

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 1 of 32

Applicant

: Shenzhen Chuangyuan Digital Technology Co., Ltd
: Building 1, 2nd Floor, Xia Zhao Village Industrial Zone,
: Gao Feng Community, Da Lang Street, Longhua District,
: Shenzhen

Product Name

: BLUETOOTH LOCATOR

Brand Name

: N/A

Model Name

: Huthur tag

Sample Acquisition Method

: Sent by Client

Sample No.

: E23120110-01#01

: E23120110-01#02

FCC ID

: 2BED2-CYTAG

Standards

: FCC CFR47 Part 15, Subpart C

Date of Receipt

: 2024-01-08

Date of Test

: 2024-01-08~2024-01-09

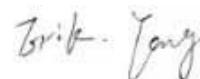
Date of Issue

: 2024-01-10

Remark:

This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Prepared by:


(Erik Yang)

Reviewed by:


(Jennifer Zhou)

Approved by:


(Authorized signatory: Echo Mu)

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 2 of 32

Contents

1 GENERAL INFORMATION	3
1.1 TESTING LABORATORY.....	3
1.2 DETAILS OF APPLICATION	3
1.3 DETAILS OF EUT	3
1.4 TEST METHODOLOGY.....	4
1.5 TEST SUMMARY.....	5
2 TEST CONDITION	6
2.1 ENVIRONMENTAL CONDITIONS	6
2.2 EQUIPMENT LIST	6
2.3 MEASUREMENT UNCERTAINTY.....	6
3 TEST SET-UP AND OPERATION MODES.....	7
3.1 DETAILS OF TEST MODE	7
3.2 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	7
3.3 SUPPORT SOFTWARE.....	7
3.4 TEST SETUP DIAGRAM	8
4 TEST RESULTS	9
4.1 TRANSMITTER REQUIREMENT & TEST SUITES	9
4.1.1 <i>Antenna Requirement</i>	9
4.1.2 <i>Maximum peak conducted output power</i>	10
4.1.3 <i>6dB Bandwidth</i>	12
4.1.4 <i>Maximum conducted output power spectral density</i>	14
4.1.5 <i>Conducted Spurious Emission & Authorized-band band-edge</i>	17
4.1.6 <i>Radiated Emission</i>	24
4.1.7 <i>Band Edge (Restricted-band band-edge)</i>	25
5 APPENDICES	26
5.1 PHOTOGRAPHS OF THE SAMPLE	26
5.2 SET-UP FOR CONDUCTED RF TEST AT ANTENNA PORT	31
5.3 SET-UP FOR SPURIOUS EMISSIONS BELOW 1GHz.....	32
5.4 SET-UP FOR SPURIOUS EMISSIONS ABOVE 1GHz	32

TEST REPORT

Report No.: SHE23120110-01AE Date: 2024-01-10

Page 3 of 32

1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Service (Shanghai) Co., Ltd.
Address	No.1298 Pingan Road, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Applicant Company Name	Shenzhen Chuangyuan Digital Technology Co., Ltd
Address	Building 1, 2nd Floor, Xia Zhao Village Industrial Zone, Gaofeng Community, Dalang Street, Longhua District, Shenzhen
Contact Person	Zhu haijun
Telephone	+86-18165786571
Email	zhuhaijun@szcydt.com
Manufacturer Company Name	Shenzhen Chuangyuan Digital Technology Co., Ltd
Address	Building 1, 2nd Floor, Xia Zhao Village Industrial Zone, Gaofeng Community, Dalang Street, Longhua District, Shenzhen
Factory Company Name	Shenzhen Chuangyuan Digital Technology Co., Ltd
Address	Building 1, 2nd Floor, Xia Zhao Village Industrial Zone, Gaofeng Community, Dalang Street, Longhua District, Shenzhen

1.3 Details of EUT

Product Name	BLUETOOTH LOCATOR
Brand Name	N/A
Test Model Name	Huthur tag
FCC ID	2BED2-CYTAG
Mode of Operation	Bluetooth Version 5.1
Frequency Range	2402MHz ~ 2480MHz
Number of Channels	40(at intervals of 2 MHz)
Modulation Type	BLE <input checked="" type="checkbox"/> GFSK 1Mbps <input type="checkbox"/> GFSK 2Mbps
RF Output Power	5.68dBm
Antenna Type	Ceramic Antenna
Antenna Gain	2.67dBi
Extreme Temperature Range	-10°C ~ +55°C
Test Voltage	DC 3V by Battery(CR2032)
Hardware Version	V1.1
Software Version	V1.0.2

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 4 of 32

RF power setting in TEST SW	TMS Async Version 2.0.3.2_Power level setting_Default
-----------------------------	---

Note:

1. The above information was declared by the manufacturer.
2. For more details, please refer to the User's manual of the EUT.

Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2.402GHz	14	2.430GHz	28	2.458GHz
1	2.404GHz	15	2.432GHz	29	2.460GHz
2	2.406GHz	16	2.434GHz	30	2.462GHz
3	2.408GHz	17	2.436GHz	31	2.464GHz
4	2.410GHz	18	2.438GHz	32	2.466GHz
5	2.412GHz	19	2.440GHz	33	2.468GHz
6	2.414GHz	20	2.442GHz	34	2.470GHz
7	2.416GHz	21	2.444GHz	35	2.472GHz
8	2.418GHz	22	2.446GHz	36	2.474GHz
9	2.420GHz	23	2.448GHz	37	2.476GHz
10	2.422GHz	24	2.450GHz	38	2.478GHz
11	2.424GHz	25	2.452GHz	39	2.480GHz
12	2.426GHz	26	2.454GHz		
13	2.428GHz	27	2.456GHz		

1.4 Test Methodology

47 CFR Part 15, Subpart C	Telecommunication-Radio Frequency Devices-Intentional Radiators
KDB Publication 558074 D01 v05r02	15.247 Meas Guidance.
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s):

All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 5 of 32

1.5 Test Summary

Test Item	FCC Rules	Result
Antenna Requirement	FCC Part 15.247(b)(4), Part 15.203	PASS
Maximum peak conducted output power	FCC Part 15.247(b)(3)	PASS
6dB Bandwidth	FCC Part 15.247(a)(2)	PASS
Maximum conducted output power spectral density	FCC Part 15.247(e)	PASS
Conducted Spurious Emission & Authorized-band band-edge	FCC Part 15.247(d)	PASS
Radiated Emission	FCC Part 15.247(d), 15.205, 15.209	PASS
Band Edge (Restricted-band band-edge)	FCC Part 15.247(d), 15.205, 15.209	PASS
Conducted Emission on AC Mains	FCC Part 15.207(a)	N/A ^{note}

Note(s): The EUT is powered by DC 3V(Battery-CR2032). Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 6 of 32

2 Test Condition

2.1 Environmental conditions

Temperature (°C)	18-25
Humidity (%RH)	40-65
Barometric Pressure (mbar)	960-1060

2.2 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	Keysight	N9020B	MY59260184	2023-07-27	2024-07-26
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2023-06-08	2024-06-07
Signal Generator	Rohde & Schwarz	SMR27	100184	2023-07-27	2024-07-26
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2023-06-08	2024-06-07
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2023-03-22	2025-03-21
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2023-06-13	2025-06-12
Loop Antenna	SCHWARZBECK	FMZB 1513	/	2023-06-09	2024-06-08
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2023-06-18	2025-06-17
Broadband Preamplifier	SCHWARZBECK	BBV 9718	346	2023-06-08	2024-06-07
EMC chamber 9*6*6(L*W*H)	CHANGNING	966	N/A	2023-06-09	2025-06-08
Test Software	BL	BL410_E	Version:1.0.0.117	N/A	N/A
Test Software	BL	BL410_R	Version:2.1.1.409	N/A	N/A

2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI. The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95.45%.

