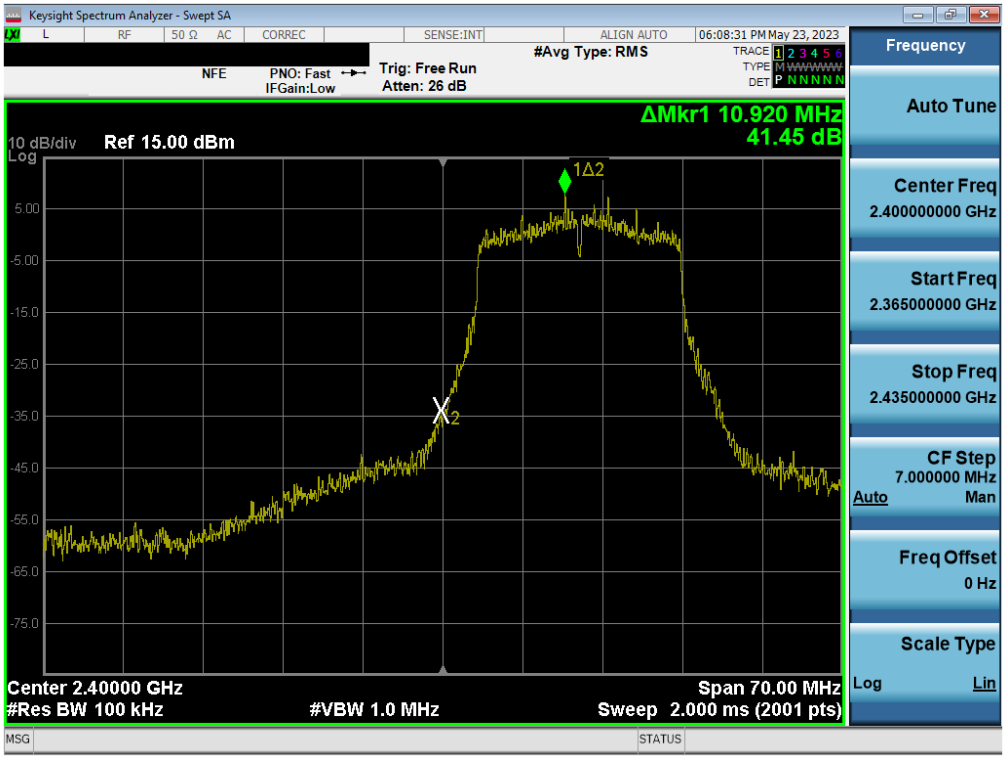
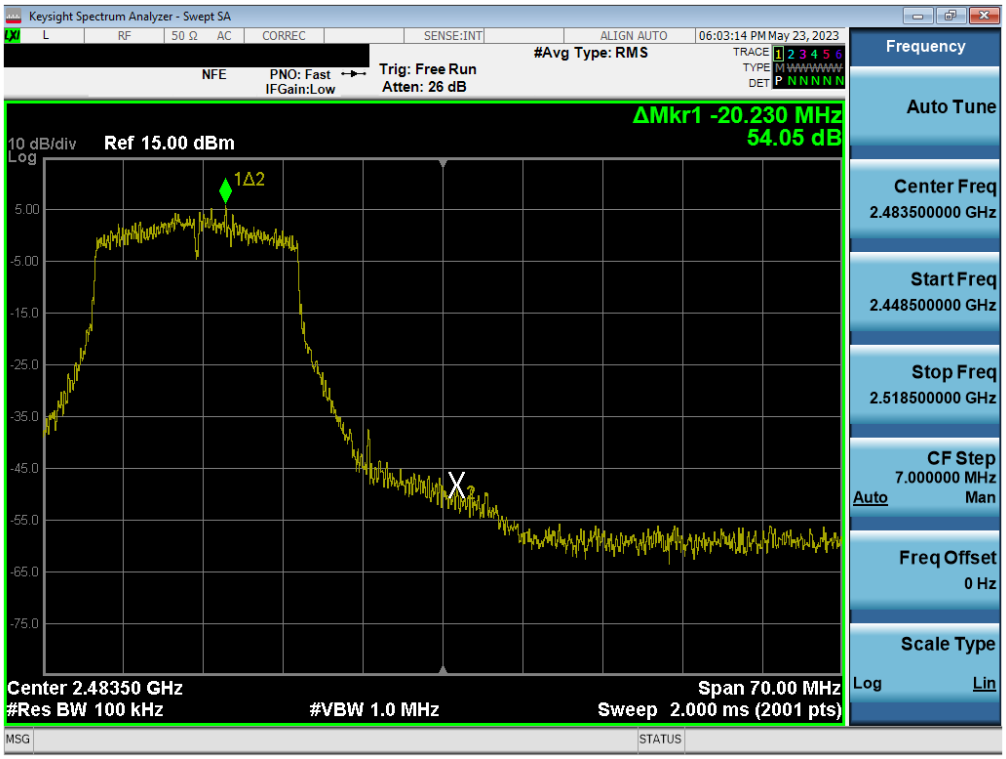
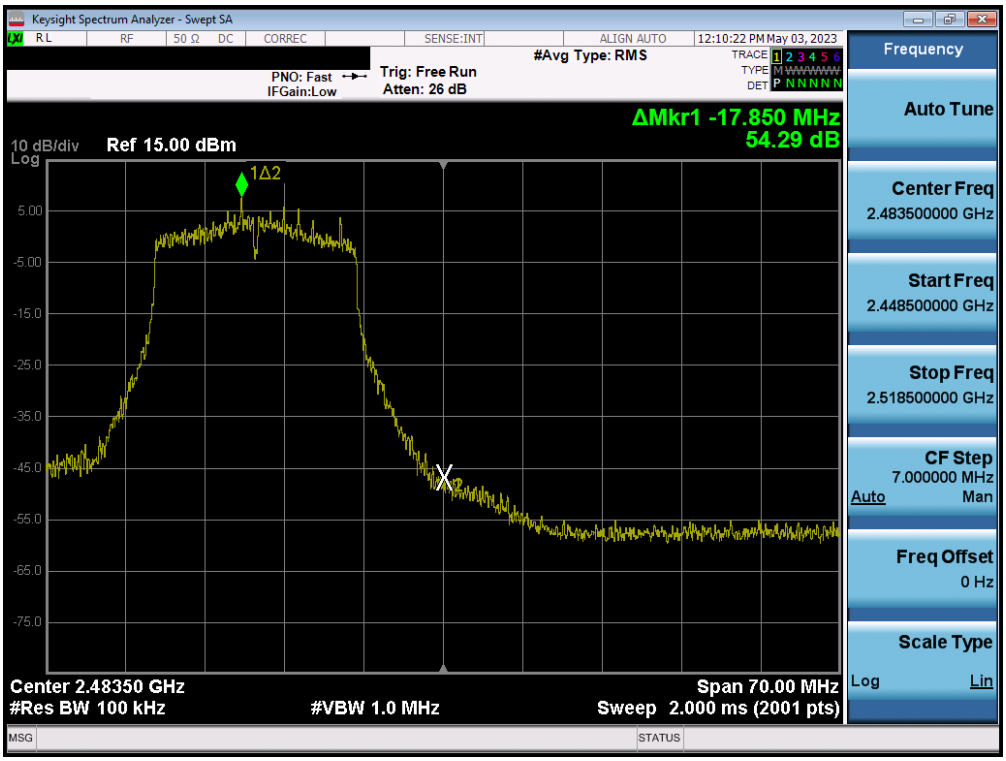


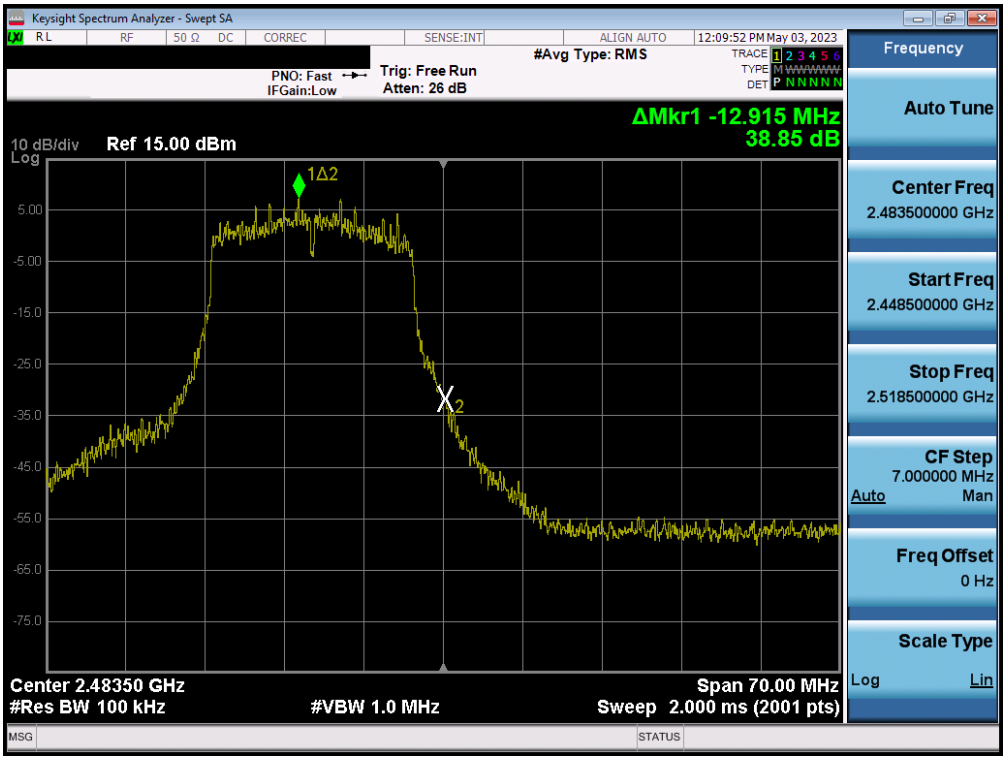
Plot 7-103. Band Edge Plot MIMO ANT2 (802.11ac (2.4GHz) – Ch. 1)



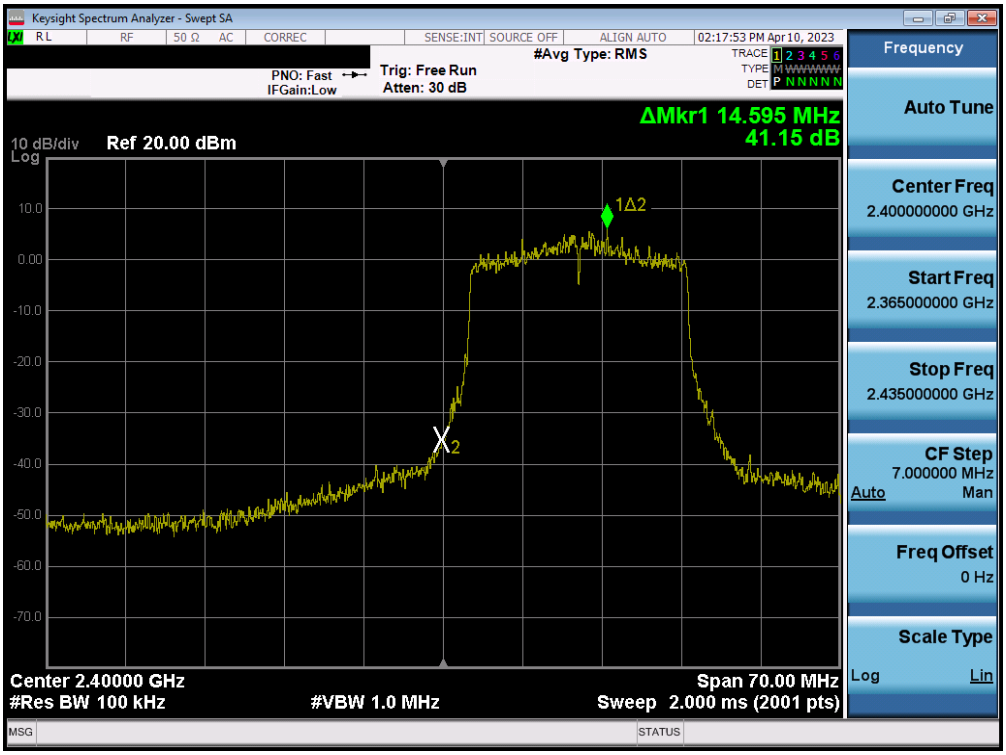
Plot 7-104. Band Edge Plot MIMO ANT2 (802.11ac (2.4GHz) – Ch. 11)



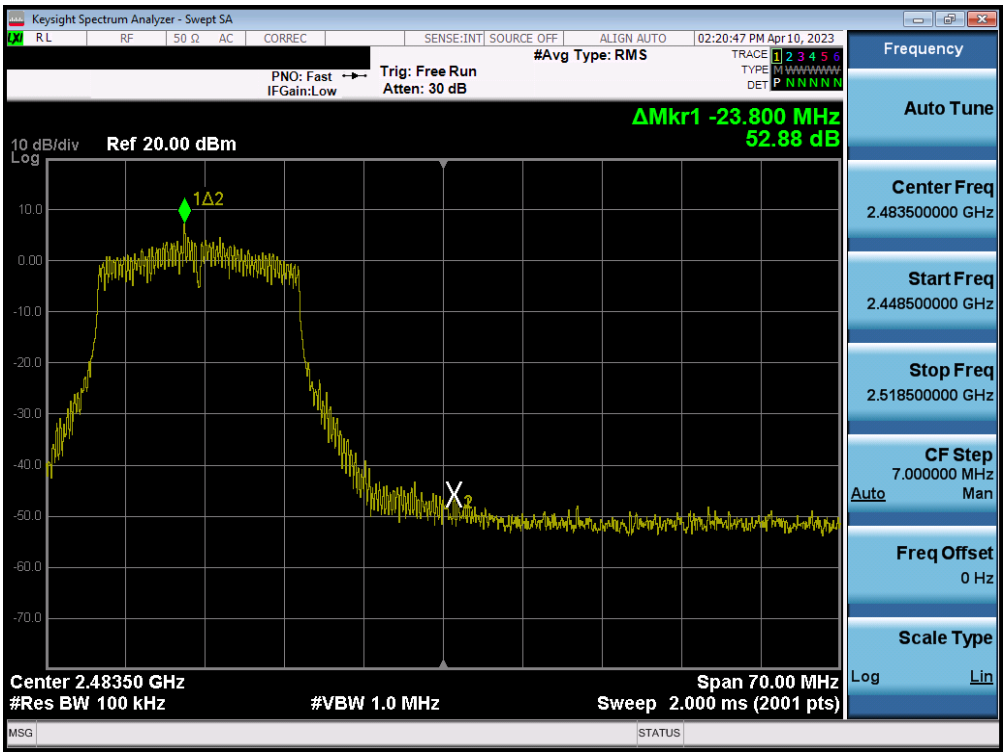
Plot 7-105. Band Edge Plot MIMO ANT2 (802.11ac (2.4GHz) – Ch. 12)



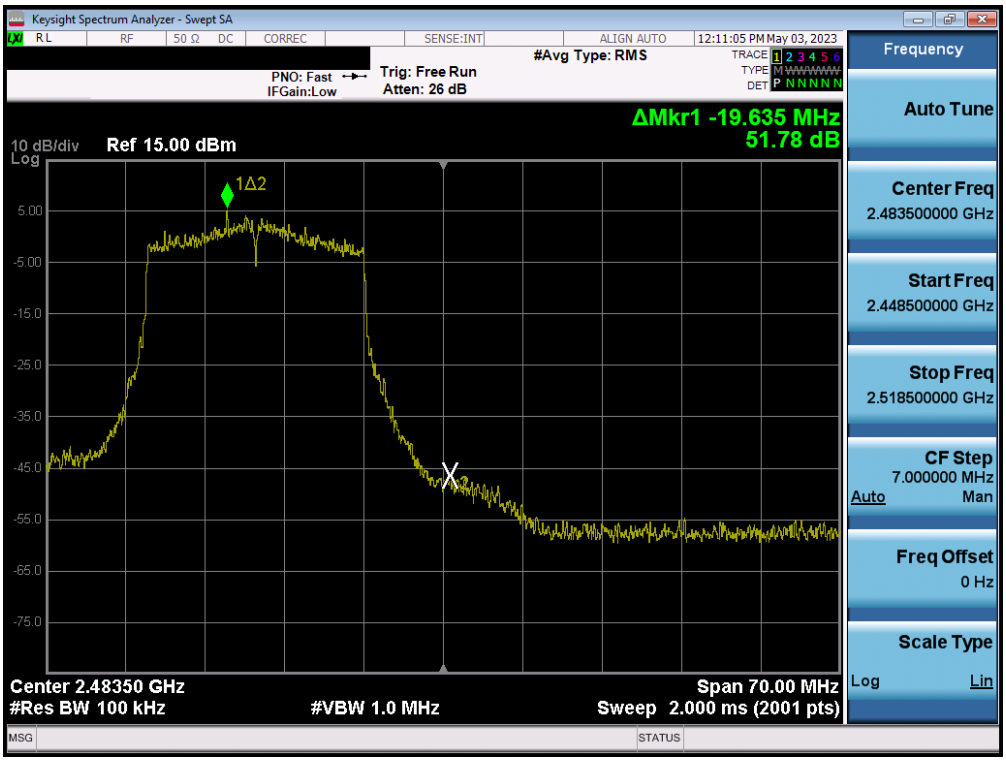
Plot 7-106. Band Edge Plot MIMO ANT2 (802.11ac (2.4GHz) – Ch. 13)



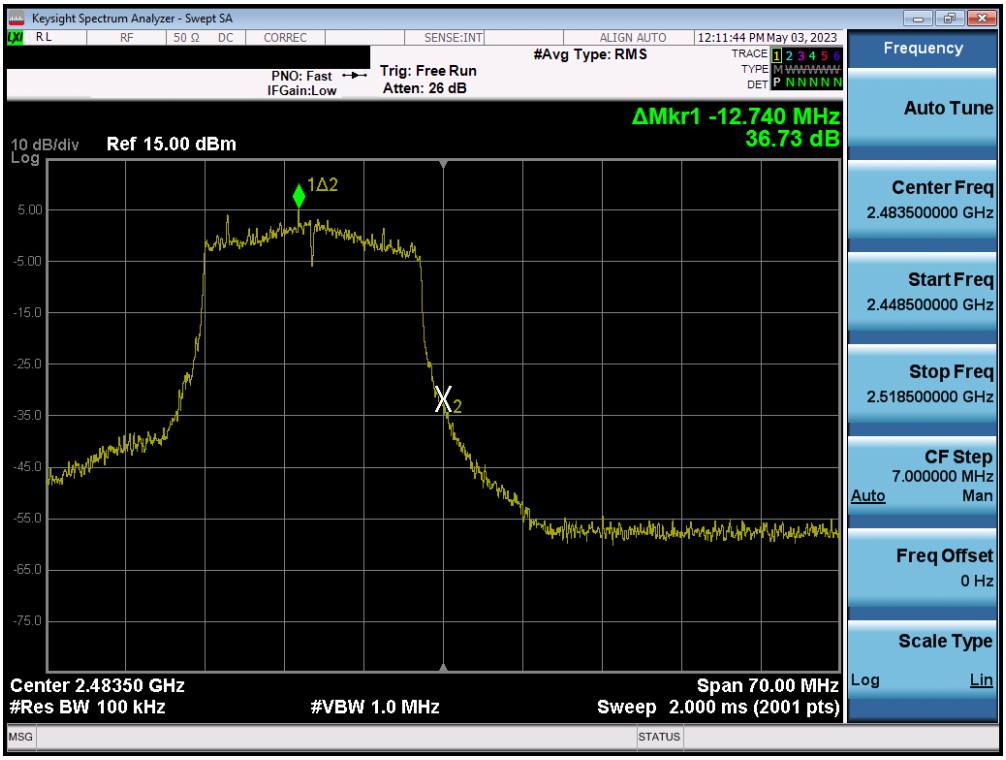
Plot 7-107. Band Edge Plot MIMO ANT2 (802.11ax (2.4GHz) – Ch. 1)



Plot 7-108. Band Edge Plot MIMO ANT2 (802.11ax (2.4GHz) – Ch. 11)



Plot 7-109. Band Edge Plot MIMO ANT2 (802.11ax (2.4GHz) – Ch. 12)



Plot 7-110. Band Edge Plot MIMO ANT2 (802.11ax (2.4GHz) – Ch. 13)

7.6 Conducted Spurious Emissions

§15.247(d); RSS-247 [5.5]

Test Overview and Limit

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. For the following out of band conducted spurious emissions plots, the EUT was investigated in all available data rates for “b”, “g”, “n”, “ax” modes. The worst case spurious emissions for the 2.4GHz band were found while transmitting in “b” mode at 1 Mbps and are shown in the plots below.

