RF TEST REPORT

FCC / ISED

APPLICANT

Hewlett Packard Enterprise Company

MODEL NAME

APINH505

FCC ID

Q9DAPINH505

ISED ID

4675A-APINH505

REPORT NUMBER

HCTA-E-2003-011

TEST REPORT

Date of Issue
March 27, 2020

Test Site
Hyundai C-Tech, Inc. dba HCT America, Inc.
1726 Ringwood Ave, San Jose, CA 95131, USA

Applicant	Hewlett Packard Enterprise Company
Applicant Address	3333 Scott Blvd, Santa Clara, CA 95054, USA
FCC ID	Q9DAPINH505
ISED ID	4675A-APINH505
Model Name	APINH505
EUT Type	Access Point
Modulation Type	OFDM / OFDM-A
FCC Classification	Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s)	Part 15.407
ISED Rule Part(s)	RSS-247 Issue 2 (February 2017), RSS-Gen Issue 5 (March 2019)
Test Procedure	ANSI C63.10-2013, KDB 789033 D02 v02r01

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures required. The results of testing in this report apply only to the product which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Hyundai C-Tech, Inc. dba HCT America, Inc. certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

Tested By	**Reviewed By**
Steve In	Sunwoo Kim
Test Engineer	Technical Manager

REVISION HISTORY

The revision history for this document is shown in table.

TEST REPORT NO.	DATE	DESCRIPTION
HCTA-2003-008	March 24, 2020	Initial Issue

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Hyundai C-Tech, Inc. dba HCT America, Inc., 1726 Ringwood Avenue, San Jose, CA 95131, USA. TEL: +1-510-933-8848 FAX: +1-510-933-8849

1. GENERAL INFORMATION

EUT DESCRIPTION

Model	APINH505
EUT Type	Access Point
Power Supply	AC Adapter : 100 – 240 VAC, 1.3 A, 50 – 60 Hz / PoE : 57 VDC
RF Specification	WIFI 2.4 GHz : IEEE 802.11b/g/n/ax HE40 (2x2 MIMO) WIFI 5 GHz : IEEE 802.11a/n/ac/ax HE80 (2x2 MIMO) Bluetooth 5.0 LE ZigBee : IEEE 802.15.4
Transmitter Chain	2x2 MIMO
Operating Environment	Indoor
Operating Temperature	0 °C – 40 °C

RF SPECIFICATION SUBJECT TO THE REPORT

RF Specification	802.11a / 802.11n HT20 / 802.11ac VHT20 / 802.11ax HE20 802.11n HT40 / 802.11ac VHT40 / 802.11ax HE40 802.11ac VHT80 / 802.11ax HE80	
Frequency Range	U-NII 1	20 MHz BW : 5280 MHz – 5240 MHz 40 MHz BW : 5190 MHz – 5230 MHz 80 MHz BW : 5210 MHz
	U-NII 3	20 MHz BW : 5745 MHz – 5825 MHz 40 MHz BW : 5755 MHz – 5795 MHz 80 MHz BW : 5775 MHz
Max. RF Output Power	U-NII 1	21.84 dBm (152.76 mW) : CDD
	U-NII 3	22.43 dBm (174.98 mW) : CDD
Modulation Type	OFDM : 802.11a/n/ac OFDM-A : 802.11ax	
Antenna Specification [1)]	Integrated Antenna Peak Gain : 2.85 dBi uncorrelated / 5.36 dBi correlated	
Firmware Version [2)]	bcm947622EAP_nand_cferom_fs_image_128_ubi.w	
Hardware Version [2)]	P2C	
Date(s) of Tests	March 7, 2020 ~ March 28, 2020	

Note :
1. Antenna information is based on the document provided.
2. Firmware and Hardware Version are as received by the client.

ANTENNA CONFIGURATION

The device employs 2x2 MIMO technologies with possible configurations below.

Frequency	Configuration	SDM	CDD
		ANT1 + ANT2	ANT1 + ANT2
2.4 GHz	802.11b	X	O
	802.11g	X	O
	802.11n	O	O
	802.11ax	O	O
5 GHz	802.11a	X	O
	802.11n	O	O
	802.11ac	O	O
	802.11ax	O	O

The equipment under test supports Cyclic Diversity mode (CDD signals can be correlated).
CDD mode was picked as worst case for testing even though the device support both CDD and SDM

ANTENNA DIRECTIONAL GAIN

Antenna Type	Type	RF Technology	Frequency	Uncorrelated Gain	CDD Correlated Gain
				ANT1 + ANT2	ANT1 + ANT2
PCB	Dipole	802.11b/g/n/ax	2.4 GHz	3.28 dBi	6.27 dBi
PCB	Dipole	802.11a/n/ac/ax	5 GHz	2.85 dBi	5.36 dBi
Metal	Monopole	BLE, ZigBee	2.4 GHz	1.29 dBi	

In accordance with KDB 662911 D01 v02r01, uncorrelated directional gain was applied for calculating max conducted output power limit and correlated directional gain was applied for calculating PSD limit.

Note :
The directional gains, uncorrelated and correlated gains were provided by the manufacturer.

2. 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. / RSS-Gen issue 5, RSS-247 issue 2.

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 30MHz 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 1GHz. Above 1GHz with 1.5m 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 3.75 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 is used to control the channel management, continuous Tx mode and Rx mode of the equipment under test.

3. 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).

4. FACILITIES AND ACCREDITATIONS

FACILITIES

The SAC (Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at 1726 Ringwood Avenue, San Jose, California 95131, USA.
The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Accredited Laboratory

A2LA has accredited

HYUNDAI C-TECH, INC. DBA HCT AMERICA, INC.

San Jose, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 25th day of November 2019.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4201.01
Valid to July 31, 2021

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

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.”

5. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

"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 antenna of this E.U.T is permanently attached and there is no provision for connection to an external antenna.
(2) The E.U.T Complies with the requirement of §15.203

6. MEASUREMENT UNCERTAINTY

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

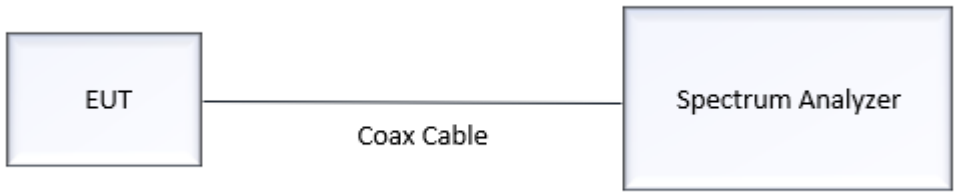
All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	2.55
Radiated Disturbance (9 kHz ~ 30 MHz)	3.20
Radiated Disturbance (30 MHz ~ 1 GHz)	4.73
Radiated Disturbance (1 GHz ~ 18 GHz)	5.21
Radiated Disturbance (18 GHz ~ 40 GHz)	5.18

7. DESCRIPTION OF TESTS

7.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.
Measurement is performed in accordance with the procedure B.2 in KDB 789033 D02 v02r01.

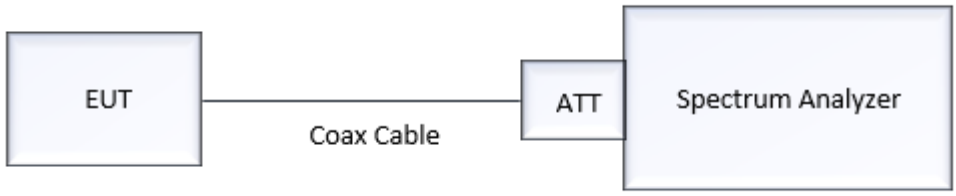
1) RBW = 8 MHz (the largest available value)
2) VBW = 8 MHz (≥ RBW)
3) SPAN = 0 Hz
4) Detector = Peak
5) Number of points in sweep > 100
6) Trace mode = Clear write
7) Measure T_{total} and T_{on}
8) Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10*log(1/Duty Cycle)

7.2. 6 dB Bandwidth / 26 dB Bandwidth / 99% 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 (26dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.
Testing was performed according to the 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 (6dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.
Testing was performed according to the procedure C.1 in KDB 789033 D02 v02r01.

1) RBW = 100 kHz
2) VBW ≥ 3*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. The automatic bandwidth measurement capability of a spectrum analyzer is used to measure X dB bandwidth.
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. 26 dB bandwidth is used to determine the conducted power limits.

Test Procedure (99 % Bandwidth measurement)

The 99 % bandwidth is used to determine the conducted power limits(for ISED).

The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized. (6.9.3 in ANSI 63.10-2013)

1) RBW = 1% ~ 5% of the occupied bandwidth
2) VBW ≥ 3 x RBW
3) Detector = Peak
4) Trace mode = max hold
5) Sweep = auto couple
6) Allow the trace to stabilize

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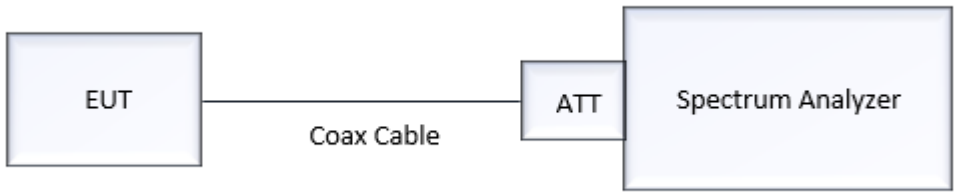
7.3. Output Power

Limit

Band	FCC Limit		IC Limit
UNII 1	Master (Outdoor)	≤ 1 W (= 30dBm) ≤ 125 mW (= 21dBm) EIRP at max elevation angle (30°) from horizon	Indoor only for LE LAN devices ≤ 200 mW EIRP or ≤ 10 + 10 log B EIRP in dBm whichever power is less, where B is 99% BW in MHz
	Master (Indoor)	≤ 1 W (= 30dBm)	
	Client Device	≤ 250 mW (= 24 dBm)	
UNII 2A, 2C	≤ 250 mW or ≤ 11 dBm + 10 log B whichever is less (where B is the 26 dB Emission BW in MHz)		≤ 250 mW or ≤ 11 dBm + 10 log B ≤ 1W EIRP or ≤ 17 dBm + 10 log B EIRP Whichever power is less, where B is 99% BW in MHz
UNII 3	≤ 1 W (= 30dBm)		≤ 1 W (= 30dBm)

