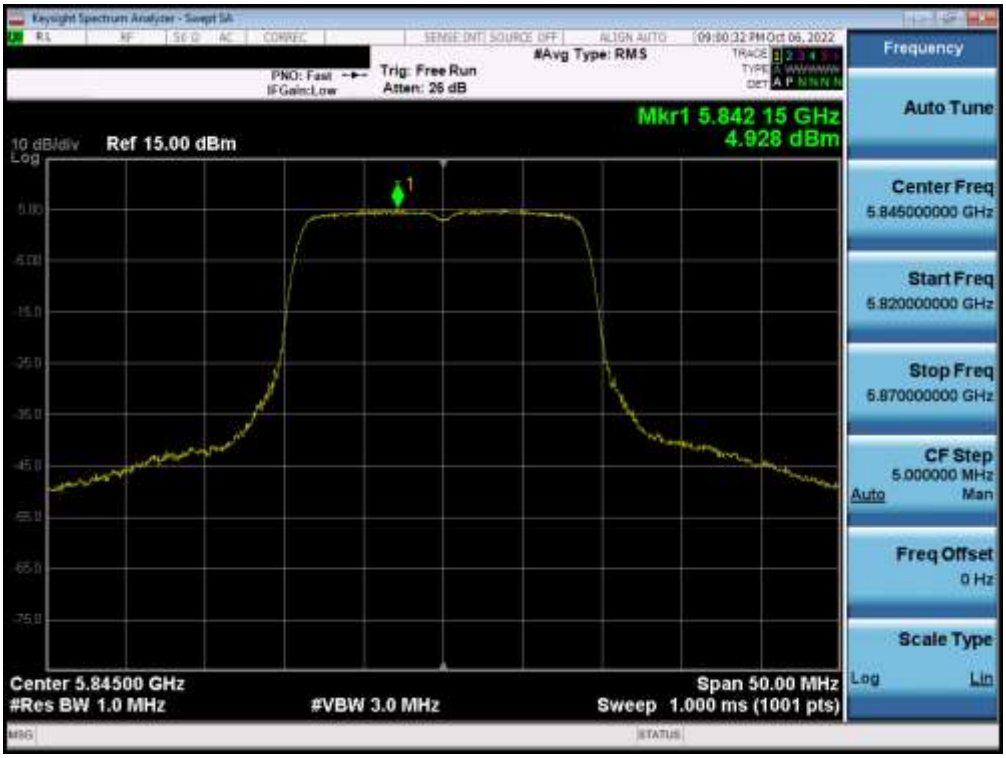
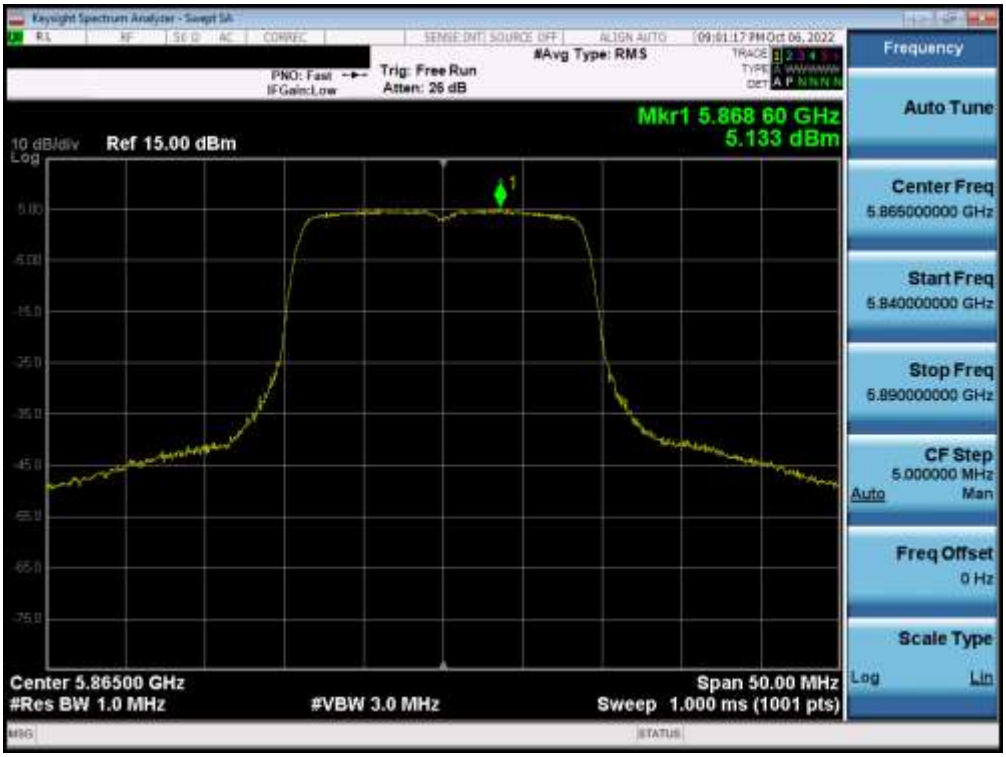


Plot 7-331. Power Spectral Density Plot MIMO ANT2 (802.11a (UNII Band 3/4) – Ch. 169)



Plot 7-332. Power Spectral Density Plot MIMO ANT2 (802.11a (UNII Band 4) – Ch. 173)

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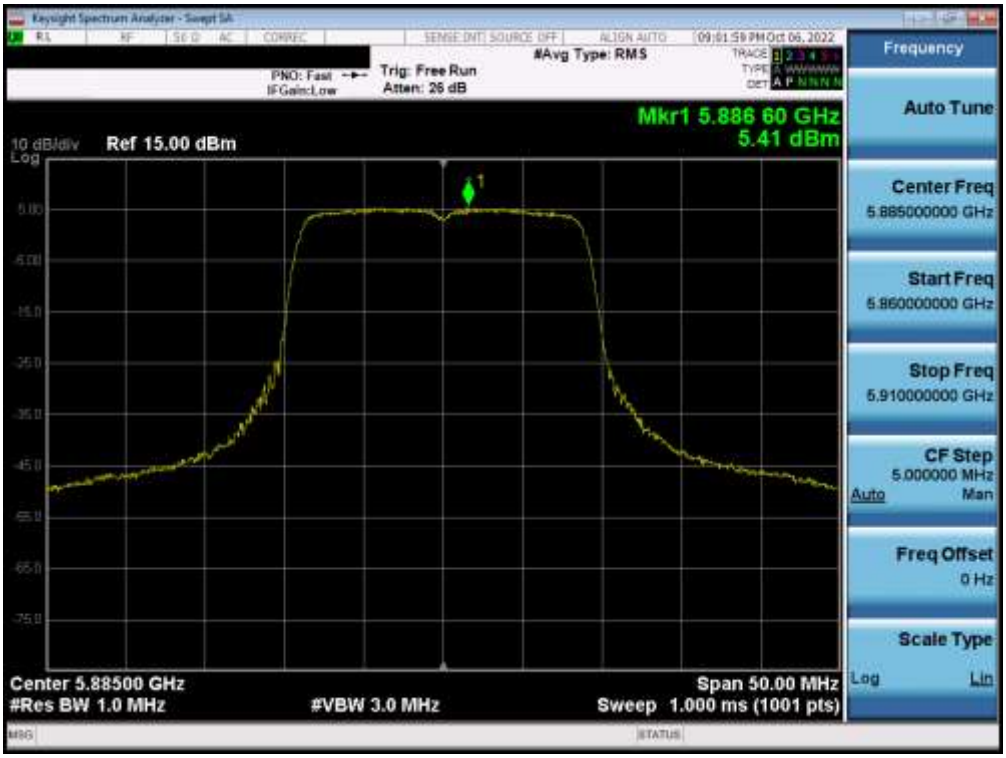
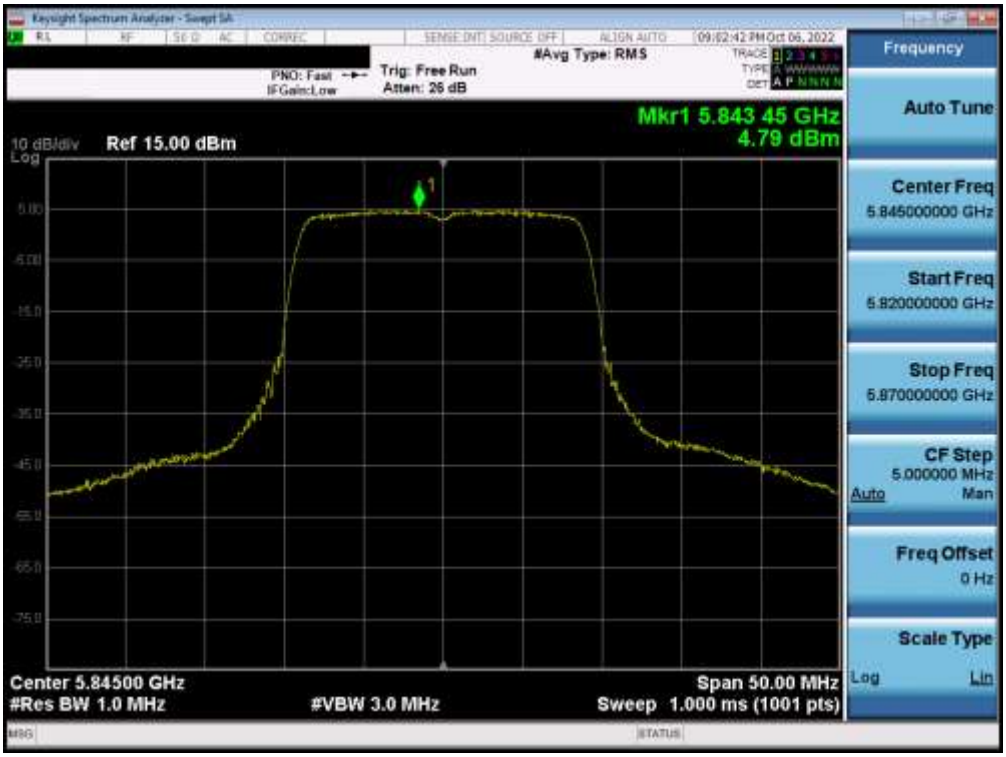


Plot 7-333. Power Spectral Density Plot MIMO ANT2 (802.11a (UNII Band 4) – Ch. 177)



Plot 7-334. Power Spectral Density Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 3/4) – Ch. 169)

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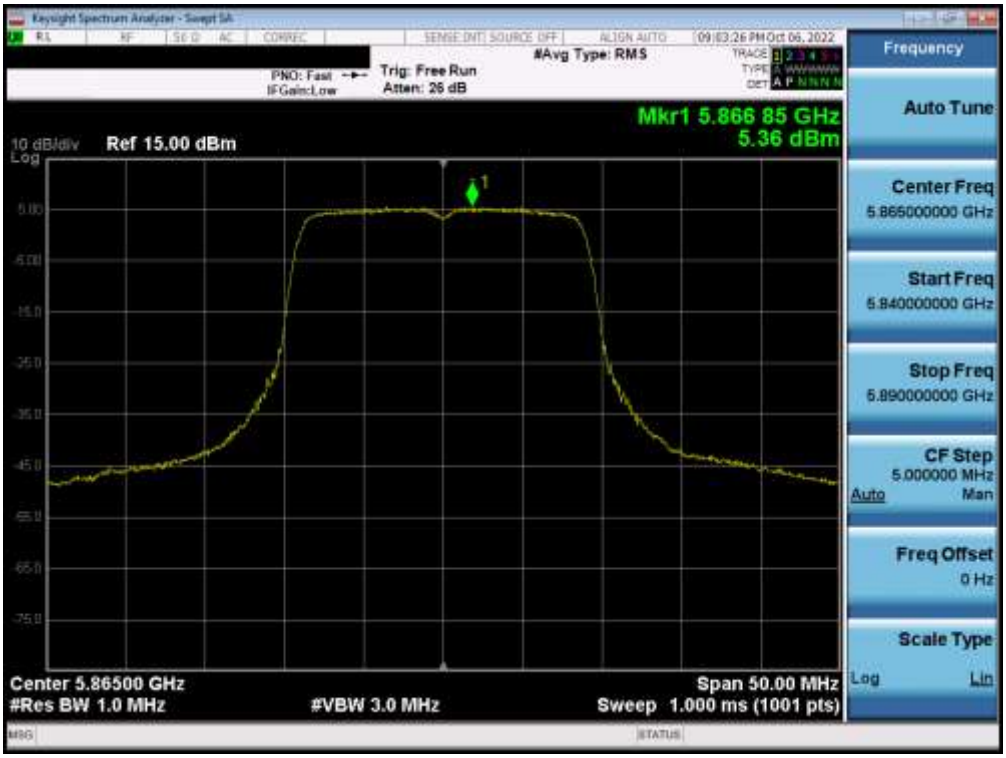
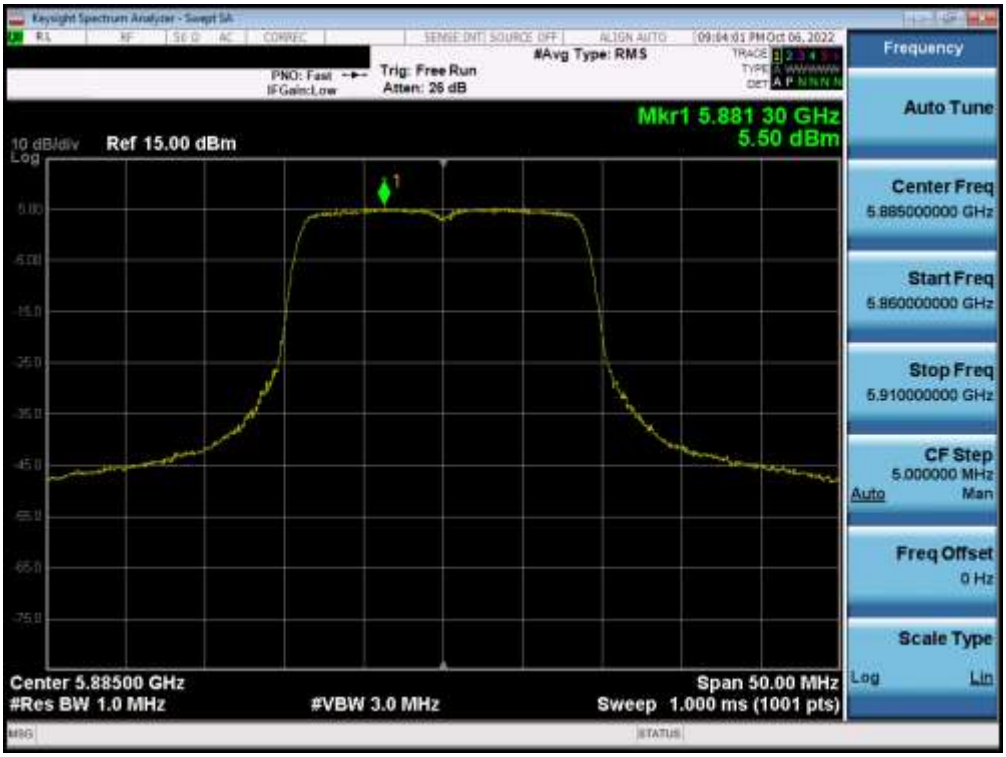


Plot 7-335. Power Spectral Density Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 4) – Ch. 173)



Plot 7-336. Power Spectral Density Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 4) – Ch. 177)

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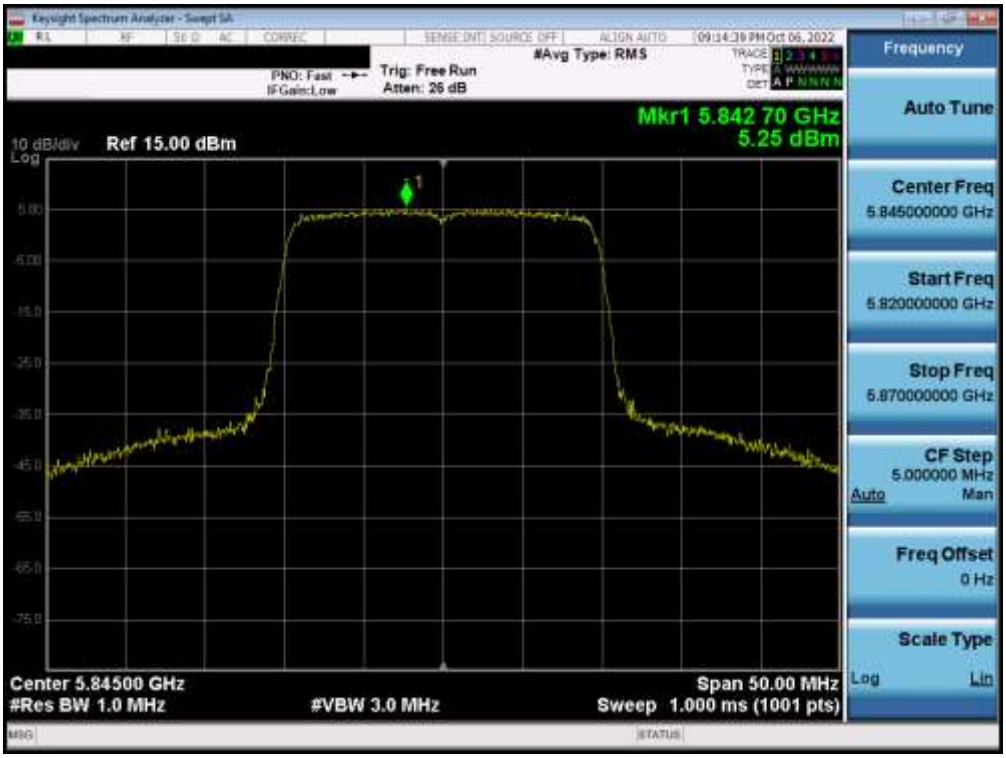
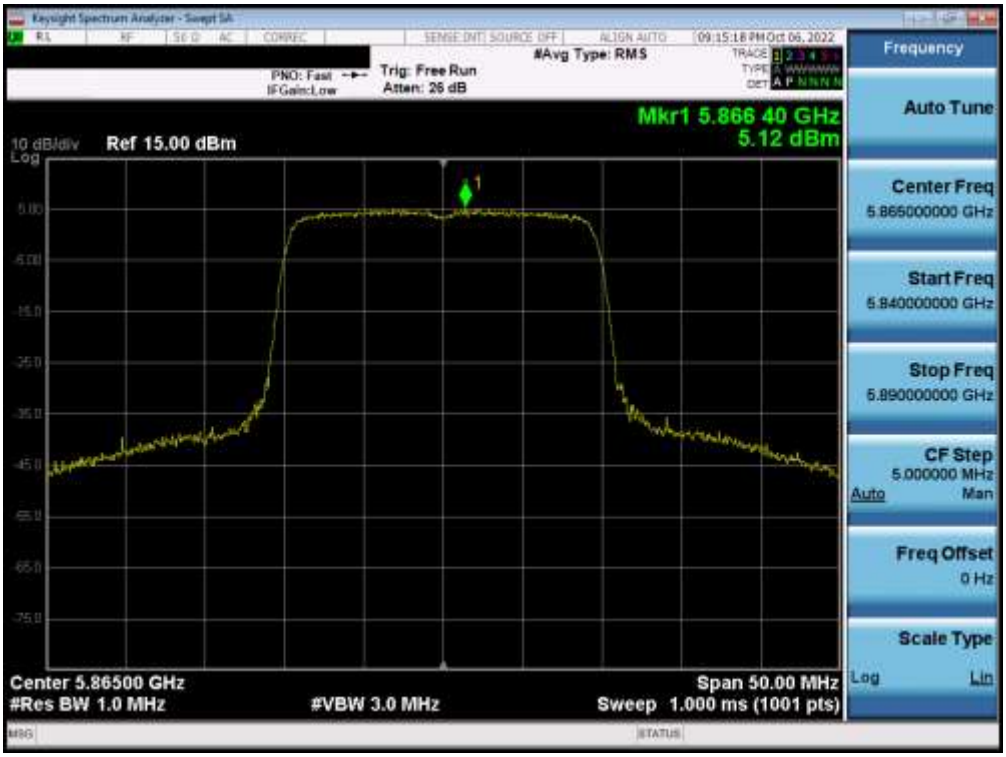


Plot 7-337. Power Spectral Density Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 3/4) – Ch. 169)



Plot 7-338. Power Spectral Density Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 4) – Ch. 173)

