Microtest
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Test Report

Report No.: MTi230615008-09E1

Date of issue: 2023-07-21

Applicant: Shenzhen Jiangtuo Network Technology Co., Ltd.

Product: Solar Battery-Wireless Security Camera

Model(s): V1, V1-3PT, V1-5PT, V2-3PT, V2-5PT, Z1-3D, Z1-5D, Z2-3D, Z2-5D, Y1-3B, Y1-5B, Y2-3B, Y2-5B, U1, U1 Pro, U1 Max, U2, U2 Pro, U2 Max

FCC ID: 2BBVZ-V1

Shenzhen Microtest Co., Ltd.

http://www.mtitest.com

The test report is only used for customer scientific research, teaching, internal quality control and other purposes, and is for internal reference only.

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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.

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Test Result Certification	
Applicant:	Shenzhen Jiangtuo Network Technology Co., Ltd.
Address:	Room 302, Infinova technology company factory building, No. 12, Guanbao Road, Luhu Community, Guanhu Street, Longhua District, Shenzhen
Manufacturer:	Shenzhen Jiangtuo Network Technology Co., Ltd.
Address:	Room 302, Infinova technology company factory building, No. 12, Guanbao Road, Luhu Community, Guanhu Street, Longhua District, Shenzhen
Product description	
Product name:	Solar Battery-Wireless Security Camera
Trade mark:	N/A
Model name:	V1
Series Model:	V1-3PT, V1-5PT, V2-3PT, V2-5PT, Z1-3D, Z1-5D, Z2-3D, Z2-5D, Y1-3B, Y1-5B, Y2-3B, Y2-5B, U1, U1 Pro, U1 Max, U2, U2 Pro, U2 Max
Standards:	FCC 47 CFR Part 15 Subpart C
Test method:	ANSI C63.10-2013 KDB 558074 D01 15.247 Meas Guidance v05r02
Date of Test	
Date of test:	2023-06-30 to 2023-07-21
Test result:	Pass

Test Engineer	:	Maleah Deng
		(Maleah Deng)
Reviewed By	:	Leon chen
		(Leon Chen)
Approved By	:	Tom Xue
		(Tom Xue)

1 General Description

1.1 Description of the EUT

Product name:	Solar Battery-Wireless Security Camera
Model name:	V1
Series Model:	V1-3PT, V1-5PT, V2-3PT, V2-5PT, Z1-3D, Z1-5D, Z2-3D, Z2-5D, Y1-3B, Y1-5B, Y2-3B, Y2-5B, U1, U1 Pro, U1 Max, U2, U2 Pro, U2 Max
Model difference:	All the models are the same circuit and module, except the model name.
Electrical rating:	Input: DC 5V1A Battery DC 3.7V 5Ah
Accessories:	1. USB-A to Type-C cable(1.0m) 2. Solar panels*1
Hardware version:	SNB26S_T1_V10
Software version:	ppstrong-b406b-m_neutral_std-3.4.1.20230413
Test sample(s) number:	MTi230615008-09S1001
RF specification	
Operating frequency range:	802.11b/g/n20:2412~2462 MHz
Modulation type:	IEEE 802.11b: DSSS (DBPSK, DQPSK, CCK) IEEE 802.11g/n (HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna(s) type:	FPC antenna
Antenna(s) gain:	3.5dBi

1.2 Description of test modes

No.	Emission test modes
Mode1	TX-802.11b mode
Mode2	TX-802.11g mode
Mode3	TX-802.11n(HT20) mode

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	/	/

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:		XCOM V2.2	
Mode	2412MHz	2437MHz	2462MHz
802.11b	-90	-90	-90
802.11g	-100	-100	-100
802.11n(HT20)	-100	-100	-100

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
HUAWEI CHARGE （10W)	HW-050200C02	K95212KA103561	HUAWEI
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 (1GHz~25GHz)	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	Test Method	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)	ANSI C63.10-2013 section 6.2	Pass
3	Occupied Bandwidth	47 CFR Part 15.247	47 CFR 15.247(a)(2)	ANSI C63.10-2013, section 11.8 KDB 558074 D01 15.247 Meas Guidance v05r02	Pass
4	Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(3)	ANSI C63.10-2013, section 11.9.1 KDB 558074 D01 15.247 Meas Guidance v05r02	Pass
5	Power Spectral Density	47 CFR Part 15.247	47 CFR 15.247(e)	ANSI C63.10-2013, section 11.10 KDB 558074 D01 15.247 Meas Guidance v05r02	Pass
6	Emissions in frequency bands	47 CFR Part 15.247	47 CFR 15.247(d)	ANSI C63.10-2013 section 11.11 KDB 558074 D01 15.247 Meas Guidance v05r02	Pass
7	Band edge emissions (Radiated)	47 CFR Part 15.247	47 CFR 15.247(d)	ANSI C63.10-2013 section 6.10 KDB 558074 D01 15.247 Meas Guidance v05r02	Pass
8	Emissions in frequency bands (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	ANSI C63.10-2013 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02	Pass
9	Emissions in frequency bands (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	ANSI C63.10-2013 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02	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

4 List of test equipment

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
Conducted Emission at AC power line						
1	EMI Test Receiver	Rohde&schwarz	ESCI3	101368	2023-04-26	2024-04-25
2	Artificial mains network	Schwarzbeck	NSLK 8127	183	2023-05-05	2024-05-04
3	Artificial Mains Network	Schwarzbeck	NSLK 8127	1001	2023-05-06	2024-05-05
Occupied Bandwidth						
1	Wideband Radio Communication Tester	Rohde&schwarz	CMW500	149155	2023-04-26	2024-04-25
2	ESG Series Analog Ssignal Generator	Agilent	E4421B	GB40051240	2023-04-25	2024-04-24
3	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2023-04-25	2024-04-24
4	Synthesized Sweeper	Agilent	83752A	3610A01957	2023-04-25	2024-04-24
5	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2023-04-26	2024-04-25
6	RF Control Unit	Tonscend	JS0806-1	19D8060152	2023-04-26	2024-04-25
7	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2023-05-05	2024-05-04
8	ESG Vector Signal Generator	Agilent	N5182A	MY50143762	2023-04-25	2024-04-24
9	DC Power Supply	Agilent	E3632A	MY40027695	2023-05-05	2024-05-04
Maximum Conducted Output Power						
1	Wideband Radio Communication Tester	Rohde&schwarz	CMW500	149155	2023-04-26	2024-04-25
2	ESG Series Analog Ssignal Generator	Agilent	E4421B	GB40051240	2023-04-25	2024-04-24
3	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2023-04-25	2024-04-24
4	Synthesized Sweeper	Agilent	83752A	3610A01957	2023-04-25	2024-04-24
5	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2023-04-26	2024-04-25
6	RF Control Unit	Tonscend	JS0806-1	19D8060152	2023-04-26	2024-04-25
7	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2023-05-05	2024-05-04
8	ESG Vector Signal Generator	Agilent	N5182A	MY50143762	2023-04-25	2024-04-24
9	DC Power Supply	Agilent	E3632A	MY40027695	2023-05-05	2024-05-04
Power Spectral Density						
1	Wideband Radio Communication Tester	Rohde&schwarz	CMW500	149155	2023-04-26	2024-04-25
2	ESG Series Analog Ssignal Generator	Agilent	E4421B	GB40051240	2023-04-25	2024-04-24
3	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2023-04-25	2024-04-24
4	Synthesized Sweeper	Agilent	83752A	3610A01957	2023-04-25	2024-04-24

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
5	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2023-04-26	2024-04-25
6	RF Control Unit	Tonscend	JS0806-1	19D8060152	2023-04-26	2024-04-25
7	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2023-05-05	2024-05-04
8	ESG Vector Signal Generator	Agilent	N5182A	MY50143762	2023-04-25	2024-04-24
9	DC Power Supply	Agilent	E3632A	MY40027695	2023-05-05	2024-05-04
Emissions in frequency bands						
1	Wideband Radio Communication Tester	Rohde&schwarz	CMW500	149155	2023-04-26	2024-04-25
2	ESG Series Analog Ssignal Generator	Agilent	E4421B	GB40051240	2023-04-25	2024-04-24
3	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2023-04-25	2024-04-24
4	Synthesized Sweeper	Agilent	83752A	3610A01957	2023-04-25	2024-04-24
5	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2023-04-26	2024-04-25
6	RF Control Unit	Tonscend	JS0806-1	19D8060152	2023-04-26	2024-04-25
7	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2023-05-05	2024-05-04
8	ESG Vector Signal Generator	Agilent	N5182A	MY50143762	2023-04-25	2024-04-24
9	DC Power Supply	Agilent	E3632A	MY40027695	2023-05-05	2024-05-04
Band edge emissions (Radiated)						
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2023-04-26	2024-04-25
2	Double Ridged Broadband Horn Antenna	schwarabeck	BBHA 9120 D	2278	2023-05-26	2024-05-25
3	Amplifier	Agilent	8449B	3008A01120	2023-05-26	2024-05-25
4	Multi-device Controller	TuoPu	TPMDC	/	/	/
5	MXA signal analyzer	Agilent	N9020A	MY54440859	2023-05-05	2024-05-04
Emissions in frequency bands (below 1GHz)						
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2023-04-26	2024-04-25
2	TRILOG Broadband Antenna	schwarabeck	VULB 9163	9163-1338	2023-06-11	2025-06-10
3	Amplifier	Hewlett-Packard	8447F	3113A06184	2023-04-26	2024-04-25
4	Multi-device Controller	TuoPu	TPMDC	/	/	/
5	Active Loop Antenna	Schwarzbeck	FMZB 1519 B	00066	2023-06-11	2025-06-10
Emissions in frequency bands (above 1GHz)						
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2023-04-26	2024-04-25
2	Double Ridged Broadband Horn Antenna	schwarabeck	BBHA 9120 D	2278	2023-05-26	2024-05-25

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
3	Amplifier	Agilent	8449B	3008A01120	2023-05-26	2024-05-25
4	Multi-device Controller	TuoPu	TPMDC	/	/	/
5	MXA signal analyzer	Agilent	N9020A	MY54440859	2023-05-05	2024-05-04

5 Evaluation Results (Evaluation)

5.1 Antenna requirement

Test 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.
Description of the antenna of EUT:	The antenna of the EUT is permanently attached.
Conclusion:	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 μH/50 ohms line impedance stabilization network (LISN).
Test Limit:	

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

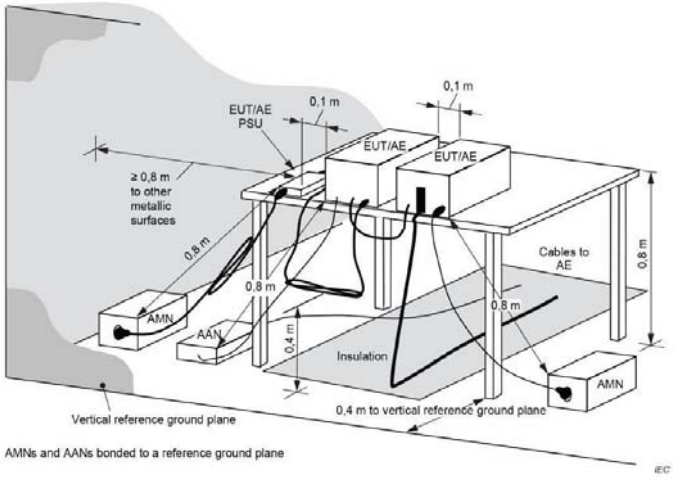
*Decreases with the logarithm of the frequency.