The limit for out-of-band spurious emissions at the band edge is 30dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the procedure in Section 11.1 of ANSI C63.10-2013 and KDB 558074 D01 v05r02.

Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3
KDB 558074 D01 v05r02 – Section 8.5
ANSI C63.10-2013 – Section 14.3.3
KDB 662911 D01 v02r01 – Section E)3)b)

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 25GHz (separated into two plots per channel)
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Test Setup

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

Figure 7-5. Test Instrument & Measurement Setup

Test Notes

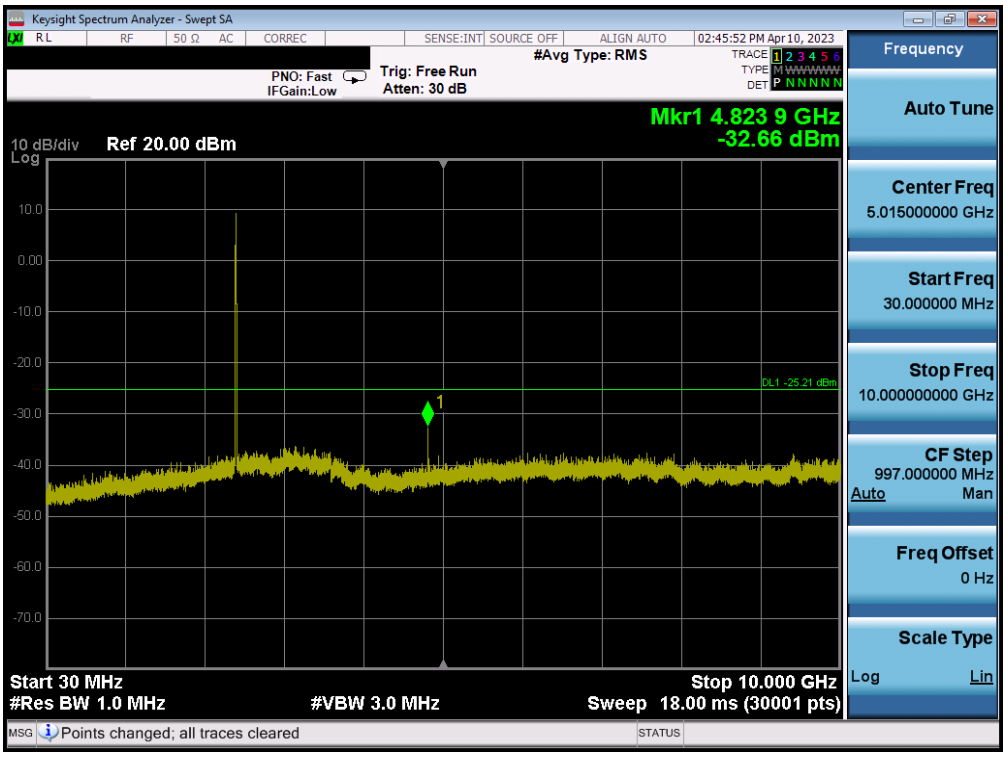
1. RBW was set to 1MHz rather than 100kHz in order to increase the measurement speed.

2. The display line shown in the following plots denotes the limit at 30dB below the fundamental emission level measured in a 100kHz bandwidth. However, since the traces in the following plots are measured with a 1MHz RBW, the display line may not necessarily appear to be 30dB below the level of the fundamental in a 1MHz bandwidth.

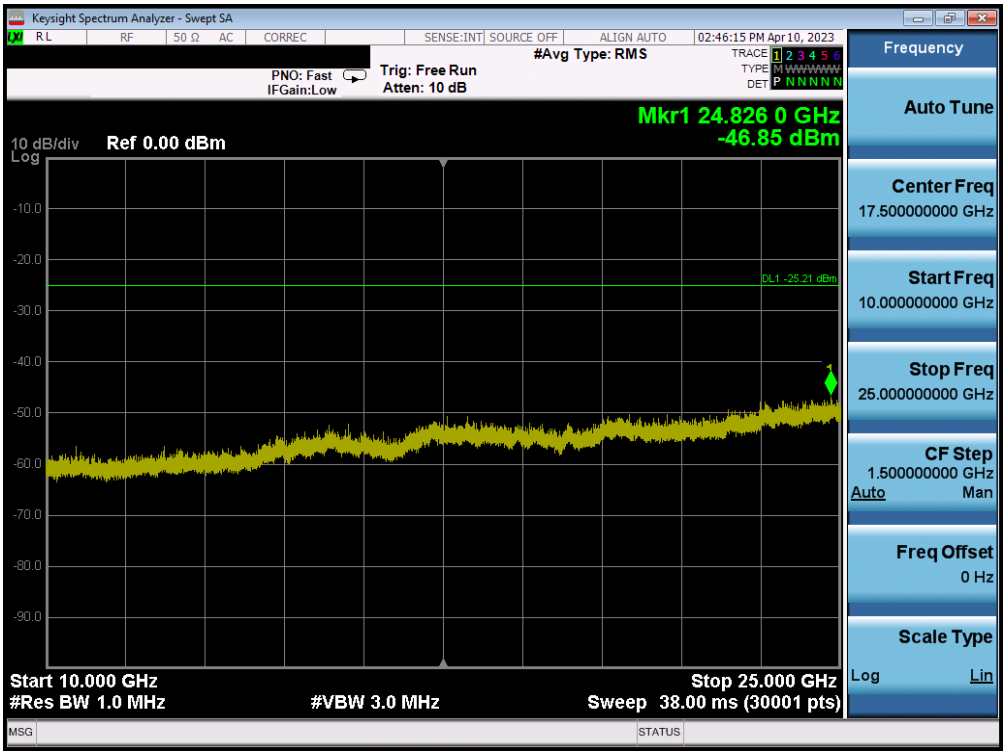
3. For plots showing conducted spurious emissions near the limit, the frequencies were investigated with a reduced RBW to ensure that no emissions were present.

4. The conducted spurious emissions were measured to relative limits. Therefore, in accordance with ANSI C63.10-2013 and KDB 662911 D01 v02r01 Section E)3)b), it was unnecessary to show compliance through the summation of test results of the individual outputs.

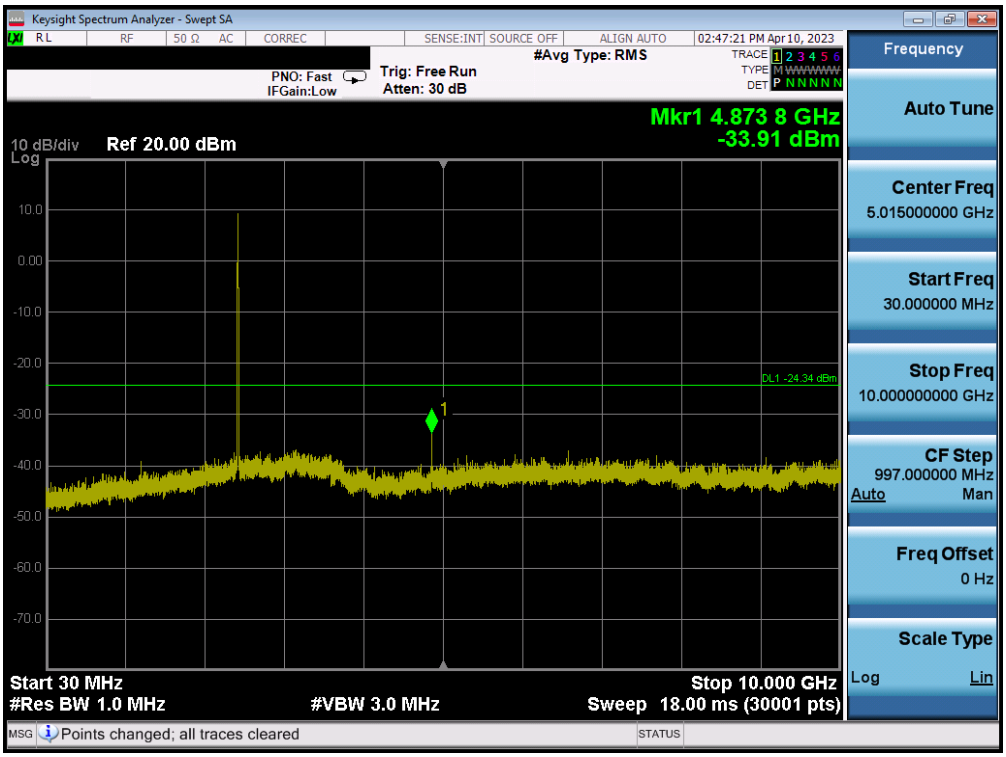
SISO Antenna-2 Conducted Spurious Emission



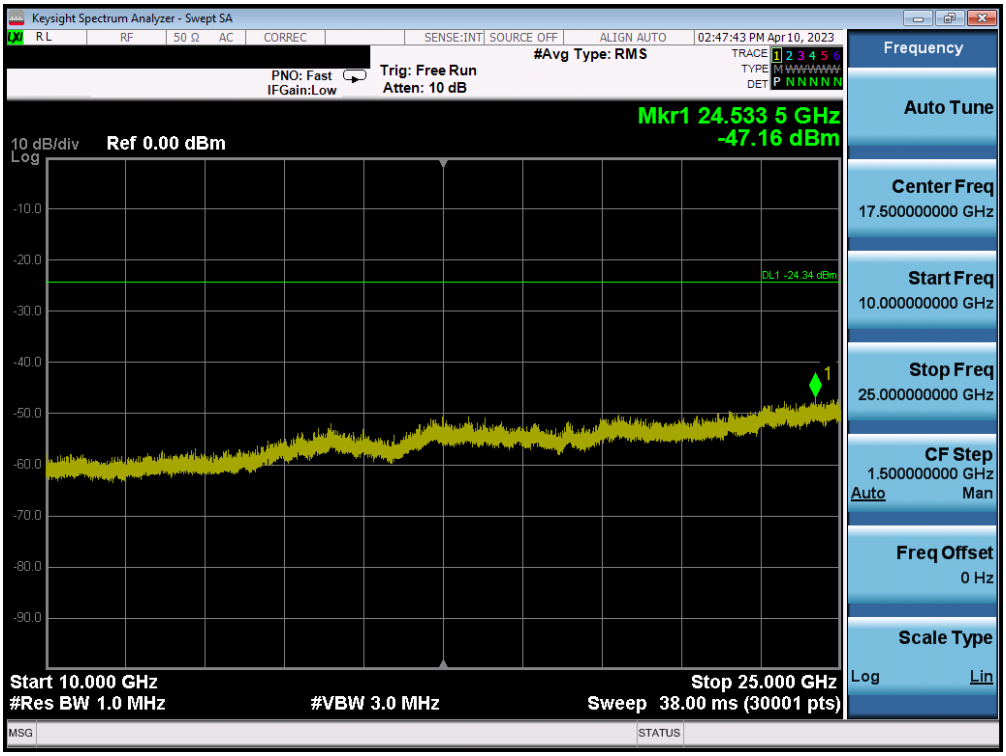
Plot 7-111. Conducted Spurious Plot SISO ANT2 (802.11b – Ch. 1)



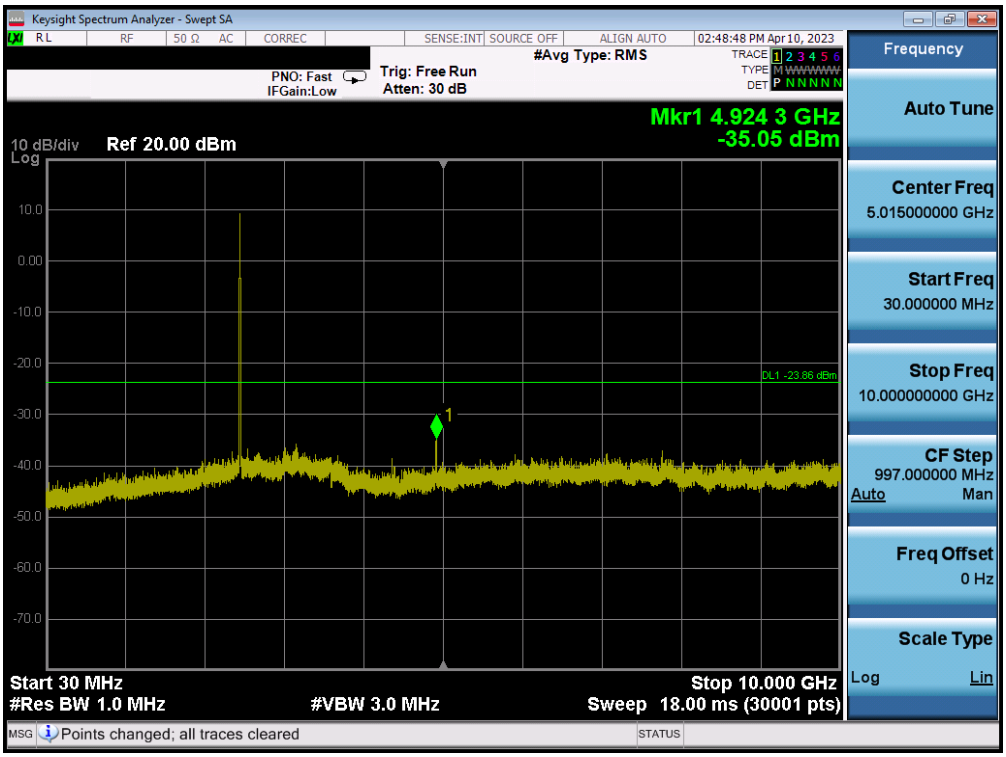
Plot 7-112. Conducted Spurious Plot SISO ANT2 (802.11b – Ch. 1)



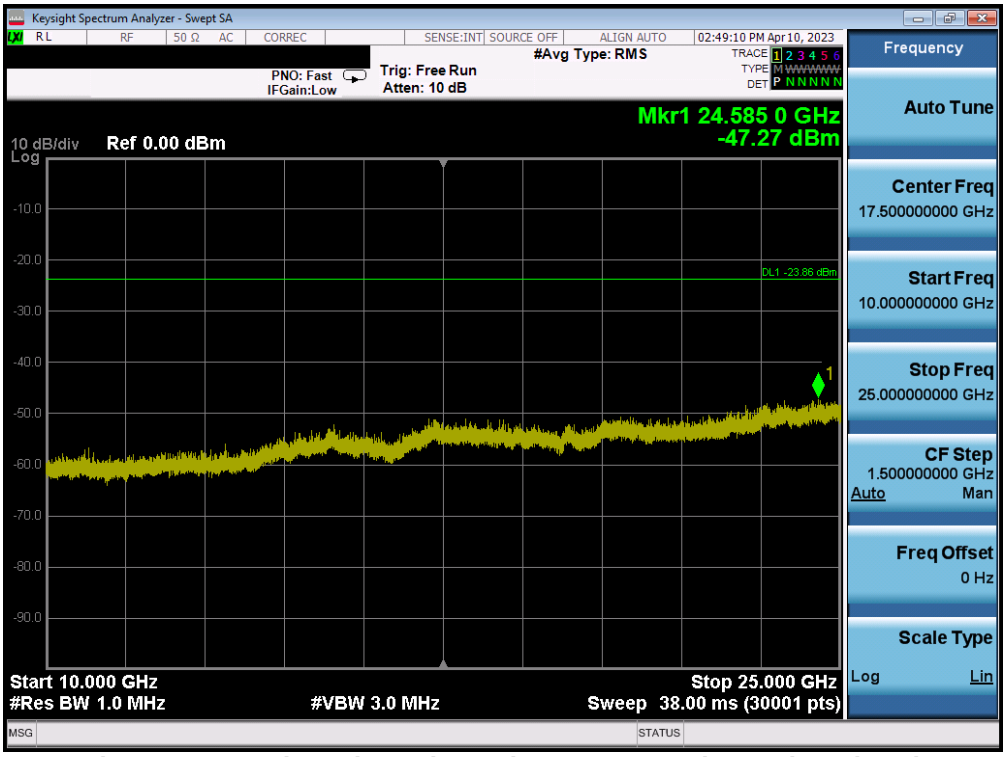
Plot 7-113. Conducted Spurious Plot SISO ANT2 (802.11b – Ch. 6)



Plot 7-114. Conducted Spurious Plot SISO ANT2 (802.11b – Ch. 6)