Test Configuration



Test Procedure

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*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

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

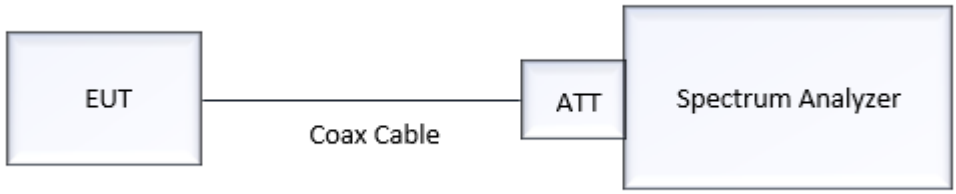
▪ Conducted Output Power (Peak) = Reading Value(dBm) + ATT loss(dB) + Cable loss(dB)
▪ Conducted Output Power (Average) = Reading Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

7.4. Power Spectral Density

Limit

Band	FCC Limit		IC Limit
UNII 1	Master Device	≤ 17 dBm/MHz	Indoor only for LE LAN devices
	Client Device	≤ 11 dBm/MHz	≤ 10 dBm/MHz EIRP
UNII 2A, 2C	≤ 11 dBm/MHz		≤ 11 dBm/MHz
UNII 3	≤ 30 dBm/500 kHz		≤ 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)
3) VBW ≥ 3 MHz
4) Number of points in sweep ≥ 2*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

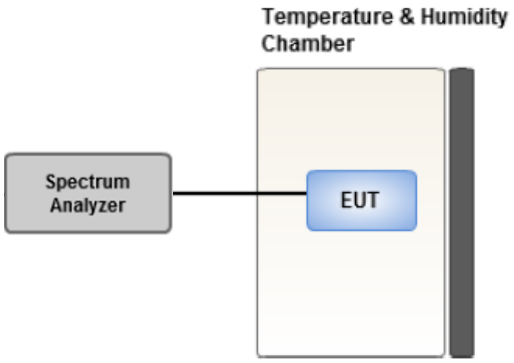
Total PSD(dBm) = Reading Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

7.5. Frequency Stability

Limit

Fundamental emissions of the radio devices should be kept within at least the central 80% of its permitted operating frequency band to minimize the possibility of out of band operation.

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 battery 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.

7.6. Radiated Test

Undesirable Emission Limits

Frequency Band	Limit
U-NII 1 [1)]	In accordance with **47 CFR § 15.407(b)(1) / RSS-247, 6.2.1.2** All emissions outside the 5.15-5.35 GHz band shall not exceed an −27 dBm/MHz e.i.r.p.
U-NII 2a	In accordance with **47 CFR § 15.407(b)(2) / RSS-247, 6.2.2.2** All emissions outside the 5.15-5.35 GHz band shall not exceed an −27 dBm/MHz e.i.r.p.
U-NII 2c	In accordance with **47 CFR § 15.407(b)(3) / RSS-247, 6.2.3.2** All emissions outside the 5.47-5.725 GHz band shall not exceed an −27 dBm/MHz e.i.r.p.
U-NII 3	In accordance with **47 CFR § 15.407(b)(4) / RSS-247, 6.2.4.2** 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.

Note :

1. For ISED, The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

Radiated Emission Limits

FCC : 47 CFR § 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

ISED : RSS-GEN Section 8.9		
Frequency (MHz)	**Field Strength (uV/m)**	**Measurement Distance (m)**
0.009 – 0.490	6.37/F(kHz)	300
0.490 – 1.705	63.7/F(kHz)	30
1.705 – 30	0.08	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Receiver Radiated Emission Limits

ISED : RSS-GEN Section 7.3		
Frequency (MHz)	**Field Strength (uV/m)**	**Measurement Distance (m)**
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

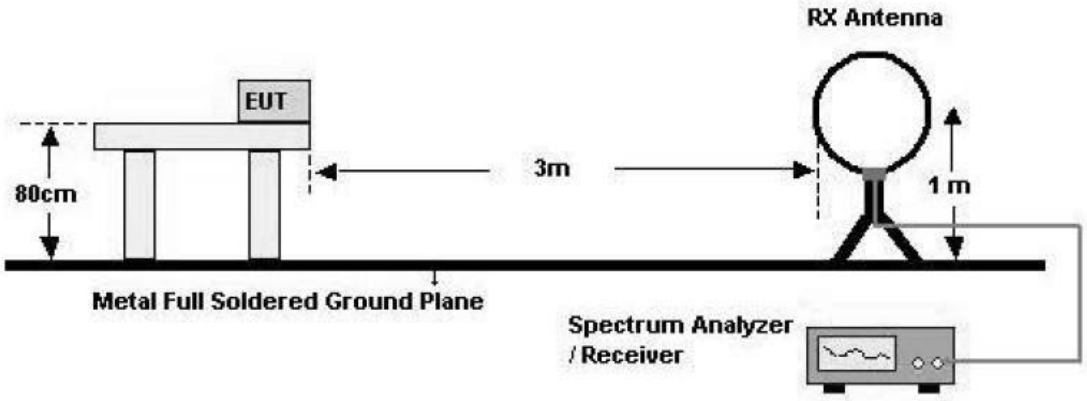
Restricted Bands of Operation

FCC : 47 CFR § 15.205(a)				
Frequency (MHz)	**Frequency (MHz)**	**Frequency (MHz)**	**Frequency (MHz)**	**Frequency (MHz)**
0.090 – 0.110	12.29-12.293	149.9 - 150.05	1660.0 - 1710.0	8025 – 8500
0.495 - 0.505	12.51975-12.52025	156.52475 - 156.52525	1718.8 - 1722.2	9000 – 9200
2.1735 – 2.1905	12.57675-12.57725	156.7 - 156.9	2200.0 - 2300.0	9300 – 9500
4.125 - 4.128	13.36-13.41	162.0125 - 167.17	2310.0 - 2390.0	10600 - 12700
4.17725-4.17775	16.42-16.423	167.72 - 173.2	2483.5 – 2500.0	13250 – 13400
4.20725-4.20775	16.69475-16.69525	240.0 - 285.0	2690.0 - 2900.0	14470 – 14500
6.215-6.218	16.80425-16.80475	322.0 - 335.4	3260.0 – 3267.0	15350 – 16200
6.26775-6.26825	25.5-25.67	399.9 - 410.0	3332.0 – 3339.0	17700 – 21400
6.31175-6.31225	37.5-38.25	608.0 - 614.0	3345.8 – 3358.0	22010 – 23120
8.291-8.294	73 - 74.6	960.0 - 1240.0	3600.0 – 4400.0	23600 – 24000
8.362-8.366	74.8 - 75.2	1300.0 - 1427.0	4500.0 – 5150.0	31200 – 31800
8.37625-8.38675	108 - 121.94	1435.0 - 1626.5	5350.0 – 5460.0	36430 – 36500
8.41425-8.41475	123 - 138	1645.5 - 1646.5	7250.0 – 7750.0	Above 38600

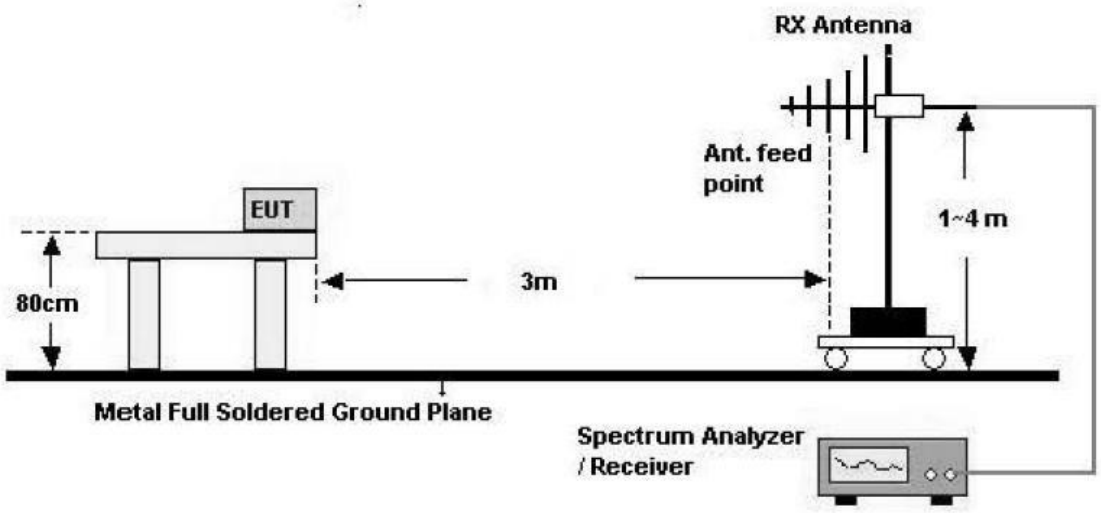
ISED : RSS-GEN Section 8.10				
Frequency (MHz)	**Frequency (MHz)**	**Frequency (MHz)**	**Frequency (MHz)**	**Frequency (MHz)**
0.090 - 0.110	8.37625 - 8.38675	108 – 138	1660 - 1710	8025 – 8500
0.495 - 0.505	8.41425 - 8.41475	149.9 - 150.05	1718.8 - 1722.2	9000 - 9200
2.1735 - 2.1905	12.29 - 12.293	156.52475 - 156.52525	2200 - 2300	9300 - 9500
3.020 - 3.026	12.51975 - 12.52025	156.7 - 156.9	2310 - 2390	10600 - 12700
4.125 - 4.128	12.57675 - 12.57725	162.0125 - 167.17	2483.5 - 2500	13250 – 13400
4.17725 - 4.17775	13.36 - 13.41	167.72 - 173.2	2655 - 2900	14470 – 14500
4.20725 - 4.20775	16.42 - 16.423	240 – 285	3260 – 3267	15350 – 16200
5.677 - 5.683	16.69475 - 16.69525	322 - 335.4	3332 - 3339	17700 – 21400
6.215 - 6.218	16.80425 - 16.80475	399.9 - 410	3345.8 - 3358	22010 – 23120
6.26775 - 6.26825	25.5 - 25.67	608 - 614	3500 - 4400	23600 – 24000
6.31175 - 6.31225	37.5 - 38.25	960 - 1427	4500 - 5150	31200 – 31800
8.291 - 8.294	73 - 74.6	1435 - 1626.5	5350 - 5460	36430 – 36500
8.362 - 8.366	74.8 - 75.2	1645.5 - 1646.5	7250 - 7750	Above 38600

