RF Test Report

Applicant	:	Mako Networks
Product Type	:	11ax 2x2 WiFi AP with LTE connectivity
Trade Name	:	Mako Networks
Model Number	:	5600, 5600-5G, 5600-LTE US
Applicable Standard	:	FCC 47 CFR PART 15 SUBPART C ANSI C63.10:2013
Received Date	:	May. 17, 2021
Test Period	:	May. 22 ~ Jul. 30, 2021
Issued Date	:	Aug. 19, 2021

Issued by

A Test Lab Techno Corp.
No. 140-1, Changan Street, Bade District,
Taoyuan City 33465, Taiwan (R.O.C.)
Tel：+886-3-2710188 / Fax：+886-3-2710190

Taiwan Accreditation Foundation accreditation number: 1330
Frequency Range : 9 kHz to 40 GHz
Test Firm MRA designation number: TW0010

Note:
1.The test results are valid only for samples provided by customers and under the test conditions described in this report.
2.This report shall not be reproduced except in full, without the written approval of A Test Lab Technology Corporation.
3.The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.

Revision History

Rev.	Issued Date	Revisions	Revised By
00	Aug. 19, 2021	Initial Issue	Emma Chao

Verification of Compliance

Applicant	:	Mako Networks
Product Type	:	11ax 2x2 WiFi AP with LTE connectivity
Trade Name	:	Mako Networks
Model Number	:	5600, 5600-5G, 5600-LTE US
FCC ID	:	2AVQL-5600
EUT Rated Voltage	:	DC 12 V, 5 A / DC 54 V, 1.11 A
Test Voltage	:	120 Vac / 60 Hz
Applicable Standard	:	FCC 47 CFR PART 15 SUBPART C ANSI C63.10:2013
Test Result	:	Complied
Performing Lab.	:	A Test Lab Techno Corp. No. 140-1, Changan Street, Bade District, Taoyuan City 33465, Taiwan (R.O.C.) Tel：+886-3-2710188 / Fax：+886-3-2710190 Taiwan Accreditation Foundation accreditation number: 1330 http://www.atl-lab.com.tw/e-index.htm

A Test Lab Techno Corp. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by A Test Lab Techno Corp. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Approved By : Ken Yang

(Manager) (Ken Yang)

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1 General Information

1.1. Summary of Test Result

Standard	Item	Result	Remark
15.207	AC Power Conducted Emission	PASS	-----
15.247(d)	Transmitter Radiated Emissions	PASS	-----
15.247(b)(3)	Max. Output Power	PASS	-----
15.247(a)(2)	6 dB RF Bandwidth	PASS	-----
15.247(e)	Maximum Power Spectral Density	PASS	-----
15.247(d)	Out of Band Conducted Spurious Emission	PASS	-----
15.203	Antenna Requirement	PASS	-----

Decision Rule

■ Uncertainty is not included.

□ Uncertainty is included.

Standard	Description
CFR47, Part 15, Subpart C	Intentional Radiators
ANSI C63. 10: 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
KDB 558074 D01 15.247 Meas Guidance v05r02	GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES
KDB 662911 D01 v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)

1.2. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conducted Emission	150 kHz ~ 30 MHz	2.7 dB
Radiated Emission	9 kHz ~ 30 MHz	2.2 dB
	30 MHz ~ 1000 MHz	5.1 dB
	1000 MHz ~ 18000 MHz	5.1 dB
	18000 MHz ~ 26500 MHz	4.4 dB
	26500 MHz ~ 40000 MHz	4.6 dB
Conducted Output Power	1.1 dB	
RF Bandwidth	4.7 %	
Power Spectral Density	1.1 dB	

2 EUT Description

Applicant	Mako Networks 1355 N. McLean Blvd, Elgin, Illinois 60123, United States				
Manufacturer	Mako Networks 1355 N. McLean Blvd, Elgin, Illinois 60123, United States				
Product Type	11ax 2x2 WiFi AP with LTE connectivity				
Trade Name	Mako Networks				
Model Number	5600, 5600-5G, 5600-LTE US				
Difference description of model number	Because marketing purpose the difference between 5600 and 5600-5G and 5600-LTE US is WWAN module different.				
FCC ID	2AVQL-5600				
Operate Freq. Band	Frequency Range (MHz)		Modulation	Channel Bandwidth	Data Rate 400 GI (ns)
IEEE 802.11b	2412 ~ 2462		DSSS	20 MHz	Up to 11 Mbps
IEEE 802.11g	2412 ~ 2462		OFDM	20 MHz	Up to 54 Mbps
IEEE 802.11n 2.4 GHz 20 MHz	2412 ~ 2462		OFDM(64QAM)	20 MHz	Up to 72.2 Mbps
IEEE 802.11n 2.4 GHz 40 MHz	2422 ~ 2452		OFDM(64QAM)	40 MHz	Up to 150 Mbps
IEEE 802.11n 2.4 GHz 20 MHz	2412 ~ 2462		OFDM(256QAM)	20 MHz	Up to 72.2 Mbps
IEEE 802.11n 2.4 GHz 40 MHz	2422 ~ 2452		OFDM(256QAM)	40 MHz	Up to 150 Mbps
IEEE 802.11ax 2.4 GHz 20 MHz	2412 ~ 2472		OFDMA	20 MHz	Up to 143.4 Mbps
IEEE 802.11ax 2.4 GHz 40 MHz	2422 ~ 2462		OFDMA	40 MHz	Up to 286.8 Mbps
Antenna information	ANT	Model Number	Type	Max. Gain (dBi)	
	ANT-0	5718A0640300	PIFA Antenna	4.26	
	ANT-1	5718A0637300	PIFA Antenna	3.14	
Antenna Delivery	See section 3.1				
Operate Temp. Range	0 ~ +40 ℃				

Frequency Band	Max. RF Output Power (W)
IEEE 802.11b	0.186
IEEE 802.11g	0.177
IEEE 802.11n 2.4 GHz 20 MHz(64QAM)	0.160
IEEE 802.11n 2.4 GHz 40 MHz(64QAM)	0.101
IEEE 802.11n 2.4 GHz 20 MHz(256QAM)	0.163
IEEE 802.11n 2.4 GHz 40 MHz(256QAM)	0.109
IEEE 802.11ax 2.4 GHz 20 MHz	0.153
IEEE 802.11ax 2.4 GHz 40 MHz	0.094

Beamforming on

Frequency Band	Max. RF Output Power (W)
IEEE 802.11b	0.001
IEEE 802.11g	0.001
IEEE 802.11n 2.4 GHz 20 MHz(64QAM)	0.072
IEEE 802.11n 2.4 GHz 40 MHz(64QAM)	0.044
IEEE 802.11n 2.4 GHz 20 MHz(256QAM)	0.073
IEEE 802.11n 2.4 GHz 40 MHz(256QAM)	0.045
IEEE 802.11ax 2.4 GHz 20 MHz	0.070
IEEE 802.11ax 2.4 GHz 40 MHz	0.038

3 Test Methodology

3.1. Mode of Operation

In the test report use EUT model: 5600-5G to operate testing.

Decision of Test ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Pre-Test Mode
Mode 1: Transmit mode
Mode 2: IEEE 802.11b Continuous TX mode
Mode 3: IEEE 802.11g Continuous TX mode
Mode 4: IEEE 802.11n 2.4 GHz 20 MHz(64QAM) Continuous TX mode
Mode 5: IEEE 802.11n 2.4 GHz 40 MHz(64QAM) Continuous TX mode
Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode
Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode
Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode
Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode

Final-Test Mode
Mode 1: Transmit mode
Mode 2: IEEE 802.11b Continuous TX mode
Mode 3: IEEE 802.11g Continuous TX mode
Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode
Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode
Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode
Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode

Note : Investigation has been done on all the possible configurations for searching the worst cases (2.4 GHz 256QAM covers 64QAM). The table is a list of the test modes show in this test report.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes.

By preliminary testing and verifying three axis (X, Y) position of EUT transmitted status, it was found that “Y axis” position was the worst, then the final test was executed the worst condition and test data were recorded in this report..

Test Mode	ANT-0	ANT-1	ANT-0+1
Mode 2	V	V	V
Mode 3	V	V	V
Mode 4	V	V	V
Mode 5	V	V	V
Mode 6	V	V	V
Mode 7	V	V	V
Mode 8	V	V	V
Mode 9	V	V	V

Test Mode	Antenna Delivery	Data Rate (Mbps)	Test Channel
Mode 2	2TX / 2RX (CDD)	1	1, 6, 11
Mode 3	2TX / 2RX (CDD)	6	1, 6, 11
Mode 4	2TX / 2RX (MIMO)	13	1, 6, 11
Mode 5	2TX / 2RX (MIMO)	27	3, 6, 9
Mode 6	2TX / 2RX (MIMO)	13	1, 6, 11
Mode 7	2TX / 2RX (MIMO)	27	3, 6, 9
Mode 8	2TX / 2RX (MIMO)	MCS 0	1, 6, 11
Mode 9	2TX / 2RX (MIMO)	MCS 0	3, 6, 9

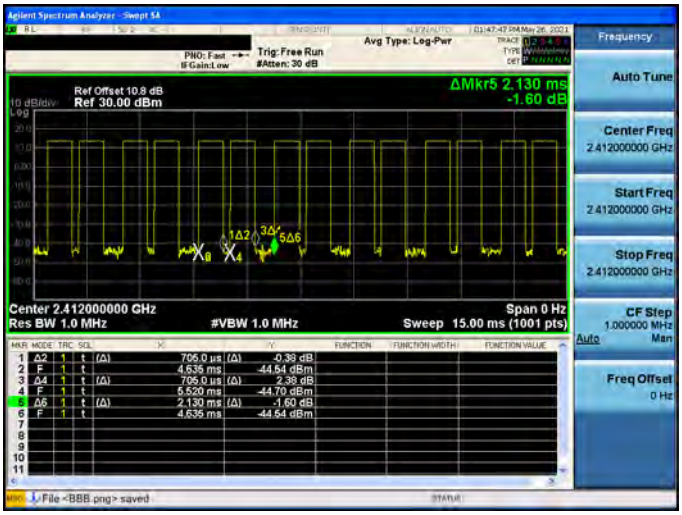
Duty cycle

Test Mode	Frequency (MHz)	on time (ms)	on+off time (ms)	Duty cycle	Duty Factor (dB)	1/T Minimum VBW (kHz)
Mode 2	2412.0	1.410	2.130	0.662	1.792	0.709
Mode 3	2412.0	2.000	2.110	0.948	0.233	0.500
Mode 6	2412.0	5.460	5.670	0.963	0.164	0.183
Mode 7	2422.0	5.460	5.670	0.963	0.164	0.183
Mode 8	2412.0	5.475	5.685	0.963	0.163	0.183
Mode 9	2422.0	5.475	5.685	0.963	0.163	0.183

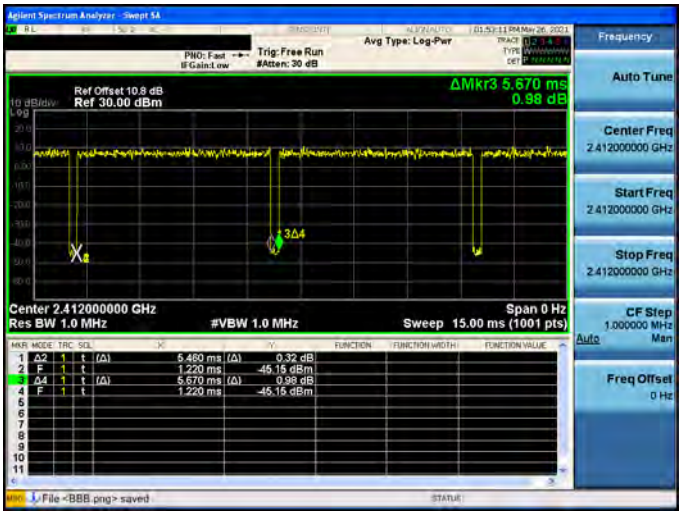
Beamforming on

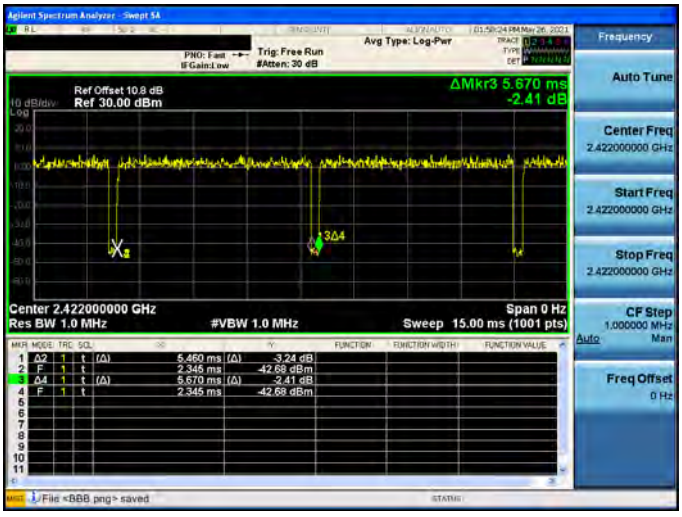
Test Mode	Frequency (MHz)	on time (ms)	on+off time (ms)	Duty cycle	Duty Factor (dB)	1/T Minimum VBW (kHz)
Mode 6	2412.0	5.460	5.670	0.963	0.164	0.183
Mode 7	2422.0	5.460	5.670	0.963	0.164	0.183
Mode 8	2412.0	5.475	5.685	0.963	0.163	0.183
Mode 9	2422.0	5.475	5.685	0.963	0.163	0.183

Duty Cycle Graphs

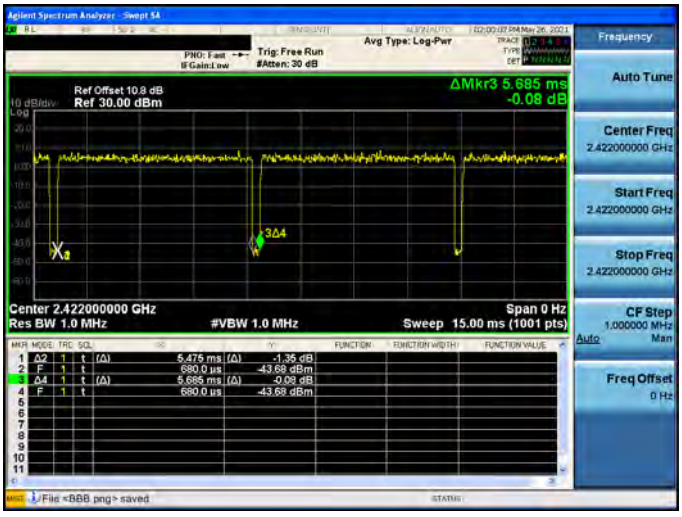
Mode 2: IEEE 802.11b Continuous TX mode	
On+off time	

Mode 3: IEEE 802.11g Continuous TX mode	
On+off time	

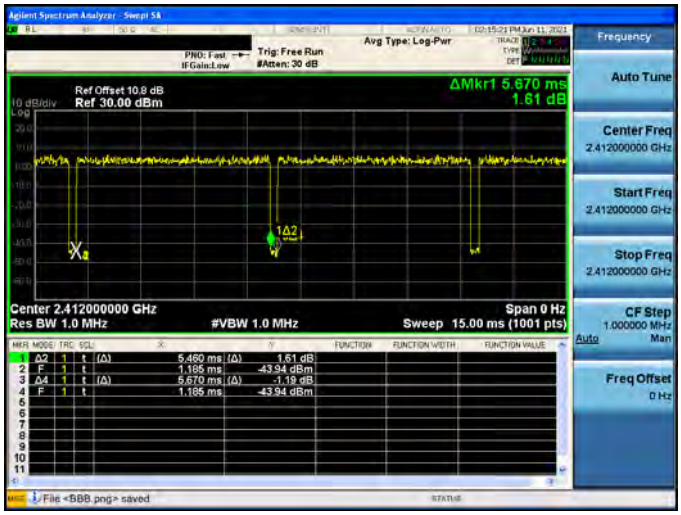
Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode	
On+off time	

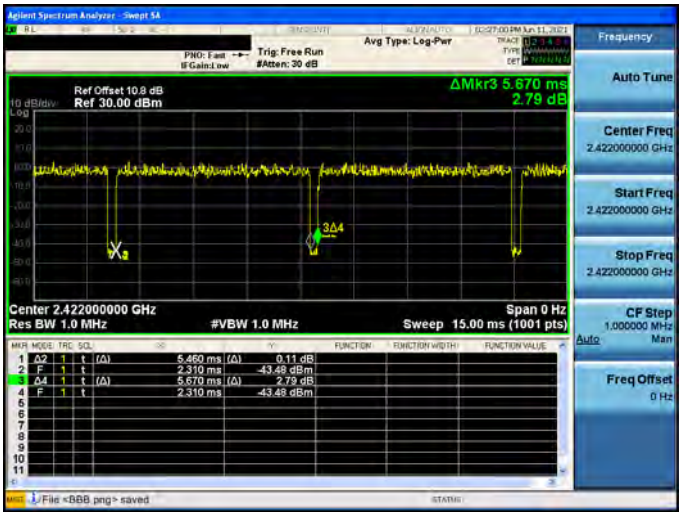
Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode	
On+off time	

Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode	
On+off time	

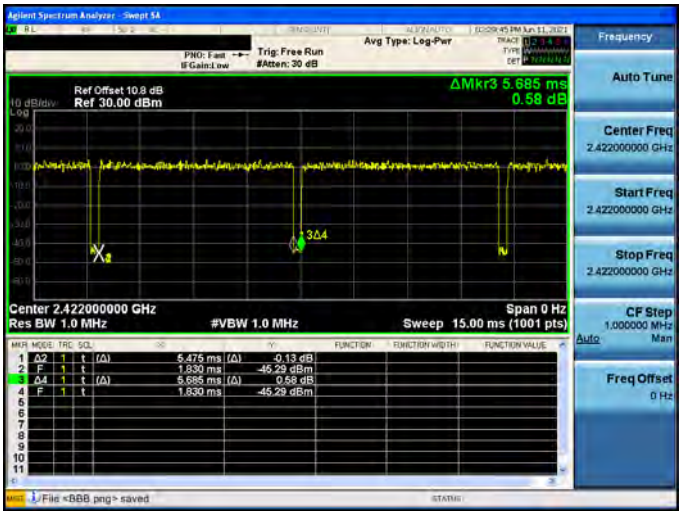
Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode	
On+off time	

Beamforming on

Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode	
On+off time	

Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode	
On+off time	

Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode	
On+off time	

Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode	
On+off time	

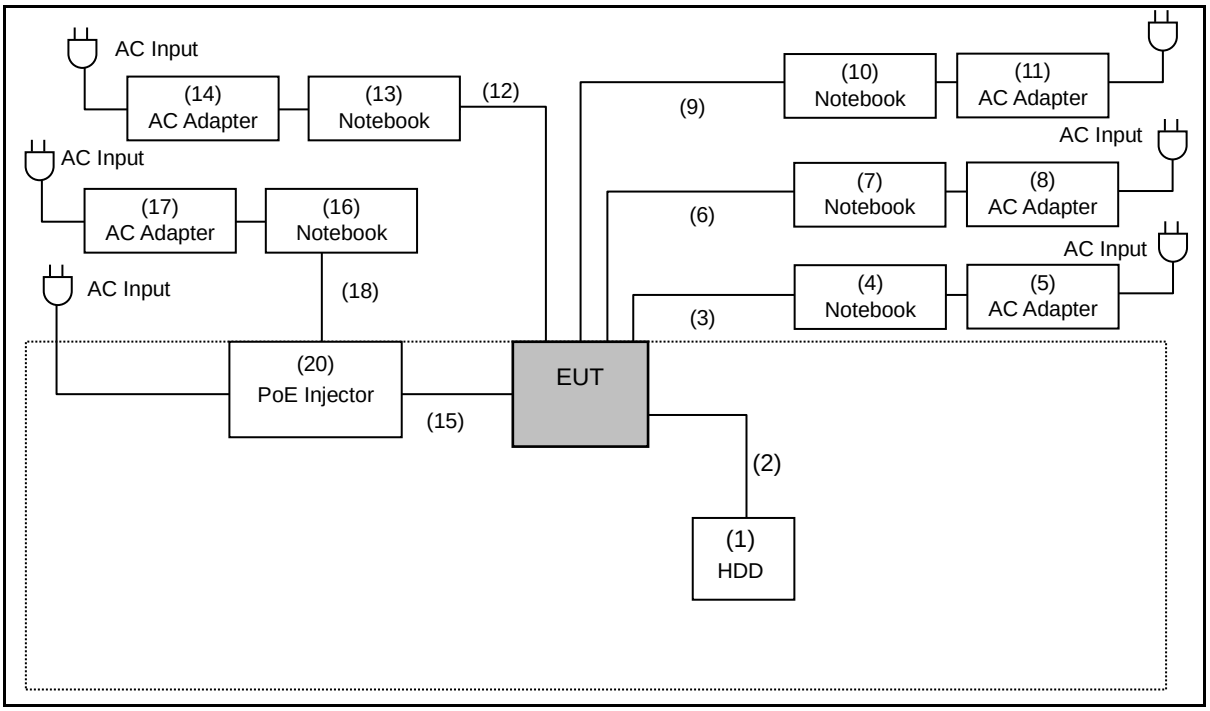
3.2. EUT Test Step

1.	Setup the EUT shown on “Configuration of Test System Details”.
2.	Turn on the power of all equipment.
3.	Turn on TX function.
4.	EUT run test program.

