Microtest
微 测 检 测

Test Report

Report No.: MTi240723018-04E3

Date of issue: 2024-09-21

Applicant: Dongguan Yucheng Communication Technology Co., Ltd.

Product name: AutoLTbx

Model(s): YUC100-U2W, YUC100-A15W, YUC100-U2A, YUC100-U2AC, YUC100-O2W, YUC100-C2A, YUC100-C2CA

FCC ID: 2BLKI-AUTOLTBX

Shenzhen Microtest Co., Ltd.

http://www.mtitest.cn

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

Address: 101, No. 7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China.
Tel: 0755-88850135-1439 Mobile: 131-4343-1439 (Wechat same number) Web: http://www.mtitest.cn E-mail: mti@51mti.com

Instructions

1. This test report shall not be partially reproduced without the written consent of the laboratory.

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.

Table of contents

1 General Description 5

1.1 Description of the EUT 5
1.2 Description of test modes 5
1.3 Environmental Conditions 7
1.4 Description of support units 7
1.5 Measurement uncertainty 7

2 Summary of Test Result 8

3 Test Facilities and accreditations 9

3.1 Test laboratory 9

4 List of test equipment 10

5 Evaluation Results (Evaluation) 11

5.1 Antenna requirement 11

6 Radio Spectrum Matter Test Results (RF) 12

6.1 Occupied Bandwidth 12
6.2 Maximum Conducted Output Power 13
6.3 Power Spectral Density 14
6.4 RF conducted spurious emissions and band edge measurement 15
6.5 Band edge emissions (Radiated) 16
6.6 Radiated emissions (below 1GHz) 21
6.7 Radiated emissions (above 1GHz) 27

Photographs of the test setup 34

Photographs of the EUT 35

Appendix A: DTS Bandwidth 37

Appendix B: Maximum conducted output power 46

Appendix C: Maximum power spectral density 47

Appendix D: Band edge measurements 60

Appendix E: Conducted Spurious Emission 68

Appendix F: Duty Cycle 104

Test Result Certification	
Applicant:	Dongguan Yucheng Communication Technology Co., Ltd.
Address:	Room 203, No. 69 Huaxing Road, Tianxin Community, Qiaotou Town, Dongguan City, Guangdong Province
Manufacturer:	Dongguan Yucheng Communication Technology Co., Ltd.
Address:	Room 203, No. 69 Huaxing Road, Tianxin Community, Qiaotou Town, Dongguan City, Guangdong Province
Product description	
Product name:	AutoLTbx
Trade mark:	N/A
Model name:	YUC100-U2W
Series Model(s):	YUC100-A15W, YUC100-U2A, YUC100-U2AC, YUC100-O2W, YUC100-C2A, YUC100-C2CA
Standards:	47 CFR Part 15.247
Test Method:	ANSI C63.10-2013 KDB 558074 D01 15.247 Meas Guidance v05r02 KDB662911 D01 Multiple Transmitter Output v01r02
Date of Test	
Date of test:	2024-09-02 to 2024-09-20
Test result:	Pass

Test Engineer	:	Letter. Lan.
		(Letter Lan)
Reviewed By	:	David. Lee
		(David Lee)
Approved By	:	Leon chen
		(Leon Chen)

1 General Description

1.1 Description of the EUT

Product name:	AutoLTbx
Model name:	YUC100-U2W
Series Model(s):	YUC100-A15W, YUC100-U2A, YUC100-U2AC, YUC100-O2W, YUC100-C2A, YUC100-C2CA
Model difference:	All the models are the same circuit and module, except the model name and color.
Electrical rating:	Input: DC 5V/1A Output: DC 5V/0.5A
Accessories:	Cable: USB-A to Type-C cable (0.2m)*1
Hardware version:	YUC100-V05
Software version:	U2W_CHP_2024.03.21.1830
Test sample(s) number:	MTi240723018-04S1001
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:	PCB
Antenna(s) gain:	ANT: 3.2dBi ANT2: 2.73dBi Directional gain: 3.2dBi, uncorrelated antenna.

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
Mode5	TX-802.11N20 MIMO
Mode6	TX-802.11N40 MIMO

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: Bluetooth RF Test Tool
For power setting, refer to below table.

Mode	2412MHz	2437MHz	2462MHz
802.11b	80	80	80
802.11g	80	80	80
802.11n20	80	80	80
802.11n20 MIMO	80	80	80
Mode	2422MHz	2437MHz	2452MHz
802.11n40	80	80	80
802.11n40 MIMO	80	80	80

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
Adapter	HW-090200CH0	/	Huizhou BYD Electronics Co., Ltd.
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	Standard	Requirement	Result
1	Antenna requirement	47 CFR Part 15.247	47 CFR 15.203	Pass
2	Occupied Bandwidth	47 CFR Part 15.247	47 CFR 15.247(a)(2)	Pass
3	Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(3)	Pass
4	Power Spectral Density	47 CFR Part 15.247	47 CFR 15.247(e)	Pass
5	RF conducted spurious emissions and band edge measurement	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
6	Band edge emissions (Radiated)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
7	Radiated emissions (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
8	Radiated emissions (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass

Note: The device is a DC power supply and does not apply to conducted emissions.

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
Emissions in frequency bands (above 1GHz) Band edge emissions (Radiated)						
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.

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)

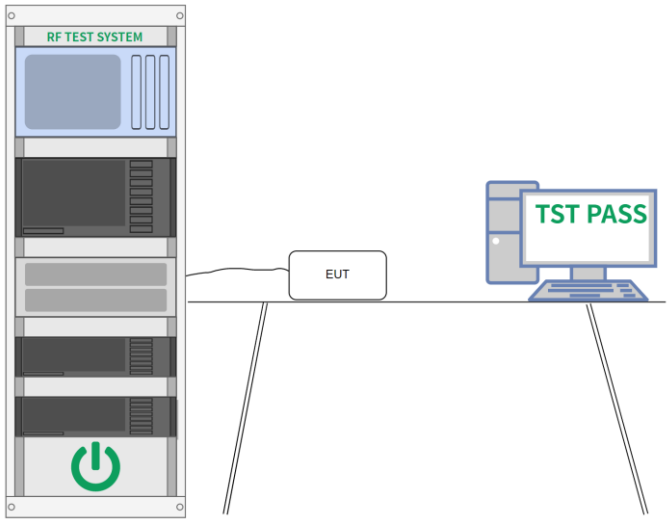
6.1 Occupied Bandwidth

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.

6.1.1 E.U.T. Operation:

Operating Environment:					
Temperature:	25.3 °C	Humidity:	46.2 %	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.

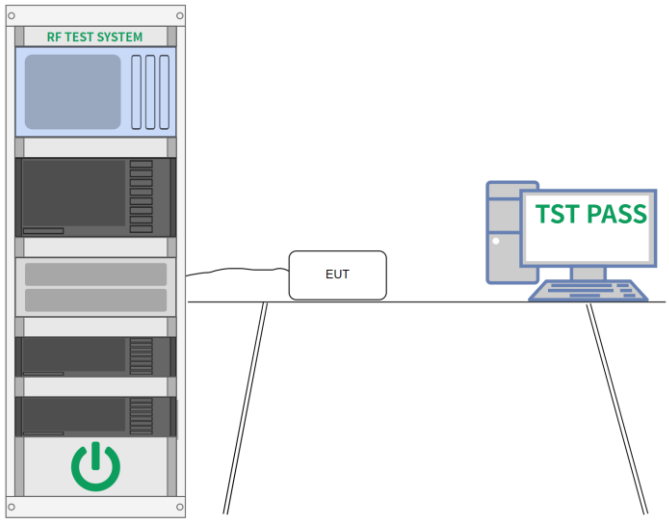
6.2 Maximum Conducted Output Power

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:	25.3 °C	Humidity:	46.2 %	Atmospheric Pressure:	99 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4, Mode5, Mode6				
Final test mode:	Mode1, Mode2, Mode3, Mode4, Mode5, Mode6				

6.2.2 Test Setup Diagram:



6.2.3 Test Data:

Please Refer to Appendix for Details.

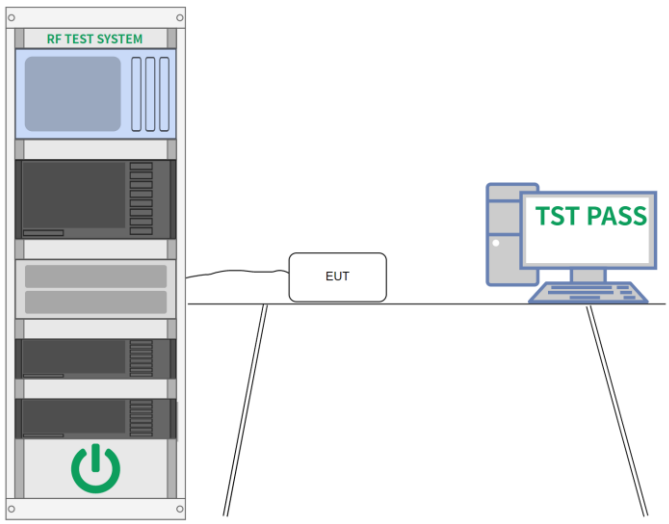
6.3 Power Spectral Density

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:	25.3 °C	Humidity:	46.2 %	Atmospheric Pressure:	99 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4, Mode5, Mode6				
Final test mode:	Mode1, Mode2, Mode3, Mode4, Mode5, Mode6				

6.3.2 Test Setup Diagram:



6.3.3 Test Data:

Please Refer to Appendix for Details.

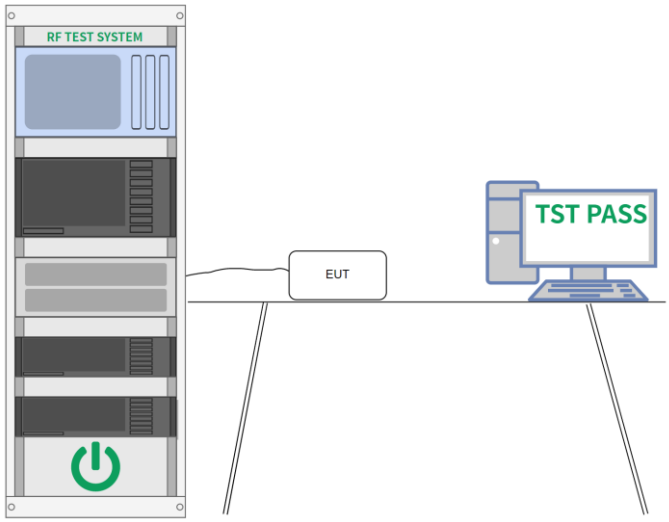
6.4 RF conducted spurious emissions and band edge measurement

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:	25.3 °C	Humidity:	46.2 %	Atmospheric Pressure:	99 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4, Mode5, Mode6				
Final test mode:	Mode1, Mode2, Mode3, Mode4, Mode5, Mode6				

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

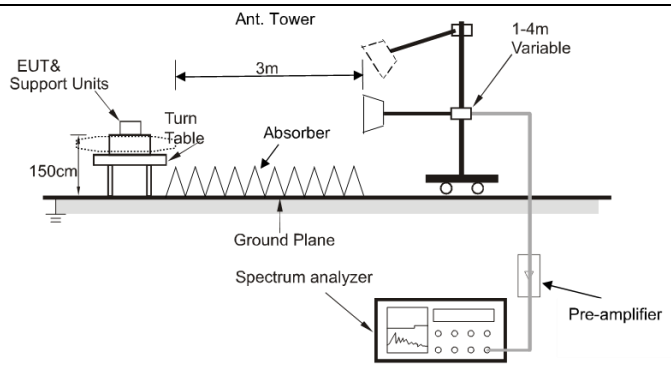
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this 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:	24 °C	Humidity:	54 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4, Mode5, Mode6				
Final test mode:	Mode1, Mode5				
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:

Mode5 / Polarization: Horizontal / CH: L / ANT1+ANT2

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	52.88	-4.83	48.05	74.00	-25.95	peak
2		2310.000	42.93	-4.83	38.10	54.00	-15.90	AVG
3		2390.000	58.25	-4.31	53.94	74.00	-20.06	peak
4	*	2390.000	47.52	-4.31	43.21	54.00	-10.79	AVG

Mode5 / Polarization: Vertical / CH: L / ANT1+ANT2

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	52.95	-4.83	48.12	74.00	-25.88	peak
2		2310.000	42.50	-4.83	37.67	54.00	-16.33	AVG
3		2390.000	52.92	-4.31	48.61	74.00	-25.39	peak
4	*	2390.000	42.97	-4.31	38.66	54.00	-15.34	AVG

Mode5 / 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	58.30	-4.21	54.09	74.00	-19.91	peak
2	*	2483.500	47.71	-4.21	43.50	54.00	-10.50	AVG
3		2500.000	56.12	-4.10	52.02	74.00	-21.98	peak
4		2500.000	45.49	-4.10	41.39	54.00	-12.61	AVG

Mode5 / 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	47.77	-4.21	43.56	74.00	-30.44	peak
2	*	2483.500	38.47	-4.21	34.26	54.00	-19.74	AVG
3		2500.000	47.87	-4.10	43.77	74.00	-30.23	peak
4		2500.000	38.26	-4.10	34.16	54.00	-19.84	AVG

Mode1 / Polarization: Horizontal / CH: L /ANT 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	53.08	-4.83	48.25	74.00	-25.75	peak
2		2310.000	42.96	-4.83	38.13	54.00	-15.87	AVG
3		2390.000	63.71	-4.31	59.40	74.00	-14.60	peak
4	*	2390.000	50.09	-4.31	45.78	54.00	-8.22	AVG

Mode1 / Polarization: Vertical / CH: L /ANT 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	52.77	-4.83	47.94	74.00	-26.06	peak
2		2310.000	42.59	-4.83	37.76	54.00	-16.24	AVG
3		2390.000	57.23	-4.31	52.92	74.00	-21.08	peak
4	*	2390.000	45.38	-4.31	41.07	54.00	-12.93	AVG

Mode1 / Polarization: Horizontal / CH: H /ANT 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	57.42	-4.21	53.21	74.00	-20.79	peak
2	*	2483.500	43.98	-4.21	39.77	54.00	-14.23	AVG
3		2500.000	49.02	-4.10	44.92	74.00	-29.08	peak
4		2500.000	39.04	-4.10	34.94	54.00	-19.06	AVG

Mode1 / Polarization: Vertical / CH: H /ANT 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	69.56	-4.21	65.35	74.00	-8.65	peak
2	*	2483.500	54.42	-4.21	50.21	54.00	-3.79	AVG
3		2500.000	55.83	-4.10	51.73	74.00	-22.27	peak
4		2500.000	44.67	-4.10	40.57	54.00	-13.43	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.

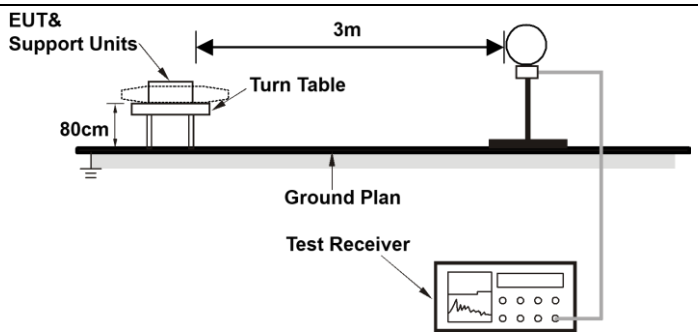
Test Method:	ANSI C63.10-2013 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013 section 6.6.4

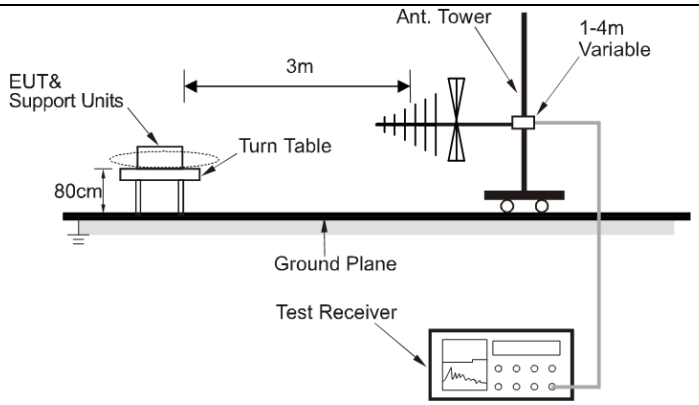
6.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	24 °C	Humidity:	54 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2, Mode3, Mode4 Mode5, Mode6				
Final test mode:	All of the listed pre-test mode were tested, only the data of the worst mode (Mode1, 5) 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.

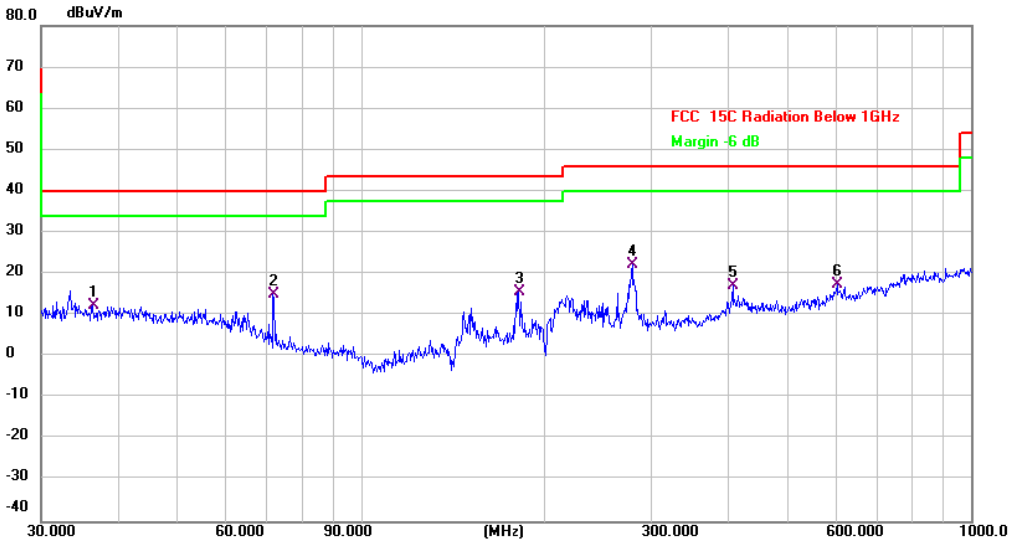
6.6.2 Test Setup Diagram:




Ant. Tower
1-4m
Variable
3m
EUT&
Support Units
Turn Table
80cm
Ground Plane
Test Receiver

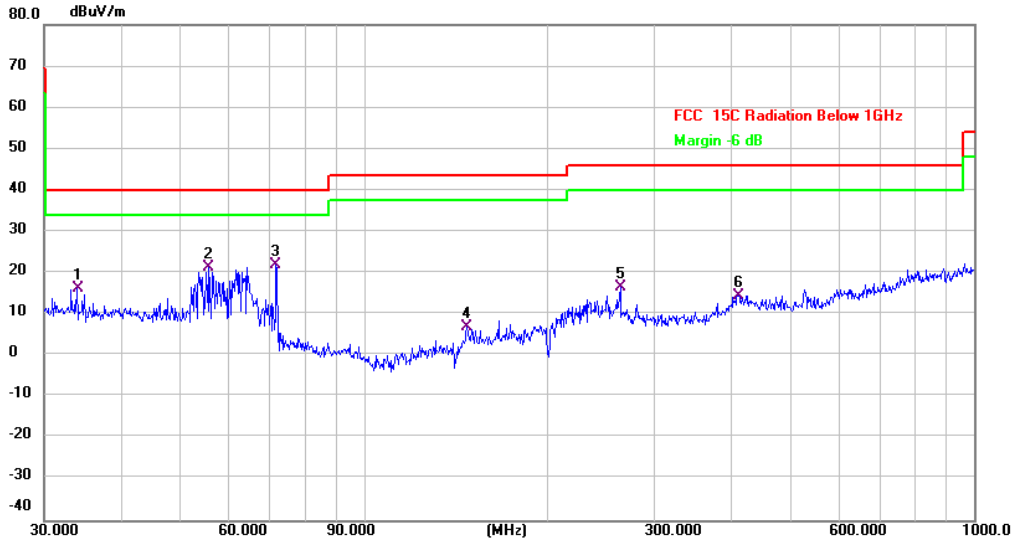
6.6.3 Test Data:

Mode5 / Polarization: Horizontal / CH: H



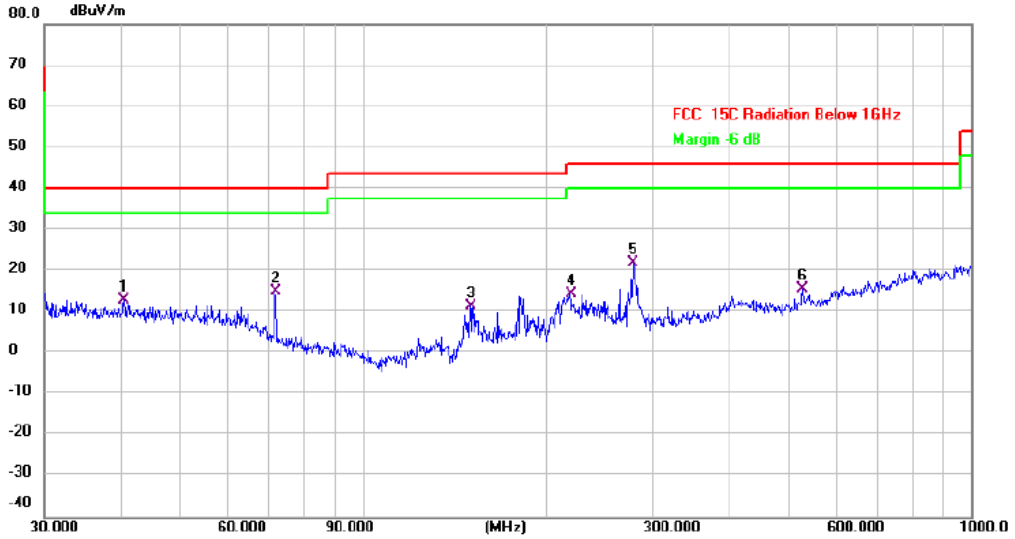
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		36.3814	26.87	-14.55	12.32	40.00	-27.68	QP	
2		71.8320	36.64	-21.68	14.96	40.00	-25.04	QP	
3		181.9202	35.85	-20.33	15.52	43.50	-27.98	QP	
4	*	279.0436	38.51	-16.17	22.34	46.00	-23.66	QP	
5		407.5145	30.57	-13.40	17.17	46.00	-28.83	QP	
6		603.5392	27.94	-10.38	17.56	46.00	-28.44	QP	

