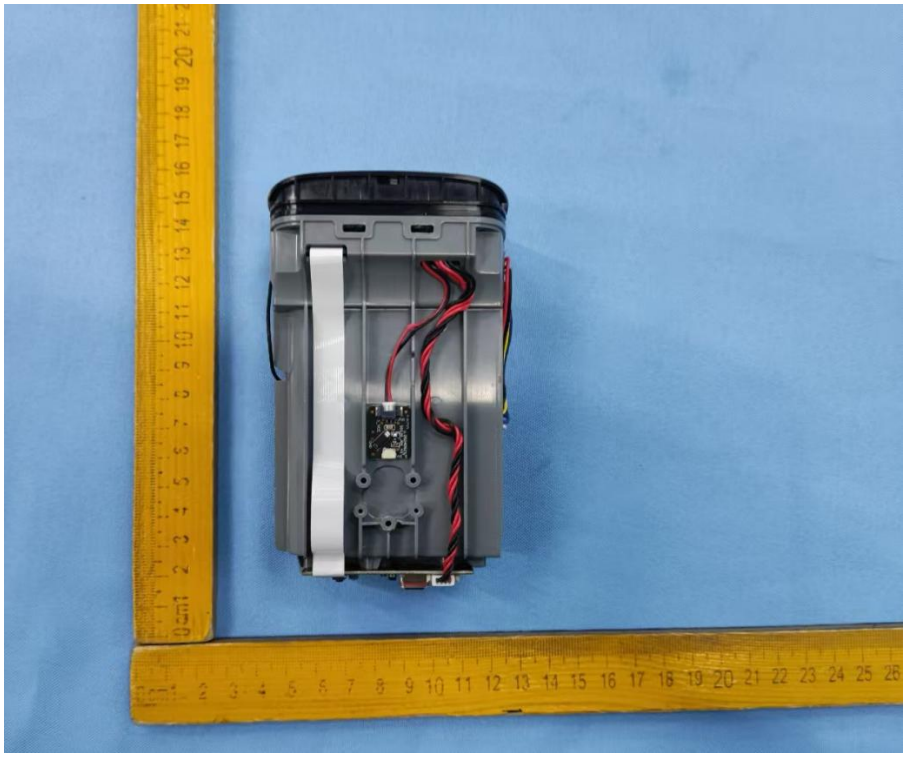


<Fig.11>

Internal Photos



<Fig.1>

<Fig.2>

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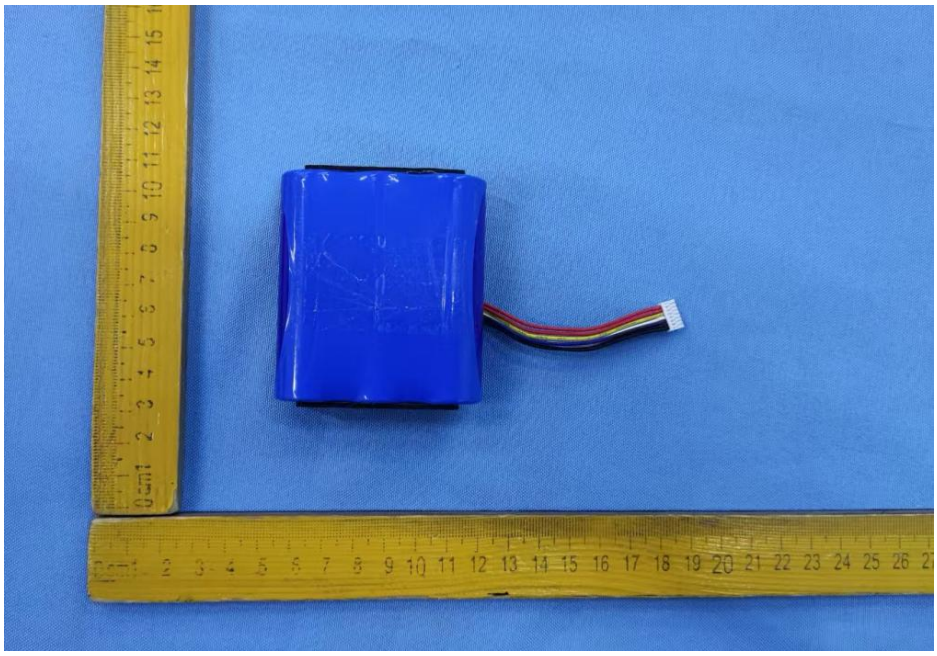