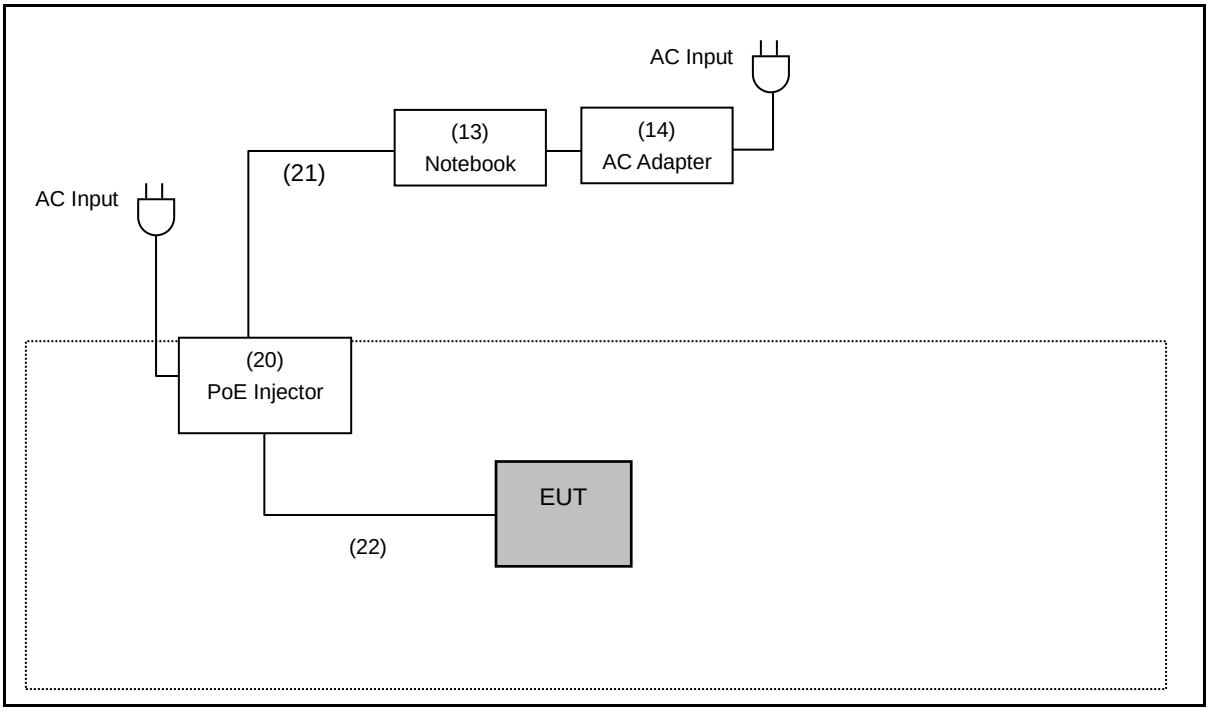
Measurement Software			
No.	Description	Software	Version
1	Conducted Emission	EZ EMC	1.1.4.3
2	Radiated Emission	EZ EMC	1.1.4.4

3.3. Configuration of Test System Details

Conducted Emissions



Radiated Emissions



Devices Description					
Product		Manufacturer	Model Number	Serial Number	Power Cord
(1)	HDD	Transend	TS1TSJ25A3K-RU	D72654-0611	---
(2)	USB Cable	Transend	TS1TSJ25A3K-RU	D72654-0611	---
(3)	LAN Cable	Huawei	UL2464	---	---
(4)	Notebook	ASUS	P2430U	---	---
(5)	AC Adapter	ASUS	ADP-65GD D	---	Non-Shielded, 0.8 m
(6)	LAN Cable	Huawei	UL2464	---	---
(7)	Notebook	ASUS	P1448U	---	---
(8)	AC Adapter	ASUS	PA-1650-78	---	Non-Shielded, 0.8 m
(9)	LAN Cable	Huawei	UL2464	---	---
(10)	Notebook	ASUS	P1448U	---	---
(11)	AC Adapter	ASUS	PA-1650-78	---	Non-Shielded, 0.8 m
(12)	LAN Cable	Huawei	UL2464	---	---
(13)	Notebook	Acer	N19C1	---	---
(14)	AC Adapter	chiicony	A18-045N2A	---	Non-Shielded, 0.8 m
(15)	LAN Cable	ATL	EMC	---	---
(16)	Notebook	Acer	N19C1	---	---
(17)	AC Adapter	chiicony	A18-045N2A	---	Non-Shielded, 0.8 m
(18)	LAN Cable	Huawei	UL2464	---	---
(19)	AC Adapter	Sunny	SYS1649-6012-T2	---	Non-Shielded, 1.7 m
(20)	PoE Injector	EnGenius	PNA60BGS-54	---	Non-Shielded, 0.5 m
(21)	LAN Cable	Tatung	CAT5E	---	---
(22)	LAN Cable	Tatung	CAT5E	---	---

3.4. Test Instruments

For Conducted Emission

Test Period: May. 29 ~ Jul. 30, 2021

Testing Engineer: Louis Shen

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Test Receiver	R&S	ESCI	100367	05/21/2021	1 year
LISN	R&S	ENV216	101040	03/29/2021	1 year
LISN	R&S	ENV216	101041	04/08/2021	1 year
RF Cable	Woken	00100D1380194M	TE-02-03	04/08/2021	1 year

For Radiated Emissions

Test Period: May. 22 ~ Jul. 30, 2021

Testing Engineer: Pink.Li, Ida.Chuang, Marc.Yeh, JS.Liao, Hung.Chou, Eva.Lee

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Spectrum Analyzer (2 Hz~50 GHz)	KEYSIGHT	N9030B	MY57143537	04/19/2021	1 year
Pre Amplifier (100 kHz~1.3 GHz)	Agilent	8447D	2944A11119	01/15/2021	1 year
Pre Amplifier (1~26.5 GHz)	Titan	T0912E01263025A1F	002	07/23/2020 07/26/2021	1 year
Pre Amplifier (1~26.5 GHz)	Agilent	8449B	3008A02237	10/21/2020	1 year
Broadband Antenna	Schwarzbeck	VULB9168	01146	07/03/2020 07/19/2021	1 year
Horn Antenna (1~18 GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	02207	06/30/2020 07/09/2021	1 year
Loop Antenna	COM-POWER CORPORATION	AL-130	121014	04/07/2021	1 year
Coaxial Cable	Titan	T0710AT327A10A100	J11005	08/13/2020	1 year
Coaxial Cable	Titan	T0710AT327A10A900	J11004	08/13/2020	1 year

For Conducted

Test Period: Jun. 11, 2021

Testing Engineer: Andy Lu, Peter Shui

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Power Sensor	Agilent	N1921A	MY45241957	12/09/2020	1 year
Power Meter	Agilent	N1911A	MY45101619	12/09/2020	1 year
Spectrum Analyzer (20 Hz~26.5 GHz)	Agilent	N9020A	US47520902	09/24/2020	1 year

Note: N.C.R. = No Calibration Request.

3.5. Test Site Environment

Items	Required (IEC 60068-1)	Actual
Temperature (°C)	15-35	20-30
Humidity (%RH)	25-75	45-75

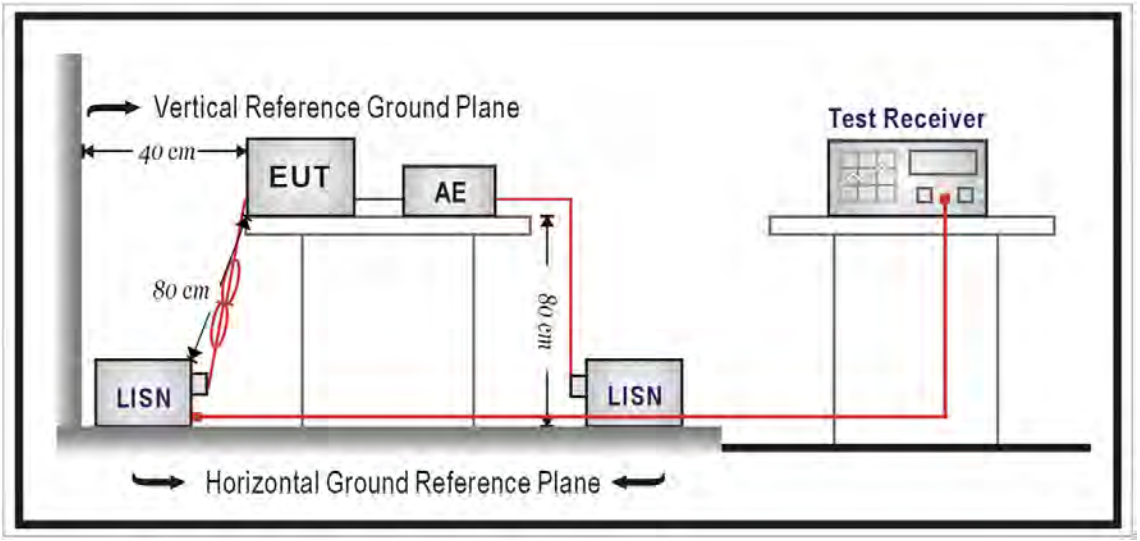
4 Measurement Procedure

4.1. AC Power Line Conducted Emission Measurement

■ **Limit**

Frequency (MHz)	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

■ **Test Setup**



■ **Test Procedure**

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 Ω// 50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 Ω// 50 uH coupling impedance with 50 ohm termination.

Tabletop device shall be placed on a non-conducting platform, of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The wall of screened room shall be located 40 cm to the rear of the EUT. Other surfaces of tabletop or floor standing EUT shall be at least 80 cm from any other ground conducting surface including one or more LISNs. For floor-standing device shall be placed under the EUT with a 12 mm insulating material.

Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a resolution bandwidth of 9 kHz. The equipment under test (EUT) shall be meet the limits in section 4.1, as applicable, including the average limit and the quasi-peak limit when using respectively, an average detector and quasi-peak detector measured in accordance with the methods described of related standard. When all of peak value were complied with quasi-peak and average limit from 150 kHz to 30 MHz then quasi-peak and average measurement was unnecessary.

The AMN shall be placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for AMNs mounted on top of the ground reference plane. This distance is between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8 m from the AMN. If the mains power cable is longer than 1 m then the cable shall be folded back and forth at the centre of the lead to form a bundle no longer than 0.4 m. All of interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long. All of EUT and AE shall be separate place more than 0.1 m. All 50 Ω ports of the LISN shall be resistively terminated into 50 Ω loads when not connected to the measuring instrument.

If the reading of the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the higher reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

4.2. Radiated Emission Measurement

■ **Limit**

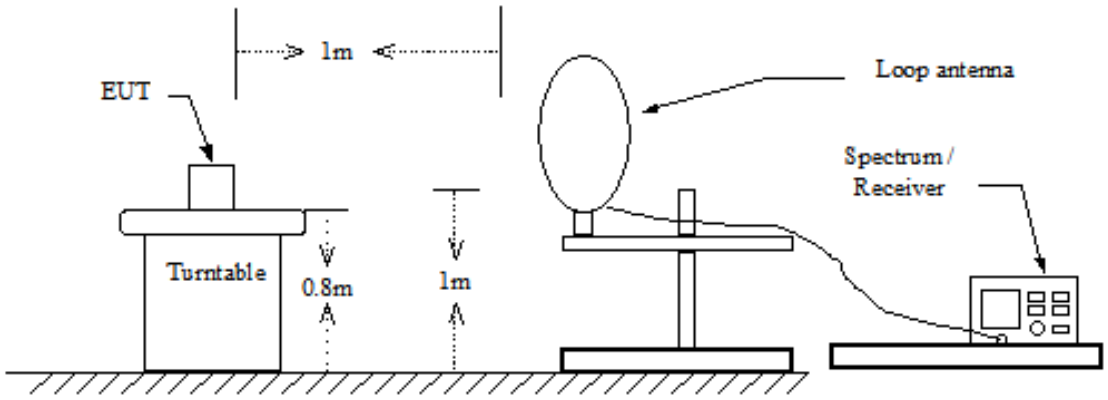
According to §15.209(a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m at 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

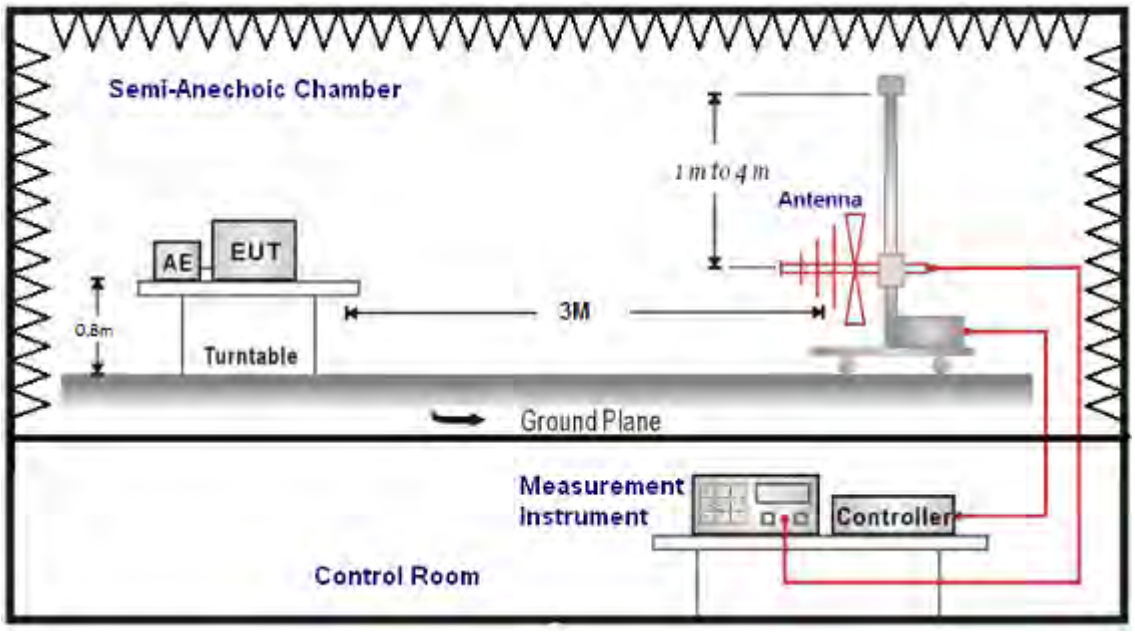
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this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

■ **Setup**

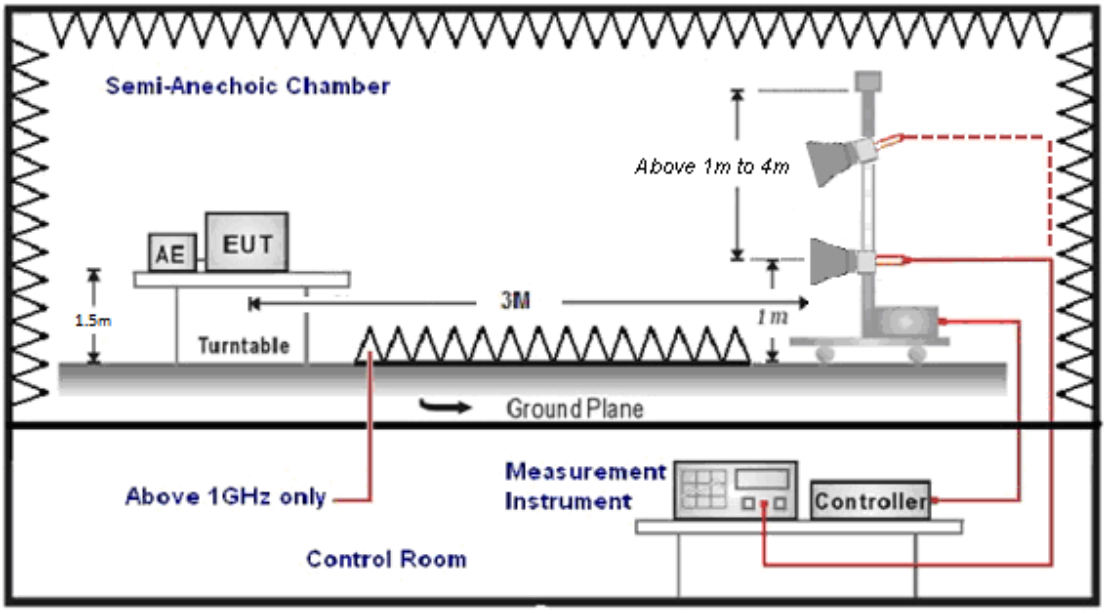
9 kHz ~ 30 MHz



Below 1 GHz



Above 1 GHz



■ **Test Procedure**

Final radiation measurements were made on a three-meter, Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 or 1.5 meters height, top surface 1.0 x 1.5 meter. The spectrum was examined from 250 MHz to 2.5 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously & Measurements spectrum range from 9 kHz to 26.5 GHz is investigated.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 3 MHz for peak measurements and 10 Hz for average measurements when Duty cycle >0.98 / 1/T for average measurements when Duty cycle <0.98. A nonconductive material surrounded the EUT to supporting the EUT for standing on tree orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

SCHWARZBECK MESS-ELEKTRONIK Biconilog Antenna at 3 Meter and the SCHWARZBECK Double Ridged Guide Antenna was used in frequencies 1 –26.5 GHz at a distance of 3 meter. The antenna at an angle toward the source of the emission. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20 dB/decade).

For testing above 1 GHz, the emission level of the EUT in peak mode was 20 dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post – detector video filters were used in the test.

The spectrum analyzer’s 6 dB bandwidth was set to 1 MHz, and the analyzer was operated in the peak detection mode, for frequencies both below and up 1 GHz. The average levels were obtained by subtracting the duty cycle correction factor from the peak readings.

The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in micro volts pre meter (uV/m).

The actual field intensity in decibels referenced to 1 microvolt in to field intensity in micro colts per meter (dBuV/m).

The actual field is intensity in referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

(1) Amplitude (dBuV/m) = FI (dBuV) +AF (dBuV) +CL (dBuV)-Gain (dB)
FI= Reading of the field intensity.
AF= Antenna factor.
CL= Cable loss.
P.S Amplitude is auto calculate in spectrum analyzer.

(2) Actual Amplitude (dBuV/m) = Amplitude (dBuV)-Dis(dB)
The FCC specified emission limits were calculated according the EUT operating frequency and by following linear interpolation equations:
(a) For fundamental frequency : Transmitter Output < +30 dBm
(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

Data of measurement within this frequency range without mark in the table above means the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.

4.3. Maximum Conducted Output Power Measurement

■ **Limit**

For systems using digital modulation in the 2400-2483.5 MHz, the limit for maximum output power is 30 dBm.

And According to 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IEEE 802.11b / IEEE 802.11g

CDD mode:

Directional = G_{ANT}=10*log{[10^(G1/10)+10^(G2/10)+…+10^(Gn/10)]/NANT} = 3.74 dBi < 6 dBi

IEEE 802.11n 2.4 GHz 20 MHz / IEEE 802.11n 2.4 GHz 40 MHz / IEEE 802.11ax 2.4 GHz 20 MHz /

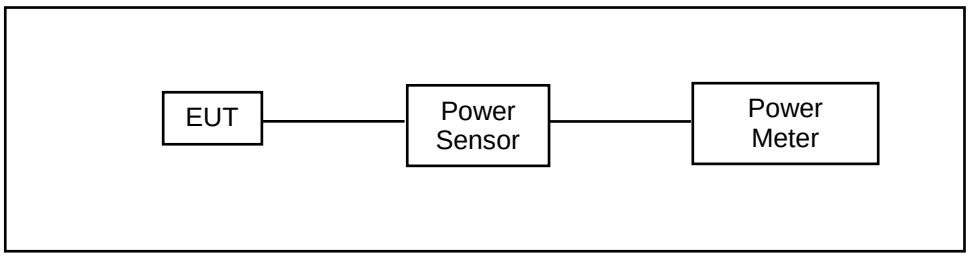
IEEE 802.11ax 2.4 GHz 40 MHz

MIMO/BF mode:

Directional Gain = 10*log{[10^(G1/20)+10^(G2/20)+…+10^(Gn/20)]^2/NANT} = 6.73 dBi > 6 dBi

∗ power limit shall be reduced = 30 - 0.73 = 29.27 dBm

■ **Test Setup**



■ **Test Procedure**

The testing follows the Measurement Procedure of ANSI C63.10:2013 section 11.9.2.3.2 Method AVGPM.

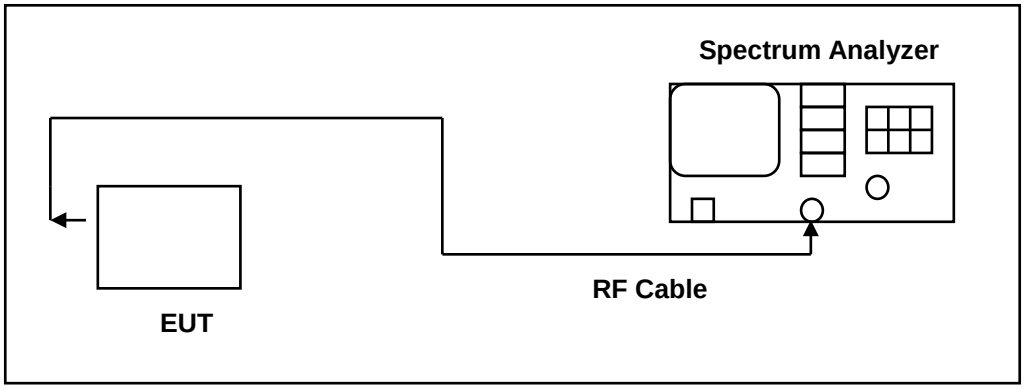
The tests below are run with the EUT's transmitter set at high power in TX mode. The EUT is needed to force selection of output power level and channel number. While testing, EUT was set to transmit continuously. Remove the Subjective device's antenna and connect the RF output port to power sensor.

4.4. 6 dB RF Bandwidth Measurement

■ **Limit**

6 dB RF Bandwidth: Systems using digital modulation techniques may operate in the 2400–2483.5 MHz bands. The minimum 6 dB band-width shall be at least 500 kHz.

■ **Test Setup**



■ **Test Procedure**

The EUT tested to DTS test procedure of ANSI C63.10:2013 section 11.8.2 option2 for compliance to FCC 47CFR 15.247 requirements.

6 dB RF Bandwidth: The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A peak output reading was taken, a DISPLAY line was drawn 6 dB lower than peak level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

The test was performed at 3 channels (Channel low, middle, high)

4.5. Maximum Power Spectral Density Measurement

■ **Limit**

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.

IEEE 802.11b / IEEE 802.11g / IEEE 802.11n 2.4 GHz 20 MHz / IEEE 802.11n 2.4 GHz 40 MHz /

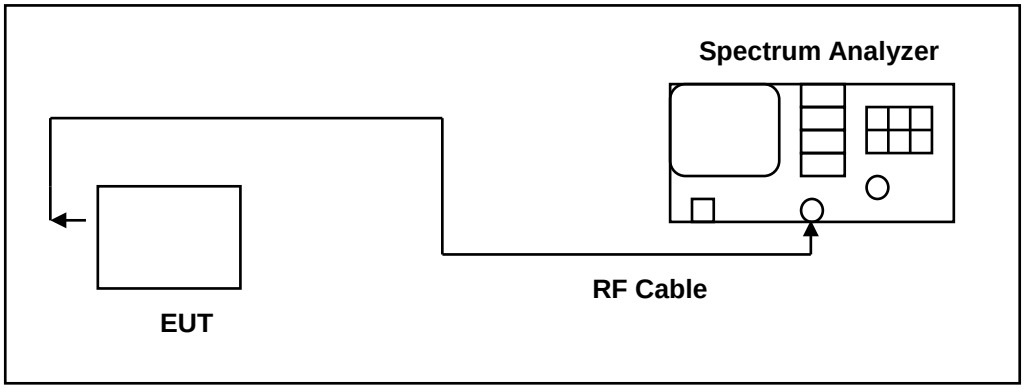
IEEE 802.11ax 2.4 GHz 20 MHz

CDD/MIMO/BF mode:

Directional Gain = 10*log{[10^(G1/20)+10^(G2/20)+…+10^(Gn/20)]^2/NANT} = 6.73 dBi > 6dBi

＊ power spectral density limit shall be reduced = 8 - 0.73 = 7.27 dBm/MHz

■ **Test Setup**



■ **Test Procedure**

The EUT tested to DTS test procedure of ANSI C63.10:2013 section 11.10.2 Method PKPSD for compliance to FCC 47CFR 15.247 requirements.

