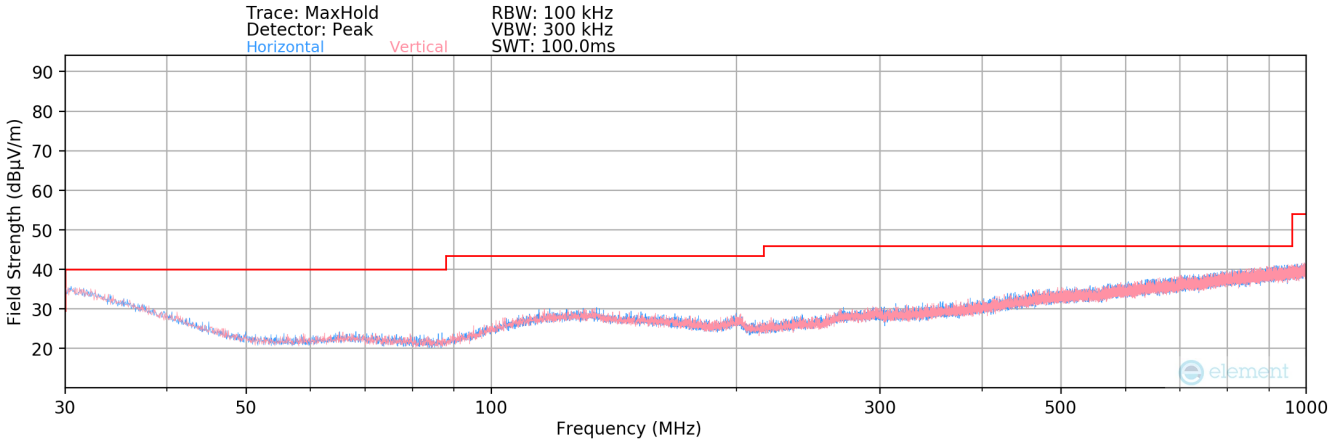
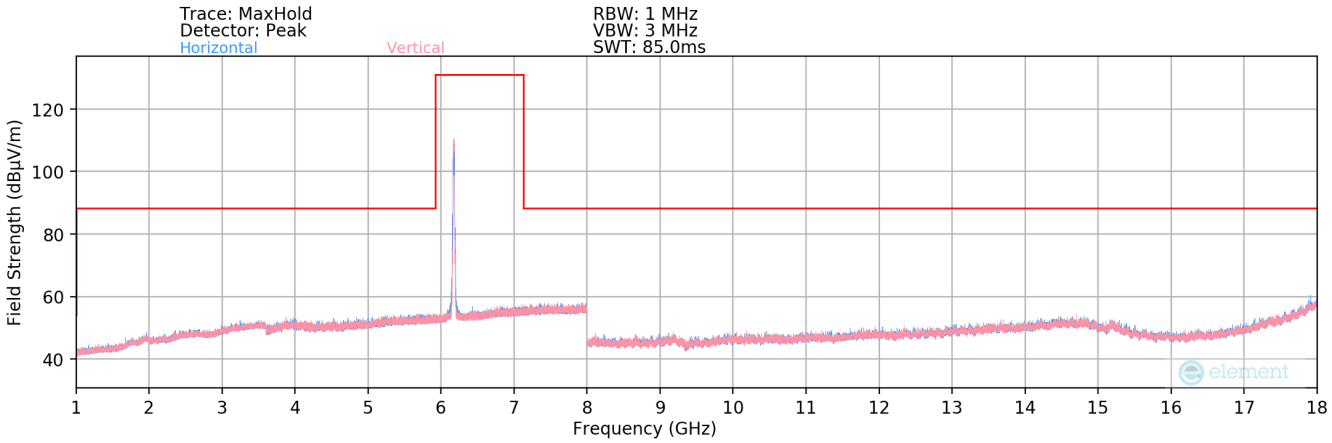
7.7.1 MIMO Radiated Spurious Emission Measurements



Plot 7-208. Radiated Spurious Plot below 1GHz MIMO (802.11a)

Mode	Antenna	UNII Band	Channel	Test Channel Freq	Restricted	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
802.11a	MIMO	7	149	6695		60.00	Quasi-Peak	H	-	-	-96.43	27.01	37.58	46.02	-8.44

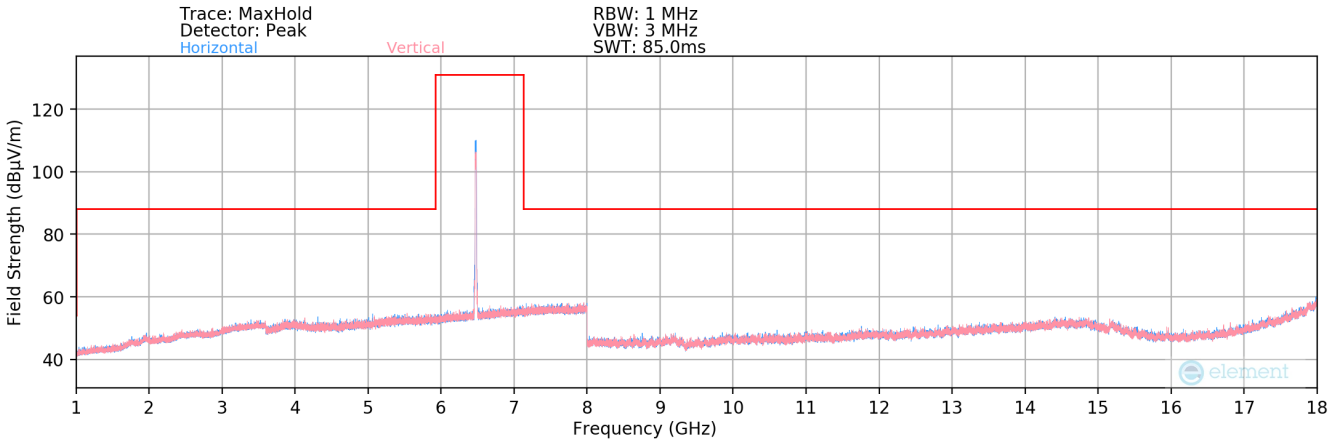
Table 7-46. Radiated Measurements MIMO – LPI&SP



Plot 7-209. Radiated Spurious Plot 1GHz – 18GHz MIMO (802.11a – UNII Band 5 Ch. 45 – LPI&SP)

Mode	Antenna	UNII Band	Channel	Test Channel Freq. [MHz]	Restricted	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
802.11a	MIMO	5	2	5935	*	11870.00	Average	H	163	193	-81.62	18.86	0.00	44.24	53.98	-9.74
					*	11870.00	Peak	H	163	193	-70.00	18.86	0.00	55.86	73.98	-18.12
					*	17805.00	Average	H	-	-	-82.81	26.16	0.00	50.35	53.98	-3.63
					*	17805.00	Peak	H	-	-	-71.49	26.16	0.00	61.67	73.98	-12.31
					*	23740.00	Average	H	-	-	-66.61	3.58	-9.54	34.43	53.98	-19.55
					*	23740.00	Peak	H	-	-	-57.00	3.58	-9.54	44.04	73.98	-29.94
						29675.00	Peak	H	-	-	-57.36	5.33	-9.54	45.42	68.20	-22.78
			45	6175	*	12350.00	Average	H	-	-	-81.76	19.23	0.00	44.47	53.98	-9.51
					*	12350.00	Peak	H	-	-	-70.76	19.23	0.00	55.47	73.98	-18.51
					*	18525.00	Average	H	-	-	-64.71	1.16	-9.54	33.91	53.98	-20.07
					*	18525.00	Peak	H	-	-	-56.42	1.16	-9.54	42.21	73.98	-31.77
						24700.00	Peak	H	-	-	-55.73	3.72	-9.54	45.45	68.20	-22.75
						30875.00	Peak	H	-	-	-57.42	6.32	-9.54	46.37	68.20	-21.83
			93	6415		12830.00	Peak	H	136	196	-69.40	20.14	0.00	57.74	68.20	-10.46
					*	19245.00	Average	H	-	-	-64.24	1.84	-9.54	35.06	53.98	-18.92
					*	19245.00	Peak	H	-	-	-56.49	1.84	-9.54	42.81	73.98	-31.17
						25660.00	Peak	H	-	-	-57.41	3.90	-9.54	43.96	68.20	-24.24
						32075.00	Peak	H	-	-	-57.21	6.64	-9.54	46.89	68.20	-21.31

