

Table 12: Peak Power Spectral Density – 802.11n HT40 Test Results – Beamforming Cont.

Test Date: March 13, 2019			Test By: Kerwinn Corpus		
Test Method: Conducted Measurements			Power Setting: See test plan		
Antenna Type: PCB			Directional Antenna Gain: + 8.2 dBi		
Operating Mode: Beamforming & Correlated			Signal State: Modulated		
Ambient Temp.: 22 °C			Relative Humidity: 48%		
802.11n HT40 (FCC Limit)					
Freq. [MHz]	Spectra Σ [dBm]	CF [dB]	Total Spectra Σ [dBm]	Limit [dBm]	Margin [dB]
5190	6.44	0.16	6.6	14.80	-8.2
5230	11.70	0.16	11.86	14.80	-2.94
802.11n HT40 (RSS Limit)					
Freq. [MHz]	Spectra Σ [dBm]	CF [dB]	Total Spectra Σ [dBm]	Limit [dBm]	Margin [dB]
5190	0.50	0.16	0.66	1.80	-1.14
5230	0.18	0.16	0.34	1.80	-1.46
<p>Note: 1. The highest output power was observed at HT40 MCS0, 4 Data Streams. 2. The sum of Ch0 + Ch1 + Ch2 + Ch3 = Total PSD. 3. FCC Limit = 17 dBm – (8.2 dBi – 6 dBi) = 14.8 dBm. 4. RSS-247 Limit = 10 dBm – 8.2 dBi = 1.8 dBm.</p>					

Table 13: Peak Power Spectral Density – 802.11ac VHT80 Test Results – Beamforming Cont.

Test Date: March 13, 2019			Test By: Kerwinn Corpus		
Test Method: Conducted Measurements			Power Setting: See test plan		
Antenna Type: PCB			Directional Antenna Gain: + 8.2 dBi		
Operating Mode: Beamforming & Correlated			Signal State: Modulated		
Ambient Temp.: 22 °C			Relative Humidity: 48%		
802.11ac VHT80 (FCC Limit)					
Freq. [MHz]	Spectra Σ [dBm]	CF [dB]	Total Spectra Σ [dBm]	Limit [dBm]	Margin [dB]
5210	3.32	0.41	3.73	14.80	-11.07
802.11ac VHT80 (RSS Limit)					
Freq. [MHz]	Spectra Σ [dBm]	CF [dB]	Total Spectra Σ [dBm]	Limit [dBm]	Margin [dB]
5210	-1.45	0.41	-1.04	1.80	-2.84
<p>Note: 1. The highest output power was observed at VHT80 MCS0, 4 Data Streams. 2. The sum of Ch0 + Ch1 + Ch2 + Ch3 = Total PSD. 3. FCC Limit = 17 dBm – (8.2 dBi – 6 dBi) = 14.8 dBm. 4. RSS-247 Limit = 10 dBm – 8.2 dBi = 1.8 dBm.</p>					

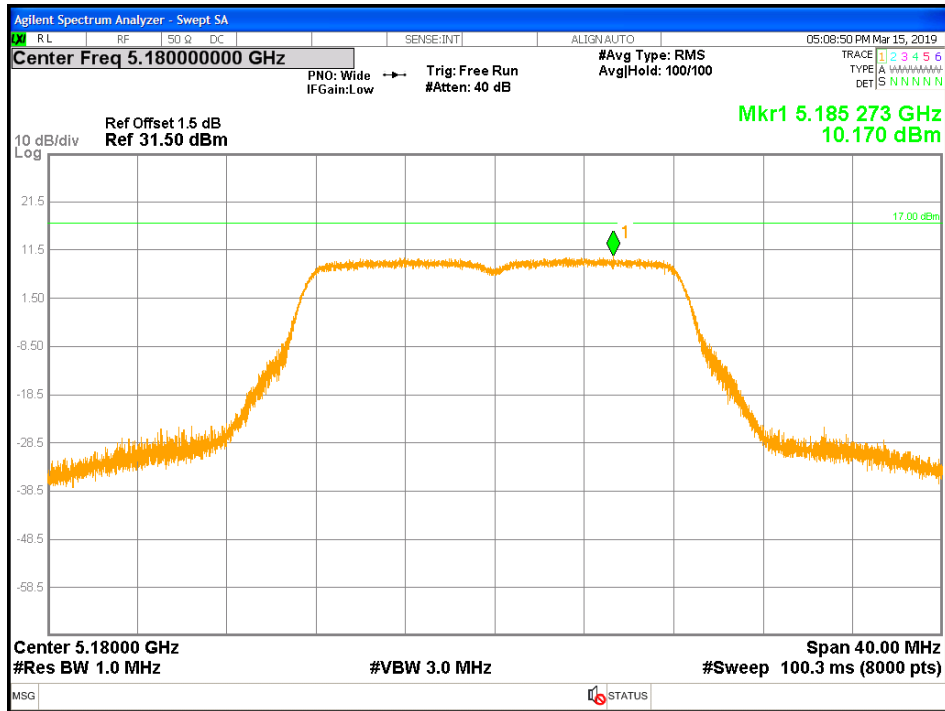


Figure 161: FCC-PPSD-5GHz-5180MHz-11a-1x4-q82-Ch0

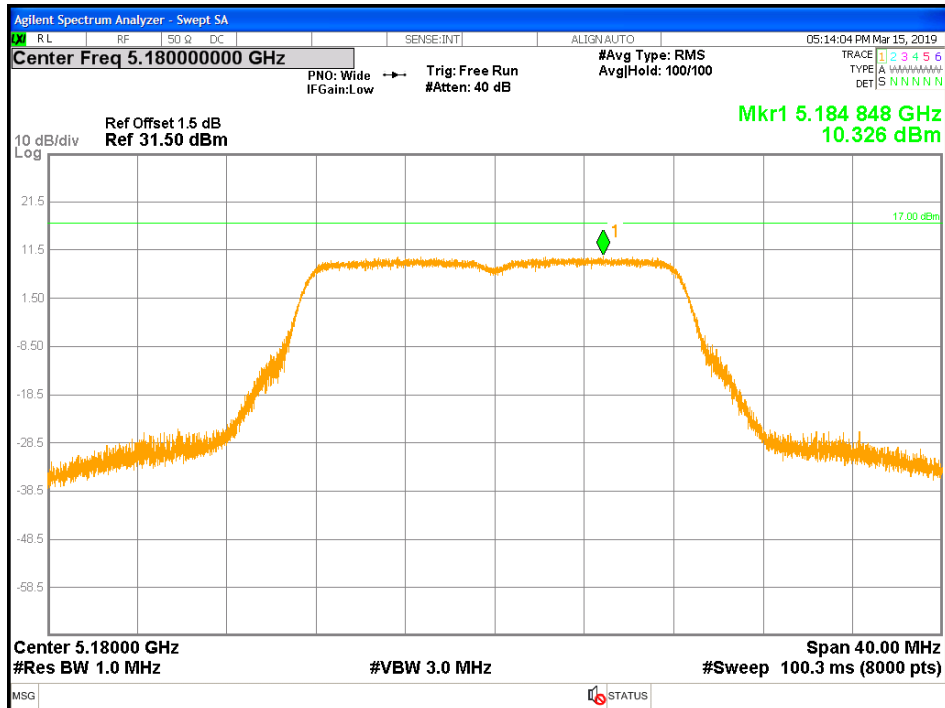


Figure 162: FCC-PPSD-5GHz-5180MHz-11a-1x4-q82-Ch1

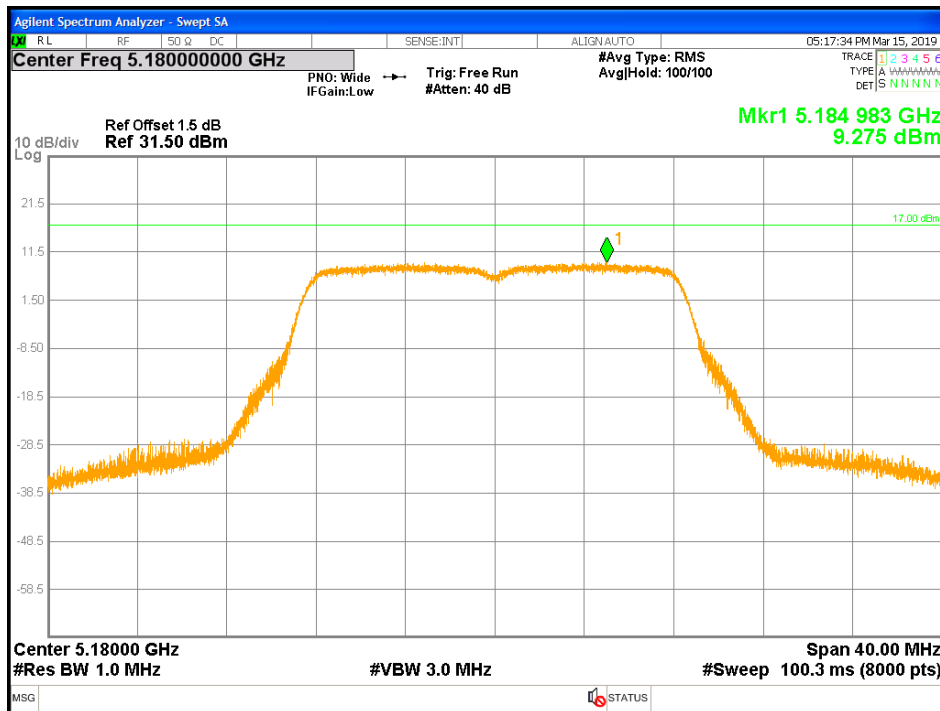


Figure 163: FCC-PPSD-5GHz-5180MHz-11a-1x4-q82-Ch2

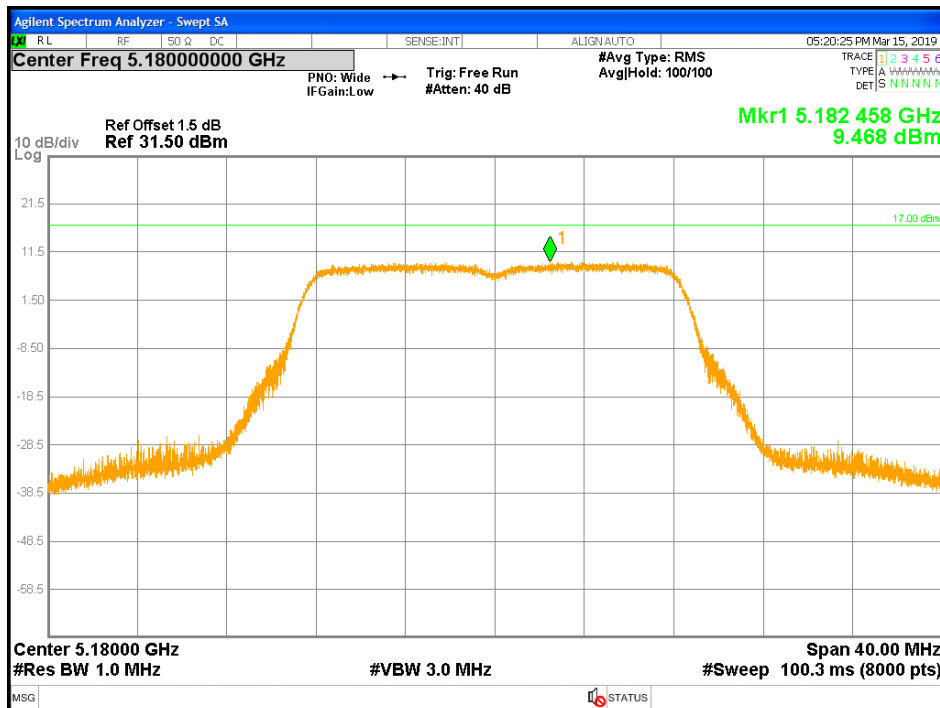


Figure 164: FCC-PPSD-5GHz-5180MHz-11a-1x4-q82-Ch3

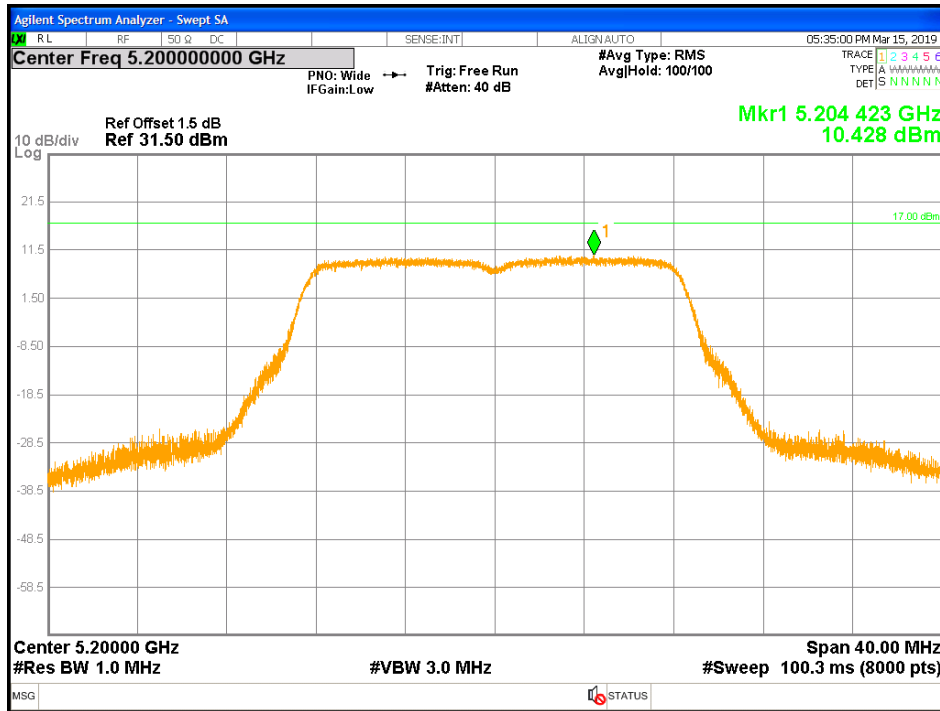


Figure 165: FCC-PPSD-5GHz-5200MHz-11a-1x4-q82-Ch0

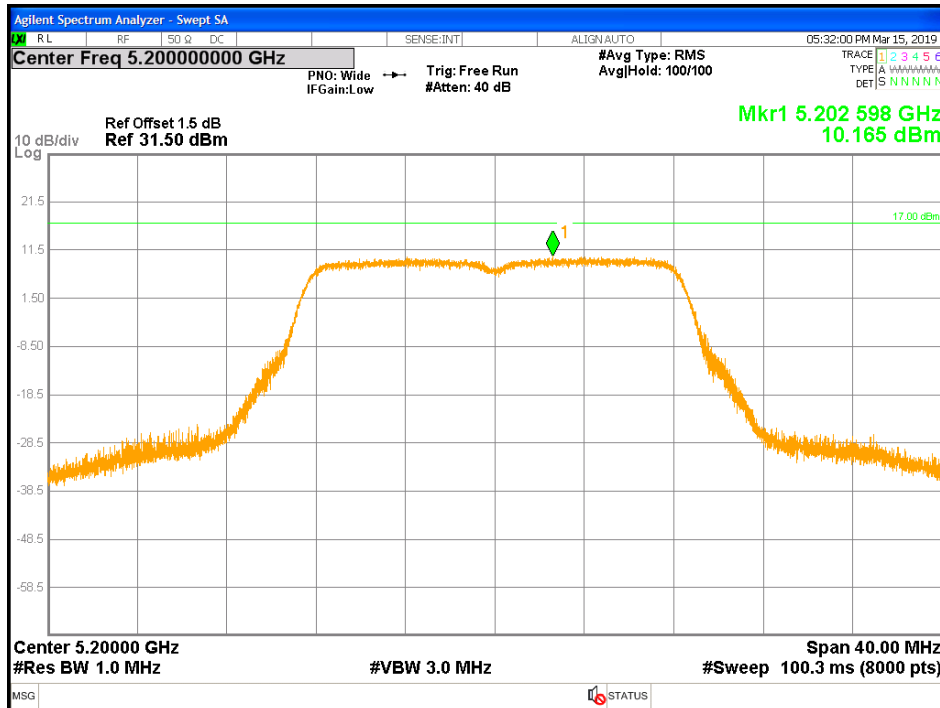


Figure 166: FCC-PPSD-5GHz-5200MHz-11a-1x4-q82-Ch1

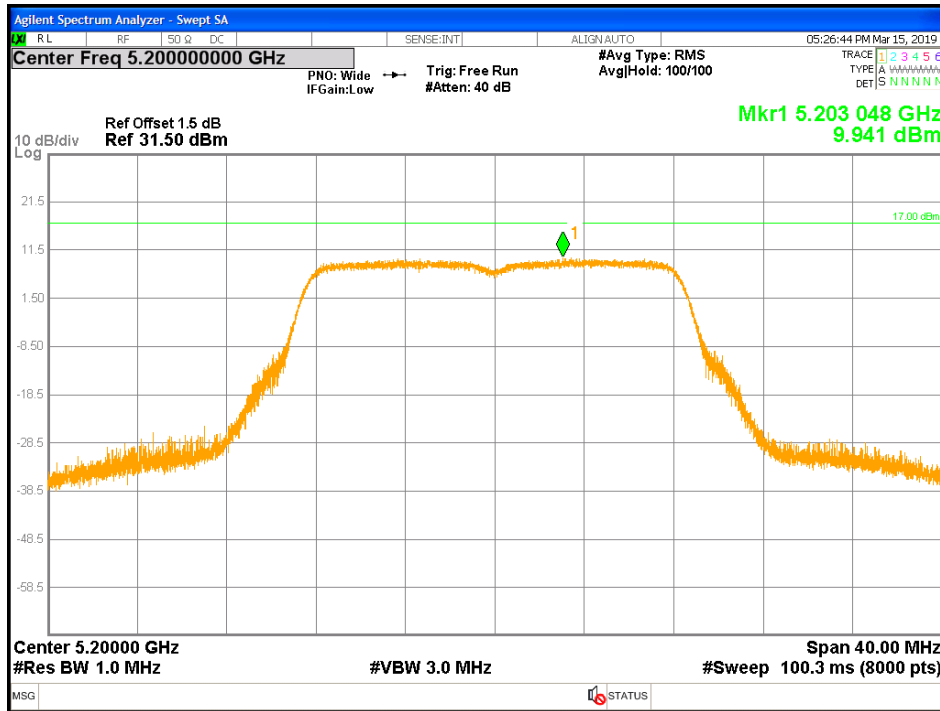


Figure 167: FCC-PPSD-5GHz-5200MHz-11a-1x4-q82-Ch2

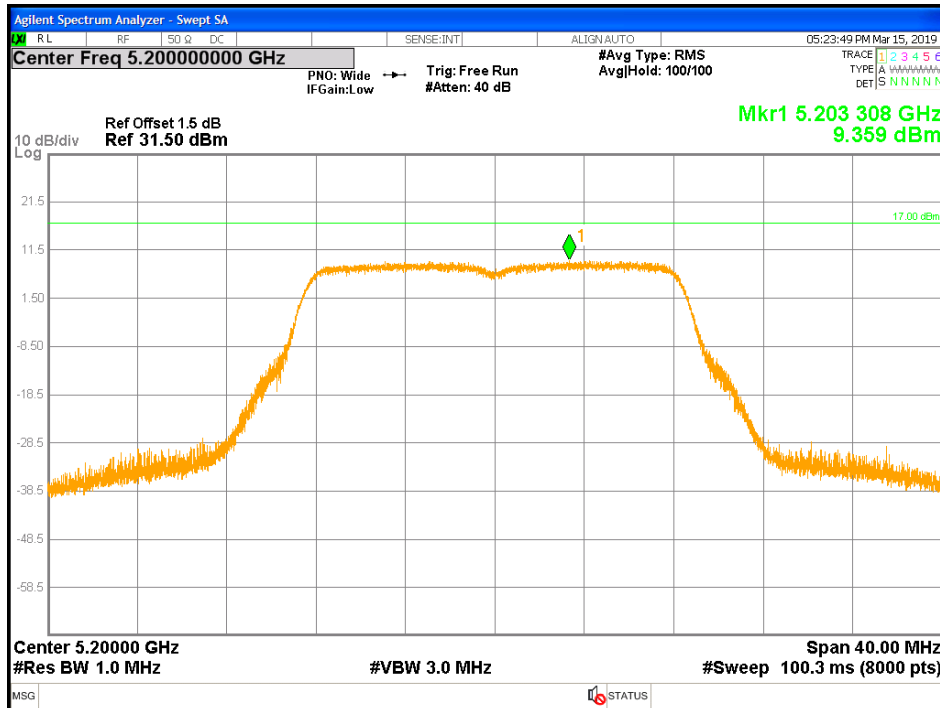


Figure 168: FCC-PPSD-5GHz-5200MHz-11a-1x4-q82-Ch3

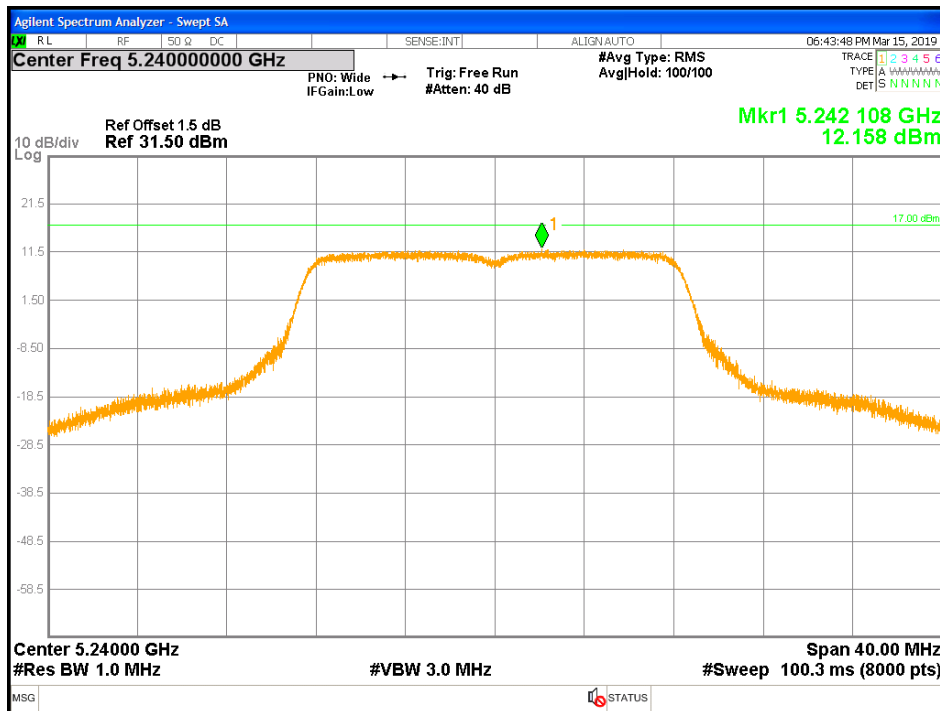


Figure 169: FCC-PPSD-5GHz-5240MHz-11a-1x4-q96-Ch0

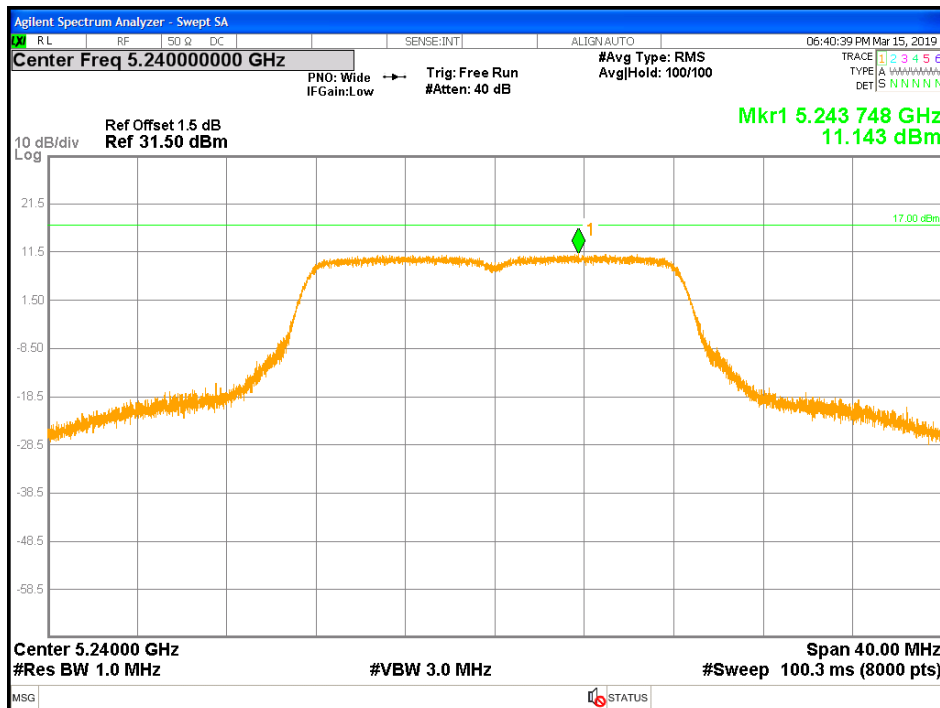


Figure 170: FCC-PPSD-5GHz-5240MHz-11a-1x4-q96-Ch1

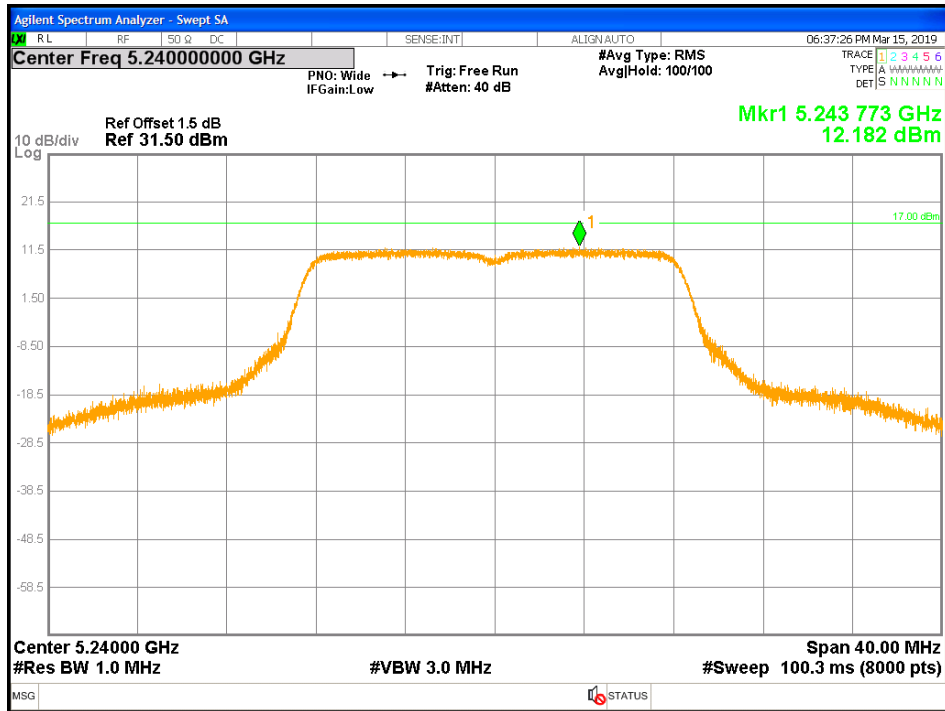


Figure 171: FCC-PPSD-5GHz-5240MHz-11a-1x4-q96-Ch2

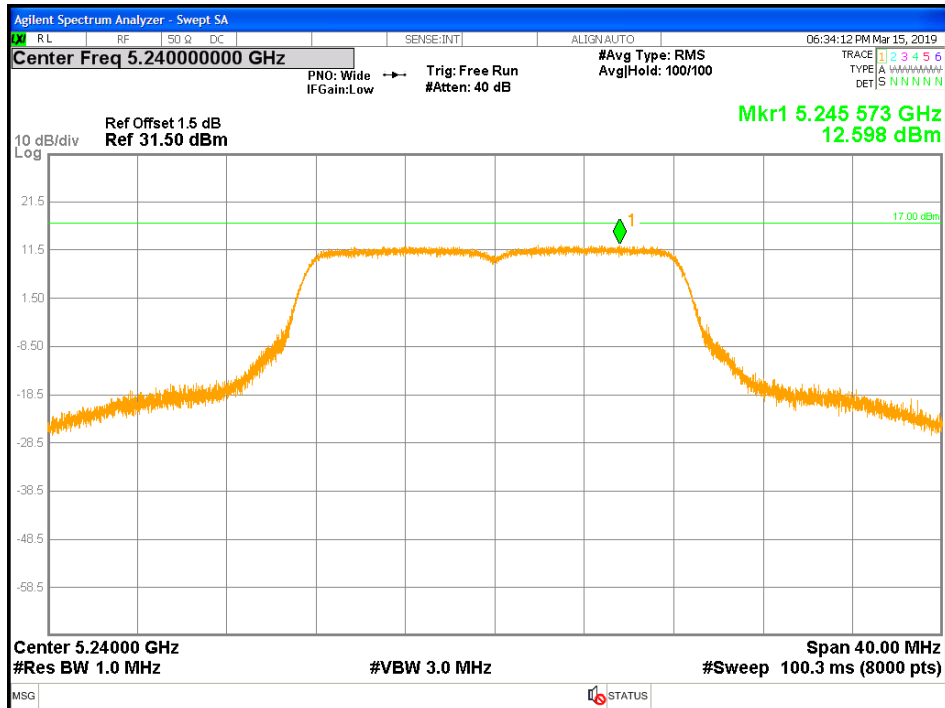


Figure 172: FCC-PPSD-5GHz-5240MHz-11a-1x4-q96-Ch3

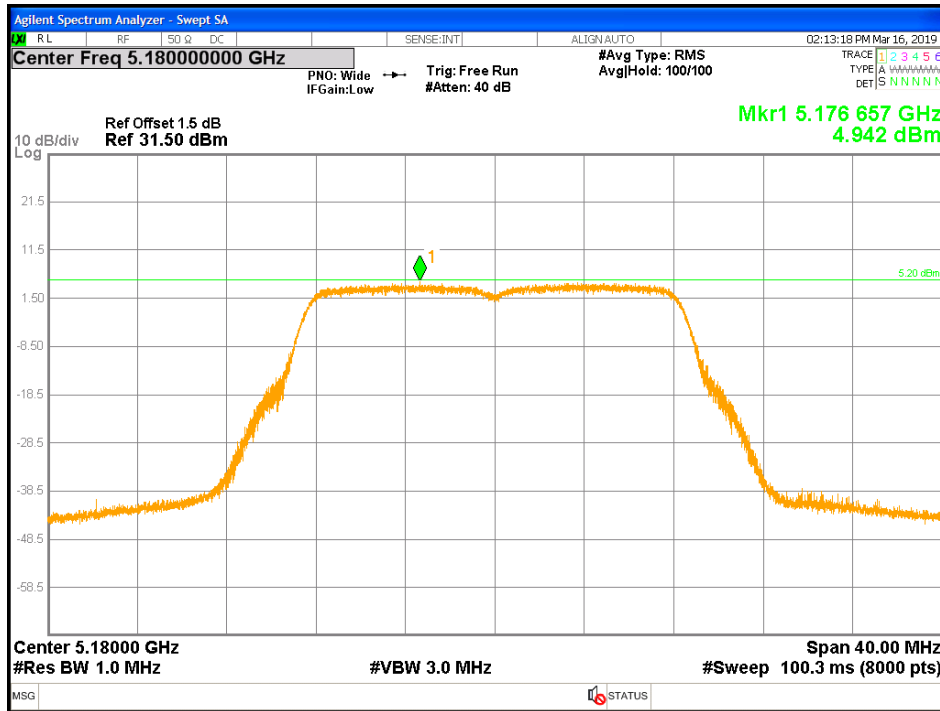


Figure 173: ISED-PPSD-5GHz-5180MHz-11a-1x4-q61-Ch0

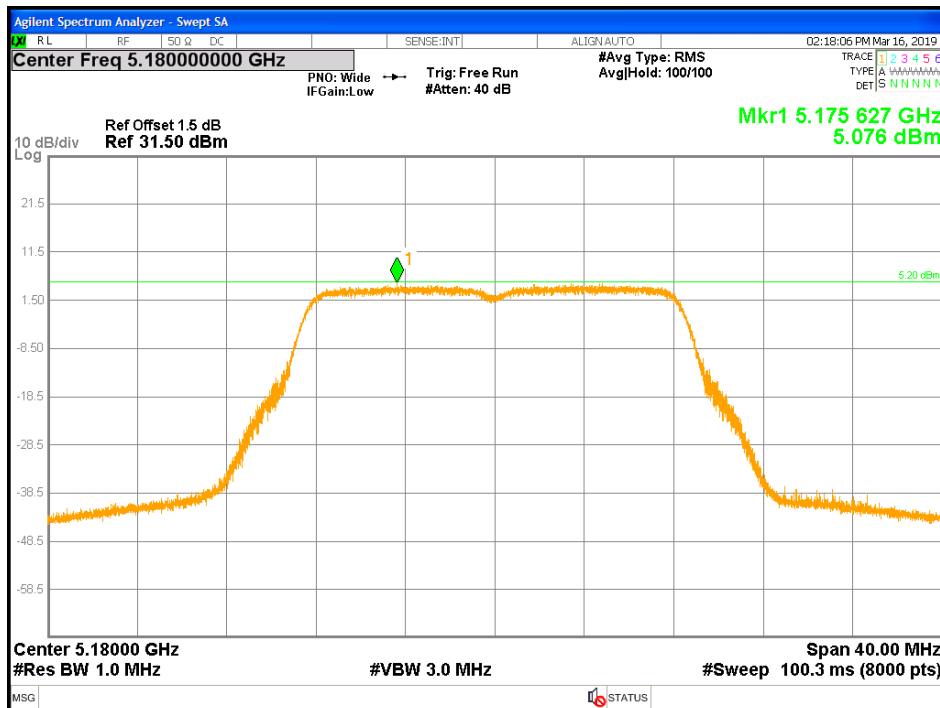


Figure 174: ISED-PPSD-5GHz-5180MHz-11a-1x4-q61-Ch1

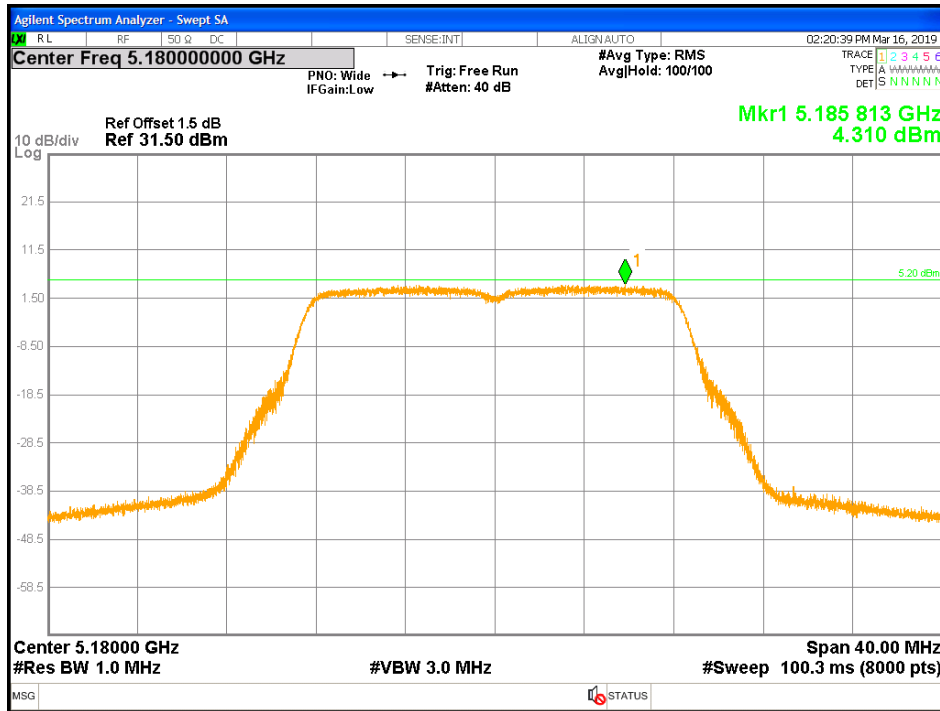


Figure 175: ISED-PPSD-5GHz-5180MHz-11a-1x4-q61-Ch2

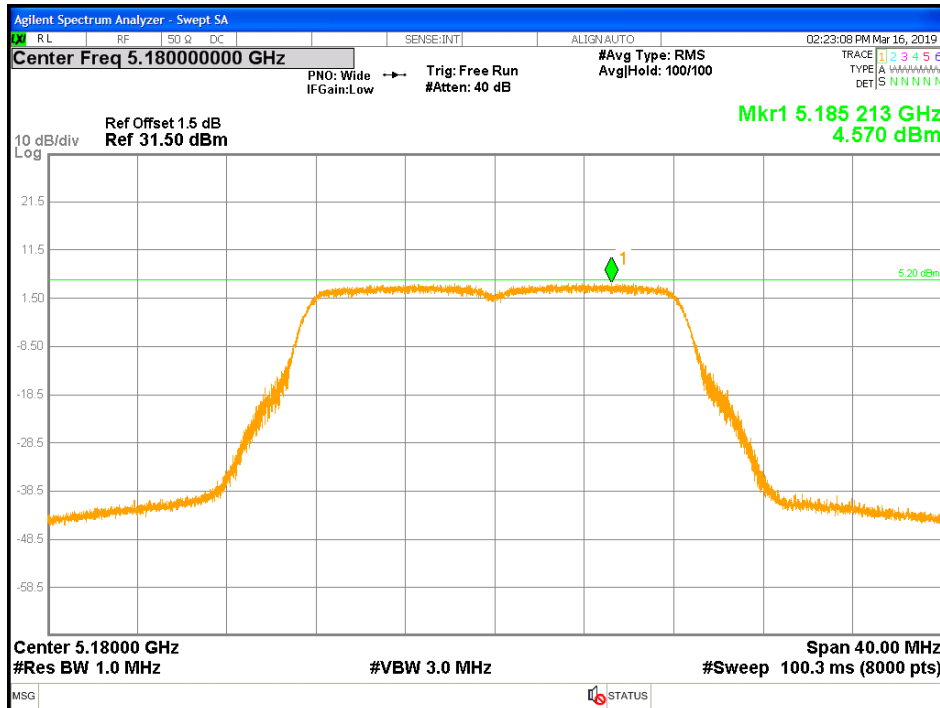


Figure 176: ISED-PPSD-5GHz-5180MHz-11a-1x4-q61-Ch3

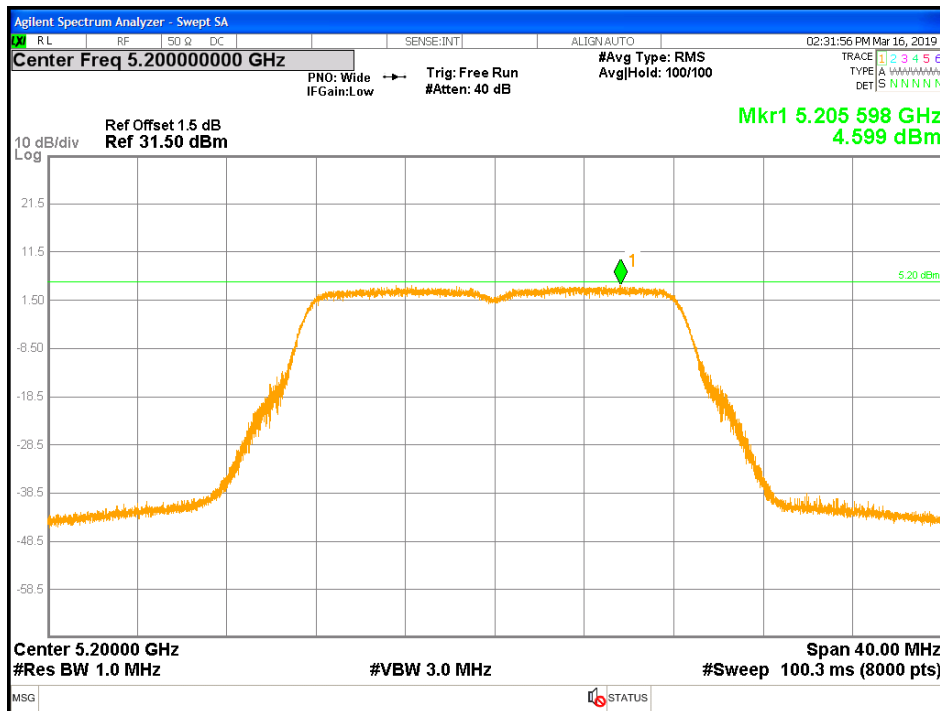


Figure 177: ISED-PPSD-5GHz-5200MHz-11a-1x4-q61-Ch0

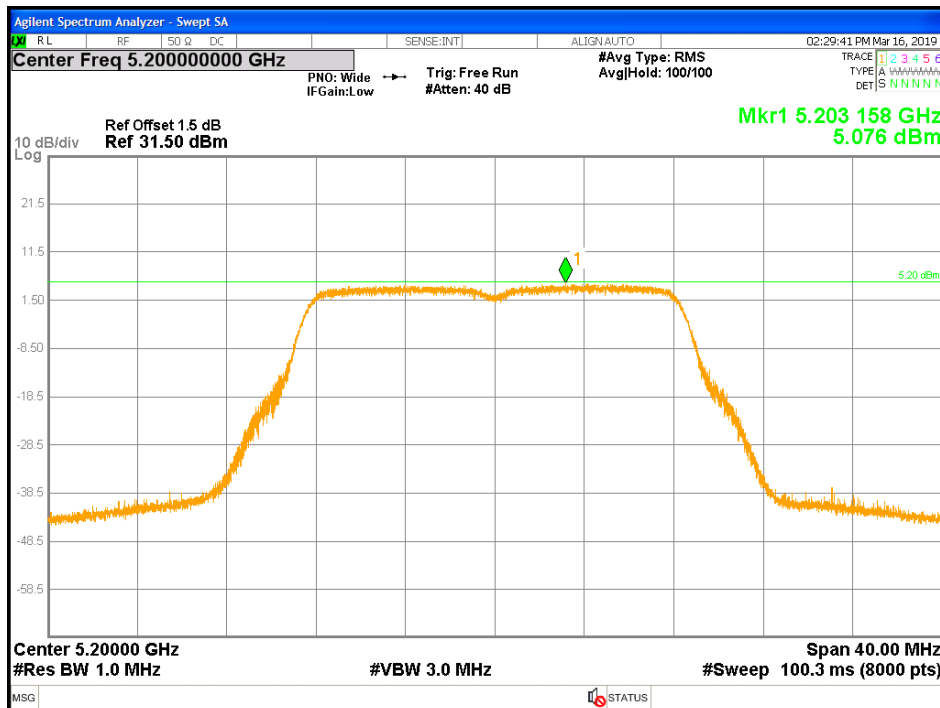


Figure 178: ISED-PPSD-5GHz-5200MHz-11a-1x4-q61-Ch1

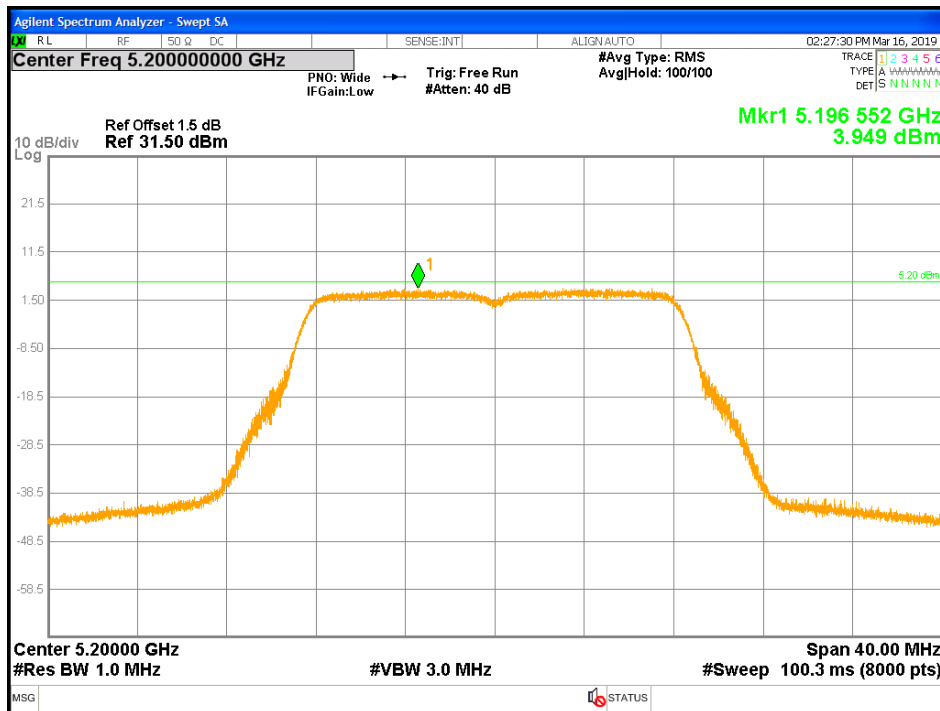


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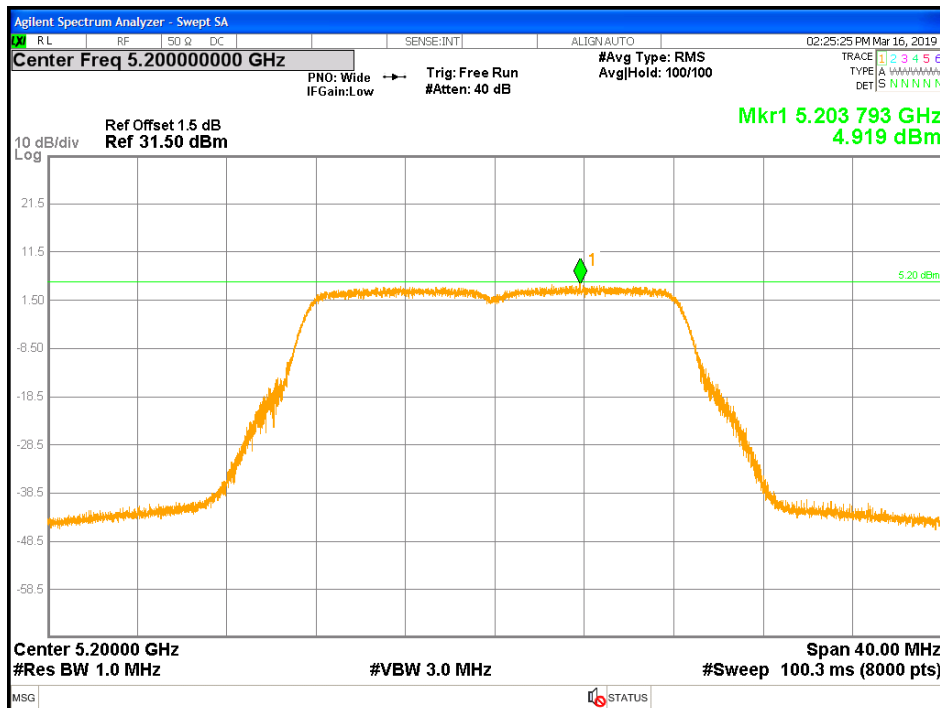


