

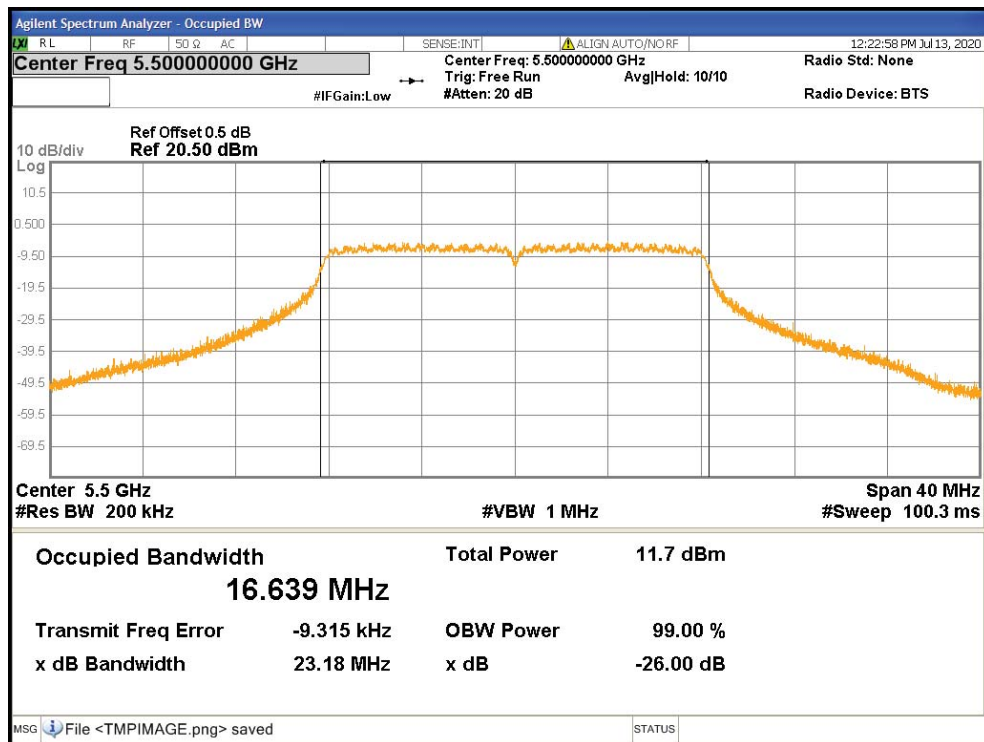


Figure 33: Occupied Bandwidth-5500 MHz-802.11a

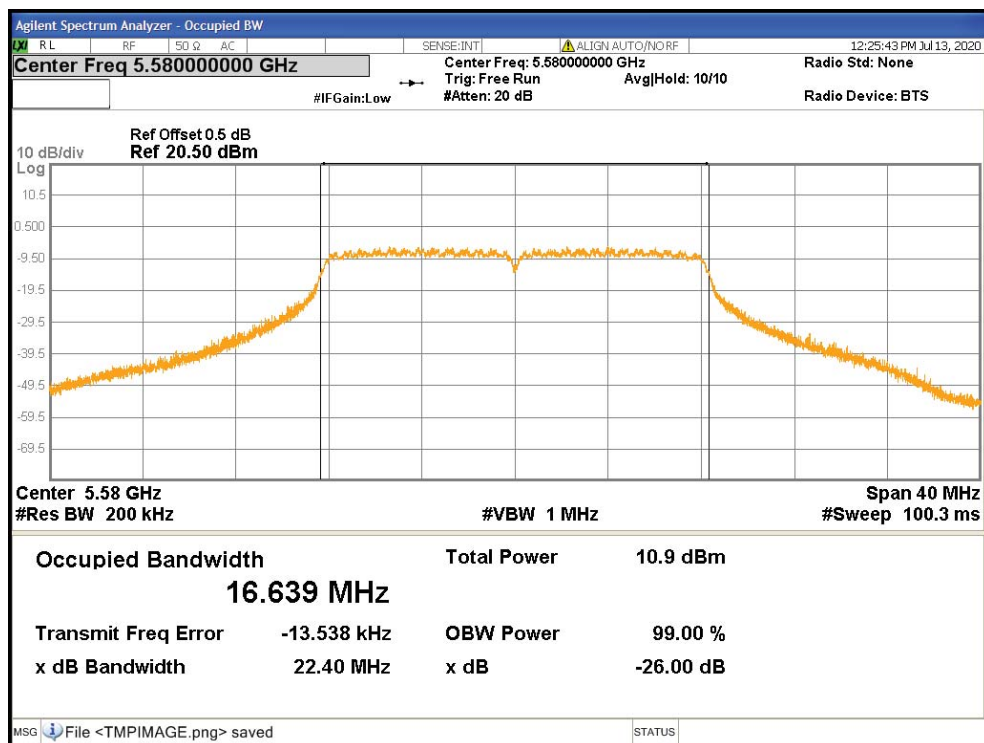


Figure 34: Occupied Bandwidth-5580 MHz-802.11a

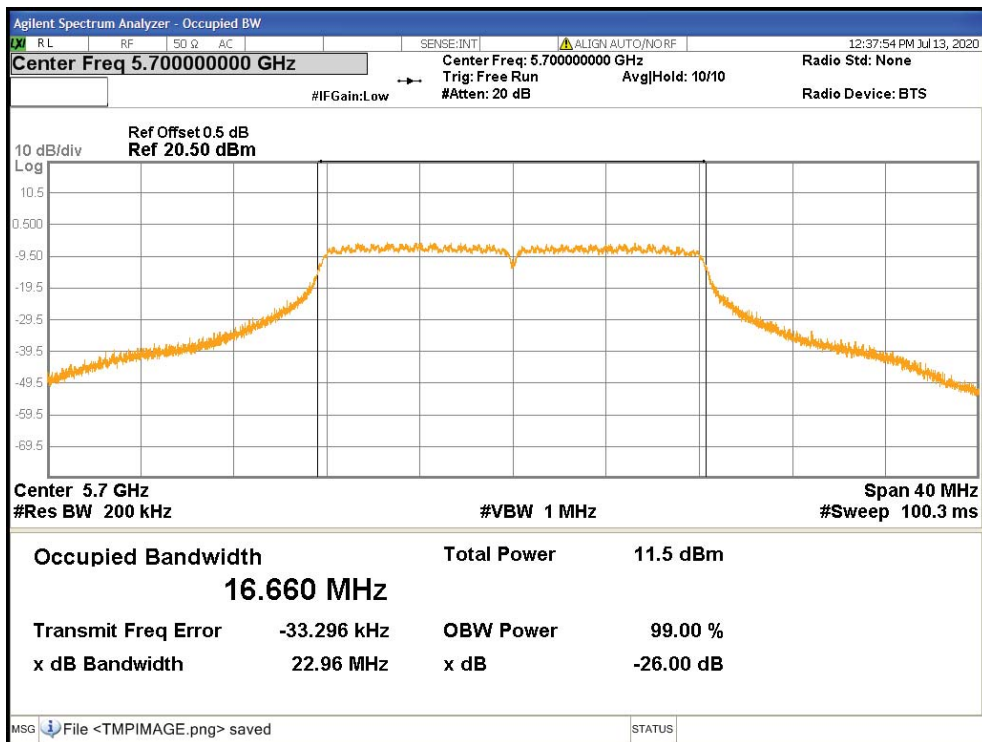


Figure 35: Occupied Bandwidth-5700 MHz-802.11a

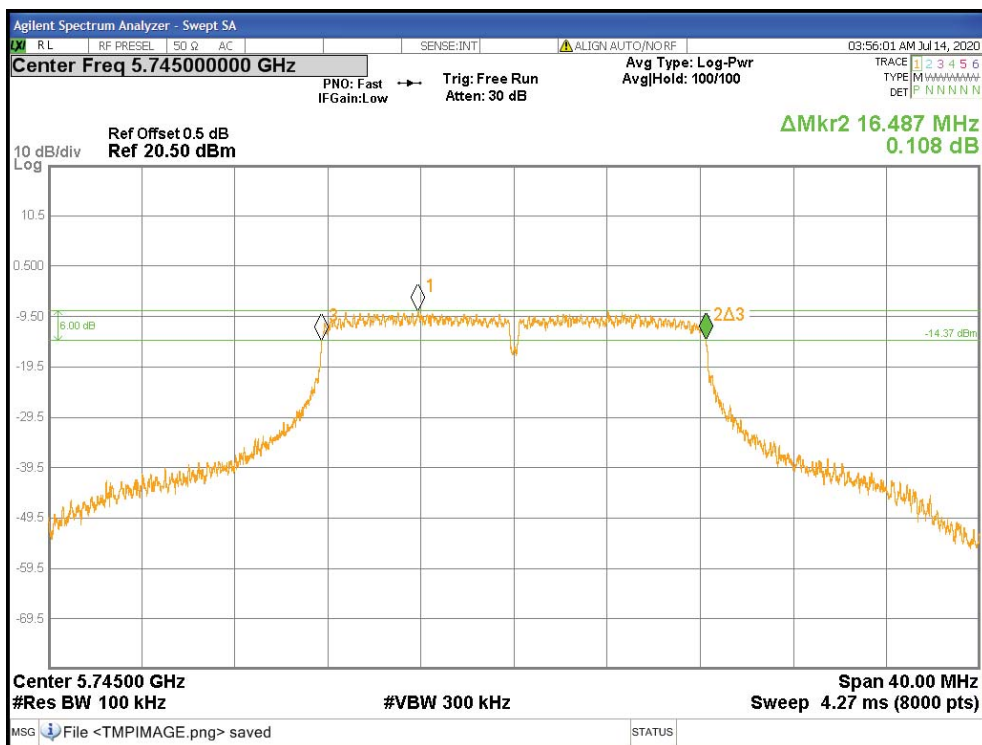


Figure 36: DTS Bandwidth-5745 MHz-802.11a

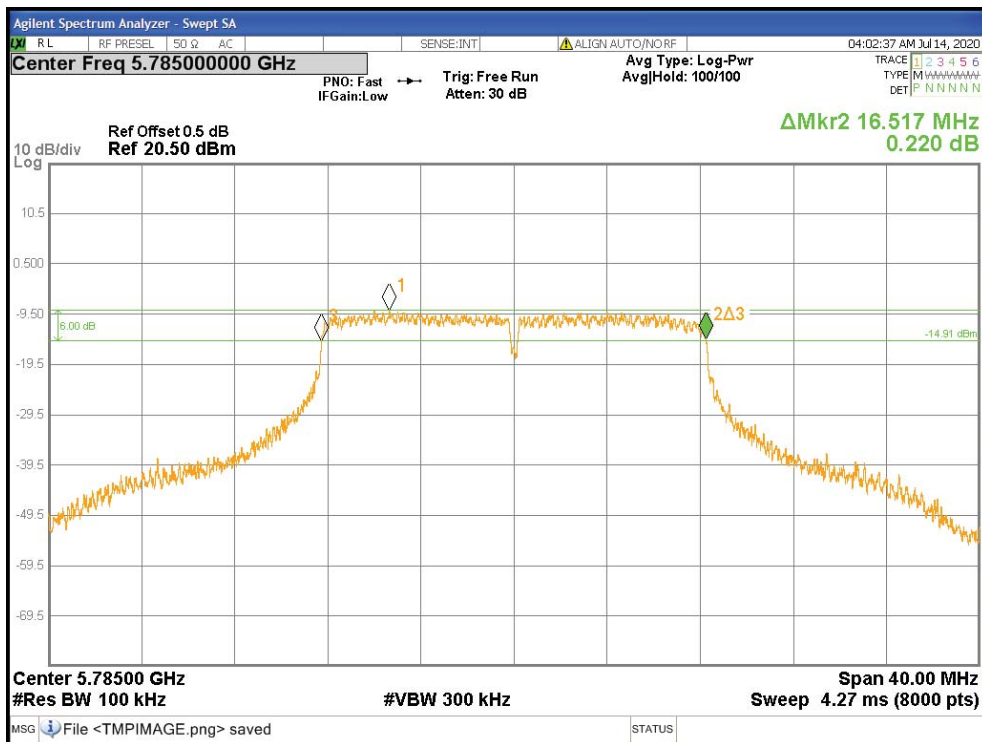


Figure 37: DTS Bandwidth-5785 MHz-802.11a

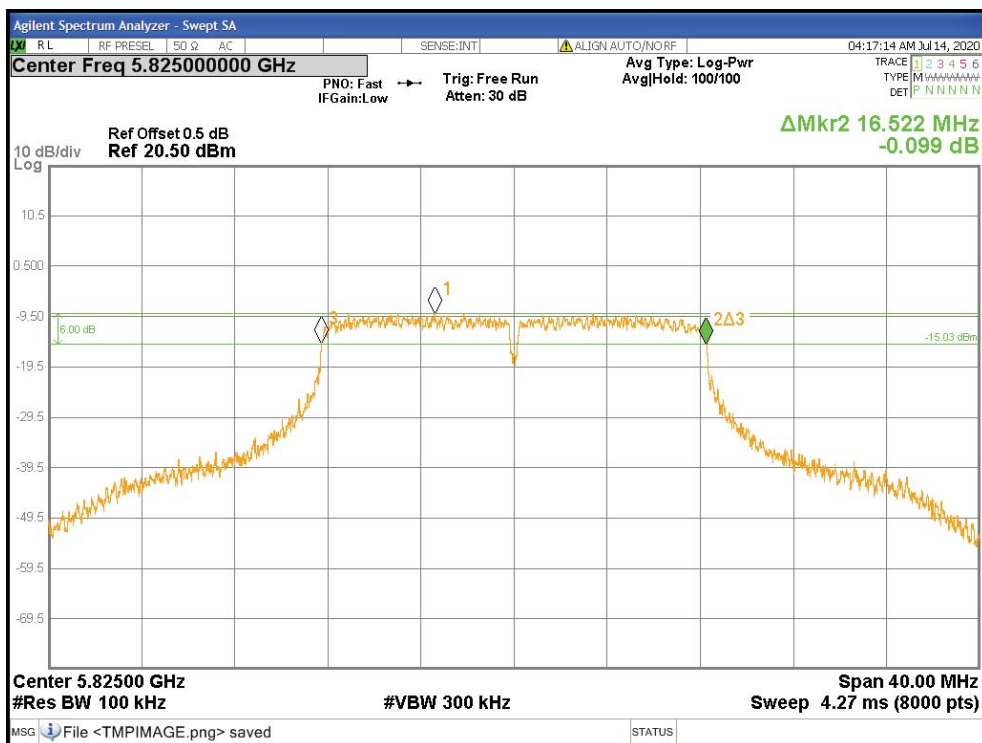


Figure 38: DTS Bandwidth-5825 MHz-802.11a

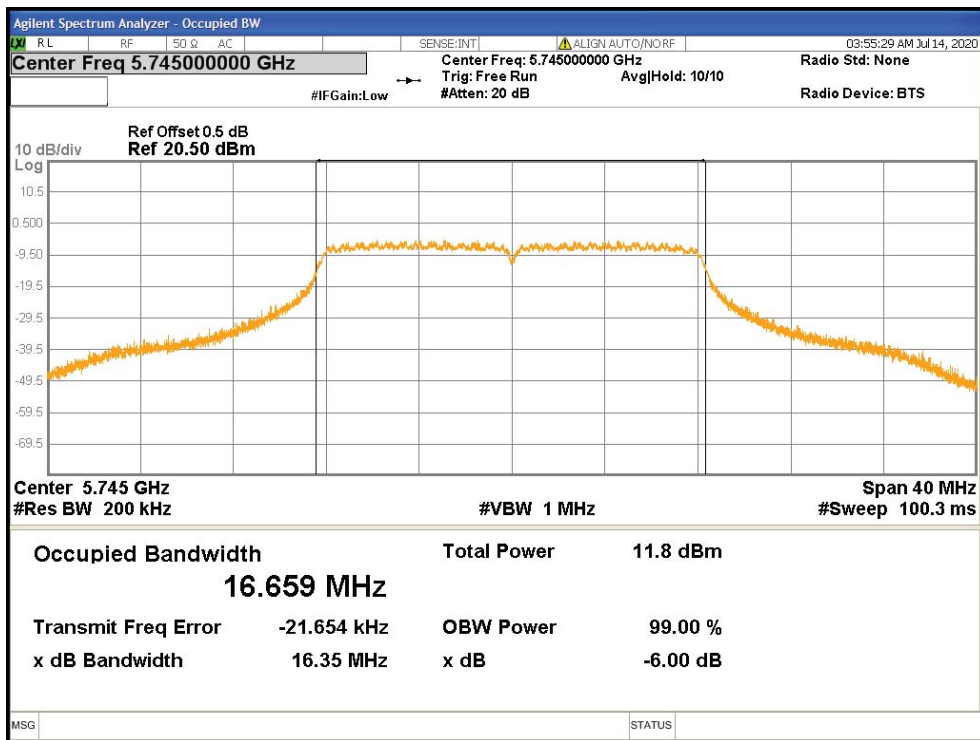


Figure 39: Occupied Bandwidth-5745 MHz-802.11a

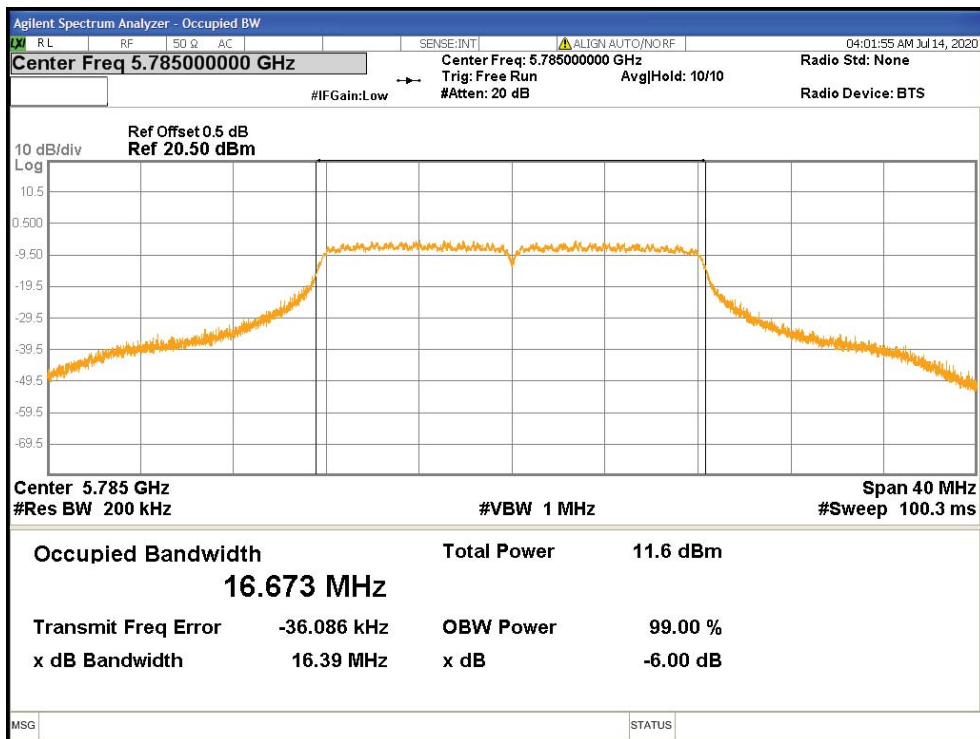


Figure 40: Occupied Bandwidth-5785 MHz-802.11a

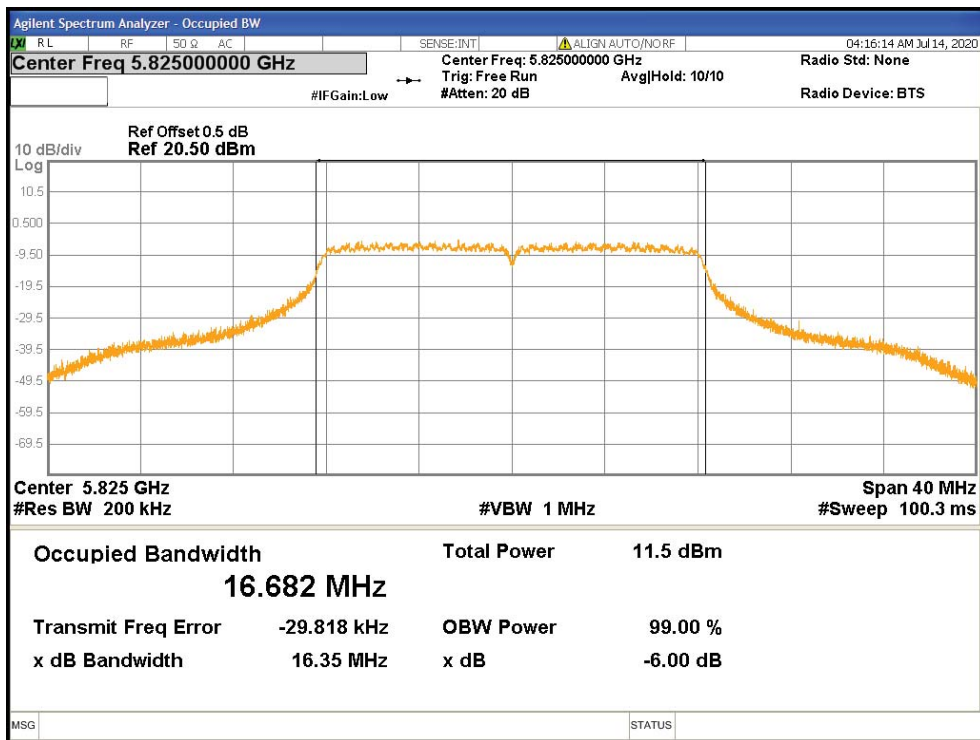


Figure 41: Occupied Bandwidth-5825 MHz-802.11a

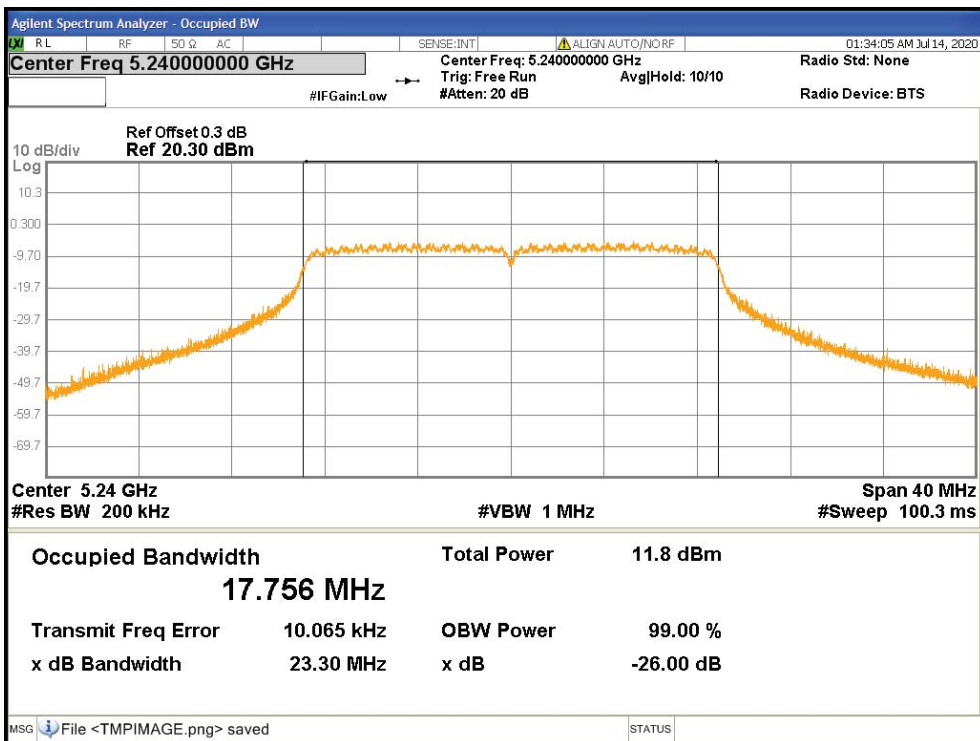


Figure 42: Occupied Bandwidth-5240 MHz-802.11n HT20

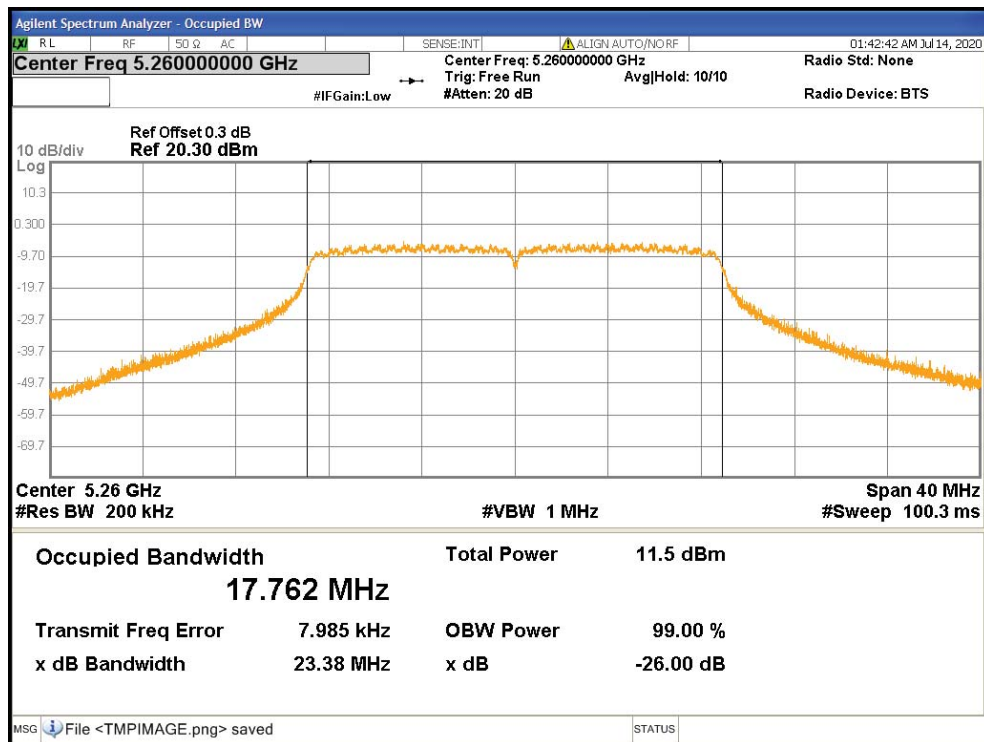


Figure 43: Occupied Bandwidth-5260 MHz-802.11n HT20

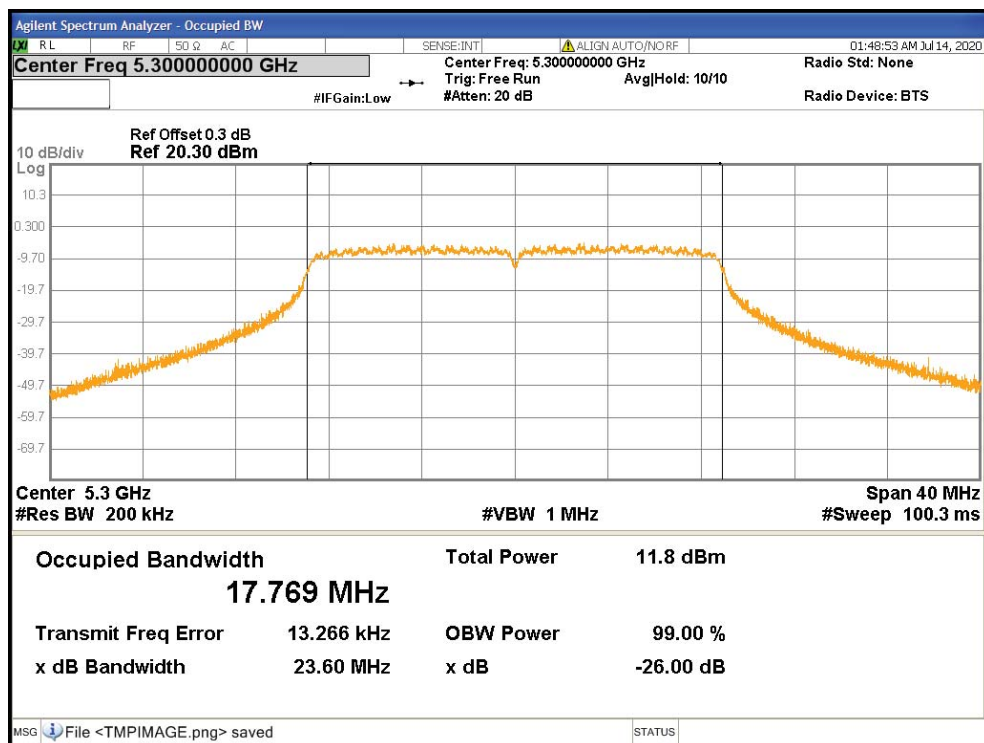


Figure 44: Occupied Bandwidth-5300 MHz-802.11n HT20

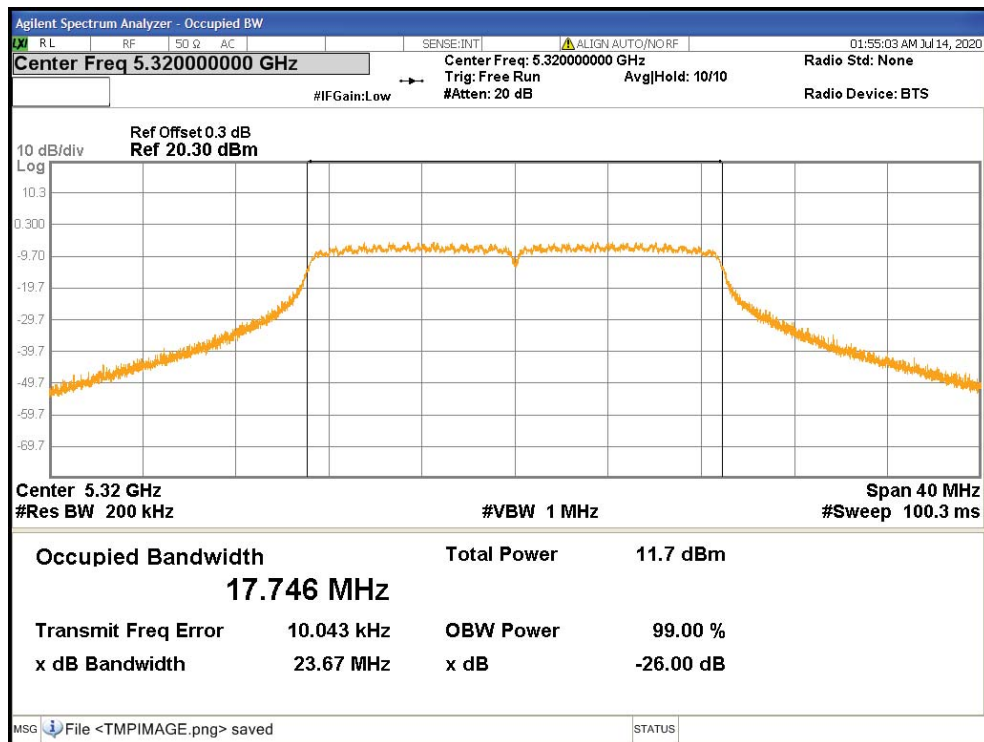


Figure 45: Occupied Bandwidth-5320 MHz-802.11n HT20

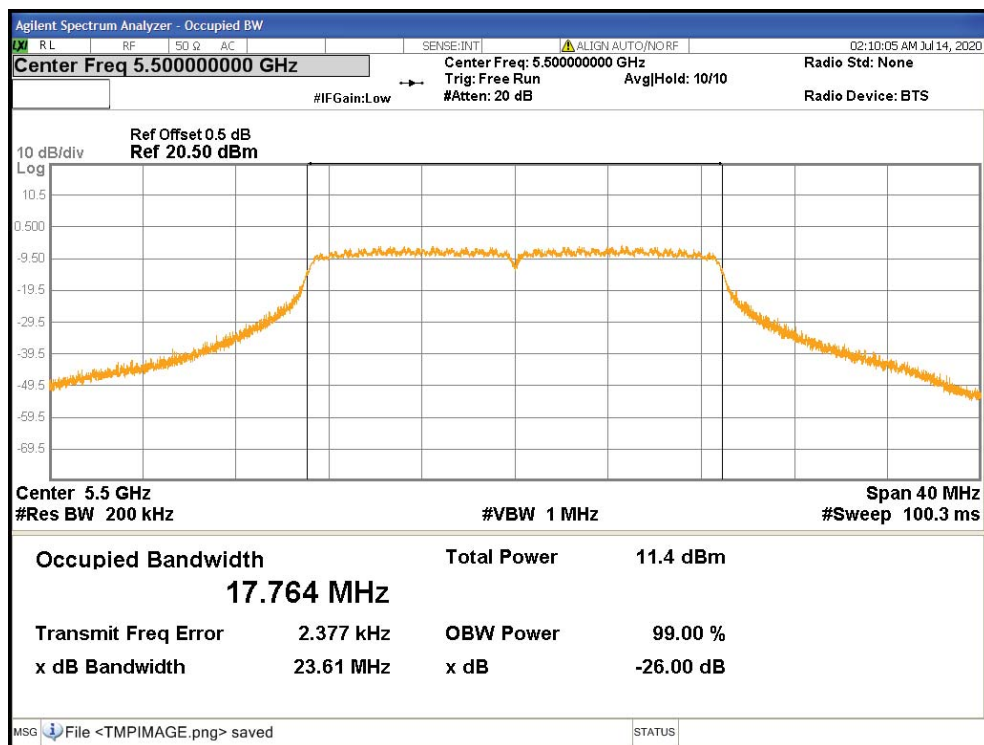


Figure 46: Occupied Bandwidth-5500 MHz-802.11n HT20

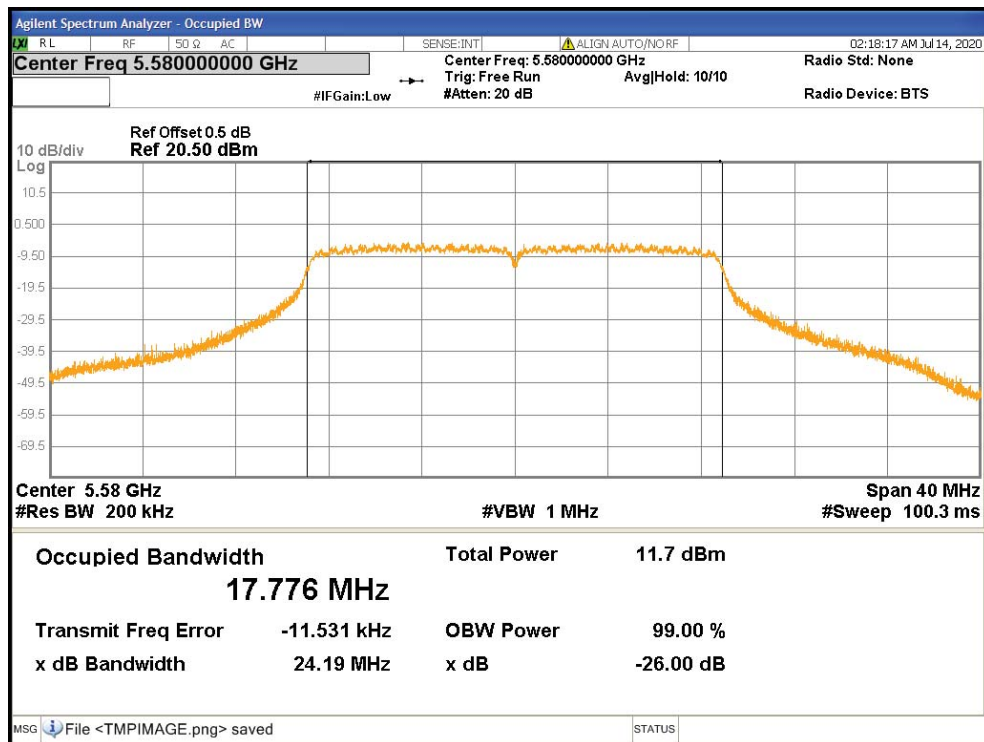


Figure 47: Occupied Bandwidth-5580 MHz-802.11n HT20

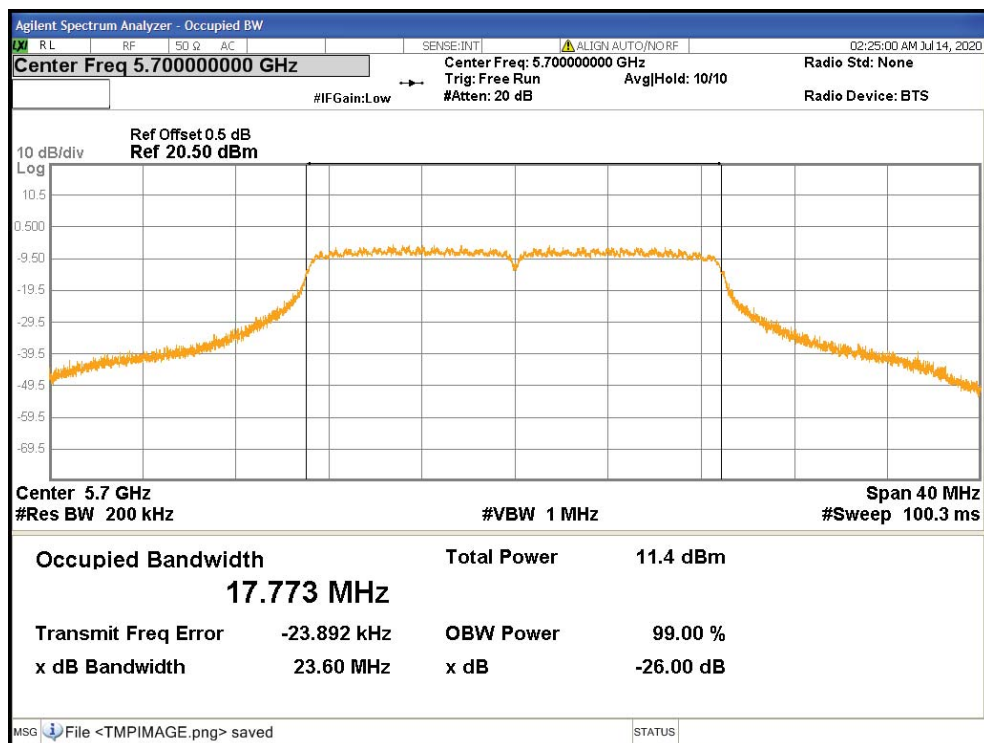


Figure 48: Occupied Bandwidth-5700 MHz-802.11n HT20

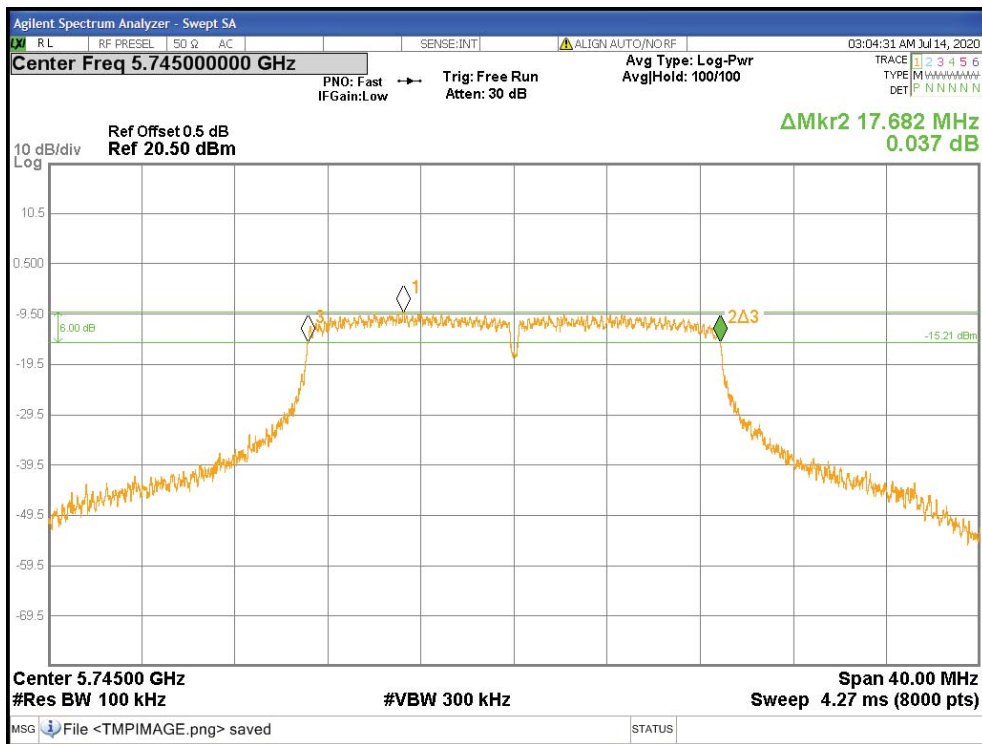


Figure 49: DTS Bandwidth-5745 MHz-802.11n HT20

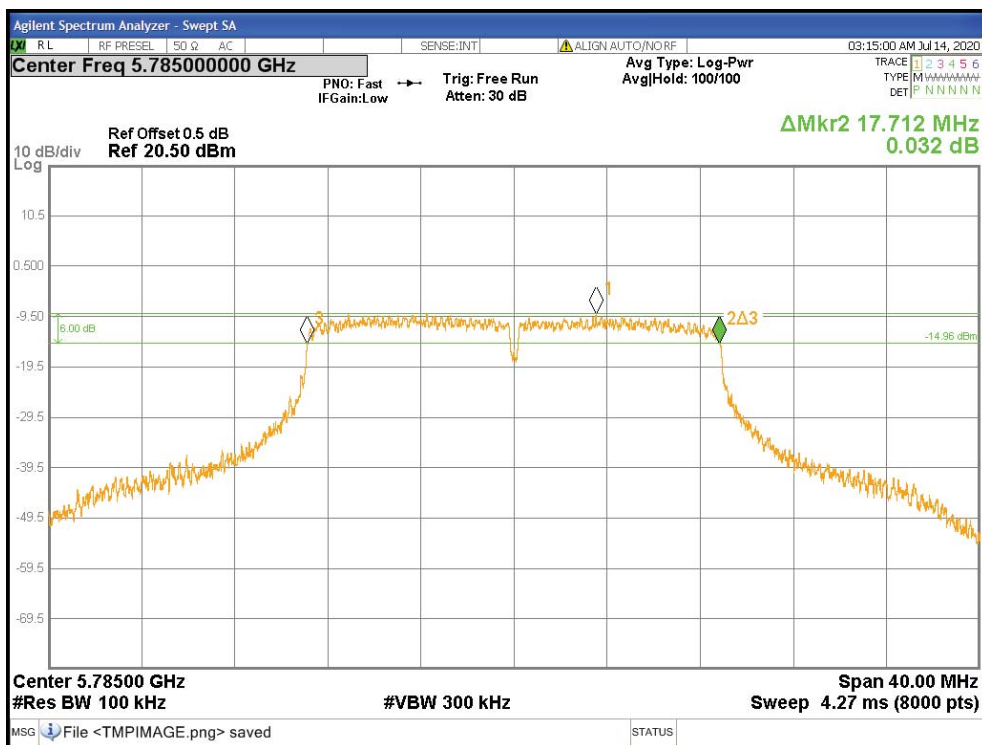


Figure 50: DTS Bandwidth-5785 MHz-802.11n HT20

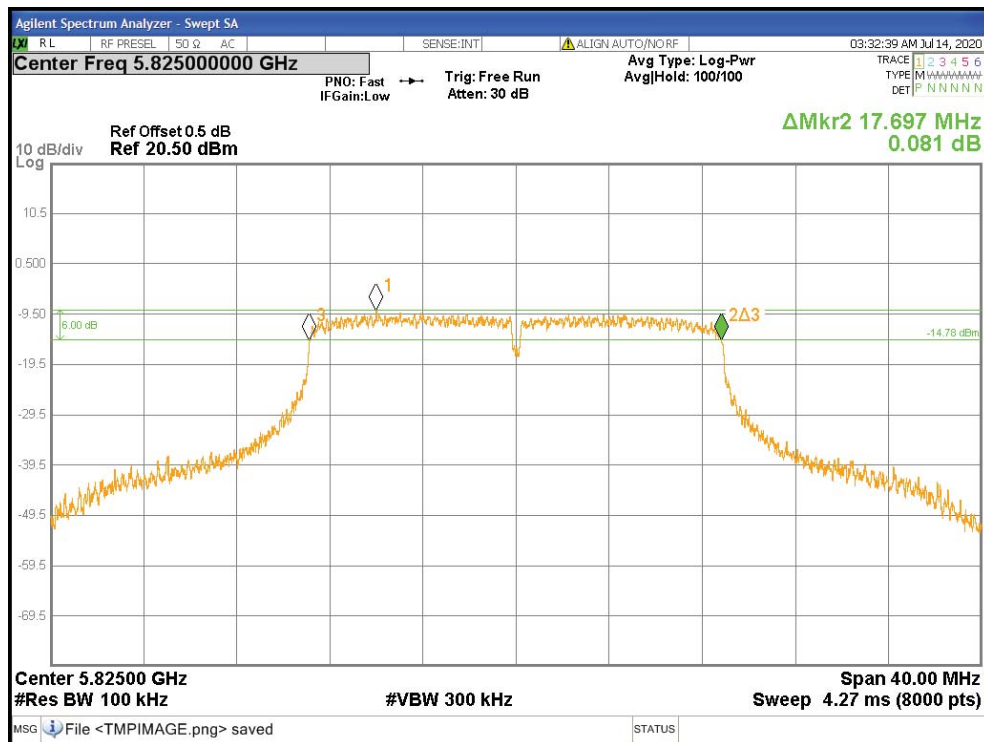


Figure 51: DTS Bandwidth-5825 MHz-802.11n HT20

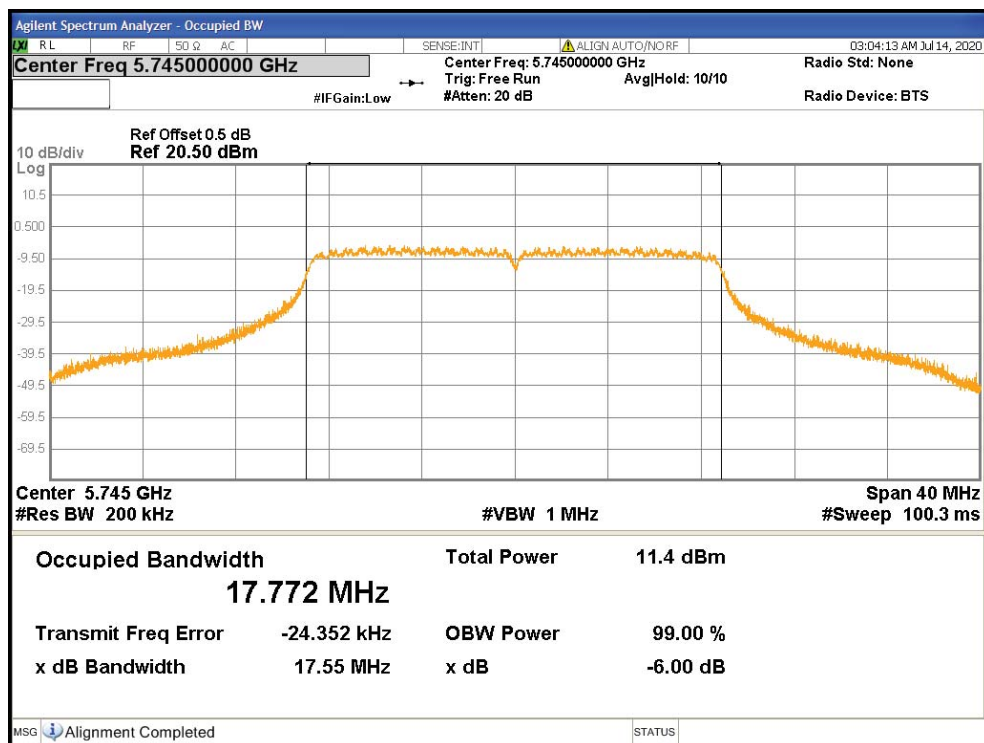


Figure 52: Occupied Bandwidth-5745 MHz-802.11n HT20

