

# Test Report

**Report No.:** MTi240604003-05E2

**Date of issue:** 2024-07-12

**Applicant:** Dongguan Huachuang Electronic Co.,Ltd.

**Product name:** wireless carplay adapter

**Model(s):** CP10, CP11,CP12, CP13, CP15, CP16, CP17, CP18, CP19, CP21,CP20, CP22, CP23, CP25, CP26, CP27, CP28, CP29, CP30,CP11C,CP12C, CP13C, CP15C, CP16C, CP17C, CP18C, CP19C, CP21C,CP20C, CP22C, CP23C, CP25C, CP26C, CP27C, CP28C, CP29C, CP30C, CP10C

**FCC ID:** 2BGM4-CP

Shenzhen Microtest Co., Ltd.

<http://www.mtitest.cn>

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2. The test results in this test report are only responsible for the samples submitted
3. This test report is invalid without the seal and signature of the laboratory.
4. This test report is invalid if transferred, altered, or tampered with in any form without authorization.
5. Any objection to this test report shall be submitted to the laboratory within 15 days from the date of receipt of the report.

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<b>Test Result Certification</b>	
<b>Applicant:</b>	Dongguan Huachuang Electronic Co.,Ltd.
<b>Address:</b>	No. 35, Rongfu Road, Shangsha Community, Chang'an Town, Dongguan, Guangdong Province
<b>Manufacturer:</b>	Dongguan Huachuang Electronic Co.,Ltd.
<b>Address:</b>	No. 35, Rongfu Road, Shangsha Community, Chang'an Town, Dongguan, Guangdong Province
<b>Product description</b>	
<b>Product name:</b>	wireless carplay adapter
<b>Trade mark:</b>	N/A
<b>Model name:</b>	CP10
<b>Series Model(s):</b>	CP11,CP12, CP13, CP15, CP16, CP17, CP18, CP19, CP21,CP20, CP22, CP23, CP25, CP26, CP27, CP28, CP29, CP30,CP11C,CP12C, CP13C, CP15C, CP16C, CP17C, CP18C, CP19C, CP21C,CP20C, CP22C, CP23C, CP25C, CP26C, CP27C, CP28C, CP29C, CP30C, CP10C
<b>Standards:</b>	47 CFR Part 15.247
<b>Test Method:</b>	ANSI C63.10-2013 KDB 558074 D01 15.247 Meas Guidance v05r02
<b>Date of Test</b>	
<b>Date of test:</b>	2024-06-29 to 2024-07-10
<b>Test result:</b>	Pass

<b>Test Engineer</b>	:	<i>Yanice Xie</i>
		(Yanice.Xie)
<b>Reviewed By</b>	:	<i>David. Lee</i>
		(David Lee)
<b>Approved By</b>	:	<i>Leon Chen</i>
		(Leon Chen)

## 1 General Description

### 1.1 Description of the EUT

Product name:	wireless carplay adapter
Model name:	CP10
Series Model(s):	CP11,CP12, CP13, CP15, CP16, CP17, CP18, CP19, CP21,CP20, CP22, CP23, CP25, CP26, CP27, CP28, CP29, CP30,CP11C,CP12C, CP13C, CP15C, CP16C, CP17C, CP18C, CP19C, CP21C,CP20C, CP22C, CP23C, CP25C, CP26C, CP27C, CP28C, CP29C, CP30C, CP10C
Model difference:	All the models are the same circuit and module, except the model name and appearance.
Electrical rating:	Input:DC 5V±0.2V 1.0A Output:DC 5V±0.2V 1.0A
Accessories:	N/A
Hardware version:	HC-CP10-V1.0
Software version:	24052301.D01
Test sample(s) number:	MTi240604003-05S1001
<b>RF specification</b>	
Operating frequency range:	802.11b/g/n20:2412~2462 MHz 802.11n40:2422~2452 MHz
Channel number:	11
Modulation type:	IEEE 802.11b : DSSS (DBPSK, DQPSK, CCK) IEEE 802.11g/n (HT20/HT40) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna(s) type:	PCB Antenna
Antenna(s) gain:	2.98 dBi

### 1.2 Description of test modes

No.	Emission test modes
Mode1	TX-802.11b
Mode2	TX-802.11g
Mode3	TX-802.11N20
Mode4	TX-802.11N40

#### 1.2.1 Operation channel list

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	7	2442	11	2462
4	2427	8	2447	/	/

**Test Channel List**
**Operation Band: 2400-2483.5 MHz**

Bandwidth (MHz)	Lowest Channel (LCH) (MHz)	Middle Channel (MCH) (MHz)	Highest Channel (HCH) (MHz)
20	2412	2437	2462
40	2422	2437	2452

Note: The test software provided by manufacturer is used to control EUT for working in engineering mode, that enables selectable channel, and capable of continuous transmitting mode.

**Test Software:**

For power setting, refer to below table.

Test software	cmd		
Mode	2412MHz	2442MHz	2462MHz
802.11b	13	13	13
802.11g	12	12	12
802.11n20	11	11	11
Mode	2422MHz	2442MHz	2452MHz
802.11n40	13	13	13

### 1.3 Environmental Conditions

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

Temperature:	15°C ~ 35°C
Humidity:	20% RH ~ 75% RH
Atmospheric pressure:	98 kPa ~ 101 kPa

### 1.4 Description of support units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support equipment list			
Description	Model	Serial No.	Manufacturer
Accumulator	55D23LX	/	CAMEL
Car Play	/	/	/
Support cable list			
Description	Length (m)	From	To
/	/	/	/

### 1.5 Measurement uncertainty

Measurement	Uncertainty
Occupied channel bandwidth	±3 %
RF output power, conducted	±1 dB
Power Spectral Density, conducted	±1 dB
Unwanted Emissions, conducted	±1 dB
Radiated spurious emissions (above 1GHz)	±5.3dB
Radiated spurious emissions (9kHz~30MHz)	±4.3dB
Radiated spurious emissions (30MHz~1GHz)	±4.7dB
Temperature	±1 °C
Humidity	± 5 %

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

## 2 Summary of Test Result

No.	Item	Requirement	Result
1	Antenna requirement	47 CFR 15.203	Pass
2	Occupied Bandwidth	47 CFR 15.247(a)(2)	Pass
3	Maximum Conducted Output Power	47 CFR 15.247(b)(3)	Pass
4	Power Spectral Density	47 CFR 15.247(e)	Pass
5	RF conducted spurious emissions and band edge measurement	47 CFR 15.247(d), 15.209, 15.205	Pass
6	Band edge emissions (Radiated)	47 CFR 15.247(d), 15.209, 15.205	Pass
7	Radiated emissions (below 1GHz)	47 CFR 15.247(d), 15.209, 15.205	Pass
8	Radiated emissions (above 1GHz)	47 CFR 15.247(d), 15.209, 15.205	Pass
9	Conducted Emission at AC power line	47 CFR 15.207(a)	N/A

### Notes:

- 1.N/A means not applicable.
- 2.Since the EUT power by DC supply, therefore AC power line conducted emissions test is not required.



### 3 Test Facilities and accreditations

#### 3.1 Test laboratory

Test laboratory:	Shenzhen Microtest Co., Ltd.
Test site location:	101, No.7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	(86-755)88850135
Fax:	(86-755)88850136
CNAS Registration No.:	CNAS L5868
FCC Registration No.:	448573
IC Registration No.:	21760
CABID:	CN0093

#### 4 List of test equipment

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
Occupied Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in non-restricted frequency bands						
1	Wideband Radio Communication Tester	Rohde&schwarz	CMW500	149155	2024-03-20	2025-03-19
2	ESG Series Analog Ssignal Generator	Agilent	E4421B	GB40051240	2024-03-21	2025-03-20
3	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2024-03-21	2025-03-20
4	Synthesized Sweeper	Agilent	83752A	3610A01957	2024-03-21	2025-03-20
5	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2024-03-21	2025-03-20
6	RF Control Unit	Tonscend	JS0806-1	19D8060152	2024-03-21	2025-03-20
7	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2024-03-21	2025-03-20
8	ESG Vector Signal Generator	Agilent	N5182A	MY50143762	2024-03-20	2025-03-19
9	DC Power Supply	Agilent	E3632A	MY40027695	2024-03-21	2025-03-20
Band edge emissions (Radiated) Emissions in frequency bands (above 1GHz)						
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2024-03-20	2025-03-19
2	Double Ridged Broadband Horn Antenna	schwarabeck	BBHA 9120 D	2278	2023-06-17	2025-06-16
3	Amplifier	Agilent	8449B	3008A01120	2024-03-20	2025-03-19
4	MXA signal analyzer	Agilent	N9020A	MY54440859	2024-03-21	2025-03-20
5	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2024-03-21	2025-03-20
6	Horn antenna	Schwarzbeck	BBHA 9170	00987	2023-06-17	2025-06-16
7	Pre-amplifier	Space-Dtronics	EWLAN1840 G	210405001	2024-03-21	2025-03-20
Emissions in frequency bands (below 1GHz)						
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2024-03-20	2025-03-19
2	TRILOG Broadband Antenna	schwarabeck	VULB 9163	9163-1338	2023-06-11	2025-06-10
3	Active Loop Antenna	Schwarzbeck	FMZB 1519 B	00066	2024-03-23	2025-03-22
4	Amplifier	Hewlett-Packard	8447F	3113A06184	2024-03-20	2025-03-19

## 5 Evaluation Results (Evaluation)

### 5.1 Antenna requirement

Test Requirement:	Refer to 47 CFR Part 15.203, 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.
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#### 5.1.1 Conclusion:

The antenna of the EUT is permanently attached. The EUT complies with the requirement of FCC PART 15.203.
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## 6 Radio Spectrum Matter Test Results (RF)

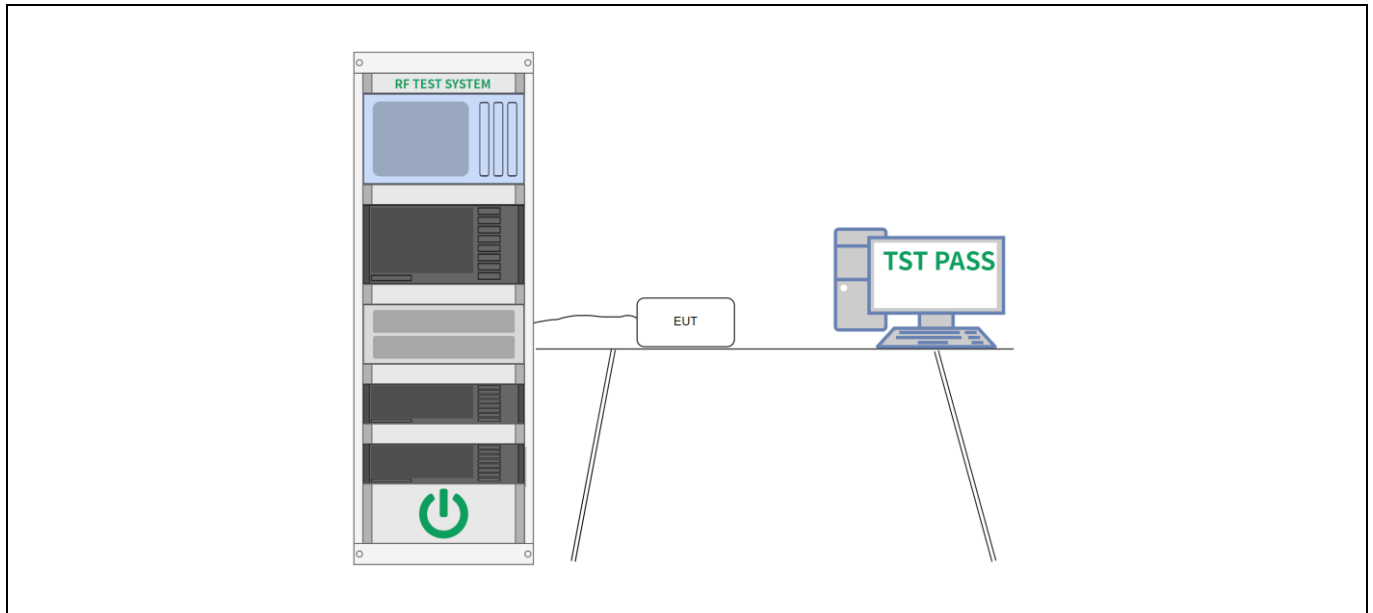
### 6.1 Occupied Bandwidth

Test Requirement:	47 CFR 15.247(a)(2)
Test Limit:	Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	ANSI C63.10-2013, section 11.8 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	a) Set RBW = 100 kHz. b) Set the VBW $\geq$ $[3 \times \text{RBW}]$ . 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.

#### 6.1.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.36 °C	Humidity:	51.37 %	Atmospheric Pressure:	99 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4				
Final test mode:	Mode1, Mode2, Mode3, Mode4				

#### 6.1.2 Test Setup Diagram:



#### 6.1.3 Test Data:

Please Refer to Appendix for Details.

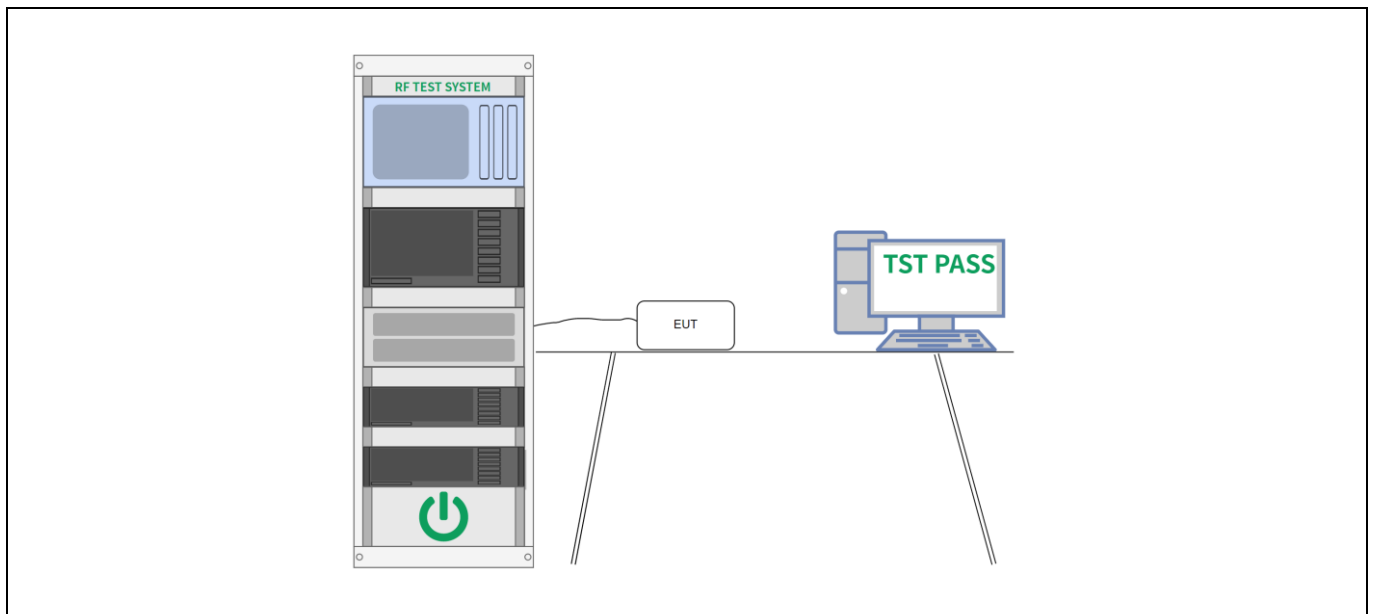
## 6.2 Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(3)
Test Limit:	Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Method:	ANSI C63.10-2013, section 11.9.1 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power

### 6.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.36 °C	Humidity:	51.37 %	Atmospheric Pressure:	99 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4				
Final test mode:	Mode1, Mode2, Mode3, Mode4				

### 6.2.2 Test Setup Diagram:



### 6.2.3 Test Data:

Please Refer to Appendix for Details.

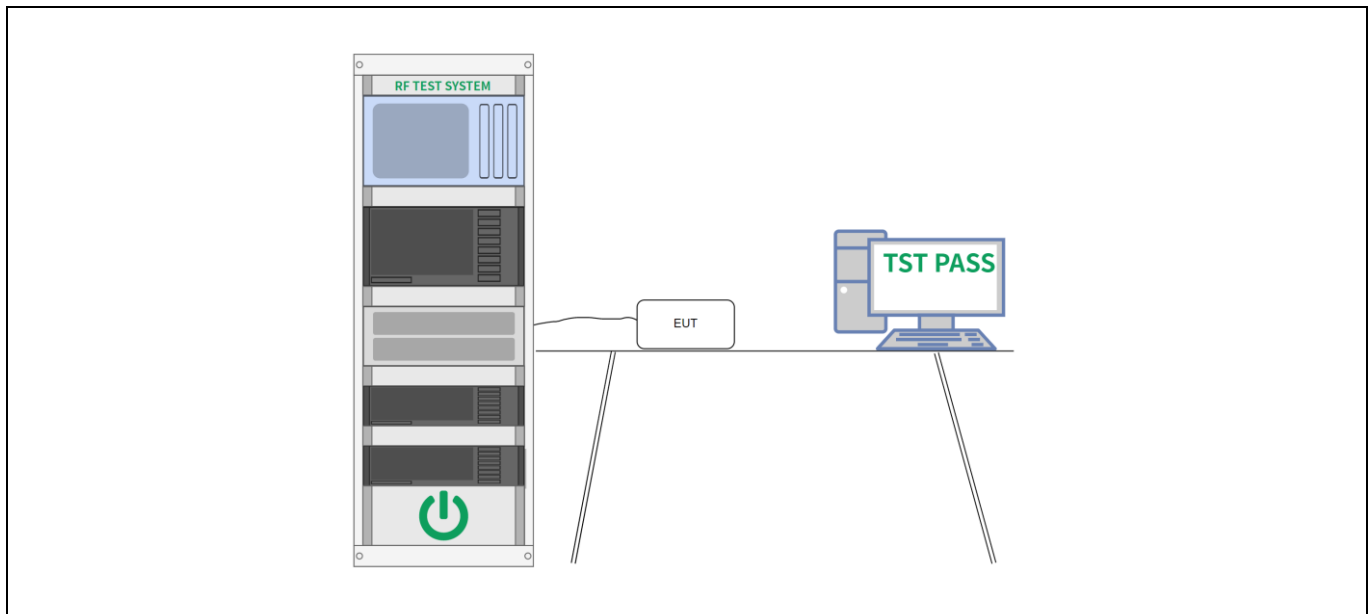
### 6.3 Power Spectral Density

Test Requirement:	47 CFR 15.247(e)
Test Limit:	Refer to 47 CFR 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Method:	ANSI C63.10-2013, section 11.10 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013, section 11.10, Maximum power spectral density level in the fundamental emission

#### 6.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.36 °C	Humidity:	51.37 %	Atmospheric Pressure:	99 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4				
Final test mode:	Mode1, Mode2, Mode3, Mode4				

#### 6.3.2 Test Setup Diagram:



#### 6.3.3 Test Data:

Please Refer to Appendix for Details.

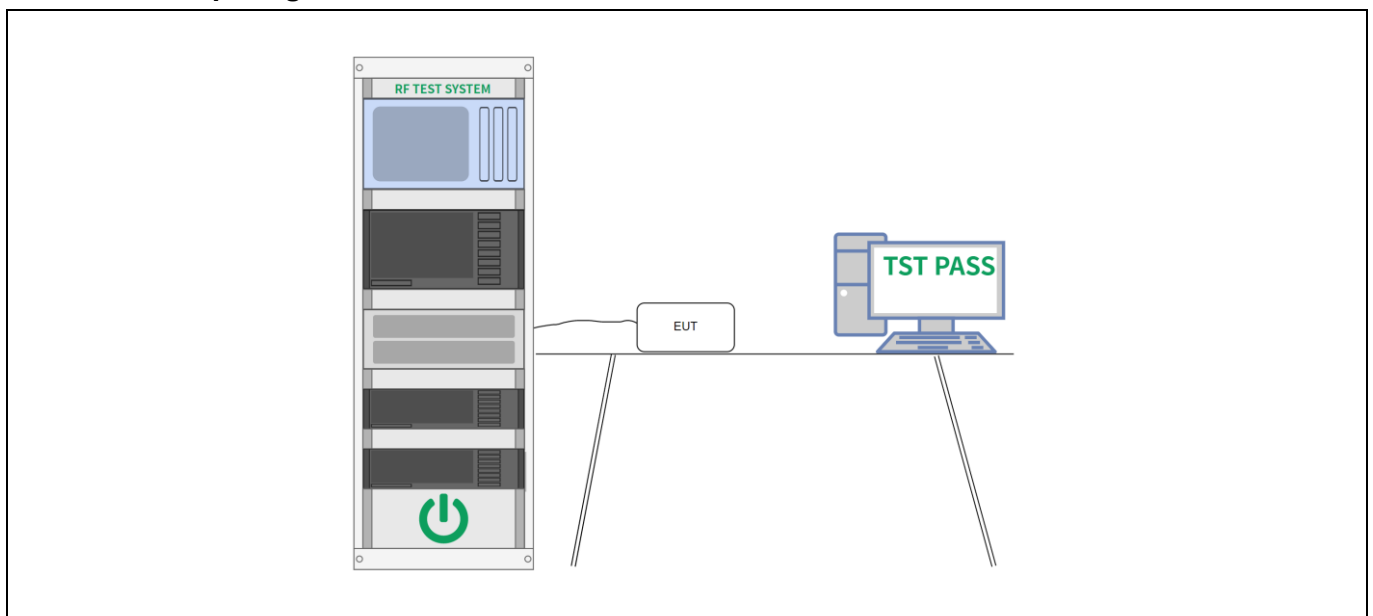
#### 6.4 RF conducted spurious emissions and band edge measurement

Test Requirement:	47 CFR 15.247(d), 15.209, 15.205
Test Limit:	Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	ANSI C63.10-2013 section 11.11 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013 Section 11.11.1, Section 11.11.2, Section 11.11.3

##### 6.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.36 °C	Humidity:	51.37 %	Atmospheric Pressure:	99 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4				
Final test mode:	Mode1, Mode2, Mode3, Mode4				

##### 6.4.2 Test Setup Diagram:



##### 6.4.3 Test Data:

Please Refer to Appendix for Details.

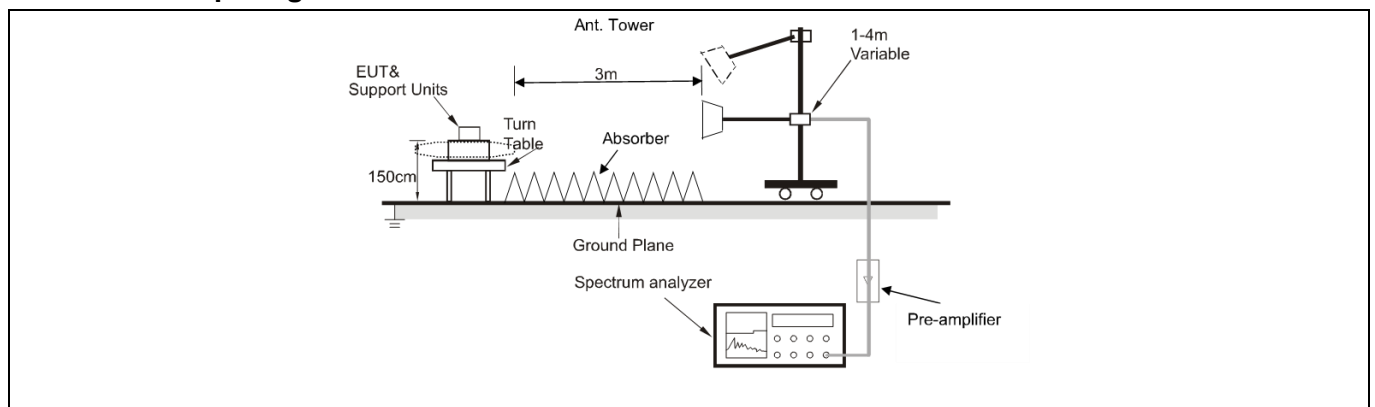
### 6.5 Band edge emissions (Radiated)

Test Requirement:	Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`		
Test Limit:	Frequency (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
	** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.		
Test Method:	ANSI C63.10-2013 section 6.10 KDB 558074 D01 15.247 Meas Guidance v05r02		
Procedure:	ANSI C63.10-2013 section 6.10.5.2		

#### 6.5.1 E.U.T. Operation:

Operating Environment:			
Temperature:	26 °C	Humidity:	54 %
		Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4		
Final test mode:	All of the listed pre-test mode were tested, only the data of the worst mode (Mode4) is recorded in the report		
Note:	The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.		