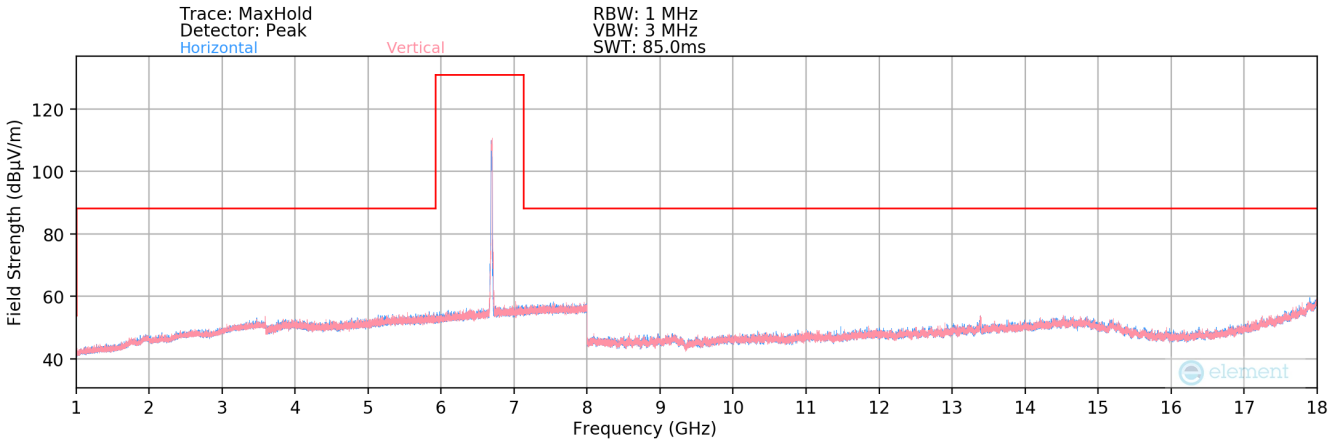
Table 7-47. Radiated Measurements MIMO – LPI&SP



Plot 7-210. Radiated Spurious Plot 1GHz – 18GHz MIMO (802.11a – UNII Band 6 Ch. 105 – LPI)

Mode	Antenna	UNII Band	Channel	Test Channel Freq. [MHz]	Restricted	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
802.11a	MIMO	6	97	6435		12870.00	Peak	H	-	-	-70.62	20.06	0.00	56.44	68.20	-11.76
					*	19305.00	Average	H	-	-	-65.99	1.64	-9.54	33.12	53.98	-20.86
					*	19305.00	Peak	H	-	-	-55.10	1.64	-9.54	44.01	73.98	-29.97
						25740.00	Peak	H	-	-	-56.58	3.84	-9.54	44.72	68.20	-23.48
						32175.00	Peak	H	-	-	-58.11	6.80	-9.54	46.15	68.20	-22.05
			105	6475		12950.00	Peak	H	-	-	-71.17	20.00	0.00	55.83	68.20	-12.37
					*	19425.00	Average	H	-	-	-65.39	1.80	-9.54	33.87	53.98	-20.11
					*	19425.00	Peak	H	-	-	-56.77	1.80	-9.54	42.50	73.98	-31.48
						25900.00	Peak	H	-	-	-57.00	4.24	-9.54	44.69	68.20	-23.51
						32375.00	Peak	H	-	-	-57.49	6.46	-9.54	46.43	68.20	-21.77
			113	6515		13030.00	Peak	H	-	-	-71.29	20.37	0.00	56.08	68.20	-12.12
					*	19545.00	Average	H	-	-	-67.00	1.84	-9.54	32.30	53.98	-21.68
					*	19545.00	Peak	H	-	-	-55.89	1.84	-9.54	43.41	73.98	-30.57
						26060.00	Peak	H	-	-	-56.49	4.18	-9.54	45.15	68.20	-23.05
						32575.00	Peak	H	-	-	-57.37	6.18	-9.54	46.27	68.20	-21.93

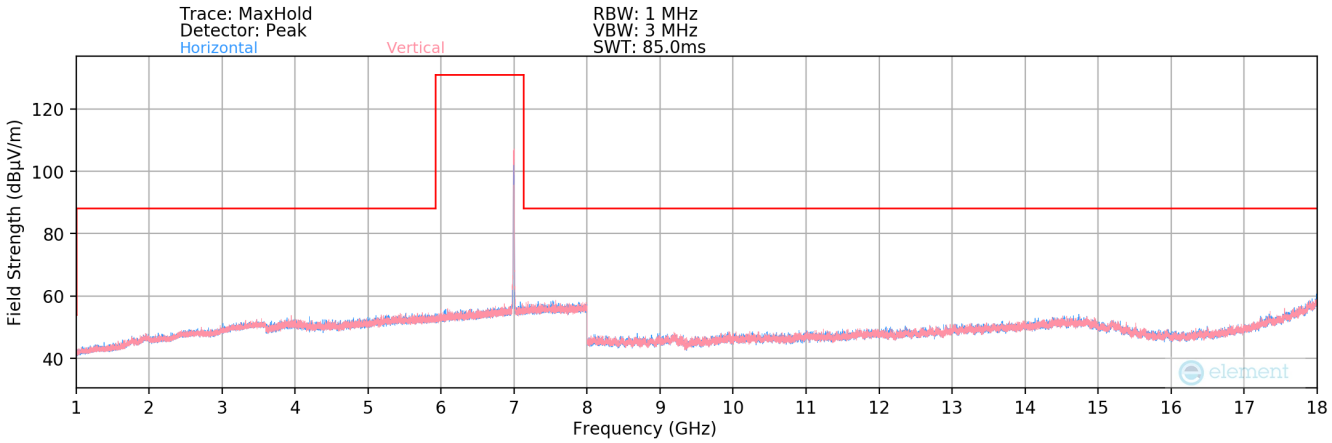
Table 7-48. Radiated Measurements MIMO – LPI



Plot 7-211. Radiated Spurious Plot 1GHz – 18GHz MIMO (802.11a – UNII Band 7 Ch. 149 – LPI&SP)

Mode	Antenna	UNII Band	Channel	Test Channel Freq. [MHz]	Restricted	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
802.11a	MIMO	7	117	6535		13070.00	Peak	H	134	197	-70.21	20.29	0.00	57.08	68.20	-11.12
					*	19605.00	Average	H	-	-	-64.63	2.38	-9.54	35.21	53.98	-18.77
					*	19605.00	Peak	H	-	-	-56.47	2.38	-9.54	43.37	73.98	-30.61
						26140.00	Peak	H	-	-	-56.70	4.03	-9.54	44.78	68.20	-23.42
						32675.00	Peak	H	-	-	-57.41	6.46	-9.54	46.50	68.20	-21.70
			149	6695	*	13390.00	Average	H	130	205	-80.23	20.77	0.00	47.54	53.98	-6.44
					*	13390.00	Peak	H	130	205	-69.01	20.02	0.00	58.01	73.98	-15.97
					*	20085.00	Average	H	-	-	-64.70	2.58	-9.54	35.34	53.98	-18.64
					*	20085.00	Peak	H	-	-	-56.31	2.58	-9.54	43.73	73.98	-30.25
						26780.00	Peak	H	-	-	-57.10	4.33	-9.54	44.69	68.20	-23.51
						33475.00	Peak	H	-	-	-56.56	6.96	-9.54	47.86	68.20	-20.34
			185	6875		13750.00	Peak	H	166	209	-70.57	21.34	0.00	57.77	68.20	-10.43
					*	20625.00	Average	H	-	-	-65.00	3.01	-9.54	35.46	53.98	-18.52
					*	20625.00	Peak	H	-	-	-57.30	3.01	-9.54	43.17	73.98	-30.81
						27500.00	Peak	H	-	-	-57.05	3.97	-9.54	44.39	68.20	-23.81
						34375.00	Peak	H	-	-	-57.12	7.33	-9.54	47.67	68.20	-20.53

