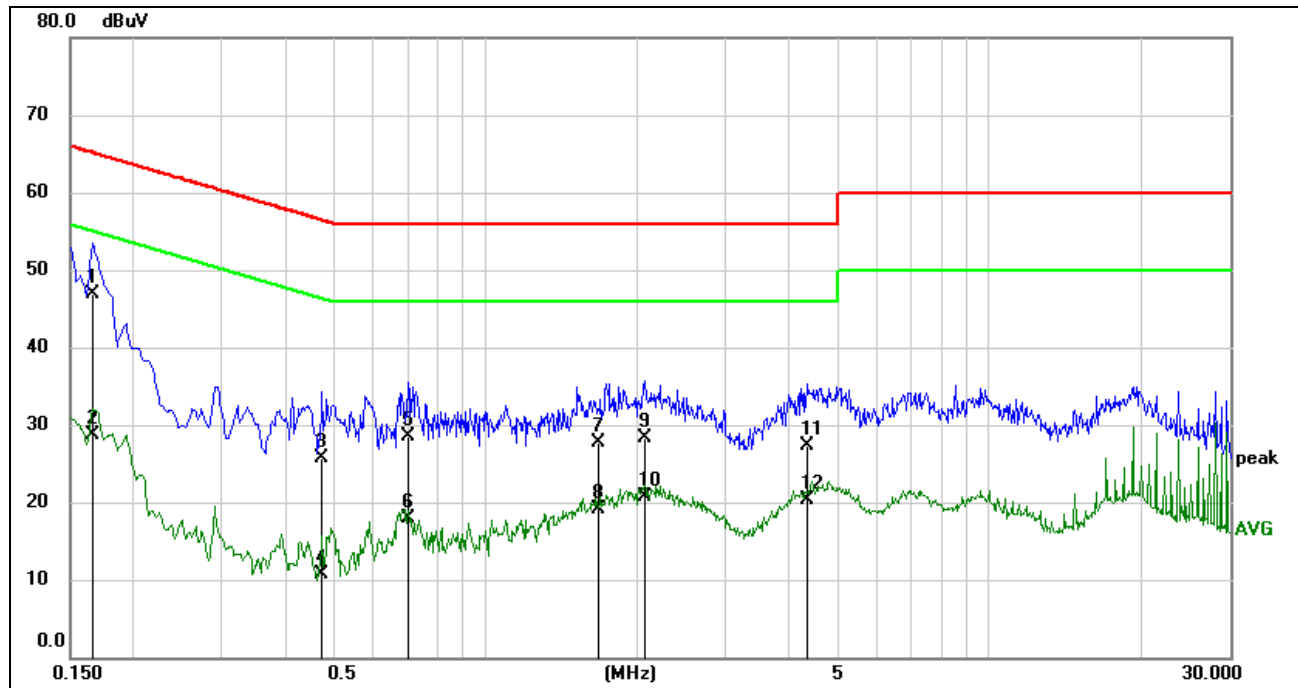




RESULTS

9.1.1. 802.11ac VHT80 MODE

LINE N RESULTS (UNII-2C BAND LOW CHANNEL, WORST-CASE CONFIGURATION)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1660	37.30	9.59	46.89	65.16	-18.27	QP
2	0.1660	19.07	9.59	28.66	55.16	-26.50	AVG
3	0.4721	16.37	9.33	25.70	56.48	-30.78	QP
4	0.4721	1.36	9.33	10.69	46.48	-35.79	AVG
5	0.7044	18.93	9.60	28.53	56.00	-27.47	QP
6	0.7044	8.28	9.60	17.88	46.00	-28.12	AVG
7	1.6857	18.18	9.62	27.80	56.00	-28.20	QP
8	1.6857	9.46	9.62	19.08	46.00	-26.92	AVG
9	2.0627	18.63	9.63	28.26	56.00	-27.74	QP
10	2.0627	11.08	9.63	20.71	46.00	-25.29	AVG
11	4.3649	17.63	9.60	27.23	56.00	-28.77	QP
12	4.3649	10.78	9.60	20.38	46.00	-25.62	AVG