#### 6.5.2 Test Setup Diagram:





**6.5.3 Test Data:**

Mode4 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 40 / CH: L							
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB
1		2310.000	59.44	-12.92	46.52	74.00	-27.48
							peak
2		2310.000	48.80	-12.92	35.88	54.00	-18.12
							AVG
3		2390.000	77.15	-12.49	64.66	74.00	-9.34
							peak
4	*	2390.000	63.29	-12.49	50.80	54.00	-3.20
							AVG

Mode4 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 40 / CH: L							
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB
1		2310.000	55.43	-12.92	42.51	74.00	-31.49
							peak
2		2310.000	46.10	-12.92	33.18	54.00	-20.82
							AVG
3		2390.000	65.09	-12.49	52.60	74.00	-21.40
							peak
4	*	2390.000	52.18	-12.49	39.69	54.00	-14.31
							AVG

Mode4 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 40 / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		2483.500	72.61	-12.50	60.11	74.00	-13.89	peak
2	*	2483.500	60.31	-12.50	47.81	54.00	-6.19	AVG
3		2500.000	62.09	-12.41	49.68	74.00	-24.32	peak
4		2500.000	51.11	-12.41	38.70	54.00	-15.30	AVG

Mode4 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 40 / CH: H

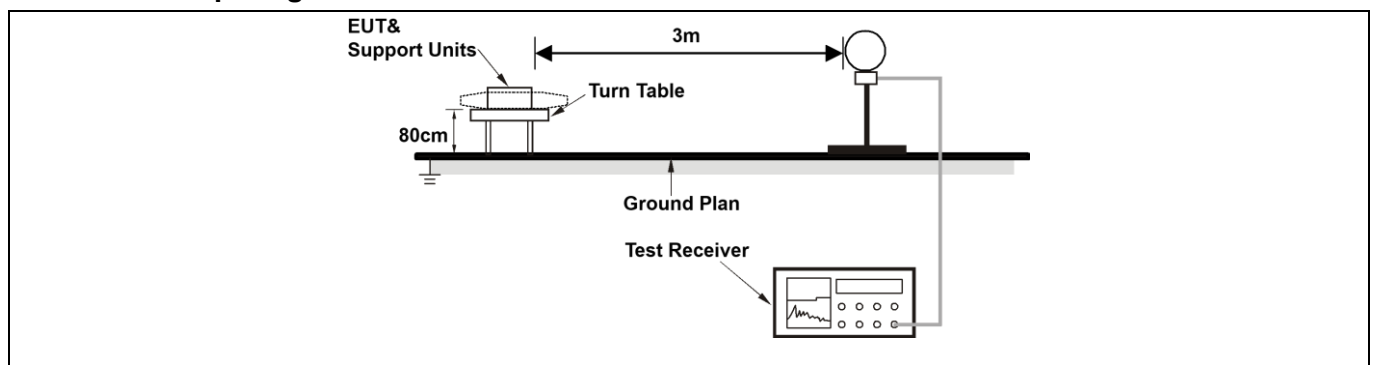
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		2483.500	58.28	-12.50	45.78	74.00	-28.22	peak
2	*	2483.500	47.84	-12.50	35.34	54.00	-18.66	AVG
3		2500.000	54.89	-12.41	42.48	74.00	-31.52	peak
4		2500.000	44.00	-12.41	31.59	54.00	-22.41	AVG

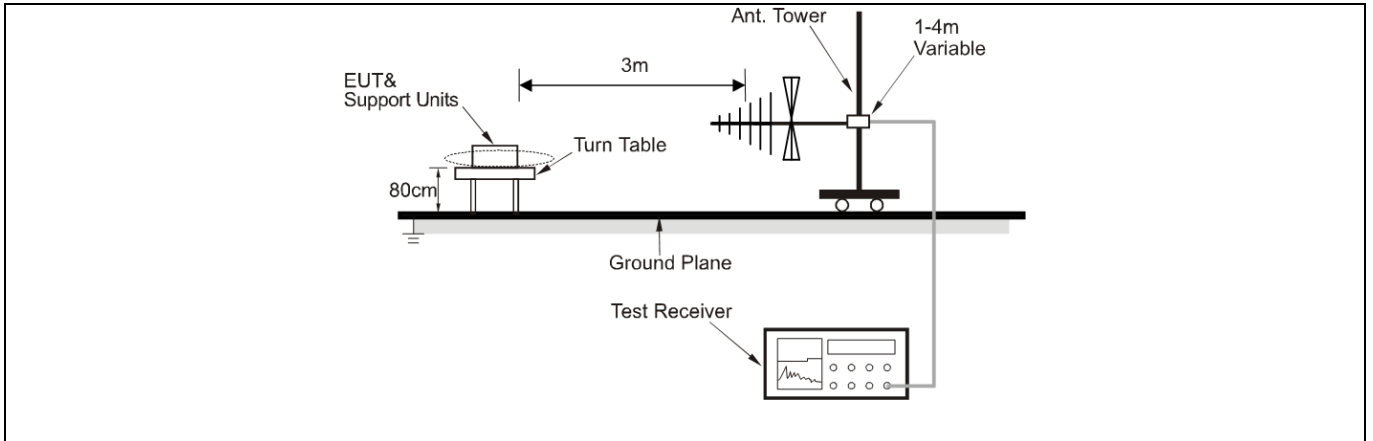
**6.6 Radiated emissions (below 1GHz)**

Test Requirement:	Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`		
Test Limit:	Frequency (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
	** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.		
Test Method:	ANSI C63.10-2013 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02		
Procedure:	ANSI C63.10-2013 section 6.6.4		

**6.6.1 E.U.T. Operation:**

Operating Environment:			
Temperature:	26 °C	Humidity:	54 %
		Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4		
Final test mode:	All of the listed pre-test mode were tested, only the data of the worst mode (Mode1) is recorded in the report		
Note:	The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported. All modes of operation of the EUT were investigated, and only the worst-case results are reported. There were no emissions found below 30MHz within 20dB of the limit.		

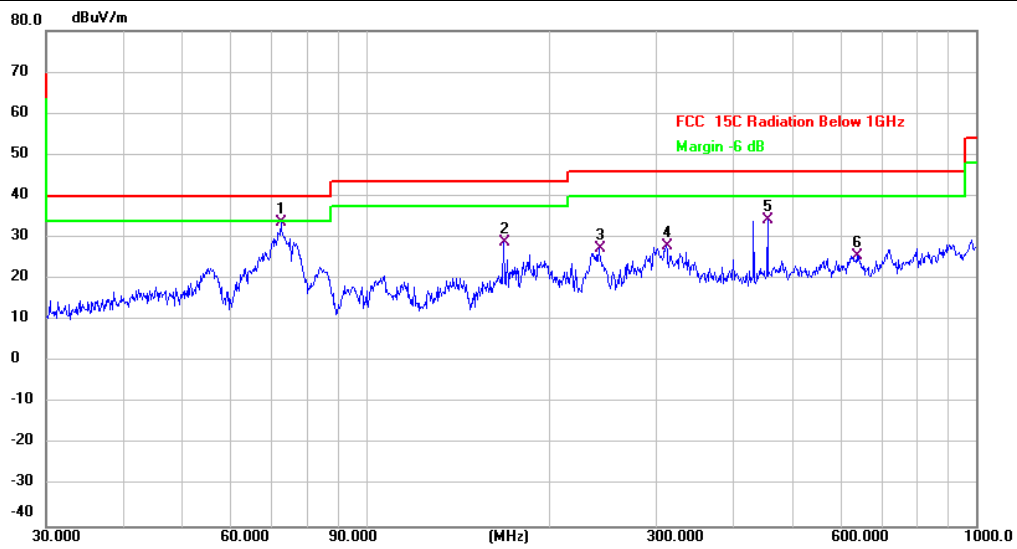
**6.6.2 Test Setup Diagram:**




**6.6.3 Test Data:**

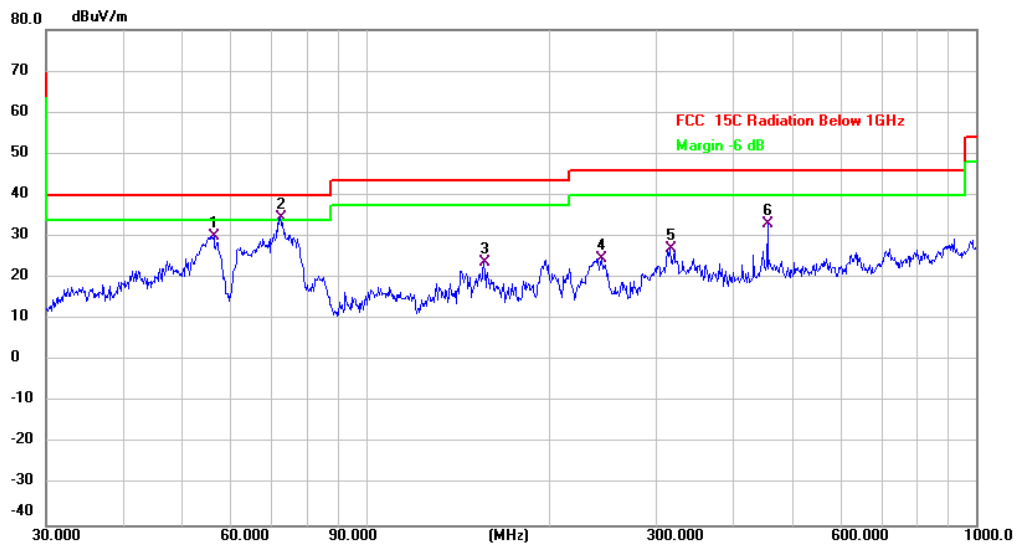
CP10:

Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	72.5916	45.03	-11.44	33.59	40.00	-6.41	QP	
2		167.8243	39.92	-11.04	28.88	43.50	-14.62	QP	
3		241.6763	34.62	-7.20	27.42	46.00	-18.58	QP	
4		311.0867	33.80	-5.88	27.92	46.00	-18.08	QP	
5		455.9058	38.26	-4.11	34.15	46.00	-11.85	QP	
6		638.3686	26.00	-0.36	25.64	46.00	-20.36	QP	

Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		56.3948	39.51	-9.39	30.12	40.00	-9.88	QP	
2	*	72.3376	45.87	-11.36	34.51	40.00	-5.49	QP	
3		155.9101	34.00	-10.32	23.68	43.50	-19.82	QP	
4		244.2321	32.30	-7.65	24.65	46.00	-21.35	QP	
5		315.4808	33.80	-6.70	27.10	46.00	-18.90	QP	
6		455.9058	37.08	-4.11	32.97	46.00	-13.03	QP	

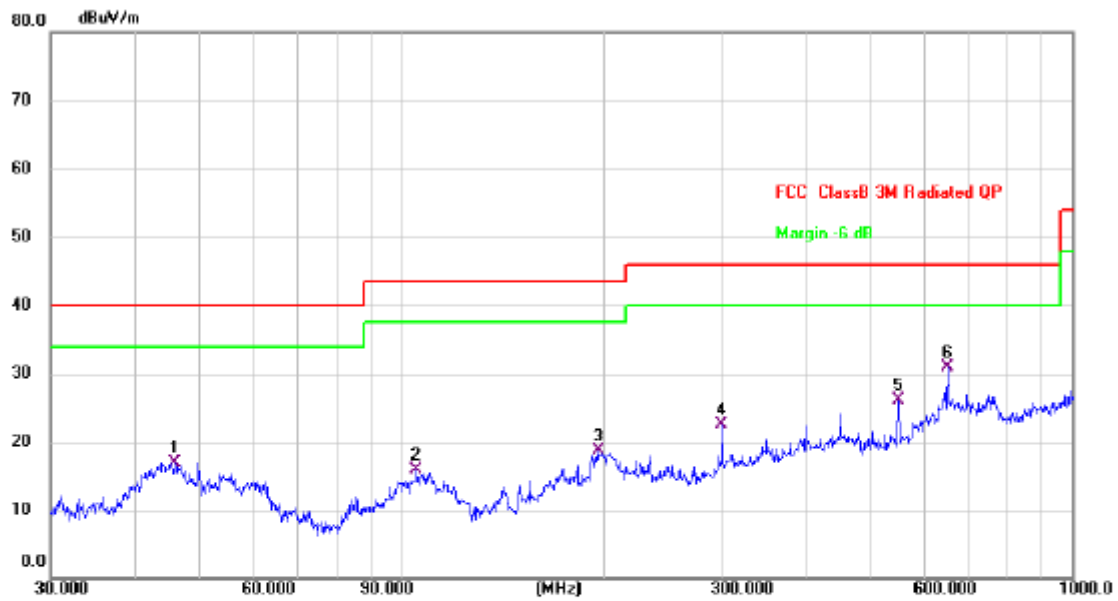
CP20:

Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		31.6201	37.03	-15.61	21.42	40.00	-18.58	QP	
2		52.5752	32.35	-12.48	19.87	40.00	-20.13	QP	
3		108.2664	30.55	-12.68	17.87	43.50	-25.63	QP	
4		150.0107	35.55	-15.42	20.13	43.50	-23.37	QP	
5	*	300.3672	39.53	-9.83	29.70	46.00	-16.30	QP	
6		750.1082	29.62	-2.43	27.19	46.00	-18.81	QP	

Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H

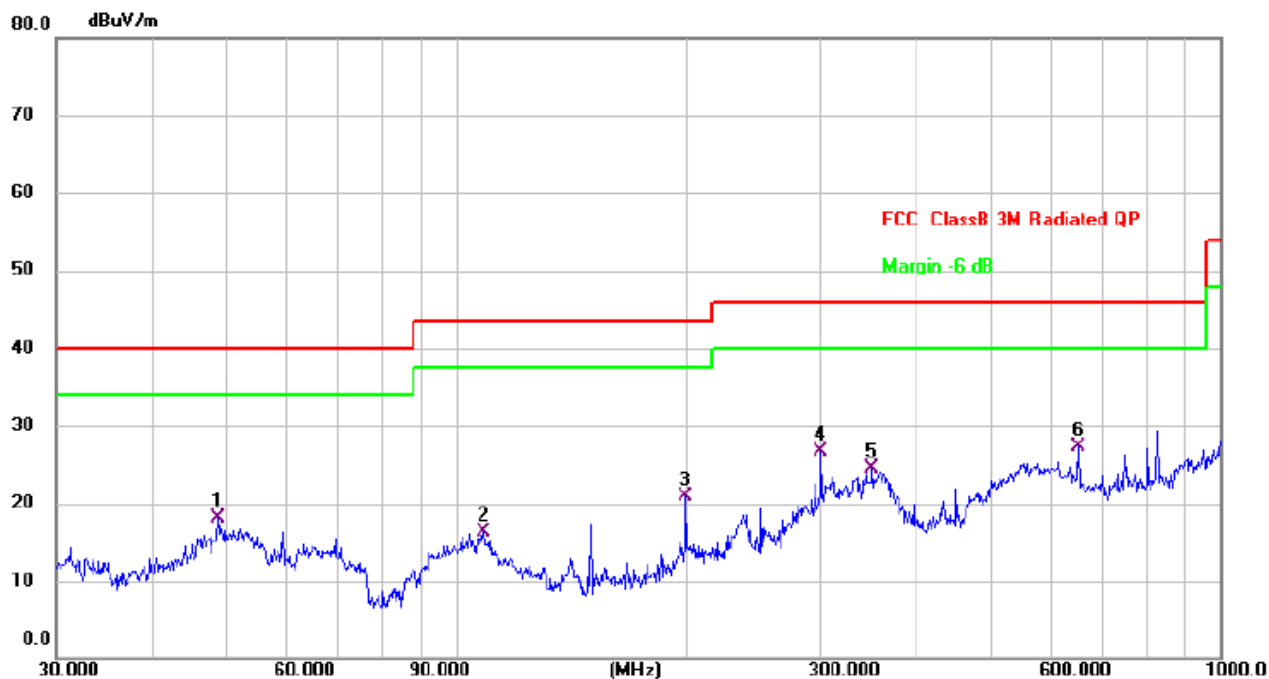


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	46.0162	29.19	-12.21	16.98	40.00	-23.02	QP	
2	105.2716	28.52	-12.69	15.83	43.50	-27.67	QP	
3	196.5098	31.49	-12.86	18.63	43.50	-24.87	QP	
4	300.3672	32.28	-9.83	22.45	46.00	-23.55	QP	
5	550.9479	31.75	-5.61	26.14	46.00	-19.86	QP	
6 *	651.9415	34.99	-4.00	30.99	46.00	-15.01	QP	



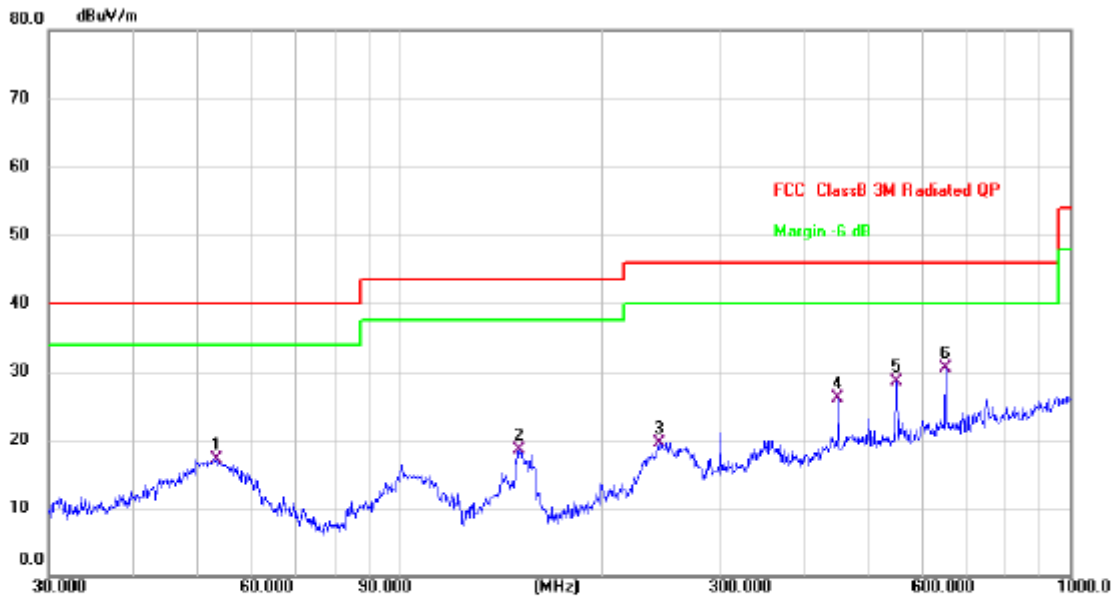
CP11:

Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		48.8427	30.38	-12.23	18.15	40.00	-21.85	QP	
2		108.6470	28.91	-12.68	16.23	43.50	-27.27	QP	
3		199.9855	32.86	-11.95	20.91	43.50	-22.59	QP	
4		300.3672	36.49	-9.83	26.66	46.00	-19.34	QP	
5		350.4766	33.34	-8.77	24.57	46.00	-21.43	QP	
6	*	651.9415	31.24	-4.00	27.24	46.00	-18.76	QP	

Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H



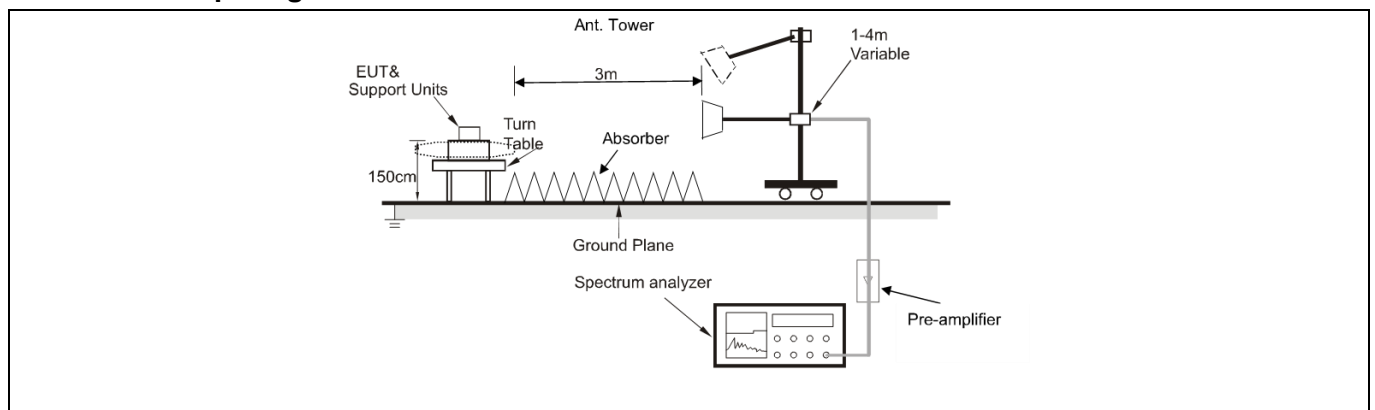
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		53.5052	29.62	-12.45	17.17	40.00	-22.83	QP	
2		150.5377	33.87	-15.37	18.50	43.50	-25.00	QP	
3		244.2321	31.22	-11.64	19.58	46.00	-26.42	QP	
4		451.1349	33.95	-7.76	26.19	46.00	-19.81	QP	
5		550.9479	34.06	-5.61	28.45	46.00	-17.55	QP	
6	*	651.9415	34.44	-4.00	30.44	46.00	-15.56	QP	

**6.7 Radiated emissions (above 1GHz)**

Test Requirement:	In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`		
Test Limit:	Frequency (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
	** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.		
Test Method:	ANSI C63.10-2013 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02		
Procedure:	ANSI C63.10-2013 section 6.6.4		

**6.7.1 E.U.T. Operation:**

Operating Environment:			
Temperature:	26 °C	Humidity:	54 %
		Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4		
Final test mode:	All of the listed pre-test mode were tested, only the data of the worst mode (Mode1) is recorded in the report		
Note: Test frequency are from 1GHz to 25GHz, the amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported. All modes of operation of the EUT were investigated, and only the worst-case results are reported.			