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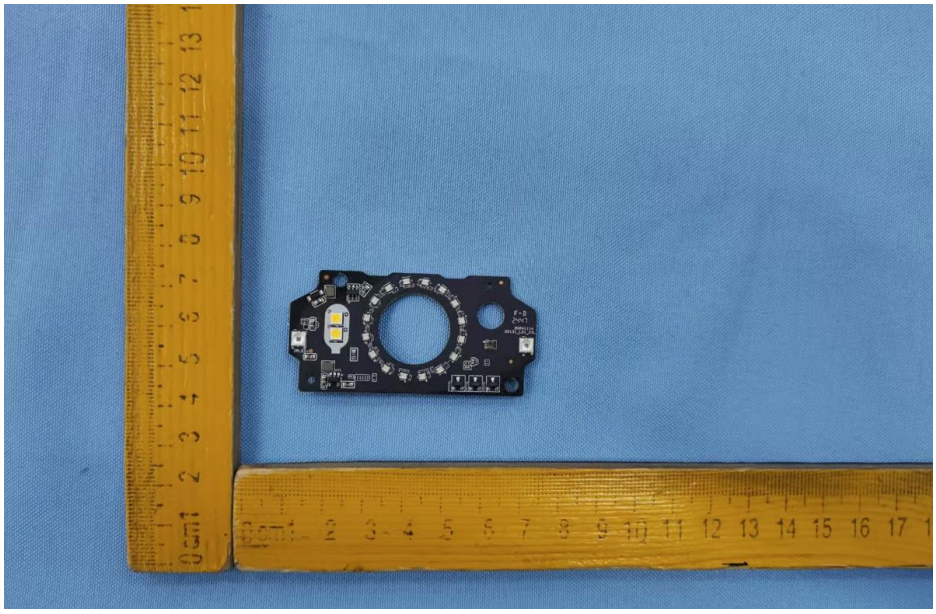

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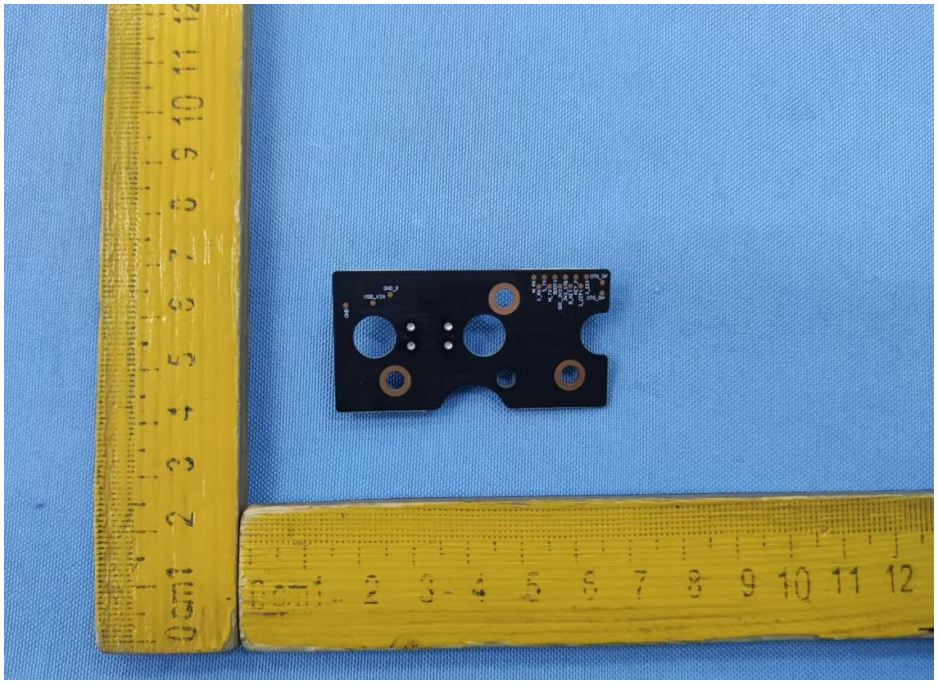