Mode5 / Polarization: Vertical / CH: H



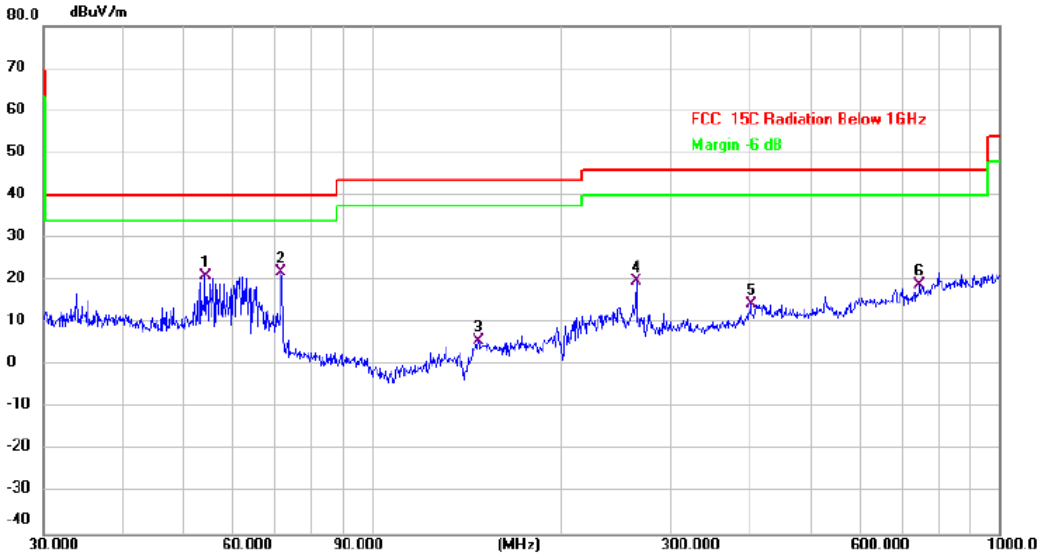
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		33.9174	41.15	-24.95	16.20	40.00	-23.80	QP	
2		55.8047	42.99	-21.76	21.23	40.00	-18.77	QP	
3	*	71.8320	40.86	-18.92	21.94	40.00	-18.06	QP	
4		147.4036	22.62	-15.77	6.85	43.50	-36.65	QP	
5		263.8190	33.42	-16.97	16.45	46.00	-29.55	QP	
6		410.3825	28.53	-13.94	14.59	46.00	-31.41	QP	

Mode1 / Polarization: Horizontal / CH: H /ANT 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		40.5591	27.55	-14.54	13.01	40.00	-26.99	QP	
2		71.8320	36.63	-21.68	14.95	40.00	-25.05	QP	
3		150.0108	31.72	-20.18	11.54	43.50	-31.96	QP	
4		219.0753	32.14	-17.78	14.36	46.00	-31.64	QP	
5	*	278.0668	38.09	-16.21	21.88	46.00	-24.12	QP	
6		528.2458	28.71	-13.12	15.59	46.00	-30.41	QP	

Mode1 / Polarization: Vertical / CH: H /ANT 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		54.2610	43.32	-22.24	21.08	40.00	-18.92	QP	
2	*	71.8320	40.92	-18.92	22.00	40.00	-18.00	QP	
3		147.9214	21.65	-15.99	5.66	43.50	-37.84	QP	
4		263.8190	36.68	-16.97	19.71	46.00	-26.29	QP	
5		401.8385	28.37	-13.93	14.44	46.00	-31.56	QP	
6		747.4825	26.17	-7.12	19.05	46.00	-26.95	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

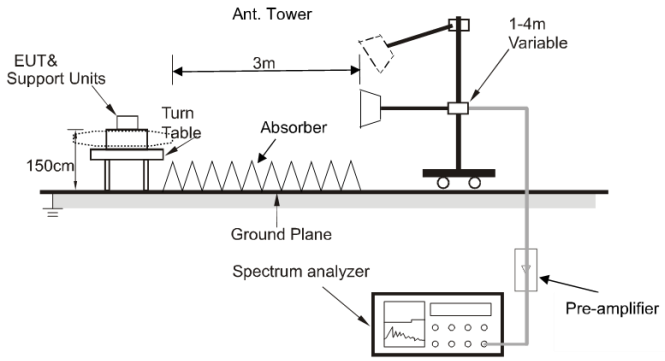
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this 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:	24 °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:

Mode5 / 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	43.35	0.52	43.87	74.00	-30.13	peak
2		4824.000	37.04	0.52	37.56	54.00	-16.44	AVG
3		7236.000	43.22	7.63	50.85	74.00	-23.15	peak
4		7236.000	37.06	7.63	44.69	54.00	-9.31	AVG
5		9648.000	42.37	8.99	51.36	74.00	-22.64	peak
6	*	9648.000	36.48	8.99	45.47	54.00	-8.53	AVG

Mode5 / 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	42.62	0.52	43.14	74.00	-30.86	peak
2		4824.000	37.04	0.52	37.56	54.00	-16.44	AVG
3		7236.000	42.67	7.63	50.30	74.00	-23.70	peak
4		7236.000	36.62	7.63	44.25	54.00	-9.75	AVG
5		9648.000	42.59	8.99	51.58	74.00	-22.42	peak
6	*	9648.000	36.60	8.99	45.59	54.00	-8.41	AVG

Mode5 / 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	43.25	0.55	43.80	74.00	-30.20	peak
2		4874.000	36.90	0.55	37.45	54.00	-16.55	AVG
3		7311.000	42.57	7.46	50.03	74.00	-23.97	peak
4		7311.000	36.75	7.46	44.21	54.00	-9.79	AVG
5		9748.000	43.12	9.32	52.44	74.00	-21.56	peak
6	*	9748.000	37.00	9.32	46.32	54.00	-7.68	AVG

Mode5 / 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	43.27	0.55	43.82	74.00	-30.18	peak
2		4874.000	37.04	0.55	37.59	54.00	-16.41	AVG
3		7311.000	42.21	7.46	49.67	74.00	-24.33	peak
4		7311.000	35.68	7.46	43.14	54.00	-10.86	AVG
5		9748.000	43.62	9.32	52.94	74.00	-21.06	peak
6	*	9748.000	37.37	9.32	46.69	54.00	-7.31	AVG

Mode5 / 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	43.95	0.59	44.54	74.00	-29.46	peak
2		4924.000	37.77	0.59	38.36	54.00	-15.64	AVG
3		7386.000	43.94	7.93	51.87	74.00	-22.13	peak
4		7386.000	37.74	7.93	45.67	54.00	-8.33	AVG
5		9848.000	44.08	9.00	53.08	74.00	-20.92	peak
6	*	9848.000	38.65	9.00	47.65	54.00	-6.35	AVG

Mode5 / 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	42.53	0.59	43.12	74.00	-30.88	peak
2		4924.000	36.97	0.59	37.56	54.00	-16.44	AVG
3		7386.000	42.91	7.93	50.84	74.00	-23.16	peak
4		7386.000	36.72	7.93	44.65	54.00	-9.35	AVG
5		9848.000	43.58	9.00	52.58	74.00	-21.42	peak
6	*	9848.000	37.38	9.00	46.38	54.00	-7.62	AVG

Mode1 / Polarization: Horizontal / CH: L /ANT 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4824.000	46.68	0.52	47.20	74.00	-26.80	peak
2		4824.000	40.84	0.52	41.36	54.00	-12.64	AVG
3		7236.000	43.57	7.63	51.20	74.00	-22.80	peak
4		7236.000	37.84	7.63	45.47	54.00	-8.53	AVG
5		9648.000	44.43	8.99	53.42	74.00	-20.58	peak
6	*	9648.000	38.29	8.99	47.28	54.00	-6.72	AVG

Mode1 / Polarization: Vertical / CH: L /ANT 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4824.000	45.27	0.52	45.79	74.00	-28.21	peak
2		4824.000	39.02	0.52	39.54	54.00	-14.46	AVG
3		7236.000	43.66	7.63	51.29	74.00	-22.71	peak
4		7236.000	37.64	7.63	45.27	54.00	-8.73	AVG
5		9648.000	44.34	8.99	53.33	74.00	-20.67	peak
6	*	9648.000	38.37	8.99	47.36	54.00	-6.64	AVG

Mode1 / Polarization: Horizontal / CH: M /ANT 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4874.000	44.75	0.55	45.30	74.00	-28.70	peak
2		4874.000	38.99	0.55	39.54	54.00	-14.46	AVG
3		7311.000	43.23	7.46	50.69	74.00	-23.31	peak
4		7311.000	37.12	7.46	44.58	54.00	-9.42	AVG
5		9748.000	43.91	9.32	53.23	74.00	-20.77	peak
6	*	9748.000	37.84	9.32	47.16	54.00	-6.84	AVG

Mode1 / Polarization: Vertical / CH: M /ANT 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4874.000	44.60	0.55	45.15	74.00	-28.85	peak
2		4874.000	38.69	0.55	39.24	54.00	-14.76	AVG
3		7311.000	43.81	7.46	51.27	74.00	-22.73	peak
4		7311.000	38.00	7.46	45.46	54.00	-8.54	AVG
5		9748.000	44.33	9.32	53.65	74.00	-20.35	peak
6	*	9748.000	37.96	9.32	47.28	54.00	-6.72	AVG

Mode1 / Polarization: Horizontal / CH: H /ANT 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4924.000	44.19	0.59	44.78	74.00	-29.22	peak
2		4924.000	37.67	0.59	38.26	54.00	-15.74	AVG
3		7386.000	44.50	7.93	52.43	74.00	-21.57	peak
4		7386.000	38.33	7.93	46.26	54.00	-7.74	AVG
5		9848.000	44.82	9.00	53.82	74.00	-20.18	peak
6	*	9848.000	38.56	9.00	47.56	54.00	-6.44	AVG

Mode1 / Polarization: Vertical / CH: H /ANT 1

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4924.000	44.17	0.59	44.76	74.00	-29.24	peak
2		4924.000	37.66	0.59	38.25	54.00	-15.75	AVG
3		7386.000	43.87	7.93	51.80	74.00	-22.20	peak
4		7386.000	37.56	7.93	45.49	54.00	-8.51	AVG
5		9848.000	44.34	9.00	53.34	74.00	-20.66	peak
6	*	9848.000	38.14	9.00	47.14	54.00	-6.86	AVG

Photographs of the test setup

Refer to Appendix - Test Setup Photos

Photographs of the EUT

Refer to Appendix - EUT Photos

Appendix

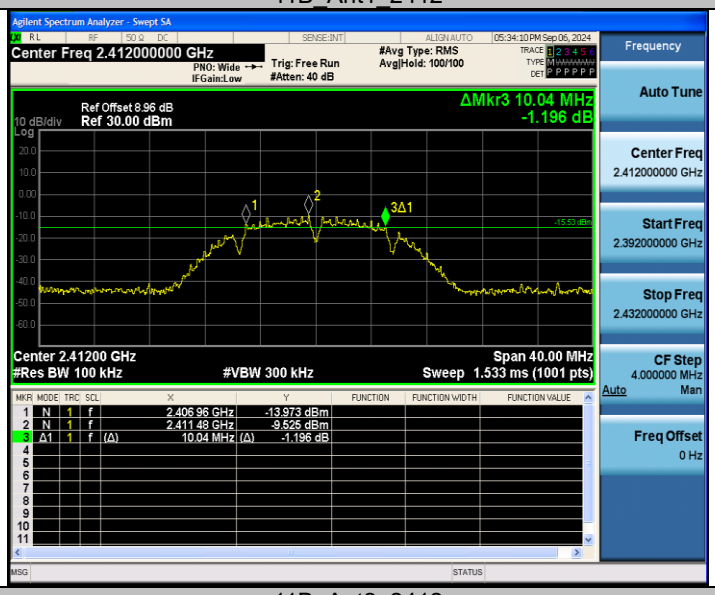
Appendix A: DTS Bandwidth

Test Result

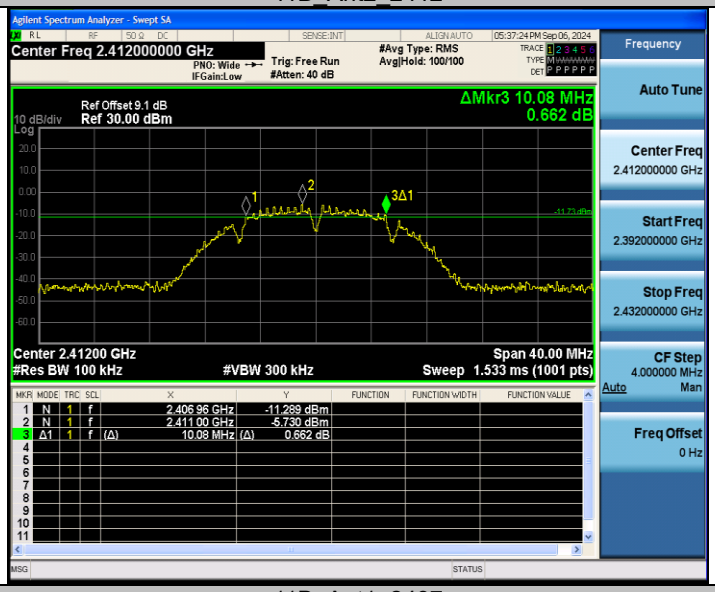
Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	10.040	0.5	PASS
	Ant2	2412	10.080	0.5	PASS
	Ant1	2437	10.080	0.5	PASS
	Ant2	2437	10.000	0.5	PASS
	Ant1	2462	10.080	0.5	PASS
	Ant2	2462	10.000	0.5	PASS
11G	Ant1	2412	16.280	0.5	PASS
	Ant2	2412	16.280	0.5	PASS
	Ant1	2437	16.320	0.5	PASS
	Ant2	2437	15.320	0.5	PASS
	Ant1	2462	16.040	0.5	PASS
	Ant2	2462	15.440	0.5	PASS
11N20	Ant1	2412	16.280	0.5	PASS
	Ant2	2412	16.120	0.5	PASS
	Ant1	2437	15.680	0.5	PASS
	Ant2	2437	15.720	0.5	PASS
	Ant1	2462	17.160	0.5	PASS
	Ant2	2462	16.960	0.5	PASS
11N40	Ant1	2422	35.360	0.5	PASS
	Ant2	2422	34.240	0.5	PASS
	Ant1	2437	35.040	0.5	PASS
	Ant2	2437	32.560	0.5	PASS
	Ant1	2452	33.840	0.5	PASS
	Ant2	2452	35.040	0.5	PASS

Test Graphs

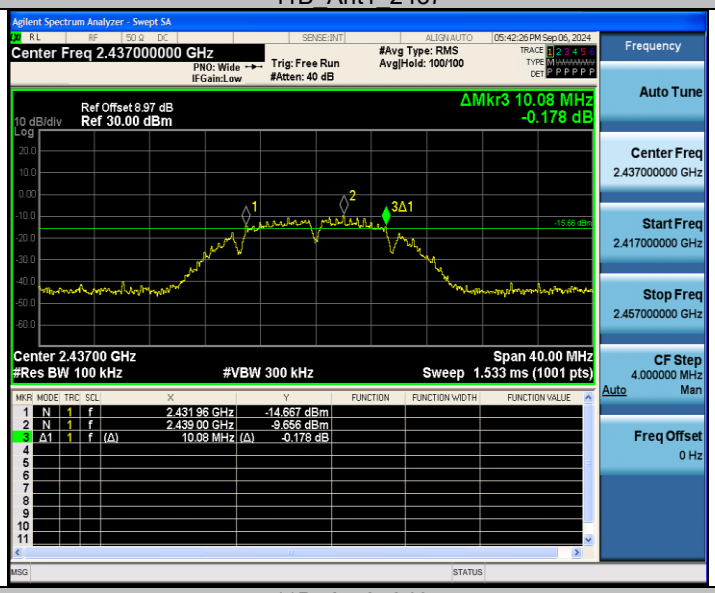
11B_Ant1_2412



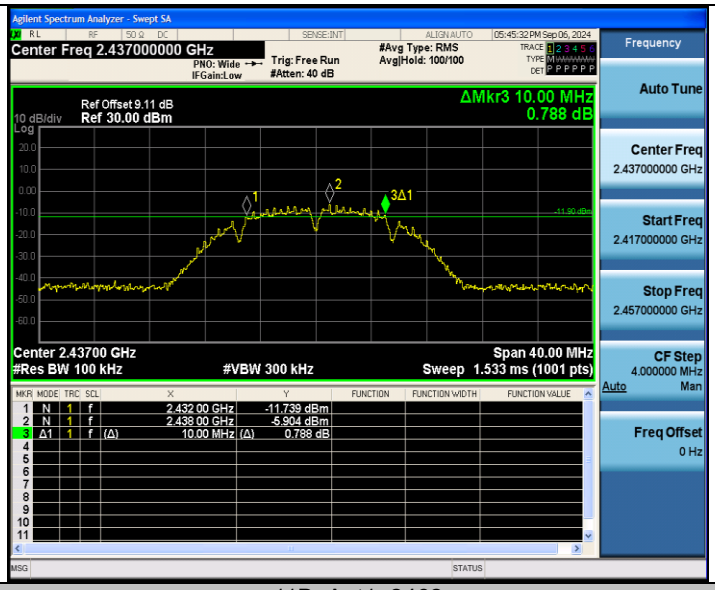
11B_Ant2_2412



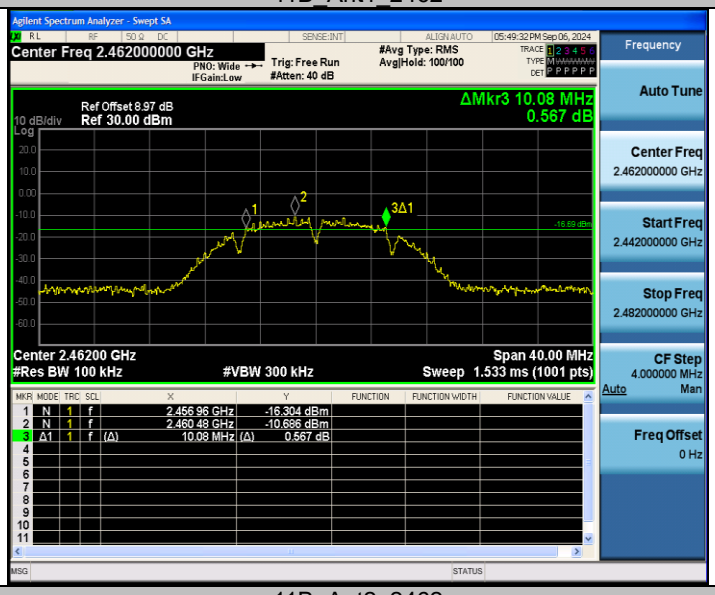
11B_Ant1_2437



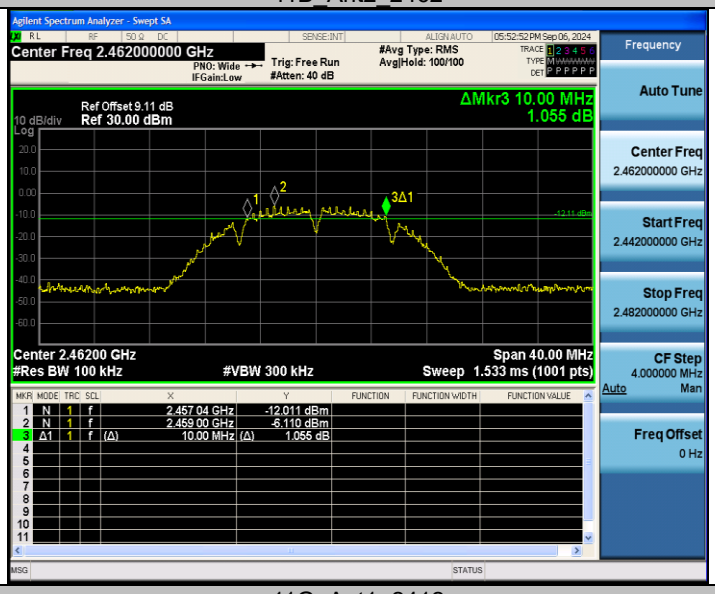
11B_Ant2_2437



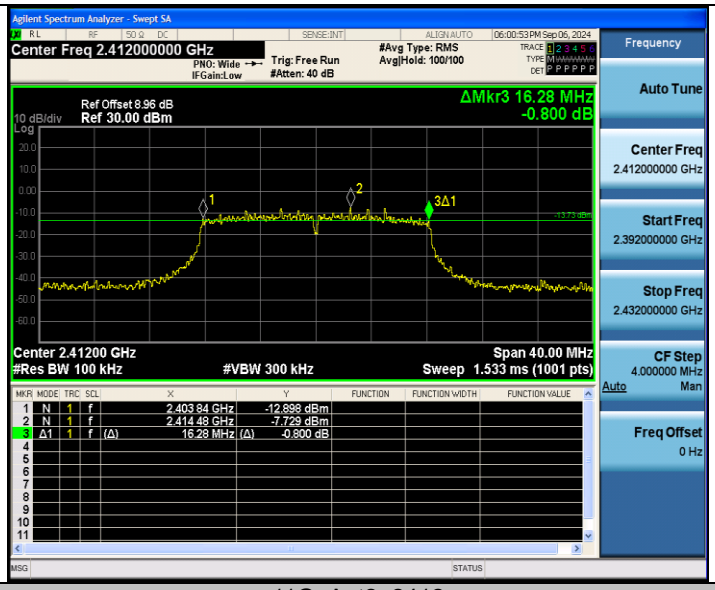
11B_Ant1_2462



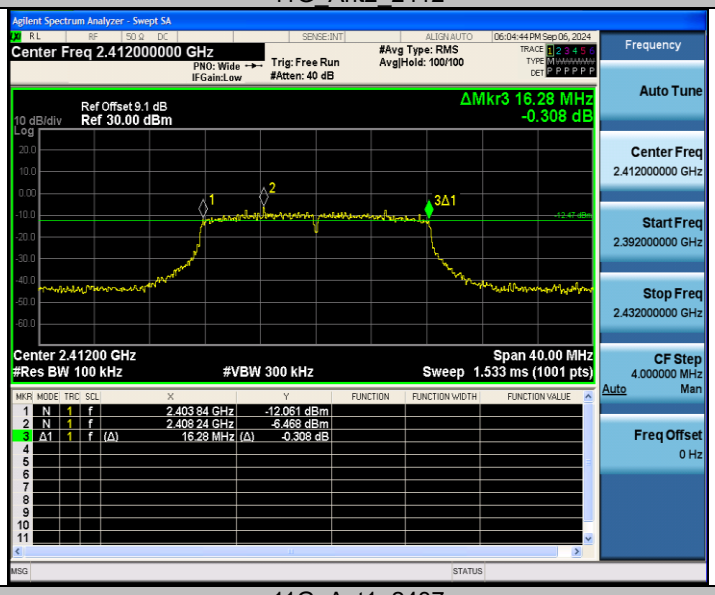
11B_Ant2_2462



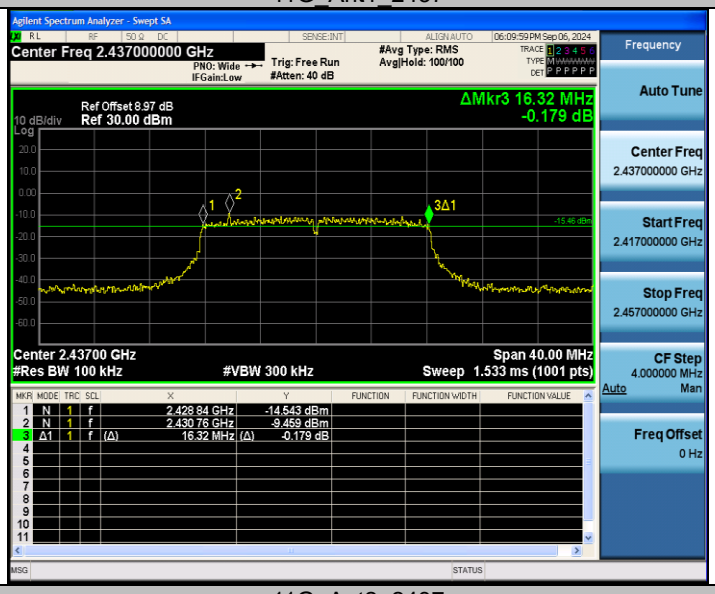
11G_Ant1_2412



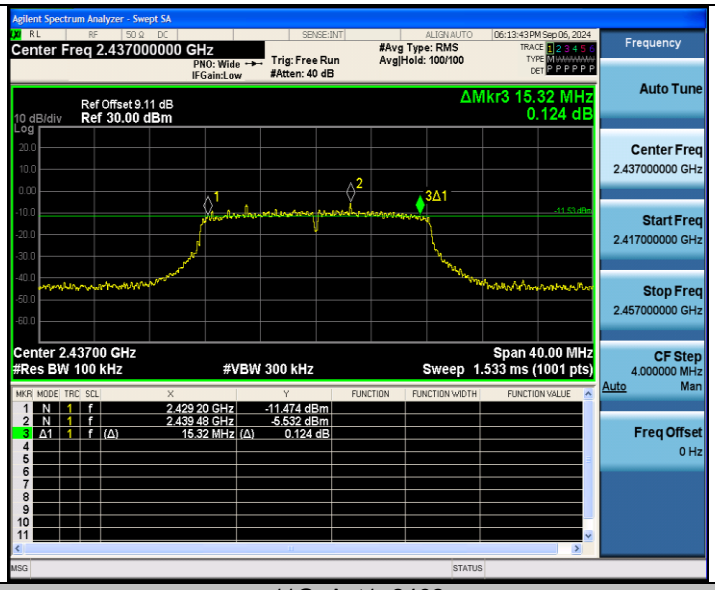
11G_Ant2_2412



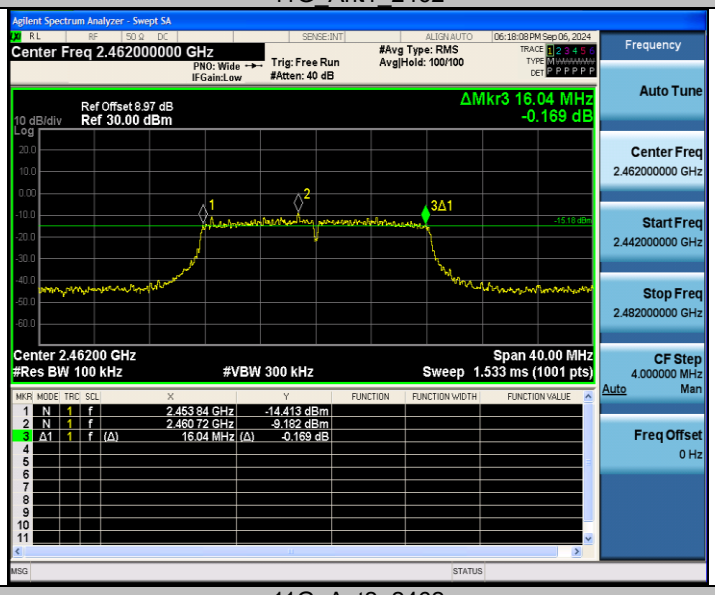
11G_Ant1_2437



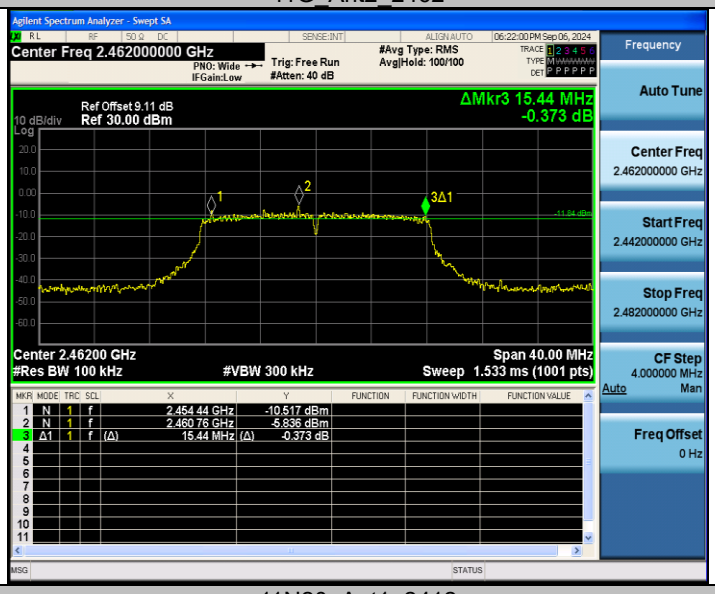
11G_Ant2_2437



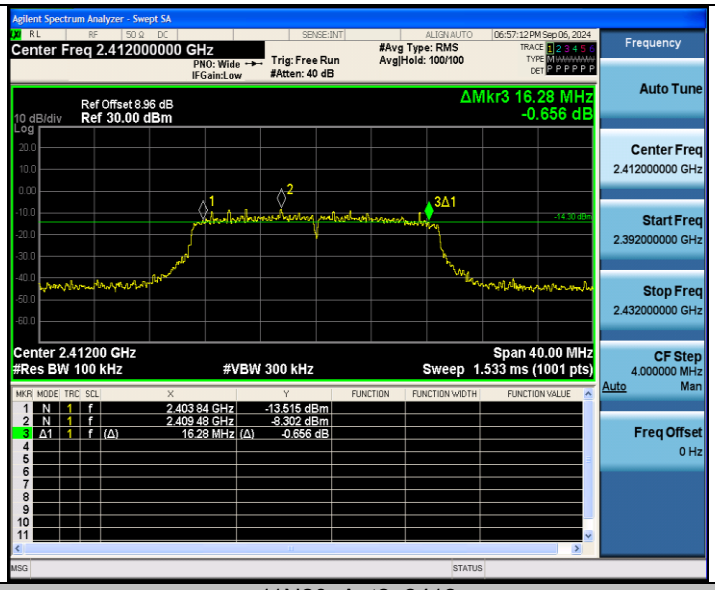
11G_Ant1_2462



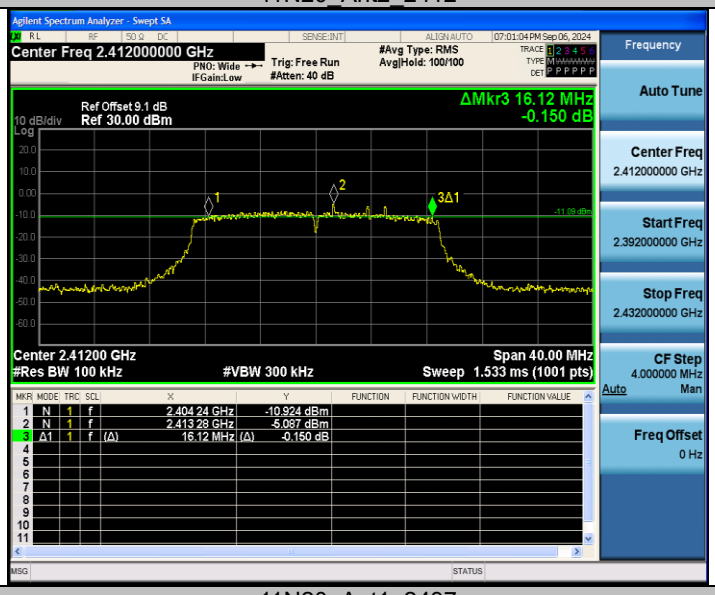
11G_Ant2_2462



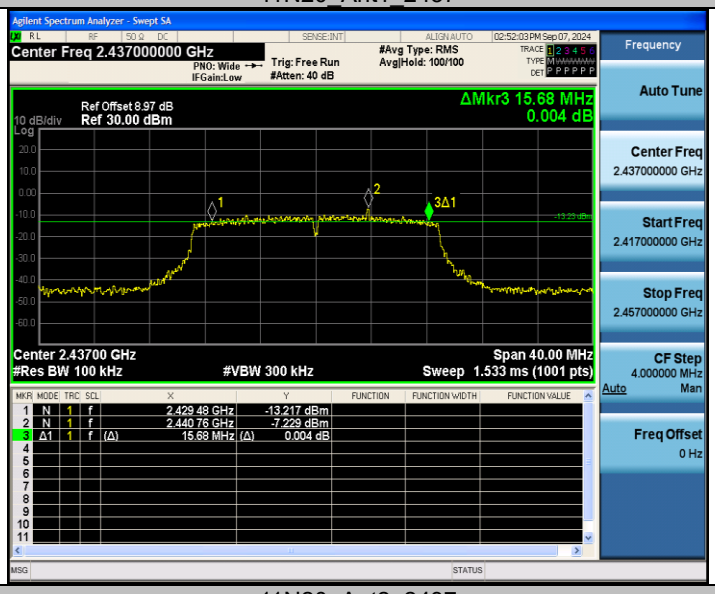
11N20_Ant1_2412



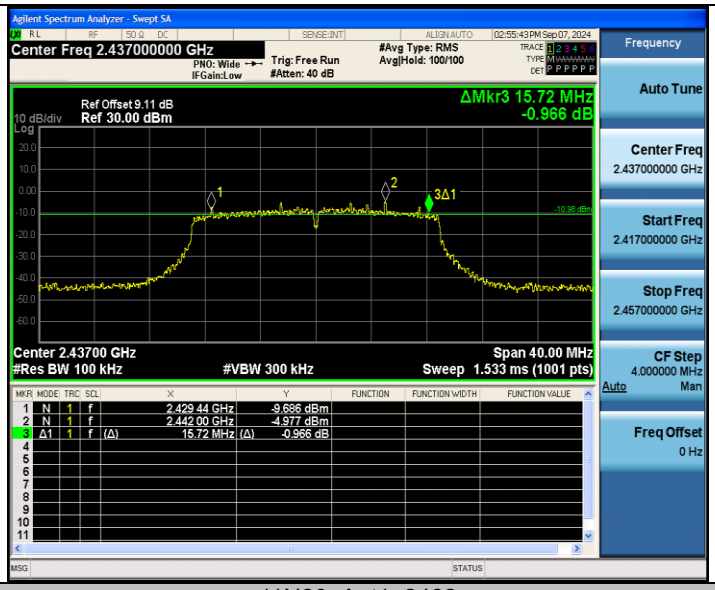
11N20_Ant2_2412



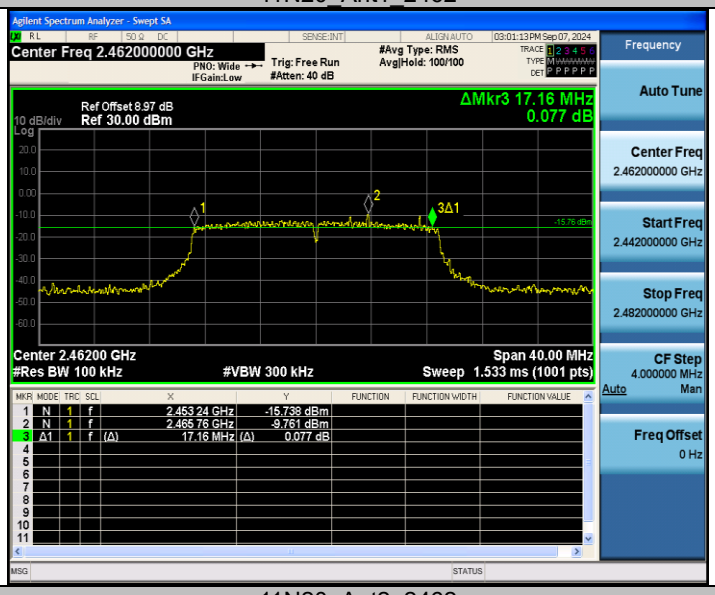
11N20_Ant1_2437



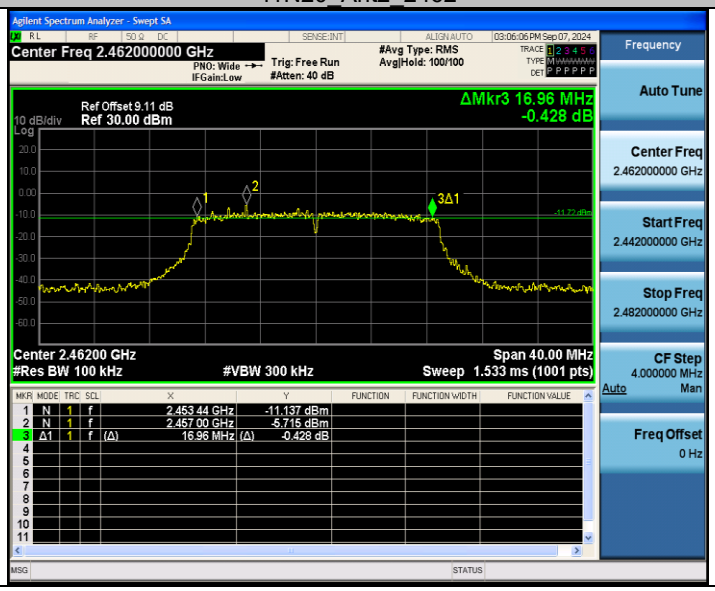
11N20_Ant2_2437



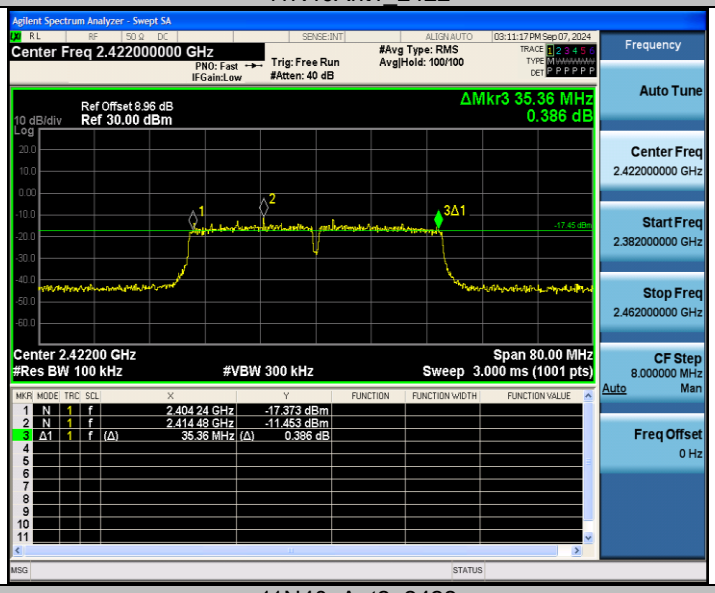
11N20_Ant1_2462



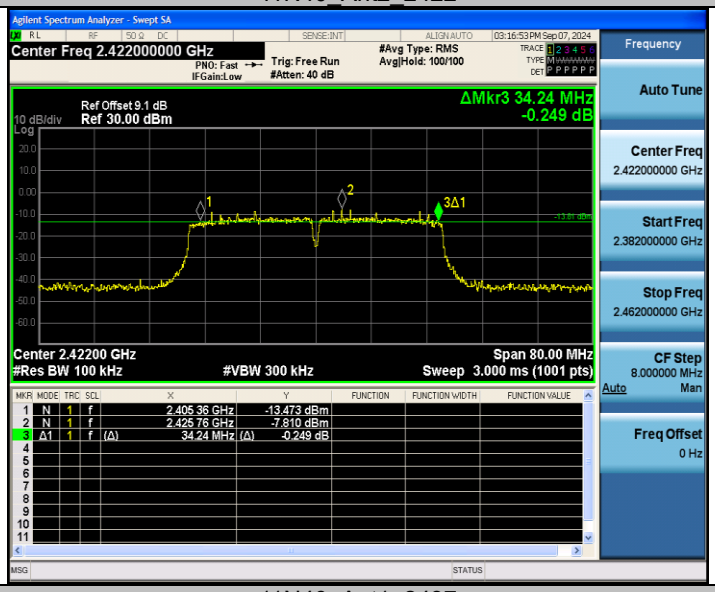
11N20_Ant2_2462



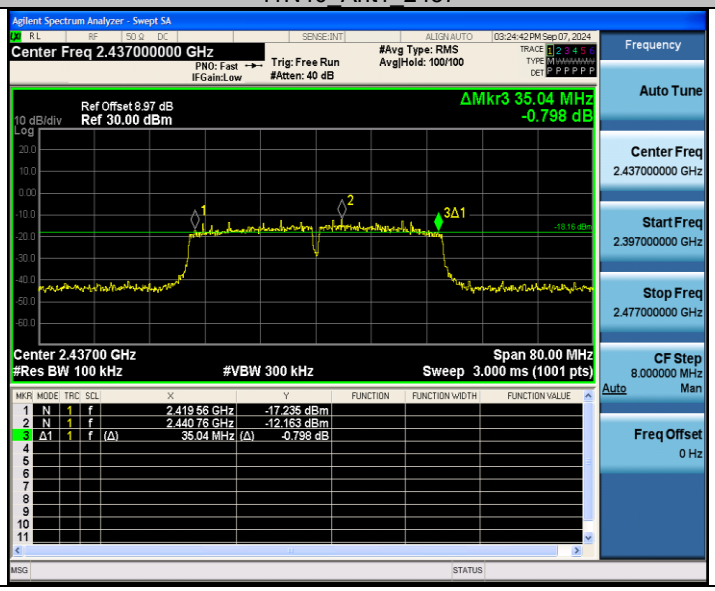
11N40Ant1_2422



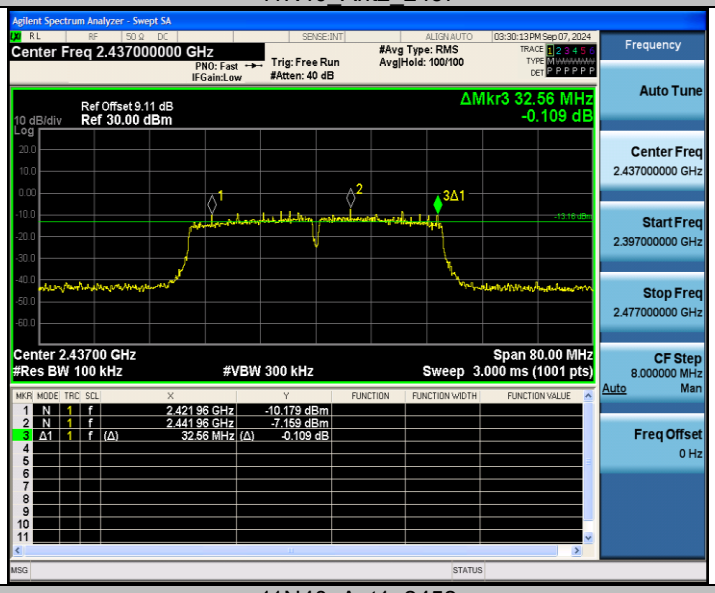
11N40_Ant2_2422



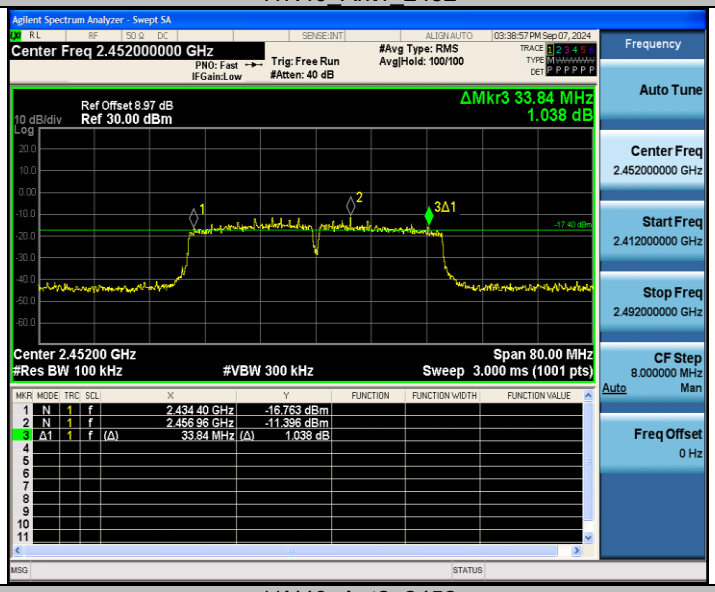
11N40_Ant1_2437



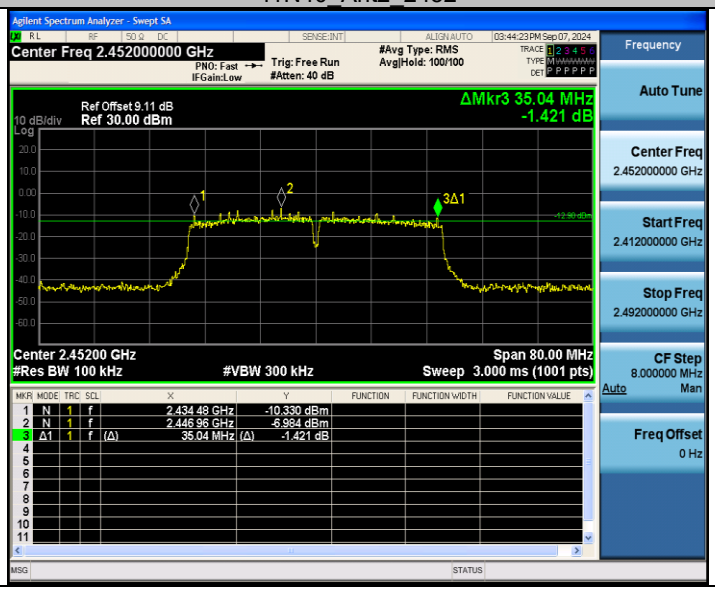
11N40_Ant2_2437



11N40_Ant1_2452



11N40_Ant2_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	10.71	≤30.00	PASS
