6. MAXIMUM CONDUCTED OUTPUT POWER

6.1 PPLIED PROCEDURES / LIMIT

According to FCC §15.407

The maximum conduced output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	1W
5725~5850	1W

The maximum e.i.r.p should not exceed:

Frequency Band(MHz)	Limit
5150~5250	200mW or 10dBm +10logB whichever is less
5725~5850	N/A

Note: Where “B” is the 99% emission bandwidth in MHz

6.2 TEST PROCEDURE

. Maximum conducted output power may be measured using a spectrum analyzer/EMI receiver or an RF power meter.

1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)

Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).

a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:

• The EUT transmits continuously (or with a duty cycle ≥ 98 percent).

• Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.

(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than ± 2 percent.

(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.

b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".

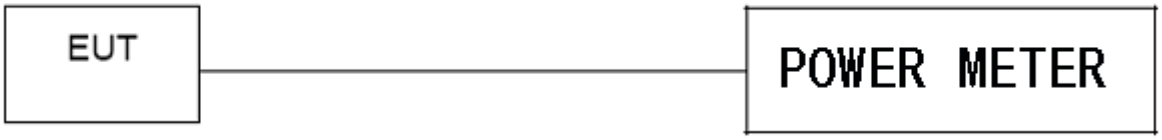
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101 kPa	Test Voltage ：	AC 120V/60Hz

5150-5250MHz					
Operating mode	Test Channel MHz	Output Power			Limit (dBm)
		Chain A(dBm)	Chain B(dBm)	Total(dBm)	
802.11a	5180	9.22	9.08	/	30
	5200	9.22	9.19	/	30
	5240	9.00	9.05	/	30
802.11n-HT20	5180	8.55	8.58	11.58	27.77
	5200	8.55	8.09	11.34	27.77
	5240	8.78	8.36	11.59	27.77
802.11n-HT40	5190	7.69	7.37	10.54	27.77
	5230	7.16	7.19	10.19	27.77

Antenna A gain: 5.05dBi, Antenna B gain: 5.38dBi, Directional gain=[10log(GA+ G B)] dbi =8.23dbi
limit=30-(8.23-6)=27.77

5725-5850MHz					
Operating mode	Test Channel MHz	Output Power			Limit (dBm)
		Chain A(dBm)	Chain B(dBm)	Total(dBm)	
802.11a	5745	8.57	8.81	/	30
	5785	8.00	8.01	/	30
	5825	8.65	8.40	/	30
802.11n-HT20	5745	8.71	8.63	11.68	27.77
	5785	8.07	8.13	11.11	27.77
	5825	8.16	8.01	11.11	27.77
802.11n-HT40	5755	6.68	7.06	9.88	27.77
	5795	6.70	6.78	9.75	27.77

Antenna A gain: 5.05dBi, Antenna B gain: 5.38dBi, Directional gain=[10log(GA+ G B)] dbi =8.23dbi
limit=30-(8.23-6)=27.77

7. OUT OF BAND EMISSIONS

7.1 APPLICABLE STANDARD

According to FCC §15.407(b)

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) 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.

(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.

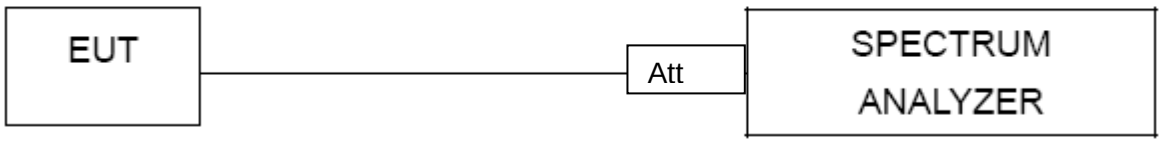
7.2 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101 kPa	Test Voltage ：	AC 120V/60Hz

