

TEST REPORT

Report No.: SHE23070127-02AE

Date: 2023-08-17

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Applicant : Ehong Technology Co.,Ltd
Address of Applicant : Room 501, No.485 Xingmei Road,
Minhang Dis,Shanghai, China.

Product Name : Ehong BLE Module
Brand Name : Ehong
Model Name : EQM100-5B, EQM100-5U
Sample Acquisition Method : Sent by Client
Sample No. : E23070127-01#01(EQM100-5B Model)
E23070127-01#03(EQM100-5U Model)

FCC ID : 2ACCREQM100

Standards : FCC CFR47 Part 15, Subpart C

Date of Receipt : 2023-07-31
Date of Test : 2023-08-01~ 2023-08-16
Date of Issue : 2023-08-17

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)

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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	Ehong Technology Co.,Ltd
Address	Room 501, No.485 Xingmei Road, Minhang Dis,Shanghai, China.
Contact Person	Rik Tang
Telephone	02164769993
Email	rik.tang@ehonglink.com
Manufacturer Company Name	Ehong Technology Co.,Ltd
Address	Room 501, No.485 Xingmei Road, Minhang Dis,Shanghai, China.
Factory Company Name	Ehong Technology Co.,Ltd
Address	Room 501, No.485 Xingmei Road, Minhang Dis,Shanghai, China.

1.3 Details of EUT

Product Name	Ehong BLE Module
Brand Name	Ehong
Test Model Name	EQM100-5B
Series Model Name	EQM100-5U
Difference Description	All the same except for the antenna type EQM100-5B Model is the pcb antenna EQM100-5U Model is the external antenna
FCC ID	2ACCREQM100
Mode of Operation	Bluetooth Version 5.3
Frequency Range	2402MHz ~ 2480MHz
Number of Channels	40 (at intervals of 2 MHz)
Modulation Type	BLE ☒ GFSK 1Mbps ☒ GFSK 2Mbps
RF Output Power	EQM100-5B (6.61dBm) EQM100-5U (6.61dBm)
Antenna Type	EQM100-5B (PCB Antenna) EQM100-5U (External Antenna)
Antenna Gain	EQM100-5B (-0.8dBi) EQM100-5U (3.0dBi)
Extreme Temperature Range	-10℃~ +85℃

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Test Voltage	DC 3.3V
Hardware version	V1.0
Software version	V1.0
RF power setting in TEST SW	sscom5.13.1_Power level setting_Default

Note:

1. The above information was declared by the manufacture.
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

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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)	PASS

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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
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2023-06-08	2024-06-07
V-network	SCHWARZBECK	NSLK8127	8127-902	2023-06-07	2024-06-06
Attenuator	SCHWARZBECK	VTSD 9561-FN	/	2023-06-06	2024-06-05
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
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2023-06-18	2025-06-17
Loop Antenna	SCHWARZBECK	FMZB 1513	/	2022-07-02	2024-07-01
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	2026-06-08
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	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

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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 expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Parameter		Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	9KHz – 30MHz	± 3.42 dB
	30 MHz – 1GHz	± 5.00 dB
	> 1GHz	± 4.88 dB
Conducted Emission on AC Mains	150kHz-30MHz	± 2.68 dB
Occupied Channel Bandwidth		± 5 %

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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(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 Name	Serial No.
Laptop	HP	HP ZHAN 66 Pro G1	N/A
USB Cable	N/A	N/A	1.00m Unshielded
Adapter	N/A	A8-501000	2017030060611

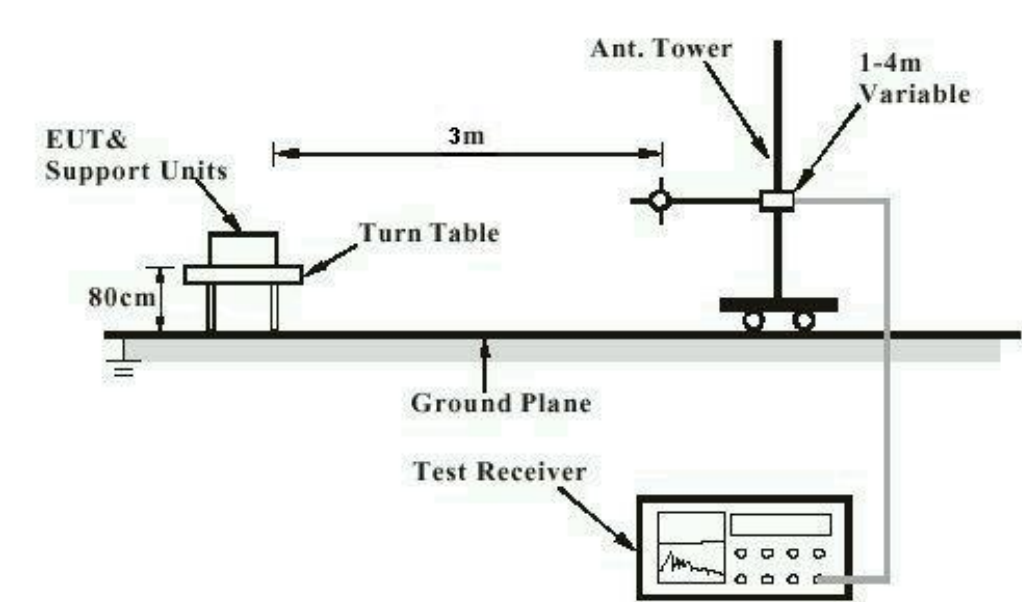
3.3 Support Software

Description	Manufacturer	Software Name
Software	N/A	sscom5.13.1

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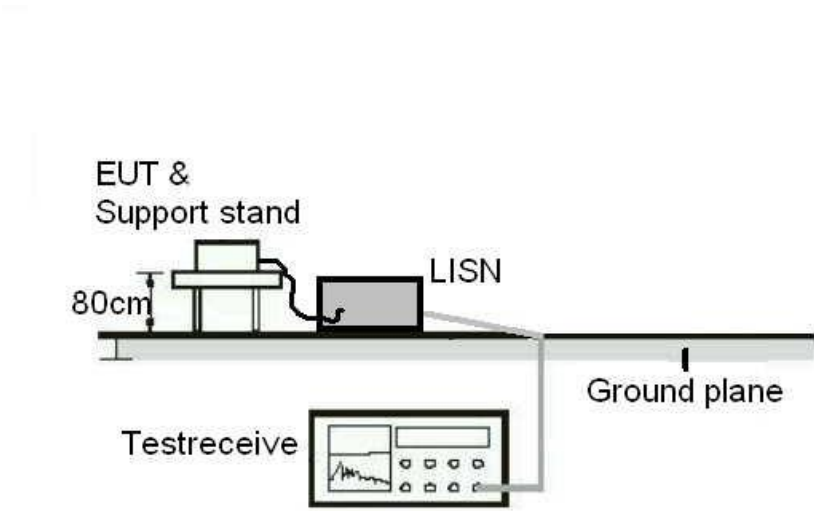
3.4 Test Setup Diagram

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 Configuration for Conduction Test



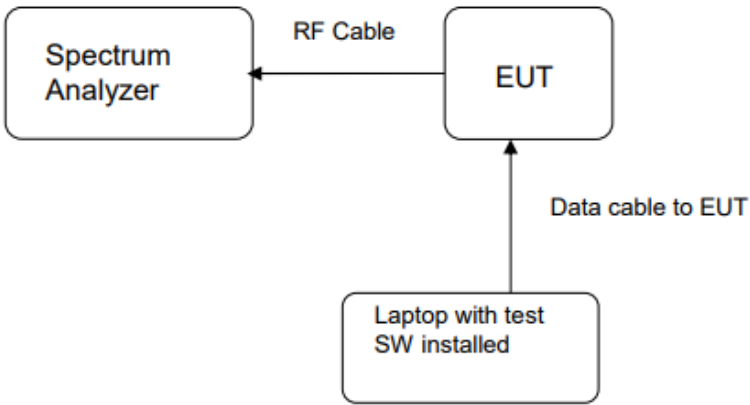
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Diagram of Measurement Equipment Configuration for Transmitter Test



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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, an antenna with a directional gain of 3.0dBi(max). The antenna is a 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.

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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 clause 8.3.1.1

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1.a

Ambient temperature : 24.9°C

Relative humidity : 56%

Table 1: Maximum peak conducted output power

Test Mode	Test Channel (MHz)	Maximum peak conducted output power		Limit (W)
		(dBm)	(mW)	
BLE-1Mbps	2402	6.58	4.55	< 1
	2440	6.53	4.50	
	2480	6.49	4.46	
BLE-2Mbps	2402	6.61	4.58	
	2440	6.51	4.48	
	2480	6.42	4.39	

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Figure 1: Peak Output Power, 2402MHz BLE-1Mbps

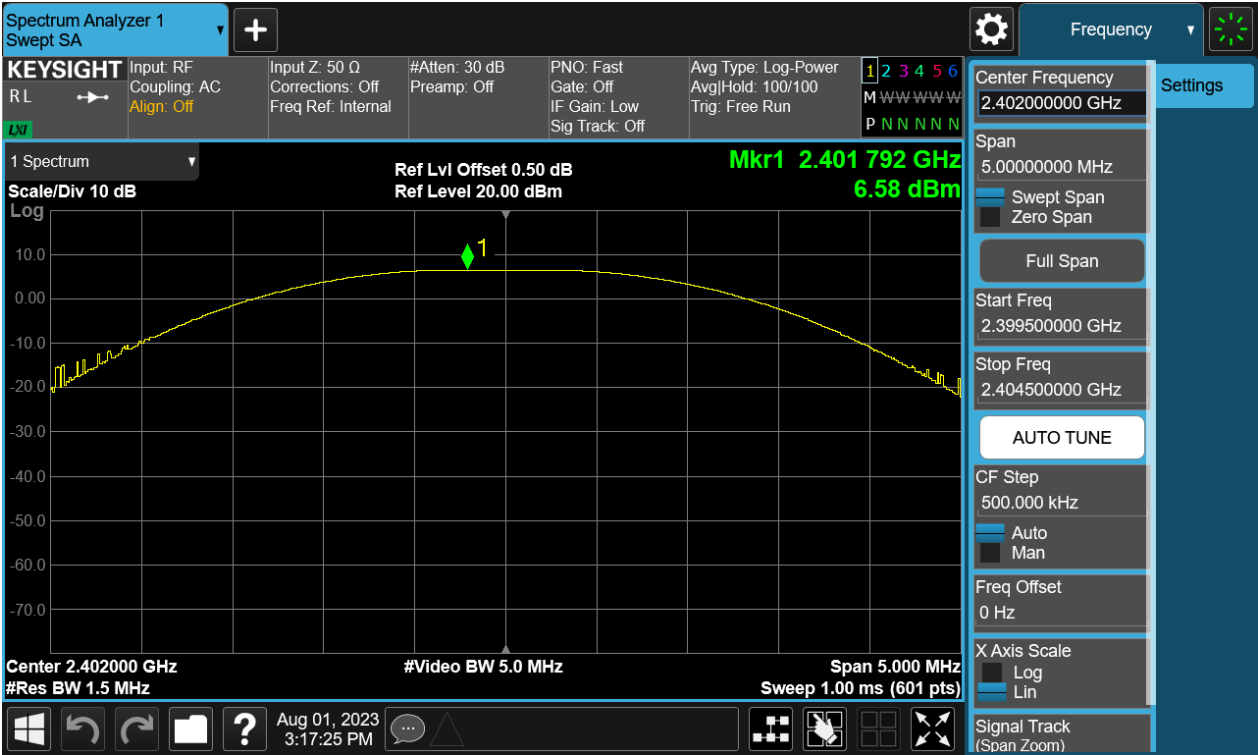


Figure 2: Peak Output Power, 2440MHz BLE-1Mbps



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Figure 3: Peak Output Power, 2480MHz BLE-1Mbps

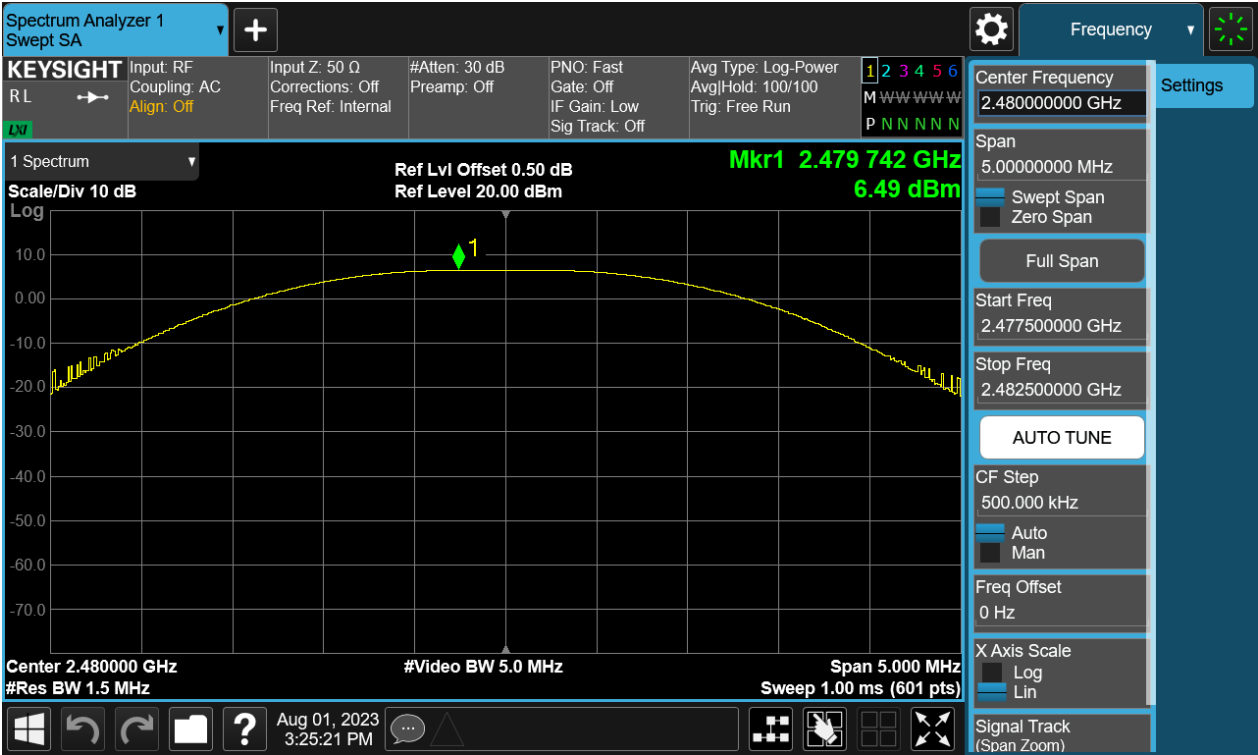


Figure 4: Peak Output Power, 2402MHz BLE-2Mbps



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Figure 5: Peak Output Power, 2440MHz BLE-2Mbps

