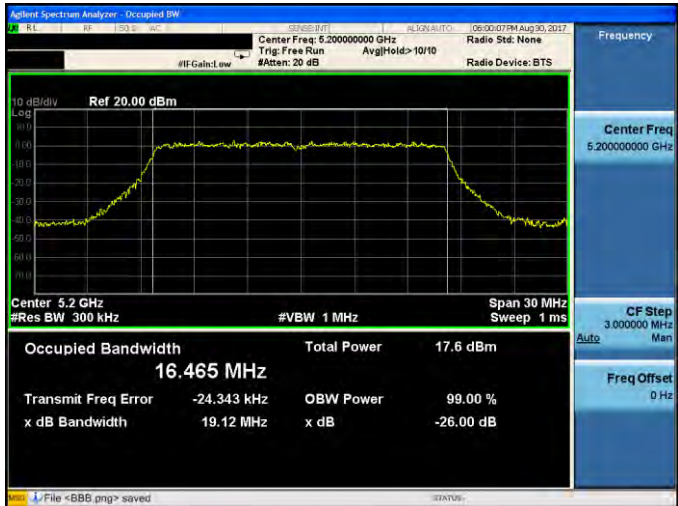




## ■ Test Graphs

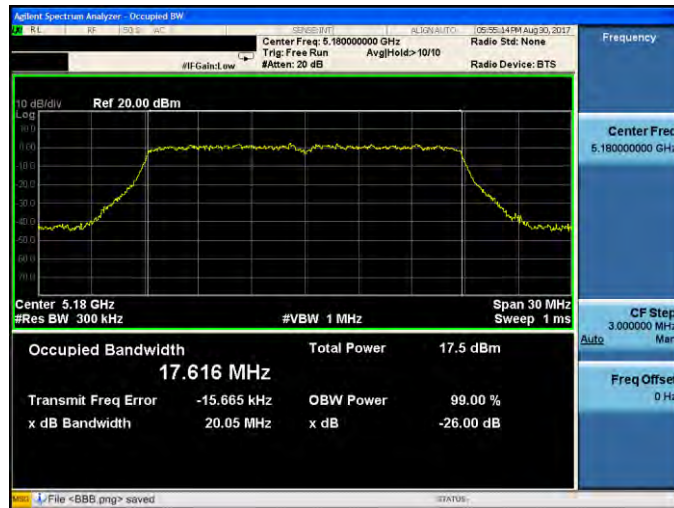
Mode 2: IEEE 802.11a Continuous TX mode\_ ANT-0

|          |                                                                                      |
|----------|--------------------------------------------------------------------------------------|
| 5180 MHz |    |
| 5200 MHz |   |
| 5240 MHz |  |



## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode\_ ANT-0

5180 MHz



5200 MHz



5240 MHz







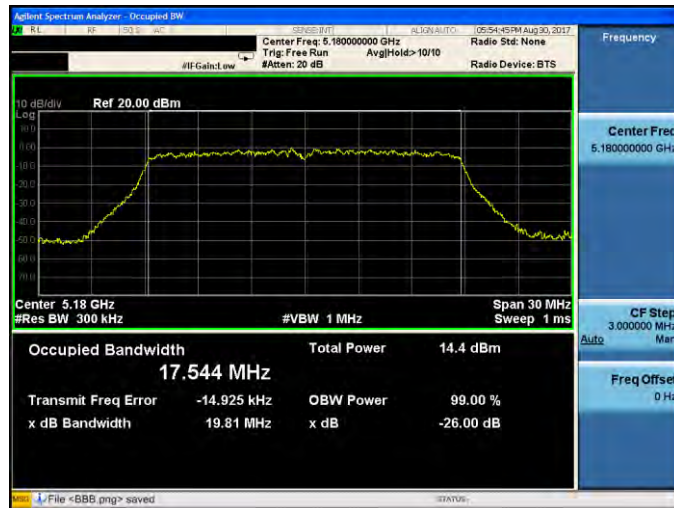
## Mode 2: IEEE 802.11a Continuous TX mode\_ ANT-1

|          |                                                                                      |
|----------|--------------------------------------------------------------------------------------|
| 5180 MHz |    |
| 5200 MHz |   |
| 5240 MHz |  |



## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode\_ ANT-1

5180 MHz



5200 MHz



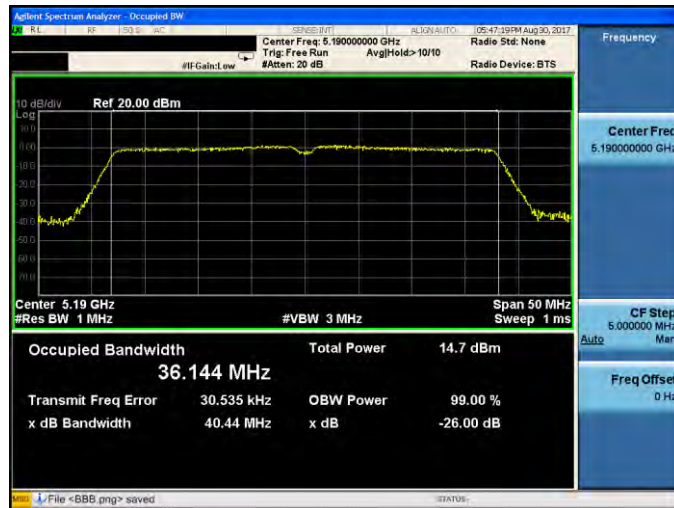
5240 MHz



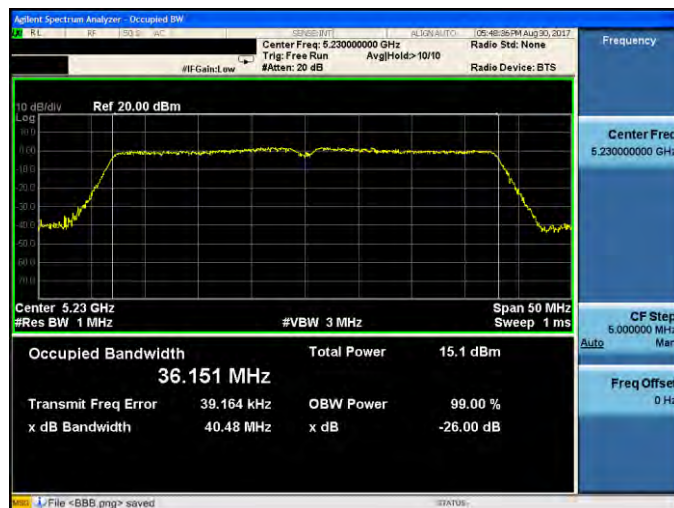


## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ ANT-1

5190 MHz



5230 MHz



## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode\_ ANT-1

5210 MHz





Beamforming on

Mode 3: IEEE 802.11ac 20MHz Continuous TX mode \_ANT-0

5180 MHz



5200 MHz

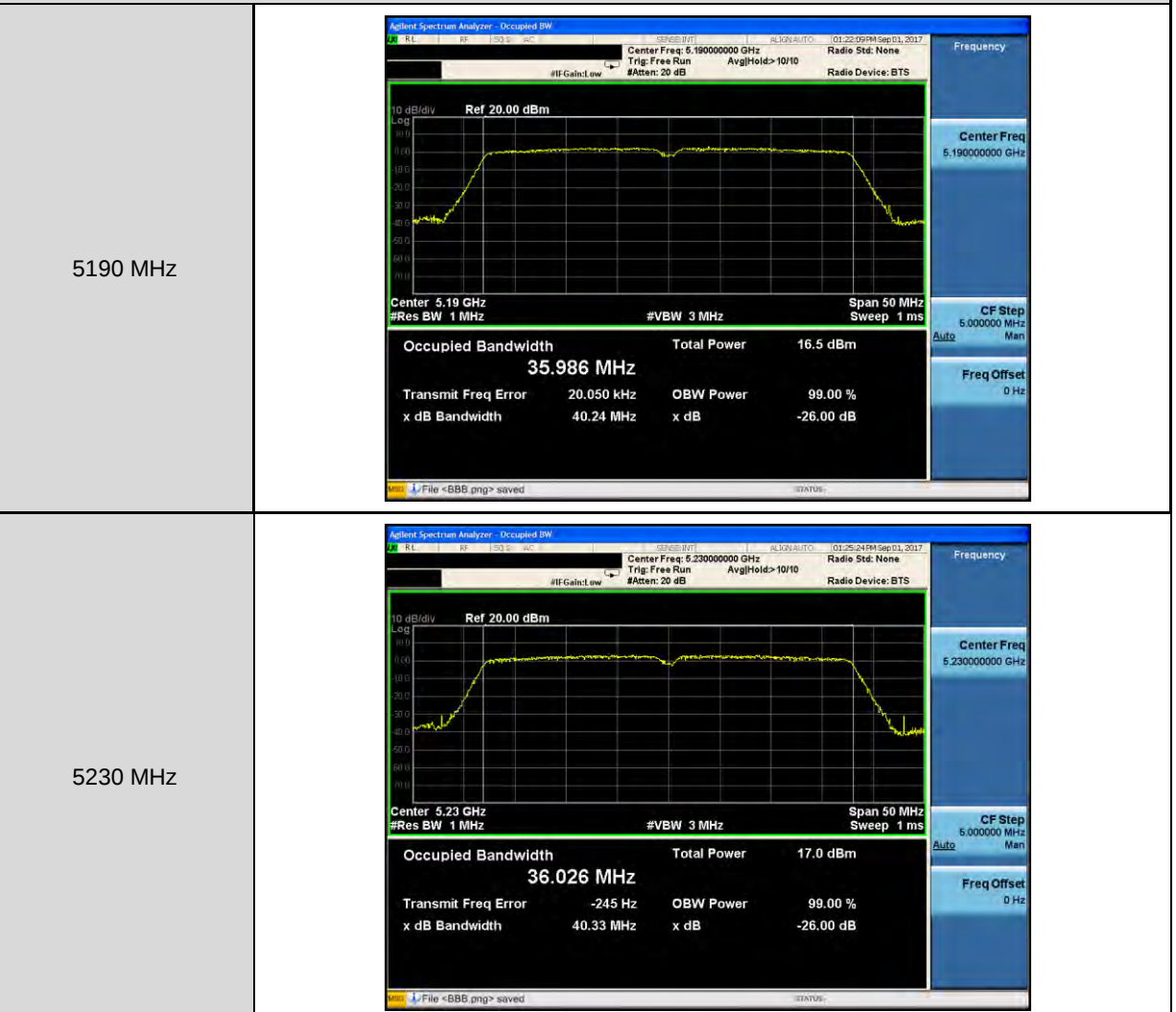


5240 MHz





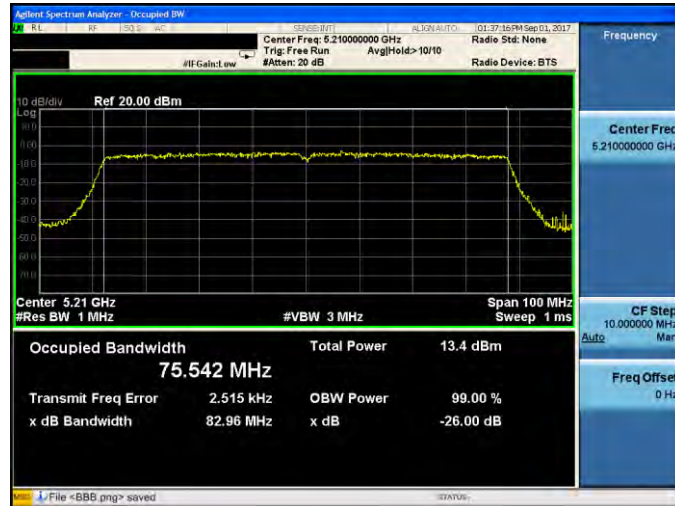
## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ ANT-0





Mode 5: IEEE 802.11ac 80MHz Continuous TX mode\_ ANT-0

5210 MHz



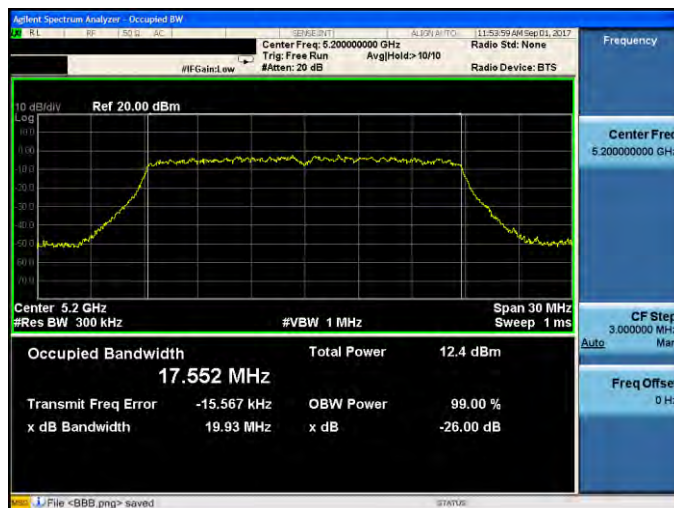


## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode\_ ANT-1

5180 MHz



5200 MHz

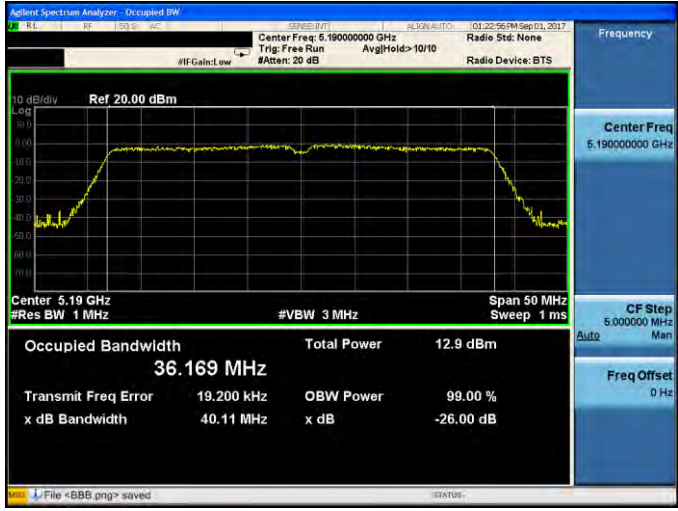
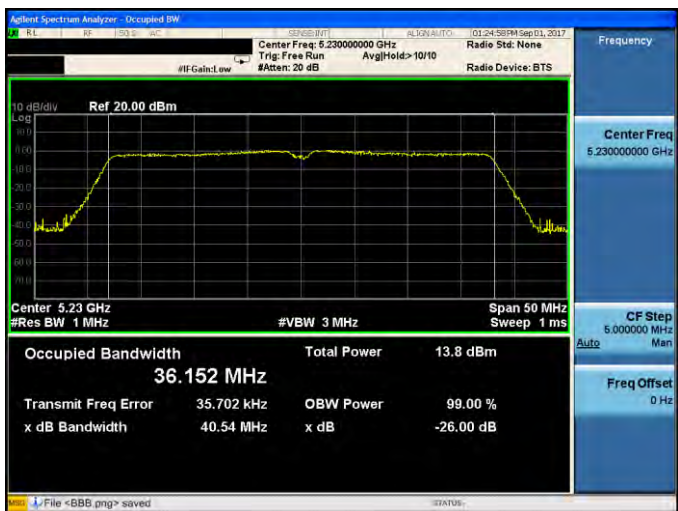


5240 MHz





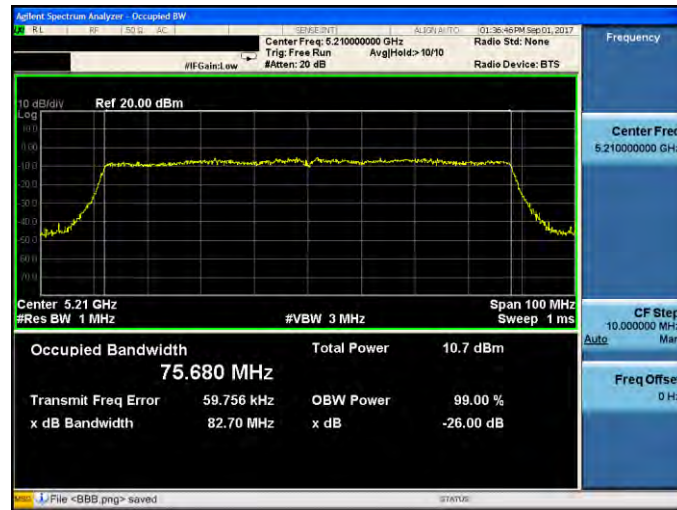
## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ ANT-1

|          |                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5190 MHz |  <p>Ref 20.00 dBm</p> <p>Center 5.19 GHz<br/>#Res BW 1 MHz</p> <p>Span 50 MHz<br/>Sweep 1 ms</p> <p>Occupied Bandwidth 36.169 MHz</p> <p>Total Power 12.9 dBm</p> <p>Transmit Freq Error 19.200 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 40.11 MHz</p> <p>x dB -26.00 dB</p> <p>File &lt;5B5.png&gt; saved</p>  |
| 5230 MHz |  <p>Ref 20.00 dBm</p> <p>Center 5.23 GHz<br/>#Res BW 1 MHz</p> <p>Span 50 MHz<br/>Sweep 1 ms</p> <p>Occupied Bandwidth 36.152 MHz</p> <p>Total Power 13.8 dBm</p> <p>Transmit Freq Error 35.702 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 40.54 MHz</p> <p>x dB -26.00 dB</p> <p>File &lt;5B5.png&gt; saved</p> |



## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode\_ ANT-1

5210 MHz



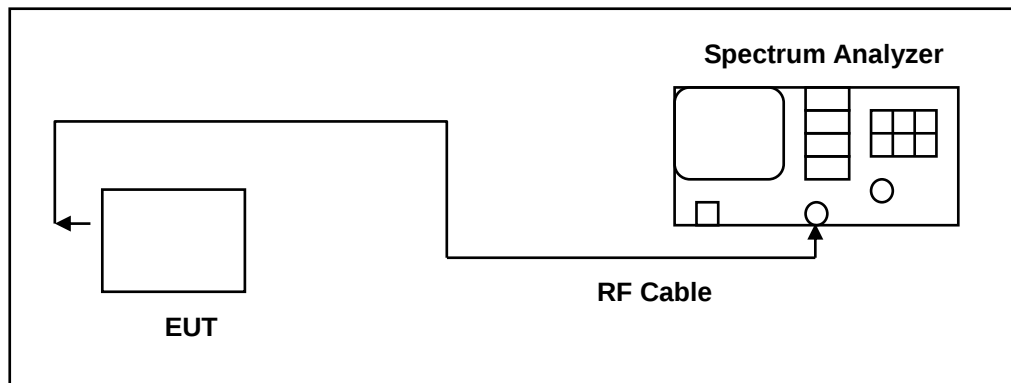
## 4.6. 6dB RF Bandwidth Measurement

### ■ Limit

#### 6dB RF Bandwidth

Systems using digital modulation techniques may operate in the 5725~5850MHz bands. The minimum 6 dB band-width shall be at least 500 kHz.

### ■ Test Setup



### ■ Test Instruments

| Equipment         | Manufacturer | Model Number | Serial Number | Cal. Date  | Cal. Period |
|-------------------|--------------|--------------|---------------|------------|-------------|
| Spectrum Analyzer | Agilent      | E4445A       | MY45300744    | 12/19/2016 | 1 year      |
| Test Site         | ATL          | TE05         | TE05          | N.C.R.     | -----       |

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

### ■ Test Procedure

#### 6dB RF Bandwidth

The EUT tested to UNII test procedure of KDB789033 D02 for compliance to FCC 47CFR 15.407 requirements. The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A peak output reading was taken, a DISPLAY line was drawn 6 dB lower than peak level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line. The test was performed at 3 channels.

# Test Result

| Test Item       | 6dB RF Bandwidth                        |       |             |
|-----------------|-----------------------------------------|-------|-------------|
| Test Mode       | Mode 2: IEEE 802.11a Continuous TX mode |       |             |
| Frequency (MHz) | 6dB Bandwidth (kHz)                     |       | Limit (kHz) |
|                 | ANT-0                                   | ANT-1 |             |
| 5745            | 16340                                   | 16350 | > 500       |
| 5785            | 16370                                   | 16370 | > 500       |
| 5825            | 16320                                   | 16390 | > 500       |

| Test Item       | 6dB RF Bandwidth                               |       |             |
|-----------------|------------------------------------------------|-------|-------------|
| Test Mode       | Mode 3: IEEE 802.11ac 20MHz Continuous TX mode |       |             |
| Frequency (MHz) | 6dB Bandwidth (kHz)                            |       | Limit (kHz) |
|                 | ANT-0                                          | ANT-1 |             |
| 5745            | 17560                                          | 17630 | > 500       |
| 5785            | 17590                                          | 17590 | > 500       |
| 5825            | 17580                                          | 17610 | > 500       |

| Test Item       | 6dB RF Bandwidth                               |       |             |
|-----------------|------------------------------------------------|-------|-------------|
| Test Mode       | Mode 4: IEEE 802.11ac 40MHz Continuous TX mode |       |             |
| Frequency (MHz) | 6dB Bandwidth (kHz)                            |       | Limit (kHz) |
|                 | ANT-0                                          | ANT-1 |             |
| 5755            | 35130                                          | 35110 | > 500       |
| 5795            | 35030                                          | 35090 | > 500       |

| Test Item       | 6dB RF Bandwidth                               |       |             |
|-----------------|------------------------------------------------|-------|-------------|
| Test Mode       | Mode 5: IEEE 802.11ac 80MHz Continuous TX mode |       |             |
| Frequency (MHz) | 6dB Bandwidth (kHz)                            |       | Limit (kHz) |
|                 | ANT-0                                          | ANT-1 |             |
| 5775            | 75410                                          | 75250 | > 500       |



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| Test Item       | 6dB RF Bandwidth                               |       |             |
|-----------------|------------------------------------------------|-------|-------------|
| Test Mode       | Mode 3: IEEE 802.11ac 20MHz Continuous TX mode |       |             |
| Frequency (MHz) | 6dB Bandwidth (kHz)                            |       | Limit (kHz) |
|                 | ANT-0                                          | ANT-1 |             |
| 5745            | 17600                                          | 17640 | > 500       |
| 5785            | 17620                                          | 17650 | > 500       |
| 5825            | 17600                                          | 17610 | > 500       |

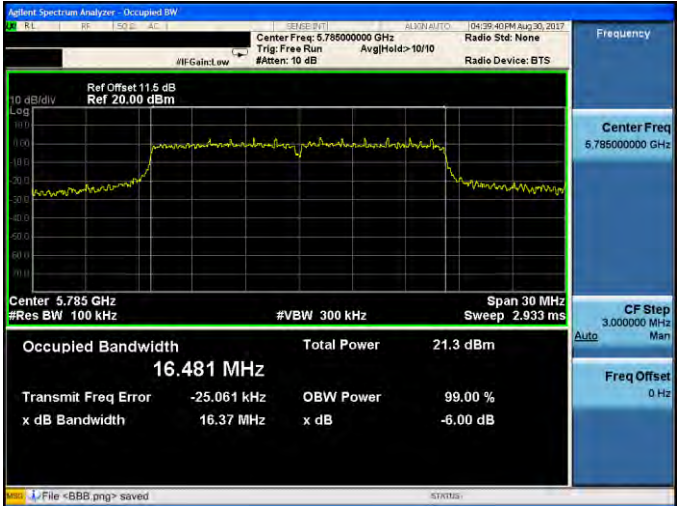
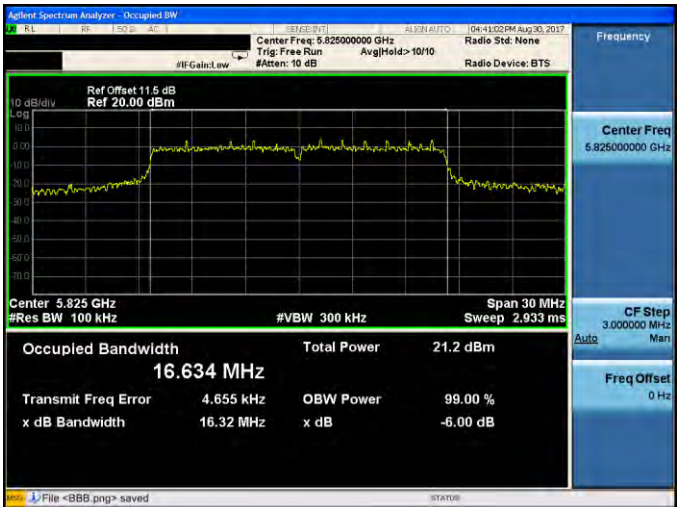
| Test Item       | 6dB RF Bandwidth                               |       |             |
|-----------------|------------------------------------------------|-------|-------------|
| Test Mode       | Mode 4: IEEE 802.11ac 40MHz Continuous TX mode |       |             |
| Frequency (MHz) | 6dB Bandwidth (kHz)                            |       | Limit (kHz) |
|                 | ANT-0                                          | ANT-1 |             |
| 5755            | 35100                                          | 34960 | > 500       |
| 5795            | 35100                                          | 34460 | > 500       |

| Test Item       | 6dB RF Bandwidth                               |       |             |
|-----------------|------------------------------------------------|-------|-------------|
| Test Mode       | Mode 5: IEEE 802.11ac 80MHz Continuous TX mode |       |             |
| Frequency (MHz) | 6dB Bandwidth (kHz)                            |       | Limit (kHz) |
|                 | ANT-0                                          | ANT-1 |             |
| 5775            | 75410                                          | 75260 | > 500       |



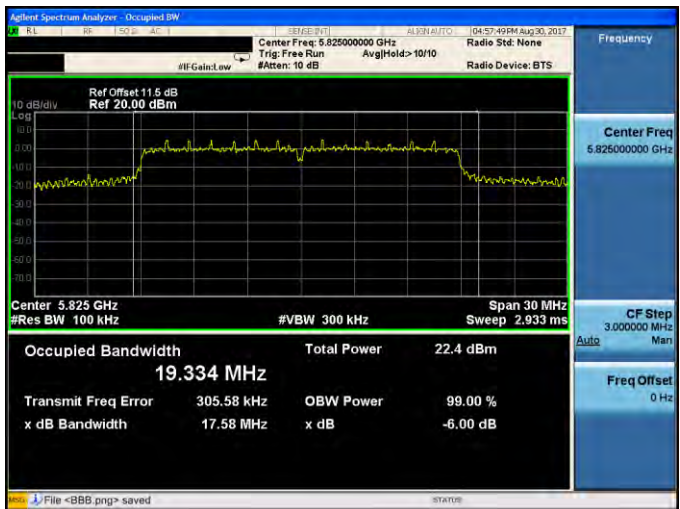
## ■ Test Graphs

Mode 2: IEEE 802.11a Continuous TX mode\_ANT-0

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5745 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.74500000 GHz<br/>Trig: Free Run<br/>Avg/Hold: 10/10<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Center: 5.745 GHz<br/>Res BW: 100 kHz<br/>Span: 30 MHz<br/>Sweep: 2.933 ms</p> <p>Occupied Bandwidth: 16.540 MHz<br/>Total Power: 22.0 dBm</p> <p>Transmit Freq Error: -9.158 kHz<br/>OBW Power: 99.00 %<br/>x dB Bandwidth: 16.34 MHz<br/>x dB: -6.00 dB</p> <p>File &lt;BBB.png&gt; saved</p>   |
| 5785 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.78500000 GHz<br/>Trig: Free Run<br/>Avg/Hold: 10/10<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Center: 5.785 GHz<br/>Res BW: 100 kHz<br/>Span: 30 MHz<br/>Sweep: 2.933 ms</p> <p>Occupied Bandwidth: 16.481 MHz<br/>Total Power: 21.3 dBm</p> <p>Transmit Freq Error: -25.061 kHz<br/>OBW Power: 99.00 %<br/>x dB Bandwidth: 16.37 MHz<br/>x dB: -6.00 dB</p> <p>File &lt;BBB.png&gt; saved</p> |
| 5825 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.82500000 GHz<br/>Trig: Free Run<br/>Avg/Hold: 10/10<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Center: 5.825 GHz<br/>Res BW: 100 kHz<br/>Span: 30 MHz<br/>Sweep: 2.933 ms</p> <p>Occupied Bandwidth: 16.634 MHz<br/>Total Power: 21.2 dBm</p> <p>Transmit Freq Error: 4.655 kHz<br/>OBW Power: 99.00 %<br/>x dB Bandwidth: 16.32 MHz<br/>x dB: -6.00 dB</p> <p>File &lt;BBB.png&gt; saved</p>  |

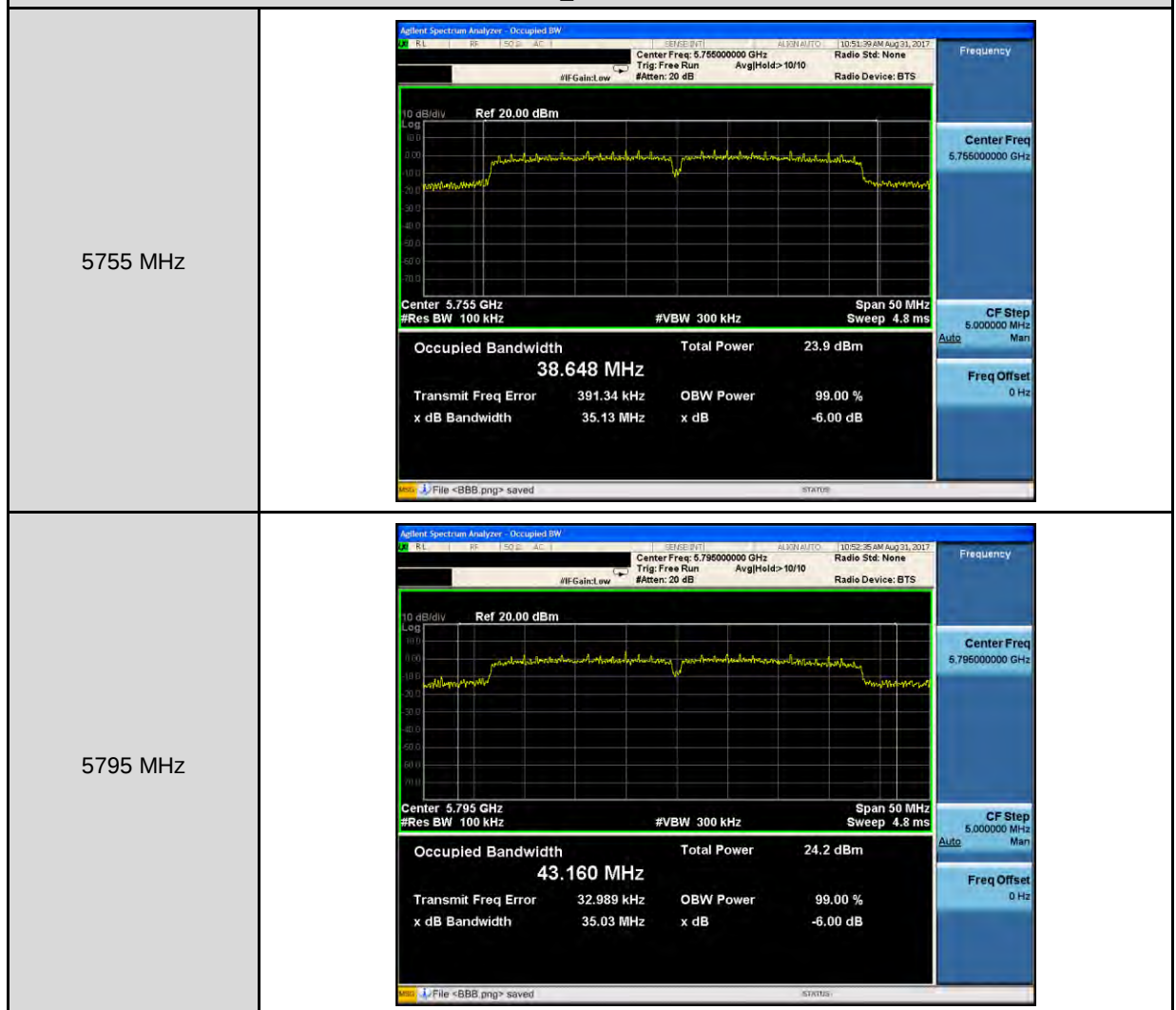


## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode\_ANT-0

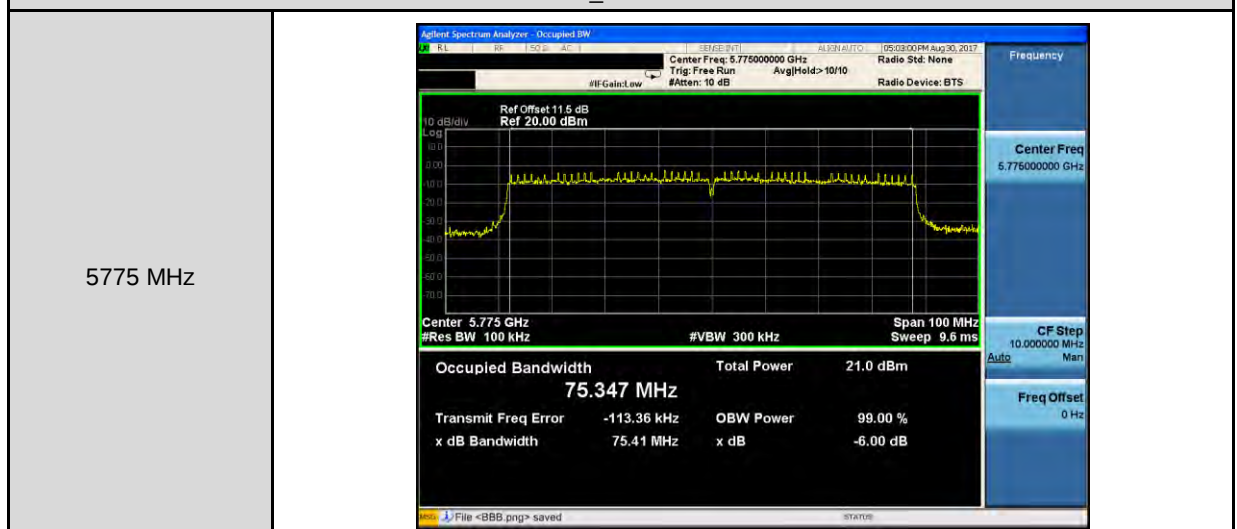
|          |                                                                                      |
|----------|--------------------------------------------------------------------------------------|
| 5745 MHz |    |
| 5785 MHz |   |
| 5825 MHz |  |



## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ANT-0



## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode\_ANT-0



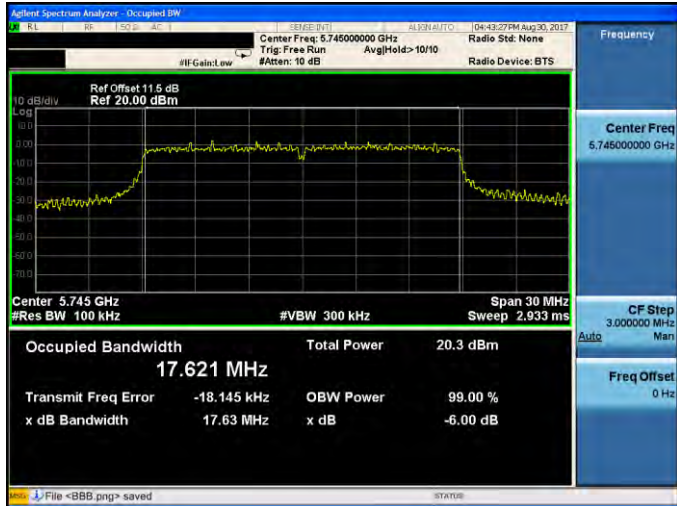
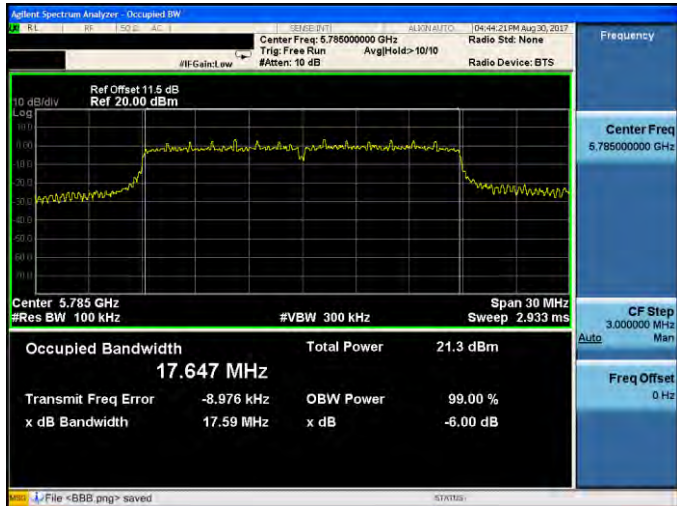


## Mode 2: IEEE 802.11a Continuous TX mode\_ANT-1

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5745 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.74500000 GHz<br/>Trig: Free Run<br/>#Att: 10 dB<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Center 5.745 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz<br/>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.391 MHz<br/>Total Power 19.8 dBm<br/>Transmit Freq Error -31.169 kHz<br/>OBW Power 99.00 %<br/>x dB Bandwidth 16.35 MHz<br/>x dB -6.00 dB</p> <p>File &lt;BBB.png&gt; saved</p>   |
| 5785 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.78500000 GHz<br/>Trig: Free Run<br/>#Att: 10 dB<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Center 5.785 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz<br/>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.378 MHz<br/>Total Power 19.6 dBm<br/>Transmit Freq Error -31.880 kHz<br/>OBW Power 99.00 %<br/>x dB Bandwidth 16.37 MHz<br/>x dB -6.00 dB</p> <p>File &lt;BBB.png&gt; saved</p>  |
| 5825 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.82500000 GHz<br/>Trig: Free Run<br/>#Att: 10 dB<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Center 5.825 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz<br/>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth 16.396 MHz<br/>Total Power 19.8 dBm<br/>Transmit Freq Error -32.150 kHz<br/>OBW Power 99.00 %<br/>x dB Bandwidth 16.39 MHz<br/>x dB -6.00 dB</p> <p>File &lt;BBB.png&gt; saved</p> |



## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode\_ANT-1

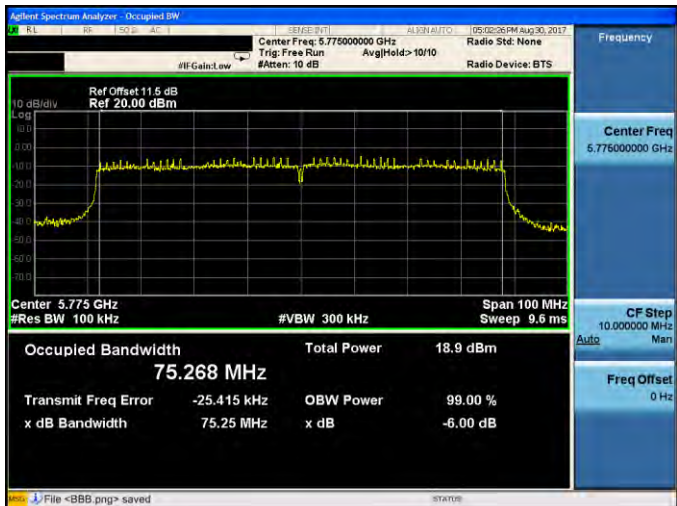
|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5745 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.74500000 GHz<br/>Trig: Free Run<br/>#Att: 10 dB<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Center 5.745 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz<br/>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.621 MHz<br/>Total Power 20.3 dBm</p> <p>Transmit Freq Error -18.145 kHz<br/>OBW Power 99.00 %<br/>x dB Bandwidth 17.63 MHz<br/>x dB -6.00 dB</p> <p>Freq Offset 0 Hz</p> <p>File &lt;BBB.png&gt; saved</p>  |
| 5785 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.78500000 GHz<br/>Trig: Free Run<br/>#Att: 10 dB<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Center 5.785 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz<br/>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.647 MHz<br/>Total Power 21.3 dBm</p> <p>Transmit Freq Error -8.976 kHz<br/>OBW Power 99.00 %<br/>x dB Bandwidth 17.59 MHz<br/>x dB -6.00 dB</p> <p>Freq Offset 0 Hz</p> <p>File &lt;BBB.png&gt; saved</p>  |
| 5825 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.82500000 GHz<br/>Trig: Free Run<br/>#Att: 10 dB<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Center 5.825 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz<br/>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.669 MHz<br/>Total Power 21.0 dBm</p> <p>Transmit Freq Error -5.363 kHz<br/>OBW Power 99.00 %<br/>x dB Bandwidth 17.61 MHz<br/>x dB -6.00 dB</p> <p>Freq Offset 0 Hz</p> <p>File &lt;BBB.png&gt; saved</p> |



## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ANT-1

|          |                                                                                     |
|----------|-------------------------------------------------------------------------------------|
| 5755 MHz |   |
| 5795 MHz |  |

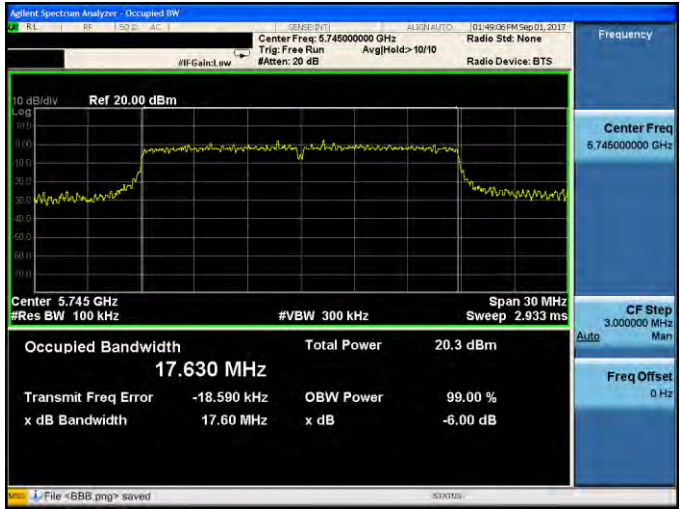
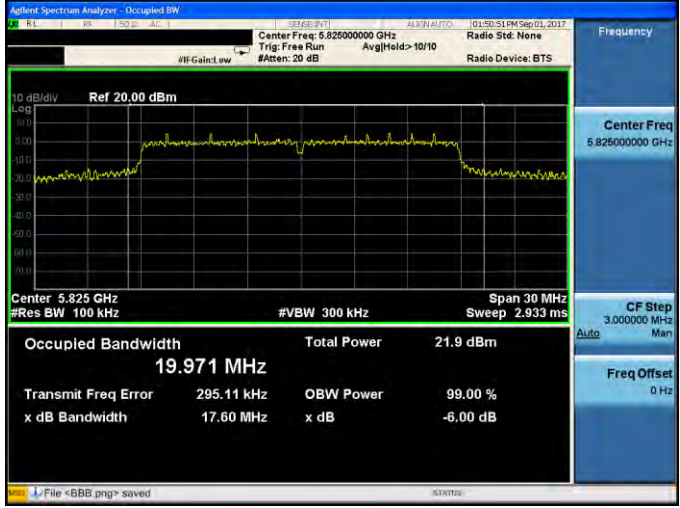
## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode\_ANT-1

|          |                                                                                      |
|----------|--------------------------------------------------------------------------------------|
| 5775 MHz |  |
|----------|--------------------------------------------------------------------------------------|



Beamforming on

Mode 3: IEEE 802.11ac 20MHz Continuous TX mode\_ANT-0

|          |                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5745 MHz |  <p>Ref 20.00 dBm</p> <p>Center 5.745 GHz<br/>#Res BW 100 kHz</p> <p>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth<br/>17.630 MHz</p> <p>Total Power<br/>20.3 dBm</p> <p>Transmit Freq Error<br/>-18.590 kHz</p> <p>OBW Power<br/>99.00 %</p> <p>x dB Bandwidth<br/>17.60 MHz</p> <p>x dB<br/>-6.00 dB</p>  |
| 5785 MHz |  <p>Ref 20.00 dBm</p> <p>Center 5.785 GHz<br/>#Res BW 100 kHz</p> <p>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth<br/>17.698 MHz</p> <p>Total Power<br/>20.9 dBm</p> <p>Transmit Freq Error<br/>-12.609 kHz</p> <p>OBW Power<br/>99.00 %</p> <p>x dB Bandwidth<br/>17.62 MHz</p> <p>x dB<br/>-6.00 dB</p> |
| 5825 MHz |  <p>Ref 20.00 dBm</p> <p>Center 5.825 GHz<br/>#Res BW 100 kHz</p> <p>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth<br/>19.971 MHz</p> <p>Total Power<br/>21.9 dBm</p> <p>Transmit Freq Error<br/>295.11 kHz</p> <p>OBW Power<br/>99.00 %</p> <p>x dB Bandwidth<br/>17.60 MHz</p> <p>x dB<br/>-6.00 dB</p> |



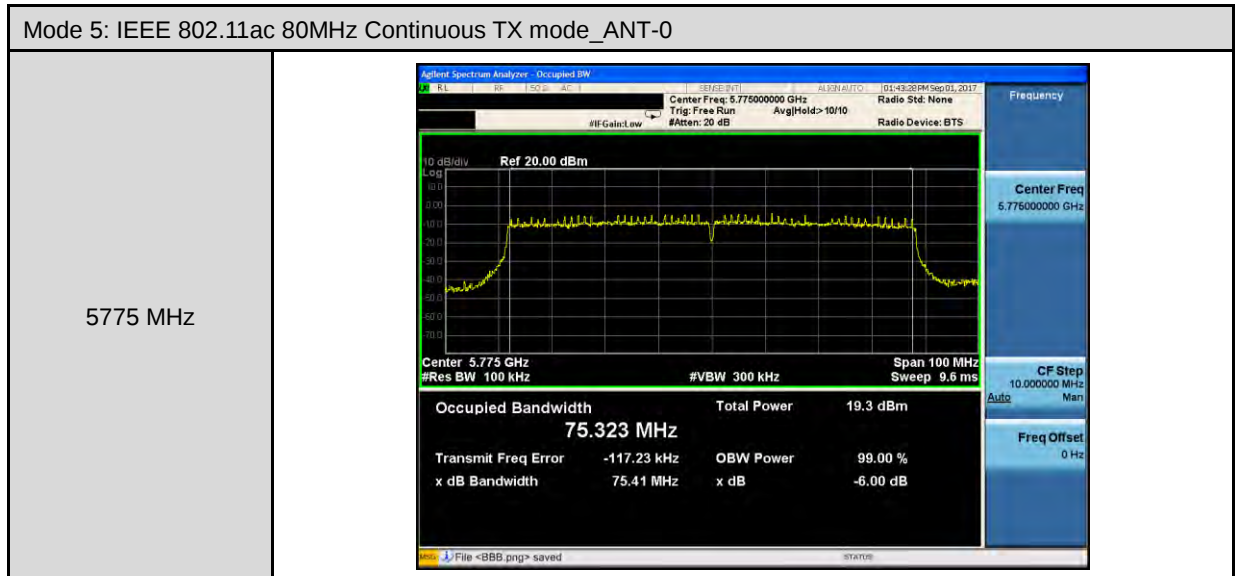
## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ANT-0

5755 MHz



5795 MHz







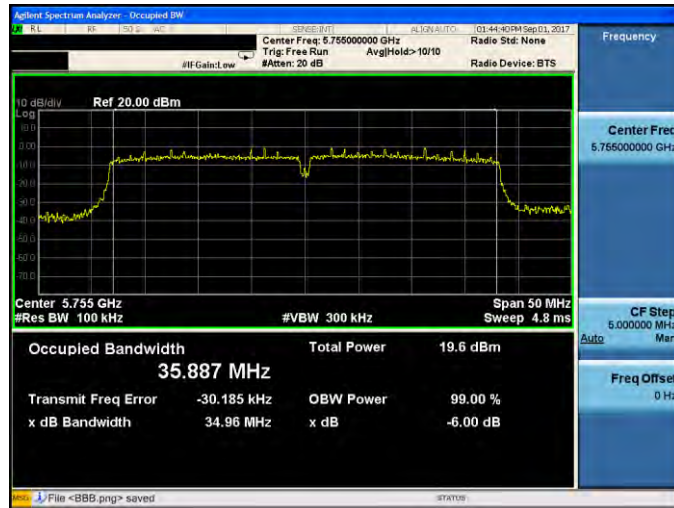
## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode\_ANT-1

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5745 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.74500000 GHz<br/>Trig: Free Run<br/>#IF Gain: Low<br/>#Atten: 20 dB<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref 20.00 dBm</p> <p>Center 5.745 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz<br/>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.599 MHz<br/>Total Power 18.4 dBm</p> <p>Transmit Freq Error -25.114 kHz<br/>OBW Power 99.00 %<br/>x dB Bandwidth 17.64 MHz<br/>x dB -6.00 dB</p> <p>File &lt;BBB.png&gt; saved</p>  |
| 5785 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.78500000 GHz<br/>Trig: Free Run<br/>#IF Gain: Low<br/>#Atten: 20 dB<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref 20.00 dBm</p> <p>Center 5.785 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz<br/>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.603 MHz<br/>Total Power 18.9 dBm</p> <p>Transmit Freq Error -21.478 kHz<br/>OBW Power 99.00 %<br/>x dB Bandwidth 17.65 MHz<br/>x dB -6.00 dB</p> <p>File &lt;BBB.png&gt; saved</p> |
| 5825 MHz |  <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 5.82500000 GHz<br/>Trig: Free Run<br/>#IF Gain: Low<br/>#Atten: 20 dB<br/>Radio Std: None<br/>Radio Device: BTS</p> <p>Ref 20.00 dBm</p> <p>Center 5.825 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz<br/>Span 30 MHz<br/>Sweep 2.933 ms</p> <p>Occupied Bandwidth 17.671 MHz<br/>Total Power 20.8 dBm</p> <p>Transmit Freq Error -4.649 kHz<br/>OBW Power 99.00 %<br/>x dB Bandwidth 17.61 MHz<br/>x dB -6.00 dB</p> <p>File &lt;BBB.png&gt; saved</p> |

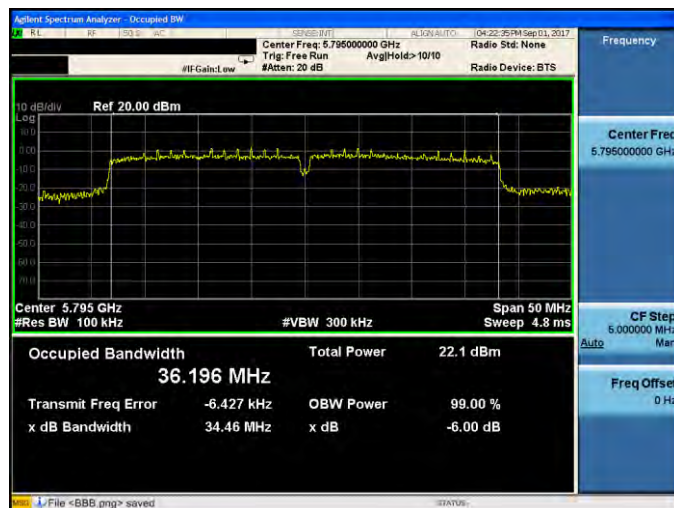


## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ANT-1

5755 MHz



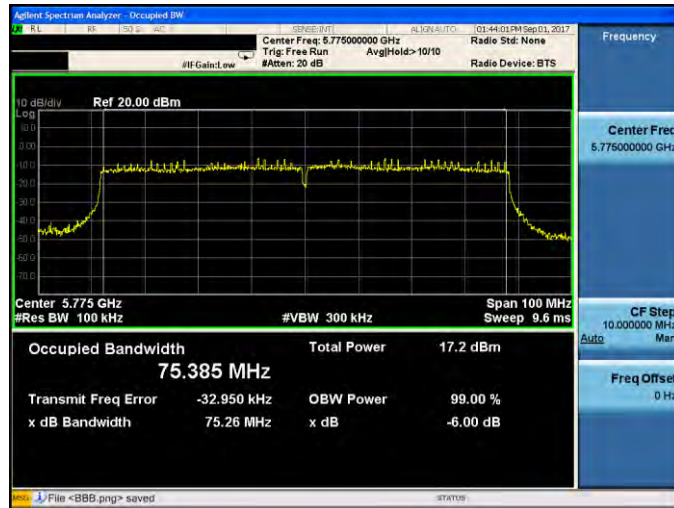
5795 MHz





## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode\_ANT-1

5775 MHz



## 4.7. Peak Power Spectral Density Measurement

### ■ Limit

Conducted power spectral density

| Frequency Range<br>(MHz) | FCC Limit     |
|--------------------------|---------------|
|                          | Master        |
| 5.150 ~ 5.250 GHz        | 17 dBm/MHz    |
| 5.725 ~ 5.850 GHz        | 30 dBm/500KHz |

According FCC KDB 662911 D01 v02r01 – for power spectral density measurements on IEEE802.11 devices,

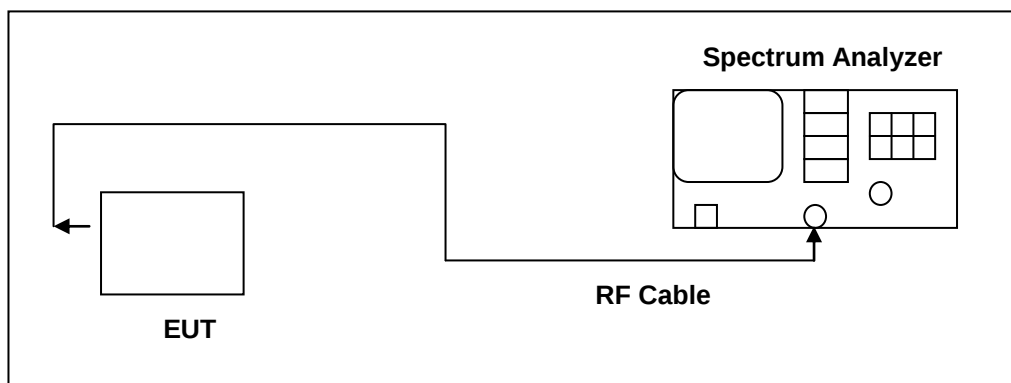
\* CDD/BF mode : Directional Gain =  $10 \cdot \log\{[10^{(G1/20)} + 10^{(G2/20)} + \dots + 10^{(Gn/20)}]^2 / NANT\}$   
= 9.19 dBi > 6dBi (5.150 ~ 5.250 GHz)

\* CDD/BF mode : Directional Gain =  $10 \cdot \log\{[10^{(G1/20)} + 10^{(G2/20)} + \dots + 10^{(Gn/20)}]^2 / NANT\}$   
= 9.06 dBi > 6dBi (5.725 ~ 5.850 GHz)

\* CDD/BF mode power limit shall be reduced = 17 – 3.19 = 13.81 dBm/MHz (5.150 ~ 5.250 GHz)

\* CDD/BF mode power limit shall be reduced = 30 – 3.06 = 26.94 dBm/500KHz (5.725 ~ 5.850 GHz)

### ■ Test Setup



### ■ Test Instruments

| Equipment         | Manufacturer | Model Number | Serial Number | Cal. Date  | Remark |
|-------------------|--------------|--------------|---------------|------------|--------|
| Spectrum Analyzer | Agilent      | E4445A       | MY45300744    | 12/19/2016 | 1 year |
| Test Site         | ATL          | TE05         | TE05          | N.C.R.     | -----  |

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

**■ Test Procedure**

The test is performed in accordance with KDB789033: D02 General UNII Test Procedures New Rules v01r04, Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

| Spectrum Parameter                                                                                                                       | Setting                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Attenuation                                                                                                                              | Auto                                                         |
| Span Frequency                                                                                                                           | Encompass the entire emissions bandwidth (EBW) of the signal |
| RBW                                                                                                                                      | 1 MHz<br>(5725 ~ 5850MHz use 100 kHz)                        |
| VBW                                                                                                                                      | 3 MHz<br>(5725 ~ 5850MHz use 300 kHz)                        |
| Detector                                                                                                                                 | RMS                                                          |
| Trace                                                                                                                                    | AVERAGE                                                      |
| Sweep Time                                                                                                                               | Auto                                                         |
| Trace Average                                                                                                                            | 100 times                                                    |
| Note: If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/100\text{kHz})$ to the measured result. |                                                              |

# Test Result

|                 |                                  |                  |                      |                 |
|-----------------|----------------------------------|------------------|----------------------|-----------------|
| Test Item       | Conducted power spectral density |                  |                      |                 |
| Test Mode       | Mode 2: IEEE 802.11a link mode   |                  |                      |                 |
| Frequency (MHz) | ANT-0                            |                  |                      |                 |
|                 | Measurement (dBm/MHz)            | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5180            | 0.377                            | 0.124            | 0.501                | < 13.81         |
| 5200            | 0.536                            | 0.124            | 0.660                |                 |
| 5240            | 0.800                            | 0.124            | 0.924                |                 |
| Frequency (MHz) | ANT-1                            |                  |                      |                 |
|                 | Measurement (dBm/MHz)            | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5180            | -2.431                           | 0.124            | -2.307               | < 13.81         |
| 5200            | -2.474                           | 0.124            | -2.350               |                 |
| 5240            | -2.340                           | 0.124            | -2.216               |                 |
| Frequency (MHz) | ANT-0+1                          |                  |                      | Limit (dBm/MHz) |
|                 | Calculated (dBm/MHz)             |                  |                      |                 |
| 5180            | 2.330                            |                  |                      | < 13.81         |
| 5200            | 2.421                            |                  |                      |                 |
| 5240            | 2.642                            |                  |                      |                 |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

|                    |                                  |                     |                            |                       |
|--------------------|----------------------------------|---------------------|----------------------------|-----------------------|
| Test Item          | Conducted power spectral density |                     |                            |                       |
| Test Mode          | Mode 2: IEEE 802.11a link mode   |                     |                            |                       |
| Frequency<br>(MHz) | ANT-0                            |                     |                            |                       |
|                    | Measurement<br>(dBm/100KHz)      | Duty Factor<br>(dB) | Calculated<br>(dBm/500KHz) | Limit<br>(dBm/500KHz) |
| 5745               | -4.97                            | 0.124               | 2.14                       | < 26.94               |
| 5785               | -5.59                            | 0.124               | 1.52                       |                       |
| 5825               | -5.33                            | 0.124               | 1.79                       |                       |
| Frequency<br>(MHz) | ANT-1                            |                     |                            |                       |
|                    | Measurement<br>(dBm/100KHz)      | Duty Factor<br>(dB) | Calculated<br>(dBm/500KHz) | Limit<br>(dBm/500KHz) |
| 5745               | -6.71                            | 0.124               | 0.40                       | < 26.94               |
| 5785               | -7.28                            | 0.124               | -0.17                      |                       |
| 5825               | -6.59                            | 0.124               | 0.53                       |                       |
| Frequency<br>(MHz) | ANT-0+1                          |                     |                            | Limit<br>(dBm/500KHz) |
|                    | Calculated<br>(dBm/500KHz)       |                     |                            |                       |
| 5745               | 4.37                             |                     |                            | < 26.94               |
| 5785               | 3.77                             |                     |                            |                       |
| 5825               | 4.21                             |                     |                            |                       |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10\*Log(500k/100k)

|                 |                                       |                  |                      |                 |
|-----------------|---------------------------------------|------------------|----------------------|-----------------|
| Test Item       | Conducted power spectral density      |                  |                      |                 |
| Test Mode       | Mode 3: IEEE 802.11ac 20MHz link mode |                  |                      |                 |
| Frequency (MHz) | ANT-0                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5180            | 0.277                                 | 0.060            | 0.337                | < 13.81         |
| 5200            | 0.026                                 | 0.060            | 0.086                |                 |
| 5240            | 0.079                                 | 0.060            | 0.139                |                 |
| Frequency (MHz) | ANT-1                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5180            | -2.405                                | 0.060            | -2.345               | < 13.81         |
| 5200            | -2.498                                | 0.060            | -2.438               |                 |
| 5240            | -2.773                                | 0.060            | -2.713               |                 |
| Frequency (MHz) | ANT-0+1                               |                  |                      | Limit (dBm/MHz) |
|                 | Calculated (dBm/MHz)                  |                  |                      |                 |
| 5180            | 2.210                                 |                  |                      | < 13.81         |
| 5200            | 2.015                                 |                  |                      |                 |
| 5240            | 1.953                                 |                  |                      |                 |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.



|                 |                                       |                  |                         |                    |
|-----------------|---------------------------------------|------------------|-------------------------|--------------------|
| Test Item       | Conducted power spectral density      |                  |                         |                    |
| Test Mode       | Mode 3: IEEE 802.11ac 20MHz link mode |                  |                         |                    |
| Frequency (MHz) | ANT-0                                 |                  |                         |                    |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/500KHz) |
| 5745            | -4.90                                 | 0.060            | 2.15                    | < 26.94            |
| 5785            | -4.22                                 | 0.060            | 2.83                    |                    |
| 5825            | -4.93                                 | 0.060            | 2.12                    |                    |
| Frequency (MHz) | ANT-1                                 |                  |                         |                    |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/500KHz) |
| 5745            | -6.31                                 | 0.060            | 0.74                    | < 26.94            |
| 5785            | -5.88                                 | 0.060            | 1.17                    |                    |
| 5825            | -5.69                                 | 0.060            | 1.36                    |                    |
| Frequency (MHz) | ANT-0+1                               |                  |                         | Limit (dBm/500KHz) |
|                 | Calculated (dBm/500KHz)               |                  |                         |                    |
| 5745            | 4.51                                  |                  |                         | < 26.94            |
| 5785            | 5.09                                  |                  |                         |                    |
| 5825            | 4.77                                  |                  |                         |                    |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10\*Log(500k/100k)

|                 |                                       |                  |                      |                 |
|-----------------|---------------------------------------|------------------|----------------------|-----------------|
| Test Item       | Conducted power spectral density      |                  |                      |                 |
| Test Mode       | Mode 4: IEEE 802.11ac 40MHz link mode |                  |                      |                 |
| Frequency (MHz) | ANT-0                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5190            | -3.123                                | 0.105            | -3.018               | < 13.81         |
| 5230            | -2.518                                | 0.105            | -2.413               |                 |
| Frequency (MHz) | ANT-1                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5190            | -5.831                                | 0.105            | -5.726               | < 13.81         |
| 5230            | -5.200                                | 0.105            | -5.095               |                 |
| Frequency (MHz) | ANT-0+1                               |                  |                      | Limit (dBm/MHz) |
|                 | Calculated (dBm/MHz)                  |                  |                      |                 |
| 5190            | -1.154                                |                  |                      | < 13.81         |
| 5230            | -0.540                                |                  |                      |                 |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.



|                 |                                       |                  |                         |                    |
|-----------------|---------------------------------------|------------------|-------------------------|--------------------|
| Test Item       | Conducted power spectral density      |                  |                         |                    |
| Test Mode       | Mode 4: IEEE 802.11ac 40MHz link mode |                  |                         |                    |
| Frequency (MHz) | ANT-0                                 |                  |                         |                    |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/500KHz) |
| 5755            | -5.80                                 | 0.105            | 1.29                    | < 26.94            |
| 5795            | -6.30                                 | 0.105            | 0.79                    |                    |
| Frequency (MHz) | ANT-1                                 |                  |                         |                    |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/500KHz) |
| 5755            | -8.11                                 | 0.105            | -1.02                   | < 26.94            |
| 5795            | -5.45                                 | 0.105            | 1.65                    |                    |
| Frequency (MHz) | ANT-0+1                               |                  |                         |                    |
|                 | Calculated (dBm/500KHz)               |                  |                         | Limit (dBm/500KHz) |
| 5755            | 3.30                                  |                  |                         | < 26.94            |
| 5795            | 4.25                                  |                  |                         |                    |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10\*Log(500k/100k)



|                 |                                       |                  |                      |                 |
|-----------------|---------------------------------------|------------------|----------------------|-----------------|
| Test Item       | Conducted power spectral density      |                  |                      |                 |
| Test Mode       | Mode 5: IEEE 802.11ac 80MHz link mode |                  |                      |                 |
| Frequency (MHz) | ANT-0                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5210            | -9.340                                | 0.272            | -9.068               | < 13.81         |
| Frequency (MHz) | ANT-1                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5210            | -11.834                               | 0.272            | -11.562              | < 13.81         |
| Frequency (MHz) | ANT-0+1                               |                  |                      |                 |
|                 | Calculated (dBm/MHz)                  |                  |                      | Limit (dBm/MHz) |
| 5210            | -7.128                                |                  |                      | < 13.81         |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.



|                 |                                       |                  |                         |                 |
|-----------------|---------------------------------------|------------------|-------------------------|-----------------|
| Test Item       | Conducted power spectral density      |                  |                         |                 |
| Test Mode       | Mode 5: IEEE 802.11ac 80MHz link mode |                  |                         |                 |
| Frequency (MHz) | ANT-0                                 |                  |                         |                 |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/MHz) |
| 5775            | -12.33                                | 0.272            | -5.07                   | < 26.94         |
| Frequency (MHz) | ANT-1                                 |                  |                         |                 |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/MHz) |
| 5775            | -14.34                                | 0.272            | -7.08                   | < 26.94         |
| Frequency (MHz) | ANT-0+1                               |                  |                         |                 |
|                 | Calculated (dBm/500KHz)               |                  |                         | Limit (dBm/MHz) |
| 5775            | -2.95                                 |                  |                         | < 26.94         |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10\*Log(500k/100k)

## Beamforming on

|                 |                                       |                  |                      |                 |
|-----------------|---------------------------------------|------------------|----------------------|-----------------|
| Test Item       | Conducted power spectral density      |                  |                      |                 |
| Test Mode       | Mode 3: IEEE 802.11ac 20MHz link mode |                  |                      |                 |
| Frequency (MHz) | ANT-0                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5180            | -1.182                                | 0.051            | -1.131               | < 13.81         |
| 5200            | -1.459                                | 0.051            | -1.408               |                 |
| 5240            | -1.051                                | 0.051            | -1.000               |                 |
| Frequency (MHz) | ANT-1                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5180            | -4.047                                | 0.051            | -3.996               | < 13.81         |
| 5200            | -4.223                                | 0.051            | -4.172               |                 |
| 5240            | -3.628                                | 0.051            | -3.577               |                 |
| Frequency (MHz) | ANT-0+1                               |                  |                      | Limit (dBm/MHz) |
|                 | Calculated (dBm/MHz)                  |                  |                      |                 |
| 5180            | 0.679                                 |                  |                      | < 13.81         |
| 5200            | 0.437                                 |                  |                      |                 |
| 5240            | 0.911                                 |                  |                      |                 |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.



|                 |                                       |                  |                         |                    |
|-----------------|---------------------------------------|------------------|-------------------------|--------------------|
| Test Item       | Conducted power spectral density      |                  |                         |                    |
| Test Mode       | Mode 3: IEEE 802.11ac 20MHz link mode |                  |                         |                    |
| Frequency (MHz) | ANT-0                                 |                  |                         |                    |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/500KHz) |
| 5745            | -5.56                                 | 0.051            | 1.48                    | < 26.94            |
| 5785            | -5.28                                 | 0.051            | 1.76                    |                    |
| 5825            | -6.11                                 | 0.051            | 0.93                    |                    |
| Frequency (MHz) | ANT-1                                 |                  |                         |                    |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/500KHz) |
| 5745            | -7.80                                 | 0.051            | -0.76                   | < 26.94            |
| 5785            | -6.91                                 | 0.051            | 0.13                    |                    |
| 5825            | -7.24                                 | 0.051            | -0.20                   |                    |
| Frequency (MHz) | ANT-0+1                               |                  |                         | Limit (dBm/500KHz) |
|                 | Calculated (dBm/500KHz)               |                  |                         |                    |
| 5745            | 3.52                                  |                  |                         | < 26.94            |
| 5785            | 4.03                                  |                  |                         |                    |
| 5825            | 3.41                                  |                  |                         |                    |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10\*Log(500k/100k)

|                 |                                       |                  |                      |                 |
|-----------------|---------------------------------------|------------------|----------------------|-----------------|
| Test Item       | Conducted power spectral density      |                  |                      |                 |
| Test Mode       | Mode 4: IEEE 802.11ac 40MHz link mode |                  |                      |                 |
| Frequency (MHz) | ANT-0                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5190            | -4.901                                | 0.105            | -4.796               | < 13.81         |
| 5230            | -4.207                                | 0.105            | -4.102               |                 |
| Frequency (MHz) | ANT-1                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5190            | -7.563                                | 0.105            | -7.458               | < 13.81         |
| 5230            | -7.141                                | 0.105            | -7.036               |                 |
| Frequency (MHz) | ANT-0+1                               |                  |                      | Limit (dBm/MHz) |
|                 | Calculated (dBm/MHz)                  |                  |                      |                 |
| 5190            | -2.916                                |                  |                      | < 13.81         |
| 5230            | -2.316                                |                  |                      |                 |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.



|                 |                                       |                  |                         |                    |
|-----------------|---------------------------------------|------------------|-------------------------|--------------------|
| Test Item       | Conducted power spectral density      |                  |                         |                    |
| Test Mode       | Mode 4: IEEE 802.11ac 40MHz link mode |                  |                         |                    |
| Frequency (MHz) | ANT-0                                 |                  |                         |                    |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/500KHz) |
| 5755            | -7.27                                 | 0.105            | -0.18                   | < 26.94            |
| 5795            | -6.20                                 | 0.105            | 0.90                    |                    |
| Frequency (MHz) | ANT-1                                 |                  |                         |                    |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/500KHz) |
| 5755            | -9.79                                 | 0.105            | -2.69                   | < 26.94            |
| 5795            | -7.43                                 | 0.105            | -0.34                   |                    |
| Frequency (MHz) | ANT-0+1                               |                  |                         | Limit (dBm/500KHz) |
|                 | Calculated (dBm/500KHz)               |                  |                         |                    |
| 5755            | 1.76                                  |                  |                         | < 26.94            |
| 5795            | 3.33                                  |                  |                         |                    |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10\*Log(500k/100k)



|                 |                                       |                  |                      |                 |
|-----------------|---------------------------------------|------------------|----------------------|-----------------|
| Test Item       | Conducted power spectral density      |                  |                      |                 |
| Test Mode       | Mode 5: IEEE 802.11ac 80MHz link mode |                  |                      |                 |
| Frequency (MHz) | ANT-0                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5210            | -11.305                               | 0.252            | -11.053              | < 13.81         |
| Frequency (MHz) | ANT-1                                 |                  |                      |                 |
|                 | Measurement (dBm/MHz)                 | Duty Factor (dB) | Calculated (dBm/MHz) | Limit (dBm/MHz) |
| 5210            | -13.715                               | 0.252            | -13.463              | < 13.81         |
| Frequency (MHz) | ANT-0+1                               |                  |                      |                 |
|                 | Calculated (dBm/MHz)                  |                  |                      | Limit (dBm/MHz) |
| 5210            | -9.082                                |                  |                      | < 13.81         |

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.



|                 |                                       |                  |                         |                 |
|-----------------|---------------------------------------|------------------|-------------------------|-----------------|
| Test Item       | Conducted power spectral density      |                  |                         |                 |
| Test Mode       | Mode 5: IEEE 802.11ac 80MHz link mode |                  |                         |                 |
| Frequency (MHz) | ANT-0                                 |                  |                         |                 |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/MHz) |
| 5775            | -13.68                                | 0.252            | -6.44                   | < 26.94         |
| Frequency (MHz) | ANT-1                                 |                  |                         |                 |
|                 | Measurement (dBm/100KHz)              | Duty Factor (dB) | Calculated (dBm/500KHz) | Limit (dBm/MHz) |
| 5775            | -15.70                                | 0.252            | -8.46                   | < 26.94         |
| Frequency (MHz) | ANT-0+1                               |                  |                         |                 |
|                 | Calculated (dBm/500KHz)               |                  |                         | Limit (dBm/MHz) |
| 5775            | -4.32                                 |                  |                         | < 26.94         |

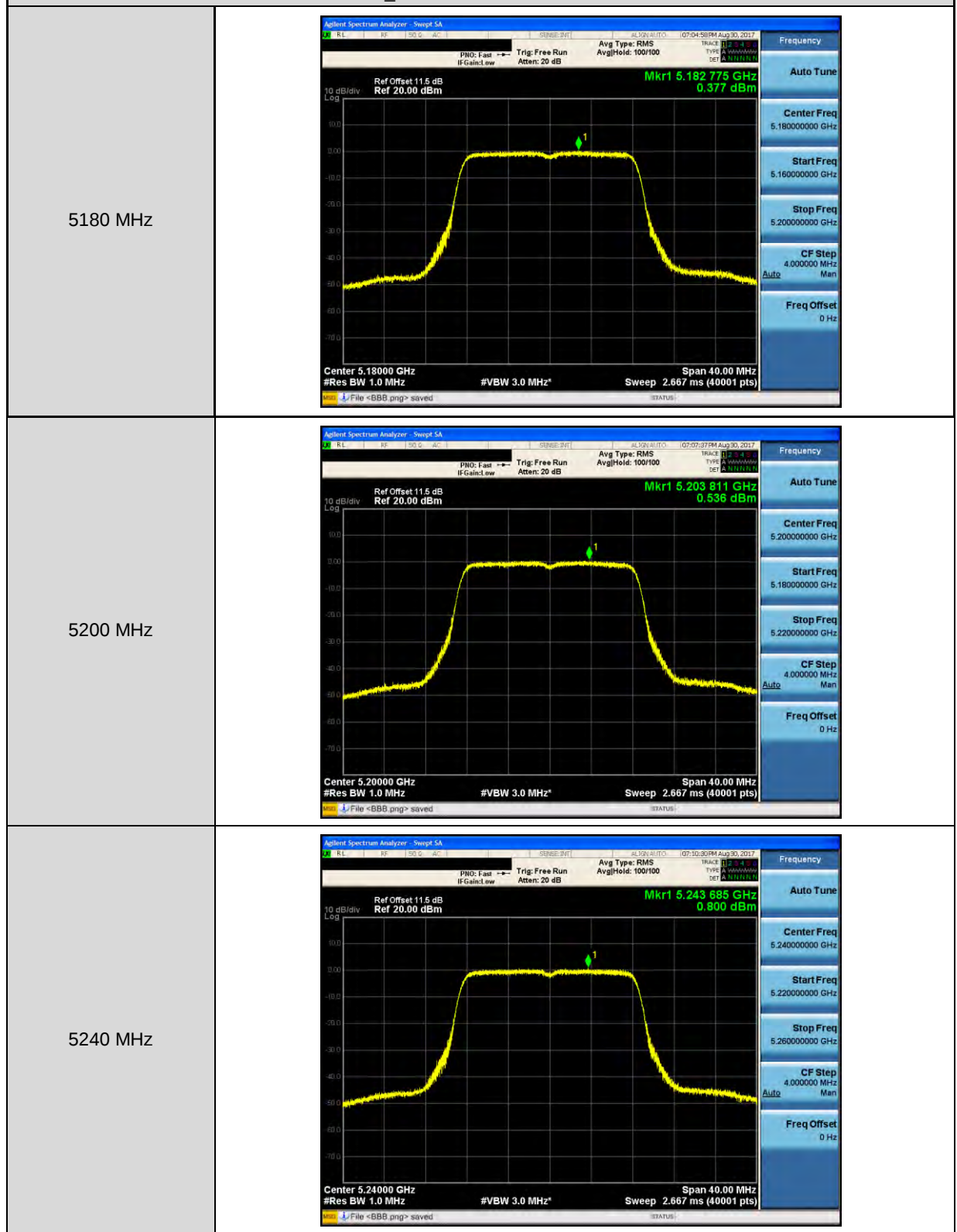
Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10\*Log(500k/100k)



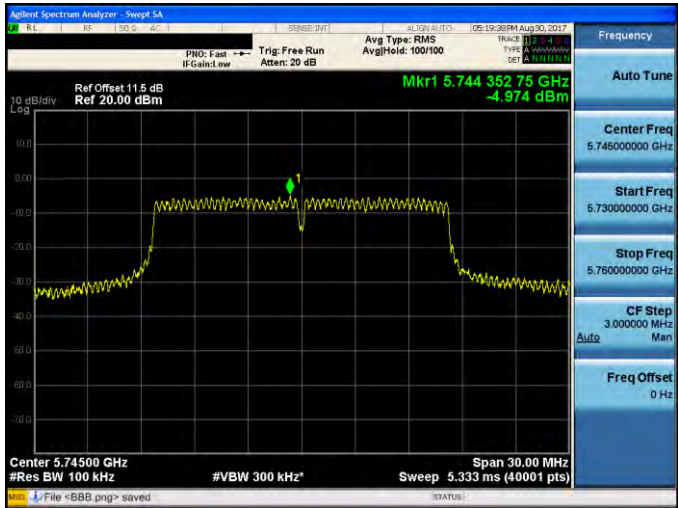
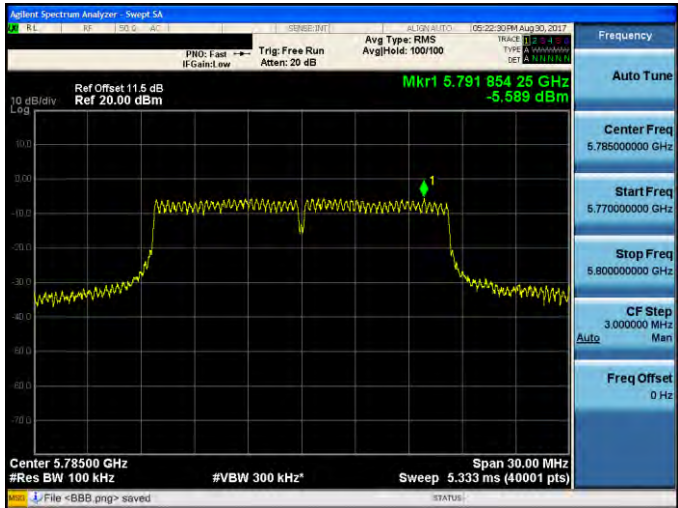
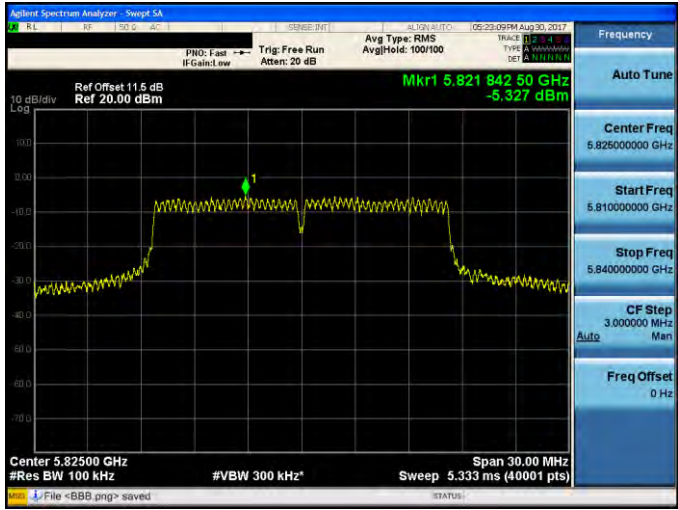
## ■ Test Graphs

Mode 2: IEEE 802.11a Continuous TX mode\_ ANT-0



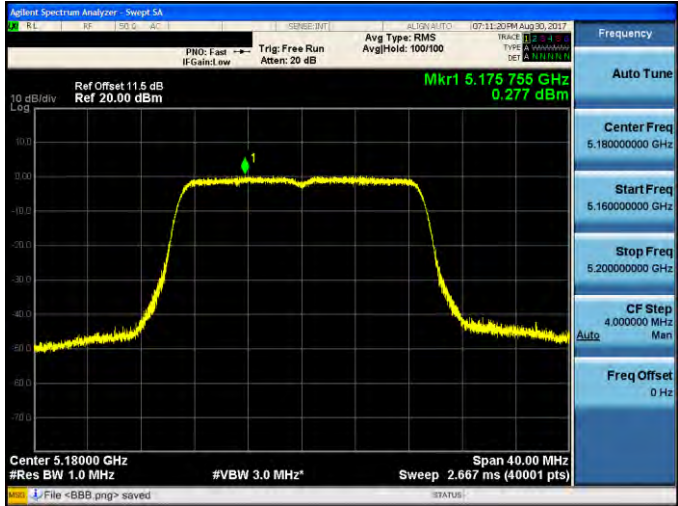
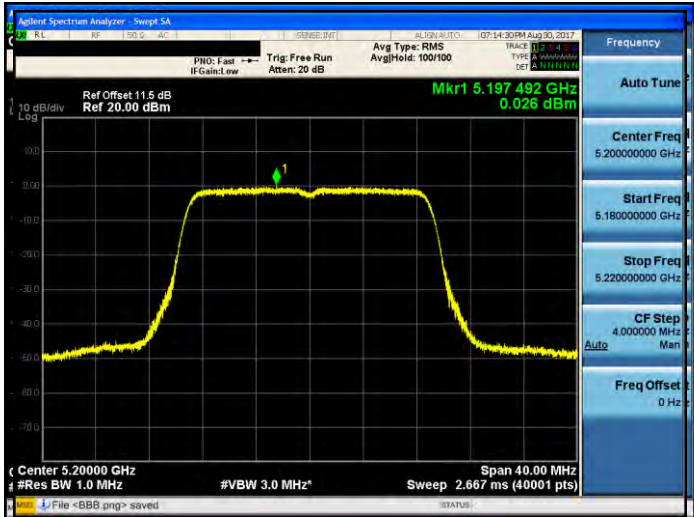
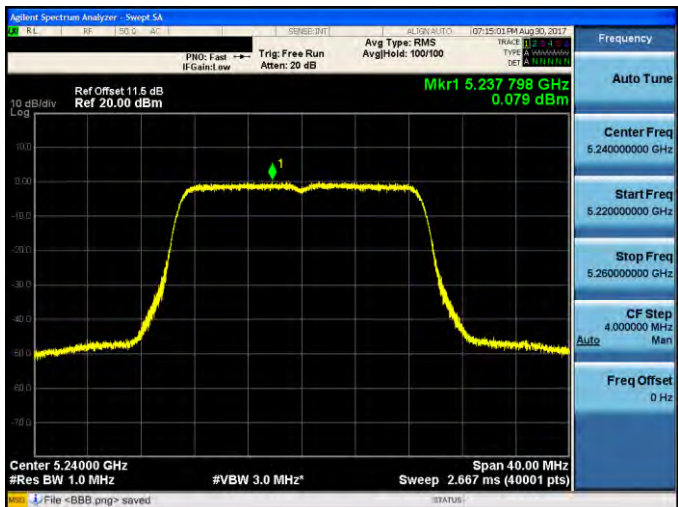


## Mode 2: IEEE 802.11a Continuous TX mode\_ ANT-0

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5745 MHz |  <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Mkr1 5.744 352.75 GHz<br/>-4.974 dBm</p> <p>Center 5.74500 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz*<br/>Sweep 5.333 ms (40001 pts)</p> <p>Span 30.00 MHz</p> <p>File &lt;BBB.png&gt; saved</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq<br/>5.745000000 GHz</p> <p>Start Freq<br/>5.730000000 GHz</p> <p>Stop Freq<br/>5.760000000 GHz</p> <p>CF Step<br/>3.000000 MHz<br/>Auto Man</p> <p>Freq Offset<br/>0 Hz</p>   |
| 5785 MHz |  <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Mkr1 5.791 854.25 GHz<br/>-5.589 dBm</p> <p>Center 5.78500 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz*<br/>Sweep 5.333 ms (40001 pts)</p> <p>Span 30.00 MHz</p> <p>File &lt;BBB.png&gt; saved</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq<br/>5.785000000 GHz</p> <p>Start Freq<br/>5.770000000 GHz</p> <p>Stop Freq<br/>5.800000000 GHz</p> <p>CF Step<br/>3.000000 MHz<br/>Auto Man</p> <p>Freq Offset<br/>0 Hz</p>  |
| 5825 MHz |  <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Mkr1 5.821 842.50 GHz<br/>-5.327 dBm</p> <p>Center 5.82500 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz*<br/>Sweep 5.333 ms (40001 pts)</p> <p>Span 30.00 MHz</p> <p>File &lt;BBB.png&gt; saved</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq<br/>5.825000000 GHz</p> <p>Start Freq<br/>5.810000000 GHz</p> <p>Stop Freq<br/>5.840000000 GHz</p> <p>CF Step<br/>3.000000 MHz<br/>Auto Man</p> <p>Freq Offset<br/>0 Hz</p> |

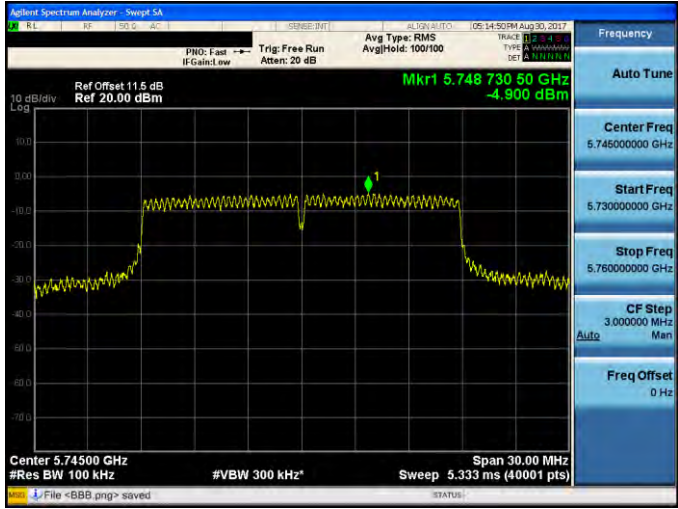
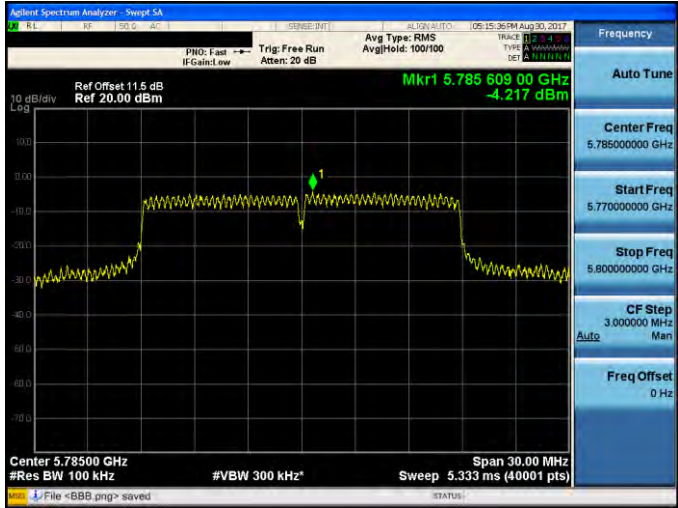
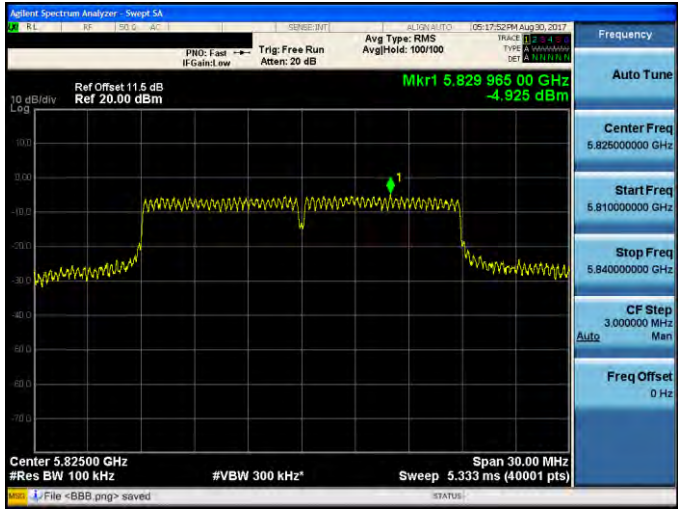


## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode \_ ANT-0

|          |                                                                                      |
|----------|--------------------------------------------------------------------------------------|
| 5180 MHz |    |
| 5200 MHz |   |
| 5240 MHz |  |

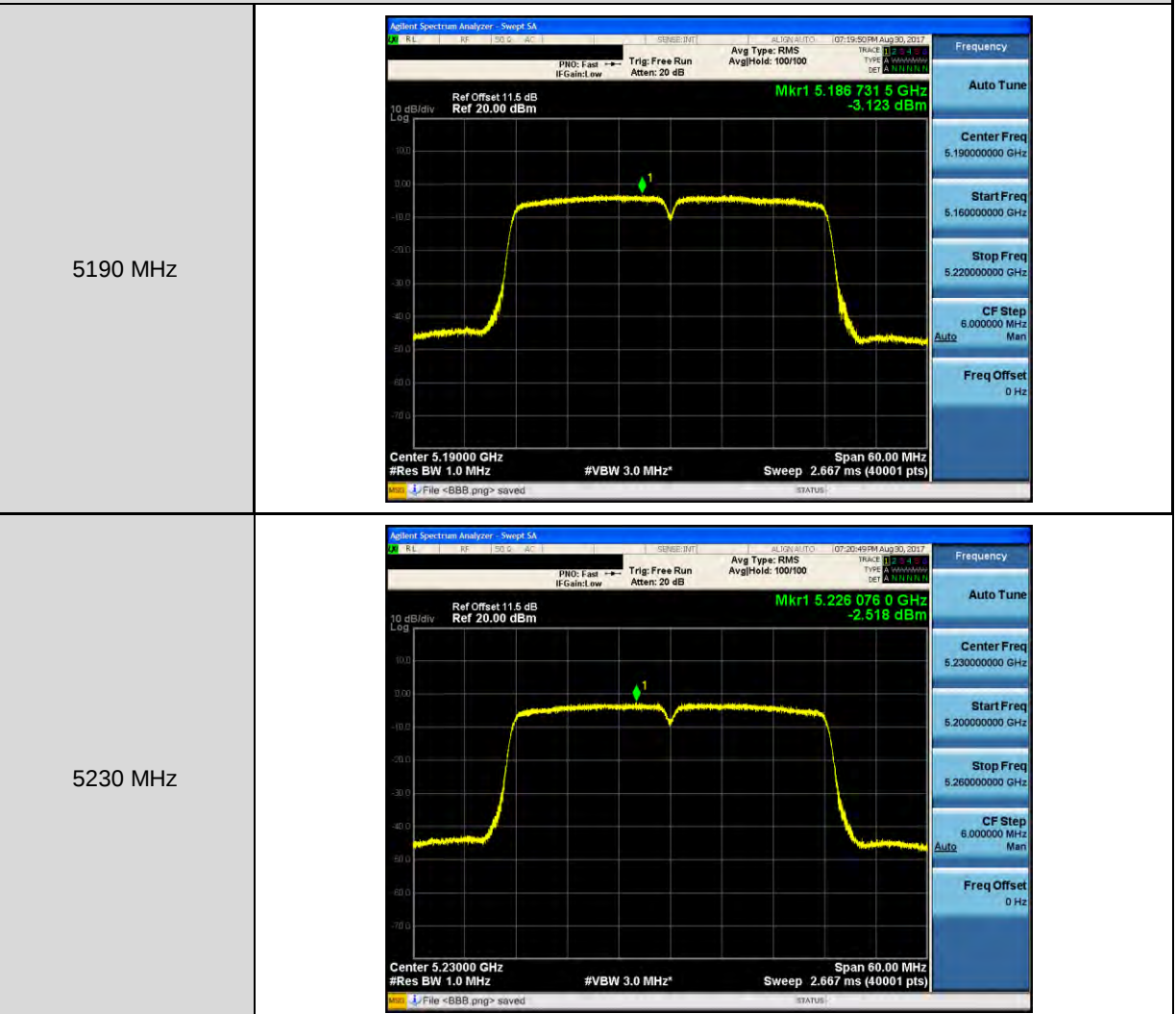


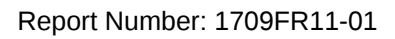
## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode \_ ANT-0

|          |                                                                                                                                                                                                                                                                                                                                     |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5745 MHz |  <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Mkr1 5.748 730 50 GHz<br/>-4.900 dBm</p> <p>Center 5.74500 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz*<br/>Sweep 5.333 ms (40001 pts)</p> <p>Span 30.00 MHz</p> <p>File &lt;558.png&gt; saved</p>   |
| 5785 MHz |  <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Mkr1 5.785 609 00 GHz<br/>-4.217 dBm</p> <p>Center 5.78500 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz*<br/>Sweep 5.333 ms (40001 pts)</p> <p>Span 30.00 MHz</p> <p>File &lt;558.png&gt; saved</p>  |
| 5825 MHz |  <p>Ref Offset 11.5 dB<br/>Ref 20.00 dBm</p> <p>Mkr1 5.829 965 00 GHz<br/>-4.925 dBm</p> <p>Center 5.82500 GHz<br/>#Res BW 100 kHz<br/>#VBW 300 kHz*<br/>Sweep 5.333 ms (40001 pts)</p> <p>Span 30.00 MHz</p> <p>File &lt;558.png&gt; saved</p> |



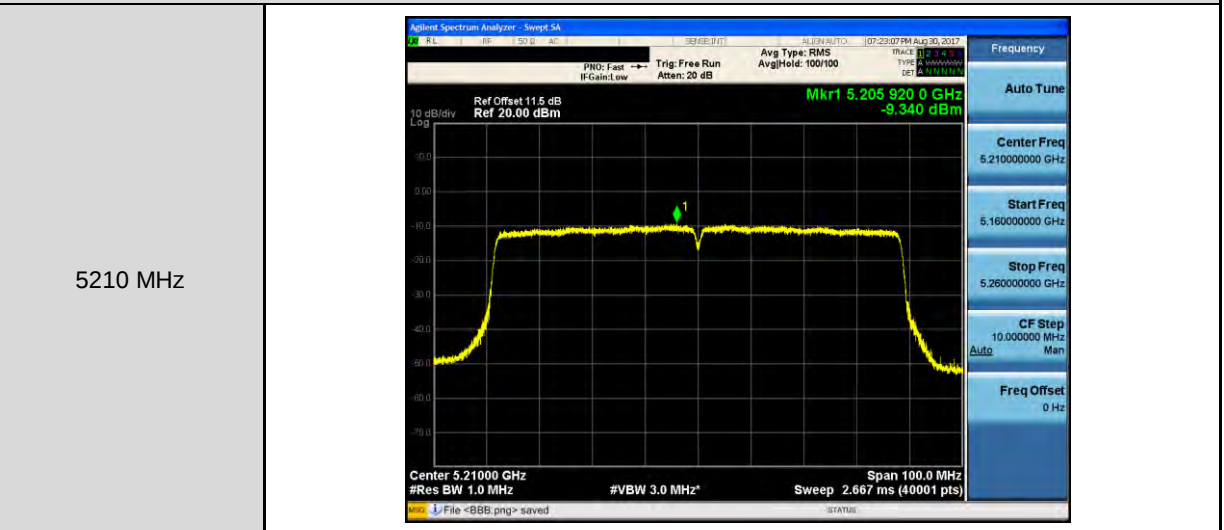
## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ ANT-0



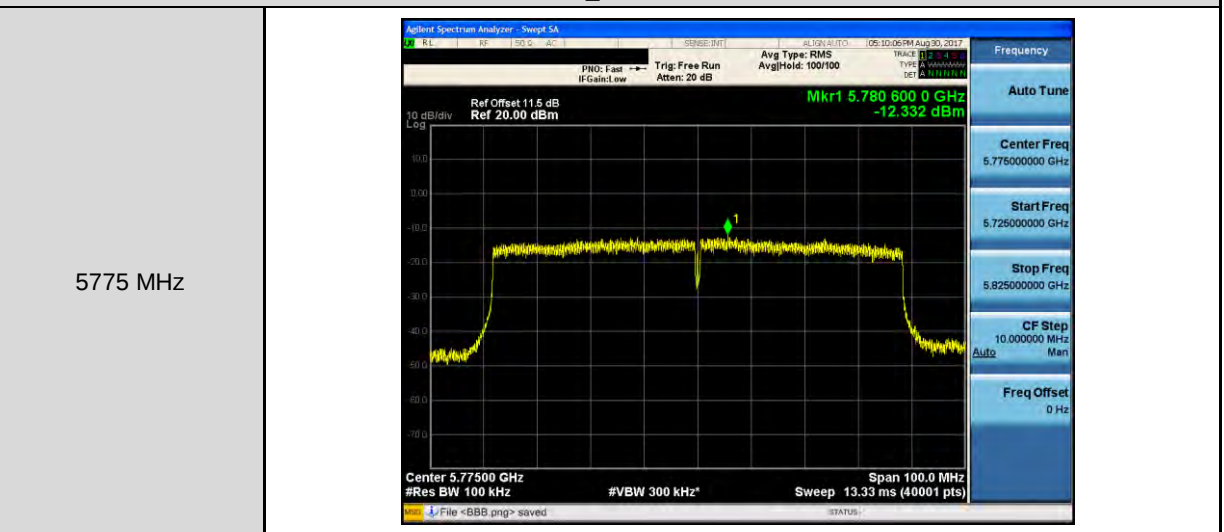




## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode \_ANT-0

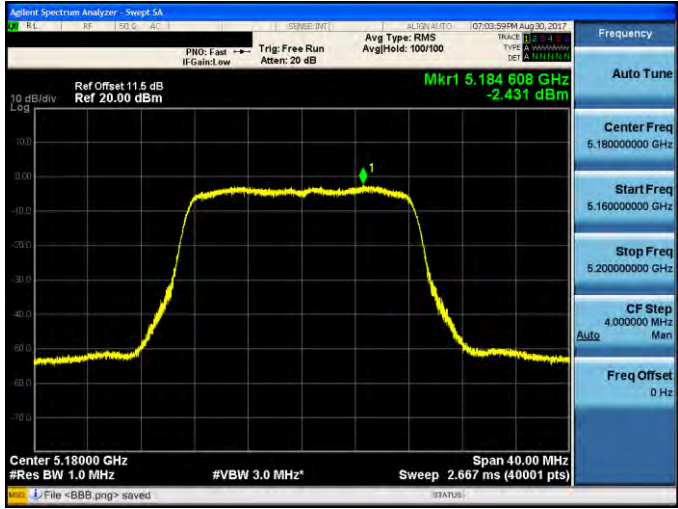
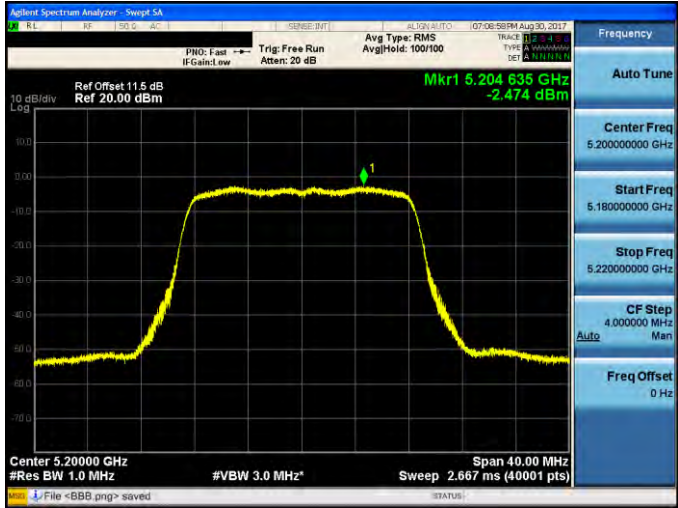
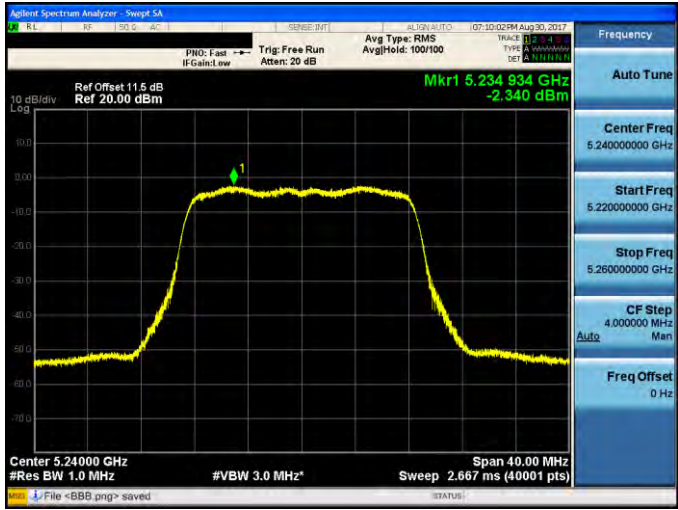


## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode \_ANT-0





## Mode 2: IEEE 802.11a Continuous TX mode\_ ANT-1

|          |                                                                                      |
|----------|--------------------------------------------------------------------------------------|
| 5180 MHz |    |
| 5200 MHz |   |
| 5240 MHz |  |



## Mode 2: IEEE 802.11a Continuous TX mode\_ ANT-1

|          |  |
|----------|--|
| 5745 MHz |  |
| 5785 MHz |  |
| 5825 MHz |  |

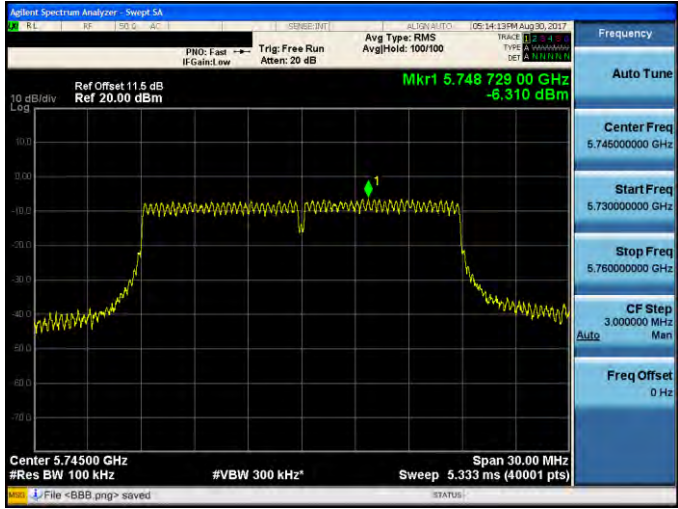
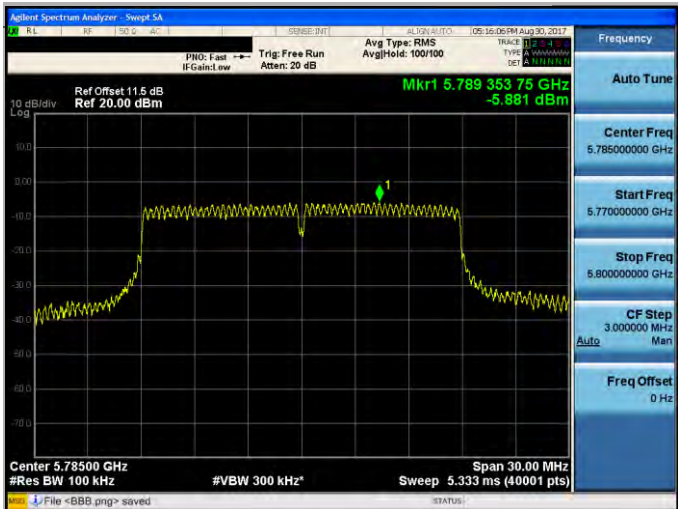
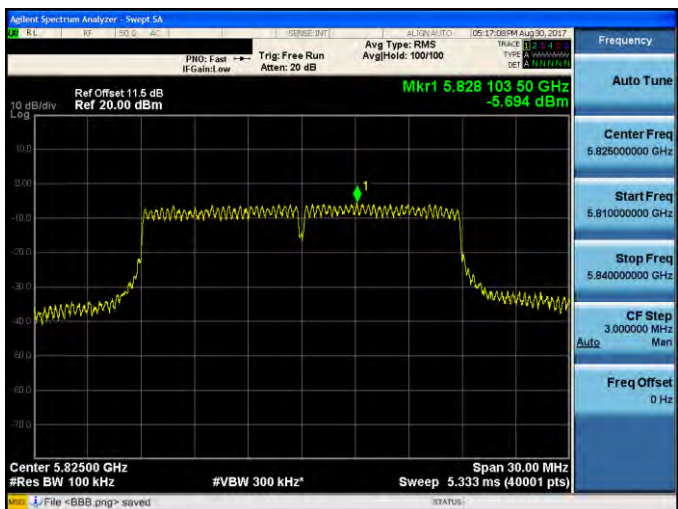


## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode \_ ANT-1

|          |  |
|----------|--|
| 5180 MHz |  |
| 5200 MHz |  |
| 5240 MHz |  |

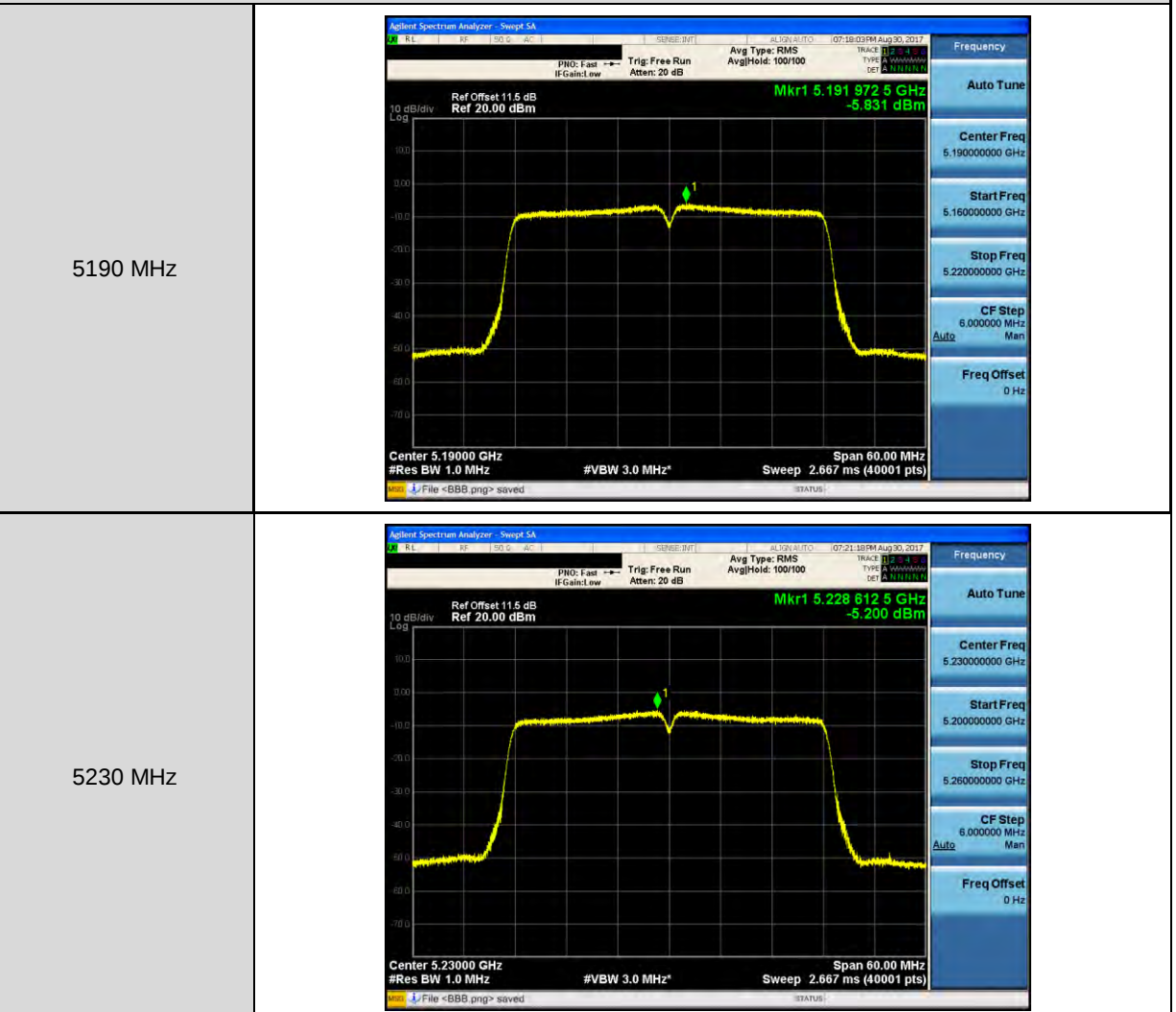


## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode \_ ANT-1

|          |                                                                                      |
|----------|--------------------------------------------------------------------------------------|
| 5745 MHz |    |
| 5785 MHz |   |
| 5825 MHz |  |



## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ ANT-1





## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ ANT-1





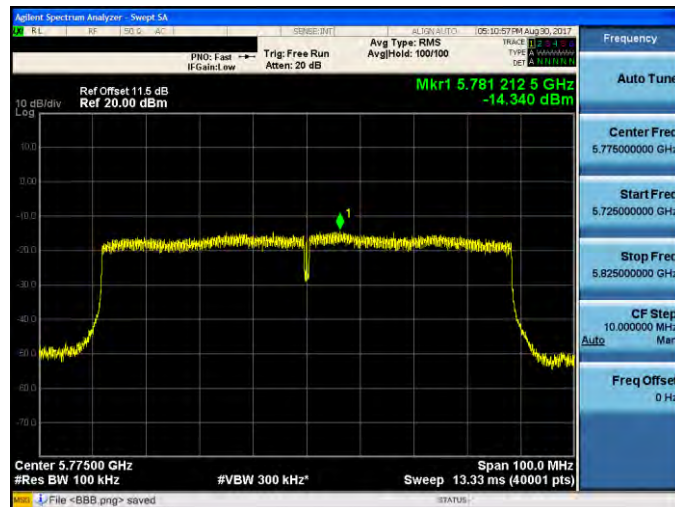
## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode \_ANT-1

5210 MHz



## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode \_ANT-1

5775 MHz

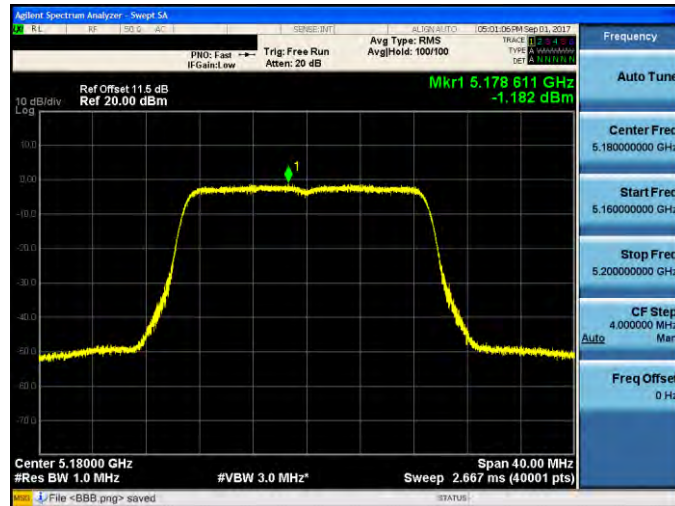




Beamforming on

Mode 3: IEEE 802.11ac 20MHz Continuous TX mode \_ ANT-0

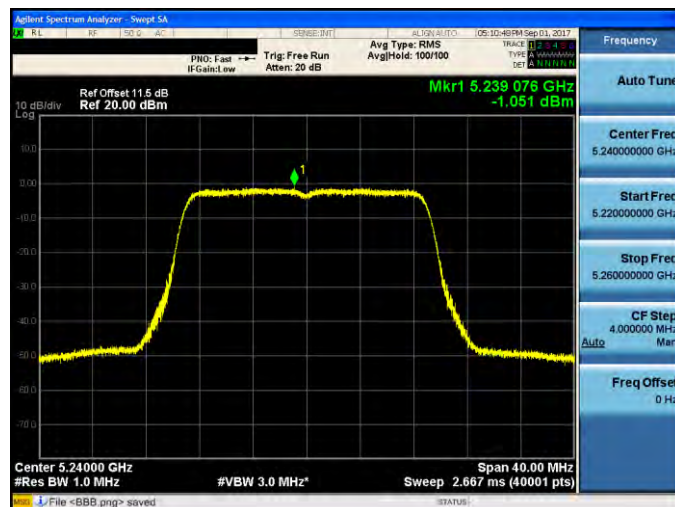
5180 MHz



5200 MHz

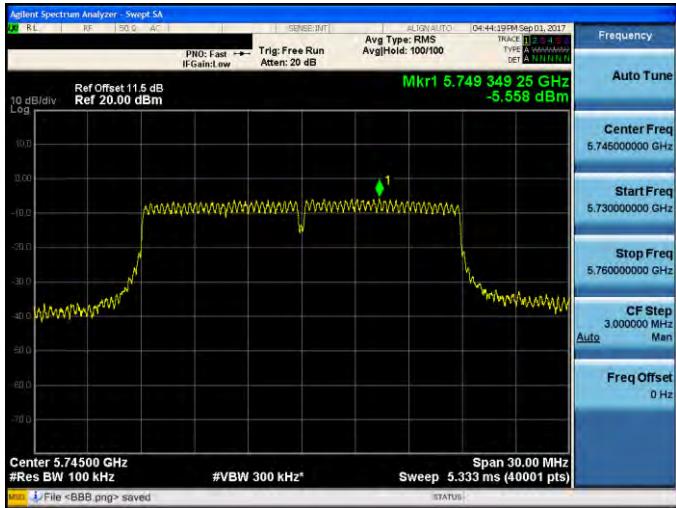
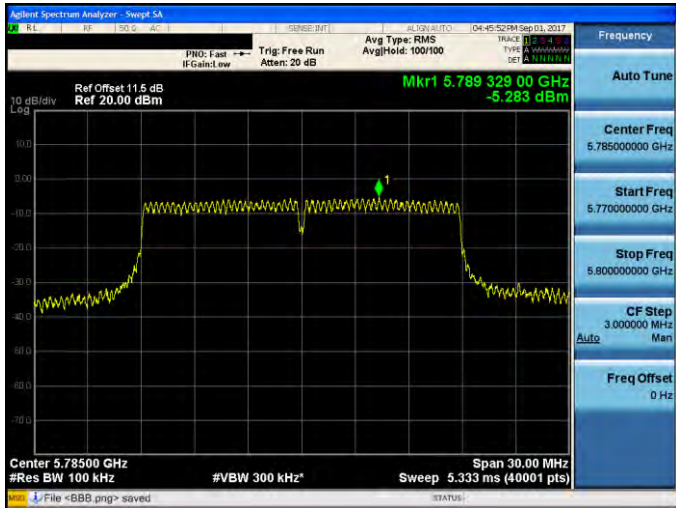
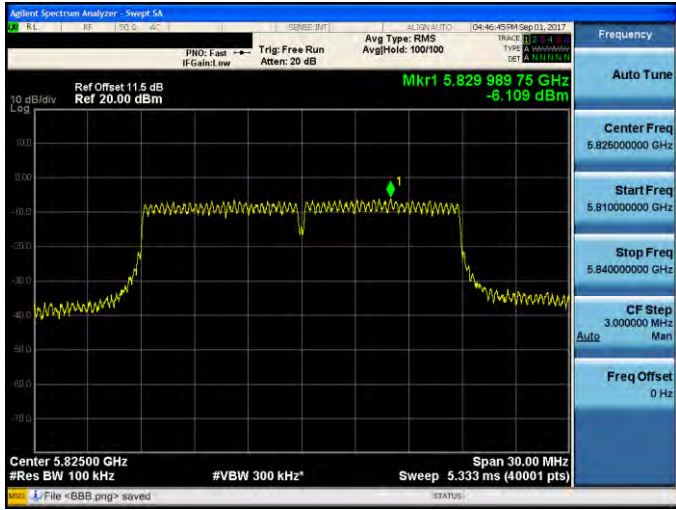


5240 MHz



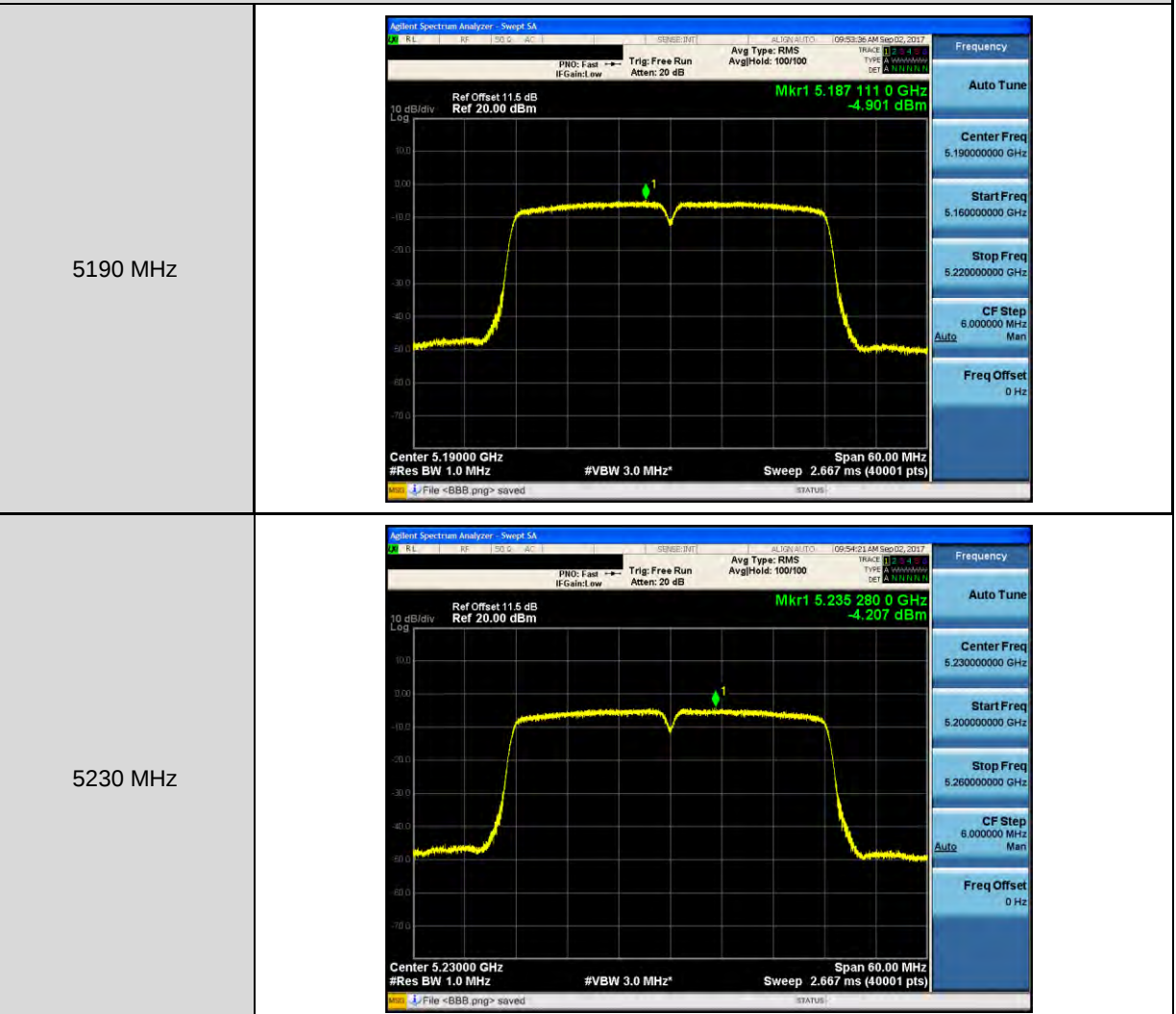


## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode \_ ANT-0

|          |                                                                                      |
|----------|--------------------------------------------------------------------------------------|
| 5745 MHz |    |
| 5785 MHz |   |
| 5825 MHz |  |



## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ ANT-0





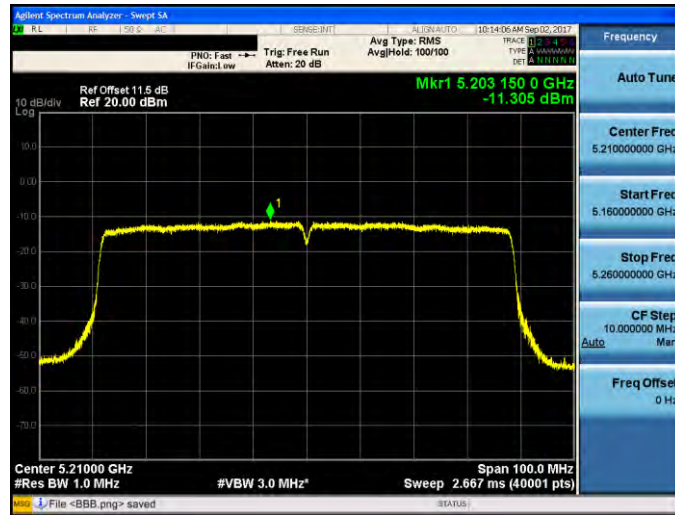
## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ ANT-0





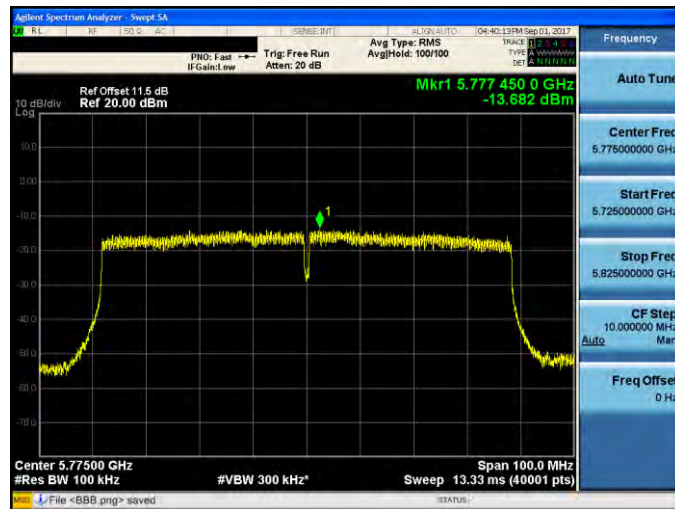
## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode \_ANT-0

5210 MHz



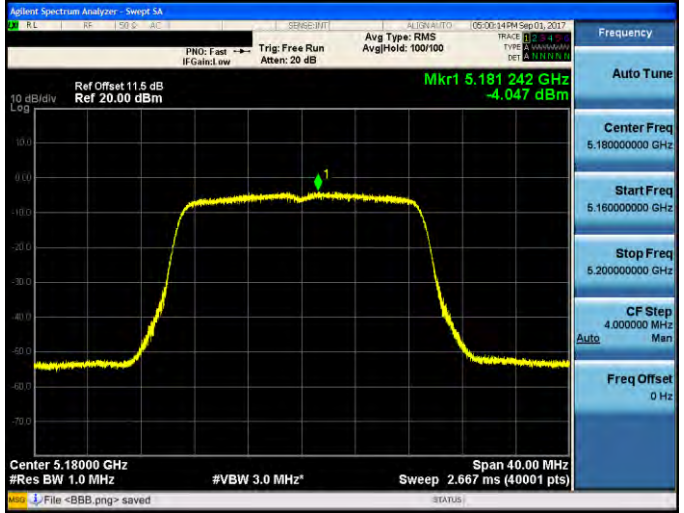
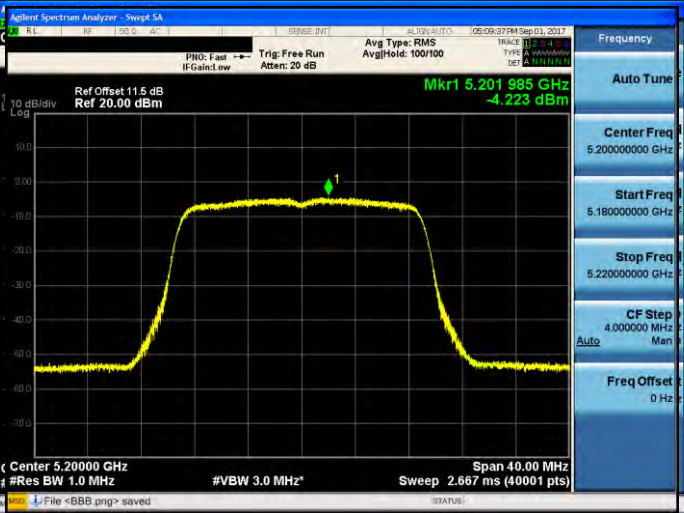
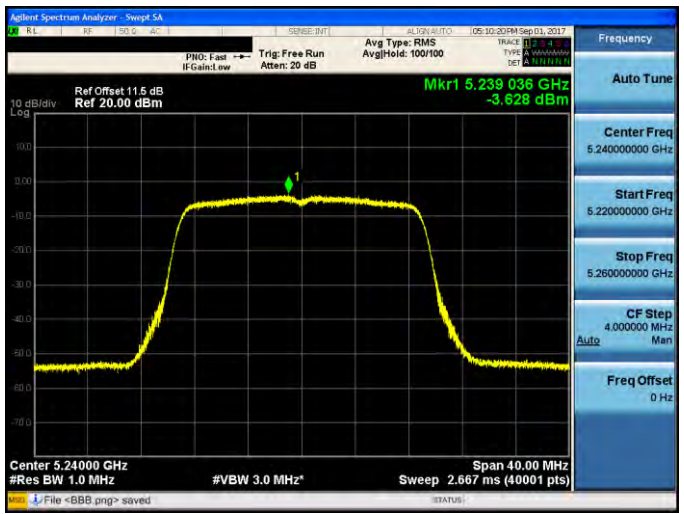
## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode \_ANT-0

5775 MHz



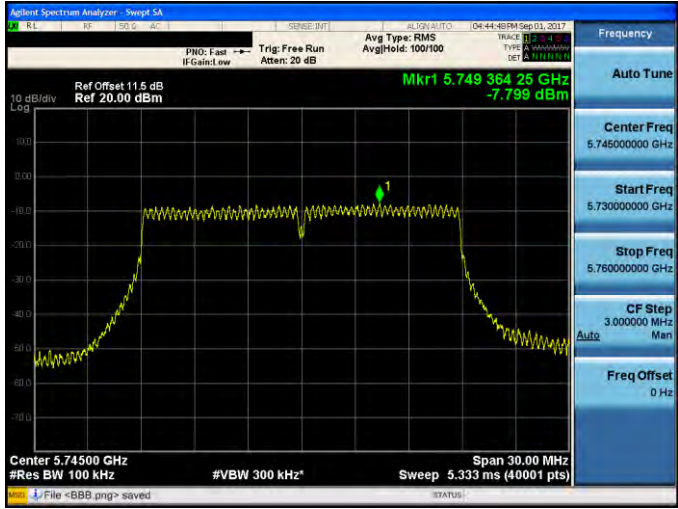
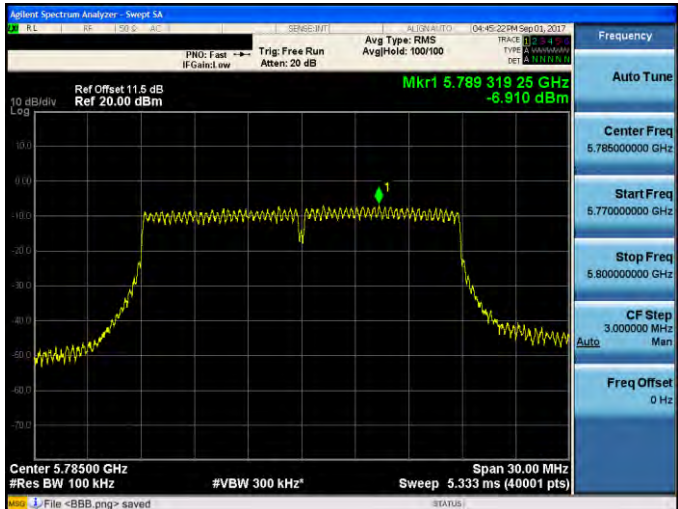
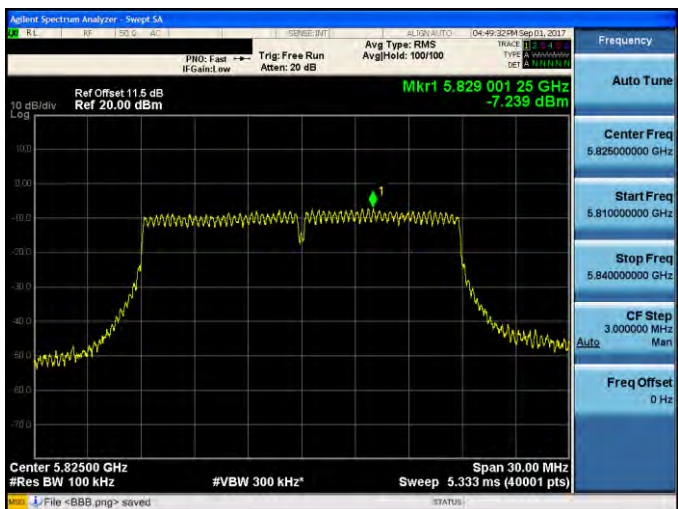


## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode \_ ANT-1

|          |                                                                                      |
|----------|--------------------------------------------------------------------------------------|
| 5180 MHz |    |
| 5200 MHz |   |
| 5240 MHz |  |



## Mode 3: IEEE 802.11ac 20MHz Continuous TX mode \_ ANT-1

|          |                                                                                      |
|----------|--------------------------------------------------------------------------------------|
| 5745 MHz |    |
| 5785 MHz |   |
| 5825 MHz |  |

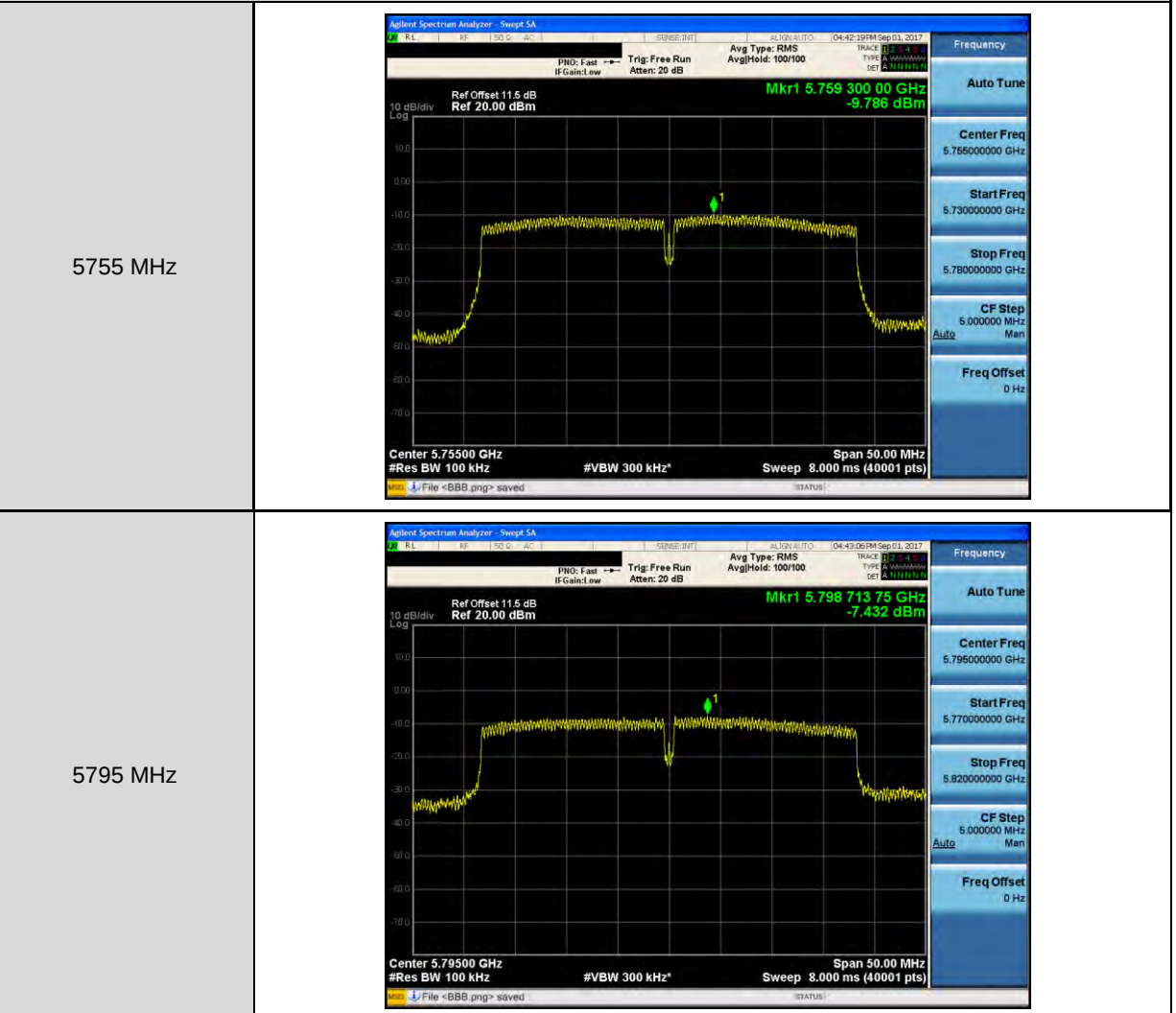


## Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ ANT-1





Mode 4: IEEE 802.11ac 40MHz Continuous TX mode\_ ANT-1





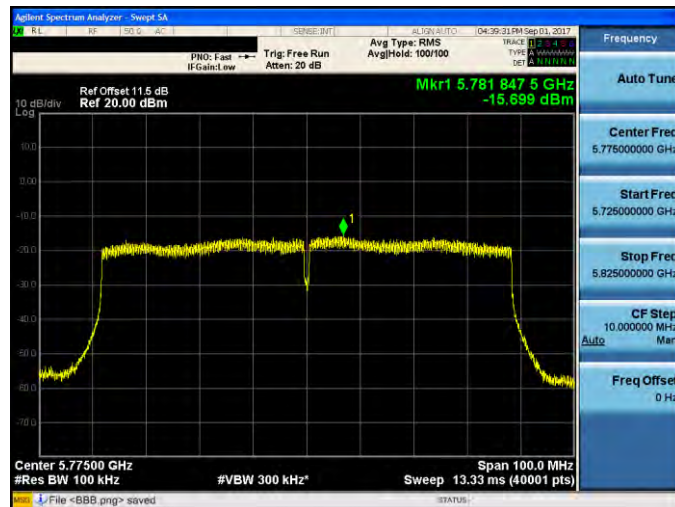
## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode \_ANT-1

5210 MHz



## Mode 5: IEEE 802.11ac 80MHz Continuous TX mode \_ANT-1

5775 MHz

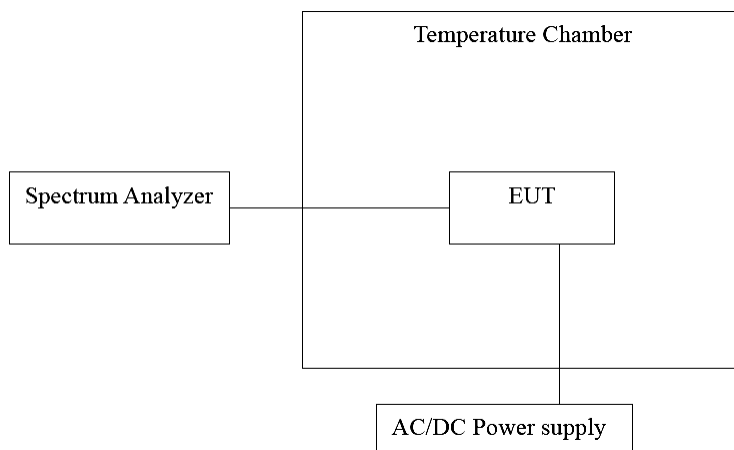


## 4.8. Frequency Stability Measurement

### ■ 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  | Remark |
|--------------------------------|--------------|--------------|---------------|------------|--------|
| Spectrum Analyzer              | Agilent      | E4408B       | MY45107753    | 08/14/2017 | 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.

### ■ 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) |
| 5200 MHz  | -40                 | 120           | 5199.944             | -56000           | -10.769         | Pass               |
|           | -30                 |               | 5199.9496            | -50400           | -9.692          | Pass               |
|           | -20                 |               | 5199.9508            | -49200           | -9.462          | Pass               |
|           | -10                 |               | 5199.956             | -44000           | -8.462          | Pass               |
|           | 0                   |               | 5199.9566            | -43400           | -8.346          | Pass               |
|           | 10                  |               | 5199.9622            | -37800           | -7.269          | Pass               |
|           | 20                  |               | 5199.9694            | -30600           | -5.885          | Pass               |
|           | 30                  |               | 5199.9713            | -28700           | -5.519          | Pass               |
|           | 40                  |               | 5199.9885            | -11500           | -2.212          | Pass               |
|           | 50                  |               | 5200.0002            | 200              | 0.038           | Pass               |
|           | 60                  |               | 5200.0084            | 8400             | 1.615           | Pass               |
| 5785 MHz  | -40                 | 120           | 5784.9387            | -61300           | -10.596         | Pass               |
|           | -30                 |               | 5784.9428            | -57200           | -9.888          | Pass               |
|           | -20                 |               | 5784.9495            | -50500           | -8.729          | Pass               |
|           | -10                 |               | 5784.9565            | -43500           | -7.519          | Pass               |
|           | 0                   |               | 5784.9598            | -40200           | -6.949          | Pass               |
|           | 10                  |               | 5784.9627            | -37300           | -6.448          | Pass               |
|           | 20                  |               | 5784.9655            | -34500           | -5.964          | Pass               |
|           | 30                  |               | 5784.9725            | -27500           | -4.754          | Pass               |
|           | 40                  |               | 5784.9824            | -17600           | -3.042          | Pass               |
|           | 50                  |               | 5784.9964            | -3600            | -0.622          | Pass               |
|           | 60                  |               | 5785.0031            | 3100             | 0.536           | Pass               |

## Voltage Variations

| Test Item | Frequency Stability |               |                      |                  |                 |                    |
|-----------|---------------------|---------------|----------------------|------------------|-----------------|--------------------|
| Frequency | Temp. (°C)          | Voltage (Vac) | Measured Freq. (MHz) | Delta Freq. (Hz) | Tolerance (ppm) | Result (Pass/Fail) |
| 5200 MHz  | 20                  | 138.00        | 5199.9449            | -55100           | -10.596         | Pass               |
|           |                     | 120.00        | 5199.9694            | -30600           | -5.885          | Pass               |
|           |                     | 102.00        | 5199.9853            | -14700           | -2.827          | Pass               |
| 5785 MHz  | 20                  | 138.00        | 5784.9372            | -62800           | -10.856         | Pass               |
|           |                     | 120.00        | 5784.9655            | -34500           | -5.964          | Pass               |
|           |                     | 102.00        | 5785.0037            | 3700             | 0.640           | Pass               |

Note: The manufacturer's frequency stability specification is better than 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) |
| 5200 MHz  | -40                 | 120           | 5199.944             | -56000           | -10.769         | Pass               |
|           | -30                 |               | 5199.9496            | -50400           | -9.692          | Pass               |
|           | -20                 |               | 5199.9508            | -49200           | -9.462          | Pass               |
|           | -10                 |               | 5199.956             | -44000           | -8.462          | Pass               |
|           | 0                   |               | 5199.9566            | -43400           | -8.346          | Pass               |
|           | 10                  |               | 5199.9622            | -37800           | -7.269          | Pass               |
|           | 20                  |               | 5199.9694            | -30600           | -5.885          | Pass               |
|           | 30                  |               | 5199.9713            | -28700           | -5.519          | Pass               |
|           | 40                  |               | 5199.9885            | -11500           | -2.212          | Pass               |
|           | 50                  |               | 5200.0002            | 200              | 0.038           | Pass               |
|           | 60                  |               | 5200.0084            | 8400             | 1.615           | Pass               |
| 5785 MHz  | -40                 | 120           | 5784.9387            | -61300           | -10.596         | Pass               |
|           | -30                 |               | 5784.9428            | -57200           | -9.888          | Pass               |
|           | -20                 |               | 5784.9495            | -50500           | -8.729          | Pass               |
|           | -10                 |               | 5784.9565            | -43500           | -7.519          | Pass               |
|           | 0                   |               | 5784.9598            | -40200           | -6.949          | Pass               |
|           | 10                  |               | 5784.9627            | -37300           | -6.448          | Pass               |
|           | 20                  |               | 5784.9655            | -34500           | -5.964          | Pass               |
|           | 30                  |               | 5784.9725            | -27500           | -4.754          | Pass               |
|           | 40                  |               | 5784.9824            | -17600           | -3.042          | Pass               |
|           | 50                  |               | 5784.9964            | -3600            | -0.622          | Pass               |
|           | 60                  |               | 5785.0031            | 3100             | 0.536           | Pass               |

**Voltage Variations**

| Test Item | Frequency Stability |               |                      |                  |                 |                    |
|-----------|---------------------|---------------|----------------------|------------------|-----------------|--------------------|
| Frequency | Temp. (°C)          | Voltage (Vac) | Measured Freq. (MHz) | Delta Freq. (Hz) | Tolerance (ppm) | Result (Pass/Fail) |
| 5200 MHz  | 20                  | 138.00        | 5199.9449            | -55100           | -10.596         | Pass               |
|           |                     | 120.00        | 5199.9694            | -30600           | -5.885          | Pass               |
|           |                     | 102.00        | 5199.9853            | -14700           | -2.827          | Pass               |
| 5785 MHz  | 20                  | 138.00        | 5784.9372            | -62800           | -10.856         | Pass               |
|           |                     | 120.00        | 5784.9655            | -34500           | -5.964          | Pass               |
|           |                     | 102.00        | 5785.0037            | 3700             | 0.640           | Pass               |

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



## 4.9. Antenna Requirement

### ■ Limit

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

$$\text{Directional Gain} = 10 \cdot \log\{[10^{(G1/20)} + 10^{(G2/20)} + \dots + 10^{(Gn/20)}]^2 / NANT\}$$
$$= 9.19 \text{ dBi} > 6\text{dBi} \text{ (5.150 ~ 5.250 GHz)}$$

$$\text{Directional Gain} = 10 \cdot \log\{[10^{(G1/20)} + 10^{(G2/20)} + \dots + 10^{(Gn/20)}]^2 / NANT\}$$
$$= 9.06 \text{ dBi} > 6\text{dBi} \text{ (5.725 ~ 5.850 GHz)}$$

| Operate Freq. Band  |                | Directional Gain (dBi) |
|---------------------|----------------|------------------------|
| IEEE 802.11a        | U-NII Band I   | 9.19                   |
|                     | U-NII Band III | 9.06                   |
| IEEE 802.11ac 20MHz | U-NII Band I   | 9.19                   |
|                     | U-NII Band III | 9.06                   |
| IEEE 802.11ac 40MHz | U-NII Band I   | 9.19                   |
|                     | U-NII Band III | 9.06                   |
| IEEE 802.11ac 80MHz | U-NII Band I   | 9.19                   |
|                     | U-NII Band III | 9.06                   |