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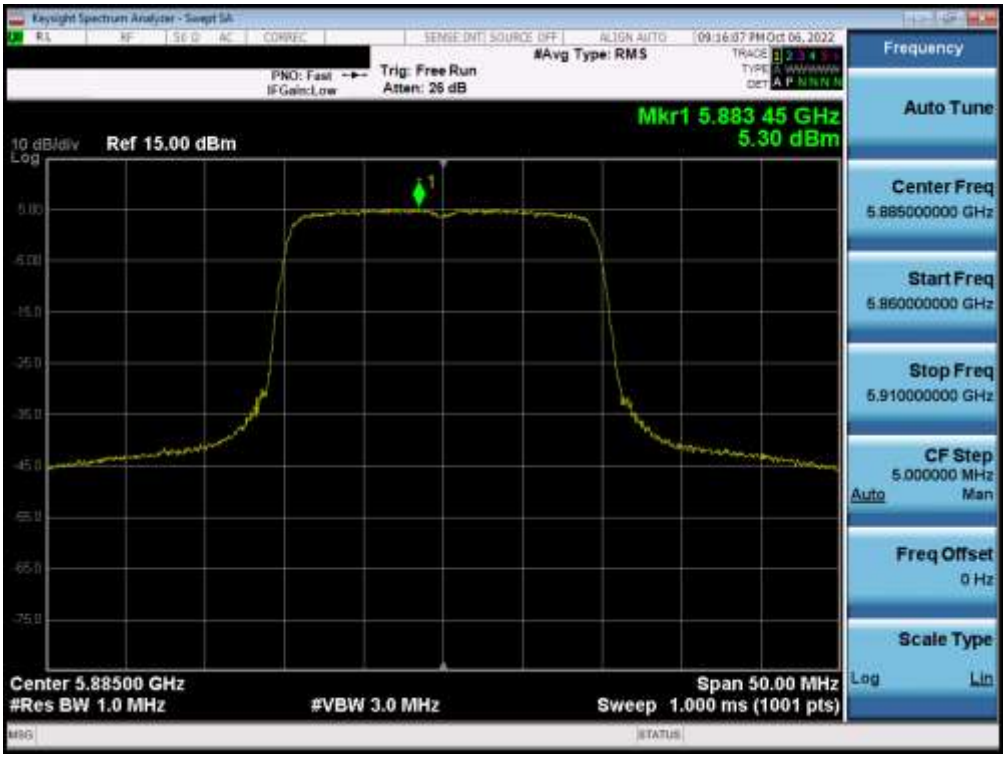
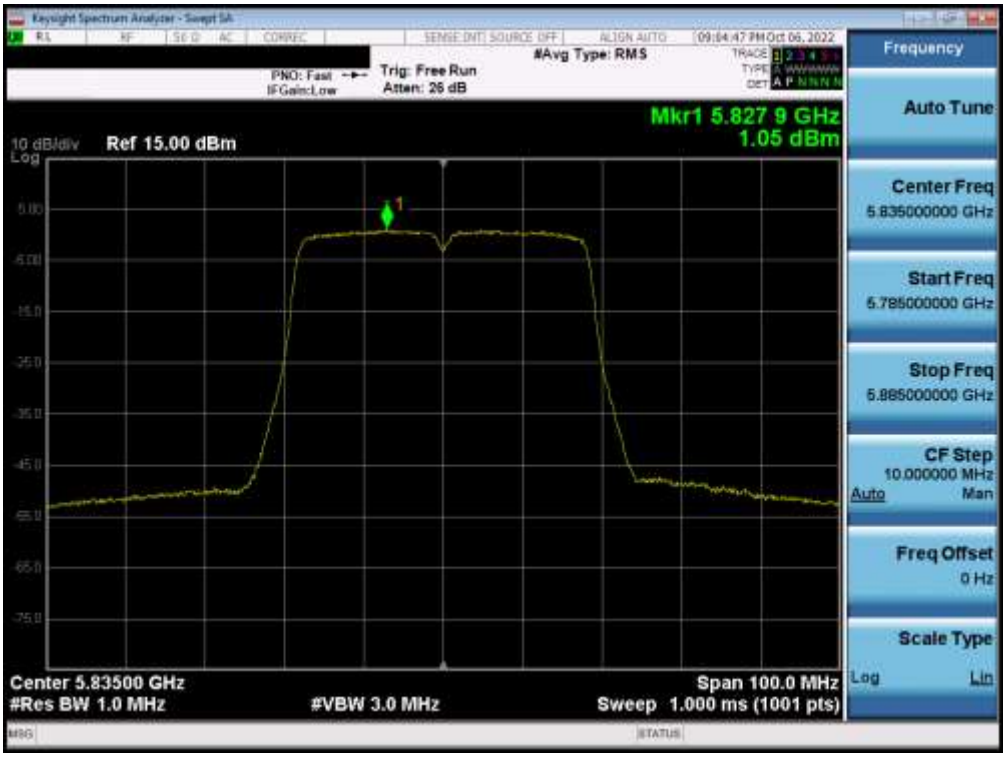


Plot 7-339. Power Spectral Density Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 4) – Ch. 177)



Plot 7-340. Power Spectral Density Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 3/4) – Ch. 167)

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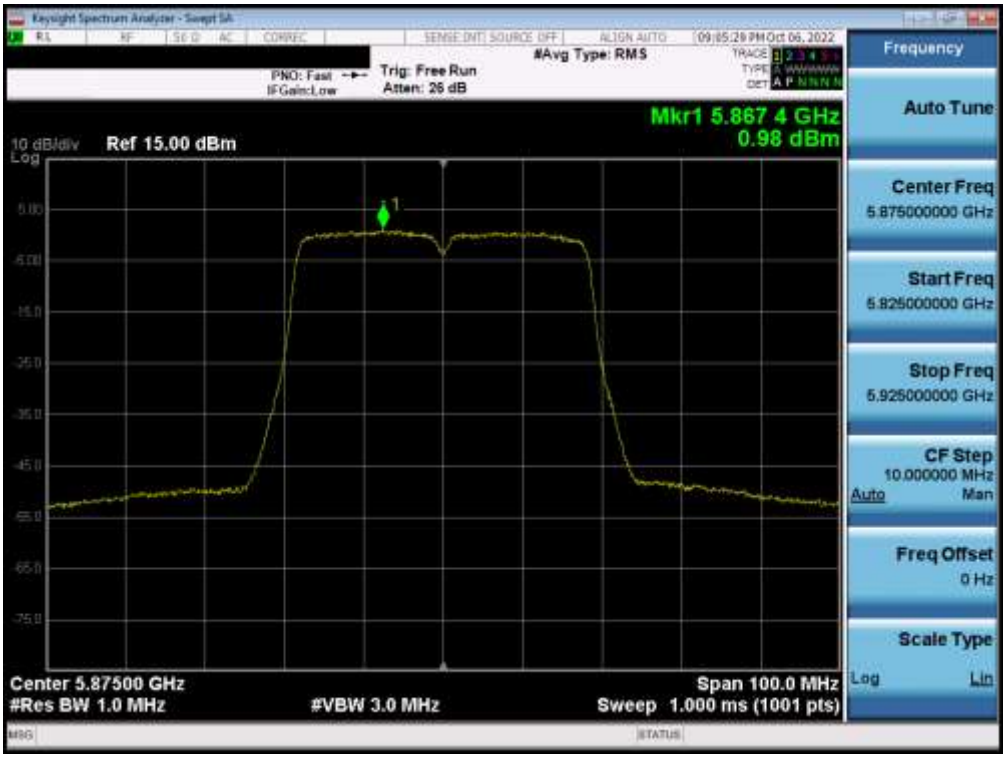
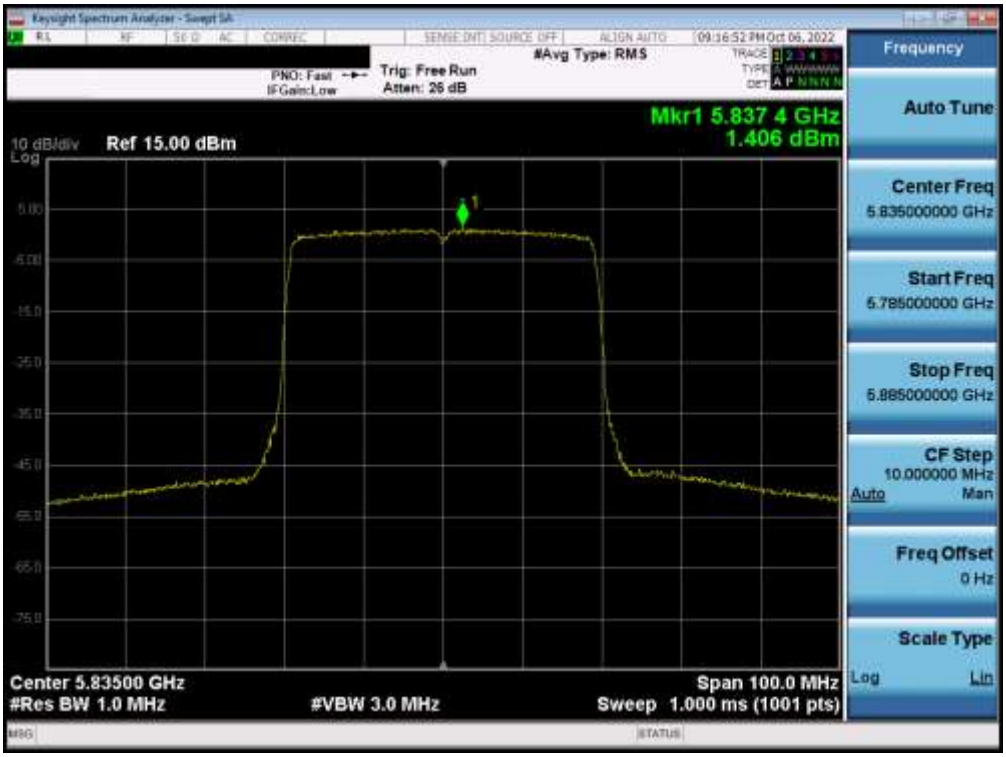


Plot 7-341. Power Spectral Density Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 4) – Ch. 175)



Plot 7-342. Power Spectral Density Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 3/4) – Ch. 167)

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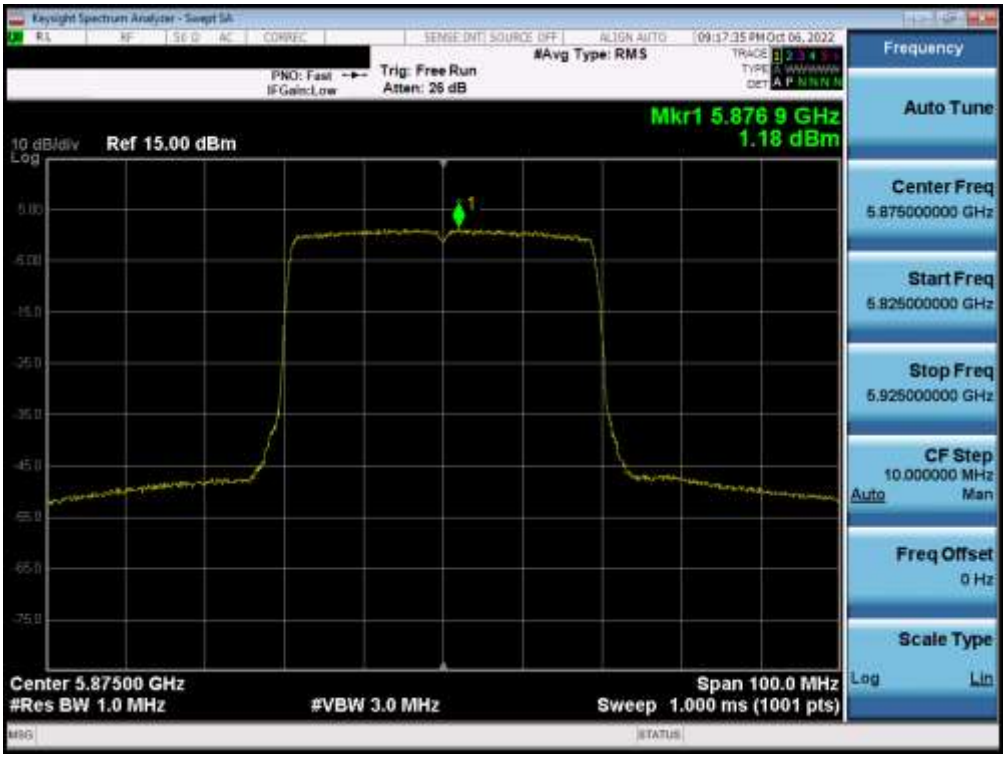
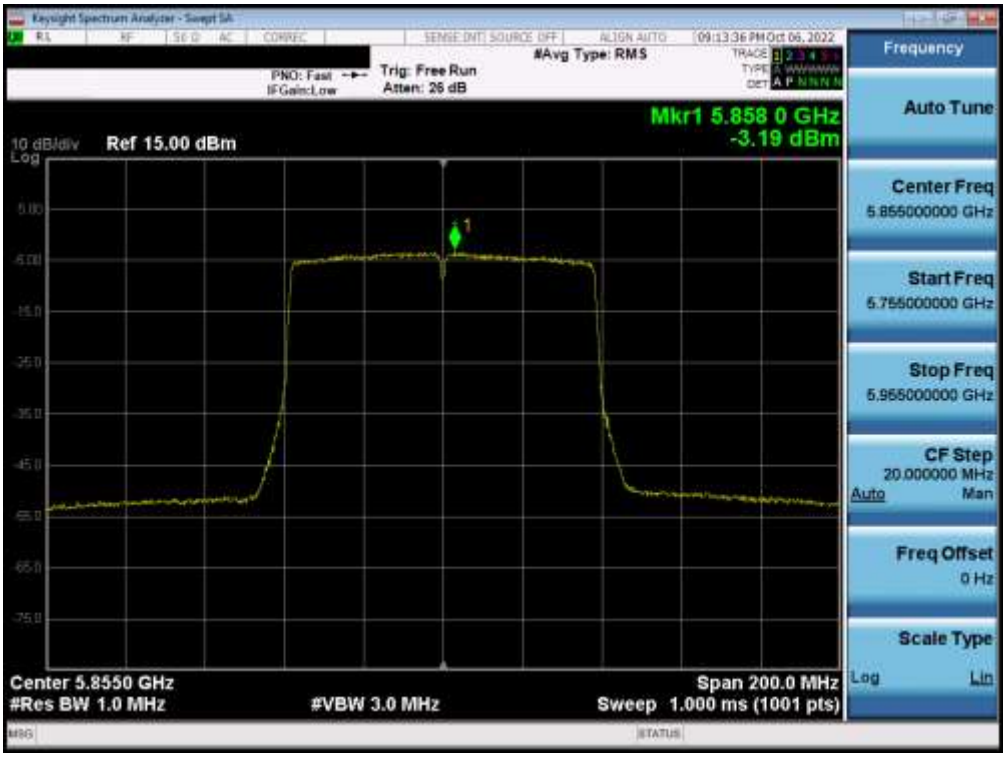


Plot 7-343. Power Spectral Density Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 4) – Ch. 175)



Plot 7-344. Power Spectral Density Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 3/4) – Ch. 171)

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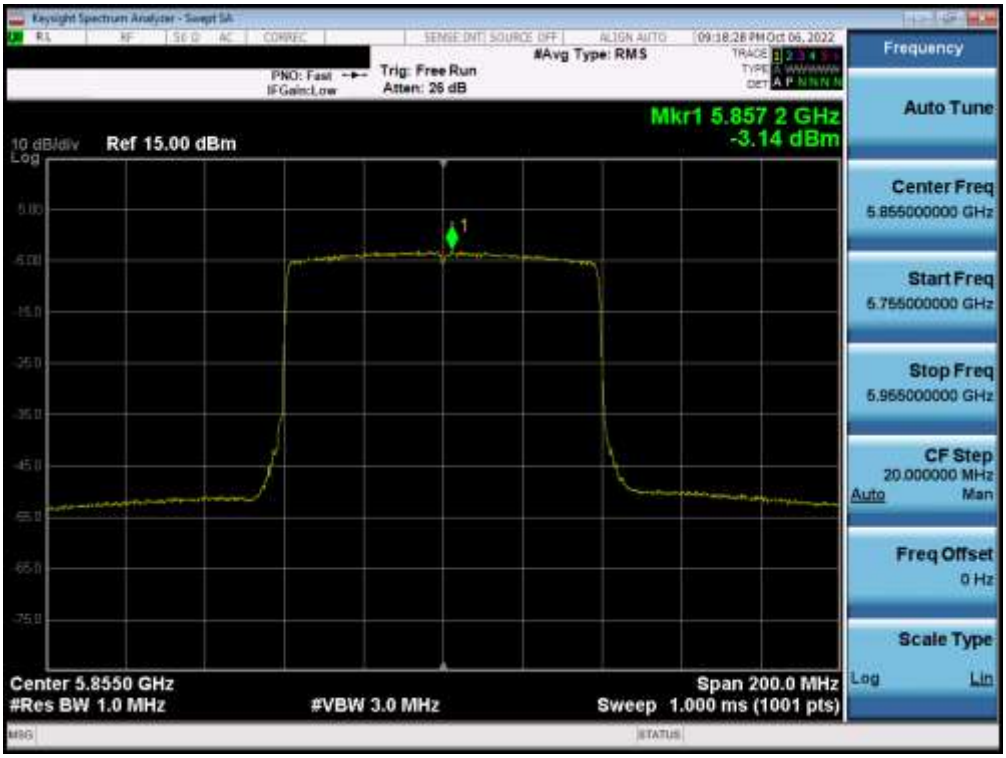
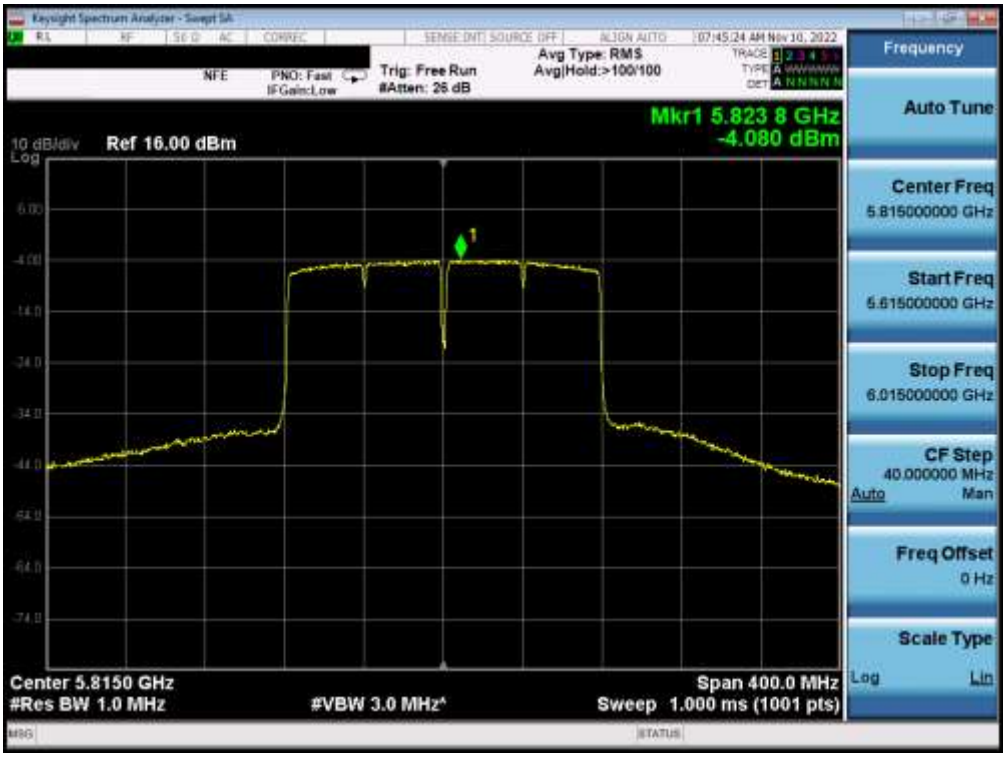


Plot 7-345. Power Spectral Density Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 3/4) – Ch. 171)



Plot 7-346. Power Spectral Density Plot MIMO ANT2 (160MHz BW 802.11ac (UNII Band 3/4) – Ch. 163)

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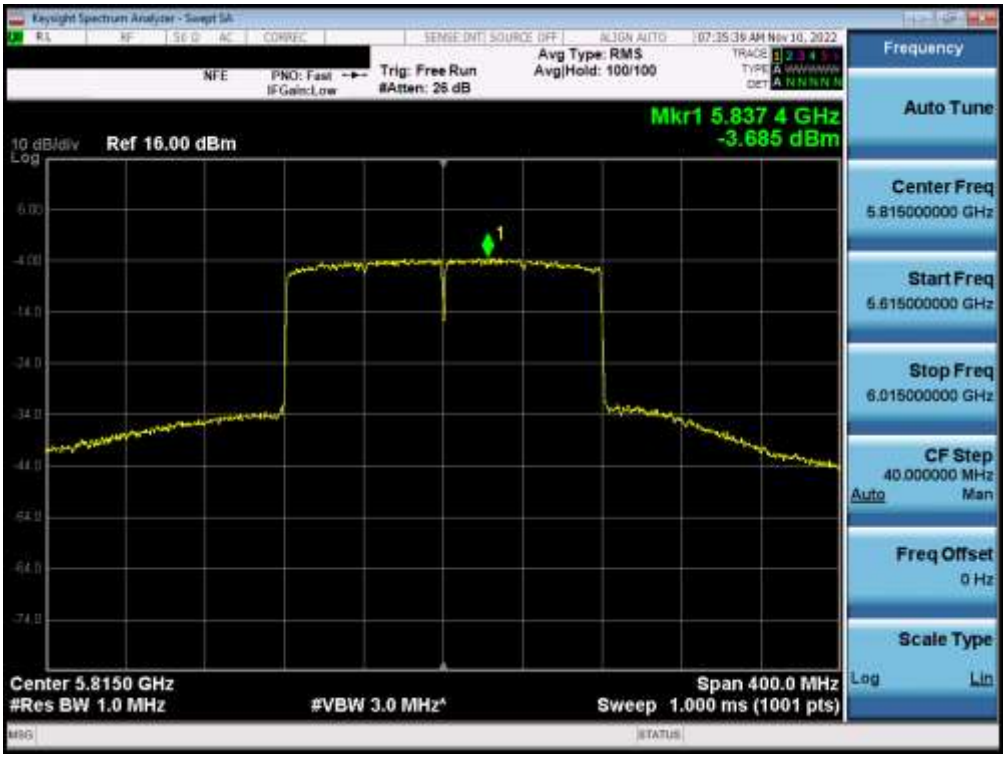

Plot 7-347. Power Spectral Density Plot MIMO ANT2 (160MHz BW 802.11ax (UNII Band 3/4) – Ch. 163)

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Note:

Per ANSI C63.10-2013 Section 14.3.2.2 and KDB 662911 v02r01 Section E)2), the power spectral density at Antenna-1 and Antenna-2 were first measured separately as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Sample MIMO Calculation:

At 5180MHz in 802.11n (20MHz BW) mode, the average conducted power spectral density was measured to be 6.27 dBm for Antenna 1 and 4.63 dBm for Antenna 2.

Antenna 1 + Antenna 2 = MIMO

(6.27 dBm + 4.63 dBm) = (4.24 mW + 2.90 mW) = 7.14 mW = 8.54 dBm

Sample e.i.r.p Power Spectral Density Calculation:

At 5180MHz in 802.11n (20MHz BW) mode, the average MIMO power density was calculated to be 8.54 dBm with directional gain of -0.99 dBi.

e.i.r.p. Power Spectral Density(dBm) = Power Spectral Density (dBm) + Ant gain (dBi)

8.54 dBm + -0.99 dBi = 7.55 dBm

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7.6 Radiated Spurious Emission Measurements – Above 1GHz

§15.407(b) §15.205 §15.209; RSS-Gen [8.9]

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. All channels, modes (e.g. 802.11a, 802.11n (20MHz BW), 802.11n (40MHz BW), 802.11ac (80MHz), and 802.11ax (160MHz)), and modulations/data rates were investigated among all UNII bands. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

For transmitters operating in the 5.15-5.25 GHz and 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of −27 dBm/MHz.

