

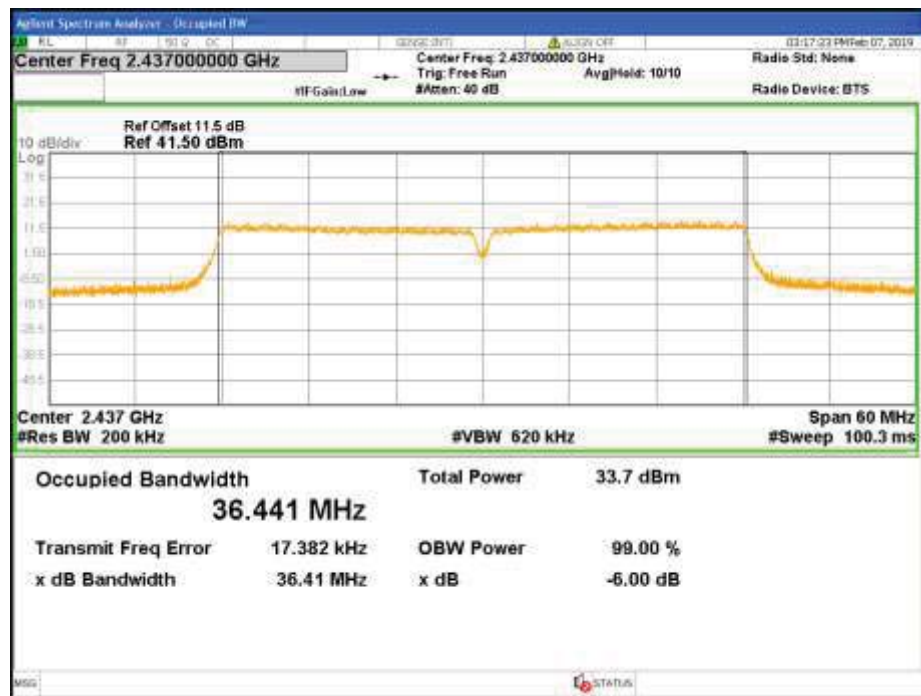


Figure 159: FCC-99%-OBW-2437MHz-HT40-1x4-q100-Ch1



Figure 160: FCC-6dB-OBW-2437MHz-HT40-1x4-q100-Ch1

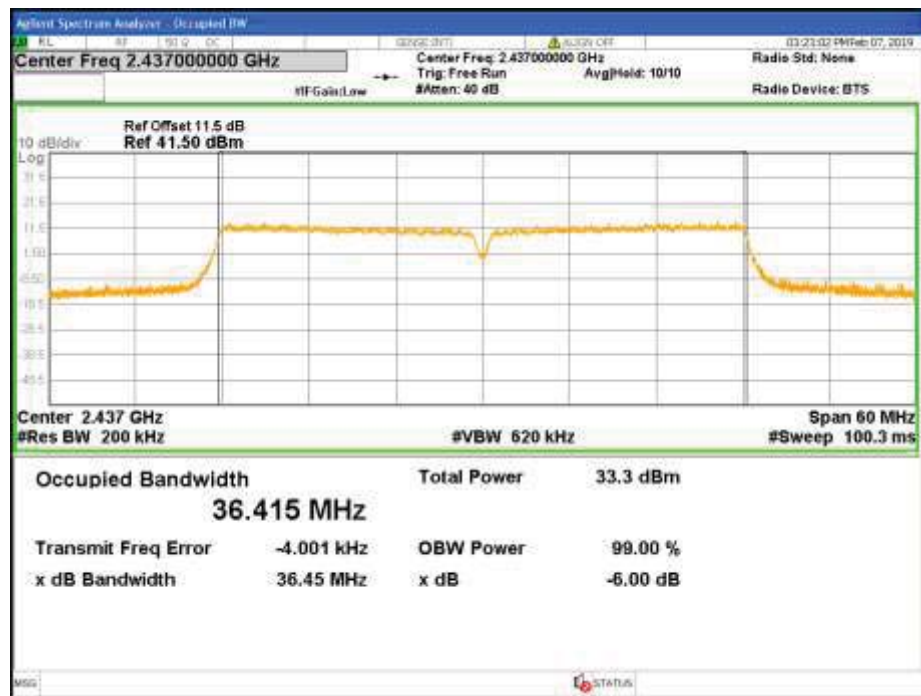


Figure 161: FCC-99%-OBW-2437MHz-HT40-1x4-q100-Ch2



Figure 162: FCC-6dB-OBW-2437MHz-HT40-1x4-q100-Ch2

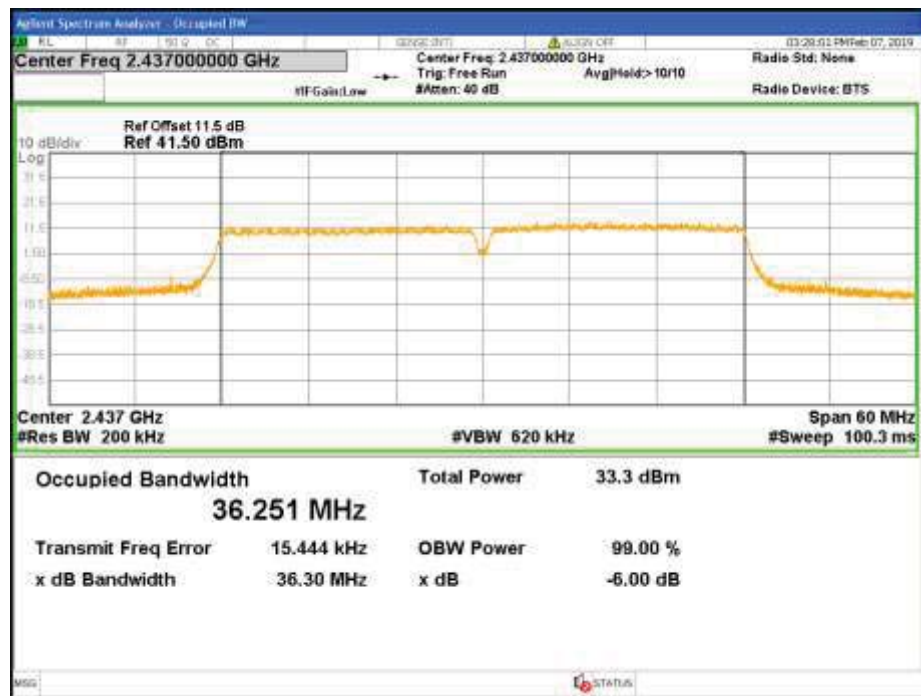


Figure 163: FCC-99%-OBW-2437MHz-HT40-1x4-q100-Ch3



Figure 164: FCC-6dB-OBW-2437MHz-HT40-1x4-q100-Ch3

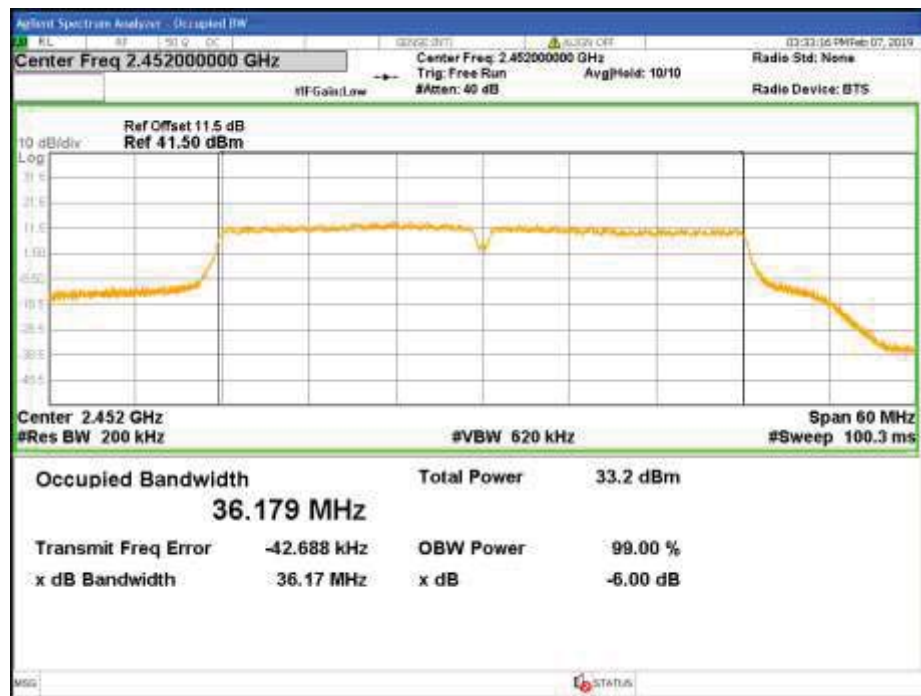


Figure 165: FCC-99%-OBW-2452MHz-HT40-1x4-q102-Ch0



Figure 166: FCC-6dB-OBW-2452MHz-HT40-1x4-q102-Ch0

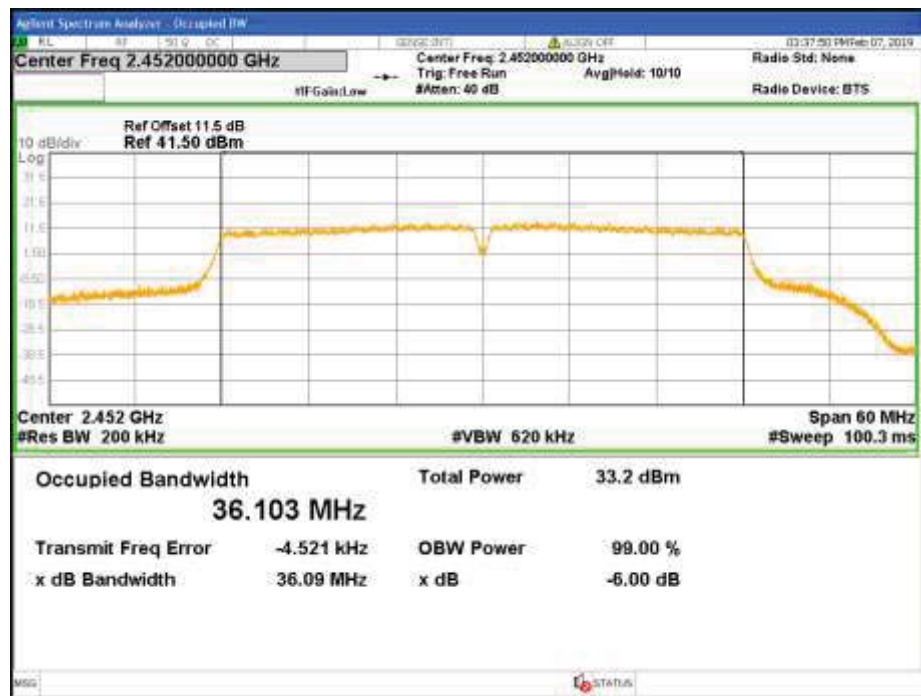


Figure 167: FCC-99%-OBW-2452MHz-HT40-1x4-q102-Ch1



Figure 168: FCC-6dB-OBW-2452MHz-HT40-1x4-q102-Ch1

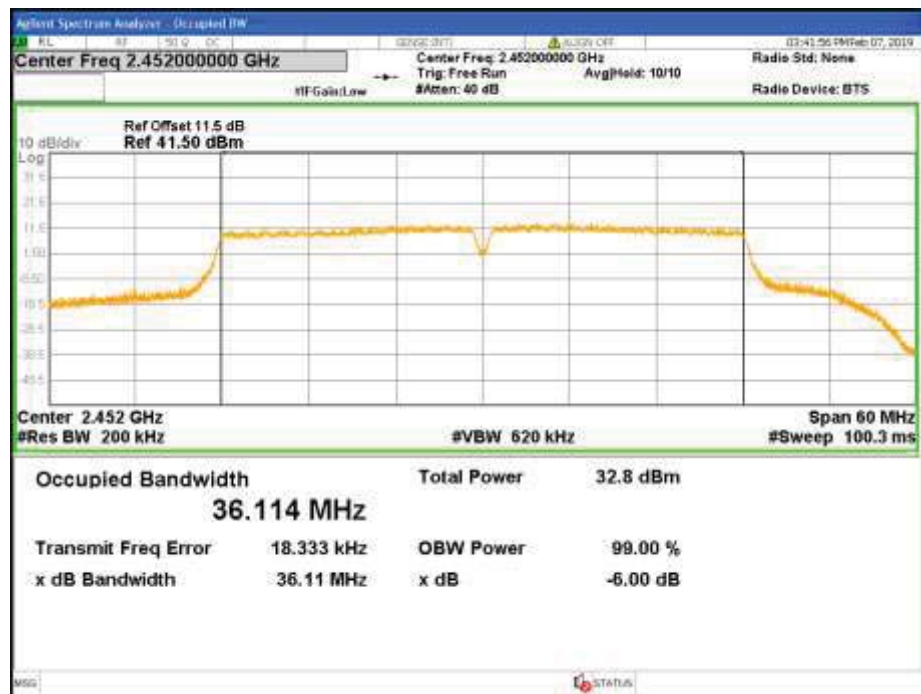


Figure 169: FCC-99%-OBW-2452MHz-HT40-1x4-q102-Ch2



Figure 170: FCC-6dB-OBW-2452MHz-HT40-1x4-q102-Ch2

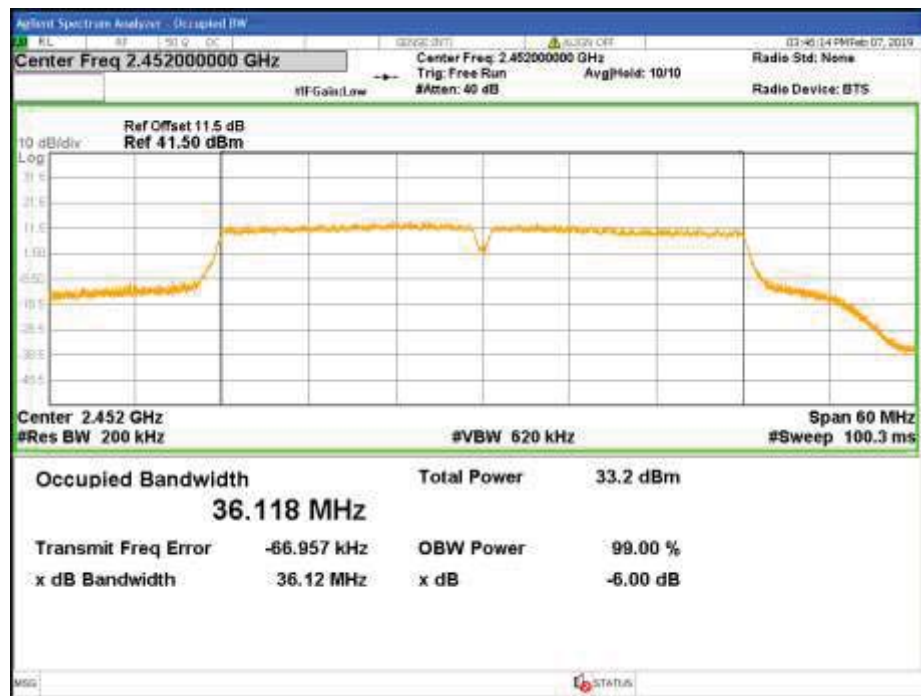


Figure 171: FCC-99%-OBW-2452MHz-HT40-1x4-q102-Ch3



Figure 172: FCC-6dB-OBW-2452MHz-HT40-1x4-q102-Ch3

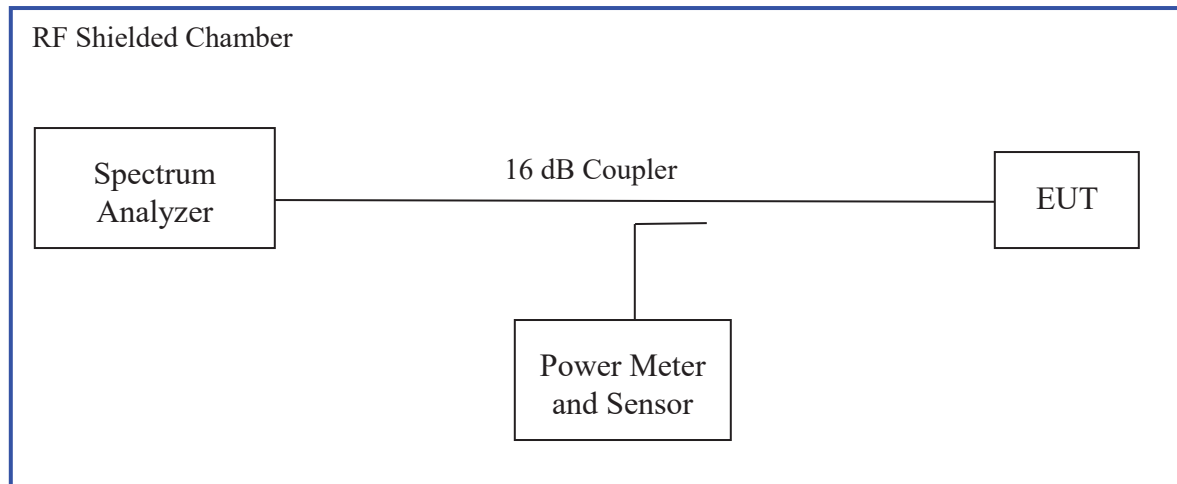
4.4 Peak Power Spectral Density

According to the CFR47 Part 15.247 (e) and RSS 247 Sect.5.2 (b), the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.4.1 Test Method

The conducted method was used to measure the channel power output per ANSI C63.10-2013 Section 11.10.3. The measurement was performed with modulation per CFR47 Part 15.247 (e) and RSS 247 Sect.5.2 (b). The pre-evaluation was performed to find the worst modes. The worst findings were conducted on 3 channels in each operating frequency range of 2400 MHz to 2483.5 MHz. The worst sample result indicated below.

Test Setup:



Method AVGSA-1 of “KDB 558074 – DTS Measurement Guidance v03r05” applies since the EUT continuously transmits with duty cycle greater than 98%. Sample detector was used.

Each chain was measured individually and applied the measure-and-sum approach per KDB662911.

4.4.2 Results

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

Table 6: Peak Power Spectral Density – Test Results – Non Beamforming

Test Date: March 21, 2019					Test By: Kerwinn Corpuz			
Test Method: Conducted Measurement					Power Setting: See test plan			
Antenna Type: PCB					Max. Antenna Gain: + 5.4 dBi			
Operating Mode: Non Beamforming & Uncorrelated					Signal State: Modulated			
Ambient Temp.: 22° C					Relative Humidity:38%			
802.11b, 1x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. PSD (RMS) [dBm]	Limit [dBm]	Margin [dB]
2412.00	9.72	9.93	9.20	8.83	0.0	9.93	23.23	-13.30
2437.00	6.55	6.85	6.53	6.86	0.0	6.86	23.23	-16.37
2462.00	2.22	2.89	2.82	3.27	0.0	3.27	23.23	-19.96
Note: 1. The highest output power was observed at 1Mbps, 1 Data Stream. 2. The new PSD Limit is 23.23 dBm, where RBW=100kHz is used. New Limit = 8dBm/3kHz + [10 log (100kHz/3kHz)] 3. Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots are placed in the report.								
802.11g, 1x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. PSD (RMS) [dBm]	Limit [dBm]	Margin [dB]
2412.00	8.02	8.60	7.90	7.31	0.0	8.60	23.23	-14.64
2437.00	6.86	7.34	6.84	6.46	0.0	7.34	23.23	-15.89
2462.00	6.08	7.69	7.19	6.05	0.0	7.69	23.23	-15.54
Note: 1. The highest output power was observed at 6Mbps, 1 Data Stream. 2. The new PSD Limit is 23.23 dBm, where RBW=100kHz is used. New Limit = 8dBm/3kHz + [10 log (100kHz/3kHz)] 3. Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots are placed in the report.								

Table 7: Peak Power Spectral Density – Test Results – Non Beamforming Continued

Test Date: March 21, 2019					Test By: Kerwinn Corpuz			
Test Method: Conducted Measurement					Power Setting: See test plan			
Antenna Type: PCB					Max. Antenna Gain: + 5.4 dBi			
Operating Mode: Non Beamforming & Uncorrelated					Signal State: Modulated			
Ambient Temp.: 22° C					Relative Humidity:38%			
802.11n-HT20, 1x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. PSD (RMS) [dBm]	Limit [dBm]	Margin [dB]
2412.00	7.08	7.61	6.97	6.52	0.0	7.61	23.23	-15.62
2437.00	6.54	6.60	6.18	6.18	0.0	6.60	23.23	-16.63
2462.00	5.50	5.82	6.10	4.52	0.0	6.10	23.23	-17.13
Note: 1. The highest output power was observed at MCS0, 1 Data Stream. 2. The new PSD Limit is 23.23 dBm, where RBW=100kHz is used. New Limit = 8dBm/3kHz + [10 log (100kHz/3kHz)] 3. Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots are placed in the report.								
802.11n-HT40, 1x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. PSD (RMS) [dBm]	Limit [dBm]	Margin [dB]
2422.00	4.36	4.38	4.68	3.95	0.25	4.68	23.23	-18.30
2437.00	3.39	3.54	3.20	3.68	0.25	3.68	23.23	-19.30
2452.00	3.59	3.56	3.25	3.77	0.25	3.77	23.23	-19.21
Note: 1. The highest output power was observed at MCS0, 1 Data Stream. 2. The new PSD Limit is 23.23 dBm, where RBW=100kHz is used. New Limit = 8dBm/3kHz + [10 log (100kHz/3kHz)] 3. Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots are placed in the report.								

Table 8: Peak Power Spectral Density – Test Results – Non Beamforming Continued

Test Date: March 21, 2019					Test By: Kerwinn Corpuz			
Test Method: Conducted Measurement					Power Setting: See test plan			
Antenna Type: PCB					Directional Antenna Gain: + 7.6 dBi			
Operating Mode: Non Beamforming & Uncorrelated					Signal State: Modulated			
Ambient Temp.: 22° C					Relative Humidity:38%			
802.11n-HT20, 4x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. PSD (RMS) [dBm]	Limit [dBm]	Margin [dB]
2412.00	3.97	4.18	4.22	3.52	0.0	10.00	21.53	-11.53
2437.00	4.28	3.60	3.15	3.49	0.0	9.67	21.53	-11.86
2462.00	3.02	3.82	3.53	2.94	0.0	9.36	21.53	-12.17
Note: 1. The highest output power was observed at MCS0, 4 Data Stream. 2. The new PSD Limit is 21.53 dBm, where RBW=100kHz is used. New Limit = 8dBm/3kHz + [10 log (100kHz/3kHz)] – (7.6dBi – 6dBi) 3. Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots are placed in the report.								
802.11n-HT40, 4x4								
Freq. (MHz)	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Max. PSD (RMS) [dBm]	Limit [dBm]	Margin [dB]
2422.00	-0.03	0.92	0.68	-0.10	0.25	6.41	21.53	-14.87
2437.00	0.12	0.23	0.36	0.31	0.25	6.28	21.53	-15.00
2452.00	0.63	0.40	-0.25	0.71	0.25	6.41	21.53	-14.87
Note: 1. The highest output power was observed at MCS0, 4 Data Stream. 2. The new PSD Limit is 21.53 dBm, where RBW=100kHz is used. New Limit = 8dBm/3kHz + [10 log (100kHz/3kHz)] – (7.6dBi – 6dBi) 3. Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots are placed in the report.								



