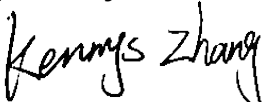




FCC CERTIFICATION TEST REPORT

Applicant:	Guangzhou Shirui Electronics Co., Ltd.
Address:	192 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District, Guangzhou, Guangdong, China
Manufacturer:	Guangzhou Shirui Electronics Co., Ltd.
Address:	192 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District, Guangzhou, Guangdong, China
Product Description:	360° All-in-one Conference Camera
Brand Name:	NA
Tested Model:	MD20A
FCC ID:	2AFG6-MD20A
Report No.:	JCF230616201-002
Received Date:	Jun. 16, 2023
Tested Date:	Jun. 16, 2023 ~ Sep. 11, 2023
Issued Date:	Sep. 11, 2023
Test Standards:	FCC Rules and Regulations Part 15 Subpart C
Test Procedure:	ANSI C63.10:2013
Test Result:	Pass
Prepared By:	
 <u>Kennys Zhang/Engineer</u>	
Date: Sep. 11, 2023	
Reviewed By:	
 <u>Roger Li/Engineer</u>	
Date: Sep. 11, 2023	
Approved By:	
 <u>Talent Zhang/Engineer</u>	
Date: Sep. 11, 2023	

Note: The test results in this report apply exclusively to the tested model / sample. Without written approval of Guangzhou Jingce Testing Technology Co., Ltd. the test report shall not be reproduced except in full.

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Sep. 11, 2023	Original Report	/

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1. Test Report Declare

Applicant:	Guangzhou Shirui Electronics Co., Ltd.
Address:	192 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District, Guangzhou, Guangdong, China
Manufacturer:	Guangzhou Shirui Electronics Co., Ltd.
Address:	192 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District, Guangzhou, Guangdong, China
Product Name:	360° All-in-one Conference Camera
Brand Name:	NA
Model Name:	MD20A, MD****, UC M**** (*=0-9,A-Z ,a-z or blank)
Difference Description:	The derivative model have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction with the basic model . The difference lies only the model number just for marketing purpose.

We Declare:

The equipment described above is tested by Guangzhou Jingce Testing Technology Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Guangzhou Jingce Testing Technology Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

2. Summary of Test Results

Summary of Test Results			
Clause	Test Items	FCC/ISED Rules	Test Results
1	6 dB Bandwidth and 99 % Occupied Bandwidth	FCC Part 15.247 (a) (2)	Pass
2	Peak Conducted Output Power	FCC Part 15.247 (b) (3)	Pass
3	Power Spectral Density	FCC Part 15.247 (e)	Pass
4	Conducted Bandedge and Spurious Emission	FCC Part 15.247 (d)	Pass
5	Radiated Bandedge and Spurious Emission	FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205	Pass
6	Conducted Emission Test For AC Power Port	FCC Part 15.207	Pass
7	Antenna Requirement	FCC Part 15.203	Pass

3. Test Laboratory

Guangzhou Jingce Testing Technology Co., Ltd.

Add.: No.192, Kezhu Road, Huangpu District, Guangzhou, Guangdong, China

Association for Laboratory Accreditation(A2LA). Certificate Number: 6594.01

FCC Designation Number: CN1331. Test Firm Registration Number: 360543

IC Test Firm Registration Number: 28796

Conformity Assessment Body identifier: CN0138

4. Equipment Under Test

4.1. Description of EUT

EUT Name:	360° All-in-one Conference Camera
Model Number:	MD20A
EUT Function Description:	Refer the user's manual
Power Supply:	12V DC 3A
Hardware Version:	NA
Software Version:	NA
Radio Specification:	Bluetooth V5.1
Operation Frequency:	2402 MHz - 2480 MHz
Modulation:	GFSK
Data Rate:	1Mbps, 2Mbps,
Antenna Type:	FPC Antenna, MAX. Gain: 2.04 dBi

Note 1: EUT is the ab. of equipment under test.

Note 2: The antenna gain is declared by the customer and the laboratory is not responsible for the accuracy of the antenna gain.

4.2. Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	11	2424	22	2446	33	2468
1	2404	12	2426	23	2448	34	2470
2	2406	13	2428	24	2450	35	2472
3	2408	14	2430	25	2452	36	2474
4	2410	15	2432	26	2454	37	2476
5	2412	16	2434	27	2456	38	2478
6	2414	17	2436	28	2458	39	2480
7	2416	18	2438	29	2460	/	/
8	2418	19	2440	30	2462	/	/
9	2420	20	2442	31	2464	/	/
10	2422	21	2444	32	2468	/	/

4.3. Test Channel Configuration

Tested mode, channel, information		
Mode	Channel	Frequency (MHz)
GFSK	LCH:CH0	2402
	MCH:CH19	2440
	HCH:CH39	2480

4.4. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25 °C
Humidity range:	40-75%
Pressure range:	86-106 kPa

4.5. The Worse Case Power Setting Parameter

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software		Non_Signaling_Test_Tool		
Modulation Type	Transmit Antenna Number	Test Software Setting Value		
		CH 00	CH 39	CH 78
GFSK_1M	1	2.6	1.3	-4.2
GFSK_2M	1	2.6	1.8	-4.2

4.6. Description of Available Antennas

Test Mode	Transmit and Receive Mode	Description
GFSK	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.

5. Description of Test Setup

5.1. Accessory

Description of Accessories	Manufacturer	Model Number	Description	Remark
SWITCHING ADAPTER	Dong Guan City GuangQi Electronic Co.Ltd	GQ36-120300-AX	Input:100-240V ~ 50/60Hz 1.0A Max Output:12.0V $\overline{=}$ 3.0A 36.0W	N/A

5.2. Support Equipment

Equipment	Brand Name	Model Name	P/N
PC	Lenovo	T480	/

5.3. Test Setup

The EUT can work in Fixed Frequency mode.

5.4. Setup Diagram for Tests



6. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
AC Power Conduction emission	1.37 dB
All Radiated emissions	5.4dB
Conducted emissions	3.09 dB
Occupied Channel Bandwidth	1.1%
Conducted Output power	0.82dB
Power Spectral Density	0.82dB

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

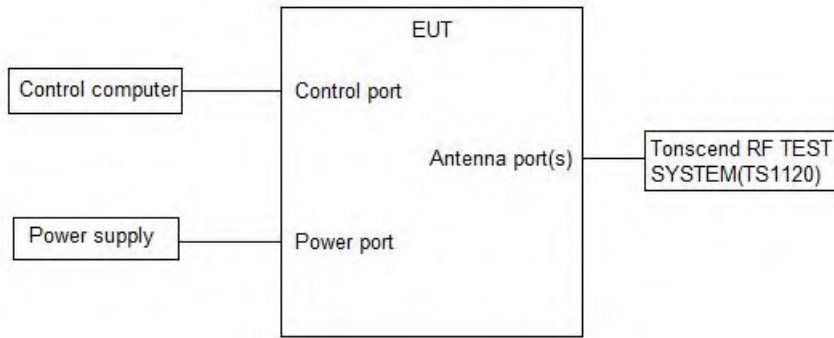
7. Measuring Instrument and Software Used

TS Test System						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9030B	MY56320512	Jul. 10, 2023	Jul. 09, 2024
<input checked="" type="checkbox"/>	Vector Signal Generator	Keysight	N5182B	MY57300334	Nov. 24, 2022	Nov. 23, 2023
<input checked="" type="checkbox"/>	Signal Generator	Keysight	N5171B	MY57280639	Nov. 24, 2022	Nov. 23, 2023
<input checked="" type="checkbox"/>	DC POWER	Keysight	E342A	MY59020356	Jul. 14, 2023	Jul. 13, 2024
<input checked="" type="checkbox"/>	Incubator thermometer	GWS	EL-02JA	21107288	Nov. 03, 2022	Nov. 02, 2023
<input checked="" type="checkbox"/>	Control unit(Power sensor)	Tonscend	JS0806-2	/	Jul. 10, 2023	Jul. 09, 2024
<input checked="" type="checkbox"/>	Wideband radio communication tester	R&S	CMW500	163478	Jul. 11, 2023	Jul. 10, 2024
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9020B	MY60112206	Nov. 24, 2022	Nov. 23, 2023
<input checked="" type="checkbox"/>	Control unit(Power sensor)	Tonscend	JS0806-2	21H8060465	Nov. 25, 2022	Nov. 24, 2023
Software						
Used	Description	Manufacturer	Name		Version	
<input checked="" type="checkbox"/>	Test software	TS+	JS1120-3		V3.3.10	
RSE Test System						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
<input checked="" type="checkbox"/>	EMI Receiver	R&S	ESW	101685	Jul. 12, 2023	Jul. 11, 2024
<input checked="" type="checkbox"/>	Bilog Antenna	Schwarzbeck	VULB 9163	01416	Mar. 21, 2023	Mar. 20, 2024
<input checked="" type="checkbox"/>	Horn Antenna 1	Schwarzbeck	BBHA 9120 D	01673	Nov. 23, 2022	Nov. 22, 2023
<input checked="" type="checkbox"/>	Horn Antenna 2	ETS	3116C	00217677	Sep. 19, 2022	Sep. 18, 2023
<input checked="" type="checkbox"/>	Signal Pre-Amplifier	Tonscend	TAP010180 50	AP21C80612 2	Jul. 10, 2023	Jul. 09, 2024
<input checked="" type="checkbox"/>	Signal Pre-Amplifier	Tonscend	TAP9K3G32	AP20K80610 4	Jul. 10, 2023	Jul. 09, 2024

