

Nello Technology (Shenzhen) Co., Ltd

RF TEST REPORT

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FCC Part 15.247 RF report

Model:

88-83007

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FCC ID: 2A25G-268036

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2020): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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TEST REPORT

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Revision History

Report No.	Version	Description	Issued Date
220401645SHA-001	Rev. 01	Initial issue of report	May 20, 2022

Measurement result summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	RSS-247 Issue 2 Clause 5.2	Pass
Maximum conducted output power and e.i.r.p.	15.247(b)(3)	RSS-247 Issue 2 Clause 5.4	Pass
Power spectrum density	15.247(e)	RSS-247 Issue 2 Clause 5.2	Pass
Emission outside the frequency band	15.247(d)	RSS-247 Issue 2 Clause 5.5	Pass
Radiated Emissions in restricted frequency bands	15.247(d), 15.205&15.209	RSS-Gen Issue 5 Clause 8.9&8.10	Pass
Power line conducted emission	15.207(a)	RSS-Gen Issue 5 Clause 8.8	Pass
Occupied bandwidth	-	RSS-Gen Issue 5 Clause 6.6	Tested
Antenna requirement	15.203	-	Pass

Notes: 1: NA =Not Applicable

2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

3: Additions, Deviations and Exclusions from Standards: None.

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	WIFI HD Action camera
Type/Model:	88-83007
Description of EUT:	EUT is a WIFI HD Action camera and has only one model. EUT supports WIFI function.
Rating:	DC 5V
EUT type:	<input checked="" type="checkbox"/> Table top <input type="checkbox"/> Floor standing
Software Version:	20220425V1.0
Hardware Version:	D802-4247F-V1
Sample No.:	0220425-07-001
Sample received date:	Apr 25, 2022
Date of test:	Apr 28~May 6, 2022

1.2 Technical Specification

Frequency Range:	2412MHz ~ 2462MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20
Type of Modulation:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT20: OFDM (64-QAM, 16-QAM, QPSK, BPSK)
Channel Number:	11 Channels for 802.11b, 802.11g and 802.11n(HT20)
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS7
Channel Separation:	5 MHz

1.3 Antenna information

Antenna No.	Model	Antenna type	Antenna Gain	Note
1	/	PCB antenna	2.5dBi	

Mode	Tx/Rx Function	Beamforming function	CDD function
802.11b	1Tx/1Rx	NO	NO
802.11g	1Tx/1Rx	NO	NO
802.11n(HT20)	1Tx/1Rx	NO	NO

TEST REPORT**1.4 Description of Test Facility**

Name:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address:	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
FCC Designation Number	CN5024

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2020)
ANSI C63.10 (2013)
KDB 558074 D01(v05r02)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the continuously transmission was applied by following software.

Software name	Manufacturer	Version	Supplied by
SSV6030P	/	/	Manufacturer

The lowest, middle and highest channel were tested as representatives.

Frequency Band (MHz)	Mode	Lowest (MHz)	Middle (MHz)	Highest (MHz)
2400-2483.5	802.11b	2412	2437	2462
	802.11g	2412	2437	2462
	802.11n(HT20)	2412	2437	2462
	/	/	/	/

Data rate VS Power:

The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases. After this pre-scan, we choose the following table of the data rate as the worst case.

Frequency Band (MHz)	Mode	Worst case data rate
2400-2483.5	802.11b	1Mbps
	802.11g	6Mbps
	802.11n(HT20)	MCS0
	/	/

The EUT will use two types antenna, and there have the following test mode:

Radiated test mode:

Mode 1: EUT transmitted signal with internal antenna;

Conducted test mode:

Mode 2: EUT transmitted signal from PCBA RF port connected to SPA directly;

We have verified all test modes, and choose the worst mode 1 for radiated test and mode 2 for conducted test as representatively to list the results in this report.

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	EZ	Farad	/
Radiated emission	E3	AUDIX	/

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Power supply	AK06WG	100-240V AC, 50/60Hz

2.5 Test environment condition:

Test items	Temperature	Humidity
Minimum 6dB Bandwidth	25°C	52% RH
Maximum conducted output power and e.i.r.p.		
Power spectrum density		
Emission outside the frequency band		
Occupied bandwidth		
Radiated Emissions in restricted frequency bands	23°C	52% RH
Power line conducted emission	22°C	53% RH

2.6 Instrument list

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	R&S	NRVS	100444	2021-06-21	2022-06-20
2	Power Sensor	R&S	NRV-Z81	100458	2021-06-21	2022-06-20
3	Power Sensor	R&S	NRV-Z32	10057	2021-06-21	2022-06-20
4	Test Software	Tonscend	JS1120-2	/	N/A	N/A
5	RF Control Unit	Tonscend	JS0806-2	N/A	2021-11-16	2022-11-15
6	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2021-11-16	2022-11-15
7	DC Power Supply	Agilent	E3642A	N/A	2021-11-25	2022-11-24
8	EMI Test Software	AUDIX	E3	/	N/A	N/A
9	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2021-06-21	2022-06-20
10	Positioning Controller	MF	MF7082	MF78020803	2021-06-21	2022-06-20
11	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2021-07-25	2024-07-24
12	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2021-07-25	2024-07-24
13	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2021-07-01	2024-06-30
14	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2020-09-20	2023-09-19
15	Broadband Preamplifier	SCHWARZBECK	BBV9745	9719-025	2021-06-21	2022-06-20
16	EMI Test Receiver	R&S	ESR 7	101181	2021-06-21	2022-06-20
17	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2021-11-16	2022-11-15
18	Broadband Preamplifier	/	BP-01M18G	P190501	2021-06-21	2022-06-20
19	6dB Attenuator	/	100W/6dB	1172040	2021-06-21	2022-06-20
20	3dB Attenuator	/	2N-3dB	/	2021-11-16	2022-11-15
21	EMI Test Receiver	R&S	ESPI	101840	2021-06-21	2022-06-20
22	Artificial Mains	R&S	ENV216	101288	2021-06-21	2022-06-20
23	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2021-06-21	2022-06-20
24	EMI Test Software	Farad	EZ	/	N/A	N/A

2.7 Measurement uncertainty

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

Test item	Measurement uncertainty
Maximum peak output power	0.61dB
Radiated Emissions in restricted frequency bands below 1GHz	30-1000MHz: 3.10dB
Radiated Emissions in restricted frequency bands above 1GHz	1-18GHz: 3.80dB 18-40GHz: 3.90dB
Emission outside the frequency band	1.22dB
Occupied Channel Bandwidth	0.9 x 10 ⁻⁴
Power line conducted emission	1.63dB

3 Minimum 6dB bandwidth

Test result: Pass

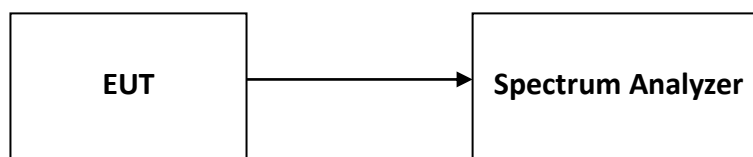
3.1 Limit

For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.2 Measurement Procedure

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) 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 relative to the maximum level measured in the fundamental emission.

3.3 Test Configuration



3.4 Test Results of Minimum 6dB bandwidth

Please refer to Appendix A

4 Maximum conducted output power and e.i.r.p.

Test result: Pass

4.1 Limit

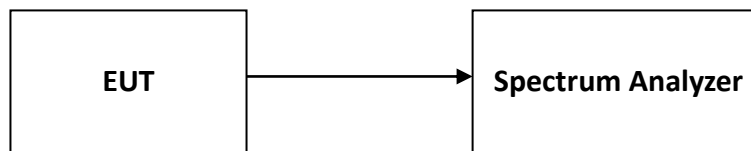
For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 W. (The e.i.r.p. shall not exceed 4 W)

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 30dBm and 30+ (6 –antenna gain-beam forming gain).

4.2 Measurement Procedure

The EUT was tested according to DTS test procedure of “KDB558074 D01v05r02 15.247 Meas Guidance” (clause 8.3.1.2) for compliance requirements.

4.3 Test Configuration



4.4 Test Results of Maximum conducted output power

Please refer to Appendix A

5 Power spectrum density

Test result: Pass

5.1 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

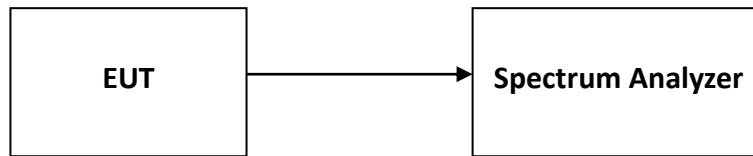
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 8dBm/MHz and $8 + (6 - \text{antenna gain} - \text{beam forming gain})$.

5.2 Measurement Procedure

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq [3 \times \text{RBW}]$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

5.3 Test Configuration



5.4 Test Results of Power spectrum density

Please refer to Appendix A

6 Emission outside the frequency band

Test result: Pass

6.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

6.2 Measurement Procedure

Reference level measurement

Establish a reference level by using the following procedure:

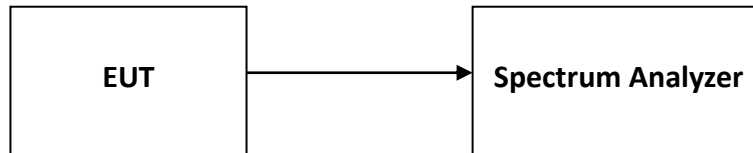
- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to ≥ 1.5 times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW $\geq 3 \times$ RBW.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

Emission level measurement

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW $\geq 3 \times$ RBW.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

6.3 Test Configuration



6.4 The results of Emission outside the frequency band

Please refer to Appendix A

7 Radiated Emissions in restricted frequency bands

Test result: Pass

7.1 Limit

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

Frequencies (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

7.2 Measurement Procedure

For Radiated emission below 30MHz:

- The EUT was placed on the top of a rotating table 0.8 meters (0.1 meters for floor-standing device) above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, the lowest height of the magnetic antenna was 1 m above the ground.
- Both X and Y axes of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

TEST REPORT**For Radiated emission above 30MHz:**

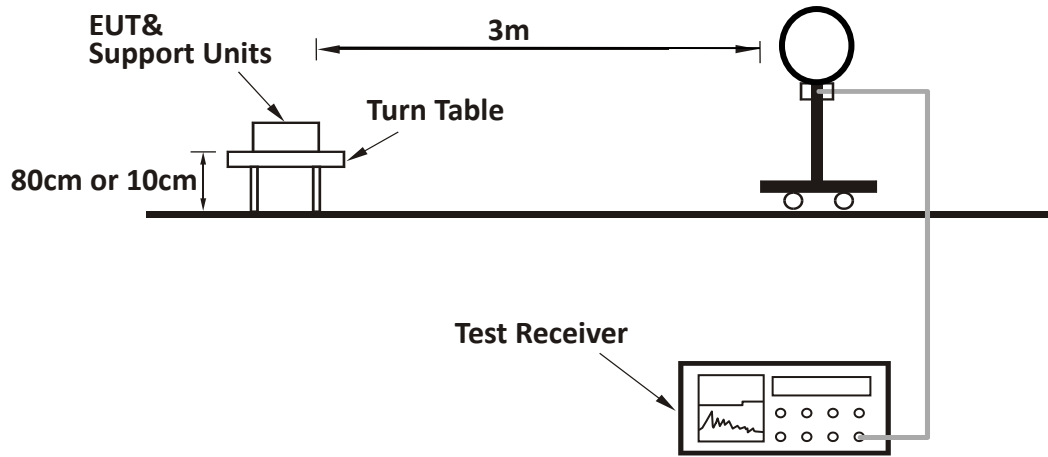
- a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) or 0.1 meters (for floor-standing device) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

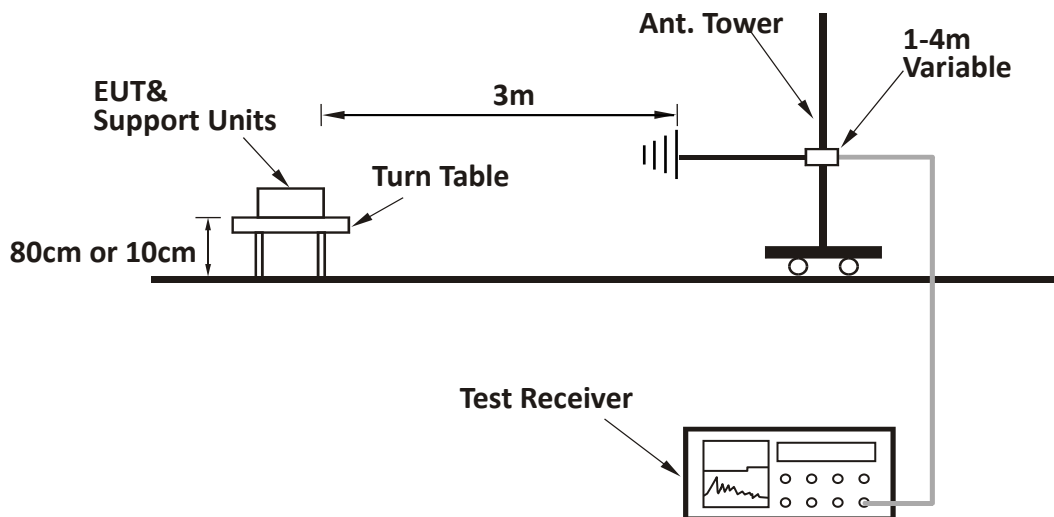
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 3 x RBW (Duty cycle \geq 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported

7.3 Test Configuration

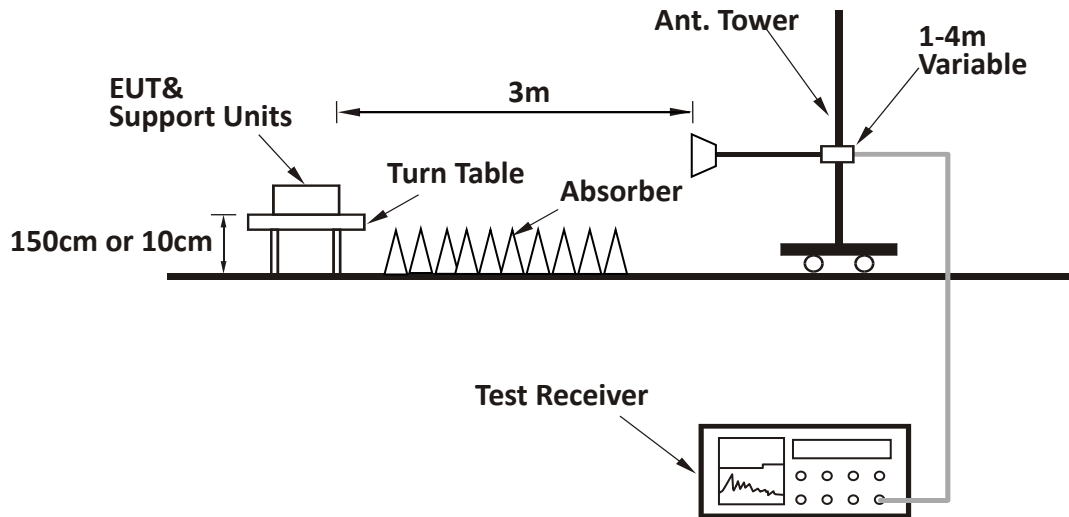
For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



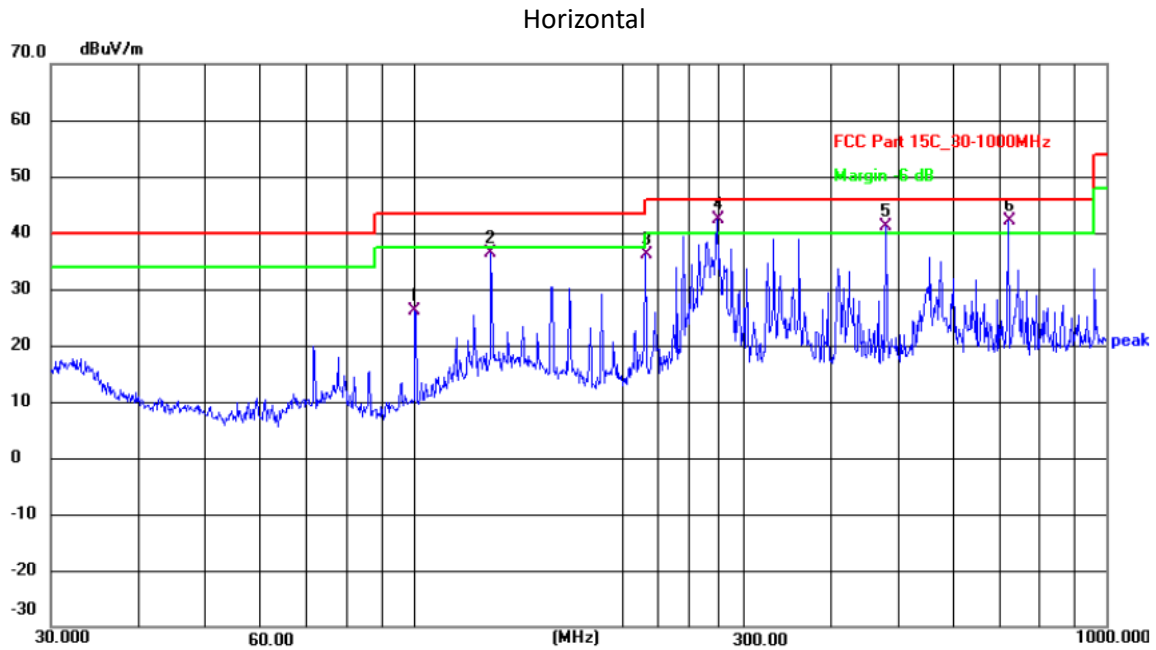
For Radiated emission above 1GHz:



7.4 Test Results of Radiated Emissions

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

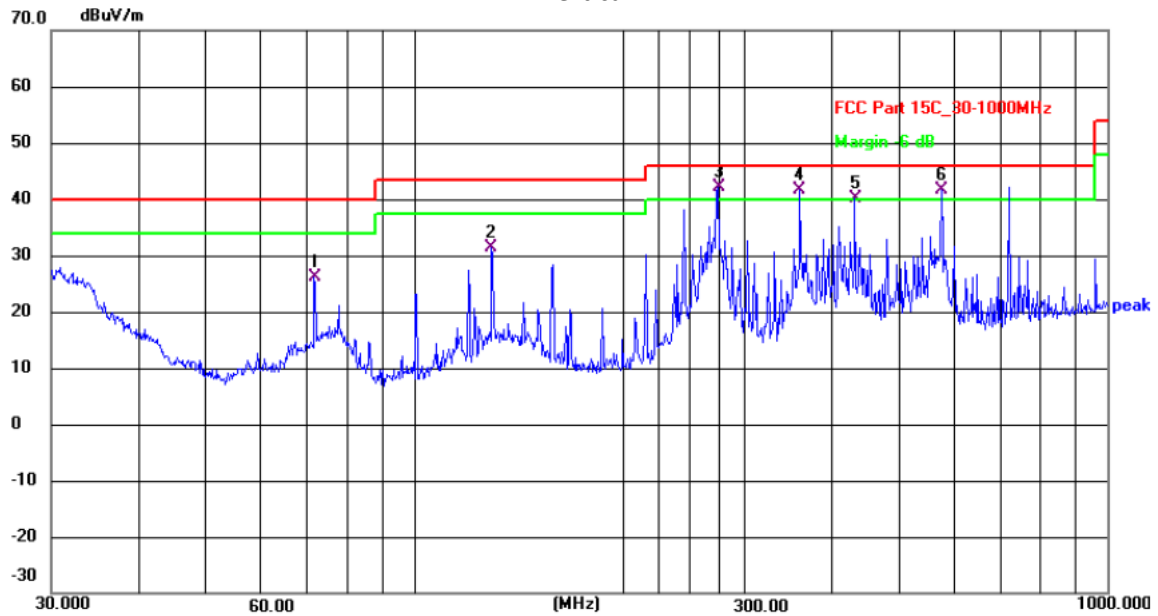
The worst waveform and test data from 30MHz to 1000MHz is listed as below:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	100.5806	44.43	-18.23	26.20	43.50	-17.30	QP	P	
2	129.4677	56.79	-20.53	36.26	43.50	-7.24	QP	P	
3	216.0240	53.22	-16.98	36.24	46.00	-9.76	QP	P	
4	274.1939	57.71	-15.37	42.34	46.00	-3.66	QP	P	
5	480.5276	55.23	-14.18	41.05	46.00	-4.95	QP	P	
6	721.7259	52.82	-10.58	42.24	46.00	-3.76	QP	P	

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Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	71.8320	45.68	-19.54	26.14	40.00	-13.86	QP	P	
2	129.4677	51.85	-20.53	31.32	43.50	-12.18	QP	P	
3	274.1939	57.56	-15.37	42.19	46.00	-3.81	QP	P	
4	360.4476	56.51	-14.81	41.70	46.00	-4.30	QP	P	
5	432.5457	54.56	-14.44	40.12	46.00	-5.88	QP	P	
6	576.6443	52.38	-10.83	41.55	46.00	-4.45	QP	P	

Note: The worst test result (30MHz to 1GHz) of 802.11b channel L (2412MHz) was chosen to list in the report as representative.