Figure 173: FCC-PPSD-2412MHz-11b-1x4-q98-Ch0



Figure 174: FCC-PPSD-2412MHz-11b-1x4-q98-Ch1



Figure 175: FCC-PPSD-2412MHz-11b-1x4-q98-Ch2



Figure 176: FCC-PPSD-2412MHz-11b-1x4-q98-Ch3



Figure 177: FCC-PPSD-2412MHz-11g-1x4-q104-Ch1



Figure 178: FCC-PPSD-2412MHz-11g-1x4-q104-Ch2



Figure 179: FCC-PPSD-2412MHz-HT20-1x4-q100-Ch0



Figure 180: FCC-PPSD-2412MHz-HT20-1x4-q100-Ch1



Figure 181: FCC-PPSD-2422MHz-HT40-1x4-q104-Ch1

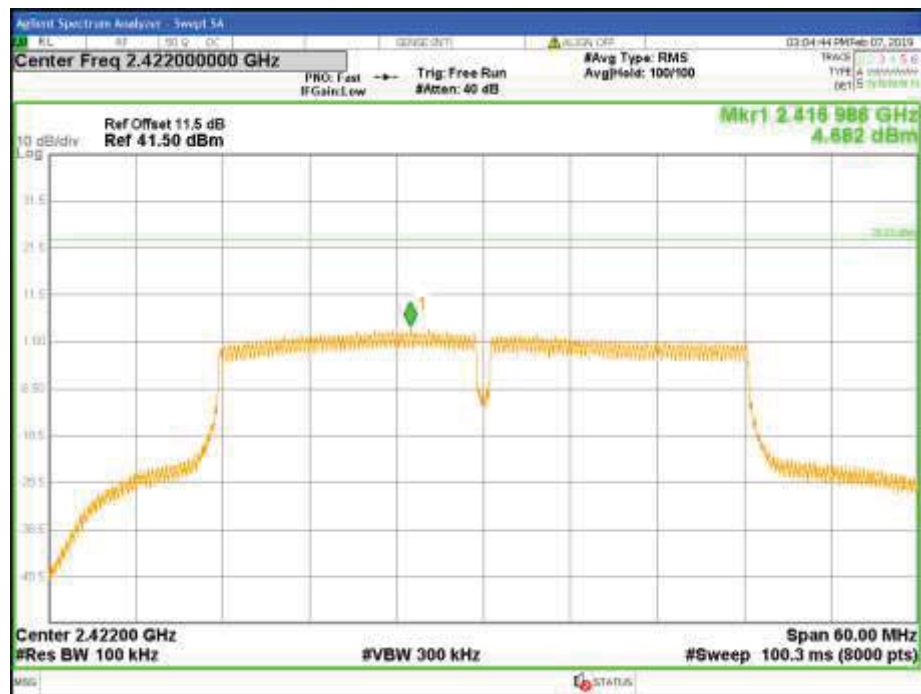


Figure 182: FCC-PPSD-2422MHz-HT40-1x4-q104-Ch2



Figure 183: FCC-PPSD-2412MHz-HT20-4x4-q87-Ch1



Figure 184: FCC-PPSD-2412MHz-HT20-4x4-q87-Ch2

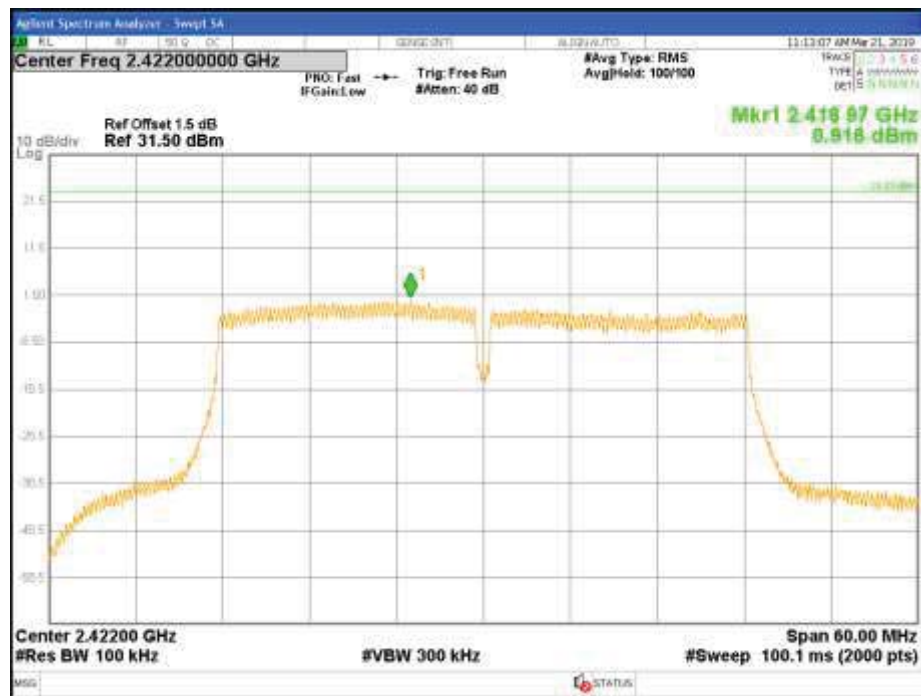


Figure 185: FCC-PPSD-2422MHz-HT40-4x4-q88-Ch1

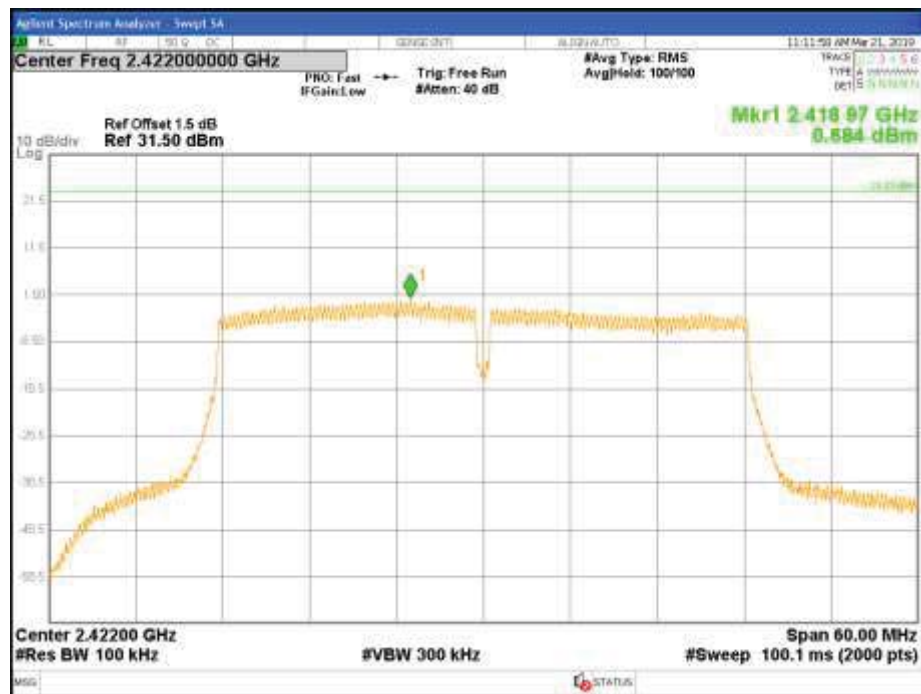


Figure 186: FCC-PPSD-2422MHz-HT40-4x4-q88-Ch2

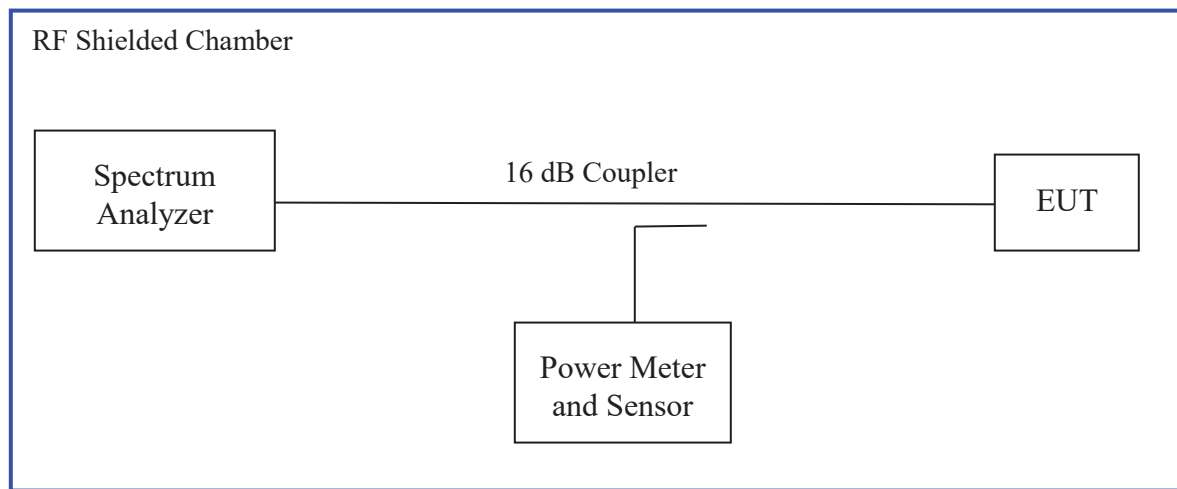
4.5 Out of Band Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmitting mode; per requirement of CFR47 15.205, 15.209, 15.247(d), RSS-247 Sect. 5.5, RSS-GEN Sect. 8.9 and 8.10.

4.5.1 Test Method

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

Test Setup:



Measurement Procedure AVG2 of KDB 662911

4.5.2 Results

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

Table 9: Emissions at the Band-Edge – Test Results – Non Beamforming

Test Date: March 21, 2019			Test By: Kerwinn Corpuz			
Test Method: Conducted Measurement			Power Setting: See test plan			
Antenna Type: PCB			Max. Antenna Gain: + 5.4 dBi			
Operating Mode: Non Beamforming & Uncorrelated			Signal State: Modulated			
Ambient Temp.: 22° C			Relative Humidity:38%			
Non-Restricted Frequency Band Emissions for 1x4						
Freq. (MHz)	Mode	Chain	Measured (dBm)	Limit (dBm)	Figure #	Results
2400	11b-1Mbps	0	-32.01	-11.73	187 & 188	Pass
2400	11b-1Mbps	1	-32.82	-11.42	--	Pass
2400	11b-1Mbps	2	-33.19	-11.79	--	Pass
2400	11b-1Mbps	3	-33.87	-11.93	--	Pass
2483.5	11b-1Mbps	0	-42.85	-18.93	--	Pass
2483.5	11b-1Mbps	1	-41.57	-18.85	189 & 190	Pass
2483.5	11b-1Mbps	2	-41.66	-18.57	--	Pass
2483.5	11b-1Mbps	3	-42.07	-18.60	--	Pass
2400	11g-6Mbps	0	-15.12	-13.53	--	Pass
2400	11g-6Mbps	1	-15.07	-13.87	191 & 192	Pass
2400	11g-6Mbps	2	-17.81	-14.94	--	Pass
2400	11g-6Mbps	3	-19.15	-14.09	--	Pass
2483.5	11g-6Mbps	0	-40.31	-15.26	193 & 194	Pass
2483.5	11g-6Mbps	1	-41.26	-15.01	--	Pass
2483.5	11g-6Mbps	2	-41.85	-14.87	--	Pass
2483.5	11g-6Mbps	3	-41.59	-16.18	--	Pass

Non-Restricted Frequency Band Emissions for 1x4 Continued						
Freq. (MHz)	Mode	Chain	Measured (dBm)	Limit (dBm)	Figure #	Results
2400	HT20-MCS0	0	-17.11	-13.80	--	Pass
2400	HT20-MCS0	1	-14.06	-13.59	195 & 196	Pass
2400	HT20-MCS0	2	-17.08	-14.25	--	Pass
2400	HT20-MCS0	3	-19.77	-14.85	--	Pass
2483.5	HT20-MCS0	0	-41.31	-15.82	--	Pass
2483.5	HT20-MCS0	1	-41.54	-15.36	--	Pass
2483.5	HT20-MCS0	2	-41.36	-15.55	--	Pass
2483.5	HT20-MCS0	3	-42.01	-16.62	197 & 198	Pass
2400	HT40-MCS0	0	-20.93	-19.25	--	Pass
2400	HT40-MCS0	1	-19.74	-18.38	199 & 200	Pass
2400	HT40-MCS0	2	-21.20	-18.81	--	Pass
2400	HT40-MCS0	3	-20.81	-18.89	--	Pass
2483.5	HT40-MCS0	0	-37.31	-16.80	--	Pass
2483.5	HT40-MCS0	1	-36.78	-16.51	201 & 202	Pass
2483.5	HT40-MCS0	2	-40.07	-17.10	--	Pass
2483.5	HT40-MCS0	3	-38.79	-16.96	--	Pass
Note: 1. The stated limits for 30 dBm are relative to each individual output per KDB 662911 Method. 2. The worst case of each data rate is recorded. 3. Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots are placed in the report.						

Table 10: Emissions at the Band-Edge – Test Results – Non Beamforming Continued

Test Date: March 21, 2019			Test By: Kerwinn Corpuz			
Test Method: Conducted Measurement			Power Setting: See test plan			
Antenna Type: PCB			Directional Antenna Gain: + 7.6 dBi			
Operating Mode: Non Beamforming & Uncorrelated			Signal State: Modulated			
Ambient Temp.: 22° C			Relative Humidity:38%			
Non-Restricted Frequency Band Emissions 4x4						
Freq. (MHz)	Mode	Chain	Measured (dBm)	Limit (dBm)	Plots	Results
2400	HT20-MCS0	0	-30.02	-17.24	--	Pass
2400	HT20-MCS0	1	-29.91	-17.82	Fig. 203, 204	Pass
2400	HT20-MCS0	2	-33.56	-18.11	--	Pass
2400	HT20-MCS0	3	-31.21	-18.35	--	Pass
2483.5	HT20-MCS0	0	-40.88	-18.10	--	Pass
2483.5	HT20-MCS0	1	-41.33	-17.74	--	Pass
2483.5	HT20-MCS0	2	-42.31	-18.05	--	Pass
2483.5	HT20-MCS0	3	-41.30	-18.56	Fig. 205, 206	Pass
2400	HT40-MCS0	0	-21.61	-19.85	--	Pass
2400	HT40-MCS0	1	-19.57	-18.92	Fig. 207, 208	Pass
2400	HT40-MCS0	2	-21.03	-19.19	--	Pass
2400	HT40-MCS0	3	-21.09	-19.81	--	Pass
2483.5	HT40-MCS0	0	-50.30	-21.45	--	Pass
2483.5	HT40-MCS0	1	-51.12	-21.67	--	Pass
2483.5	HT40-MCS0	2	-50.46	-21.97	Fig. 209, 210	Pass
2483.5	HT40-MCS0	3	-51.71	-21.14	--	Pass
Note: 1. The stated limits for 30 dBr are relative to each individual output per KDB 662911 Method. 2. The worst case of each data rate is recorded. 3. Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots are placed in the report.						