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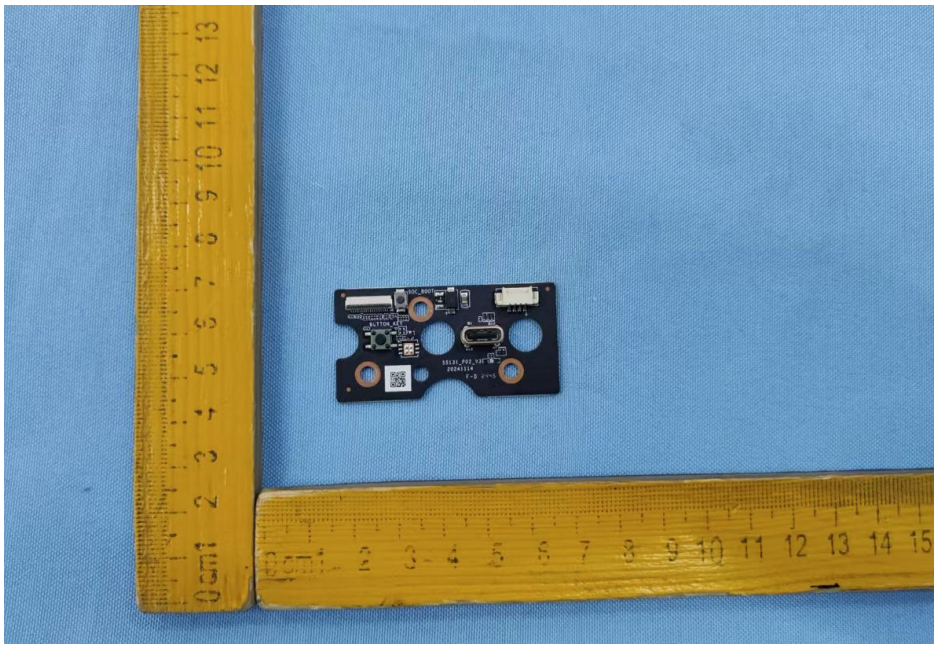

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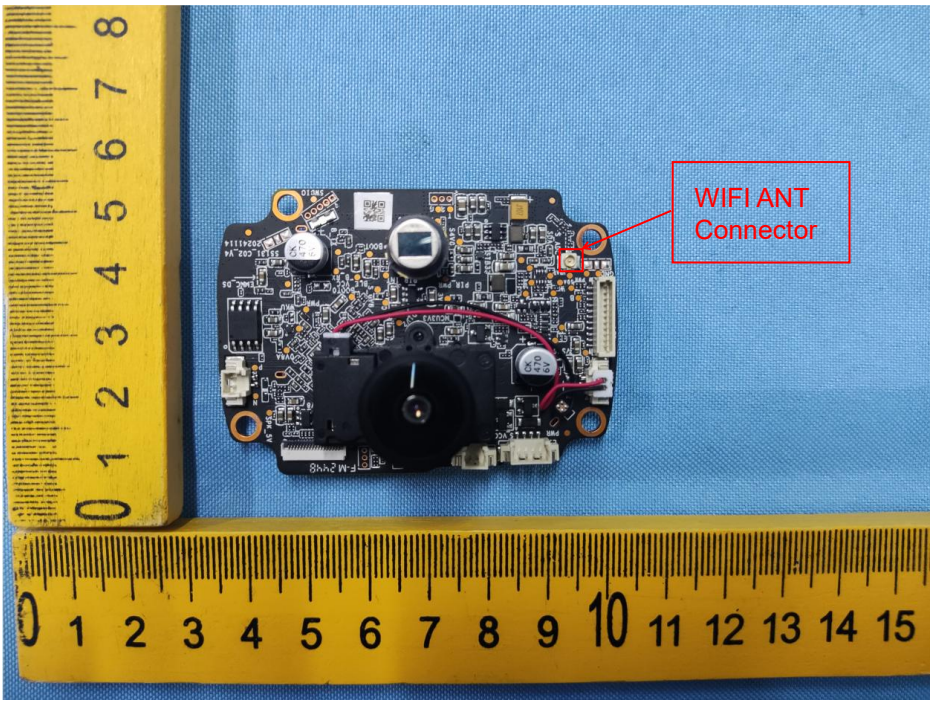