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Test result above 1GHz:

Emissions in Restricted Bands

Test Result

TestMode	Channel	Detector	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
11B	2412	AV	2310.000	-48.92	≤-41.20	46.28	≤54	PASS
		AV	2387.360	-48.33	≤-41.20	46.87	≤54	PASS
		AV	2390.000	-48.4	≤-41.20	46.80	≤54	PASS
		Peak	2310.000	-38.49	≤-21.20	56.71	≤74	PASS
		Peak	2343.030	-35.42	≤-21.20	59.78	≤74	PASS
	Peak	2390.000	-38.15	≤-21.20	57.05	≤74	PASS	
	2462	AV	2483.500	-48.1	≤-41.20	47.10	≤54	PASS
		AV	2498.630	-47.9	≤-41.20	47.30	≤54	PASS
		AV	2500.000	-48.02	≤-41.20	47.18	≤54	PASS
		Peak	2483.500	-37.53	≤-21.20	57.67	≤74	PASS
Peak		2496.650	-35.87	≤-21.20	59.33	≤74	PASS	
Peak	2500.000	-37.49	≤-21.20	57.71	≤74	PASS		
11G	2412	AV	2310.000	-48.61	≤-41.20	46.59	≤54	PASS
		AV	2388.530	-47.88	≤-41.20	47.32	≤54	PASS
		AV	2390.000	-47.96	≤-41.20	47.24	≤54	PASS
		Peak	2310.000	-37.88	≤-21.20	57.32	≤74	PASS
		Peak	2382.030	-36.22	≤-21.20	58.98	≤74	PASS
	Peak	2390.000	-37.21	≤-21.20	57.99	≤74	PASS	
	2462	AV	2483.500	-47.6	≤-41.20	47.60	≤54	PASS
		AV	2489.390	-47.26	≤-41.20	47.94	≤54	PASS
		AV	2500.000	-47.57	≤-41.20	47.63	≤54	PASS
		Peak	2483.500	-37.86	≤-21.20	57.34	≤74	PASS
Peak		2487.630	-35.84	≤-21.20	59.36	≤74	PASS	
Peak	2500.000	-36.82	≤-21.20	58.38	≤74	PASS		
11N20 SISO	2412	AV	2310.000	-48.56	≤-41.20	46.64	≤54	PASS
		AV	2375.530	-47.8	≤-41.20	47.40	≤54	PASS
		AV	2390.000	-47.91	≤-41.20	47.29	≤54	PASS
		Peak	2310.000	-38.24	≤-21.20	56.96	≤74	PASS
		Peak	2353.560	-35.46	≤-21.20	59.74	≤74	PASS
	Peak	2390.000	-37.49	≤-21.20	57.71	≤74	PASS	
	2462	AV	2483.500	-47.67	≤-41.20	47.53	≤54	PASS
		AV	2494.560	-47.37	≤-41.20	47.83	≤54	PASS
		AV	2500.000	-47.53	≤-41.20	47.67	≤54	PASS
		Peak	2483.500	-37.43	≤-21.20	57.77	≤74	PASS
Peak		2495.440	-35.82	≤-21.20	59.38	≤74	PASS	
Peak	2500.000	-37.28	≤-21.20	57.92	≤74	PASS		

Note:

1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

TEST REPORT

Results for Radiated Emissions (1 GHz~26 GHz)

IEEE 802.11b

Channel 1 / 2412 MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4824.00	54.27	33.06	35.04	3.94	56.23	74.00	-17.77	Peak	Horizontal
4824.00	43.25	33.06	35.04	3.94	45.21	54.00	-8.79	Average	Horizontal
4824.00	58.13	33.06	35.04	3.94	60.09	74.00	-13.91	Peak	Vertical
4824.00	44.36	33.06	35.04	3.94	46.32	54.00	-7.68	Average	Vertical

Channel 6 / 2437 MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4874.00	55.03	33.16	35.15	3.96	57.00	74.00	-17.00	Peak	Horizontal
4874.00	42.61	33.16	35.15	3.96	44.58	54.00	-9.42	Average	Horizontal
4874.00	60.91	33.16	35.15	3.96	62.88	74.00	-11.12	Peak	Vertical
4874.00	44.13	33.16	35.15	3.96	46.10	54.00	-7.90	Average	Vertical

Channel 11 / 2462 MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4924.00	59.76	33.26	35.14	3.98	61.86	74.00	-12.14	Peak	Horizontal
4924.00	44.29	33.26	35.14	3.98	46.39	54.00	-7.61	Average	Horizontal
4924.00	52.74	33.26	35.14	3.98	54.84	74.00	-19.16	Peak	Vertical
4924.00	45.21	33.26	35.14	3.98	47.31	54.00	-6.69	Average	Vertical

IEEE 802.11g

Channel 1 / 2412 MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4824.00	54.00	33.06	35.04	3.94	55.96	74.00	-18.04	Peak	Horizontal
4824.00	44.38	33.06	35.04	3.94	46.34	54.00	-7.66	Average	Horizontal
4824.00	58.06	33.06	35.04	3.94	60.02	74.00	-13.98	Peak	Vertical
4824.00	43.26	33.06	35.04	3.94	45.22	54.00	-8.78	Average	Vertical

Channel 6 / 2437 MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4874.00	56.37	33.16	35.15	3.96	58.34	74.00	-15.66	Peak	Horizontal
4874.00	43.19	33.16	35.15	3.96	45.16	54.00	-8.84	Average	Horizontal
4874.00	60.71	33.16	35.15	3.96	62.68	74.00	-11.32	Peak	Vertical
4874.00	44.90	33.16	35.15	3.96	46.87	54.00	-7.13	Average	Vertical

TEST REPORT

Channel 11 / 2462 MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4924.00	60.93	33.26	35.14	3.98	63.03	74.00	-10.97	Peak	Horizontal
4924.00	45.00	33.26	35.14	3.98	47.10	54.00	-6.90	Average	Horizontal
4924.00	54.40	33.26	35.14	3.98	56.50	74.00	-17.50	Peak	Vertical
4924.00	44.49	33.26	35.14	3.98	46.59	54.00	-7.41	Average	Vertical

IEEE 802.11n HT20

Channel 1 / 2412 MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4824.00	54.33	33.06	35.04	3.94	56.29	74.00	-17.71	Peak	Horizontal
4824.00	42.99	33.06	35.04	3.94	44.95	54.00	-9.05	Average	Horizontal
4824.00	57.77	33.06	35.04	3.94	59.73	74.00	-14.27	Peak	Vertical
4824.00	43.86	33.06	35.04	3.94	45.82	54.00	-8.18	Average	Vertical

Channel 6 / 2437 MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4874.00	56.39	33.16	35.15	3.96	58.36	74.00	-15.64	Peak	Horizontal
4874.00	44.41	33.16	35.15	3.96	46.38	54.00	-7.62	Average	Horizontal
4874.00	60.62	33.16	35.15	3.96	62.59	74.00	-11.41	Peak	Vertical
4874.00	45.94	33.16	35.15	3.96	47.91	54.00	-6.09	Average	Vertical

Channel 11 / 2462 MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4924.00	61.03	33.26	35.14	3.98	63.13	74.00	-10.87	Peak	Horizontal
4924.00	44.97	33.26	35.14	3.98	47.07	54.00	-6.93	Average	Horizontal
4924.00	54.41	33.26	35.14	3.98	56.51	74.00	-17.49	Peak	Vertical
4924.00	44.81	33.26	35.14	3.98	46.91	54.00	-7.09	Average	Vertical

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = Limit - Corrected Reading

4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
 Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
 Limit = 40.00dBuV/m.
 Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
 Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m;
 Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

8 Power line conducted emission

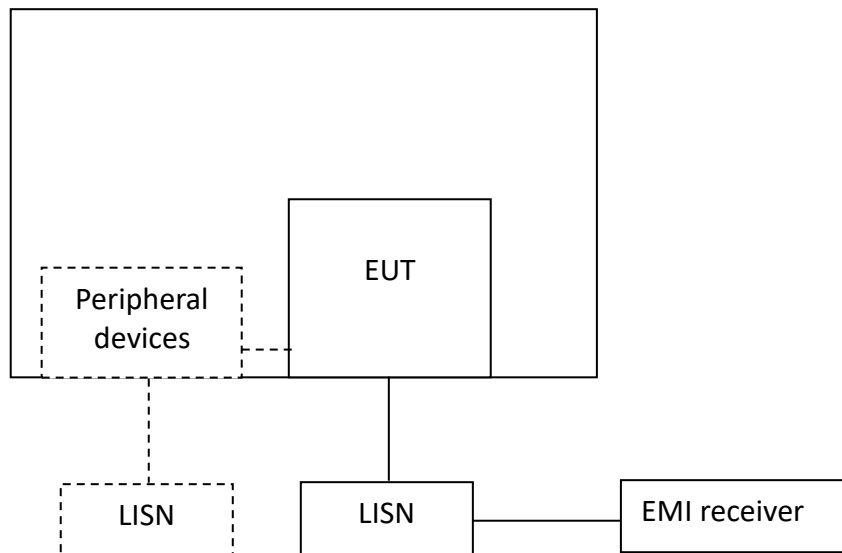
Test result: Pass

8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
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.

8.2 Test Configuration



TEST REPORT**8.3 Measurement Procedure**

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

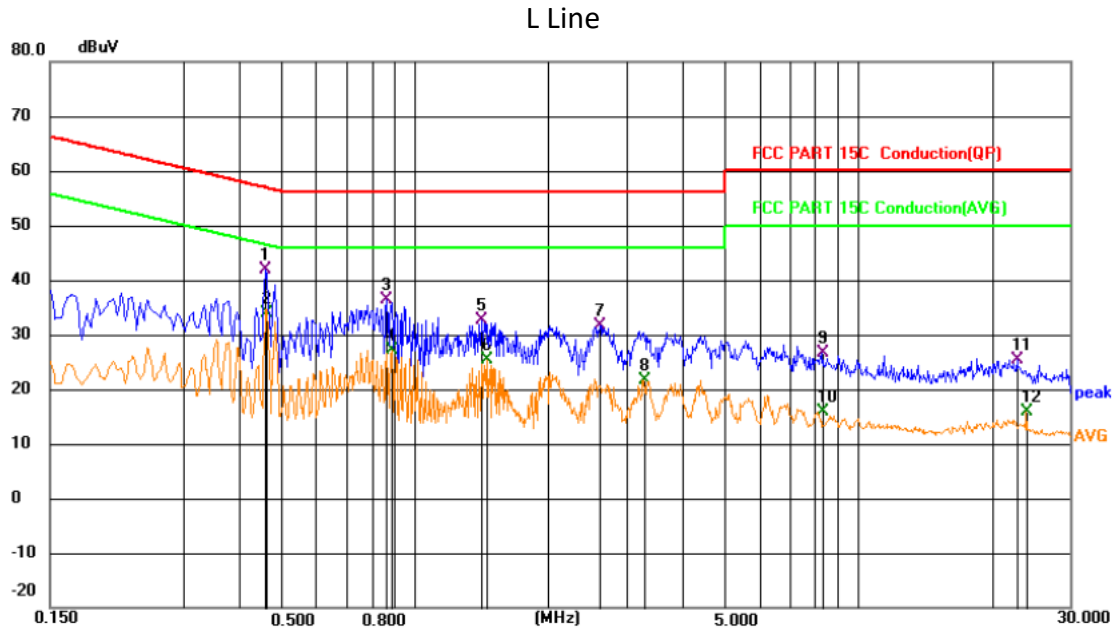
The bandwidth of the test receiver is set at 9 kHz.

TEST REPORT

8.4 Test Results of Power line conducted emission

Charging mode(Supply voltage: 120V~,60Hz)

Test Curve:

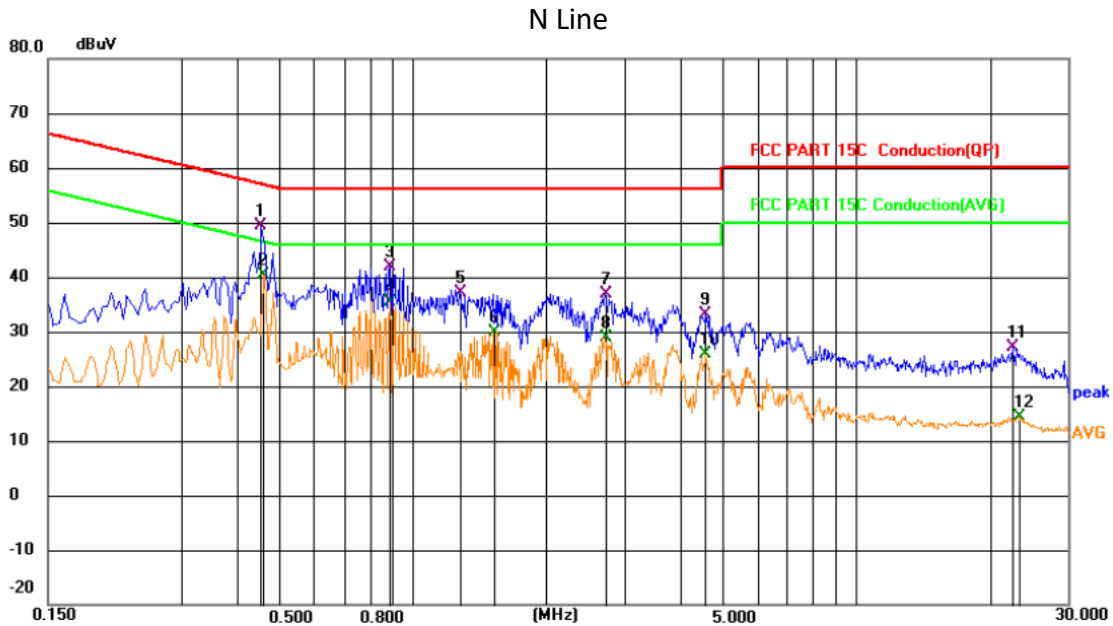


Test Data:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector
1		0.4606	22.29	19.64	41.93	56.68	-14.75	QP
2	*	0.4651	14.23	19.64	33.87	46.60	-12.73	AVG
3		0.8655	16.74	19.64	36.38	56.00	-19.62	QP
4		0.8880	7.59	19.64	27.23	46.00	-18.77	AVG
5		1.4144	12.97	19.66	32.63	56.00	-23.37	QP
6		1.4595	5.68	19.66	25.34	46.00	-20.66	AVG
7		2.6116	12.00	19.68	31.68	56.00	-24.32	QP
8		3.2821	2.04	19.70	21.74	46.00	-24.26	AVG
9		8.2996	6.89	19.78	26.67	60.00	-33.33	QP
10		8.2996	-3.80	19.78	15.98	50.00	-34.02	AVG
11		22.8706	5.40	20.08	25.48	60.00	-34.52	QP
12		24.0001	-4.26	20.04	15.78	50.00	-34.22	AVG

TEST REPORT

Test Curve:



Test Data:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector
1		0.4561	29.80	19.64	49.44	56.76	-7.32	QP
2	*	0.4606	20.81	19.64	40.45	46.68	-6.23	AVG
3		0.8880	22.31	19.64	41.95	56.00	-14.05	QP
4		0.8880	15.84	19.64	35.48	46.00	-10.52	AVG
5		1.2705	17.44	19.66	37.10	56.00	-18.90	QP
6		1.5225	10.33	19.67	30.00	46.00	-16.00	AVG
7		2.7106	17.06	19.72	36.78	56.00	-19.22	QP
8		2.7106	9.25	19.72	28.97	46.00	-17.03	AVG
9		4.5781	13.38	19.80	33.18	56.00	-22.82	QP
10		4.5781	6.16	19.80	25.96	46.00	-20.04	AVG
11		22.6051	6.93	20.08	27.01	60.00	-32.99	QP
12		23.3746	-5.70	20.06	14.36	50.00	-35.64	AVG

Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = Limit - Corrected Reading

4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

9 Occupied Bandwidth

Test result: Tested

9.1 Limit

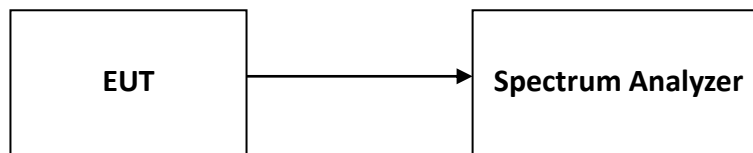
None

9.2 Measurement Procedure

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

9.3 Test Configuration



9.4 The results of Occupied Bandwidth

Please refer to Appendix A

10 Antenna requirement

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.

Result:

EUT uses a permanently attached antenna to the intentional radiator, so it can comply with the provisions of this section.

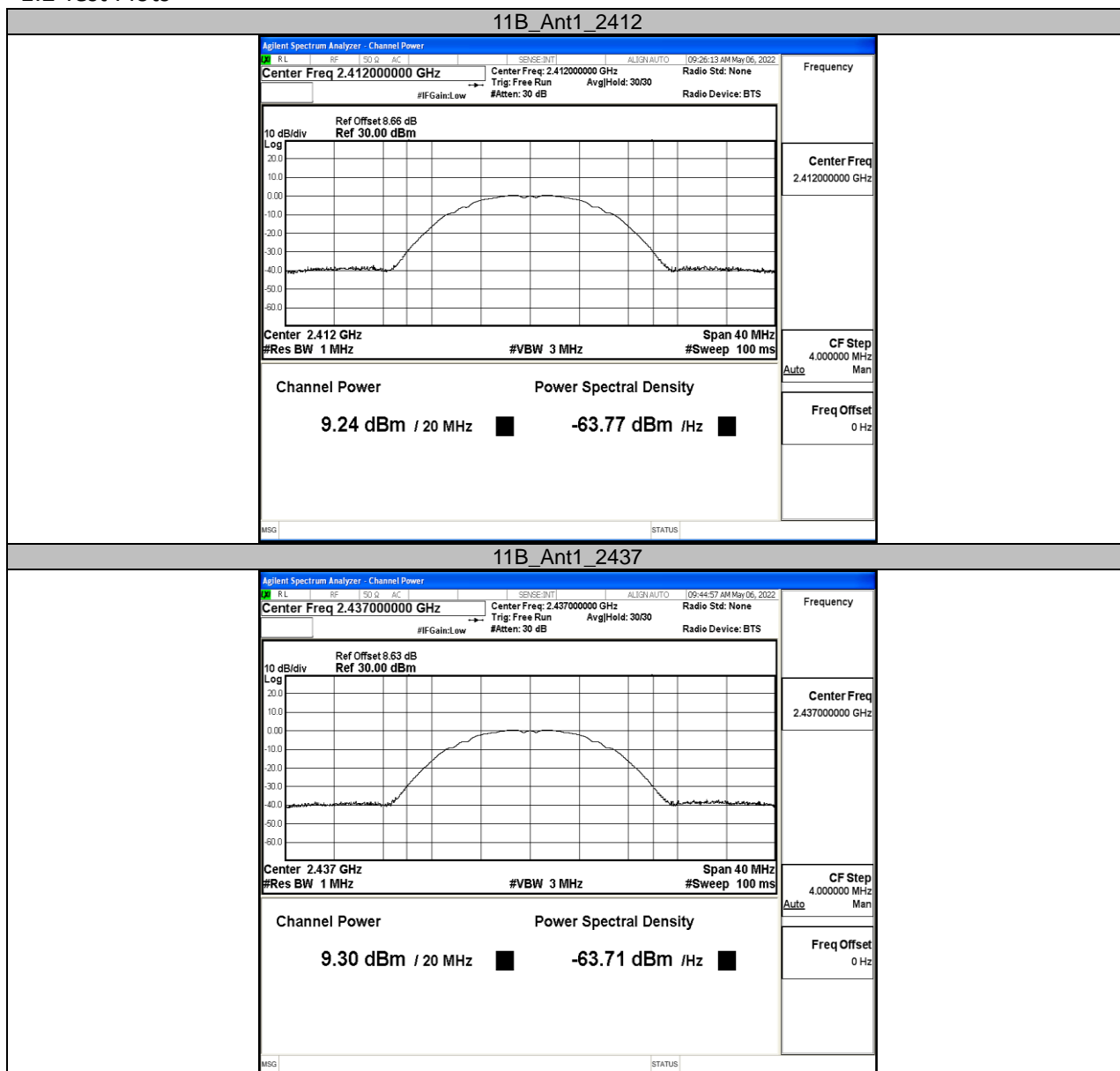
Appendix A: Test results

1. RF Output Power

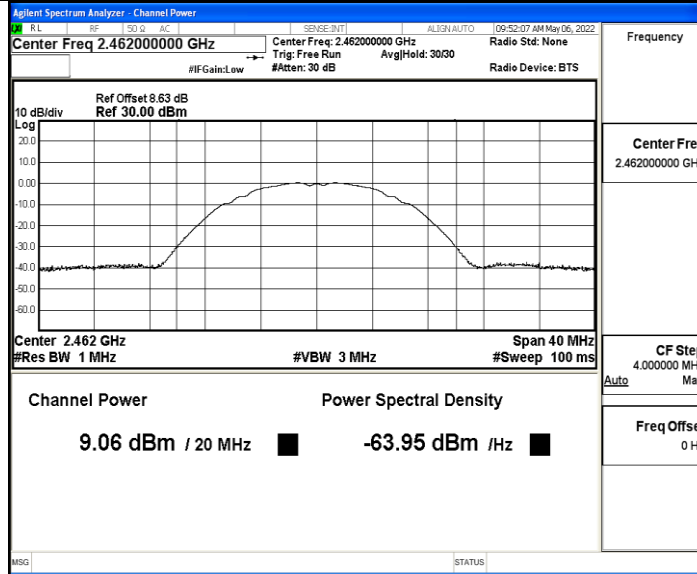
1.1 Test Result and Data

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	9.24	≤30.00	PASS
		2437	9.30	≤30.00	PASS
		2462	9.06	≤30.00	PASS
11G	Ant1	2412	9.38	≤30.00	PASS
		2437	9.28	≤30.00	PASS
		2462	9.37	≤30.00	PASS
11N20SISO	Ant1	2412	9.35	≤30.00	PASS
		2437	9.02	≤30.00	PASS
		2462	9.25	≤30.00	PASS

