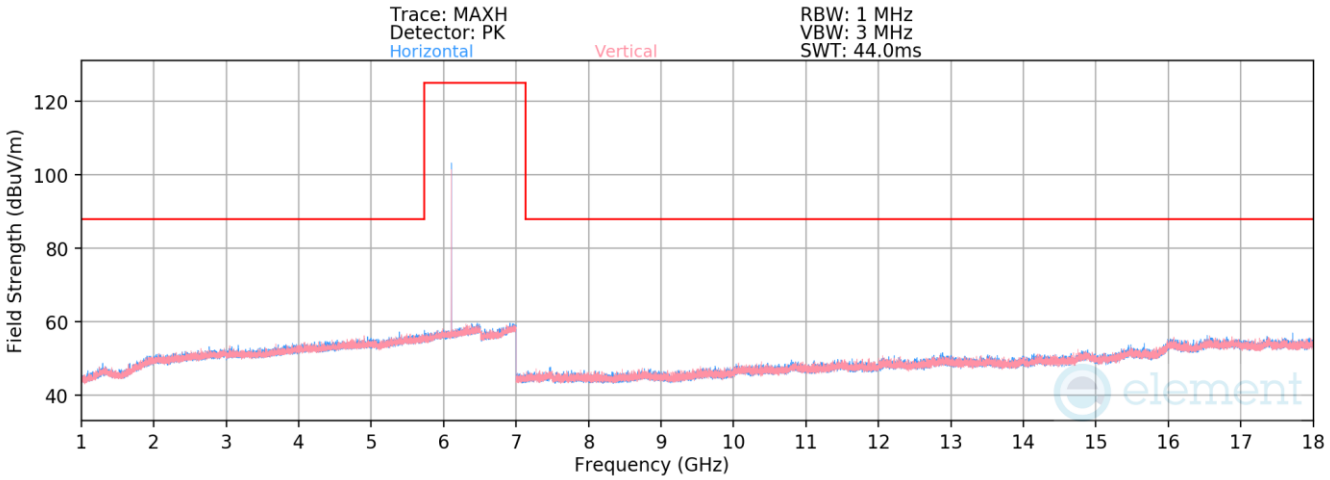
## 7.8.1 Radiated Spurious Emission (Above 1GHz)

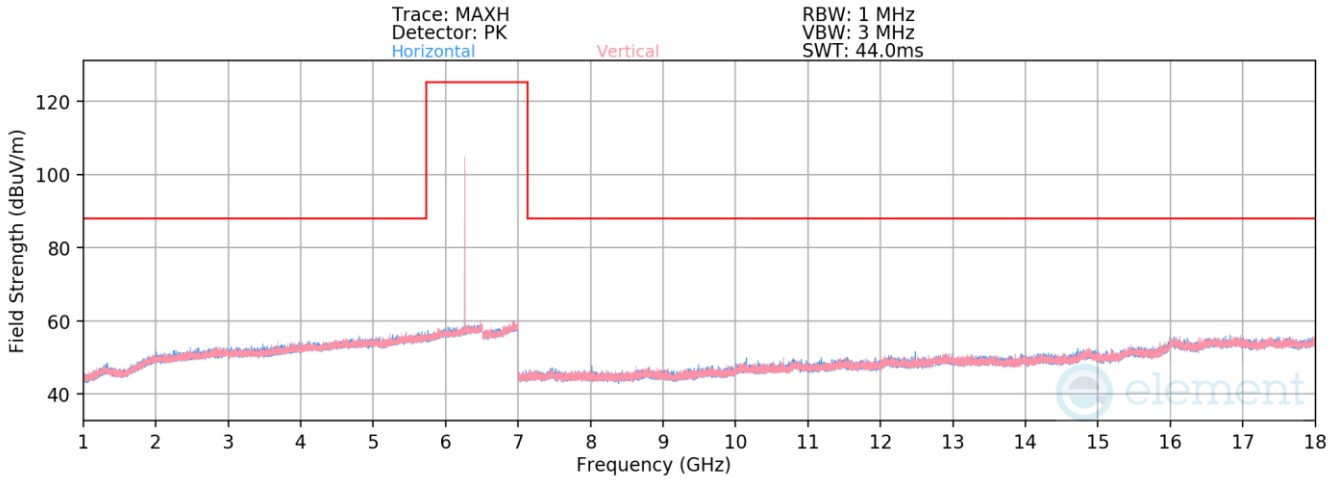



**Plot 7-134. Radiated Spurious Emissions 1-18GHz (NB UNII BDR – 6108MHz)**

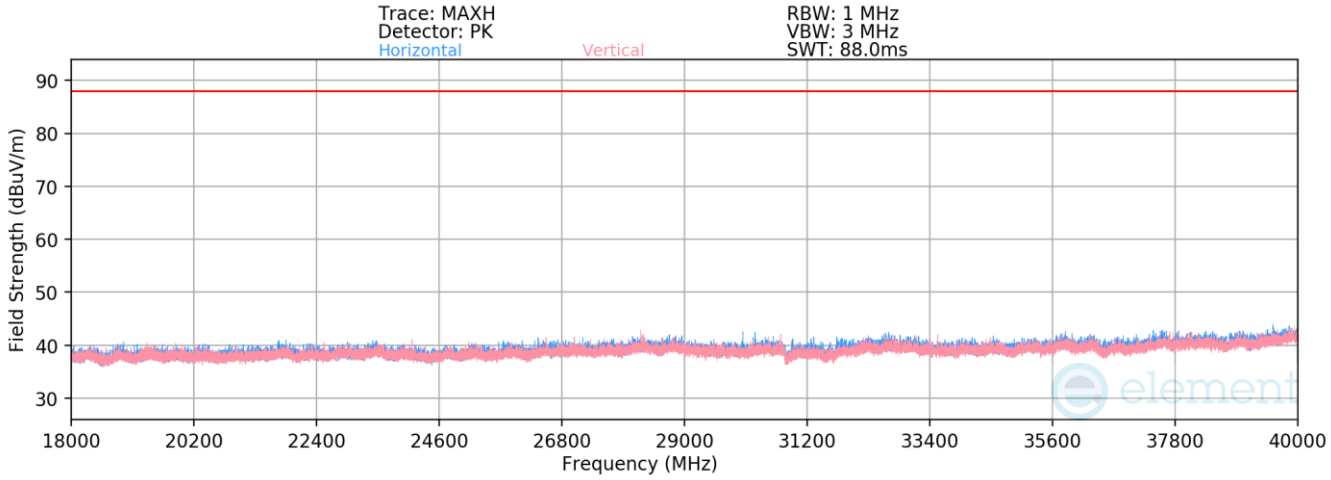
| | |
|---|---|
| Mode: | NB UNII BDR |
| Data Rate: | 1Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6108MHz |

| | 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] |
|---|---|---|---|---|---|---|---|---|---|---|
| * | 12216.00 | Average | - | - | - | -78.99 | 11.16 | 39.17 | 53.98 | -14.81 |
| * | 12216.00 | Peak | - | - | - | -68.11 | 11.16 | 50.05 | 73.98 | -23.93 |

**Table 7-14. Radiated Spurious Emissions Measurements**




**Plot 7-135. Radiated Spurious Emissions 1-18GHz (NB UNII BDR – 6264MHz)**

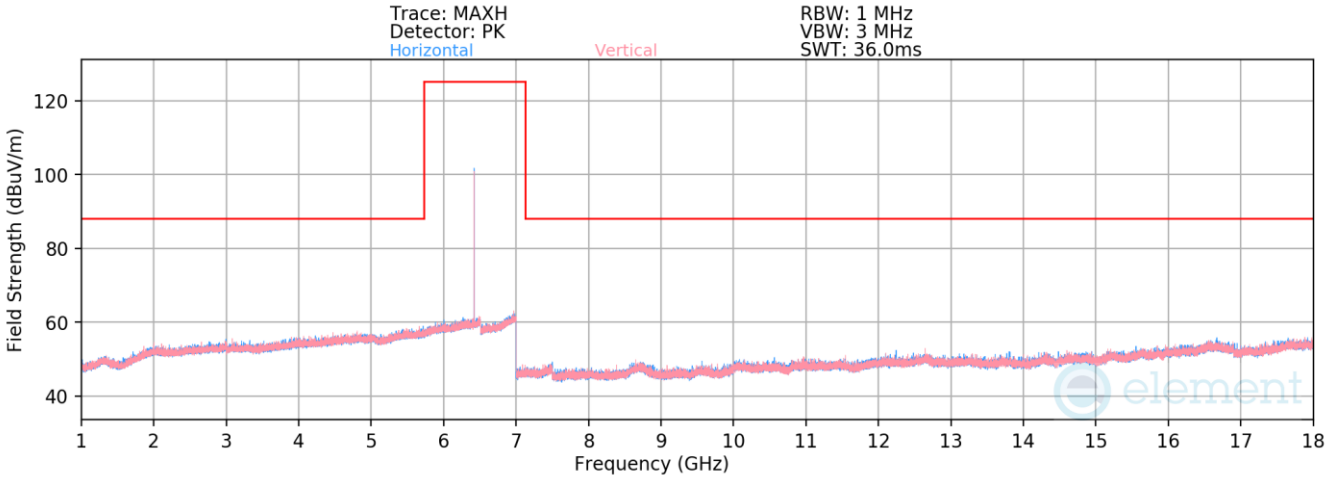



**Plot 7-136. Radiated Spurious Emissions 18-40GHz (NB UNII BDR– 6264MHz)**

| | |
|---|---|
| Mode: | NB UNII BDR |
| Data Rate: | 1Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6264MHz |

| | 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] |
|---|---|---|---|---|---|---|---|---|---|---|
| * | 12528.00 | Average | - | - | - | -79.19 | 11.35 | 39.16 | 53.98 | -14.82 |
| * | 12528.00 | Peak | - | - | - | -68.01 | 11.35 | 50.34 | 73.98 | -23.64 |

**Table 7-15. Radiated Spurious Emissions Measurements**

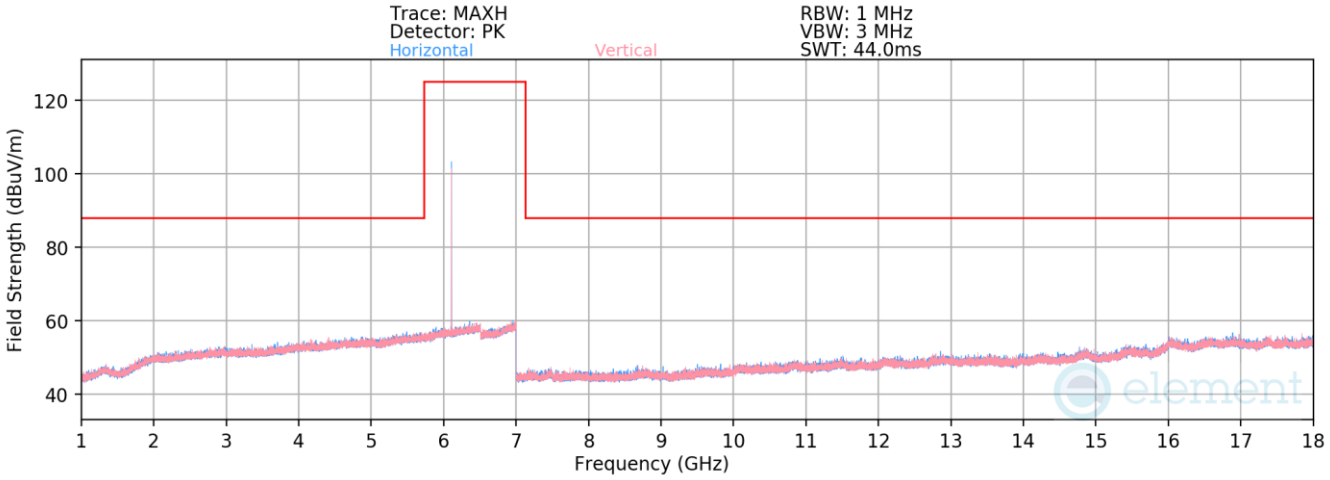



**Plot 7-137. Radiated Spurious Emissions 1-18GHz (NB UNII BDR – 6420MHz)**

| | |
|---|---|
| Mode: | NB UNII BDR |
| Data Rate: | 1Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6420MHz |