Figure 180: ISED-PPSD-5GHz-5200MHz-11a-1x4-q61-Ch3

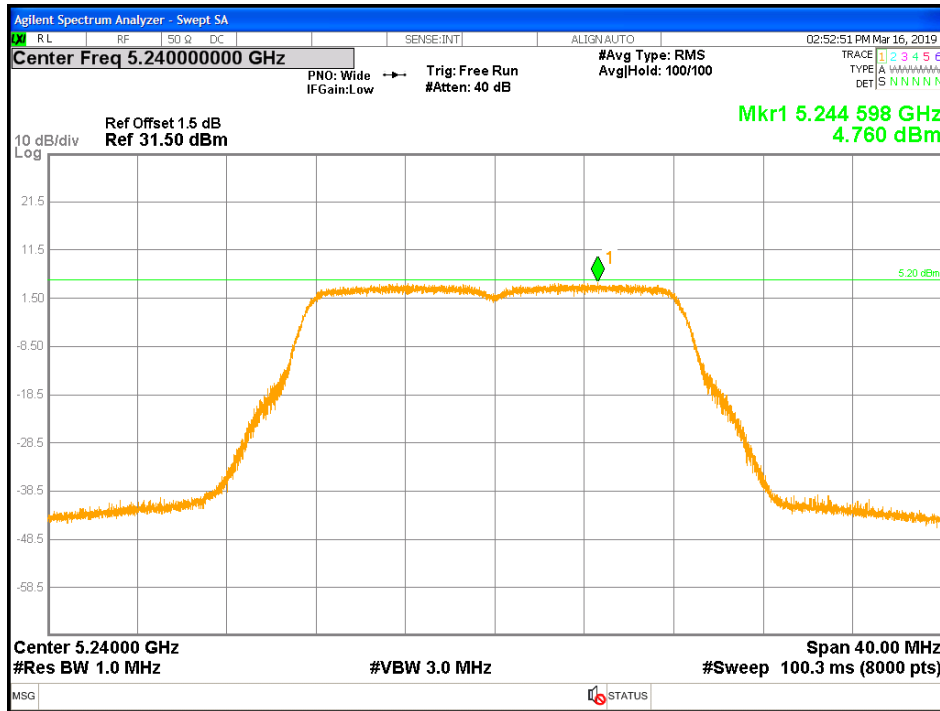


Figure 181: ISED-PPSD-5GHz-5240MHz-11a-1x4-q61-Ch0

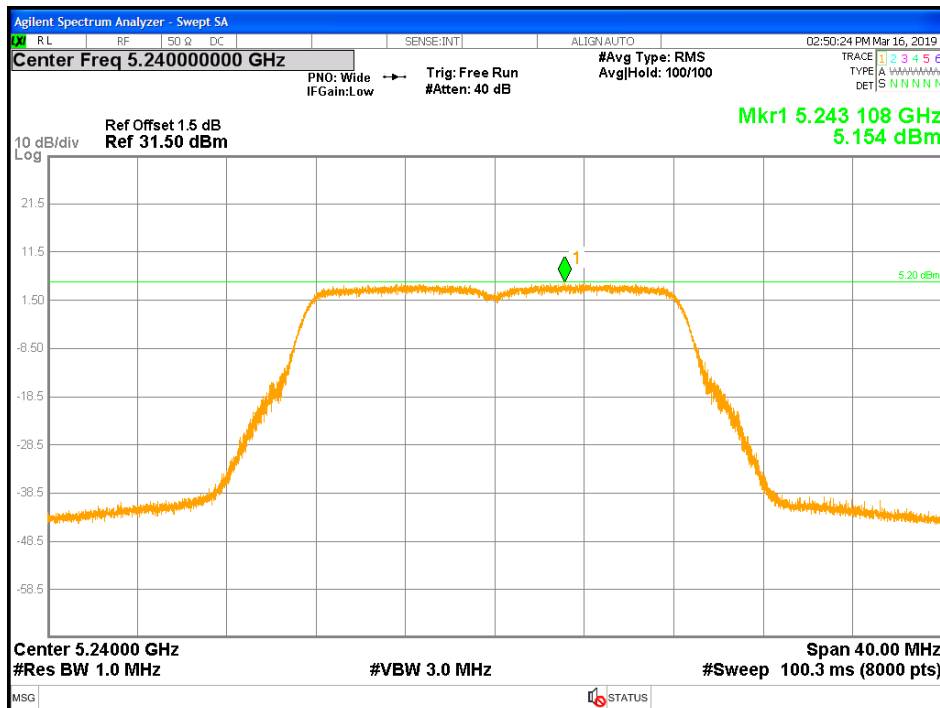


Figure 182: ISED-PPSD-5GHz-5240MHz-11a-1x4-q61-Ch1

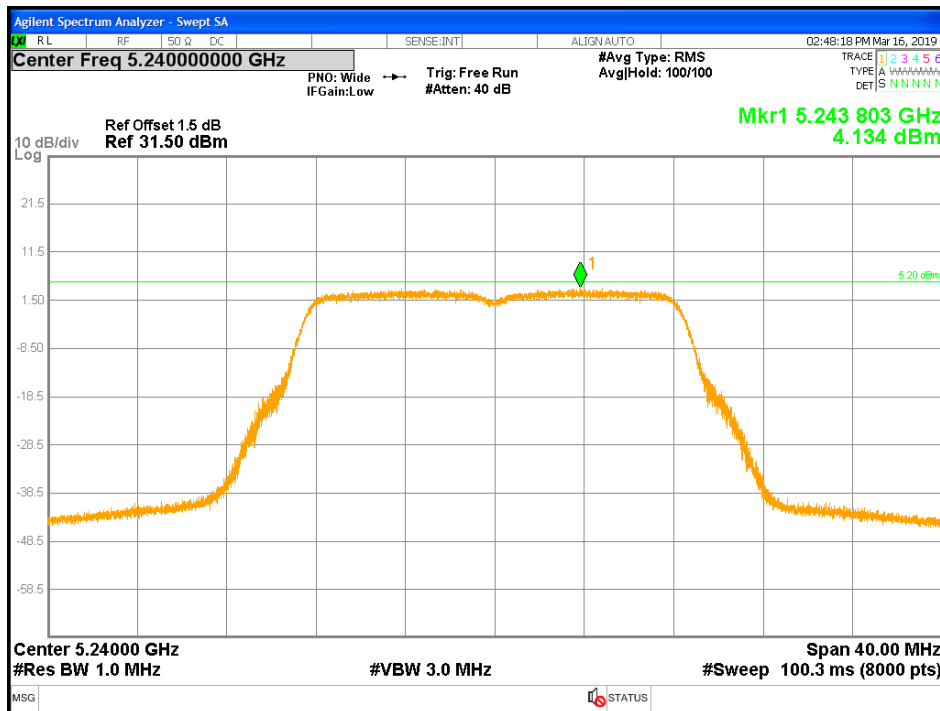


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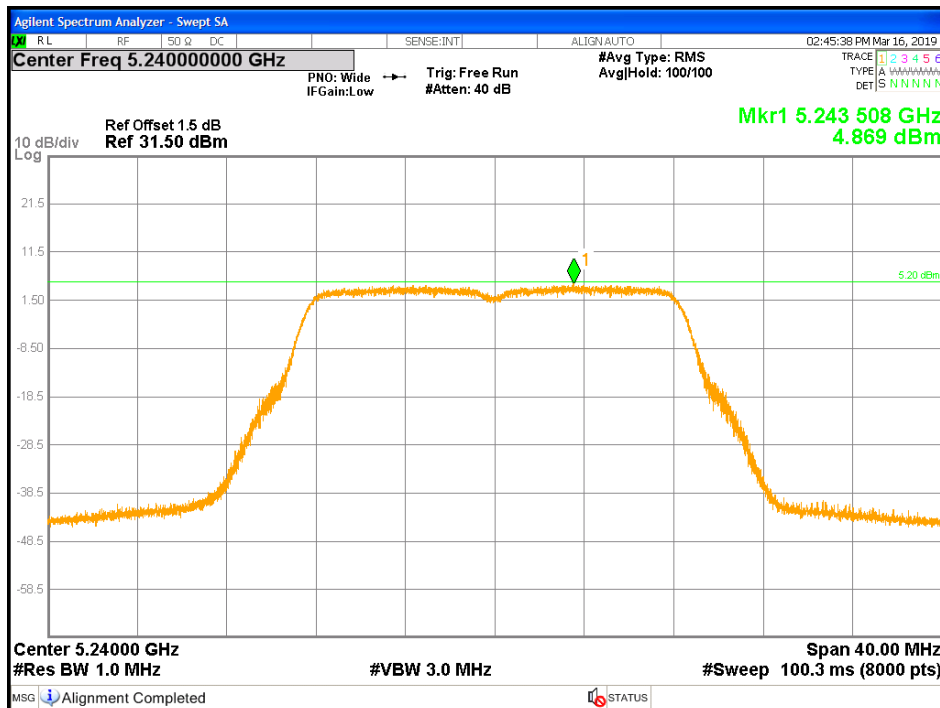


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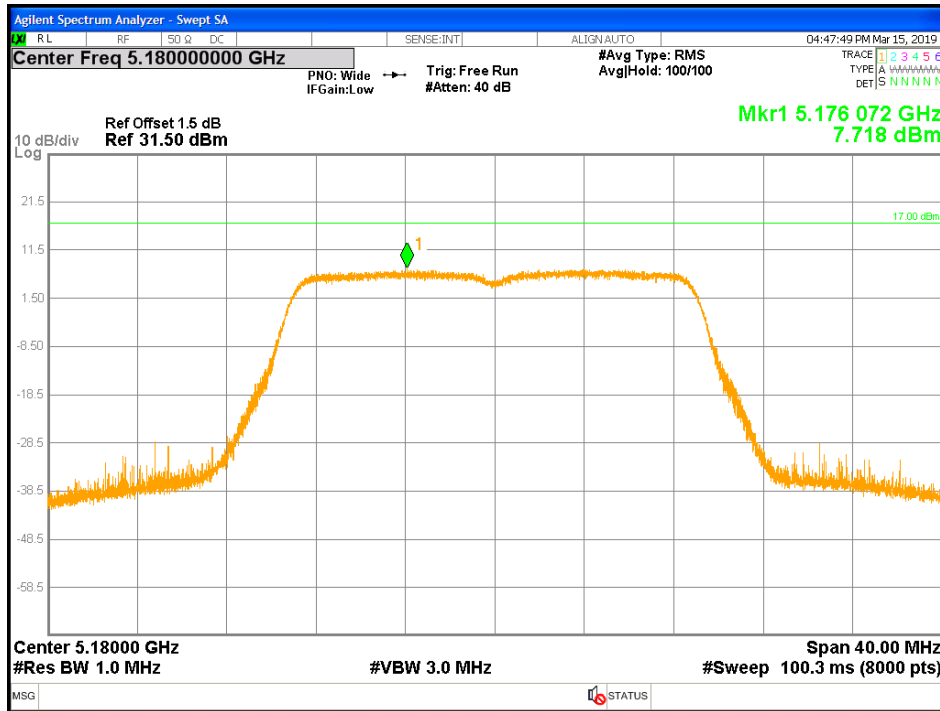


Figure 185: FCC-PPSD-5GHz-5180MHz-HT20-1x4-q74-Ch0

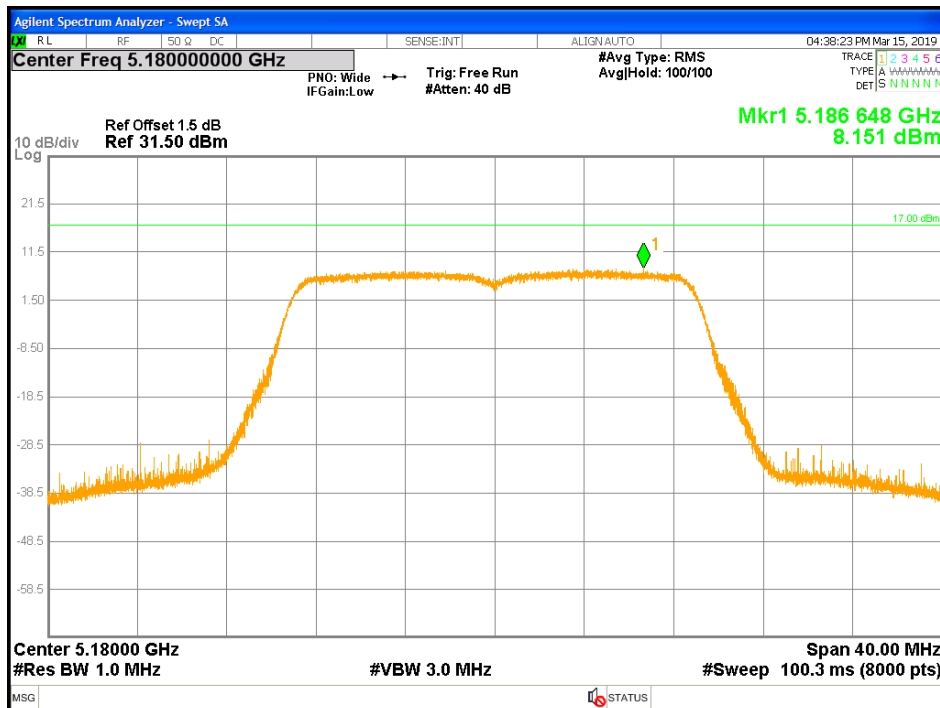


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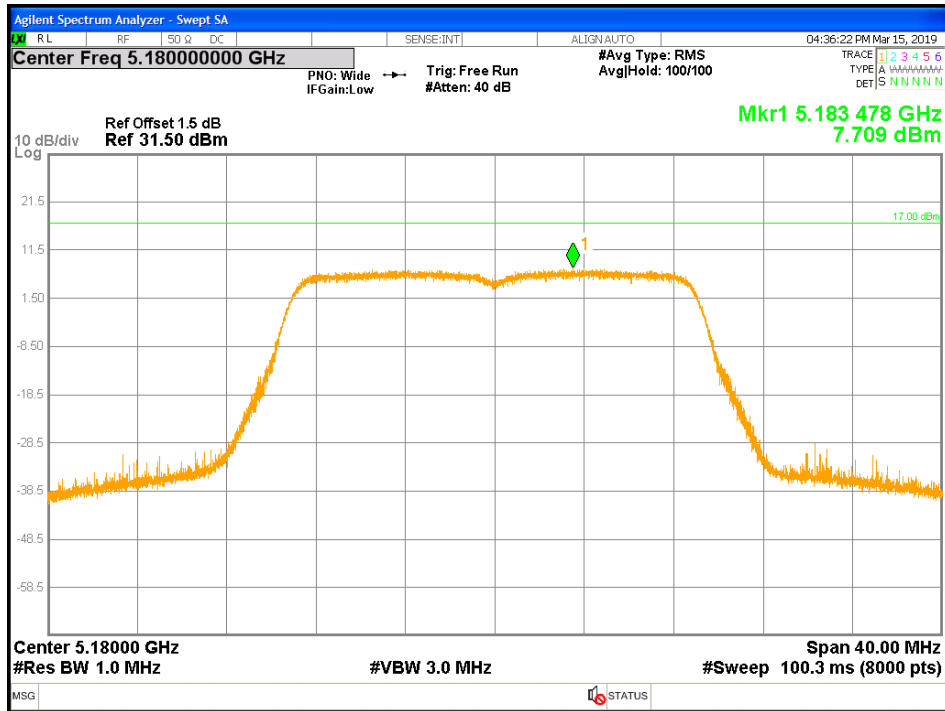


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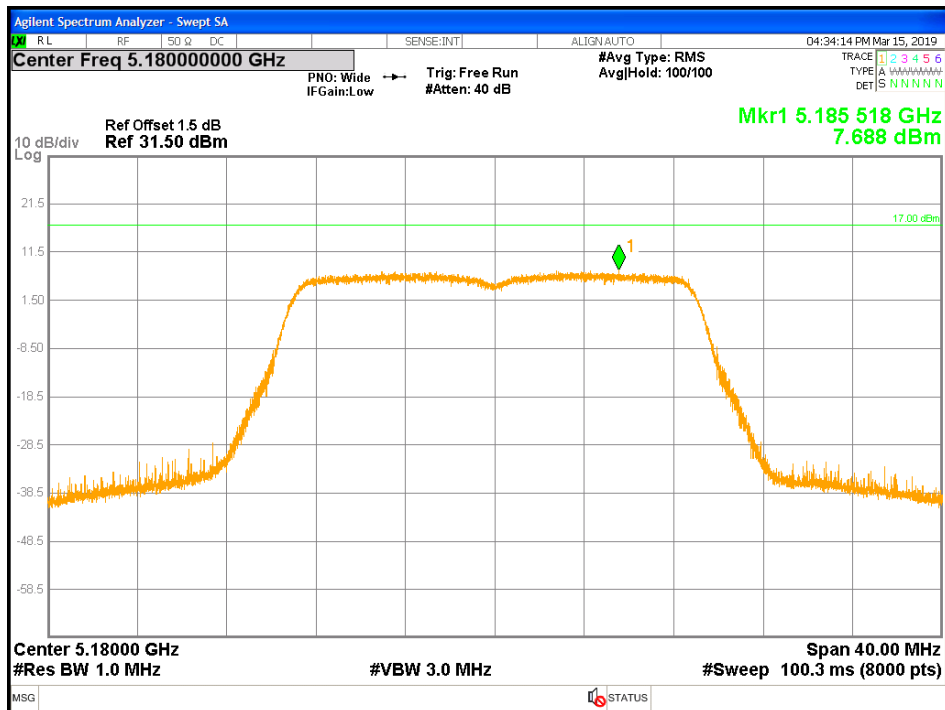


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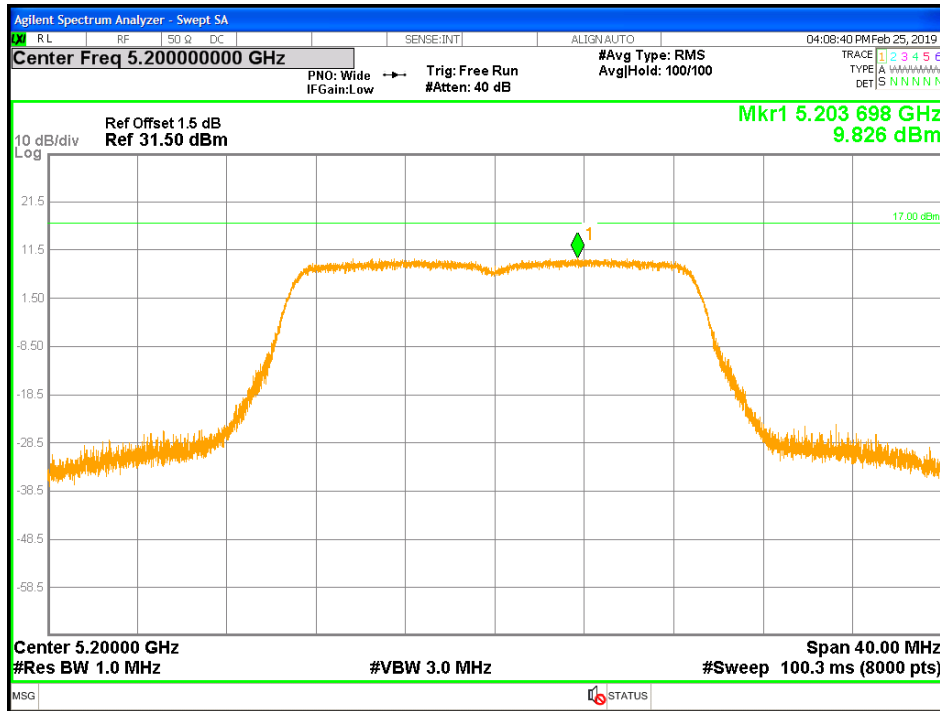


Figure 189: FCC-PPSD-5GHz-5200MHz-HT20-1x4-q82-Ch0

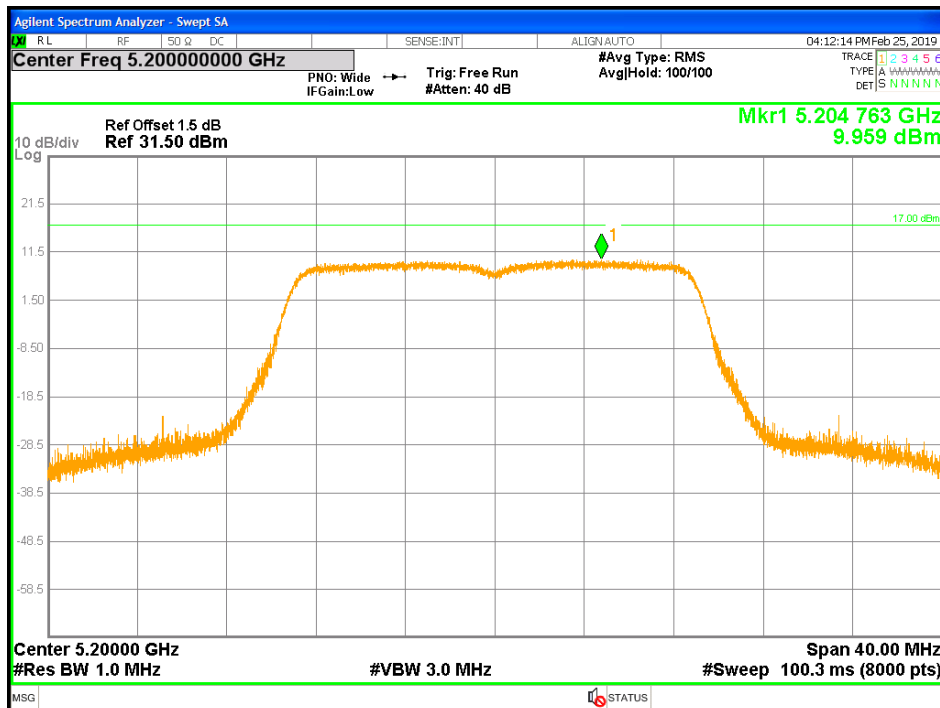


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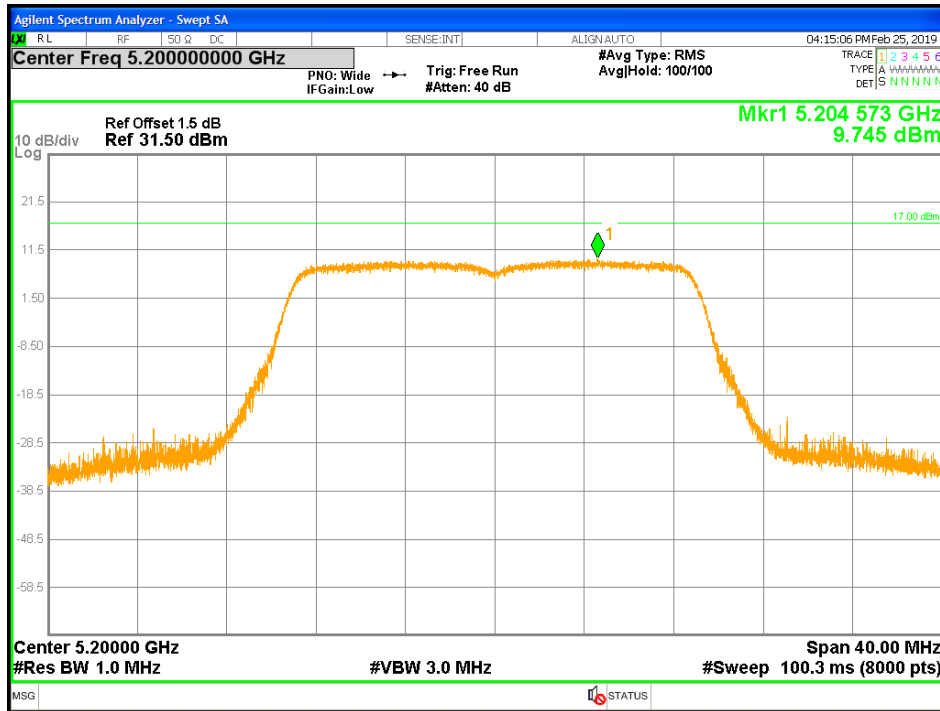


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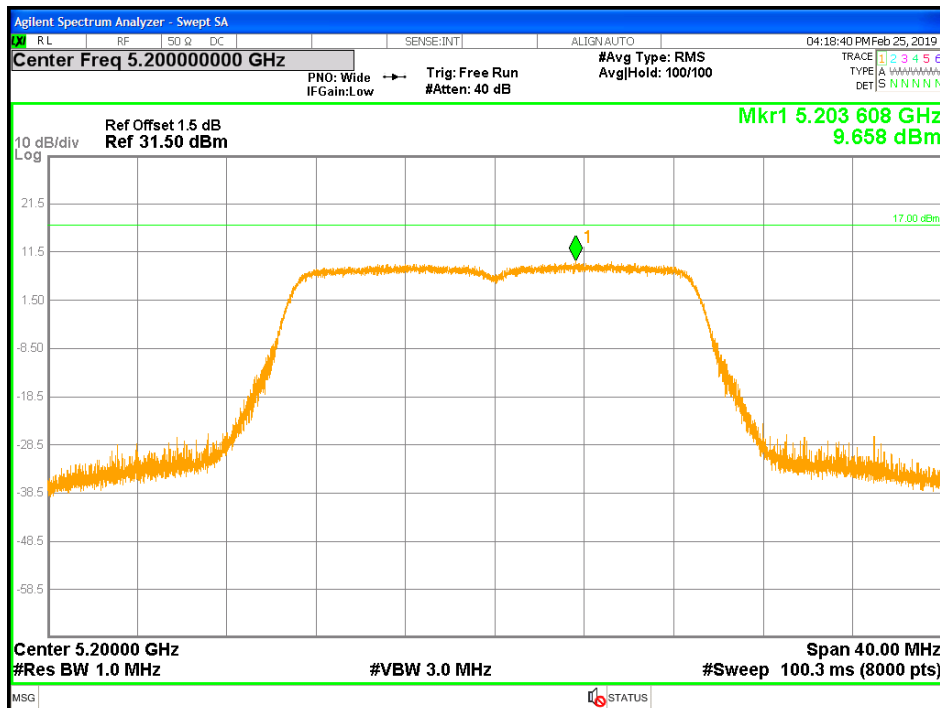


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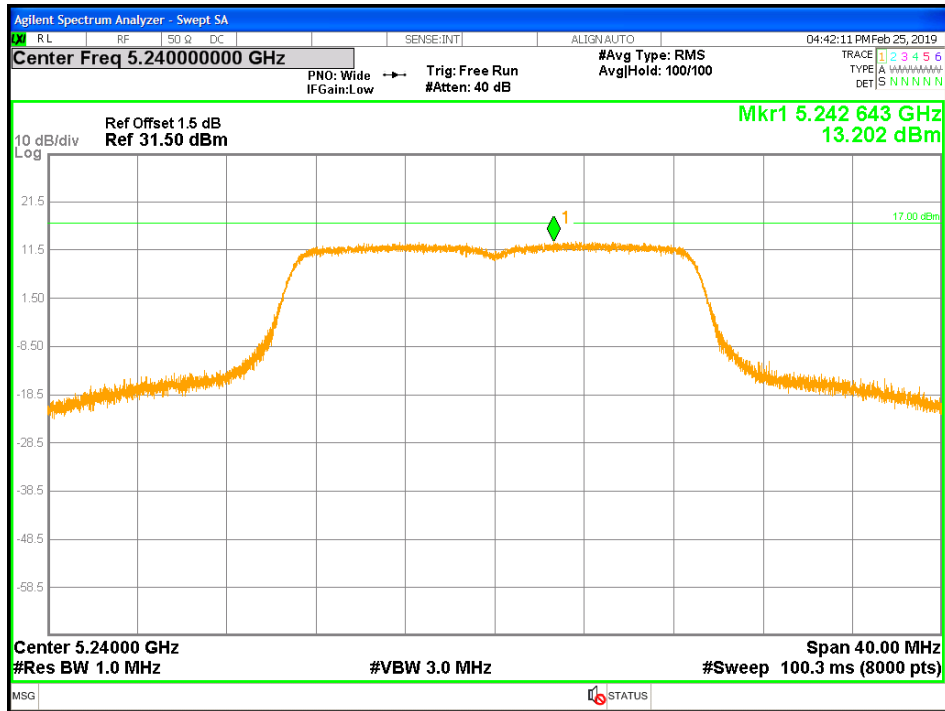


Figure 193: FCC-PPSD-5GHz-5240MHz-HT20-1x4-q96-Ch0

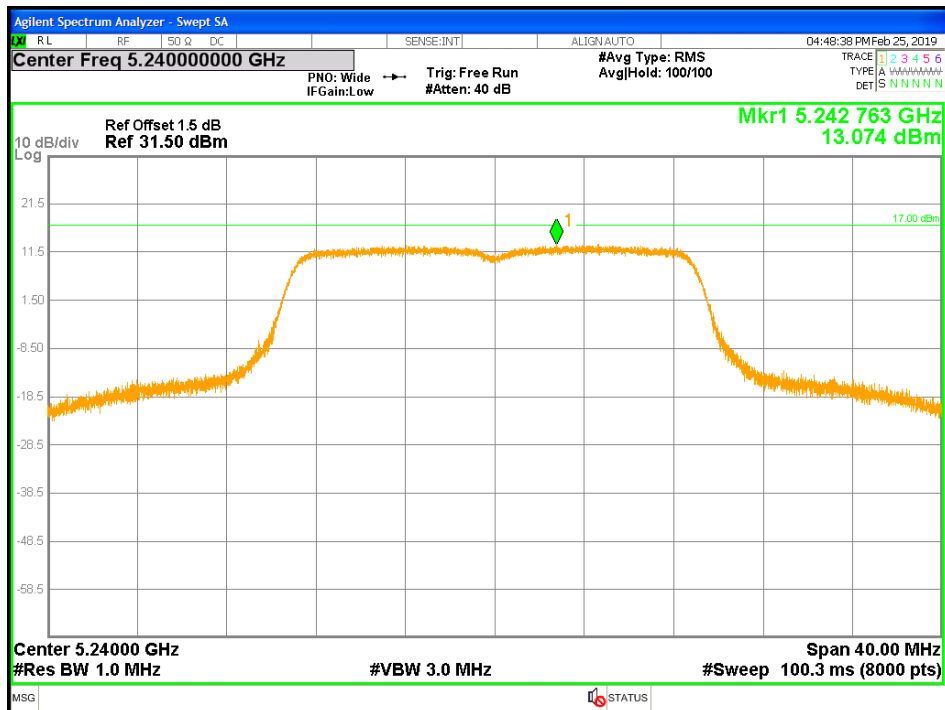


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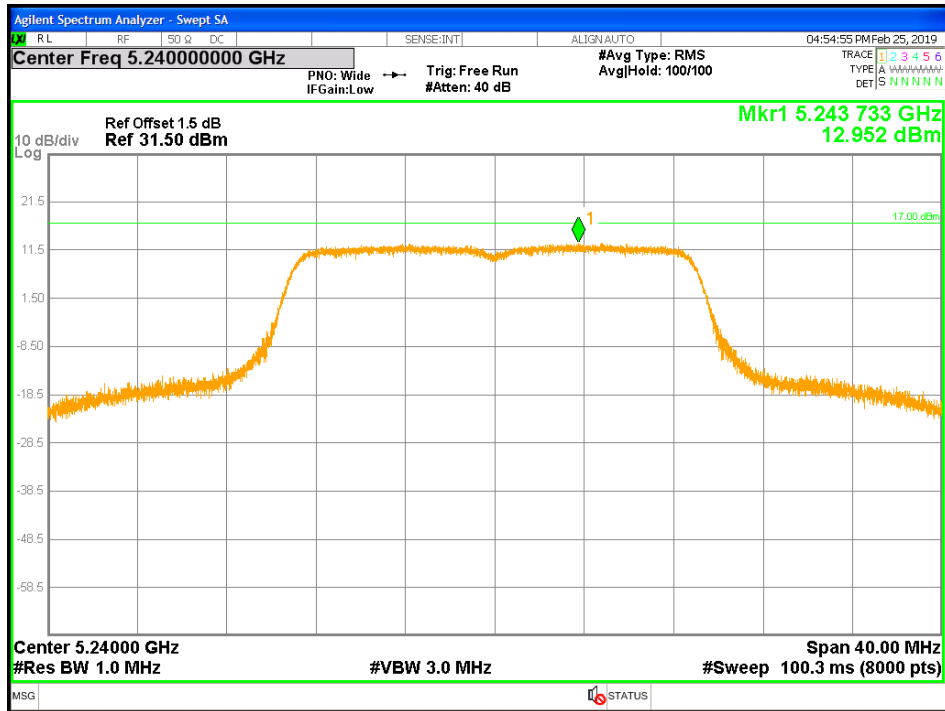


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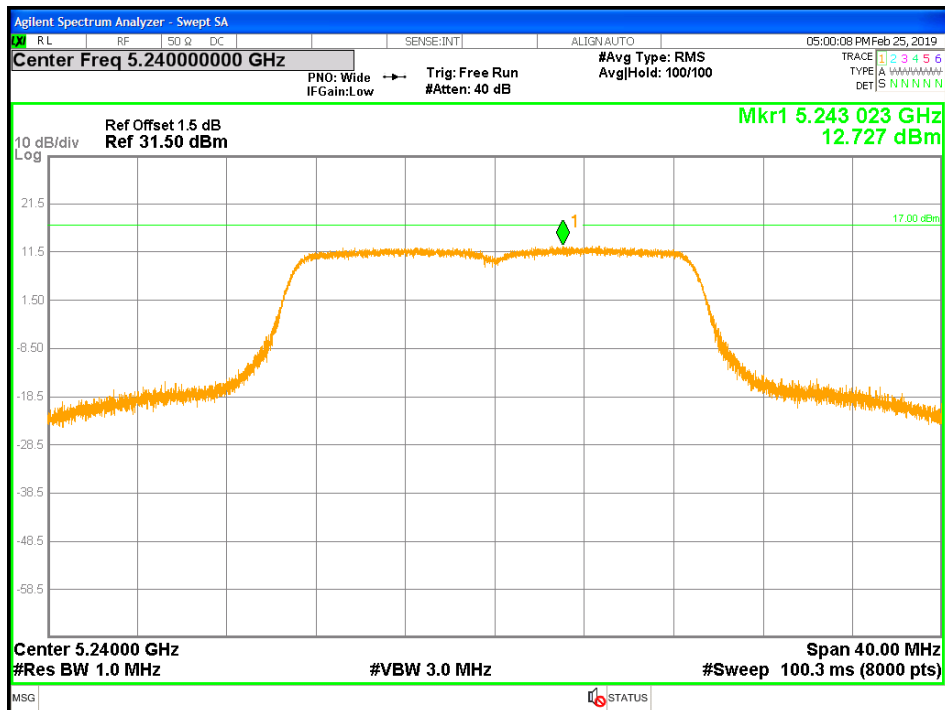


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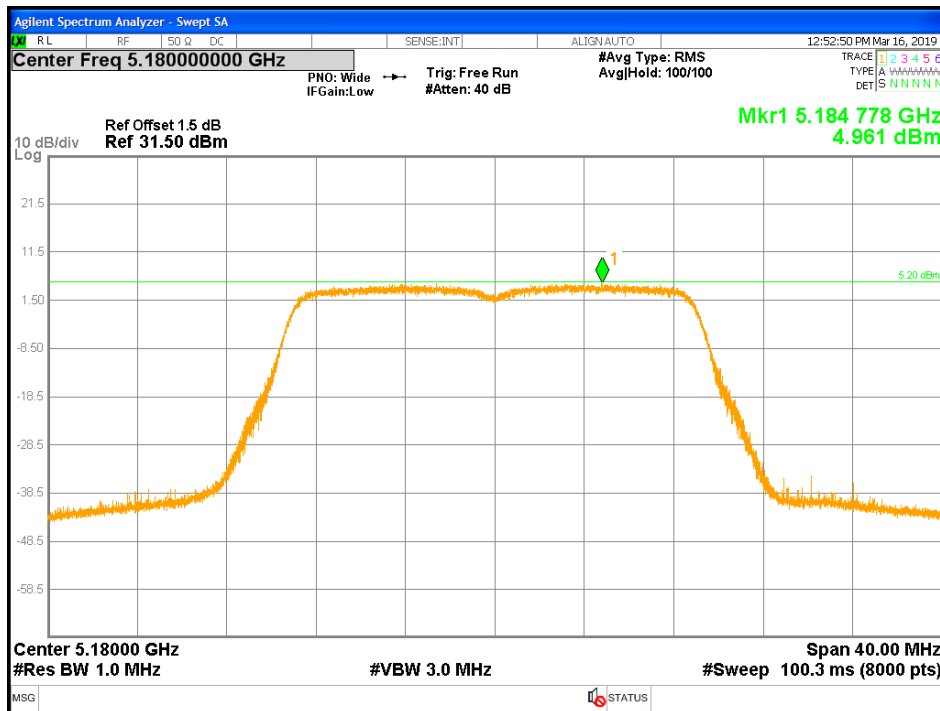


Figure 197: ISED-PPSD-5GHz-5180MHz-HT20-1x4-q63-Ch0

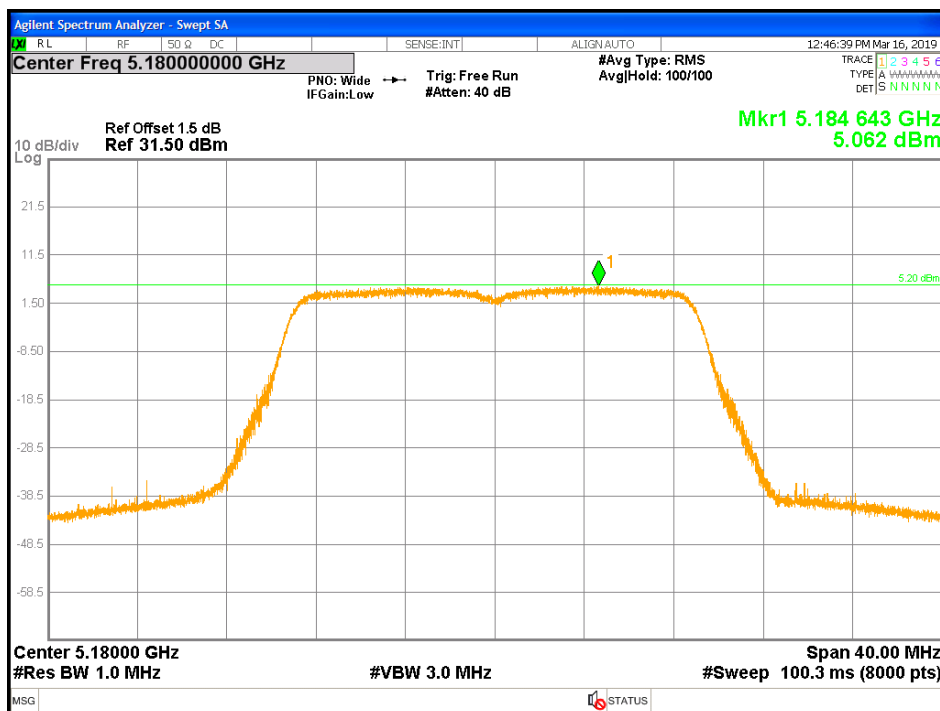


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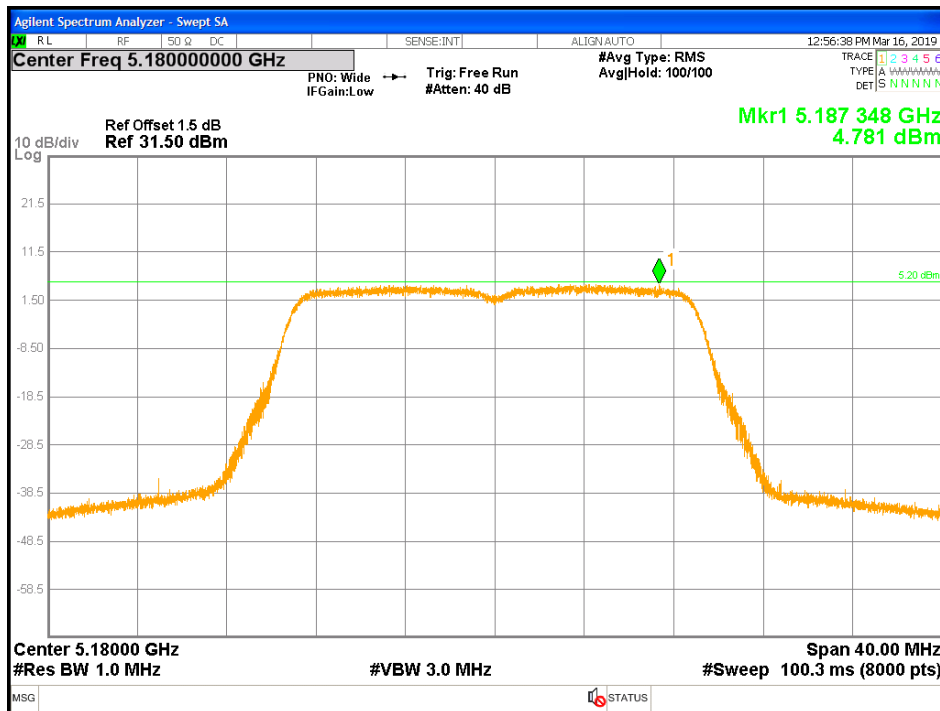


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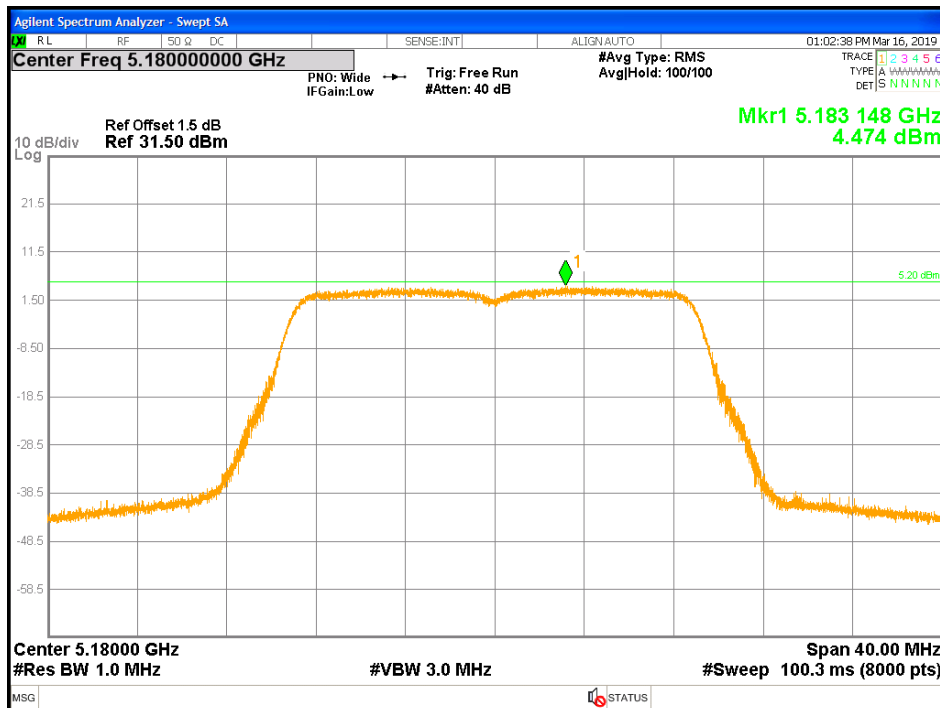