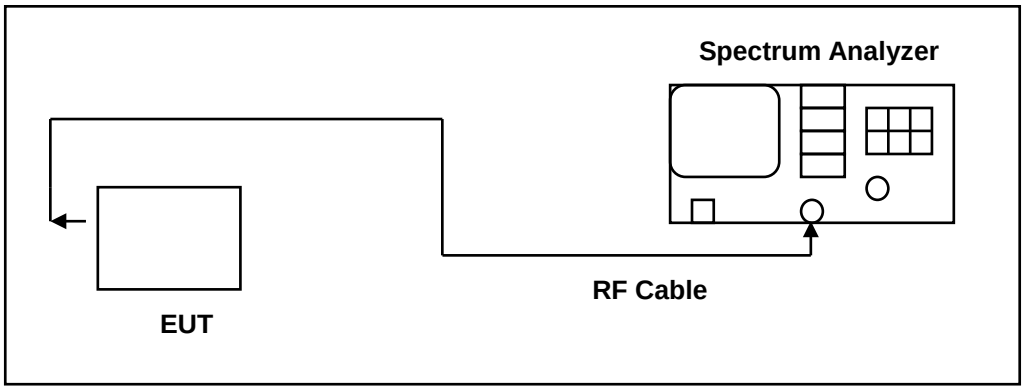
1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 × RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.6. Out of Band Conducted Emissions Measurement

■ **Limit**

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 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

■ **Test Setup**



■ **Test Procedure**

In any 100 kHz bandwidth outside the EUT pass band, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 30 dB below that of the maximum in-band 100 kHz emission, antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.
All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the pass band.
The test was performed at 3 channels.

4.7. Antenna Measurement

■ **Limit**

For intentional device, according to 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.

And According to 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

■ **Antenna Description**

See section 2 – antenna information.

■ **Directional Gain Calculated**

For Maximum Conducted Output Power

Operate Freq. Band	Directional Gain (dBi)
IEEE 802.11b	3.74
IEEE 802.11g	3.74
IEEE 802.11n 2.4 GHz 20 MHz(64QAM)	6.73
IEEE 802.11n 2.4 GHz 40 MHz(64QAM)	6.73
IEEE 802.11n 2.4 GHz 20 MHz(256QAM)	6.73
IEEE 802.11n 2.4 GHz 40 MHz(256QAM)	6.73
IEEE 802.11ax 2.4 GHz 20 MHz	6.73
IEEE 802.11ax 2.4 GHz 40 MHz	6.73

For Maximum Power Density

Operate Freq. Band	Directional Gain (dBi)
IEEE 802.11b	6.73
IEEE 802.11g	6.73
IEEE 802.11n 2.4 GHz 20 MHz(64QAM)	6.73
IEEE 802.11n 2.4 GHz 40 MHz(64QAM)	6.73
IEEE 802.11n 2.4 GHz 20 MHz(256QAM)	6.73
IEEE 802.11n 2.4 GHz 40 MHz(256QAM)	6.73
IEEE 802.11ax 2.4 GHz 20 MHz	6.73
IEEE 802.11ax 2.4 GHz 40 MHz	6.73

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For Maximum Conducted Output Power

Operate Freq. Band	Directional Gain (dBi)
IEEE 802.11n 2.4 GHz 20 MHz(64QAM)	6.73
IEEE 802.11n 2.4 GHz 40 MHz(64QAM)	6.73
IEEE 802.11n 2.4 GHz 20 MHz(256QAM)	6.73
IEEE 802.11n 2.4 GHz 40 MHz(256QAM)	6.73
IEEE 802.11ax 2.4 GHz 20 MHz	6.73
IEEE 802.11ax 2.4 GHz 40 MHz	6.73

For Maximum Power Density

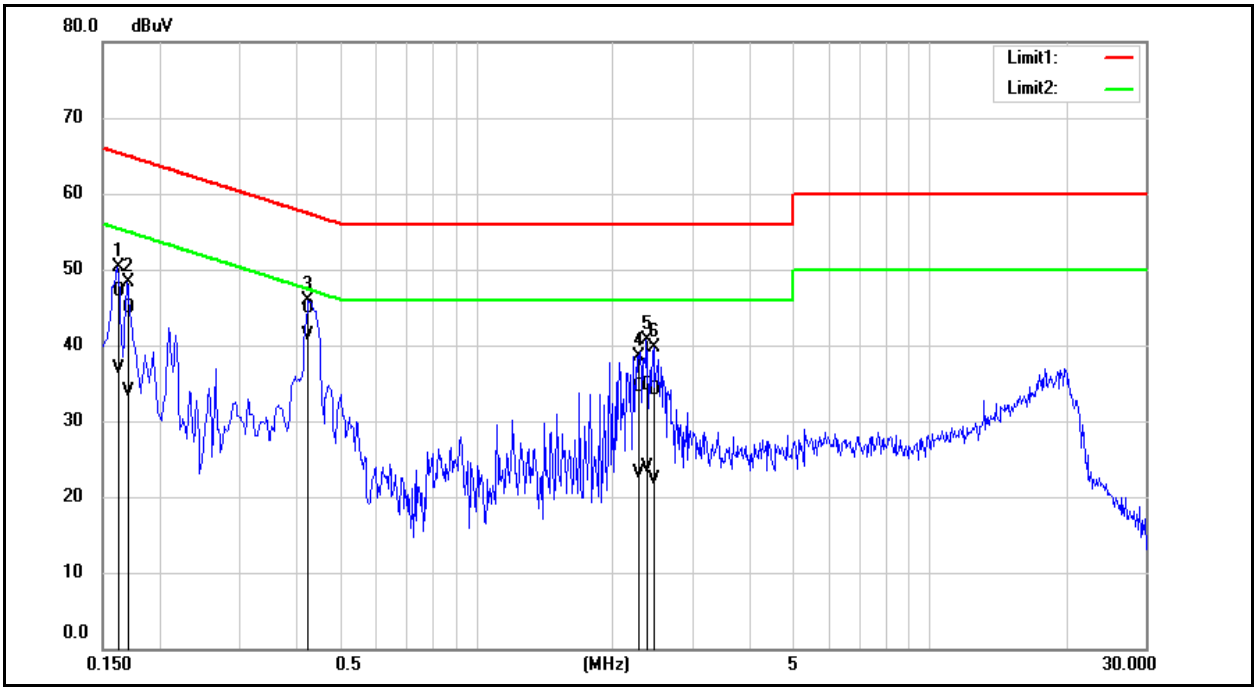
Operate Freq. Band	Directional Gain (dBi)
IEEE 802.11n 2.4 GHz 20 MHz(256QAM)	6.73
IEEE 802.11n 2.4 GHz 40 MHz(256QAM)	6.73
IEEE 802.11ax 2.4 GHz 20 MHz	6.73
IEEE 802.11ax 2.4 GHz 40 MHz	6.73

5 Test Results

Annex A. Conducted Emission

5600-5G

Standard:	FCC Part 15.247	Line:	L1
Test item:	Conducted Emission	Power:	AC 120 V/60 Hz
Mode:	Mode 1		
Description:			

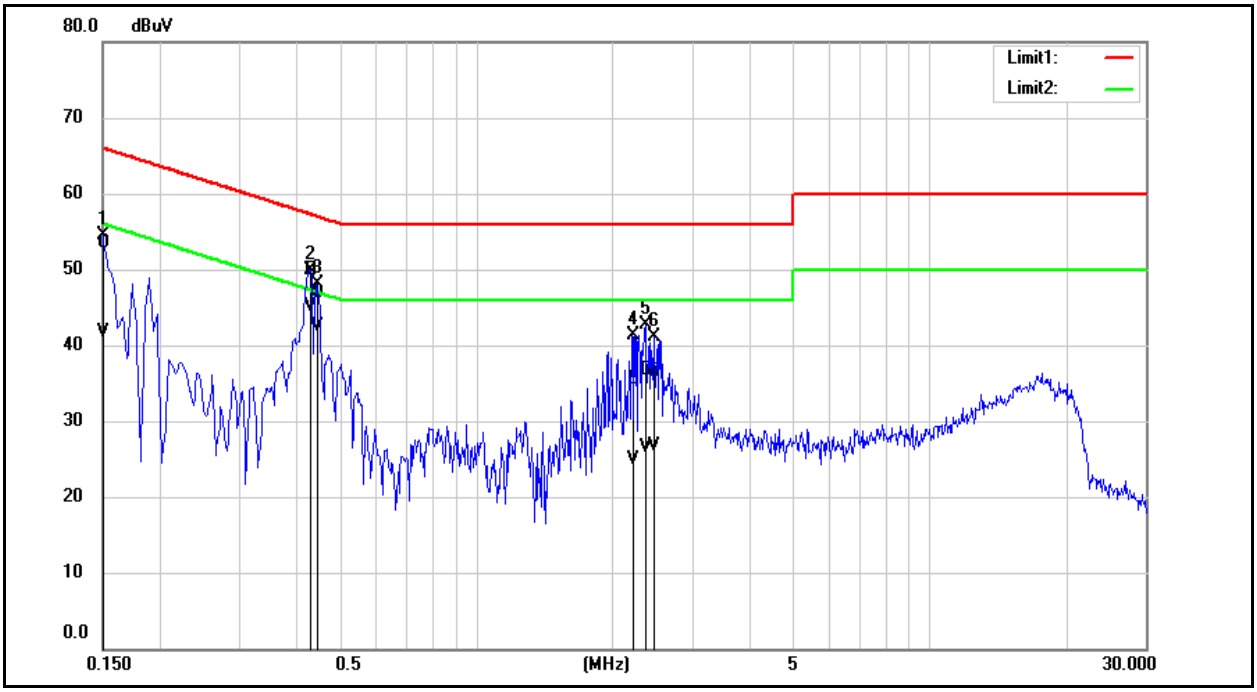


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1620	37.32	27.22	9.72	47.04	36.94	65.36	55.36	-18.32	-18.42	Pass
2	0.1700	35.28	24.28	9.72	45.00	34.00	64.96	54.96	-19.96	-20.96	Pass
3	0.4260	35.24	31.52	9.71	44.95	41.23	57.33	47.33	-12.38	-6.10	Pass
4	2.2740	24.75	13.23	9.78	34.53	23.01	56.00	46.00	-21.47	-22.99	Pass
5	2.3740	24.94	14.18	9.79	34.73	23.97	56.00	46.00	-21.27	-22.03	Pass
6	2.4660	24.23	12.60	9.79	34.02	22.39	56.00	46.00	-21.98	-23.61	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

Standard:	FCC Part 15.247	Line:	N
Test item:	Conducted Emission	Power:	AC 120 V/60 Hz
Mode:	Mode 1		
Description:			



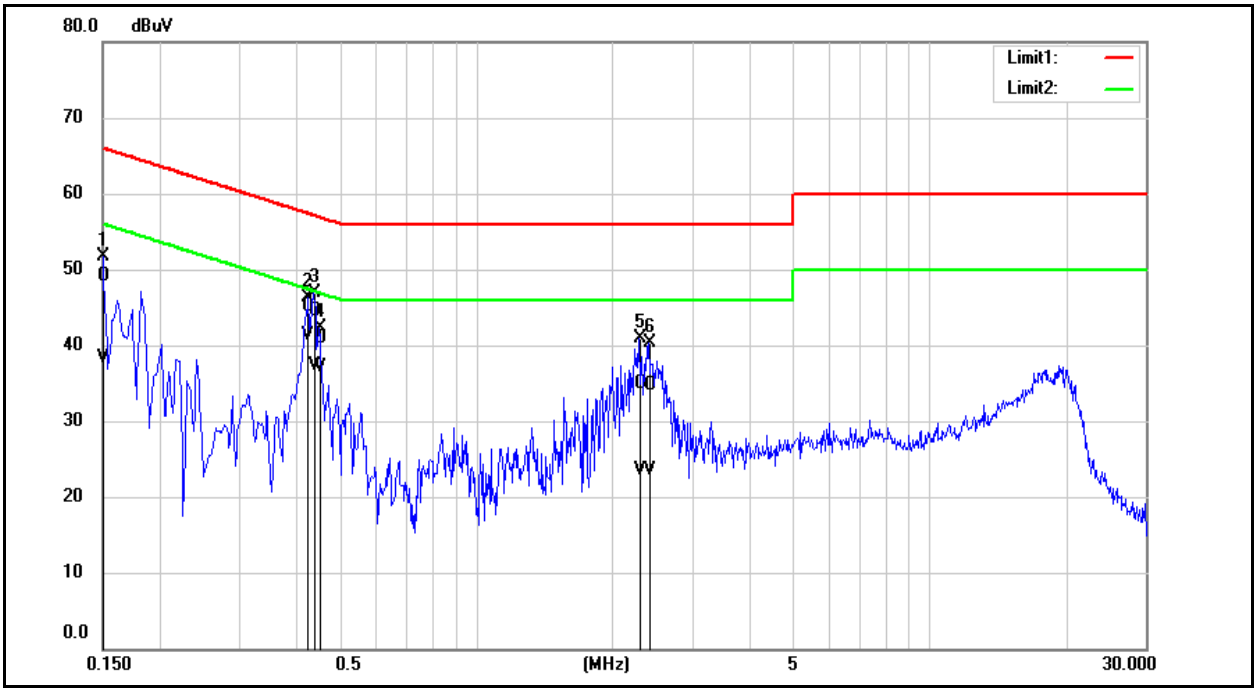
No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1500	43.74	31.98	9.71	53.45	41.69	66.00	56.00	-12.55	-14.31	Pass
2	0.4300	40.13	35.43	9.70	49.83	45.13	57.25	47.25	-7.42	-2.12	Pass
3	0.4460	37.19	32.78	9.70	46.89	42.48	56.95	46.95	-10.06	-4.47	Pass
4	2.2060	25.72	15.20	9.76	35.48	24.96	56.00	46.00	-20.52	-21.04	Pass
5	2.3660	26.87	16.80	9.77	36.64	26.57	56.00	46.00	-19.36	-19.43	Pass
6	2.4700	26.64	16.98	9.77	36.41	26.75	56.00	46.00	-19.59	-19.25	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

5600-LTE US

Standard:	FCC Part 15.247	Line:	L1
Test item:	Conducted Emission	Power:	AC 120 V/60 Hz
Mode:	Mode 1		
Description:			

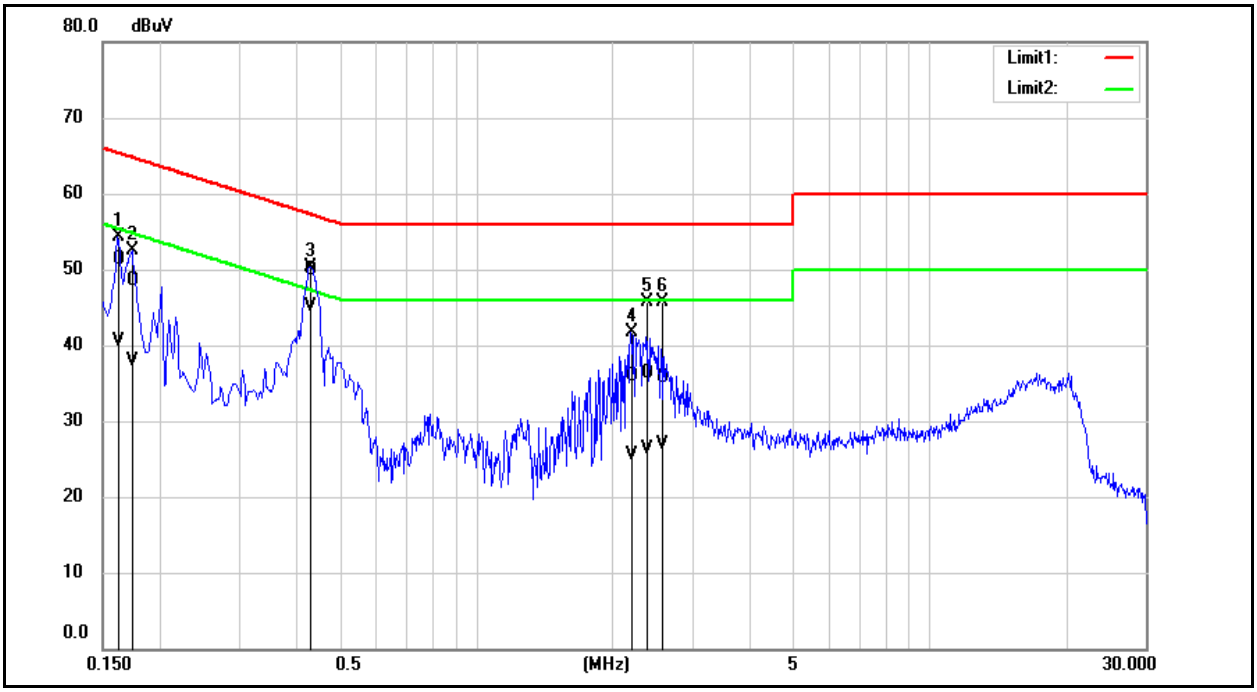


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1500	39.47	28.65	9.72	49.19	38.37	66.00	56.00	-16.81	-17.63	Pass
2	0.4260	35.42	31.69	9.71	45.13	41.40	57.33	47.33	-12.20	-5.93	Pass
3	0.4380	34.85	27.56	9.71	44.56	37.27	57.10	47.10	-12.54	-9.83	Pass
4	0.4500	31.13	27.38	9.71	40.84	37.09	56.88	46.88	-16.04	-9.79	Pass
5	2.2940	25.06	13.74	9.78	34.84	23.52	56.00	46.00	-21.16	-22.48	Pass
6	2.4020	24.94	13.77	9.79	34.73	23.56	56.00	46.00	-21.27	-22.44	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

Standard:	FCC Part 15.247	Line:	N
Test item:	Conducted Emission	Power:	AC 120 V/60 Hz
Mode:	Mode 1		
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1620	41.66	30.84	9.71	51.37	40.55	65.36	55.36	-13.99	-14.81	Pass
2	0.1740	38.70	28.17	9.71	48.41	37.88	64.77	54.77	-16.36	-16.89	Pass
3	0.4300	40.16	35.37	9.70	49.86	45.07	57.25	47.25	-7.39	-2.18	Pass
4	2.1980	26.10	15.66	9.76	35.86	25.42	56.00	46.00	-20.14	-20.58	Pass
5	2.3740	26.45	16.55	9.77	36.22	26.32	56.00	46.00	-19.78	-19.68	Pass
6	2.5580	25.94	17.05	9.77	35.71	26.82	56.00	46.00	-20.29	-19.18	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

Annex B. Conducted Test Results

Maximum Conducted Output Power Measurement

ANT-0					
Test Mode	Frequency (MHz)	Data Rate	Average Output Power		
			Measurement Results		Limit
			dBm	W	dBm
Mode 2	2412	1 M	19.50	0.089	≤ 30.00
	2437		19.09	0.081	≤ 30.00
	2462		18.79	0.076	≤ 30.00
Mode 3	2412	6 M	17.69	0.059	≤ 30.00
	2437		19.24	0.084	≤ 30.00
	2462		15.40	0.035	≤ 30.00
Mode 4	2412	13 M	15.56	0.036	≤ 29.27
	2437		18.83	0.076	≤ 29.27
	2462		15.16	0.033	≤ 29.27
Mode 5	2422	27 M	16.11	0.041	≤ 29.27
	2437		16.88	0.049	≤ 29.27
	2452		14.87	0.031	≤ 29.27
Mode 6	2412	13 M	15.69	0.037	≤ 29.27
	2437		18.88	0.077	≤ 29.27
	2462		14.93	0.031	≤ 29.27
Mode 7	2422	27 M	16.24	0.042	≤ 29.27
	2437		16.91	0.049	≤ 29.27
	2452		14.70	0.030	≤ 29.27
Mode 8	2412	MCS0	16.19	0.042	≤ 29.27
	2437		18.41	0.069	≤ 29.27
	2462		14.78	0.030	≤ 29.27
Mode 9	2422	MCS0	15.78	0.038	≤ 29.27
	2437		16.52	0.045	≤ 29.27
	2452		14.31	0.027	≤ 29.27

Note: The relevant measured result has the offset with cable loss already.

ANT-1					
Test Mode	Frequency (MHz)	Data Rate	Average Output Power		
			Measurement Results		Limit
			dBm	W	dBm
Mode 2	2412	1 M	19.85	0.097	≤ 30.00
	2437		19.55	0.090	≤ 30.00
	2462		18.86	0.077	≤ 30.00
Mode 3	2412	6 M	17.97	0.063	≤ 30.00
	2437		19.67	0.093	≤ 30.00
	2462		15.21	0.033	≤ 30.00
Mode 4	2412	13 M	15.71	0.037	≤ 29.27
	2437		19.24	0.084	≤ 29.27
	2462		14.92	0.031	≤ 29.27
Mode 5	2422	27 M	16.11	0.041	≤ 29.27
	2437		17.22	0.053	≤ 29.27
	2452		14.61	0.029	≤ 29.27
Mode 6	2412	13 M	16.31	0.043	≤ 29.27
	2437		19.31	0.085	≤ 29.27
	2462		15.21	0.033	≤ 29.27
Mode 7	2422	27 M	16.61	0.046	≤ 29.27
	2437		17.75	0.060	≤ 29.27
	2452		14.90	0.031	≤ 29.27
Mode 8	2412	MCS0	16.97	0.050	≤ 29.27
	2437		19.20	0.083	≤ 29.27
	2462		14.88	0.031	≤ 29.27
Mode 9	2422	MCS0	16.01	0.040	≤ 29.27
	2437		16.94	0.049	≤ 29.27
	2452		14.44	0.028	≤ 29.27

Note: The relevant measured result has the offset with cable loss already.

ANT-0+1					
Test Mode	Frequency (MHz)	Data Rate	Average Output Power		
			Measurement Results		Limit
			dBm	W	dBm
Mode 2	2412	1 M	**22.69**	**0.186**	≤ 30.00
	2437		22.34	0.171	≤ 30.00
	2462		21.84	0.153	≤ 30.00
Mode 3	2412	6 M	20.84	0.121	≤ 30.00
	2437		22.47	**0.177**	≤ 30.00
	2462		18.32	0.068	≤ 30.00
Mode 4	2412	13 M	18.65	0.073	≤ 29.27
	2437		22.05	0.160	≤ 29.27
	2462		18.05	0.064	≤ 29.27
Mode 5	2422	27 M	19.12	0.082	≤ 29.27
	2437		20.06	0.101	≤ 29.27
	2452		17.75	0.060	≤ 29.27
Mode 6	2412	13 M	19.02	0.080	≤ 29.27
	2437		22.11	**0.163**	≤ 29.27
	2462		18.08	0.064	≤ 29.27
Mode 7	2422	27 M	19.44	0.088	≤ 29.27
	2437		20.36	**0.109**	≤ 29.27
	2452		17.81	0.060	≤ 29.27
Mode 8	2412	MCS0	19.61	0.091	≤ 29.27
	2437		21.83	0.153	≤ 29.27
	2462		17.84	0.061	≤ 29.27
Mode 9	2422	MCS0	18.91	0.078	≤ 29.27
	2437		19.75	0.094	≤ 29.27
	2452		17.39	0.055	≤ 29.27

Note: The relevant measured result has the offset with cable loss already.