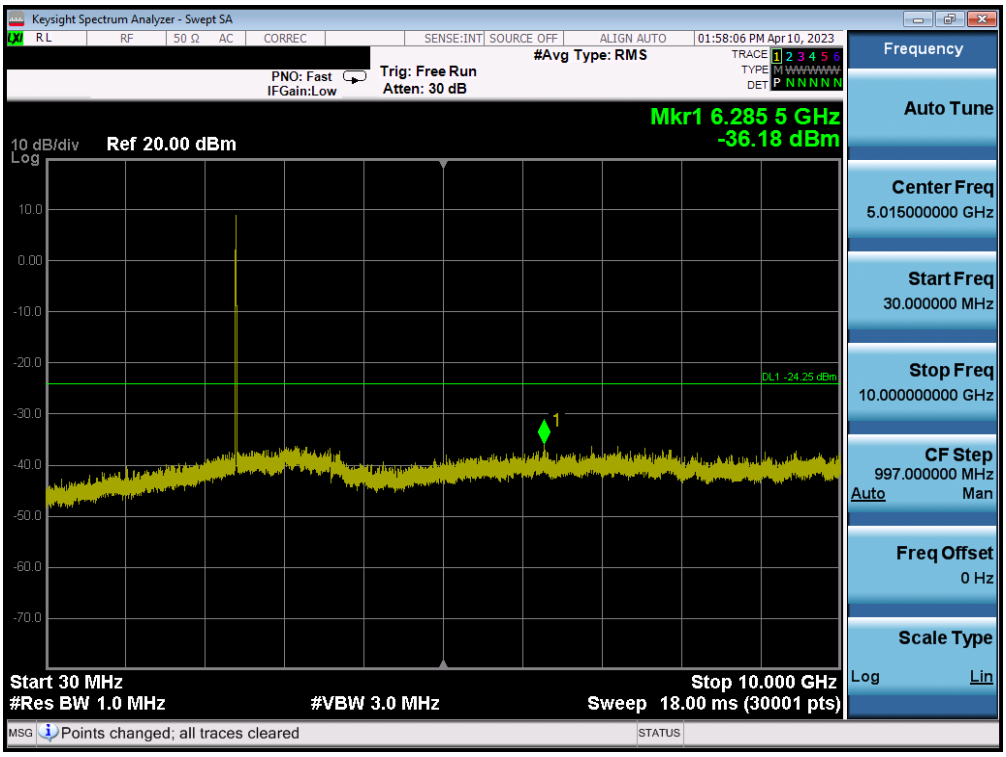


Plot 7-115. Conducted Spurious Plot SISO ANT2 (802.11b – Ch. 11)

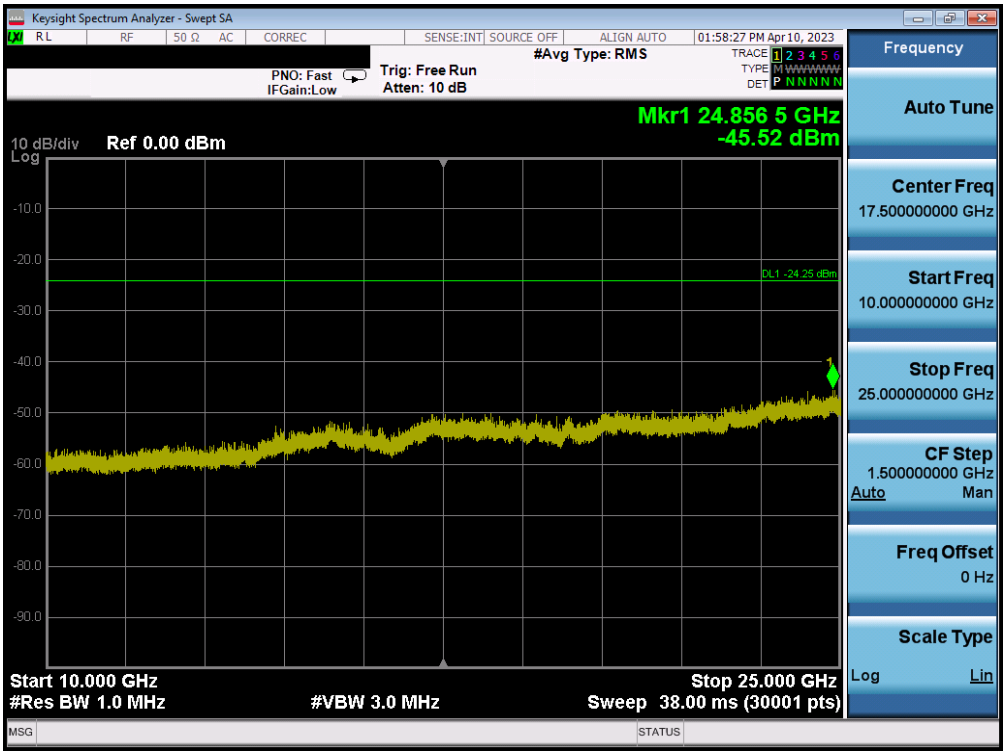


Plot 7-116. Conducted Spurious Plot SISO ANT2 (802.11b – Ch. 11)

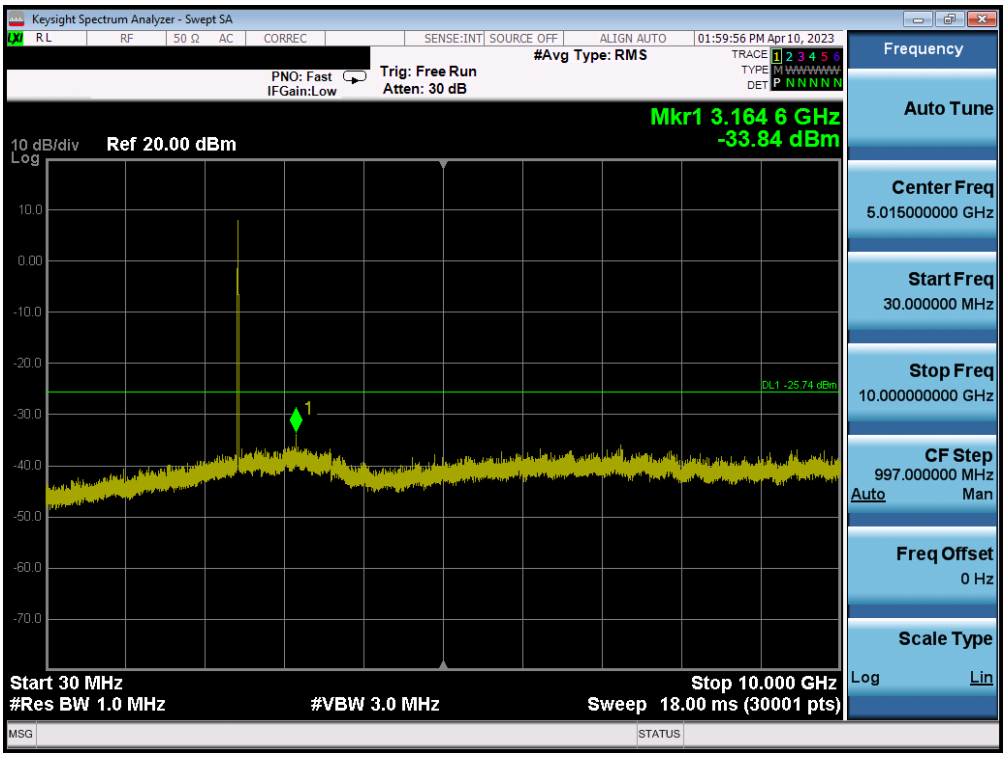
MIMO Antenna-1 Conducted Spurious Emission



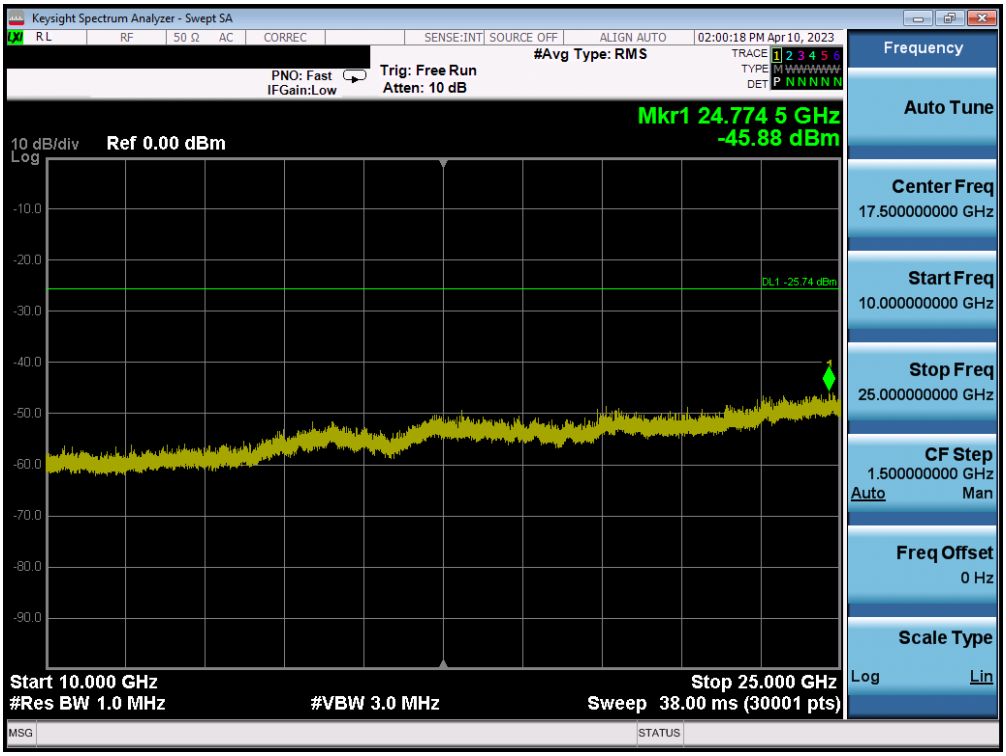
Plot 7-117. Conducted Spurious Plot MIMO ANT1 (802.11b – Ch. 1)



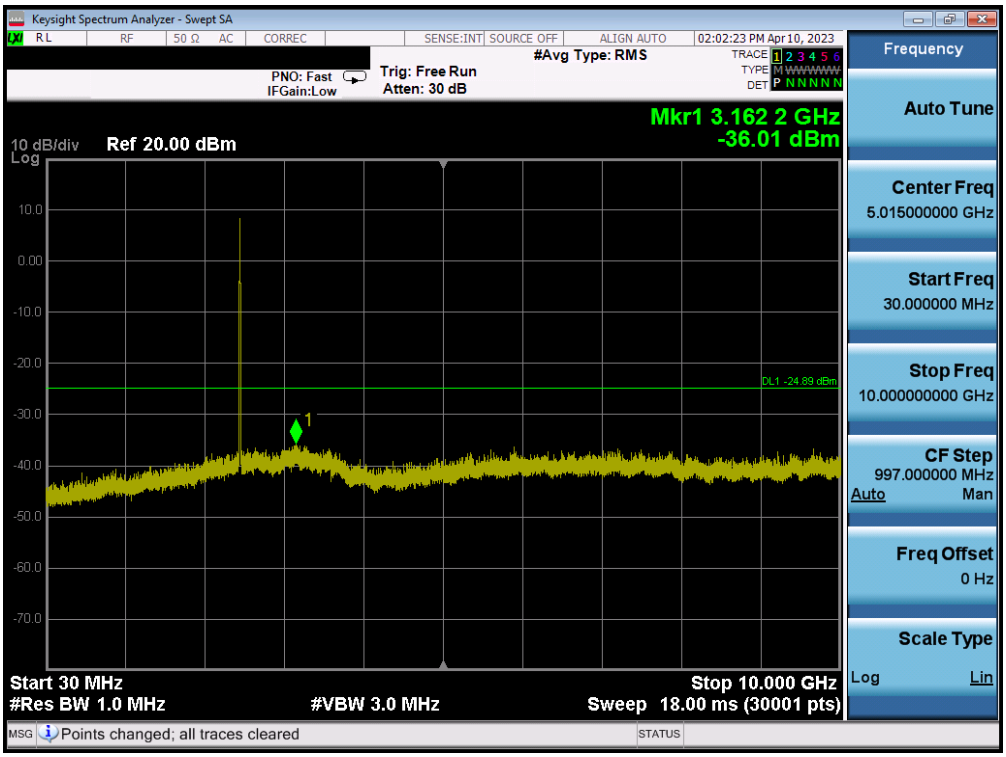
Plot 7-118. Conducted Spurious Plot MIMO ANT1 (802.11b – Ch. 1)



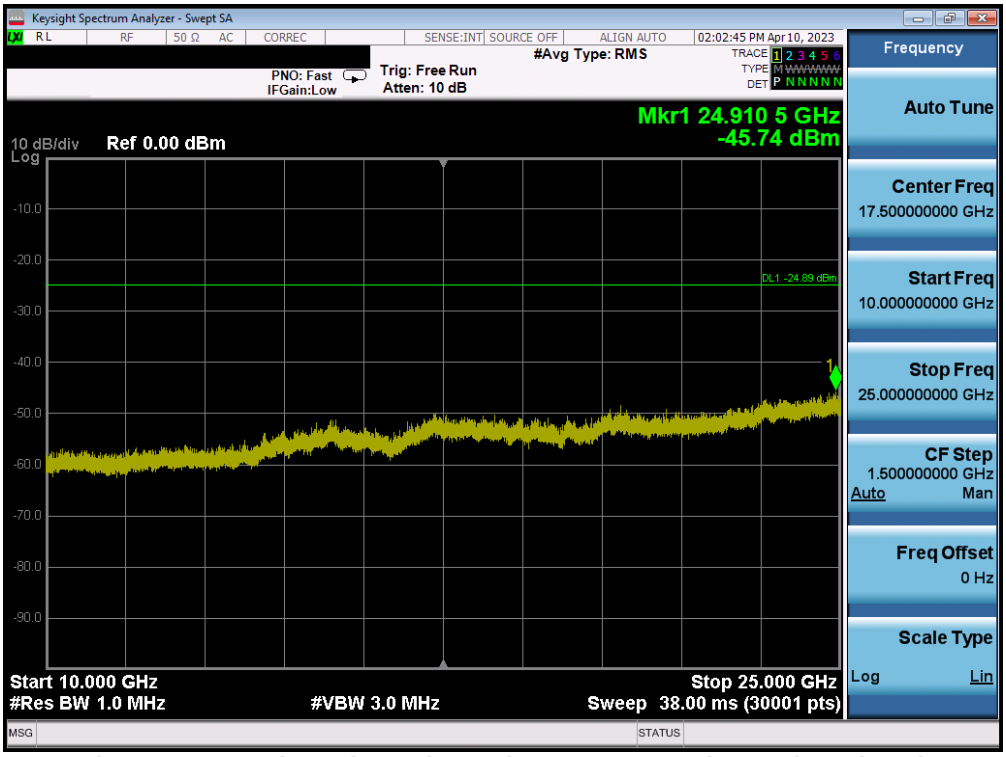
Plot 7-119. Conducted Spurious Plot MIMO ANT1 (802.11b – Ch. 6)



Plot 7-120. Conducted Spurious Plot MIMO ANT1 (802.11b – Ch. 6)

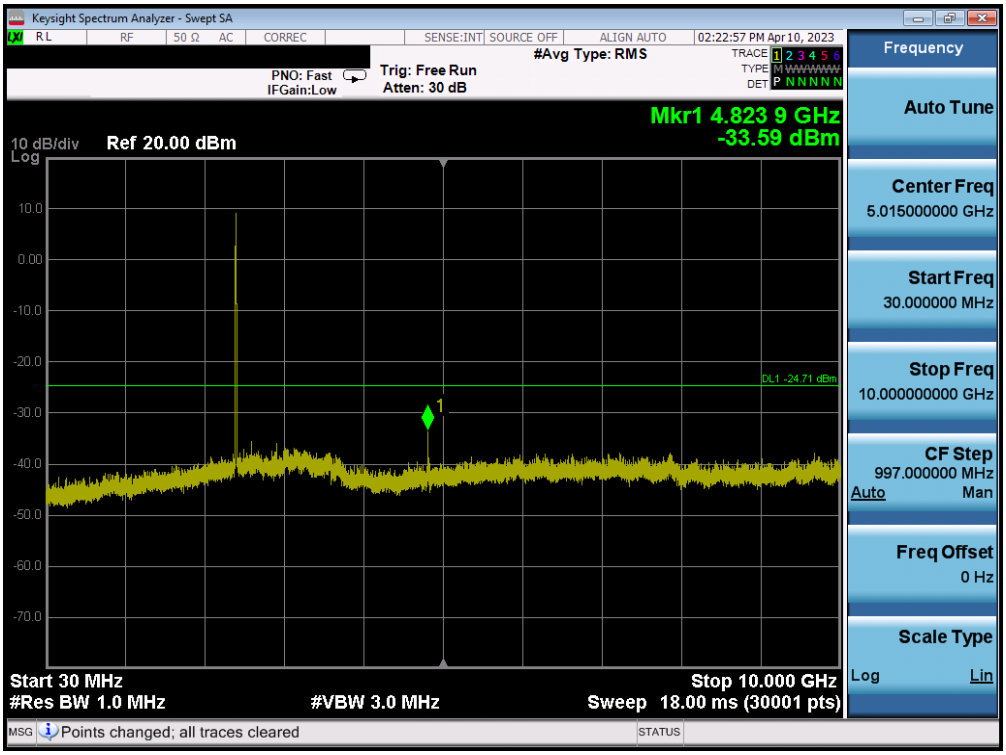


Plot 7-121. Conducted Spurious Plot MIMO ANT1 (802.11b – Ch. 11)