Figure 200: ISED-PPSD-5GHz-5180MHz-HT20-1x4-q63-Ch3

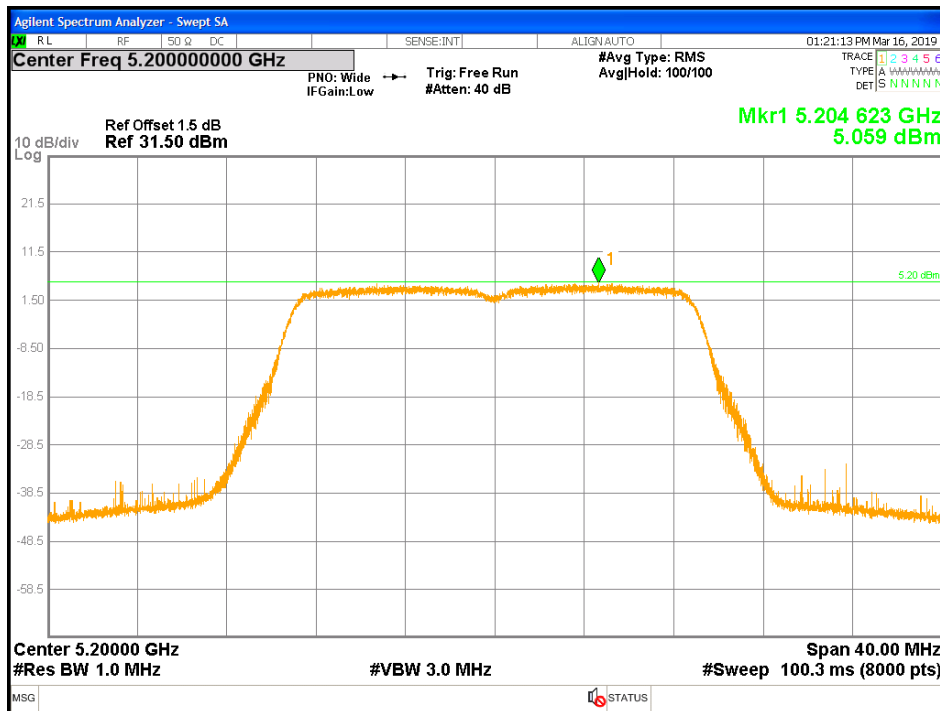


Figure 201: ISED-PPSD-5GHz-5200MHz-HT20-1x4-q62-Ch0

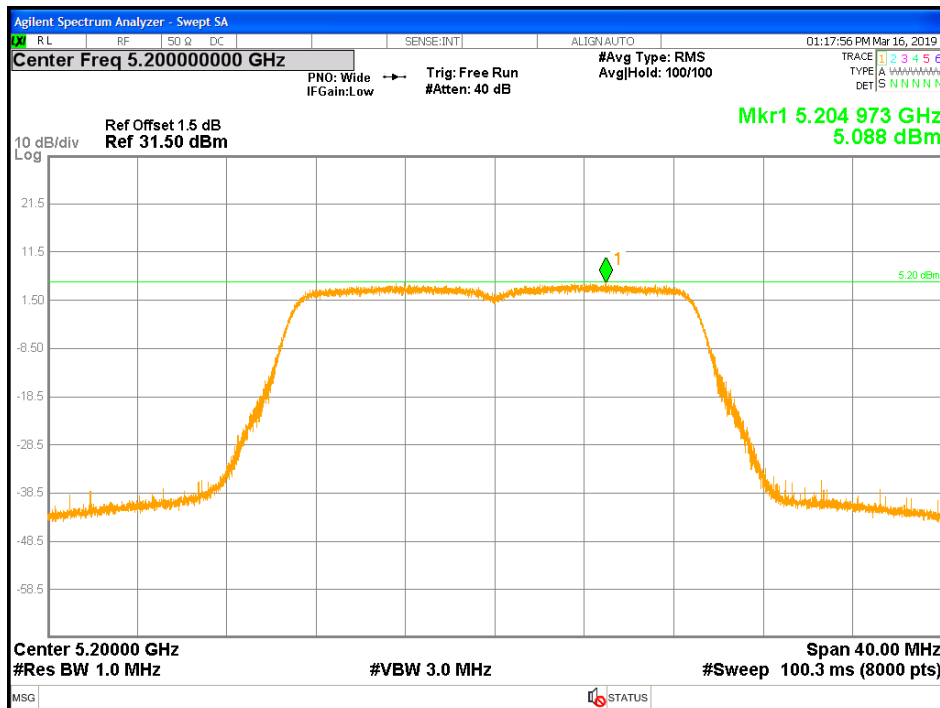


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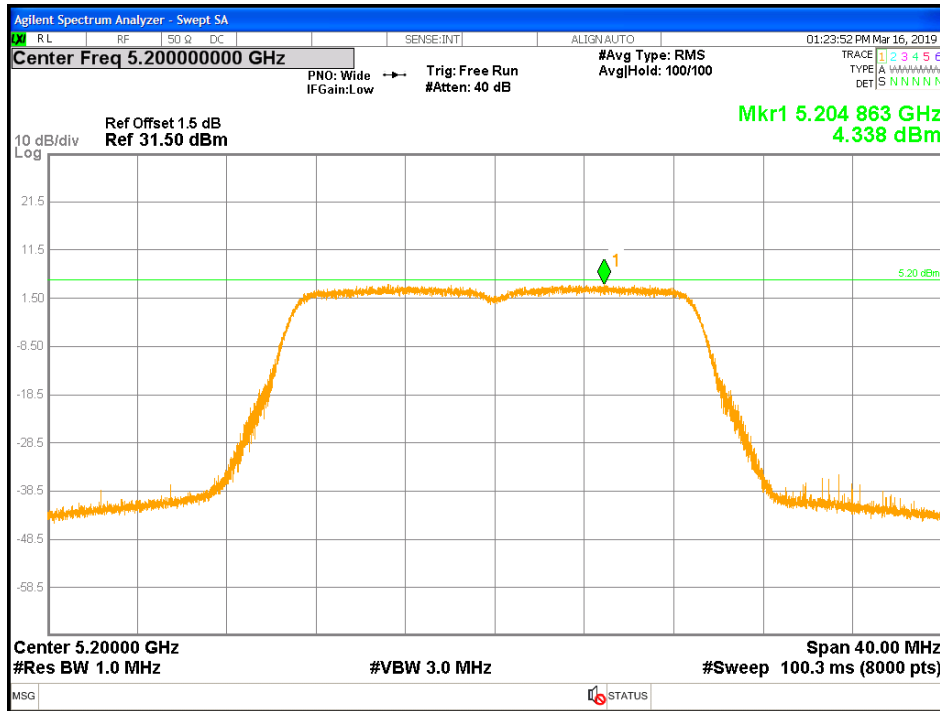


Figure 203: ISED-PPSD-5GHz-5200MHz-HT20-1x4-q62-Ch2

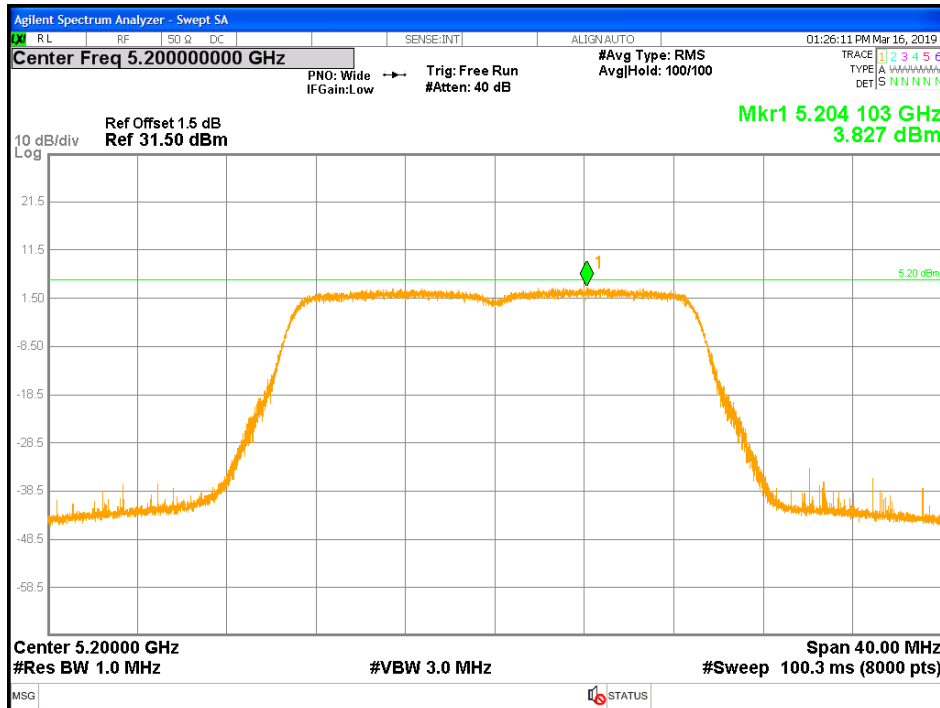


Figure 204: ISED-PPSD-5GHz-5200MHz-HT20-1x4-q62-Ch3

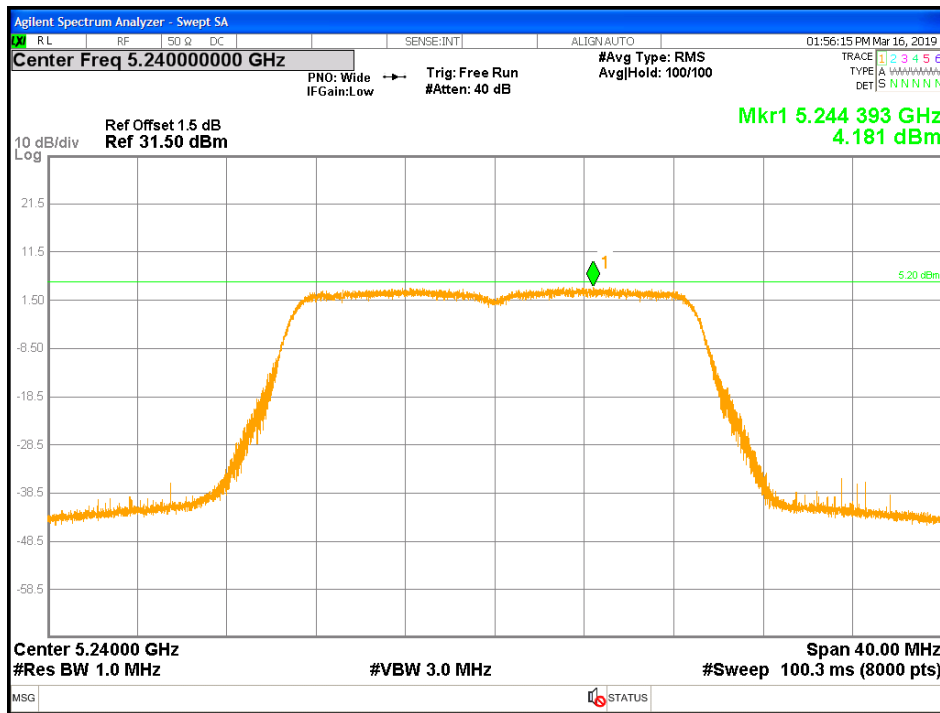


Figure 205: ISED-PPSD-5GHz-5240MHz-HT20-1x4-q62-Ch0

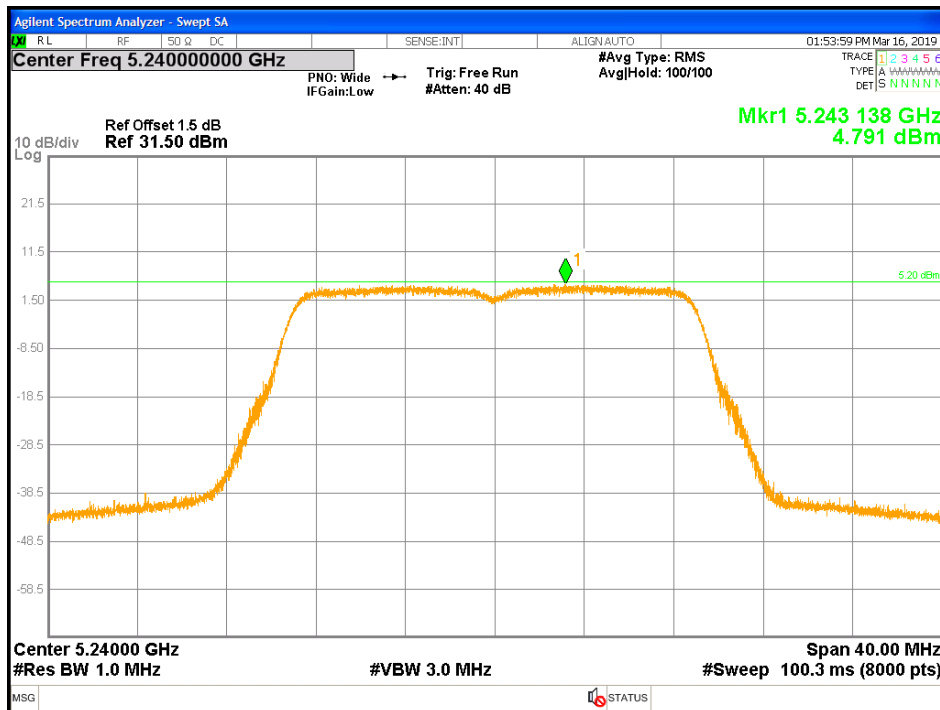


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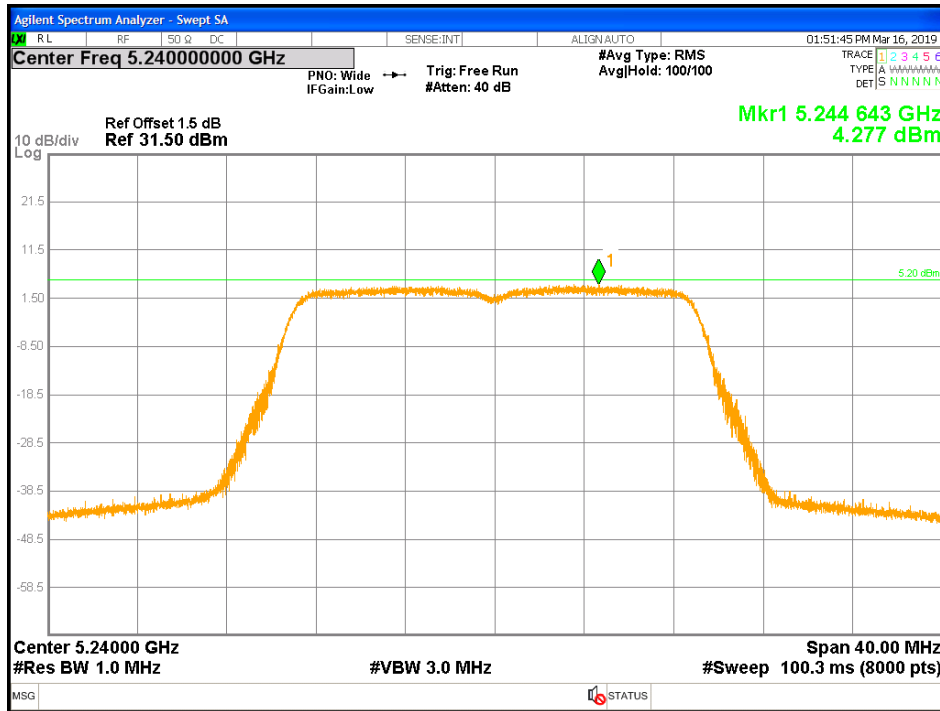