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 12840.00 | Average | - | - | - | -82.89 | 13.68 | 37.79 | 68.23 | -30.44 |
| 12840.00 | Peak | - | - | - | -69.52 | 13.68 | 51.16 | 88.23 | -37.07 |

**Table 7-16. Radiated Spurious Emissions Measurements**

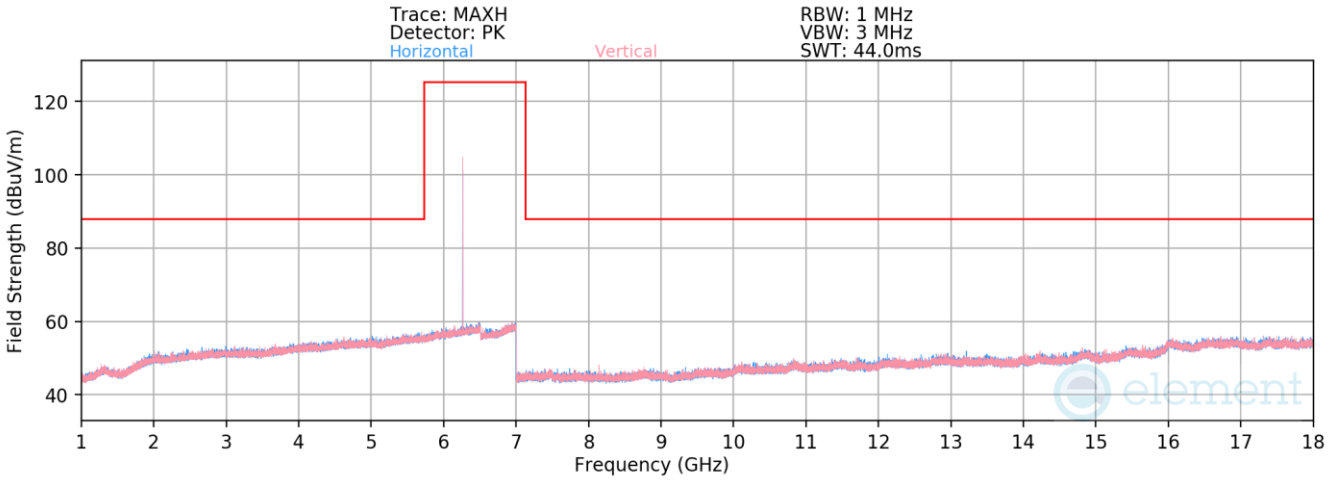



**Plot 7-138. Radiated Spurious Emissions 1-18GHz (NB UNII (LE1M) – 6108MHz)**

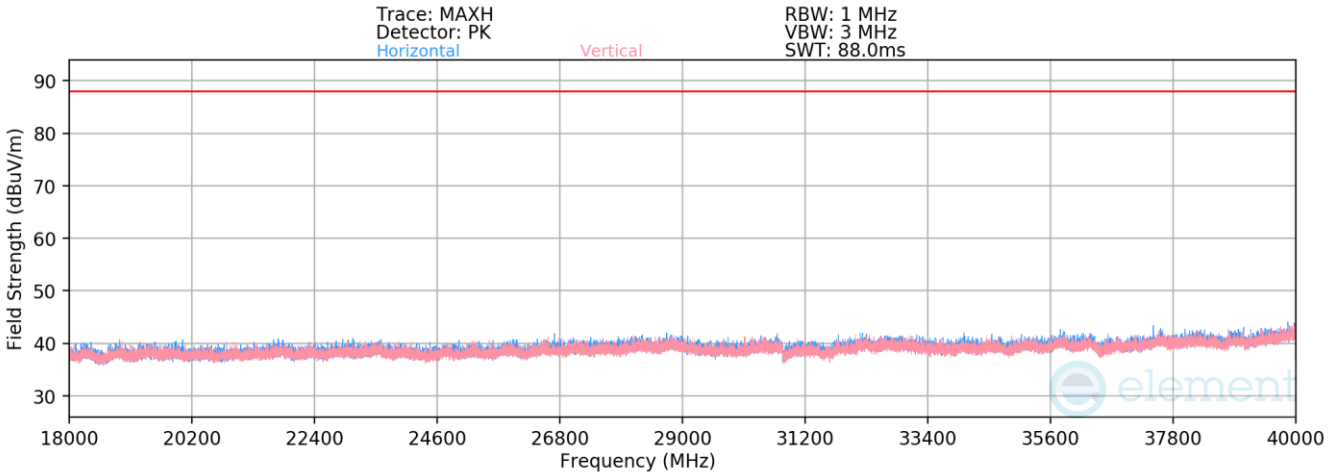
| | |
|---|---|
| Mode: | NB UNII LE |
| Data Rate: | 1Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6108MHz |

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 12216.00 | Average | - | - | - | -78.99 | 11.16 | 39.17 | 68.23 | -29.06 |
| 12216.00 | Peak | - | - | - | -68.11 | 11.16 | 50.05 | 88.23 | -38.18 |

**Table 7-17. Radiated Spurious Emissions Measurements**




**Plot 7-139. Radiated Spurious Emissions 1-18GHz (NB UNII (LE1M) – 6264MHz)**

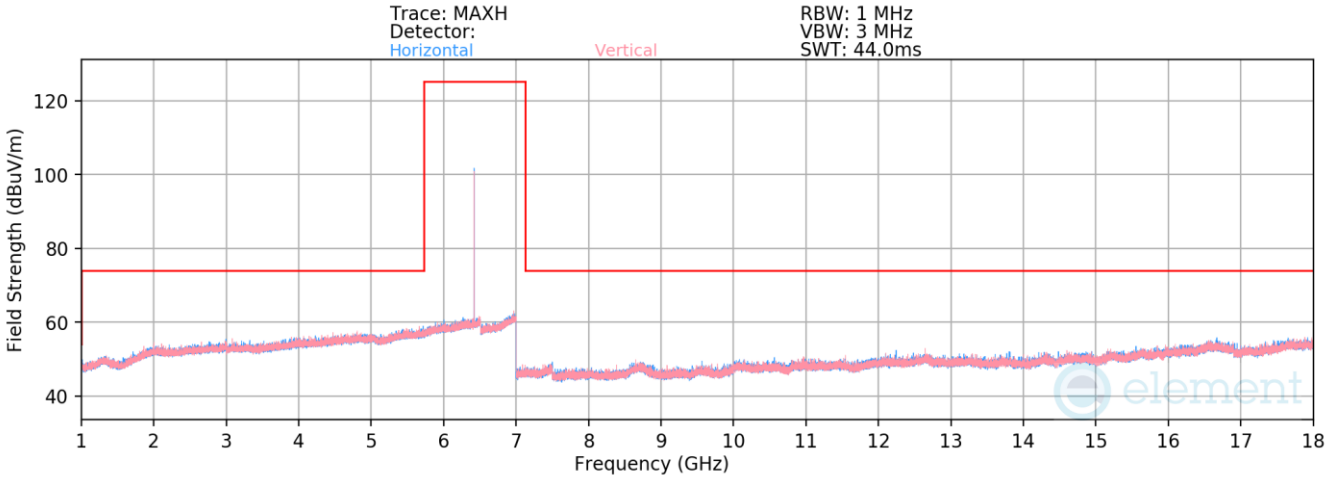



**Plot 7-140. Radiated Spurious Emissions 18-40GHz (NB UNII (LE1M) – 6264MHz)**

| | |
|---|---|
| Mode: | NB UNII LE |
| Data Rate: | 1Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6264MHz |

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 12528.00 | Average | - | - | - | -79.19 | 11.35 | 39.16 | 68.23 | -29.07 |
| 12528.00 | Peak | - | - | - | -68.01 | 11.35 | 50.34 | 88.23 | -37.89 |

**Table 7-18. Radiated Spurious Emissions Measurements**

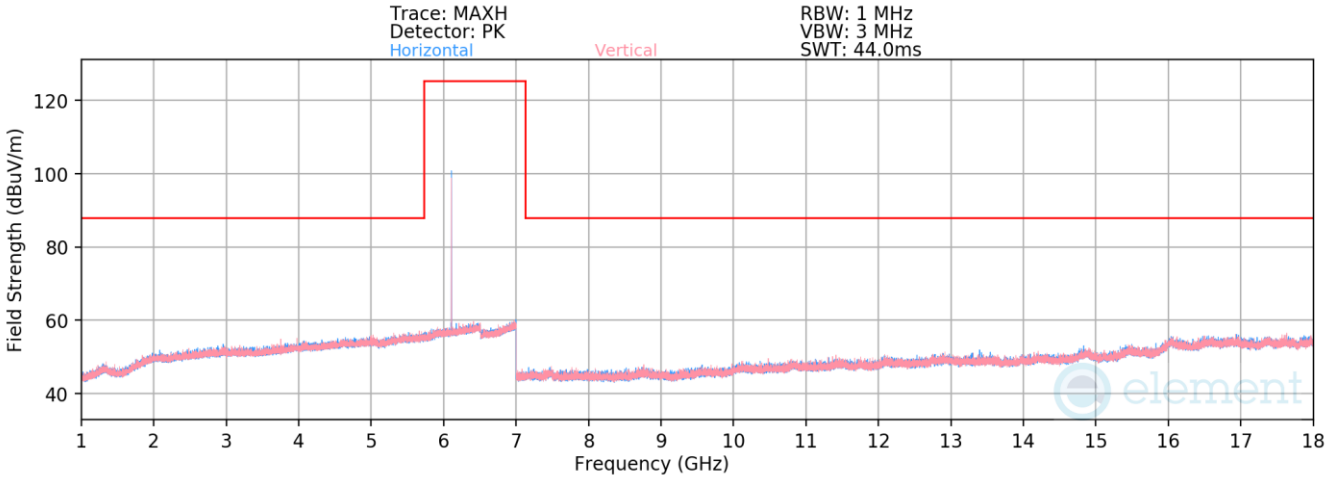



**Plot 7-141. Radiated Spurious Emissions 1-18GHz (NB UNII (LE1M) – 6420MHz)**

| | |
|---|---|
| Mode: | NB UNII LE |
| Data Rate: | 1Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6420MHz |

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 12840.00 | Average | - | - | - | -82.75 | 13.55 | 37.80 | 68.23 | -30.43 |
| 12840.00 | Peak | - | - | - | -69.27 | 13.55 | 51.28 | 88.23 | -36.95 |

**Table 7-19. Radiated Spurious Emissions Measurements**

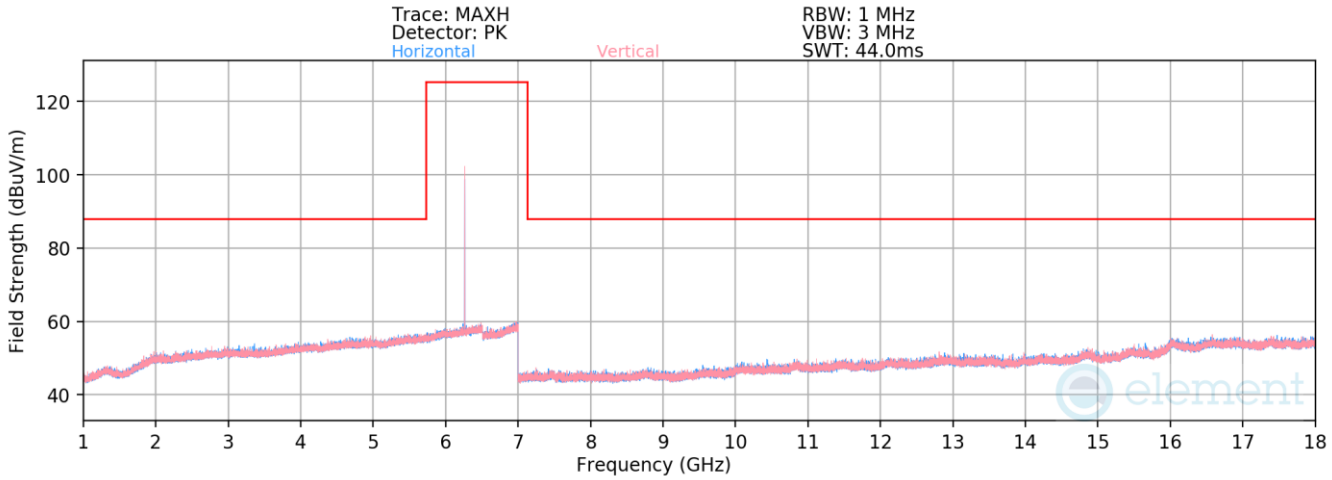



**Plot 7-142. Radiated Spurious Emissions 1-18GHz (NB UNII HDR4 – 6108MHz)**

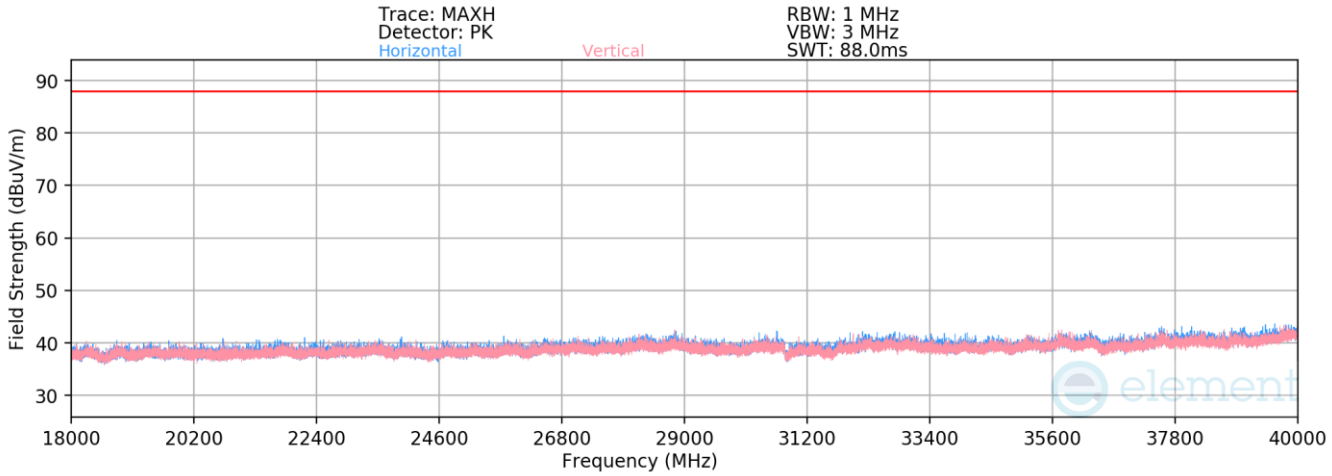
| | |
|---|---|
| Mode: | NB UNII HDR4 |
| Data Rate: | 4Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6108MHz |

| | 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] |
|---|---|---|---|---|---|---|---|---|---|---|
| * | 12216.00 | Average | - | - | - | -82.31 | 12.73 | 37.42 | 53.98 | -16.56 |
| * | 12216.00 | Peak | - | - | - | -69.90 | 12.73 | 48.84 | 73.98 | -25.14 |

**Table 7-20. Radiated Spurious Emissions Measurements**




**Plot 7-143. Radiated Spurious Emissions 1-18GHz (NB UNII HDR4 – 6264MHz)**

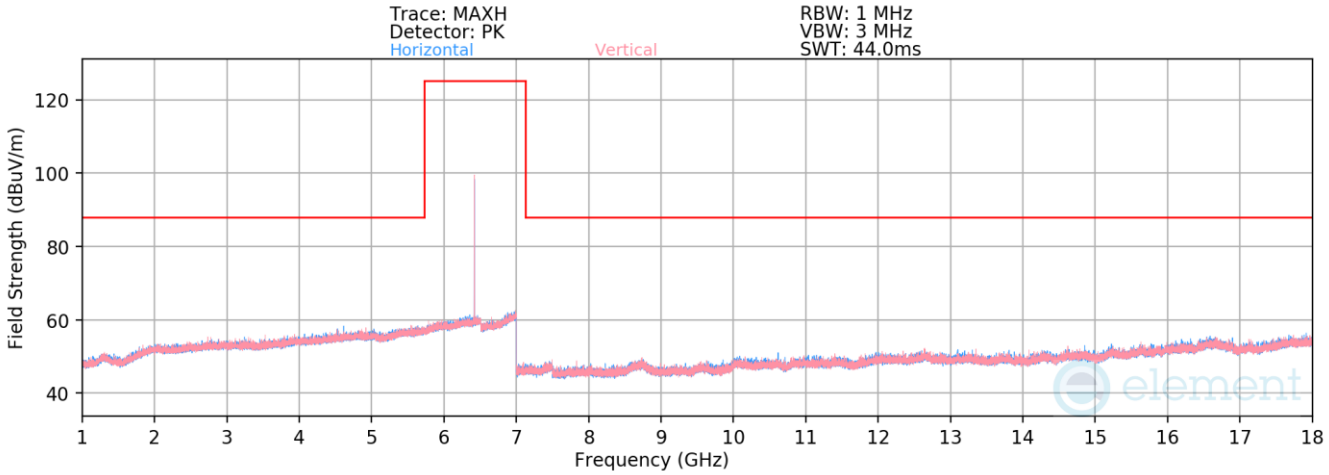



**Plot 7-144. Radiated Spurious Emissions Above 18GHz (NB UNII HDR4 – 6264MHz)**

| | |
|---|---|
| Mode: | NB UNII HDR4 |
| Data Rate: | 4Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6264MHz |

| | 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] |
|---|---|---|---|---|---|---|---|---|---|---|
| * | 12528.00 | Average | - | - | - | -82.82 | 13.23 | 37.41 | 53.98 | -16.57 |
| * | 12528.00 | Peak | - | - | - | -70.74 | 13.23 | 49.49 | 73.98 | -24.49 |

**Table 7-21. Radiated Spurious Emissions Measurements**

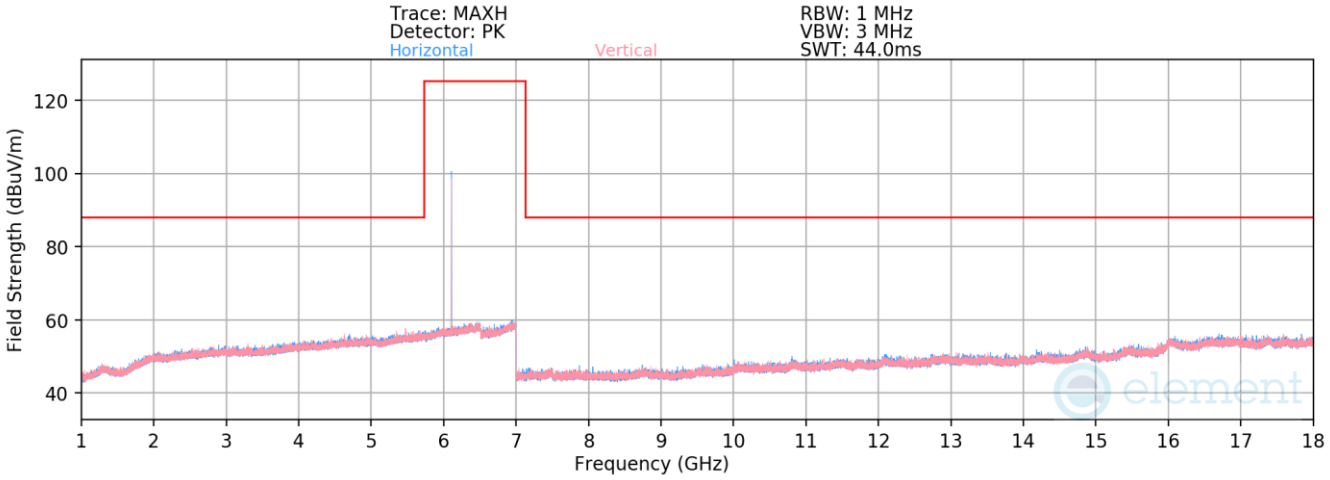



**Plot 7-145. Radiated Spurious Emissions 1-18GHz (NB UNII HDR4 – 6420MHz)**

| | |
|---|---|
| Mode: | NB UNII HDR4 |
| Data Rate: | 4Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6420MHz |

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 12840.00 | Average | - | - | - | -82.55 | 13.68 | 38.13 | 68.23 | -30.10 |
| 12840.00 | Peak | - | - | - | -70.16 | 13.68 | 50.52 | 88.23 | -37.71 |

**Table 7-22. Radiated Spurious Emissions Measurements**

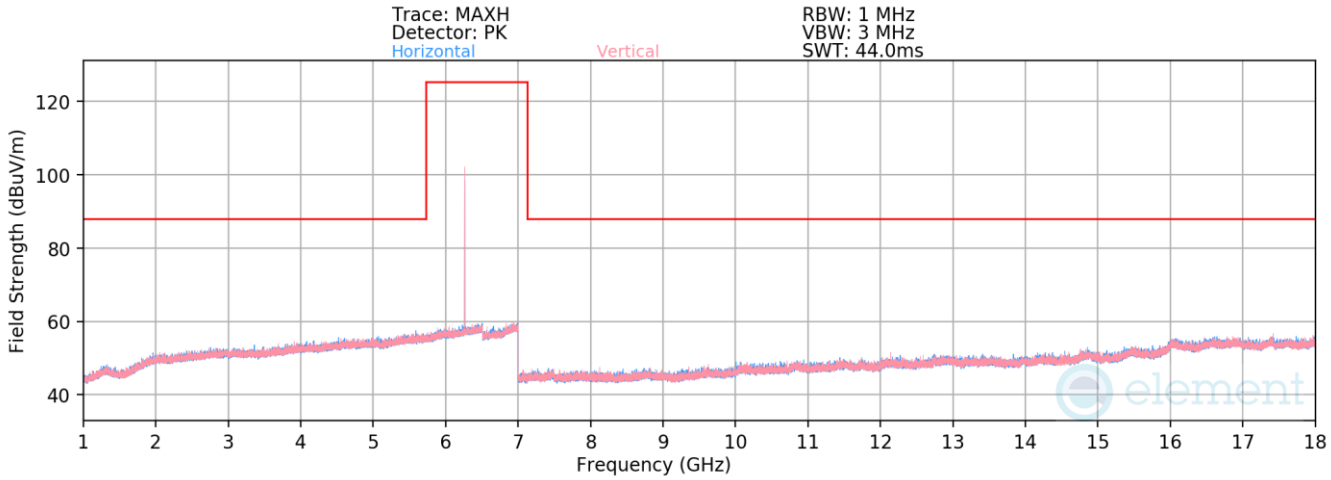



**Plot 7-146. Radiated Spurious Emissions 1-18GHz (NB UNII HDRp4 – 6108MHz)**

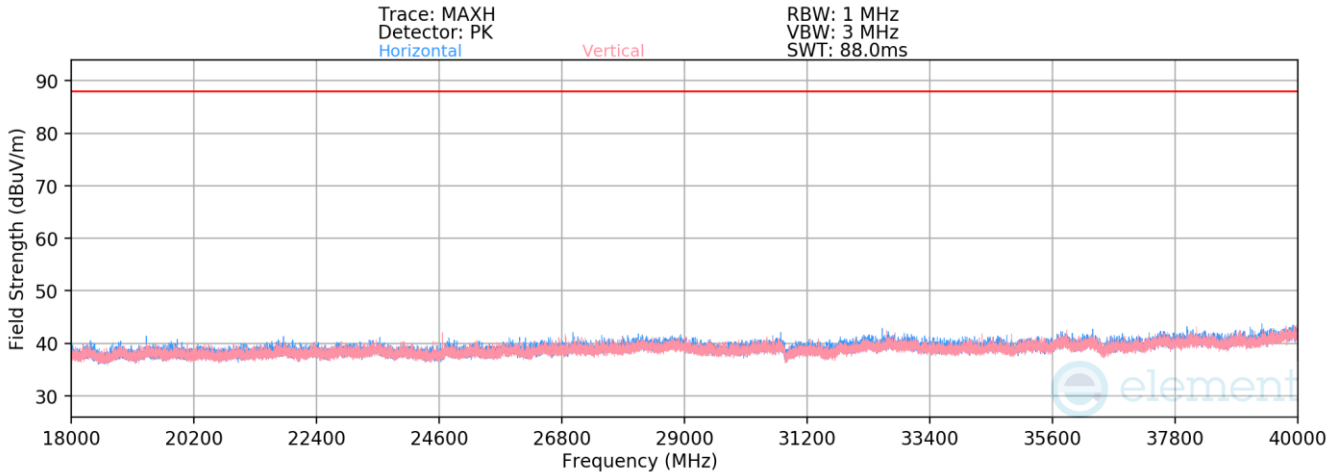
| | |
|---|---|
| Mode: | NB UNII HDRp4 |
| Data Rate: | 4Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6108MHz |

| | 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] |
|---|---|---|---|---|---|---|---|---|---|---|
| * | 12216.00 | Average | - | - | - | -82.40 | 12.73 | 37.33 | 53.98 | -16.65 |
| * | 12216.00 | Peak | - | - | - | -69.83 | 12.73 | 49.90 | 73.98 | -24.08 |

**Table 7-23. Radiated Spurious Emissions Measurements**




**Plot 7-147. Radiated Spurious Emissions 1-18GHz (NB UNII HDRp4 – 6264MHz)**

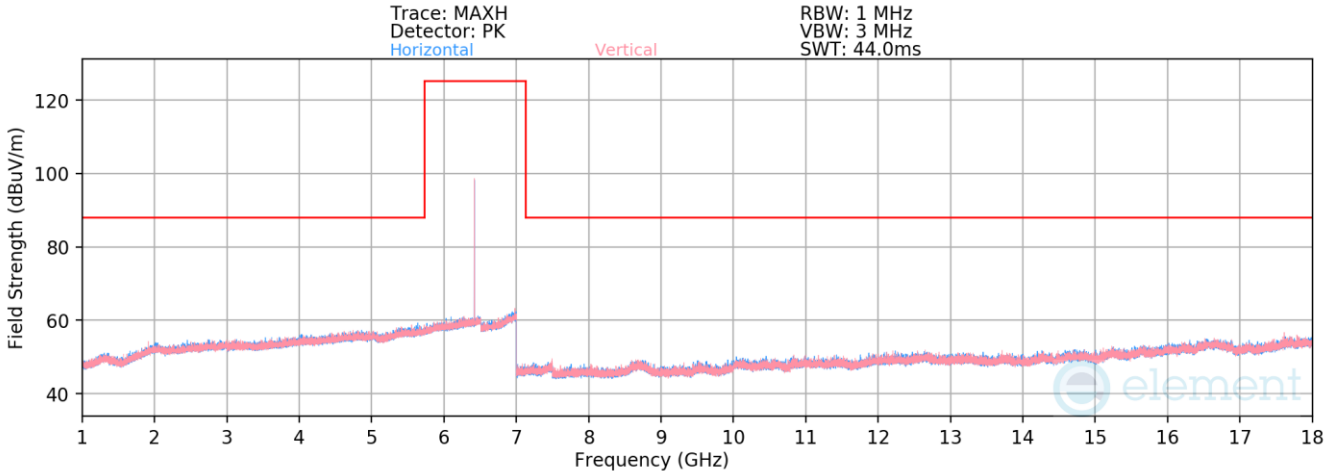



**Plot 7-148. Radiated Spurious Emissions Above 18GHz (NB UNII HDRp4 – 6264MHz)**

| | |
|---|---|
| Mode: | NB UNII HDRp4 |
| Data Rate: | 4Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6264MHz |

| | 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] |
|---|---|---|---|---|---|---|---|---|---|---|
| * | 12528.00 | Average | - | - | - | -82.74 | 13.23 | 37.49 | 53.98 | -16.49 |
| * | 12528.00 | Peak | - | - | - | -70.22 | 13.23 | 50.01 | 73.98 | -23.97 |

**Table 7-24. Radiated Spurious Emissions Measurements**




**Plot 7-149. Radiated Spurious Emissions 1-18GHz (NB UNII HDRp4 – 6420MHz)**

| | |
|---|---|
| Mode: | NB UNII HDRp4 |
| Data Rate: | 4Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 6420MHz |

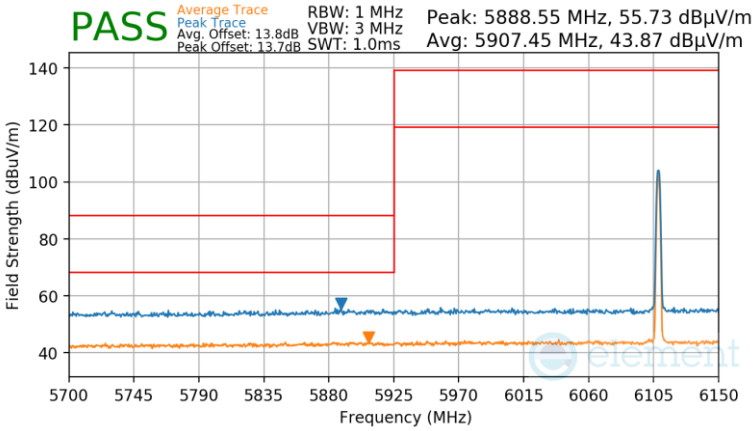
| Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|
| 12840.00 | Average | - | - | - | -82.77 | 13.68 | 37.91 | 68.23 | -30.32 |
| 12840.00 | Peak | - | - | - | -70.34 | 13.68 | 50.34 | 88.23 | -37.89 |

**Table 7-25. Radiated Spurious Emissions Measurements**

## 7.8.2 Radiated Band Edge Measurements

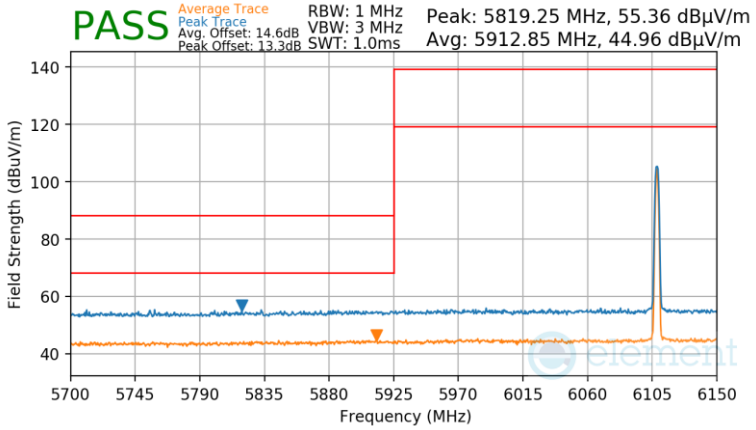
**§15.407(b) §15.205 §15.209**

| | |
|---|---|
| Mode: | NB UNII BDR |
| Data Rate: | 1Mbps |
| Measurement Distance: | 3 Meters |
| Operating Frequency: | 6108MHz |



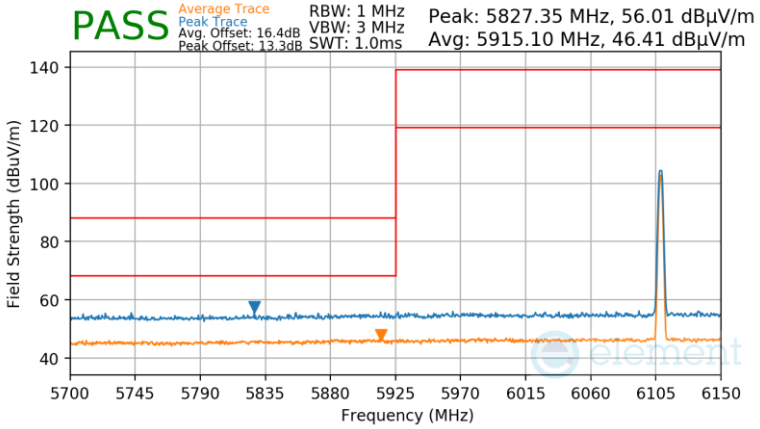

**Plot 7-150. Radiated Lower Band Edge Measurement**

| | |
|---|---|
| Mode: | NB UNII LE |
| Data Rate: | 1Mbps |
| Measurement Distance: | 3 Meters |
| Operating Frequency: | 6108MHz |



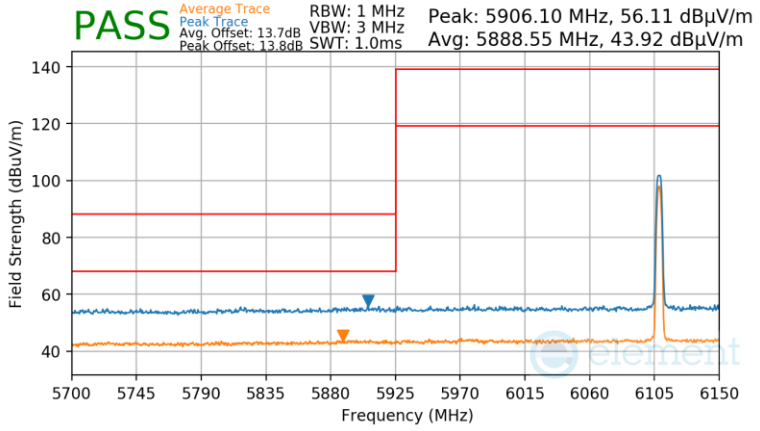

**Plot 7-151. Radiated Lower Band Edge Measurement**

| | |
|---|---|
| Mode: | NB UNII LE |
| Data Rate: | 2Mbps |
| Measurement Distance: | 3 Meters |
| Operating Frequency: | 6108MHz |



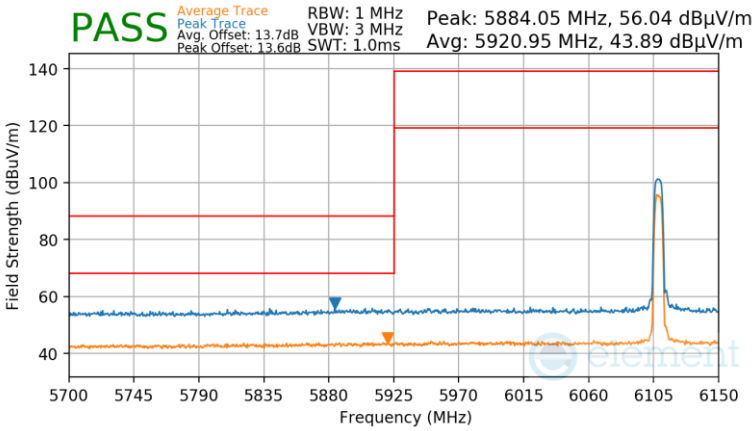

**Plot 7-152. Radiated Lower Band Edge Measurement**

| | |
|---|---|
| Mode: | NB UNII HDR4 |
| Measurement Distance: | 3 Meters |
| Operating Frequency: | 6108MHz |



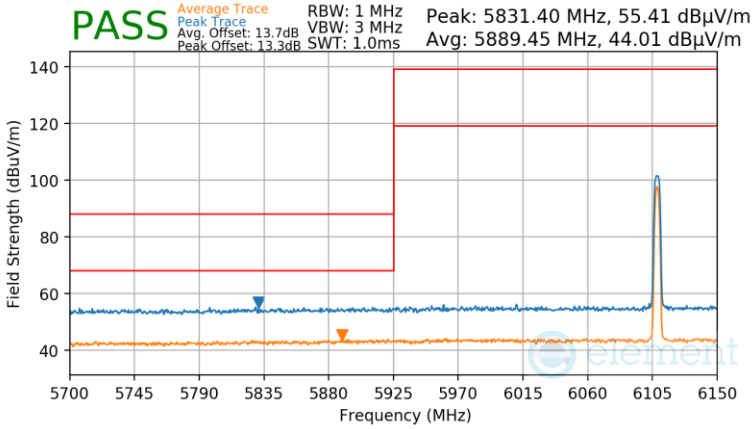

**Plot 7-153. Radiated Lower Band Edge Measurement**

| | |
|---|---|
| Mode: | NB UNII HDR8 |
| Measurement Distance: | 3 Meters |
| Operating Frequency: | 6108MHz |



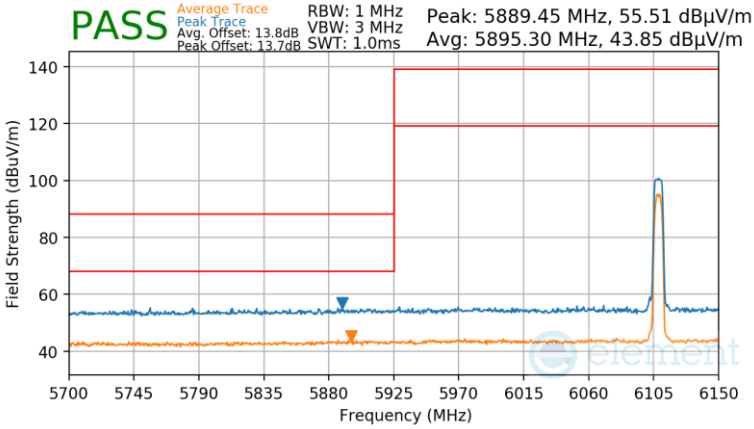

**Plot 7-154. Radiated Lower Band Edge Measurement**

| | |
|---|---|
| Mode: | NB UNII HDRp4 |
| Measurement Distance: | 3 Meters |
| Operating Frequency: | 6108MHz |




**Plot 7-155. Radiated Lower Band Edge Measurement**

| | |
|---|---|
| Mode: | NB UNII HDRp8 |
| Measurement Distance: | 3 Meters |
| Operating Frequency: | 6108MHz |




**Plot 7-156. Radiated Lower Band Edge Measurement**

## 7.9 Radiated Spurious Emissions – Below 1GHz

**§15.209**

### 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 must not exceed the limits shown in Table 7-26 per Section 15.209.***

| 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 7-26. Radiated Limits**

### Test Procedures Used

ANSI C63.10-2020

### 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

#### 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. VBW = 300kHz
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 diagrams below.

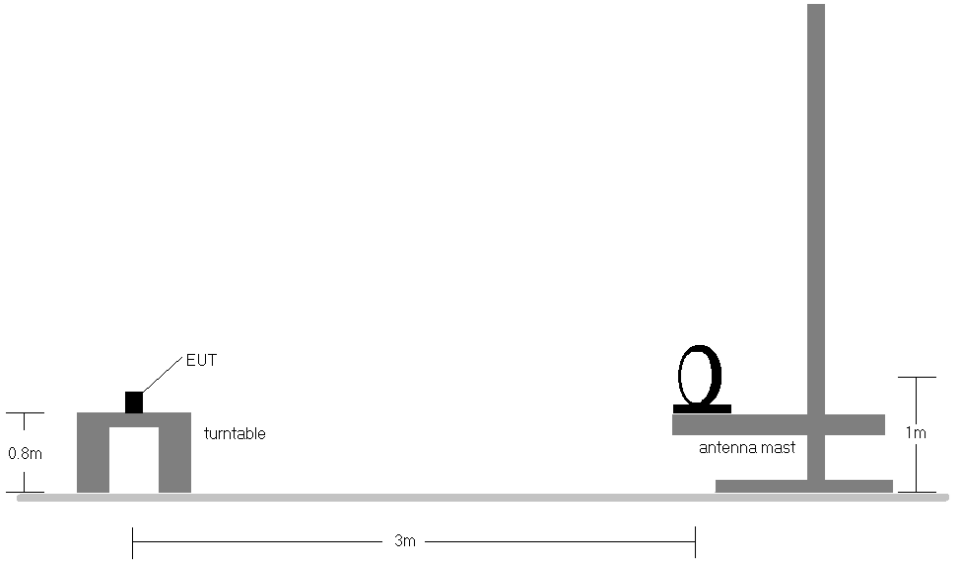



**Figure 7-9. Radiated Test Setup < 30MHz**

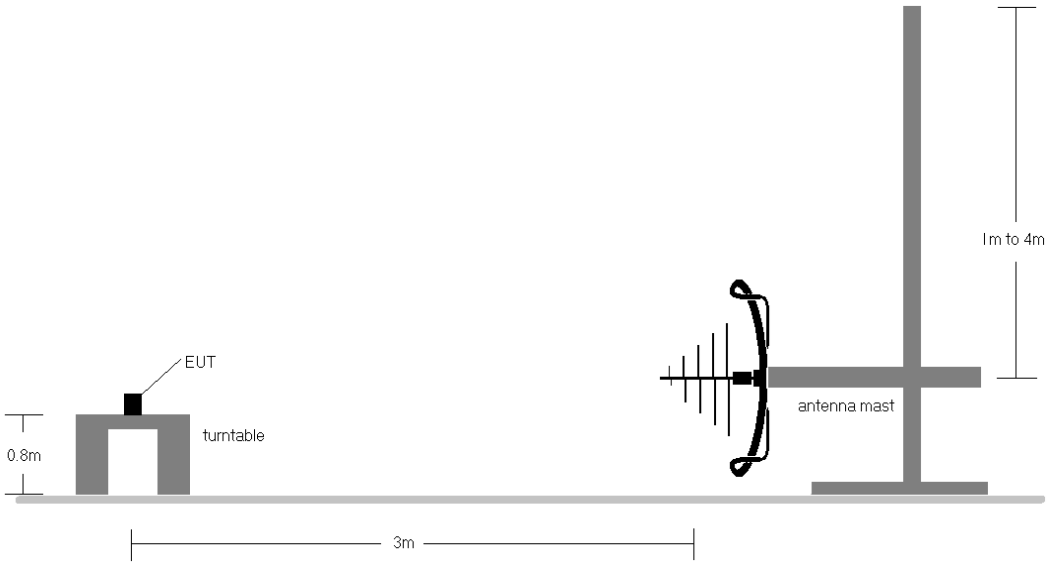



**Figure 7-10. Radiated Test Setup < 1GHz**

## Test Notes

1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-26.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes. For below 30MHz the loop antenna was positioned in 3 orthogonal planes (X front, Y side, Z top) to determine the orientation resulting in the worst case emissions.
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 for emissions within 6dB of the limit.
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. Both configurations below were investigated, and the worst case has been reported.
    a. EUT powered by AC/DC adaptor to USB-C Power Pack to Magnetic Charging Cable
    b. EUT powered by host PC via USB-C Power Pack to Magnetic Charging Cable

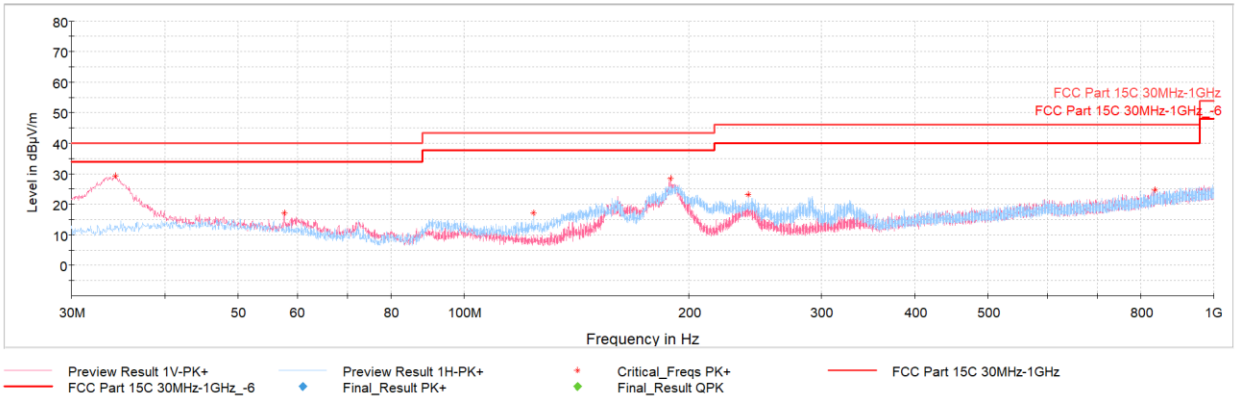
## Sample Calculations

### 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 $_{[dB]}$ – Preamplifier Gain $_{[dB]}$
- Margin $_{[dB]}$ = Field Strength Level $_{[dB\mu V/m]}$ – Limit $_{[dB\mu V/m]}$

## Radiated Spurious Emissions (Below 1GHz)

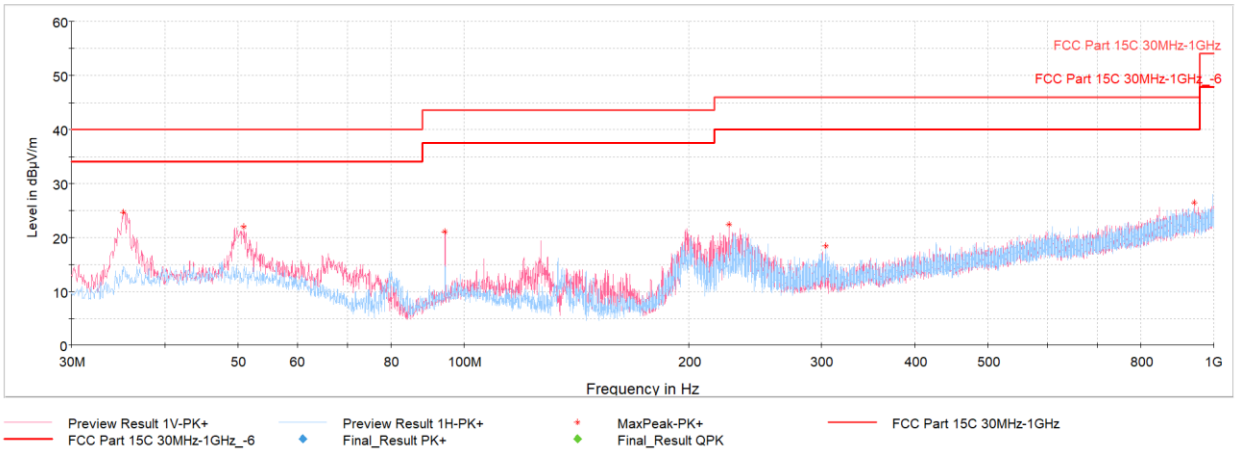
**§15.209**




**Plot 7-157. Radiated Spurious Emissions Below 1GHz (NB UNII BDR – 6264MHz), with AC/DC Adapter**

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 34.32 | Max Peak | V | 100 | 48 | -62.29 | -15.46 | 29.25 | 40.00 | -10.75 |
| 57.65 | Max Peak | V | 100 | 85 | -75.69 | -14.22 | 17.09 | 40.00 | -22.91 |
| 124.04 | Max Peak | H | 300 | 212 | -71.33 | -18.53 | 17.14 | 43.52 | -26.38 |
| 188.64 | Max Peak | V | 100 | 250 | -61.50 | -17.16 | 28.34 | 43.52 | -15.18 |
| 239.71 | Max Peak | H | 100 | 334 | -68.80 | -15.08 | 23.12 | 46.02 | -22.90 |
| 835.83 | Max Peak | H | 200 | 32 | -79.13 | -3.18 | 24.69 | 46.02 | -21.33 |

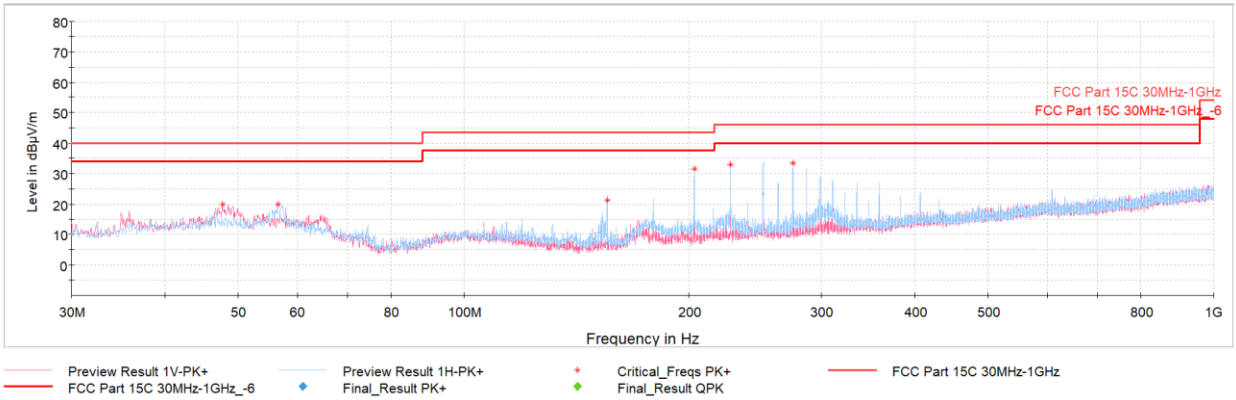
**Table 7-27. Radiated Spurious Emissions Below 1GHz (NB UNII BDR – 6264MHz), with AC/DC Adapter**




**Plot 7-158. Radiated Spurious Emissions Below 1GHz (NB UNII (LE1M) – 6264MHz), with AC/DC Adapter**

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 35.24 | Max Peak | V | 100 | 38 | -67.09 | -15.22 | 24.69 | 40.00 | -15.31 |
| 50.90 | Max Peak | V | 100 | 244 | -72.09 | -12.91 | 22.00 | 40.00 | -18.00 |
| 94.46 | Max Peak | V | 200 | 137 | -69.06 | -16.91 | 21.03 | 43.52 | -22.49 |
| 225.84 | Max Peak | V | 100 | 8 | -69.03 | -15.66 | 22.31 | 46.02 | -23.71 |
| 304.17 | Max Peak | H | 100 | 263 | -74.81 | -13.81 | 18.38 | 46.02 | -27.64 |
| 942.62 | Max Peak | V | 100 | 346 | -78.73 | -1.87 | 26.40 | 46.02 | -19.62 |

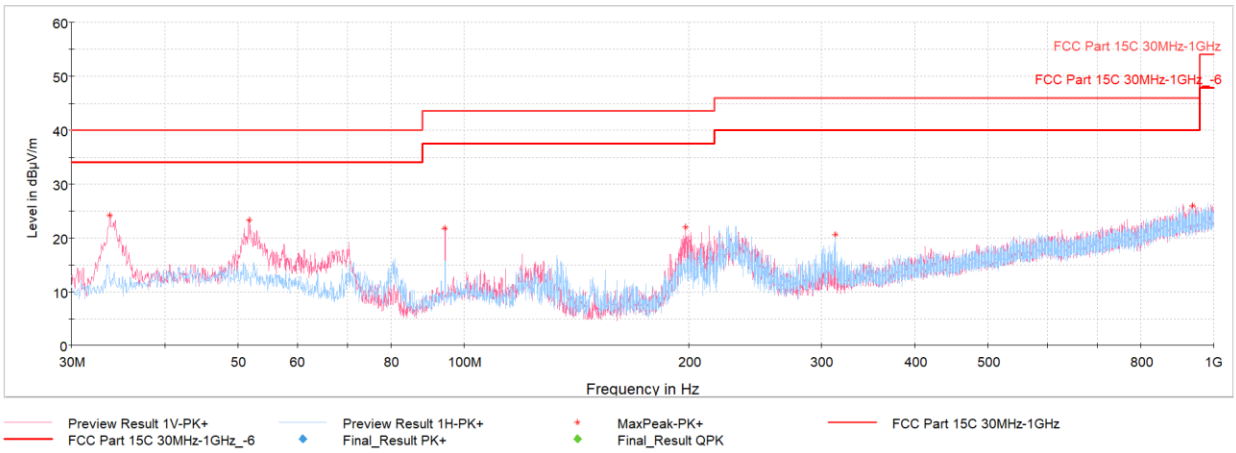
**Table 7-28. Radiated Spurious Emissions Below 1GHz (NB UNII (LE1M) – 6264MHz), with AC/DC Adapter**




**Plot 7-159. Radiated Spurious Emissions Below 1GHz (NB UNII HDR4 – 6264MHz), with Laptop**

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 47.70 | Max Peak | V | 100 | 51 | -74.17 | -12.82 | 20.01 | 40.00 | -19.99 |
| 56.53 | Max Peak | H | 300 | 165 | -73.06 | -13.91 | 20.03 | 40.00 | -19.97 |
| 155.28 | Max Peak | H | 200 | 229 | -66.52 | -19.31 | 21.17 | 43.52 | -22.35 |
| 203.05 | Max Peak | H | 100 | 335 | -58.60 | -16.86 | 31.54 | 43.52 | -11.98 |
| 226.96 | Max Peak | H | 100 | 147 | -58.41 | -15.65 | 32.94 | 46.02 | -13.08 |
| 274.68 | Max Peak | H | 100 | 136 | -59.13 | -14.55 | 33.32 | 46.02 | -12.70 |

**Table 7-29. Radiated Spurious Emissions Below 1GHz (NB UNII HDR4 – 6264MHz), with Laptop**




**Plot 7-160. Radiated Spurious Emissions Below 1GHz (NB UNII HDRp4 – 6264MHz), with AC/DC Adapter**

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 33.78 | Max Peak | V | 100 | 331 | -67.19 | -15.58 | 24.23 | 40.00 | -15.77 |
| 51.73 | Max Peak | V | 100 | 226 | -70.83 | -12.96 | 23.21 | 40.00 | -16.79 |
| 94.46 | Max Peak | V | 100 | 314 | -68.25 | -16.91 | 21.84 | 43.52 | -21.68 |
| 197.91 | Max Peak | V | 100 | 319 | -68.92 | -16.07 | 22.01 | 43.52 | -21.51 |
| 313.24 | Max Peak | H | 100 | 189 | -72.95 | -13.49 | 20.56 | 46.02 | -25.46 |
| 937.63 | Max Peak | H | 300 | 160 | -79.12 | -1.93 | 25.95 | 46.02 | -20.07 |

**Table 7-30. Radiated Spurious Emissions Below 1GHz (NB UNII HDRp4 – 6264MHz), with AC/DC Adapter**

## 7.10 AC Line Conducted Emissions Measurement

**§15.207**

### 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 AC Line conducted spurious emissions. All data rates and modes were investigated for AC Line conducted spurious emissions.

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

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

**Table 7-31. Conducted Limits**

*Decreases with the logarithm of the frequency.

### Test Procedures Used

ANSI C63.10-2020, Section 6.2

### Test Settings

#### Quasi-Peak 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 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.

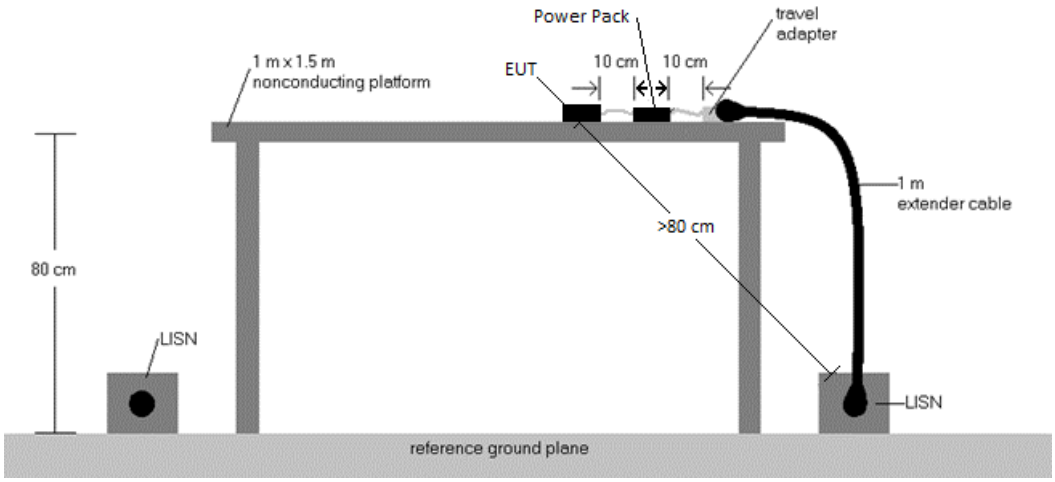
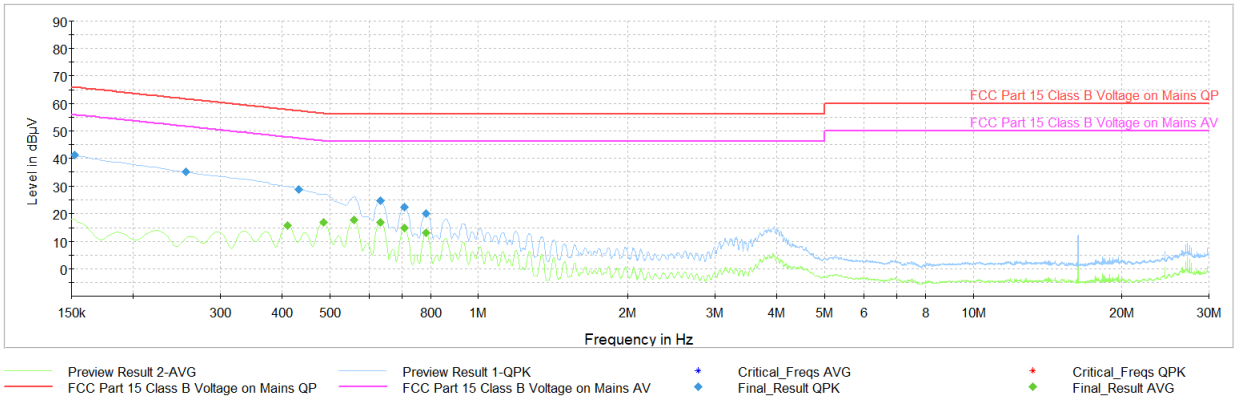



**Figure 7-11. Test Instrument & Measurement Setup**

## Test Notes

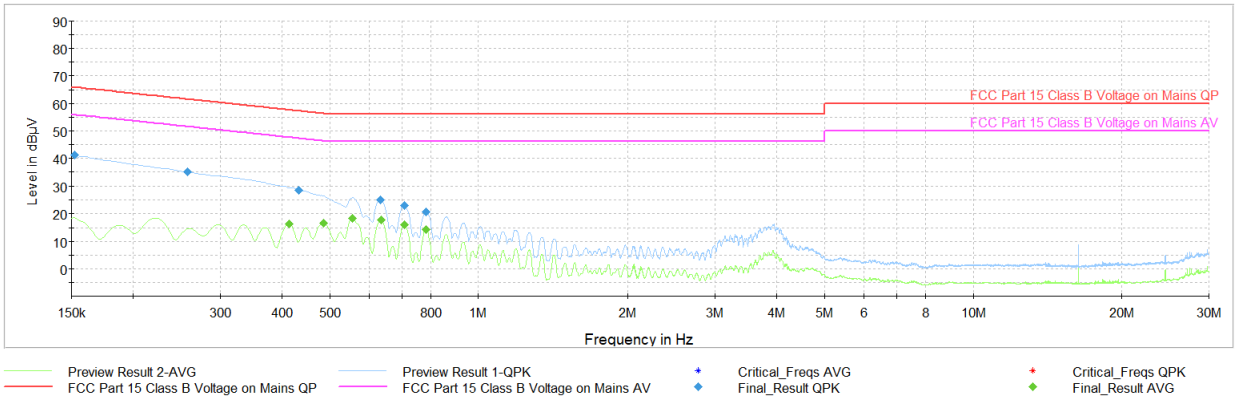
1. All modes of operation were investigated and the worst-case emissions are reported. The emissions found were not affected by the choice of channel used during testing.
2. Both configurations below were investigated, and the worst case has been reported.
    a. EUT powered by AC/DC adaptor to USB-C Power Pack to Magnetic Charging Cable
    b. EUT powered by host PC via USB-C Power Pack to Magnetic Charging Cable
3. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207.
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Correction Factor (dB)
6. Margin (dB) = QP/AV Level (dBμV) - QP/AV Limit (dBμV)
7. Traces shown in plots are made using quasi-peak and average detectors.
8. Deviations to the Specifications: None.




**Plot 7-161. AC Line Conducted Plot (NB UNII BDR – 6264MHz) (L1) with AC/DC Adapter**

| Frequency [MHz] | Process State | QuasiPeak [dBµV] | Average [dBµV] | Limit [dBµV] | Margin [dB] | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.152 | FINAL | 41.2 | — | 65.88 | -24.69 | L1 | GND |
| 0.256 | FINAL | 34.9 | — | 61.57 | -26.68 | L1 | GND |
| 0.411 | FINAL | — | 15.67 | 47.63 | -31.95 | L1 | GND |
| 0.434 | FINAL | 28.9 | — | 57.19 | -28.29 | L1 | GND |
| 0.485 | FINAL | — | 16.82 | 46.25 | -29.43 | L1 | GND |
| 0.560 | FINAL | — | 17.68 | 46.00 | -28.32 | L1 | GND |
| 0.634 | FINAL | 24.8 | — | 56.00 | -31.21 | L1 | GND |
| 0.634 | FINAL | — | 16.87 | 46.00 | -29.14 | L1 | GND |
| 0.708 | FINAL | 22.4 | — | 56.00 | -33.61 | L1 | GND |
| 0.708 | FINAL | — | 14.92 | 46.00 | -31.08 | L1 | GND |
| 0.785 | FINAL | — | 13.16 | 46.00 | -32.84 | L1 | GND |
| 0.785 | FINAL | 20.2 | — | 56.00 | -35.80 | L1 | GND |

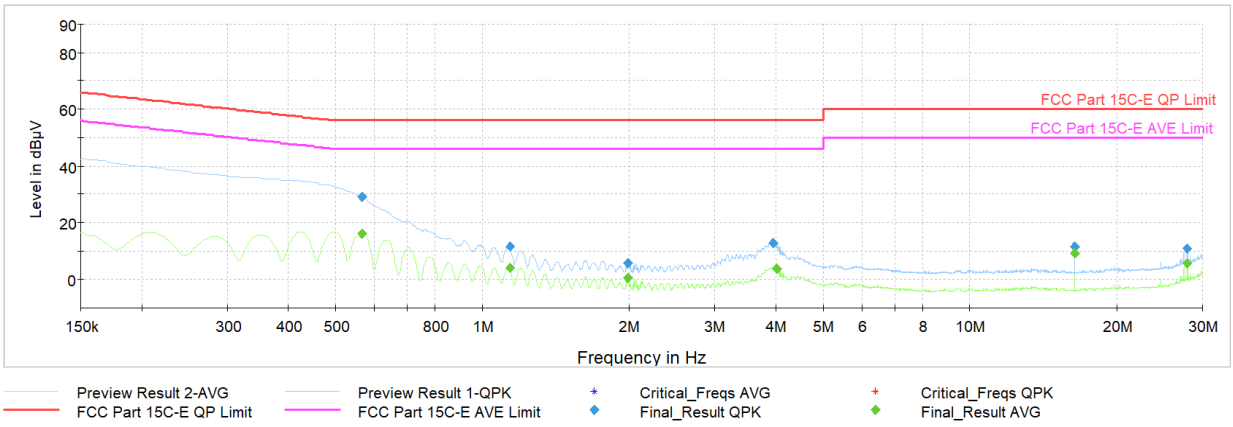
**Table 7-32. AC Line Conducted Data (NB UNII BDR – 6264MHz) (L1) with AC/DC Adapter**




**Plot 7-162. AC Line Conducted Plot (NB UNII BDR – 6264MHz) (N) with AC/DC Adapter**

| Frequency [MHz] | Process State | QuasiPeak [dBµV] | Average [dBµV] | Limit [dBµV] | Margin [dB] | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.152 | FINAL | 41.1 | — | 65.88 | -24.77 | N | GND |
| 0.258 | FINAL | 35.0 | — | 61.50 | -26.55 | N | GND |
| 0.413 | FINAL | — | 16.39 | 47.58 | -31.19 | N | GND |
| 0.434 | FINAL | 28.7 | — | 57.19 | -28.50 | N | GND |
| 0.485 | FINAL | — | 16.46 | 46.25 | -29.79 | N | GND |
| 0.555 | FINAL | — | 18.28 | 46.00 | -27.72 | N | GND |
| 0.634 | FINAL | 25.2 | — | 56.00 | -30.77 | N | GND |
| 0.636 | FINAL | — | 17.73 | 46.00 | -28.27 | N | GND |
| 0.708 | FINAL | 23.0 | — | 56.00 | -33.00 | N | GND |
| 0.708 | FINAL | — | 16.03 | 46.00 | -29.97 | N | GND |
| 0.782 | FINAL | — | 14.34 | 46.00 | -31.66 | N | GND |
| 0.785 | FINAL | 20.8 | — | 56.00 | -35.20 | N | GND |

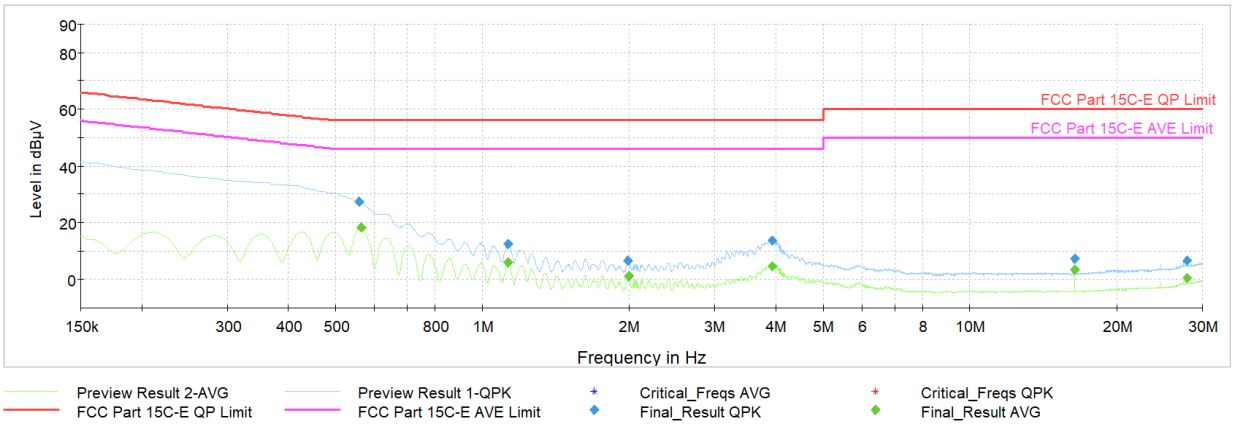
**Table 7-33. AC Line Conducted Data (NB UNII BDR – 6264MHz) (N) with AC/DC Adapter**




**Plot 7-163. AC Line Conducted Plot (NB UNII (LE1M) – 6264MHz) (L1) with AC/DC Adapter**

| Frequency [MHz] | Process State | QuasiPeak [dBµV] | Average [dBµV] | Limit [dBµV] | Margin [dB] | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.566 | FINAL | — | 16.08 | 46.00 | -29.92 | L1 | GND |
| 0.566 | FINAL | 29.2 | — | 56.00 | -26.81 | L1 | GND |
| 1.138 | FINAL | 11.3 | — | 56.00 | -44.66 | L1 | GND |
| 1.140 | FINAL | — | 4.14 | 46.00 | -41.86 | L1 | GND |
| 1.988 | FINAL | — | 0.26 | 46.00 | -45.74 | L1 | GND |
| 1.991 | FINAL | 5.7 | — | 56.00 | -50.28 | L1 | GND |
| 3.941 | FINAL | 12.8 | — | 56.00 | -43.21 | L1 | GND |
| 4.011 | FINAL | — | 3.84 | 46.00 | -42.16 | L1 | GND |
| 16.382 | FINAL | 11.4 | — | 60.00 | -48.59 | L1 | GND |
| 16.382 | FINAL | — | 9.17 | 50.00 | -40.83 | L1 | GND |
| 27.866 | FINAL | — | 5.72 | 50.00 | -44.28 | L1 | GND |
| 27.866 | FINAL | 10.9 | — | 60.00 | -49.08 | L1 | GND |

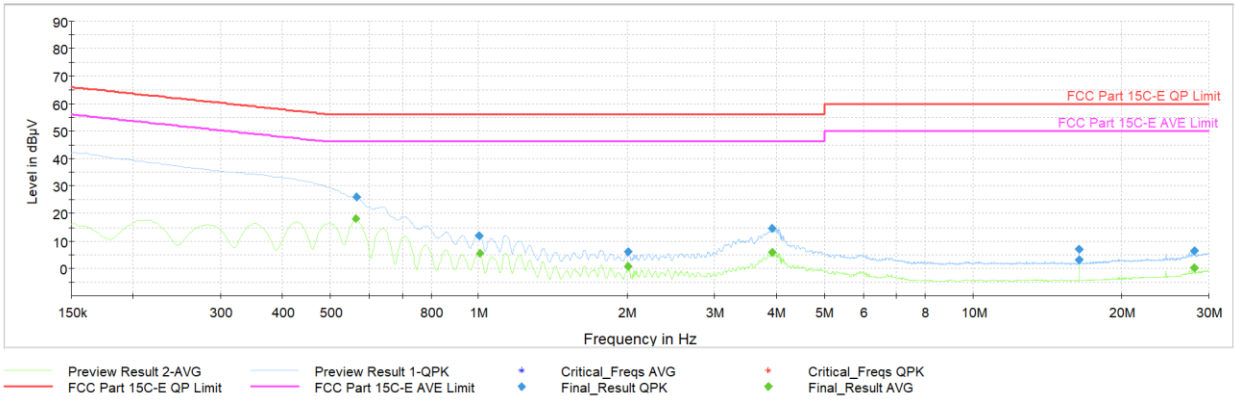
**Table 7-34. AC Line Conducted Data (NB UNII (LE1M) – 6264MHz) (L1) with AC/DC Adapter**




**Plot 7-164. AC Line Conducted Data (NB UNII (LE1M) – 6264MHz) (N) with AC/DC Adapter**

| Frequency [MHz] | Process State | QuasiPeak [dBµV] | Average [dBµV] | Limit [dBµV] | Margin [dB] | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.560 | FINAL | 27.4 | — | 56.00 | -28.63 | N | GND |
| 0.564 | FINAL | — | 18.25 | 46.00 | -27.75 | N | GND |
| 1.129 | FINAL | — | 5.82 | 46.00 | -40.18 | N | GND |
| 1.129 | FINAL | 12.4 | — | 56.00 | -43.59 | N | GND |
| 1.991 | FINAL | 6.5 | — | 56.00 | -49.48 | N | GND |
| 1.993 | FINAL | — | 1.05 | 46.00 | -44.95 | N | GND |
| 3.923 | FINAL | — | 4.72 | 46.00 | -41.28 | N | GND |
| 3.932 | FINAL | 13.7 | — | 56.00 | -42.28 | N | GND |
| 16.391 | FINAL | 7.2 | — | 60.00 | -52.83 | N | GND |
| 16.391 | FINAL | — | 3.35 | 50.00 | -46.65 | N | GND |
| 27.866 | FINAL | — | 0.34 | 50.00 | -49.66 | N | GND |
| 27.866 | FINAL | 6.6 | — | 60.00 | -53.40 | N | GND |

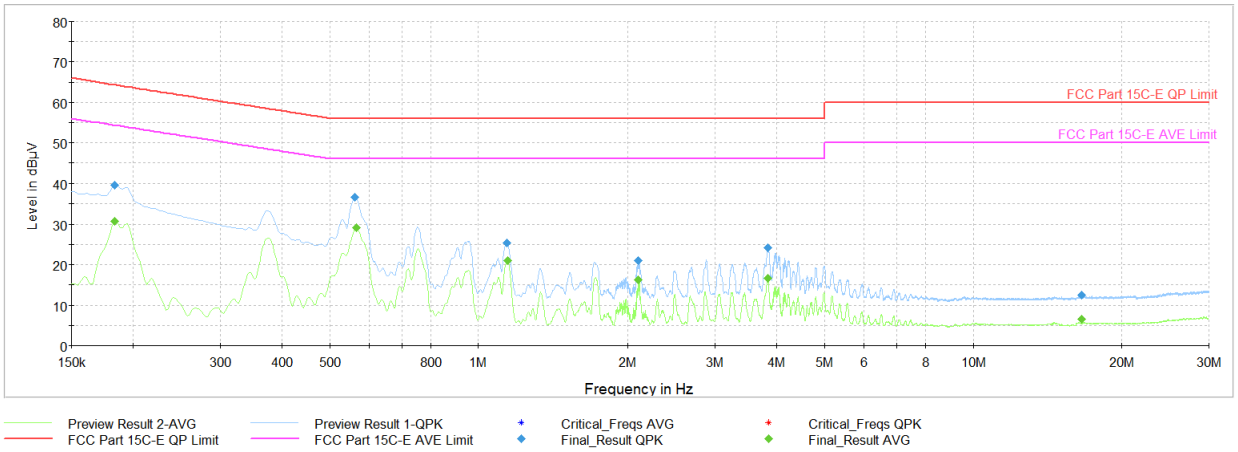
**Table 7-35. AC Line Conducted Data (NB UNII (LE1M) – 6264MHz) (N) with AC/DC Adapter**




**Plot 7-165. AC Line Conducted Plot (NB UNII HDR4 – 6264MHz) (L1) with AC/DC Adapter**

| Frequency [MHz] | Process State | QuasiPeak [dBµV] | Average [dBµV] | Limit [dBµV] | Margin [dB] | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.564 | FINAL | — | 18.10 | 46.00 | -27.90 | L1 | GND |
| 0.566 | FINAL | 26.1 | — | 56.00 | -29.95 | L1 | GND |
| 1.001 | FINAL | 12.0 | — | 56.00 | -43.99 | L1 | GND |
| 1.005 | FINAL | — | 5.36 | 46.00 | -40.64 | L1 | GND |
| 2.004 | FINAL | — | 0.80 | 46.00 | -45.20 | L1 | GND |
| 2.004 | FINAL | 6.2 | — | 56.00 | -49.78 | L1 | GND |
| 3.923 | FINAL | 14.5 | — | 56.00 | -41.53 | L1 | GND |
| 3.923 | FINAL | — | 5.87 | 46.00 | -40.13 | L1 | GND |
| 16.377 | FINAL | 7.1 | — | 60.00 | -52.91 | L1 | GND |
| 16.384 | FINAL | 3.2 | — | 60.00 | -56.84 | L1 | GND |
| 28.010 | FINAL | — | 0.19 | 50.00 | -49.81 | L1 | GND |
| 28.010 | FINAL | 6.4 | — | 60.00 | -53.59 | L1 | GND |

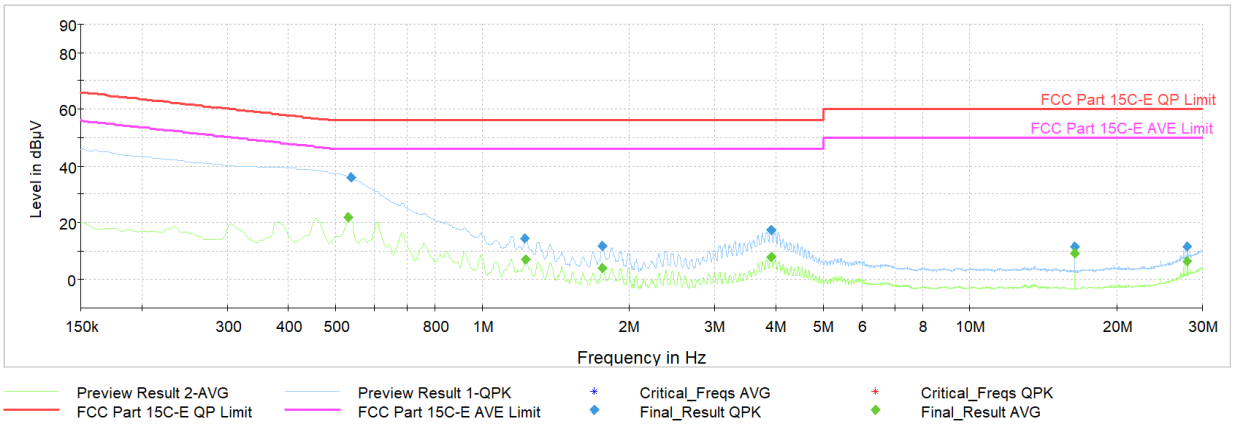
**Table 7-36. AC Line Conducted Data (NB UNII HDR4 – 6264MHz) (L1) with AC/DC Adapter**




**Plot 7-166. AC Line Conducted Plot (NB UNII HDR4 – 6264MHz) (N) with AC/DC Adapter**

| Frequency [MHz] | Process State | QuasiPeak [dBµV] | Average [dBµV] | Limit [dBµV] | Margin [dB] | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.184 | FINAL | — | 30.78 | 54.31 | -23.54 | N | GND |
| 0.184 | FINAL | 39.6 | — | 64.31 | -24.76 | N | GND |
| 0.562 | FINAL | 36.4 | — | 56.00 | -19.57 | N | GND |
| 0.566 | FINAL | — | 29.15 | 46.00 | -16.85 | N | GND |
| 1.140 | FINAL | 25.4 | — | 56.00 | -30.61 | N | GND |
| 1.145 | FINAL | — | 21.13 | 46.00 | -24.87 | N | GND |
| 2.099 | FINAL | 21.1 | — | 56.00 | -34.88 | N | GND |
| 2.099 | FINAL | — | 16.19 | 46.00 | -29.81 | N | GND |
| 3.840 | FINAL | 24.1 | — | 56.00 | -31.88 | N | GND |
| 3.842 | FINAL | — | 16.62 | 46.00 | -29.38 | N | GND |
| 16.553 | FINAL | 12.6 | — | 60.00 | -47.40 | N | GND |
| 16.555 | FINAL | — | 6.46 | 50.00 | -43.54 | N | GND |

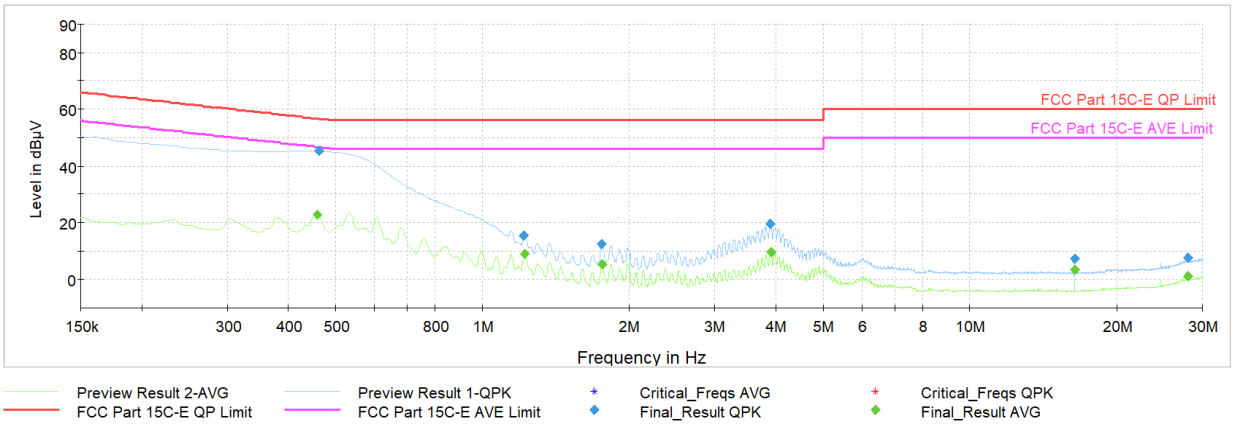
**Table 7-37. AC Line Conducted Data (NB UNII HDR4 – 6264MHz) (N) with AC/DC Adapter**




**Plot 7-167. AC Line Conducted Plot (NB UNII HDRp4 – 6264MHz) (L1) with AC/DC Adapter**

| Frequency [MHz] | Process State | QuasiPeak [dBµV] | Average [dBµV] | Limit [dBµV] | Margin [dB] | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.530 | FINAL | — | 21.83 | 46.00 | -24.17 | L1 | GND |
| 0.537 | FINAL | 35.9 | — | 56.00 | -20.13 | L1 | GND |
| 1.221 | FINAL | 14.4 | — | 56.00 | -41.61 | L1 | GND |
| 1.226 | FINAL | — | 6.87 | 46.00 | -39.13 | L1 | GND |
| 1.759 | FINAL | — | 3.87 | 46.00 | -42.13 | L1 | GND |
| 1.759 | FINAL | 12.0 | — | 56.00 | -44.04 | L1 | GND |
| 3.910 | FINAL | 17.2 | — | 56.00 | -38.76 | L1 | GND |
| 3.910 | FINAL | — | 7.81 | 46.00 | -38.19 | L1 | GND |
| 16.377 | FINAL | 11.6 | — | 60.00 | -48.36 | L1 | GND |
| 16.377 | FINAL | — | 9.23 | 50.00 | -40.77 | L1 | GND |
| 27.866 | FINAL | 11.5 | — | 60.00 | -48.47 | L1 | GND |
| 27.868 | FINAL | — | 6.23 | 50.00 | -43.77 | L1 | GND |

**Table 7-38. AC Line Conducted Data (NB UNII HDRp4 – 6264MHz) (L1) with AC/DC Adapter**




**Plot 7-168. AC Line Conducted Plot (NB UNII HDRp4 – 6264MHz) (N) with AC/DC Adapter**

| Frequency [MHz] | Process State | QuasiPeak [dBµV] | Average [dBµV] | Limit [dBµV] | Margin [dB] | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.458 | FINAL | — | 23.06 | 46.72 | -23.67 | N | GND |
| 0.463 | FINAL | 45.2 | — | 56.64 | -11.42 | N | GND |
| 1.217 | FINAL | 15.3 | — | 56.00 | -40.71 | N | GND |
| 1.221 | FINAL | — | 8.96 | 46.00 | -37.04 | N | GND |
| 1.757 | FINAL | 12.4 | — | 56.00 | -43.64 | N | GND |
| 1.759 | FINAL | — | 5.42 | 46.00 | -40.58 | N | GND |
| 3.905 | FINAL | 19.5 | — | 56.00 | -36.48 | N | GND |
| 3.908 | FINAL | — | 9.59 | 46.00 | -36.41 | N | GND |
| 16.375 | FINAL | 7.2 | — | 60.00 | -52.76 | N | GND |
| 16.377 | FINAL | — | 3.28 | 50.00 | -46.72 | N | GND |
| 28.001 | FINAL | — | 1.23 | 50.00 | -48.77 | N | GND |
| 28.001 | FINAL | 7.4 | — | 60.00 | -52.56 | N | GND |

**Table 7-39. AC Line Conducted Data (NB UNII HDRp4 – 6264MHz) (N) with AC/DC Adapter**

# 8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Apple Head Mounted Device FCC ID: BCGA2117** is in compliance with Part 15 Subpart E (15.407) of the FCC Rules.