Test Configuration

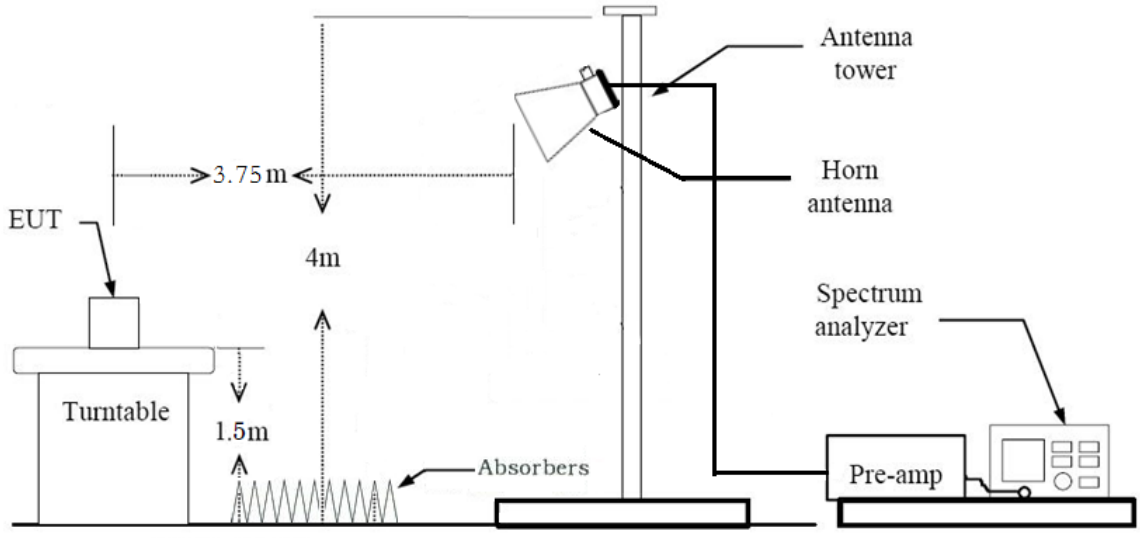
Below 30 MHz



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 3m 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 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) = 40*log(3 m/300 m) = - 80 dB
   Measurement Distance: 3 m
7. Distance Correction Factor (0.490 MHz – 30 MHz) = 40*log(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*RBW

9. Total = Reading Value + Antenna Factor (A.F) + Cable Loss (C.L) + Distance Factor (D.F)
10. There is a comparison data both open-field test site and alternative test site – semi-Anechoic chamber according to 414788 D01. And the results are properly calibrated.

Test Procedure of Radiated spurious emissions (Below 1GHz)

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. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. Spectrum Setting

(1) Measurement Type (Peak):

- Measured Frequency Range: 30 MHz – 1 GHz
- Detector = Peak
- Trace = Max hold
- RBW = 100 kHz
- VBW ≥ 3*RBW

(2) Measurement Type(Quasi-peak):

- Measured Frequency Range: 30 MHz – 1 GHz
- Detector = Quasi-Peak
- RBW = 120 kHz

In general, the method (1) is mainly used

6. Total = Reading Value + Antenna Factor (A.F) + Cable Loss (C.L)

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 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
   *Distance extrapolation factor = 20*log (test distance / specific distance) (dB)
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
8. The unit was tested with its standard battery.
9. 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.

10. Measurement value only up to 6 maximum emissions noted or would be lesser if no specific emissions from the EUT are recorded (i.e.: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor
11. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency
12. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(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 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
   *Distance extrapolation factor = 20*log (test distance / specific distance) (dB)
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
8. The unit was tested with its standard battery.
9. 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.

10. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

7.7. AC Power line Conducted Emissions

Limit

47 CFR § 15.207, RSS-GEN Section 8.8

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*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

*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) = Reading Value + Correction Factor

7.8. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated, and the worst-case configuration results are reported.
   - PSU mode : AC powered mode / PoE powered mode
   - Worst case: AC powered mode

2. EUT Axis
   - Radiated Spurious Emissions: Z
   - Radiated Restricted Band Edge: Z

   All X, Y, and Z positions were investigated to find the worst-case position. Typical installation recommended is in right up position (Z) on the wall or placed on the desk using cradle.

3. Operations with all the data rates available were investigated. And the worst-case test result was evaluated for each different channel BW

4. Tx mode
   - The device support 2x2 MIMO with SDM and CDD.
   - Worst-case : 2 x TX CDD mode

5. All positions of loop antenna were investigated, but no critical peak was found

Conducted test

1. Operations with all the data rates available were investigated and the worst-case result was reported based on the worst-case data rate found.

8. SUMMARY OF TEST RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26dB Bandwidth	§15.407	N/A (For power measurement)	Conducted	PASS
6 dB Bandwidth	§15.407(e)	≥ 500 kHz (U-NII 3)		PASS
Maximum Conducted Output Power	§15.407(a)(1),(3)	≤ 1 W (U-NII 1) ≤ 1 W (U-NII 3)		PASS
Power Spectral Density	§15.407(a)(1),(5)	≤ 17 dBm/MHz (U-NII 1) ≤ 30 dBm/500 kHz (U-NII 3)		PASS
Frequency Stability	§15.407(g) §2.1055	Maintained within the band		PASS
AC Power line Conducted Emissions	§15.407(b)(6) §15.207	cf. Section 7.7		PASS
Undesirable Emissions	§15.407(b)	cf. Section 7.6	Radiated	PASS
Radiated Spurious Emissions	§15.407(b)(6) §15.209	cf. Section 7.6		PASS
Radiated Restricted Band Edge	§15.407(b)(7) §15.205(a)	cf. Section 7.6		PASS

Test Description	ISED Rule Parts	Test Limit	Test Condition	Test Result
99% Bandwidth	RSS-GEN, 6.7	N/A	Conducted	PASS
6 dB Bandwidth	RSS-247, 6.2.4.1	≥ 500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	RSS-247, 6.2.4 1	≤ 1 W (5725-5850 MHz)		PASS
Maximum e.i.r.p.	RSS-247, 6.2.1.1	≤ 200 mW EIRP or 10+10 log(B) dBm EIRP Whichever power is less (5150-5250 MHz)		PASS
Power Spectral Density	RSS-247 6.2.1.1	≤ 10 dBm/ MHz EIRP (5150-5250 MHz)		PASS
	RSS-247, 6.2.4 1	≤ 30 dBm/500 kHz (5725-5850 MHz)		
Frequency Stability	RSS-GEN 8.11	should be kept within at least the central 80% of its permitted operating frequency band in order to minimize the possibility of out-of-band operation.		PASS
AC Power line Conducted Emissions	RSS-GEN, 8.8	cf. Section 7.7		PASS
Undesirable Emissions	RSS-247, 6.2.1.2	cf. Section 7.6	Radiated	PASS
	RSS-247, 6.2.4 2	cf. Section 7.6		
Radiated Spurious Emissions	RSS-Gen, 8.9	cf. Section 7.6		PASS
Radiated Restricted Band Edge	RSS-Gen, 8.10	cf. Section 7.6		PASS
Receiver Spurious Emissions	RSS-GEN, 7.3	cf. Section 7.6		PASS

SUMMARY OF OUTPUT POWER AND SETTING

FCC : Output Power Summary

Mode	U-NII 1 (CDD)			U-NII 3 (CDD)		
	Max Output Power (dBm)	Max Output Power (mW)	Channel Frequency (MHz)	Max Output Power (dBm)	Max Output Power (mW)	Channel Frequency (MHz)
802.11a	21.23	132.74	5240	21.72	148.59	5785
802.11n HT20	21.23	132.74	5240	21.76	149.97	5785
802.11n HT40	21.14	130.02	5230	21.58	143.88	5755
802.11ac VHT20	21.39	137.72	5240	21.84	152.76	5785
802.11ac VHT40	21.36	136.77	5230	21.73	148.94	5755
802.11ac VHT80	17.58	57.28	5210	21.95	156.68	5775
802.11ax HE20	21.84	152.76	5240	22.43	174.98	5785
802.11ax HE40	21.68	147.23	5230	22.25	167.88	5755
802.11ax HE80	17.86	61.09	5210	22.42	174.58	5775

FCC : Output Power Setting

Frequency (MHz)	802.11a (2TX CDD)	802.11n HT20 (2TX CDD)	802.11ac VHT20 (2TX CDD)	802.11ax HE20 (2TX CDD)
5180	74	74	72	68
5200	74	74	74	74
5220	74	74	74	74
5240	74	74	74	74
5745	76	76	76	76
5765	76	76	76	76
5785	76	76	76	76
5805	76	76	76	76
5825	76	76	76	76

Frequency (MHz)	802.11n HT40 (2TX CDD)	802.11ac VHT40 (2TX CDD)	802.11ax HE40 (2TX CDD)
5190	58	58	56
5230	74	74	74
5755	76	76	76
5795	76	76	76

Frequency (MHz)	802.11ac VHT80 (2TX CDD)	802.11ax HE80 (2TX CDD)
5210	58	58
5775	76	76

Note :
power setting value shown on the table above is based on quadruple number from M-Tool 3.1.0.5 used for RF testing.