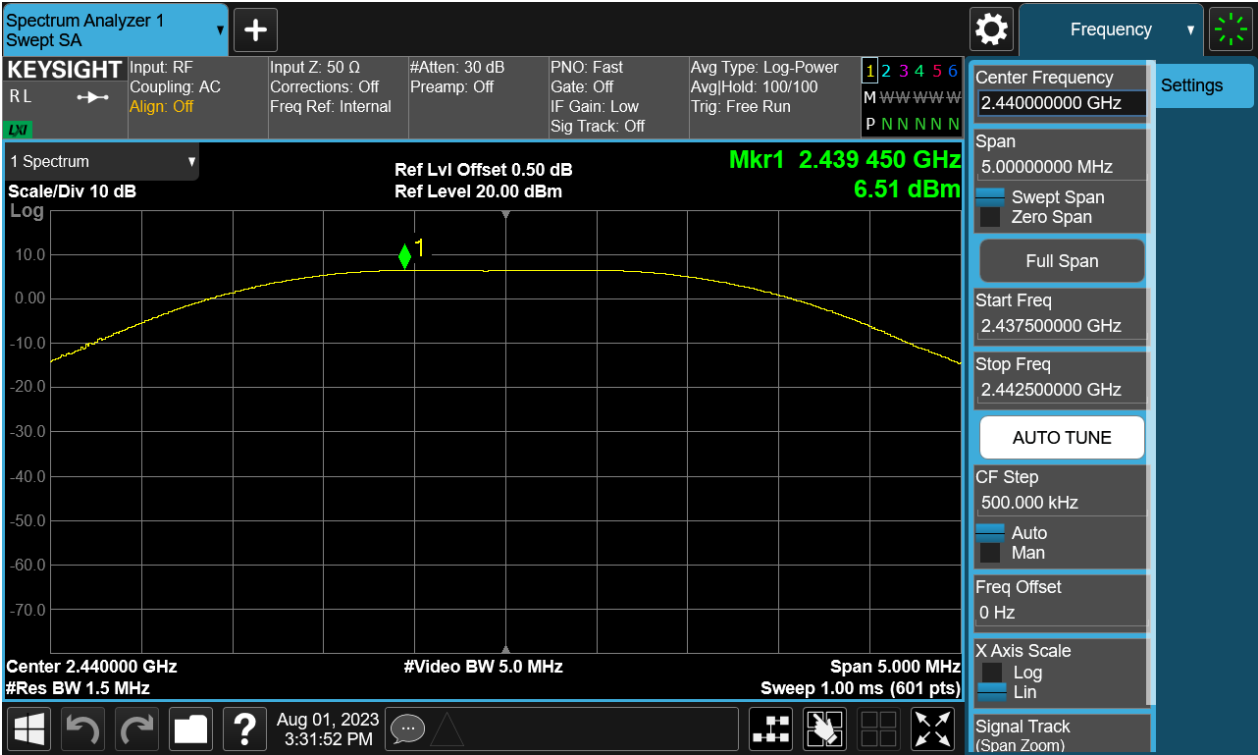


Figure 6: Peak Output Power, 2480MHz BLE-2Mbps



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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 clause 8.2

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1.a

Ambient temperature : 24.9°C

Relative humidity : 56%

Table 2: 6dB Bandwidth

Test Mode	Test Channel (MHz)	6dB Bandwidth (MHz)	Limit
BLE-1Mbps	2402	0.6846	>0.5 MHz
	2440	0.7214	
	2480	0.7231	
BLE-2Mbps	2402	1.1300	
	2440	1.1540	
	2480	1.1240	

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Figure 7: 6dB Bandwidth, 2402MHz BLE-1Mbps



Figure 8: 6dB Bandwidth, 2440MHz BLE-1Mbps



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Figure 9: 6dB Bandwidth, 2480MHz BLE-1Mbps

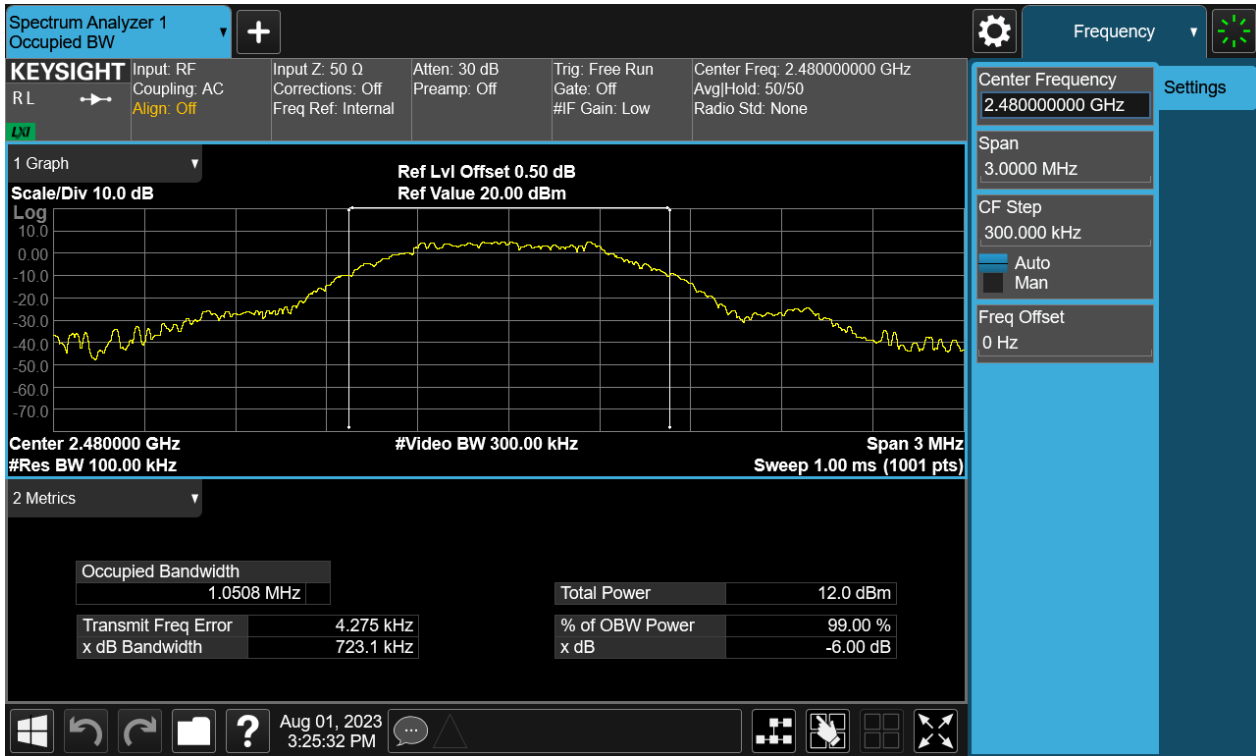
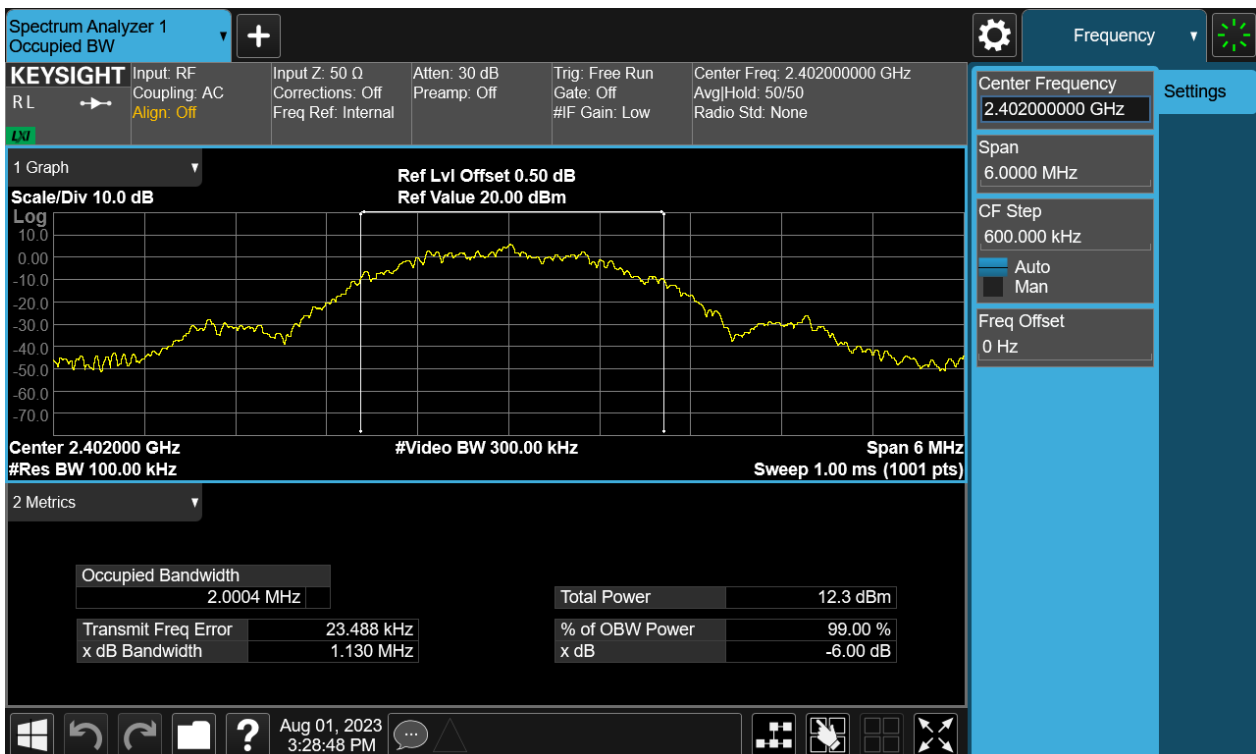


Figure 10: 6dB Bandwidth, 2402MHz BLE-2Mbps



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Figure 11: 6dB Bandwidth, 2440MHz BLE-2Mbps

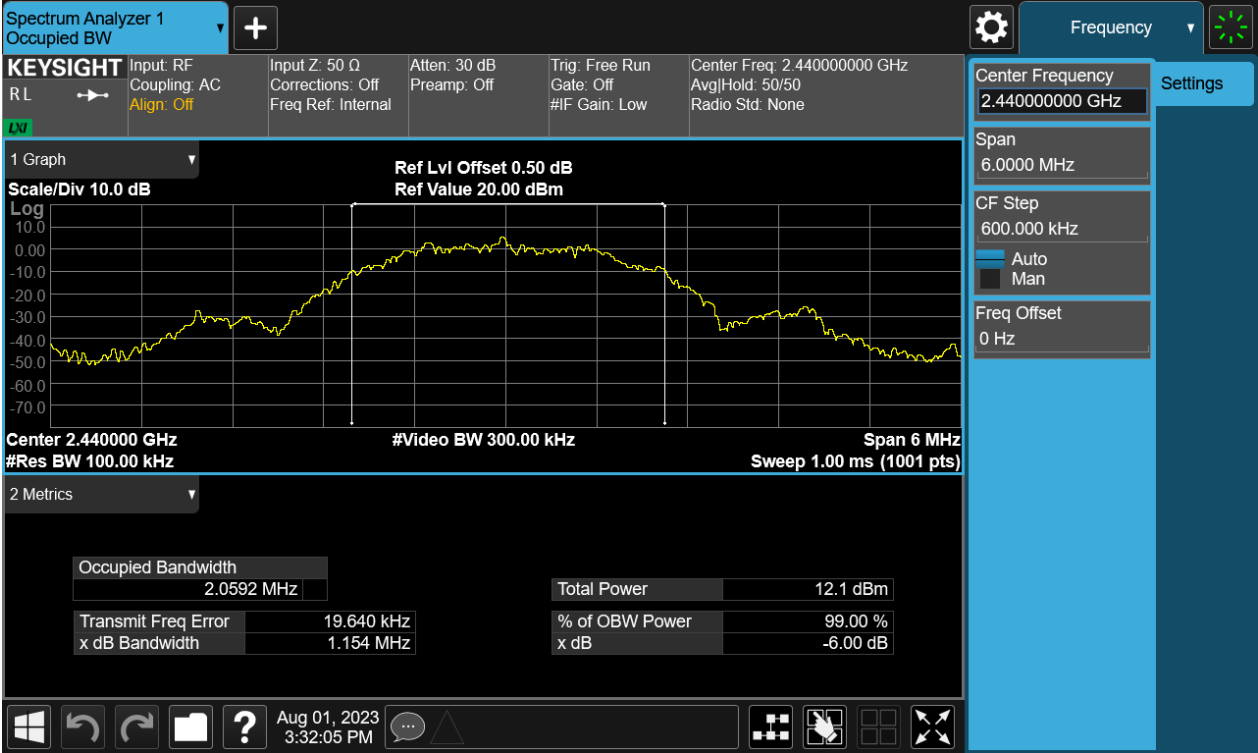


Figure 12: 6dB Bandwidth, 2480MHz BLE-2Mbps



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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 clause 8.4

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1.a

Ambient temperature : 24.9°C

Relative humidity : 56%

Table 3: Maximum conducted output power spectral density

Test Mode	Test Channel (MHz)	Measured Result (dBm/3kHz)	Limit (dBm/3kHz)
BLE-1Mbps	2402	-8.77	8
	2440	-8.98	
	2480	-8.66	
BLE-2Mbps	2402	-12.45	
	2440	-12.35	
	2480	-12.28	

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Figure 13: Power Spectral Density, 2402MHz BLE-1Mbps

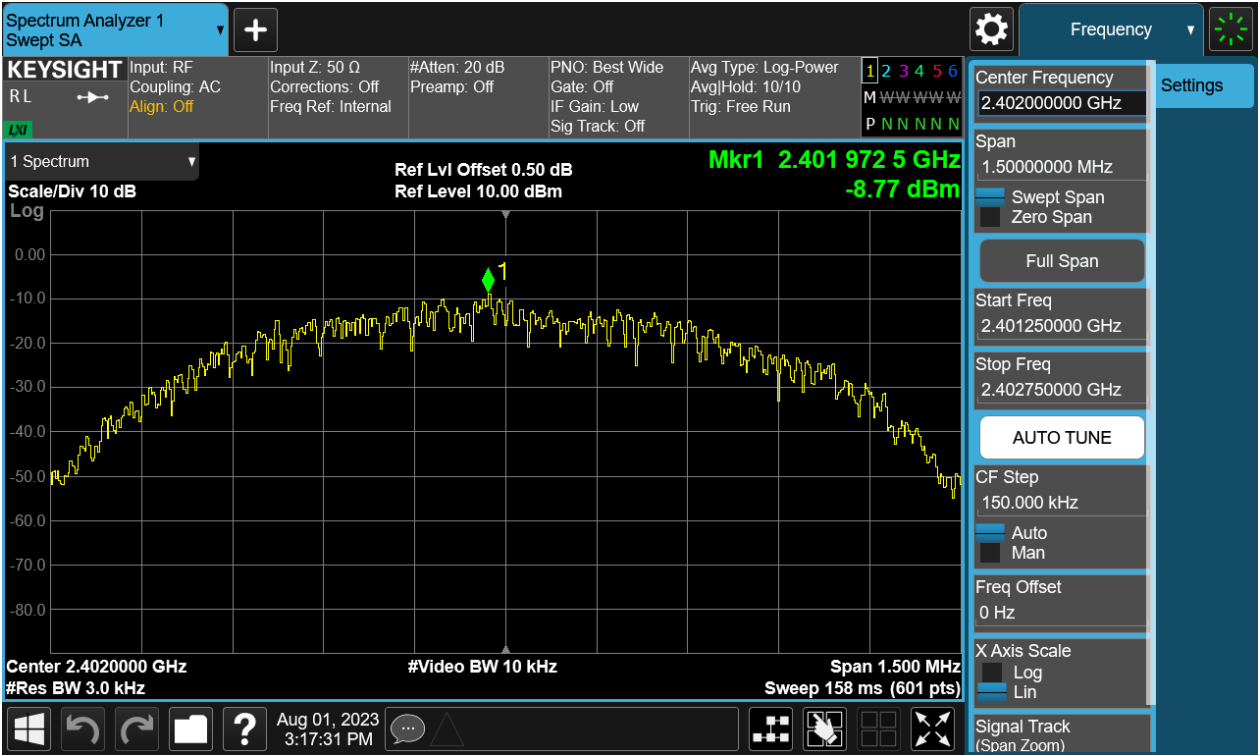
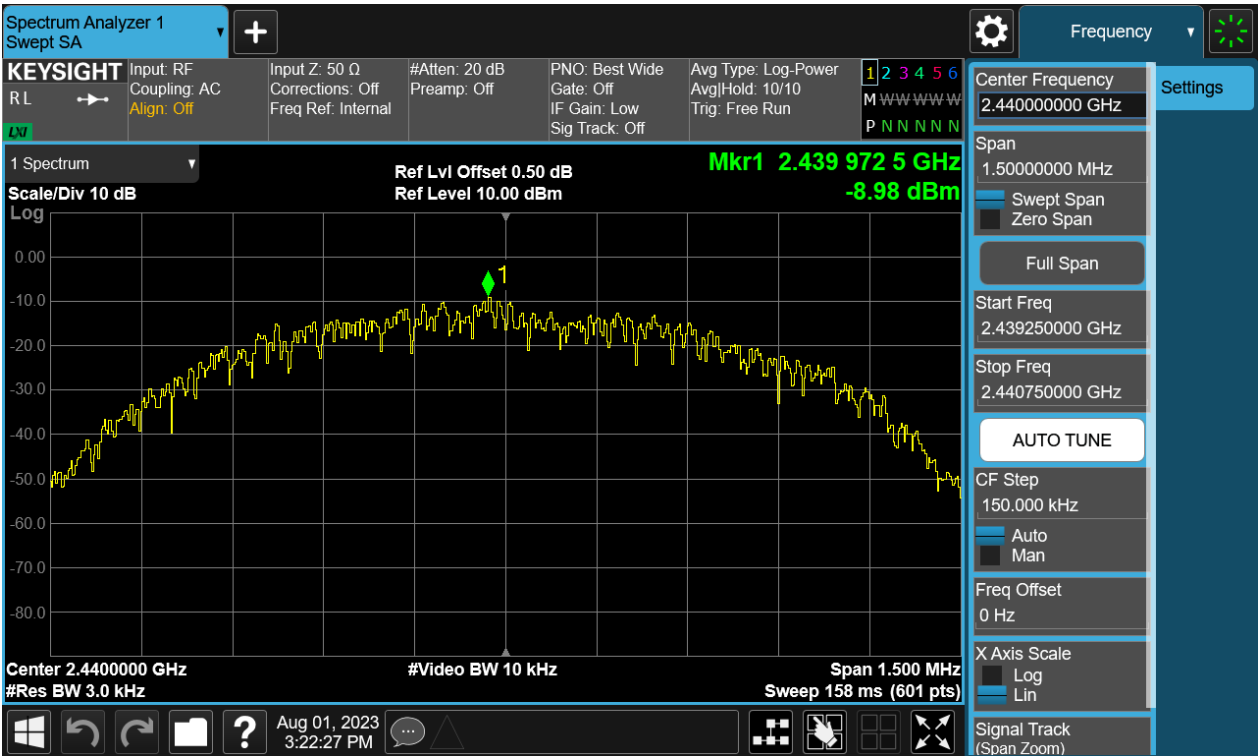