Beamforming on

ANT-0					
Test Mode	Frequency (MHz)	Data Rate	Average Output Power		
			Measurement Results		Limit
			dBm	W	dBm
Mode 4	2412	13 M	11.78	0.015	≤ 29.27
	2437		15.44	0.035	≤ 29.27
	2462		11.55	0.014	≤ 29.27
Mode 5	2422	27 M	12.48	0.018	≤ 29.27
	2437		13.16	0.021	≤ 29.27
	2452		11.29	0.013	≤ 29.27
Mode 6	2412	13 M	11.88	0.015	≤ 29.27
	2437		15.50	0.035	≤ 29.27
	2462		11.62	0.015	≤ 29.27
Mode 7	2422	27 M	12.50	0.018	≤ 29.27
	2437		13.21	0.021	≤ 29.27
	2452		11.32	0.014	≤ 29.27
Mode 8	2412	MCS0	12.63	0.018	≤ 29.27
	2437		15.27	0.034	≤ 29.27
	2462		11.47	0.014	≤ 29.27
Mode 9	2422	MCS0	12.08	0.016	≤ 29.27
	2437		12.36	0.017	≤ 29.27
	2452		10.85	0.012	≤ 29.27

Note: The relevant measured result has the offset with cable loss already.

ANT-1					
Test Mode	Frequency (MHz)	Data Rate	Average Output Power		
			Measurement Results		Limit
			dBm	W	dBm
Mode 4	2412	13 M	12.25	0.017	≤ 29.27
	2437		15.69	0.037	≤ 29.27
	2462		11.38	0.014	≤ 29.27
Mode 5	2422	27 M	12.64	0.018	≤ 29.27
	2437		13.68	0.023	≤ 29.27
	2452		10.94	0.012	≤ 29.27
Mode 6	2412	13 M	12.35	0.017	≤ 29.27
	2437		15.72	0.037	≤ 29.27
	2462		11.44	0.014	≤ 29.27
Mode 7	2422	27 M	12.76	0.019	≤ 29.27
	2437		13.78	0.024	≤ 29.27
	2452		10.96	0.012	≤ 29.27
Mode 8	2412	MCS0	13.15	0.021	≤ 29.27
	2437		15.62	0.036	≤ 29.27
	2462		11.11	0.013	≤ 29.27
Mode 9	2422	MCS0	12.54	0.018	≤ 29.27
	2437		13.13	0.021	≤ 29.27
	2452		10.52	0.011	≤ 29.27

Note: The relevant measured result has the offset with cable loss already.

ANT-0+1					
Test Mode	Frequency (MHz)	Data Rate	Average Output Power		
			Measurement Results		Limit
			dBm	W	dBm
Mode 4	2412	13 M	15.03	0.032	≤ 29.27
	2437		18.58	0.072	≤ 29.27
	2462		14.48	0.028	≤ 29.27
Mode 5	2422	27 M	15.57	0.036	≤ 29.27
	2437		16.44	0.044	≤ 29.27
	2452		14.13	0.026	≤ 29.27
Mode 6	2412	13 M	15.13	0.033	≤ 29.27
	2437		18.62	**0.073**	≤ 29.27
	2462		14.54	0.028	≤ 29.27
Mode 7	2422	27 M	15.64	0.037	≤ 29.27
	2437		16.51	**0.045**	≤ 29.27
	2452		14.15	0.026	≤ 29.27
Mode 8	2412	MCS0	15.91	0.039	≤ 29.27
	2437		18.46	0.070	≤ 29.27
	2462		14.30	0.027	≤ 29.27
Mode 9	2422	MCS0	15.33	0.034	≤ 29.27
	2437		15.77	0.038	≤ 29.27
	2452		13.70	0.023	≤ 29.27

Note: The relevant measured result has the offset with cable loss already.

6 dB RF Bandwidth Measurement

ANT-0			
Test Mode	Frequency (MHz)	Measurement (kHz)	Limit (kHz)
Mode 2	2412	7115	≥ 500
	2437	8539	≥ 500
	2462	7119	≥ 500
Mode 3	2412	16050	≥ 500
	2437	15110	≥ 500
	2462	15490	≥ 500
Mode 6	2412	16070	≥ 500
	2437	17300	≥ 500
	2462	16060	≥ 500
Mode 7	2422	36380	≥ 500
	2437	36130	≥ 500
	2452	36050	≥ 500
Mode 8	2412	18010	≥ 500
	2437	18300	≥ 500
	2462	18320	≥ 500
Mode 9	2422	37690	≥ 500
	2437	37860	≥ 500
	2452	37950	≥ 500

ANT-1			
Test Mode	Frequency (MHz)	Measurement (kHz)	Limit (kHz)
Mode 2	2412	7556	≥ 500
	2437	8079	≥ 500
	2462	8117	≥ 500
Mode 3	2412	15740	≥ 500
	2437	16040	≥ 500
	2462	15160	≥ 500
Mode 6	2412	17170	≥ 500
	2437	16610	≥ 500
	2462	17290	≥ 500
Mode 7	2422	35970	≥ 500
	2437	36360	≥ 500
	2452	36340	≥ 500
Mode 8	2412	17900	≥ 500
	2437	18400	≥ 500
	2462	17860	≥ 500
Mode 9	2422	37330	≥ 500
	2437	37830	≥ 500
	2452	37880	≥ 500

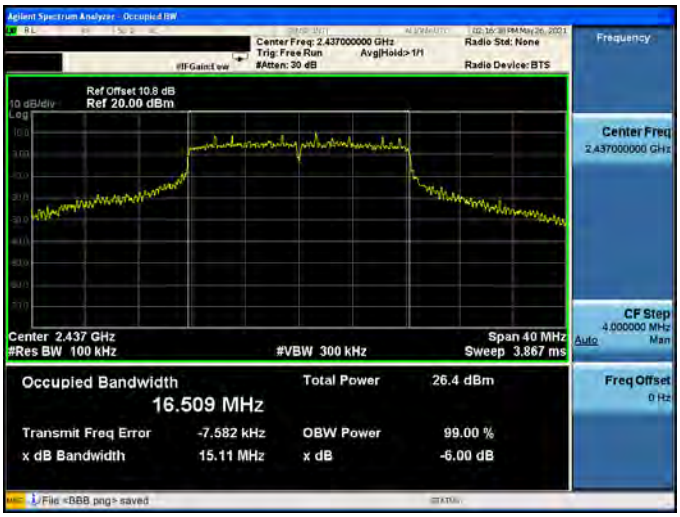
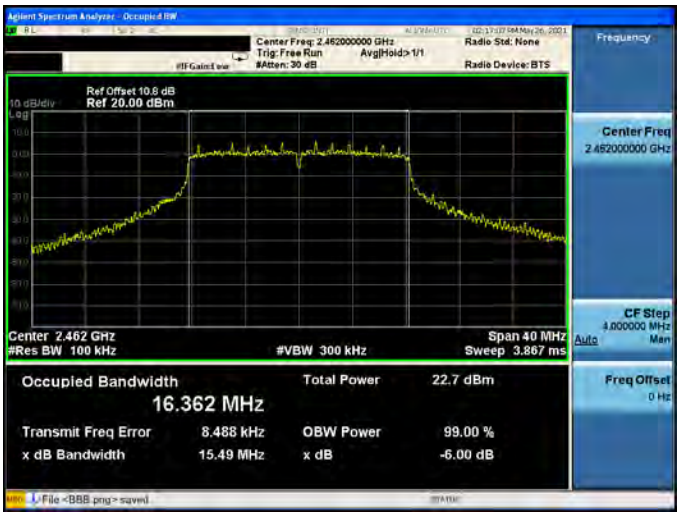
Beamforming on

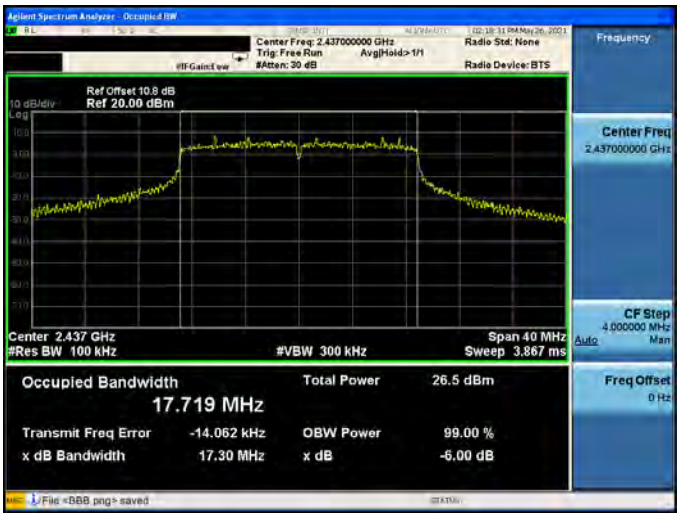
ANT-0			
Test Mode	Frequency (MHz)	Measurement (kHz)	Limit (kHz)
Mode 6	2412	15950	≥ 500
	2437	16810	≥ 500
	2462	16770	≥ 500
Mode 7	2422	37530	≥ 500
	2437	37890	≥ 500
	2452	37270	≥ 500
Mode 8	2412	18180	≥ 500
	2437	17820	≥ 500
	2462	18290	≥ 500
Mode 9	2422	35680	≥ 500
	2437	37610	≥ 500
	2452	37900	≥ 500

ANT-1			
Test Mode	Frequency (MHz)	Measurement (kHz)	Limit (kHz)
Mode 6	2412	16960	≥ 500
	2437	16940	≥ 500
	2462	16700	≥ 500
Mode 7	2422	36090	≥ 500
	2437	36370	≥ 500
	2452	36090	≥ 500
Mode 8	2412	18150	≥ 500
	2437	17770	≥ 500
	2462	17670	≥ 500
Mode 9	2422	37580	≥ 500
	2437	37820	≥ 500
	2452	37650	≥ 500

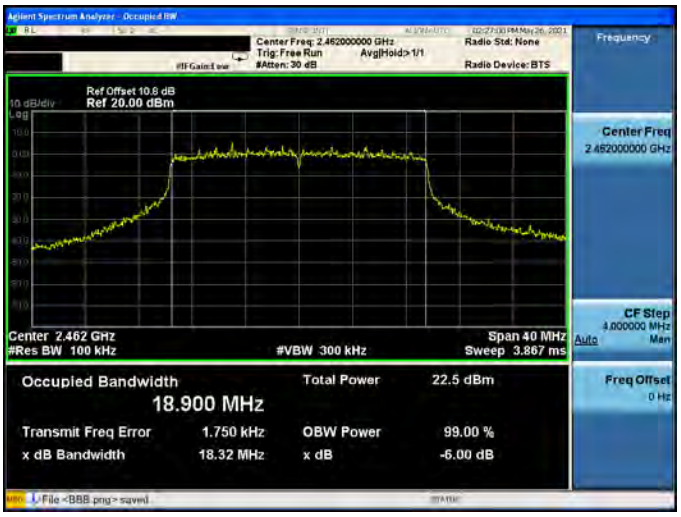
■ **Test Graphs**

Mode 2: IEEE 802.11b Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 3: IEEE 802.11g Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

Mode 2: IEEE 802.11b Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 3: IEEE 802.11g Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

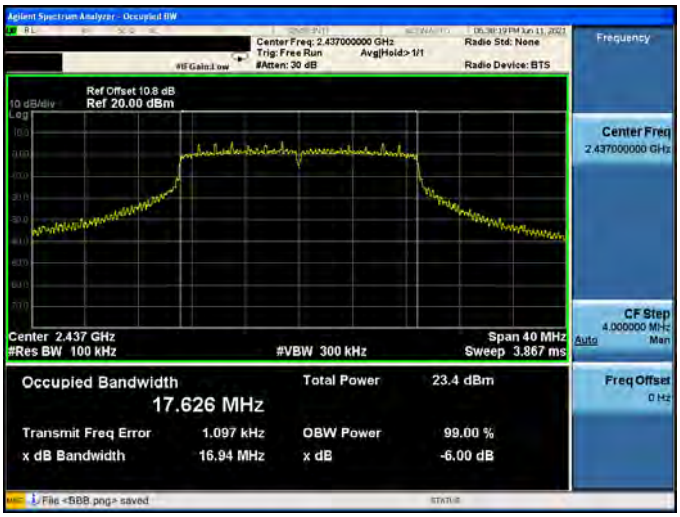
Beamforming on

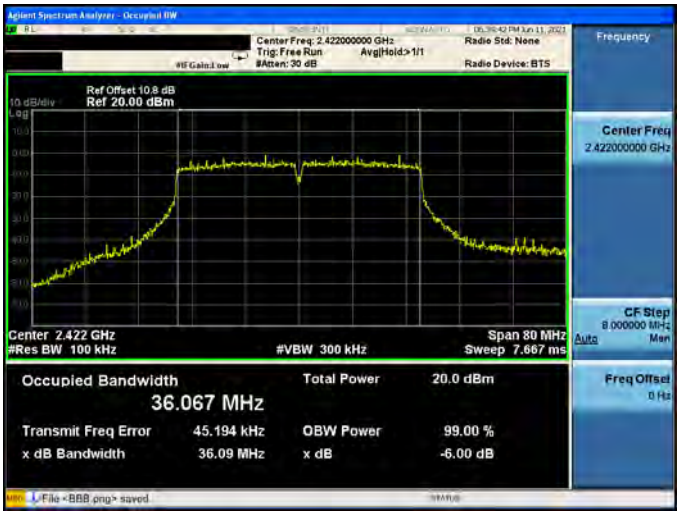
Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

Maximum Power Spectral Density Measurement

ANT-0			
Test Mode	Frequency (MHz)	Measurement (dBm/3 kHz)	Limit (dBm/ 3 kHz)
Mode 2	2412	-2.628	≤ 7.27
	2437	-4.054	≤ 7.27
	2462	-3.792	≤ 7.27
Mode 3	2412	-8.867	≤ 7.27
	2437	-7.277	≤ 7.27
	2462	-10.997	≤ 7.27
Mode 6	2412	-9.688	≤ 7.27
	2437	-6.925	≤ 7.27
	2462	-10.605	≤ 7.27
Mode 7	2422	-10.804	≤ 7.27
	2437	-11.598	≤ 7.27
	2452	-12.894	≤ 7.27
Mode 8	2412	-10.155	≤ 7.27
	2437	-7.149	≤ 7.27
	2462	-11.120	≤ 7.27
Mode 9	2422	-13.037	≤ 7.27
	2437	-11.396	≤ 7.27
	2452	-13.621	≤ 7.27

ANT-1			
Test Mode	Frequency (MHz)	Measurement (dBm/3 kHz)	Limit (dBm/ 3 kHz)
Mode 2	2412	-1.648	≤ 7.27
	2437	-1.594	≤ 7.27
	2462	-2.370	≤ 7.27
Mode 3	2412	-7.835	≤ 7.27
	2437	-6.489	≤ 7.27
	2462	-10.705	≤ 7.27
Mode 6	2412	-9.447	≤ 7.27
	2437	-5.502	≤ 7.27
	2462	-10.250	≤ 7.27
Mode 7	2422	-11.403	≤ 7.27
	2437	-9.975	≤ 7.27
	2452	-12.266	≤ 7.27
Mode 8	2412	-7.355	≤ 7.27
	2437	-6.197	≤ 7.27
	2462	-10.421	≤ 7.27
Mode 9	2422	-11.987	≤ 7.27
	2437	-11.253	≤ 7.27
	2452	-13.558	≤ 7.27

ANT-0+1			
Test Mode	Frequency (MHz)	Measurement (dBm/3 kHz)	Limit (dBm/ 3 kHz)
Mode 2	2412	0.900	≤ 7.27
	2437	0.358	≤ 7.27
	2462	-0.013	≤ 7.27
Mode 3	2412	-5.310	≤ 7.27
	2437	-3.855	≤ 7.27
	2462	-7.838	≤ 7.27
Mode 6	2412	-6.556	≤ 7.27
	2437	-3.145	≤ 7.27
	2462	-7.414	≤ 7.27
Mode 7	2422	-8.083	≤ 7.27
	2437	-7.701	≤ 7.27
	2452	-9.558	≤ 7.27
Mode 8	2412	-5.523	≤ 7.27
	2437	-3.637	≤ 7.27
	2462	-7.746	≤ 7.27
Mode 9	2422	-9.470	≤ 7.27
	2437	-8.314	≤ 7.27
	2452	-10.579	≤ 7.27

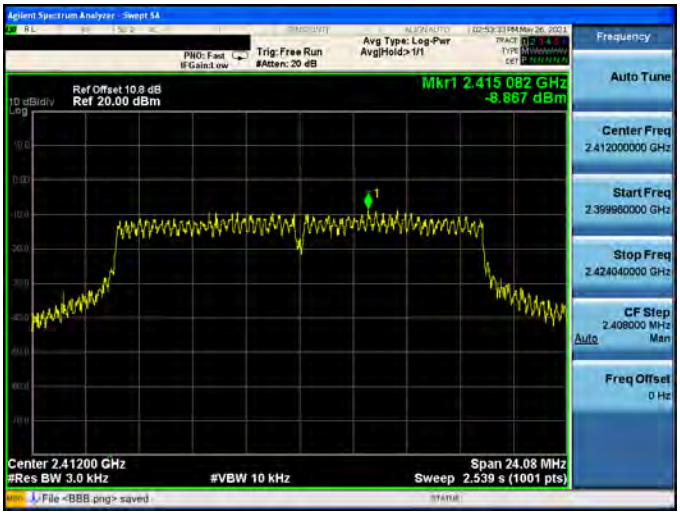
Beamforming on

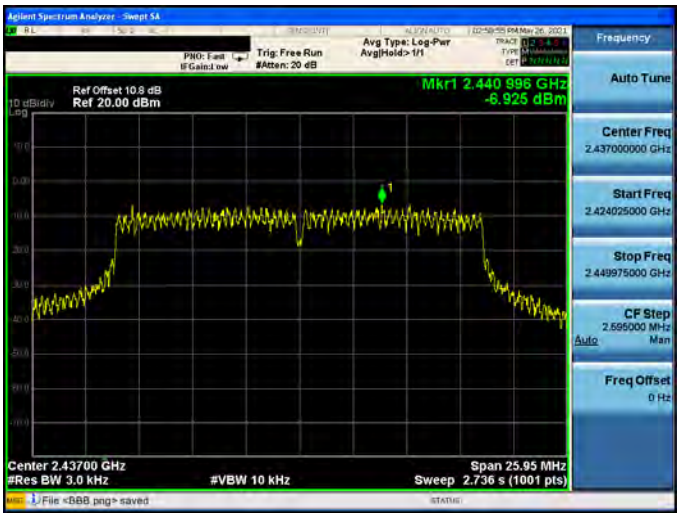
ANT-0			
Test Mode	Frequency (MHz)	Measurement (dBm/3 kHz)	Limit (dBm/ 3 kHz)
Mode 6	2412	-13.856	≤ 7.27
	2437	-9.533	≤ 7.27
	2462	-13.454	≤ 7.27
Mode 7	2422	-16.072	≤ 7.27
	2437	-15.080	≤ 7.27
	2452	-16.488	≤ 7.27
Mode 8	2412	-13.616	≤ 7.27
	2437	-11.189	≤ 7.27
	2462	-14.593	≤ 7.27
Mode 9	2422	-16.641	≤ 7.27
	2437	-16.844	≤ 7.27
	2452	-18.162	≤ 7.27

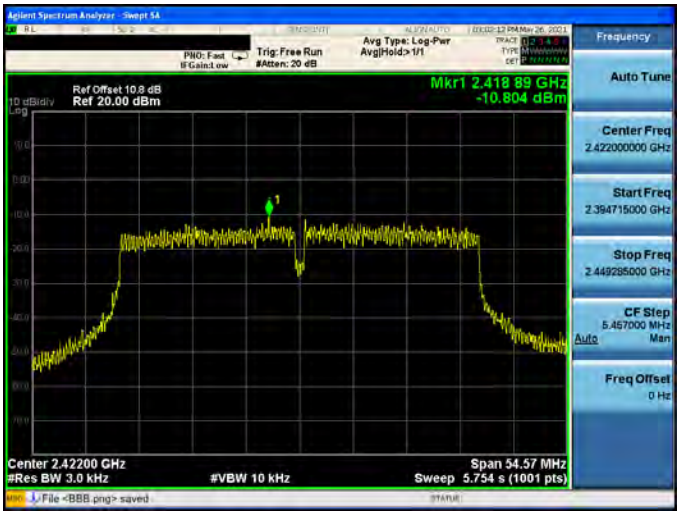
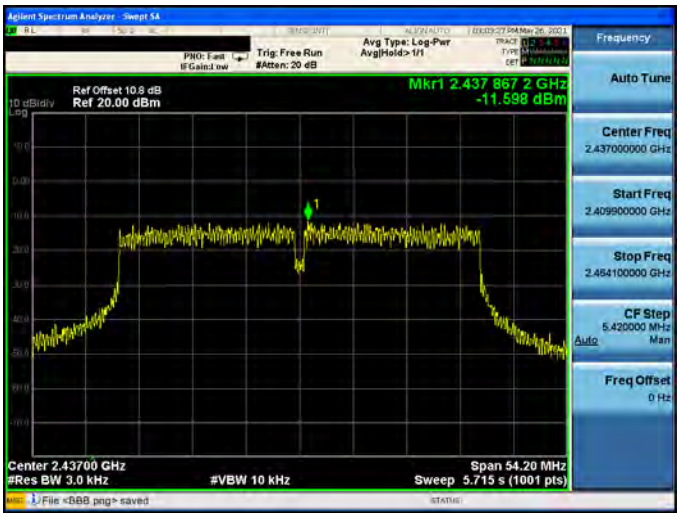
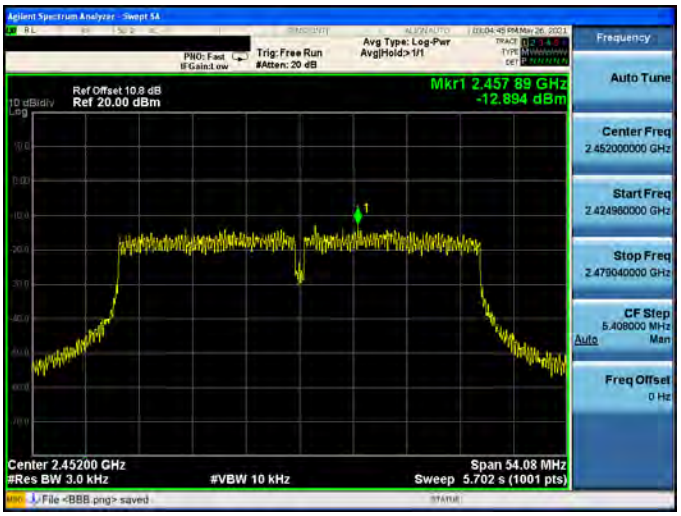
ANT-1			
Test Mode	Frequency (MHz)	Measurement (dBm/3 kHz)	Limit (dBm/ 3 kHz)
Mode 6	2412	-12.601	≤ 7.27
	2437	-9.550	≤ 7.27
	2462	-12.897	≤ 7.27
Mode 7	2422	-15.710	≤ 7.27
	2437	-14.590	≤ 7.27
	2452	-17.117	≤ 7.27
Mode 8	2412	-12.775	≤ 7.27
	2437	-10.150	≤ 7.27
	2462	-15.175	≤ 7.27
Mode 9	2422	-16.159	≤ 7.27
	2437	-16.191	≤ 7.27
	2452	-18.678	≤ 7.27

ANT-0+1			
Test Mode	Frequency (MHz)	Measurement (dBm/3 kHz)	Limit (dBm/ 3 kHz)
Mode 6	2412	-10.173	≤ 7.27
	2437	-6.531	≤ 7.27
	2462	-10.156	≤ 7.27
Mode 7	2422	-12.877	≤ 7.27
	2437	-11.818	≤ 7.27
	2452	-13.781	≤ 7.27
Mode 8	2412	-10.165	≤ 7.27
	2437	-7.628	≤ 7.27
	2462	-11.864	≤ 7.27
Mode 9	2422	-13.383	≤ 7.27
	2437	-13.495	≤ 7.27
	2452	-15.402	≤ 7.27

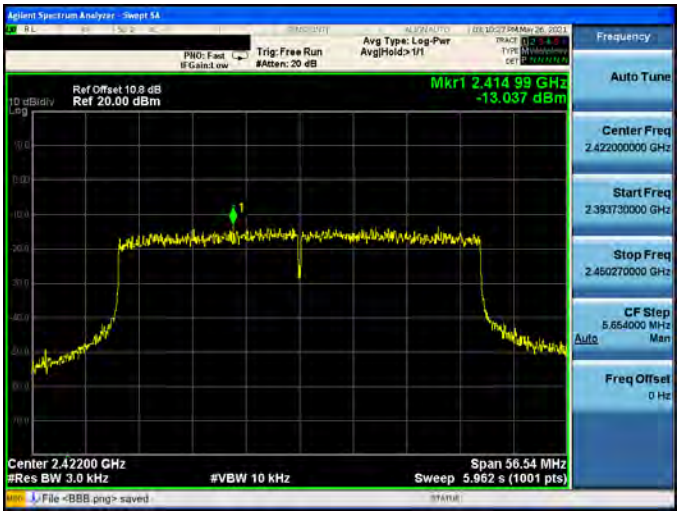
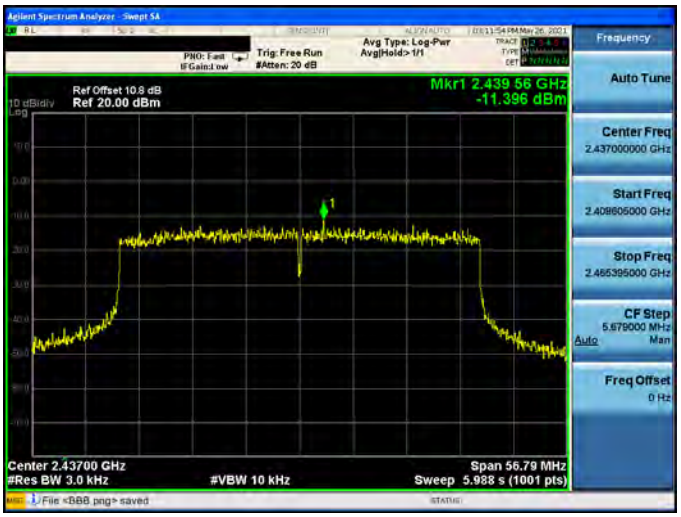
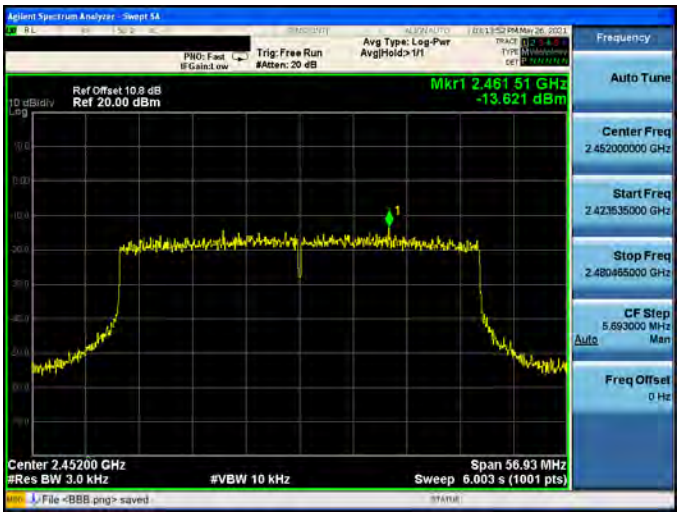
Mode 2: IEEE 802.11b Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 3: IEEE 802.11g Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

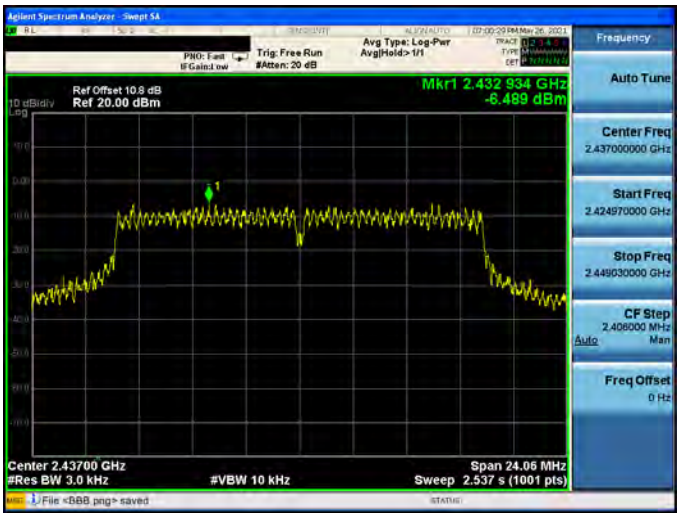
Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

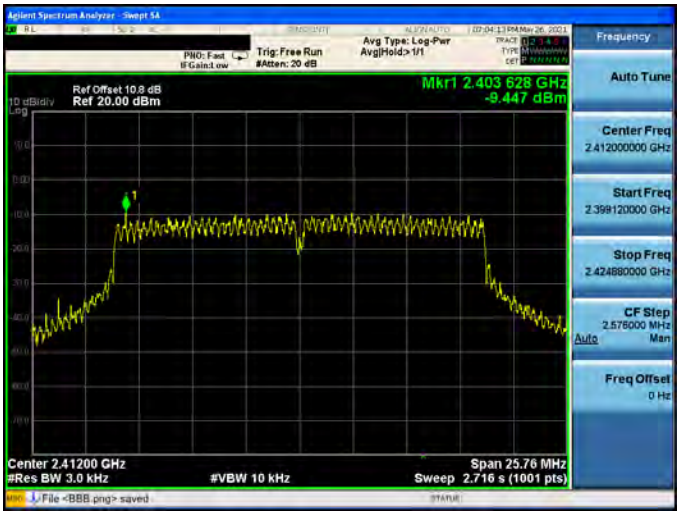
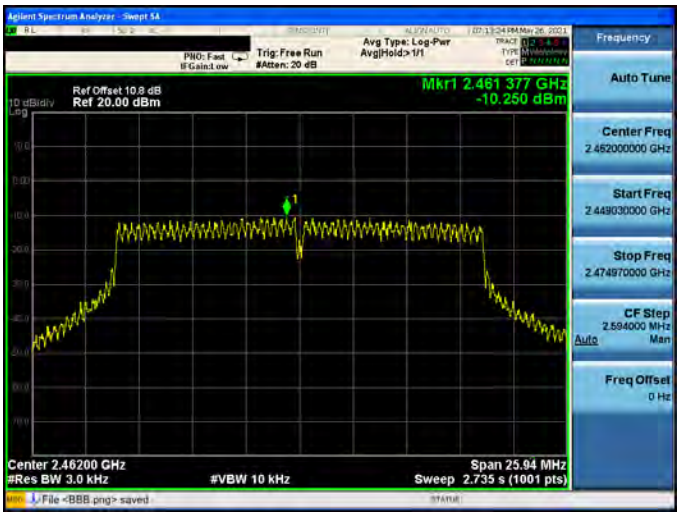
Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

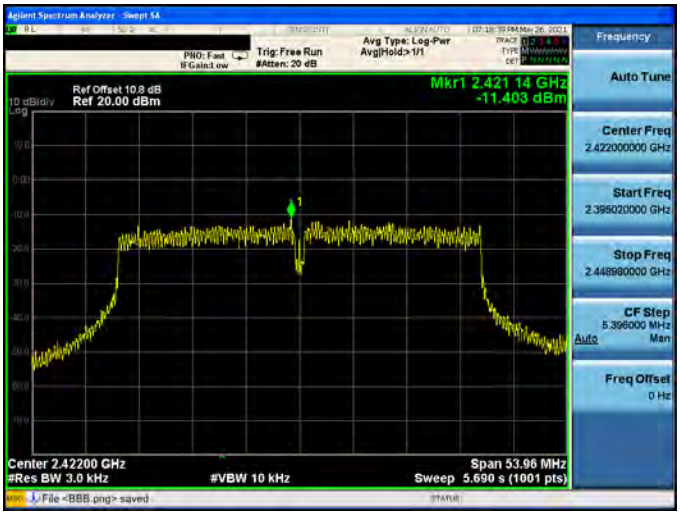
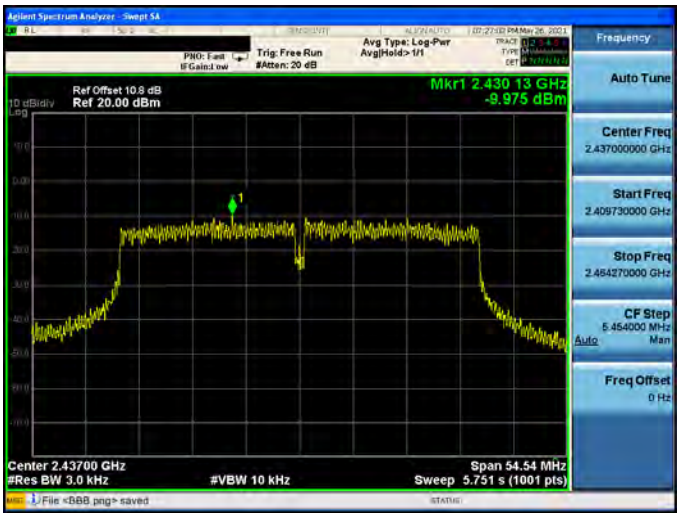
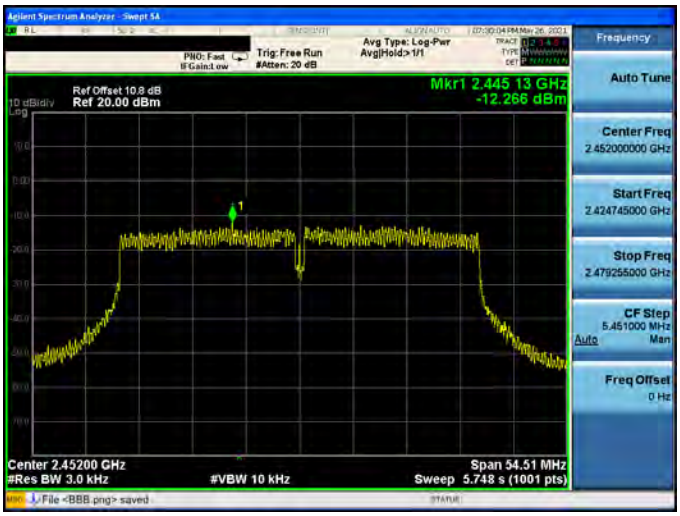
Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

Mode 2: IEEE 802.11b Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 3: IEEE 802.11g Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

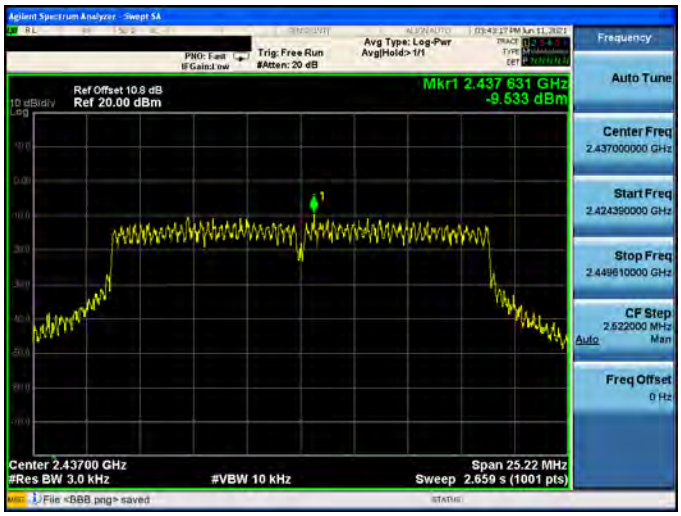
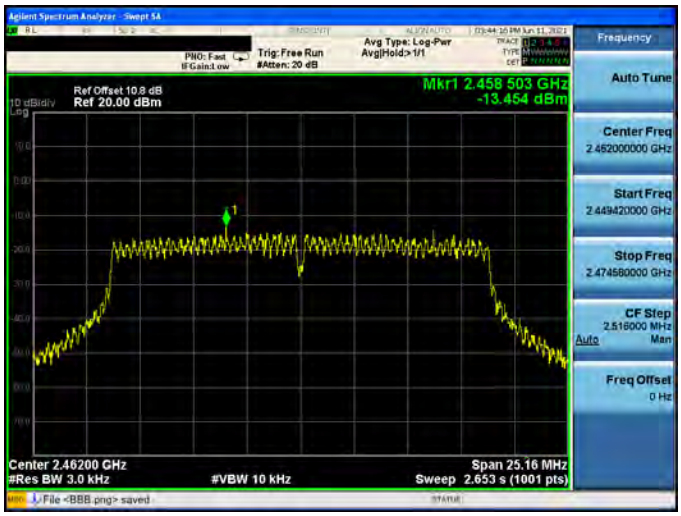
Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

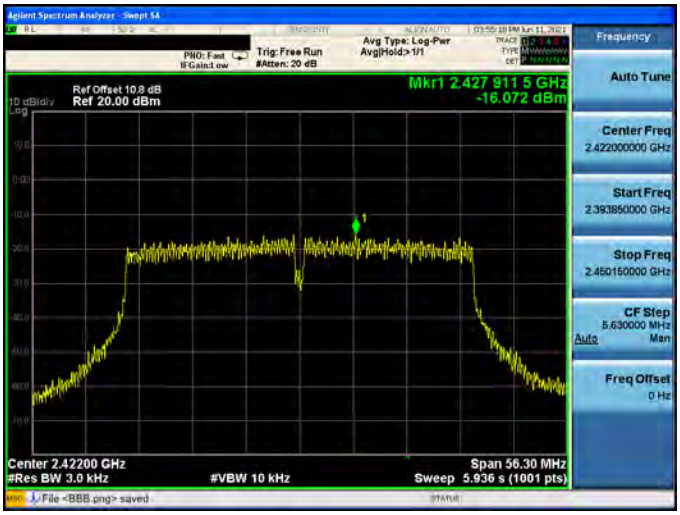
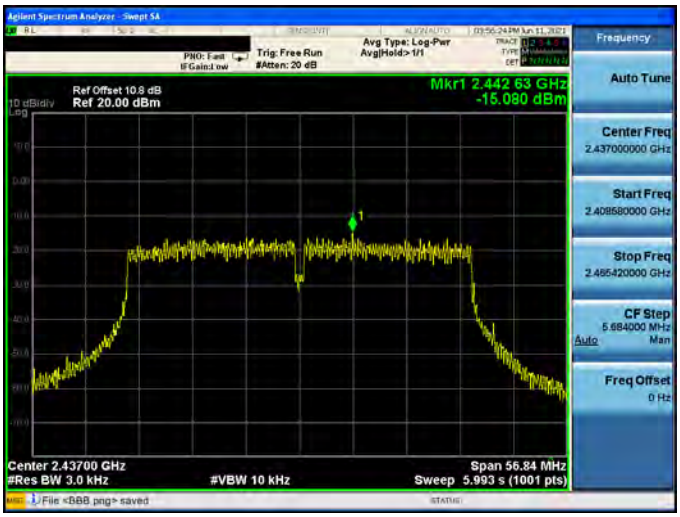
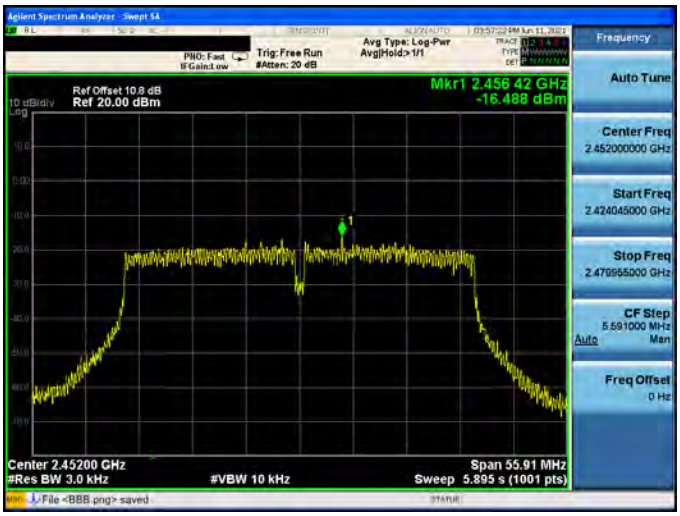
Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

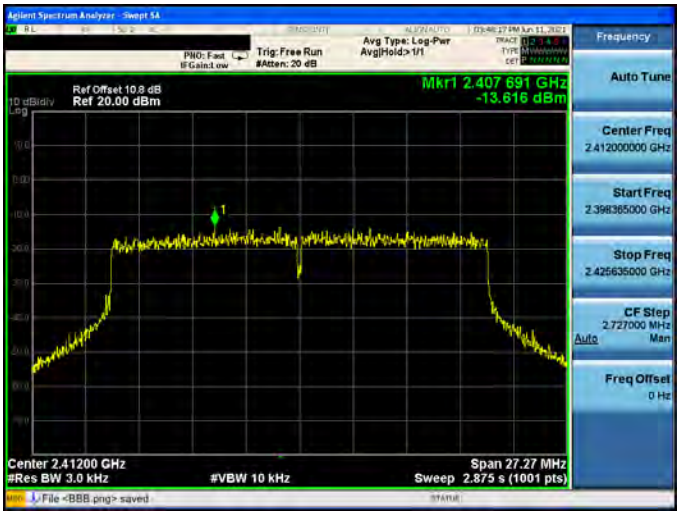
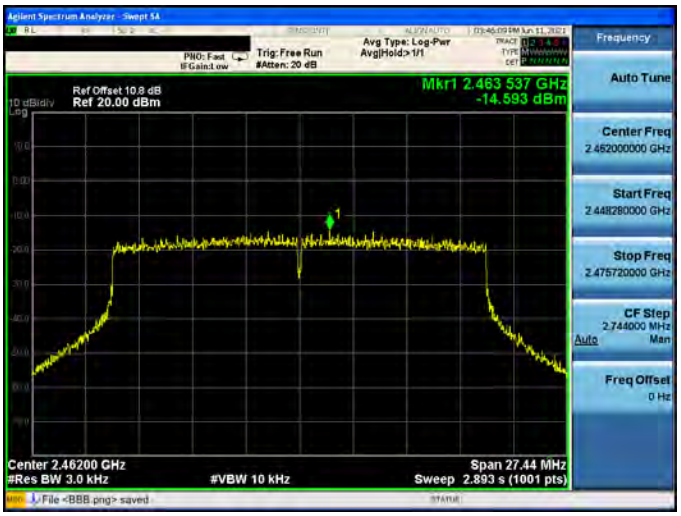
Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

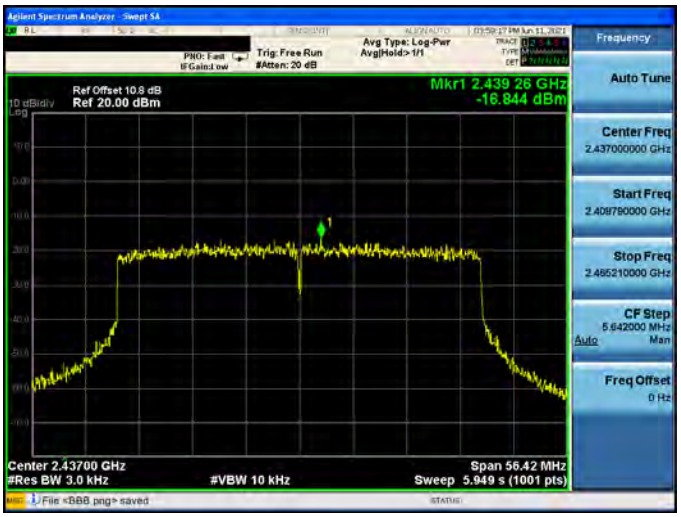
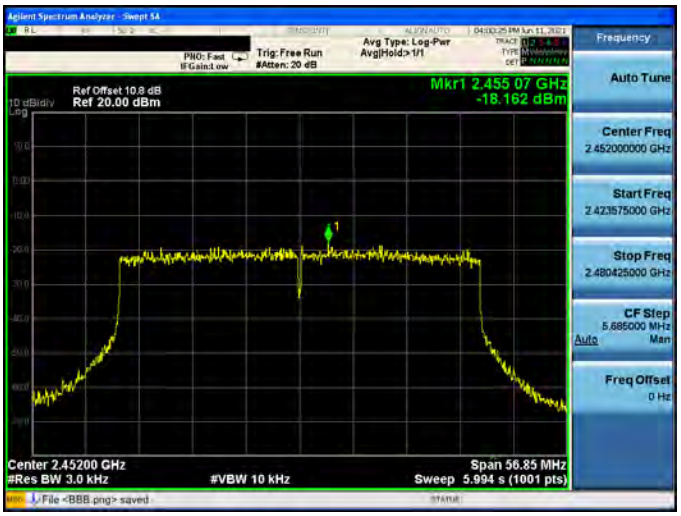
Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