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:

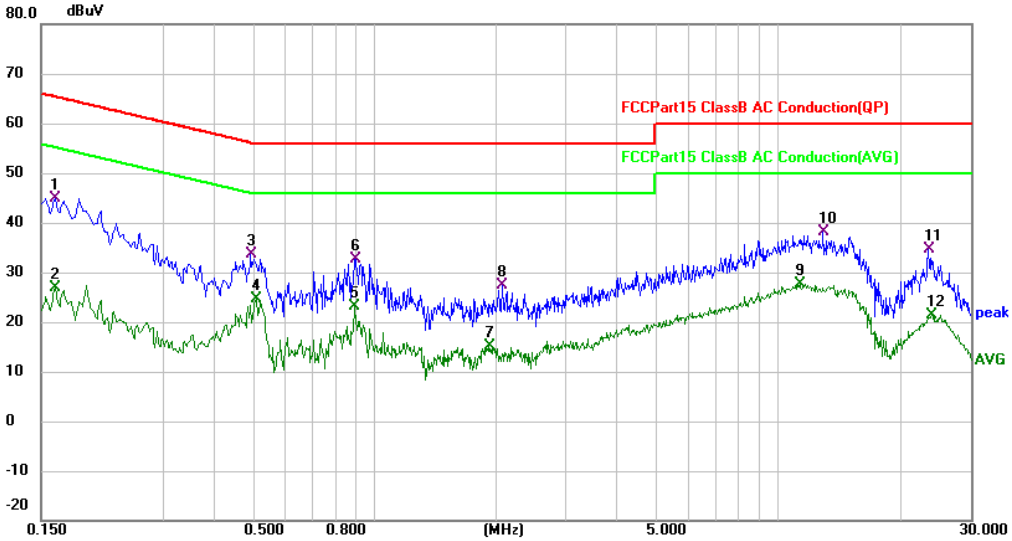
Operating Environment:					
Temperature:	25.6 °C	Humidity:	61 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3				
Final test mode:	All of the listed pre-test mode were tested, only the data of the worst mode (Mode1) is recorded in the report				

6.1.2 Test Setup Diagram:



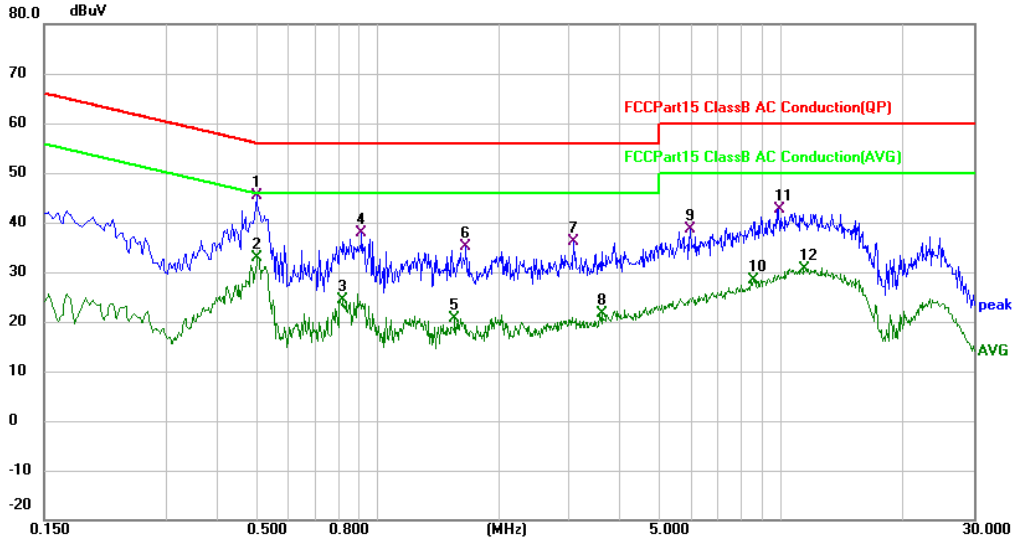
6.1.3 Test Data:

Mode1 / Line: Line / Band: 2.4G / BW: 20 / CH: 11



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1620	34.52	10.28	44.80	65.36	-20.56	QP	
2		0.1620	16.58	10.28	26.86	55.36	-28.50	AVG	
3		0.4940	22.37	11.30	33.67	56.10	-22.43	QP	
4		0.5100	13.30	11.34	24.64	46.00	-21.36	AVG	
5		0.8940	10.95	12.17	23.12	46.00	-22.88	AVG	
6		0.9020	20.54	12.19	32.73	56.00	-23.27	QP	
7		1.9260	5.19	10.03	15.22	46.00	-30.78	AVG	
8		2.0700	17.40	10.02	27.42	56.00	-28.58	QP	
9		11.3460	17.19	10.43	27.62	50.00	-22.38	AVG	
10		12.9340	27.71	10.47	38.18	60.00	-21.82	QP	
11		23.5540	23.80	10.74	34.54	60.00	-25.46	QP	
12		24.0700	10.75	10.75	21.50	50.00	-28.50	AVG	

Mode1 / Line: Neutral / Band: 2.4G / BW: 20 / CH: 11



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.5020	34.07	11.32	45.39	56.00	-10.61	QP	
2		0.5060	21.51	11.34	32.85	46.00	-13.15	AVG	
3		0.8260	12.38	12.03	24.41	46.00	-21.59	AVG	
4		0.9180	25.69	12.18	37.87	56.00	-18.13	QP	
5		1.5540	7.12	13.51	20.63	46.00	-25.37	AVG	
6		1.6620	21.48	13.74	35.22	56.00	-20.78	QP	
7		3.0740	25.87	10.29	36.16	56.00	-19.84	QP	
8		3.6220	11.31	10.28	21.59	46.00	-24.41	AVG	
9		5.9899	28.30	10.27	38.57	60.00	-21.43	QP	
10		8.5659	17.97	10.30	28.27	50.00	-21.73	AVG	
11		9.8620	32.30	10.31	42.61	60.00	-17.39	QP	
12		11.4340	20.33	10.36	30.69	50.00	-19.31	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 >= [3 × 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.

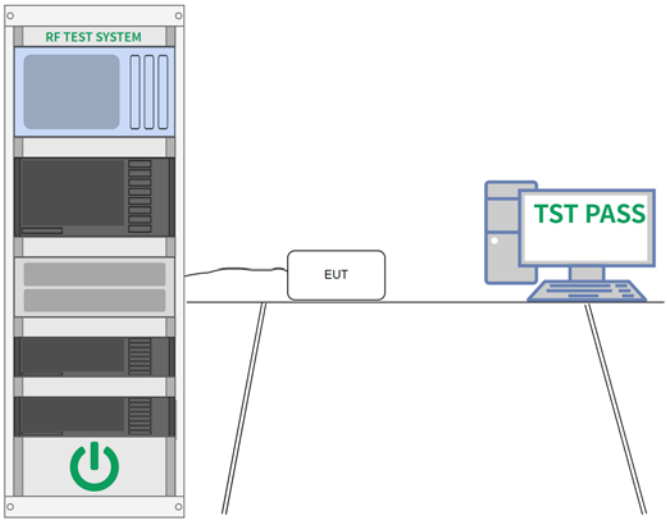
6.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	26 °C	Humidity:	57 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3				
Final test mode:	Mode1, Mode2, Mode3				

6.2.2 Test Data:

Please Refer to Appendix for Details.

6.2.3 Test Setup Diagram:



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 Maximum peak conducted output power

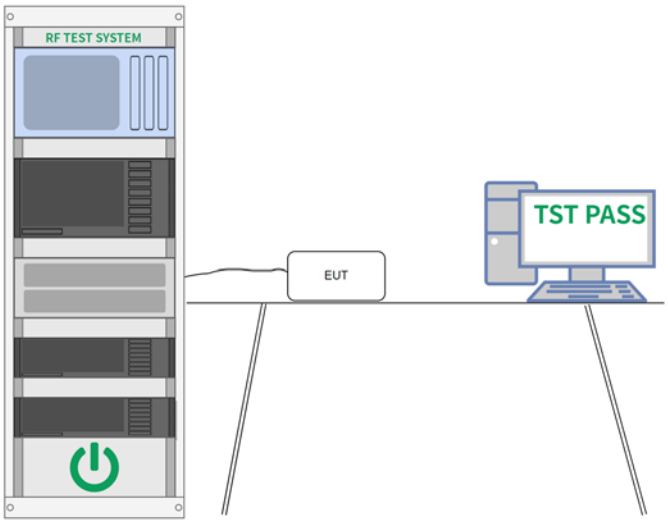
6.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	26 °C	Humidity:	57 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3				
Final test mode:	Mode1, Mode2, Mode3				

6.3.2 Test Data:

Please Refer to Appendix for Details.

6.3.3 Test Setup Diagram:



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:	26 °C	Humidity:	57 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3				
Final test mode:	Mode1, Mode2, Mode3				

6.4.2 Test Data:

Please Refer to Appendix for Details.

6.5 Emissions in frequency bands

Test Requirement:	47 CFR 15.247(d)
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

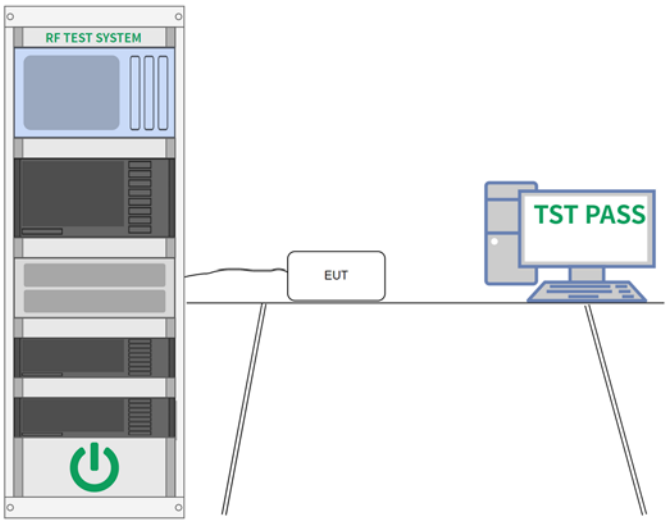
6.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	26 °C	Humidity:	57 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3				
Final test mode:	Mode1, Mode2, Mode3				

6.5.2 Test Data:

Please Refer to Appendix for Details.

6.5.3 Test Setup Diagram:



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

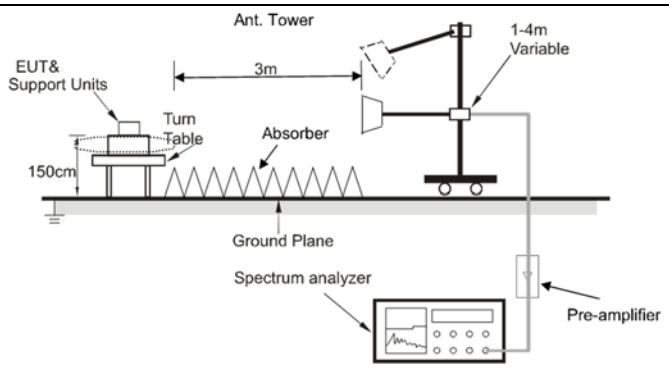
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g.,
§§ 15.231 and 15.241.

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:	20.8 °C	Humidity:	30.9 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3				
Final test mode:	Mode1, Mode2, Mode3				
Note: All other emissions are attenuated 20dB below the limit, so does not recorded					

6.6.2 Test Setup Diagram:



6.6.3 Test Data:

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 20 / CH: 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	44.13	-8.08	36.05	74.00	-37.95	peak
2		2310.000	33.58	-8.08	25.50	54.00	-28.50	AVG
3		2390.000	54.35	-7.71	46.64	74.00	-27.36	peak
4	*	2390.000	45.06	-7.71	37.35	54.00	-16.65	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 20 / CH: 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	48.01	-8.08	39.93	74.00	-34.07	peak
2		2310.000	38.44	-8.08	30.36	54.00	-23.64	AVG
3		2390.000	62.01	-7.71	54.30	74.00	-19.70	peak
4	*	2390.000	52.89	-7.71	45.18	54.00	-8.82	AVG

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 20 / CH: 11

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	54.23	-7.24	46.99	74.00	-27.01	peak
2	*	2483.500	44.62	-7.24	37.38	54.00	-16.62	AVG
3		2500.000	51.94	-7.17	44.77	74.00	-29.23	peak
4		2500.000	43.80	-7.17	36.63	54.00	-17.37	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 20 / CH: 11

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	60.10	-7.24	52.86	74.00	-21.14	peak
2	*	2483.500	50.24	-7.24	43.00	54.00	-11.00	AVG
3		2500.000	56.87	-7.17	49.70	74.00	-24.30	peak
4		2500.000	49.19	-7.17	42.02	54.00	-11.98	AVG

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 20 / CH: 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	43.53	-8.08	35.45	74.00	-38.55	peak
2		2310.000	33.43	-8.08	25.35	54.00	-28.65	AVG
3		2390.000	55.18	-7.71	47.47	74.00	-26.53	peak
4	*	2390.000	45.29	-7.71	37.58	54.00	-16.42	AVG

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 20 / CH: 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	46.30	-8.08	38.22	74.00	-35.78	peak
2		2310.000	36.75	-8.08	28.67	54.00	-25.33	AVG
3		2390.000	62.48	-7.71	54.77	74.00	-19.23	peak
4	*	2390.000	51.41	-7.71	43.70	54.00	-10.30	AVG