Figure 14: Power Spectral Density, 2440MHz BLE-1Mbps



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Figure 15: Power Spectral Density, 2480MHz BLE-1Mbps

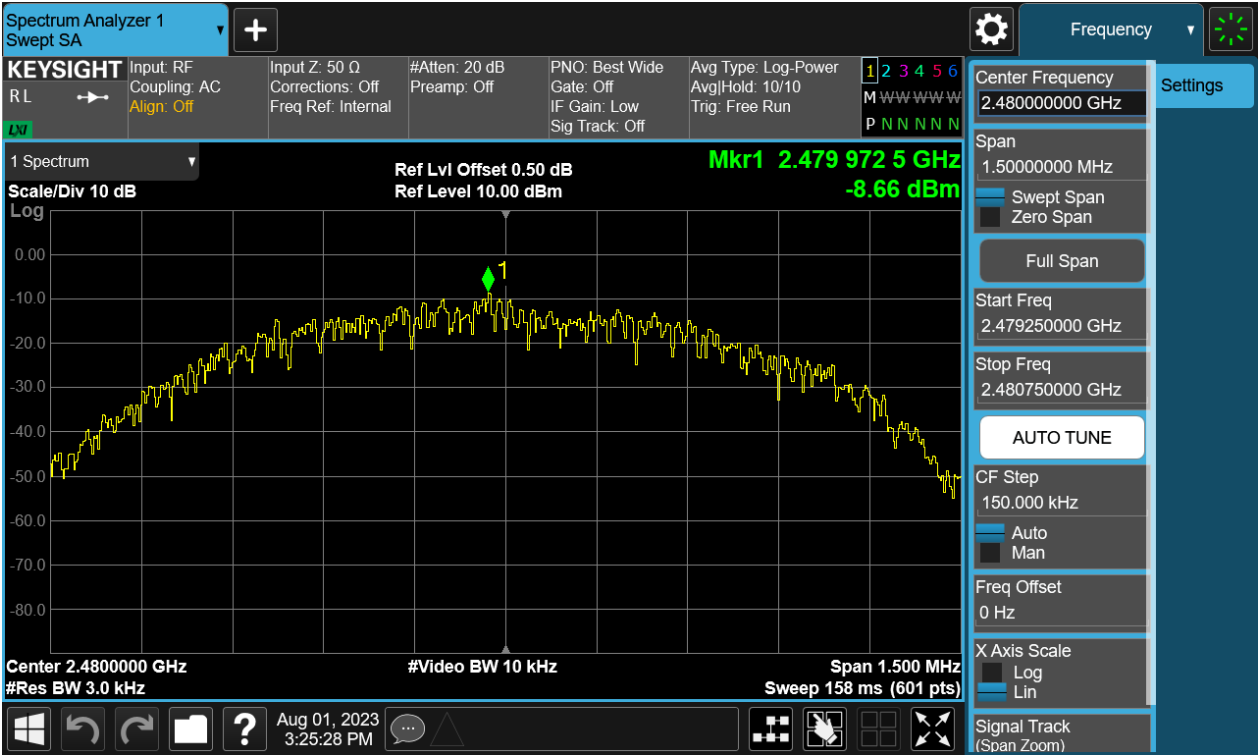
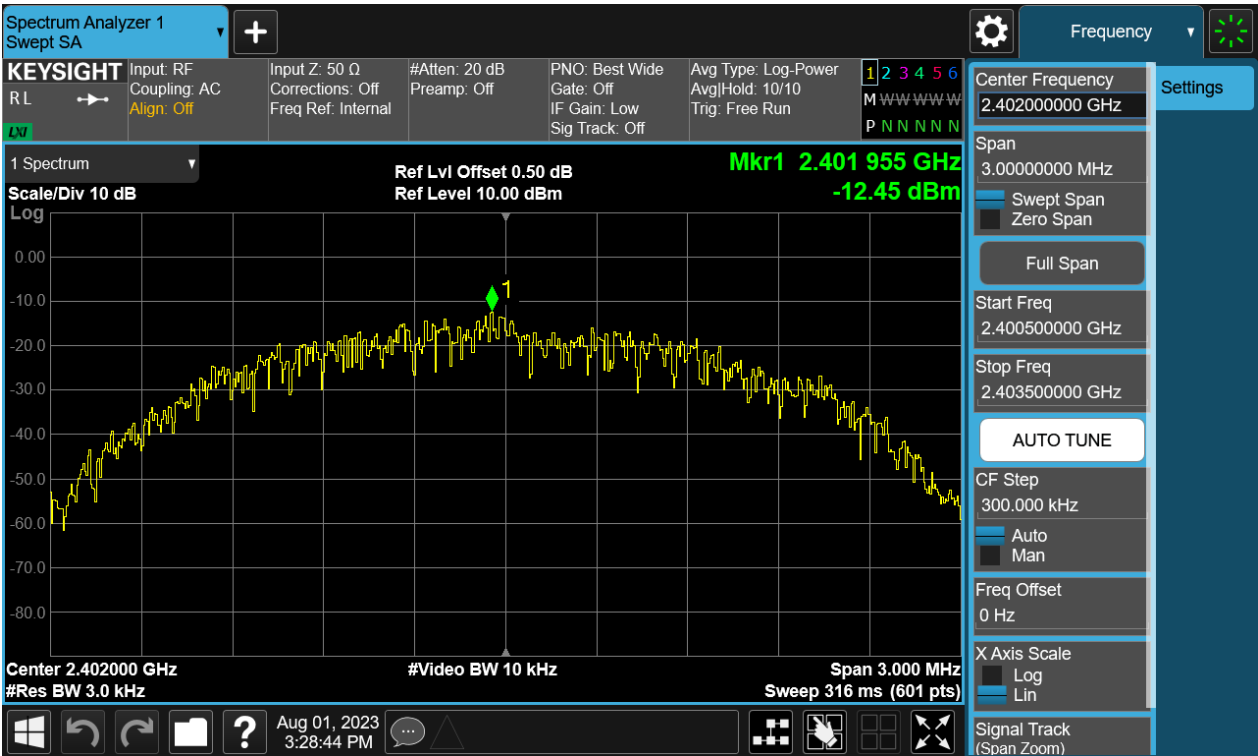


Figure 16: Power Spectral Density, 2402MHz BLE-2Mbps



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Figure 17: Power Spectral Density, 2440MHz BLE-2Mbps

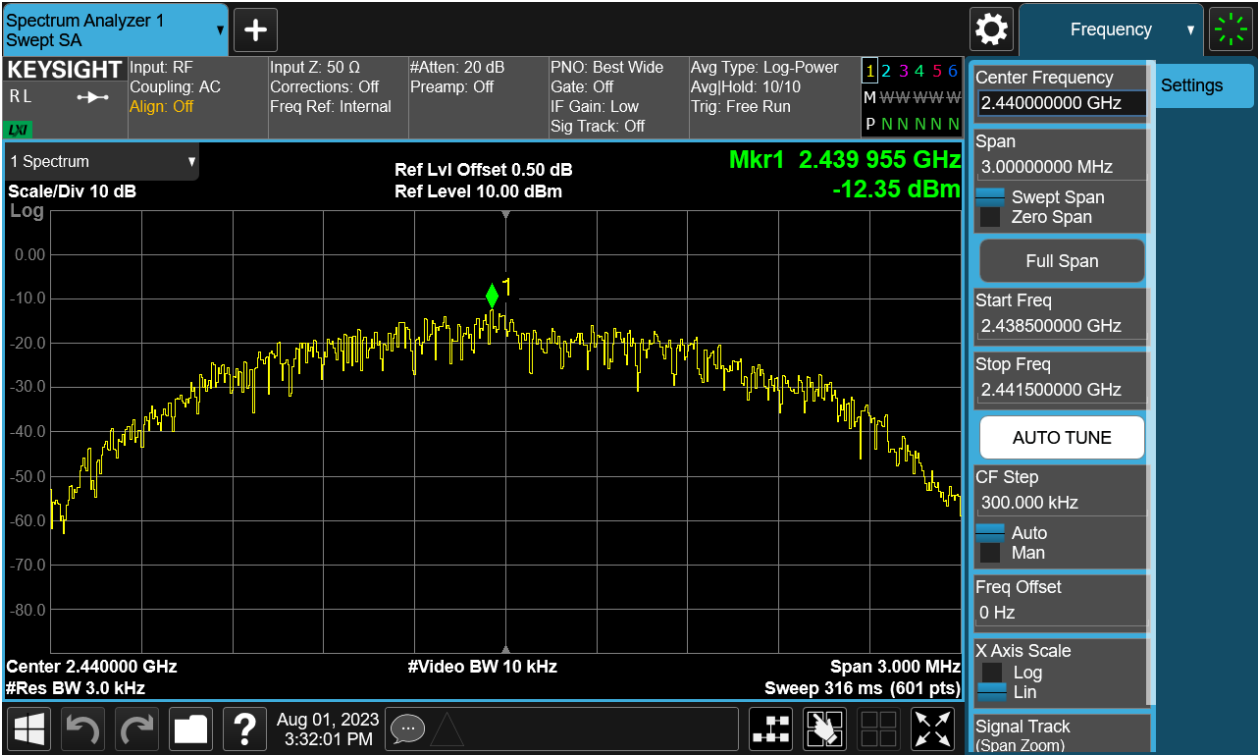
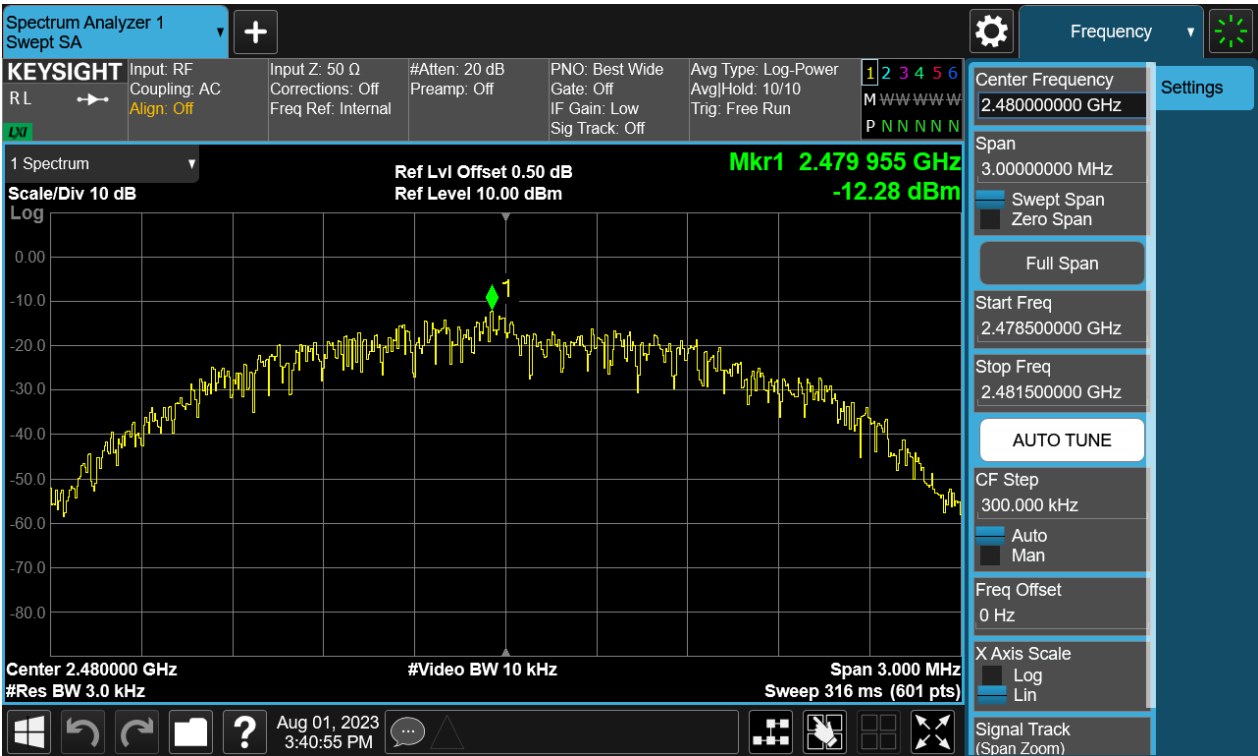


Figure 18: Power Spectral Density, 2480MHz BLE-2Mbps



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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, KDB 558074 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	: 24.9°C
Relative humidity	: 56%

For details refer to following test plot.

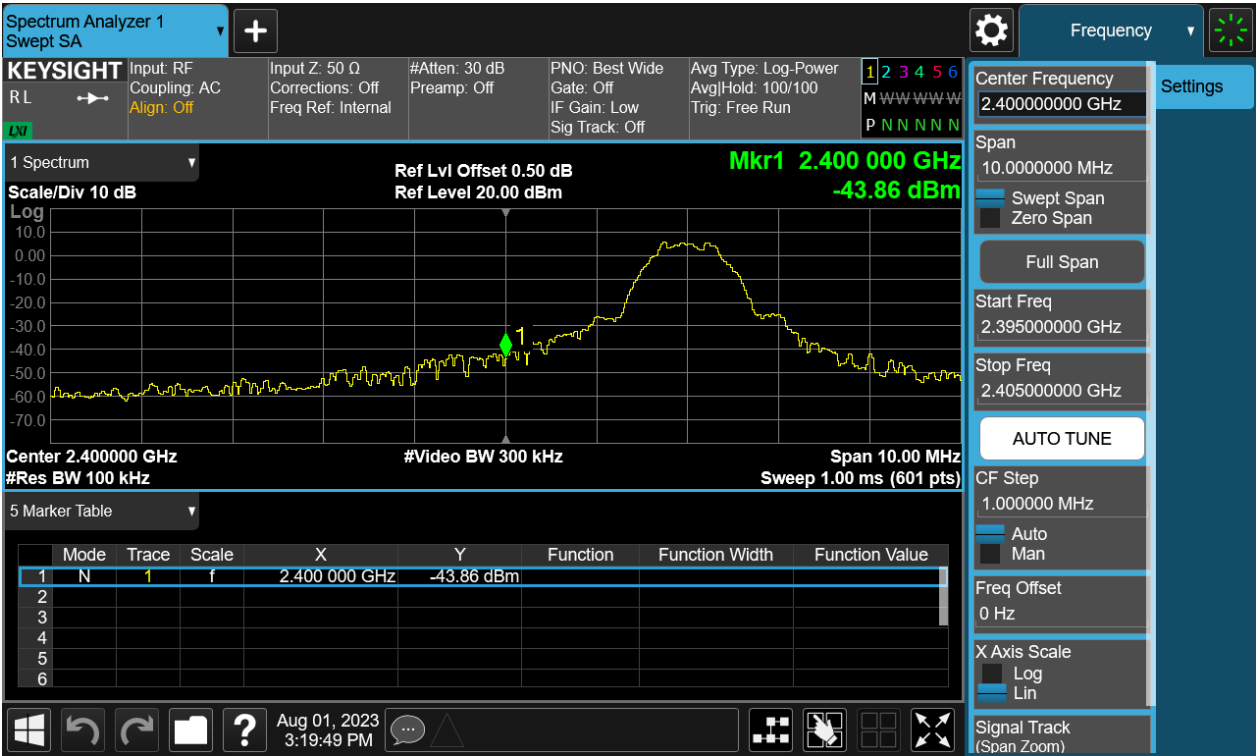
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Figure 19: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, BLE-1M Carrier Level



Band Edge



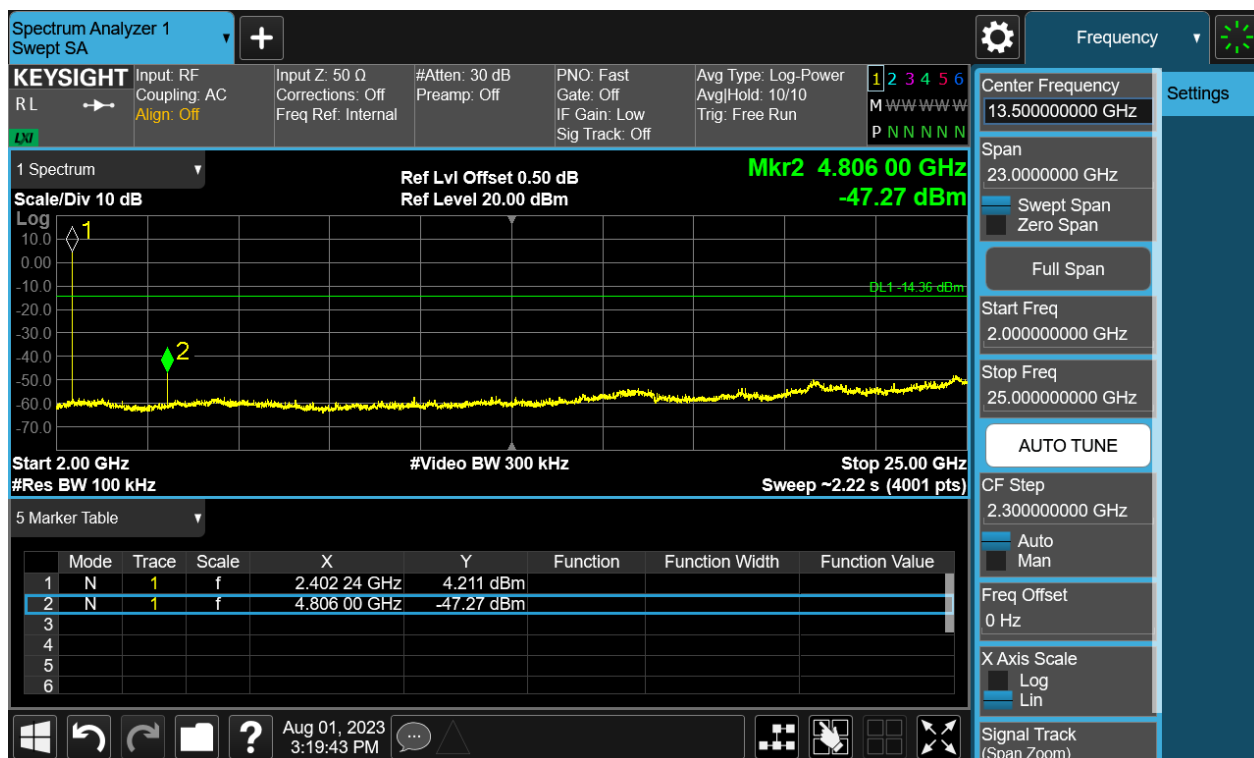
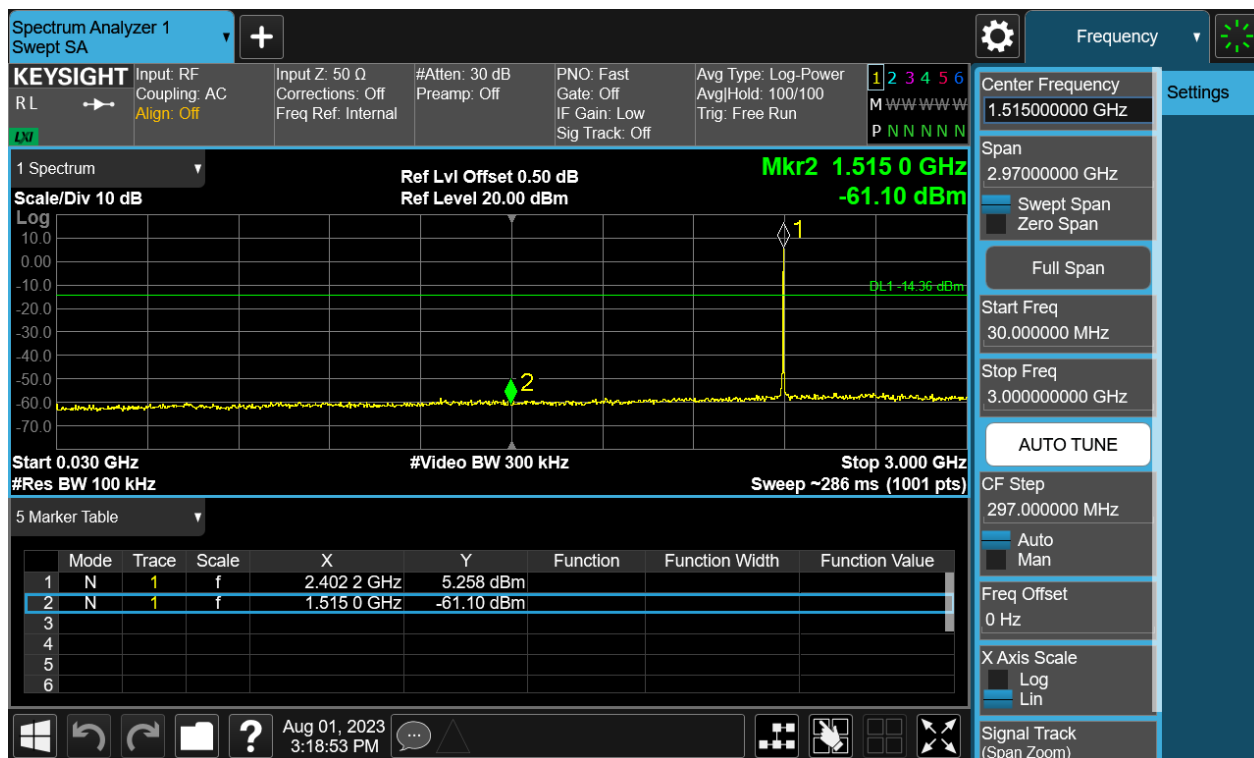
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Conducted spurious emissions 30MHz-25GHz



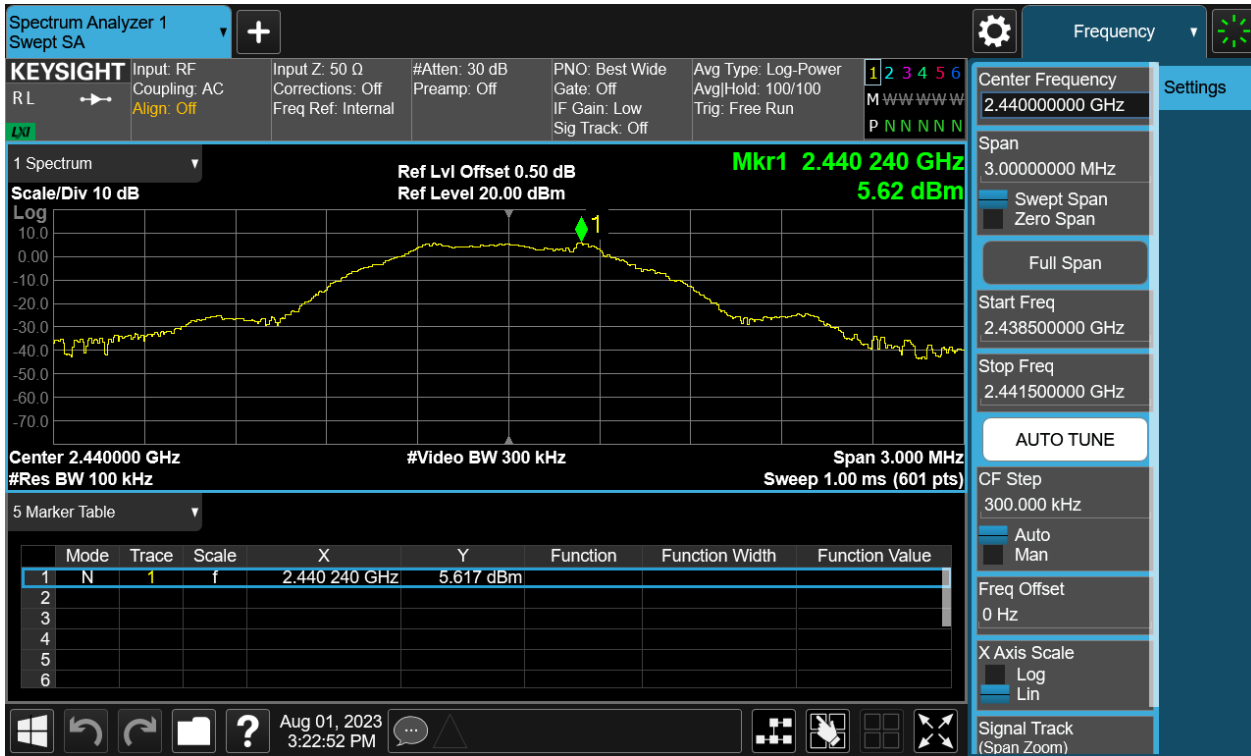
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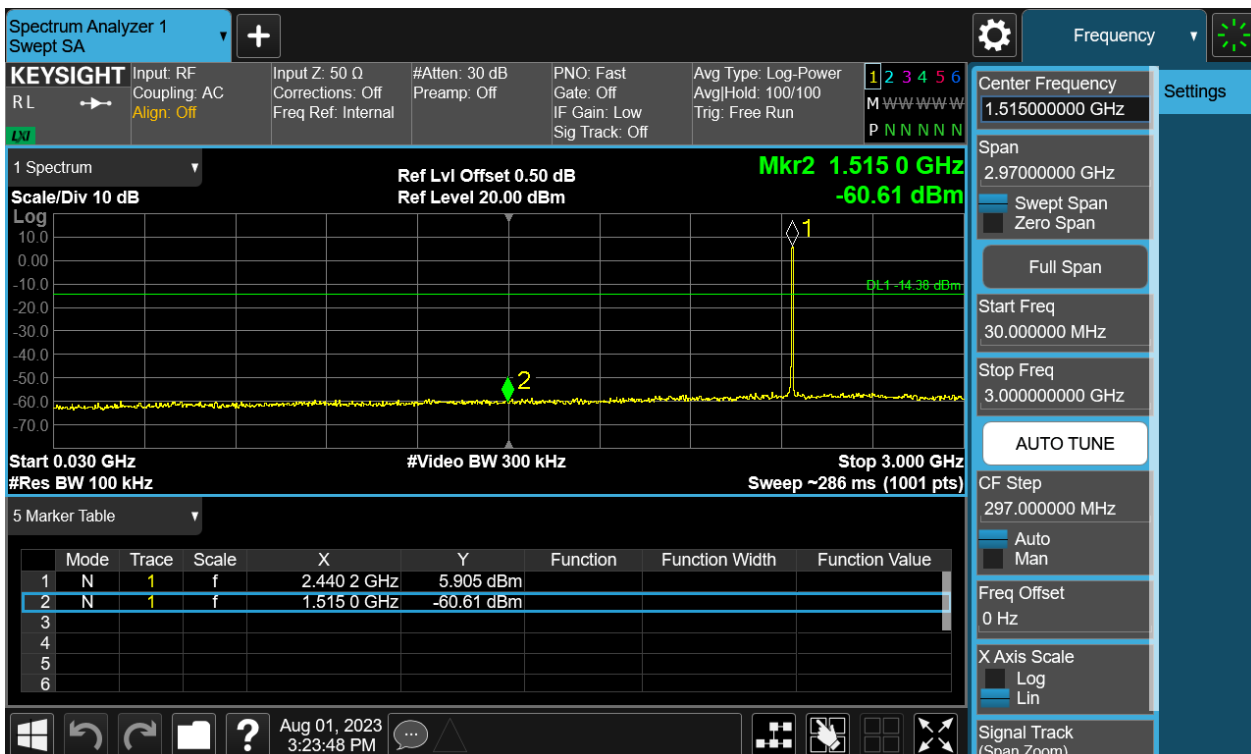
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Figure 20: Conducted Spurious Emission & Authorized-band band-edge, 2440MHz, BLE-1M Carrier Level



Conducted spurious emissions 30MHz-25GHz



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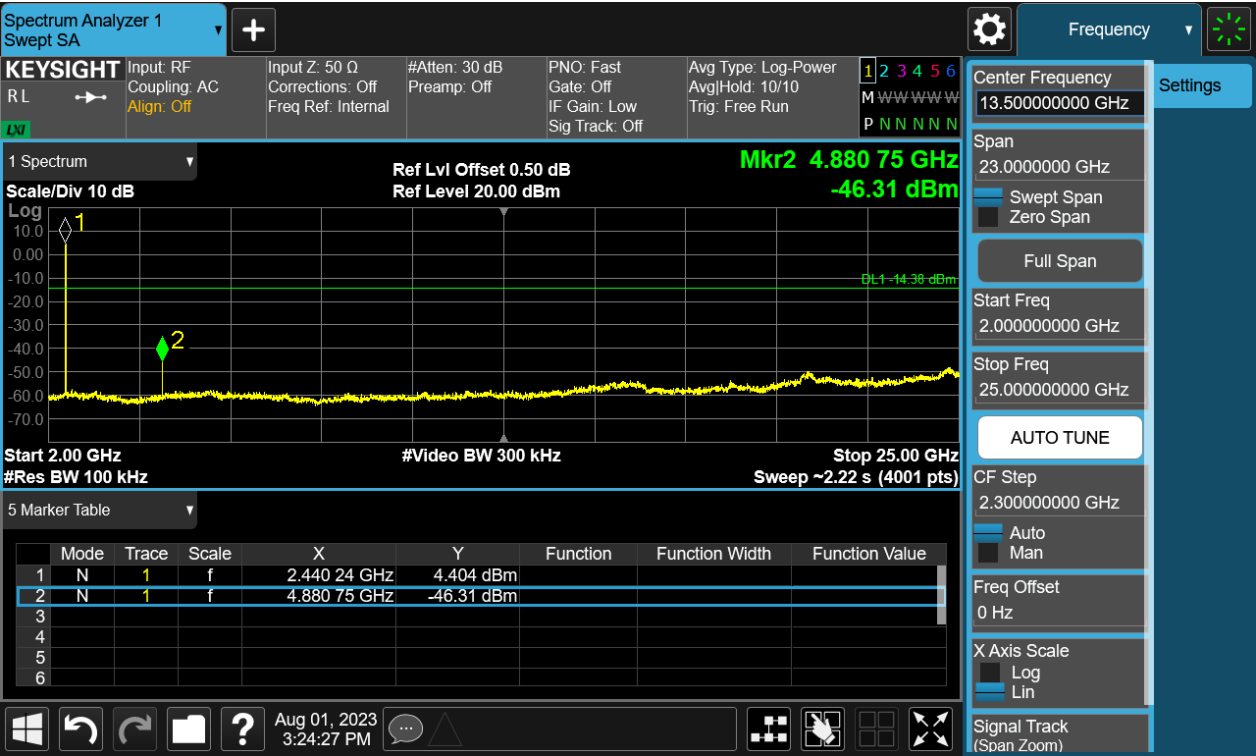


Figure 21: Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, BLE-1M Carrier Level



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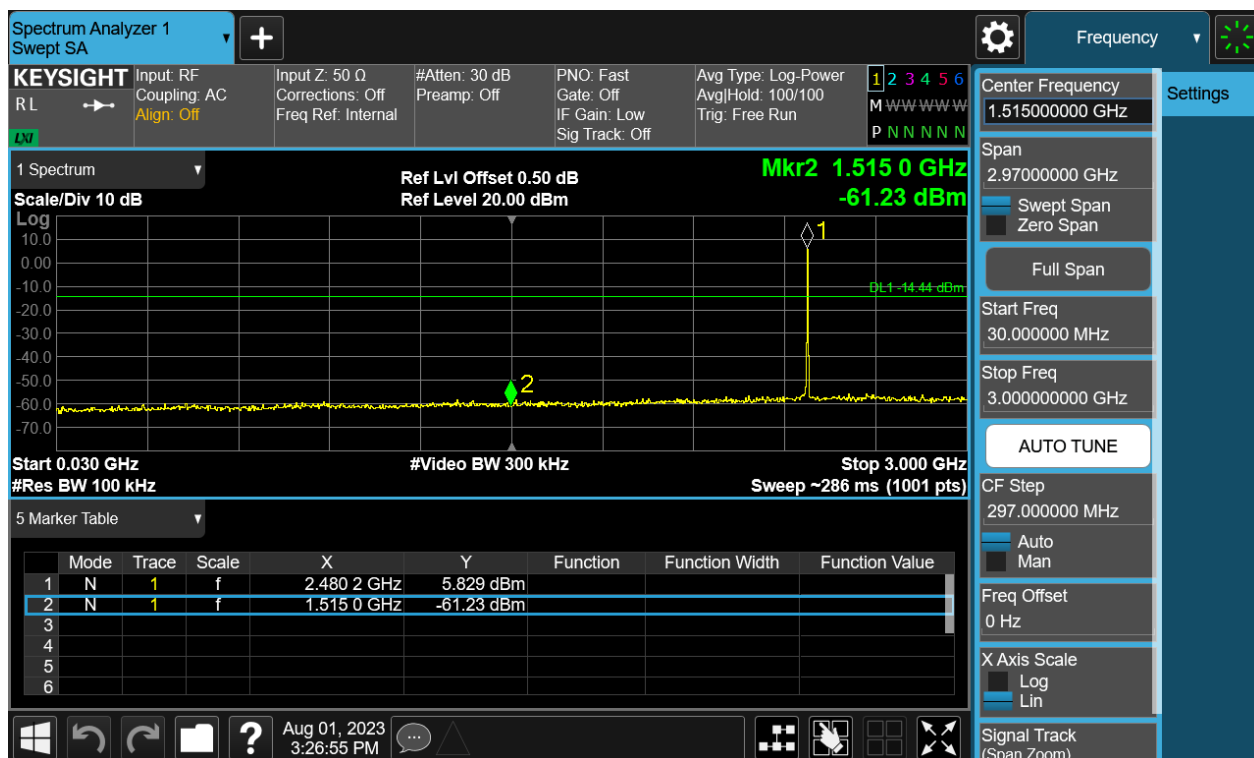
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Band Edge



Conducted spurious emissions 30MHz-25GHz



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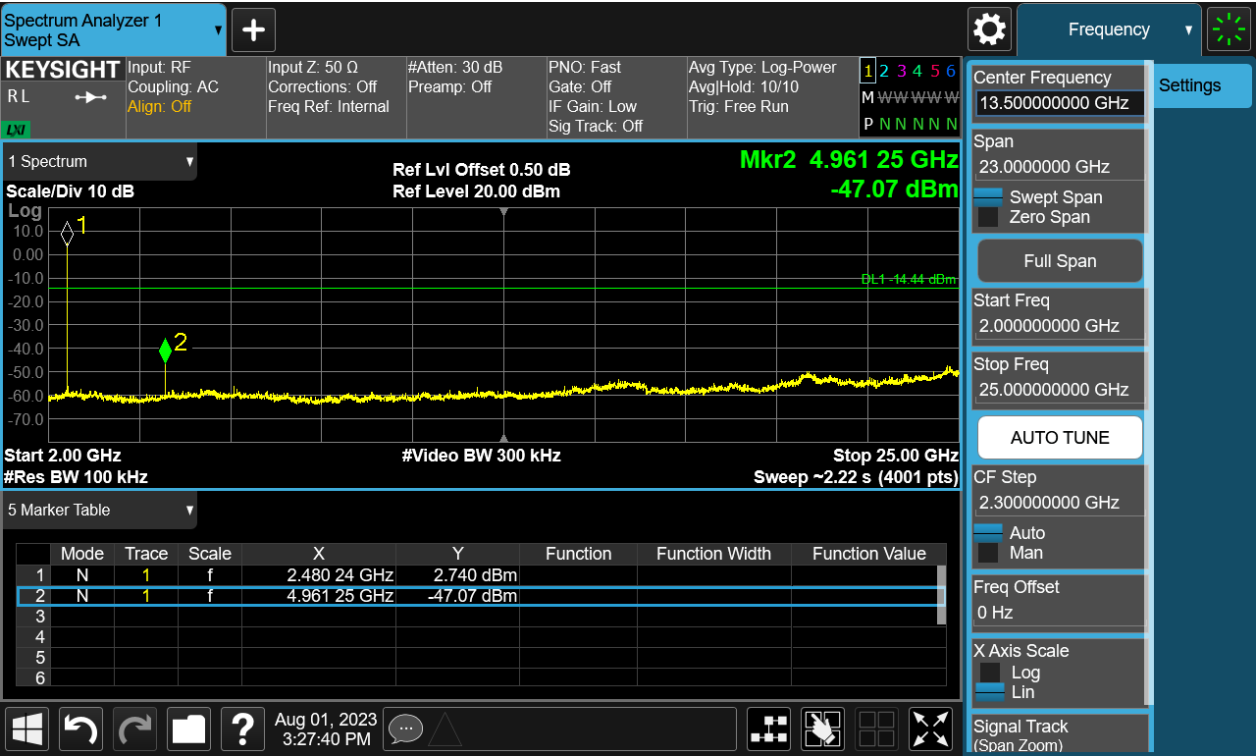
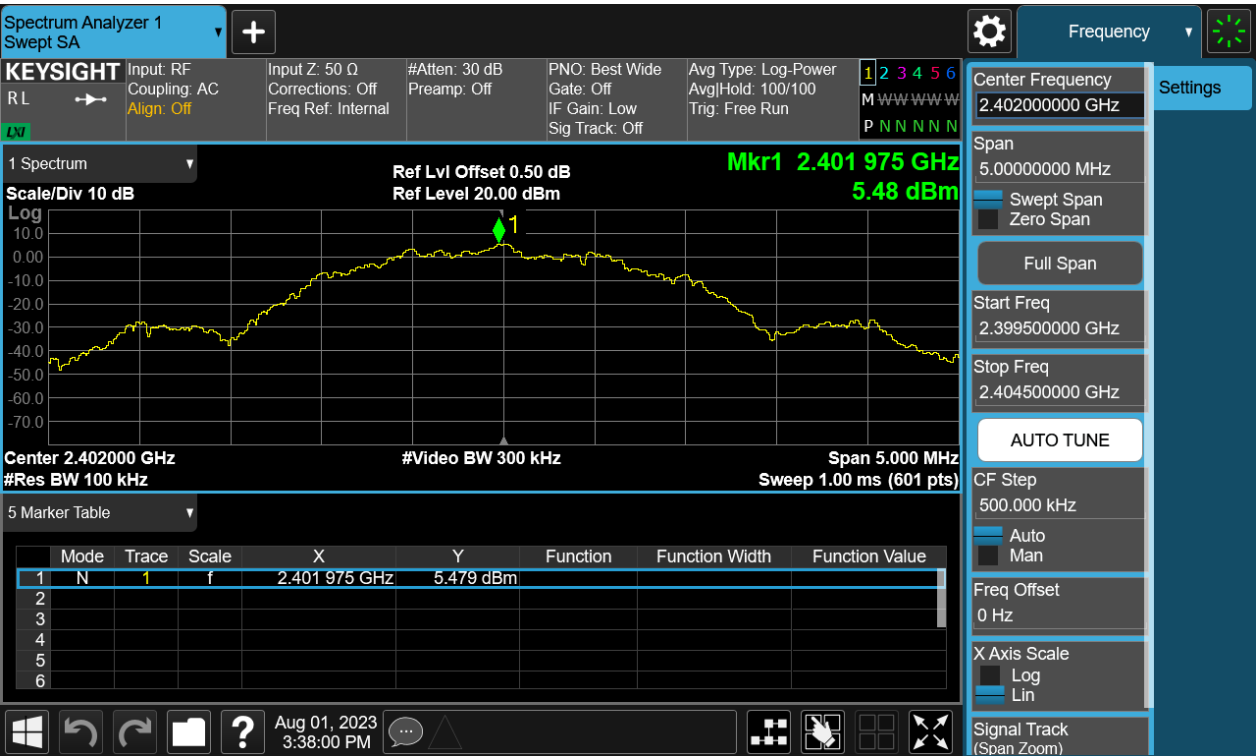


Figure 22: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, BLE-2M Carrier Level



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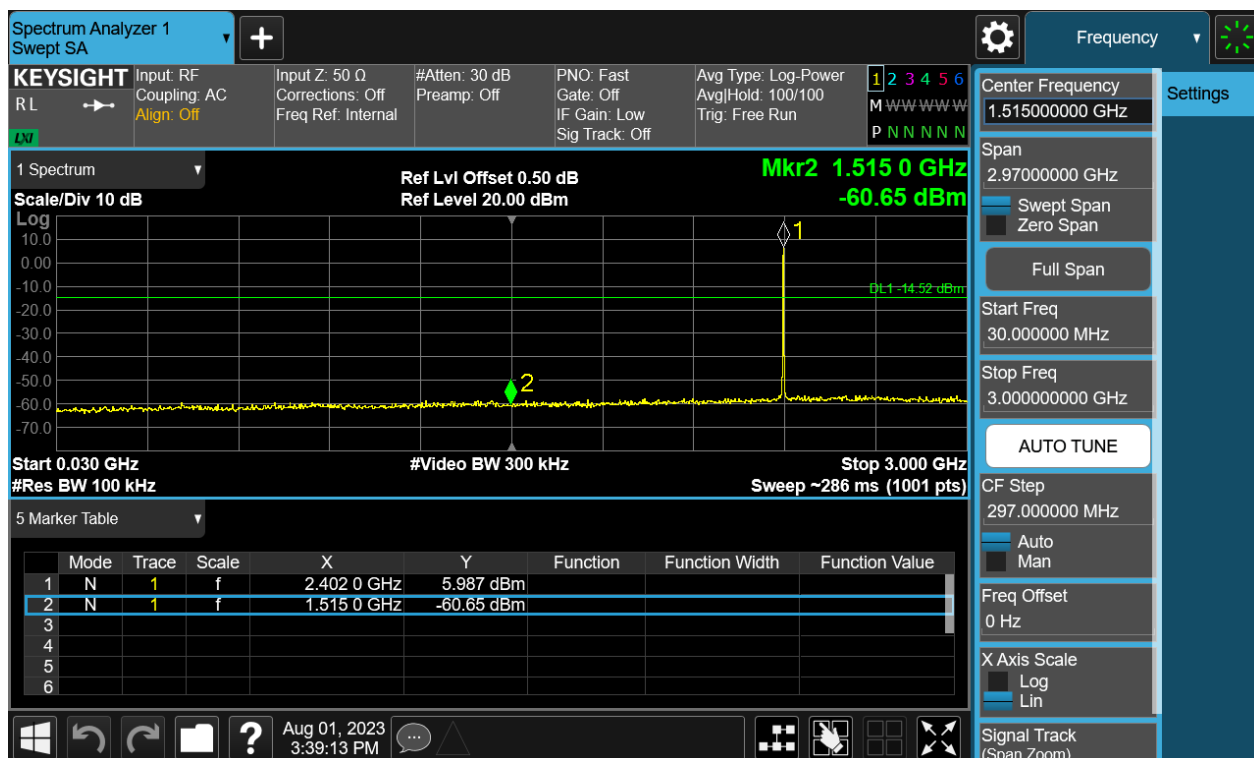
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Band Edge



Conducted spurious emissions 30MHz-25GHz



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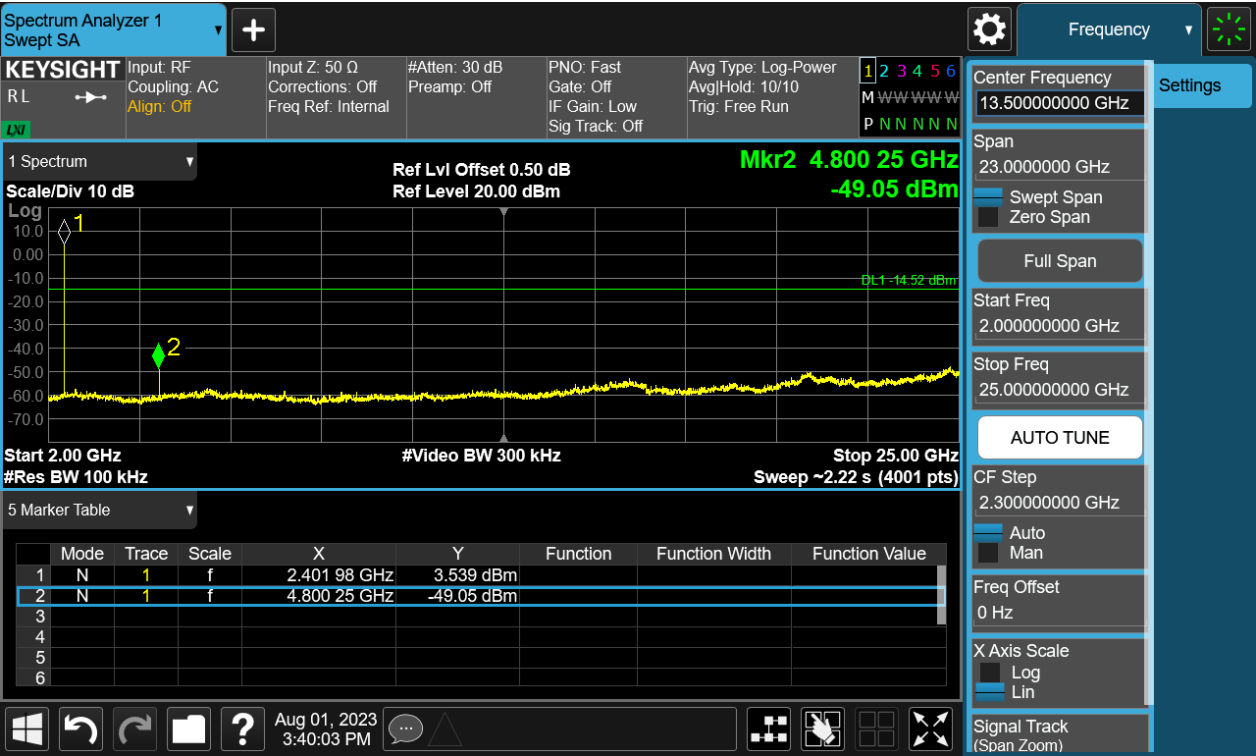
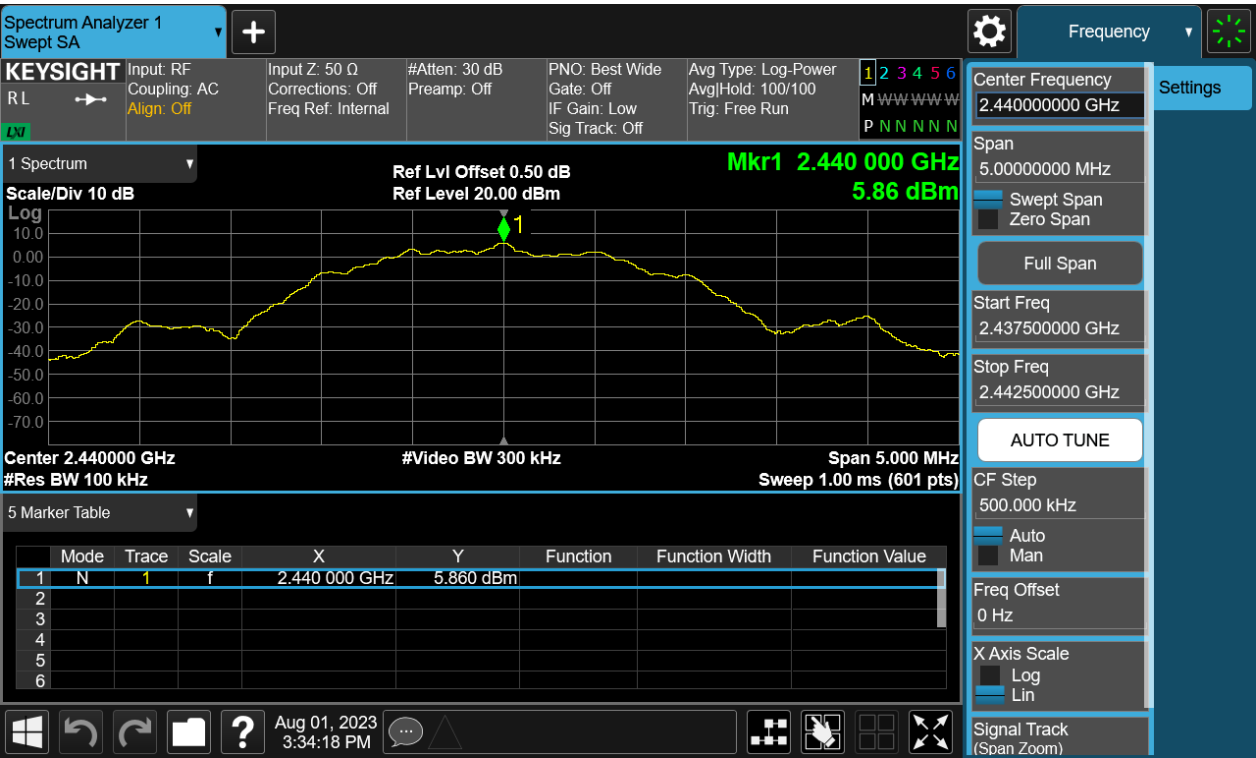