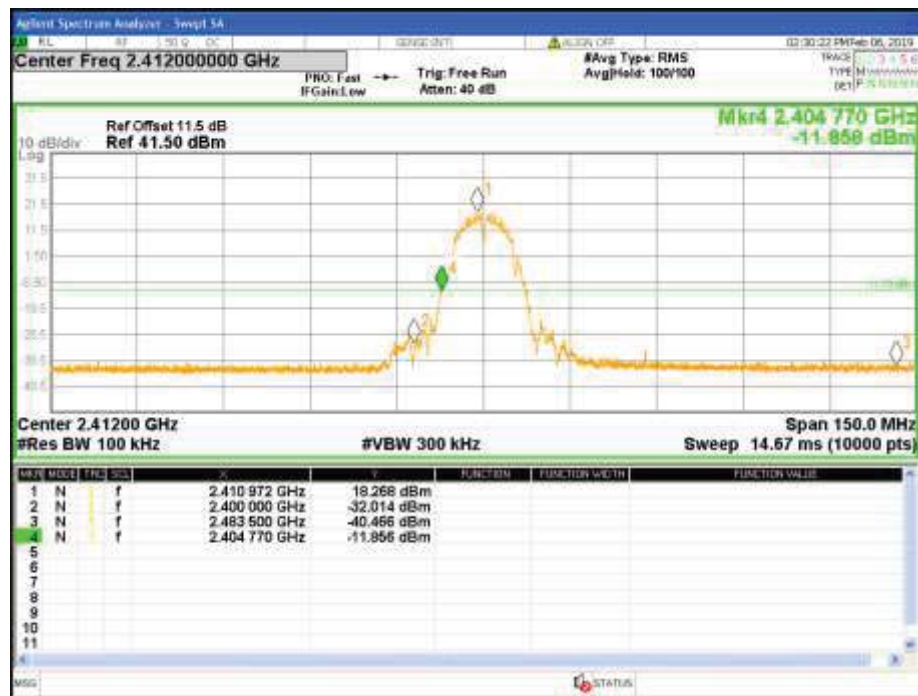


Figure 187: Measured Bandedge at 2400MHz-2412MHz-11b-1x4-Ch0

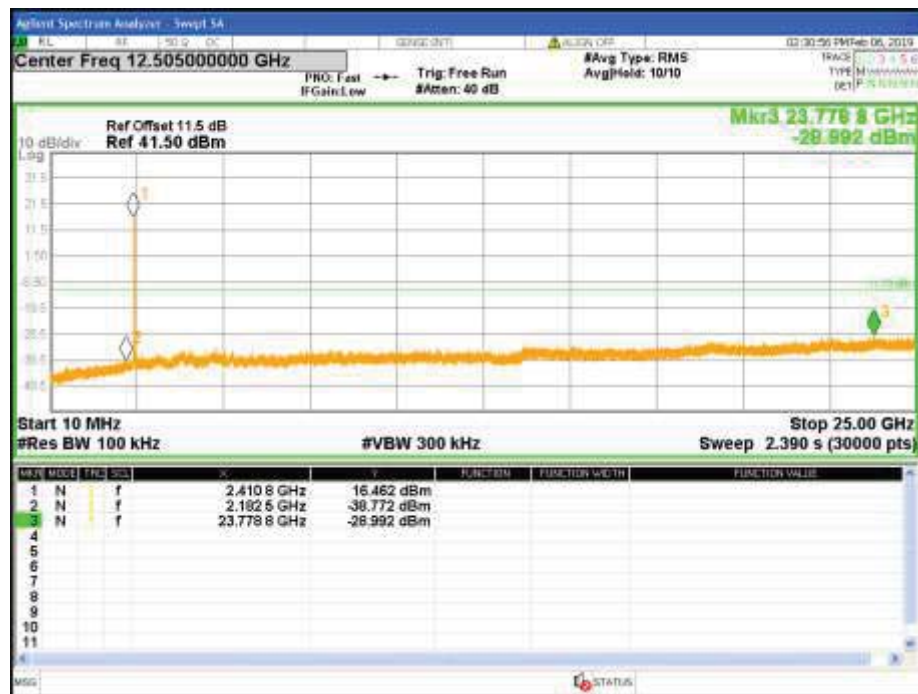


Figure 188: Out of Band Emissions-2412MHz-11b-1x4-Ch0

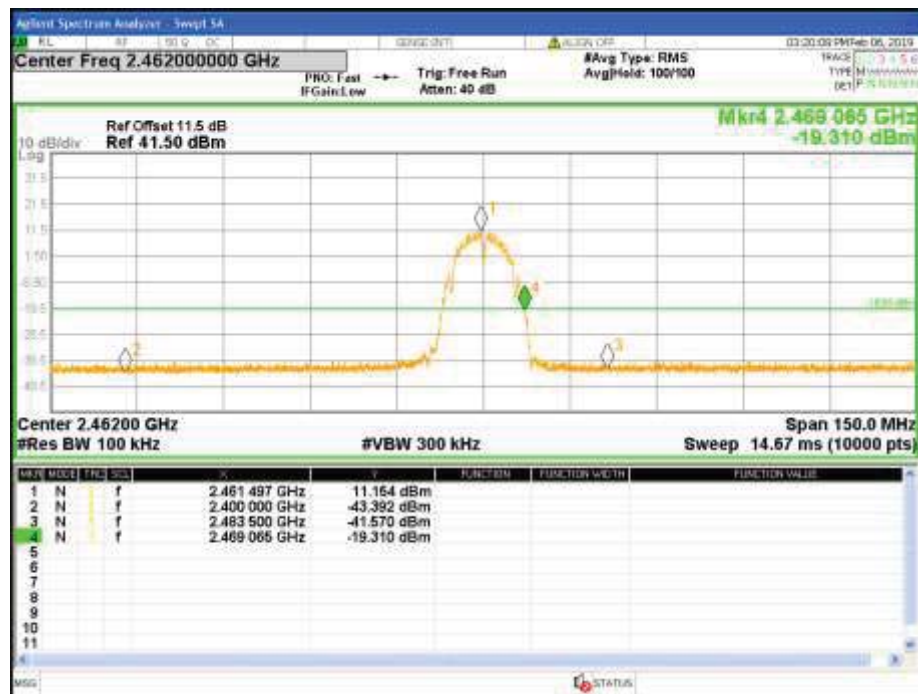


Figure 189: Measured Bandedge at 2483.5MHz-2462MHz-11b-1x4-Ch1



Figure 190: Out of Band Emissions-2462MHz-11b-1x4 -Ch1

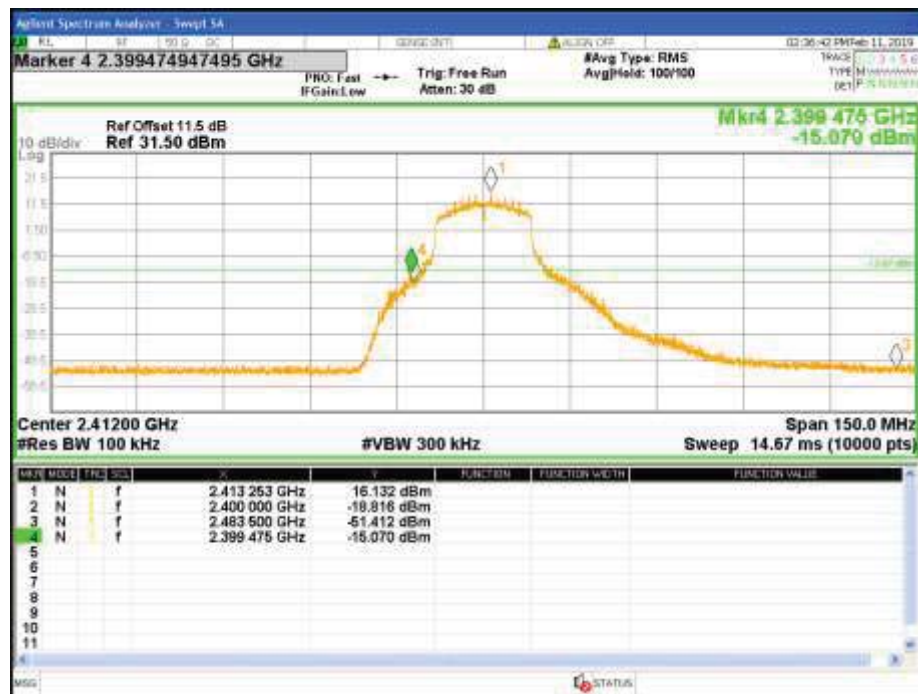


Figure 191: Measured Bandedge at 2400MHz-2412MHz-11g-1x4-Ch1

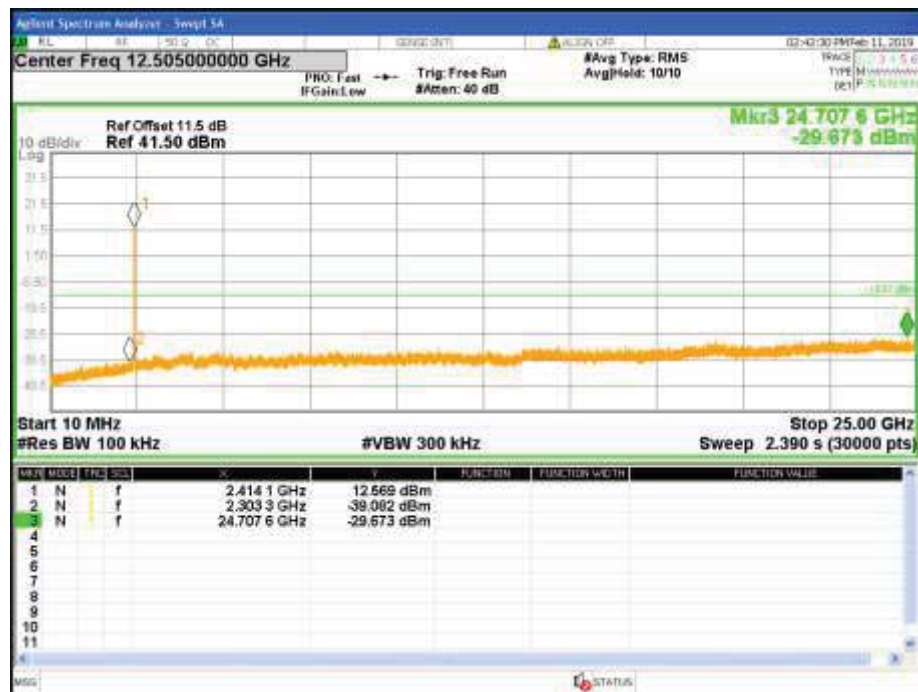


Figure 192: Out of Band Emissions-2412MHz-11g-1x4-Ch1

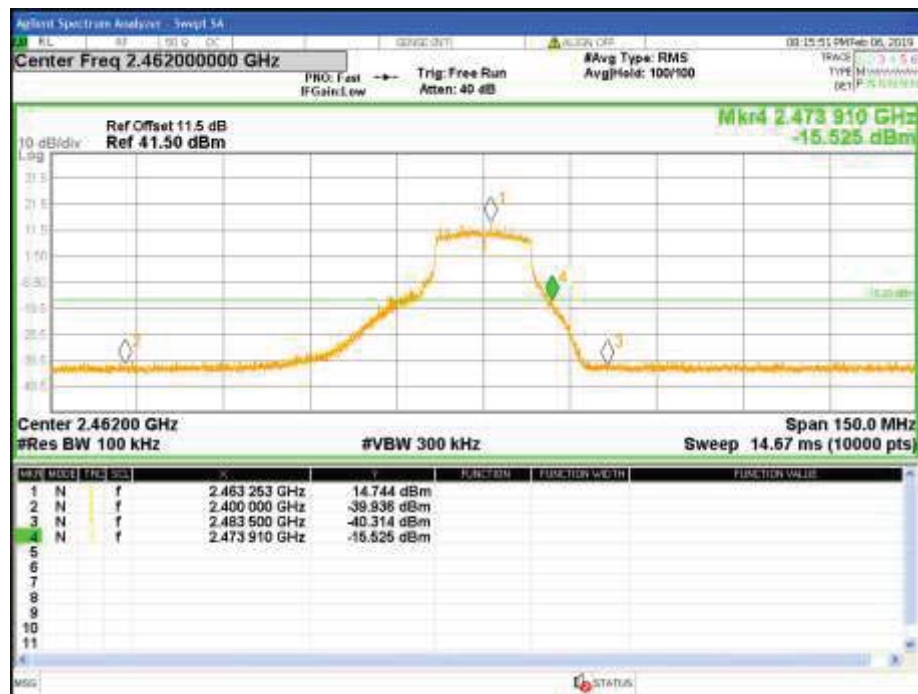


Figure 193: Measured Bandedge at 2483.5MHz-2462MHz-11g-1x4-Ch0



Figure 194: Out of Band Emissions-2462MHz-11g-1x4-Ch0

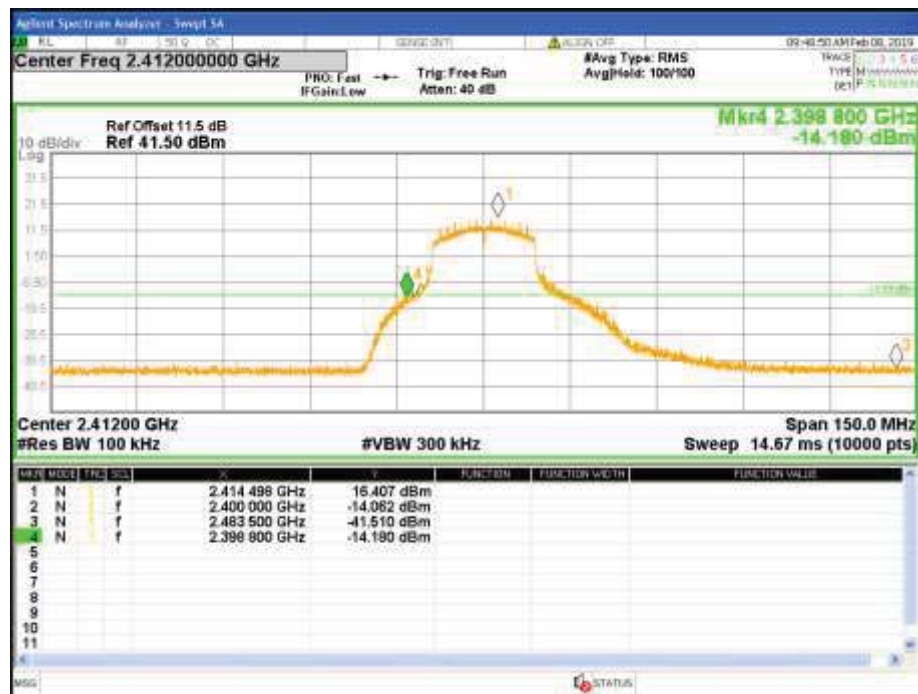


Figure 195: Measured Bandedge at 2400MHz-2412MHz-HT20-1x4- Ch1

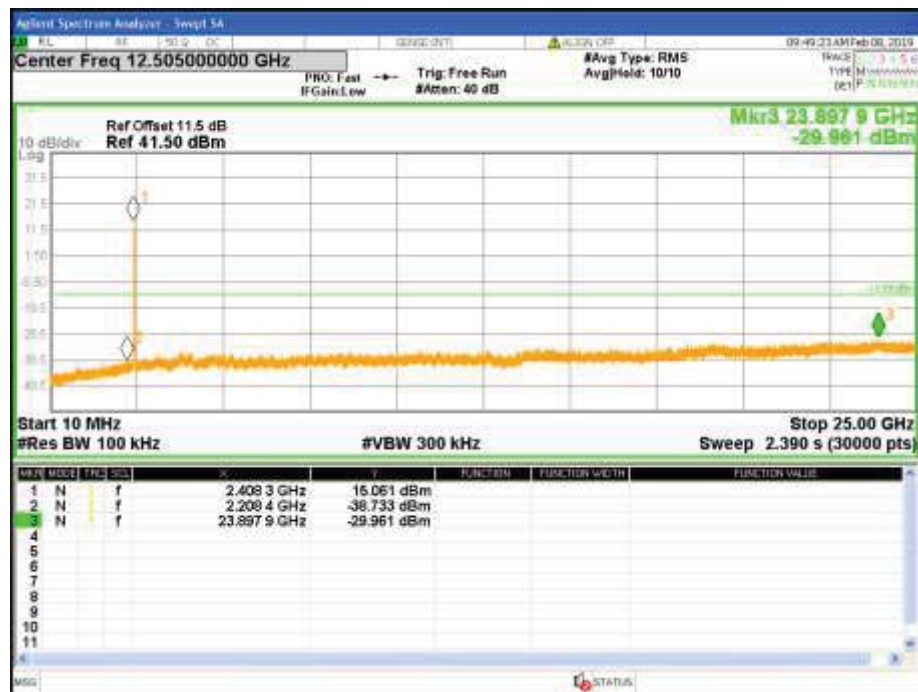


Figure 196: Out of Band Emissions-2412MHz-HT20-1x4-Ch1



Figure 197: Measured Bandedge at 2483.5MHz-2462MHz-HT20-1x4 -Ch3

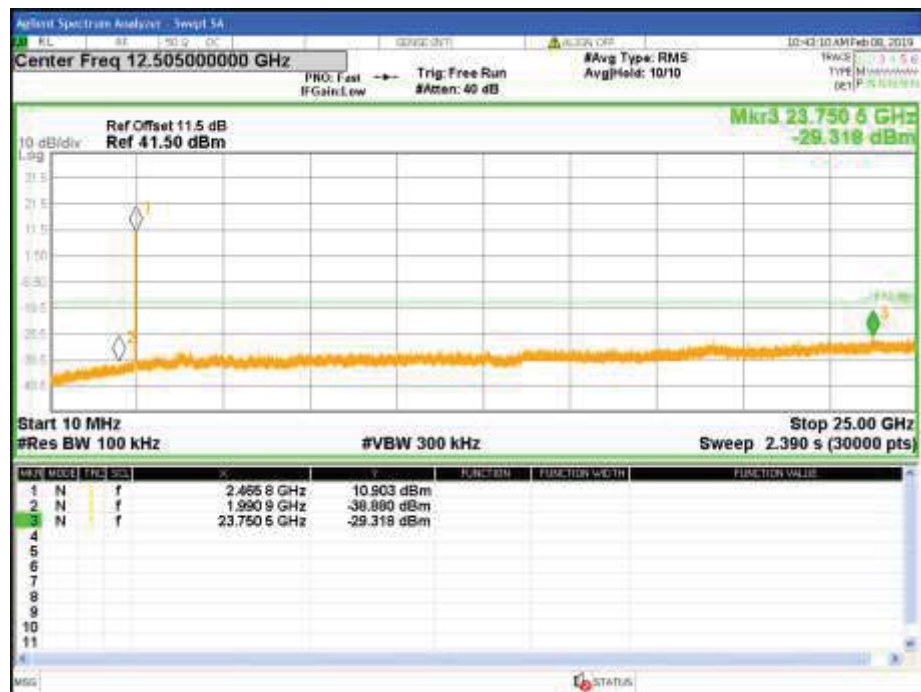


Figure 198: Out of Band Emissions-2462MHz-HT20-1x4 -Ch3

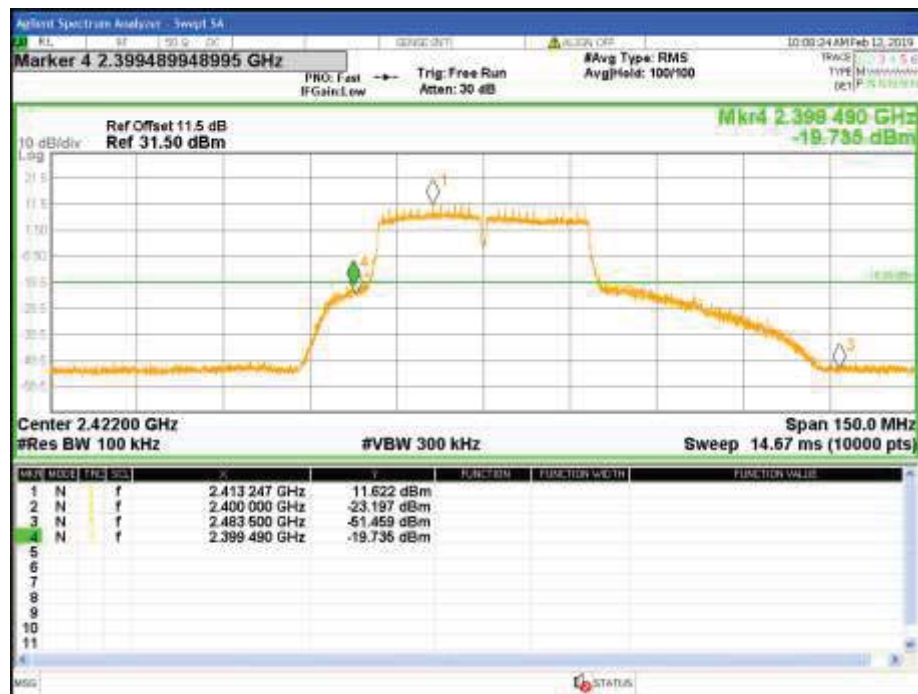


Figure 199: Measured Bandedge at 2400MHz-2422MHz-HT40-1x4-Ch1



Figure 200: Out of Band Emissions-2422MHz-HT40-1x4-Ch1



Figure 201: Measured Bandedge at 2483.5MHz-2452MHz-HT40-1x4-Ch1



Figure 202: Out of Band Emissions-2452MHz-HT40-1x4-Ch1

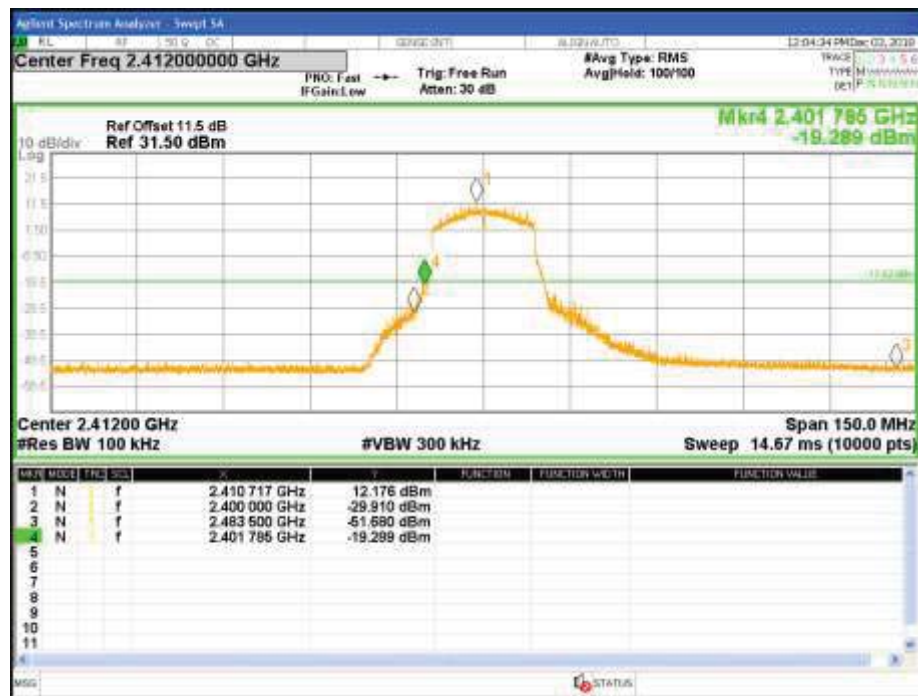


Figure 203: Measured Bandedge at 2400MHz-2412MHz-HT20-4x4-Ch1



Figure 204: Out of Band Emissions-2412MHz-HT20-4x4-Ch1

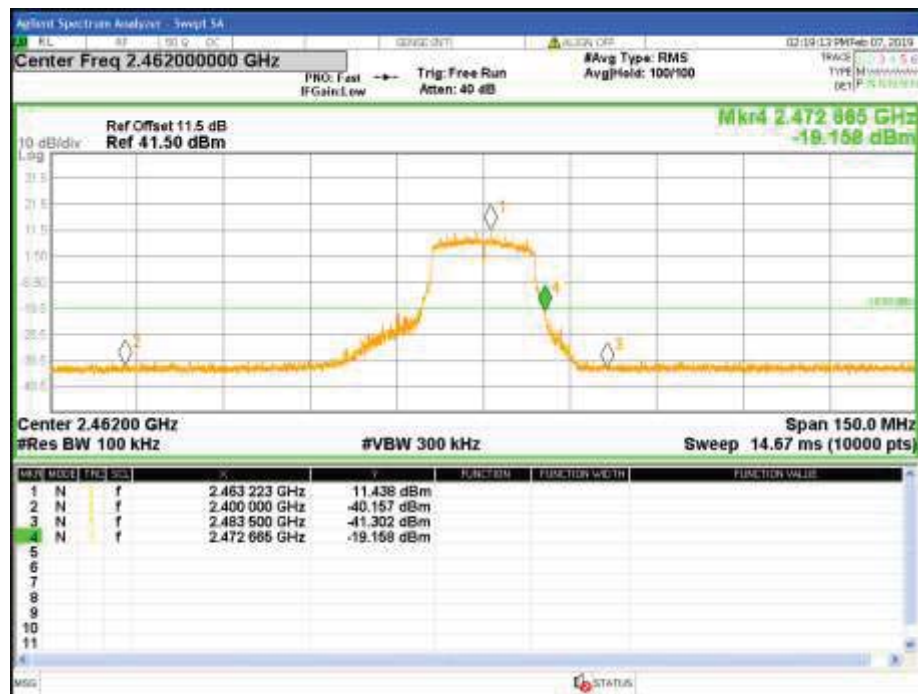


Figure 205: Measured Bandedge at 2483.5MHz-2462MHz-HT20-4x4-Ch3



Figure 206: Out of Band Emissions-2462MHz-HT20-4x4-Ch3



Figure 207: Measured Bandedge at 2400MHz-2422MHz-HT40-4x4-Ch1



Figure 208: Out of Band Emissions-2422MHz-HT40-4x4-Ch1



Figure 209: Measured Bandedge at 2483.5MHz-2452MHz-HT40-4x4-Ch2

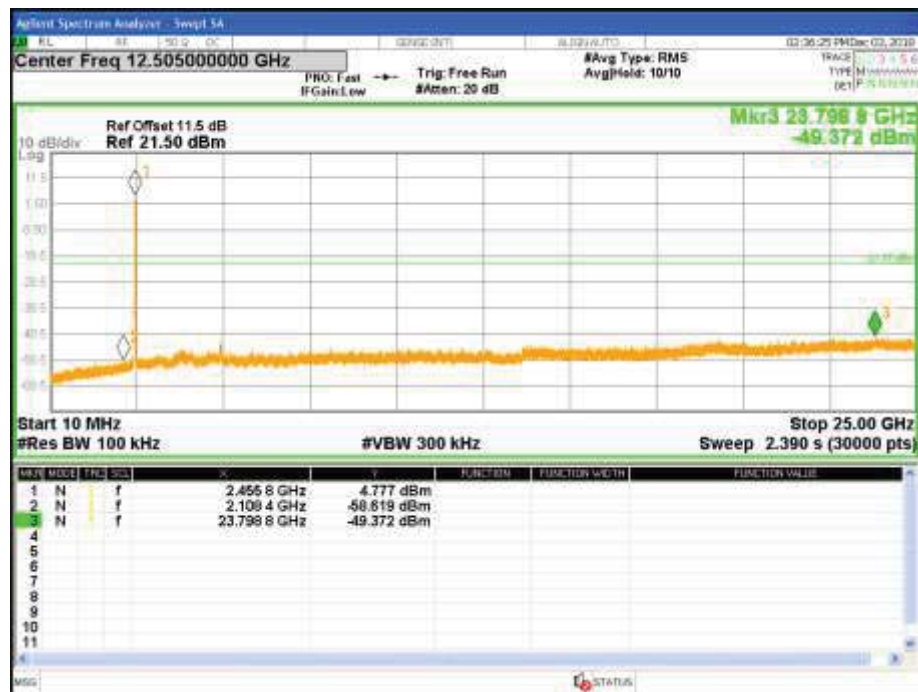


Figure 210: Out of Band Emissions-2452MHz-HT40-4x4-Ch2

4.6 Transmit 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, 15.247(d), RSS 247 Sect.5.5, RSS-GEN Sect. 8.9 and 8.10.

4.6.1 Test Methodology

4.6.1.1 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.

Pre-scans were performed to determine the worst data rate / chains for 802.11b, 802.11g and 802.11n (HT20 and HT40)

4.6.1.2 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, then the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

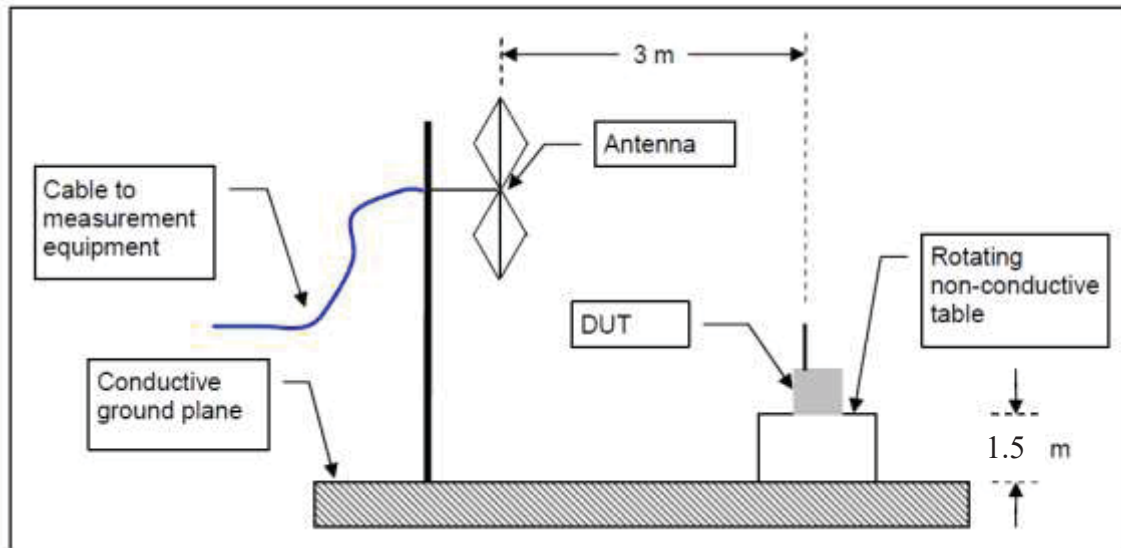
Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

Final results are: 802.11b – 1 Mbps, 802.11g – 6 Mbps, HT20 – MCS0 and HT40 – MCS0.

