

Test Report

Report No.: MTi230620016-05E1

Date of issue: 2024-09-05

Applicant: INSTAR Deutschland GmbH

Product name: IP / NETWORK CAMERA

Model(s): IN-8401 2K+, IN-8402 2K+

FCC ID: SO6-IN8401

Shenzhen Microtest Co., Ltd.

<http://www.mtitest.cn>

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Test Result Certification	
Applicant:	INSTAR Deutschland GmbH
Address:	Auf der Hostert 17, 65510 Hünstetten, Germany
Manufacturer:	INSTAR Deutschland GmbH
Address:	Auf der Hostert 17, 65510 Hünstetten, Germany
Product description	
Product name:	IP / NETWORK CAMERA
Trademark:	INSTAR
Model name:	IN-8401 2K+
Series Model(s):	IN-8402 2K+
Standards:	47 CFR Part 15.247
Test Method:	ANSI C63.10-2013 KDB 558074 D01 15.247 Meas Guidance v05r02
Date of Test	
Date of test:	2023-01-04 to 2023-01-08
Test result:	Pass

Test Engineer	:	<i>Letter Lan.</i>
		(Letter Lan)
Reviewed By	:	<i>David. Lee</i>
		(David Lee)
Approved By	:	<i>Leon Chen</i>
		(Leon Chen)

1 General Description

1.1 Description of the EUT

Product name:	IP / NETWORK CAMERA
Model name:	IN-8401 2K+
Series Model(s):	IN-8402 2K+
Model difference:	All the models are the same circuit and module, except the model name.
Electrical rating:	Input: 5VDC 2A
Accessories:	Adapter: Model: GLH50C2000HW Input: AC 100-240V 50/60Hz, 0.4A Output: DC 5V 2A, 10W Manufacturer: INSTAR Deutschland Gmbh Cable 1: USB-A to DC cable 3m *1 Cable 2: Lan cable 3m *1
Hardware version:	1.2
Software version:	1.1.1
Test sample(s) number:	MTi230620016-05S1001
RF specification	
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:	Metal antenna
Antenna(s) gain:	3.07dBi

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: Please Apply settings before executing TX or RX

For power setting, refer to below table.

Test Software:	Please Apply settings before executing TX or RX		
802.112b		802.11g	
Channel	Power setting	Channel	Power setting
1	30	1	30
6	30	6	31
11	30	11	33
802.112n (HT20)		802.112n (HT40)	
Channel	Power setting	Channel	Power setting
1	27	3	27
6	27	6	27
11	27	9	27

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

Support equipment list			
Description	Model	Serial No.	Manufacturer
/	/	/	/
Support cable list			
Description	Length (m)	From	To
/	/	/	/

1.5 Measurement uncertainty

Measurement	Uncertainty
Conducted emissions (AMN 150kHz~30MHz)	±3.1dB
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	Standard	Requirement	Result
1	Antenna requirement	47 CFR Part 15.247	47 CFR 15.203	Pass
2	Conducted Emission at AC power line	47 CFR Part 15.247	47 CFR 15.207(a)	Pass
3	Occupied Bandwidth	47 CFR Part 15.247	47 CFR 15.247(a)(2)	Pass
4	Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(3)	Pass
5	Power Spectral Density	47 CFR Part 15.247	47 CFR 15.247(e)	Pass
6	RF conducted spurious emissions and band edge measurement	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
7	Band edge emissions (Radiated)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
8	Radiated emissions (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
9	Radiated emissions (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass

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
MTi-E002	EMI Test Receiver	R&S	ESCI3	101368	2022/05/05	2023/05/04
MTi-E023	Artificial power network	Schwarzbeck	NSLK8127	NSLK8127#841	2022/05/05	2023/05/04
MTi-E025	Artificial power network	Schwarzbeck	NSLK8127	8127183	2022/05/05	2023/05/04
MTi-E043	EMI test receiver	R&S	ESCI7	101166	2022/05/05	2023/05/04
MTi-E046	Active Loop Antenna	Schwarzbeck	FMZB 1519 B	00044	2021/05/30	2023/05/29
MTi-E044	Broadband antenna	Schwarzbeck	VULB9163	9163-1338	2021/05/30	2023/05/29
MTi-E045	Horn antenna	Schwarzbeck	BBHA9120D	9120D-2278	2021/05/30	2023/05/29
MTi-E047	Pre-amplifier	Hewlett-Packard	8447F	3113A06184	2022/05/05	2023/05/04
MTi-E048	Pre-amplifier	Agilent	8449B	3008A01120	2022/05/05	2023/05/04
MTi-E120	Broadband antenna	Schwarzbeck	VULB9163	9163-1419	2021/05/30	2023/05/29
MTi-E121	Pre-amplifier	Hewlett-Packard	8447D	2944A09365	2022/04/15	2023/04/14
MTi-E123	Pre-amplifier	Agilent	8449B	3008A04723	2022/05/05	2023/05/04
MTi-E135	Horn antenna	Schwarzbeck	BBHA 9170	00987	2021/05/30	2023/05/29
MTi-E136	Pre-amplifier	Space-Dtronics	EVLAN1840 G-G45	210405001	2022/05/05	2023/05/04
MTi-E062	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2022/05/05	2023/05/04
MTi-E067	RF Control Unit	Tonscend	JS0806-1	19D8060152	2022/05/05	2023/05/04
MTi-E068	RF Control Unit	Tonscend	JS0806-2	19D8060153	2022/05/05	2023/05/04
MTi-E069	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2022/05/05	2023/05/04
MTi-E010S	EMI Measurement Software	Farad	EZ-EMC Ver. EMEC-3A1	/	/	/
MTi-E014S	RF Test System	Tonscend	TS@JS1120 V2.6.88.0330	/	/	/

Note: the calibration interval of the test equipment is 12 or 24 months and the calibrations are traceable to international system unit(SI)

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.

6 Radio Spectrum Matter Test Results (RF)

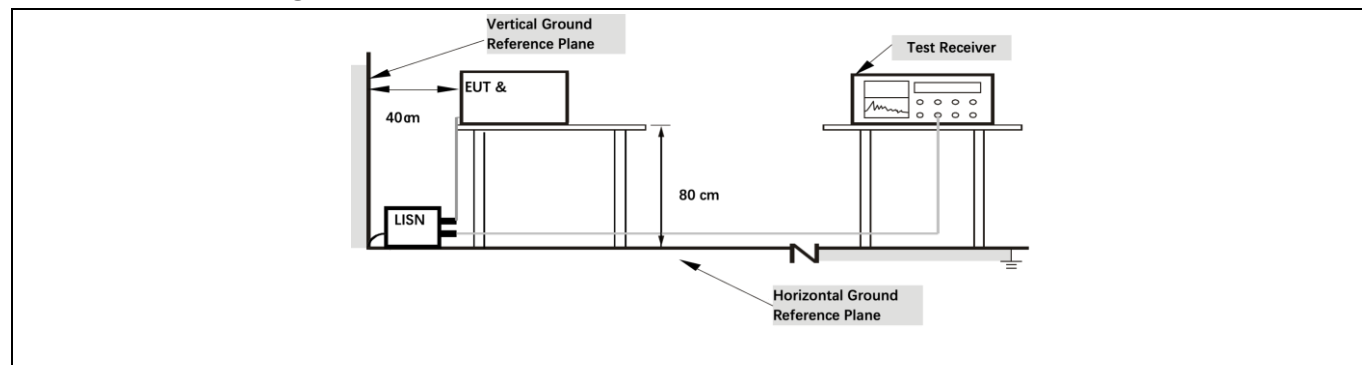
6.1 Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(a), Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).		
Test Limit:	Frequency of emission (MHz)	Conducted limit (dB μ V)	
		Quasi-peak	Average
	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.		
Test Method:	ANSI C63.10-2013 section 6.2		
Procedure:	Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices		

6.1.1 E.U.T. Operation:

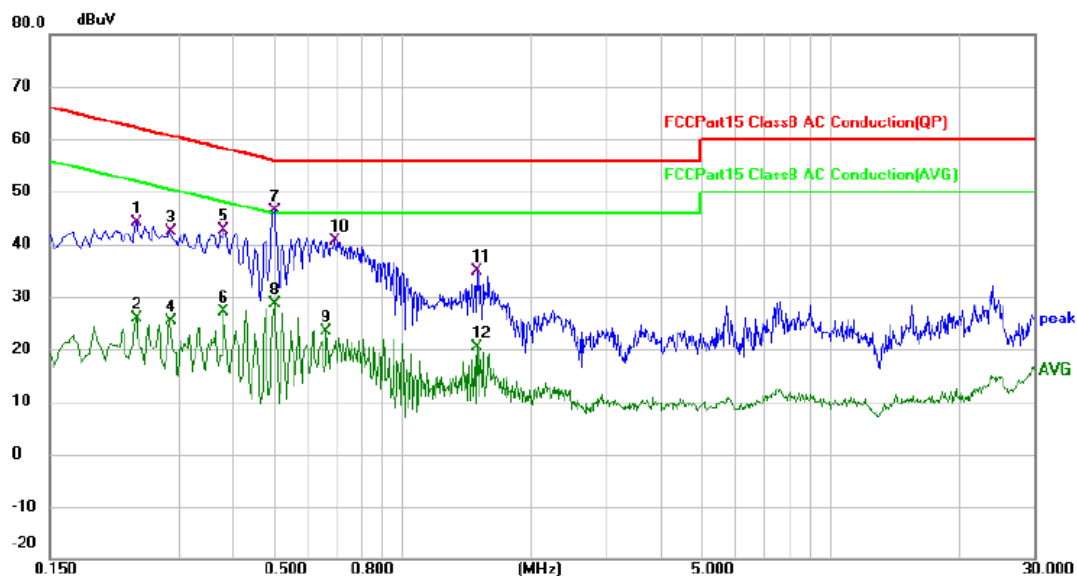
Operating Environment:					
Temperature:	16.5 °C	Humidity:	67.4 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4				
Final test mode:	Mode1				

6.1.2 Test Setup Diagram:



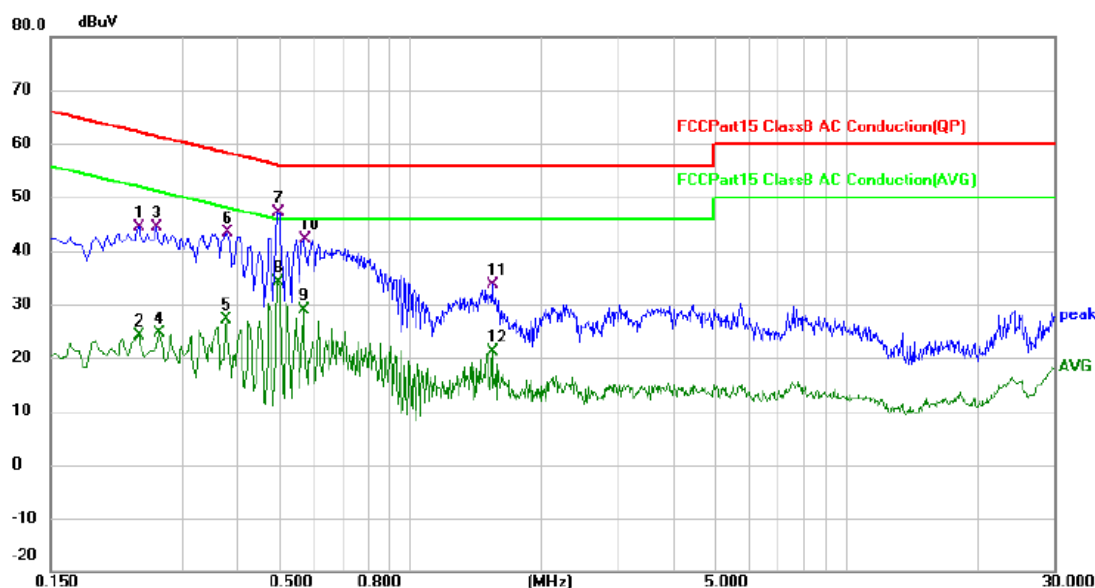
6.1.3 Test Data:

Mode1 / Line: Line / CH: L



No. Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
	MHz	Level	Factor	ment			Detector	Comment
		dBuV	dB	dBuV	dBuV	dB		
1	0.2380	33.86	10.32	44.18	62.17	-17.99	QP	
2	0.2380	15.65	10.32	25.97	52.17	-26.20	AVG	
3	0.2860	32.02	10.35	42.37	60.64	-18.27	QP	
4	0.2860	14.91	10.35	25.26	50.64	-25.38	AVG	
5	0.3820	32.37	10.38	42.75	58.24	-15.49	QP	
6	0.3820	16.66	10.38	27.04	48.24	-21.20	AVG	
7 *	0.5020	35.98	10.43	46.41	56.00	-9.59	QP	
8	0.5020	18.17	10.43	28.60	46.00	-17.40	AVG	
9	0.6660	12.91	10.46	23.37	46.00	-22.63	AVG	
10	0.6940	30.03	10.48	40.51	56.00	-15.49	QP	
11	1.5020	24.25	10.54	34.79	56.00	-21.21	QP	
12	1.5020	9.94	10.54	20.48	46.00	-25.52	AVG	

Mode1 / Line: Neutral / CH: L



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2380	34.12	10.32	44.44	62.17	-17.73	QP	
2		0.2380	13.86	10.32	24.18	52.17	-27.99	AVG	
3		0.2620	33.95	10.33	44.28	61.37	-17.09	QP	
4		0.2660	14.26	10.33	24.59	51.24	-26.65	AVG	
5		0.3780	16.80	10.38	27.18	48.32	-21.14	AVG	
6		0.3820	33.09	10.38	43.47	58.24	-14.77	QP	
7	*	0.4980	36.59	10.43	47.02	56.03	-9.01	QP	
8		0.4980	23.71	10.43	34.14	46.03	-11.89	AVG	
9		0.5700	18.55	10.45	29.00	46.00	-17.00	AVG	
10		0.5740	31.65	10.45	42.10	56.00	-13.90	QP	
11		1.5460	23.02	10.55	33.57	56.00	-22.43	QP	
12		1.5460	10.49	10.55	21.04	46.00	-24.96	AVG	

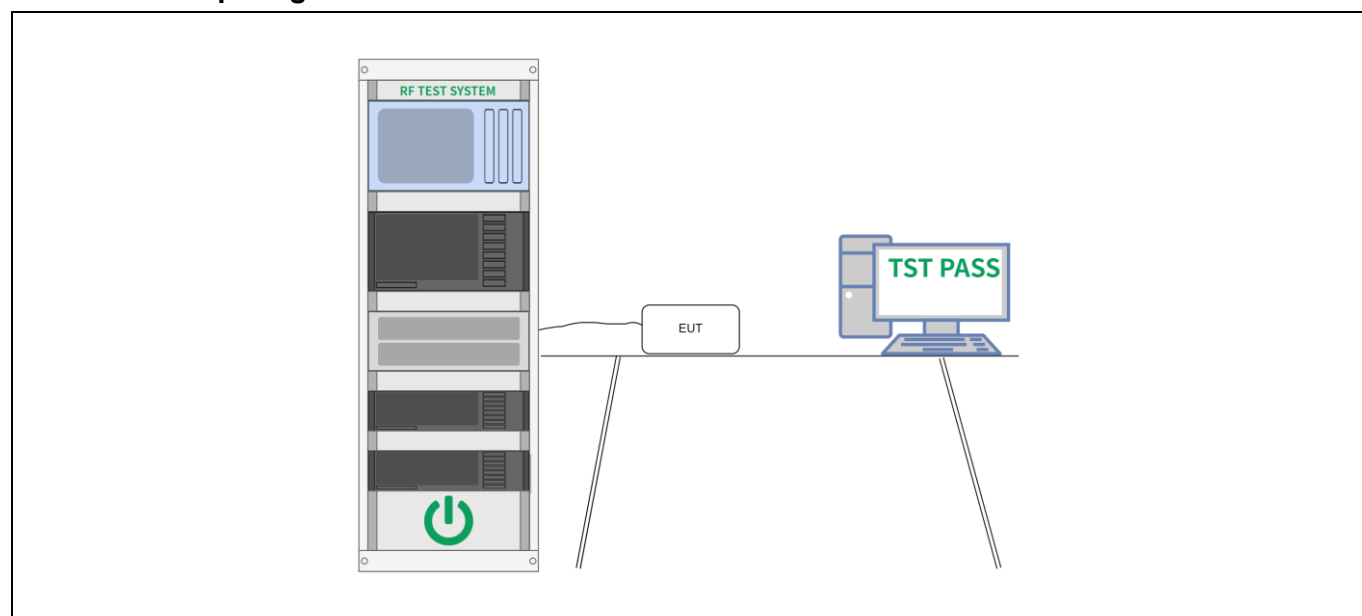
6.2 Occupied Bandwidth

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.

6.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	16.5 °C	Humidity:	67.4 %	Atmospheric Pressure:	100 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.

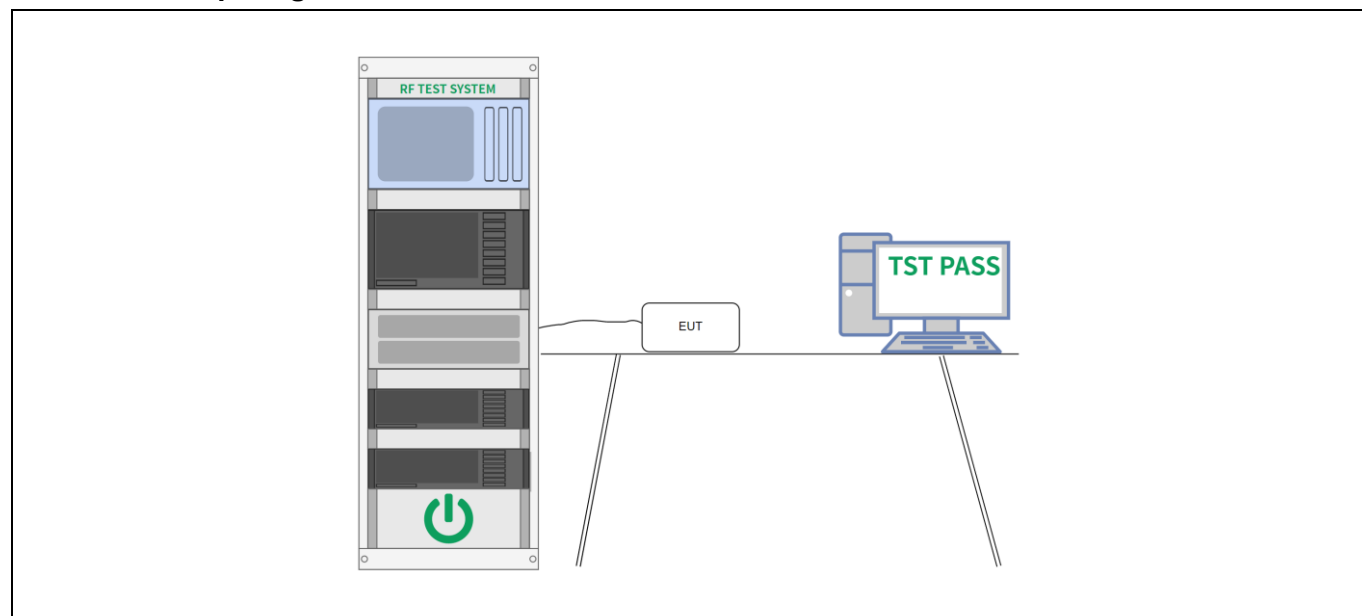
6.3 Maximum Conducted Output Power

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 11.9.1.3 Maximum peak conducted output power

6.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	16.5 °C	Humidity:	67.4 %	Atmospheric Pressure:	100 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.

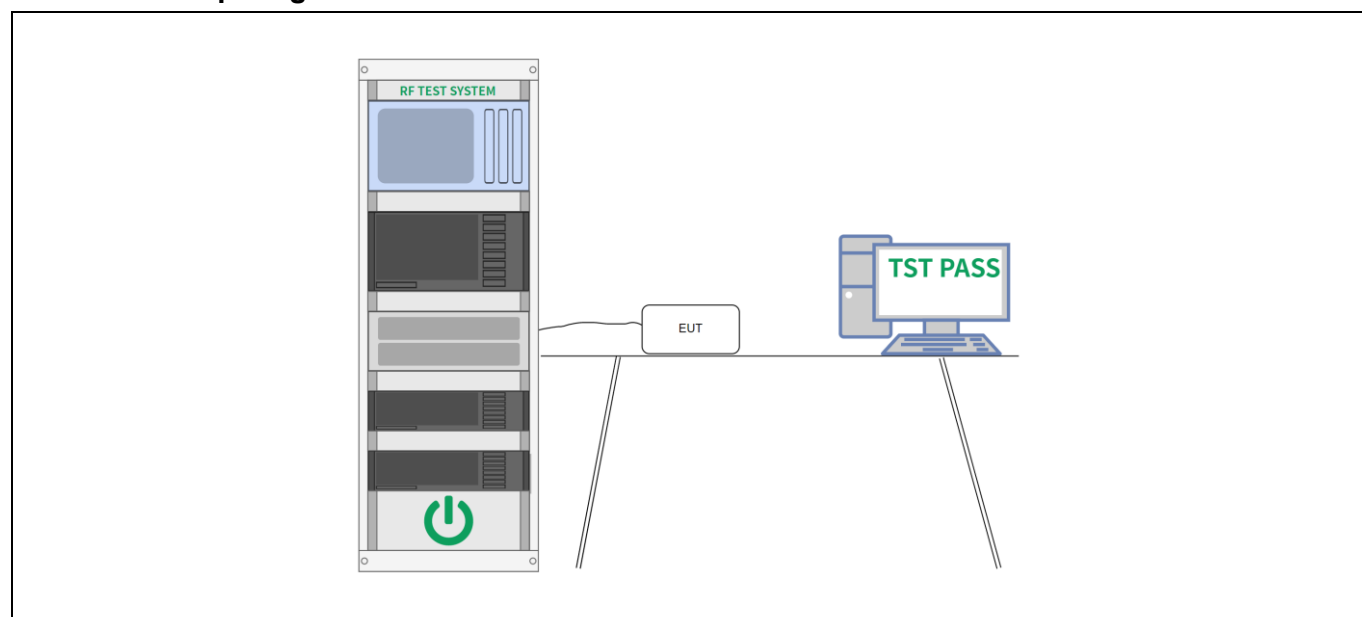
6.4 Power Spectral Density

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

6.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	16.5 °C	Humidity:	67.4 %	Atmospheric Pressure:	100 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.

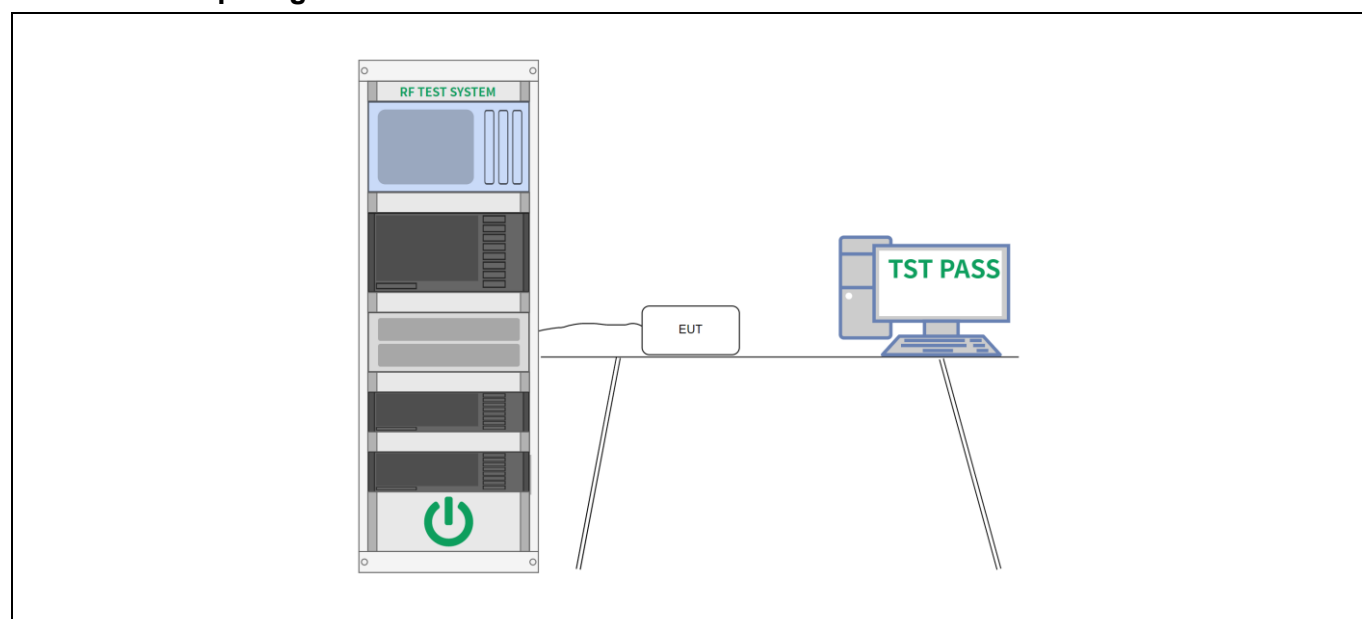
6.5 RF conducted spurious emissions and band edge measurement

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

6.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	16.5 °C	Humidity:	67.4 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4				
Final test mode:	Mode1, Mode2, Mode3, Mode4				

6.5.2 Test Setup Diagram:



6.5.3 Test Data:

Please Refer to Appendix for Details.

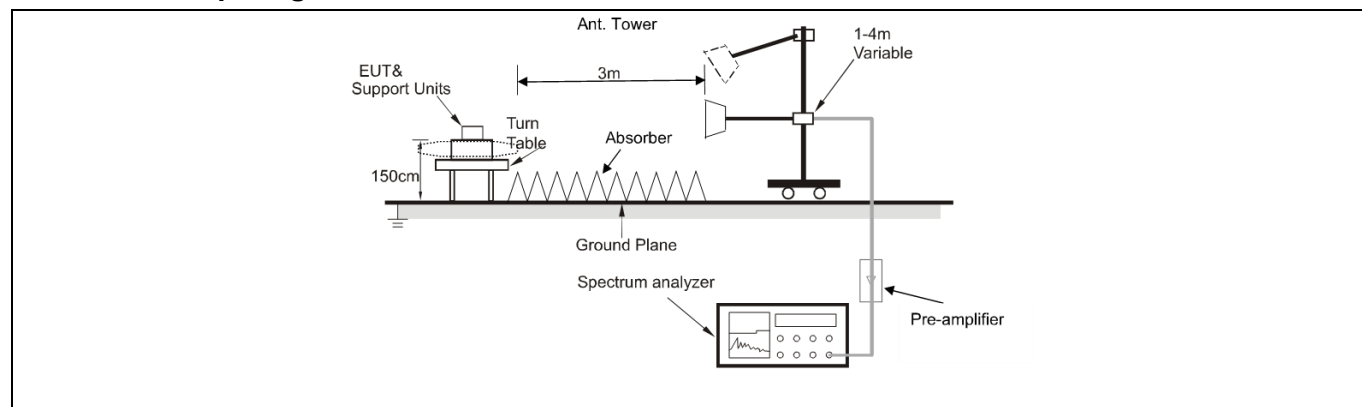
6.6 Band edge emissions (Radiated)

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		

6.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	16.5 °C	Humidity:	67.4 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4				
Final test mode:	Mode1, Mode4				
Note: The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.					

6.6.2 Test Setup Diagram:



6.6.3 Test Data:

Mode1 / Polarization: Horizontal / CH: L							
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB Detector
1		2310.000	49.14	-8.08	41.06	74.00	-32.94 peak
2		2310.000	37.84	-8.08	29.76	54.00	-24.24 AVG
3		2390.000	56.14	-7.71	48.43	74.00	-25.57 peak
4	*	2390.000	40.13	-7.71	32.42	54.00	-21.58 AVG

Mode1 / Polarization: Vertical / CH: L							
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB Detector
1		2310.000	46.70	-8.08	38.62	74.00	-35.38 peak
2		2310.000	36.48	-8.08	28.40	54.00	-25.60 AVG
3		2390.000	52.97	-7.71	45.26	74.00	-28.74 peak
4	*	2390.000	37.33	-7.71	29.62	54.00	-24.38 AVG

Mode1 / Polarization: Horizontal / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	55.70	-7.24	48.46	74.00	-25.54	peak
2	*	2483.500	40.50	-7.24	33.26	54.00	-20.74	AVG
3		2500.000	51.44	-7.17	44.27	74.00	-29.73	peak
4		2500.000	40.26	-7.17	33.09	54.00	-20.91	AVG

Mode1 / Polarization: Vertical / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	55.00	-7.24	47.76	74.00	-26.24	peak
2	*	2483.500	39.41	-7.24	32.17	54.00	-21.83	AVG
3		2500.000	49.77	-7.17	42.60	74.00	-31.40	peak
4		2500.000	38.83	-7.17	31.66	54.00	-22.34	AVG

Mode4 / Polarization: Horizontal / CH: L

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	46.99	-8.08	38.91	74.00	-35.09	peak
2		2310.000	36.84	-8.08	28.76	54.00	-25.24	AVG
3		2390.000	49.28	-7.71	41.57	74.00	-32.43	peak
4	*	2390.000	38.89	-7.71	31.18	54.00	-22.82	AVG

Mode4 / Polarization: Vertical / CH: L

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	46.41	-8.08	38.33	74.00	-35.67	peak
2		2310.000	36.13	-8.08	28.05	54.00	-25.95	AVG
3		2390.000	46.95	-7.71	39.24	74.00	-34.76	peak
4	*	2390.000	36.31	-7.71	28.60	54.00	-25.40	AVG

Mode4 / Polarization: Horizontal / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	49.04	-7.24	41.80	74.00	-32.20	peak
2	*	2483.500	39.72	-7.24	32.48	54.00	-21.52	AVG
3		2500.000	49.87	-7.17	42.70	74.00	-31.30	peak
4		2500.000	39.35	-7.17	32.18	54.00	-21.82	AVG

Mode4 / Polarization: Vertical / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	48.83	-7.24	41.59	74.00	-32.41	peak
2	*	2483.500	38.91	-7.24	31.67	54.00	-22.33	AVG
3		2500.000	48.85	-7.17	41.68	74.00	-32.32	peak
4		2500.000	38.71	-7.17	31.54	54.00	-22.46	AVG

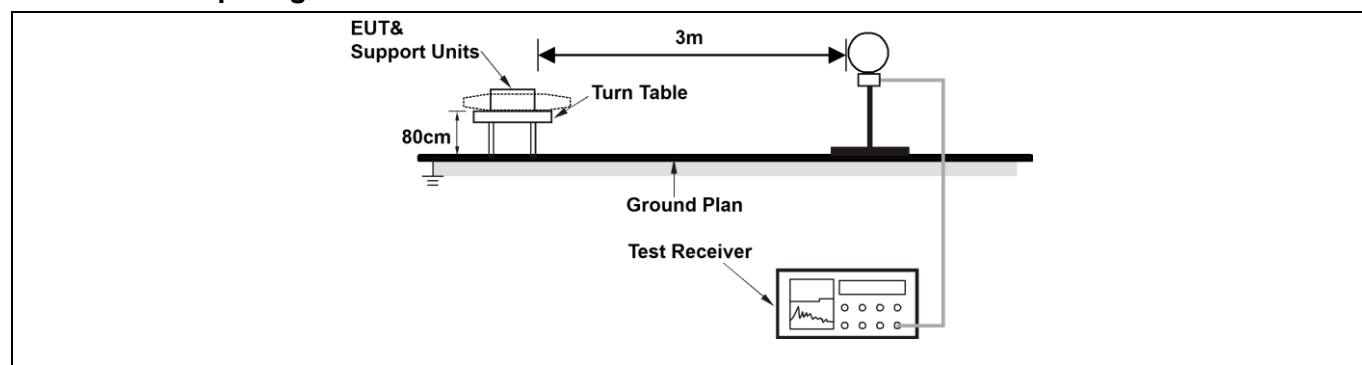
6.7 Radiated emissions (below 1GHz)

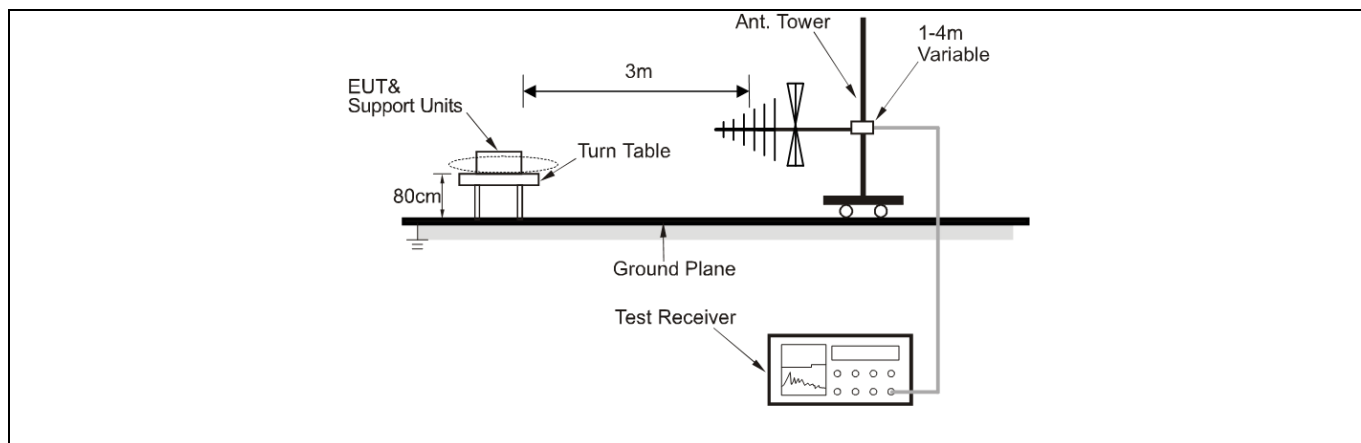
Test Requirement:	Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`		
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measurement 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		

6.7.1 E.U.T. Operation:

Operating Environment:						
Temperature:	16.5 °C		Humidity:	67.4 %	Atmospheric Pressure:	100 kPa
Pre test mode:		Mode1, Mode2, Mode3, Mode4				
Final test mode:		Mode1				
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.						

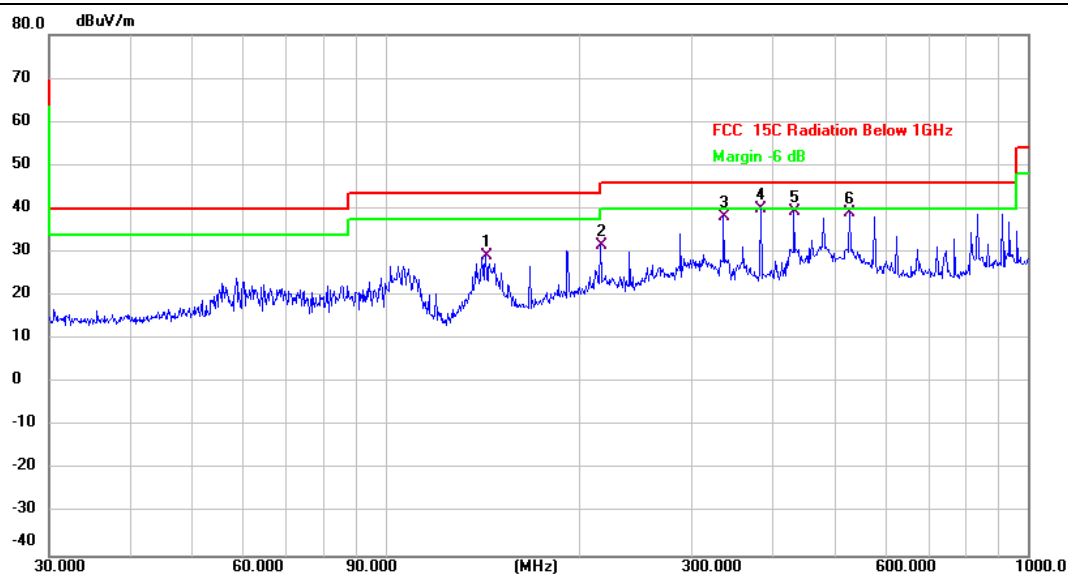
6.7.2 Test Setup Diagram:





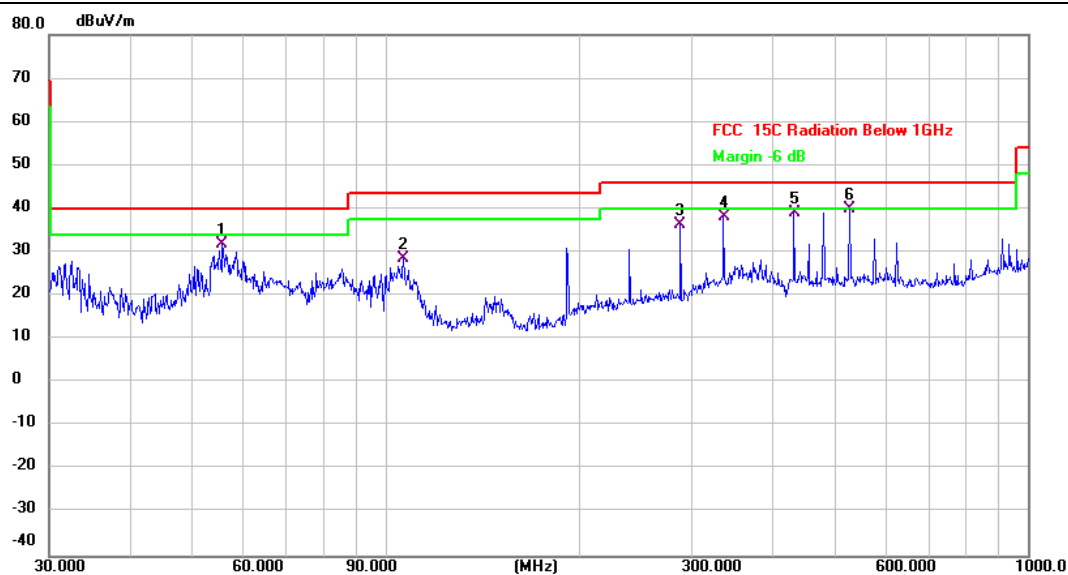
6.7.3 Test Data:

Mode1 / Polarization: Horizontal / CH: L



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV/m	dBuV/m	dB	
1		143.3261	41.92	-12.73	29.19	43.50	-14.31	QP
2		216.0240	40.93	-9.40	31.53	46.00	-14.47	QP
3		336.0352	45.07	-7.00	38.07	46.00	-7.93	QP
4	*	383.9318	46.84	-6.95	39.89	46.00	-6.11	QP
5		432.5457	45.25	-5.90	39.35	46.00	-6.65	QP
6		528.2458	44.10	-4.91	39.19	46.00	-6.81	QP

Mode1 / Polarization: Vertical / CH: L



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV/m	dBuV/m	dB	
1		55.8047	42.43	-10.47	31.96	40.00	-8.04	QP
2		106.7587	39.32	-10.65	28.67	43.50	-14.83	QP
3		287.9904	44.47	-8.07	36.40	46.00	-9.60	QP
4		336.0352	45.15	-7.00	38.15	46.00	-7.85	QP
5		432.5457	44.87	-5.90	38.97	46.00	-7.03	QP
6	*	528.2458	44.72	-4.91	39.81	46.00	-6.19	QP

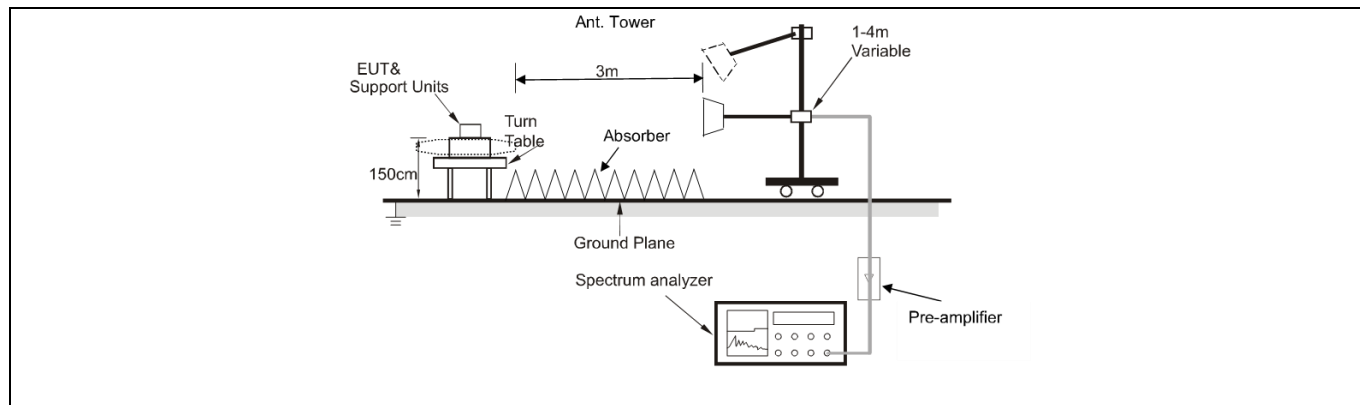
6.8 Radiated emissions (above 1GHz)

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		

6.8.1 E.U.T. Operation:

Operating Environment:					
Temperature:	16.5 °C	Humidity:	67.4 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4				
Final test mode:	Mode1				
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.					

6.8.2 Test Setup Diagram:



6.8.3 Test Data:

Mode1 / Polarization: Horizontal / CH: L

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB Detector
1		4824.000	39.41	0.82	40.23	74.00	-33.77 peak
2		4824.000	33.30	0.82	34.12	54.00	-19.88 AVG
3		7236.000	40.08	6.00	46.08	74.00	-27.92 peak
4		7236.000	34.02	6.00	40.02	54.00	-13.98 AVG
5		9648.000	40.01	6.17	46.18	74.00	-27.82 peak
6	*	9648.000	33.96	6.17	40.13	54.00	-13.87 AVG

Mode1 / Polarization: Vertical / CH: L

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB Detector
1		4824.000	39.67	0.82	40.49	74.00	-33.51 peak
2		4824.000	33.51	0.82	34.33	54.00	-19.67 AVG
3		7236.000	39.53	6.00	45.53	74.00	-28.47 peak
4		7236.000	33.21	6.00	39.21	54.00	-14.79 AVG
5		9648.000	39.87	6.17	46.04	74.00	-27.96 peak
6	*	9648.000	33.85	6.17	40.02	54.00	-13.98 AVG

Mode1 / Polarization: Horizontal / CH: M

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4874.000	40.16	1.01	41.17	74.00	-32.83	peak
2		4874.000	34.09	1.01	35.10	54.00	-18.90	AVG
3		7311.000	40.02	5.94	45.96	74.00	-28.04	peak
4		7311.000	33.39	5.94	39.33	54.00	-14.67	AVG
5		9748.000	40.92	6.54	47.46	74.00	-26.54	peak
6	*	9748.000	34.74	6.54	41.28	54.00	-12.72	AVG

Mode1 / Polarization: Vertical / CH: M

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4874.000	39.31	1.01	40.32	74.00	-33.68	peak
2		4874.000	33.14	1.01	34.15	54.00	-19.85	AVG
3		7311.000	39.28	5.94	45.22	74.00	-28.78	peak
4		7311.000	33.19	5.94	39.13	54.00	-14.87	AVG
5		9748.000	39.86	6.54	46.40	74.00	-27.60	peak
6	*	9748.000	33.74	6.54	40.28	54.00	-13.72	AVG

Mode1 / Polarization: Horizontal / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4924.000	41.82	1.27	43.09	74.00	-30.91	peak
2		4924.000	35.74	1.27	37.01	54.00	-16.99	AVG
3		7386.000	39.84	5.86	45.70	74.00	-28.30	peak
4		7386.000	33.40	5.86	39.26	54.00	-14.74	AVG
5		9848.000	41.75	6.31	48.06	74.00	-25.94	peak
6	*	9848.000	35.79	6.31	42.10	54.00	-11.90	AVG

Mode1 / Polarization: Vertical / CH: H

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4924.000	41.19	1.27	42.46	74.00	-31.54	peak
2		4924.000	34.86	1.27	36.13	54.00	-17.87	AVG
3		7386.000	41.65	5.86	47.51	74.00	-26.49	peak
4	*	7386.000	35.43	5.86	41.29	54.00	-12.71	AVG
5		9848.000	40.68	6.31	46.99	74.00	-27.01	peak
6		9848.000	34.37	6.31	40.68	54.00	-13.32	AVG

Photographs of the test setup

Refer to Appendix - Test Setup Photos

Photographs of the EUT

Refer to Appendix - EUT Photos

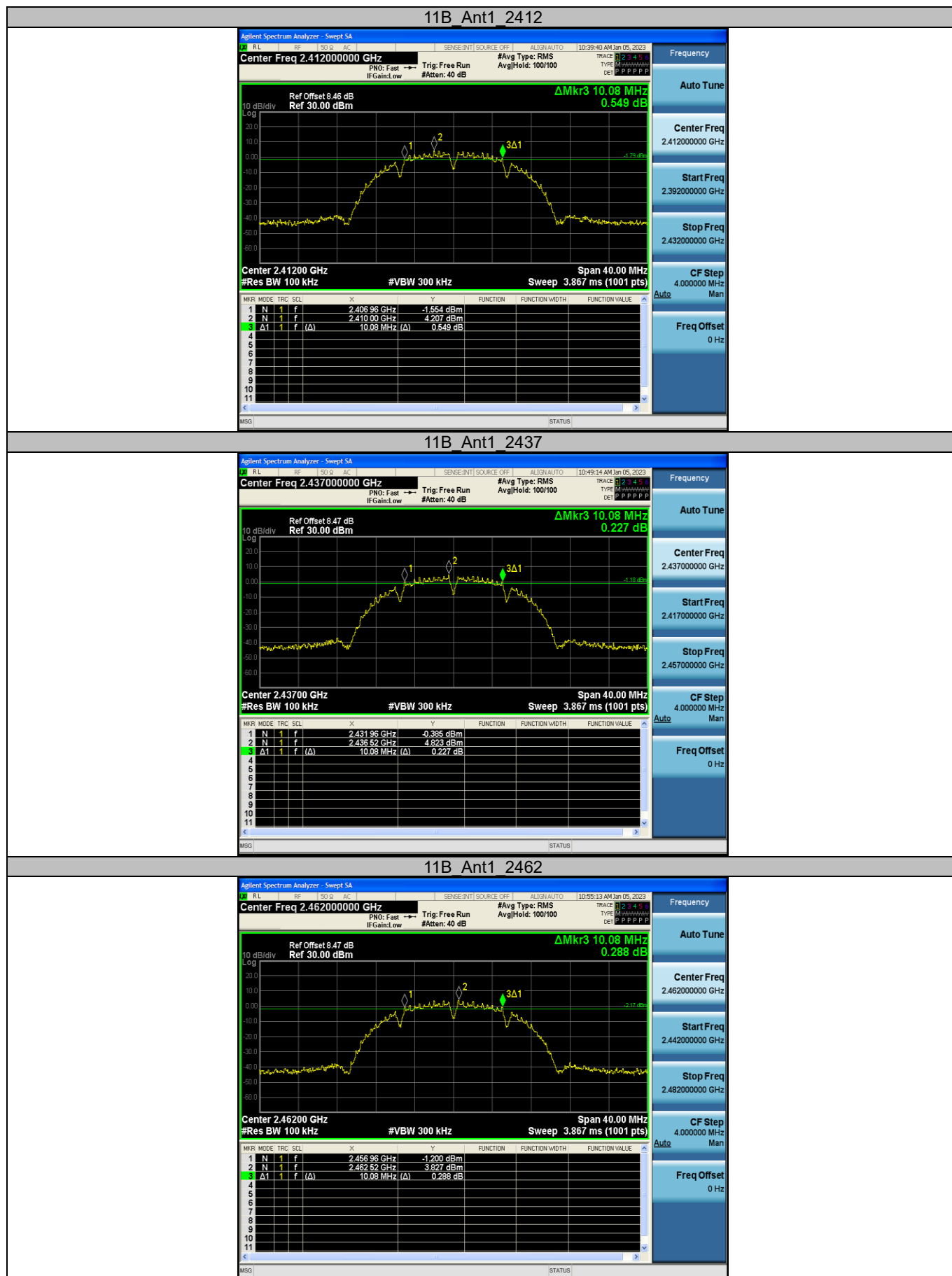
Appendix

Appendix A: DTS Bandwidth

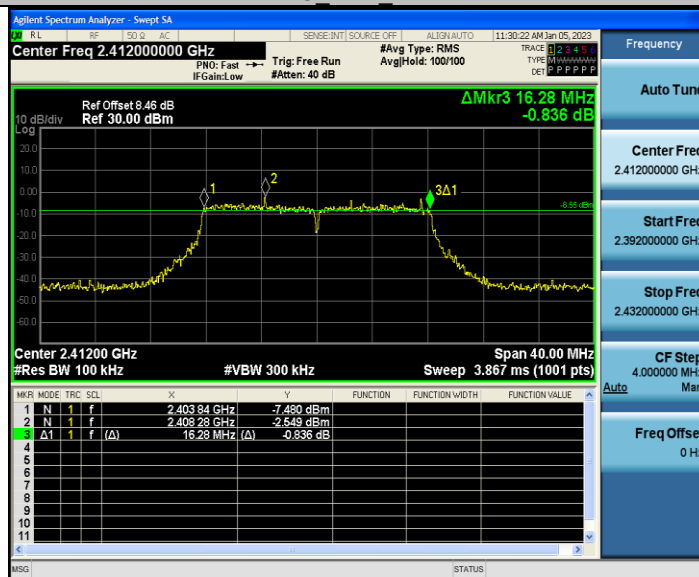
Test Result

Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	10.080	0.5	PASS
		2437	10.080	0.5	PASS
		2462	10.080	0.5	PASS
11G	Ant1	2412	16.280	0.5	PASS
		2437	16.320	0.5	PASS
		2462	16.320	0.5	PASS
11N20SISO	Ant1	2412	16.880	0.5	PASS
		2437	17.600	0.5	PASS
		2462	17.720	0.5	PASS
11N40SISO	Ant1	2422	34.400	0.5	PASS
		2437	35.760	0.5	PASS
		2452	35.440	0.5	PASS

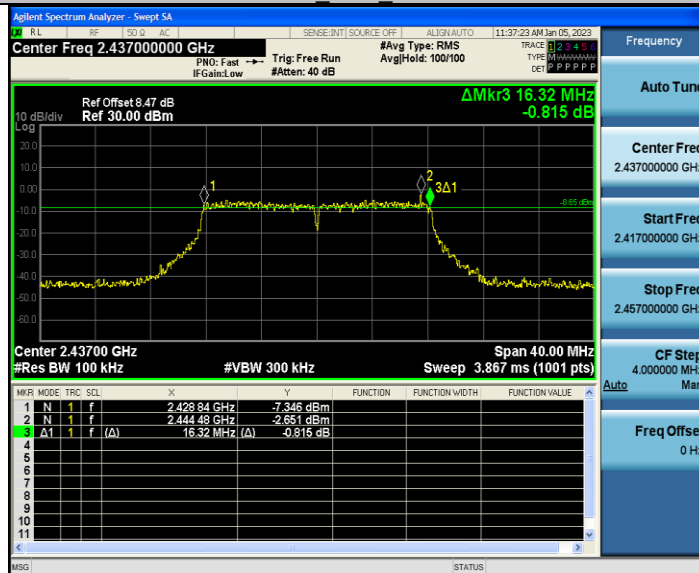
Test Graphs



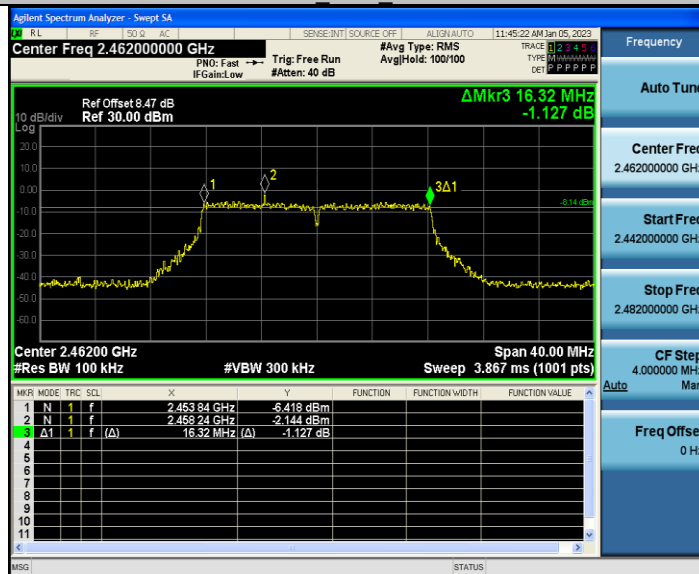
11G Ant1 2412



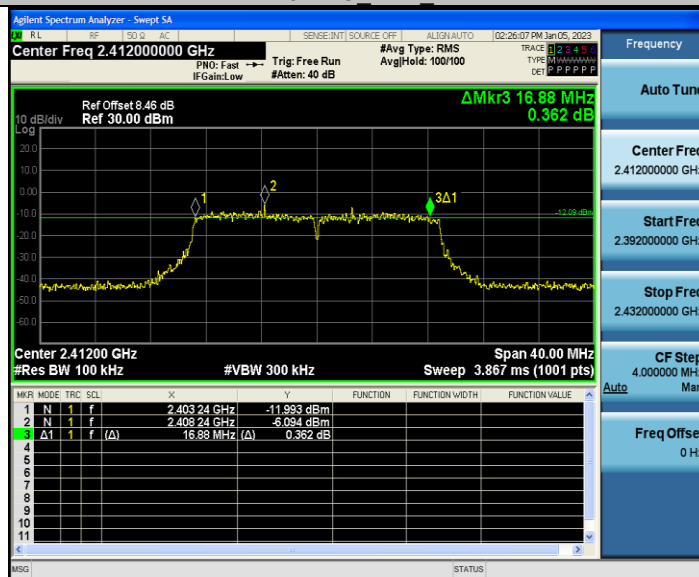
11G Ant1 2437



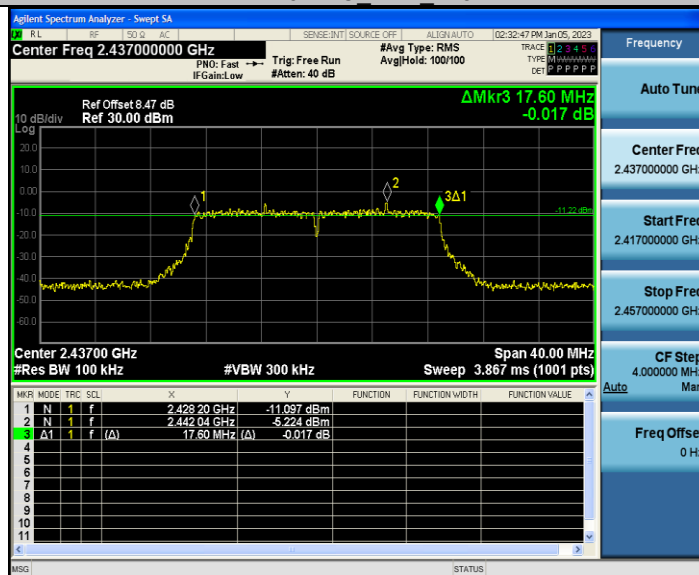
11G Ant1 2462



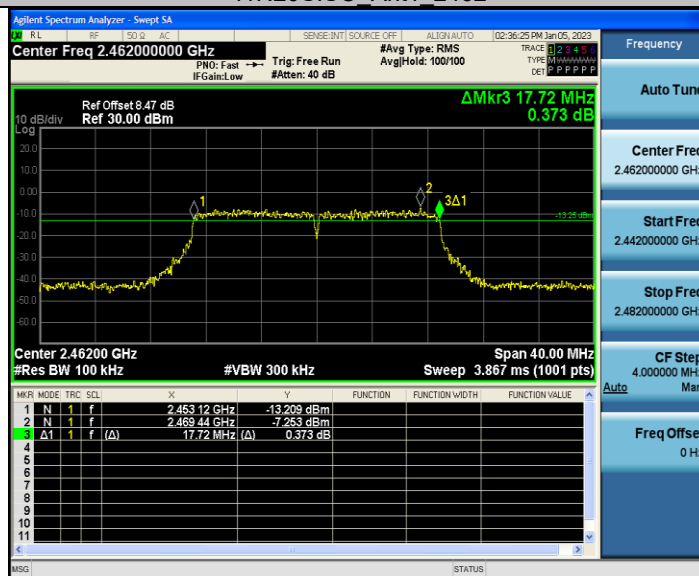
11N20SISO_Ant1_2412



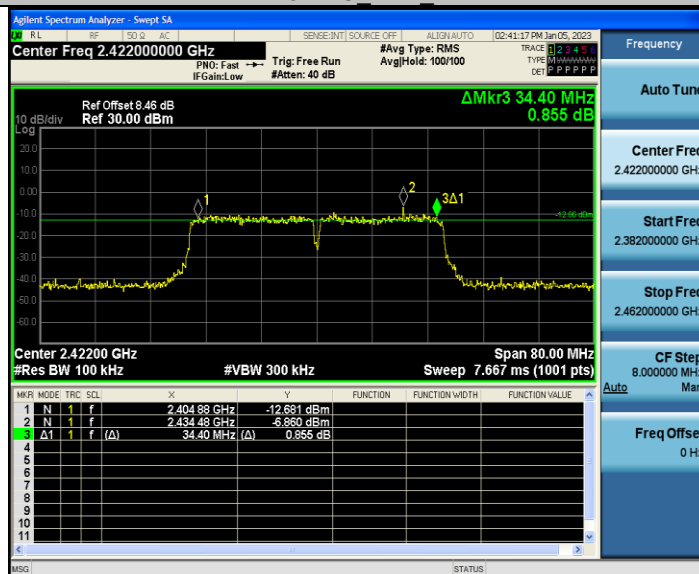
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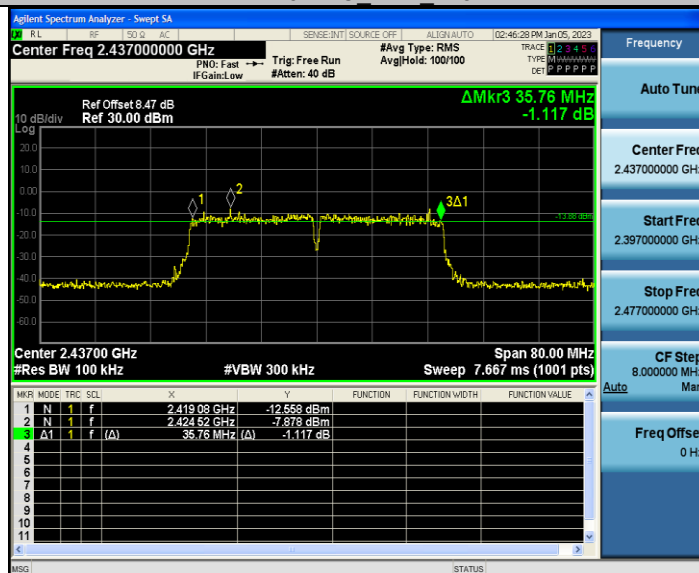
11N20SISO_Ant1_2462



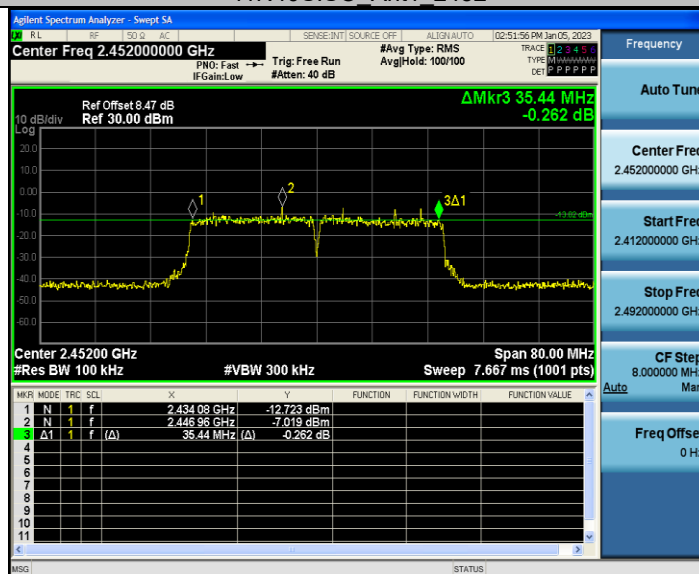
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



Appendix B: Maximum conducted output power

Test Result Peak

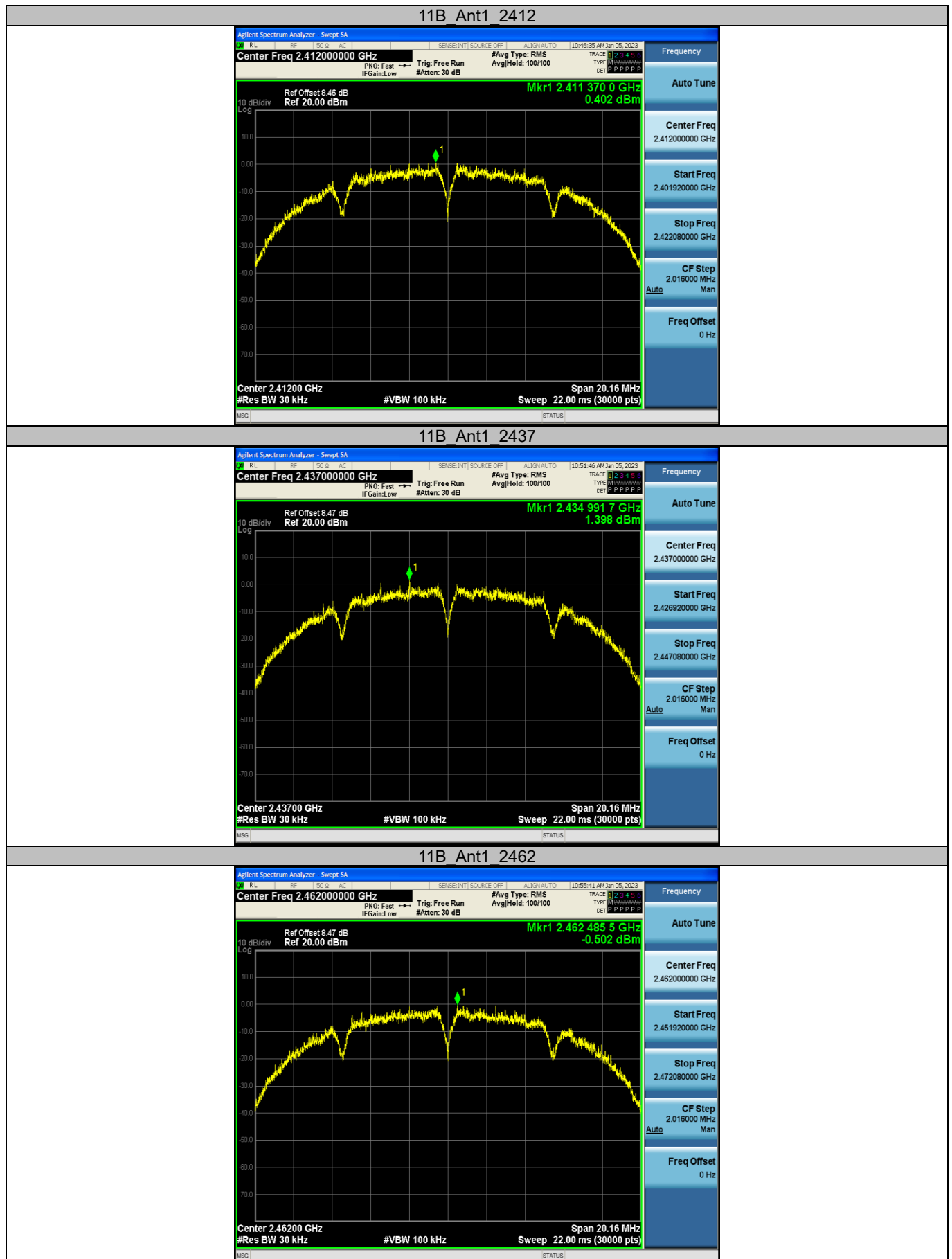
Test Mode	Antenna	Frequency [MHz]	Peak Power [dBm]	Conducted Limit [dBm]	Verdict
11B	Ant1	2412	16.25	≤30.00	PASS
		2437	16.59	≤30.00	PASS
		2462	15.97	≤30.00	PASS
11G	Ant1	2412	15.23	≤30.00	PASS
		2437	15.54	≤30.00	PASS
		2462	15.29	≤30.00	PASS
11N20SISO	Ant1	2412	12.87	≤30.00	PASS
		2437	12.96	≤30.00	PASS
		2462	12.61	≤30.00	PASS
11N40SISO	Ant1	2422	12.58	≤30.00	PASS
		2437	13.13	≤30.00	PASS
		2452	12.63	≤30.00	PASS

Appendix C: Maximum power spectral density

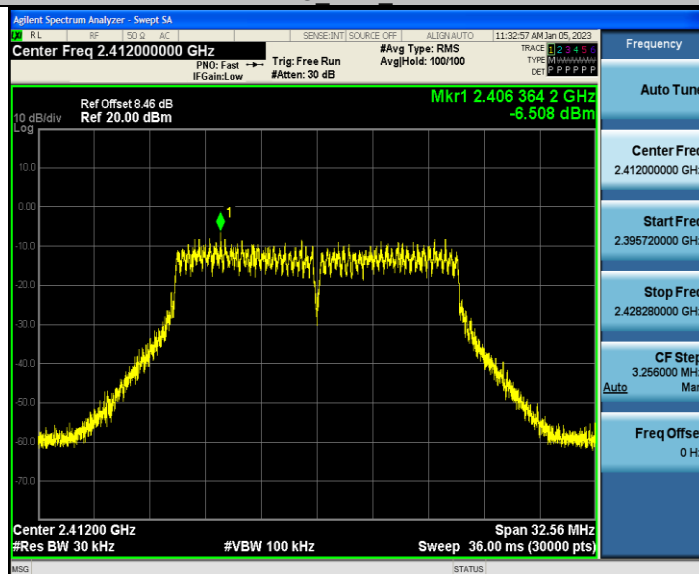
Test Result

Test Mode	Antenna	Frequency [MHz]	Result [dBm/3-100kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	0.4	≤8.00	PASS
		2437	1.4	≤8.00	PASS
		2462	-0.5	≤8.00	PASS
11G	Ant1	2412	-6.51	≤8.00	PASS
		2437	-6.56	≤8.00	PASS
		2462	-6.65	≤8.00	PASS
11N20SISO	Ant1	2412	-8.46	≤8.00	PASS
		2437	-9.2	≤8.00	PASS
		2462	-10.85	≤8.00	PASS
11N40SISO	Ant1	2422	-12.32	≤8.00	PASS
		2437	-12.15	≤8.00	PASS
		2452	-12.49	≤8.00	PASS

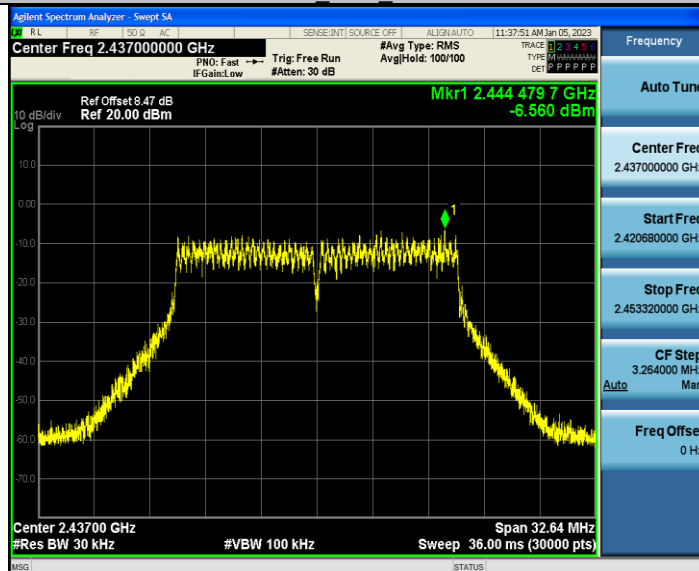
Test Graphs



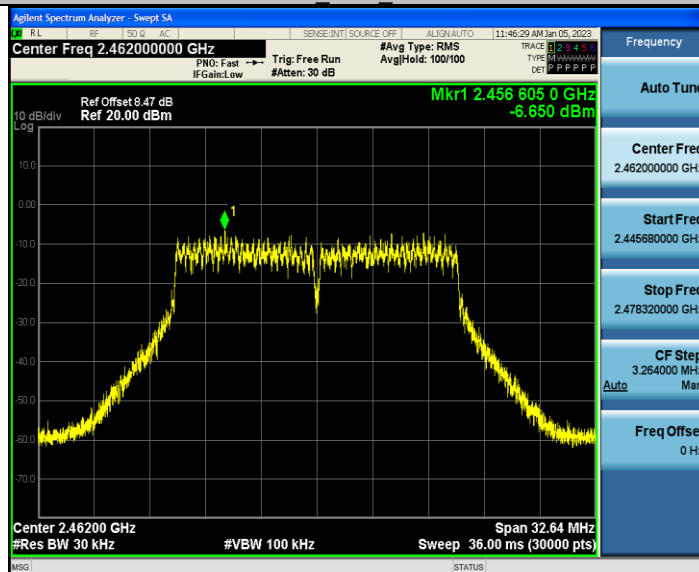
11G Ant1 2412



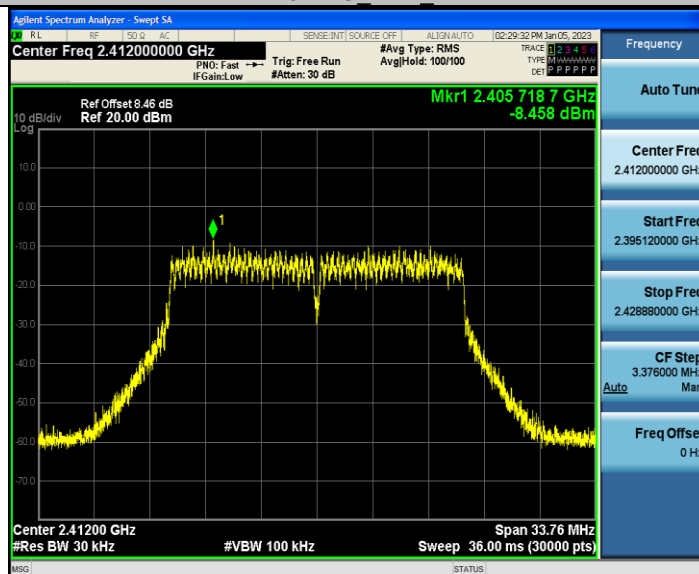
11G Ant1 2437



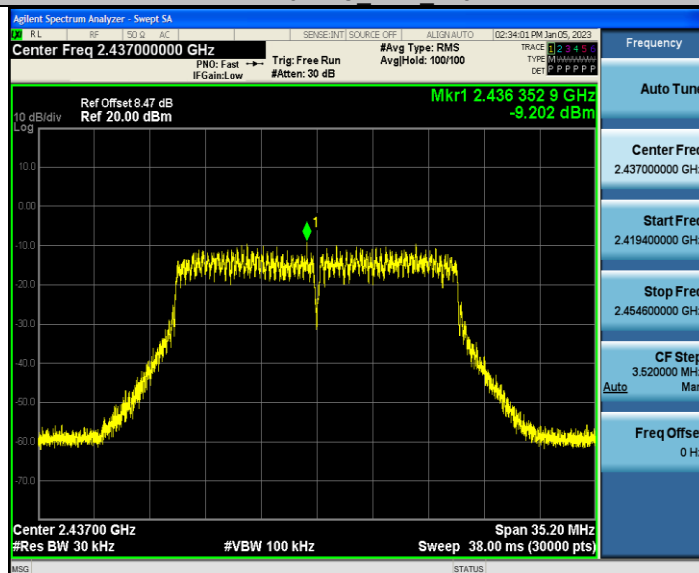
11G Ant1 2462



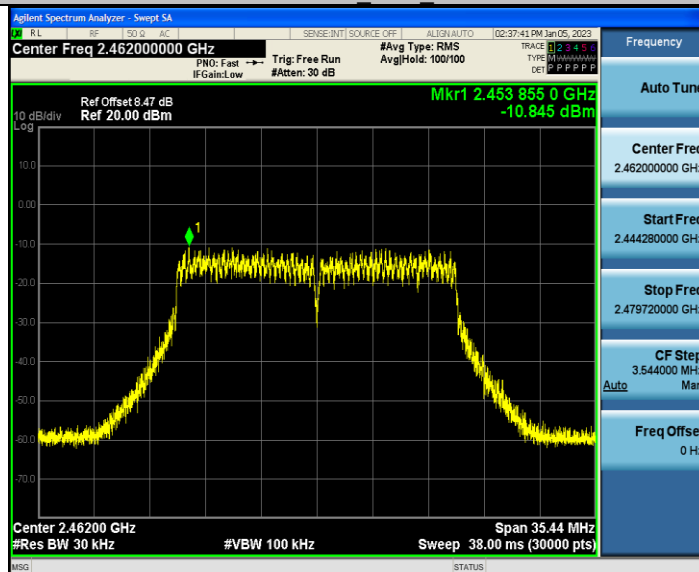
11N20SISO_Ant1_2412



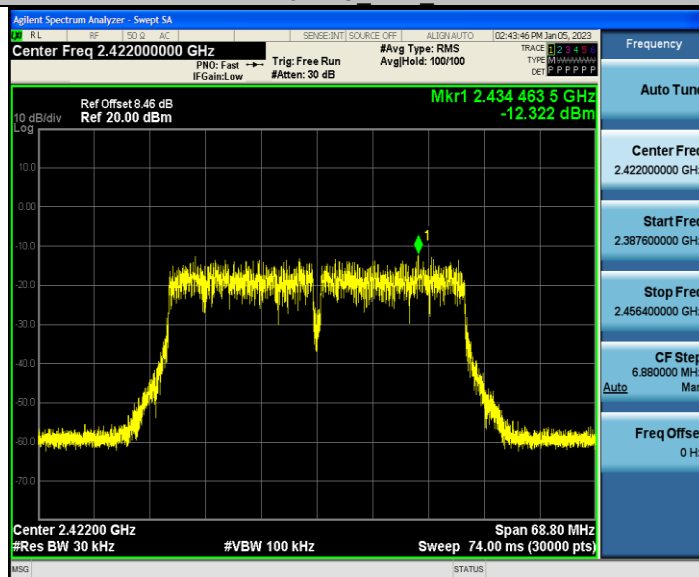
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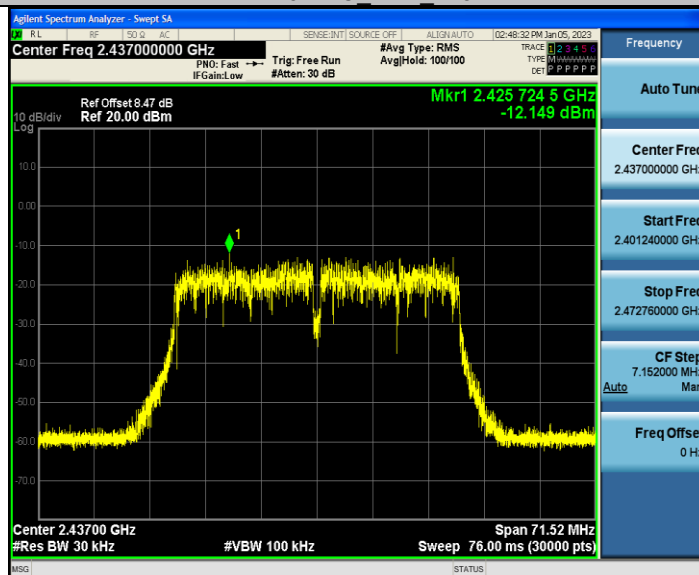
11N20SISO_Ant1_2462



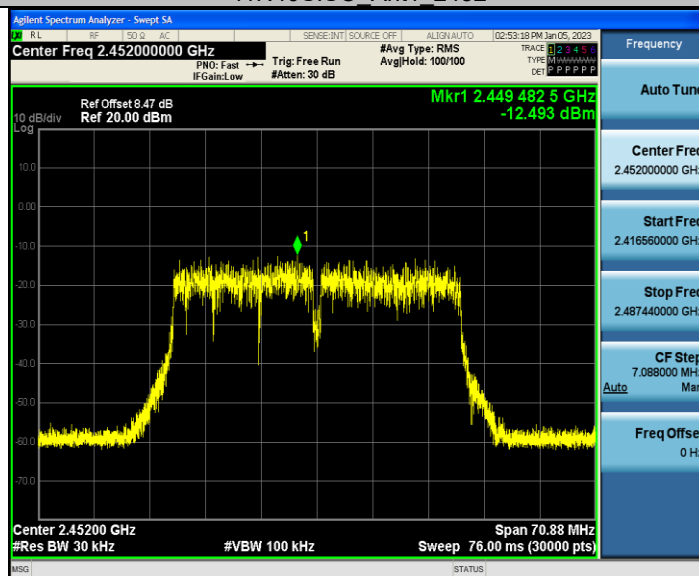
11N40SISO_Ant1_2422



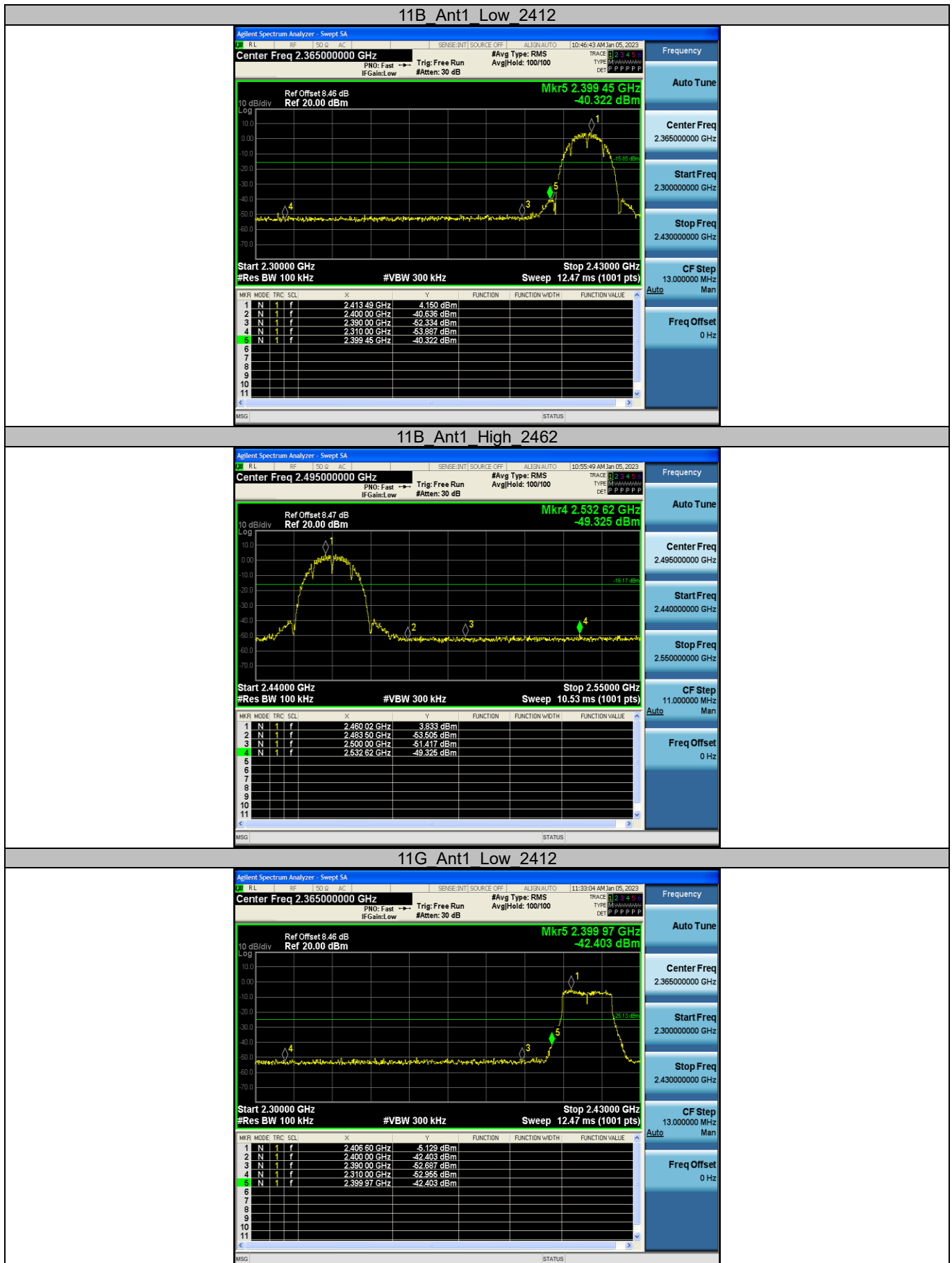
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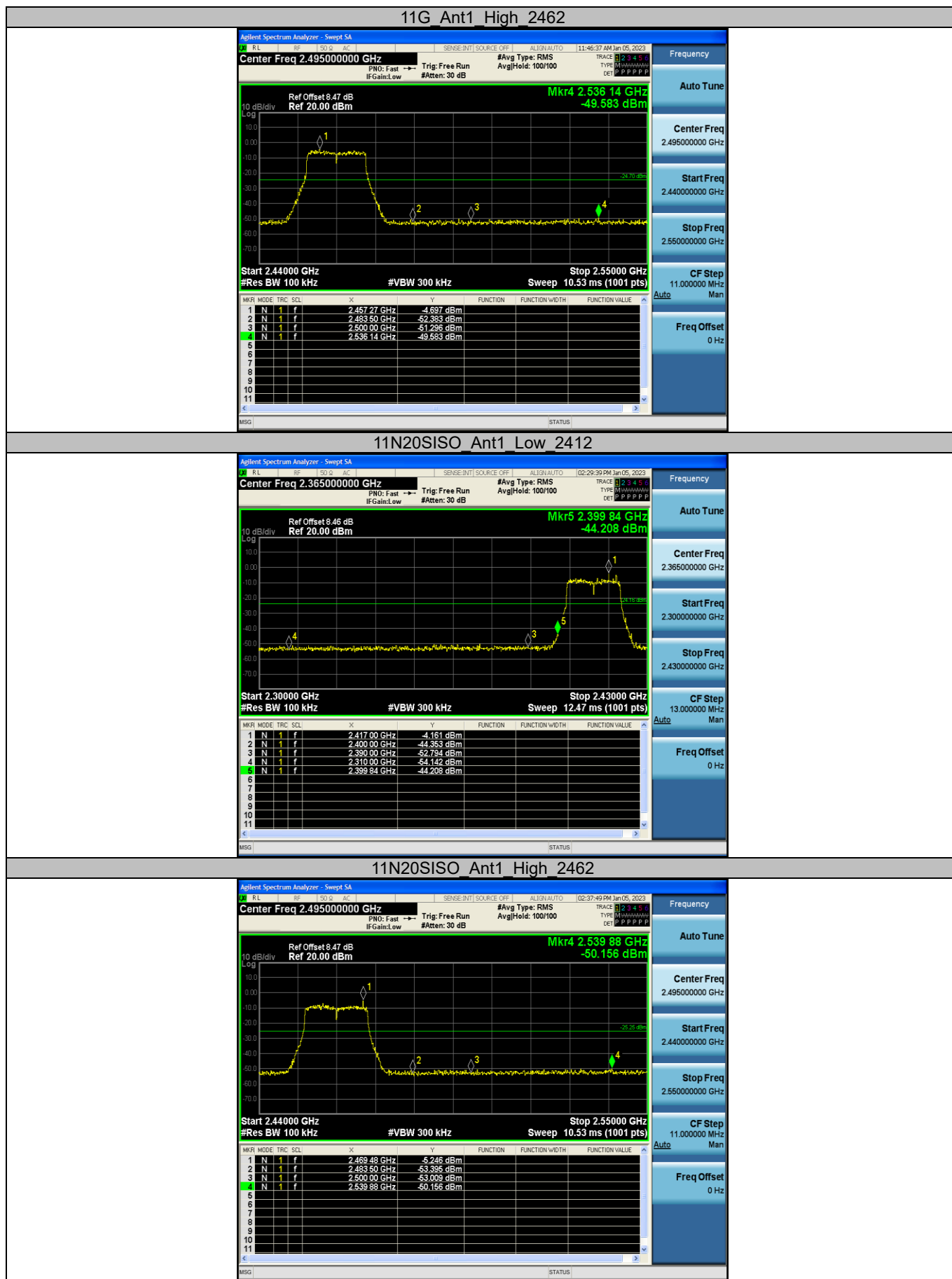


11N40SISO_Ant1_2452

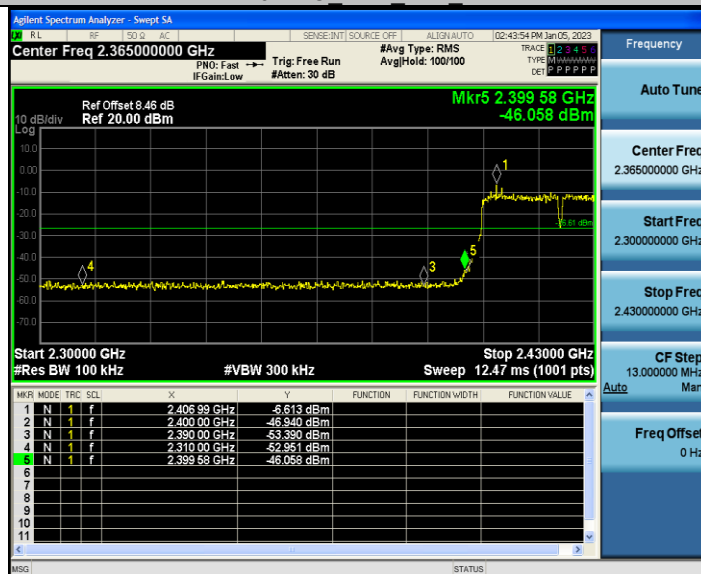


Appendix D: Band edge measurements

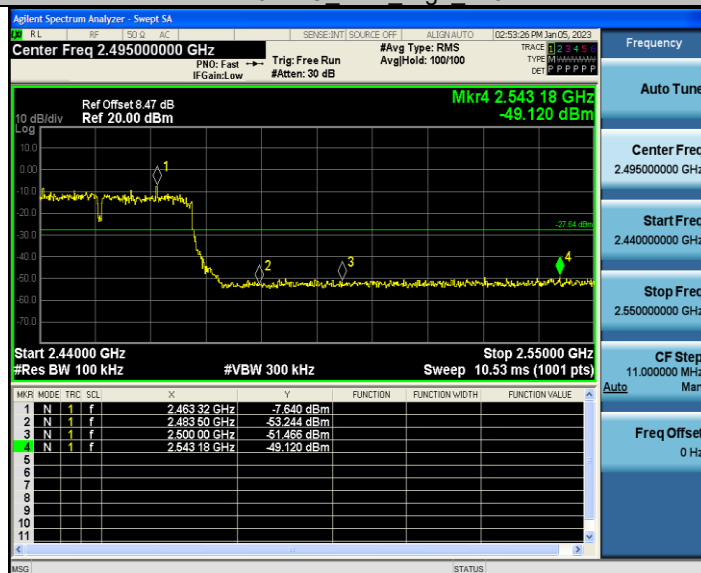




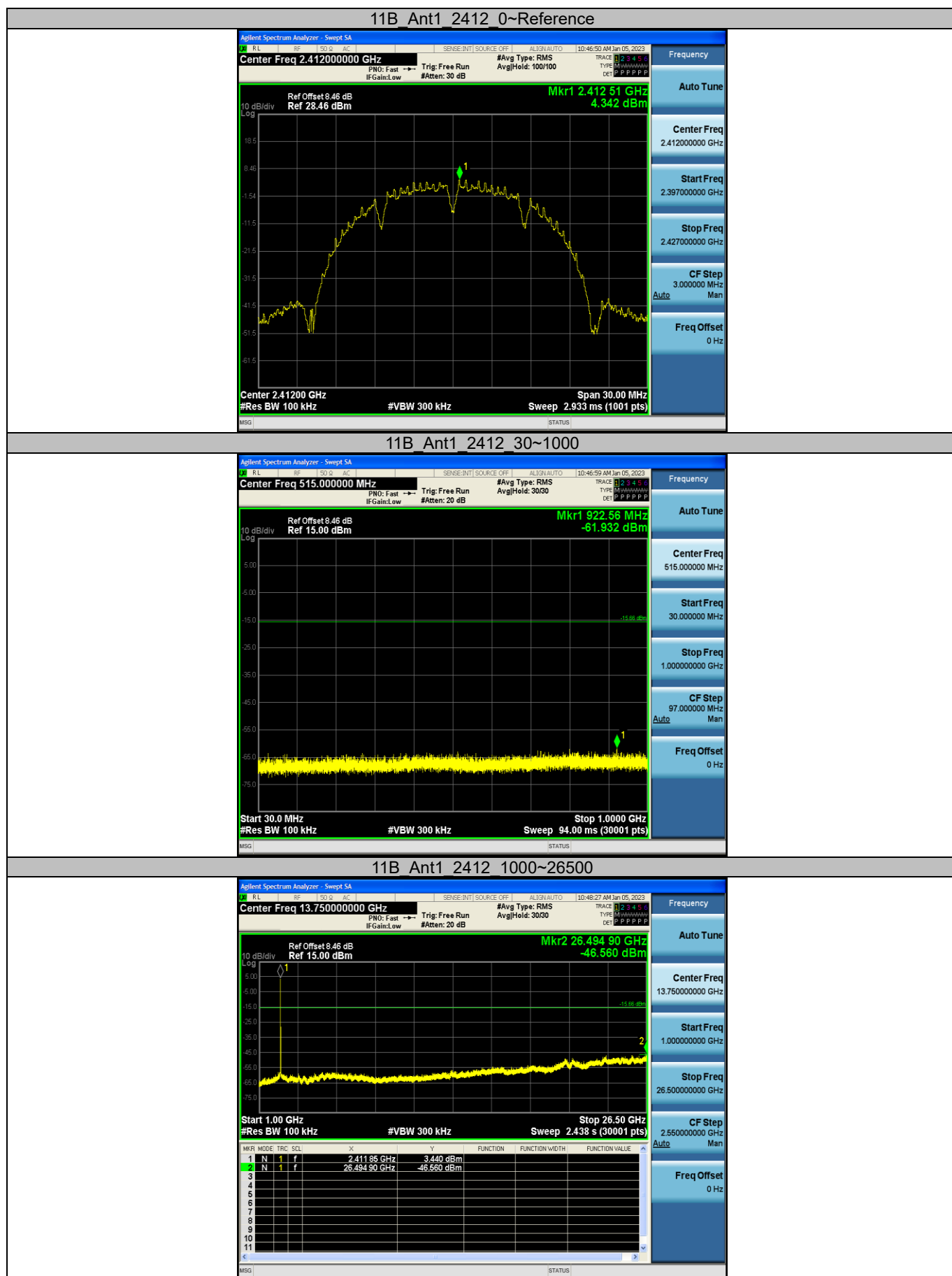
11N40SISO Ant1 Low 2422



11N40SISO Ant1 High 2452

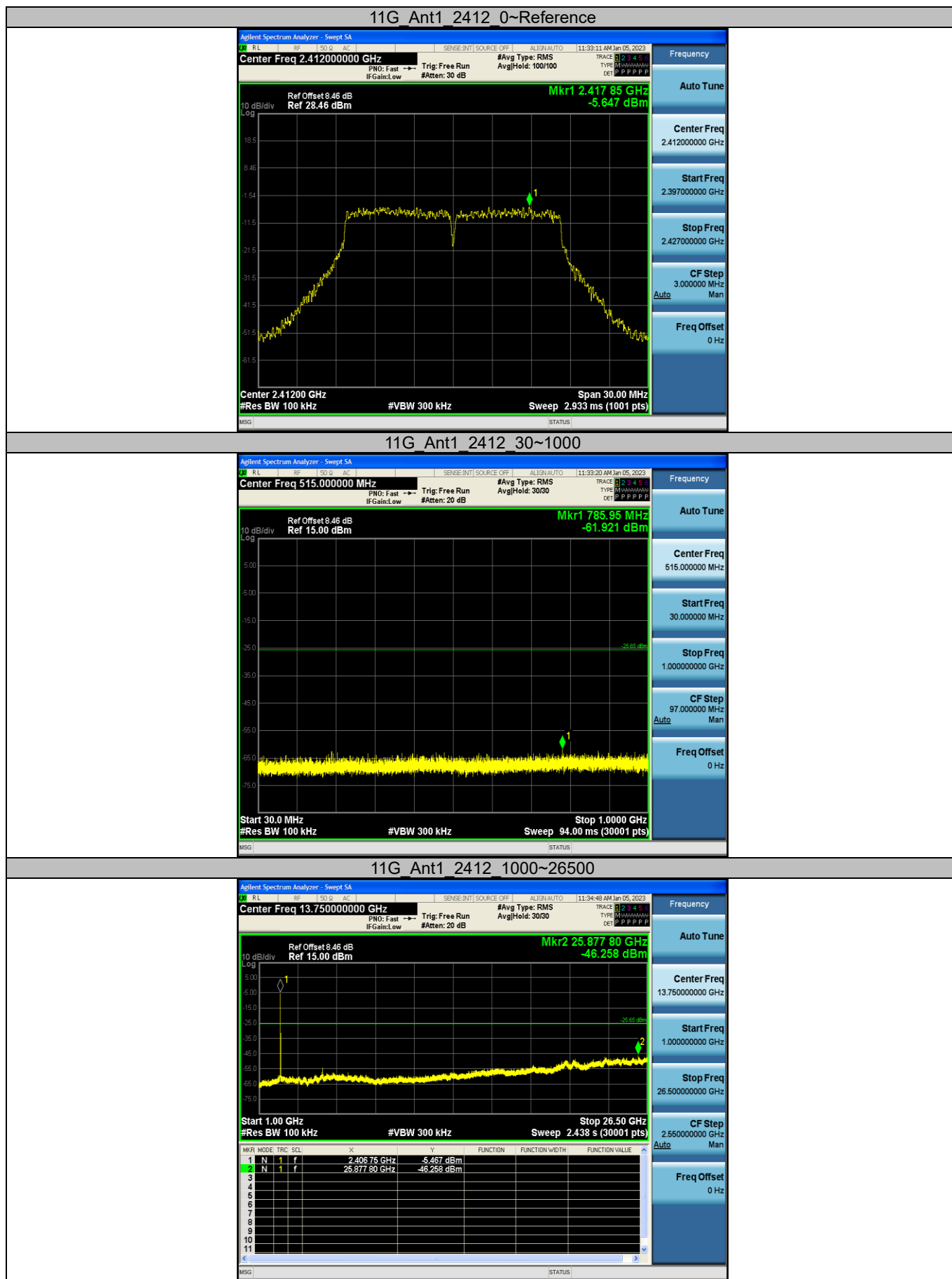


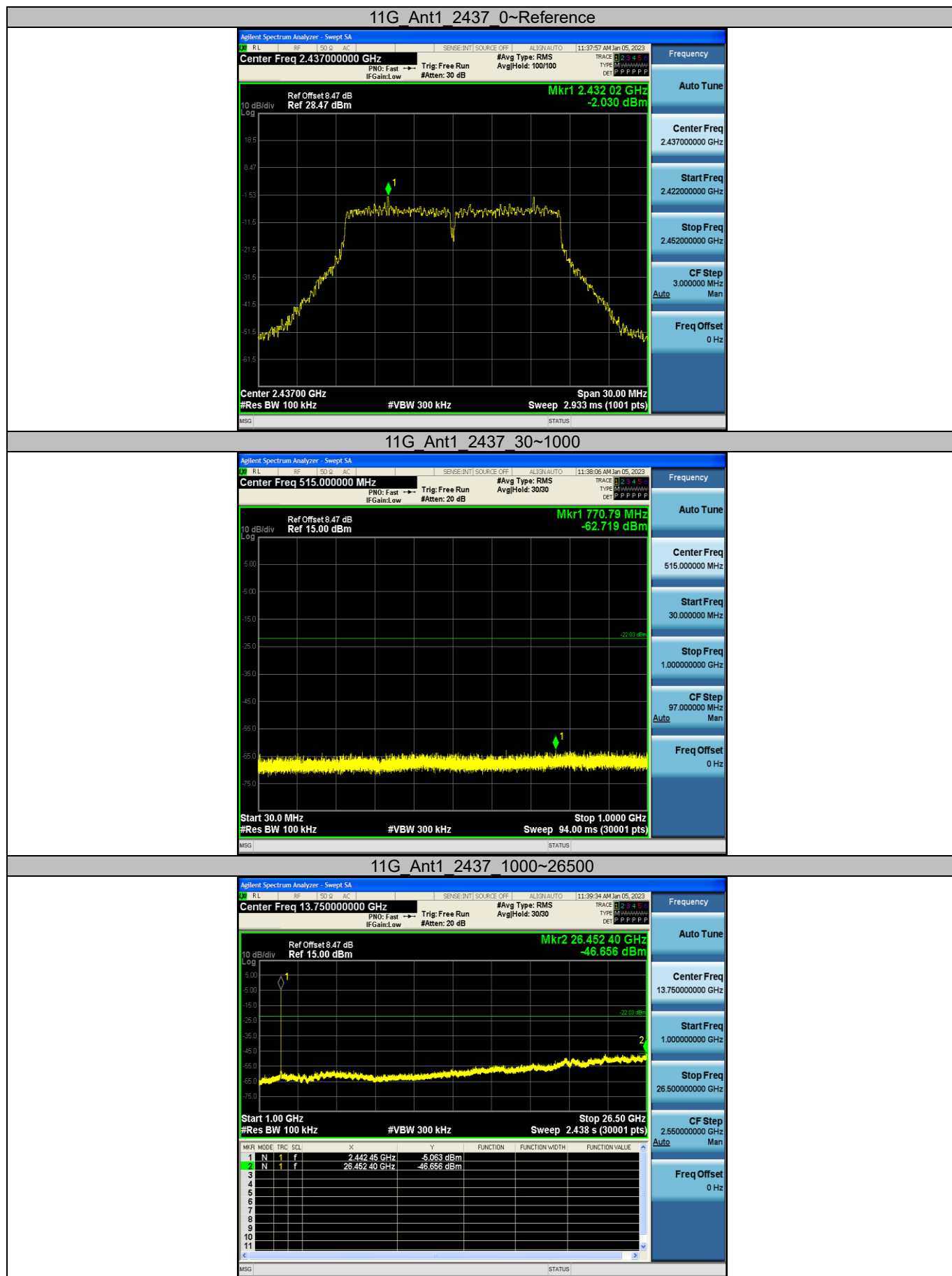
Appendix E: Conducted Spurious Emission

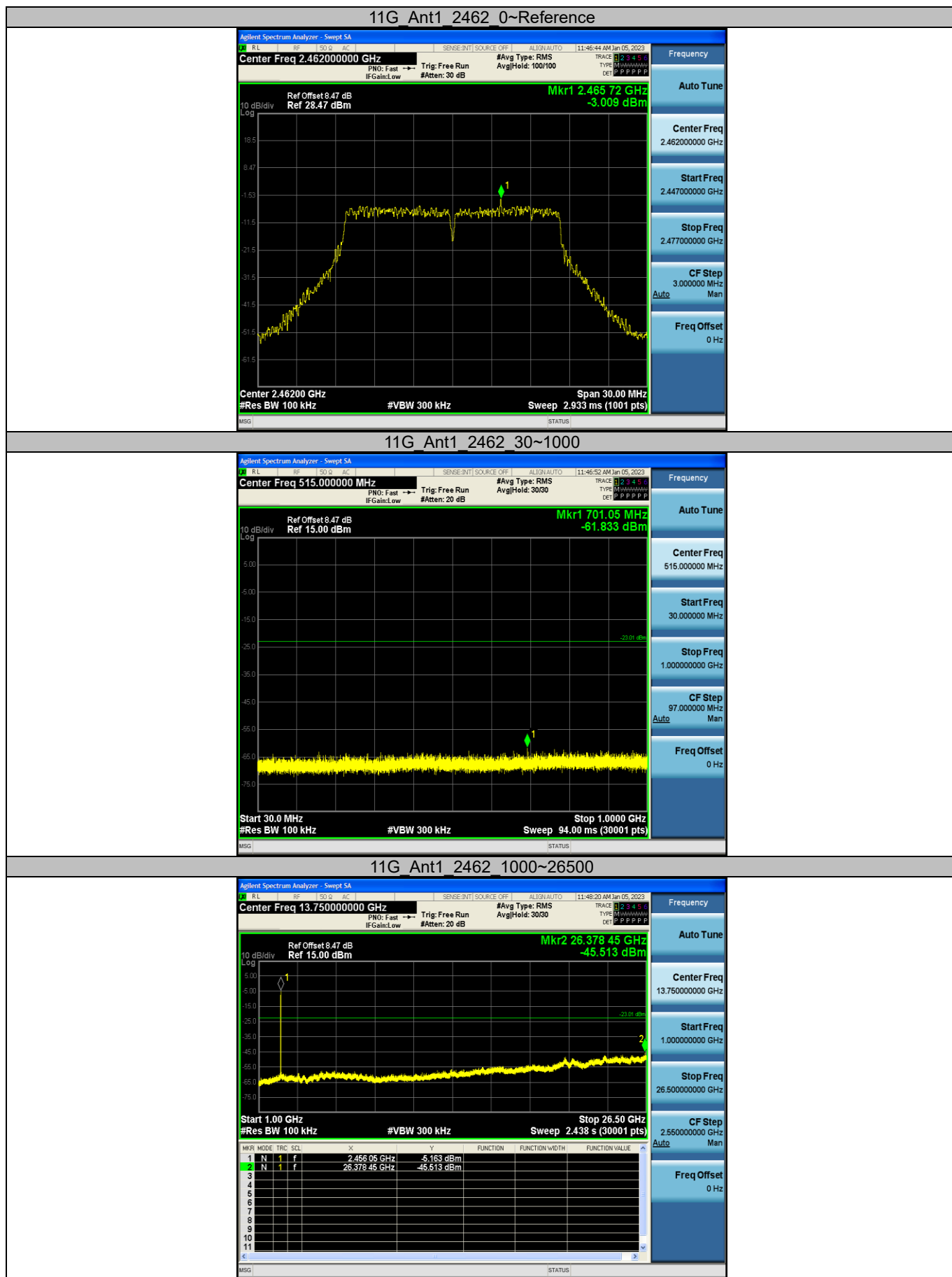




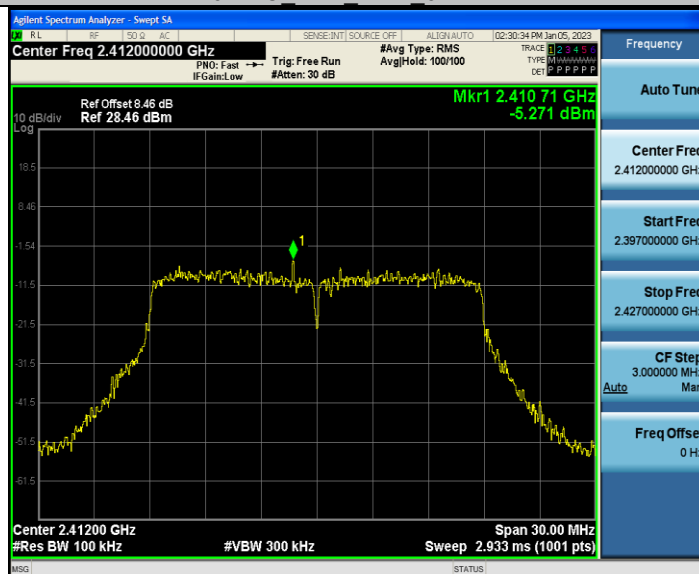




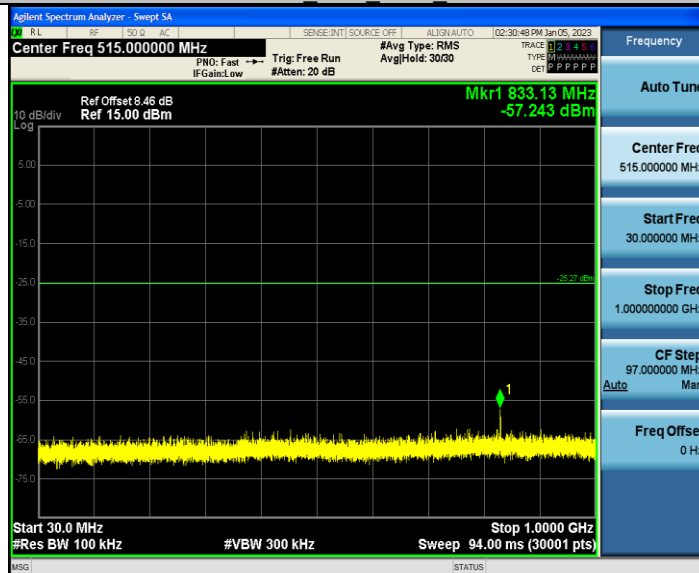




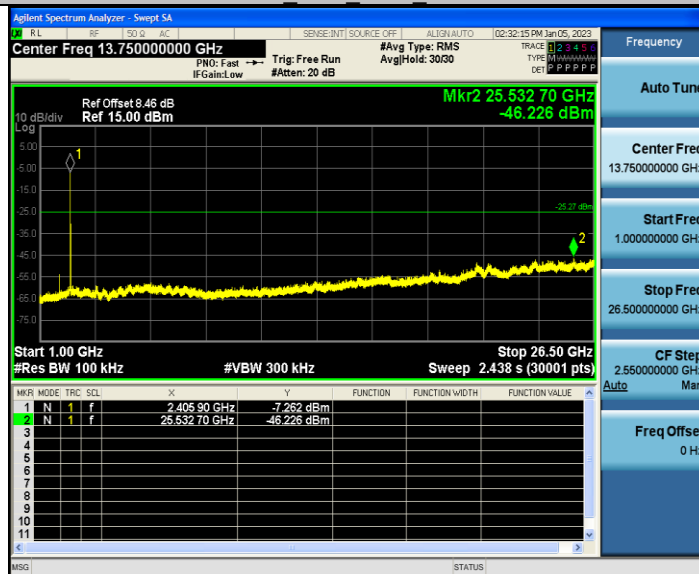
11N20SISO Ant1 2412 0~Reference



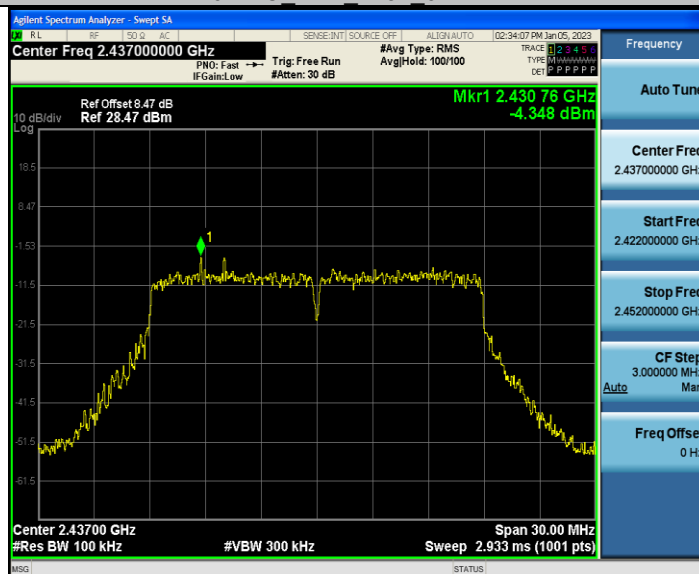
11N20SISO Ant1 2412 30~1000



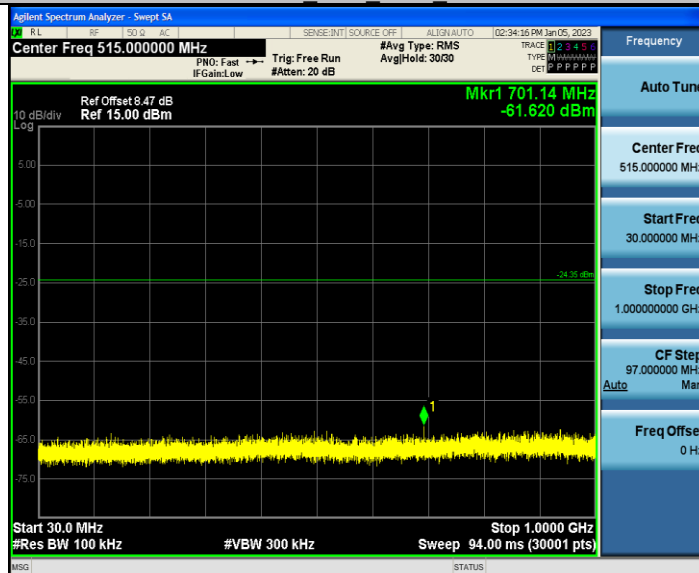
11N20SISO Ant1 2412 1000~26500



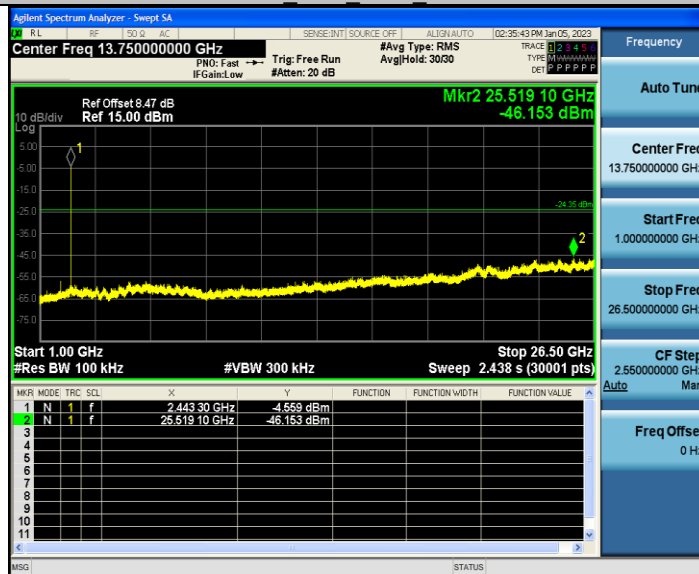
11N20SISO Ant1 2437 0~Reference



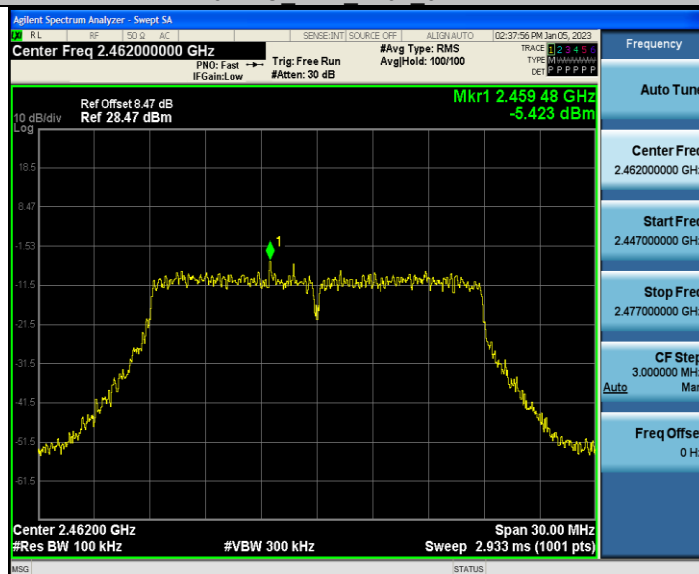
11N20SISO Ant1 2437 30~1000



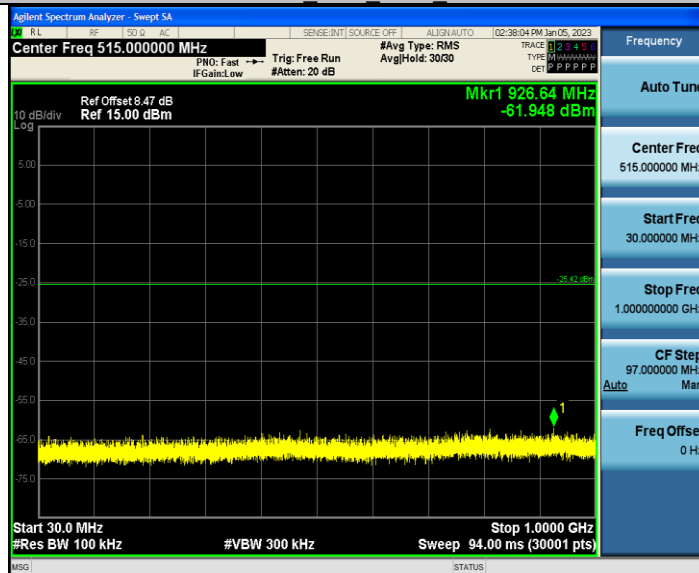
11N20SISO Ant1 2437 1000~26500



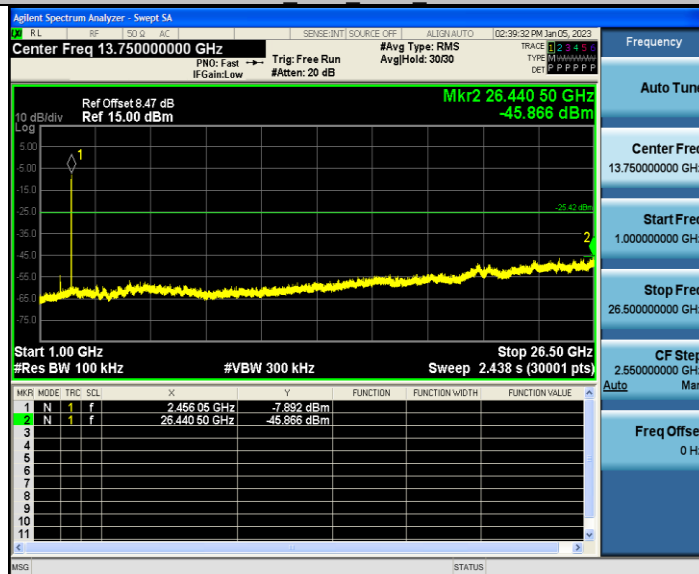
11N20SISO Ant1 2462 0~Reference



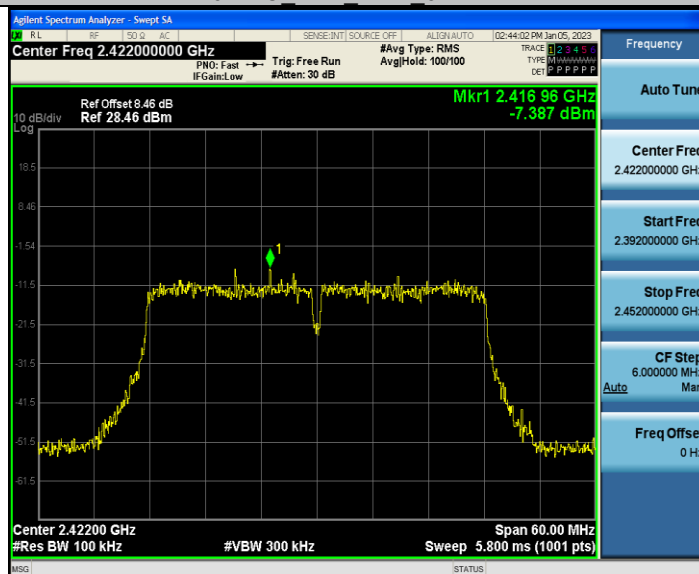
11N20SISO Ant1 2462 30~1000



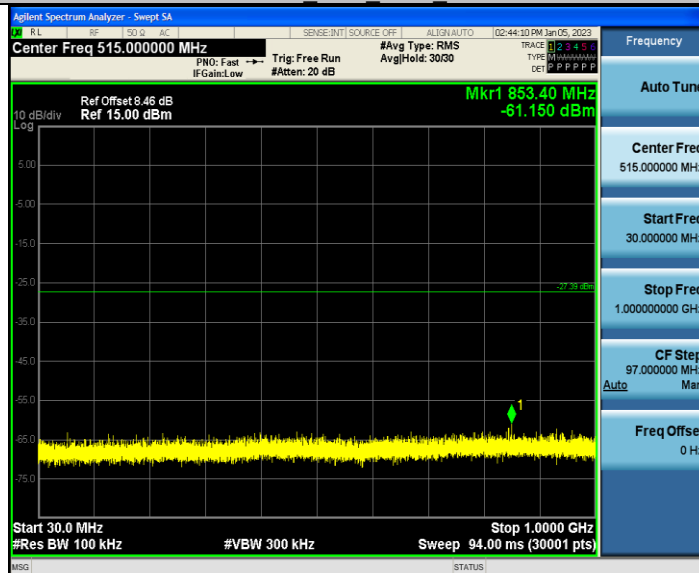
11N20SISO Ant1 2462 1000~26500



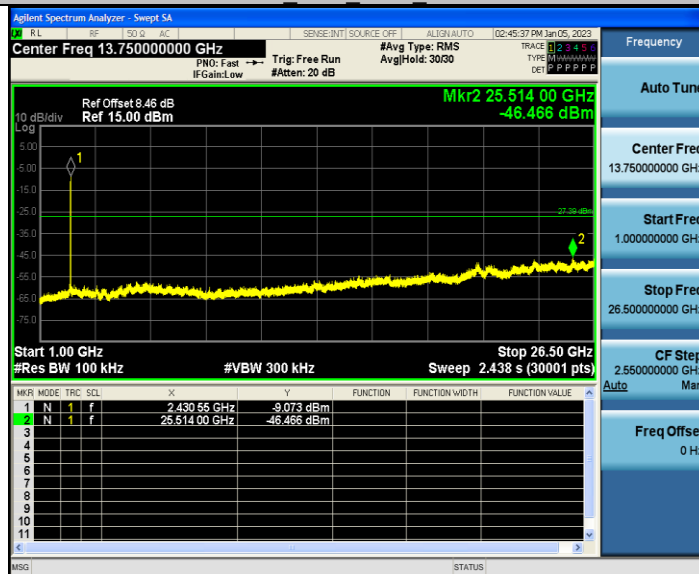
11N40SISO Ant1 2422 0~Reference



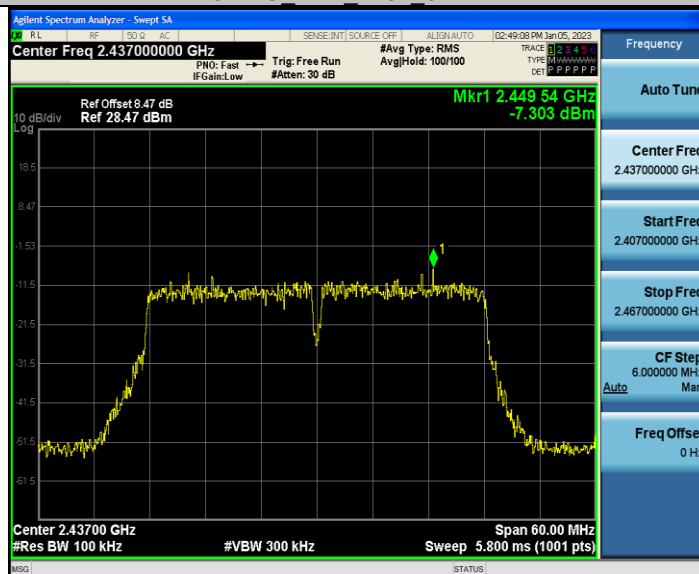
11N40SISO Ant1 2422 30~1000



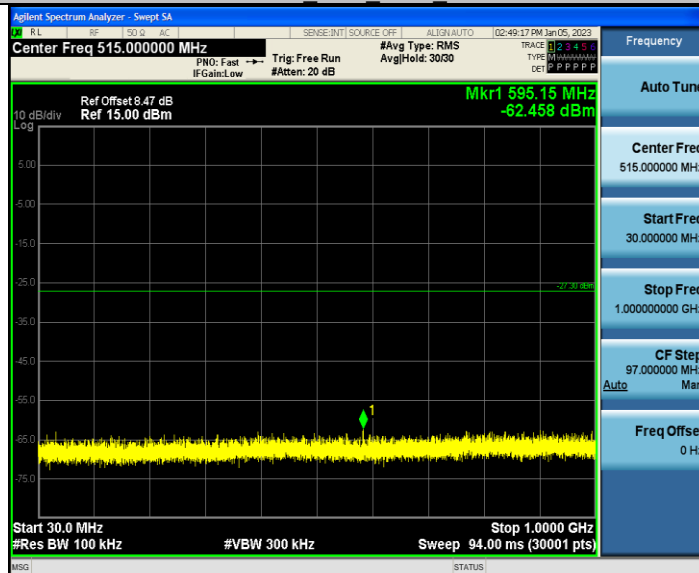
11N40SISO Ant1 2422 1000~26500



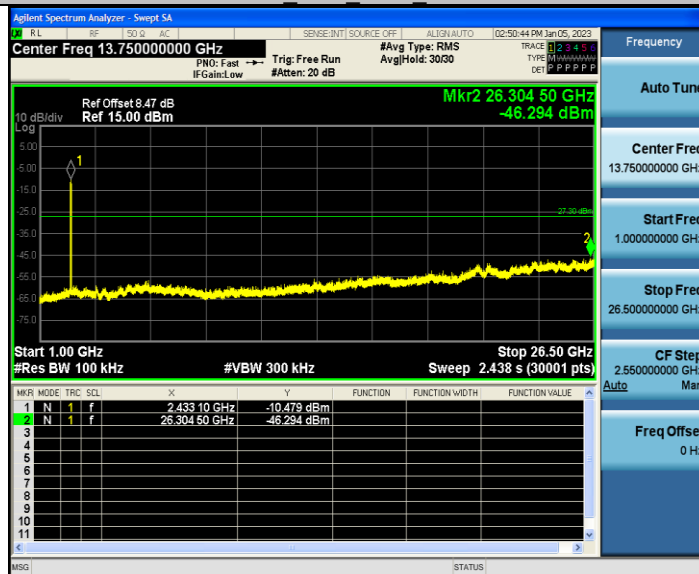
11N40SISO Ant1 2437 0~Reference



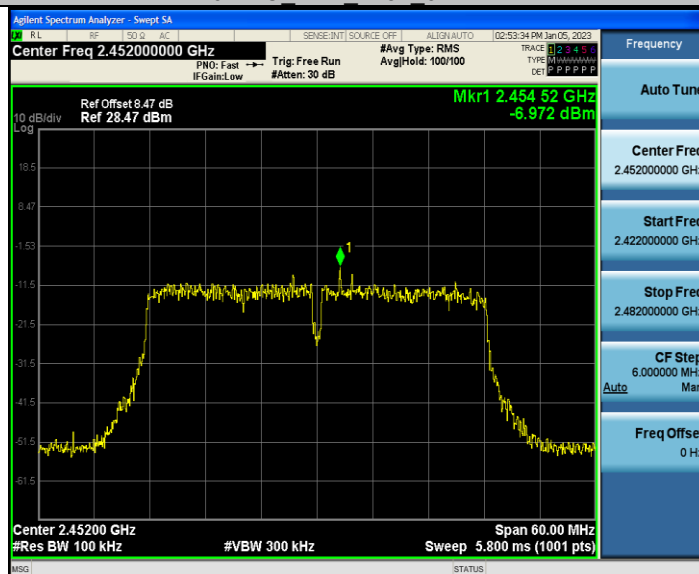
11N40SISO Ant1 2437 30~1000



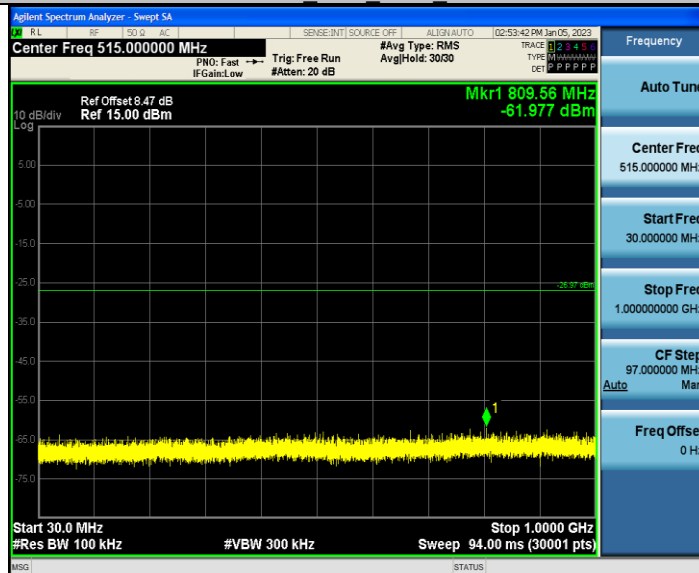
11N40SISO Ant1 2437 1000~26500



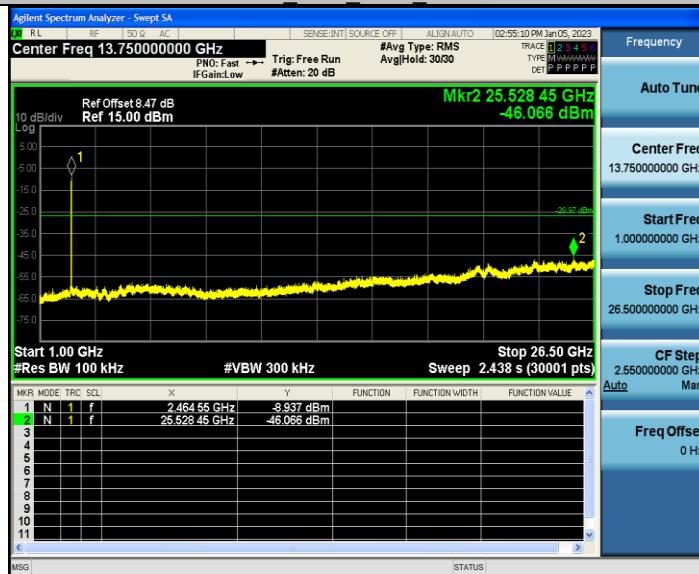
11N40SISO Ant1 2452 0~Reference



11N40SISO Ant1 2452 30~1000



11N40SISO Ant1 2452 1000~26500



Appendix F: Duty Cycle

Test Result

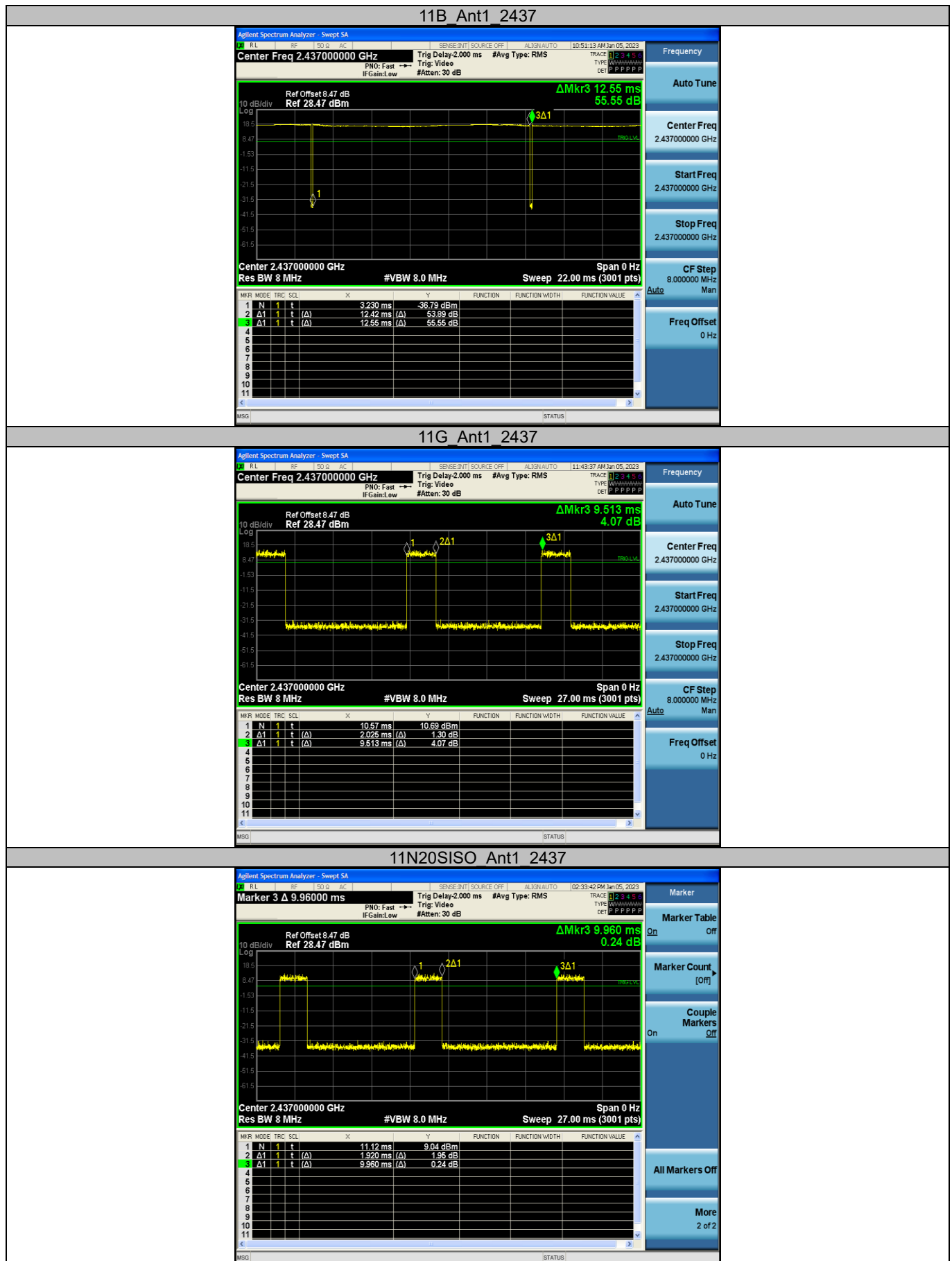
Test Mode	Antenna	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Factor
11B	Ant1	2437	12.42	12.55	98.96	0.05
11G	Ant1	2437	2.025	9.513	21.29	6.72
11N20SISO	Ant1	2437	1.92	9.96	19.28	7.15
11N40SISO	Ant1	2437	0.94	10.04	9.36	10.29

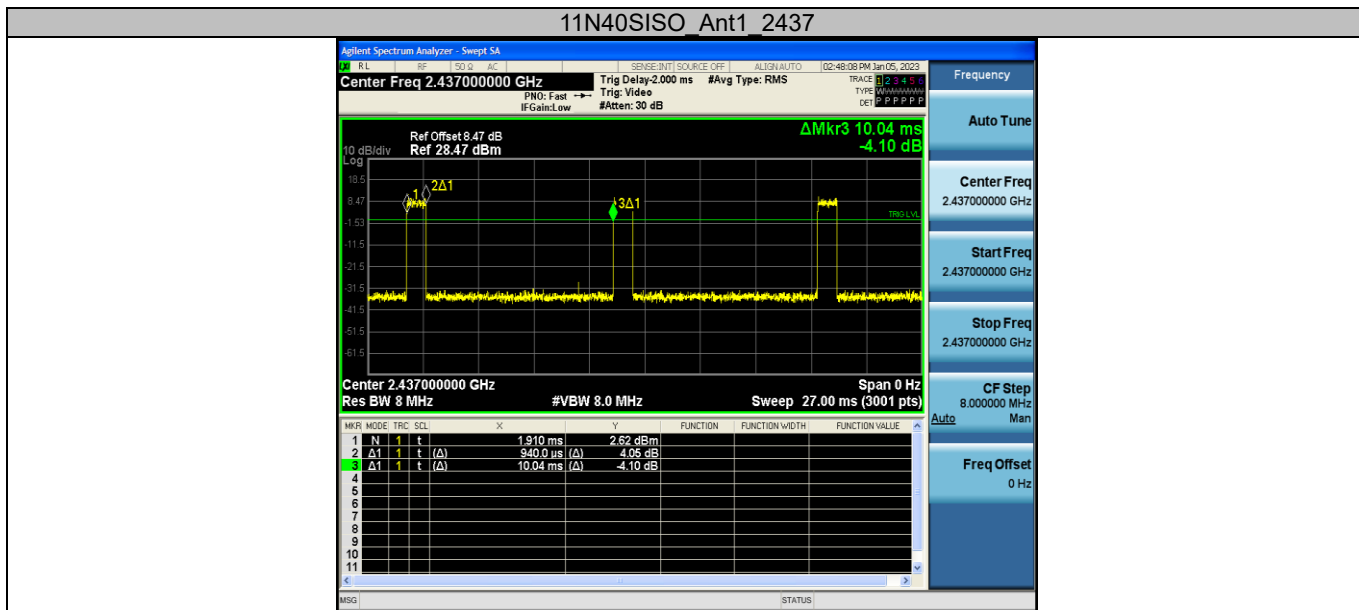
Notes:

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

Factor = 10 * log (Duty Cycle)

Test Graphs





Photographs of the Test Setup

See the Appendix – Test Setup Photos.

Photographs of the EUT

See the Appendix - EUT Photos.

----End of Report----