<input checked="" type="checkbox"/>	Signal Pre-Amplifier	ETS	3116C-PA	00217677	Aug. 24, 2023	Aug. 23, 2024
<input checked="" type="checkbox"/>	3m Fully-anechoic Chamber	ETS	RFD-100	/	Apr. 24, 2021	Apr. 23, 2024
Software						
Used	Description	Manufacturer	Name		Version	
<input checked="" type="checkbox"/>	Test software	TS+	TS+		V3.0.0.4	
Conducted Emission Test For AC Power Port						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
<input checked="" type="checkbox"/>	LISN	R&S	ENV216	102154	Jul. 10, 2023	Jul. 09, 2024
<input checked="" type="checkbox"/>	EMI Receiver	R&S	ESR3	102509	Jul. 12, 2023	Jul. 11, 2024
Software						
Used	Description	Manufacturer	Name		Version	
<input checked="" type="checkbox"/>	Test software	EZ	EZ-EMC		EMEC-3A1	
Other Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
<input checked="" type="checkbox"/>	Temperature & Humidity	Temperature	HTC-1	/	Nov. 25, 2022	Nov. 24, 2023

8. On Time and Duty Cycle

8.1. Block diagram of test setup



8.2. Limits

None; for reporting purposes only

8.3. Procedure

KDB 558074 Zero-Span Spectrum Analyzer Method

8.4. Results

Test Mode	Ant.	Freq. (MHz)	ON Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Factor(dB)
BLE_1M	Ant1	2402	0.42	2.78	15.11	8.21
		2440	0.42	2.78	15.11	8.21
		2480	0.42	2.78	15.11	8.21
BLE_2M	Ant1	2402	0.21	2.57	8.17	10.88
		2440	0.21	2.57	8.17	10.88
		2480	0.21	2.57	8.17	10.88

Note: Duty Cycle Correction Factor = $10\log(1/x)$.

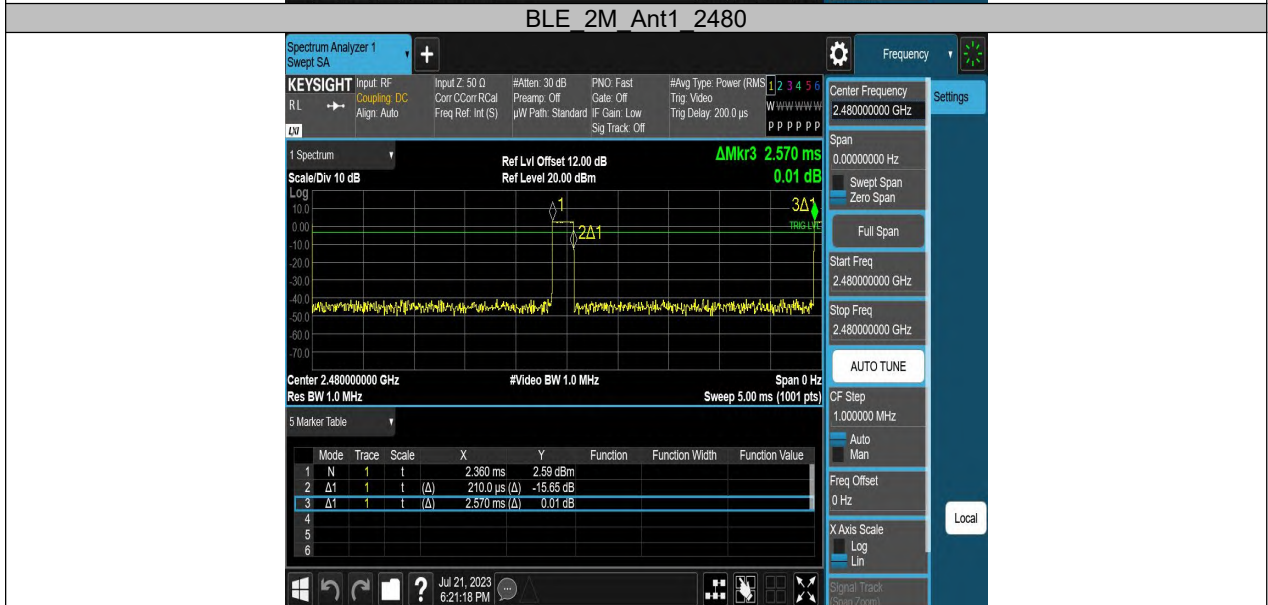
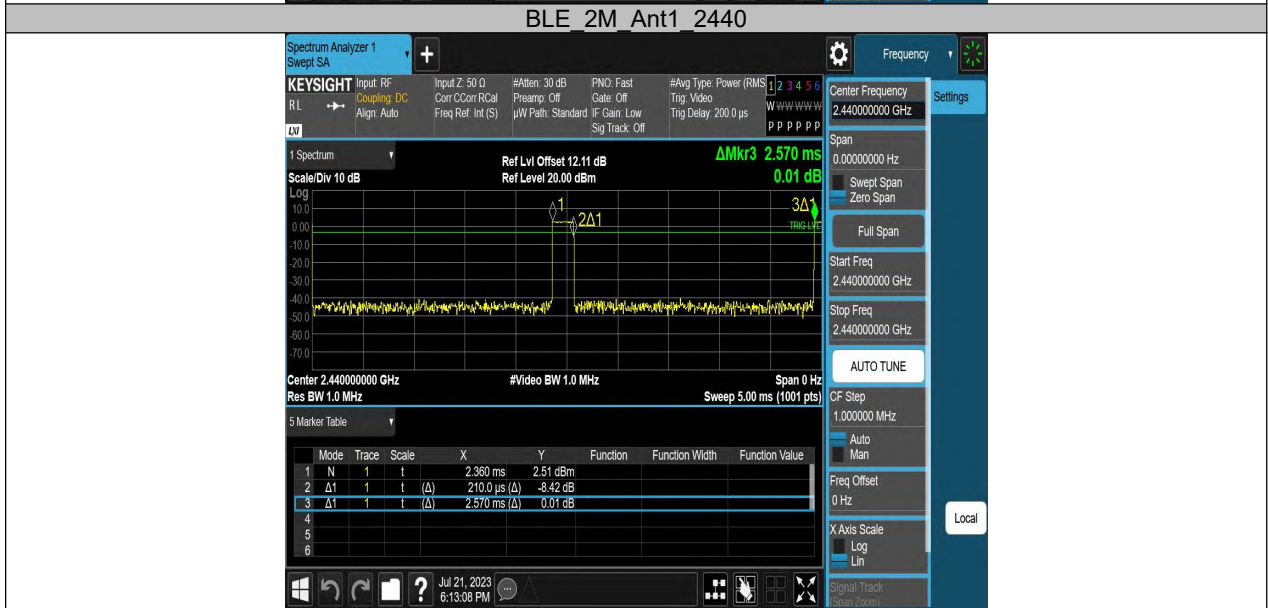
Where: x is Duty Cycle(Linear)

Where: T is On Time (transmit duration)

If that calculated VBW is not available on the analyzer, then the next higher value should be used.

