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FCC UNII REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
July 21, 2023

Test Site/Location:
74, Seoicheon-ro 578 beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2307-FC020-R1

FCC ID:	**A3LSMX616B**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**
Model:	SM-X616B
Additional Model:	-
EUT Type:	Tablet
Modulation type	OFDM
FCC Classification:	Unlicensed National Information Infrastructure(NII)
FCC Rule Part(s):	Part 15.407

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

REVIEWED BY

Report prepared by : Chang Hee Hwang
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2307-FC020	July 13, 2023	- First Approval Report
HCT-RF-2307-FC020-R1	July 21, 2023	- Revised The Summary of Test results on page 29.

Table of Contents

1. GENERAL INFORMATION

EUT DESCRIPTION

Model	SM-X616B	
Additional Model	-	
EUT Type	Tablet	
Power Supply	DC 3.85 V	
Modulation Type	OFDM : 802.11a, 802.11n, 802.11ac	
Frequency Range (MHz)	U-NII-1	20 MHz BW : 5180 - 5240 40 MHz BW : 5190 - 5230 80 MHz BW : 5210
	U-NII-2A	20 MHz BW : 5260 - 5320 40 MHz BW : 5270 - 5310 80 MHz BW : 5290
	U-NII-2C	20 MHz BW : 5500 - 5720 40 MHz BW : 5510 - 5710 80 MHz BW : 5530 – 5690
	U-NII-3	20 MHz BW : 5745 - 5825 40 MHz BW : 5755 - 5795 80 MHz BW : 5775
Straddle channel	Supported	
TDWR Band	Supported	
Dynamic Frequency Selection	Slave without radar detection	
Date(s) of Tests	May 24, 2023 ~ July 13, 2023	
Serial number	Radiated: R32W500WXYD Conducted : R32W500WYVV	

ANTENNA CONFIGURATIONS

1. Antenna configuration

Configurations	SISO		MIMO	
	Ant.1	Ant.2	CDD	SDM
802.11a	X	O	O	X
802.11n	X	O	X	O
802.11ac	X	O	X	O

Note:

(1) O = Support, X = Not Support

(2) SISO = Single Input Single Output

(3) SDM = Spatial Diversity Multiplexing

(4) CDD = Cyclic Delay Diversity

2. This device supports simultaneous transmission operation, which allows for two channels to operate independent of one another in the BT and 5 GHz bands simultaneously on each antenna.

DBS Scenario	2.4 GHz WiFi Ant.1	2.4 GHz WiFi Ant.2	5 GHz WiFi Ant.1	5 GHz WiFi Ant.2	Bluetooth Ant.1	Test Case
Bluetooth ANT.1 + 5 GHz WiFi ANT.2	-	-	-	on	on	Scenario1

3. Directional Gain Calculation

According to KDB 662911 D01 Multiple Transmitter Output v02r01 F) 2) f) (ii)

Directional gain(CDD) =

$$\bullet \quad DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

Directional gain(SDM) = $G_{max} + 10 \cdot \log(N_{ANT} / N_{ss})$,

Band	Ant Gain (dBi)		N_{ANT}/ N_{ss}	Directional Gain CDD (dBi)	Directional Gain SDM (dBi)
	ANT1	ANT2			
UNII 1	-4.80	-2.17	2 / 2	-0.38	-2.17
UNII 2A	-5.78	-2.58	2 / 2	-1.02	-2.58
UNII 2C	-6.25	-2.38	2 / 2	-1.09	-2.38
UNII 3	-5.00	-2.52	2 / 2	-0.66	-2.52

Note

According to Ansi C63.10-2013 section 14.4.3, the directional gain is calculated using the formula, where GN is the gain of the nth antenna and NANT is the total number of antennas used.

Directional Gain = $10 \cdot \log(((10^{(ANT1\ Gain/20)}+10^{(ANT2\ Gain/20)})^2)/2)$ dBi

Sample Calculation (Conducted Power, MIMO):

Ex) Ant 1 : 11.58 dBm Ant 2 : 12.08 dBm

Ant1 + Ant 2 = MIMO

(11.58 dBm + 12.08 dBm) = (14.387 mW + 16.143 mW) = 30.53 mW = 14.88 dBm

Sample Calculation (E.I.R.P & E.I.R.P Spectral Density, MIMO):

Ex) ANT1 : 15.35 dBm , ANT2 : 15.12 dBm, Directional Gain : 3 dBi

Conducted Power = (15.35 dBm + 15.12 dBm) = (34.276 mW + 32.508 mW) = 66.784 mW = 18.25 dBm

E.I.R.P = 18.25 dBm + 3 dBi = 21.25 dBm

2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

Band	Mode	SISO		MIMO					
		Ant.2 Power		Ant.1 Power		Ant.2 Power		Ant.1 + Ant.2 Power	
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)
UNII1	802.11a	14.86	0.031	15.91	0.039	14.40	0.028	18.23	0.067
	802.11n (HT20)	14.76	0.030	15.99	0.040	14.52	0.028	18.33	0.068
	802.11n (HT40)	12.12	0.016	13.50	0.022	12.51	0.018	16.04	0.040
	802.11ac (VHT20)	14.70	0.030	15.99	0.040	14.61	0.029	18.36	0.069
	802.11ac (VHT40)	12.25	0.017	13.67	0.023	12.42	0.017	16.10	0.041
	802.11ac (VHT80)	10.22	0.011	11.90	0.015	10.44	0.011	14.24	0.027
UNII2A	802.11a	15.32	0.034	15.33	0.034	15.32	0.034	18.33	0.068
	802.11n (HT20)	15.40	0.035	15.23	0.033	15.82	0.038	18.55	0.072
	802.11n (HT40)	12.94	0.020	13.25	0.021	13.27	0.021	16.27	0.042
	802.11ac (VHT20)	15.39	0.035	15.54	0.036	15.65	0.037	18.61	0.073
	802.11ac (VHT40)	12.69	0.019	12.87	0.019	13.04	0.020	15.97	0.040
	802.11ac (VHT80)	8.91	0.008	8.98	0.008	9.59	0.009	12.30	0.017
UNII2C	802.11a	15.99	0.040	15.56	0.036	15.99	0.040	18.79	0.076
	802.11n (HT20)	15.99	0.040	15.74	0.038	15.44	0.035	18.60	0.073
	802.11n (HT40)	13.88	0.024	13.53	0.023	13.67	0.023	16.61	0.046
	802.11ac (VHT20)	15.72	0.037	15.99	0.040	15.43	0.035	18.73	0.075
	802.11ac (VHT40)	13.98	0.025	13.26	0.021	13.54	0.023	16.41	0.044
	802.11ac (VHT80)	12.98	0.020	11.30	0.013	12.42	0.017	14.90	0.031
UNII3	802.11a	15.98	0.040	15.99	0.040	15.61	0.036	18.81	0.076
	802.11n (HT20)	15.98	0.040	15.82	0.038	15.57	0.036	18.71	0.074
	802.11n (HT40)	13.48	0.022	13.78	0.024	12.87	0.019	16.36	0.043
	802.11ac (VHT20)	15.89	0.039	15.33	0.034	15.99	0.040	18.68	0.074
	802.11ac (VHT40)	13.06	0.020	13.47	0.022	12.51	0.018	16.03	0.040
	802.11ac (VHT80)	12.38	0.017	12.14	0.016	11.88	0.015	15.02	0.032

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 dated December 14, 2017 entitled “Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E” and ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’ were used in the measurement.

EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E.

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1 GHz. Above 1 GHz with 1.5 m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)

DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.
Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203, §15.407:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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."

(1) The antennas of this E.U.T are permanently attached.

(2) The E.U.T Complies with the requirement of §15.203, §15.407

7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

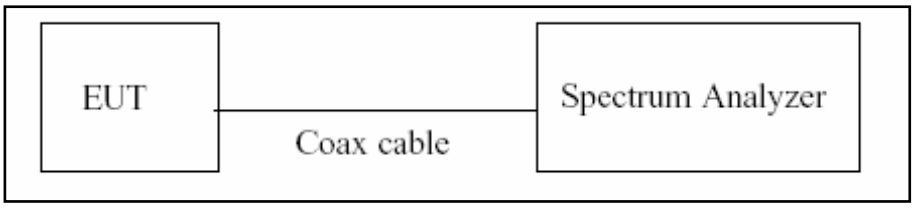
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.90 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.14 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.82 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.74 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.76 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.52 (Confidence level about 95 %, k=2)

8. DESCRIPTION OF TESTS

8.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure B.2 in KDB 789033 D02 v02r01.

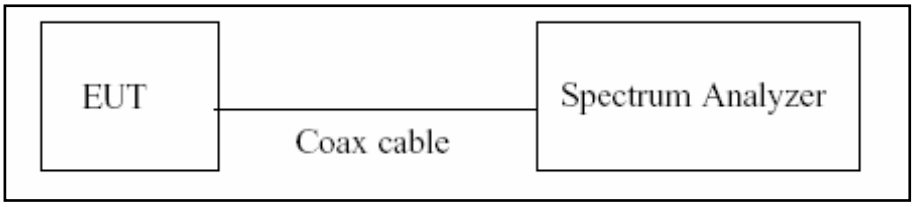
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

8.2. 6 dB Bandwidth & 26 dB Bandwidth

Limit

Within the 5.725-5.85 GHz(NII-3) band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Configuration



Test Procedure(26 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure C.1 in KDB 789033 D02 v02r01.

1. RBW = approximately 1 % of the emission bandwidth
2. VBW > RBW
3. Detector = Peak
4. Trace mode = max hold
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Test Procedure (6 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure C.2 in KDB 789033 D02 v02r01.

1. RBW = 100 kHz
2. VBW ≥ 3 x RBW
3. Detector = Peak
4. Trace mode = max hold
5. Allow the trace to stabilize
6. 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 lever measured in the fundamental emission.

Note:

1. We tested X dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any channels belong to UNII1 and UNII3 band for DFS.
3. The 26 dB bandwidth is used to determine the conducted power limits.

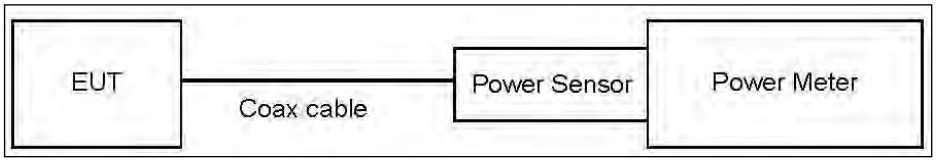
8.3. Output Power Measurement

Limit

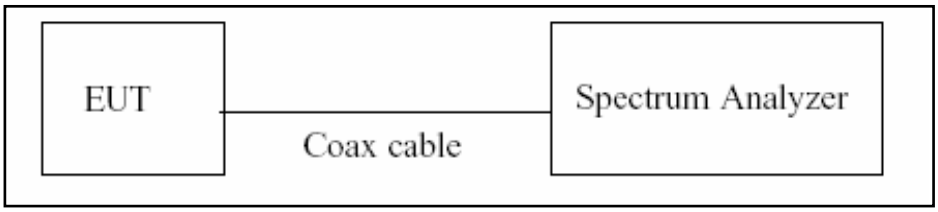
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30 dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 2A, 2C	Not exceed the lesser of 250 mW or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)
UNII 3	Not exceed 1 W(=30 dBm)

Test Configuration

Power Meter



Spectrum Analyzer(Only Straddle Channel)



Test Procedure(Power Meter)

We tested according to Procedure E.3.a in KDB 789033 D02 v02r01.

1. Measure the duty cycle.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Test Procedure(Spectrum Analyzer)

The transmitter output is connected to the Spectrum Analyzer.

We use the spectrum analyzer's integrated band power measurement function.

We tested according to Procedure E.2.d) in KDB 789033 D02 v02r01.

1. Measure the duty cycle.
2. Set span to encompass the 26 dB EBW of the signal.
3. RBW = 1 MHz.
4. VBW ≥ 3 MHz.
5. Number of points in sweep ≥ 2 x span/RBW.
6. Sweep time = auto.
7. Detector = RMS.
8. Do not use sweep triggering. Allow the sweep to "free run".
9. Trace average at least 100 traces in power averaging(RMS) mode
10. Integrated bandwidth = OBW
11. Add 10log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Sample Calculation

Total Power(dBm) = Measured Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

Note

1. Spectrum Measured Levels are not plot data.
   The power results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset Loss
   Attenuator loss(10 dB) + Cable loss + EUT Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	12.04
UNII 2A	12.04
UNII 2C	12.04
UNII 3	12.04

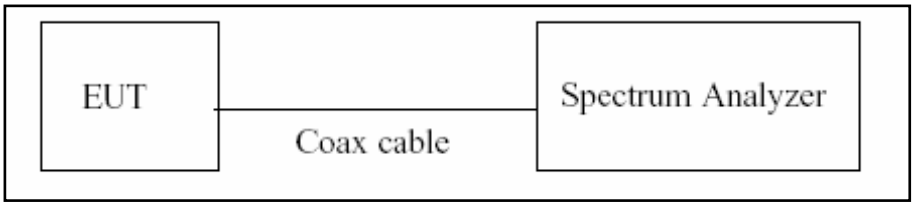
(Actual value of loss for the attenuator and cable combination)

8.4. Power Spectral Density

Limit

Band	Limit
UNII 1	11 dBm/MHz
UNII 2A, 2C	11 dBm/MHz
UNII 3	30 dBm/500 kHz

Test Configuration



Test Procedure

We tested according to Procedure F in KDB 789033 D02 v02r01.

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz(510 kHz for UNII 3)
   ➔For portion within the NII-3 be used RBW 510kHz
3. VBW ≥ 3 MHz
4. Number of points in sweep ≥ 2 x span/RBW.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to “free run”.
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.

Sample Calculation

Total PSD(dBm) = Measured Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

Note

1. Spectrum Measured Levels are not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset Loss
   Attenuator loss(10 dB) + Cable loss + EUT Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	12.04
UNII 2A	12.04
UNII 2C	12.04
UNII 3	12.04

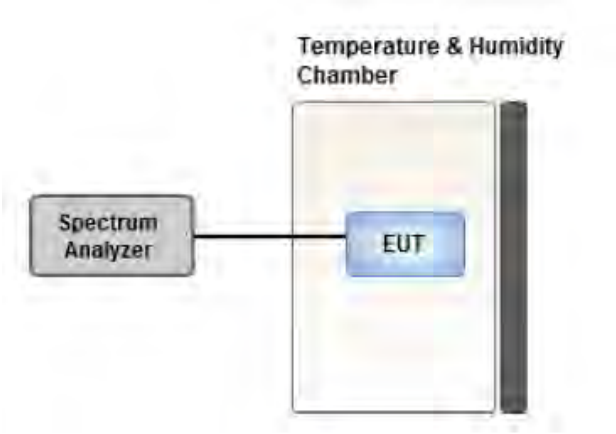
(Actual value of loss for the attenuator and cable combination)

8.5. Frequency Stability

Limit

Maintained within the band

Test Configuration



Test Procedure

1. The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 ℃ and 50 ℃.
2. The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.
3. The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battety operating end point which shall be specified by the manufacturer.
4. While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

8.6. AC Power line Conducted Emissions

Limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56[a]	56 to 46[a]
0.50 to 5	56	46
5 to 30	60	50

[a]Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.

Sample Calculation

Quasi-peak(Final Result) = Measured Value + Correction Factor

8.7. Radiated Test

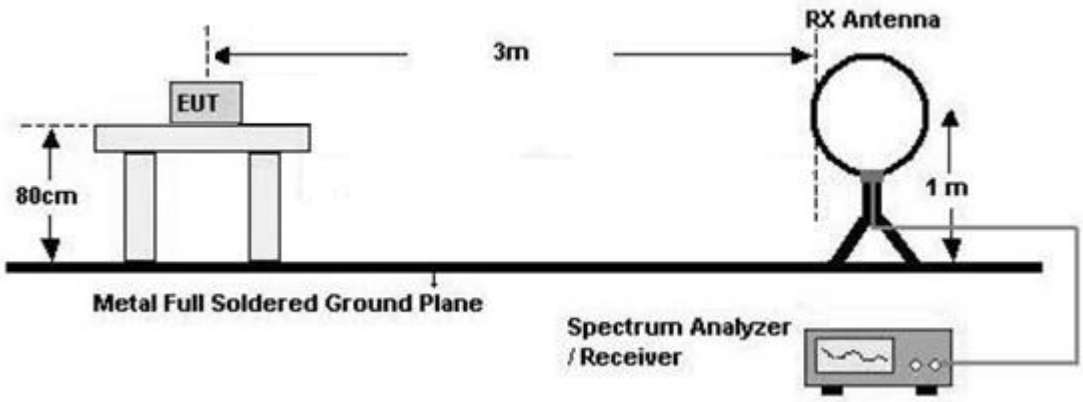
Limit

1. UNII 1: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of −27 dBm/MHz.
2. UNII 2A, 2C: All emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.
3. UNII 3: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
4. All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Section 15.209.