Parameter	Uncertainty
Antenna Port Conducted Emission	< 1GHz
	> 1GHz
Radiated Emission	9KHz – 30MHz
	30MHz – 1GHz
	> 1GHz
Occupied Channel Bandwidth	±5 %

TEST REPORT

Report No.: SHE23120110-01AE Date: 2024-01-10

Page 7 of 32

3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software was control EUT work in continuous transmitter and receiver mode. Select test channel as below:

Channel	Frequency
The lowest channel(CH00)	2402MHz
The middle channel(CH19)	2440MHz
The Highest channel(CH39)	2480MHz

The basic operation modes are:

- A. On
 - 1. BLE mode
 - a. Transmitting
 - i. Low Channel
 - ii. Middle Channel
 - iii. High Channel
 - b. Receiving
 - 2. Normal working with Bluetooth on
- B. Standby
- C. Off

3.2 Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model Name	Serial No.
Laptop	Lenovo	TP00083A	PF-0PRDGN
USB Cable	N/A	N/A	1.00m Unshielded

3.3 Support Software

Description	Manufacturer	Software Name
Software	N/A	TMS Async Version 2.0.3.2

TEST REPORT

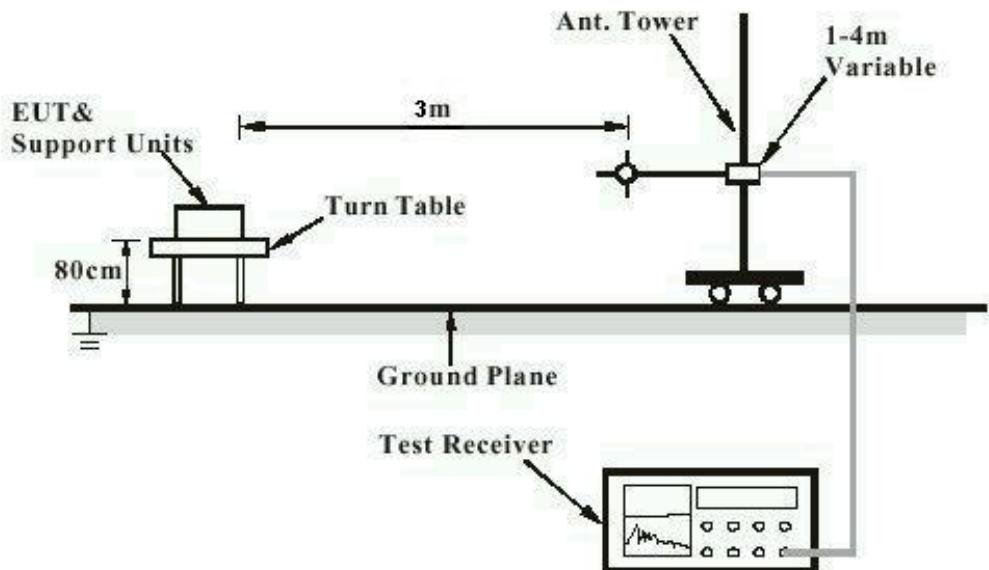
Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 8 of 32

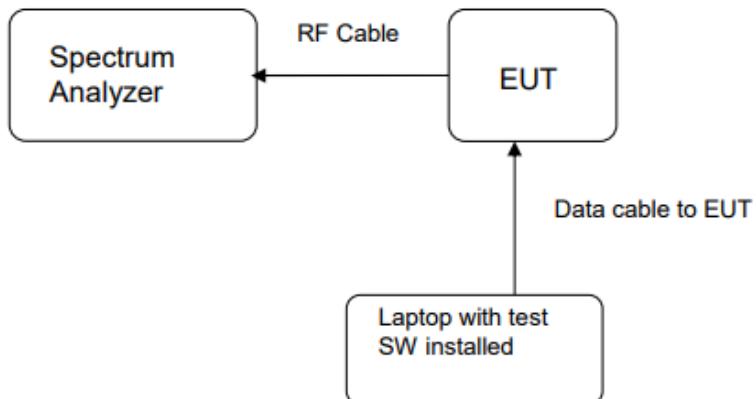
3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Transmitter Test



TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 9 of 32

4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT:

PASS

Test standard	: FCC Part 15.247(b)(4), Part 15.203
Requirement	: 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 replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. In addition, If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

According to the manufacturer declaration, an antenna with a directional gain of 2.67dBi. The antenna is Ceramic Antenna with no possibility of replacement with a non-approved antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 10 of 32

4.1.2 Maximum peak conducted output power

RESULT:

PASS

Test standard	:	FCC Part 15.247(b)(3)
Requirement	:	ANSI C63.10-2013 clause 11.9.1.1, KDB 558074 D01 v05r02, Clause 8.3.1
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/Middle/High
Operation Mode	:	A.1.a
Ambient temperature	:	21.1°C
Relative humidity	:	50%

Table 1: Maximum peak conducted output power

Test Mode	Test Channel (MHz)	Maximum peak conducted output power		Limit (W)
		(dBm)	(mW)	
BLE	2402	5.68	3.70	< 1
	2440	5.52	3.56	
	2480	5.37	3.44	

Figure 1: Peak Output Power, 2402MHz



TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 11 of 32

Figure 2: Peak Output Power, 2440MHz

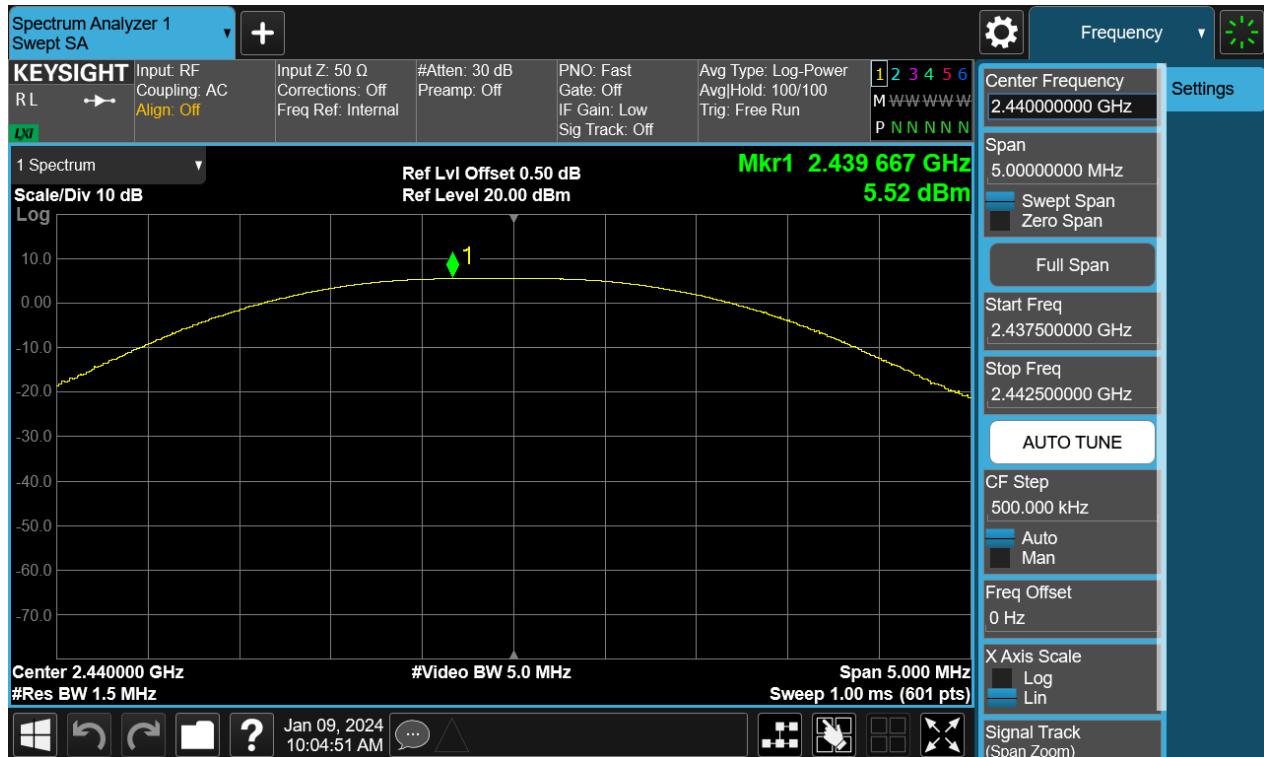
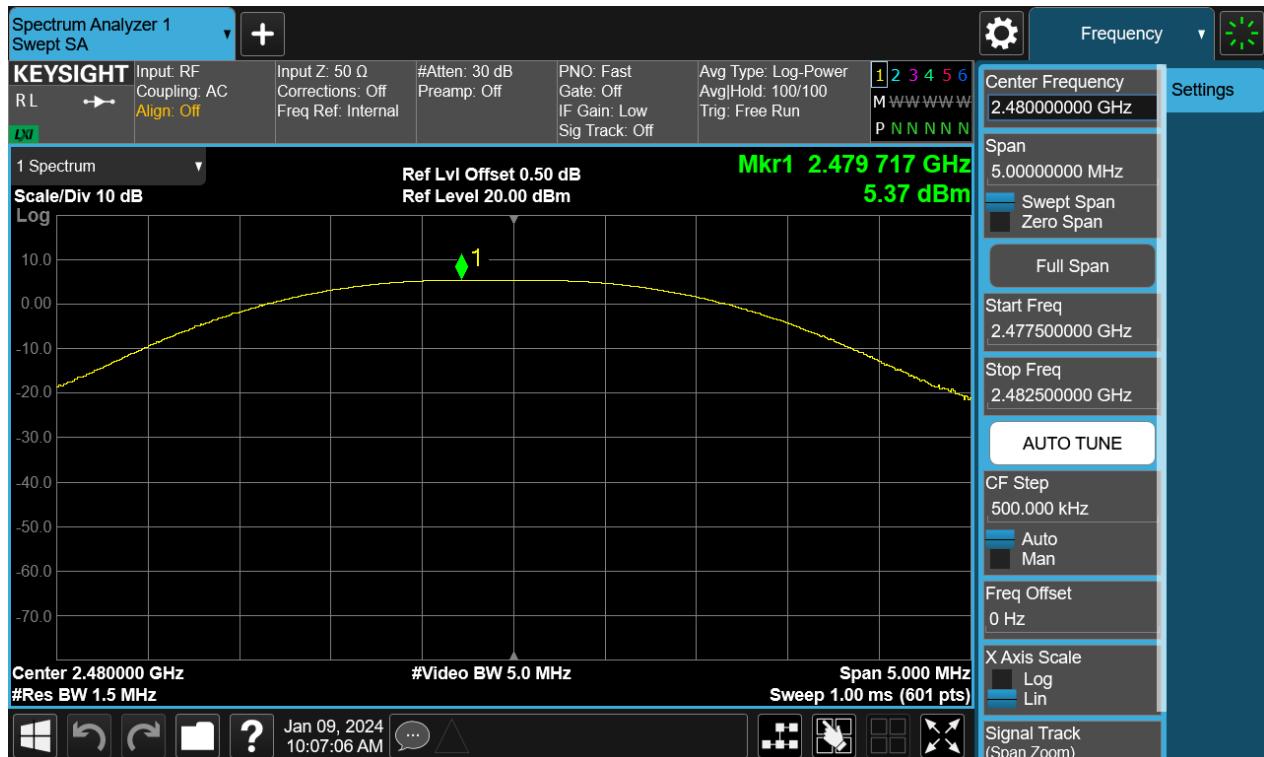