8.5. Original test data





9. 6 dB DTS Bandwidth and 99 % Bandwidth

9.1. Block diagram of test setup

Same as section 8.1

9.2. Limits

CFR 47FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(a)(2)	6 dB Bandwidth	≥ 500 kHz	2400-2483.5
--	99 % Occupied Bandwidth	For reporting purposes only.	2400-2483.5

9.3. Test Procedure

Connect the UUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 6 dB Bandwidth :100 kHz For 99 % Occupied Bandwidth :1 % to 5 % of the occupied bandwidth
VBW	For 6 dB Bandwidth : $\geq 3 \times$ RBW For 99 % Occupied Bandwidth : $\geq 3 \times$ RBW
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB/99 % relative to the maximum level measured in the fundamental emission.

9.4. Results

Test Mode	Ant.	Freq. (MHz)	DTS BW (MHz)	FL (MHz)	FH (MHz)	Limit (MHz)	Verdict
BLE_1M	Ant1	2402	0.600	2401.656	2402.256	0.5	PASS
		2440	0.664	2439.596	2440.260	0.5	PASS
		2480	0.676	2479.608	2480.284	0.5	PASS
BLE_2M	Ant1	2402	1.352	2401.268	2402.620	0.5	PASS
		2440	1.108	2439.404	2440.512	0.5	PASS
		2480	0.888	2479.484	2480.372	0.5	PASS

TestMode	Antenna	Frequency(MHz)	OCB (MHz)	FL(MHz)	FH(MHz)	Limit(MHz)	Verdict
BLE_1M	Ant1	2402	1.0317	2401.4307	2402.4624	---	---
		2440	1.0286	2439.4349	2440.4635	---	---
		2480	1.0331	2479.4302	2480.4633	---	---
BLE_2M	Ant1	2402	2.0611	2400.9221	2402.9832	---	---
		2440	2.0537	2438.9385	2440.9922	---	---
		2480	2.0485	2478.9304	2480.9789	---	---

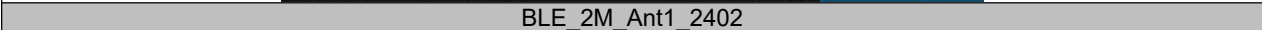
9.5. Original test data

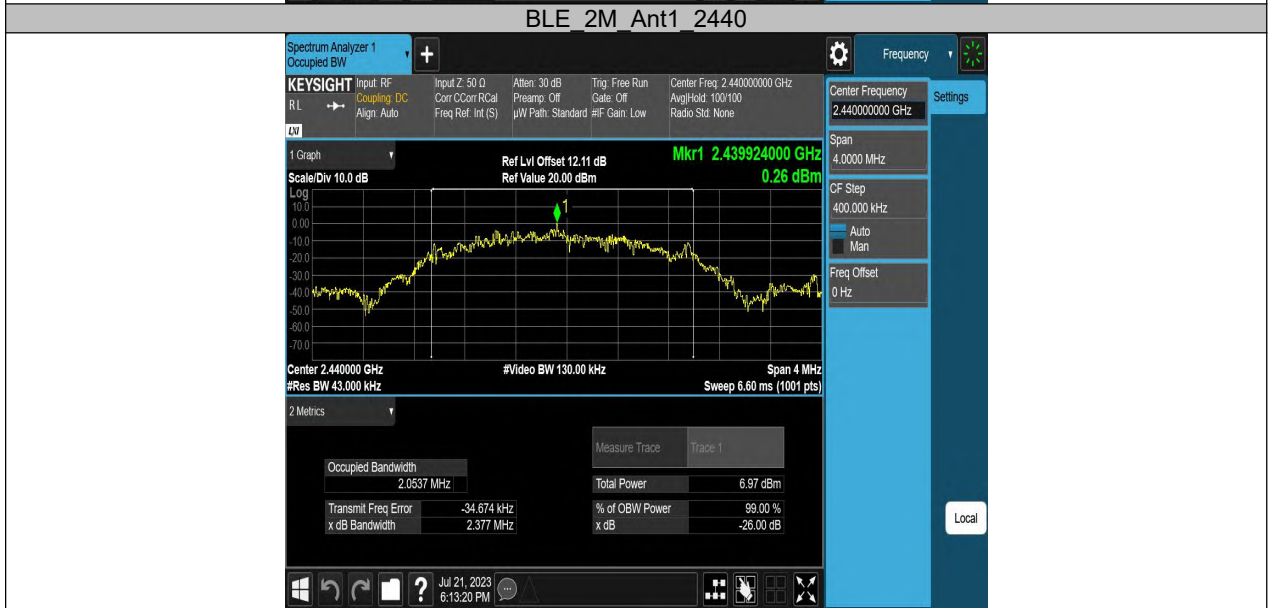
6 dB bandwidth:





99% bandwidth





10. Peak Conducted Output Power

10.1. Block diagram of test setup

Same as section 8.1

10.2. Limits

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(b)(3)	Peak Output Power	1 watt or 30 dBm	2400 - 2483.5

10.3. Test Procedure

Connect EUT's antenna output to spectrum analyzer by RF cable.

99% Bandwidth set the spectrum analyzer as follows:

RBW:	30 kHz
VBW:	100 kHz
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

6 dB Bandwidth set the spectrum analyzer as follows:

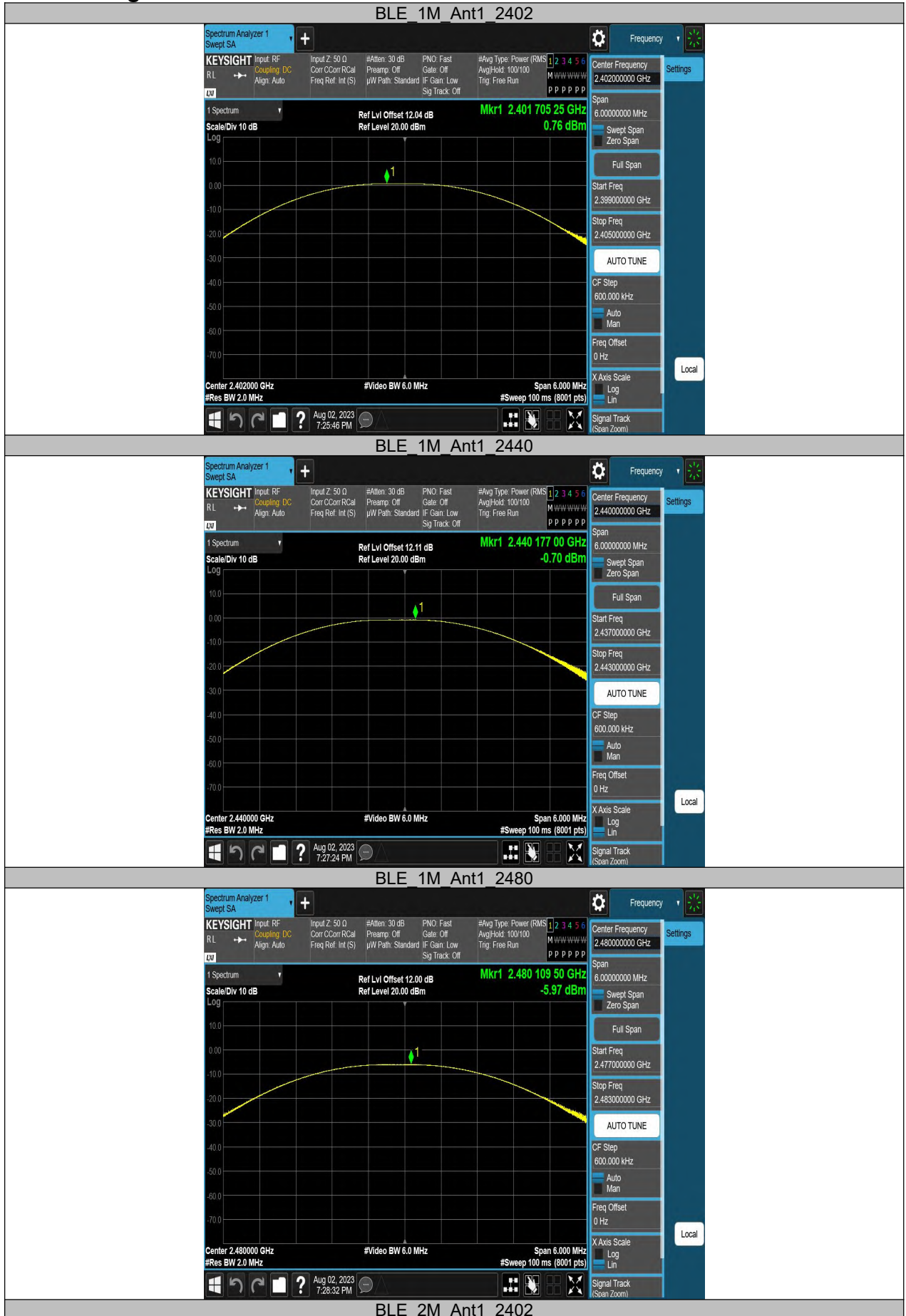
RBW:	100 kHz
VBW:	300 kHz
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