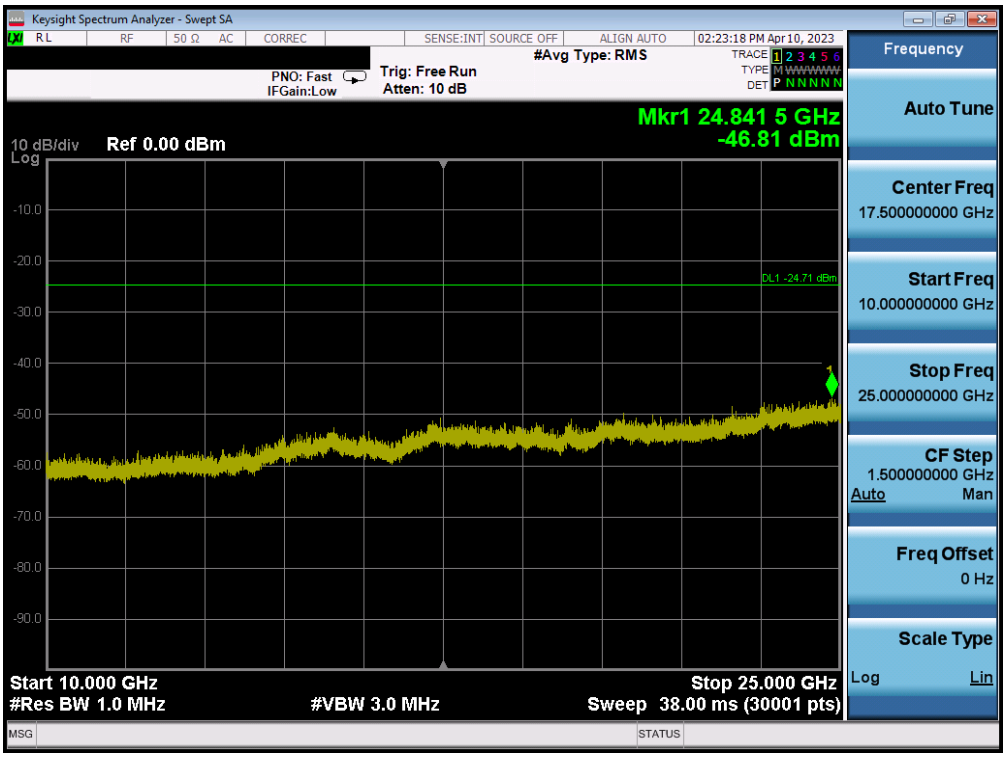


Plot 7-122. Conducted Spurious Plot MIMO ANT1 (802.11b – Ch. 11)

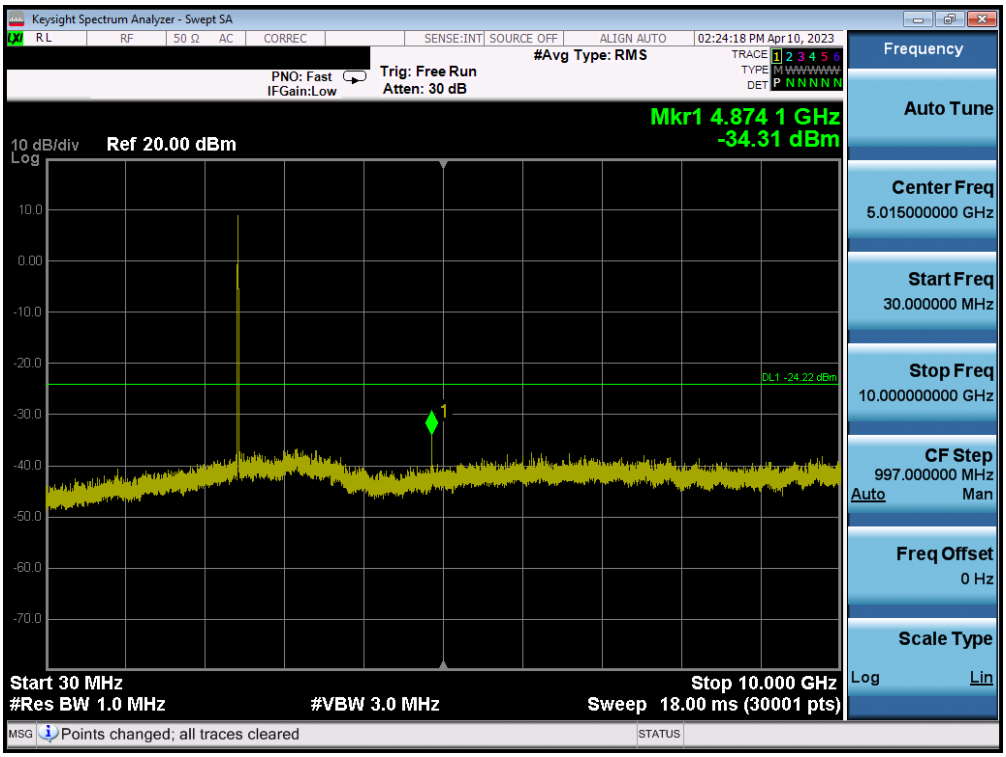
MIMO Antenna-2 Conducted Spurious Emissions



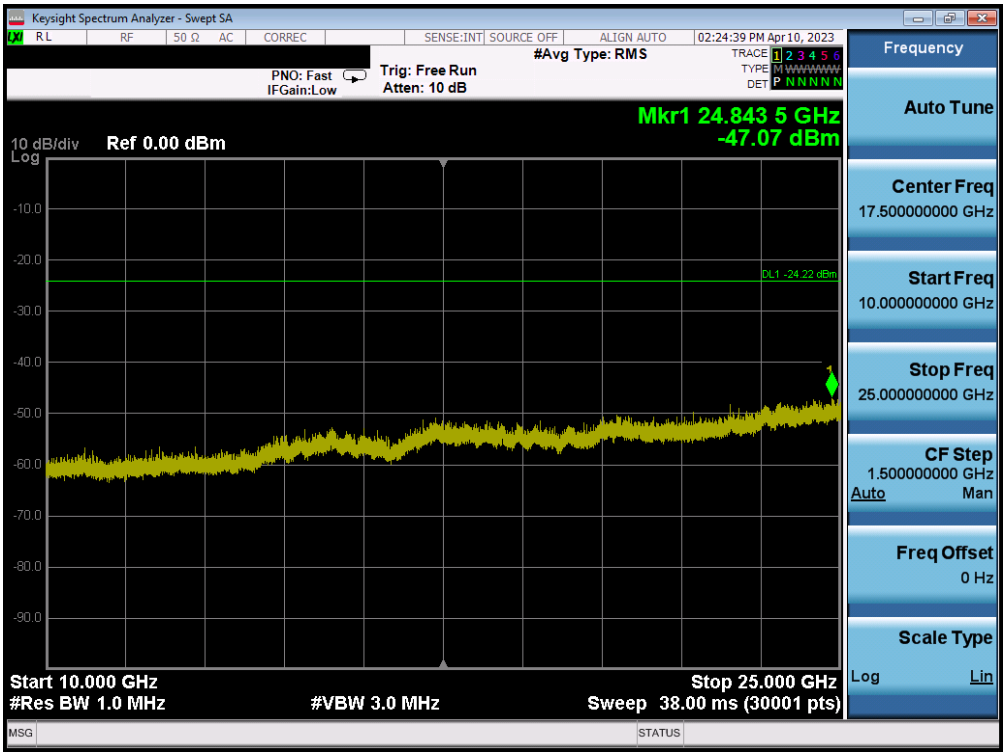
Plot 7-123. Conducted Spurious Plot MIMO ANT2 (802.11b – Ch. 1)



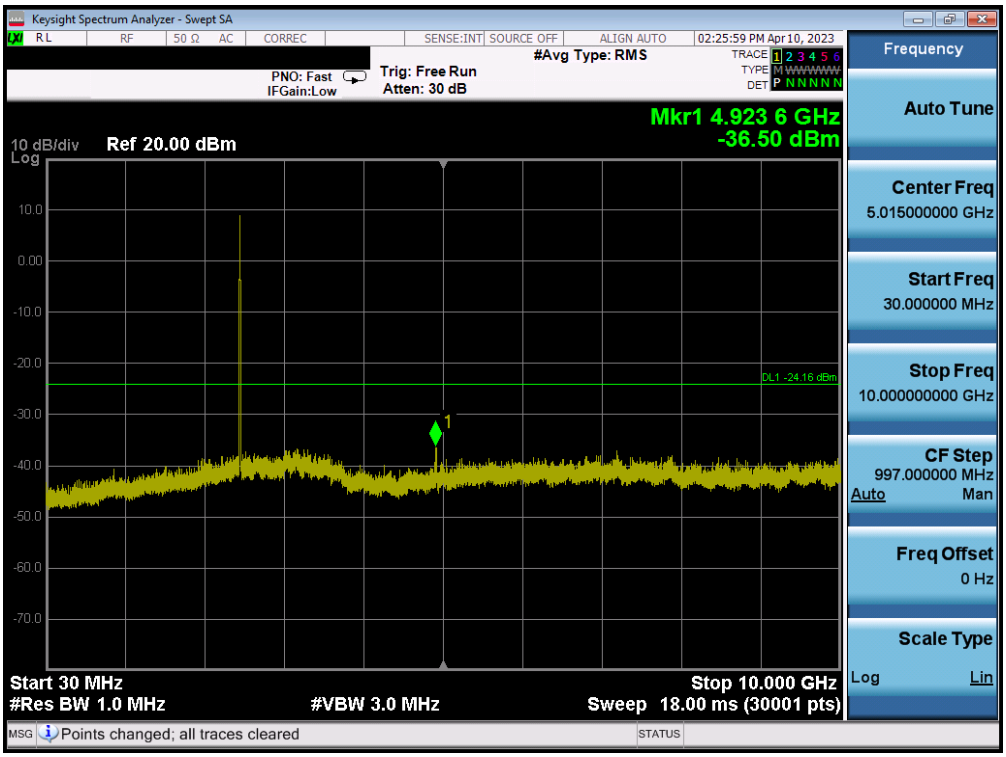
Plot 7-124. Conducted Spurious Plot MIMO ANT2 (802.11b – Ch. 1)



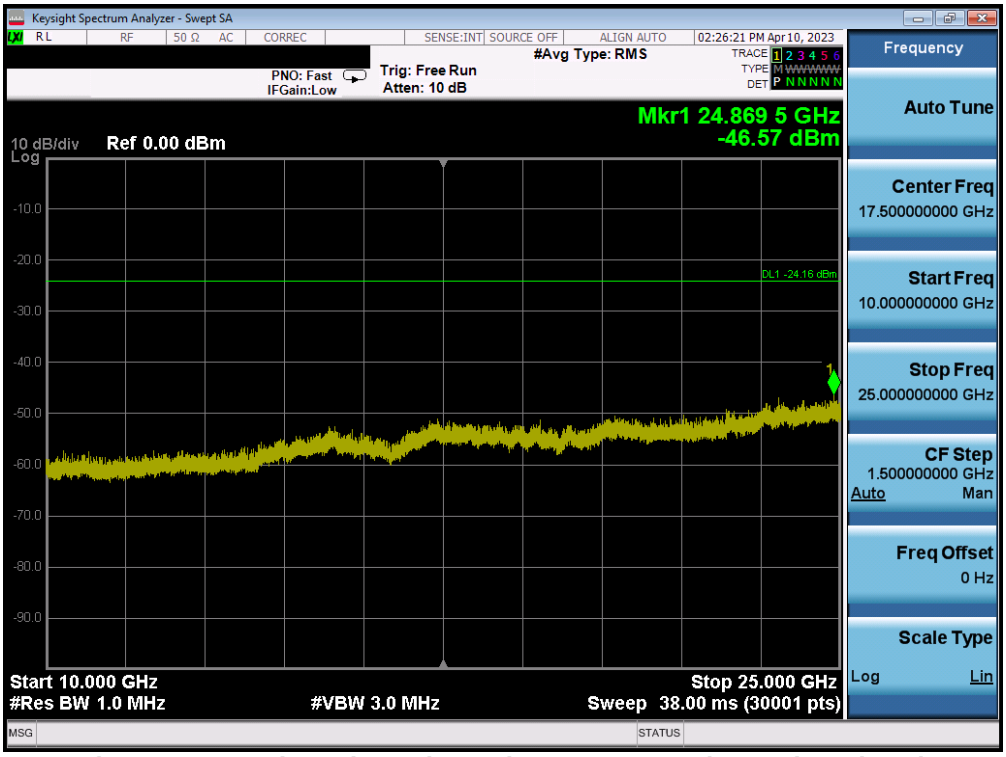
Plot 7-125. Conducted Spurious Plot MIMO ANT2 (802.11b – Ch. 6)



Plot 7-126. Conducted Spurious Plot MIMO ANT2 (802.11b – Ch. 6)



Plot 7-127. Conducted Spurious Plot MIMO ANT2 (802.11b – Ch. 11)



Plot 7-128. Conducted Spurious Plot MIMO ANT2 (802.11b – Ch. 11)

7.7 Radiated Spurious Emission Measurements – Above 1 GHz

§15.247(d) §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 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 7-13 per Section 15.209 and RSS-Gen (8.9).

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

Table 7-13. Radiated Limits

Test Procedures Used

ANSI C63.10-2013 – Section 6.6.4.3
KDB 558074 D01 v05r02 – Sections 8.6, 8.7

Test Settings

Average Field Strength Measurements

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 ≥ 2 x span/RBW)
6. Sweep time = auto
7. Trace (RMS) averaging was performed over at least 100 traces

Peak Field Strength Measurements

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

Test Setup

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

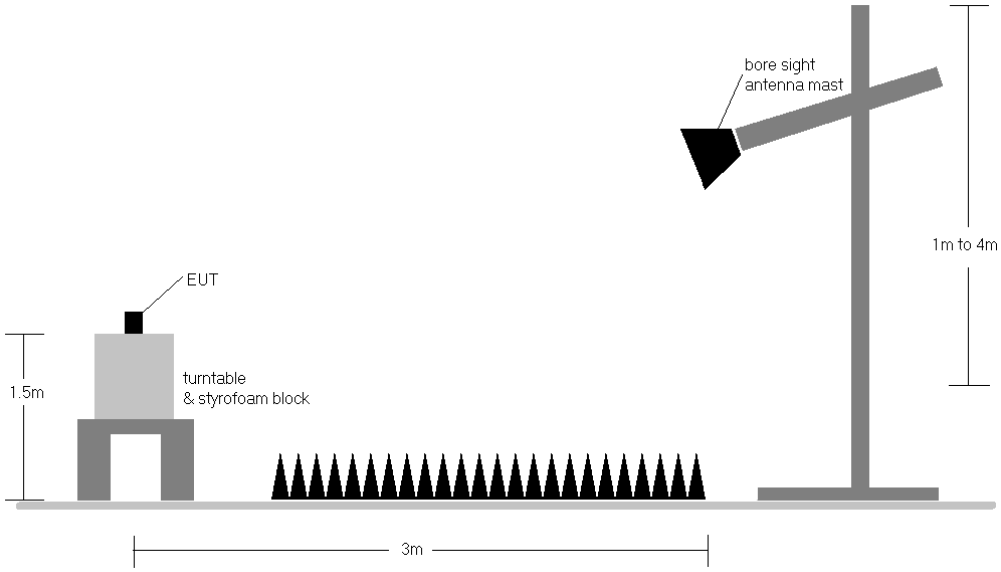


Figure 7-6. Test Instrument & Measurement Setup

Test Notes

1. The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 D01 v05r02 were not used to evaluate this device for compliance to radiated limits. All radiated spurious emissions levels were measured in a radiated test setup.
2. All emissions lying in restricted bands specified in Section 15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-13.
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

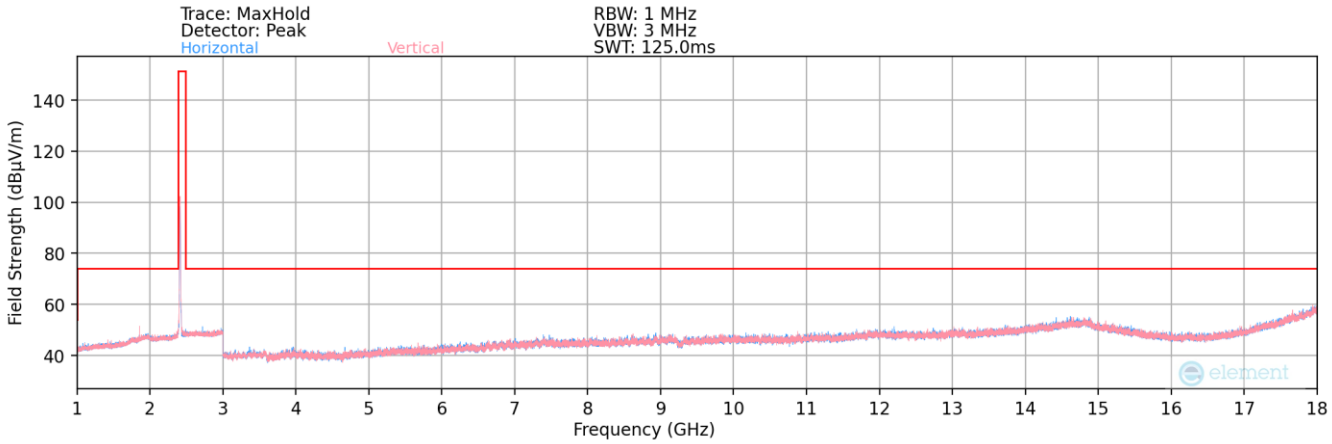
- Field Strength Level $_{[dB\mu V/m]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB/m]}$
- AFCL $_{[dB/m]}$ = Antenna Factor $_{[dB/m]}$ + Cable Loss $_{[dB]}$
- Margin $_{[dB]}$ = Field Strength Level $_{[dB\mu V/m]}$ – Limit $_{[dB\mu V/m]}$

Radiated Band Edge Measurement Offset

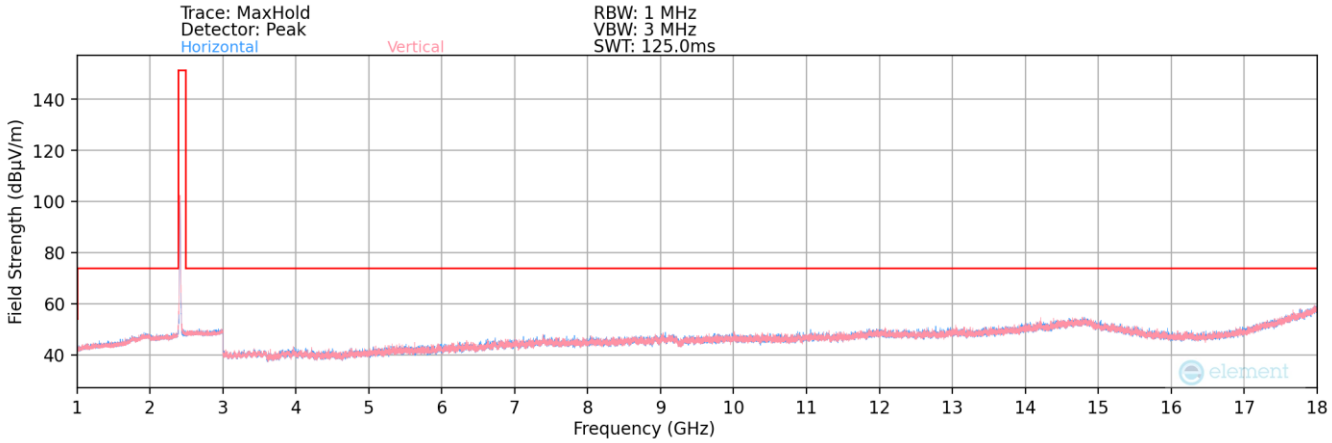
- The amplitude offset shown in the radiated restricted band edge plots in Section 7.7 was calculated using the formula:
  Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