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 20 / CH: 11

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	55.26	-7.24	48.02	74.00	-25.98	peak
2	*	2483.500	45.39	-7.24	38.15	54.00	-15.85	AVG
3		2500.000	51.99	-7.17	44.82	74.00	-29.18	peak
4		2500.000	40.30	-7.17	33.13	54.00	-20.87	AVG

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 20 / CH: 11

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	62.95	-7.24	55.71	74.00	-18.29	peak
2	*	2483.500	51.04	-7.24	43.80	54.00	-10.20	AVG
3		2500.000	54.59	-7.17	47.42	74.00	-26.58	peak
4		2500.000	45.40	-7.17	38.23	54.00	-15.77	AVG

Mode3 / Polarization: Horizontal / Band: 2.4G / BW: 20 / CH: 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	43.66	-8.08	35.58	74.00	-38.42	peak
2		2310.000	33.61	-8.08	25.53	54.00	-28.47	AVG
3		2390.000	55.84	-7.71	48.13	74.00	-25.87	peak
4	*	2390.000	45.71	-7.71	38.00	54.00	-16.00	AVG

Mode3 / Polarization: Vertical / Band: 2.4G / BW: 20 / CH: 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	46.95	-8.08	38.87	74.00	-35.13	peak
2		2310.000	37.03	-8.08	28.95	54.00	-25.05	AVG
3		2390.000	63.66	-7.71	55.95	74.00	-18.05	peak
4	*	2390.000	51.73	-7.71	44.02	54.00	-9.98	AVG

Mode3 / Polarization: Horizontal / Band: 2.4G / BW: 20 / CH: 11

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	55.99	-7.24	48.75	74.00	-25.25	peak
2	*	2483.500	44.73	-7.24	37.49	54.00	-16.51	AVG
3		2500.000	49.93	-7.17	42.76	74.00	-31.24	peak
4		2500.000	40.06	-7.17	32.89	54.00	-21.11	AVG

Mode3 / Polarization: Vertical / Band: 2.4G / BW: 20 / CH: 11

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	62.12	-7.24	54.88	74.00	-19.12	peak
2	*	2483.500	50.96	-7.24	43.72	54.00	-10.28	AVG
3		2500.000	54.41	-7.17	47.24	74.00	-26.76	peak
4		2500.000	44.86	-7.17	37.69	54.00	-16.31	AVG

6.7 Emissions in frequency bands (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.

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				
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				

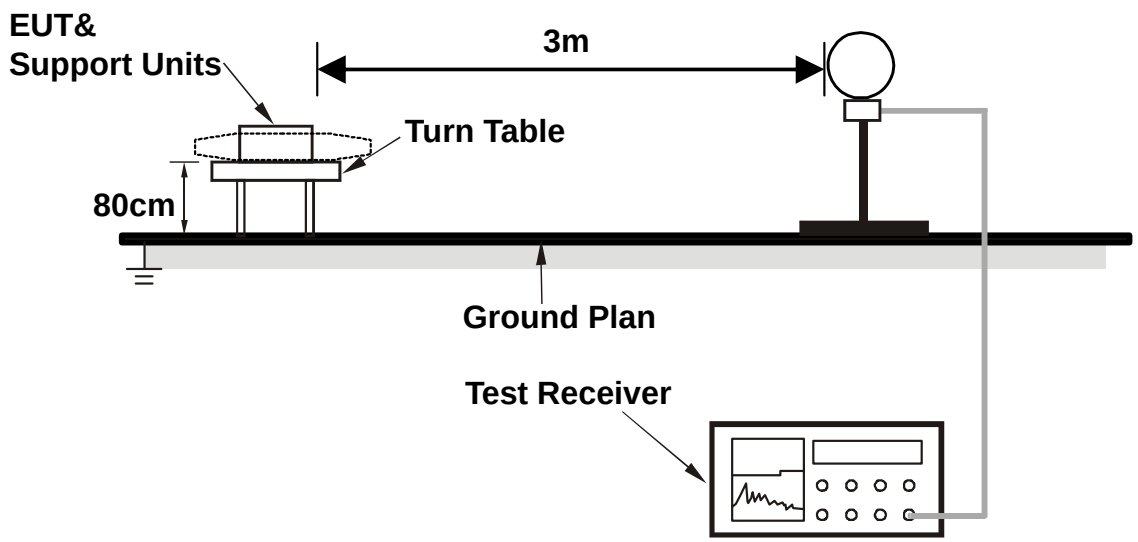
Note:

The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.

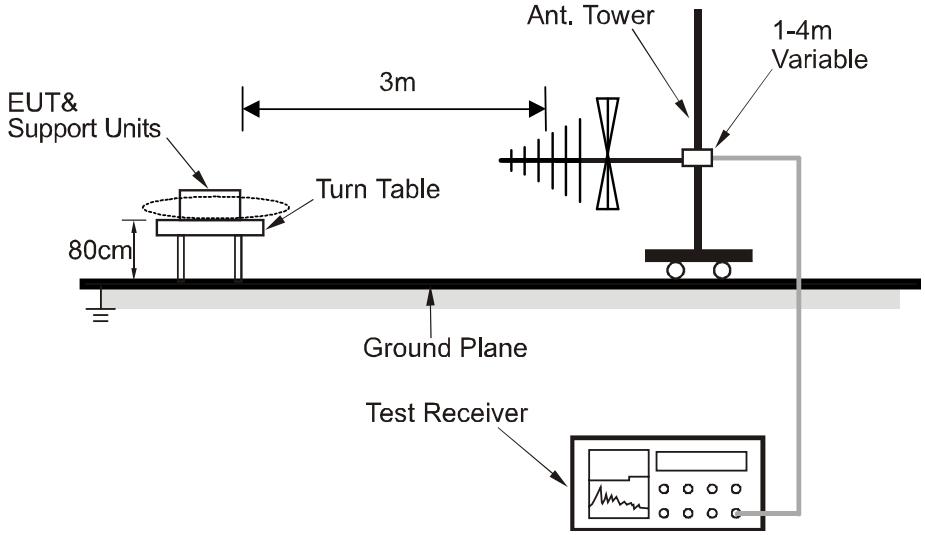
All modes of operation of the EUT were investigated, and only the worst-case results are reported. There were no emissions found below 30MHz within 20dB of the limit.

6.7.2 Test Setup Diagram:

Below 30MHz



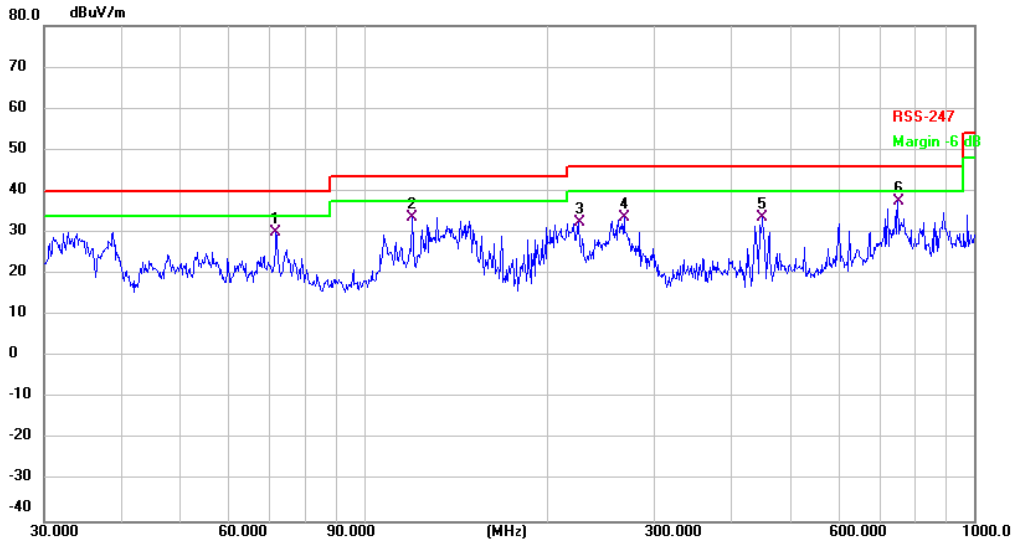
30MHz~1GHz



For the actual test configuration, please refer to the related item – Photographs of the test setup.

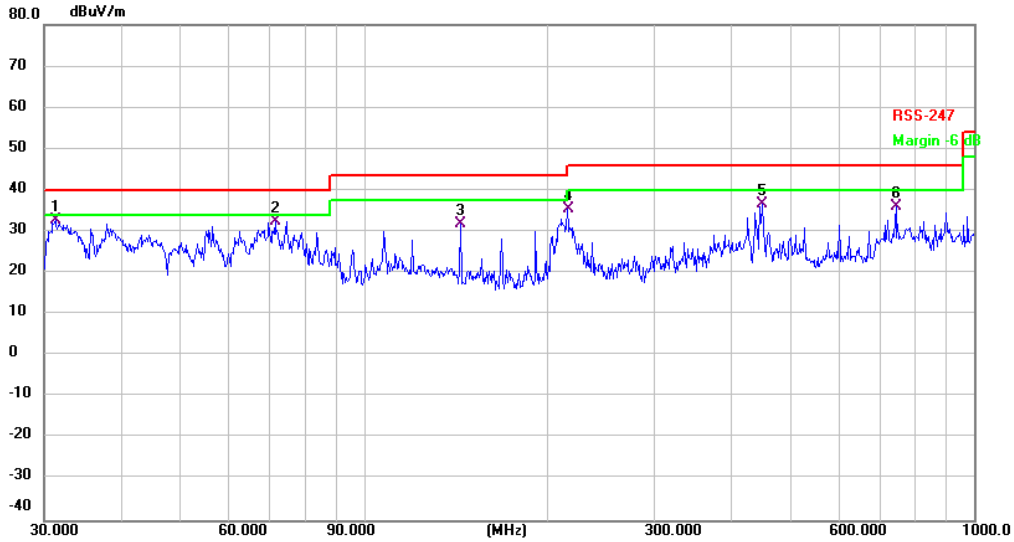
6.7.3 Test Data:

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 20 / CH: 11



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		71.8320	40.18	-10.04	30.14	40.00	-9.86	QP	
2		119.8556	43.90	-10.20	33.70	43.50	-9.80	QP	
3		225.3080	36.78	-4.23	32.55	46.00	-13.45	QP	
4		267.5455	41.36	-7.77	33.59	46.00	-12.41	QP	
5		451.1350	39.00	-5.39	33.61	46.00	-12.39	QP	
6	*	750.1083	34.78	2.81	37.59	46.00	-8.41	QP	

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 20 / CH: 11



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	31.2893	40.85	-8.21	32.64	40.00	-7.36	QP	
2		71.5806	42.44	-10.00	32.44	40.00	-7.56	QP	
3		143.8295	43.19	-11.28	31.91	43.50	-11.59	QP	
4		216.0240	42.03	-6.62	35.41	46.00	-10.59	QP	
5		449.5558	41.82	-5.30	36.52	46.00	-9.48	QP	
6		744.8661	33.80	2.33	36.13	46.00	-9.87	QP	

6.8 Emissions in frequency bands (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.

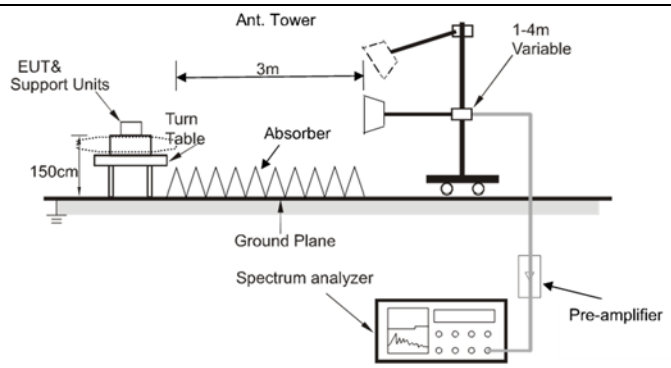
Test Method:	ANSI C63.10-2013 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013 section 6.6.4

6.8.1 E.U.T. Operation:

Operating Environment:					
Temperature:	26 °C	Humidity:	54 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3				
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.