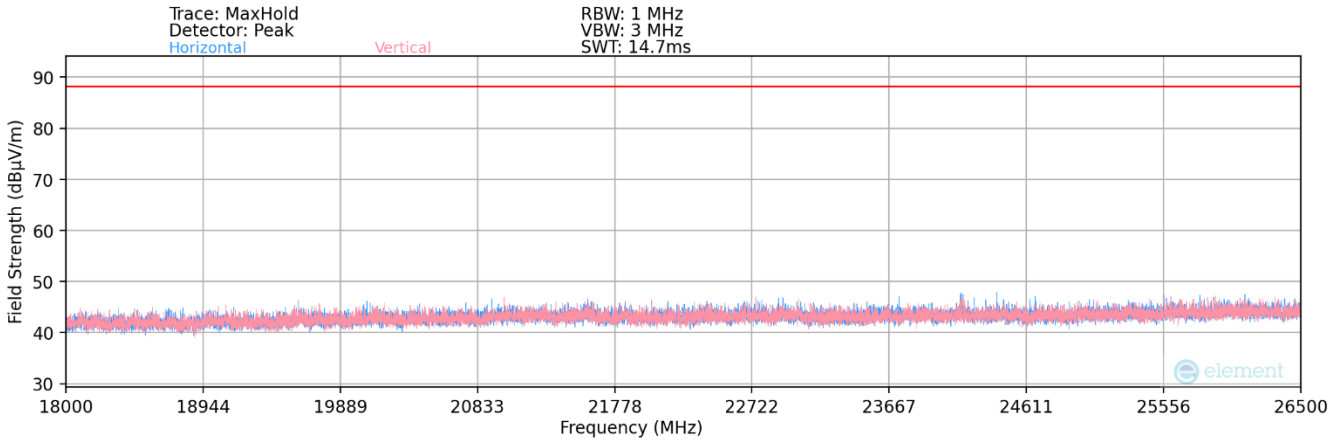
Table 7-49. Radiated Measurements MIMO – LPI&SP



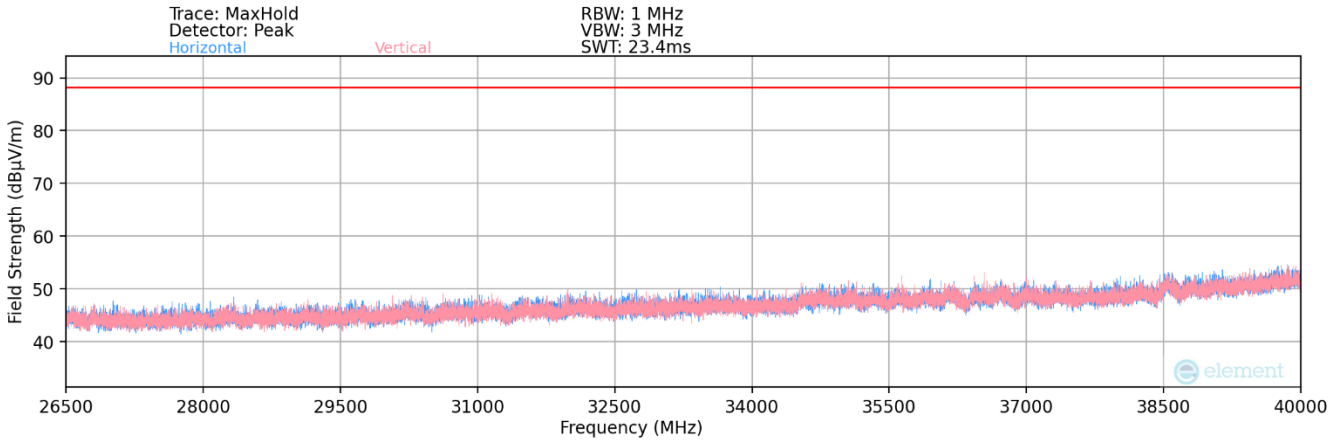
Plot 7-212. Radiated Spurious Plot 1GHz – 18GHz MIMO (802.11a – U Band 8 Ch. 209 – LPI)

Mode	Antenna	UNII Band	Channel	Test Channel Freq. [MHz]	Restricted	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
802.11a	MIMO	8	189	6895		13790.00	Peak	H	-	-	-71.17	21.59	0.00	57.42	68.20	-10.78
					*	20685.00	Average	H	-	-	-65.34	3.01	-9.54	35.14	53.98	-18.84
					*	20685.00	Peak	H	-	-	-57.01	3.01	-9.54	43.46	73.98	-30.52
						27580.00	Peak	H	-	-	-55.16	4.40	-9.54	46.70	68.20	-21.50
						34475.00	Peak	H	-	-	-56.60	7.31	-9.54	48.17	68.20	-20.03
			209	6995		13990.00	Peak	H	-	-	-71.06	21.24	0.00	57.18	68.20	-11.02
					*	20985.00	Average	H	-	-	-65.33	3.27	-9.54	35.40	53.98	-18.58
					*	20985.00	Peak	H	-	-	-56.71	3.27	-9.54	44.01	73.98	-29.97
						27980.00	Peak	H	-	-	-56.45	4.40	-9.54	45.41	68.20	-22.79
						34975.00	Peak	H	-	-	-56.81	7.79	-9.54	48.43	68.20	-19.77
			233	7115		14230.00	Peak	H	-	-	-71.33	21.94	0.00	57.61	68.20	-10.59
					*	21345.00	Average	H	-	-	-65.46	3.57	-9.54	35.57	53.98	-18.41
					*	21345.00	Peak	H	-	-	-56.03	3.57	-9.54	45.01	73.98	-28.97
						28460.00	Peak	H	-	-	-57.26	5.01	-9.54	45.21	68.20	-22.99
						35575.00	Peak	H	-	-	-57.08	7.78	-9.54	48.16	68.20	-20.04

Table 7-50. Radiated Measurements MIMO – LPI



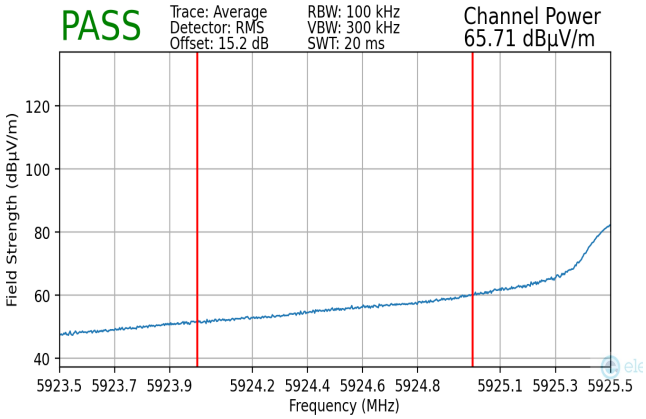
Plot 7-213. Radiated Spurious Plot 18GHz - 26.5GHz (802.11a)



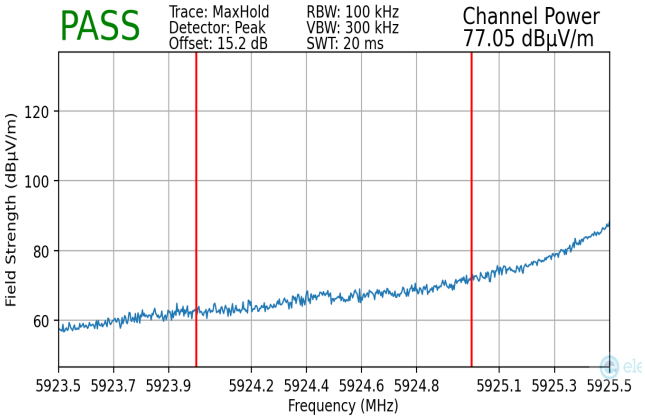
Plot 7-214. Radiated Spurious Plot 26.5GHz - 40GHz (802.11a)

7.7.2 MIMO Radiated Band Edge Measurements (20MHz BW)

Worst Case Mode:	802.11be
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5935MHz
Channel:	2

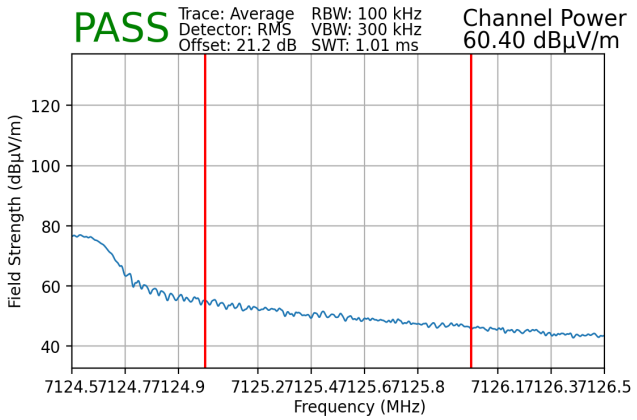


Plot 7-215. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 5)

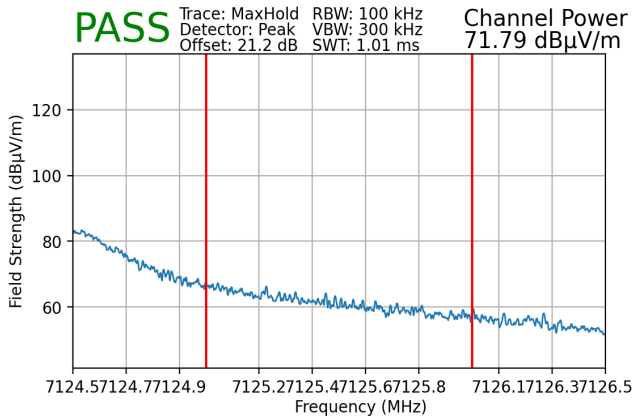


Plot 7-216. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 5)

Worst Case Mode:	802.11be
Worst Case Transfer Rate:	MSC0
Distance of Measurements:	3 Meters
Operating Frequency:	7115MHz
Channel:	233



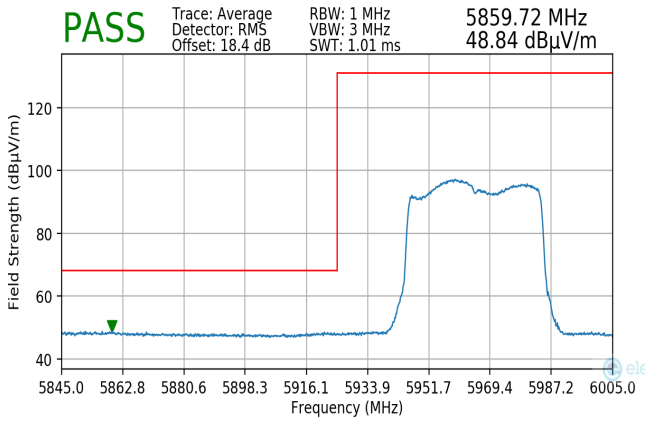
Plot 7-217. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 8)



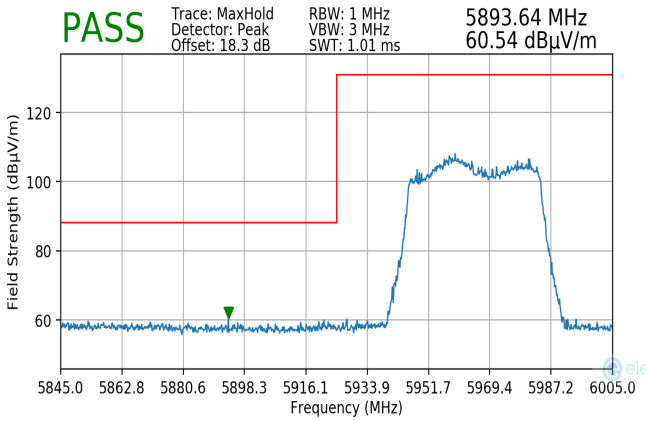
Plot 7-218. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 8)

7.7.3 MIMO Radiated Band Edge Measurements (40MHz BW)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5965MHz
Channel:	3

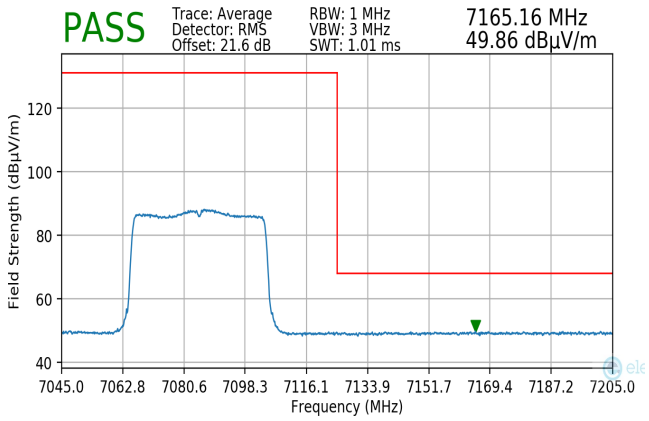


Plot 7-219. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 5)

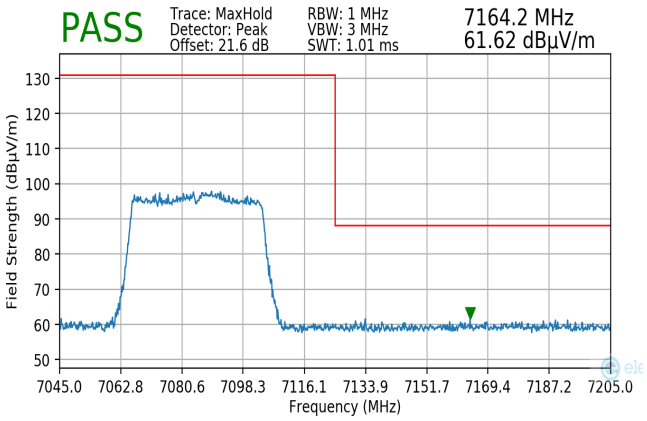


Plot 7-220. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 5)

Worst Case Mode:	802.11be
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	7085MHz
Channel:	227



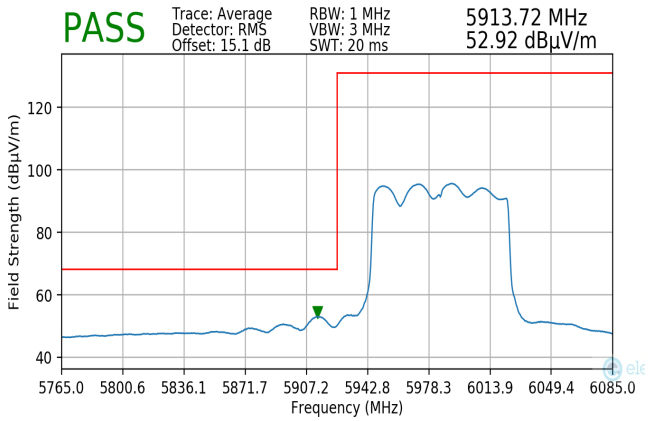
Plot 7-221. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 8)



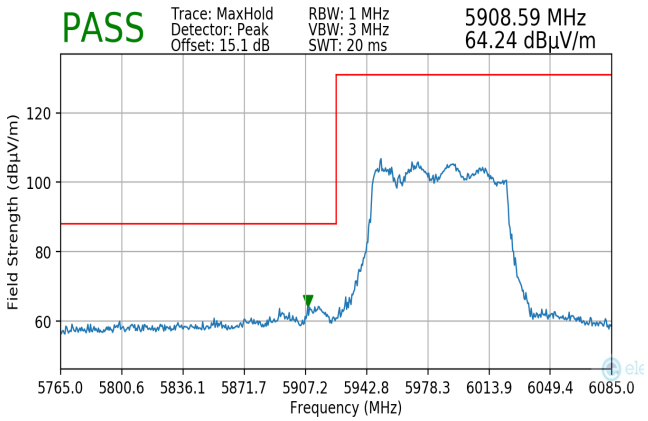
Plot 7-222. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 8)

7.7.4 MIMO Radiated Band Edge Measurements (80MHz BW)

Worst Case Mode:	802.11be
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5985MHz
Channel:	7

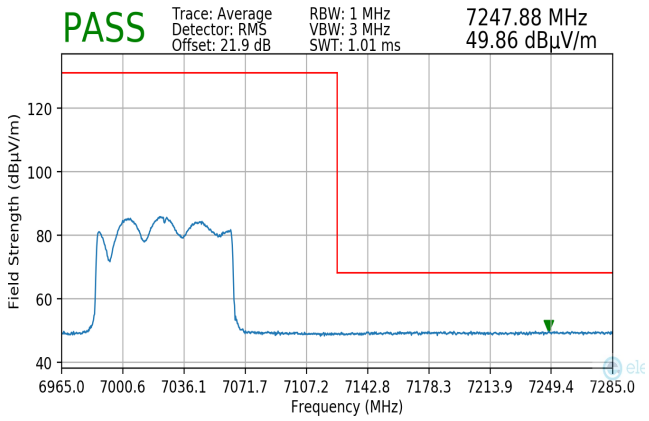


Plot 7-223. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 5)

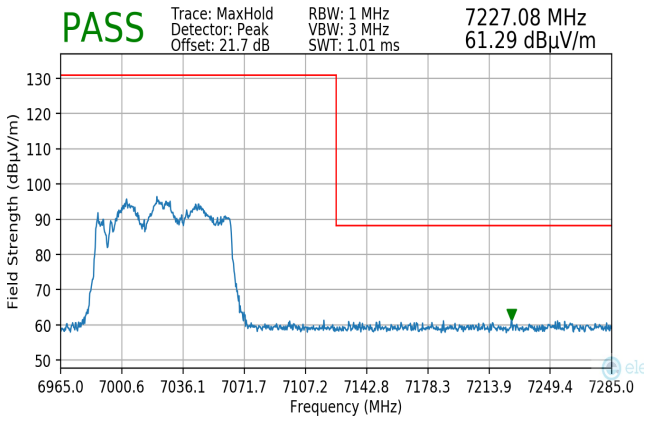


Plot 7-224. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 5)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	7025MHz
Channel:	215



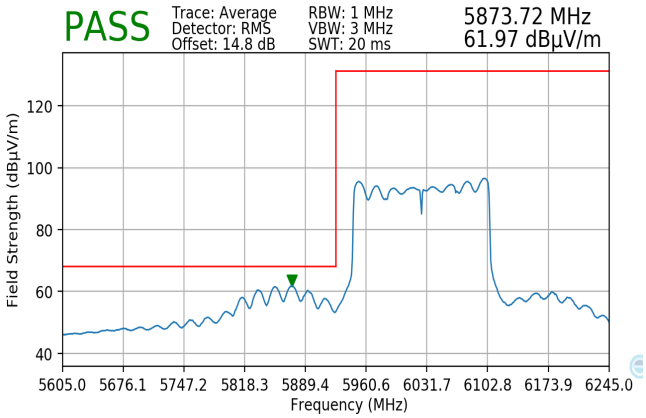
Plot 7-225. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 8)



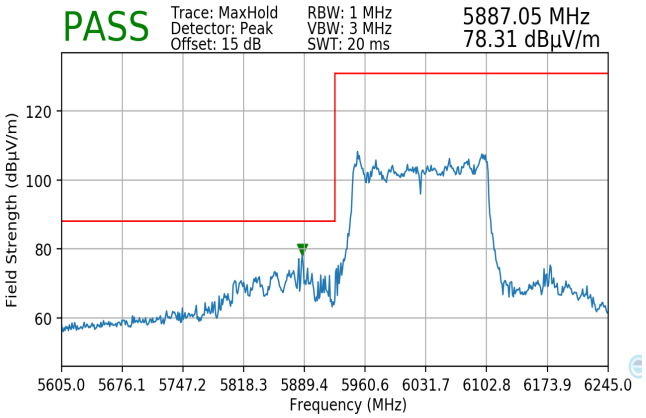
Plot 7-226. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 8)

7.7.5 MIMO Radiated Band Edge Measurements (160MHz BW)

Worst Case Mode:	802.11be
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	6025MHz
Channel:	15

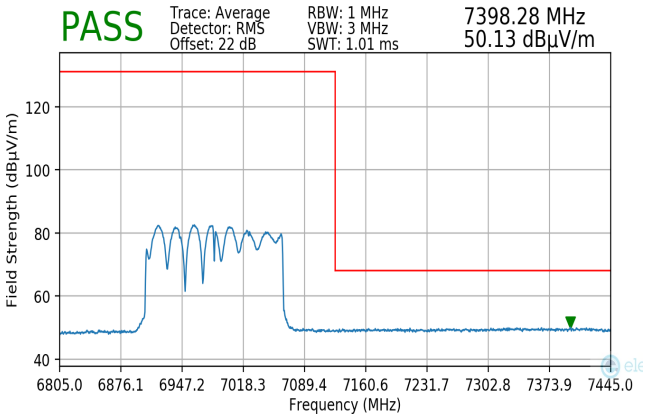


Plot 7-227. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 5)

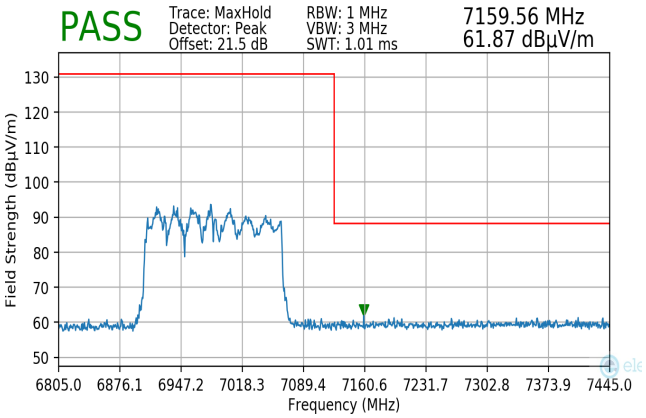


Plot 7-228. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 5)

Worst Case Mode:	802.11be
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	6985MHz
Channel:	207



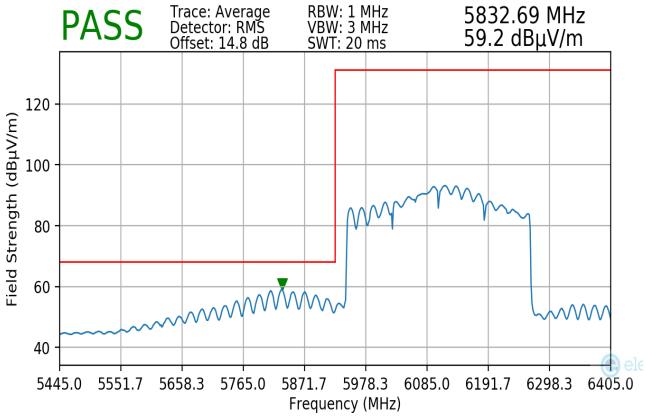
Plot 7-229. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 8)



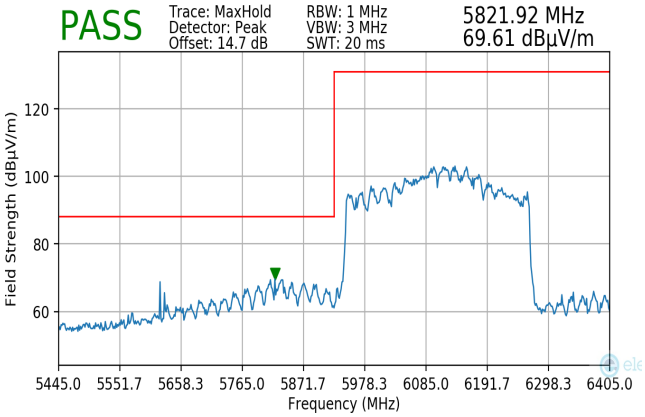
Plot 7-230. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 8)

7.7.6 MIMO Radiated Band Edge Measurements (320MHz BW)

Worst Case Mode:	802.11be
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	6105MHz
Channel:	31

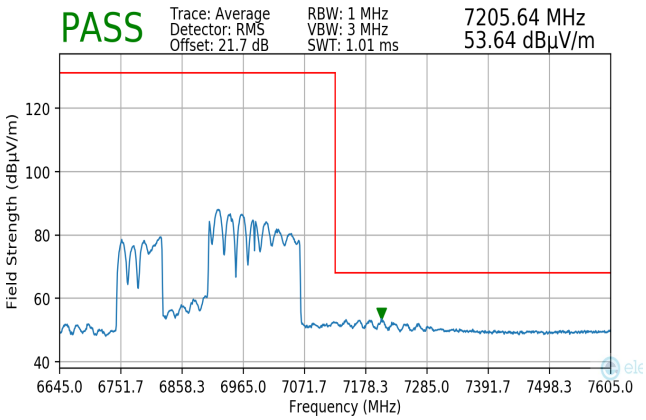


Plot 7-231. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 5)

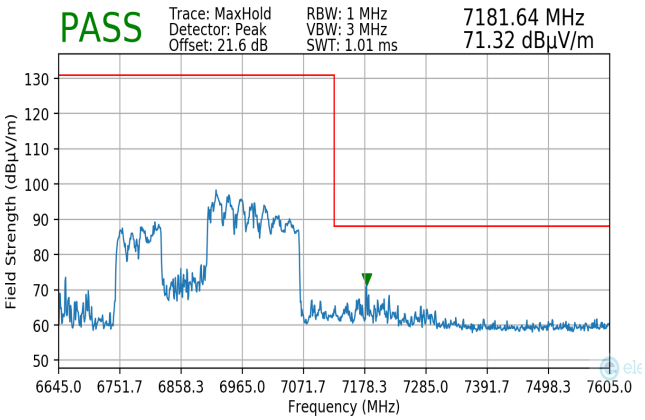


Plot 7-232. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 5)

Worst Case Mode:	802.11be
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	6905MHz
Channel:	191



Plot 7-233. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 8)



Plot 7-234. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 8)

7.8 Line Conducted Test Data

Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst-case emissions are reported in this section.

All conducted emissions must not exceed the limits shown in the table below, per Section 15.207.

Frequency of emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

Table 7-51. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.10-2013, Section 6.2

Test Settings

Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest.
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize.

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest.
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = RMS
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

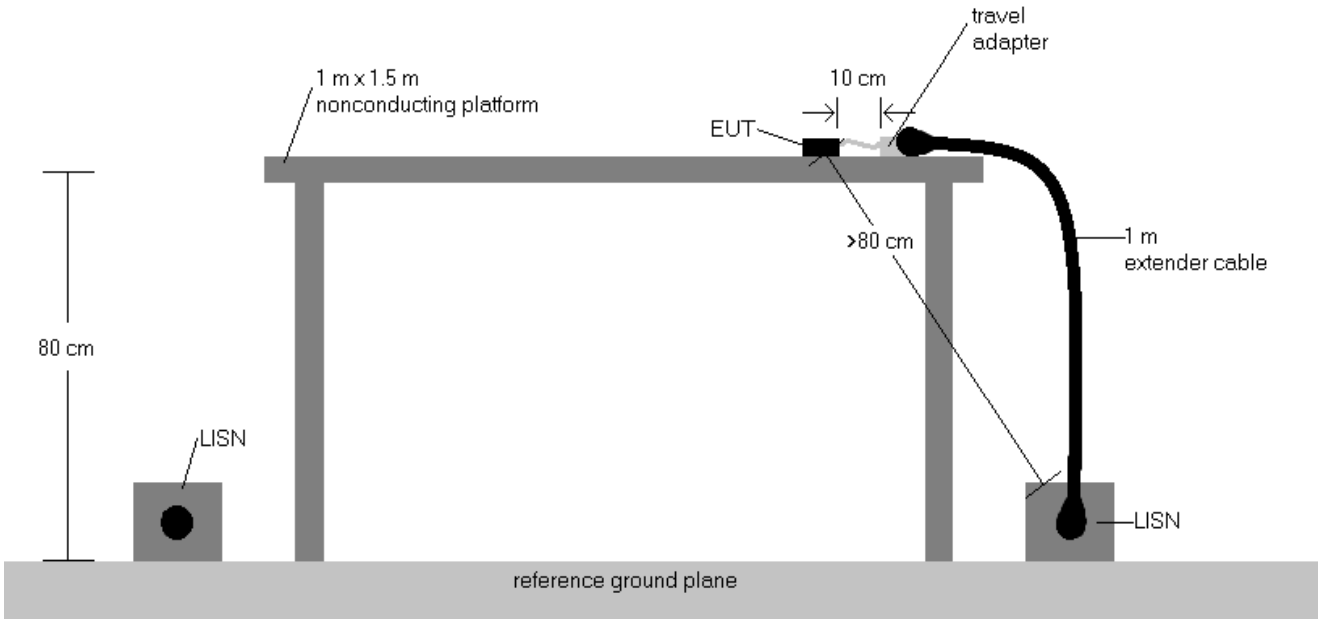
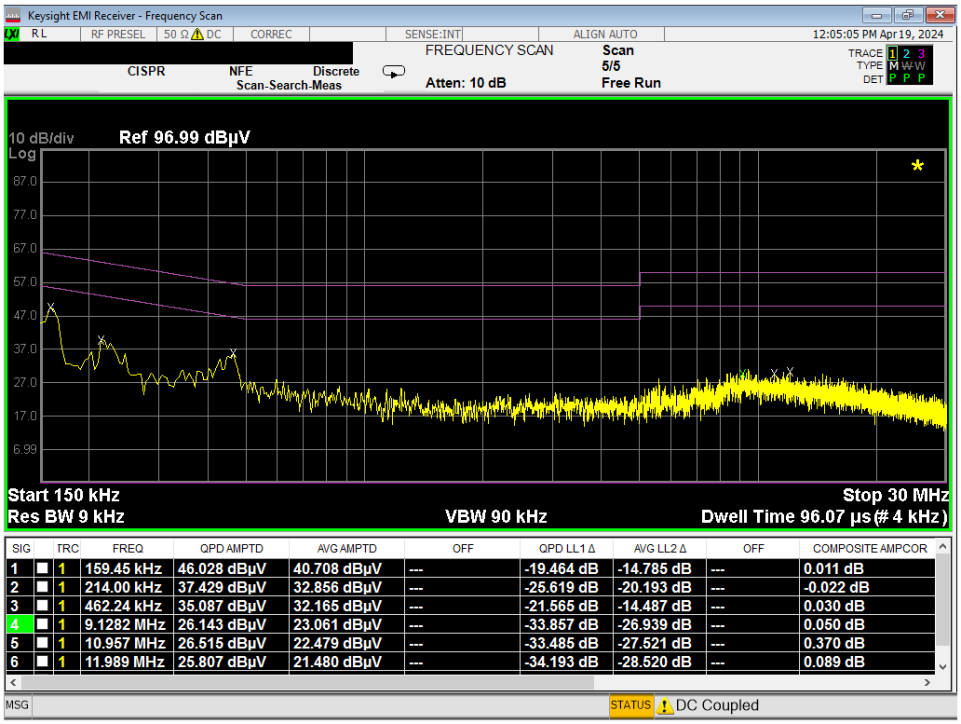


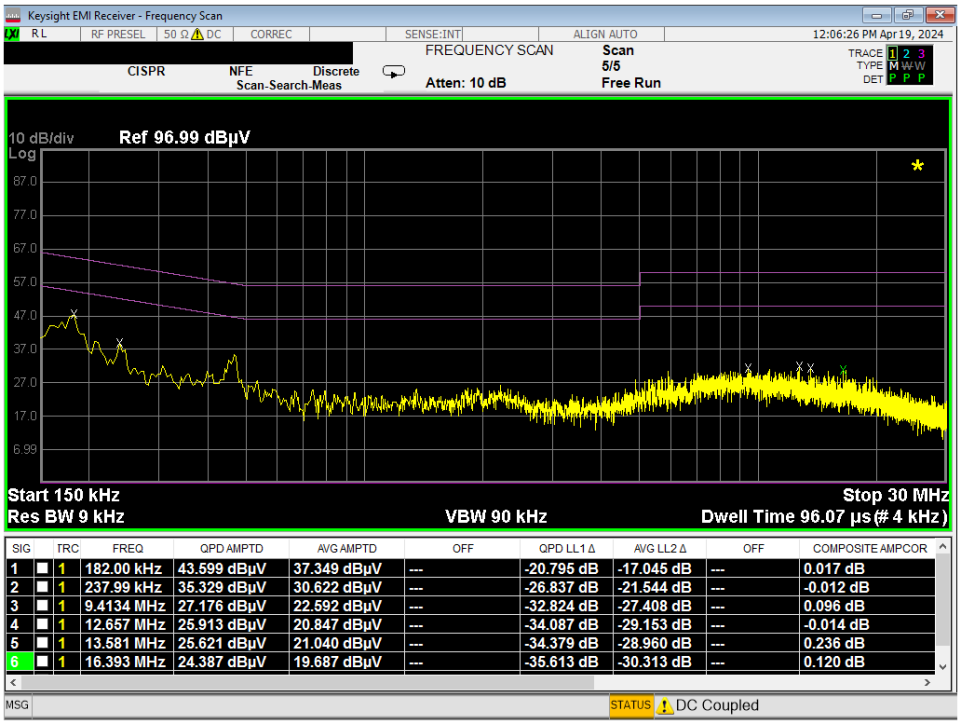
Figure 7-9. Test Instrument & Measurement Setup

Test Notes

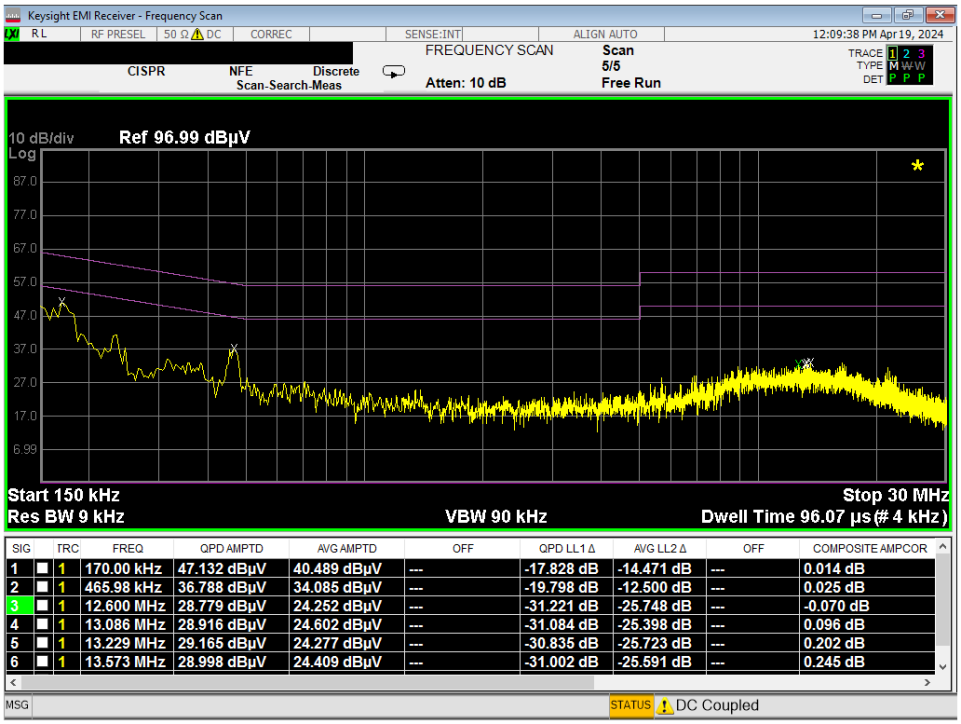
1. All modes of operation were investigated, and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
2. The limit for an intentional radiator from 150kHz to 30MHz is specified in 15.207.
3. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
4. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
5. Margin (dB) = QP/AV Limit (dBμV) - QP/AV Level (dBμV)
6. Traces shown in plot are made using a peak detector.
7. Deviations to the Specifications: None.



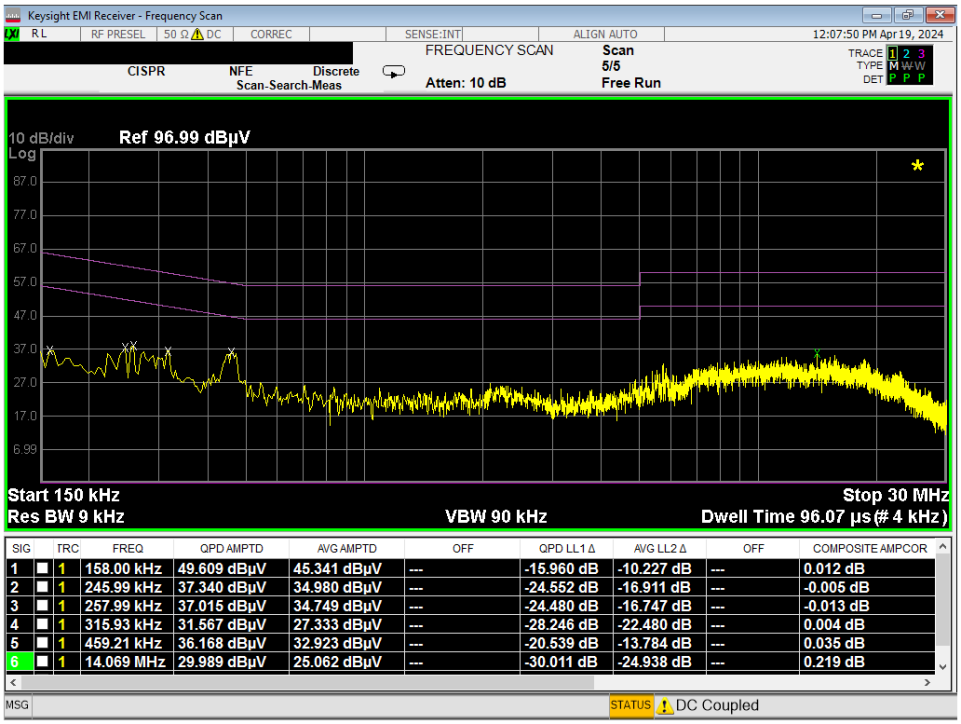
Plot 7-235. Line Conducted Plot with 802.11a UNII Band 5 (L1)



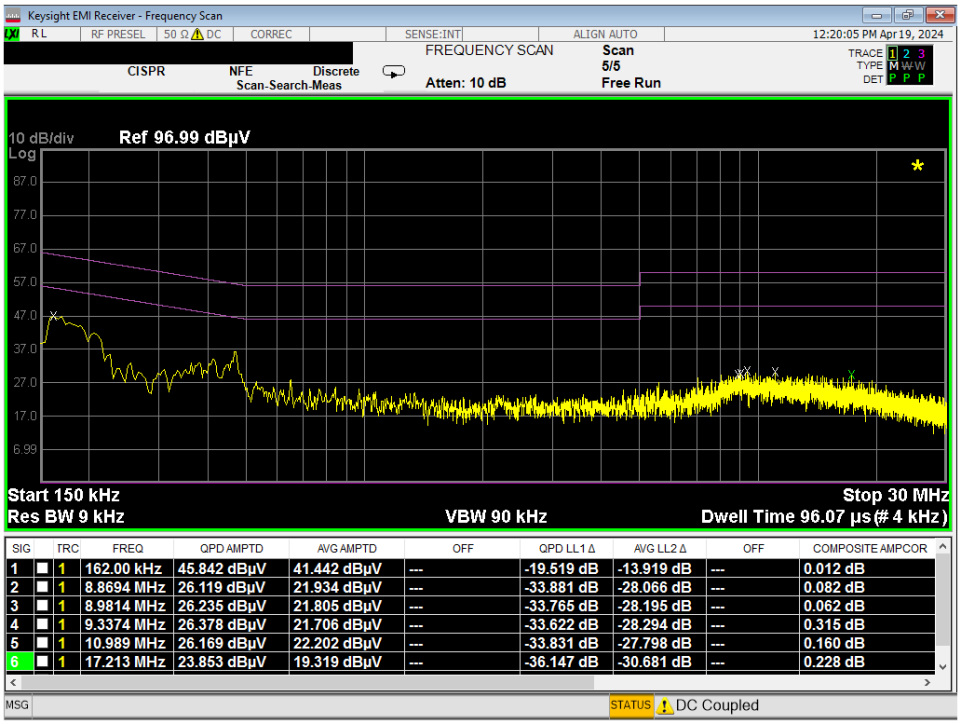
Plot 7-236. Line Conducted Plot with 802.11a UNII Band 5 (N)



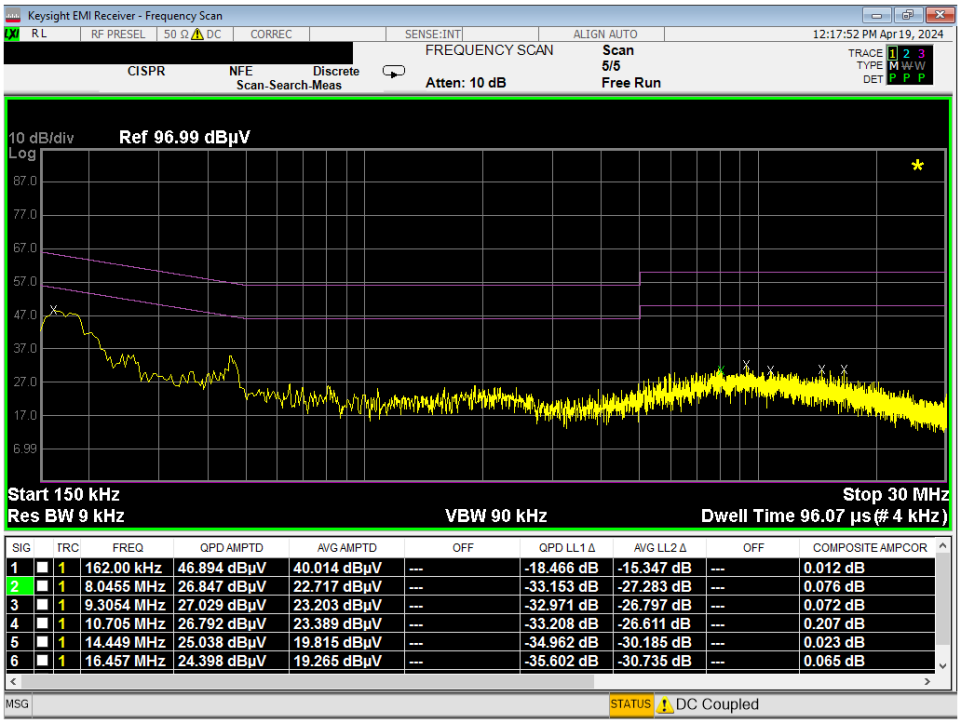
Plot 7-237. Line Conducted Plot with 802.11a UNII Band 6 (L1)



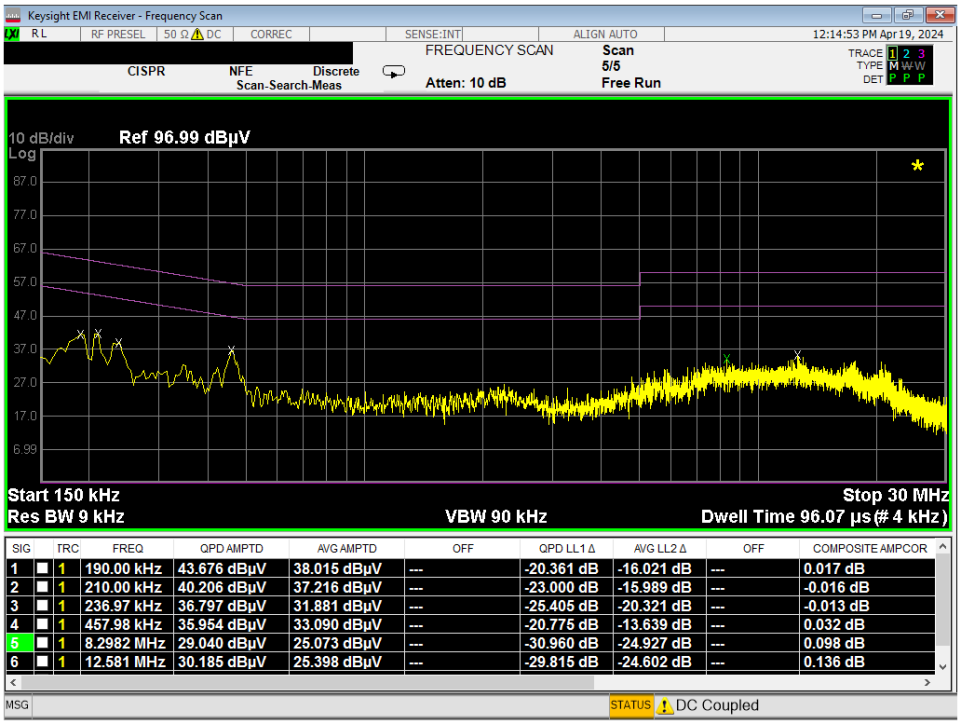
Plot 7-238. Line Conducted Plot with 802.11a UNII Band 6 (N)



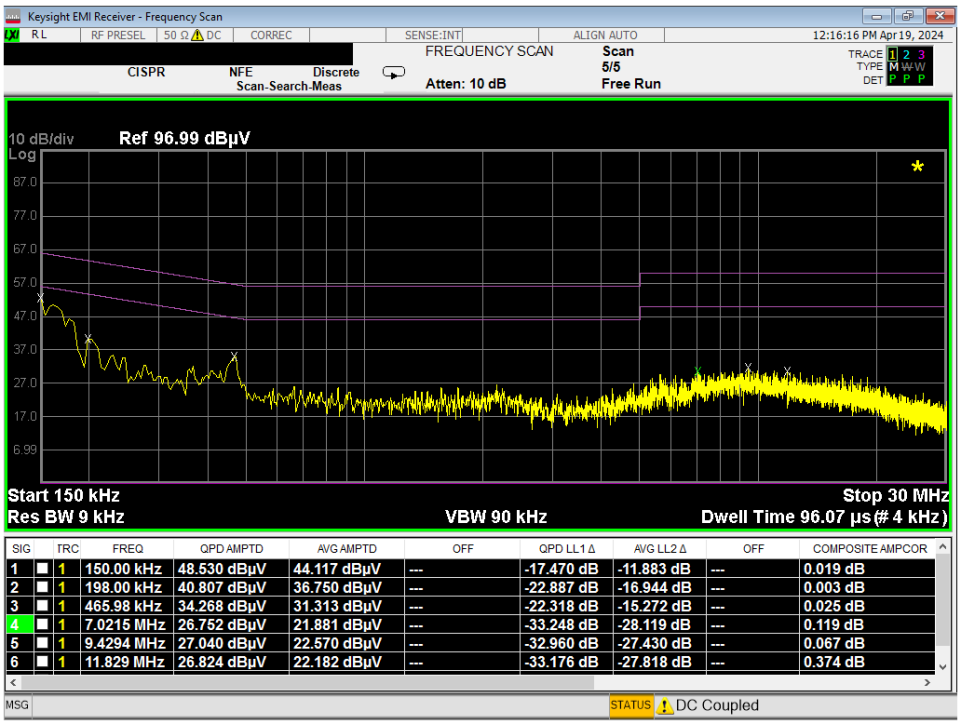
Plot 7-239. Line Conducted Plot with 802.11a UNII Band 7 (L1)



Plot 7-240. Line Conducted Plot with 802.11a UNII Band 7 (N)



Plot 7-241. Line Conducted Plot with 802.11a UNII Band 8 (L1)



Plot 7-242. Line Conducted Plot with 802.11a UNII Band 8 (N)

8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Portable Computing Device FCC ID: A3LNP960XMA** is in compliance with Part 15.407 of the FCC rules.