4.6.1.3 Deviations

None.

Test Setup:



4.6.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209 and 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

All harmonics and spurious emission which are outside of the restricted band shall be 20dB below the in-band emission.

4.6.3 Test 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 11: Transmit Spurious Emission at Band-Edge Requirements

Test Date: November 14, 2018					Test By: Jeremy Luong			
Test Method: Radiated Measurement					Power Setting: See test plan			
Antenna Type: PCB					Signal State: Modulated			
Directional Antenna Gain: + 7.6 dBi					Max. Antenna Gain: + 5.4 dBi			
Ambient Temp.: 21° C					Relative Humidity:43%			
Band-Edge Results								
Freq. (MHz)	Level (dBuV/m)	Pol. (H/V)	Limit (dBuV/m)	Margin (dB)	Det.	Table Deg.	Tower (cm)	Note
2390.0	70.56	H	74	-3.44	Pk	298	202	Fig. 211: 11b-1Mbps-2412MHz-q104
2390.0	51.54	H	54	-2.46	Ave	298	202	Fig. 212: 11b-1Mbps-2412MHz-q104
2390.0	64.48	V	74	-9.52	Pk	292	164	Fig. 213: 11b-1Mbps-2412MHz-q104
2390.0	50.81	V	54	-3.19	Ave	292	164	Fig. 214: 11b-1Mbps-2412MHz-q104
2483.5	64.91	H	74	-9.09	Pk	295	120	Fig. 215: 11b-1Mbps-2462MHz-q125
2483.5	50.79	H	54	-3.21	Ave	295	120	Fig. 216: 11b-1Mbps-2462MHz-q125
2483.5	64.55	V	74	-9.45	Pk	295	178	Fig. 217: 11b-1Mbps-2462MHz-q125
2483.5	50.68	V	54	-3.32	Ave	295	178	Fig. 218: 11b-1Mbps-2462MHz-q125
2390.0	70.57	V	74	-3.43	Pk	345	217	Fig. 219: 11g-6Mbps-2412MHz-q125
2390.0	52.62	V	54	-1.38	Ave	345	217	Fig. 220: 11g-6Mbps-2412MHz-q125
2390.0	70.15	H	74	-3.85	Pk	244	267	Fig. 221: 11g-6Mbps-2412MHz-q125
2390.0	53.09	H	54	-0.91	Ave	244	267	Fig. 222: 11g-6Mbps-2412MHz-q125
2483.5	69.25	H	74	-4.75	Pk	221	294	Fig. 223: 11g-6Mbps-2462MHz-q125
2483.5	53.67	H	54	-0.33	Ave	221	294	Fig. 224: 11g-6Mbps-2462MHz-q125
2483.5	67.82	V	74	-6.18	Pk	353	302	Fig. 225: 11g-6Mbps-2462MHz-q125
2483.5	53.16	V	54	-0.84	Ave	353	302	Fig. 226: 11g-6Mbps-2462MHz-q125
2390.0	67.03	V	74	-6.97	Pk	342	282	Fig. 227: HT40-MCS0-2422MHz-q100
2390.0	52.97	V	54	-1.03	Ave	342	282	Fig. 228: HT40-MCS0-2422MHz-q100
2390.0	65.75	H	74	-8.25	Pk	57	197	Fig. 229: HT40-MCS0-2422MHz-q100
2390.0	51.97	H	54	-2.03	Ave	57	197	Fig. 230: HT40-MCS0-2422MHz-q100
2483.5	66.99	H	74	-7.01	Pk	300	170	Fig. 231: HT40-MCS0-2452MHz-q100
2483.5	52.39	H	54	-1.61	Ave	300	170	Fig. 232: HT40-MCS0-2452MHz-q100
2483.5	65.30	V	74	-8.70	Pk	179	175	Fig. 233: HT40-MCS0-2452MHz-q100
2483.5	50.98	V	54	-3.02	Ave	179	175	Fig. 234: HT40-MCS0-2452MHz-q100
Note: 1. 802.11g is worst case for 20MHz channel and covers HT20. 2. The emissions were measured at the adjacent restricted band of the fundamental signal. 3. All the band-edge measurements met the restricted band requirements of CFR47 15.205. 4. Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report, Highlighted Plots are placed in the report.								