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

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

For transmitters operating in the 5.850 – 5.895 GHz band: all emissions at or above 5.895GHz shall not exceed an e.i.r.p. of -5dBm/MHz and shall decrease linearly up to an e.i.r.p. of -27dBm/MHz at or above 5.925GHz, and all emissions below 5.725 GHz shall not exceed an e.i.r.p. of -27dBm/MHz at 5.65 GHz increasing linearly to 10dBm/MHz at 5.7GHz and from 5.7GHz increasing linearly to a level of 15.6dMb/MHz at 5.72GHz, and from 5.72GHz increasing linearly to a level of 27dBm/MHz at 5.725GHz.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-22 per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
Above 960.0 MHz	500	3

Table 7-22. Radiated Limits

Test Procedures Used

ANSI C63.10-2013 – Sections 12.7.7.2, 12.7.6, 12.7.5
KDB 789033 D02 v02r01 – Section G

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Test Settings

Average Measurements above 1GHz (Method AD)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be $\geq$ 2 x span/RBW)
6. Averaging type = power (RMS)
7. Sweep time = auto couple
8. Trace was averaged over 100 sweeps

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 120kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Test Setup

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

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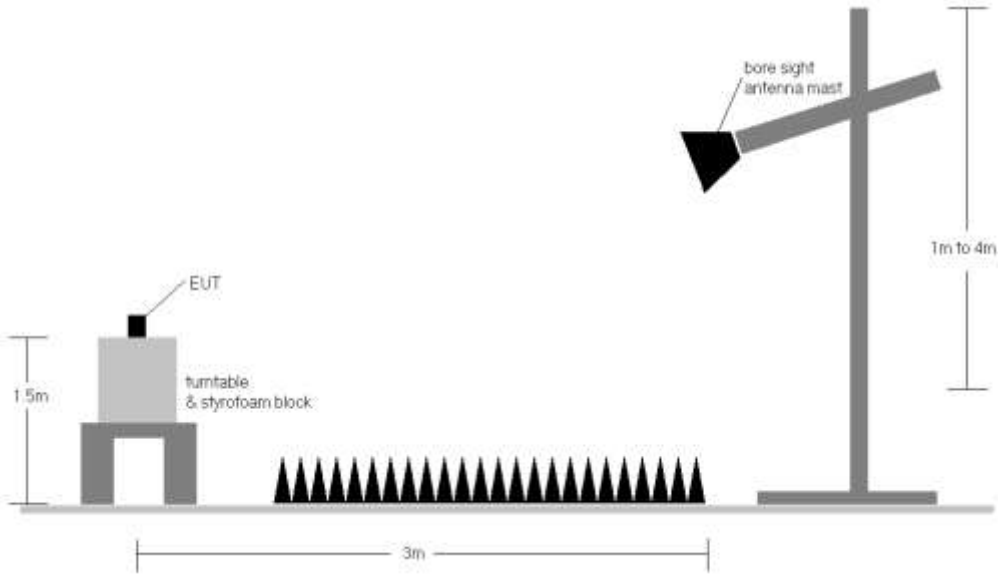

Figure 7-5. Test Instrument & Measurement Setup

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Test Notes

1. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-22.
2. All spurious emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-22. All spurious emissions that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. This unit was tested with its standard battery.
5. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
6. Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
7. Radiated spurious emissions were investigated while operating in MIMO mode, however, it was determined that single antenna operation produced the worst case emissions. Since the emissions produced from MIMO operation were found to be more than 20dB below the limit, the MIMO emissions are not reported.
8. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. Any emissions found to be within 20dB of the limit are fully investigated and the results are shown in this section.
9. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Sample Calculations

Determining Spurious Emissions Levels

- Field Strength Level [dBμV/m] = Analyzer Level [dBm] + 107 + AFCL [dB/m]
- AFCL [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB]
- Margin [dB] = Field Strength Level [dBμV/m] – Limit [dBμV/m]

Radiated Band Edge Measurement Offset

- The amplitude offset shown in the radiated restricted band edge plots was calculated using the formula:

  Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gai

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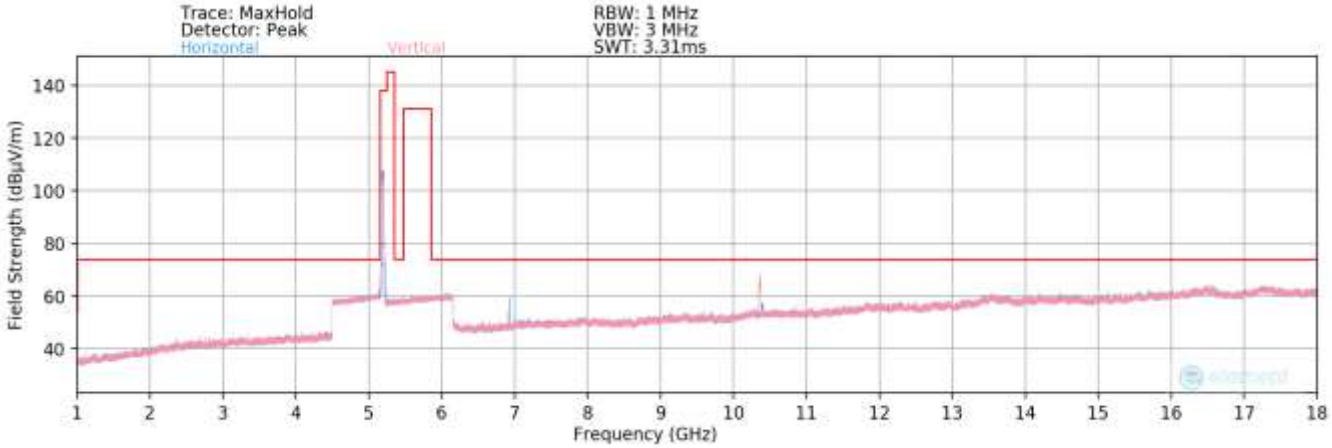
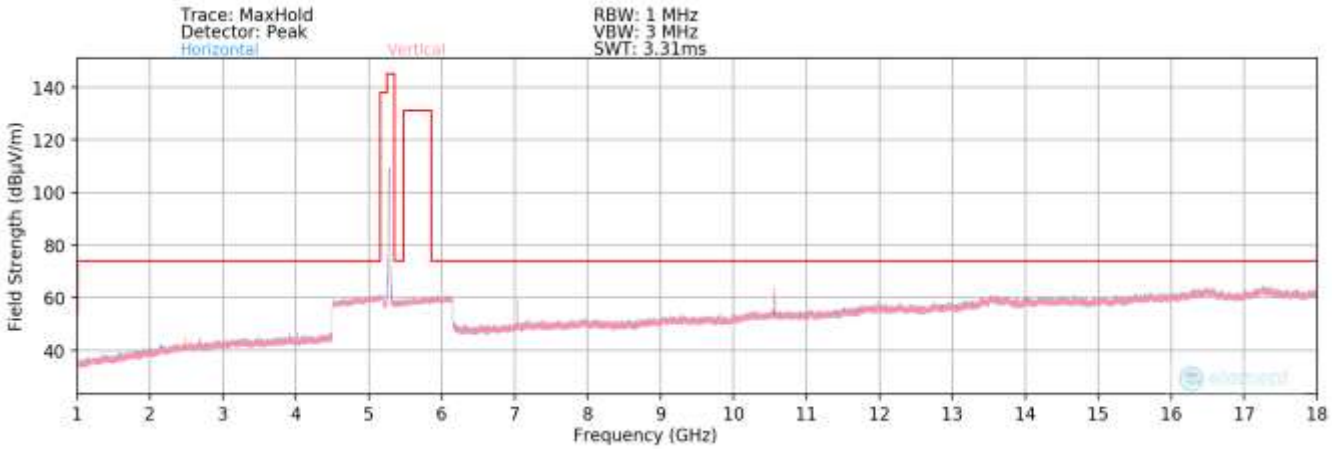
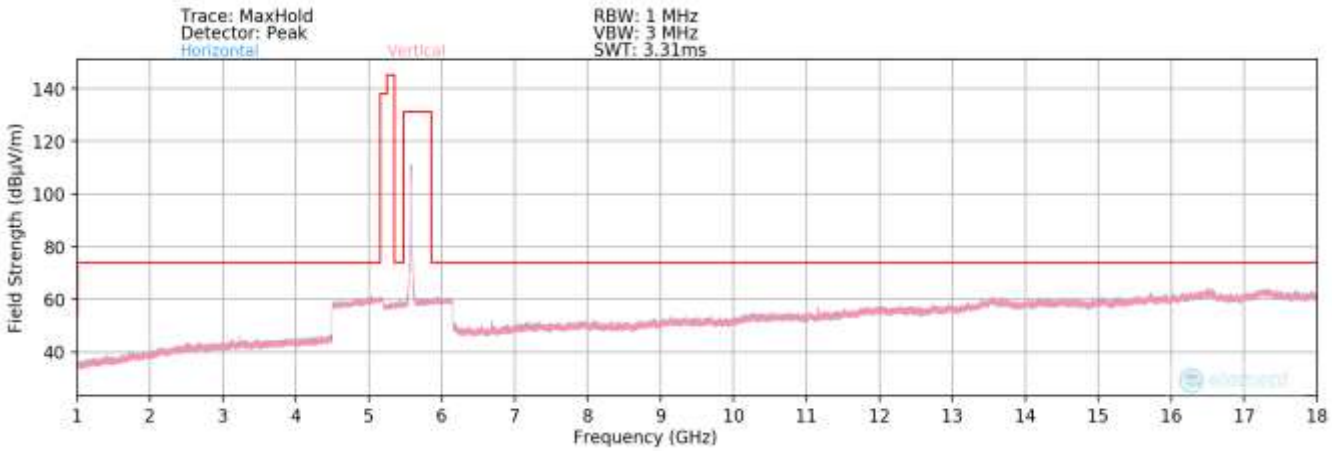
7.6.1 MIMO Radiated Spurious Emission Measurements



Plot 7-348. Radiated Spurious Plot above 1GHz MIMO (802.11ax – U1 Ch. 40)



Plot 7-349. Radiated Spurious Plot above 1GHz MIMO (802.11ax – U2A Ch. 56)



Plot 7-350. Radiated Spurious Plot above 1GHz MIMO (802.11ax – U2C Ch. 120)

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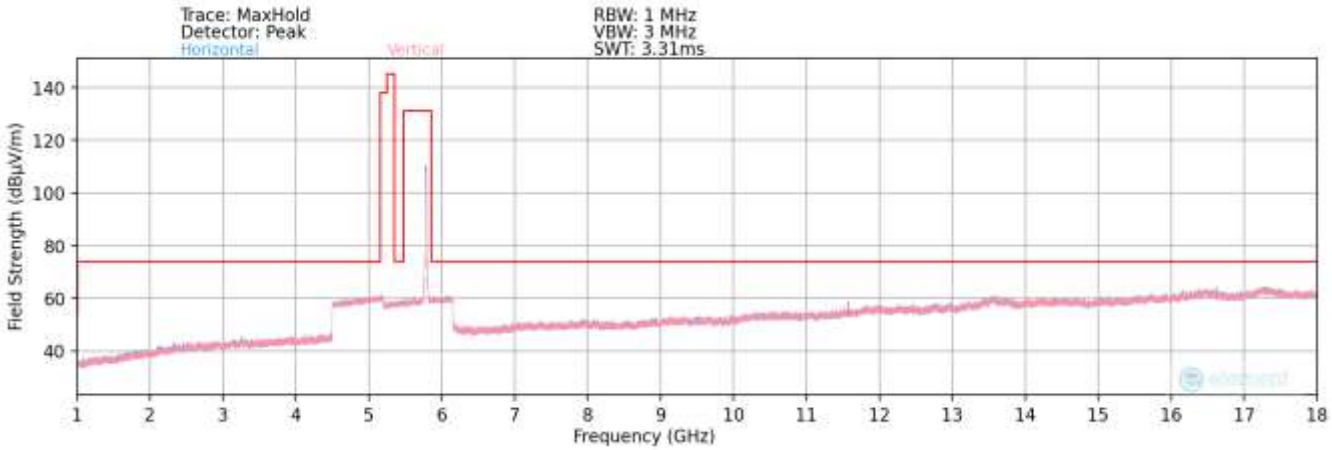
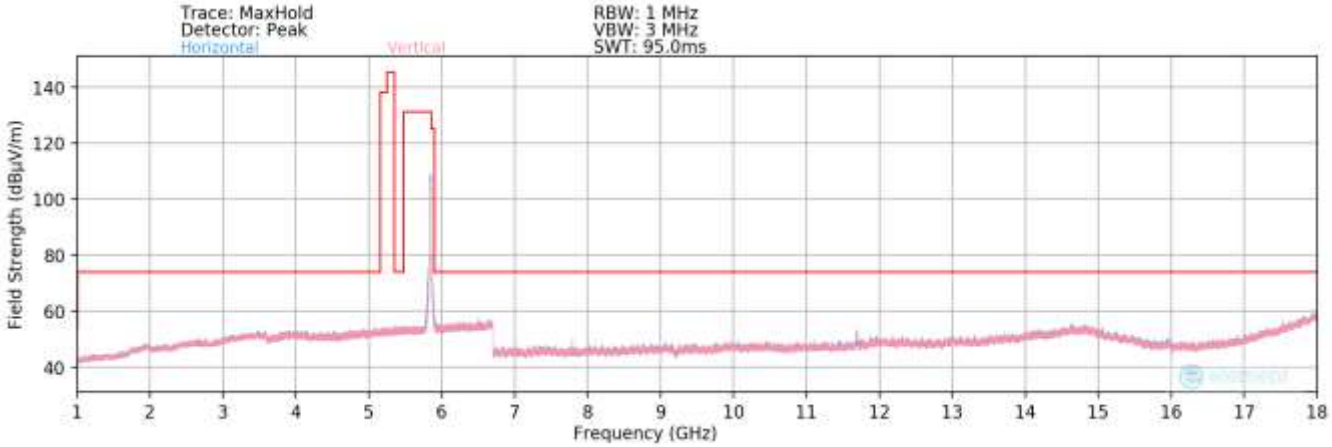


Plot 7-351. Radiated Spurious Plot above 1GHz MIMO (802.11ax – U3 Ch. 157)



Plot 7-352. Radiated Spurious Plot above 1GHz MIMO (802.11ax – U4 Ch. 173)

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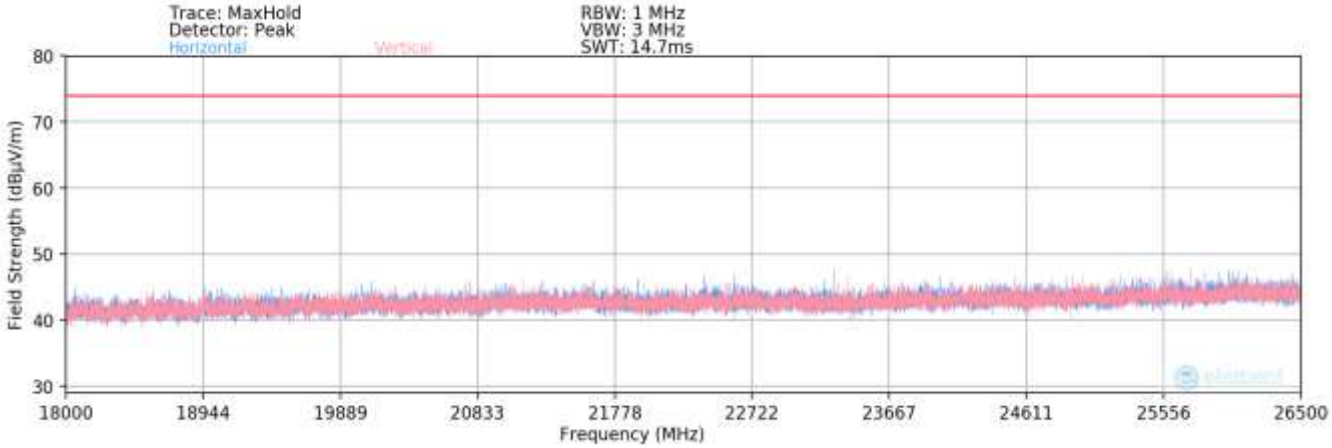
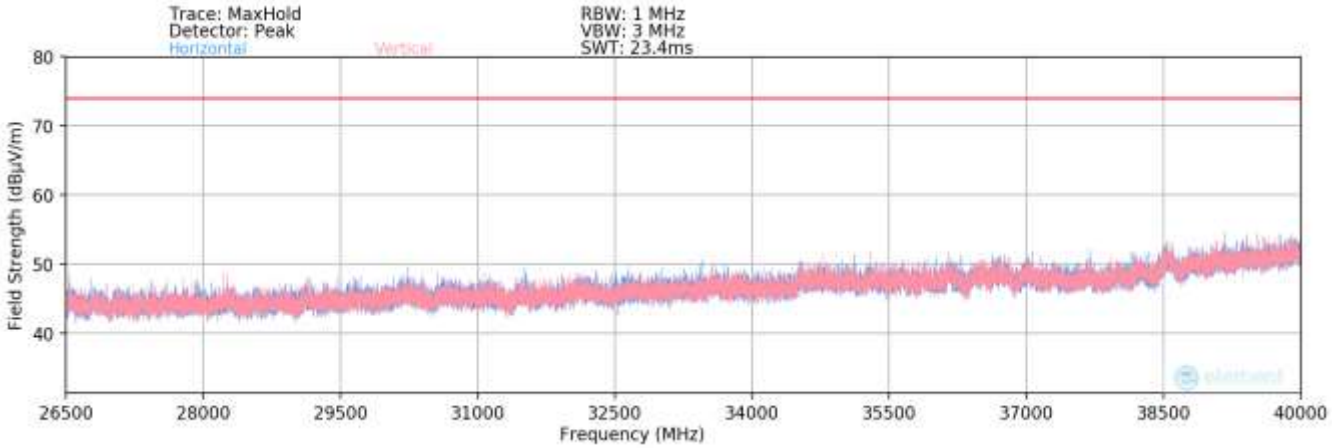
MIMO Radiated Spurious Emissions Measurements (Above 18GHz)



Plot 7-353. Radiated Spurious Plot 18GHz – 26.5GHz MIMO (802.11ax)



Plot 7-354. Radiated Spurious Plot 26.5GHz – 40GHz MIMO (802.11ax)

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MIMO Radiated Spurious Emission Measurements

§15.407(b) §15.205 & §15.209

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5180MHz
Channel:	36

	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]
	10360.00	Peak	V	200	224	-52.72	10.60	0.00	64.88	68.20	-3.32
*	15540.00	Average	V	-	-	-80.39	16.03	0.00	42.64	53.98	-11.34
*	15540.00	Peak	V	-	-	-68.62	16.03	0.00	54.41	73.98	-19.57
*	20720.00	Average	V	-	-	-85.76	3.37	-9.54	15.07	53.98	-38.91
*	20720.00	Peak	V	-	-	-74.26	3.37	-9.54	26.57	73.98	-47.41
	25900.00	Peak	V	-	-	-71.98	4.84	-9.54	30.31	68.20	-37.89

Table 7-23. Radiated Measurements MIMO

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5200MHz
Channel:	40

	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]
	10400.00	Peak	V	195	225	-52.24	10.31	0.00	65.07	68.20	-3.13
*	15600.00	Average	V	-	-	-80.49	16.05	0.00	42.56	53.98	-11.42
*	15600.00	Peak	V	-	-	-69.02	16.05	0.00	54.03	73.98	-19.95
*	20800.00	Average	V	-	-	-85.46	3.43	-9.54	15.42	53.98	-38.56
*	20800.00	Peak	V	-	-	-74.64	3.43	-9.54	26.24	73.98	-47.74
	26000.00	Peak	V	-	-	-71.28	4.89	-9.54	31.07	68.20	-37.13

Table 7-24. Radiated Measurements MIMO

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Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5240MHz
Channel:	48

	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]
	10480.00	Peak	V	189	139	-57.13	10.54	0.00	60.41	68.20	-7.79
*	15720.00	Average	V	-	-	-80.96	17.36	0.00	43.40	53.98	-10.58
*	15720.00	Peak	V	-	-	-68.66	17.36	0.00	55.70	73.98	-18.28
*	20960.00	Average	V	-	-	-85.11	3.50	-9.54	15.85	53.98	-38.13
*	20960.00	Peak	V	-	-	-73.63	3.50	-9.54	27.33	73.98	-46.65
	26200.00	Peak	V	-	-	-70.74	4.72	-9.54	31.44	68.20	-36.76

Table 7-25. Radiated Measurements MIMO

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	5180MHz
Channel:	36

	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]
	10360.00	Peak	V	152	341	-52.49	8.74	63.25	68.20	-4.95
*	15540.00	Average	V	-	-	-77.29	10.23	39.94	53.98	-14.04
*	15540.00	Peak	V	-	-	-65.12	10.23	52.11	73.98	-21.87

Table 7-26. Radiated Measurements MIMO with WCP

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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5260MHz
Channel: 52

	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]
	10520.00	Peak	V	116	38	-55.61	7.91	0.00	59.30	68.20	-8.90
*	15780.00	Average	V	-	-	-77.45	9.19	0.00	38.74	53.98	-15.24
*	15780.00	Peak	V	-	-	-65.32	9.19	0.00	50.87	73.98	-23.11
*	21040.00	Average	V	-	-	-81.97	3.56	-9.54	19.05	53.98	-34.93
*	21040.00	Peak	V	-	-	-73.77	3.56	-9.54	27.25	73.98	-46.73
	26300.00	Peak	V	-	-	-72.16	4.68	-9.54	29.98	68.20	-38.22