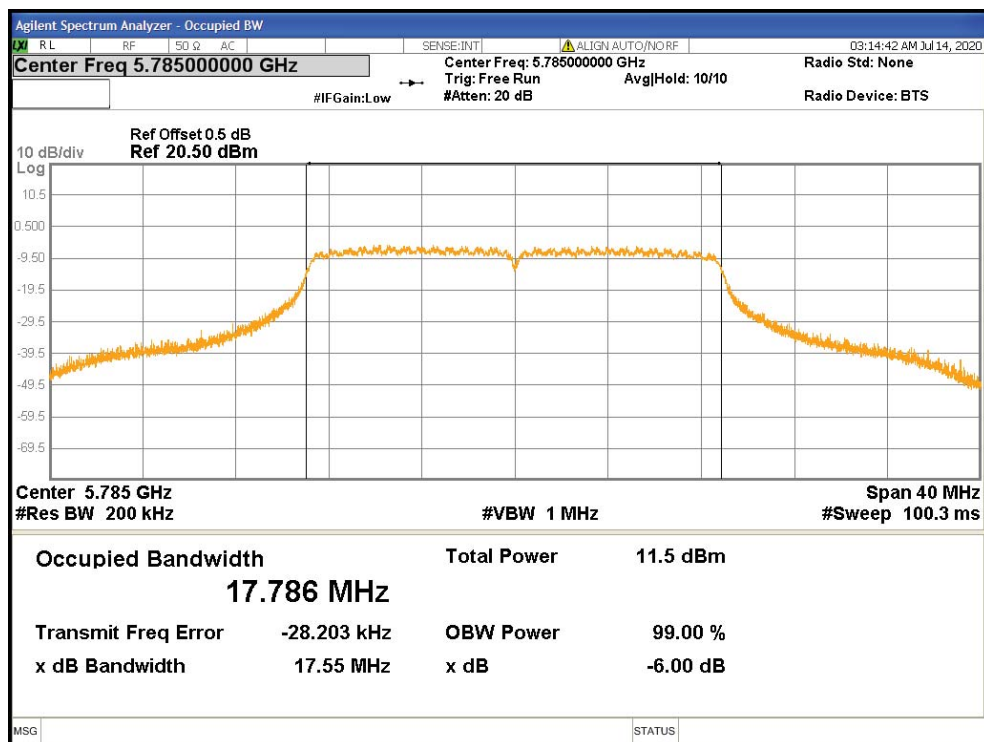


Figure 53: Occupied Bandwidth-5785 MHz-802.11n HT20

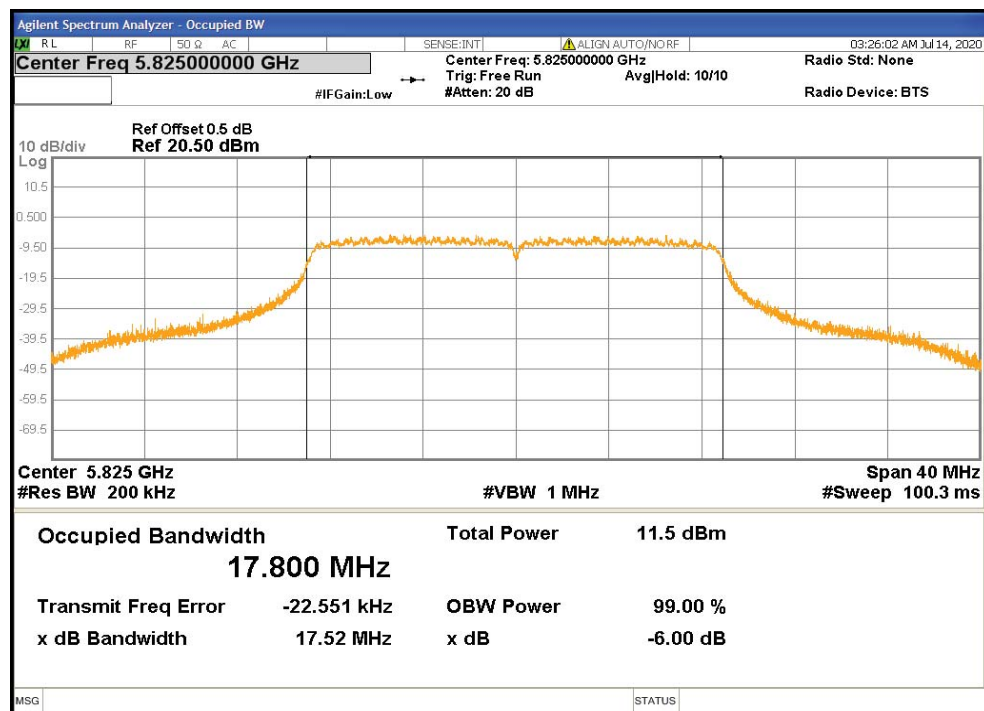


Figure 54: Occupied Bandwidth-5825 MHz-802.11n HT20

4.3 Power Spectral Density

According to the CFR47 Part 15.407 (a) and RSS 247 Sect. 6.2, the spectral power density output of the antenna port shall be as followed listed below during any time interval of continuous transmission.

The power spectral density limits per CFR47 Part 15.407 (a):

Band 5150-5250 MHz, 5250-5350 MHz, and 5470-5725 MHz: 11 dBm in any 1 MHz band

Band 5725-5850 MHz: 30 dBm in any 500 kHz band.

The power spectral density limits per RSS-247 Section 6.2:

Band 5150-5250 MHz: 10 dBm in any 1 MHz band, E.I.R.P.

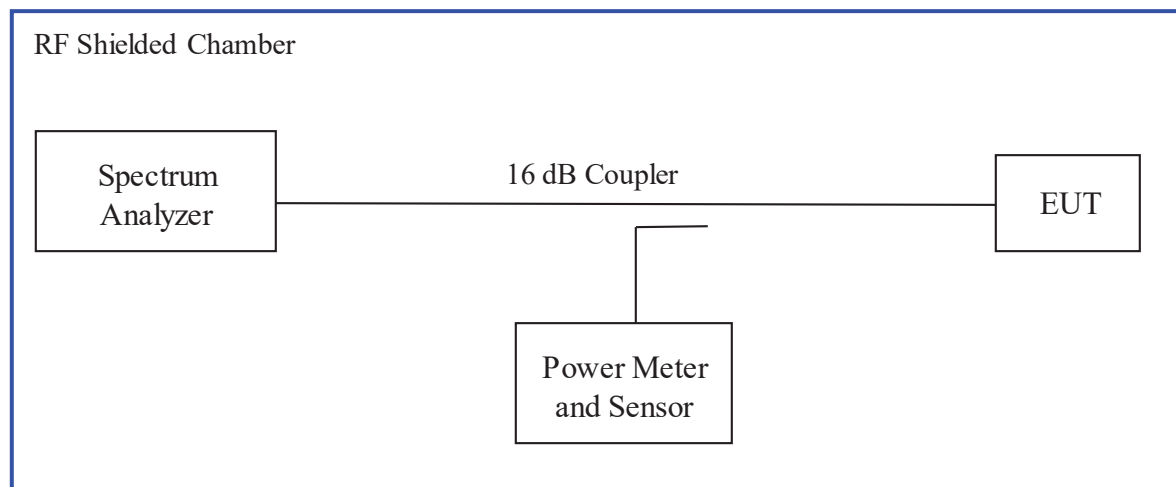
Band 5250-5350 MHz, and 5470-5725 MHz: 11 dBm in any 1 MHz band

Band 5725-5850 MHz: 30 dBm in any 500 kHz band

4.3.1 Test Method

The conducted method was used to measure the channel power output per ANSI C63.10-2013 Section 12.3.2.2. The measurement was performed with modulation per CFR47 Part 15.407 (a) and RSS 247 Sect. 6.2. The pre-evaluation was performed to find the worst modes. The worst findings were conducted on 3 channels in each operating frequency range. The worst sample result indicated below.

Test Setup:



4.3.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 5: Power Spectral Density – Test Results for 802.11a

Date: July 13, 2020			Tested By: Jeremy Luong		
Test Method: Conducted Measurements			Power Setting: See test plan.		
Antenna Type: Chip			Antenna Gain: +3.7 dBi		
Operating Mode: Uncorrelated			Signal State: Modulated at 100%		
Ambient Temp.: 23 °C			Relative Humidity: 38%		
802.11a					
Freq. (MHz)	Output [dBm]	CF [dB]	Total PPD [dBm]	Limit [dBm]	Margin [dB]
5180	-5.02			11.00*	-16.02
5200	-5.64			11.00*	-16.64
5240	-5.23			11.00*	-16.23