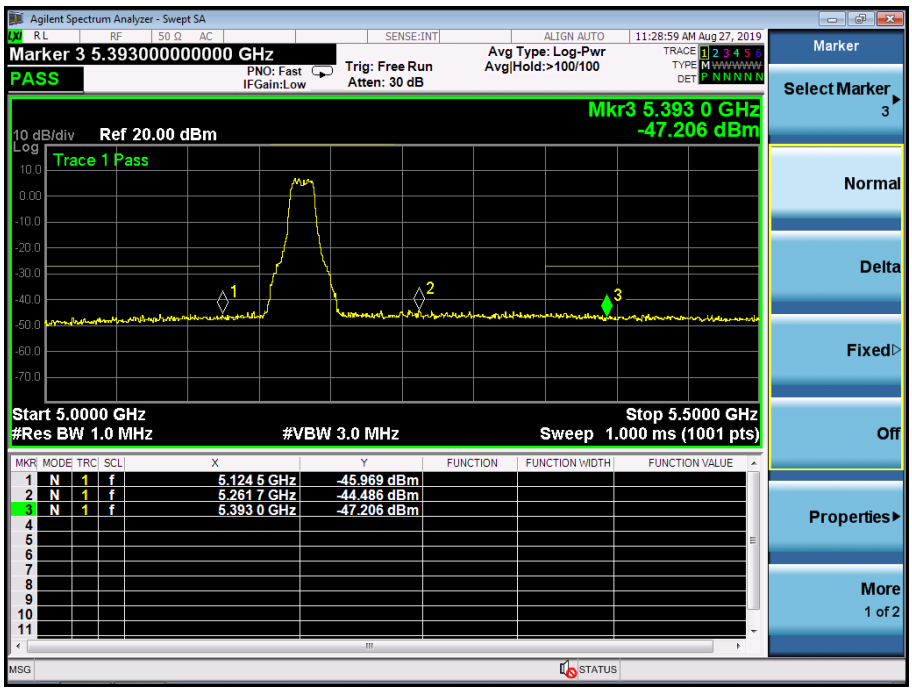
Out of Band edge

Antenna A: 5150-5250MHz

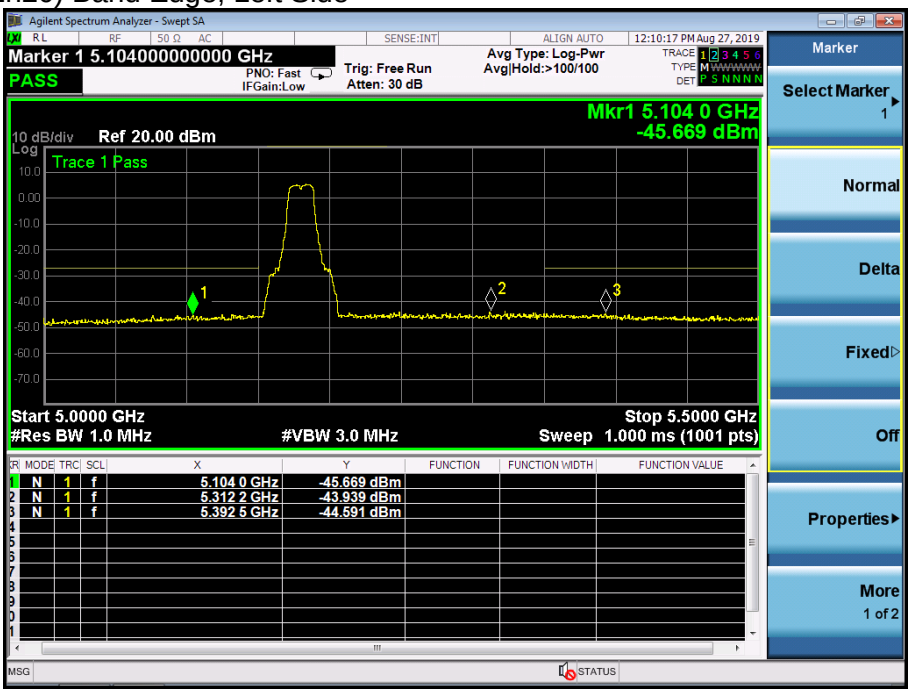
5.2G

5.15~5.25 GHz

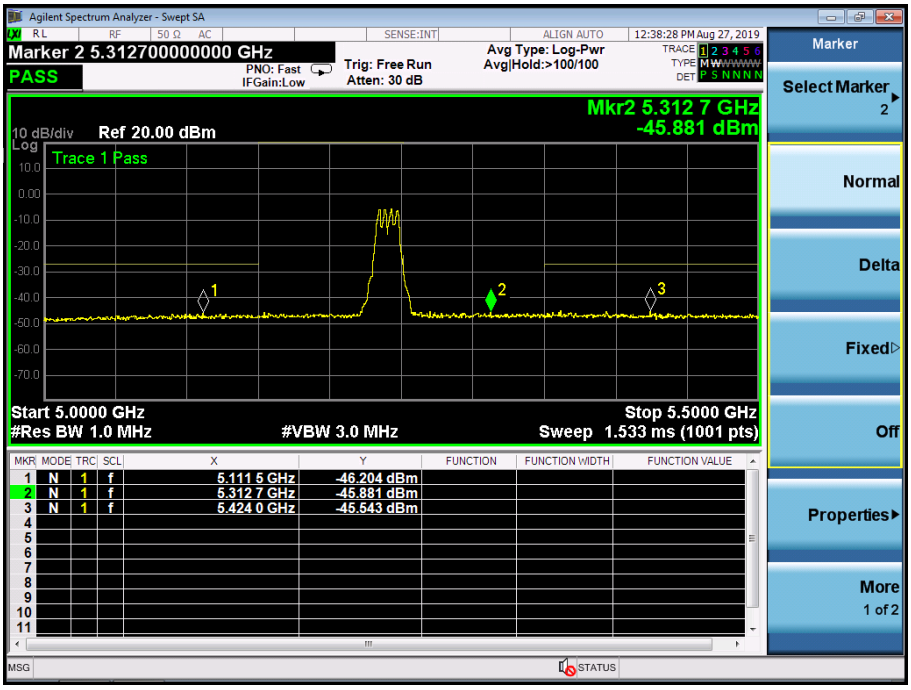
(802.11a) Band Edge, Left Side



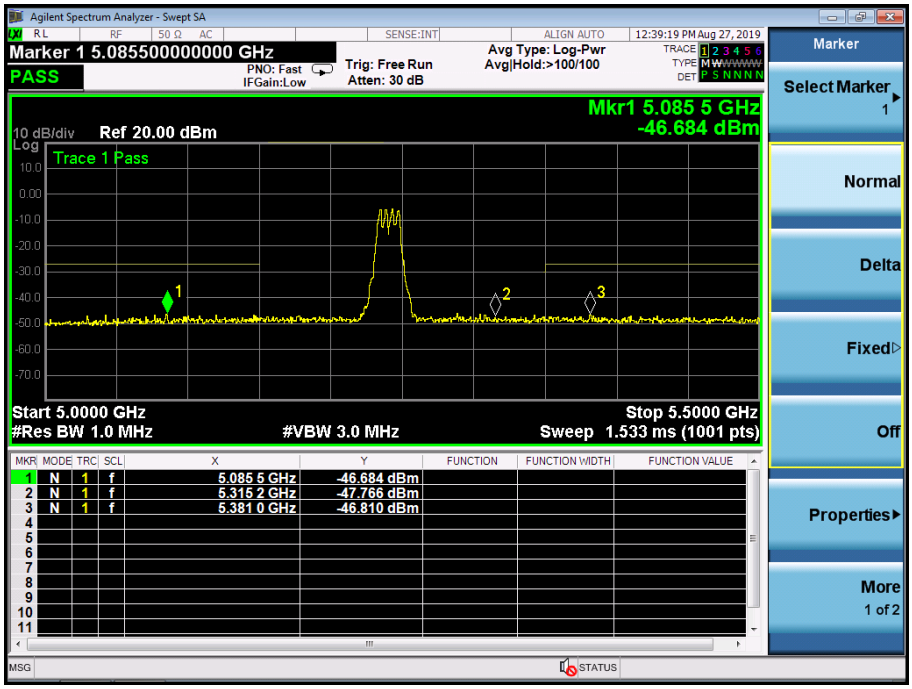
(802.11n20) Band Edge, Left Side



(802.11a) Band Edge, Right Side

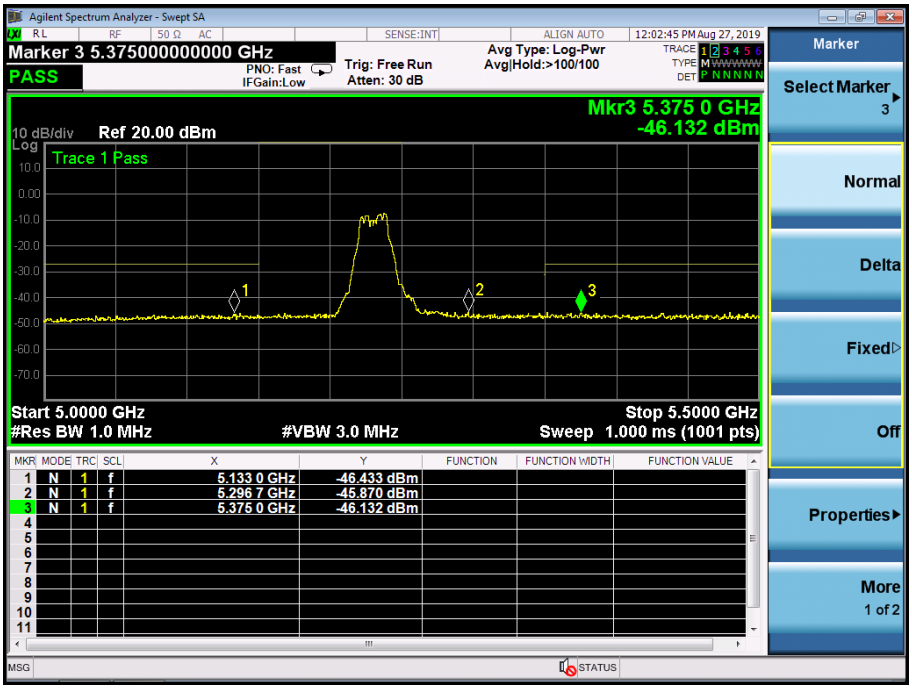


(802.11n20) Band Edge, Right Side

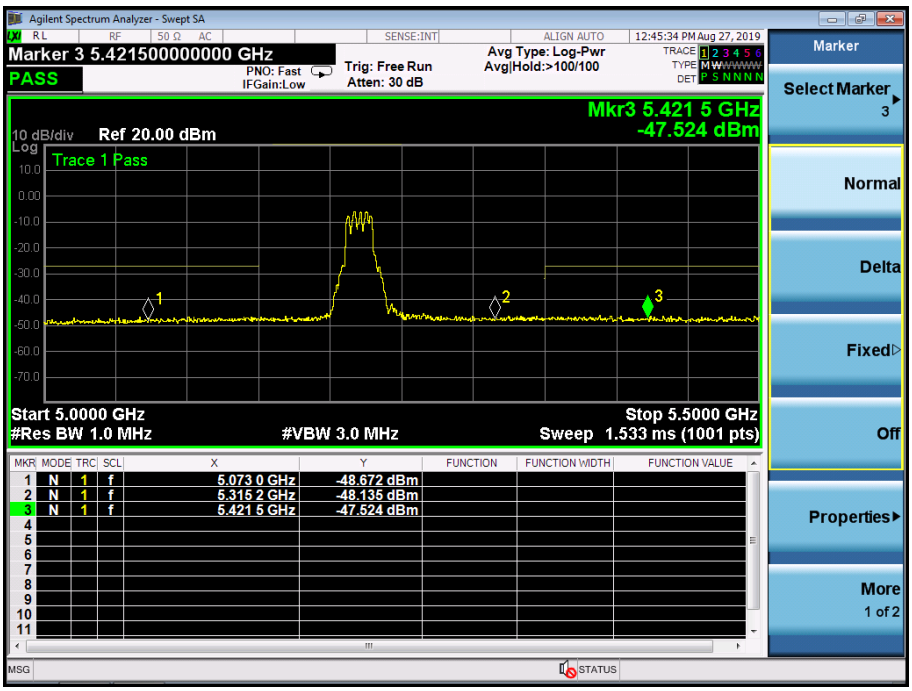


5.15~5.25 GHz

(802.11n40) Band Edge, Left Side



(802.11n40) Band Edge, Right Side