Table 7-27. Radiated Measurements MIMO

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5280MHz
Channel: 56

	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]
	10560.00	Peak	V	129	30	-56.60	8.05	0.00	58.45	68.20	-9.75
*	15840.00	Average	V	-	-	-84.36	9.10	0.00	31.74	53.98	-22.24
*	15840.00	Peak	V	-	-	-65.55	9.10	0.00	50.55	73.98	-23.43
*	21120.00	Average	v	-	-	-85.42	3.66	-9.54	15.70	53.98	-38.28
*	21120.00	Peak	v	-	-	-73.96	3.66	-9.54	27.16	73.98	-46.82
	26400.00	Peak	v	-	-	-71.86	4.56	-9.54	30.15	68.20	-38.05

Table 7-28. Radiated Measurements MIMO

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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5320MHz
Channel: 64

	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]
*	10640.00	Average	V	125	37	-70.08	8.17	0.00	45.09	53.98	-8.89
*	10640.00	Peak	V	125	37	-58.27	8.17	0.00	56.90	73.98	-17.08
*	15960.00	Average	V	-	-	-77.17	8.86	0.00	38.69	53.98	-15.29
*	15960.00	Peak	V	-	-	-65.18	8.86	0.00	50.68	73.98	-23.30
*	21280.00	Average	V	-	-	-85.53	3.77	-9.54	15.70	53.98	-38.28
*	21280.00	Peak	V	-	-	-74.05	3.77	-9.54	27.18	73.98	-46.80
	26600.00	Peak	V	-	-	-71.97	4.58	-9.54	30.07	68.20	-38.13

Table 7-29. Radiated Measurements MIMO

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 3 Meters
Operating Frequency: 5320MHz
Channel: 64

	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]
*	10640.00	Average	V	299	44	-68.80	8.17	46.37	53.98	-7.61
*	10640.00	Peak	V	299	44	-57.64	8.17	57.53	73.98	-16.45
*	15960.00	Average	V	-	-	-72.22	8.86	43.64	53.98	-10.34
*	15960.00	Peak	V	-	-	-65.26	8.86	50.60	73.98	-23.38

Table 7-30. Radiated Measurements MIMO with WCP

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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5500MHz
Channel: 100

	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]
*	11000.00	Average	V	-	-	-82.99	13.48	0.00	37.49	53.98	-16.49
*	11000.00	Peak	V	-	-	-72.17	13.48	0.00	48.31	73.98	-25.67
	16500.00	Peak	V	-	-	-72.66	19.44	0.00	53.78	68.20	-14.42
	22000.00	Peak	V	-	-	-72.83	3.80	-9.54	28.43	68.20	-39.77
	27500.00	Peak	V	-	-	-73.77	4.79	-9.54	28.47	68.20	-39.73

Table 7-31. Radiated Measurements MIMO

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5600MHz
Channel: 120

	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]
*	11200.00	Average	V	107	286	-74.84	8.67	0.00	40.83	53.98	-13.15
*	11200.00	Peak	V	107	286	-68.17	8.67	0.00	47.50	73.98	-26.48
	16800.00	Peak	V	-	-	-64.57	9.37	0.00	51.80	68.20	-16.40
*	22400.00	Average	V	-	-	-81.22	3.82	-9.54	20.06	53.98	-33.92
*	22400.00	Peak	V	-	-	-73.92	3.82	-9.54	27.36	73.98	-46.62
	28000.00	Peak	V	-	-	-73.69	5.43	-9.54	29.20	68.20	-39.00

Table 7-32. Radiated Measurements MIMO

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Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5720MHz
Channel:	144

	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]
*	11440.00	Average	V	131	225	-74.91	12.77	0.00	44.86	53.98	-9.11
*	11440.00	Peak	V	131	225	-58.67	12.77	0.00	61.10	73.98	-12.87
	17160.00	Peak	V	-	-	-63.42	16.63	0.00	60.21	68.20	-7.99
*	22880.00	Average	V	-	-	-81.23	3.82	-9.54	20.05	53.98	-33.93
*	22880.00	Peak	V	-	-	-73.99	3.82	-9.54	27.29	73.98	-46.69
	28600.00	Peak	V	-	-	-73.61	5.43	-9.54	29.28	68.20	-38.92

Table 7-33. Radiated Measurements MIMO

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	5600MHz
Channel:	120

	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]
*	11200.00	Average	V	164	73	-79.43	12.20	39.77	53.98	-14.21
*	11200.00	Peak	V	164	73	-66.26	12.20	52.94	73.98	-21.04
	16800.00	Peak	V	-	-	-69.52	17.91	55.39	68.20	-12.81

Table 7-34. Radiated Measurements MIMO with WCP

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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5745MHz
Channel: 149

	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]
*	11490.00	Average	V	-	-	-82.85	14.11	0.00	38.26	53.98	-15.72
*	11490.00	Peak	V	-	-	-71.70	14.11	0.00	49.41	73.98	-24.57
	17235.00	Peak	V	-	-	-72.74	19.76	0.00	54.02	68.20	-14.18
*	22980.00	Average	V	-	-	-86.16	3.76	-9.54	15.06	53.98	-38.92
*	22980.00	Peak	V	-	-	-74.50	3.76	-9.54	26.72	73.98	-47.26
	28725.00	Peak	V	-	-	-73.57	5.46	-9.54	29.35	68.20	-38.85

Table 7-35. Radiated Measurements MIMO

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5785MHz
Channel: 157

	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]
*	11570.00	Average	V	102	210	-77.17	13.94	0.00	43.77	53.98	-10.21
*	11570.00	Peak	V	102	210	-66.23	13.94	0.00	54.71	73.98	-19.27
	17355.00	Peak	V	-	-	-73.42	20.47	0.00	54.05	68.20	-14.15
	23140.00	Peak	V	-	-	-74.46	3.80	-9.54	26.79	68.20	-41.41
	28925.00	Peak	V	-	-	-73.61	5.51	-9.54	29.36	68.20	-38.84

Table 7-36. Radiated Measurements MIMO

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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5825MHz
Channel: 165

	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]
*	11650.00	Average	V	-	-	-82.89	14.11	0.00	38.22	53.98	-15.76
*	11650.00	Peak	V	-	-	-71.54	14.11	0.00	49.57	73.98	-24.41
	17475.00	Peak	V	-	-	-73.23	20.02	0.00	53.79	68.20	-14.41
	23300.00	Peak	V	-	-	-74.75	3.74	-9.54	26.44	68.20	-41.76
	29125.00	Peak	V	-	-	-73.49	5.67	-9.54	29.63	68.20	-38.57

Table 7-37. Radiated Measurements MIMO

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 3 Meters
Operating Frequency: 5785MHz
Channel: 157

	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]
*	11570.00	Average	V	-	-	-77.95	8.50	37.55	53.98	-16.43
*	11570.00	Peak	V	-	-	-66.10	8.50	49.40	73.98	-24.58
	17355.00	Peak	V	-	-	-65.12	12.72	54.60	68.20	-13.60

Table 7-38. Radiated Measurements MIMO with WCP

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Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5845MHz
Channel:	169

	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]
*	11690.00	Average	V	-	-	-71.65	9.31	0.00	44.66	53.98	-9.32
*	11690.00	Peak	V	-	-	-58.22	9.31	0.00	58.09	73.98	-15.89
	17535.00	Peak	V	-	-	-65.60	14.18	0.00	55.58	68.20	-12.62
	23380.00	Peak	V	-	-	-56.36	3.76	-9.54	54.40	68.20	-13.80
	29225.00	Peak	V	-	-	-55.56	5.66	-9.54	57.10	68.20	-11.10
	35070.00	Peak	V	-	-	-54.54	7.69	-9.54	60.15	68.20	-8.05

Table 7-39. Radiated Measurements MIMO

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5865MHz
Channel:	173

	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]
*	11730.00	Average	V	107	225	-72.69	9.22	0.00	43.53	53.98	-10.45
*	11730.00	Peak	V	107	225	-59.11	9.22	0.00	57.11	73.98	-16.87
	17595.00	Peak	V	-	-	-65.90	14.38	0.00	55.48	68.20	-12.72
	23460.00	Peak	V	-	-	-55.44	3.76	-9.54	55.32	68.20	-12.88
	29325.00	Peak	V	-	-	-56.02	5.90	-9.54	56.88	68.20	-11.32
	35190.00	Peak	V	-	-	-54.55	7.78	-9.54	60.23	68.20	-7.97

Table 7-40. Radiated Measurements MIMO

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Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6Mbps
Distance of Measurements:	1 & 3 Meters
Operating Frequency:	5885MHz
Channel:	177

	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]
*	11770.00	Average	V	-	-	-74.18	10.00	0.00	42.82	53.98	-11.16
*	11770.00	Peak	V	-	-	-60.80	10.00	0.00	56.20	73.98	-17.78
	17655.00	Peak	V	-	-	-65.28	14.79	0.00	56.51	68.20	-11.69
	23540.00	Peak	V	-	-	-56.51	3.80	-9.54	54.29	68.20	-13.91
	29425.00	Peak	V	-	-	-55.88	5.83	-9.54	56.95	68.20	-11.25
	35310.00	Peak	V	-	-	-54.13	7.90	-9.54	60.77	68.20	-7.43

Table 7-41. Radiated Measurements MIMO

Worst Case Mode:	802.11a
Worst Case Transfer Rate:	6Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	5865MHz
Channel:	173

	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]
*	11730.00	Average	V	107	225	-72.69	9.22	43.53	53.98	-10.45
*	11730.00	Peak	V	107	225	-59.11	9.22	57.11	73.98	-16.87
	17595.00	Peak	V	-	-	-65.90	14.38	55.48	68.20	-12.72

Table 7-42. Radiated Measurements MIMO with WCP

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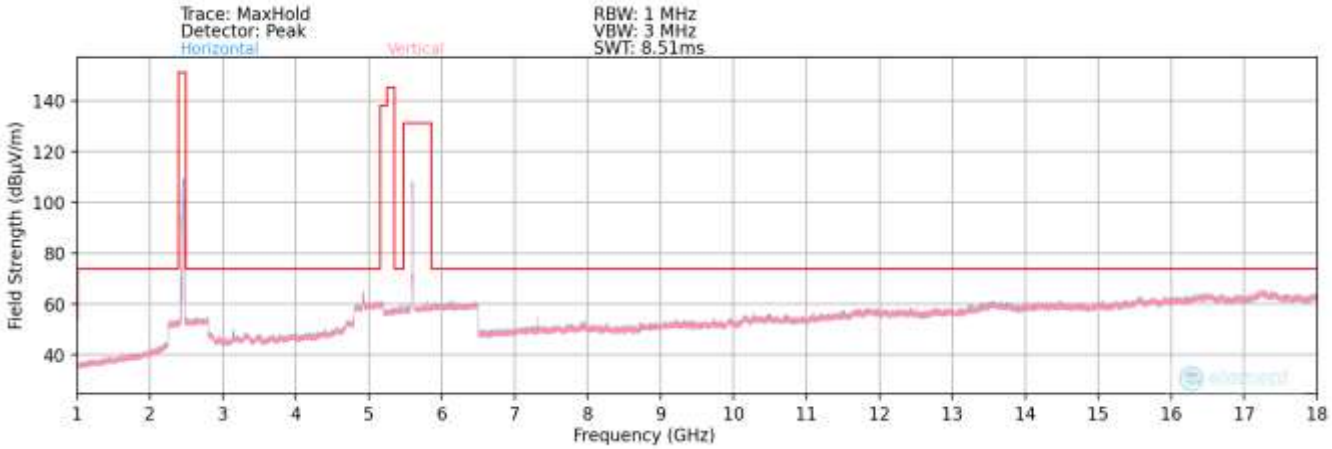
7.6.2 Simultaneous Tx Radiated Spurious Emissions Measurements

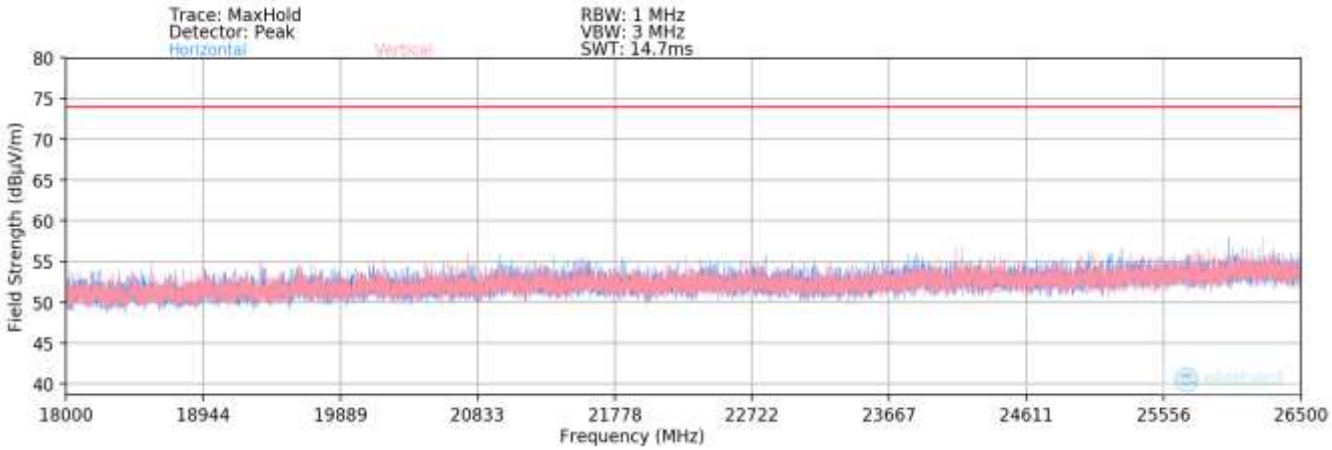
§15.407(b) §15.205 & §15.209; RSS-Gen [8.9]

Description	2.4 GHz Emission	5 GHz Emission
Antenna	1, 2	1, 2
Channel	11	120
Operating Frequency (MHz)	2462	5600
Data Rate (Mbps)	1Mbps	6Mbps
Mode	802.11b	802.11a

Table 7-43. Simultaneous Transmission Config-1



Plot 7-355. Radiated Spurious Plot above 1GHz (2.4GHz – 5GHz)



Plot 7-356. Radiated Spurious Plot 18GHz – 26.5GHz (2.4GHz – 5GHz)

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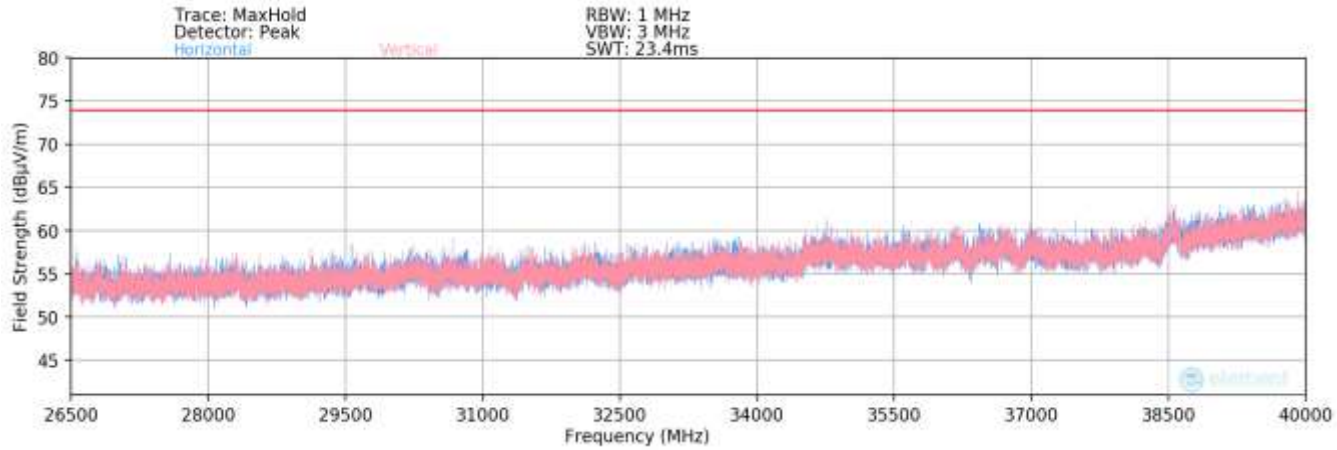

Plot 7-357. Radiated Spurious Plot above 26.5GHz (2.4GHz – 5GHz)

	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]
*	3814.00	Avg	V	-	-	-83.87	8.17	0.00	31.30	53.98	-22.68
*	3814.00	Peak	V	-	-	-70.77	8.17	0.00	44.40	73.98	-29.58
	6952.00	Peak	V	-	-	-71.58	14.86	0.00	50.28	68.20	-17.92
	8738.00	Peak	V	-	-	-67.93	17.71	0.00	56.78	68.20	-11.42
*	11876.00	Avg	V	-	-	-89.77	23.55	0.00	40.78	53.98	-13.20
*	11876.00	Peak	V	-	-	-75.20	23.55	0.00	55.35	73.98	-18.63
*	18152.00	Avg	V	-	-	-64.15	1.37	-9.54	34.67	53.98	-19.31
*	18152.00	Peak	V	-	-	-54.26	1.37	-9.54	44.57	73.98	-29.41

Table 7-44. Radiated Measurements (2.4GHz – 5GHz)

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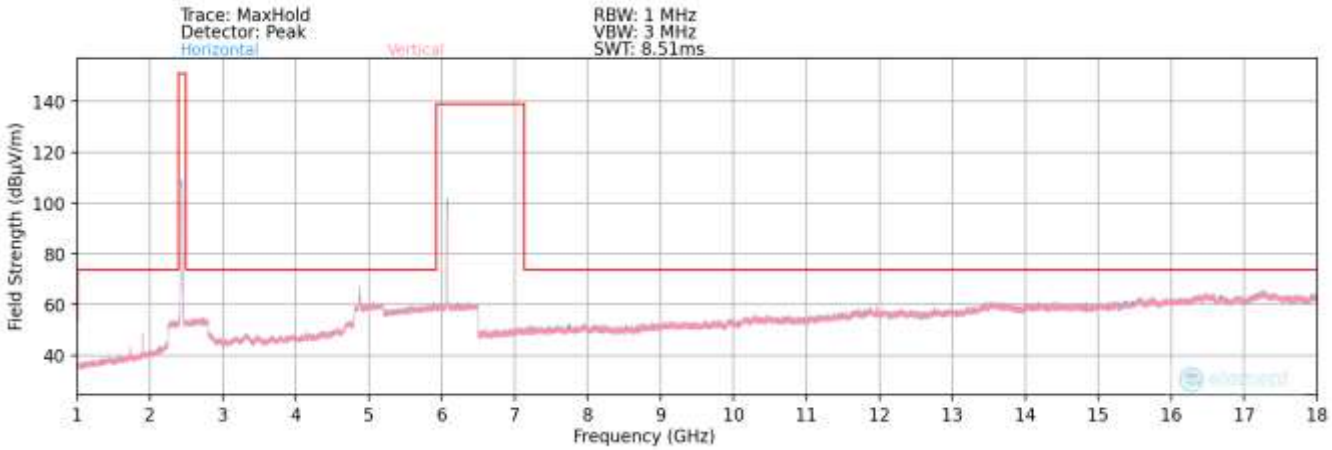
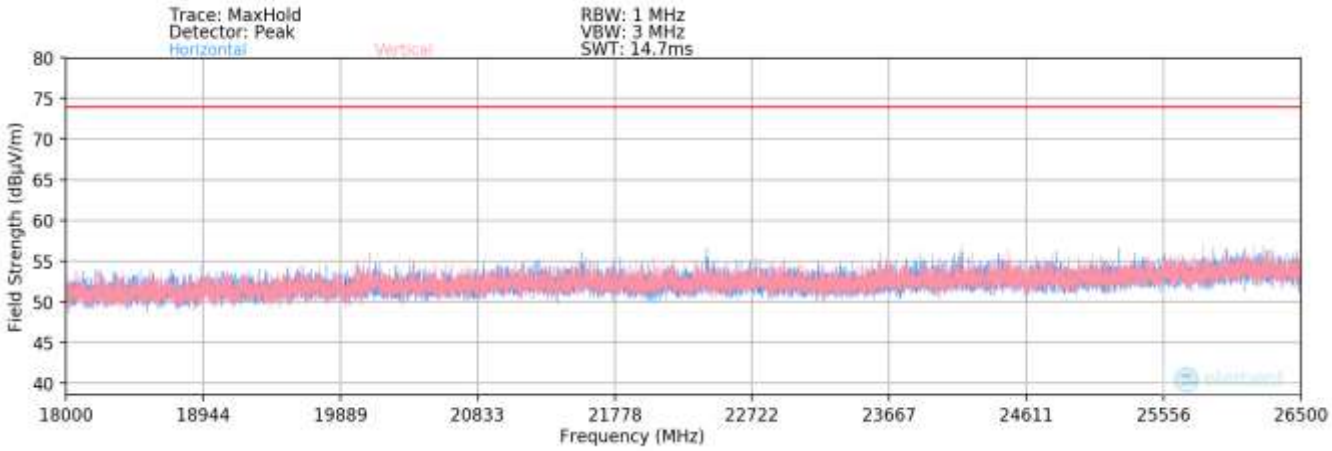
Description	2.4 GHz Emission	6 GHz Emission
Antenna	1, 2	1, 2
Channel	6	25
Operating Frequency (MHz)	2437	6075
Data Rate (Mbps)	1Mbps	6Mbps
Mode	802.11b	802.11a

Table 7-45. Simultaneous Transmission Config-2



Plot 7-358. Radiated Spurious Plot above 1GHz (6GHz – 2.4 GHz)



Plot 7-359. Radiated Spurious Plot 18GHz – 26.5GHz (6GHz – 2.4 GHz)