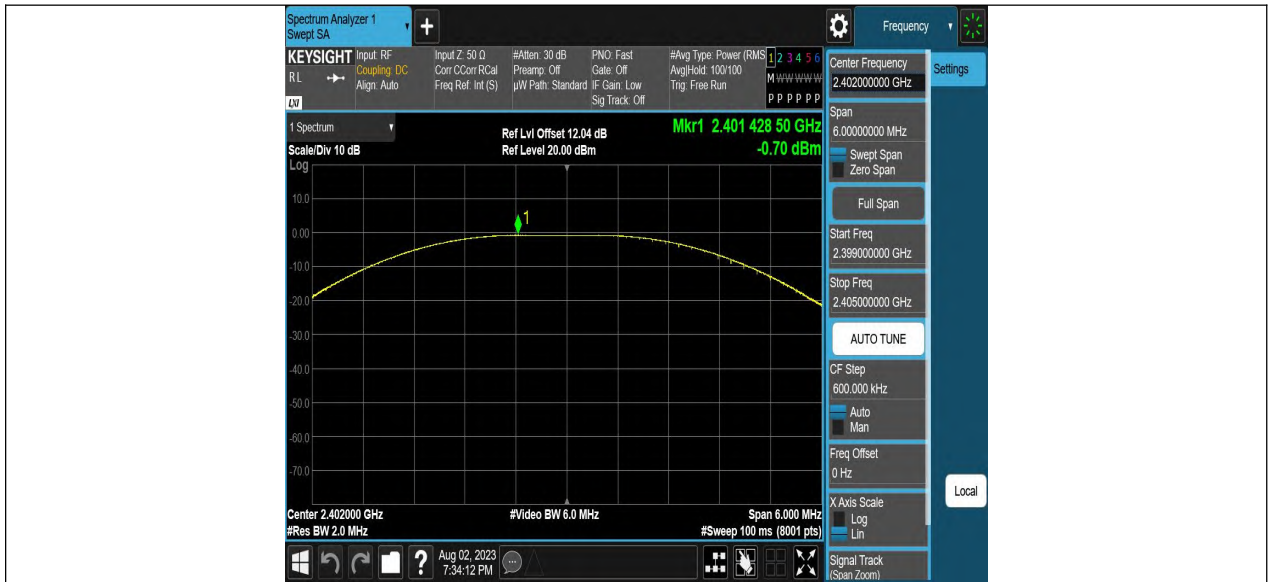
Allow the trace to stabilize, measure the 6 dB and 99% bandwidth of signal.

10.4. Results

Test Mode	Ant.	Freq (MHz)	Conducted Peak Power (dBm)	Conducted Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Verdict
BLE_1M	Ant1	2402	0.76	≤30	2.80	≤36	PASS
		2440	-0.70	≤30	1.34	≤36	PASS
		2480	-5.97	≤30	-3.93	≤36	PASS
BLE_2M	Ant1	2402	-0.71	≤30	1.33	≤36	PASS
		2440	-0.19	≤30	1.85	≤36	PASS
		2480	-6.06	≤30	-4.02	≤36	PASS

10.5. Original test data





11. Power Spectral Density

11.1. Block diagram of test setup

Same as section 8.1

11.2. Limits

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC §15.247 (e)	Power Spectral Density	8 dBm in any 3 kHz band	2400 - 2483.5

11.3. Test Procedure

Connect the UUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

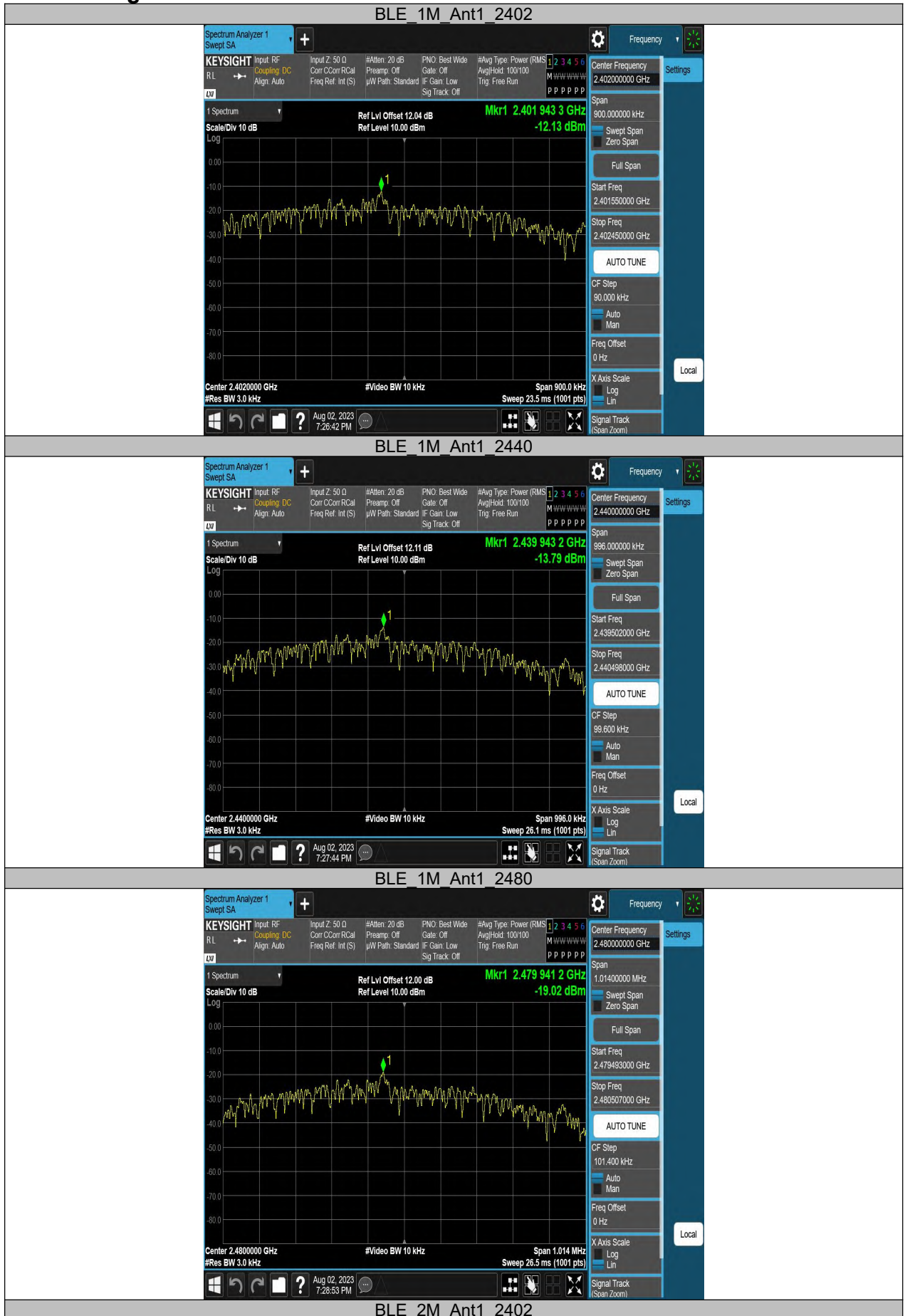
Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