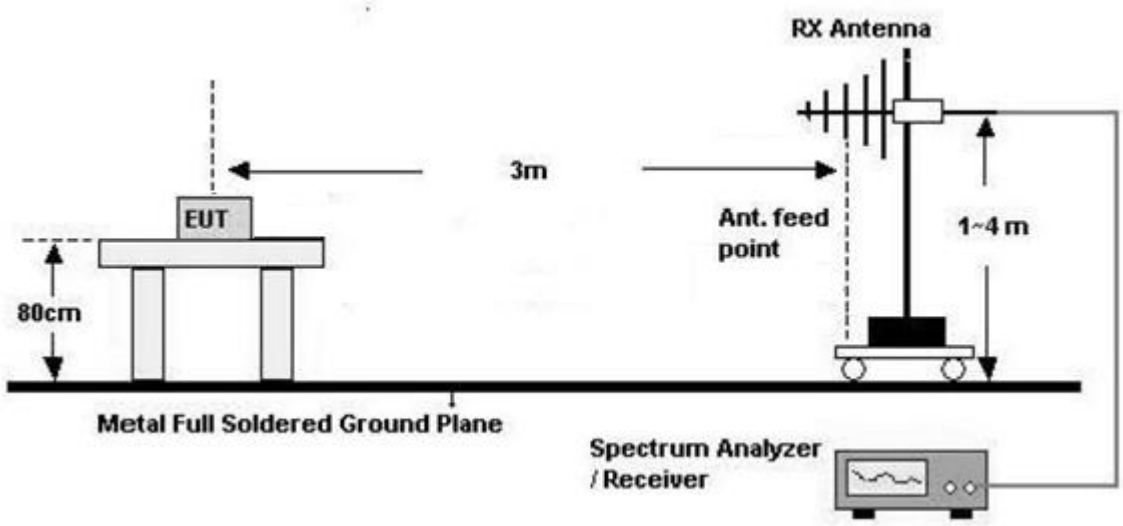
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

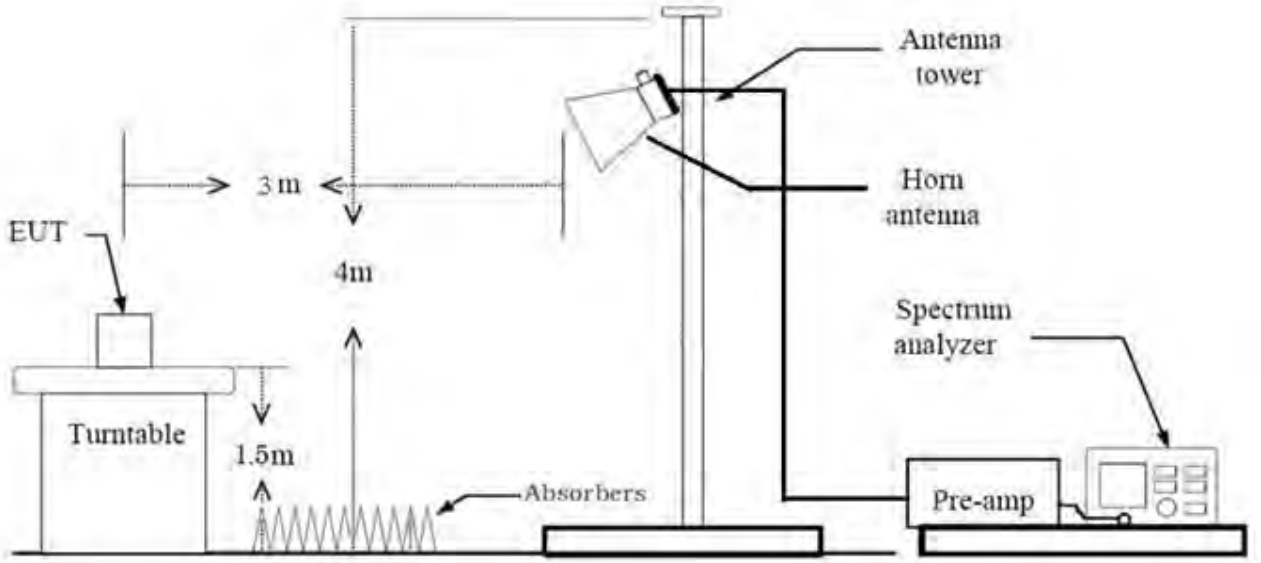
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m above ground plane.
4. .We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
8. Spectrum Setting
   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 9 kHz
   - VBW ≥ 3 x RBW
9. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Below 1 GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
   (1) Measurement Type(Peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 100 kHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Quasi-peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Quasi-Peak
      - RBW = 120 kHz

   ※In general, (1) is used mainly
7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type (Peak, G.5 in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep Time = auto
- Trace mode = max hold
- Allow sweeps to continue until the trace stabilizes.

Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

(2) Measurement Type (Average, G.6.d in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW(Duty cycle ≥ 98 %) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 %) = VBW ≥ 1/T, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = max hold.
- Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 % duty cycle. For lower duty cycles, increase the minimym number of traces by a factor of 1/x, where x is the duty cycle.

9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor
10. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency
11. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
12. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep Time = auto
- Trace mode = max hold
- Allow sweeps to continue until the trace stabilizes.

Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

(2) Measurement Type(Average, G.6.d in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW(Duty cycle ≥ 98 %) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 %) = VBW ≥ 1/T, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = max hold.
- Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 % duty cycle. For lower duty cycles, increase the minimym number of traces by a factor of 1/x, where x is the duty cycle.

9. Measured Frequency Range :
   - 4 500 MHz ~ 5 150 MHz
   - 5 350 MHz ~ 5 460 MHz
   - 5 460 MHz ~ 5 470 MHz
   - (75 MHz or more below the 5 725 MHz) ~ 5 725 MHz
   - 5 850 MHz ~ (75 MHz or more above the 5 850 MHz)
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Attenuator(ATT) + Distance Factor(D.F)

The actual setting value of VBW

SISO

Mode	Worst Data rate (Mbps)	Duty Cycle	Duty Cycle Factor (dB)	The actual setting value of VBW (Hz)
802.11a	6	0.934	0.298	1000
802.11n(HT20)	MCS0	0.931	0.310	1000
802.11n(HT40)	MCS0	0.868	0.617	3000
802.11ac(VHT20)	MCS0	0.932	0.308	1000
802.11ac(VHT40)	MCS0	0.871	0.598	3000
802.11ac(VHT80)	MCS0	0.766	1.157	5000

MIMO

Mode	Worst Data rate (Mbps)	Duty Cycle	Duty Cycle Factor (dB)	The actual setting value of VBW (Hz)
802.11a	6	0.934	0.298	1000
802.11n(HT20)	MCS8	0.875	0.580	3000
802.11n(HT40)	MCS8	0.766	1.156	3000
802.11ac(VHT20)	MCS0	0.873	0.592	3000
802.11ac(VHT40)	MCS0	0.785	1.054	3000
802.11ac(VHT80)	MCS0	0.661	1.799	10000

8.8. Worst case configuration and mode

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone, Stand alone + External accessories(Earphone, etc)
   - Worstcase : Stand alone
2. EUT Axis
   - Radiated Spurious Emissions : Y
   - Radiated Restricted Band Edge : Z
3. All datarate of operation were investigated and the worst case datarate results are reported.
   - Mode : Ant.2(SISO), Ant.1+Ant.2(SDM), Ant.1+Ant.2(CDD)
   - Worstcase : Ant.1+Ant.2(CDD)
   - 802.11a : 6 Mbps
   - Worstcase : Ant.1+Ant.2(SDM)
   - 802.11n_HT20 : MCS8
   - 802.11n_HT40 : MCS8
   - 802.11ac_VHT20 : MCS0
   - 802.11ac_VHT40 : MCS0
   - 802.11ac_VHT80 : MCS0
4. Radiated Spurious Emission
   - All modulation of operation were investigated and the worst case modulation results are reported.

     Worst-case :

     1) 802.11a_6 Mbps_UNII1 ~ UNII3
     2) 802.11n(HT20)_MCS8_UNII3
     3) 802.11ac(VHT20)_MCS0_UNII3
5. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
   - Position : Horizontal, Vertical, Parallel to the ground plane

Radiated test(DBS)

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone, Stand alone + External accessories(Earphone, Keyboard, etc)
   - Worstcase : Stand alone
2. EUT Axis - Radiated Spurious Emissions : Y
3. All of DBS Scenario were investigated and the worst case configuration results are reported.

DBS Scenario	2.4 GHz WiFi Ant.1	2.4 GHz WiFi Ant.2	5 GHz WiFi Ant.1	5 GHz WiFi Ant.2	Bluetooth	Test Case
Bluetooth ANT.1 + 5 GHz WiFi ANT.2		-	-	on	on	Scenario1

4. The DBS mode test investigated both intermodulation and radiated spurious emissions.
   And the worst results were reported.
   - Worst result: Radiated spurious emissions
   - Intermodulation: No signals are generated.
   - Radiated spurious emissions: cf. Section 10.8

5. The following tables show the worst case configurations determined during testing.

(Worst case: The lowest margin condition the channels and modes were selected for test.)

DBS Scenario 1	Description	Bluetooth Emission	5 GHz Emission
Bluetooth ANT.1 + 5 GHz WiFi ANT.2	Antenna	ANT1	ANT2
	Channel	78	165
	Data Rate	1 Mbps	6 Mbps
	Mode	GFSK	802.11a

Note : BT DBS data refer to [BT] Test Report

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone + External accessories(Earphone,etc) + Travel Adapter,
     Stand alone + Travel Adapter
   - Worstcase : Stand alone + Travel Adapter

9. SUMMARY OF TEST RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26 dB Bandwidth	§15.407 (for Power Measurement)	N/A	Conducted	PASS
6 dB Bandwidth	§15.407(e)	>500 kHz (5725-5850 MHz)(UNII-3)		PASS
Maximum Conducted Output Power	§15.407(a)(1),(2),(3)	< 250 mW(5150-5250 MHz) < 250 mW or 11+10log$_{10}$ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10log$_{10}$ (BW) dBm (5470-5725 MHz) <1 W (5725-5850 MHz)		PASS
Maximum Power Spectral Density	§15.407(a)(1),(2),(3)	<11 dBm/ MHz (5150-5250 MHz) <11 dBm/ MHz (5250-5350 MHz) <11 dBm/ MHz (5470-5725 MHz) <30 dBm/500 kHz(5725-5850 MHz)		PASS
Frequency Stability	§15.407(g) §2.1055	Maintained within the band		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207 15.407(b)(8)	<FCC 15.207 limits		PASS
Undesirable Emissions	§15.407(b) (1),(2),(3),(4) §15.407(b)(5)(ii),(iii) §15.35(b)	<-27 dBm/MHz EIRP (UNII1, 2A, 2C) cf. Section 8.6 (UNII 3&4)	Radiated	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(9),(10)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

10. TEST RESULT

10.1 DUTY CYCLE

[SISO]

Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	1.426	1.528	0.934	0.298
	9	0.960	1.051	0.913	0.394
	12	0.725	0.816	0.888	0.515
	18	0.491	0.590	0.833	0.796
	24	0.372	0.456	0.817	0.880
	36	0.253	0.337	0.752	1.239
	48	0.195	0.286	0.681	1.666
	54	0.180	0.271	0.664	1.781

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	0	1.335	1.434	0.931	0.310
	1	0.689	0.770	0.895	0.483
	2	0.471	0.570	0.827	0.827
	3	0.362	0.464	0.781	1.071
	4	0.256	0.355	0.721	1.418
	5	0.200	0.299	0.669	1.743
	6	0.182	0.274	0.667	1.761
	7	0.170	0.269	0.632	1.992
802.11n (HT40)	0	0.664	0.765	0.868	0.617
	1	0.352	0.451	0.781	1.074
	2	0.246	0.347	0.708	1.499
	3	0.195	0.294	0.664	1.780
	4	0.144	0.236	0.613	2.126
	5	0.114	0.198	0.577	2.389
	6	0.109	0.208	0.524	2.803
	7	0.099	0.200	0.494	3.066

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11ac (VHT20)	0	1.345	1.444	0.932	0.308
	1	0.689	0.783	0.880	0.554
	2	0.476	0.575	0.828	0.819
	3	0.367	0.469	0.784	1.058
	4	0.261	0.360	0.725	1.395
	5	0.205	0.304	0.675	1.707
	6	0.187	0.289	0.649	1.877
	7	0.172	0.274	0.630	2.009
	8	0.152	0.253	0.600	2.218
802.11ac (VHT40)	0	0.669	0.768	0.871	0.598
	1	0.355	0.456	0.778	1.091
	2	0.251	0.342	0.733	1.347
	3	0.200	0.299	0.669	1.743
	4	0.147	0.246	0.598	2.233
	5	0.122	0.220	0.552	2.583
	6	0.111	0.193	0.579	2.374
	7	0.104	0.213	0.488	3.115
	8	0.096	0.198	0.487	3.123
	9	0.086	0.187	0.459	3.378
802.11ac (VHT80)	0	0.332	0.433	0.766	1.157
	1	0.187	0.279	0.673	1.722
	2	0.142	0.241	0.589	2.295
	3	0.114	0.205	0.556	2.553
	4	0.091	0.182	0.500	3.010
	5	0.079	0.180	0.437	3.599
	6	0.076	0.175	0.435	3.617
	7	0.071	0.170	0.418	3.789
	8	0.068	0.167	0.409	3.882
	9	0.063	0.165	0.385	4.150

[MIMO]

Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	1.426	1.528	0.934	0.298
	9	0.960	1.051	0.913	0.394
	12	0.725	0.816	0.888	0.515
	18	0.491	0.590	0.833	0.796
	24	0.372	0.456	0.817	0.880
	36	0.253	0.337	0.752	1.239
	48	0.195	0.286	0.681	1.666
	54	0.180	0.271	0.664	1.781

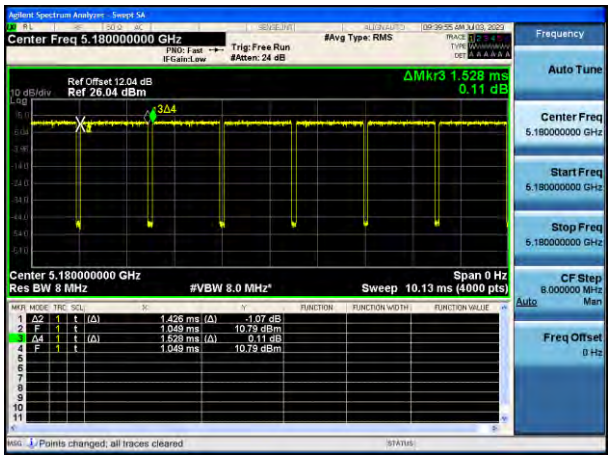
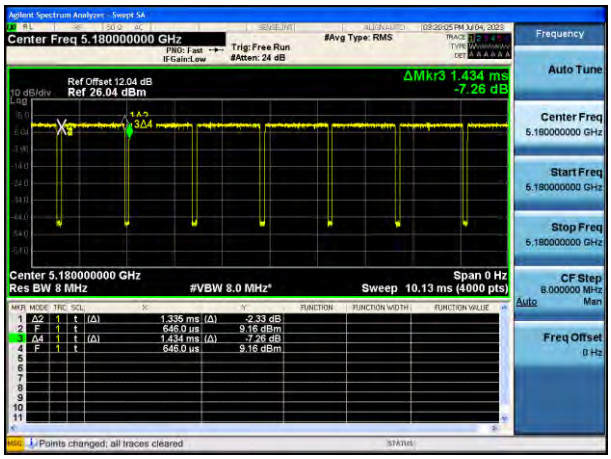
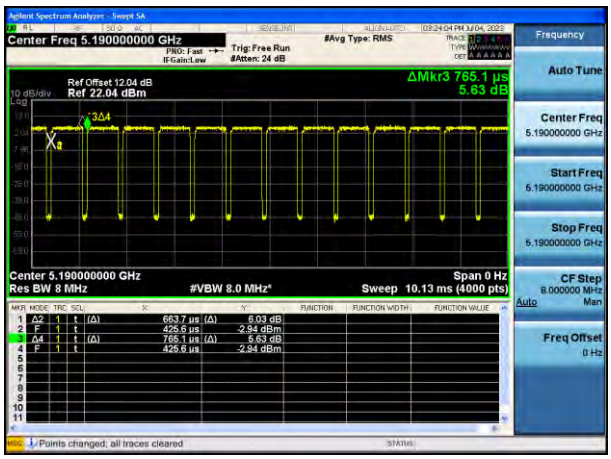
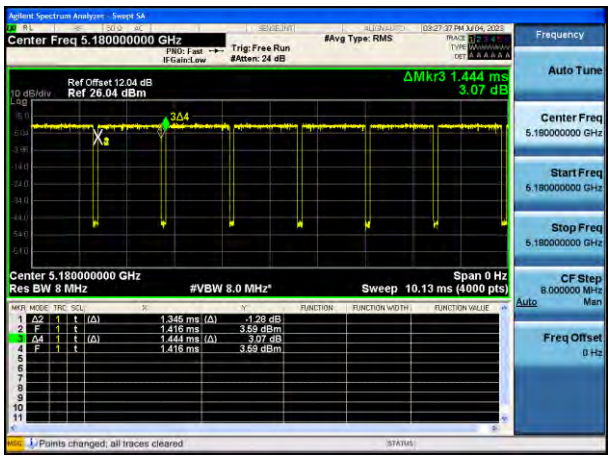
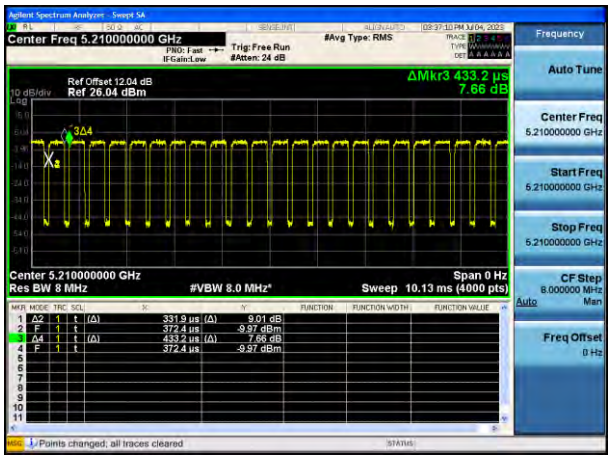
Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	8	0.692	0.790	0.875	0.580
	9	0.367	0.469	0.784	1.058
	10	0.258	0.360	0.718	1.437
	11	0.203	0.294	0.690	1.614
	12	0.152	0.252	0.604	2.190
	13	0.122	0.223	0.545	2.632
	14	0.117	0.208	0.561	2.511
	15	0.106	0.208	0.512	2.906
802.11n (HT40)	8	0.357	0.466	0.766	1.156
	9	0.200	0.309	0.648	1.887
	10	0.147	0.238	0.617	2.097
	11	0.122	0.231	0.527	2.778
	12	0.096	0.195	0.494	3.067
	13	0.081	0.180	0.451	3.461
	14	0.076	0.185	0.411	3.862
	15	0.073	0.182	0.403	3.949

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11ac (VHT20)	0	0.694	0.795	0.873	0.592
	1	0.372	0.474	0.786	1.045
	2	0.263	0.365	0.722	1.413
	3	0.205	0.307	0.669	1.743
	4	0.155	0.256	0.604	2.190
	5	0.127	0.228	0.556	2.553
	6	0.119	0.220	0.540	2.674
	7	0.111	0.210	0.530	2.756
	8	0.099	0.200	0.494	3.066
802.11ac (VHT40)	0	0.360	0.459	0.785	1.054
	1	0.203	0.304	0.667	1.761
	2	0.149	0.251	0.596	2.248
	3	0.124	0.225	0.551	2.592
	4	0.101	0.200	0.506	2.956
	5	0.084	0.193	0.434	3.623
	6	0.081	0.190	0.427	3.699
	7	0.076	0.175	0.435	3.617
	8	0.071	0.172	0.412	3.854
	9	0.068	0.177	0.386	4.137
802.11ac (VHT80)	0	0.193	0.291	0.661	1.799
	1	0.119	0.218	0.547	2.624
	2	0.096	0.195	0.494	3.067
	3	0.084	0.185	0.452	3.448
	4	0.073	0.165	0.446	3.505
	5	0.063	0.165	0.385	4.150
	6	0.066	0.165	0.400	3.979
	7	0.058	0.160	0.365	4.376
	8	0.061	0.160	0.381	4.191
	9	0.056	0.155	0.361	4.429

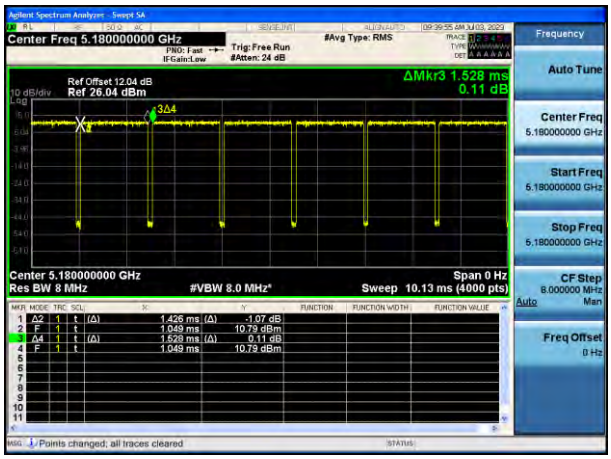
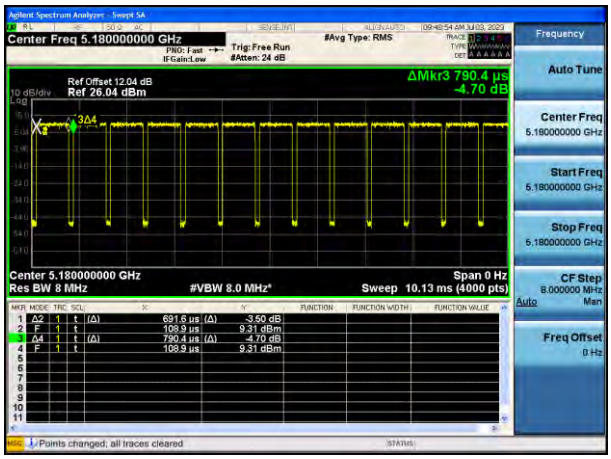
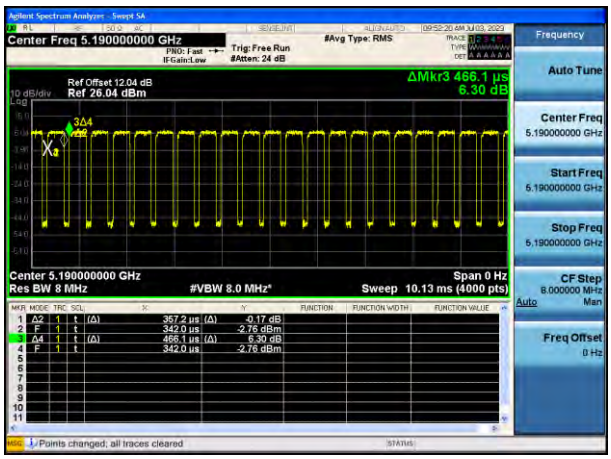
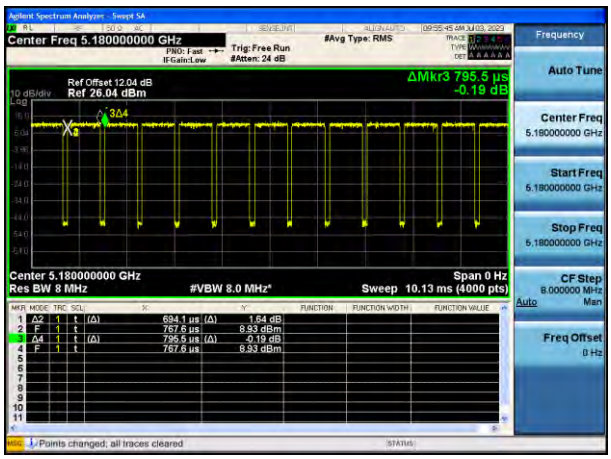
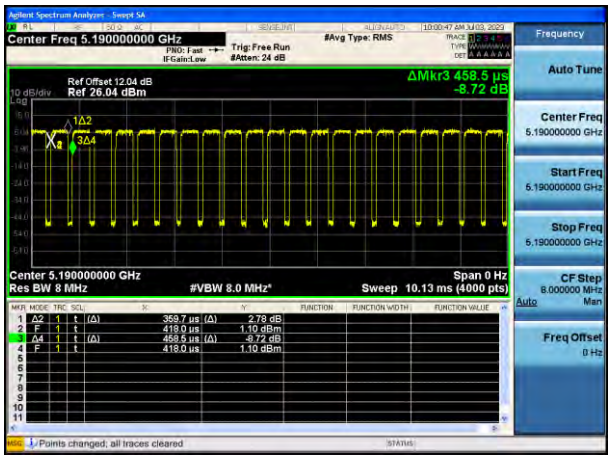
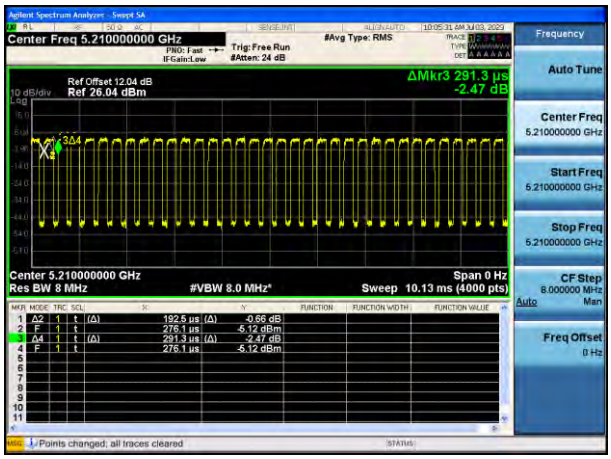
Note:

In order to simplify the report, attached plots were only the lowest datarate.

[SISO]

802.11a	802.11n(HT20)
	
802.11n(HT40)	**802.11ac(VHT20)**
	
802.11ac(VHT40)	**802.11ac(VHT80)**
	

[MIMO]

802.11a	802.11n(HT20)
	
802.11n(HT40)	**802.11ac(VHT20)**
	
802.11ac(VHT40)	**802.11ac(VHT80)**
	

10.2 26 dB Bandwidth

Straddle channel data in the table below are for reporting purposes only. Straddle channel data were added in section 10.7.1.

[SISO ANT. 2]

802.11a Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	23.06	16.794
5200	40	23.01	16.797
5240	48	22.95	16.825
5260	52	23.01	16.803
5300	60	23.33	16.804
5320	64	23.02	16.807
5500	100	23.70	16.799
5600	120	23.64	16.803
5720	144	23.91	16.841
5745	149	25.45	16.877
5785	157	23.93	16.860
5825	165	24.33	16.863

802.11n(HT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	24.53	17.973
5200	40	24.35	17.990
5240	48	25.47	18.014
5260	52	24.83	18.007
5300	60	25.25	18.034
5320	64	25.79	18.035
5500	100	25.06	18.012
5600	120	24.62	18.016
5720	144	25.91	18.041
5745	149	27.83	18.079
5785	157	25.94	18.081
5825	165	24.63	18.005

802.11ac(VHT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	24.84	17.971
5200	40	24.74	17.967
5240	48	25.81	18.024
5260	52	24.84	17.995
5300	60	25.46	17.993
5320	64	25.35	18.025
5500	100	25.59	18.011
5600	120	24.94	17.983
5720	144	26.29	18.041
5745	149	26.69	18.090
5785	157	26.58	18.043
5825	165	24.59	18.010

802.11n(HT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	45.34	36.744
5230	46	53.08	36.848
5270	54	53.60	36.884
5310	62	45.06	36.772
5510	102	57.41	36.864
5590	118	46.70	36.794
5710	142	62.53	36.998
5755	151	62.45	36.899
5795	159	62.65	36.914

802.11ac(VHT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	44.79	36.690
5230	46	45.40	36.742
5270	54	45.06	36.775
5310	62	45.58	36.815
5510	102	44.50	36.775
5590	118	45.09	36.746
5710	142	45.39	36.796
5755	151	45.42	36.796
5795	159	47.45	36.862

802.11ac(VHT80) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	85.22	76.421
5290	58	108.4	76.499
5530	106	108.4	76.565
5610	122	86.65	76.402
5690	138	90.78	76.489
5775	155	108.4	76.569

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802.11a Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	24.18	16.850
5200	40	23.53	16.804
5240	48	23.37	16.799
5260	52	23.45	16.801
5300	60	23.75	16.835
5320	64	23.16	16.818
5500	100	23.52	16.799
5600	120	23.15	16.817
5720	144	22.79	16.810
5745	149	23.16	16.800
5785	157	23.52	16.826
5825	165	23.50	16.836

802.11n(HT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	24.02	17.958
5200	40	24.30	17.989
5240	48	24.91	17.997
5260	52	25.26	18.030
5300	60	24.96	18.019
5320	64	25.14	18.020
5500	100	24.07	17.979
5600	120	24.63	17.983
5720	144	25.04	18.017
5745	149	24.96	18.003
5785	157	25.02	18.045
5825	165	25.34	18.017

802.11ac(VHT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	24.51	17.981
5200	40	24.01	17.994
5240	48	23.98	17.974
5260	52	27.12	18.003
5300	60	25.81	17.986
5320	64	27.14	18.006
5500	100	24.73	17.974
5600	120	24.06	17.996
5720	144	25.29	18.035
5745	149	24.53	18.004
5785	157	29.66	18.074
5825	165	26.46	18.003

802.11n(HT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	45.02	36.736
5230	46	45.45	36.651
5270	54	44.92	36.694
5310	62	45.12	36.639
5510	102	45.32	36.727
5590	118	44.57	36.644
5710	142	45.65	36.736
5755	151	44.90	36.698
5795	159	44.96	36.750

802.11ac(VHT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	45.11	36.684
5230	46	44.51	36.724
5270	54	45.53	36.727
5310	62	45.78	36.674
5510	102	45.38	36.699
5590	118	45.20	36.671
5710	142	45.15	36.736
5755	151	44.89	36.744
5795	159	45.00	36.705

802.11ac(VHT80) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	107.0	76.289
5290	58	83.96	76.296
5530	106	84.80	76.312
5610	122	85.20	76.290
5690	138	85.21	76.268
5775	155	110.1	76.463

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802.11a Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	23.06	16.794
5200	40	23.01	16.797
5240	48	22.95	16.825
5260	52	23.01	16.803
5300	60	23.33	16.804
5320	64	23.02	16.807
5500	100	23.70	16.799
5600	120	23.64	16.803
5720	144	23.91	16.841
5745	149	25.45	16.877
5785	157	23.93	16.860
5825	165	24.33	16.863

802.11n(HT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	23.63	17.853
5200	40	23.26	17.849
5240	48	23.45	17.855
5260	52	23.15	17.867
5300	60	23.33	17.871
5320	64	23.38	17.860
5500	100	23.37	17.863
5600	120	24.22	17.863
5720	144	23.95	17.881
5745	149	23.85	17.902
5785	157	24.22	17.884
5825	165	25.82	17.947

802.11ac(VHT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	23.44	17.863
5200	40	23.27	17.860
5240	48	23.45	17.868
5260	52	23.47	17.853
5300	60	23.15	17.858
5320	64	23.02	17.856
5500	100	23.40	17.860
5600	120	23.32	17.865
5720	144	24.47	17.888
5745	149	23.75	17.885
5785	157	23.21	17.882
5825	165	26.06	17.897

802.11n(HT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	43.25	36.463
5230	46	43.63	36.464
5270	54	43.14	36.446
5310	62	43.61	36.494
5510	102	43.49	36.503
5590	118	43.30	36.454
5710	142	43.45	36.474
5755	151	43.44	36.469
5795	159	43.99	36.449

802.11ac(VHT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	43.12	36.509
5230	46	43.26	36.461
5270	54	43.67	36.512
5310	62	43.60	36.527
5510	102	43.24	36.511
5590	118	43.57	36.472
5710	142	43.64	36.495
5755	151	43.57	36.488
5795	159	43.60	36.512

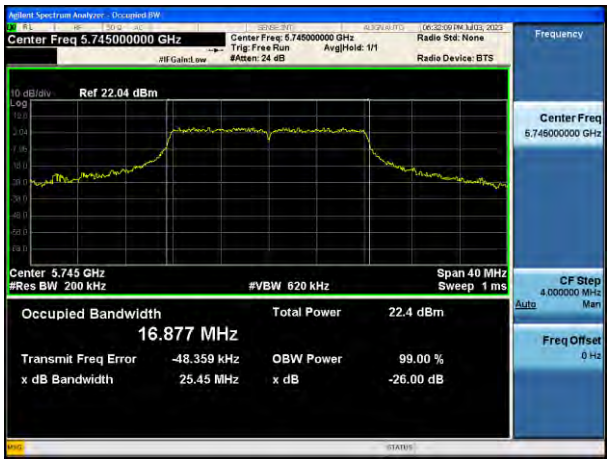
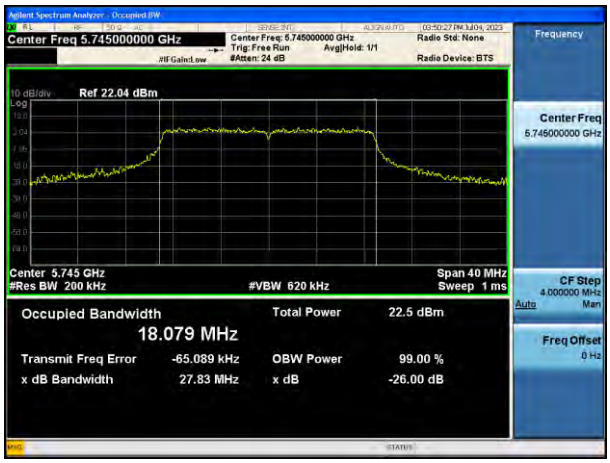
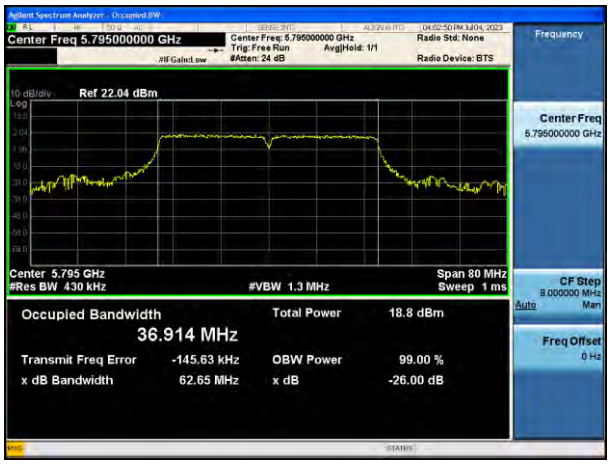
802.11ac(VHT80) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	84.87	76.076
5290	58	104.1	76.203
5530	106	85.37	76.110
5610	122	85.27	76.140
5690	138	85.65	76.091
5775	155	96.66	76.264

[SISO ANT. 2]

▣ Test Plots

Note:

In order to simplify the report, attached plots were only the widest channel per channel bandwidth.

802.11a 26 dB Bandwidth (CH 149)	802.11n(HT20) 26 dB Bandwidth (CH 149)
	
802.11ac(VHT20) 26 dB Bandwidth (CH 149)	**802.11n(HT40) 26 dB Bandwidth (CH 159)**
	
802.11ac(VHT40) 26 dB Bandwidth (CH 149)	**802.11ac(VHT80) 26 dB Bandwidth (CH 106)**
	

[MIMO ANT. 1]

▣ Test Plots

Note:

In order to simplify the report, attached plots were only the widest channel per channel bandwidth.

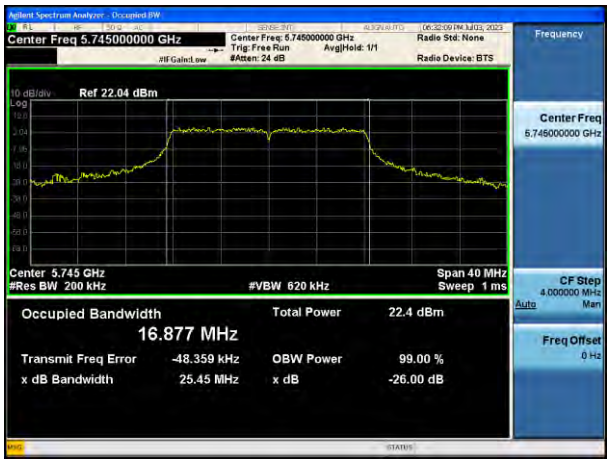
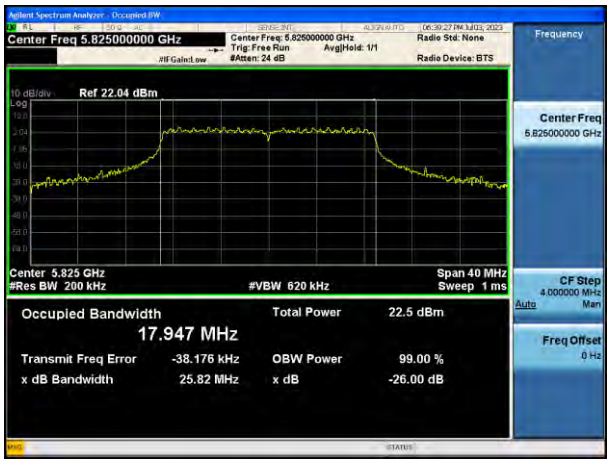
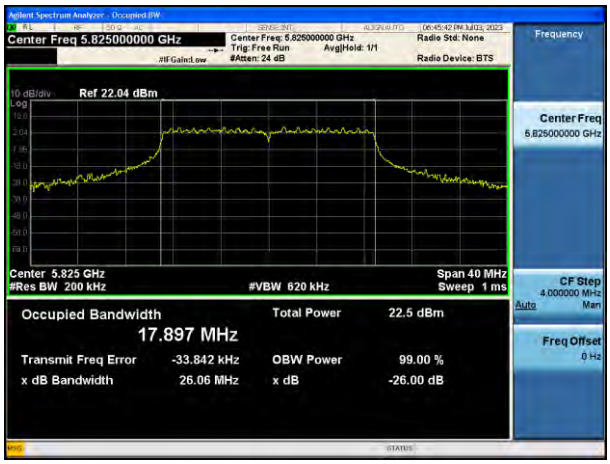
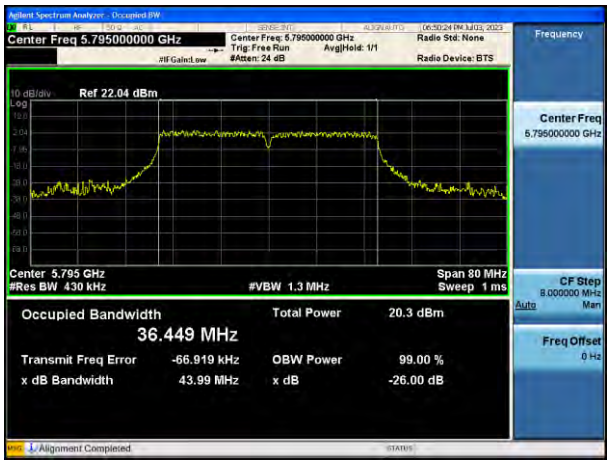
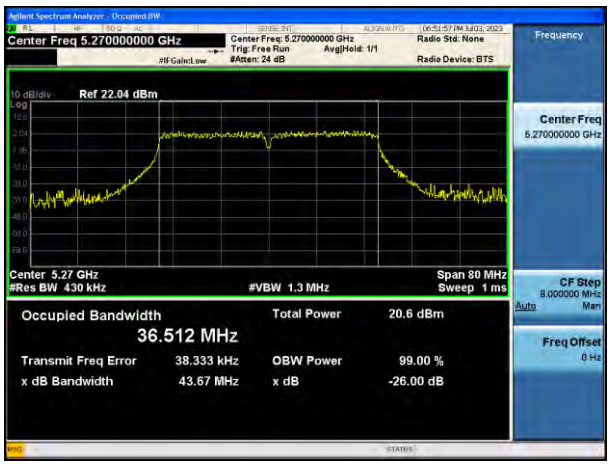
802.11a 26 dB Bandwidth (CH 36)	802.11n(HT20) 26 dB Bandwidth (CH 165)
	
802.11ac(VHT20) 26 dB Bandwidth (CH 157)	**802.11n(HT40) 26 dB Bandwidth (CH 142)**
	
802.11ac(VHT40) 26 dB Bandwidth (CH 62)	**802.11ac(VHT80) 26 dB Bandwidth (CH 155)**
	

[MIMO ANT. 2]

▣ Test Plots

Note:

In order to simplify the report, attached plots were only the widest channel per channel bandwidth.

802.11a 26 dB Bandwidth (CH 149)	802.11n(HT20) 26 dB Bandwidth (CH 165)
	
802.11ac(VHT20) 26 dB Bandwidth (CH 165)	**802.11n(HT40) 26 dB Bandwidth (CH 159)**
	
802.11ac(VHT40) 26 dB Bandwidth (CH 54)	**802.11ac(VHT80) 26 dB Bandwidth (CH 58)**
	

10.3 6 dB BANDWIDTH

[SISO ANT. 2]

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.41	> 0.5	Pass
5785	157	16.43	> 0.5	Pass
5825	165	16.42	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.67	> 0.5	Pass
5785	157	17.68	> 0.5	Pass
5825	165	17.68	> 0.5	Pass

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.68	> 0.5	Pass
5785	157	17.67	> 0.5	Pass
5825	165	17.67	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	36.45	> 0.5	Pass
5795	159	36.45	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	36.45	> 0.5	Pass
5795	159	36.44	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	76.28	> 0.5	Pass

[MIMO ANT. 1]

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.44	> 0.5	Pass
5785	157	16.43	> 0.5	Pass
5825	165	16.44	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.65	> 0.5	Pass
5785	157	17.64	> 0.5	Pass
5825	165	17.63	> 0.5	Pass

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.64	> 0.5	Pass
5785	157	17.63	> 0.5	Pass
5825	165	17.64	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	36.41	> 0.5	Pass
5795	159	36.41	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	36.41	> 0.5	Pass
5795	159	36.42	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	76.04	> 0.5	Pass

[MIMO ANT. 2]

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.41	> 0.5	Pass
5785	157	16.43	> 0.5	Pass
5825	165	16.42	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.66	> 0.5	Pass
5785	157	17.66	> 0.5	Pass
5825	165	17.67	> 0.5	Pass

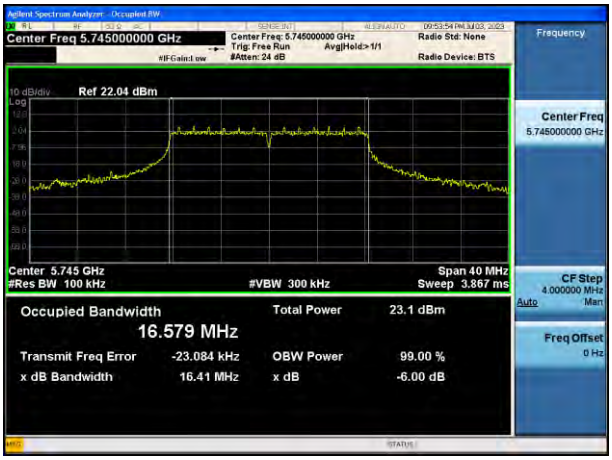
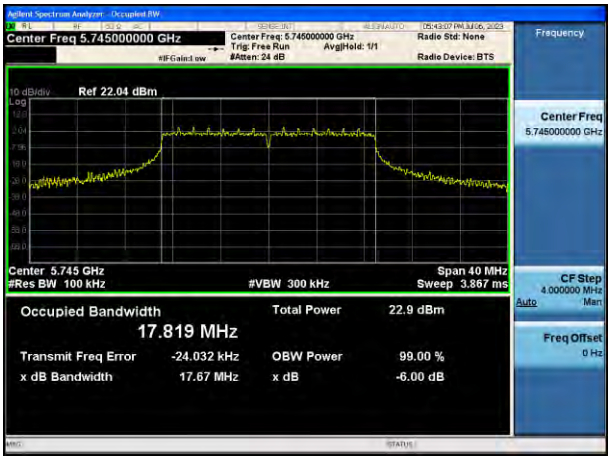
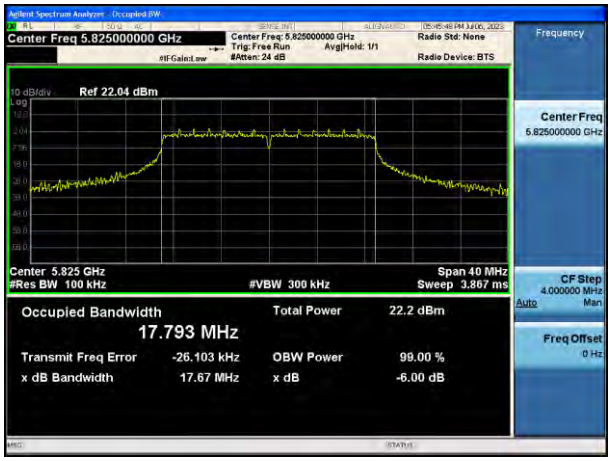
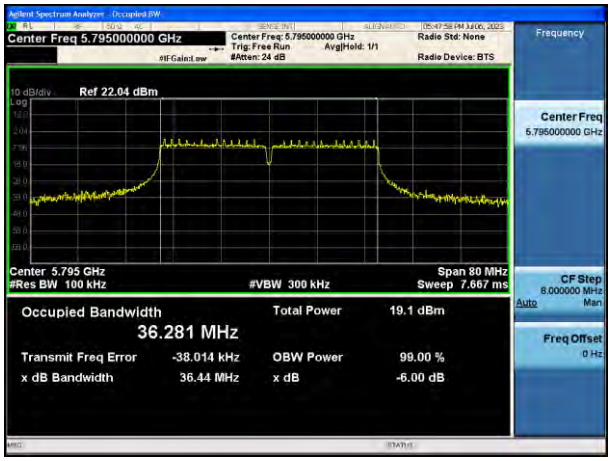
802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.67	> 0.5	Pass
5785	157	17.67	> 0.5	Pass
5825	165	17.67	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	36.48	> 0.5	Pass
5795	159	36.46	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	36.48	> 0.5	Pass
5795	159	36.46	> 0.5	Pass

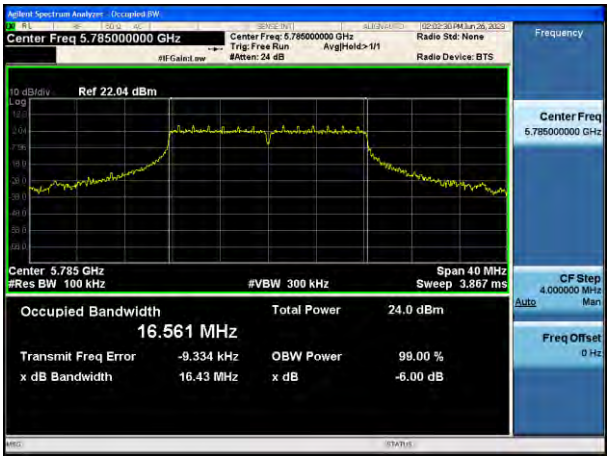
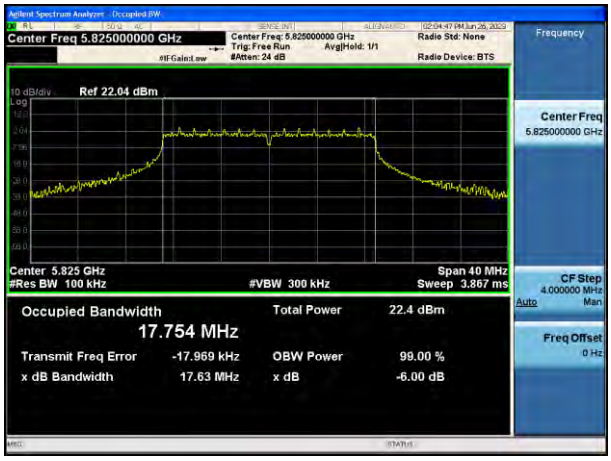
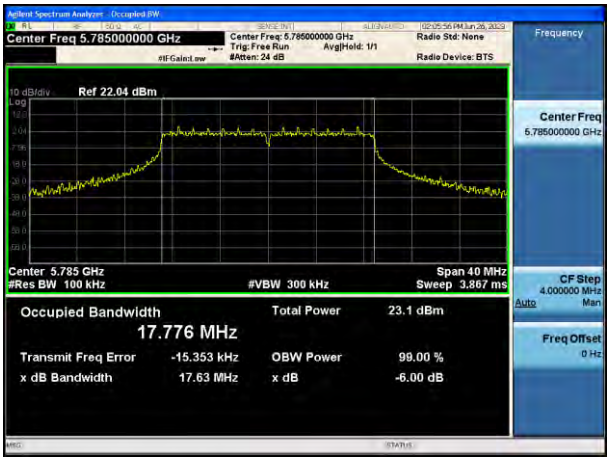
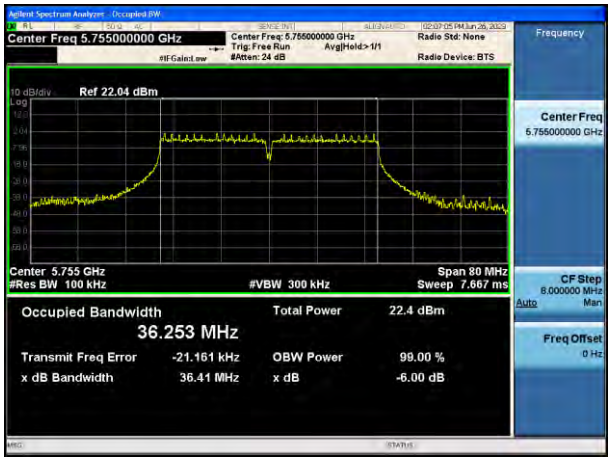
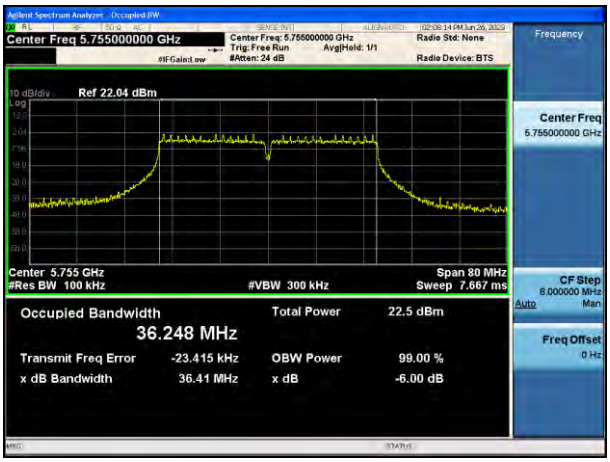
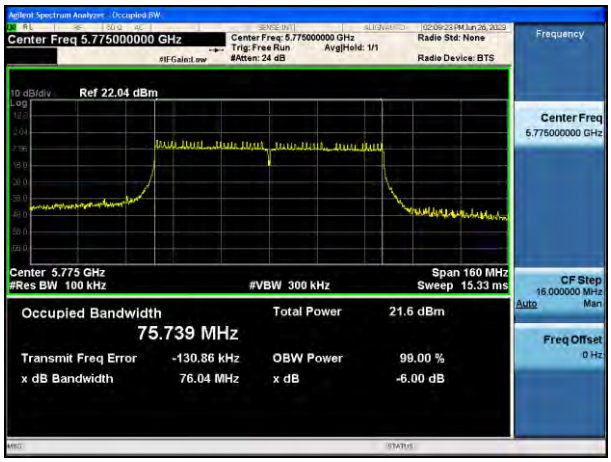
802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	76.46	> 0.5	Pass

[SISO ANT. 2]
▣ Test Plots
Note: In order to simplify the report, attached plots were only the narrowest channel.

802.11a (CH.149)	802.11n(HT20) (CH.149)
	
802.11ac(VHT20) (CH.165)	**802.11n(HT40) (CH.151)**
	
802.11ac(VHT40) (CH.159)	**802.11ac(VHT80) (CH.155)**
	

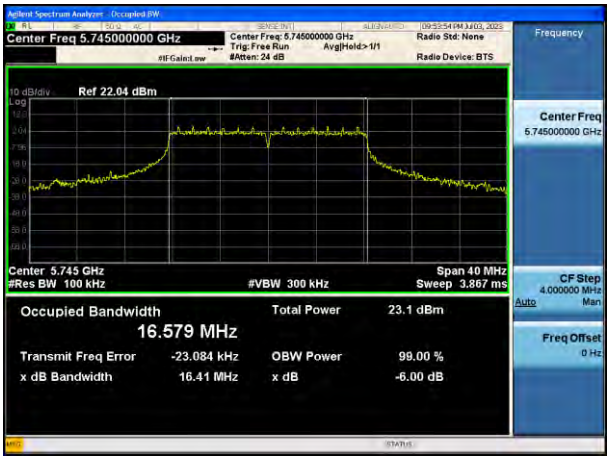
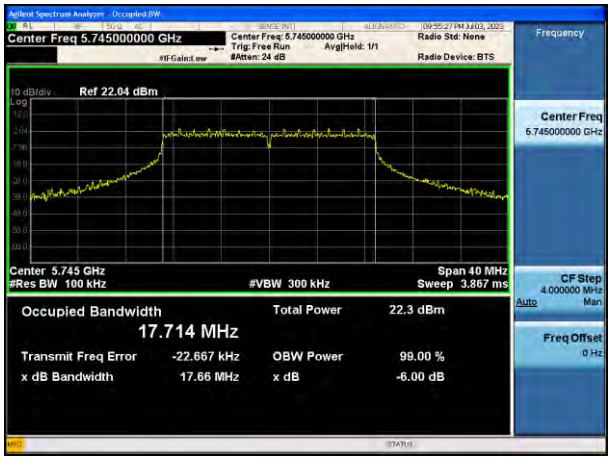
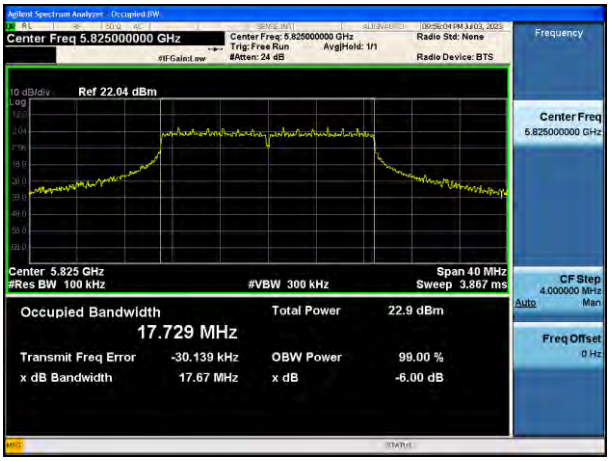
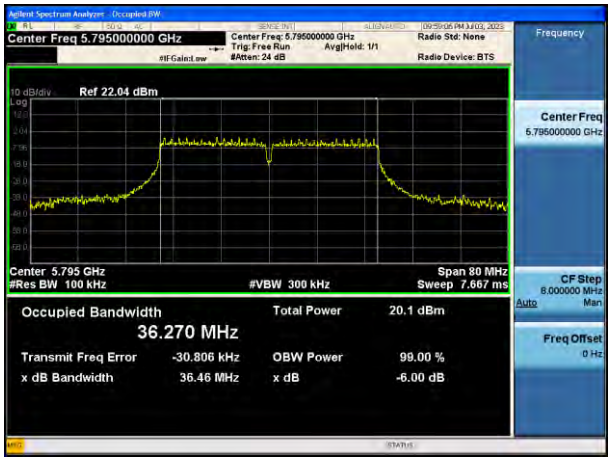
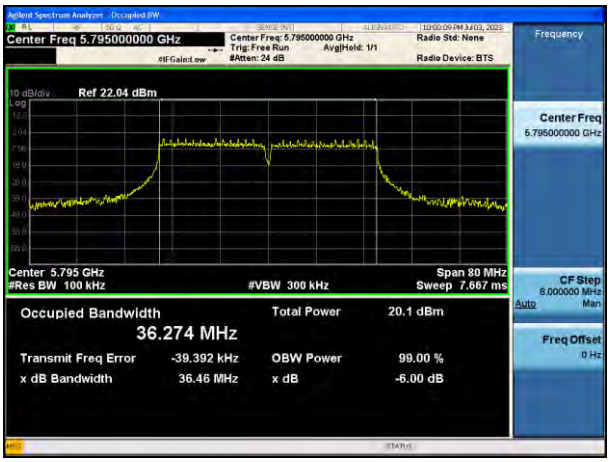
[MIMO ANT. 1]

Note: In order to simplify the report, attached plots were only the narrowest channel.

802.11a (CH.157)	802.11n(HT20) (CH.165)
	
802.11ac(VHT20) (CH.157)	**802.11n(HT40) (CH.151)**
	
802.11ac(VHT40) (CH.151)	**802.11ac(VHT80) (CH.155)**
	

[MIMO ANT. 2]

Note: In order to simplify the report, attached plots were only the narrowest channel.

802.11a (CH.149)	802.11n(HT20) (CH.149)
	
802.11ac(VHT20) (CH.165)	**802.11n(HT40) (CH.159)**
	
802.11ac(VHT40) (CH.159)	**802.11ac(VHT80) (CH.155)**
	

10.4 OUTPUT POWER MEASUREMENT

Straddle channel data in the table below are for reporting purposes only.

Straddle channel data were added in section 10.7.3.

Limit

(UNII 1) : 23.98 dBm

(UNII 2A, 2C) : 23.98 dBm or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)

(UNII 3) : 30.00 dBm

[SISO ANT. 2]

Frequency [MHz]	Channel	Datarate	Mode	Mea. Power [dBm]	D.C.F [dB]	Total Power [dBm]	Limit [dBm]
5180	36	18M	a	13.60	0.796	14.40	23.98
5200	40	18M	a	13.28	0.796	14.08	23.98
5240	48	18M	a	14.06	0.796	14.86	23.98
5260	52	18M	a	13.84	0.796	14.63	23.98
5300	60	18M	a	14.52	0.796	15.32	23.98
5320	64	18M	a	13.48	0.796	14.27	23.98
5500	100	18M	a	12.07	0.796	12.87	23.98
5600	120	18M	a	15.20	0.796	15.99	23.98
5720	144	18M	a	14.81	0.796	15.60	23.98
5745	149	18M	a	15.18	0.796	15.98	30.00
5785	157	18M	a	14.35	0.796	15.15	30.00
5825	165	18M	a	14.82	0.796	15.61	30.00

Frequency [MHz]	Channel	Datarate	Mode	Mea. Power [dBm]	D.C.F [dB]	Total Power [dBm]	Limit [dBm]
5180	36	MCS4	n20	12.16	1.418	13.58	23.98
5200	40	MCS4	n20	12.65	1.418	14.06	23.98
5240	48	MCS4	n20	13.35	1.418	14.76	23.98
5260	52	MCS4	n20	13.56	1.418	14.98	23.98
5300	60	MCS4	n20	13.98	1.418	15.40	23.98
5320	64	MCS4	n20	13.18	1.418	14.60	23.98
5500	100	MCS4	n20	11.22	1.418	12.64	23.98
5600	120	MCS4	n20	14.57	1.418	15.99	23.98
5720	144	MCS4	n20	14.39	1.418	15.81	23.98
5745	149	MCS4	n20	14.17	1.418	15.59	30.00
5785	157	MCS4	n20	13.32	1.418	14.74	30.00
5825	165	MCS4	n20	14.56	1.418	15.98	30.00

Frequency [MHz]	Channel	Datarate	Mode	Mea. Power [dBm]	D.C.F [dB]	Total Power [dBm]	Limit [dBm]
5180	36	MCS4	ac20	12.83	1.395	14.23	23.98
5200	40	MCS4	ac20	12.71	1.395	14.10	23.98
5240	48	MCS4	ac20	13.31	1.395	14.70	23.98
5260	52	MCS4	ac20	13.26	1.395	14.65	23.98
5300	60	MCS4	ac20	14.00	1.395	15.39	23.98
5320	64	MCS4	ac20	12.95	1.395	14.34	23.98
5500	100	MCS4	ac20	11.17	1.395	12.57	23.98
5600	120	MCS4	ac20	14.29	1.395	15.69	23.98
5720	144	MCS4	ac20	14.33	1.395	15.72	23.98
5745	149	MCS4	ac20	14.49	1.395	15.89	30.00
5785	157	MCS4	ac20	13.30	1.395	14.69	30.00
5825	165	MCS4	ac20	14.37	1.395	15.77	30.00

Frequency [MHz]	Channel	Datarate	Mode	Mea. Power [dBm]	D.C.F [dB]	Total Power [dBm]	Limit [dBm]
5190	38	MCS3	n40	9.22	1.780	11.00	23.98
5230	46	MCS3	n40	10.34	1.780	12.12	23.98
5270	54	MCS3	n40	11.16	1.780	12.94	23.98
5310	62	MCS3	n40	8.08	1.780	9.86	23.98
5510	102	MCS3	n40	9.16	1.780	10.93	23.98
5590	118	MCS3	n40	11.99	1.780	13.77	23.98
5710	142	MCS3	n40	12.10	1.780	13.88	23.98
5755	151	MCS3	n40	11.70	1.780	13.48	30.00
5795	159	MCS3	n40	10.12	1.780	11.90	30.00

Frequency [MHz]	Channel	Datarate	Mode	Mea. Power [dBm]	D.C.F [dB]	Total Power [dBm]	Limit [dBm]
5190	38	MCS4	ac40	8.79	2.233	11.02	23.98
5230	46	MCS4	ac40	10.02	2.233	12.25	23.98
5270	54	MCS4	ac40	10.46	2.233	12.69	23.98
5310	62	MCS4	ac40	7.59	2.233	9.83	23.98
5510	102	MCS4	ac40	8.74	2.233	10.97	23.98
5590	118	MCS4	ac40	11.71	2.233	13.94	23.98
5710	142	MCS4	ac40	11.75	2.233	13.98	23.98
5755	151	MCS4	ac40	10.82	2.233	13.06	30.00
5795	159	MCS4	ac40	10.08	2.233	12.32	30.00

Frequency [MHz]	Channel	Datarate	Mode	Mea. Power [dBm]	D.C.F [dB]	Total Power [dBm]	Limit [dBm]
5210	42	MCS4	ac80	7.21	3.010	10.22	23.98
5290	58	MCS4	ac80	5.90	3.010	8.91	23.98
5530	106	MCS4	ac80	7.67	3.010	10.68	23.98
5610	122	MCS4	ac80	9.94	3.010	12.95	23.98
5690	138	MCS4	ac80	9.97	3.010	12.98	23.98
5775	155	MCS4	ac80	9.37	3.010	12.38	30.00

[MIMO(ANT1+ANT2)]

Ant Total Power [dBm] = Measured Power [dBm] + Duty Cycle Factor [dB]

MIMO Total Power [dBm] = Ant.1 Total Power [dBm] + Ant.2 Total Power [dB]

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5180	36	18M	a	15.91	14.40	18.23	23.98
5200	40	18M	a	15.92	14.08	18.10	23.98
5240	48	18M	a	15.55	14.86	18.22	23.98
5260	52	18M	a	15.40	14.63	18.04	23.98
5300	60	18M	a	15.33	15.32	18.33	23.98
5320	64	18M	a	15.09	14.27	17.71	23.98
5500	100	18M	a	12.56	12.87	15.73	23.98
5600	120	18M	a	15.56	15.99	18.79	23.98
5720	144	18M	a	15.82	15.60	18.72	23.98
5745	149	18M	a	15.55	15.98	18.78	30.00
5785	157	18M	a	15.66	15.15	18.42	30.00
5825	165	18M	a	15.99	15.61	18.81	30.00

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5180	36	MCS12	n20	15.59	13.90	17.84	23.98
5200	40	MCS12	n20	15.99	14.52	18.33	23.98
5240	48	MCS12	n20	15.21	15.00	18.12	23.98
5260	52	MCS12	n20	15.10	15.18	18.15	23.98
5300	60	MCS12	n20	15.23	15.82	18.55	23.98
5320	64	MCS12	n20	15.25	14.06	17.70	23.98
5500	100	MCS12	n20	11.70	11.88	14.80	23.98
5600	120	MCS12	n20	14.88	15.16	18.04	23.98
5720	144	MCS12	n20	15.74	15.44	18.60	23.98
5745	149	MCS12	n20	15.82	15.57	18.71	30.00
5785	157	MCS12	n20	15.40	14.72	18.08	30.00
5825	165	MCS12	n20	15.35	15.89	18.64	30.00

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5180	36	MCS4	ac20	15.69	14.03	17.95	23.98
5200	40	MCS4	ac20	15.99	14.61	18.36	23.98
5240	48	MCS4	ac20	15.28	15.04	18.17	23.98
5260	52	MCS4	ac20	15.13	15.02	18.09	23.98
5300	60	MCS4	ac20	15.54	15.65	18.61	23.98
5320	64	MCS4	ac20	15.46	14.23	17.90	23.98
5500	100	MCS4	ac20	11.72	11.79	14.76	23.98
5600	120	MCS4	ac20	15.29	15.19	18.25	23.98
5720	144	MCS4	ac20	15.99	15.43	18.73	23.98
5745	149	MCS4	ac20	15.84	15.38	18.62	30.00
5785	157	MCS4	ac20	15.11	14.57	17.86	30.00
5825	165	MCS4	ac20	15.33	15.99	18.68	30.00

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5190	38	MCS11	n40	12.56	11.03	14.87	23.98
5230	46	MCS11	n40	13.50	12.51	16.04	23.98
5270	54	MCS11	n40	13.25	13.27	16.27	23.98
5310	62	MCS11	n40	10.65	10.11	13.40	23.98
5510	102	MCS11	n40	10.49	9.99	13.26	23.98
5590	118	MCS11	n40	13.53	13.67	16.61	23.98
5710	142	MCS11	n40	13.56	13.52	16.55	23.98
5755	151	MCS11	n40	13.78	12.87	16.36	30.00
5795	159	MCS11	n40	13.29	12.68	16.01	30.00

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5190	38	MCS3	ac40	12.45	10.65	14.65	23.98
5230	46	MCS3	ac40	13.67	12.42	16.10	23.98
5270	54	MCS3	ac40	12.87	13.04	15.97	23.98
5310	62	MCS3	ac40	10.55	10.12	13.35	23.98
5510	102	MCS3	ac40	10.32	9.90	13.13	23.98
5590	118	MCS3	ac40	13.26	13.54	16.41	23.98
5710	142	MCS3	ac40	13.32	13.43	16.39	23.98
5755	151	MCS3	ac40	13.47	12.51	16.03	30.00
5795	159	MCS3	ac40	13.47	12.37	15.97	30.00

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5210	42	MCS3	ac80	11.90	10.44	14.24	23.98
5290	58	MCS3	ac80	8.98	9.59	12.30	23.98
5530	106	MCS3	ac80	9.93	10.28	13.12	23.98
5610	122	MCS3	ac80	11.30	12.42	14.90	23.98
5690	138	MCS3	ac80	11.25	12.30	14.82	23.98
5775	155	MCS3	ac80	12.14	11.88	15.02	30.00

10.5 POWER SPECTRAL DENSITY

[SISO ANT. 2]

Frequency [MHz]	Channel	Datarate	Mode	Mea. PSD [dBm/MHz]	D.C.F [dB]	Total PSD [dBm/MHz]	Limit
5180	36	18M	a	2.241	0.796	3.037	11 dBm/MHz
5200	40	18M	a	2.111	0.796	2.907	11 dBm/MHz
5240	48	18M	a	2.545	0.796	3.341	11 dBm/MHz
5260	52	18M	a	2.584	0.796	3.380	11 dBm/MHz
5300	60	18M	a	3.130	0.796	3.926	11 dBm/MHz
5320	64	18M	a	2.331	0.796	3.127	11 dBm/MHz
5500	100	18M	a	0.633	0.796	1.429	11 dBm/MHz
5600	120	18M	a	3.493	0.796	4.289	11 dBm/MHz
5720	144	18M	a	3.644	0.796	4.440	11 dBm/MHz
5745	149	18M	a	0.823	0.796	1.619	30 dBm/500kHz
5785	157	18M	a	-0.088	0.796	0.708	30 dBm/500kHz
5825	165	18M	a	0.868	0.796	1.664	30 dBm/500kHz

Frequency [MHz]	Channel	Datarate	Mode	Mea. PSD [dBm/MHz]	D.C.F [dB]	Total PSD [dBm/MHz]	Limit
5180	36	MCS4	n20	1.953	1.418	3.371	11 dBm/MHz
5200	40	MCS4	n20	1.084	1.418	2.502	11 dBm/MHz
5240	48	MCS4	n20	1.956	1.418	3.374	11 dBm/MHz
5260	52	MCS4	n20	1.896	1.418	3.314	11 dBm/MHz
5300	60	MCS4	n20	1.889	1.418	3.307	11 dBm/MHz
5320	64	MCS4	n20	1.844	1.418	3.262	11 dBm/MHz
5500	100	MCS4	n20	-0.176	1.418	1.242	11 dBm/MHz
5600	120	MCS4	n20	2.910	1.418	4.328	11 dBm/MHz
5720	144	MCS4	n20	3.071	1.418	4.489	11 dBm/MHz
5745	149	MCS4	n20	0.321	1.418	1.739	30 dBm/500kHz
5785	157	MCS4	n20	-0.583	1.418	0.835	30 dBm/500kHz
5825	165	MCS4	n20	0.328	1.418	1.746	30 dBm/500kHz

Frequency [MHz]	Channel	Datarate	Mode	Mea. PSD [dBm/MHz]	D.C.F [dB]	Total PSD [dBm/MHz]	Limit
5180	36	MCS4	ac20	1.888	1.395	3.283	11 dBm/MHz
5200	40	MCS4	ac20	1.005	1.395	2.400	11 dBm/MHz
5240	48	MCS4	ac20	2.101	1.395	3.496	11 dBm/MHz
5260	52	MCS4	ac20	1.849	1.395	3.244	11 dBm/MHz
5300	60	MCS4	ac20	2.035	1.395	3.430	11 dBm/MHz
5320	64	MCS4	ac20	1.875	1.395	3.270	11 dBm/MHz
5500	100	MCS4	ac20	-0.352	1.395	1.043	11 dBm/MHz
5600	120	MCS4	ac20	2.891	1.395	4.286	11 dBm/MHz
5720	144	MCS4	ac20	2.694	1.395	4.089	11 dBm/MHz
5745	149	MCS4	ac20	0.746	1.395	2.141	30 dBm/500kHz
5785	157	MCS4	ac20	-0.518	1.395	0.877	30 dBm/500kHz
5825	165	MCS4	ac20	0.029	1.395	1.424	30 dBm/500kHz

Frequency [MHz]	Channel	Datarate	Mode	Mea. PSD [dBm/MHz]	D.C.F [dB]	Total PSD [dBm/MHz]	Limit
5190	38	MCS3	n40	-4.956	1.780	-3.176	11 dBm/MHz
5230	46	MCS3	n40	-4.103	1.780	-2.323	11 dBm/MHz
5270	54	MCS3	n40	-3.278	1.780	-1.498	11 dBm/MHz
5310	62	MCS3	n40	-6.145	1.780	-4.365	11 dBm/MHz
5510	102	MCS3	n40	-4.809	1.780	-3.029	11 dBm/MHz
5590	118	MCS3	n40	-2.138	1.780	-0.358	11 dBm/MHz
5710	142	MCS3	n40	-1.517	1.780	0.263	11 dBm/MHz
5755	151	MCS3	n40	-5.595	1.780	-3.815	30 dBm/500kHz
5795	159	MCS3	n40	-6.694	1.780	-4.914	30 dBm/500kHz

Frequency [MHz]	Channel	Datarate	Mode	Mea. PSD [dBm/MHz]	D.C.F [dB]	Total PSD [dBm/MHz]	Limit
5190	38	MCS4	ac40	-5.235	2.233	-3.002	11 dBm/MHz
5230	46	MCS4	ac40	-3.878	2.233	-1.645	11 dBm/MHz
5270	54	MCS4	ac40	-2.989	2.233	-0.756	11 dBm/MHz
5310	62	MCS4	ac40	-6.497	2.233	-4.264	11 dBm/MHz
5510	102	MCS4	ac40	-4.726	2.233	-2.493	11 dBm/MHz
5590	118	MCS4	ac40	-1.973	2.233	0.260	11 dBm/MHz
5710	142	MCS4	ac40	-2.168	2.233	0.065	11 dBm/MHz
5755	151	MCS4	ac40	-5.260	2.233	-3.027	30 dBm/500kHz
5795	159	MCS4	ac40	-6.762	2.233	-4.529	30 dBm/500kHz

Frequency [MHz]	Channel	Datarate	Mode	Mea. PSD [dBm/MHz]	D.C.F [dB]	Total PSD [dBm/MHz]	Limit
5210	42	MCS4	ac80	-9.139	3.010	-6.129	11 dBm/MHz
5290	58	MCS4	ac80	-10.136	3.010	-7.126	11 dBm/MHz
5530	106	MCS4	ac80	-8.258	3.010	-5.248	11 dBm/MHz
5610	122	MCS4	ac80	-6.231	3.010	-3.221	11 dBm/MHz
5690	138	MCS4	ac80	-5.840	3.010	-2.830	11 dBm/MHz
5775	155	MCS4	ac80	-9.226	3.010	-6.216	30 dBm/500kHz

[MIMO(ANT1+ANT2)]

Ant Total PSD [dBm] = Measured PSD [dBm] + Duty Cycle Factor [dB]

MIMO Total PSD [dBm] = Ant.1 Total PSD [dBm] + Ant.2 Total PSD [dB]

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total PSD [dBm]	Ant.2 Total PSD [dBm]	MIMO Total PSD [dBm]	Limit
5180	36	18M	a	4.667	3.037	6.938	11dBm/MHz
5200	40	18M	a	4.918	2.907	7.038	11dBm/MHz
5240	48	18M	a	4.200	3.341	6.802	11dBm/MHz
5260	52	18M	a	4.285	3.380	6.866	11dBm/MHz
5300	60	18M	a	3.537	3.926	6.746	11dBm/MHz
5320	64	18M	a	3.829	3.127	6.502	11dBm/MHz
5500	100	18M	a	0.193	1.429	3.865	11dBm/MHz
5600	120	18M	a	4.008	4.289	7.161	11dBm/MHz
5720	144	18M	a	4.272	4.440	7.367	11dBm/MHz
5745	149	18M	a	1.409	1.619	4.525	30dBm/500k
5785	157	18M	a	1.743	0.708	4.266	30dBm/500k
5825	165	18M	a	1.742	1.664	4.713	30dBm/500k

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total PSD [dBm]	Ant.2 Total PSD [dBm]	MIMO Total PSD [dBm]	Limit
5180	36	MCS12	n20	4.522	2.649	6.696	11dBm/MHz
5200	40	MCS12	n20	4.670	3.384	7.085	11dBm/MHz
5240	48	MCS12	n20	4.501	4.079	7.306	11dBm/MHz
5260	52	MCS12	n20	4.075	4.292	7.196	11dBm/MHz
5300	60	MCS12	n20	3.616	4.316	6.991	11dBm/MHz
5320	64	MCS12	n20	4.051	2.520	6.363	11dBm/MHz
5500	100	MCS12	n20	0.512	1.027	3.788	11dBm/MHz
5600	120	MCS12	n20	3.257	3.723	6.507	11dBm/MHz
5720	144	MCS12	n20	4.753	3.816	7.320	11dBm/MHz
5745	149	MCS12	n20	1.661	1.228	4.461	30dBm/500k
5785	157	MCS12	n20	2.030	0.668	4.413	30dBm/500k
5825	165	MCS12	n20	1.885	2.168	5.040	30dBm/500k

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total PSD [dBm]	Ant.2 Total PSD [dBm]	MIMO Total PSD [dBm]	Limit
5180	36	MCS4	ac20	4.595	2.869	6.827	11dBm/MHz
5200	40	MCS4	ac20	4.586	3.682	7.168	11dBm/MHz
5240	48	MCS4	ac20	4.335	3.933	7.149	11dBm/MHz
5260	52	MCS4	ac20	4.306	3.715	7.031	11dBm/MHz
5300	60	MCS4	ac20	3.570	3.949	6.774	11dBm/MHz
5320	64	MCS4	ac20	4.045	2.798	6.476	11dBm/MHz
5500	100	MCS4	ac20	0.422	0.656	3.551	11dBm/MHz
5600	120	MCS4	ac20	3.723	3.588	6.666	11dBm/MHz
5720	144	MCS4	ac20	4.603	3.431	7.067	11dBm/MHz
5745	149	MCS4	ac20	1.994	1.308	4.675	30dBm/500k
5785	157	MCS4	ac20	1.971	1.089	4.563	30dBm/500k
5825	165	MCS4	ac20	1.893	2.002	4.958	30dBm/500k

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total PSD [dBm]	Ant.2 Total PSD [dBm]	MIMO Total PSD [dBm]	Limit
5190	38	MCS11	n40	-1.475	-3.270	0.730	11dBm/MHz
5230	46	MCS11	n40	-0.412	-1.092	2.272	11dBm/MHz
5270	54	MCS11	n40	-0.648	-0.445	2.465	11dBm/MHz
5310	62	MCS11	n40	-3.060	-3.044	-0.042	11dBm/MHz
5510	102	MCS11	n40	-3.905	-4.172	-1.026	11dBm/MHz
5590	118	MCS11	n40	-0.652	-0.695	2.337	11dBm/MHz
5710	142	MCS11	n40	-0.235	-1.065	2.380	11dBm/MHz
5755	151	MCS11	n40	-3.383	-4.111	-0.721	30dBm/500k
5795	159	MCS11	n40	-2.991	-4.031	-0.470	30dBm/500k

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total PSD [dBm]	Ant.2 Total PSD [dBm]	MIMO Total PSD [dBm]	Limit
5190	38	MCS3	ac40	-1.789	-3.386	0.496	11dBm/MHz
5230	46	MCS3	ac40	-0.389	-1.099	2.281	11dBm/MHz
5270	54	MCS3	ac40	-1.184	-1.068	1.885	11dBm/MHz
5310	62	MCS3	ac40	-2.816	-3.569	-0.166	11dBm/MHz
5510	102	MCS3	ac40	-3.293	-3.113	-0.192	11dBm/MHz
5590	118	MCS3	ac40	-0.848	-0.768	2.202	11dBm/MHz
5710	142	MCS3	ac40	-0.858	-0.821	2.171	11dBm/MHz
5755	151	MCS3	ac40	-3.473	-3.881	-0.662	30dBm/500k
5795	159	MCS3	ac40	-3.255	-4.400	-0.780	30dBm/500k

Frequency [MHz]	Channel	Datarate	Mode	Ant.1 Total PSD [dBm]	Ant.2 Total PSD [dBm]	MIMO Total PSD [dBm]	Limit
5210	42	MCS3	ac80	-4.372	-5.635	-1.947	11dBm/MHz
5290	58	MCS3	ac80	-6.872	-7.038	-3.944	11dBm/MHz
5530	106	MCS3	ac80	-7.126	-6.447	-3.763	11dBm/MHz
5610	122	MCS3	ac80	-4.804	-3.940	-1.340	11dBm/MHz
5690	138	MCS3	ac80	-4.210	-3.653	-0.912	11dBm/MHz
5775	155	MCS3	ac80	-5.959	-6.603	-3.259	30dBm/500k

[SISO ANT. 2]

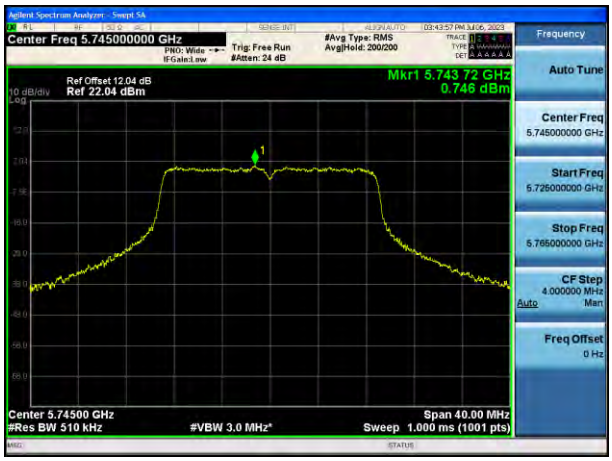
▣ Test Plots(802.11a)

Note:

In order to simplify the report, attached plots were only channel of the highest power.

802.11a	
UNII 1-2C (Ch. 144)	**UNII 3 (Ch. 165)**
	

802.11n(HT20)	
UNII 1-2C (Ch. 144)	**UNII 3 (Ch. 165)**
	

802.11ac(VHT20)	
UNII 1-2C (Ch. 120)	**UNII 3 (Ch. 149)**
	

802.11n(HT40)	
UNII 1-2C (Ch. 142)	**UNII 3 (Ch. 151)**
	

802.11ac(VHT40)	
UNII 1-2C (Ch. 118)	**UNII 3 (Ch. 151)**
	

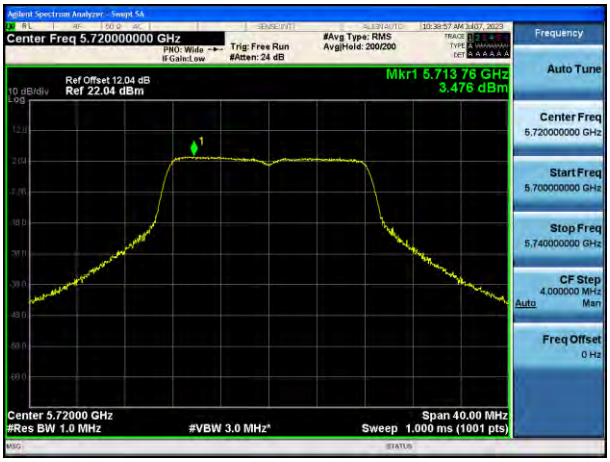
802.11ac(VHT80)	
UNII 1-2C (Ch. 138)	**UNII 3 (Ch. 155)**
	

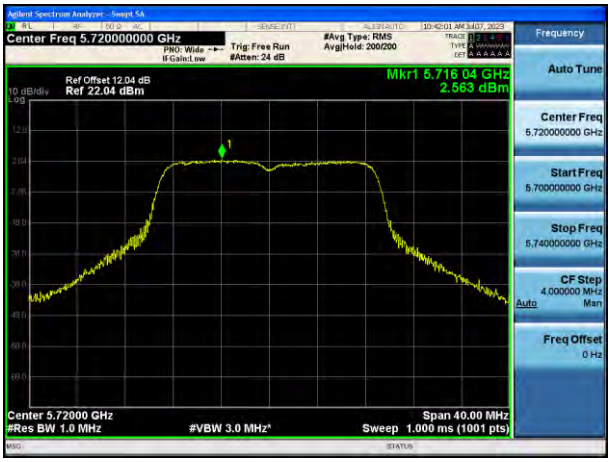
[MIMO(ANT1+ANT2)]

▣ Test Plots

Note:

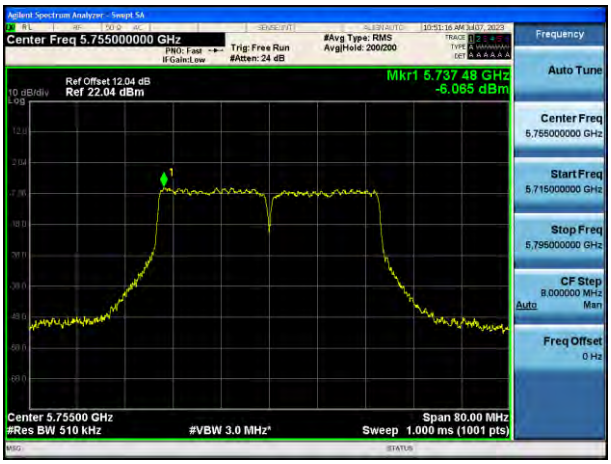
In order to simplify the report, attached plots were only channel of the highest power.

802.11a UNII 1-2C (Ch. 144)	
ANT1	**ANT2**
	
802.11a UNII 3 (Ch. 165)	
ANT1	**ANT2**
	

802.11n(HT20) UNII 1-2C (Ch. 144)	
ANT1	**ANT2**
	
802.11 n(HT20) UNII 3 (Ch. 165)	
ANT1	**ANT2**
	

802.11ac(VHT20) UNII 1-2C (Ch. 40)	
ANT1	**ANT2**
	
802.11 ac(VHT20) UNII 3 (Ch. 165)	
ANT1	**ANT2**
	

802.11n(HT40) UNII 1-2C (Ch. 54)	
ANT1	**ANT2**
	
802.11 n(HT40) UNII 3 (Ch. 159)	
ANT1	**ANT2**
	

802.11ac(VHT40) UNII 1-2C (Ch. 46)	
ANT1	**ANT2**
	
802.11 ac(VHT40) UNII 3 (Ch. 151)	
ANT1	**ANT2**
	

802.11ac(VHT80) UNII 1-2C (Ch. 138)	
ANT1	**ANT2**
	
802.11 ac(VHT80) UNII 3 (Ch. 155)	
ANT1	**ANT2**
	

10.6 FREQUENCY STABILITY.

10.6.1 80 MHz BW

Note

All modes of operation were investigated and the worst case configuration results are reported.

[MIMO]

Startup after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5210034.55	34.55
100%		-30	5210010.57	10.57
100%		-20	5210013.89	13.89
100%		-10	5210015.20	15.20
100%		0	5210025.96	25.96
100%		+10	5210026.85	26.85
100%		+30	5210039.86	39.86
100%		+40	5210048.72	48.72
100%		+50	5210050.64	50.64
High	4.40	+20	5210035.09	35.09
Low	3.70	+20	5210034.17	34.17

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5290032.40	32.40
100%		-30	5290010.63	10.63
100%		-20	5290014.77	14.77
100%		-10	5290020.17	20.17
100%		0	5290022.57	22.57
100%		+10	5290026.43	26.43
100%		+30	5290039.85	39.85
100%		+40	5290045.14	45.14
100%		+50	5290059.14	59.14
High	4.40	+20	5290034.54	34.54
Low	3.70	+20	5290031.68	31.68

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5530033.87	33.87
100%		-30	5530006.18	6.18
100%		-20	5530010.36	10.36
100%		-10	5530015.82	15.82
100%		0	5530025.81	25.81
100%		+10	5530025.87	25.87
100%		+30	5530039.67	39.67
100%		+40	5530043.53	43.53
100%		+50	5530051.58	51.58
High	4.40	+20	5530031.11	31.11
Low	3.70	+20	5530034.59	34.59

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5775034.59	34.59
100%		-30	5775005.08	5.08
100%		-20	5775013.57	13.57
100%		-10	5775016.49	16.49
100%		0	5775025.16	25.16
100%		+10	5775028.19	28.19
100%		+30	5775040.28	40.28
100%		+40	5775042.78	42.78
100%		+50	5775053.65	53.65
High	4.40	+20	5775034.71	34.71
Low	3.70	+20	5775034.98	34.98

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

2 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5210033.27	33.27
100%		-30	5210006.58	6.58
100%		-20	5210011.56	11.56
100%		-10	5210015.53	15.53
100%		0	5210022.29	22.29
100%		+10	5210030.22	30.22
100%		+30	5210035.07	35.07
100%		+40	5210050.73	50.73
100%		+50	5210055.90	55.90
High	4.40	+20	5210033.67	33.67
Low	3.70	+20	5210032.16	32.16

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5290031.75	31.75
100%		-30	5290006.77	6.77
100%		-20	5290012.55	12.55
100%		-10	5290016.92	16.92
100%		0	5290024.44	24.44
100%		+10	5290025.89	25.89
100%		+30	5290038.04	38.04
100%		+40	5290046.68	46.68
100%		+50	5290050.59	50.59
High	4.40	+20	5290032.51	32.51
Low	3.70	+20	5290031.20	31.20

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5530034.99	34.99
100%		-30	5530010.28	10.28
100%		-20	5530013.93	13.93
100%		-10	5530015.83	15.83
100%		0	5530024.18	24.18
100%		+10	5530030.54	30.54
100%		+30	5530038.42	38.42
100%		+40	5530040.34	40.34
100%		+50	5530056.68	56.68
High	4.40	+20	5530030.60	30.60
Low	3.70	+20	5530033.71	33.71

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5775030.29	30.29
100%		-30	5775008.57	8.57
100%		-20	5775015.22	15.22
100%		-10	5775016.08	16.08
100%		0	5775020.03	20.03
100%		+10	5775027.62	27.62
100%		+30	5775039.85	39.85
100%		+40	5775044.27	44.27
100%		+50	5775060.83	60.83
High	4.40	+20	5775031.50	31.50
Low	3.70	+20	5775030.67	30.67

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

5 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5210032.27	32.27
100%		-30	5210009.98	9.98
100%		-20	5210011.55	11.55
100%		-10	5210016.76	16.76
100%		0	5210020.54	20.54
100%		+10	5210028.34	28.34
100%		+30	5210039.82	39.82
100%		+40	5210042.24	42.24
100%		+50	5210058.85	58.85
High	4.40	+20	5210031.53	31.53
Low	3.70	+20	5210030.93	30.93

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5290031.15	31.15
100%		-30	5290009.90	9.90
100%		-20	5290011.15	11.15
100%		-10	5290016.84	16.84
100%		0	5290020.79	20.79
100%		+10	5290028.32	28.32
100%		+30	5290035.71	35.71
100%		+40	5290045.38	45.38
100%		+50	5290052.28	52.28
High	4.40	+20	5290030.59	30.59
Low	3.70	+20	5290031.46	31.46

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5530035.11	35.11
100%		-30	5530007.25	7.25
100%		-20	5530011.99	11.99
100%		-10	5530019.79	19.79
100%		0	5530020.97	20.97
100%		+10	5530029.71	29.71
100%		+30	5530037.86	37.86
100%		+40	5530040.34	40.34
100%		+50	5530051.33	51.33
High	4.40	+20	5530034.27	34.27
Low	3.70	+20	5530034.42	34.42

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5775033.71	33.71
100%		-30	5775005.80	5.80
100%		-20	5775014.92	14.92
100%		-10	5775019.33	19.33
100%		0	5775020.55	20.55
100%		+10	5775029.64	29.64
100%		+30	5775039.10	39.10
100%		+40	5775044.52	44.52
100%		+50	5775059.52	59.52
High	4.40	+20	5775030.51	30.51
Low	3.70	+20	5775034.87	34.87

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

10 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5210034.37	34.37
100%		-30	5210009.57	9.57
100%		-20	5210010.69	10.69
100%		-10	5210019.35	19.35
100%		0	5210022.12	22.12
100%		+10	5210025.76	25.76
100%		+30	5210035.89	35.89
100%		+40	5210042.63	42.63
100%		+50	5210052.50	52.50
High	4.40	+20	5210030.82	30.82
Low	3.70	+20	5210033.89	33.89

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5290035.22	35.22
100%		-30	5290005.36	5.36
100%		-20	5290014.12	14.12
100%		-10	5290016.16	16.16
100%		0	5290021.43	21.43
100%		+10	5290029.10	29.10
100%		+30	5290037.92	37.92
100%		+40	5290041.81	41.81
100%		+50	5290056.33	56.33
High	4.40	+20	5290033.14	33.14
Low	3.70	+20	5290035.82	35.82

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5530034.89	34.89
100%		-30	5530008.49	8.49
100%		-20	5530011.17	11.17
100%		-10	5530017.61	17.61
100%		0	5530025.14	25.14
100%		+10	5530026.40	26.40
100%		+30	5530036.10	36.10
100%		+40	5530050.66	50.66
100%		+50	5530054.20	54.20
High	4.40	+20	5530030.46	30.46
Low	3.70	+20	5530034.91	34.91

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5775033.89	33.89
100%		-30	5775010.97	10.97
100%		-20	5775011.10	11.10
100%		-10	5775017.66	17.66
100%		0	5775022.07	22.07
100%		+10	5775030.10	30.10
100%		+30	5775037.64	37.64
100%		+40	5775040.75	40.75
100%		+50	5775050.80	50.80
High	4.40	+20	5775035.47	35.47
Low	3.70	+20	5775034.16	34.16

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

10.7 STRADDLE CHANNEL

10.7.1 26 dB Bandwidth

[SISO ANT. 2]

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5708.44	16.56
802.11n(HT20)				5707.76	17.24
802.11ac(VHT20)				5707.84	17.16
802.11a	UNII 3	5720	144	5731.28	6.28
802.11n(HT20)				5732.20	7.20
802.11ac(VHT20)				5731.68	6.68

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5687.76	37.24
802.11ac(VHT40)				5687.44	37.56
802.11n(HT40)	UNII 3	5710	142	5731.76	6.76
802.11ac(VHT40)				5731.28	6.28

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5647.12	77.88
	UNII 3	5690	138	5732.08	7.08

Note:

[UNII 2C] 26 dB Bandwidth = 5 725 MHz - Measured Frequency[MHz]

[UNII 3C] 26 dB Bandwidth = Measured Frequency[MHz] – 5 725 MHz

[MIMO ANT. 1]

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5708.44	16.56
802.11n(HT20)				5707.92	17.08
802.11ac(VHT20)				5707.88	17.12
802.11a	UNII 3	5720	144	5731.24	6.24
802.11n(HT20)				5731.80	6.80
802.11ac(VHT20)				5731.56	6.56

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5687.44	37.56
802.11ac(VHT40)				5687.52	37.48
802.11n(HT40)	UNII 3	5710	142	5731.52	6.52
802.11ac(VHT40)				5731.68	6.68

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5646.48	78.52
	UNII 3	5690	138	5732.40	7.40

Note:

[UNII 2C] 26 dB Bandwidth = 5 725 MHz - Measured Frequency[MHz]

[UNII 3C] 26 dB Bandwidth = Measured Frequency[MHz] – 5 725 MHz

[MIMO ANT. 2]

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5708.44	16.56
802.11n(HT20)				5708.24	16.76
802.11ac(VHT20)				5708.40	16.60
802.11a	UNII 3	5720	144	5731.28	6.28
802.11n(HT20)				5731.64	6.64
802.11ac(VHT20)				5731.60	6.60

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5688.08	36.92
802.11ac(VHT40)				5687.68	37.32
802.11n(HT40)	UNII 3	5710	142	5731.68	6.68
802.11ac(VHT40)				5731.60	6.60

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5646.48	78.52
	UNII 3	5690	138	5731.44	6.44

Note:

[UNII 2C] 26 dB Bandwidth = 5 725 MHz - Measured Frequency[MHz]

[UNII 3C] 26 dB Bandwidth = Measured Frequency[MHz] – 5 725 MHz

[SISO ANT. 2]

▣ Test Plots (26 dB Bandwidth)

802.11a UNII Band	802.11n(HT20) UNII Band
	
802.11ac(VHT20) UNII Band	**802.11n(HT40) UNII Band**
	
802.11ac(VHT40) UNII Band	**802.11ac(VHT80) UNII Band**
	

[MIMO ANT. 1]

▣ Test Plots (26 dB Bandwidth)

802.11a UNII Band	802.11n(HT20) UNII Band
	
802.11ac(VHT20) UNII Band	**802.11n(HT40) UNII Band**
	
802.11ac(VHT40) UNII Band	**802.11ac(VHT80) UNII Band**
	

[MIMO ANT. 2]

▣ Test Plots (26 dB Bandwidth)

802.11a UNII Band	802.11n(HT20) UNII Band
	
802.11ac(VHT20) UNII Band	**802.11n(HT40) UNII Band**
	
802.11ac(VHT40) UNII Band	**802.11ac(VHT80) UNII Band**
	

10.7.2 6 dB Bandwidth

[SISO ANT. 2]

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII3	5720	144	5728.24	3.24	> 0.5
802.11n(HT20)				5728.92	3.92	> 0.5
802.11ac(VHT20)				5728.92	3.92	> 0.5
802.11n(HT40)	UNII3	5710	142	5728.32	3.32	> 0.5
802.11ac(VHT40)				5728.24	3.24	> 0.5
802.11ac(VHT80)	UNII3	5690	138	5728.24	3.24	> 0.5

[MIMO ANT. 1]

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII3	5720	144	5728.28	3.28	> 0.5
802.11n(HT20)				5728.88	3.88	> 0.5
802.11ac(VHT20)				5728.88	3.88	> 0.5
802.11n(HT40)	UNII3	5710	142	5728.24	3.24	> 0.5
802.11ac(VHT40)				5728.24	3.24	> 0.5
802.11ac(VHT80)	UNII3	5690	138	5728.24	3.24	> 0.5

[MIMO ANT. 2]

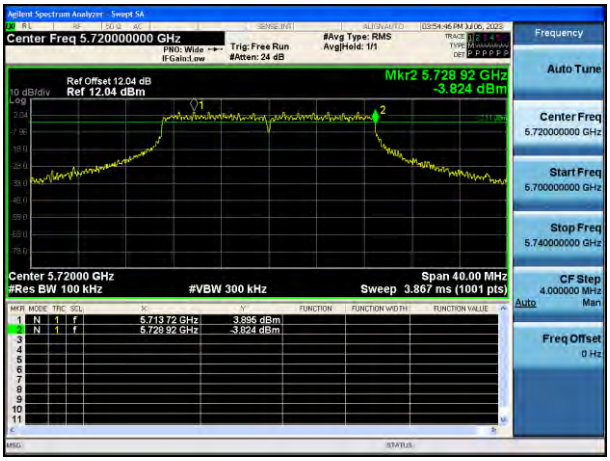
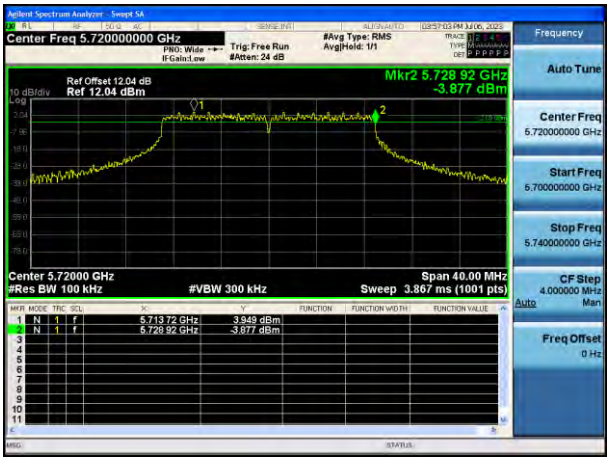
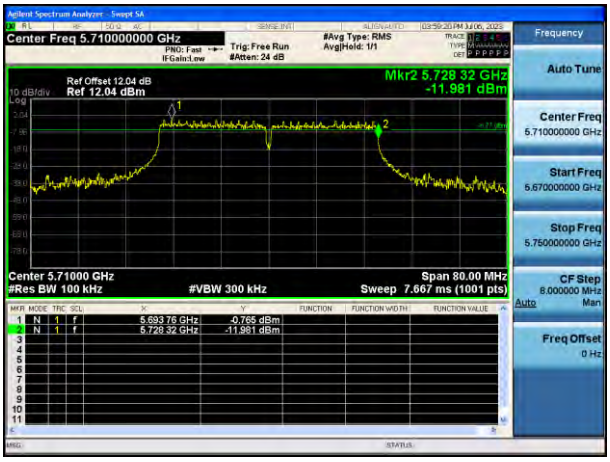
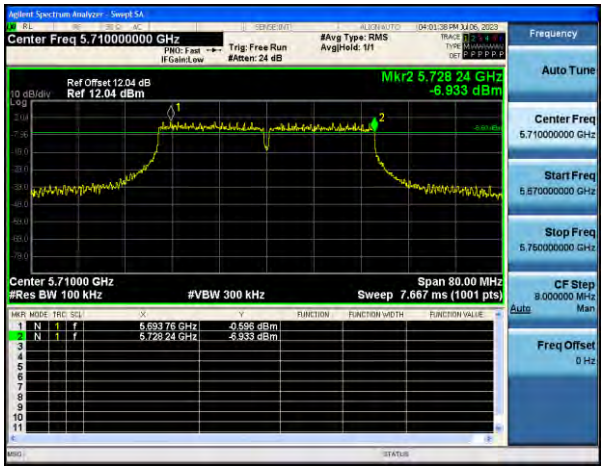
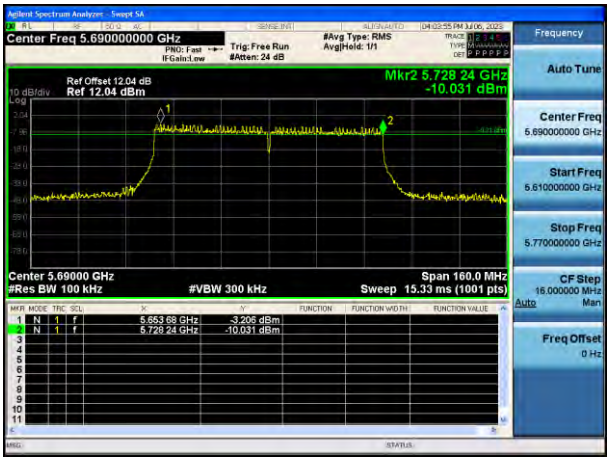
Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII3	5720	144	5728.24	3.24	> 0.5
802.11n(HT20)				5728.88	3.88	> 0.5
802.11ac(VHT20)				5728.88	3.88	> 0.5
802.11n(HT40)	UNII3	5710	142	5728.24	3.24	> 0.5
802.11ac(VHT40)				5728.24	3.24	> 0.5
802.11ac(VHT80)	UNII3	5690	138	5728.08	3.08	> 0.5

Note:

6 dB Bandwidth = Measured Frequency[MHz] – 5 725MHz

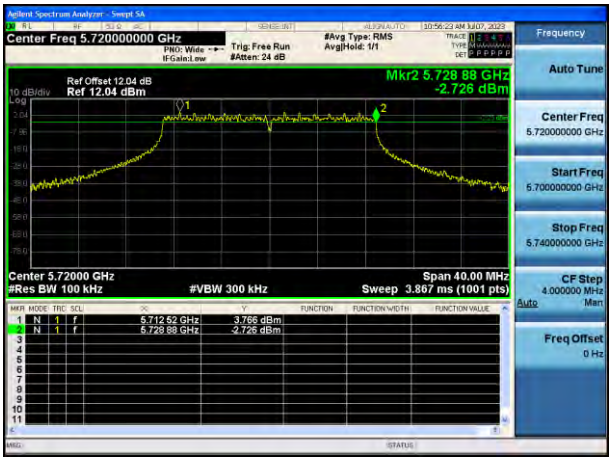
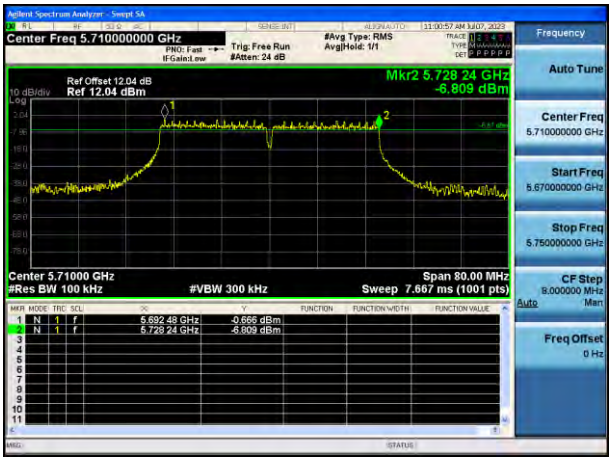
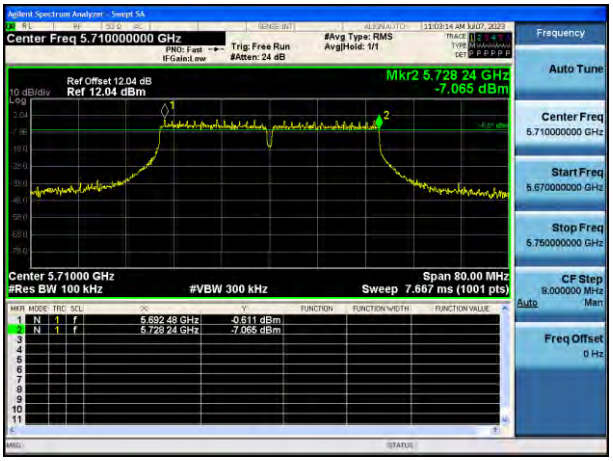
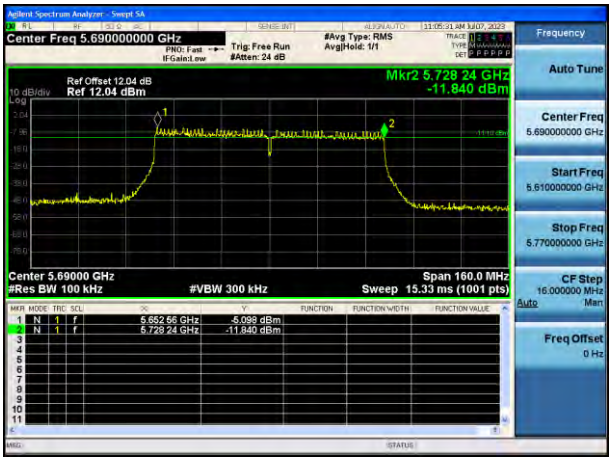
[SISO ANT. 2]

▣ Test Plots(UNII 3 Band 6 dB Bandwidth)

802.11a UNII Band	802.11n(HT20) UNII Band
	
802.11ac(VHT20) UNII Band	**802.11n(HT40) UNII Band**
	
802.11ac(VHT40) UNII Band	**802.11ac(VHT80) UNII Band**
	

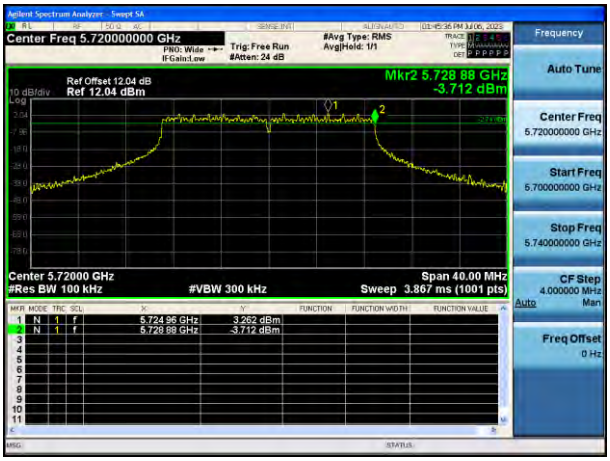
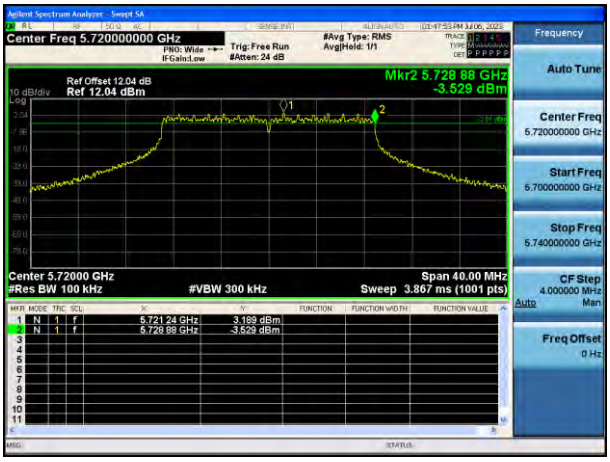
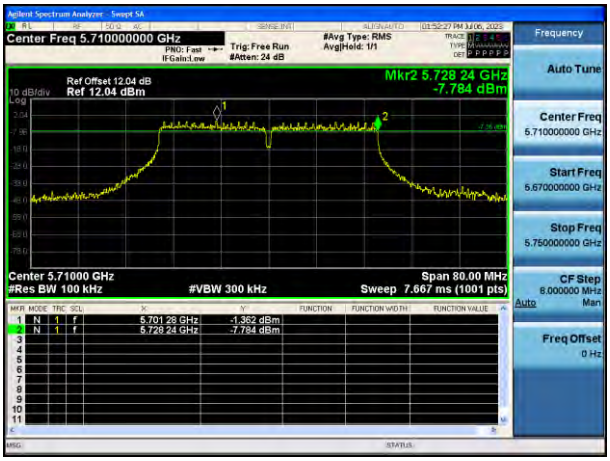
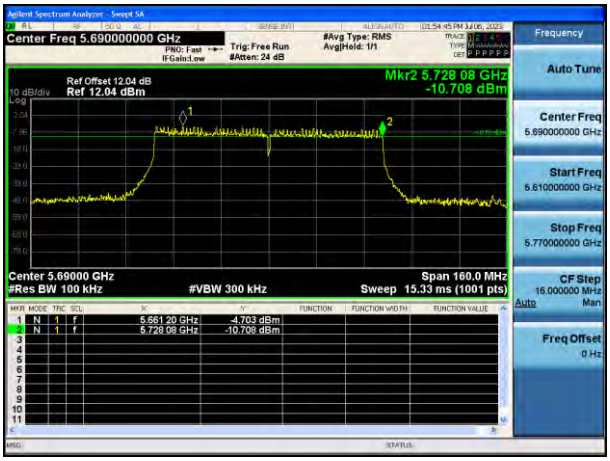
[MIMO ANT. 1]

▣ Test Plots(UNII 3 Band 6 dB Bandwidth)

802.11a UNII Band	802.11n(HT20) UNII Band
	
802.11ac(VHT20) UNII Band	**802.11n(HT40) UNII Band**
	
802.11ac(VHT40) UNII Band	**802.11ac(VHT80) UNII Band**
	

[MIMO ANT. 2]

▣ Test Plots(UNII 3 Band 6 dB Bandwidth)

802.11a UNII Band	802.11n(HT20) UNII Band
	
802.11ac(VHT20) UNII Band	**802.11n(HT40) UNII Band**
	
802.11ac(VHT40) UNII Band	**802.11ac(VHT80) UNII Band**
	

10.7.3 Output Power

[SISO ANT. 2]

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11a	5720 (UNII 2C Band)	144	13.44	0.796	14.24	23.19	18 Mbps
802.11n(HT20)			12.94	1.418	14.36	23.37	MCS4
802.11ac(VHT20)			12.94	1.395	14.33	23.35	MCS4
802.11a	5720 (UNII 3 Band)	144	7.25	0.796	8.04	30.00	18 Mbps
802.11n(HT20)			7.22	1.418	8.64	30.00	MCS4
802.11ac(VHT20)			7.18	1.395	8.58	30.00	MCS4

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710 (UNII 2C Band)	142	11.34	1.780	13.12	23.98	MCS3
802.11ac(VHT40)			11.00	2.233	13.24	23.98	MCS4
802.11n(HT40)	5710 (UNII 3 Band)	142	0.88	1.780	2.66	30.00	MCS3
802.11ac(VHT40)			0.54	2.233	2.77	30.00	MCS4

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11ac(VHT80)	5690 (UNII 2C Band)	138	9.44	3.010	12.45	23.98	MCS4
	5690 (UNII 3 Band)	138	-4.78	3.010	-1.77	30.00	MCS4

[MIMO ANT. 1]

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11a	5720 (UNII 2C Band)	144	13.85	0.796	14.65	23.19	18 Mbps
802.11n(HT20)			11.79	2.190	13.98	23.32	MCS12
802.11ac(VHT20)			11.78	2.190	13.97	23.34	MCS4
802.11a	5720 (UNII 3 Band)	144	7.58	0.796	8.37	30.00	18 Mbps
802.11n(HT20)			6.01	2.190	8.20	30.00	MCS12
802.11ac(VHT20)			6.02	2.190	8.21	30.00	MCS4

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710 (UNII 2C Band)	142	10.39	2.778	13.17	23.98	MCS11
802.11ac(VHT40)			10.40	2.592	13.00	23.98	MCS3
802.11n(HT40)	5710 (UNII 3 Band)	142	-0.06	2.778	2.71	30.00	MCS11
802.11ac(VHT40)			0.04	2.592	2.63	30.00	MCS3

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11ac(VHT80)	5690 (UNII 2C Band)	138	7.66	3.448	11.11	23.98	MCS3
	5690 (UNII 3 Band)	138	-6.92	3.448	-3.47	30.00	MCS3

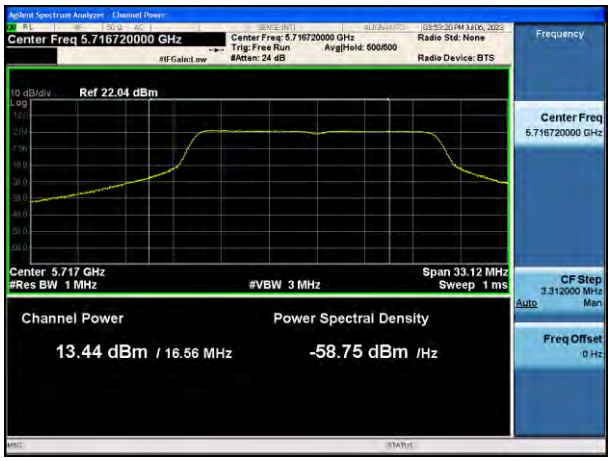
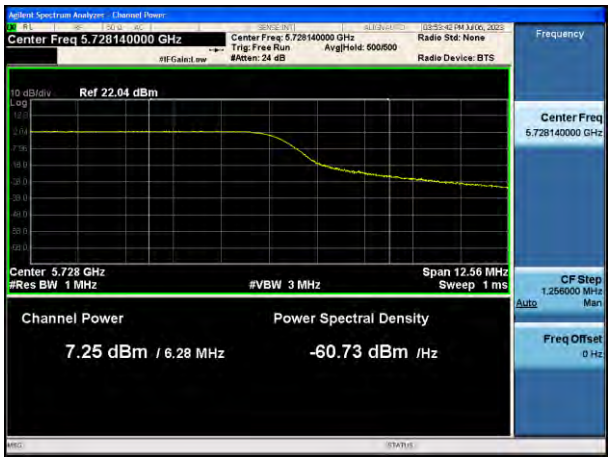
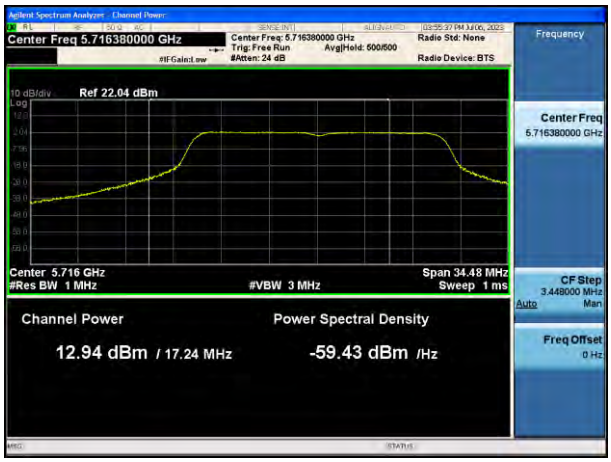
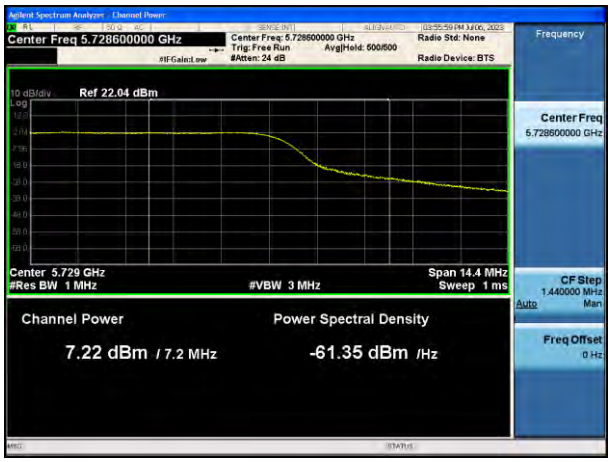
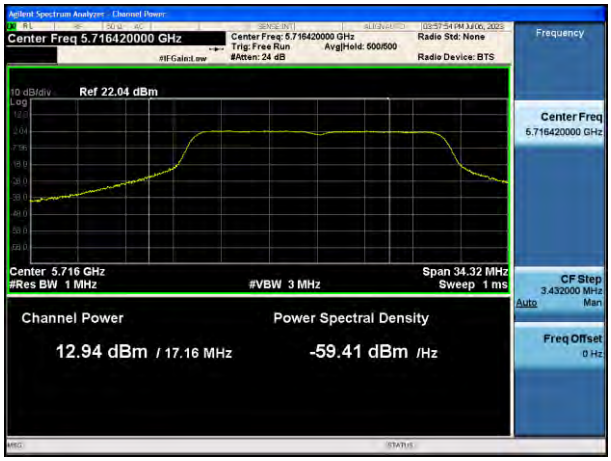
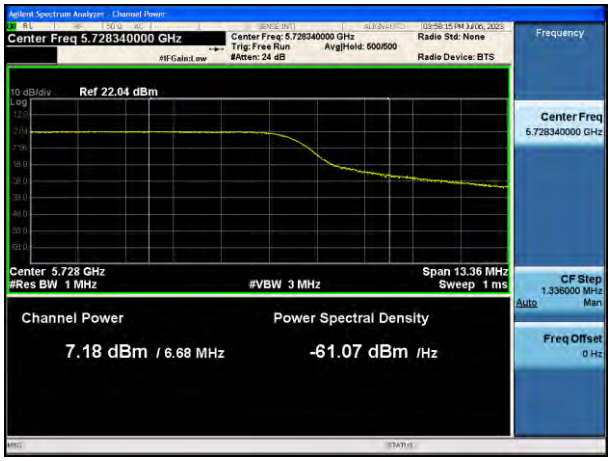
[MIMO ANT. 2]

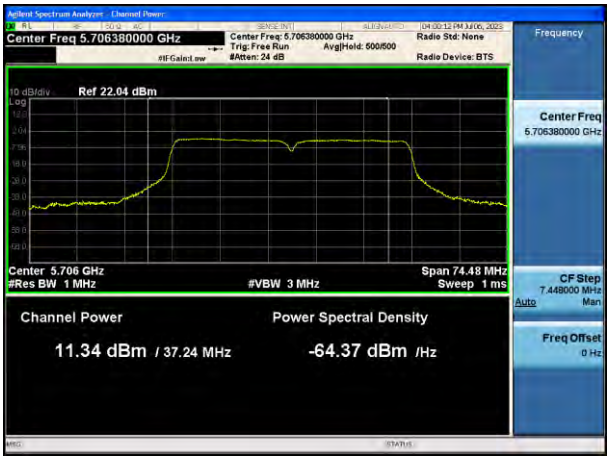
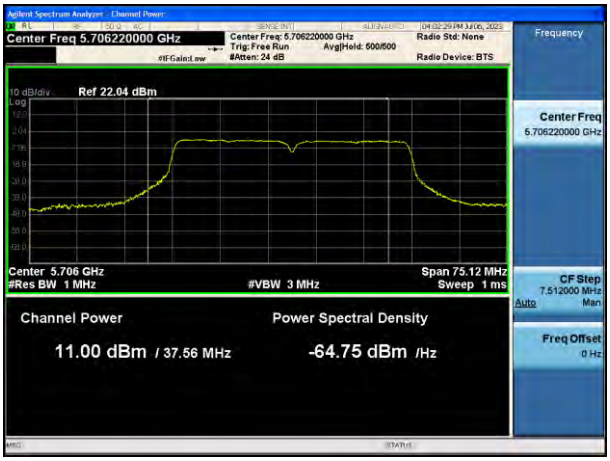
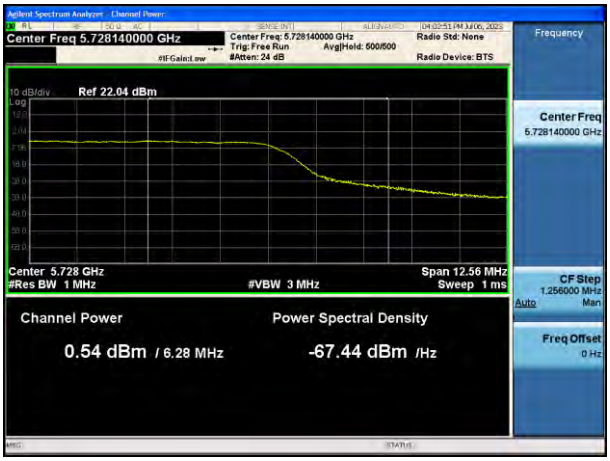
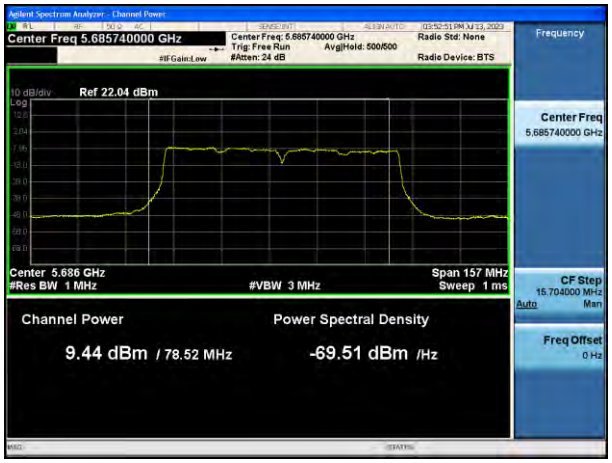
Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11a	5720 (UNII 2C Band)	144	13.44	0.796	14.24	23.19	18 Mbps
802.11n(HT20)			11.28	2.190	13.47	23.24	MCS12
802.11ac(VHT20)			11.27	2.190	13.46	23.20	MCS4
802.11a	5720 (UNII 3 Band)	144	7.25	0.796	8.04	30.00	18 Mbps
802.11n(HT20)			5.50	2.190	7.69	30.00	MCS12
802.11ac(VHT20)			5.48	2.190	7.67	30.00	MCS4

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710 (UNII 2C Band)	142	9.65	2.778	12.42	23.98	MCS11
802.11ac(VHT40)			9.71	2.592	12.30	23.98	MCS3
802.11n(HT40)	5710 (UNII 3 Band)	142	-0.67	2.778	2.11	30.00	MCS11
802.11ac(VHT40)			-0.65	2.592	1.94	30.00	MCS3

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11ac(VHT80)	5690 (UNII 2C Band)	138	8.44	3.448	11.88	23.98	MCS3
	5690 (UNII 3 Band)	138	-5.83	3.448	-2.38	30.00	MCS3

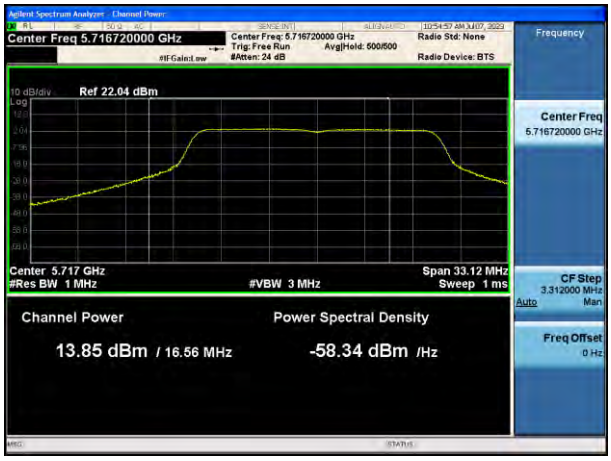
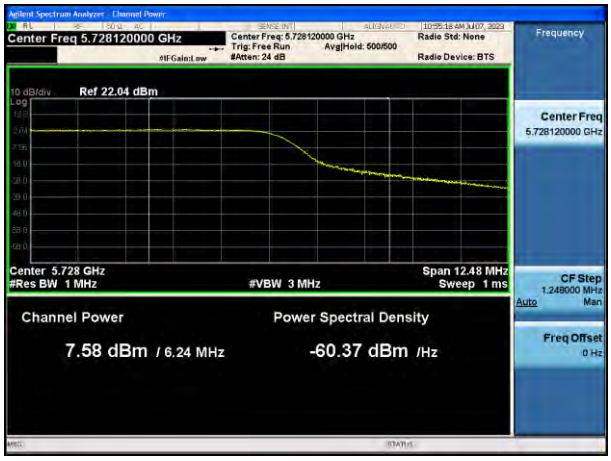
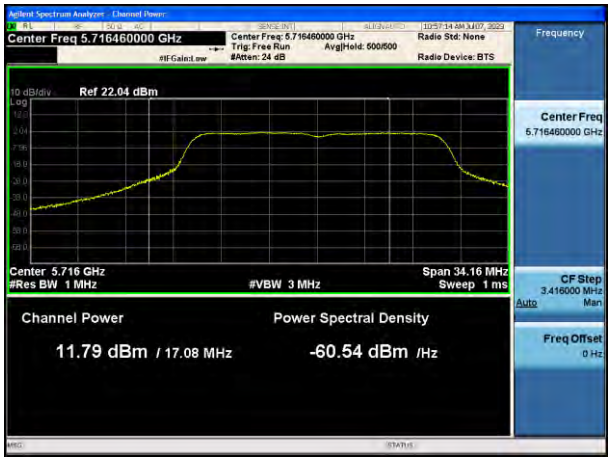
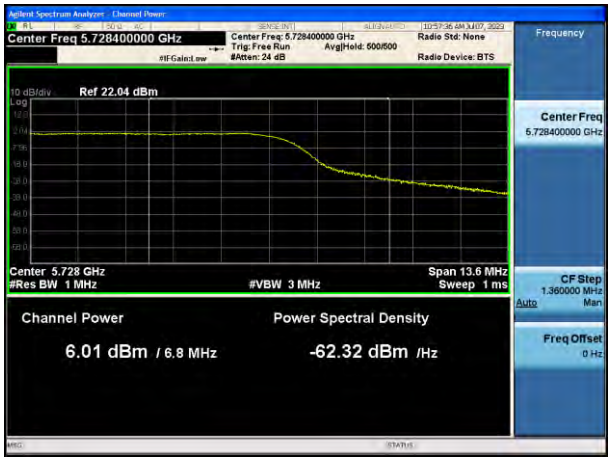
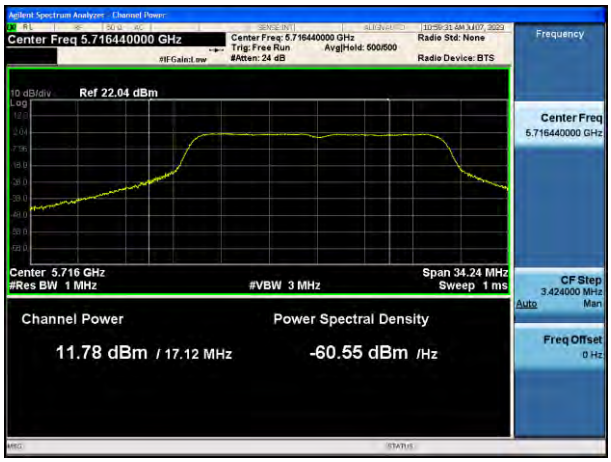
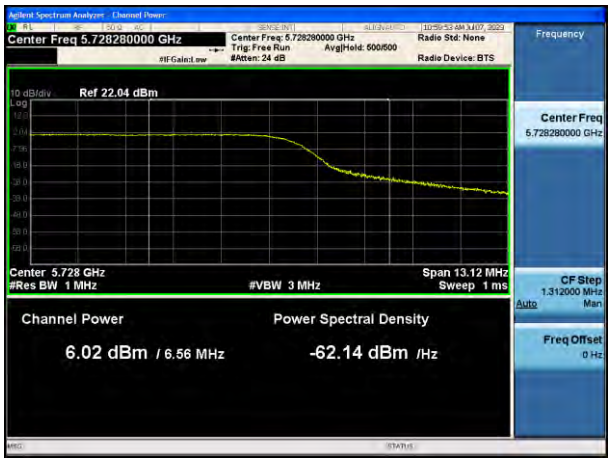
[SISO ANT. 2]
▣ Test Plots

802.11a UNII 2C Band	802.11a UNII 3 Band
	
802.11n(HT20) UNII 2C Band	**802.11n(HT20) UNII 3 Band**
	
802.11ac(VHT20) UNII 2C Band	**802.11ac(VHT20) UNII 3 Band**
	

802.11n(HT40) UNII 2C Band	802.11n(HT40) UNII 3 Band
	
802.11ac(VHT40) UNII 2C Band	**802.11ac(VHT40) UNII 3 Band**
	
802.11ac(VHT80) UNII 2C Band	**802.11ac(VHT80) UNII 3 Band**
	

[MIMO ANT. 1]

▣ Test Plots

802.11a UNII 2C Band	802.11a UNII 3 Band
	
802.11n(HT20) UNII 2C Band	**802.11n(HT20) UNII 3 Band**
	
802.11ac(VHT20) UNII 2C Band	**802.11ac(VHT20) UNII 3 Band**
	

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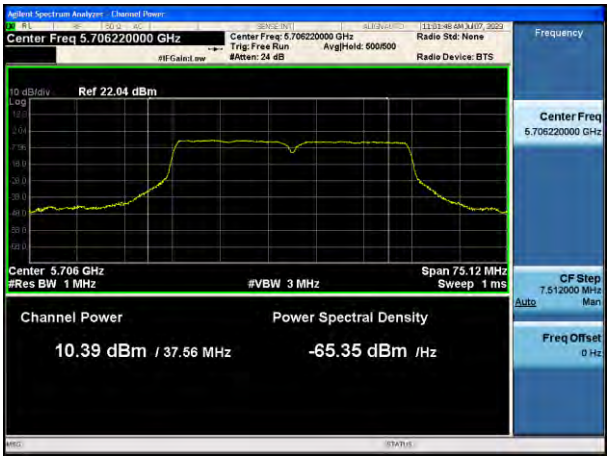	
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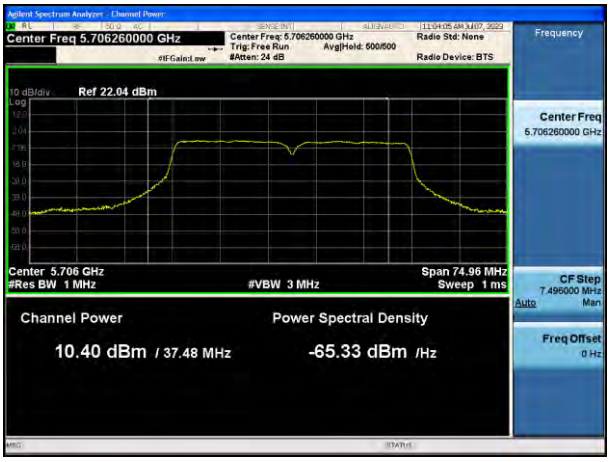	
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