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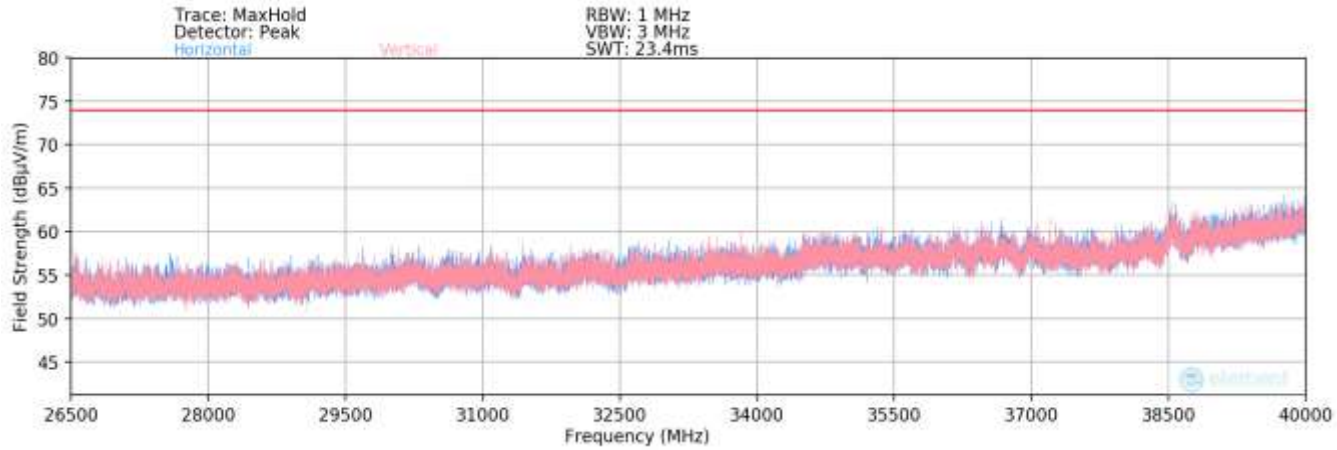

Plot 7-360. Radiated Spurious Plot above 26.5GHz (6GHz – 2.4 GHz)

	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]
*	1201.00	Avg	H	-	-	-70.52	-2.06	0.00	34.42	53.98	-19.56
*	1201.00	Peak	H	-	-	-55.76	-2.06	0.00	49.18	73.98	-24.80
*	4839.00	Avg	H	105	152	-80.02	19.99	0.00	46.97	53.98	-7.01
*	4839.00	Peak	H	105	152	-68.27	19.99	0.00	58.72	73.98	-15.26
*	8477.00	Avg	H	-	-	-84.11	16.34	0.00	39.23	53.98	-14.75
*	8477.00	Peak	H	-	-	-71.01	16.34	0.00	52.33	73.98	-21.65
	9713.00	Peak	H	-	-	-71.61	19.43	0.00	54.82	68.20	-13.38
*	20627.00	Avg	H	-	-	-65.46	3.28	-9.54	35.27	53.98	-18.71
*	20627.00	Peak	H	-	-	-55.10	3.28	-9.54	45.64	73.98	-28.34

Table 7-46. Radiated Measurements (6GHz – 2.4GHz)

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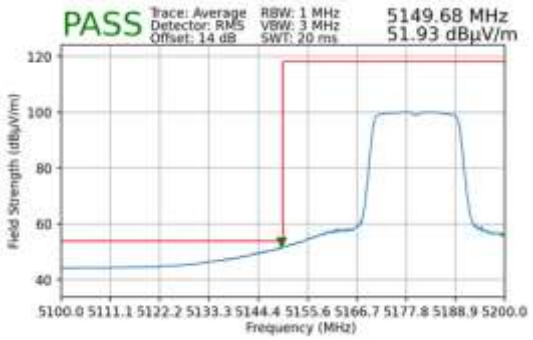
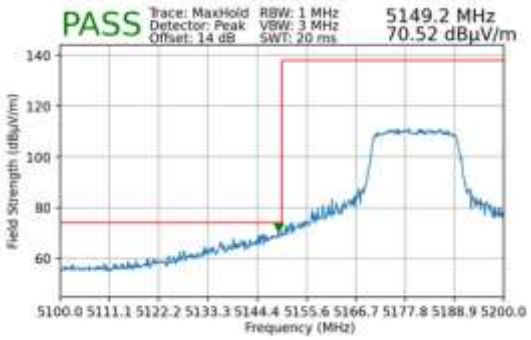
7.6.3 MIMO Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5180MHz
Channel:	36



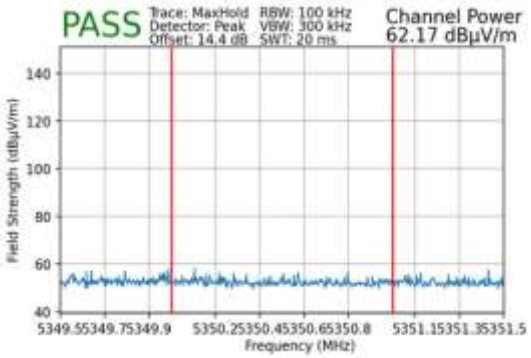
Plot 7-361. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 1)



Plot 7-362. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 1)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5320MHz
Channel:	64

Plot 7-363. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 2A)



Plot 7-364. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 2A)

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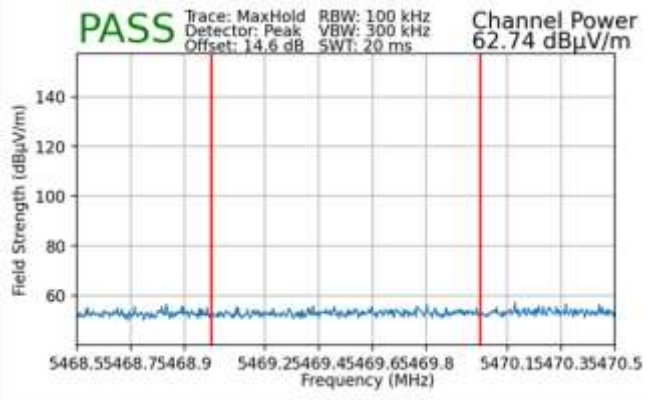
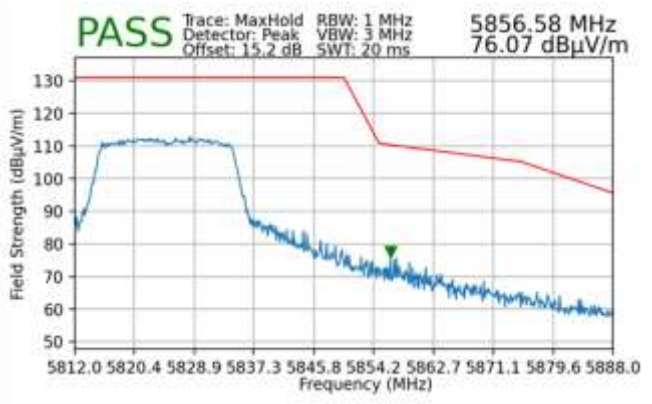
Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5500MHz
Channel:	100

Plot 7-365. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 2C)



Plot 7-366. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 2C)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5825MHz
Channel:	165



Plot 7-367. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 3)

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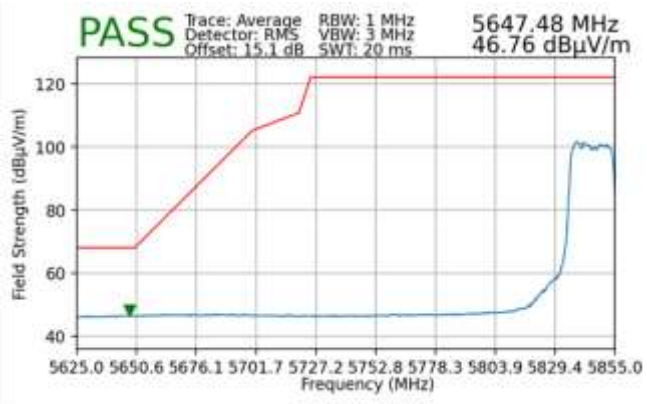
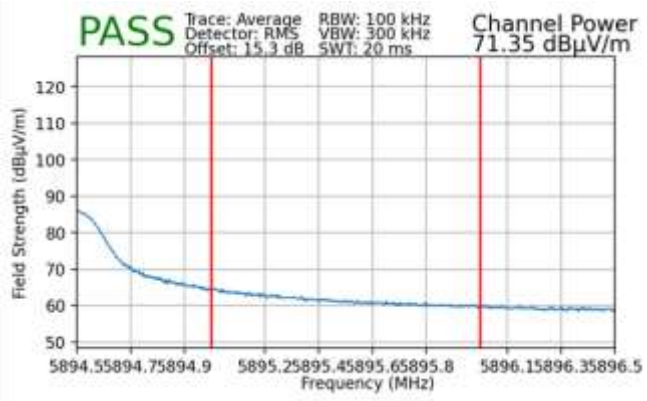
Worst Case Mode:	802.11ac
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5845MHz
Channel:	169



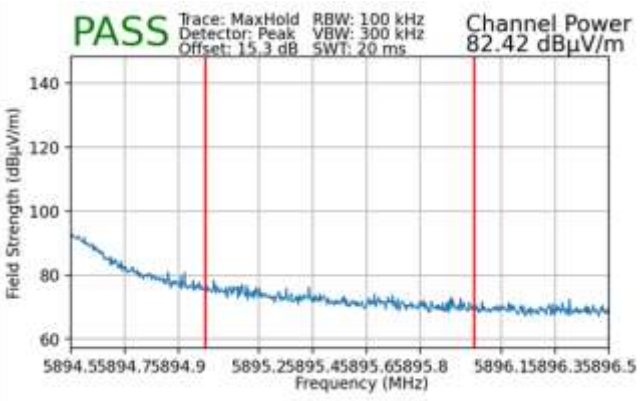
Plot 7-368. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 4)

Plot 7-369. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 4)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5885MHz
Channel:	177



Plot 7-370. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 4)



Plot 7-371. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 4)

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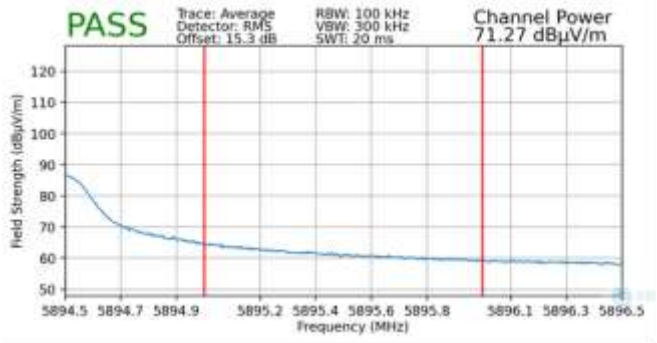
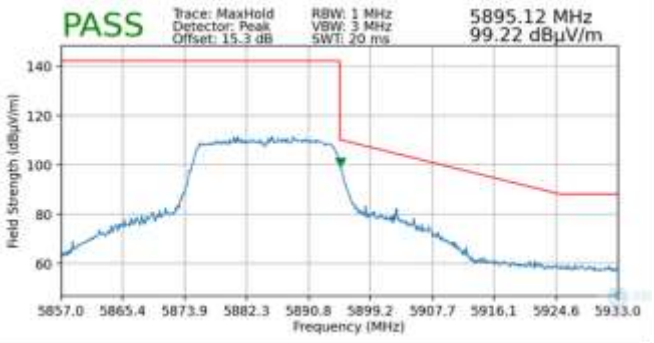
Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5885MHz
Channel:	177



Plot 7-372. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 4) with WCP



Plot 7-373. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 4) with WCP

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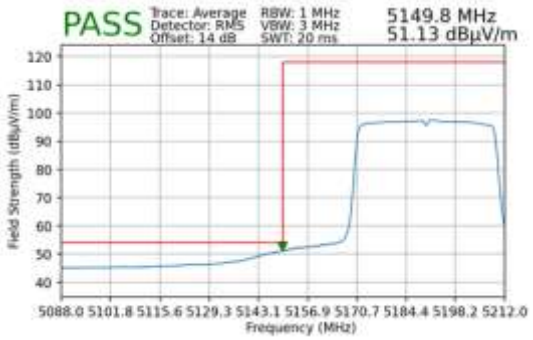
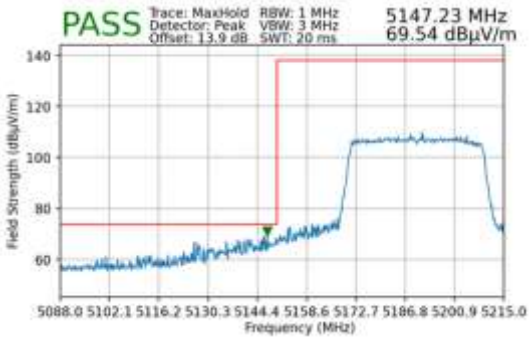
7.6.4 MIMO Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5190MHz
Channel:	38

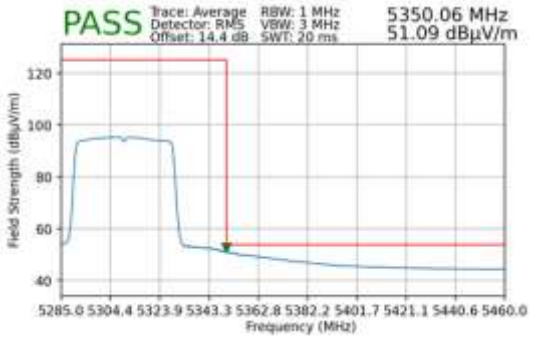


Plot 7-374. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 1)

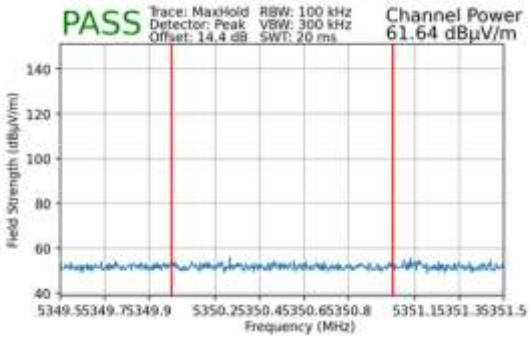


Plot 7-375. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 1)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5310MHz
Channel:	62



Plot 7-376. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 2A)



Plot 7-377. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 2A)

Worst Case Mode:	802.11ax

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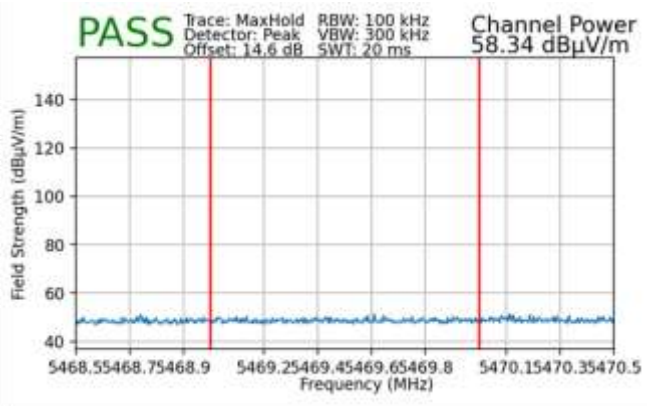
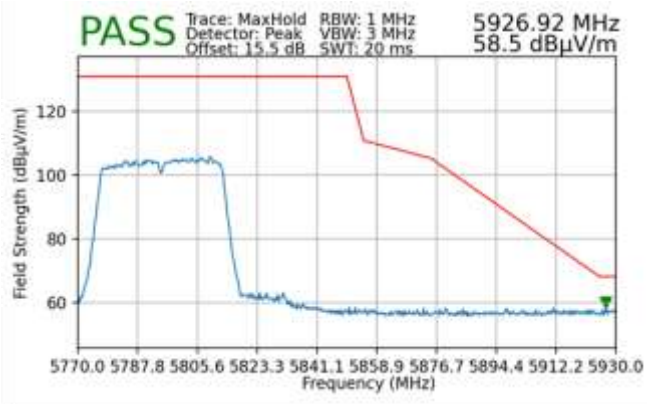
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5510MHz
Channel:	102

Plot 7-378. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 2C)



Plot 7-379. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 2C)

Worst Case Mode:	802.11ac
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5795MHz
Channel:	159



Plot 7-380. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 3)

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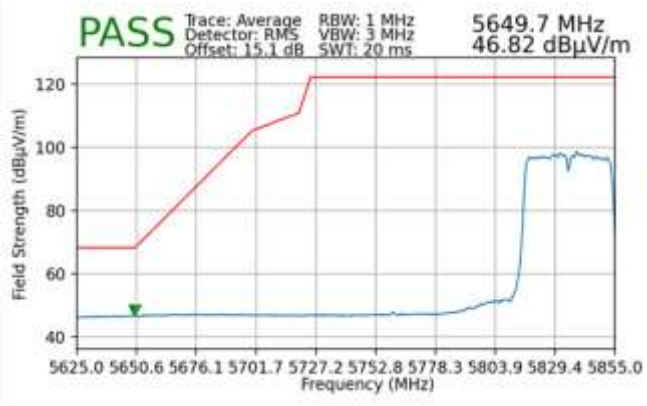
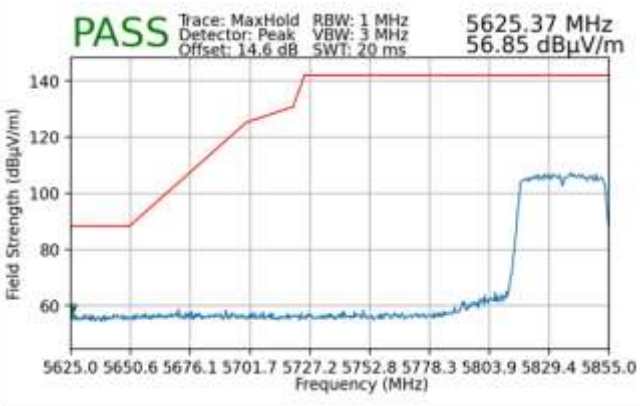
Worst Case Mode:	802.11ac
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5835MHz
Channel:	167

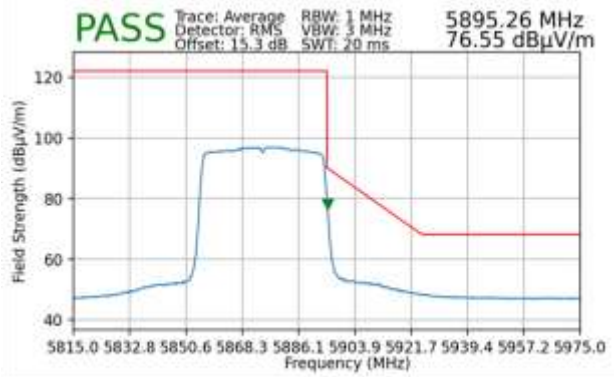


Plot 7-381. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 4)

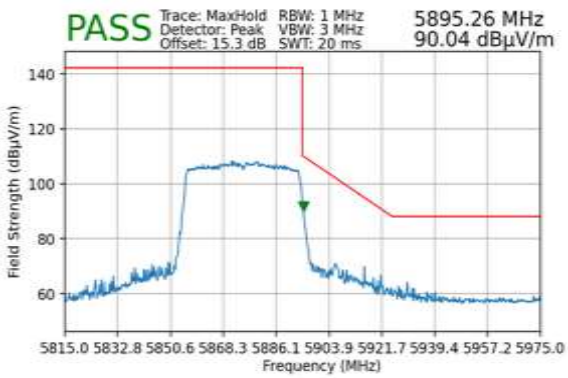


Plot 7-382. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 4)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5875MHz
Channel:	175



Plot 7-383. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 4)



Plot 7-384. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 4)

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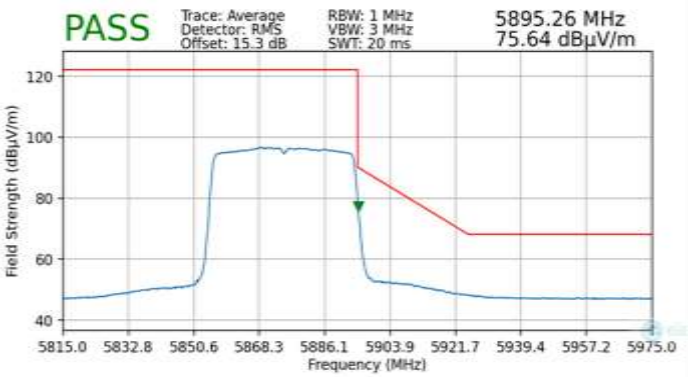
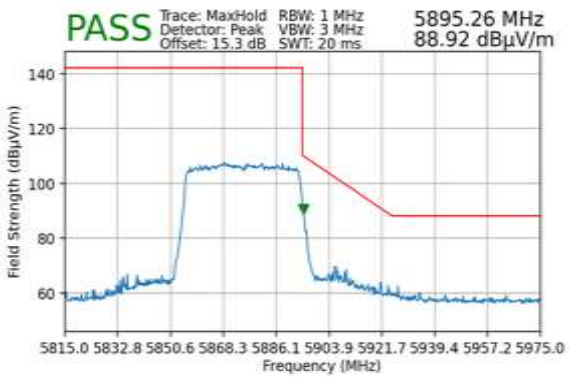
Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5875MHz
Channel:	175



Plot 7-385. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 4) with WCP



Plot 7-386. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 4) with WCP

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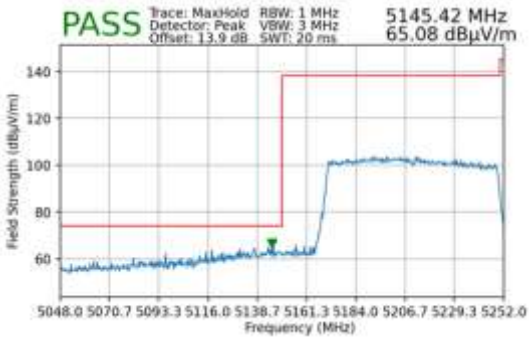
7.6.5 MIMO Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]

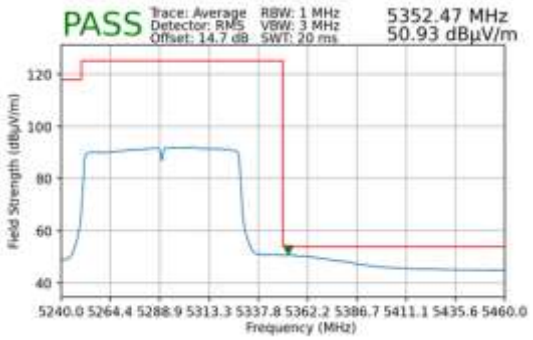
Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5210MHz
Channel:	42

Plot 7-387. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 1)