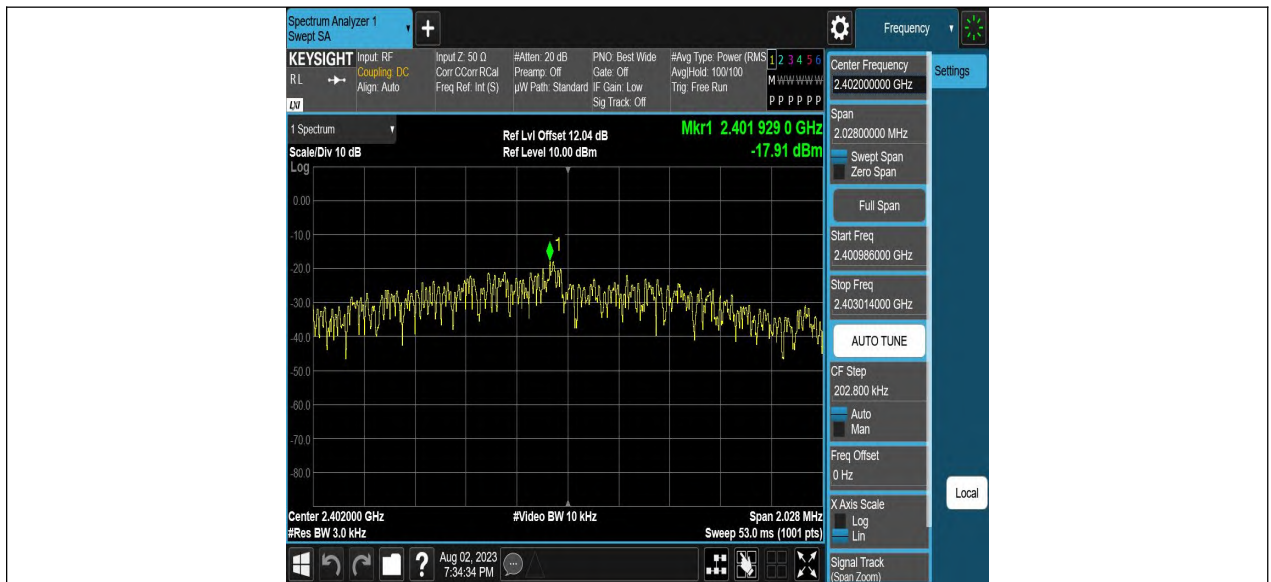
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

11.4. Results

Test Mode	Ant.	Freq. (MHz)	Result (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
BLE_1M	Ant1	2402	-12.13	≤ 8.00	PASS
		2440	-13.79	≤ 8.00	PASS
		2480	-19.02	≤ 8.00	PASS
BLE_2M	Ant1	2402	-17.91	≤ 8.00	PASS
		2440	-17.35	≤ 8.00	PASS
		2480	-23.26	≤ 8.00	PASS

11.5. Original test data





12. Conducted Bandedge and Spurious Emissions

12.1. Block diagram of test setup

Same as section 8.1

12.2. Limits

CFR 47 FCC Part15 (15.247) Subpart C		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d)	Conducted Band edge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

12.3. Test Procedure

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
Span	$\geq 1.5 \times \text{DTS bandwidth}$
Trace	Max hold
Sweep time	Auto couple

Connect the UUT to the spectrum analyzer and use the following settings:

Use the peak marker function to determine the maximum peak power level to establish the reference level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span/RBW}$
Trace	Max hold
Sweep time	Auto couple

Use the peak marker function to determine the maximum amplitude level.

12.4. Results

Band edge

Test Mode	Ant.	Ch Name	Freq. (MHz)	Ref Level (dBm)	Result (dBm)	Limit (dBm)	Verdict
BLE_1M	Ant1	Low	2402	1.97	-44.23	≤ -18.03	PASS
		High	2480	2.39	-43.89	≤ -17.61	PASS
BLE_2M	Ant1	Low	2402	0.70	-33.14	≤ -19.3	PASS
		High	2480	-1.41	-45.97	≤ -21.41	PASS

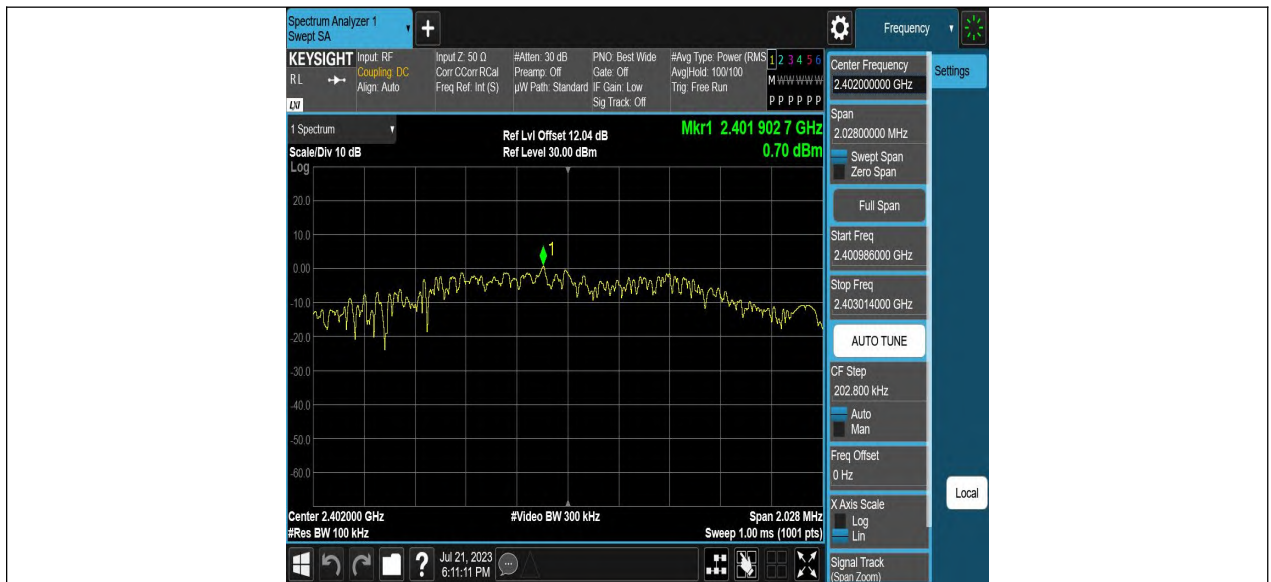
Spurious Emissions

Test Mode	Ant.	Freq. (MHz)	Freq Range (MHz)	Ref Level (dBm)	Result (dBm)	Limit (dBm)	Verdict
BLE_1M	Ant1	2402	30~1000	1.97	-58.76	≤-18.03	PASS
			1000~26500	1.97	-35.92	≤-18.03	PASS
		2440	30~1000	2.34	-60.16	≤-17.66	PASS
			1000~26500	2.34	-35.2	≤-17.66	PASS
		2480	30~1000	2.39	-61.05	≤-17.61	PASS
			1000~26500	2.39	-39.09	≤-17.61	PASS
BLE_2M	Ant1	2402	30~1000	0.70	-61.18	≤-19.3	PASS
			1000~26500	0.70	-38.81	≤-19.3	PASS
		2440	30~1000	1.97	-61.35	≤-18.03	PASS
			1000~26500	1.97	-37.7	≤-18.03	PASS
		2480	30~1000	-1.41	-61.63	≤-21.41	PASS
			1000~26500	-1.41	-49.94	≤-21.41	PASS