7.7.1 SISO Antenna-2 Radiated Spurious Emission Measurements

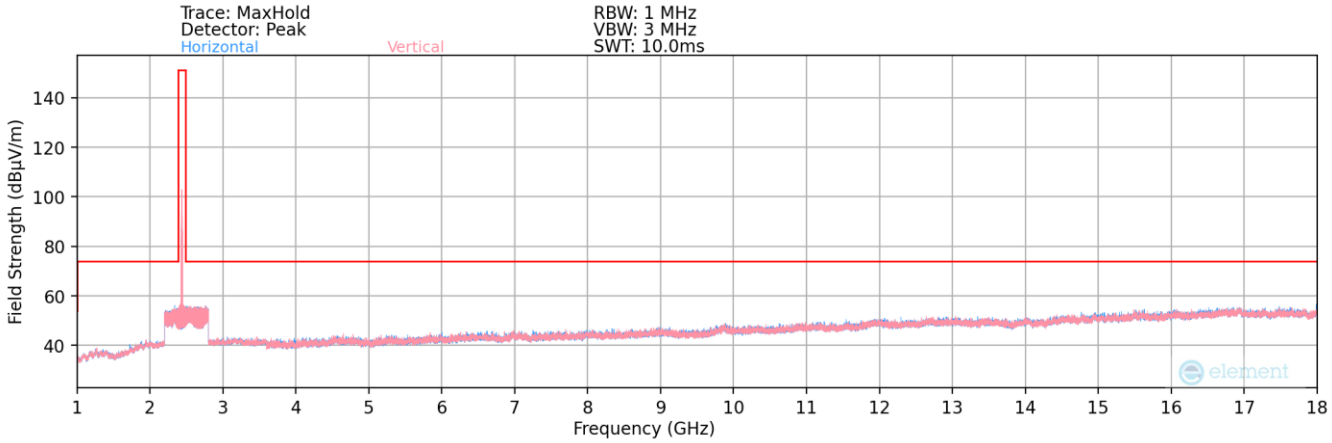
§15.247(d) §15.205 & §15.209; RSS-Gen [8.9]



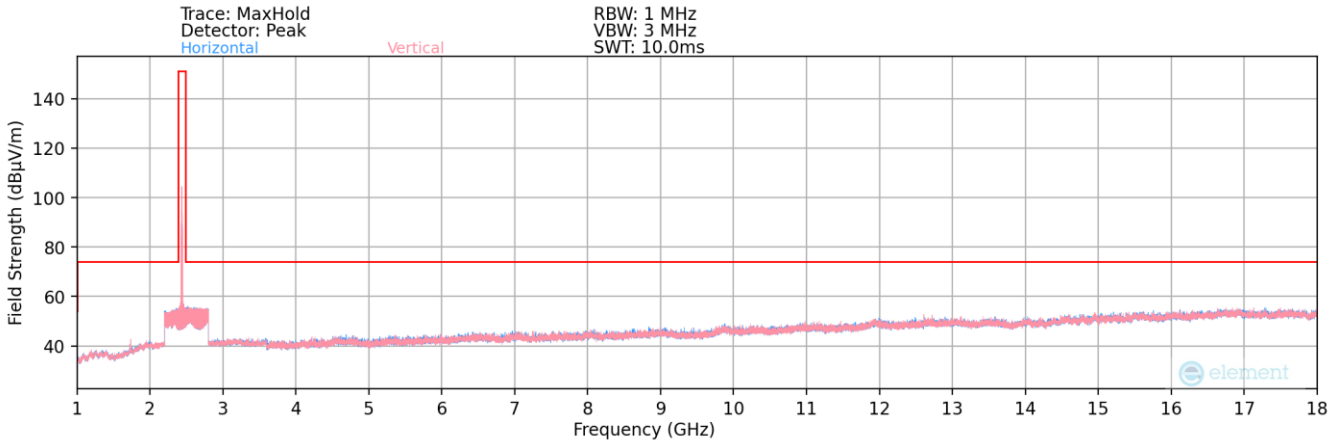
Plot 7-129. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11b – Ch. 1) - Closed



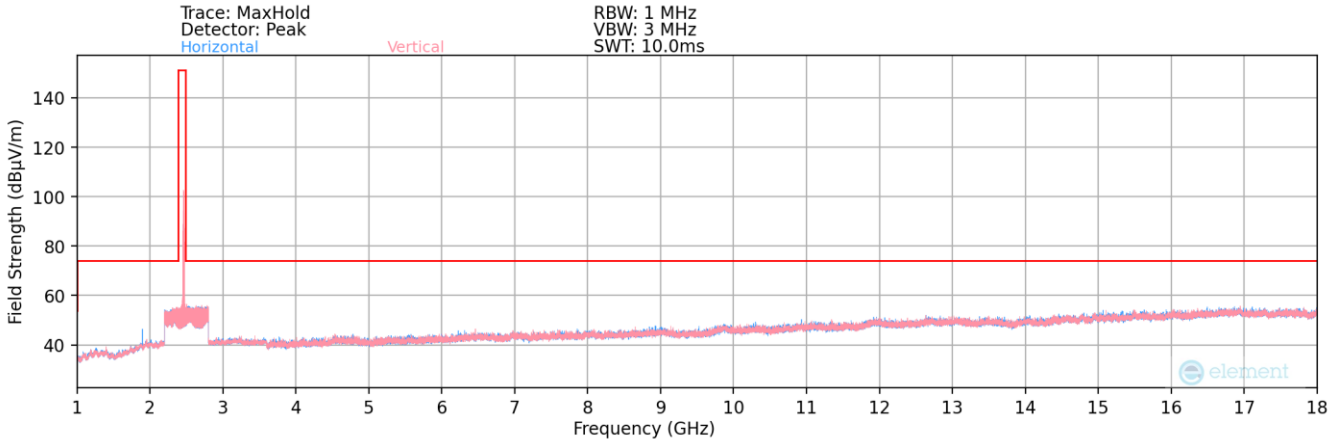
Plot 7-130. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11b – Ch. 1) - Half



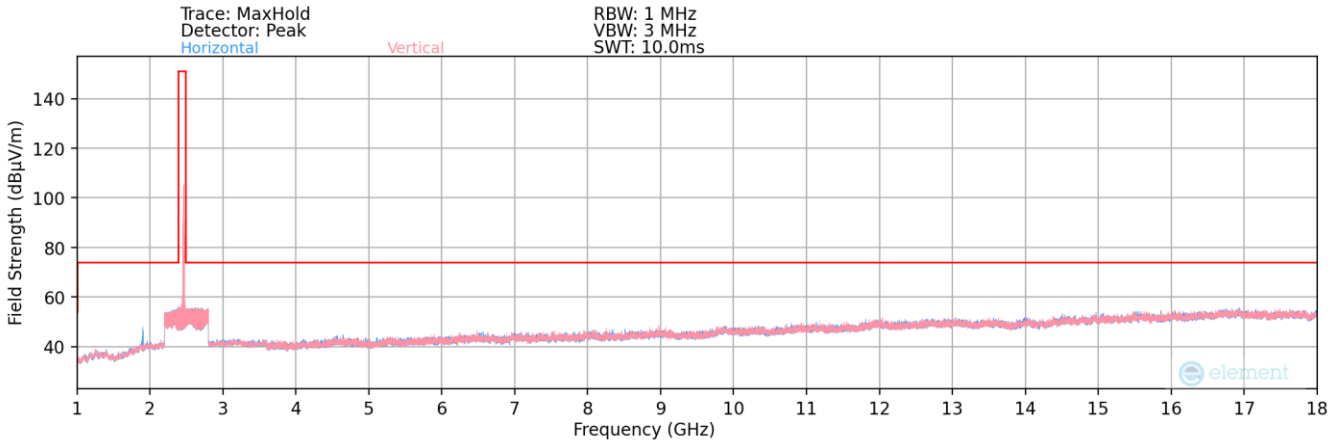
Plot 7-131. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11b – Ch. 6) - Closed



Plot 7-132. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11b – Ch. 6) - Half



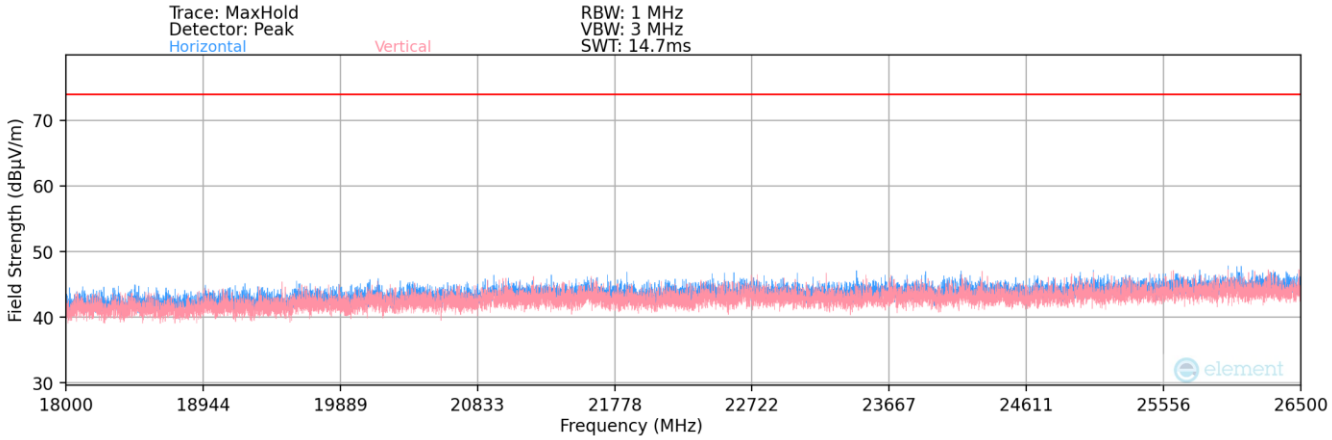
Plot 7-133. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11b – Ch. 11) - Closed



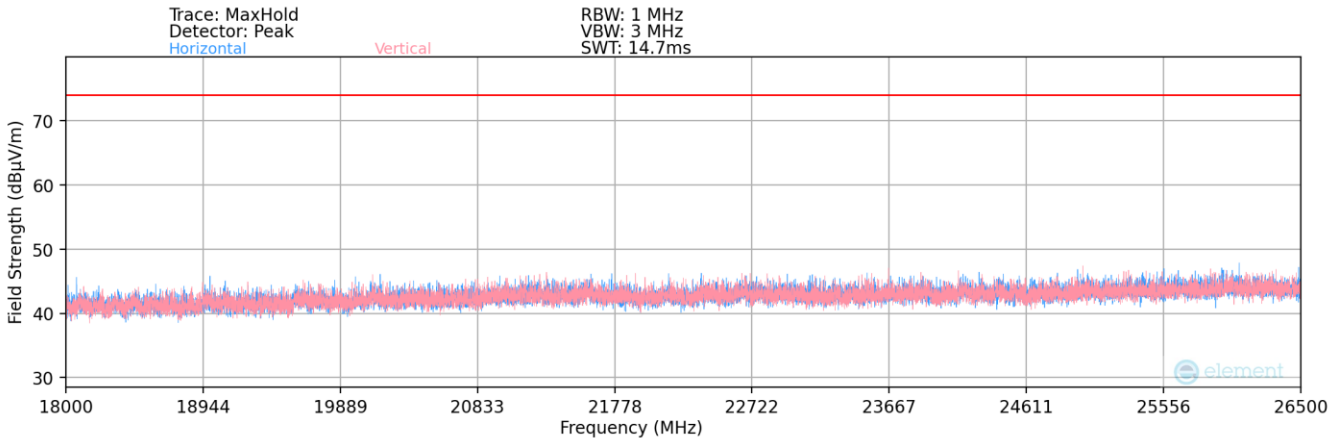
Plot 7-134. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11b – Ch. 11) - Half

SISO Antenna-2 Radiated Spurious Emissions Measurements (Above 18GHz)

§15.209; RSS-Gen [8.9]



Plot 7-135. Radiated Spurious Plot above 18GHz SISO ANT2 - Closed



Plot 7-136. Radiated Spurious Plot above 18GHz SISO ANT2 - Half

SISO Antenna-2 Radiated Spurious Emission Measurements

§15.247(d) §15.205 & §15.209; RSS-Gen [8.9]

Worst Case Mode:	802.11b
Worst Case Transfer Rate:	1 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	01

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]
4824.00	Avg	V	-	-	-74.71	-1.53	30.76	53.98	-23.22
4824.00	Peak	V	-	-	-62.34	-1.53	43.13	73.98	-30.85
12060.00	Avg	V	-	-	-78.06	9.65	38.59	53.98	-15.39
12060.00	Peak	V	-	-	-65.14	9.65	51.51	73.98	-22.47

Table 7-14. Radiated Measurements SISO ANT2

Worst Case Mode:	802.11b
Worst Case Transfer Rate:	1 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	2437MHz
Channel:	06

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]
4874.00	Avg	V	-	-	-74.77	-1.38	30.85	53.98	-23.13
4874.00	Peak	V	-	-	-62.13	-1.38	43.49	73.98	-30.49
7311.00	Avg	V	-	-	-75.98	4.59	35.61	53.98	-18.37
7311.00	Peak	V	-	-	-64.05	4.59	47.54	73.98	-26.44
12185.00	Avg	V	-	-	-78.01	9.66	38.65	53.98	-15.33
12185.00	Peak	V	-	-	-66.24	9.66	50.42	73.98	-23.56

Table 7-15. Radiated Measurements SISO ANT2

Worst Case Mode: 802.11b
Worst Case Transfer Rate: 1 Mbps
Distance of Measurements: 3 Meters
Operating Frequency: 2462MHz
Channel: 11

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]
4924.00	Avg	V	-	-	-75.05	-1.16	30.79	53.98	-23.19
4924.00	Peak	V	-	-	-63.24	-1.16	42.60	73.98	-31.38
7386.00	Avg	V	-	-	-76.01	4.81	35.80	53.98	-18.18
7386.00	Peak	V	-	-	-63.41	4.81	48.40	73.98	-25.58
12310.00	Avg	V	-	-	-78.21	9.69	38.48	53.98	-15.50
12310.00	Peak	V	-	-	-65.69	9.69	51.00	73.98	-22.98

Table 7-16. Radiated Measurements SISO ANT2

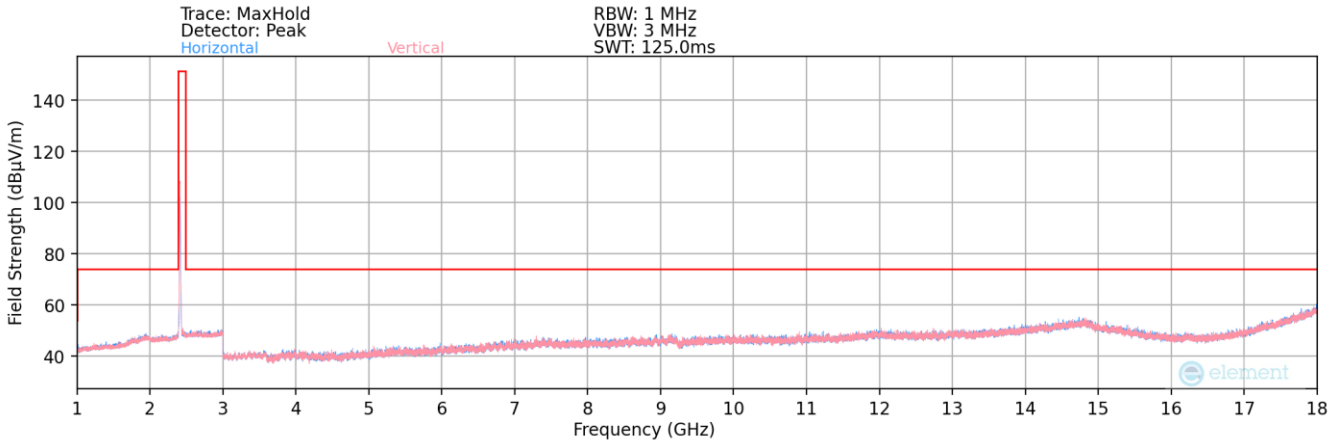
Worst Case Mode: 802.11b
Worst Case Transfer Rate: 1 Mbps
Distance of Measurements: 3 Meters
Operating Frequency: 2437MHz
Channel: 6

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]
4874.00	Avg	V	-	-	-79.75	6.61	33.86	53.98	-20.12
4874.00	Peak	V	-	-	-68.51	6.61	45.10	73.98	-28.88
7311.00	Avg	V	-	-	-80.58	12.35	38.77	53.98	-15.21
7311.00	Peak	V	-	-	-69.96	12.35	49.39	73.98	-24.59
12185.00	Avg	V	-	-	-81.80	18.88	44.08	53.98	-9.90
12185.00	Peak	V	-	-	-71.06	18.88	54.82	73.98	-19.16

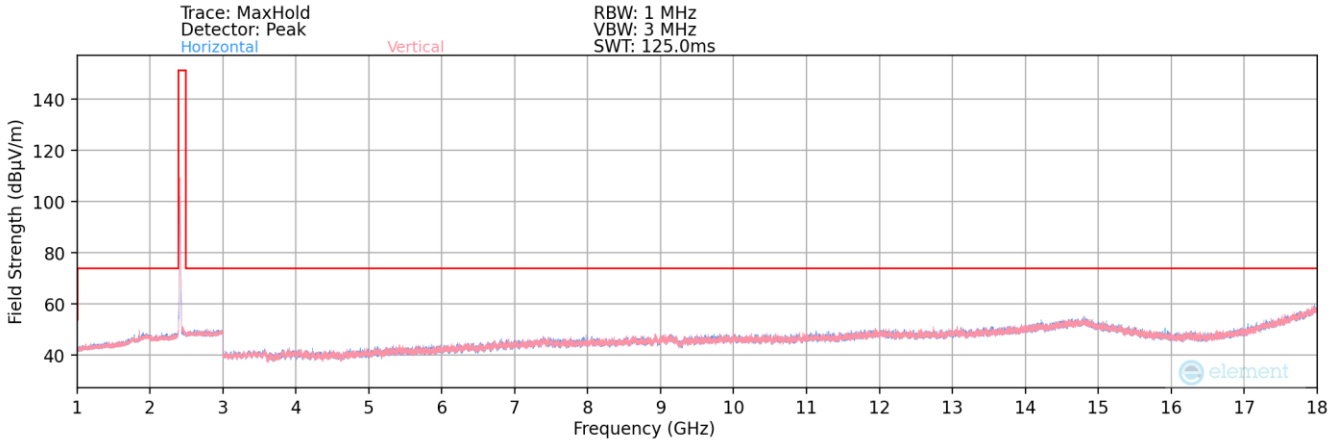
Table 7-17. Radiated Measurements SISO ANT2 with WCP