ISED : Output Power Summary

Mode	U-NII 1 (CDD)			U-NII 3 (CDD)		
	Max Output Power (dBm)	Max Output Power (mW)	Channel Frequency (MHz)	Max Output Power (dBm)	Max Output Power (mW)	Channel Frequency (MHz)
802.11a	15.10	32.36	5240	21.72	148.59	5785
802.11n HT20	14.56	28.58	5240	21.76	149.97	5785
802.11n HT40	17.93	62.09	5230	21.58	143.88	5755
802.11ac VHT20	14.63	29.04	5240	21.84	152.76	5785
802.11ac VHT40	17.94	62.23	5230	21.73	148.94	5755
802.11ac VHT80	17.45	55.59	5210	21.95	156.68	5775
802.11ax HE20	14.92	31.05	5240	22.43	174.98	5785
802.11ax HE40	18.20	66.07	5230	22.25	167.88	5755
802.11ax HE80	17.47	55.85	5210	22.42	174.58	5775

ISED : Output Power Setting

Frequency (MHz)	802.11a (2TX CDD)	802.11n HT20 (2TX CDD)	802.11ac VHT20 (2TX CDD)	802.11ax HE20 (2TX CDD)
5180	46	46	46	46
5200	46	46	46	46
5220	46	46	46	46
5240	46	46	46	46
5745	76	76	76	76
5765	76	76	76	76
5785	76	76	76	76
5805	76	76	76	76
5825	76	76	76	76

Frequency (MHz)	802.11n HT40 (2TX CDD)	802.11ac VHT40 (2TX CDD)	802.11ax HE40 (2TX CDD)
5190	58	58	56
5230	60	60	60
5755	76	76	76
5795	76	76	76

Frequency (MHz)	802.11ac VHT80 (2TX CDD)	802.11ax HE80 (2TX CDD)
5210	58	58
5775	76	76

Note :
power setting value shown on the table above is based on quadruple number from M-Tool 3.1.0.5 used for RF testing.

9. TEST RESULT

9.1 DUTY CYCLE

Mode	Data Rate (Mbps)	T_{onn} (ms)	T_{totaln} (ms)	Duty Cycle	Duty Factor (dB)	VBW(1/T) (Hz)
802.11a	6 Mbps	2.07	2.17	0.95	0.22	484.06
	9 Mbps	1.38	1.49	0.93	0.33	723.24
	12 Mbps	1.05	1.15	0.91	0.42	956.82
	18 Mbps	0.70	0.81	0.86	0.63	1421.40
	24 Mbps	0.53	0.64	0.83	0.81	1877.11
	36 Mbps	0.37	0.47	0.78	1.10	2732.24
	48 Mbps	0.28	0.38	0.72	1.41	3616.20
	54 Mbps	0.25	0.35	0.70	1.54	4031.17
802.11n (HT20)	MCS0	1.93	2.03	0.95	0.21	517.69
	MCS1	0.98	1.08	0.91	0.41	1016.12
	MCS2	0.67	0.77	0.87	0.62	1499.40
	MCS3	0.51	0.61	0.83	0.79	1951.60
	MCS4	0.35	0.45	0.77	1.11	2859.32
	MCS5	0.28	0.37	0.74	1.31	3616.20
	MCS6	0.25	0.35	0.72	1.44	4031.17
	MCS7	0.23	0.33	0.70	1.55	4391.11
802.11n (HT40)	MCS0	0.95	1.05	0.90	0.44	1055.37
	MCS1	0.49	0.59	0.83	0.82	2032.24
	MCS2	0.34	0.44	0.77	1.14	2962.67
	MCS3	0.26	0.37	0.72	1.41	3783.11
	MCS4	0.19	0.29	0.65	1.88	5345.68
	MCS5	0.15	0.25	0.61	2.13	6471.11
	MCS6	0.14	0.24	0.59	2.27	7025.78
	MCS7	0.13	0.23	0.55	2.57	7932.29

Mode	Data Rate (Mbps)	T_{onn} (ms)	T_{totaln} (ms)	Duty Cycle	Duty Factor (dB)	VBW(1/T) (Hz)
802.11ac (VHT20)	MCS0	1.93	1.96	0.98	0.07	518.78
	MCS1	0.98	1.01	0.97	0.12	1016.12
	MCS2	0.67	0.70	0.95	0.21	1490.31
	MCS3	0.51	0.54	0.95	0.23	1951.60
	MCS4	0.35	0.38	0.93	0.34	2826.46
	MCS5	0.28	0.31	0.89	0.48	3616.20
	MCS6	0.25	0.28	0.89	0.53	3966.16
	MCS7	0.23	0.26	0.88	0.57	4314.06
	MCS8	0.20	0.23	0.88	0.58	5018.39
802.11ac (VHT40)	MCS0	0.95	0.98	0.97	0.13	1050.86
	MCS1	0.50	0.53	0.94	0.28	2015.59
	MCS2	0.34	0.37	0.92	0.35	2927.40
	MCS3	0.27	0.30	0.90	0.44	3725.78
	MCS4	0.19	0.22	0.87	0.60	5231.96
	MCS5	0.15	0.19	0.83	0.83	6471.11
	MCS6	0.15	0.17	0.84	0.77	6830.60
	MCS7	0.13	0.16	0.82	0.86	7684.45
	MCS8	0.11	0.15	0.78	1.09	8782.18
	MCS9	0.11	0.14	0.79	1.00	9107.47
802.11ac (VHT80)	MCS0	0.46	0.49	0.94	0.26	2157.03
	MCS1	0.25	0.28	0.90	0.46	3966.16
	MCS2	0.18	0.21	0.85	0.73	5588.68
	MCS3	0.15	0.18	0.84	0.75	6645.98
	MCS4	0.11	0.14	0.79	1.00	9107.47
	MCS5	0.10	0.13	0.77	1.11	10245.90
	MCS6	0.09	0.12	0.76	1.20	11177.34
	MCS7	0.09	0.11	0.75	1.25	11709.60
	MCS8	0.07	0.11	0.69	1.60	13661.20
	MCS9	0.07	0.10	0.71	1.50	14464.81

Mode	Data Rate (Mbps)	T_{onn} (ms)	T_{totaln} (ms)	Duty Cycle	Duty Factor (dB)	VBW(1/T) (Hz)
802.11ax (HE20)	MCS0	1.49	1.52	0.98	0.09	671.86
	MCS1	0.77	0.81	0.96	0.18	1294.22
	MCS2	0.53	0.57	0.94	0.26	1877.11
	MCS3	0.41	0.45	0.93	0.33	2410.80
	MCS4	0.30	0.33	0.90	0.45	3368.51
	MCS5	0.24	0.27	0.88	0.56	4239.68
	MCS6	0.22	0.25	0.87	0.61	4639.66
	MCS7	0.20	0.23	0.86	0.66	5018.39
	MCS8	0.18	0.21	0.86	0.64	5588.68
	MCS9	0.17	0.20	0.84	0.77	5997.61
	MCS10	0.15	0.19	0.83	0.83	6471.11
	MCS11	0.15	0.18	0.80	0.97	6830.60
802.11ax (HE40)	MCS0	0.78	0.81	0.96	0.18	1287.44
	MCS1	0.41	0.45	0.93	0.33	2410.80
	MCS2	0.30	0.33	0.90	0.45	3323.00
	MCS3	0.24	0.27	0.88	0.56	4239.68
	MCS4	0.18	0.21	0.87	0.63	5464.48
	MCS5	0.15	0.18	0.82	0.85	6645.98
	MCS6	0.14	0.17	0.81	0.92	7232.38
	MCS7	0.13	0.17	0.80	0.94	7451.56
	MCS8	0.12	0.15	0.78	1.06	8479.39
	MCS9	0.11	0.15	0.78	1.09	8782.18
	MCS10	0.11	0.14	0.77	1.13	9107.47
	MCS11	0.10	0.13	0.78	1.07	9836.03
802.11ax (HE80)	MCS0	0.41	0.44	0.94	0.29	2410.80
	MCS1	0.24	0.27	0.88	0.56	4239.68
	MCS2	0.17	0.21	0.84	0.74	5718.63
	MCS3	0.15	0.18	0.82	0.87	6830.60
	MCS4	0.12	0.15	0.78	1.06	8479.39
	MCS5	0.10	0.13	0.76	1.21	9836.03
	MCS6	0.10	0.13	0.75	1.25	10245.90
	MCS7	0.09	0.13	0.74	1.30	10691.38
	MCS8	0.09	0.12	0.72	1.40	11709.60
	MCS9	0.09	0.12	0.76	1.20	11177.34
	MCS10	0.08	0.11	0.74	1.30	12295.09
	MCS11	0.09	0.11	0.75	1.46	11709.60

9.2 26 dB BANDWIDTH / 99% BANDWIDTH / 6 dB BANDWIDTH

26 dB BANDWIDTH / 99% BANDWIDTH

802.11a Mode		99% Bandwidth [MHz]		26 dB Bandwidth [MHz]	
Frequency [MHz]	Channel No.	ANT1	ANT2	ANT1	ANT2
5180	36	16.68	16.67	21.19	21.34
5200	40	16.74	16.68	21.11	21.41
5240	48	16.70	16.67	21.17	21.52
5745	149	16.82	16.75	22.64	22.14
5785	157	16.87	16.75	22.00	22.05
5825	165	17.02	16.78	22.36	22.51

802.11n(HT20) Mode		99% Bandwidth [MHz]		26 dB Bandwidth [MHz]	
Frequency [MHz]	Channel No.	ANT1	ANT2	ANT1	ANT2
5180	36	17.82	17.85	21.47	21.63
5200	40	17.84	17.84	21.46	21.46
5240	48	17.78	17.82	21.48	21.48
5745	149	17.89	17.86	21.64	23.79
5785	157	17.91	17.91	22.96	24.10
5825	165	17.97	17.90	23.11	24.61

802.11ac(VHT20) Mode		99% Bandwidth [MHz]		26 dB Bandwidth [MHz]	
Frequency [MHz]	Channel No.	ANT1	ANT2	ANT1	ANT2
5180	36	17.89	17.82	21.39	21.27
5200	40	17.88	17.80	21.56	21.91
5240	48	17.87	17.81	21.47	21.58
5745	149	17.90	17.86	22.11	22.20
5785	157	17.93	17.87	22.68	23.07
5825	165	17.98	17.88	22.01	21.65

802.11ax(HE20) Mode		99% Bandwidth [MHz]		26 dB Bandwidth [MHz]	
Frequency [MHz]	Channel No.	ANT1	ANT2	ANT1	ANT2
5180	36	19.04	19.02	21.33	21.22
5200	40	19.06	19.04	21.71	21.31
5240	48	19.07	19.03	21.51	21.34
5745	149	19.09	19.06	22.08	21.55
5785	157	19.08	19.14	22.59	22.76
5825	165	19.14	19.14	21.05	21.17