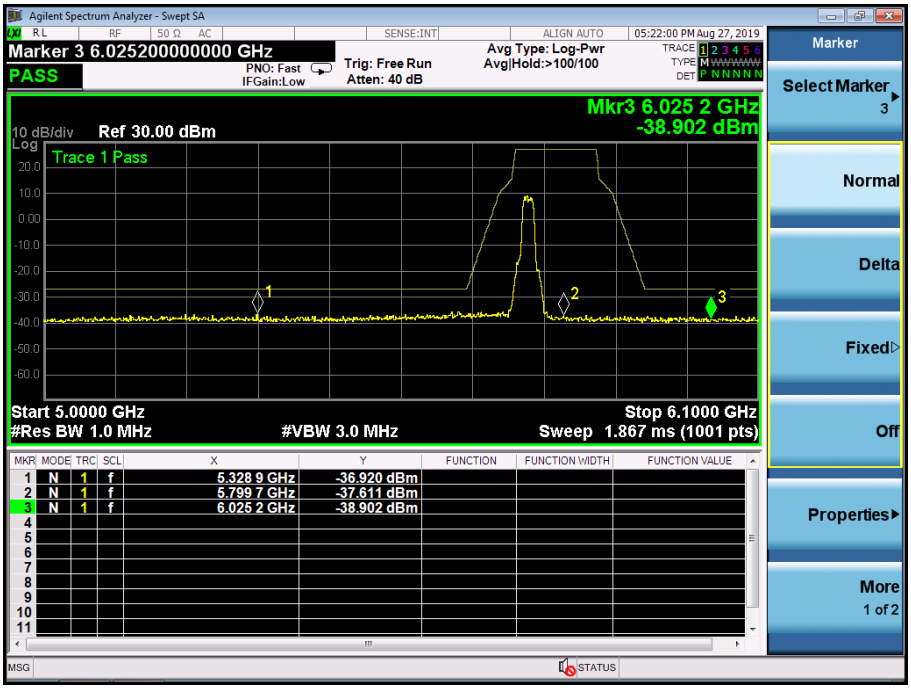


Antenna A: 5725-5850MHz

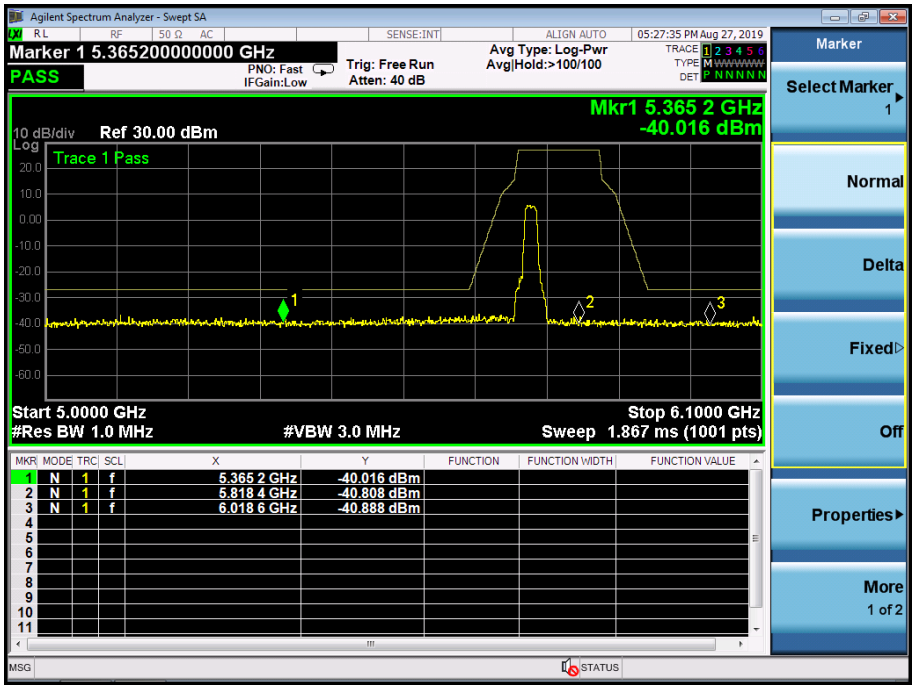
5.8G

5.75~5.85 GHz

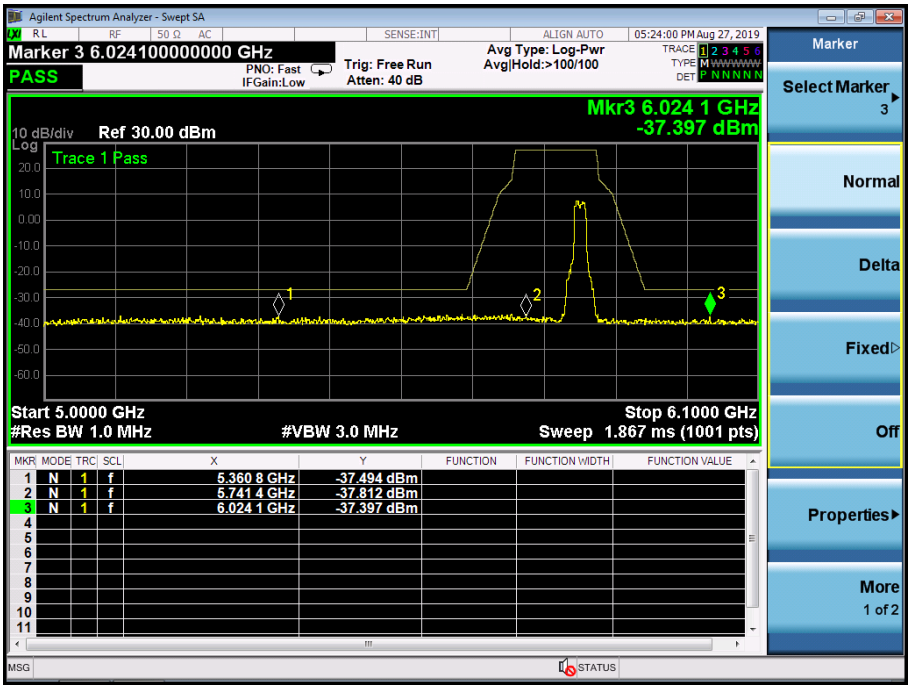
(802.11a) Band Edge, Left Side



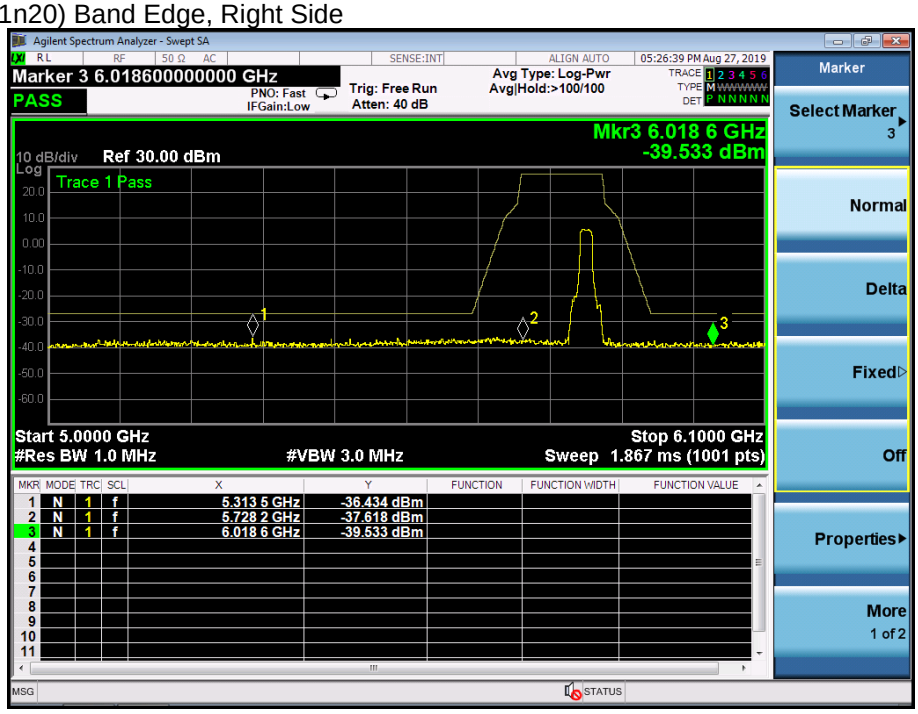
(802.11n20) Band Edge, Left Side



(802.11a) Band Edge, Right Side

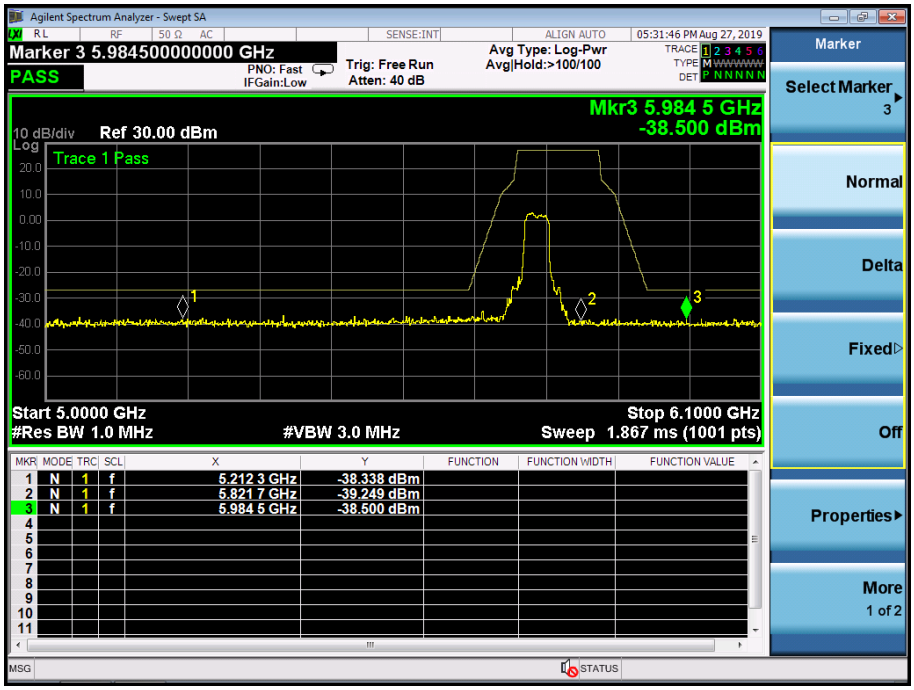


(802.11n20) Band Edge, Right Side

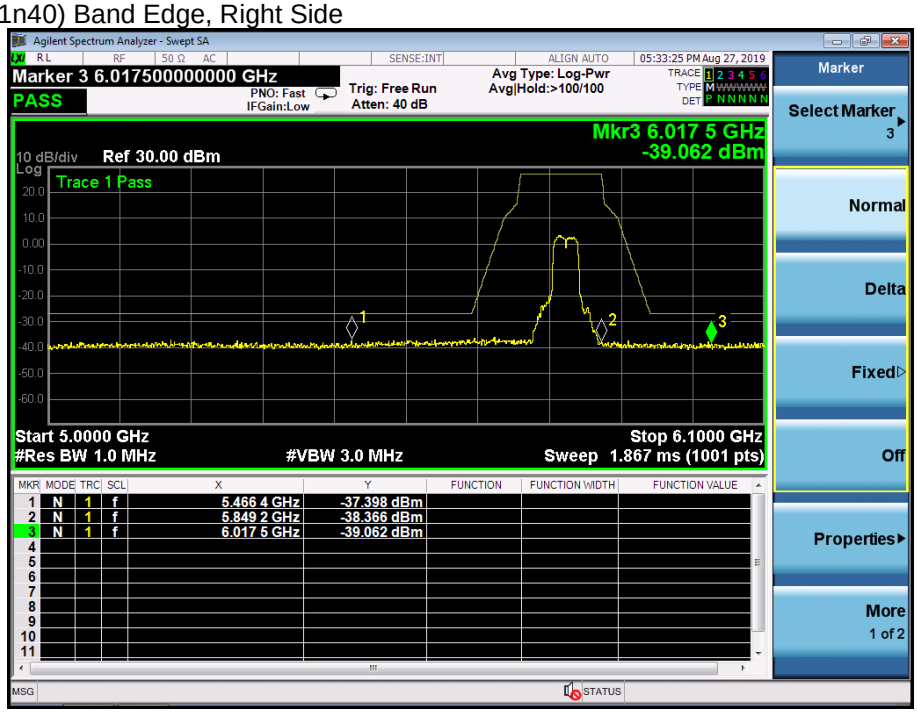


5.75~5.85 GHz

(802.11n40) Band Edge, Left Side



(802.11n40) Band Edge, Right Side