7.7.2 MIMO/CDD Radiated Spurious Emission Measurements

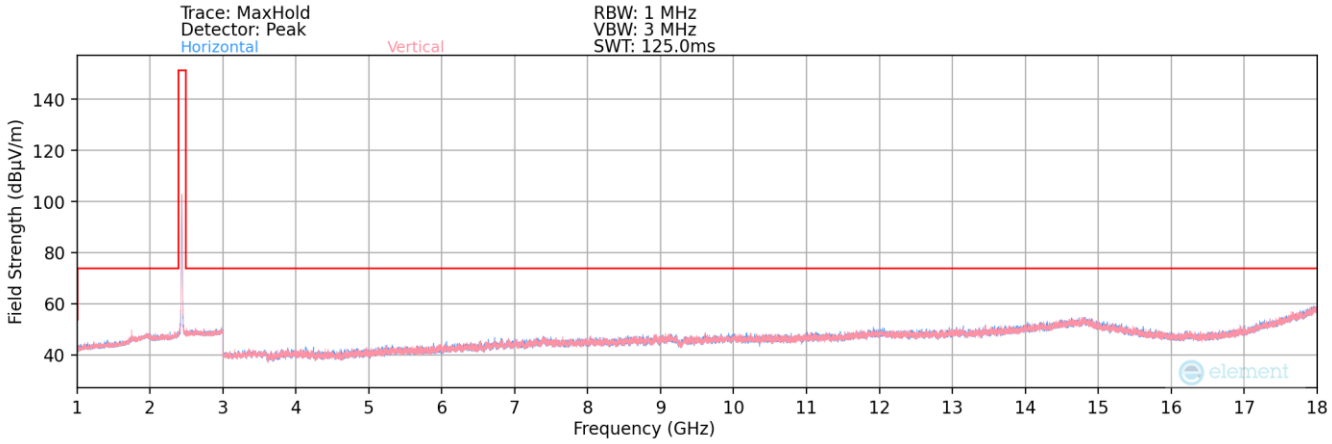
§15.247(d) §15.205 & §15.209; RSS-Gen [8.9]



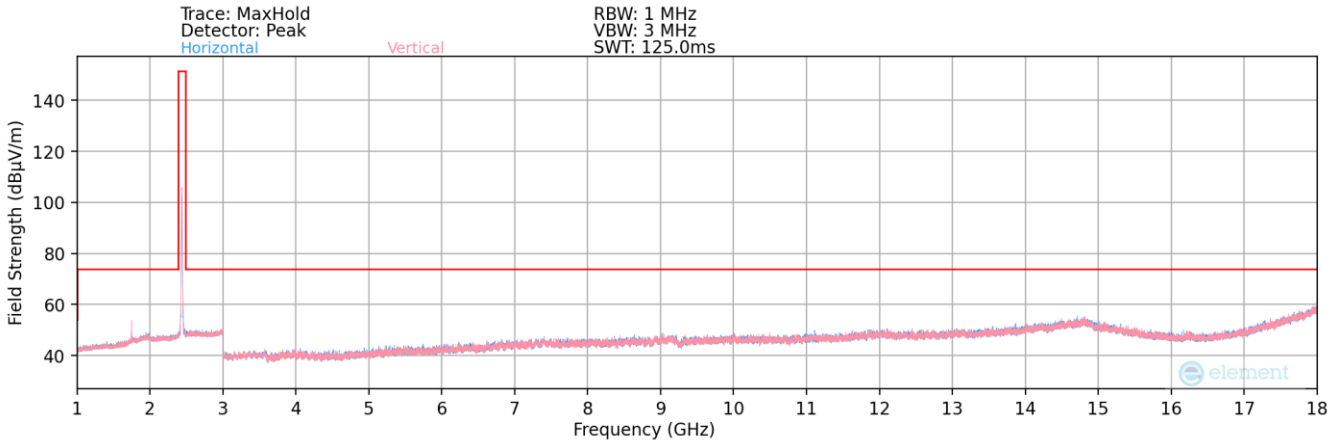
Plot 7-137. Radiated Spurious Plot above 1GHz MIMO/CDD (802.11g – Ch. 1) - Closed



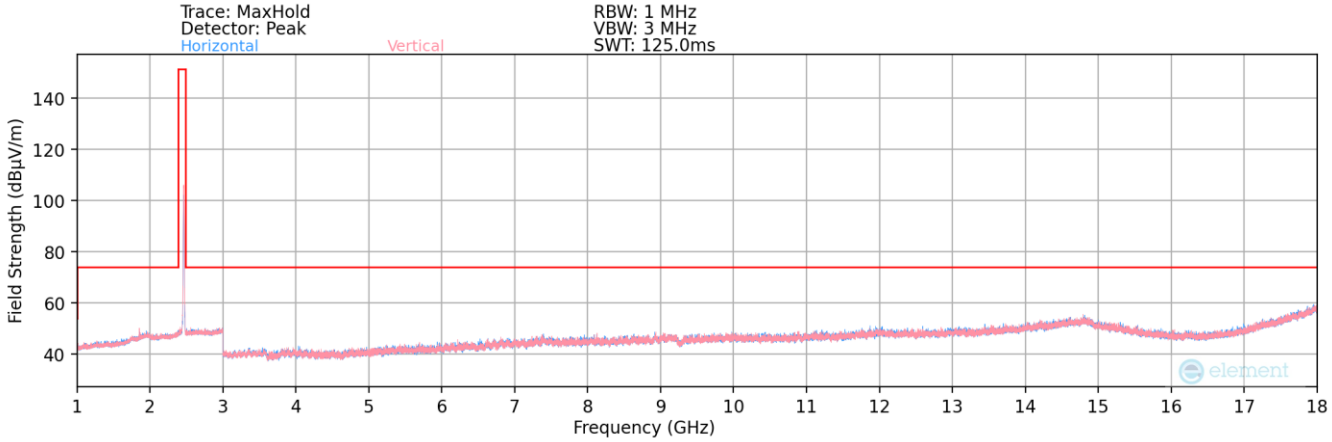
Plot 7-138. Radiated Spurious Plot above 1GHz MIMO/CDD (802.11g – Ch. 1) - Open



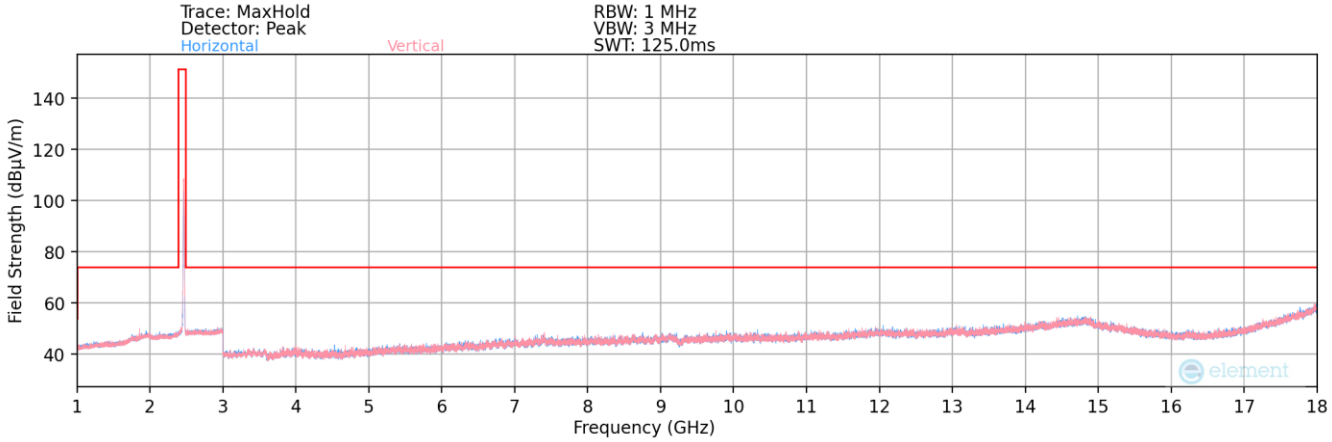
Plot 7-139. Radiated Spurious Plot above 1GHz MIMO/CDD (802.11g – Ch. 6) - Closed



Plot 7-140. Radiated Spurious Plot above 1GHz MIMO/CDD (802.11g – Ch. 6) - Open



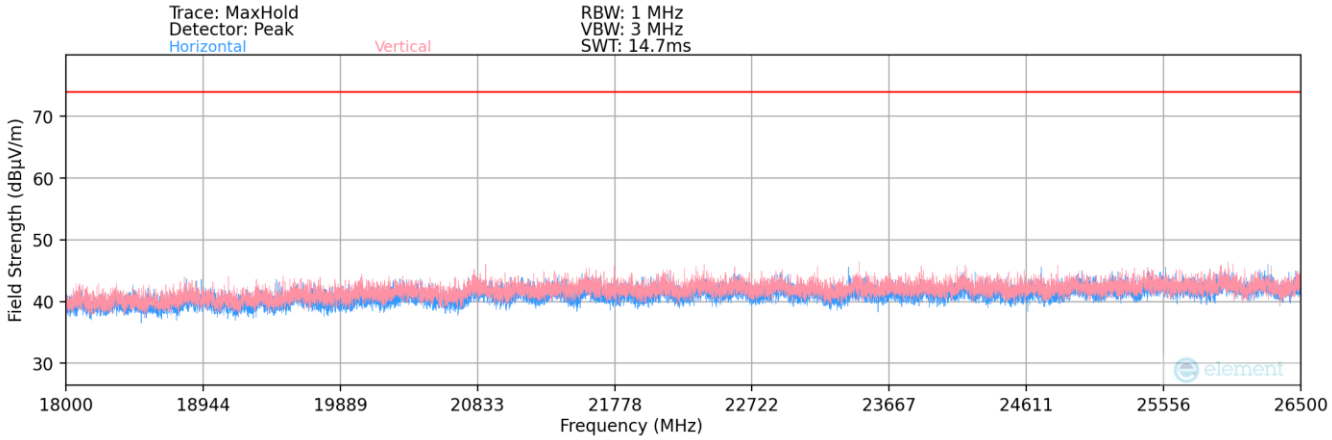
Plot 7-141. Radiated Spurious Plot above 1GHz MIMO/CDD (802.11g – Ch. 11) - Closed



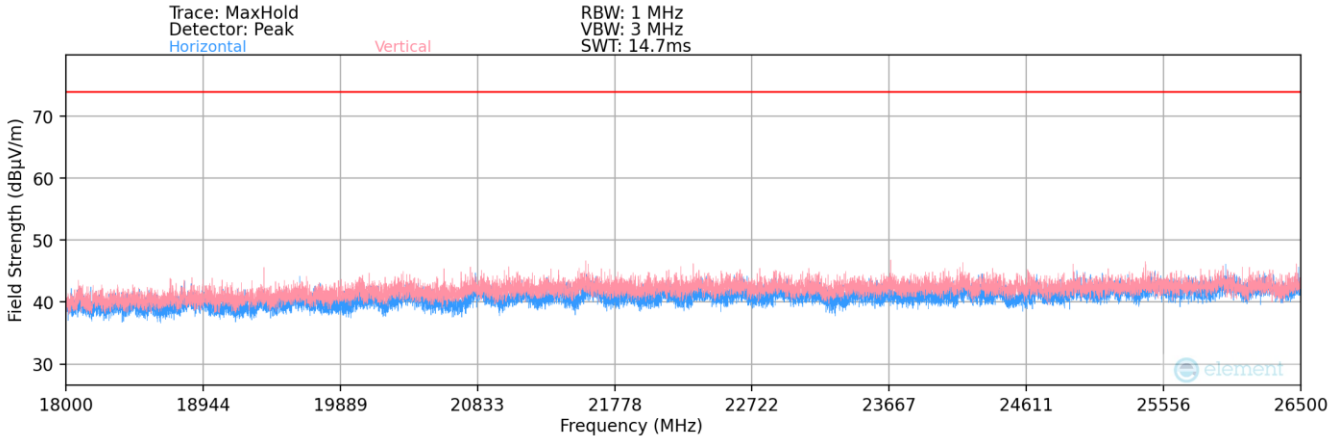
Plot 7-142. Radiated Spurious Plot above 1GHz MIMO/CDD (802.11g – Ch. 11) - Open

MIMO/CDD Radiated Spurious Emissions Measurements (Above 18GHz)

§15.209; RSS-Gen [8.9]



Plot 7-143. Radiated Spurious Plot above 18GHz MIMO/CDD - Closed



Plot 7-144. Radiated Spurious Plot above 18GHz MIMO/CDD - Open

MIMO/CDD Radiated Spurious Emission Measurements

§15.247(d) §15.205 & §15.209; RSS-Gen [8.9]

Worst Case Mode:	802.11b
Worst Case Transfer Rate:	1 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	01

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]
4824.00	Avg	H	-	-	-74.67	-1.53	30.80	53.98	-23.18
4824.00	Peak	H	-	-	-61.71	-1.53	43.76	73.98	-30.22
12060.00	Avg	H	-	-	-74.68	9.65	41.97	53.98	-12.01
12060.00	Peak	H	-	-	-65.49	9.65	51.16	73.98	-22.82

Table 7-18. Radiated Measurements MIMO/CDD

Worst Case Mode:	802.11b
Worst Case Transfer Rate:	1 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	2437MHz
Channel:	06

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]
4874.00	Avg	H	-	-	-74.67	-1.38	30.95	53.98	-23.03
4874.00	Peak	H	-	-	-62.66	-1.38	42.96	73.98	-31.02
7311.00	Avg	H	-	-	-76.00	4.59	35.59	53.98	-18.39
7311.00	Peak	H	-	-	-63.57	4.59	48.02	73.98	-25.96
12185.00	Avg	H	-	-	-78.01	9.66	38.65	53.98	-15.33
12185.00	Peak	H	-	-	-66.07	9.66	50.59	73.98	-23.39

Table 7-19. Radiated Measurements MIMO/CDD

Worst Case Mode: 802.11b
Worst Case Transfer Rate: 1 Mbps
Distance of Measurements: 3 Meters
Operating Frequency: 2462MHz
Channel: 11

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]
4924.00	Avg	H	229	208	-74.28	-1.16	31.56	53.98	-22.42
4924.00	Peak	H	229	208	-62.54	-1.16	43.30	73.98	-30.68
7386.00	Avg	H	-	-	-75.96	4.81	35.85	53.98	-18.13
7386.00	Peak	H	-	-	-64.13	4.81	47.68	73.98	-26.30
12310.00	Avg	H	-	-	-78.15	9.69	38.54	53.98	-15.44
12310.00	Peak	H	-	-	-66.54	9.69	50.15	73.98	-23.83

Table 7-20. Radiated Measurements MIMO/CDD

Worst Case Mode: 802.11b
Worst Case Transfer Rate: 1 Mbps
Distance of Measurements: 3 Meters
Operating Frequency: 2437 MHz
Channel: 6

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]
4874.00	Avg	H	132	177	-79.46	6.61	34.15	53.98	-19.83
4874.00	Peak	H	132	177	-68.18	6.61	45.43	73.98	-28.55
7311.00	Avg	H	-	-	-80.80	12.35	38.55	53.98	-15.43
7311.00	Peak	H	-	-	-69.62	12.35	49.73	73.98	-24.25
12185.00	Avg	H	-	-	-81.86	18.88	44.02	53.98	-9.96
12185.00	Peak	H	-	-	-70.79	18.88	55.09	73.98	-18.89

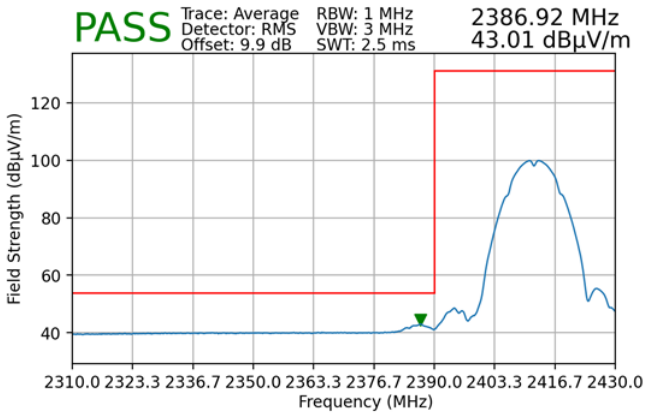
Table 7-21. Radiated Measurements MIMO/CDD with WCP

7.7.3 SISO Antenna-2 Radiated Restricted Band Edge Measurements

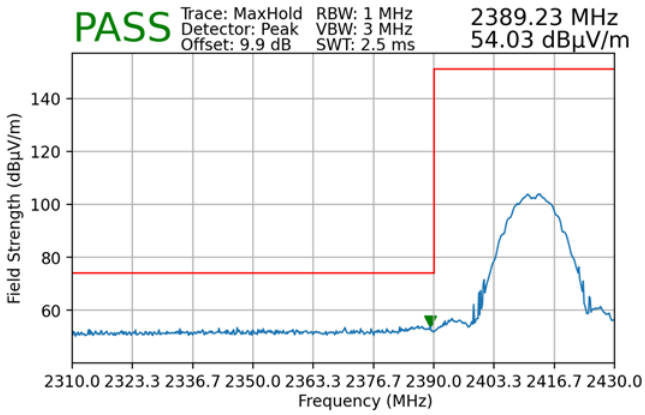
§15.205 §15.209; RSS-Gen [8.9]

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

Worst Case Mode:	802.11b
Worst Case Transfer Rate:	1Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	1

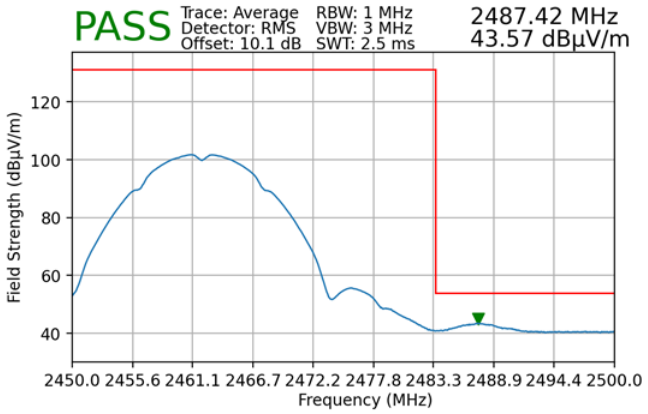


Plot 7-145. Radiated Restricted Lower Band Edge Measurement SISO ANT2 (Average)