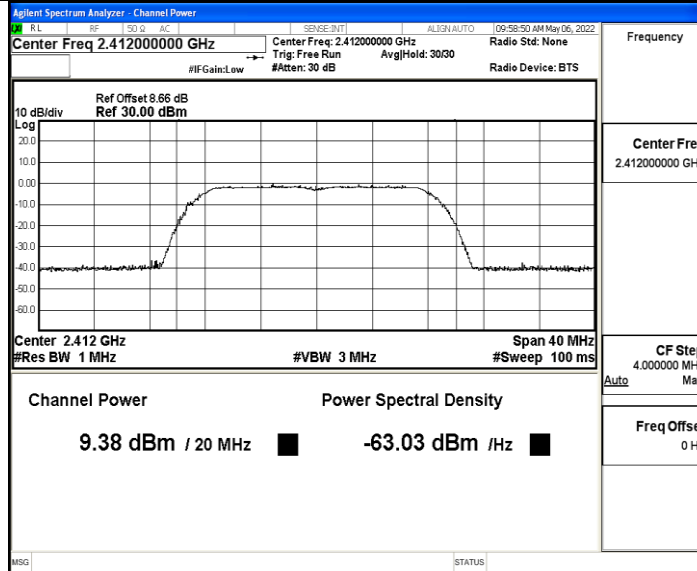
1.2 Test Plots



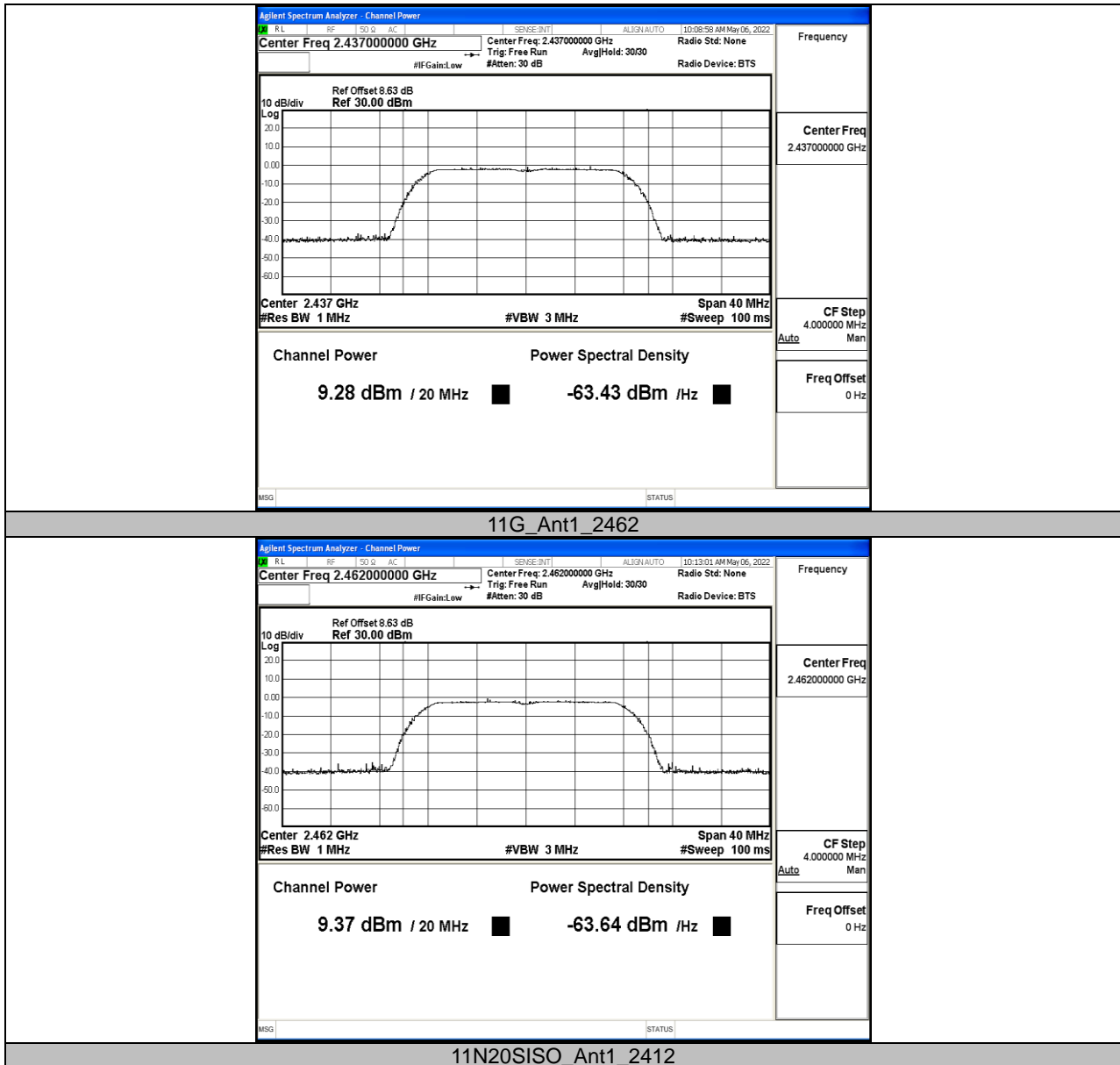
11B_Ant1_2462

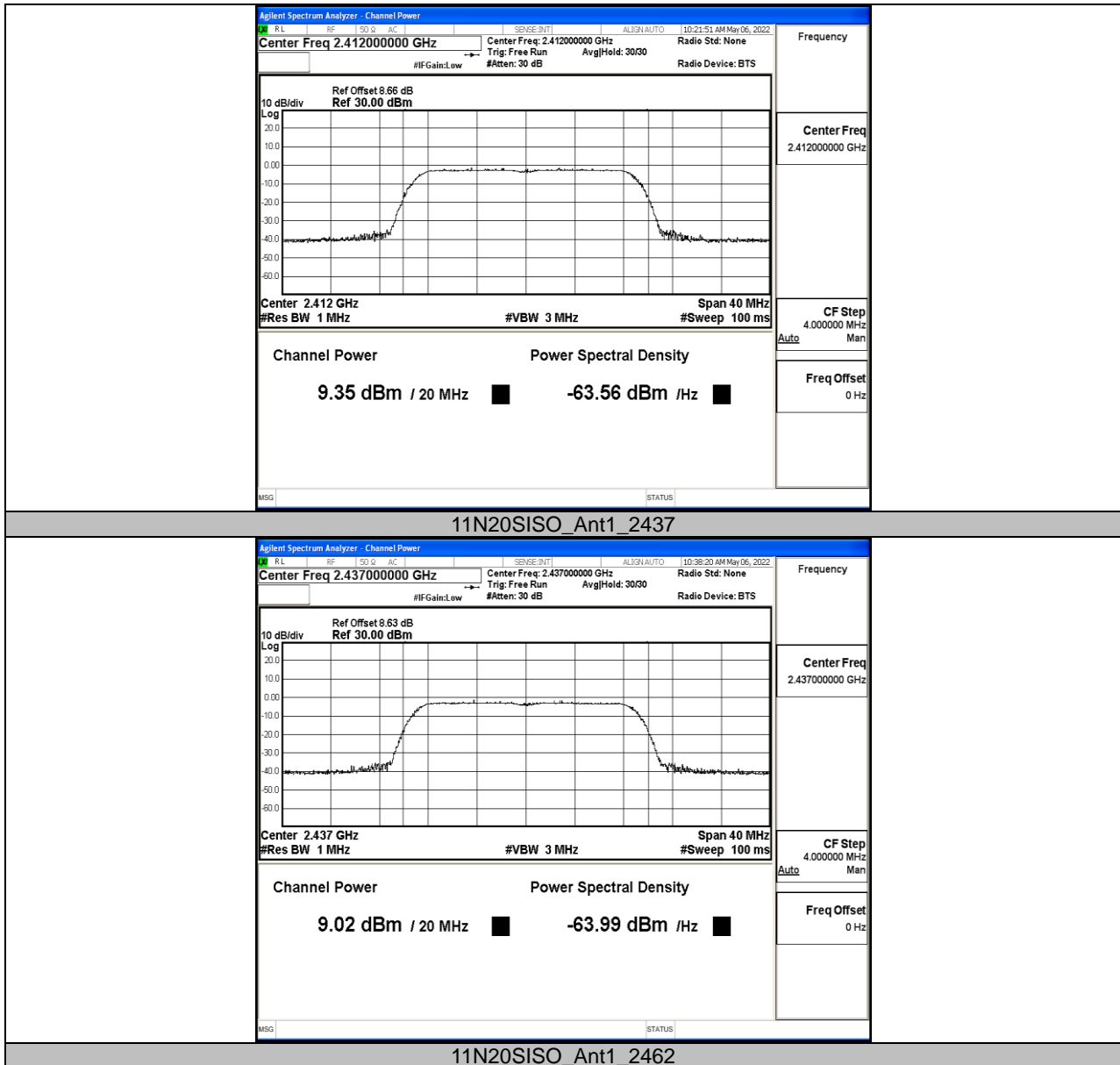


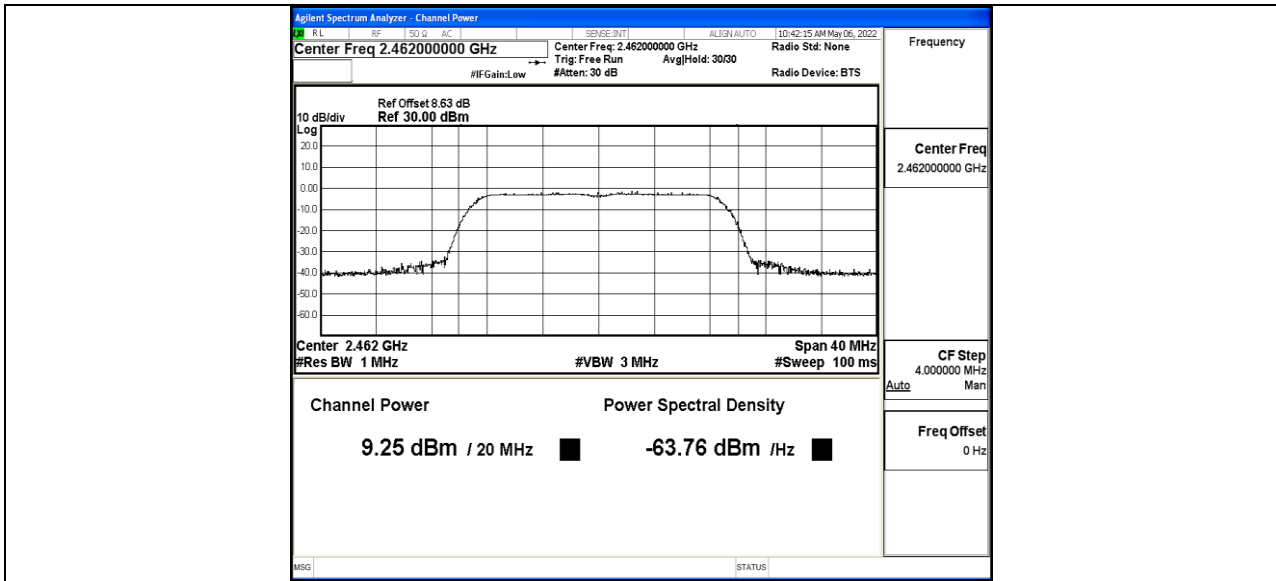
11G_Ant1_2412



11G_Ant1_2437





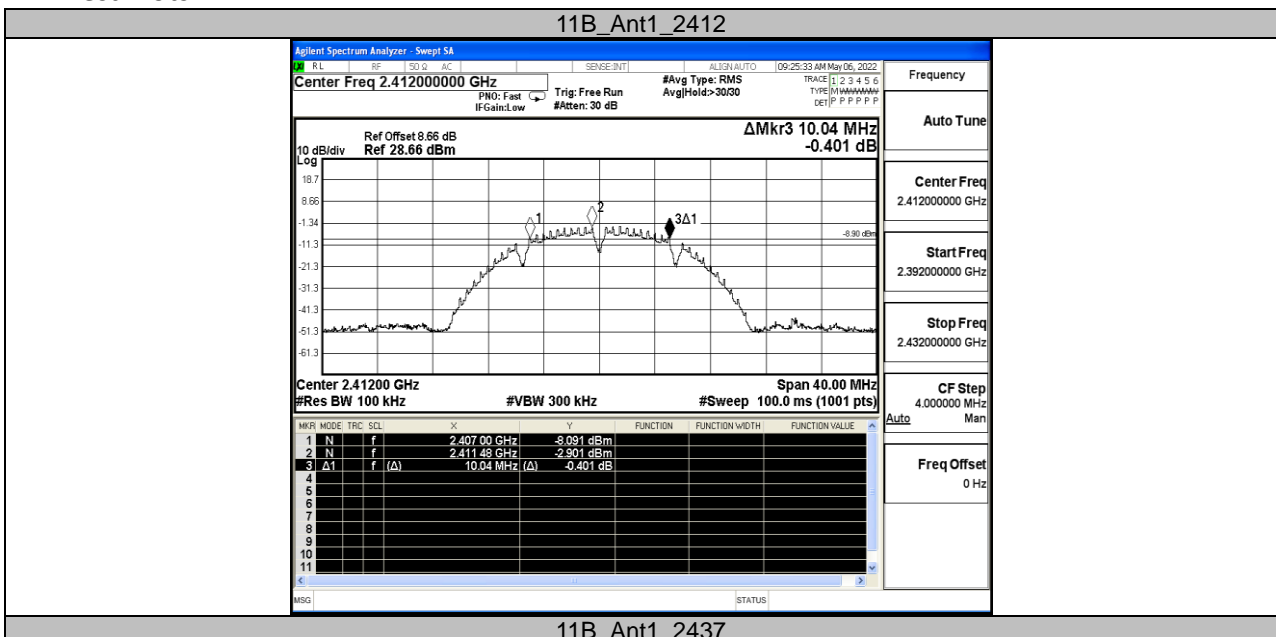


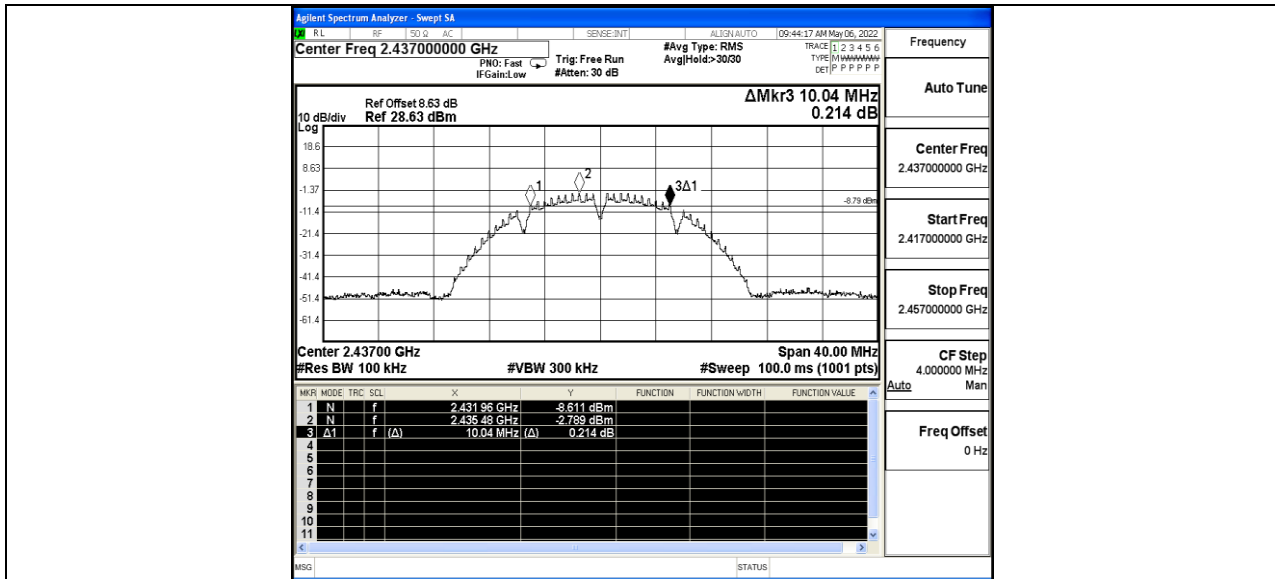
2. Minimum 6dB bandwidth

2.1 Test Result and Data

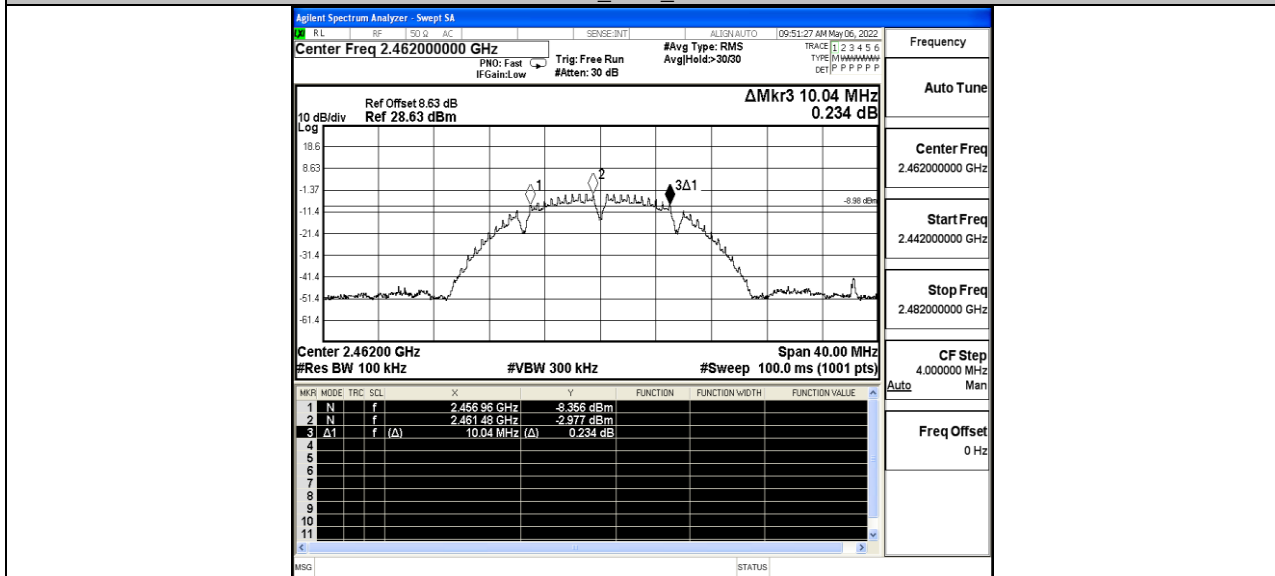
TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	10.040	2407.000	2417.040	0.5	PASS
		2437	10.040	2431.960	2442.000	0.5	PASS
		2462	10.040	2456.960	2467.000	0.5	PASS
11G	Ant1	2412	16.320	2403.840	2420.160	0.5	PASS
		2437	16.320	2428.840	2445.160	0.5	PASS
		2462	16.320	2453.840	2470.160	0.5	PASS
11N20SISO	Ant1	2412	17.600	2403.200	2420.800	0.5	PASS
		2437	17.600	2428.200	2445.800	0.5	PASS
		2462	17.600	2453.200	2470.800	0.5	PASS

2.2 Test Plots

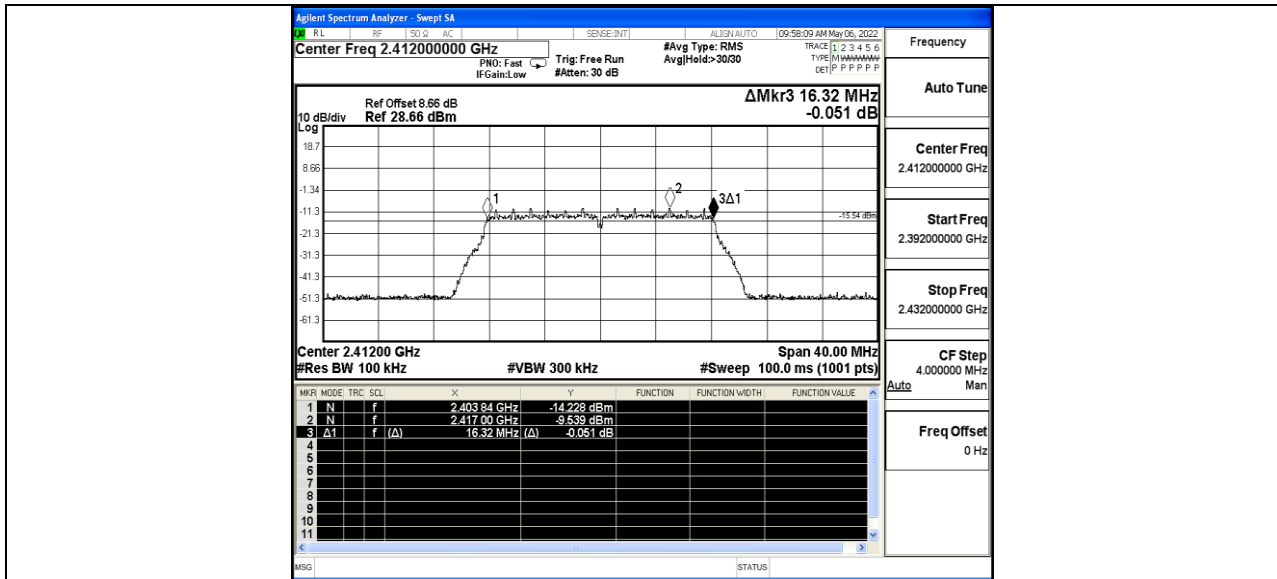




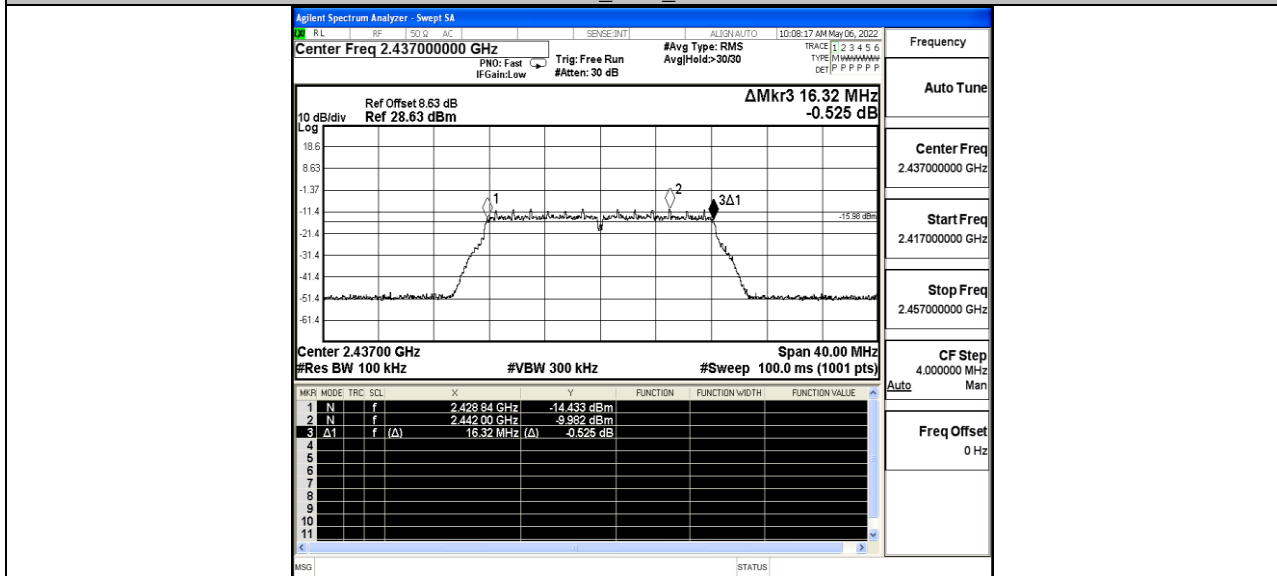
11B_Ant1_2462



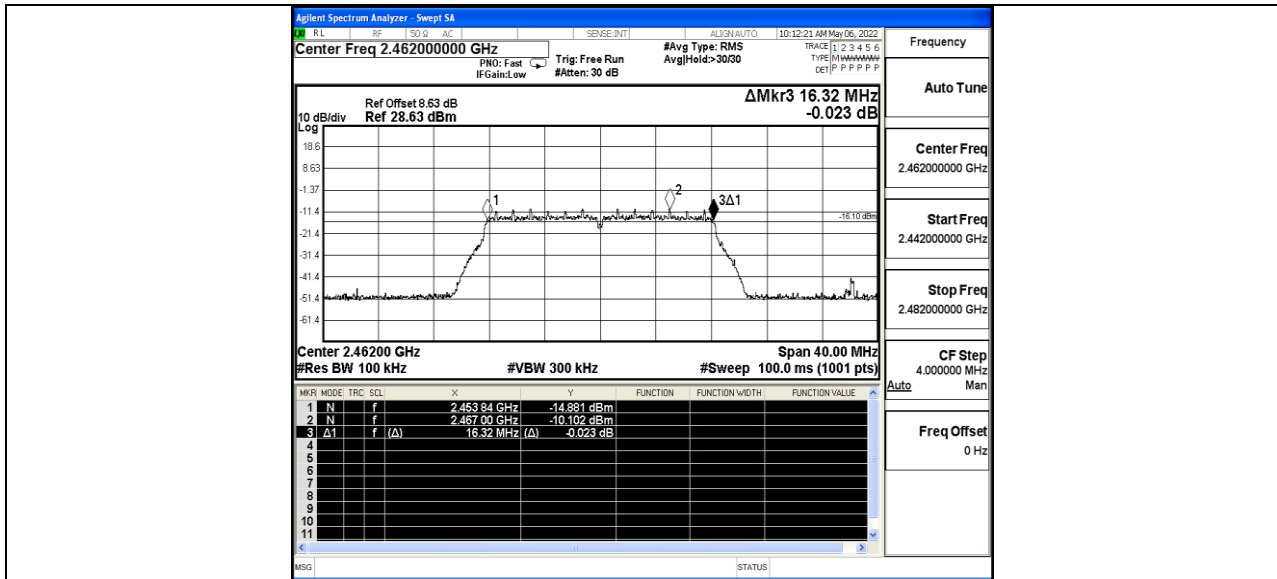
11G_Ant1_2412



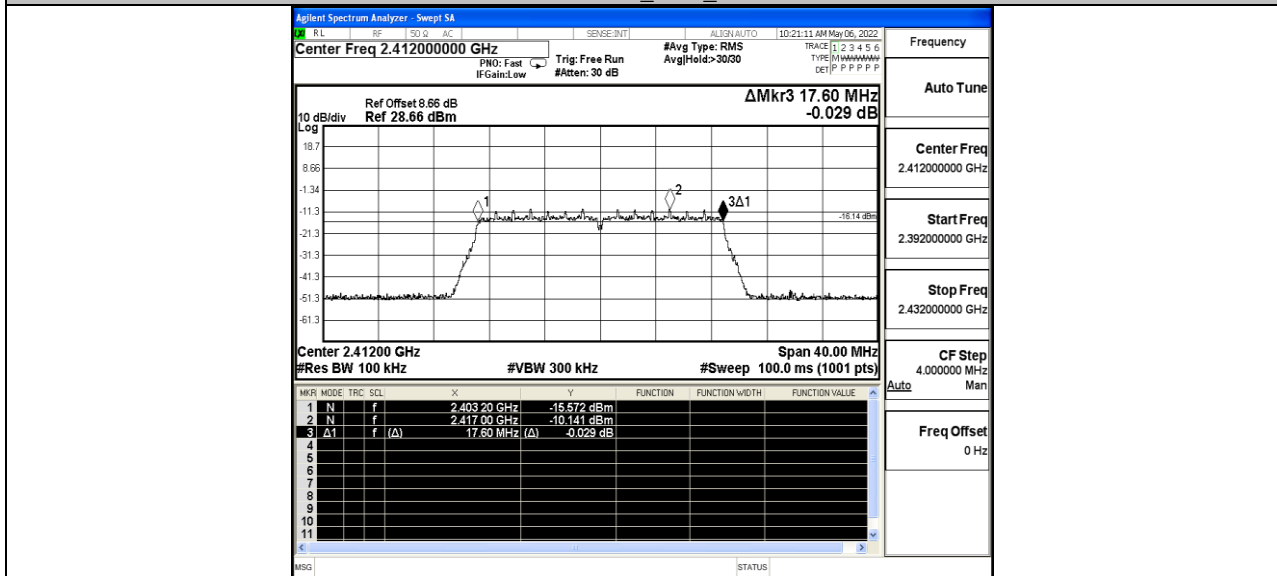
11G_Ant1_2437



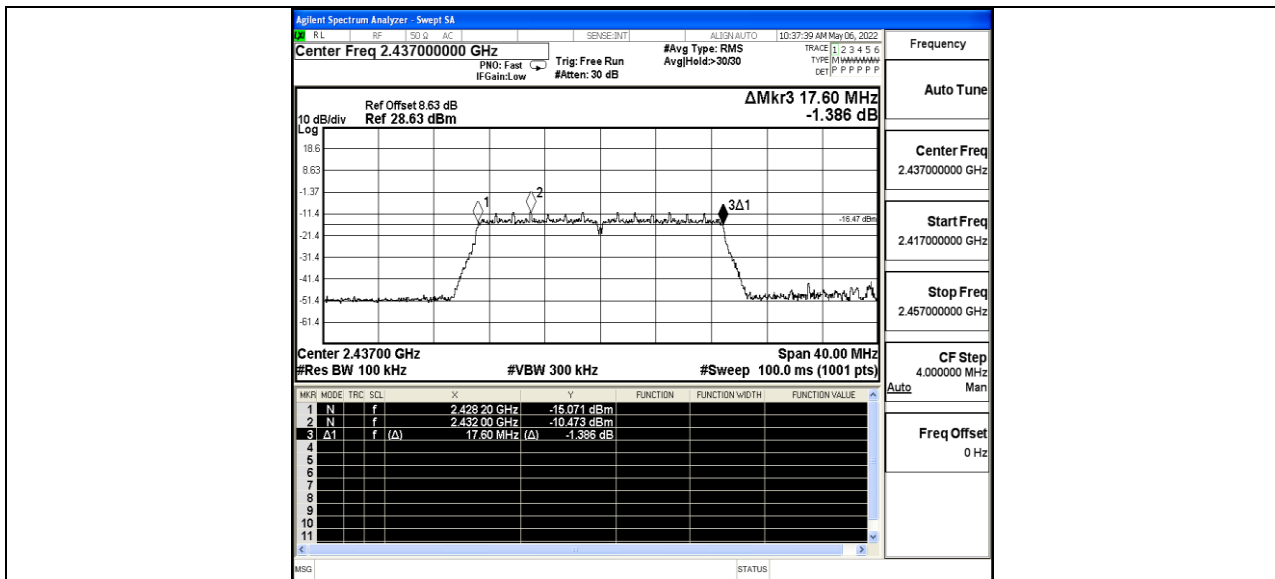
11G_Ant1_2462



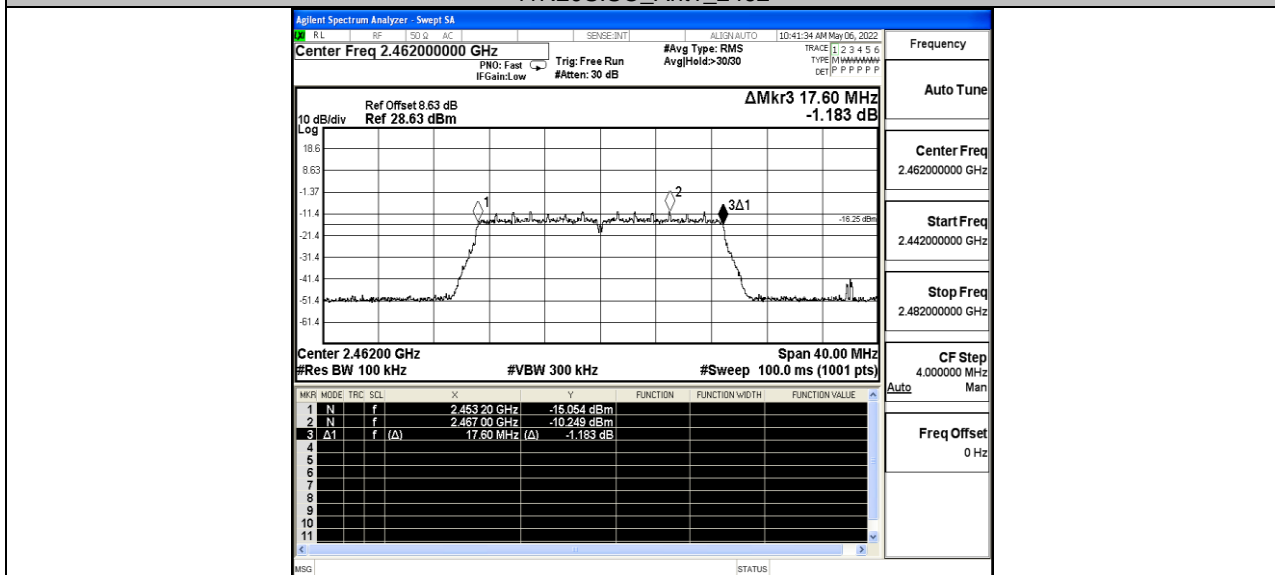
11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



11N20SISO_Ant1_2462

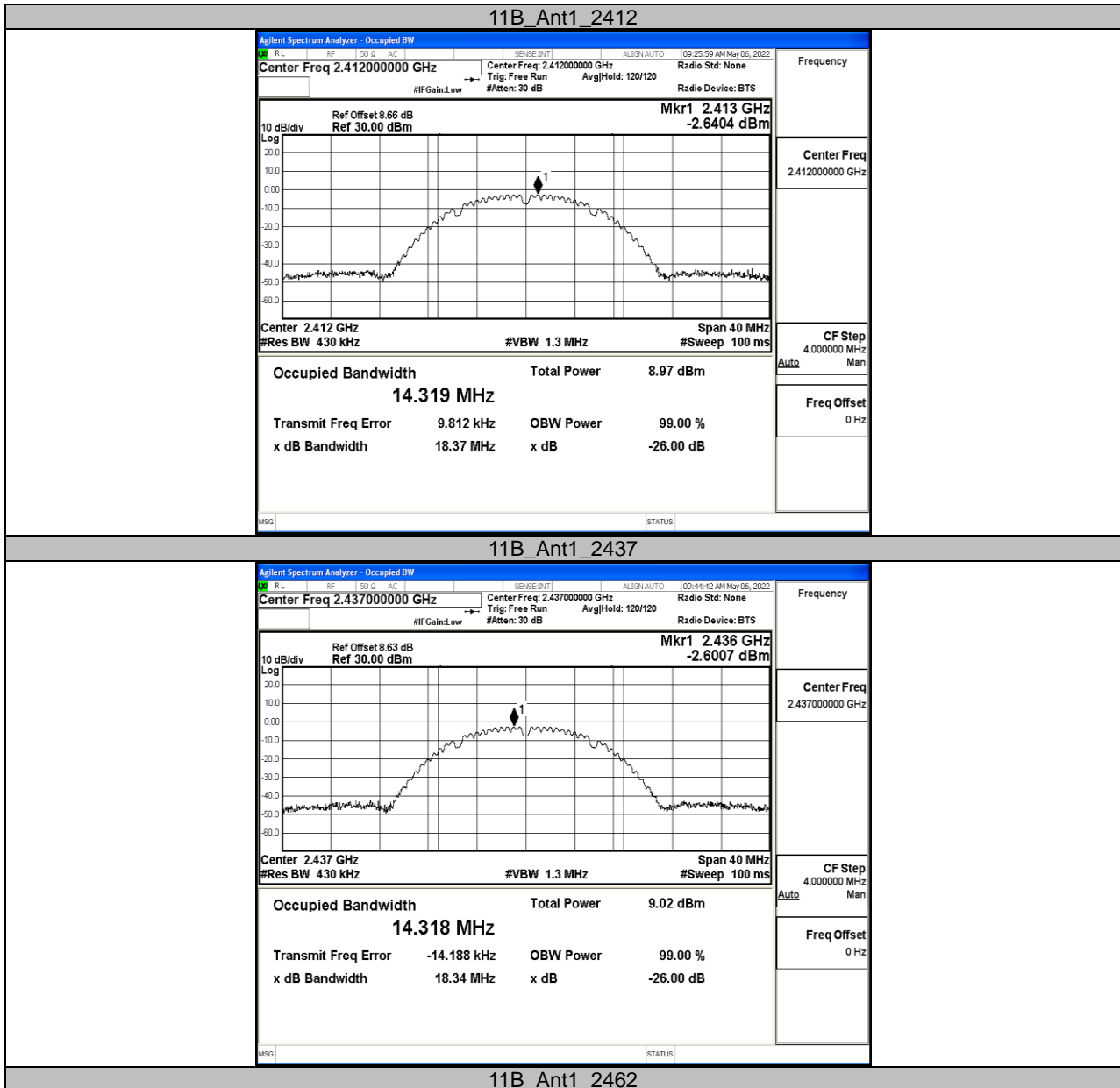


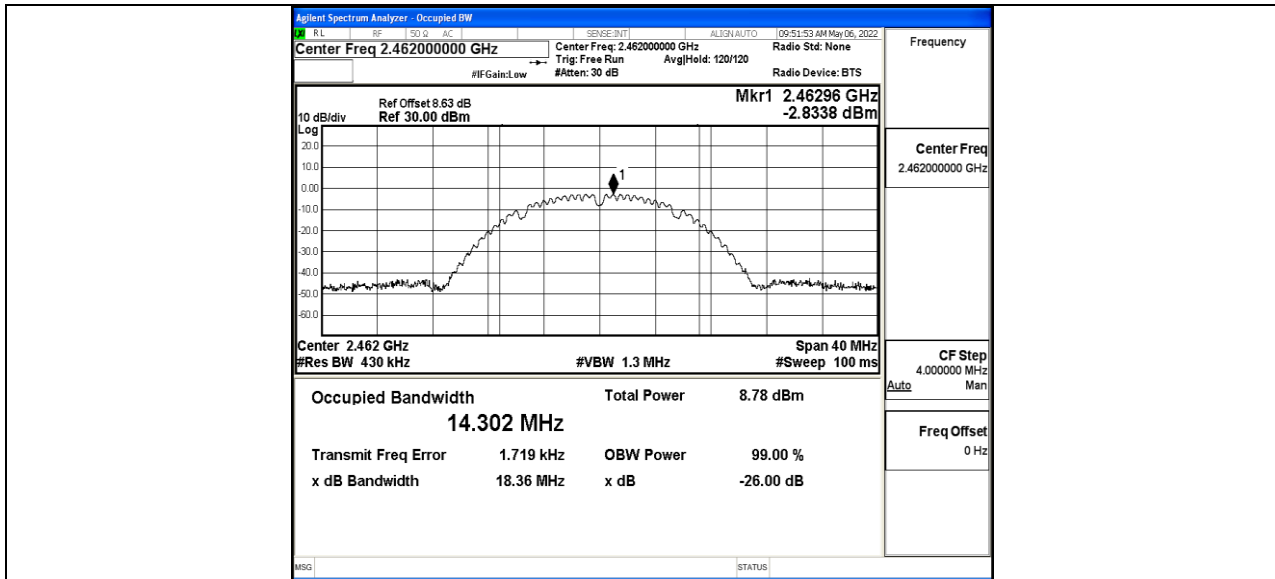
3. Occupied Bandwidth

3.1 Test Result and Data

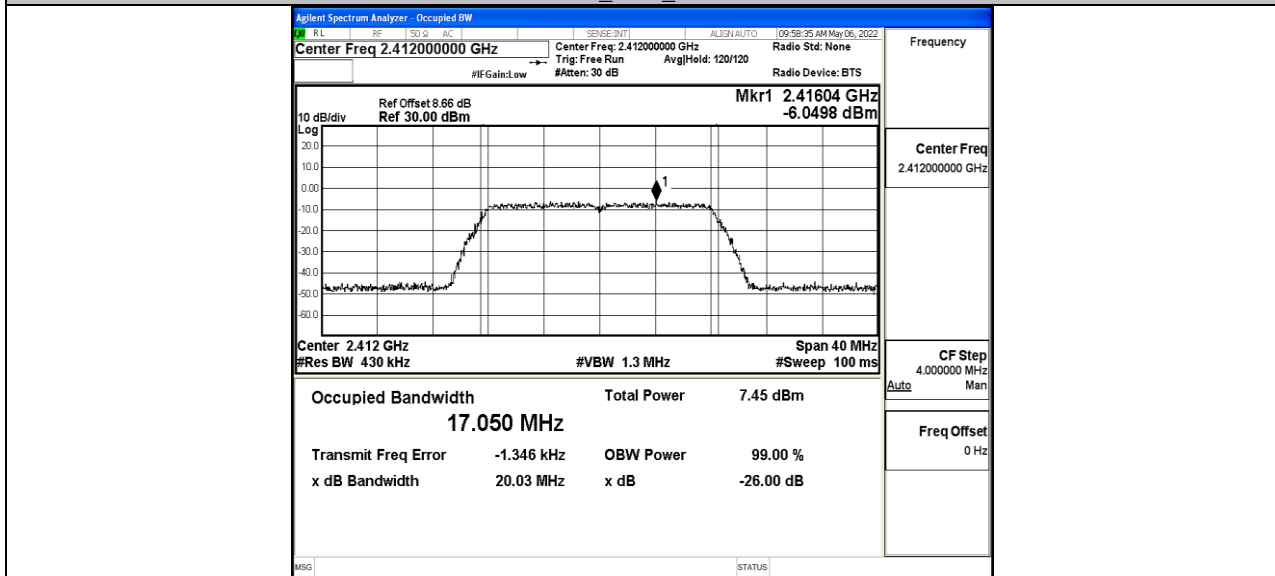
TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	14.319	2404.850	2419.169	---	---
		2437	14.318	2429.827	2444.145	---	---
		2462	14.302	2454.851	2469.153	---	---
11G	Ant1	2412	17.050	2403.474	2420.524	---	---
		2437	17.042	2428.453	2445.495	---	---
		2462	16.987	2453.498	2470.485	---	---
11N20SISO	Ant1	2412	17.912	2403.054	2420.966	---	---
		2437	17.881	2428.058	2445.939	---	---
		2462	17.921	2453.051	2470.972	---	---

3.2 Test Plots

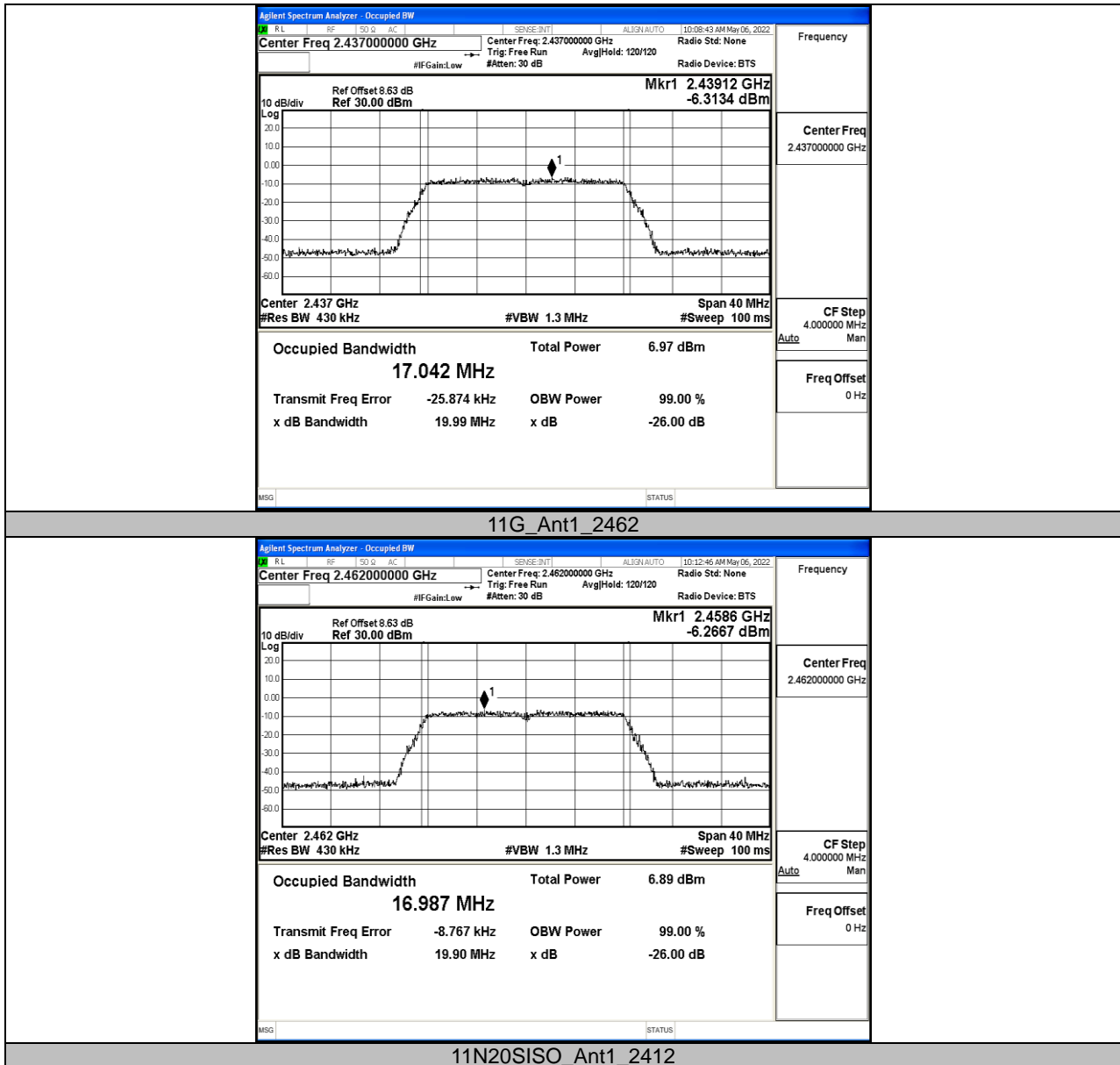


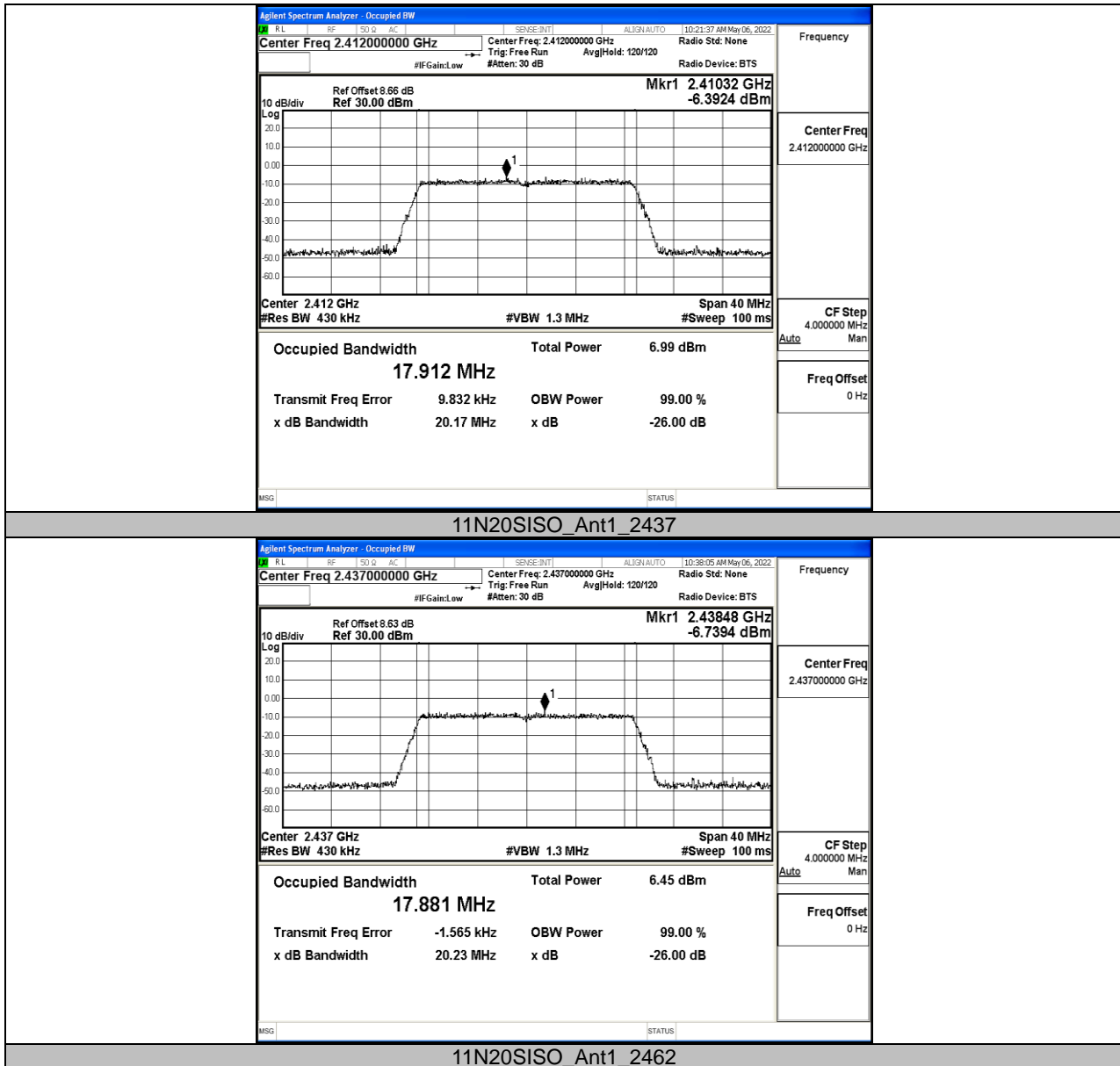


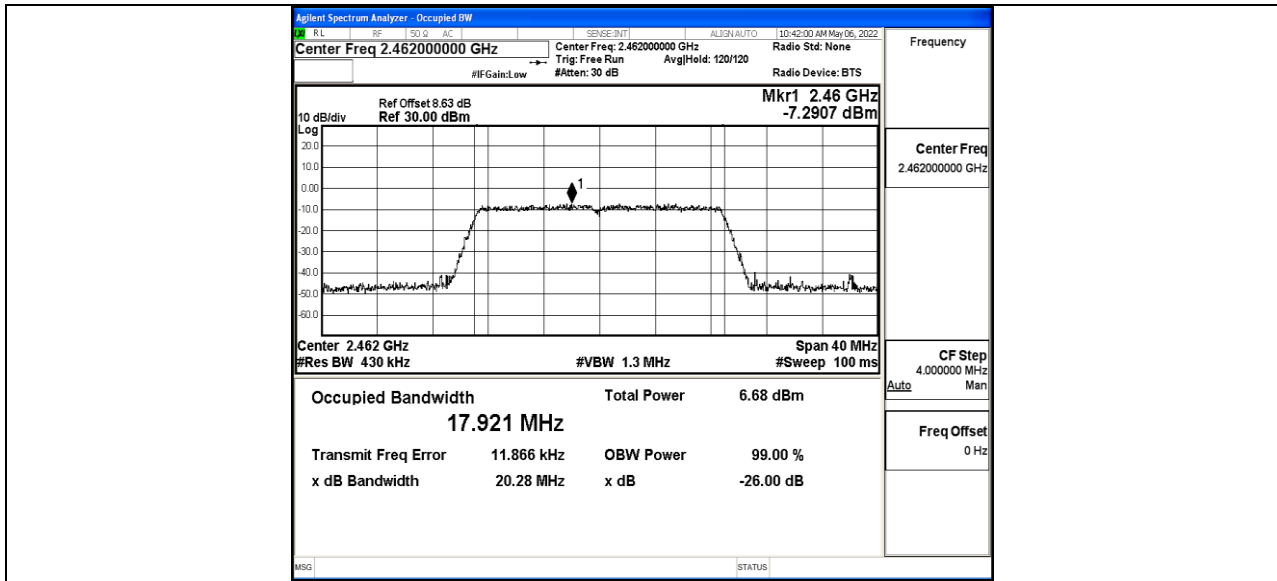
11G_Ant1_2412



11G_Ant1_2437





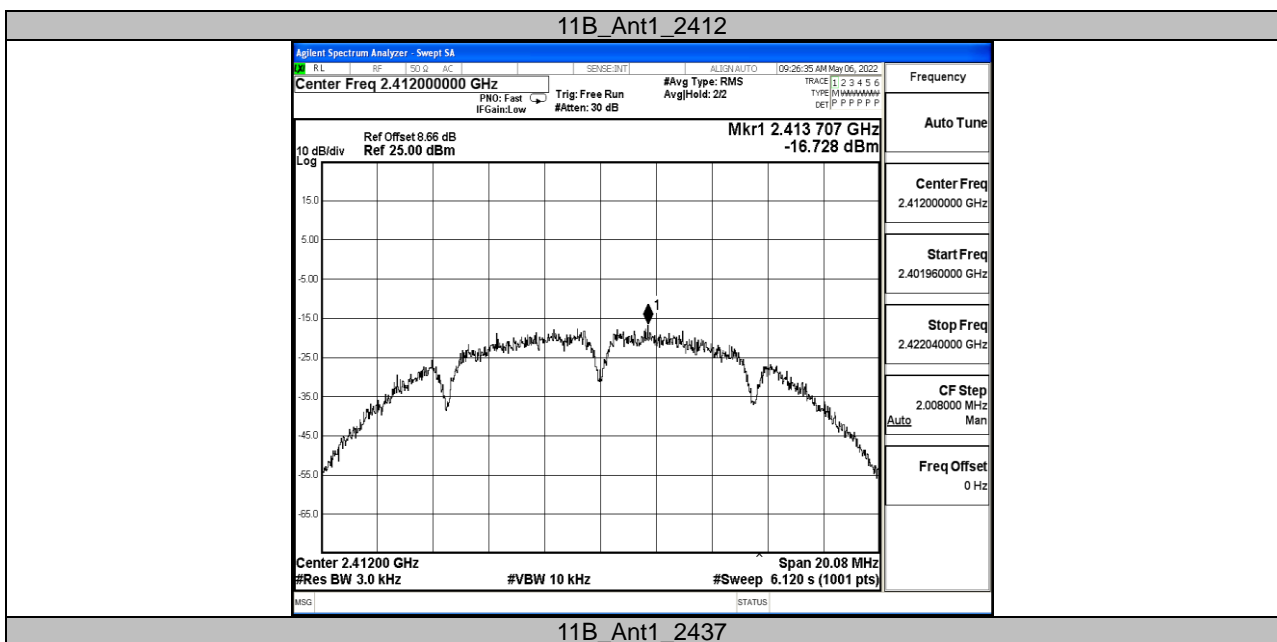


4. Power Spectral Density

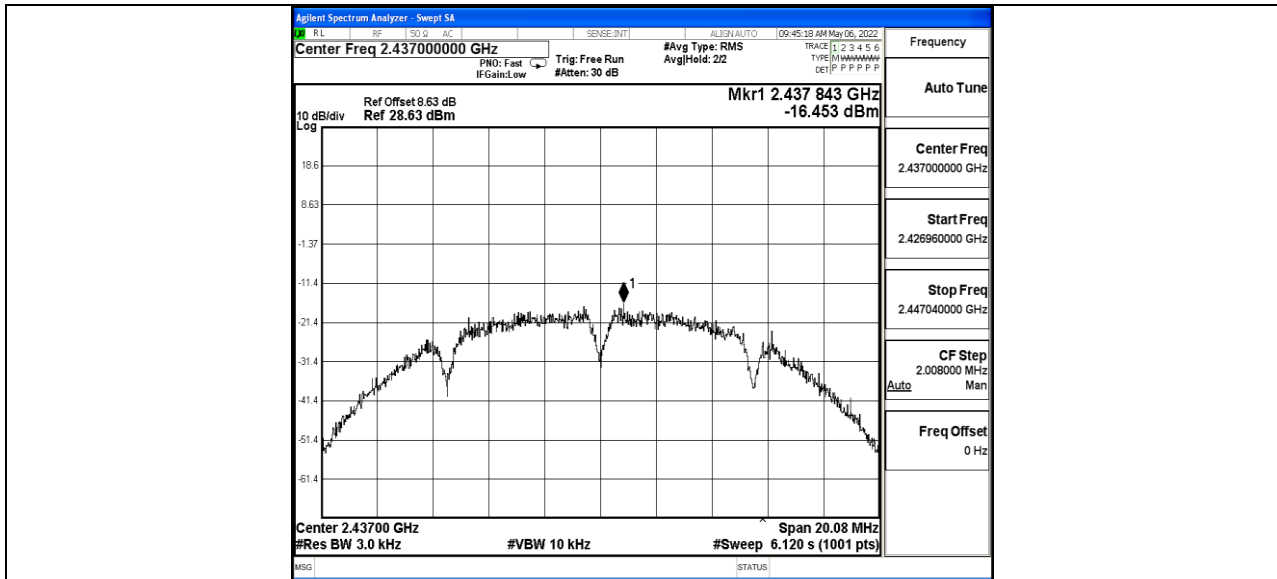
4.1 Test Result and Data

TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-16.73	≤8.00	PASS
		2437	-16.45	≤8.00	PASS
		2462	-17.76	≤8.00	PASS
11G	Ant1	2412	-22.99	≤8.00	PASS
		2437	-23.43	≤8.00	PASS
		2462	-23.86	≤8.00	PASS
11N20SISO	Ant1	2412	-23.59	≤8.00	PASS
		2437	-23.82	≤8.00	PASS
		2462	-23.48	≤8.00	PASS