Figure 3: Peak Output Power, 2480MHz



TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 12 of 32

4.1.3 6dB Bandwidth

RESULT:

PASS

Test standard	:	FCC Part 15.247(a)(2)
Requirement	:	ANSI C63.10-2013 clause 11.8.1, KDB 558074 D01 v05r02, Clause 8.2
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/Middle/High
Operation Mode	:	A.1.a
Ambient temperature	:	21.1°C
Relative humidity	:	50%

Table 2: 6dB Bandwidth

Test Mode	Test Channel (MHz)	6dB Bandwidth (MHz)	Limit
BLE	2402	0.6605	≥0.5 MHz
	2440	0.6742	
	2480	0.6653	

Figure 4: 6dB Bandwidth, 2402MHz

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 13 of 32



Figure 5: 6dB Bandwidth, 2440MHz

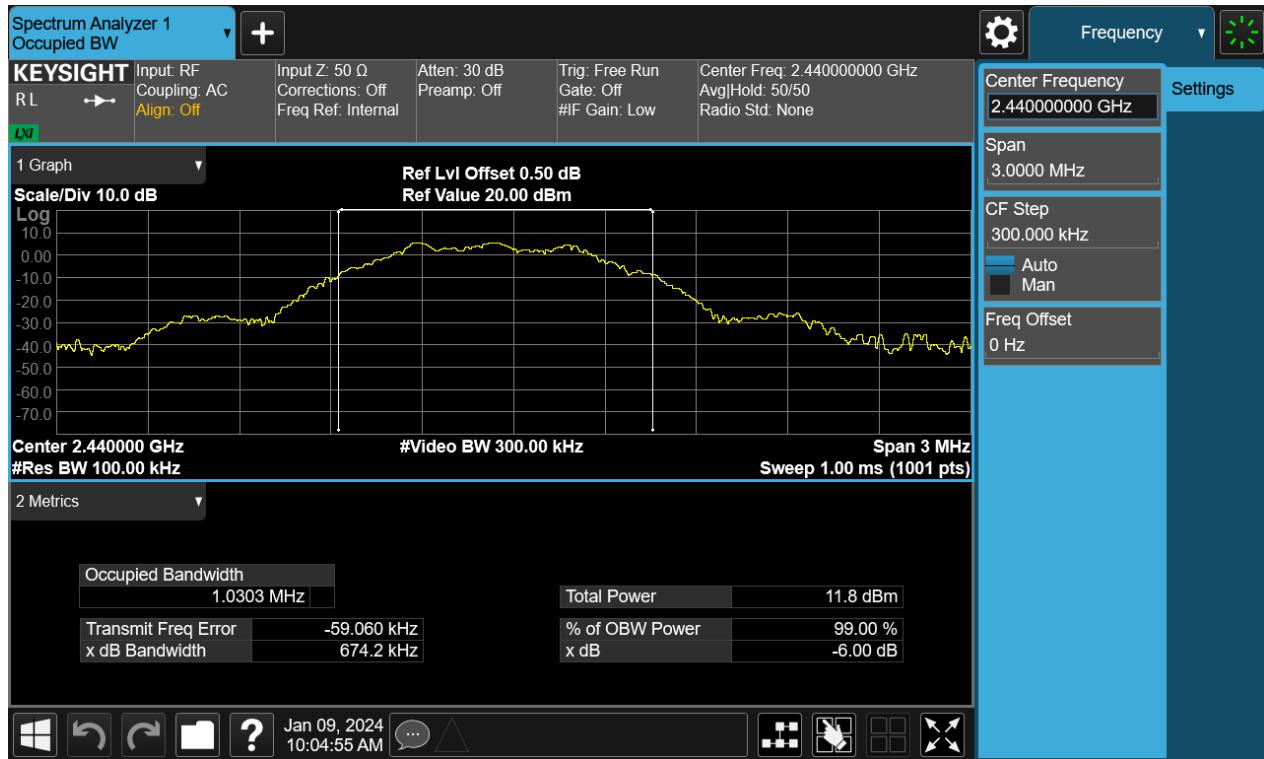


Figure 6: 6dB Bandwidth, 2480MHz

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 14 of 32



4.1.4 Maximum conducted output power spectral density

RESULT:

PASS

Test standard : FCC Part 15.247(e)
 Requirement : ANSI C63.10-2013 clause 11.10.2,
 KDB 558074 D01 v05r02, Clause 8.4
 Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
 Operation Mode : A.1.a
 Ambient temperature : 21.1°C
 Relative humidity : 50%

Table 3: Maximum conducted output power spectral density

Test Mode	Test Channel (MHz)	Measured Result (dBm/3kHz)	Limit (dBm/3kHz)
BLE	2402	-9.86	8
	2440	-10.25	

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 15 of 32

	2480	-10.48	
--	------	--------	--

Figure 7: Power Spectral Density, 2402MHz



Figure 8: Power Spectral Density, 2440MHz

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 16 of 32

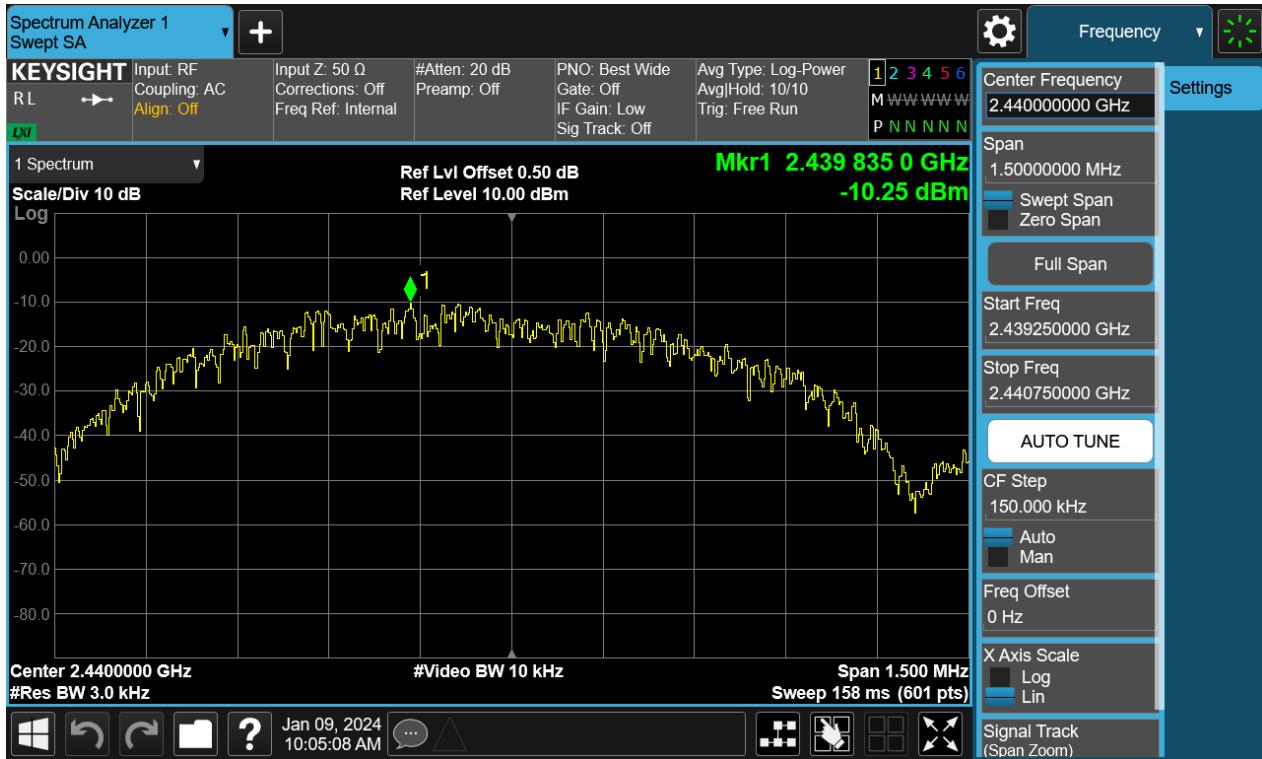


Figure 9: Power Spectral Density, 2480MHz



TEST REPORT

Report No.: SHE23120110-01AE Date: 2024-01-10

Page 17 of 32

4.1.5 Conducted Spurious Emission & Authorized-band band-edge

RESULT: PASS

Test standard	:	FCC Part 15.247(d)
Requirement	:	ANSI C63.10-2013, Clause 11.11.1(a) KDB 558074 D01 v05r02, Clause 8.5
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/Middle/High for spurious, Low/High for Band Edge
Operation Mode	:	A.1.a
Ambient temperature	:	21.1°C
Relative humidity	:	50%

For details refer to following test plot.