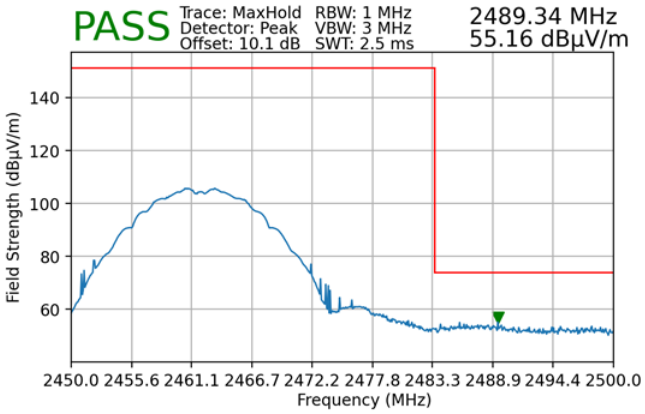


Plot 7-146. Radiated Restricted Lower Band Edge Measurement SISO ANT2 (Peak)

Worst Case Mode:	802.11b
Worst Case Transfer Rate:	1Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	2462MHz
Channel:	11

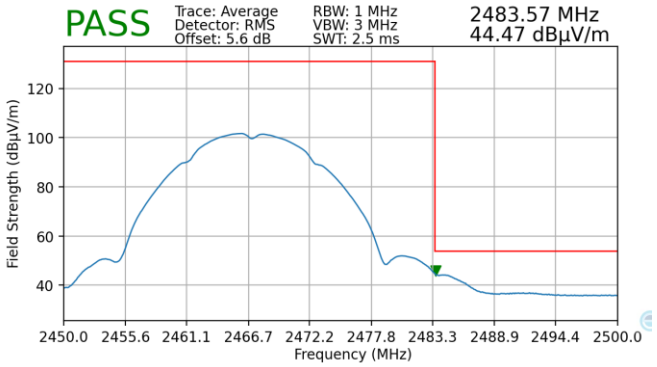


Plot 7-147. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Average)

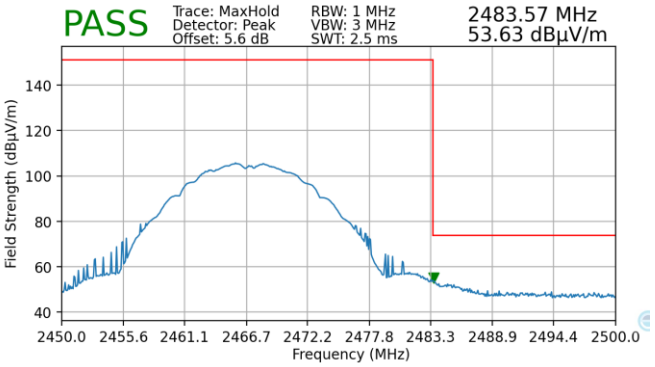


Plot 7-148. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Peak)

Worst Case Mode:	802.11b
Worst Case Transfer Rate:	1Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	2467MHz
Channel:	12

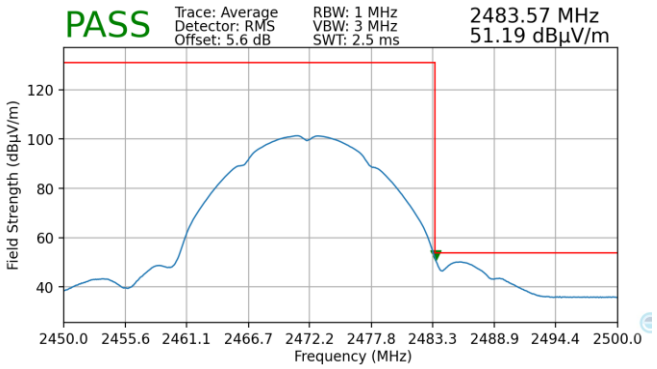


Plot 7-149. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Average)

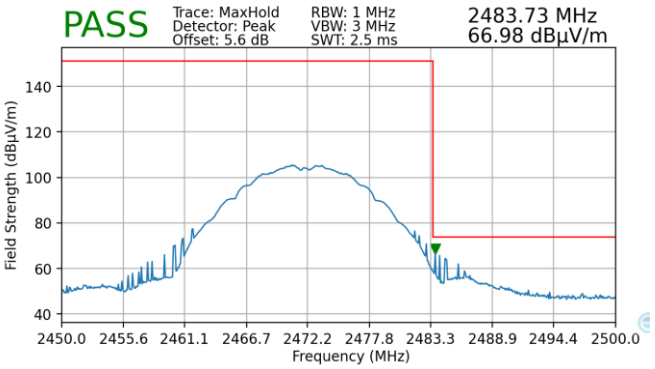


Plot 7-150. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Peak)

Worst Case Mode:	802.11b
Worst Case Transfer Rate:	1Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	2472MHz
Channel:	13



Plot 7-151. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Average)



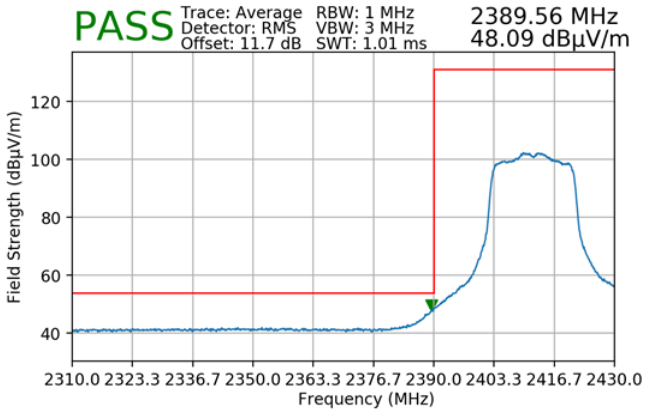
Plot 7-152. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Peak)

7.7.4 MIMO Radiated Restricted Band Edge Measurements

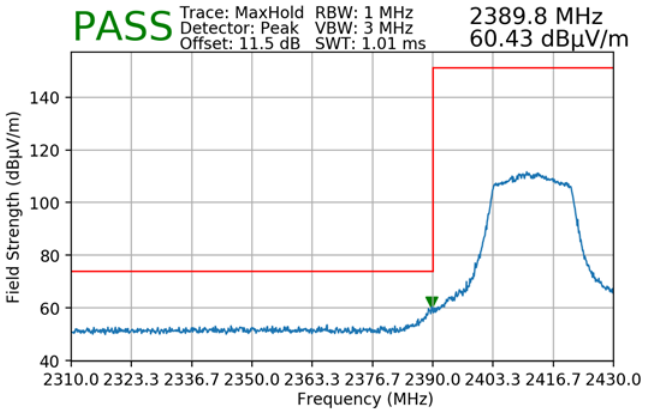
§15.205 §15.209; RSS-Gen [8.9]

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

Worst Case Mode:	802.11ac
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	1

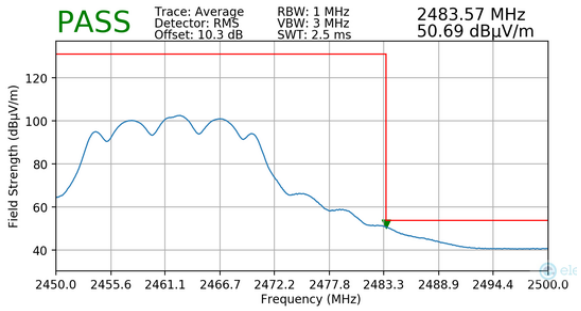


Plot 7-153. Radiated Restricted Lower Band Edge Measurement MIMO (Average)

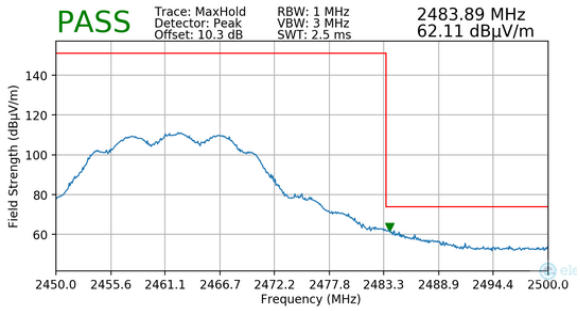


Plot 7-154. Radiated Restricted Lower Band Edge Measurement MIMO (Peak)

Worst Case Mode:	802.11g
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	2462MHz
Channel:	11

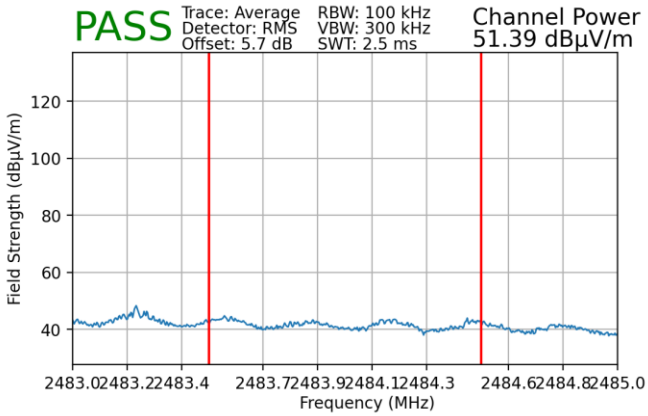


Plot 7-155. Radiated Restricted Upper Band Edge Measurement MIMO (Average)

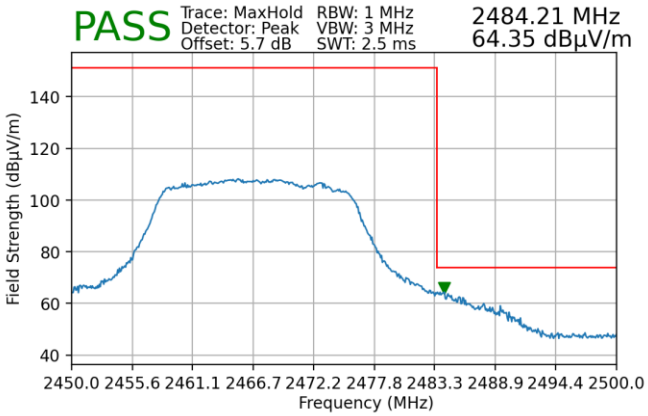


Plot 7-156. Radiated Restricted Upper Band Edge Measurement MIMO (Peak)

Worst Case Mode:	802.11n
Worst Case Transfer Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	2467MHz
Channel:	12

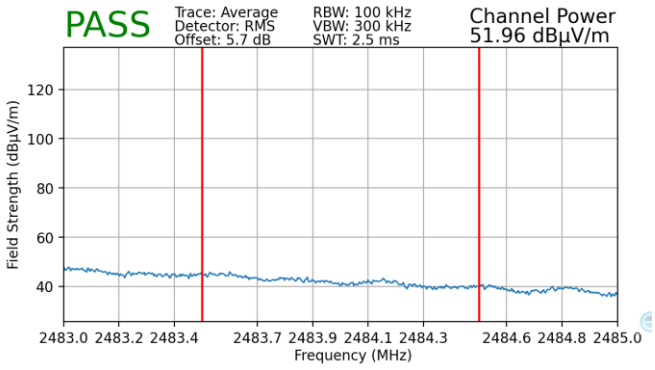


Plot 7-157. Radiated Restricted Upper Band Edge Measurement MIMO (Average)

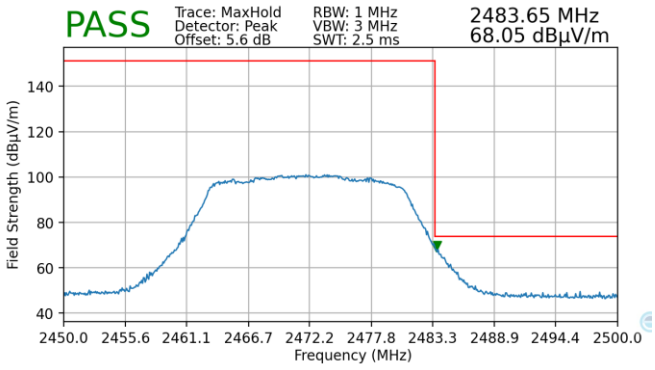


Plot 7-158. Radiated Restricted Upper Band Edge Measurement MIMO (Peak)

Worst Case Mode:	802.11n
Worst Case Transfer Rate:	MCS8
Distance of Measurements:	3 Meters
Operating Frequency:	2472MHz
Channel:	13

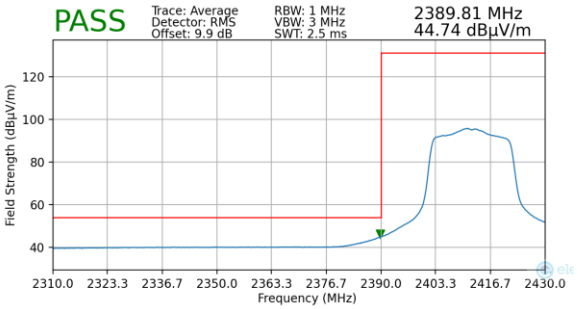


Plot 7-159. Radiated Restricted Upper Band Edge Measurement MIMO (Average)

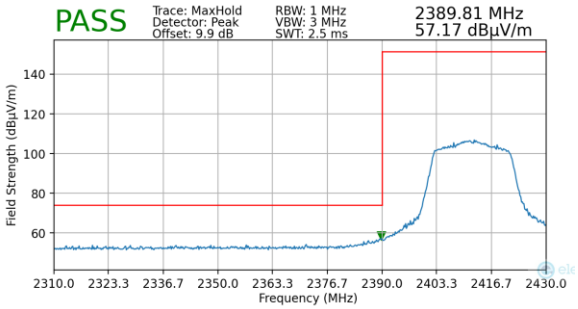


Plot 7-160. Radiated Restricted Upper Band Edge Measurement MIMO (Peak)

Worst Case Mode:	802.11ax
Worst Case Transfer Rate:	MCS0
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	1

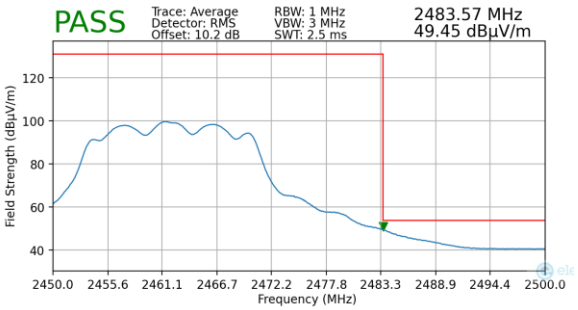


Plot 7-161. Radiated Restricted Band Edge Measurement MIMO with WCP (Average)

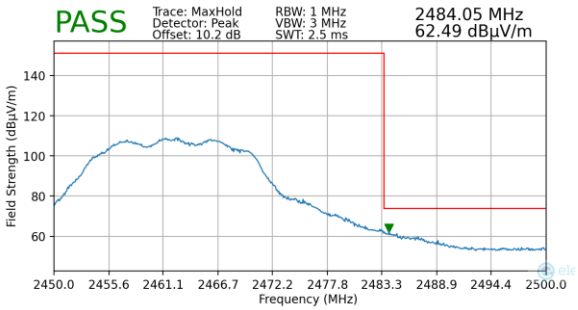


Plot 7-162. Radiated Restricted Band Edge Measurement MIMO with WCP (Peak)

Worst Case Mode:	802.11g
Worst Case Transfer Rate:	6 Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	2462MHz
Channel:	11



Plot 7-163. Radiated Restricted Band Edge Measurement MIMO with WCP (Average)



Plot 7-164. Radiated Restricted Band Edge Measurement MIMO with WCP (Peak)

7.8 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 7-22 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 7-22. 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