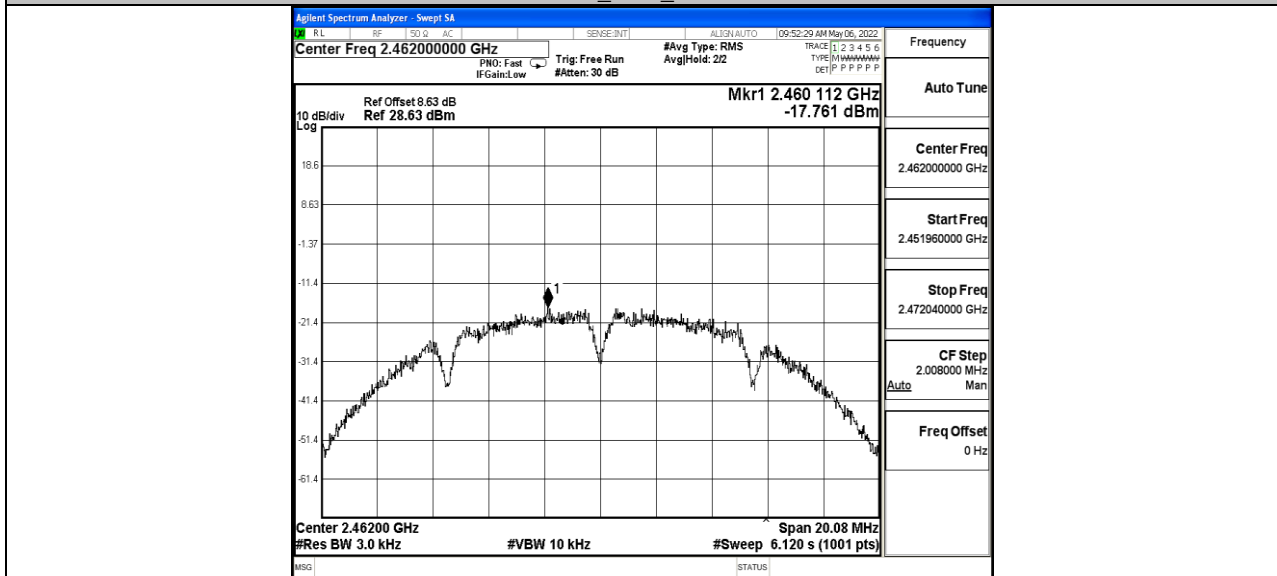
4.2 Test Plots



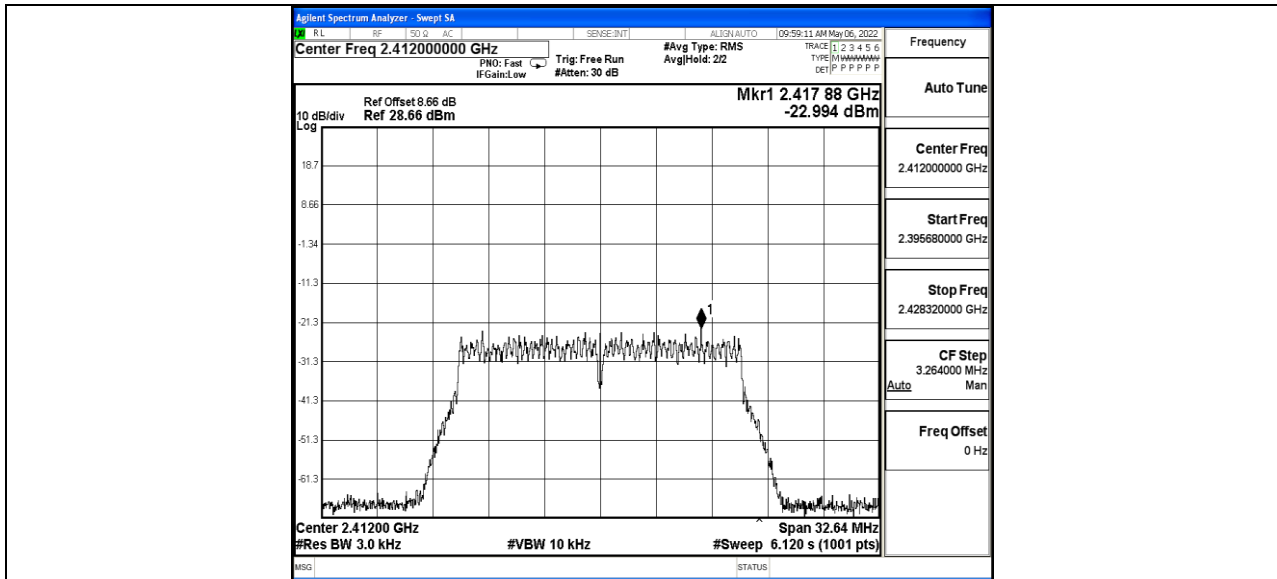
11B_Ant1_2437



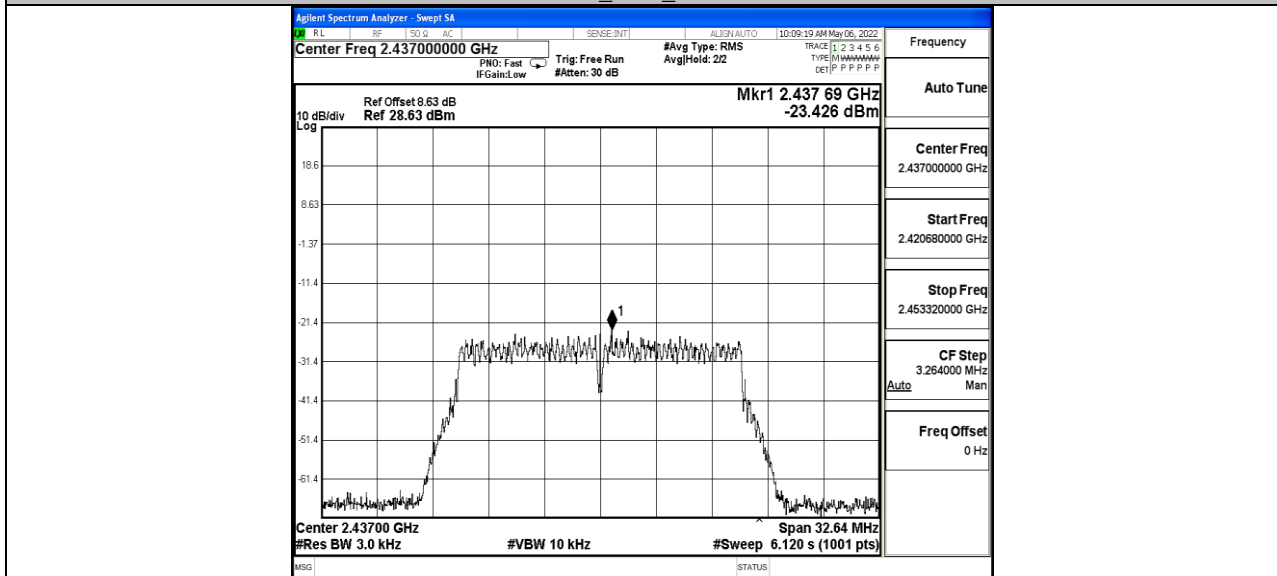
11B_Ant1_2462



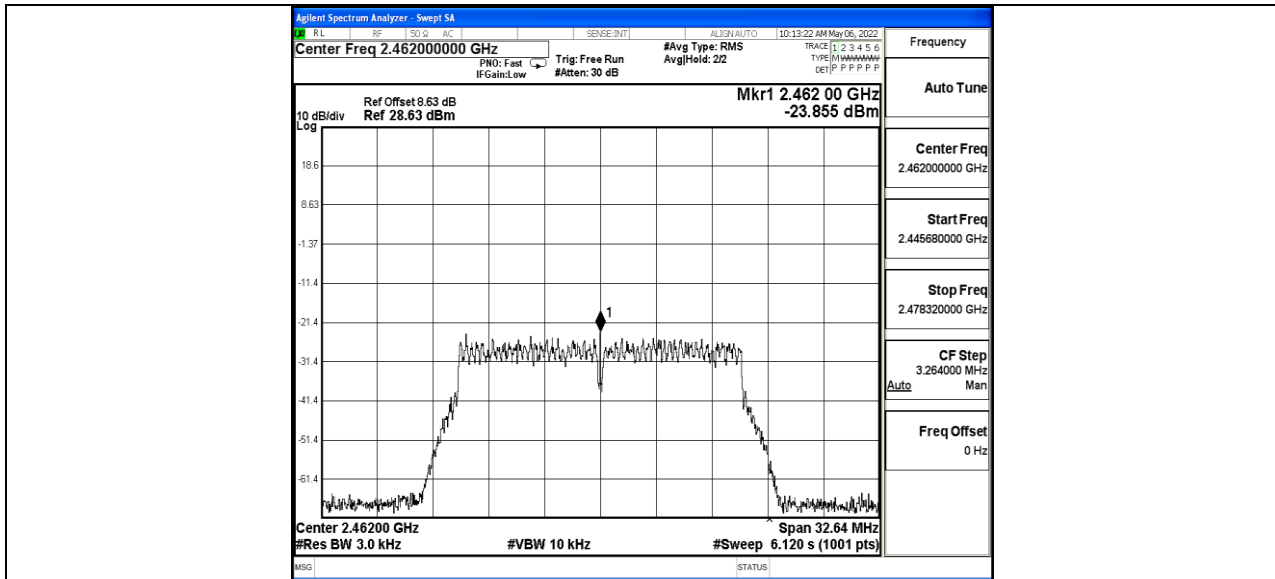
11G_Ant1_2412



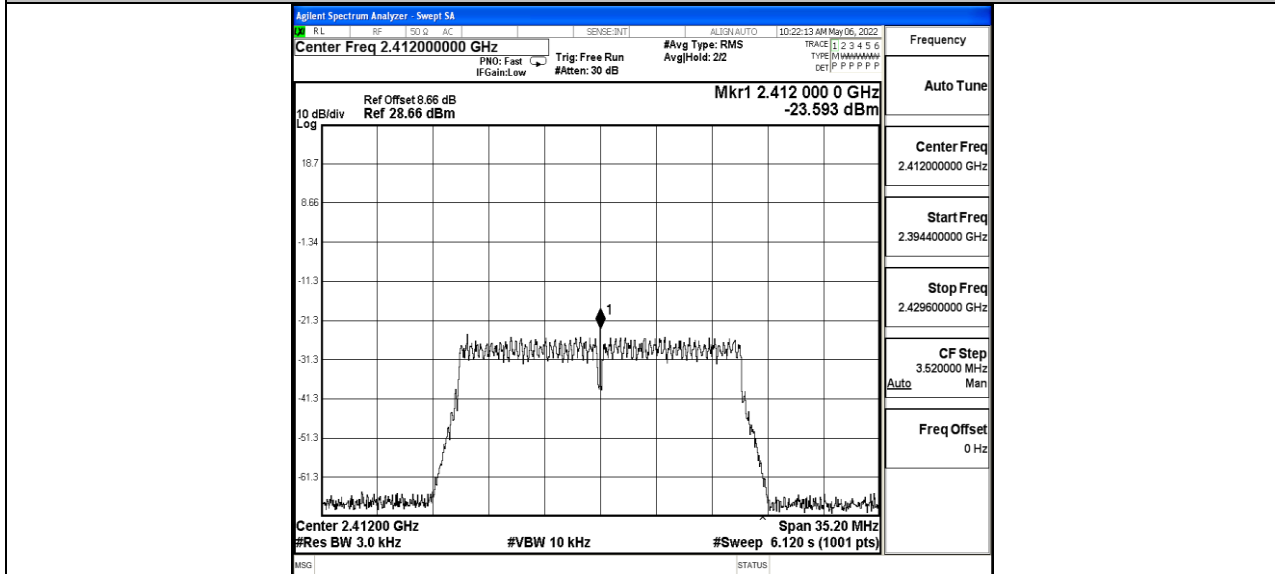
11G_Ant1_2437



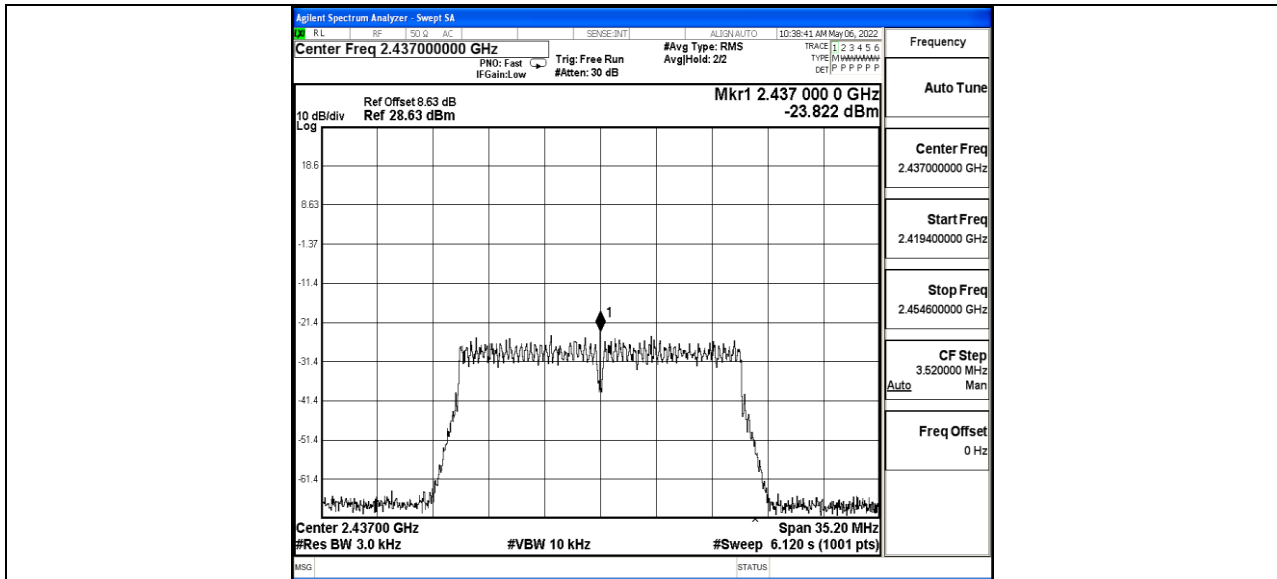
11G_Ant1_2462



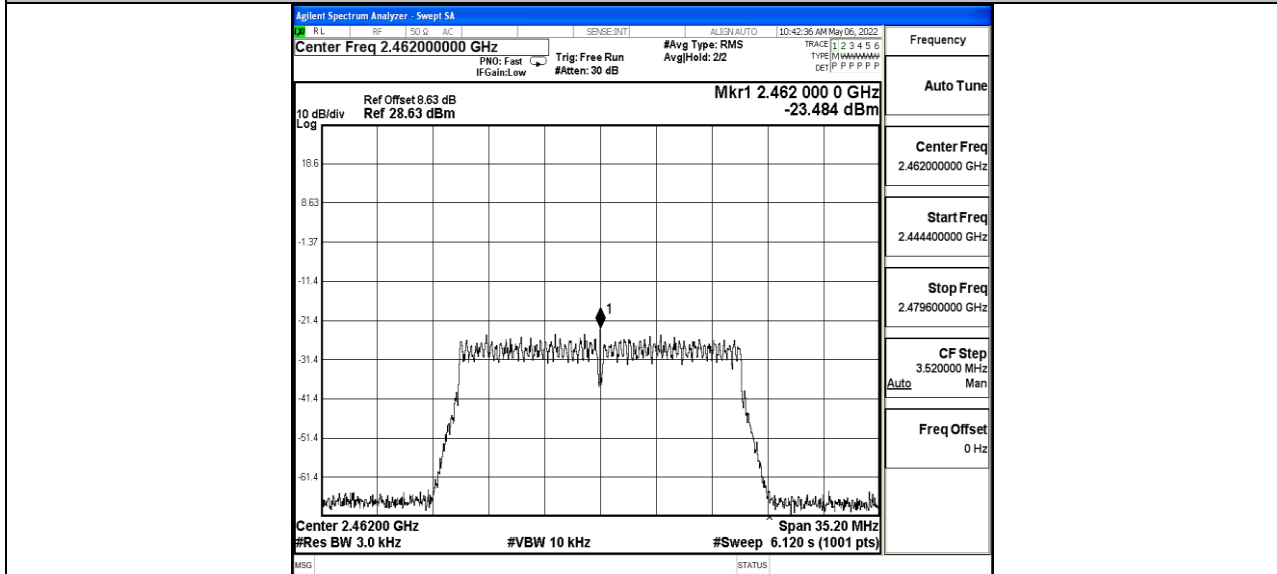
11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



11N20SISO_Ant1_2462



TEST REPORT

5. Emission outside the frequency band

5.1 Test Result and Data

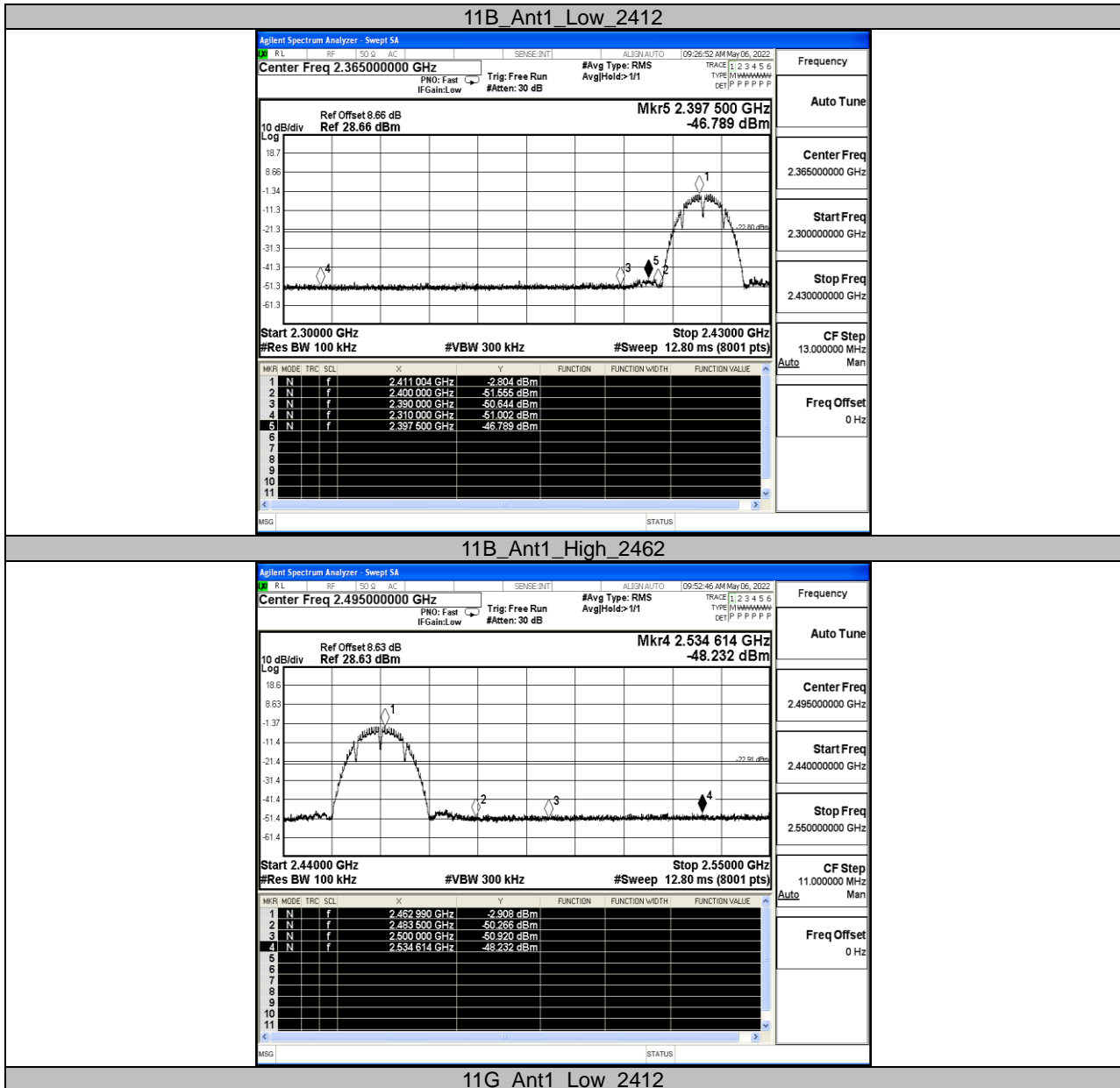
Band edge measurements

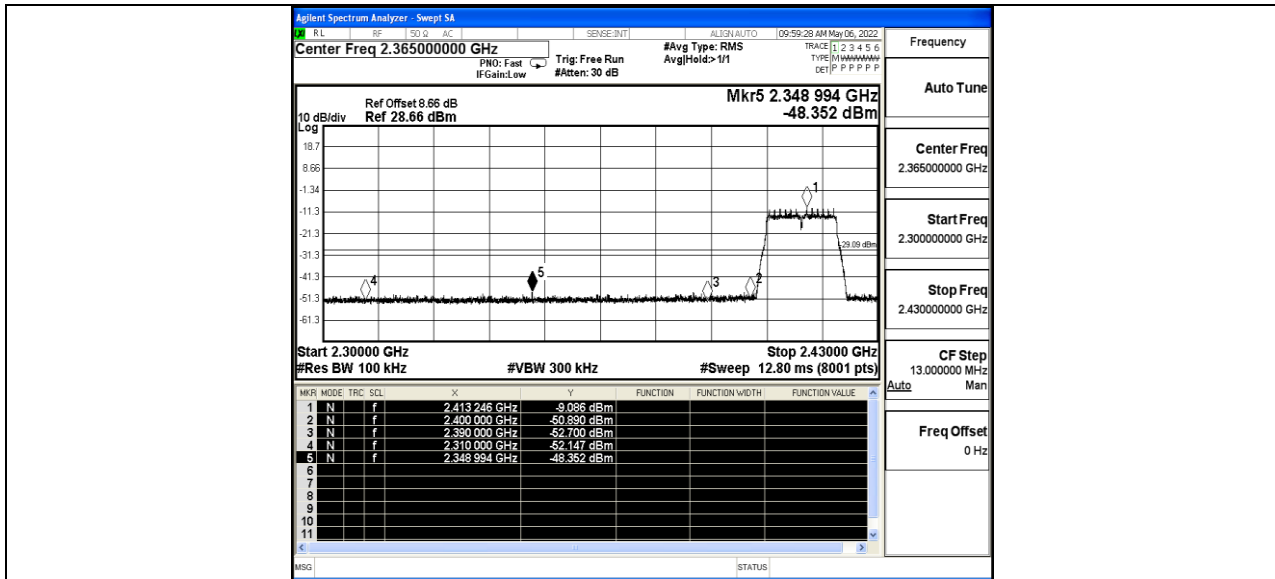
TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	-2.80	-46.79	≤-22.8	PASS
		High	2462	-2.91	-48.23	≤-22.91	PASS
11G	Ant1	Low	2412	-9.09	-48.35	≤-29.09	PASS
		High	2462	-9.80	-48.11	≤-29.8	PASS
11N20SISO	Ant1	Low	2412	-9.56	-48.79	≤-29.56	PASS
		High	2462	-10.00	-47.82	≤-30	PASS

