

TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 1 of 33

Applicant : Shanghai XinMiaoLink Technology Co., Ltd.
Address of Applicant : Floor 1, building 28, No. 6055, Jinhai highway, Fengxian District, Shanghai, China

Product Name : Wi-Fi&BLE Module
Model No. : X-C13SG-0
Sample No. : E21120049-01#01
E21120049-01#04
FCC ID : 2A3M5-X-C13SG-0

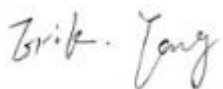
Standards : FCC CFR47 Part 15, Subpart C

Date of Receipt : 2021-12-15
Date of Test : 2021-12-16 ~ 2021-12-22
Date of Issue : 2022-01-13

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: Guoyou Chi)

TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 2 of 33

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	4
2	TEST CONDITION	5
2.1	ENVIRONMENTAL CONDITIONS	5
2.2	EQUIPMENT LIST	5
2.3	MEASUREMENT UNCERTAINTY	5
3	TEST SET-UP AND OPERATION MODES	6
3.1	DETAILS OF TEST MODE	6
3.2	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	6
3.3	SUPPORT SOFTWARE	6
3.4	TEST SETUP DIAGRAM	7
4	TEST RESULTS	9
4.1	TRANSMITTER REQUIREMENT & TEST SUITES	9
4.1.1	<i>Antenna Requirement</i>	9
4.1.2	<i>Peak Output Power</i>	10
4.1.3	<i>6dB Bandwidth and 99% Bandwidth</i>	13
4.1.4	<i>Power Spectral Density</i>	16
4.1.5	<i>Conducted Spurious Emission & Authorized-band band-edge</i>	19
4.1.6	<i>Radiated Spurious Emission</i>	26
4.1.7	<i>Band Edge (Restricted-band band-edge)</i>	27
4.2	MAINS EMISSIONS	28
4.2.1	<i>Conducted Emission on AC Mains</i>	28
5	APPENDIXES	31
5.1	PHOTOGRAPHS OF THE SAMPLE	31
5.2	SET-UP FOR CONDUCTED EMISSIONS	32
5.3	SET-UP FOR CONDUCTED RF TEST AT ANTENNA PORT	32
5.4	SET-UP FOR SPURIOUS EMISSIONS BELOW 1GHZ	33
5.5	SET-UP FOR SPURIOUS EMISSIONS ABOVE 1GHZ	33

TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 3 of 33

1 General Information

1.1 Testing Laboratory

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

1.2 Details of Application

Applicant Company Name	Shanghai XinMiaoLink Technology Co., Ltd.
Address	Floor 1, building 28, No. 6055, Jinhai highway, Fengxian District, Shanghai, China
Contact Person	Yue liren
Telephone	13818419836
Email	tomas@chipfresh.com
Manufacturer Company Name	Shanghai XinMiaoLink Technology Co., Ltd.
Address	Floor 1, building 28, No. 6055, Jinhai highway, Fengxian District, Shanghai, China

1.3 Details of EUT

Product Name	Wi-Fi&BLE Module
Brand Name	N/A
Test Model No.	X-C13SG-0
FCC ID	2A3M5-X-C13SG-0
Mode of Operation	Bluetooth BLE
Frequency Range	2400MHz ~ 2483.5MHz
Number of Channels	40 (at intervals of 2 MHz)
Modulation Type	GFSK
Antenna Type	External Antenna
Antenna Gain	3dBi
Test Voltage	DC 3.3V
Hardware version	V1.0
Software version	V1.00.10
RF power setting in TEST SW	Bouffalo Lab Dev Cube V1.6.5

TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 4 of 33

1.4 Test Methodology

47 CFR Part 15, Subpart C	Miscellaneous Wireless Communications Services
KDB Publication 558074 D01 v05r02	Part 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.

1.5 Test Summary

Test Item	FCC Rules	Result
Antenna Requirement	FCC Part 15.247(b)(4), Part 15.203	PASS
Peak Output Power	FCC Part 15.247(b)(3)	PASS
6dB Bandwidth	FCC Part 15.247(a)(2)	PASS
Power Spectral Density	FCC Part 15.247(e)	PASS
Conducted Spurious Emission & Authorized-band band-edge	FCC Part 15.247(d)	PASS
Radiated Spurious 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)	PASS

TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 5 of 33

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 Date
Spectrum Analyzer	Keysight	N9020B	MY59260184	2021-08-17	2022-08-16
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2021-06-10	2022-06-09
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2021-06-10	2022-06-09
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2021-06-10	2022-06-09
V-network	SCHWARZBECK	NSLK 8127	8127-902	2021-06-10	2022-06-09
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	100687	2021-08-13	2022-08-12
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2021-06-08	2022-06-07
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2021-06-08	2022-06-07
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2020-11-23	2022-11-22
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2021-06-12	2022-06-11
EMC chamber 9*6*6 (L*W*H)	CHANGNING	966	N/A	2020-06-09	2023-06-08
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	N/A	2020-06-09	2023-06-08
Test Software	BL	BL410_E	N/A	N/A	N/A
Test Software	BL	BL410_R	N/A	N/A	N/A

2.3 Measurement Uncertainty

Parameter	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	30 MHz – 1 GHz	± 3.42 dB
	> 1GHz	± 4.20 dB
Conducted Emission on AC Mains	9 kHz to 30 MHz	± 1.71 dB

TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 6 of 33

3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software (Bouffalo Lab Dev Cube V1.6.5) was control EUT work in continuous transmitter and receiver mode.
Select test channel as below:

Channel	Frequency
The lowest channel(CH0)	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 No.	Serial No.
Laptop	Lenovo	TP00083A	N/A
USB Cable	N/A	N/A	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	Bouffalo Lab	Bouffalo Lab Dev Cube V1.6.5

TEST REPORT

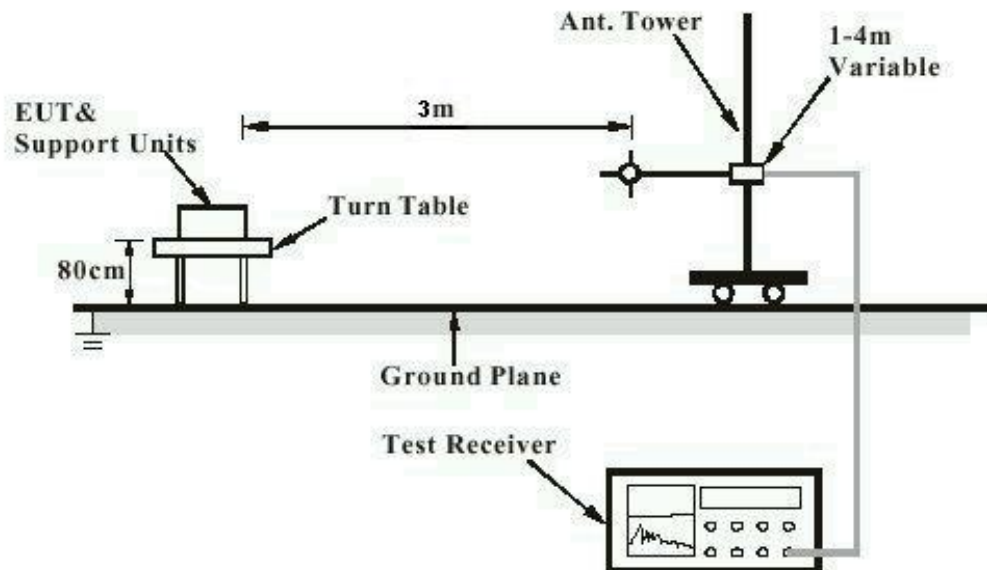
Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 7 of 33

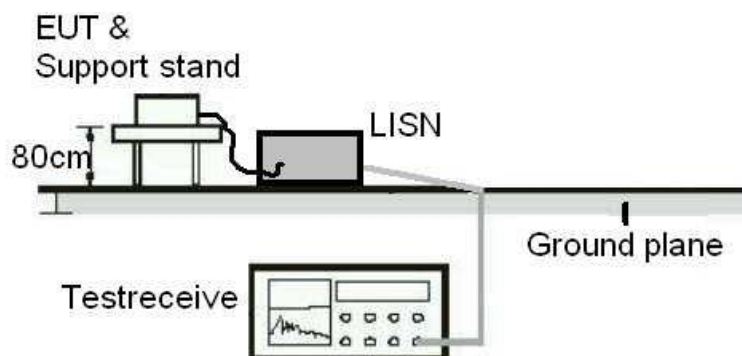
3.4 Test Setup Diagram

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 Conduction Measurement



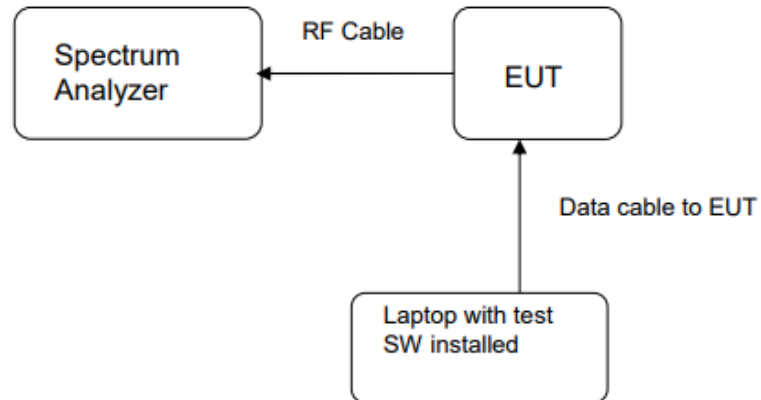
TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 8 of 33

