

8.3 MAXIMUM PEAK POWER DENSITY

8.3.1 Applicable Standard

According to FCC Part 15.407(a)(1) for UNII Band I

According to FCC Part 15.407(a)(2) for UNII Band II-A and UNII Band II-C

According to FCC Part 15.407(a)(3) for UNII Band III

According to 789033 D02 Section II(F)

8.3.2 Conformance Limit

■ For the band 5.15-5.25 GHz,

(a) (1) (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(a) (1) (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(a) (1) (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(a) (1) (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

■ For the 5.25-5.35 GHz and 5.47-5.725 GHz bands

(b) (2) the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

■ For the band 5.725-5.85 GHz

(a) (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.3.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.3.4 Test Procedure

Methods refer to FCC KDB 789033

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:

- a) Set $RBW \geq 1/T$, where T is defined in section II.B.I.a).
- b) Set $VBW \geq 3 RBW$.
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/RBW)$ to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10\log(1\text{MHz}/RBW)$ to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections

5.c) and 5.d) above, since $RBW=100\text{ KHz}$ is available on nearly all spectrum analyzers.

8.3.5 Test Results

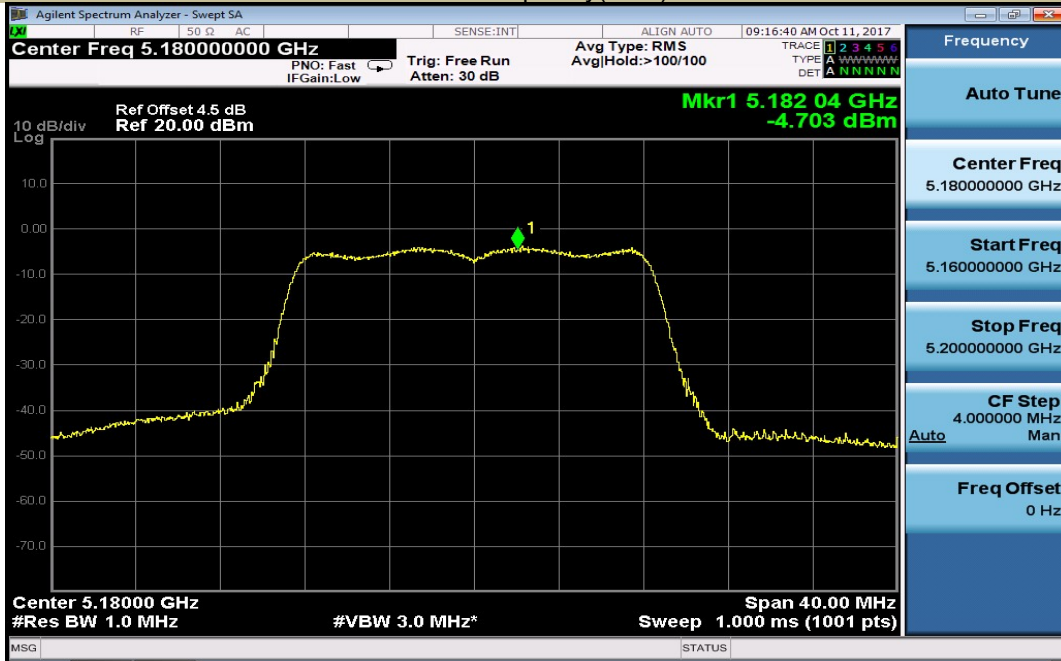
5150-5250MHz

Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5180	-4.703	11
	5200	-4.124	11
	5240	-3.576	11
802.11n-HT20	5180	-4.638	11
	5200	-4.812	11
	5240	-3.801	11
802.11n-HT40	5190	-12.764	11
	5230	-12.046	11
802.11ac	5210	-20.416	11

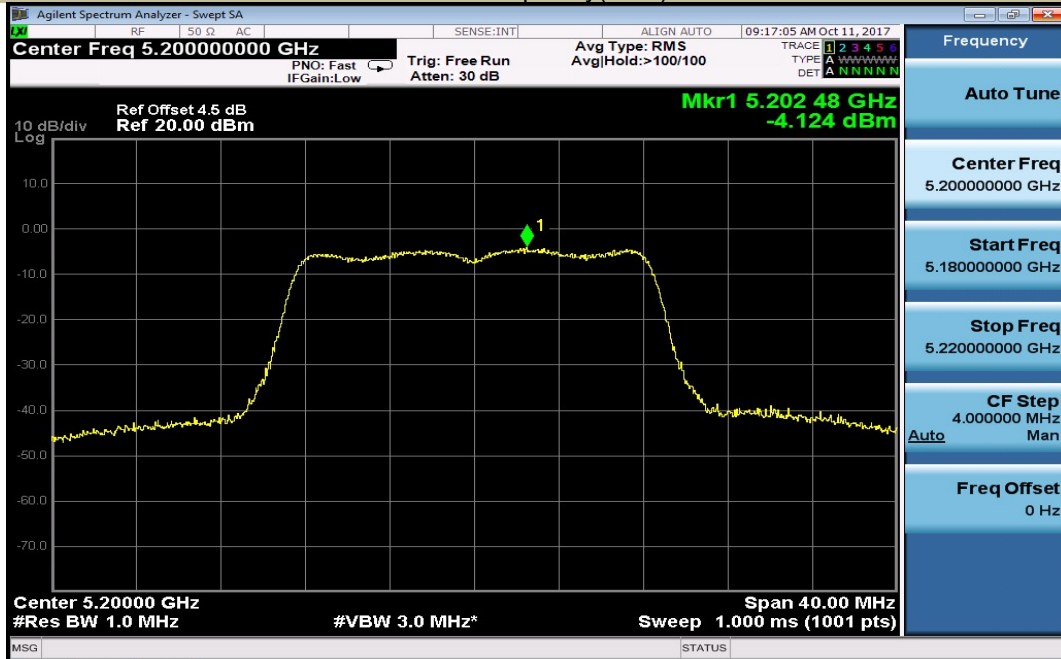
5725-5850MHz

Operating mode	Test Channel	Power Spectral Density dBm/500kHz	Limit (dBm/500kHz)
802.11a	5745	-9.197	30
	5785	-9.302	30
	5825	-9.036	30
802.11n-HT20	5745	-9.615	30
	5785	-9.814	30
	5825	-9.505	30
802.11n-HT40	5755	-17.572	30
	5795	-16.275	30
802.11ac	5775	-24.803	30

Emission Bandwidth&99% Occupied Bandwidth UNII Band I
Test Model 802.11a Frequency(MHz) 5180



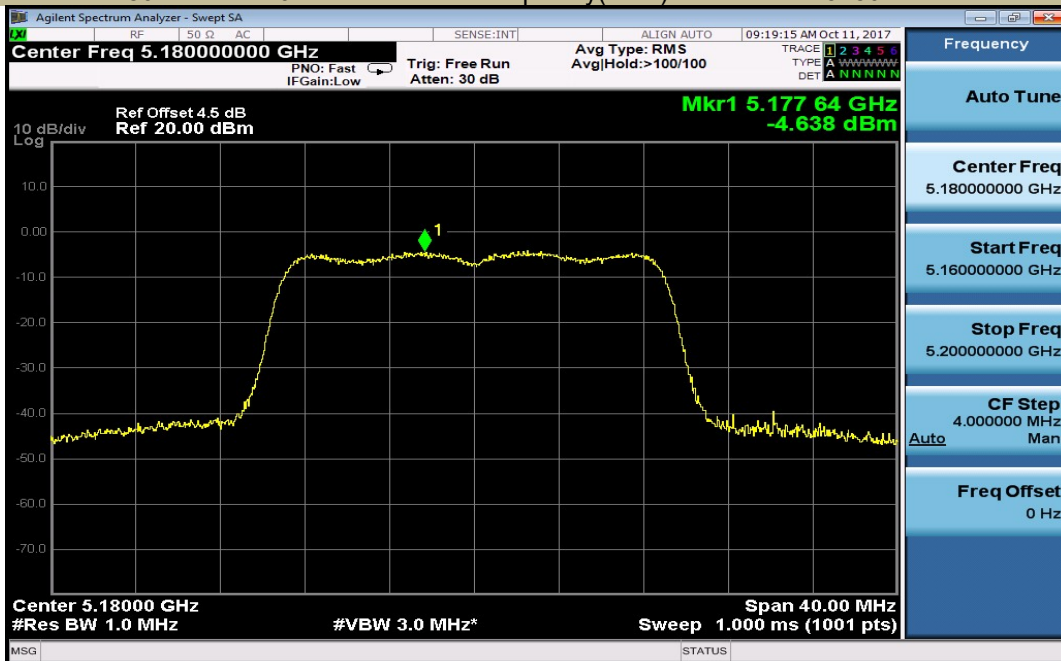
Emission Bandwidth&99% Occupied Bandwidth UNII Band I
Test Model 802.11a Frequency(MHz) 5200



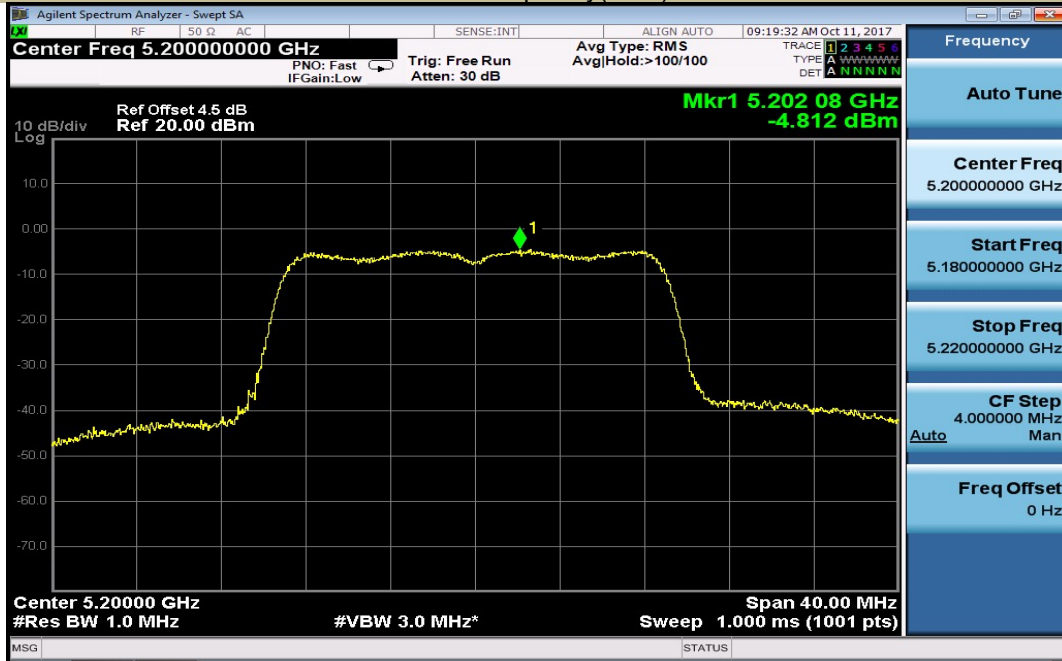
Emission Bandwidth&99% Occupied Bandwidth UNII Band I
Test Model 802.11a Frequency(MHz) 5240