	Ant2	2412	10.61	≤30.00	PASS
	Ant1	2437	9.01	≤30.00	PASS
	Ant2	2437	8.99	≤30.00	PASS
	Ant1	2462	9.14	≤30.00	PASS
	Ant2	2462	9.28	≤30.00	PASS
11G	Ant1	2412	10.87	≤30.00	PASS
	Ant2	2412	12.67	≤30.00	PASS
	Ant1	2437	10.34	≤30.00	PASS
	Ant2	2437	12.37	≤30.00	PASS
	Ant1	2462	9.68	≤30.00	PASS
	Ant2	2462	12.32	≤30.00	PASS
11N20MIMO	Ant1	2412	10.29	≤30.00	PASS
	Ant2	2412	12.96	≤30.00	PASS
	total	2412	14.84	≤30.00	PASS
	Ant1	2437	10.89	≤30.00	PASS
	Ant2	2437	13.45	≤30.00	PASS
	total	2437	15.37	≤30.00	PASS
	Ant1	2462	8.94	≤30.00	PASS
	Ant2	2462	13.04	≤30.00	PASS
	total	2462	14.47	≤30.00	PASS
11N40MIMO	Ant1	2422	10.01	≤30.00	PASS
	Ant2	2422	13.27	≤30.00	PASS
	total	2422	14.95	≤30.00	PASS
	Ant1	2437	9.69	≤30.00	PASS
	Ant2	2437	13.22	≤30.00	PASS
	total	2437	14.81	≤30.00	PASS
	Ant1	2452	9.70	≤30.00	PASS
	Ant2	2452	13.63	≤30.00	PASS
	total	2452	15.11	≤30.00	PASS
11N20SISO	Ant1	2412	22.00	≤30.00	PASS
	Ant2	2412	22.30	≤30.00	PASS
	Ant1	2437	21.95	≤30.00	PASS
	Ant2	2437	22.09	≤30.00	PASS
	Ant1	2462	21.53	≤30.00	PASS
	Ant2	2462	21.72	≤30.00	PASS
11N40SISO	Ant1	2422	21.76	≤30.00	PASS
	Ant2	2422	22.04	≤30.00	PASS
	Ant1	2437	21.82	≤30.00	PASS
	Ant2	2437	21.95	≤30.00	PASS
	Ant1	2452	21.80	≤30.00	PASS
	Ant2	2452	21.87	≤30.00	PASS

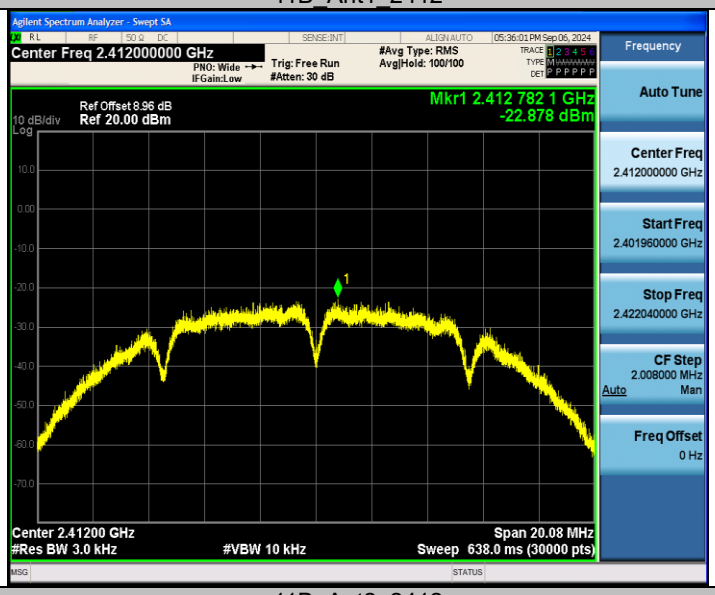
Appendix C: Maximum power spectral density

Test Result