**6.7.2 Test Setup Diagram:**


**6.7.3 Test Data:**

Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: L

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		4824.000	56.77	-7.75	49.02	74.00	-24.98	peak
2	*	4824.000	51.00	-7.75	43.25	54.00	-10.75	AVG
3		7236.000	46.76	0.61	47.37	74.00	-26.63	peak
4		7236.000	40.71	0.61	41.32	54.00	-12.68	AVG
5		9648.000	46.99	1.99	48.98	74.00	-25.02	peak
6		9648.000	40.70	1.99	42.69	54.00	-11.31	AVG

Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: L

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		4824.000	52.98	-7.75	45.23	74.00	-28.77	peak
2		4824.000	46.87	-7.75	39.12	54.00	-14.88	AVG
3		7236.000	47.24	0.61	47.85	74.00	-26.15	peak
4		7236.000	40.64	0.61	41.25	54.00	-12.75	AVG
5		9648.000	47.11	1.99	49.10	74.00	-24.90	peak
6	*	9648.000	41.37	1.99	43.36	54.00	-10.64	AVG

Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: M

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		4874.000	54.16	-7.83	46.33	74.00	-27.67	peak
2		4874.000	48.19	-7.83	40.36	54.00	-13.64	AVG
3		7311.000	46.69	0.53	47.22	74.00	-26.78	peak
4		7311.000	40.72	0.53	41.25	54.00	-12.75	AVG
5		9748.000	48.22	2.55	50.77	74.00	-23.23	peak
6	*	9748.000	41.72	2.55	44.27	54.00	-9.73	AVG

Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: M

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		4874.000	49.42	-7.83	41.59	74.00	-32.41	peak
2		4874.000	43.45	-7.83	35.62	54.00	-18.38	AVG
3		7311.000	46.22	0.53	46.75	74.00	-27.25	peak
4		7311.000	40.16	0.53	40.69	54.00	-13.31	AVG
5		9748.000	47.36	2.55	49.91	74.00	-24.09	peak
6	*	9748.000	41.03	2.55	43.58	54.00	-10.42	AVG

Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		4924.000	51.81	-7.83	43.98	74.00	-30.02	peak
2		4924.000	46.48	-7.83	38.65	54.00	-15.35	AVG
3		7386.000	46.10	0.86	46.96	74.00	-27.04	peak
4		7386.000	39.50	0.86	40.36	54.00	-13.64	AVG
5		9848.000	49.23	2.14	51.37	74.00	-22.63	peak
6	*	9848.000	43.43	2.14	45.57	54.00	-8.43	AVG

Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		4924.000	49.10	-7.83	41.27	74.00	-32.73	peak
2		4924.000	43.45	-7.83	35.62	54.00	-18.38	AVG
3		7386.000	45.93	0.86	46.79	74.00	-27.21	peak
4		7386.000	39.82	0.86	40.68	54.00	-13.32	AVG
5		9848.000	48.88	2.14	51.02	74.00	-22.98	peak
6	*	9848.000	42.98	2.14	45.12	54.00	-8.88	AVG

## Photographs of the test setup

Refer to Appendix - Test Setup Photos

## Photographs of the EUT

Refer to Appendix - EUT Photos



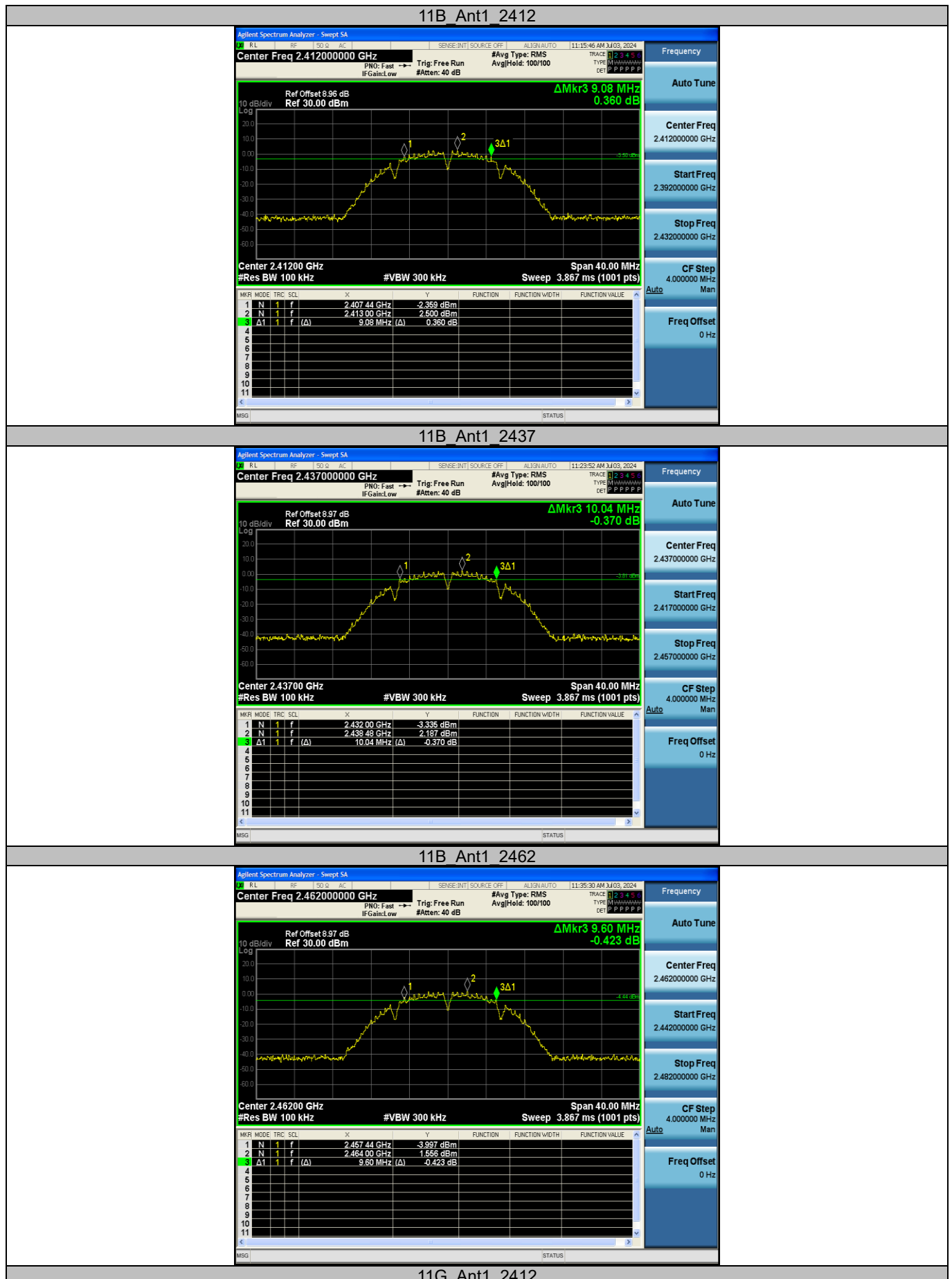
# Appendix

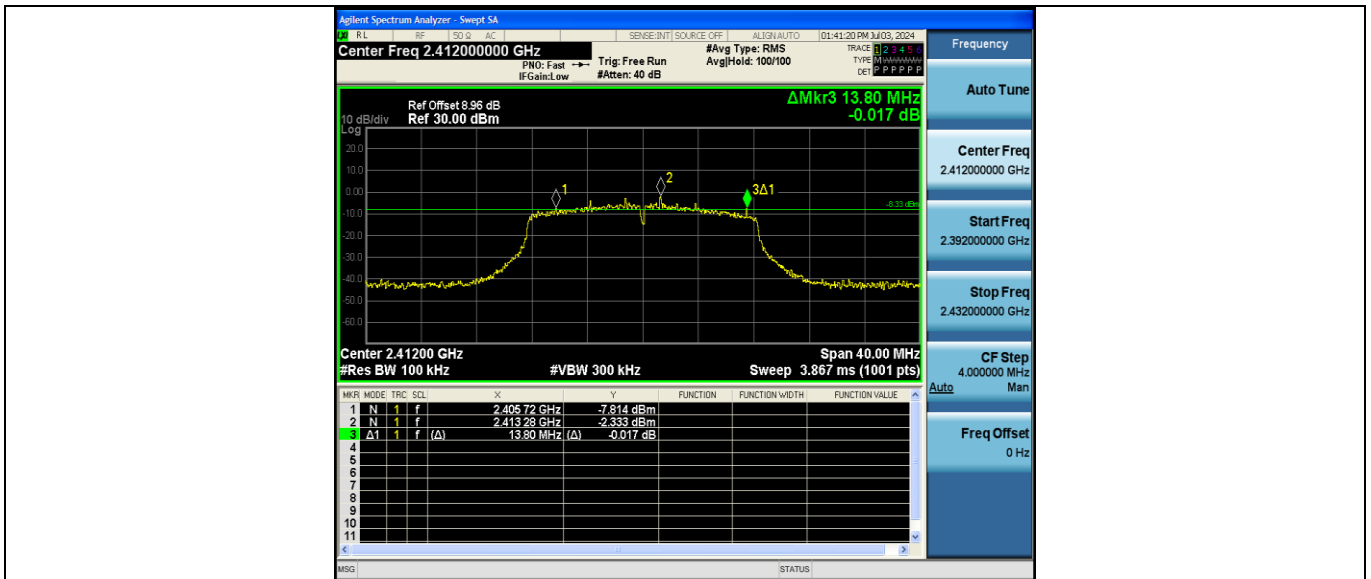
## Appendix A: DTS Bandwidth

### Test Result

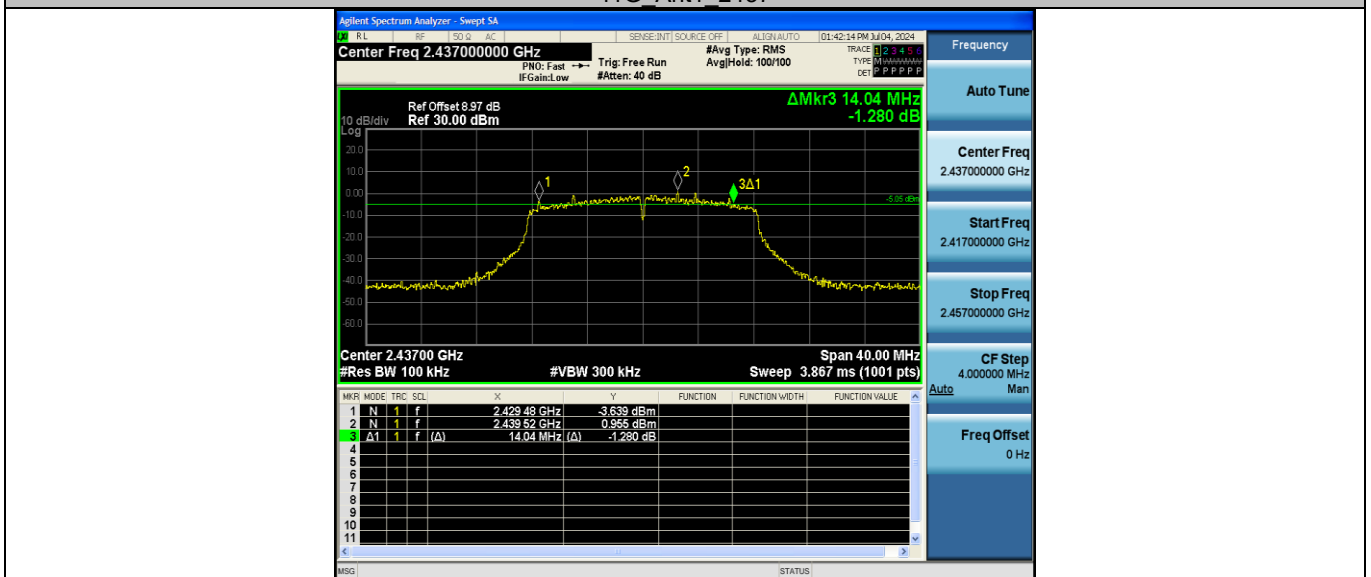
Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	9.080	0.5	PASS
		2437	10.040	0.5	PASS
		2462	9.600	0.5	PASS
11G	Ant1	2412	13.800	0.5	PASS
		2437	14.040	0.5	PASS
		2462	15.640	0.5	PASS
11N20SISO	Ant1	2412	15.120	0.5	PASS
		2437	15.240	0.5	PASS
		2462	15.080	0.5	PASS
11N40SISO	Ant1	2422	33.760	0.5	PASS
		2437	30.080	0.5	PASS
		2452	28.880	0.5	PASS

## Test Graphs

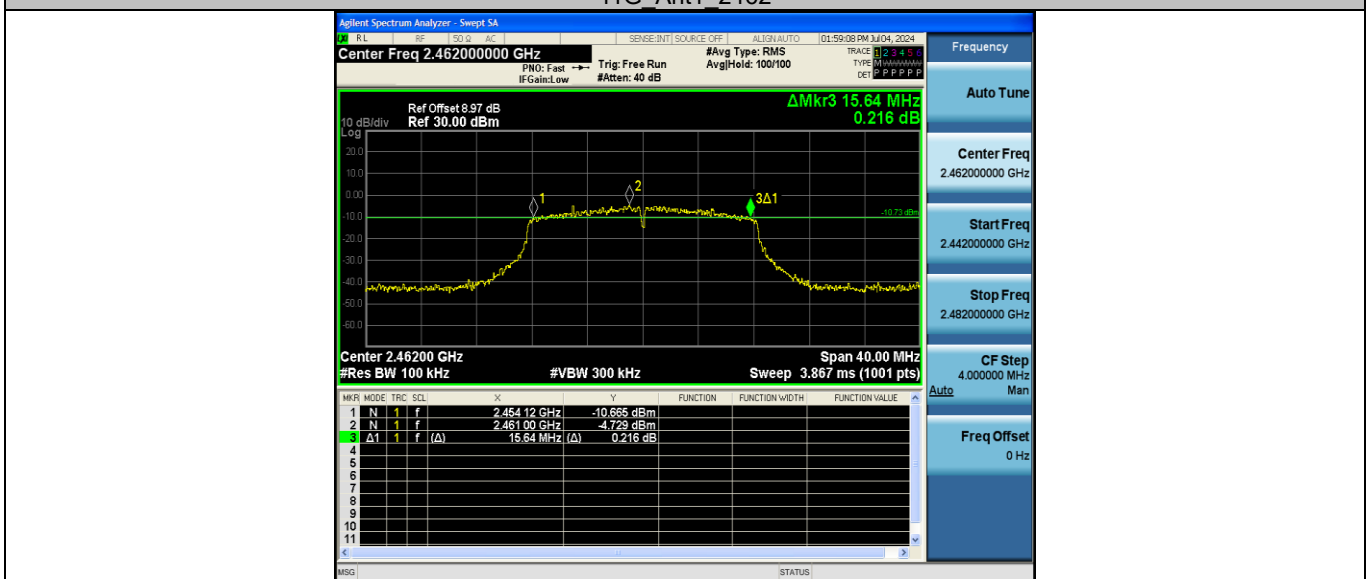




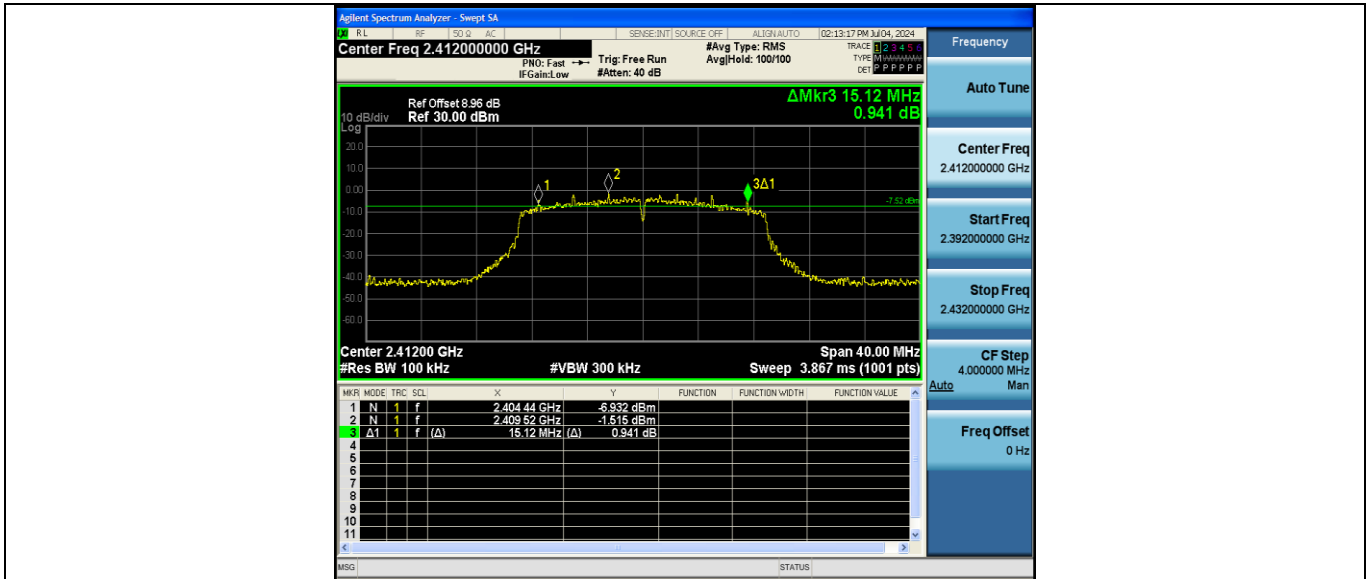
11G Ant1\_2437



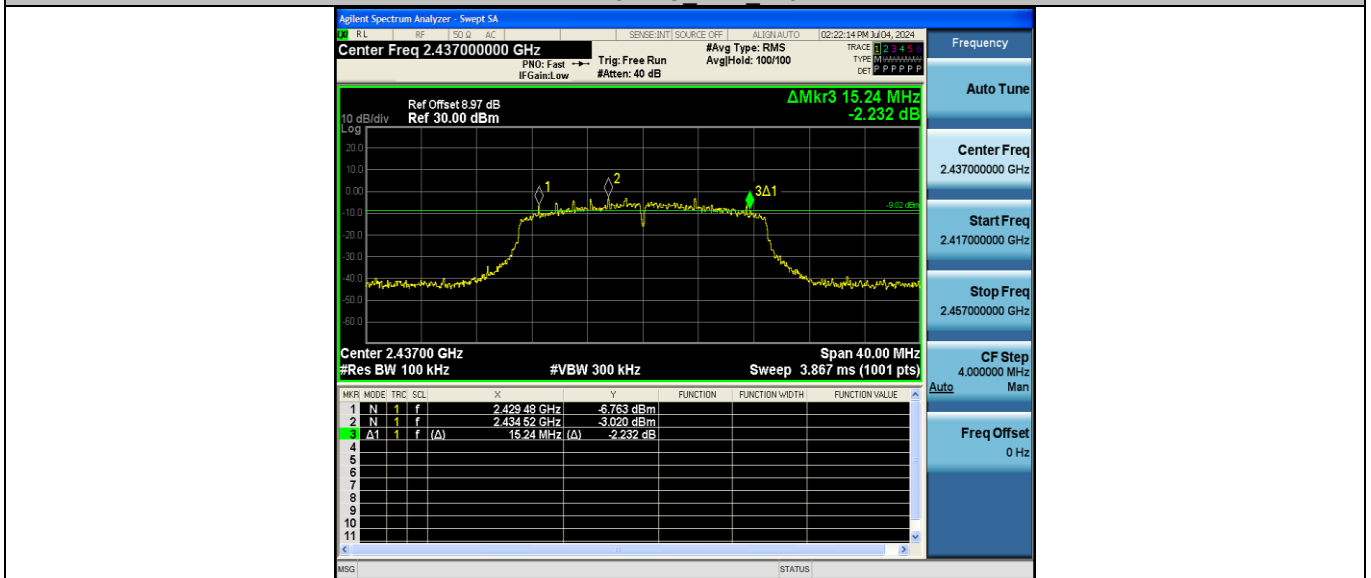
11G Ant1\_2462



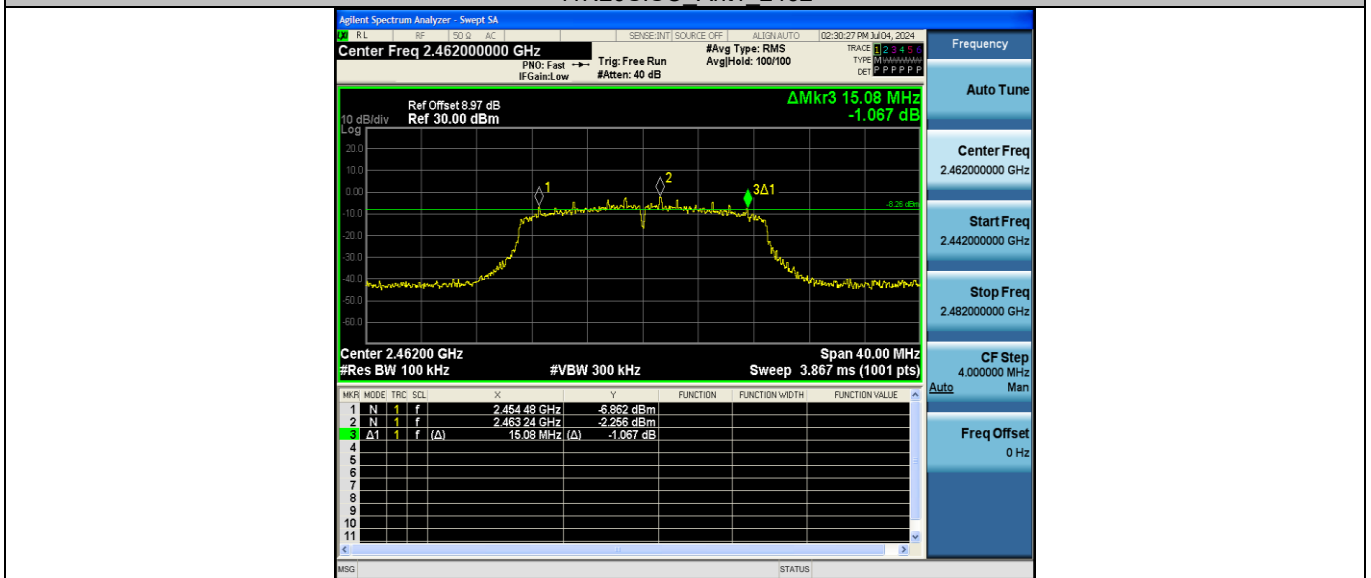
11N20SISO Ant1\_2412



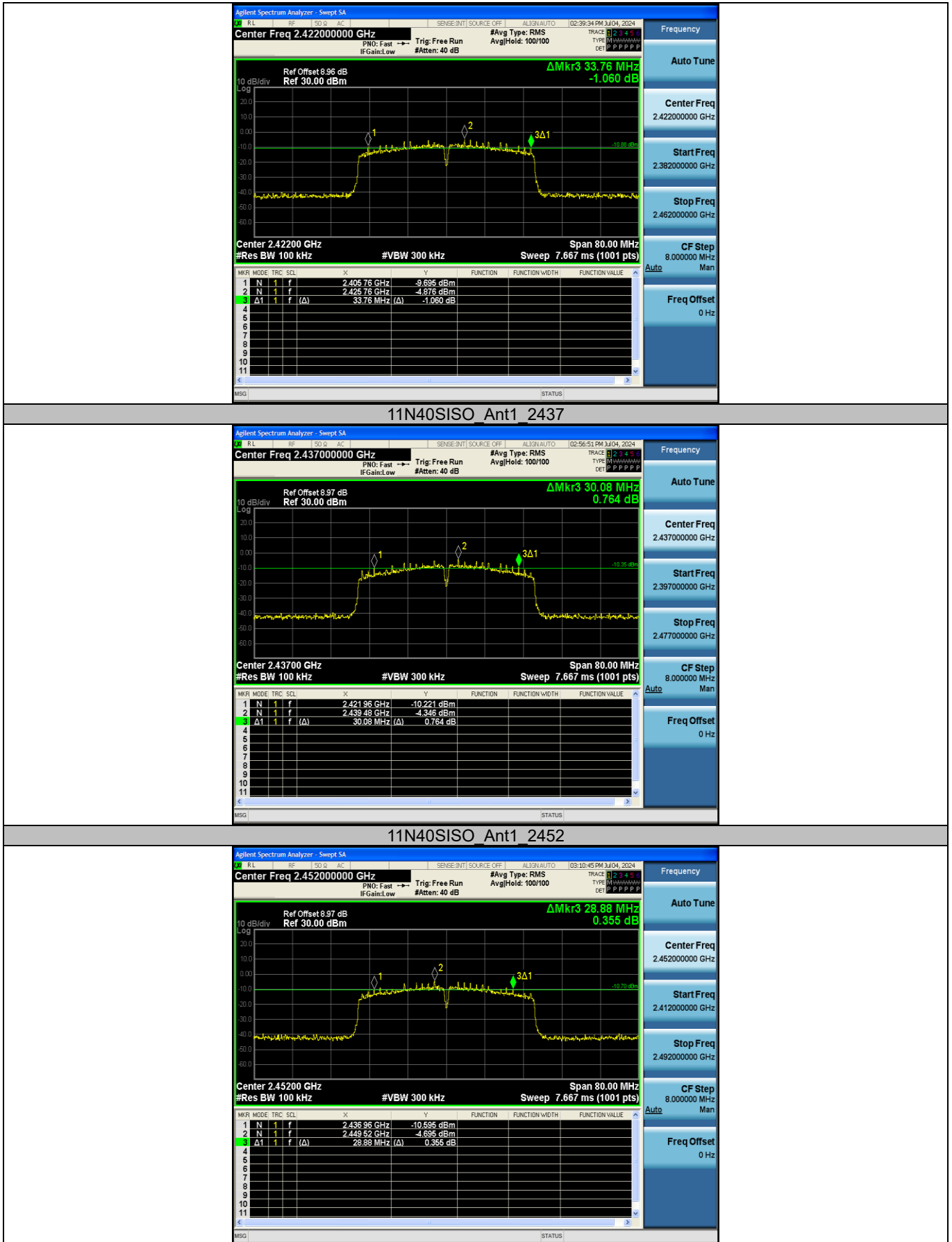
11N20SISO\_Ant1\_2437



11N20SISO\_Ant1\_2462



11N40SISO\_Ant1\_2422



## Appendix B: Maximum conducted output power

### Test Result Peak

Test Mode	Antenna	Frequency [MHz]	Peak Power [dBm]	Conducted Limit [dBm]	Verdict
11B	Ant1	2412	12.51	≤30.00	PASS
		2437	12.38	≤30.00	PASS
		2462	12.81	≤30.00	PASS
11G	Ant1	2412	14.50	≤30.00	PASS
		2437	14.90	≤30.00	PASS
		2462	14.90	≤30.00	PASS
11N20SISO	Ant1	2412	14.58	≤30.00	PASS
		2437	14.85	≤30.00	PASS
		2462	14.50	≤30.00	PASS
11N40SISO	Ant1	2422	14.94	≤30.00	PASS
		2437	14.68	≤30.00	PASS
		2452	14.44	≤30.00	PASS

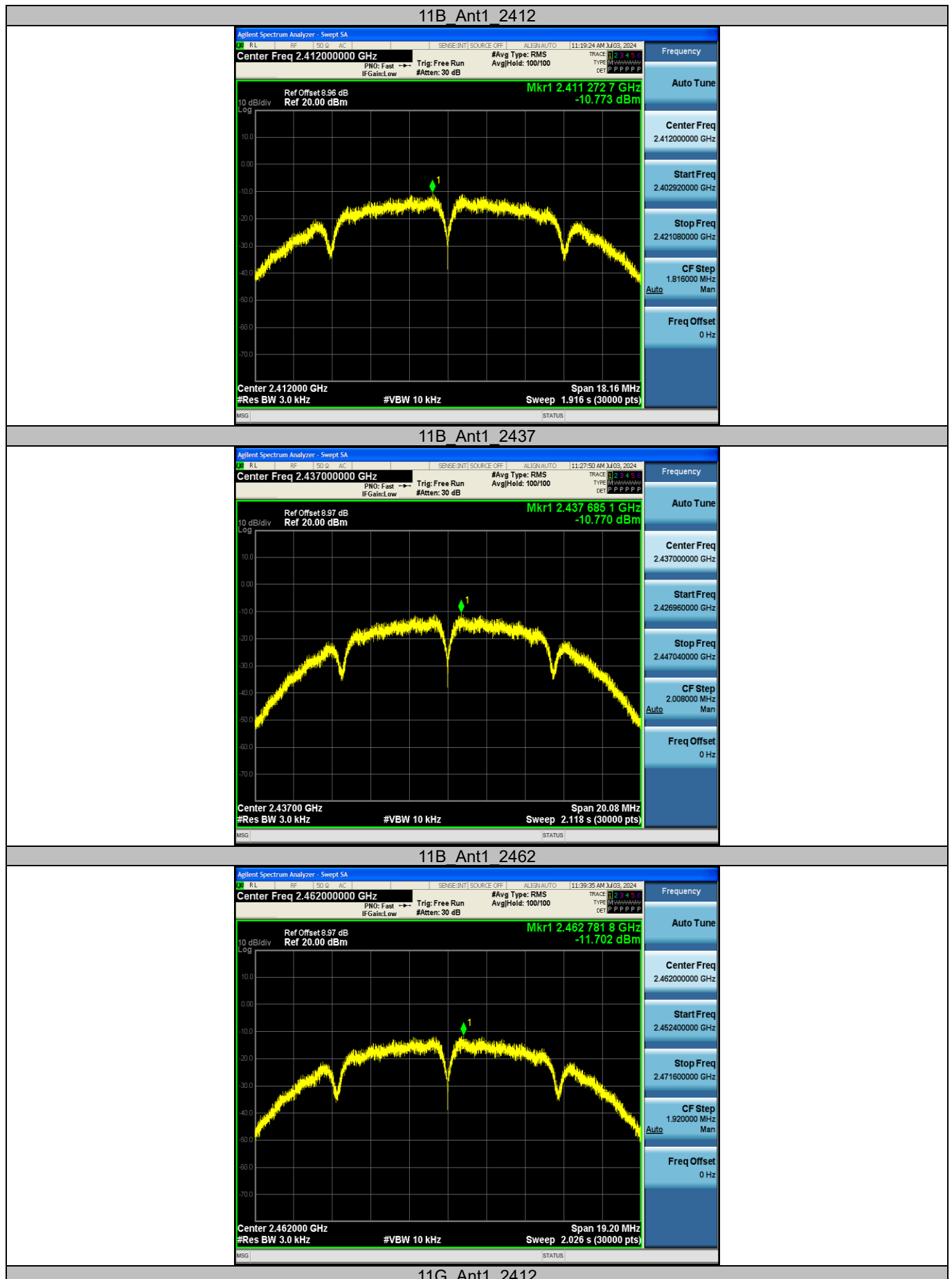
## Appendix C: Maximum power spectral density

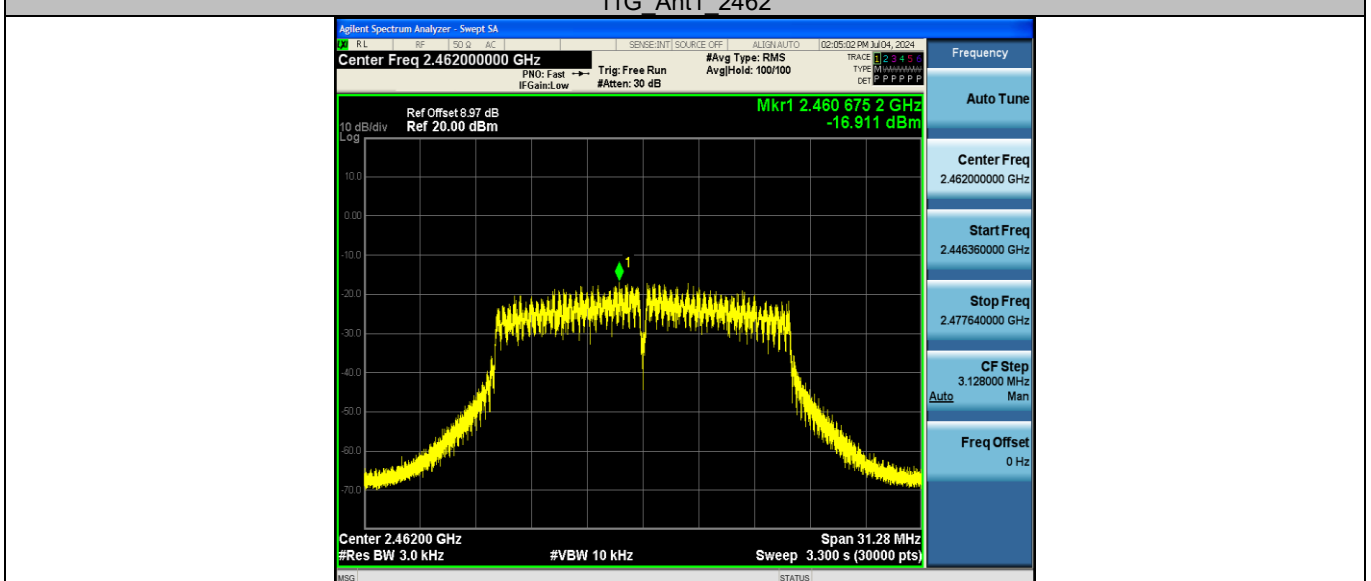
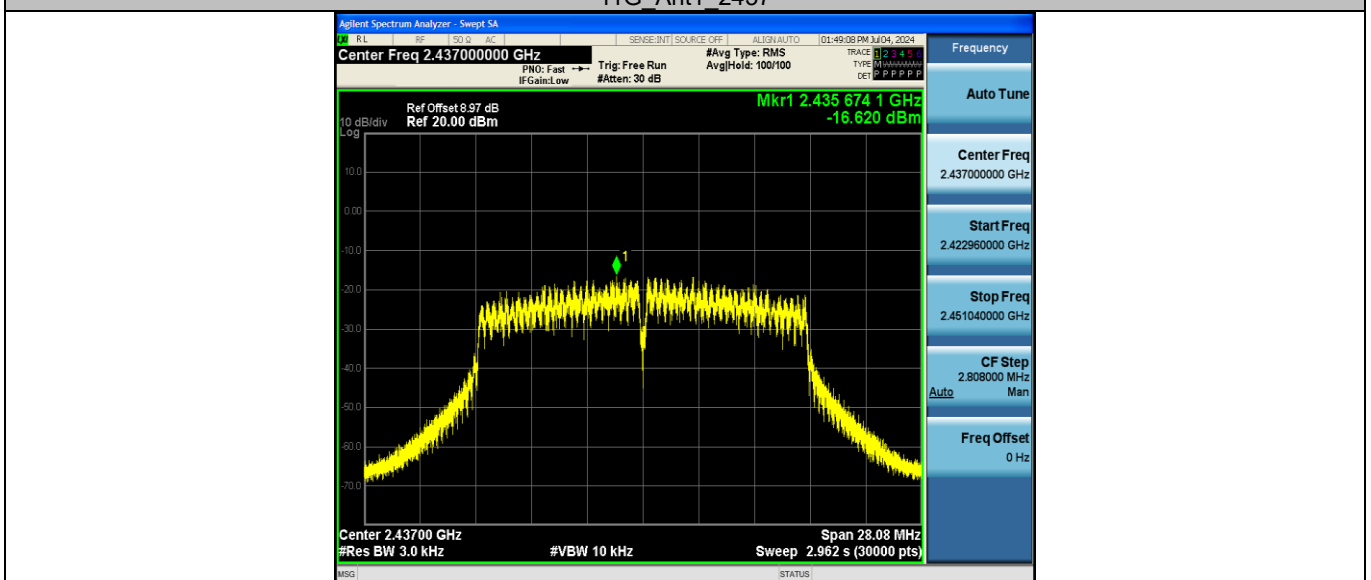
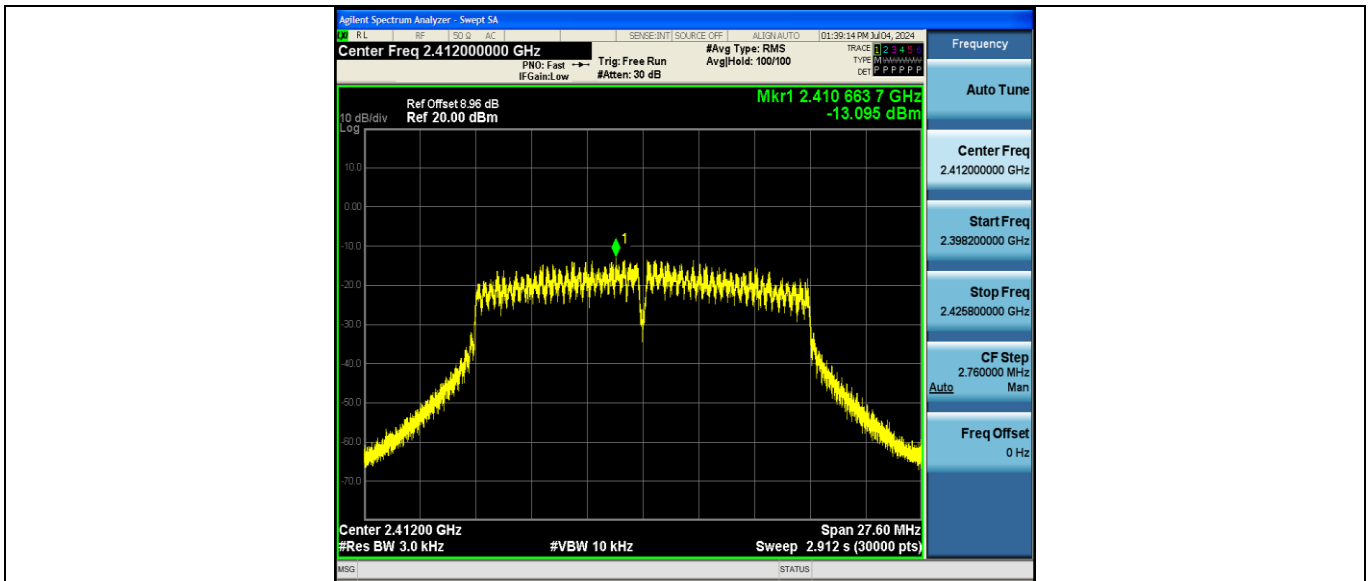
### Test Result

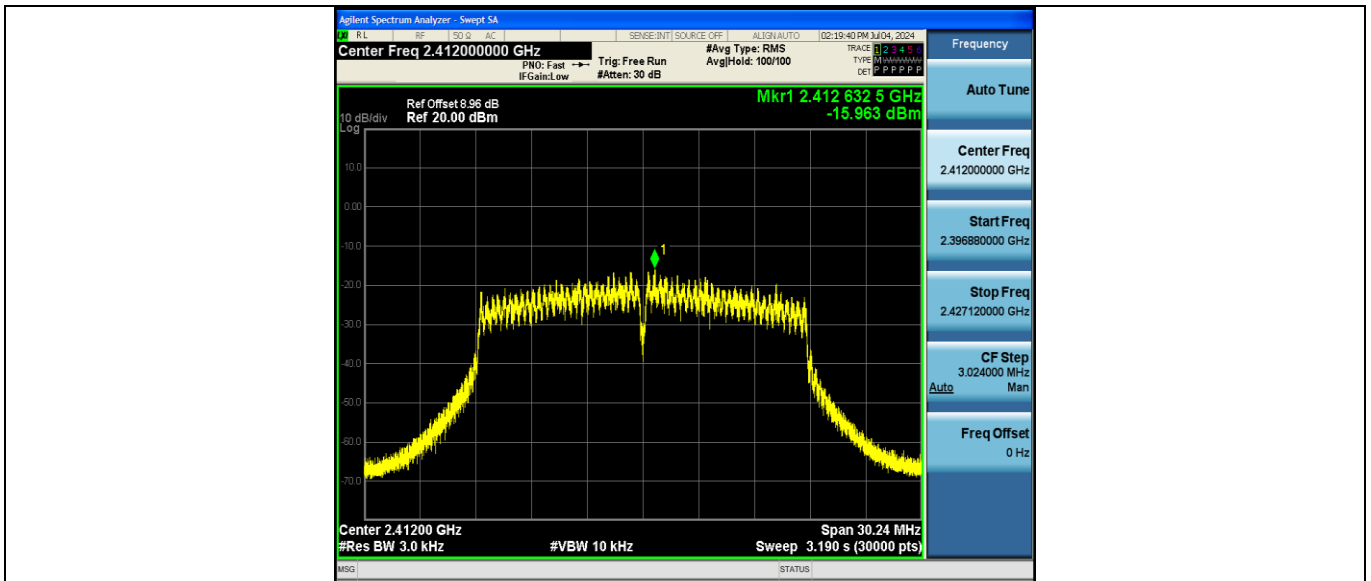
Test Mode	Antenna	Frequency [MHz]	Result [dBm/3-100kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	-10.77	≤8.00	PASS
		2437	-10.77	≤8.00	PASS
		2462	-11.70	≤8.00	PASS
11G	Ant1	2412	-13.10	≤8.00	PASS
		2437	-16.62	≤8.00	PASS
		2462	-16.91	≤8.00	PASS
11N20SISO	Ant1	2412	-15.96	≤8.00	PASS
		2437	-15.48	≤8.00	PASS
		2462	-16.06	≤8.00	PASS
11N40SISO	Ant1	2422	-19.63	≤8.00	PASS
		2437	-19.24	≤8.00	PASS
		2452	-19.30	≤8.00	PASS



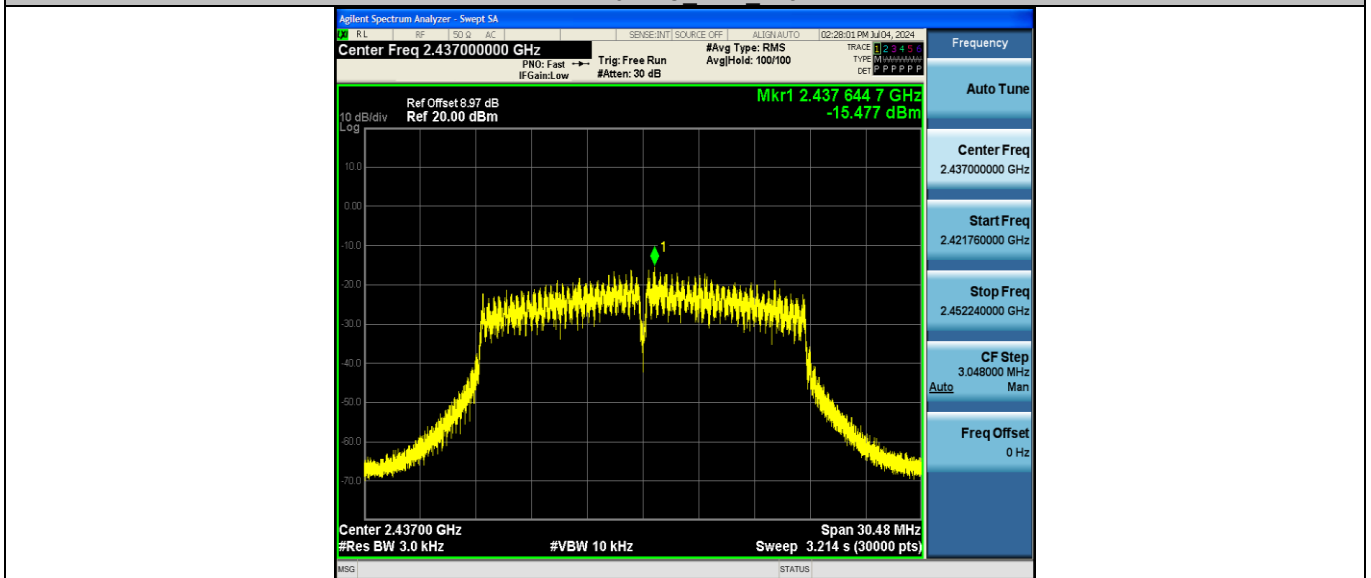
## Test Graphs



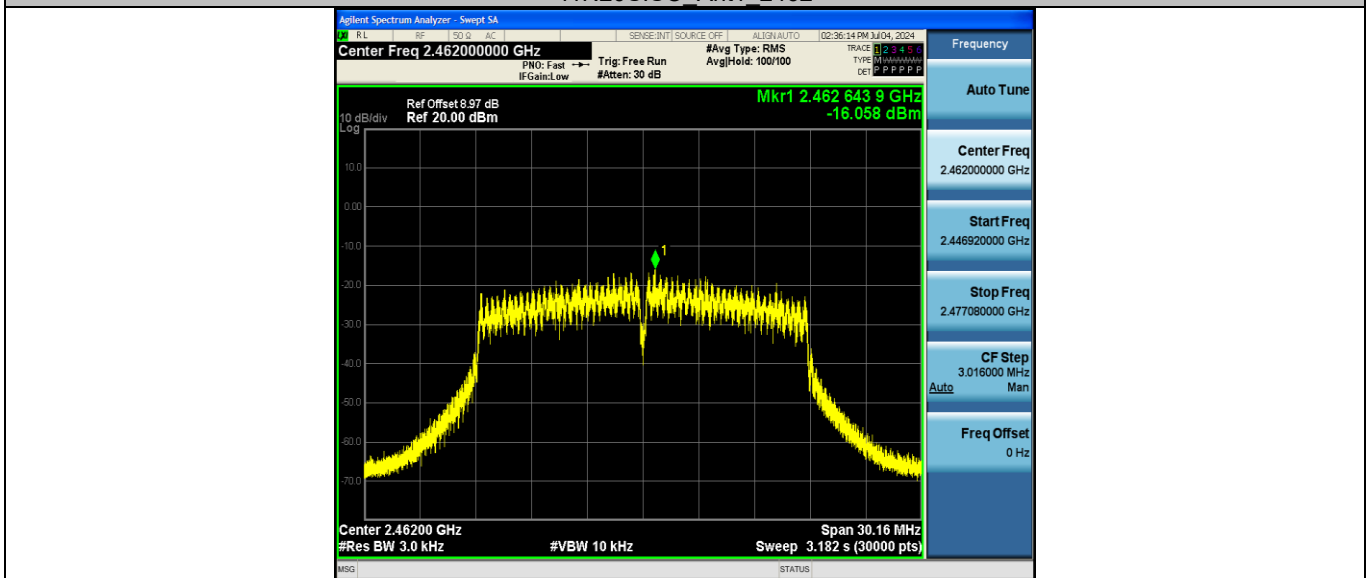




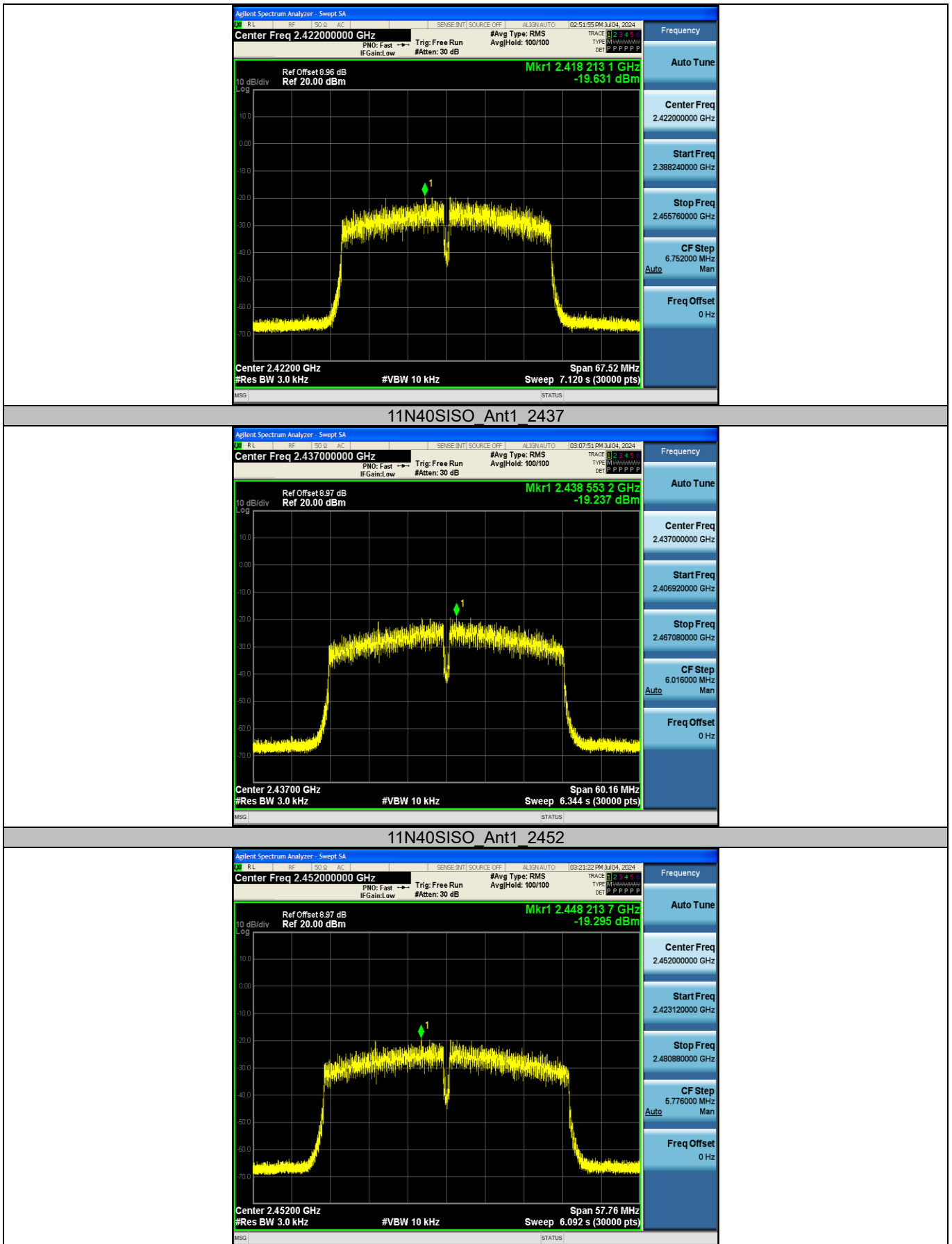
11N20SISO\_Ant1\_2437



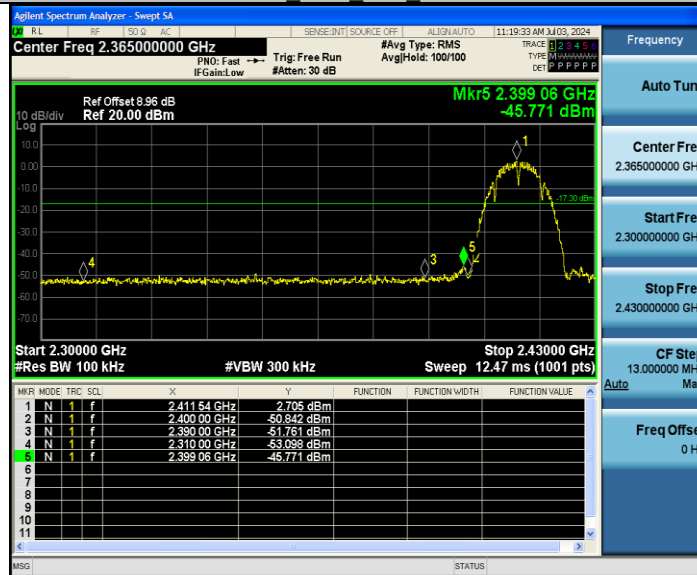
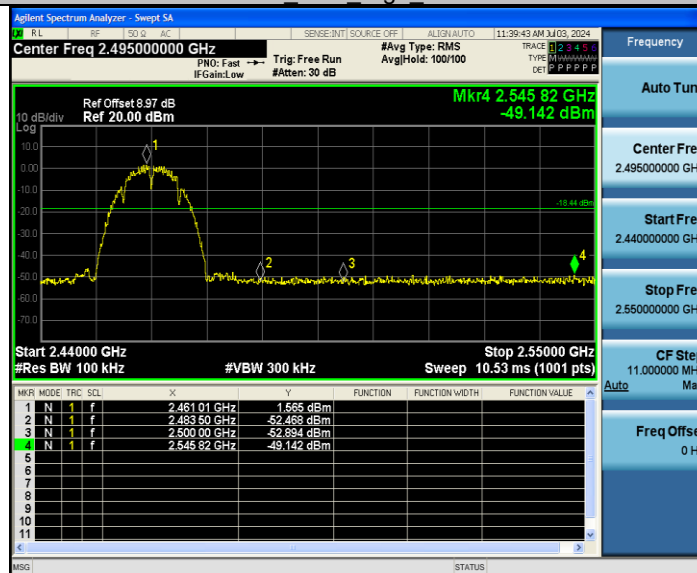
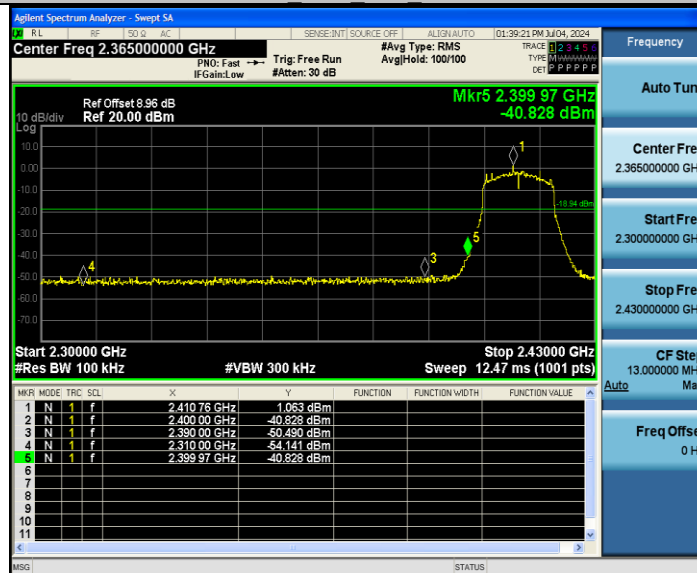
11N20SISO\_Ant1\_2462

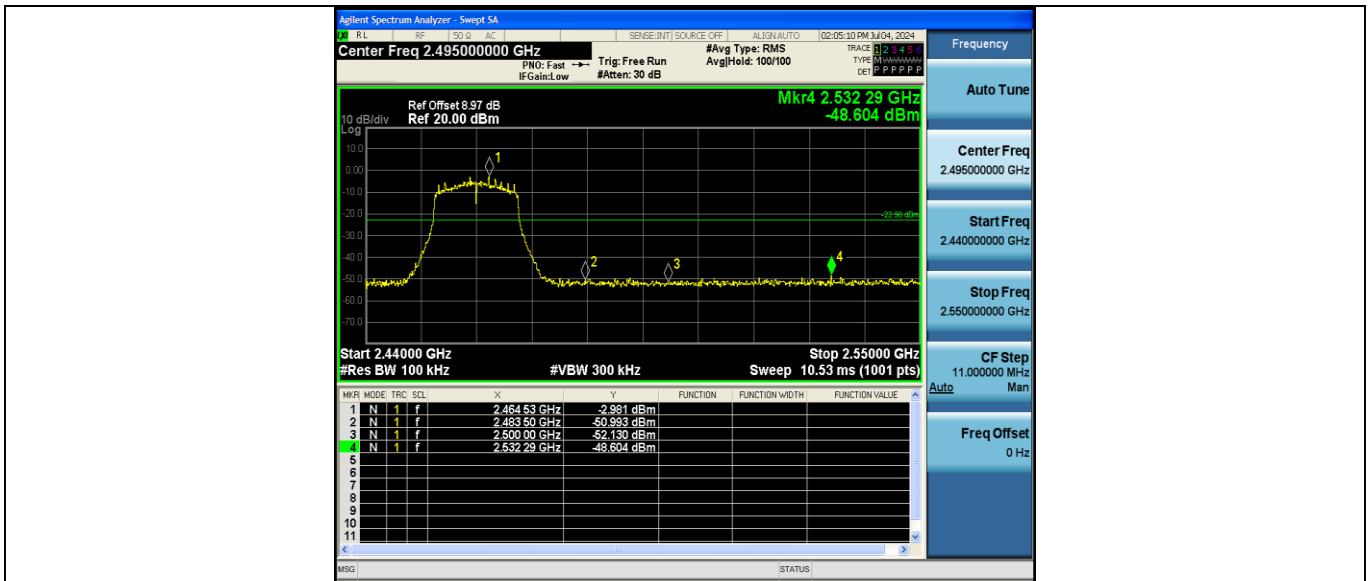


11N40SISO\_Ant1\_2422

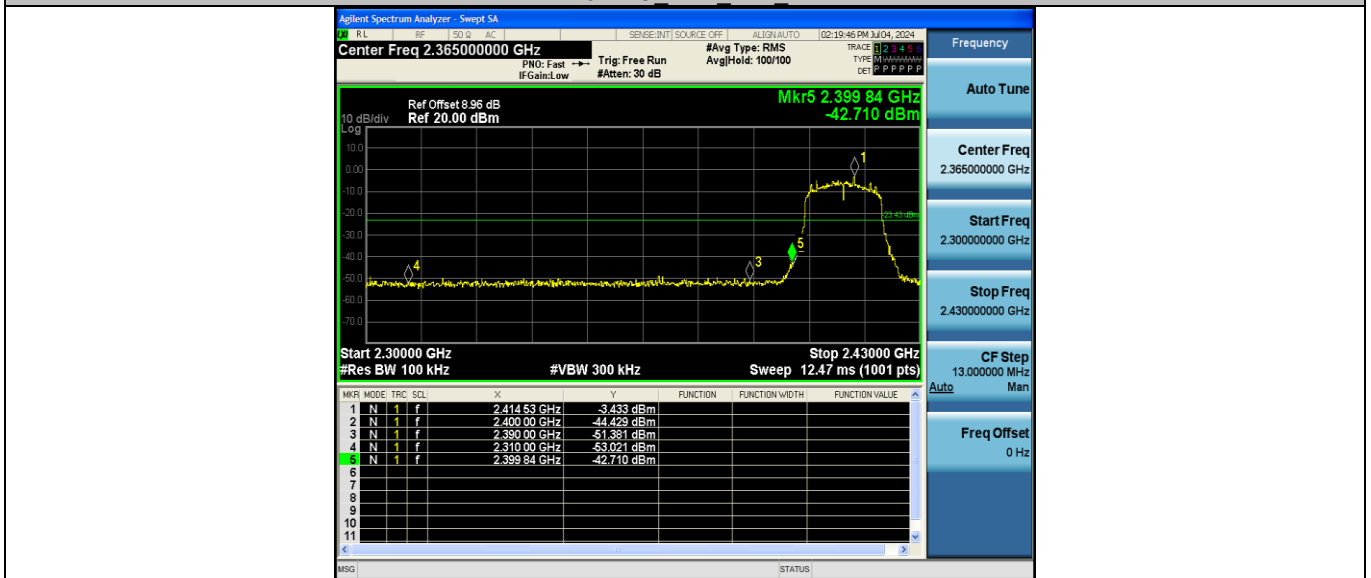


## Appendix D: Band edge measurements

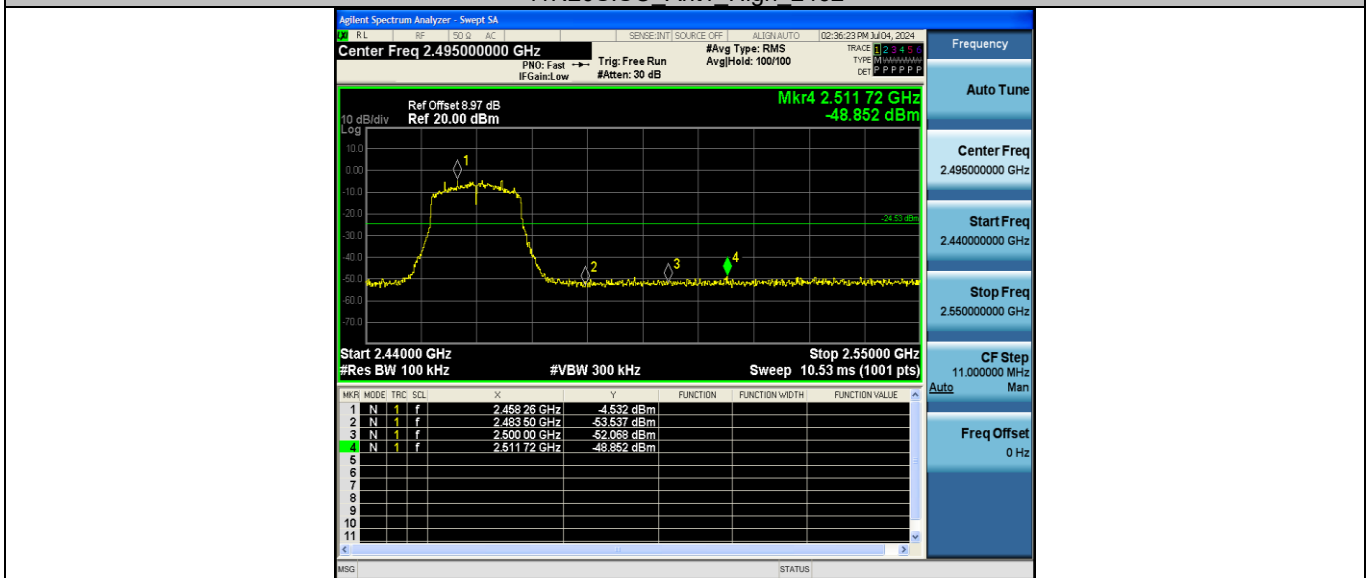
**11B Ant1 Low 2412**

**11B Ant1 High 2462**

**11G Ant1 Low 2412**

**11G Ant1 High 2462**



11N20SISO Ant1 Low 2412



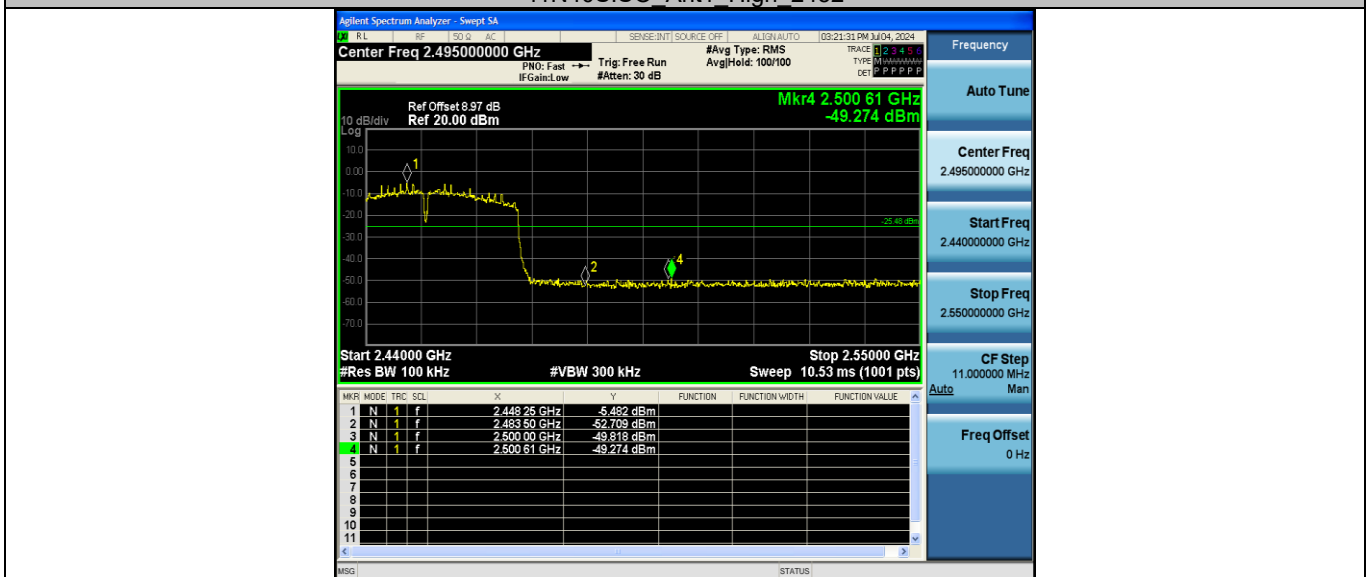
11N20SISO Ant1 High 2462



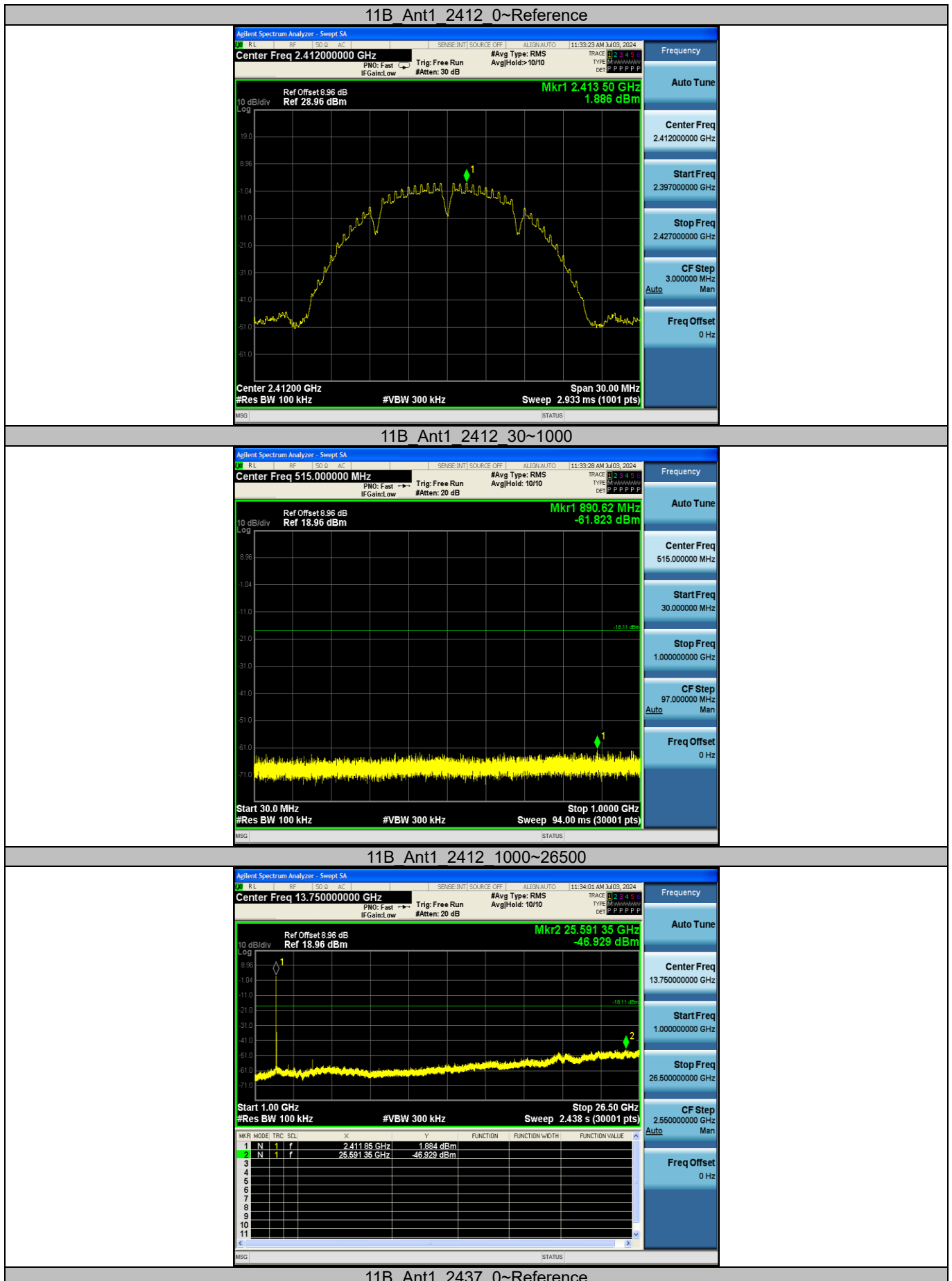
11N40SISO Ant1 Low 2422



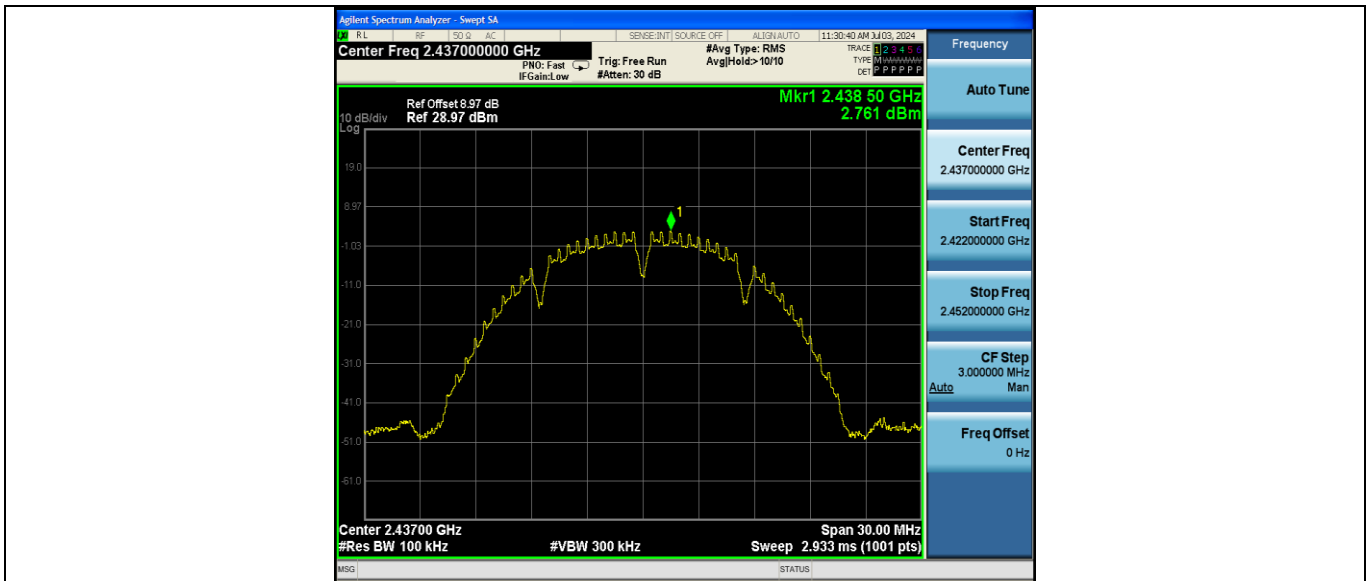
11N40SISO Ant1 High 2452



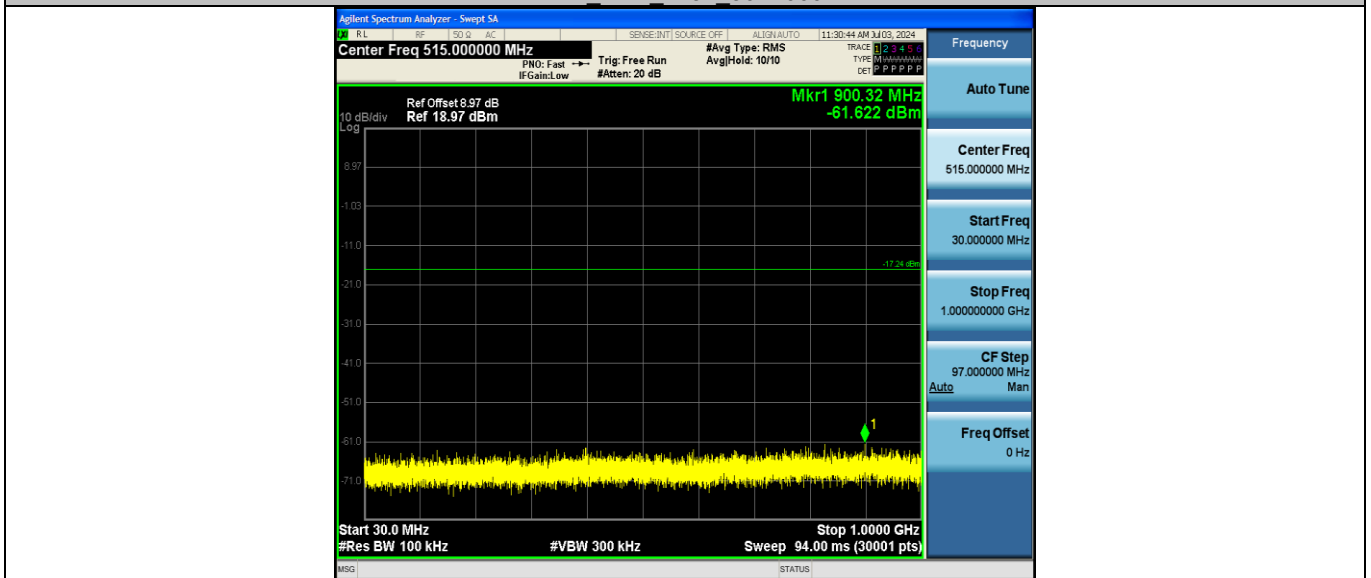
## Appendix E: Conducted Spurious Emission



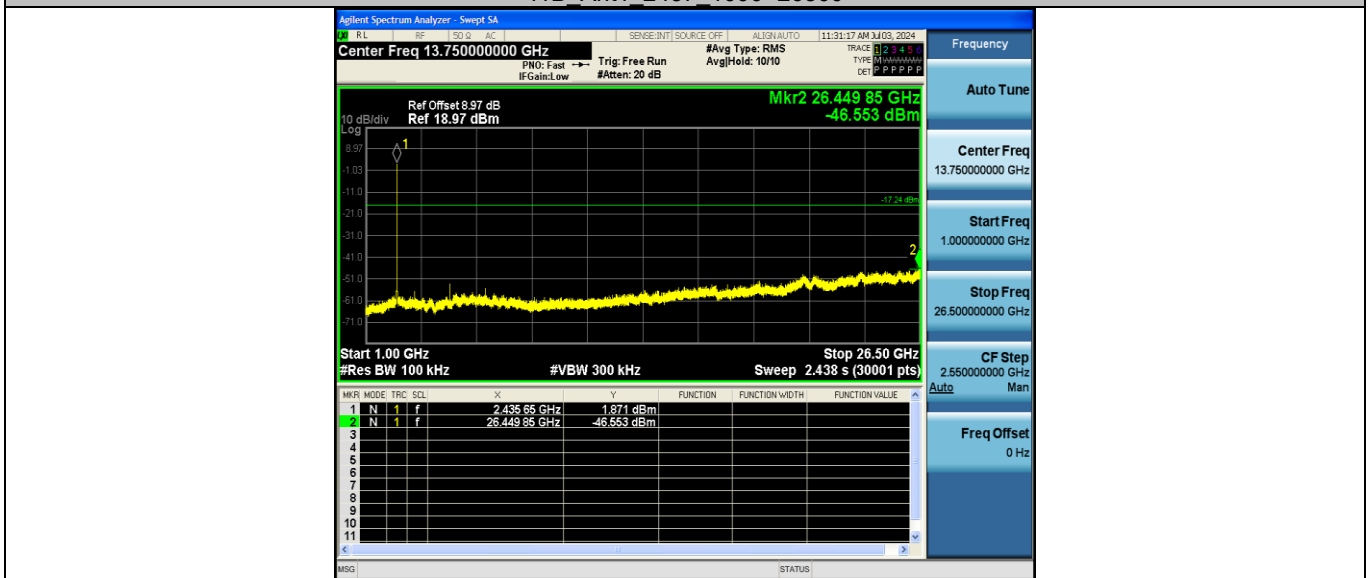




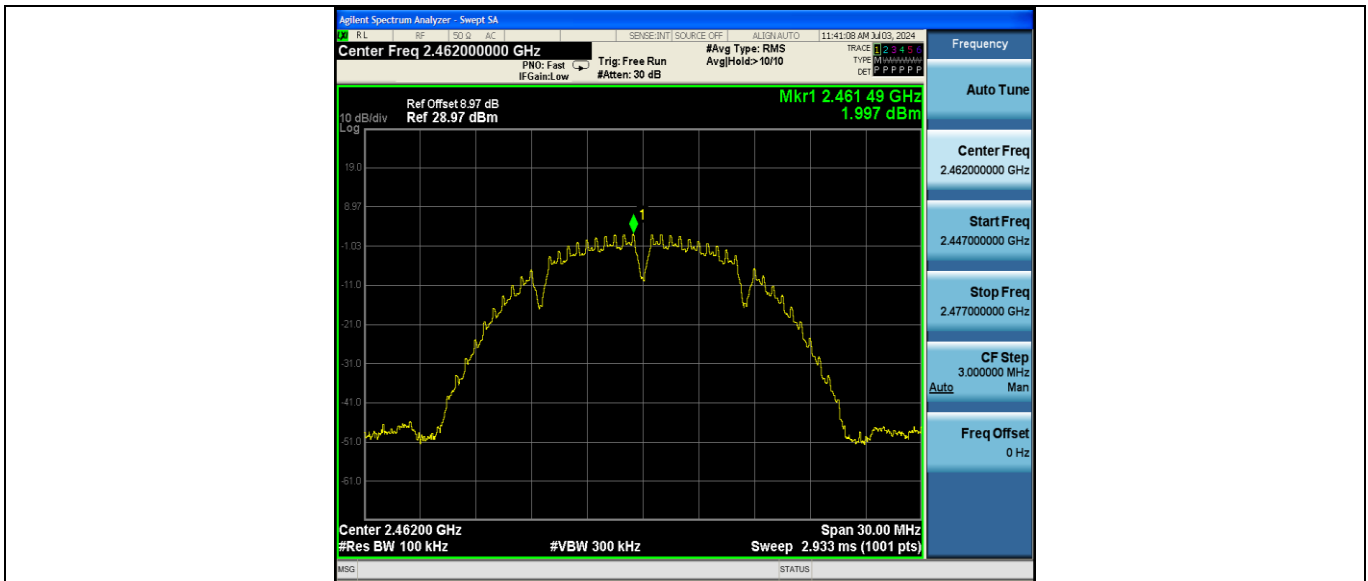
11B\_Ant1\_2437\_30~1000



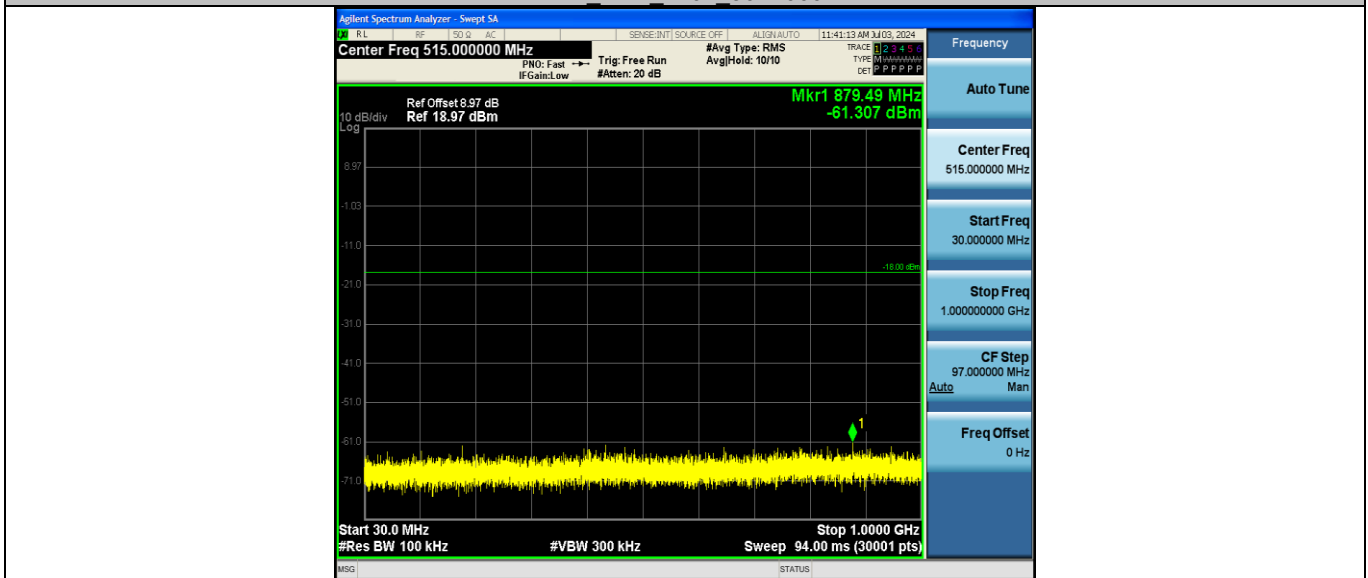
11B\_Ant1\_2437\_1000~26500



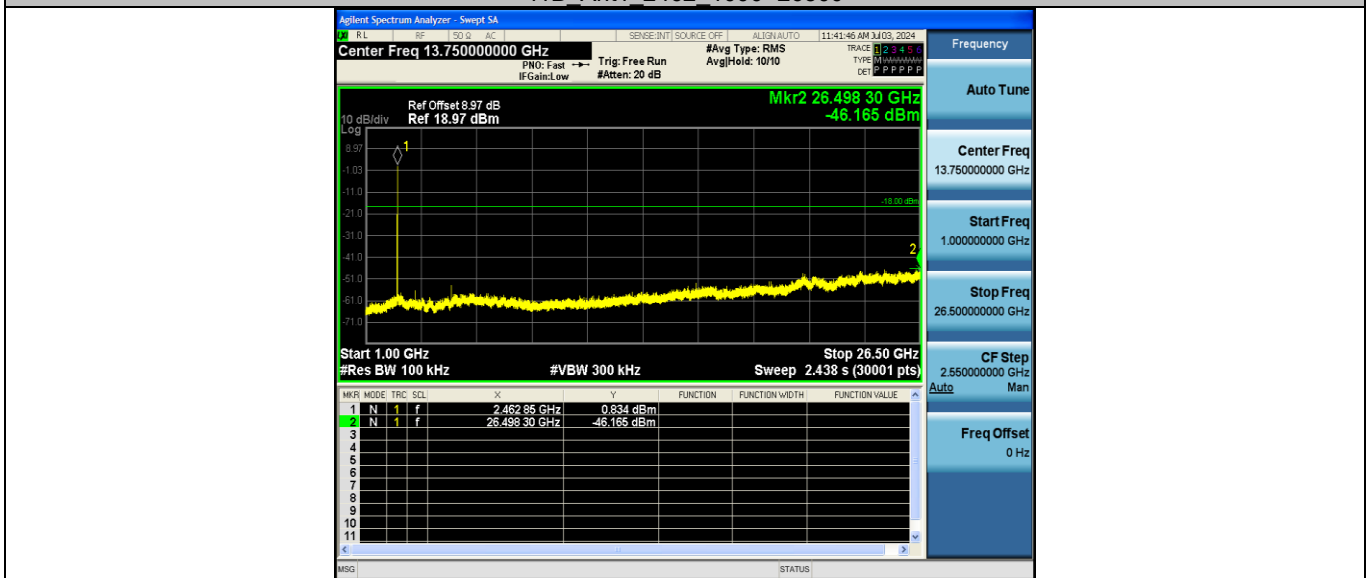
11B\_Ant1\_2462\_0~Reference



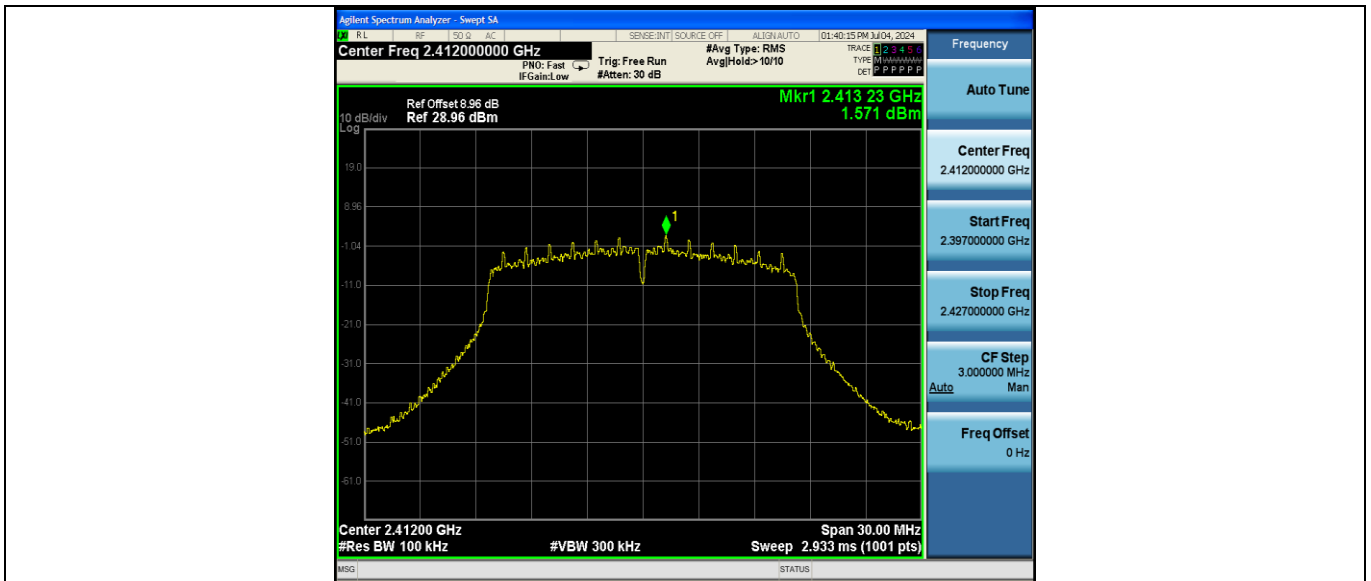
11B Ant1\_2462\_30~1000



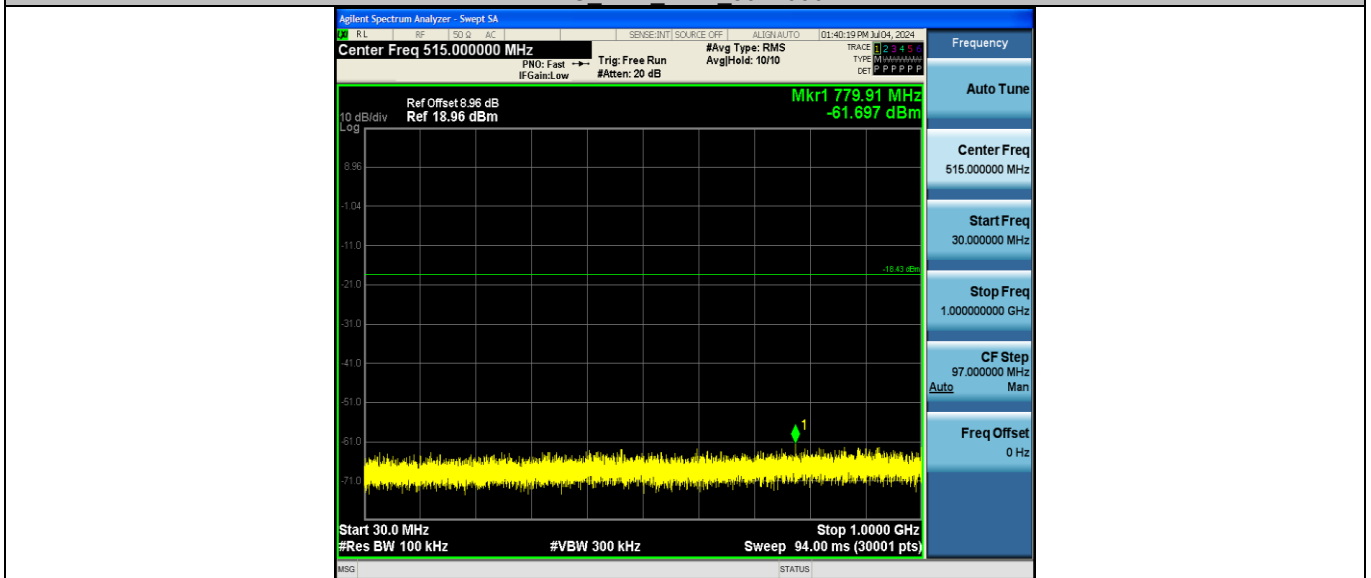
11B Ant1\_2462\_1000~26500



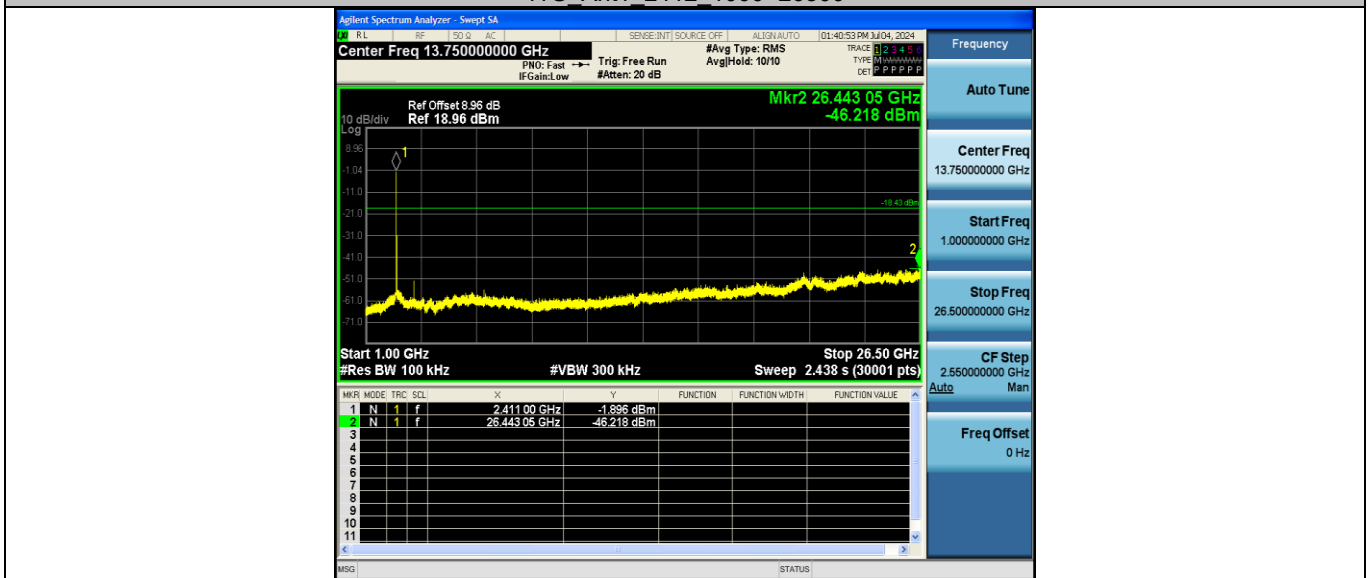
11G Ant1\_2412\_0~Reference



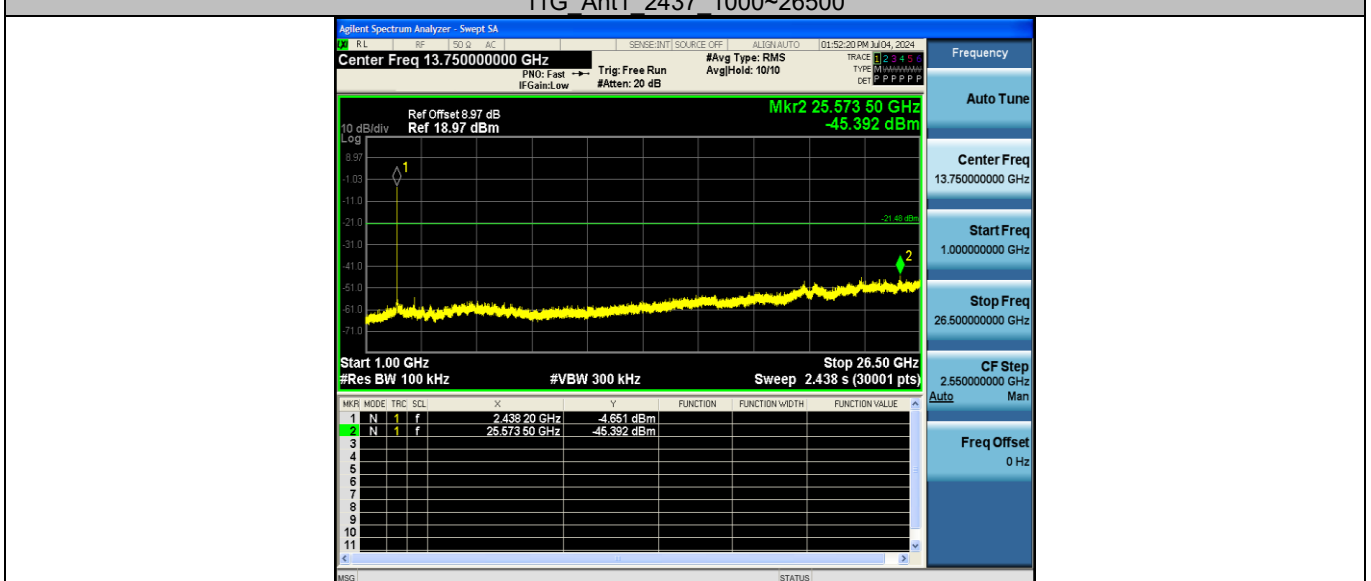
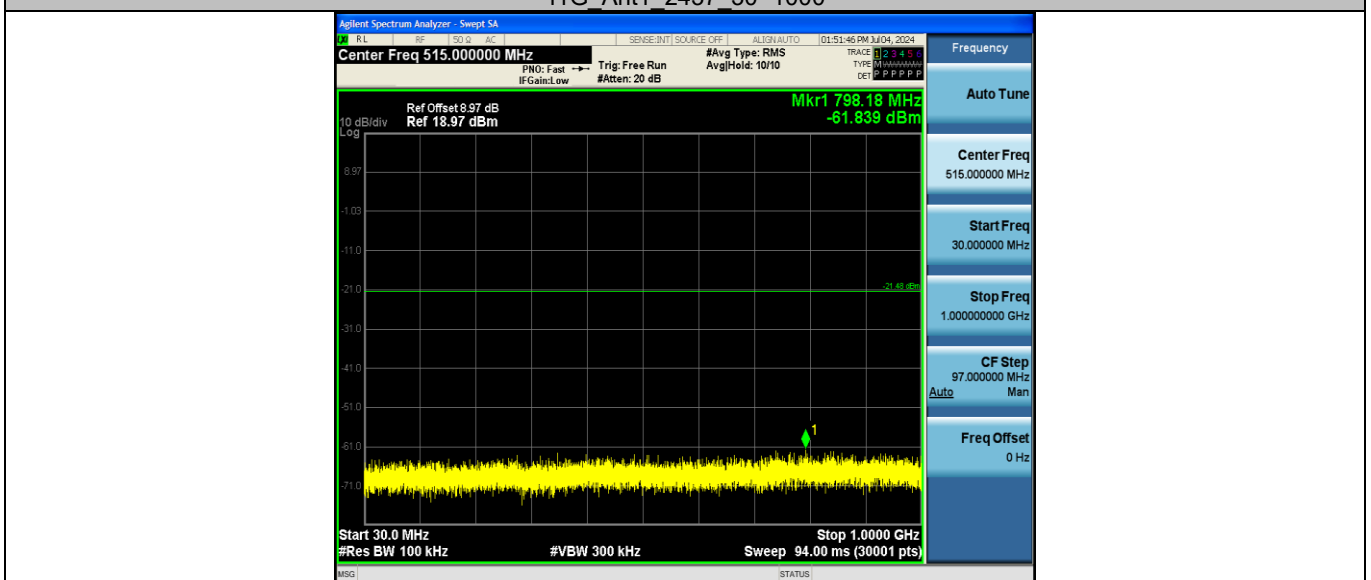
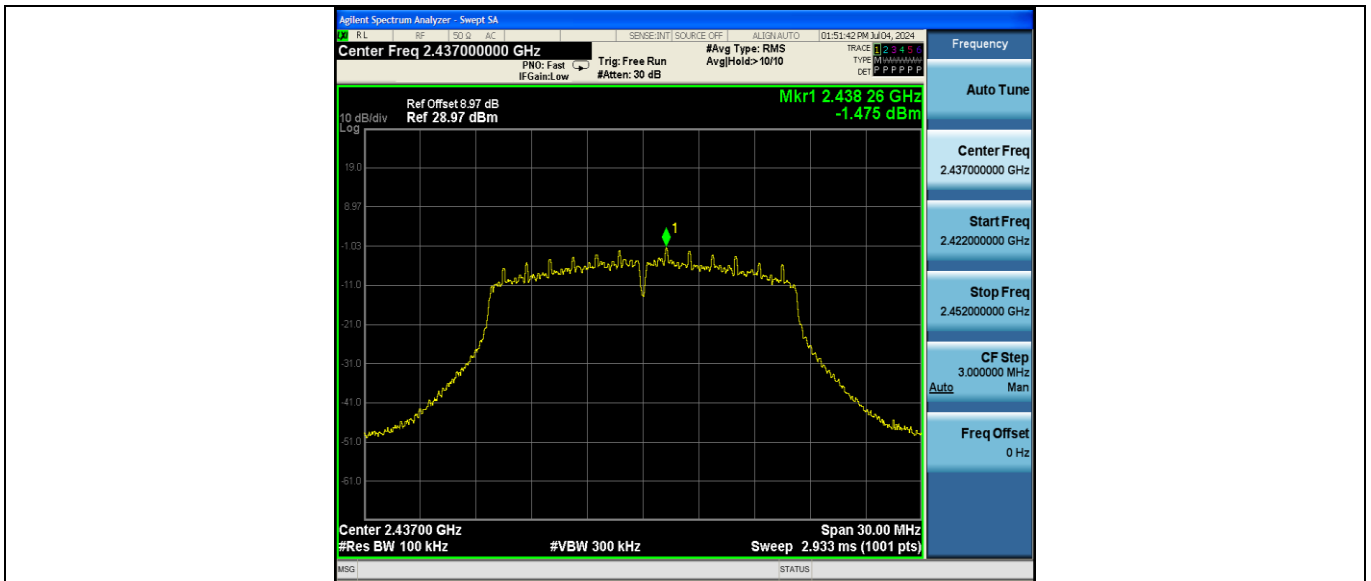
11G Ant1\_2412\_30~1000

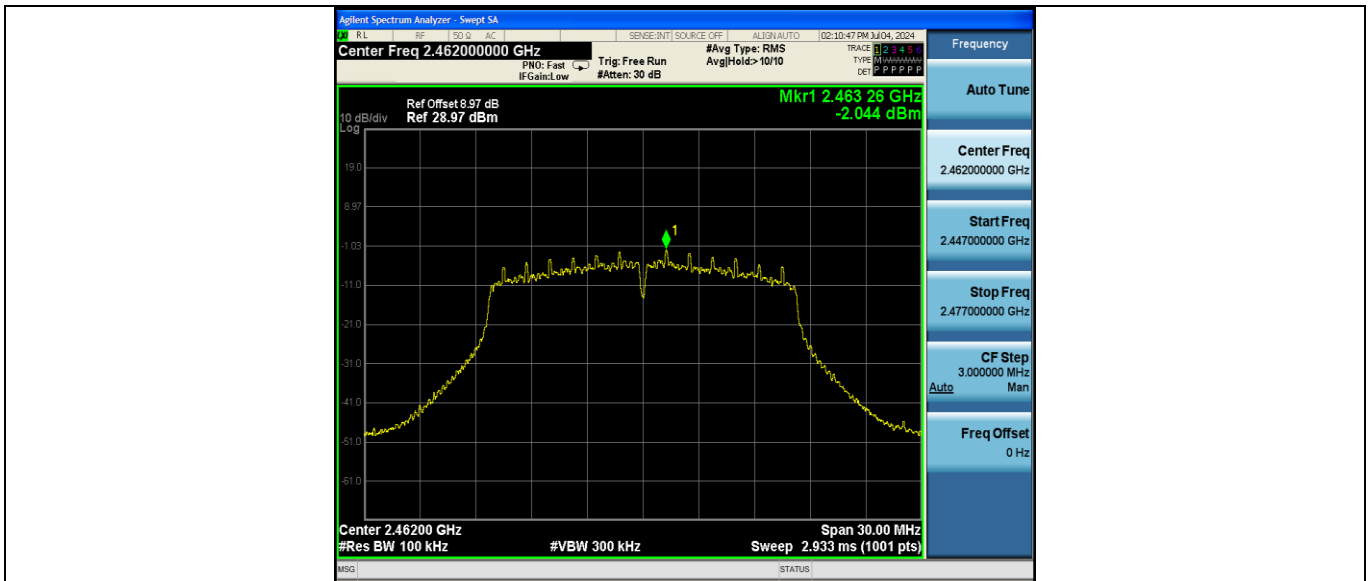


11G Ant1\_2412\_1000~26500

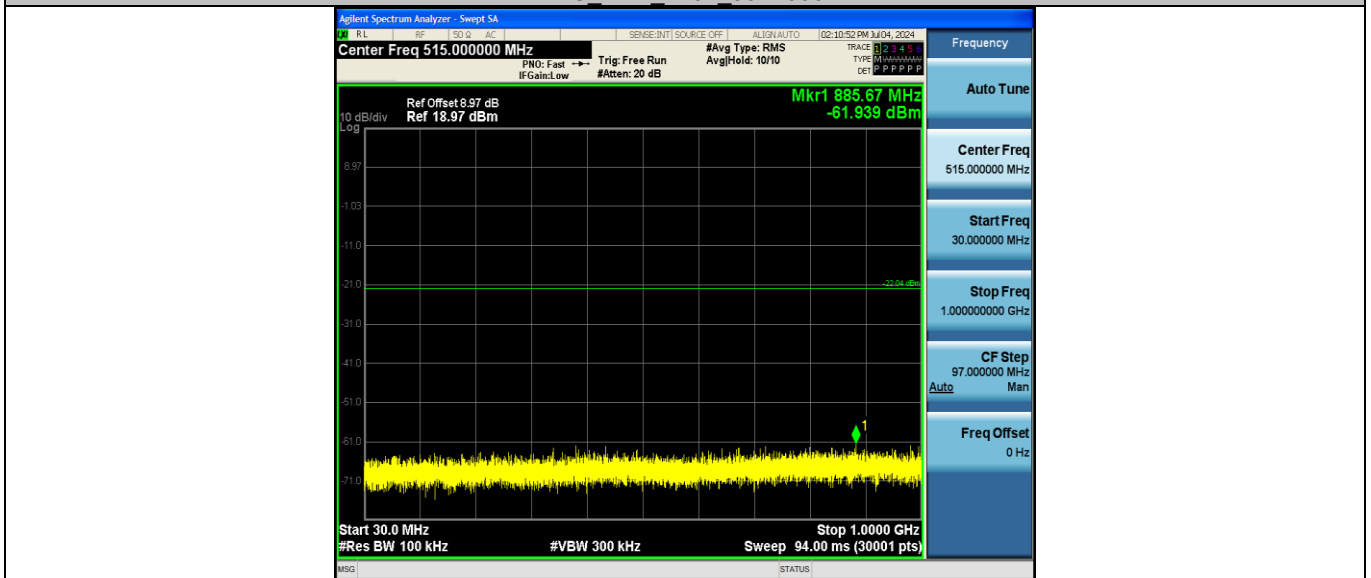


11G Ant1\_2437\_0~Reference

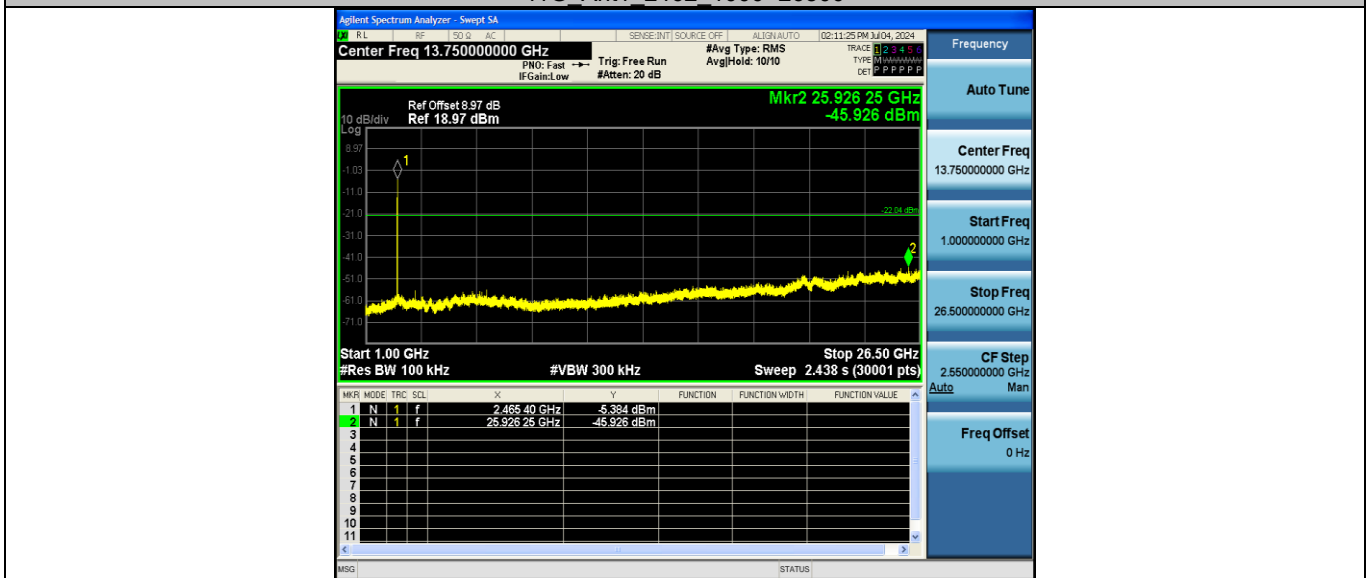




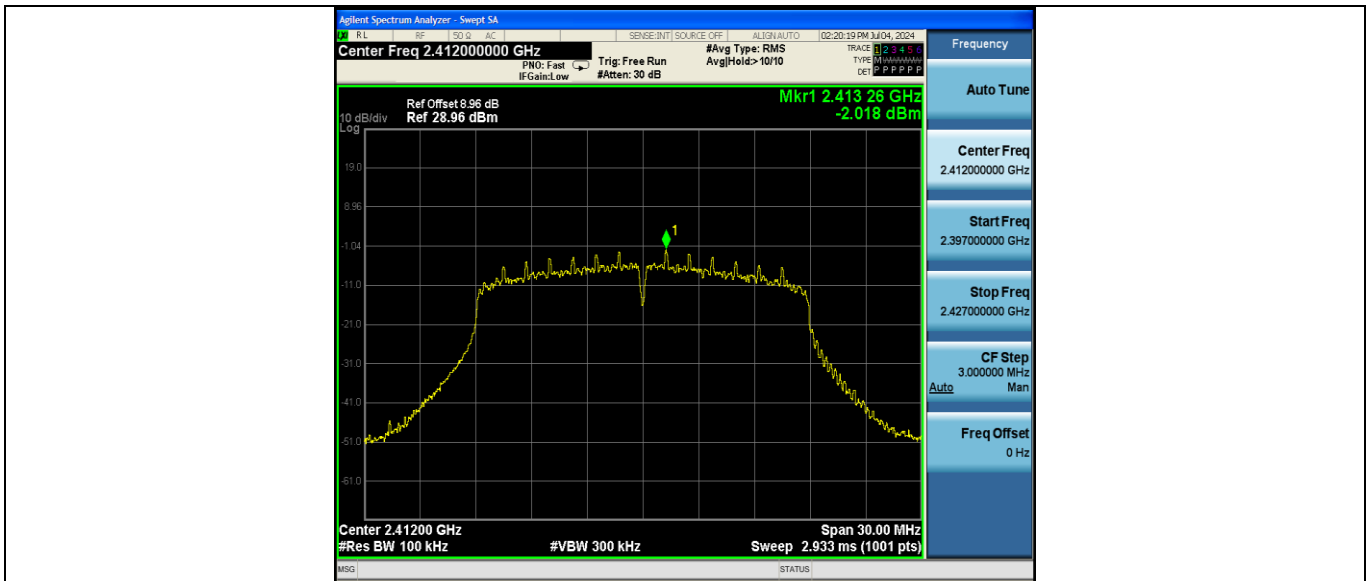
11G Ant1\_2462\_30~1000



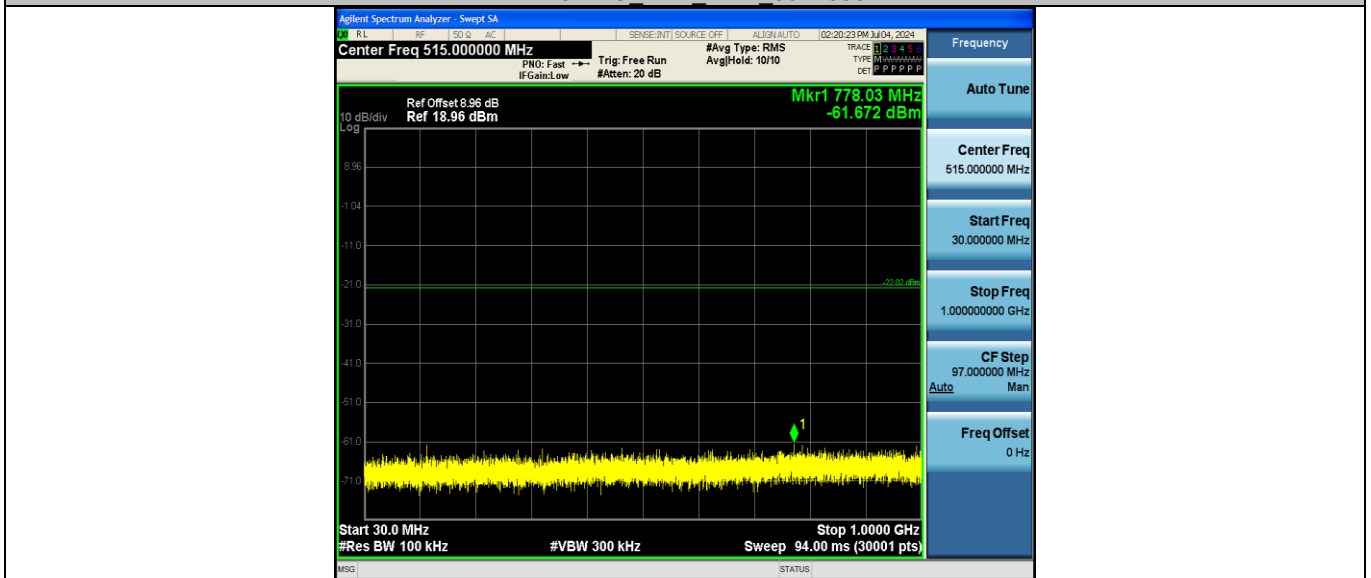
11G Ant1\_2462\_1000~26500



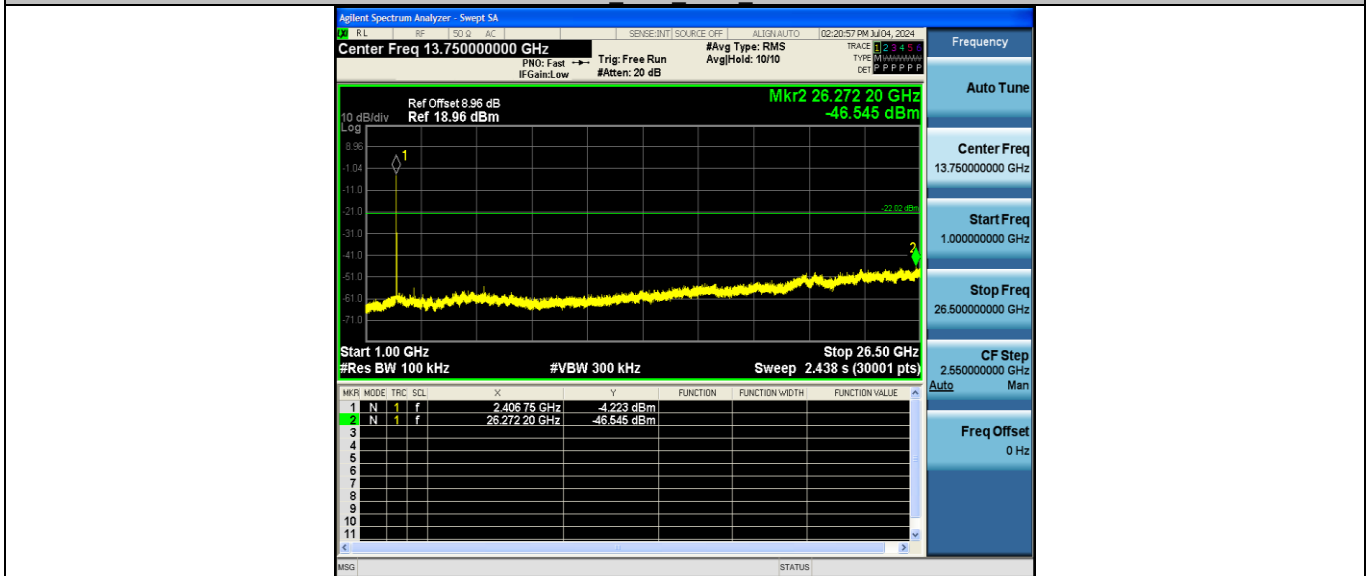
11N20SISO Ant1\_2412\_0~Reference



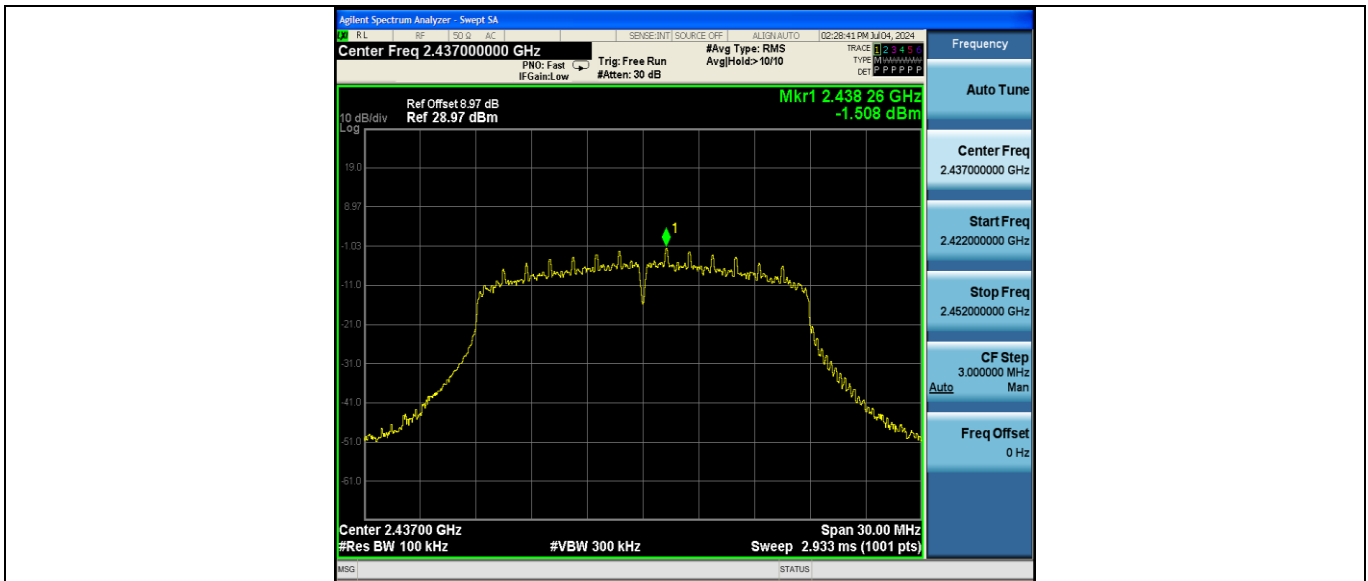
11N20SISO Ant1 2412 30~1000



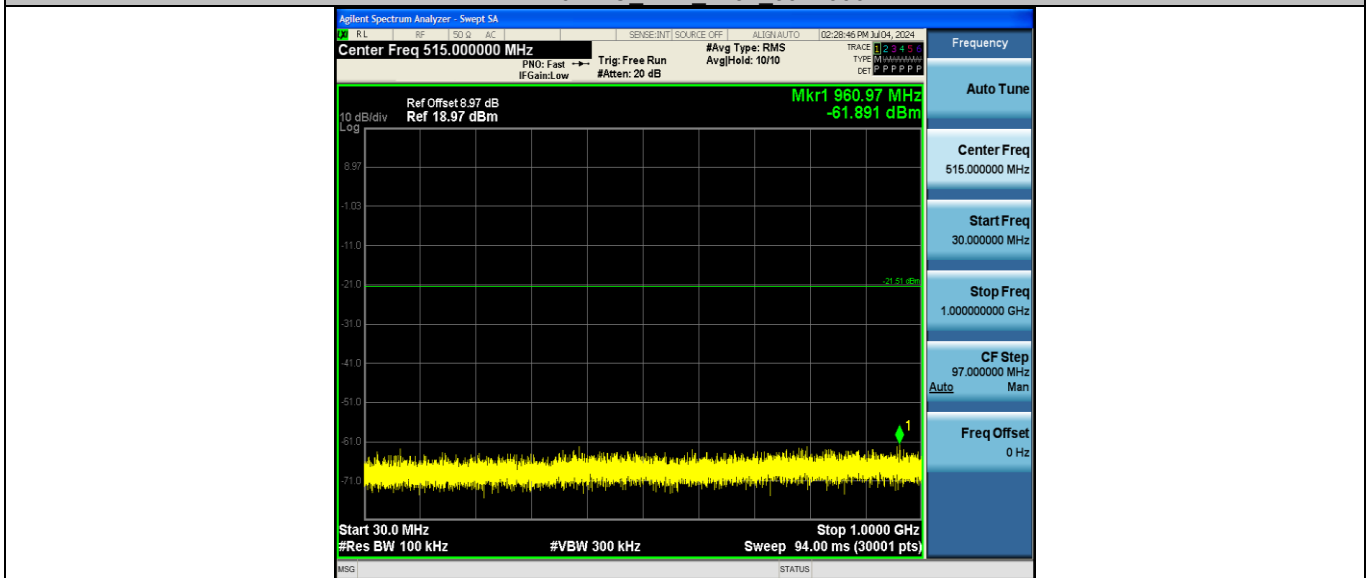
11N20SISO Ant1 2412 1000~26500



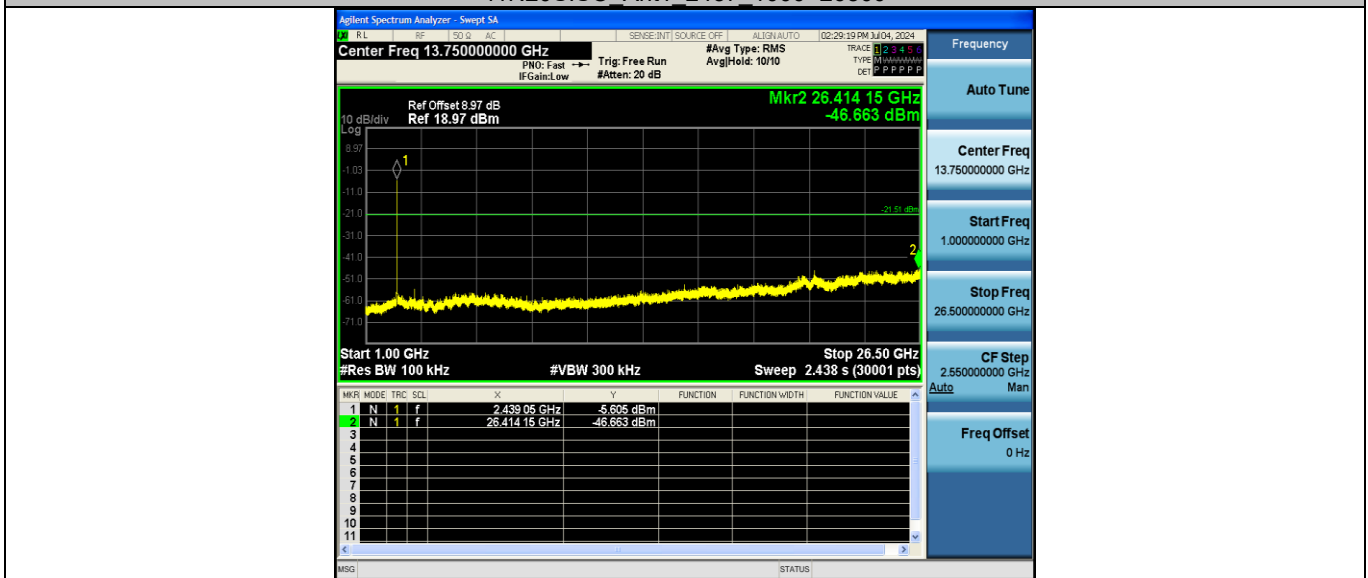
11N20SISO Ant1 2437 0~Reference



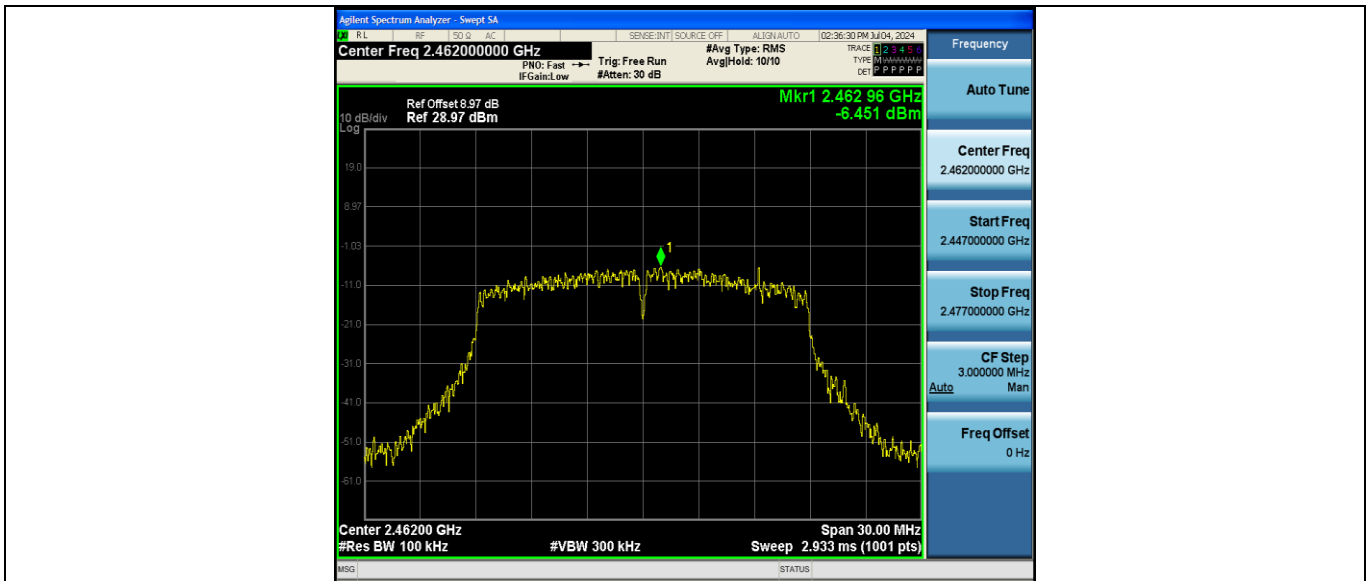
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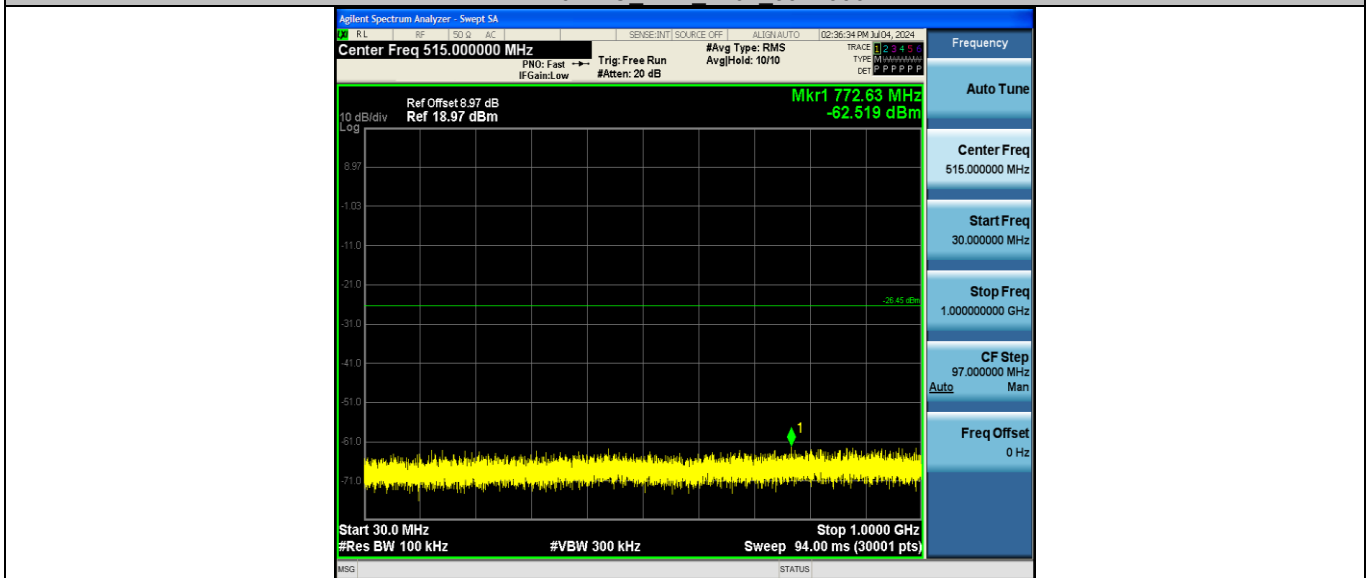
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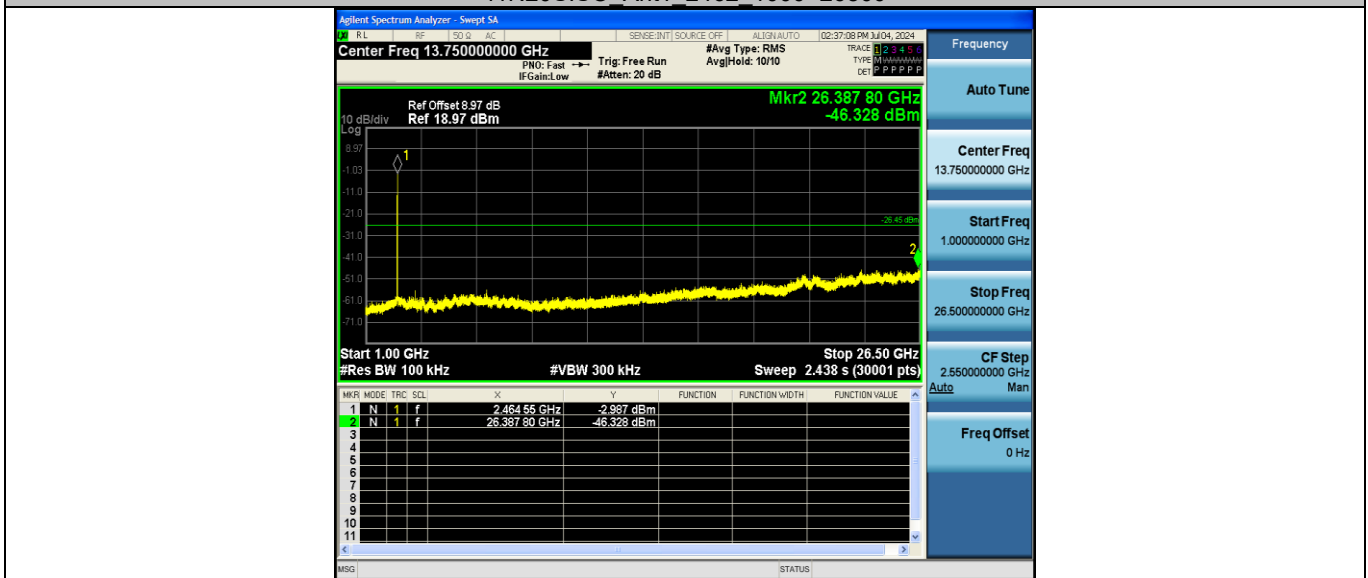
11N20SISO Ant1 2462 0~Reference



11N20SISO Ant1 2462 30~1000

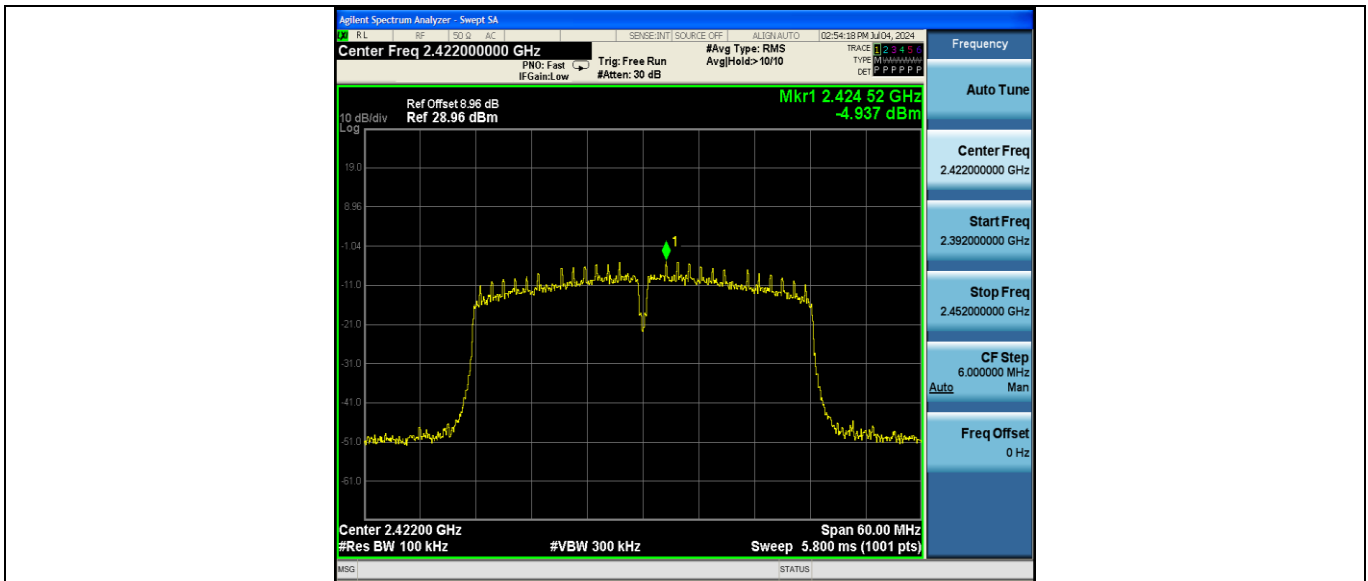