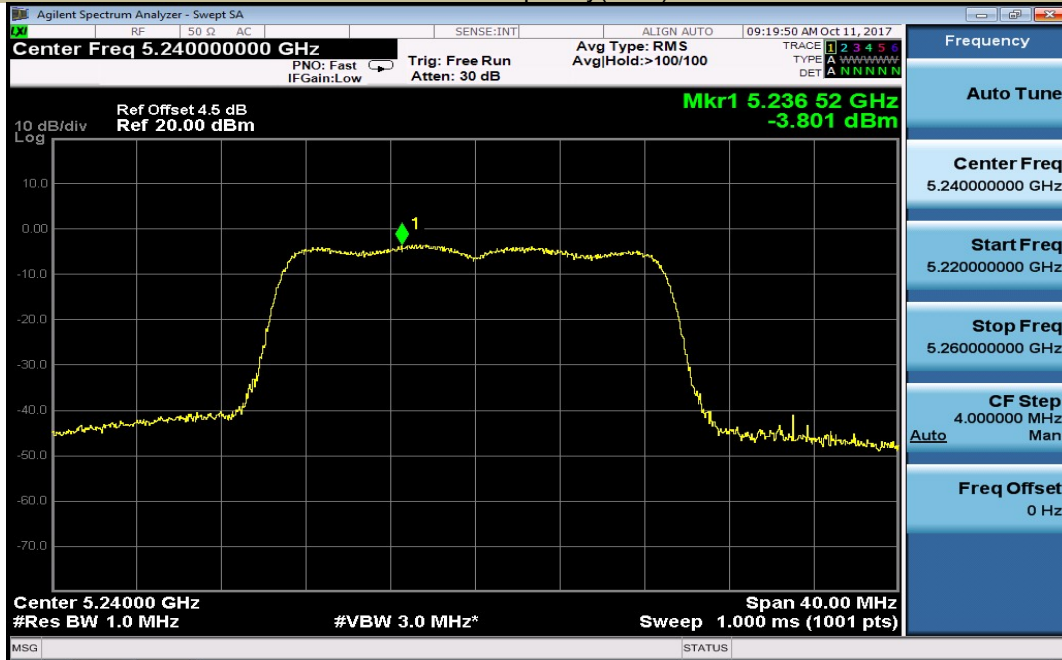
Emission Bandwidth&99% Occupied Bandwidth UNII Band I
Test Model 802.11n-HT20 Frequency(MHz) 5180



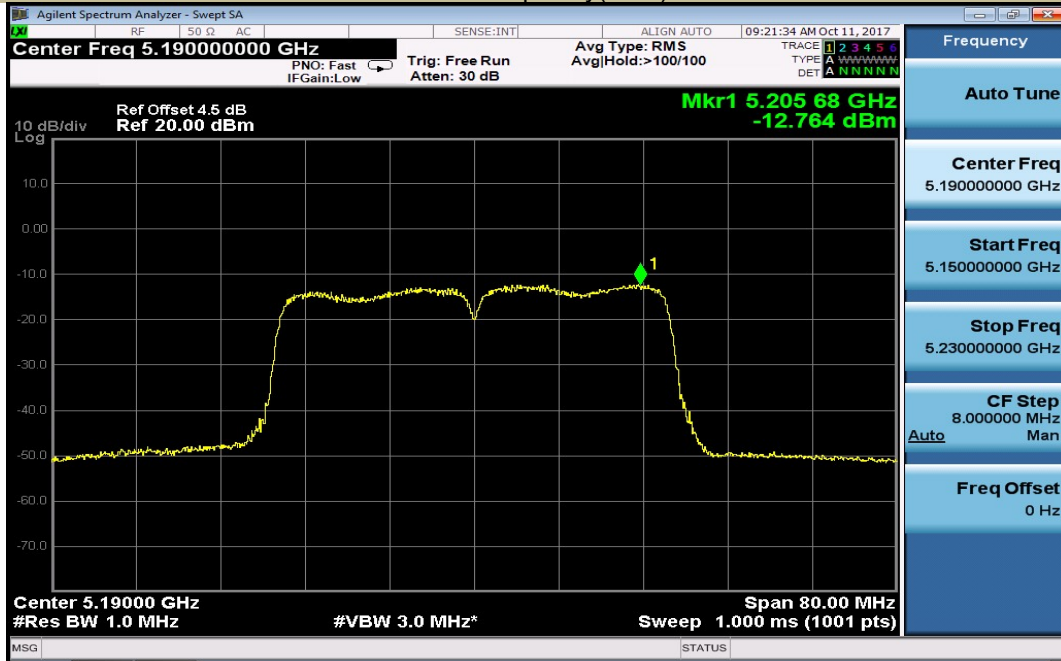
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 Test Model 802.11n-HT20 Frequency(MHz) 5200



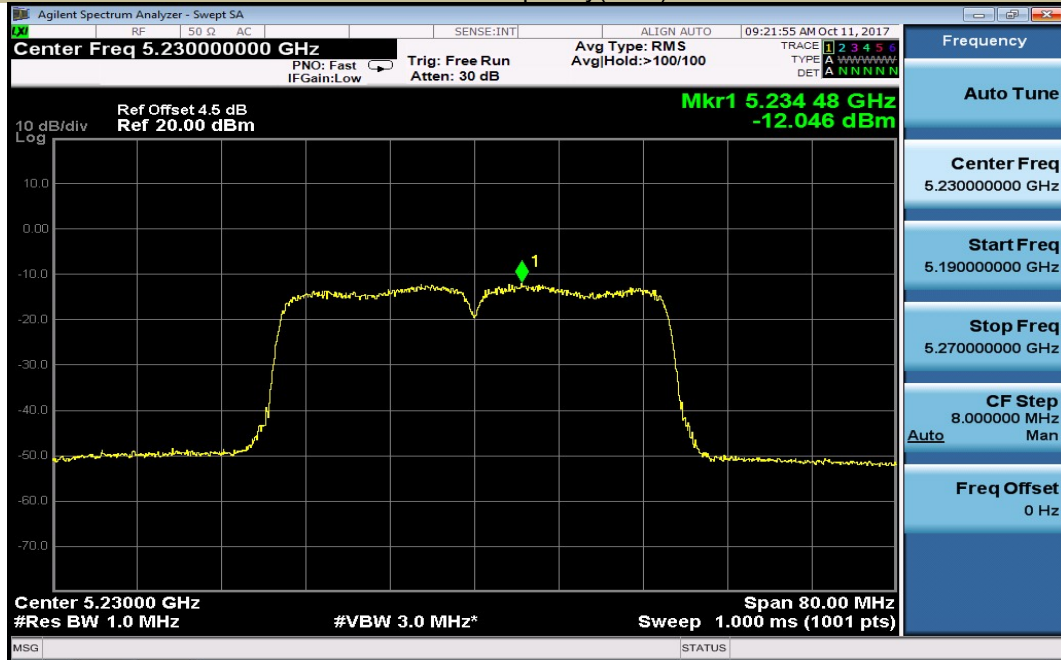
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 Test Model 802.11n-HT20 Frequency(MHz) 5240



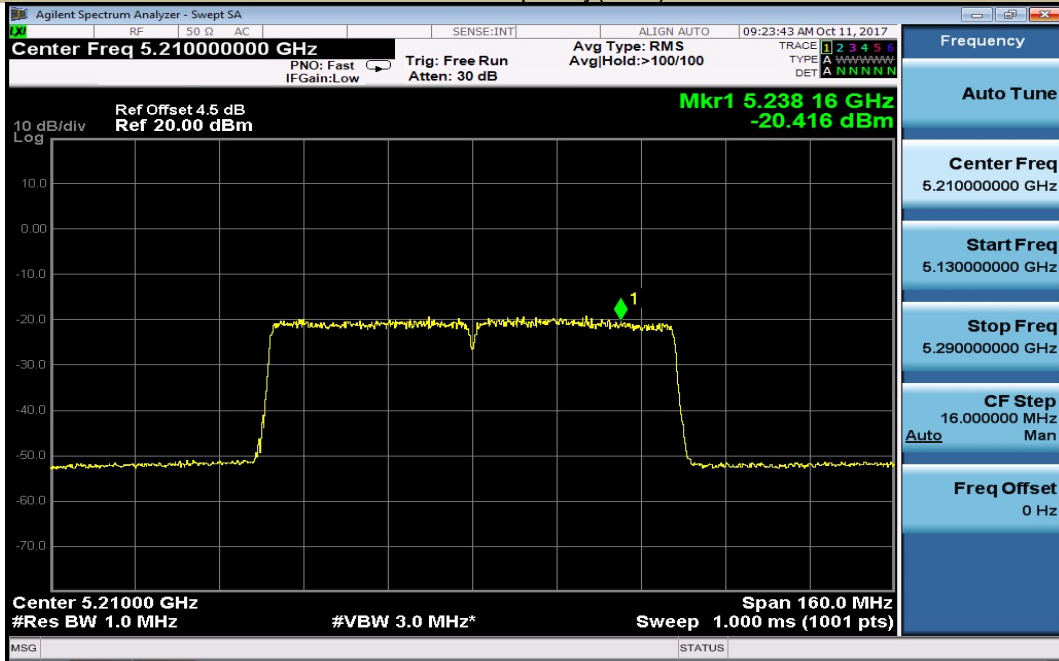
Emission Bandwidth&99% Occupied Bandwidth UNII Band I
 Test Model 802.11n-HT40 Frequency(MHz) 5190



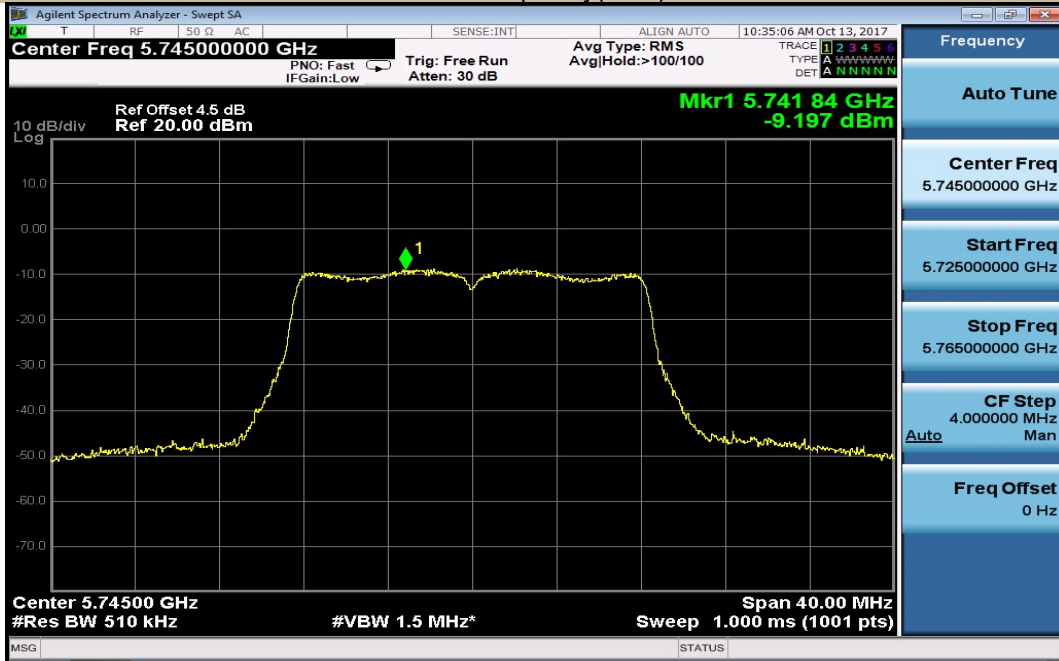
Emission Bandwidth&99% Occupied Bandwidth UNII Band I
 Test Model 802.11n-HT40 Frequency(MHz) 5230



