

### 802.11n-HT40 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Non-Beam Forming

#### Channel 38 (5190MHz)



#### Channel 46 (5230MHz)



### 802.11ac-VHT40 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Non-Beam Forming

#### Channel 38 (5190MHz)



#### Channel 46 (5230MHz)



### 802.11ac-VHT80 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Non-Beam Forming

#### Channel 42 (5210MHz)

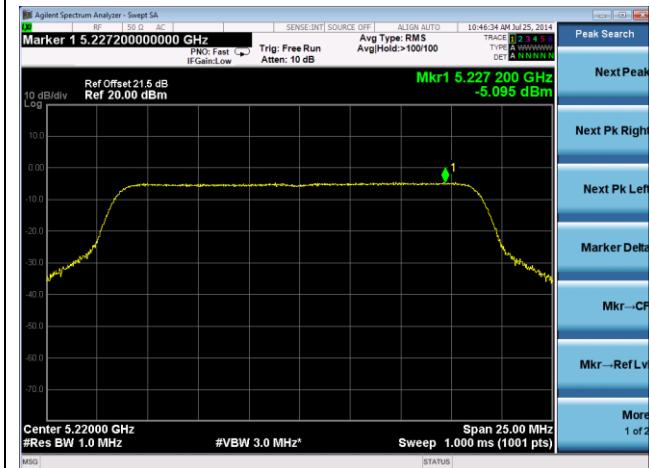


### 802.11n-HT20 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Beam Forming

#### Channel 36 (5180MHz)



#### Channel 44 (5220MHz)



#### Channel 48 (5240MHz)

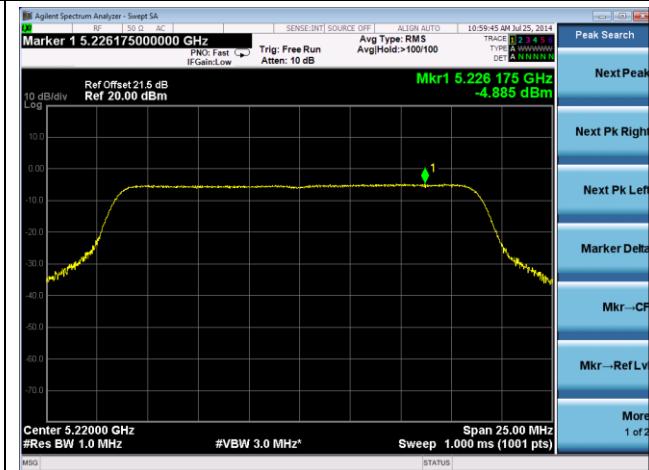


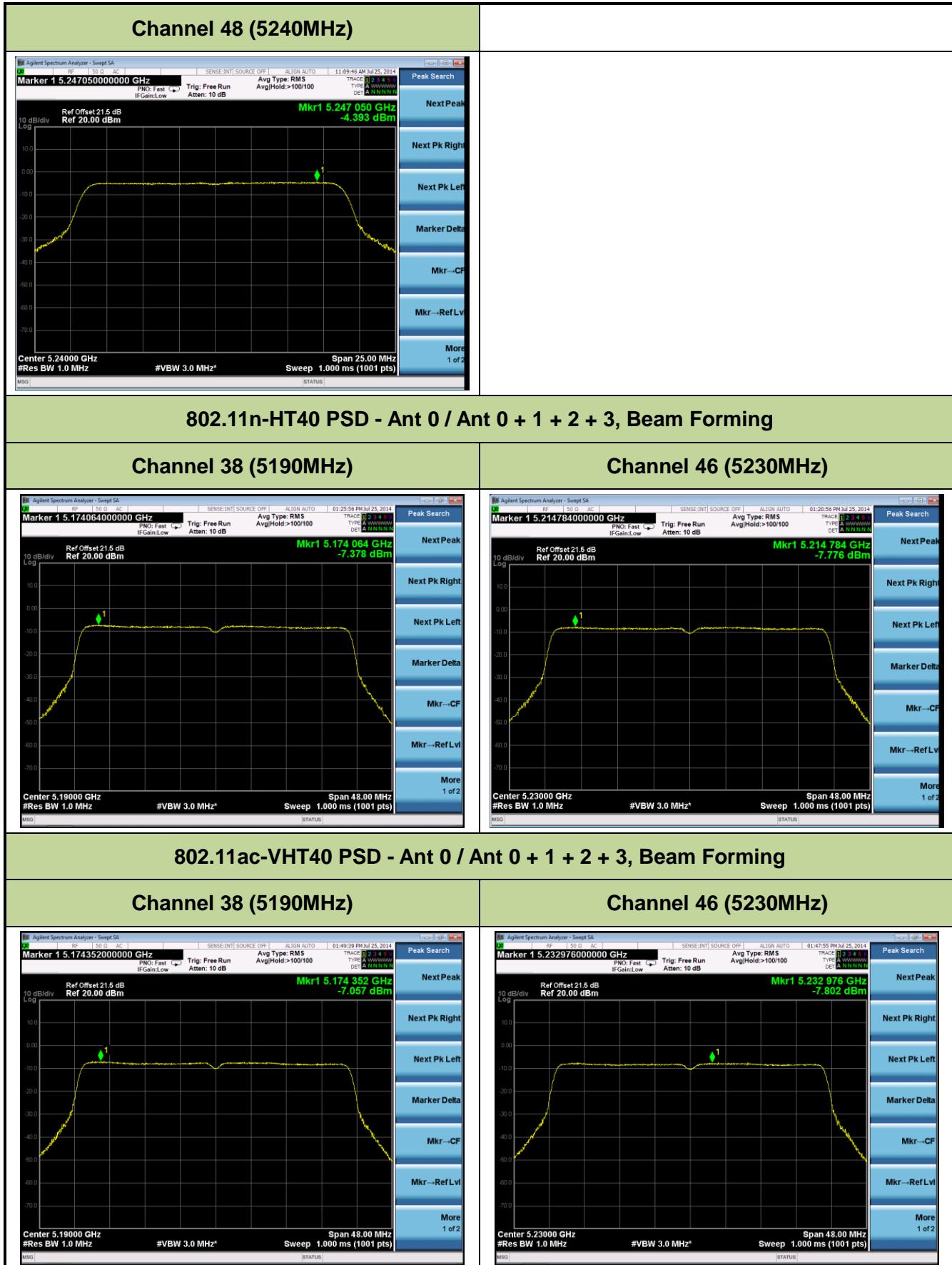
### 802.11ac-VHT20 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Beam Forming

#### Channel 36 (5180MHz)



#### Channel 44 (5220MHz)





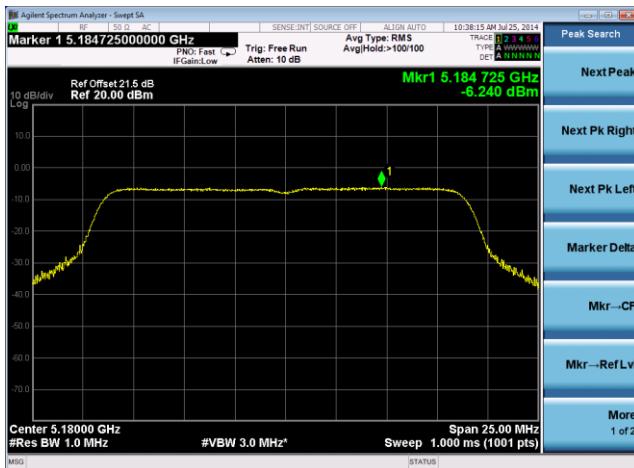
## 802.11ac-VHT80 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Beam Forming

### Channel 42 (5210MHz)

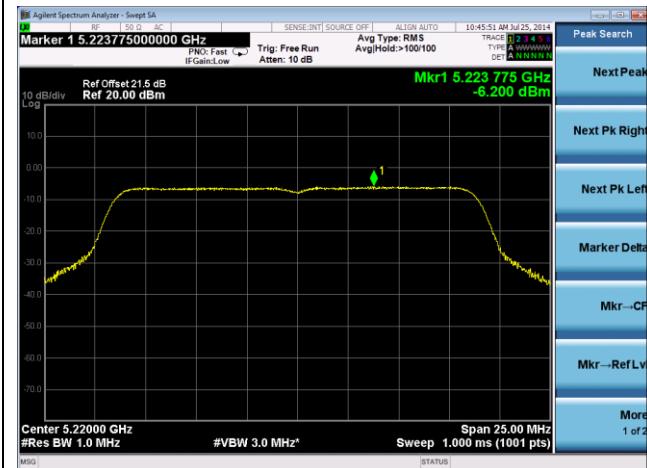


### 802.11n-HT20 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Beam Forming

#### Channel 36 (5180MHz)



#### Channel 44 (5220MHz)



#### Channel 48 (5240MHz)



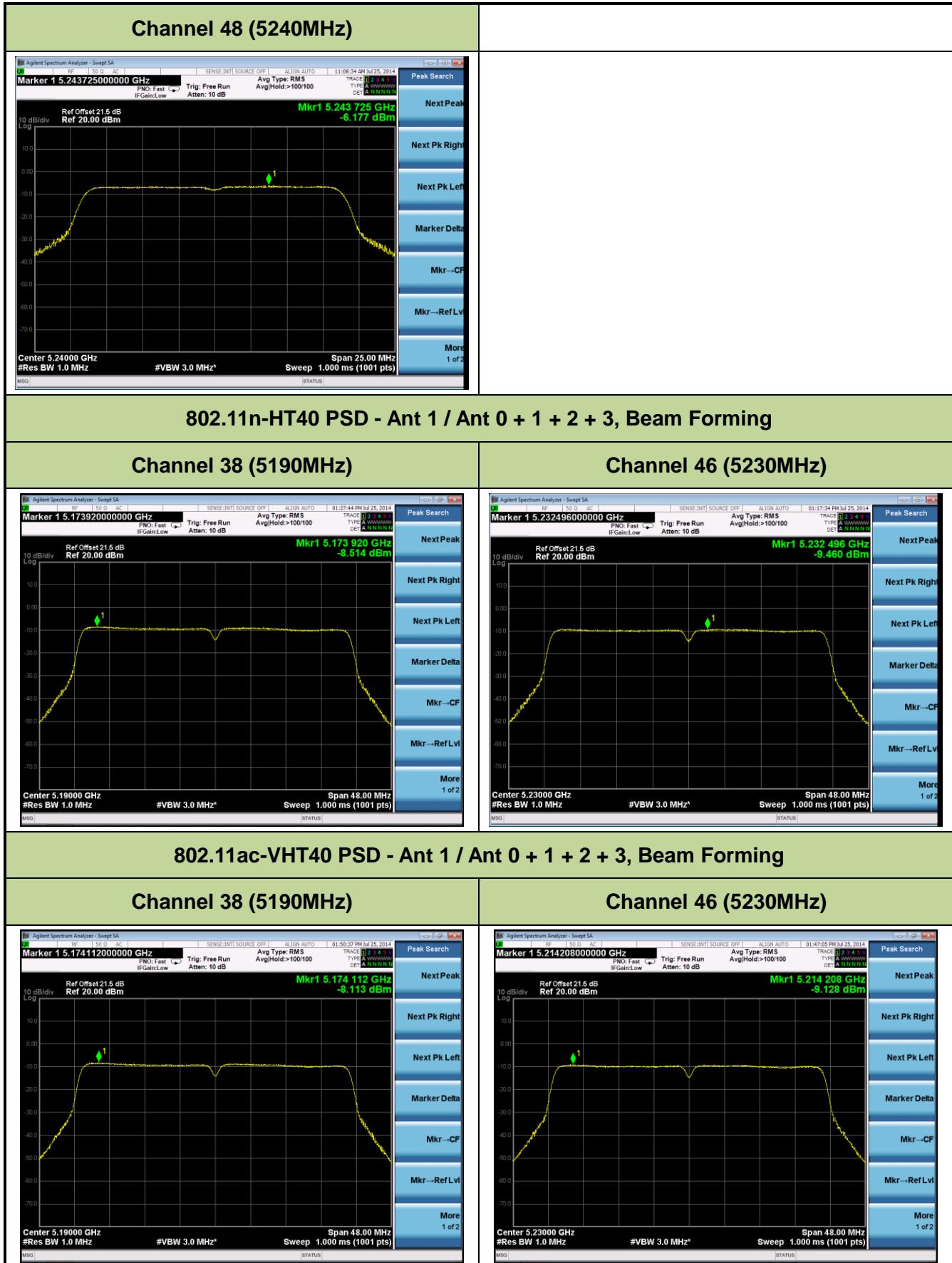
### 802.11ac-VHT20 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Beam Forming

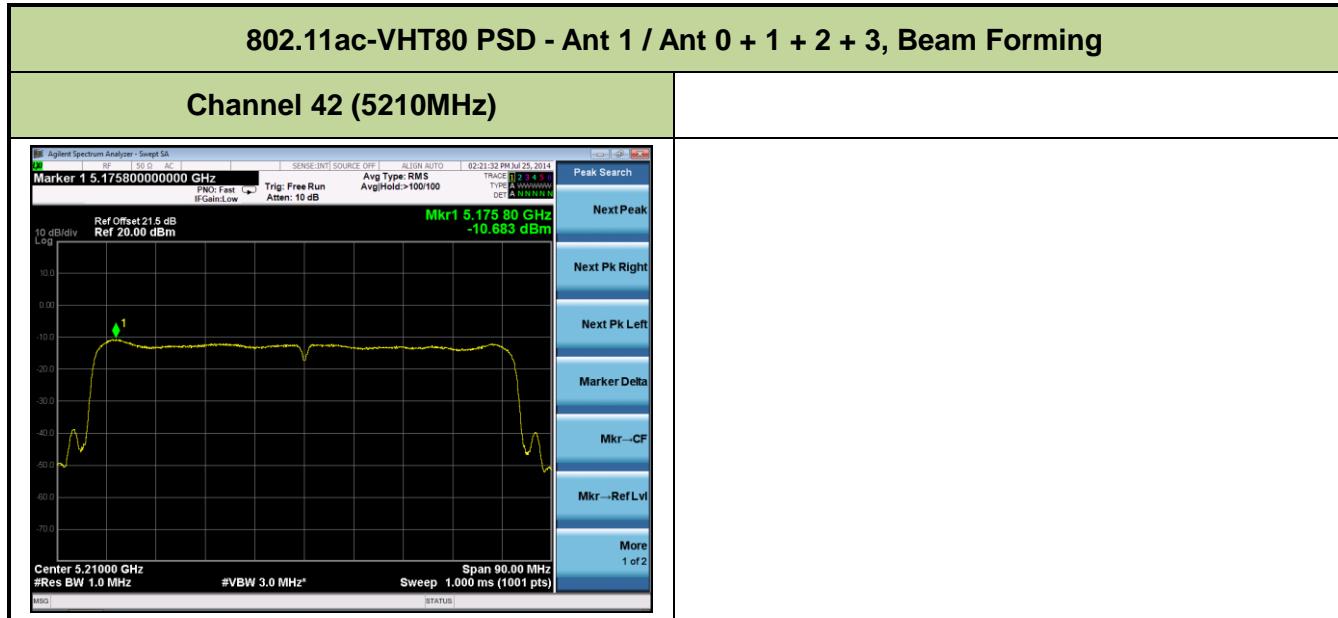
#### Channel 36 (5180MHz)



#### Channel 44 (5220MHz)





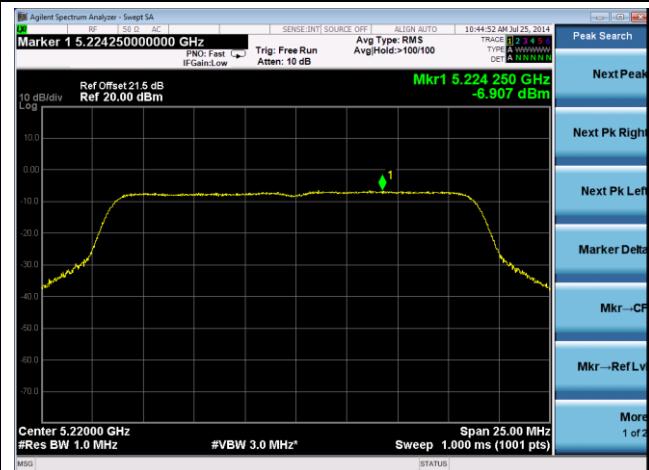


### 802.11n-HT20 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Beam Forming

#### Channel 36 (5180MHz)



#### Channel 44 (5220MHz)

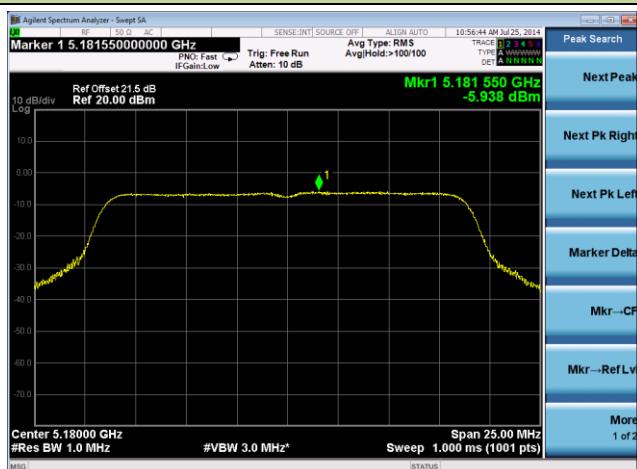


#### Channel 48 (5240MHz)

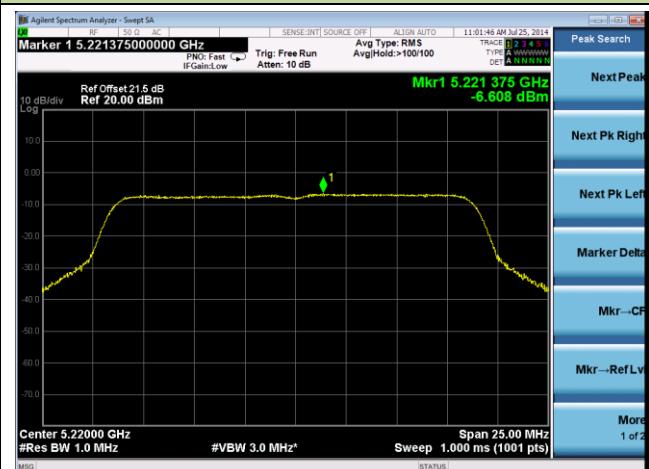


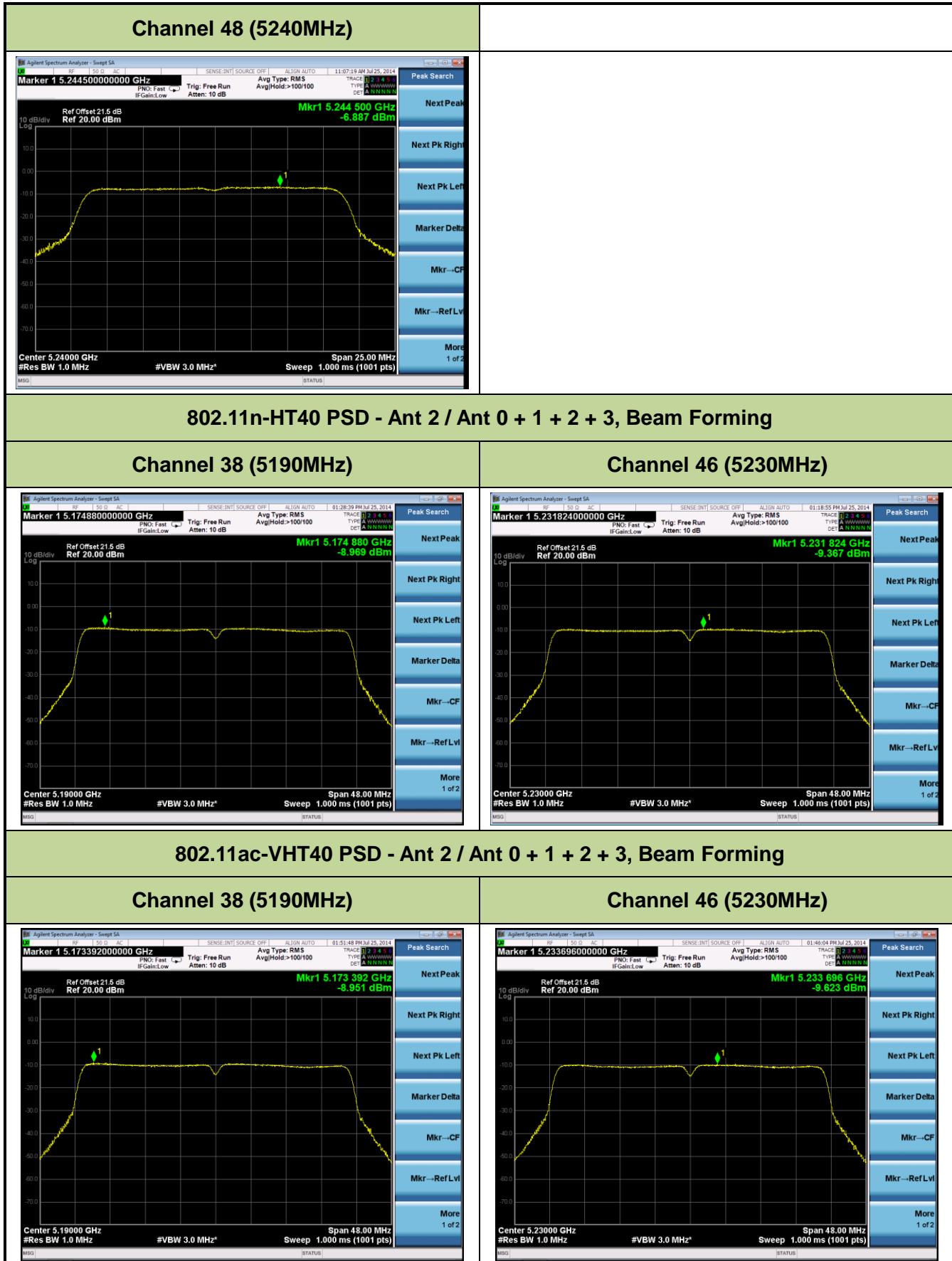
### 802.11ac-VHT20 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Beam Forming

#### Channel 36 (5180MHz)



#### Channel 44 (5220MHz)





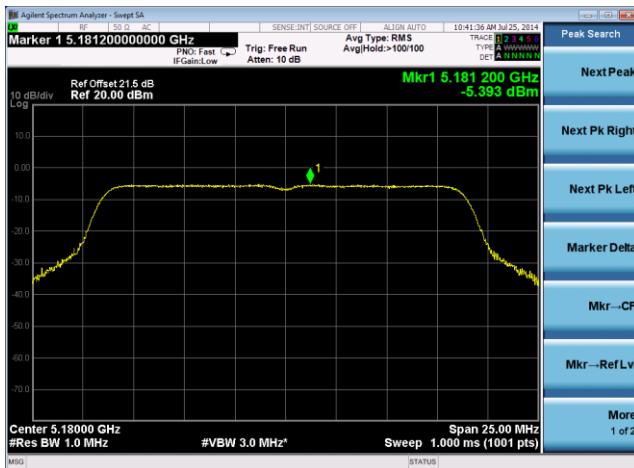
## 802.11ac-VHT80 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Beam Forming

### Channel 42 (5210MHz)

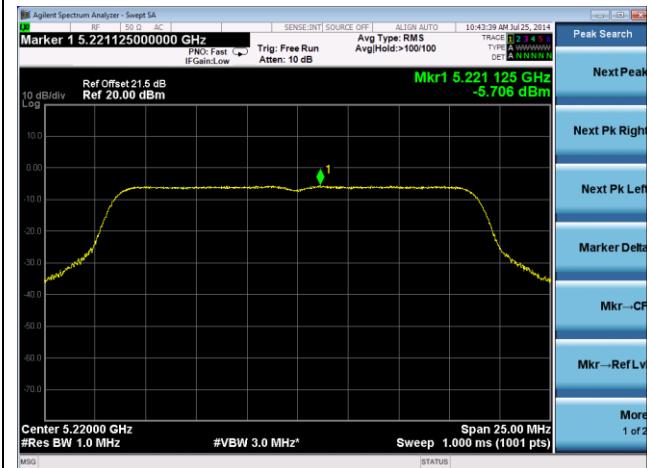


### 802.11n-HT20 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Beam Forming

#### Channel 36 (5180MHz)



#### Channel 44 (5220MHz)



#### Channel 48 (5240MHz)



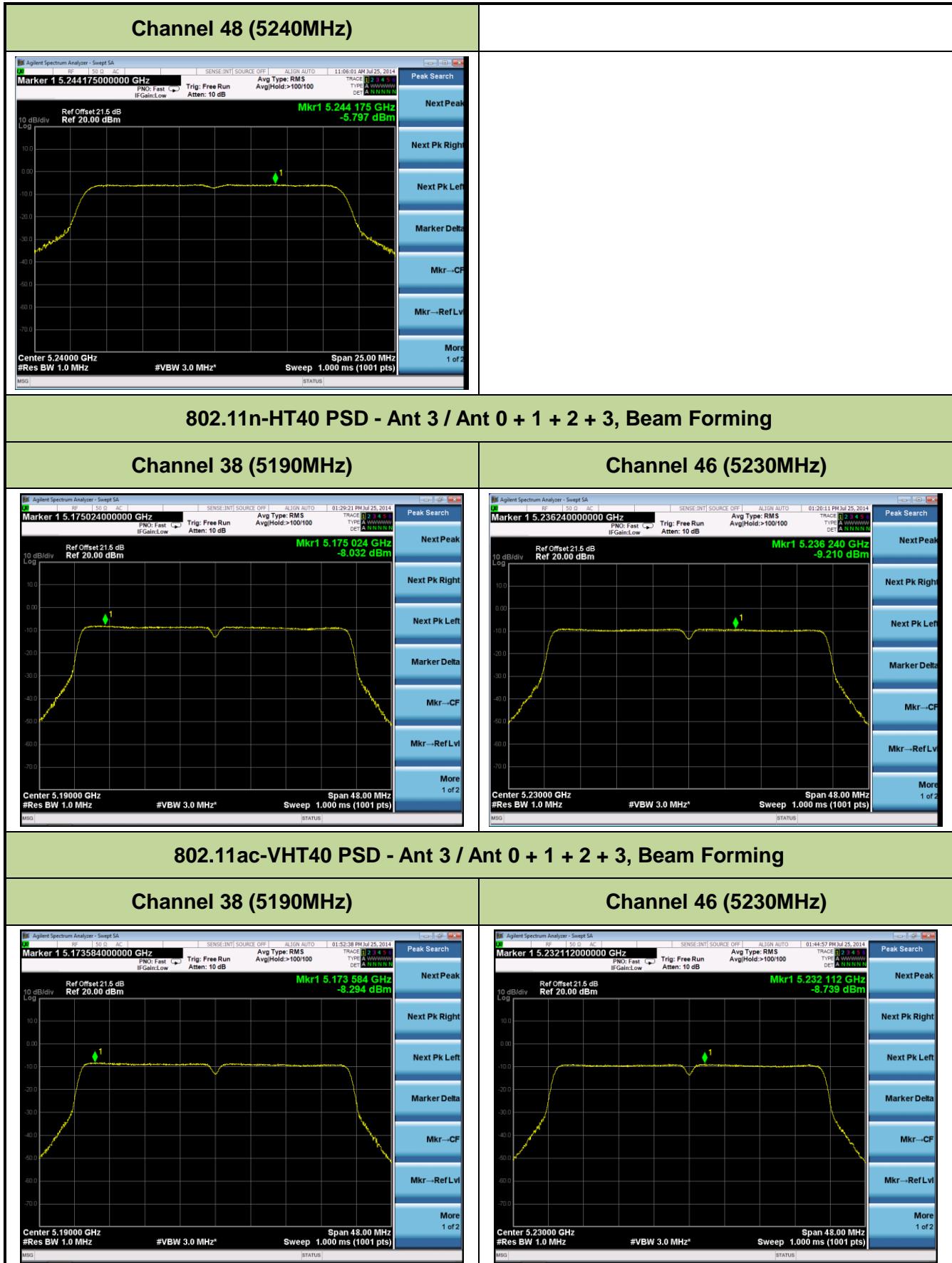
### 802.11ac-VHT20 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Beam Forming

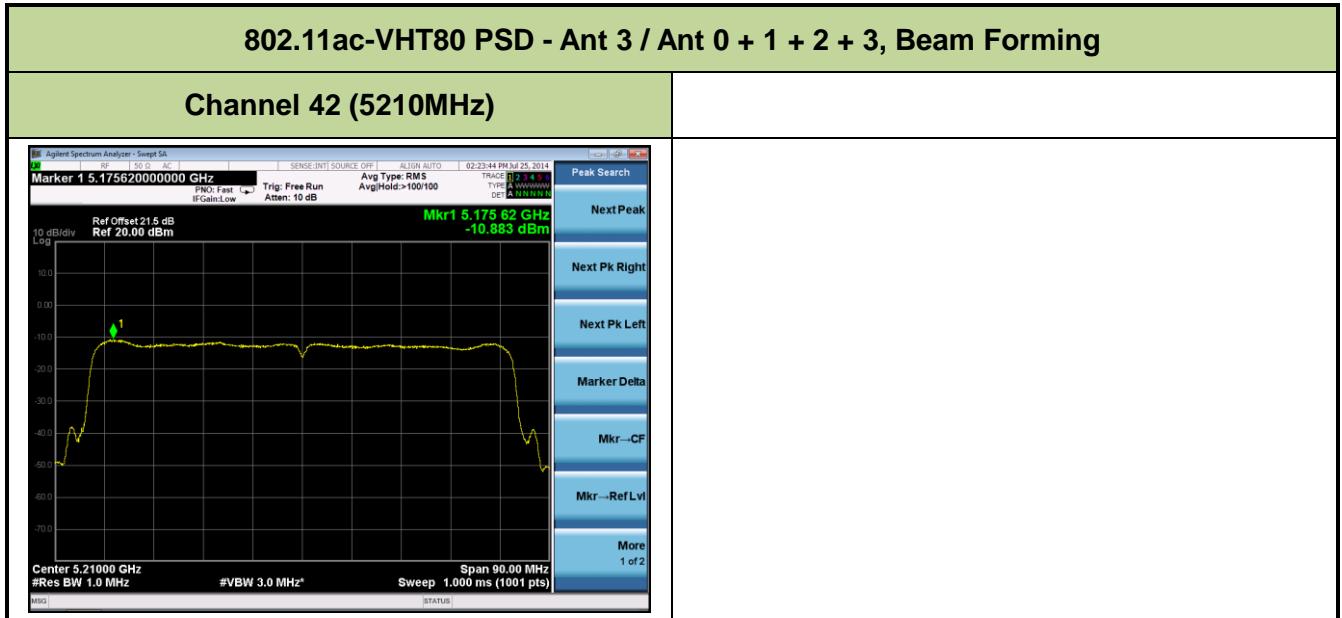
#### Channel 36 (5180MHz)



#### Channel 44 (5220MHz)







## 7.6. Peak Excursion Ratio Measurement §15.407(a)(6)

### 7.6.1. Test Limit

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

### 7.6.2. Test Procedure Used

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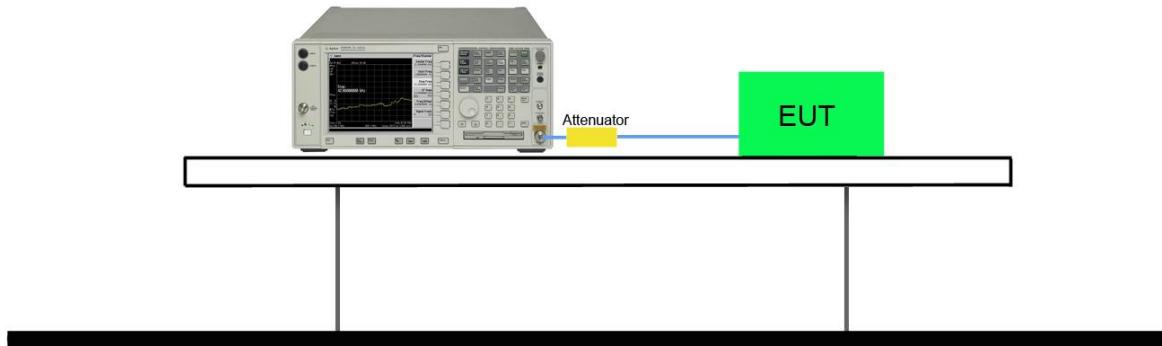
### 7.6.3. Test Setting

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire emission bandwidth of the signal
3. RBW = 1MHz
4. VBW = 3MHz
5. Detector = Peak
6. Trace mode = max hold
7. Trace was allowed to stabilize
8. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

This level was compared to the peak power density level found from the previous section to determine the peak excursion.

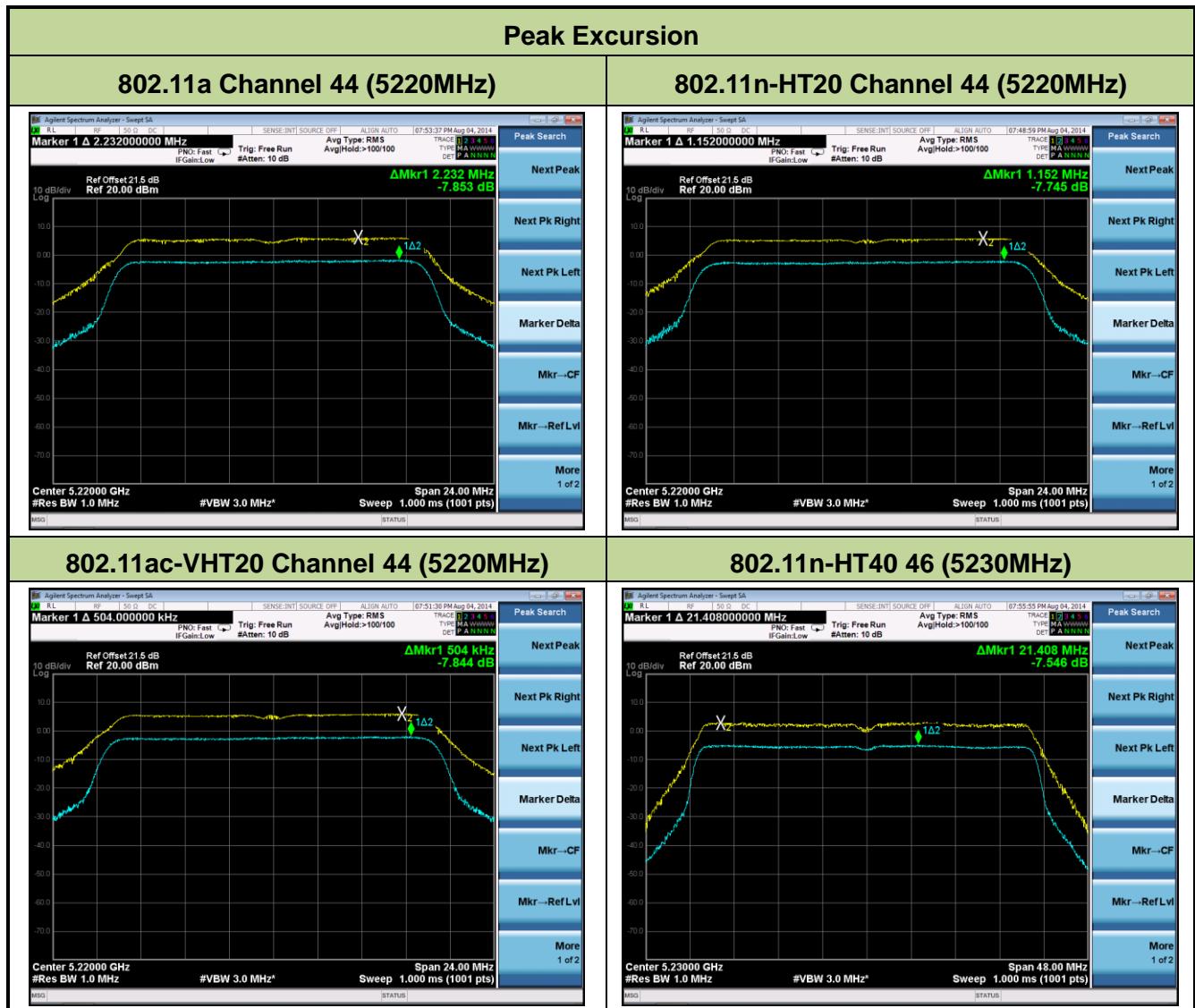
### 7.6.4. Test Setup

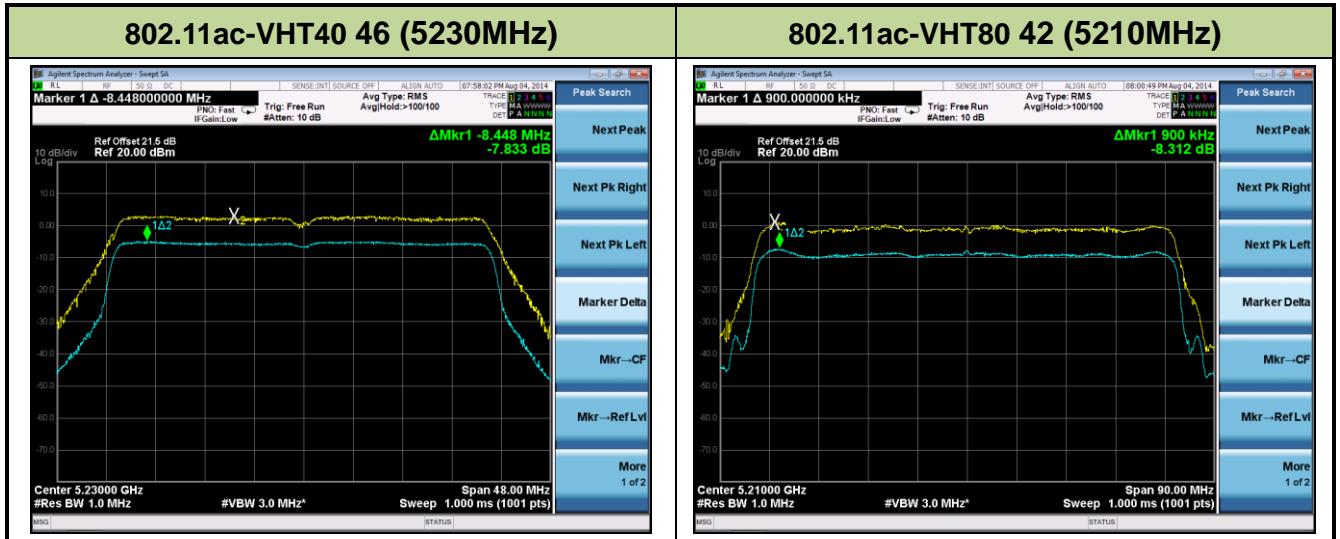
Spectrum Analyzer



### 7.6.5. Test Result

| Test Mode      | Data Rate (Mbps) | Channel No. | Frequency (MHz) | Peak Excursion Ratio (dB) | Limit (dB) | Result |
|----------------|------------------|-------------|-----------------|---------------------------|------------|--------|
| 802.11a        | 6                | 44          | 5220            | 7.853                     | 13         | Pass   |
| 802.11n-HT20   | 6.5              | 44          | 5220            | 7.745                     | 13         | Pass   |
| 802.11ac-VHT20 | 6.5              | 44          | 5220            | 7.844                     | 13         | Pass   |
| 802.11n-HT40   | 13.5             | 46          | 5230            | 7.546                     | 13         | Pass   |
| 802.11ac-VHT40 | 13.5             | 46          | 5230            | 7.833                     | 13         | Pass   |
| 802.11ac-VHT80 | 29.3             | 42          | 5210            | 8.312                     | 13         | Pass   |





## 7.7. Frequency Stability Measurement §15.407(g); RSS-210[7.2.6]

### 7.7.1. Test Limit

Manufactures 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 user's manual.

### 7.7.2. Test Procedure Used

#### Frequency Stability Under Temperature Variations:

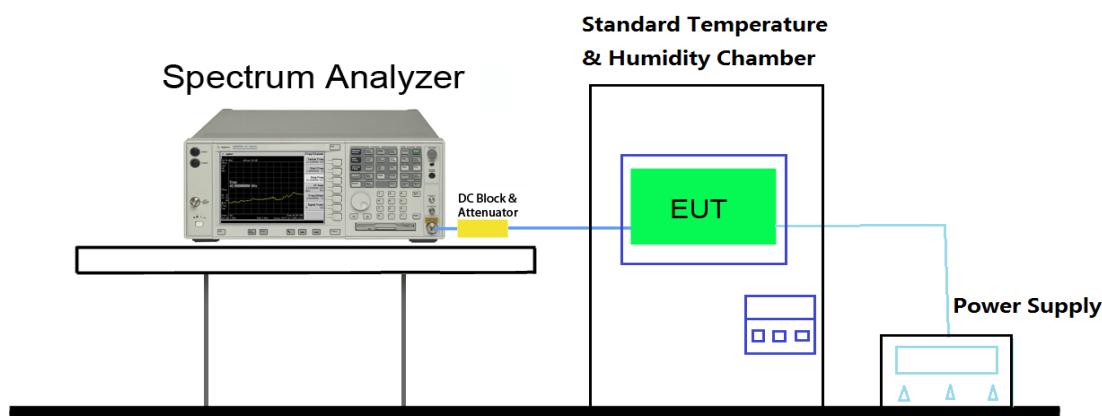
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

#### Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

### 7.7.3. Test Setup



#### 7.7.4. Test Result

| Voltage (%) | Power (VAC) | Temp (°C)  | Frequency (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|-------------|-------------|------------|----------------|-----------------|---------------|
| 100%        | 120         | + 20 (Ref) | 5180051870.830 | 37927.101       | 0.0000716     |
|             |             | - 10       | 5179995035.284 | -12808.445      | -0.0000241    |
|             |             | 0          | 5180059213.201 | 51369.472       | 0.0000971     |
|             |             | + 10       | 5179968273.839 | -39569.890      | -0.0000747    |
|             |             | + 20       | 5180109982.983 | 102139.254      | 0.0001924     |
|             |             | + 30       | 5180107392.385 | 99548.656       | 0.0001882     |
|             |             | + 40       | 5179935641.725 | -72202.004      | -0.0001362    |
| 115%        | 138         | + 20       | 5180073584.823 | 65741.094       | 0.0001238     |
| 85%         | 102         | + 20       | 5179968214.354 | -39629.375      | -0.0000749    |

## 7.8. Radiated Spurious Emission Measurement §15.407(b)(1)(2)(3); RSS-210[A9.2]

### 7.8.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

All out of band emissions appearing in a restricted band as specified in Section 7.2.2 of the RSS-Gen Issue 3 must not exceed the limits shown in Table per Section 7.2.5.

| FCC Part 15 Subpart C Paragraph 15.209 & RSS-Gen Issue3 Section 7.2.5 |                      |                            |
|---|----------------------|----------------------------|
| Frequency [MHz]   | Field Strength [V/m] | Measured Distance [Meters] |
| 0.009 – 0.490   | 2400/F (kHz)         | 300                        |
| 0.490 – 1.705   | 24000/F (kHz)        | 30                         |
| 1.705 - 30  | 30                   | 30                         |
| 30 - 88   | 100                  | 3                          |
| 88 - 216  | 150                  | 3                          |
| 216 - 960   | 200                  | 3                          |
| Above 960   | 500                  | 3                          |

### 7.8.2. Test Procedure Used

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### 7.8.3. Test Setting

#### Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold

7. Trace was allowed to stabilize

#### **Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 120 kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

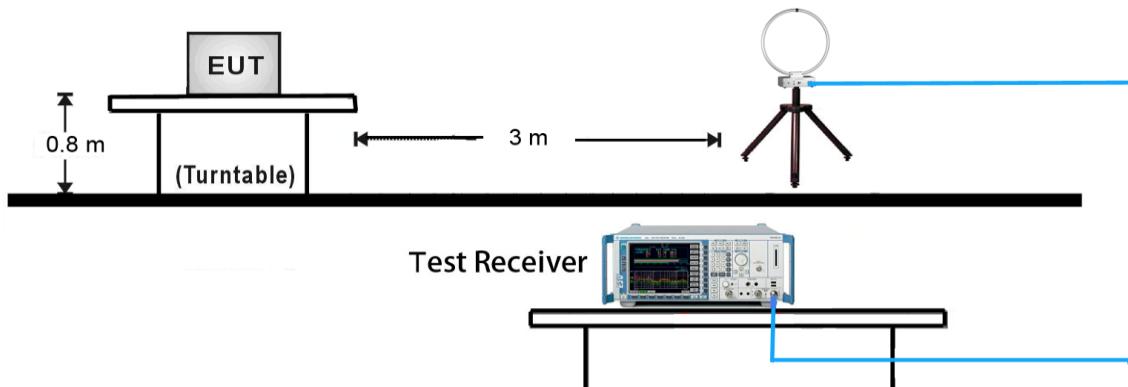
#### **Average Measurements above 1GHz (Method VB)**

1. RBW = 1 MHz.
2. Video bandwidth.
  - If the EUT is configured to transmit with duty cycle  $\geq$  98 percent, set  $VBW \leq RBW/100$  (i.e., 10 kHz) but not less than 10 Hz.
  - If the EUT duty cycle is  $<$  98 percent, set  $VBW \geq 1/T$
3. Video bandwidth mode
4. The instrument shall be set to ensure that video filtering is applied in the power domain.

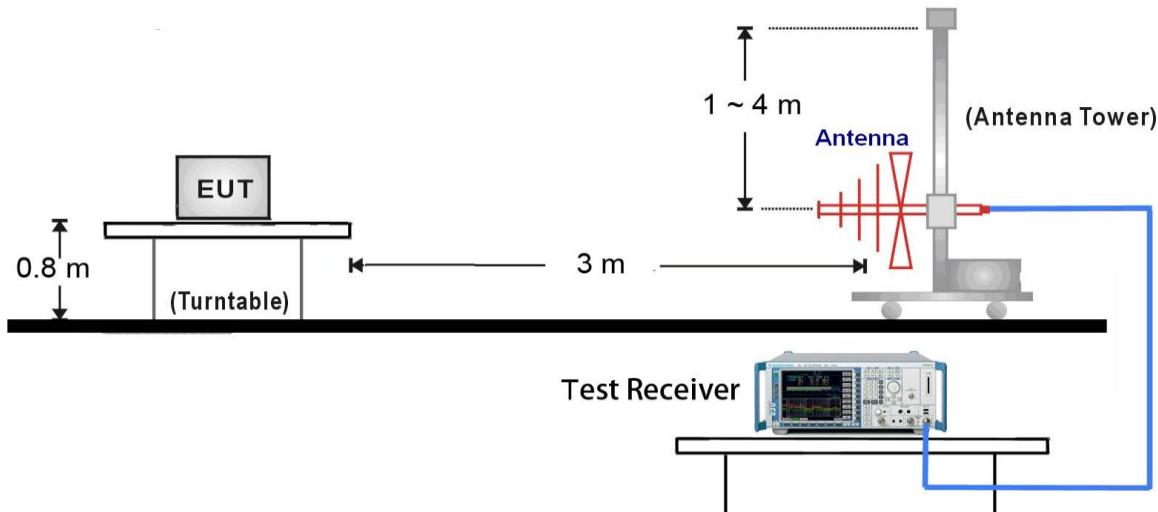
Typically, this requires setting the detector mode to RMS and setting the Average-VBW Type to Power (RMS).
5. Detector = Peak.
6. Sweep time = auto.
7. Trace mode = max hold.
7. Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of  $1/x$ , where  $x$  is the duty cycle. For example, use at least 200 traces if the duty cycle is 25 percent. (If a specific emission is demonstrated to be continuous—i.e., 100 percent duty cycle—rather than turning on and off with the transmit cycle, at least 50 traces shall be averaged.)

#### 7.8.4. Test Setup

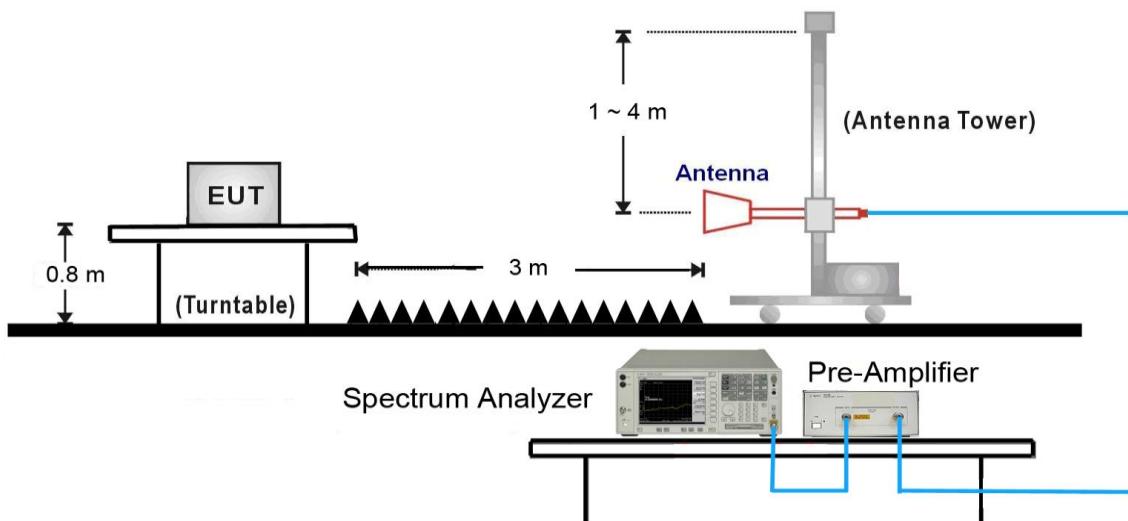
##### 9kHz ~ 30MHz Test Setup:

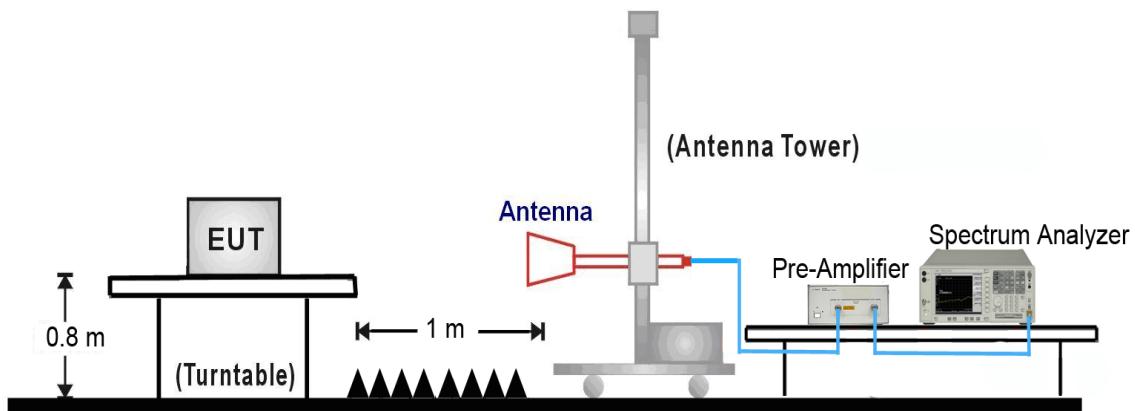


##### 30MHz ~ 1GHz Test Setup:



##### 1GHz ~18GHz Test Setup:



18GHz ~40GHz Test Setup:

### 7.8.5. Test Result

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11a   | Test Site:     | AC1       |
| Test Channel: | 36  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7008.0          | 37.7                       | 12.8        | 50.5                         | 68.2                 | -17.7       | Peak     | Horizontal   |
| *    | 7869.0          | 35.9                       | 15.0        | 50.9                         | 68.2                 | -17.3       | Peak     | Horizontal   |
|      | 9137.0          | 35.9                       | 15.1        | 51.0                         | 74.0                 | -23.0       | Peak     | Horizontal   |
|      | 10698.5         | 33.4                       | 17.7        | 51.1                         | 74.0                 | -22.9       | Peak     | Horizontal   |
| *    | 7132.5          | 37.0                       | 13.5        | 50.5                         | 68.2                 | -17.7       | Peak     | Vertical     |
| *    | 7963.5          | 36.2                       | 15.0        | 51.2                         | 68.2                 | -17.0       | Peak     | Vertical     |
|      | 9467.5          | 37.7                       | 15.4        | 53.1                         | 74.0                 | -20.9       | Peak     | Vertical     |
|      | 10673.0         | 33.8                       | 17.7        | 51.5                         | 74.0                 | -22.5       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11a   | Test Site:     | AC1       |
| Test Channel: | 44  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 6192.0          | 37.5                       | 9.1         | 46.6                         | 68.2                 | -21.6       | Peak     | Horizontal   |
| *    | 7911.5          | 36.1                       | 15.0        | 51.1                         | 68.2                 | -17.1       | Peak     | Horizontal   |
|      | 9137.5          | 34.5                       | 15.1        | 49.6                         | 74.0                 | -24.4       | Peak     | Horizontal   |
|      | 10656.0         | 33.3                       | 17.9        | 51.2                         | 74.0                 | -22.8       | Peak     | Horizontal   |
| *    | 7111.5          | 37.7                       | 13.4        | 51.1                         | 68.2                 | -17.1       | Peak     | Vertical     |
| *    | 7794.5          | 35.4                       | 15.0        | 50.4                         | 68.2                 | -17.8       | Peak     | Vertical     |
|      | 9364.5          | 37.1                       | 15.3        | 52.4                         | 74.0                 | -21.6       | Peak     | Vertical     |
|      | 10639.0         | 34.2                       | 18.0        | 52.2                         | 74.0                 | -21.8       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11a   | Test Site:     | AC1       |
| Test Channel: | 48  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7111.5          | 37.6                       | 13.4        | 51.0                         | 68.2                 | -17.2       | Peak     | Horizontal   |
| *    | 7816.5          | 34.8                       | 15.0        | 49.8                         | 68.2                 | -18.4       | Peak     | Horizontal   |
|      | 9169.5          | 34.9                       | 15.3        | 50.2                         | 74.0                 | -23.8       | Peak     | Horizontal   |
|      | 10690.0         | 33.6                       | 17.6        | 51.2                         | 74.0                 | -22.8       | Peak     | Horizontal   |
| *    | 7231.0          | 36.1                       | 13.8        | 49.9                         | 68.2                 | -18.3       | Peak     | Vertical     |
| *    | 7769.5          | 35.1                       | 14.9        | 50.0                         | 68.2                 | -18.2       | Peak     | Vertical     |
|      | 9466.5          | 37.8                       | 15.4        | 53.2                         | 74.0                 | -20.8       | Peak     | Vertical     |
|      | 10681.5         | 33.4                       | 17.6        | 51.0                         | 74.0                 | -23.0       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11n-HT20  | Test Site:     | AC1       |
| Test Channel: | 36  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7215.7          | 34.2                       | 13.7        | 47.9                         | 68.2                 | -20.3       | Peak     | Horizontal   |
| *    | 8513.5          | 34.2                       | 14.6        | 48.8                         | 68.2                 | -19.4       | Peak     | Horizontal   |
|      | 9362.5          | 35.2                       | 15.3        | 50.5                         | 74.0                 | -23.5       | Peak     | Horizontal   |
|      | 12536.4         | 33.8                       | 19.9        | 53.7                         | 74.0                 | -20.3       | Peak     | Horizontal   |
| *    | 7025.6          | 36.0                       | 12.9        | 48.9                         | 68.2                 | -19.3       | Peak     | Vertical     |
| *    | 7753.7          | 34.1                       | 14.8        | 48.9                         | 68.2                 | -19.3       | Peak     | Vertical     |
|      | 9342.7          | 35.2                       | 15.4        | 50.6                         | 74.0                 | -23.4       | Peak     | Vertical     |
|      | 12571.1         | 33.8                       | 20.0        | 53.8                         | 74.0                 | -20.2       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11n-HT20  | Test Site:     | AC1       |
| Test Channel: | 44  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7145.8          | 34.2                       | 13.5        | 47.7                         | 68.2                 | -20.5       | Peak     | Horizontal   |
| *    | 8543.6          | 34.0                       | 14.5        | 48.5                         | 68.2                 | -19.7       | Peak     | Horizontal   |
|      | 9471.8          | 35.2                       | 15.4        | 50.6                         | 74.0                 | -23.4       | Peak     | Horizontal   |
|      | 12431.6         | 34.2                       | 19.4        | 53.6                         | 74.0                 | -20.4       | Peak     | Horizontal   |
| *    | 7184.3          | 33.8                       | 13.6        | 47.4                         | 68.2                 | -20.8       | Peak     | Vertical     |
| *    | 7762.4          | 33.4                       | 14.8        | 48.2                         | 68.2                 | -20.0       | Peak     | Vertical     |
|      | 9326.5          | 35.1                       | 15.4        | 50.5                         | 74.0                 | -23.5       | Peak     | Vertical     |
|      | 12662.0         | 33.3                       | 19.9        | 53.2                         | 74.0                 | -20.8       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11n-HT20  | Test Site:     | AC1       |
| Test Channel: | 48  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7045.5          | 36.2                       | 13.1        | 49.3                         | 68.2                 | -18.9       | Peak     | Horizontal   |
| *    | 7625.5          | 35.1                       | 14.6        | 49.7                         | 68.2                 | -18.5       | Peak     | Horizontal   |
|      | 9152.7          | 36.0                       | 15.3        | 51.3                         | 74.0                 | -22.7       | Peak     | Horizontal   |
|      | 11803.5         | 33.7                       | 19.3        | 53.0                         | 74.0                 | -21.0       | Peak     | Horizontal   |
| *    | 7152.6          | 34.1                       | 13.6        | 47.7                         | 68.2                 | -20.5       | Peak     | Vertical     |
| *    | 7915.2          | 34.2                       | 15.0        | 49.2                         | 68.2                 | -19.0       | Peak     | Vertical     |
|      | 9173.5          | 34.6                       | 15.3        | 49.9                         | 74.0                 | -24.1       | Peak     | Vertical     |
|      | 11319.0         | 32.9                       | 19.1        | 52.0                         | 74.0                 | -22.0       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11ac-VHT20  | Test Site:     | AC1       |
| Test Channel: | 36  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7045.6          | 35.4                       | 13.1        | 48.5                         | 68.2                 | -19.7       | Peak     | Horizontal   |
| *    | 7752.1          | 33.5                       | 14.8        | 48.3                         | 68.2                 | -19.9       | Peak     | Horizontal   |
|      | 9179.5          | 35.4                       | 15.3        | 50.7                         | 74.0                 | -23.3       | Peak     | Horizontal   |
|      | 12526.0         | 33.7                       | 19.8        | 53.5                         | 74.0                 | -20.5       | Peak     | Horizontal   |
| *    | 7025.7          | 36.4                       | 12.9        | 49.3                         | 68.2                 | -18.9       | Peak     | Vertical     |
| *    | 7691.5          | 34.9                       | 14.5        | 49.4                         | 68.2                 | -18.8       | Peak     | Vertical     |
|      | 9482.5          | 35.2                       | 15.4        | 50.6                         | 74.0                 | -23.4       | Peak     | Vertical     |
|      | 12424.0         | 33.2                       | 19.2        | 52.4                         | 74.0                 | -21.6       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11ac-VHT20  | Test Site:     | AC1       |
| Test Channel: | 44  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7184.7          | 34.0                       | 13.6        | 47.6                         | 68.2                 | -20.6       | Peak     | Horizontal   |
| *    | 8015.5          | 34.5                       | 15.1        | 49.6                         | 68.2                 | -18.6       | Peak     | Horizontal   |
|      | 9418.3          | 35.3                       | 15.5        | 50.8                         | 74.0                 | -23.2       | Peak     | Horizontal   |
|      | 11803.5         | 32.9                       | 19.3        | 52.2                         | 74.0                 | -21.8       | Peak     | Horizontal   |
| *    | 7048.7          | 35.7                       | 13.1        | 48.8                         | 68.2                 | -19.4       | Peak     | Vertical     |
| *    | 8512.6          | 34.7                       | 14.6        | 49.3                         | 68.2                 | -18.9       | Peak     | Vertical     |
|      | 9472.5          | 35.7                       | 15.4        | 51.1                         | 74.0                 | -22.9       | Peak     | Vertical     |
|      | 11914.0         | 33.6                       | 19.6        | 53.2                         | 74.0                 | -20.8       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11ac-VHT20  | Test Site:     | AC1       |
| Test Channel: | 48  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7204.9          | 34.9                       | 13.6        | 48.5                         | 68.2                 | -19.7       | Peak     | Horizontal   |
| *    | 8543.7          | 34.0                       | 14.5        | 48.5                         | 68.2                 | -19.7       | Peak     | Horizontal   |
|      | 9173.5          | 35.5                       | 15.3        | 50.8                         | 74.0                 | -23.2       | Peak     | Horizontal   |
|      | 12407.0         | 34.4                       | 19.0        | 53.4                         | 74.0                 | -20.6       | Peak     | Horizontal   |
| *    | 7173.7          | 34.5                       | 13.6        | 48.1                         | 68.2                 | -20.1       | Peak     | Vertical     |
| *    | 8517.6          | 35.1                       | 14.6        | 49.7                         | 68.2                 | -18.5       | Peak     | Vertical     |
|      | 9173.6          | 35.0                       | 15.3        | 50.3                         | 74.0                 | -23.7       | Peak     | Vertical     |
|      | 12475.0         | 33.8                       | 19.6        | 53.4                         | 74.0                 | -20.6       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11n-HT40  | Test Site:     | AC1       |
| Test Channel: | 38  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7126.5          | 34.9                       | 13.5        | 48.4                         | 68.2                 | -19.8       | Peak     | Horizontal   |
| *    | 8536.5          | 34.4                       | 14.5        | 48.9                         | 68.2                 | -19.3       | Peak     | Horizontal   |
|      | 9402.5          | 35.5                       | 15.4        | 50.9                         | 74.0                 | -23.1       | Peak     | Horizontal   |
|      | 11803.5         | 33.1                       | 19.3        | 52.4                         | 74.0                 | -21.6       | Peak     | Horizontal   |
| *    | 7044.0          | 35.9                       | 13.1        | 49.0                         | 68.2                 | -19.2       | Peak     | Vertical     |
| *    | 7760.5          | 34.3                       | 14.8        | 49.1                         | 68.2                 | -19.1       | Peak     | Vertical     |
|      | 9372.2          | 36.6                       | 15.3        | 51.9                         | 74.0                 | -22.1       | Peak     | Vertical     |
|      | 12424.0         | 33.8                       | 19.2        | 53.0                         | 74.0                 | -21.0       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11n-HT40  | Test Site:     | AC1       |
| Test Channel: | 46  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7215.5          | 34.6                       | 13.7        | 48.3                         | 68.2                 | -19.9       | Peak     | Horizontal   |
| *    | 8925.5          | 35.2                       | 14.3        | 49.5                         | 68.2                 | -18.7       | Peak     | Horizontal   |
|      | 9412.5          | 35.3                       | 15.5        | 50.8                         | 74.0                 | -23.2       | Peak     | Horizontal   |
|      | 11812.0         | 32.7                       | 19.3        | 52.0                         | 74.0                 | -22.0       | Peak     | Horizontal   |
| *    | 7002.5          | 35.2                       | 12.7        | 47.9                         | 68.2                 | -20.3       | Peak     | Vertical     |
| *    | 8572.7          | 33.6                       | 14.5        | 48.1                         | 68.2                 | -20.1       | Peak     | Vertical     |
|      | 9415.6          | 35.8                       | 15.5        | 51.3                         | 74.0                 | -22.7       | Peak     | Vertical     |
|      | 11795.0         | 33.8                       | 19.4        | 53.2                         | 74.0                 | -20.8       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11ac-VHT40  | Test Site:     | AC1       |
| Test Channel: | 38  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7173.6          | 34.1                       | 13.6        | 47.7                         | 68.2                 | -20.5       | Peak     | Horizontal   |
| *    | 8592.6          | 33.9                       | 14.8        | 48.7                         | 68.2                 | -19.5       | Peak     | Horizontal   |
|      | 9403.5          | 35.0                       | 15.4        | 50.4                         | 74.0                 | -23.6       | Peak     | Horizontal   |
|      | 11803.5         | 32.9                       | 19.3        | 52.2                         | 74.0                 | -21.8       | Peak     | Horizontal   |
| *    | 7146.6          | 34.2                       | 13.5        | 47.7                         | 68.2                 | -20.5       | Peak     | Vertical     |
| *    | 8535.3          | 34.1                       | 14.5        | 48.6                         | 68.2                 | -19.6       | Peak     | Vertical     |
|      | 9125.6          | 35.2                       | 14.9        | 50.1                         | 74.0                 | -23.9       | Peak     | Vertical     |
|      | 11803.5         | 33.2                       | 19.3        | 52.5                         | 74.0                 | -21.5       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11ac-VHT40  | Test Site:     | AC1       |
| Test Channel: | 46  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7146.6          | 34.8                       | 13.5        | 48.3                         | 68.2                 | -19.9       | Peak     | Horizontal   |
| *    | 8572.5          | 34.0                       | 14.5        | 48.5                         | 68.2                 | -19.7       | Peak     | Horizontal   |
|      | 9173.5          | 34.8                       | 15.3        | 50.1                         | 74.0                 | -23.9       | Peak     | Horizontal   |
|      | 12067.0         | 33.9                       | 19.2        | 53.1                         | 74.0                 | -20.9       | Peak     | Horizontal   |
| *    | 7045.7          | 35.5                       | 13.1        | 48.6                         | 68.2                 | -19.6       | Peak     | Vertical     |
| *    | 7983.6          | 34.3                       | 15.0        | 49.3                         | 68.2                 | -18.9       | Peak     | Vertical     |
|      | 9183.5          | 35.7                       | 15.3        | 51.0                         | 74.0                 | -23.0       | Peak     | Vertical     |
|      | 11803.5         | 32.6                       | 19.3        | 51.9                         | 74.0                 | -22.1       | Peak     | Vertical     |

Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

|               |   |                |           |
|---------------|---|----------------|-----------|
| Test Mode:    | 802.11ac-VHT80  | Test Site:     | AC1       |
| Test Channel: | 42  | Test Engineer: | Roy Cheng |
| Remark:       | 1. Average measurement was not performed if peak level lower than average limit.<br>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. |                |           |

| Mark | Frequency (MHz) | Reading Level (dB $\mu$ V) | Factor (dB) | Measure Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Polarization |
|------|-----------------|----------------------------|-------------|------------------------------|----------------------|-------------|----------|--------------|
| *    | 7263.5          | 34.7                       | 13.9        | 48.6                         | 68.2                 | -19.6       | Peak     | Horizontal   |
| *    | 8515.5          | 34.5                       | 14.6        | 49.1                         | 68.2                 | -19.1       | Peak     | Horizontal   |
|      | 9376.6          | 35.3                       | 15.3        | 50.6                         | 74.0                 | -23.4       | Peak     | Horizontal   |
|      | 11854.5         | 33.4                       | 19.5        | 52.9                         | 74.0                 | -21.1       | Peak     | Horizontal   |
| *    | 7163.5          | 34.5                       | 13.6        | 48.1                         | 68.2                 | -20.1       | Peak     | Vertical     |
| *    | 8547.5          | 33.9                       | 14.5        | 48.4                         | 68.2                 | -19.8       | Peak     | Vertical     |
|      | 9392.5          | 34.9                       | 15.4        | 50.3                         | 74.0                 | -23.7       | Peak     | Vertical     |
|      | 11259.5         | 33.6                       | 18.8        | 52.4                         | 74.0                 | -21.6       | Peak     | Vertical     |

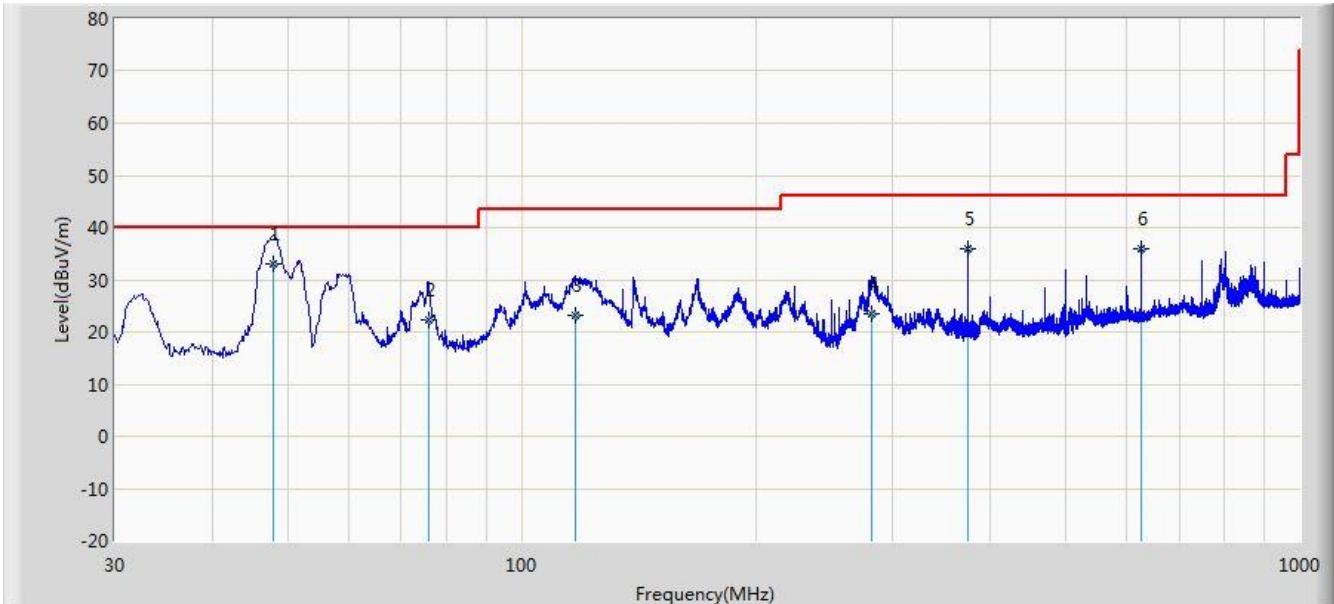
Note 1: “\*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB $\mu$ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dB $\mu$ V/m.

Note 2: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

**The worst case of Radiated Emission below 1GHz:**

|   |                          |
|---|--------------------------|
| Engineer: Sunny Sun                             |                          |
| Site: AC1                                       | Time: 2014/07/27 - 14:11 |
| Limit: FCC_Part15.209_RE(3m)                    | Margin: 0                |
| Probe: VULB9162_0.03-8GHz                       | Polarity: Horizontal     |
| EUT: WIFI dual band 4 GE LAN GPON HGU           | Power: AC 120V/60Hz      |
| <b>Worst Case Mode:</b> 802.11a Channel 5180MHz |                          |

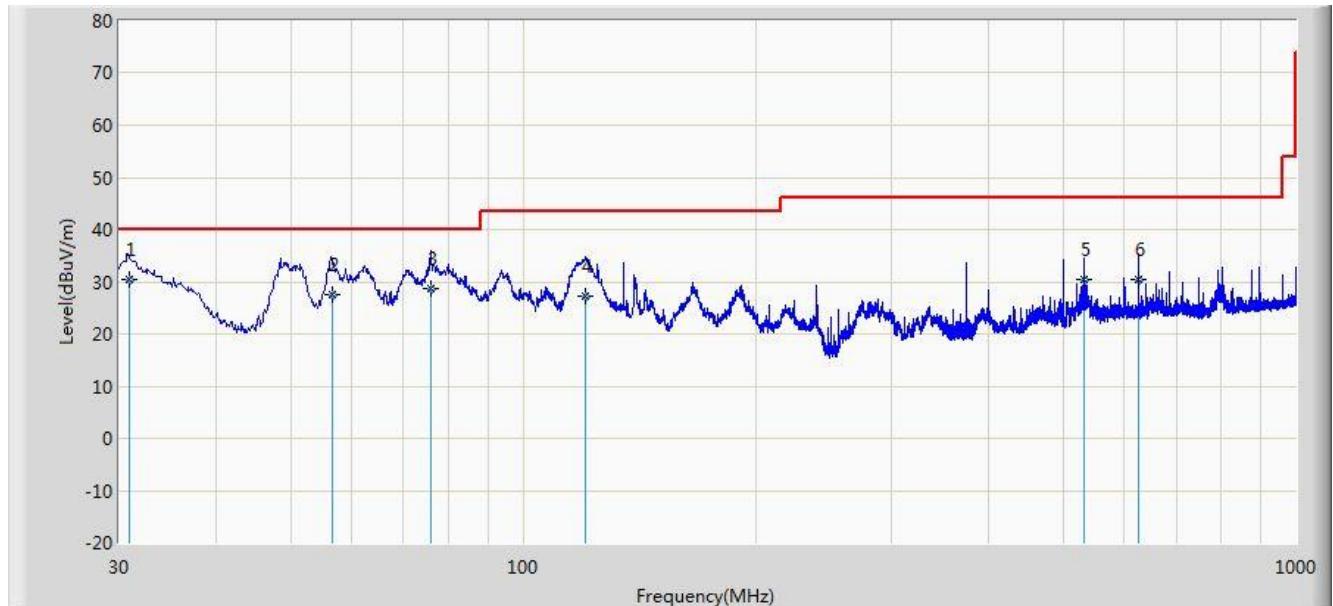


| No | Flag | Mark | Frequency (MHz) | Measure Level (dB $\mu$ V/m) | Reading Level (dB $\mu$ V) | Over Limit (dB) | Limit (dB $\mu$ V/m) | Factor (dB) | Type |
|----|------|------|-----------------|------------------------------|----------------------------|-----------------|----------------------|-------------|------|
| 1  |      |      | 47.945          | 33.151                       | 18.360                     | -6.849          | 40.000               | 14.792      | QP   |
| 2  |      |      | 75.833          | 22.228                       | 12.900                     | -17.772         | 40.000               | 9.328       | QP   |
| 3  |      |      | 117.201         | 23.141                       | 11.700                     | -20.359         | 43.500               | 11.441      | QP   |
| 4  |      |      | 281.959         | 23.394                       | 9.600                      | -22.606         | 46.000               | 13.794      | QP   |
| 5  |      | *    | 374.992         | 35.832                       | 20.100                     | -10.168         | 46.000               | 15.732      | QP   |
| 6  |      |      | 625.003         | 35.922                       | 16.200                     | -10.078         | 46.000               | 19.722      | QP   |

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

|   |                          |
|---|--------------------------|
| Engineer: Sunny Sun                             |                          |
| Site: AC1                                       | Time: 2014/07/27 - 13:39 |
| Limit: FCC_Part15.209_RE(3m)                    | Margin: 0                |
| Probe: VULB9162_0.03-8GHz                       | Polarity: Vertical       |
| EUT: WIFI dual band 4 GE LAN GPON HGU           | Power: AC 120V/60Hz      |
| <b>Worst Case Mode:</b> 802.11a Channel 5180MHz |                          |



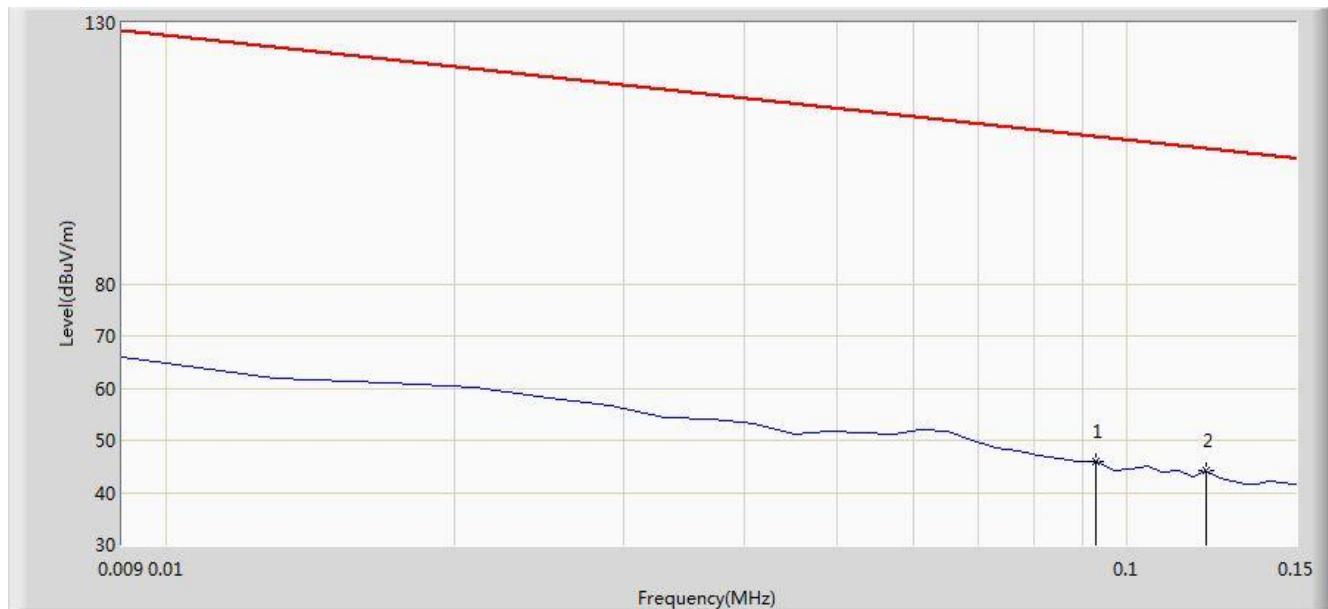
| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    |      | 30.937          | 30.372                 | 18.300               | -9.628          | 40.000         | 12.072      | QP   |
| 2  |      |      | 56.581          | 27.646                 | 13.400               | -12.354         | 40.000         | 14.246      | QP   |
| 3  |      |      | 75.965          | 28.796                 | 19.500               | -11.204         | 40.000         | 9.296       | QP   |
| 4  |      |      | 120.238         | 27.373                 | 16.400               | -16.127         | 43.500         | 10.973      | QP   |
| 5  |      |      | 531.260         | 30.387                 | 12.200               | -15.613         | 46.000         | 18.187      | QP   |
| 6  |      |      | 624.999         | 30.522                 | 10.800               | -15.478         | 46.000         | 19.722      | QP   |

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

|                                       |                          |
|---------------------------------------|--------------------------|
| Engineer: Roy Cheng                   |                          |
| Site: AC1                             | Time: 2014/07/27 - 13:42 |
| Limit: FCC_Part15.209_RE(3m)          | Margin: 0                |
| Probe: FMZB1519_0.009-30MHz           | Polarity: Face On        |
| EUT: WIFI dual band 4 GE LAN GPON HGU | Power: AC 120V/60Hz      |

**Note: There is the ambient noise within frequency range 9kHz~30MHz.**



| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      |      | 0.093           | 46.049                 | 25.820               | -62.178         | 108.226        | 20.229      | QP   |
| 2  | *    |      | 0.121           | 44.063                 | 23.875               | -61.879         | 105.942        | 20.188      | QP   |

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)