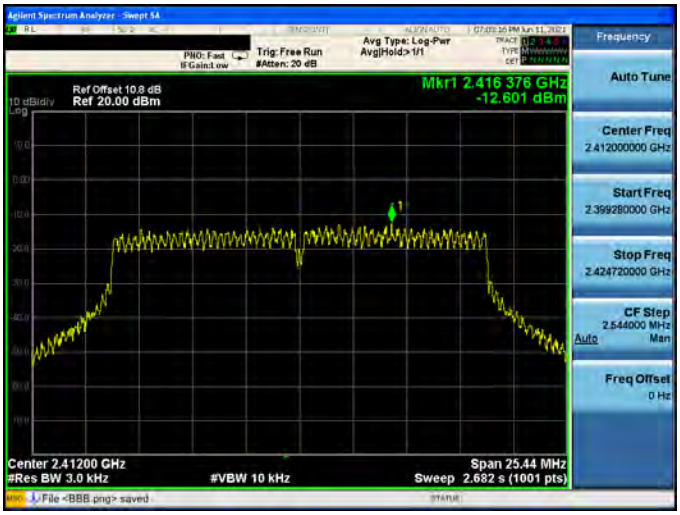
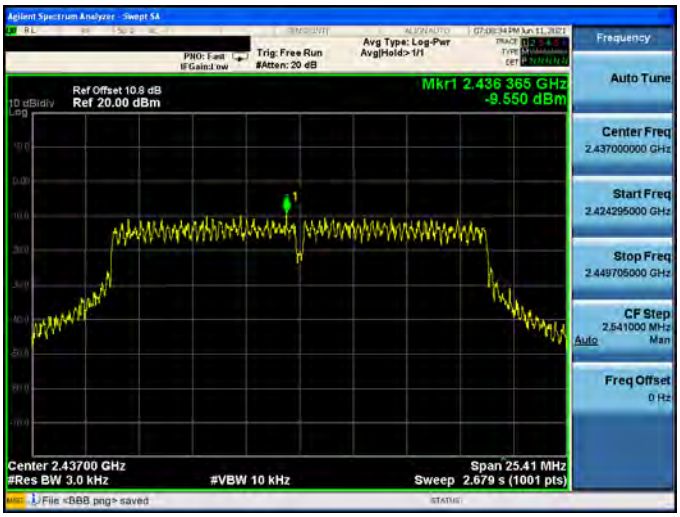
Beamforming on

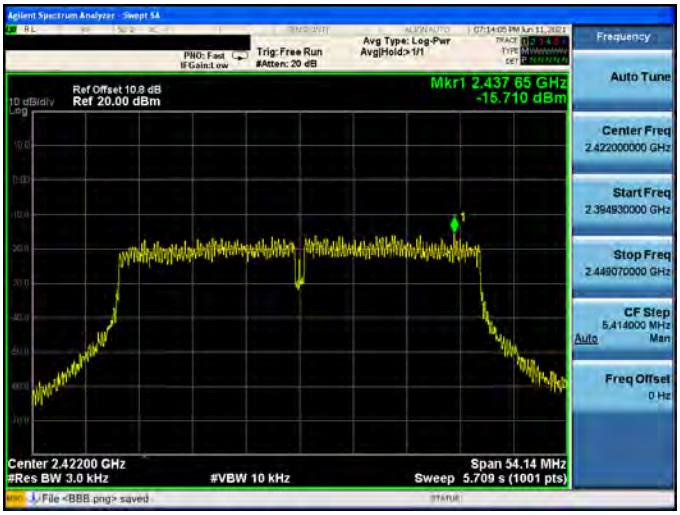
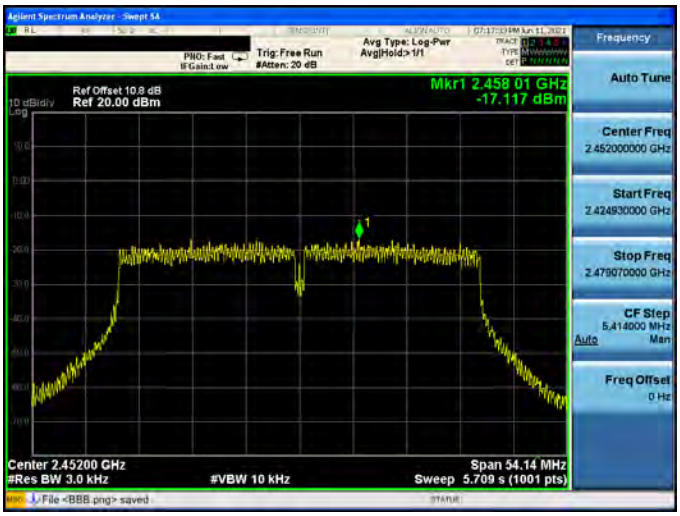
Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

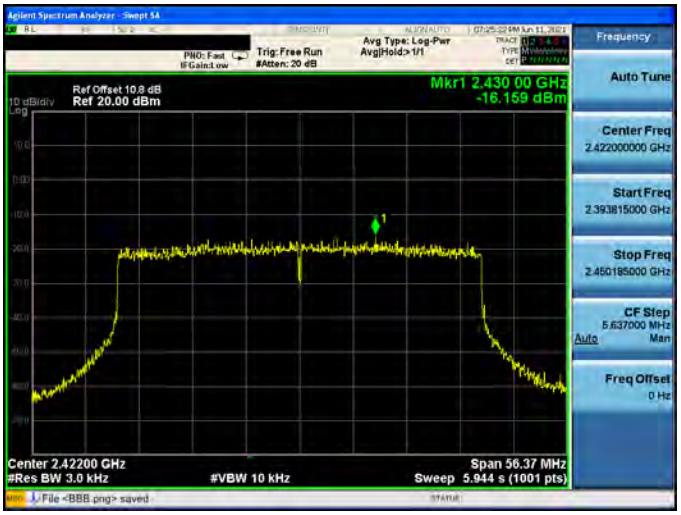
Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

Out of Band Conducted Emissions Measurement

■ **Test Graphs**

Reference level

Mode 2: IEEE 802.11b Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 3: IEEE 802.11g Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

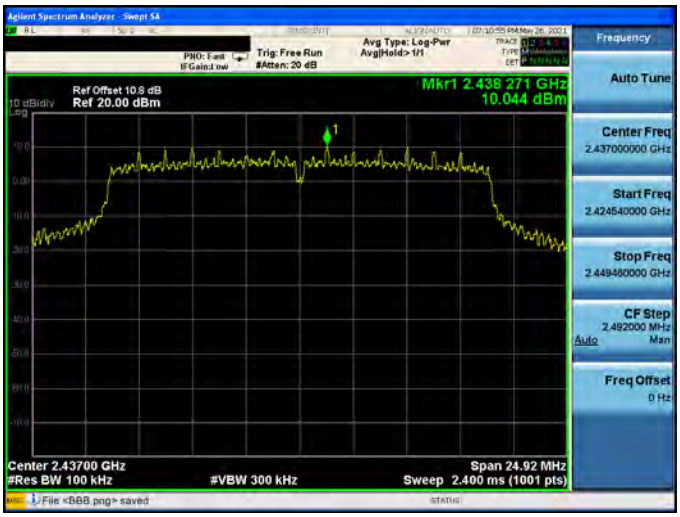
Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

Mode 2: IEEE 802.11b Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 3: IEEE 802.11g Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

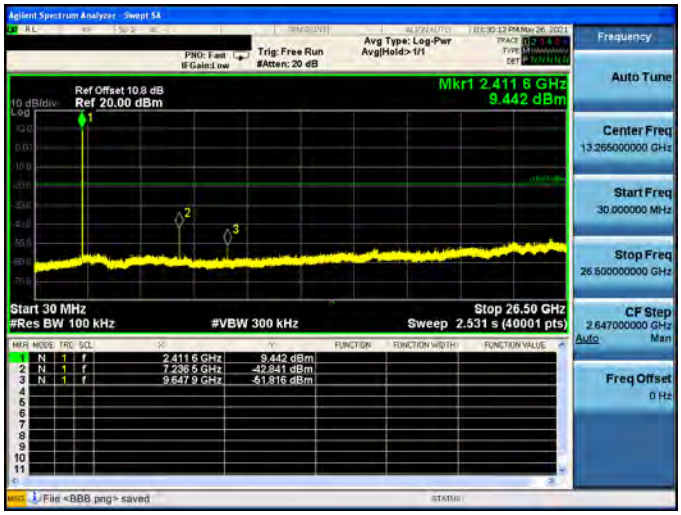
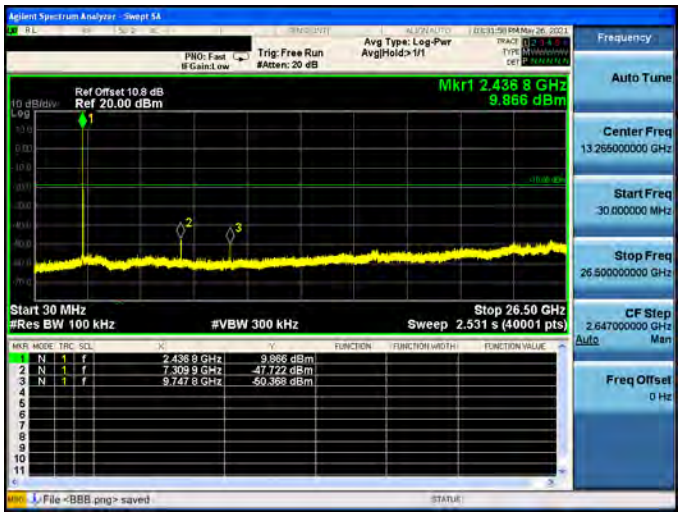
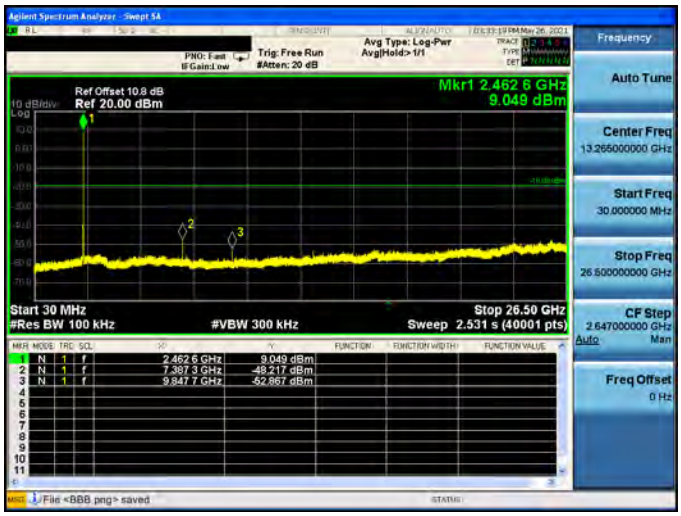
Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

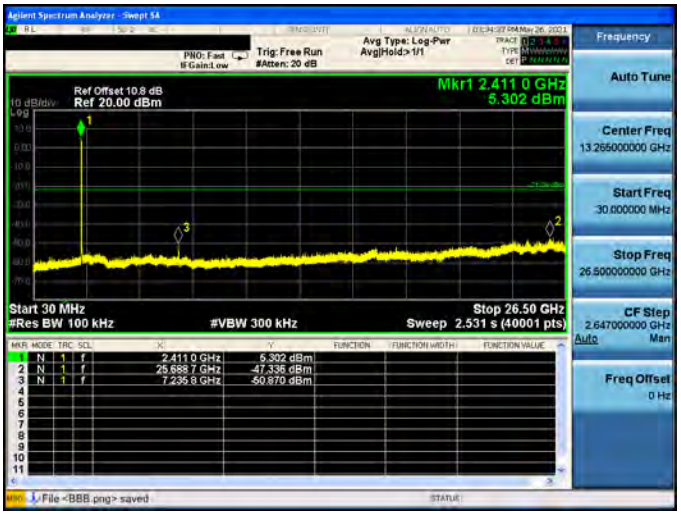
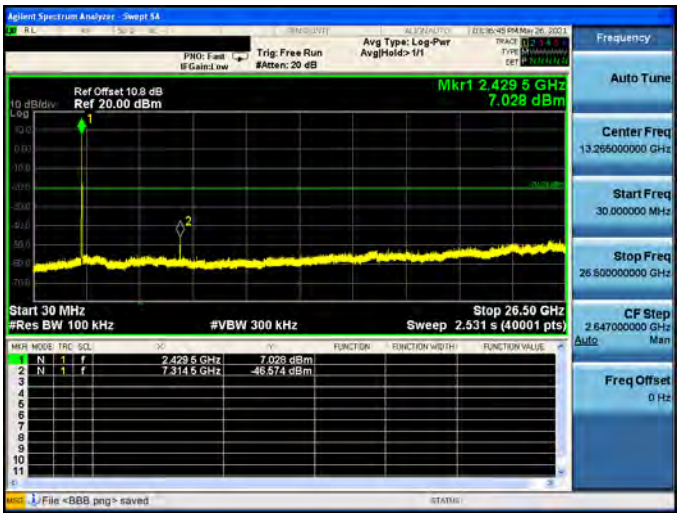
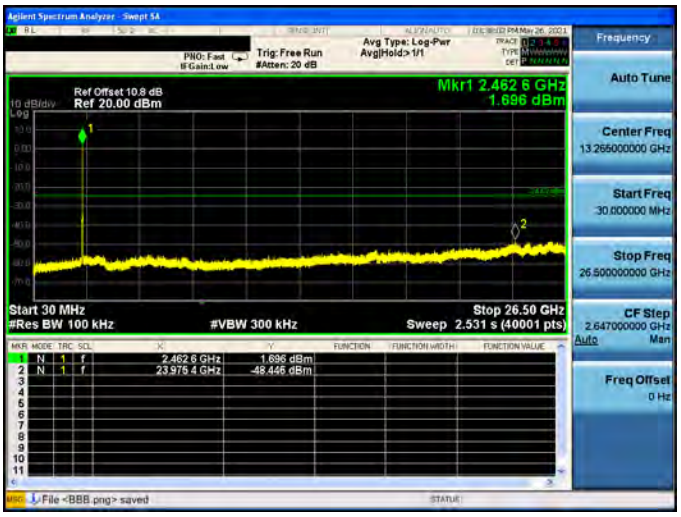
Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

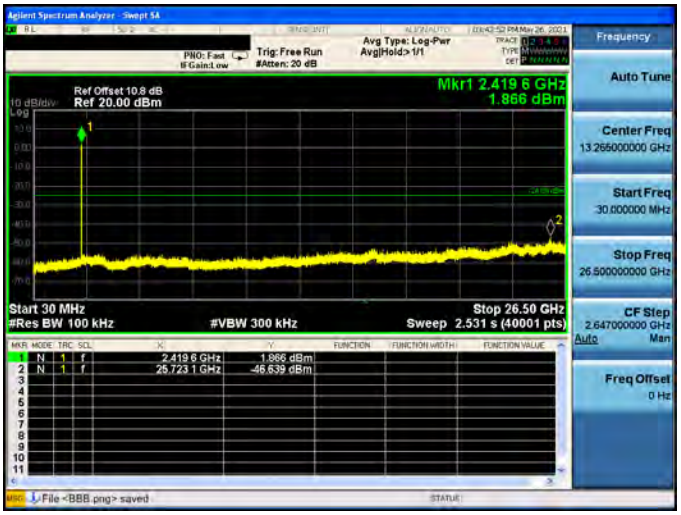
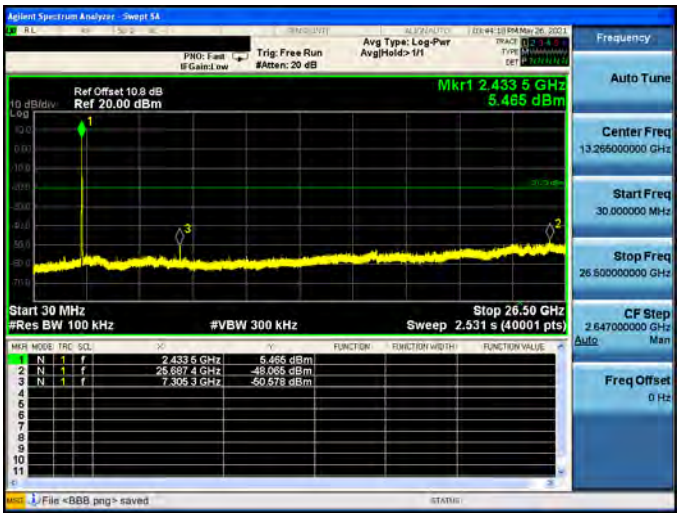
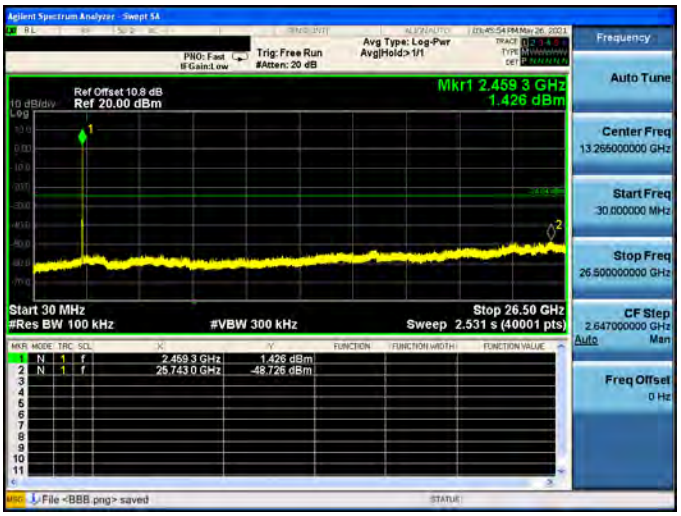
Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

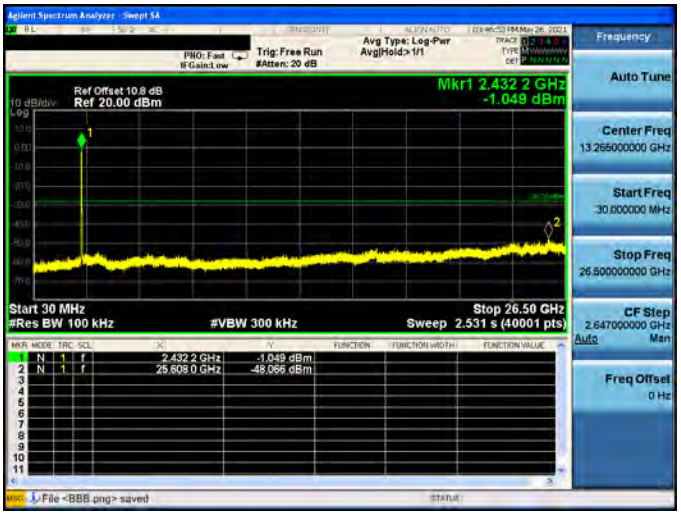
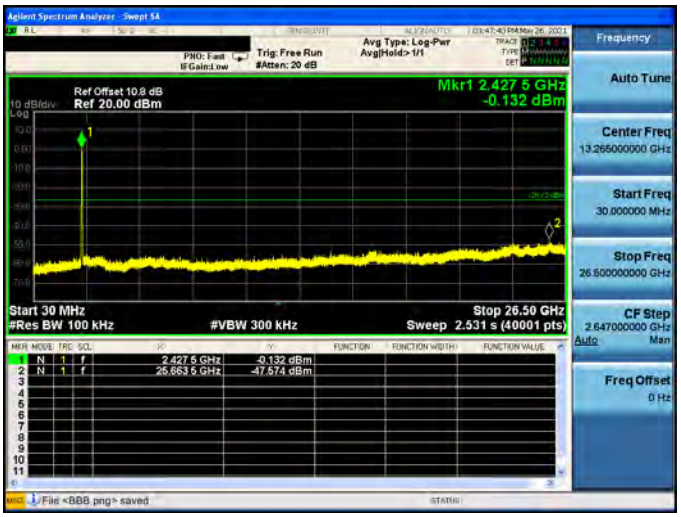
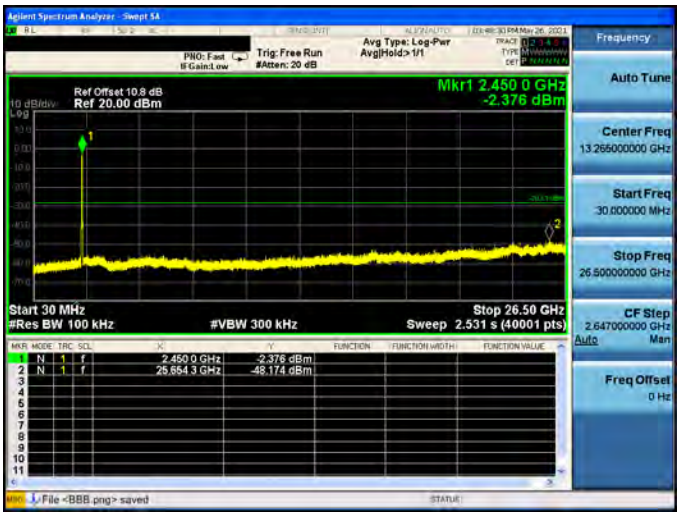
Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