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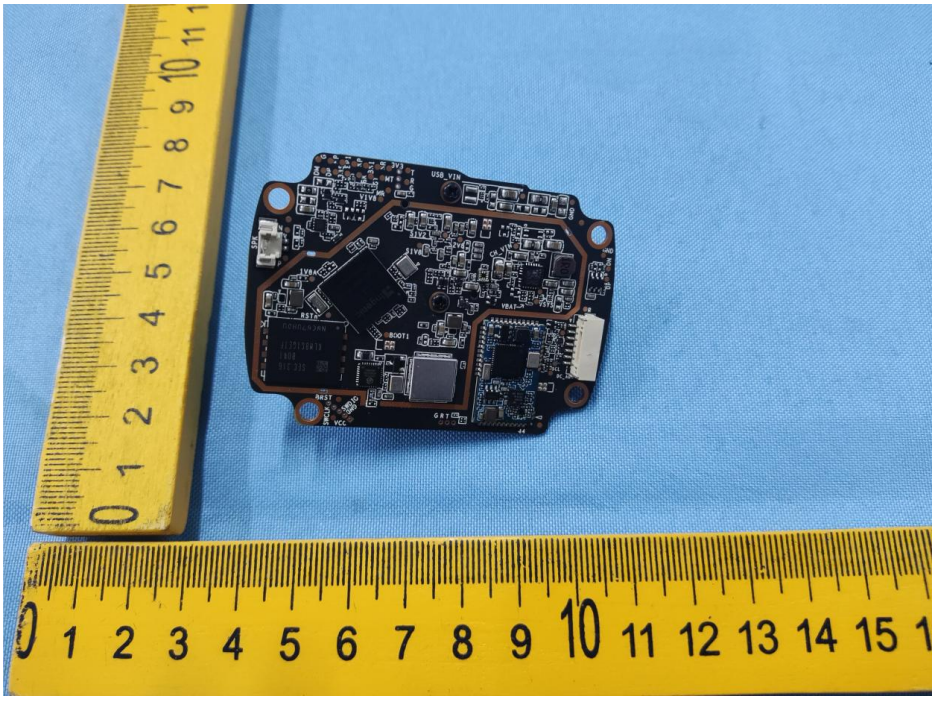

