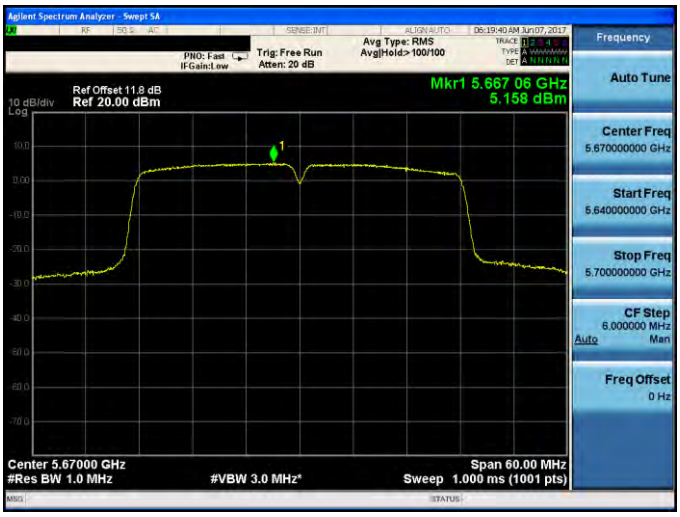
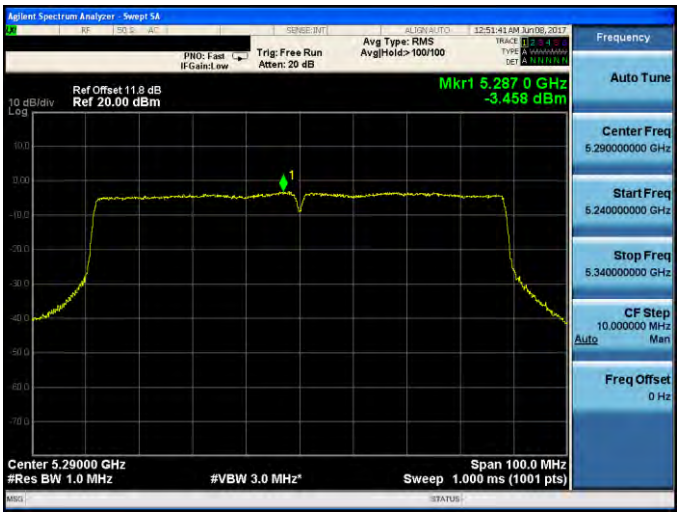
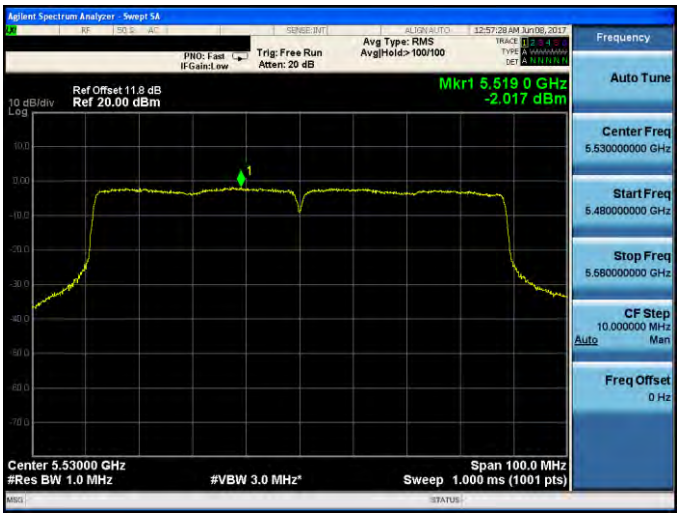
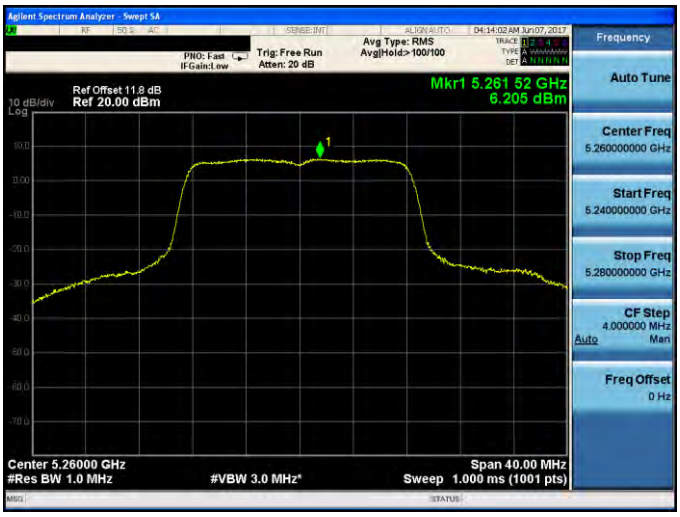
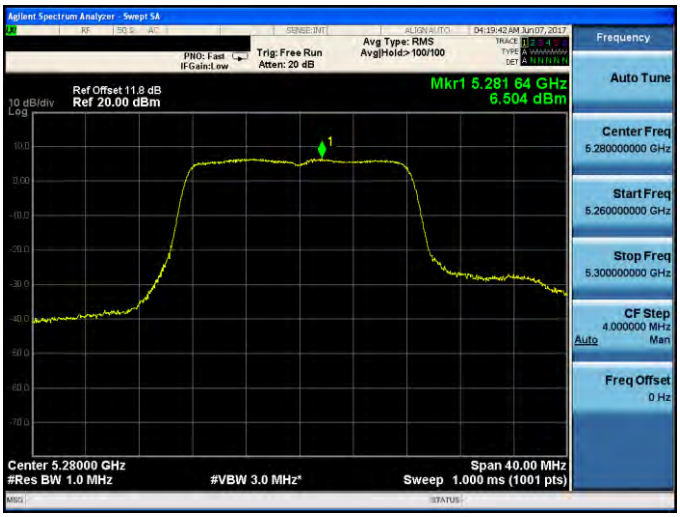
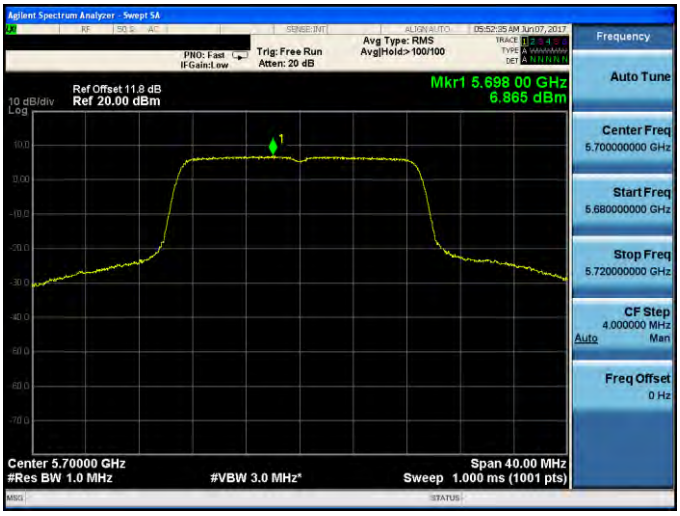
| Mode 4: IEEE 802.11ac 40MHz Continuous TX mode_ANT-0 | |
|---|---|
| 5510 |  |
| 5550 |  |
| 5670 |  |

| Mode 5: IEEE 802.11ac 80MHz Continuous TX mode_ANT-0 | |
|---|---|
| 5290 |  |
| 5530 |  |
| 5610 |  |

| Mode 2: IEEE 802.11a Continuous TX mode_ANT-1 | |
|---|---|
| 5260 |  |
| 5280 |  |
| 5320 |  |

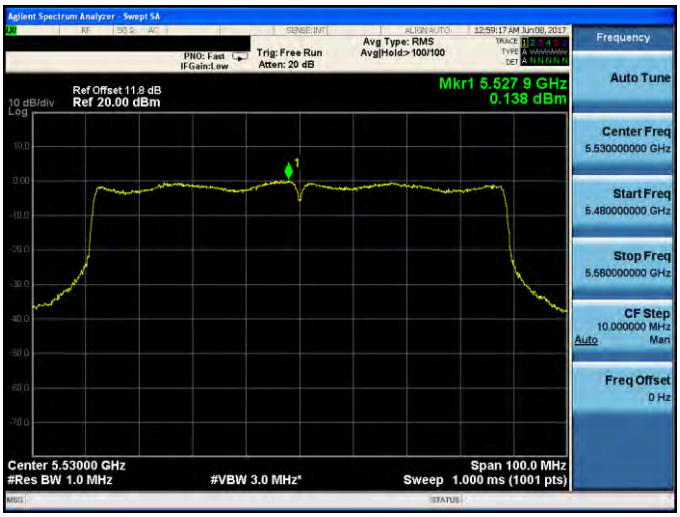
| Mode 2: IEEE 802.11a Continuous TX mode_ANT-1 | |
|---|---|
| 5500 |  |
| 5560 |  |
| 5700 |  |

| Mode 3: IEEE 802.11ac 20MHz Continuous TX mode_ANT-1 | |
|---|---|
| 5260 |  |
| 5280 |  |
| 5320 |  |

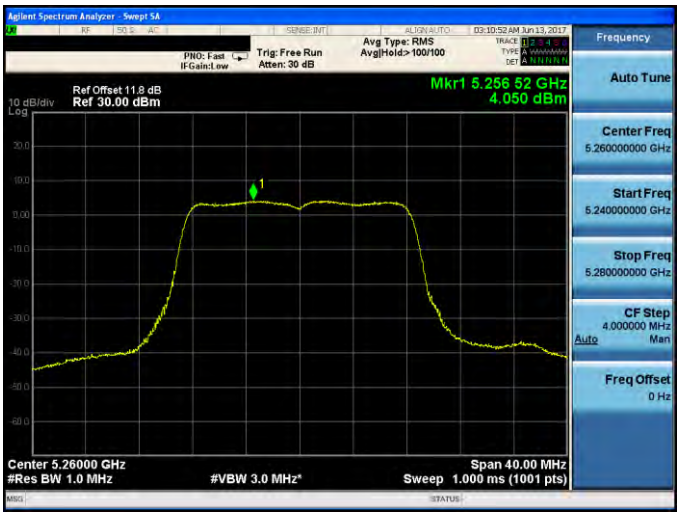
| Mode 3: IEEE 802.11ac 20MHz Continuous TX mode_ANT-1 | |
|---|---|
| 5500 |  |
| 5560 |  |
| 5700 |  |

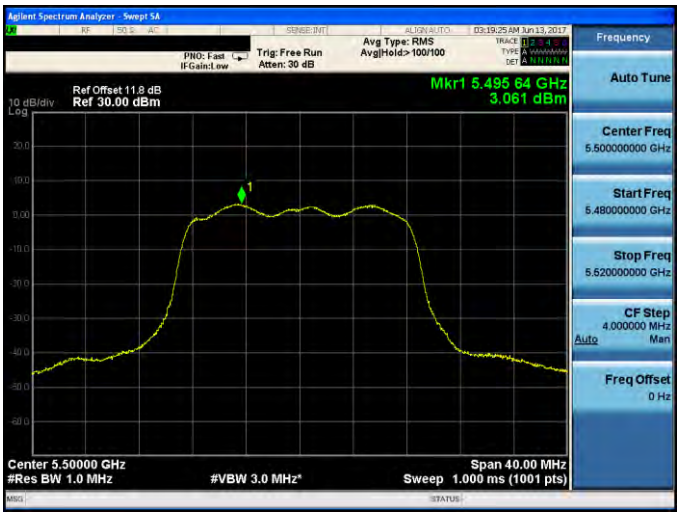
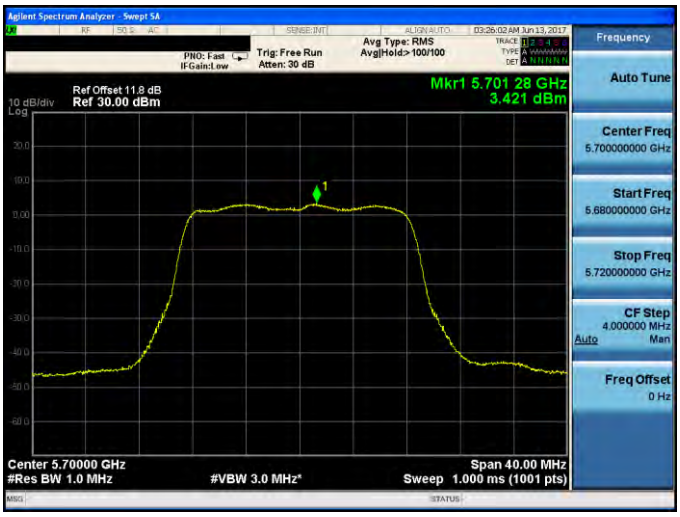
| Mode 4: IEEE 802.11ac 40MHz Continuous TX mode_ANT-1 | |
|---|---|
| 5270 |  |
| 5310 |  |

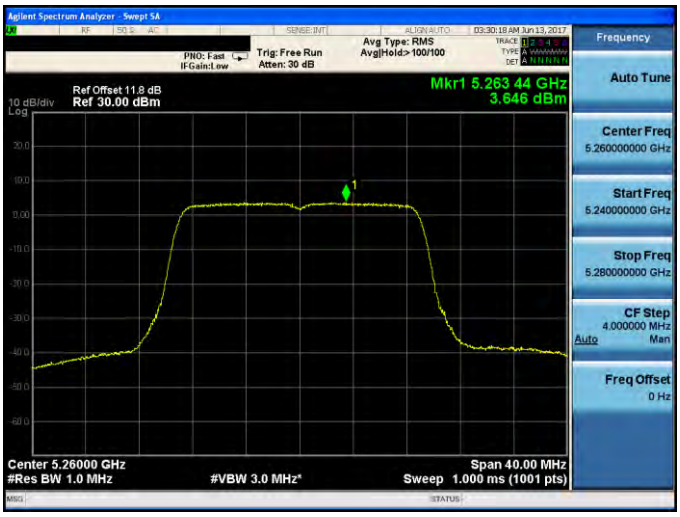
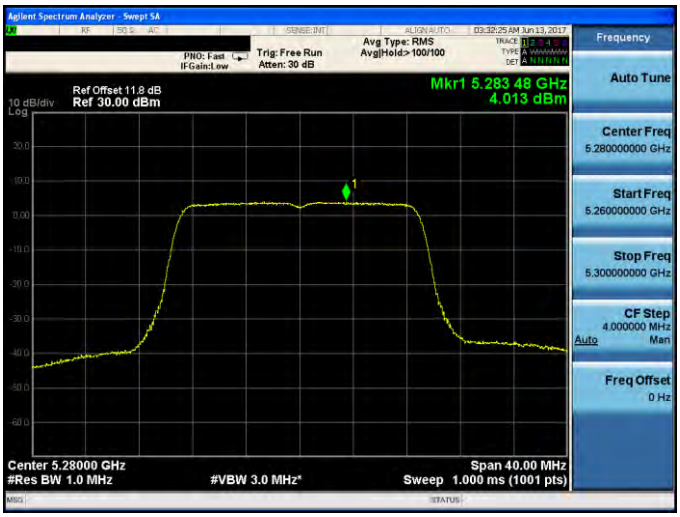
| Mode 4: IEEE 802.11ac 40MHz Continuous TX mode_ANT-1 | |
|---|---|
| 5510 |  |
| 5550 |  |
| 5670 |  |

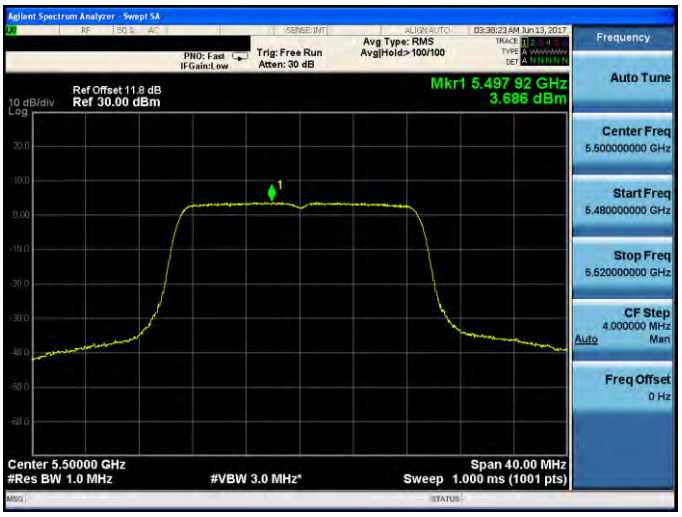
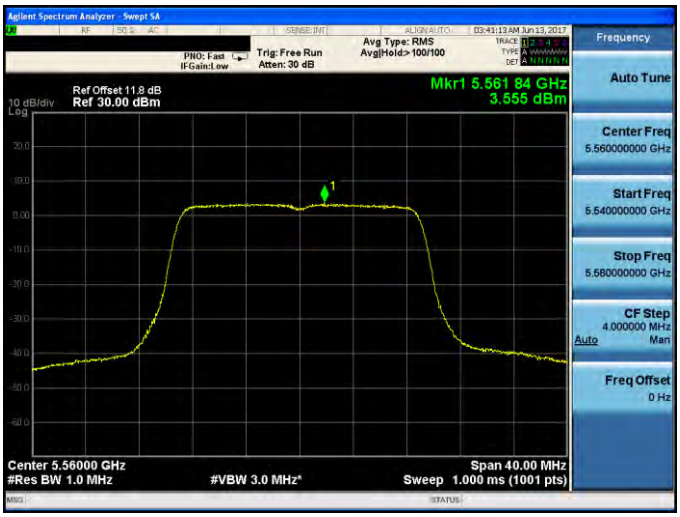
| Mode 5: IEEE 802.11ac 80MHz Continuous TX mode_ANT-1 | |
|---|---|
| 5290 |  |
| 5530 |  |
| 5610 |  |

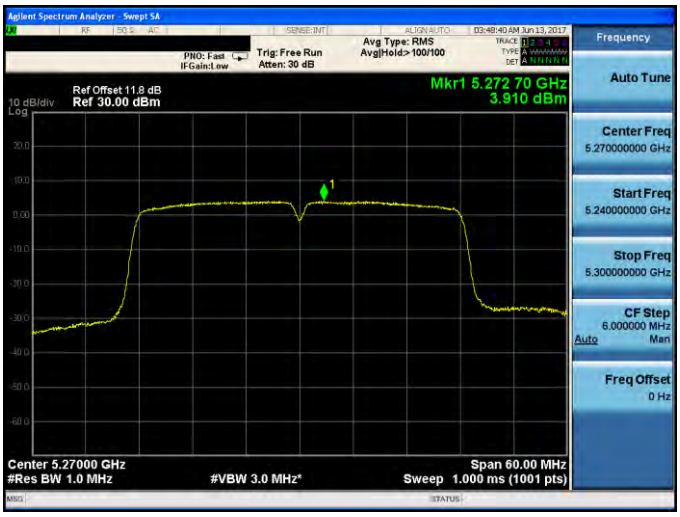
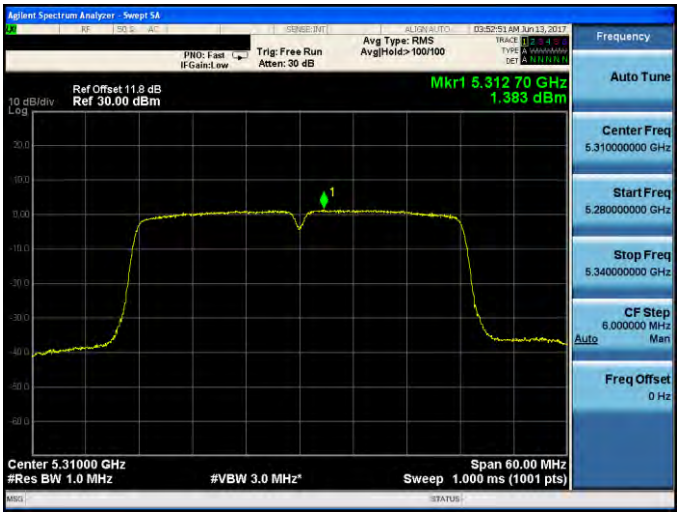
| Beamforming on |
|---|

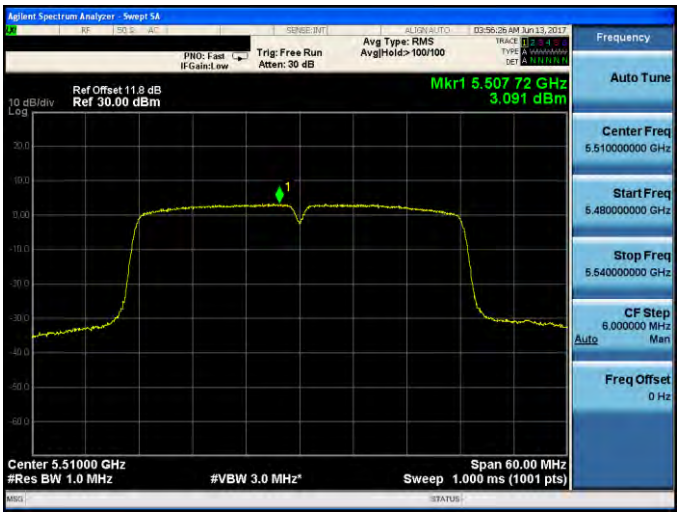
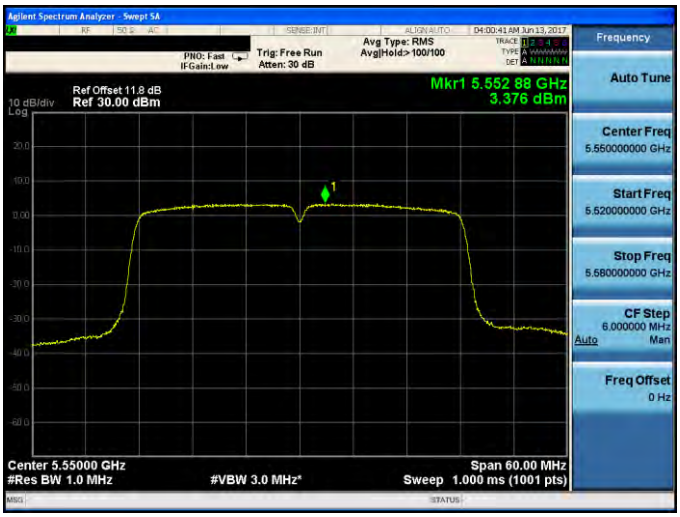
| Mode 2: IEEE 802.11a Continuous TX mode_ANT-0 | |
|---|---|
| 5260 |  |
| 5280 |  |
| 5320 |  |

| Mode 2: IEEE 802.11a Continuous TX mode_ANT-0 | |
|---|---|
| 5500 |  |
| 5560 |  |
| 5700 |  |

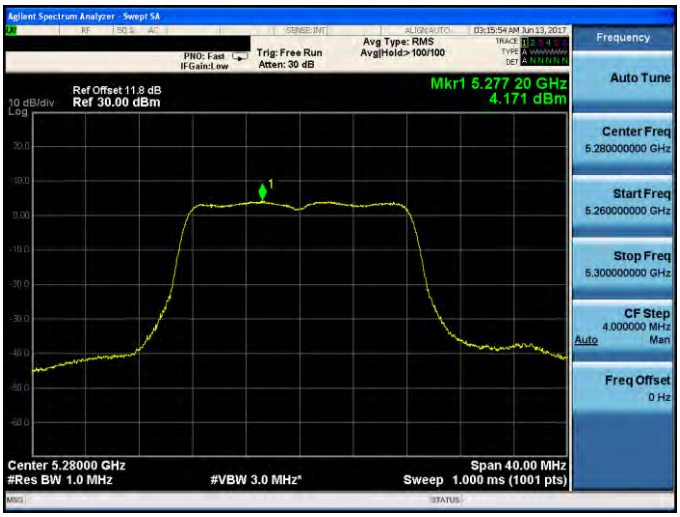
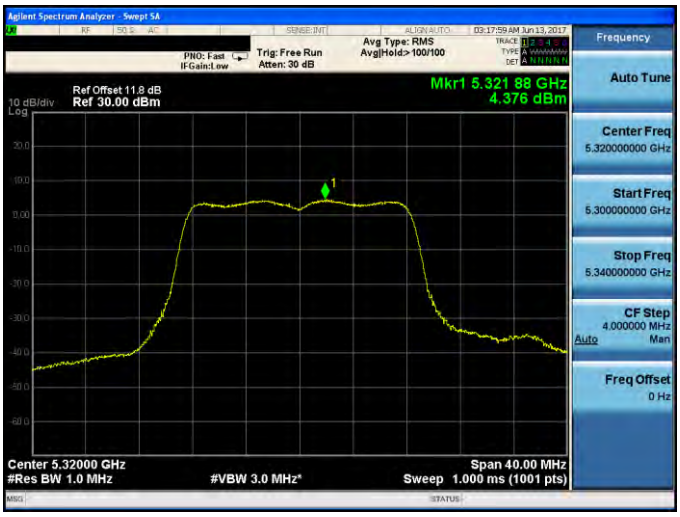
| Mode 3: IEEE 802.11ac 20MHz Continuous TX mode_ANT-0 | |
|---|---|
| 5260 |  |
| 5280 |  |
| 5320 |  |

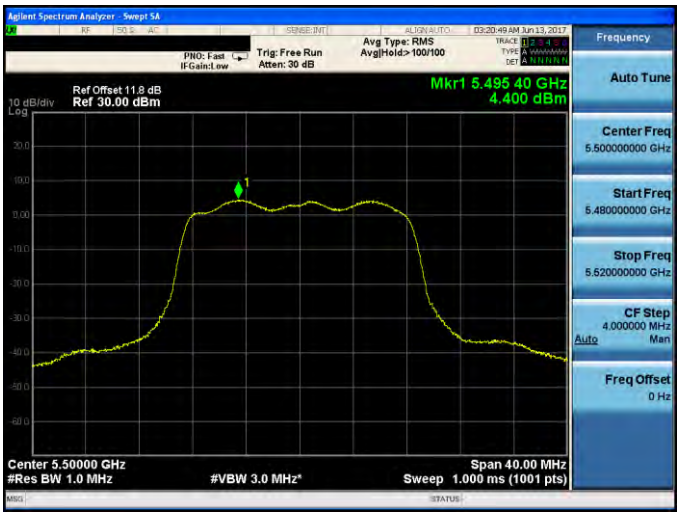
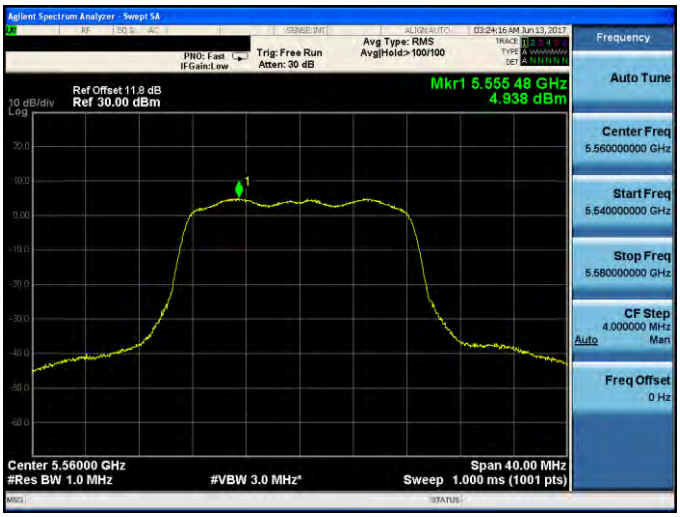
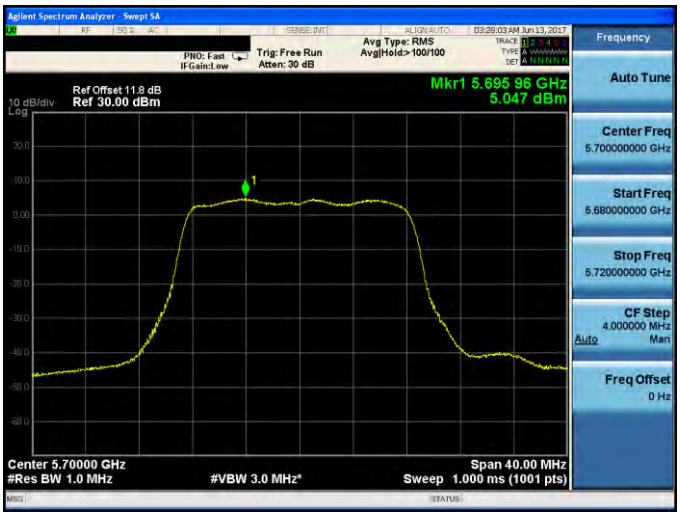
| Mode 3: IEEE 802.11ac 20MHz Continuous TX mode_ANT-0 | |
|---|---|
| 5500 |  |
| 5560 |  |
| 5700 |  |

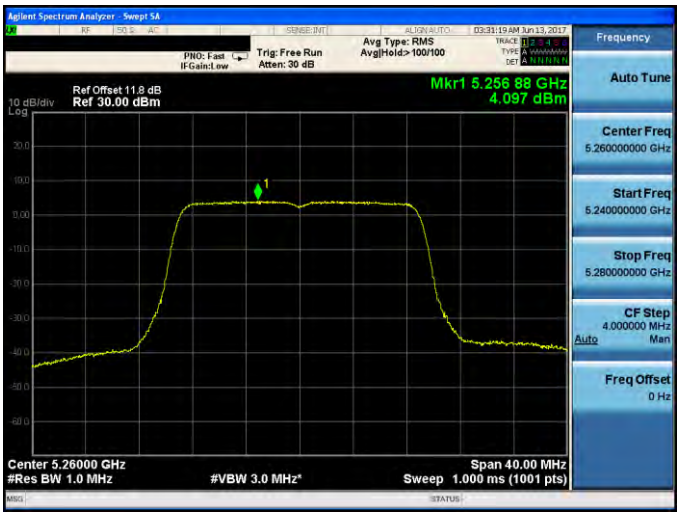
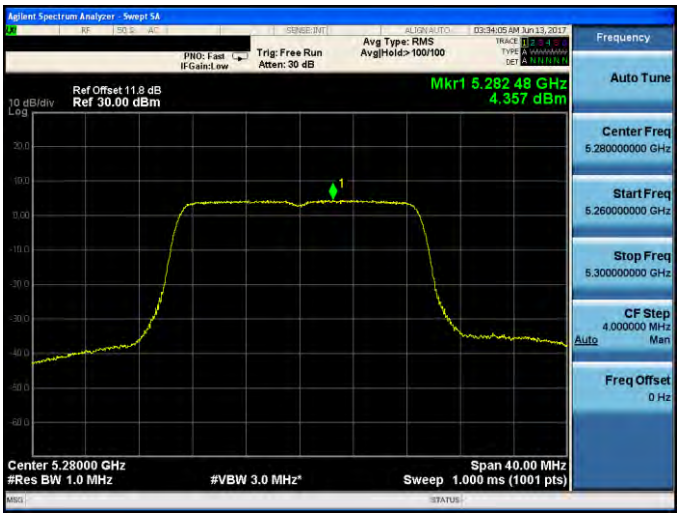
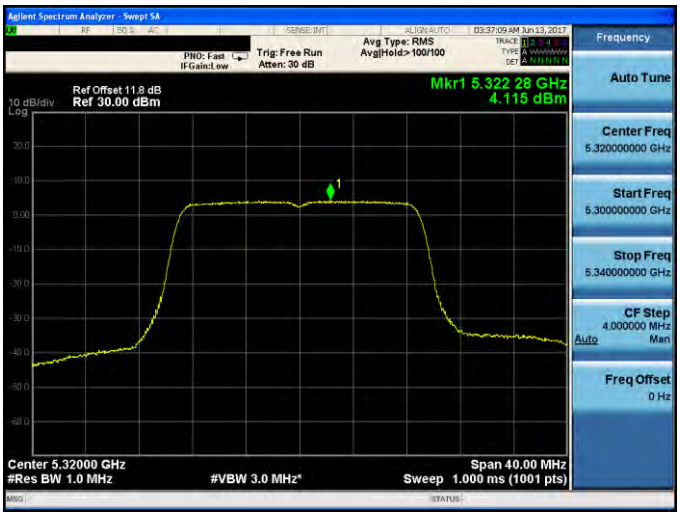
| Mode 4: IEEE 802.11ac 40MHz Continuous TX mode_ANT-0 | |
|---|---|
| 5270 |  |
| 5310 |  |

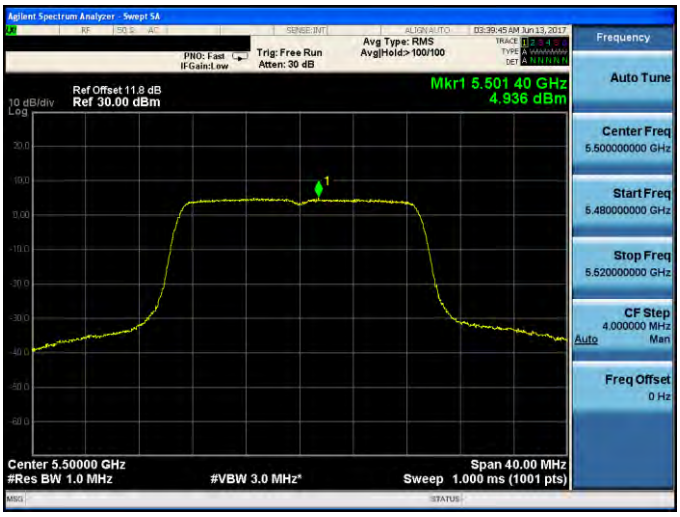
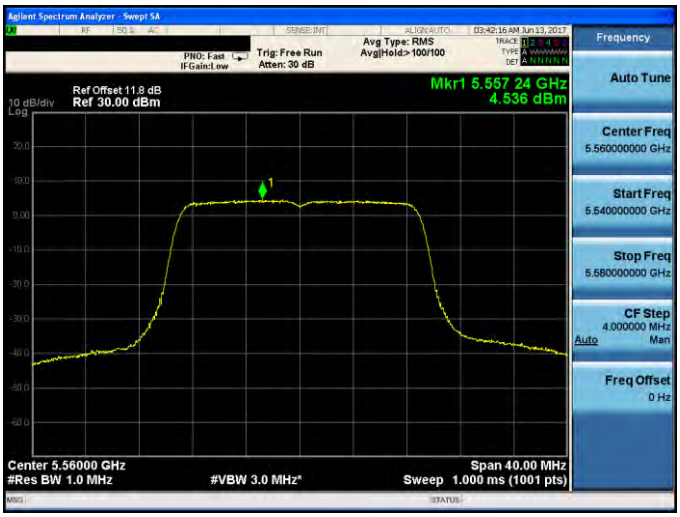
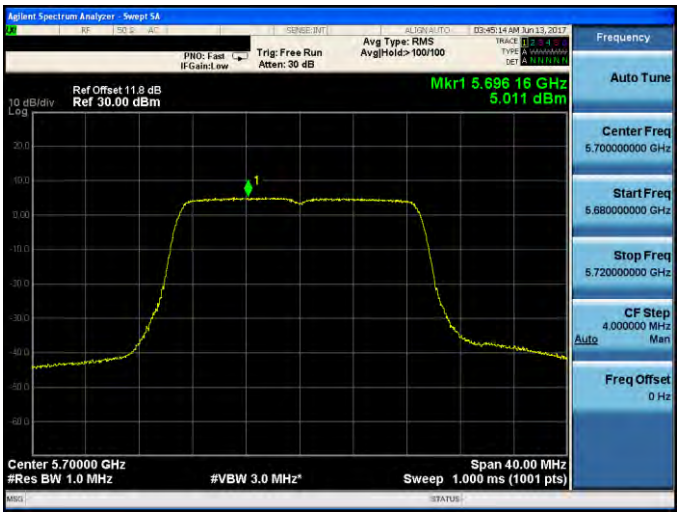
| Mode 4: IEEE 802.11ac 40MHz Continuous TX mode_ANT-0 | |
|---|---|
| 5510 |  |
| 5550 |  |
| 5670 |  |

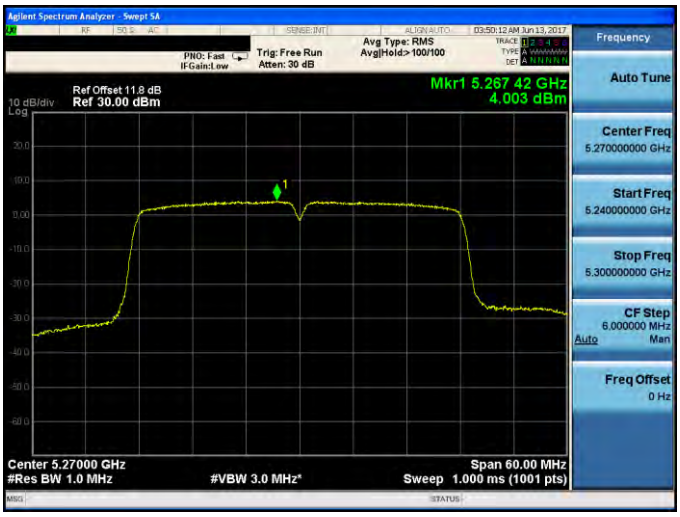
| Mode 5: IEEE 802.11ac 80MHz Continuous TX mode_ANT-0 | |
|---|---|
| 5290 |  |
| 5530 |  |
| 5610 |  |

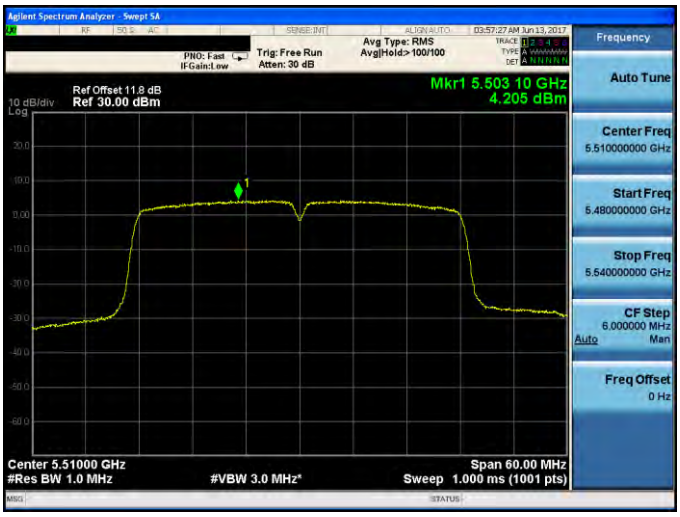
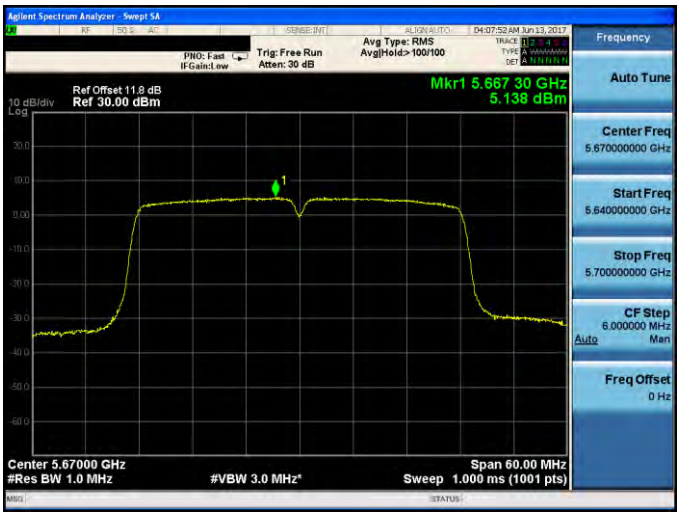
| Mode 2: IEEE 802.11a Continuous TX mode_ANT-1 | |
|---|---|
| 5260 |  |
| 5280 |  |
| 5320 |  |

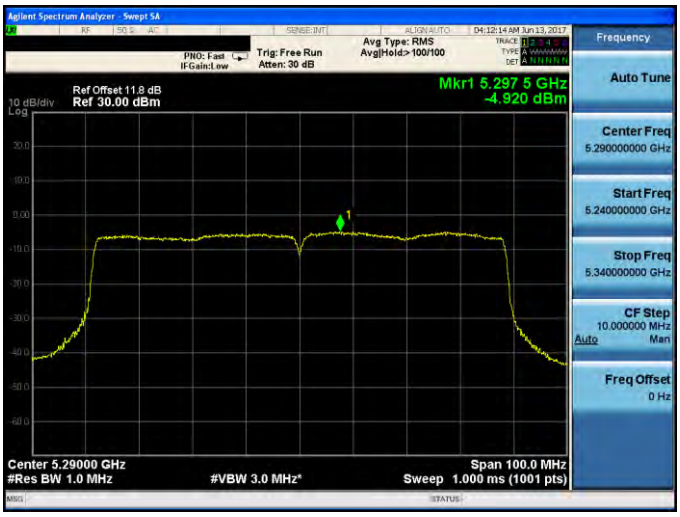
| Mode 2: IEEE 802.11a Continuous TX mode_ANT-1 | |
|---|---|
| 5500 |  |
| 5560 |  |
| 5700 |  |

| Mode 3: IEEE 802.11ac 20MHz Continuous TX mode_ANT-1 | |
|---|---|
| 5260 |  |
| 5280 |  |
| 5320 |  |

| Mode 3: IEEE 802.11ac 20MHz Continuous TX mode_ANT-1 | |
|---|---|
| 5500 |  |
| 5560 |  |
| 5700 |  |

| Mode 4: IEEE 802.11ac 40MHz Continuous TX mode_ANT-1 | |
|---|---|
| 5270 |  |
| 5310 |  |

| Mode 4: IEEE 802.11ac 40MHz Continuous TX mode_ANT-1 | |
|---|---|
| 5510 |  |
| 5550 |  |
| 5670 |  |

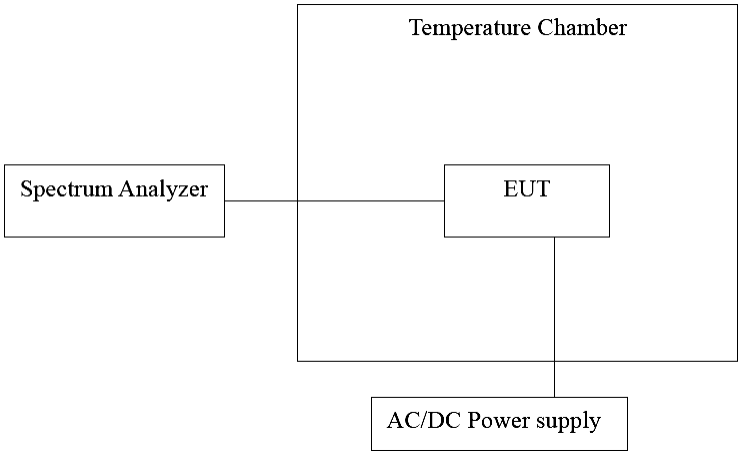
| Mode 5: IEEE 802.11ac 80MHz Continuous TX mode_ANT-1 | |
|---|---|
| 5290 |  |
| 5530 |  |
| 5610 |  |

## 4.6. Frequency Stability Measurement

■ **Limit**

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

■ **Test Setup**




■ **Test Instruments**

| Equipment | Manufacturer | Model Number | Serial Number | Cal. Date | Cal. Period |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4408B | MY45107753 | 08/08/2016 | 1 year |
| Temperature & Humidity Chamber | TAICHY | MHU-225LA | 980729 | 04/17/2017 | 1 year |
| Test Site | ATL | TE05 | TE05 | N.C.R. | ----- |

Note: N.C.R. = No Calibration Request.

## 4.7. Test Procedure

1. The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

■ **Test Result**

**Temperature Variations**

| Test Item | Frequency Stability | | | | | |
|---|---|---|---|---|---|---|
| Frequency | Temp. (°C) | Voltage (Vac) | Measured Freq. (MHz) | Delta Freq. (Hz) | Tolerance (ppm) | Result (Pass/Fail) |
| 5280 MHz | 0 | 120 | 5279.9981 | -1900 | -0.360 | Pass |
| | 10 | | 5279.99 | -10000 | -1.894 | Pass |
| | 20 | | 5279.9854 | -14600 | -2.765 | Pass |
| | 30 | | 5279.9887 | -11300 | -2.140 | Pass |
| | 40 | | 5279.991 | -9000 | -1.705 | Pass |
| 5560 MHz | 0 | 120 | 5559.9915 | -8500 | -1.529 | Pass |
| | 10 | | 5559.9862 | -13800 | -2.482 | Pass |
| | 20 | | 5559.9801 | -19900 | -3.579 | Pass |
| | 30 | | 5559.9817 | -18300 | -3.291 | Pass |
| | 40 | | 5559.9898 | -10200 | -1.835 | Pass |

**Voltage Variations**

| Test Item | Frequency Stability | | | | | |
|---|---|---|---|---|---|---|
| Frequency | Temp. (°C) | Voltage (Vac) | Measured Freq. (MHz) | Delta Freq. (Hz) | Tolerance (ppm) | Result (Pass/Fail) |
| 5280 MHz | 20 | 138.00 | 5279.9888 | -11200 | -2.121 | Pass |
| | | 120.00 | 5279.9854 | -14600 | -2.765 | Pass |
| | | 102.00 | 5279.9935 | -6500 | -1.231 | Pass |
| 5560 MHz | 20 | 138.00 | 5559.9867 | -13300 | -2.392 | Pass |
| | | 120.00 | 5559.9801 | -19900 | -3.579 | Pass |
| | | 102.00 | 5559.9934 | -6600 | -1.187 | Pass |

Note: The manufacturer's frequency stability specification is better then 20ppm.

| Beamforming on |
|---|

**Temperature Variations**

| Test Item | Frequency Stability | | | | | |
|---|---|---|---|---|---|---|
| Frequency | Temp. (°C) | Voltage (Vac) | Measured Freq. (MHz) | Delta Freq. (Hz) | Tolerance (ppm) | Result (Pass/Fail) |
| 5280 MHz | 0 | 120 | 5279.9981 | -1900 | -0.360 | Pass |
| | 10 | | 5279.99 | -10000 | -1.894 | Pass |
| | 20 | | 5279.9854 | -14600 | -2.765 | Pass |
| | 30 | | 5279.9887 | -11300 | -2.140 | Pass |
| | 40 | | 5279.991 | -9000 | -1.705 | Pass |
| 5560 MHz | 0 | 120 | 5559.9915 | -8500 | -1.529 | Pass |
| | 10 | | 5559.9862 | -13800 | -2.482 | Pass |
| | 20 | | 5559.9801 | -19900 | -3.579 | Pass |
| | 30 | | 5559.9817 | -18300 | -3.291 | Pass |
| | 40 | | 5559.9898 | -10200 | -1.835 | Pass |

**Voltage Variations**

| Test Item | Frequency Stability | | | | | |
|---|---|---|---|---|---|---|
| Frequency | Temp. (°C) | Voltage (Vac) | Measured Freq. (MHz) | Delta Freq. (Hz) | Tolerance (ppm) | Result (Pass/Fail) |
| 5280 MHz | 20 | 138.00 | 5279.9888 | -11200 | -2.121 | Pass |
| | | 120.00 | 5279.9854 | -14600 | -2.765 | Pass |
| | | 102.00 | 5279.9935 | -6500 | -1.231 | Pass |
| 5560 MHz | 20 | 138.00 | 5559.9867 | -13300 | -2.392 | Pass |
| | | 120.00 | 5559.9801 | -19900 | -3.579 | Pass |
| | | 102.00 | 5559.9934 | -6600 | -1.187 | Pass |

Note: The manufacturer's frequency stability specification is better then 20ppm.

## 4.8. Antenna Requirement

■ **Requirement**

For intentional device, according to 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And According to 15.407 (a), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

■ **Antenna Connector Construction**

See section 2 – antenna information.

■ **Directional Gain Calculated**

Directional Gain = 10*log{[10^(G1/20)+10^(G2/20)+…+10^(Gn/20)]^2/NANT} = 7.36 dBi > 6dBi

| Operate Freq. Band | | Directional Gain (dBi) |
|---|---|---|
| IEEE 802.11a | U-NII Band II-A | 7.36 |
| | U-NII Band II-C | 7.36 |
| IEEE 802.11ac 20MHz | U-NII Band II-A | 7.36 |
| | U-NII Band II-C | 7.36 |
| IEEE 802.11ac 40MHz | U-NII Band II-A | 7.36 |
| | U-NII Band II-C | 7.36 |
| IEEE 802.11ac 80MHz | U-NII Band II-A | 7.36 |
| | U-NII Band II-C | 7.36 |