TEST REPORT

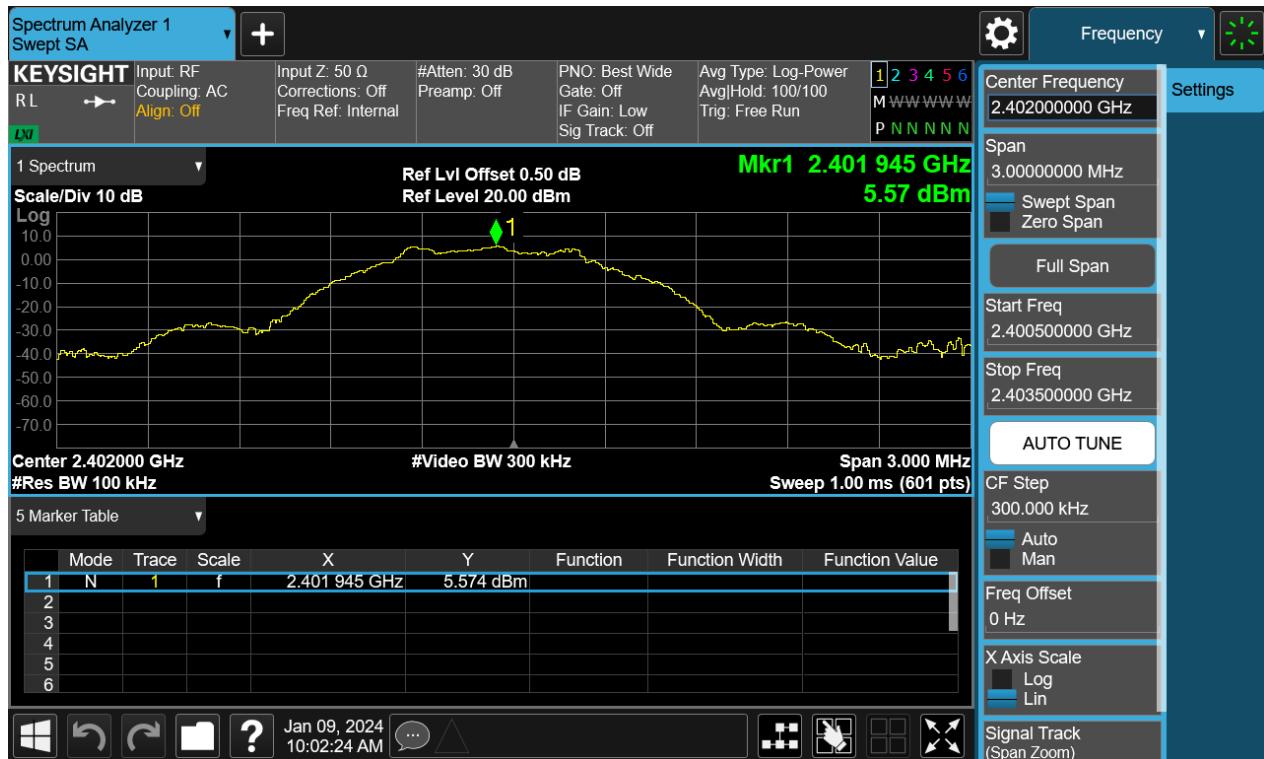
Report No.: SHE23120110-01AE

Date: 2024-01-10

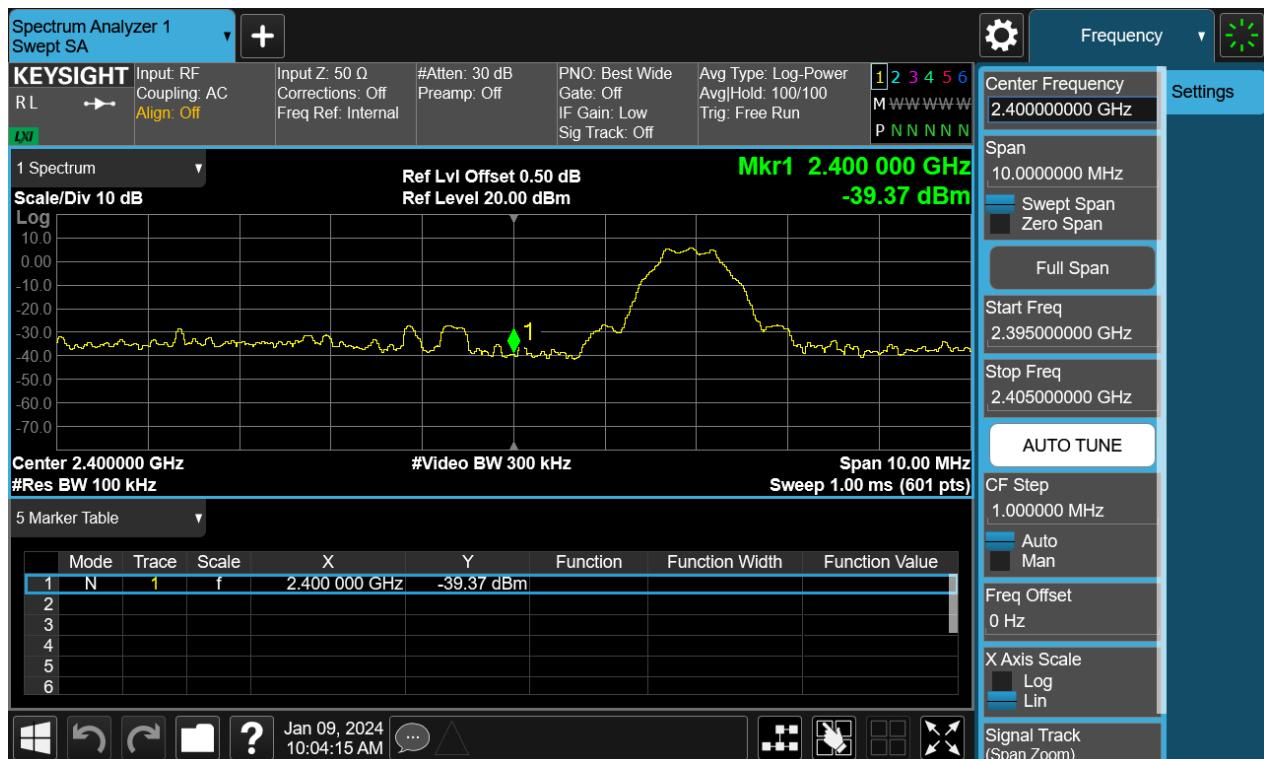
Page 18 of 32

Figure 10: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, BLE

Carrier Level



Band Edge



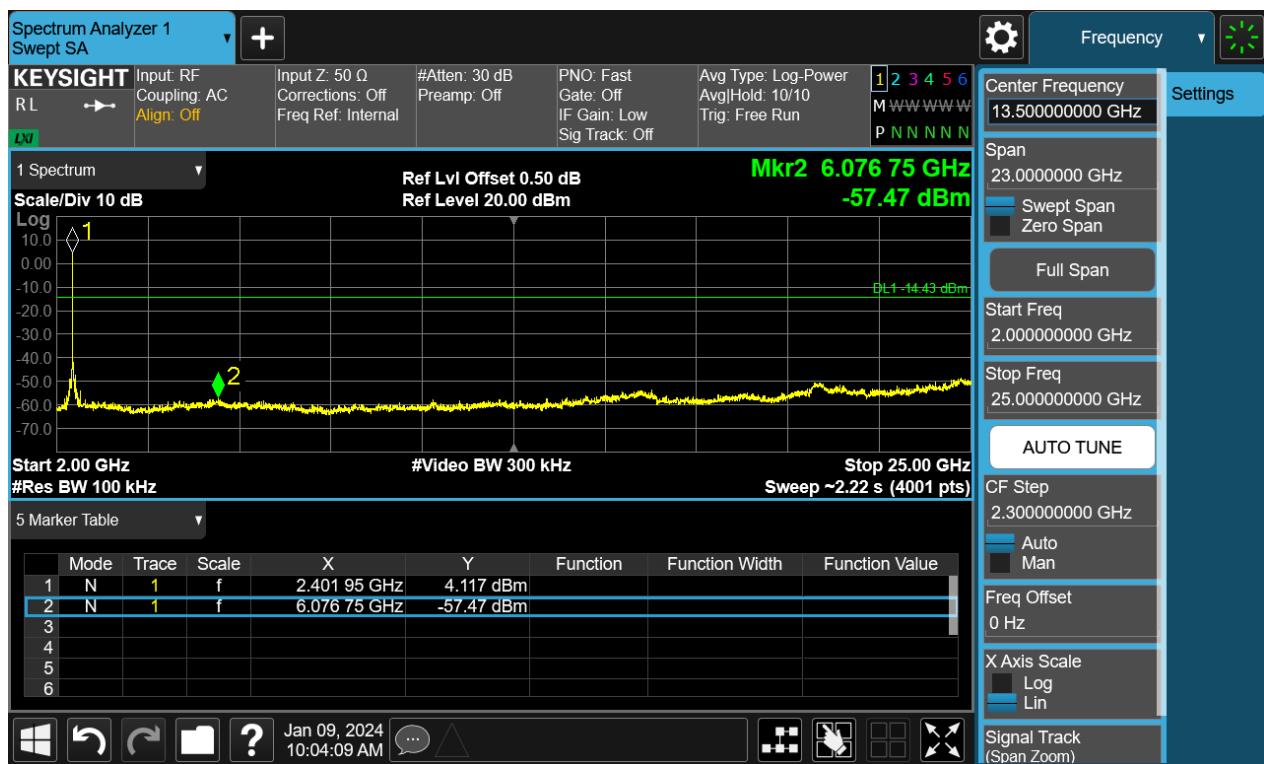
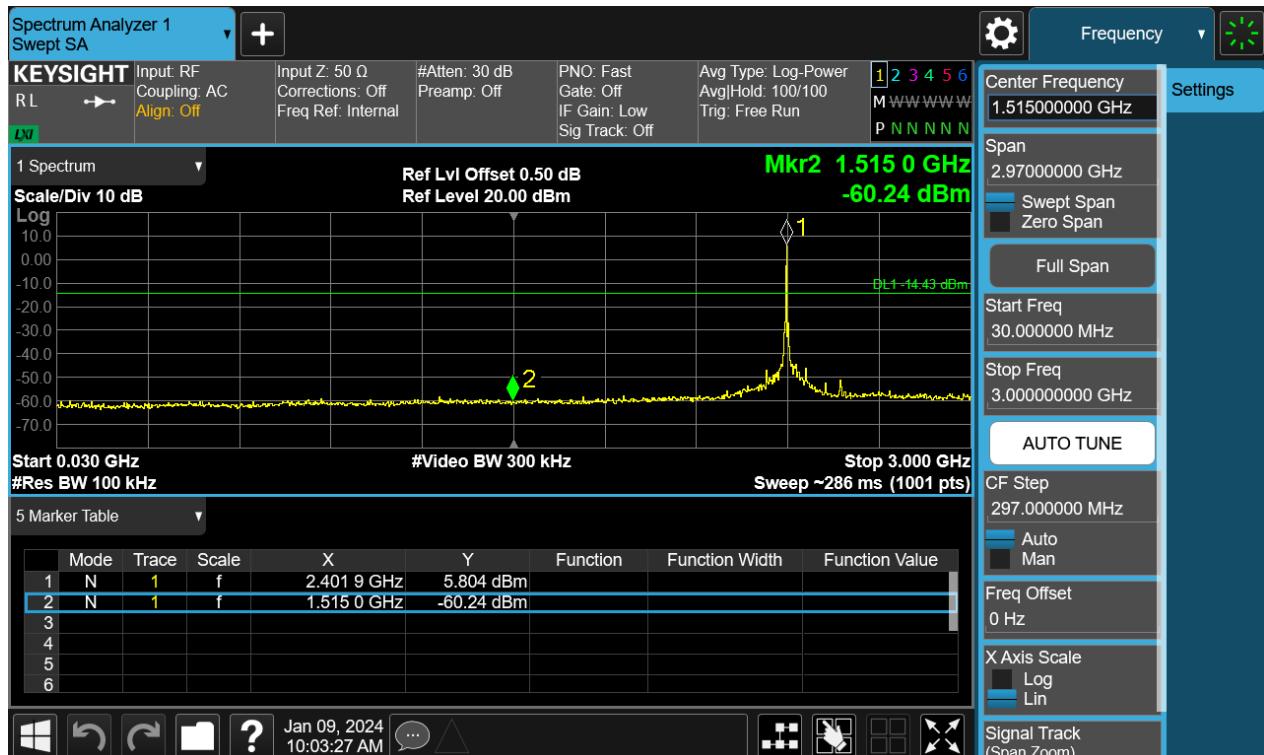
TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 19 of 32

Conducted spurious emissions 30MHz-25GHz



TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

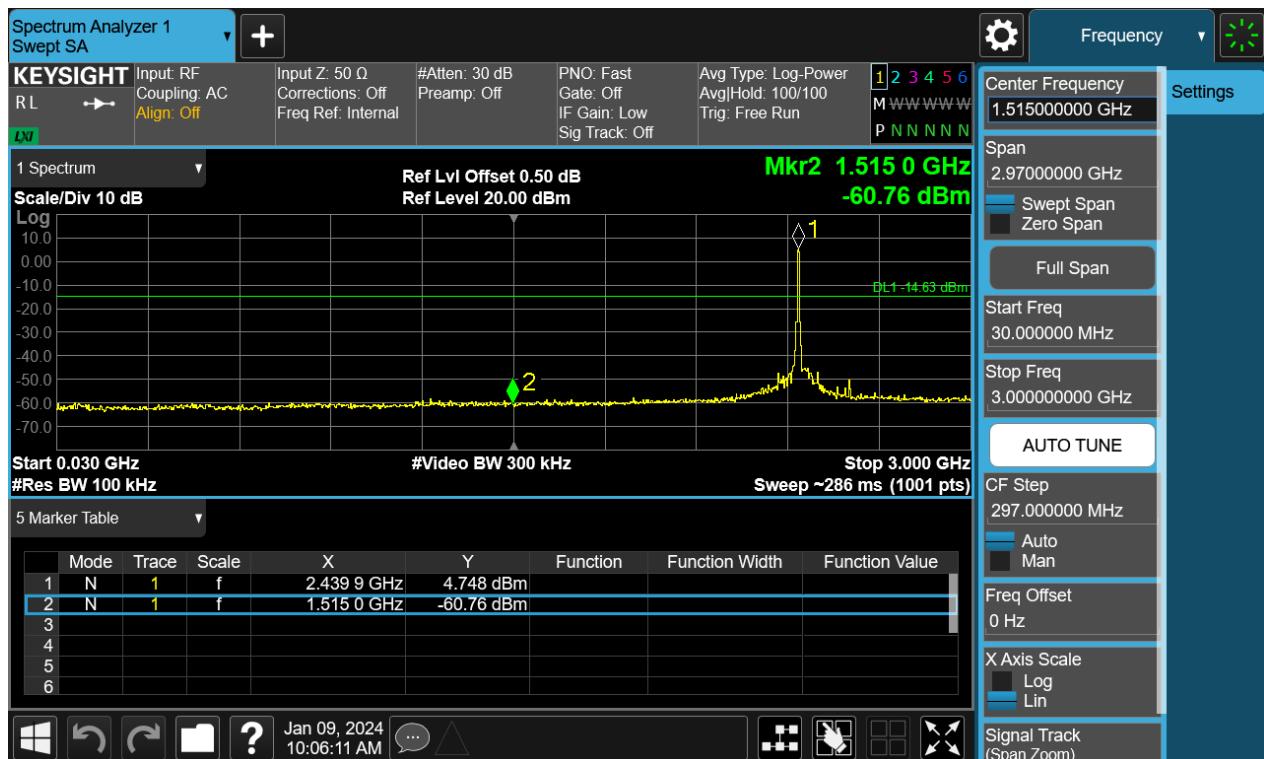
Page 20 of 32

Figure 11: Conducted Spurious Emission & Authorized-band band-edge, 2440MHz, BLE

Carrier Level



Conducted spurious emissions 30MHz-25GHz



TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 21 of 32



Figure 12: Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, BLE Carrier Level