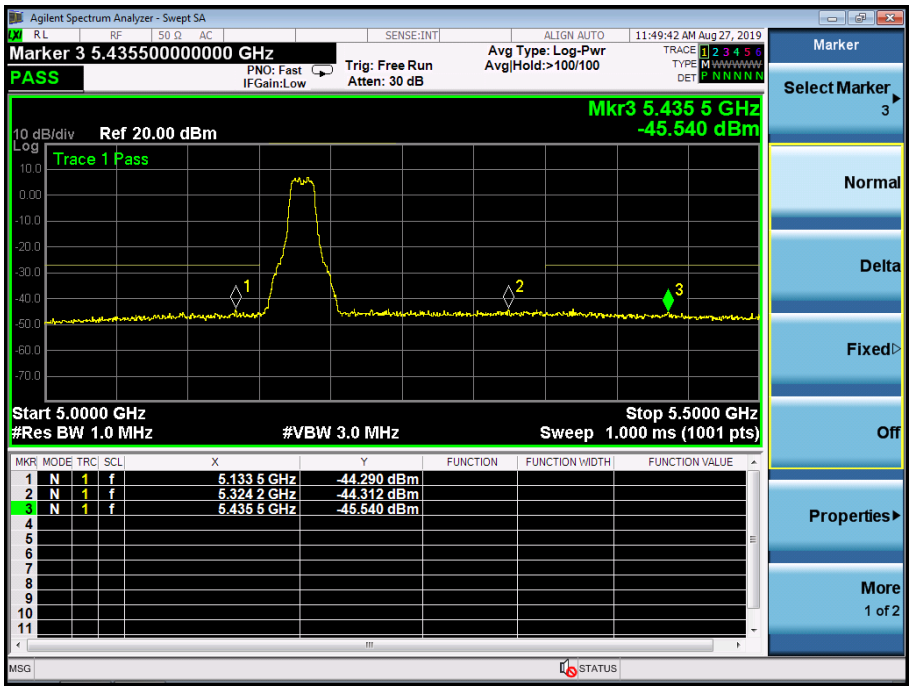


Antenna B: 5150-5250MHz

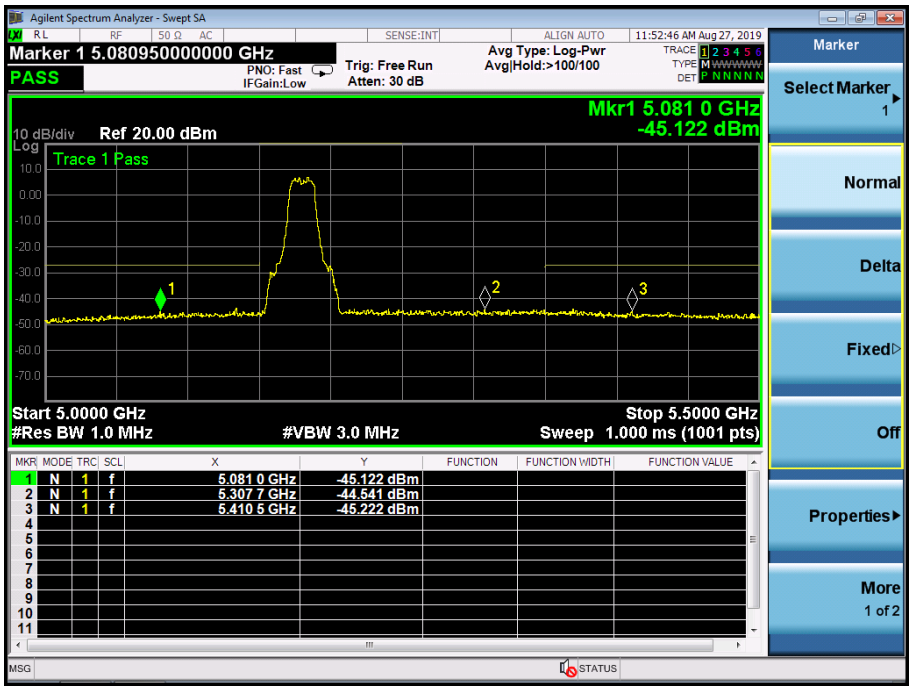
5.2G

5.15~5.25 GHz

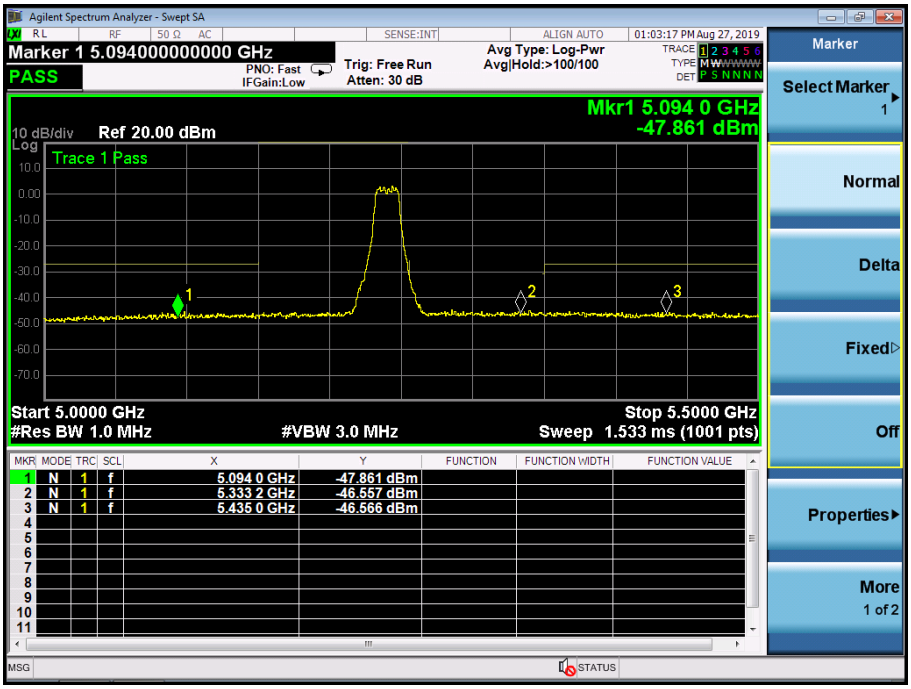
(802.11a) Band Edge, Left Side



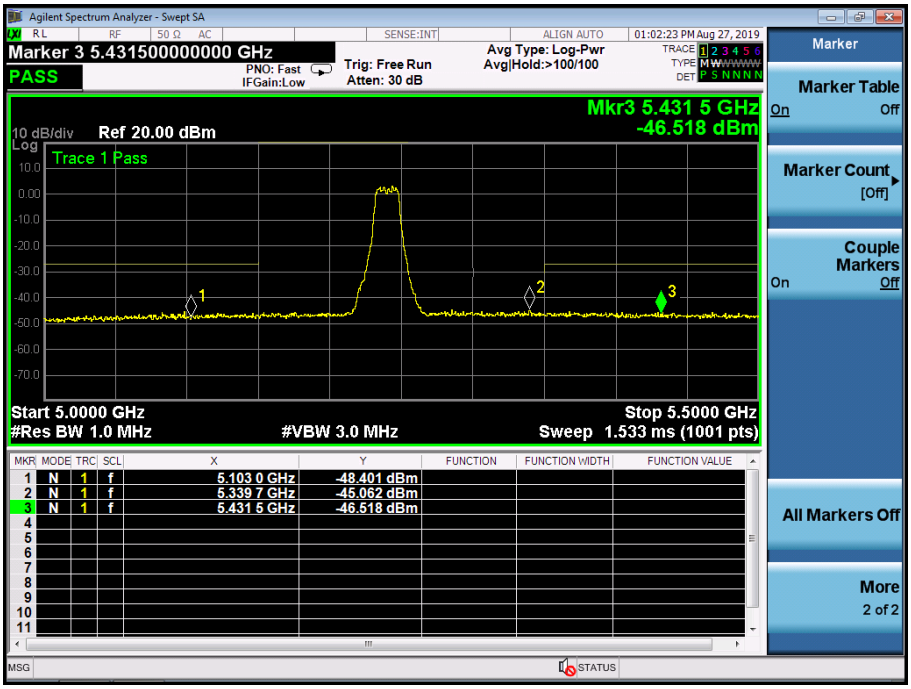
(802.11n20) Band Edge, Left Side



(802.11a) Band Edge, Right Side

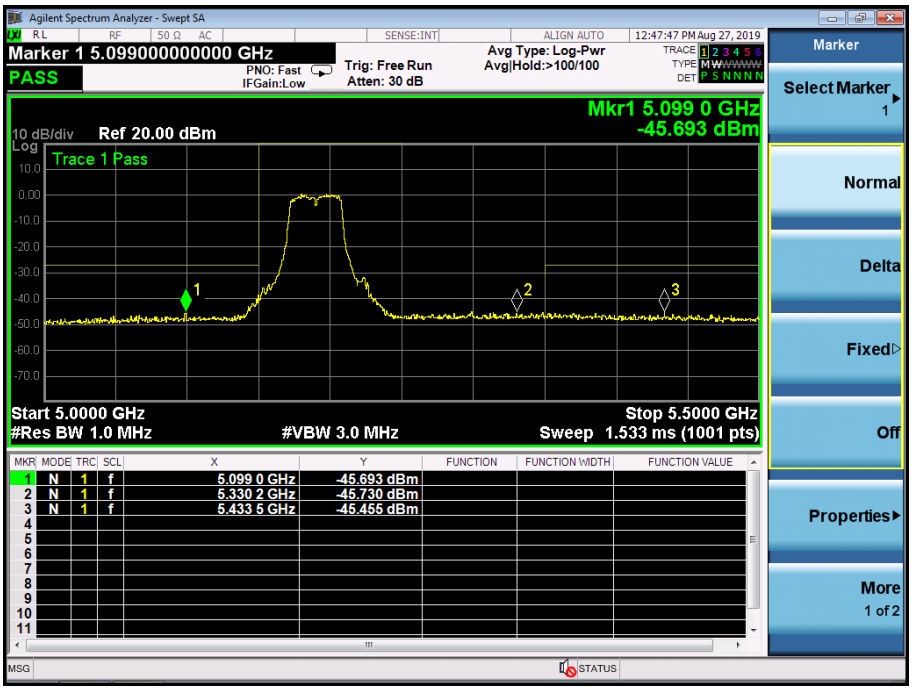


(802.11n20) Band Edge, Right Side

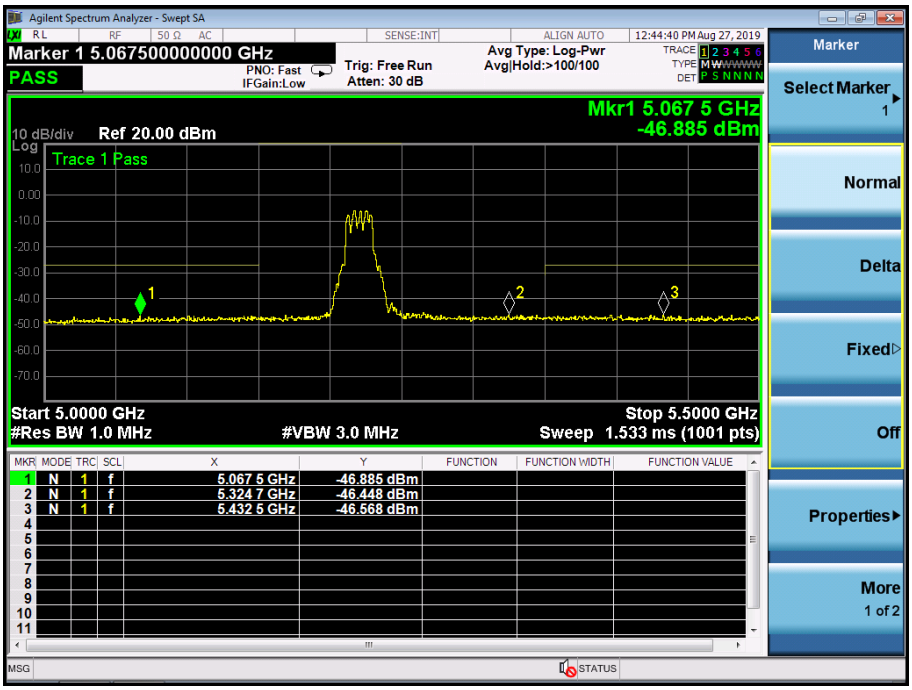


5.15~5.25 GHz

(802.11n40) Band Edge, Left Side



(802.11n40) Band Edge, Right Side