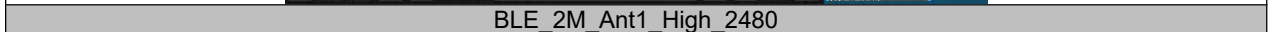
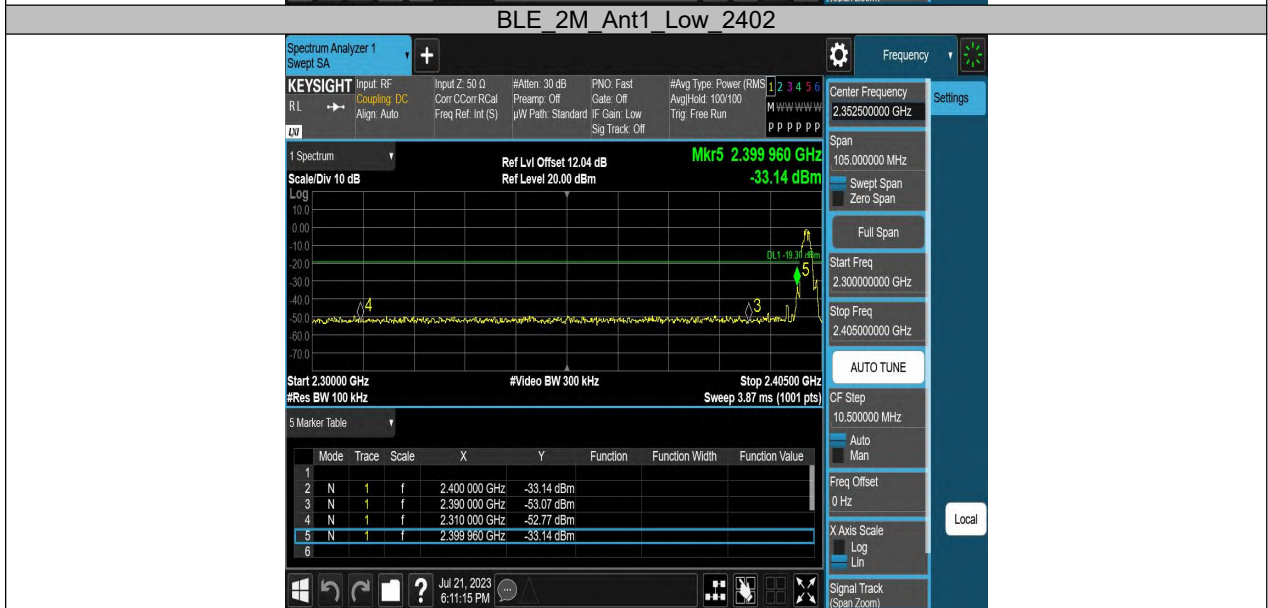
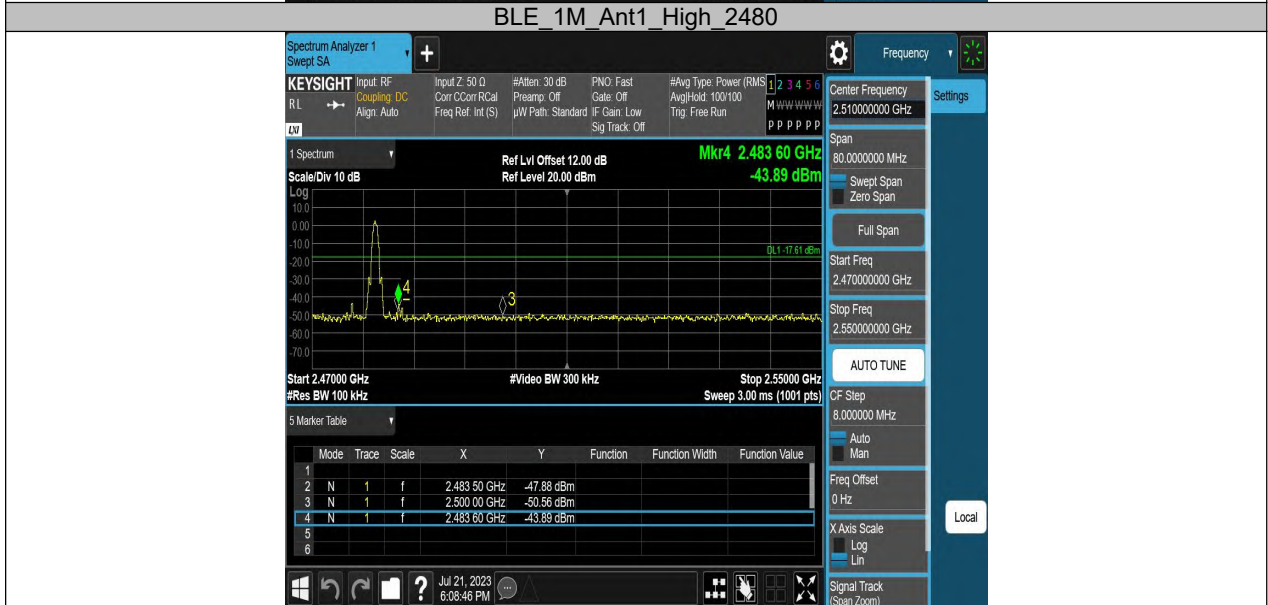
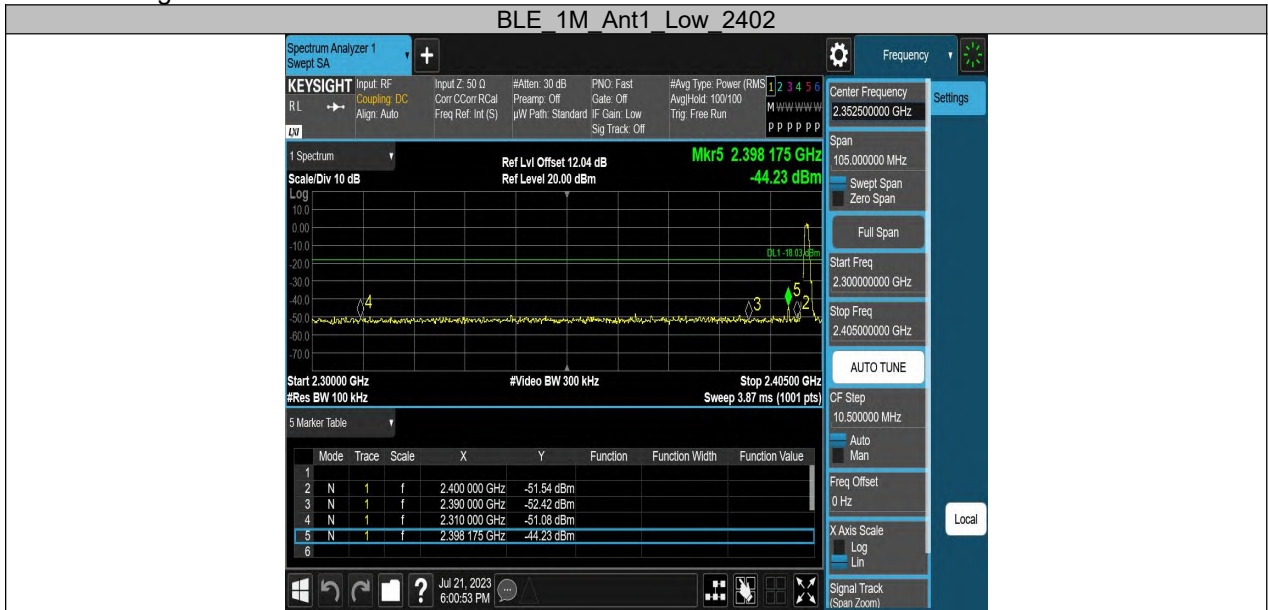
12.5. Original test data