TEST REPORT

Report No.: SHE23120110-01AE

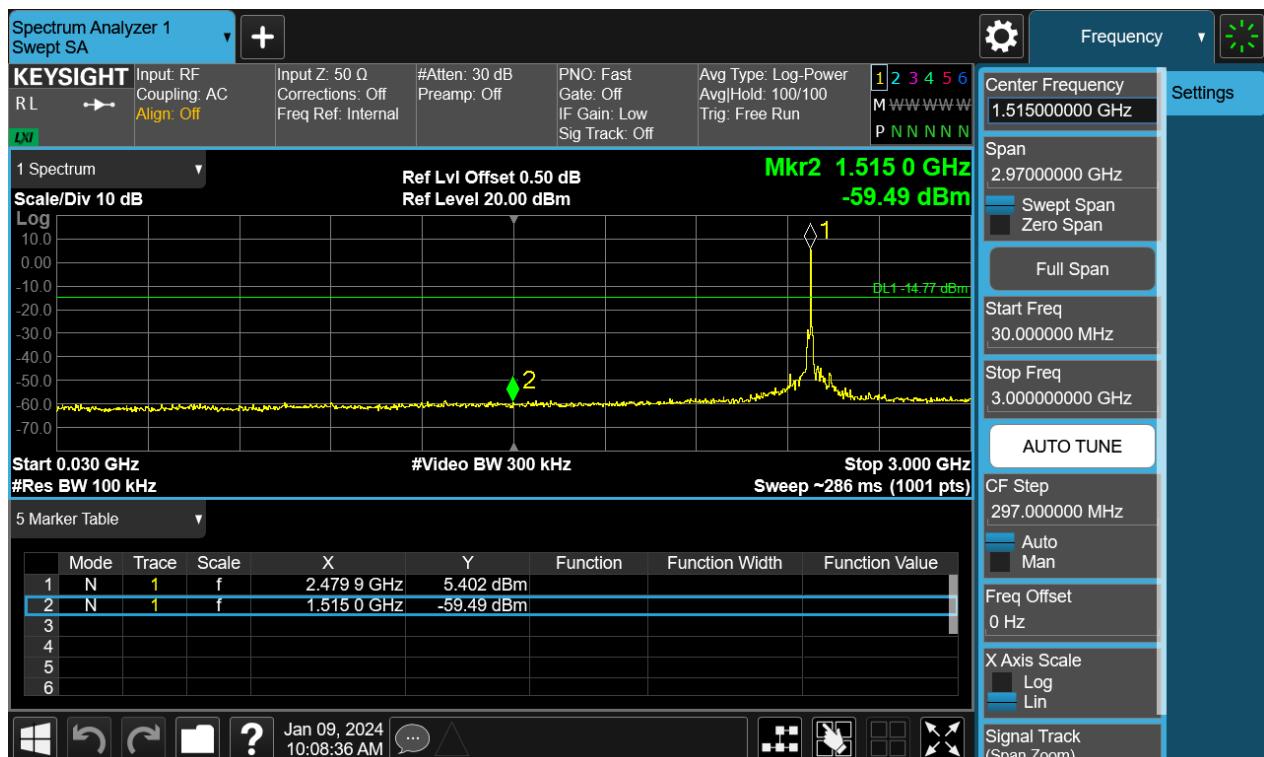
Date: 2024-01-10

Page 22 of 32

Band Edge



Conducted spurious emissions 30MHz-25GHz



TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 23 of 32



TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 24 of 32

4.1.6 Radiated Emission

RESULT:

PASS

Test standard	:	FCC Part 15.247(d), 15.205, 15.209
Requirement	:	ANSI C63.10-2013 clause 11.12, KDB 558074 D01 v05r02, Clause 8.6
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/Middle/High
Operation Mode	:	A
Ambient temperature	:	20.1°C
Relative humidity	:	43%

Notes

Test plots please refer to the annex document "SHE23120110-01AE DATA BLE-TX EXHIBIT A".

1. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
2. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
3. All test modes had been pre-tested, but only the BLE at low channel of below 1 GHz is the worst case and recorded in the report.
4. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

TEST REPORT

Report No.: SHE23120110-01AE Date: 2024-01-10

Page 25 of 32

4.1.7 Band Edge (Restricted-band band-edge)

RESULT:

PASS

Test standard	:	FCC Part 15.247(d), 15.205, 15.209
Requirement	:	ANSI C63.10-2013 clause 11.13, KDB 558074 D01 v05r02, Clause 8.7
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/Middle/High
Operation Mode	:	A.1
Ambient temperature	:	20.1°C
Relative humidity	:	43%

Notes

Test plots please refer to the annex document "SHE23120110-01AE DATA BLE-TX EXHIBIT A".

TEST REPORT

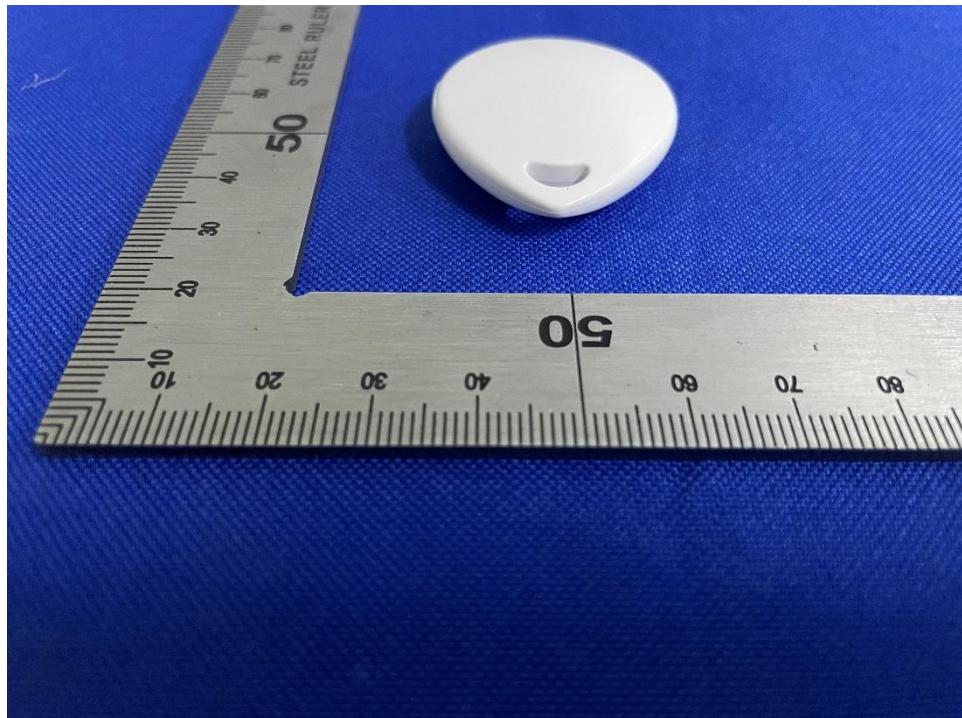
Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 26 of 32