Diagram of Measurement Equipment Configuration for Transmitter Measurement



TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 9 of 33

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	: The use of approved antennas only with directional gains that do not exceed 6dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 3 dBi. The antenna is an External 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.: SHE21120049-02BE

Date: 2022-01-13

Page 10 of 33

4.1.2 Peak Output Power

RESULT:

PASS

Test standard : FCC Part 15.247(b)(3)

Requirement : ANSI C63.10-2013, KDB 558074

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1.a

Ambient temperature : 25°C

Relative humidity : 50%

Table 1: Peak Output Power

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(mW)	
BLE	2402	8.20	6.61	≤1
	2440	8.41	6.93	
	2480	7.78	6.00	

TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 11 of 33

Figure 1: Peak Output Power, 2402MHz

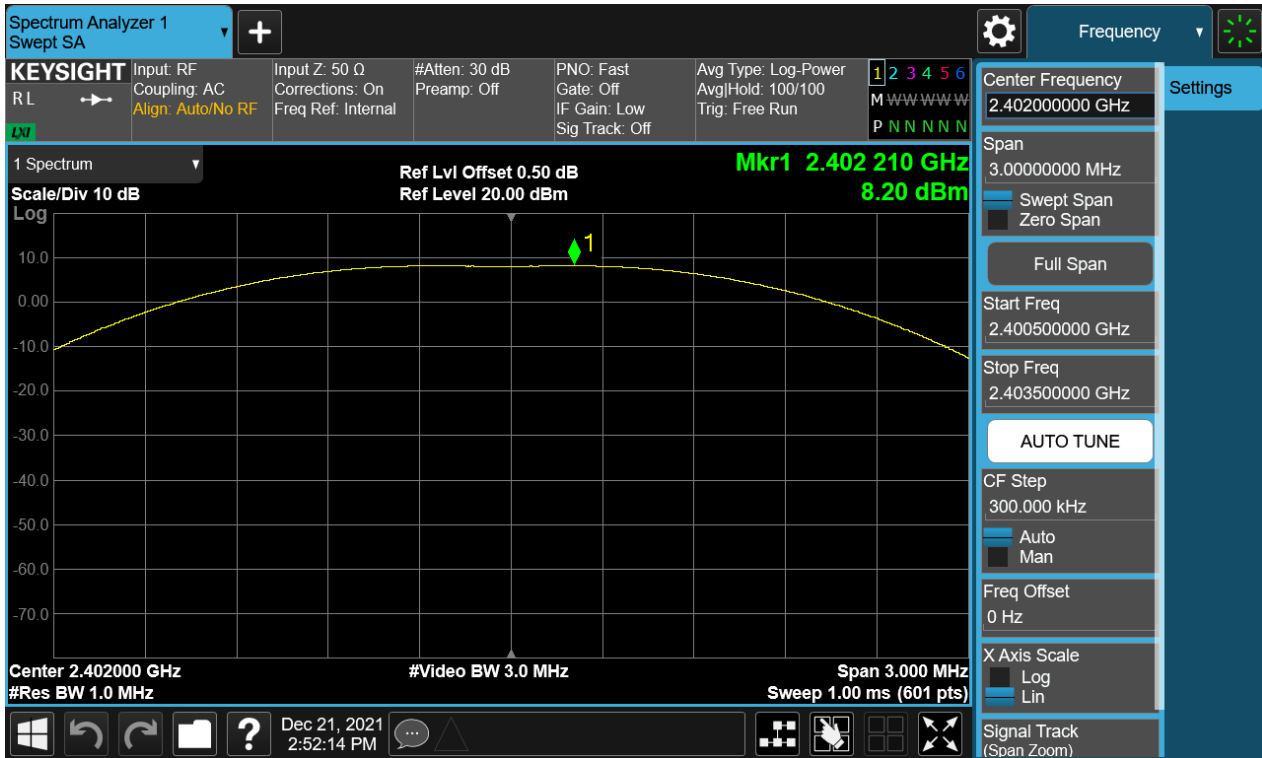


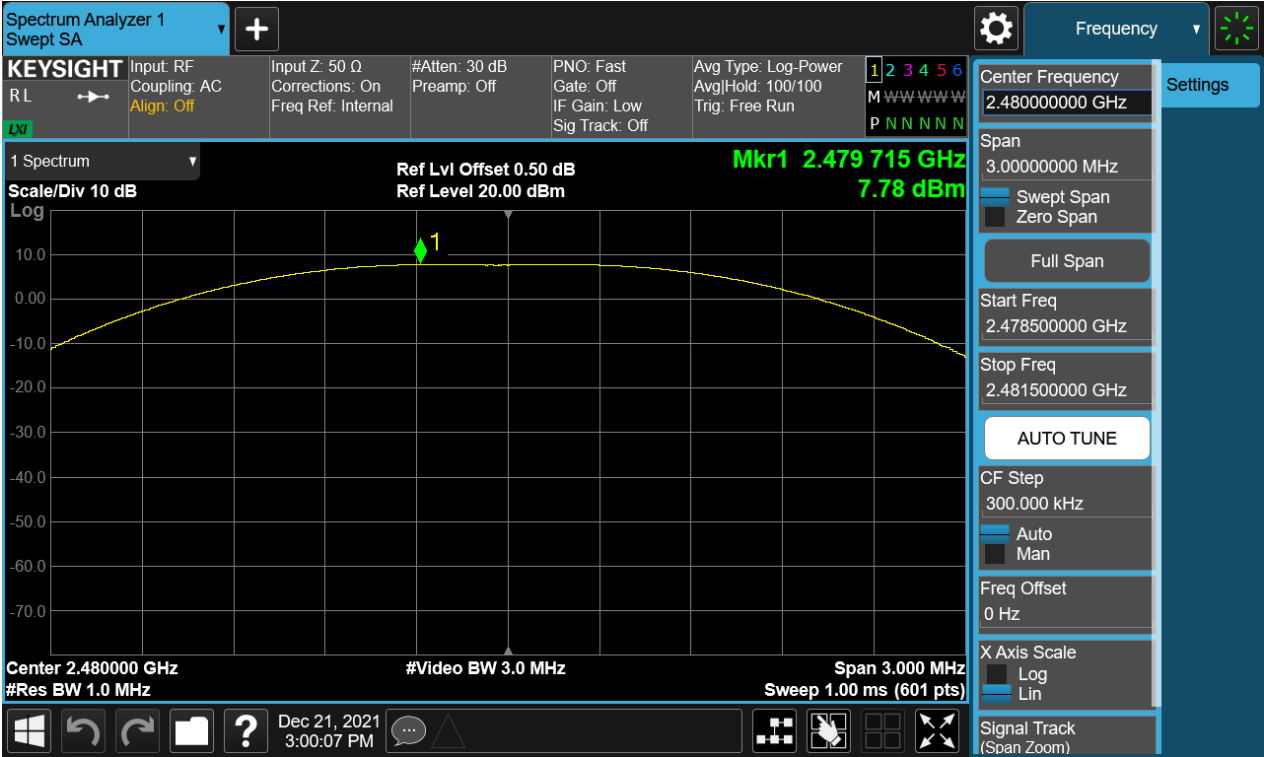
Figure 2: Peak Output Power, 2440MHz



TEST REPORT

Report No.: SHE21120049-02BE Date: 2022-01-13 Page 12 of 33

Figure 3: Peak Output Power, 2480MHz



TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 13 of 33

4.1.3 6dB Bandwidth

RESULT:

PASS

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

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 50%

Table 2: 6dB Bandwidth

Test Mode	Test Channel (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Limit
BLE	2402	0.6611	≥ 0.5 MHz
	2440	0.6633	
	2480	0.6675	

TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 14 of 33

Figure 4: 6dB Bandwidth, 2402MHz



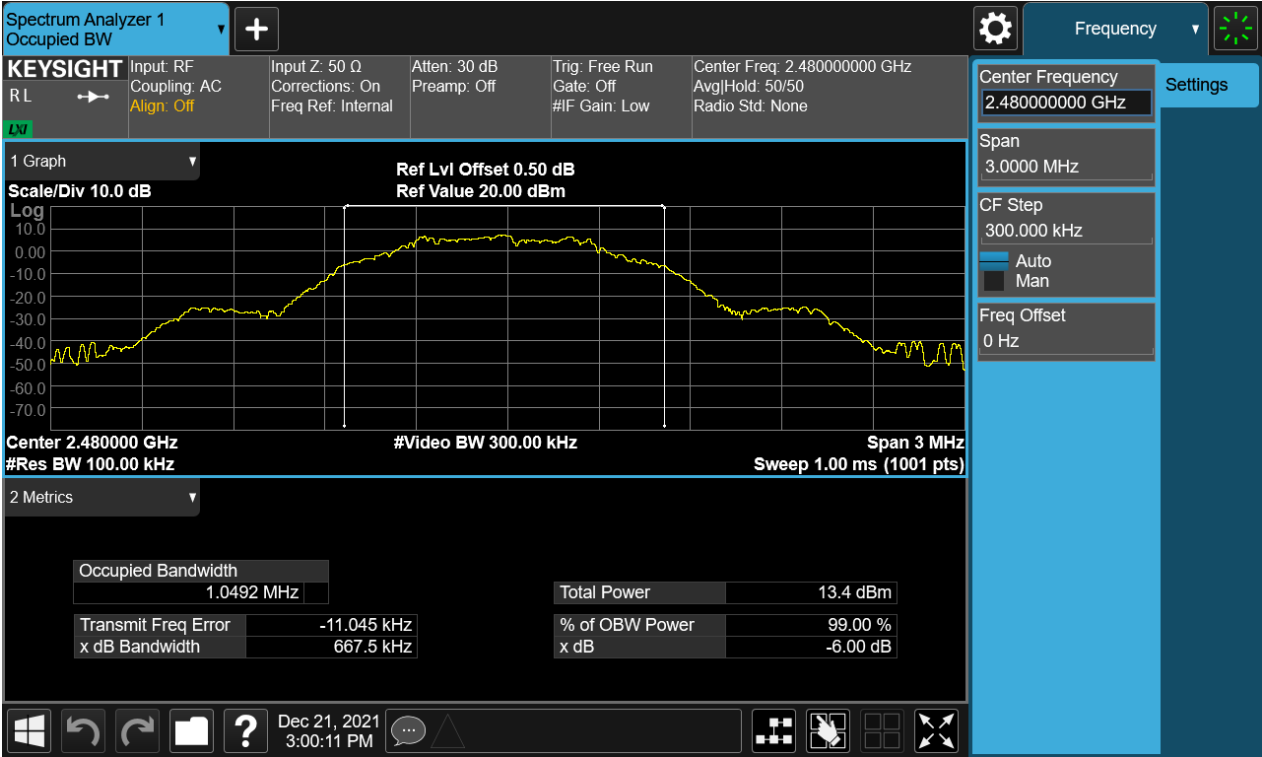
Figure 5: 6dB Bandwidth, 2440MHz



TEST REPORT

Report No.: SHE21120049-02BE Date: 2022-01-13 Page 15 of 33

Figure 6: 6dB Bandwidth, 2480MHz



TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 16 of 33

4.1.4 Power Spectral Density

RESULT:

PASS

Test standard : FCC Part 15.247(e)

Requirement : ANSI C63.10-2013, KDB 558074

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1.a

Ambient temperature : 25°C

Relative humidity : 50%

Table 3: Power Spectral Density

Test Mode	Test Channel (MHz)	Measured Result (dBm/3kHz)	Limit (dBm/3kHz)
BLE	2402	-7.48	≤8
	2440	-7.69	
	2480	-7.98	

TEST REPORT

Report No.: SHE21120049-02BE Date: 2022-01-13 Page 17 of 33

Figure 7: Power Spectral Density, 2402MHz

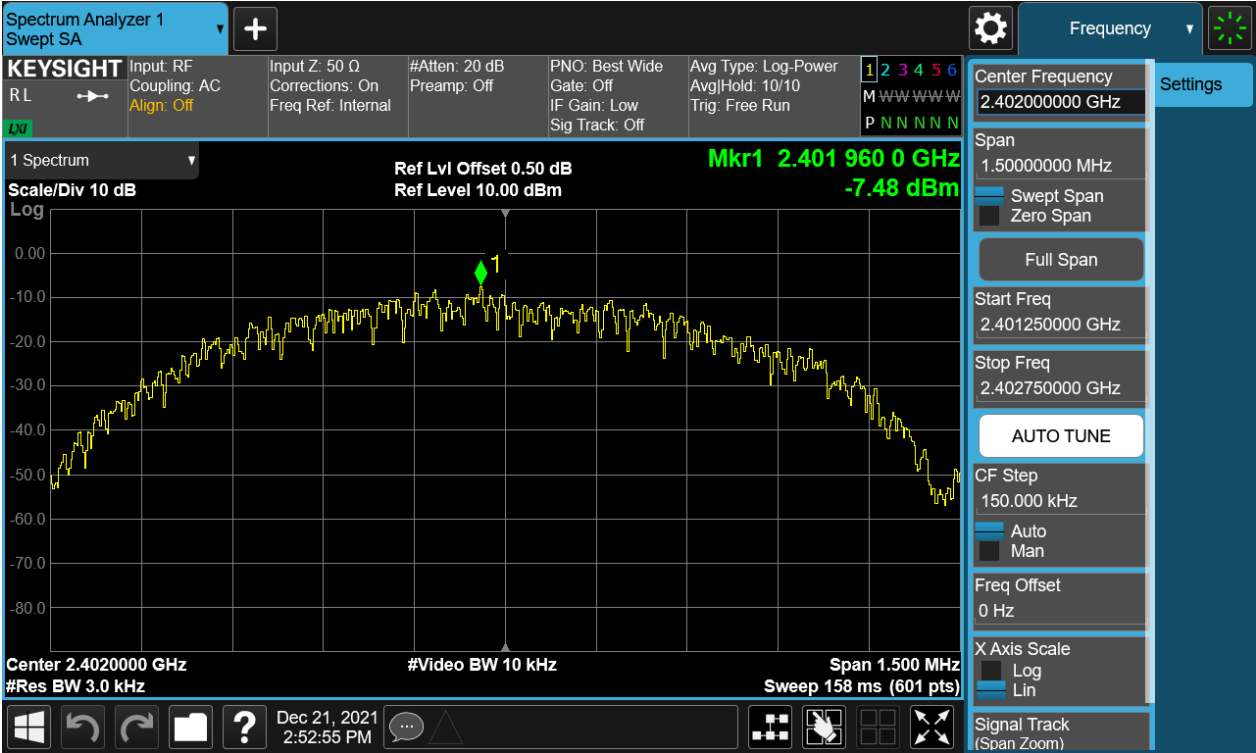


Figure 8: Power Spectral Density, 2440MHz



TEST REPORT

Report No.:

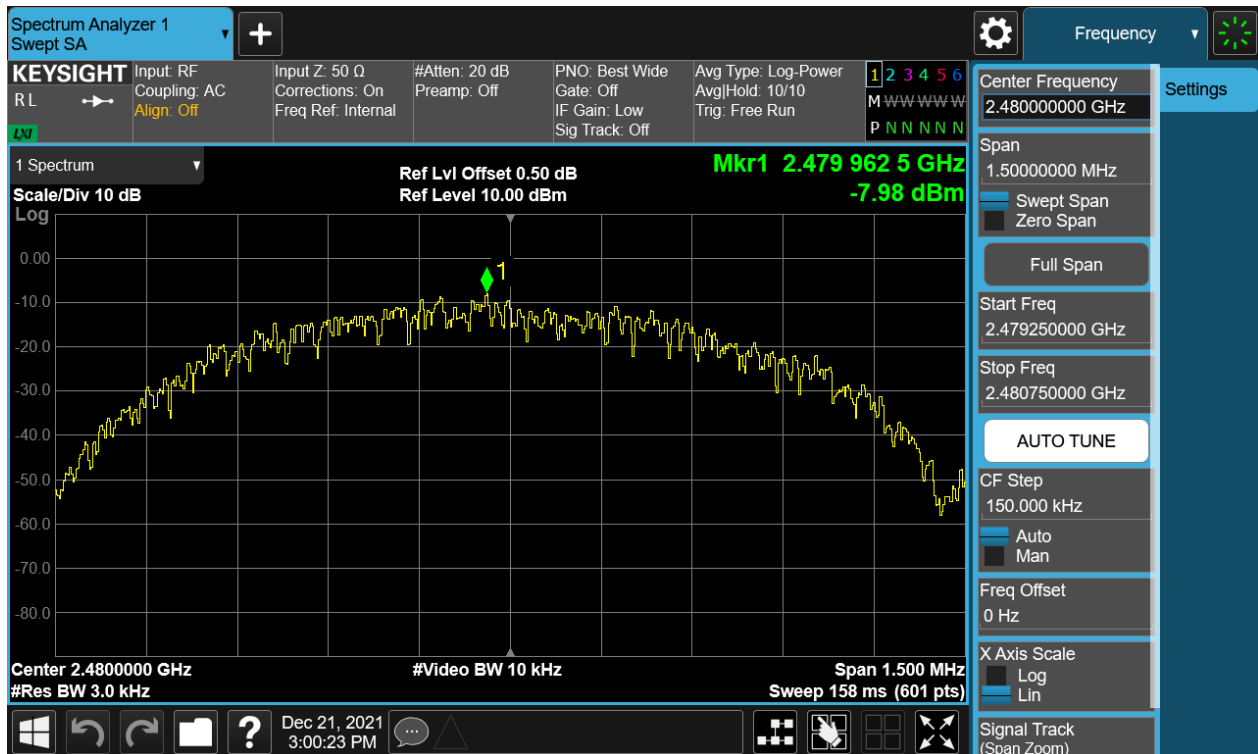
SHE21120049-02BE

Date:

2022-01-13

Page 18 of 33

Figure 9: Power Spectral Density, 2480MHz



TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 19 of 33

4.1.5 Conducted Spurious Emission & Authorized-band band-edge

RESULT:

PASS

Test standard	: FCC Part 15.247(d)
Requirement	: ANSI C63.10-2013, KDB 558074
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	: 25°C
Relative humidity	: 50%

For details refer to following test plot.

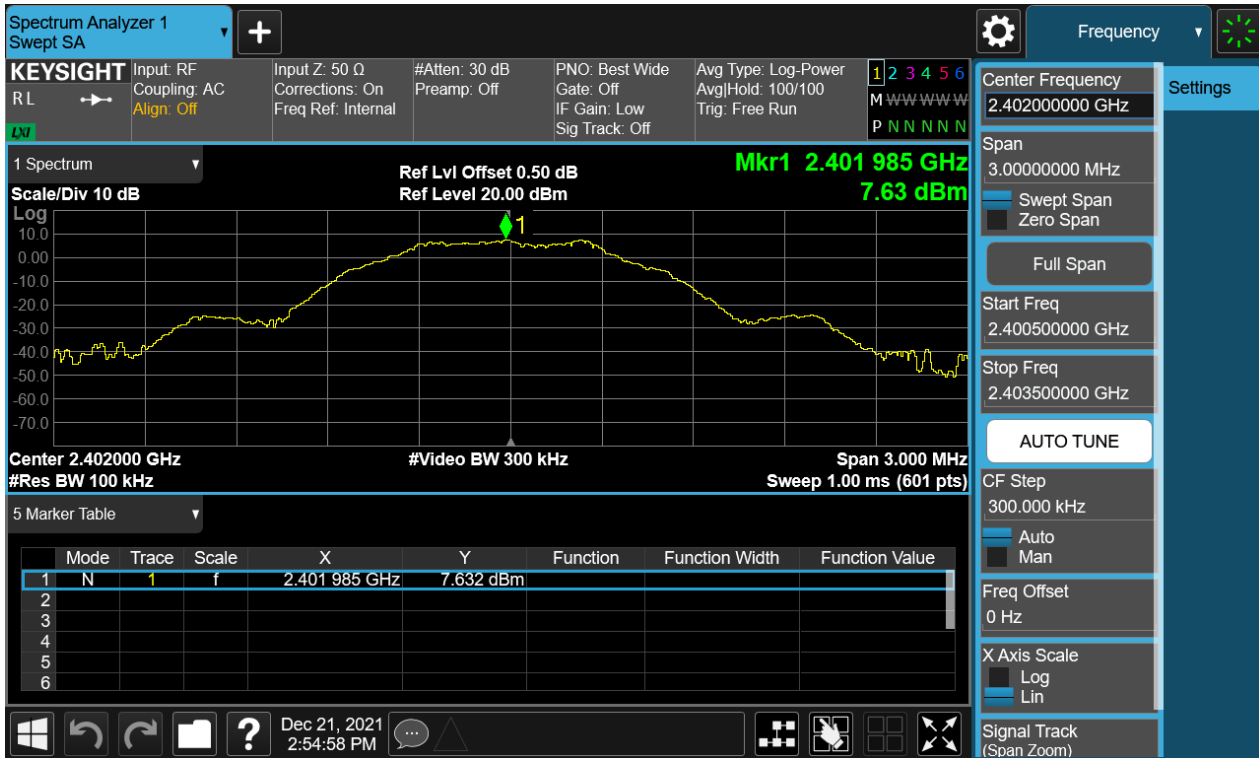
TEST REPORT

Report No.: SHE21120049-02BE

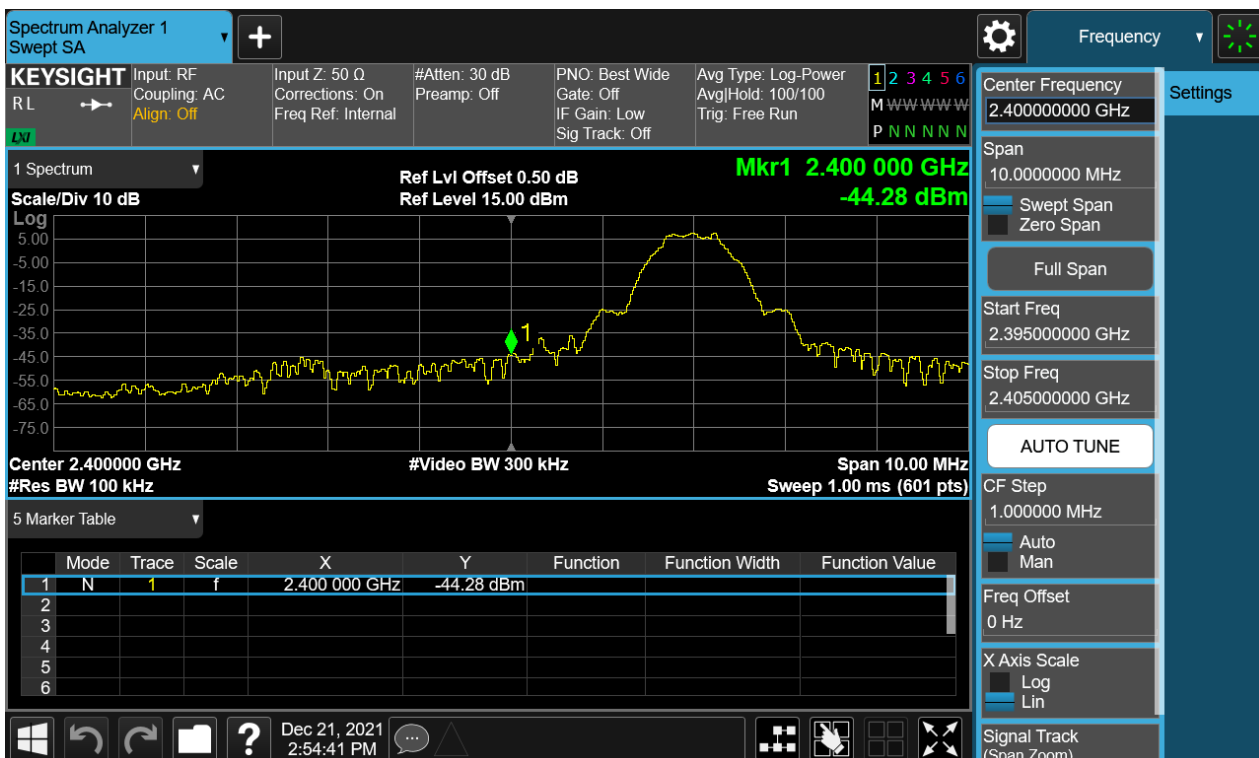
Date: 2022-01-13

Page 20 of 33

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



Band Edge



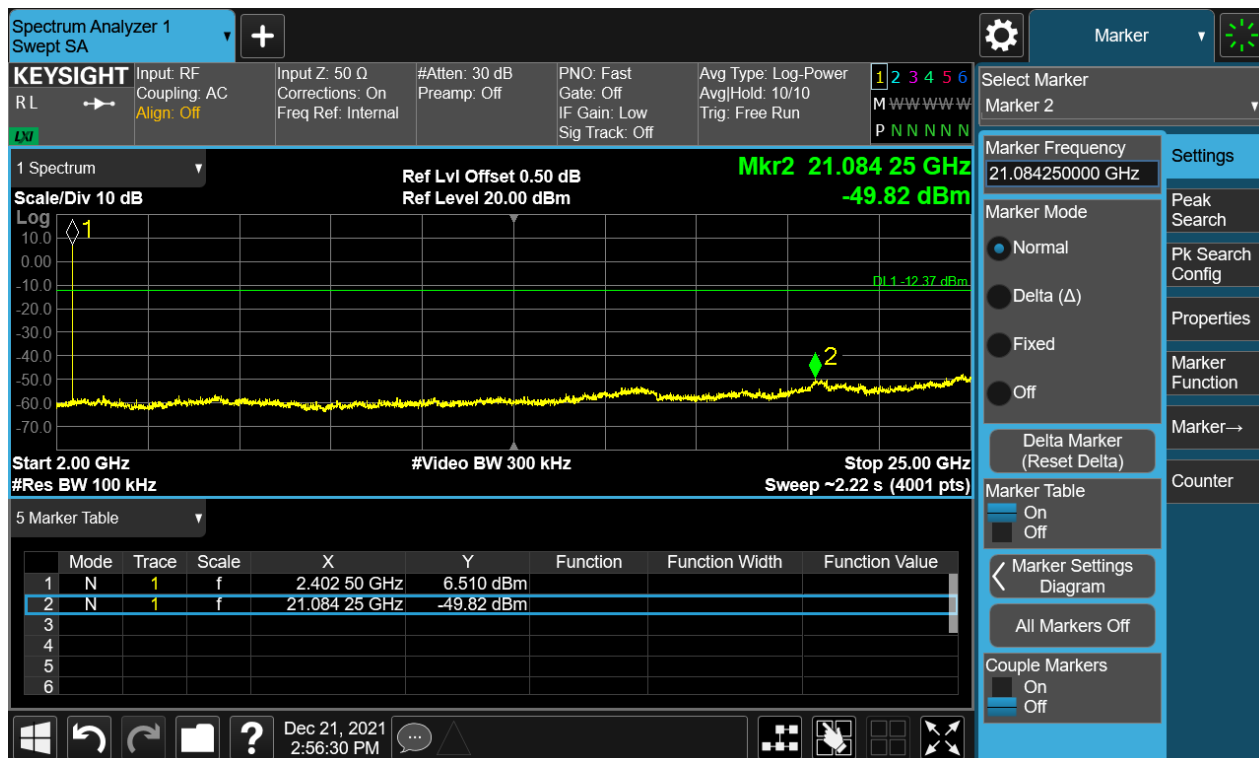
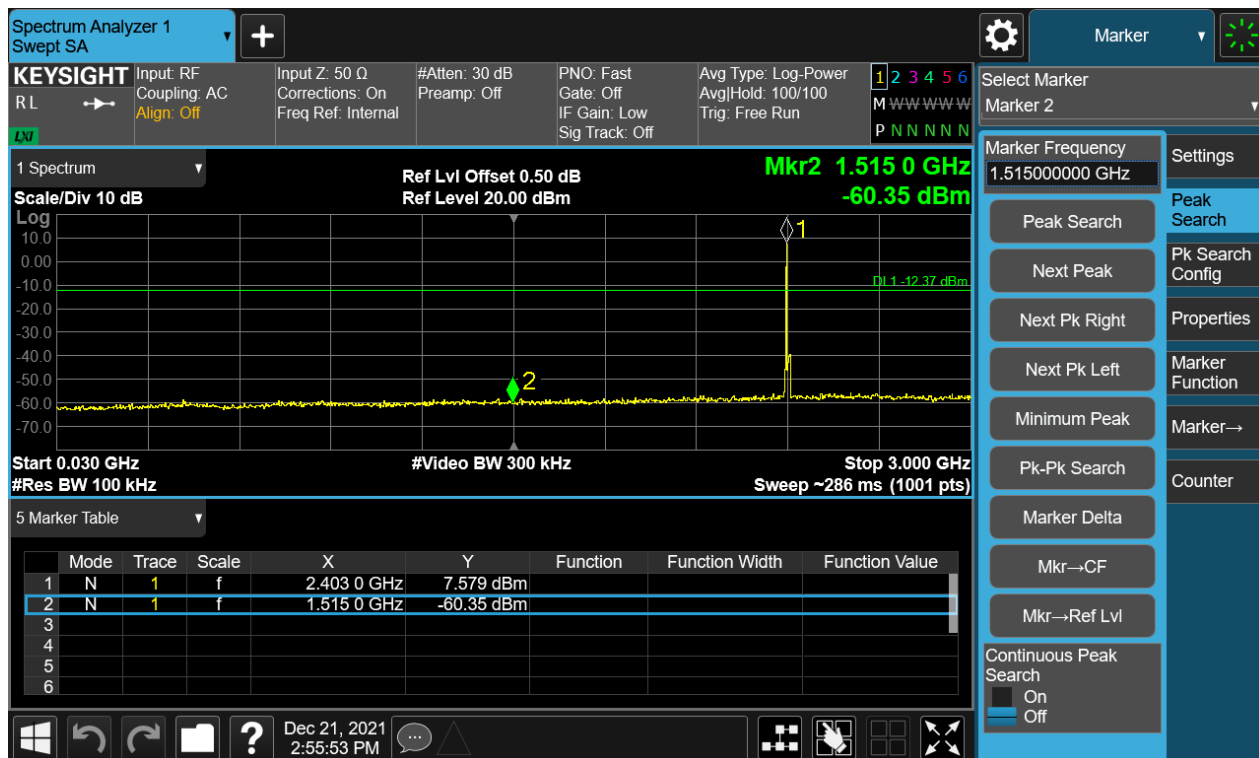
TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 21 of 33