802.11n(HT40) Mode		99% Bandwidth [MHz]		26 dB Bandwidth [MHz]	
Frequency [MHz]	Channel No.	ANT1	ANT2	ANT1	ANT2
5190	38	36.43	36.31	39.90	39.55
5230	46	36.40	36.30	39.71	39.40
5755	151	36.61	36.31	39.42	39.57
5795	159	36.65	36.36	39.63	39.70

802.11ac(VHT40) Mode		99% Bandwidth [MHz]		26 dB Bandwidth [MHz]	
Frequency [MHz]	Channel No.	ANT1	ANT2	ANT1	ANT2
5190	38	36.29	36.28	39.73	39.61
5230	46	36.34	36.28	39.94	39.46
5755	151	36.36	36.35	40.24	40.38
5795	159	36.46	36.34	40.82	41.33

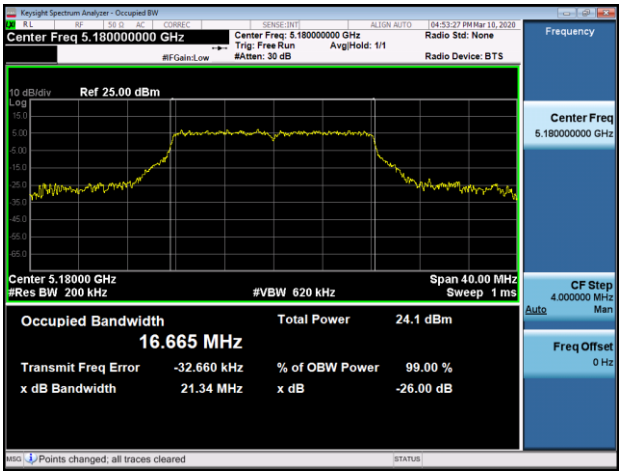
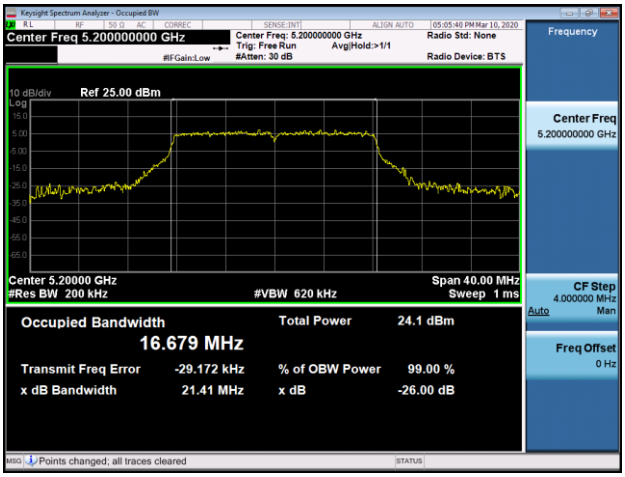
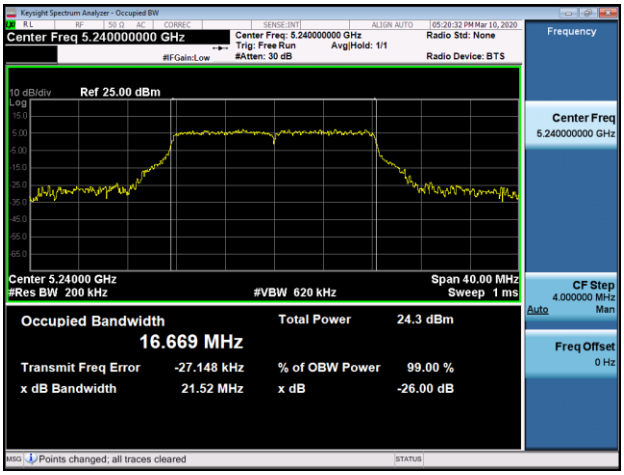
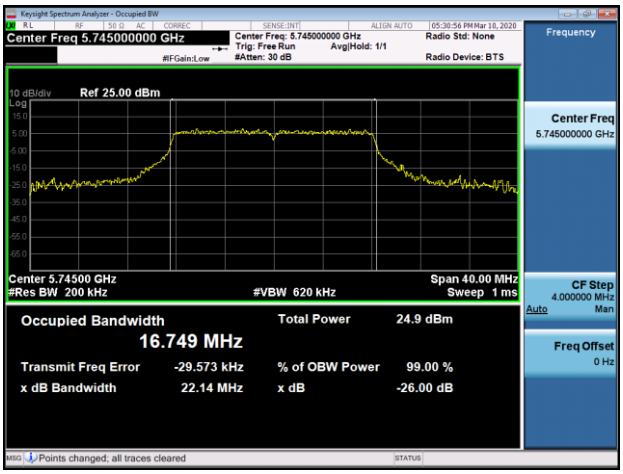
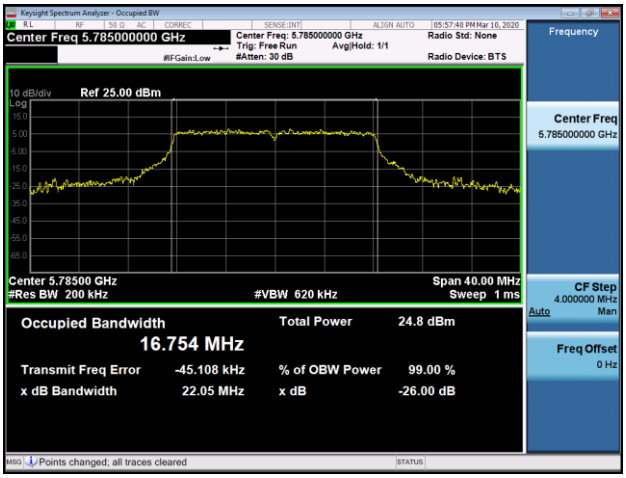
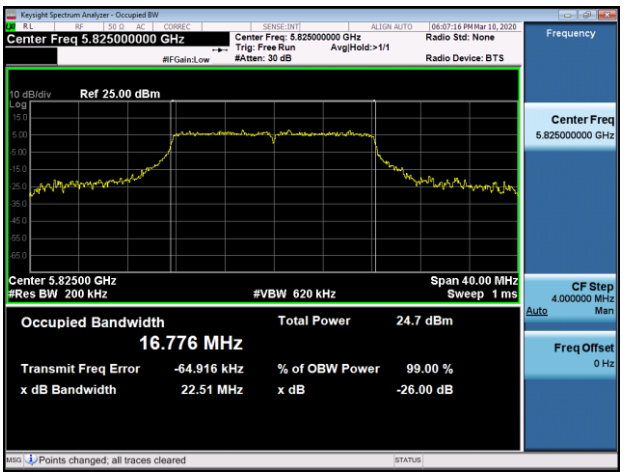
802.11ax(HE40) Mode		99% Bandwidth [MHz]		26 dB Bandwidth [MHz]	
Frequency [MHz]	Channel No.	ANT1	ANT2	ANT1	ANT2
5190	38	37.55	37.57	39.97	39.69
5230	46	37.53	37.62	40.01	39.44
5755	151	37.64	37.68	40.15	39.87
5795	159	37.64	37.65	40.17	42.55

802.11ac(VHT80) Mode		99% Bandwidth [MHz]		26 dB Bandwidth [MHz]	
Frequency [MHz]	Channel No.	ANT1	ANT2	ANT1	ANT2
5210	42	75.74	75.64	81.47	80.89
5775	155	75.89	75.75	83.29	84.02

802.11ax(HE80) Mode		99% Bandwidth [MHz]		26 dB Bandwidth [MHz]	
Frequency [MHz]	Channel No.	ANT1	ANT2	ANT1	ANT2
5210	42	76.78	76.80	81.02	80.81
5775	155	76.96	76.90	81.10	80.79