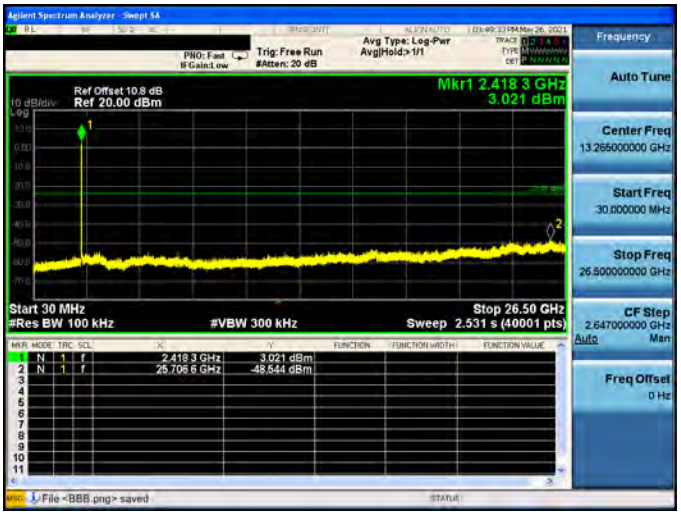
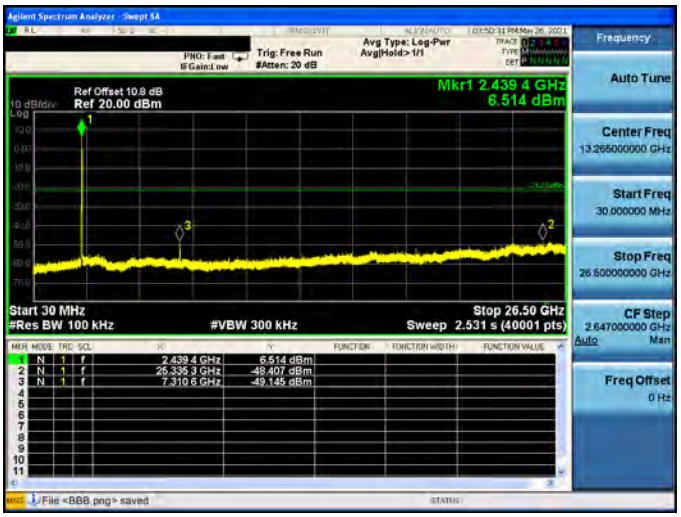
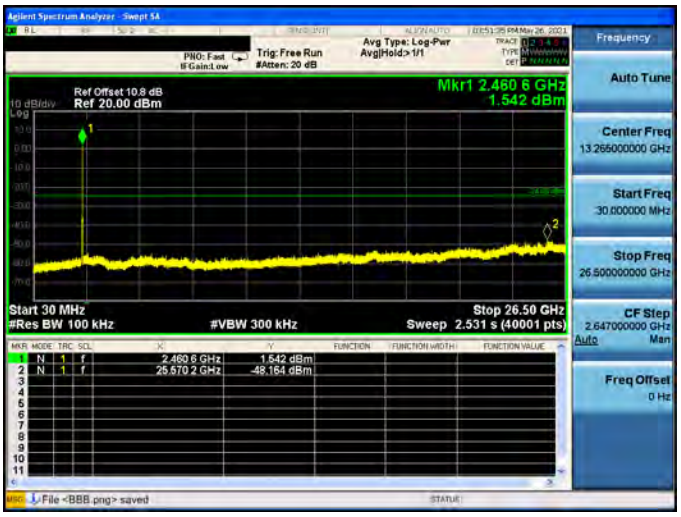
Out of Band Conducted Emissions

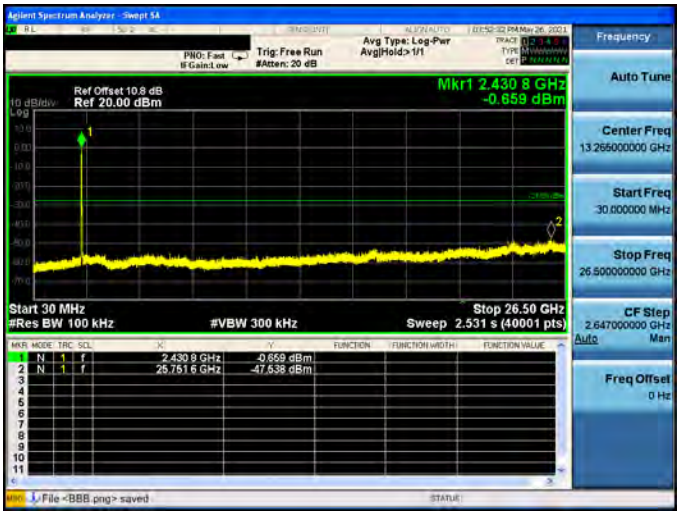
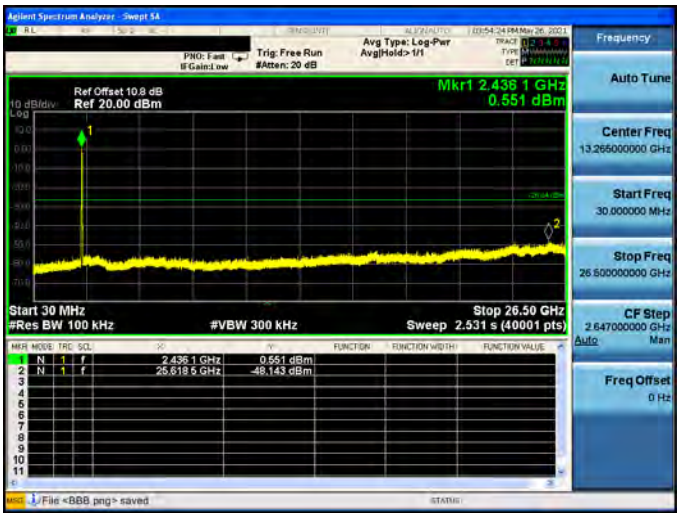
Mode 2: IEEE 802.11b Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

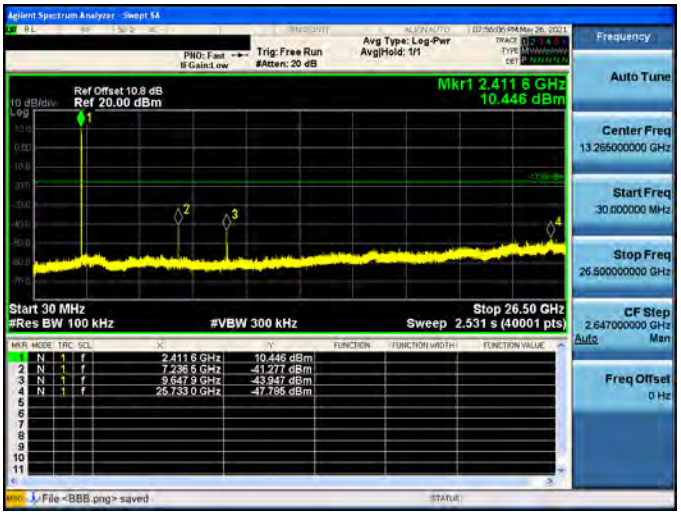
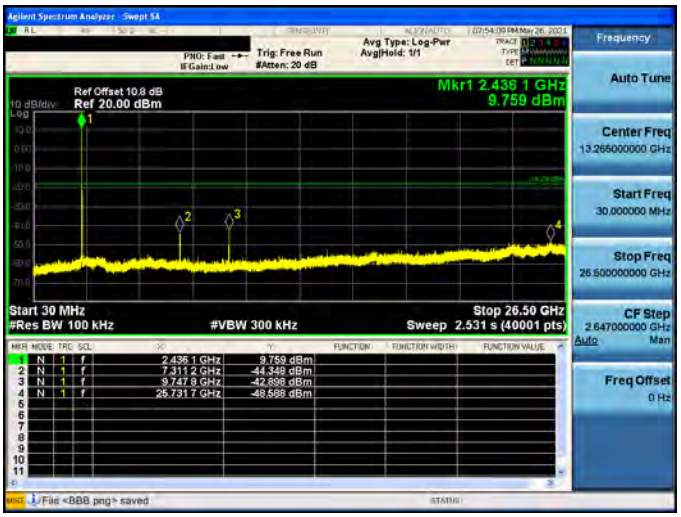
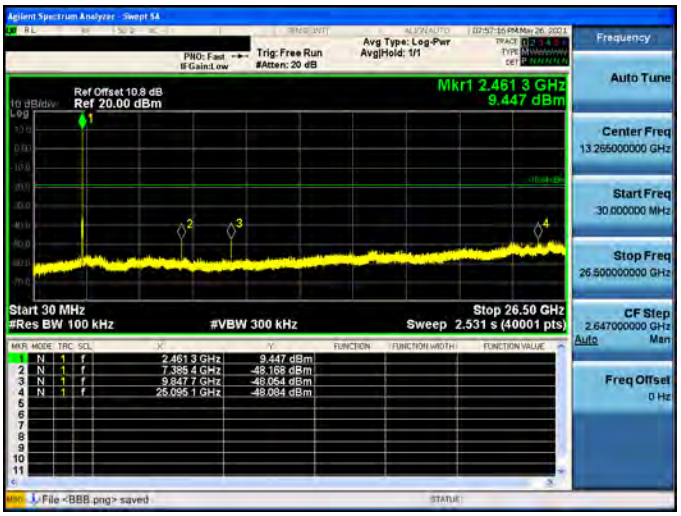
Mode 3: IEEE 802.11g Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

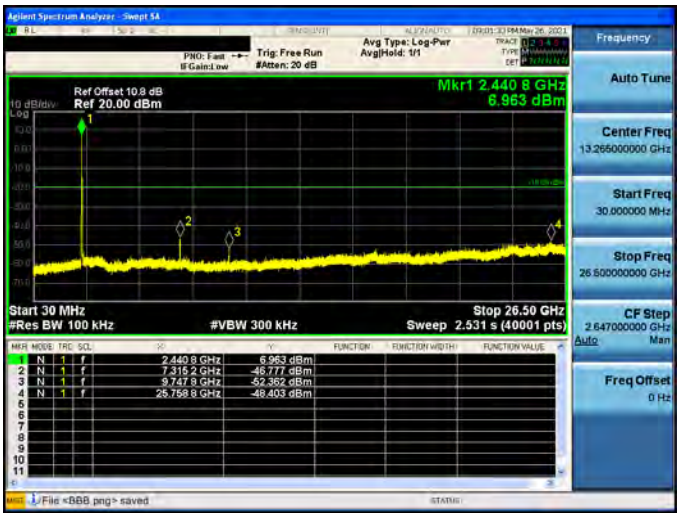
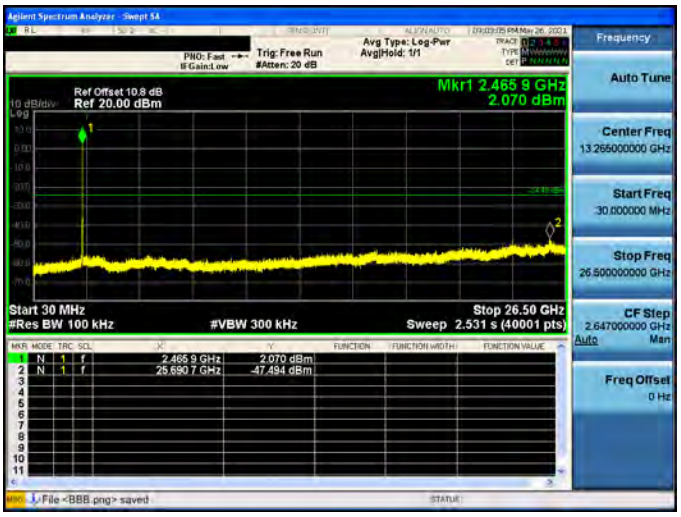
Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

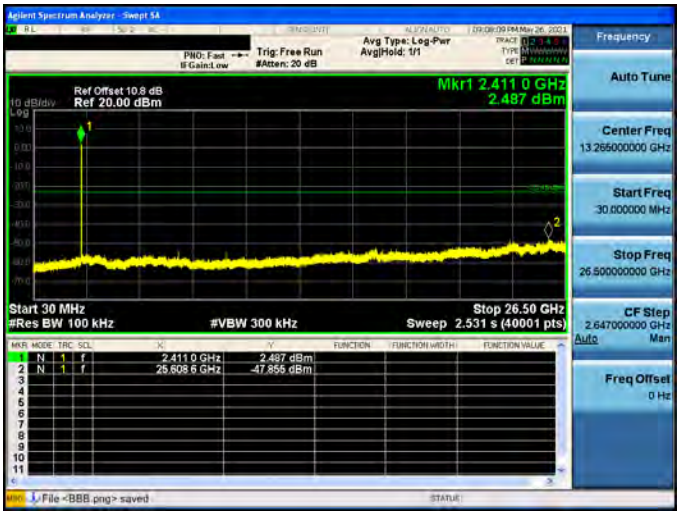
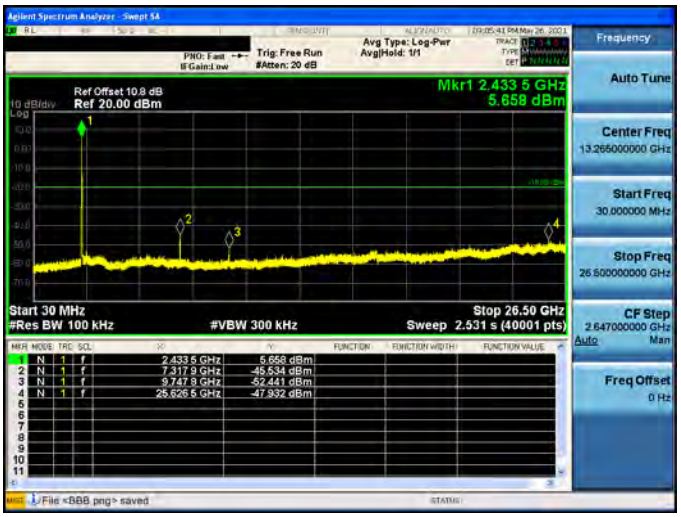
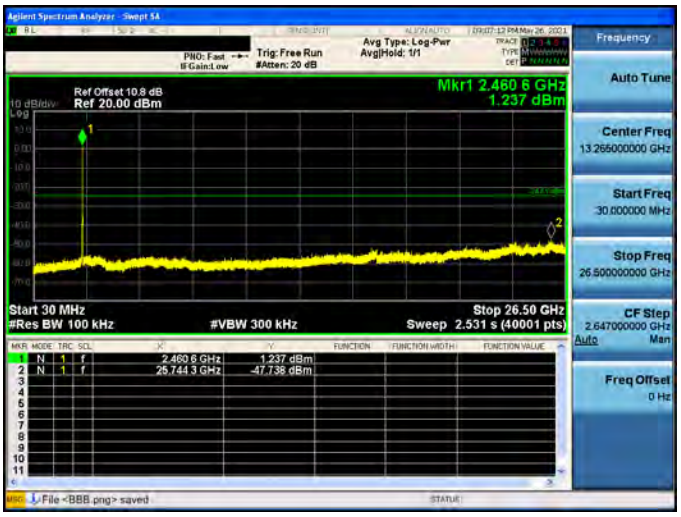
Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

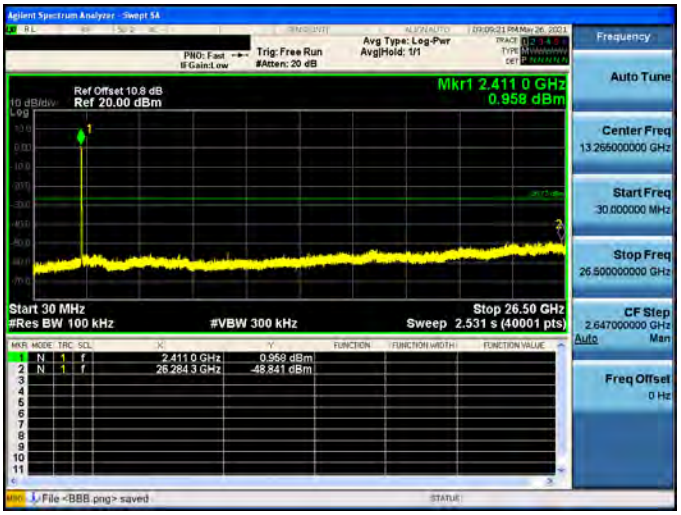
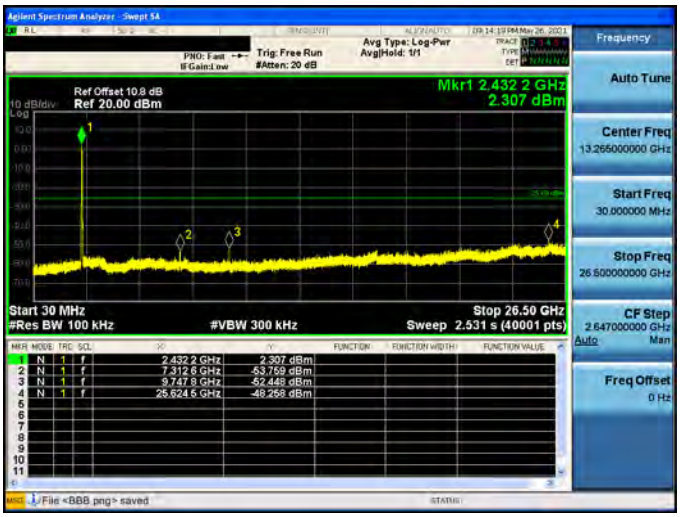
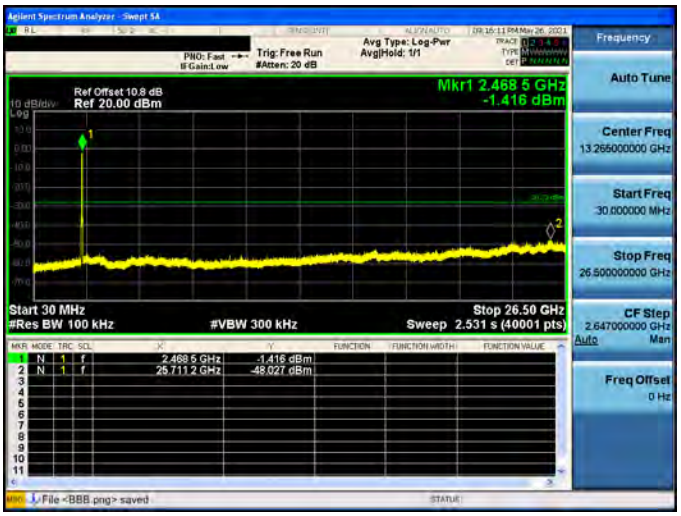
Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-0	
2412 MHz	
2437 MHz	
2462 MHz	

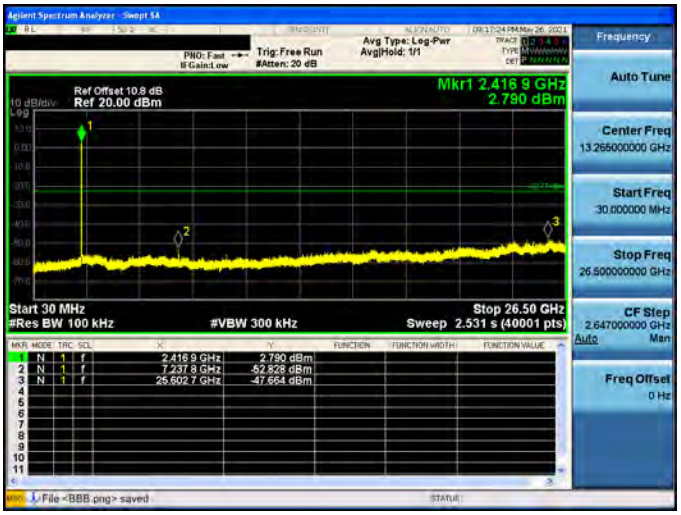
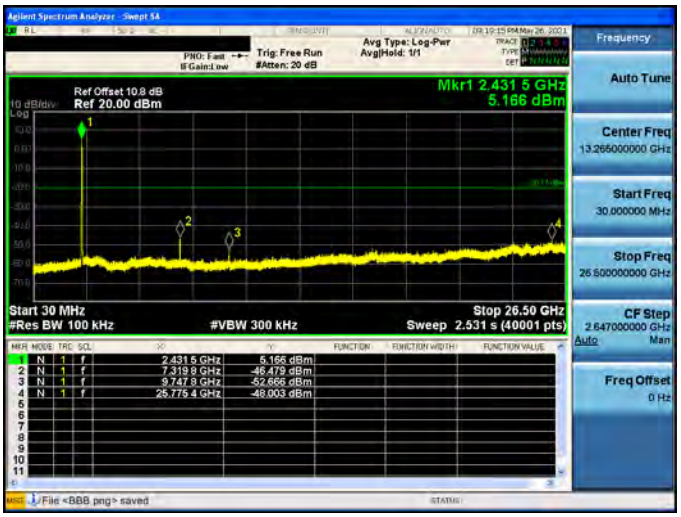
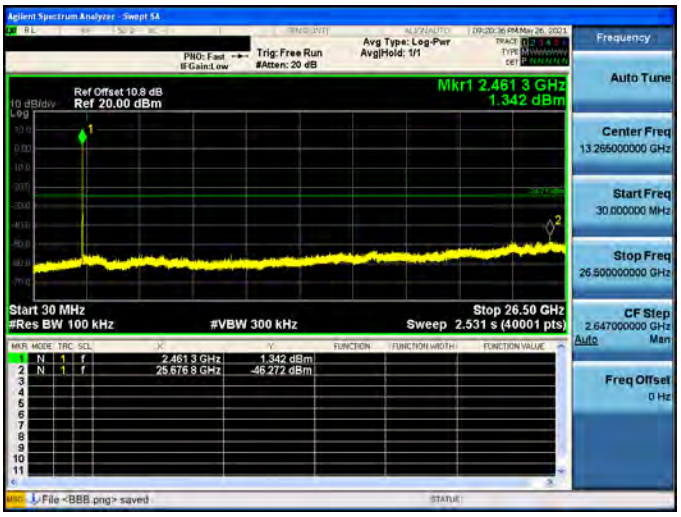
Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-0	
2422 MHz	
2437 MHz	
2452 MHz	

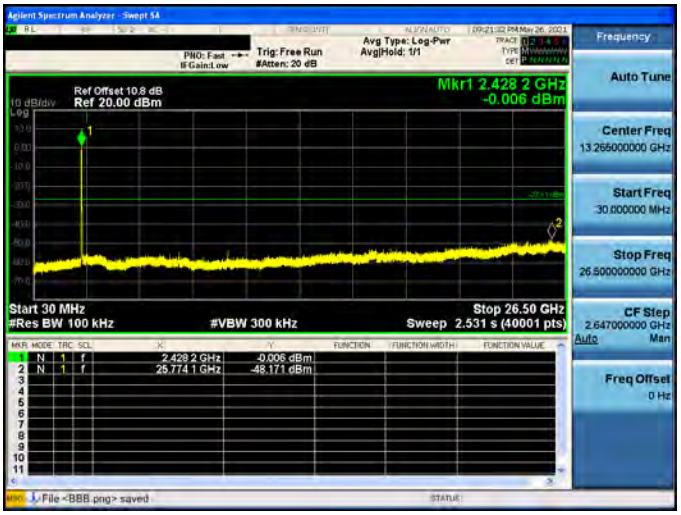
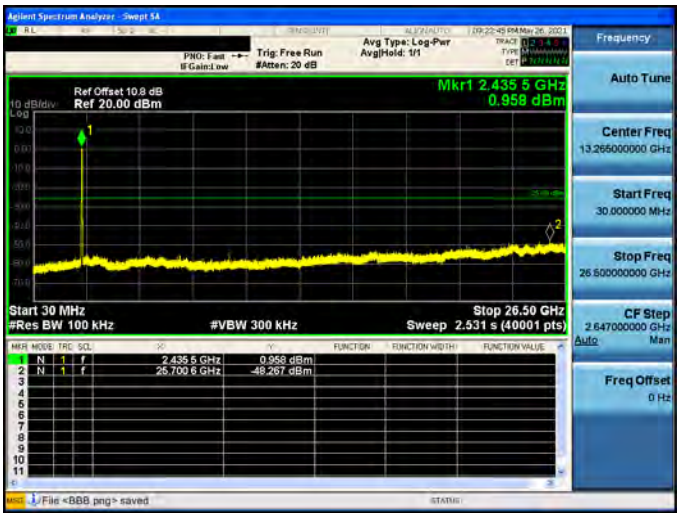
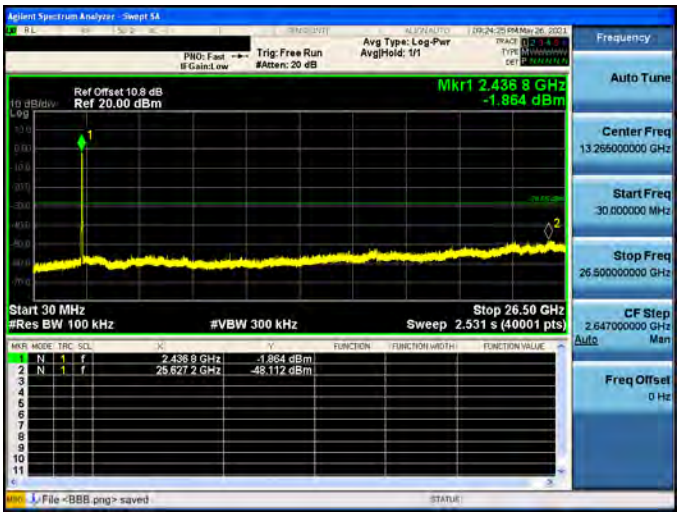
Mode 2: IEEE 802.11b Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