Conducted spurious emissions 30MHz-25GHz



TEST REPORT

Report No.: SHE21120049-02BE

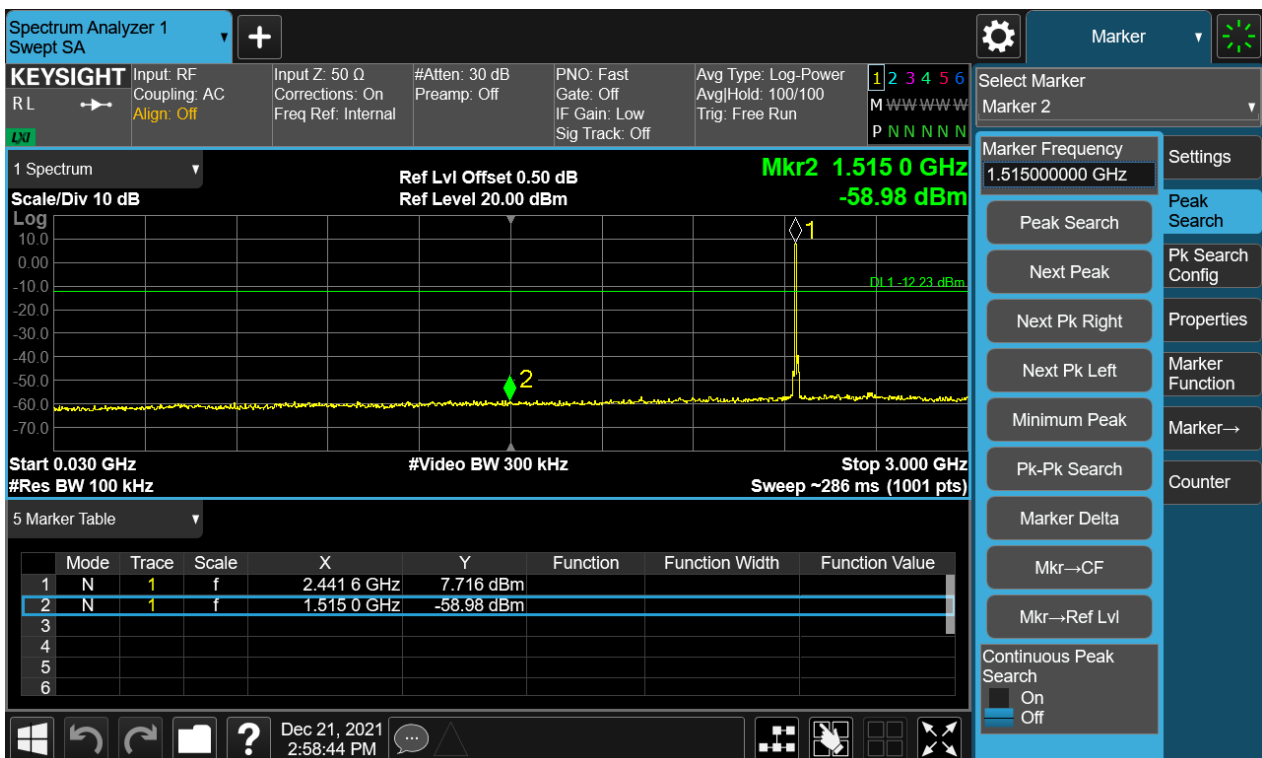
Date: 2022-01-13

Page 22 of 33

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



Conducted spurious emissions 30MHz-25GHz



TEST REPORT

Report No.:

SHE21120049-02BE

Date:

2022-01-13

Page 23 of 33

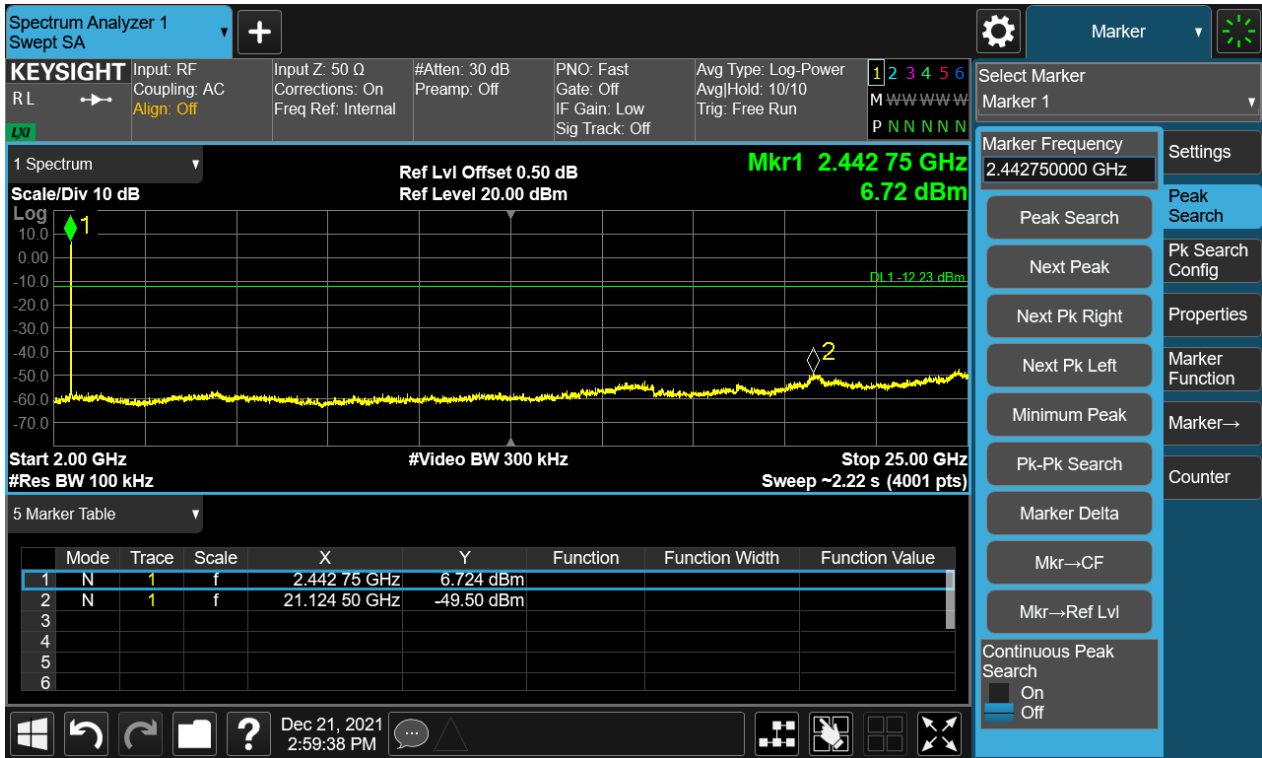
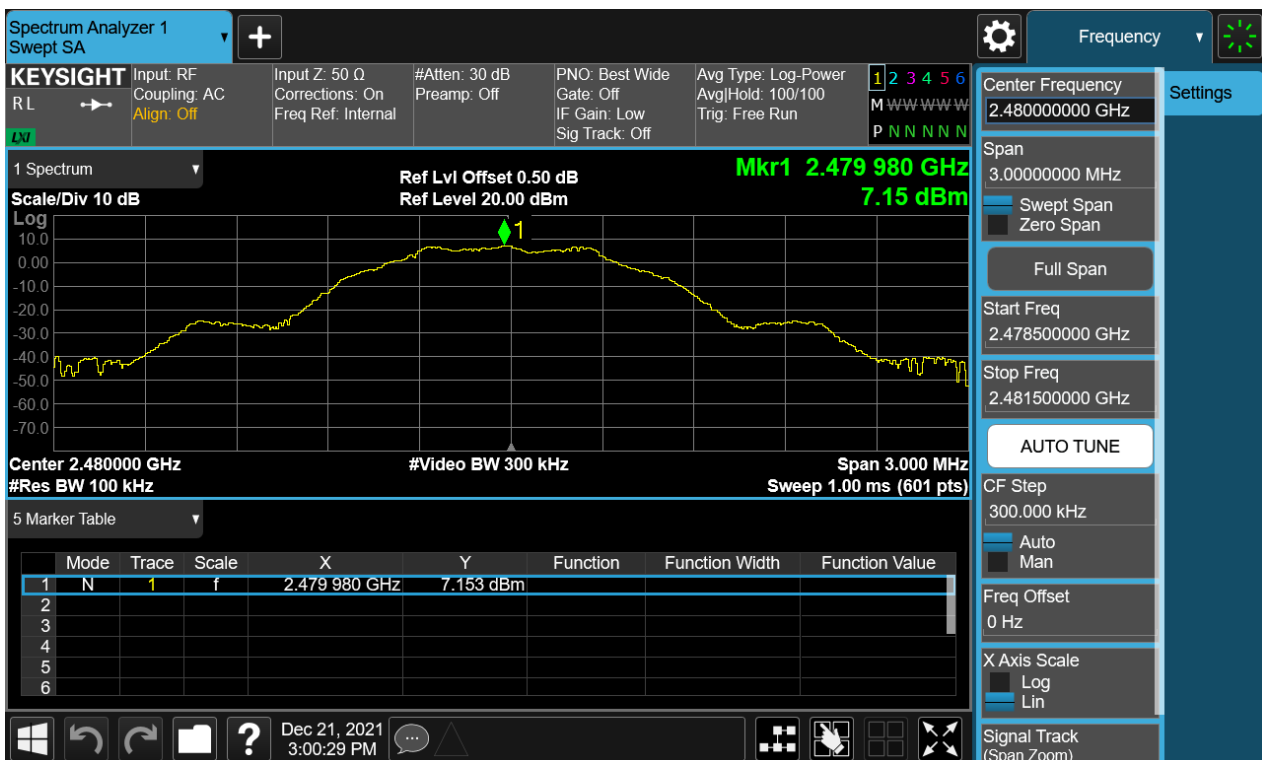


Figure 12: Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, BLE Carrier Level



TEST REPORT

Report No.: SHE21120049-02BE

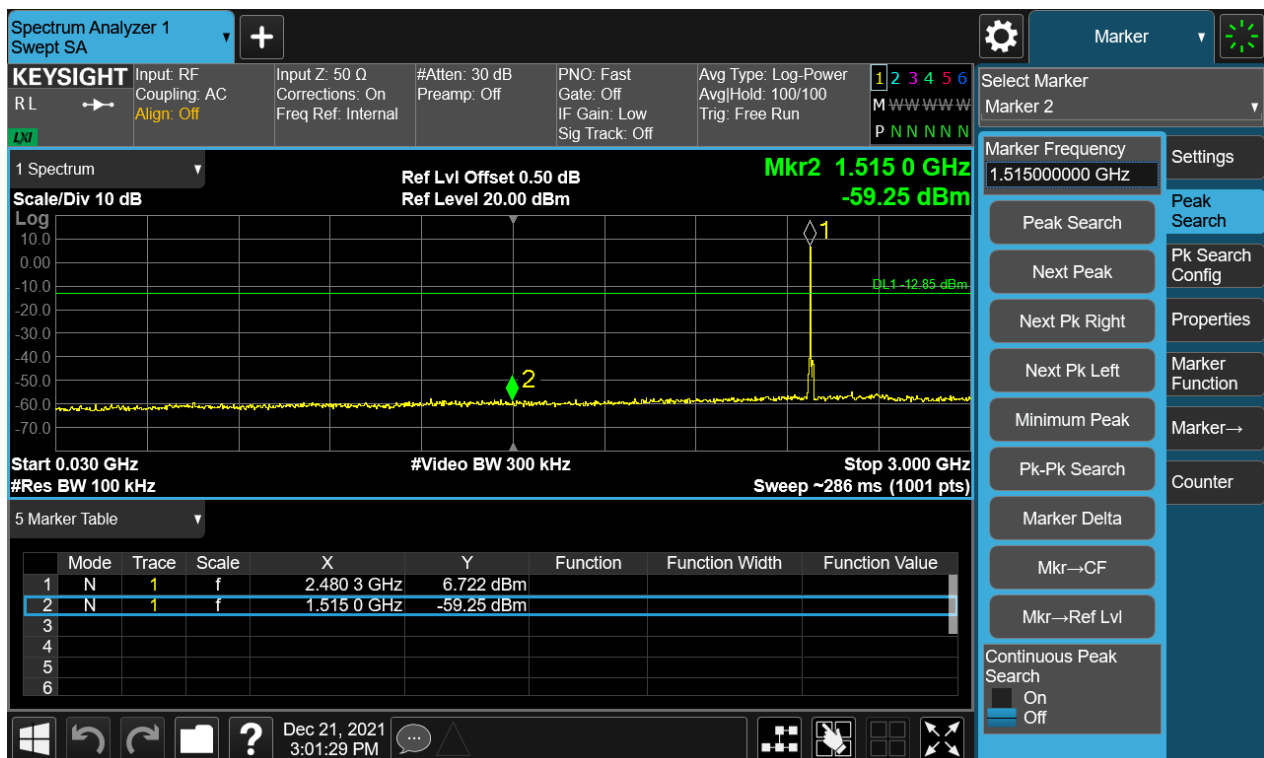
Date: 2022-01-13

Page 24 of 33

Band Edge



Conducted spurious emissions 30MHz-25GHz



TEST REPORT

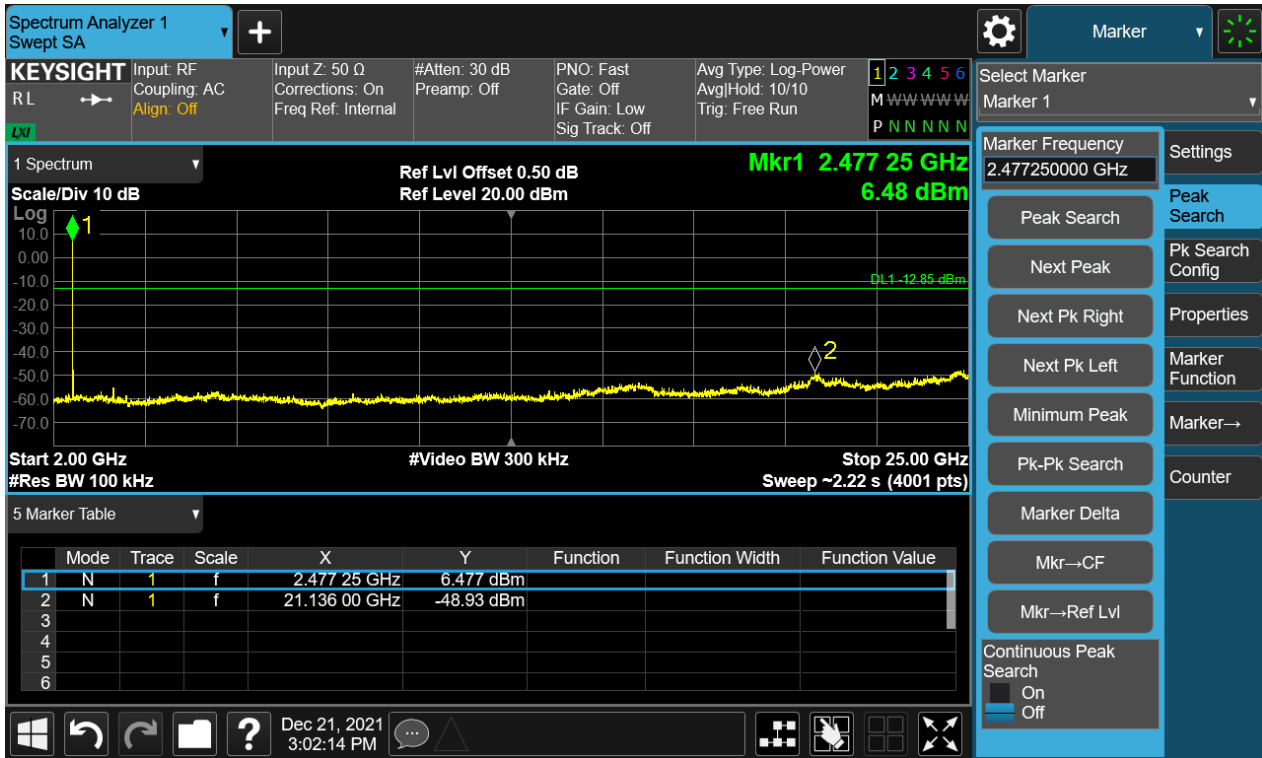
Report No.:

SHE21120049-02BE

Date:

2022-01-13

Page 25 of 33



TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 26 of 33

4.1.6 Radiated Spurious Emission

RESULT:

PASS

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

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A
Ambient temperature	: 16.8°C
Relative humidity	: 49%

Notes

Test plots please refer to the annex document "SHE21120049-02BE 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. The EUT is working in the Normal link mode below 1 GHz.*
- 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.: SHE21120049-02BE

Date: 2022-01-13

Page 27 of 33

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, KDB 558074
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A.1
Ambient temperature	: 16.3°C
Relative humidity	: 49%

Notes

1. Test plots please refer to the annex document "SHE21120049-02BE DATA BLE-TX EXHIBIT A".
2. 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.: SHE21120049-02BE

Date: 2022-01-13

Page 28 of 33

4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT:

PASS

Test standard	: FCC Part 15.207(a)
Requirement	: ANSI C63.10-2013
Kind of test site	: Shielded room

Test setup

Input Voltage	: DC 5V by pc (which received AC 120V 60Hz)
Operation Mode	: A.2
Earthing	: Not Connected
Ambient temperature	: 23°C
Relative humidity	: 51%

For details refer to following test plot.