Conducted Spurious Emission

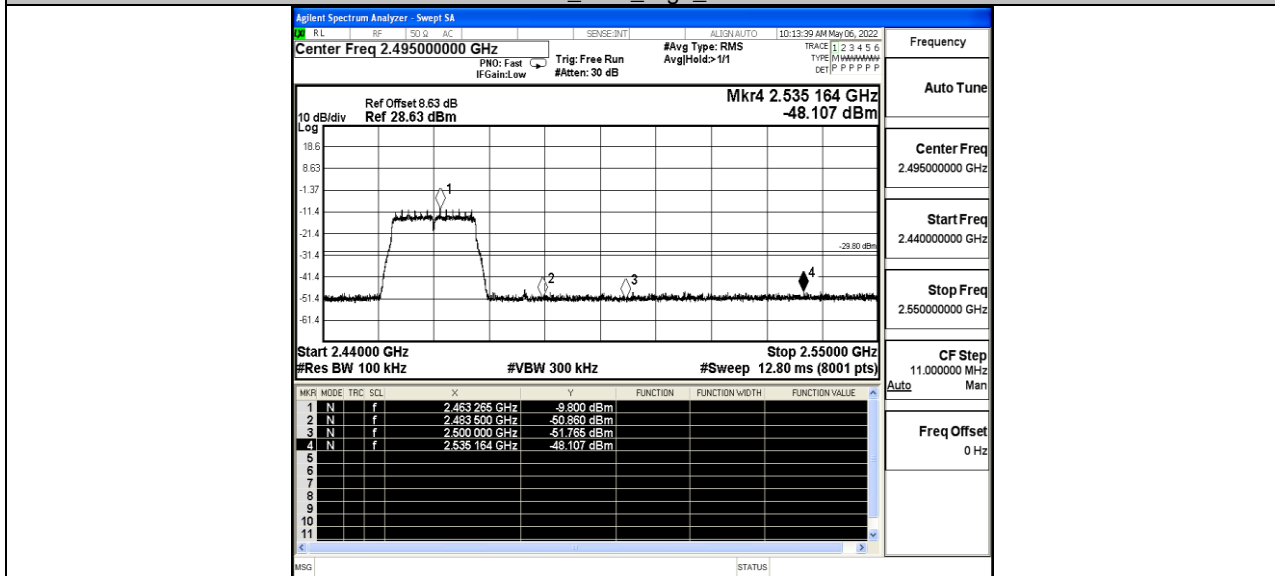
TestMode	Antenna	Channel	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	-2.90	-2.90	---	PASS
			30~1000	-2.90	-60.33	≤-22.9	PASS
			1000~26500	-2.90	-46.61	≤-22.9	PASS
		2437	Reference	-3.22	-3.22	---	PASS
			30~1000	-3.22	-59.26	≤-23.22	PASS
			1000~26500	-3.22	-41.03	≤-23.22	PASS
		2462	Reference	-2.97	-2.97	---	PASS
			30~1000	-2.97	-59.87	≤-22.97	PASS
			1000~26500	-2.97	-45.35	≤-22.97	PASS
11G	Ant1	2412	Reference	-9.43	-9.43	---	PASS
			30~1000	-9.43	-60.29	≤-29.43	PASS
			1000~26500	-9.43	-41.55	≤-29.43	PASS
		2437	Reference	-9.78	-9.78	---	PASS
			30~1000	-9.78	-60.02	≤-29.78	PASS
			1000~26500	-9.78	-40.84	≤-29.78	PASS
		2462	Reference	-9.73	-9.73	---	PASS
			30~1000	-9.73	-42.2	≤-29.73	PASS
			1000~26500	-9.73	-37.46	≤-29.73	PASS
11N20SISO	Ant1	2412	Reference	-9.66	-9.66	---	PASS
			30~1000	-9.66	-60.19	≤-29.66	PASS
			1000~26500	-9.66	-41.1	≤-29.66	PASS
		2437	Reference	-10.45	-10.45	---	PASS
			30~1000	-10.45	-60.39	≤-30.45	PASS
			1000~26500	-10.45	-46.63	≤-30.45	PASS
		2462	Reference	-9.72	-9.72	---	PASS
			30~1000	-9.72	-57.95	≤-29.72	PASS
			1000~26500	-9.72	-46.59	≤-29.72	PASS

5.2 Test plots

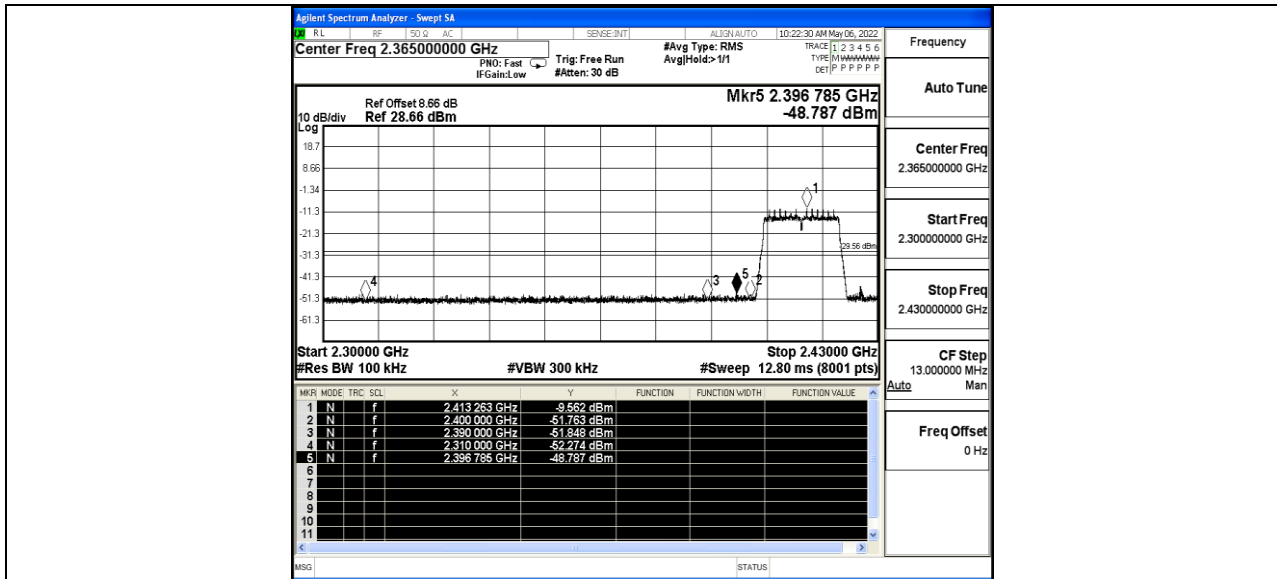




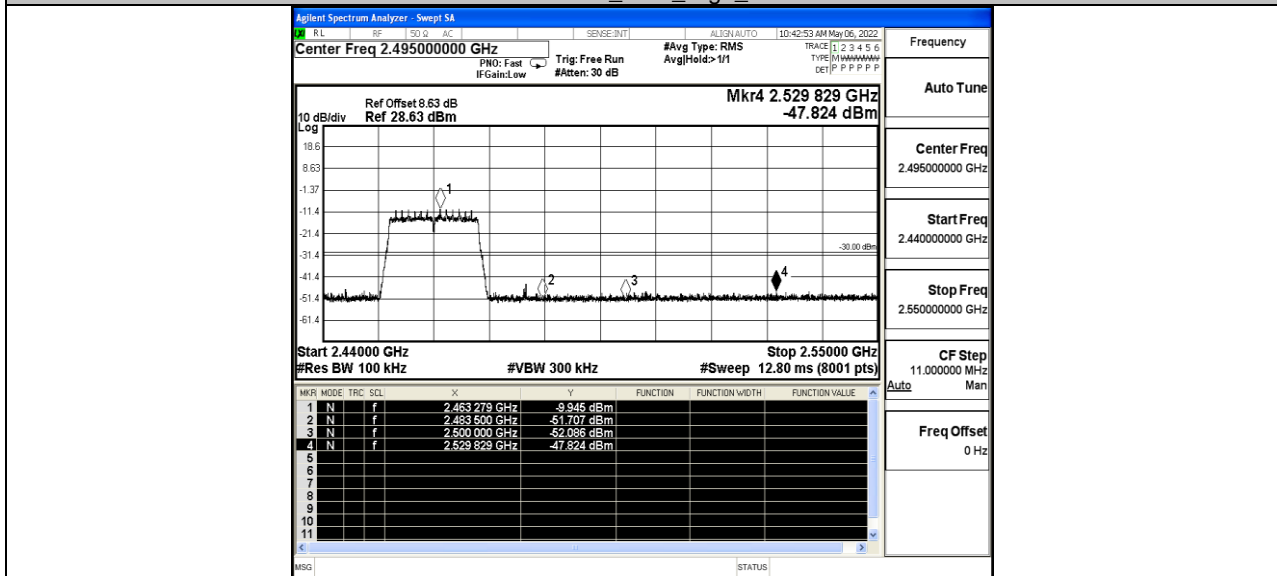
11G_Ant1_High_2462



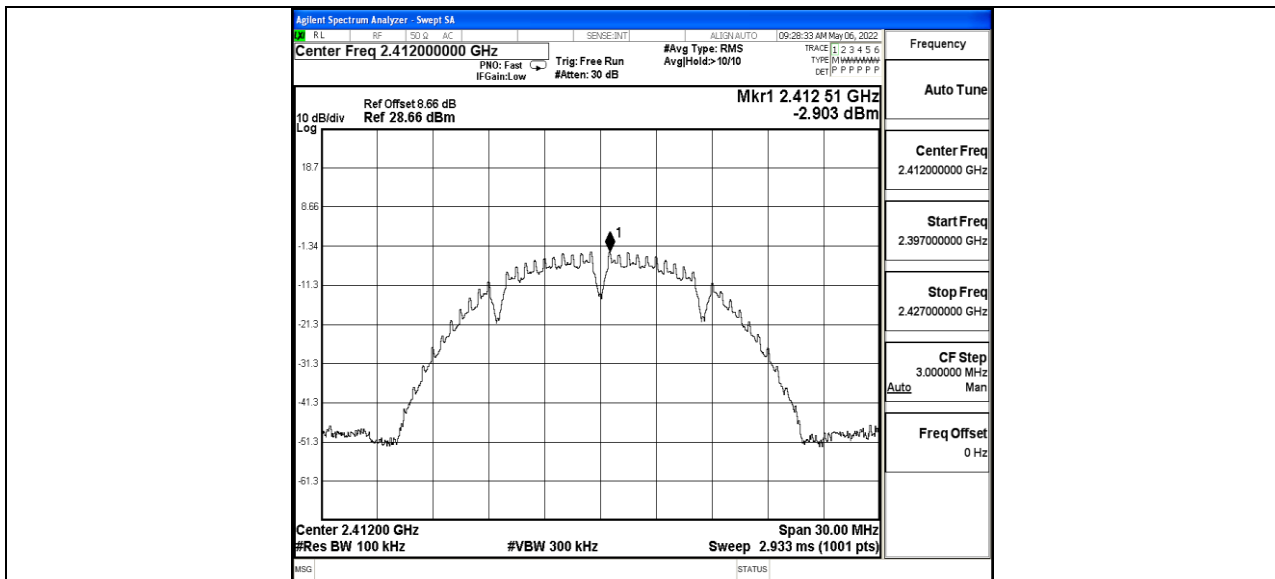
11N20SISO_Ant1_Low_2412



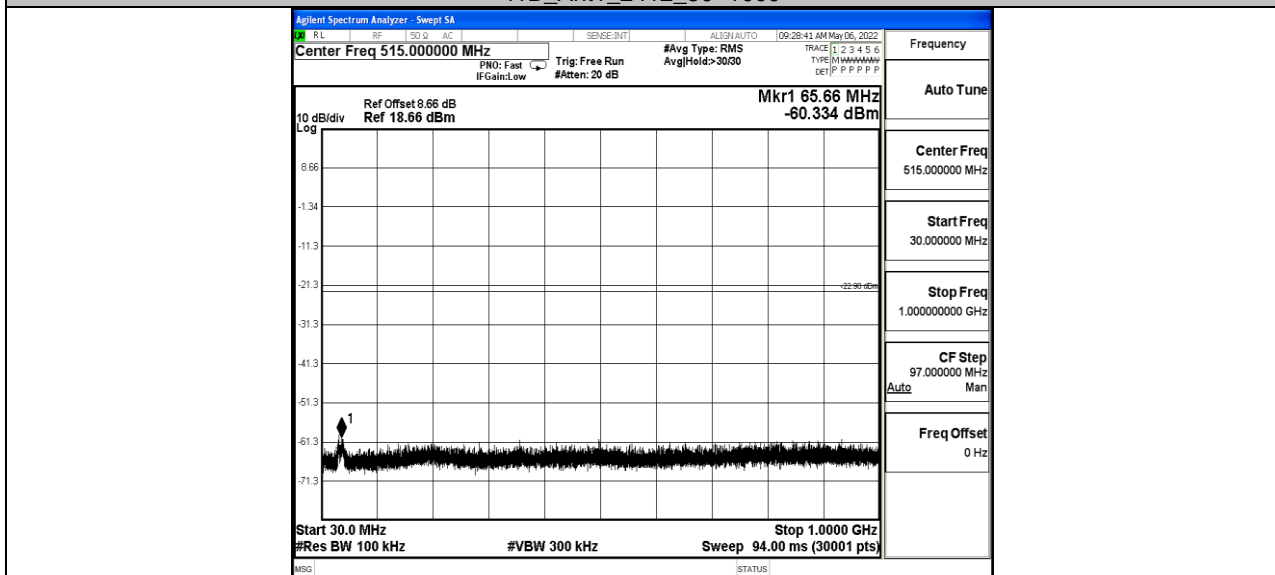
11N20SISO_Ant1_High_2462



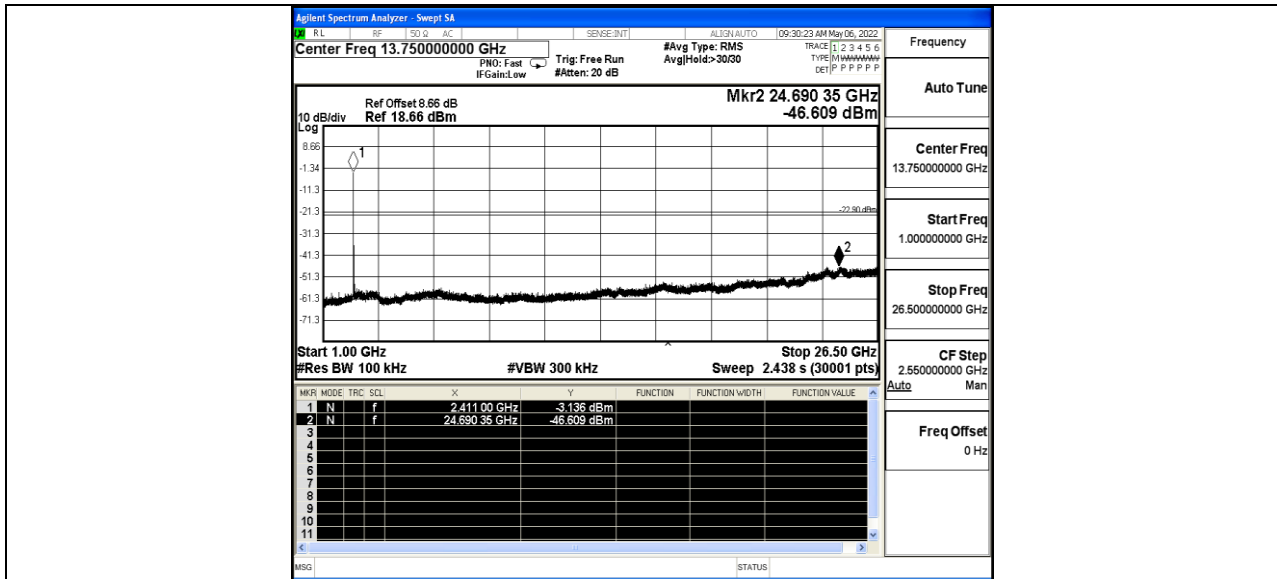
11B_Ant1_2412_0-Reference



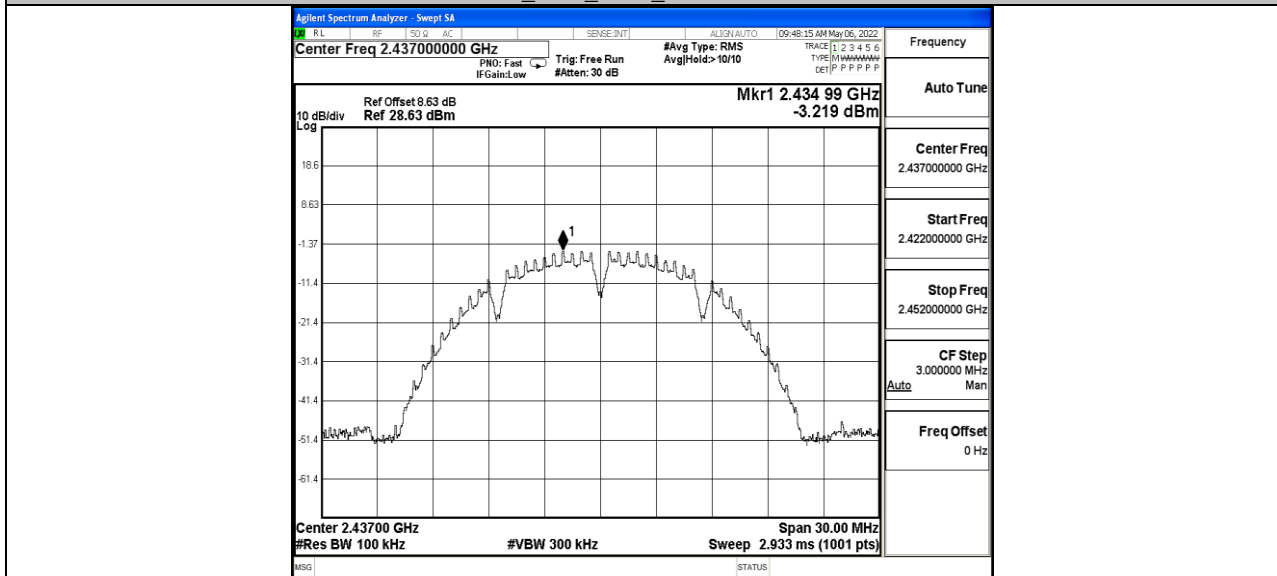
11B_Ant1_2412_30~1000



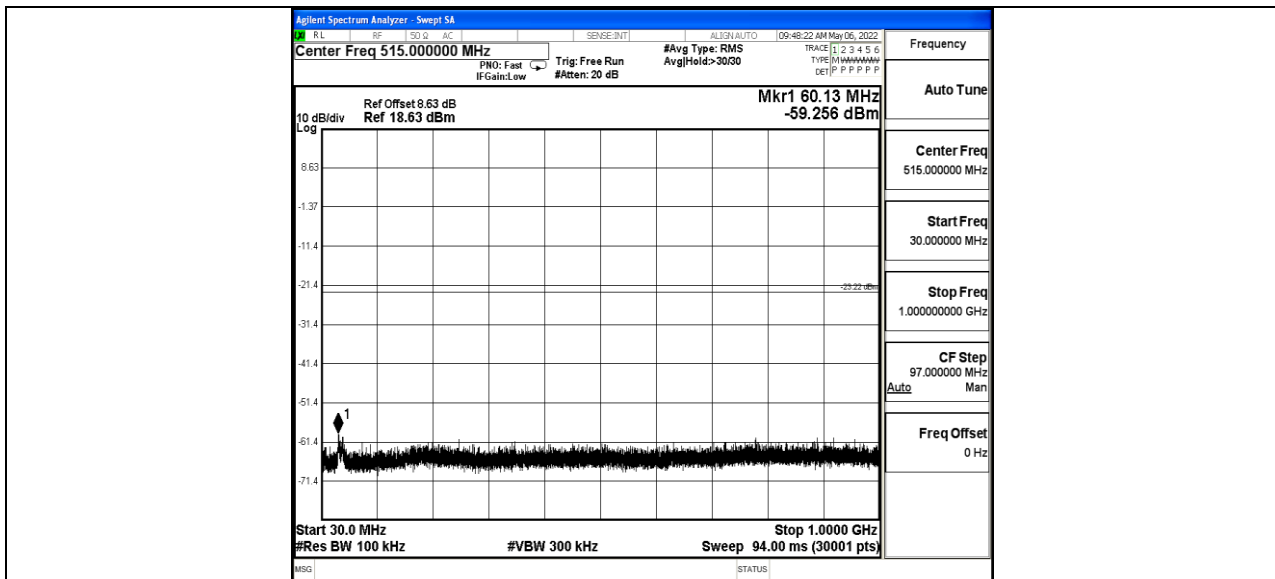
11B_Ant1_2412_1000~26500



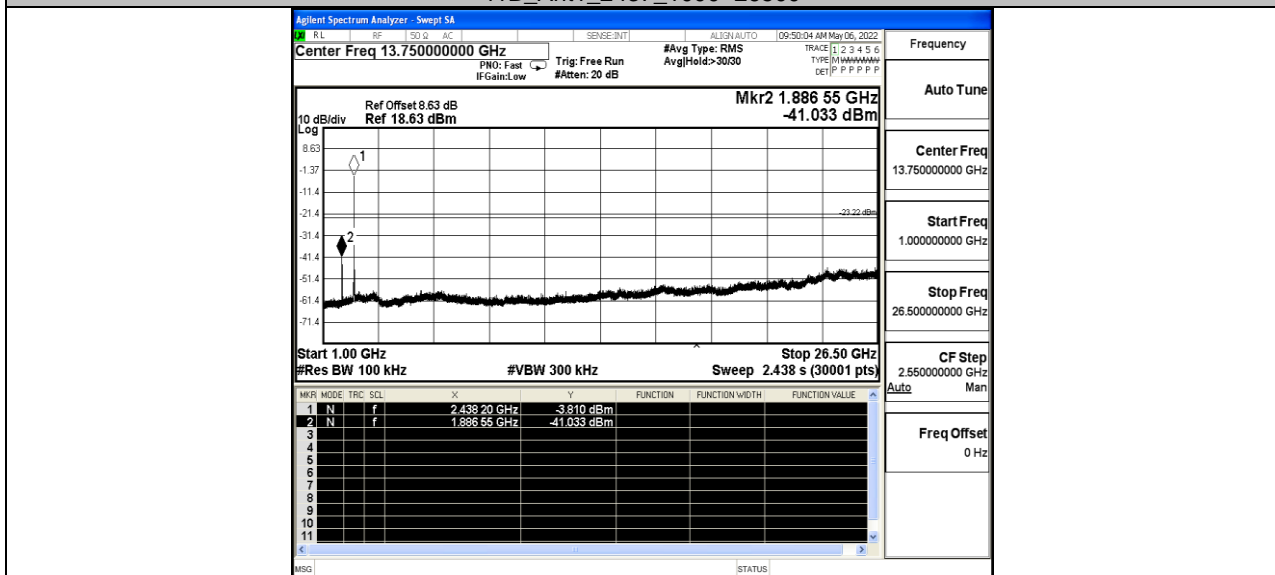
11B_Ant1_2437_0~Reference



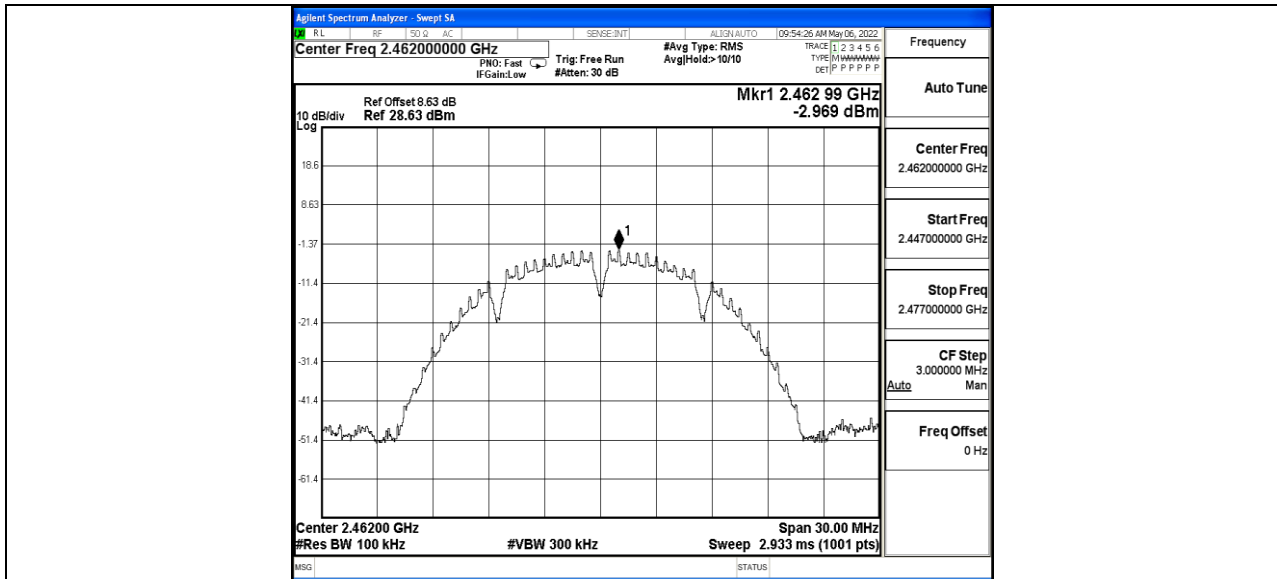
11B_Ant1_2437_30~1000



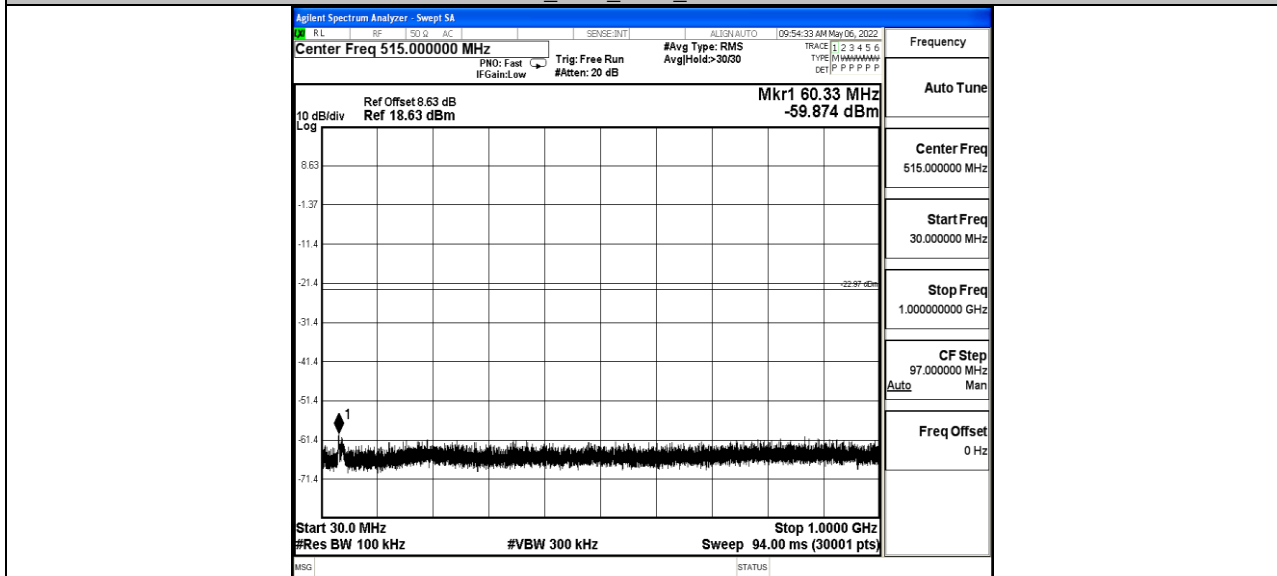
11B_Ant1_2437_1000~26500



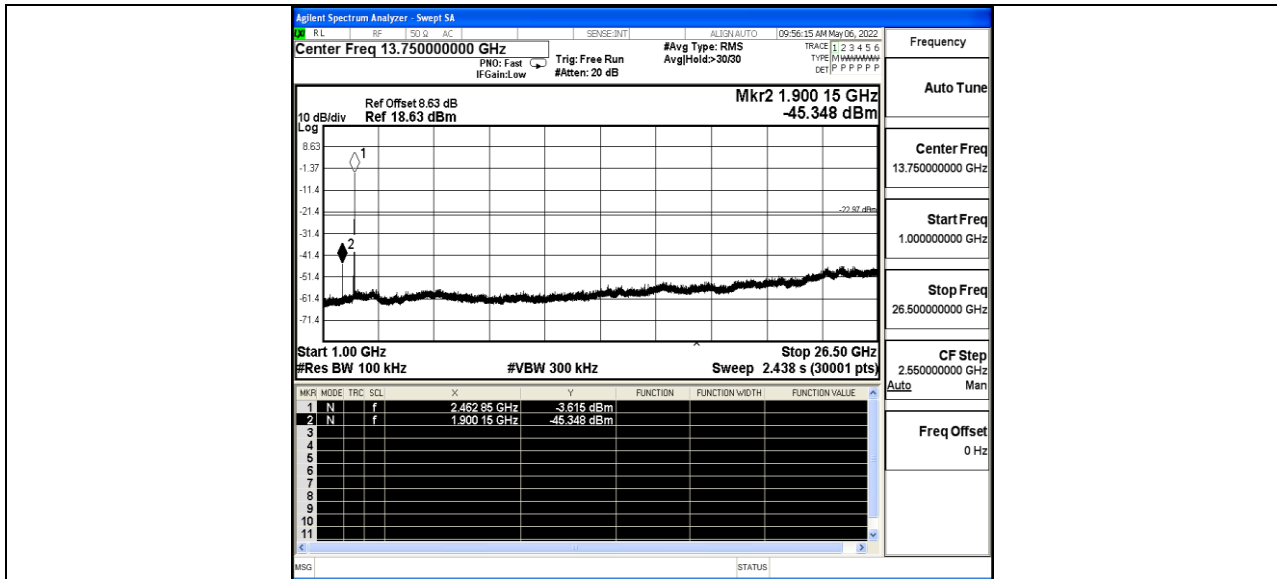
11B_Ant1_2462_0~Reference



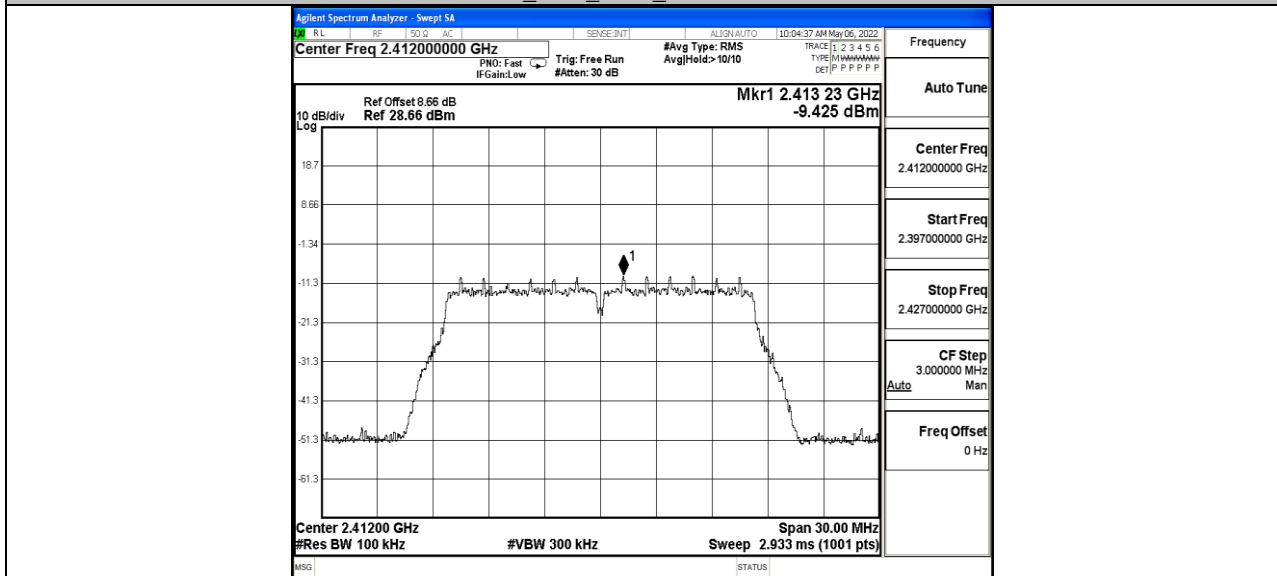
11B_Ant1_2462_30~1000



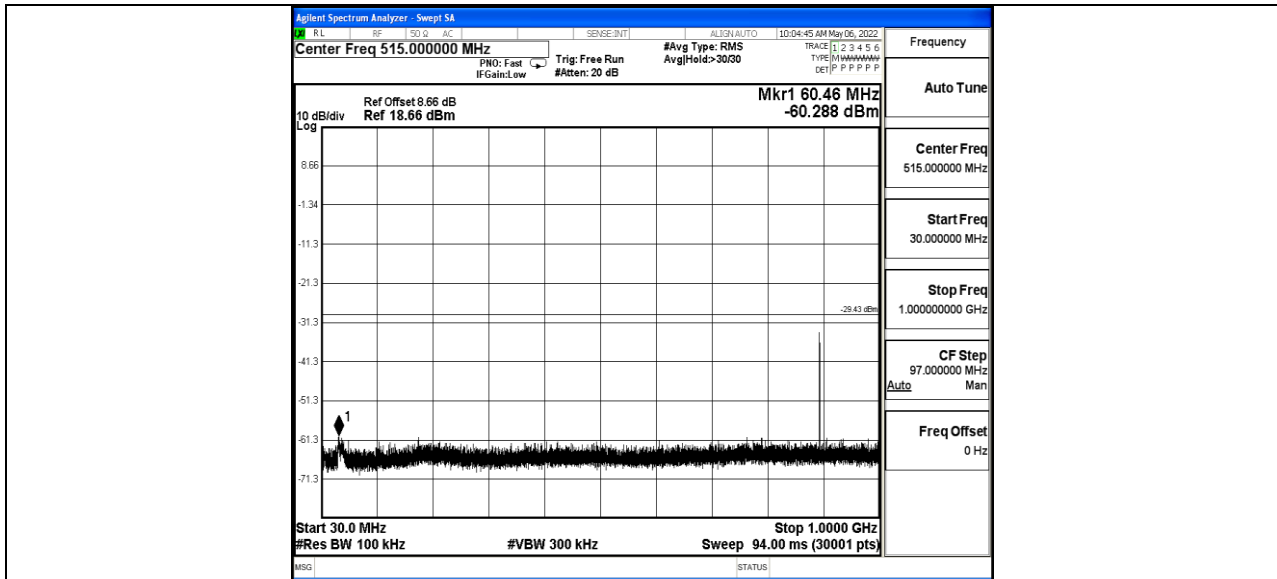
11B_Ant1_2462_1000~26500



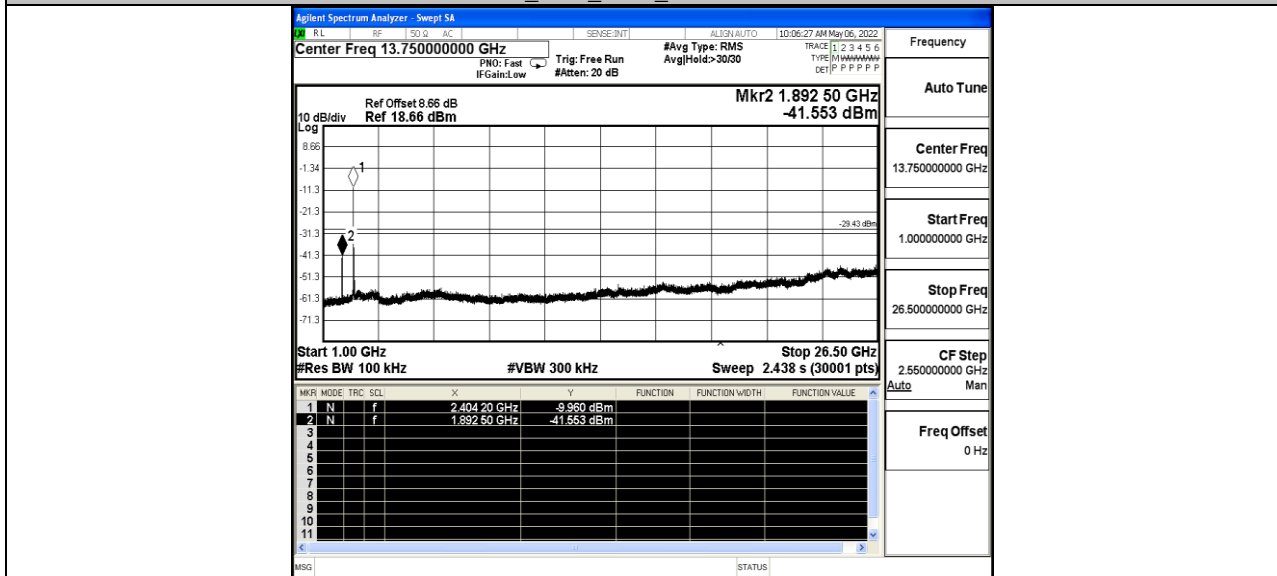
11G_Ant1_2412_0~Reference



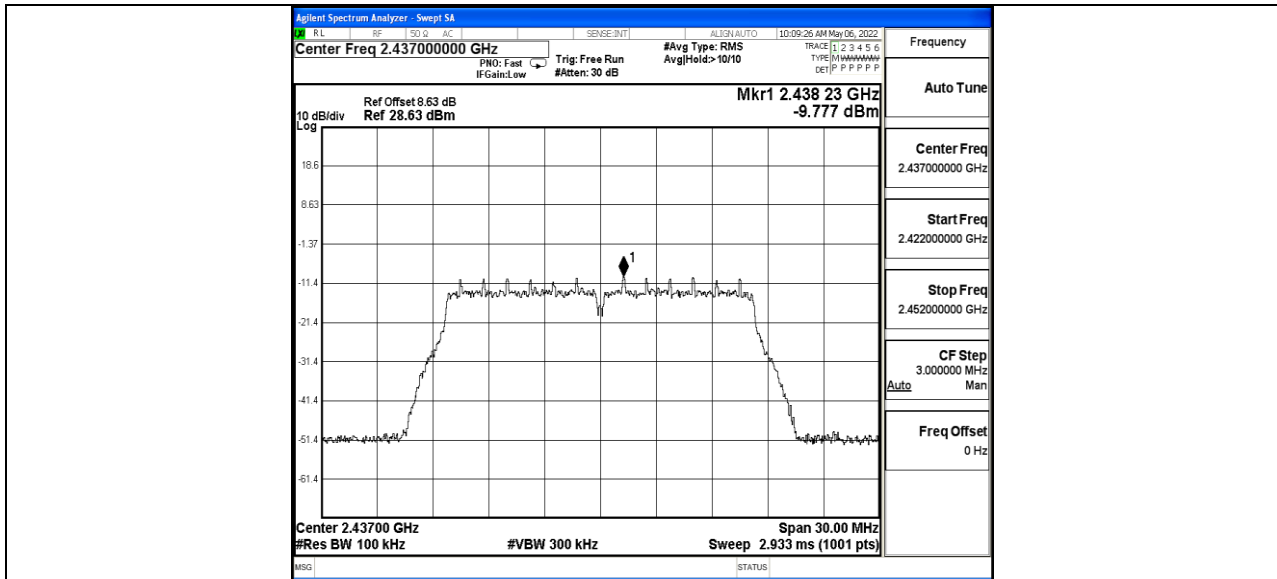
11G_Ant1_2412_30~1000



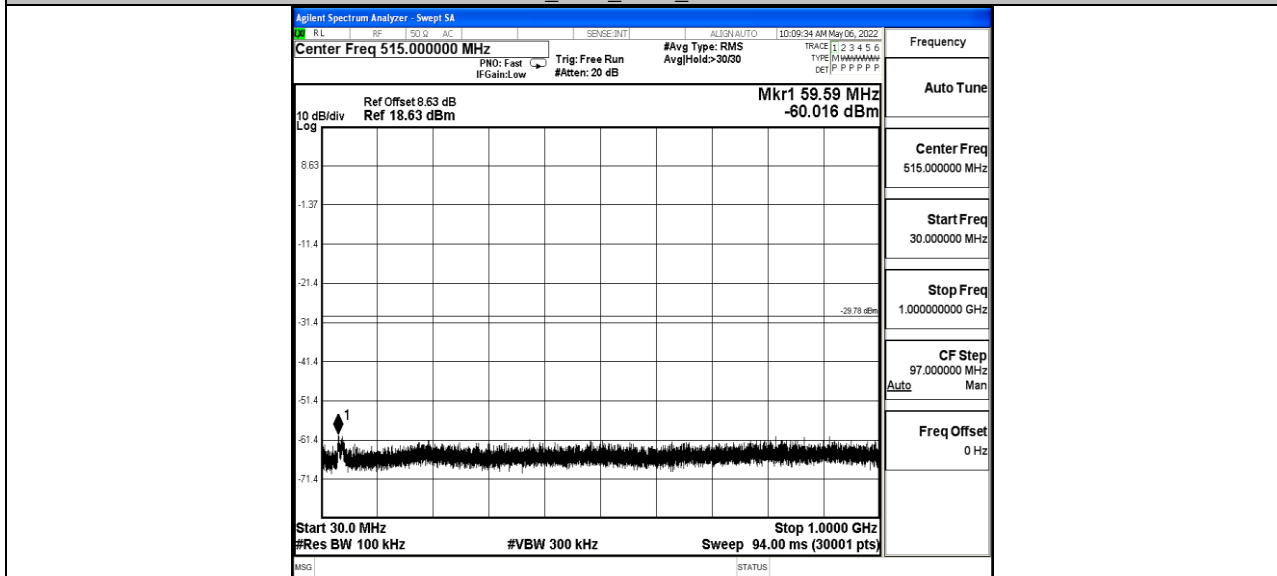
11G_Ant1_2412_1000~26500



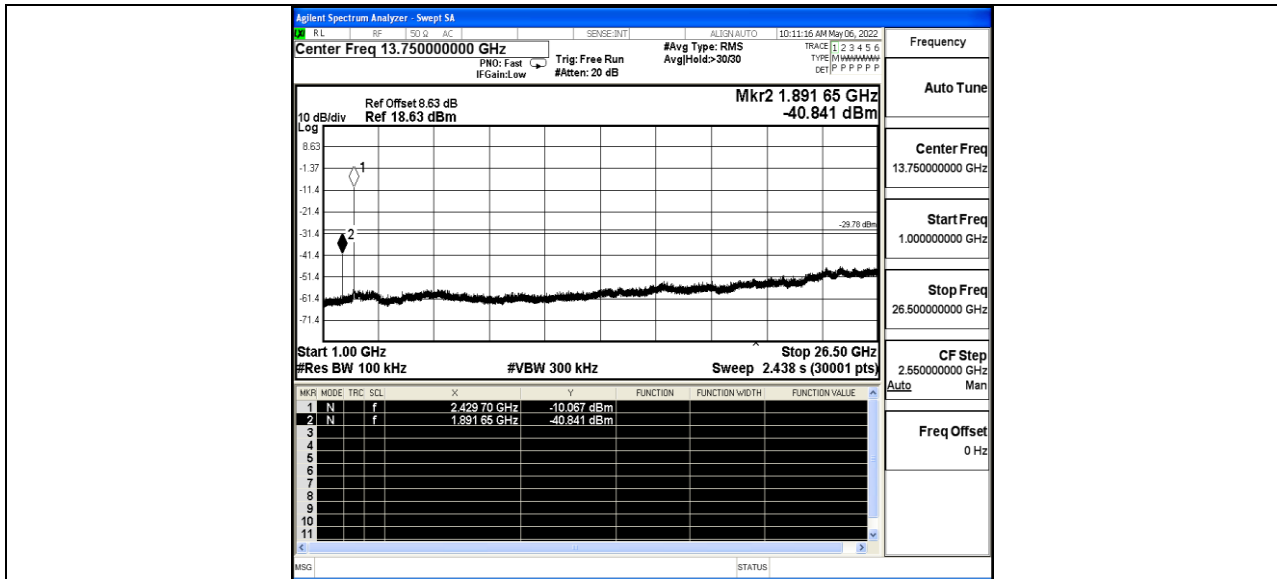
11G_Ant1_2437_0~Reference



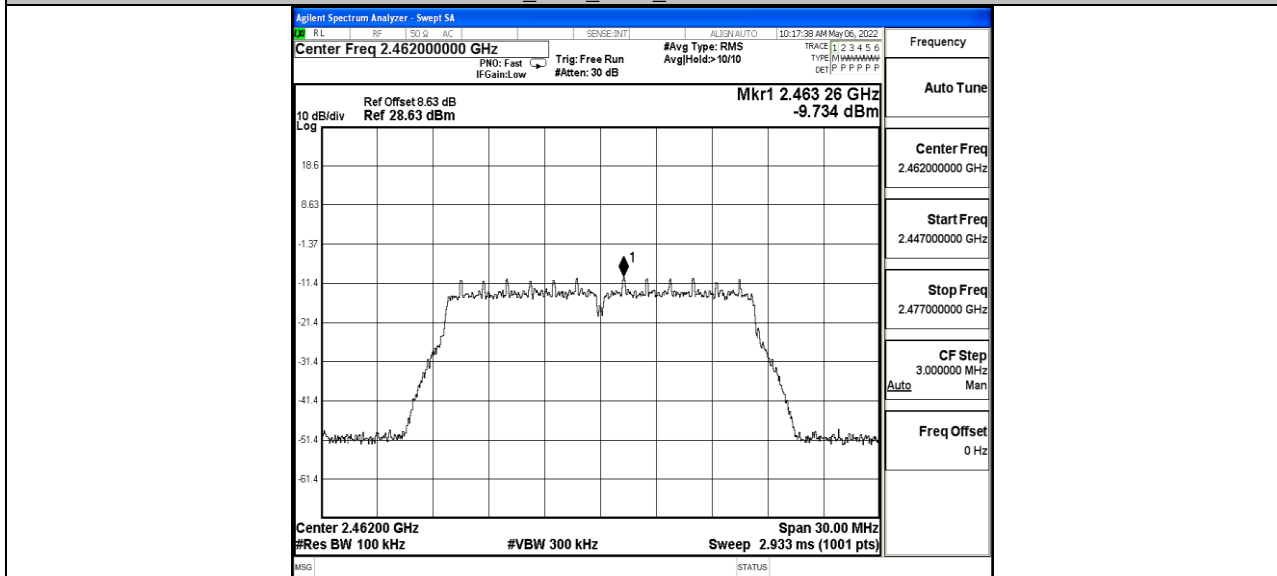
11G_Ant1_2437_30-1000



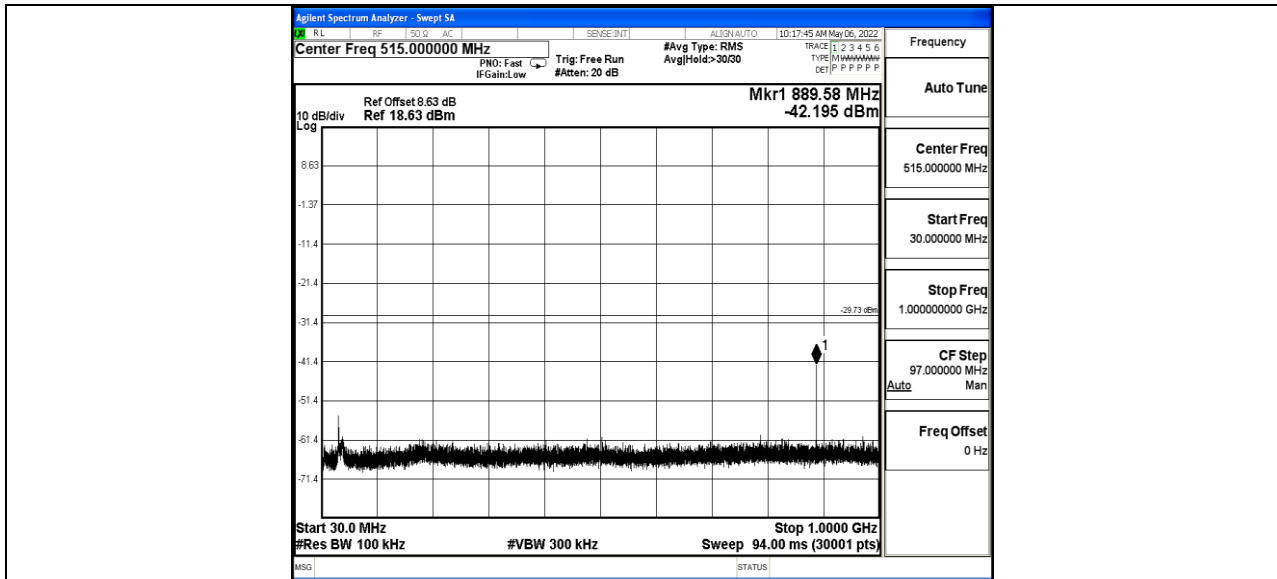
11G_Ant1_2437_1000-26500



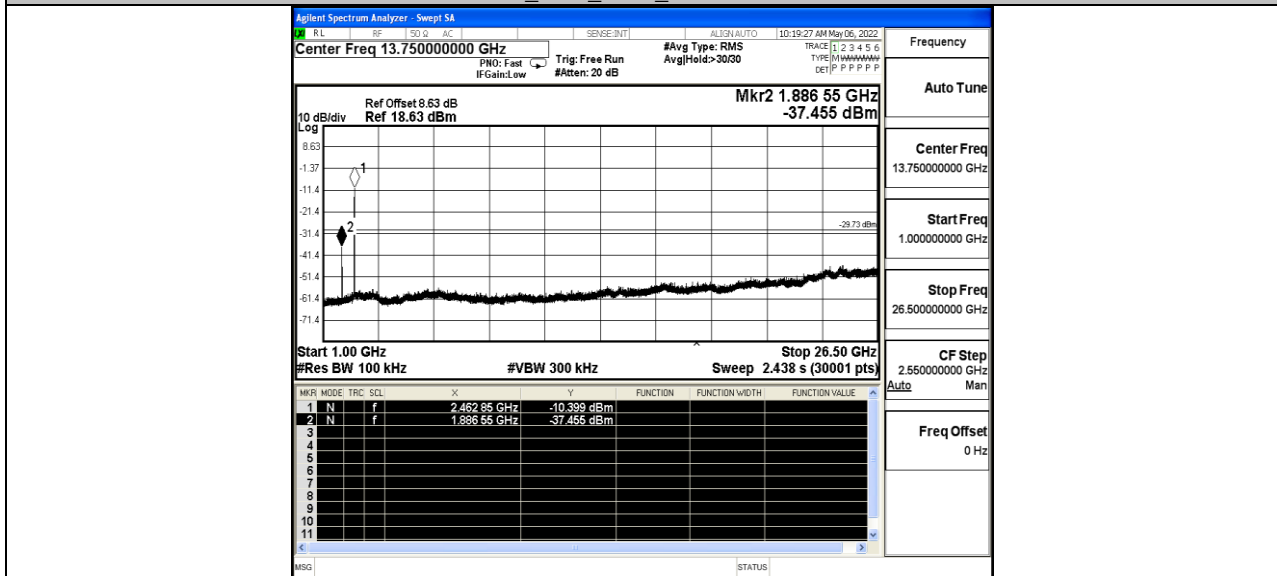
11G_Ant1_2462_0-Reference



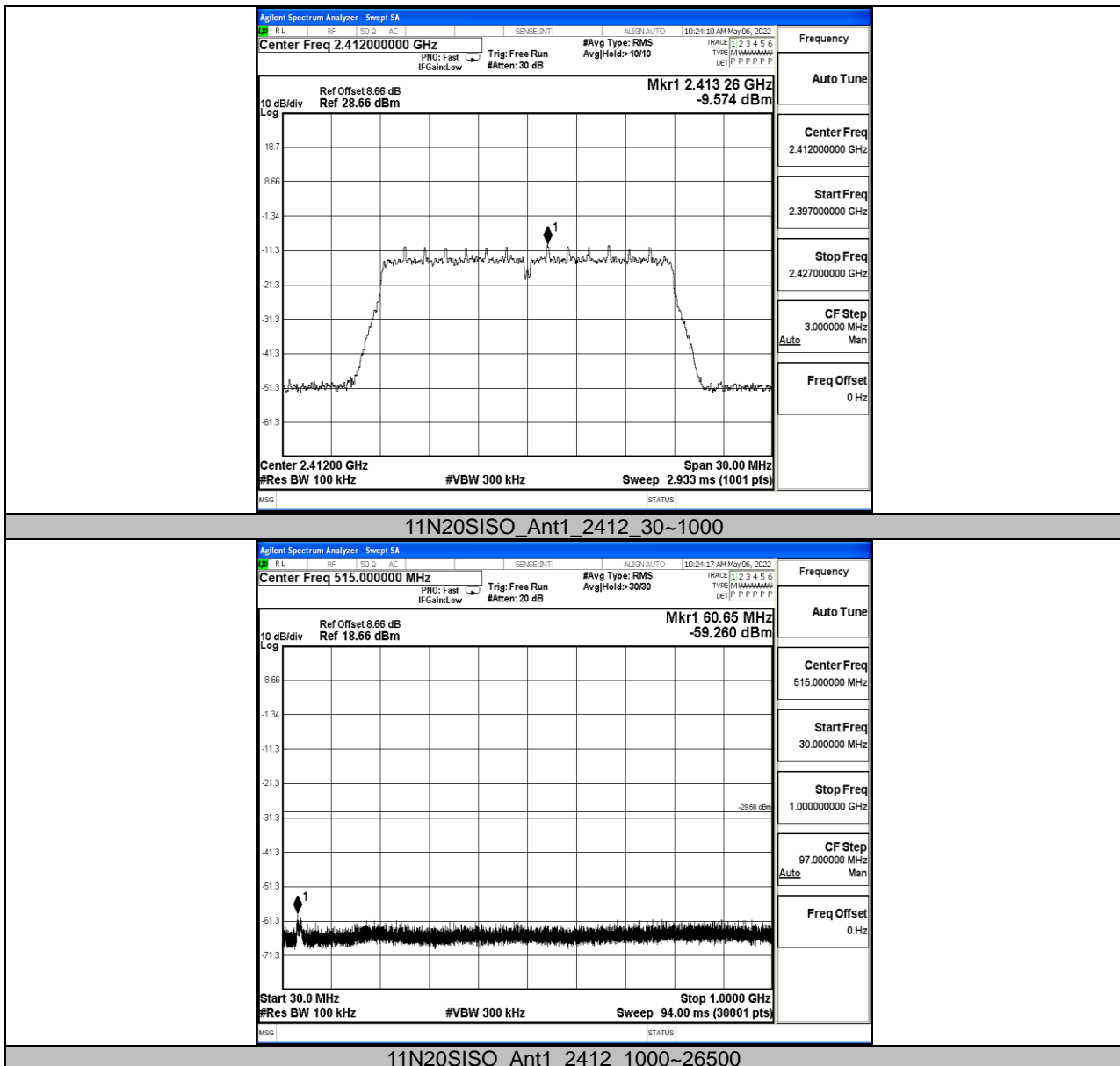
11G_Ant1_2462_30-1000

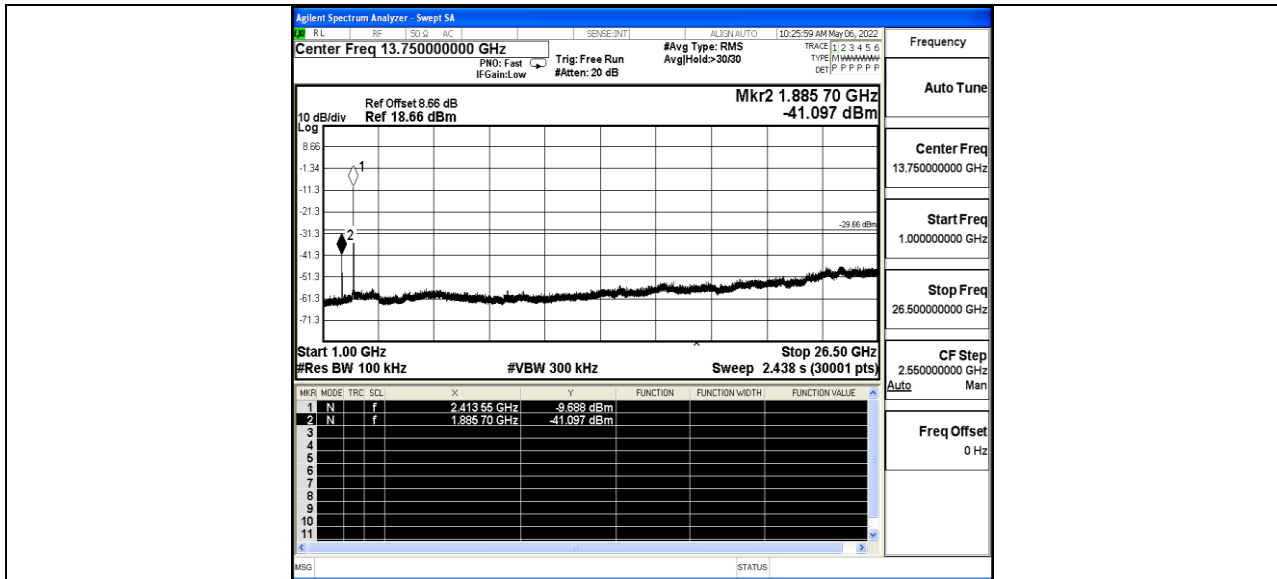


11G_Ant1_2462_1000-26500

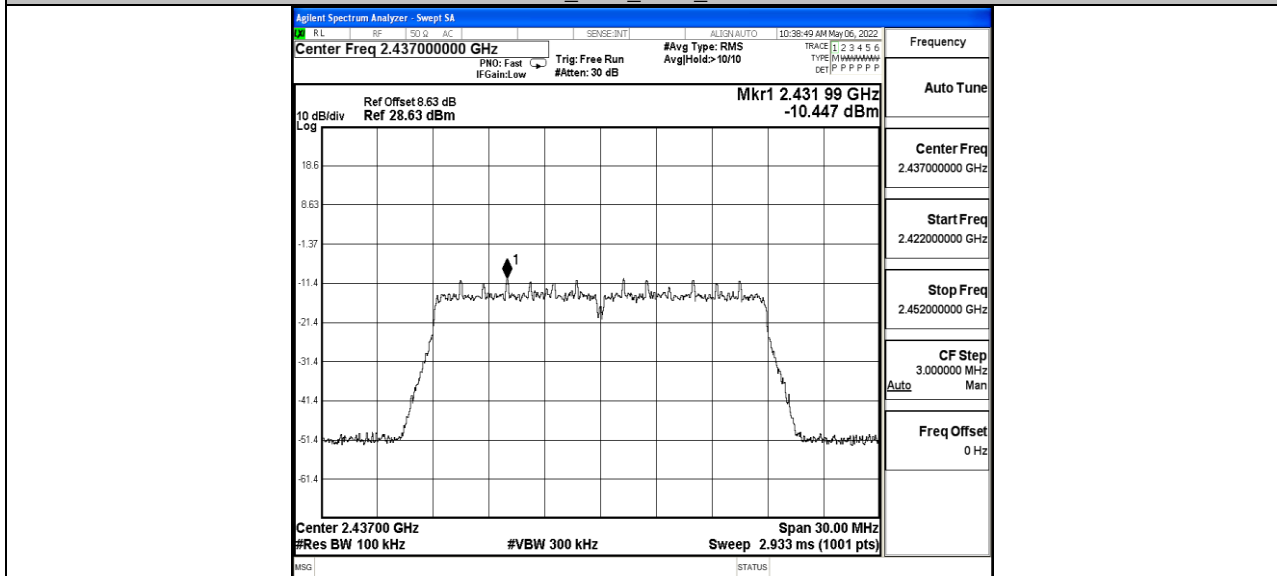


11N20SISO_Ant1_2412_0-Reference

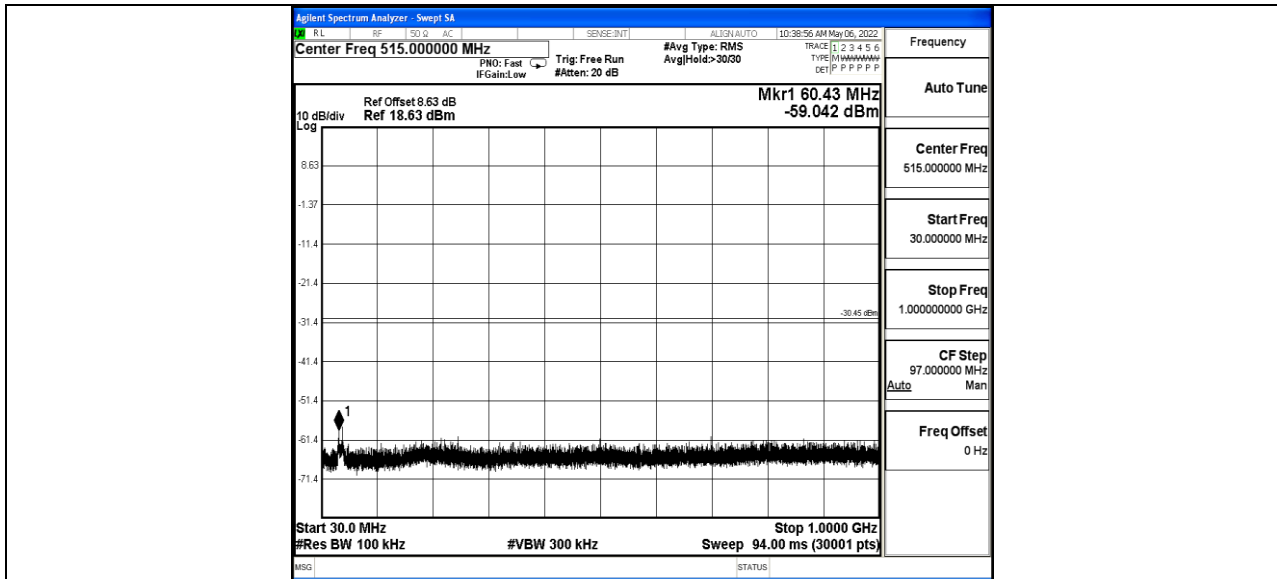




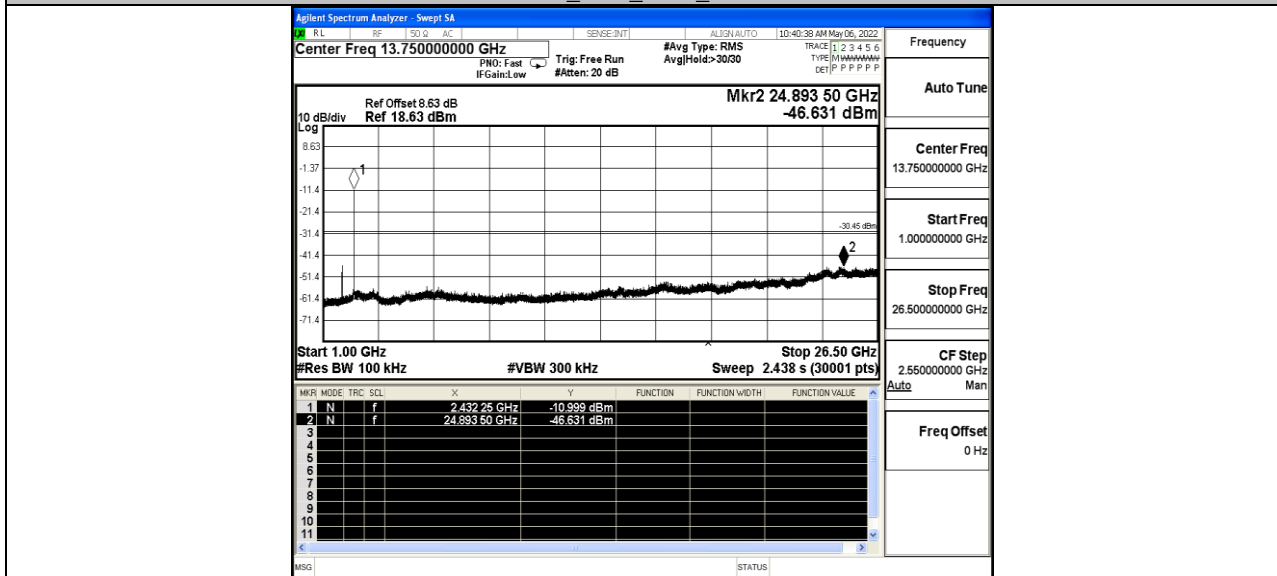
11N20SISO_Ant1_2437_0-Reference



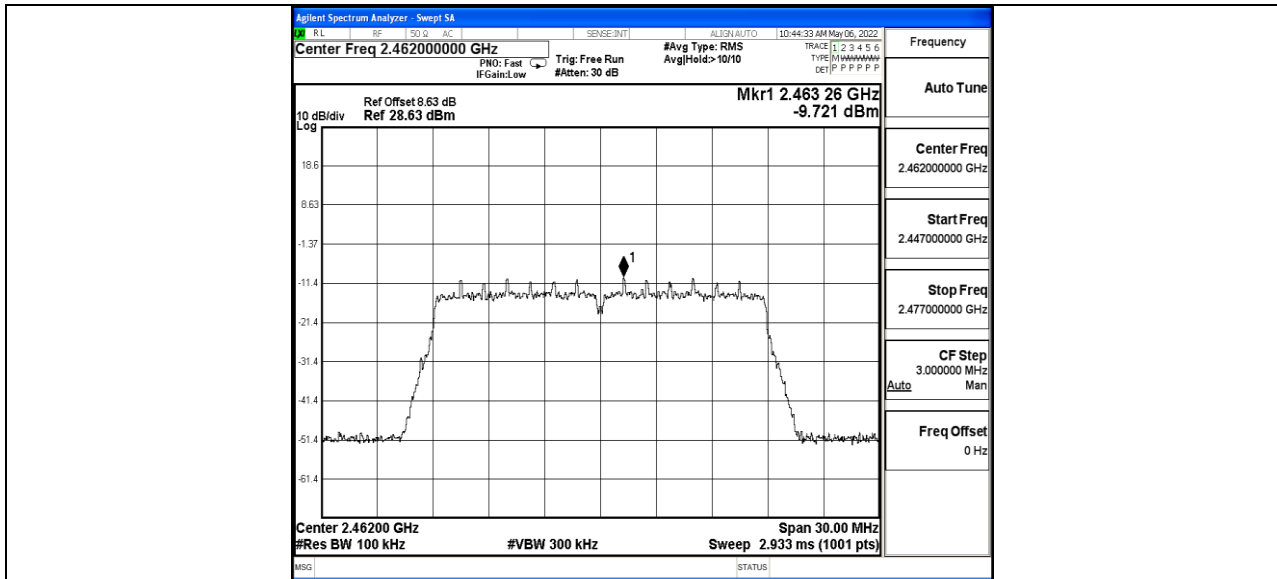
11N20SISO_Ant1_2437_30-1000



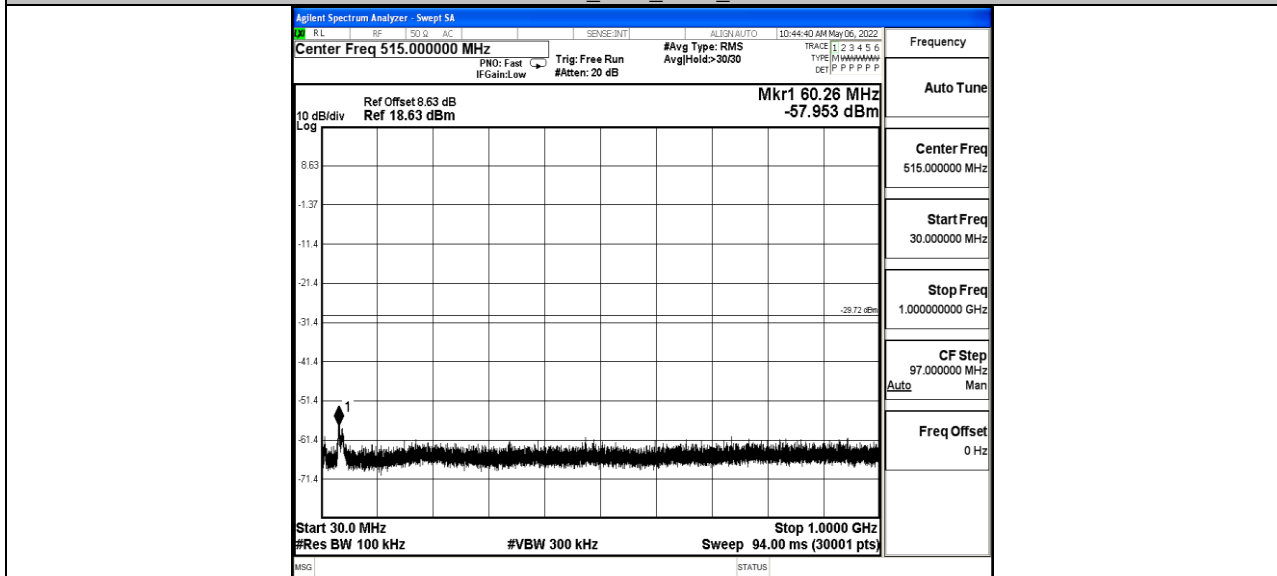
11N20SISO_Ant1_2437_1000-26500



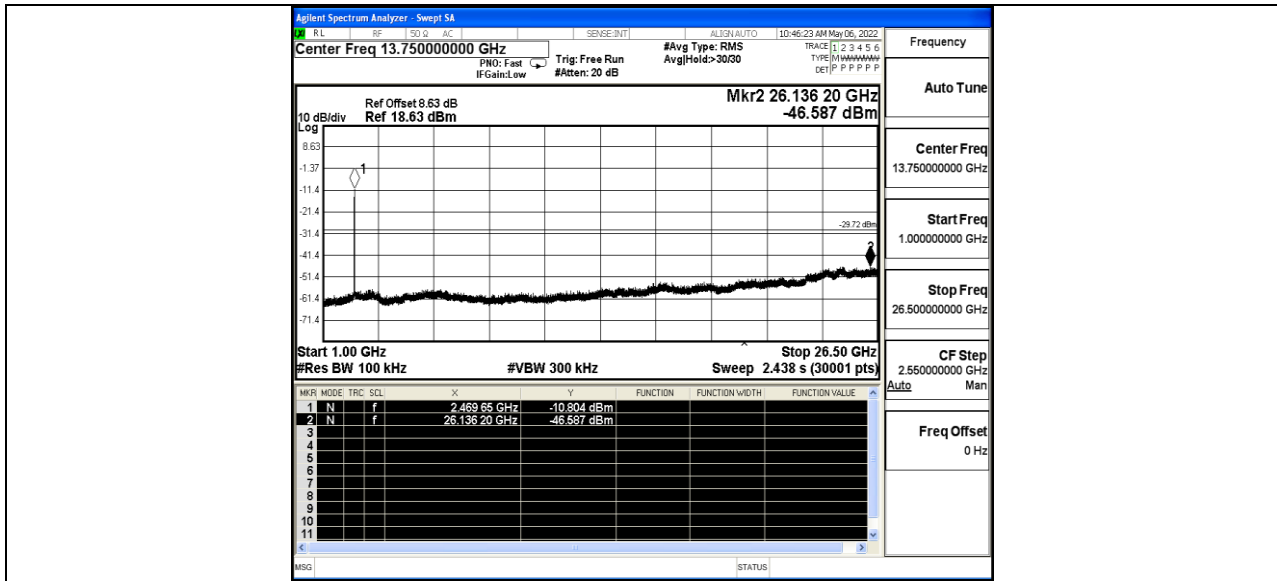
11N20SISO_Ant1_2462_0-Reference



11N20SISO_Ant1_2462_30~1000



11N20SISO_Ant1_2462_1000~26500



***** END *****