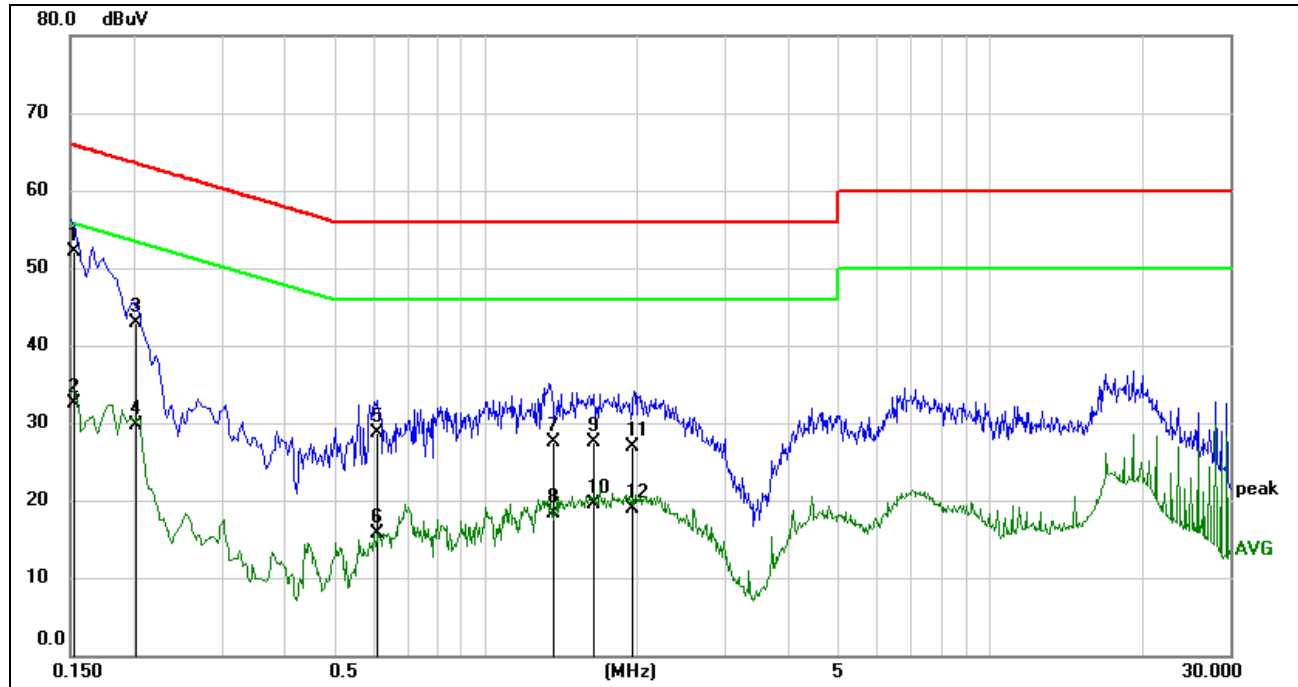
Note: 1. Result = Reading + Correct Factor.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).

4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

LINE L RESULTS (UNII-2C BAND LOW CHANNEL, WORST-CASE CONFIGURATION)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1526	42.59	9.59	52.18	65.86	-13.68	QP
2	0.1526	22.86	9.59	32.45	55.86	-23.41	AVG
3	0.2021	33.23	9.59	42.82	63.52	-20.70	QP
4	0.2021	20.06	9.59	29.65	53.52	-23.87	AVG
5	0.6128	19.33	9.47	28.80	56.00	-27.20	QP
6	0.6128	6.25	9.47	15.72	46.00	-30.28	AVG
7	1.3699	17.85	9.61	27.46	56.00	-28.54	QP
8	1.3699	8.71	9.61	18.32	46.00	-27.68	AVG
9	1.6434	17.96	9.62	27.58	56.00	-28.42	QP
10	1.6434	9.80	9.62	19.42	46.00	-26.58	AVG
11	1.9488	17.21	9.63	26.84	56.00	-29.16	QP
12	1.9488	9.19	9.63	18.82	46.00	-27.18	AVG

Note: 1. Result = Reading + Correct Factor.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).

4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

Note: All the modes had been tested, but only the worst data was recorded in the report.

10. FREQUENCY STABILITY

LIMITS

The frequency of the carrier signal shall be maintained within band of operation.