6.8.2 Test Setup Diagram:



6.8.3 Test Data:

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 20 / CH: 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4824.000	48.50	0.82	49.32	74.00	-24.68	peak
2	*	4824.000	45.67	0.82	46.49	54.00	-7.51	AVG
3		7236.000	40.87	6.00	46.87	74.00	-27.13	peak
4		7236.000	34.39	6.00	40.39	54.00	-13.61	AVG
5		9648.000	41.59	6.17	47.76	74.00	-26.24	peak
6		9648.000	35.11	6.17	41.28	54.00	-12.72	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 20 / CH: 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4824.000	54.37	0.82	55.19	74.00	-18.81	peak
2	*	4824.000	53.12	0.82	53.94	54.00	-0.06	AVG
3		7236.000	40.05	6.00	46.05	74.00	-27.95	peak
4		7236.000	34.02	6.00	40.02	54.00	-13.98	AVG
5		9648.000	41.38	6.17	47.55	74.00	-26.45	peak
6		9648.000	35.06	6.17	41.23	54.00	-12.77	AVG

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 20 / CH: 6

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4874.000	46.20	1.01	47.21	74.00	-26.79	peak
2	*	4874.000	44.18	1.01	45.19	54.00	-8.81	AVG
3		7311.000	40.54	5.94	46.48	74.00	-27.52	peak
4		7311.000	34.39	5.94	40.33	54.00	-13.67	AVG
5		9748.000	40.91	6.54	47.45	74.00	-26.55	peak
6		9748.000	34.68	6.54	41.22	54.00	-12.78	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 20 / CH: 6

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4874.000	52.32	1.01	53.33	74.00	-20.67	peak
2	*	4874.000	51.20	1.01	52.21	54.00	-1.79	AVG
3		7311.000	40.10	5.94	46.04	74.00	-27.96	peak
4		7311.000	34.16	5.94	40.10	54.00	-13.90	AVG
5		9748.000	40.99	6.54	47.53	74.00	-26.47	peak
6		9748.000	34.75	6.54	41.29	54.00	-12.71	AVG

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 20 / CH: 11

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4924.000	46.74	1.27	48.01	74.00	-25.99	peak
2	*	4924.000	44.81	1.27	46.08	54.00	-7.92	AVG
3		7386.000	40.33	5.86	46.19	74.00	-27.81	peak
4		7386.000	34.25	5.86	40.11	54.00	-13.89	AVG
5		9848.000	41.27	6.31	47.58	74.00	-26.42	peak
6		9848.000	34.97	6.31	41.28	54.00	-12.72	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 20 / CH: 11

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4924.000	52.03	1.27	53.30	74.00	-20.70	peak
2	*	4924.000	50.96	1.27	52.23	54.00	-1.77	AVG
3		7386.000	39.64	5.86	45.50	74.00	-28.50	peak
4		7386.000	33.38	5.86	39.24	54.00	-14.76	AVG
5		9848.000	41.60	6.31	47.91	74.00	-26.09	peak
6		9848.000	35.02	6.31	41.33	54.00	-12.67	AVG

Photographs of the test setup

Refer to Appendix - Test Setup Photo

Photographs of the EUT

Refer to Appendix - EUT Photos

Appendix

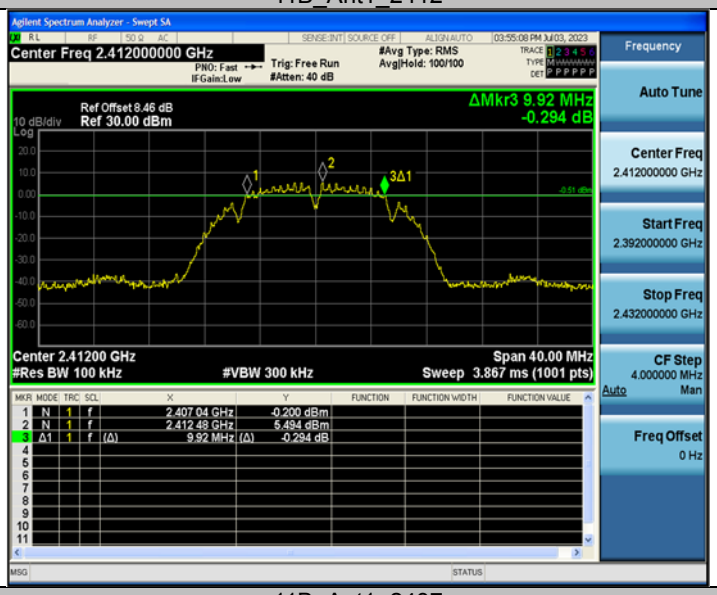
Appendix A: DTS Bandwidth

Test Result

Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	9.920	0.5	PASS
		2437	10.040	0.5	PASS
		2462	10.080	0.5	PASS
11G	Ant1	2412	16.360	0.5	PASS
		2437	16.360	0.5	PASS
		2462	16.360	0.5	PASS
11N20SISO	Ant1	2412	17.600	0.5	PASS
		2437	17.600	0.5	PASS
		2462	17.560	0.5	PASS

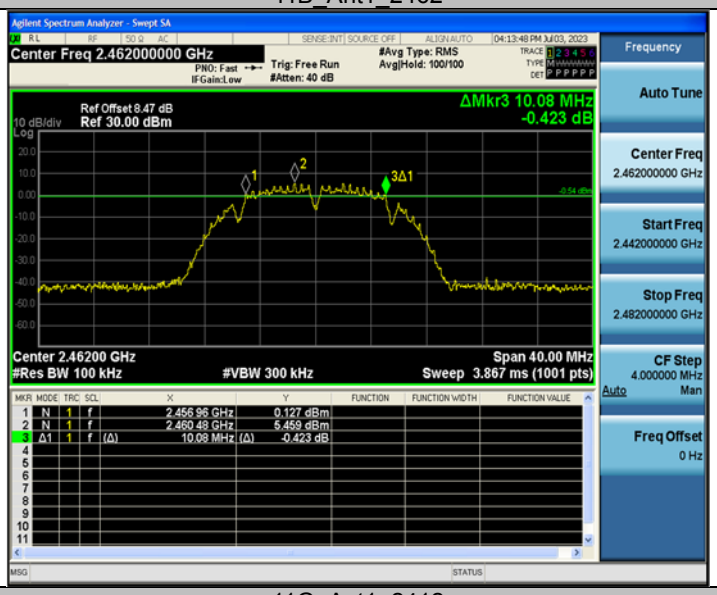
Test Graphs

11B_Ant1_2412



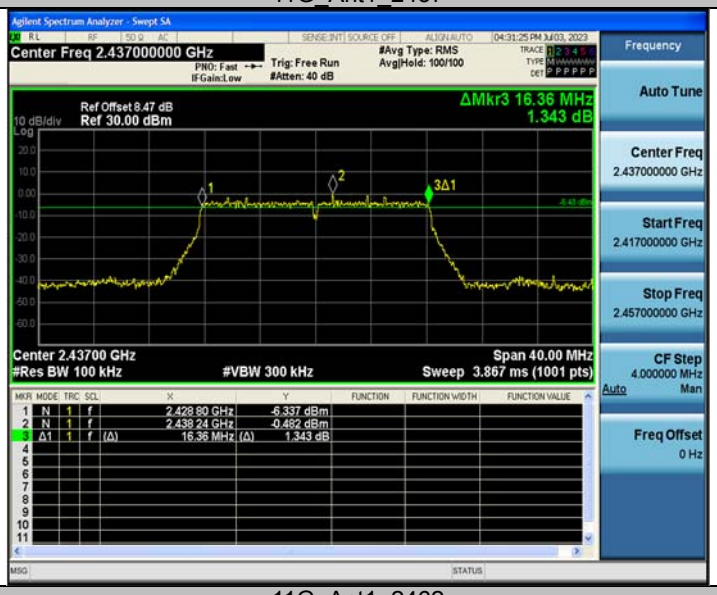
11B_Ant1_2437

11B_Ant1_2462

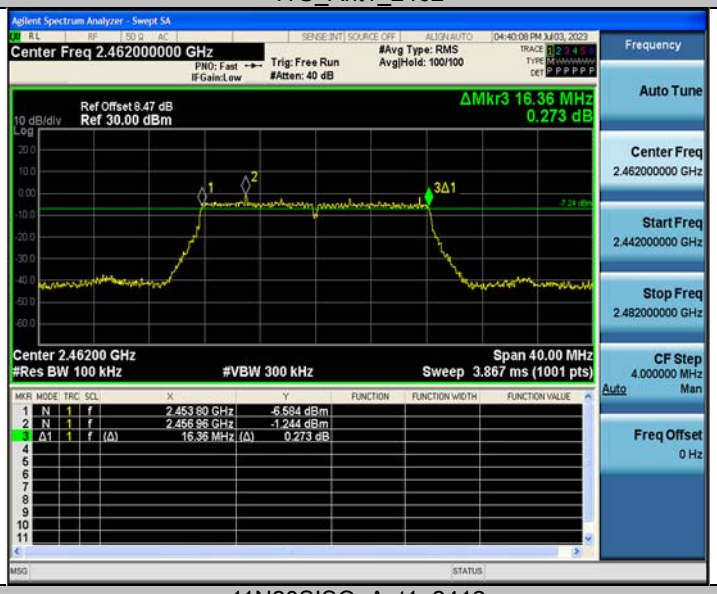


11G_Ant1_2412

11G_Ant1_2437

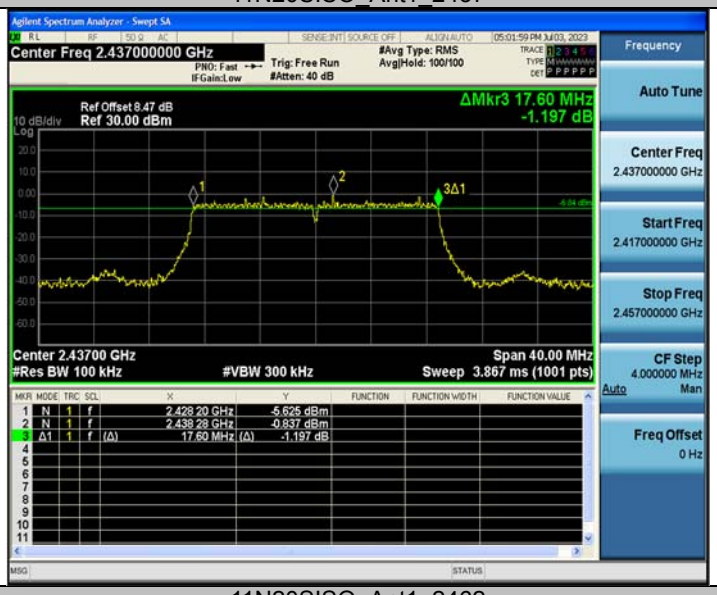


11G_Ant1_2462

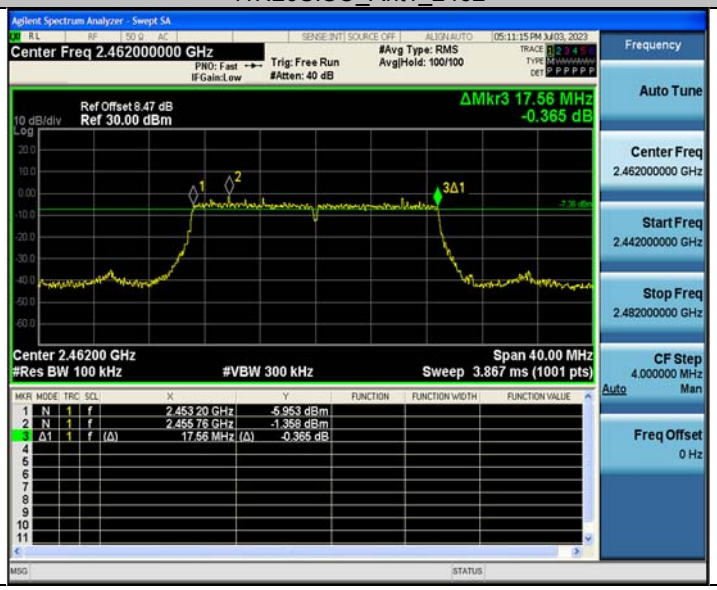


11N20SISO_Ant1_2412

11N20SISO_Ant1_2437



11N20SISO_Ant1_2462



Appendix B: Maximum conducted output power

Test Result Peak

Test Mode	Antenna	Frequency [MHz]	Peak Power [dBm]	Conducted Limit [dBm]	Verdict
11B	Ant1	2412	17.44	≤30.00	PASS
		2437	17.44	≤30.00	PASS
		2462	17.25	≤30.00	PASS
11G	Ant1	2412	18.27	≤30.00	PASS
		2437	18.27	≤30.00	PASS
		2462	17.58	≤30.00	PASS
11N20SISO	Ant1	2412	17.78	≤30.00	PASS
		2437	17.80	≤30.00	PASS
		2462	17.36	≤30.00	PASS