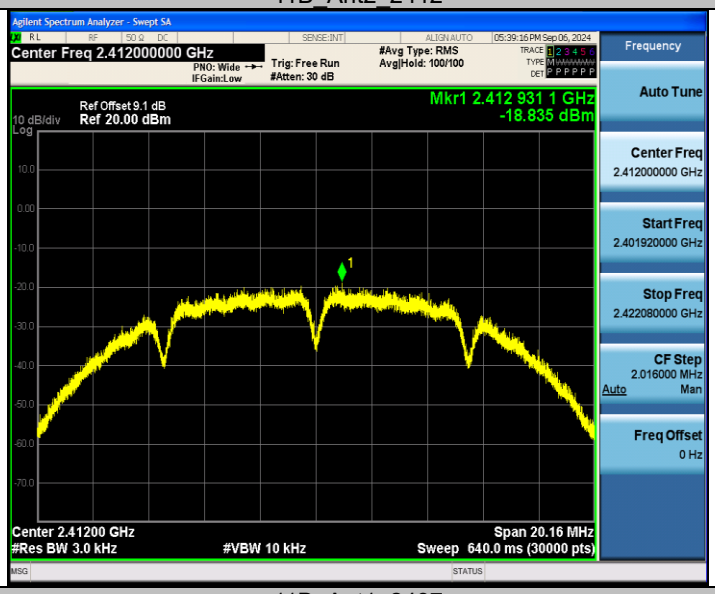
Test Mode	Antenna	Frequency [MHz]	Result [dBm/3-100kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	-22.88	≤8.00	PASS
	Ant2	2412	-18.84	≤8.00	PASS
	Ant1	2437	-23.43	≤8.00	PASS
	Ant2	2437	-19.35	≤8.00	PASS
	Ant1	2462	-23.70	≤8.00	PASS
	Ant2	2462	-18.83	≤8.00	PASS
11G	Ant1	2412	-22.09	≤8.00	PASS
	Ant2	2412	-19.23	≤8.00	PASS
	Ant1	2437	-21.87	≤8.00	PASS
	Ant2	2437	-20.09	≤8.00	PASS
	Ant1	2462	-22.58	≤8.00	PASS
	Ant2	2462	-19.48	≤8.00	PASS
11N20MIMO	Ant1	2412	-21.95	≤8.00	PASS
	Ant2	2412	-19.03	≤8.00	PASS
	total	2412	-17.24	≤8.00	PASS
	Ant1	2437	-21.25	≤8.00	PASS
	Ant2	2437	-18.60	≤8.00	PASS
	total	2437	-16.72	≤8.00	PASS
	Ant1	2462	-23.02	≤8.00	PASS
	Ant2	2462	-18.71	≤8.00	PASS
	total	2462	-17.34	≤8.00	PASS
11N40MIMO	Ant1	2422	-25.51	≤8.00	PASS
	Ant2	2422	-21.88	≤8.00	PASS
	total	2422	-20.32	≤8.00	PASS
	Ant1	2437	-24.26	≤8.00	PASS
	Ant2	2437	-20.48	≤8.00	PASS
	total	2437	-18.96	≤8.00	PASS
	Ant1	2452	-24.64	≤8.00	PASS
	Ant2	2452	-20.77	≤8.00	PASS
	total	2452	-19.28	≤8.00	PASS
11N20SISO	Ant1	2412	-9.90	≤8.00	PASS
	Ant2	2412	-9.52	≤8.00	PASS
	Ant1	2437	-10.14	≤8.00	PASS
	Ant2	2437	-10.01	≤8.00	PASS
	Ant1	2462	-10.93	≤8.00	PASS
	Ant2	2462	-10.40	≤8.00	PASS
11N40SISO	Ant1	2422	-13.02	≤8.00	PASS
	Ant2	2422	-13.27	≤8.00	PASS
	Ant1	2437	-13.19	≤8.00	PASS
	Ant2	2437	-13.16	≤8.00	PASS
	Ant1	2452	-12.68	≤8.00	PASS
	Ant2	2452	-13.11	≤8.00	PASS