TEST PROCEDURE

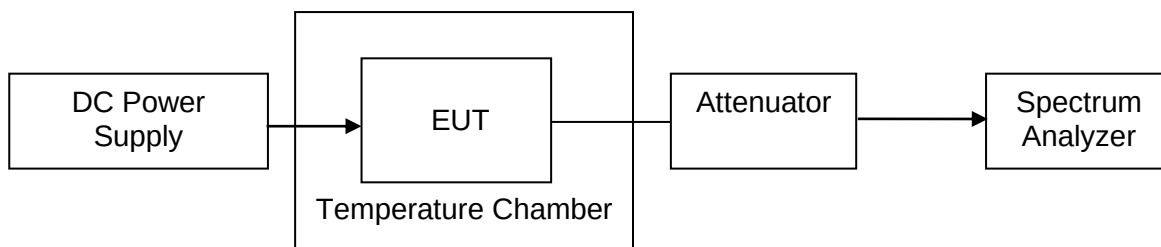
1. The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between 0 °C ~ 60 °C (declared by customer).
2. The temperature was incremented by 10 °C intervals and the unit allowed to stabilize at each temperature before each measurement. The center frequency of 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.

Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	10 kHz
VBW	$\geq 3 \times \text{RBW}$
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

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.
5. Allow the trace to stabilize, find the peak value of the power envelope and record the frequency, then calculated the frequency drift.

TEST SETUP





TEST ENVIRONMENT

	Normal Test Conditions	Extreme Test Conditions
Relative Humidity	20 % - 75 %	/
Atmospheric Pressure	100 kPa ~102 kPa	/
Temperature	T_N (Normal Temperature): 25.1 °C	T_L (Low Temperature): 0 °C
		T_H (High Temperature): 60 °C
Supply Voltage	V_N (Normal Voltage): DC 5 V	V_L (Low Voltage): AC 4.5 V
		V_H (High Voltage): DC 5.5 V

RESULTS

Please refer to Appendix E.

11. DYNAMIC FREQUENCY SELECTION

APPLICABILITY OF DFS REQUIREMENTS

A U-NII network will employ a DFS function to detect signals from radar systems and to avoid co-channel operation with these systems. This applies to the 5250-5350 MHz and/or 5470-5725 MHz bands.

Within the context of the operation of the DFS function, a U-NII device will operate in either Master Mode or Client Mode. U-NII devices operating in Client Mode can only operate in a network controlled by a U-NII device operating in Master Mode.

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	☐ Master	☒ Client Without Radar Detection	☐ Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	☐ Master Device or Client with Radar Detection	☒ Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	☐ Master Device or Client with Radar Detection	☒ Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required

Note: Frequencies selected for statistical performance check should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.

LIMITS

(1) DFS Detection Thresholds

Table 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP $\geq$ 200 milliwatt	-64 dBm
EIRP $<$ 200 milliwatt and power spectral density $<$ 10 dBm/MHz	-62 dBm
EIRP $<$ 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.
Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

(2) DFS Response Requirements

Table 4: DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.

Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.
Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required facilitating a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.
Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

PARAMETERS OF RADAR TEST WAVEFORMS

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

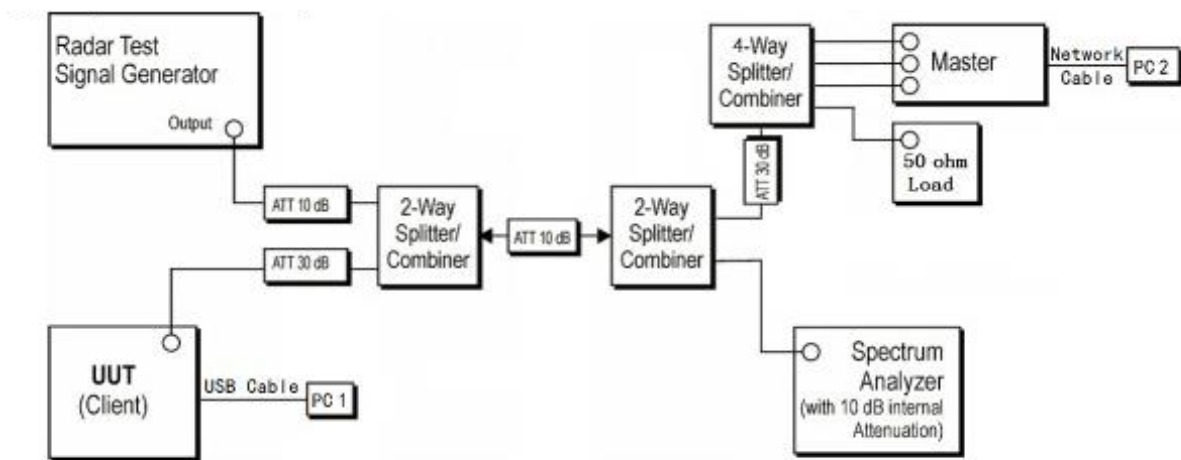
Table 5 Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A	Roundup $\left\{ \left(\frac{1}{360} \right) \cdot \left(\frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right) \right\}$	60%	30
		Test B			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests. Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A					

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B. Test aggregate is average of the percentage of successful detections of short pulse radar types 1-4.