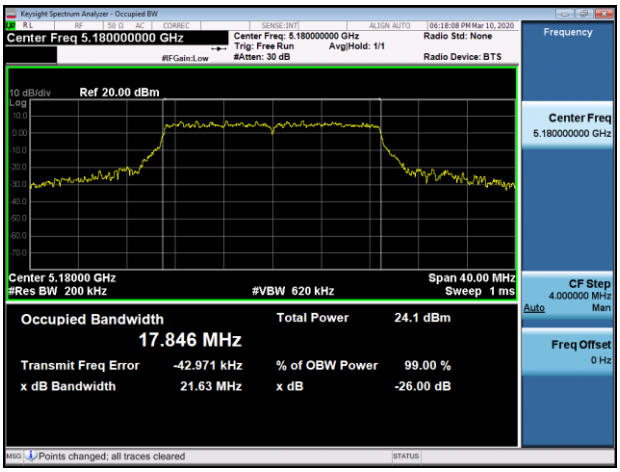
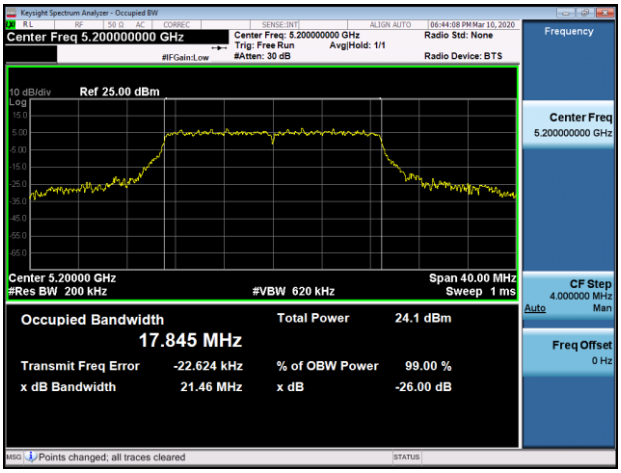
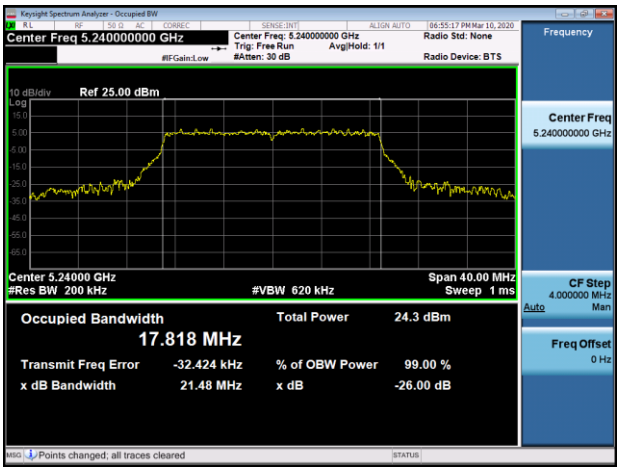
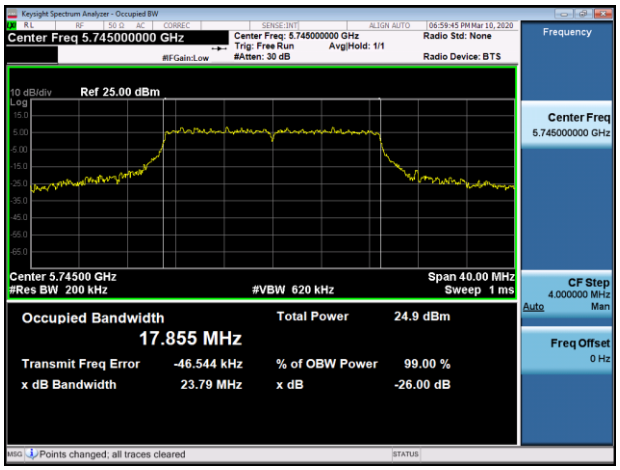
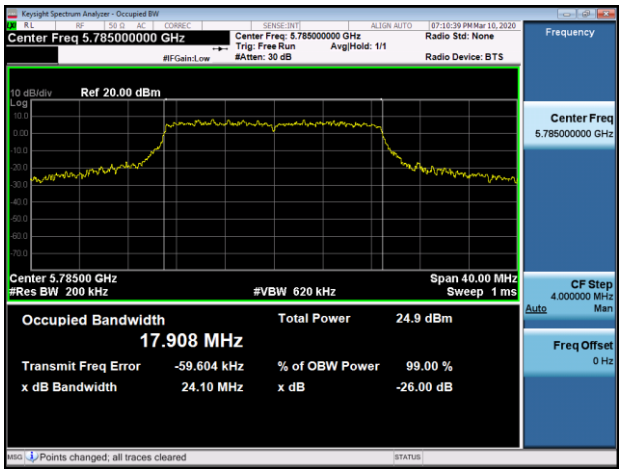
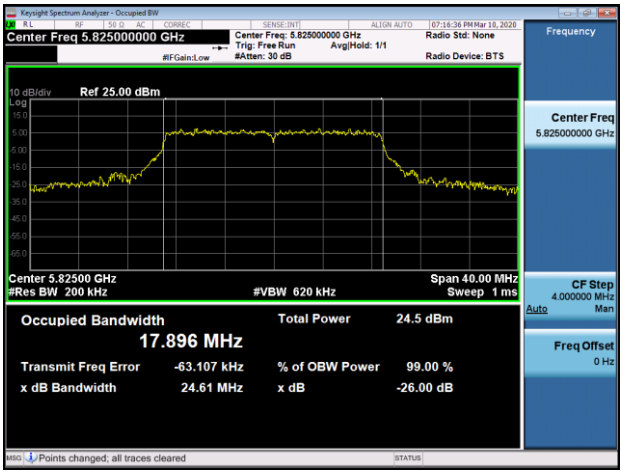
▣ Test Plots

802.11a

802.11a UNII 1 BAND 26dB BW (CH 36)	802.11a UNII 1 BAND 26dB BW (CH 40)
	
802.11a UNII 1 BAND 26dB BW (CH 48)	**802.11a UNII 3 BAND 26dB BW (CH 149)**
	
802.11a UNII 3 BAND 26dB BW (CH 157)	**802.11a UNII 3 BAND 26dB BW (CH 165)**
	

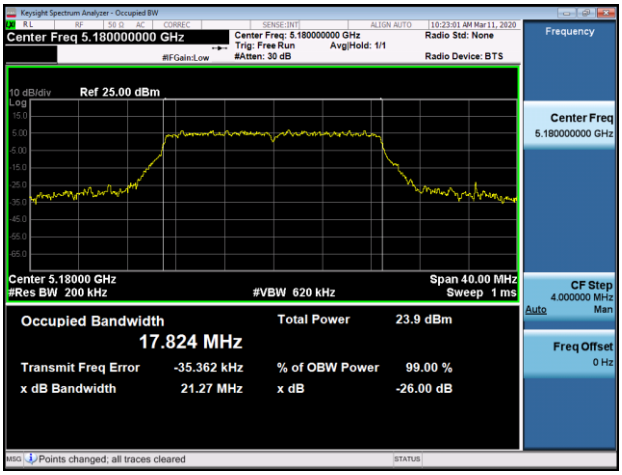
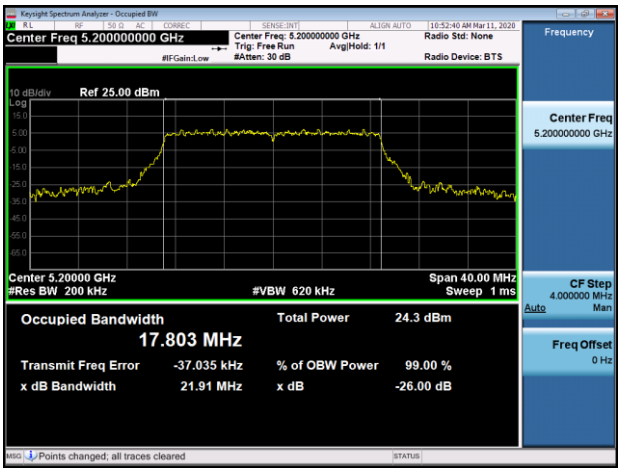
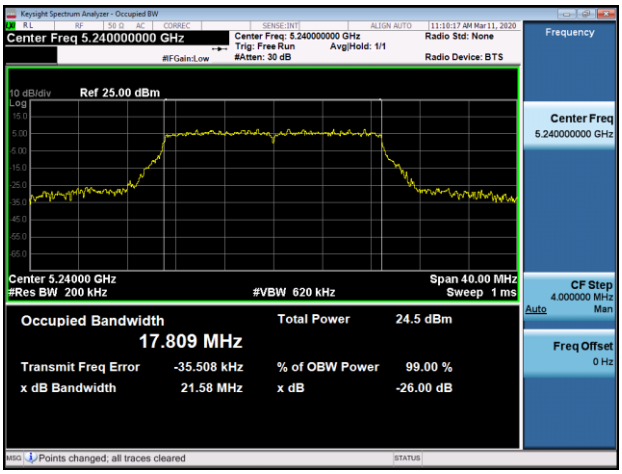
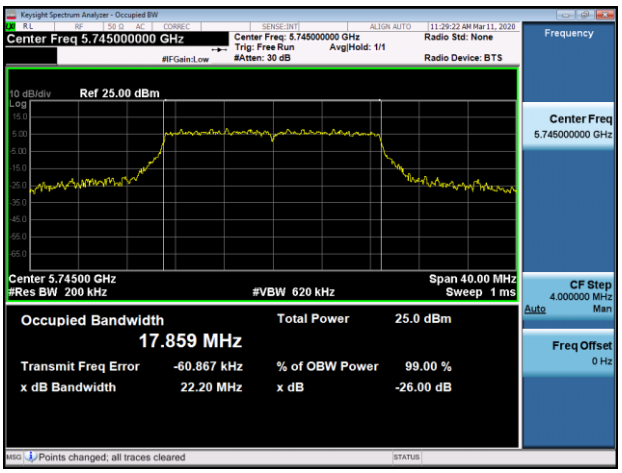
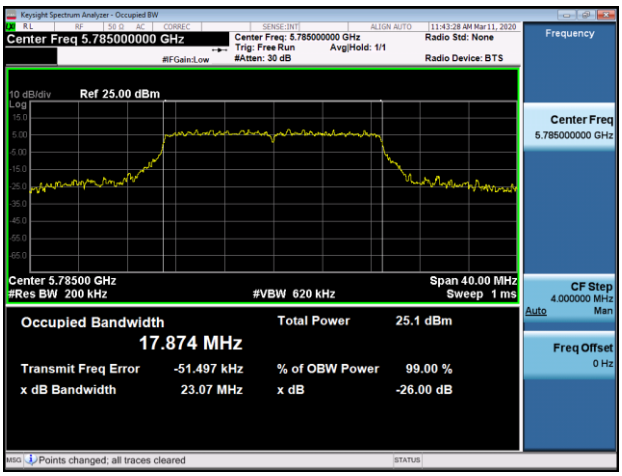
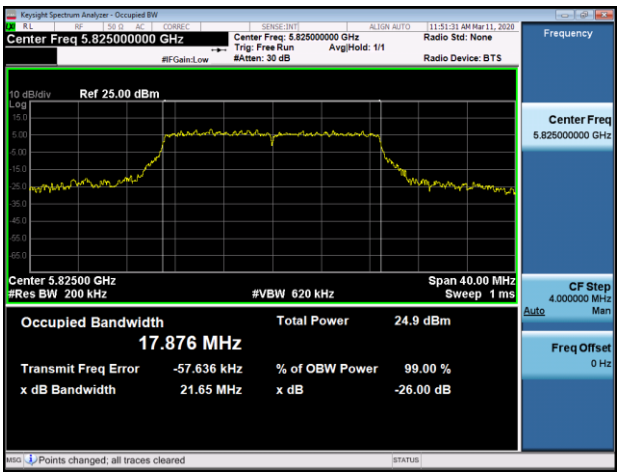
▣ Test Plots (Continued)

802.11n HT20

802. 11n HT20 UNII 1 BAND 26dB BW (CH 36)	802. 11n HT20 UNII 1 BAND 26dB BW (CH 40)
	
802. 11n HT20 UNII 1 BAND 26dB BW (CH 48)	**802. 11n HT20 UNII 3 BAND 26dB BW (CH 149)**
	
802. 11n HT20 UNII 3 BAND 26dB BW (CH 157)	**802. 11n HT20 UNII 3 BAND 26dB BW (CH 165)**
	

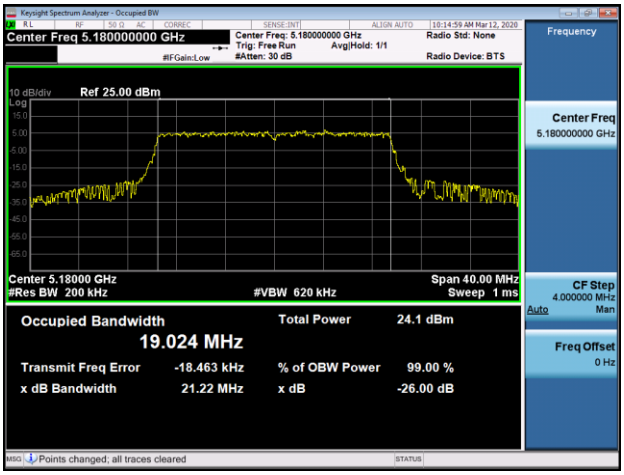
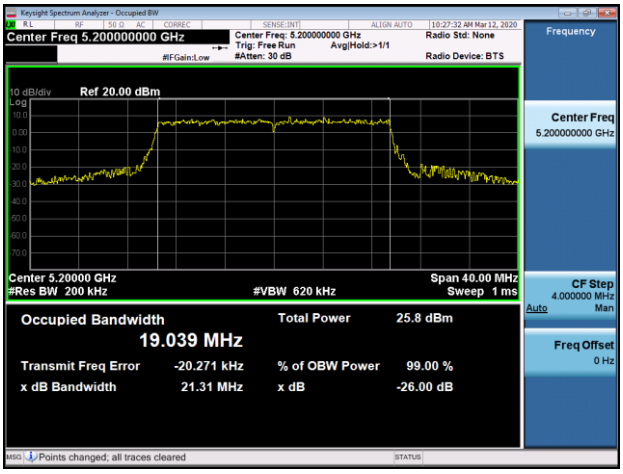
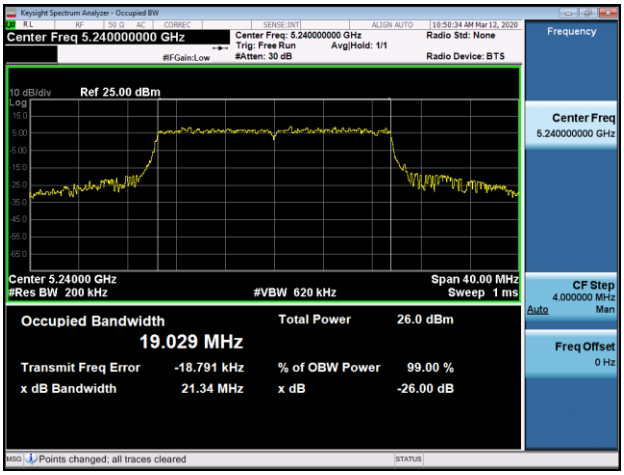
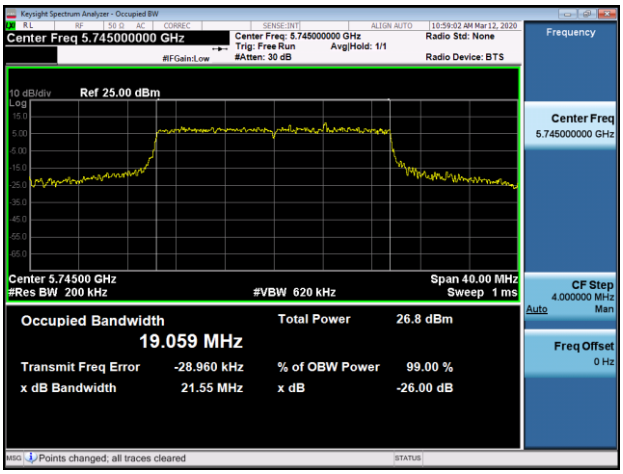
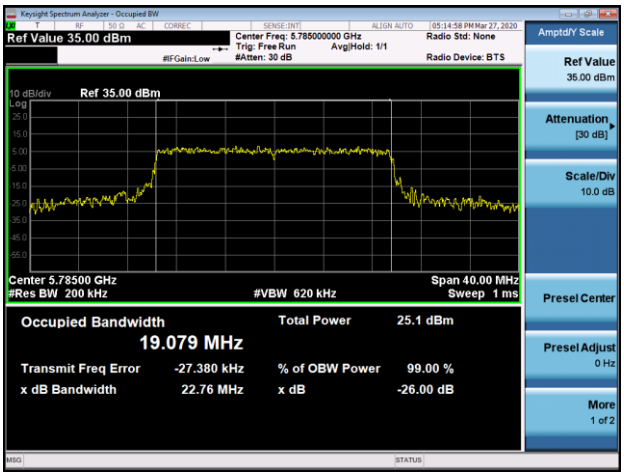
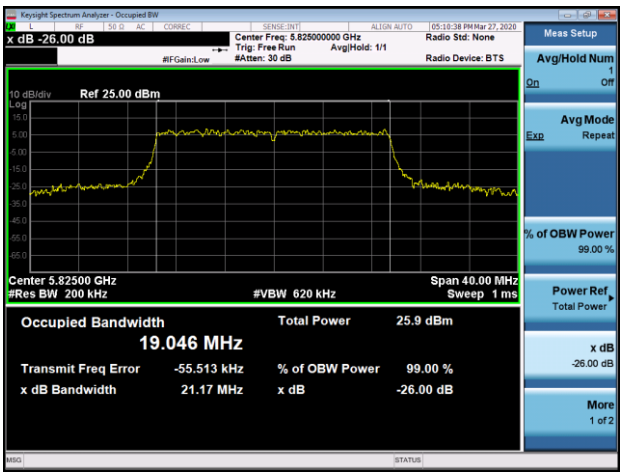
▣ Test Plots (Continued)

802.11ac VHT20

802.11ac VHT20 UNII 1 BAND 26dB BW (CH 36)	802.11ac VHT20 UNII 1 BAND 26dB BW (CH 40)
	
802.11ac VHT20 UNII 1 BAND 26dB BW (CH 48)	**802.11ac VHT20 UNII 3 BAND 26dB BW (CH 149)**
	
802.11ac VHT20 UNII 3 BAND 26dB BW (CH 157)	**802.11ac VHT20 UNII 3 BAND 26dB BW (CH 165)**
	

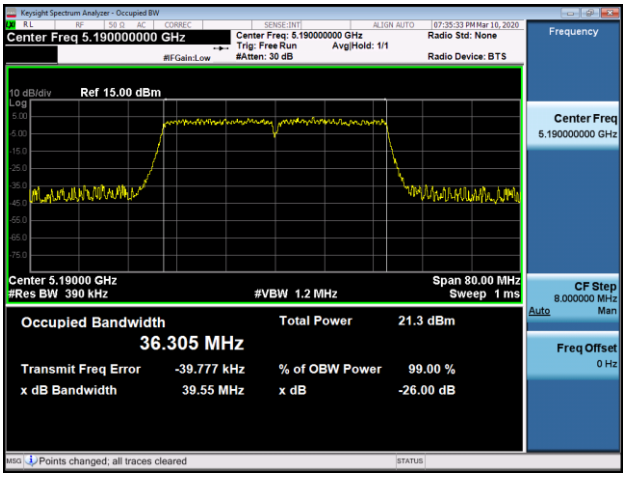
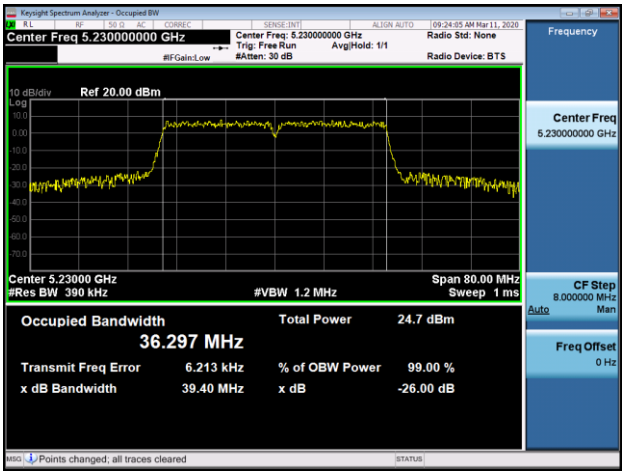
▣ Test Plots (Continued)

802.11ax HE20

802.11ax HE20 UNII 1 BAND 26dB BW (CH 36)	802.11ax HE20 UNII 1 BAND 26dB BW (CH 40)
	
802.11ax HE20 UNII 1 BAND 26dB BW (CH 48)	**802.11ax HE20 UNII 3 BAND 26dB BW (CH 149)**
	
802.11ax HE20 UNII 3 BAND 26dB BW (CH 157)	**802.11ax HE20 UNII 3 BAND 26dB BW (CH 165)**
	

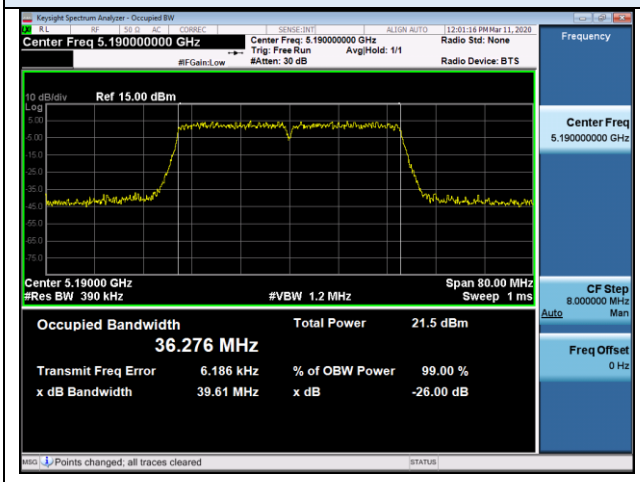
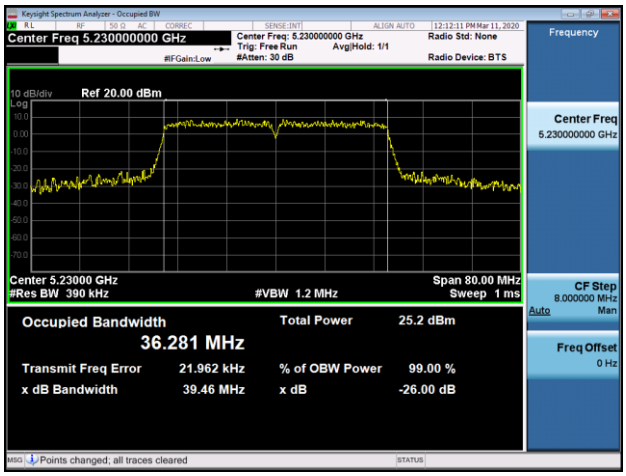
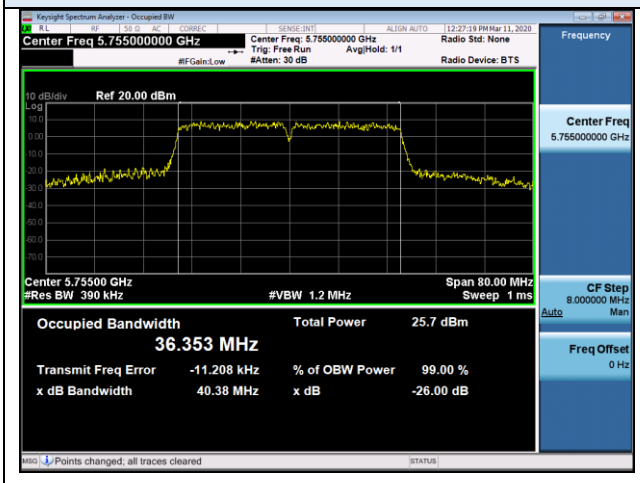
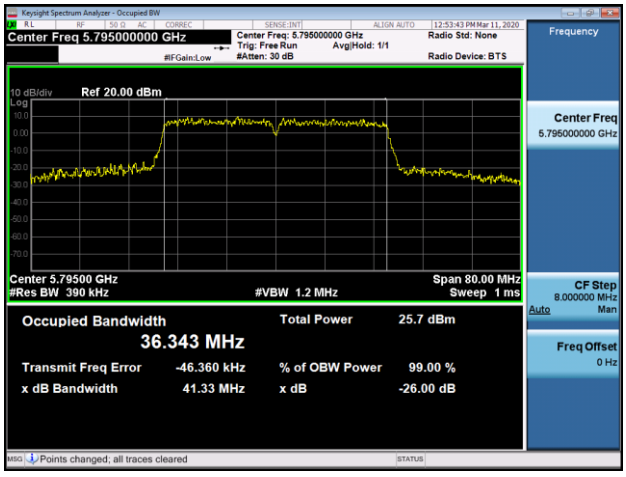
▣ Test Plots (Continued)

802.11n HT40

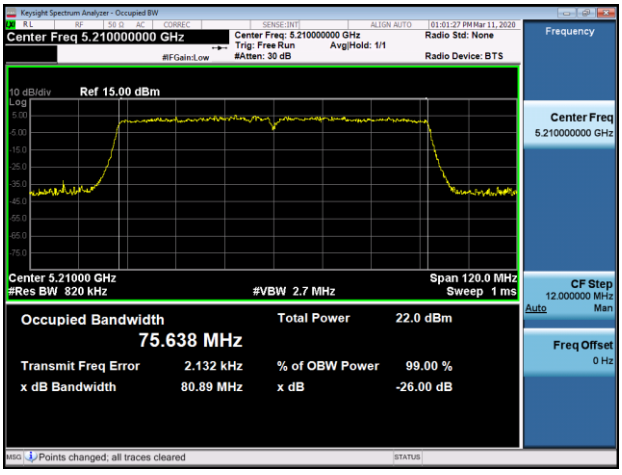
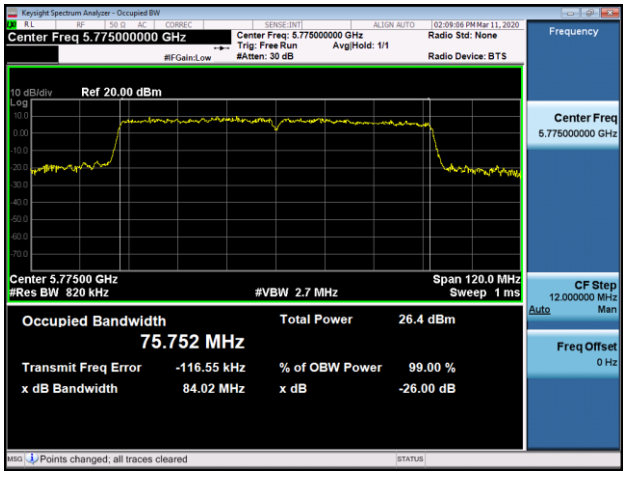
802.11n HT40 UNII 1 BAND 26dB BW (CH 38)	802.11n HT40 UNII 1 BAND 26dB BW (CH 46)
	
802.11n HT40 UNII 1 BAND 26dB BW (CH 151)	**802.11n HT40 UNII 3 BAND 26dB BW (CH 159)**
	

▣ Test Plots (Continued)

802.11ac VHT40

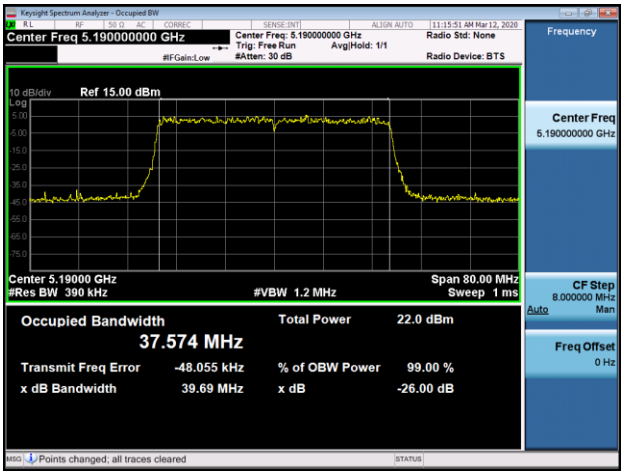
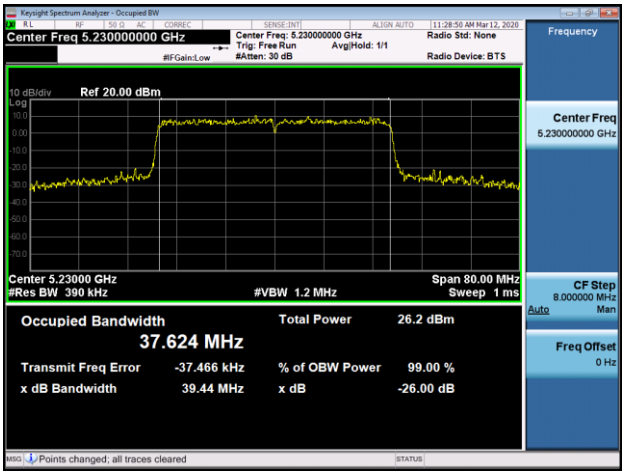
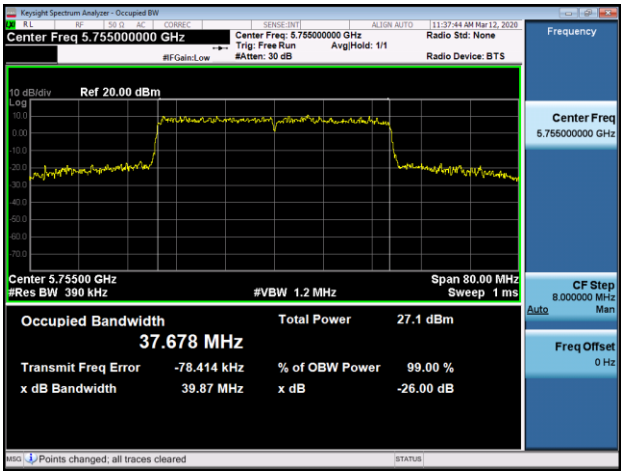
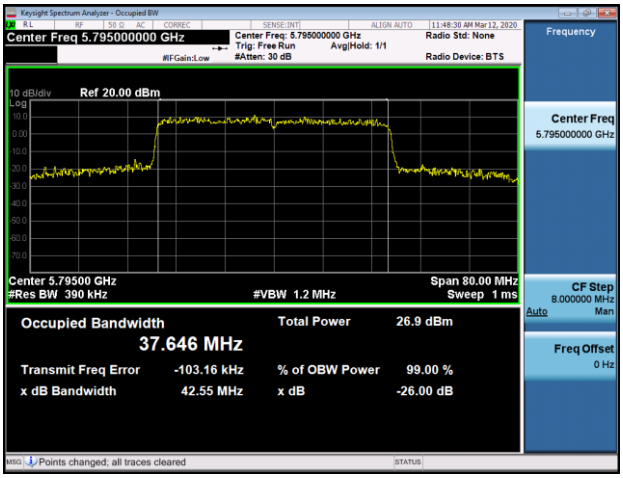
802.11ac VHT40 UNII 1 BAND 26dB BW (CH 38)	802.11ac VHT40 UNII 1 BAND 26dB BW (CH 46)
	
802.11ac VHT40 UNII 1 BAND 26dB BW (CH 151)	**802.11ac VHT40 UNII 3 BAND 26dB BW (CH 159)**
	

802.11ac VHT80

802.11ac VHT80 UNII 1 BAND 26dB BW (CH 42)	802.11ac VHT80 UNII 3 BAND 26dB BW (CH 155)
	

▣ Test Plots (Continued)

802.11ax HE40

802.11ax HE40 UNII 1 BAND 26dB BW (CH 38)	802.11ax HE40 UNII 1 BAND 26dB BW (CH 46)
	
802.11ax HE40 UNII 1 BAND 26dB BW (CH 151)	**802.11ax HE40 UNII 3 BAND 26dB BW (CH 159)**
	

802.11ax HE80

802.11ax HE80 UNII 1 BAND 26dB BW (CH 42)	802.11ax HE80 UNII 3 BAND 26dB BW (CH 155)