Test Setup

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

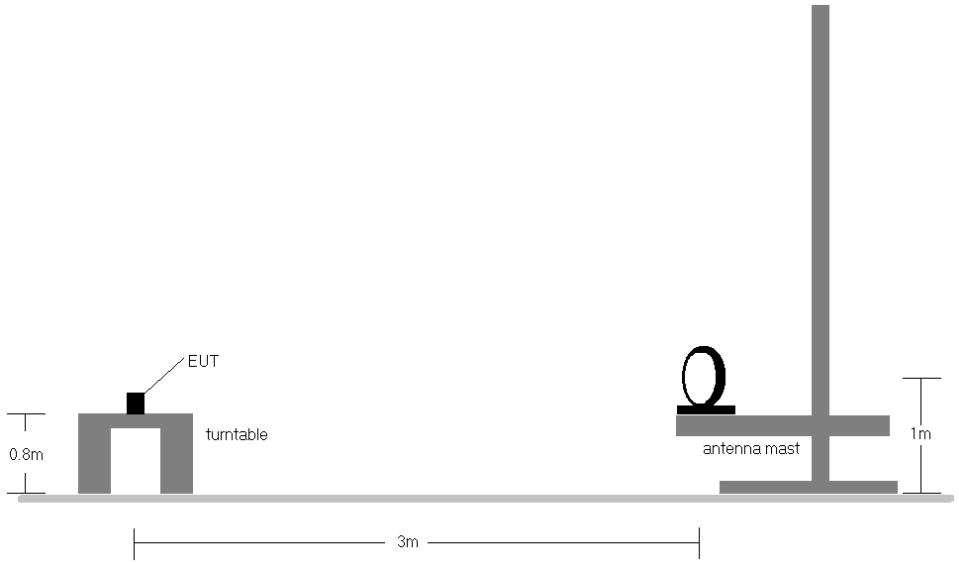


Figure 7-7. Radiated Test Setup < 30Mhz

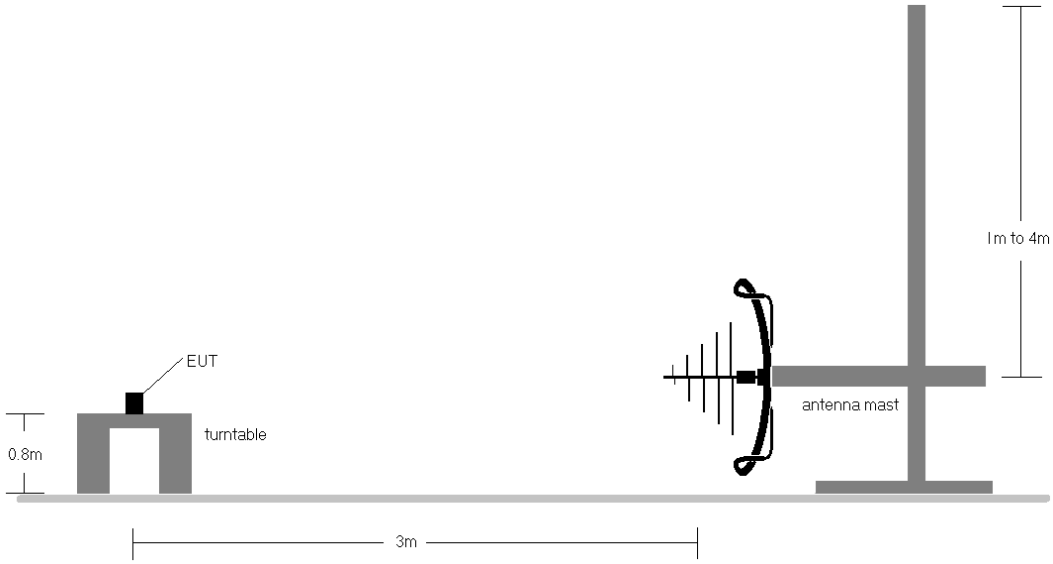


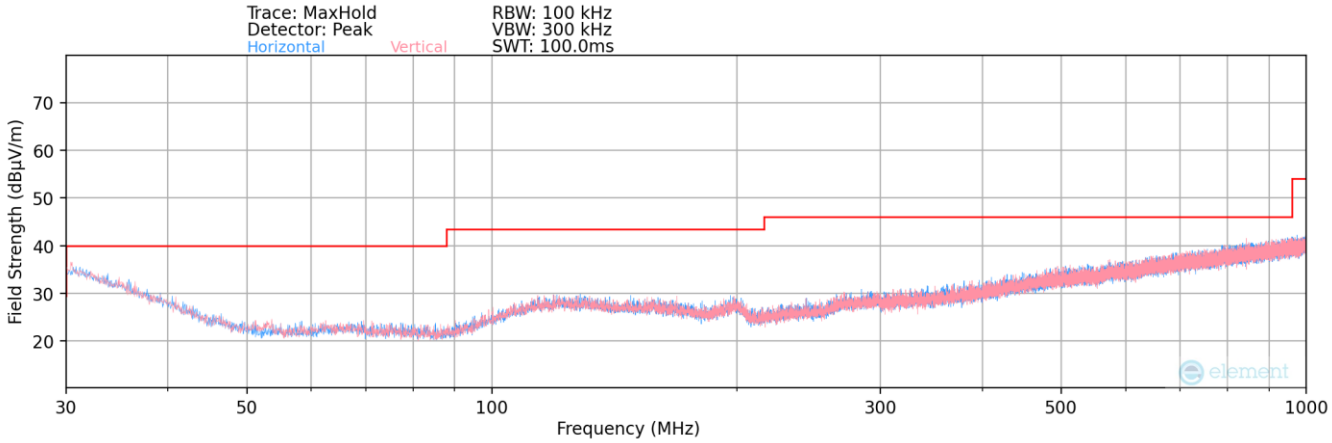
Figure 7-8. Radiated Test Setup < 1GHz

Test Notes

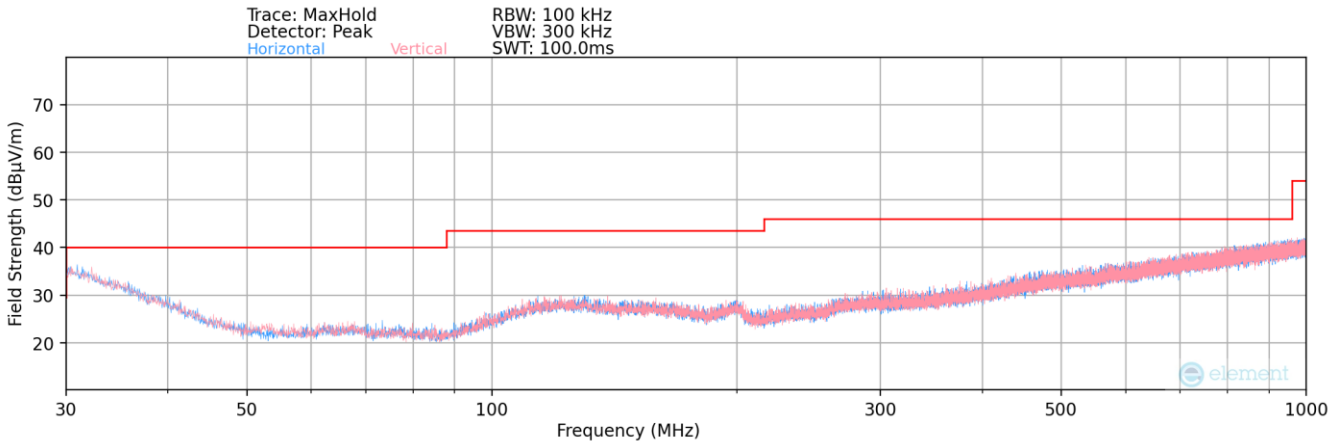
1. All emissions lying in restricted bands specified in §15.205 and RSS-Gen(8.10) are below the limit shown in Table 7-22.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit 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.

MIMO Radiated Spurious Emissions Measurements (Below 1GHz)

§15.209; RSS-Gen [8.9]



Plot 7-165. Radiated Spurious Plot below 1GHz MIMO - Closed



Plot 7-166. Radiated Spurious Plot below 1GHz MIMO - Open

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]
32.00	Quasi-Peak	H	-	-	-97.30	26.22	35.92	40.00	-4.08
850.00	Quasi-Peak	H	-	-	-96.24	30.82	41.58	46.02	-4.44
961.50	Quasi-Peak	H	-	-	-96.79	31.62	41.83	53.98	-12.15

Table 7-23. Radiated Spurious Emissions below 1GHz MIMO

7.9 Line-Conducted Test Data

§15.207; 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 7-24. 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.

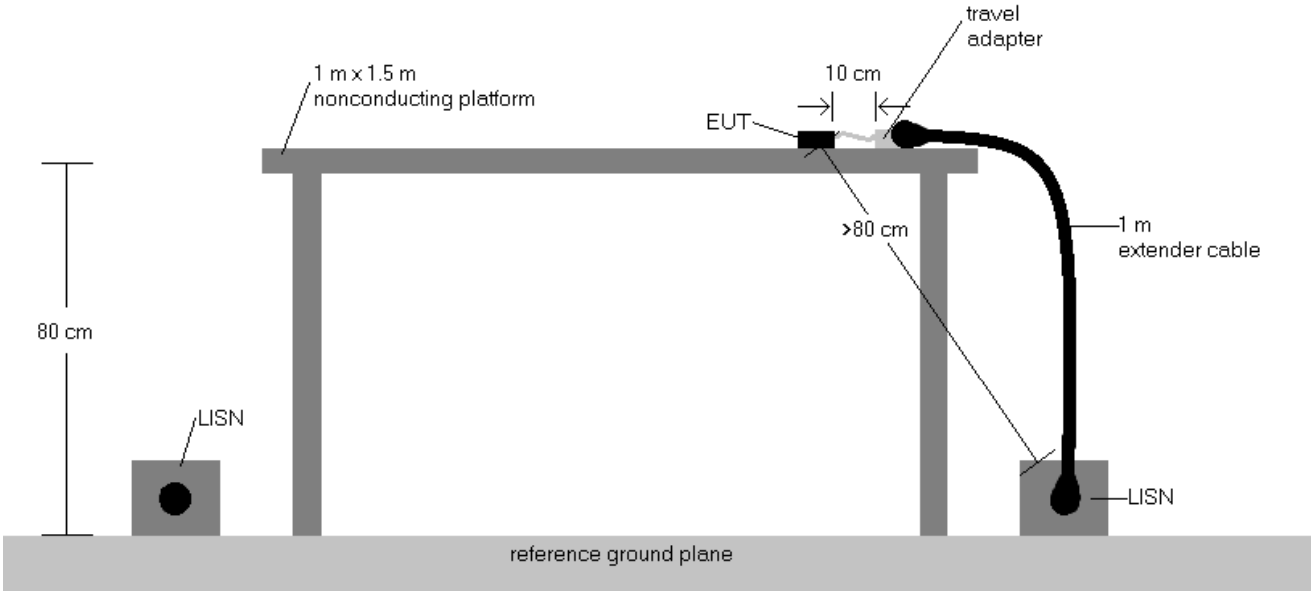
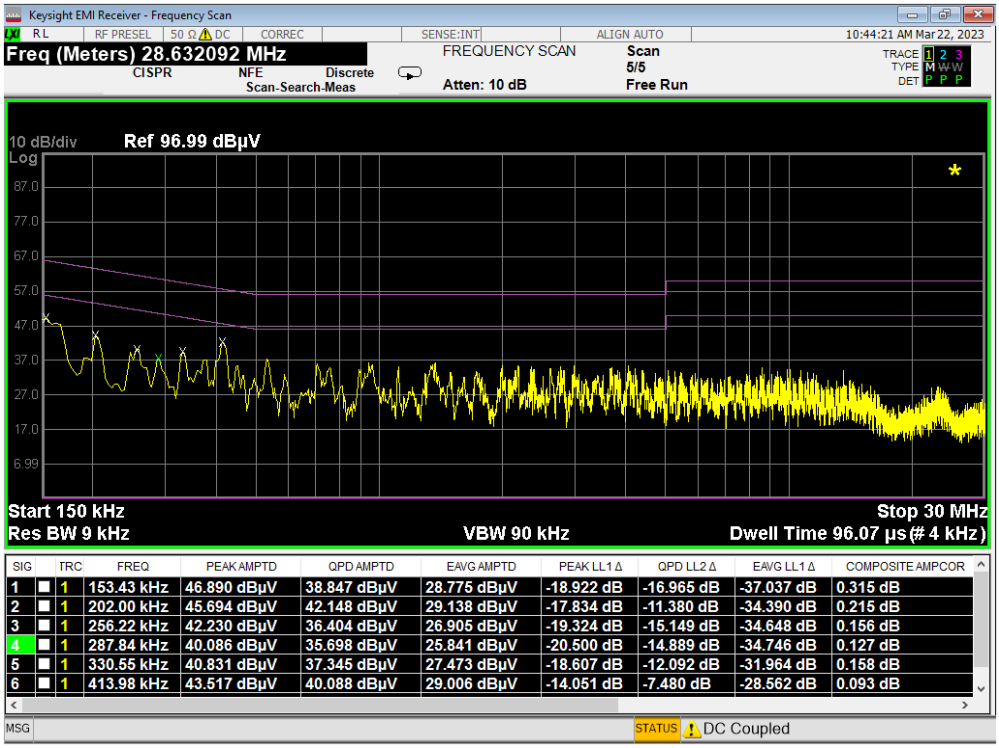


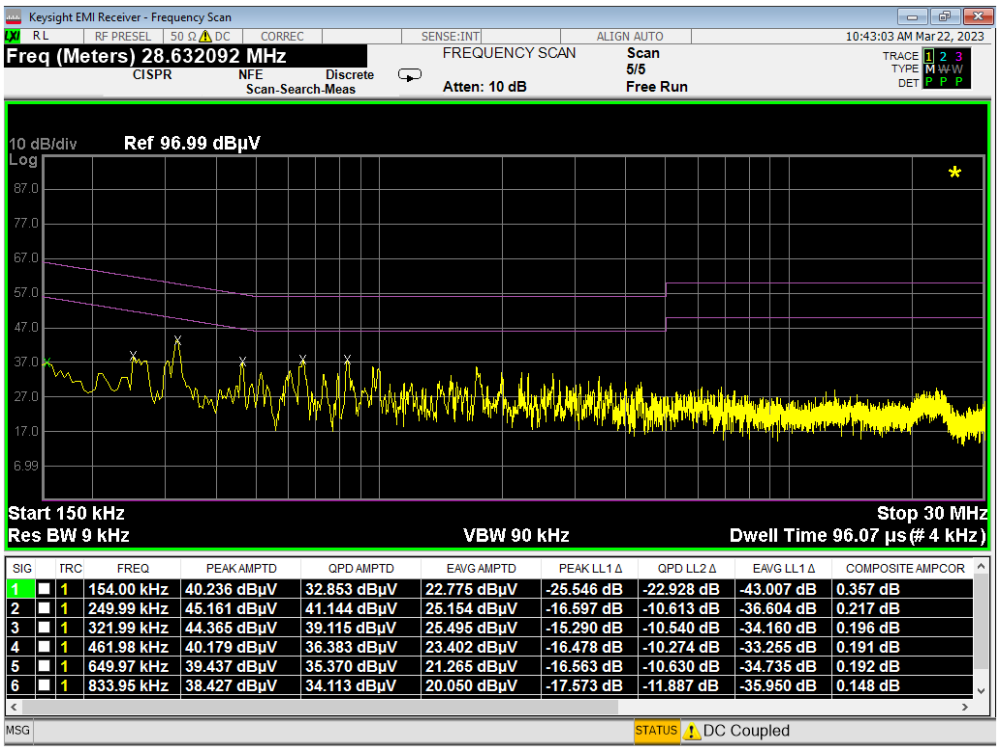
Figure 7-9. Test Instrument & Measurement Setup

Test Notes

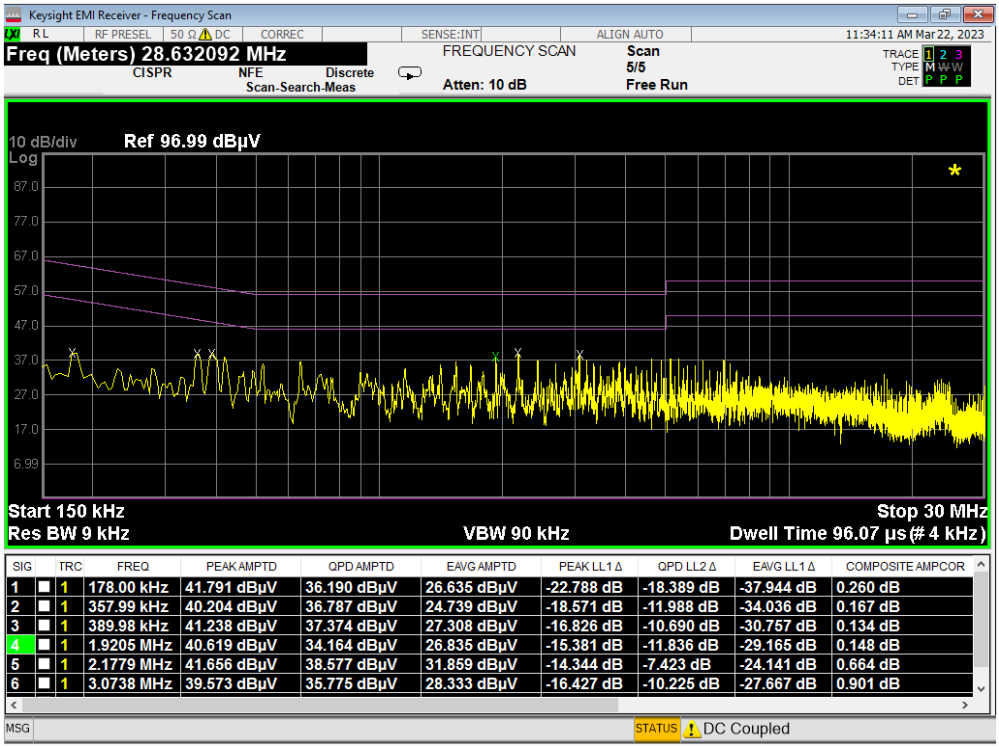
1. All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
2. The limit for an intentional radiator from 150kHz to 30MHz are specified in Part 15.207 and RSS-Gen(8.8).
3. 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.



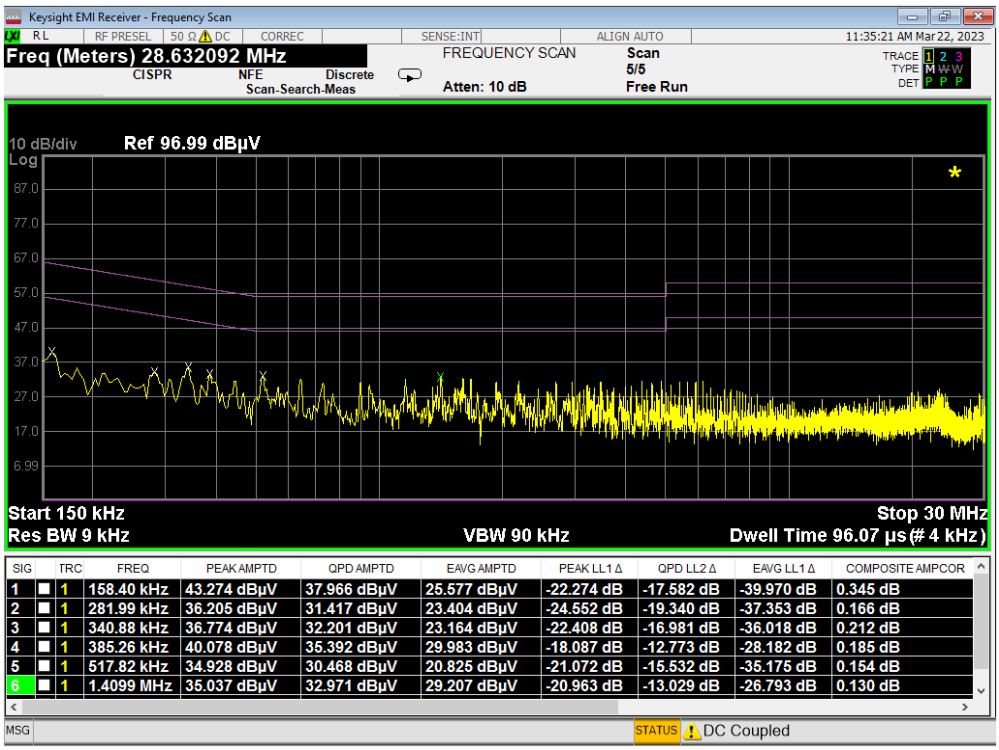
Plot 7-167. Line Conducted Plot with 802.11b (L1)



Plot 7-168. Line Conducted Plot with 802.11b (N)



Plot 7-169. Line Conducted Plot with 802.11b (L1) with WCP



Plot 7-170. Line Conducted Plot with 802.11b (N) with WCP

8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMF731JPN** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules.