TEST REPORT

FCC UNII Test for LGSBWAC24
Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2408-FC004

DATE OF ISSUE
August 9, 2024

Tested by
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Accredited by KOLAS, Republic of KOREA

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Applicant	**LG Electronics Inc.** 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 17709, Republic of Korea
Product Name Model Name	RF Module LGSBWAC24
FCC ID	BEJLGSBWAC24
Date of Test	July 16, 2024 ~ August 09, 2024
FCC Classification	Unlicensed National Information Infrastructure(NII)
Test Standard Used	FCC Rule Part(s): Part 15.407
Test Results	PASS
Location of Test	■ Permanent Testing Lab ☐ On Site Testing Lab (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)
Brand	LG

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	August 09, 2024	Initial Release

Notice

Content
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. The laboratory is not accredited for the test results marked *. Information provided by the applicant is marked **. Test results provided by external providers are marked ***. The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s). When confirmation of authenticity of this test report is required, please contact www.hct.co.kr This test report provides test result(s) under the scope accredited by the Korea Laboratory Accreditation Scheme (KOLAS), which signed the ILAC-MRA. (KOLAS (KS Q ISO/IEC 17025) Accreditation No. KT197)

CONTENTS

1. GENERAL INFORMATION

EUT DESCRIPTION

Model	LGSBWAC24	
Additional Model	-	
EUT Type	RF Module	
Power Supply	DC 3.30 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	Not Supported	
Dynamic Frequency Selection	Slave without radar detection	
Antenna Specification	Type: Metal press Ant	
Serial number	Conducted : D07602C7ACA6 Radiated : D07602C7ACAE	

ANTENNA CONFIGURATIONS

1. Antenna configuration

Configurations	SISO		MIMO	
	Ant.1	Ant.2	CDD	SDM
802.11a	O	O	O	X
802.11n	O	O	O	O
802.11ac	O	O	O	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 2.4 GHz and 5 GHz or 6GHz Bands simultaneously on each antenna.

RSDB Scenario	2.4 GHz WiFi Ant.1	2.4 GHz WiFi Ant.2	5 GHz WiFi Ant.1	5 GHz WiFi Ant.2	BT Ant	Test Case
2.4 GHz WiFi MIMO + Bluetooth	on	on			on	Scenario1
5 GHz WiFi MIMO + Bluetooth			on	on	on	Scenario2

3. Directional Gain Calculation

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

$$\text{Directional Gain(CDD)} = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\{\sum_{k=1}^{N_{ANT}} g_{j,k}\}^2}{N_{ANT}}\right]$$

Directional gain(SDM) = Gmax + 10·LOG(N_{ANT}/ N_{ss})

Band	Ant Gain (dBi)		N_{ANT}/ N_{ss}	Directional Gain (dBi)	
	ANT1	ANT2		CDD	SDM
UNII 1	-0.11	1.84	2 / 2	3.93	1.84
UNII 2A	-0.11	1.86		3.94	1.86
UNII 2C	0.79	1.41		4.12	1.41
UNII 3	1.74	1.78		4.77	1.78

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

Directional gain(SDM) = Gmax + 10·LOG(N_{ANT}/ N_{ss})

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	MIMO_CDD(Ant.1+ Ant.2)					
		Ant.1 Power		Ant.2 Power		Ant.1 + Ant.2 Power	
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)
UNII1	802.11a	13.81	0.024	13.71	0.023	16.77	0.048
	802.11n (HT20)	13.96	0.025	13.82	0.024	16.90	0.049
	802.11n (HT40)	13.51	0.022	13.23	0.021	16.38	0.043
	802.11ac (VHT20)	14.02	0.025	13.81	0.024	16.93	0.049
	802.11ac (VHT40)	13.46	0.022	13.31	0.021	16.40	0.044
	802.11ac (VHT80)	12.70	0.019	12.67	0.018	15.70	0.037
UNII2A	802.11a	13.18	0.021	13.62	0.023	16.42	0.044
	802.11n (HT20)	13.19	0.021	13.78	0.024	16.51	0.045
	802.11n (HT40)	12.99	0.020	13.44	0.022	16.23	0.042
	802.11ac (VHT20)	13.24	0.021	13.82	0.024	16.55	0.045
	802.11ac (VHT40)	12.89	0.019	13.39	0.022	16.16	0.041
	802.11ac (VHT80)	12.71	0.019	12.85	0.019	15.79	0.038
UNII2C	802.11a	13.20	0.021	13.83	0.024	16.54	0.045
	802.11n (HT20)	13.47	0.022	13.94	0.025	16.72	0.047
	802.11n (HT40)	13.45	0.022	13.75	0.024	16.61	0.046
	802.11ac (VHT20)	13.50	0.022	13.87	0.024	16.70	0.047
	802.11ac (VHT40)	13.53	0.023	13.72	0.024	16.64	0.046
	802.11ac (VHT80)	13.04	0.020	13.33	0.022	16.20	0.042
UNII3	802.11a	13.01	0.020	13.41	0.022	16.22	0.042
	802.11n (HT20)	12.84	0.019	13.42	0.022	16.15	0.041
	802.11n (HT40)	12.90	0.019	13.11	0.020	16.02	0.040
	802.11ac (VHT20)	12.86	0.019	13.37	0.022	16.13	0.041
	802.11ac (VHT40)	12.82	0.019	13.19	0.021	16.02	0.040
	802.11ac (VHT80)	13.00	0.020	13.22	0.021	16.12	0.041

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 Measurement Typeor 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 Publication22.
Detailed description of test facility was submitted to the Commission and accepted dated March 11, 2024 (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 Measurement Typeors 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.

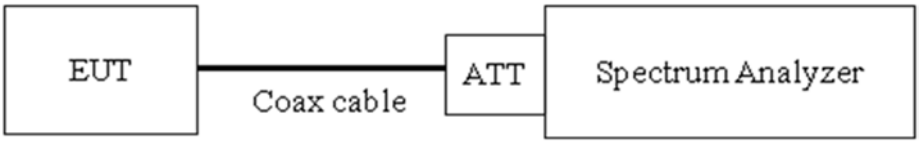
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.98 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.36 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.70 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.52 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.66 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.58 (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.

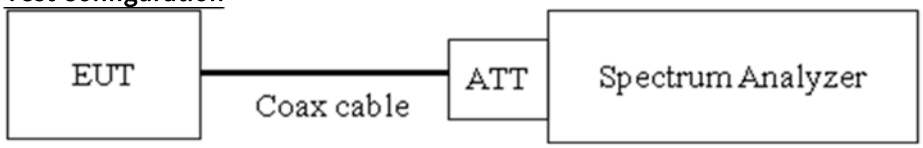
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Measurement Type = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

8.2. 6 dB Bandwidth & 26 dB Bandwidth

Limit

Within the 5.725-5.85 GHz 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. Measurement Type = 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. Measurement Type = 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 99 % Bandwidth is used to determine the conducted power limits.

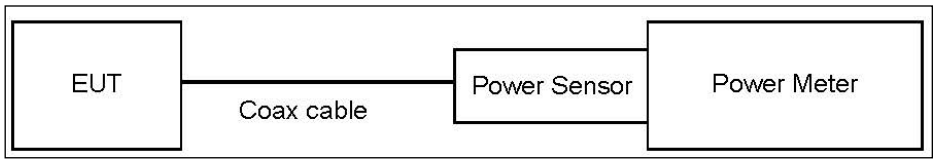
8.3. Output Power Measurement

Limit

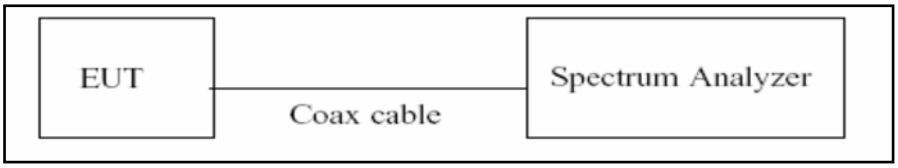
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30 dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 2A, 2C	Not exceed the lesser of 250 mW or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)
UNII 3	Not exceed 1 W(=30 dBm)

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. Measurement Type = 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. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	11.82
UNII 2A	11.82
UNII 2C	11.82
UNII 3	11.82

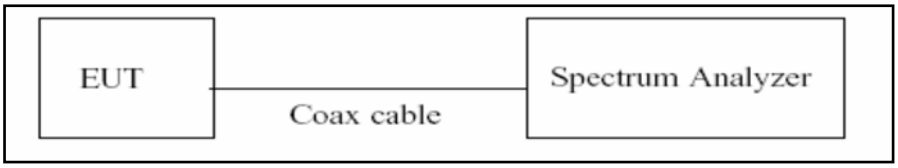
(Actual value of loss for the attenuator and cable combination)

8.4. Power Spectral Density

Limit

Band	Limit
UNII 1, 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. Measurement Type = RMS(i.e., power averaging), if available. Otherwise, use sample Measurement Type 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. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	11.82
UNII 2A	11.82
UNII 2C	11.82
UNII 3	11.82

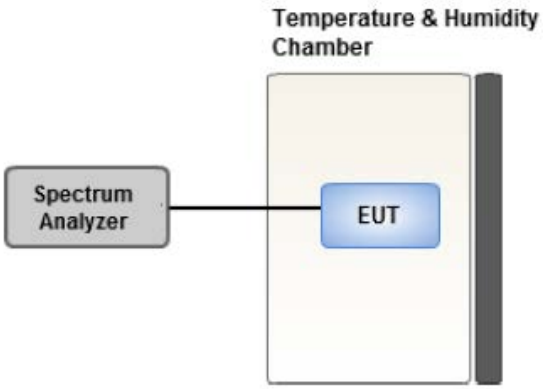
(Actual value of loss for the attenuator and cable combination)

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 °C and 50 °C.
2. The temperature was incremented by 10 °C 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. Measurement Types : Quasi Peak and Average Measurement Type.

Sample Calculation

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

8.7. Radiated Test

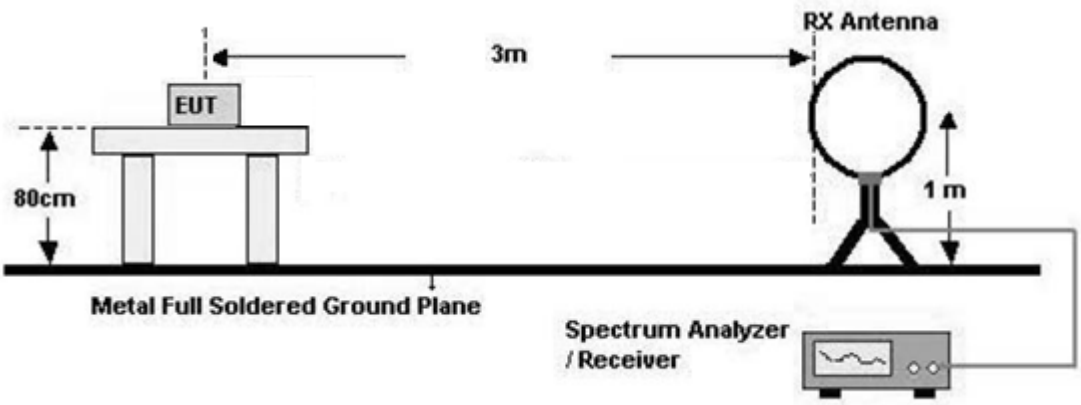
Limit

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.

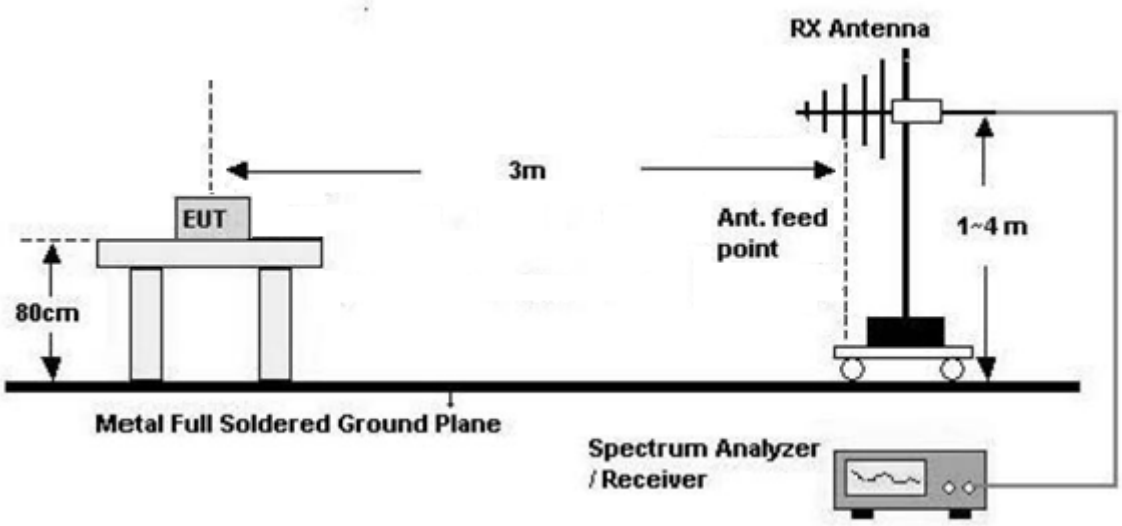
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

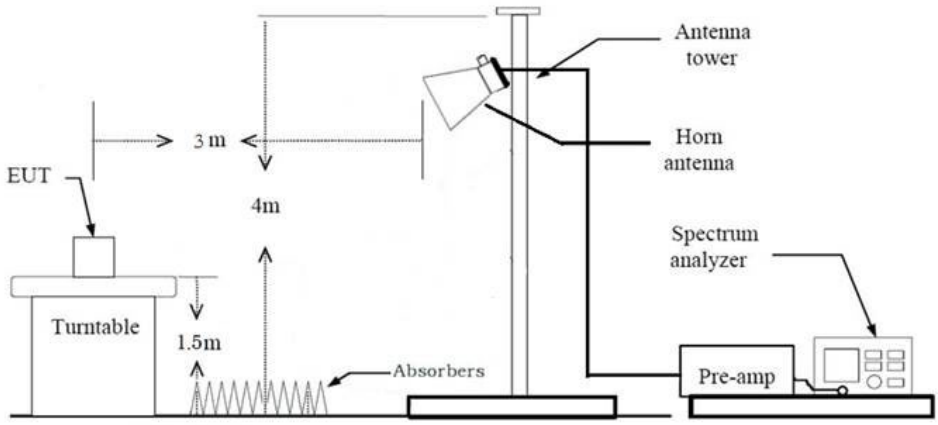
Below 30 MHz



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 0.8m 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 = Max Hold
   - 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 0.8m 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 = Max Hold
      - 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 percent) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 percent) = 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 percent duty cycle. For lower duty cycles, increase the minimum 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 percent) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
   - VBW(Duty cycle is < 98 percent) = 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 percent duty cycle. For lower duty cycles, increase the minimum 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

(1)Measurement(Peak)

= Measured Value(Peak)

(2)Measurement(Avg)

= Measured Value (Avg)

- We apply to the offset in the range 1 GHz - 18 GHz.
- The offset = Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) – Amp. Gain(A.G) + Attenuator(ATT)

The actual setting value of VBW

Mode	Worst Data rate (Mbps)	Duty Cycle	Duty Cycle Factor (dB)	The actual setting value of VBW (Hz)
802.11a	6	-	-	1 000
802.11n(HT20)	MCS0	-	-	1 000
802.11n(HT40)	MCS0	-	-	1 000
802.11ac(VHT20)	MCS0	-	-	1 000
802.11ac(VHT40)	MCS0	-	-	1 000
802.11ac(VHT80)	MCS0	-	-	1 000

8.8. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone
   - Worstcase : Stand alone
2. All configurations of antenna were investigated and the worst case configuration results are reported.
   - Mode : Ant1(SISO), Ant2(SISO), Ant1+Ant2(CDD,SDM)
   - Worstcase : Ant1+Ant2(CDD)
3. EUT Axis
   - Radiated Spurious Emissions : Z
   - Radiated Restricted Band Edge : Y
4. All datarate of operation were investigated and the worst case datarate results are reported
   - 802.11a : 6 Mbps
   - 802.11n(20M, 40M) : MCS 0
   - 802.11ac(20M, 40M, 80M) : MCS 0
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
6. All test was performed with continuous signal.(Duty Cycle ≥ 98%)
7. Radiated Spurious Emission
   - All modulation of operation were investigated and the worst case modulation results are reported.

   Worst-case : 802.11a_6 Mbps

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone
   - Worstcase : Stand alone

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.
   - 802.11a : 6 Mbps
   - 802.11n(20M, 40M) : MCS 0
   - 802.11ac(20M, 40M, 80M) : MCS 0
2. All configurations of antenna were investigated and All case results are reported.
   - Mode : Ant1(SISO), Ant2(SISO), Ant1+Ant2(MIMO)
3. All test was performed with continuous signal.(Duty Cycle ≥ 98%)

Radiated test(DBS)

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone
   - Worstcase : Stand alone
2. EUT Axis
   - Radiated Spurious Emissions : Z
3. All of RSDB Scenario were investigated and the worst case configuration results are reported.

RSDB Scenario	2.4 GHz WiFi Ant.1	2.4 GHz WiFi Ant.2	5 GHz WiFi Ant.1	5 GHz WiFi Ant.2	BT Ant	Test Case
2.4 GHz WiFi MIMO + Bluetooth	on	on			on	Scenario1
5 GHz WiFi MIMO + Bluetooth			on	on	on	Scenario2

4. The RSDB 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 10.6.2.
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.)

RSDB Scenario 2	Description	Bluetooth Emission	5 GHz Emission
5 GHz WiFi MIMO + Bluetooth	Antenna	SISO	MIMO(CDD)
	Channel	Ch. 0	Ch. 116
	Data Rate	3 Mbps	6 Mbps
	Mode	8DPSK	802.11a

Note : BT RSDB Data refer to [BT] Test Report

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)		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	Radiated	PASS

10. TEST RESULT

10.1 DUTY CYCLE

Mode	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11a	-	-	-	-
802.11n	-	-	-	-
802.11ac	-	-	-	-

Note:

1. Duty Cycle Factor = 10Xlog(1/Duty Cycle). where, Duty Cycle = T_{on} / T_{total}
2. Test was performed with continuous Tx

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.

[Ant.1]

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
802.11a	5180	36	18.63	16.439
	5200	40	21.05	16.453
	5240	48	23.54	16.475
	5260	52	18.66	16.440
	5300	60	20.98	16.453
	5320	64	21.07	16.463
	5500	100	18.67	16.431
	5580	116	18.62	16.399
	5720	144	18.70	16.386
	5745	149	18.75	16.413
	5785	157	18.84	16.420
	5825	165	18.73	16.389

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
802.11n (HT20)	5180	36	19.64	17.566
	5200	40	19.69	17.584
	5240	48	21.76	17.618
	5260	52	19.67	17.567
	5300	60	19.80	17.587
	5320	64	19.81	17.588
	5500	100	19.65	17.573
	5580	116	19.53	17.563
	5720	144	19.53	17.549
	5745	149	19.57	17.553
	5785	157	19.70	17.559
	5825	165	19.65	17.564

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
802.11ac (VHT20)	5180	36	19.68	17.590
	5200	40	19.64	17.585
	5240	48	21.91	17.607
	5260	52	19.62	17.575
	5300	60	19.60	17.574
	5320	64	19.83	17.582
	5500	100	19.69	17.567
	5580	116	19.67	17.573
	5720	144	19.59	17.558
	5745	149	19.66	17.562
	5785	157	19.63	17.566
	5825	165	19.66	17.557

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth[MHz]	99% Occupied Bandwidth[MHz]
802.11n (HT40)	5190	38	41.24	36.171
	5230	46	41.59	36.172
	5270	54	41.55	36.165
	5310	62	41.36	36.211
	5510	102	41.85	36.175
	5550	110	41.48	36.185
	5710	142	41.46	36.136
	5755	151	41.47	36.129
	5795	159	41.25	36.142

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
802.11ac (VHT40)	5190	38	41.63	36.143
	5230	46	41.88	36.158
	5270	54	41.79	36.139
	5310	62	41.63	36.165
	5510	102	41.48	36.166
	5550	110	41.43	36.148
	5710	142	41.37	36.103
	5755	151	41.76	36.112
	5795	159	41.49	36.143

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth[MHz]	99% Occupied Bandwidth[MHz]
802.11ac (VHT80)	5210	42	81.31	74.655
	5290	58	81.33	74.674
	5530	106	81.48	74.701
	5690	138	81.42	74.668
	5775	155	81.80	74.696

[Ant.2]

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
802.11a	5180	36	18.51	16.383
	5200	40	18.51	16.394
	5240	48	18.52	16.399
	5260	52	18.49	16.390
	5300	60	18.52	16.402
	5320	64	18.52	16.408
	5500	100	18.54	16.390
	5580	116	18.48	16.386
	5720	144	18.50	16.379
	5745	149	18.51	16.372
	5785	157	18.56	16.389
	5825	165	18.49	16.380

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
802.11n (HT20)	5180	36	19.59	17.565
	5200	40	19.52	17.555
	5240	48	19.58	17.562
	5260	52	19.60	17.555
	5300	60	19.62	17.572
	5320	64	19.56	17.568
	5500	100	19.55	17.568
	5580	116	19.57	17.564
	5720	144	19.67	17.570
	5745	149	19.66	17.564
	5785	157	19.64	17.553
	5825	165	19.56	17.561

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
802.11ac (VHT20)	5180	36	19.53	17.565
	5200	40	19.63	17.566
	5240	48	19.51	17.555
	5260	52	19.63	17.566
	5300	60	19.62	17.562
	5320	64	19.63	17.568
	5500	100	19.63	17.565
	5580	116	19.60	17.566
	5720	144	19.53	17.558
	5745	149	19.64	17.569
	5785	157	19.60	17.568
	5825	165	19.56	17.567

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth[MHz]	99% Occupied Bandwidth[MHz]
802.11n (HT40)	5190	38	41.25	36.118
	5230	46	41.72	36.087
	5270	54	41.43	36.116
	5310	62	41.59	36.131
	5510	102	41.48	36.117
	5550	110	41.32	36.132
	5710	142	41.44	36.099
	5755	151	41.81	36.130
	5795	159	41.72	36.153

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth [MHz]	99% Occupied Bandwidth [MHz]
802.11ac (VHT40)	5190	38	41.28	36.124
	5230	46	41.40	36.103
	5270	54	41.60	36.119
	5310	62	41.04	36.110
	5510	102	41.41	36.115
	5550	110	41.34	36.076
	5710	142	41.13	36.100
	5755	151	41.76	36.106
	5795	159	41.51	36.176

Mode	Frequency [MHz]	Channel No.	26 dB Bandwidth[MHz]	99% Occupied Bandwidth[MHz]
802.11ac (VHT80)	5210	42	81.08	74.581
	5290	58	81.21	74.619
	5530	106	81.01	74.570
	5690	138	81.03	74.615
	5775	155	81.15	74.643

[ANT. 1]

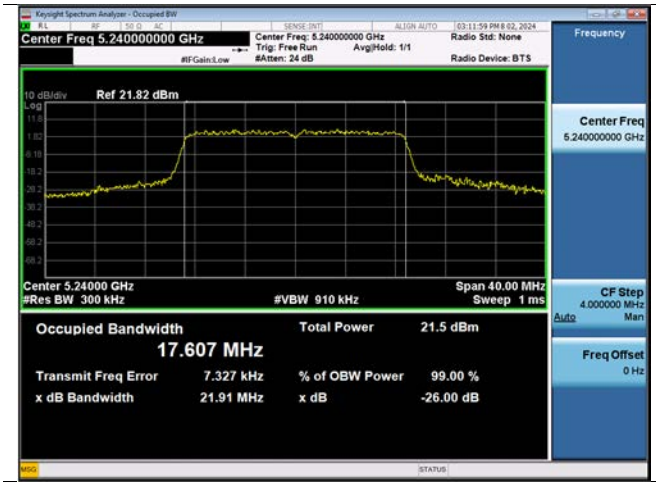
▣ Test Plots

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

802.11a 26 dB Bandwidth (CH 48)

802.11n(HT20) 26 dB Bandwidth (CH 48)

802.11ac(VHT20) 26 dB Bandwidth (CH 48)



802.11n(HT40) 26 dB Bandwidth (CH 102)

802.11ac(VHT40) 26 dB Bandwidth (CH 46)

802.11ac(VHT80) 26 dB Bandwidth (CH 155)

[ANT. 2]

▣ Test Plots

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

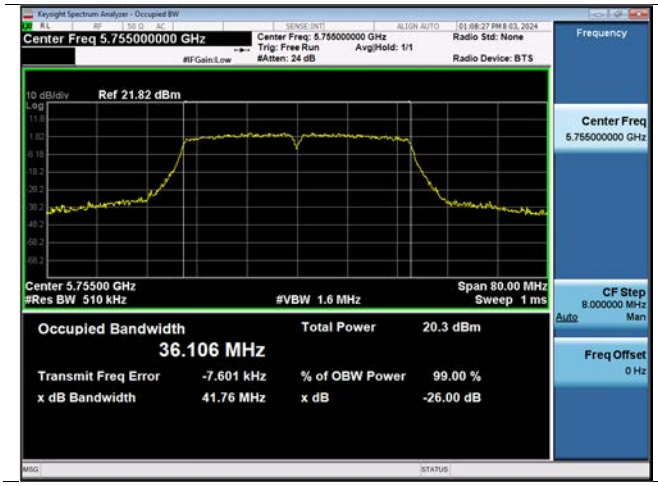
802.11a 26 dB Bandwidth (CH 157)

802.11n(HT20) 26 dB Bandwidth (CH 144)

802.11ac(VHT20) 26 dB Bandwidth (CH 149)

802.11n(HT40) 26 dB Bandwidth (CH 151)

802.11ac(VHT40) 26 dB Bandwidth (CH 151)



802.11ac(VHT80) 26 dB Bandwidth (CH 58)

10.3 6 dB BANDWIDTH

[Ant.1]

Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11a	5745	149	16.53	0.5
	5785	157	16.52	0.5
	5825	165	16.53	0.5

Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11n (HT20)	5745	149	17.71	0.5
	5785	157	17.72	0.5
	5825	165	17.70	0.5

Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11ac (VHT20)	5745	149	17.69	0.5
	5785	157	17.71	0.5
	5825	165	17.70	0.5

Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11n (HT40)	5755	151	36.45	0.5
	5795	159	36.44	0.5

Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11ac (VHT40)	5755	151	36.44	0.5
	5795	159	36.43	0.5

Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11ac (VHT80)	5775	155	75.99	0.5

[Ant.2]

Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11a	5745	149	16.50	0.5
	5785	157	16.49	0.5
	5825	165	16.48	0.5

Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11n (HT20)	5745	149	17.69	0.5
	5785	157	17.70	0.5
	5825	165	17.70	0.5

Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11ac (VHT20)	5745	149	17.71	0.5
	5785	157	17.69	0.5
	5825	165	17.69	0.5

Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11n (HT40)	5755	151	36.43	0.5
	5795	159	36.44	0.5

Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11ac (VHT40)	5755	151	36.45	0.5
	5795	159	36.46	0.5

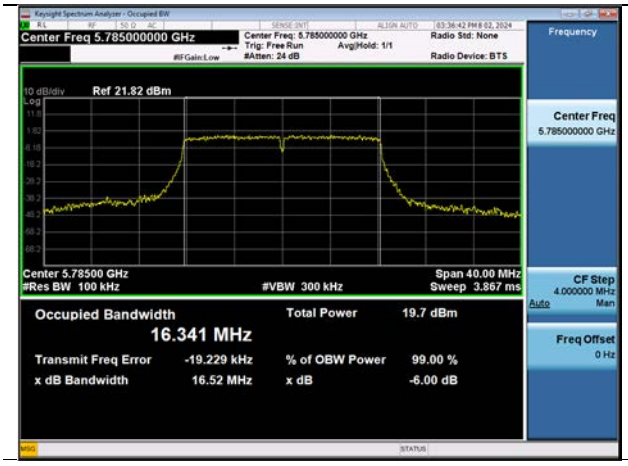
Mode	Frequency [MHz]	Channel No.	6 dB Bandwidth [MHz]	Limit [MHz]
802.11ac (VHT80)	5775	155	75.87	0.5

[ANT. 1]

▣ Test Plots

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

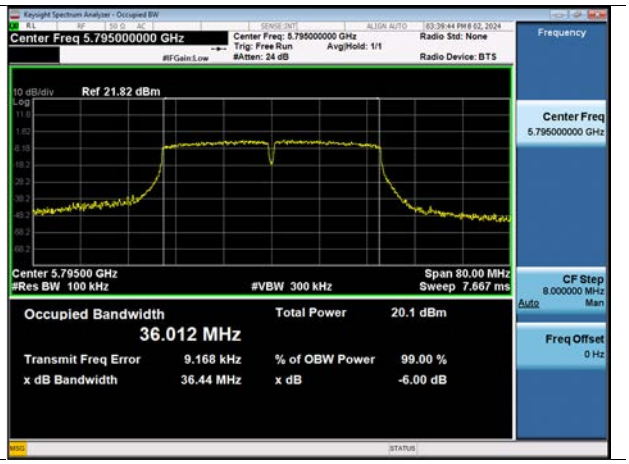
802.11a (CH.157)



802.11n(HT20) (CH.165)

802.11ac(VHT20) (CH.149)

802.11n(HT40) (CH.159)



802.11ac(VHT40) (CH.159)

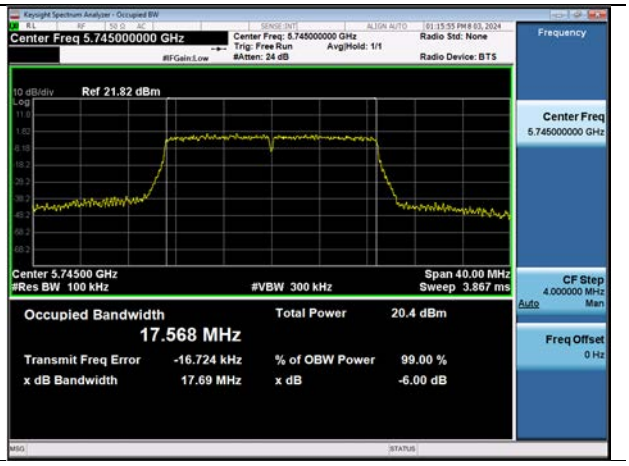
802.11ac(VHT80) (CH.155)

[ANT. 2]

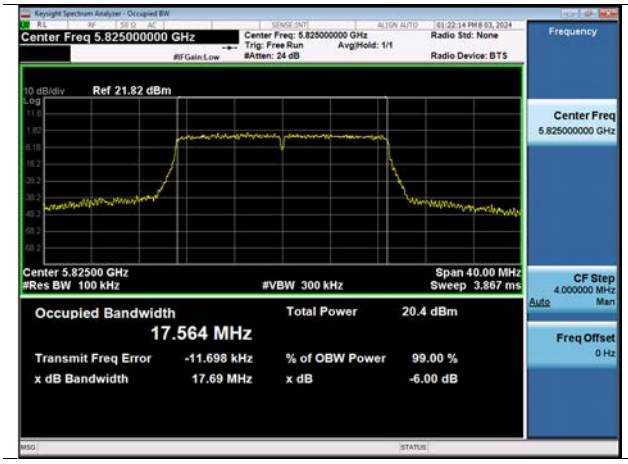
Note: In order to simplify the report, attached plots were only the narrowest channel.

802.11a (CH.165)

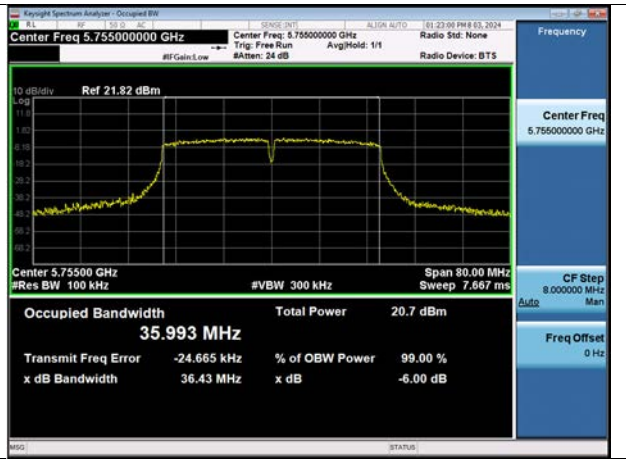
802.11n(HT20) (CH.149)



802.11ac(VHT20) (CH.165)



802.11n(HT40) (CH.151)



802.11ac(VHT40) (CH.151)

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

[MIMO_CDD(Ant.1+ Ant.2)]

Ant Total Power [dBm] = Measured Power [dBm] + Duty Cycle Factor [dB]
MIMO_CDD(Ant.1+ Ant.2) Total Power [dBm] = Ant.1 Total Power [dBm] + Ant.2 Total Power [dBm]

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5180	36	6M	a	13.06	12.85	15.97	23.98
5200	40	6M	a	13.21	13.13	16.18	23.98
5240	48	6M	a	13.81	13.71	16.77	23.98
5260	52	6M	a	12.89	13.15	16.03	23.67
5300	60	6M	a	13.18	13.62	16.42	23.68
5320	64	6M	a	13.10	13.59	16.36	23.68
5500	100	6M	a	13.02	13.66	16.36	23.68
5580	116	6M	a	13.20	13.83	16.54	23.67
5720	144	6M	a	12.82	13.18	16.01	23.67
5745	149	6M	a	12.85	13.07	15.97	30.00
5785	157	6M	a	13.01	13.41	16.22	30.00
5825	165	6M	a	13.05	13.35	16.21	30.00

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5180	36	MCS0	n20	12.91	13.07	16.00	23.98
5200	40	MCS0	n20	13.14	13.19	16.18	23.98
5240	48	MCS0	n20	13.96	13.82	16.90	23.98
5260	52	MCS0	n20	12.98	13.40	16.21	23.92
5300	60	MCS0	n20	13.19	13.78	16.51	23.93
5320	64	MCS0	n20	13.15	13.77	16.48	23.91
5500	100	MCS0	n20	13.22	13.82	16.54	23.91
5580	116	MCS0	n20	13.47	13.94	16.72	23.91
5720	144	MCS0	n20	12.71	13.12	15.93	23.91
5745	149	MCS0	n20	12.76	13.29	16.04	30.00
5785	157	MCS0	n20	12.84	13.42	16.15	30.00
5825	165	MCS0	n20	12.87	13.38	16.14	30.00

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5180	36	MCS0	ac20	12.89	13.12	16.02	23.98
5200	40	MCS0	ac20	13.10	13.29	16.21	23.98
5240	48	MCS0	ac20	14.02	13.81	16.93	23.98
5260	52	MCS0	ac20	12.93	13.31	16.13	23.93
5300	60	MCS0	ac20	13.09	13.84	16.49	23.92
5320	64	MCS0	ac20	13.24	13.82	16.55	23.93
5500	100	MCS0	ac20	13.25	13.90	16.60	23.93
5580	116	MCS0	ac20	13.50	13.87	16.70	23.92
5720	144	MCS0	ac20	12.70	13.05	15.89	23.91
5745	149	MCS0	ac20	12.86	13.37	16.13	30.00
5785	157	MCS0	ac20	12.82	13.38	16.12	30.00
5825	165	MCS0	ac20	12.89	13.27	16.09	30.00

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5190	38	MCS0	n40	12.77	12.87	15.83	23.98
5230	46	MCS0	n40	13.51	13.23	16.38	23.98
5270	54	MCS0	n40	12.83	13.24	16.05	23.98
5310	62	MCS0	n40	12.99	13.44	16.23	23.98
5510	102	MCS0	n40	13.45	13.75	16.61	23.98
5550	110	MCS0	n40	13.33	13.59	16.47	23.98
5710	142	MCS0	n40	12.60	12.78	15.70	23.98
5755	151	MCS0	n40	12.90	13.11	16.02	30.00
5795	159	MCS0	n40	12.73	12.87	15.81	30.00

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5190	38	MCS0	ac40	12.79	12.83	15.82	23.98
5230	46	MCS0	ac40	13.46	13.31	16.40	23.98
5270	54	MCS0	ac40	12.91	13.36	16.15	23.98
5310	62	MCS0	ac40	12.89	13.39	16.16	23.98
5510	102	MCS0	ac40	13.53	13.72	16.64	23.98
5550	110	MCS0	ac40	13.26	13.54	16.41	23.98
5710	142	MCS0	ac40	12.58	12.83	15.72	23.98
5755	151	MCS0	ac40	12.82	13.19	16.02	30.00
5795	159	MCS0	ac40	12.71	12.94	15.84	30.00

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total Power [dBm]	Ant.2 Total Power [dBm]	MIMO Total Power [dBm]	Limit [dBm]
5210	42	MCS0	ac80	12.70	12.67	15.70	23.98
5290	58	MCS0	ac80	12.71	12.85	15.79	23.98
5530	106	MCS0	ac80	13.04	13.33	16.20	23.98
5690	138	MCS0	ac80	12.98	13.04	16.02	23.98
5775	155	MCS0	ac80	13.00	13.22	16.12	30.00

10.5 POWER SPECTRAL DENSITY

Limit(UNII 1, 2A, 2C) : 11.0 dBm/MHz

Limit(UNII 3) : 30.0 dBm/500 kHz

[MIMO_CDD(Ant.1+ Ant.2)]

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

MIMO_CDD(ANT.1+ ANT.2)Total PSD [dBm] = Ant.1 Total PSD [dBm] + Ant.2 Total PSD [dBm]

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total PSD [dBm/MHz]	Ant.2 Total PSD [dBm/MHz]	MIMO Total PSD [dBm/MHz]	Limit [dBm]
5180	36	6M	a	1.998	1.621	4.824	11 dBm/MHz
5200	40	6M	a	2.535	1.869	5.225	11 dBm/MHz
5240	48	6M	a	2.797	2.707	5.763	11 dBm/MHz
5260	52	6M	a	2.684	2.697	5.701	11 dBm/MHz
5300	60	6M	a	2.979	2.861	5.931	11 dBm/MHz
5320	64	6M	a	3.066	2.766	5.929	11 dBm/MHz
5500	100	6M	a	2.646	2.715	5.691	11 dBm/MHz
5580	116	6M	a	2.557	3.006	5.798	11 dBm/MHz
5720	144	6M	a	1.806	2.235	5.036	11 dBm/MHz
5745	149	6M	a	-1.166	-0.867	1.996	30 dBm/500kHz
5785	157	6M	a	-0.319	-0.806	2.455	30 dBm/500kHz
5825	165	6M	a	-0.423	-0.707	2.448	30 dBm/500kHz

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total PSD [dBm/MHz]	Ant.2 Total PSD [dBm/MHz]	MIMO Total PSD [dBm/MHz]	Limit [dBm]
5180	36	MCS0	n20	2.012	1.620	4.831	11 dBm/MHz
5200	40	MCS0	n20	2.027	1.979	5.013	11 dBm/MHz
5240	48	MCS0	n20	3.072	2.259	5.695	11 dBm/MHz
5260	52	MCS0	n20	1.931	2.259	5.108	11 dBm/MHz
5300	60	MCS0	n20	2.191	2.241	5.226	11 dBm/MHz
5320	64	MCS0	n20	2.289	2.234	5.272	11 dBm/MHz
5500	100	MCS0	n20	2.736	2.323	5.545	11 dBm/MHz
5580	116	MCS0	n20	2.744	2.774	5.769	11 dBm/MHz
5720	144	MCS0	n20	1.811	1.812	4.822	11 dBm/MHz
5745	149	MCS0	n20	-1.078	-0.888	2.028	30 dBm/500kHz
5785	157	MCS0	n20	-1.398	-0.926	1.855	30 dBm/500kHz
5825	165	MCS0	n20	-1.045	-0.731	2.125	30 dBm/500kHz

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total PSD [dBm/MHz]	Ant.2 Total PSD [dBm/MHz]	MIMO Total PSD [dBm/MHz]	Limit [dBm]
5180	36	MCS0	ac20	1.932	1.671	4.814	11 dBm/MHz
5200	40	MCS0	ac20	2.103	1.906	5.016	11 dBm/MHz
5240	48	MCS0	ac20	2.968	2.435	5.720	11 dBm/MHz
5260	52	MCS0	ac20	1.975	2.009	5.002	11 dBm/MHz
5300	60	MCS0	ac20	2.074	2.641	5.377	11 dBm/MHz
5320	64	MCS0	ac20	2.316	2.498	5.418	11 dBm/MHz
5500	100	MCS0	ac20	2.356	2.980	5.689	11 dBm/MHz
5580	116	MCS0	ac20	2.790	2.816	5.813	11 dBm/MHz
5720	144	MCS0	ac20	1.766	1.733	4.760	11 dBm/MHz
5745	149	MCS0	ac20	-1.107	-0.754	2.083	30 dBm/500kHz
5785	157	MCS0	ac20	-0.953	-0.713	2.179	30 dBm/500kHz
5825	165	MCS0	ac20	-1.030	-0.917	2.037	30 dBm/500kHz

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total PSD [dBm/MHz]	Ant.2 Total PSD [dBm/MHz]	MIMO Total PSD [dBm/MHz]	Limit [dBm]
5190	38	MCS0	n40	-1.211	-1.257	1.776	11 dBm/MHz
5230	46	MCS0	n40	-0.354	-0.851	2.415	11 dBm/MHz
5270	54	MCS0	n40	-1.064	-0.925	2.016	11 dBm/MHz
5310	62	MCS0	n40	-0.865	-0.650	2.254	11 dBm/MHz
5510	102	MCS0	n40	-0.393	-0.540	2.544	11 dBm/MHz
5550	110	MCS0	n40	-0.525	-0.567	2.464	11 dBm/MHz
5710	142	MCS0	n40	-1.436	-1.377	1.604	11 dBm/MHz
5755	151	MCS0	n40	-3.792	-3.978	-0.874	30 dBm/500kHz
5795	159	MCS0	n40	-3.771	-4.189	-0.965	30 dBm/500kHz

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total PSD [dBm/MHz]	Ant.2 Total PSD [dBm/MHz]	MIMO Total PSD [dBm/MHz]	Limit [dBm]
5190	38	MCS0	ac40	-1.276	-1.228	1.758	11 dBm/MHz
5230	46	MCS0	ac40	-0.330	-0.871	2.418	11 dBm/MHz
5270	54	MCS0	ac40	-0.951	-0.913	2.078	11 dBm/MHz
5310	62	MCS0	ac40	-1.035	-0.726	2.133	11 dBm/MHz
5510	102	MCS0	ac40	-0.473	-0.382	2.583	11 dBm/MHz
5550	110	MCS0	ac40	-0.418	-0.510	2.547	11 dBm/MHz
5710	142	MCS0	ac40	-1.389	-1.206	1.714	11 dBm/MHz
5755	151	MCS0	ac40	-3.577	-3.923	-0.736	30 dBm/500kHz
5795	159	MCS0	ac40	-3.919	-4.086	-0.991	30 dBm/500kHz

Frequency [MHz]	Channel No.	Worstcase Datarate	Mode(802.11)	Ant.1 Total PSD [dBm/MHz]	Ant.2 Total PSD [dBm/MHz]	MIMO Total PSD [dBm/MHz]	Limit [dBm]
5210	42	MCS0	ac80	-3.998	-4.413	-1.190	11 dBm/MHz
5290	58	MCS0	ac80	-4.058	-4.130	-1.084	11 dBm/MHz
5530	106	MCS0	ac80	-3.760	-3.768	-0.754	11 dBm/MHz
5690	138	MCS0	ac80	-3.969	-4.135	-1.041	11 dBm/MHz
5775	155	MCS0	ac80	-7.054	-7.184	-4.108	30 dBm/500kHz

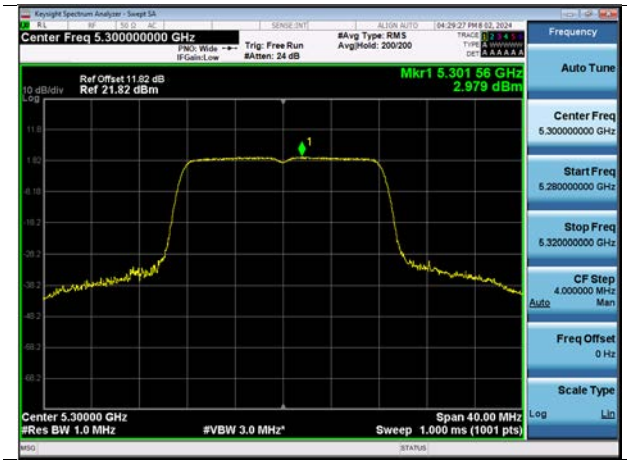
[MIMO_CDD(Ant.1+ Ant.2)]

▣ Test Plots

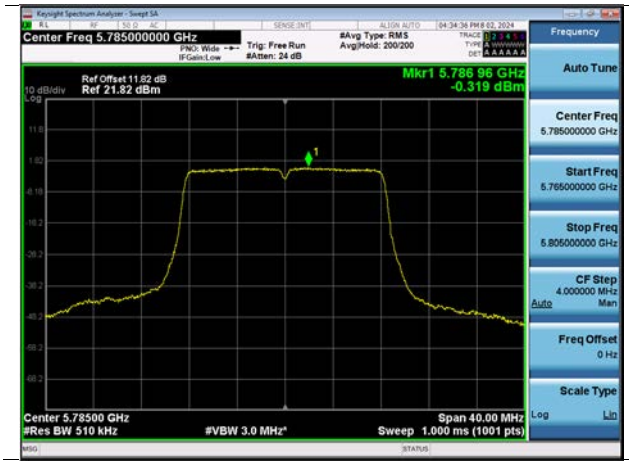
Note: In order to simplify the report, attached plots were only channel of the highest PSD.

ANT. 1	ANT. 2

802.11a UNII 1-2C (Ch. 60)

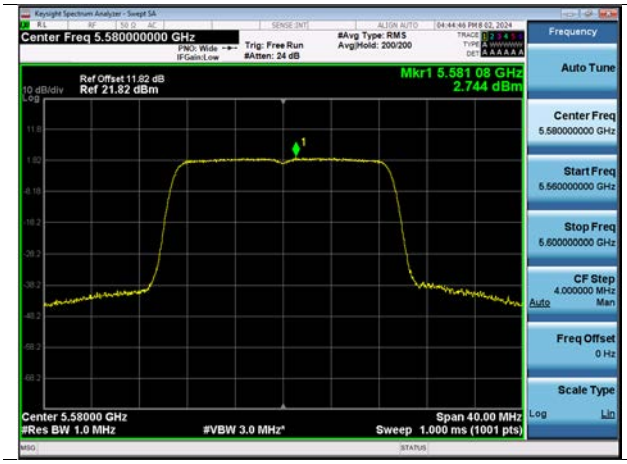


802.11a UNII 3 (Ch. 157)

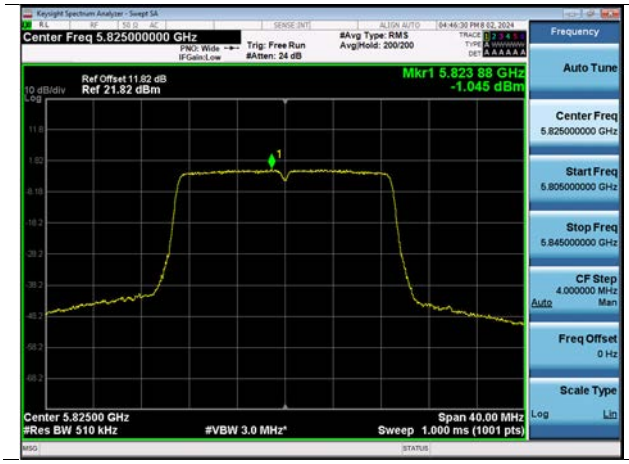


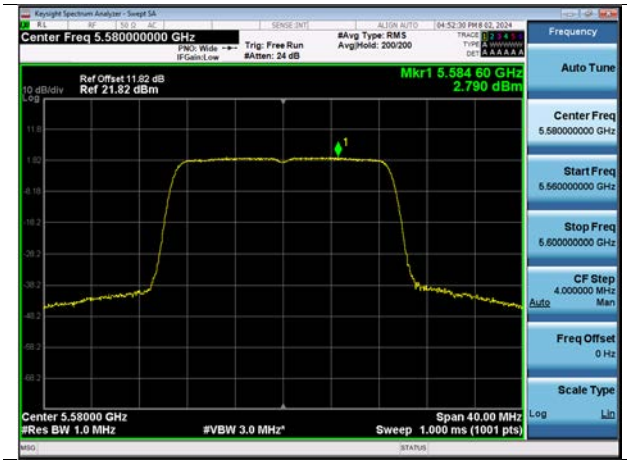
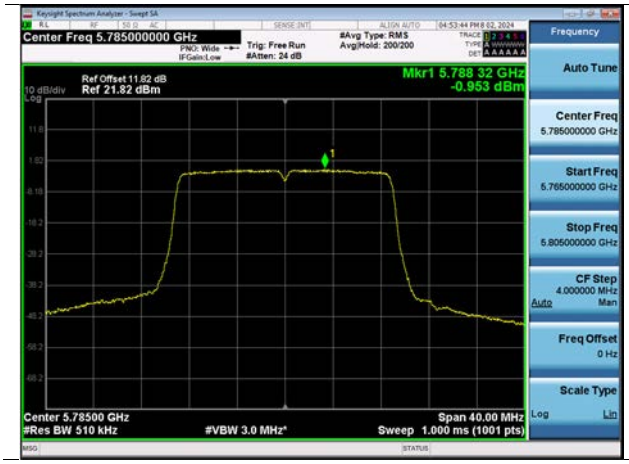
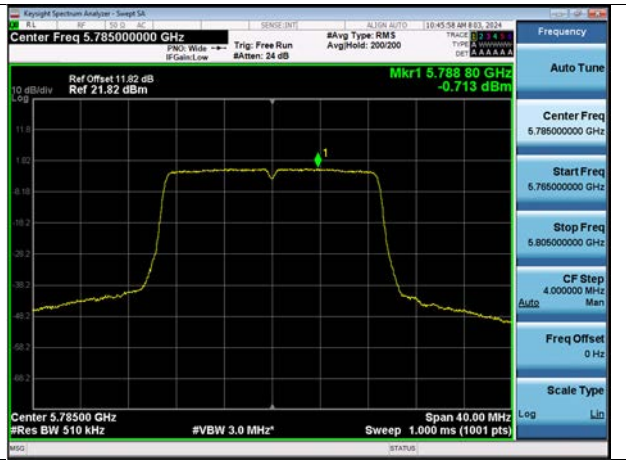
ANT. 1	ANT. 2

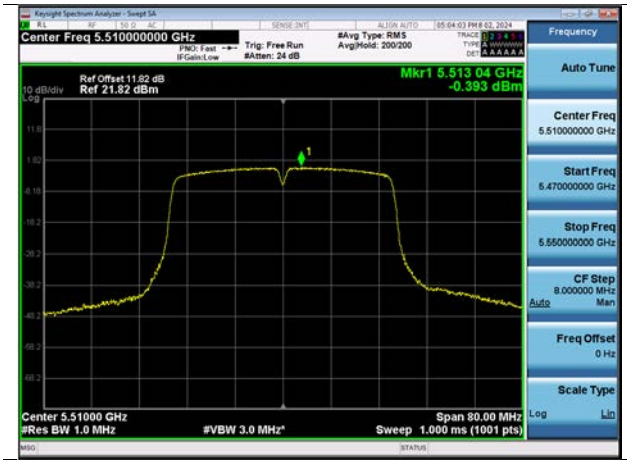
802.11n(HT20) UNII 1-2C (Ch. 116)

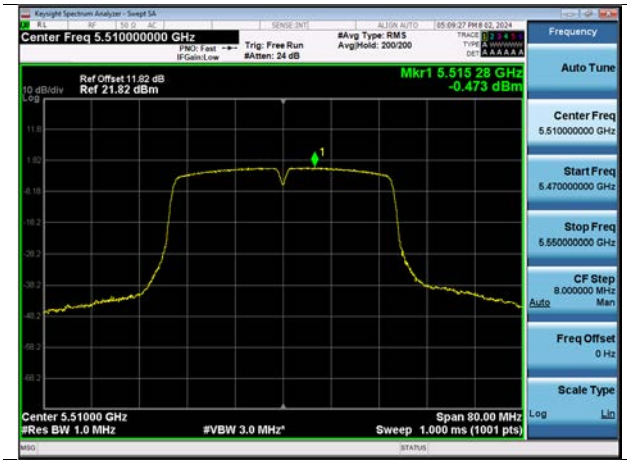


802.11 n(HT20) UNII 3 (Ch. 165)



ANT. 1	ANT. 2
802.11ac(VHT20) UNII 1-2C (Ch. 116)	
	
802.11 ac(VHT20) UNII 3 (Ch. 157)	
	

ANT. 1	ANT. 2
802.11n(HT40) UNII 1-2C (Ch. 102)	
	
802.11 n(HT40) UNII 3 (Ch. 151)	
	

ANT. 1	ANT. 2
802.11ac(VHT40) UNII 1-2C (Ch. 102)	
	
802.11 ac(VHT40) UNII 3 (Ch. 151)	
	

ANT. 1	ANT. 2

802.11ac(VHT80) UNII 1-2C (Ch. 106)

802.11 ac(VHT80) UNII 3 (Ch. 155)

10.6 FREQUENCY STABILITY

Note:

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

2. 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.

10.6.1 80 MHz BW

[MIMO_CDD(Ant1+Ant2)]

Startup after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5210083.14	83.14
100%		-30	5210012.87	12.87
100%		-20	5210063.53	63.53
100%		-10	5210086.28	86.28
100%		0	5210035.77	35.77
100%		+10	5210075.60	75.60
100%		+30	5210033.56	33.56
100%		+40	5210005.84	5.84
100%		+50	5210044.21	44.21
High	3.6	+20	5210075.47	75.47
Low	3.135	+20	5210077.73	77.73

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5290061.90	61.90
100%		-30	5290016.62	16.62
100%		-20	5290048.23	48.23
100%		-10	5290060.49	60.49
100%		0	5290076.65	76.65
100%		+10	5290035.63	35.63
100%		+30	5290066.25	66.25
100%		+40	5290080.48	80.48
100%		+50	5290077.50	77.50
High	3.6	+20	5290083.16	83.16
Low	3.135	+20	5290044.51	44.51

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5690068.58	68.58
100%		-30	5690085.31	85.31
100%		-20	5690005.30	5.30
100%		-10	5690039.90	39.90
100%		0	5690089.13	89.13
100%		+10	5690015.21	15.21
100%		+30	5690090.44	90.44
100%		+40	5690053.78	53.78
100%		+50	5690035.76	35.76
High	3.6	+20	5690058.69	58.69
Low	3.135	+20	5690082.68	82.68

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5775040.63	40.63
100%		-30	5775011.94	11.94
100%		-20	5775080.17	80.17
100%		-10	5775017.96	17.96
100%		0	5775017.96	17.96
100%		+10	5775027.65	27.65
100%		+30	5775025.35	25.35
100%		+40	5775096.96	96.96
100%		+50	5775001.13	1.13
High	3.6	+20	5775036.63	36.63
Low	3.135	+20	5775047.19	47.19

2 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5210009.78	9.78
100%		-30	5210086.25	86.25
100%		-20	5210068.47	68.47
100%		-10	5210043.42	43.42
100%		0	5210004.58	4.58
100%		+10	5210042.14	42.14
100%		+30	5210007.75	7.75
100%		+40	5210097.89	97.89
100%		+50	5210021.82	21.82
High	3.6	+20	5210052.86	52.86
Low	3.135	+20	5210092.50	92.50

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5290054.66	54.66
100%		-30	5290044.27	44.27
100%		-20	5290015.27	15.27
100%		-10	5290016.45	16.45
100%		0	5290002.98	2.98
100%		+10	5290069.54	69.54
100%		+30	5290040.62	40.62
100%		+40	5290060.60	60.60
100%		+50	5290083.36	83.36
High	3.6	+20	5290090.69	90.69
Low	3.135	+20	5290026.66	26.66

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5690027.24	27.24
100%		-30	5690055.08	55.08
100%		-20	5690074.84	74.84
100%		-10	5690061.79	61.79
100%		0	5690053.84	53.84
100%		+10	5690097.41	97.41
100%		+30	5690046.79	46.79
100%		+40	5690099.03	99.03
100%		+50	5690053.40	53.40
High	3.6	+20	5690067.32	67.32
Low	3.135	+20	5690066.54	66.54

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5775068.43	68.43
100%		-30	5775074.06	74.06
100%		-20	5775050.98	50.98
100%		-10	5775009.78	9.78
100%		0	5775052.17	52.17
100%		+10	5775035.29	35.29
100%		+30	5775073.88	73.88
100%		+40	5775053.81	53.81
100%		+50	5775069.12	69.12
High	3.6	+20	5775069.49	69.49
Low	3.135	+20	5775025.32	25.32

5 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5210063.92	63.92
100%		-30	5210061.73	61.73
100%		-20	5210091.05	91.05
100%		-10	5210052.35	52.35
100%		0	5210018.83	18.83
100%		+10	5210001.99	1.99
100%		+30	5210050.65	50.65
100%		+40	5210001.41	1.41
100%		+50	5210072.64	72.64
High	3.6	+20	5210029.66	29.66
Low	3.135	+20	5210014.39	14.39

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5290031.03	31.03
100%		-30	5290096.67	96.67
100%		-20	5290053.16	53.16
100%		-10	5290090.24	90.24
100%		0	5290051.44	51.44
100%		+10	5290085.20	85.20
100%		+30	5290094.07	94.07
100%		+40	5290021.82	21.82
100%		+50	5290056.77	56.77
High	3.6	+20	5290011.47	11.47
Low	3.135	+20	5290060.66	60.66

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5690047.74	47.74
100%		-30	5690008.44	8.44
100%		-20	5690043.52	43.52
100%		-10	5690005.80	5.80
100%		0	5690086.32	86.32
100%		+10	5690053.17	53.17
100%		+30	5690089.36	89.36
100%		+40	5690051.46	51.46
100%		+50	5690044.15	44.15
High	3.6	+20	5690032.59	32.59
Low	3.135	+20	5690038.69	38.69

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5775076.86	76.86
100%		-30	5775021.95	21.95
100%		-20	5775046.13	46.13
100%		-10	5775006.98	6.98
100%		0	5775004.55	4.55
100%		+10	5775061.18	61.18
100%		+30	5775041.97	41.97
100%		+40	5775027.53	27.53
100%		+50	5775008.55	8.55
High	3.6	+20	5775022.64	22.64
Low	3.135	+20	5775030.50	30.50

10 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5210092.57	92.57
100%		-30	5210096.66	96.66
100%		-20	5210074.52	74.52
100%		-10	5210079.69	79.69
100%		0	5210052.40	52.40
100%		+10	5210069.18	69.18
100%		+30	5210006.39	6.39
100%		+40	5210026.24	26.24
100%		+50	5210029.62	29.62
High	3.6	+20	5210058.20	58.20
Low	3.135	+20	5210053.98	53.98

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5290026.27	26.27
100%		-30	5290028.20	28.20
100%		-20	5290016.07	16.07
100%		-10	5290073.73	73.73
100%		0	5290091.31	91.31
100%		+10	5290034.69	34.69
100%		+30	5290028.06	28.06
100%		+40	5290016.40	16.40
100%		+50	5290083.37	83.37
High	3.6	+20	5290079.15	79.15
Low	3.135	+20	5290022.59	22.59

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5690063.97	63.97
100%		-30	5690048.07	48.07
100%		-20	5690095.87	95.87
100%		-10	5690011.82	11.82
100%		0	5690025.72	25.72
100%		+10	5690049.31	49.31
100%		+30	5690049.73	49.73
100%		+40	5690031.80	31.80
100%		+50	5690061.88	61.88
High	3.6	+20	5690095.27	95.27
Low	3.135	+20	5690003.76	3.76

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	3.30 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5775074.28	74.28
100%		-30	5775006.50	6.50
100%		-20	5775004.07	4.07
100%		-10	5775063.47	63.47
100%		0	5775085.71	85.71
100%		+10	5775046.67	46.67
100%		+30	5775041.23	41.23
100%		+40	5775095.47	95.47
100%		+50	5775088.45	88.45
High	3.6	+20	5775069.58	69.58
Low	3.135	+20	5775028.61	28.61

10.7 STRADDLE CHANNEL

10.7.1 26 dB Bandwidth

[ANT. 1]

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5710.52	14.48
802.11n(HT20)				5710.20	14.80
802.11ac(VHT20)				5710.16	14.84
802.11a	UNII 3	5720	144	5729.32	4.32
802.11n(HT20)				5729.88	4.88
802.11ac(VHT20)				5729.76	4.76

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5689.28	35.72
802.11ac(VHT40)				5689.20	35.80
802.11n(HT40)	UNII 3	5710	142	5730.80	5.80
802.11ac(VHT40)				5730.64	5.64

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5649.04	75.96
	UNII 3	5690	138	5730.64	5.64

Note:

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

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

[ANT. 2]

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5710.68	14.32
802.11n(HT20)				5710.20	14.80
802.11ac(VHT20)				5710.16	14.84
802.11a	UNII 3	5720	144	5729.20	4.20
802.11n(HT20)				5729.84	4.84
802.11ac(VHT20)				5729.84	4.84

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5689.36	35.64
802.11ac(VHT40)				5689.12	35.88
802.11n(HT40)	UNII 3	5710	142	5730.72	5.72
802.11ac(VHT40)				5730.72	5.72

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5649.04	75.96
	UNII 3	5690	138	5730.64	5.64

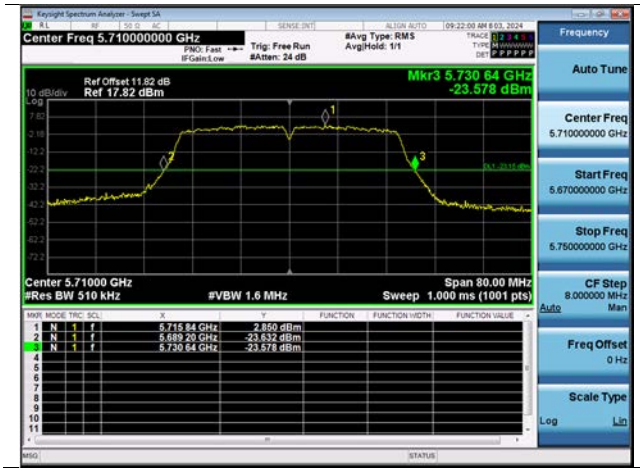
Note:

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

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

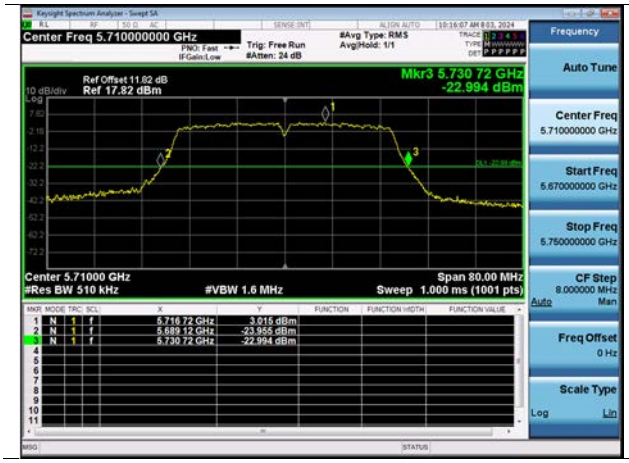
[ANT. 1]

▣ 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**
	

[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

[ANT. 1]

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)				5728.84	3.84	> 0.5
802.11ac(VHT20)				5728.84	3.84	> 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	5727.92	2.92	> 0.5

[ANT. 2]

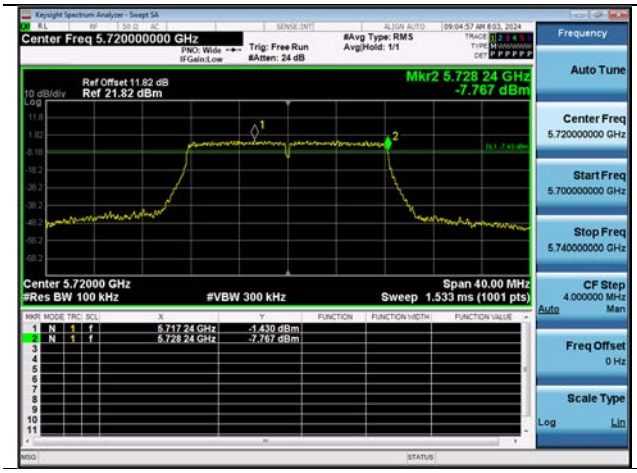
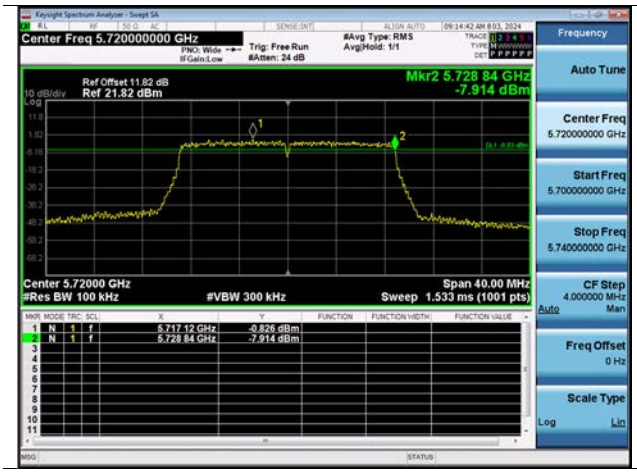
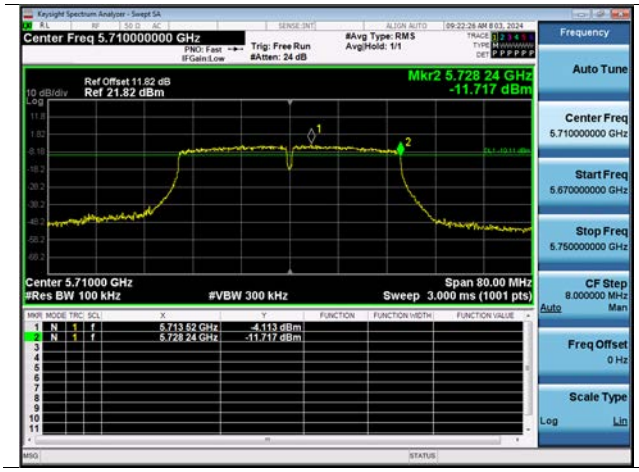
Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII3	5720	144	5728.20	3.20	> 0.5
802.11n(HT20)				5728.84	3.84	> 0.5
802.11ac(VHT20)				5728.84	3.84	> 0.5
802.11n(HT40)	UNII3	5710	142	5728.24	3.24	> 0.5
802.11ac(VHT40)				5728.24	3.24	> 0.5
802.11ac(VHT80)	UNII3	5690	138	5727.92	2.92	> 0.5

Note:

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

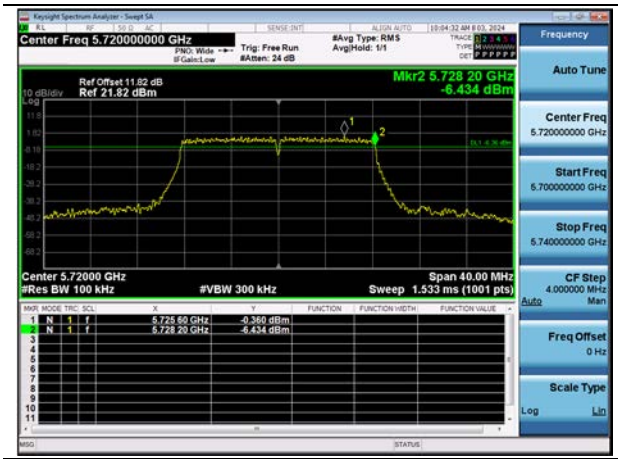
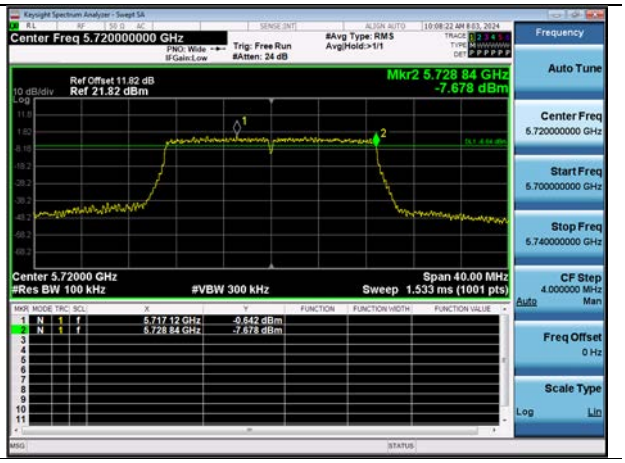
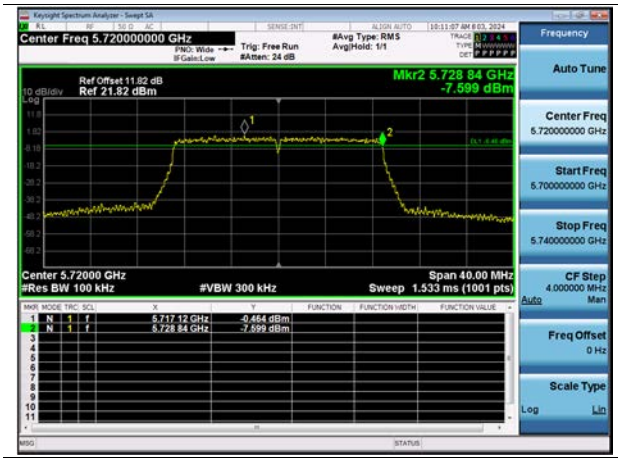
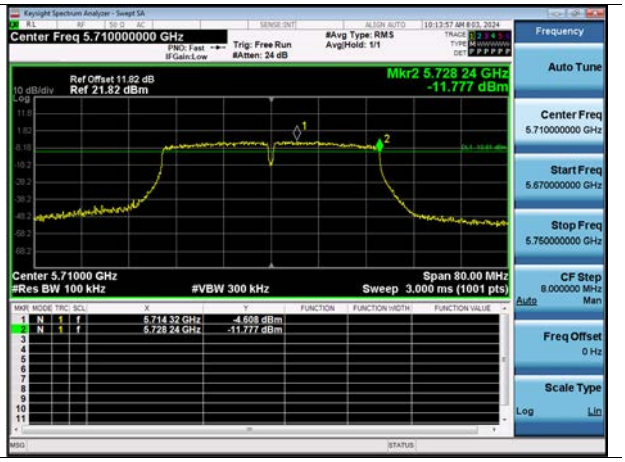
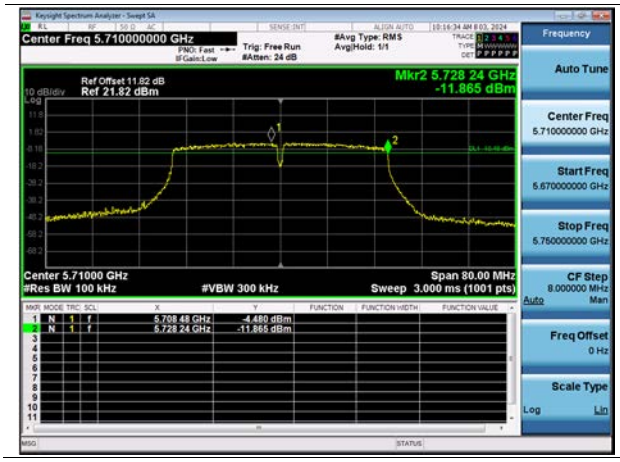
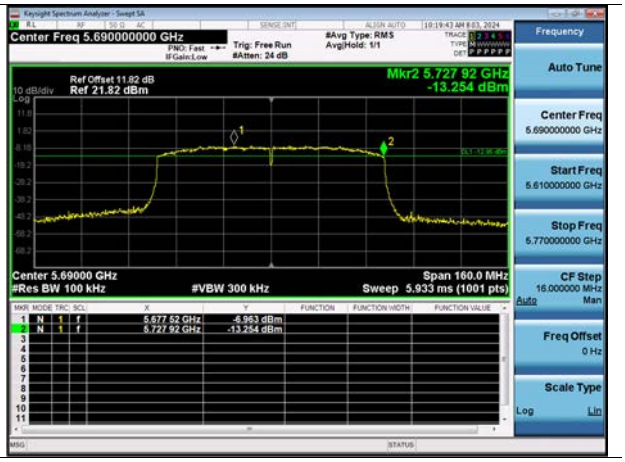
[ANT. 1]

▣ 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**
	

[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

[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	11.90	0.000	11.90	22.61	6 Mbps
802.11n(HT20)			11.80	0.000	11.80	22.70	MCS0
802.11ac(VHT20)			11.83	0.000	11.83	22.71	MCS0
802.11a	5720 (UNII 3 Band)	144	5.51	0.000	5.51	30.00	6 Mbps
802.11n(HT20)			5.91	0.000	5.91	30.00	MCS0
802.11ac(VHT20)			5.96	0.000	5.96	30.00	MCS0

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	12.56	0.000	12.56	23.98	MCS0
802.11ac(VHT40)			12.32	0.000	12.32	23.98	MCS0
802.11n(HT40)	5710 (UNII 3 Band)	142	0.88	0.000	0.88	30.00	MCS0
802.11ac(VHT40)			0.60	0.000	0.60	30.00	MCS0

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	12.83	0.000	12.83	23.98	MCS0
	5690 (UNII 3 Band)	138	-4.07	0.000	-4.07	30.00	MCS0

[ANT. 2]

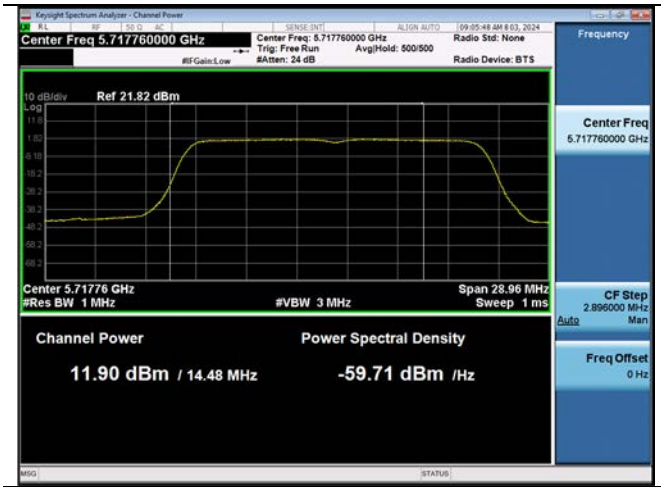
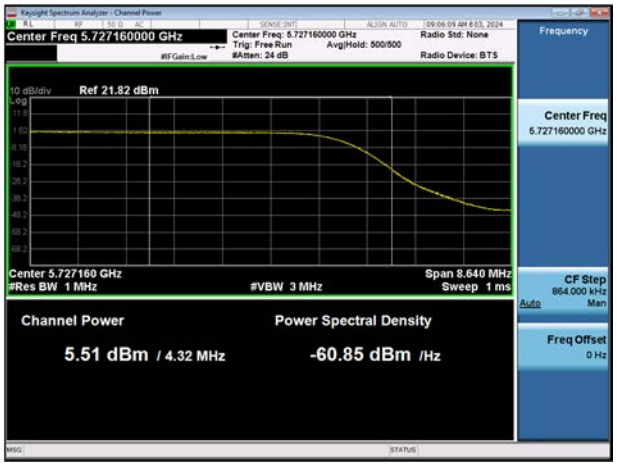
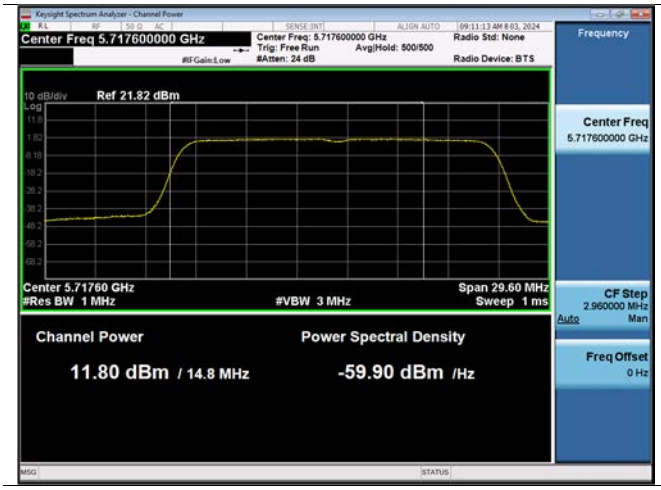
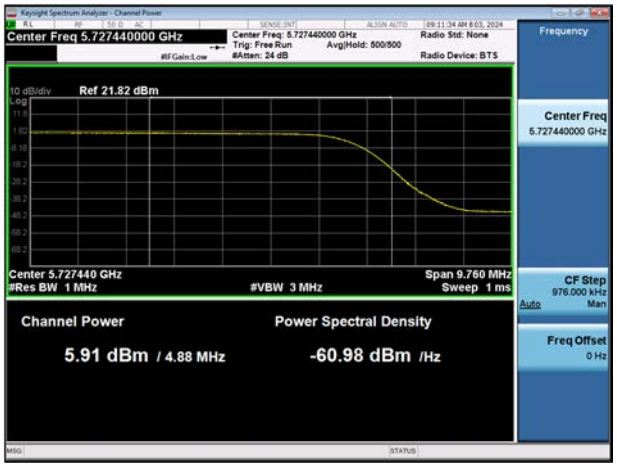
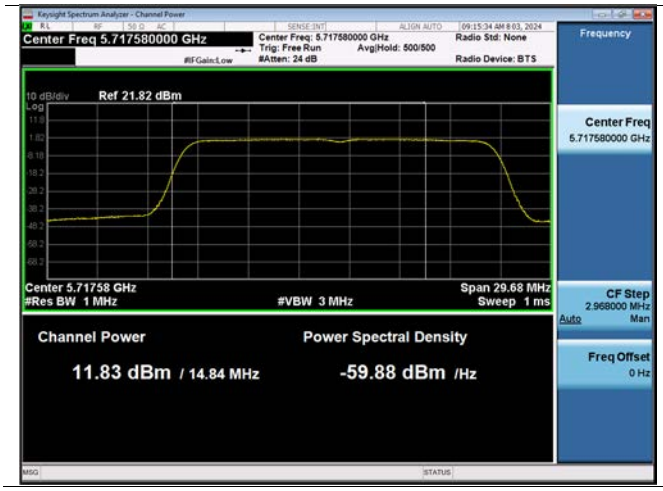
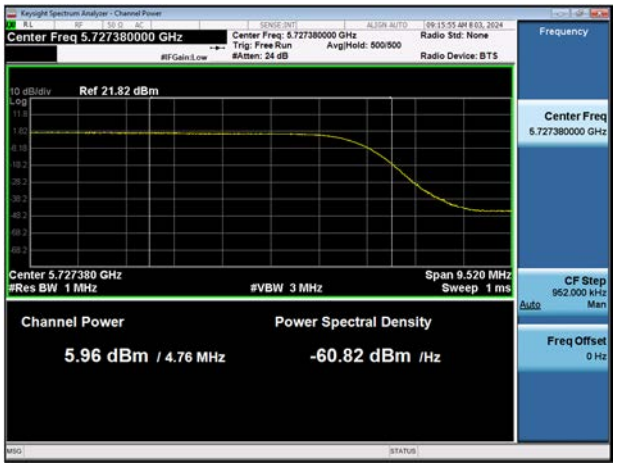
Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11a	5720 (UNII 2C Band)	144	12.45	0.000	12.45	22.56	6 Mbps
802.11n(HT20)			12.15	0.000	12.15	22.70	MCS0
802.11ac(VHT20)			12.16	0.000	12.16	22.71	MCS0
802.11a	5720 (UNII 3 Band)	144	6.05	0.000	6.05	30.00	6 Mbps
802.11n(HT20)			6.29	0.000	6.29	30.00	MCS0
802.11ac(VHT20)			6.25	0.000	6.25	30.00	MCS0

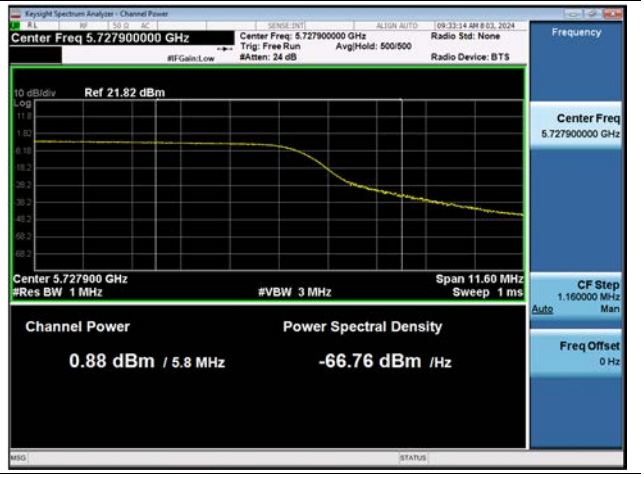
Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710 (UNII 2C Band)	142	12.48	0.000	12.48	23.98	MCS0
802.11ac(VHT40)			12.48	0.000	12.48	23.98	MCS0
802.11n(HT40)	5710 (UNII 3 Band)	142	0.85	0.000	0.85	30.00	MCS0
802.11ac(VHT40)			0.84	0.000	0.84	30.00	MCS0

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	13.01	0.000	13.01	23.98	MCS0
	5690 (UNII 3 Band)	138	-3.99	0.000	-3.99	30.00	MCS0

[ANT. 1]

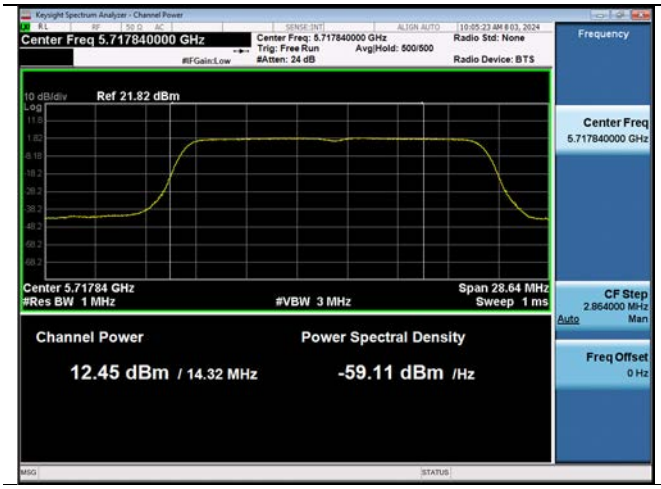
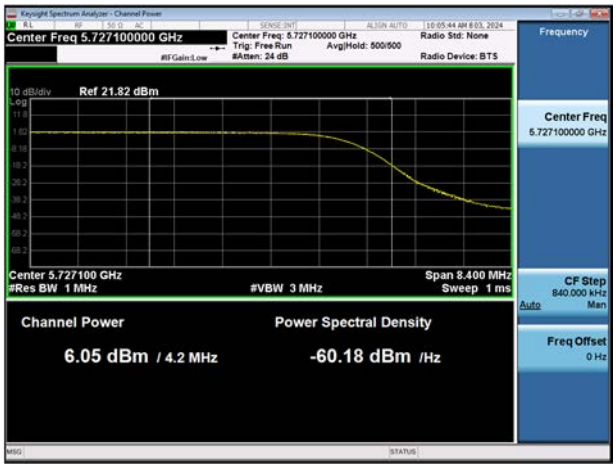
▣ Test Plots

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**
	

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**
	

[ANT. 2]

▣ Test Plots

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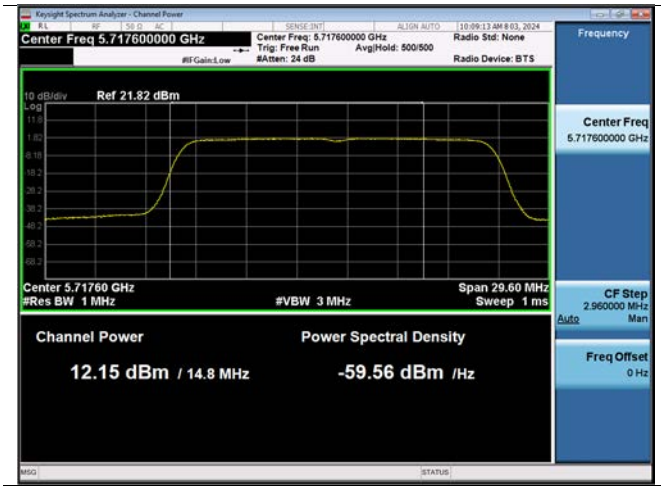
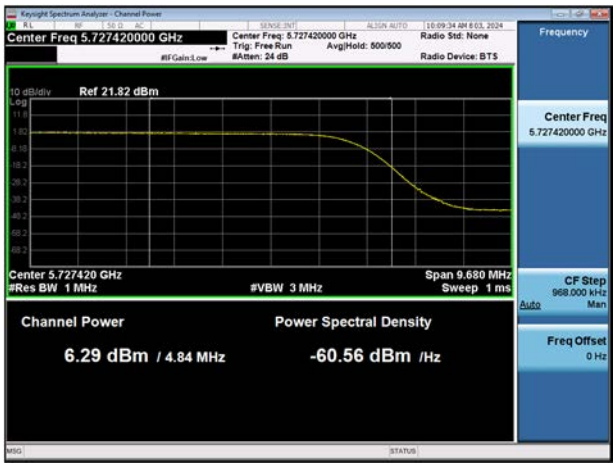
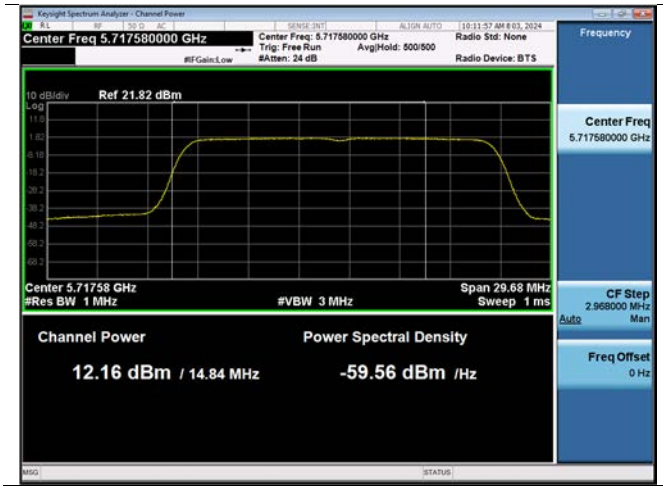
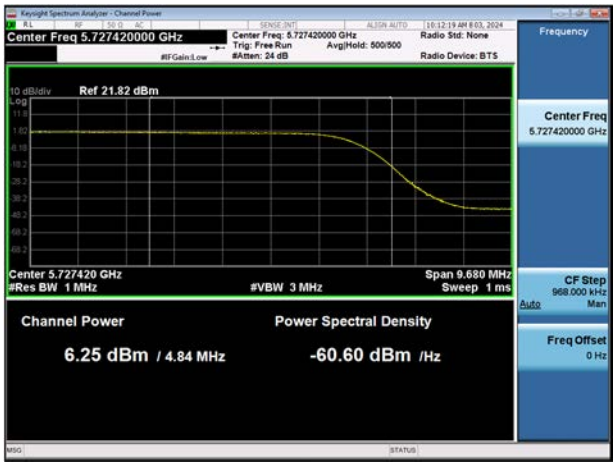
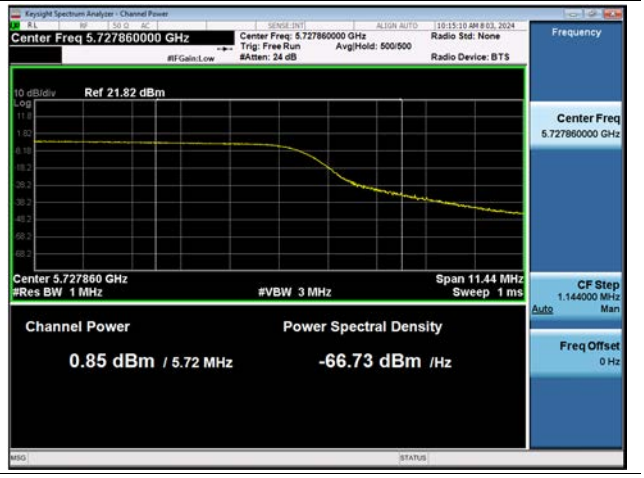
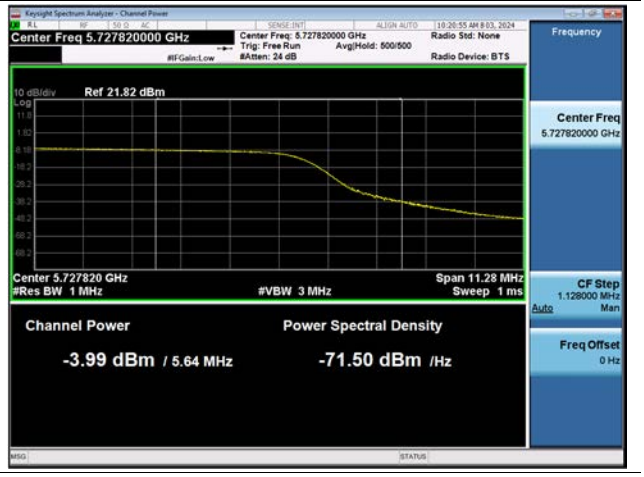
	
802.11ac(VHT20) UNII 2C Band	**802.11ac(VHT20) UNII 3 Band**
	

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**
	

10.7.4 Power Spectral Density

[ANT. 1]

Mode	Frequency [MHz]	Channel	Measured Density [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm]	Limit [dBm]	Worstcase Datarate
802.11a	5720 (UNII 2C Band)	144	1.694	0.000	1.694	11 dBm/ MHz	6 Mbps
802.11n(HT20)			1.345	0.000	1.345		MCS0
802.11ac(VHT20)			1.282	0.000	1.282		MCS0
802.11a	5720 (UNII 3 Band)	144	-1.782	0.000	-1.782	30 dBm/ 500 kHz	6 Mbps
802.11n(HT20)			-1.727	0.000	-1.727		MCS0
802.11ac(VHT20)			-1.978	0.000	-1.978		MCS0

Mode	Frequency [MHz]	Channel	Measured Density [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710 (UNII 2C Band)	142	-1.287	0.000	-1.287	11 dBm/ MHz	MCS0
802.11ac(VHT40)			-1.533	0.000	-1.533		MCS0
802.11n(HT40)	5710 (UNII 3 Band)	142	-6.125	0.000	-6.125	30 dBm/500 kHz	MCS0
802.11ac(VHT40)			-6.417	0.000	-6.417		MCS0

Mode	Frequency [MHz]	Channel	Measured Density [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm]	Limit [dBm]	Worstcase Datarate
802.11ac(VHT80)	5690 (UNII 2C Band)	138	-4.340	0.000	-4.340	11 dBm/ MHz	MCS0
	5690 (UNII 3 Band)	138	-10.987	0.000	-10.987	30 dBm/500 kHz	MCS0

[ANT. 2]

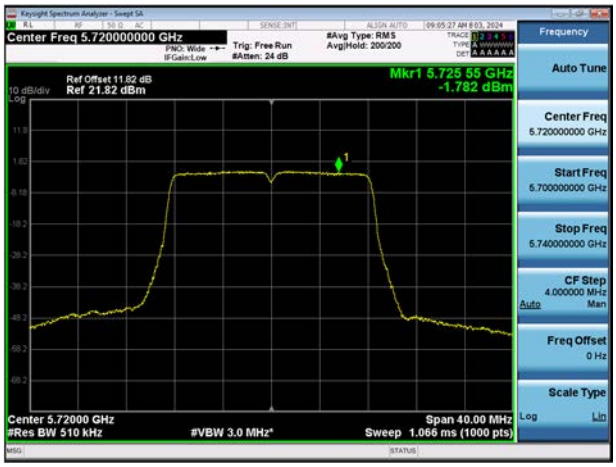
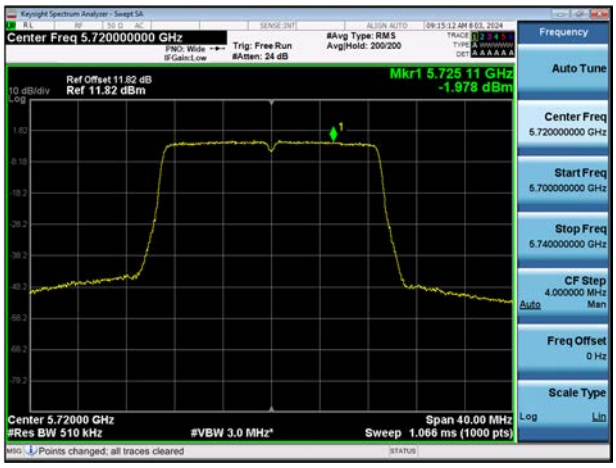
Mode	Frequency [MHz]	Channel	Measured Density [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm]	Limit [dBm]	Worstcase Datarate
802.11a	5720 (UNII 2C Band)	144	2.276	0.000	2.276	11 dBm/ MHz	6 Mbps
802.11n(HT20)			1.610	0.000	1.610		MCS0
802.11ac(VHT20)			1.664	0.000	1.664		MCS0
802.11a	5720 (UNII 3 Band)	144	-1.054	0.000	-1.054	30 dBm/50 0 kHz	6 Mbps
802.11n(HT20)			-1.679	0.000	-1.679		MCS0
802.11ac(VHT20)			-1.494	0.000	-1.494		MCS0

Mode	Frequency [MHz]	Channel	Measured Density [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710 (UNII 2C Band)	142	-1.473	0.000	-1.473	11 dBm/ MHz	MCS0
802.11ac(VHT40)			-1.364	0.000	-1.364		MCS0
802.11n(HT40)	5710 (UNII 3 Band)	142	-6.304	0.000	-6.304	30 dBm/50 0 kHz	MCS0
802.11ac(VHT40)			-6.279	0.000	-6.279		MCS0

Mode	Frequency [MHz]	Channel	Measured Density [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm]	Limit [dBm]	Worstcase Datarate
802.11ac(VHT80)	5690 (UNII 2C Band)	138	-4.045	0.000	-4.045	11 dBm/ MHz	MCS0
	5690 (UNII 3 Band)	138	-10.984	0.000	-10.984	30 dBm/5 00 kHz	MCS0

[ANT. 1]

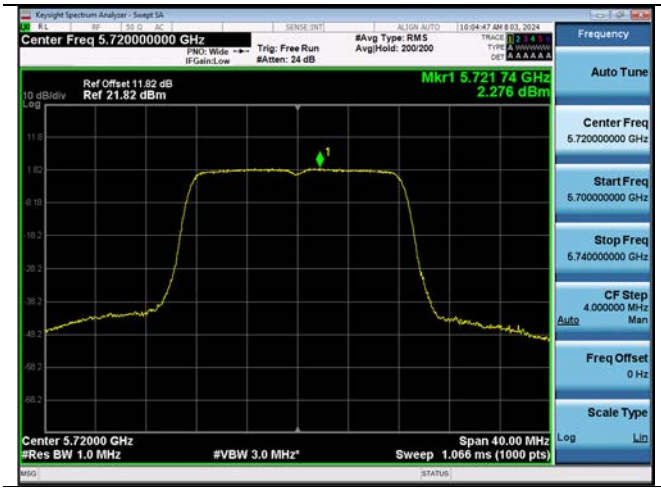
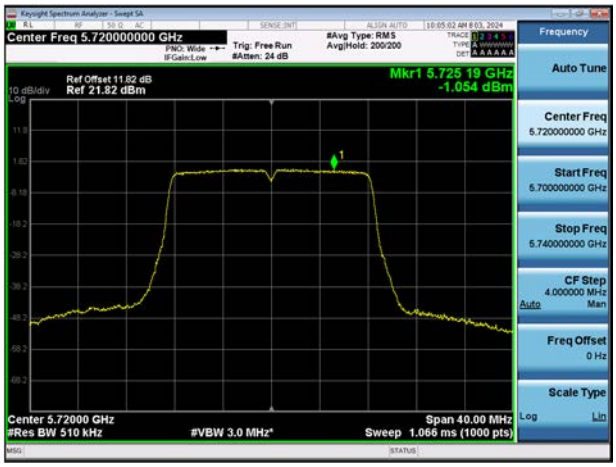
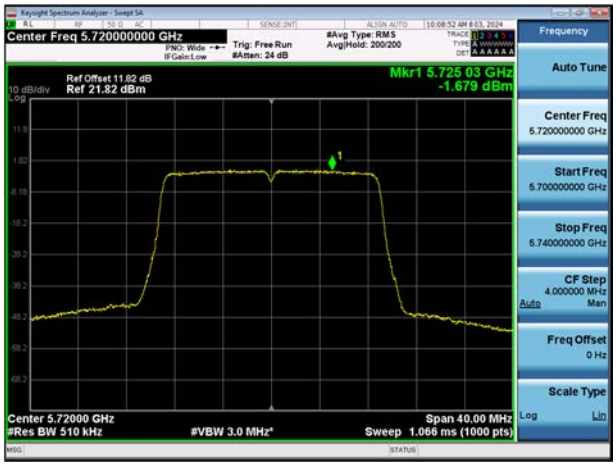
▣ Test Plots

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**
	

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**
	

[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**