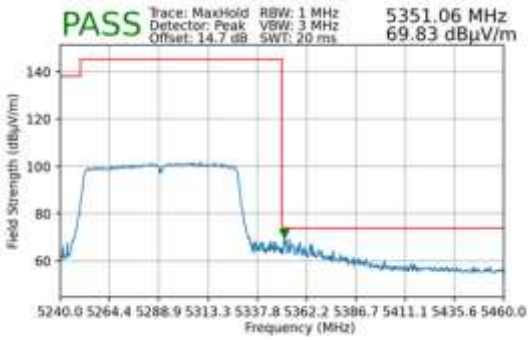


Plot 7-388. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 1)

Worst Case Mode:	802.11ac
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5290MHz
Channel:	58



Plot 7-389. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 2A)



Plot 7-390. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 2A)

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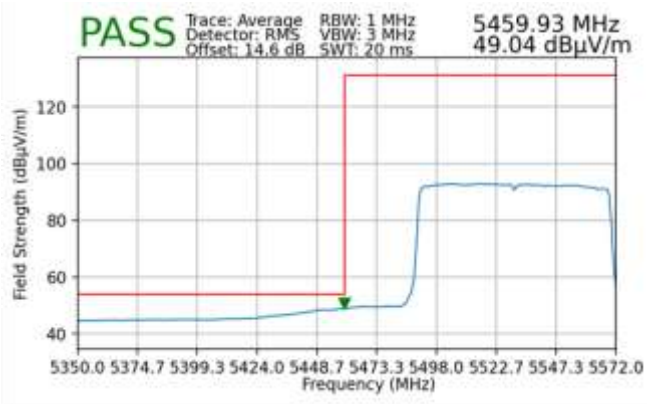
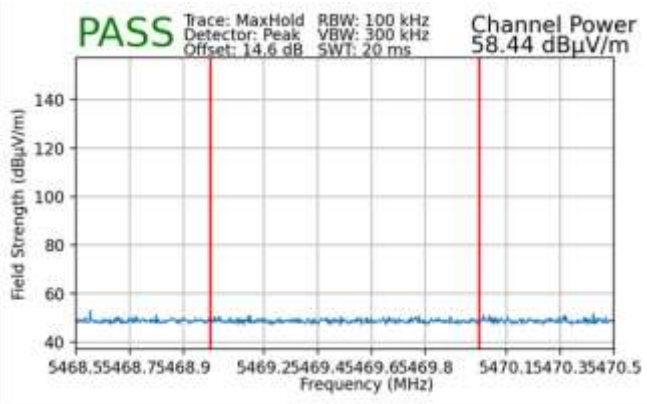
Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5530MHz
Channel:	106

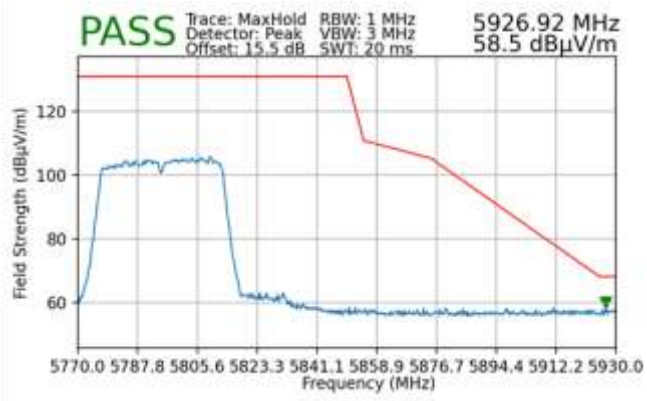


Plot 7-391. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 2C)



Plot 7-392. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 2C)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5775MHz
Channel:	155



Plot 7-393. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 3)

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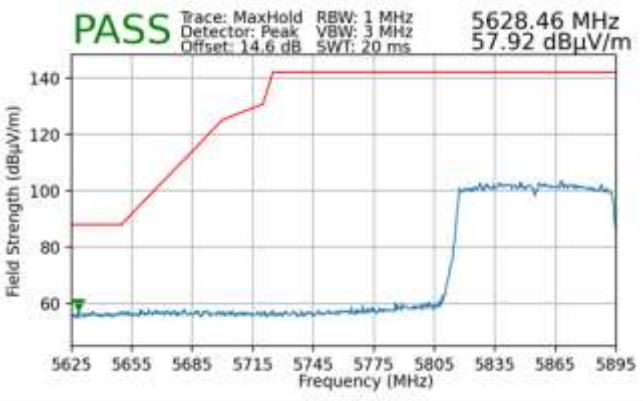
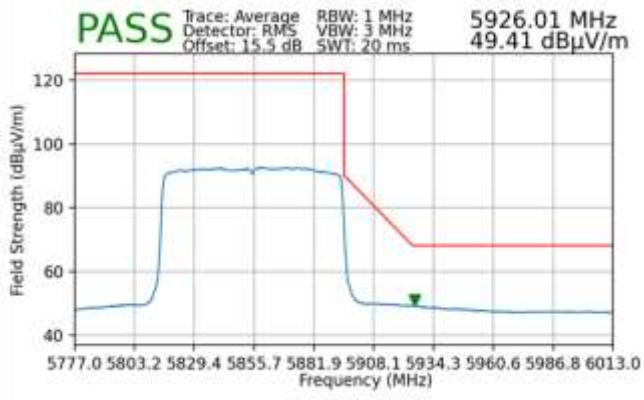
Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5855MHz
Channel:	171

Plot 7-394. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 4)

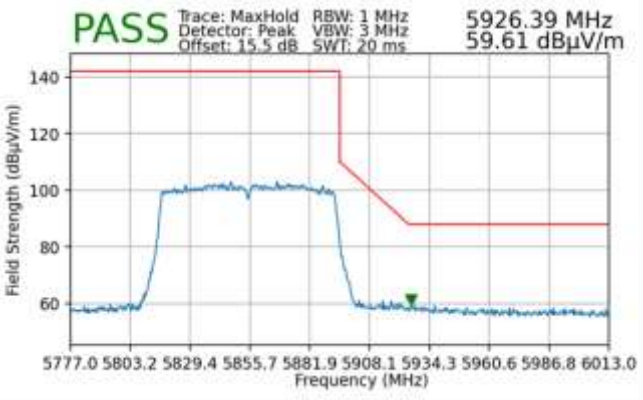


Plot 7-395. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 4)

Worst Case Mode:	802.11ac
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5855MHz
Channel:	171



Plot 7-396. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 4)



Plot 7-397. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 4)

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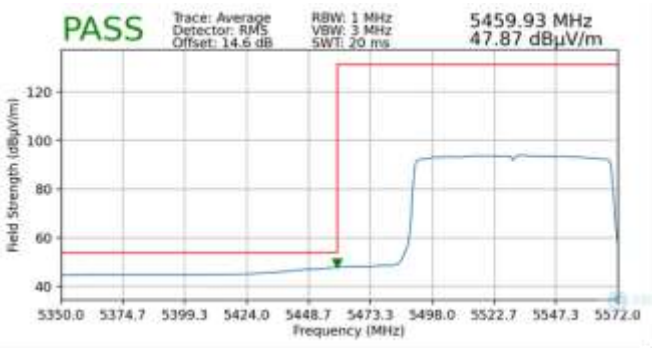
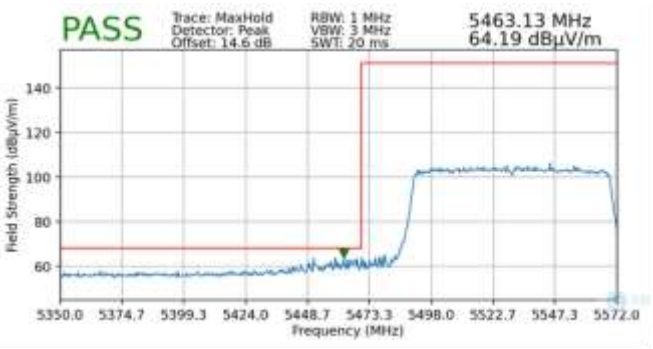
Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5530MHz
Channel:	106



Plot 7-398. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 2C) with WCP



Plot 7-399. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 2C) with WCP

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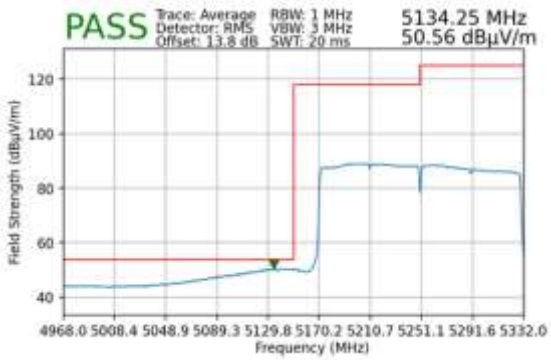
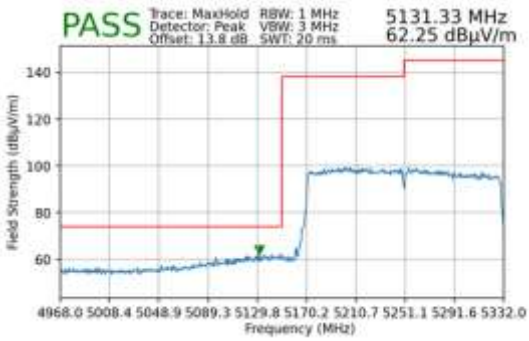
7.6.6 MIMO Radiated Band Edge Measurements (160MHz BW)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5250MHz
Channel:	50

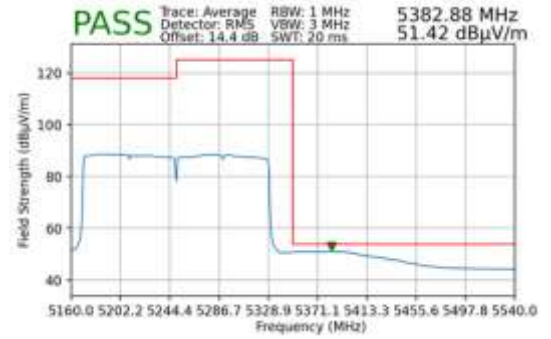


Plot 7-400. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 1)

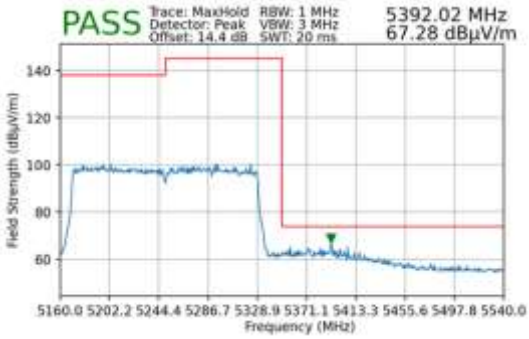


Plot 7-401. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 1)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5250MHz
Channel:	50



Plot 7-402. Radiated Upper Band Edge Plot MIMO (Average – UNII Band 2A)



Plot 7-403. Radiated Upper Band Edge Plot MIMO (Peak – UNII Band 2A)

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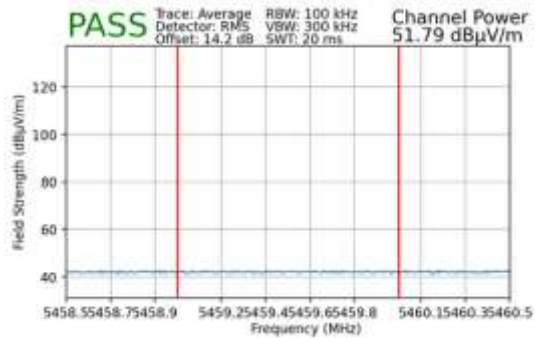
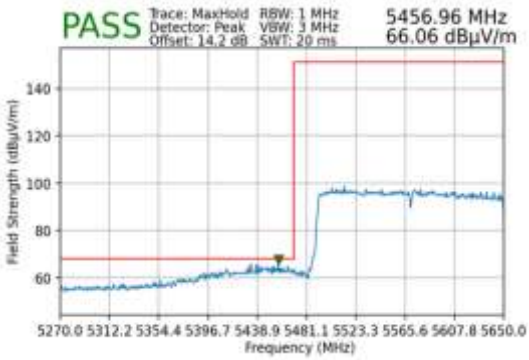
Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5570MHz
Channel:	114



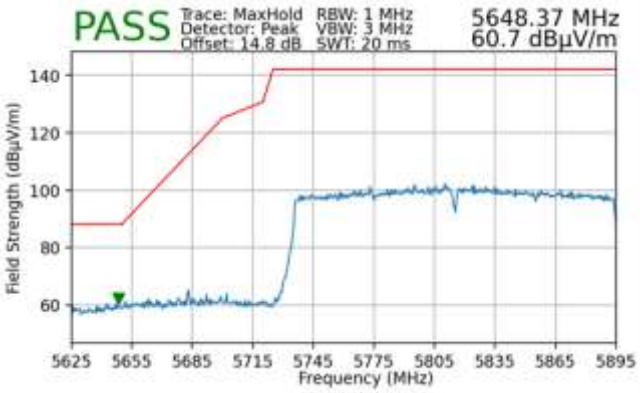
Plot 7-404. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 2C)



Plot 7-405. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 2C)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5815MHz
Channel:	163

Plot 7-406. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 4)



Plot 7-407. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 4)

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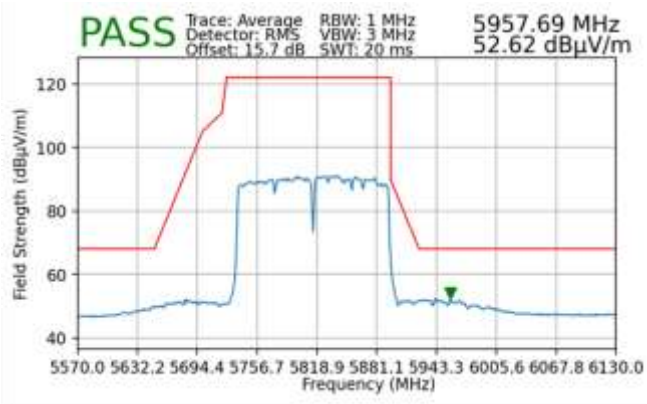
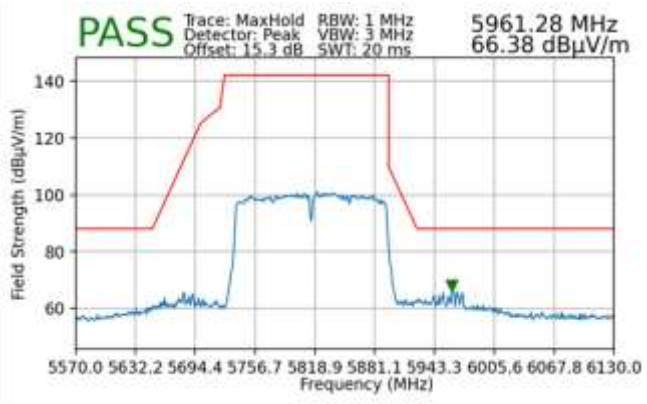
Worst Case Mode:	802.11ac
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5815MHz
Channel:	163

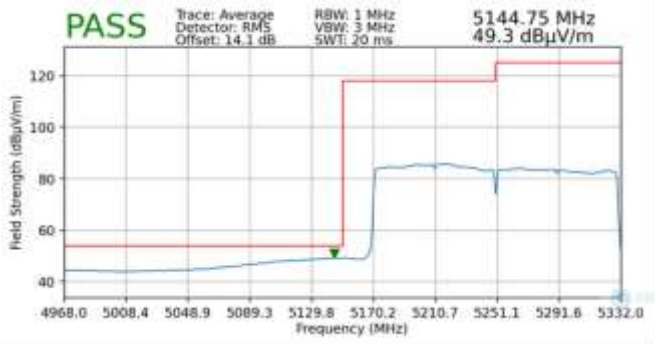


Plot 7-408. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 4)

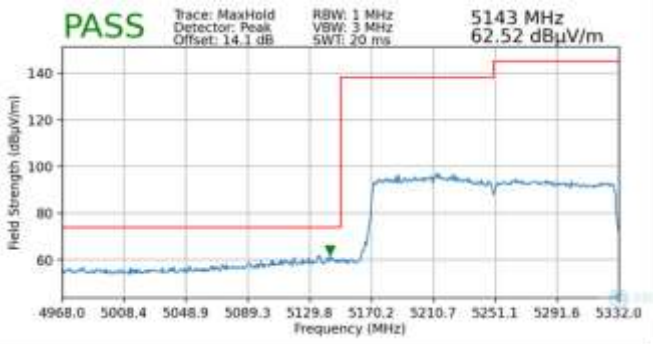


Plot 7-409. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 4)

Worst Case Mode:	802.11ac
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	5250MHz
Channel:	50



Plot 7-410. Radiated Lower Band Edge Plot MIMO (Average – UNII Band 1) with WCP



Plot 7-411. Radiated Lower Band Edge Plot MIMO (Peak – UNII Band 1) with WCP

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7.7 Radiated Spurious Emissions Measurements – Below 1GHz

§15.209; RSS-Gen [8.9]

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna 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 radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-47 per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [µV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 7-47. Radiated Limits

Test Procedures Used

ANSI C63.10-2013

Test Settings

Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

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Test Setup

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

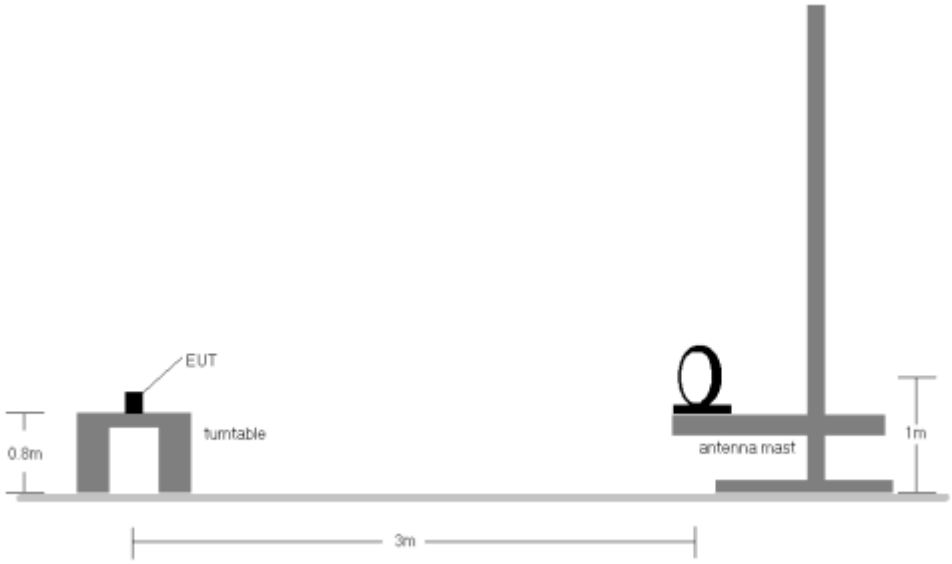

Figure 7-6. Radiated Test Setup < 30MHz

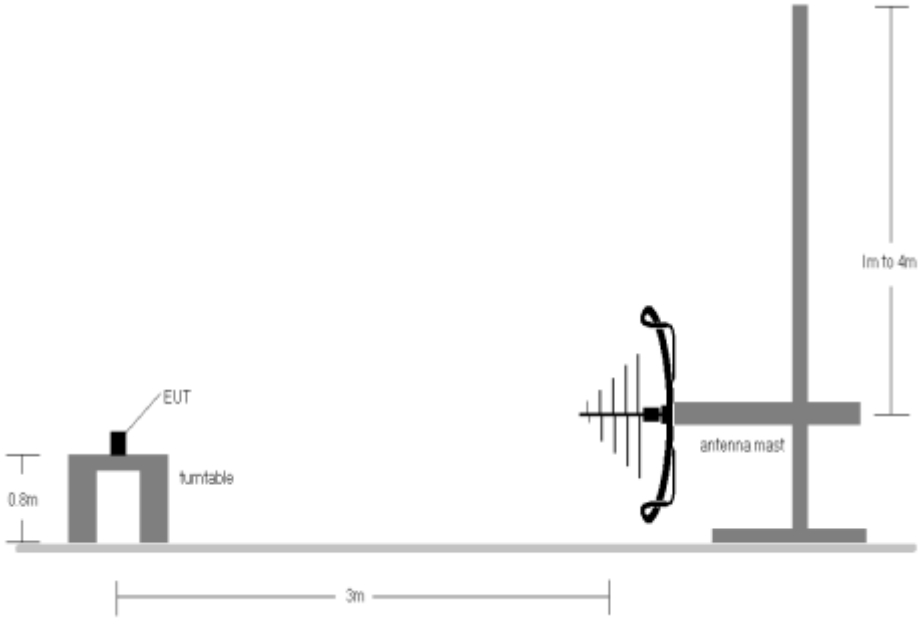

Figure 7-7. Radiated Test Setup < 1GHz

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Test Notes

1. All emissions lying in restricted bands specified in §15.205 and RSS-Gen (8.10) are below the limit shown in Table 7-47.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit was tested with its standard battery.
4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.