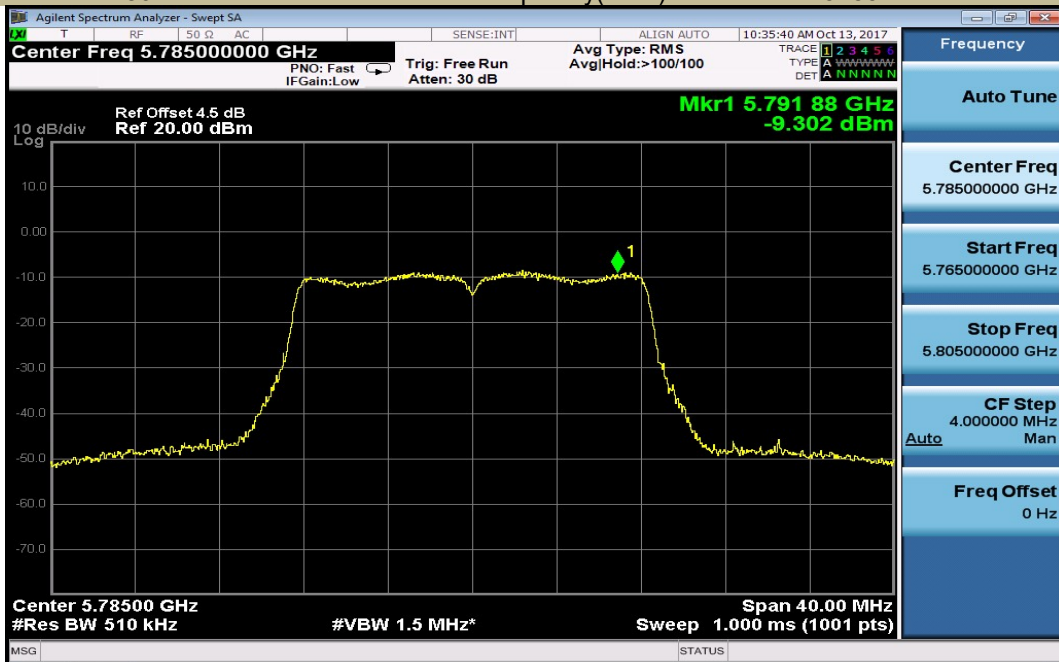
Emission Bandwidth & 99% Occupied Bandwidth UNII Band I
 Test Model 802.11ac 80 Frequency(MHz) 5210



Emission Bandwidth&99% Occupied Bandwidth UNII Band III
 Test Model 802.11a Frequency(MHz) 5745



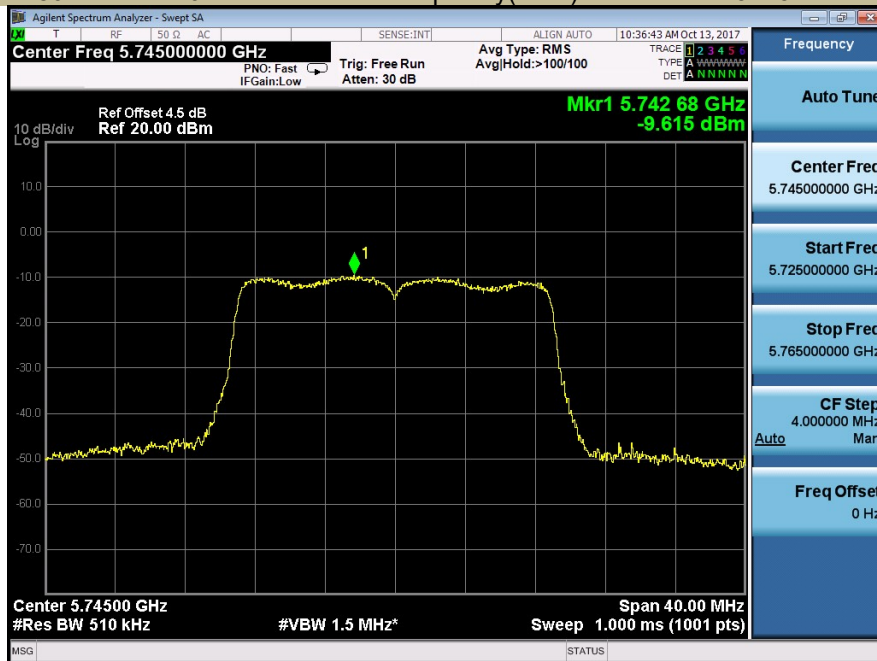
Emission Bandwidth&99% Occupied Bandwidth UNII Band III
 Test Model 802.11a Frequency(MHz) 5785



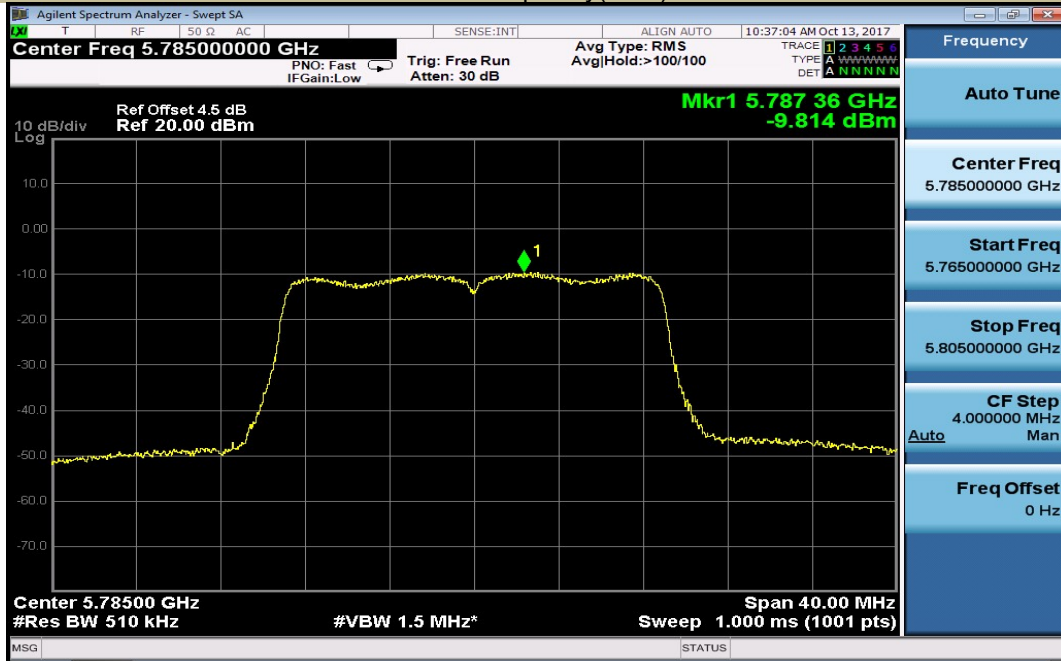
Emission Bandwidth&99% Occupied Bandwidth UNII Band III
 Test Model 802.11a Frequency(MHz) 5825



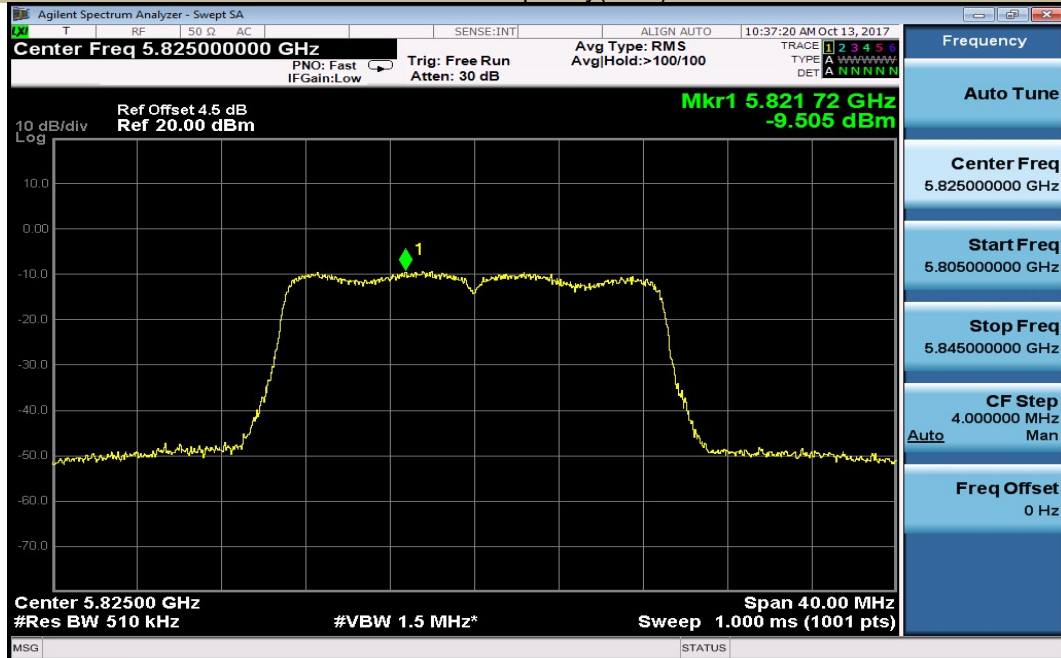
Emission Bandwidth&99% Occupied Bandwidth UNII Band III
 Test Model 802.11n-HT20 Frequency(MHz) 5745



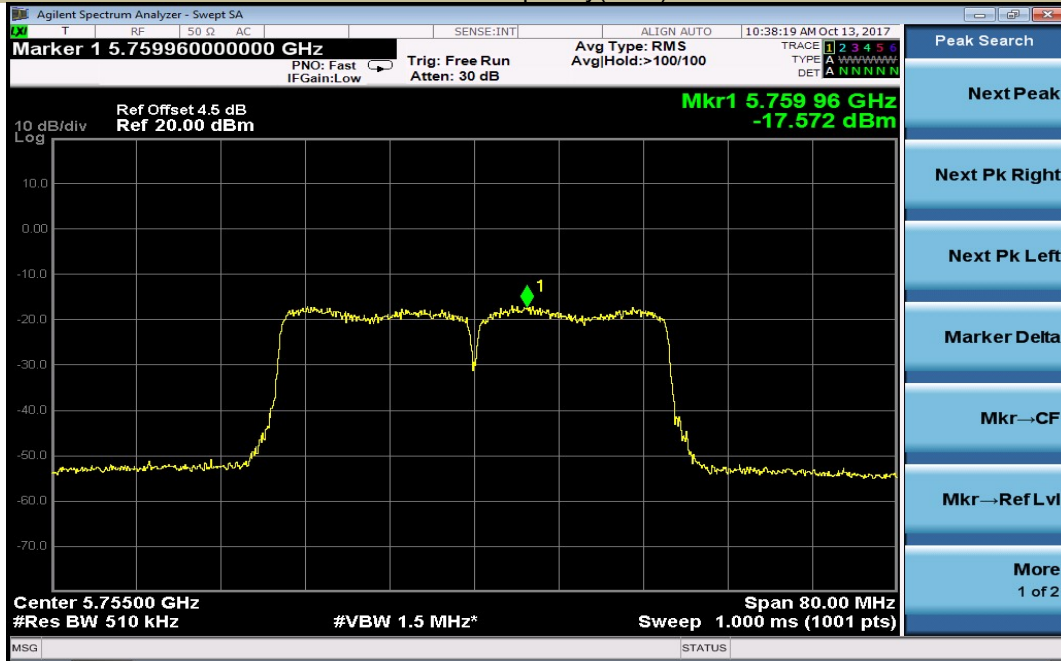
Emission Bandwidth&99% Occupied Bandwidth UNII Band III
Test Model 802.11n-HT20 Frequency(MHz) 5785



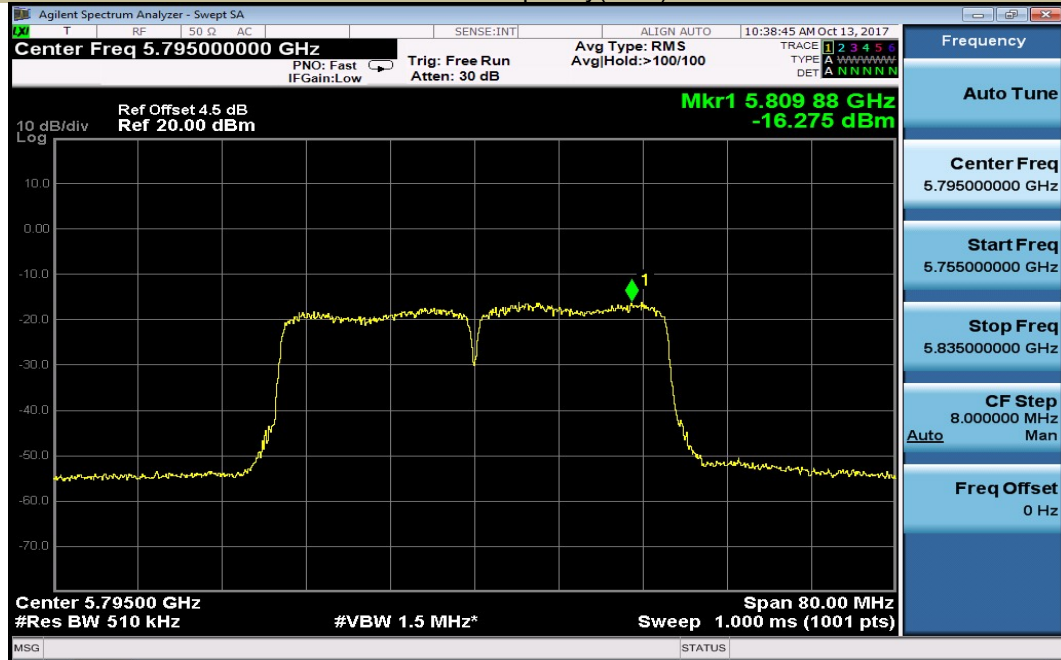
Emission Bandwidth&99% Occupied Bandwidth UNII Band III
Test Model 802.11n-HT20 Frequency(MHz) 5825



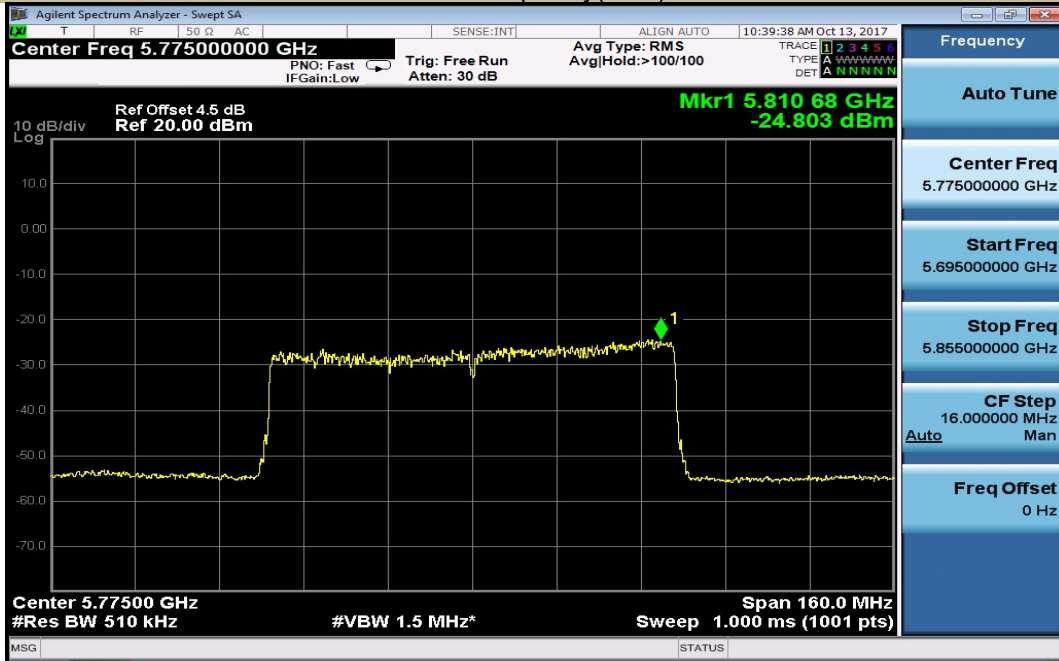
Emission Bandwidth&99% Occupied Bandwidth UNII Band III
Test Model 802.11n-HT40 Frequency(MHz) 5755



Emission Bandwidth&99% Occupied Bandwidth UNII Band III
Test Model 802.11n-HT40 Frequency(MHz) 5795



Emission Bandwidth & 99% Occupied Bandwidth UNII Band III
 Test Model 802.11ac 80 Frequency(MHz) 5775



8.4 FREQUENCY STABILITY

8.4.1 Applicable Standard

According to FCC Part 15.407(g)
ANSI C63.10 Section 6.8

8.4.2 Conformance Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

8.4.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.4.4 Test Procedure

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 10 kHz.

Set the video bandwidth (VBW) =30 kHz.

Set Span= Entire absence of modulation emissions bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.

Beginning at each temperature level specified in user manual , the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater. During each test, the ambient temperature shall not be allowed to rise more than 10° centigrade above the respective beginning ambient temperature level

Measure and record the results in the test report.

8.4.5 Test Results

802.11a 5180

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5179.9827	-17.30	Pass
	-10	5179.9891	-10.90	Pass
	0	5179.9881	-11.90	Pass
	10	5179.9841	-15.90	Pass
	20	5179.9800	-20.00	Pass
	30	5179.9876	-12.40	Pass
	40	5179.9868	-13.20	Pass
50	5179.9857	-14.30	Pass	
85% Vnom	20	5179.9890	-11.00	Pass
115% Vnom	20	5179.9802	-19.80	Pass

5200

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5199.9832	-16.80	Pass
	-10	5199.9884	-11.60	Pass
	0	5199.9897	-10.30	Pass
	10	5199.9884	-11.60	Pass
	20	5199.9887	-11.30	Pass
	30	5199.9804	-19.60	Pass
	40	5199.9829	-17.10	Pass
50	5199.9816	-18.40	Pass	
85% Vnom	20	5199.9803	-19.70	Pass
115% Vnom	20	5199.9893	-10.70	Pass

5240

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5239.9898	-10.20	Pass
	-10	5239.9816	-18.40	Pass
	0	5239.9801	-19.90	Pass
	10	5239.9865	-13.50	Pass
	20	5239.9880	-12.00	Pass
	30	5239.9805	-19.50	Pass
	40	5239.9800	-20.00	Pass
50	5239.9850	-15.00	Pass	
85% Vnom	20	5239.9844	-15.60	Pass
115% Vnom	20	5239.9862	-13.80	Pass

5745

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5744.9864	-13.60	Pass
	-10	5744.9889	-11.10	Pass
	0	5744.9878	-12.20	Pass
	10	5744.9873	-12.70	Pass
	20	5744.9880	-12.00	Pass
	30	5744.9899	-10.10	Pass
	40	5744.9866	-13.40	Pass
	50	5744.9822	-17.80	Pass
85% Vnom	20	5744.9825	-17.50	Pass
115% Vnom	20	5744.9800	-20.00	Pass

5785

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5784.9807	-19.30	Pass
	-10	5784.9869	-13.10	Pass
	0	5784.9888	-11.20	Pass
	10	5784.9854	-14.60	Pass
	20	5784.9912	-8.80	Pass
	30	5784.9934	-6.60	Pass
	40	5784.9811	-18.90	Pass
	50	5784.9882	-11.80	Pass
85% Vnom	20	5784.9870	-13.00	Pass
115% Vnom	20	5784.9863	-13.70	Pass

5825

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5824.9752	-24.80	Pass
	-10	5824.9813	-18.70	Pass
	0	5824.9793	-20.70	Pass
	10	5824.9793	-20.70	Pass
	20	5824.9738	-26.20	Pass
	30	5824.9886	-11.40	Pass
	40	5824.9648	-35.20	Pass
	50	5824.9842	-15.80	Pass
85% Vnom	20	5824.9979	-2.10	Pass
115% Vnom	20	5824.9973	-2.70	Pass

5190

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5189.9697	-30.30	Pass
	-10	5189.9640	-36.00	Pass
	0	5189.9551	-44.90	Pass
	10	5189.9819	-18.10	Pass
	20	5189.9801	-19.90	Pass
	30	5189.9861	-13.90	Pass
	40	5189.9825	-17.50	Pass
	50	5189.9867	-13.30	Pass
85% Vnom	20	5189.9869	-13.10	Pass
115% Vnom	20	5189.9813	-18.70	Pass

5230

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5229.9859	-14.10	Pass
	-10	5229.9888	-11.20	Pass
	0	5229.9810	-19.00	Pass
	10	5229.9875	-12.50	Pass
	20	5229.9808	-19.20	Pass
	30	5229.9863	-13.70	Pass
	40	5229.9836	-16.40	Pass
	50	5229.9856	-14.40	Pass
85% Vnom	20	5229.9832	-16.80	Pass
115% Vnom	20	5229.9859	-14.10	Pass

5755

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5754.9843	-15.70	Pass
	-10	5754.9823	-17.70	Pass
	0	5754.9807	-19.30	Pass
	10	5754.9871	-12.90	Pass
	20	5754.9891	-10.90	Pass
	30	5754.9896	-10.40	Pass
	40	5754.9820	-18.00	Pass
	50	5754.9887	-11.30	Pass
85% Vnom	20	5754.9866	-13.40	Pass
115% Vnom	20	5754.9898	-10.20	Pass

5795

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5794.9886	-11.40	Pass
	-10	5794.9804	-19.60	Pass
	0	5794.9883	-11.70	Pass
	10	5794.9825	-17.50	Pass
	20	5794.9884	-11.60	Pass
	30	5794.9873	-12.70	Pass
	40	5794.9828	-17.20	Pass
	50	5794.9879	-12.10	Pass
85% Vnom	20	5794.9858	-14.20	Pass
115% Vnom	20	5794.9892	-10.80	Pass

5210

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5209.9867	-13.30	Pass
	-10	5209.9894	-10.60	Pass
	0	5209.9882	-11.80	Pass
	10	5209.9815	-18.50	Pass
	20	5209.9887	-11.30	Pass
	30	5209.9861	-13.90	Pass
	40	5209.9897	-10.30	Pass
	50	5209.9869	-13.10	Pass
85% Vnom	20	5209.9865	-13.50	Pass
115% Vnom	20	5209.9835	-16.50	Pass

5775

Voltage(V)	Temp(°C)	Test Frequency (MHz)	Max. Deviation (KHz)	Verdict
Vnom	-20	5774.9838	-16.20	Pass
	-10	5774.9855	-14.50	Pass
	0	5774.9830	-17.00	Pass
	10	5774.9800	-20.00	Pass
	20	5774.9810	-19.00	Pass
	30	5774.9888	-11.20	Pass
	40	5774.9883	-11.70	Pass
	50	5774.9881	-11.90	Pass
85% Vnom	20	5774.9850	-15.00	Pass
115% Vnom	20	5774.9899	-10.10	Pass

8.5 UNDESIRABLE RADIATED SPURIOUS EMISSION

8.5.1 Applicable Standard

According to FCC Part 15.407 (b)

According to 789033 D02 Section II(G)

8.5.2 Conformance Limit

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: 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.

The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	2400/F(KHz)	20 log (uV/m)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

The provisions of §15.205 apply to intentional radiators operating under this section, 15.205 Restricted bands of operation

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

- Remark:
1. Emission level in dBuV/m=20 log (uV/m)
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

8.5.3 Test Configuration

Test according to clause 6.2 radio frequency test setup

8.5.4 Test Procedure

■ Unwanted Emissions Measurements below 1000 MHz

Compliance shall be demonstrated using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.

The EUT was placed on a turn table which is 0.8m above ground plane.

And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

Repeat above procedures until all frequency measured was complete.

We use software control the EUT, Let EUT hopping on and transmit with highest power, All the modes have been tested and the worst result was reported.

Use the following spectrum analyzer settings:

Set RBW=120kHz for $f < 1$ GHz(30MHz to 1GHz), 200Hz for $f < 150$ KHz(9KHz to 150KHz), 9KHz for < 30 MHz (150KHz to 30KHz).

Set the VBW > RBW.

Detector = Peak.

Trace mode = max hold.

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

Repeat above procedures until all frequency measured was complete.

■ Unwanted Maximum peak Emissions Measurements above 1000 MHz

Maximum emission levels are measured by setting the analyzer as follows:

RBW = 1 MHz.

VBW \geq 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. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

■ Unwanted Average Emissions Measurements above 1000 MHz

Method VB (Averaging using reduced video bandwidth): Alternative method.

RBW = 1 MHz.

Video bandwidth. • If the EUT is configured to transmit with duty cycle \geq 98 percent, set VBW \leq RBW/100 (i.e., 10 kHz) but not less than 10 Hz.

• If the EUT duty cycle is $<$ 98 percent, set VBW \geq $1/T$, where T is defined in section II.B.1.a).

Video bandwidth mode or display mode • The instrument shall be set to ensure that video filtering is applied in the power domain. Typically, this requires setting the detector mode to RMS and setting the Average-VBW Type to Power (RMS).

• As an alternative, the analyzer may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some analyzers require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display 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. For example, use at least 200 traces if the duty cycle is 25 percent. (If a specific emission is demonstrated to be continuous—i.e., 100 percent duty cycle—rather than turning on and off with the transmit cycle, at least 50 traces shall be averaged.)

■ Band edge measurements.

Unwanted band-edge emissions may be measured using either of the special band-edge measurement techniques (the marker-delta or integration methods) described below. Note that the marker-delta method is primarily a radiated measurement technique that requires the 99% occupied bandwidth edge to be within 2 MHz of the authorized band edge, whereas the integration method can be used in either a radiated or conducted measurement without any special requirement with regards to the displacement of the unwanted emission(s) relative to the authorized bandwidth.

Marker-Delta Method.

The marker-delta method, as described in ANSI C63.10, can be used to perform measurements of the radiated unwanted emissions level of emissions provided that the 99% occupied bandwidth of the fundamental is within 2 MHz of the authorized band-edge.

8.5.5 Test Results

■ For Undesirable radiated Spurious Emission in UNII Band I

The voltage 120V & 240V and the modes 802.11a/n/ac has been tested and the worst result recorded as below:

- Undesirable radiated Spurious Emission Above 1GHz (1GHz to 40GHz)

Test mode:		802.11a		Frequency(MHz):		5180	
Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)		
7676.16	V	64.99	-30.24	-27	-3.24		
10360.00	V	57.29	-37.94	-27	-10.94		
15540.00	V	54.44	-40.79	-27	-13.79		
7676.16	H	63.99	-31.24	-27	-4.24		
10360.00	H	60.16	-35.07	-27	-8.07		
15540.00	H	51.75	-43.48	-27	-16.48		

Test mode:		802.11a		Frequency(MHz):		5200	
Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)		
7656.16	V	61.56	-33.67	-27	-6.67		
10400.00	V	59.02	-36.21	-27	-9.21		
15600.00	V	53.14	-42.09	-27	-15.09		
7656.16	H	63.21	-32.02	-27	-5.02		
10400.00	H	57.24	-37.99	-27	-10.99		
15600.00	H	54.52	-40.71	-27	-13.71		

Test mode:		802.11a		Frequency(MHz):		5240	
Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)		
7661.04	V	63.64	-31.59	-27	-4.59		
10480.00	V	61.42	-33.81	-27	-6.81		
15720.00	V	52.58	-42.65	-27	-15.65		
7661.04	H	61.81	-33.42	-27	-6.42		
10480.00	H	57.87	-37.36	-27	-10.36		
15720.00	H	52.37	-42.86	-27	-15.86		

Test mode:		802.11n20		Frequency(MHz):		5180	
Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)		
7625.68	V	61.65	-33.58	-27	-6.58		
12720.56	V	55.85	-39.38	-27	-12.38		
14063.33	V	54.98	-40.25	-27	-13.25		
7625.68	H	58.02	-37.21	-27	-10.21		
12720.56	H	59.58	-35.65	-27	-8.65		
14063.33	H	50.13	-45.1	-27	-18.1		

Test mode:		802.11n20		Frequency(MHz):		5200	
Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)		
7782.69	V	64.26	-30.97	-27	-3.97		
12899.03	V	53.96	-41.27	-27	-14.27		
13856.77	V	54.09	-41.14	-27	-14.14		
7782.69	H	63.7	-31.53	-27	-4.53		
12899.03	H	60.72	-34.51	-27	-7.51		
13856.77	H	54.56	-40.67	-27	-13.67		

Test mode: 802.11n20 Frequency(MHz): 5240

Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)
7809.50	V	64.19	-31.04	-27	-4.04
12738.28	V	54.92	-40.31	-27	-13.31
13839.19	V	51.55	-43.68	-27	-16.68
7809.50	H	64.93	-30.3	-27	-3.30
12738.28	H	55.19	-40.04	-27	-13.04
13839.19	H	54.53	-40.7	-27	-13.7

Test mode: 802.11n40 Frequency(MHz): 5190

Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)
7709.80	V	62.24	-32.99	-27	-5.99
12971.66	V	60.45	-34.78	-27	-7.78
14151.44	V	56.52	-38.71	-27	-11.71
7709.80	H	59.31	-35.92	-27	-8.92
12971.66	H	60.57	-34.66	-27	-7.66
14151.44	H	57.62	-37.61	-27	-10.61

Test mode: 802.11n40 Frequency(MHz): 5230

Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)
7677.56	V	60.95	-34.28	-27	-7.28
12991.03	V	57.37	-37.86	-27	-10.86
14079.63	V	52.35	-42.88	-27	-15.88
7677.56	H	63.92	-31.31	-27	-4.31
12991.03	H	55.92	-39.31	-27	-12.31
14079.63	H	52.35	-42.88	-27	-15.88

Test mode: 802.11ac80 Frequency(MHz): 5210

Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)
7596.66	V	62.88	-32.35	-27	-5.35
12898.11	V	53.86	-41.37	-27	-14.37
13830.50	V	50.61	-44.62	-27	-17.62
7596.66	H	60.14	-35.09	-27	-8.09
12898.11	H	59.73	-35.5	-27	-8.5
13830.50	H	52.92	-42.31	-27	-15.31

- Note:** (1) All Readings are Peak Value (VBW=3MHz) and AV Value (VBW=10Hz).
 (2) Emission Level= Reading Level+Probe Factor +Cable Loss.
 (3)EIRP[dBm] = E[dBμV/m] + 20 log(d[meters]) - 104.77
 d is the measurement distance in 3 meters

- Undesirable radiated Undesirable radiated Spurious Emission in Band Edge

Test mode: 802.11a Frequency(MHz): 5180

Freq. (MHz)	Ant.Pol. H/V	Field Strength (RBW=100KHz) (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Verdict
5149.25	H	49.03	-46.20	-27	Pass
5140.70	V	46.14	-49.09	-27	Pass

Test mode: 802.11a Frequency(MHz): 5240

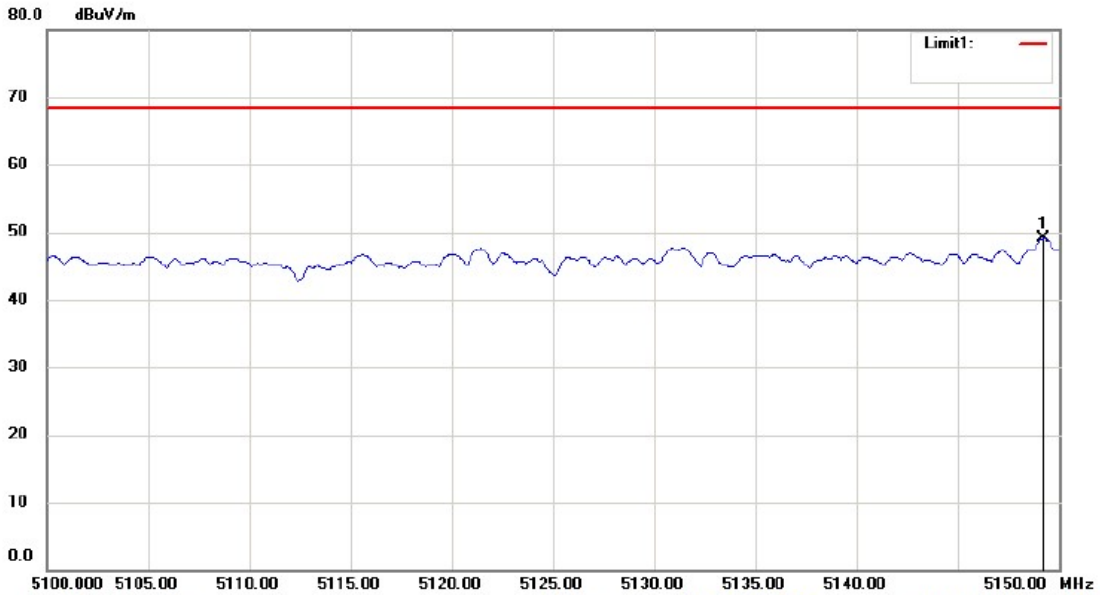
Freq. (MHz)	Ant.Pol. H/V	Field Strength (RBW=100KHz) (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Verdict
5351.55	V	47.44	-47.79	-27	Pass
5350.50	H	46.33	-48.90	-27	Pass

- Note:** (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).
 (2) Emission Level= Reading Level+Correct Factor +Cable Loss.
 (3) Correct Factor= Ant_F + Cab_L - Preamp
 (4) EIRP[dBm] = E[dBμV/m] + 20 log(d[meters]) - 104.77
 d is the measurement distance in 3 meters

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5100-5150MHz)

802.11a 802.11n(HT20) 802.11n(HT40)
 5180 5200 5240 Ant.Pol H

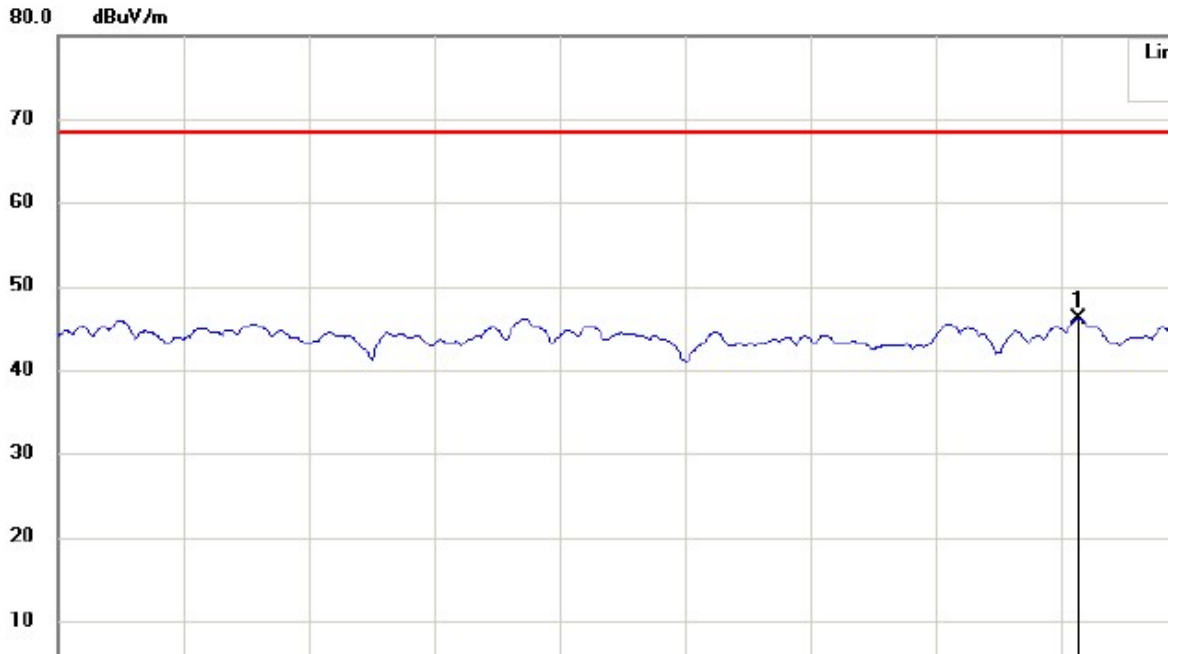


Site 3m Chamber 3# Polarization: **Horizontal** Temperature: 22 C
 Limit: (RE)FCC PART 15C (Bandedge) Peak Power: DC 5V Humidity: 55 %

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5100-5150MHz)

802.11a 802.11n(HT20) 802.11n(HT40)
 5180 5200 5240 Ant.Pol V

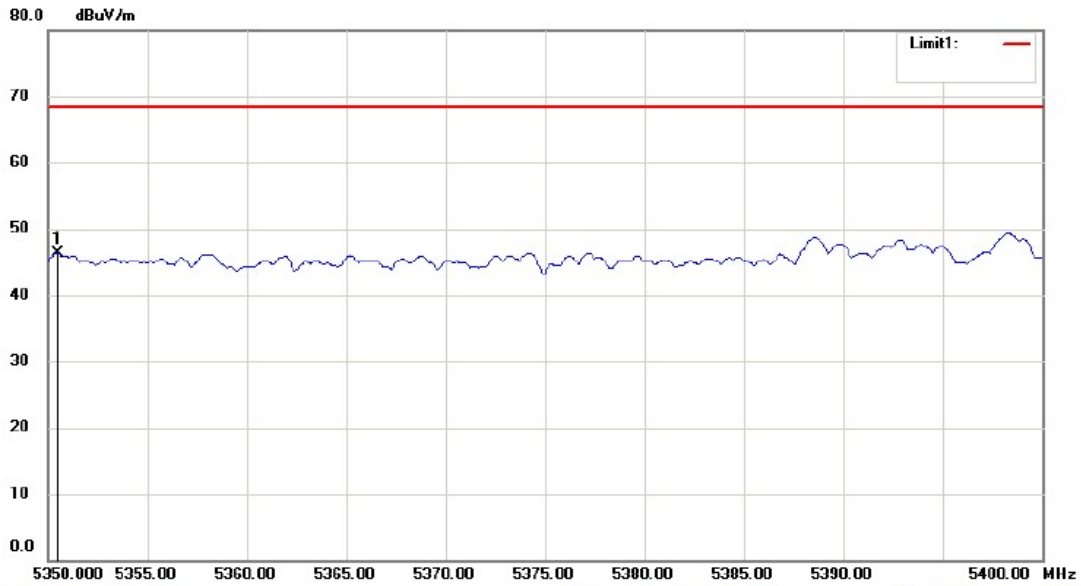


UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5350-5400MHz)

802.11a 802.11n(HT20) 802.11n(HT40)

5180 5200 5240 Ant.Pol H



Site 3m Chamber 3# Polarization: **Horizontal** Temperature: 22 C

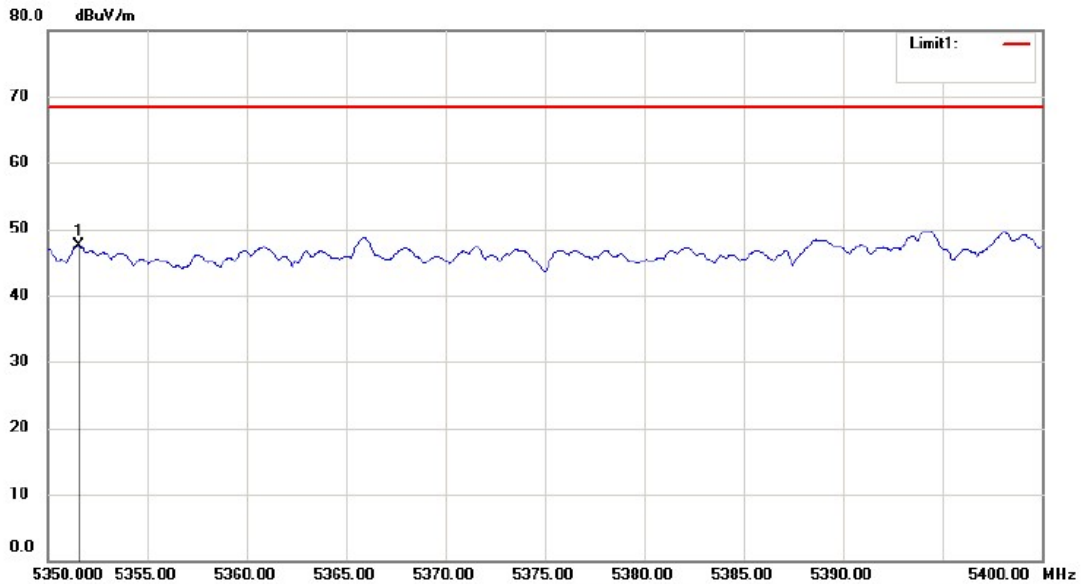
Limit: (RE)FCC PART 15C (Bandedge) Peak Power: DC 5V Humidity: 55 %

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5350-5400MHz)

802.11a 802.11n(HT20) 802.11n(HT40)

5180 5200 5240 Ant.Pol V



Site 3m Chamber 3# Polarization: **Vertical** Temperature: 22 C

Limit: (RE)FCC PART 15C (Bandedge) Peak Power: DC 5V Humidity: 55 %

- Undesirable radiated Undesirable radiated Spurious Emission in Band Edge

Test mode: 802.11n20 Frequency(MHz): 5180

Freq. (MHz)	Ant.Pol. H/V	Field Strength (RBW=100KHz) (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Verdict
5150.00	H	62.07	-33.16	-27	Pass
5150.00	V	62.02	-33.21	-27	Pass

Test mode: 802.11n20 Frequency(MHz): 5240

Freq. (MHz)	Ant.Pol. H/V	Field Strength (RBW=100KHz) (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Verdict
5350.10	V	47.83	-47.40	-27	Pass
5351.55	H	46.55	-48.68	-27	Pass

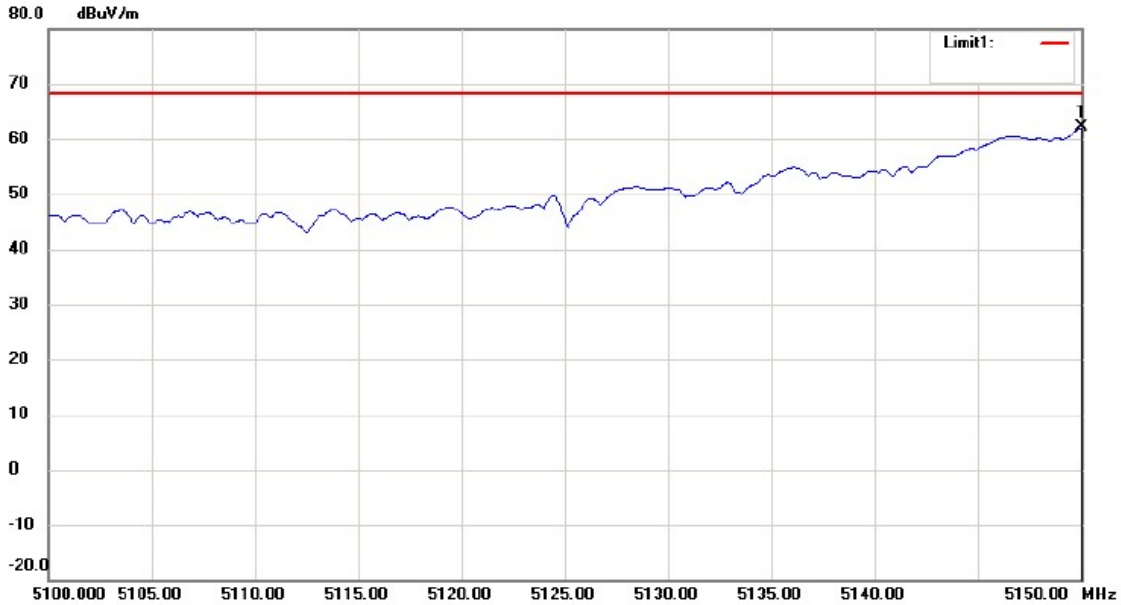
- Note:** (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).
 (2) Emission Level= Reading Level+Correct Factor +Cable Loss.
 (3) Correct Factor= Ant_F + Cab_L - Preamp
 (4) EIRP[dBm] = E[dBμV/m] + 20 log(d[meters]) - 104.77
 d is the measurement distance in 3 meters

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5100-5150MHz)

802.11a 802.11n(HT20) 802.11n(HT40)

5180 5200 5240 Ant.Pol H



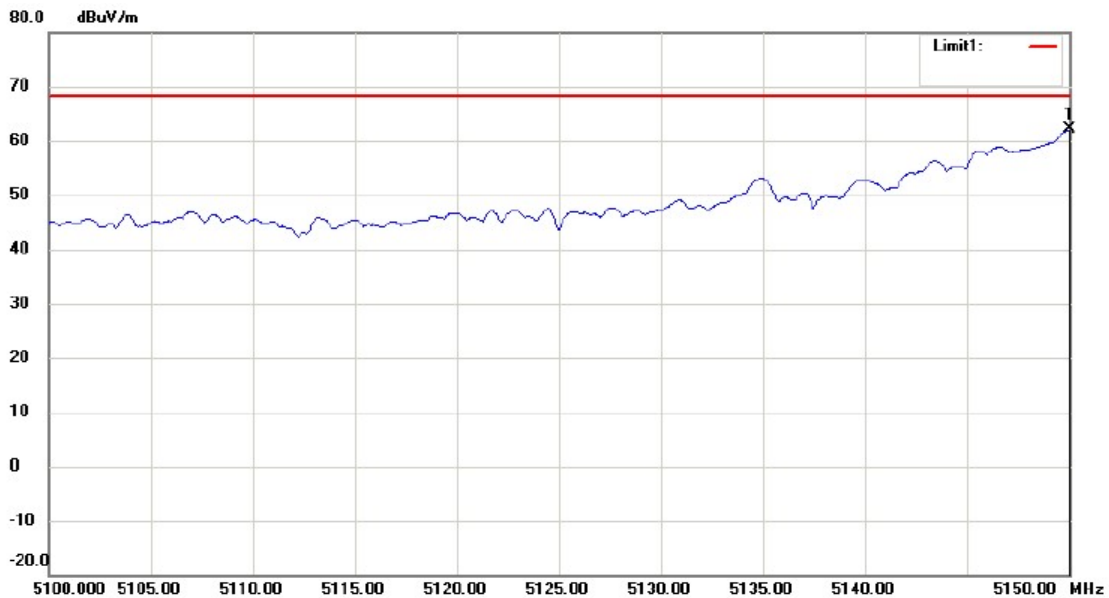
Site 3m Chamber 3# Polarization: **Horizontal** Temperature: 22 C
 Limit: (RE)FCC PART 15C (Bandedge) Peak Power: DC 5V Humidity: 55 %

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5100-5150MHz)

802.11a 802.11n(HT20) 802.11n(HT40)

5180 5200 5240 Ant.Pol V



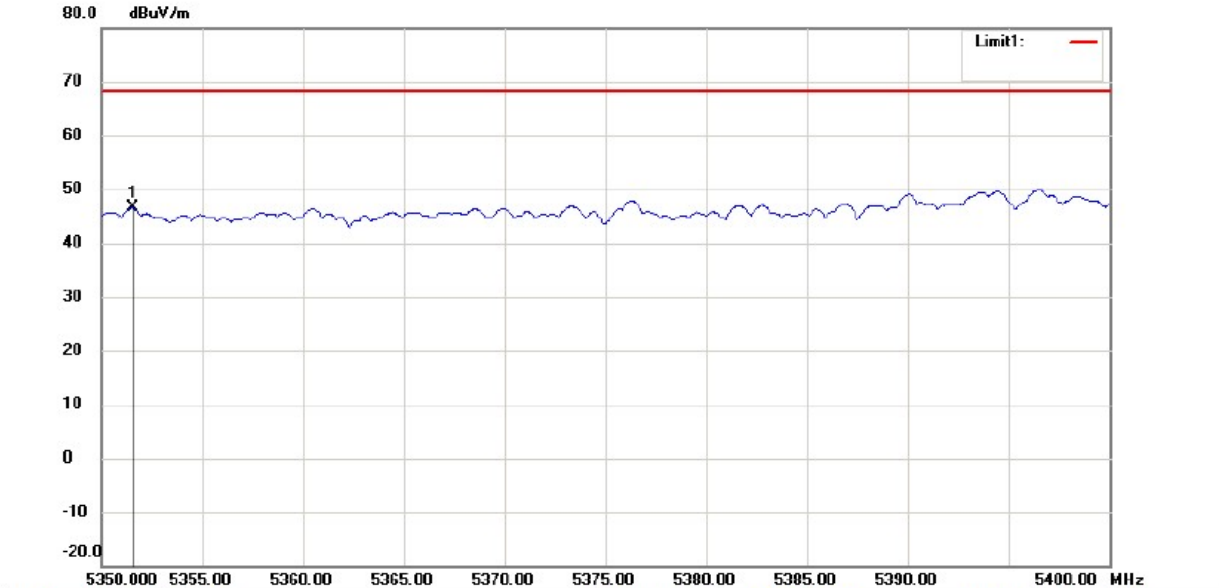
Site 3m Chamber 3# Polarization: **Vertical** Temperature: 22 C
 Limit: (RE)FCC PART 15C (Bandedge) Peak Power: DC 5V Humidity: 55 %

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5350-5400MHz)

802.11a 802.11n(HT20) 802.11n(HT40)

5180 5200 5240 Ant.Pol H



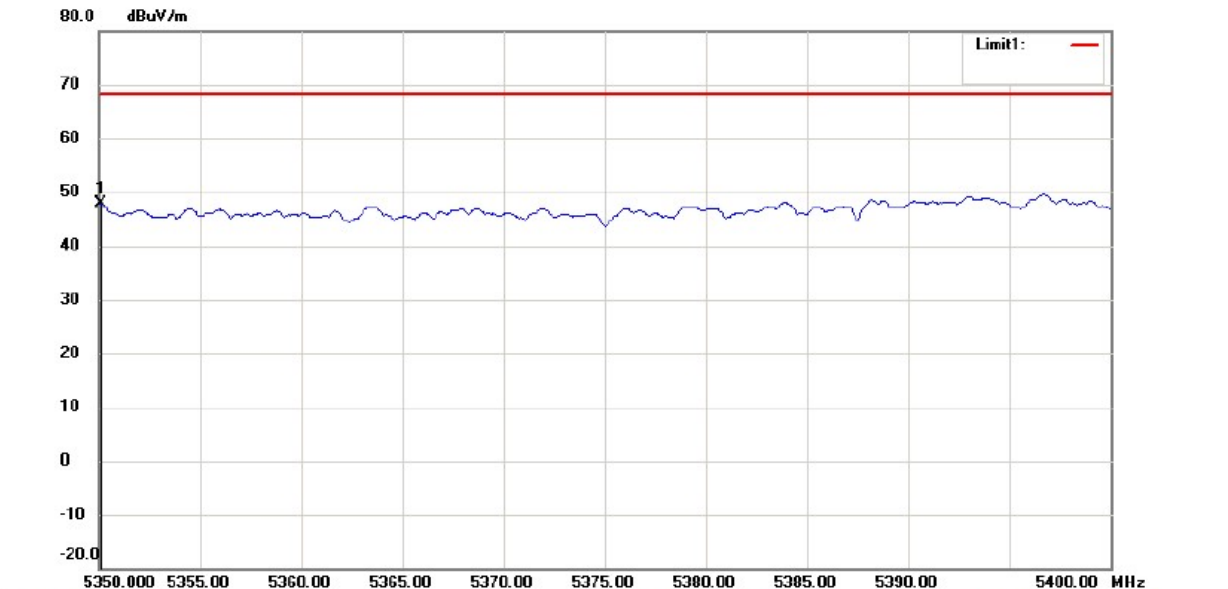
Site 3m Chamber 3# Polarization: **Horizontal** Temperature: 22 C
Limit: (RE)FCC PART 15C (Bandedge) Peak Power: DC 5V Humidity: 55 %

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5350-5400MHz)

802.11a 802.11n(HT20) 802.11n(HT40)

5180 5200 5240 Ant.Pol V



Site 3m Chamber 3# Polarization: **Vertical** Temperature: 22 C
Limit: (RE)FCC PART 15C (Bandedge) Peak Power: DC 5V Humidity: 55 %

- Undesirable radiated Undesirable radiated Spurious Emission in Band Edge

Test mode: 802.11n40 Frequency(MHz): 5190

Freq. (MHz)	Ant.Pol. H/V	Field Strength (RBW=100KHz) (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Verdict
5148.10	H	57.73	-37.50	-27	Pass
5144.55	V	52.95	-42.28	-27	Pass

Test mode: 802.11n40 Frequency(MHz): 5230

Freq. (MHz)	Ant.Pol. H/V	Field Strength (RBW=100KHz) (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Verdict
5356.50	V	47.56	-47.67	-27	Pass
5360.85	H	47.46	-47.77	-27	Pass

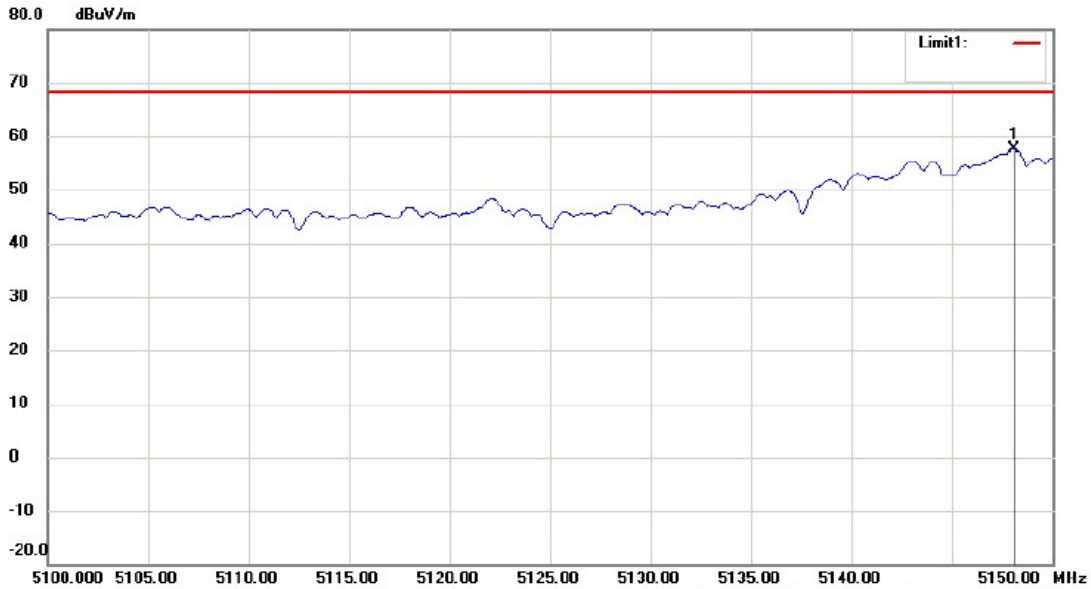
- Note:** (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).
 (2) Emission Level= Reading Level+Correct Factor +Cable Loss.
 (3) Correct Factor= Ant_F + Cab_L - Preamp
 (4) EIRP[dBm] = E[dBuV/m] + 20 log(d[meters]) - 104.77
 d is the measurement distance in 3 meters

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5100-5150MHz)

802.11a 802.11n(HT20) 802.11n(HT40)

5190 5200 5240 Ant.Pol H



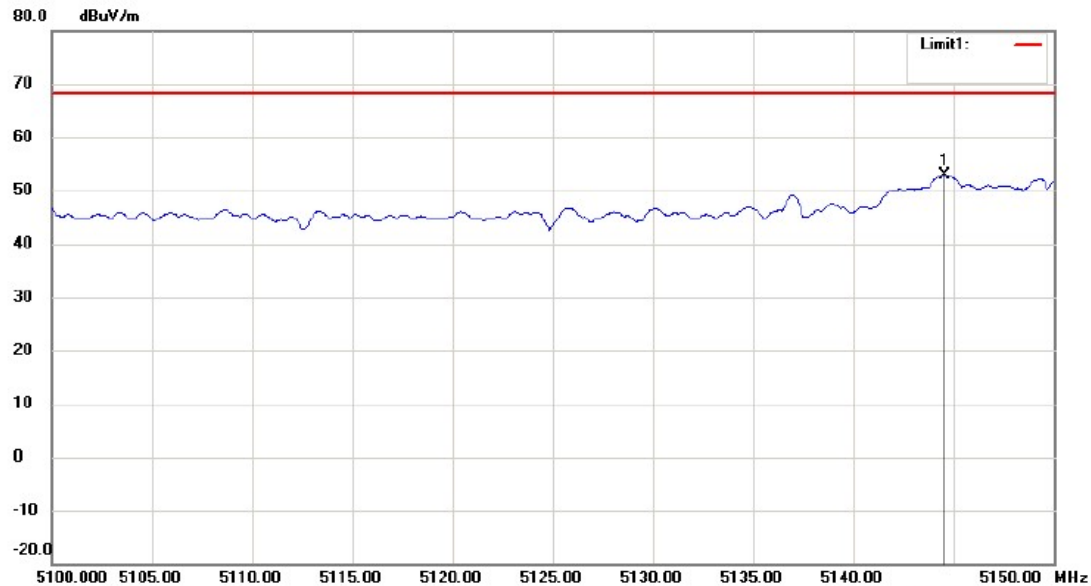
Site 3m Chamber 3# Polarization: **Horizontal** Temperature: 22 C
 Limit: (RE)FCC PART 15C (Bandedge) Peak Power: DC 5V Humidity: 55 %

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5100-5150MHz)

802.11a 802.11n(HT20) 802.11n(HT40)

5190 5200 5240 Ant.Pol V



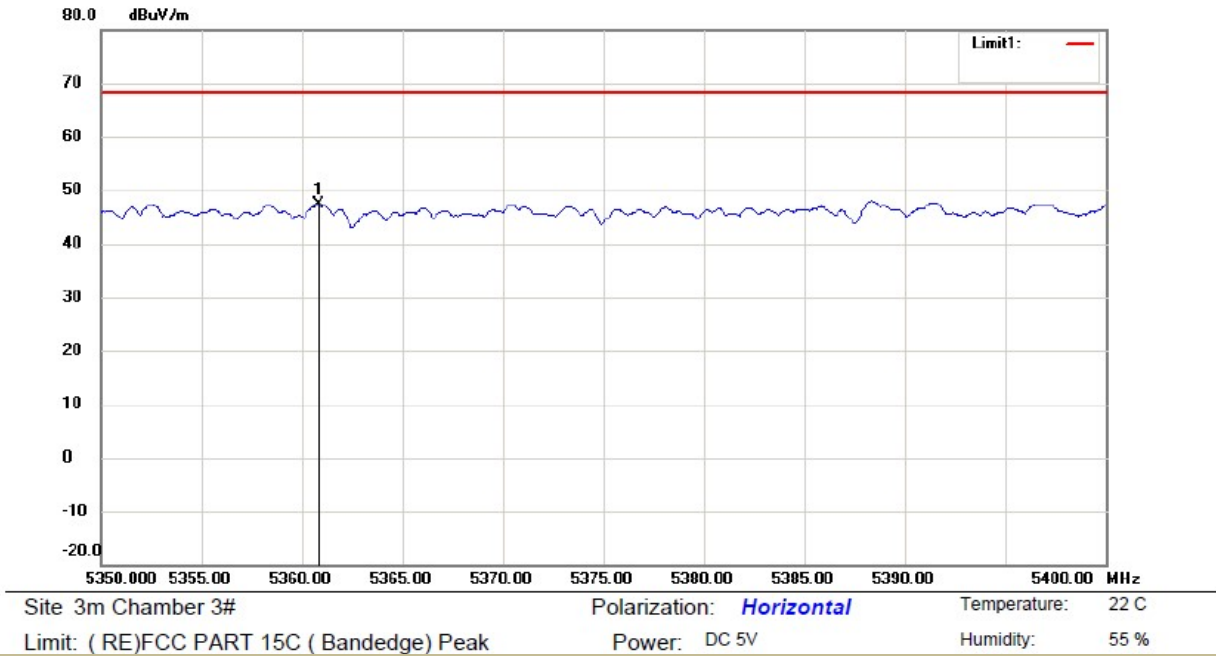
Site 3m Chamber 3# Polarization: **Vertical** Temperature: 22 C
 Limit: (RE)FCC PART 15C (Bandedge) Peak Power: DC 5V Humidity: 55 %

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5350-5400MHz)

802.11a 802.11n(HT20) 802.11n(HT40)

5180 5200 5230 Ant.Pol H

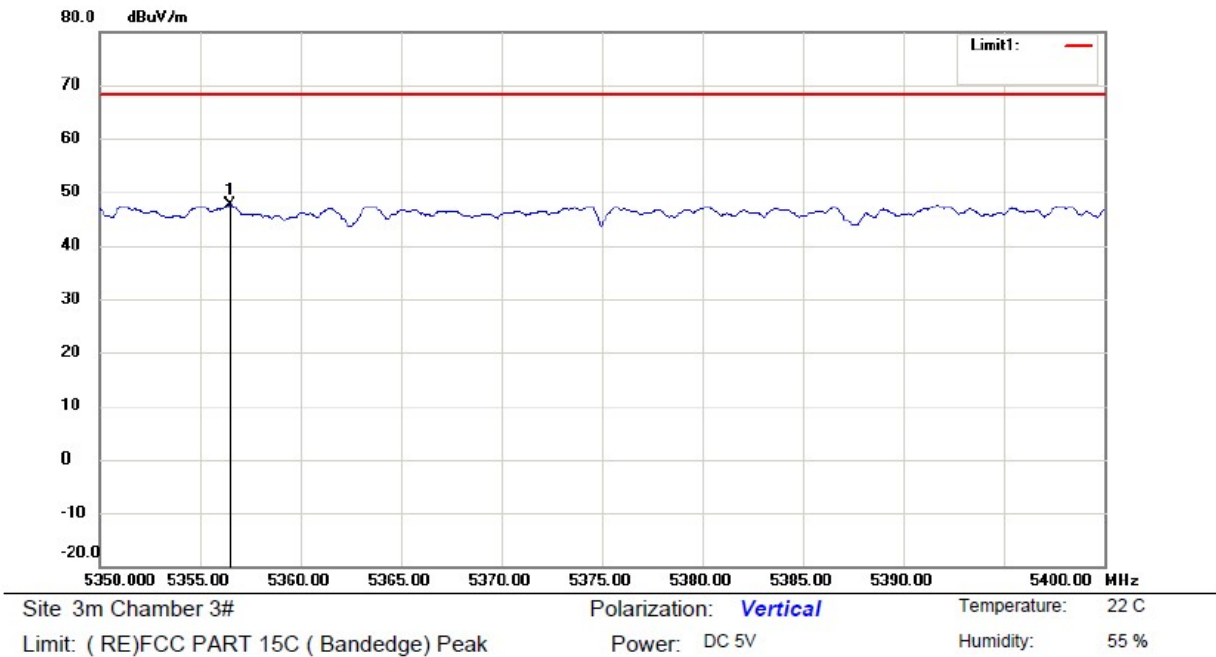


UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5350-5400MHz)

802.11a 802.11n(HT20) 802.11n(HT40)

5180 5200 5230 Ant.Pol V



- Undesirable radiated Undesirable radiated Spurious Emission in Band Edge

Test mode: 802.11ac80 Frequency(MHz): 5210

Freq. (MHz)	Ant.Pol. H/V	Field Strength (RBW=100KHz) (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Verdict
5143.05	H	58.23	-37.00	-27	Pass
5149.80	V	61.15	-34.08	-27	Pass

Test mode: 802.11ac80 Frequency(MHz): 5210

Freq. (MHz)	Ant.Pol. H/V	Field Strength (RBW=100KHz) (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Verdict
5350.45	V	48.03	-47.20	-27	Pass
5353.05	H	47.03	-48.20	-27	Pass

Note: (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).
 (2) Emission Level= Reading Level+Correct Factor +Cable Loss.
 (3) Correct Factor= Ant_F + Cab_L - Preamp
 (4) EIRP[dBm] = E[dBuV/m] + 20 log(d[meters]) - 104.77
 d is the measurement distance in 3 meters

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5100-5150MHz)

802.11a 802.11n(HT20) 802.11ac80

5210 5200 5240 Ant.Pol H



Site 3m Chamber 3# Polarization: **Horizontal** Temperature: 22 C

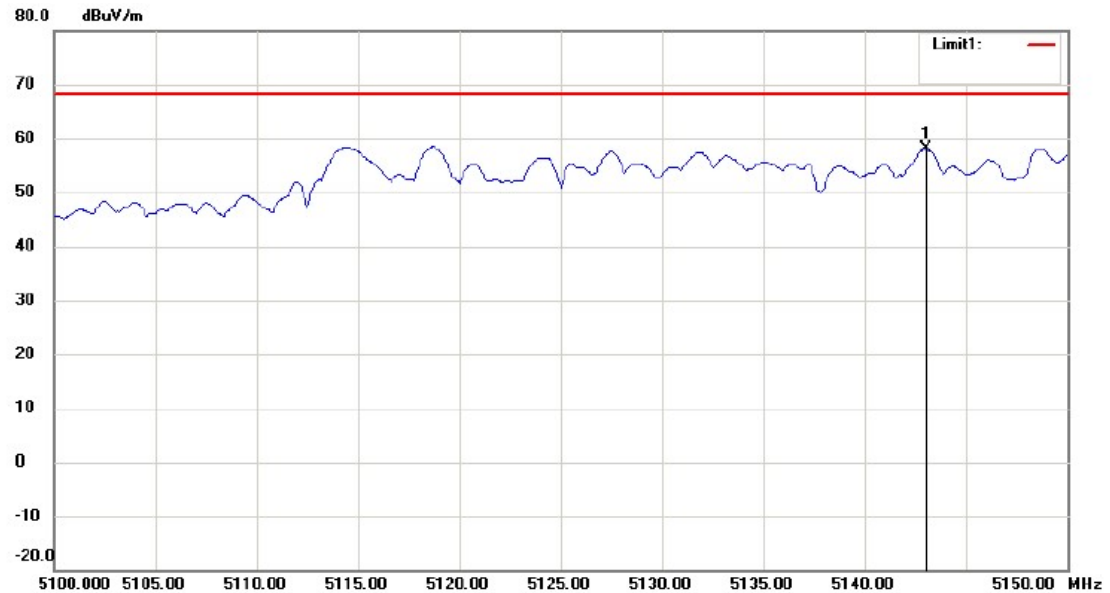
Limit: (RE)FCC PART 15C (Bandedge) Peak Power: DC 5V Humidity: 55 %

UNII Band I

Test Model Undesirable radiated Spurious Emission in Restricted Band (5100-5150MHz)

802.11a 802.11n(HT20) 802.11ac80

5210 5200 5240 Ant.Pol V



Site 3m Chamber 3# Polarization: **Vertical** Temperature: 22 C

Limit: (RE)FCC PART 15C (Bandedge) Peak Power: DC 5V Humidity: 55 %