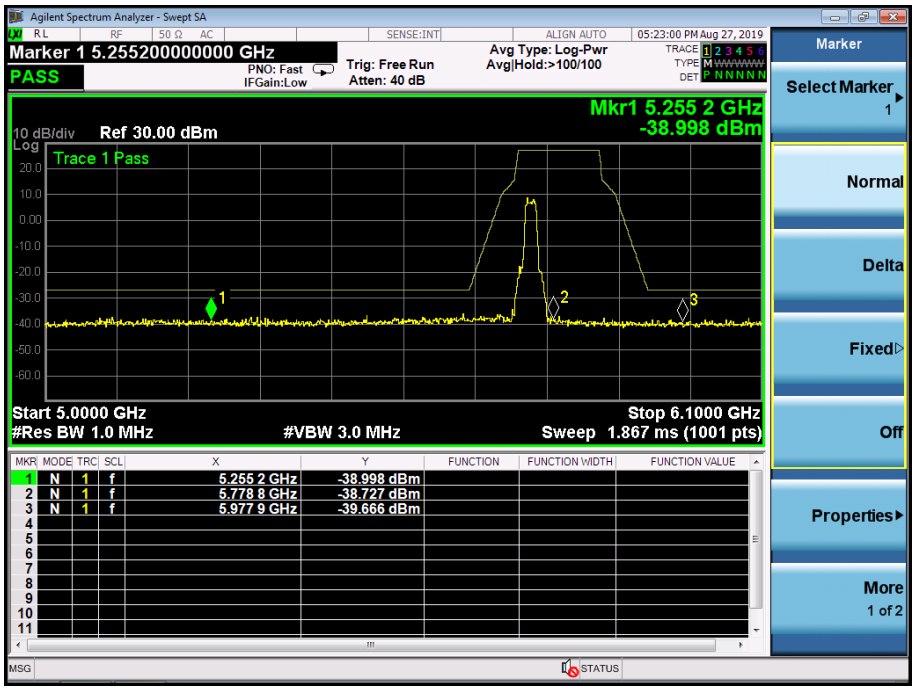


Antenna B: 5725-5850MHz

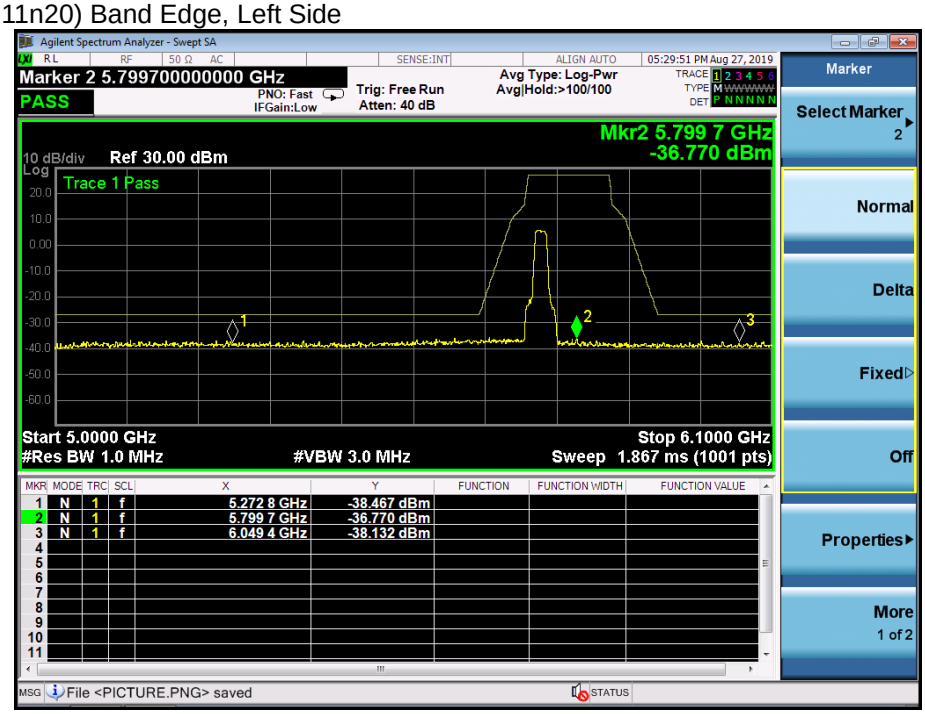
5.8G

5.75~5.85 GHz

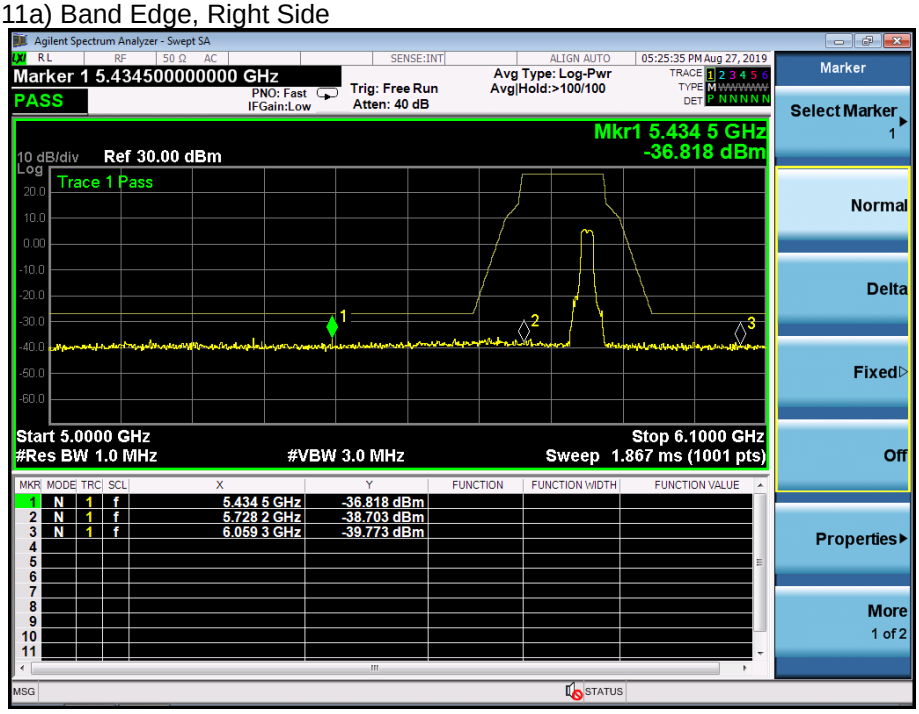
(802.11a) Band Edge, Left Side



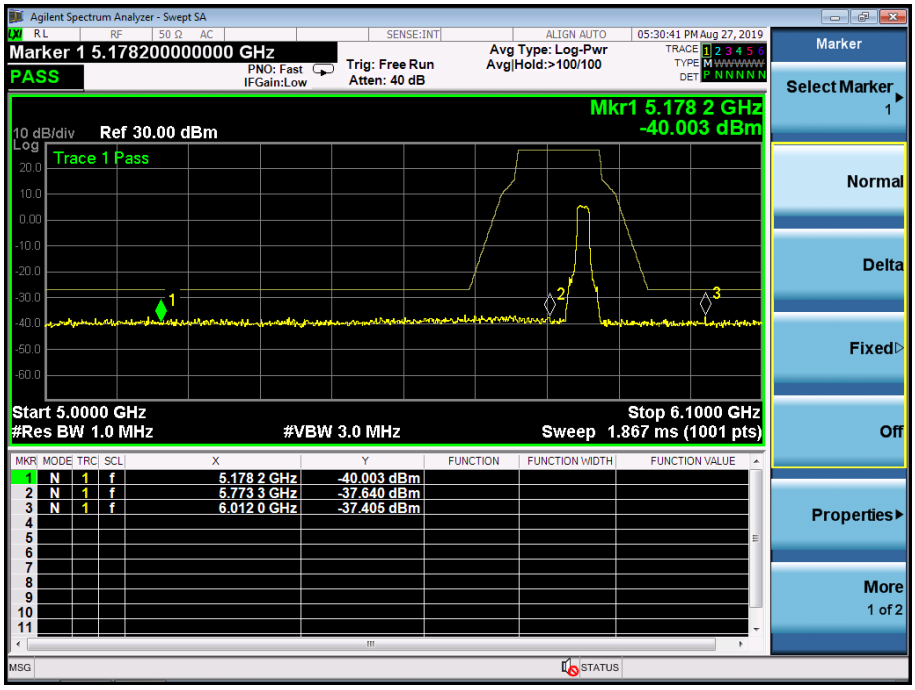
(802.11n20) Band Edge, Left Side



(802.11a) Band Edge, Right Side

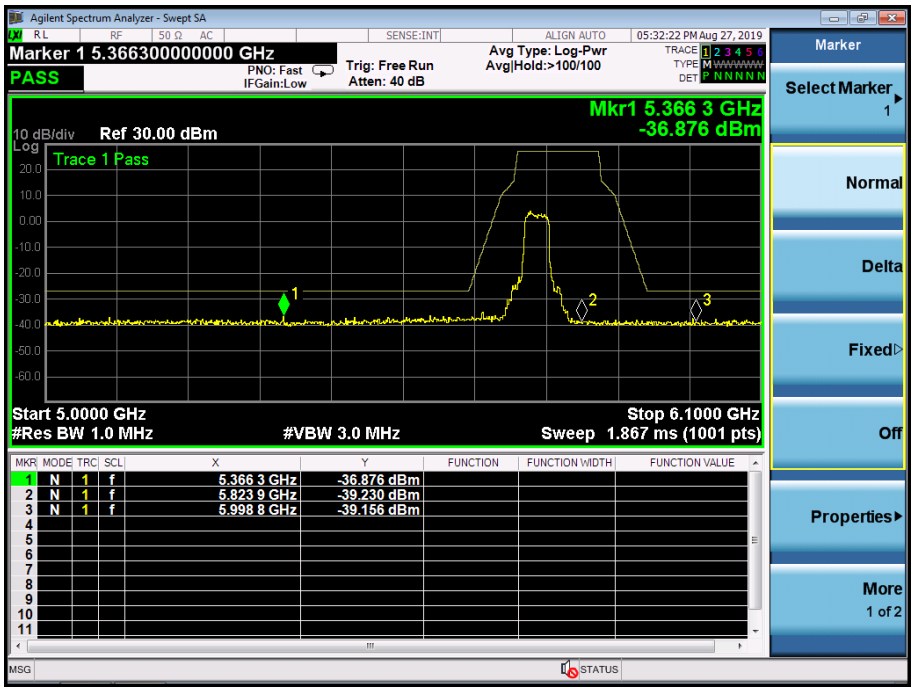


(802.11n20) Band Edge, Right Side

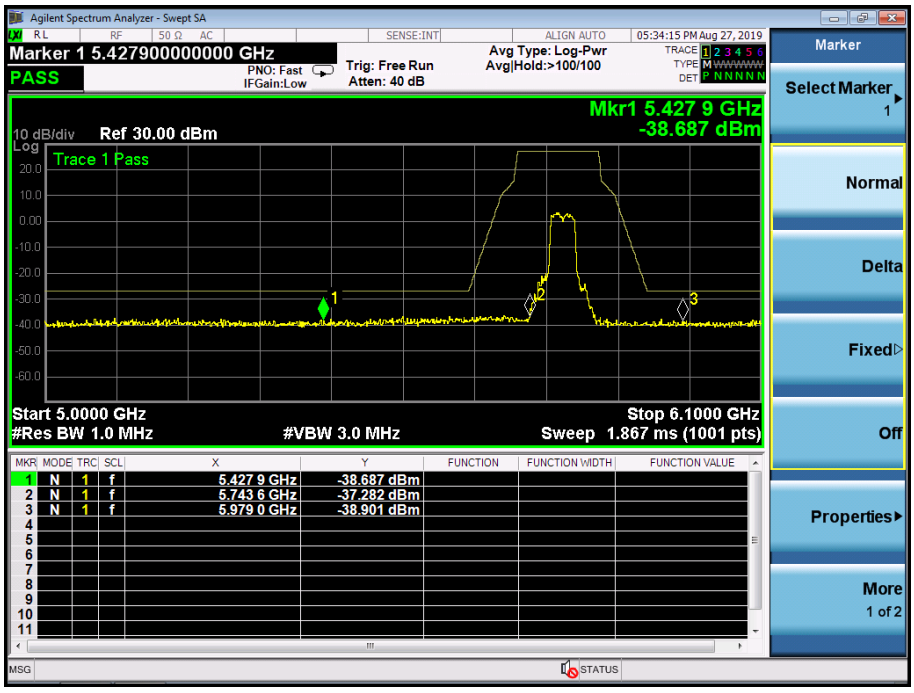


5.75~5.85 GHz

(802.11n40) Band Edge, Left Side

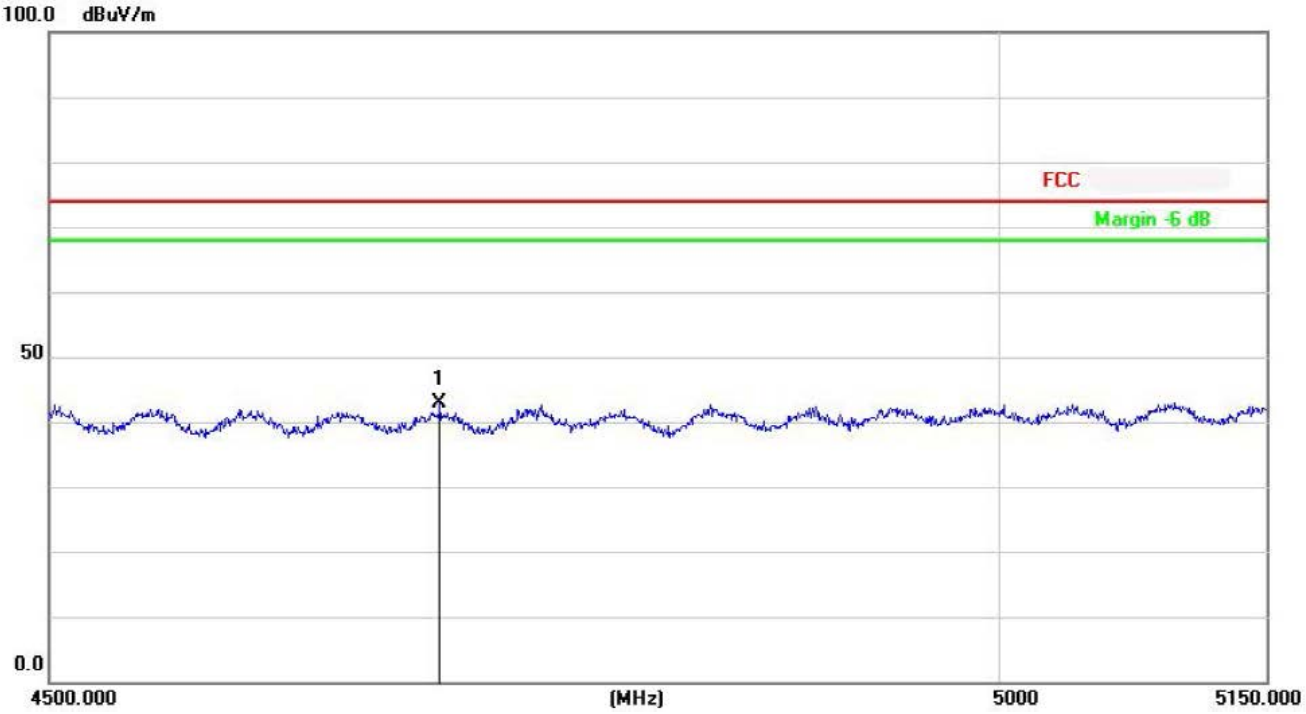