Mode 3: IEEE 802.11g Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

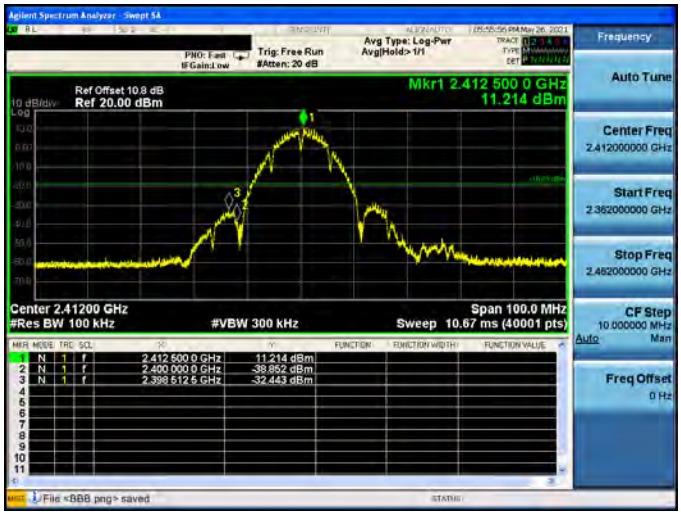
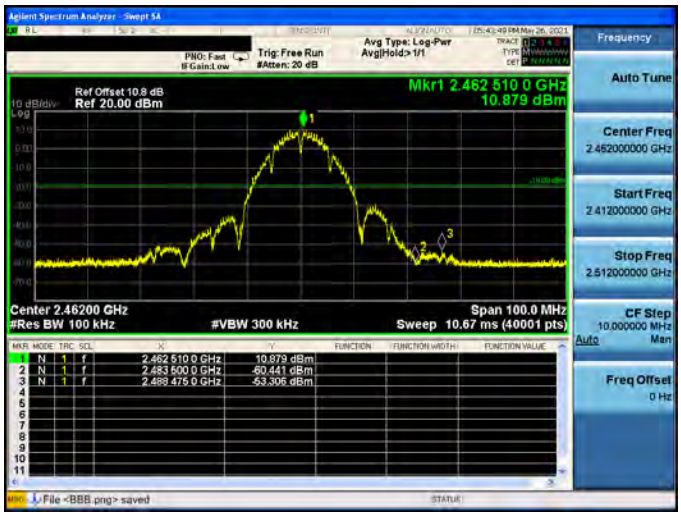
Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

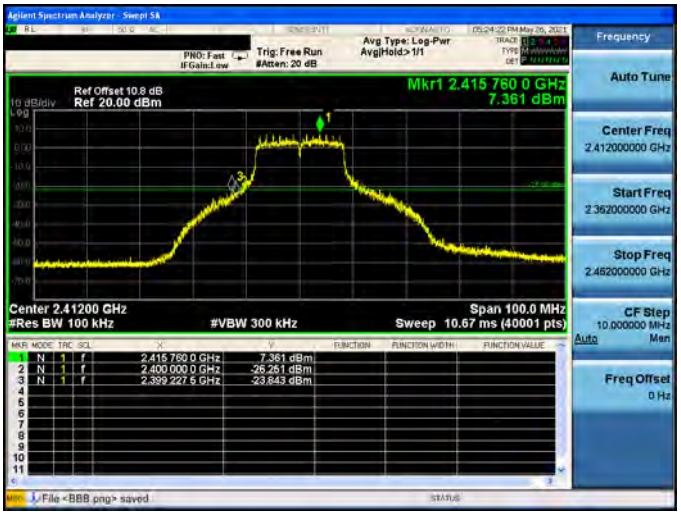
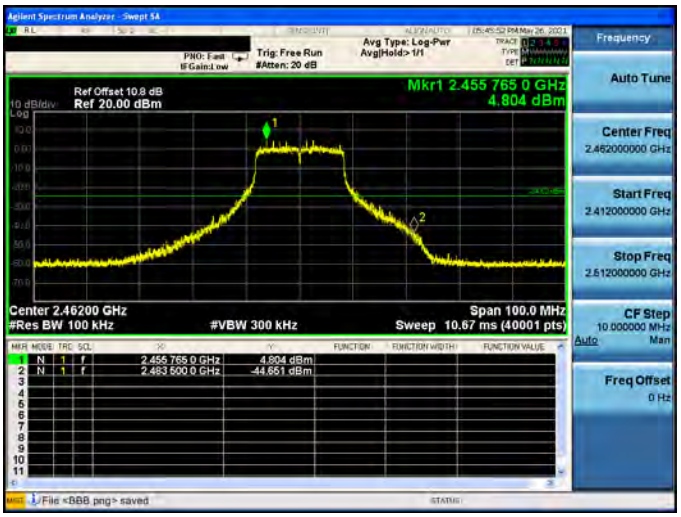
Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

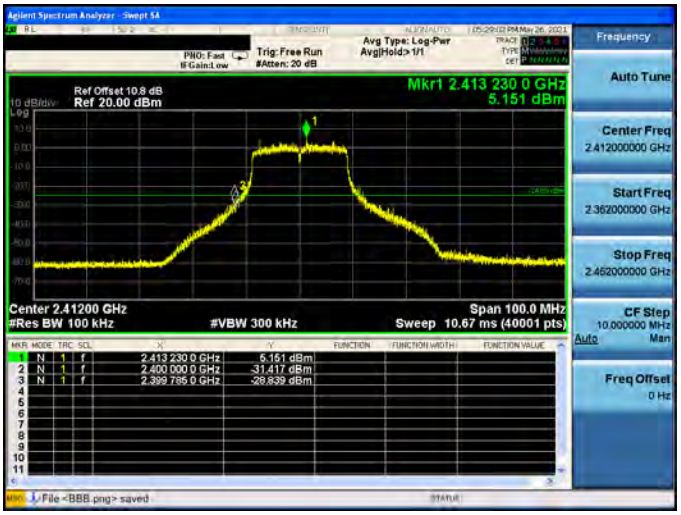
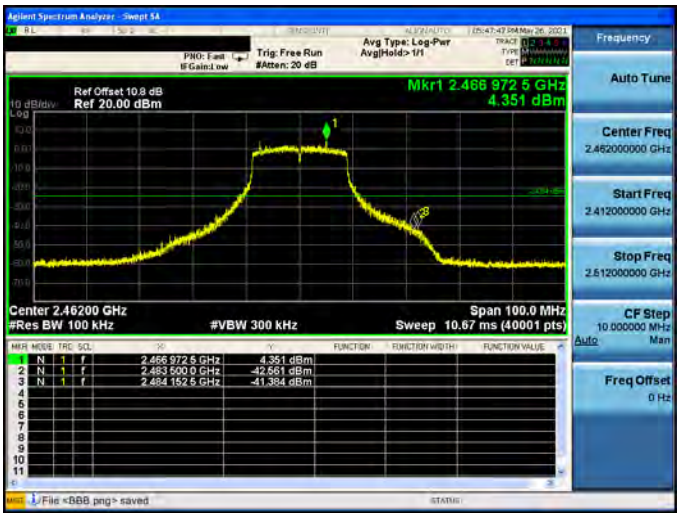
Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-1	
2412 MHz	
2437 MHz	
2462 MHz	

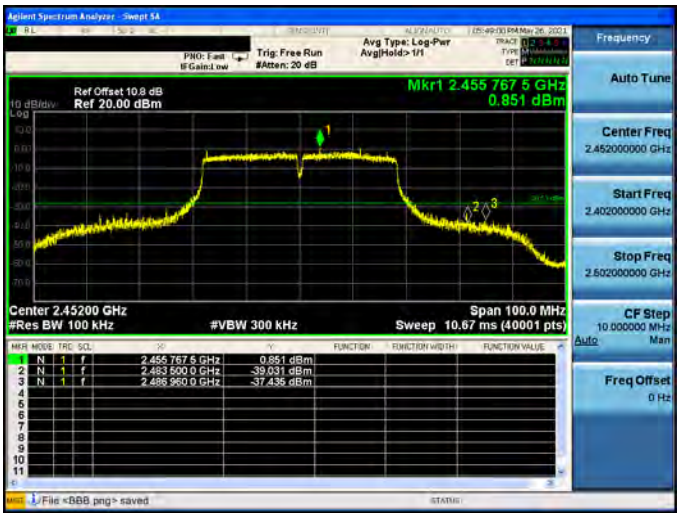
Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-1	
2422 MHz	
2437 MHz	
2452 MHz	

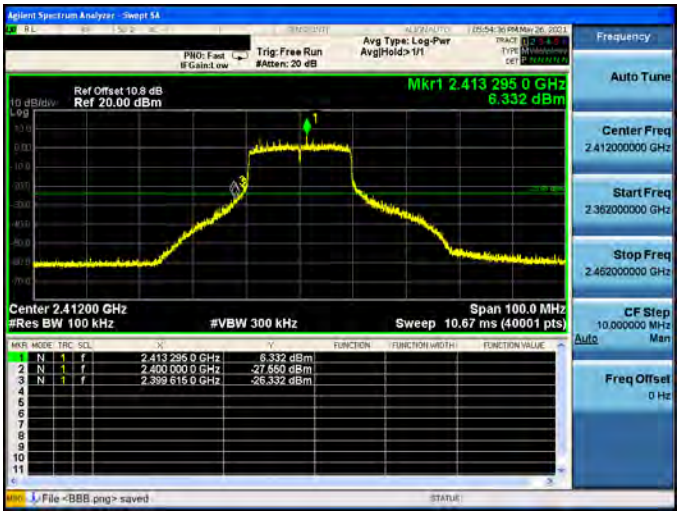
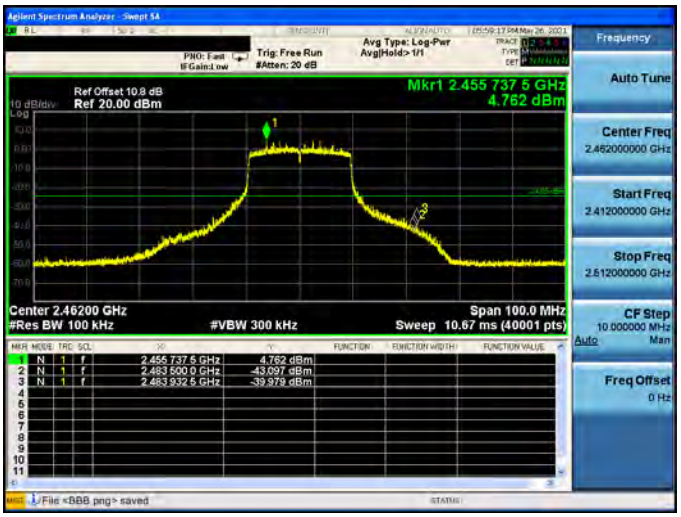
Conducted Band Edge

Mode 2: IEEE 802.11b Continuous TX mode_ANT-0	
2412 MHz	
2462 MHz	

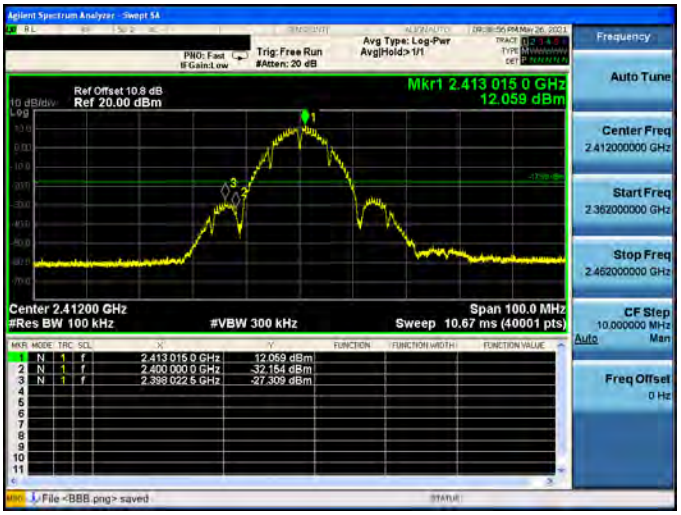
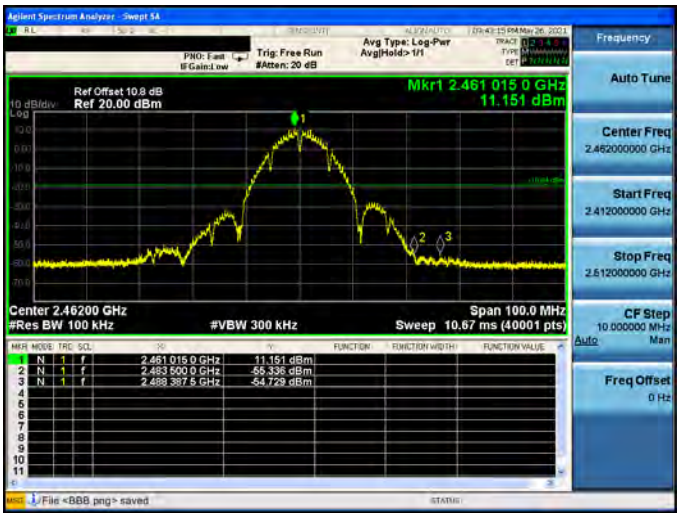
Mode 3: IEEE 802.11g Continuous TX mode_ANT-0	
2412 MHz	
2462 MHz	

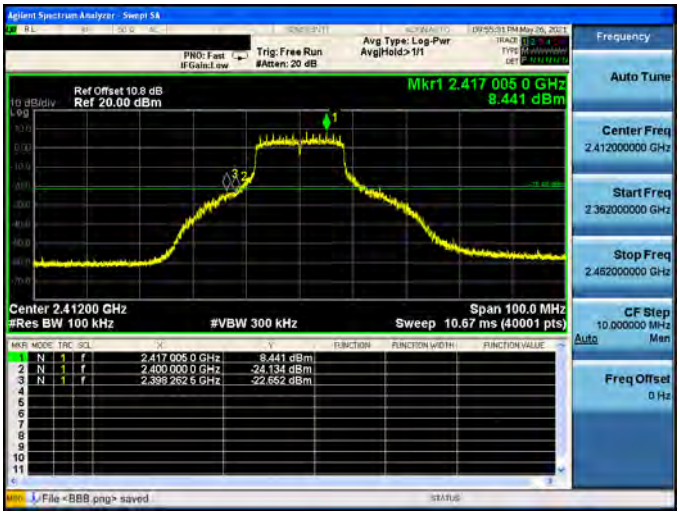
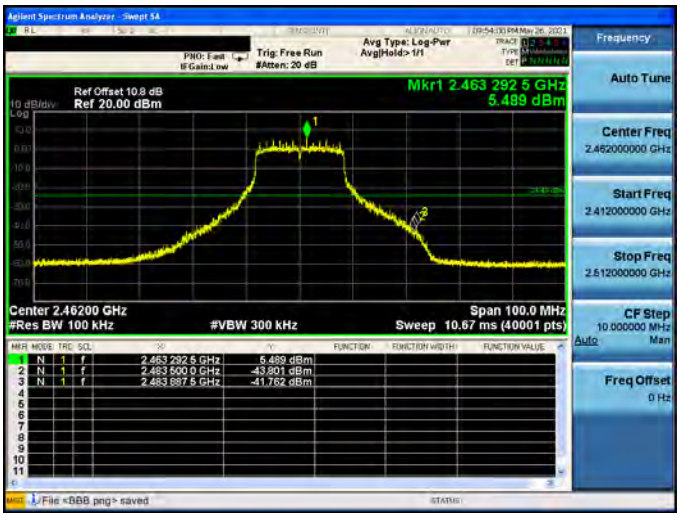
Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-0	
2412 MHz	
2462 MHz	

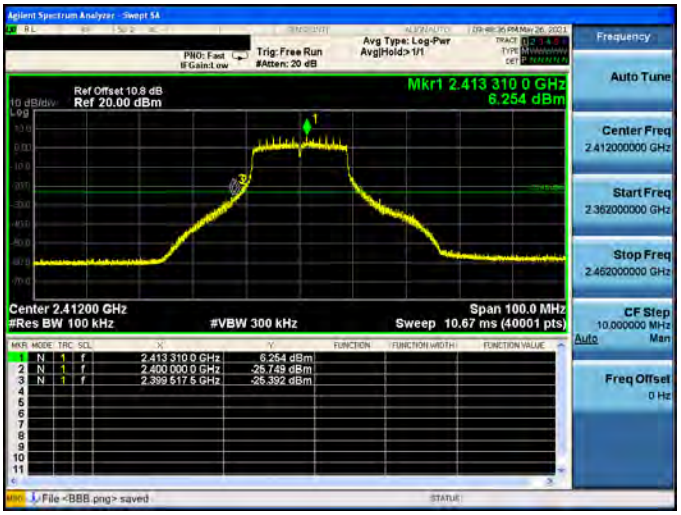
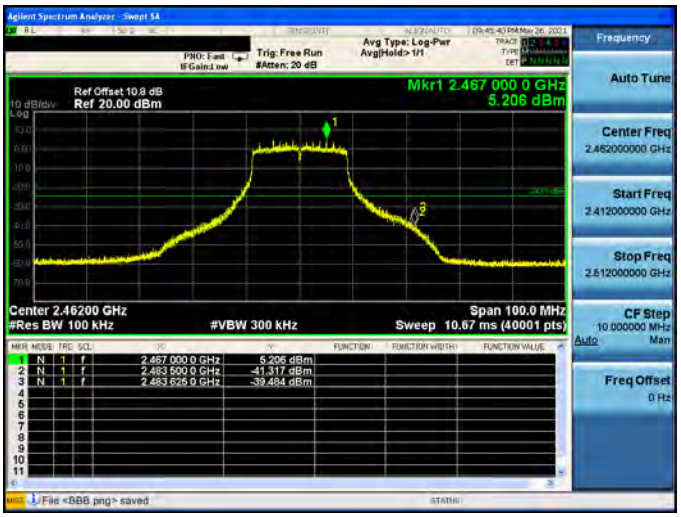
Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-0	
2422 MHz	
2452 MHz	

Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-0	
2412 MHz	
2462 MHz	

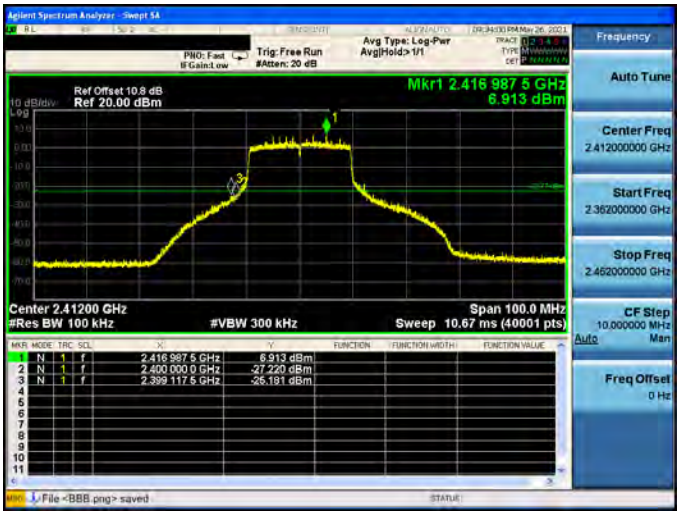
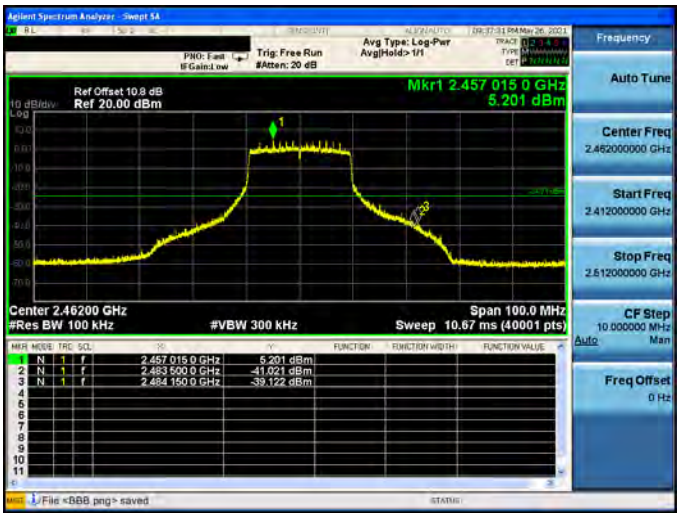
Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-0	
2422 MHz	
2452 MHz	

Mode 2: IEEE 802.11b Continuous TX mode_ANT-1	
2412 MHz	
2462 MHz	

Mode 3: IEEE 802.11g Continuous TX mode_ANT-1	
2412 MHz	
2462 MHz	

Mode 6: IEEE 802.11n 2.4 GHz 20 MHz(256QAM) Continuous TX mode_ANT-1	
2412 MHz	
2462 MHz	

Mode 7: IEEE 802.11n 2.4 GHz 40 MHz(256QAM) Continuous TX mode_ANT-1	
2422 MHz	
2452 MHz	

Mode 8: IEEE 802.11ax 2.4 GHz 20 MHz Continuous TX mode_ANT-1	
2412 MHz	
2462 MHz	

Mode 9: IEEE 802.11ax 2.4 GHz 40 MHz Continuous TX mode_ANT-1	
2422 MHz	
2452 MHz