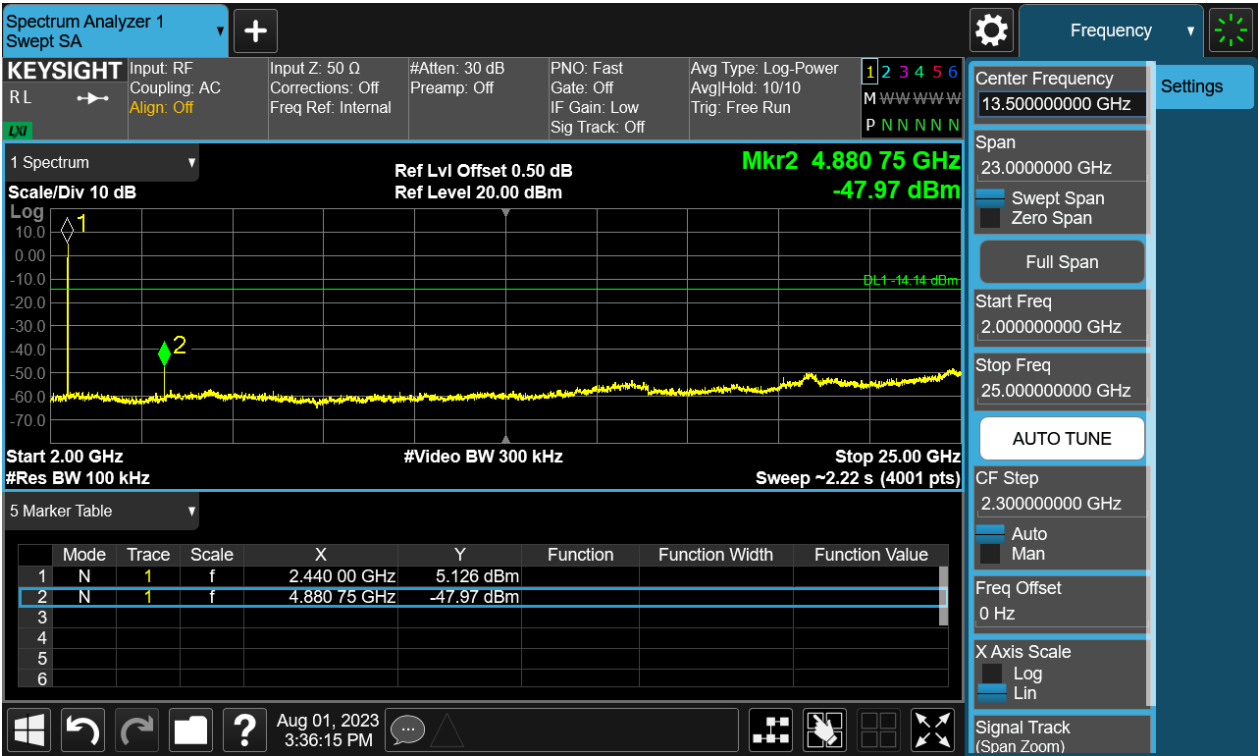
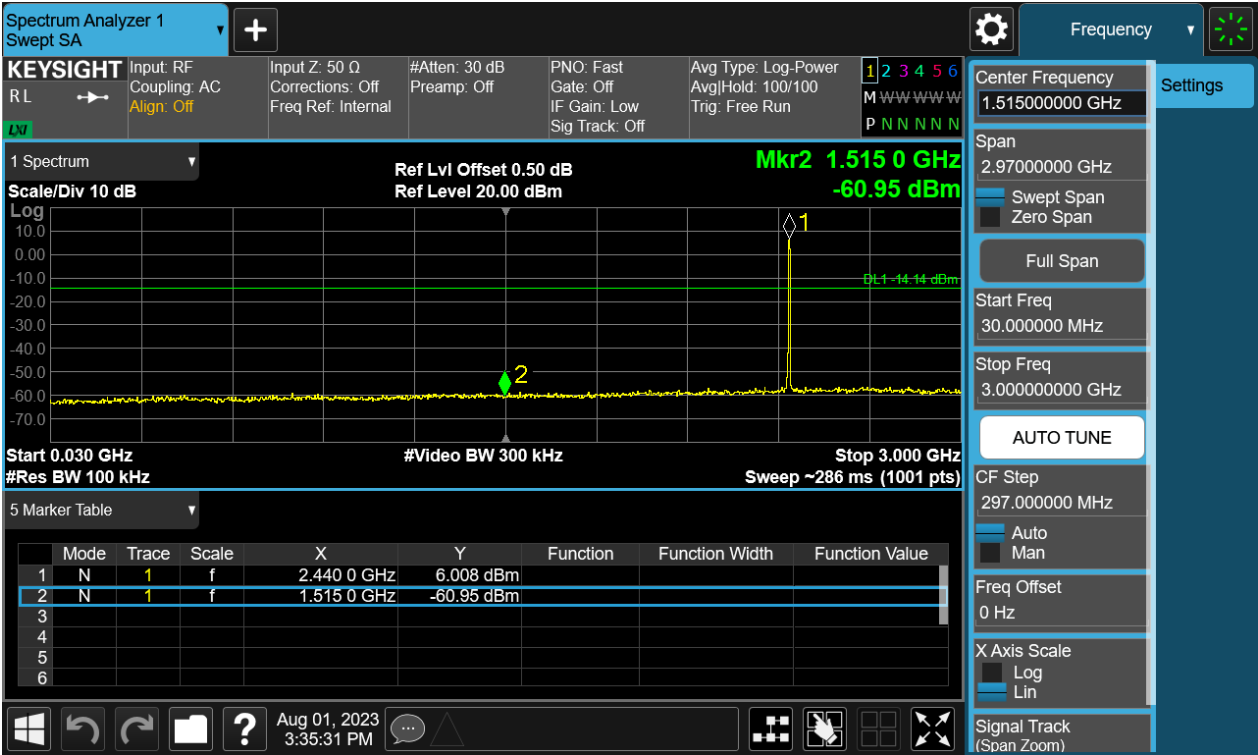
Figure 23: Conducted Spurious Emission & Authorized-band band-edge, 2440MHz, BLE-2M Carrier Level



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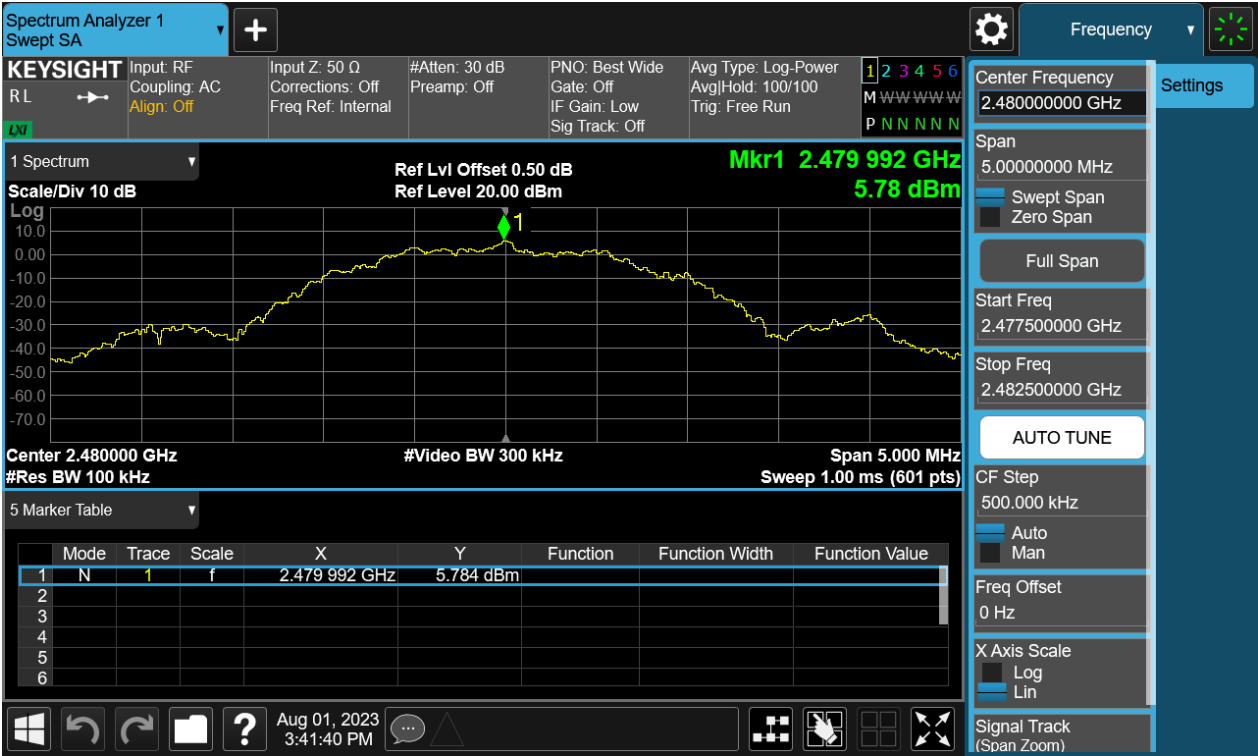
Conducted spurious emissions 30MHz-25GHz



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Figure 24: Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, BLE-2M Carrier Level



Band Edge



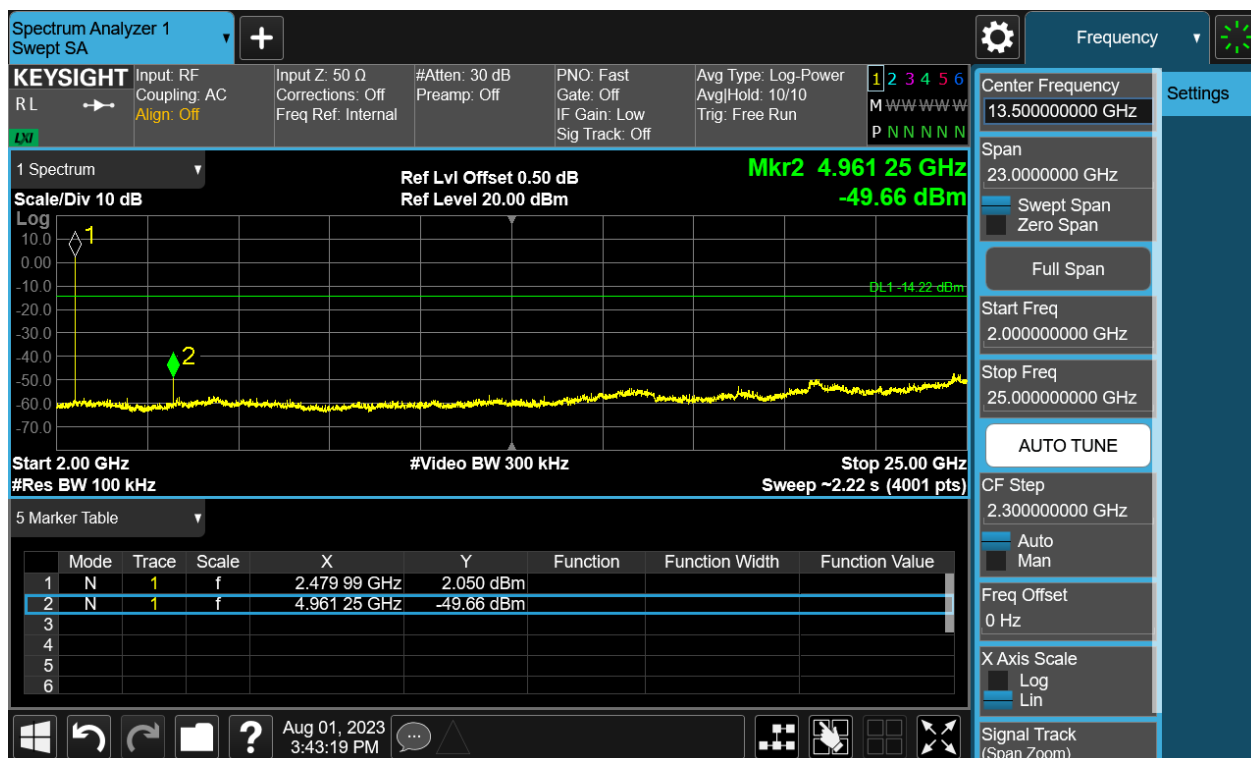
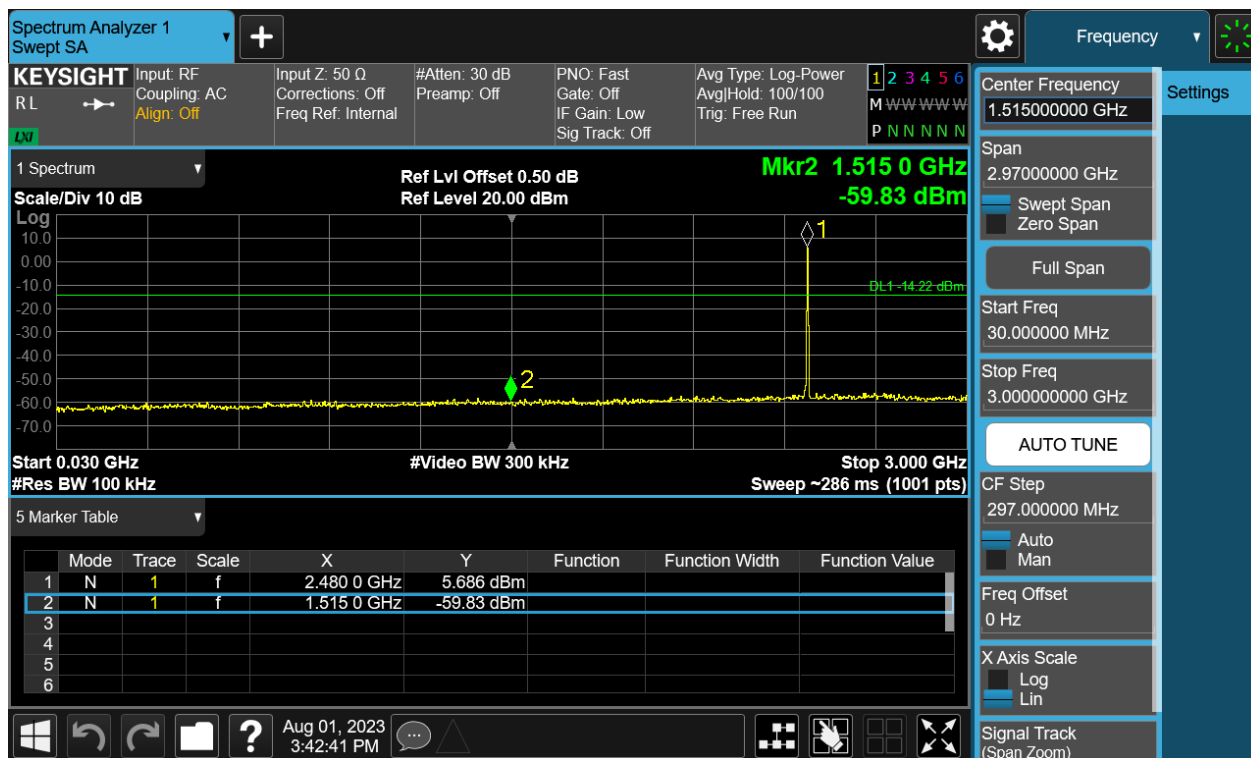
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Conducted spurious emissions 30MHz-25GHz



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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 clause 8.6
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A
Ambient temperature	: 24.5°C
Relative humidity	: 53%

Notes

Test plots please refer to the annex document "SHE23070127-02AE DATA BLE-TX EXHIBIT A of EQM100-5B Model" and "SHE23070127-02AE DATA BLE-TX EXHIBIT A of EQM100-5U Model".