(802.11n40) Band Edge, Right Side

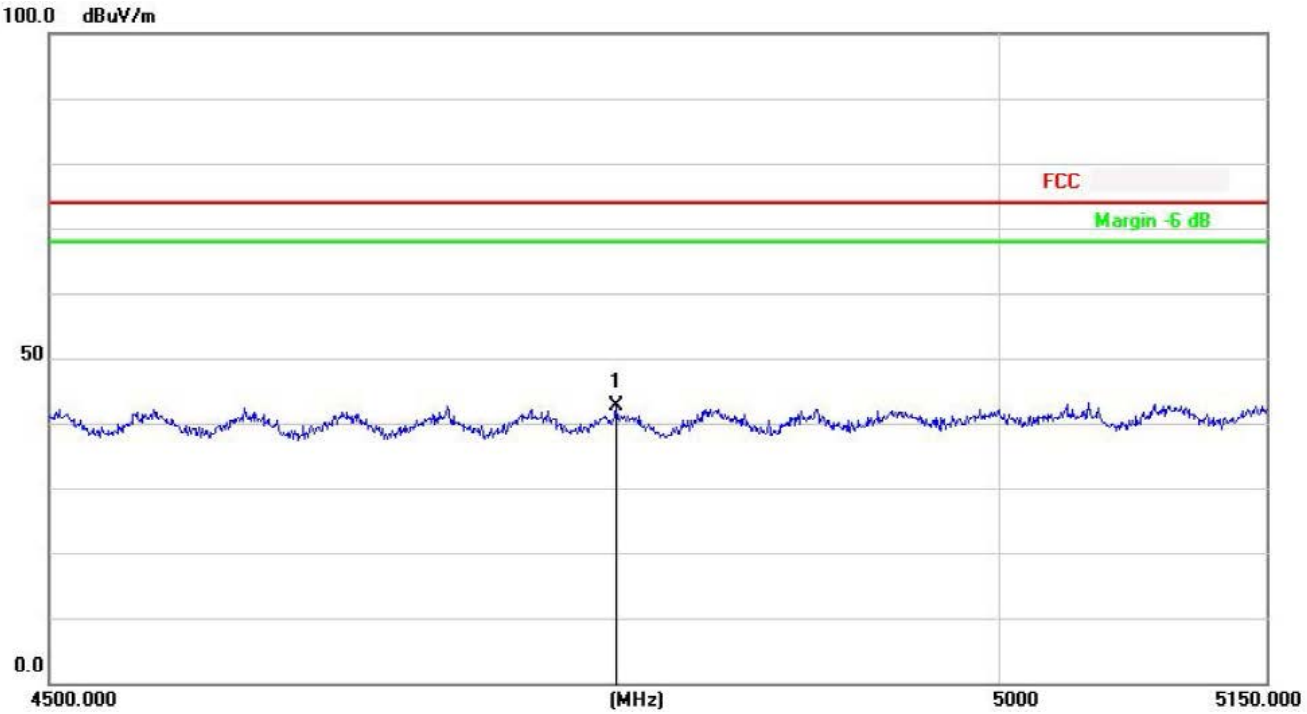


Radiated bandedge

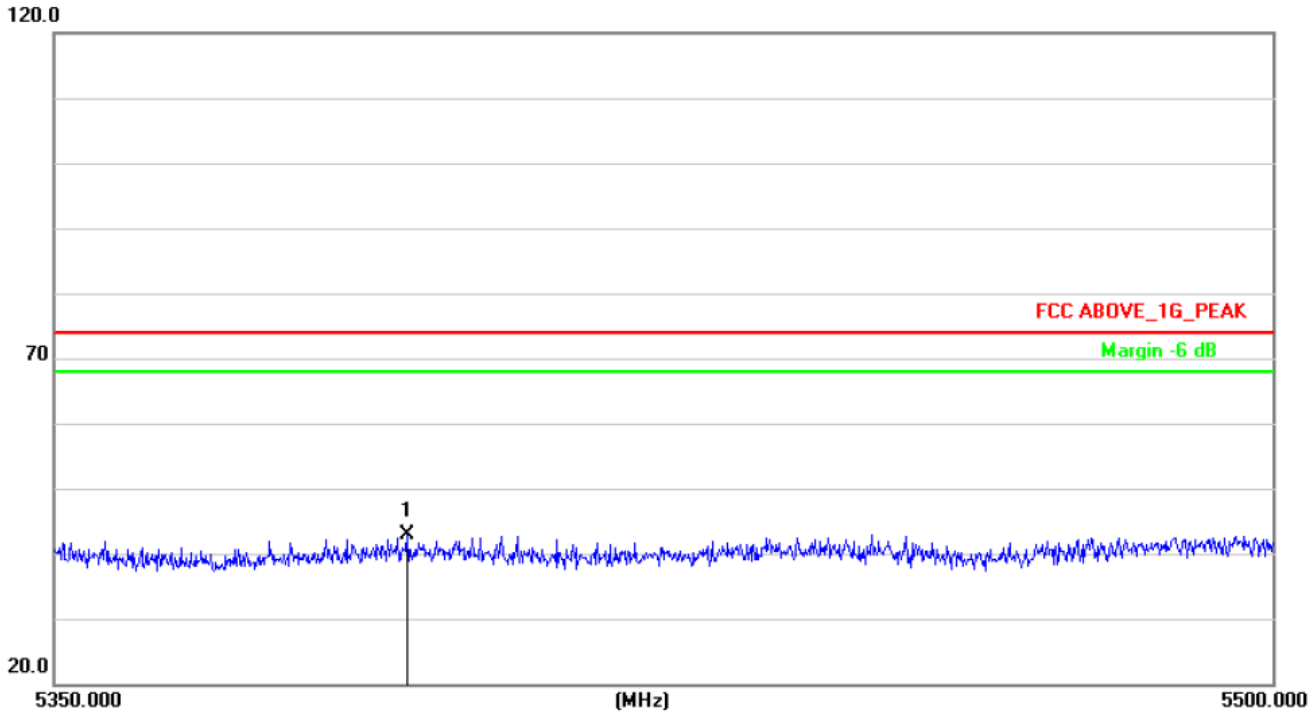
802.11 a
For the frequency band 5150-5250MHz



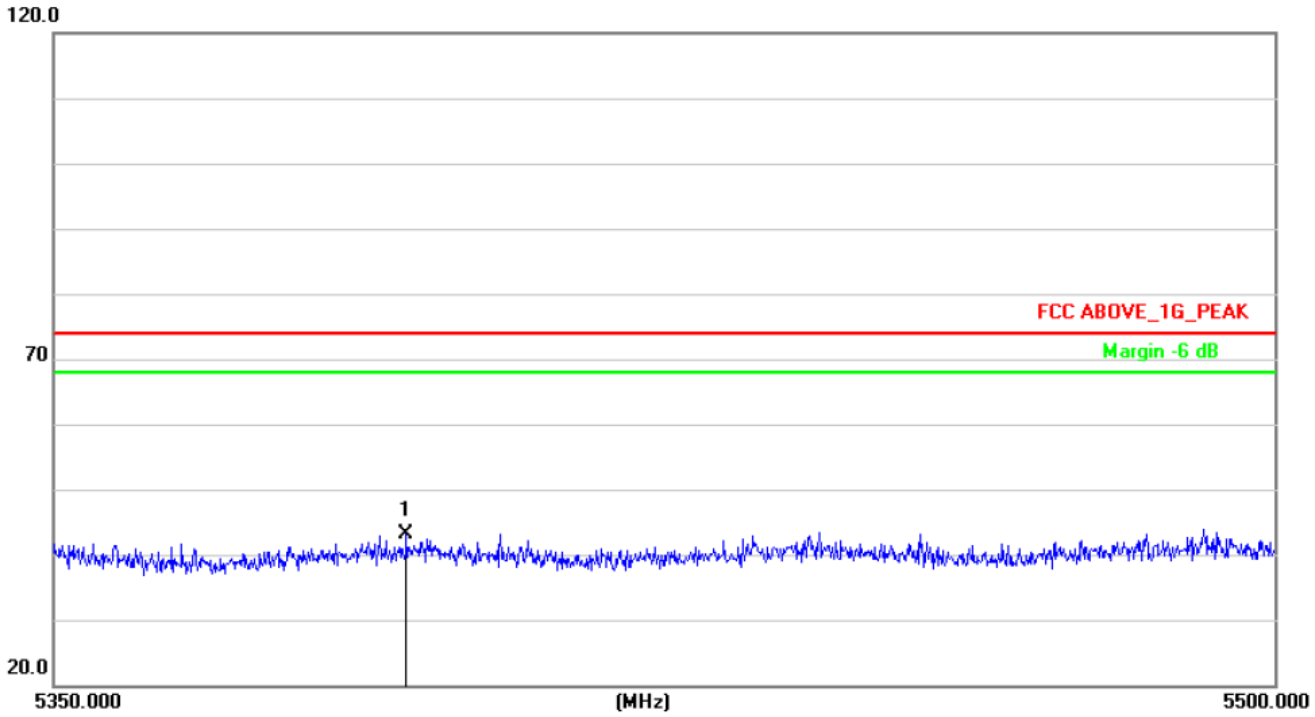
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type	Polarization
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
4699.550	43.33	-0.51	42.82	74.00	-31.18	PK	Horizontal
Remark: Factor = Antenna Factor + Correct Factor. Correct Factor= Cable Loss – Pre-amplifier							



Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type	Polarization
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
4792.55	43.16	-0.44	42.72	74.00	-31.28	PK	Vertical
Remark: Factor = Antenna Factor + Correct Factor. Correct Factor= Cable Loss – Pre-amplifier							



Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type	Polarization
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
5393.200	41.61	1.38	42.99	74.00	-31.01	PK	Horizontal
Remark: Factor = Antenna Factor + Correct Factor. Correct Factor= Cable Loss – Pre-amplifier							