Figure 207: ISED-PPSD-5GHz-5240MHz-HT20-1x4-q62-Ch2

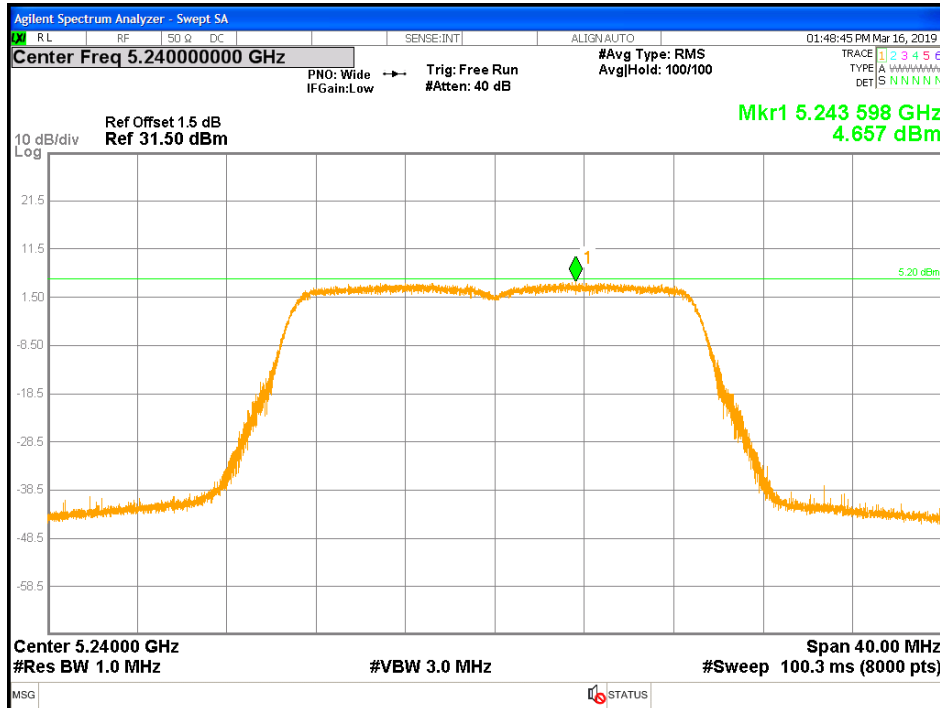


Figure 208: ISED-PPSD-5GHz-5240MHz-HT20-1x4-q62-Ch3

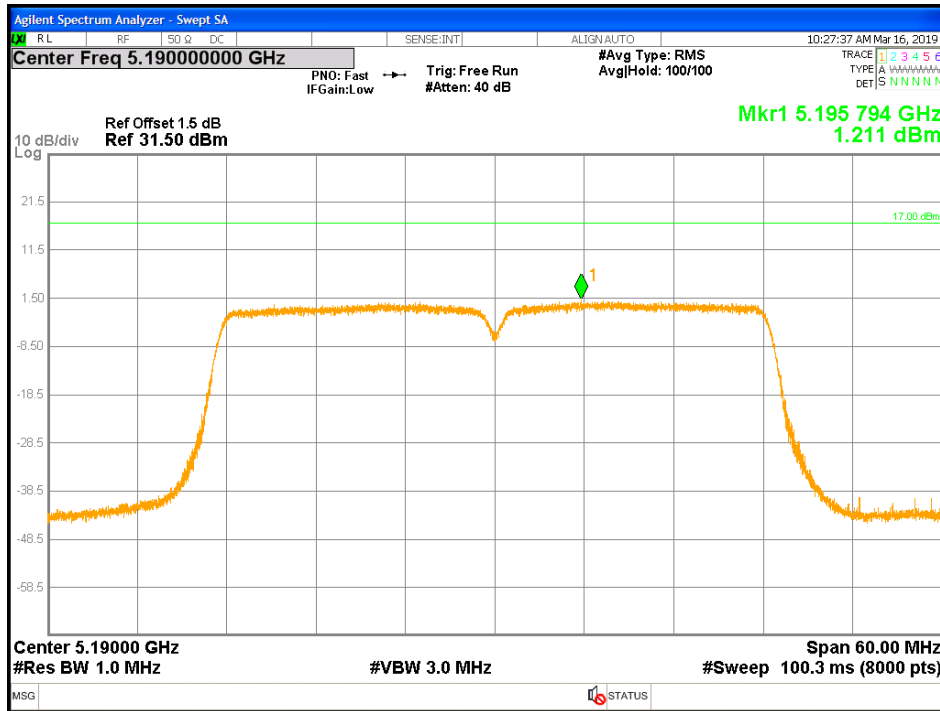


Figure 209: FCC-PPSD-5GHz-5190MHz-HT40-1x4-q61-Ch0

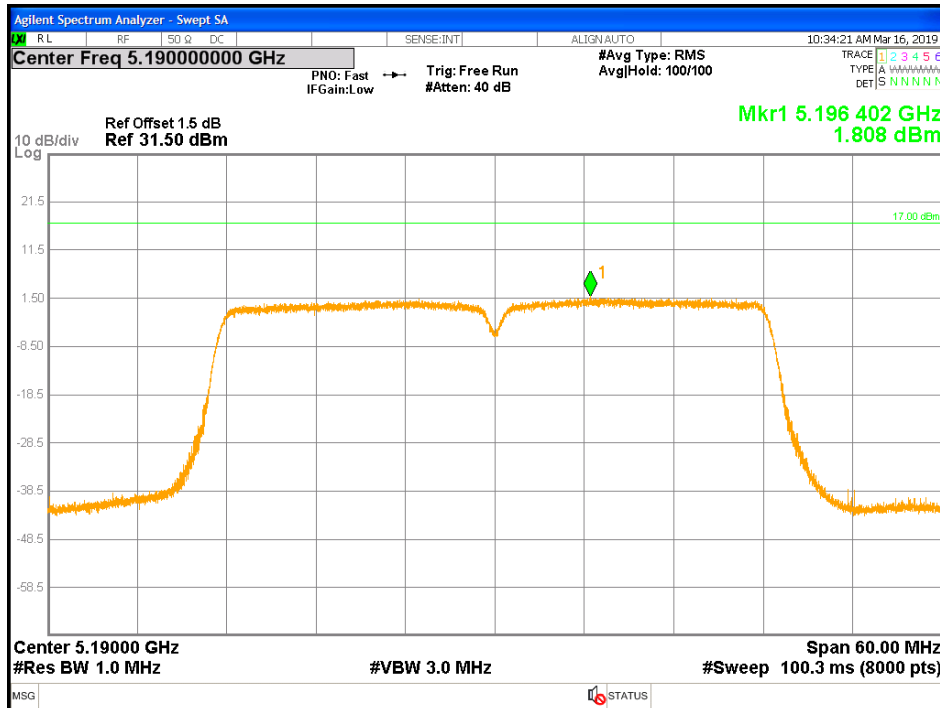


Figure 210: FCC-PPSD-5GHz-5190MHz-HT40-1x4-q61-Ch1

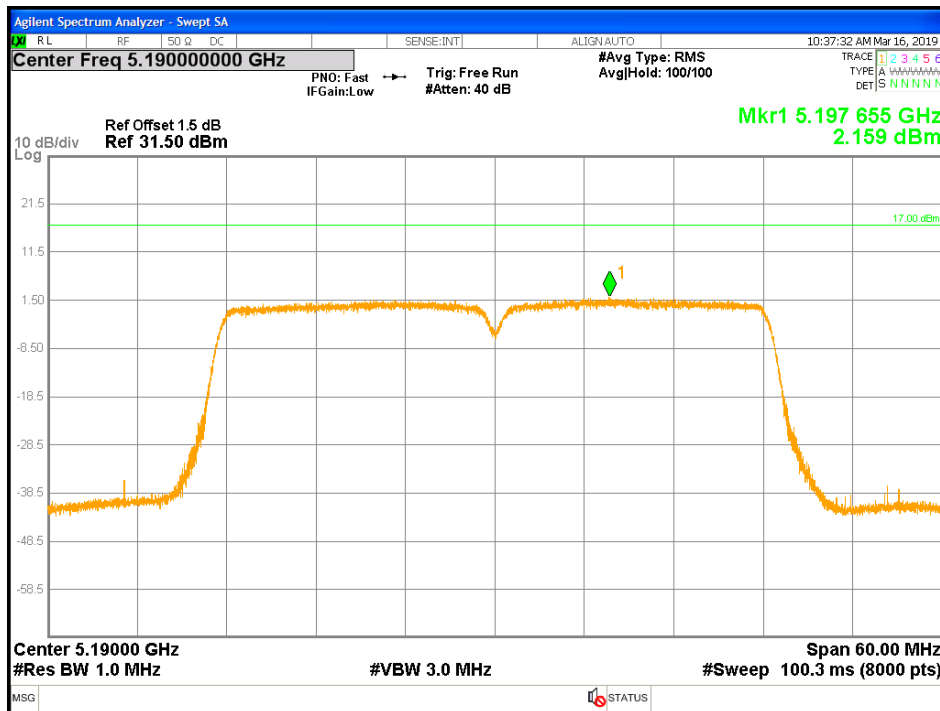


Figure 211: FCC-PPSD-5GHz-5190MHz-HT40-1x4-q61-Ch2

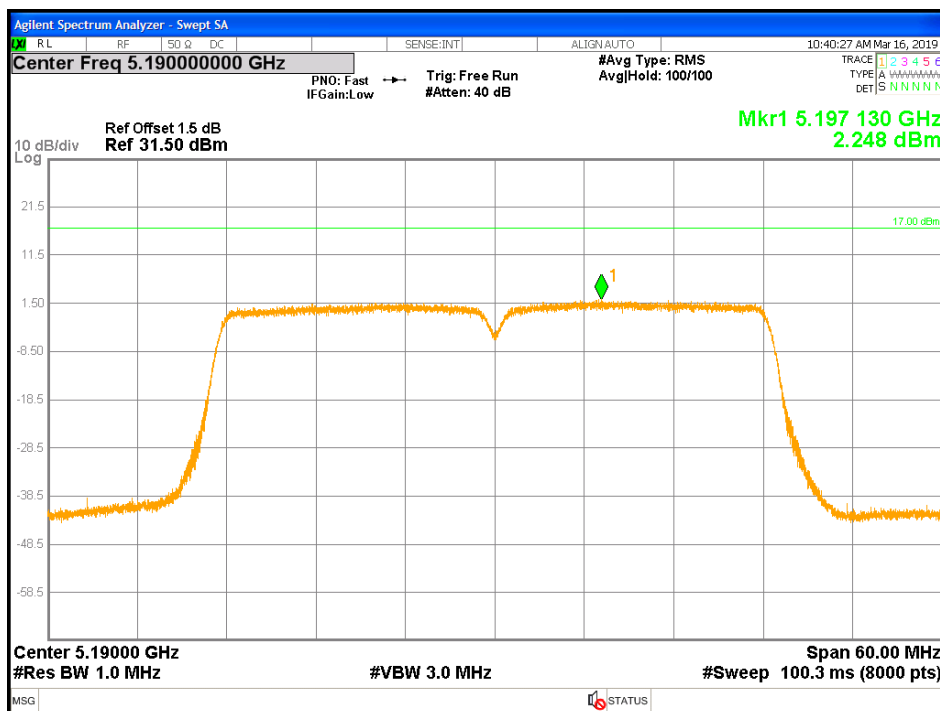


Figure 212: FCC-PPSD-5GHz-5190MHz-HT40-1x4-q61-Ch3

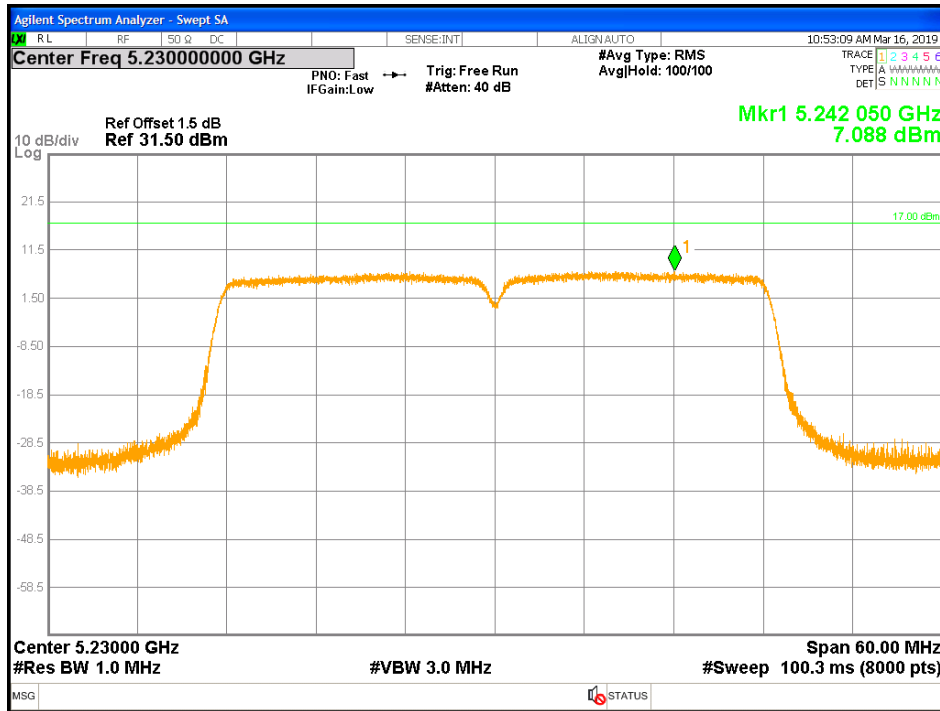


Figure 213: FCC-PPSD-5GHz-5230MHz-HT40-1x4-q82-Ch0

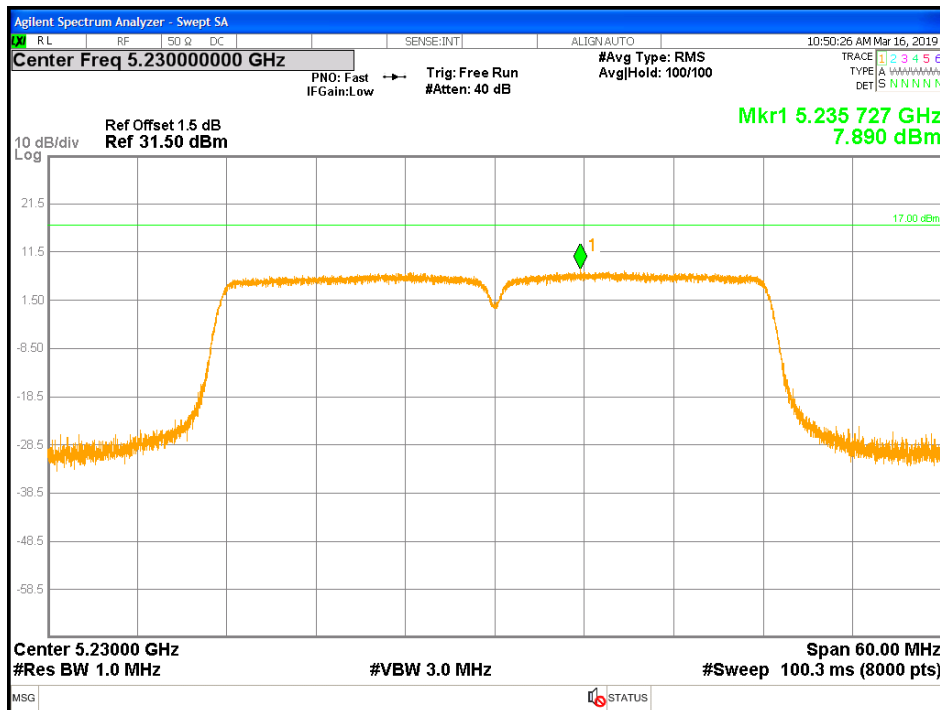


Figure 214: FCC-PPSD-5GHz-5230MHz-HT40-1x4-q82-Ch1

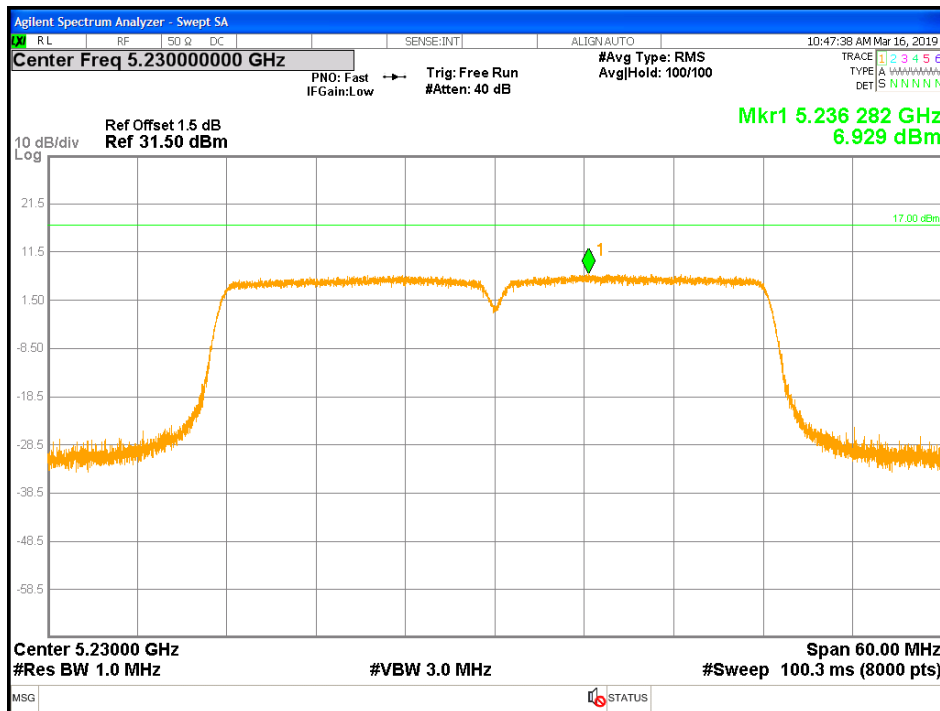


Figure 215: FCC-PPSD-5GHz-5230MHz-HT40-1x4-q82-Ch2

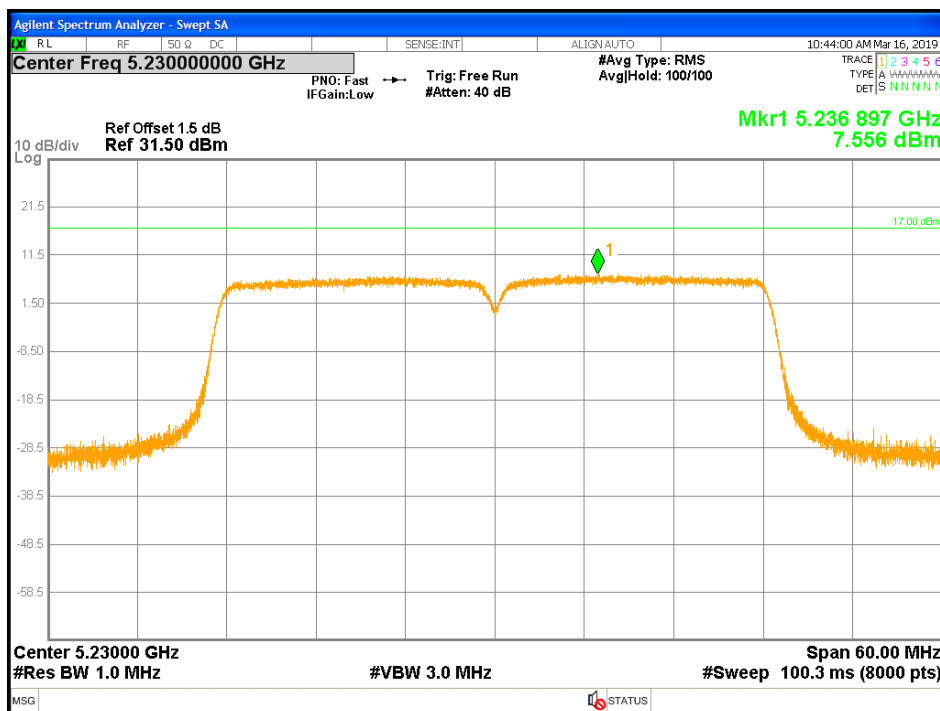


Figure 216: FCC-PPSD-5GHz-5230MHz-HT40-1x4-q82-Ch3

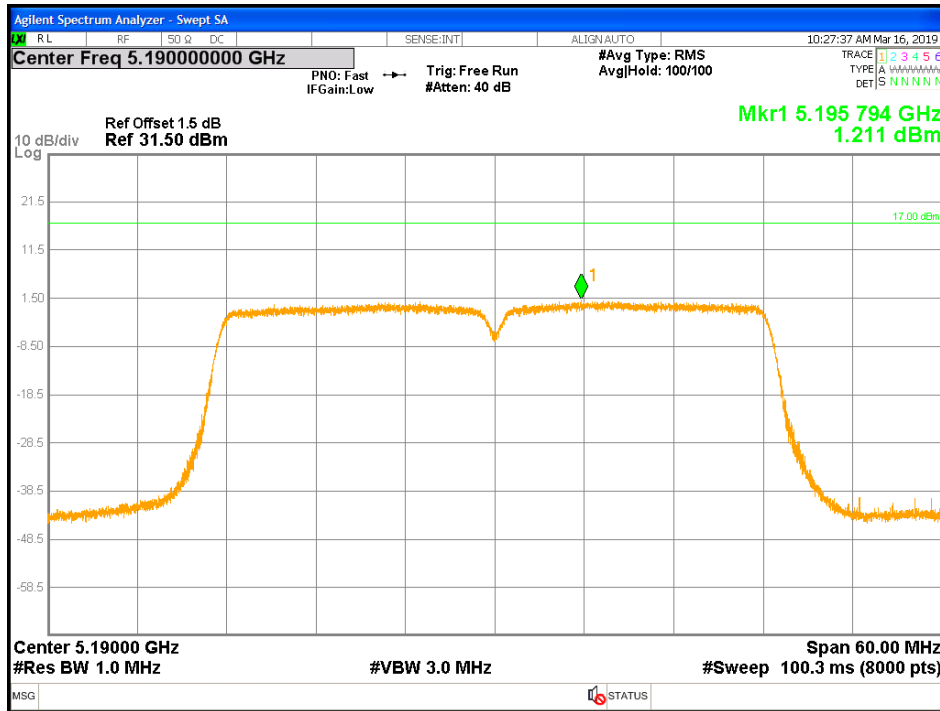


Figure 217: ISED-PPSD-5GHz-5190MHz-HT40-1x4-q61-Ch0

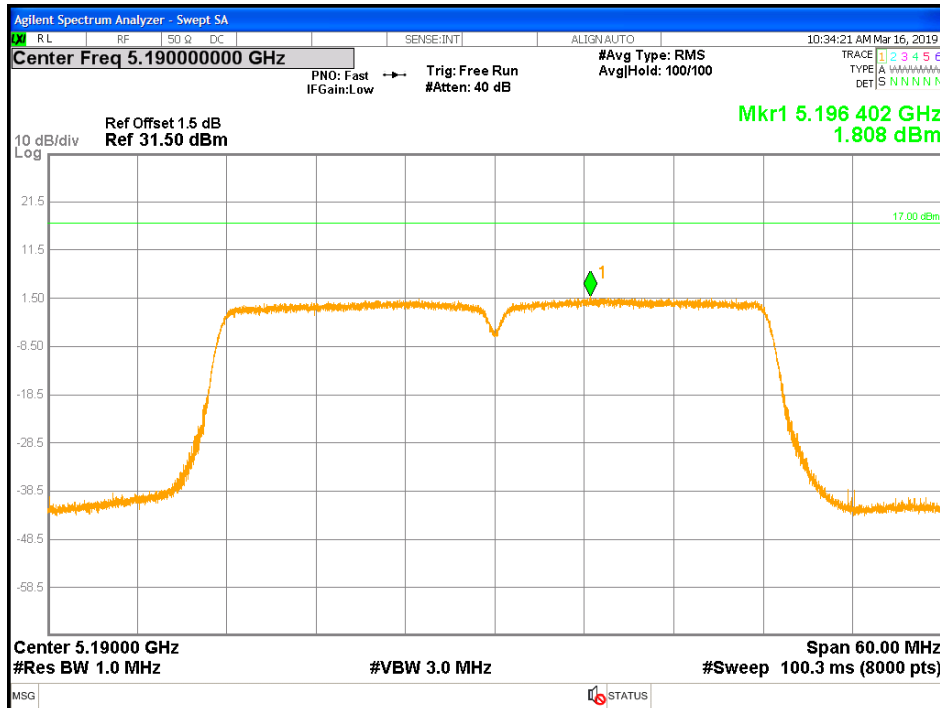


Figure 218: ISED-PPSD-5GHz-5190MHz-HT40-1x4-q61-Ch1

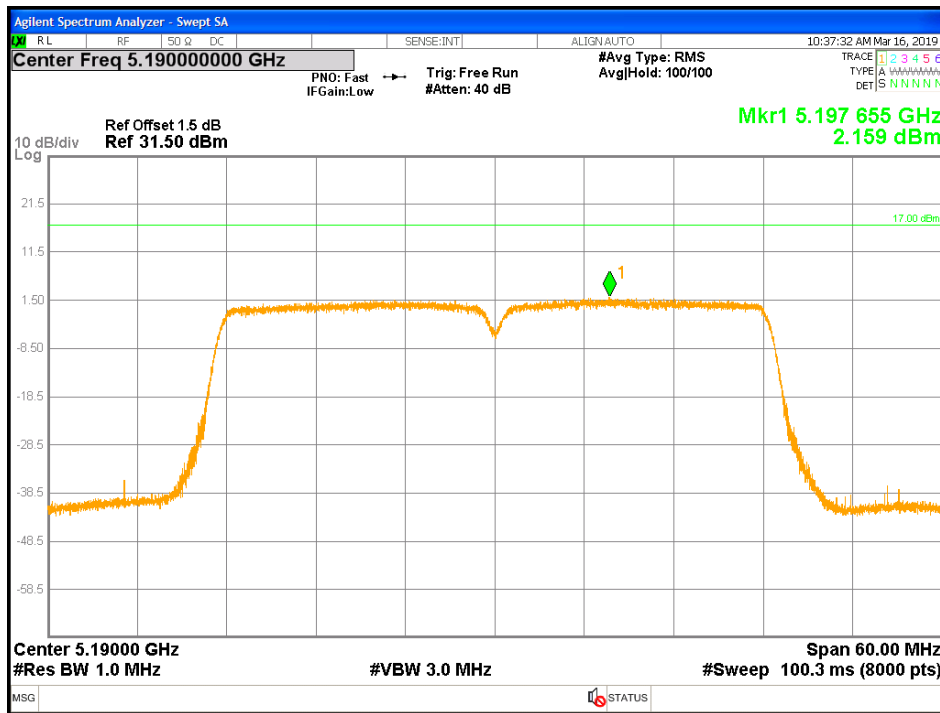


Figure 219: ISED-PPSD-5GHz-5190MHz-HT40-1x4-q61-Ch2

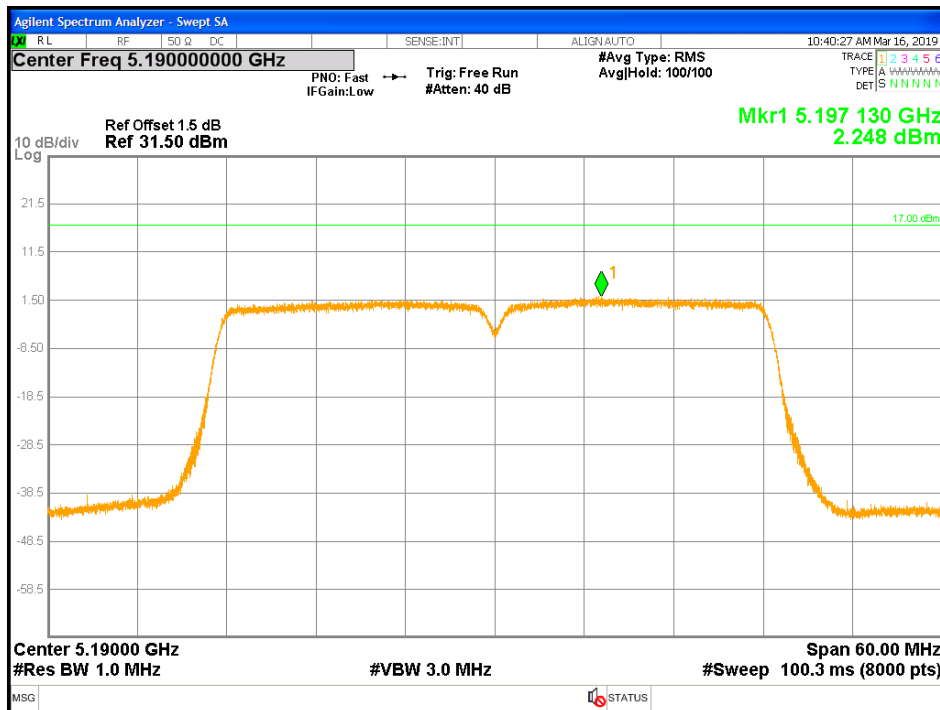


Figure 220: ISED-PPSD-5GHz-5190MHz-HT40-1x4-q61-Ch3

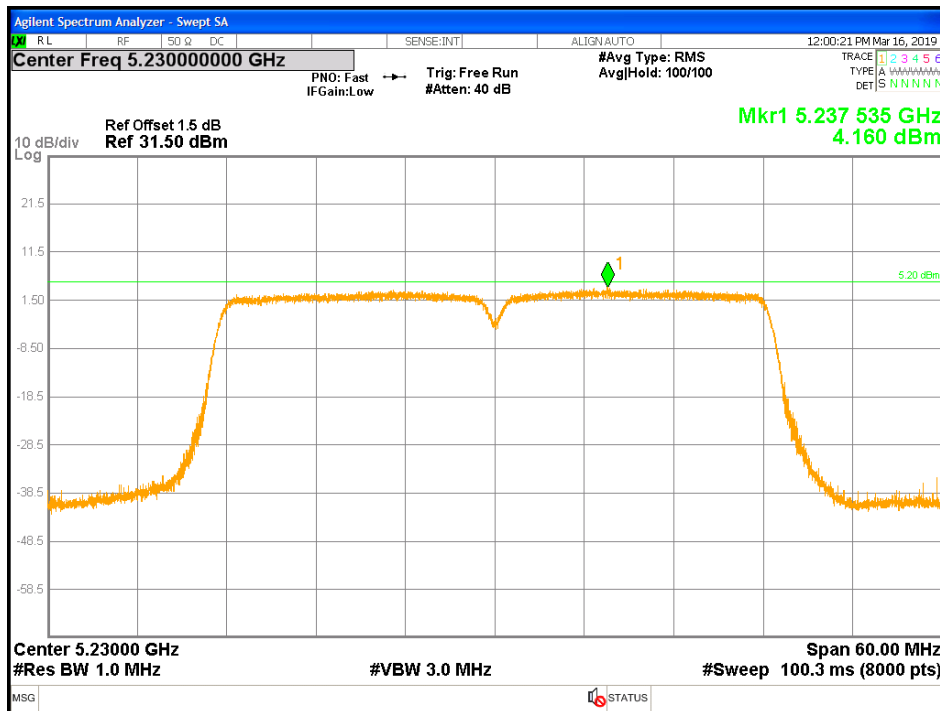


Figure 221: ISED-PPSD-5GHz-5230MHz-HT40-1x4-q69-Ch0

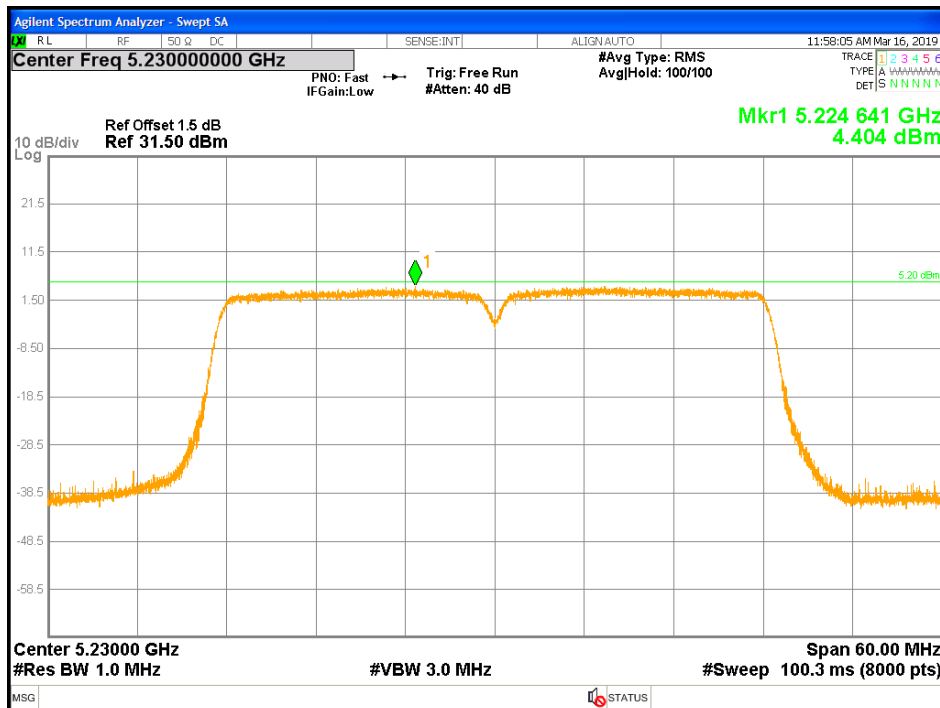


Figure 222: ISED-PPSD-5GHz-5230MHz-HT40-1x4-q69-Ch1

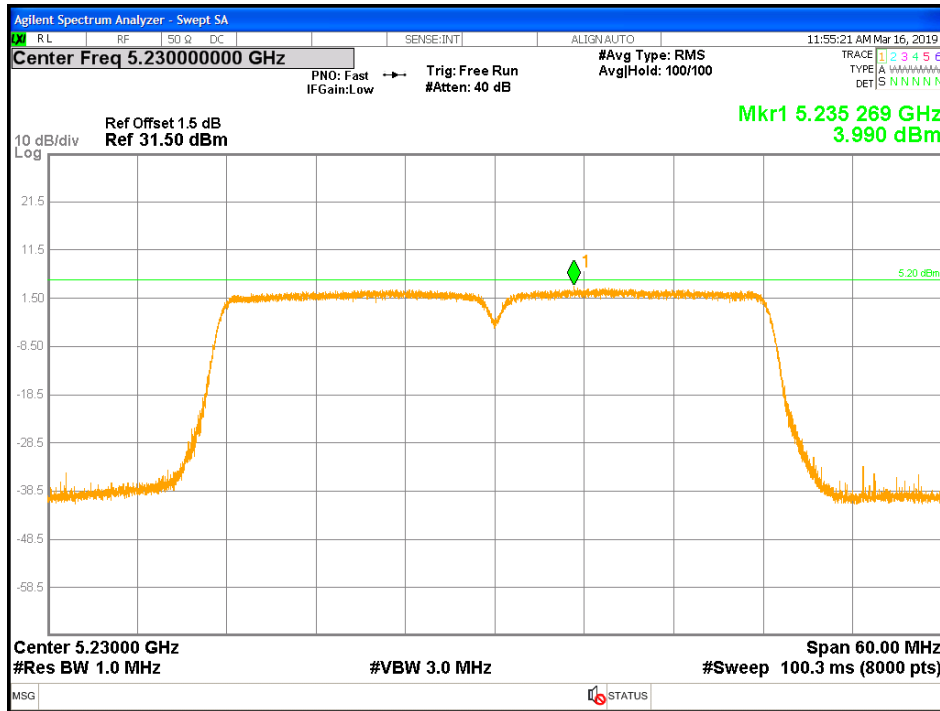


Figure 223: ISED-PPSD-5GHz-5230MHz-HT40-1x4-q69-Ch2

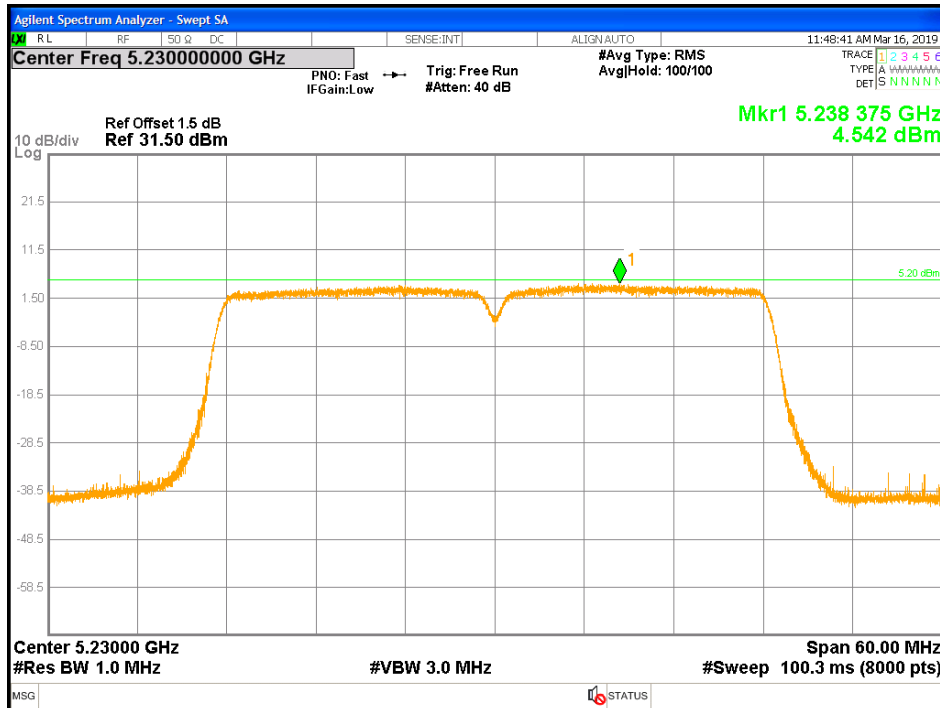


Figure 224: ISED-PPSD-5GHz-5230MHz-HT40-1x4-q69-Ch3

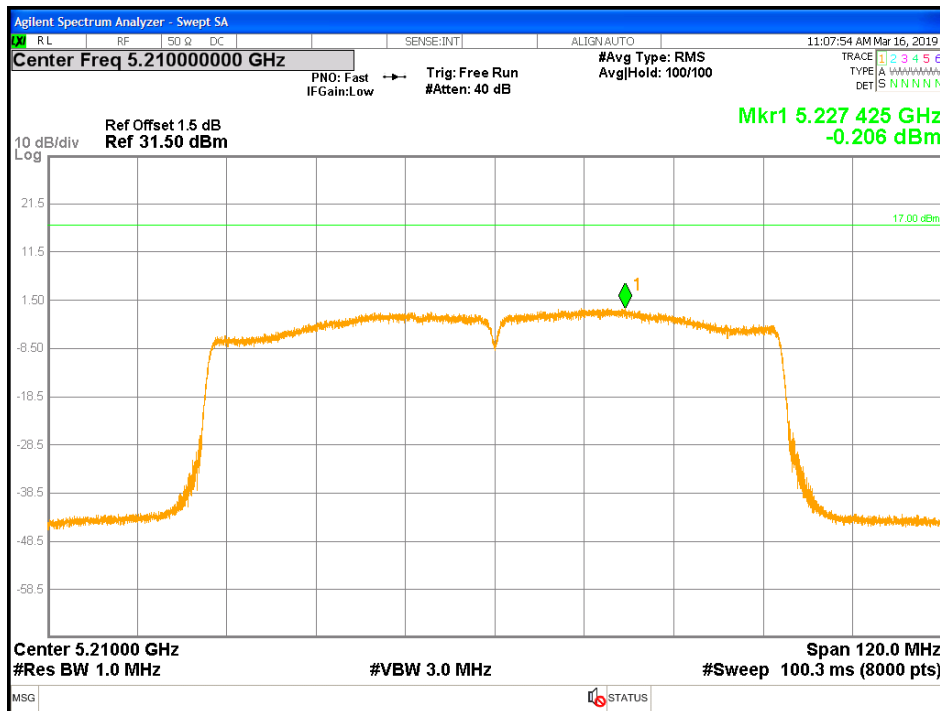


Figure 225: FCC-PPSD-5GHz-5210MHz-VHT80-1x4-q60-Ch0

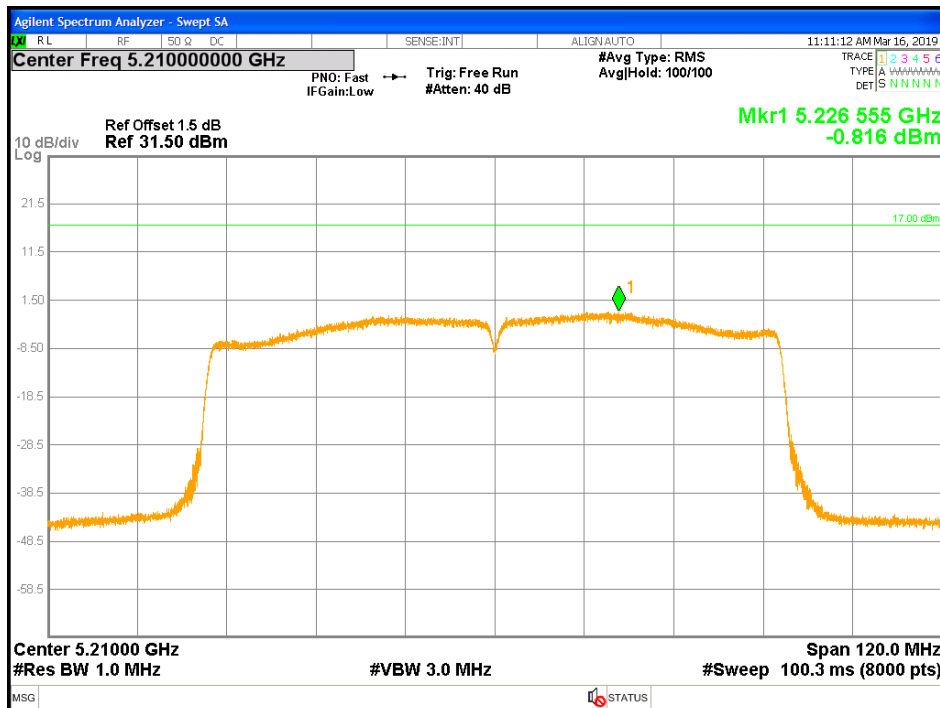


Figure 226: FCC-PPSD-5GHz-5210MHz-VHT80-1x4-q60-Ch1

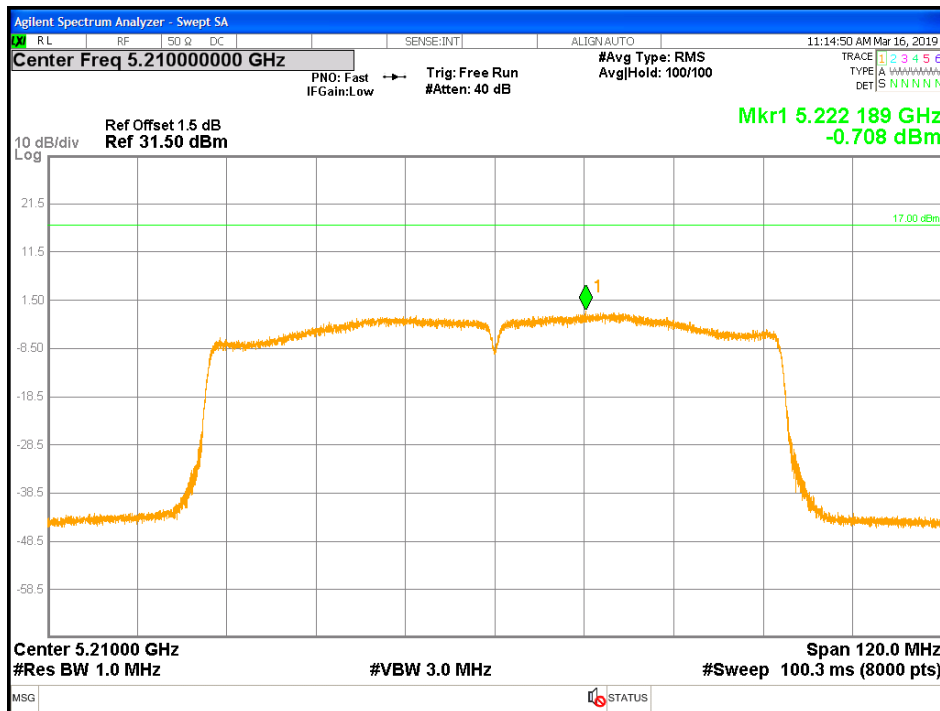


Figure 227: FCC-PPSD-5GHz-5210MHz-VHT80-1x4-q60-Ch2

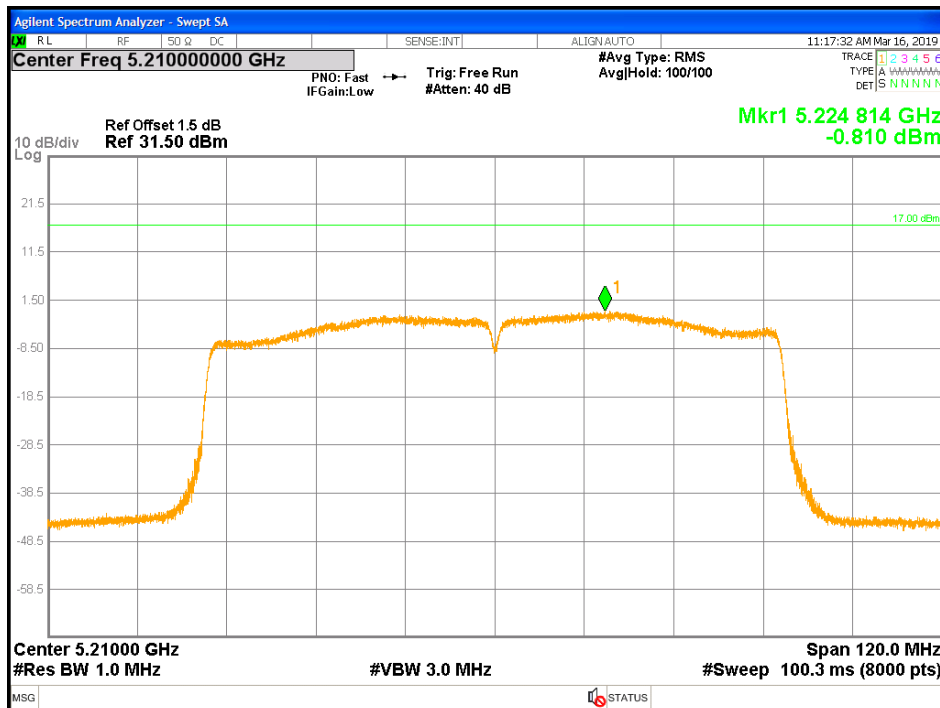


Figure 228: FCC-PPSD-5GHz-5210MHz-VHT80-1x4-q60-Ch3

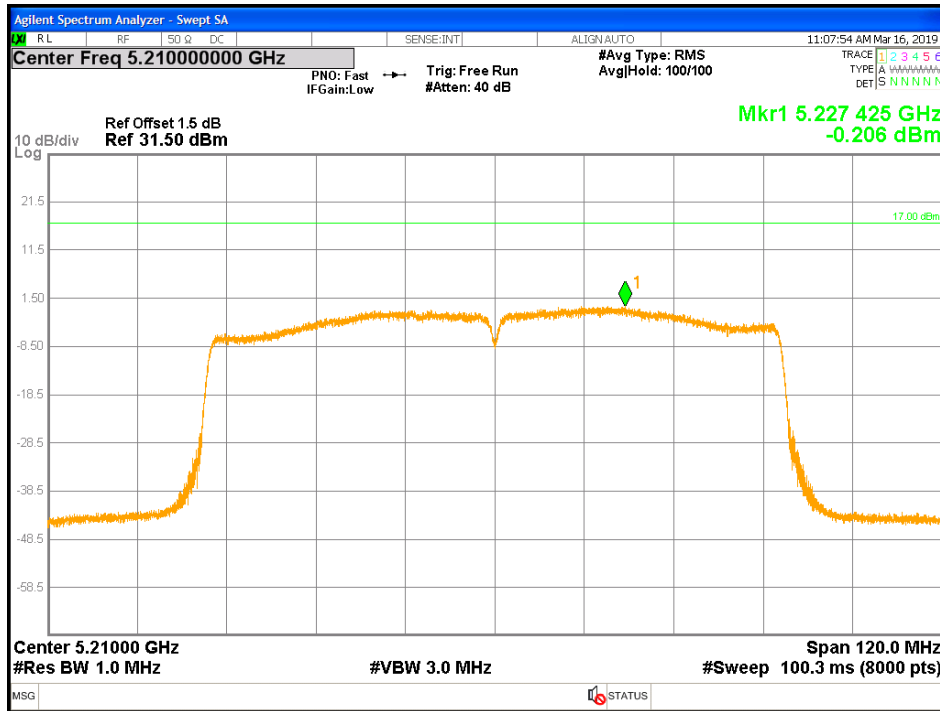


Figure 229: ISED-PPSD-5GHz-5210MHz-VHT80-1x4-q60-Ch0

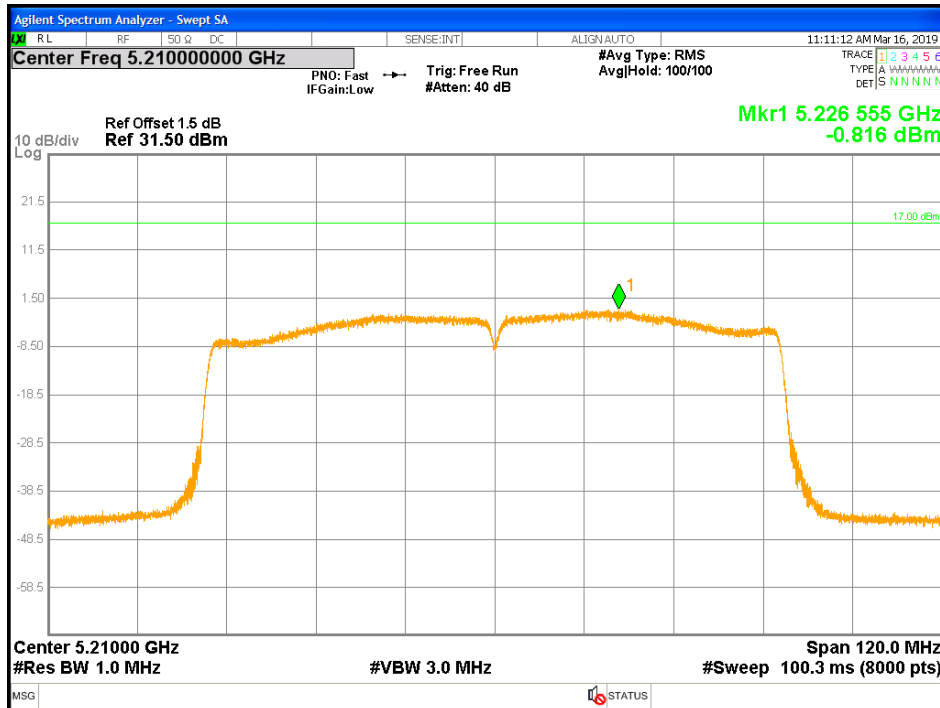


Figure 230: ISED-PPSD-5GHz-5210MHz-VHT80-1x4-q60-Ch1

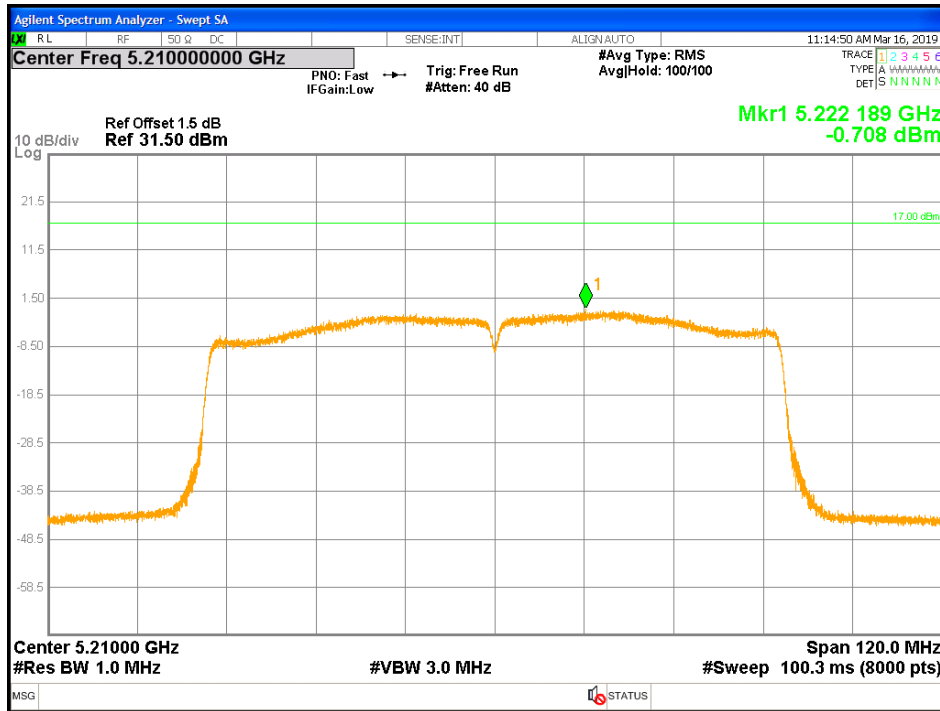


Figure 231: ISED-PPSD-5GHz-5210MHz-VHT80-1x4-q60-Ch2

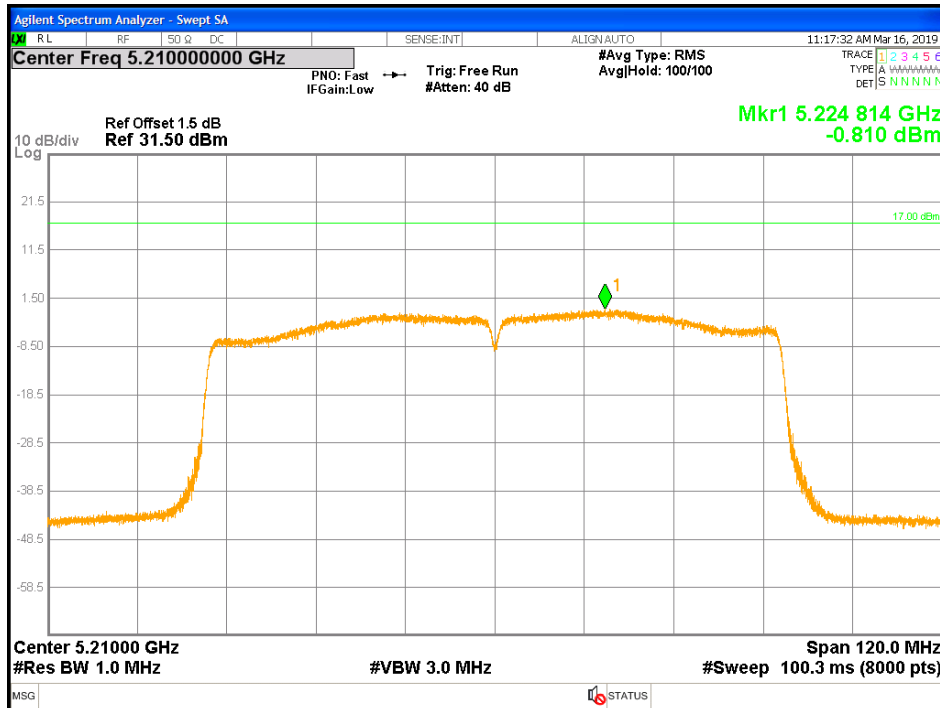


Figure 232: ISED-PPSD-5GHz-5210MHz-VHT80-1x4-q60-Ch3

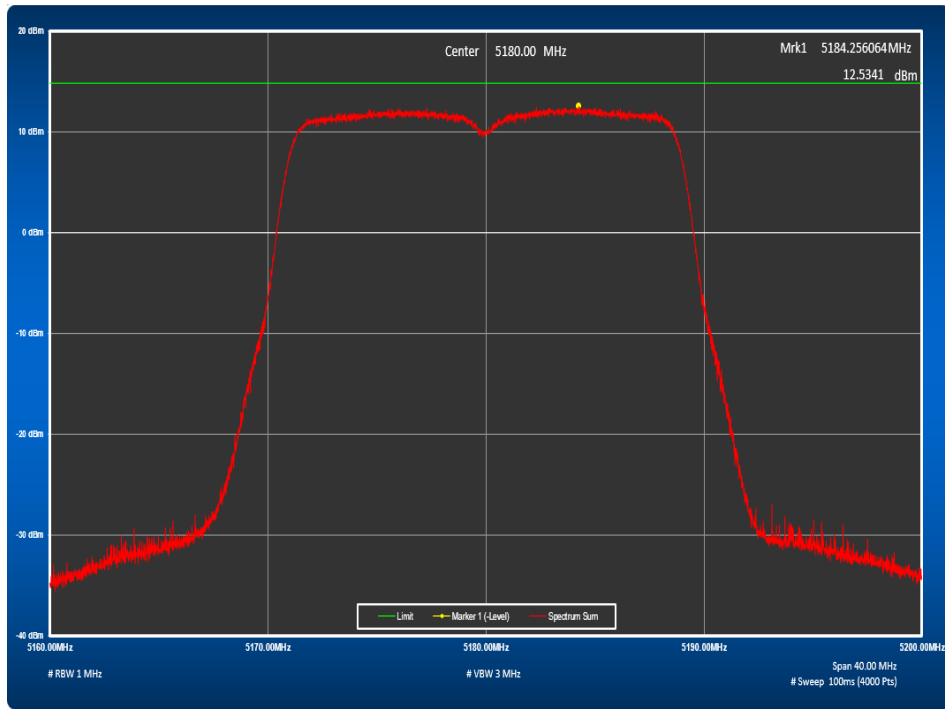


Figure 233: FCC-Spectra Sum-5GHz-5180MHz-HT20-4x4

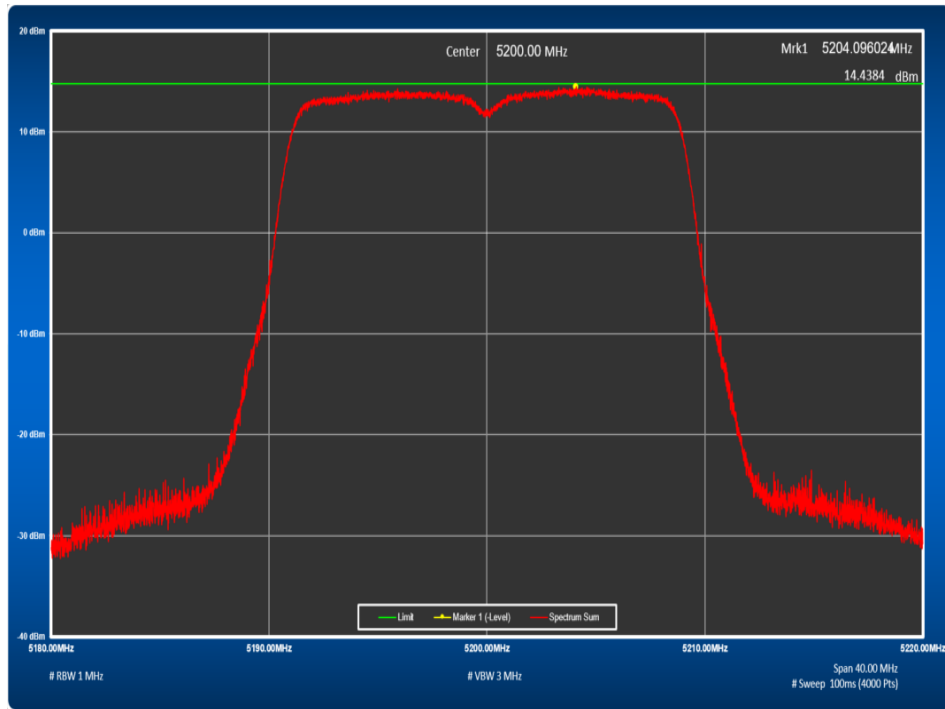


Figure 234: FCC-Spectra Sum-5GHz-5200MHz-HT20-4x4

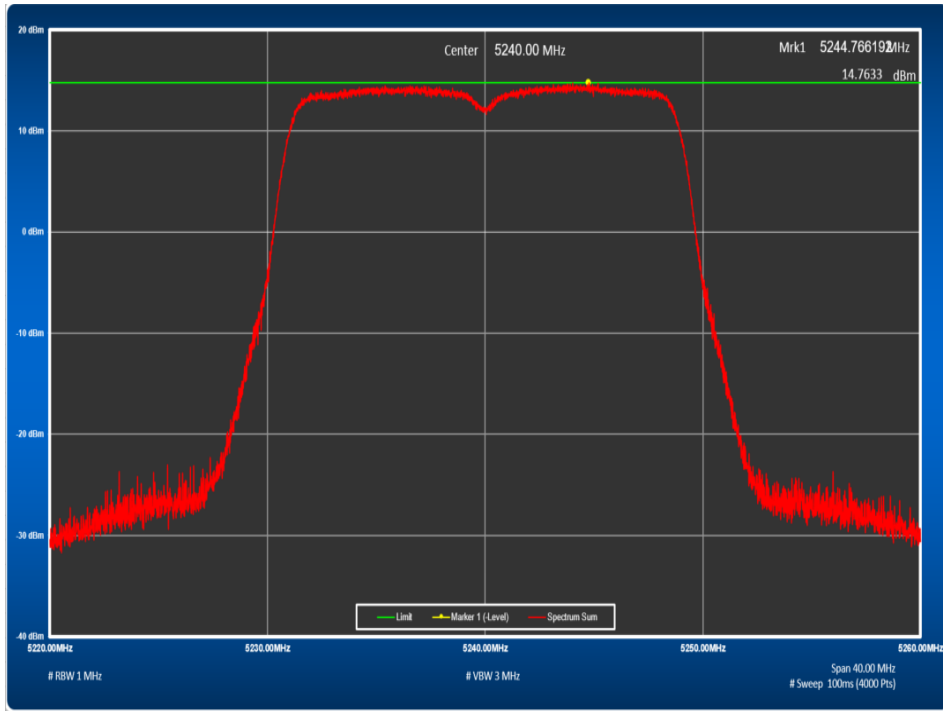


Figure 235: FCC-Spectra Sum-5GHz-5240MHz-HT20-4x4

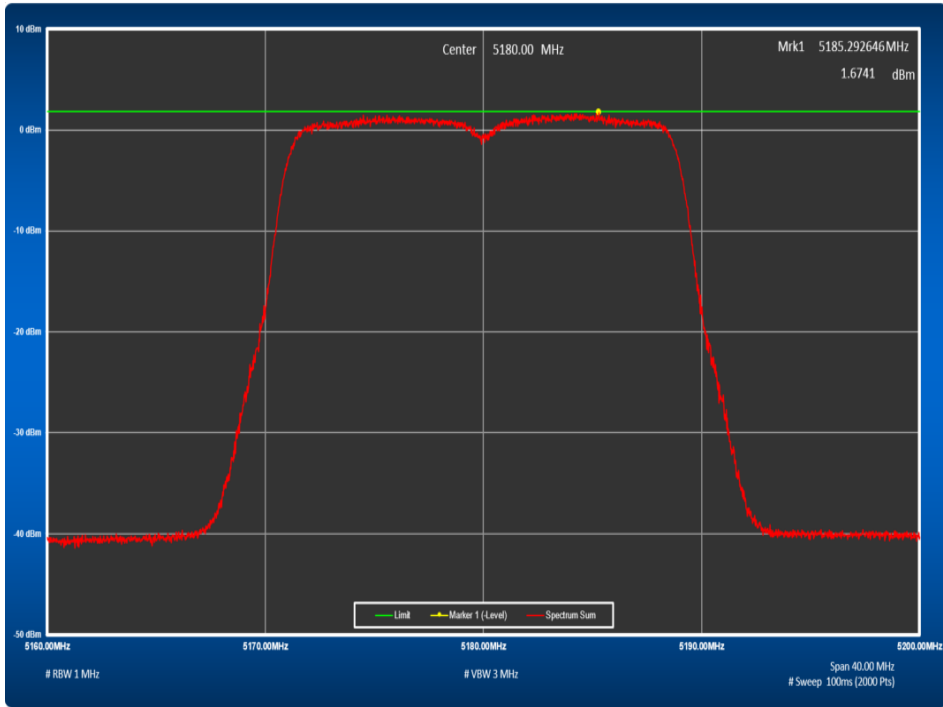


Figure 236: ISED-Spectra Sum-5GHz-5180MHz-HT20-4x4

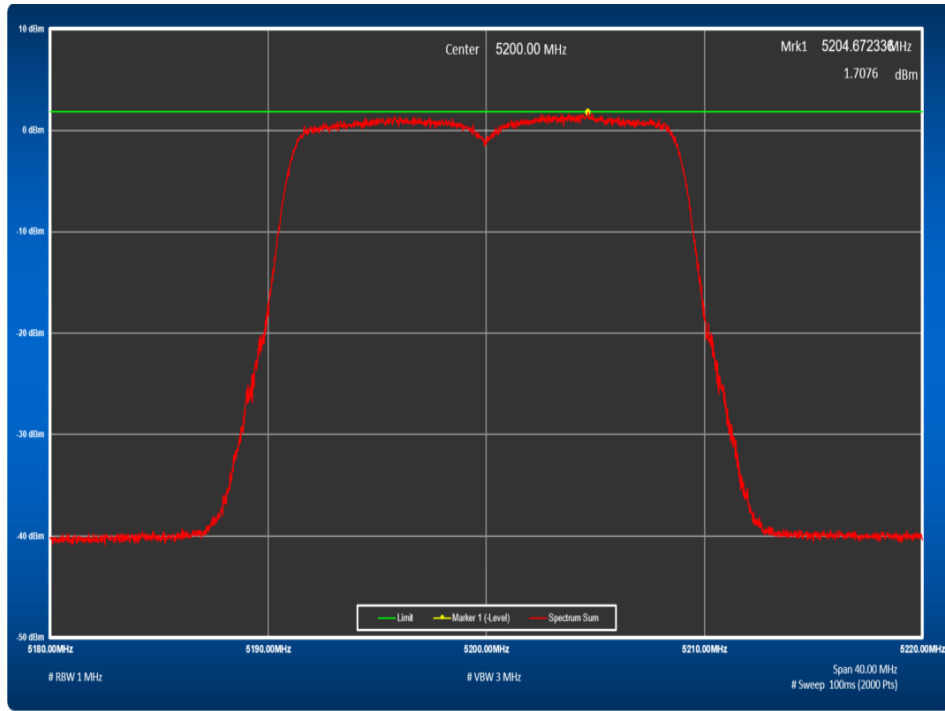


Figure 237: ISED-Spectra Sum-5GHz-5200MHz-HT20-4x4

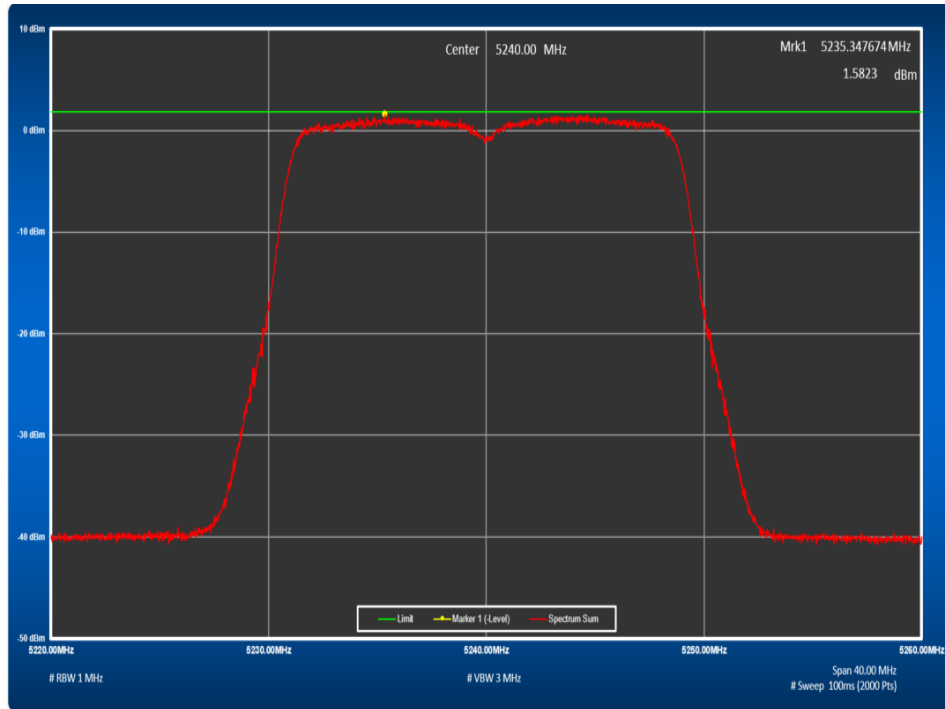


Figure 238: ISED-Spectra Sum-5GHz-5240MHz-HT20-4x4

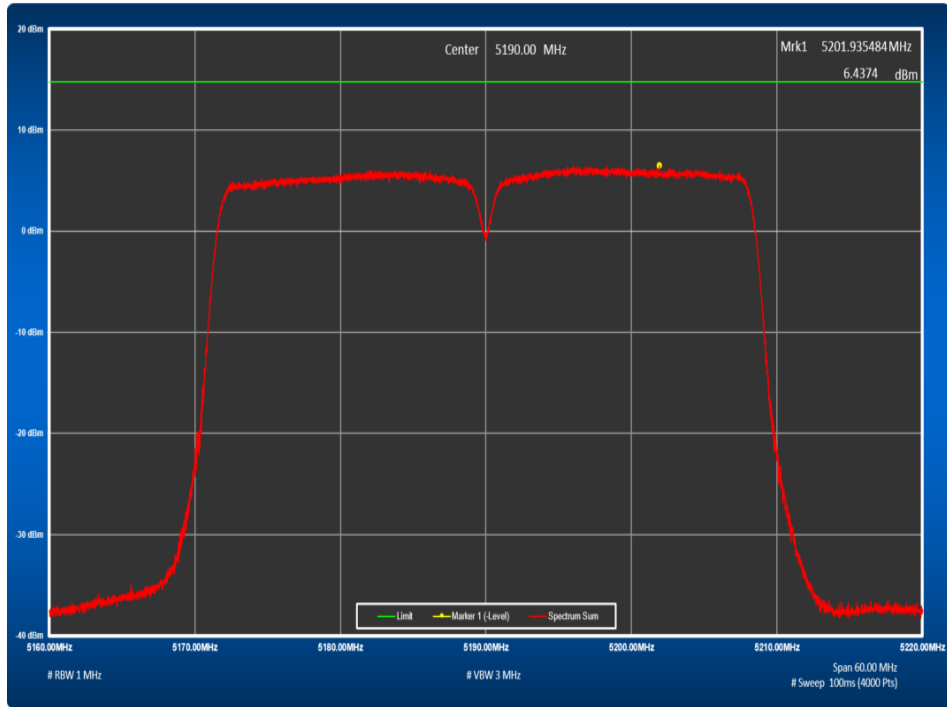


Figure 239: FCC-Spectra Sum-5GHz-5190MHz-HT40-4x4

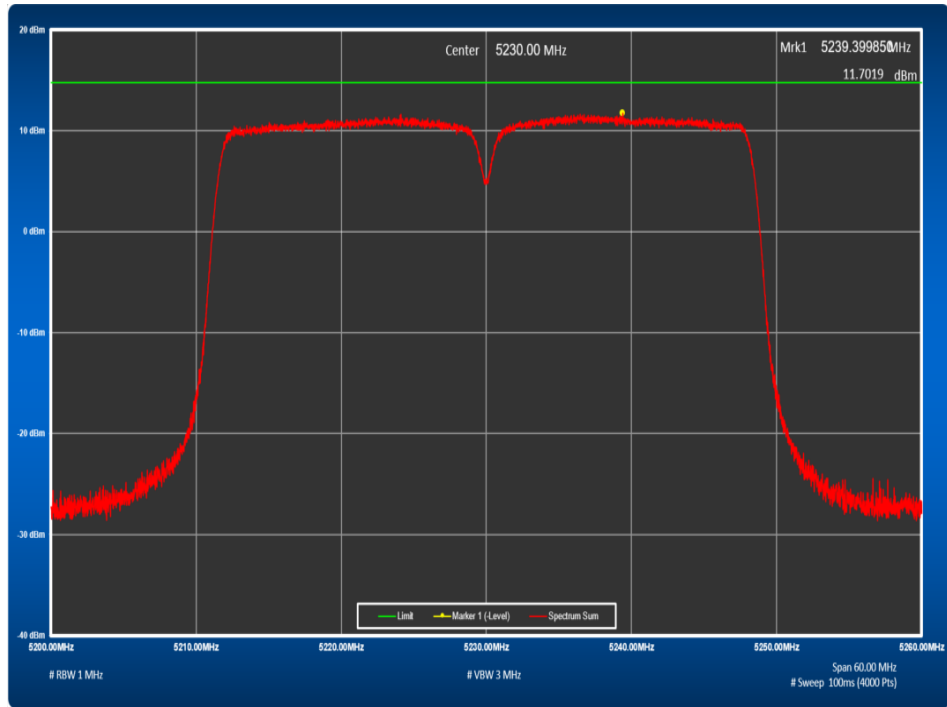


Figure 240: FCC-Spectra Sum-5GHz-5230MHz-HT40-4x4

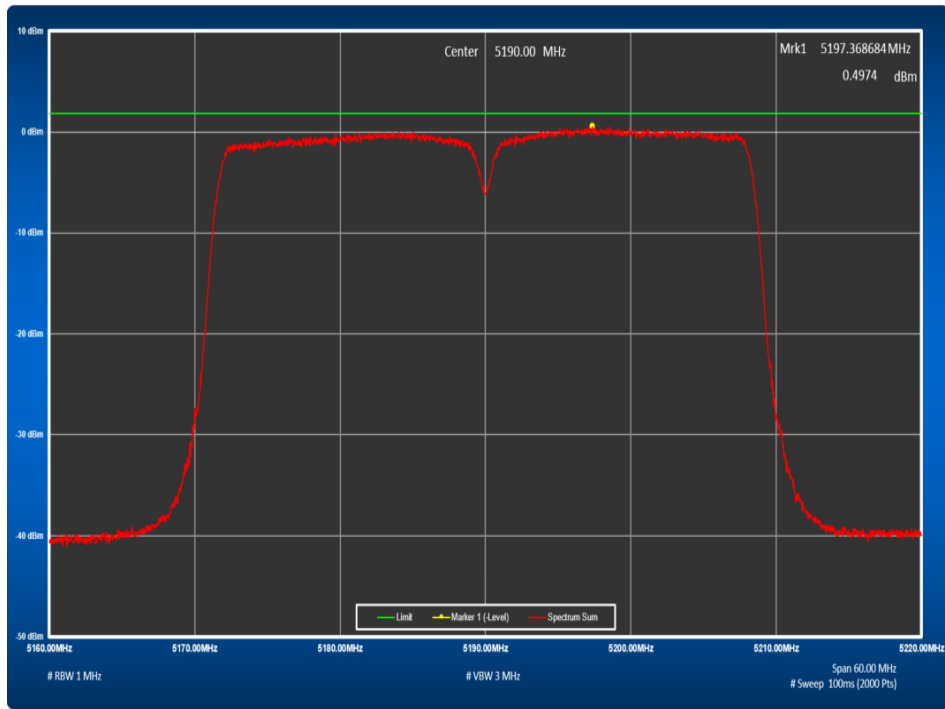


Figure 241: ISED-Spectra Sum-5GHz-5190MHz-HT40-4x4

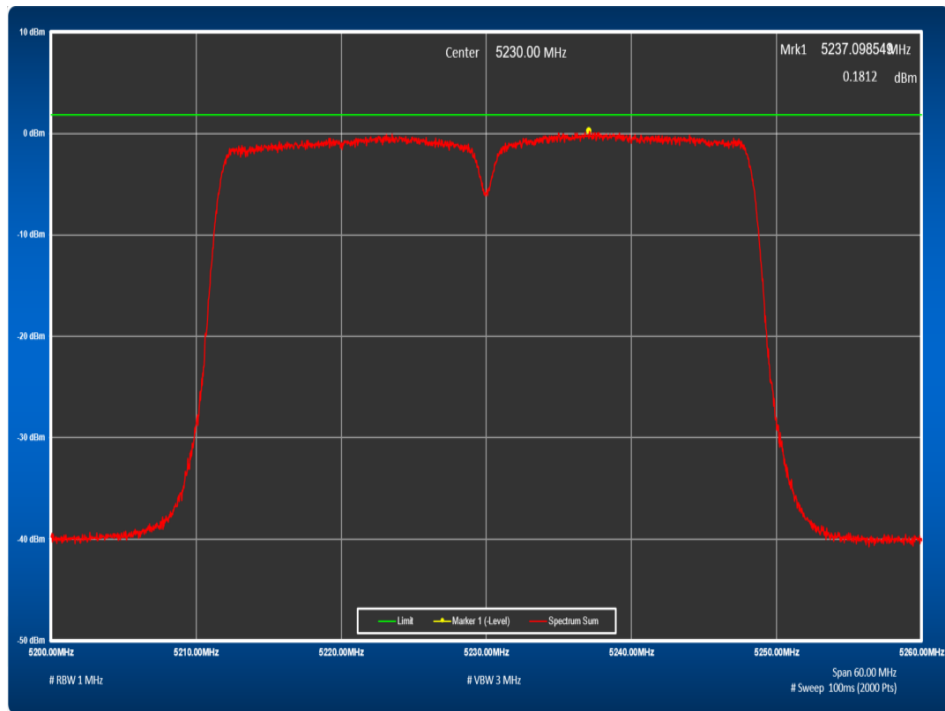


Figure 242: ISED-Spectra Sum-5GHz-5230MHz-HT40-4x4

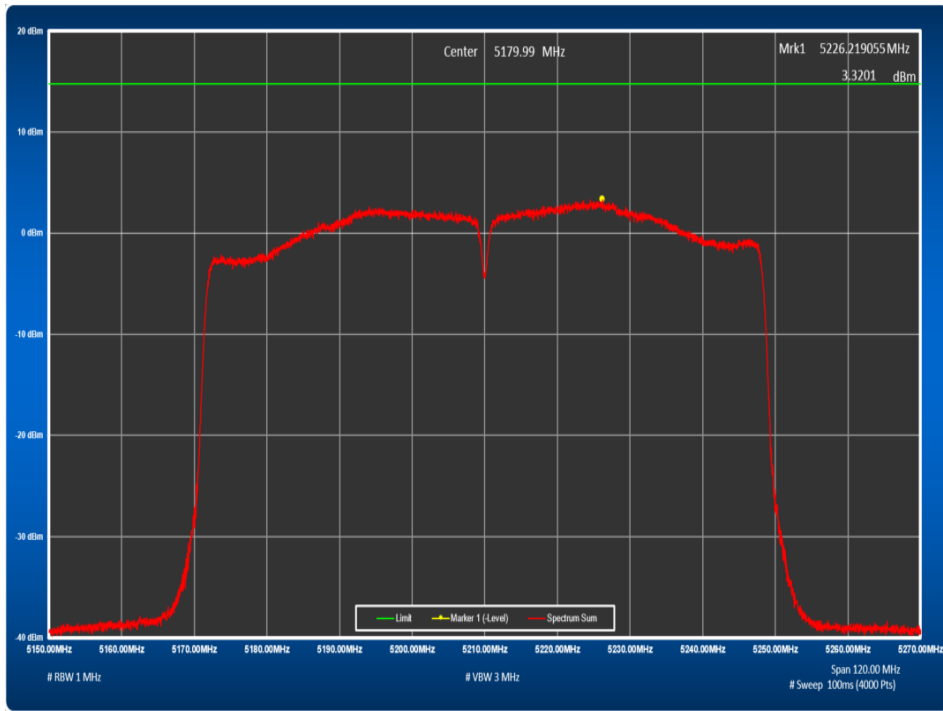


Figure 243: FCC-Spectra Sum-5GHz-5210MHz-VHT80-4x4

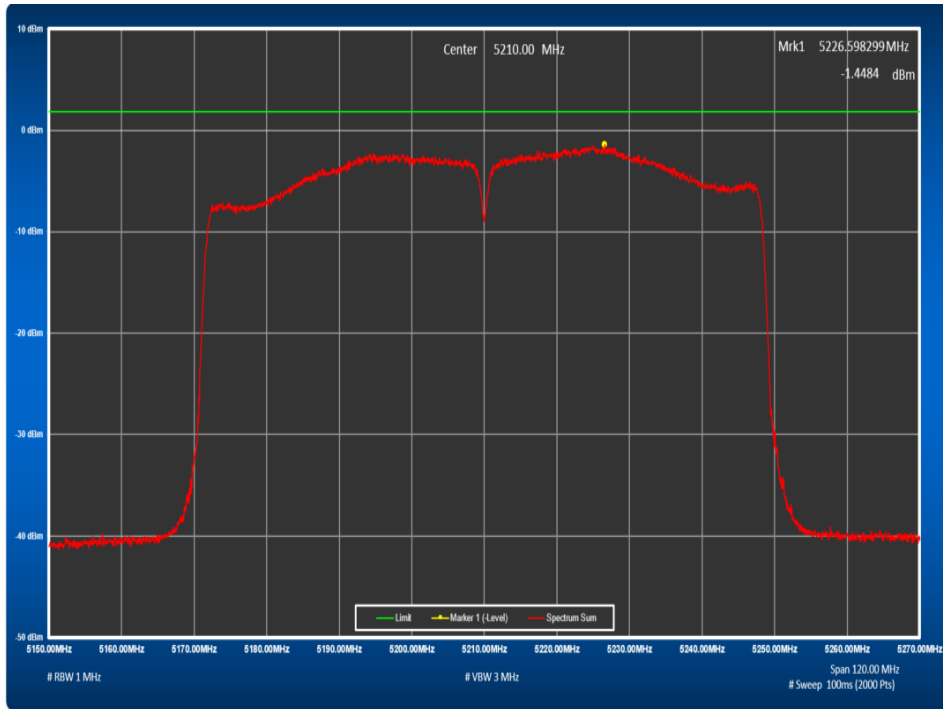


Figure 244: ISED-Spectra Sum-5GHz-5210MHz-VHT80-4x4

4.4 Transmitter Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.407(b), RSS 247 Sect. 6.2.1.2, RSS GEN Sect.8.9 and 8.10

4.4.1 Test Methodology

4.4.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

Pres-scans were performed to determine the worst, data rate/ chains for 802.11a, 802.11n (HT20 and HT40), 802.11ac (VHT20, VHT40 and VHT80).