TEST SETUP

Setup for Client with injection at the Master



TEST ENVIRONMENT

Temperature	24.1 °C	Relative Humidity	60.5 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to Appendix F.



12. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RESULTS

Complies

**12.1. Appendix A1: Emission Bandwidth****12.1.1. Test Result**

Test Mode	Antenna	Channel	26db EBW [MHz]	FL[MHz]	FH[MHz]	Verdict
11A	Ant1	5180	24.080	5168.120	5192.200	PASS
	Ant2	5180	24.040	5168.600	5192.640	PASS
	Ant1	5200	24.000	5187.960	5211.960	PASS
	Ant2	5200	23.240	5188.560	5211.800	PASS
	Ant1	5240	24.000	5227.800	5251.800	PASS
	Ant2	5240	24.160	5228.240	5252.400	PASS
	Ant1	5260	23.920	5247.560	5271.480	PASS
	Ant2	5260	23.760	5247.160	5270.920	PASS
	Ant1	5280	23.960	5267.920	5291.880	PASS
	Ant2	5280	23.600	5267.680	5291.280	PASS
	Ant1	5320	23.640	5308.320	5331.960	PASS
	Ant2	5320	23.800	5308.680	5332.480	PASS
	Ant1	5500	23.920	5488.040	5511.960	PASS
	Ant2	5500	23.640	5488.080	5511.720	PASS
	Ant1	5580	24.520	5568.080	5592.600	PASS
	Ant2	5580	23.840	5568.120	5591.960	PASS
	Ant1	5700	24.000	5688.640	5712.640	PASS
	Ant2	5700	23.120	5687.920	5711.040	PASS
	Ant1	5720	24.920	5707.360	5732.280	PASS
	Ant2	5720	22.760	5708.480	5731.240	PASS
	Ant1	5720 UNII-2C	17.64	5707.360	5725	PASS
	Ant2	5720 UNII-2C	16.52	5708.480	5725	PASS
	Ant1	5720 UNII-3	7.28	5725	5732.280	PASS
	Ant2	5720 UNII-3	6.24	5725	5731.240	PASS
	Ant1	5745	24.120	5731.840	5755.960	PASS
	Ant2	5745	23.400	5733.280	5756.680	PASS
	Ant1	5785	23.360	5773.160	5796.520	PASS
	Ant2	5785	23.920	5773.080	5797.000	PASS
	Ant1	5825	23.600	5812.760	5836.360	PASS
	Ant2	5825	24.200	5812.520	5836.720	PASS
11N20MIMO	Ant1	5180	23.960	5168.440	5192.400	PASS
	Ant2	5180	23.480	5167.200	5190.680	PASS
	Ant1	5200	25.200	5186.960	5212.160	PASS
	Ant2	5200	23.840	5187.720	5211.560	PASS
	Ant1	5240	23.200	5228.400	5251.600	PASS
	Ant2	5240	23.280	5228.680	5251.960	PASS
	Ant1	5260	24.600	5248.080	5272.680	PASS
	Ant2	5260	24.400	5247.520	5271.920	PASS
	Ant1	5280	24.400	5268.040	5292.440	PASS
	Ant2	5280	23.400	5268.520	5291.920	PASS
	Ant1	5320	23.880	5308.520	5332.400	PASS
	Ant2	5320	24.240	5307.560	5331.800	PASS
	Ant1	5500	23.480	5488.240	5511.720	PASS
	Ant2	5500	23.800	5487.920	5511.720	PASS
	Ant1	5580	24.440	5567.680	5592.120	PASS
	Ant2	5580	24.000	5567.560	5591.560	PASS
	Ant1	5700	24.200	5687.560	5711.760	PASS
	Ant2	5700	23.080	5688.440	5711.520	PASS
	Ant1	5720	24.240	5707.880	5732.120	PASS
	Ant2	5720	24.240	5707.640	5731.880	PASS
	Ant1	5720 UNII-2C	17.12	5707.880	5725	PASS
	Ant2	5720 UNII-2C	17.36	5707.640	5725	PASS
	Ant1	5720 UNII-3	7.12	5725	5732.120	PASS
	Ant2	5720 UNII-3	6.88	5725	5731.880	PASS



	Ant1	5745	23.840	5733.320	5757.160	PASS
	Ant2	5745	24.840	5732.480	5757.320	PASS
	Ant1	5785	24.680	5772.120	5796.800	PASS
	Ant2	5785	23.240	5773.000	5796.240	PASS
	Ant1	5825	24.880	5812.880	5837.760	PASS
	Ant2	5825	24.040	5812.920	5836.960	PASS
11N40MIMO	Ant1	5190	39.280	5170.560	5209.840	PASS
	Ant2	5190	39.200	5170.320	5209.520	PASS
	Ant1	5230	39.760	5210.080	5249.840	PASS
	Ant2	5230	38.800	5210.560	5249.360	PASS
	Ant1	5270	40.240	5250.080	5290.320	PASS
	Ant2	5270	39.520	5250.480	5290.000	PASS
	Ant1	5310	39.520	5290.320	5329.840	PASS
	Ant2	5310	39.440	5290.320	5329.760	PASS
	Ant1	5510	38.880	5490.400	5529.280	PASS
	Ant2	5510	39.120	5490.480	5529.600	PASS
	Ant1	5590	39.600	5570.400	5610.000	PASS
	Ant2	5590	38.880	5570.800	5609.680	PASS
	Ant1	5670	39.760	5650.400	5690.160	PASS
	Ant2	5670	39.600	5650.000	5689.600	PASS
	Ant1	5710	39.760	5689.920	5729.680	PASS
	Ant2	5710	38.720	5690.720	5729.440	PASS
	Ant1	5710 UNII-2C	35.08	5689.920	5725	PASS
	Ant2	5710 UNII-2C	34.28	5690.720	5725	PASS
	Ant1	5710 UNII-3	4.68	5725	5729.680	PASS
	Ant2	5710 UNII-3	4.44	5725	5729.440	PASS
	Ant1	5755	39.360	5735.320	5774.680	PASS
	Ant2	5755	39.680	5735.080	5774.760	PASS
	Ant1	5795	39.440	5775.160	5814.600	PASS
	Ant2	5795	39.280	5775.160	5814.440	PASS
11AC80MIMO	Ant1	5210	79.040	5170.800	5249.840	PASS
	Ant2	5210	78.880	5170.480	5249.360	PASS
	Ant1	5290	79.840	5250.480	5330.320	PASS
	Ant2	5290	78.880	5250.640	5329.520	PASS
	Ant1	5530	79.200	5490.480	5569.680	PASS
	Ant2	5530	78.400	5491.120	5569.520	PASS
	Ant1	5610	78.400	5570.960	5649.360	PASS
	Ant2	5610	79.200	5570.640	5649.840	PASS
	Ant1	5690	78.880	5650.480	5729.360	PASS
	Ant2	5690	79.040	5650.320	5729.360	PASS
	Ant1	5690 UNII-2C	74.52	5650.480	5725	PASS
	Ant2	5690 UNII-2C	74.68	5650.320	5725	PASS
	Ant1	5690 UNII-3	4.36	5725	5729.360	PASS
	Ant2	5690 UNII-3	4.36	5725	5729.360	PASS
	Ant1	5775	79.200	5735.480	5814.680	PASS
	Ant2	5775	78.880	5735.480	5814.360	PASS
11AX20MIMO	Ant1	5180	21.480	5169.280	5190.760	PASS
	Ant2	5180	21.600	5169.280	5190.880	PASS
	Ant1	5200	21.280	5189.440	5210.720	PASS
	Ant2	5200	21.280	5189.200	5210.480	PASS
	Ant1	5240	21.520	5228.920	5250.440	PASS
	Ant2	5240	20.920	5229.480	5250.400	PASS
	Ant1	5260	21.720	5249.200	5270.920	PASS
	Ant2	5260	20.680	5249.640	5270.320	PASS
	Ant1	5280	21.880	5269.280	5291.160	PASS
	Ant2	5280	21.480	5269.160	5290.640	PASS
	Ant1	5320	21.720	5309.240	5330.960	PASS
	Ant2	5320	21.160	5309.440	5330.600	PASS
	Ant1	5500	21.720	5489.480	5511.200	PASS
	Ant2	5500	21.640	5489.200	5510.840	PASS
	Ant1	5580	21.040	5569.840	5590.880	PASS