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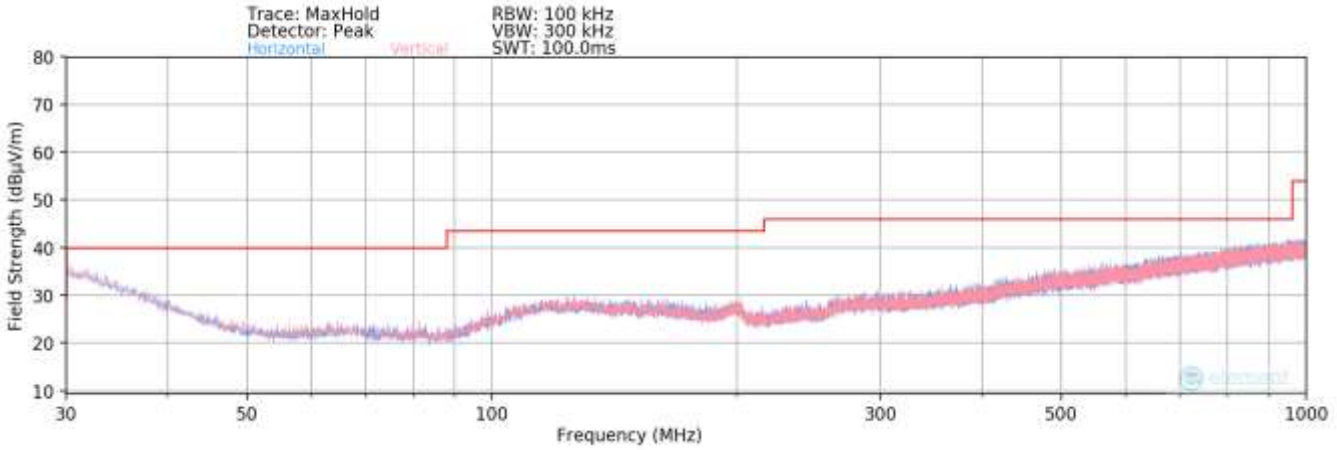
MIMO Radiated Spurious Emissions Measurements (Below 1GHz)

§15.209; RSS-Gen [8.9]



Plot 7-412. Radiated Spurious Plot below 1GHz MIMO (802.11ax – U1 Ch. 36)

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]
697.00	Peak	V	-	-	-96.59	28.87	39.28	46.0206	-6.74

Table 7-46. Radiated Spurious Emissions below 1GHz MIMO

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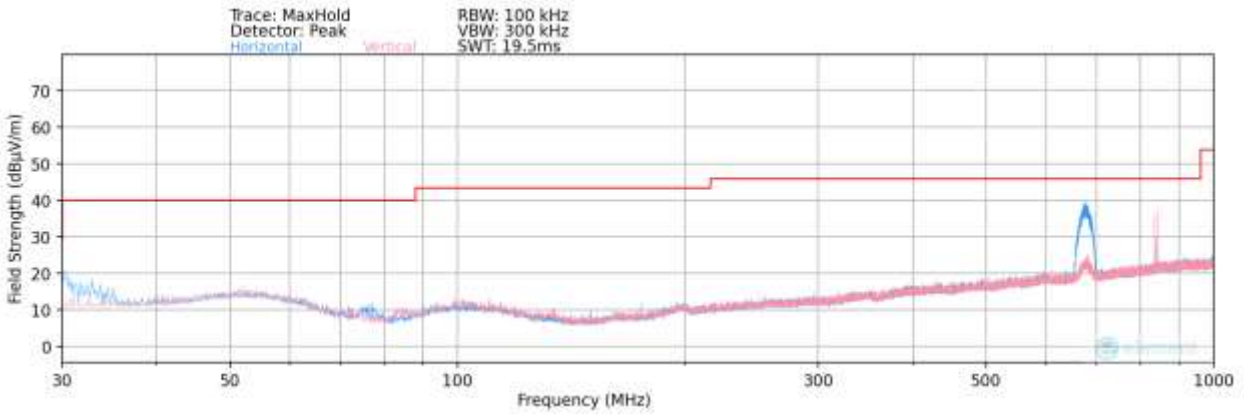
Simultaneous Tx Radiated Spurious Emissions Measurements (Below 1GHz)

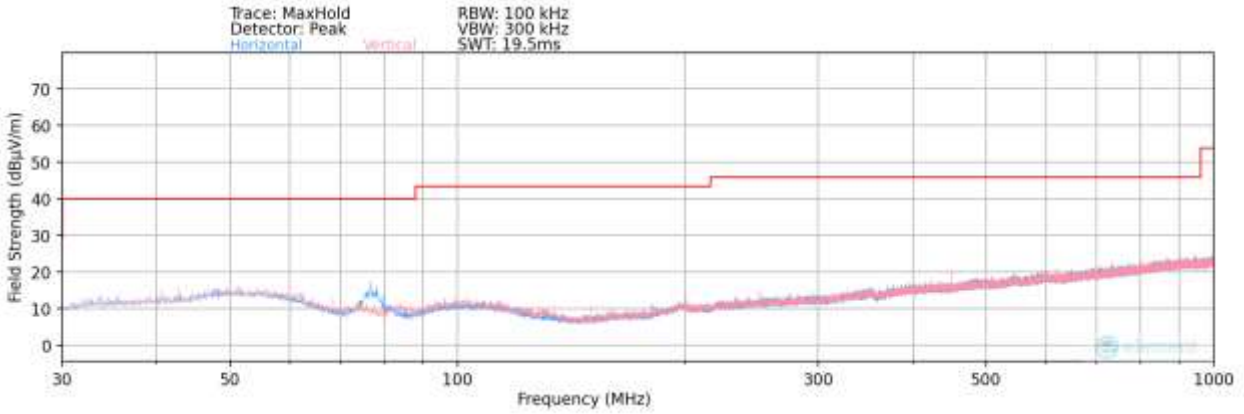
§15.209; RSS-Gen [8.9]



Plot 7-413. Radiated Spurious Plot below 1GHz (2.4GHz – 5GHz)

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]
679.39	Peak	H	202	59	-68.39	-6.88	31.73	46.02	-14.29
844.38	Peak	V	257	149	-65.49	-4.31	37.20	46.02	-8.82

Table 7-48. Radiated Spurious Emissions below 1GHz (2.4GHz – 5GHz)



Plot 7-414. Radiated Spurious Plot below 1GHz (6GHz – 2.4GHz)

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]
76.77	Peak	H	227	115	-68.17	-21.53	17.30	40.00	-22.70
449.93	Quasi-Peak	H	125	109	-77.35	-11.28	18.37	46.02	-27.65

Table 7-49. Radiated Spurious Emissions below 1GHz (6GHz – 2.4GHz)

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7.8 Line-Conducted Test Data

§15.407; RSS-Gen [8.8]

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 and RSS-Gen (8.8).

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 7-50. 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

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Test Setup

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

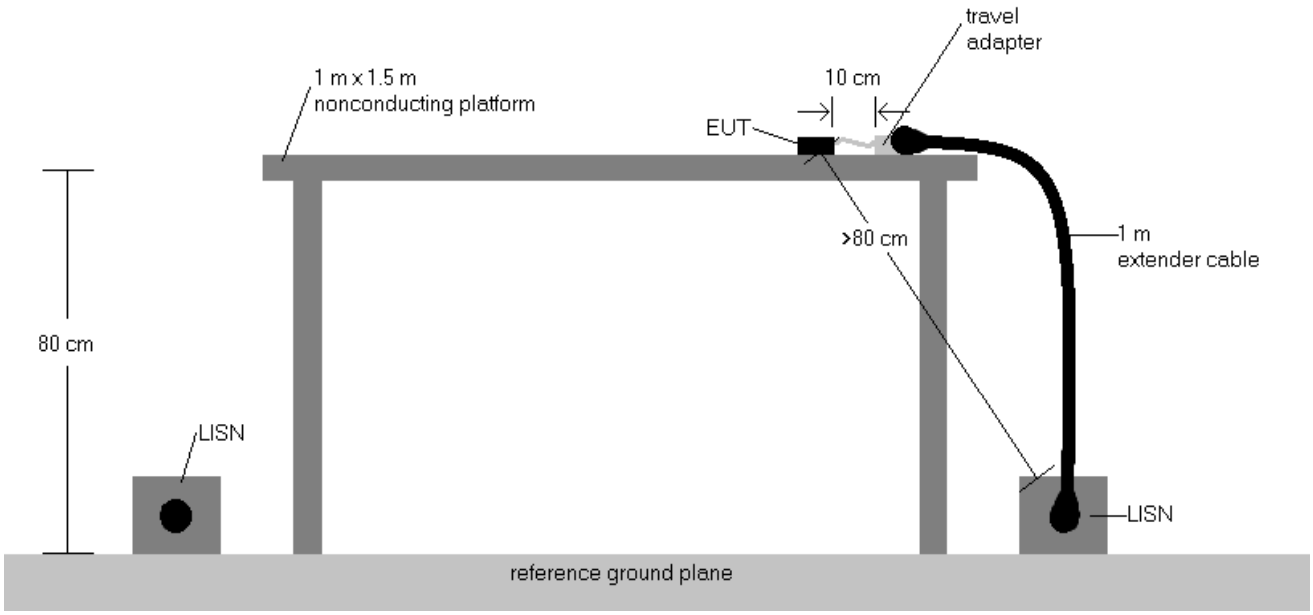

Figure 7-8. Test Instrument & Measurement Setup

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 are specified in 15.207 and RSS-Gen (8.8).
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.

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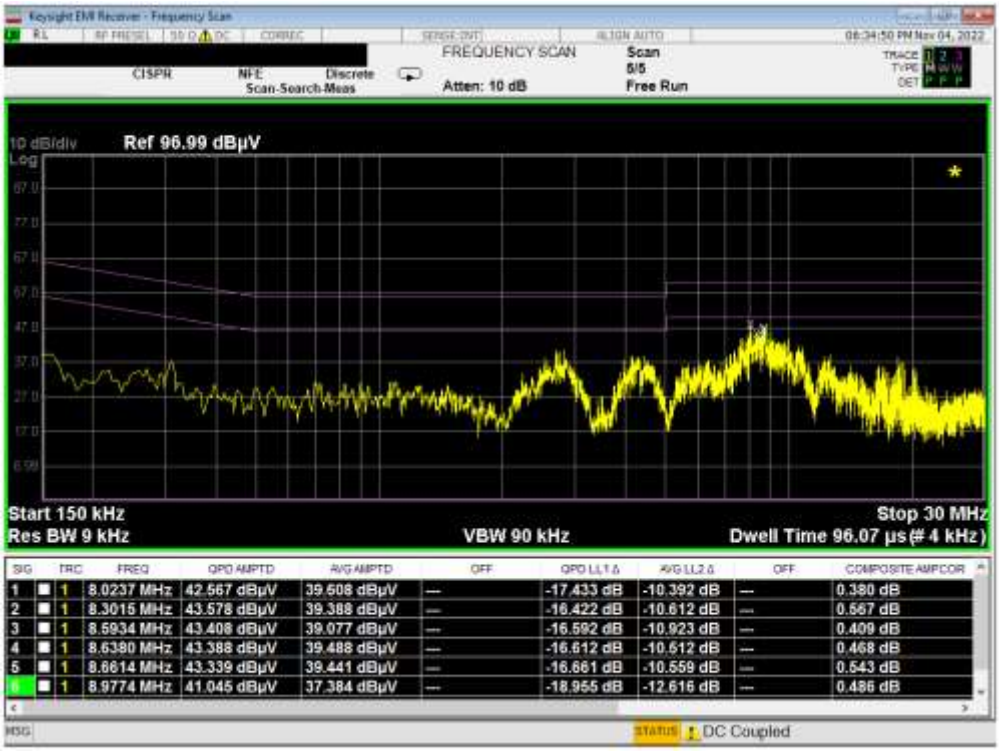
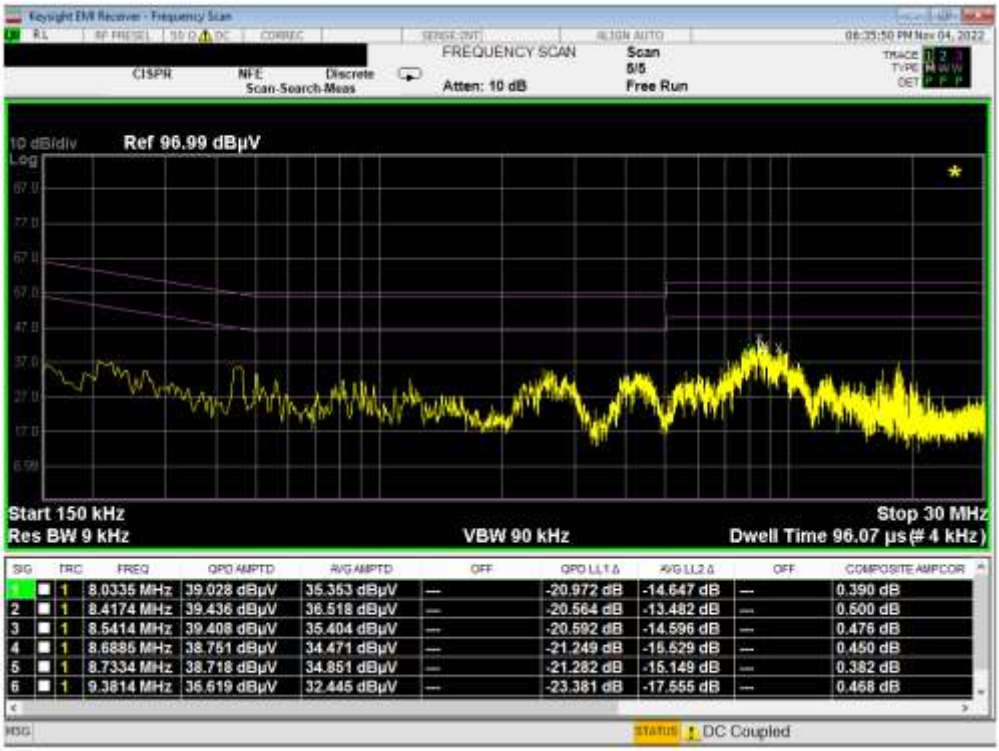


SIG	TRC	FREQ	QPD AMPTD	AVG AMPTD	OFF	QPD LL1 Δ	AVG LL2 Δ	OFF	COMPOSITE AMPCOR
1	1	8.0237 MHz	42.567 dBµV	39.608 dBµV	---	-17.433 dB	-10.392 dB	---	0.380 dB
2	1	8.3015 MHz	43.578 dBµV	39.388 dBµV	---	-16.422 dB	-10.612 dB	---	0.567 dB
3	1	8.5934 MHz	43.408 dBµV	39.077 dBµV	---	-16.592 dB	-10.923 dB	---	0.409 dB
4	1	8.6380 MHz	43.388 dBµV	39.488 dBµV	---	-16.612 dB	-10.512 dB	---	0.468 dB
5	1	8.8614 MHz	43.339 dBµV	39.441 dBµV	---	-16.661 dB	-10.559 dB	---	0.543 dB
6	1	8.9774 MHz	41.045 dBµV	37.384 dBµV	---	-18.955 dB	-12.616 dB	---	0.486 dB

Plot 7-415. Line Conducted Plot with 802.11a UNII Band 1 (L1)



SIG	TRC	FREQ	QPD AMPTD	AVG AMPTD	OFF	QPD LL1 Δ	AVG LL2 Δ	OFF	COMPOSITE AMPCOR
1	1	8.0335 MHz	39.028 dBµV	35.353 dBµV	---	-20.972 dB	-14.647 dB	---	0.390 dB
2	1	8.4174 MHz	39.436 dBµV	36.518 dBµV	---	-20.564 dB	-13.482 dB	---	0.500 dB
3	1	8.5414 MHz	39.408 dBµV	35.404 dBµV	---	-20.592 dB	-14.596 dB	---	0.476 dB
4	1	8.6885 MHz	38.751 dBµV	34.471 dBµV	---	-21.249 dB	-15.529 dB	---	0.450 dB
5	1	8.7334 MHz	38.718 dBµV	34.851 dBµV	---	-21.282 dB	-15.149 dB	---	0.382 dB
6	1	9.3814 MHz	36.619 dBµV	32.445 dBµV	---	-23.381 dB	-17.555 dB	---	0.468 dB

Plot 7-416. Line Conducted Plot with 802.11a UNII Band 1 (N)

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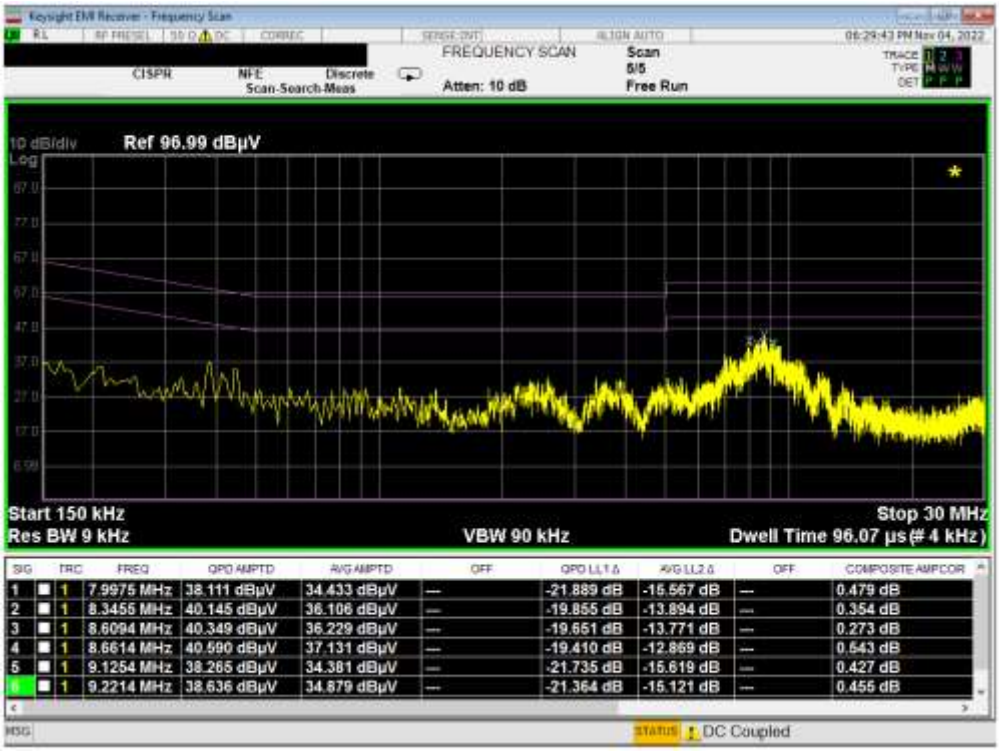
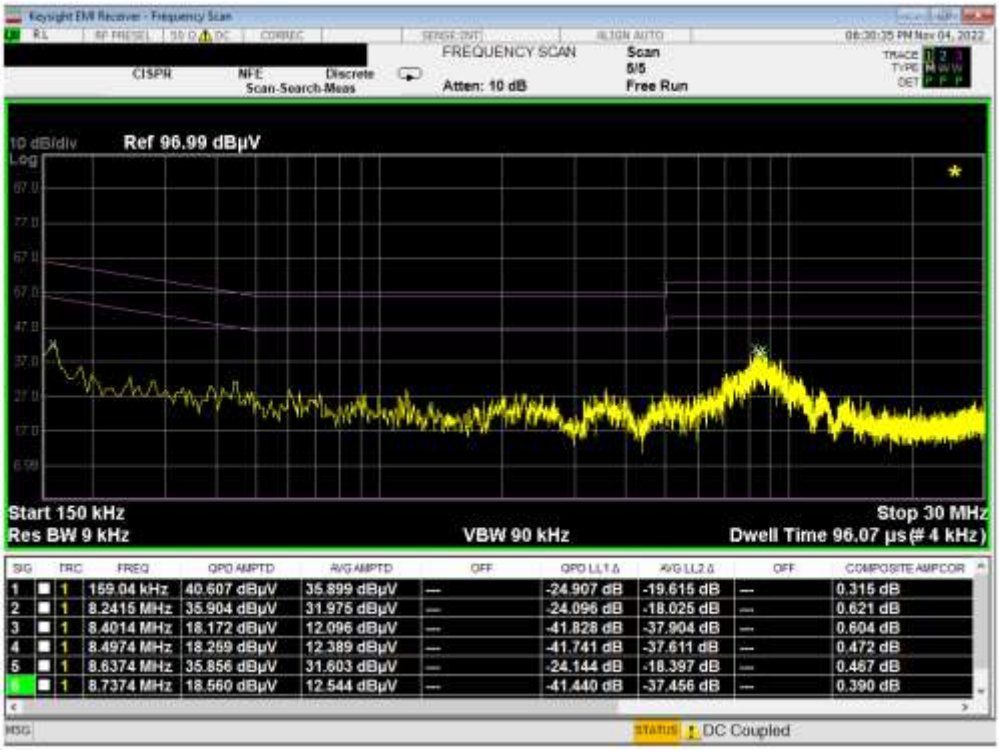


SIG	TRC	FREQ	QPD AMPTD	AVG AMPTD	OFF	QPD LL1 Δ	AVG LL2 Δ	OFF	COMPOSITE AMP COR
1	1	7.9975 MHz	38.111 dBµV	34.433 dBµV	---	-21.889 dB	-15.567 dB	---	0.479 dB
2	1	8.3455 MHz	40.145 dBµV	36.106 dBµV	---	-19.855 dB	-13.894 dB	---	0.354 dB
3	1	8.6094 MHz	40.349 dBµV	36.229 dBµV	---	-19.651 dB	-13.771 dB	---	0.273 dB
4	1	8.6614 MHz	40.590 dBµV	37.131 dBµV	---	-19.410 dB	-12.869 dB	---	0.543 dB
5	1	9.1254 MHz	38.265 dBµV	34.381 dBµV	---	-21.735 dB	-15.619 dB	---	0.427 dB
6	1	9.2214 MHz	38.636 dBµV	34.879 dBµV	---	-21.364 dB	-15.121 dB	---	0.455 dB

Plot 7-417. Line Conducted Plot with 802.11a UNII Band 2A (L1)



SIG	TRC	FREQ	QPD AMPTD	AVG AMPTD	OFF	QPD LL1 Δ	AVG LL2 Δ	OFF	COMPOSITE AMP COR
1	1	159.04 kHz	40.607 dBµV	35.899 dBµV	---	-24.907 dB	-19.615 dB	---	0.315 dB
2	1	8.2415 MHz	35.904 dBµV	31.975 dBµV	---	-24.096 dB	-18.025 dB	---	0.621 dB
3	1	8.4014 MHz	18.172 dBµV	12.096 dBµV	---	-41.828 dB	-37.904 dB	---	0.604 dB
4	1	8.4974 MHz	18.259 dBµV	12.389 dBµV	---	-41.741 dB	-37.611 dB	---	0.472 dB
5	1	8.6374 MHz	35.856 dBµV	31.603 dBµV	---	-24.144 dB	-18.397 dB	---	0.467 dB
6	1	8.7374 MHz	18.560 dBµV	12.544 dBµV	---	-41.440 dB	-37.456 dB	---	0.390 dB