Test Graphs

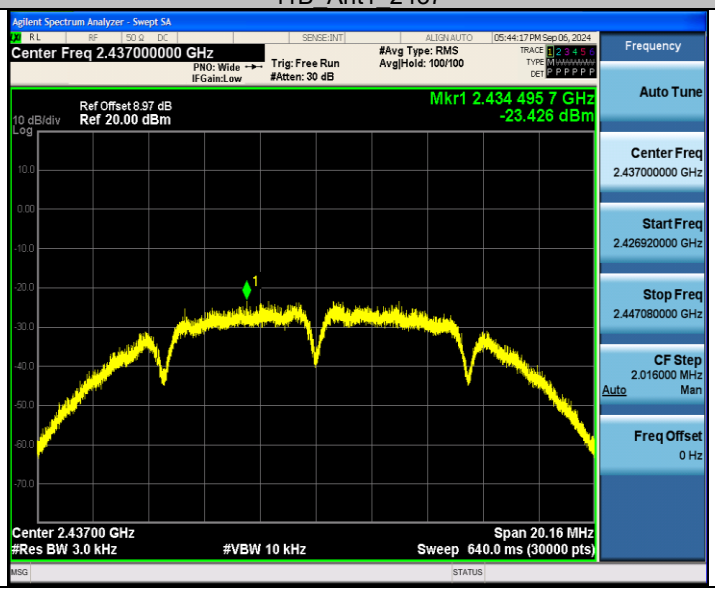
11B_Ant1_2412



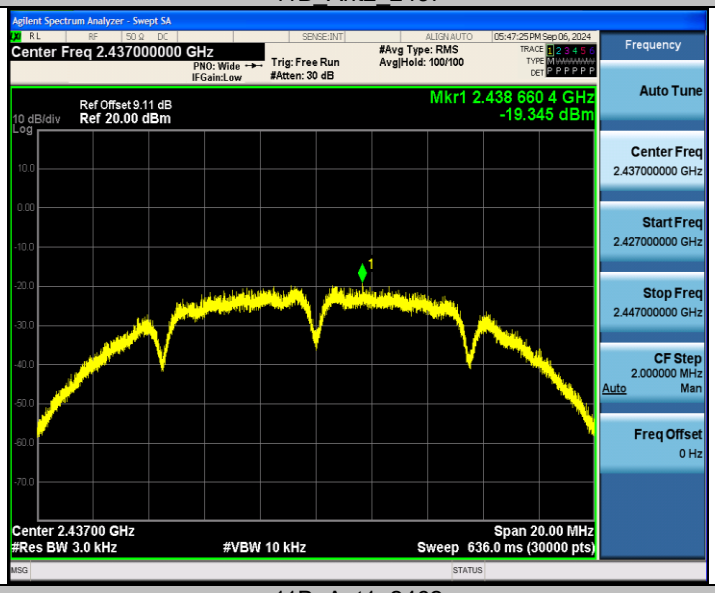
11B_Ant2_2412



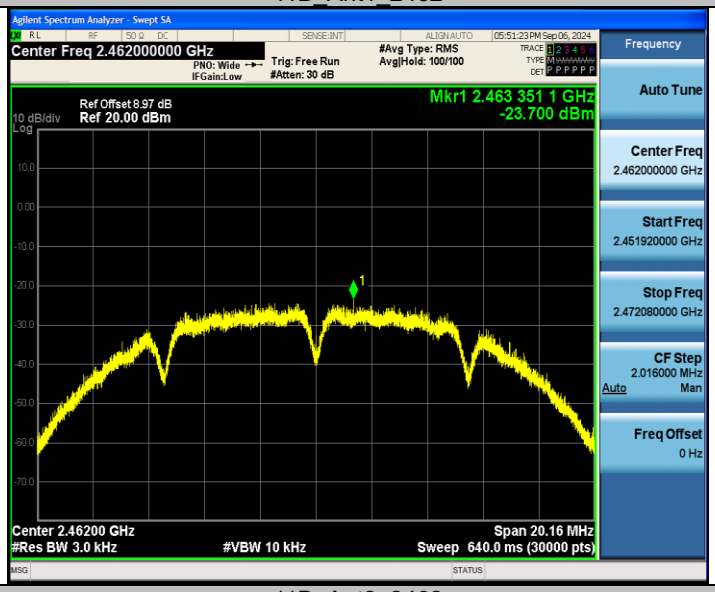
11B_Ant1_2437



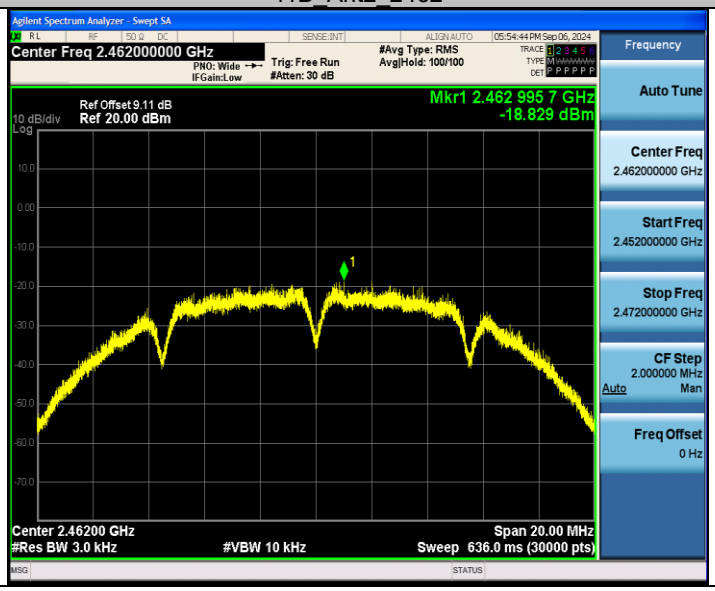
11B_Ant2_2437



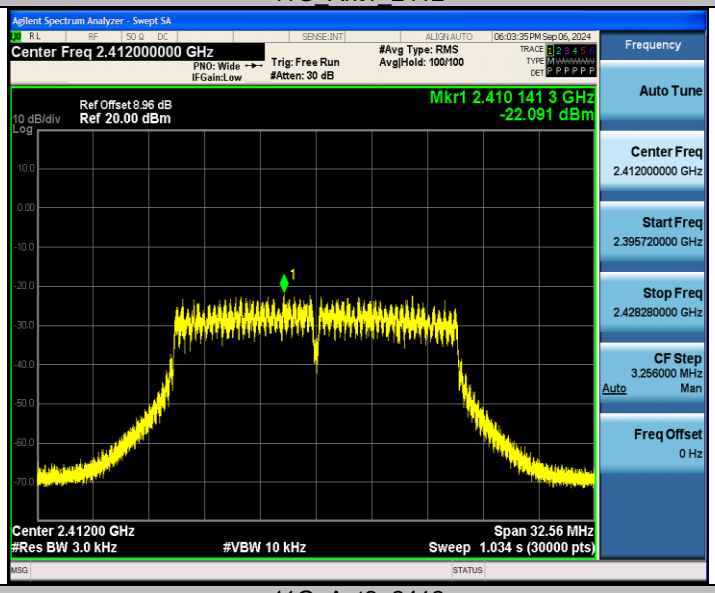
11B_Ant1_2462



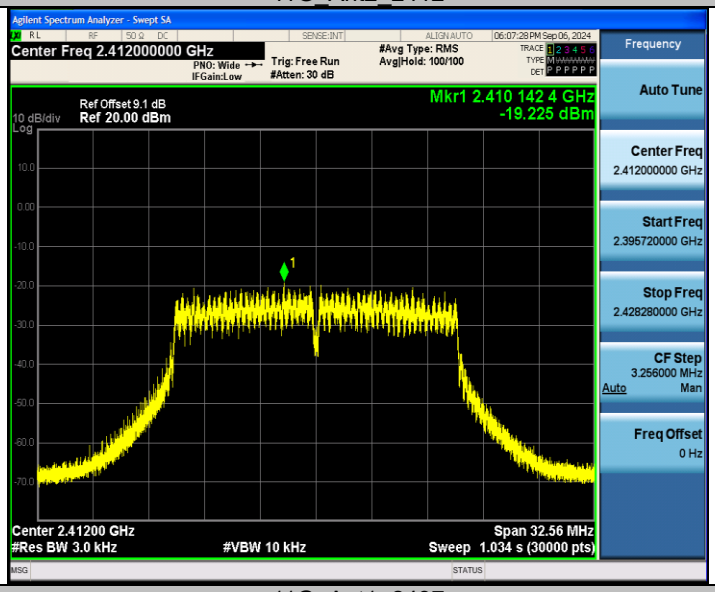
11B_Ant2_2462



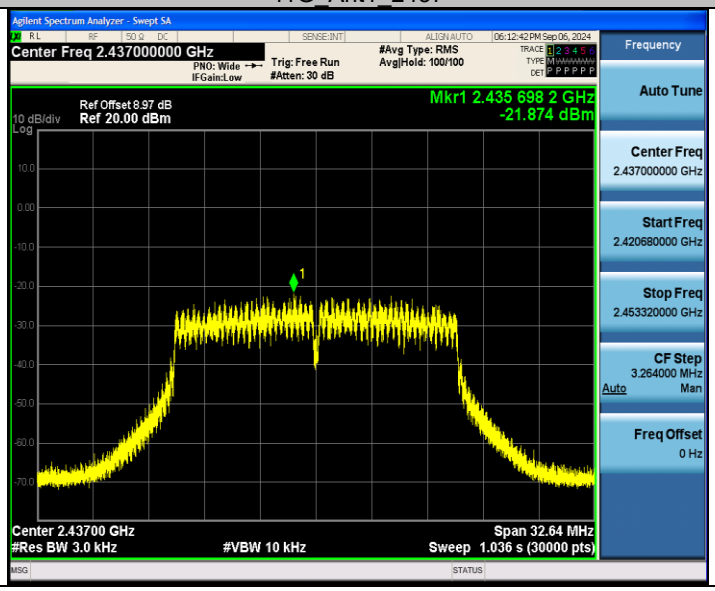
11G_Ant1_2412



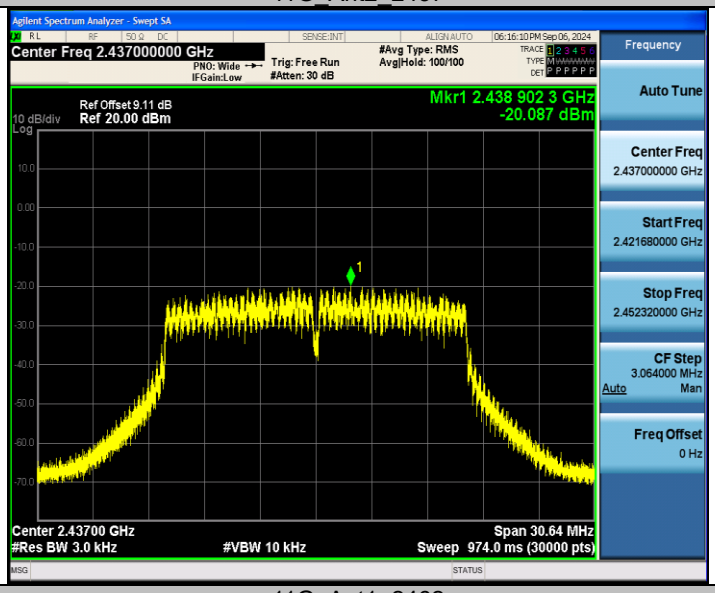
11G_Ant2_2412



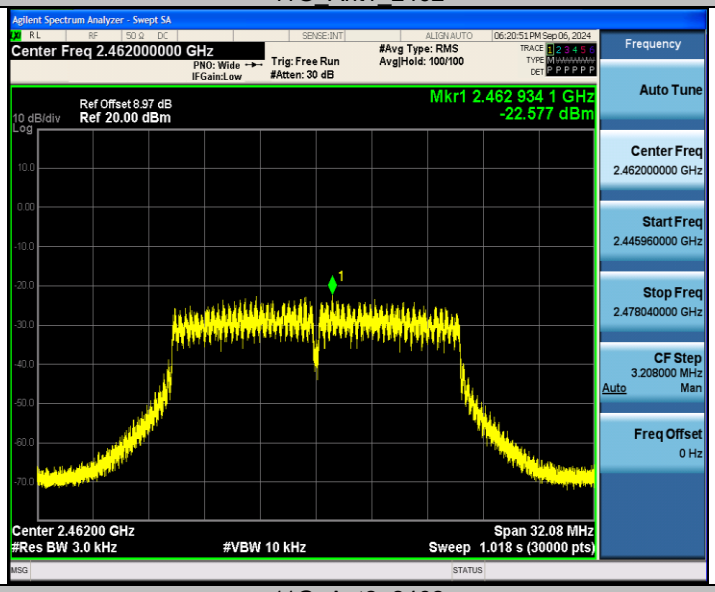
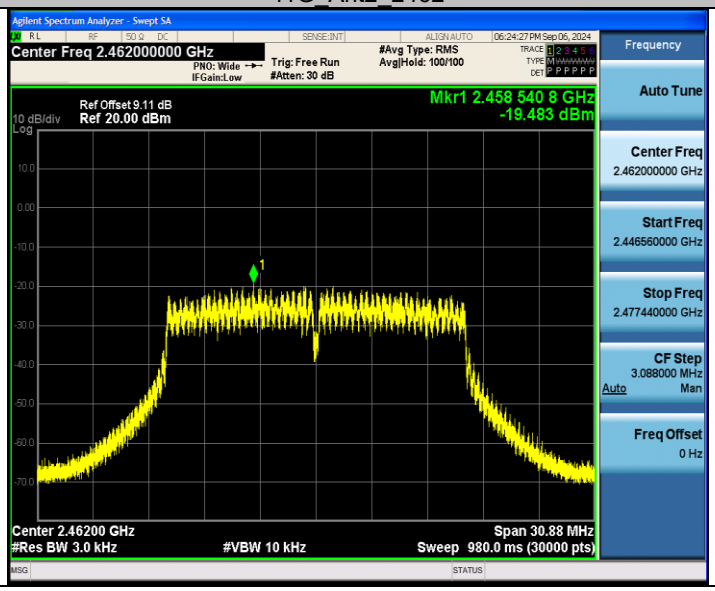
11G_Ant1_2437



11G_Ant2_2437



11G_Ant1_2462



11G_Ant2_2462