4.4.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

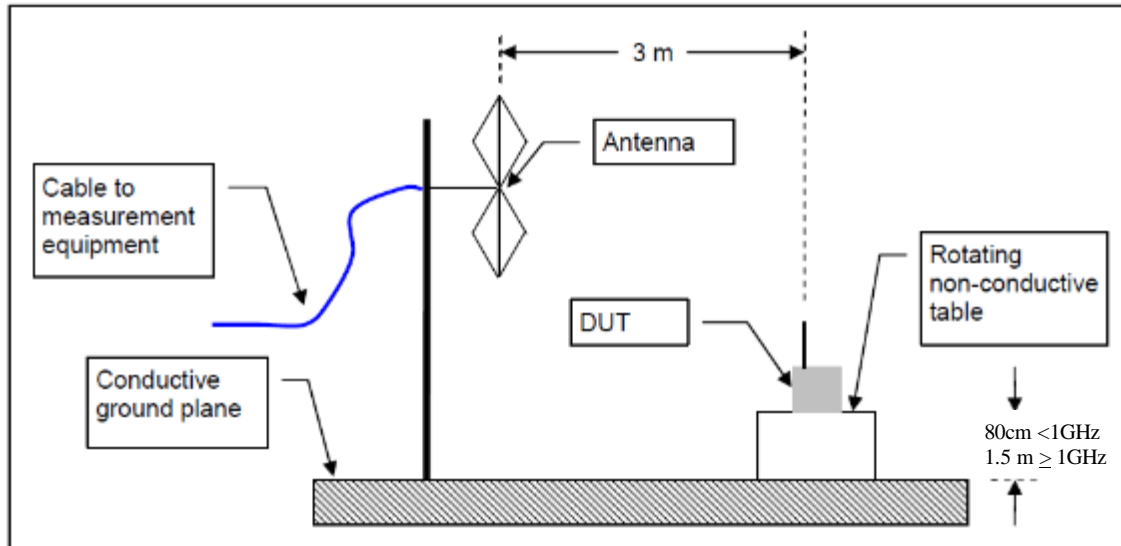
Final results are:

1. 802.11a at 6Mbps with 1 Chain – Nonbeamforming
2. 802.11n HT20 at 6.5Mbps with 1 Chain – Nonbeamforming (covering VHT20)
3. 802.11n HT40 at MCS0 with 1 Chain – Nonbeamforming (covering VHT40)
4. 802.11ac VHT80 at MCS0 with 1 Chain – Nonbeamforming
5. 802.11a at 6Mbps with 4 Chains – Beamforming
6. 802.11n HT20 at 6.5Mbps with 4 Chains – Beamforming (covering VHT20)
7. 802.11n HT40 at MCS0 with 4 Chains – Beamforming (covering VHT40)
8. 802.11ac VHT80 at MCS0 with 4 Chains – Nonbeamforming

4.4.1.3 Deviations

None.

Test Setup:



4.4.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209, RSS 247 Sect. 6, RSS GEN Sect. 8.9 and 8.10

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

CFR47 15.407 (b) and RSS 247 Sect.6.2.1.2: 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. This is equivalent to 68.2 dBuV/m at 3 meter distance.

4.4.3 Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and test plan.

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

Table 14: Transmit Spurious Emission at Band-Edge Requirements

Test Date: February 14, 2019				Test By: Kerwinn Corpus		
Test Method: Conducted Measurements				Power Setting: See test plan		
Antenna Type: PCB				Signal State: Modulated		
Directional Antenna Gain: + 8.2 dBi				Max Antenna Gain: + 4.8 dBi		
Ambient Temp.: 22 °C				Relative Humidity: 48%		
Band-Edge Results						
Freq. (MHz)	Det.	Level (dBuV/m)	Duty Cycle (dB)	Limit (dBuV/m)	Margin (dB)	Note
5150	Pk	72.80	0.00	74.00	-1.20	11a-1x4-5180MHz-6Mbps-q82
5150	Ave	53.80	0.00	54.00	-0.20	11a-1x4-5180MHz-6Mbps-q82
5150	Pk	72.70	0.00	74.00	-1.30	HT20-1x4-5180MHz-MCS0-q74
5150	Ave	53.10	0.00	54.00	-0.90	HT20-1x4-5180MHz-MCS0-q74
5150	Pk	73.50	0.16	74.00	-0.34	HT40-1x4-5190MHz-MCS0-q61
5150	Ave	53.40	0.16	54.00	-0.44	HT40-1x4-5190MHz-MCS0-q61
5150	Pk	72.20	0.41	74.00	-1.39	VHT80-1x4-5210MHz-MCS0-q60
5150	Ave	53.40	0.41	54.00	-0.19	VHT80-1x4-5210MHz-MCS0-q60
5150	Pk	70.12	0.00	74.00	-3.88	HT20-4x4-5180MHz-MCS0-q74
5150	Ave	53.33	0.00	54.00	-0.67	HT20-4x4-5180MHz-MCS0-q74
5150	Pk	64.21	0.16	74.00	-9.63	HT40-4x4-5190MHz-MCS0-q58
5150	Ave	51.53	0.16	54.00	-2.31	HT40-4x4-5190MHz-MCS0-q58
5150	Pk	71.40	0.41	74.00	-2.19	VHT80-4x4-5210MHz-MCS0-q60
5150	Ave	51.63	0.41	54.00	-1.96	VHT80-4x4-5210MHz-MCS0-q60
<p>Note: 1. Restricted band-edge frequencies were only taken at 5150 MHz since 5250-5350 MHz band is not a restricted band.</p> <p>2. All the band-edge measurements met the restricted band requirements of CFR47 15.205.</p> <p>3. For 5250 MHz In-band-edge, refer to Section 4.2.2.</p> <p>4. Power level is the same for both HT20 & VHT20 and HT40 & VHT40. HT20 and HT40 found as worst case, therefore HT20 and HT40 scanned to cover for band-edge measurements.</p>						

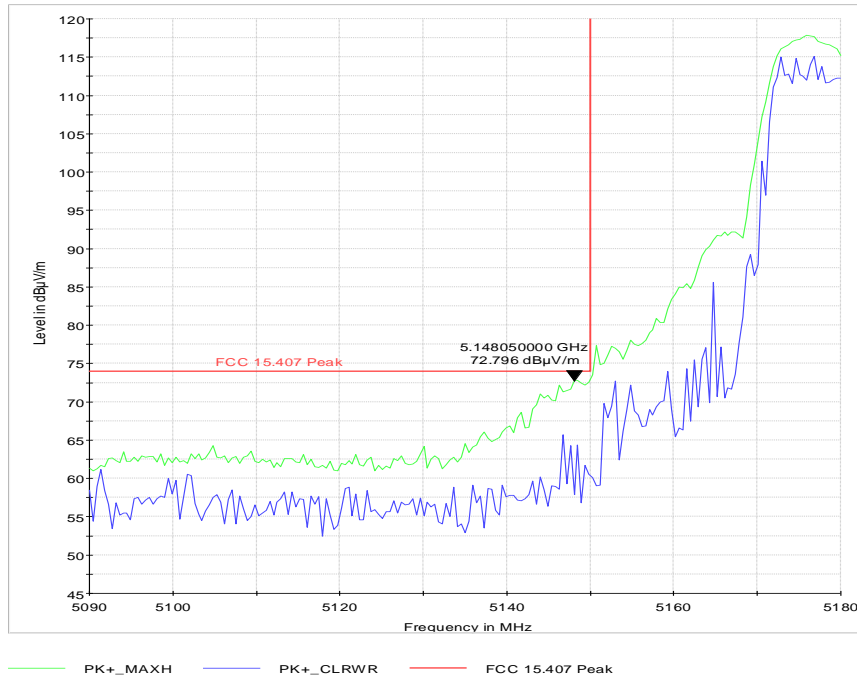


Figure 245: Bandedge-802.11a-1x4-5180MHz-6Mbps-q82-Peak

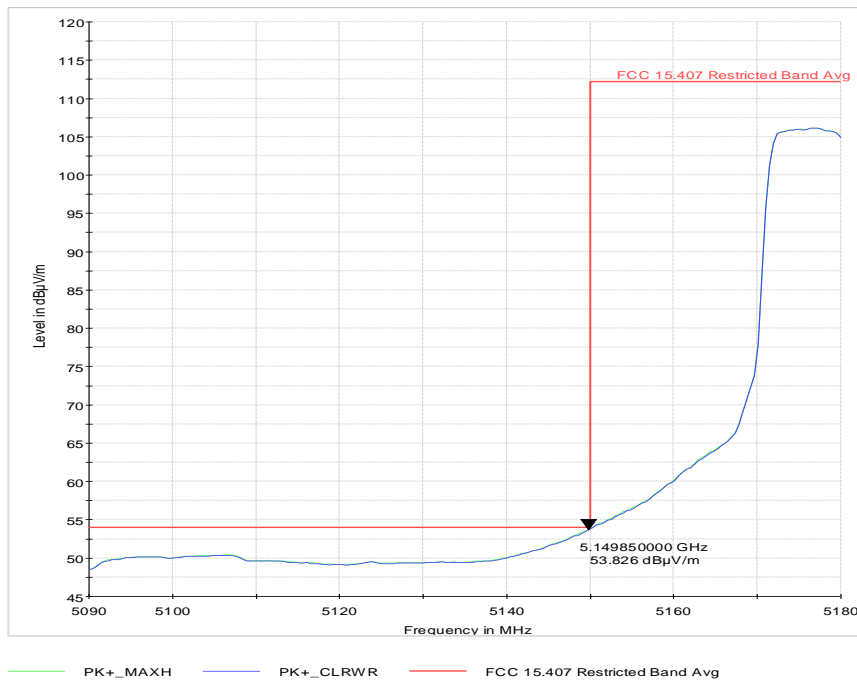


Figure 246: Bandedge-802.11a-1x4-5180MHz-6Mbps-q82-Average

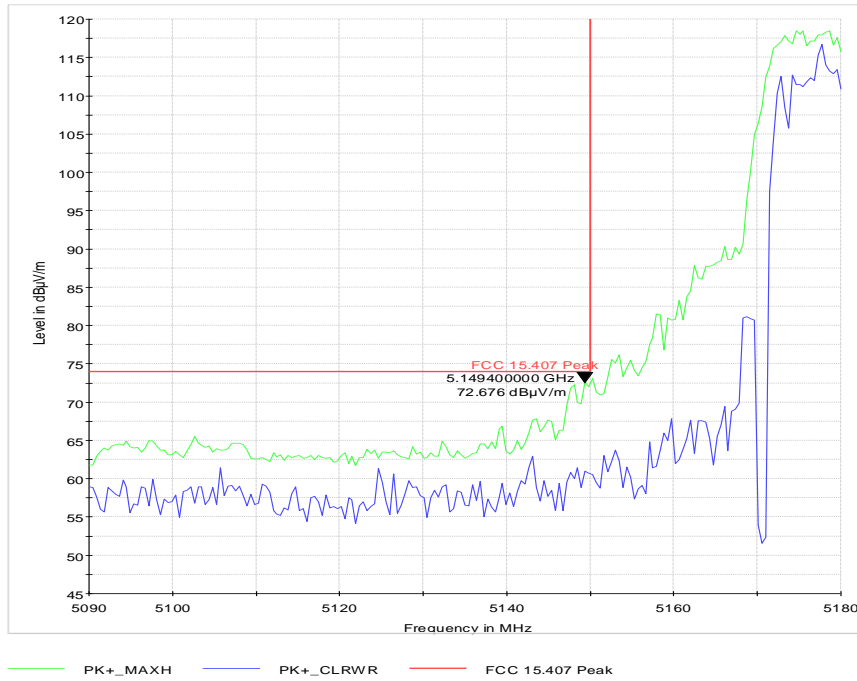


Figure 247: Bandedge-HT20-1x4-5180MHz-MCS0-q74-Peak

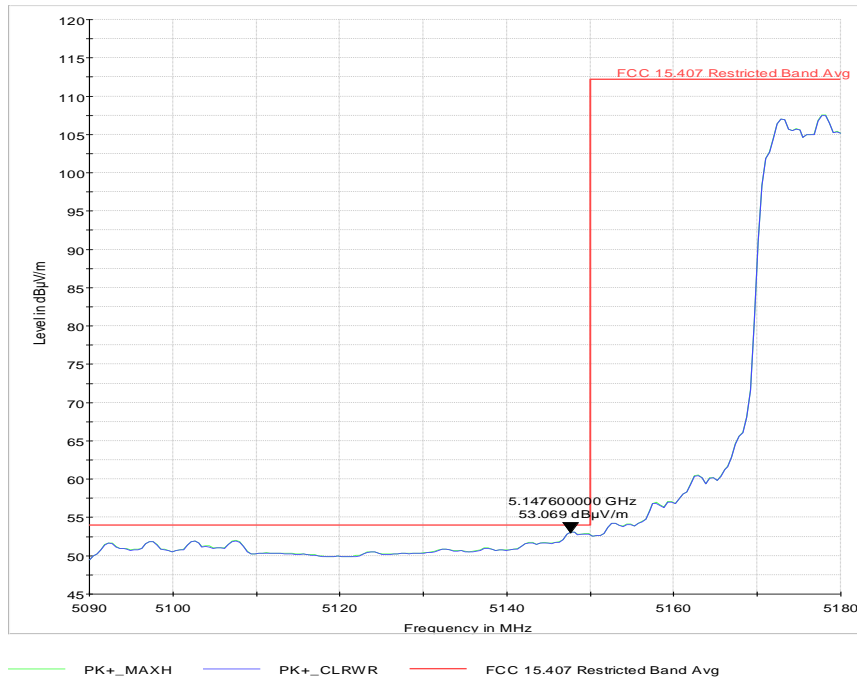


Figure 248: Bandedge-HT20-1x4-5180MHz-MCS0-q74-Average

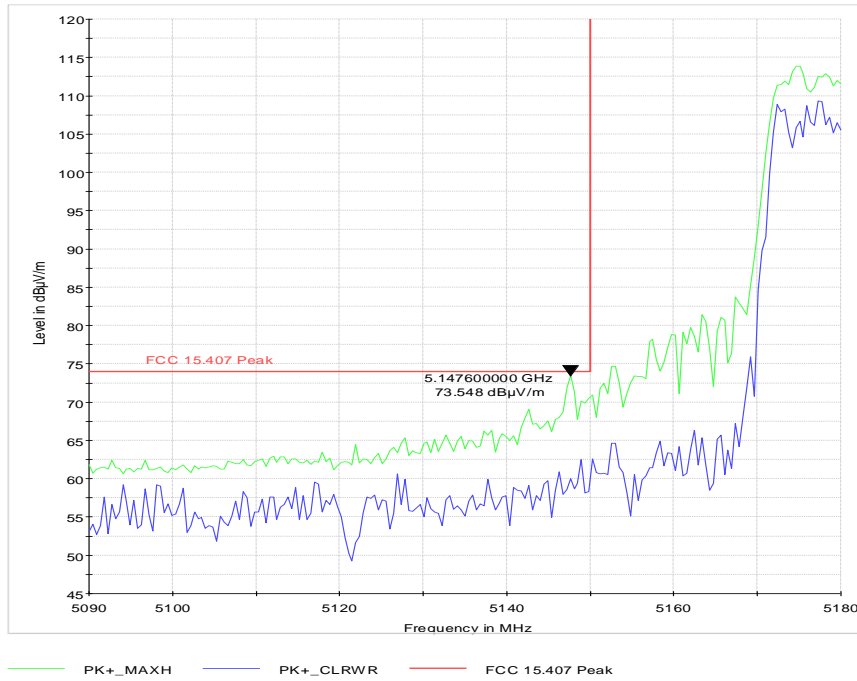


Figure 249: Bandedge-HT40-1x4-5190MHz-MCS0-q61-Peak

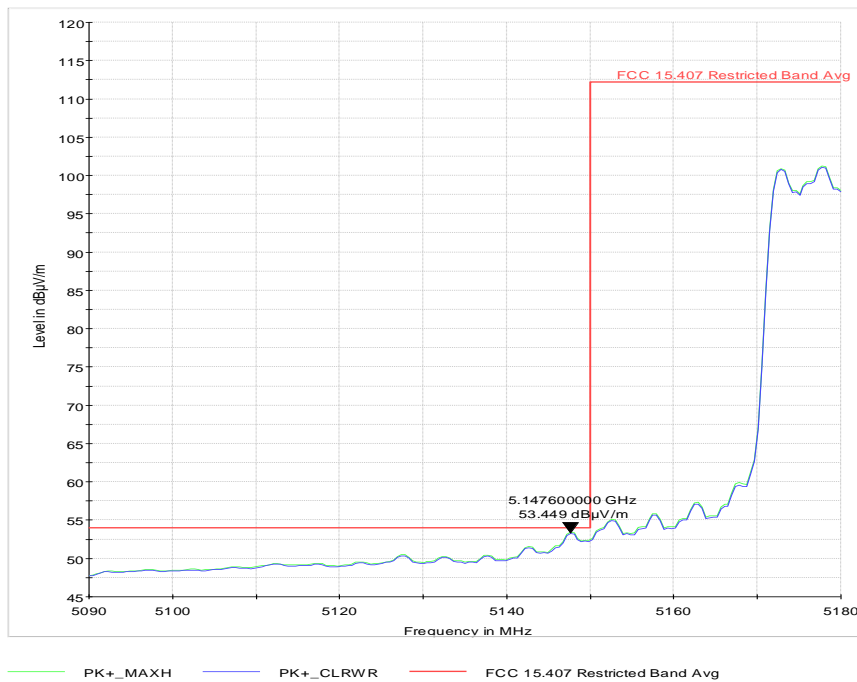


Figure 250: Bandedge-HT40-1x4-5190MHz-MCS0-q61-Average

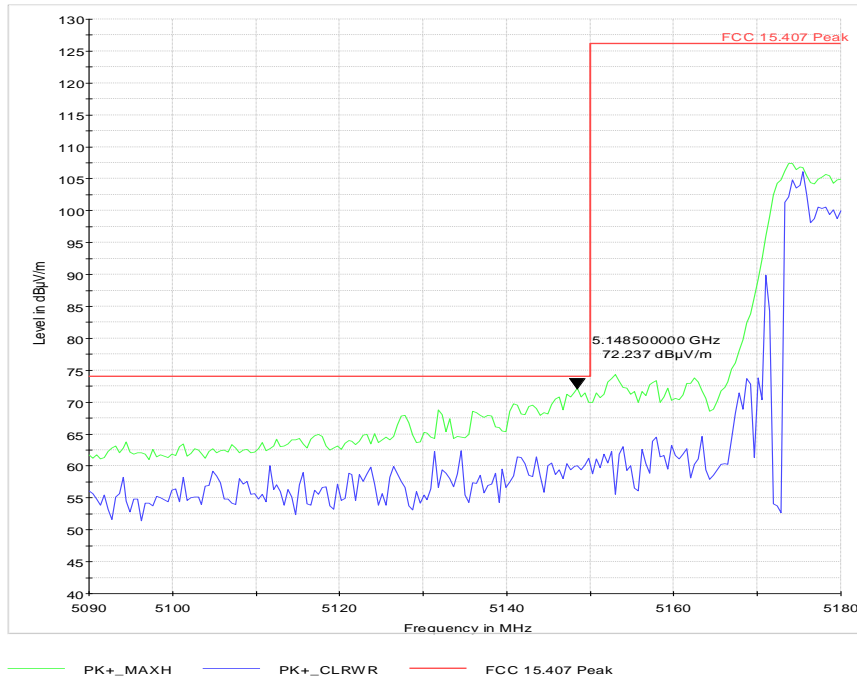


Figure 251: Bandedge-VHT80-1x4-5210MHz-MCS0-q60-Peak

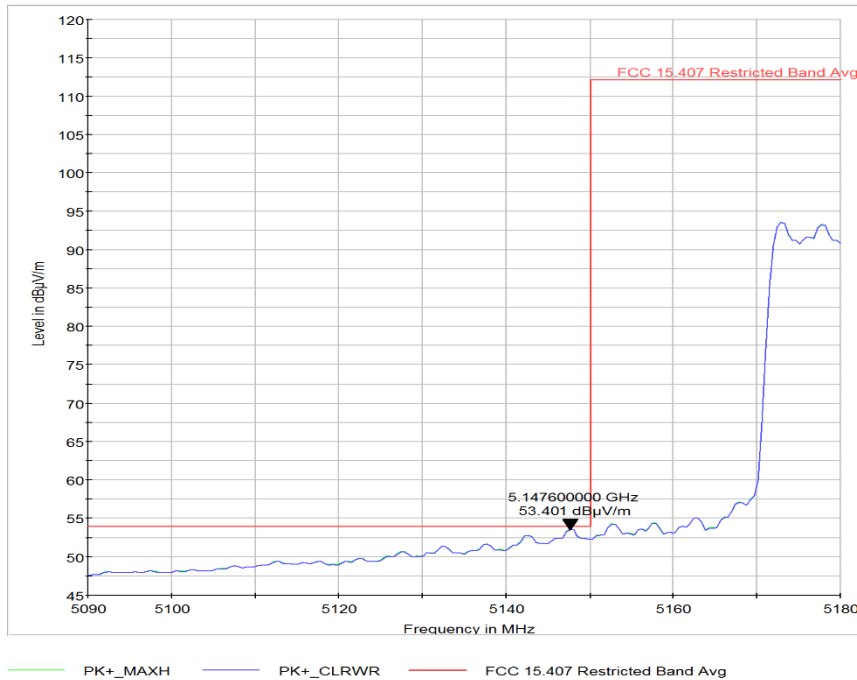


Figure 252: Bandedge-VHT80-1x4-5210MHz-MCS0-q60-Average

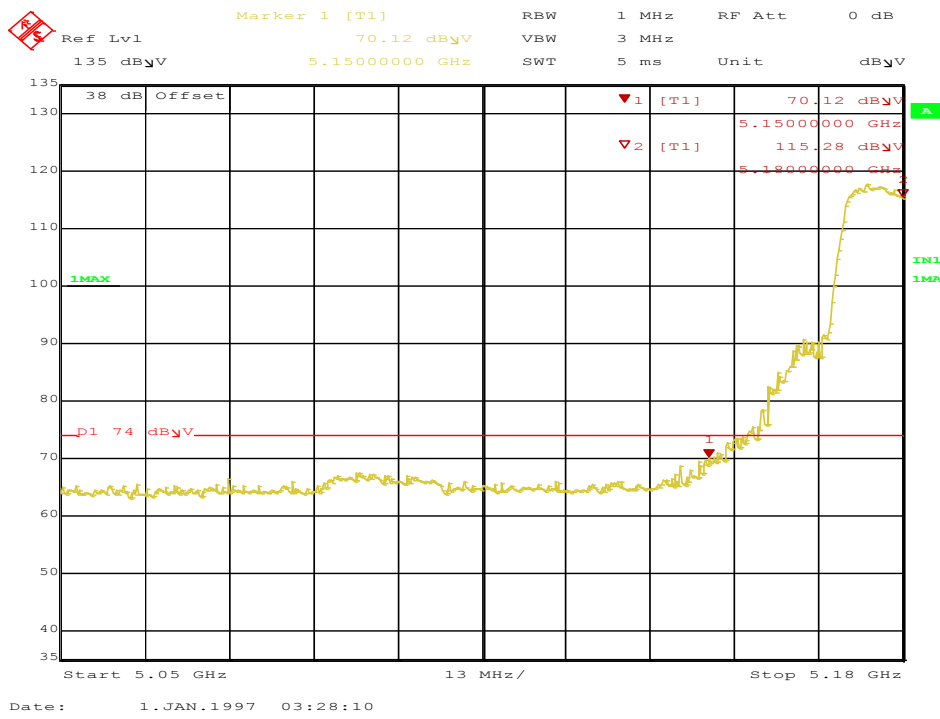


Figure 253: Bandedge-HT20-4x4-5180MHz-MCS0-q74-Peak

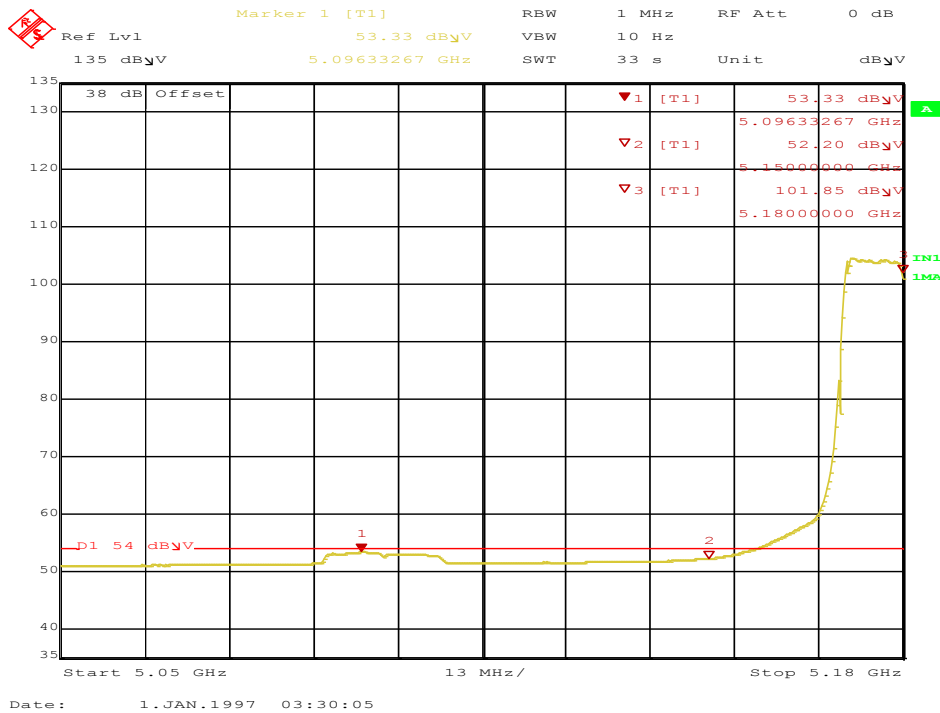


Figure 254: Bandedge-HT20-4x4-5180MHz-MCS0-q74-Average

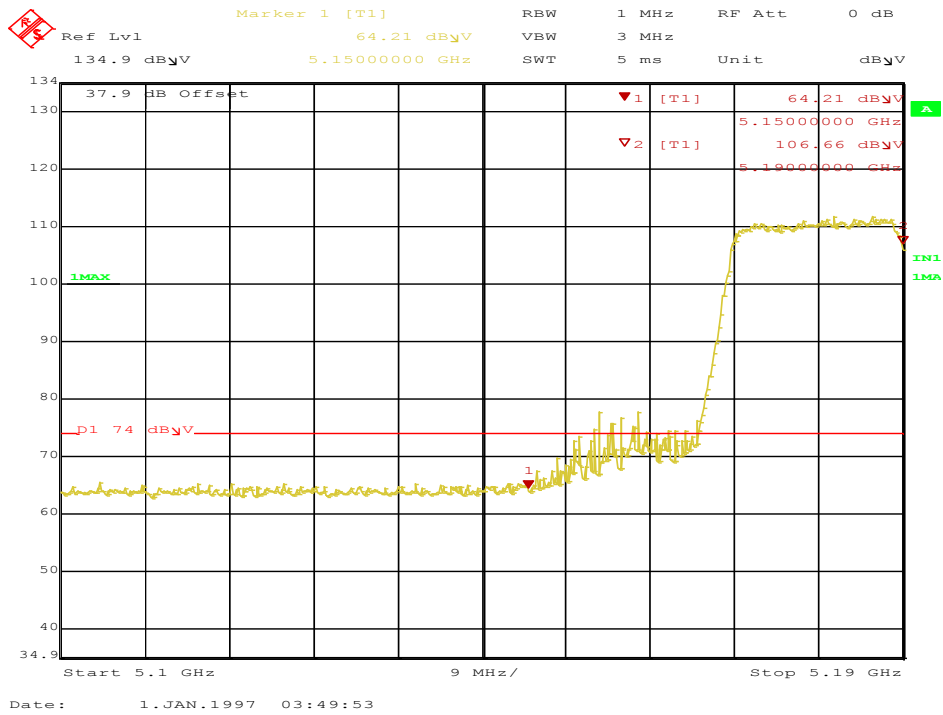


Figure 255: Bandedge-HT40-4x4-5190MHz-MCS0-q58-Peak

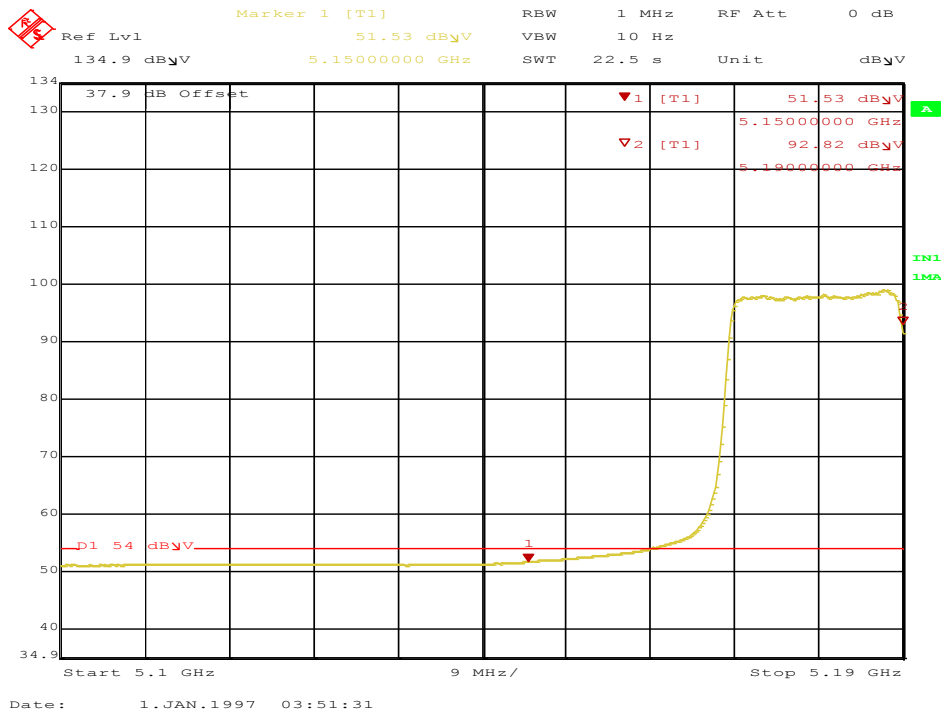


Figure 256: Bandedge-HT40-4x4-5190MHz-MCS0-q58-Average

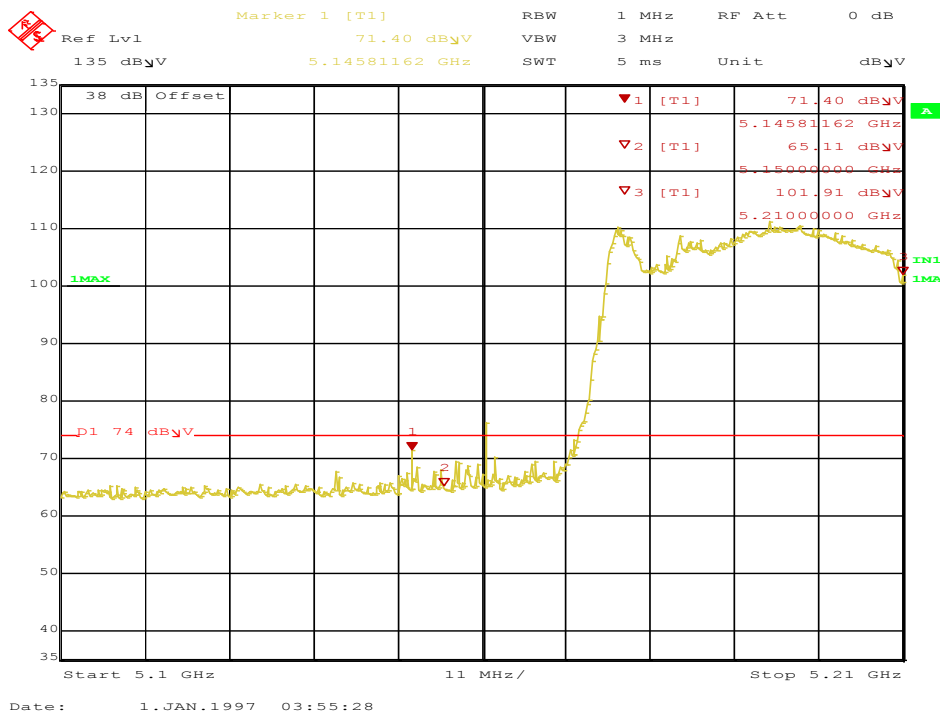


Figure 257: Bandedge-VHT80-4x4-5210MHz-MCS0-q60-Peak

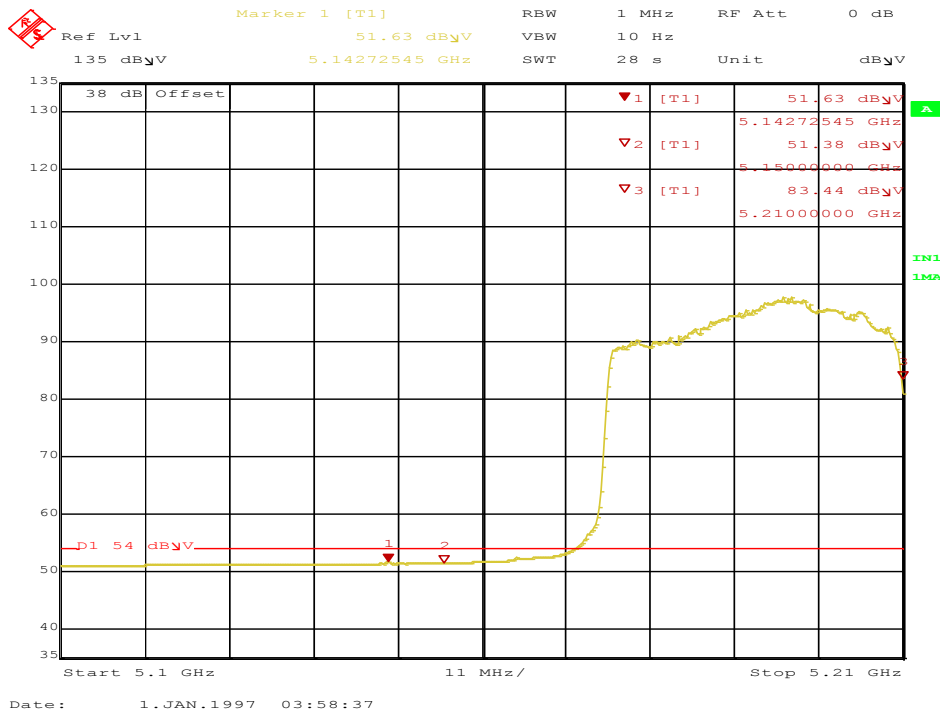
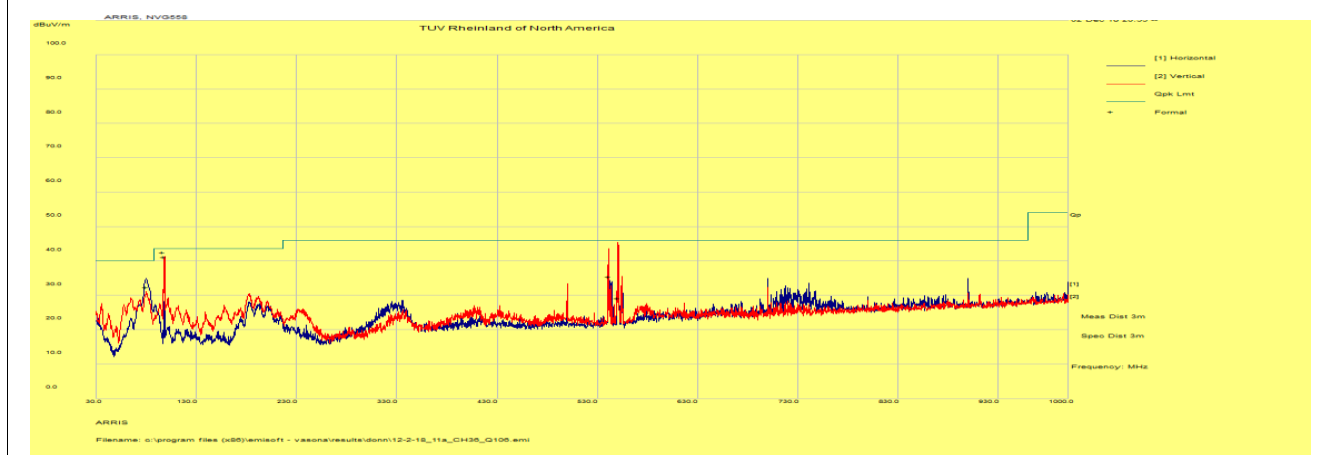
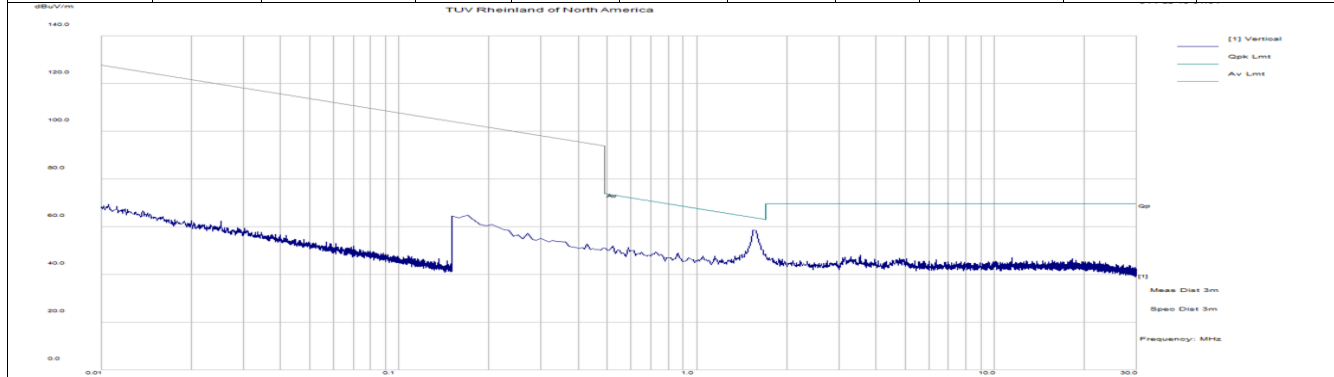


Figure 258: Bandedge-VHT80-4x4-5210MHz-MCS0-q60-Average

SOP 1 Radiated Emissions		Tracking # 31962243.001 Page 1 of 31	
EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	21° C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart C, RSS-247, RSS-GEN	RBW / VBW	120 kHz/ 300 kHz
Dist/Ant Used	3m / JB3 / EMCO 6502	Performed by	Abraham Avalos

9 kHz – 1 GHz Transmit at 5180 MHz

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
1.55	45.54	2.32	10.60	58.47	Pk	V	136	0	63.79	-5.32
80.22	50.06	2.78	-20.45	32.39	QP	H	273	186	40.00	-7.61
97.34	58.45	2.86	-18.74	42.58	QP	V	122	98	43.50	-0.92
98.17	56.76	2.87	-18.49	41.15	QP	V	116	212	43.50	-2.35
541.29	40.74	4.23	-9.54	35.42	QP	V	146	338	46.00	-10.58
550.98	34.38	4.24	-9.43	29.19	QP	V	184	232	46.00	-16.81



Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
 Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

- Note:
1. Worst case was observed on Mid channel of 802.11a 6Mbps mode for 20MHz channel BW.
 2. Mode tested are 802.11a, HT20, VHT20, HT40, VHT40 & VHT80 (low, mid & high channel).
 3. All emissions are less than 68.23 dBuV/m (-27 dBm/MHz e.i.r.p. per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2)
 4. To reduce complexity and bulkiness of the report Worst case Plots are placed in the report.