TEST REPORT

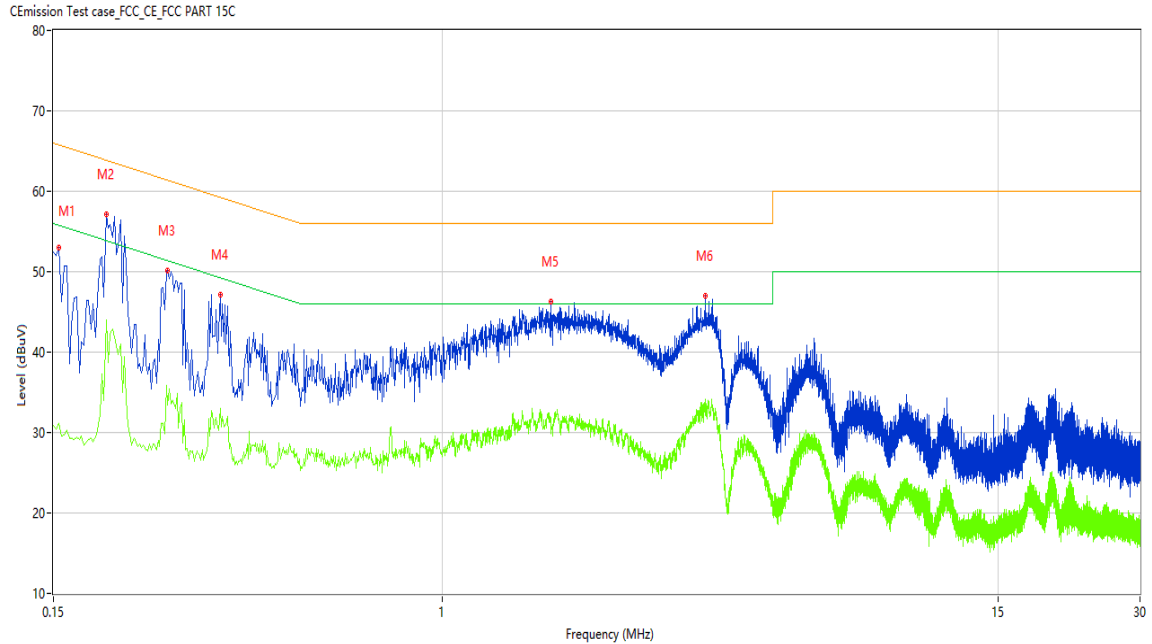
Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 29 of 33

Note: The all configurations were tested respectively, but only the worst configuration shown here.

Figure 13: Conducted Emission on AC Mains, L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.154	54.05	10.26	65.78	-11.73	Peak	L	Pass
1*	0.154	43.59	10.26	65.78	-22.19	QP	L	Pass
1**	0.154	31.07	10.26	55.78	-24.71	AV	L	Pass
2	0.194	57.29	10.23	63.86	-6.57	Peak	L	Pass
2*	0.194	53.96	10.23	63.86	-9.90	QP	L	Pass
2**	0.194	43.94	10.23	53.86	-9.92	AV	L	Pass
3	0.262	49.80	10.23	61.37	-11.57	Peak	L	Pass
3*	0.262	47.04	10.23	61.37	-14.33	QP	L	Pass
3**	0.262	33.39	10.23	51.37	-17.98	AV	L	Pass
4	0.338	46.33	10.23	59.25	-12.92	Peak	L	Pass
4*	0.338	41.78	10.23	59.25	-17.47	QP	L	Pass
4**	0.338	33.03	10.23	49.25	-16.22	AV	L	Pass
5	1.694	44.51	10.17	56.00	-11.49	Peak	L	Pass
5*	1.694	40.42	10.17	56.00	-15.58	QP	L	Pass
5**	1.694	31.87	10.17	46.00	-14.13	AV	L	Pass
6	3.596	47.13	10.18	56.00	-8.87	Peak	L	Pass
6*	3.596	42.36	10.18	56.00	-13.64	QP	L	Pass
6**	3.596	33.82	10.18	46.00	-12.18	AV	L	Pass

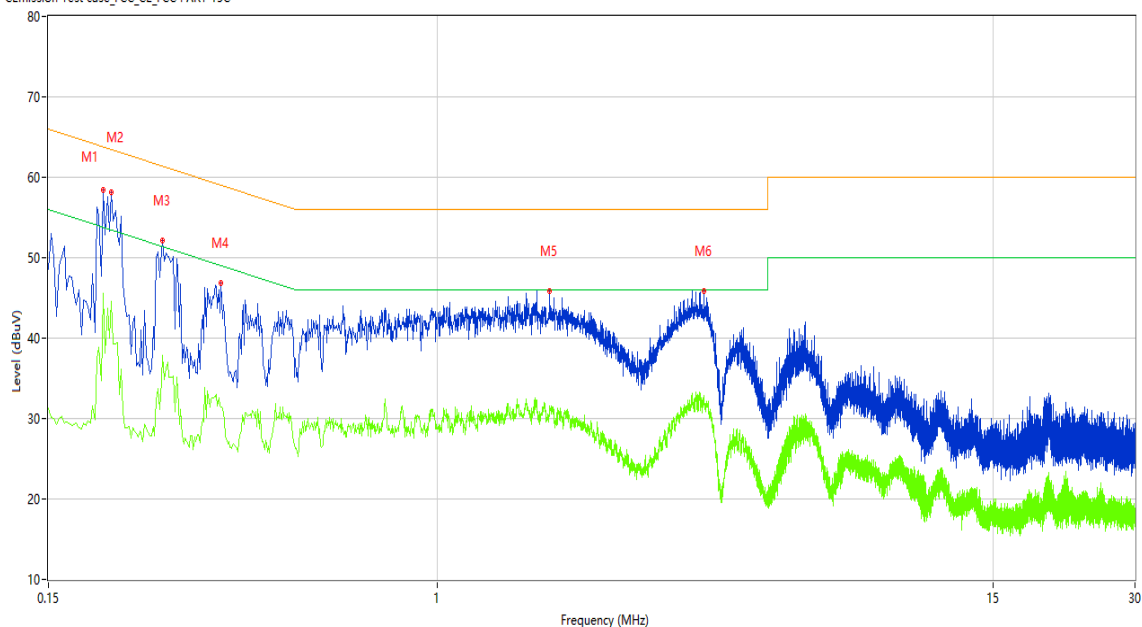
TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 30 of 33

CEmission Test case_FCC_CE_FCC PART 15C



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.196	58.33	10.23	63.78	-5.45	Peak	N	Pass
1*	0.196	55.11	10.23	63.78	-8.67	QP	N	Pass
1**	0.196	45.57	10.23	53.78	-8.21	AV	N	Pass
2	0.204	57.66	10.23	63.45	-5.79	Peak	N	Pass
2*	0.204	54.35	10.23	63.45	-9.10	QP	N	Pass
2**	0.204	44.54	10.23	53.45	-8.91	AV	N	Pass
3	0.262	51.24	10.23	61.37	-10.13	Peak	N	Pass
3*	0.262	48.13	10.23	61.37	-13.24	QP	N	Pass
3**	0.262	37.82	10.23	51.37	-13.55	AV	N	Pass
4	0.348	46.26	10.23	59.01	-12.75	Peak	N	Pass
4*	0.348	41.79	10.23	59.01	-17.22	QP	N	Pass
4**	0.348	31.44	10.23	49.01	-17.57	AV	N	Pass
5	1.728	44.21	10.17	56.00	-11.79	Peak	N	Pass
5*	1.728	40.15	10.17	56.00	-15.85	QP	N	Pass
5**	1.728	31.05	10.17	46.00	-14.95	AV	N	Pass
6	3.672	46.21	10.19	56.00	-9.79	Peak	N	Pass
6*	3.672	40.36	10.19	56.00	-15.64	QP	N	Pass
6**	3.672	32.62	10.19	46.00	-13.38	AV	N	Pass