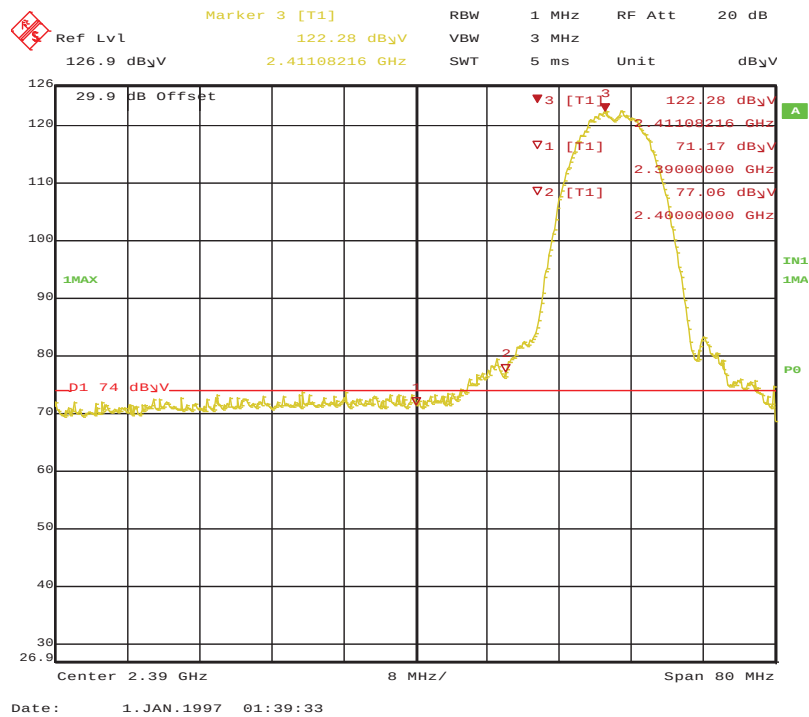


Figure 211: 11b Radiated Emission at the Edge of 2390 MHz Horz-Pk

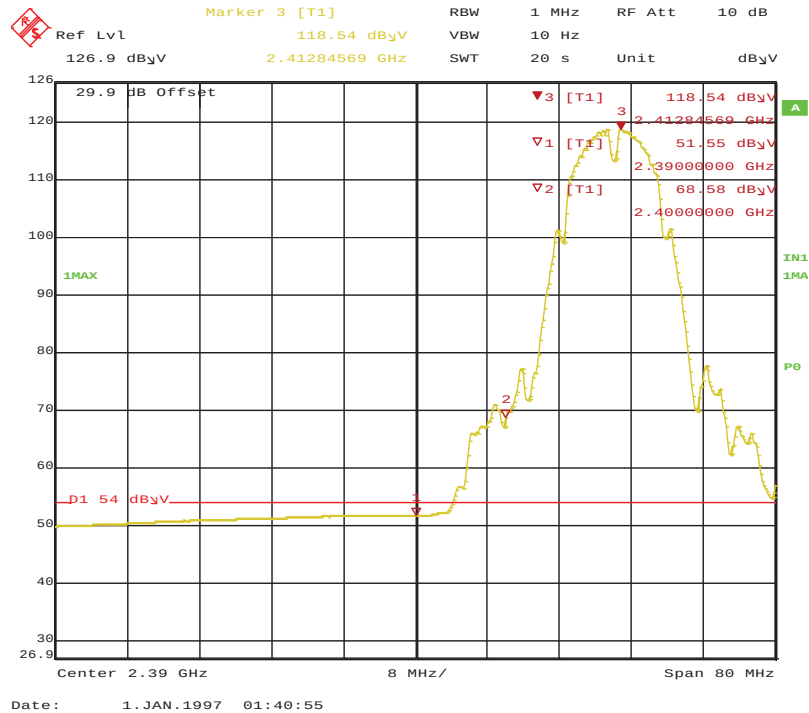


Figure 212: 11b Radiated Emission at the Edge of 2390 MHz Horz-Ave

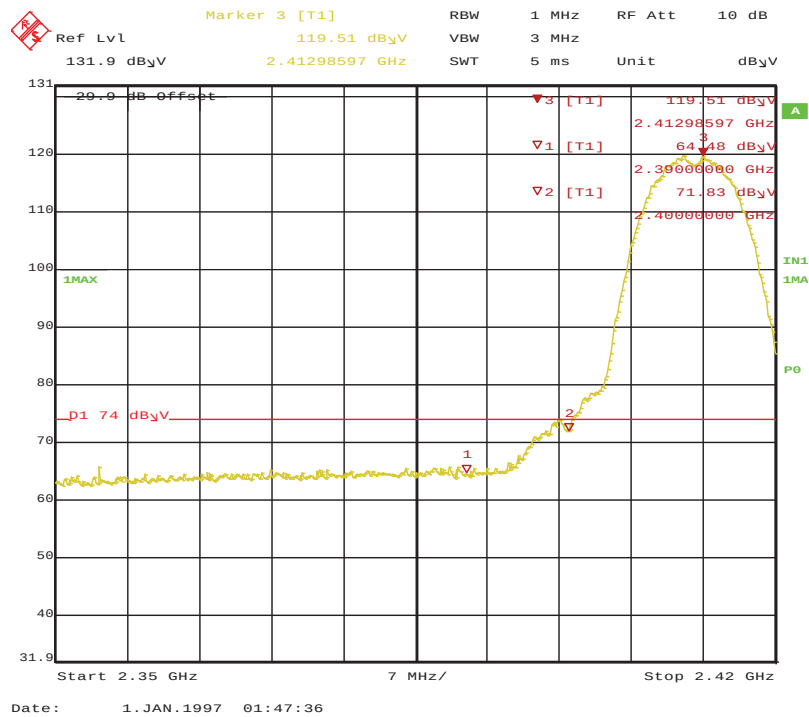


Figure 213: 11b Radiated Emission at the Edge of 2390 MHz Vert-Pk

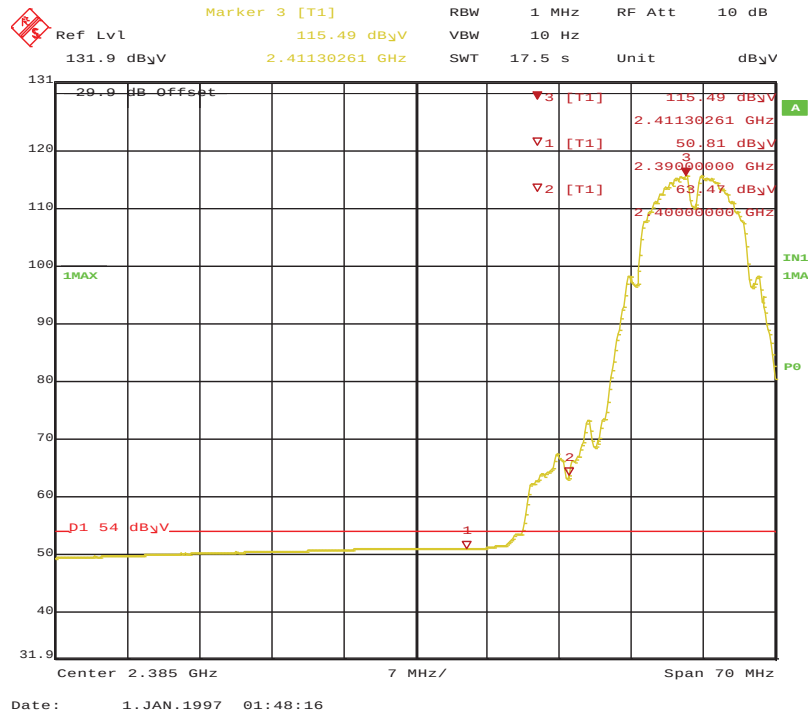


Figure 214: 11b Radiated Emission at the Edge of 2390 MHz Vert-Ave

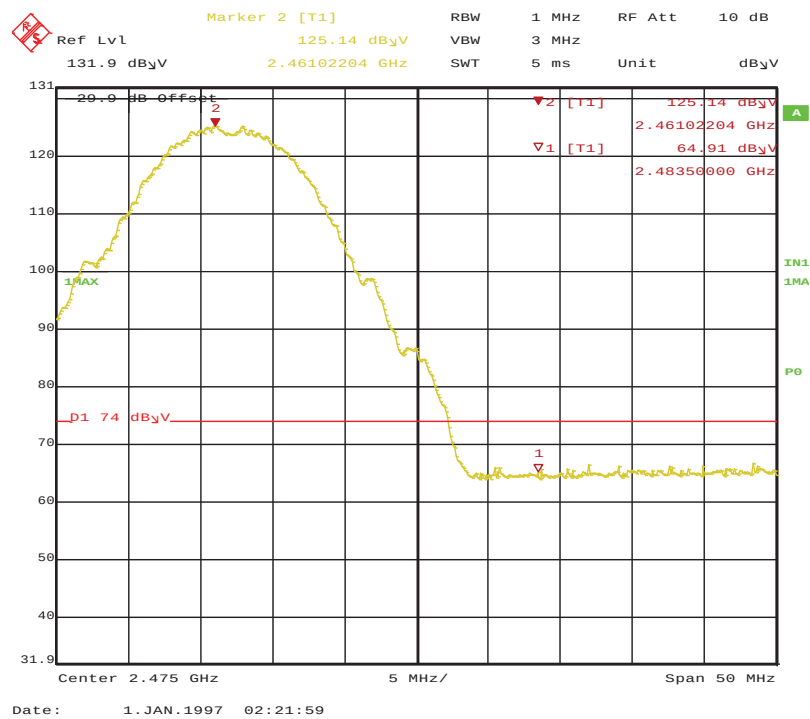


Figure 215: 11b Radiated Emission at the Edge of 2483.5 MHz Horz-Pk

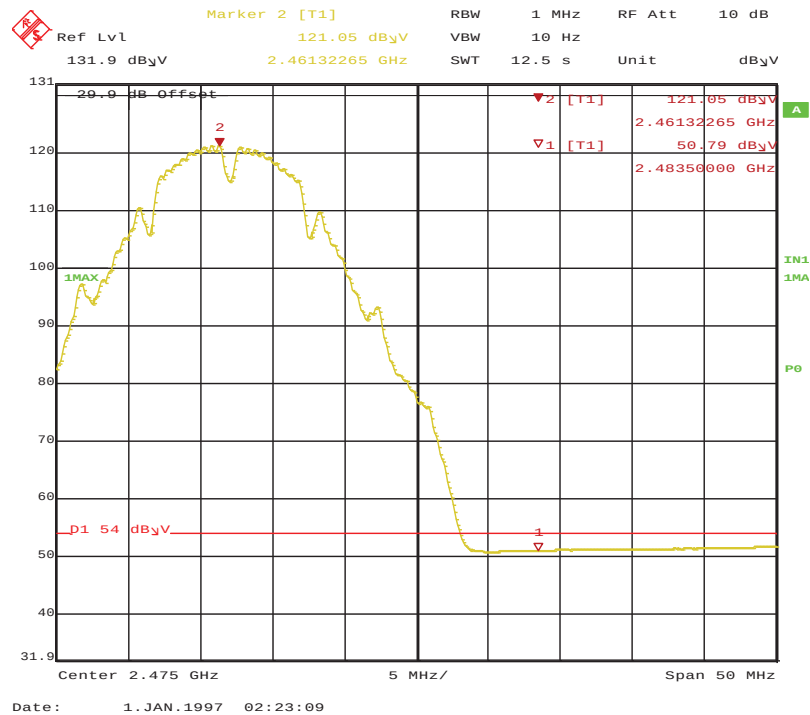


Figure 216: 11b Radiated Emission at the Edge of 2483.5 MHz Horz-Ave

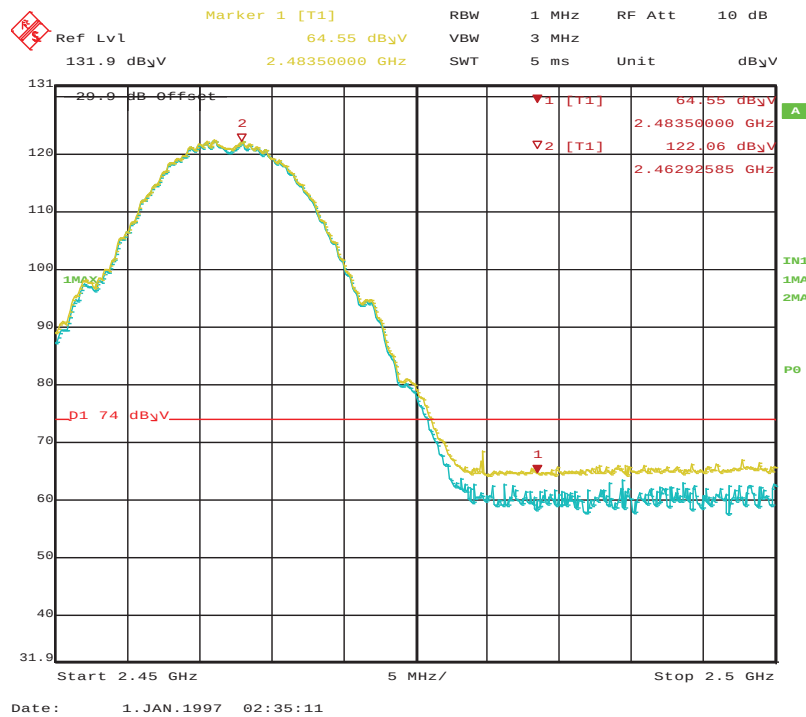


Figure 217: 11b Radiated Emission at the Edge of 2483.5 MHz Vert-Pk

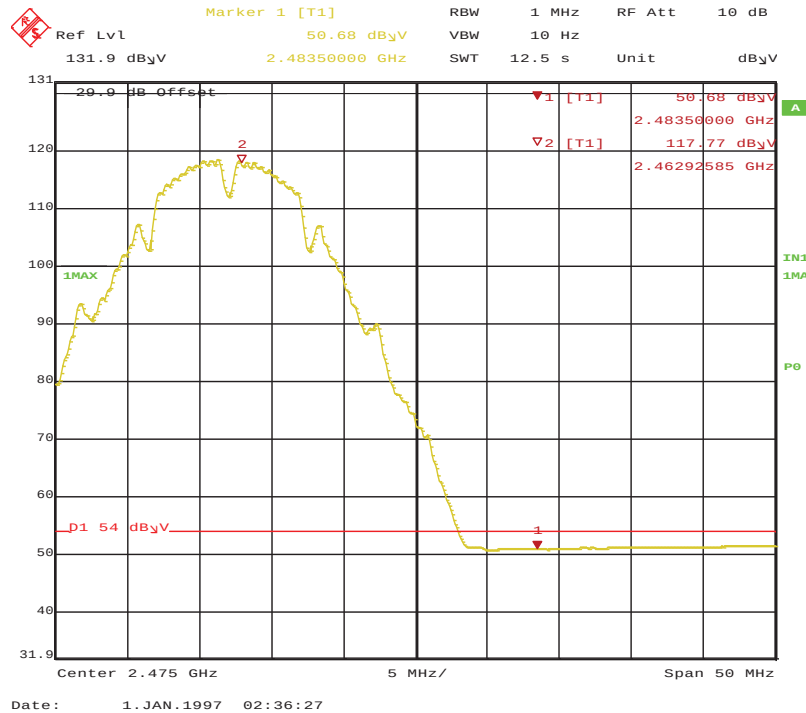


Figure 218: 11b Radiated Emission at the Edge of 2483.5 MHz Vert-Ave

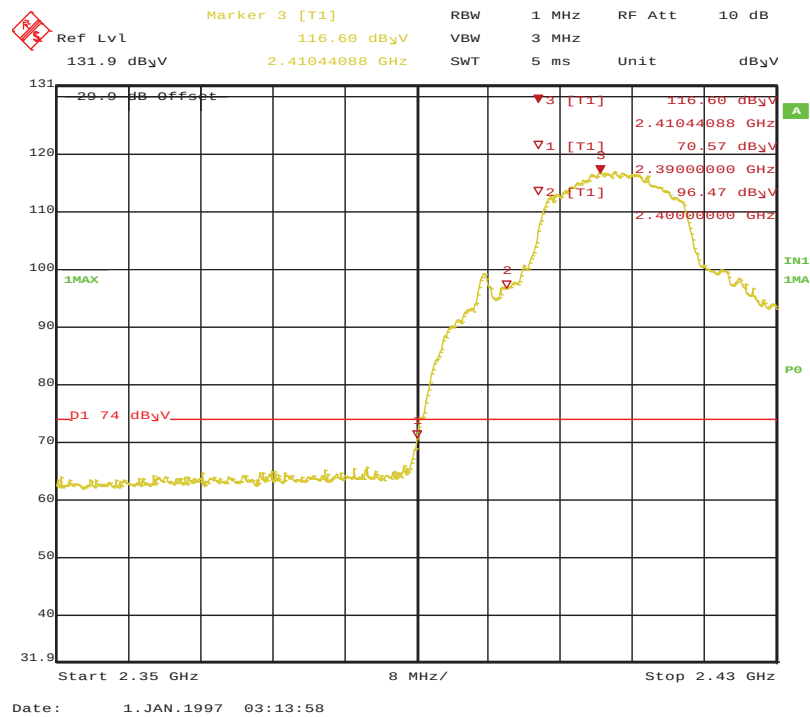


Figure 219: 11g Radiated Emission at the Edge of 2390 MHz Vert-Pk

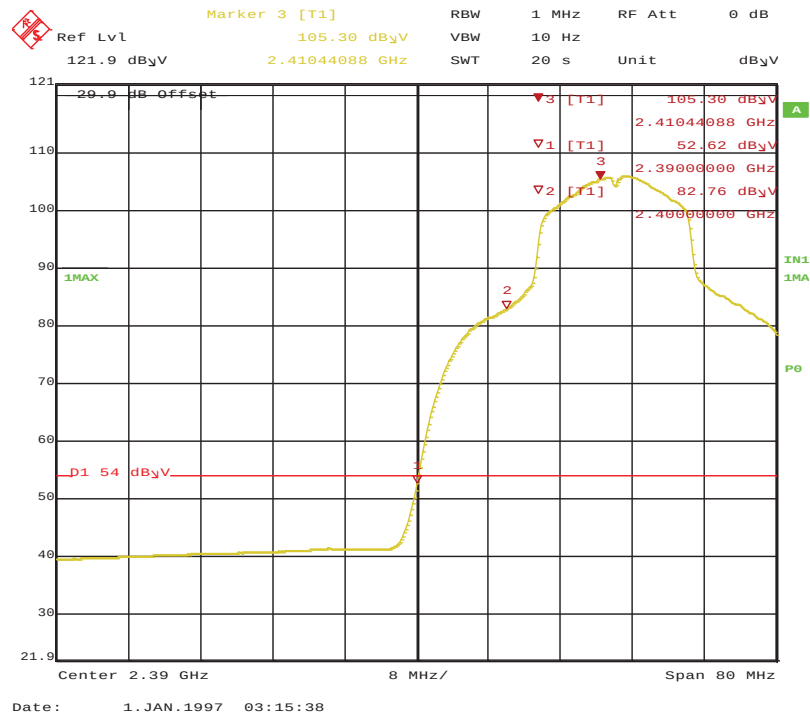


Figure 220: 11g Radiated Emission at the Edge of 2390 MHz Vert-Ave

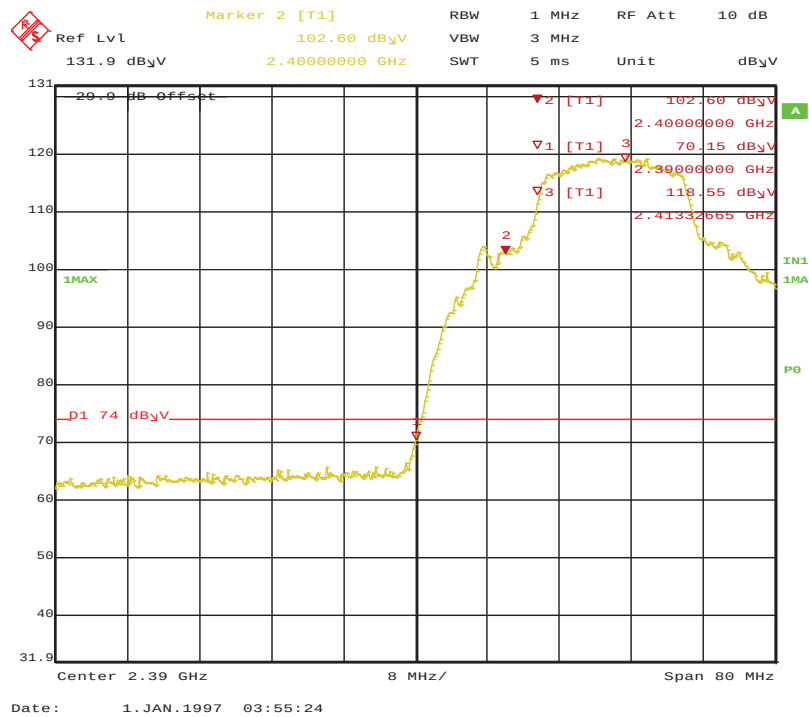


Figure 221: 11g Radiated Emission at the Edge of 2390 MHz Horz-Pk

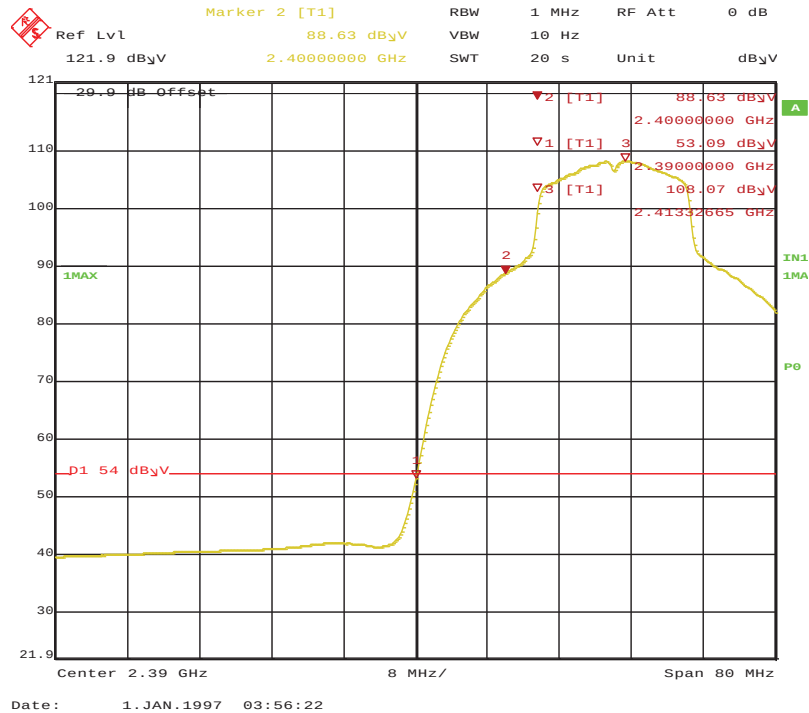


Figure 222: 11g Radiated Emission at the Edge of 2390 MHz Horz-Ave

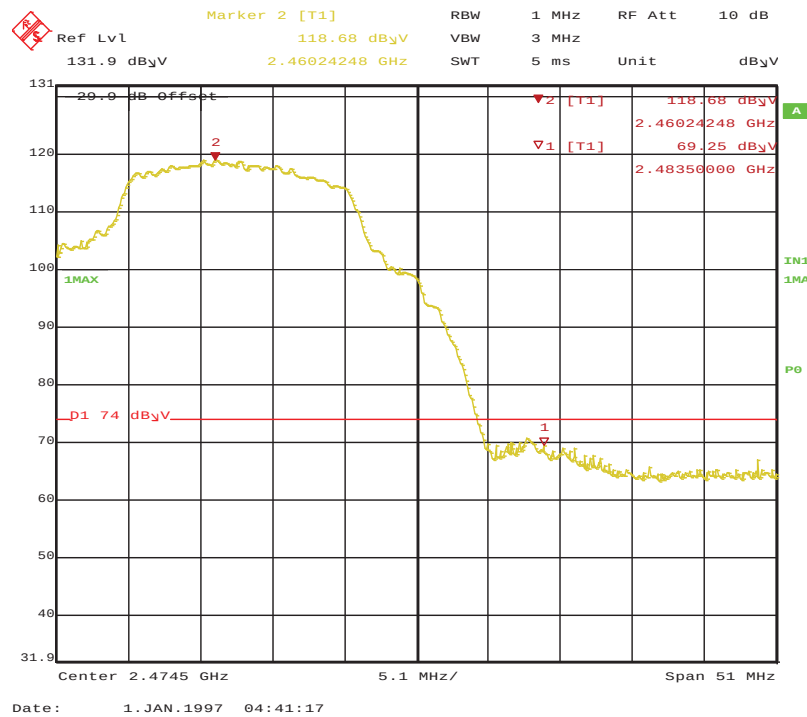


Figure 223: 11g Radiated Emission at the Edge of 2483.5 MHz Horz-Pk

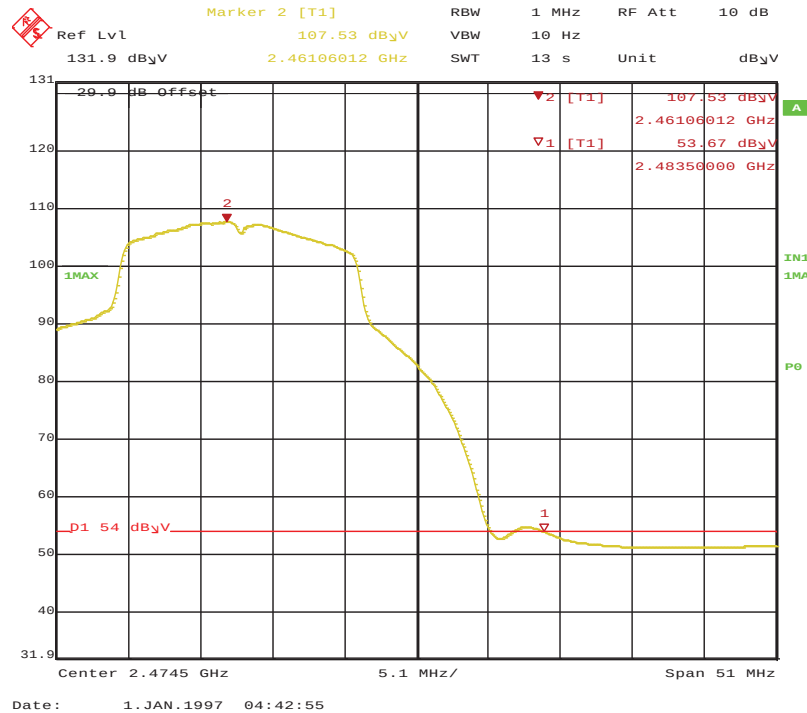


Figure 224: 11g Radiated Emission at the Edge of 2483.5 MHz Horz-Ave

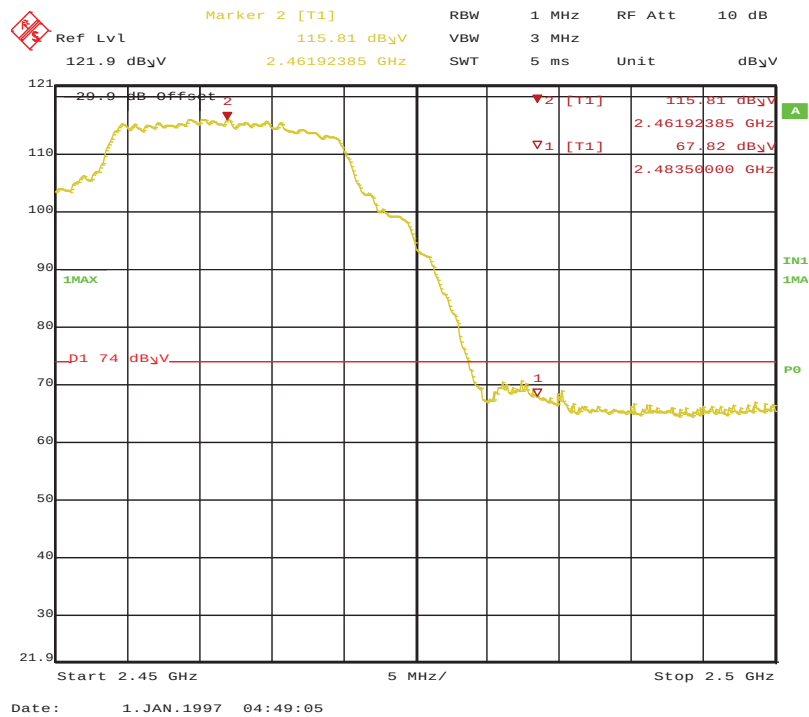


Figure 225: 11g Radiated Emission at the Edge of 2483.5 MHz Vert-Pk

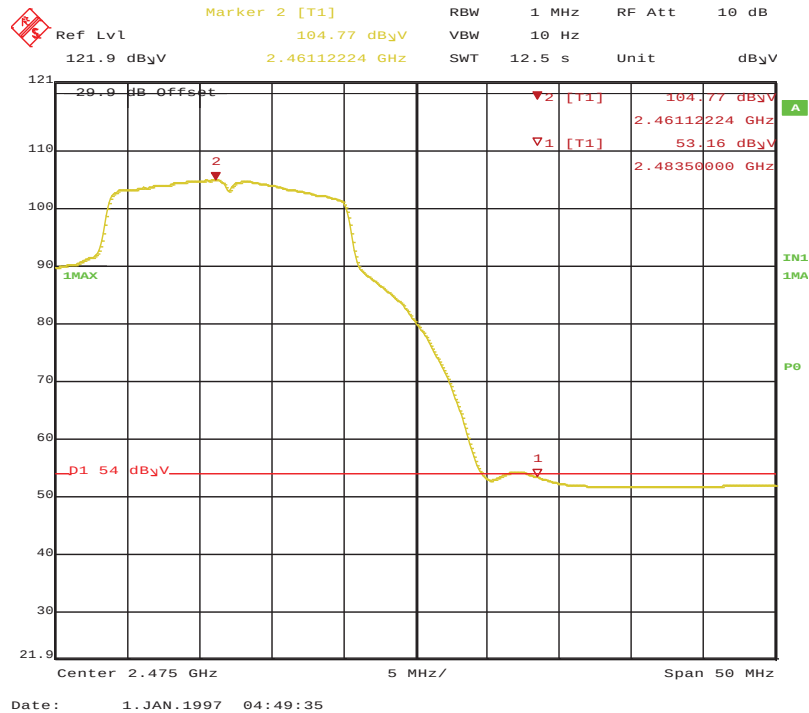


Figure 226: 11g Radiated Emission at the Edge of 2483.5 MHz Vert-Ave

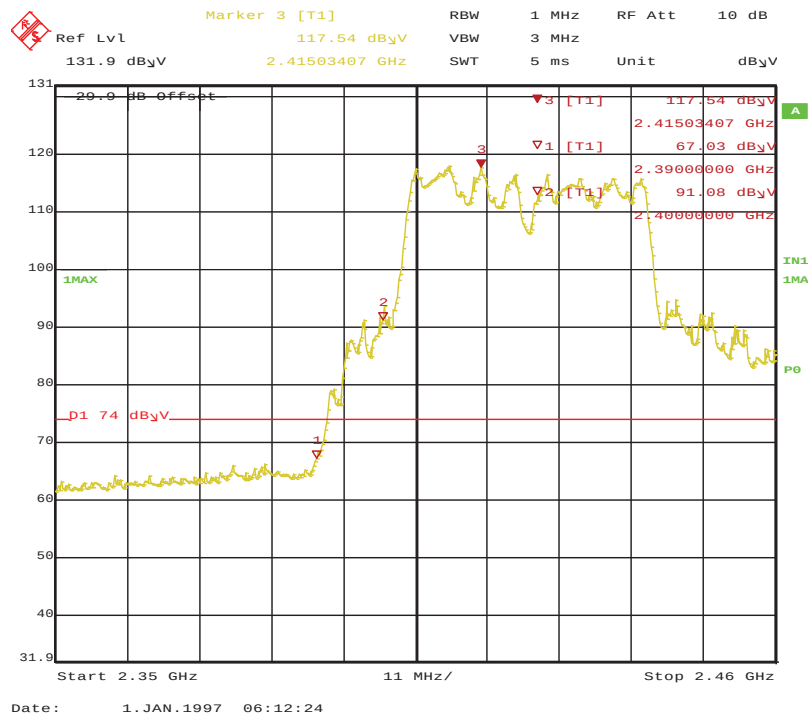


Figure 227: HT40 Radiated Emission at the Edge of 2390 MHz Vert-Pk

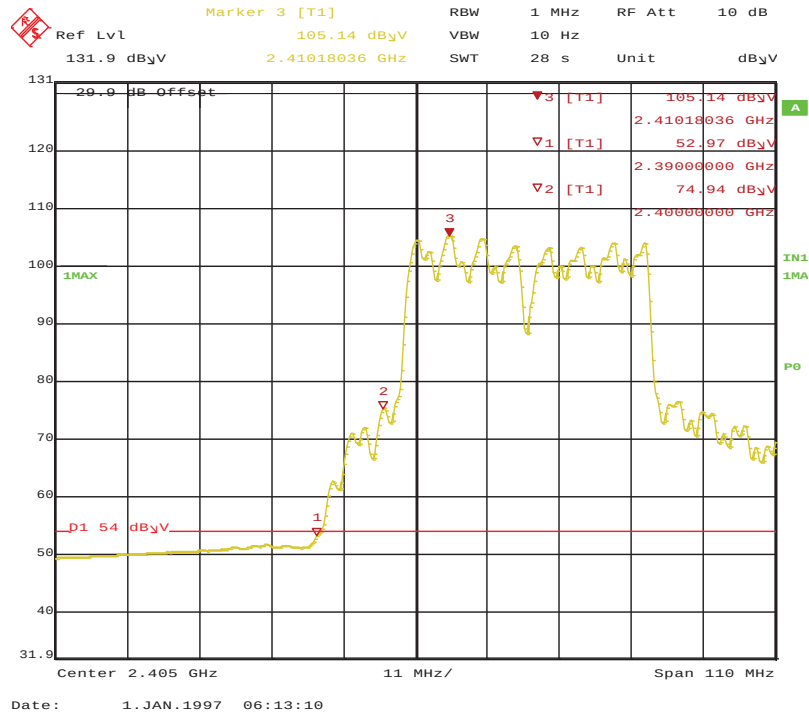


Figure 228: HT40 Radiated Emission at the Edge of 2390 MHz Vert-Ave

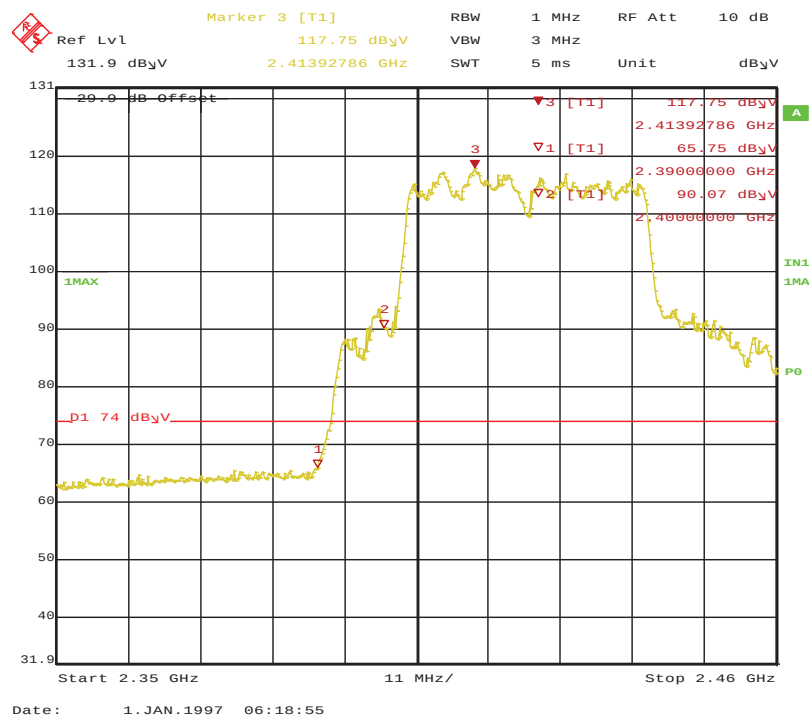


Figure 229: HT40 Radiated Emission at the Edge of 2390 MHz Horz-Pk

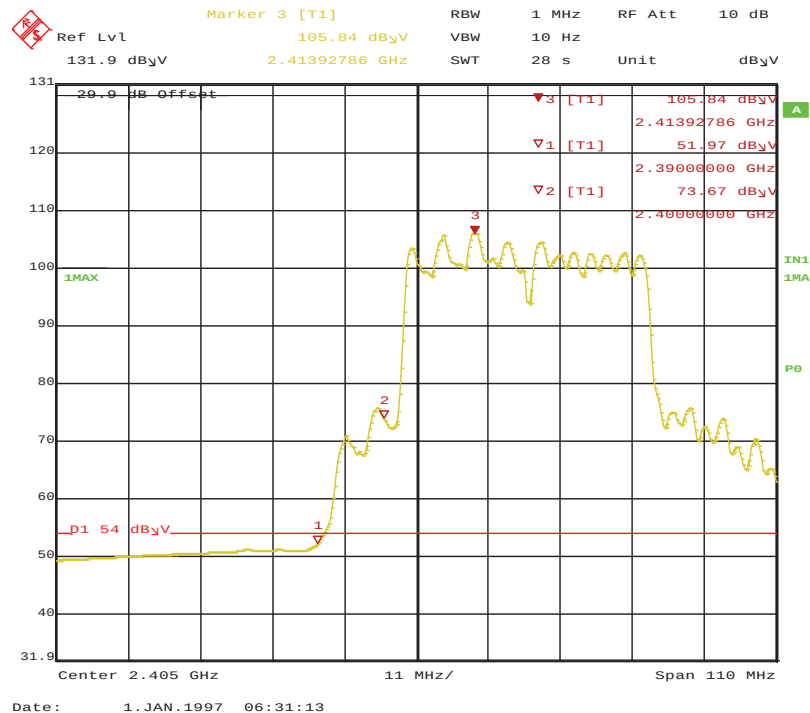


Figure 230: HT40 Radiated Emission at the Edge of 2390 MHz Horz-Ave

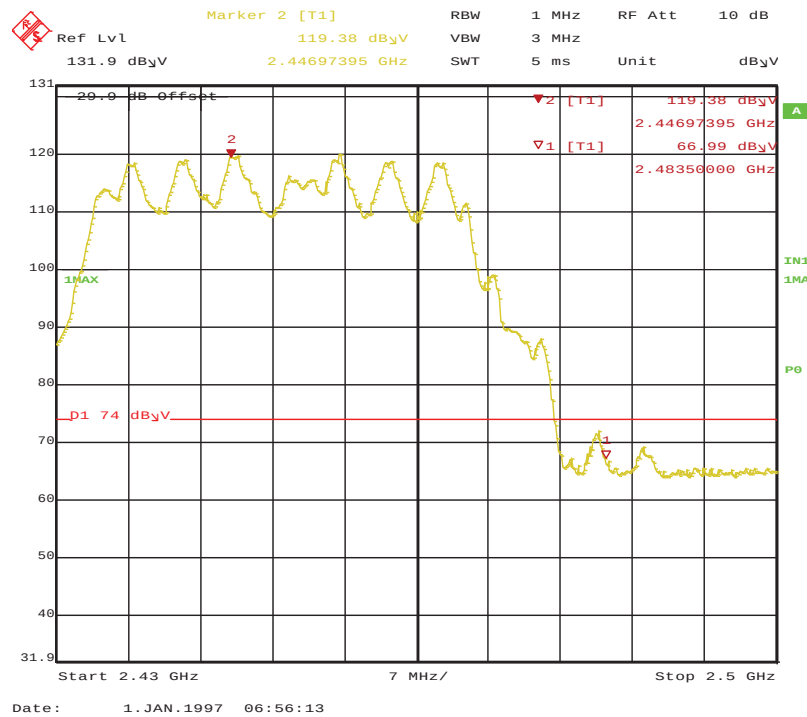


Figure 231: HT40 Radiated Emission at the Edge of 2483.5 MHz Horz-Pk

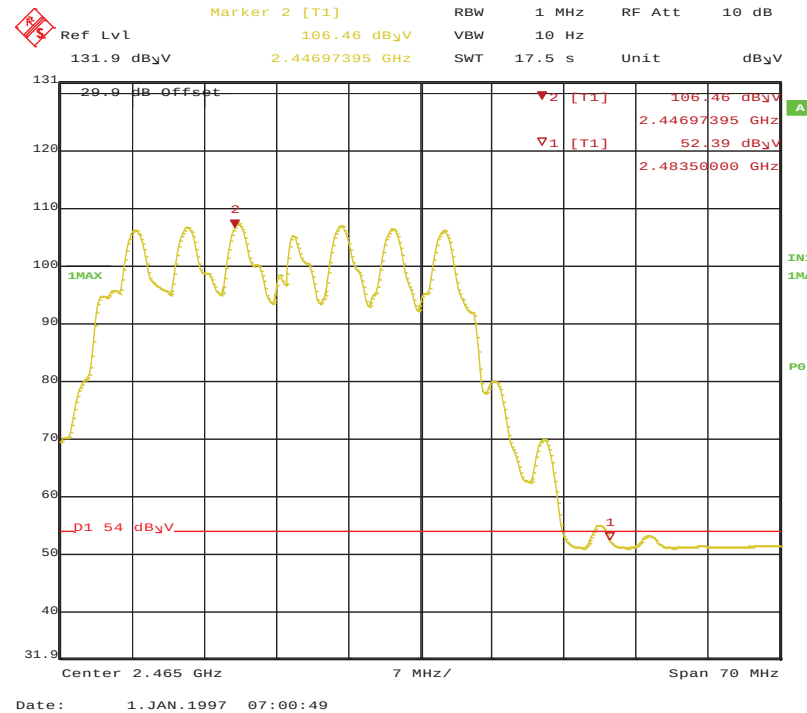


Figure 232: HT40 Radiated Emission at the Edge of 2483.5 MHz Horz-Ave

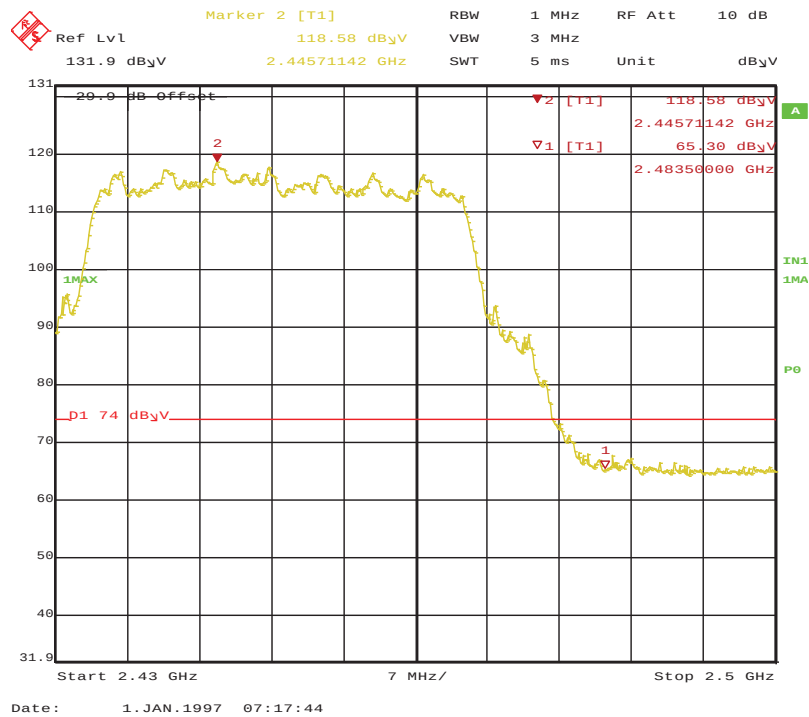


Figure 233: HT40 Radiated Emission at the Edge of 2483.5 MHz Vert-Pk

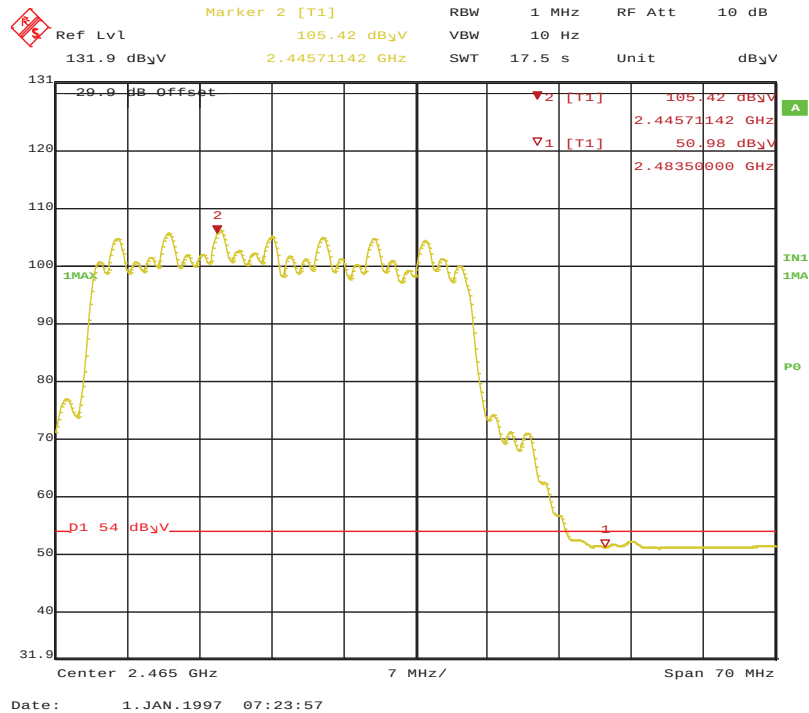


Figure 234: HT40 Radiated Emission at the Edge of 2483.5 MHz Vert-Ave

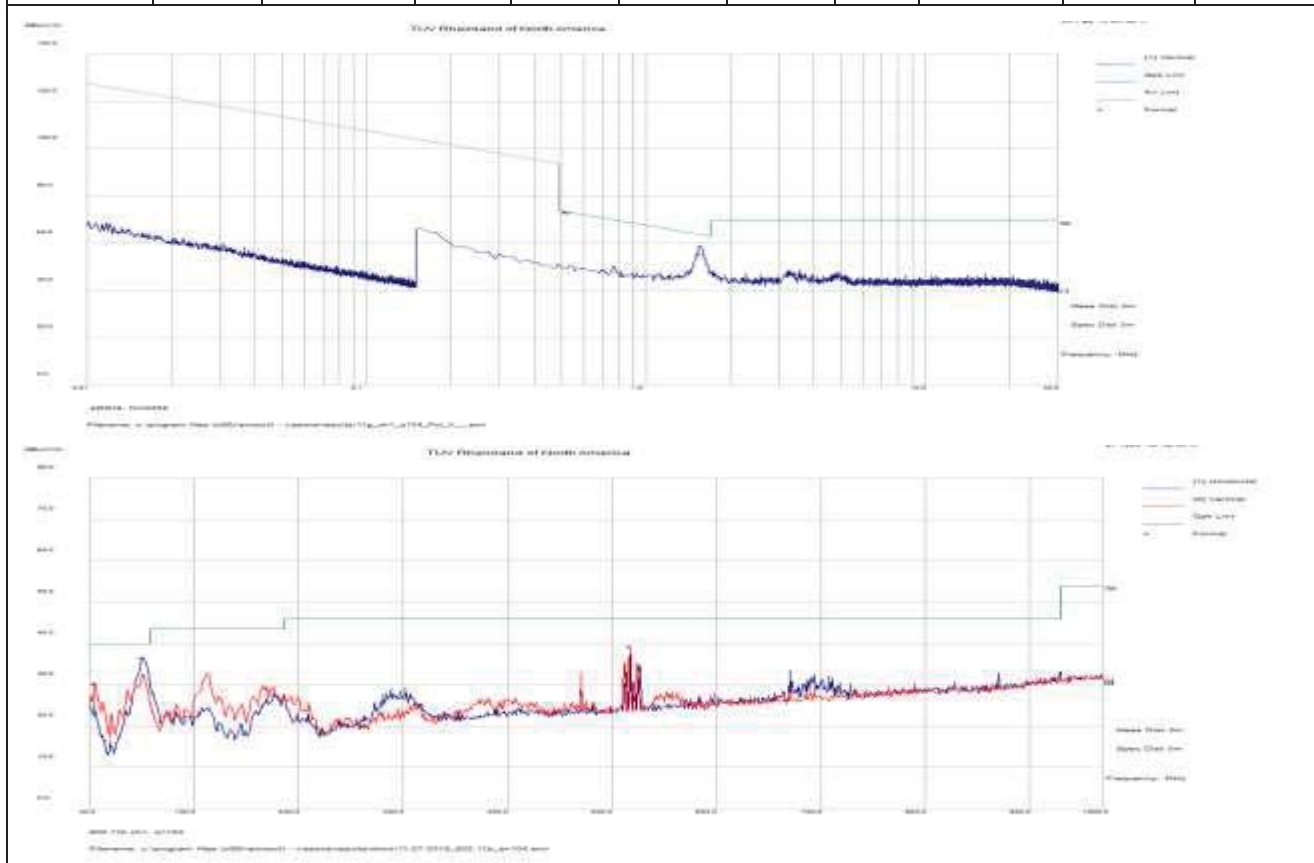
SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	November 27, 2018
EUT Model	NVG5X8AC	Temp / Hum in	22° C / 39%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11b at 1Mbps / See note	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 2412 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
1.56	42.38	2.32	10.60	55.30	QP	V	134	244	63.74	-8.43
80.52	53.98	2.79	-20.45	36.32	QP	H	267	172	40.00	-3.68
35.11	29.76	2.51	-10.28	21.99	QP	V	178	102	40.00	-18.01
546.83	36.84	4.24	-9.54	31.54	QP	V	194	240	46.00	-14.46



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. Evaluated 1x4 mode, 4x4 mode, 802.11b, 802.11g, HT20 and HT40. Worst case was observed on lowest channel of 802.11b, 1x4 mode.

2. To reduce complexity and bulkiness of the report, worst case plots are placed in the report.

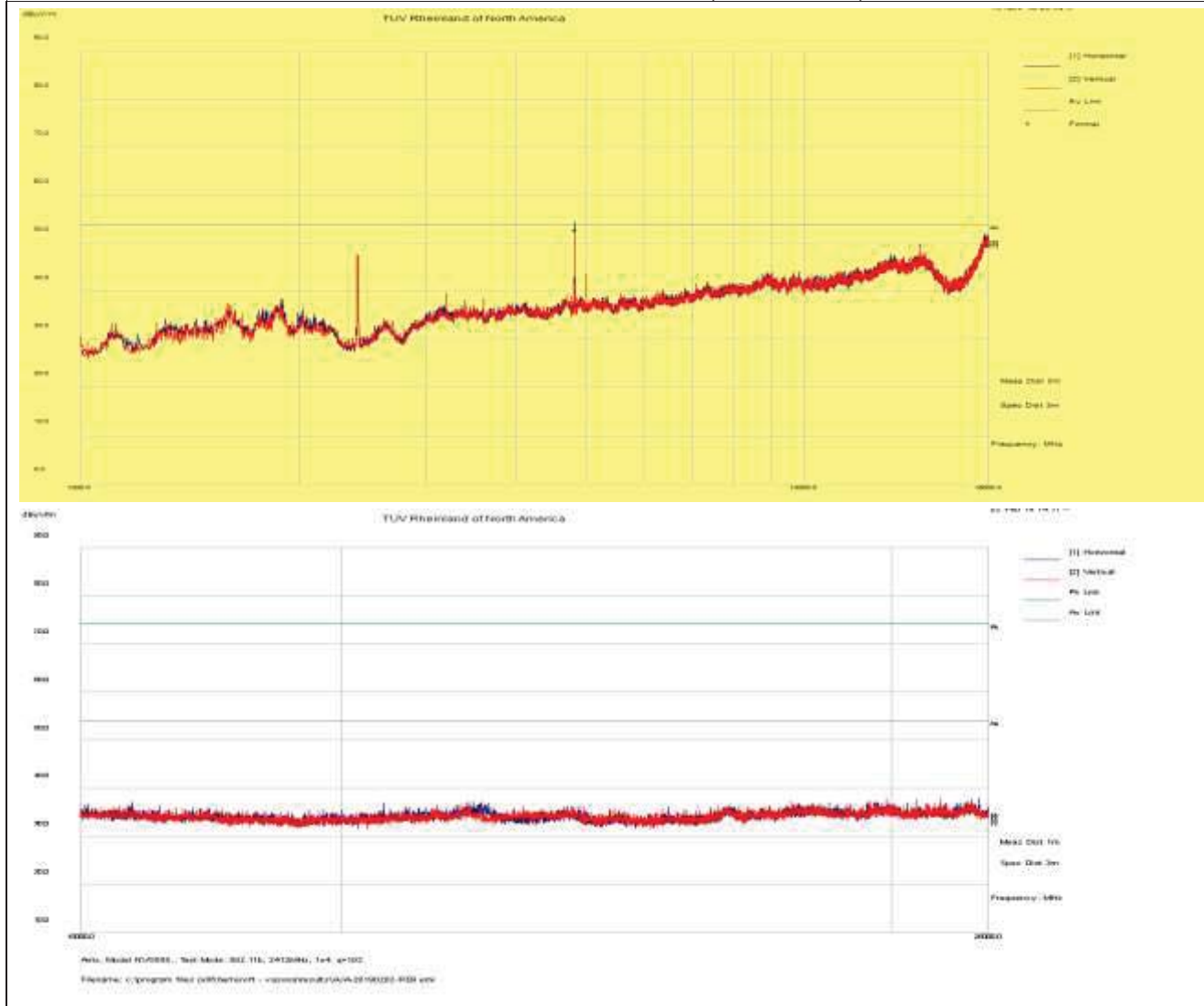
SOP 1 Radiated Emissions						Tracking # 31962242.001 Page 2 of 13					
EUT Name	Wi-Fi Module					Date	November 19, 2018				
EUT Model	NVG5X8AC					Temp / Hum in	23° C / 38%rh				
EUT Serial	M11839QW0022					Temp / Hum out	N/A				
EUT Config.	802.11b at 1Mbps / See note					Line AC / Freq	120 Vac / 60 Hz				
Standard	CFR47 Part 15 Subpart C, RSS-247, RSS-GEN					RBW / VBW	1 MHz/ 3 MHz				
Dist/Ant Used	3m – EMCO3115 / 1m – ComPower					Performed by	Abraham Avalos				
1 – 25 GHz Transmit at 2412 MHz (Low Channel); 1x4											
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	
4824.04	74.87	2.09	-23.99	52.98	Ave	H	236	310	54.00	-1.02	
1 – 25 GHz Transmit at 2437 MHz (Mid Channel); 1x4											
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	
4874.00	74.83	2.19	-24.00	53.03	Ave	H	216	300	54.00	-0.97	
24183.53	31.45	8.10	-12.36	27.18	Ave	H	144	0	54.00	-26.82	
20788.98	38.83	7.60	-9.05	37.38	Pk	V	208	154	74.00	-36.62	
1 – 25 GHz Transmit at 2462 MHz (High Channel); 1x4											
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	
4924.02	75.62	2.25	-24.11	53.76	Ave	H	183	298	54.00	-0.24	
21062.01	27.82	7.60	-9.27	26.15	Ave	V	117	116	54.00	-27.85	
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty											
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp											
Note: Evaluated 1x4 and 4x4 mode. Worst case was observed on 802.11b 1x4 mode											

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	November 19, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11b at 1Mbps / See note	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart C, RSS-247, RSS-GEN	RBW / VBW	1 MHz/ 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m – ComPower	Performed by	Abraham Avalos

1 – 25 GHz Transmit at 2412 MHz (Low Channel); 1x4



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

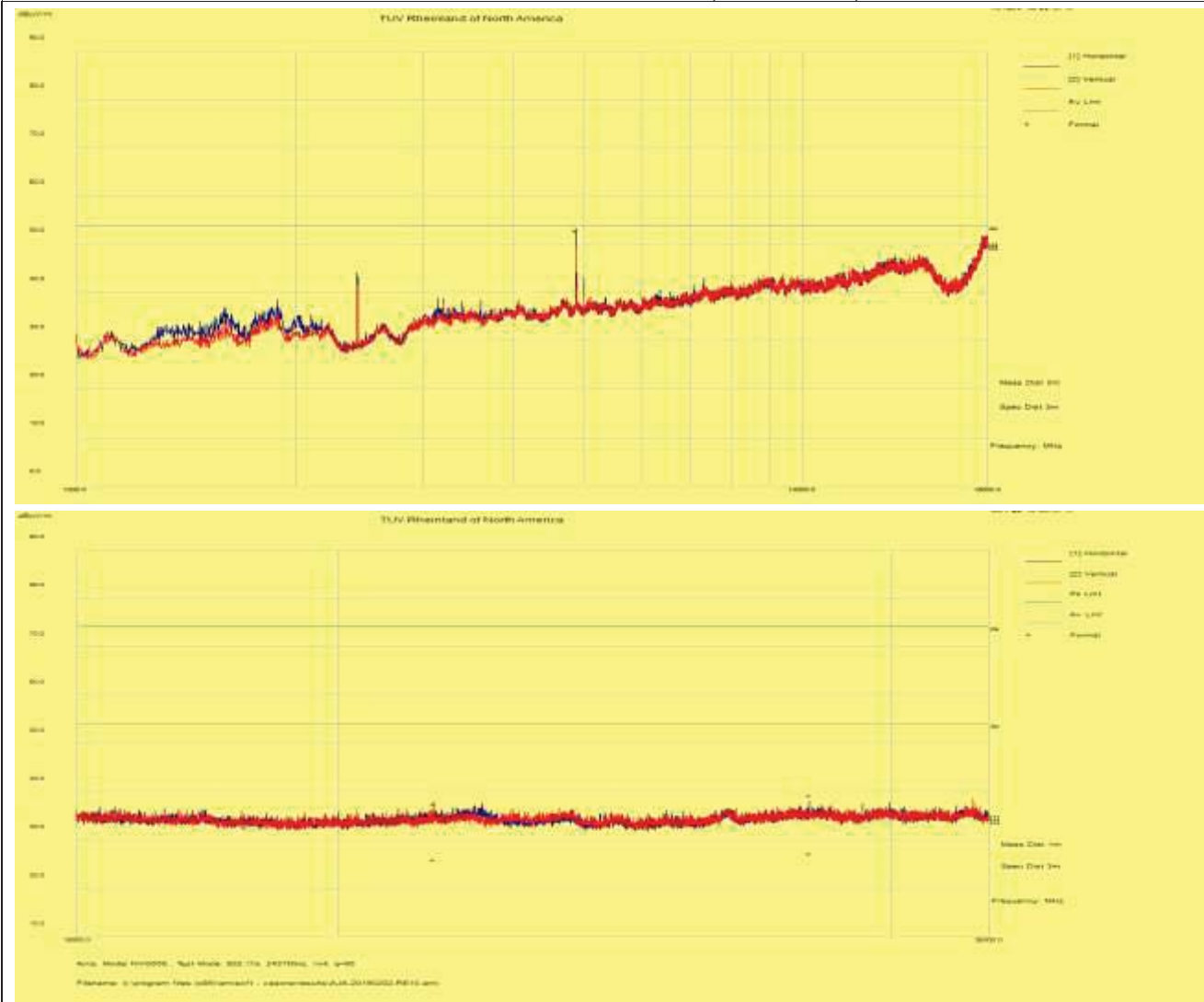
Note: Evaluated 1x4 and 4x4 mode. Worst case was observed on 802.11b 1x4 mode.

SOP 1 Radiated Emissions

Tracking # 31962242.001 Page 4 of 13

EUT Name	Wi-Fi Module	Date	November 19, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11b at 1Mbps / See note	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart C, RSS-247, RSS-GEN	RBW / VBW	1 MHz/ 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m – ComPower	Performed by	Abraham Avalos

1 – 25 GHz Transmit at 2437 MHz (Mid Channel); 1x4



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

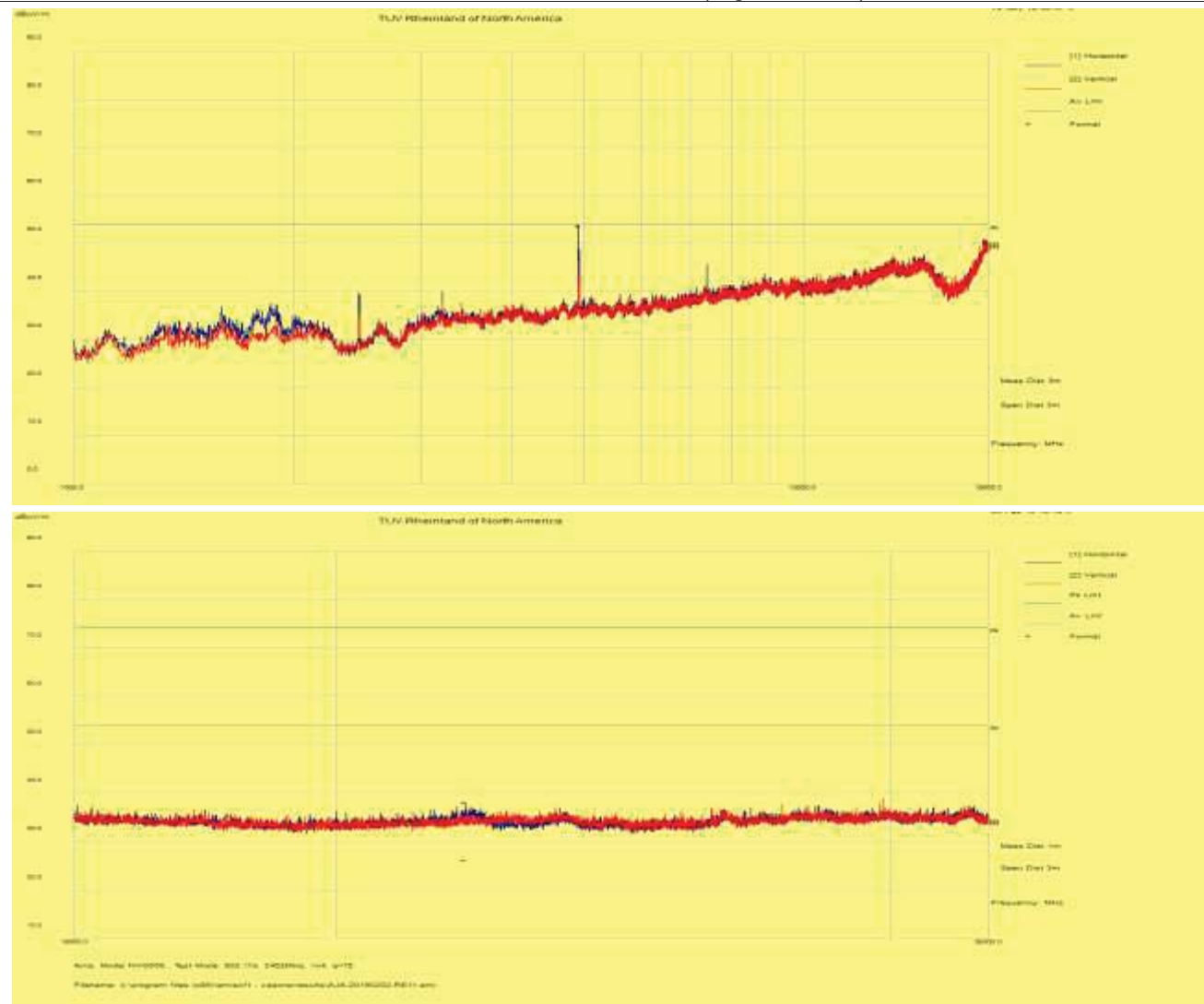
Note: Evaluated 1x4 and 4x4 mode. Worst case was observed on 802.11b 1x4 mode.

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	November 19, 2018
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 38%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11b at 1Mbps / See note	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart C, RSS-247, RSS-GEN	RBW / VBW	1 MHz/ 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m – ComPower	Performed by	Abraham Avalos

1 – 25 GHz Transmit at 2462 MHz (High Channel); 1x4



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

Note: Evaluated 1x4 and 4x4 mode. Worst case was observed on 802.11b 1x4 mode.

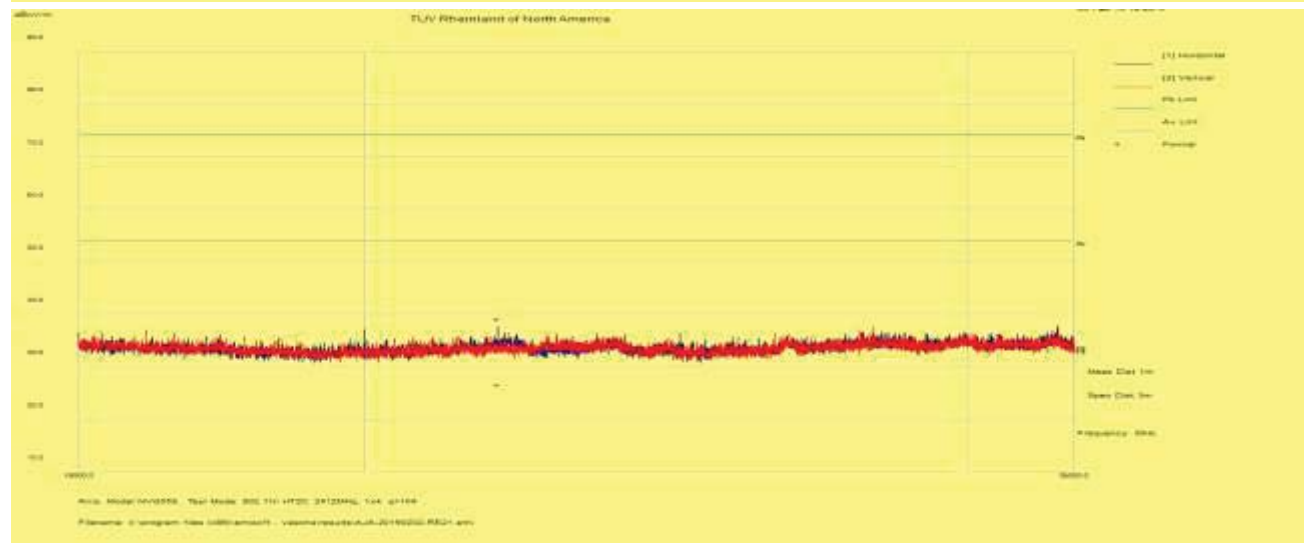
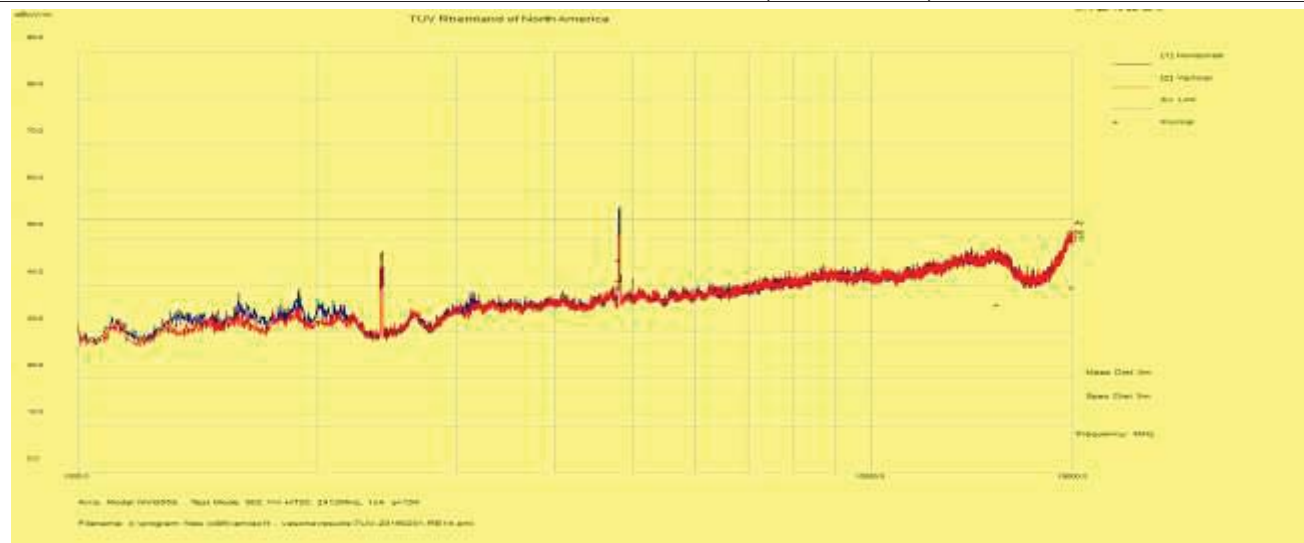
SOP 1 Radiated Emissions						Tracking # 31962242.001 Page 6 of 13				
EUT Name		Wi-Fi Module				Date		February 1, 2019		
EUT Model		NVG5X8AC				Temp / Hum in		23° C / 40%rh		
EUT Serial		M11839QW0022				Temp / Hum out		N/A		
EUT Config.		802.11n-HT20 at MCS0 / See note				Line AC / Freq		120 Vac / 60 Hz		
Standard		CFR47 Part 15 Subpart C, RSS-247, RSS-GEN				RBW / VBW		1 MHz/ 3 MHz		
Dist/Ant Used		3m – EMCO3115 / 1m – ComPower				Performed by		Abraham Avalos		
1 – 25 GHz Transmit at 2412 MHz (Low Channel); 1x4										
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
4815.87	65.59	3.50	-23.69	45.40	Ave	H	112	302	54.00	-8.60
21015.25	28.23	7.60	-9.24	26.59	Ave	H	213	242	54.00	-27.41
1 – 25 GHz Transmit at 2437 MHz (Mid Channel); 1x4										
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
4879.49	68.04	3.50	-23.48	48.06	Ave	H	121	288	54.00	-5.94
1 – 25 GHz Transmit at 2462 MHz (High Channel); 1x4										
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
4926.37	73.41	3.50	-23.51	53.39	Ave	H	167	308	54.00	-0.61
7385.94	58.28	4.30	-20.07	42.52	Ave	H	117	22	54.00	-11.48
23410.12	31.07	7.80	-11.48	27.39	Ave	V	157	266	54.00	-26.61
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty										
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp										
Note: Evaluated 1x4 mode, 4x4 mode, 802.11g and 802.11n-HT20. Worst case was observed on 802.11n 1x4 mode.										

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	February 1, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n-HT20 at MCS0 / See note	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart C, RSS-247, RSS-GEN	RBW / VBW	1 MHz/ 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m – ComPower	Performed by	Abraham Avalos

1 – 25 GHz Transmit at 2412 MHz (Low Channel); 1x4



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF $\pm$ Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

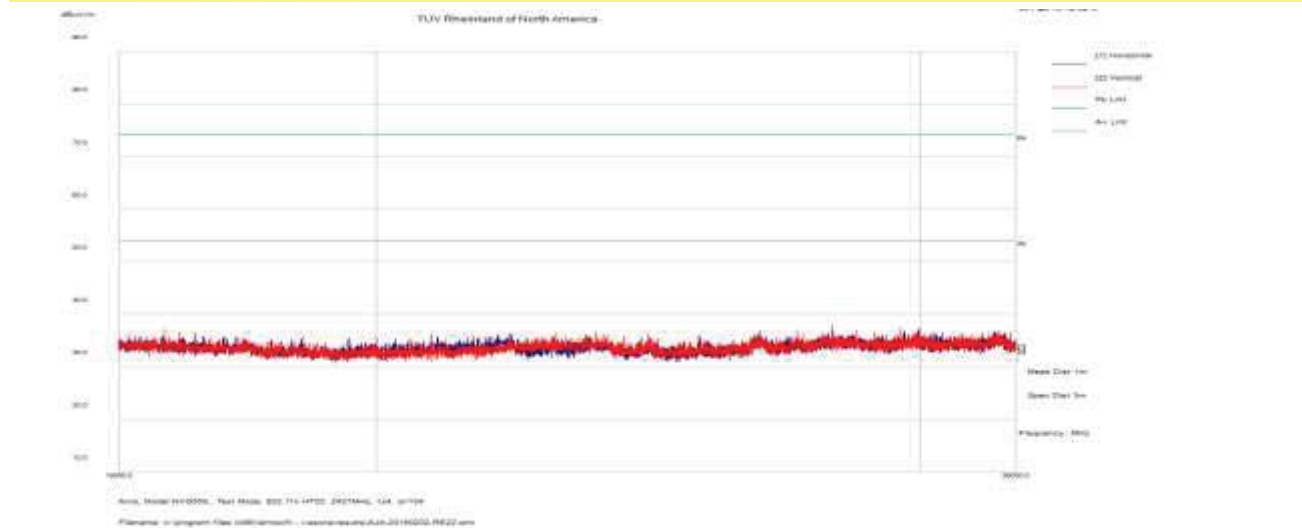
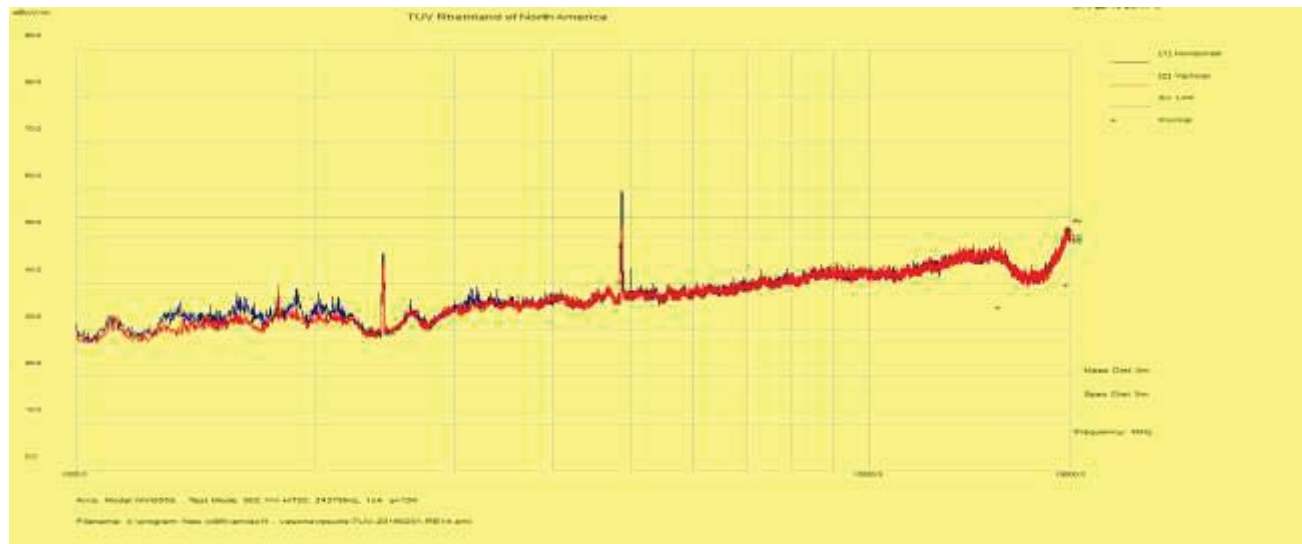
Note: Evaluated 1x4 mode, 4x4 mode, 802.11g and 802.11n-HT20. Worst case was observed on 802.11n 1x4 mode.

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	February 1, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n-HT20 at MCS0 / See note	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart C, RSS-247, RSS-GEN	RBW / VBW	1 MHz/ 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m – ComPower	Performed by	Abraham Avalos

1 – 25 GHz Transmit at 2437 MHz (Mid Channel); 1x4



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

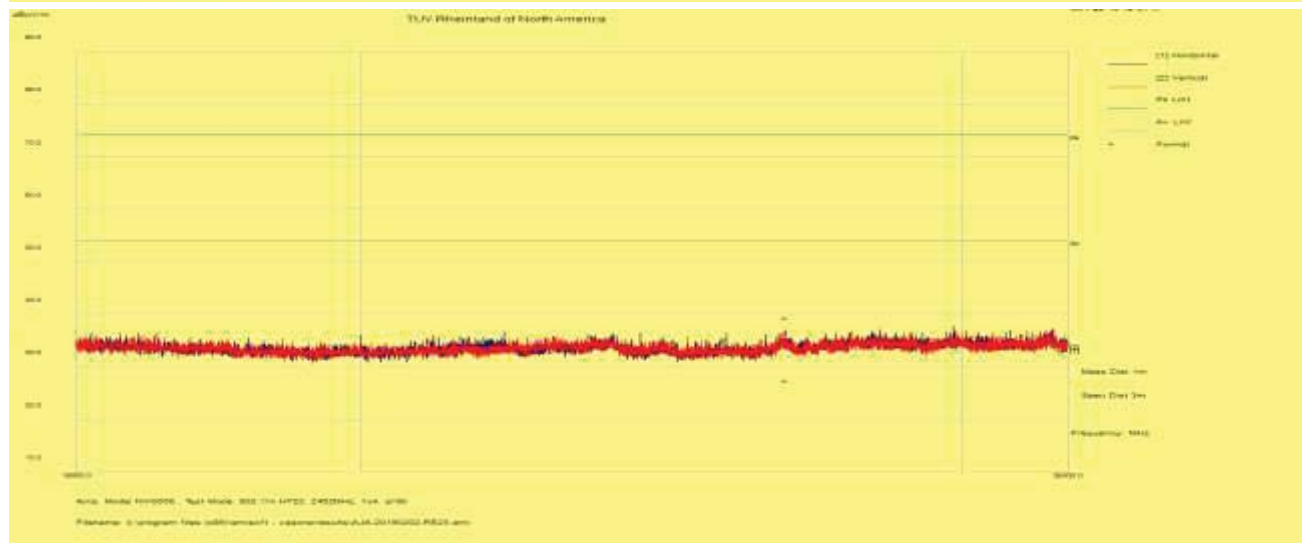
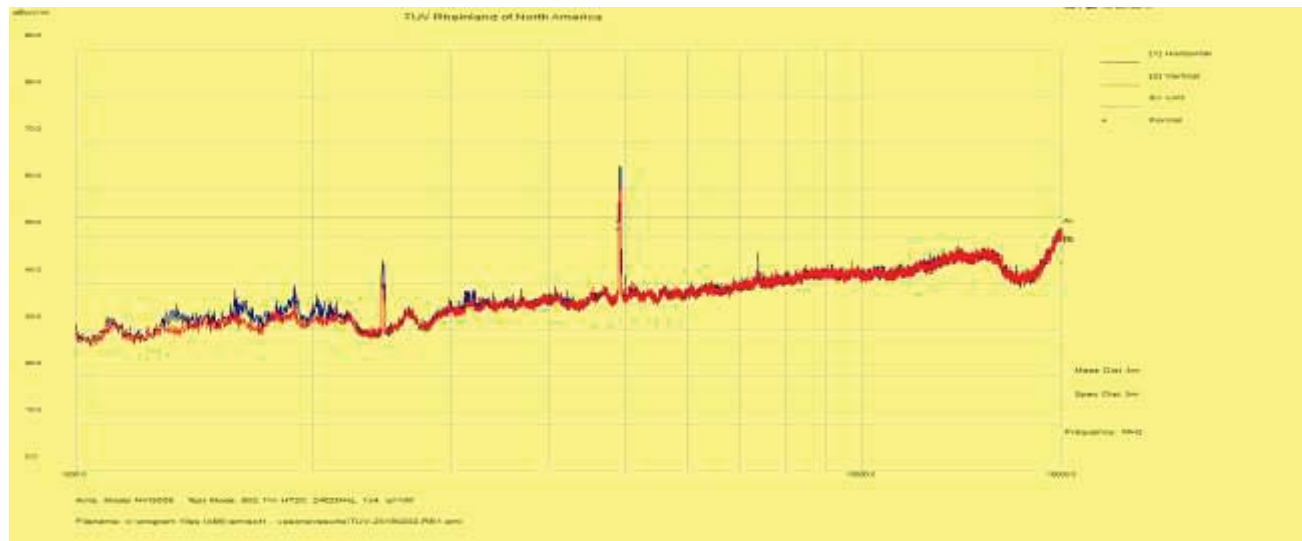
Note: Evaluated 1x4 mode, 4x4 mode, 802.11g and 802.11n-HT20. Worst case was observed on 802.11n 1x4 mode.

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	February 1, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n-HT20 at MCS0 / See note	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart C, RSS-247, RSS-GEN	RBW / VBW	1 MHz/ 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m – ComPower	Performed by	Abraham Avalos

1 – 25 GHz Transmit at 2462 MHz (High Channel); 1x4



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF $\pm$ Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Evaluated 1x4 mode, 4x4 mode, 802.11g and 802.11n-HT20. Worst case was observed on 802.11n 1x4 mode.

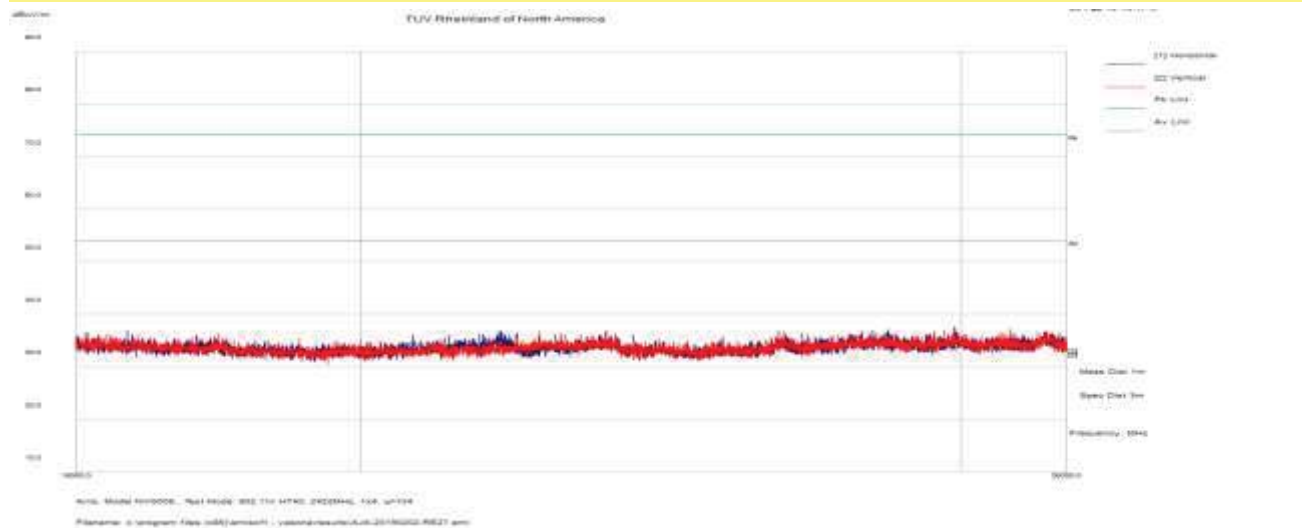
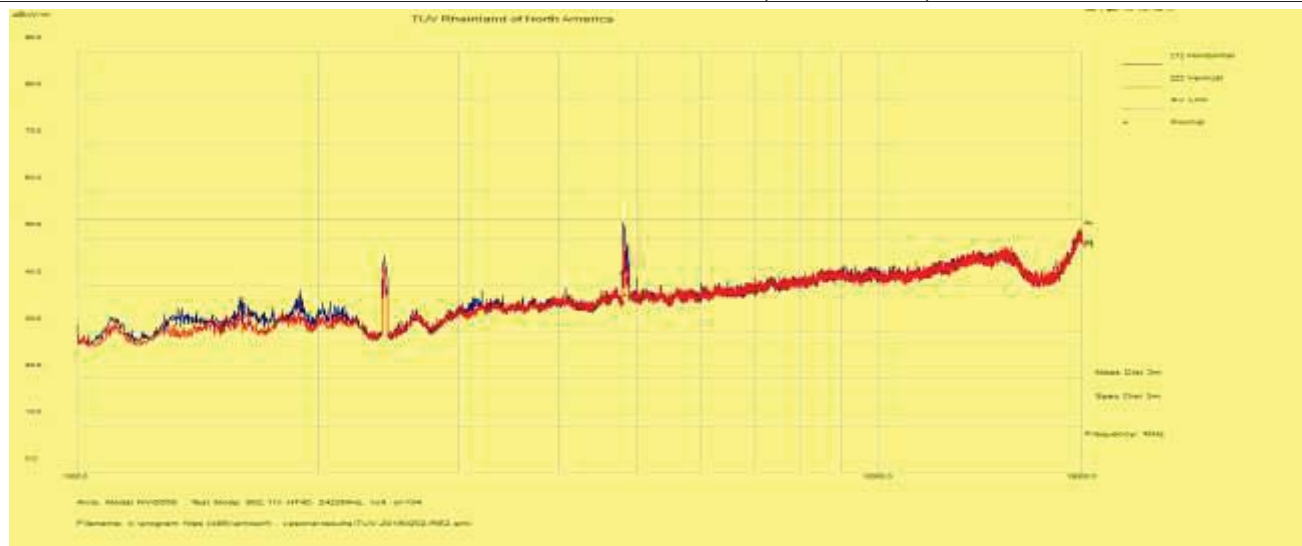
SOP 1 Radiated Emissions						Tracking # 31962242.001 Page 10 of 13				
EUT Name		Wi-Fi Module				Date		February 1, 2019		
EUT Model		NVG5X8AC				Temp / Hum in		23° C / 40%rh		
EUT Serial		M11839QW0022				Temp / Hum out		N/A		
EUT Config.		802.11n-HT40 at MCS0 / See note				Line AC / Freq		120 Vac / 60 Hz		
Standard		CFR47 Part 15 Subpart C, RSS-247, RSS-GEN				RBW / VBW		1 MHz/ 3 MHz		
Dist/Ant Used		3m – EMCO3115 / 1m – ComPower				Performed by		Abraham Avalos		
1 – 25 GHz Transmit at 2422 MHz (Low Channel); 1x4										
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
4813.86	63.05	3.50	-23.69	42.87	Ave	H	218	320	54.00	-11.13
1 – 25 GHz Transmit at 2437 MHz (Mid Channel); 1x4										
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
4892.41	63.32	3.50	-23.47	43.36	Ave	H	274	340	54.00	-10.64
1 – 25 GHz Transmit at 2452 MHz (High Channel); 1x4										
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
4908.57	71.12	3.50	-23.48	51.14	Ave	H	102	296	54.00	-2.86
19998.96	26.37	7.40	-9.24	24.53	Ave	V	275	360	54.00	-29.47
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty										
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp										
Note: Evaluated 1x4 mode and 4x4 mode. Worst case was observed on 802.11n-HT40 1x4 mode.										

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	February 1, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n-HT40 at MCS0 / See note	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart C, RSS-247, RSS-GEN	RBW / VBW	1 MHz/ 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m – ComPower	Performed by	Abraham Avalos

1 – 25 GHz Transmit at 2422 MHz (Low Channel); 1x4



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

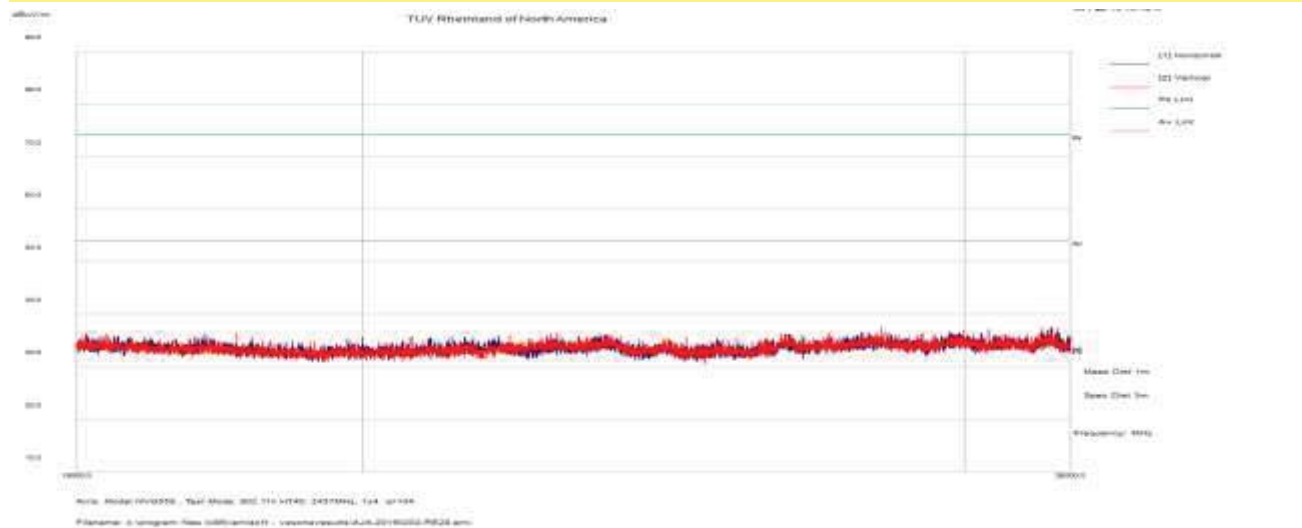
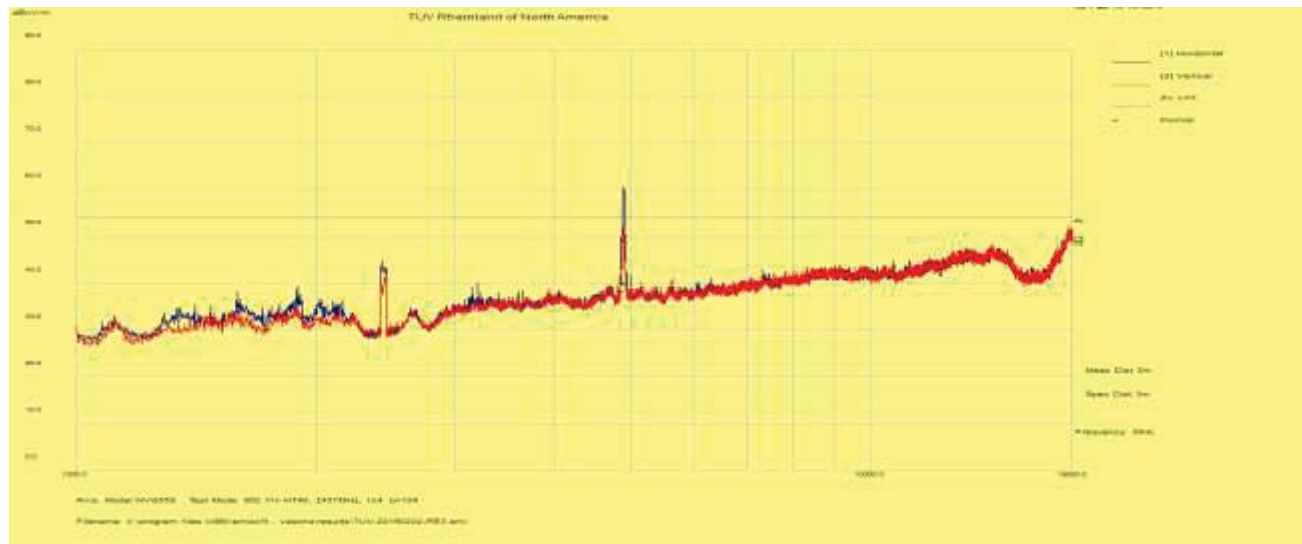
Note: Evaluated 1x4 mode and 4x4 mode. Worst case was observed on 802.11n-HT40 1x4 mode.

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	February 1, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n-HT40 at MCS0 / See note	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart C, RSS-247, RSS-GEN	RBW / VBW	1 MHz/ 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m – ComPower	Performed by	Abraham Avalos

1 – 25 GHz Transmit at 2437 MHz (Mid Channel); 1x4



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

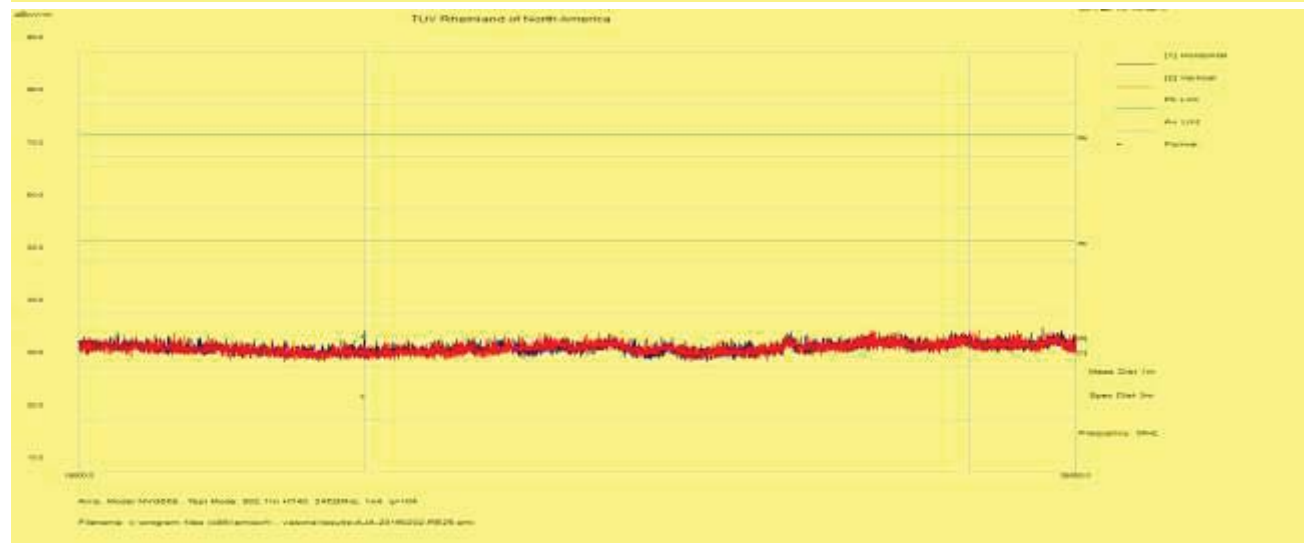
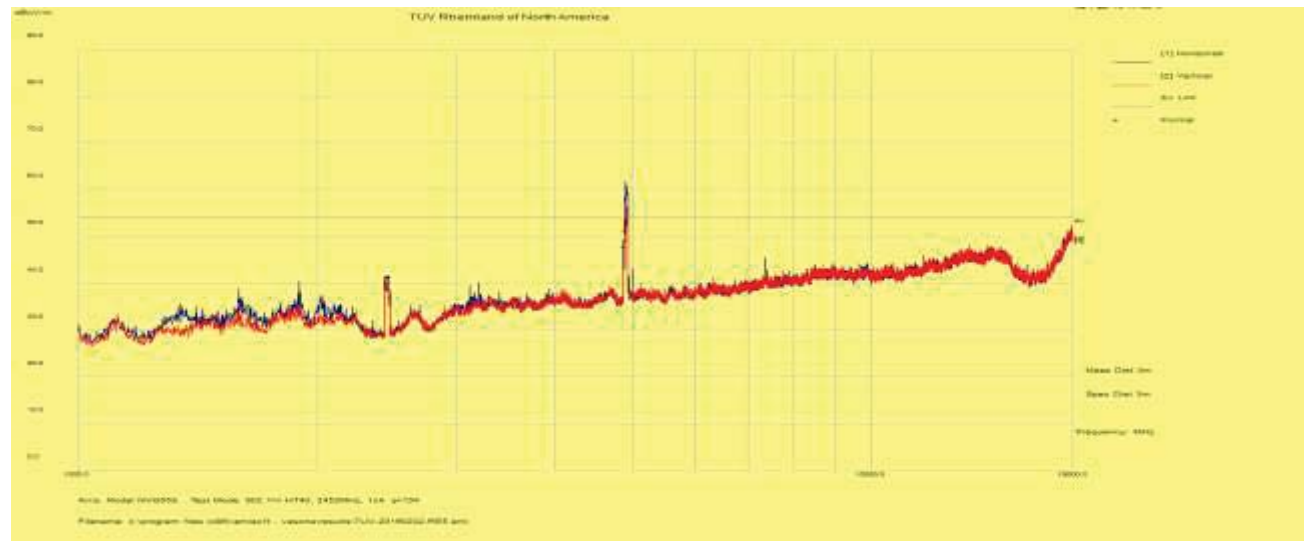
Note: Evaluated 1x4 mode and 4x4 mode. Worst case was observed on 802.11n-HT40 1x4 mode.

SOP 1 Radiated Emissions

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EUT Name	Wi-Fi Module	Date	February 1, 2019
EUT Model	NVG5X8AC	Temp / Hum in	23° C / 40%rh
EUT Serial	M11839QW0022	Temp / Hum out	N/A
EUT Config.	802.11n-HT40 at MCS0 / See note	Line AC / Freq	120 Vac / 60 Hz
Standard	CFR47 Part 15 Subpart C, RSS-247, RSS-GEN	RBW / VBW	1 MHz/ 3 MHz
Dist/Ant Used	3m – EMCO3115 / 1m – ComPower	Performed by	Abraham Avalos

1 – 25 GHz Transmit at 2452 MHz (High Channel); 1x4



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

Note: Evaluated 1x4 mode and 4x4 mode. Worst case was observed on 802.11n-HT40 1x4 mode.

4.7 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.

4.7.1 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 50 μ H / 50 Ω 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.

4.7.1.1 Deviations

There were no deviations from this test methodology.

4.7.2 Test Results

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

Test data were extracted from Report Number 31962243.001 (UNII 1) as 2.4 GHz band uses the same RF chip.

Table 12: AC Conducted Emissions – Test Results

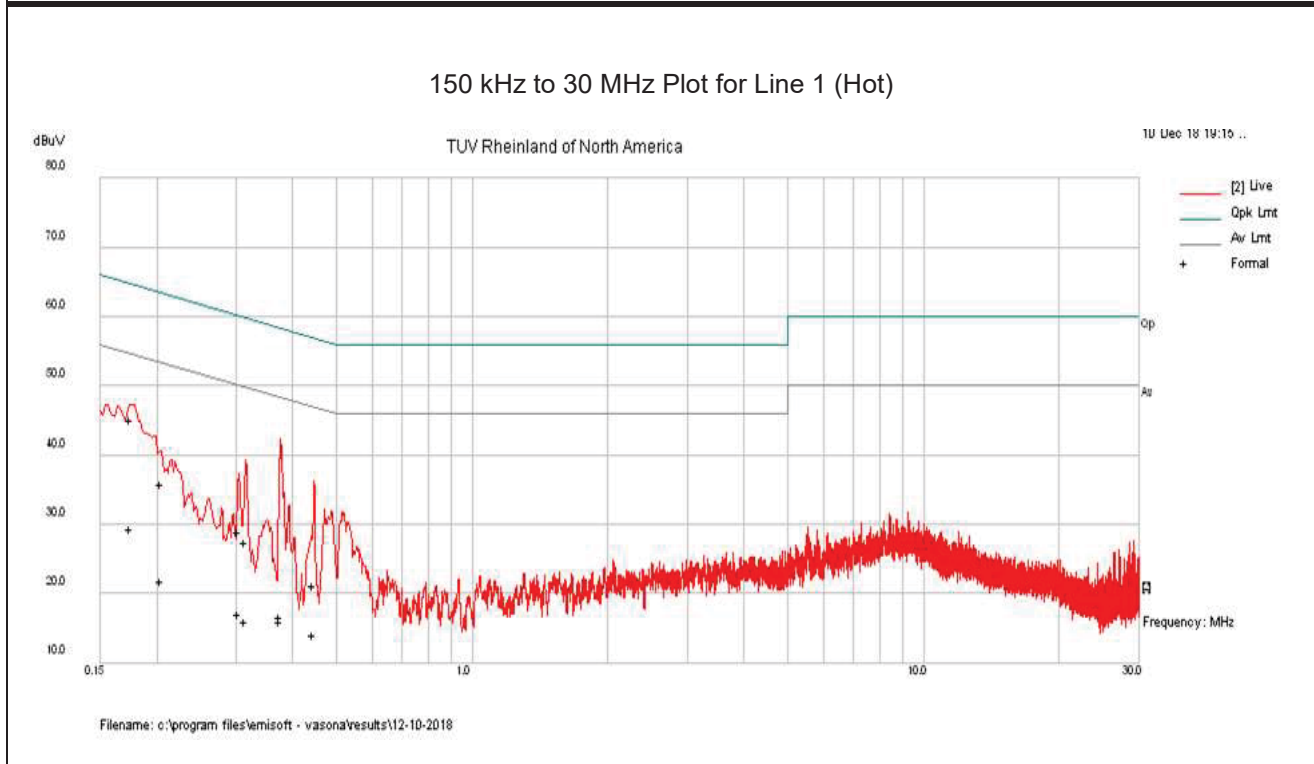
Test Date: December 10, 2018		Tested By: Abraham Avalos	
Antenna Type: PCB		Power Level: See Test Plan	
AC Power: 120 Vac/60 Hz		Configuration: Tabletop	
Ambient Temperature: 22° C		Relative Humidity: 41% RH	
Configuration	Frequency Range	Test Result	
Line 1 (Hot)	0.15 to 30 MHz	Pass	
Line 2 (Neutral)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

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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



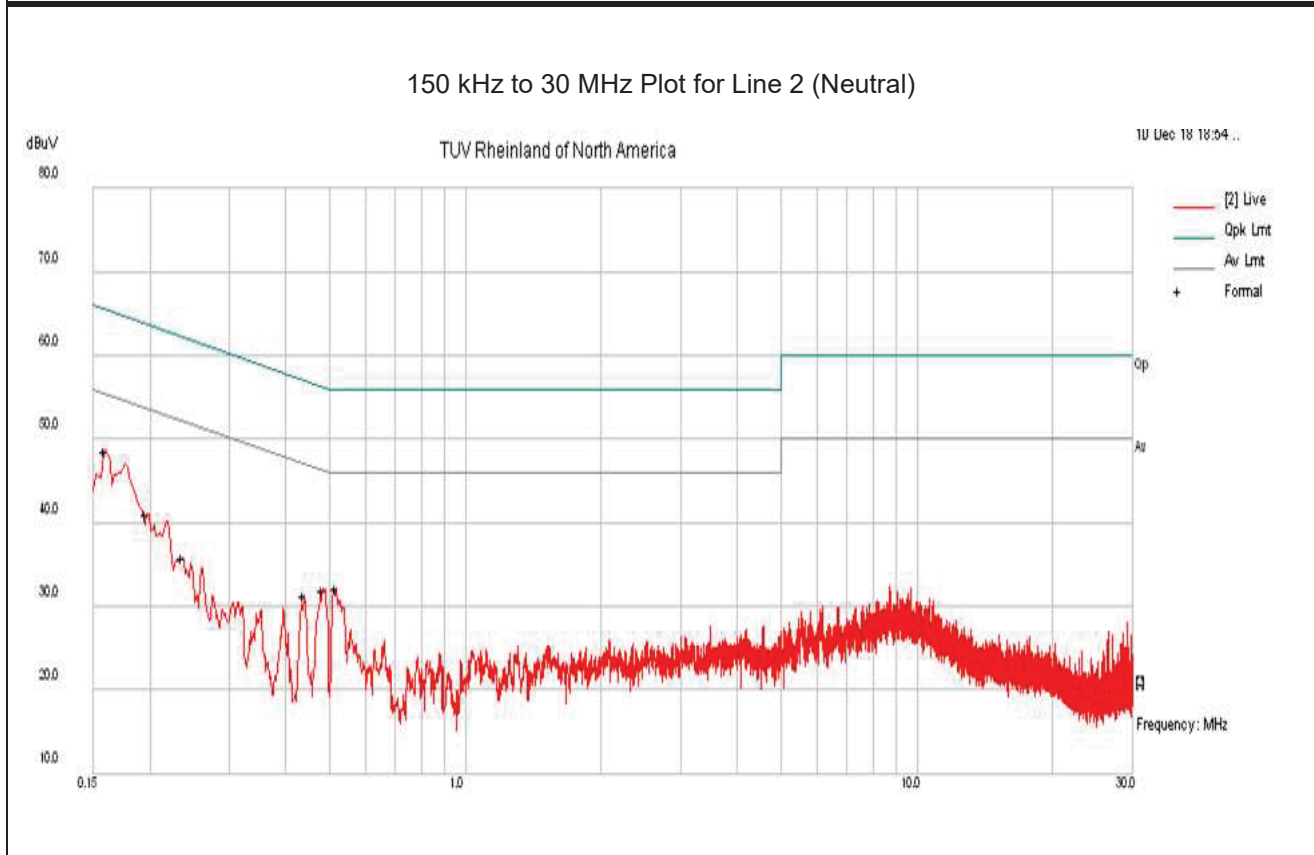
Note: Met FCC Class B limit.

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, $\pm$ 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.

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 13: Customer Information

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

Table 14: 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 15: 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:	☐ Yes and how many ☒ No
Product Marketing Name (PMN)	WiFi Module
Hardware Version Identification Number (HVIN)	NVG5X8AC
Firmware Version Identification Number (FVIN)	
802.11-radio module	
Operating Mode	802.11b, 802.11g, 802.11n (HT20, HT40), 802.11ac (VHT20, VHT40)
Transmitter Frequency Band	2.4 GHz – 2.4835 GHz 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 2.412-2.462GHz
Antenna Gain	See Section 3.4.1
Modulation Type	☐ AM ☐ FM ☒ DSSS ☒ OFDM ☐ Other describe:
Data Rate	802.11b: 4 Spatial Streams: 1, 2, 5.5, 11 Mbps 802.11g: 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

EUT Specifications	
TX/RX Chain (s)	MIMO (4x4)
Directional Gain Type	☒ Correlated ☒ Beam-Forming ☐ Other describe:
Type of Equipment	☒ Table Top ☐ Wall-mount ☐ Floor standing cabinet ☐ Other:
Note: 1. All four chains will be on / transmitted at all time. 2.This report only documents the radio characteristics for 2412 – 2462 MHz band.	

Table 16: EUT Channel Power Specifications

Non-Beamforming 1x4 Mode

No.	Frequency (MHz)	Target Power Value dBm					
		802.11b	802.11g	802.11n HT20	802.11n HT40		
1	2412	25.99	25.42	25.97			
3	2422				24.84		
6	2437	23.60	25.99	25.87	25.73		
9	2452				25.98		
11	2462	19.47	25.91	24.75			
Note: The adjusted power target values are updated at the evaluated frequencies.							

Non-Beamforming 4x4 Mode

No.	Frequency (MHz)	Target Power Value dBm					
		802.11b	802.11g	802.11n HT20	802.11n HT40		
1	2412			28.39			
3	2422				28.14		
6	2437			28.35	28.13		
9	2452				28.13		
11	2462			28.18			
Note: 1. The adjusted power target values are updated at the evaluated frequencies. 2. Power values are total power.							

Table 17: 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	☒ No	☒ Metric: 2 m	☐ N/A

Table 18: Supported Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	Dell	Latitude	CN-0C4708-48643-62C-1856	Setup EUT operating channel
Note: None.				

Table 19: Description of Sample used for Testing

Device	Serial	RF Connection	CFR47 Part 15.247
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
Note: N/A			

Table 20: 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

Table 21: Test Specifications

Emissions and Immunity	
Standard	Requirement
CFR 47 Part 15.247: 2018	All
RSS 247 Issue 2, 2017	All

END OF REPORT