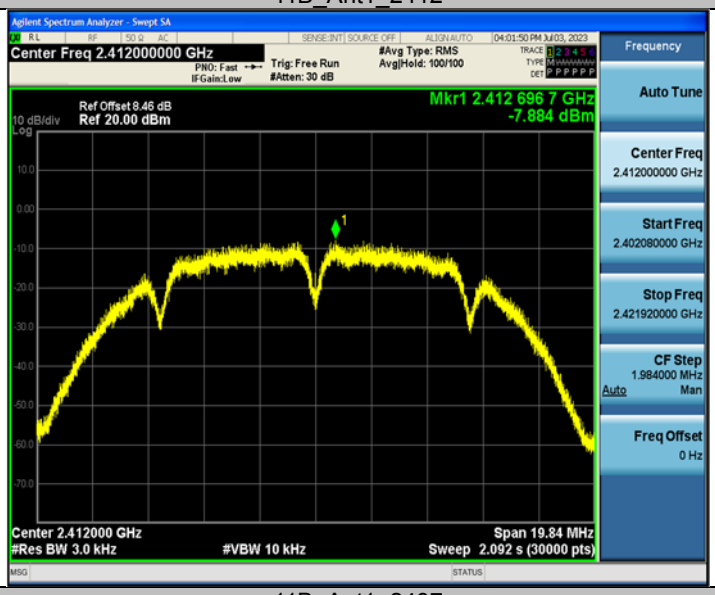
Appendix C: Maximum power spectral density

Test Result

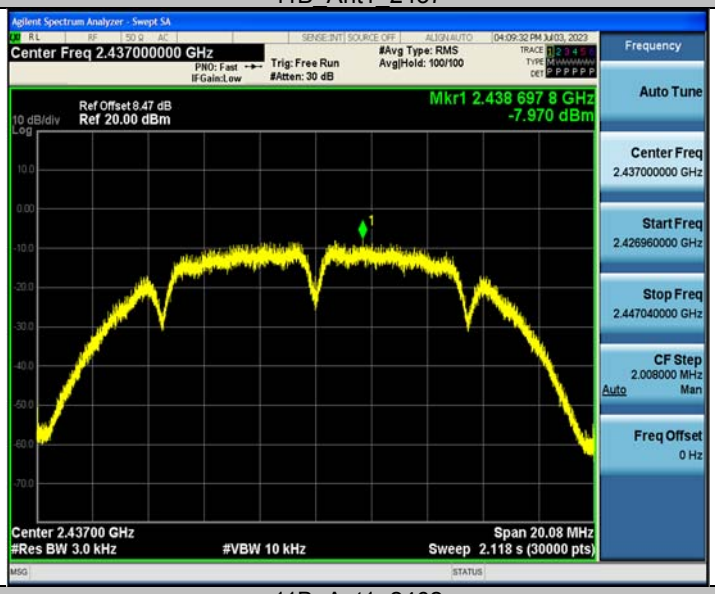
Test Mode	Antenna	Frequency [MHz]	Result [dBm/3-100kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	-7.88	≤8.00	PASS
		2437	-7.97	≤8.00	PASS
		2462	-8.41	≤8.00	PASS
11G	Ant1	2412	-11.96	≤8.00	PASS
		2437	-12.95	≤8.00	PASS
		2462	-13.4	≤8.00	PASS
11N20SISO	Ant1	2412	-13.59	≤8.00	PASS
		2437	-12.8	≤8.00	PASS
		2462	-14	≤8.00	PASS

Test Graphs

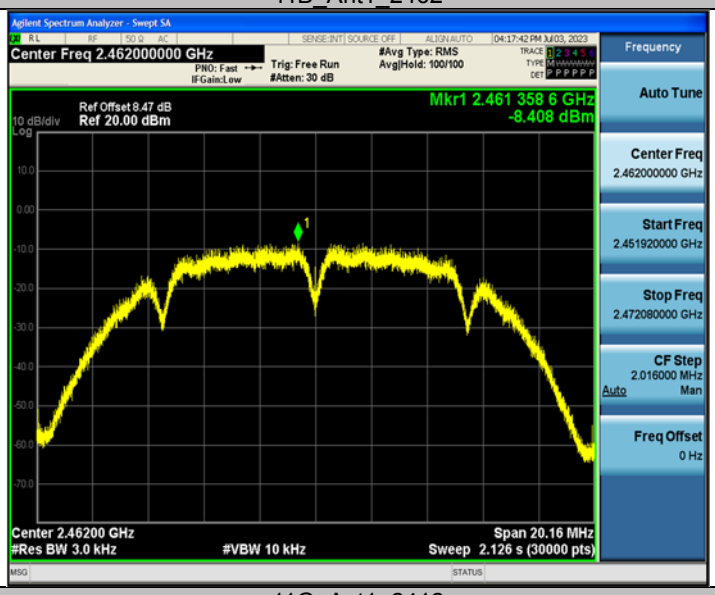
11B_Ant1_2412



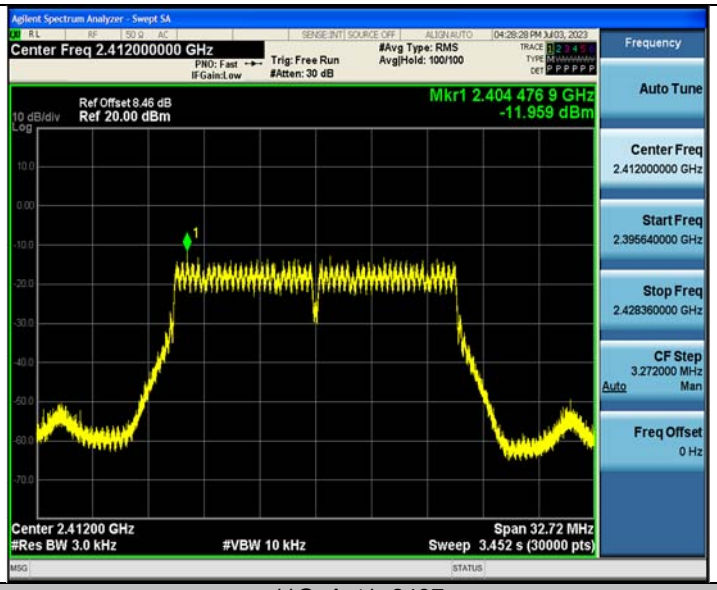
11B_Ant1_2437



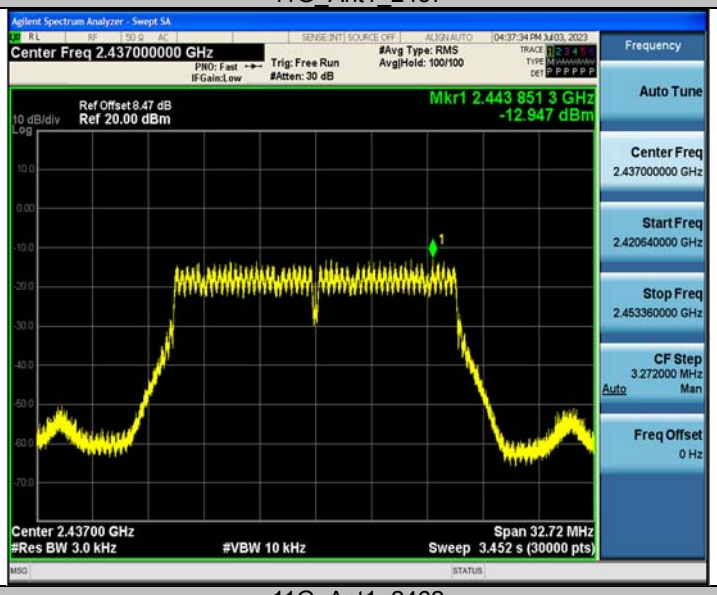
11B_Ant1_2462



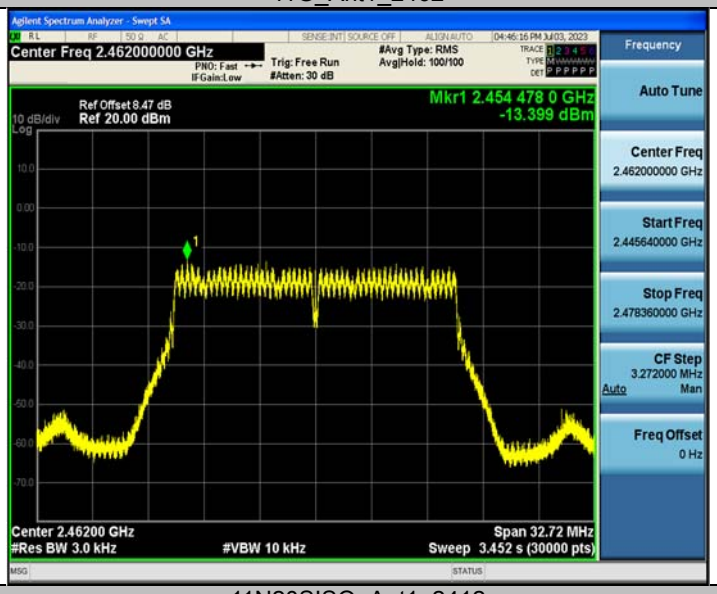
11G_Ant1_2412



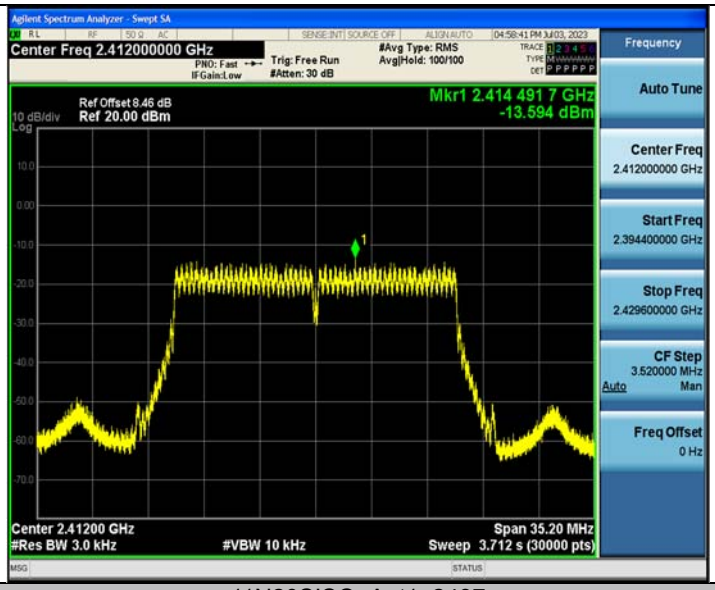
11G_Ant1_2437



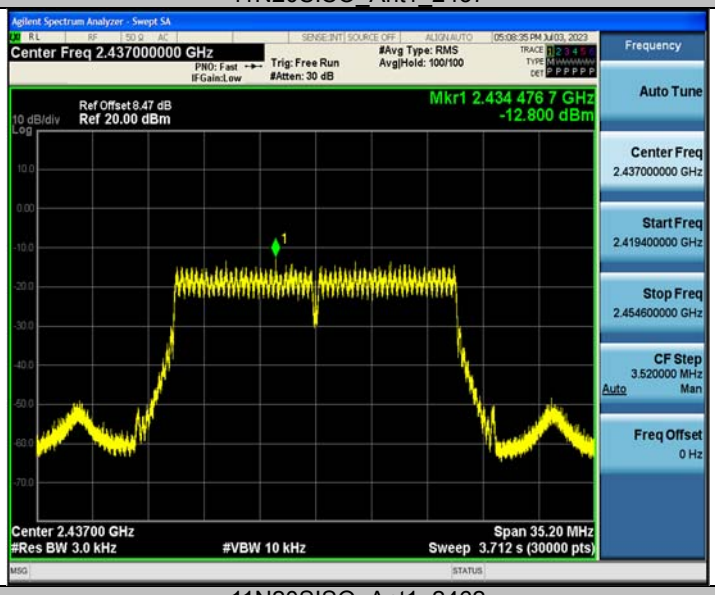
11G_Ant1_2462



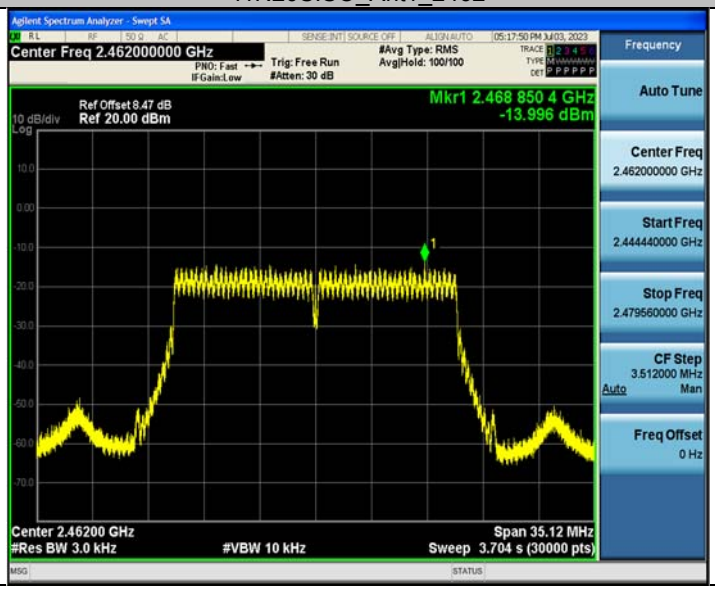
11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



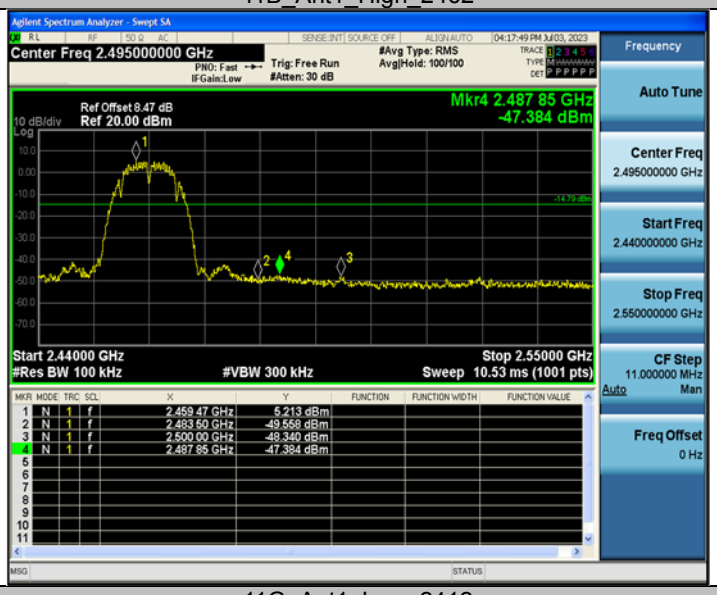
11N20SISO_Ant1_2462



Appendix D: Band edge measurements

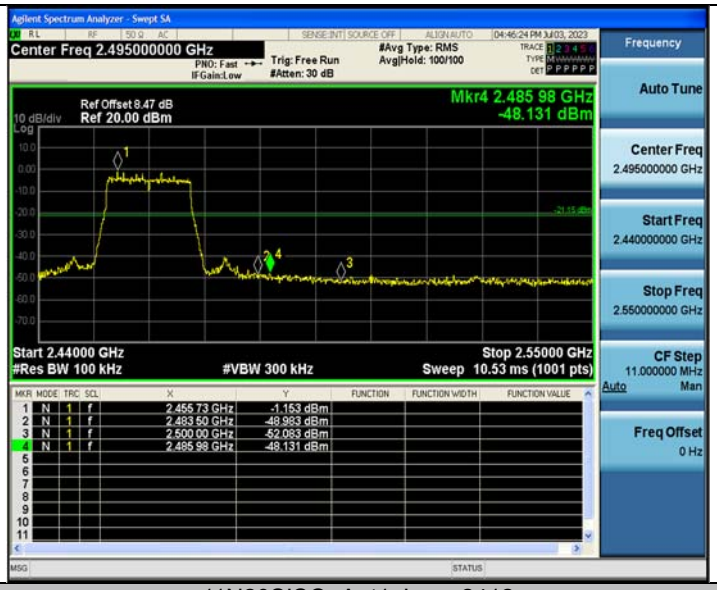
11B_Ant1_Low_2412

11B_Ant1_High_2462



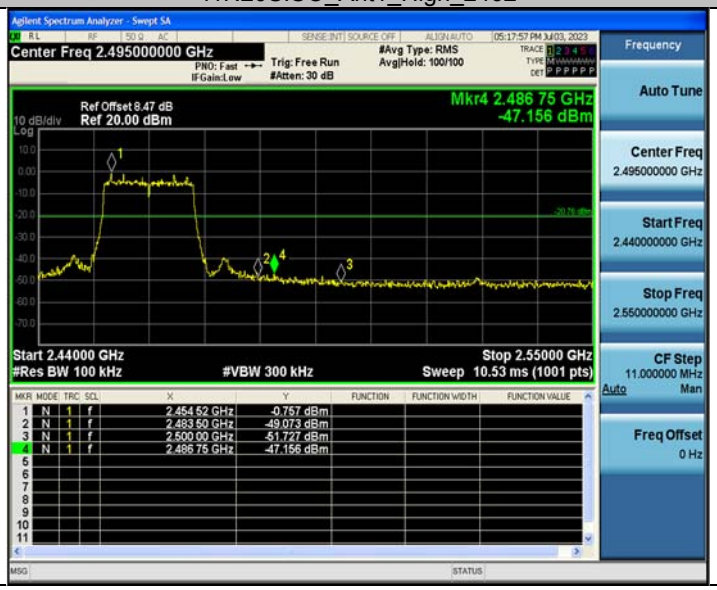
11G_Ant1_Low_2412

11G_Ant1_High_2462



11N20SISO_Ant1_Low_2412

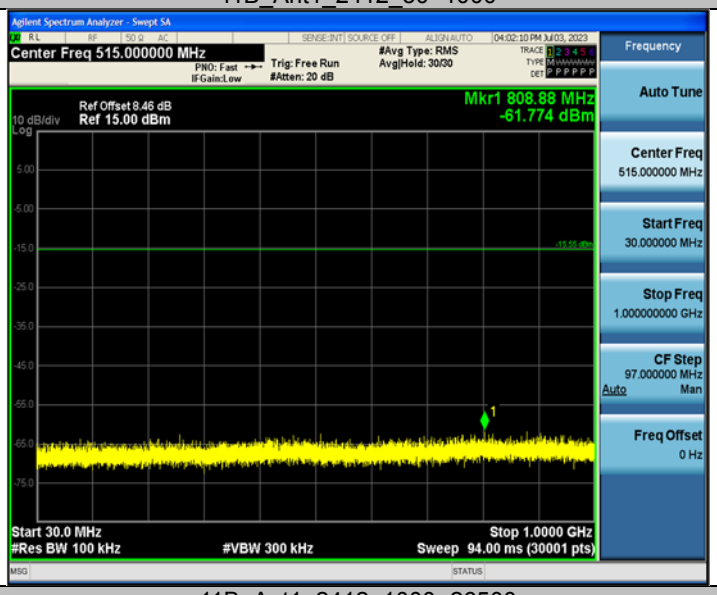
11N20SISO_Ant1_High_2462



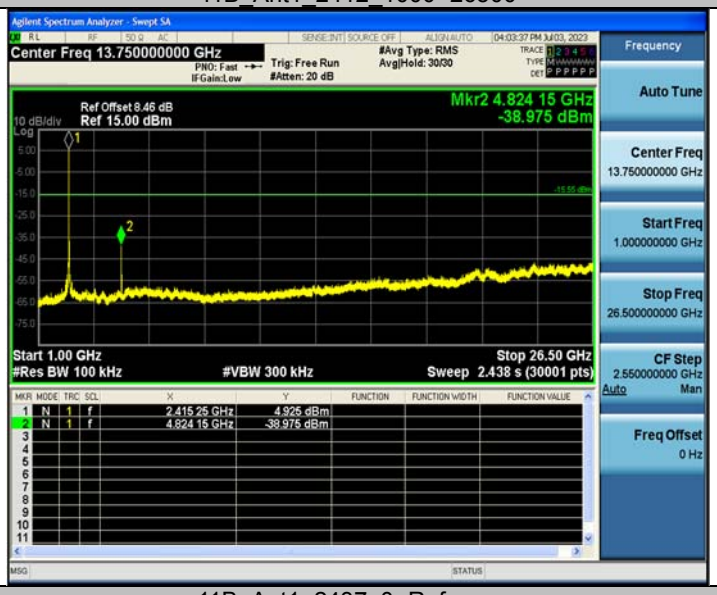
Appendix E: Conducted Spurious Emission

11B_Ant1_2412_0~Reference

11B_Ant1_2412_30~1000

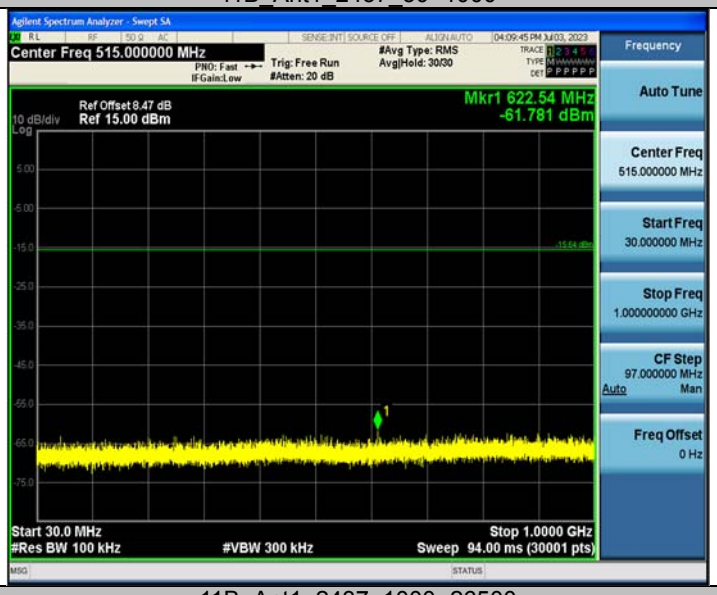


11B_Ant1_2412_1000~26500

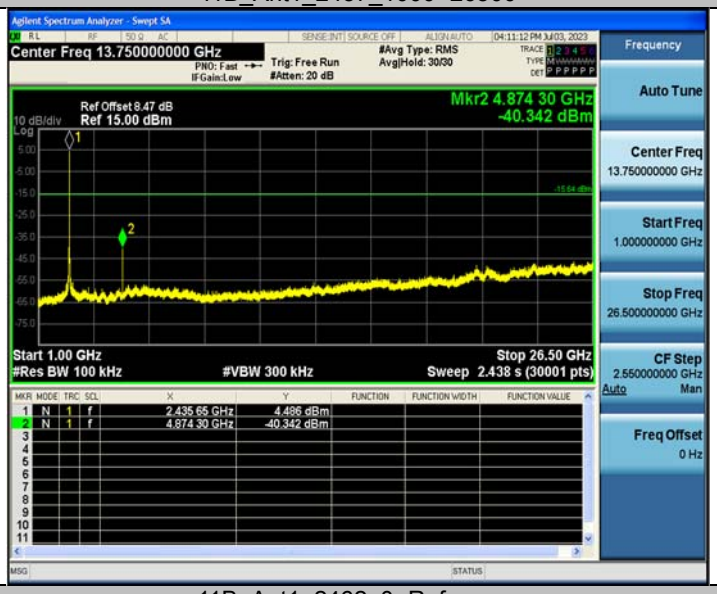


11B_Ant1_2437_0~Reference

11B_Ant1_2437_30~1000

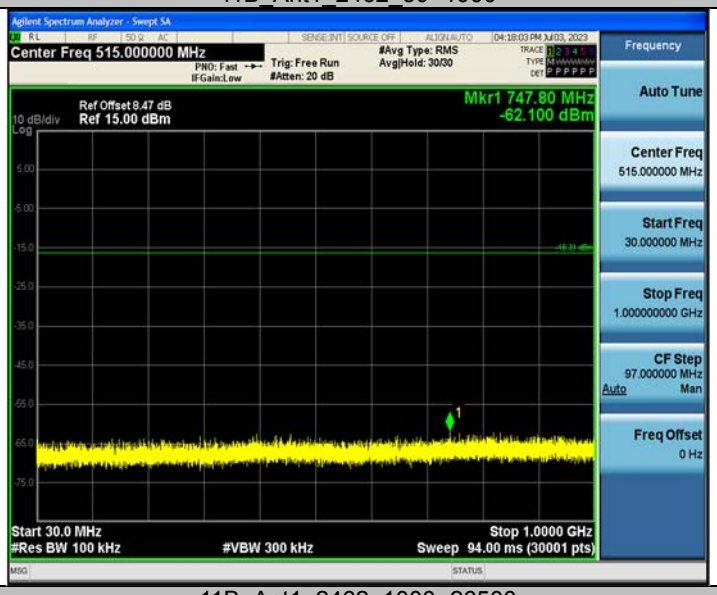


11B_Ant1_2437_1000~26500

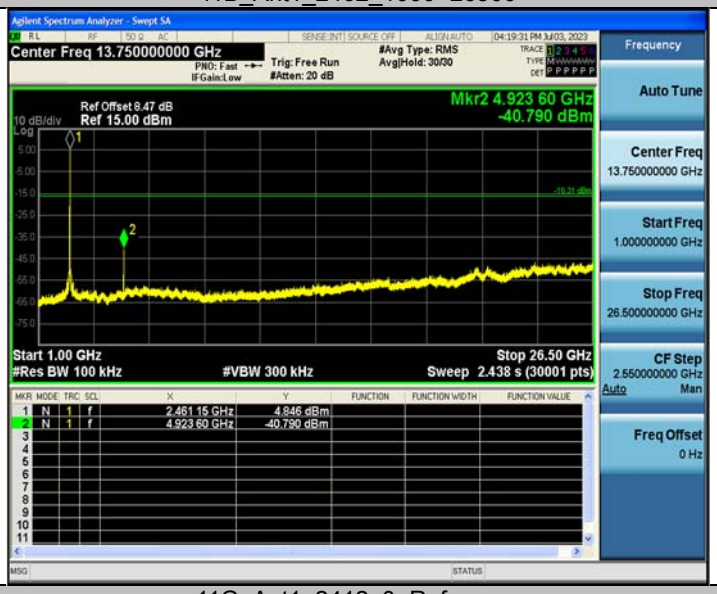


11B_Ant1_2462_0~Reference

11B_Ant1_2462_30~1000

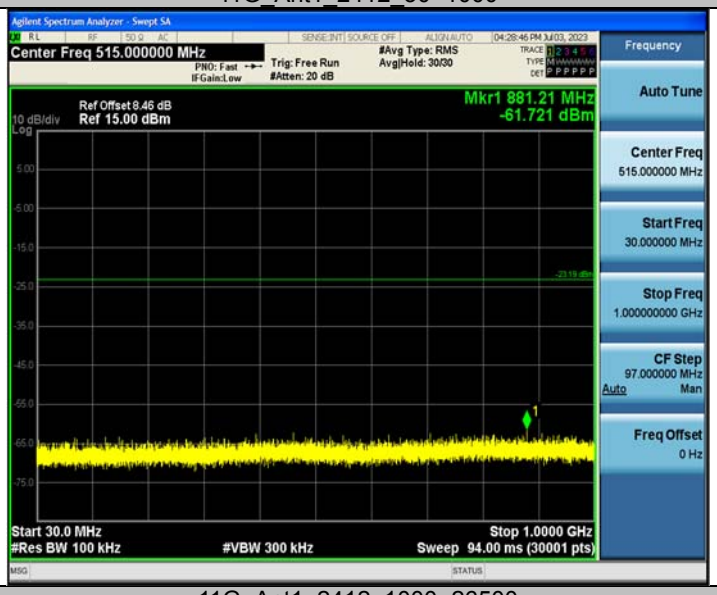


11B_Ant1_2462_1000~26500

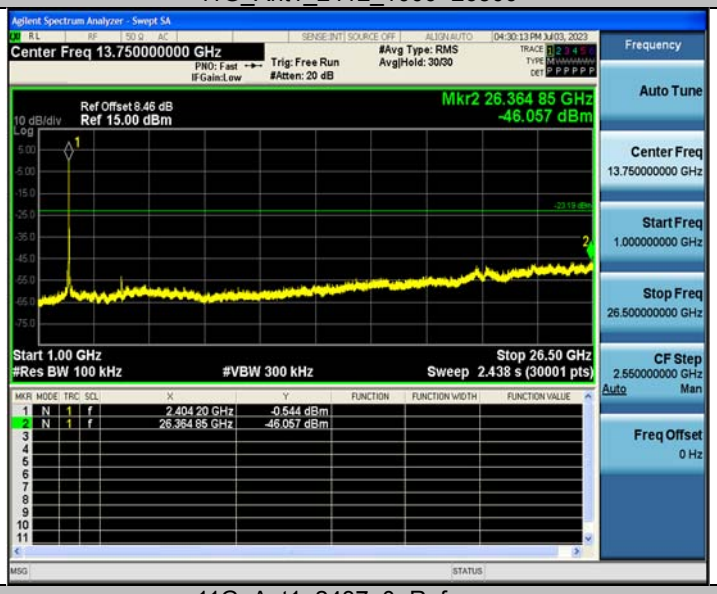


11G_Ant1_2412_0~Reference

11G_Ant1_2412_30~1000

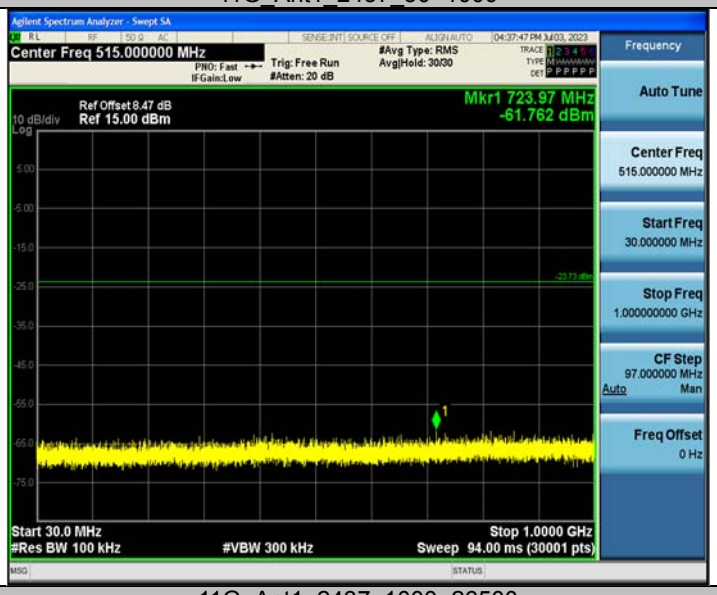


11G_Ant1_2412_1000~26500

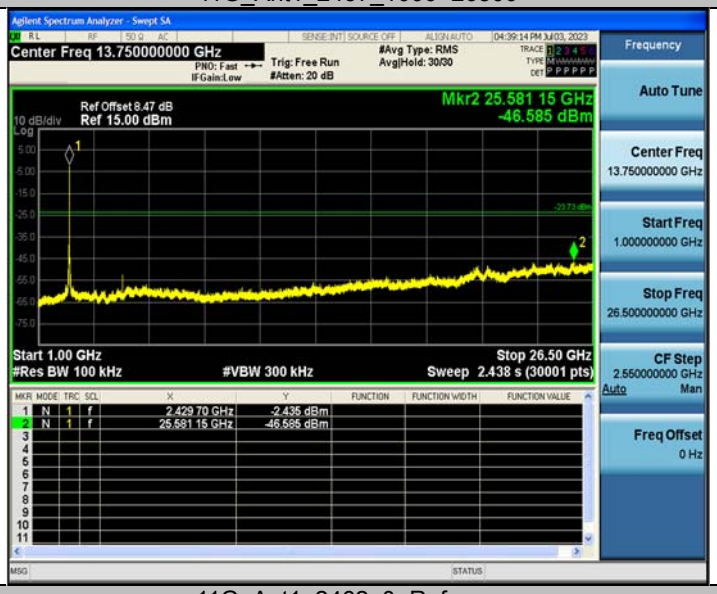


11G_Ant1_2437_0~Reference

11G_Ant1_2437_30~1000

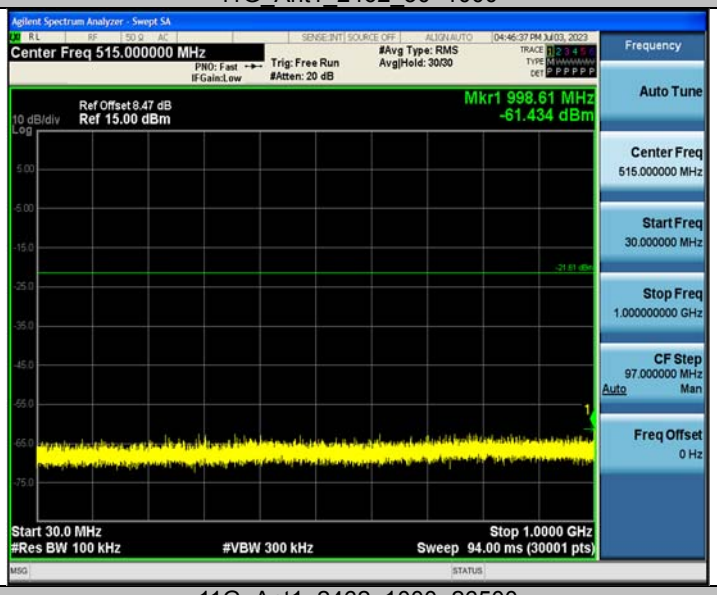


11G_Ant1_2437_1000~26500

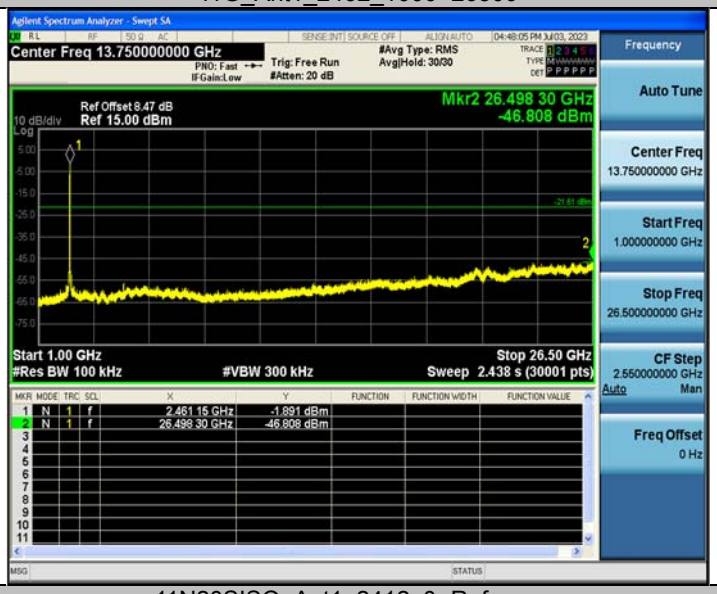


11G_Ant1_2462_0~Reference

11G_Ant1_2462_30~1000

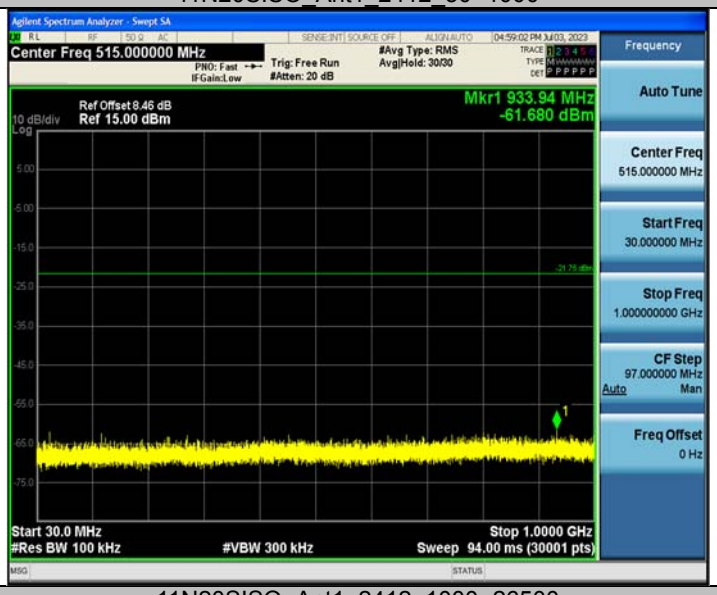


11G_Ant1_2462_1000~26500

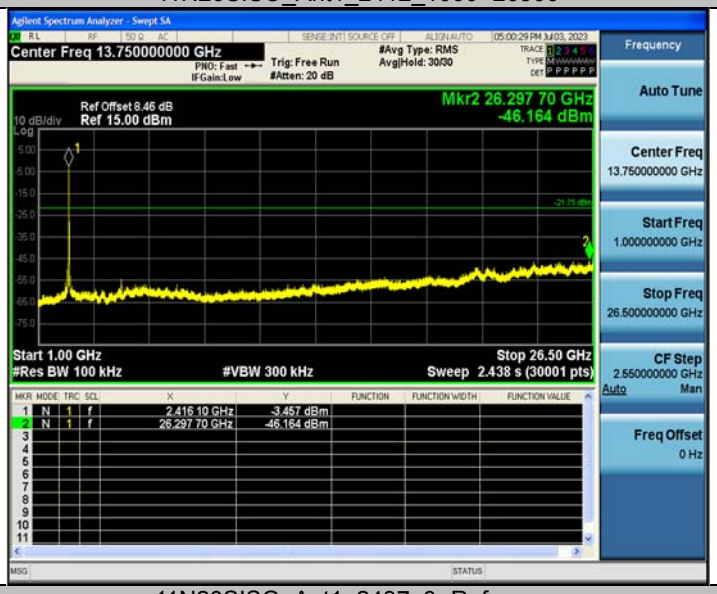


11N20SISO_Ant1_2412_0~Reference

11N20SISO_Ant1_2412_30~1000

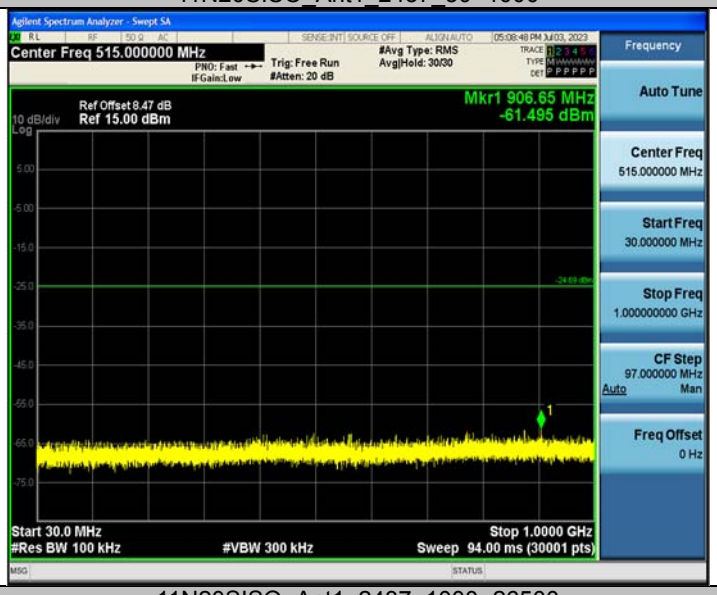


11N20SISO_Ant1_2412_1000~26500

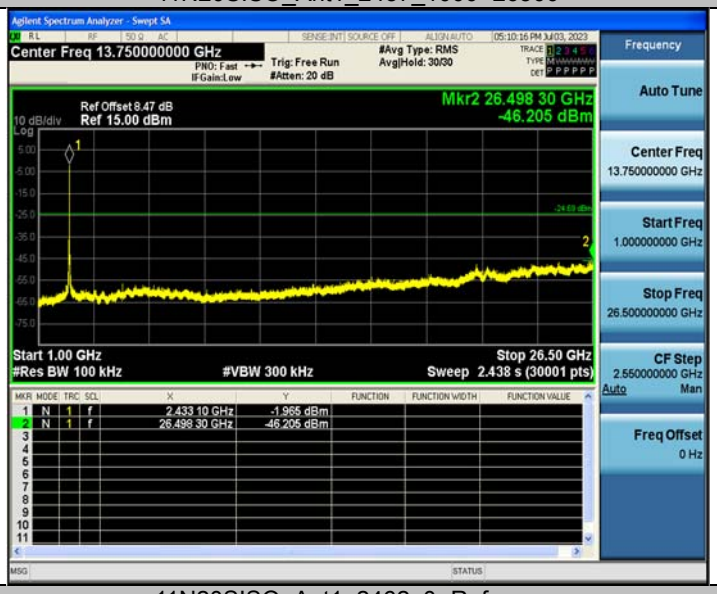


11N20SISO_Ant1_2437_0~Reference

11N20SISO_Ant1_2437_30~1000

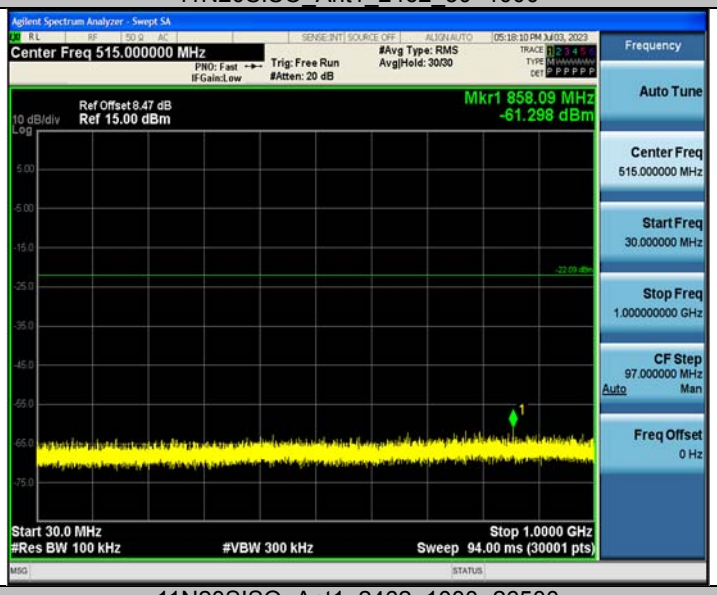


11N20SISO_Ant1_2437_1000~26500

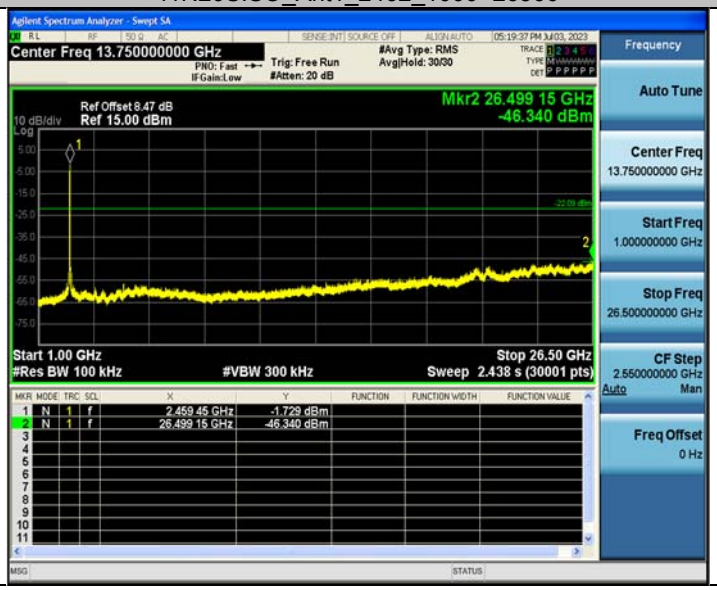


11N20SISO_Ant1_2462_0~Reference

11N20SISO_Ant1_2462_30~1000



11N20SISO_Ant1_2462_1000~26500



Appendix F: Duty Cycle

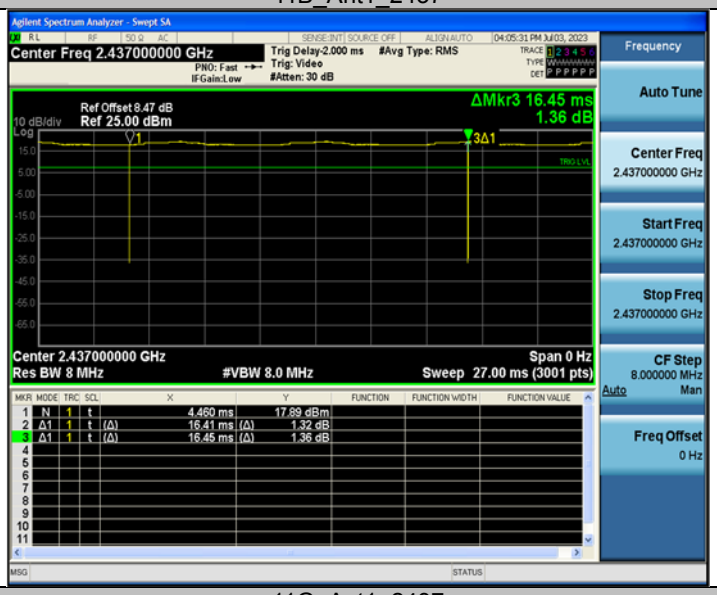
Test Result

Test Mode	Antenna	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Factor
11B	Ant1	2437	16.41	16.45	99.76	0.01
11G	Ant1	2437	2.72	2.76	98.55	0.06
11N20SISO	Ant1	2437	2.53	2.57	98.44	0.07

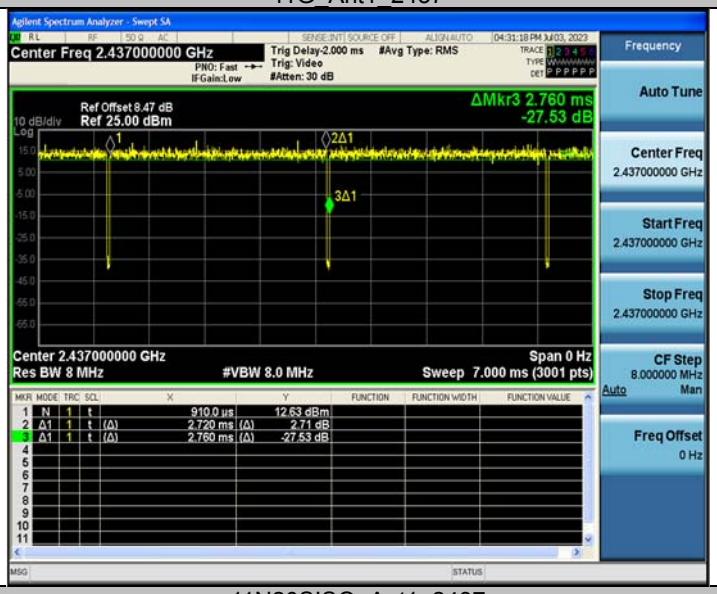
Notes:
Duty Cycle [%] = Transmission Duration [ms] / Transmission Period [ms] * 100
Factor = 10 * log (Duty Cycle)

Test Graphs

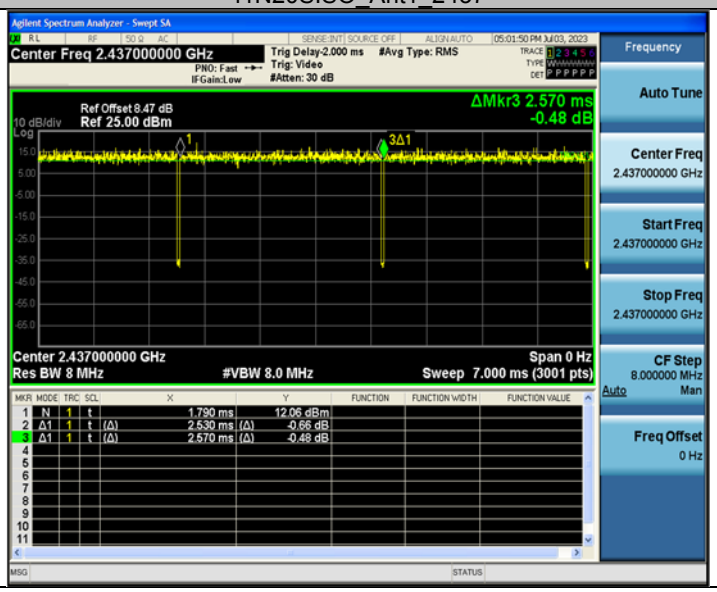
11B_Ant1_2437



11G_Ant1_2437



11N20SISO_Ant1_2437



----End of Report----