5260	-5.38			11.00	-16.38
5300	-5.49			11.00	-16.49
5320	-5.62			11.00	-16.62
5500	-5.10			11.00	-16.10
5580	5.58			11.00	-5.42
5700	-5.32			11.00	-16.32
5745	-14.46	6.99	-7.47	30.00	-37.47
5785	-14.29	6.99	-7.30	30.00	-37.30
5825	-14.54	6.99	-7.55	30.00	-37.55
802.11a (RSS-247 Limit)					
5180	-5.02			6.30	-11.32
5200	-5.64			6.30	-11.94
5240	-5.23			6.30	-11.53
Note: (*) FCC limit only, 5150-5250 MHz. RSS-247 and CFR47 Part 15.407 have same PPD limit in 5250-5350 MHz, 5470-5725 MHz, and 5725-5850 MHz bands. CF accounted for the measured RBW; 10*log (500kHz/100kHz) or 6.99 dB. RSS-247 Limit at 5150-5250 MHz is eirp; 10dBm – 3.7dBi = 6.3 dBm					

Table 6: Power Spectral Density – Test Results for 802.11n HT20

Date: July 13, 2020			Tested By: Jeremy Luong		
Test Method: Conducted Measurements			Power Setting: See test plan.		
Antenna Type: Chip			Antenna Gain: +3.7 dBi		
Operating Mode: Uncorrelated			Signal State: Modulated at 100%		
Ambient Temp.: 23 °C			Relative Humidity: 38%		
802.11n HT20					
Freq. (MHz)	Output [dBm]	CF [dB]	Total PPD [dBm]	Limit [dBm]	Margin [dB]
5180	-5.55			11.00*	-16.55
5200	-5.69			11.00*	-16.69
5240	-5.27			11.00*	-16.27
5260	-5.43			11.00	-16.43
5300	-5.44			11.00	-16.44
5320	-5.65			11.00	-16.65
5500	-5.76			11.00	-16.76
5580	-5.38			11.00	-16.38
5700	-5.47			11.00	-16.47
5745	-15.09	6.99	-8.10	30.00	-38.10
5785	-14.76	6.99	-7.77	30.00	-37.77
5825	-14.66	6.99	-7.67	30.00	-37.67
802.11n HT20 (RSS-247 Limit)					
5180	-5.55			6.30	-11.85
5200	-5.69			6.30	-11.99
5240	-5.27			6.30	-11.57
Note: (*) FCC limit only, 5150-5250 MHz. RSS-247 and CFR47 Part 15.407 have same PPD limit in 5250-5350 MHz, 5470-5725 MHz, and 5725-5850 MHz bands. CF accounted for the measured RBW; 10*log (500kHz/100kHz) or 6.99 dB. RSS-247 Limit at 5150-5250 MHz is eirp; 10dBm – 3.7dBi = 6.3 dBm					