Plot 7-418. Line Conducted Plot with 802.11a UNII Band 2A (N)

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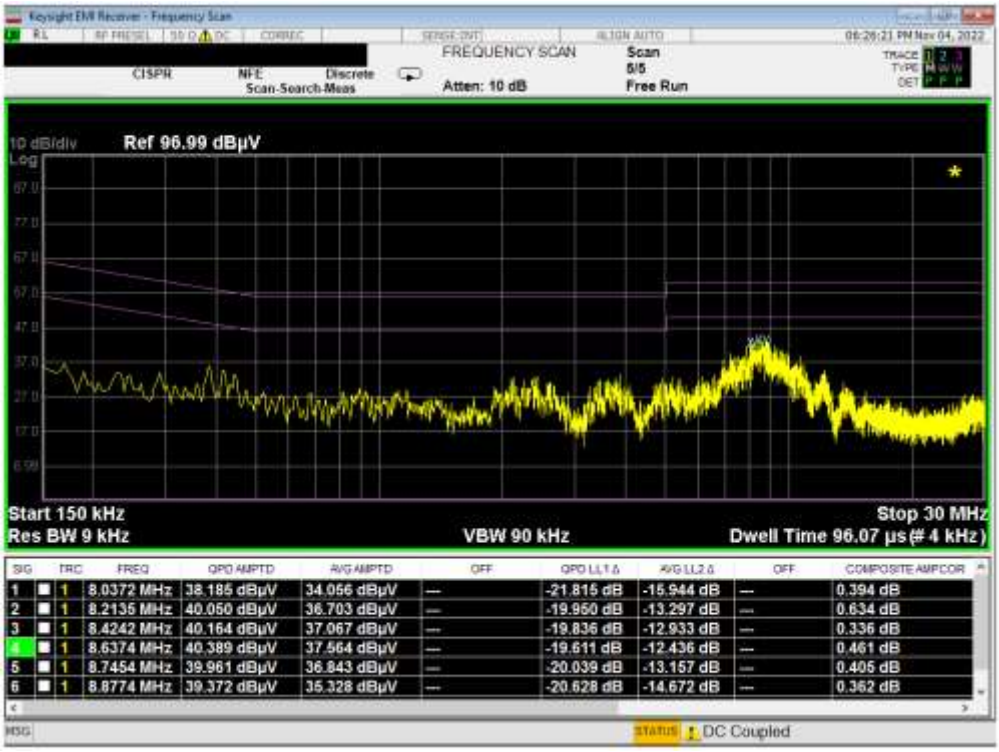
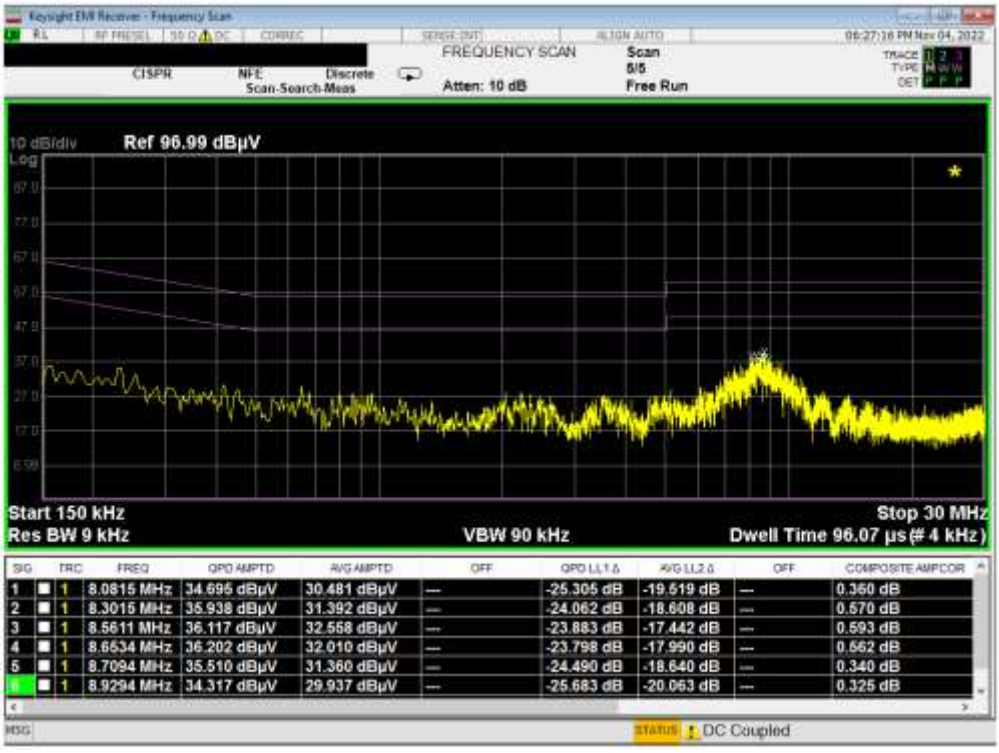


Plot 7-419. Line Conducted Plot with 802.11a UNII Band 2C (L1)



Plot 7-420. Line Conducted Plot with 802.11a UNII Band 2C (N)

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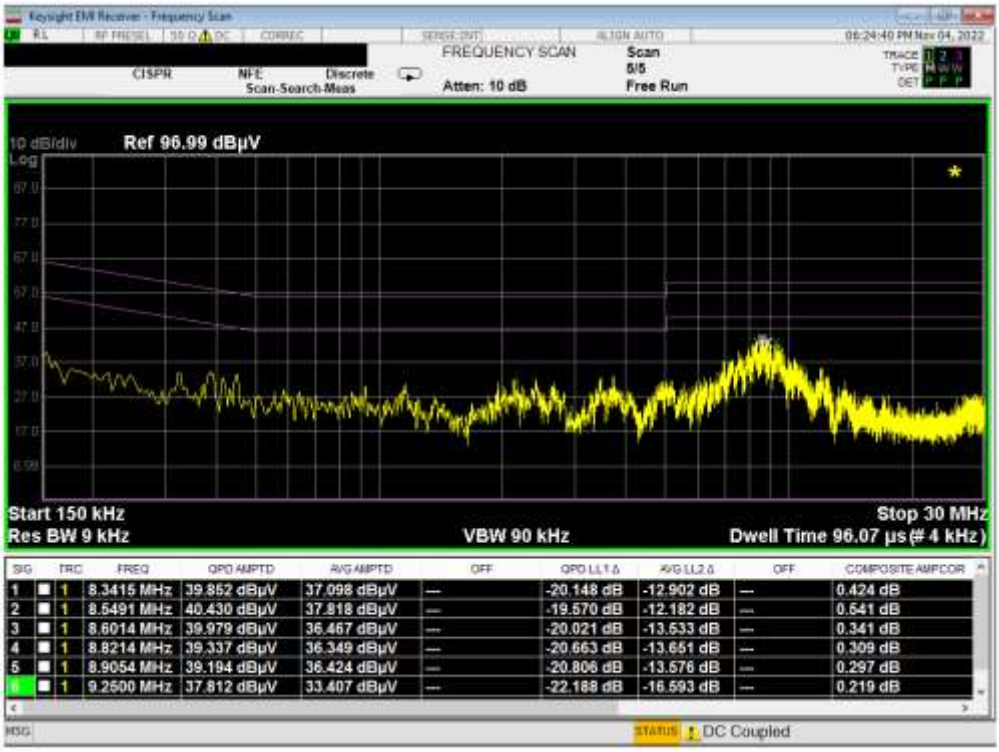
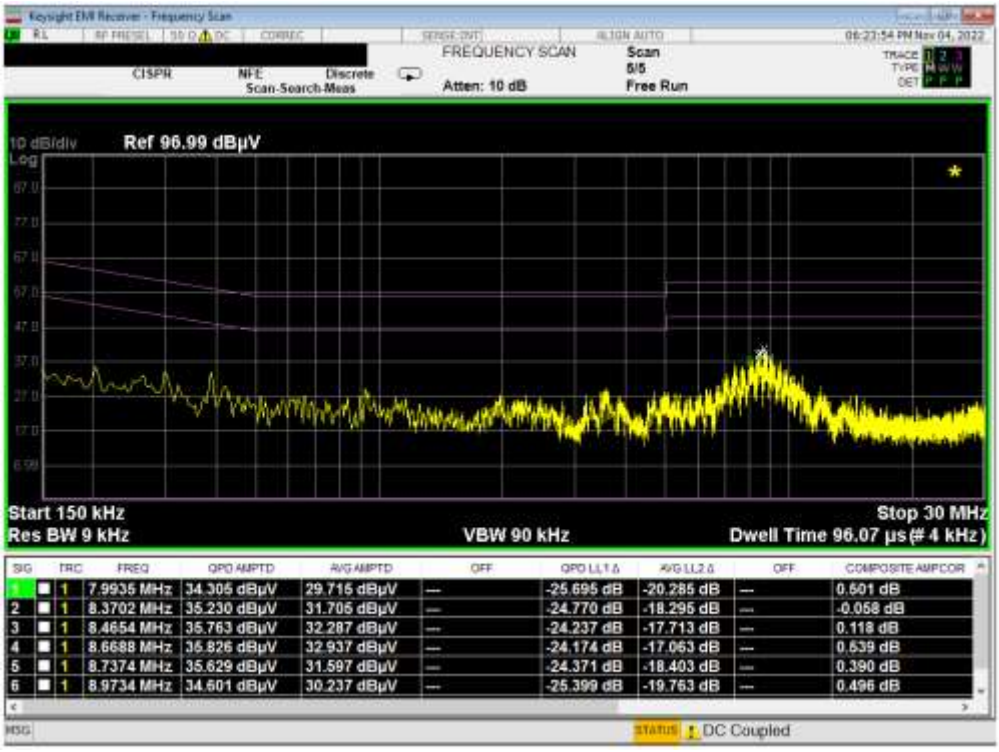


Plot 7-421. Line Conducted Plot with 802.11a UNII Band 3 (L1)



Plot 7-422. Line Conducted Plot with 802.11a UNII Band 3 (N)

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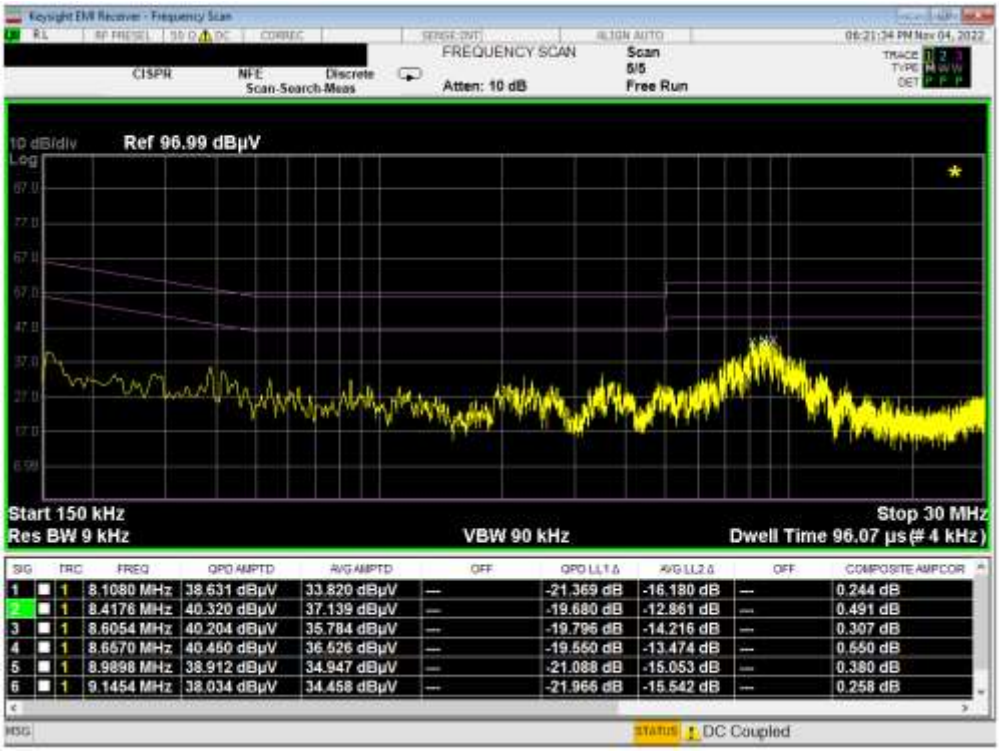
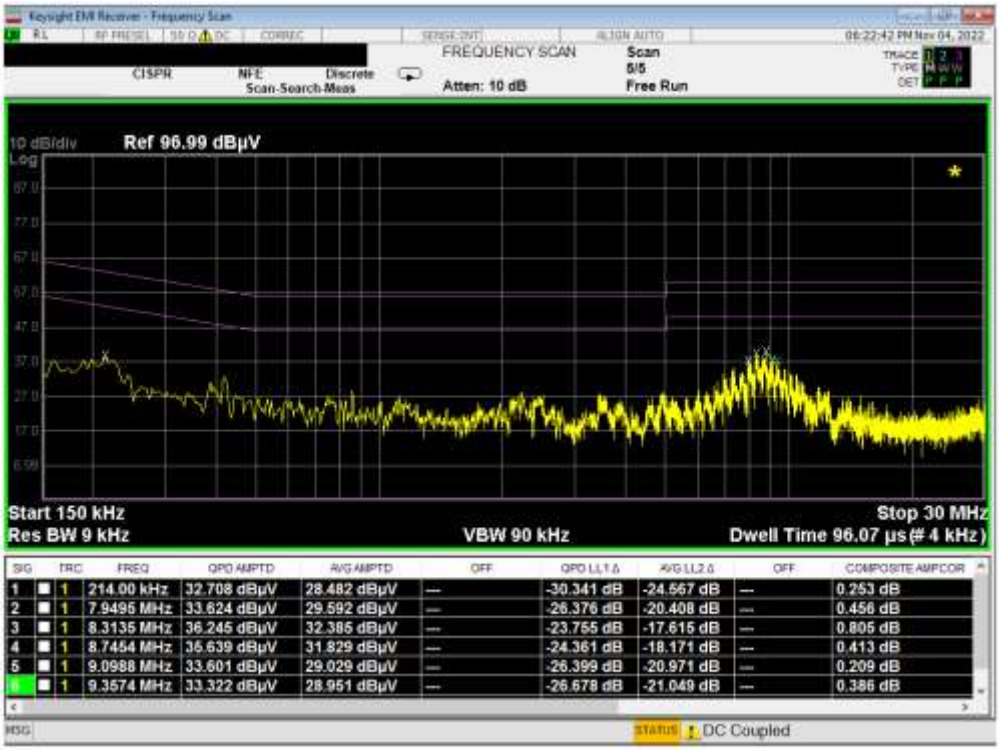


SIG	TRC	FREQ	QPD AMPTD	AVG AMPTD	OFF	QPD LL1 Δ	AVG LL2 Δ	OFF	COMPOSITE AMP COR
1	1	8.1080 MHz	38.631 dBµV	33.820 dBµV	---	-21.369 dB	-16.180 dB	---	0.244 dB
2	1	8.4176 MHz	40.320 dBµV	37.139 dBµV	---	-19.680 dB	-12.861 dB	---	0.491 dB
3	1	8.6054 MHz	40.204 dBµV	35.784 dBµV	---	-19.796 dB	-14.216 dB	---	0.307 dB
4	1	8.6570 MHz	40.460 dBµV	36.526 dBµV	---	-19.550 dB	-13.474 dB	---	0.550 dB
5	1	8.9898 MHz	38.912 dBµV	34.947 dBµV	---	-21.088 dB	-15.053 dB	---	0.380 dB
6	1	9.1454 MHz	38.034 dBµV	34.458 dBµV	---	-21.966 dB	-15.542 dB	---	0.258 dB

Plot 7-423. Line Conducted Plot with 802.11a UNII Band 4 (L1)



SIG	TRC	FREQ	QPD AMPTD	AVG AMPTD	OFF	QPD LL1 Δ	AVG LL2 Δ	OFF	COMPOSITE AMP COR
1	1	214.00 kHz	32.708 dBµV	28.482 dBµV	---	-30.341 dB	-24.567 dB	---	0.253 dB
2	1	7.9495 MHz	33.624 dBµV	29.592 dBµV	---	-26.376 dB	-20.408 dB	---	0.456 dB
3	1	8.3135 MHz	36.245 dBµV	32.385 dBµV	---	-23.755 dB	-17.615 dB	---	0.805 dB
4	1	8.7454 MHz	35.639 dBµV	31.829 dBµV	---	-24.361 dB	-18.171 dB	---	0.413 dB
5	1	9.0988 MHz	33.601 dBµV	29.029 dBµV	---	-26.399 dB	-20.971 dB	---	0.209 dB
6	1	9.3574 MHz	33.322 dBµV	28.951 dBµV	---	-26.678 dB	-21.049 dB	---	0.386 dB

Plot 7-424. Line Conducted Plot with 802.11a UNII Band 4 (N)

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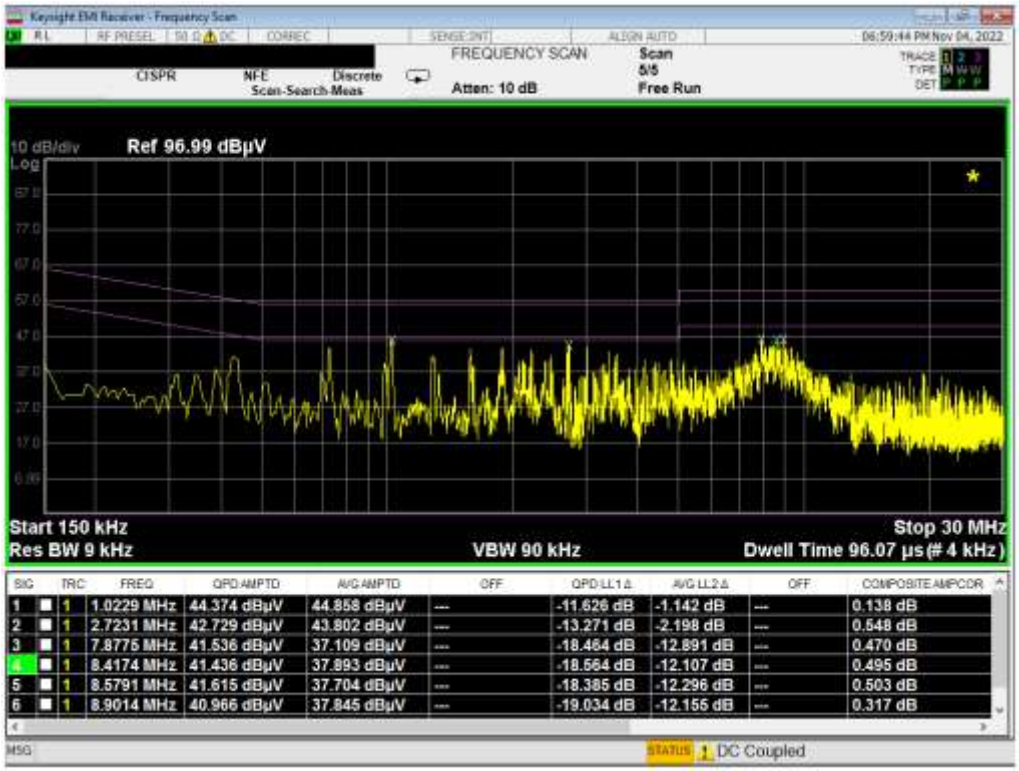
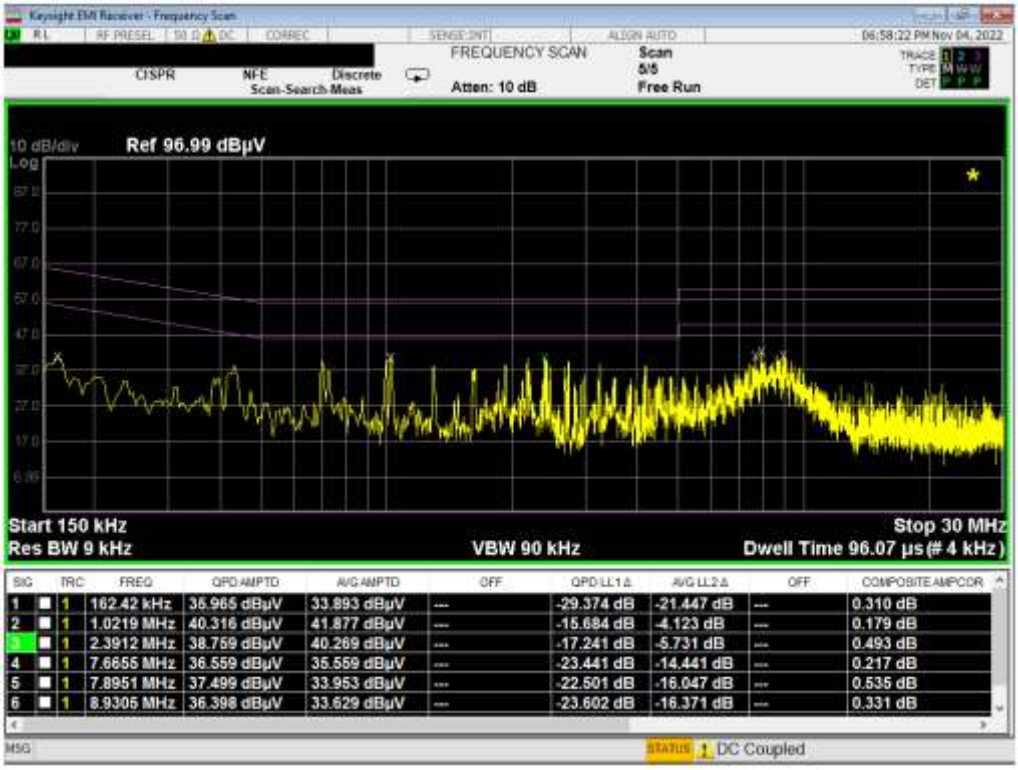


Plot 7-425. Line Conducted Plot with 802.11a UNII Band 1 (L1) with WCP



Plot 7-426. Line Conducted Plot with 802.11a UNII Band 1 (N) with WCP

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8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMS911JPN** is in compliance with Part 15 Subpart E (15.407) of the FCC Rules.

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