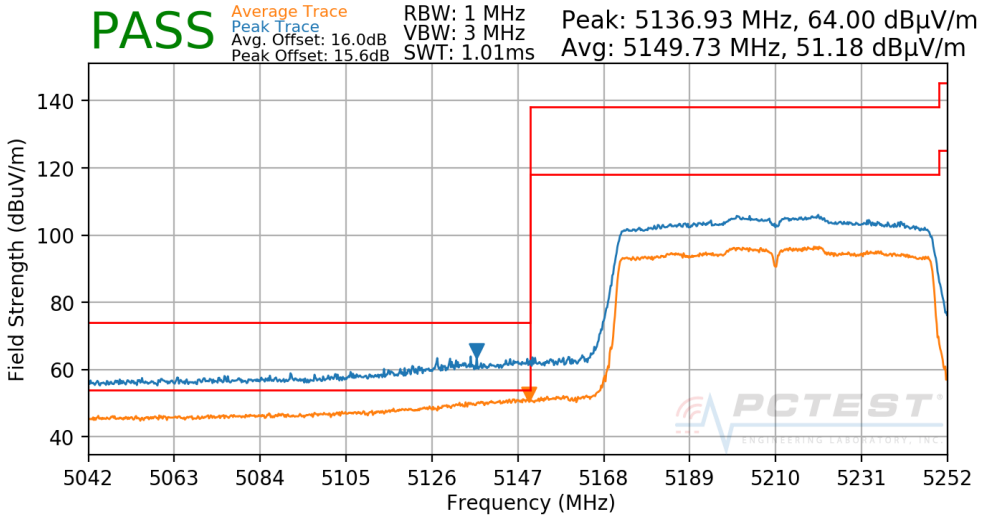
## 7.6.10 SISO CORE 1 Radiated Band Edge Measurements (80MHz BW)

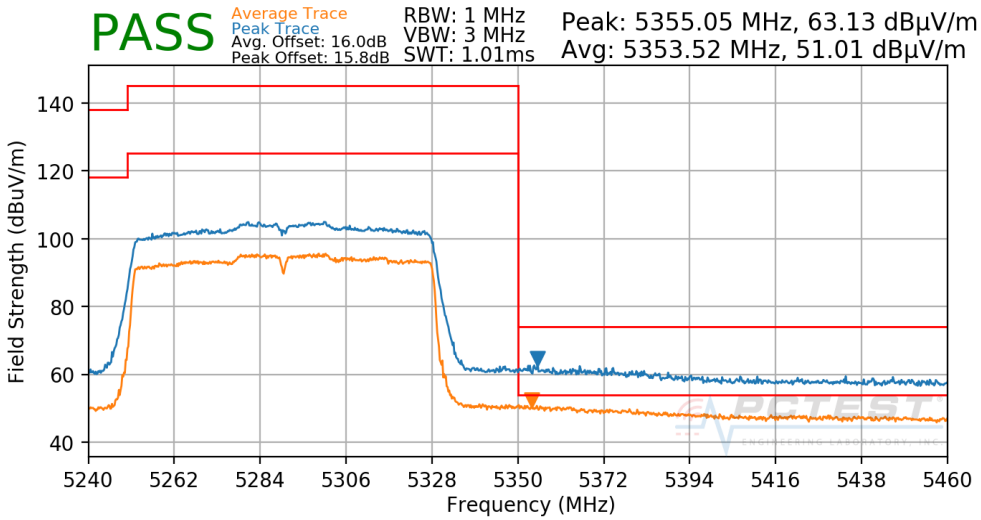
**§15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]**

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



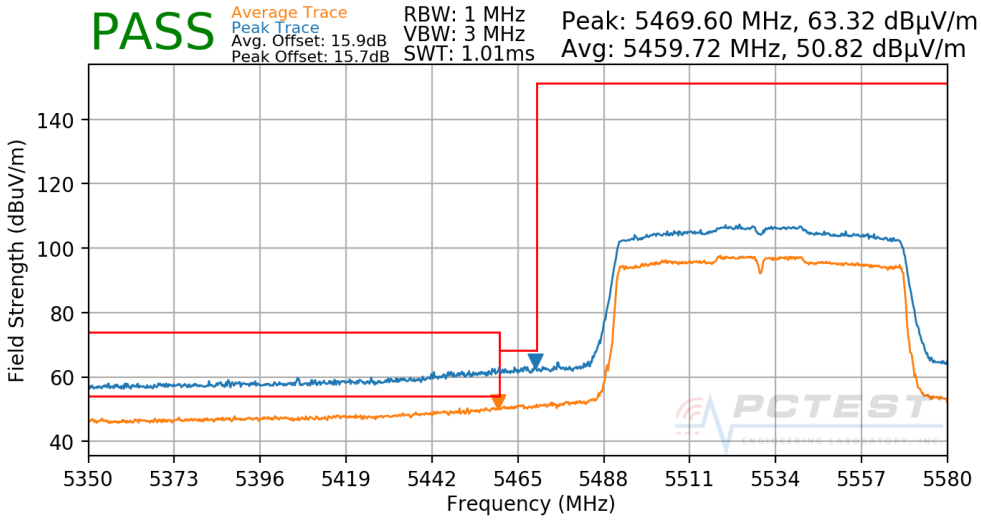

**Plot 7-241. Radiated Lower Band Edge Plot SISO CORE 1 (UNII Band 1)**

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



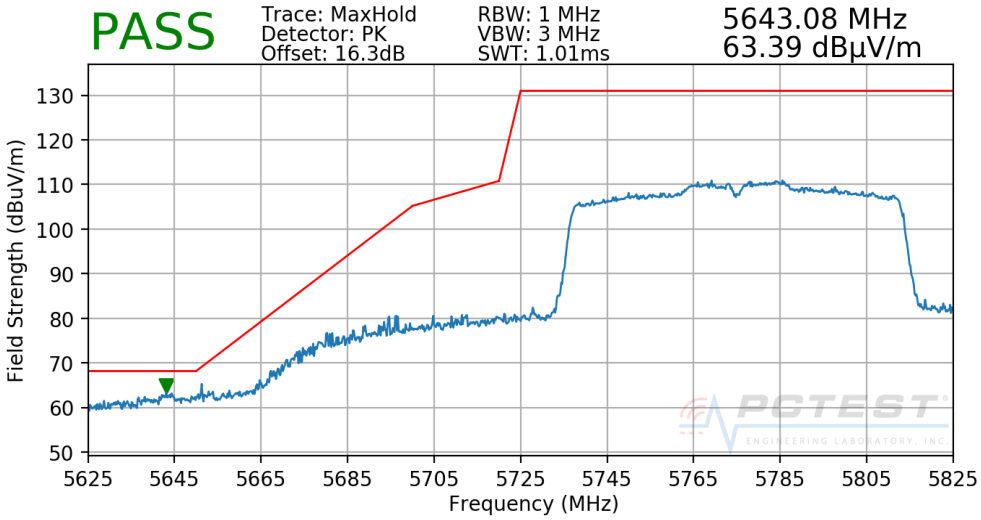

**Plot 7-242. Radiated Upper Band Edge Plot SISO CORE 1 (UNII Band 2A)**

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



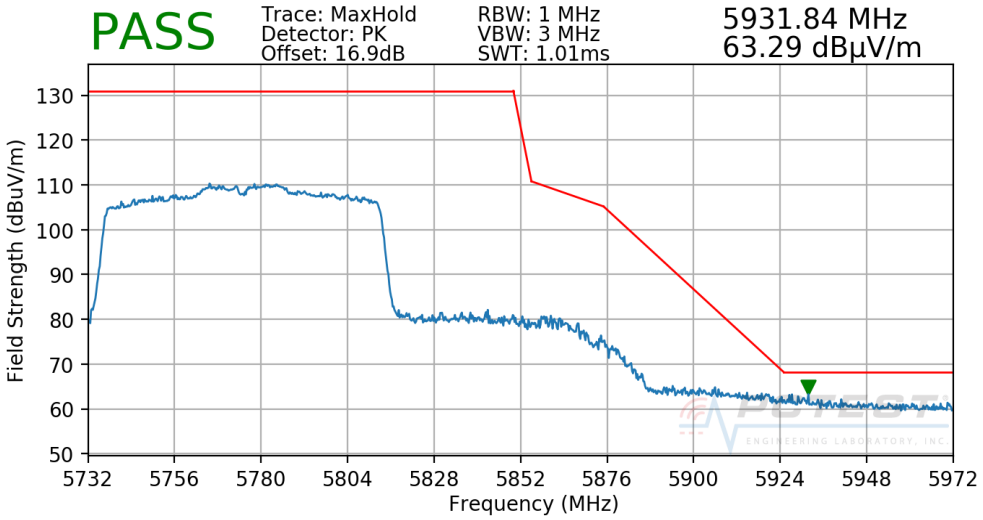

**Plot 7-243. Radiated Lower Band Edge Plot SISO CORE 1 (UNII Band 2C)**

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




**Plot 7-244. Radiated Lower Band Edge Plot SISO CORE 1 (Peak – UNII Band 3)**

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

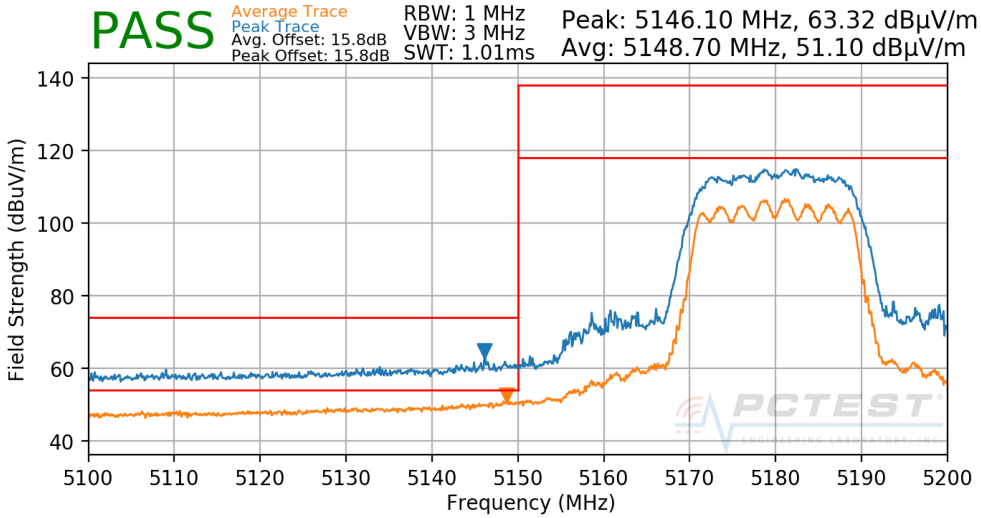



**Plot 7-245. Radiated Upper Band Edge Plot SISO CORE 1 (Peak – UNII Band 3)**

## 7.6.11 MIMO/CDD Radiated Band Edge Measurements (20MHz BW)

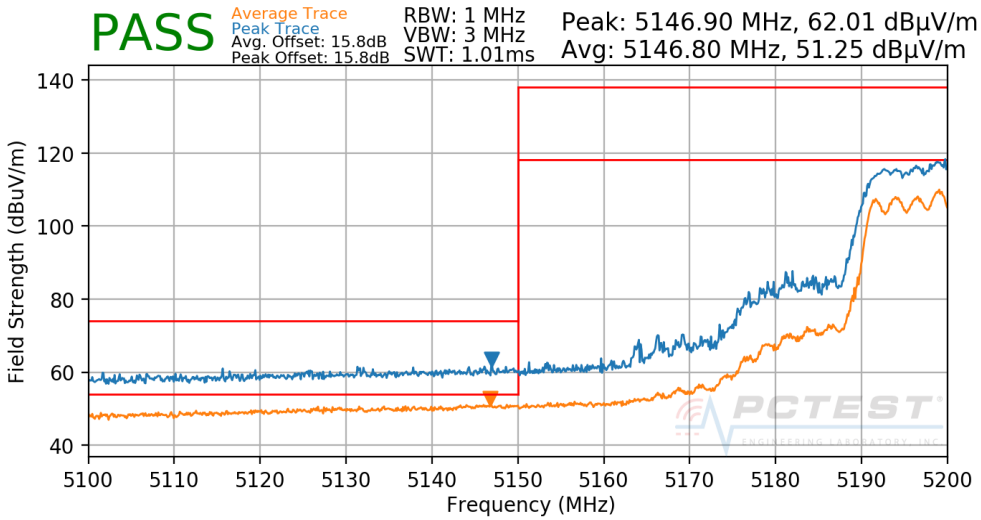
**§15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]**

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



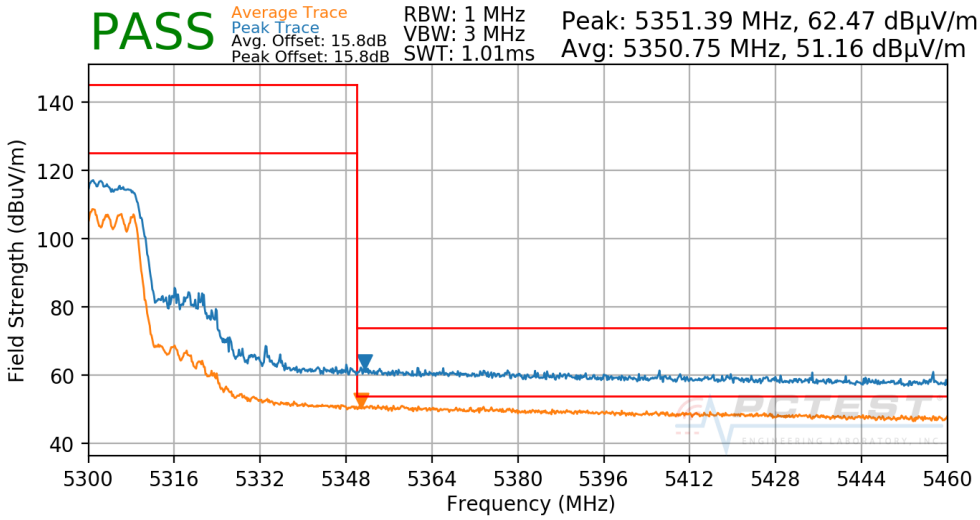

**Plot 7-246. Radiated Lower Band Edge Plot MIMO/CDD (UNII Band 1)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5200MHz |
| Channel: | 40 |



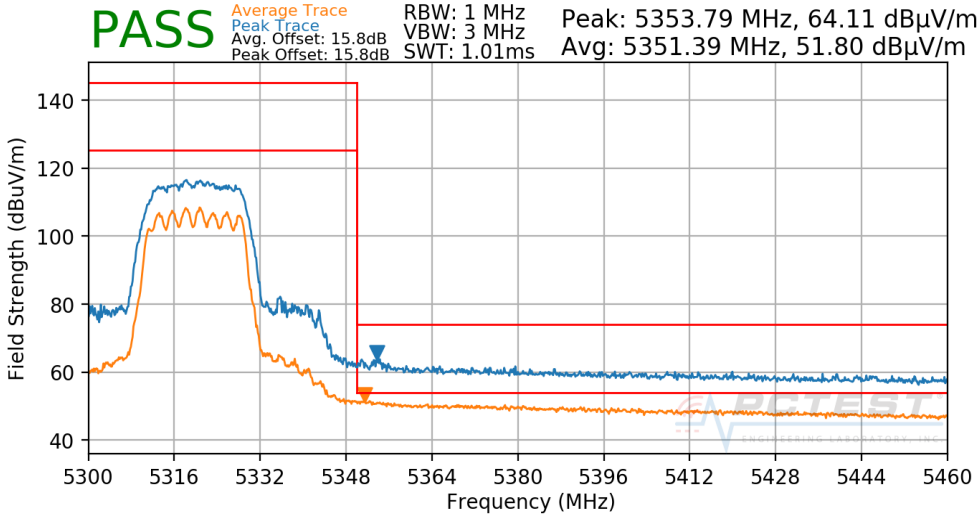

**Plot 7-247. Radiated Lower Band Edge Plot MIMO/CDD (UNII Band 1)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5300MHz |
| Channel: | 60 |



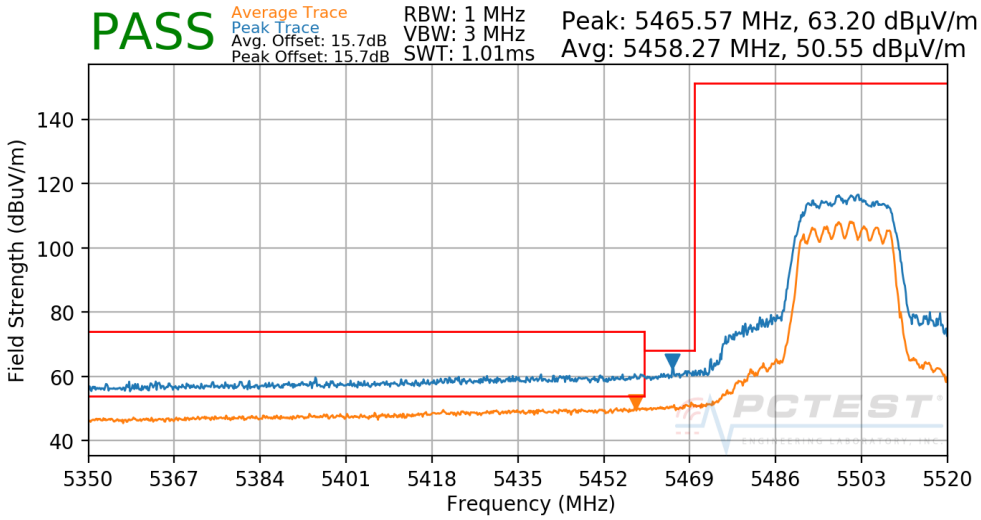

**Plot 7-248. Radiated Upper Band Edge Plot MIMO/CDD (UNII Band 2A)**

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



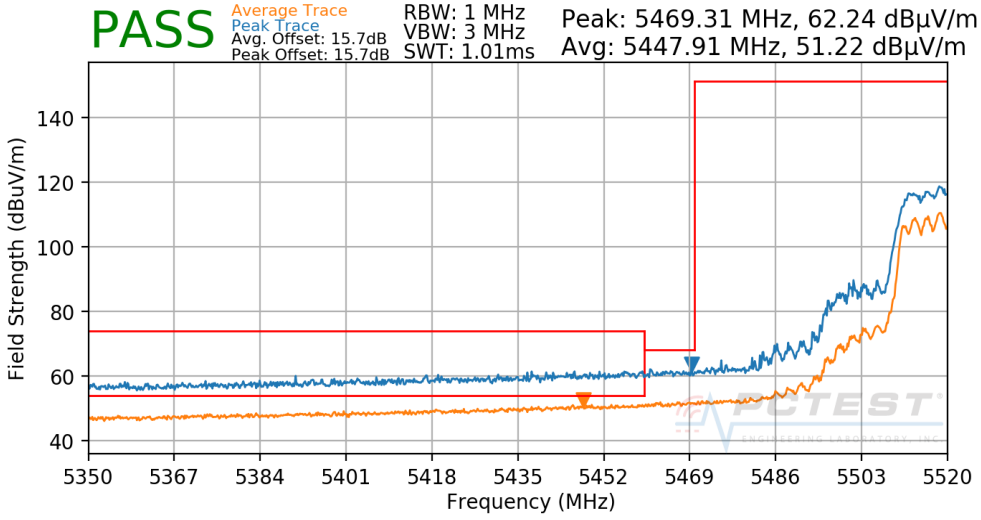

**Plot 7-249. Radiated Upper Band Edge Plot MIMO/CDD (UNII Band 2A)**

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



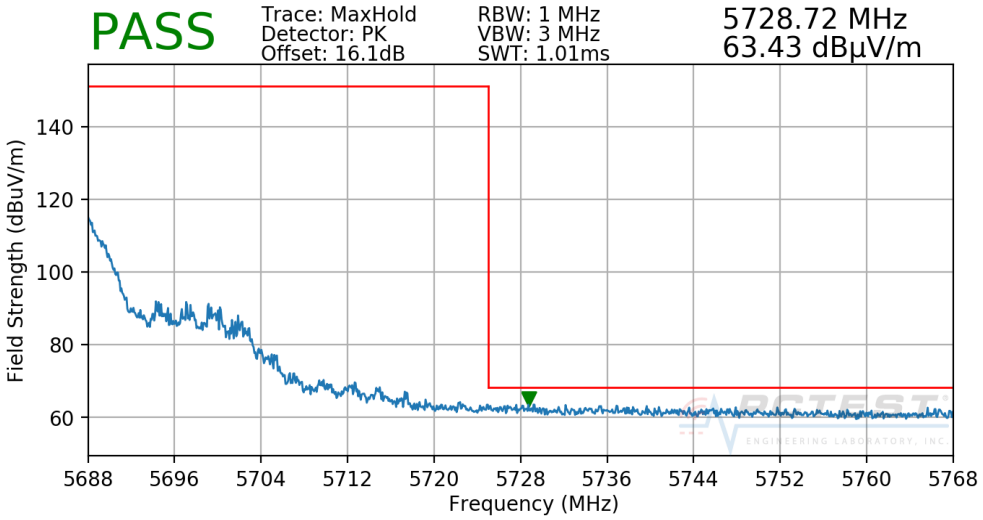

**Plot 7-250. Radiated Lower Band Edge Plot MIMO/CDD (UNII Band 2C)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5520MHz |
| Channel: | 104 |



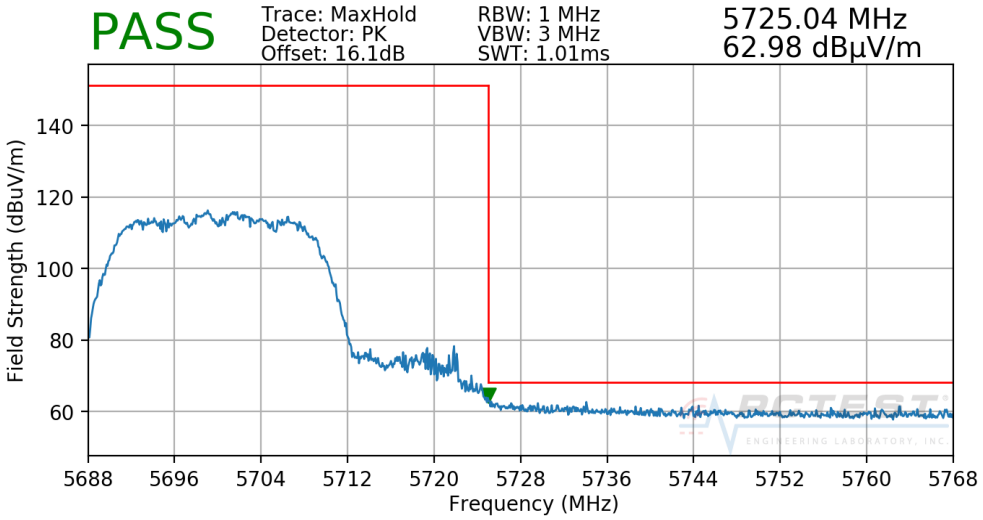

**Plot 7-251. Radiated Lower Band Edge Plot MIMO/CDD (UNII Band 2C)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5680MHz |
| Channel: | 136 |



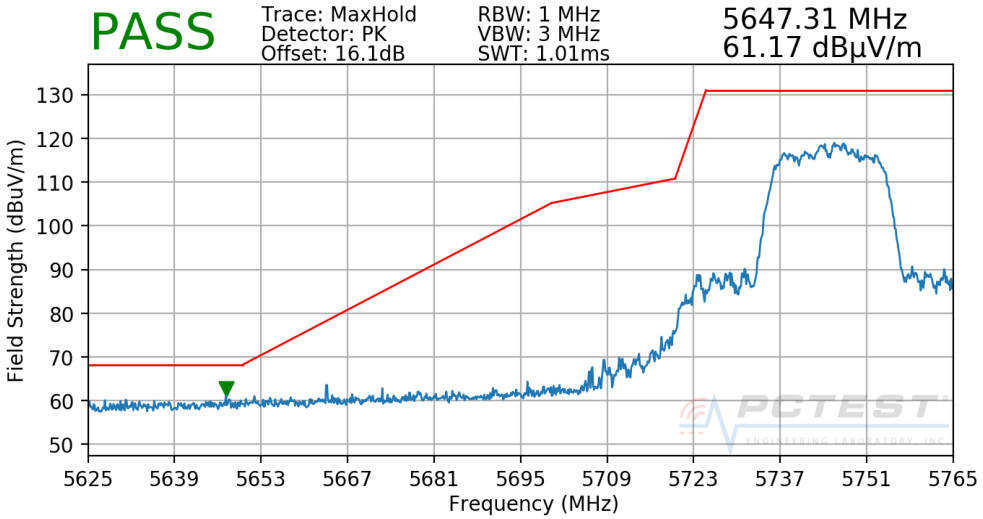

**Plot 7-252. Radiated Lower Band Edge Plot MIMO/CDD (UNII Band 2C)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5700MHz |
| Channel: | 140 |



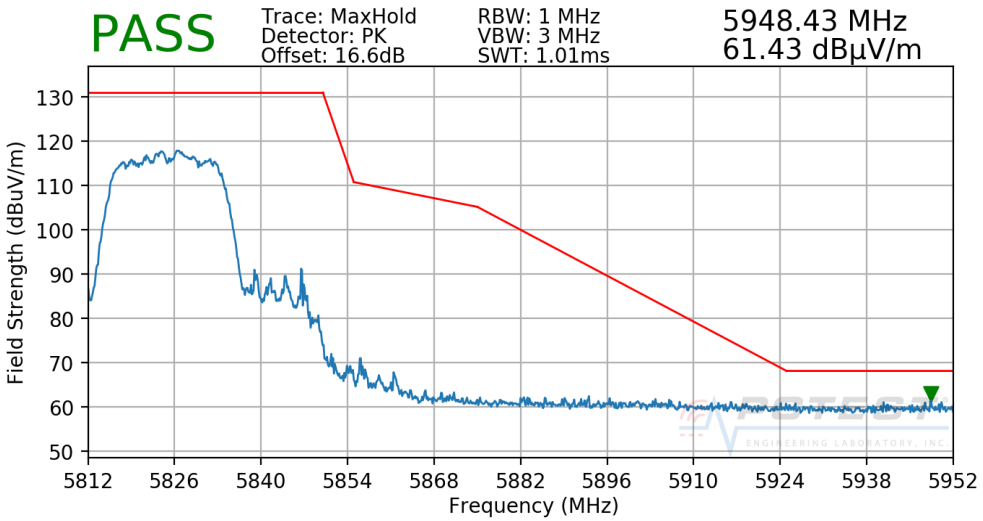

**Plot 7-253. Radiated Upper Band Edge Plot MIMO/CDD (Peak – UNII Band 2C)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5745MHz |
| Channel: | 149 |




**Plot 7-254. Radiated Lower Band Edge Plot MIMO/CDD (Peak – UNII Band 3)**

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

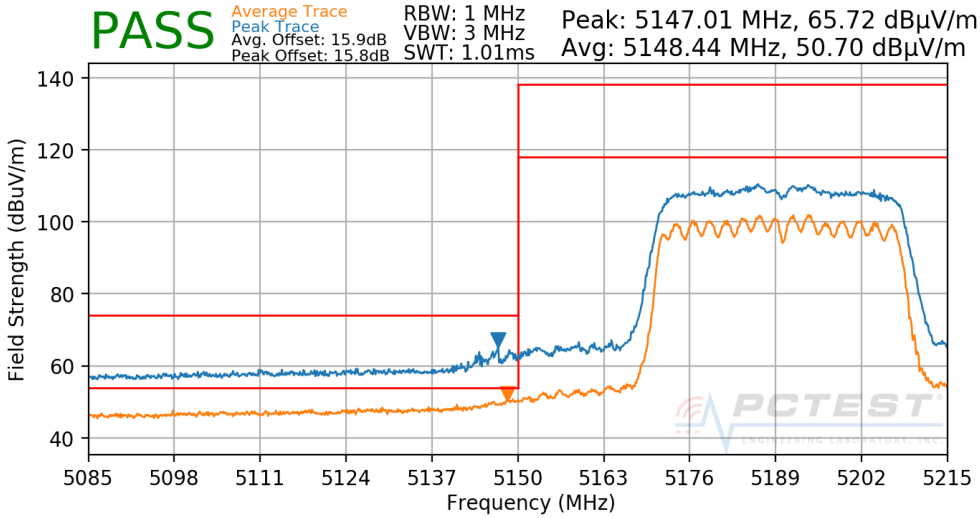



**Plot 7-255. Radiated Upper Band Edge Plot MIMO/CDD (Peak – UNII Band 3)**

## 7.6.12 MIMO/CDD Radiated Band Edge Measurements (40MHz BW)

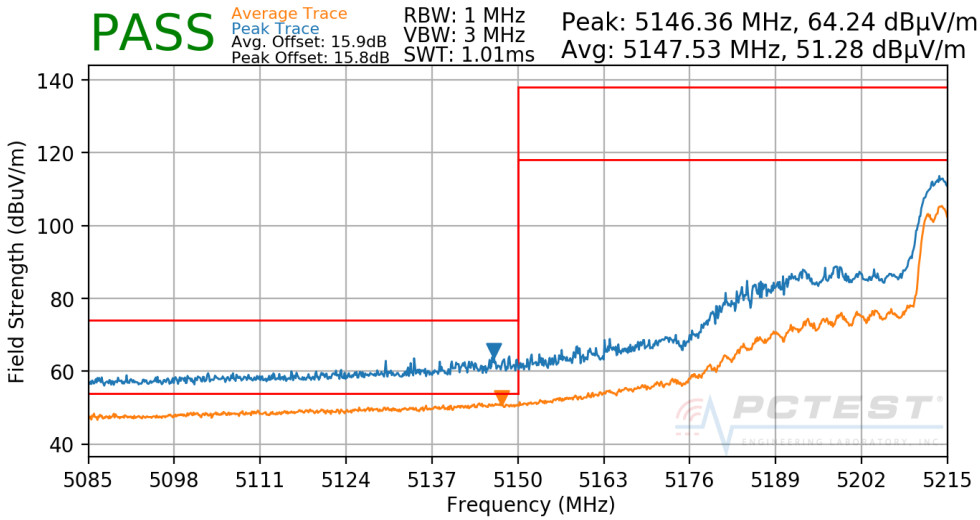
**§15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]**

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



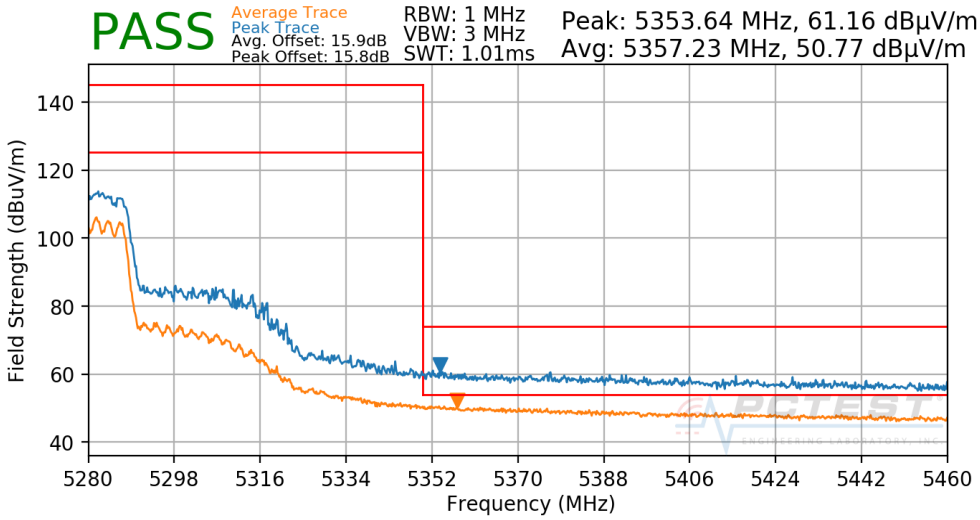

**Plot 7-256. Radiated Lower Band Edge Plot MIMO/CDD (UNII Band 1)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5230MHz |
| Channel: | 46 |



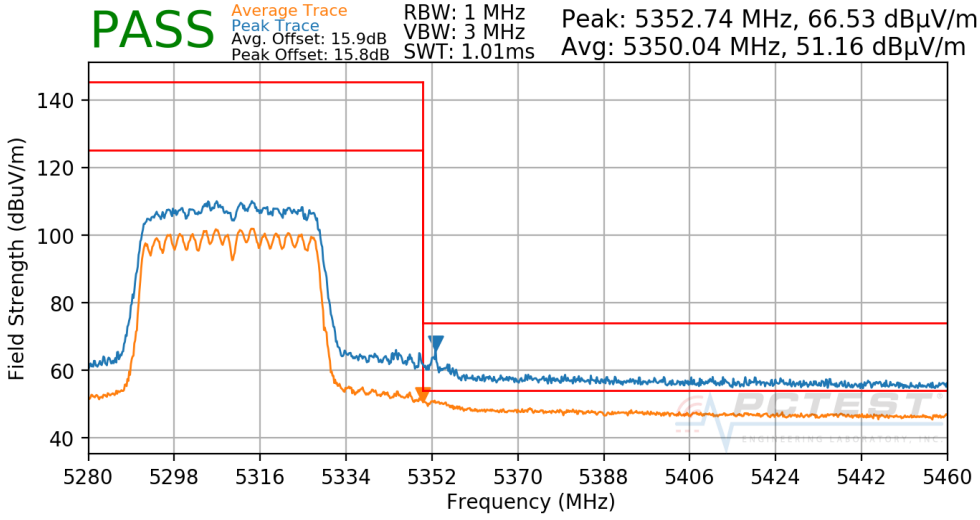

**Plot 7-257. Radiated Lower Band Edge Plot MIMO/CDD (UNII Band 1)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5270MHz |
| Channel: | 54 |



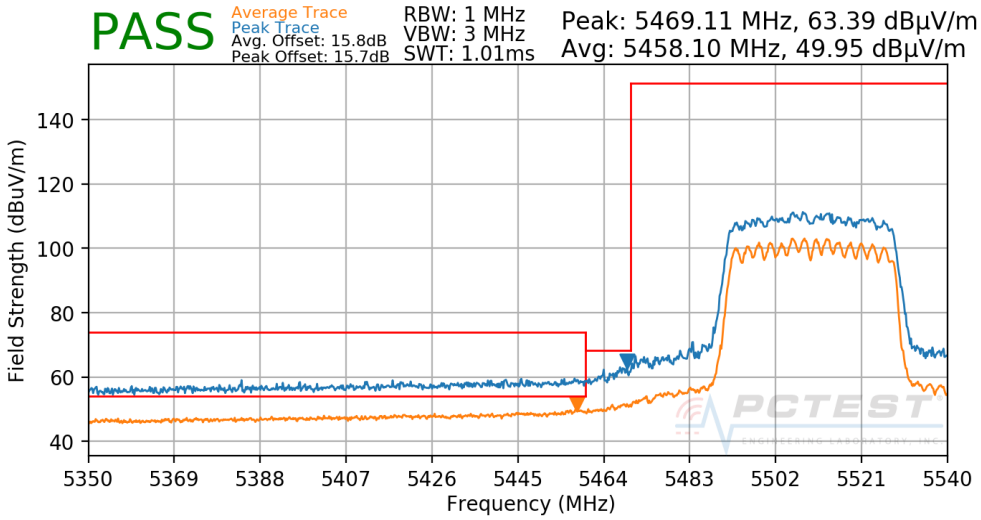

**Plot 7-258. Radiated Upper Band Edge Plot MIMO/CDD (UNII Band 2A)**

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



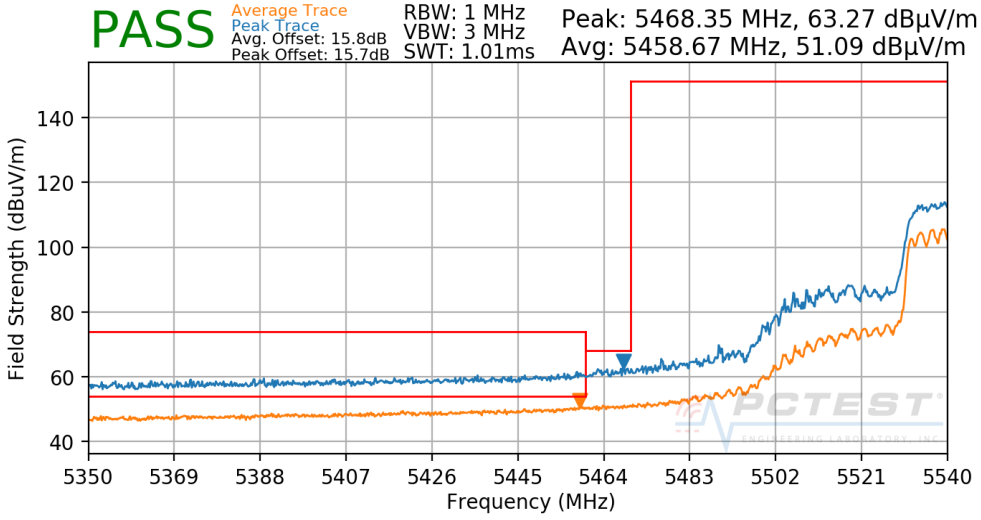

**Plot 7-259. Radiated Upper Band Edge Plot MIMO/CDD (UNII Band 2A)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5510MHz |
| Channel: | 102 |



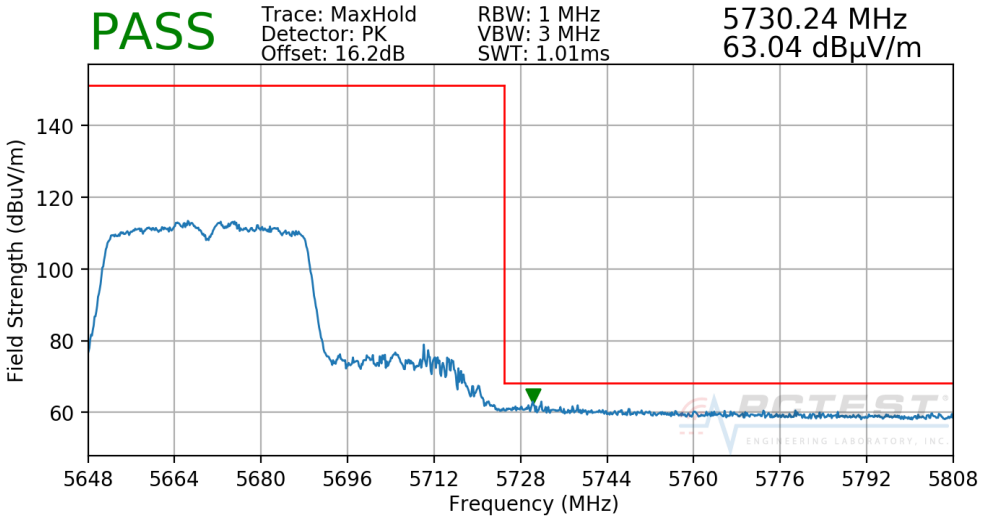

**Plot 7-260. Radiated Lower Band Edge Plot MIMO/CDD (UNII Band 2C)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5550MHz |
| Channel: | 110 |



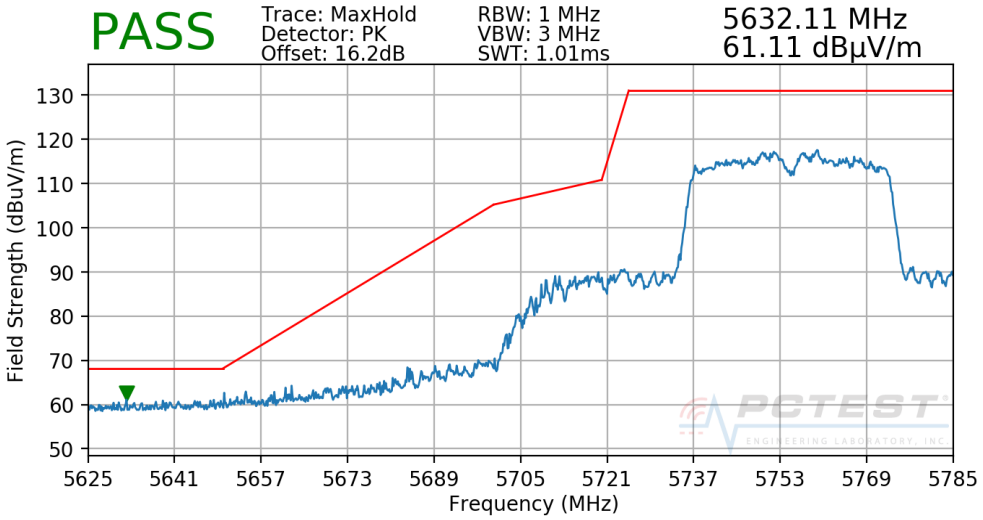

**Plot 7-261. Radiated Lower Band Edge Plot MIMO/CDD (UNII Band 2C)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5670 MHz |
| Channel: | 134 |



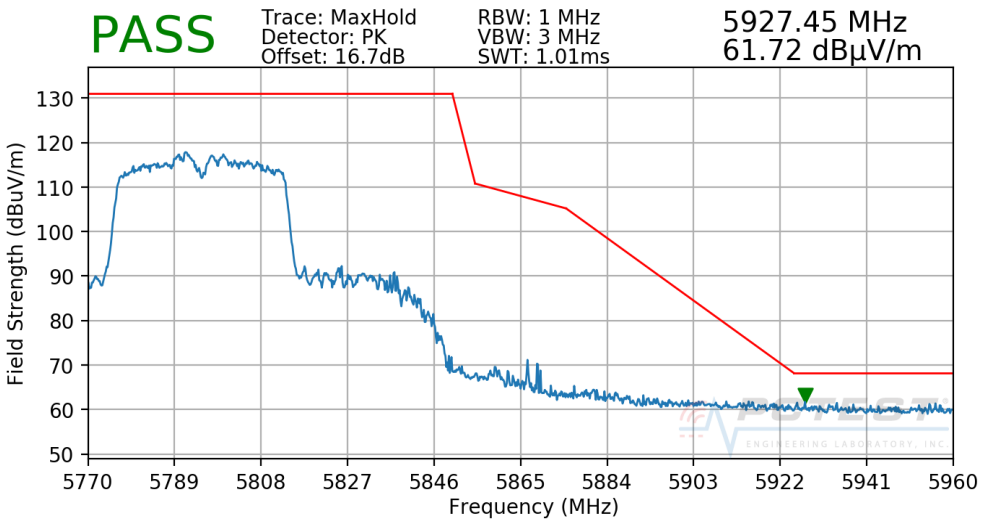

**Plot 7-262. Radiated Upper Band Edge Plot MIMO/CDD (Peak - UNII Band 2C)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5755MHz |
| Channel: | 151 |




**Plot 7-263. Radiated Lower Band Edge Plot MIMO/CDD (Peak – UNII Band 3)**

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

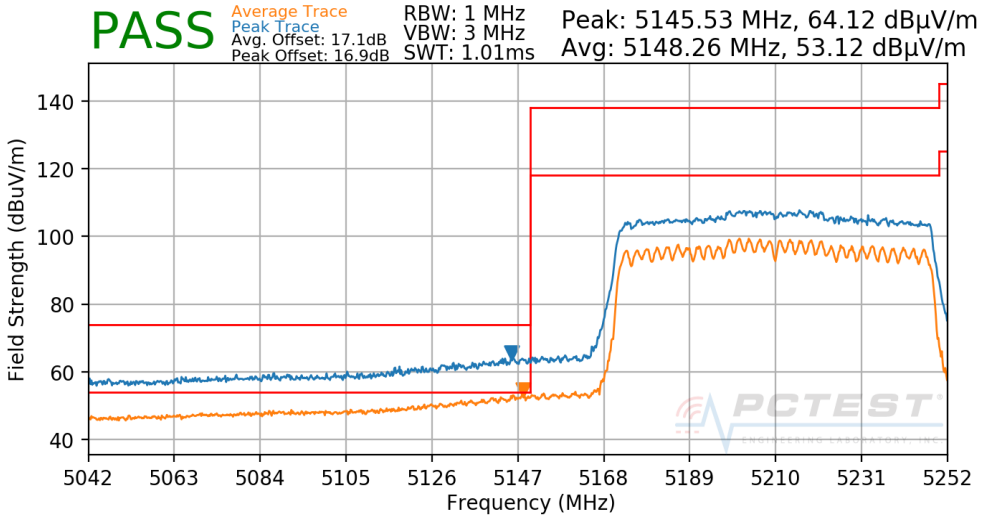



**Plot 7-264. Radiated Upper Band Edge Plot MIMO/CDD (Peak – UNII Band 3)**

## 7.6.13 MIMO/CDD Radiated Band Edge Measurements (80MHz BW)

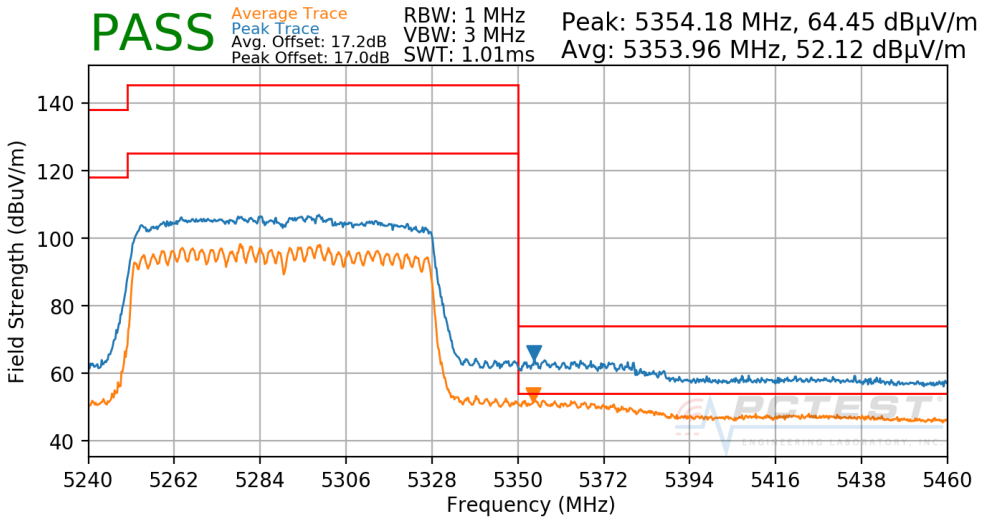
**§15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]**

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



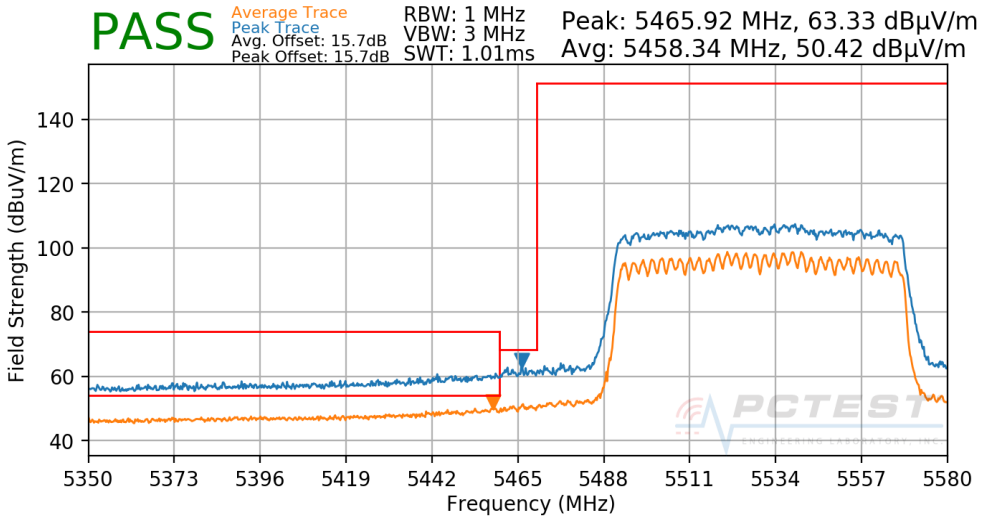

**Plot 7-265. Radiated Lower Band Edge Plot MIMO/CDD (UNII Band 1)**

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



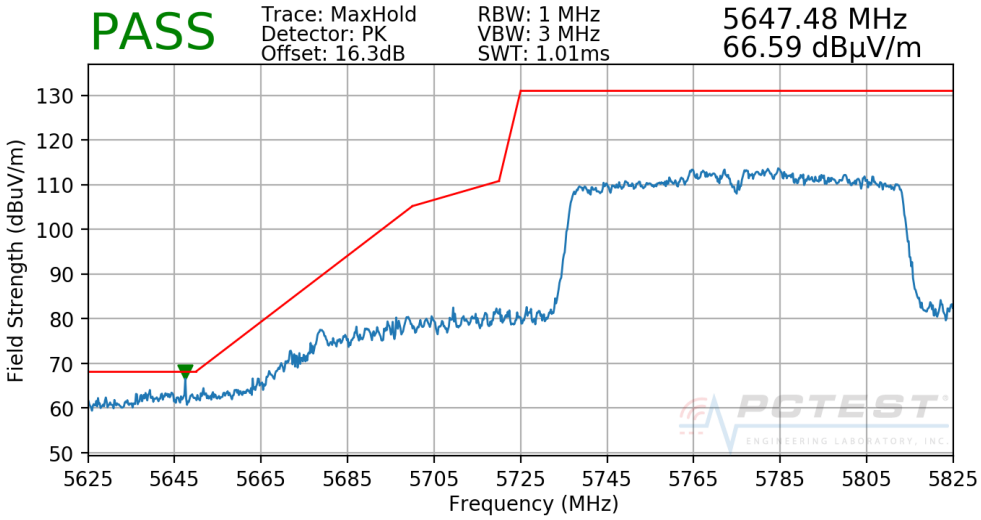

**Plot 7-266. Radiated Upper Band Edge Plot MIMO/CDD (UNII Band 2A)**

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



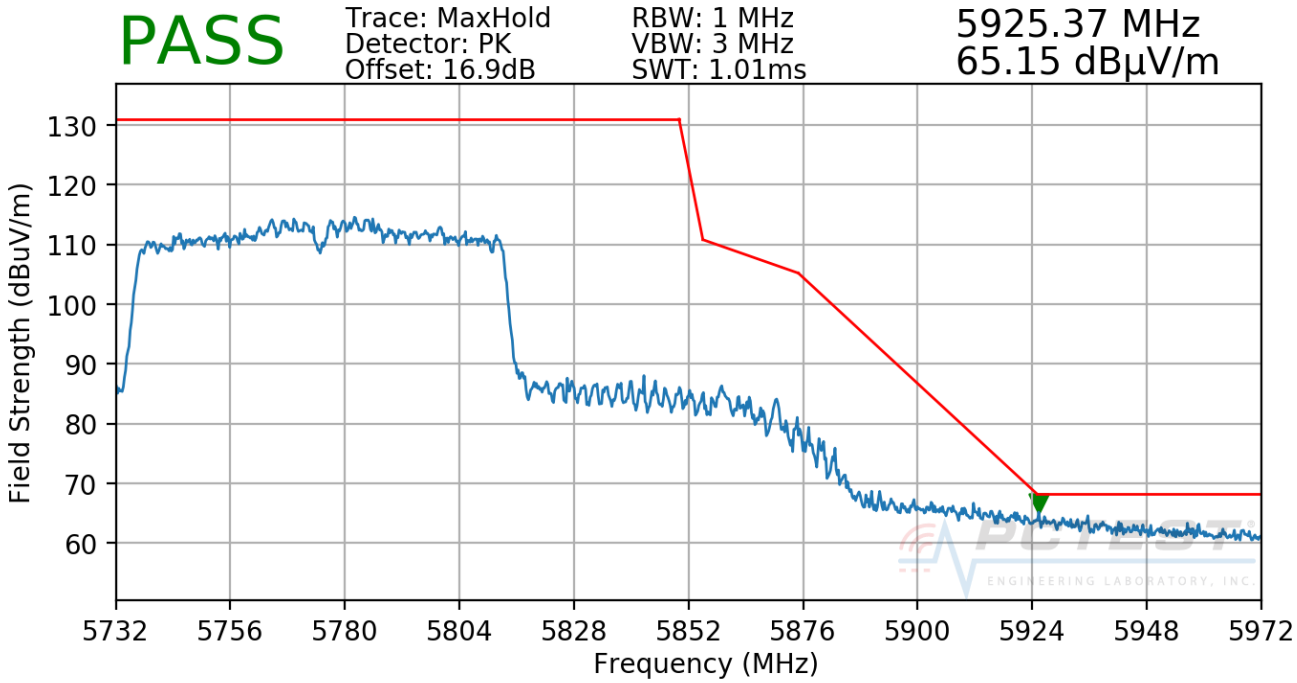

**Plot 7-267. Radiated Lower Band Edge Plot MIMO/CDD (UNII Band 2C)**

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




**Plot 7-268. Radiated Lower Band Edge Plot MIMO/CDD (Peak – UNII Band 3)**

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




**Plot 7-269. Radiated Upper Band Edge Plot MIMO/CDD (Peak – UNII Band 3)**

## 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 7-72 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 7-72. 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.

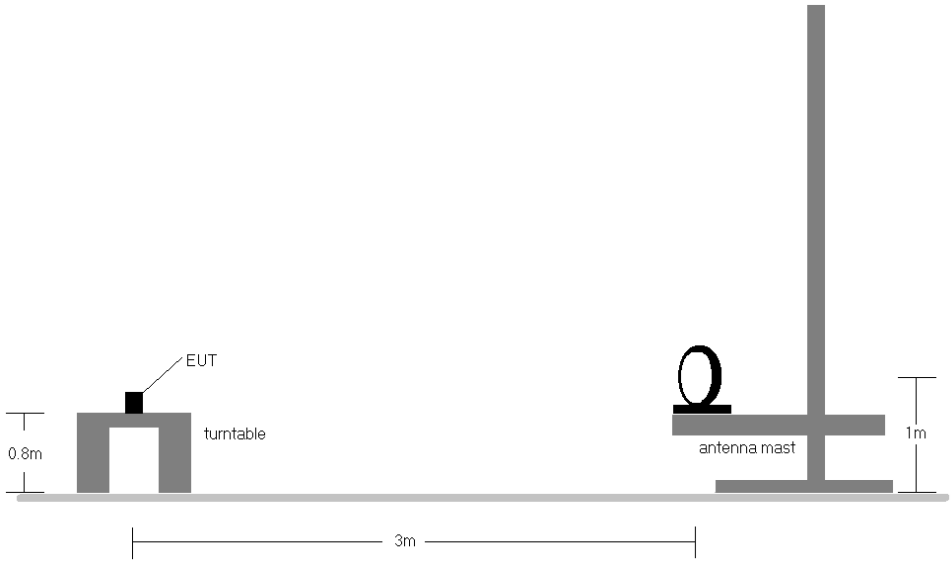



**Figure 7-6. Radiated Test Setup < 30MHz**

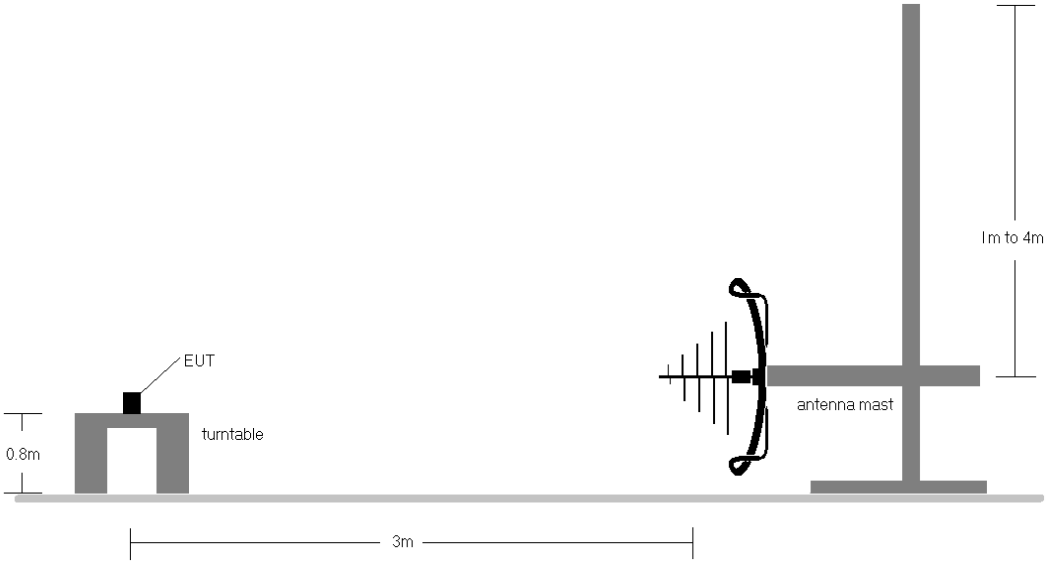


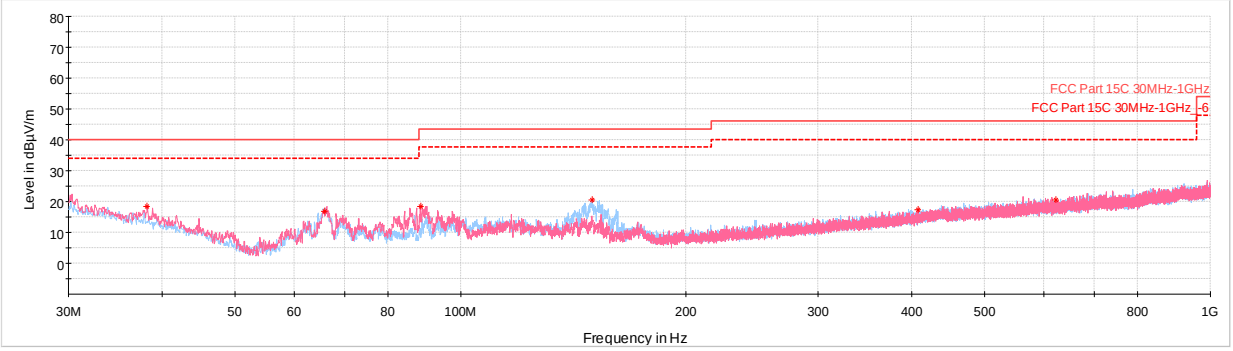

**Figure 7-7. Radiated Test Setup < 1GHz**

## 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 7-72.
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 on emissions within 6dB of limit. 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]**



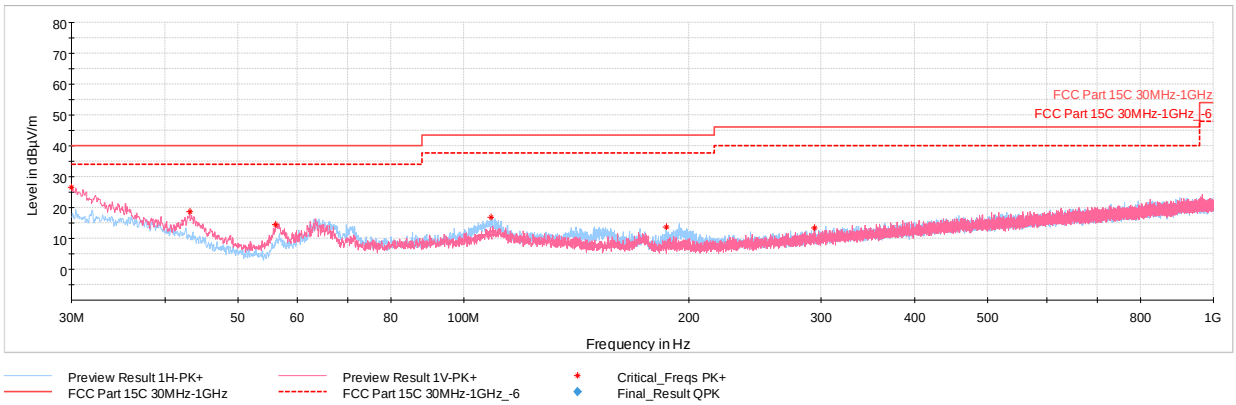

**Plot 7-270. Radiated Spurious Plot below 1GHz MIMO/CDD – Ch.36, with AC/DC Adapter**

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 38.20 | Max Peak | V | 100 | 15 | -75.49 | -13.16 | 18.35 | 40.00 | -21.65 |
| 65.94 | Max Peak | H | 250 | 174 | -69.52 | -20.63 | 16.85 | 40.00 | -23.15 |
| 88.49 | Max Peak | V | 100 | 5 | -70.36 | -18.29 | 18.35 | 43.52 | -25.17 |
| 149.84 | Max Peak | H | 250 | 265 | -67.42 | -19.14 | 20.44 | 43.52 | -23.08 |
| 407.67 | Max Peak | V | 100 | 45 | -77.11 | -12.62 | 17.27 | 46.02 | -28.75 |
| 622.82 | Max Peak | H | 250 | 2 | -78.16 | -8.42 | 20.42 | 46.02 | -25.60 |

**Table 7-73. Radiated Spurious Emissions below 1GHz MIMO/CDD – Ch.36, with AC/DC Adapter**

## Simultaneous Tx Radiated Spurious Emissions Measurements (Below 1GHz)

**§15.209; RSS-Gen [8.9]**




**Plot 7-271. Radiated Spurious Plot below 1GHz (2.4GHz Ch.78 – 5GHz Ch.36), 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] |
|---|---|---|---|---|---|---|---|---|---|
| 30.00 | Max Peak | V | 100 | 218 | -71.63 | -8.89 | 26.48 | 40.00 | -13.52 |
| 43.14 | Max Peak | V | 100 | 200 | -72.02 | -16.33 | 18.65 | 40.00 | -21.35 |
| 56.19 | Max Peak | V | 250 | 65 | -69.14 | -23.37 | 14.49 | 40.00 | -25.51 |
| 108.81 | Max Peak | H | 250 | 222 | -72.83 | -17.30 | 16.87 | 43.52 | -26.65 |
| 186.27 | Max Peak | H | 100 | 245 | -73.81 | -19.43 | 13.76 | 43.52 | -29.76 |
| 293.55 | Max Peak | V | 100 | 229 | -77.73 | -15.87 | 13.40 | 46.02 | -32.62 |

**Table 7-74. Radiated Spurious Emissions below 1GHz (2.4GHz Ch.78 – 5GHz Ch.36), with AC/DC Adapter**

## 7.8 AC 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 7-75. 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.

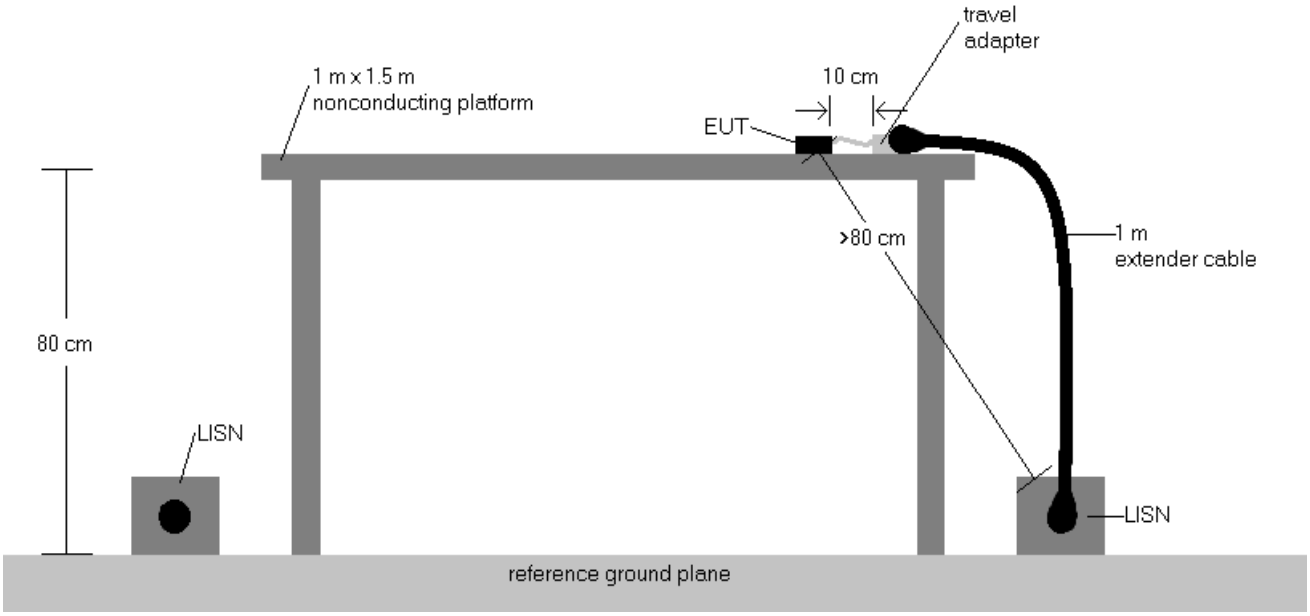
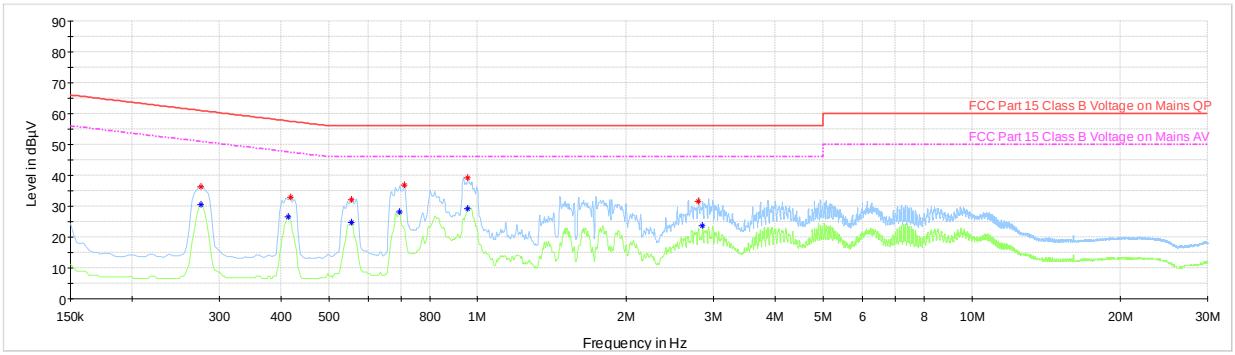



**Figure 7-8. Test Instrument & Measurement Setup**

## Test Notes

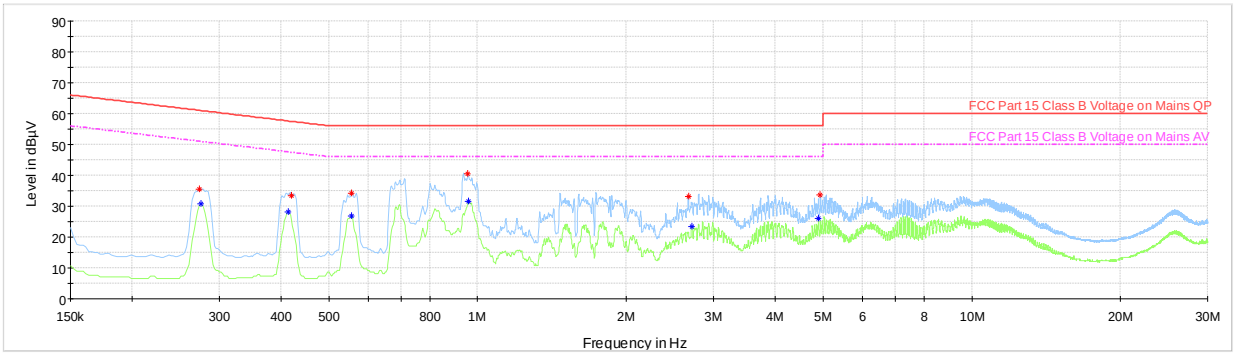
1. All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
2. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207 and RSS-Gen (8.8).
3. Corr.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




**Plot 7-272. Line Conducted Plot with 802.11n UNII Band 1 Ch.36 (L1), with AC/DC Adapter**

| Frequency [MHz] | Process State | QuasiPeak [dBµV] | Average [dBµV] | Limit [dBµV] | Margin [dB] | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.276 | FINAL | — | 30.53 | 50.94 | -20.41 | L1 | GND |
| 0.276 | FINAL | 36.4 | — | 60.94 | -24.50 | L1 | GND |
| 0.413 | FINAL | — | 26.49 | 47.58 | -21.10 | L1 | GND |
| 0.418 | FINAL | 32.8 | — | 57.49 | -24.68 | L1 | GND |
| 0.555 | FINAL | — | 24.62 | 46.00 | -21.38 | L1 | GND |
| 0.555 | FINAL | 32.2 | — | 56.00 | -23.77 | L1 | GND |
| 0.695 | FINAL | — | 28.26 | 46.00 | -17.74 | L1 | GND |
| 0.710 | FINAL | 37.0 | — | 56.00 | -19.05 | L1 | GND |
| 0.953 | FINAL | — | 29.34 | 46.00 | -16.66 | L1 | GND |
| 0.956 | FINAL | 39.2 | — | 56.00 | -16.80 | L1 | GND |
| 2.798 | FINAL | 31.5 | — | 56.00 | -24.53 | L1 | GND |
| 2.850 | FINAL | — | 23.76 | 46.00 | -22.24 | L1 | GND |

**Table 7-76. Line Conducted Table with 802.11n UNII Band 1 Ch.36 (L1), with AC/DC Adapter**




**Plot 7-273. Line Conducted Plot with 802.11n UNII Band 1 Ch.36 ( (N), with AC/DC Adapter**

| Frequency [MHz] | Process State | QuasiPeak [dBµV] | Average [dBµV] | Limit [dBµV] | Margin [dB] | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.274 | FINAL | 35.6 | — | 61.00 | -25.44 | N | GND |
| 0.276 | FINAL | — | 30.79 | 50.94 | -20.15 | N | GND |
| 0.413 | FINAL | — | 28.20 | 47.58 | -19.38 | N | GND |
| 0.420 | FINAL | 33.5 | — | 57.45 | -23.95 | N | GND |
| 0.555 | FINAL | — | 26.80 | 46.00 | -19.20 | N | GND |
| 0.555 | FINAL | 34.3 | — | 56.00 | -21.67 | N | GND |
| 0.956 | FINAL | 40.4 | — | 56.00 | -15.59 | N | GND |
| 0.958 | FINAL | — | 31.48 | 46.00 | -14.52 | N | GND |
| 2.670 | FINAL | 33.1 | — | 46.00 | -22.91 | N | GND |
| 2.711 | FINAL | — | 23.54 | 46.00 | -22.46 | N | GND |
| 4.891 | FINAL | — | 25.94 | 46.00 | -20.06 | N | GND |
| 4.938 | FINAL | 33.7 | — | 56.00 | -22.35 | N | GND |

**Table 7-77. Line Conducted Table with 802.11n UNII Band 1 Ch.36 ( (N), with AC/DC Adapter**

# 8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Apple Tablet Device FCC ID: BCGA2126** is in compliance with Part 15 Subpart E (15.407) of the FCC Rules and RSS-247 of the Innovation, Science and Economic Development Canada Rules.