11N20SISO Ant1 2462 1000~26500

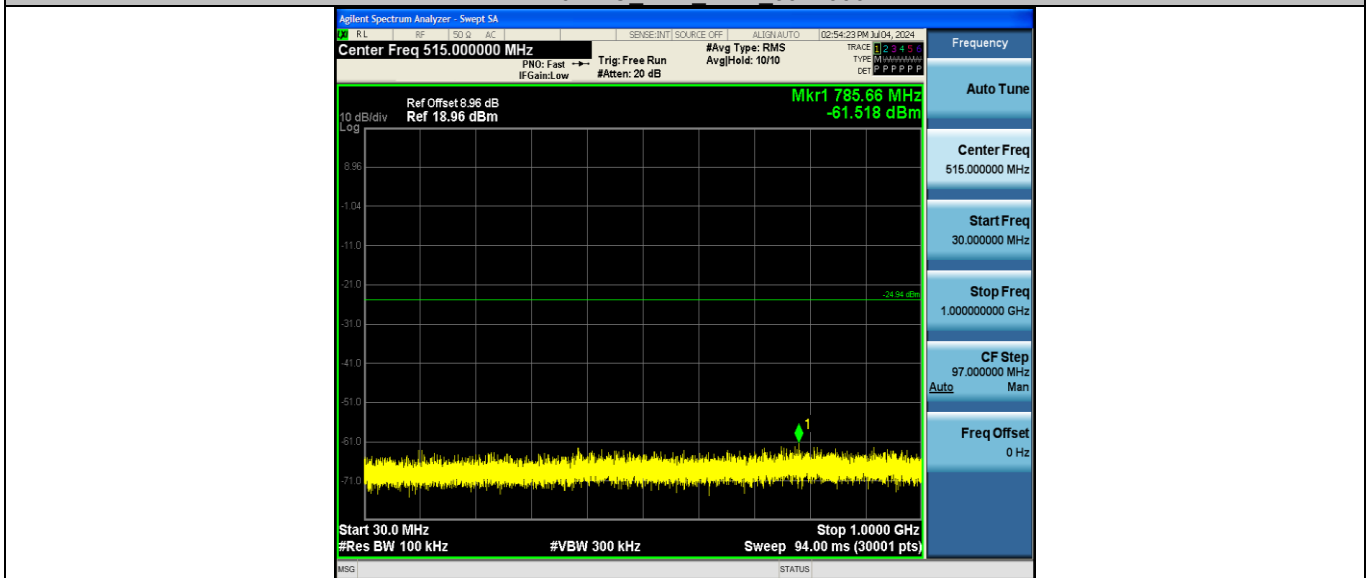


11N40SISO Ant1 2422 0~Reference

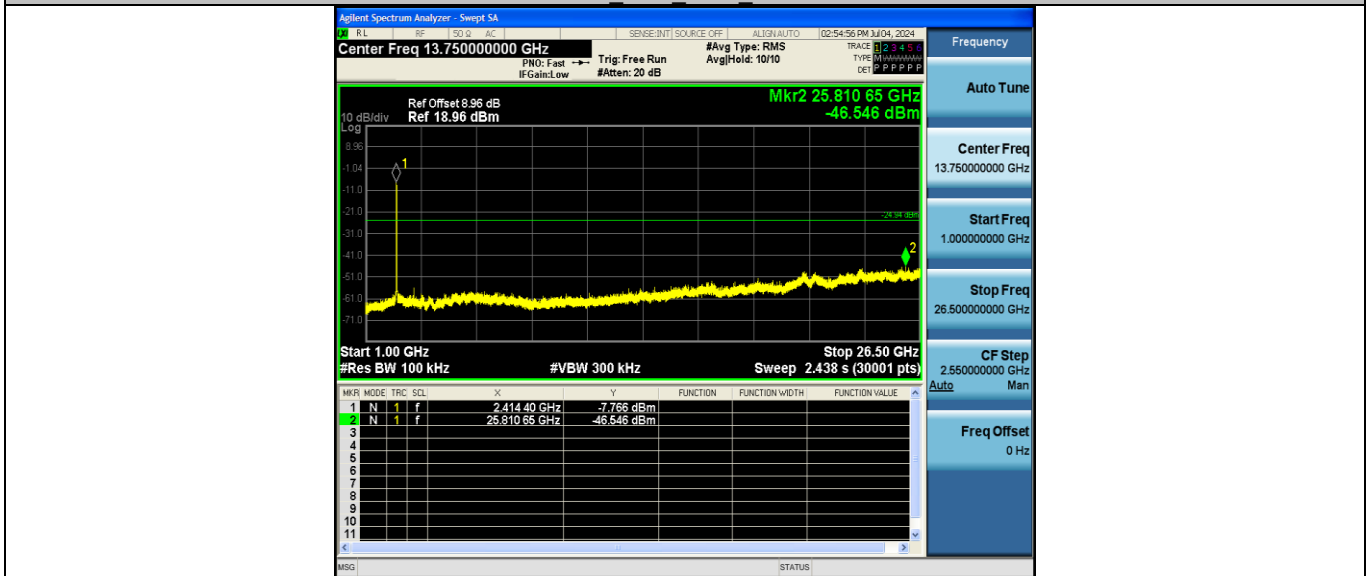




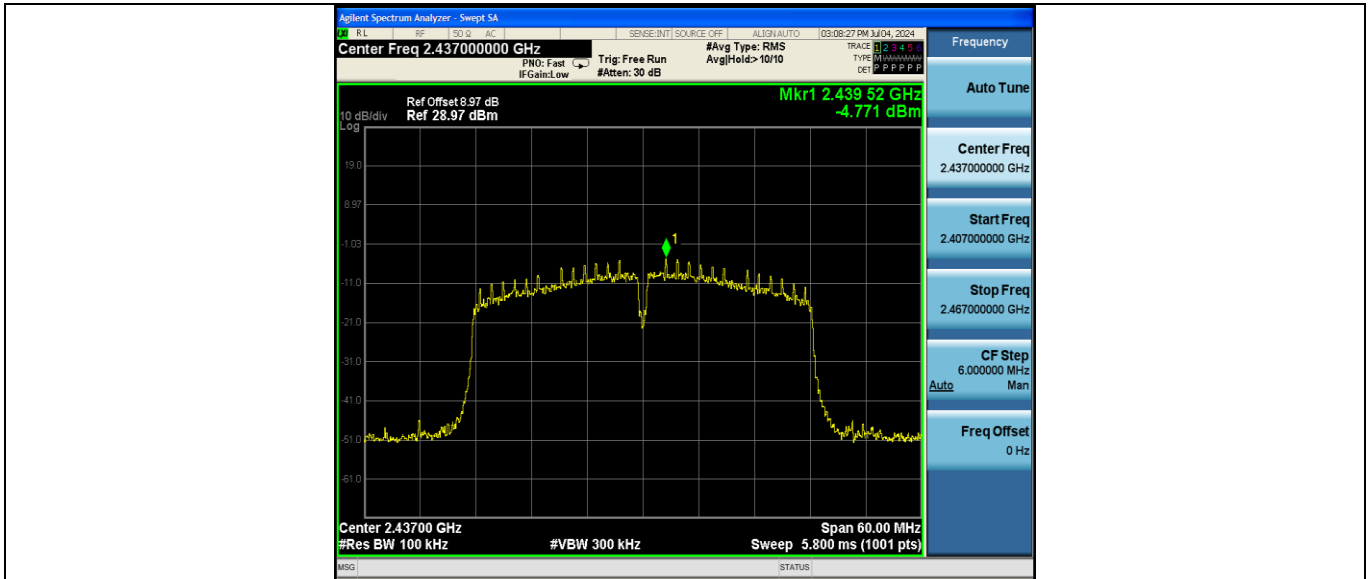
11N40SISO Ant1 2422 30~1000



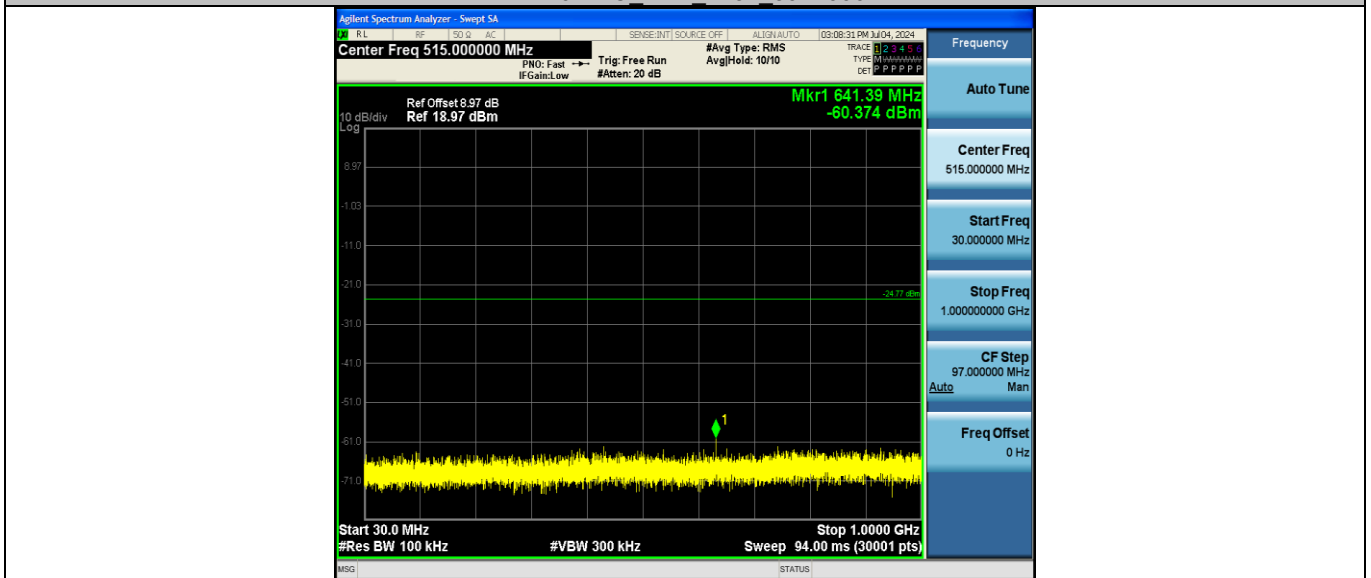
11N40SISO Ant1 2422 1000~26500



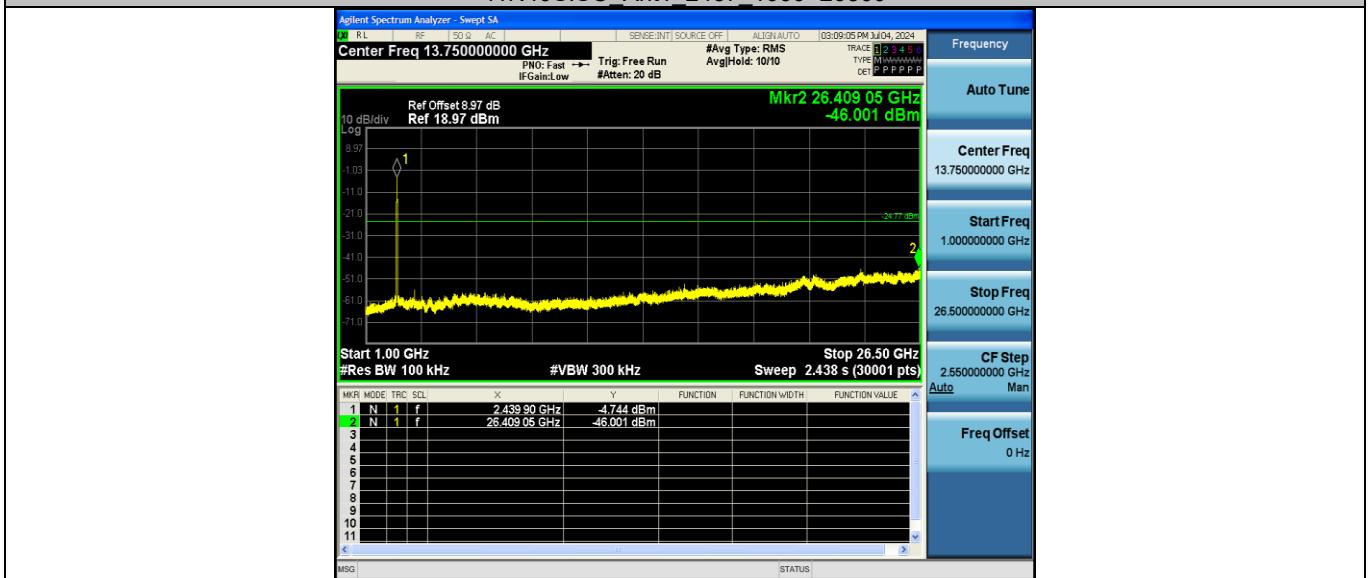
11N40SISO Ant1 2437 0~Reference



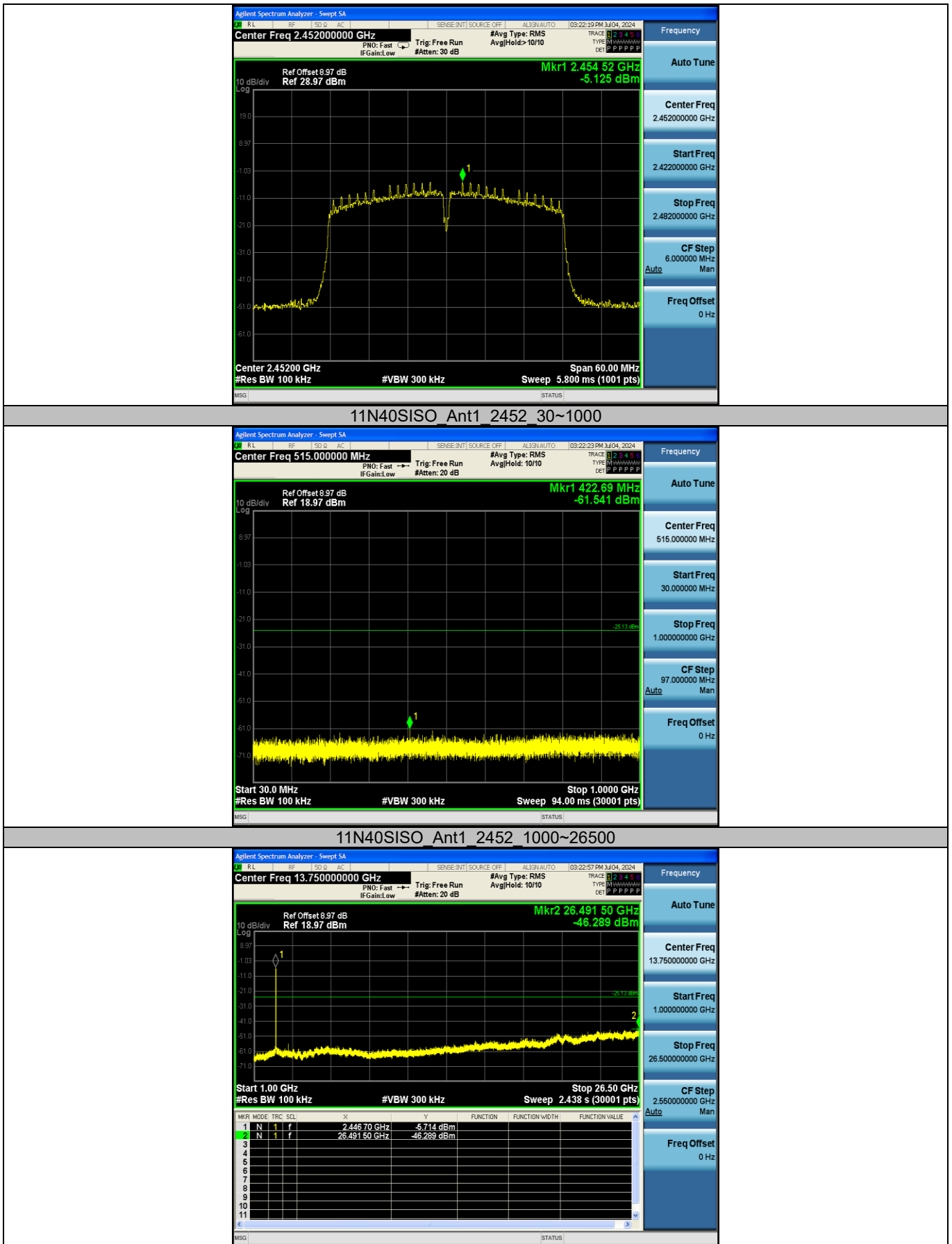
11N40SISO Ant1 2437\_30~1000



11N40SISO Ant1 2437\_1000~26500



11N40SISO Ant1 2452\_0~Reference



## Appendix F: Duty Cycle

### Test Result

Test Mode	Antenna	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Factor
11B	Ant1	2437	8.19	8.20	99.88	0.01
11G	Ant1	2437	1.36	1.41	96.45	0.16
11N20SISO	Ant1	2437	1.14	1.19	95.80	0.19
11N40SISO	Ant1	2437	0.63	0.68	92.65	0.33

**Notes:**

Duty Cycle [%] = Transmission Duration [ms] / Transmission Period [ms] \* 100

Factor = 10 \* log (Duty Cycle)

----End of Report----