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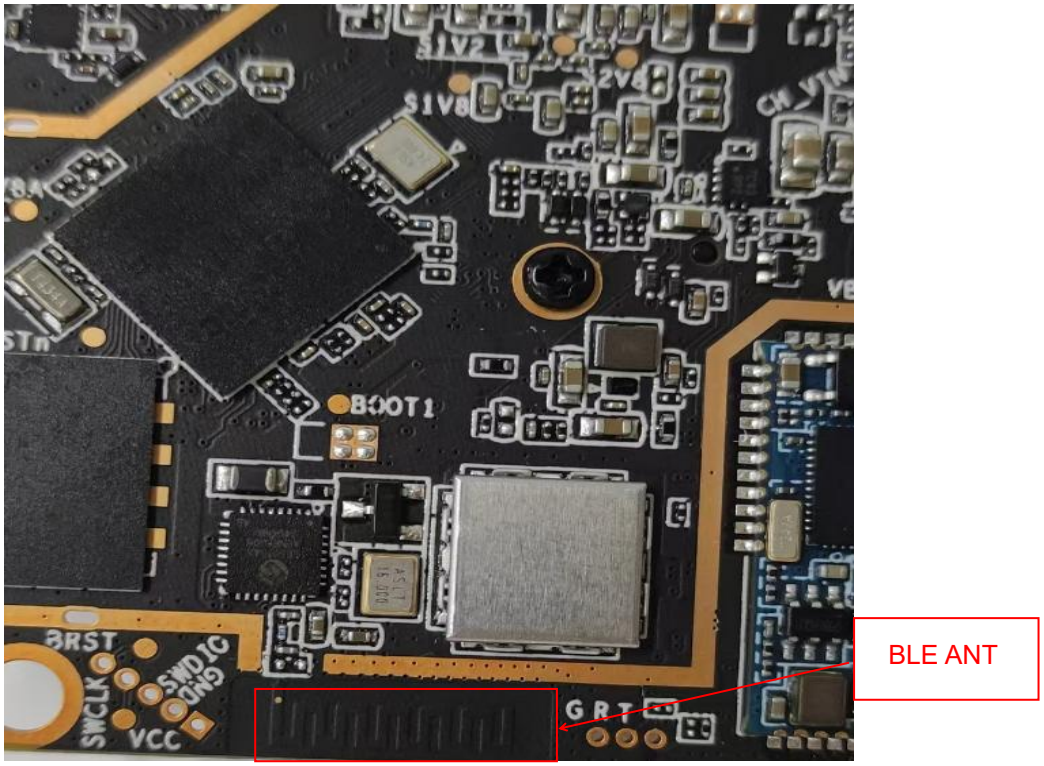
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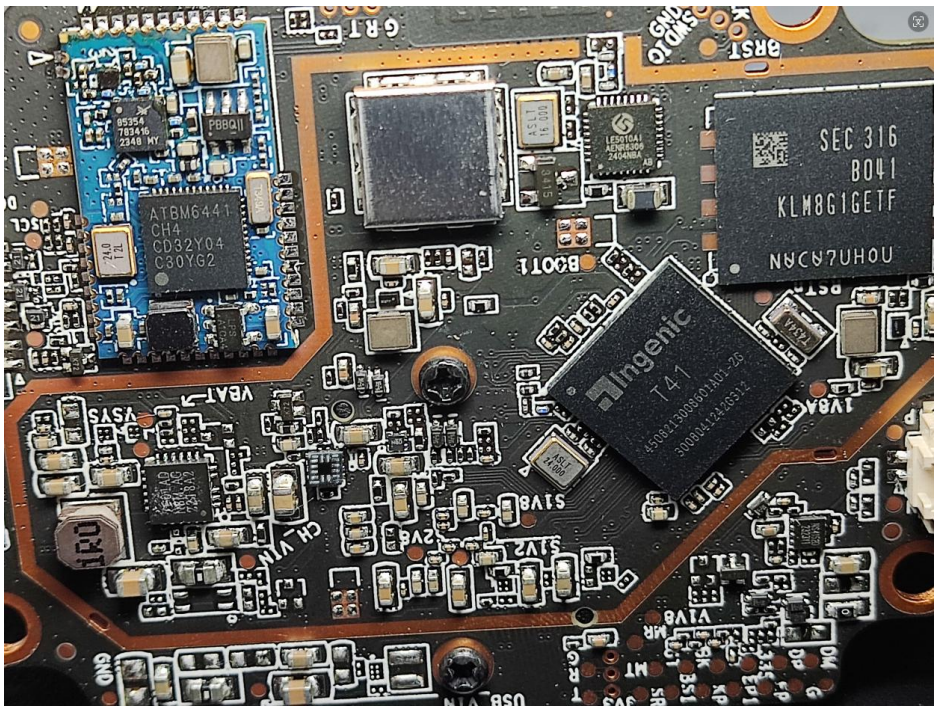
BRST
SWCLK
VCC
BLE ANT

<Fig.11>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