5 Appendixes

5.1 Photographs of the Sample



Front of the sample



Rear of the sample

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 27 of 32



Left of the sample



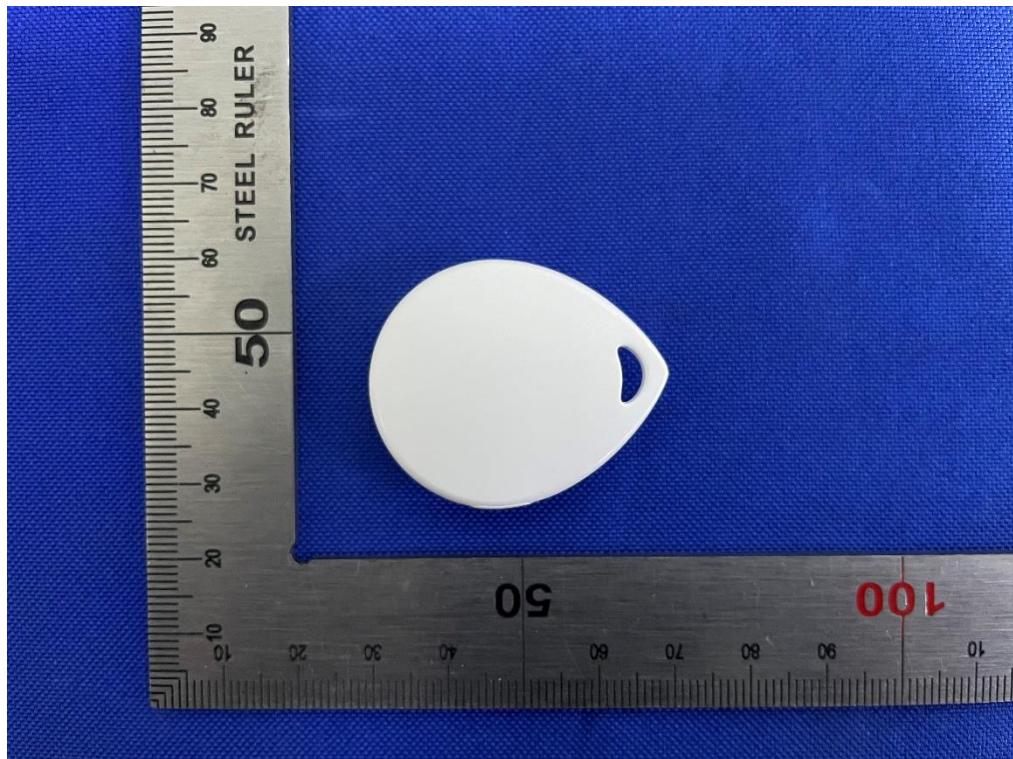
Right of the sample

TEST REPORT

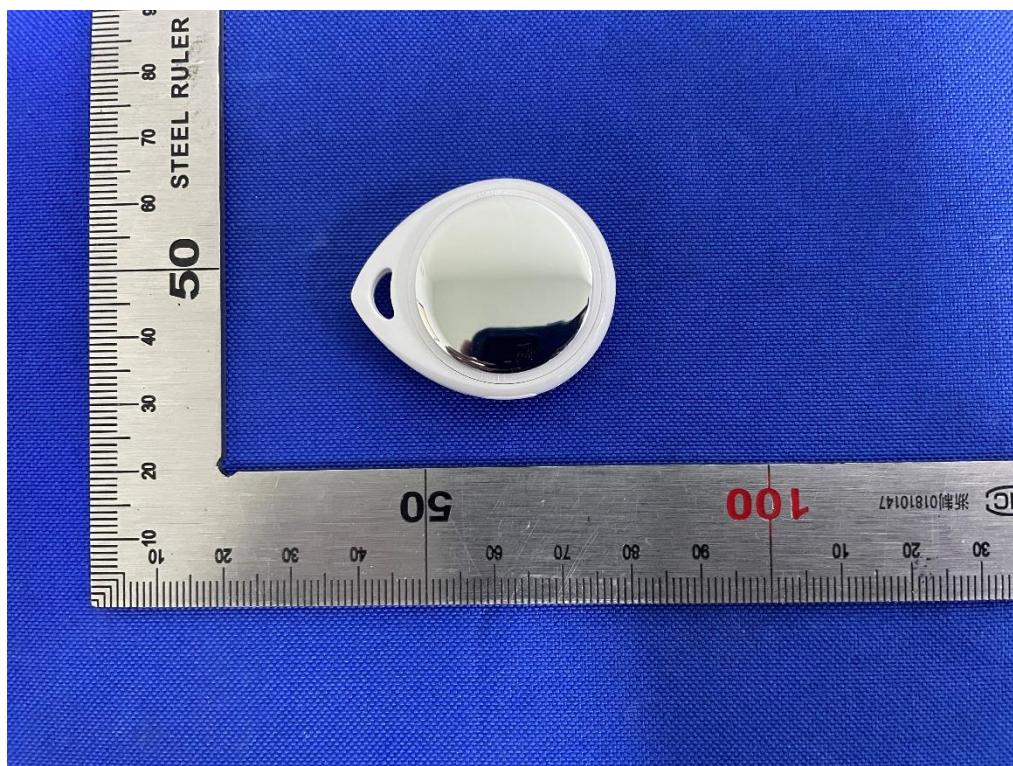
Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 28 of 32



Top of the sample



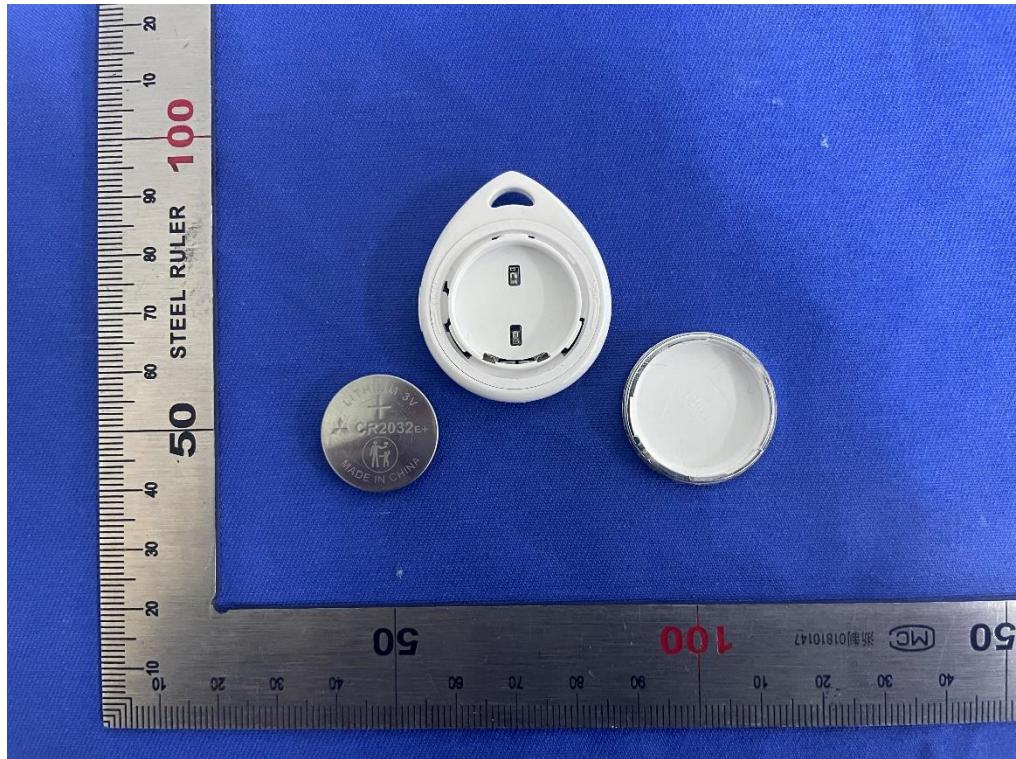
Bottom of the sample

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 29 of 32



Open-1 of the sample



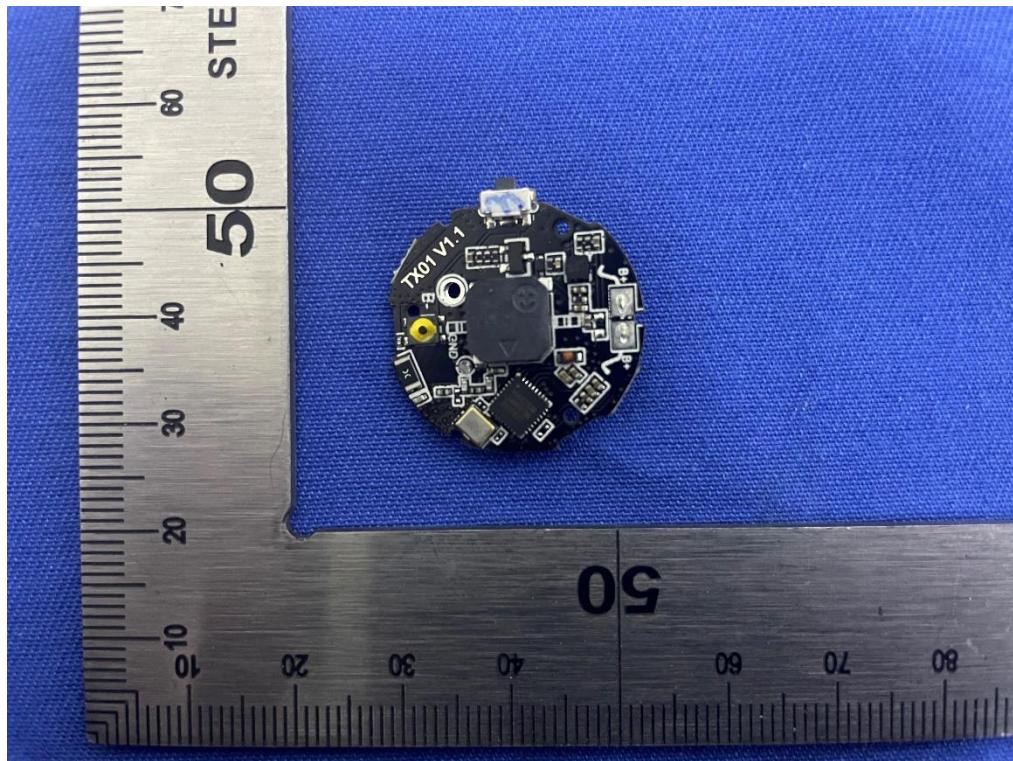
Open-2 of the sample

TEST REPORT

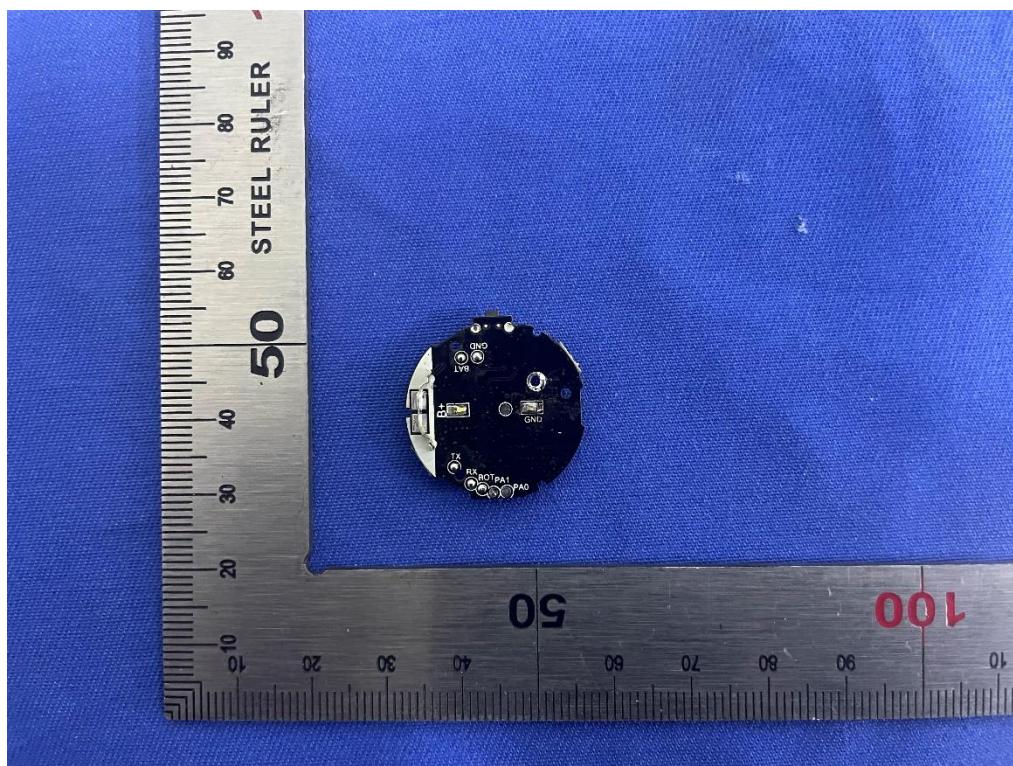
Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 30 of 32



Internal-1 of the sample



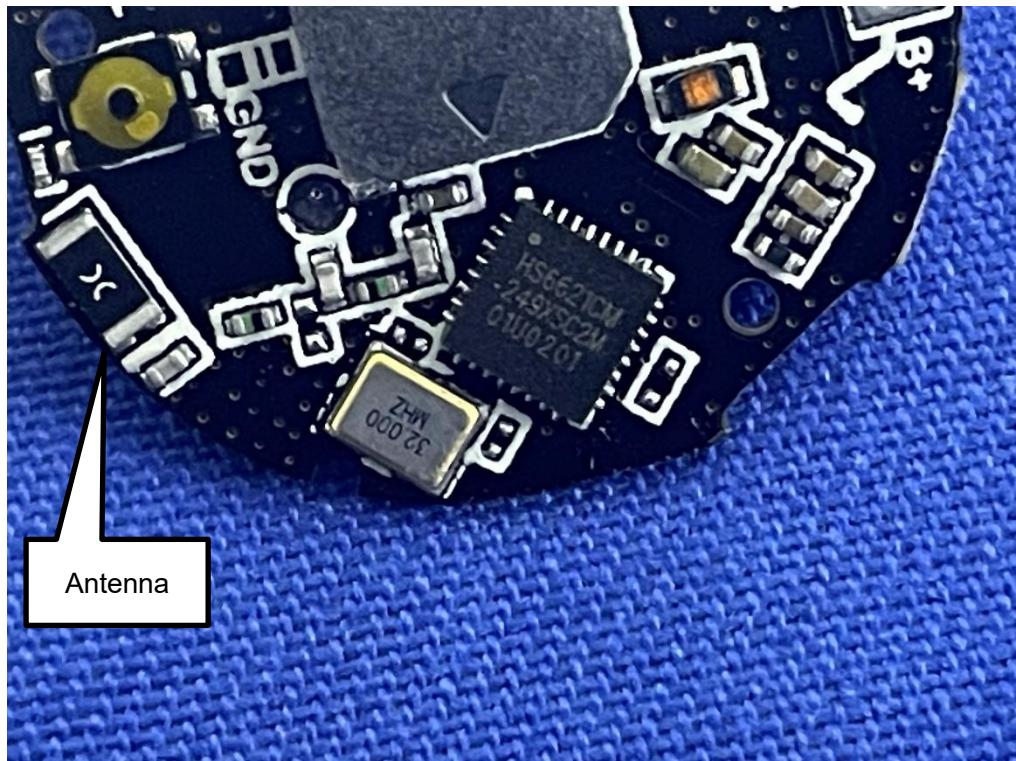
Internal-2 of the sample

TEST REPORT

Report No.: SHE23120110-01AE

Date: 2024-01-10

Page 31 of 32



Bluetooth Antenna position

5.2 Set-up for Conducted RF test at Antenna Port



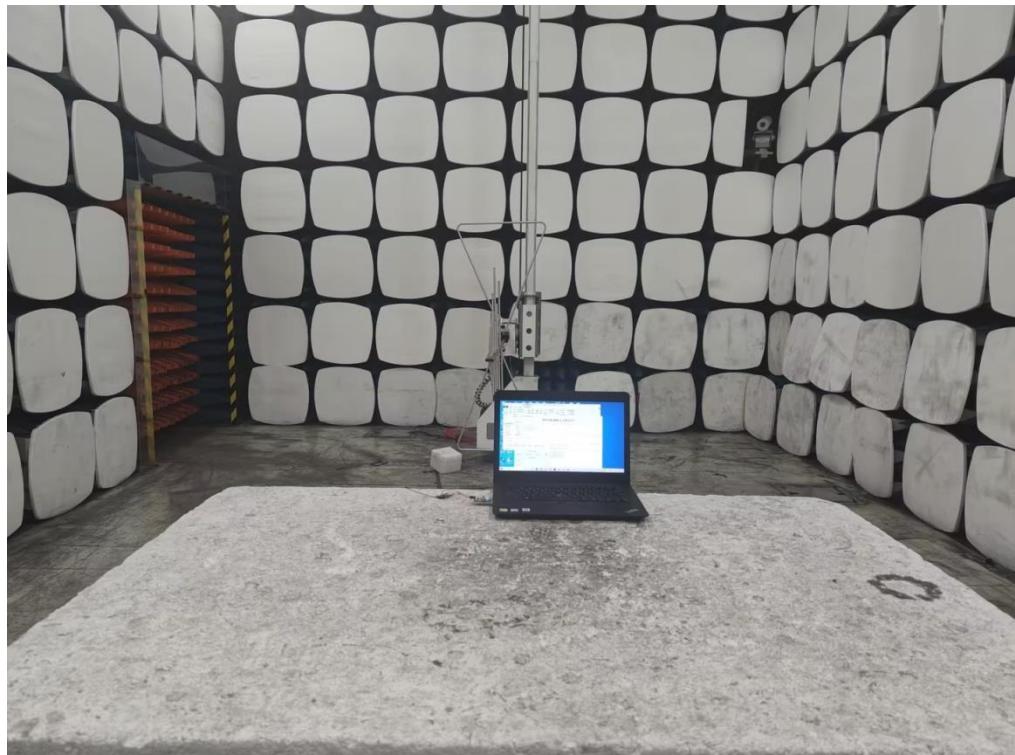
TEST REPORT

Report No.: SHE23120110-01AE

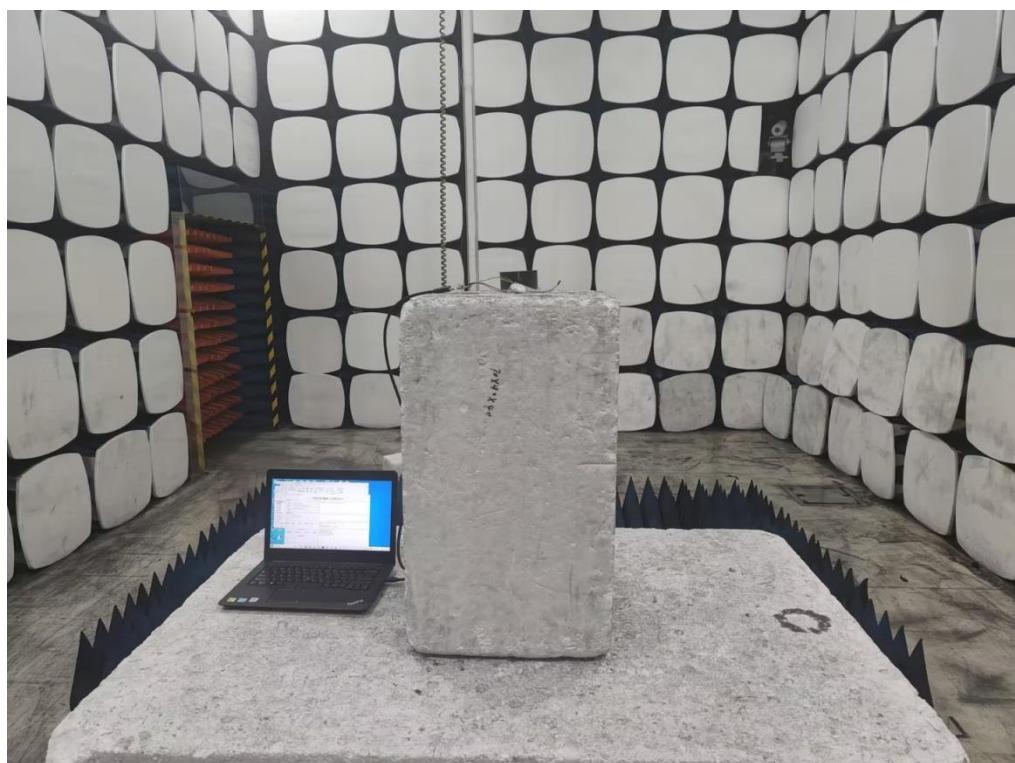
Date: 2024-01-10

Page 32 of 32

5.3 Set-up for Spurious Emissions below 1GHz



5.4 Set-up for Spurious Emissions above 1GHz



End of the report