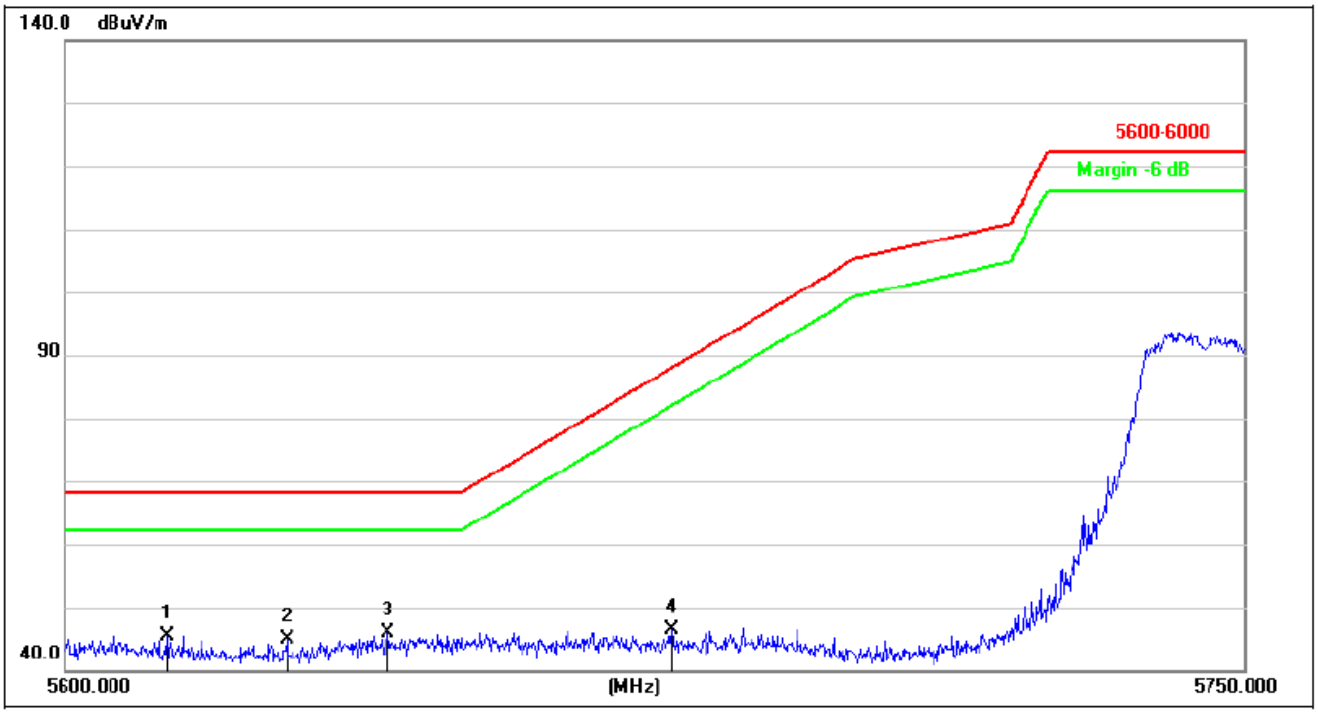
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type	Polarization
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
5393.05	41.79	1.38	43.17	74.00	-30.83	PK	Vertical
Remark: Factor = Antenna Factor + Correct Factor. Correct Factor= Cable Loss – Pre-amplifier							

Note:
1. This EUT was tested in 802.11a/n(HT20), n(HT40) mode and 802.11a the worst case position data was reported.

802.11n(HT20)

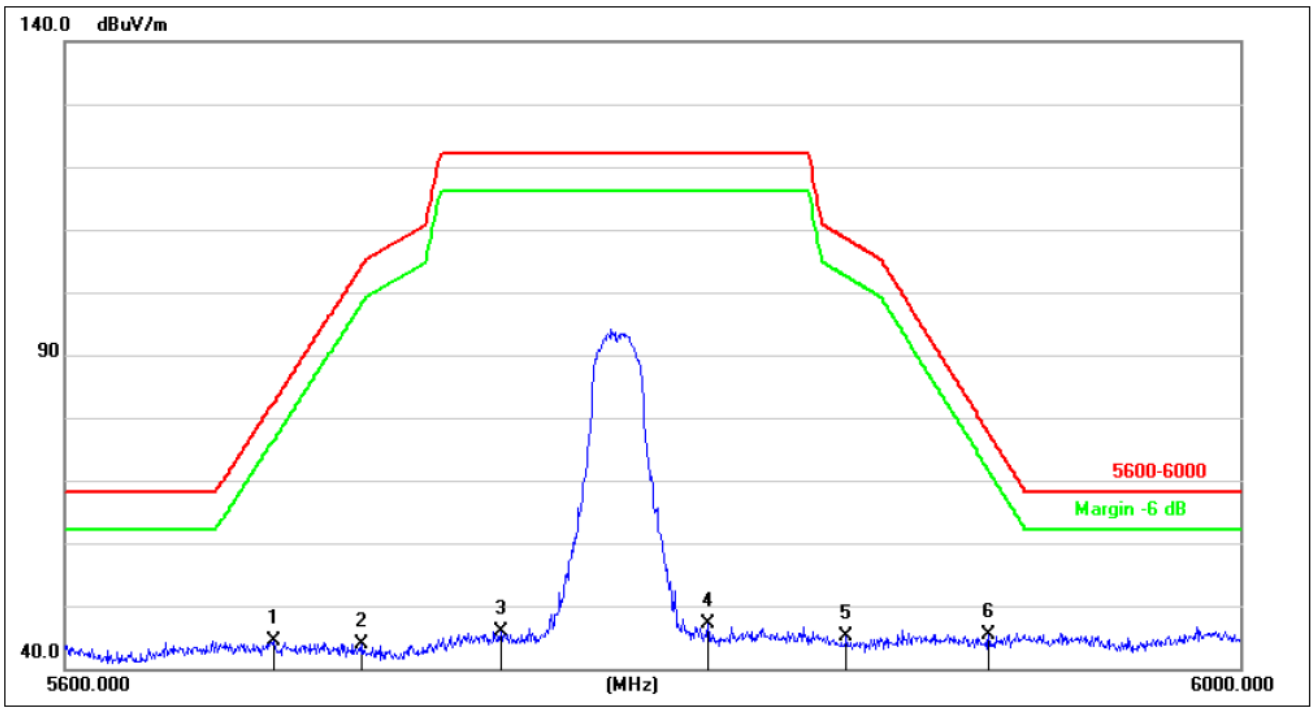
For the frequency band 5725-5850MHz

Low Channel



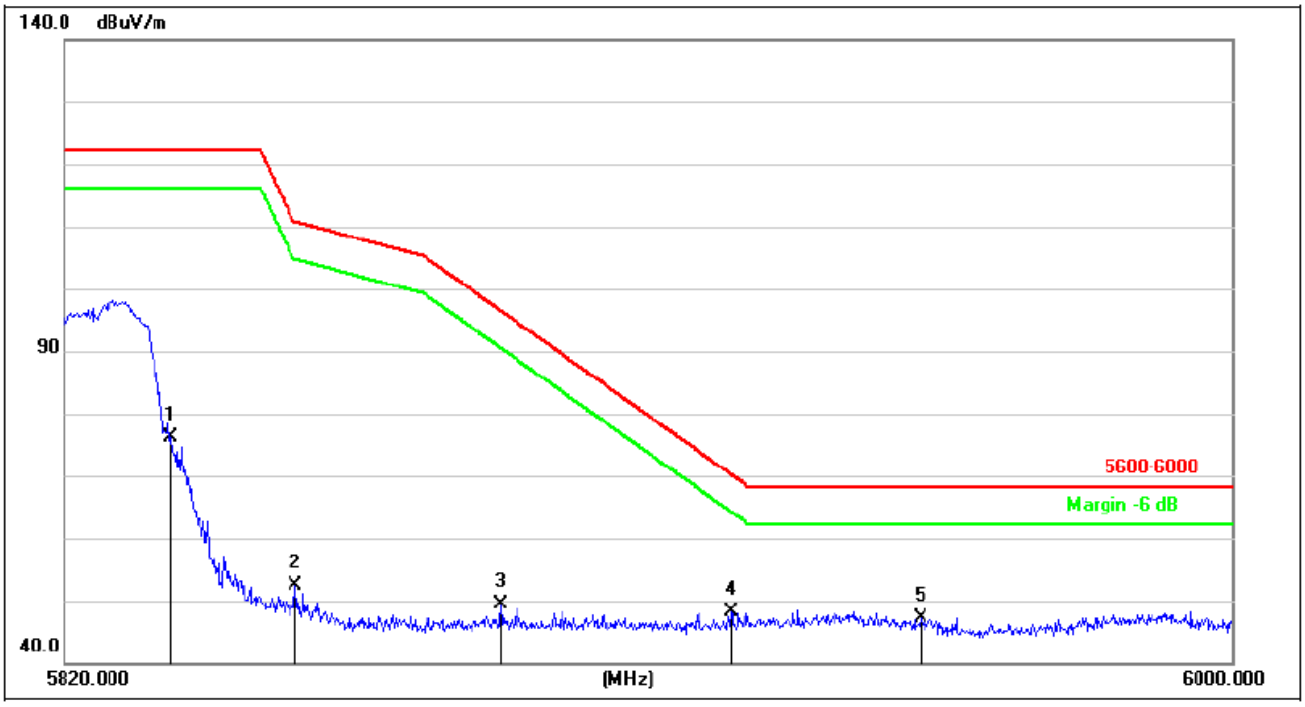
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	5612.900	42.99	2.31	45.30	68.20	-22.90	peak
2	5627.900	42.40	2.38	44.78	68.20	-23.42	peak
3	5640.800	43.36	2.43	45.79	68.20	-22.41	peak
4	5676.800	43.86	2.59	46.45	88.07	-41.62	peak

Middle Channel



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	5669.200	41.79	2.55	44.34	82.45	-38.11	peak
2	5698.800	41.25	2.68	43.93	104.32	-60.39	peak
3	5745.200	43.06	2.88	45.94	122.20	-76.26	peak
4	5815.600	44.06	3.18	47.24	122.20	-74.96	peak
5	5863.200	41.63	3.38	45.01	108.50	-63.49	peak
6	5912.400	41.76	3.59	45.35	77.49	-32.14	peak

High Channel



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	5836.200	72.96	3.26	76.22	122.20	-45.98	peak
2	5855.280	49.14	3.34	52.48	110.72	-58.24	peak
3	5886.780	45.93	3.48	49.41	96.45	-47.04	peak
4	5922.240	44.38	3.63	48.01	70.23	-22.22	peak
5	5951.760	43.37	3.75	47.12	68.20	-21.08	peak

Note:
1. This EUT was tested in 802.11a/n/ac(HT20), n/ac(HT40), ac(HT80) mode and 802.11n(HT20) the worst case position data was reported.