TEST REPORT

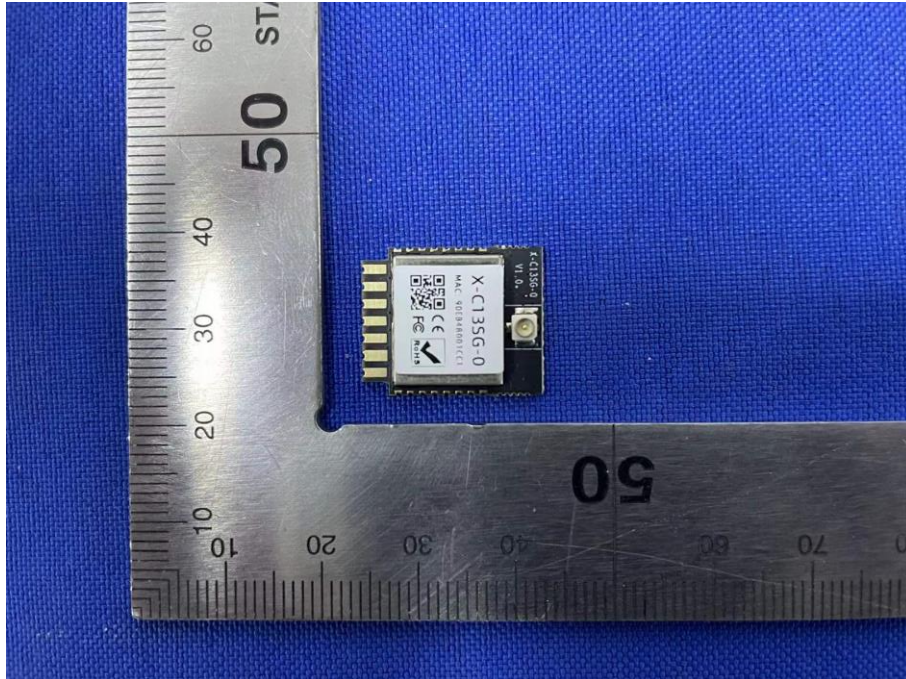
Report No.: SHE21120049-02BE

Date: 2022-01-13

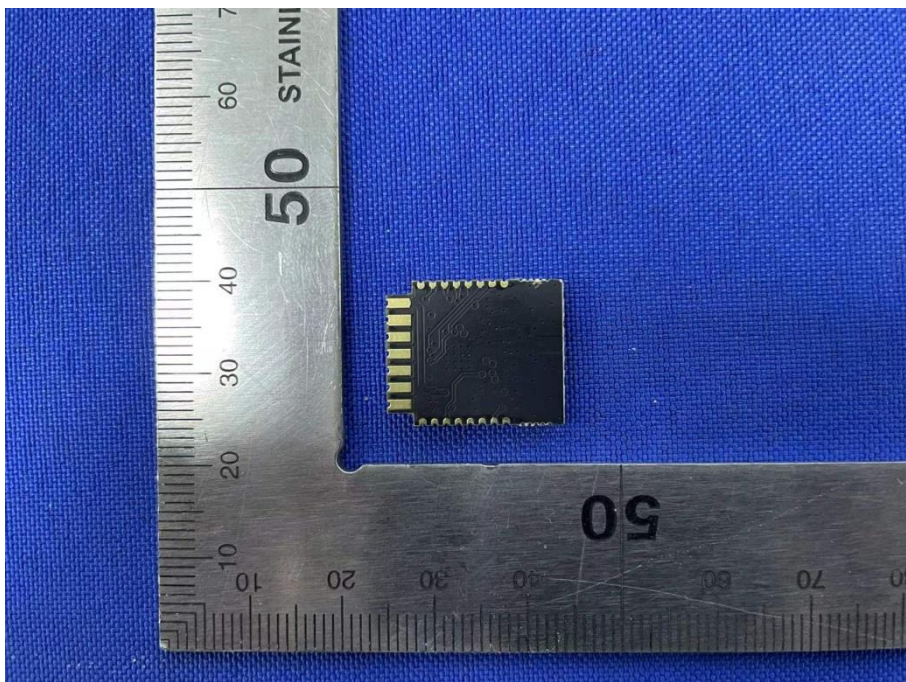
Page 31 of 33

5 Appendixes

5.1 Photographs of the Sample



Front of the sample



Rear of the sample

TEST REPORT

Report No.: SHE21120049-02BE

Date: 2022-01-13

Page 32 of 33

5.2 Set-up for Conducted Emissions



5.3 Set-up for Conducted RF test at Antenna Port



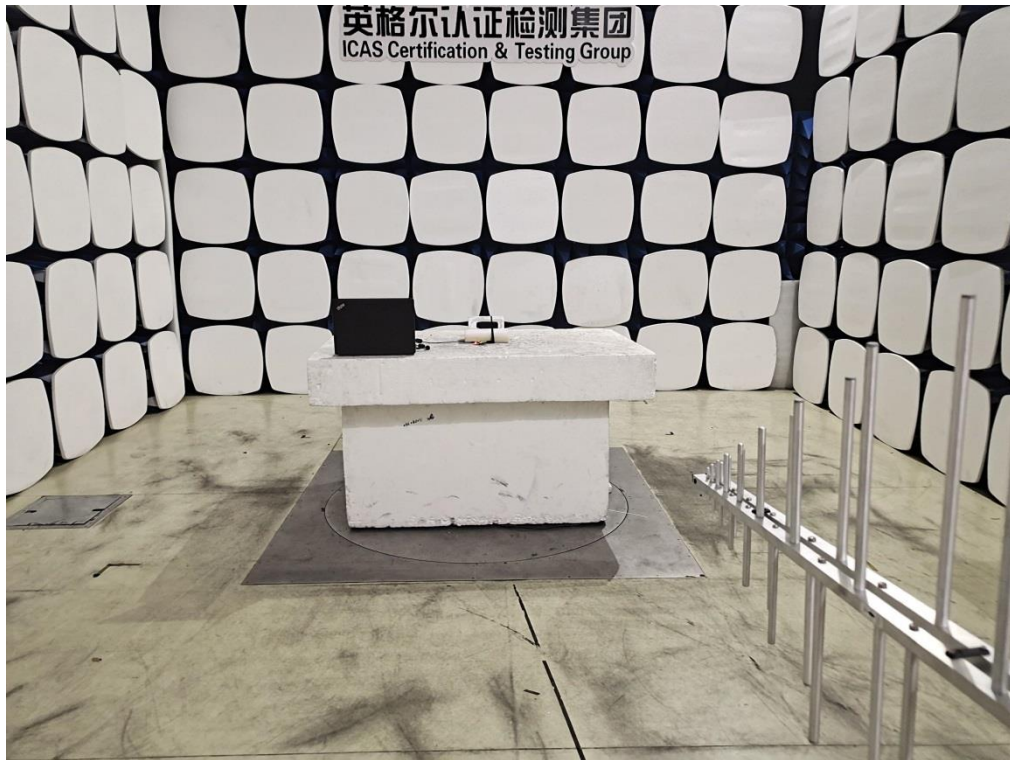
TEST REPORT

Report No.: SHE21120049-02BE

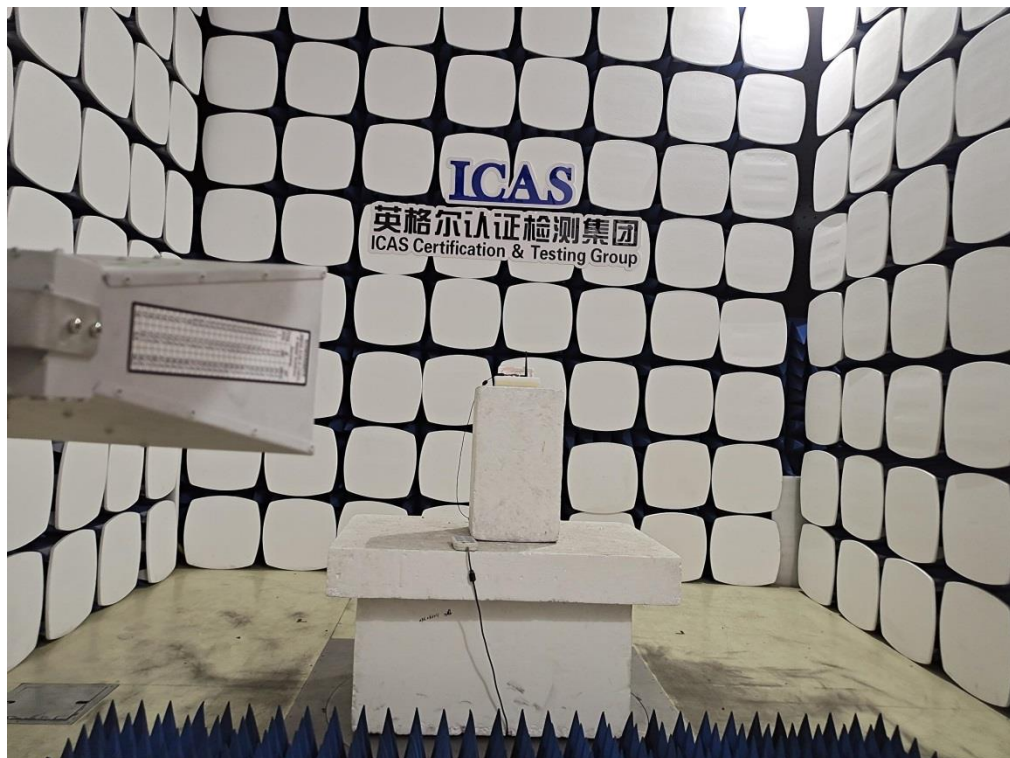
Date: 2022-01-13

Page 33 of 33

5.4 Set-up for Spurious Emissions below 1GHz



5.5 Set-up for Spurious Emissions above 1GHz



End of the report