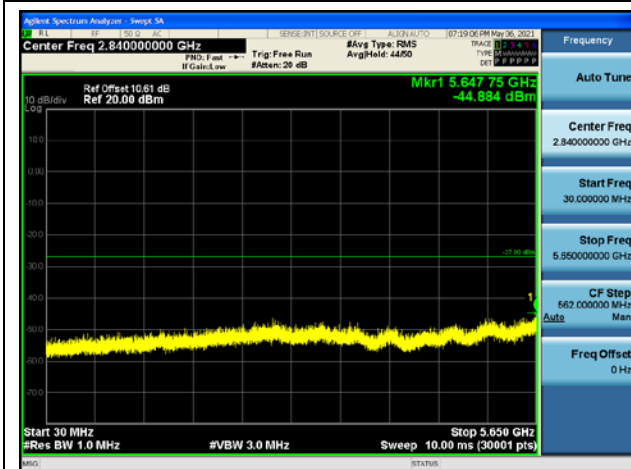


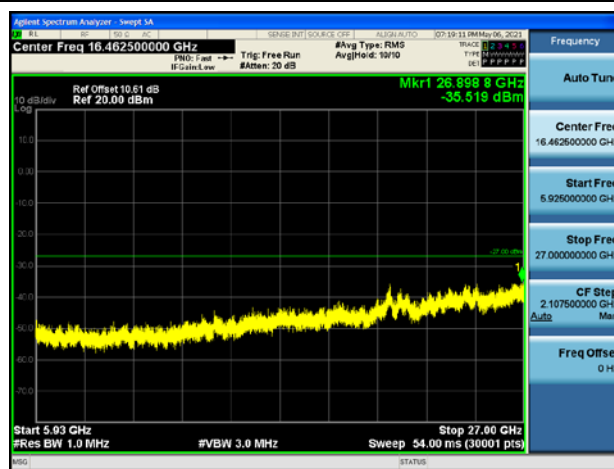


11n40

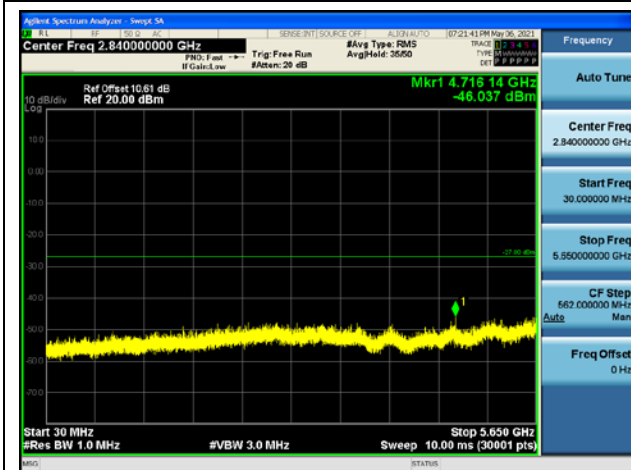
Low channel



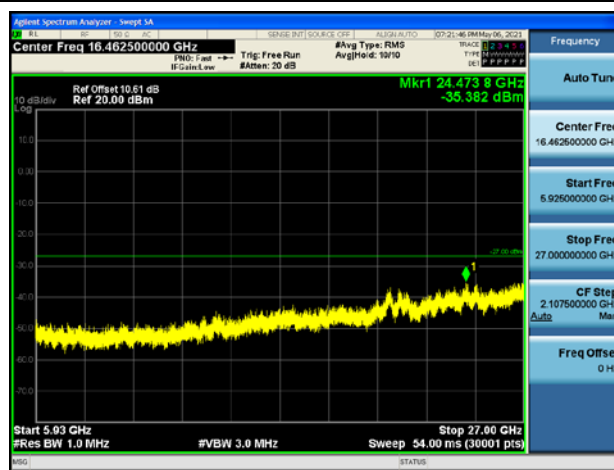
Low channel



High channel



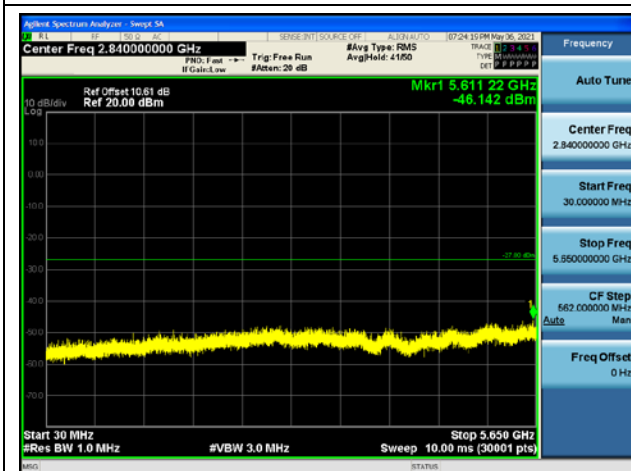
High channel



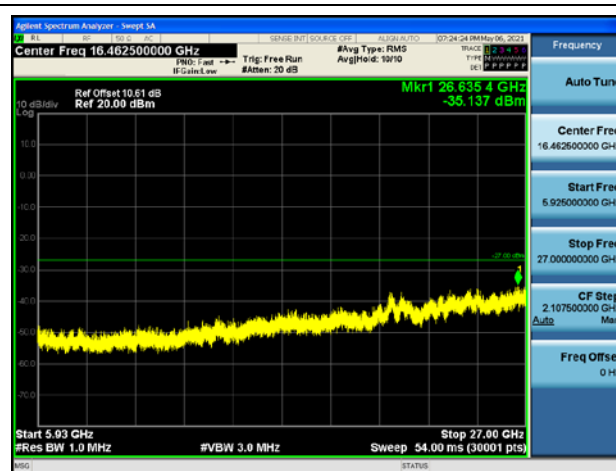


11ac20

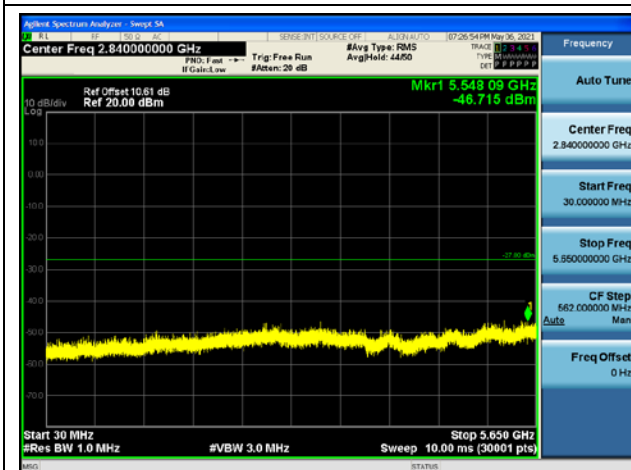
Low channel



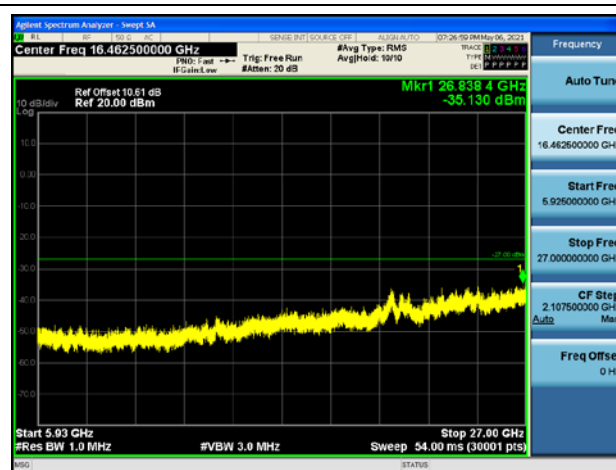
Low channel



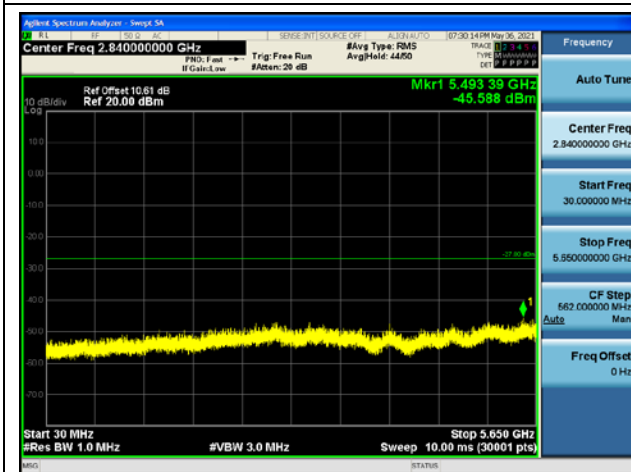
Middle channel



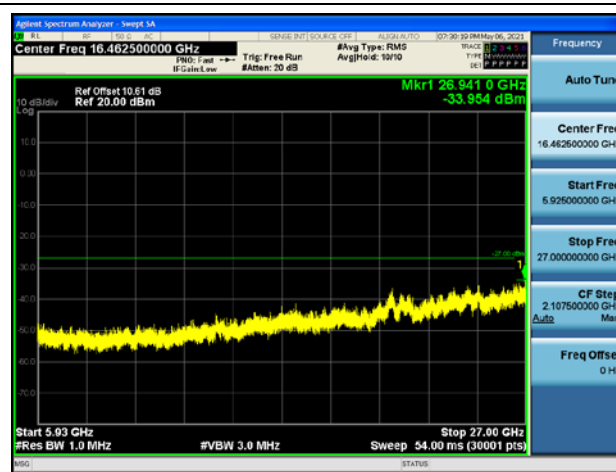
Middle channel



High channel



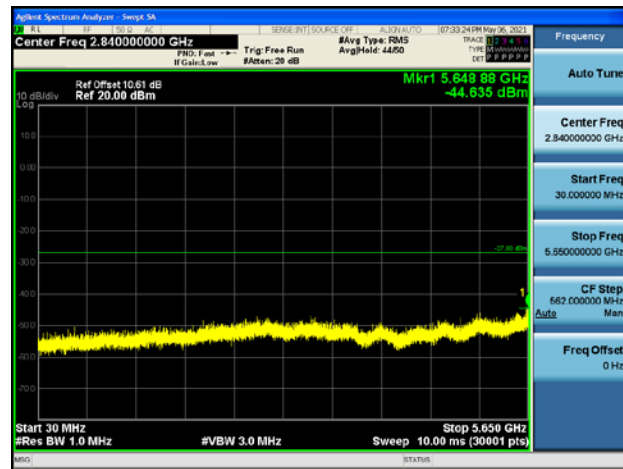
High channel



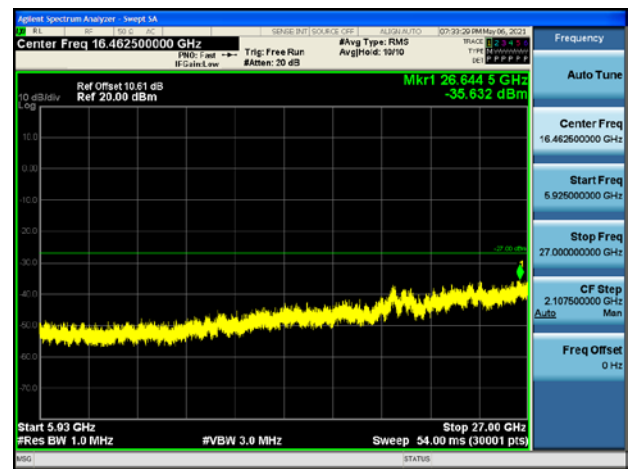


11ac40

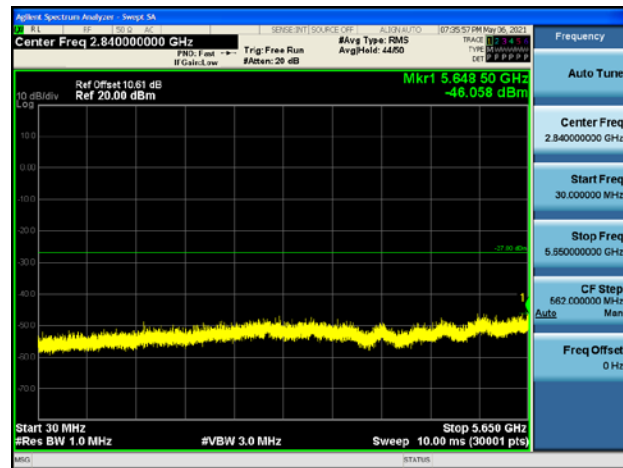
Low channel



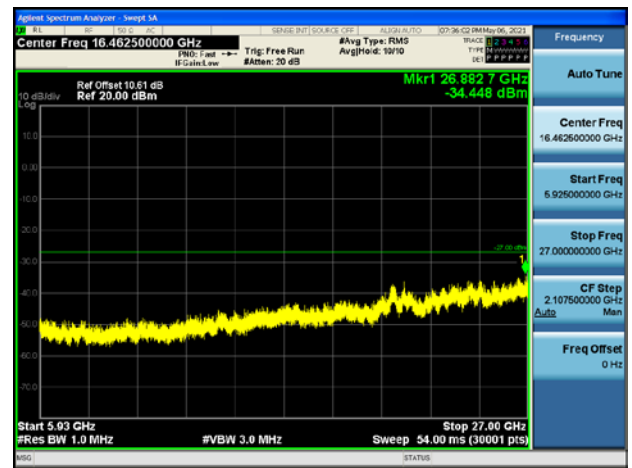
Low channel



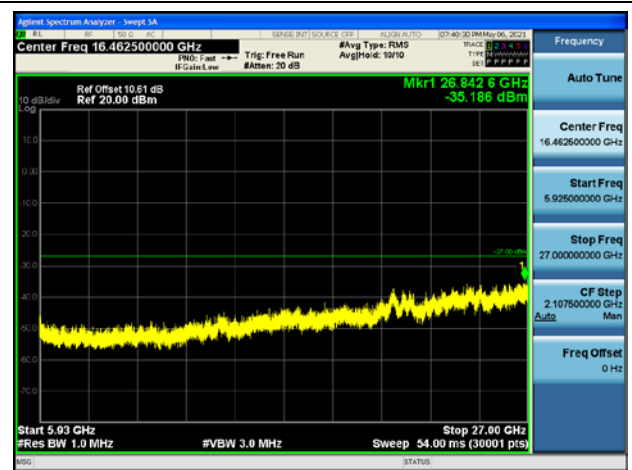
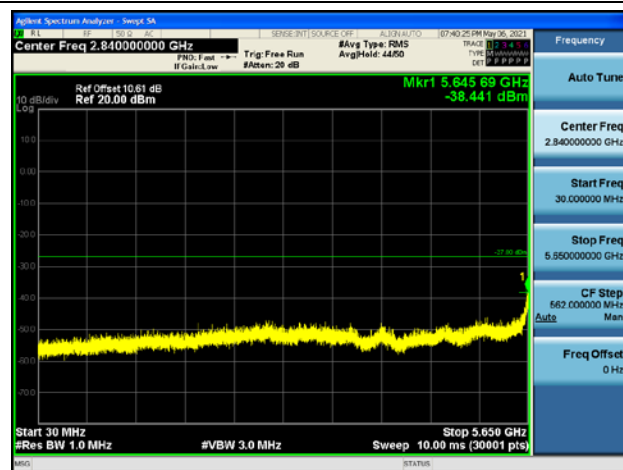
High channel



High channel



11ac80



Note: The test result of 27G-40GHz is far below the limit, so it is no need to report.

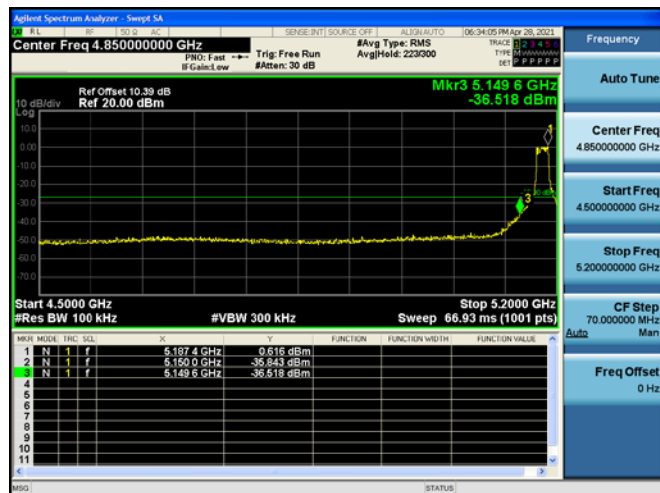


## 5.7.5 Conduction Band edge

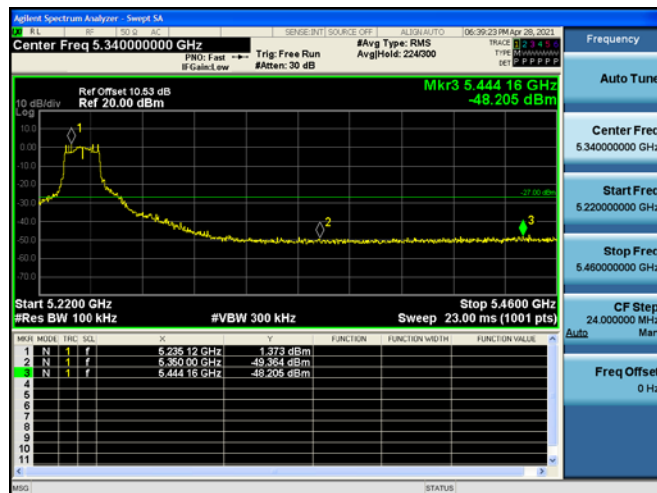
For U-NII-1 test plot

11a

Band edge-Left

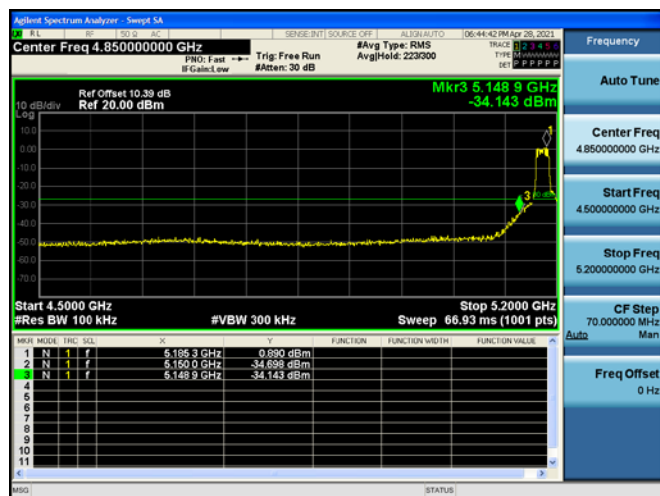


Band edge-Right



11n20

Band edge-Left



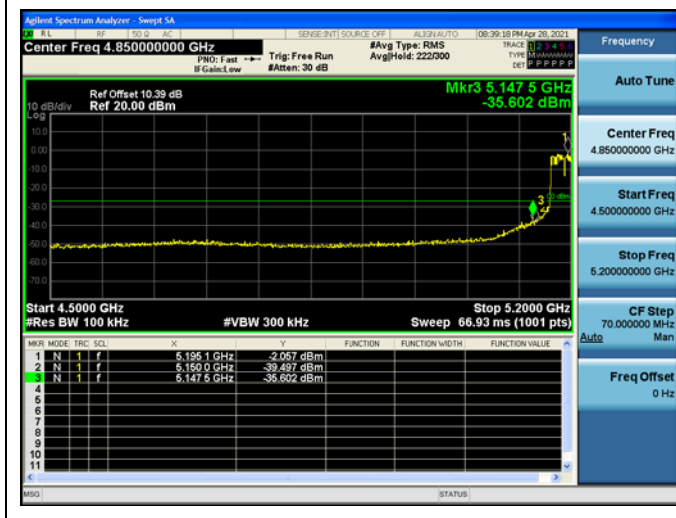
Band edge-Right





11n40

Band edge-Left

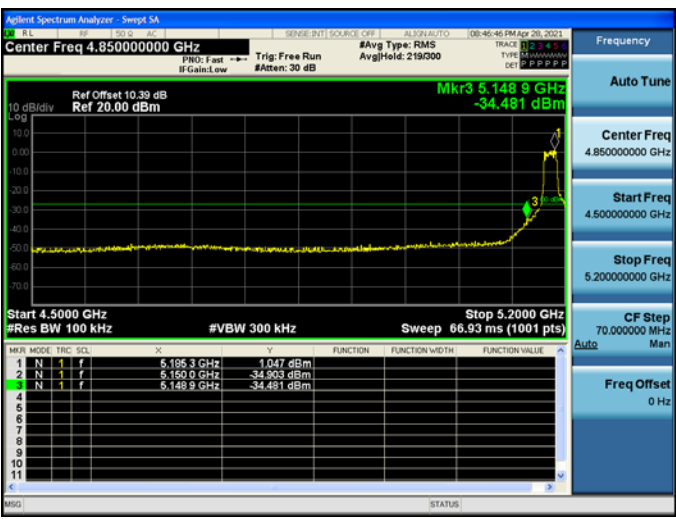


Band edge-Right

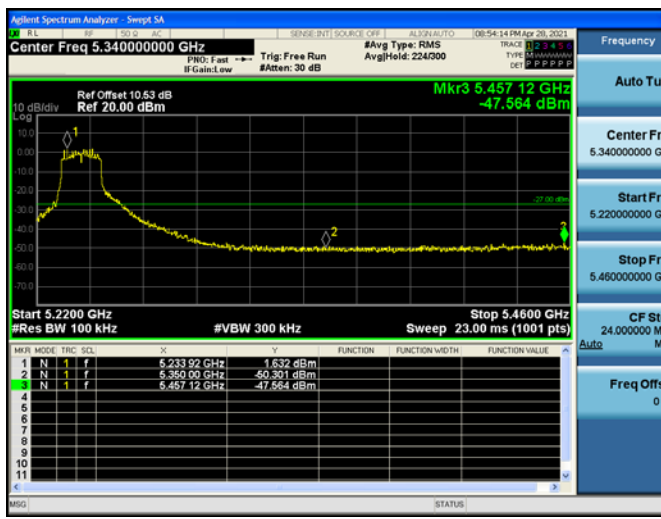


11ac20

Band edge-Left



Band edge-Right

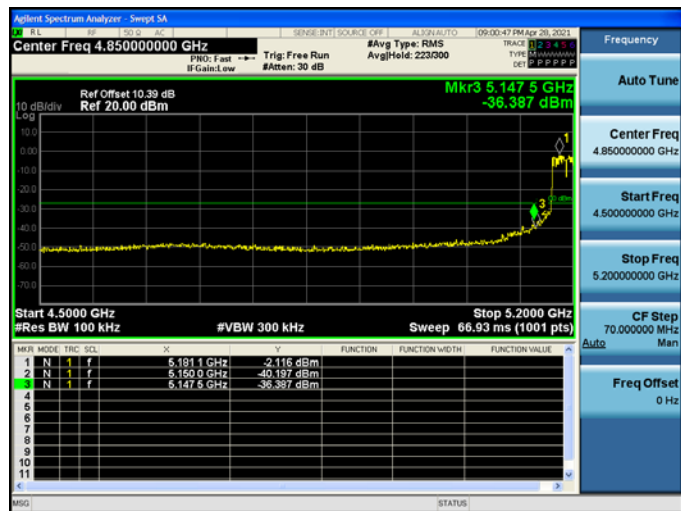




11ac40

Band edge-Left

Band edge-Right



11ac80

Band edge-Left

Band edge-Right





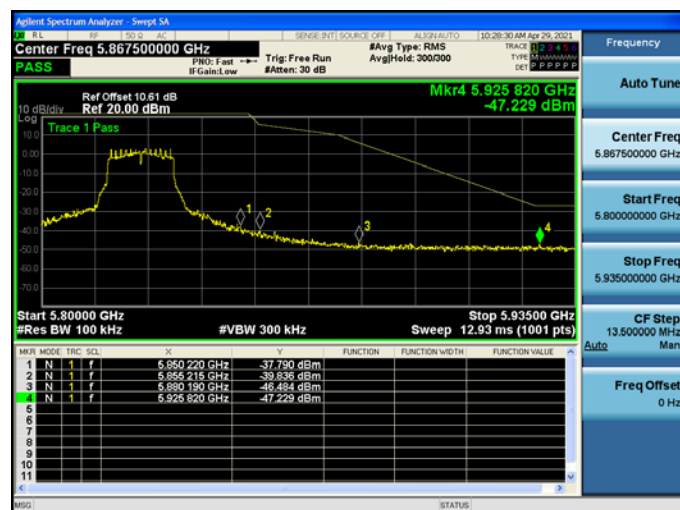
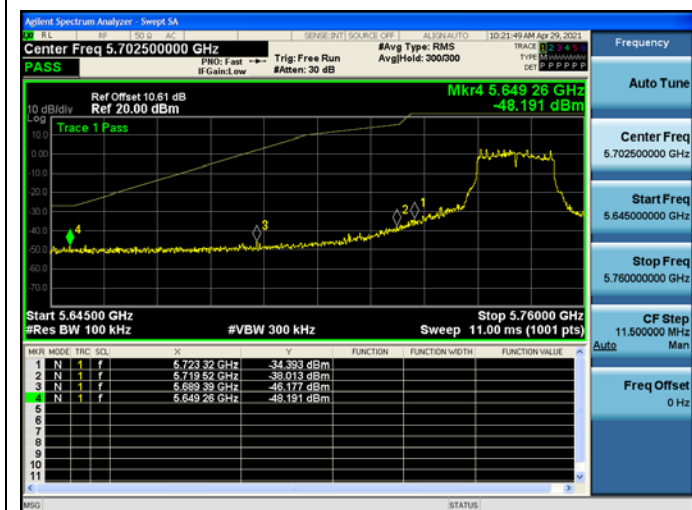
## Conduction Band edge

For U-NII-3 test plot

11a

Band edge-Left

Band edge-Right



11n20

Band edge-Left

Band edge-Right

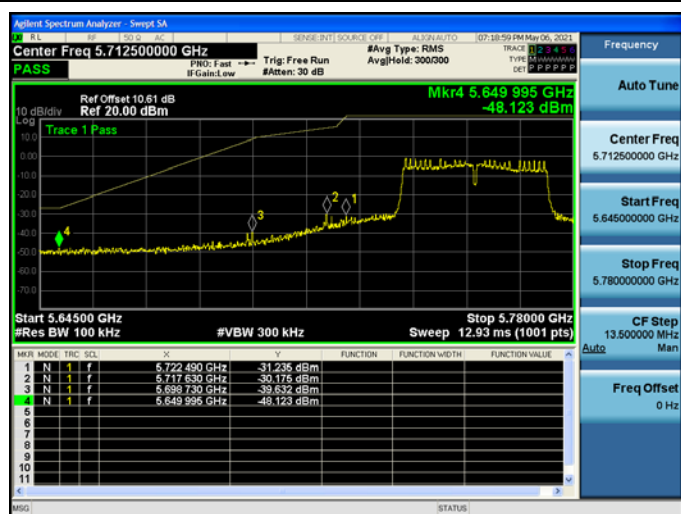




11n40

Band edge-Left

Band edge-Right

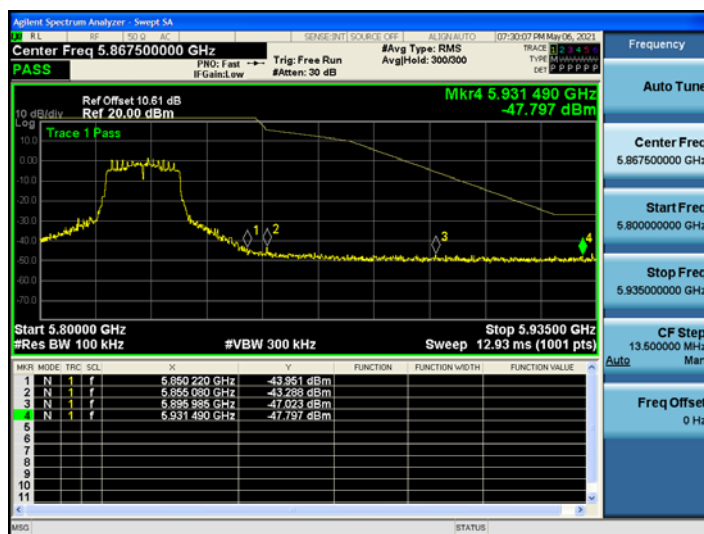
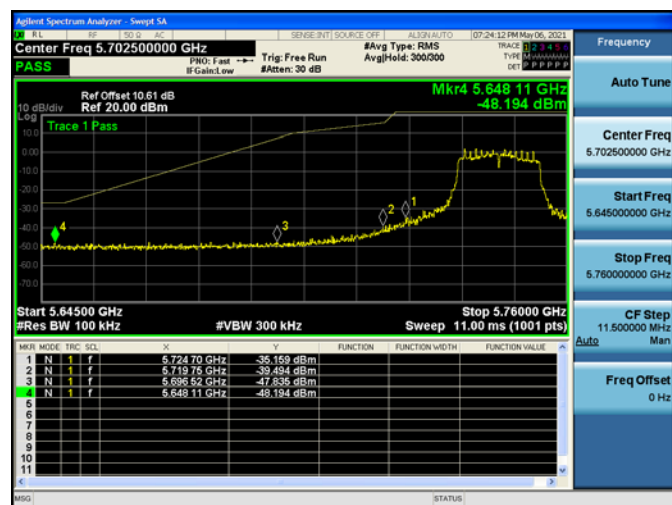




11ac20

Band edge-Left

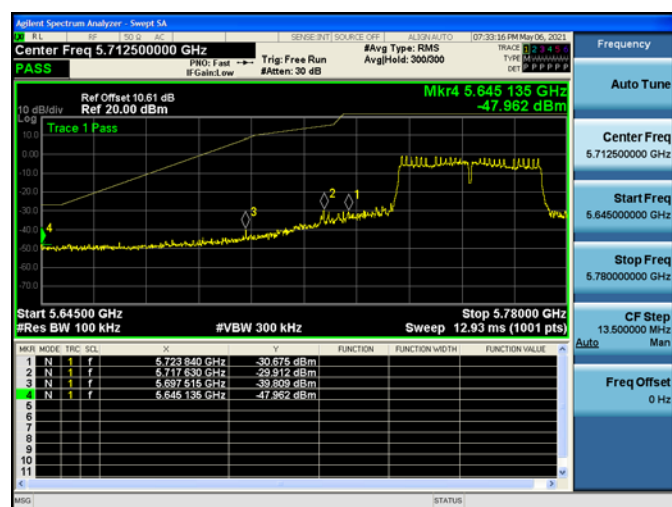
Band edge-Right



11ac40

Band edge-Left

Band edge-Right

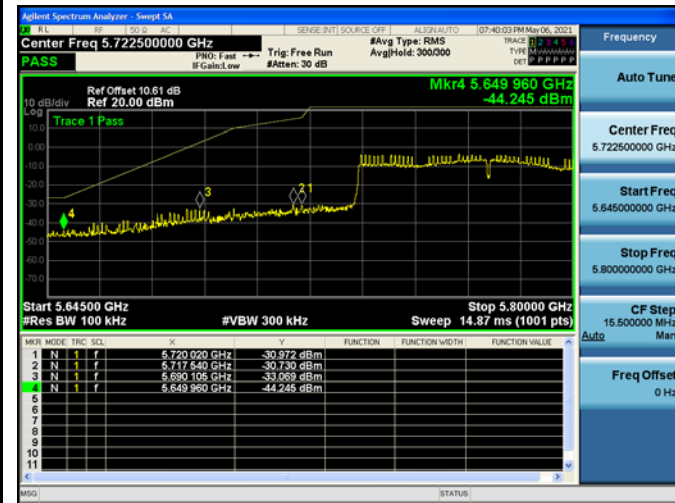




11ac80

Band edge-Left

Band edge-Right





## **5.8 Power spectral density**

### **5.8.1 Limit**

#### For the band 5.15-5.25 GHz

For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### For the band 5.25-5.35 GHz and 5.47-5.725 GHz

The maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### For the band 5.725-5.85 GHz

The maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **5.8.2 Test procedure**

#### For U-NII-1

1. Set analyzer center frequency to NII channel center frequency.
2. Set the RBW  $\geq 1\text{MHz}$ .
3. Set the VBW  $\geq 3 \times \text{RBW}$ .
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

#### For U-NII-3

1. Set analyzer center frequency to NII channel center frequency.
2. Set the RBW  $\geq 510\text{kHz}$ .
3. Set the VBW  $\geq 3 \times \text{RBW}$ .
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.



### 5.8.3 Test setup



### 5.8.4 Test results

For U-NII-1

| Mode           | Channel | Frequency(MHz) | Measurement<br>PSD (dBm/MHz) | Limit<br>(dBm/MHz) | Result |
|----------------|---------|----------------|------------------------------|--------------------|--------|
| 11a            | CH36    | 5180           | 7.840                        | 11                 | Pass   |
| 11a            | CH44    | 5220           | 7.829                        | 11                 | Pass   |
| 11a            | CH48    | 5240           | 8.766                        | 11                 | Pass   |
| 11n(HT20)      | CH36    | 5180           | 6.904                        | 11                 | Pass   |
| 11n(HT20)      | CH44    | 5220           | 7.830                        | 11                 | Pass   |
| 11n(HT20)      | CH48    | 5240           | 7.711                        | 11                 | Pass   |
| 11n(HT40)      | CH38    | 5190           | 4.188                        | 11                 | Pass   |
| 11n(HT40)      | CH46    | 5230           | 5.060                        | 11                 | Pass   |
| 11ac(HT20)     | CH36    | 5180           | 7.017                        | 11                 | Pass   |
| 11ac<br>(HT20) | CH40    | 5200           | 7.107                        | 11                 | Pass   |
| 11ac<br>(HT20) | CH48    | 5240           | 7.690                        | 11                 | Pass   |
| 11ac<br>(HT40) | CH38    | 5190           | 5.164                        | 11                 | Pass   |
| 11ac<br>(HT40) | CH46    | 5230           | 4.884                        | 11                 | Pass   |
| 11ac<br>(HT80) | CH42    | 5210           | 2.111                        | 11                 | Pass   |



For U-NII-3

| Mode   | Channel | Frequency<br>(MHz) | PSD<br>(dBm/510kHz) | PSD<br>(dBm/500kHz) | Limit<br>(dBm/500kHz) | Result |
|--------|---------|--------------------|---------------------|---------------------|-----------------------|--------|
| 11a    | CH149   | 5745               | 7.335               | 5.308               | 30                    | Pass   |
| 11a    | CH157   | 5785               | 6.854               | 4.751               | 30                    | Pass   |
| 11a    | CH165   | 5825               | 7.416               | 5.408               | 30                    | Pass   |
| 11n20  | CH149   | 5745               | 6.961               | 4.870               | 30                    | Pass   |
| 11n20  | CH157   | 5785               | 6.355               | 4.235               | 30                    | Pass   |
| 11n20  | CH165   | 5825               | 6.691               | 4.576               | 30                    | Pass   |
| 11n40  | CH151   | 5755               | 2.459               | 1.727               | 30                    | Pass   |
| 11n40  | CH159   | 5795               | 1.666               | 1.439               | 30                    | Pass   |
| 11ac20 | CH149   | 5745               | 5.740               | 3.676               | 30                    | Pass   |
| 11ac20 | CH157   | 5785               | 5.678               | 3.624               | 30                    | Pass   |
| 11ac20 | CH165   | 5825               | 4.790               | 2.954               | 30                    | Pass   |
| 11ac40 | CH151   | 5755               | 2.523               | 1.753               | 30                    | Pass   |
| 11ac40 | CH159   | 5795               | 1.845               | 1.499               | 30                    | Pass   |
| 11ac80 | CH155   | 5775               | 0.870               | 1.198               | 30                    | Pass   |

Note: If the measurement is X dBm/510kHz, thus X dBm/510kHz =

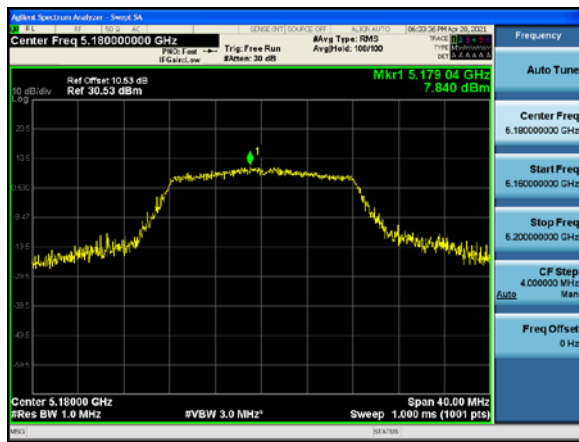
$$(10^{X/10}) * (500 / 510) \text{ mW/500kHz} = 10 * \lg 10 \{ (10^{X/10}) * (500 / 510) \} \text{ dBm/500kHz}$$



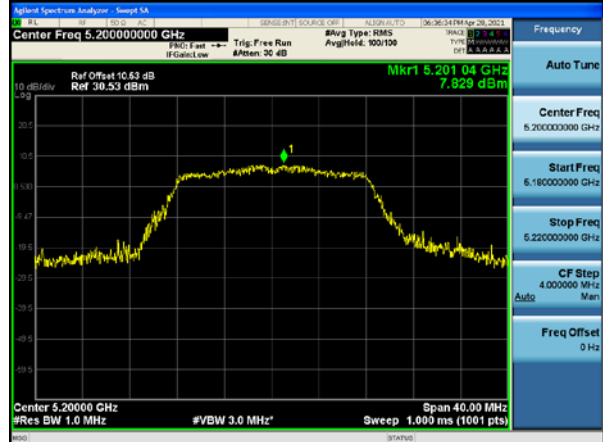
## Test plots

For U-NII-1

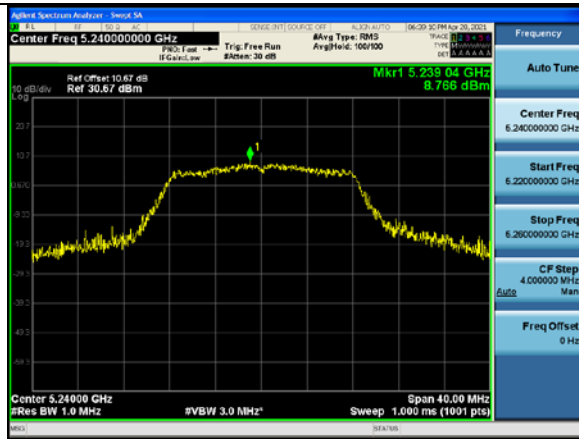
11a CH36



11a CH44



11a CH48



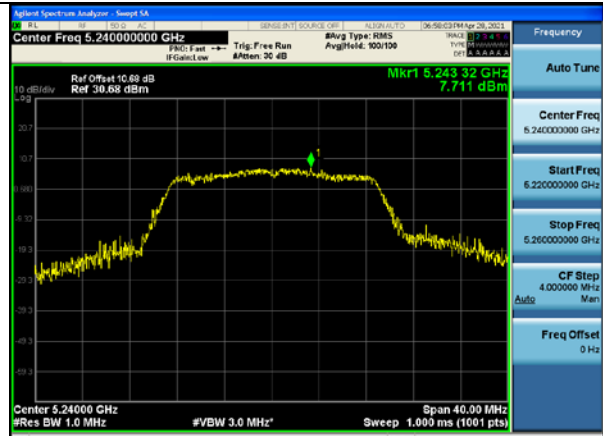
11n20 CH36



11n20 CH44



11n20 CH48

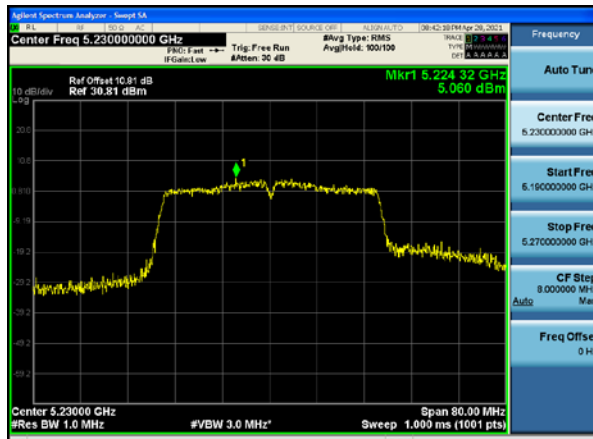




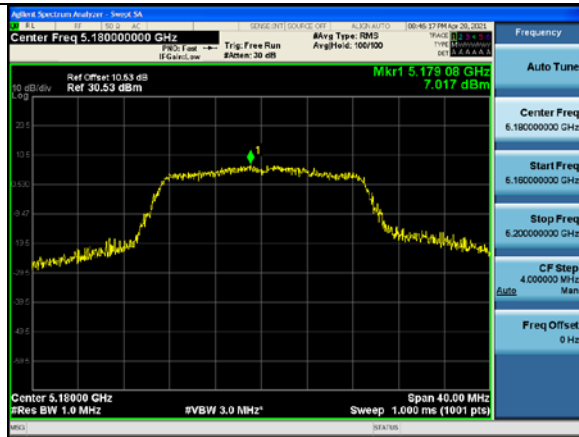
11n40 CH38



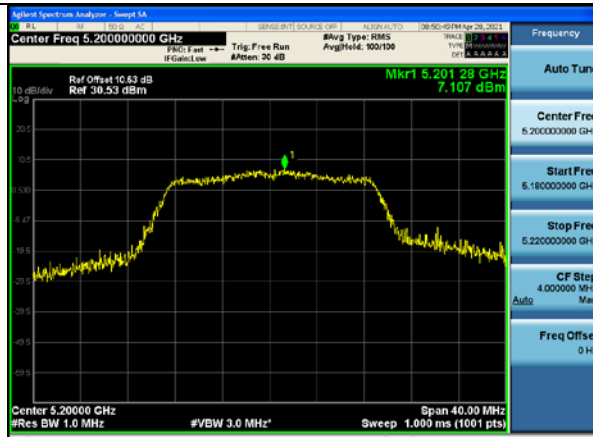
11n40 CH46



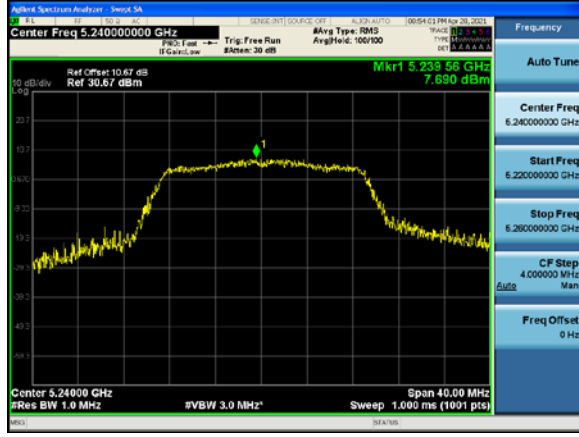
11ac20 CH36



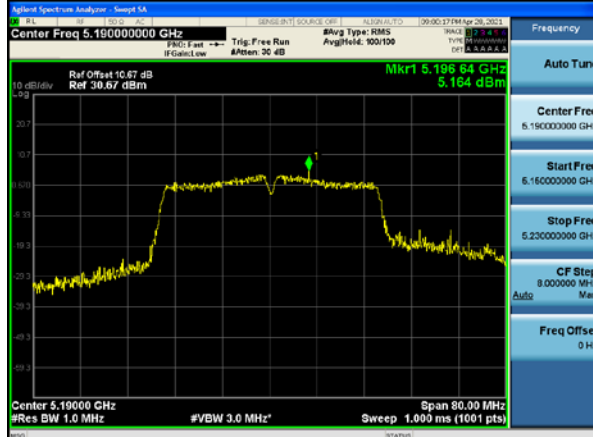
11ac20 CH40

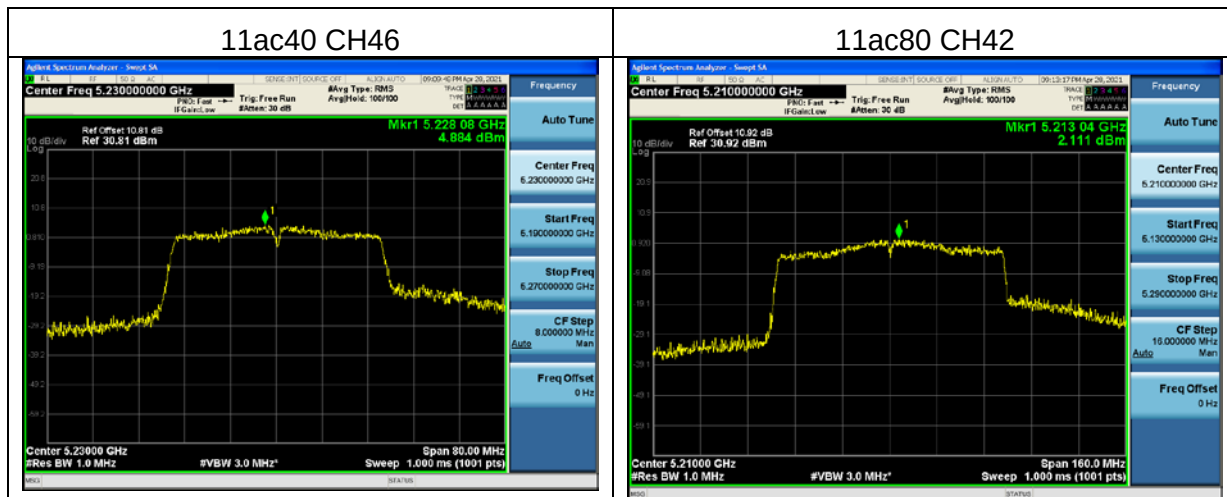


11ac20 CH48



11ac40 CH38

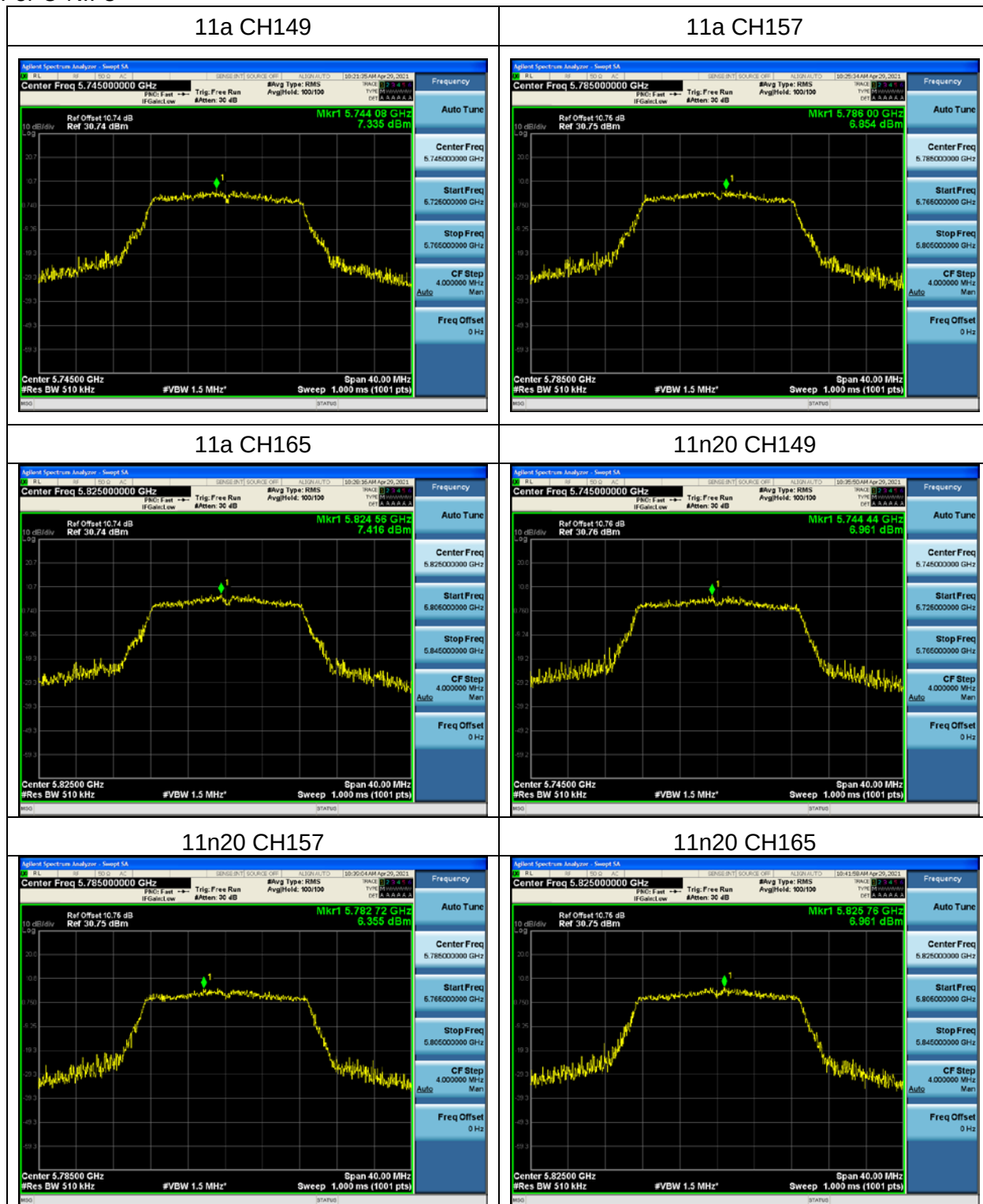






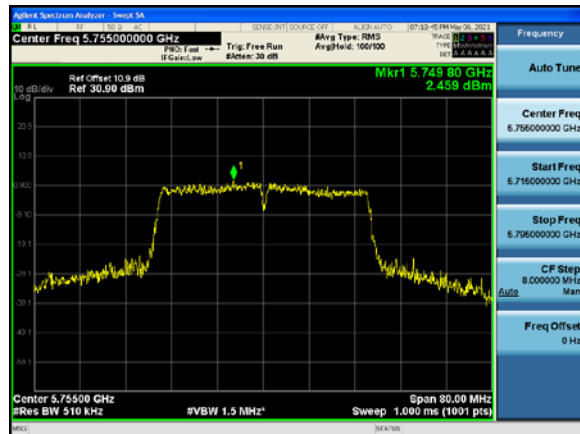
## Test plots

For U-NII-3

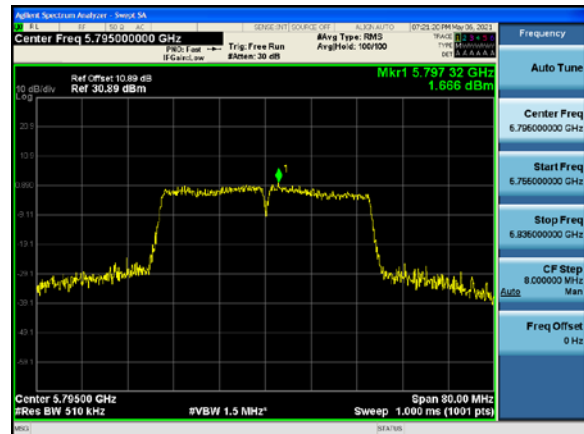




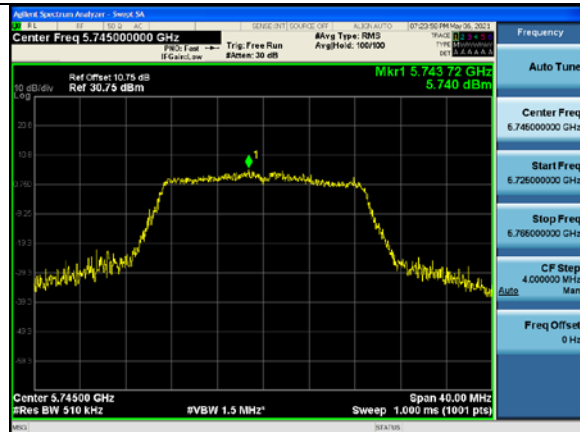
11n40 CH151



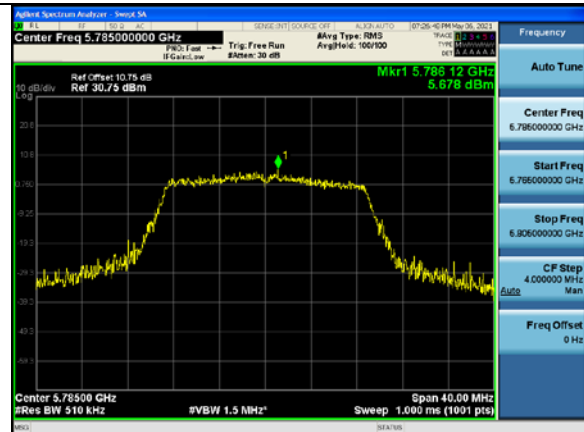
11n40 CH159



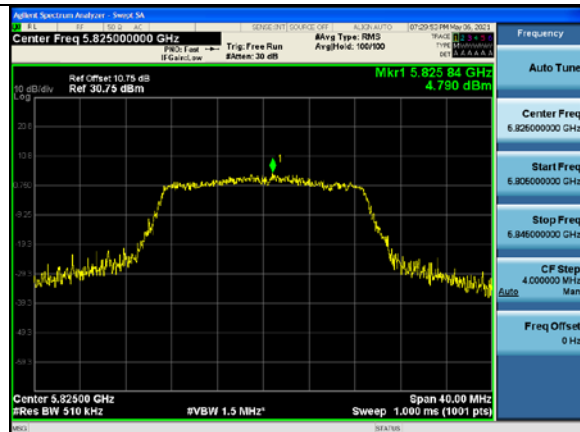
11ac20 CH149



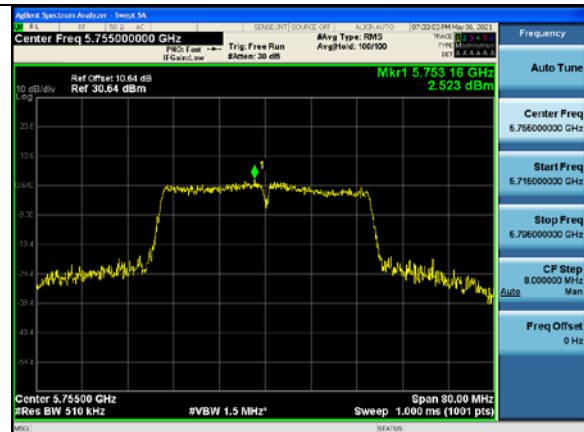
11ac20 CH157

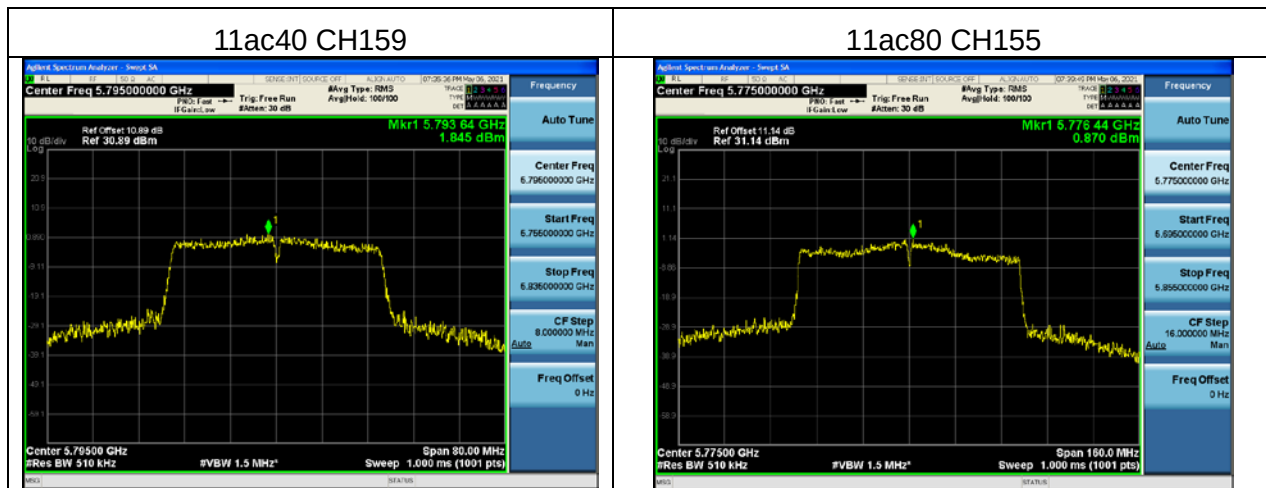


11ac20 CH165



11ac40 CH151







## 5.9 Frequency Stability Measurement

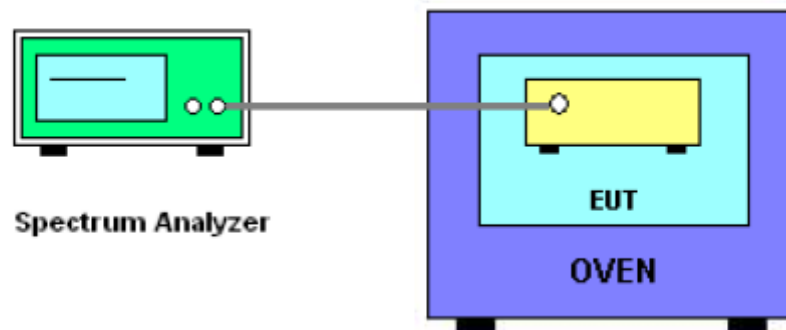
### 5.9.1 Limit

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.

### 5.9.2 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and max hold settings.
5. Fc is declaring of channel frequency. Then the frequency error formula is  $(f_c - f)/f_c \times 10^6$  ppm and the limit is less than  $\pm 20$  ppm (IEEE 802.11 specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is  $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$ .

### 5.9.3 Test Setup Layout



### 5.9.4 EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.



### 5.9.5 TEST RESULTS

For U-NII-1

Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency: 5180MHz |      |                      |                      |
|-----------------|----|-----------|------|------------------------------|------|----------------------|----------------------|
|                 |    |           |      | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C)      | 20 | V nom (V) | 5.00 | 5180.0140                    | 5180 | 0.0140               | -2.7027              |
|                 |    | V max (V) | 5.75 | 5180.0197                    | 5180 | 0.0197               | -3.7992              |
|                 |    | V min (V) | 4.25 | 5180.0112                    | 5180 | 0.0112               | -2.1622              |
| Limits          |    |           |      | within 5150-5250MHz          |      |                      |                      |
| Result          |    |           |      | Complies                     |      |                      |                      |

Temperature vs. Frequency Stability

| TEST CONDITIONS |   |        |     | Reference Frequency: 5180MHz |      |                      |                      |
|-----------------|---|--------|-----|------------------------------|------|----------------------|----------------------|
|                 |   |        |     | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V)       | 5 | T (°C) | -20 | 5180.0136                    | 5180 | 0.0136               | -2.6274              |
|                 |   | T (°C) | -10 | 5180.0102                    | 5180 | 0.0102               | -1.9691              |
|                 |   | T (°C) | 0   | 5180.0126                    | 5180 | 0.0126               | -2.4324              |
|                 |   | T (°C) | 10  | 5180.0130                    | 5180 | 0.0130               | -2.5097              |
|                 |   | T (°C) | 20  | 5180.0123                    | 5180 | 0.0123               | -2.3745              |
|                 |   | T (°C) | 30  | 5180.0134                    | 5180 | 0.0134               | -2.5869              |
|                 |   | T (°C) | 40  | 5180.0110                    | 5180 | 0.0110               | -2.1236              |
|                 |   | T (°C) | 50  | 5180.0123                    | 5180 | 0.0123               | -2.3745              |
|                 |   | T (°C) | 60  | 5180.0140                    | 5180 | 0.0140               | -2.7027              |
|                 |   | T (°C) | 70  | 5180.0143                    | 5180 | 0.0143               | -2.7606              |
| Limits          |   |        |     | within 5150-5250MHz          |      |                      |                      |
| Result          |   |        |     | Complies                     |      |                      |                      |



Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency: 5200MHz |      |                      |                      |
|-----------------|----|-----------|------|------------------------------|------|----------------------|----------------------|
|                 |    |           |      | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C)      | 20 | V nom (V) | 3.70 | 5200.0121                    | 5200 | 0.0121               | -2.3269              |
|                 |    | V max (V) | 4.26 | 5200.0119                    | 5200 | 0.0119               | -2.2885              |
|                 |    | V min (V) | 3.15 | 5200.0134                    | 5200 | 0.0134               | -2.5769              |
| Limits          |    |           |      | within 5150-5250MHz          |      |                      |                      |
| Result          |    |           |      | Complies                     |      |                      |                      |

Temperature vs. Frequency Stability

| TEST CONDITIONS |   |        |     | Reference Frequency: 5200MHz |      |                      |                      |
|-----------------|---|--------|-----|------------------------------|------|----------------------|----------------------|
|                 |   |        |     | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V)       | 5 | T (°C) | -20 | 5200.0190                    | 5200 | 0.0190               | -3.6538              |
|                 |   | T (°C) | -10 | 5200.0135                    | 5200 | 0.0135               | -2.5962              |
|                 |   | T (°C) | 0   | 5200.0124                    | 5200 | 0.0124               | -2.3846              |
|                 |   | T (°C) | 10  | 5200.0113                    | 5200 | 0.0113               | -2.1731              |
|                 |   | T (°C) | 20  | 5200.0121                    | 5200 | 0.0121               | -2.3269              |
|                 |   | T (°C) | 30  | 5200.0131                    | 5200 | 0.0131               | -2.5192              |
|                 |   | T (°C) | 40  | 5200.0110                    | 5200 | 0.0110               | -2.1154              |
|                 |   | T (°C) | 50  | 5200.0112                    | 5200 | 0.0112               | -2.1538              |
|                 |   | T (°C) | 60  | 5200.0119                    | 5200 | 0.0119               | -2.2885              |
|                 |   | T (°C) | 70  | 5200.0129                    | 5200 | 0.0129               | -2.4808              |
| Limits          |   |        |     | within 5150-5250MHz          |      |                      |                      |
| Result          |   |        |     | Complies                     |      |                      |                      |



Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency: 5240MHz |      |                            |                         |
|-----------------|----|-----------|------|------------------------------|------|----------------------------|-------------------------|
|                 |    |           |      | f                            | fc   | Max.<br>Deviation<br>(MHz) | Max. Deviation<br>(ppm) |
| T nom<br>(°C)   | 20 | V nom (V) | 3.70 | 5240.0154                    | 5240 | 0.0154                     | -2.9389                 |
|                 |    | V max (V) | 4.26 | 5240.0189                    | 5240 | 0.0189                     | -3.6069                 |
|                 |    | V min (V) | 3.15 | 5240.0144                    | 5240 | 0.0144                     | -2.7481                 |
| Limits          |    |           |      | within 5150-5250MHz          |      |                            |                         |
| Result          |    |           |      | Complies                     |      |                            |                         |

Temperature vs. Frequency Stability

| TEST CONDITIONS |   |        |     | Reference Frequency: 5240MHz |      |                      |                      |
|-----------------|---|--------|-----|------------------------------|------|----------------------|----------------------|
|                 |   |        |     | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V)       | 5 | T (°C) | -20 | 5240.0233                    | 5240 | 0.0233               | -4.4466              |
|                 |   | T (°C) | -10 | 5240.0124                    | 5240 | 0.0124               | -2.3664              |
|                 |   | T (°C) | 0   | 5240.0137                    | 5240 | 0.0137               | -2.6145              |
|                 |   | T (°C) | 10  | 5240.0164                    | 5240 | 0.0164               | -3.1298              |
|                 |   | T (°C) | 20  | 5240.0140                    | 5240 | 0.0140               | -2.6718              |
|                 |   | T (°C) | 30  | 5240.0130                    | 5240 | 0.0130               | -2.4809              |
|                 |   | T (°C) | 40  | 5240.0120                    | 5240 | 0.0120               | -2.2901              |
|                 |   | T (°C) | 50  | 5240.0119                    | 5240 | 0.0119               | -2.2710              |
|                 |   | T (°C) | 60  | 5240.0110                    | 5240 | 0.0110               | -2.0992              |
|                 |   | T (°C) | 70  | 5240.0120                    | 5240 | 0.0120               | -2.2901              |
| Limits          |   |        |     | within 5150-5250MHz          |      |                      |                      |
| Result          |   |        |     | Complies                     |      |                      |                      |



For U-NII-3  
Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency: 5745MHz |      |                            |                         |
|-----------------|----|-----------|------|------------------------------|------|----------------------------|-------------------------|
|                 |    |           |      | f                            | fc   | Max.<br>Deviation<br>(MHz) | Max. Deviation<br>(ppm) |
| T nom (°<br>C)  | 20 | V nom (V) | 3.70 | 5745.00921                   | 5745 | 0.00921                    | -1.6024                 |
|                 |    | V max (V) | 4.26 | 5745.00549                   | 5745 | 0.00549                    | -0.9554                 |
|                 |    | V min (V) | 3.15 | 5745.00607                   | 5745 | 0.00607                    | -1.0560                 |
| Limits          |    |           |      | within 5725-5850MHz          |      |                            |                         |
| Result          |    |           |      | Complies                     |      |                            |                         |

Temperature vs. Frequency Stability

| TEST CONDITIONS |   |        |     | Reference Frequency: 5745MHz |      |                      |                      |
|-----------------|---|--------|-----|------------------------------|------|----------------------|----------------------|
|                 |   |        |     | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V)       | 5 | T (°C) | -20 | 5745.01161                   | 5745 | 0.01161              | -2.0203              |
|                 |   | T (°C) | -10 | 5745.00274                   | 5745 | 0.00274              | -0.4775              |
|                 |   | T (°C) | 0   | 5745.01242                   | 5745 | 0.01242              | -2.1627              |
|                 |   | T (°C) | 10  | 5745.01258                   | 5745 | 0.01258              | -2.1899              |
|                 |   | T (°C) | 20  | 5745.00203                   | 5745 | 0.00203              | -0.3532              |
|                 |   | T (°C) | 30  | 5745.00909                   | 5745 | 0.00909              | -1.5824              |
|                 |   | T (°C) | 40  | 5745.00264                   | 5745 | 0.00264              | -0.4587              |
|                 |   | T (°C) | 50  | 5745.00965                   | 5745 | 0.00965              | -1.6800              |
|                 |   | T (°C) | 60  | 5745.00251                   | 5745 | 0.00251              | -0.4374              |
|                 |   | T (°C) | 70  | 5745.00129                   | 5745 | 0.00129              | -0.2248              |
| Limits          |   |        |     | within 5725-5850MHz          |      |                      |                      |
| Result          |   |        |     | Complies                     |      |                      |                      |



Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency: 5785MHz |      |                      |                      |
|-----------------|----|-----------|------|------------------------------|------|----------------------|----------------------|
|                 |    |           |      | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C)      | 20 | V nom (V) | 3.70 | 5785.01074                   | 5785 | 0.01074              | -1.8559              |
|                 |    | V max (V) | 4.26 | 5785.00675                   | 5785 | 0.00675              | -1.1677              |
|                 |    | V min (V) | 3.15 | 5785.01065                   | 5785 | 0.01065              | -1.8403              |
| Limits          |    |           |      | within 5725-5850MHz          |      |                      |                      |
| Result          |    |           |      | Complies                     |      |                      |                      |

Temperature vs. Frequency Stability

| TEST CONDITIONS |   |        |     | Reference Frequency: 5785MHz |      |                      |                      |
|-----------------|---|--------|-----|------------------------------|------|----------------------|----------------------|
|                 |   |        |     | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V)       | 5 | T (°C) | -20 | 5785.00509                   | 5785 | 0.00509              | -0.8795              |
|                 |   | T (°C) | -10 | 5785.01172                   | 5785 | 0.01172              | -2.0254              |
|                 |   | T (°C) | 0   | 5785.00986                   | 5785 | 0.00986              | -1.7049              |
|                 |   | T (°C) | 10  | 5785.00834                   | 5785 | 0.00834              | -1.4410              |
|                 |   | T (°C) | 20  | 5785.00750                   | 5785 | 0.00750              | -1.2963              |
|                 |   | T (°C) | 30  | 5785.00474                   | 5785 | 0.00474              | -0.8188              |
|                 |   | T (°C) | 40  | 5785.00623                   | 5785 | 0.00623              | -1.0763              |
|                 |   | T (°C) | 50  | 5785.00087                   | 5785 | 0.00087              | -0.1501              |
|                 |   | T (°C) | 60  | 5785.01067                   | 5785 | 0.01067              | -1.8447              |
|                 |   | T (°C) | 70  | 5785.00436                   | 5785 | 0.00436              | -0.7545              |
| Limits          |   |        |     | within 5725-5850MHz          |      |                      |                      |
| Result          |   |        |     | Complies                     |      |                      |                      |



Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency: 5825MHz |      |                      |                      |
|-----------------|----|-----------|------|------------------------------|------|----------------------|----------------------|
|                 |    |           |      | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C)      | 20 | V nom (V) | 3.70 | 5825.00599                   | 5825 | 0.00599              | -1.0281              |
|                 |    | V max (V) | 4.26 | 5825.01298                   | 5825 | 0.01298              | -2.2276              |
|                 |    | V min (V) | 3.15 | 5825.00779                   | 5825 | 0.00779              | -1.3380              |
| Limits          |    |           |      | within 5725-5850MHz          |      |                      |                      |
| Result          |    |           |      | Complies                     |      |                      |                      |

Temperature vs. Frequency Stability

| TEST CONDITIONS |   |        |     | Reference Frequency: 5825MHz |      |                            |                         |
|-----------------|---|--------|-----|------------------------------|------|----------------------------|-------------------------|
|                 |   |        |     | f                            | fc   | Max.<br>Deviation<br>(MHz) | Max. Deviation<br>(ppm) |
| V nom<br>(V)    | 5 | T (°C) | -20 | 5825.00034                   | 5825 | 0.00034                    | -0.0589                 |
|                 |   | T (°C) | -10 | 5825.00170                   | 5825 | 0.00170                    | -0.2918                 |
|                 |   | T (°C) | 0   | 5825.00448                   | 5825 | 0.00448                    | -0.7690                 |
|                 |   | T (°C) | 10  | 5825.00146                   | 5825 | 0.00146                    | -0.2507                 |
|                 |   | T (°C) | 20  | 5825.00389                   | 5825 | 0.00389                    | -0.6670                 |
|                 |   | T (°C) | 30  | 5825.01254                   | 5825 | 0.01254                    | -2.1523                 |
|                 |   | T (°C) | 40  | 5825.01175                   | 5825 | 0.01175                    | -2.0175                 |
|                 |   | T (°C) | 50  | 5825.01079                   | 5825 | 0.01079                    | -1.8523                 |
|                 |   | T (°C) | 60  | 5825.00688                   | 5825 | 0.00688                    | -1.1804                 |
|                 |   | T (°C) | 70  | 5825.00807                   | 5825 | 0.00807                    | -1.3856                 |
| Limits          |   |        |     | within 5725-5850MHz          |      |                            |                         |
| Result          |   |        |     | Complies                     |      |                            |                         |



## Photographs of the Test Setup

### Radiated emission





Conducted emission





## Photographs of the EUT

See the APPENDIX 1- EUT PHOTO.

----END OF REPORT----