	Ant2	5580	20.800	5569.640	5590.440	PASS
	Ant1	5700	21.280	5689.200	5710.480	PASS
	Ant2	5700	21.160	5689.320	5710.480	PASS
	Ant1	5720	20.680	5709.480	5730.160	PASS
	Ant2	5720	21.560	5709.080	5730.640	PASS
	Ant1	5720 UNII-2C	15.52	5709.480	5725	PASS
	Ant2	5720 UNII-2C	15.92	5709.080	5725	PASS
	Ant1	5720 UNII-3	5.16	5725	5730.160	PASS
	Ant2	5720 UNII-3	5.64	5725	5730.640	PASS
	Ant1	5745	20.240	5734.880	5755.120	PASS
	Ant2	5745	21.320	5734.200	5755.520	PASS
	Ant1	5785	20.600	5774.560	5795.160	PASS
	Ant2	5785	21.120	5774.280	5795.400	PASS
	Ant1	5825	21.480	5814.040	5835.520	PASS
	Ant2	5825	21.440	5814.320	5835.760	PASS
11AX40MIMO	Ant1	5190	39.600	5170.000	5209.600	PASS
	Ant2	5190	39.200	5170.240	5209.440	PASS
	Ant1	5230	39.200	5210.400	5249.600	PASS
	Ant2	5230	39.200	5210.320	5249.520	PASS
	Ant1	5270	39.120	5250.400	5289.520	PASS
	Ant2	5270	39.040	5250.400	5289.440	PASS
	Ant1	5310	39.360	5290.320	5329.680	PASS
	Ant2	5310	39.440	5290.320	5329.760	PASS
	Ant1	5510	39.280	5490.160	5529.440	PASS
	Ant2	5510	39.360	5490.400	5529.760	PASS
	Ant1	5590	39.120	5570.480	5609.600	PASS
	Ant2	5590	39.200	5570.400	5609.600	PASS
	Ant1	5670	39.120	5650.400	5689.520	PASS
	Ant2	5670	39.440	5650.240	5689.680	PASS
	Ant1	5710	39.120	5690.400	5729.520	PASS
	Ant2	5710	39.120	5690.400	5729.520	PASS
	Ant1	5710 UNII-2C	34.6	5690.400	5725	PASS
	Ant2	5710 UNII-2C	34.6	5690.400	5725	PASS
	Ant1	5710 UNII-3	4.52	5725	5729.520	PASS
	Ant2	5710 UNII-3	4.52	5725	5729.520	PASS
	Ant1	5755	39.040	5735.560	5774.600	PASS
	Ant2	5755	38.880	5735.560	5774.440	PASS
	Ant1	5795	39.360	5775.320	5814.680	PASS
	Ant2	5795	39.280	5775.480	5814.760	PASS
11AX80MIMO	Ant1	5210	80.000	5170.160	5250.160	PASS
	Ant2	5210	80.160	5170.000	5250.160	PASS
	Ant1	5290	80.160	5250.160	5330.320	PASS
	Ant2	5290	80.160	5250.160	5330.320	PASS
	Ant1	5530	80.000	5490.160	5570.160	PASS
	Ant2	5530	80.000	5490.160	5570.160	PASS
	Ant1	5610	79.520	5570.320	5649.840	PASS
	Ant2	5610	79.680	5570.320	5650.000	PASS
	Ant1	5690	80.000	5650.160	5730.160	PASS
	Ant2	5690	79.840	5650.160	5730.000	PASS
	Ant1	5690 UNII-2C	74.84	5650.160	5725	PASS
	Ant2	5690 UNII-2C	74.84	5650.160	5725	PASS
	Ant1	5690 UNII-3	5.16	5725	5730.160	PASS
	Ant2	5690 UNII-3	5	5725	5730.000	PASS
	Ant1	5775	79.680	5735.320	5815.000	PASS
	Ant2	5775	79.840	5735.160	5815.000	PASS



12.1.2. Test Graphs





