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-1M&2M 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.

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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 clause 8.7
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A.1
Ambient temperature	: 24.5°C
Relative humidity	: 53%

Notes

Test plots please refer to the annex document "SHE23070127-02AE DATA BLE-TX EXHIBIT A of EQM100-5B Model" and "SHE23070127-02AE DATA BLE-TX EXHIBIT A of EQM100-5U Model".

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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 clause 6.2
Kind of test site	: Shielded room

Test setup

Input Voltage	: which received AC 120V, 60Hz Power
Operation Mode	: A.1.a
Earthing	: Not Connected
Ambient temperature	: 24.4°C
Relative humidity	: 54%

For details refer to following test plot.

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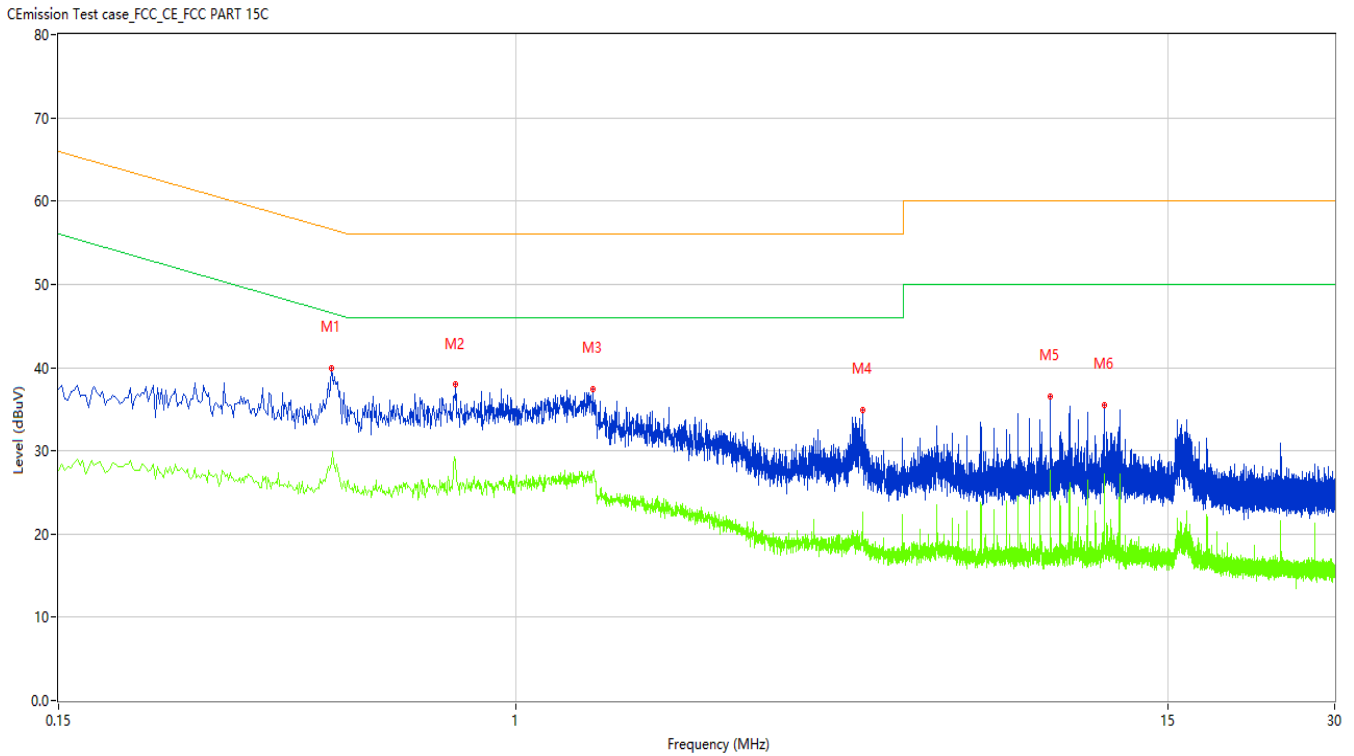
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Note: The all configurations were tested respectively, but only the worst configuration shown here.

Model: EQM100-5B

Figure 25: Conducted Emission on AC Mains, L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.466	39.93	9.96	56.58	16.65	Peak	L	Pass
1**	0.466	28.61	9.96	46.58	17.97	AV	L	Pass
2	0.780	37.94	9.94	56.00	18.06	Peak	L	Pass
2**	0.780	28.77	9.94	46.00	17.23	AV	L	Pass
3	1.378	37.45	9.84	56.00	18.55	Peak	L	Pass
3**	1.378	27.49	9.84	46.00	18.51	AV	L	Pass
4	4.222	34.92	9.82	56.00	21.08	Peak	L	Pass
4**	4.222	22.58	9.82	46.00	23.42	AV	L	Pass
5	9.212	36.58	9.71	60.00	23.42	Peak	L	Pass
5**	9.212	27.70	9.71	50.00	22.30	AV	L	Pass
6	11.516	35.53	9.64	60.00	24.47	Peak	L	Pass
6**	11.516	27.23	9.64	50.00	22.77	AV	L	Pass

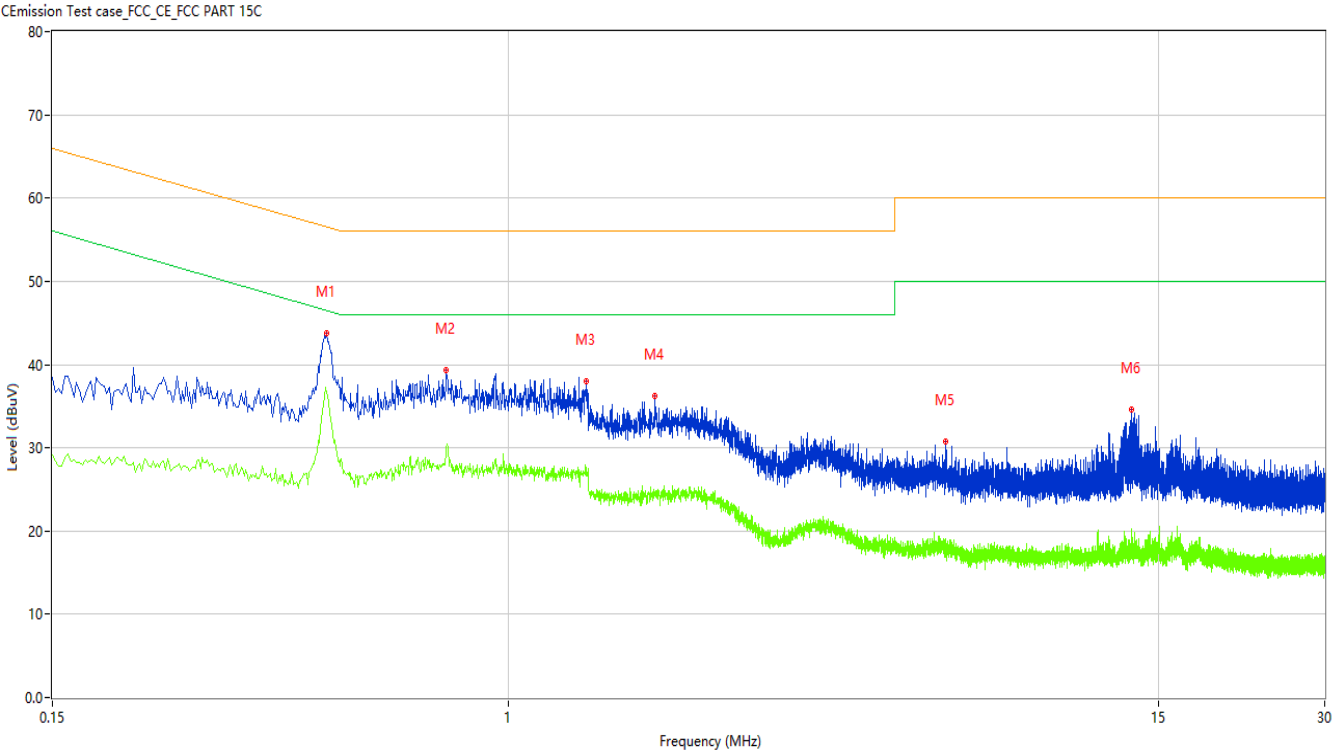
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Figure 26: Conducted Emission on AC Mains, N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.470	43.77	10.07	56.51	12.74	Peak	N	Pass
1**	0.470	36.67	10.07	46.51	9.84	AV	N	Pass
2	0.774	39.34	10.04	56.00	16.66	Peak	N	Pass
2**	0.774	29.99	10.04	46.00	16.01	AV	N	Pass
3	1.386	38.06	9.94	56.00	17.94	Peak	N	Pass
3**	1.386	27.31	9.94	46.00	18.69	AV	N	Pass
4	1.842	36.21	9.94	56.00	19.79	Peak	N	Pass
4**	1.842	24.32	9.94	46.00	21.68	AV	N	Pass
5	6.190	30.79	9.80	60.00	29.21	Peak	N	Pass
5**	6.190	18.70	9.80	50.00	31.30	AV	N	Pass
6	13.426	34.59	9.65	60.00	25.41	Peak	N	Pass
6**	13.426	20.27	9.65	50.00	29.73	AV	N	Pass

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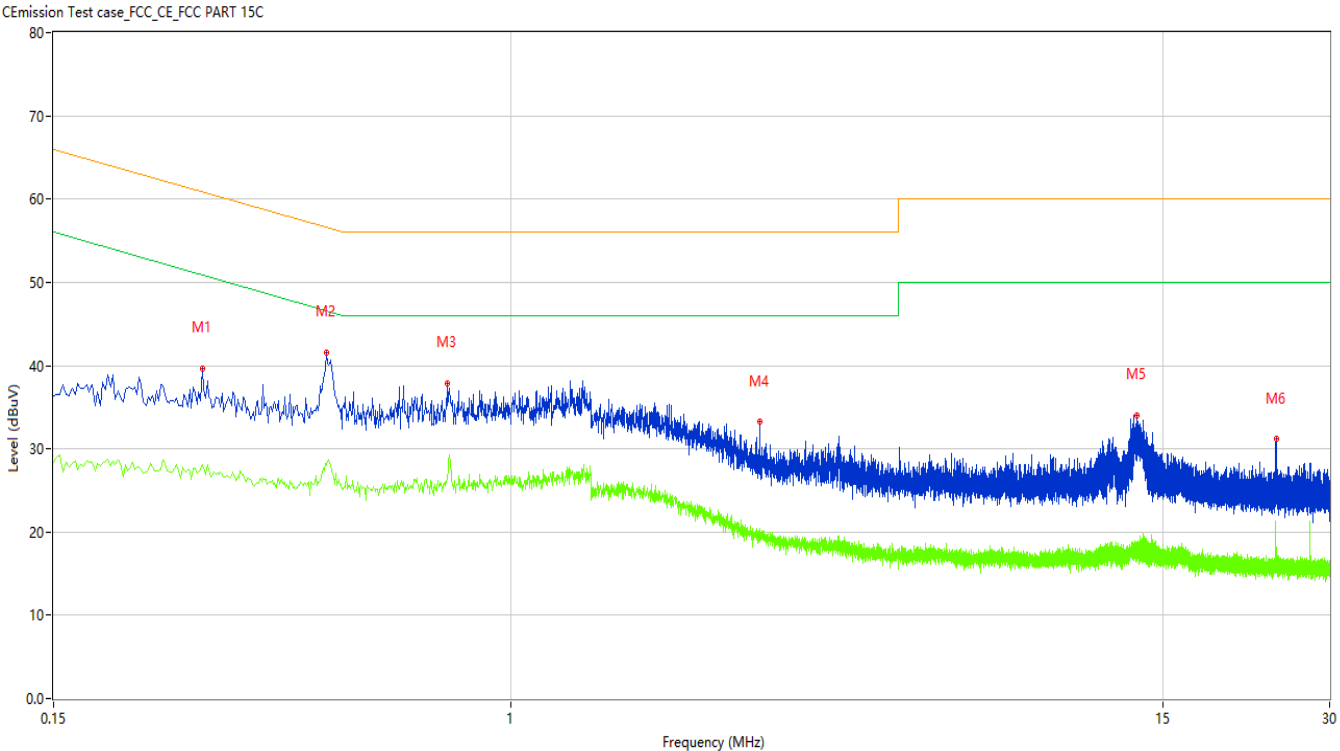
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Model: EQM100-5U

Figure 27: Conducted Emission on AC Mains, L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.278	39.64	9.97	60.88	21.24	Peak	L	Pass
1**	0.278	28.07	9.97	50.88	22.81	AV	L	Pass
2	0.466	41.59	9.96	56.58	14.99	Peak	L	Pass
2**	0.466	28.16	9.96	46.58	18.42	AV	L	Pass
3	0.770	37.87	9.94	56.00	18.13	Peak	L	Pass
3**	0.770	26.26	9.94	46.00	19.74	AV	L	Pass
4	2.812	33.20	9.84	56.00	22.80	Peak	L	Pass
4**	2.812	20.36	9.84	46.00	25.64	AV	L	Pass
5	13.462	34.06	9.58	60.00	25.94	Peak	L	Pass
5**	13.462	18.18	9.58	50.00	31.82	AV	L	Pass
6	24.036	31.15	9.19	60.00	28.85	Peak	L	Pass
6**	24.036	18.25	9.19	50.00	31.75	AV	L	Pass

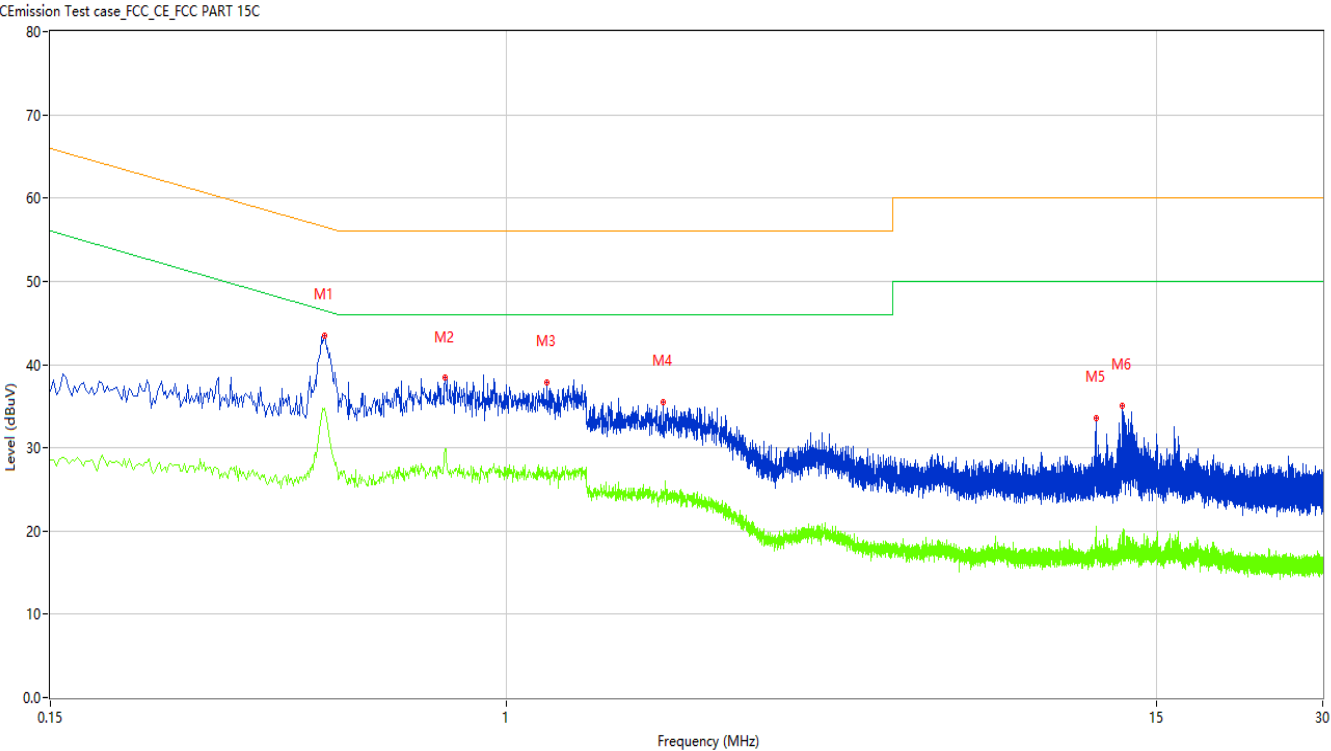
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Figure 28: Conducted Emission on AC Mains, N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.470	43.44	10.07	56.51	13.07	Peak	N	Pass
1**	0.470	34.69	10.07	46.51	11.82	AV	N	Pass
2	0.776	38.38	10.04	56.00	17.62	Peak	N	Pass
2**	0.776	29.93	10.04	46.00	16.07	AV	N	Pass
3	1.186	37.83	9.95	56.00	18.17	Peak	N	Pass
3**	1.186	27.17	9.95	46.00	18.83	AV	N	Pass
4	1.924	35.46	9.94	56.00	20.54	Peak	N	Pass
4**	1.924	24.80	9.94	46.00	21.20	AV	N	Pass
5	11.692	33.51	9.71	60.00	26.49	Peak	N	Pass
5**	11.692	20.56	9.71	50.00	29.44	AV	N	Pass
6	13.026	35.05	9.67	60.00	24.95	Peak	N	Pass
6**	13.026	19.79	9.67	50.00	30.21	AV	N	Pass

