

8.SPURIOUS RF CONDUCTED EMISSIONS

8.1CONFORMANCE LIMIT

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.725-5.85 GHz band(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge..

8.2MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

8.3TEST SETUP

Please refer to Section 6.1 of this test report.

8.4TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

8.5TEST RESULTS

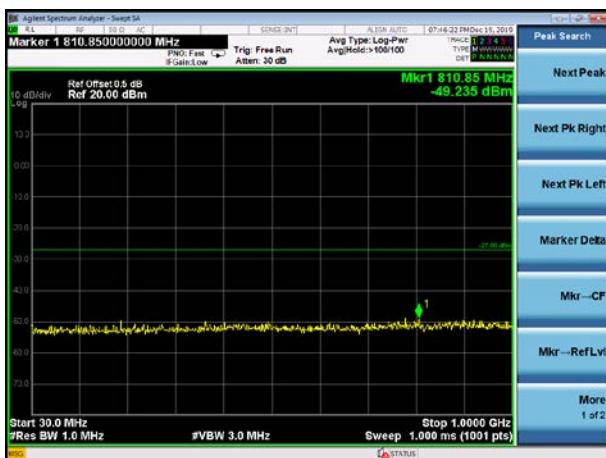
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

About:26.5GHz-40GHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

5.2G

Test Plot

802.11a on channel 36



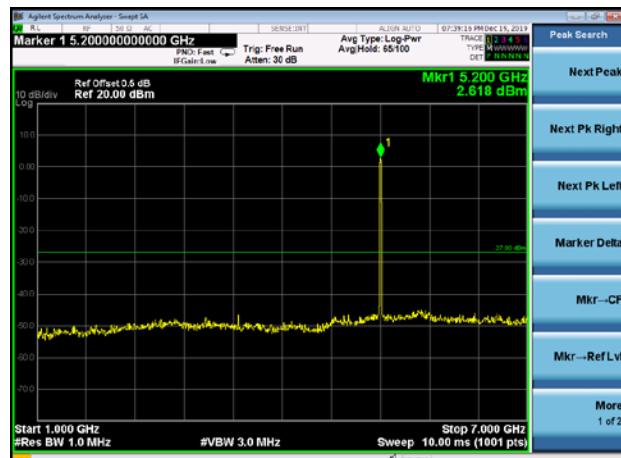
802.11a on channel 40



802.11a on channel 36



802.11a on channel 40



802.11a on channel 36

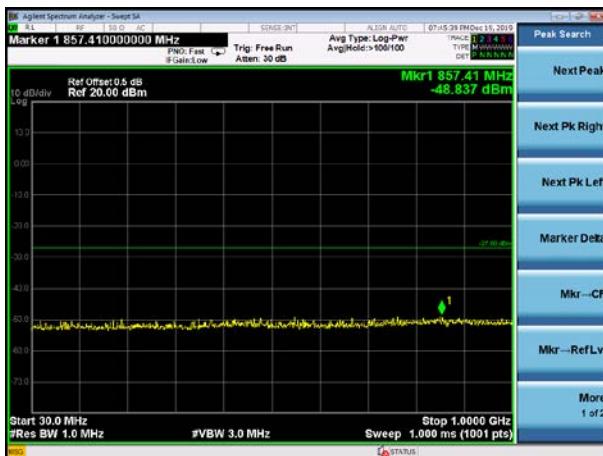


802.11a on channel 40

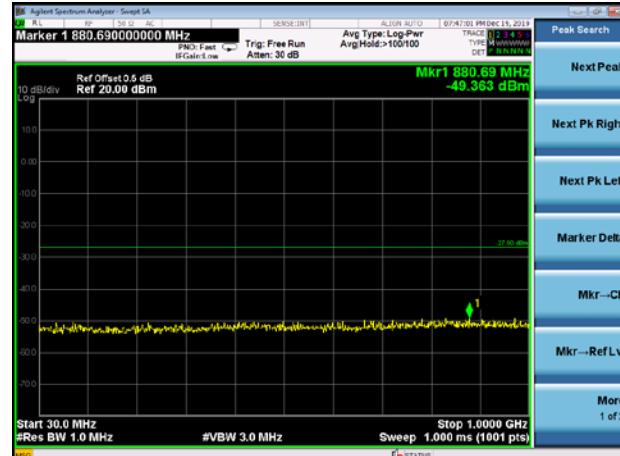


Test Plot

802.11a on channel 48



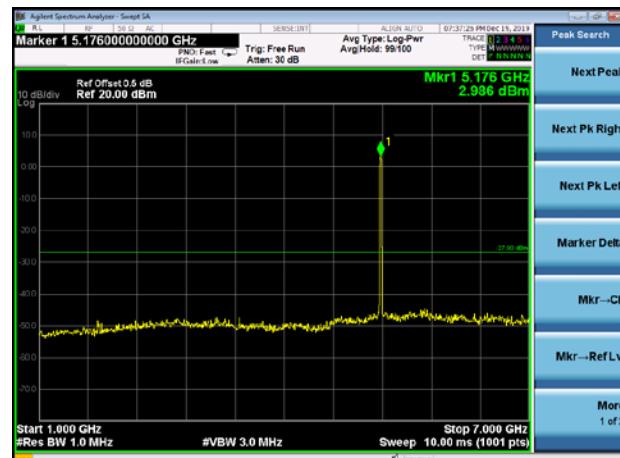
802.11n20 on channel 36



802.11a on channel 48



802.11n20 on channel 36



802.11a on channel 48

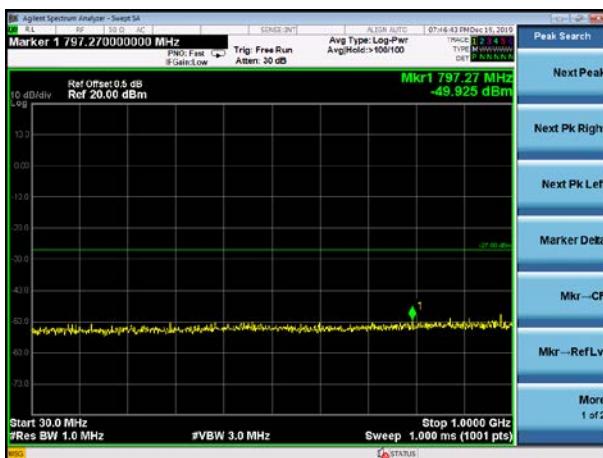


802.11n20 on channel 36

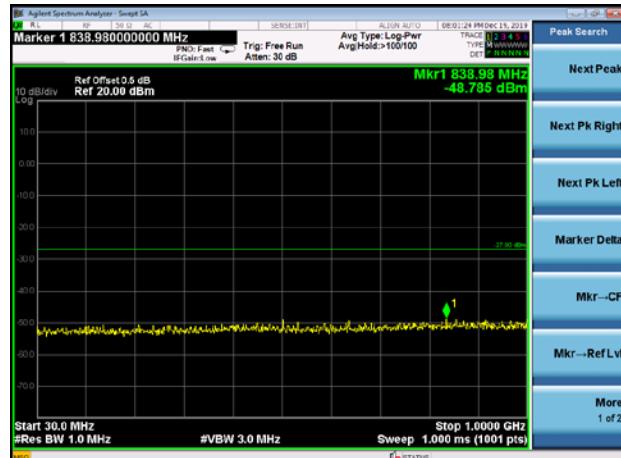


Test Plot

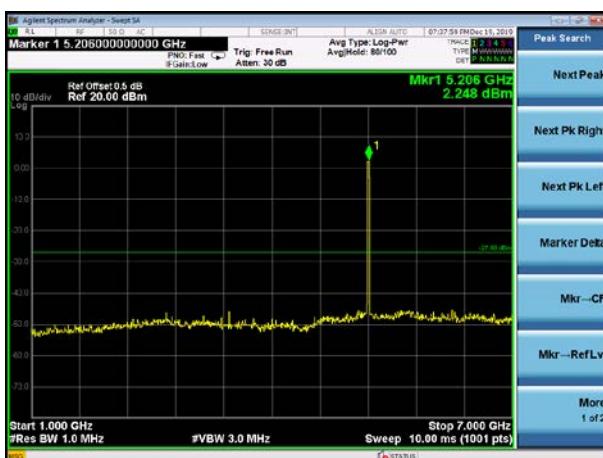
802.11n20 on channel 40



802.11n20 on channel 48



802.11n20 on channel 40



802.11n20 on channel 48



802.11n20 on channel 40

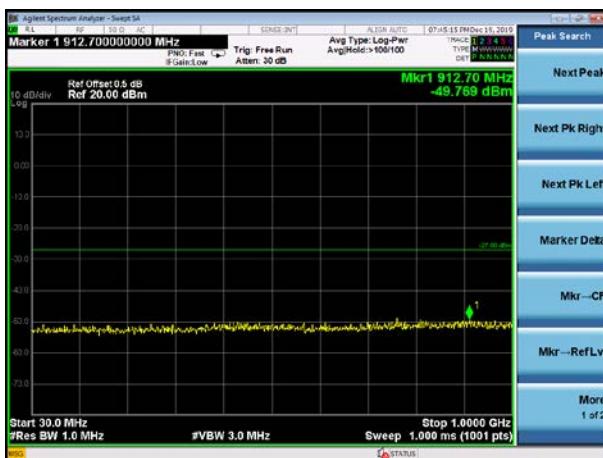


802.11n20 on channel 48

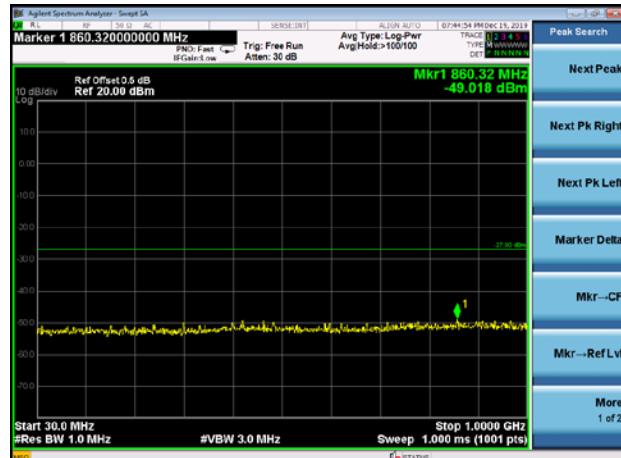


Test Plot

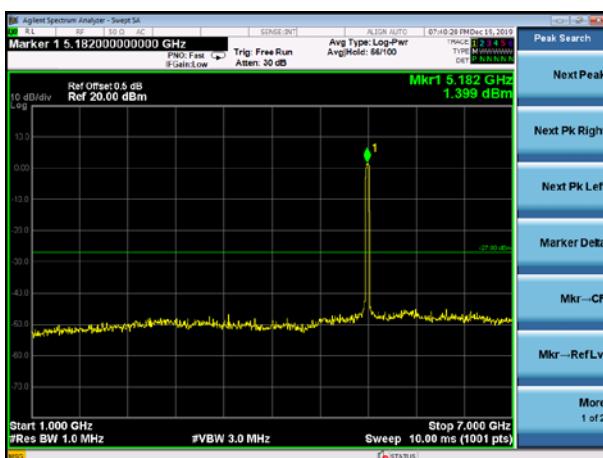
802.11n40 on channel 38



802.11n40 on channel 46



802.11n40 on channel 38



802.11n40 on channel 46



802.11n40 on channel 38



802.11n40 on channel 46

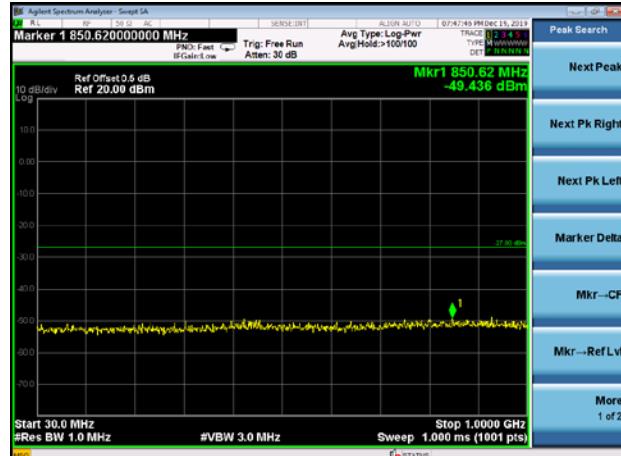


Test Plot

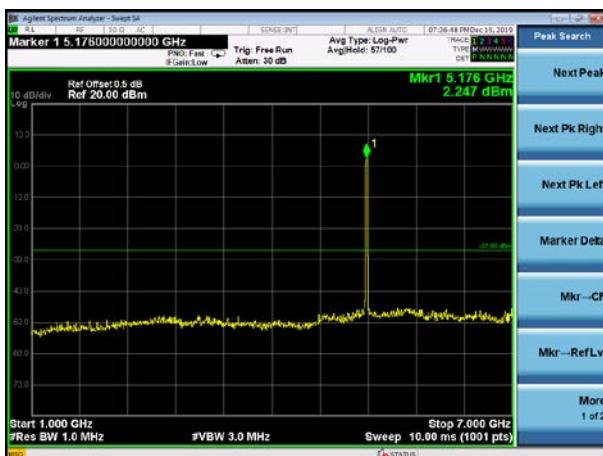
802.11ac20 on channel 36



802.11ac20 on channel 40



802.11ac20 on channel 36



802.11ac20 on channel 40



802.11ac20 on channel 36



802.11ac20 on channel 40

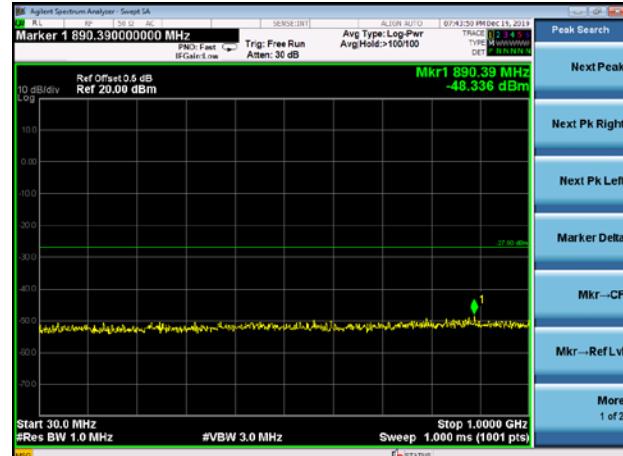


Test Plot

802.11ac20 on channel 48



802.11ac40 on channel 38



802.11ac20 on channel 48



802.11ac40 on channel 38



802.11ac20 on channel 48



802.11ac40 on channel 38

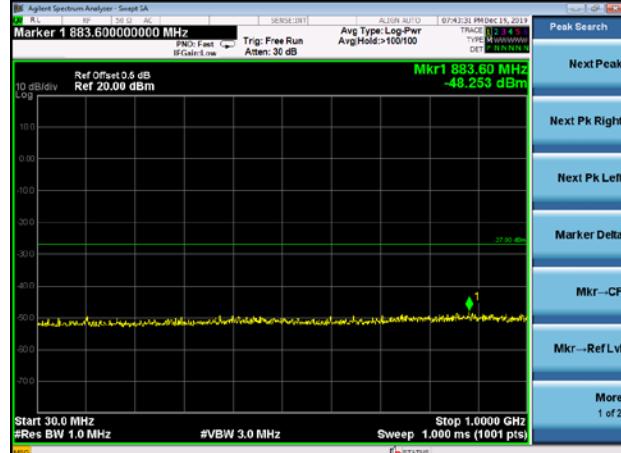


Test Plot

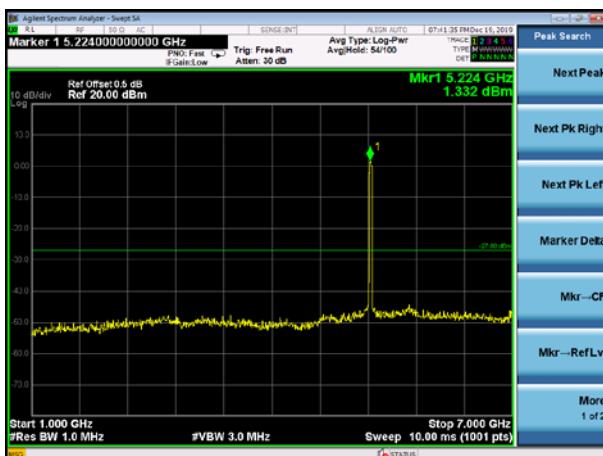
802.11ac40 on channel 46



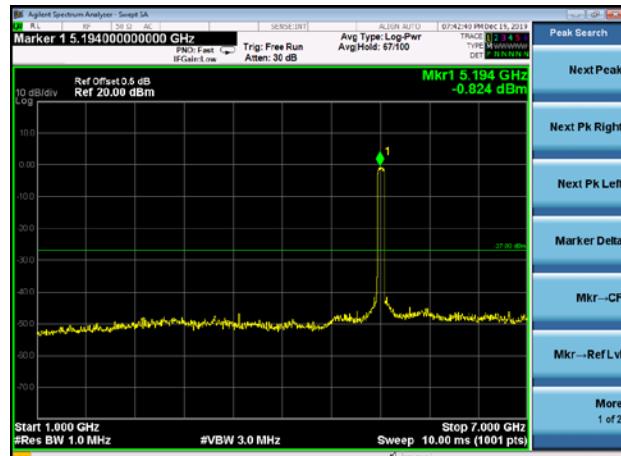
802.11ac80 on channel 42



802.11 ac40 on channel 46



802.11 ac80 on channel 42



802.11 ac40 on channel 46



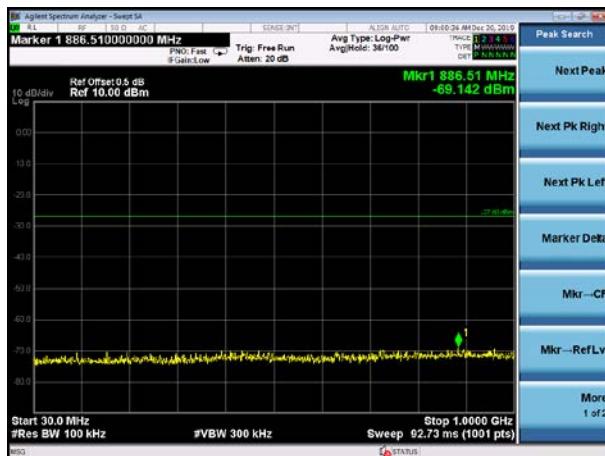
802.11 ac80 on channel 42



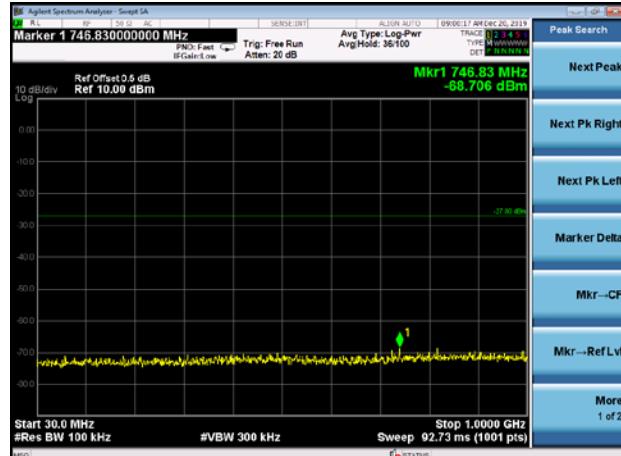
5.8G

Test Plot

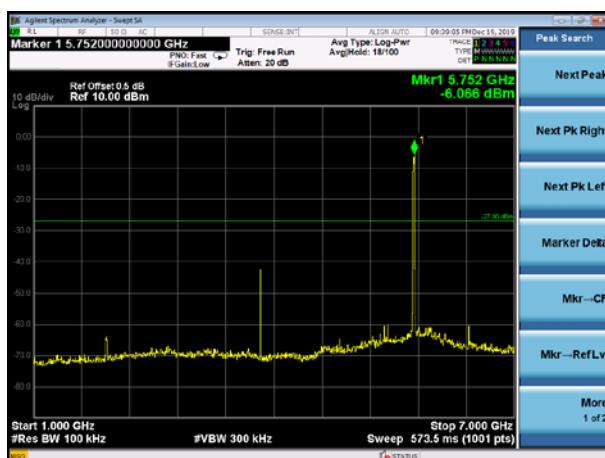
802.11a on channel 149



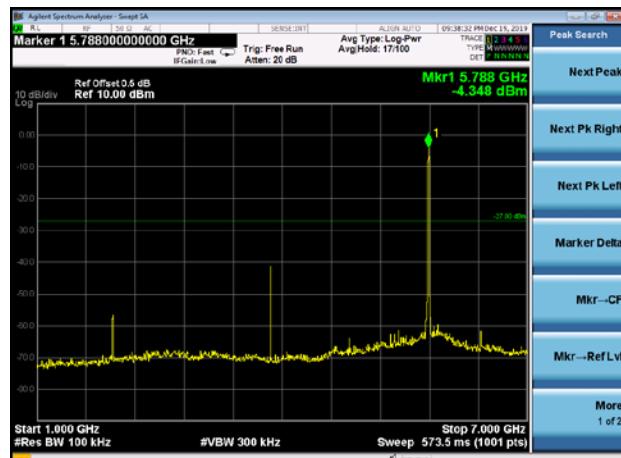
802.11a on channel 157



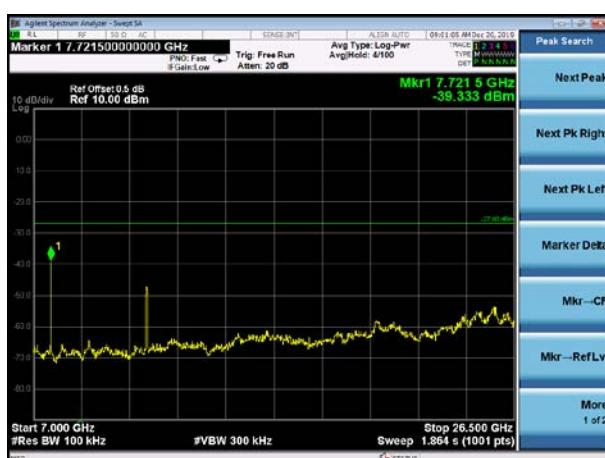
802.11a on channel 149



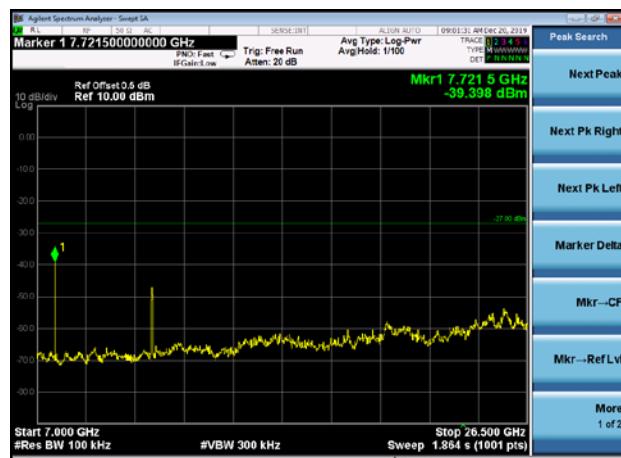
802.11a on channel 157



802.11a on channel 149

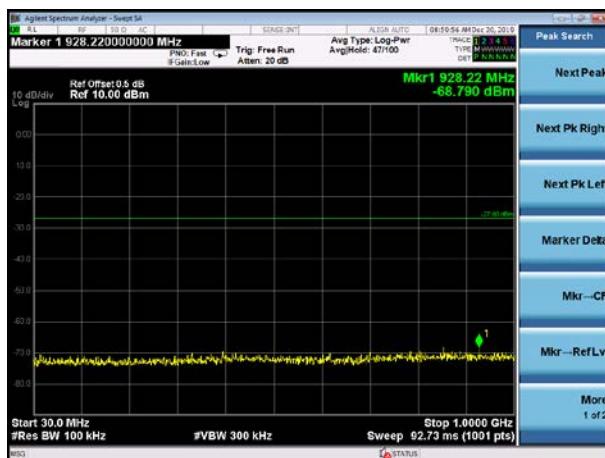


802.11a on channel 157

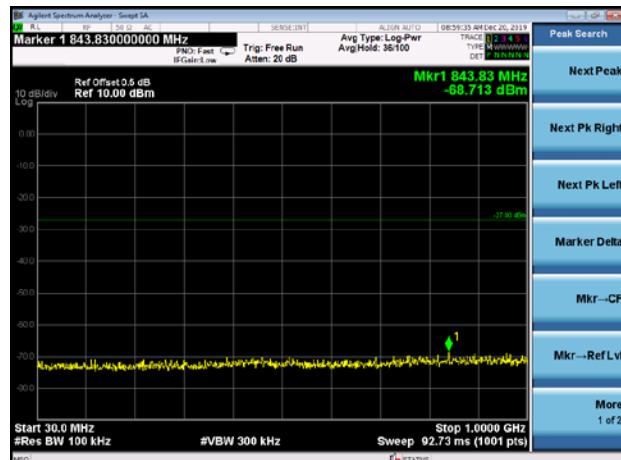


Test Plot

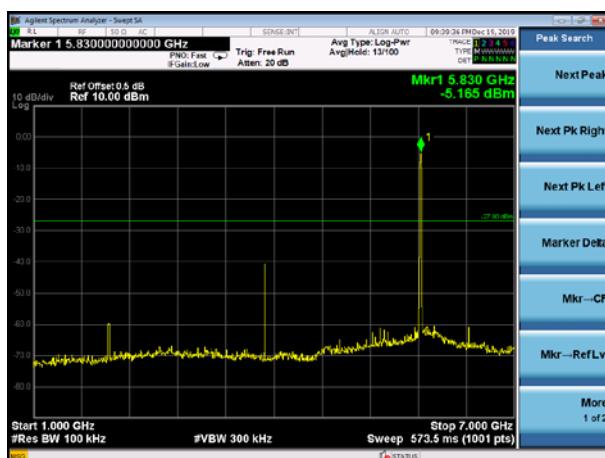
802.11a on channel 165



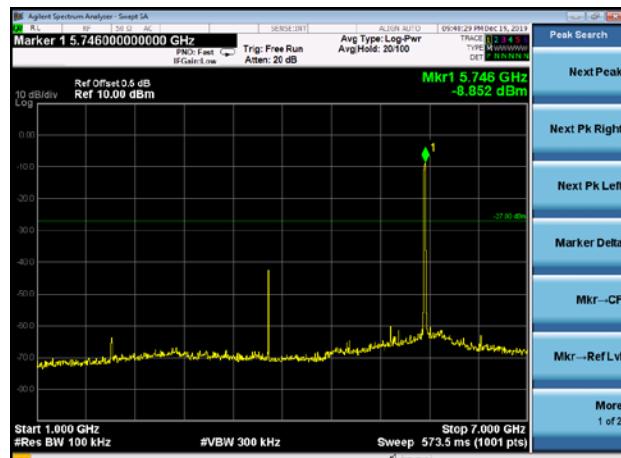
802.11n20 on channel 149



802.11a on channel 165



802.11n20 on channel 149



802.11a on channel 165

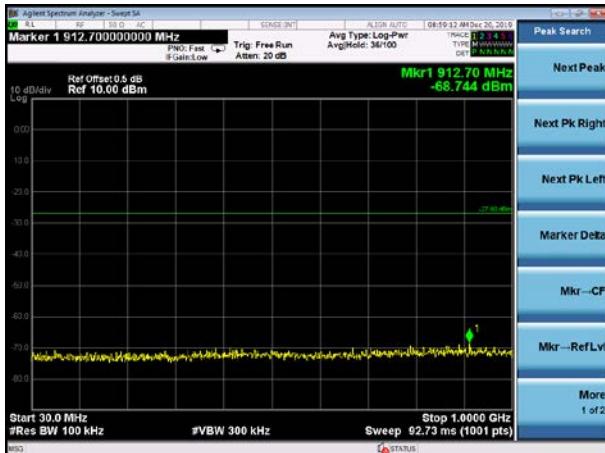


802.11n20 on channel 149



Test Plot

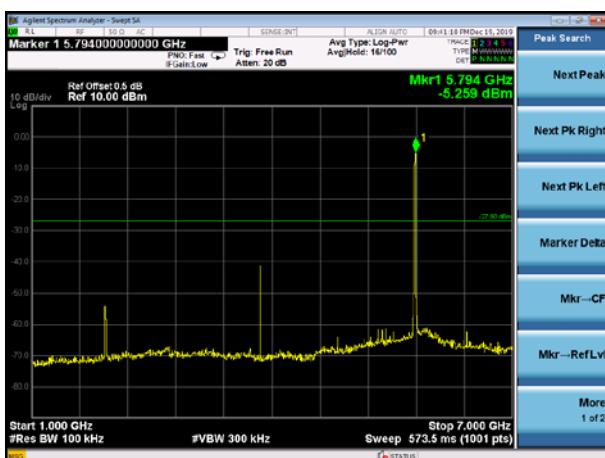
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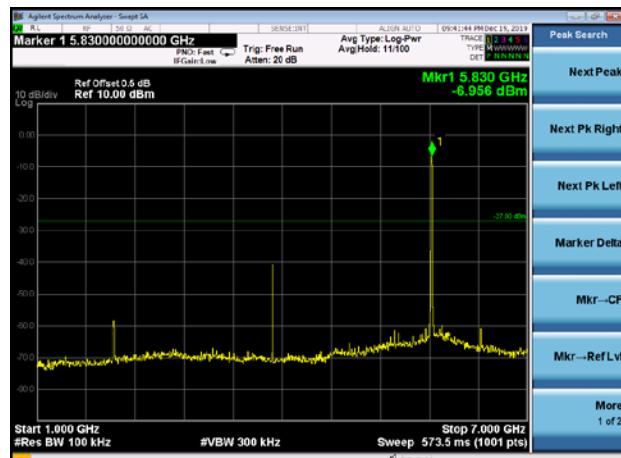
802.11n20 on channel 165



802.11n20 on channel 157



802.11n20 on channel 165



802.11n20 on channel 157

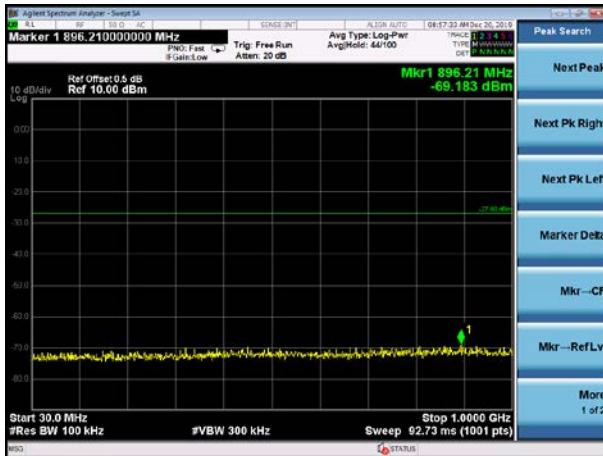


802.11n20 on channel 165

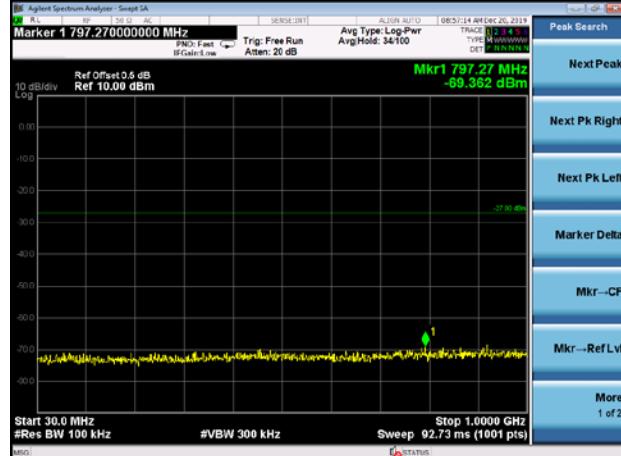


Test Plot

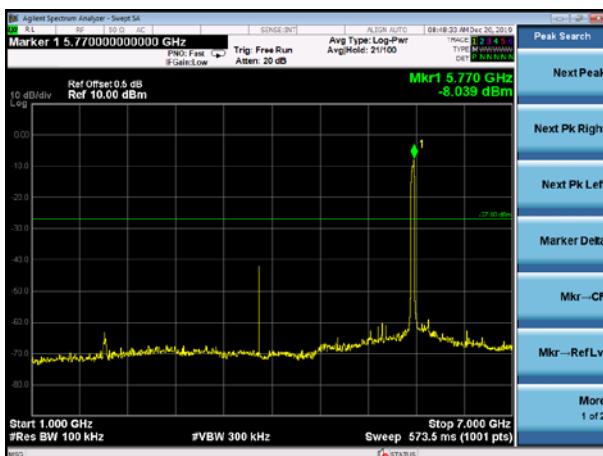
802.11n40 on channel 151



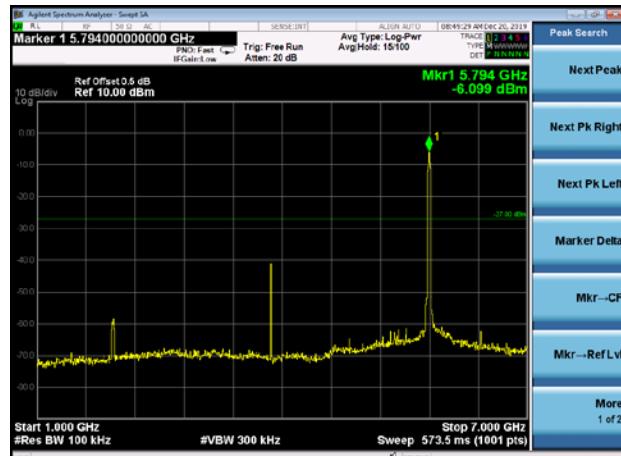
802.11n40 on channel 159



802.11n40 on channel 151



802.11n40 on channel 159



802.11n40 on channel 151

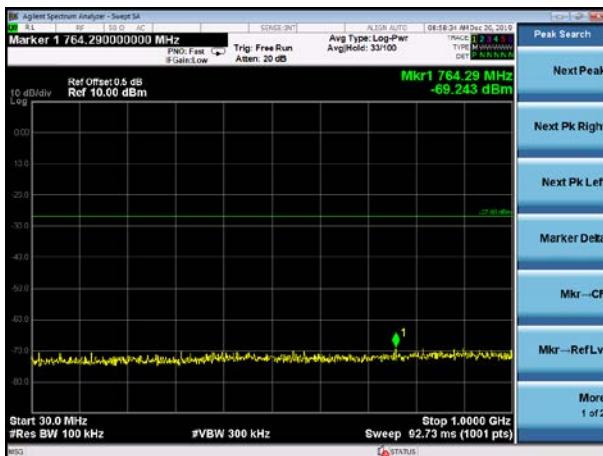


802.11n40 on channel 159

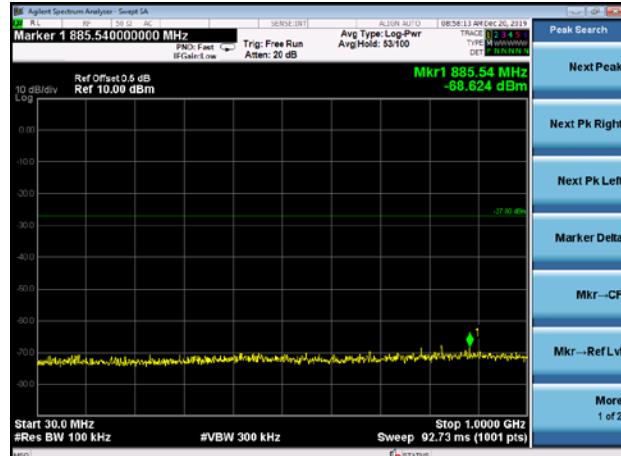


Test Plot

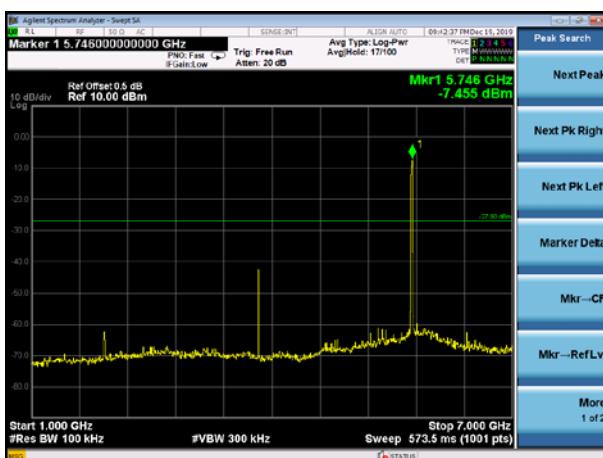
802.11ac20 on channel 149



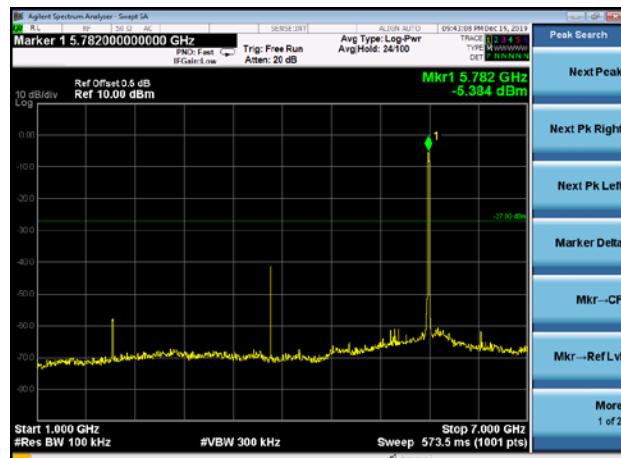
802.11ac20 on channel 157



802.11ac20 on channel 149



802.11ac20 on channel 157



802.11ac20 on channel 149

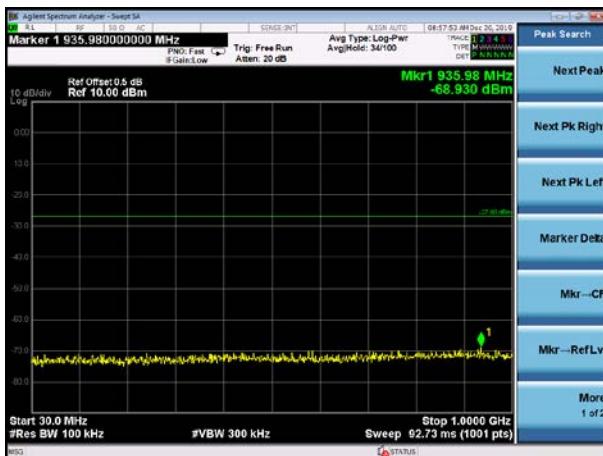


802.11ac20 on channel 157

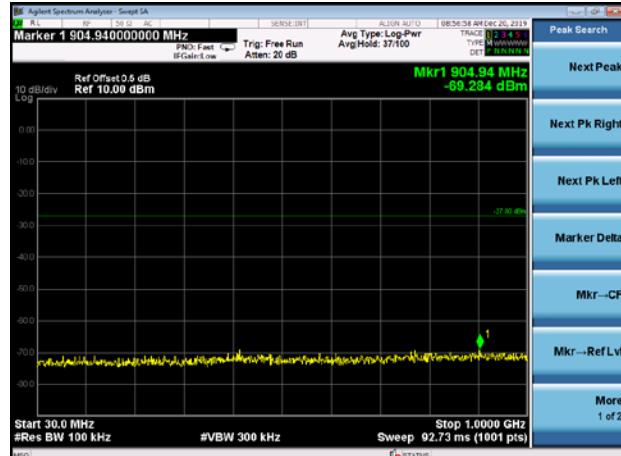


Test Plot

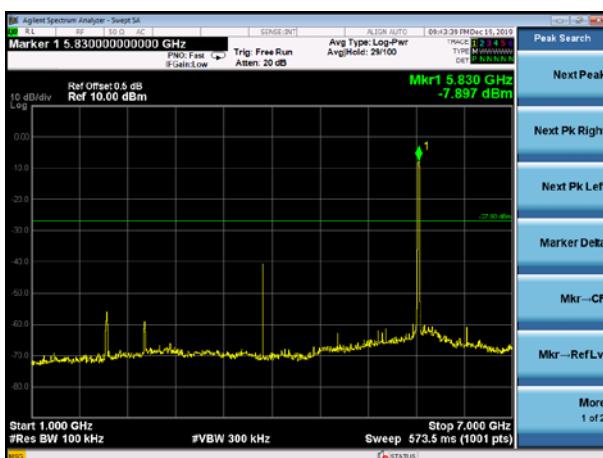
802.11ac20 on channel 165



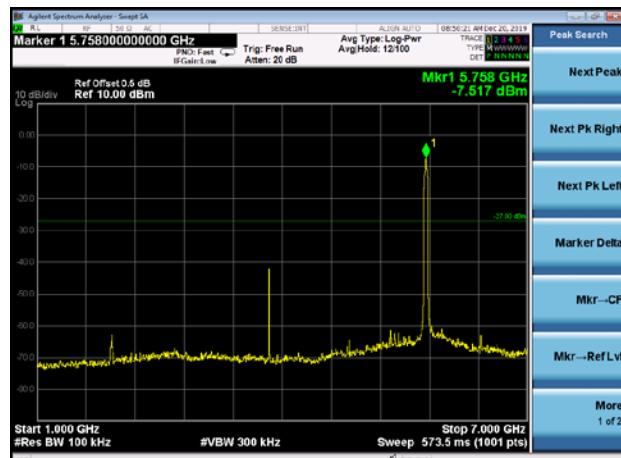
802.11ac40 on channel 151



802.11ac20 on channel 165



802.11ac40 on channel 151



802.11ac20 on channel 165

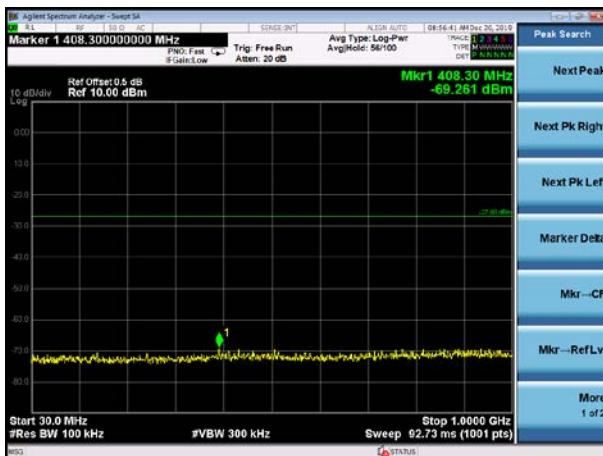


802.11ac40 on channel 151

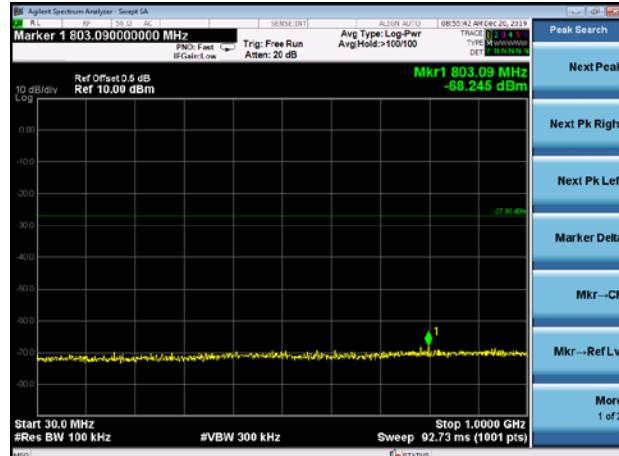


Test Plot

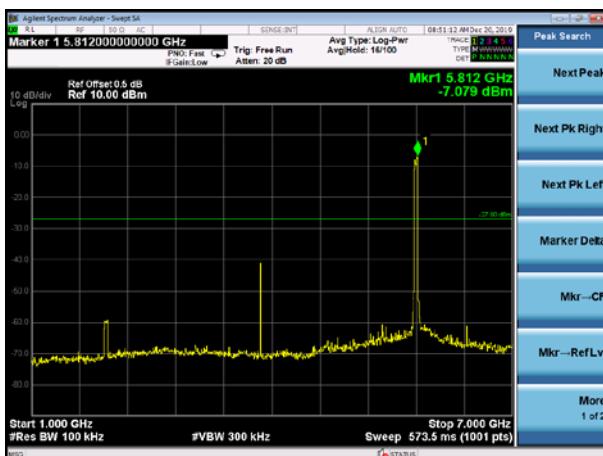
802.11ac40 on channel 159



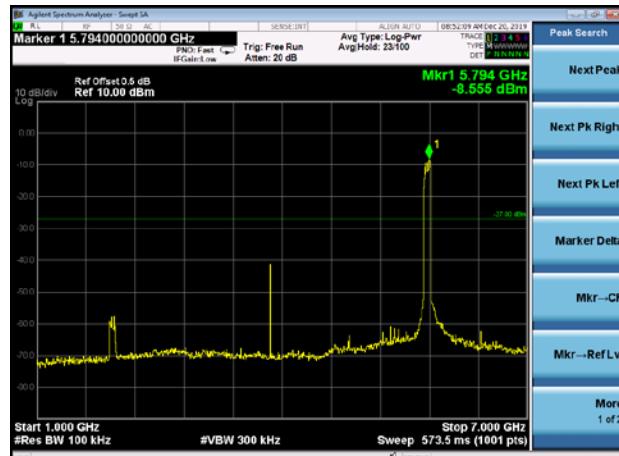
802.11ac80 on channel 155



802.11 ac40 on channel 159



802.11 ac80 on channel 155



802.11 ac40 on channel 159



802.11 ac80 on channel 155



9. Frequency Stability Measurement

9.1 LIMIT

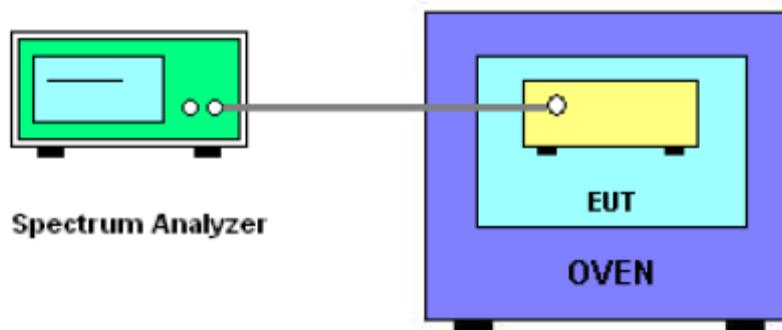
Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

9.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT has 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 maxhold 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 ± 20 ppm (IEEE 802.11n 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°C~70°C.

9.3 TEST SETUP LAYOUT



9.4 EUT OPERATION DURING TEST

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

9.5 TEST RESULTS

| | | | |
|---------------|------------------------------------|---------------------|--------|
| Temperature : | 26 °C | Relative Humidity : | 54% |
| Pressure : | 101kPa | Test Voltage : | DC3.8V |
| Test Mode : | TX Frequency Band I (5180-5240MHz) | | |

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | Reference Frequency: 5180MHz | | | | |
|-----------------|----|-----------|------------------------------|-----------|----------------------|----------------------|---------|
| | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) | |
| T nom ("C) | 20 | V nom (V) | 3.80 | 5180.0524 | 5180 | 0.0524 | 10.1158 |
| | | V max (V) | 4.37 | 5180.0325 | 5180 | 0.0325 | 6.2741 |
| | | V min (V) | 3.23 | 5180.0247 | 5180 | 0.0247 | 4.7683 |
| Limits | | | 5150-5250MHz | | | | |
| Result | | | Complies | | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | Reference Frequency: 5180MHz | | | | |
|-----------------|-----|--------|------------------------------|-----------|----------------------|----------------------|---------|
| | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) | |
| V nom (V) | 3.7 | T ("C) | -20 | 5180.0053 | 5180 | 0.0053 | 1.0232 |
| | | T ("C) | -10 | 5180.0107 | 5180 | 0.0107 | 2.0656 |
| | | T ("C) | 0 | 5180.0323 | 5180 | 0.0323 | 6.2355 |
| | | T ("C) | 10 | 5180.0386 | 5180 | 0.0386 | 7.4517 |
| | | T ("C) | 20 | 5180.0293 | 5180 | 0.0293 | 5.6564 |
| | | T ("C) | 30 | 5180.0217 | 5180 | 0.0217 | 4.1892 |
| | | T ("C) | 40 | 5180.0123 | 5180 | 0.0123 | 2.3745 |
| | | T ("C) | 50 | 5180.0097 | 5180 | 0.0097 | 1.8726 |
| | | T ("C) | 60 | 5180.0413 | 5180 | 0.0413 | 7.9730 |
| | | T ("C) | 70 | 5180.0696 | 5180 | 0.0696 | 13.4363 |
| Limits | | | 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) | 3.80 | 5200.0253 | 5200 | 0.0253 | 4.8654 |
| | | V max (V) | 4.37 | 5200.0426 | 5200 | 0.0426 | 8.1923 |
| | | V min (V) | 3.23 | 5200.0693 | 5200 | 0.0693 | 13.3269 |
| Limits | | | 5150-5250MHz | | | | |
| Result | | | Complies | | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | Reference Frequency: 5200MHz | | | | |
|-----------------|-----|--------|------------------------------|-----------|----------------------|----------------------|---------|
| | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) | |
| V nom (V) | 3.7 | T (°C) | -20 | 5200.0633 | 5200 | 0.0633 | 12.1731 |
| | | T (°C) | -10 | 5200.0527 | 5200 | 0.0527 | 10.1346 |
| | | T (°C) | 0 | 5200.0433 | 5200 | 0.0433 | 8.3269 |
| | | T (°C) | 10 | 5200.0925 | 5200 | 0.0925 | 17.7885 |
| | | T (°C) | 20 | 5200.0637 | 5200 | 0.0637 | 12.2500 |
| | | T (°C) | 30 | 5200.0123 | 5200 | 0.0123 | 2.3654 |
| | | T (°C) | 40 | 5200.0735 | 5200 | 0.0735 | 14.1346 |
| | | T (°C) | 50 | 5200.0413 | 5200 | 0.0413 | 7.9423 |
| | | T (°C) | 60 | 5200.0327 | 5200 | 0.0327 | 6.2885 |
| | | T (°C) | 70 | 5200.0425 | 5200 | 0.0425 | 8.1731 |
| Limits | | | 5150-5250MHz | | | | |
| Result | | | Complies | | | | |

Voltage vs. Frequency Stability

| TEST CONDITIONS | | | Reference Frequency: 5240MHz | | | | |
|-----------------|----|-----------|------------------------------|-----------|----------------------|----------------------|--------|
| | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) | |
| T nom (°C) | 20 | V nom (V) | 3.80 | 5240.0133 | 5240 | 0.0133 | 2.5382 |
| | | V max (V) | 4.37 | 5240.0416 | 5240 | 0.0416 | 7.9389 |
| | | V min (V) | 3.23 | 5240.0096 | 5240 | 0.0096 | 1.8321 |
| Limits | | | 5150-5250MHz | | | | |
| Result | | | Complies | | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | Reference Frequency: 5240MHz | | | | |
|-----------------|-----|--------|------------------------------|-----------|----------------------|----------------------|---------|
| | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) | |
| V nom (V) | 3.7 | T (°C) | -20 | 5240.0094 | 5240 | 0.0094 | 1.7939 |
| | | T (°C) | -10 | 5240.0036 | 5240 | 0.0036 | 0.6870 |
| | | T (°C) | 0 | 5240.0145 | 5240 | 0.0145 | 2.7672 |
| | | T (°C) | 10 | 5240.0856 | 5240 | 0.0856 | 16.3359 |
| | | T (°C) | 20 | 5240.0113 | 5240 | 0.0113 | 2.1565 |
| | | T (°C) | 30 | 5240.0127 | 5240 | 0.0127 | 2.4237 |
| | | T (°C) | 40 | 5240.0063 | 5240 | 0.0063 | 1.2023 |
| | | T (°C) | 50 | 5240.0076 | 5240 | 0.0076 | 1.4504 |
| | | T (°C) | 60 | 5240.0056 | 5240 | 0.0056 | 1.0687 |
| | | T (°C) | 70 | 5240.0105 | 5240 | 0.0105 | 2.0038 |
| Limits | | | 5150-5250MHz | | | | |
| Result | | | Complies | | | | |

| | | | |
|---------------|----------------------------|---------------------|--------|
| Temperature : | 26 °C | Relative Humidity : | 54% |
| Pressure : | 101kPa | Test Voltage : | DC3.8V |
| Test Mode : | TX Frequency(5745-5825MHz) | | |

| TEST CONDITIONS | | | Reference Frequency: 5745MHz | | | | | |
|-----------------|----|-----------|------------------------------|------------|----------------------|----------------------|--------|--|
| | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) | | |
| T nom (°C) | 20 | V nom (V) | 3.80 | 5745.01252 | 5745 | 0.01252 | 2.1798 | |
| | | V max (V) | 4.37 | 5745.01191 | 5745 | 0.01191 | 2.0723 | |
| | | V min (V) | 3.23 | 5745.01269 | 5745 | 0.01269 | 2.2095 | |
| Limits | | | 5725-5850MHz | | | | | |
| Result | | | Complies | | | | | |

Voltage vs. Frequency Stability

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | Reference Frequency: 5745MHz | | | | | |
|-----------------|-----|--------|------------------------------|------------|----------------------|----------------------|--------|--|
| | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) | | |
| V nom (V) | 3.7 | T (°C) | -20 | 5745.01133 | 5745 | 0.01133 | 1.9726 | |
| | | T (°C) | -10 | 5745.01053 | 5745 | 0.01053 | 1.8331 | |
| | | T (°C) | 0 | 5745.00917 | 5745 | 0.00917 | 1.5970 | |
| | | T (°C) | 10 | 5745.00802 | 5745 | 0.00802 | 1.3955 | |
| | | T (°C) | 20 | 5745.00349 | 5745 | 0.00349 | 0.6072 | |
| | | T (°C) | 30 | 5745.00084 | 5745 | 0.00084 | 0.1457 | |
| | | T (°C) | 40 | 5745.00237 | 5745 | 0.00237 | 0.4119 | |
| | | T (°C) | 50 | 5745.00355 | 5745 | 0.00355 | 0.6178 | |
| | | T (°C) | 60 | 5745.00027 | 5745 | 0.00027 | 0.0468 | |
| | | T (°C) | 70 | 5745.00963 | 5745 | 0.00963 | 1.6768 | |
| Limits | | | 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) | 3.80 | 5785.00309 | 5785 | 0.00309 | 0.5348 |
| | | V max (V) | 4.37 | 5785.01058 | 5785 | 0.01058 | 1.8296 |
| | | V min (V) | 3.23 | 5785.00803 | 5785 | 0.00803 | 1.3879 |
| Limits | | | 5725-5850MHz | | | | |
| Result | | | Complies | | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | Reference Frequency: 5785MHz | | | | |
|-----------------|-----|--------|------------------------------|------------|----------------------|----------------------|--------|
| | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) | |
| V nom (V) | 3.7 | T (°C) | -20 | 5785.00450 | 5785 | 0.00450 | 0.7781 |
| | | T (°C) | -10 | 5785.00281 | 5785 | 0.00281 | 0.4861 |
| | | T (°C) | 0 | 5785.01198 | 5785 | 0.01198 | 2.0709 |
| | | T (°C) | 10 | 5785.01092 | 5785 | 0.01092 | 1.8877 |
| | | T (°C) | 20 | 5785.00252 | 5785 | 0.00252 | 0.4356 |
| | | T (°C) | 30 | 5785.00212 | 5785 | 0.00212 | 0.3671 |
| | | T (°C) | 40 | 5785.00856 | 5785 | 0.00856 | 1.4795 |
| | | T (°C) | 50 | 5785.00260 | 5785 | 0.00260 | 0.4494 |
| | | T (°C) | 60 | 5785.00806 | 5785 | 0.00806 | 1.3936 |
| | | T (°C) | 70 | 5785.00700 | 5785 | 0.00700 | 1.2092 |
| Limits | | | 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) | 3.80 | 5825.01008 | 5825 | 0.01008 | 1.7310 |
| | | V max (V) | 4.37 | 5825.00999 | 5825 | 0.00999 | 1.7151 |
| | | V min (V) | 3.23 | 5825.00601 | 5825 | 0.00601 | 1.0310 |
| Limits | | | 5725-5850MHz | | | | |
| Result | | | Complies | | | | |

Temperature vs. Frequency Stability

| TEST CONDITIONS | | | Reference Frequency: 5825MHz | | | | |
|-----------------|-----|--------|------------------------------|------------|----------------------|----------------------|--------|
| | | | f | fc | Max. Deviation (MHz) | Max. Deviation (ppm) | |
| V nom (V) | 3.7 | T (°C) | -20 | 5825.00971 | 5825 | 0.00971 | 1.6676 |
| | | T (°C) | -10 | 5825.00042 | 5825 | 0.00042 | 0.0713 |
| | | T (°C) | 0 | 5825.00051 | 5825 | 0.00051 | 0.0879 |
| | | T (°C) | 10 | 5825.00715 | 5825 | 0.00715 | 1.2267 |
| | | T (°C) | 20 | 5825.00291 | 5825 | 0.00291 | 0.4992 |
| | | T (°C) | 30 | 5825.01062 | 5825 | 0.01062 | 1.8231 |
| | | T (°C) | 40 | 5825.01015 | 5825 | 0.01015 | 1.7421 |
| | | T (°C) | 50 | 5825.00368 | 5825 | 0.00368 | 0.6326 |
| | | T (°C) | 60 | 5825.00023 | 5825 | 0.00023 | 0.0391 |
| | | T (°C) | 70 | 5825.01288 | 5825 | 0.01288 | 2.2120 |
| Limits | | | 5725-5850MHz | | | | |
| Result | | | Complies | | | | |

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

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

10.2 EUT ANTENNA

The EUT antenna is FPCB Antenna (antenna gain:1dBi). It comply with the standard requirement.

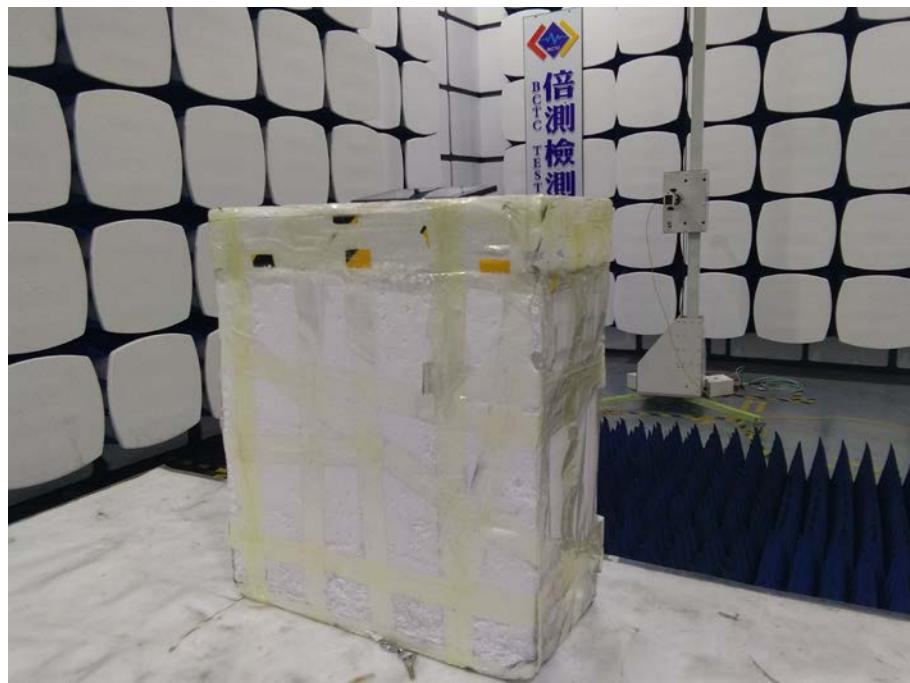
11. EUT TEST PHOTO

Conducted Measurement Photos



Radiated Measurement Photos





12. EUT PHOTO

EUT Photo 1



EUT Photo 2



***** END OF REPORT *****