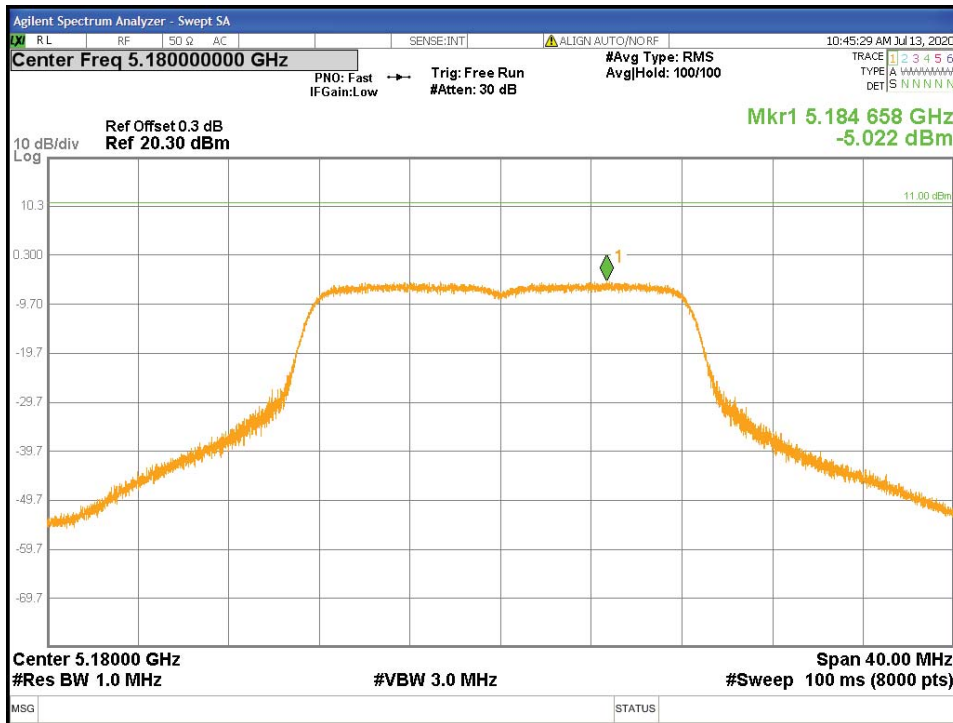


Figure 55: Power Spectral Density-5180 MHz-802.11a-6 Mbps

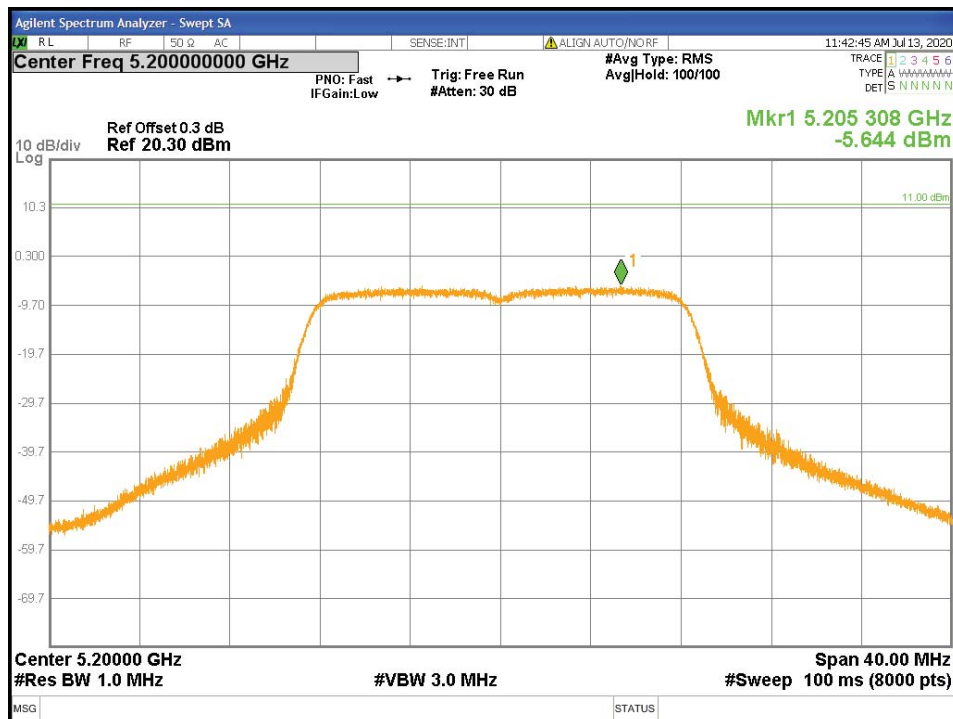


Figure 56: Power Spectral Density-5200 MHz-802.11a-6 Mbps

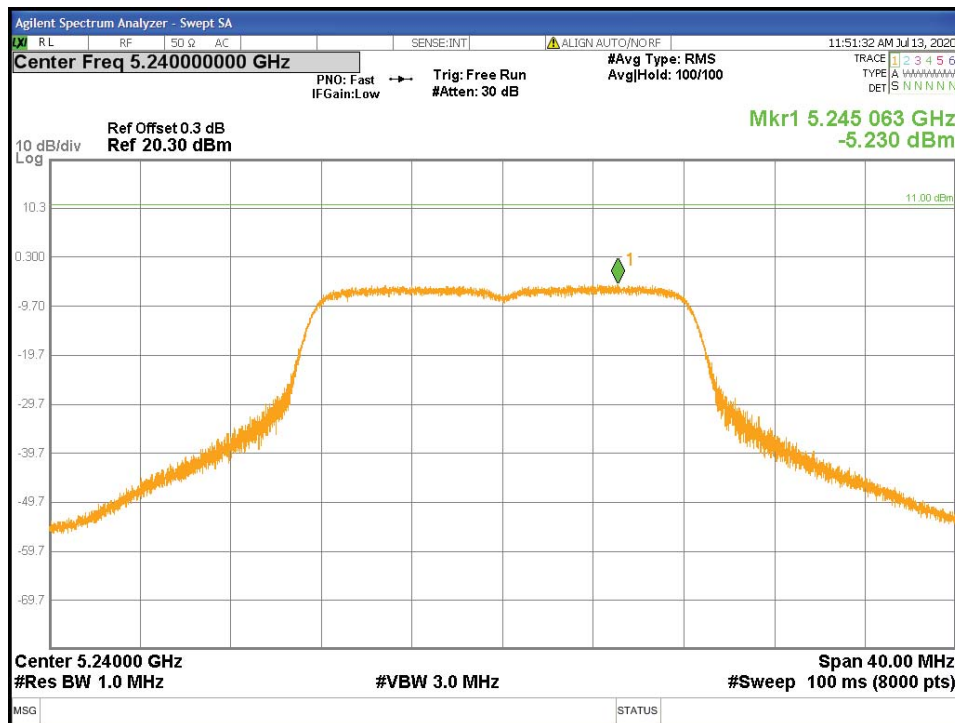


Figure 57: Power Spectral Density-5240 MHz-802.11a-6 Mbps

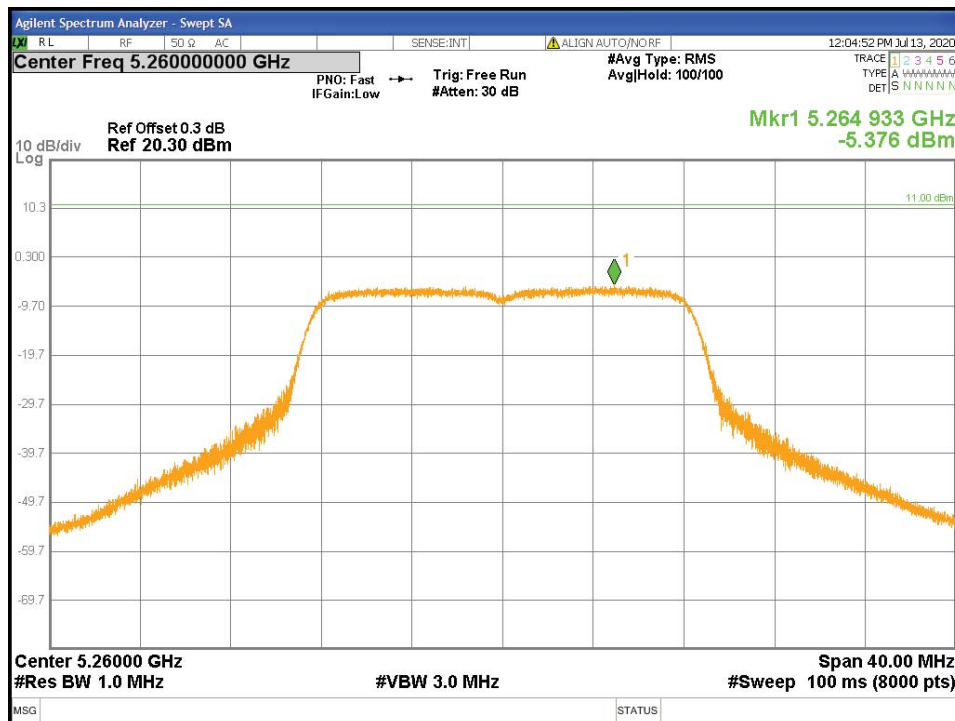


Figure 58: Power Spectral Density-5260 MHz-802.11a-6 Mbps

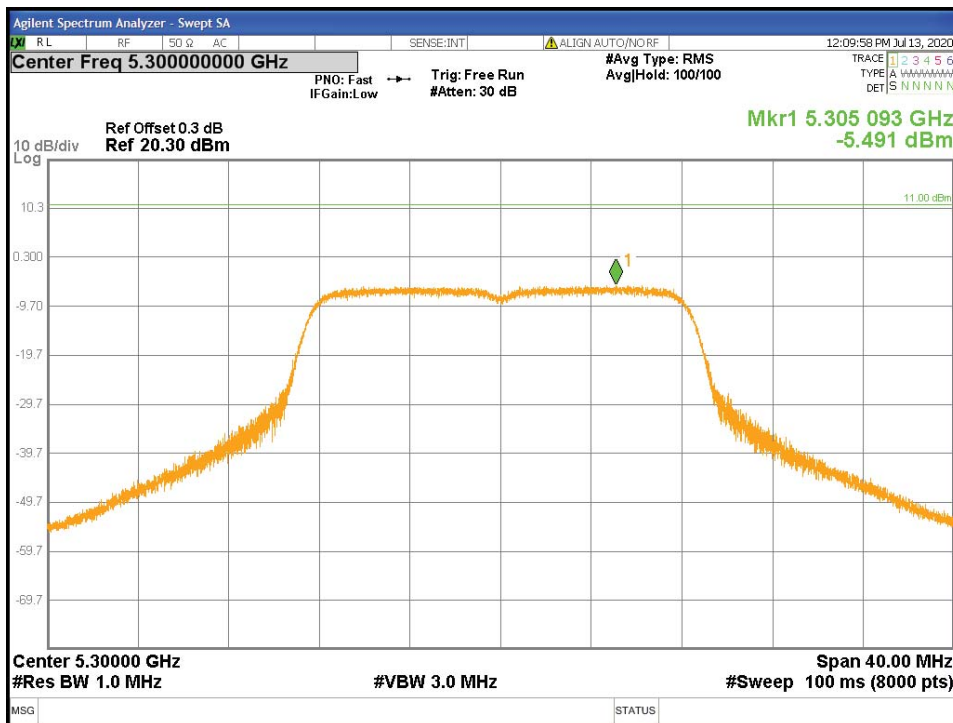


Figure 59: Power Spectral Density-5300 MHz-802.11a-6 Mbps

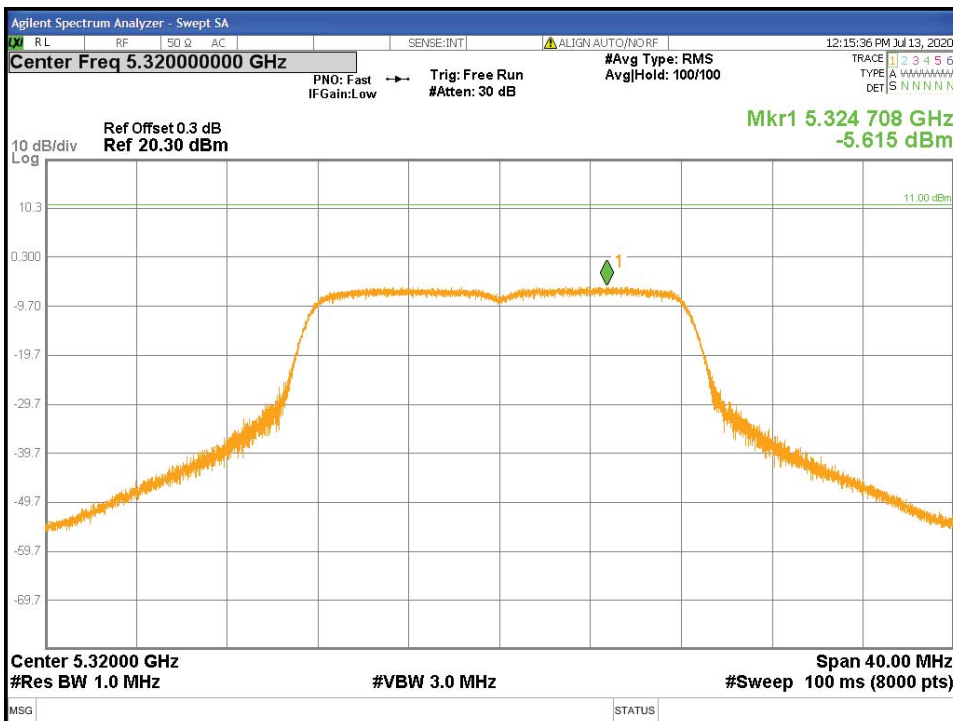


Figure 60: Power Spectral Density-5320 MHz-802.11a-6 Mbps

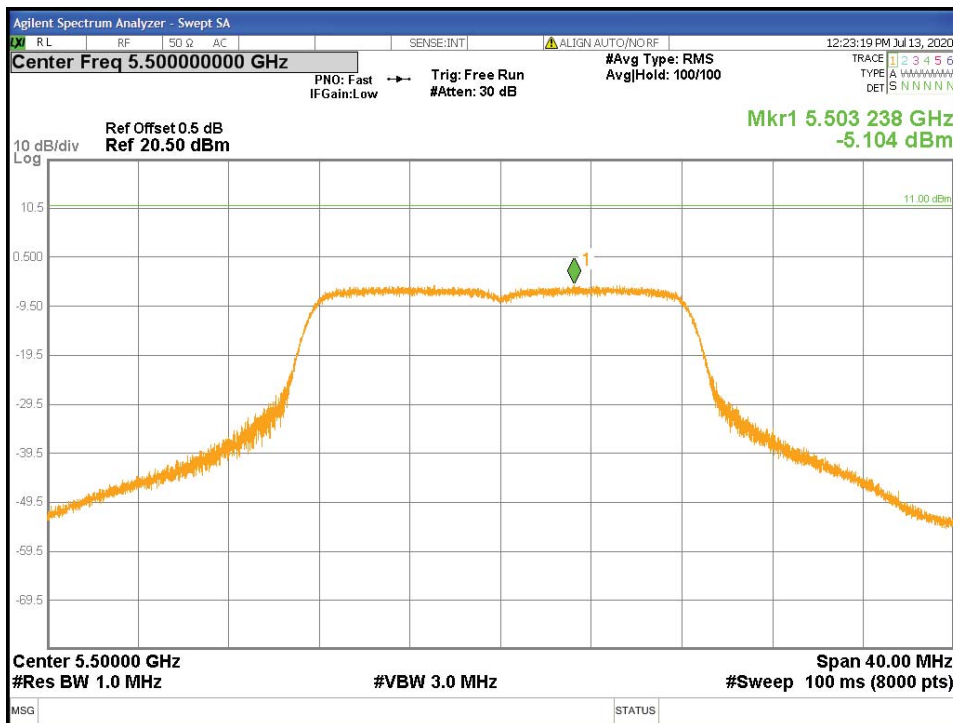


Figure 61: Power Spectral Density-5500 MHz-802.11a-6 Mbps

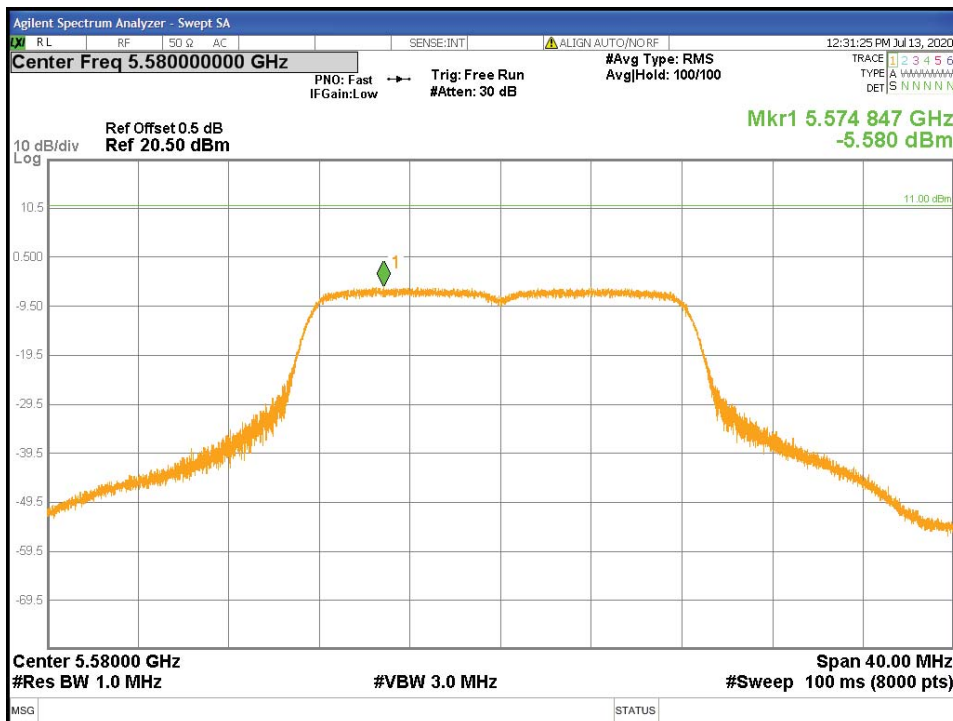


Figure 62: Power Spectral Density-5580 MHz-802.11a-6 Mbps

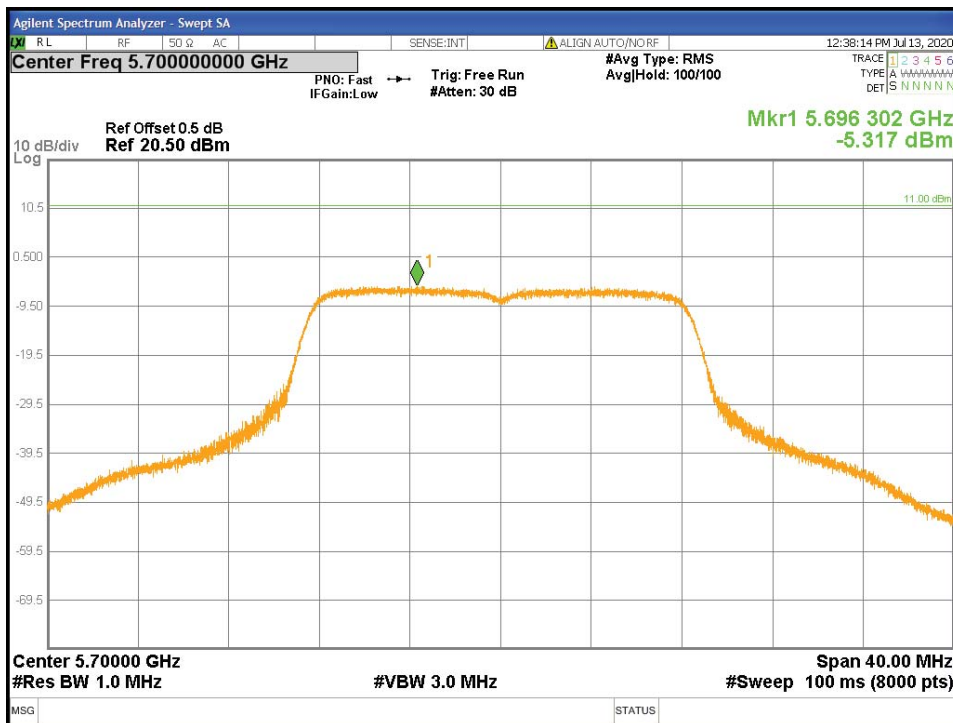


Figure 63: Power Spectral Density-5700 MHz-802.11a-6 Mbps

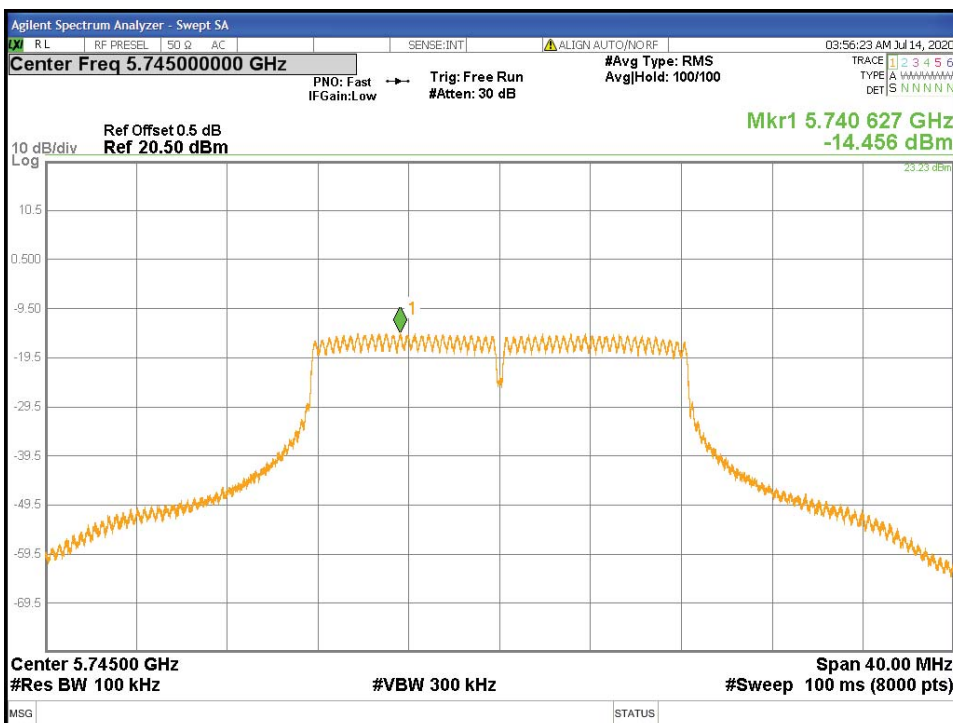


Figure 64: Power Spectral Density-5745 MHz-802.11a-6 Mbps

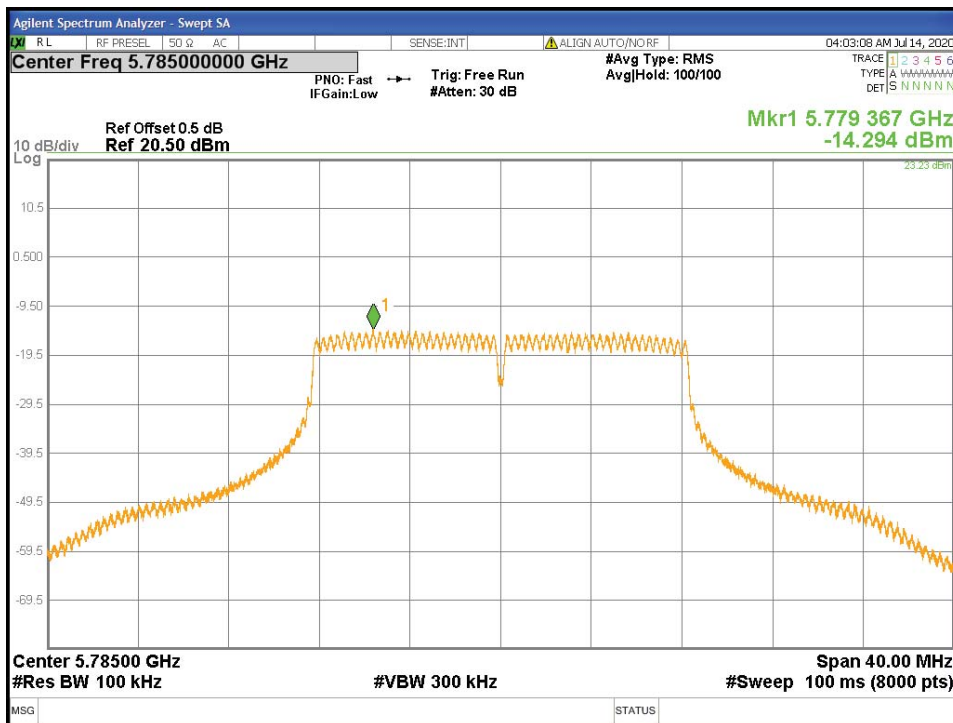


Figure 65: Power Spectral Density-5785 MHz-802.11a-6 Mbps

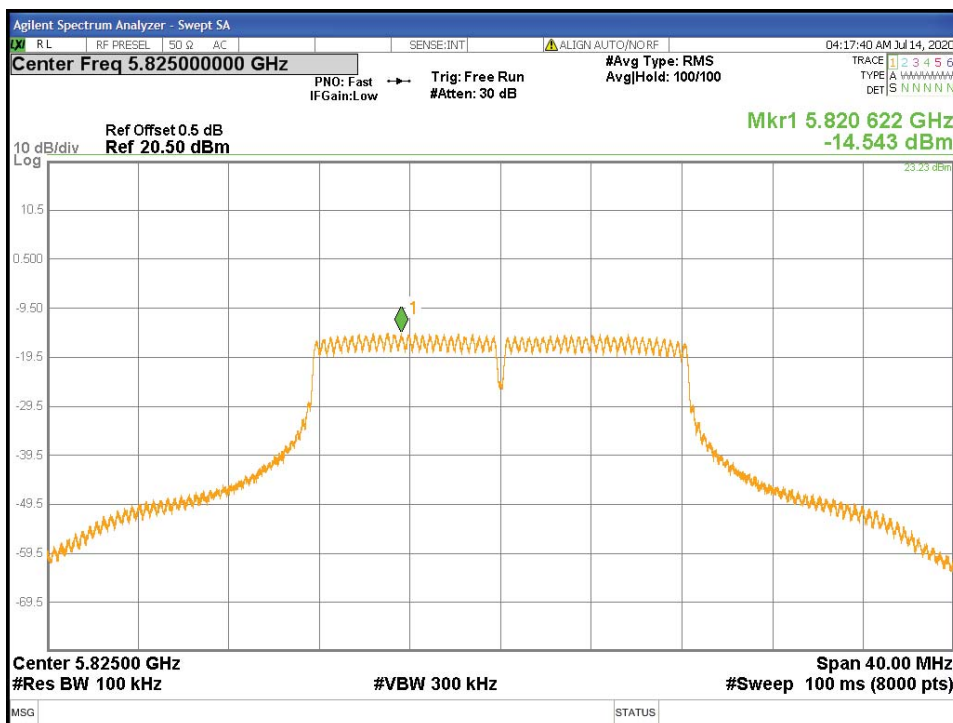


Figure 66: Power Spectral Density-5825 MHz-802.11a-6 Mbps

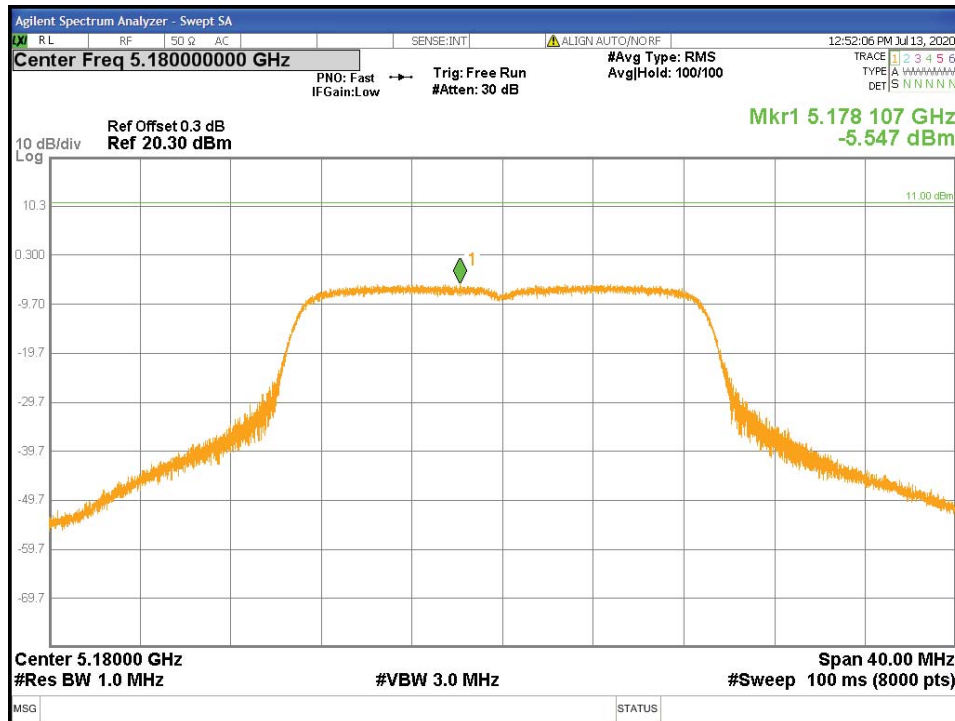


Figure 67: Power Spectral Density-5180 MHz-802.11n HT20-6 Mbps

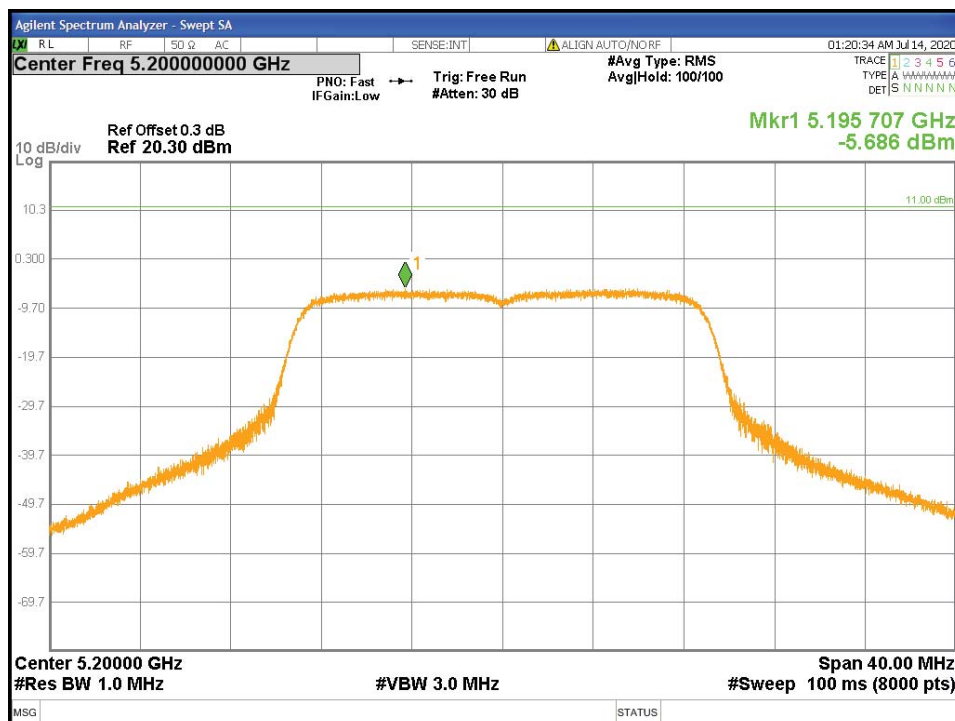


Figure 68: Power Spectral Density-5200 MHz-802.11n HT20-6 Mbps

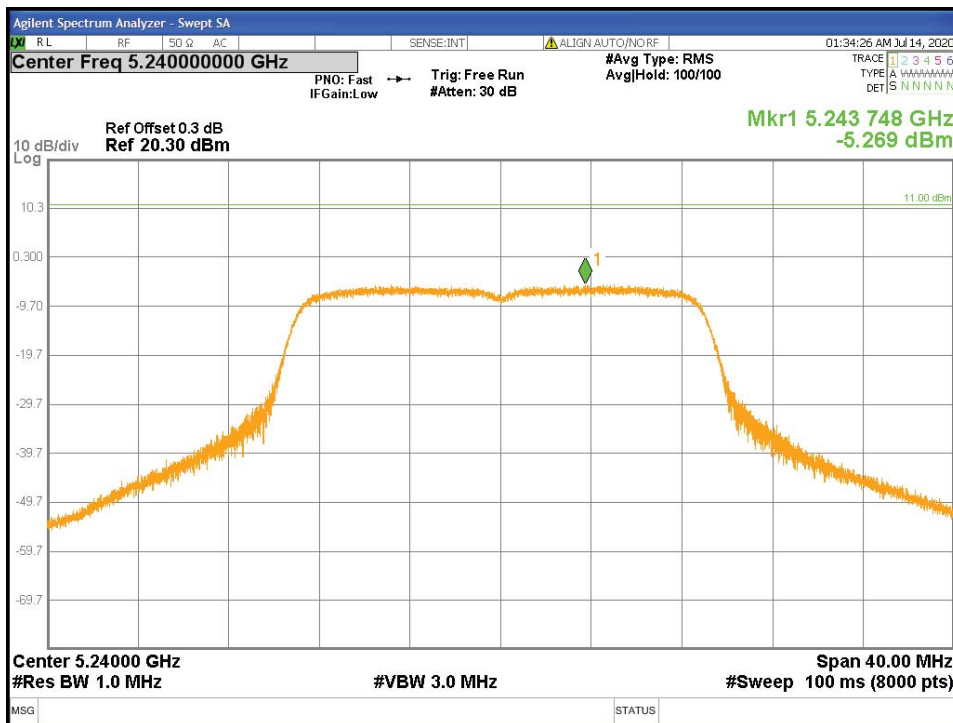


Figure 69: Power Spectral Density-5240 MHz-802.11n HT20-6 Mbps

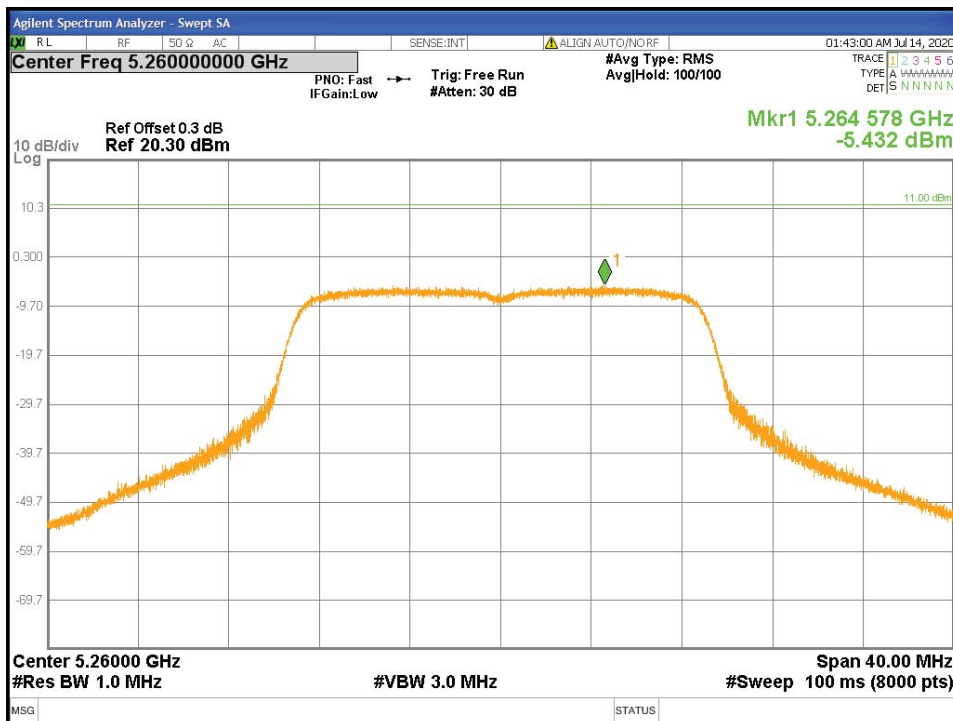


Figure 70: Power Spectral Density-5260 MHz-802.11n HT20-6 Mbps

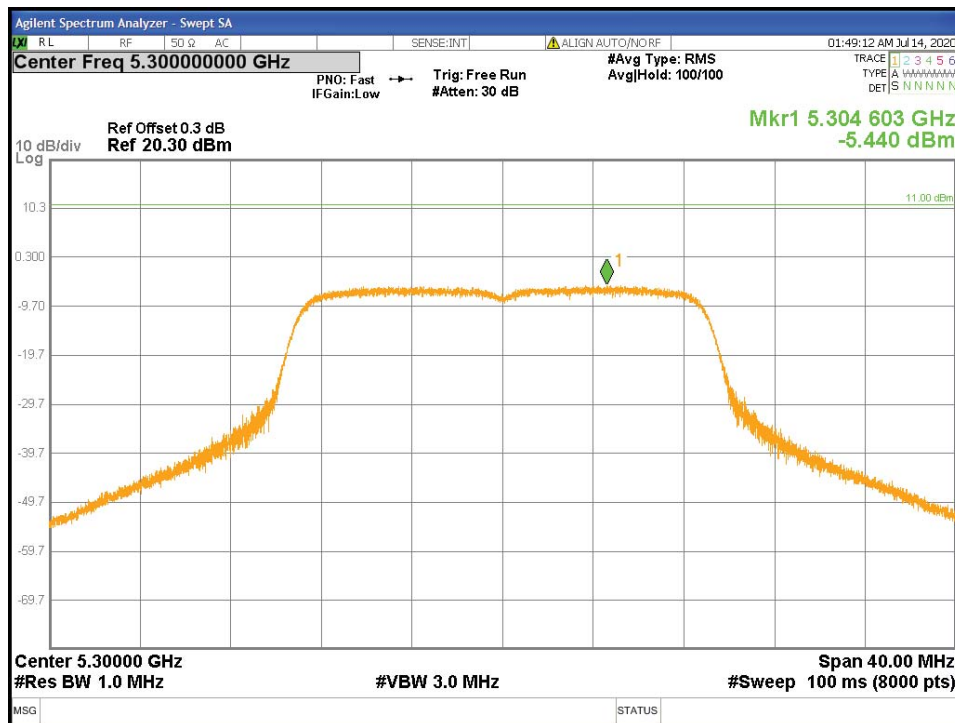


Figure 71: Power Spectral Density-5300 MHz-802.11n HT20-6 Mbps

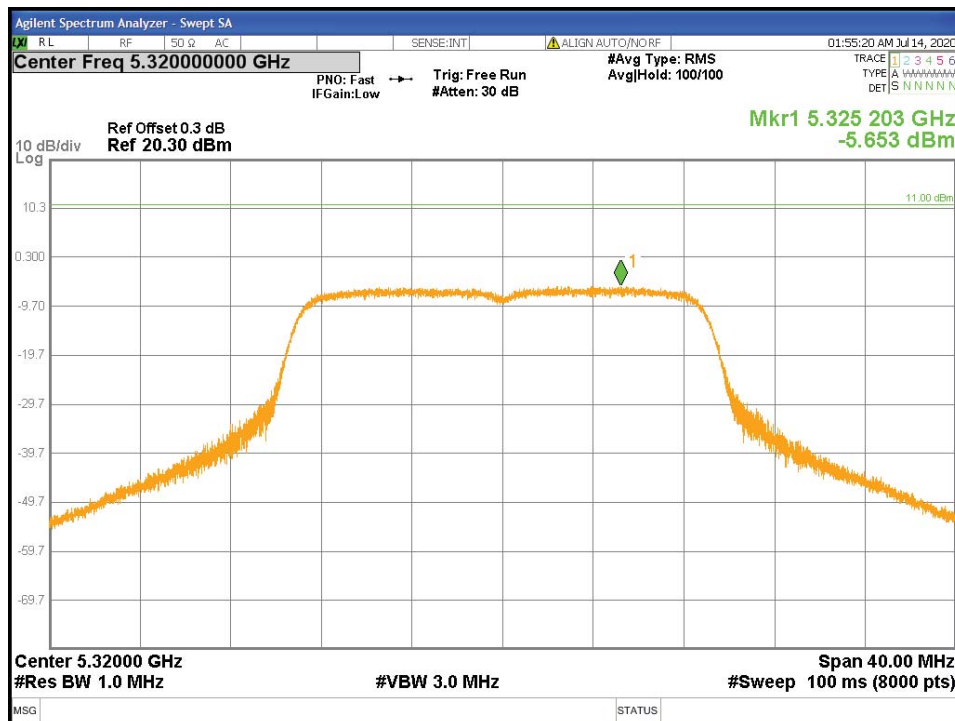


Figure 72: Power Spectral Density-5320 MHz-802.11n HT20-6 Mbps

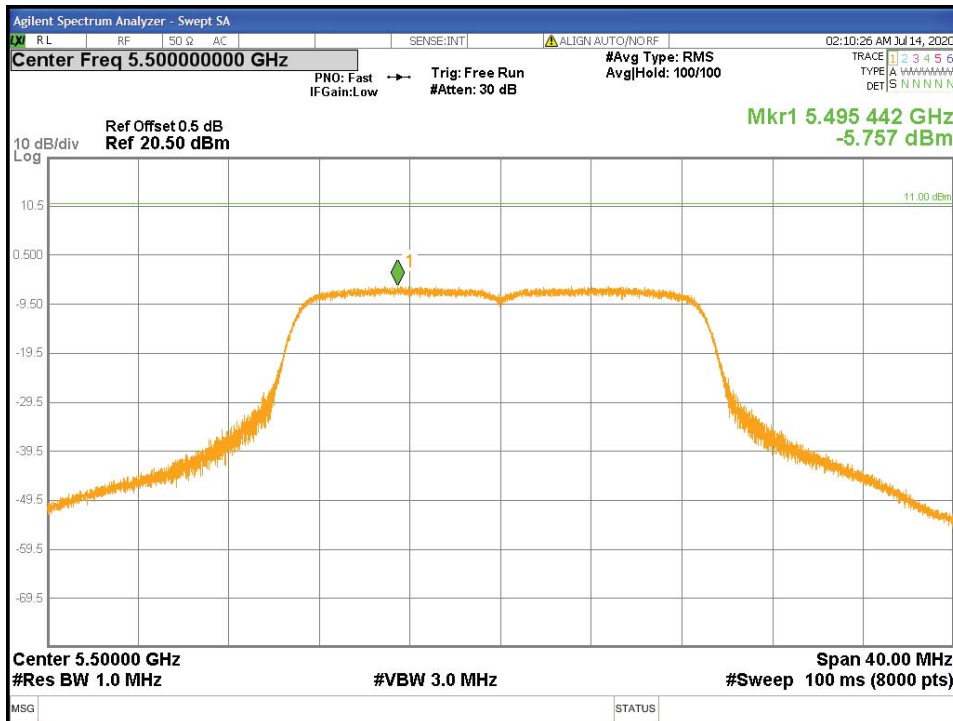


Figure 73: Power Spectral Density-5500 MHz-802.11n HT20-6 Mbps

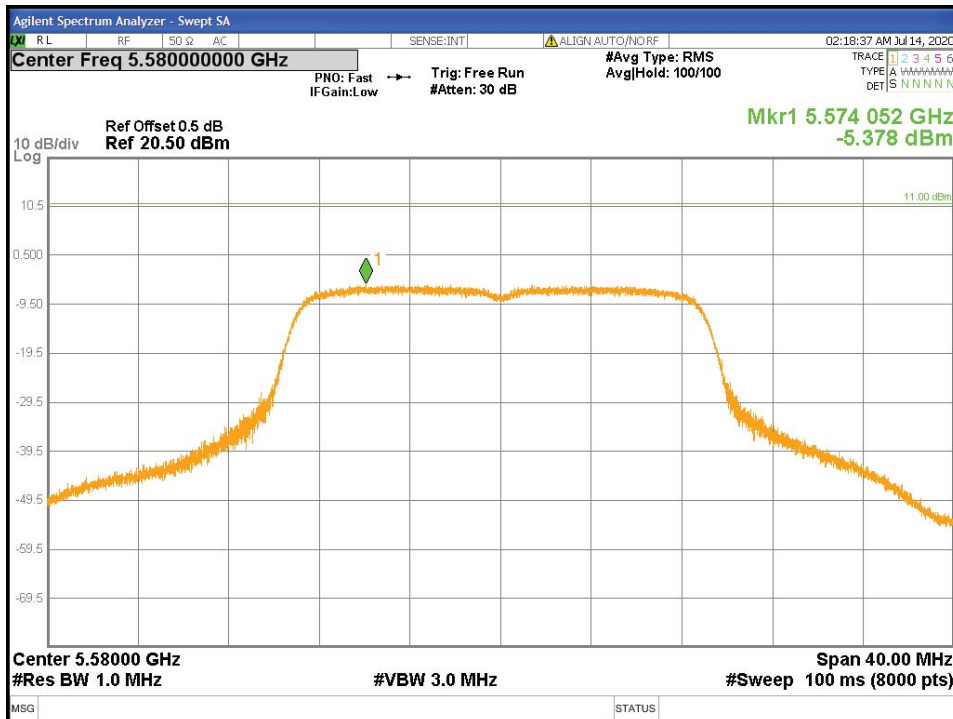


Figure 74: Power Spectral Density-5580 MHz-802.11n HT20-6 Mbps

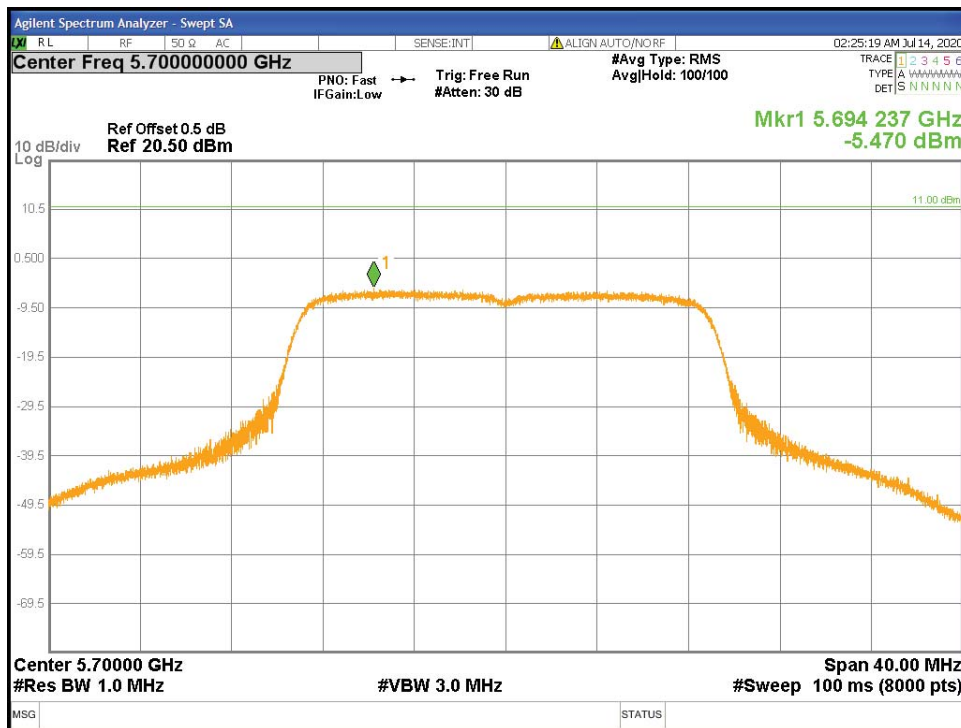


Figure 75: Power Spectral Density-5700 MHz-802.11n HT20-6 Mbps



Figure 76: Power Spectral Density-5745 MHz-802.11n HT20-6 Mbps

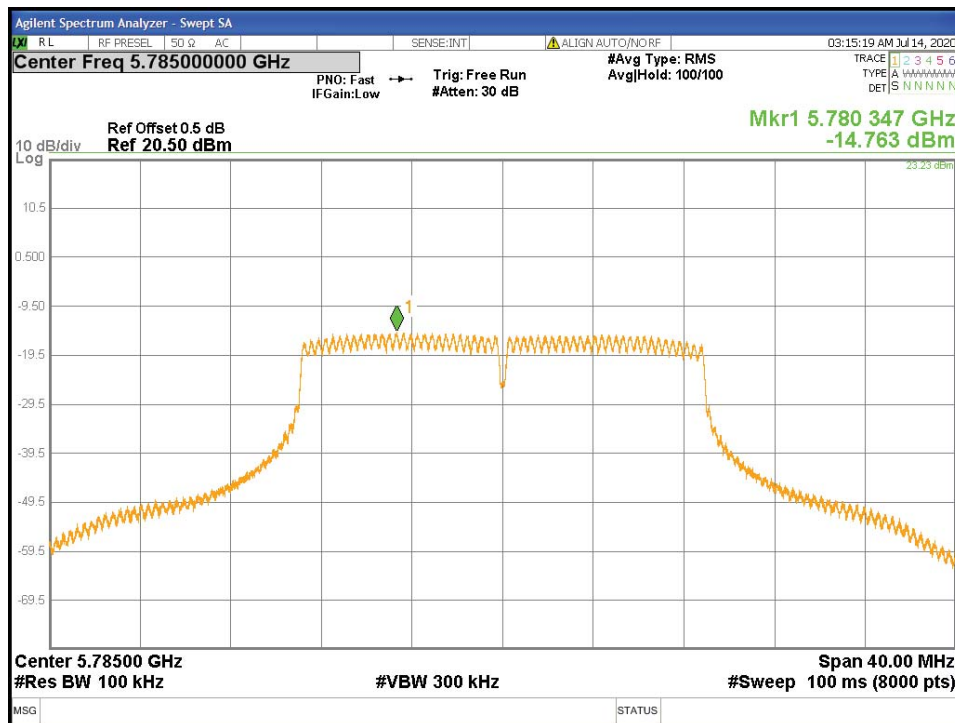


Figure 77: Power Spectral Density-5785 MHz-802.11n HT20-6 Mbps

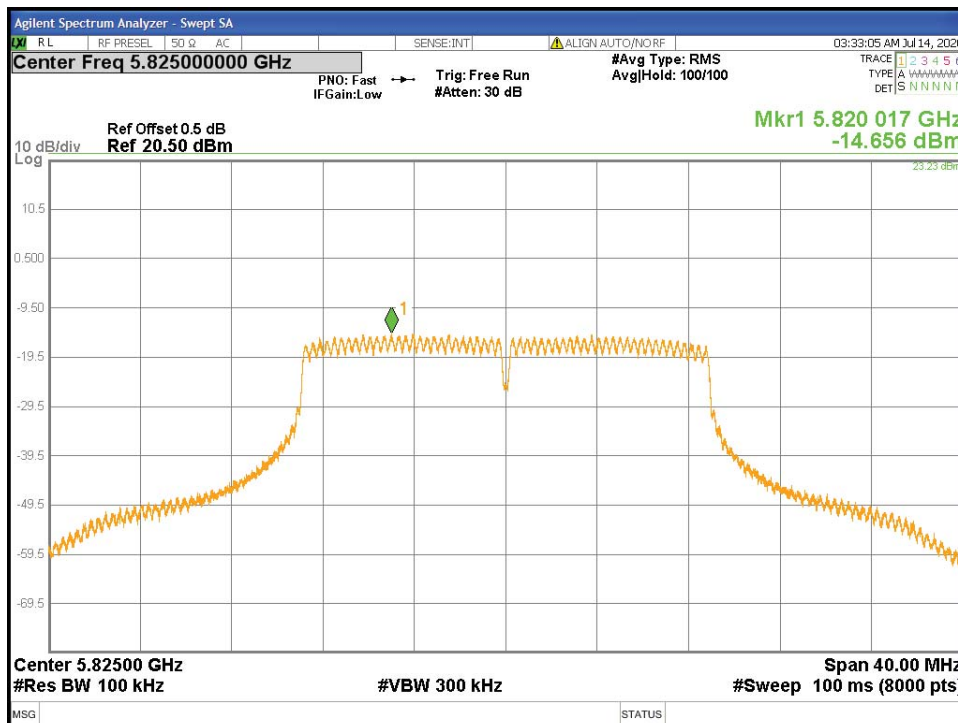


Figure 78: Power Spectral Density-5825 MHz-802.11n HT20-6 Mbps

4.4 Undesirable Emission Limits

CFR47 15.407 (b) and RSS 247 Sect.6.2.1.2, 6.2.2.2, and 6.2.3.2: The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

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.

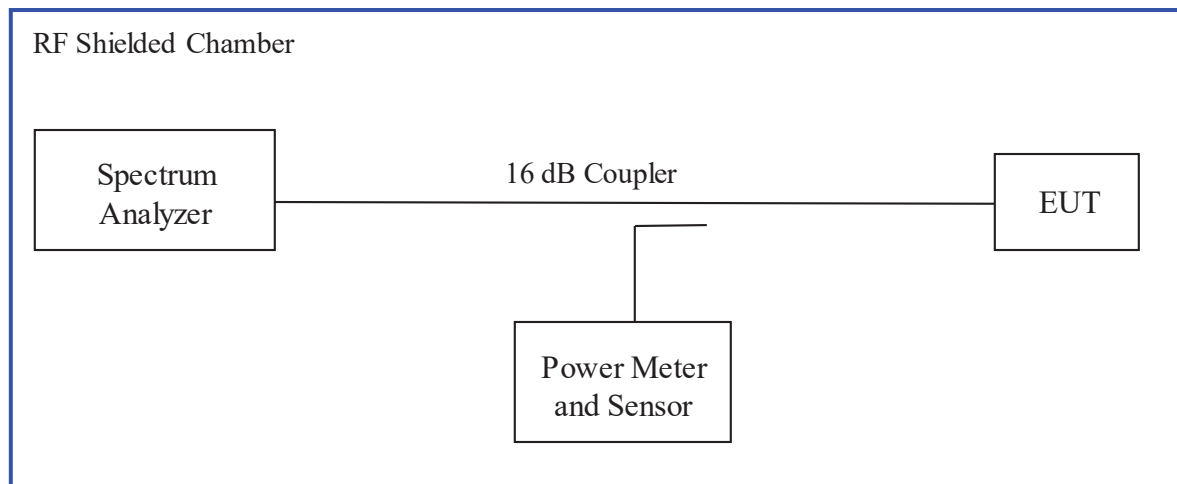
For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

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.

4.4.1 Test Method

The conducted method was used to measure the undesirable emission requirement. The measurement was performed with modulation. This test was conducted on 3 channels of Sample in each mode on Sample. The worst sample result indicated below.

Test Setup:



4.4.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 7: Undesired Emissions for 802.11a – Test Results

Date: September 3, 2020						Tested By: Jeremy Luong			
Test Method: Conducted Measurements						Power Setting: See test plan.			
Antenna Type: Chip						Antenna Gain: +3.7 dBi			
Operating Mode: Uncorrelated						Signal State: Modulated at 100%			
Ambient Temp.: 23 °C						Relative Humidity: 35%			
Undesired Emissions for 802.11a									
Frequency	Raw	Ant. Gain	CF	Level	Det.	Port	Limit	Margin	Comments
MHz	dBuV/m	dBi	dB	dBuV/m			dBm	dB	
1731.54	-48.83	0.86	0.00	-47.97	Pk	RF	-27.00	-20.97	11a, 5180MHz, 6.0Mbps
1739.80	-46.91	0.86	0.00	-46.05	Pk	RF	-27.00	-19.05	11a, 5200MHz, 6.0Mbps
1752.53	-46.18	0.86	0.00	-45.32	Pk	RF	-27.00	-18.32	11a, 5240MHz, 6.0Mbps
1758.82	-44.90	0.86	0.00	-44.04	Pk	RF	-27.00	-17.04	11a, 5260MHz, 6.0Mbps
3748.53	-44.79	0.99	0.00	-43.80	Pk	RF	-27.00	-16.80	11a, 5260MHz, 6.0Mbps
1773.05	-44.10	0.86	0.00	-43.24	Pk	RF	-27.00	-16.24	11a, 5300MHz, 6.0Mbps
1780.15	-45.71	0.87	0.00	-44.84	Pk	RF	-27.00	-17.84	11a, 5320MHz, 6.0Mbps
1828.21	-47.14	0.87	0.00	-46.27	Pk	RF	-27.00	-19.27	11a, 5500MHz, 6.0Mbps
3666.67	-42.70	0.98	0.00	-41.72	Pk	RF	-27.00	-14.72	11a, 5500MHz, 6.0Mbps
4037.21	-45.36	1.01	0.00	-44.35	Pk	RF	-27.00	-17.35	11a, 5580MHz, 6.0Mbps
1856.36	-47.86	0.87	0.00	-46.99	Pk	RF	-27.00	-19.99	11a, 5700MHz, 6.0Mbps
3720.82	-41.31	0.99	0.00	-40.32	Pk	RF	-27.00	-13.32	11a, 5700MHz, 6.0Mbps
3830.13	-37.64	0.99	0.00	-36.65	Pk	RF	-27.00	-9.65	11a, 5745MHz, 6.0Mbps
4764.27	-41.47	1.04	0.00	-40.43	Pk	RF	-27.00	-13.43	11a, 5745MHz, 6.0Mbps
3856.88	-37.99	0.99	0.00	-37.00	Pk	RF	-27.00	-10.00	11a, 5785MHz, 6.0Mbps
3883.07	-37.75	0.99	0.00	-36.76	Pk	RF	-27.00	-9.76	11a, 5825MHz, 6.0Mbps
Note: 1. Worst case observed at 6.0 Mbps. 2. All out of band emissions are lower than the -27dBm level. 3. 99% OBW emission of 5240 MHz operating channel did not leak into 5250 -5350 MHz band. See Fig. 127. 4. Emissions of UNII3 channels met the band-edge spectrum mask.									

Table 8: Undesired Emissions for 802.11n HT20 – Test Results

Date: September 3, 2020						Tested By: Jeremy Luong			
Test Method: Conducted Measurements						Power Setting: See test plan.			
Antenna Type: Chip						Antenna Gain: +3.7 dBi			
Operating Mode: Uncorrelated						Signal State: Modulated at 100%			
Ambient Temp.: 23 °C						Relative Humidity: 35%			
Undesired Emissions for 802.11n HT20									
Frequency	Raw	Ant. Gain	CF	Level	Det.	Port	Limit	Margin	Comments
MHz	dBuV/m	dBi	dB	dBuV/m			cm	dB	
1732.15	-47.95	0.86	0.00	-47.09	Pk	RF	-27.00	-20.09	HT20, 5180MHz, 6.5Mbps
2410.76	-44.26	0.91	0.00	-43.35	Pk	RF	-27.00	-16.35	HT20, 5180MHz, 6.5Mbps
1739.28	-47.68	0.86	0.00	-46.82	Pk	RF	-27.00	-19.82	HT20, 5200MHz, 6.5Mbps
2440.46	-47.82	0.91	0.00	-46.91	Pk	RF	-27.00	-19.91	HT20, 5200MHz, 6.5Mbps
1748.25	-46.21	0.86	0.00	-45.35	Pk	RF	-27.00	-18.35	HT20, 5240MHz, 6.5Mbps
1749.26	-46.32	0.86	0.00	-45.46	Pk	RF	-27.00	-18.46	HT20, 5260MHz, 6.5Mbps
3811.98	-45.17	0.99	0.00	-44.18	Pk	RF	-27.00	-17.18	HT20, 5260MHz, 6.5Mbps
1779.22	-45.95	0.87	0.00	-45.08	Pk	RF	-27.00	-18.08	HT20, 5300MHz, 6.5Mbps
1767.25	-45.19	0.86	0.00	-44.33	Pk	RF	-27.00	-17.33	HT20, 5320MHz, 6.5Mbps
1831.85	-48.48	0.87	0.00	-47.61	Pk	RF	-27.00	-20.61	HT20, 5500MHz, 6.5Mbps
2440.04	-43.60	0.91	0.00	-42.69	Pk	RF	-27.00	-15.69	HT20, 5500MHz, 6.5Mbps
3719.73	-44.87	0.99	0.00	-43.88	Pk	RF	-27.00	-16.88	HT20, 5580MHz, 6.5Mbps
3799.79	-45.23	0.99	0.00	-44.24	Pk	RF	-27.00	-17.24	HT20, 5700MHz, 6.5Mbps
20021.71	-42.30	1.50	0.00	-40.80	Pk	RF	-27.00	-13.80	HT20, 5700MHz, 6.5Mbps
3830.02	-44.97	0.99	0.00	-43.98	Pk	RF	-27.00	-16.98	HT20, 5745MHz, 6.5Mbps
14402.12	-43.86	1.37	0.00	-42.49	Pk	RF	-27.00	-15.49	HT20, 5785MHz, 6.5Mbps
26688.21	-38.88	1.63	0.00	-37.25	Pk	RF	-27.00	-10.25	HT20, 5785MHz, 6.5Mbps
2411.77	-47.35	0.91	0.00	-46.44	Pk	RF	-27.00	-19.44	HT20, 5825MHz, 6.5Mbps
Note: 1. Worst case observed at 6.5 Mbps. 2. All out of band emissions are lower than the -27dBm level. 3. 99% OBW emission of 5240MHz operating channel did not leak into 5250 -5350 MHz band. See Fig. 128. 4. Emissions of UNII3 channels met the band-edge spectrum mask.									

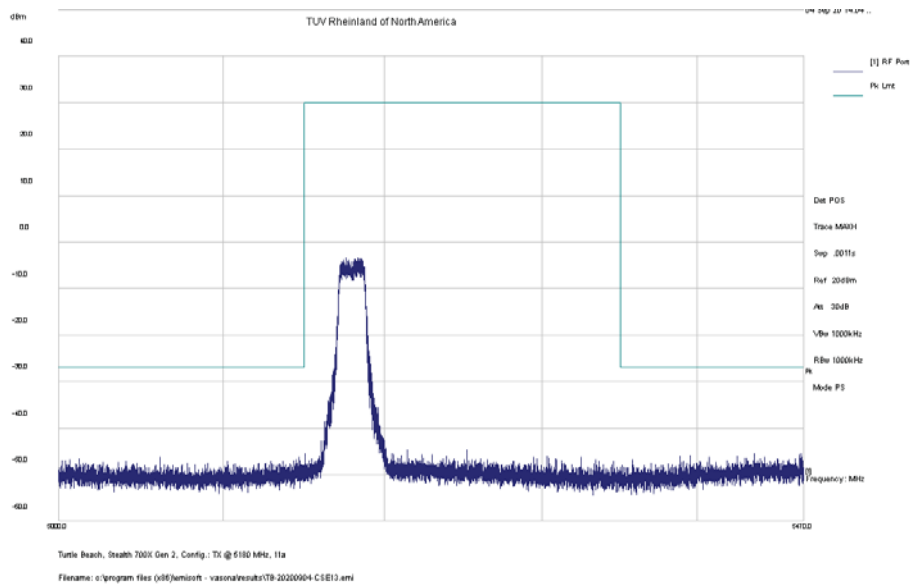


Figure 79: Measured Band-edge for 802.11a-6 Mbps at 5180 MHz

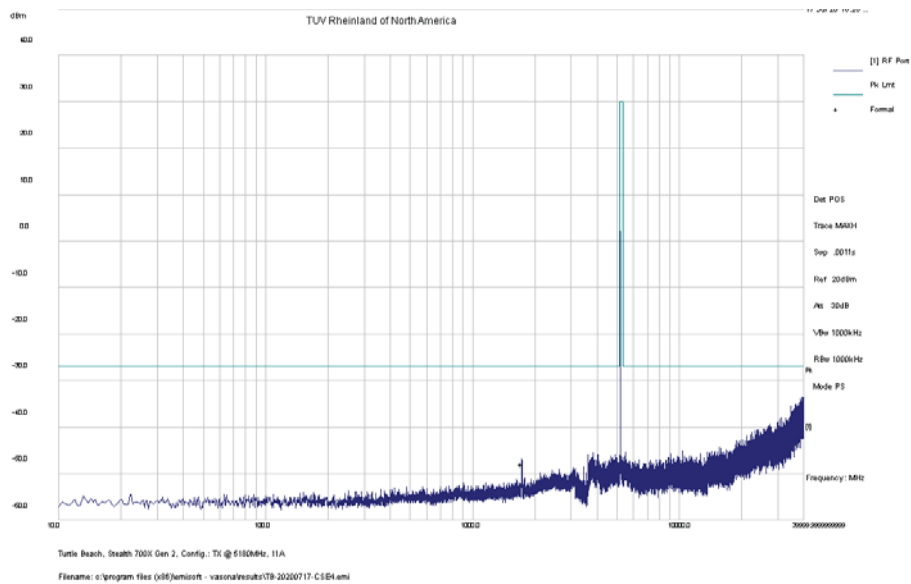


Figure 80: Undesirable Emission for 802.11a-6 Mbps at 5180 MHz

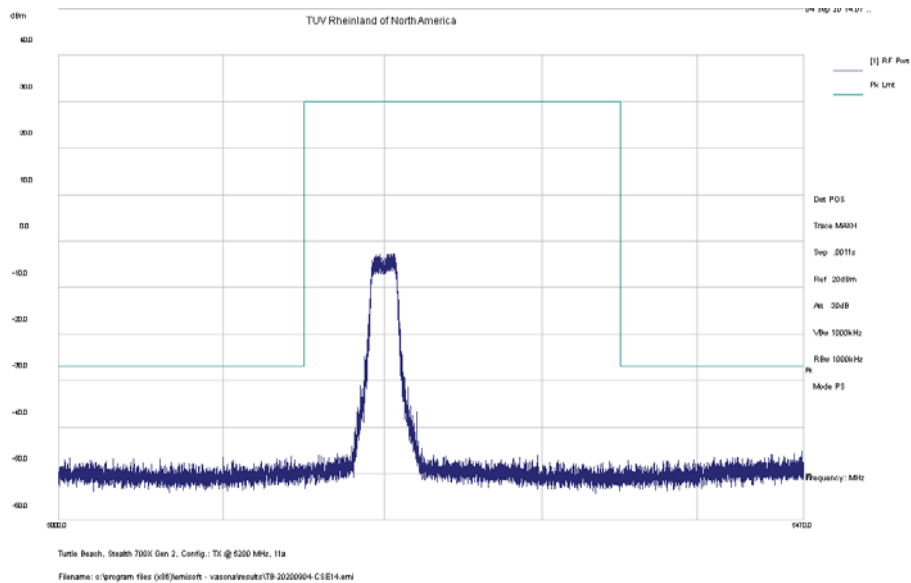


Figure 81: Measured Band-edge for 802.11a-6 Mbps at 5200 MHz

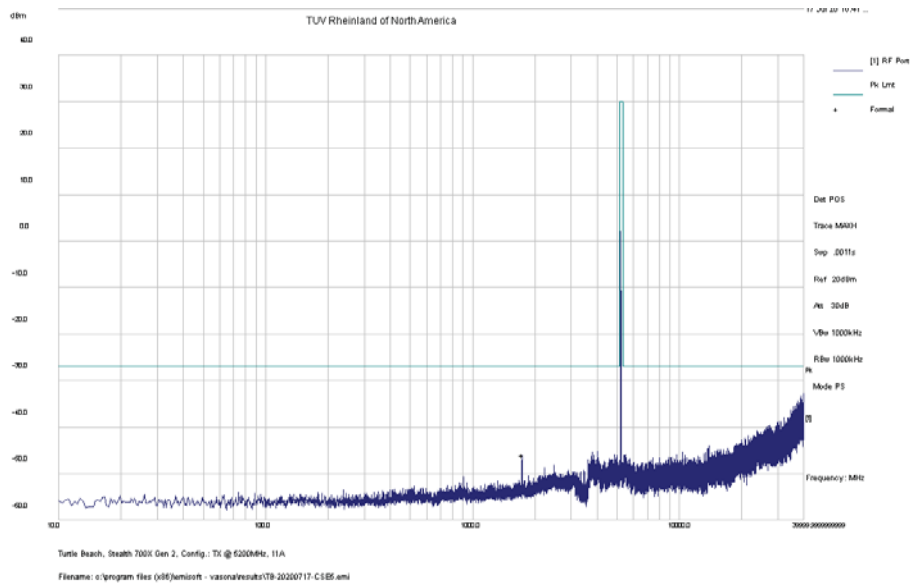


Figure 82: Undesirable Emission for 802.11a-6 Mbps at 5200 MHz

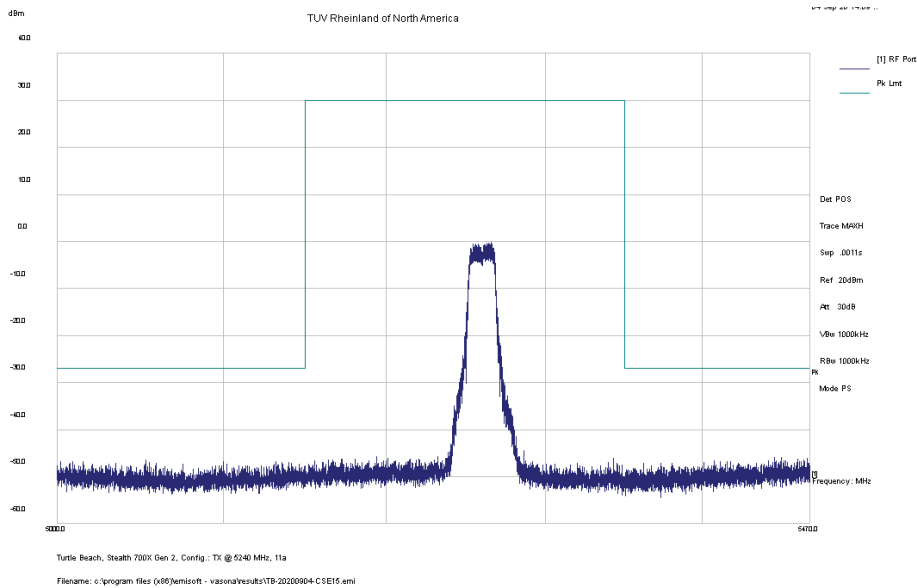


Figure 83: Measured In-Band Band-edge for 802.11a-6 Mbps at 5240 MHz

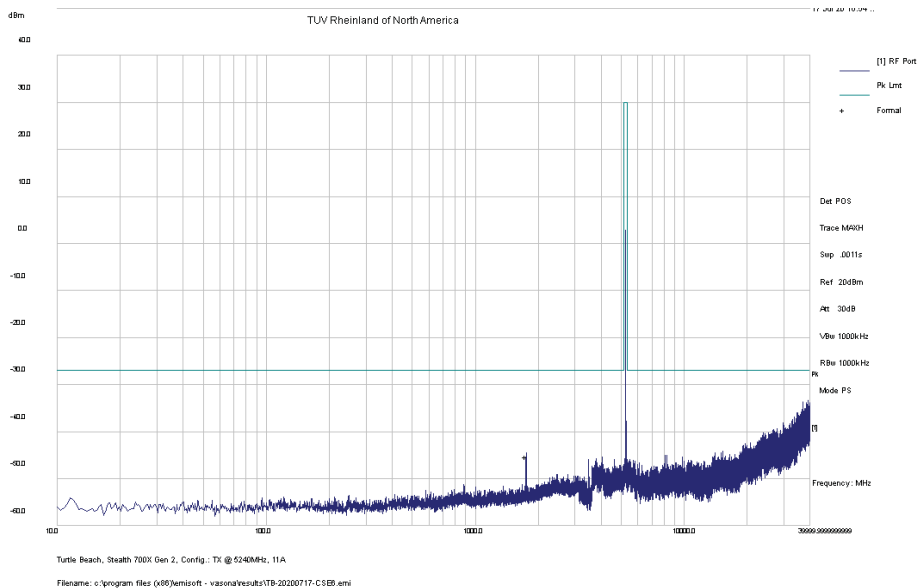


Figure 84: Measured In-Band Band-edge for 802.11a-6 Mbps at 5240 MHz

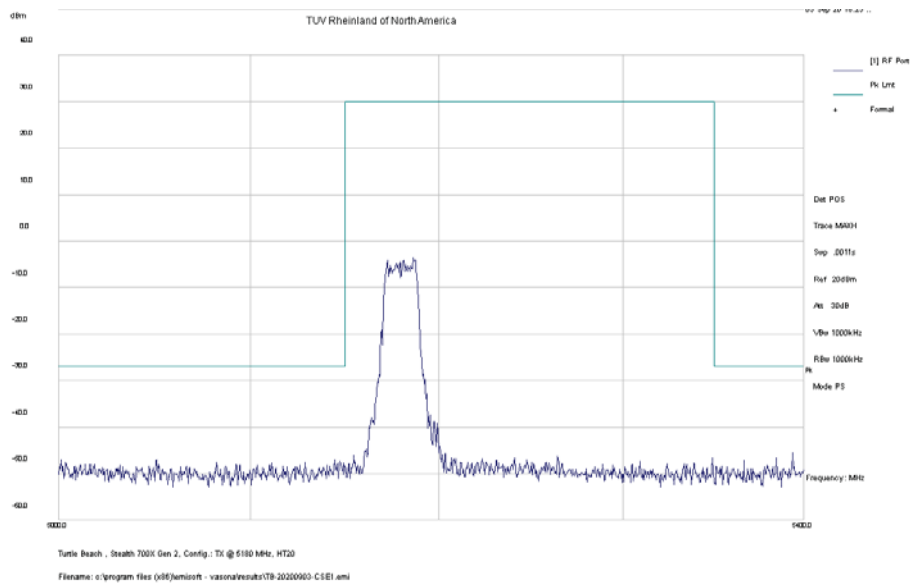


Figure 85: Measured Band-edge for HT20-MCS0 at 5180 MHz

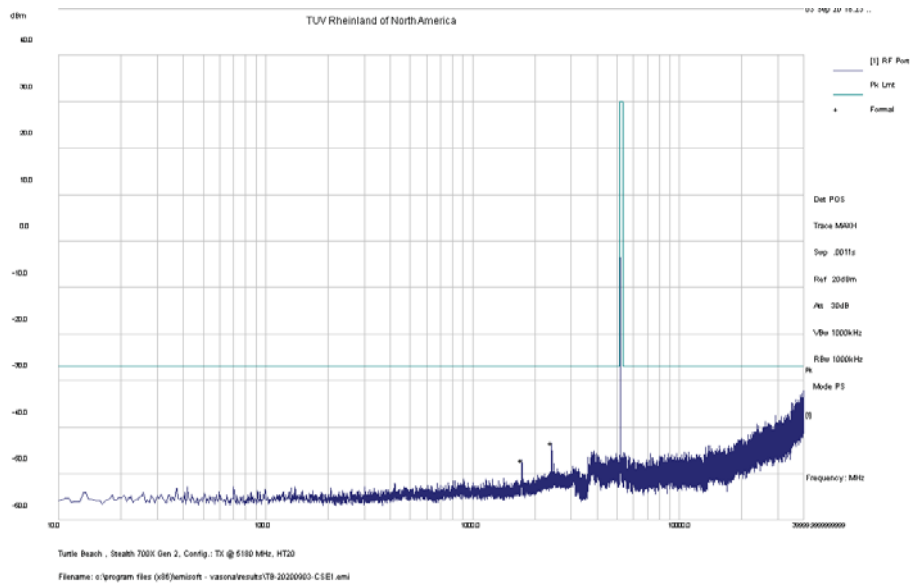


Figure 86: Undesirable Emission for HT20-MCS0 at 5180 MHz

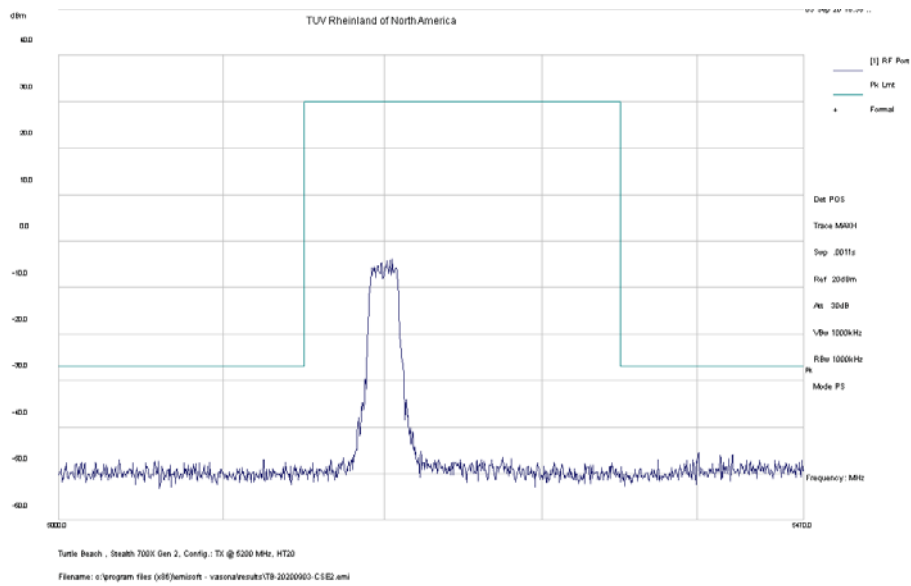


Figure 87: Measured In-Band Band-edge for HT20-MCS0 at 5200 MHz

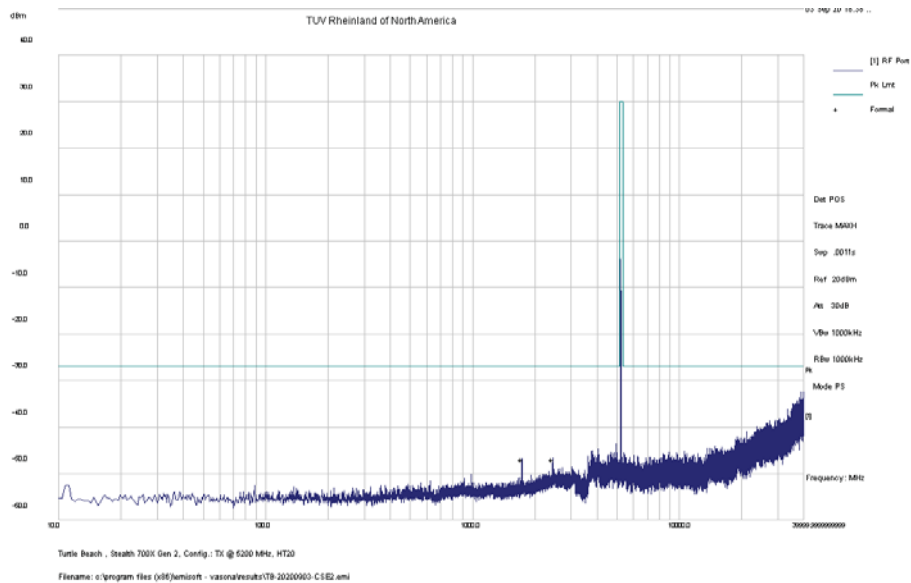


Figure 88: Measured In-Band Band-edge for HT20-MCS0 at 5200 MHz

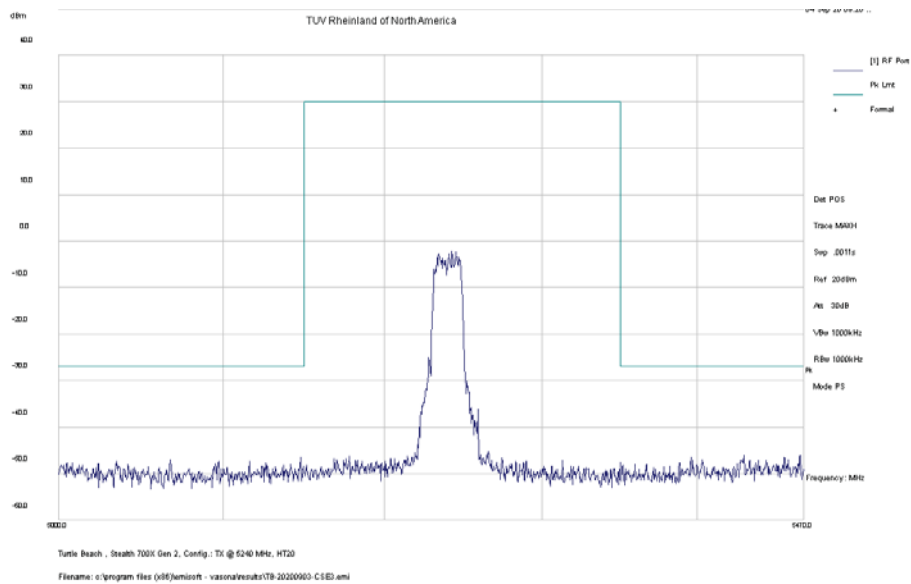


Figure 89: Measured Band-edge for HT20-MCS0 at 5240 MHz

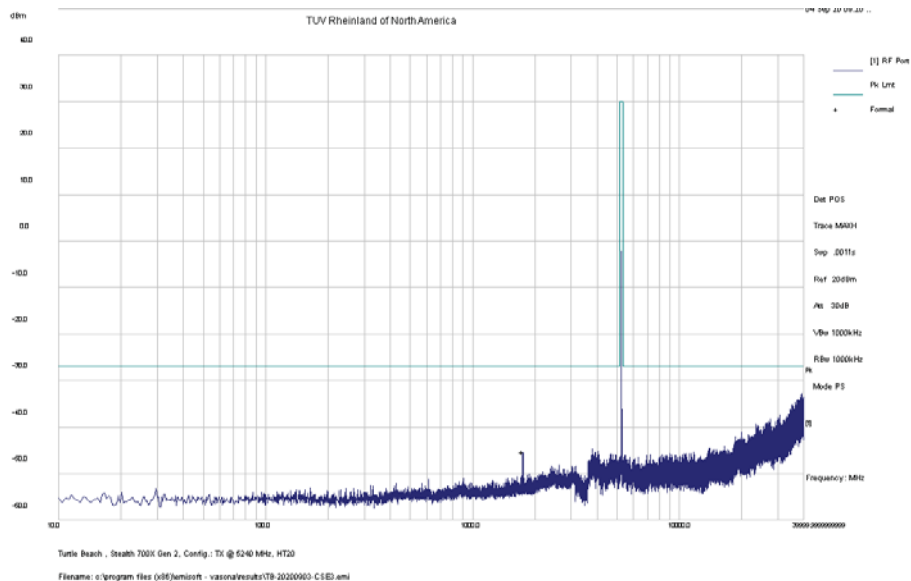


Figure 90: Undesirable Emission for HT20-MCS0 at 5240 MHz

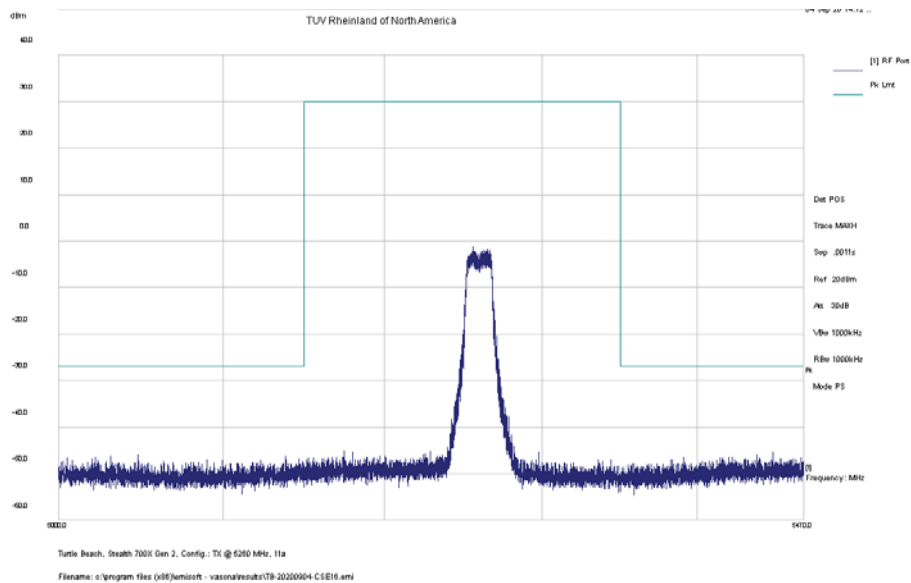


Figure 91: Measured Band-edge for 802.11a-6 Mbps at 5260 MHz

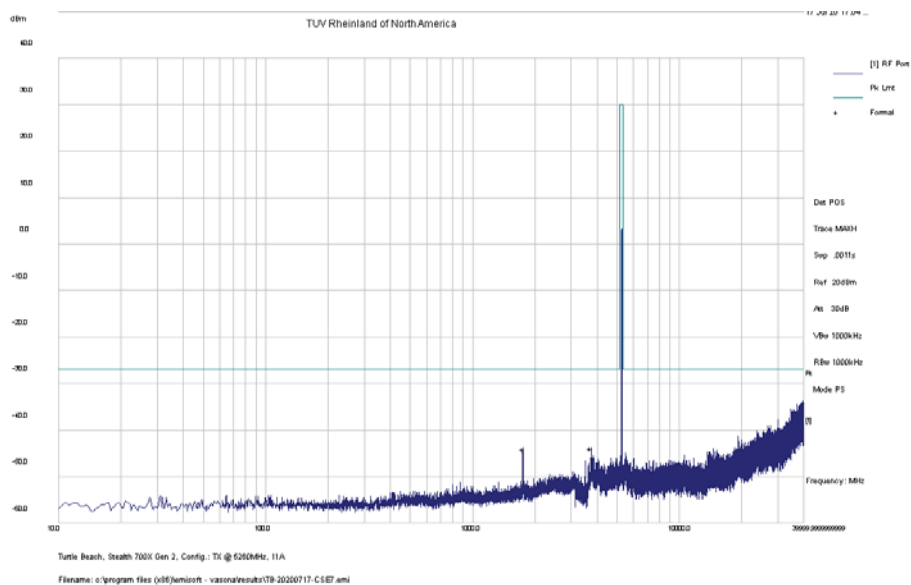


Figure 92: Undesirable Emission for 802.11a-6 Mbps at 5260 MHz

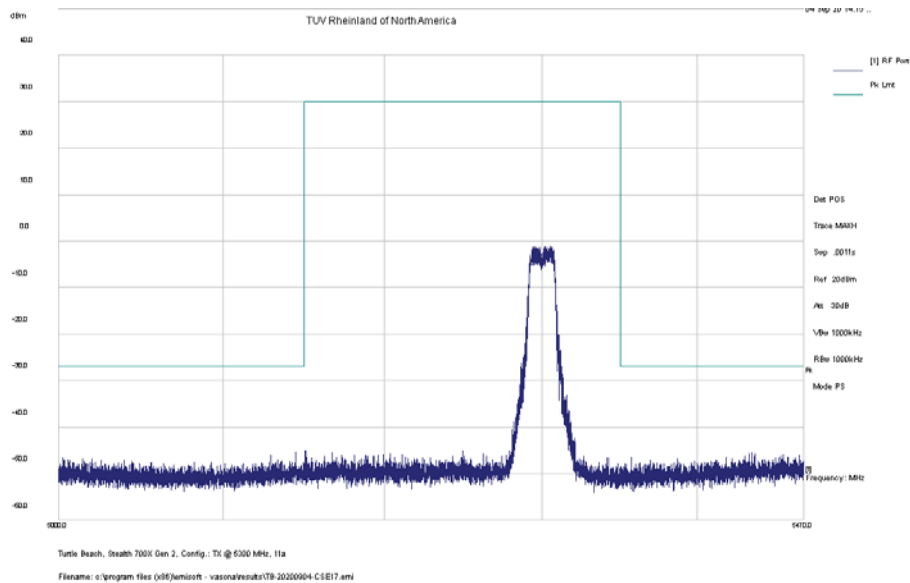


Figure 93: Measured Band-edge for 802.11a-6 Mbps at 5300 MHz

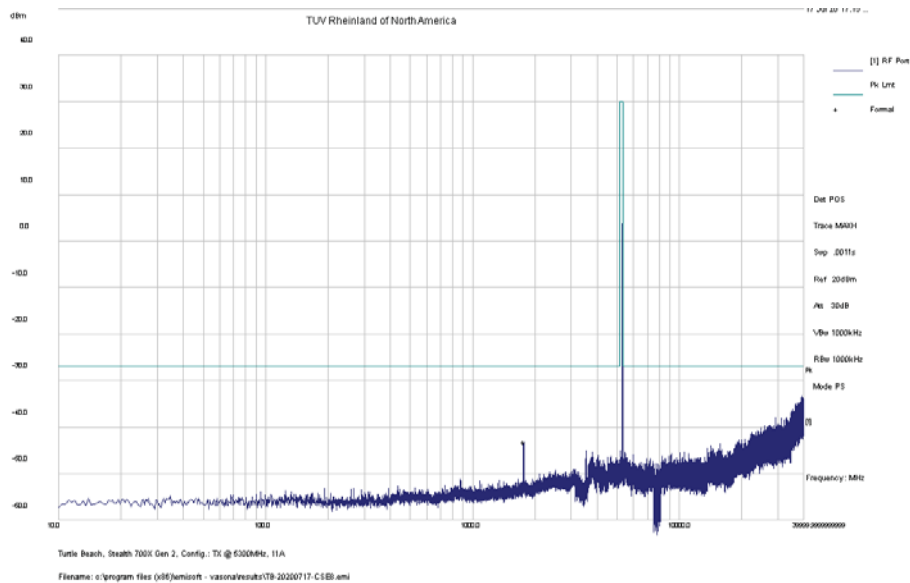


Figure 94: Undesirable Emission for 802.11a-6 Mbps at 5300 MHz

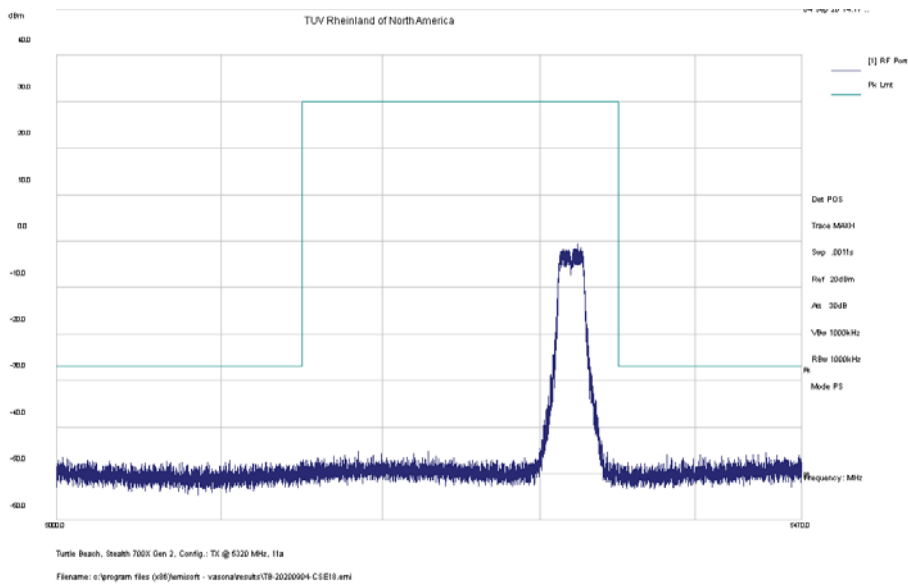


Figure 95: Measured In-Band Band-edge for 802.11a-6 Mbps at 5320 MHz

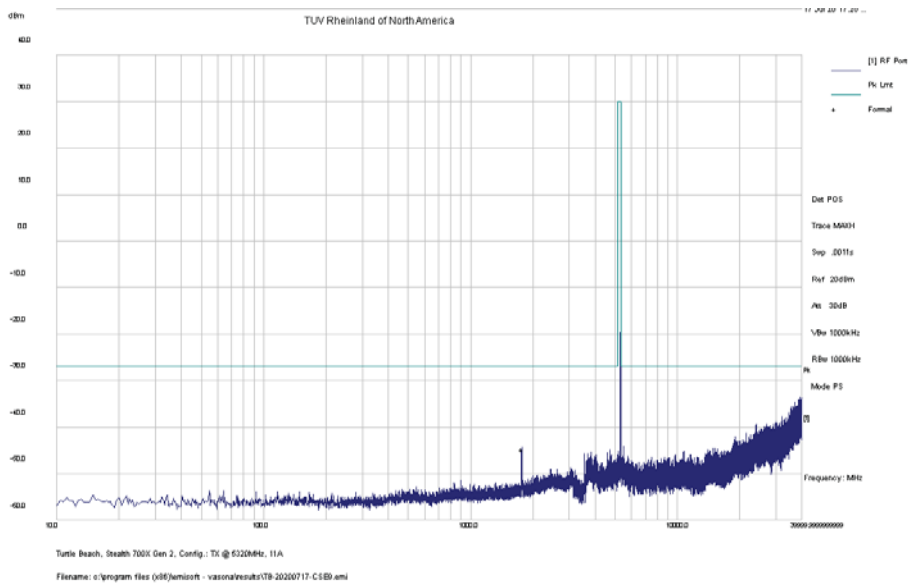


Figure 96: Measured In-Band Band-edge for 802.11a-6 Mbps at 5320 MHz

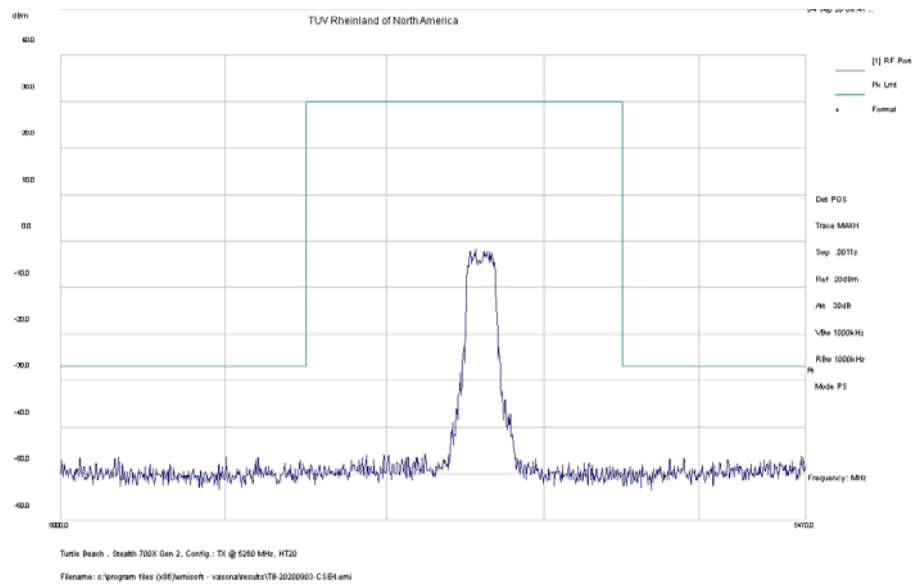


Figure 97: Measured Band-edge for HT20-MCS0 at 5260 MHz

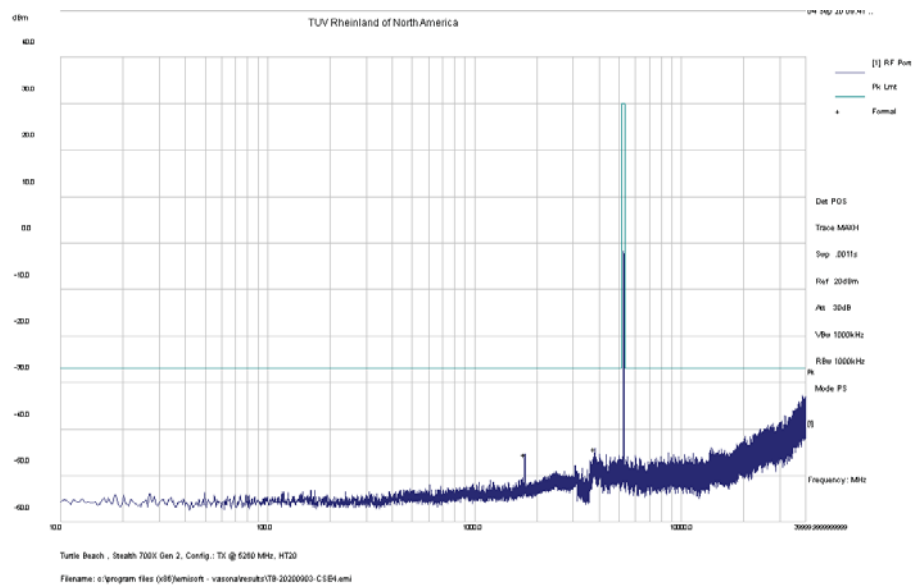


Figure 98: Undesirable Emission for HT20-MCS0 at 5260 MHz

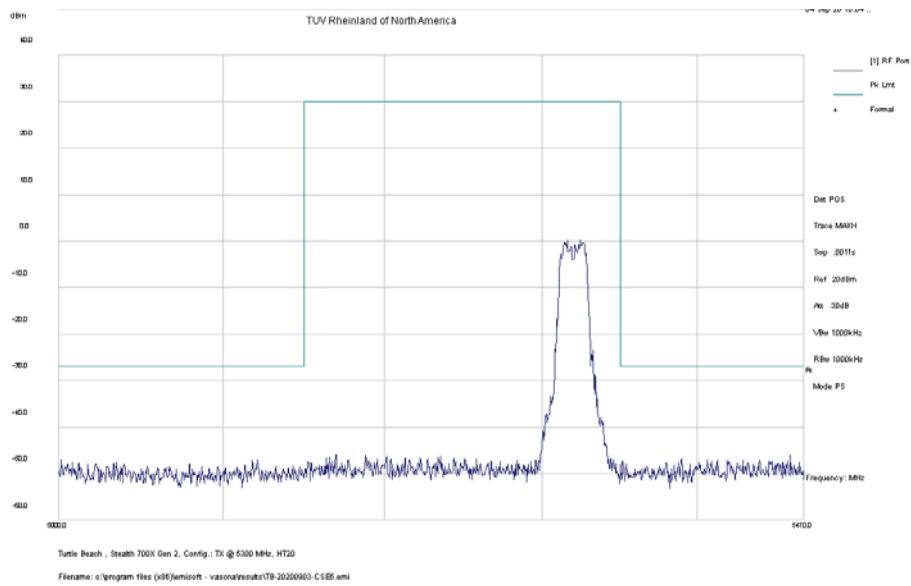


Figure 99: Measured In-Band Band-edge for HT20-MCS0 at 5300 MHz

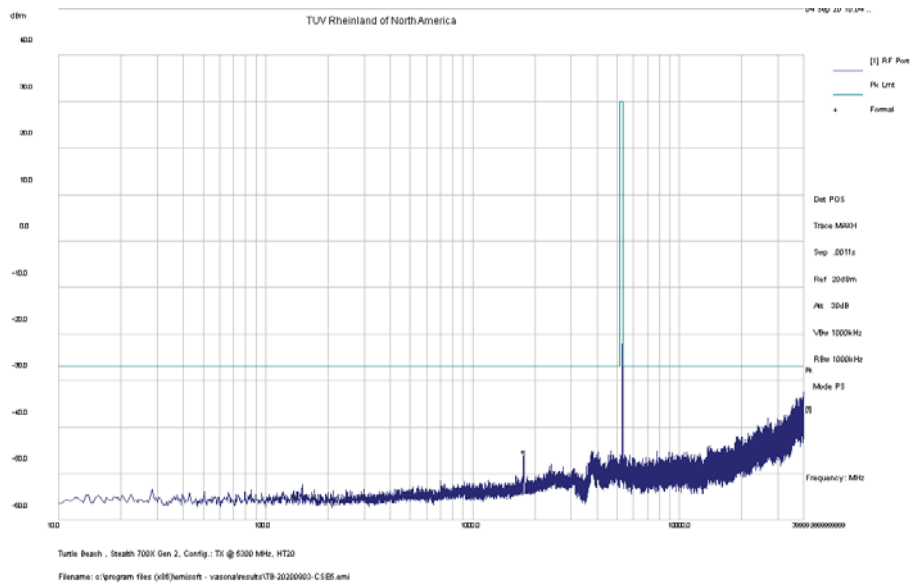


Figure 100: Measured In-Band Band-edge for HT20-MCS0 at 5300 MHz