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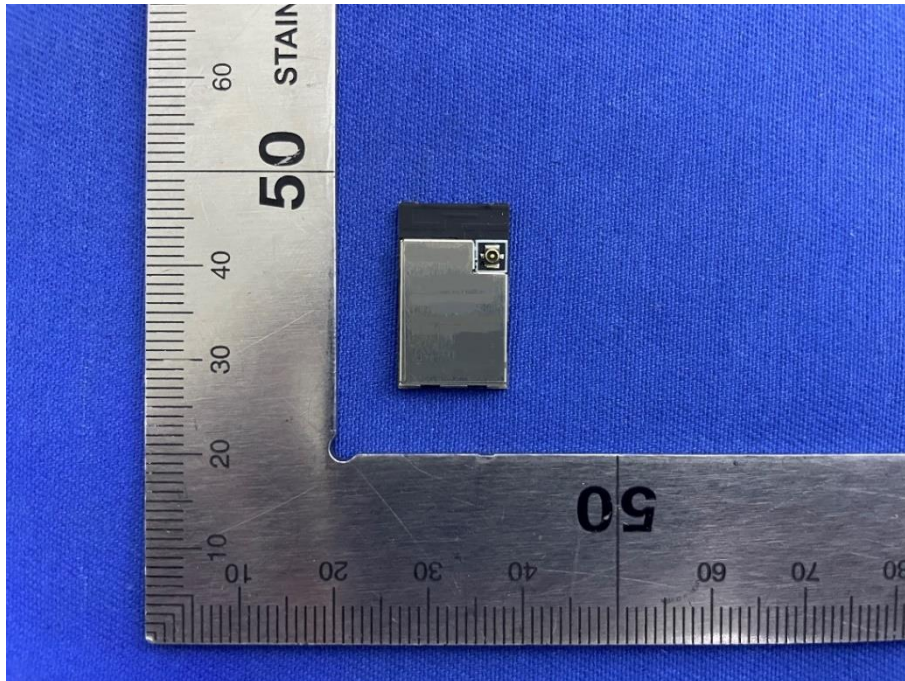
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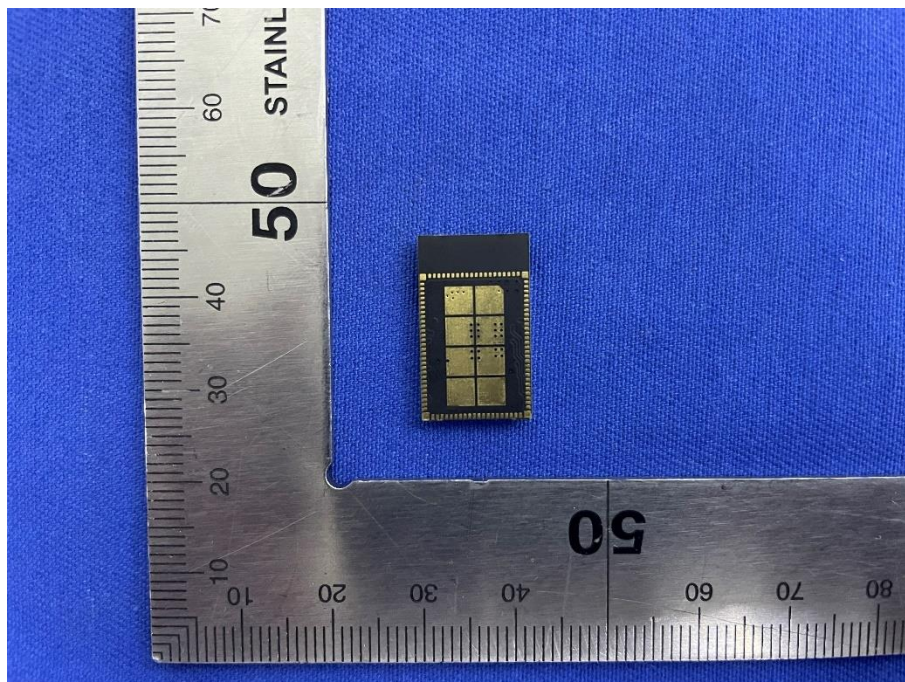
5 Appendixes

5.1 Photographs of the Sample

Model: EQM100-5B

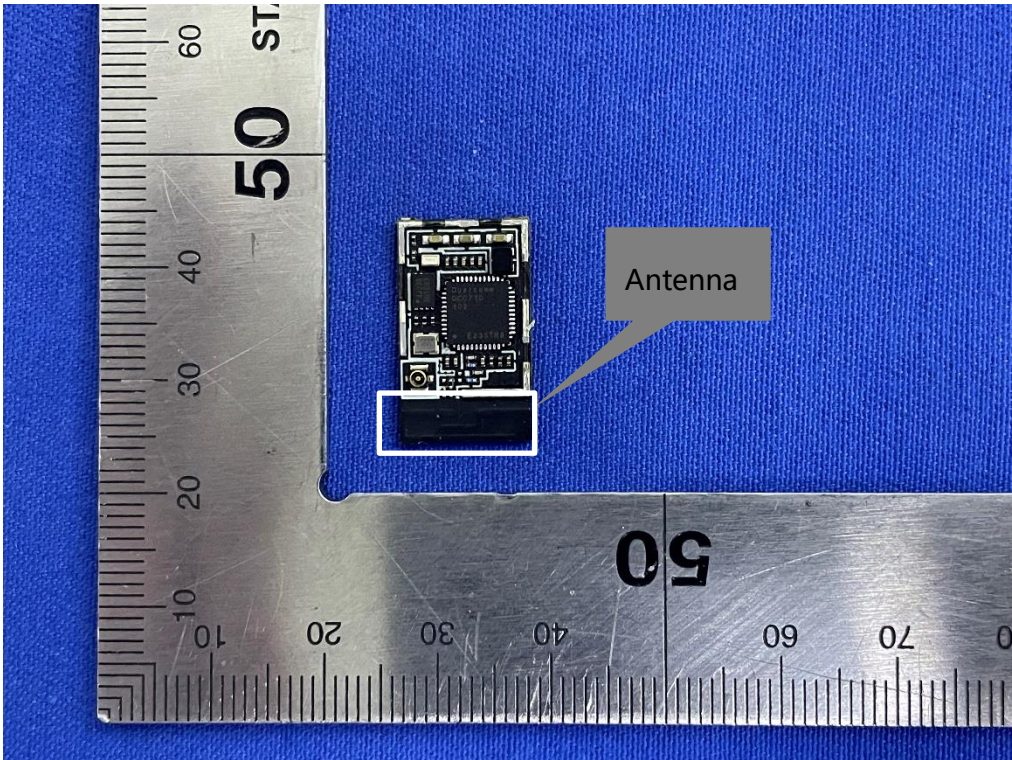


Front of the sample



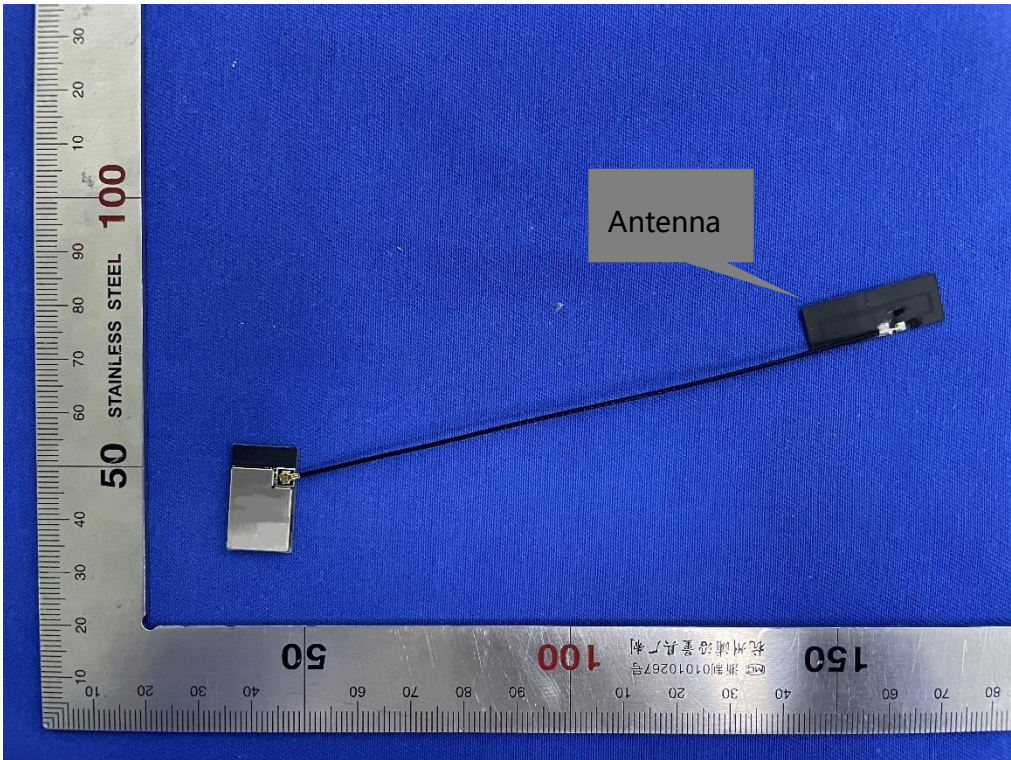
Rear of the sample

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Remove the shield cover and Antenna Position

Model: EQM100-5U



Antenna Position

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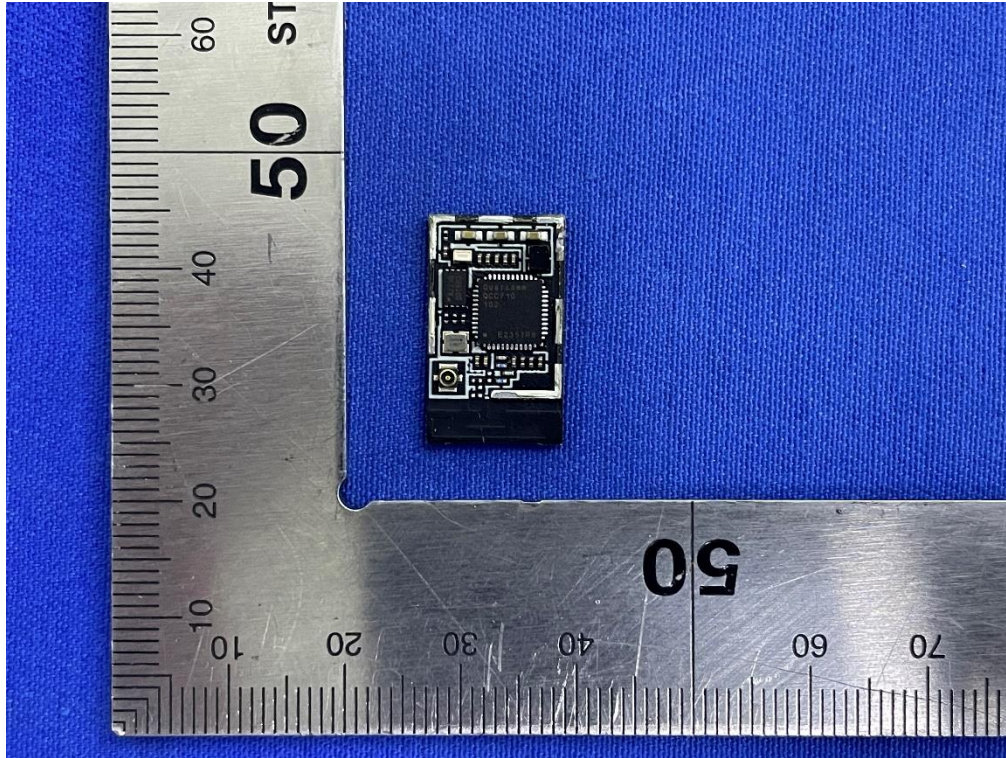
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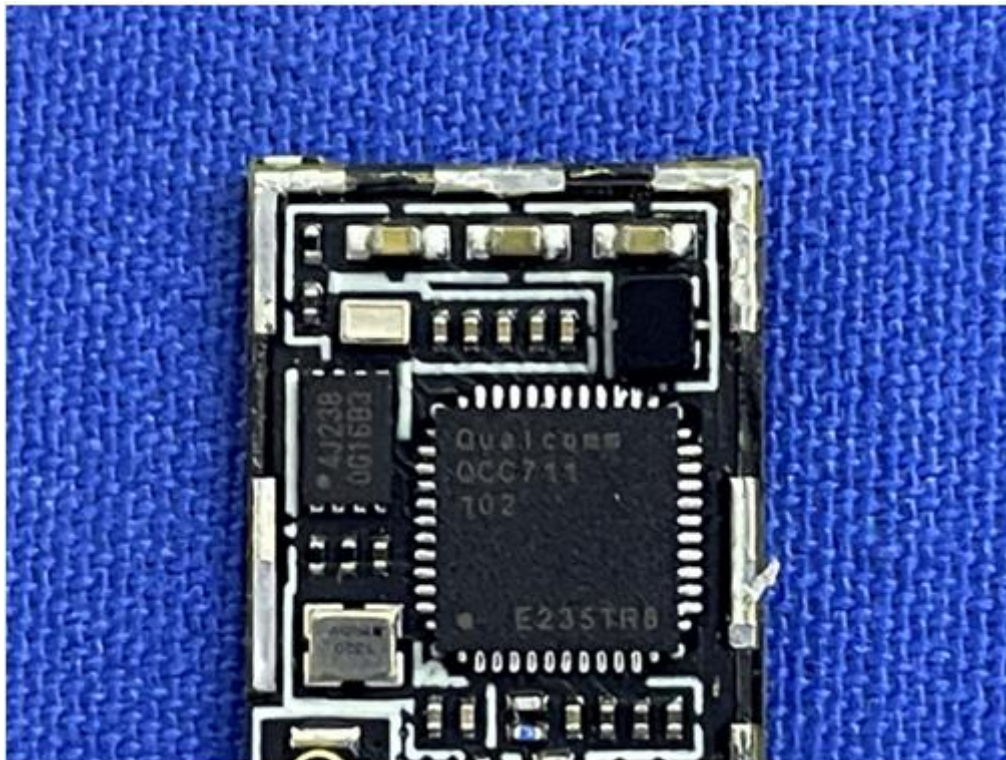
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Remove the shield cover



Chip

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5.2 Set-up for Conducted Emissions

Model: EQM100-5B



Model: EQM100-5U



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5.3 Set-up for Conducted RF test at Antenna Port



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5.4 Set-up for Spurious Emissions below 1GHz

Model: EQM100-5B



Model: EQM100-5U



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5.5 Set-up for Spurious Emissions above 1GHz

Model: EQM100-5B



Model: EQM100-5U



End of the report