SOP 1 Radiated Emissions						Tracking # 31962243.001 Page 2 of 31					
EUT Name Wi-Fi Module			Date December 2, 2018								
EUT Model NVG5X8AC			Temp / Hum in 23°C / 38%rh								
EUT Serial M11839QW0022			Temp / Hum out N/A								
EUT Config. 802.11a at 6Mbps			Line AC / Freq 120 VAC/ 60Hz								
Standard CFR47 Part 15 Subpart C			RBW / VBW 1 MHz / 3 MHz								
Dist/Ant Used 3m – EMCO3115 / 1m - ComPower			Performed by Abraham Avalos & Douglas Antioco								

Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Above 1 GHz Radiated Emission at 802.11a, 5180 MHz, 6Mbps (1x4)											
4898.89	63.07	2.36	-24.01	41.42	Ave	V	225	192	54.00	-12.58	Pass
14640.55	47.71	3.68	-15.74	35.65	Ave	V	110	96	54.00	-18.35	Pass
17996.02	43.36	4.20	-8.82	38.75	Ave	V	212	174	54.00	-15.25	Pass
12934.38	44.57	5.90	-16.52	33.95	Ave	H	134	102	54.00	-20.05	Pass
14482.52	44.59	6.16	-15.73	35.03	Ave	H	156	118	54.00	-18.98	Pass
17895.54	41.25	6.80	-8.40	39.65	Ave	V	169	14	54.00	-14.35	Pass
33928.00	42.81	9.58	-12.52	39.87	Ave	H	211	244	54.00	-14.13	Pass
38101.90	44.46	10.20	-12.03	42.63	Ave	H	225	94	54.00	-11.37	Pass
39853.00	47.45	10.87	-13.53	44.79	Ave	H	201	360	54.00	-9.21	Pass
20721.53	26.18	7.60	-8.99	24.79	Ave	V	161	14	54.00	-29.21	Pass
25897.25	30.99	8.21	-12.86	26.33	Ave	V	162	32	54.00	-27.67	Pass
Above 1 GHz Radiated Emission at 802.11a, 5220 MHz, 6Mbps (1x4)											
17979.42	43.25	4.21	-8.78	38.68	Ave	H	134	110	54.00	-15.32	Pass
1461.67	52.72	1.17	-33.11	20.79	Ave	V	106	282	54.00	-33.21	Pass
4937.73	64.70	2.18	-24.18	42.71	Ave	V	106	6	54.00	-11.29	Pass
15654.61	51.06	6.32	-19.13	38.25	Ave	H	115	30	54.00	-15.75	Pass
17849.61	40.91	6.80	-8.43	39.27	Ave	H	284	272	54.00	-14.73	Pass
15661.11	45.01	6.34	-19.15	32.20	Ave	V	102	90	54.00	-21.80	Pass
26106.85	29.31	8.18	-12.96	24.54	Ave	H	140	22	54.00	-29.46	Pass
38576.25	44.65	10.44	-12.02	43.07	Ave	H	176	336	54.00	-10.93	Pass
34378.50	43.25	9.62	-12.44	40.43	Ave	V	195	192	54.00	-13.57	Pass
39860.52	47.34	10.88	-13.53	44.69	Ave	V	186	184	54.00	-9.31	Pass
Above 1 GHz Radiated Emission at 802.11a, 5240 MHz, 6Mbps (1x4)											
17834.39	43.48	4.25	-8.42	39.31	Ave	H	135	4	54.00	-14.69	Pass
2082.69	49.54	1.39	-30.50	20.42	Ave	V	204	360	54.00	-33.58	Pass
4956.74	63.55	2.15	-24.25	41.45	Ave	V	136	28	54.00	-12.55	Pass
15723.13	57.57	6.55	-19.31	44.80	Ave	H	150	46	54.00	-9.20	Pass
15737.05	47.23	6.57	-19.37	34.43	Ave	H	128	20	54.00	-19.57	Pass
15729.29	45.19	6.56	-19.34	32.41	Ave	V	312	114	54.00	-21.59	Pass
17843.96	40.88	6.80	-8.43	39.26	Ave	V	121	266	54.00	-14.75	Pass
26199.82	35.78	8.23	-13.05	30.96	Ave	H	188	53	54.00	-23.04	Pass
33960.12	43.05	9.60	-12.48	40.17	Ave	H	136	98	54.00	-13.83	Pass
38379.11	44.29	10.42	-11.93	42.78	Ave	H	173	74	54.00	-11.22	Pass

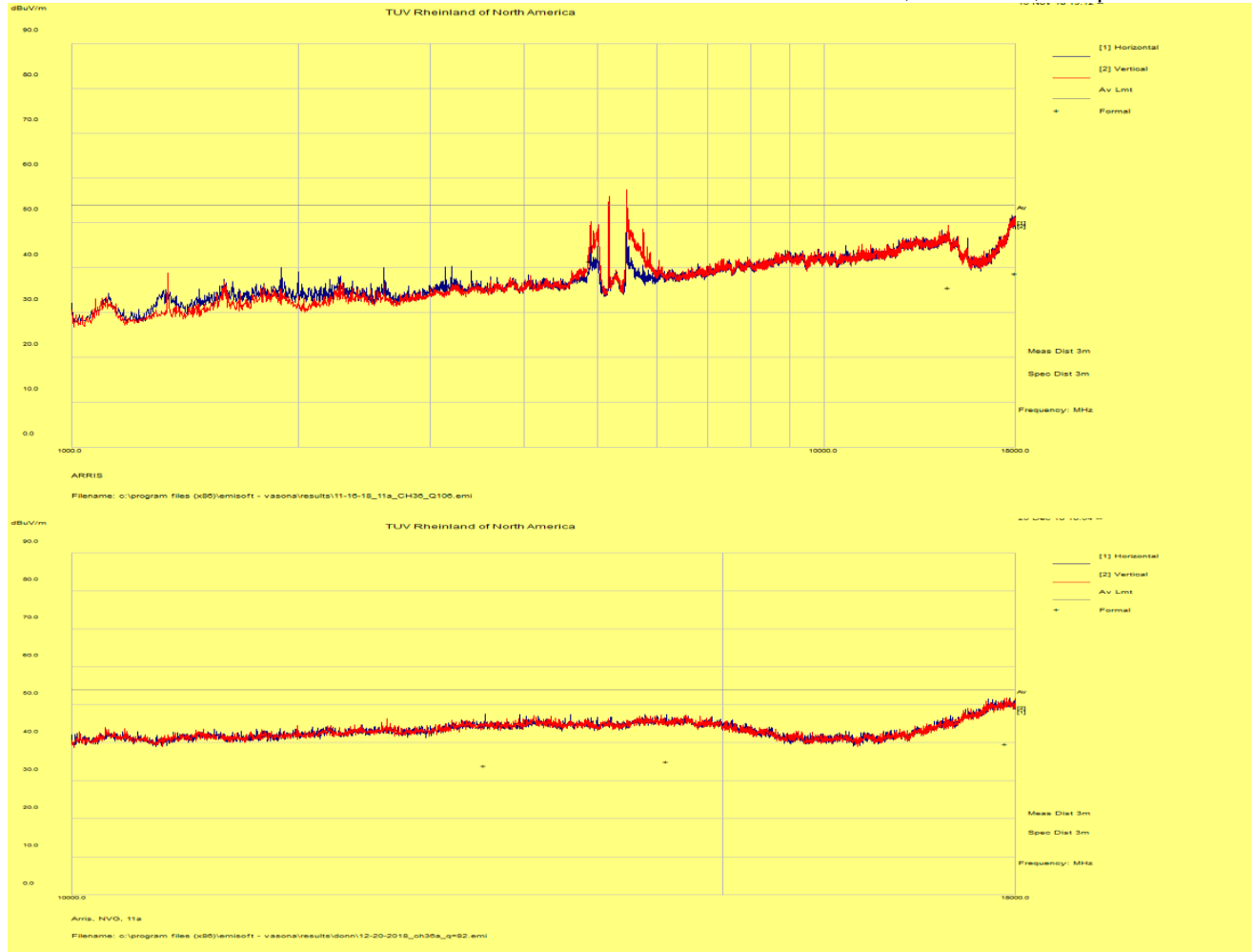
39840.24	47.19	10.86	-13.54	44.52	Ave	V	220	72	54.00	-9.48	Pass
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty AF= Amp Gain + ANT Factor											
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = ku_c(y)$ $k = 2$ for 95% confidence											
Note Worst case was observed at 6Mbps. All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2)											

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11a, 5180 MHz, 6Mbps

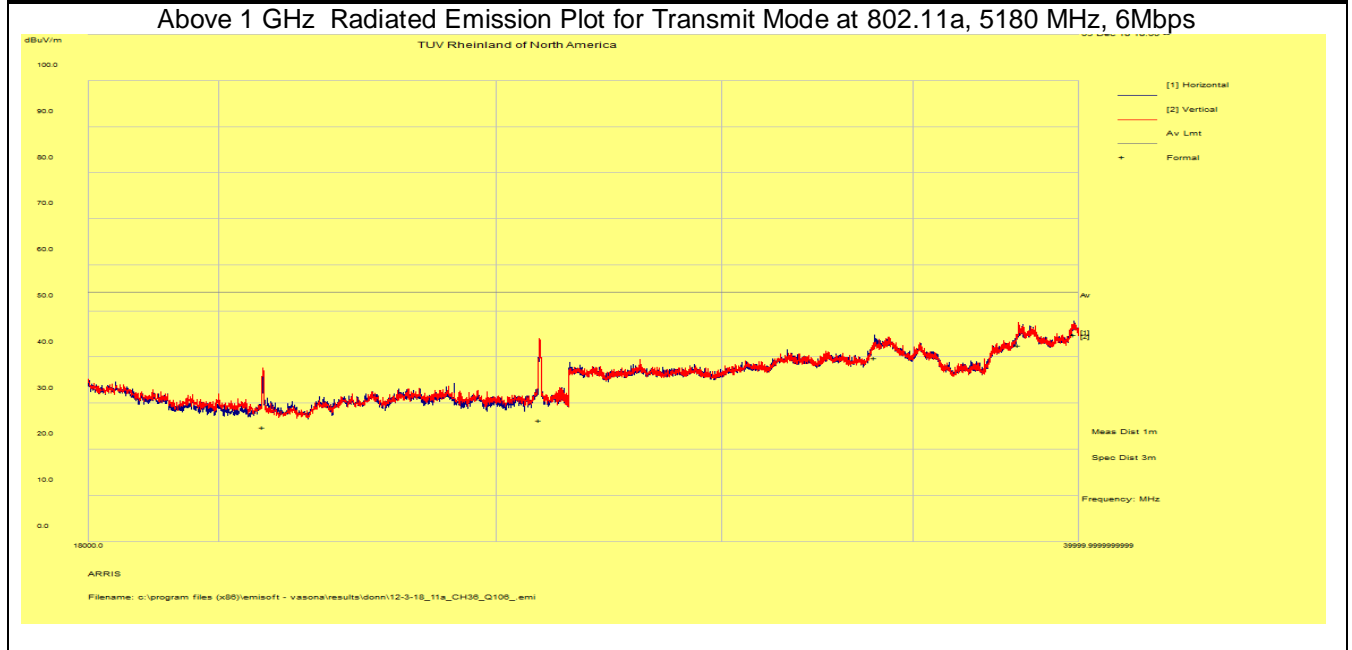


Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2)

SOP 1 Radiated Emissions

Tracking # 31962243.001 Page 4 of 31

EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m - ComPower	Performed by	Abraham Avalos & Douglas Antioco



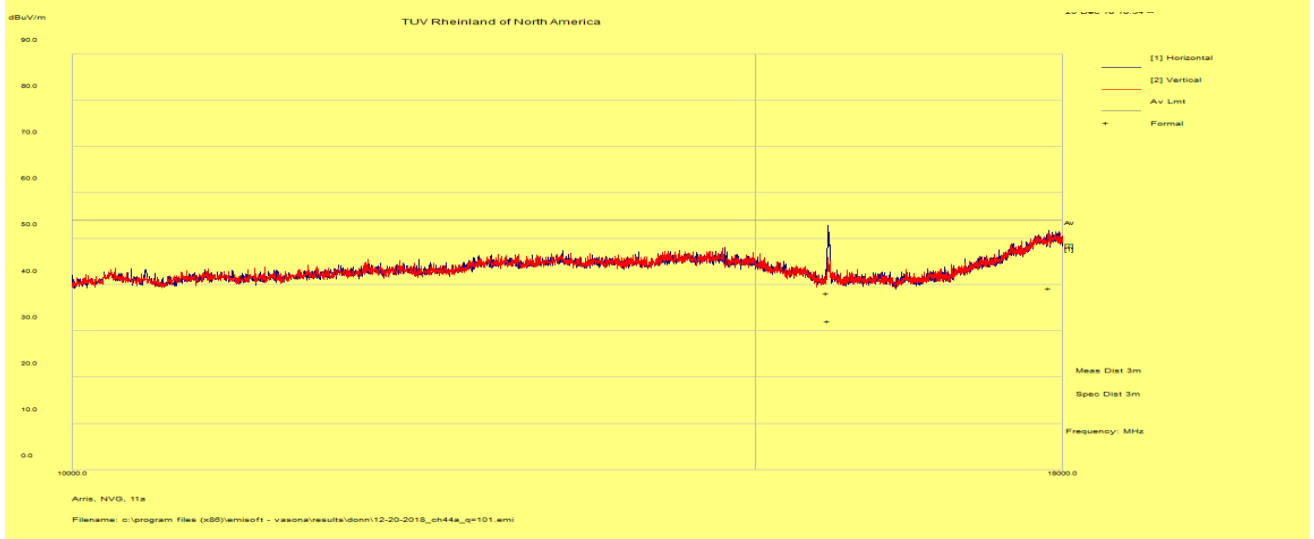
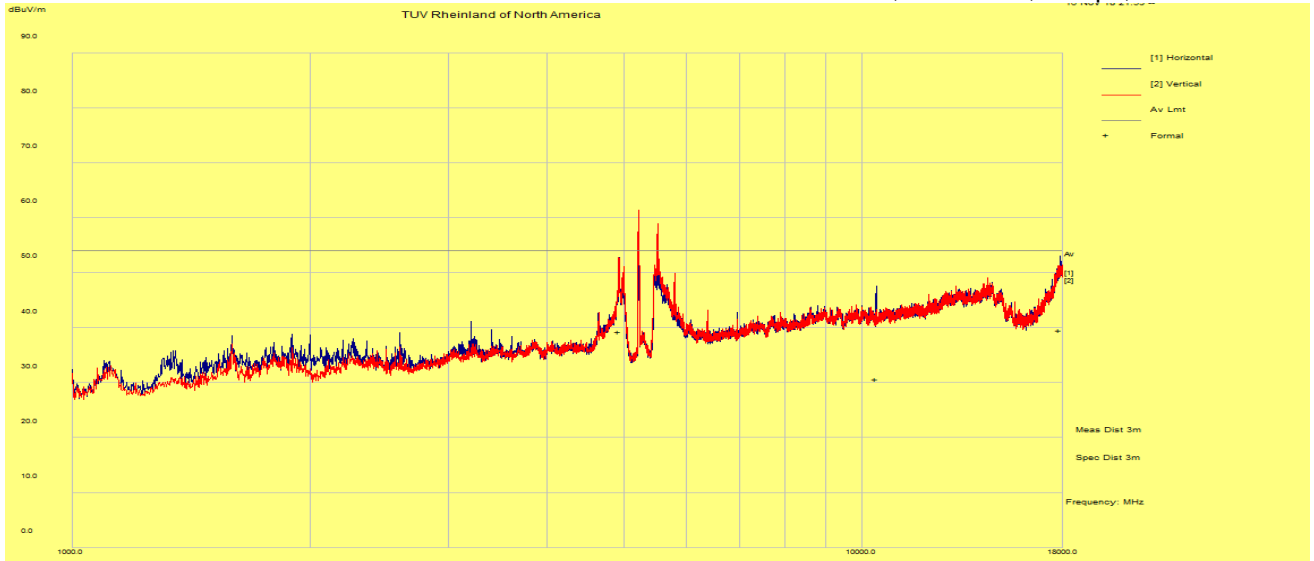
Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 1 GHz – 40 GHz was scanned at 1m distance.

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115	Performed by	Abraham Avalos & Douglas Antioco

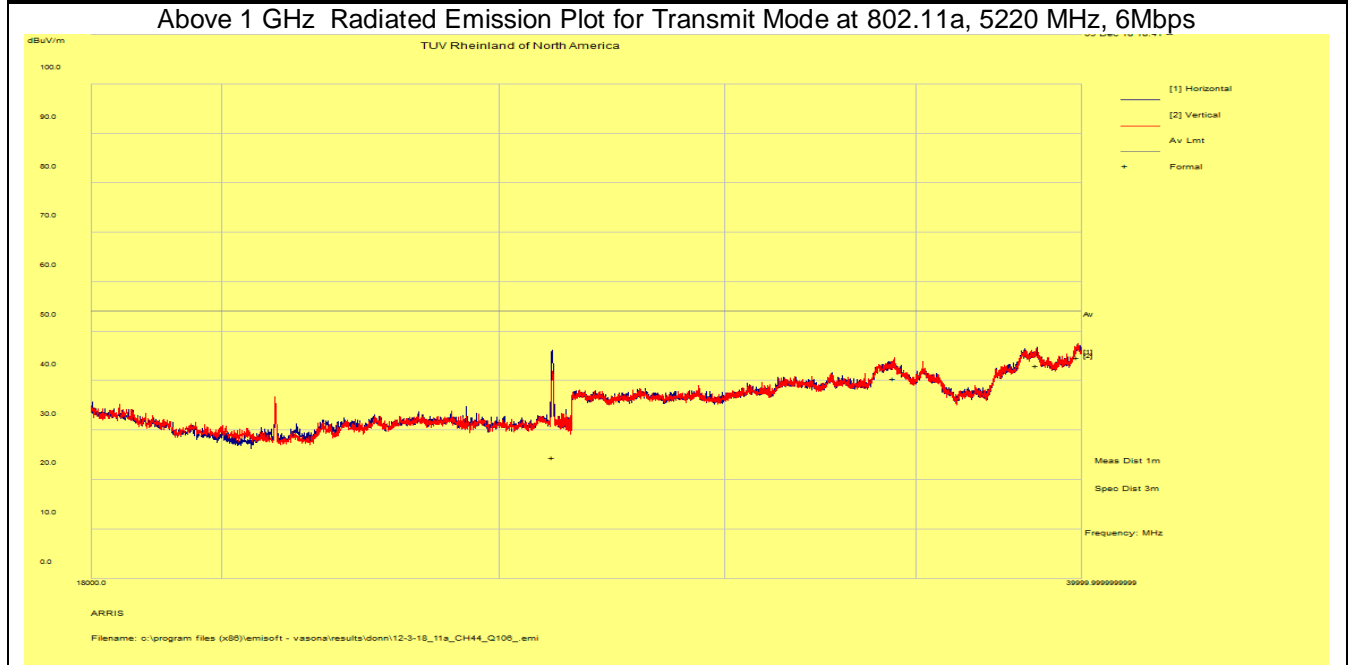
Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11a, 5220 MHz, 6Mbps, Chain 1



Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2)

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m - ComPower	Performed by	Abraham Avalos & Douglas Antioco



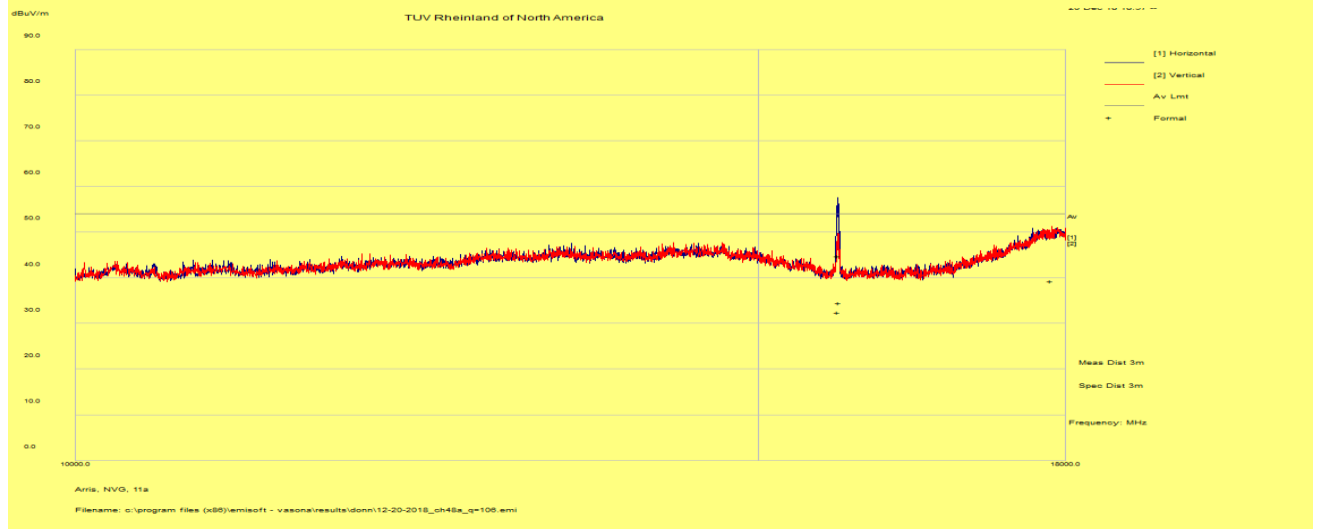
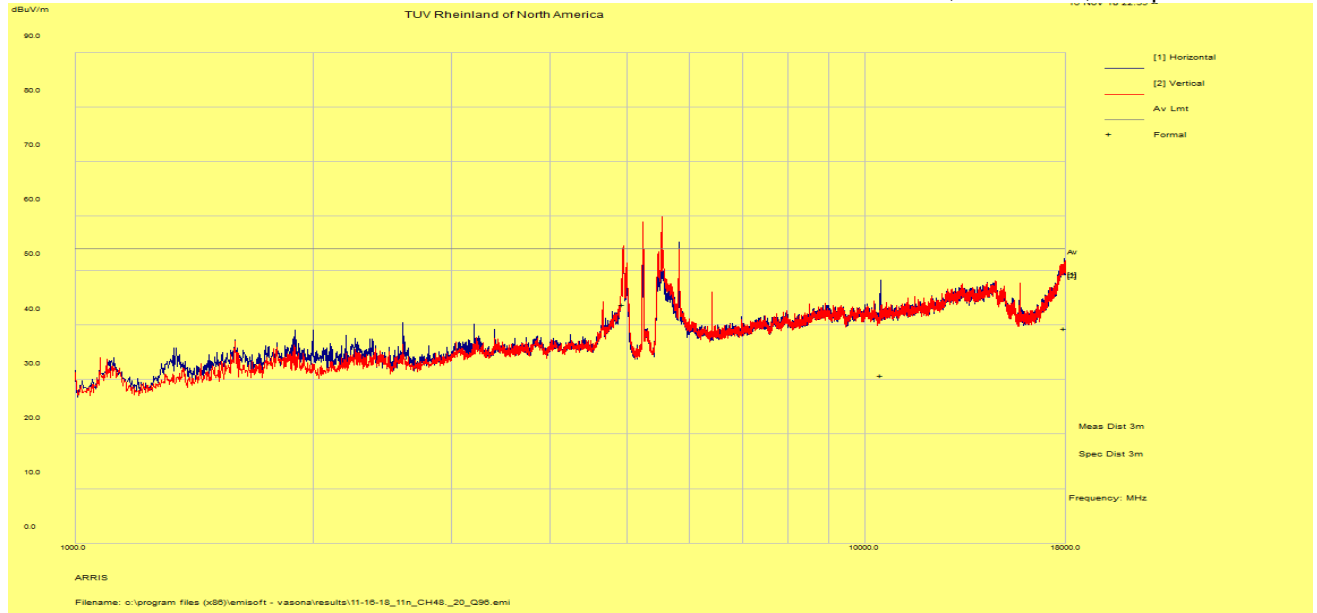
Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2)
 1 GHz – 40 GHz was scanned at 1m distance.

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11a, 5240 MHz, 6Mbps



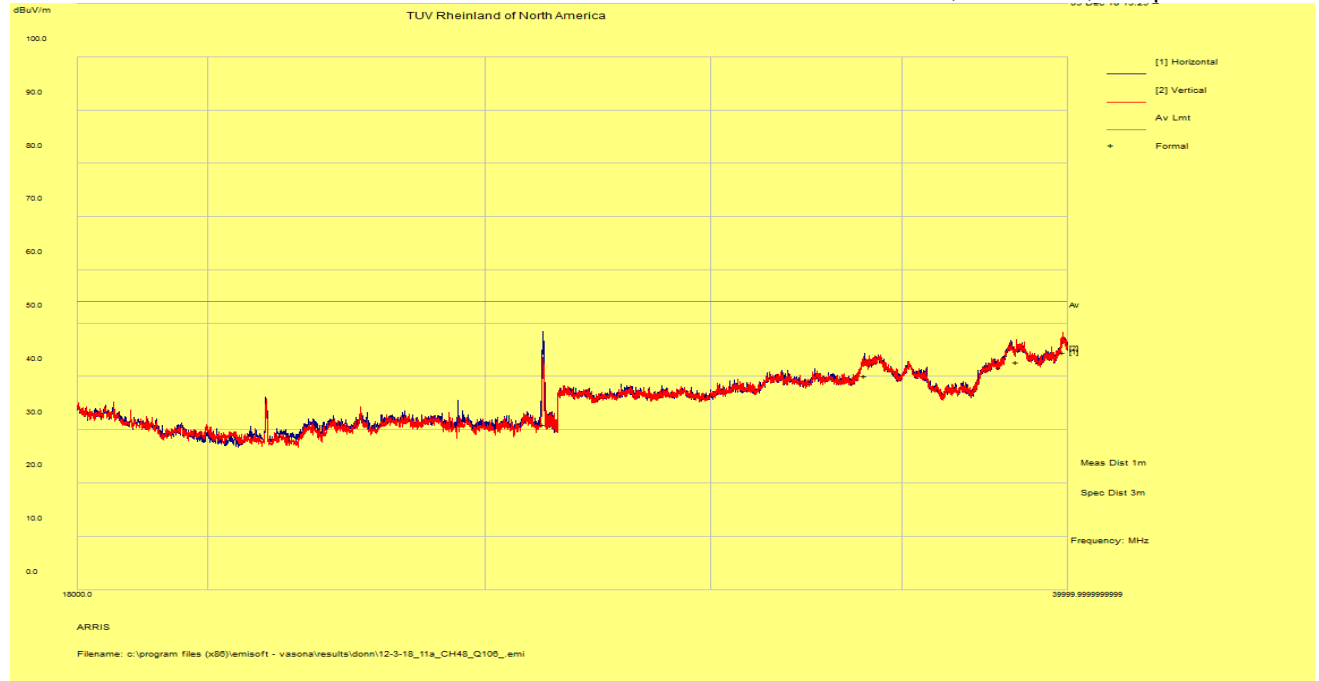
Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2)

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a at 6Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m - ComPower	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11a, 5240 MHz, 6Mbps



Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2)
 1 GHz – 40 GHz was scanned at 1m distance.

SOP 1 Radiated Emissions						Tracking # 31962243.001 Page 9 of 31					
EUT Name Wi-Fi Module			Date December 20, 2018								
EUT Model NVG5X8AC			Temp / Hum in 23°C / 38%rh								
EUT Serial M11839QW0022			Temp / Hum out N/A								
EUT Config. 802.11n HT20 at 6.5Mbps (1x4)			Line AC / Freq 120 VAC/ 60Hz								
Standard CFR47 Part 15 Subpart C			RBW / VBW 1 MHz / 3 MHz								
Dist/Ant Used 3m – EMCO3115 / 1m - ComPower			Performed by Abraham Avalos & Douglas Antioco								

Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Above 1 GHz Radiated Emission at 802.11n HT20, 5180 MHz, 6.5Mbps											
4899.58	63.93	2.37	-24.01	42.28	Ave	V	150	230	54.00	-11.72	Pass
10364.96	47.84	3.13	-19.64	31.33	Ave	V	224	315	54.00	-22.68	Pass
17916.82	43.77	4.21	-8.39	39.58	Ave	V	135	220	54.00	-14.42	Pass
17901.78	41.22	6.81	-8.39	39.64	Ave	H	118	112	54.00	-14.36	Pass
14559.57	44.32	6.26	-15.78	34.81	Ave	V	330	162	54.00	-19.19	Pass
17918.18	41.33	6.87	-8.39	39.81	Ave	V	215	316	54.00	-14.19	Pass
20717.19	26.19	7.60	-8.99	24.80	Ave	H	184	62	54.00	-29.20	Pass
38490.16	44.84	10.32	-11.88	43.28	Ave	H	176	232	54.00	-10.72	Pass
18024.00	26.70	6.95	-7.04	26.61	Ave	V	132	290	54.00	-27.39	Pass
25902.50	36.47	8.21	-12.86	31.82	Ave	V	169	116	54.00	-22.18	Pass
34195.91	42.92	9.70	-12.43	40.19	Ave	V	208	148	54.00	-13.81	Pass
39807.09	47.01	10.84	-13.54	44.31	Ave	V	139	190	54.00	-9.69	Pass
Above 1 GHz Radiated Emission at 802.11n HT20, 5220 MHz, 6.5Mbps											
17847.26	43.78	4.23	-8.43	39.58	Ave	H	132	200	54.00	-14.42	Pass
4924.60	61.15	2.25	-24.11	39.29	Ave	V	225	226	54.00	-14.71	Pass
10444.14	47.53	3.29	-20.15	30.66	Ave	V	191	124	54.00	-23.34	Pass
14403.38	44.94	6.29	-16.07	35.16	Ave	H	161	0	54.00	-18.84	Pass
15653.61	47.29	6.31	-19.12	34.48	Ave	H	112	156	54.00	-19.52	Pass
17915.77	41.31	6.86	-8.39	39.78	Ave	H	175	10	54.00	-14.22	Pass
15654.95	45.14	6.32	-19.13	32.33	Ave	V	243	104	54.00	-21.67	Pass
20878.30	27.71	7.60	-9.13	26.19	Ave	H	158	120	54.00	-27.81	Pass
34307.91	43.40	9.64	-12.43	40.60	Ave	H	130	160	54.00	-13.40	Pass
38495.82	45.04	10.32	-11.88	43.48	Ave	H	150	272	54.00	-10.52	Pass
18015.43	26.83	6.93	-7.02	26.74	Ave	V	149	222	54.00	-27.26	Pass
26097.68	37.61	8.18	-12.95	32.84	Ave	V	171	117	54.00	-21.16	Pass
26129.34	30.39	8.19	-12.98	25.60	Ave	V	169	88	54.00	-28.40	Pass
Above 1 GHz Radiated Emission at 802.11n HT20, 5240 MHz, 6.5Mbps											
17942.84	43.80	4.23	-8.56	39.47	Ave	H	202	307	54.00	-14.54	Pass
4945.19	65.85	2.14	-24.22	43.78	Ave	V	184	174	54.00	-10.22	Pass
10487.21	47.61	3.16	-20.02	30.75	Ave	V	115	322	54.00	-23.25	Pass
15707.17	44.99	6.51	-19.27	32.23	Ave	V	276	94	54.00	-21.77	Pass
15713.83	46.54	6.53	-19.28	33.78	Ave	V	136	78	54.00	-20.22	Pass

17918.38	41.29	6.87	-8.39	39.77	Ave	V	267	80	54.00	-14.24	Pass
18015.46	26.62	6.93	-7.02	26.53	Ave	H	128	28	54.00	-27.47	Pass
20959.01	27.03	7.60	-9.19	25.44	Ave	H	191	0	54.00	-28.56	Pass
39811.56	47.07	10.85	-13.54	44.38	Ave	H	128	66	54.00	-9.62	Pass
26204.35	37.11	8.23	-13.05	32.28	Ave	V	177	24	54.00	-21.72	Pass
26239.72	30.16	8.23	-13.09	25.30	Ave	V	164	26	54.00	-28.70	Pass
34256.56	43.16	9.67	-12.43	40.39	Ave	V	219	229	54.00	-13.61	Pass

Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty
 AF= Amp Gain + ANT Factor

Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence

Note Worst case was observed at 6.5Mbps.

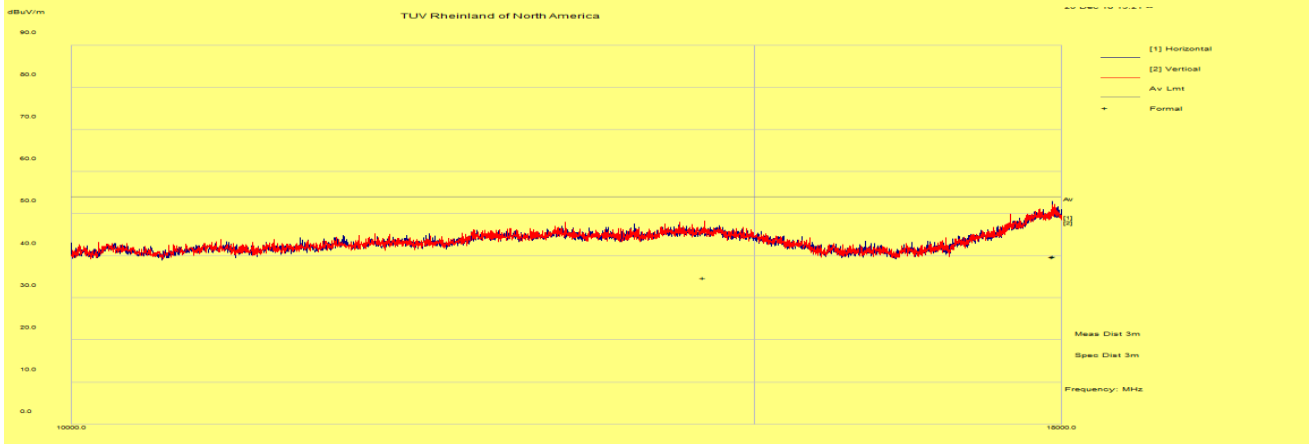
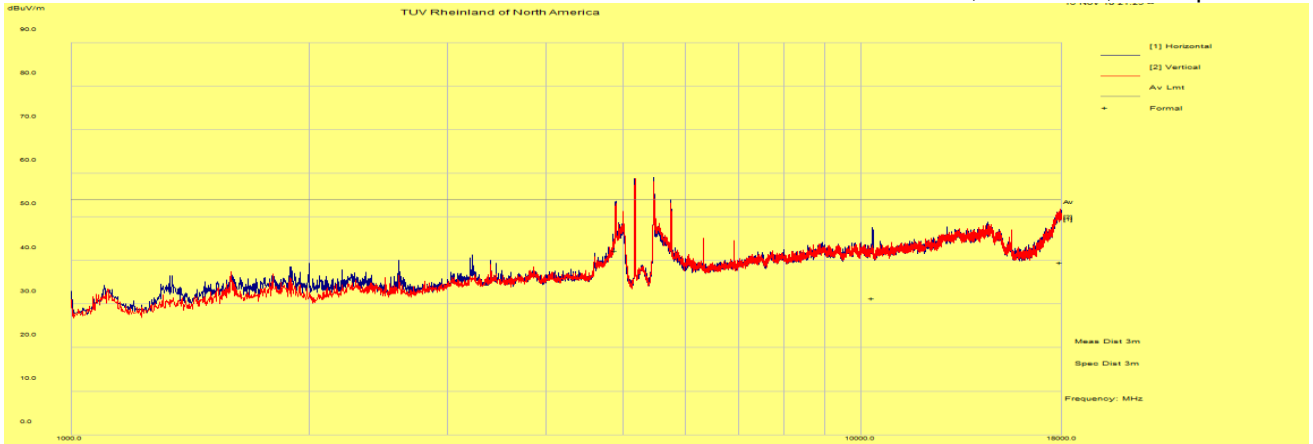
All emissions met restricted band limits and less than 68.23 dBuV/m (-27 dBm eirp per CFR47 15.407 (b) and RSS 247 Sect.6.2.1.2)

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at 6.5Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT20, 5180 MHz, 6.5Mbps



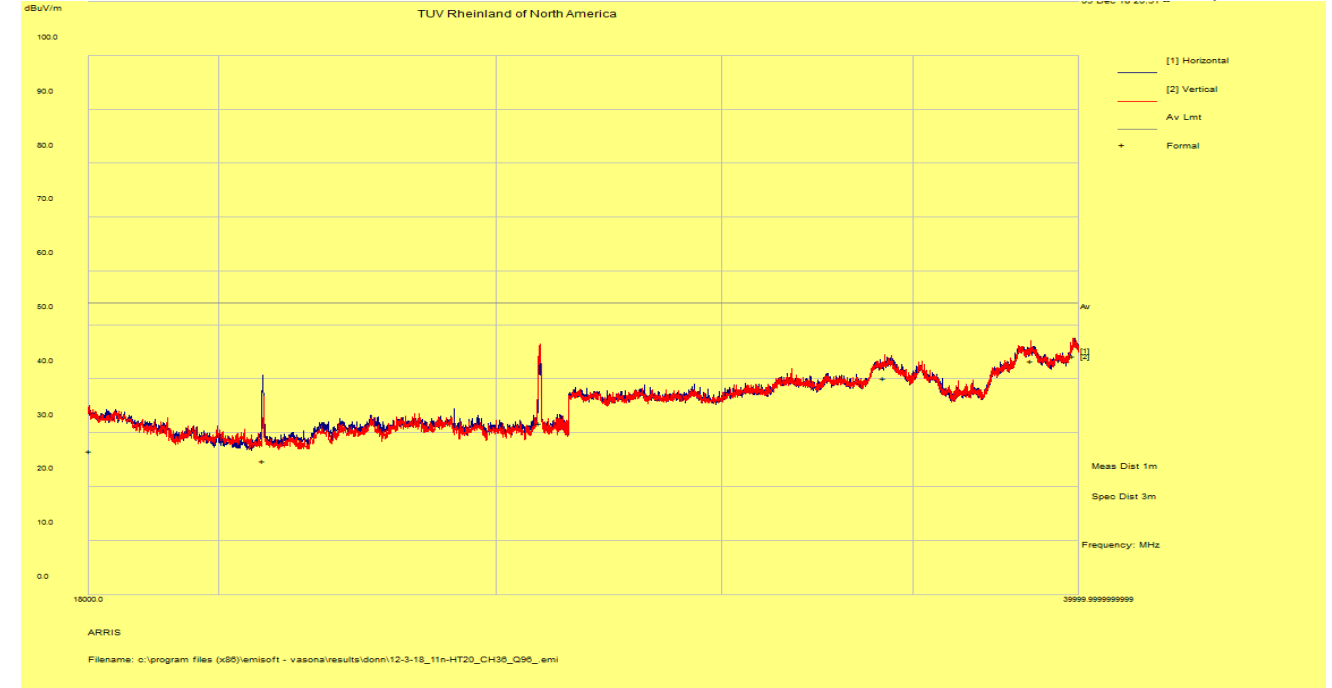
Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2)

SOP 1 Radiated Emissions

Tracking # 31962243.001 Page 11 of 31

EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at 6.5Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m - ComPower	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT20, 5180 MHz, 6.5Mbps



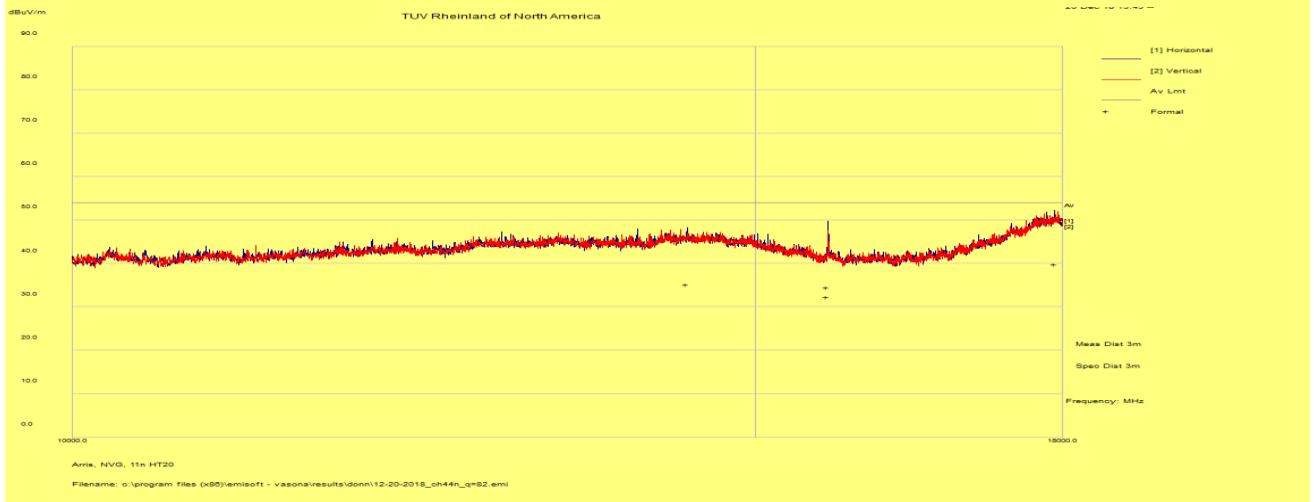
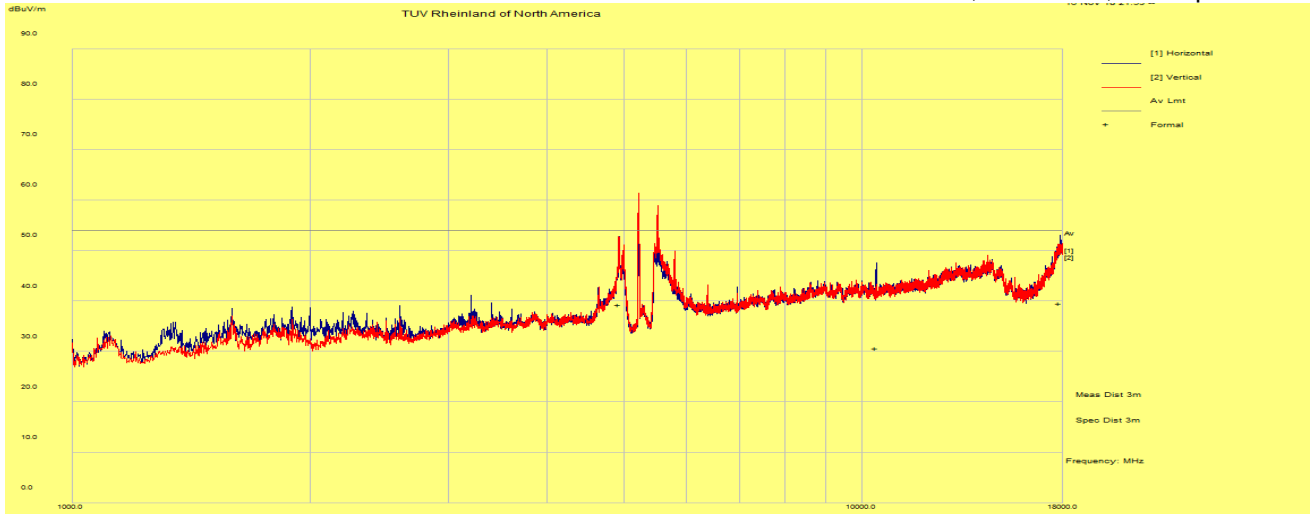
Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 1 GHz – 40 GHz was scanned at 1m distance.

SOP 1 Radiated Emissions

Tracking # 31962243.001 Page 12 of 31

EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at 6.5Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT20, 5220 MHz, 6.5Mbps



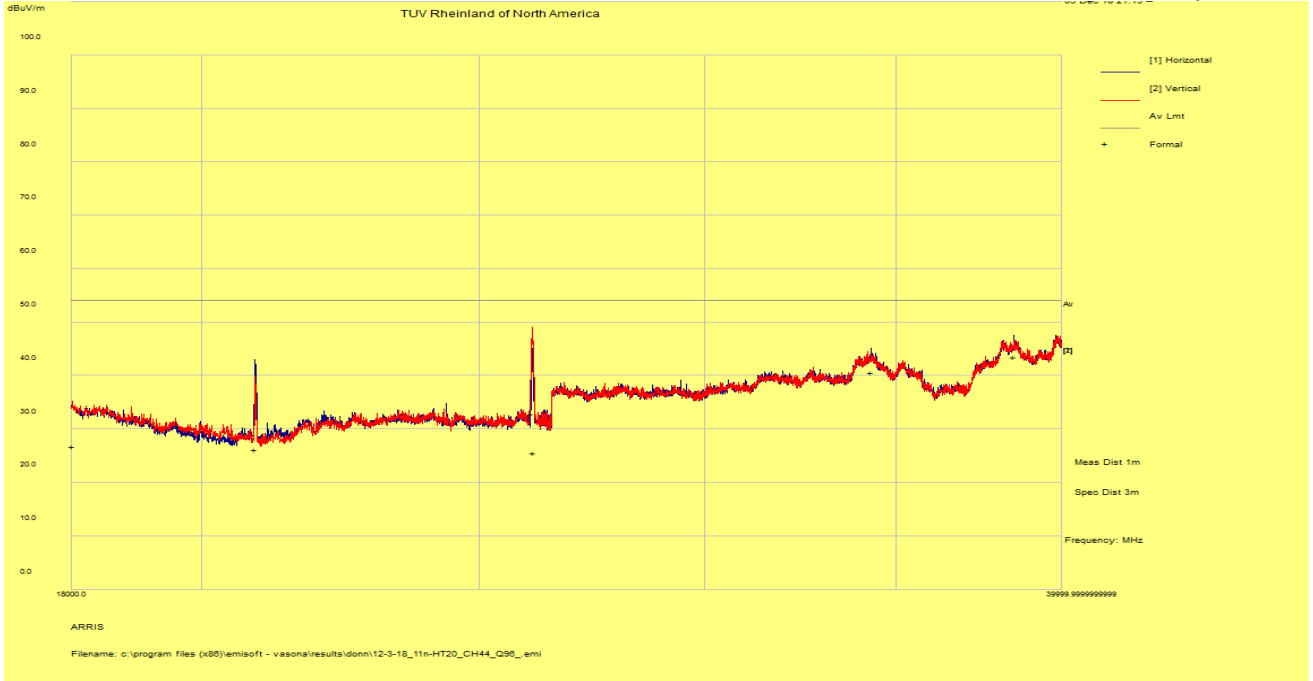
Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).

SOP 1 Radiated Emissions

Tracking # 31962243.001 Page 13 of 31

EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at 6.5Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m - ComPower	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT20, 5220 MHz, 6.5Mbps



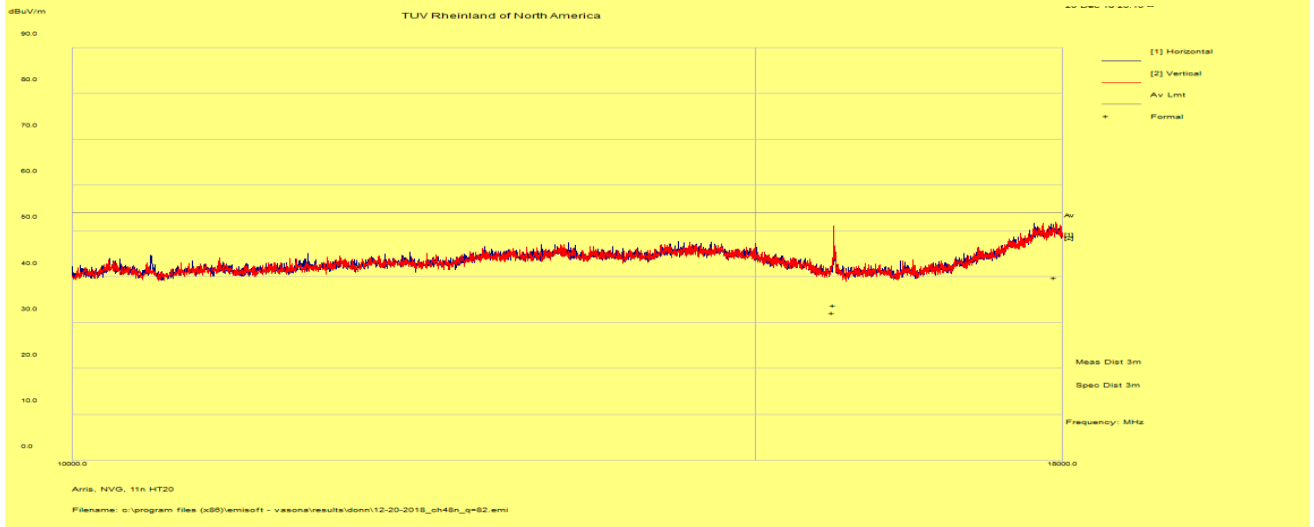
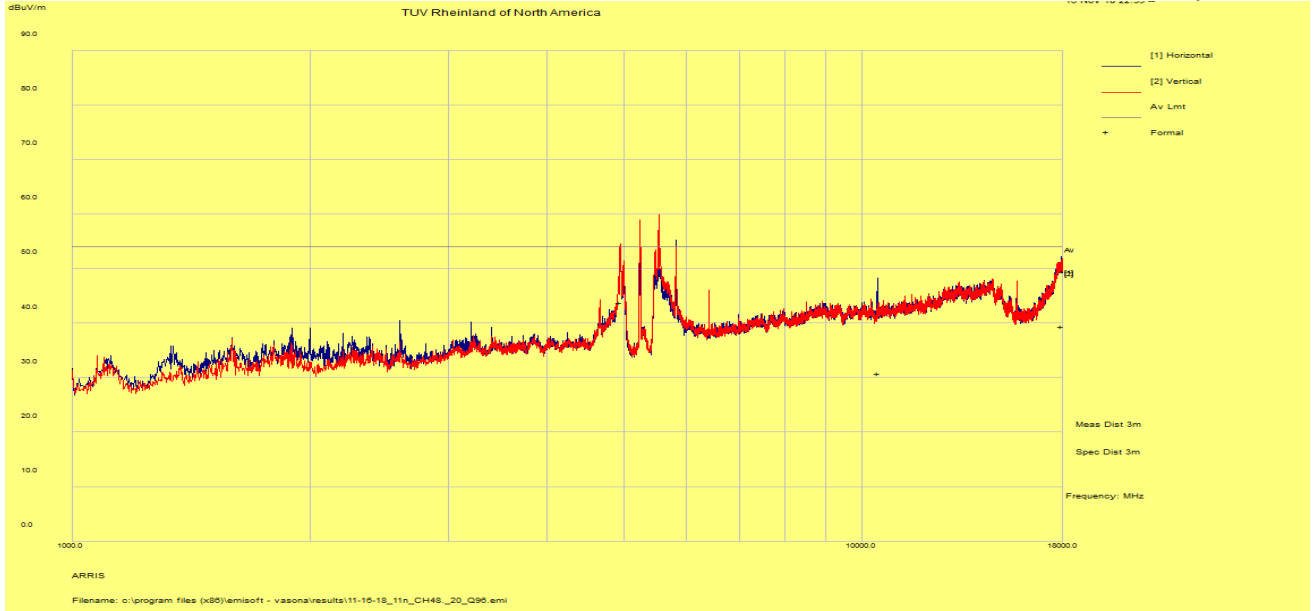
Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 1 GHz – 40 GHz was scanned at 1m distance.

SOP 1 Radiated Emissions

Tracking # 31962243.001 Page 14 of 31

EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at 6.5Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT20, 5240 MHz, 6.5Mbps



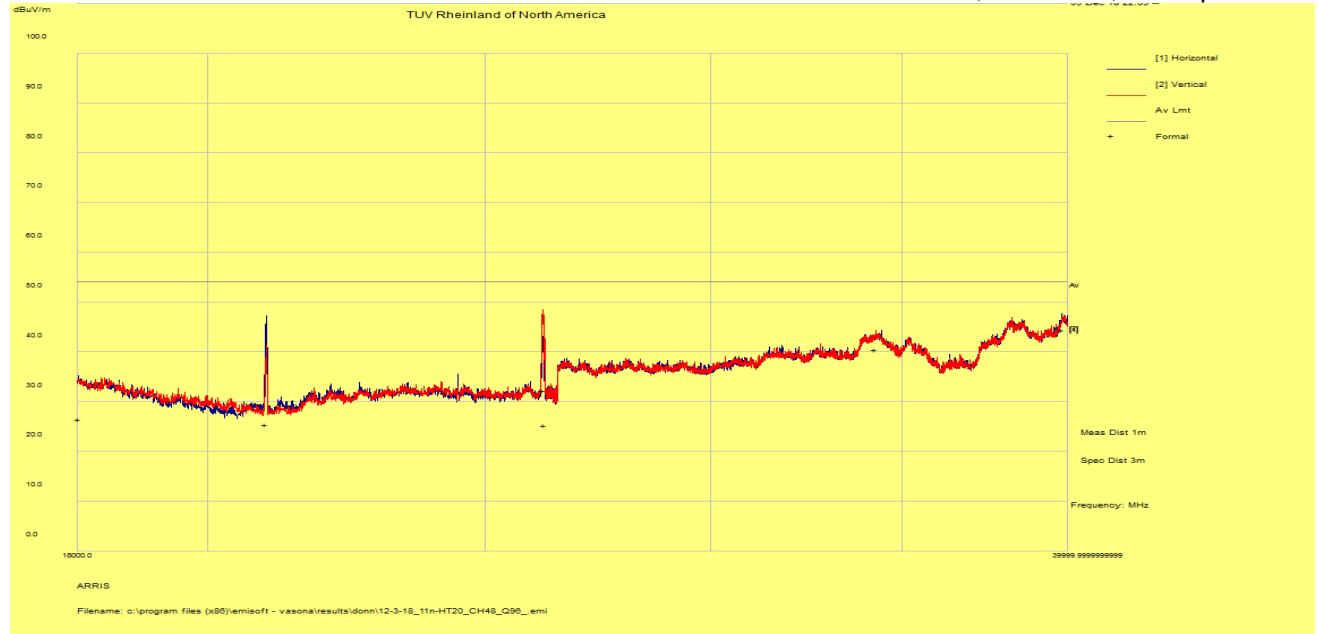
Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).

SOP 1 Radiated Emissions

Tracking # 31962243.001 Page 15 of 31

EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at 6.5Mbps (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m - ComPower	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT20, 5240 MHz, 6.5Mbps



Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 1 GHz – 40 GHz was scanned at 1m distance.

SOP 1 Radiated Emissions						Tracking # 31962243.001 Page 15 of 31					
EUT Name	Wi-Fi Module					Date	December 20, 2018				
EUT Model	NVG5X8AC					Temp / Hum in	23°C / 38%rh				
EUT Serial	M11839QW0022					Temp / Hum out	N/A				
EUT Config.	802.11n HT40 at MCS0 (1x4)					Line AC / Freq	120 VAC/ 60Hz				
Standard	CFR47 Part 15 Subpart C					RBW / VBW	1 MHz / 3 MHz				
Dist/Ant Used	3m – EMCO3115 / 1m - ComPower					Performed by	Abraham Avalos & Douglas Antioco				

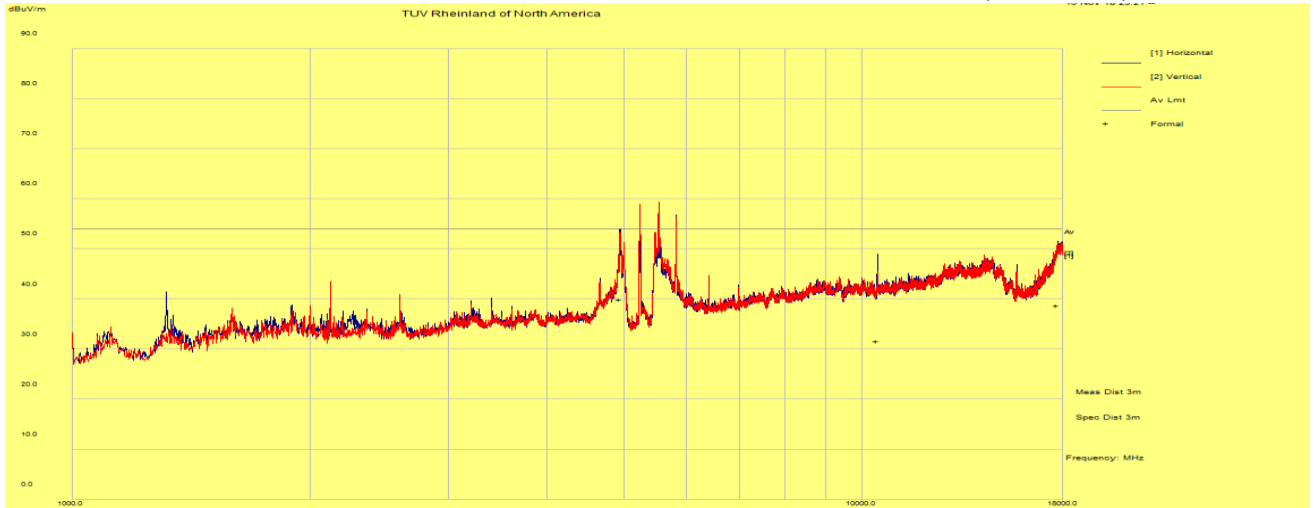
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Above 1 GHz Radiated Emission at 802.11n HT40, 5190 MHz, MCS0											
4943.92	62.04	2.15	-24.21	39.98	Ave	H	118	226	54.00	-14.02	Pass
17715.56	44.15	4.16	-9.56	38.75	Ave	H	133	341	54.00	-15.25	Pass
10478.89	48.52	3.20	-20.04	31.68	Ave	V	107	298	54.00	-22.32	Pass
15563.56	55.79	6.52	-19.13	43.19	Ave	H	127	148	54.00	-10.81	Pass
15580.80	49.79	6.42	-19.10	37.10	Ave	V	150	94	54.00	-16.90	Pass
20749.74	41.20	7.60	-9.00	39.80	Ave	V	169	120	54.00	-14.20	Pass
20765.67	42.10	7.60	-9.00	40.70	Ave	V	179	130	54.00	-13.30	Pass
25960.22	35.80	8.20	-12.90	31.10	Ave	V	152	361	54.00	-22.90	Pass
Above 1 GHz Radiated Emission at 802.11n HT40, 5230 MHz, MCS0											
4946.10	61.16	2.14	-24.22	39.08	Ave	V	152	114	54.00	-14.92	Pass
10481.24	47.87	3.19	-20.03	31.02	Ave	V	105	210	54.00	-22.98	Pass
17925.93	44.10	4.22	-8.44	39.88	Ave	V	112	188	54.00	-14.12	Pass
10472.22	51.05	5.30	-20.06	36.29	Ave	H	112	10	54.00	-17.71	Pass
15702.97	52.35	6.51	-19.26	39.59	Ave	H	104	60	54.00	-14.41	Pass
15702.35	53.05	6.50	-19.26	40.29	Ave	V	269	96	54.00	-13.71	Pass
26163.69	37.30	8.20	-13.00	32.50	Ave	H	139	22	54.00	-21.50	Pass
20930.41	43.30	7.60	-9.20	41.70	Ave	V	181	160	54.00	-12.30	Pass
20939.57	41.80	7.60	-9.20	40.20	Ave	V	178	174	54.00	-13.80	Pass
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty											
AF= Amp Gain + ANT Factor											
Combined Standard Uncertainty uc(y) = ± 4.52 dB Expanded Uncertainty U = kuc(y) k = 2 for 95% confidence											
Note Worst case was observed at MCS0. All emissions met restricted band limits and less than 68.23 dBuV/m (-27 dBm eirp per CFR47 15.407 (b) and RSS 247 Sect.6.2.1.2).											

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT40, 5190 MHz, MCS0



ARRIS
 Filename: c:\program files (x86)\emisoft - vasona\results\11-16-18_11n_HT40_CH38_40_Q90.emi

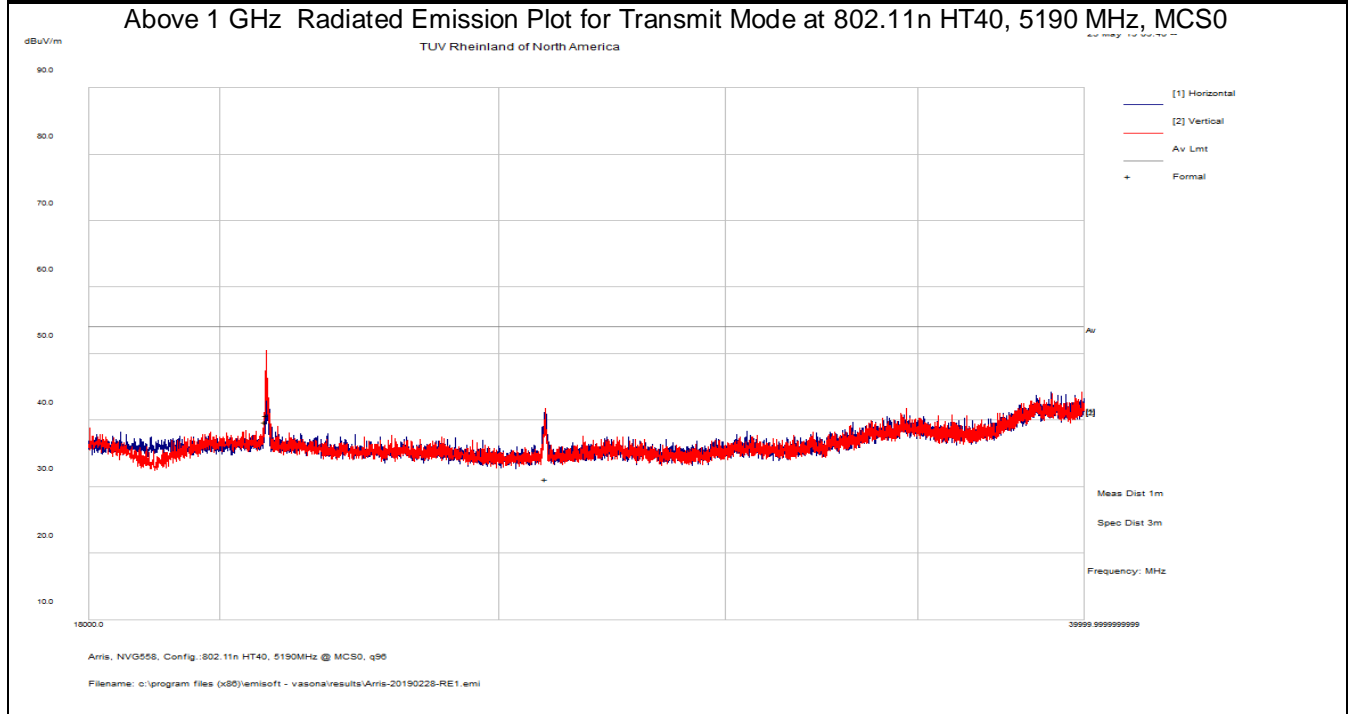


Arris, NVG, 11n HT40
 Filename: c:\program files (x86)\emisoft - vasona\results\donn\12-20-2018_ch38n_q90.emi

Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m - ComPower	Performed by	Abraham Avalos & Douglas Antioco



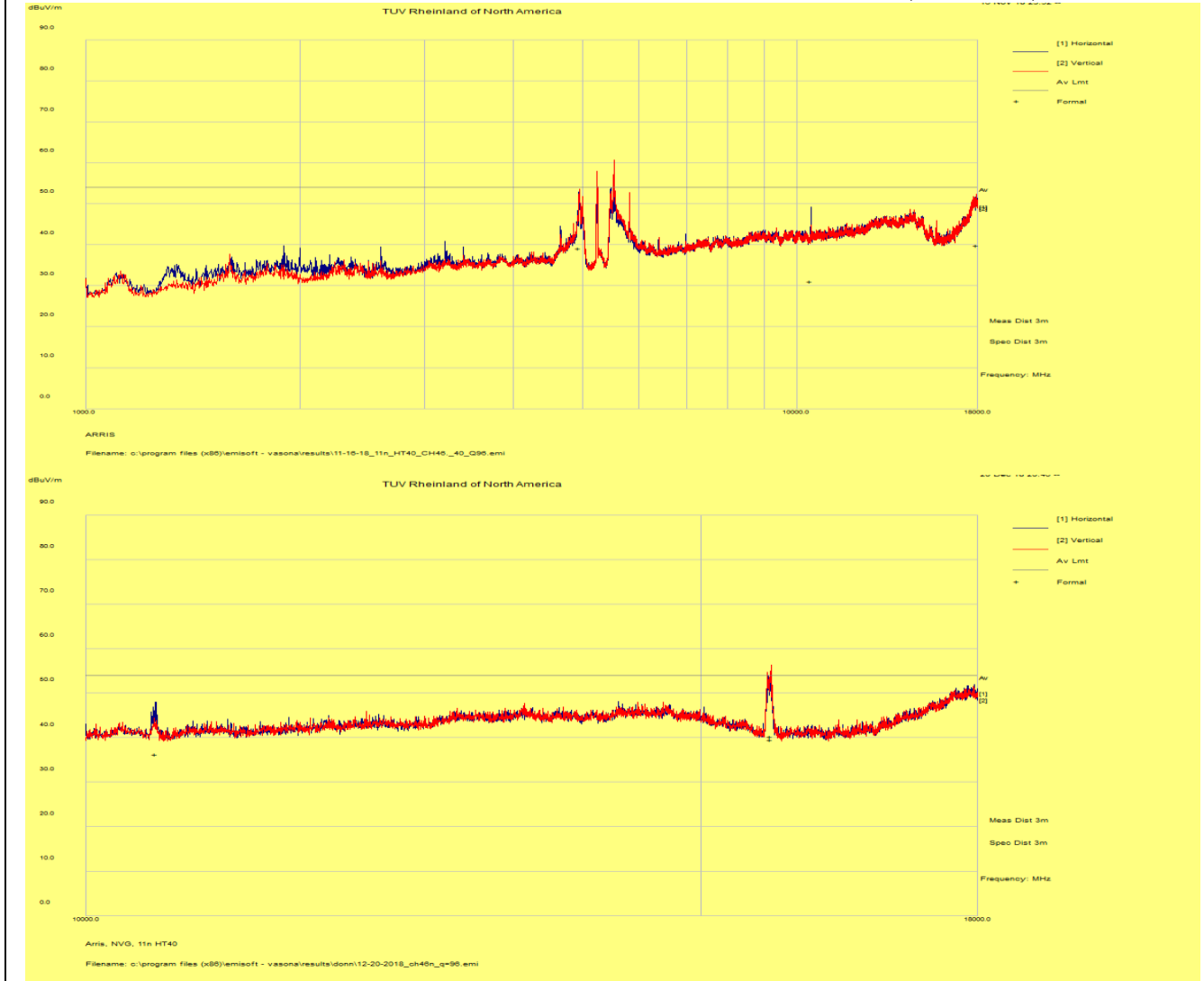
Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 1 GHz – 40 GHz was scanned at 1m distance.

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT40, 5230 MHz, MCS0

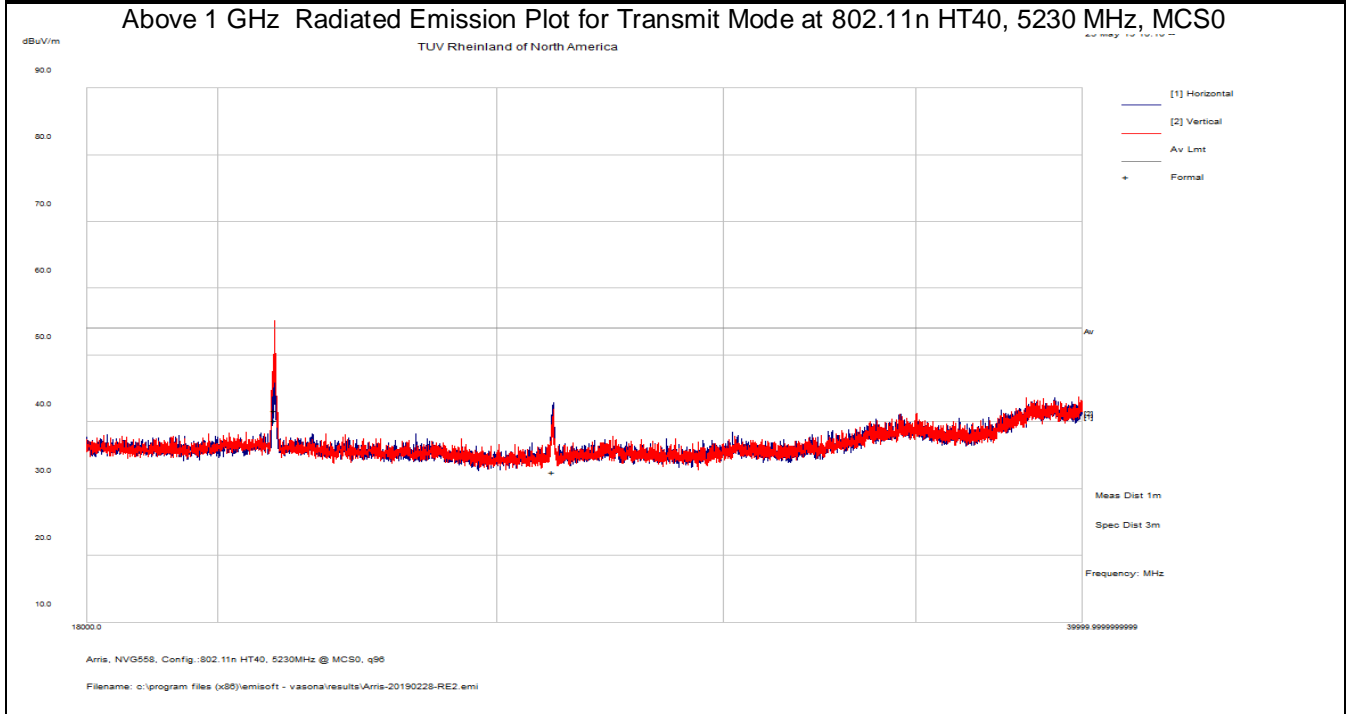


Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m - ComPower	Performed by	Abraham Avalos & Douglas Antioco



Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 1 GHz – 40 GHz was scanned at 1m distance.

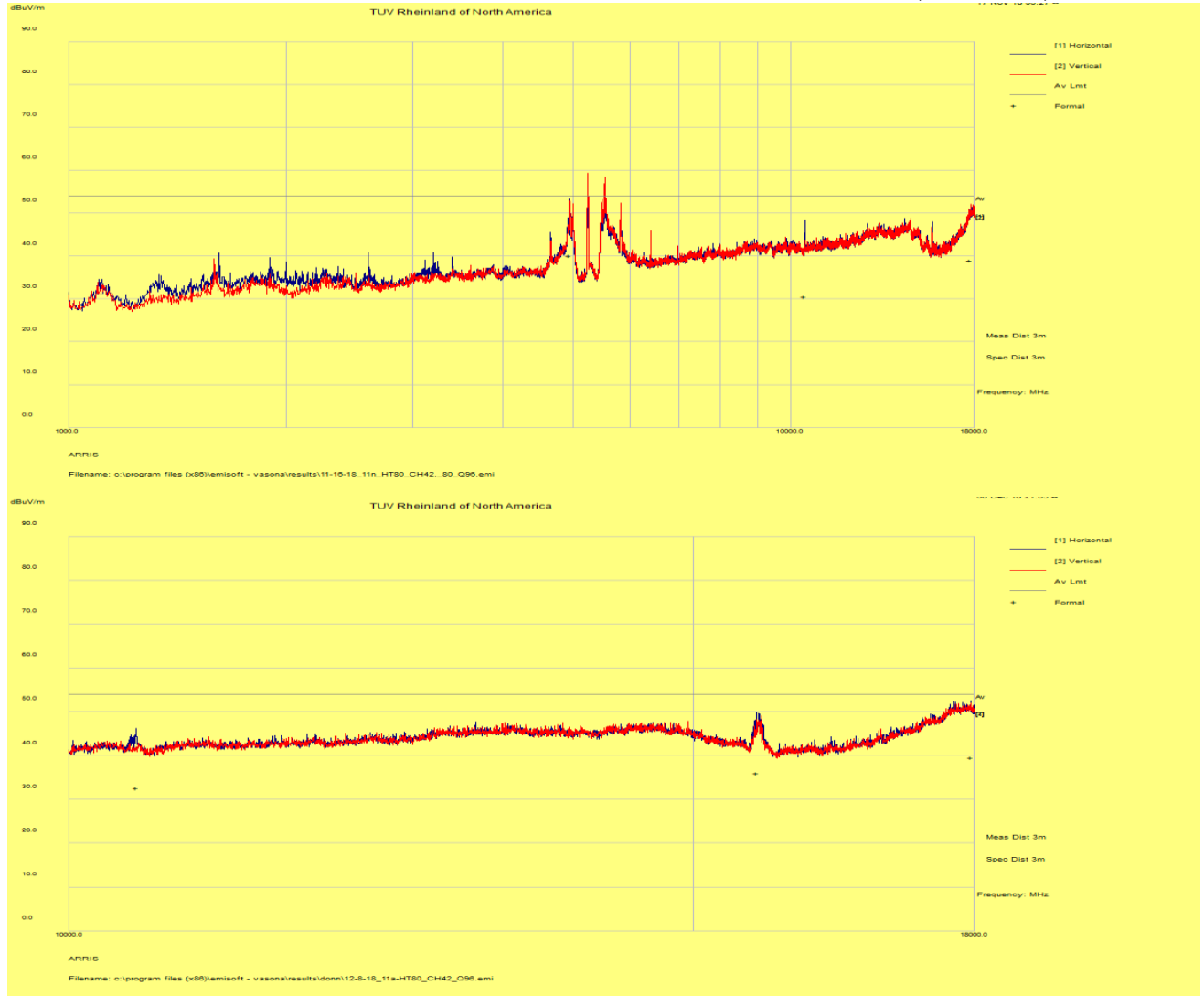
SOP 1 Radiated Emissions											Tracking # 31962243.001 Page 20 of 31	
EUT Name		Wi-Fi Module					Date		December 20, 2018			
EUT Model		NVG5X8AC					Temp / Hum in		23°C / 38%rh			
EUT Serial		M11839QW0022					Temp / Hum out		N/A			
EUT Config.		802.11ac VHT80 at MCS0 (1x4)					Line AC / Freq		120 VAC/ 60Hz			
Standard		CFR47 Part 15 Subpart C					RBW / VBW		1 MHz / 3 MHz			
Dist/Ant Used		3m – EMCO3115 / 1m - ComPower					Performed by		Abraham Avalos & Douglas Antioco			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
Above 1 GHz Radiated Emission at 802.11ac VHT80, 5210 MHz, MCS0												
4943.57	62.16	2.15	-24.21	40.10	Ave	V	168	222	54.00	-13.90	Pass	
10477.74	47.34	3.20	-20.04	30.50	Ave	V	111	66	54.00	-23.50	Pass	
17778.38	43.48	4.23	-8.69	39.03	Ave	V	143	100	54.00	-14.98	Pass	
10446.72	49.43	3.30	-20.15	32.59	Ave	H	354	10	54.00	-21.41	Pass	
15625.17	51.07	3.91	-18.99	36.00	Ave	H	121	76	54.00	-18.00	Pass	
17958.07	44.05	4.23	-8.67	39.60	Ave	H	330	154	54.00	-14.40	Pass	
26163.69	37.30	8.20	-13.00	32.50	Ave	H	139	22	54.00	-21.50	Pass	
20930.41	43.30	7.60	-9.20	41.70	Ave	V	181	160	54.00	-12.30	Pass	
20939.57	41.80	7.60	-9.20	40.20	Ave	V	178	174	54.00	-13.80	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note Worst case was observed at MCS0.												
All emissions met restricted band limits and less than 68.23 dBuV/m (-27 dBm eirp per CFR47 15.407 (b) and RSS 247 Sect.6.2.1.2)												

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11ac VHT80 at MCS0 (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115	Performed by	Abraham Avalos & Douglas Antioco

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11ac VHT80, 5210 MHz, MCS0

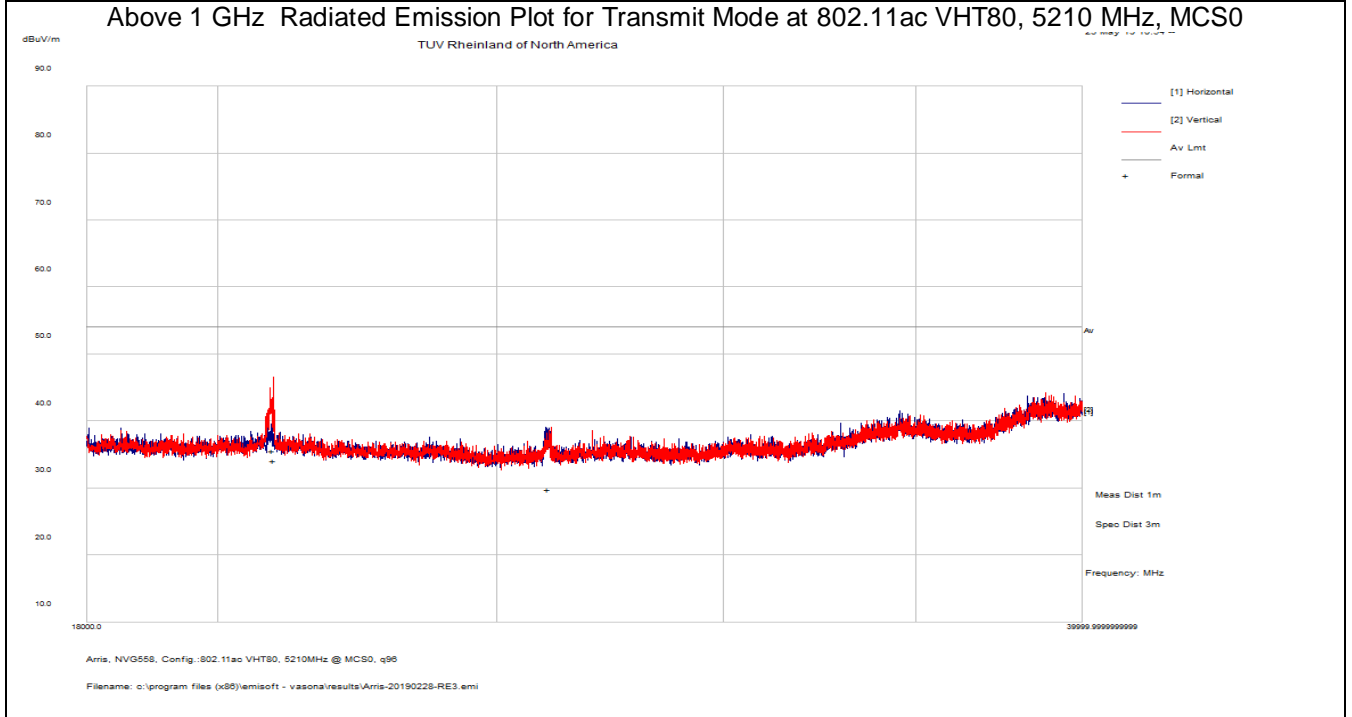


Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	December 2, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11ac VHT80 at MCS0 (1x4)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	1m - ComPower	Performed by	Abraham Avalos & Douglas Antioco



Notes: All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 1 GHz – 40 GHz was scanned at 1m distance.

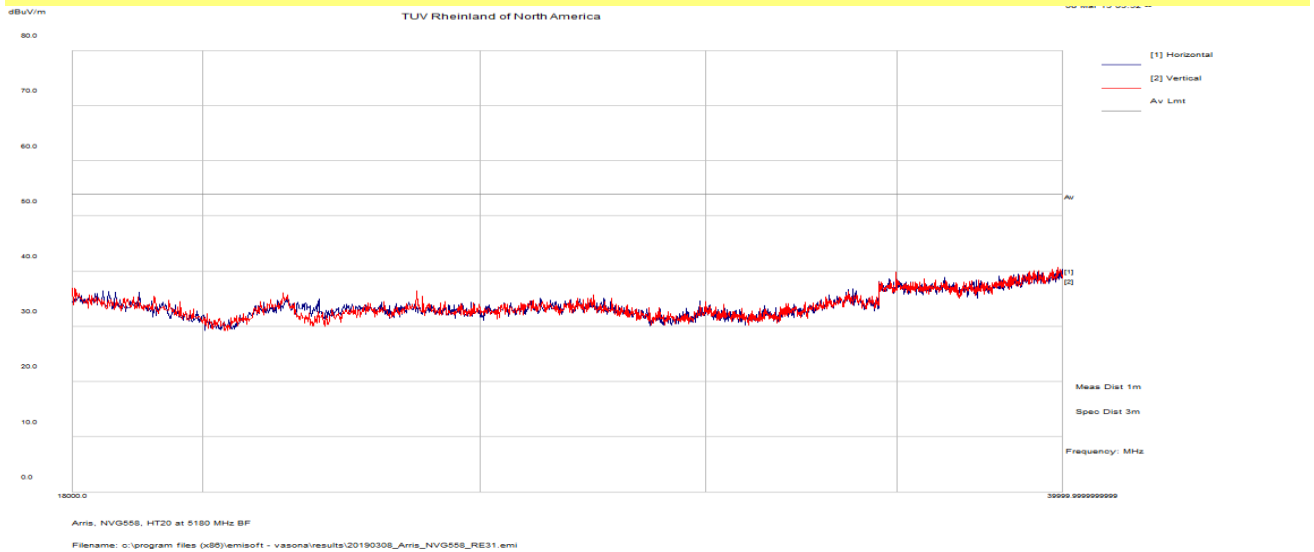
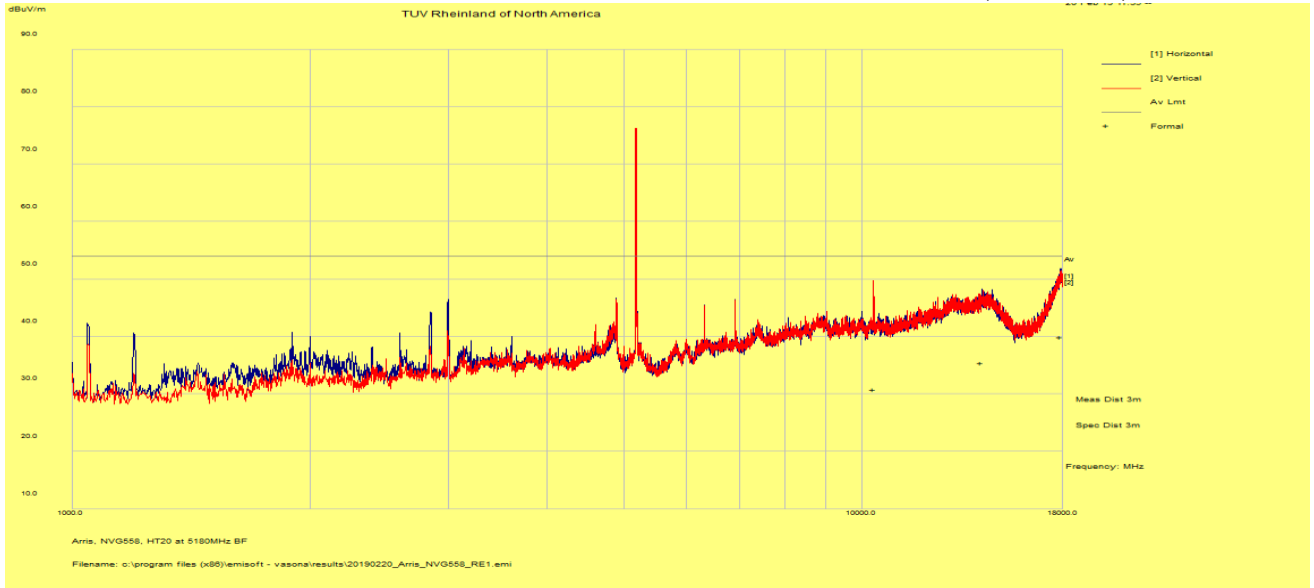
SOP 1 Radiated Emissions											Tracking # 31962243.001 Page 23 of 31	
EUT Name		Wi-Fi Module					Date		March 6, 2019			
EUT Model		NVG5X8AC					Temp / Hum in		23°C / 38%rh			
EUT Serial		M11839QW0022					Temp / Hum out		N/A			
EUT Config.		802.11n HT20 at MCS0 (4x4 Beamforming)					Line AC / Freq		120 VAC/ 60Hz			
Standard		CFR47 Part 15 Subpart C					RBW / VBW		1 MHz /3 MHz			
Dist/Ant Used		3m – EMCO3115 / 1m - ComPower					Performed by		Kerwin Corp & Colton Aliff			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
Above 1 GHz Radiated Emission at 802.11n HT20, 5180 MHz, MCS0												
14197.92	45.37	6.01	-15.94	35.43	Ave	H	103	22	54.00	-18.57	Pass	
17897.41	41.01	6.80	-7.86	39.96	Ave	H	145	60	54.00	-14.04	Pass	
10362.40	44.44	5.22	-18.89	30.78	Ave	V	234	240	54.00	-23.22	Pass	
Above 1 GHz Radiated Emission at 802.11n HT20, 5220 MHz, MCS0												
17876.06	40.76	6.80	-7.79	39.77	Ave	H	242	0	54.00	-14.23	Pass	
10430.55	44.57	5.30	-19.05	30.82	Ave	V	187	368	54.00	-23.18	Pass	
14470.57	44.79	6.14	-15.54	35.39	Ave	V	254	62	54.00	-18.61	Pass	
Above 1 GHz Radiated Emission at 802.11n HT20, 5240 MHz, MCS0												
17902.99	40.91	6.81	-7.90	39.82	Ave	H	228	242	54.00	-14.18	Pass	
10468.66	49.14	5.30	-19.08	35.36	Ave	V	219	206	54.00	-18.64	Pass	
14199.70	45.28	6.00	-15.93	35.34	Ave	V	135	23	54.00	-18.66	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = ku_c(y)$ $k = 2$ for 95% confidence												
Note Worst case was observed at MCS0.												
All emissions met restricted band limits and less than 68.23 dBuV/m (-27 dBm eirp per CFR47 15.407 (b) and RSS 247 Sect.6.2.1.2)												

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EUT Name	Wi-Fi Module	Date	March 6, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at 6.5Mbps (4x4 Beamforming)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m - ComPower	Performed by	Kerwinn Corpus & Colton Aliff

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT20, 5180 MHz, MCS0



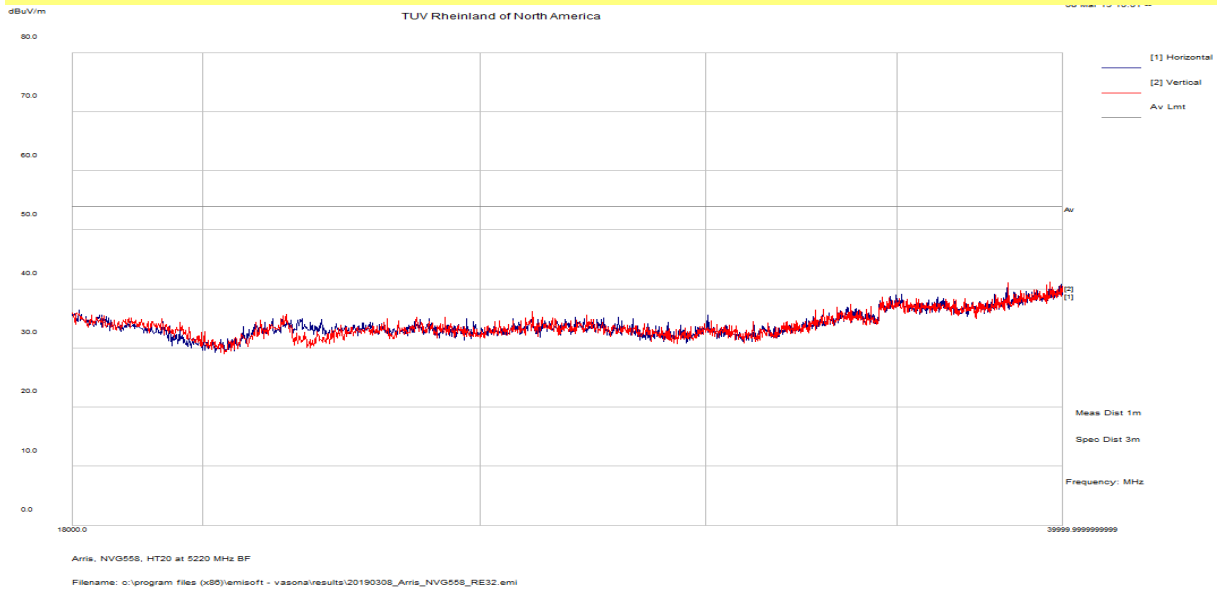
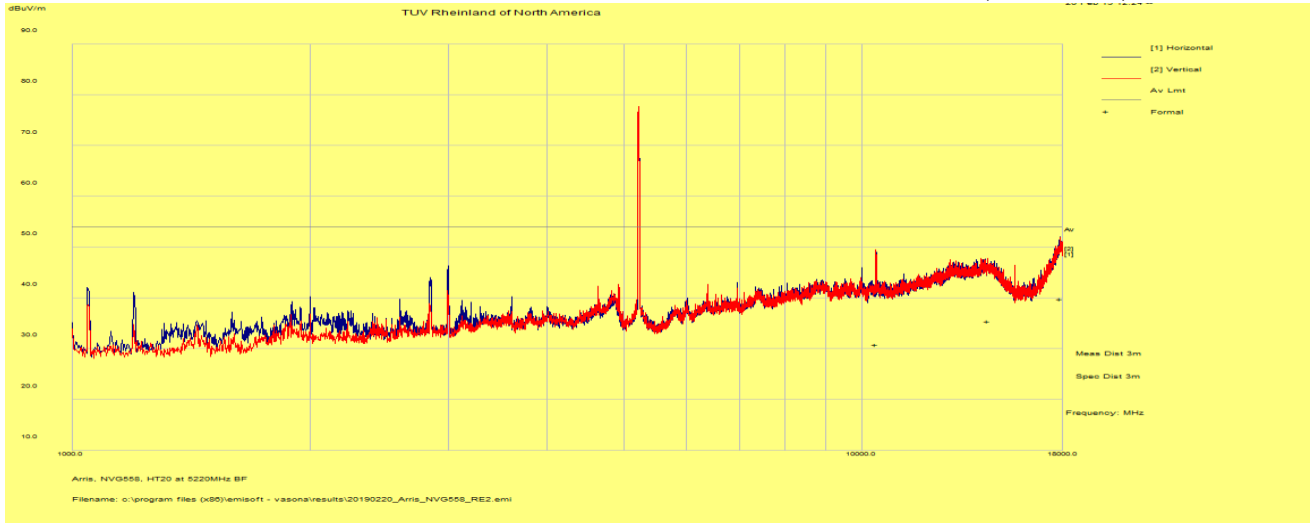
Notes: 1. All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 2. 18 GHz – 40 GHz was scanned at 1m distance.
 3. Emissions above the limit is the fundamental.

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EUT Name	Wi-Fi Module	Date	March 6, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 (4x4 Beamforming)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m - ComPower	Performed by	Kerwinn Corpus & Colton Aliff

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT20, 5220 MHz, MCS0



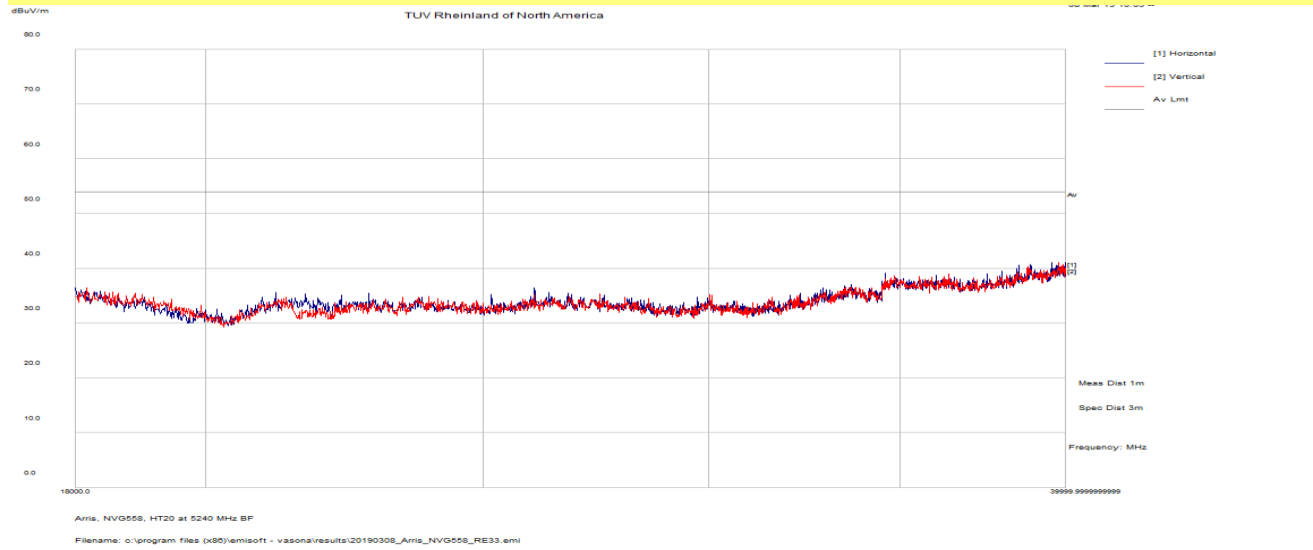
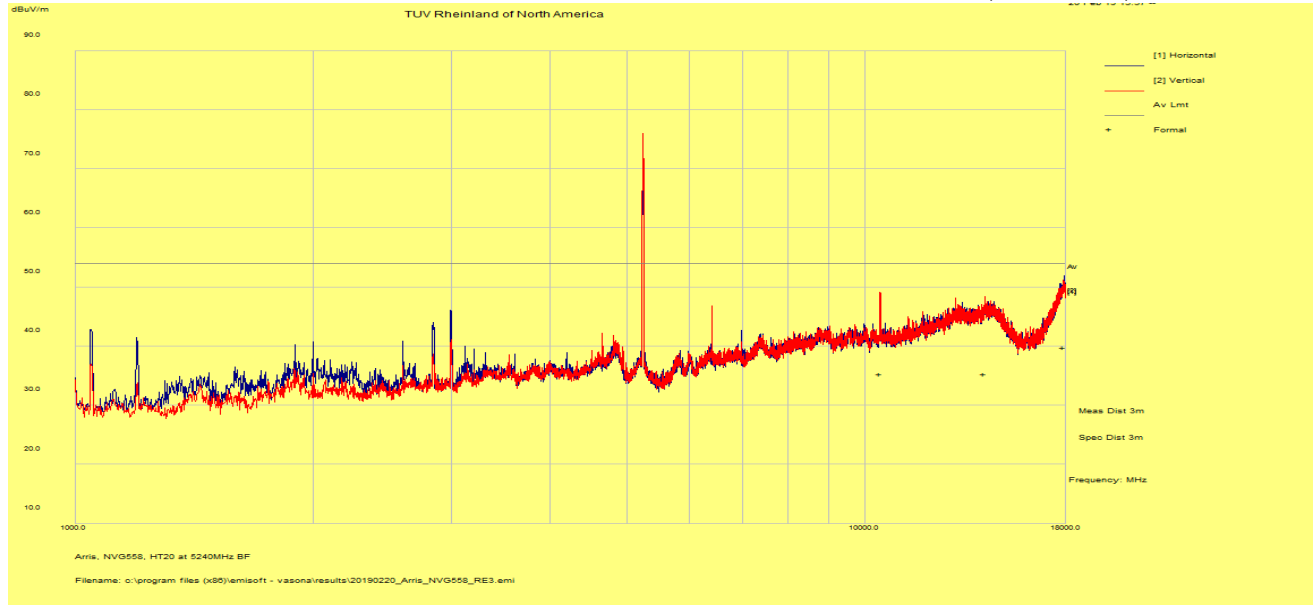
Notes: 1. All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 2. 18 GHz – 40 GHz was scanned at 1m distance.
 3. Emissions above the limit is the fundamental.

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EUT Name	Wi-Fi Module	Date	March 6, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT20 at MCS0 (4x4 Beamforming)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m - ComPower	Performed by	Kerwinn Corpus & Colton Aliff

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT20, 5240 MHz, MCS0



Notes: 1. All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 2. 18 GHz – 40 GHz was scanned at 1m distance.
 3. Emissions above the limit is the fundamental.

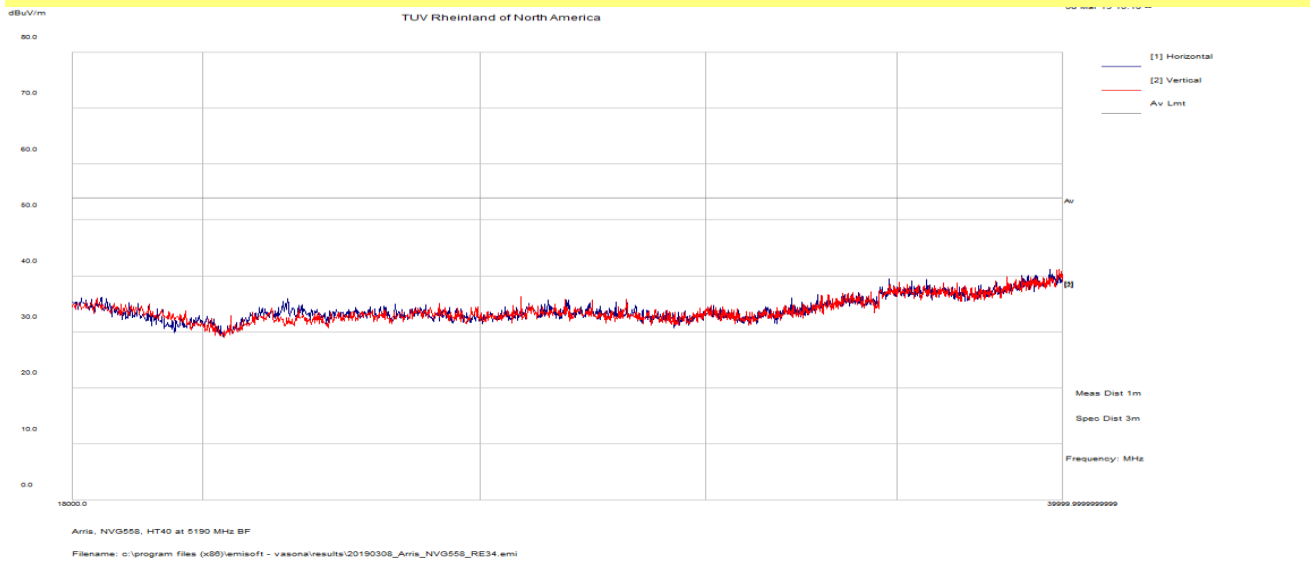
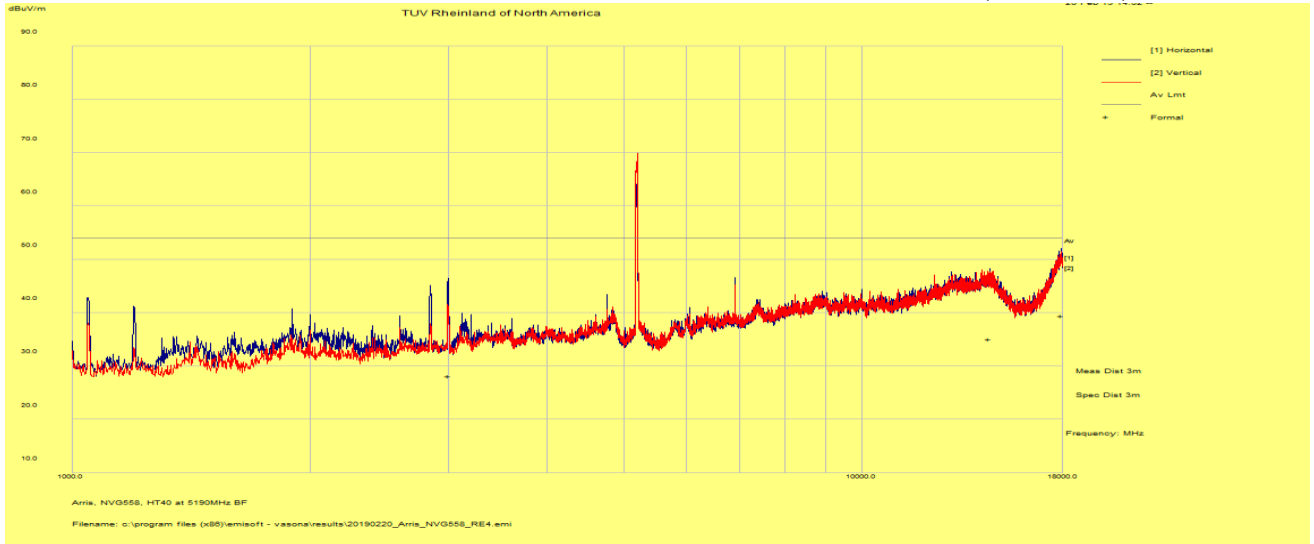
SOP 1 Radiated Emissions											Tracking # 31962243.001 Page 27 of 31	
EUT Name		Wi-Fi Module					Date		March 6, 2019			
EUT Model		NVG5X8AC					Temp / Hum in		23°C / 38%rh			
EUT Serial		M11839QW0022					Temp / Hum out		N/A			
EUT Config.		802.11n HT40 at MCS0 (4x4 Beamforming)					Line AC		120 VAC/ 60Hz			
Standard		CFR47 Part 15 Subpart C					RBW / VBW		1 MHz / 3 MHz			
Dist/Ant Used		3m – EMCO3115 / 1m - ComPower					Performed by		Kerwinn Corpus & Colton Aliff			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
Above 1 GHz Radiated Emission at 802.11n HT40, 5190 MHz, MCS0												
2995.70	52.56	2.80	-27.18	28.18	Ave	H	246	64	54.00	-25.82	Pass	
14534.37	44.37	6.27	-15.63	35.01	Ave	H	177	150	54.00	-18.99	Pass	
17939.68	40.58	6.96	-8.10	39.44	Ave	H	123	34	54.00	-14.56	Pass	
Above 1 GHz Radiated Emission at 802.11n HT40, 5230 MHz, MCS0												
17831.79	40.71	6.80	-8.12	39.39	Ave	H	138	2	54.00	-14.61	Pass	
10449.92	46.84	5.30	-19.08	33.06	Ave	V	179	44	54.00	-20.94	Pass	
15699.05	44.99	6.50	-19.39	32.10	Ave	V	265	112	54.00	-21.90	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note Worst case was observed at MCS0. All emissions met restricted band limits and less than 68.23 dBuV/m (-27 dBm eirp per CFR47 15.407 (b) and RSS 247 Sect.6.2.1.2)												

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	March 6, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 (4x4 Beamforming)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m - ComPower	Performed by	Kerwinn Corpus & Colton Aliff

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT40, 5190 MHz, MCS0



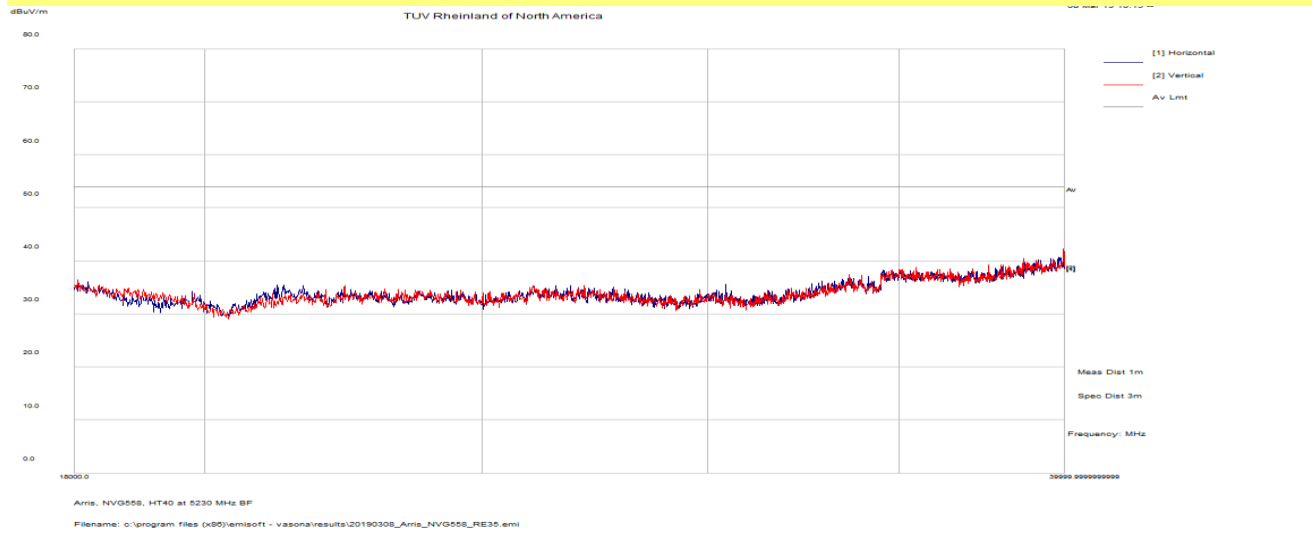
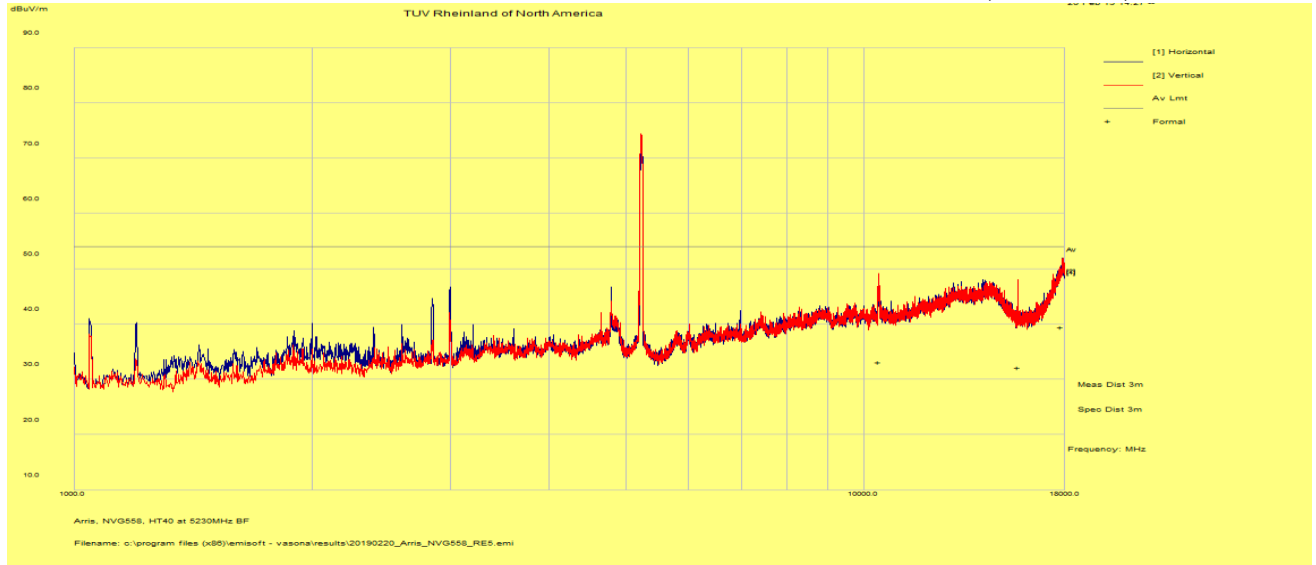
Notes: 1. All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 2. 18 GHz – 40 GHz was scanned at 1m distance.
 3. Emissions above the limit is the fundamental.

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EUT Name	Wi-Fi Module	Date	March 6, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n HT40 at MCS0 (4x4 Beamforming)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m - ComPower	Performed by	Kerwinn Corpus & Colton Aliff

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11n HT40, 5230 MHz, MCS0



Notes: 1. All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 2. 18 GHz – 40 GHz was scanned at 1m distance.
 3. Emissions above the limit is the fundamental.

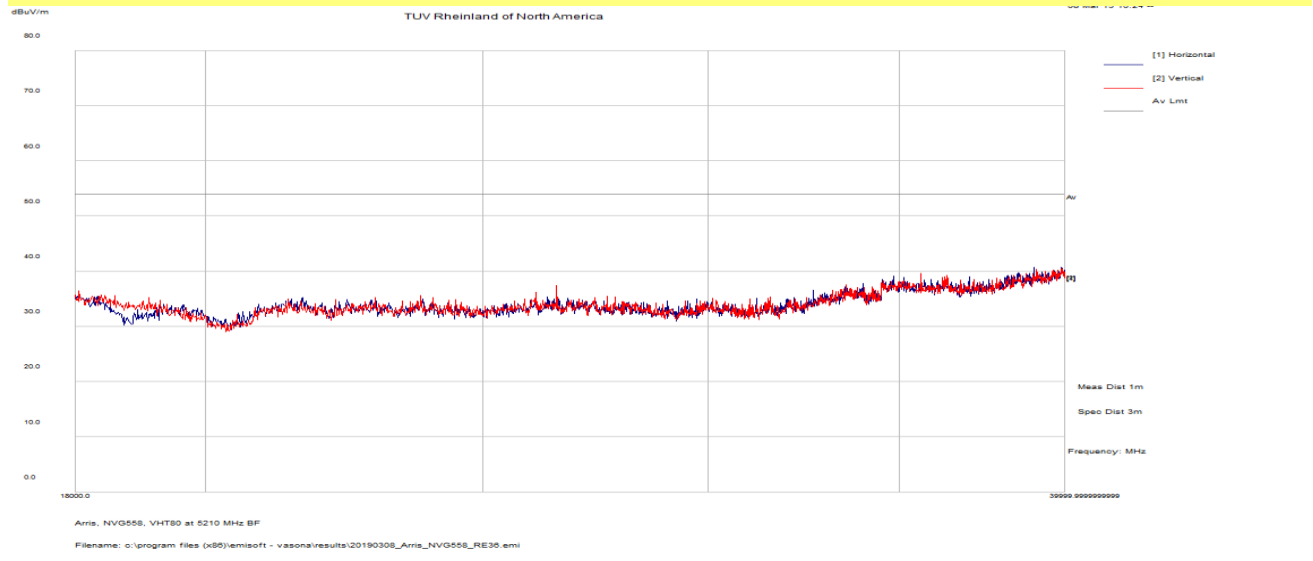
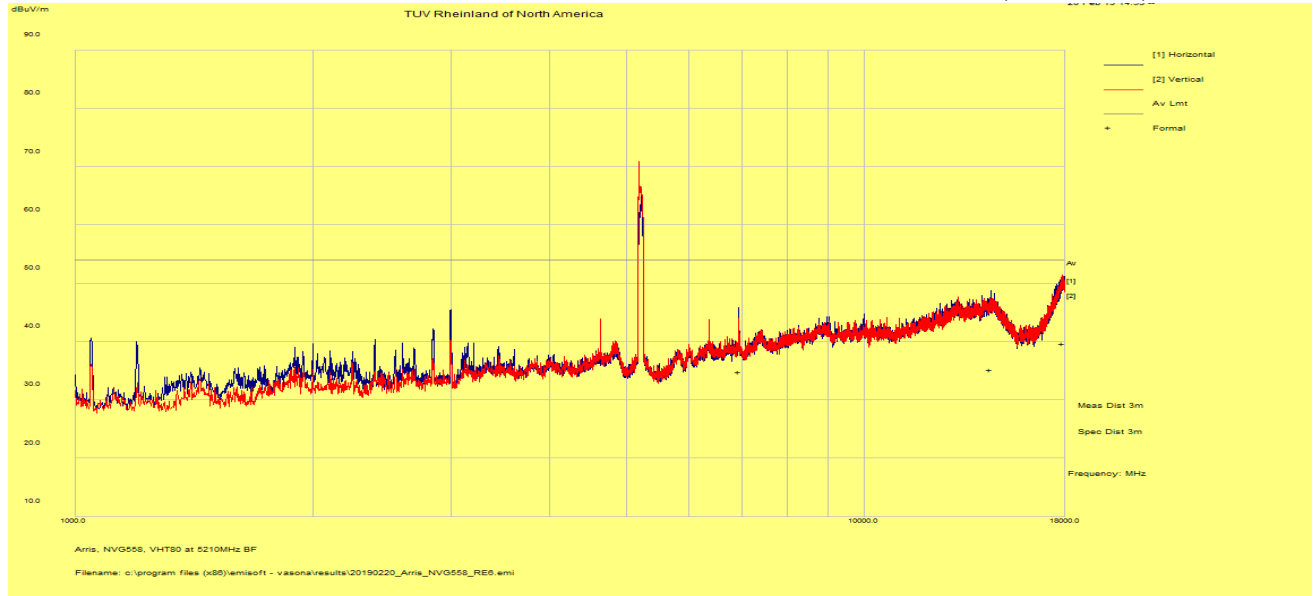
SOP 1 Radiated Emissions											Tracking # 31962243.001 Page 30 of 31	
EUT Name		Wi-Fi Module					Date		March 6, 2019			
EUT Model		NVG5X8AC					Temp / Hum in		23°C / 38%rh			
EUT Serial		M11839QW0022					Temp / Hum out		N/A			
EUT Config.		802.11ac VHT80 at MCS0 (4x4 Beamforming)					Line AC		120 VAC/ 60Hz			
Standard		CFR47 Part 15 Subpart C					RBW / VBW		1 MHz /3 MHz			
Dist/Ant Used		3m – EMCO3115 / 1m - ComPower					Performed by		Kerwinn Corpus & Colton Aliff			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result	
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
Above 1 GHz Radiated Emission at 802.11ac VHT80, 5210 MHz, MCS0												
6946.88	52.16	4.20	-21.50	34.86	Ave	H	246	260	54.00	-19.14	Pass	
14482.35	44.48	6.16	-15.45	35.20	Ave	H	122	52	54.00	-18.80	Pass	
17866.03	40.70	6.80	-7.86	39.64	Ave	V	115	114	54.00	-14.36	Pass	
Spec Margin = Level – Limit, Level = Raw + Cable + AF ± Uncertainty												
AF= Amp Gain + ANT Factor												
Combined Standard Uncertainty $u_c(y) = \pm 4.52$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence												
Note Worst case was observed at MCS0.												
All emissions met restricted band limits and less than 68.23dBuV/m (-27 dBm eirp per CFR47 15.407 (b) and RSS 247 Sect.6.2.1.2)												

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EUT Name	Wi-Fi Module	Date	March 6, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23°C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11ac VHT80 at MCS0 (4x4 Beamforming)	Line AC	120 VAC/ 60Hz
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1 MHz / 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m - ComPower	Performed by	Kerwin Corpus & Colton Aliff

Above 1 GHz Radiated Emission Plot for Transmit Mode at 802.11ac VHT80, 5210 MHz, MCS0



Notes: 1. All emission levels met restricted band limits and less than 68.23dBuV/m (-27 dBm/MHz eirp per CFR47 15.407 (b) & RSS 247 Sect.6.2.1.2).
 2. 18 GHz – 40 GHz was scanned at 1m distance.
 3. Emissions above the limit is the fundamental.

4.5 AC Conducted Emissions

Testing was performed in accordance with ANSI C63.4: 2014. These test methods are listed under the laboratory's A2LA Scope of Accreditation.

This test measures the levels emanating from the EUT's AC input port, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

The AC conducted emissions of equipment under test shall not exceed the values in CFR47 Part 15.207 and RSS GEN Sect. 8.8.

4.5.1 Test Methodology

A test program that controls instrumentation and data logging was used to automate the AC Power Line Conducted emission test procedure. The frequency range of interest was divided into sub-ranges such as to yield a frequency resolution of 9 kHz. Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a set of 50µH / 50Ω LISNs.

Testing is performed in Lab 5. The setup photographs clearly identify which site was used. The vertical ground plane used in the semi-anechoic chamber is a 2m x 2m solid aluminum frame and panel, and it is bonded to the horizontal ground plane.

In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane. Support equipment was powered from a separate LISN.

4.5.1.1 Deviations

There were no deviations from this test methodology.

4.5.2 Test Results

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

Table 15: AC Conducted Emissions – Test Results

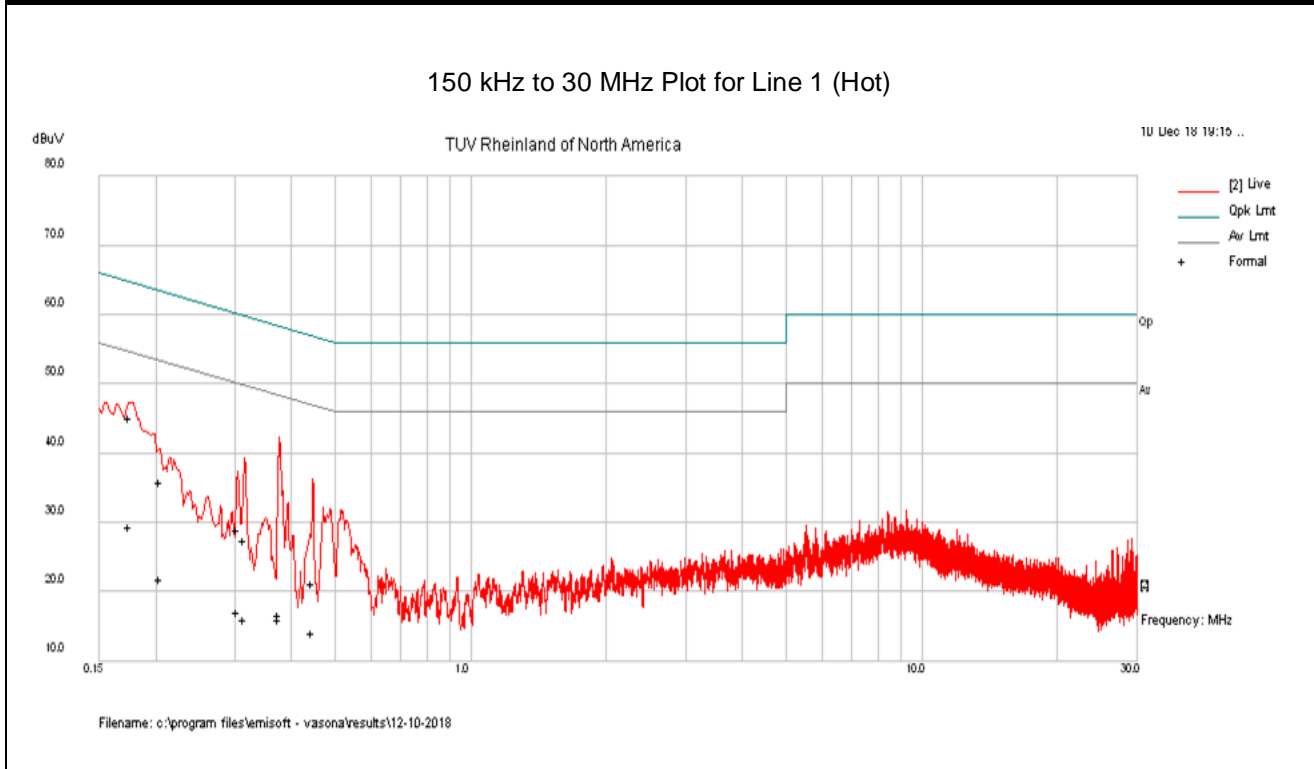
Test Date: December 10, 2018		Tested By: Abraham Avalos	
Antenna Type: Patch		Power Level: See Test Plan	
AC Power: 120 Vac/60 Hz		Configuration: Tabletop	
Ambient Temperature: 22° C		Relative Humidity: 41% RH	
Configuration	Frequency Range	Test Result	
Line 1 (Hot)	0.15 to 30 MHz	Pass	
Line 2 (Neutral)	0.15 to 30 MHz	Pass	

SOP 2 Conducted Emissions						Tracking # 31962243.001 Page 1 of 4			
EUT Name		Wi-Fi Module				Date		December 10, 2018	
EUT Model		NVG5X8AC				Temp / Hum in		22° C / 41% rh	
EUT Serial		M11839QW0022				Temp / Hum out		N/A	
EUT Config.		802.11a TX				Line AC / Freq		120Vac/60Hz	
Standard		CFR47 Part 15.207 and RSS Gen				RBW / VBW		9 kHz / 30 kHz	
Lab/LISN		Lab #5 /Com-Power, Line 1				Performed by		Abraham Avalos	
Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV			dBuV	dB	
0.174	35.21	9.82	0.05	45.08	QP	Live	64.75	-19.67	Pass
0.174	19.47	9.82	0.05	29.34	Ave	Live	54.75	-25.41	Pass
0.204	25.95	9.83	0.04	35.82	QP	Live	63.44	-27.62	Pass
0.204	11.97	9.83	0.04	21.84	Ave	Live	53.44	-31.60	Pass
0.303	19.03	9.83	0.03	28.89	QP	Live	60.15	-31.26	Pass
0.303	7.14	9.83	0.03	17.00	Ave	Live	50.15	-33.15	Pass
0.315	17.52	9.83	0.03	27.38	QP	Live	59.85	-32.47	Pass
0.315	6.07	9.83	0.03	15.93	Ave	Live	49.85	-33.92	Pass
0.376	6.06	9.84	0.03	15.93	QP	Live	58.36	-42.43	Pass
0.376	6.72	9.84	0.03	16.59	Ave	Live	48.36	-31.77	Pass
0.445	11.24	9.84	0.03	21.11	QP	Live	56.96	-35.85	Pass
0.445	4.29	9.84	0.03	14.16	Ave	Live	46.96	-32.80	Pass
Spec Margin = QP./Ave. - Limit, ± Uncertainty									
Combined Standard Uncertainty $u_c(y) = \pm 1.2$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence									
Notes: The EUT was set as the tabletop equipment.									

SOP 2 Conducted Emissions

Tracking # 31962243.001 Page 2 of 4

EUT Name	Wi-Fi Module	Date	December 10, 2018
EUT Model	NVG5X8AC	Temp / Hum in	22° C / 41% rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a TX	Line AC / Freq	120Vac/60Hz
Standard	CFR47 Part 15.207 and RSS Gen	RBW / VBW	9 kHz / 30 kHz
Lab/LISN	Lab #5 /Com-Power, Line 1	Performed by	Abraham Avalos



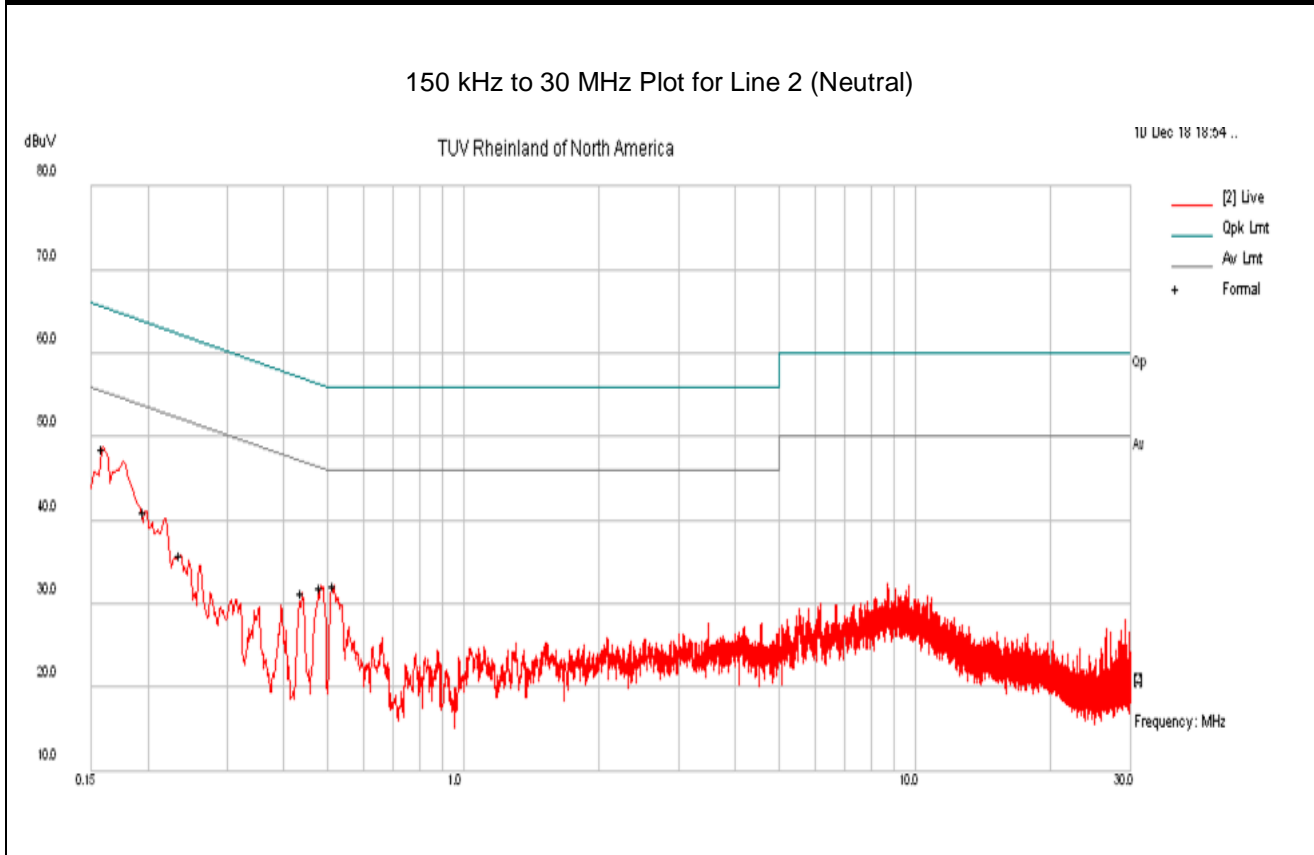
Note: Met FCC Class B limit.

SOP 2 Conducted Emissions						Tracking # 31962243.001 Page 3 of 4			
EUT Name		Wi-Fi Module			Date		December 10, 2018		
EUT Model		NVG5X8AC			Temp / Hum in		22° C / 41% rh		
EUT Serial		M11839QW0022			Temp / Hum out		N/A		
EUT Config.		802.11a TX			Line AC / Freq		120Vac/60Hz		
Standard		CFR47 Part 15.207 and RSS Gen			RBW / VBW		9 kHz / 30 kHz		
Lab/LISN		Lab #5 /Com-Power, Line 1			Performed by		Abraham Avalos		
Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV			dBuV	dB	
0.159	36.16	9.82	0.05	46.03	QP	Neutral	65.50	-19.47	Pass
0.159	18.33	9.82	0.05	28.20	Ave	Neutral	55.50	-27.30	Pass
0.197	29.74	9.83	0.04	39.60	QP	Neutral	63.75	-24.14	Pass
0.197	17.45	9.83	0.04	27.32	Ave	Neutral	53.75	-26.43	Pass
0.236	23.35	9.83	0.04	33.22	QP	Neutral	62.24	-29.02	Pass
0.236	8.27	9.83	0.04	18.14	Ave	Neutral	52.24	-34.10	Pass
0.440	18.71	9.84	0.03	28.58	QP	Neutral	57.07	-28.49	Pass
0.440	10.72	9.84	0.03	20.59	Ave	Neutral	47.07	-26.47	Pass
0.483	19.76	9.84	0.03	29.63	QP	Neutral	56.29	-26.66	Pass
0.483	11.85	9.84	0.03	21.72	Ave	Neutral	46.29	-24.57	Pass
0.518	20.13	9.84	0.03	30.00	QP	Neutral	56.00	-26.00	Pass
0.518	13.74	9.84	0.03	23.61	Ave	Neutral	46.00	-22.39	Pass
Spec Margin = QP./Ave. - Limit, ± Uncertainty									
Combined Standard Uncertainty $u_c(y) = \pm 1.2$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence									
Notes: The EUT was set as the tabletop equipment.									

SOP 2 Conducted Emissions

Tracking # 31962243.001 Page 4 of 4

EUT Name	Wi-Fi Module	Date	December 10, 2018
EUT Model	NVG5X8AC	Temp / Hum in	22° C / 41% rh
EUT Serial	P M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11a TX	Line AC / Freq	120Vac/60Hz
Standard	CFR47 Part 15.207 and RSS Gen	RBW / VBW	9 kHz / 30 kHz
Lab/LISN	Lab #5 /Com-Power, Line 1	Performed by	Abraham Avalos



Note: Met FCC Class B Limit.

4.6 Frequency Stability and Voltage Variation

In accordance with 47 CFR Part 15.407(g) and RSS GEN Sect. 6.11 the frequency stability of U-NII devices must be such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

Per 47 CFR Part 15.31 (e) intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery

4.6.1 Test Methodology

The manufacturer of the equipment is responsible for ensuring that the frequency stability is such that emissions are always maintained within the band of operation under all conditions. This test performs according to ANSI C63.10-2013 Section 6.8

4.6.2 Manufacturer Declaration

Arris International declares that the NVG5X8AC WiFi Module is compliant to CFR47 Part 15.31(e), 15.407(g) and RSS GEN Sect. 6.11 requirements. The NVG5X8AC maintains the fundamental emission within the bands of operation under all conditions of normal operation as specified in the user's manual.

5 Test Equipment List

5.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yyyy	Next Cal mm/dd/yyyy
Loop Antenna	EMCO	6502	9110-2683	07/20/2017	07/20/2019
Bilog Antenna	Sunol Sciences	JB3	A020502	03/27/2018	03/27/2020
Horn Antenna	Sunol Sciences	3115	9211-3969	05/16/2017	05/16/2019
Antenna (18-40 GHz)	Com-Power	AHA-840	105005	05/26/2017	05/26/2019
Spectrum Analyzer	Rohde & Schwarz	FSL6	100169	02/16/2019	02/16/2020
Receiver	Agilent	N9038A	MY52260210	01/16/2019	01/16/2020
Spectrum Analyzer	Agilent	N9030A	MY52350885	10/26/2018	10/26/2019
EMI Receiver	Rohde & Schwarz	ESIB40	100180	09/20/2018	09/20/2019
Spectrum Analyzer	Rohde Schwarz	FSW67	104088	06/11/2018	06/11/2019
Amplifier	Sonoma Instruments	310	185516	01/15/2019	01/15/2020
Amplifier	Miteq	TTA1800-30-HG	184252	01/15/2019	01/15/2020
Power Meter	Agilent	E4418B	MY45103902	01/17/2019	01/17/2020
Power Sensor	Hewlett Packard	8482A	US37292296	01/16/2019	01/16/2020
High Pass Filter	Wainwright	WHJE5-915.4-995-4000-6055	001	01/15/2019	01/15/2020
Notch Filter	Micro-Tronics	BRM50703	011	01/15/2019	01/15/2020
Notch Filter	Micro-Tronics	BRM50716	003	01/15/2019	01/15/2020
Signal Generator	Anritsu	MG3694A	42803	03/20/2018	03/20/2020
Signal Generator	Rohde & Schwarz	SMF100A	1167.0000K02	07/10/2018	07/10/2020
Signal Generator	Rohde & Schwarz	SMBV100A	1407.6004K02	07/10/2018	07/10/2020
Power Sensors	Rohde & Schwarz	OSP120	1520.9010.02	01/18/2018	01/18/2020

* Calibration of equipment past due for re-calibration will be performed expeditiously. If any equipment is found to be out of tolerance at that time, affected customers will be notified accordingly.

6 EMC Test Plan

6.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

6.2 Customer

Table 16: Customer Information

Company Name	ARRIS International plc
Address	310 Providence Mine Road, Ste. 200
City, State, Zip	Nevada City, CA 95959 U.S.A
Country	USA
Phone	(530) 274-5440
Fax	(530) 273-6340

Table 17: Technical Contact Information

Name	Mark Rieger
E-mail	mark.rieger@commscope.com
Phone	(530) 274-5440
Fax	(530) 273-6340

6.3 Equipment Under Test (EUT)

Table 18: EUT Specifications

EUT Specifications	
Dimensions	W: 2.875in (73mm) x D: 4.750in (121mm) x H: 1.188in (30mm)
AC Input	100-240V AC, 50 – 60 Hz
Environment	Indoor
Operating Temperature Range:	0 to 35 degrees C
Multiple Feeds:	<input type="checkbox"/> Yes and how many <input checked="" type="checkbox"/> No
Product Marketing Name (PMN)	WiFi Module
Hardware Version Identification Number (HVIN)	NVG5X8AC
Firmware Version Identification Number (FVIN)	
802.11-radio module	
Operating Mode	802.11a, 802.11n (HT20, HT40), 802.11ac (VHT20, VHT40, VHT80)
Transmitter Frequency Band	5.150 GHz – 5.250 GHz, U-NII-1 band
Max. Rated Power Output	See Channel Planning Table.
Power Setting @ Operating Channel	See Channel Planning Table.
Antenna Type	Qty 8. 4 PCB antennas at 5.18-5.24GHz. See Table 30 for details
Antenna Gain	See Section 3.4.1
Modulation Type	<input type="checkbox"/> AM <input type="checkbox"/> FM <input checked="" type="checkbox"/> DSSS <input checked="" type="checkbox"/> OFDM <input type="checkbox"/> Other describe:
Data Rate	802.11a: 4 Spatial Streams: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n HT20: 4 Spatial Streams: 26, 52, 78, 104, 156, 208, 234, 260 Mbps 802.11n HT40: 4 Spatial Streams: 54, 108, 162, 216, 324, 432, 486, 540 Mbps 802.11ac VHT20: 4 Spatial Streams: 26, 52, 78, 104, 156, 208, 234, 260, 312 Mbps 802.11ac VHT40: 4 Spatial Streams: 54, 108, 162, 216, 324, 432, 486, 540, 648, 720 Mbps 802.11ac VHT80: 4 Spatial Streams: 117, 234, 351, 468, 702, 936, 1053, 1170, 1404, 1560 Mbps

EUT Specifications	
TX/RX Chain (s)	MIMO (4x4)
Directional Gain Type	<input checked="" type="checkbox"/> Correlated <input checked="" type="checkbox"/> Beam-Forming <input type="checkbox"/> Other describe:
Type of Equipment	<input checked="" type="checkbox"/> Table Top <input type="checkbox"/> Wall-mount <input type="checkbox"/> Floor standing cabinet <input type="checkbox"/> Other:
Note: 1. All four chains will be on / transmitted at all time. 2. This report only documents the radio characteristics for 5180 – 5240 MHz; UNIII band.	

Table 19: EUT Channel Power Specifications

No.	Freq. (MHz)	Target Power Value dBm										
		Non-Beamforming Mode						Beamforming Mode				
		802.11a	802.11n HT20	802.11n HT40	802.11ac VHT20	802.11ac VHT40	802.11ac VHT80	802.11n HT20	802.11n HT40	802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
FCC Power Setting (q)												
36	5180	82	74		74			74		74		
38	5190			61		61			58		58	
40	5200	82	82		82			80		80		
42	5210						60					58
44	5220	82	82		82			80		80		
46	5230			82		82			80		80	
48	5240	96	96		96			80		80		
RSS Power Setting (q)												
36	5180	61	63		63			28		28		
38	5190			61		61			32		32	
40	5200	61	62		62			28		28		
42	5210						60					36
44	5220	61	62		62			28		28		
46	5230			69		69			32		32	
48	5240	61	62		62			28		28		
Note: The adjusted power target values are updated at the evaluated frequencies.												

Table 20: Interface Specifications

Interface Type	Cabled with what type of cable?	Is the cable shielded?	Maximum potential length of the cable?	Metallic (M), Coax (C), Fiber (F), or Not Applicable?
Ethernet	RJ45	<input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Metric: 2 m	<input type="checkbox"/> N/A

Table 21: Supported Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	Dell	Latitude	CN-0C4708-48643-62C-1856	Setup EUT operating channel
WiFi Router	Arris	NVG568	M91846P10031	Used as station for beamforming mode.
Note: None.				

Table 22: Description of Sample used for Testing

Device	Serial	RF Connection	CFR47 Part 15.407
Wi-Fi Module	M11839QW0022	PCB Antenna	TX Emission, Radiated Band-Edge Out-of-Band Emission AC Conducted Emission
	M11839QW0031	Direct Connection	Max. RMS Power, Power Spectral Density, Occupied Bandwidth Out-of-Band Emission

Table 23: Description of Test Configuration used for Radiated Measurement.

Device	Antenna	Mode	Setup Photo (X-Axis)	Setup Photo (Y-Axis)	Setup Photo (Z-Axis)
Wi-Fi Module	PCB	Transmit	N/A	EUT standing up	N/A
Note: EUT designed to operate on the upright (Y-Axis) position.					

6.4 Test Specifications

Testing requirements

Table 24: Test Specifications

Emissions and Immunity	
Rules & Regulations / Standard	Requirement
CFR 47 Part 15.407: 2018	All
RSS 247 Issue 2, 2017	All

END OF REPORT