Reference level



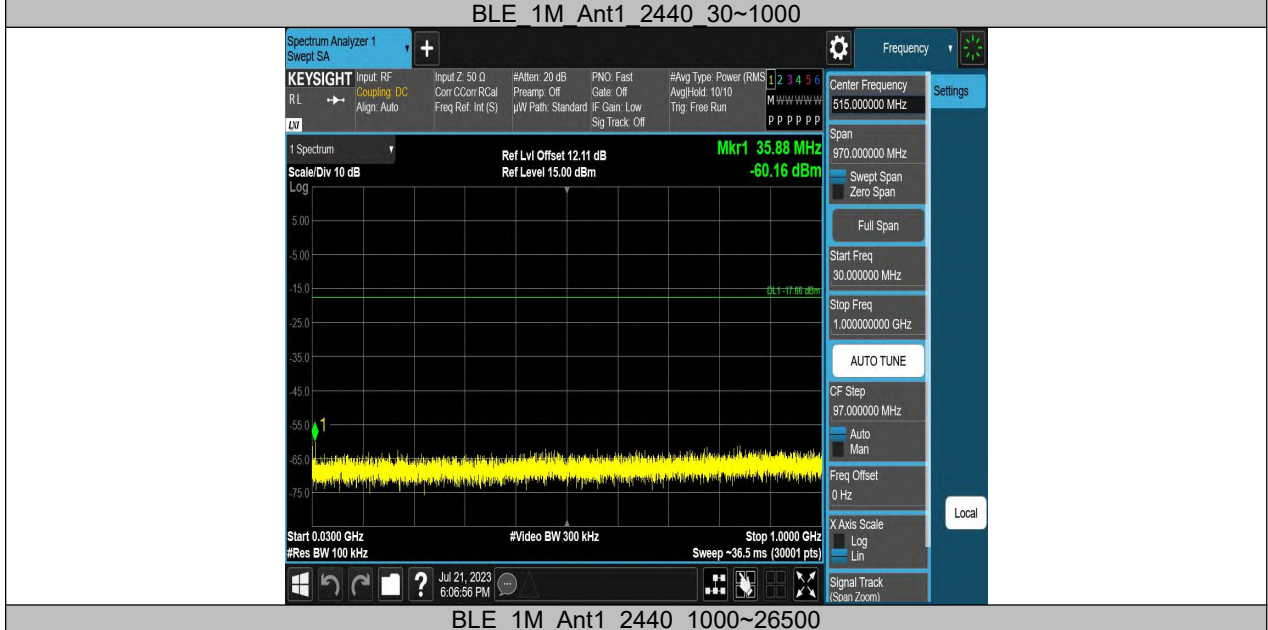
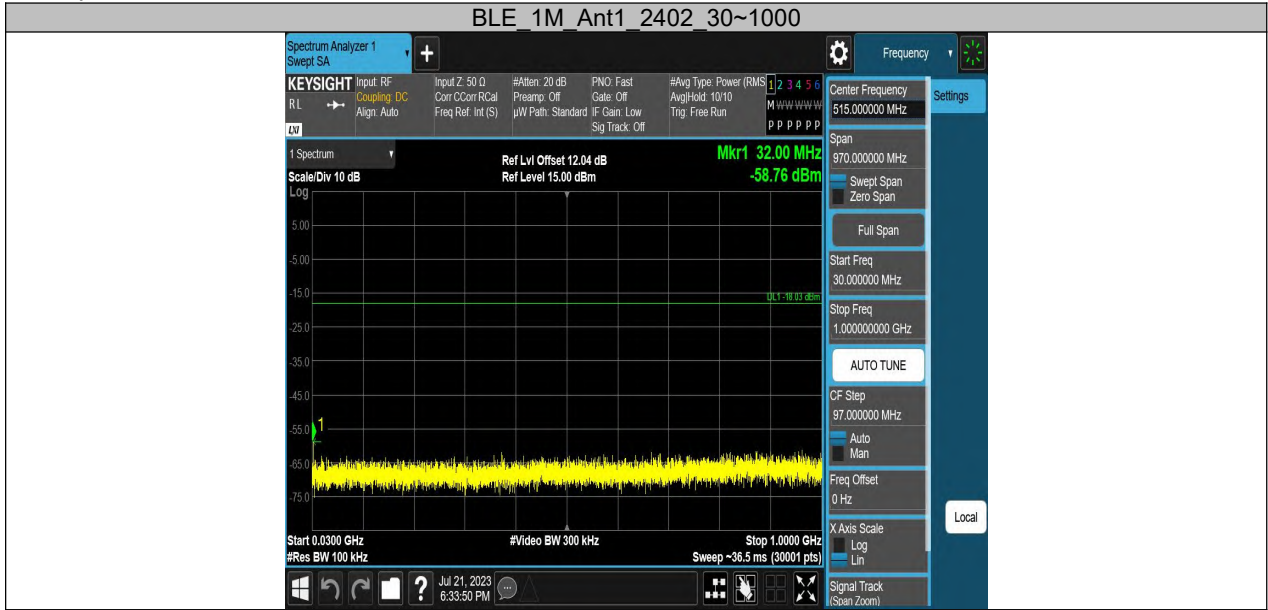


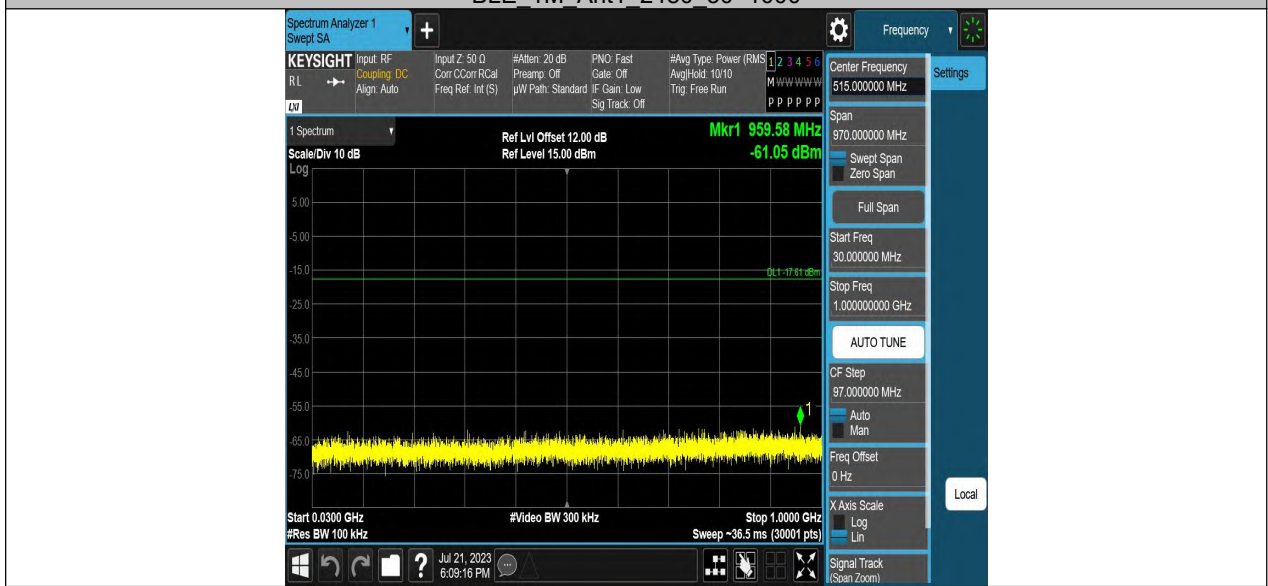
Band edge:

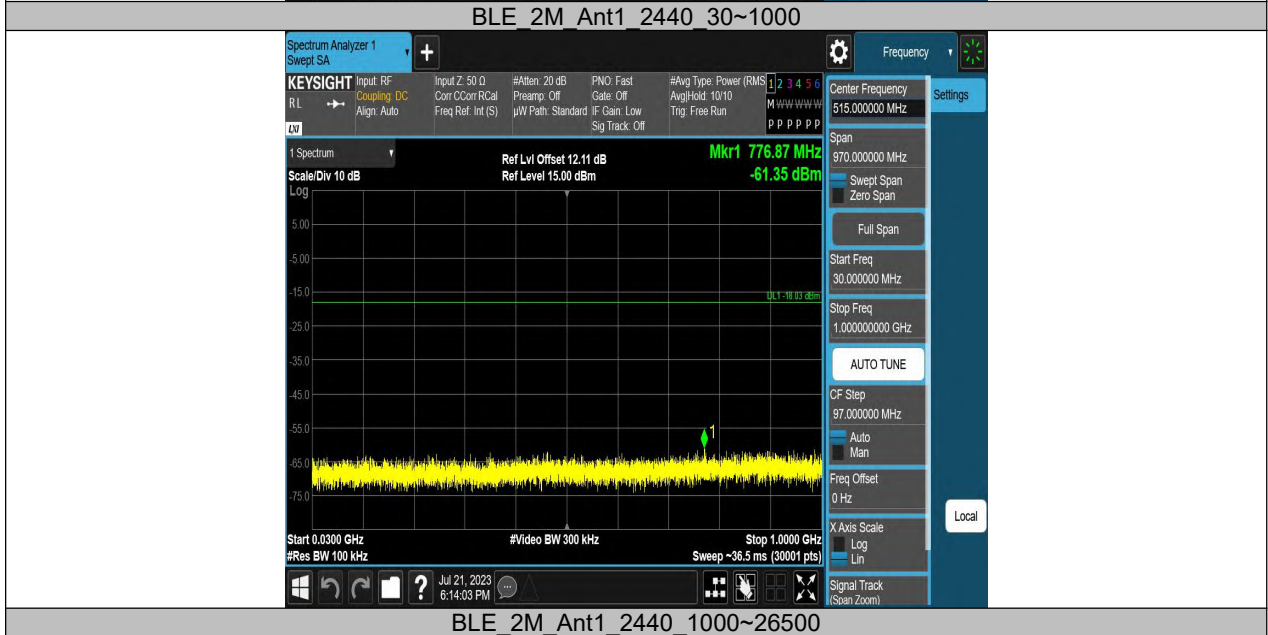
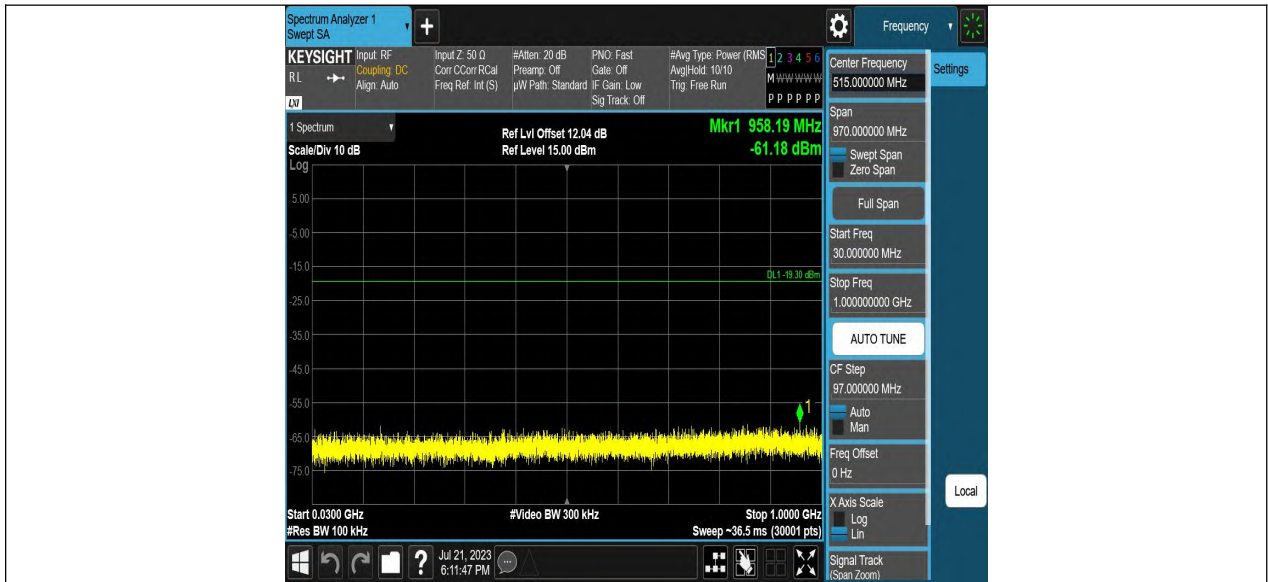


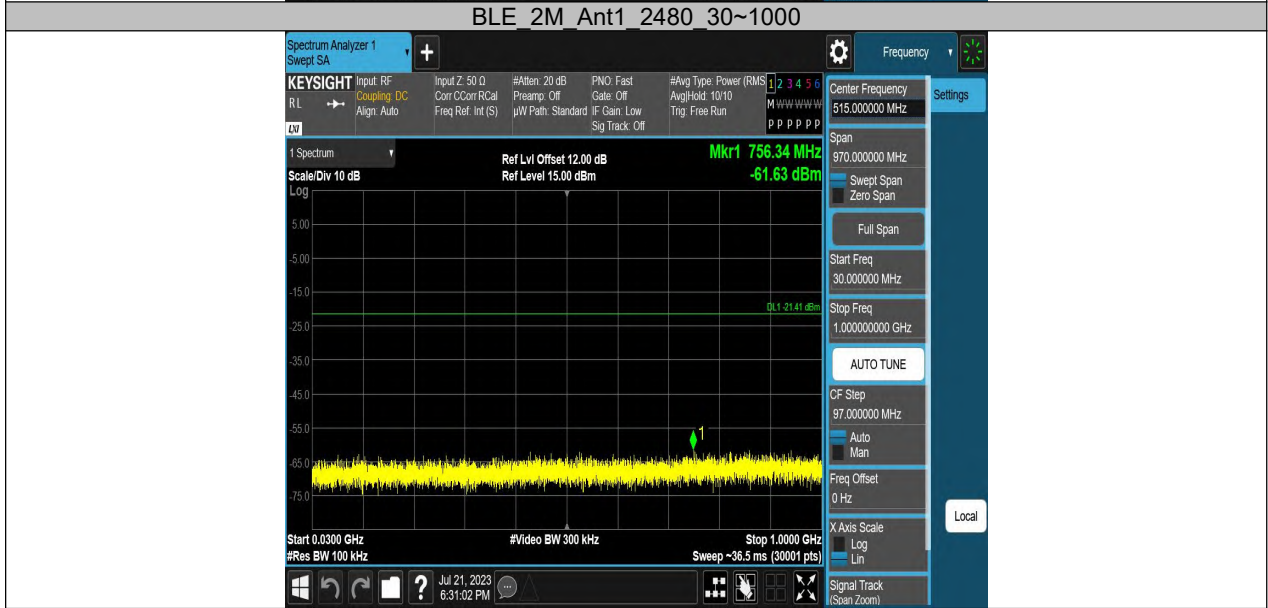


Spurious Emissions:





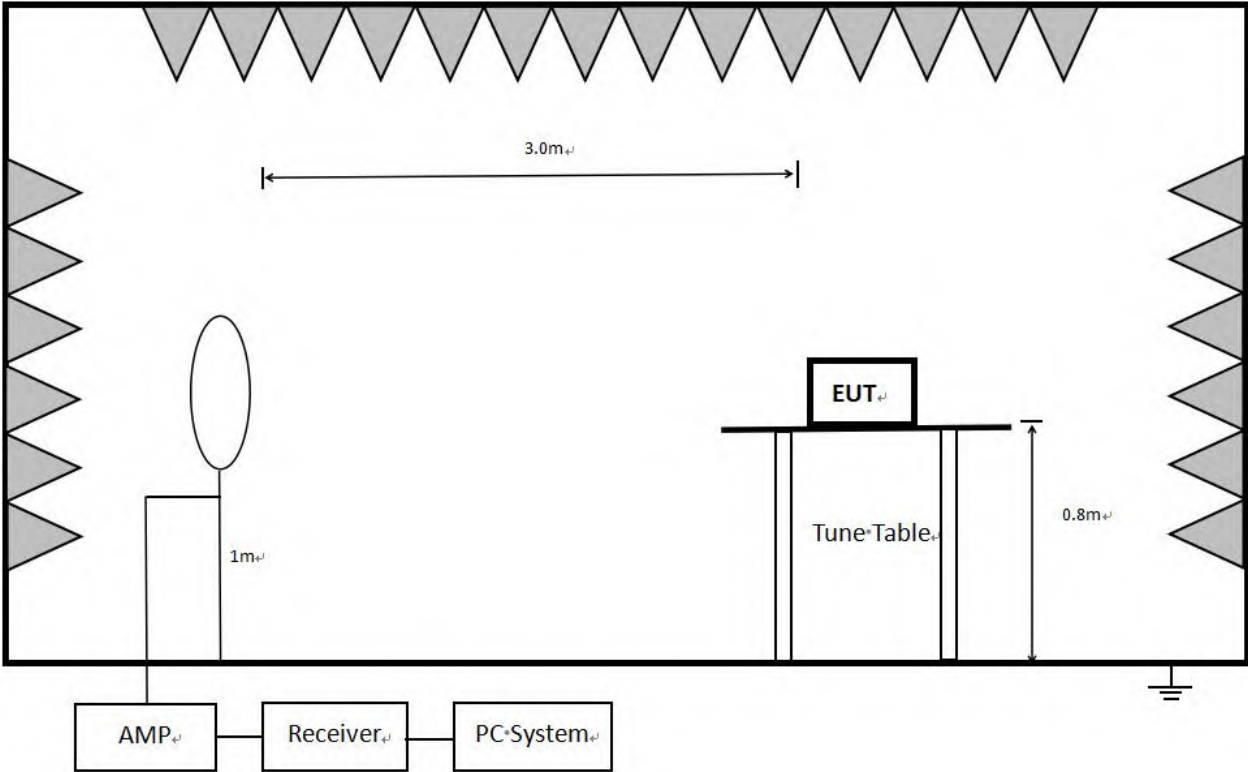




13. Radiated Emission

13.1. Block diagram of test setup

In 3 m Anechoic Chamber, test setup diagram for 9 kHz - 30 MHz:



In 3 m Anechoic Chamber, test setup diagram for 30 MHz - 1 GHz:

