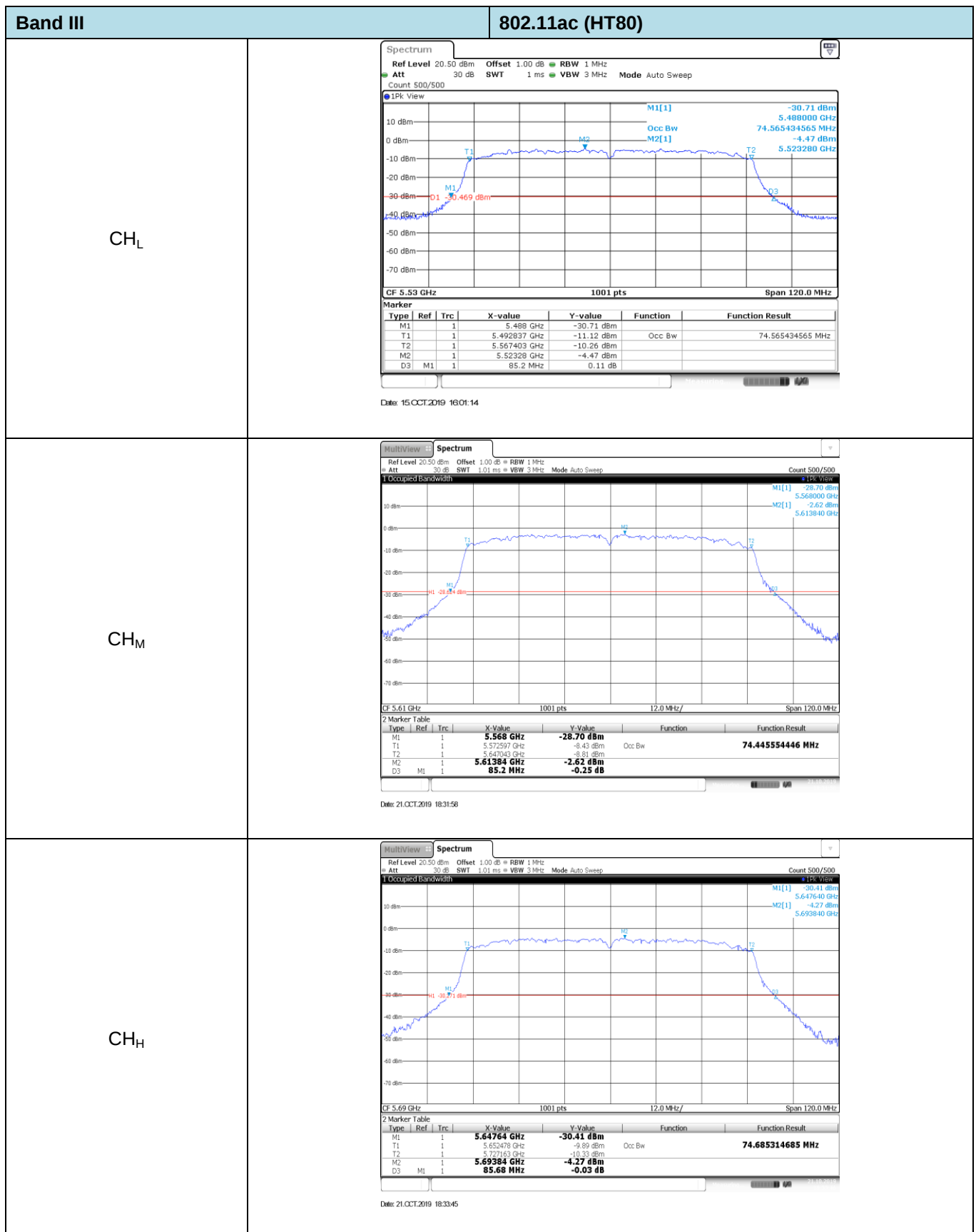




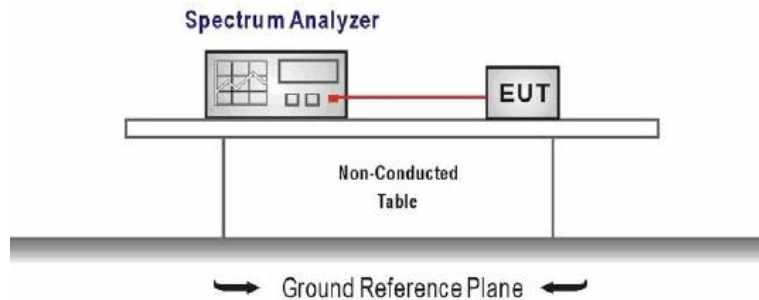
## 5.6. 6dB Bandwidth

### LIMIT

#### **FCC CFR Title 47 Part 15 Subpart E Section 15.407(e)**

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz

### TEST CONFIGURATION



### TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).  
Center Frequency = test channel center frequency  
Span = 2 x emission bandwidth  
RBW = 100 kHz, VBW  $\geq 3 \times$  RBW  
Sweep time = auto couple  
Detector = Peak  
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission, and record the pertinent measurements.

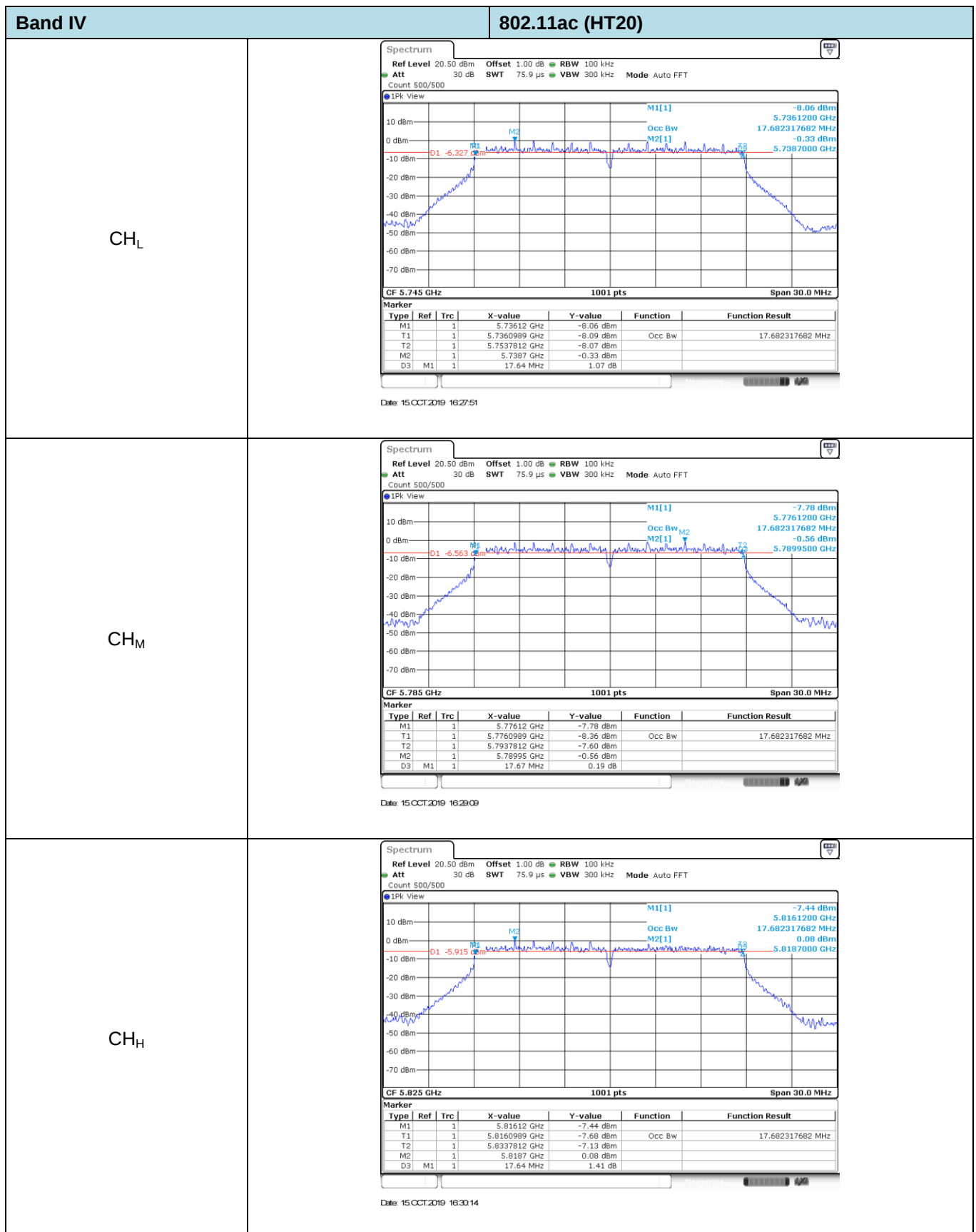
### TEST MODE:

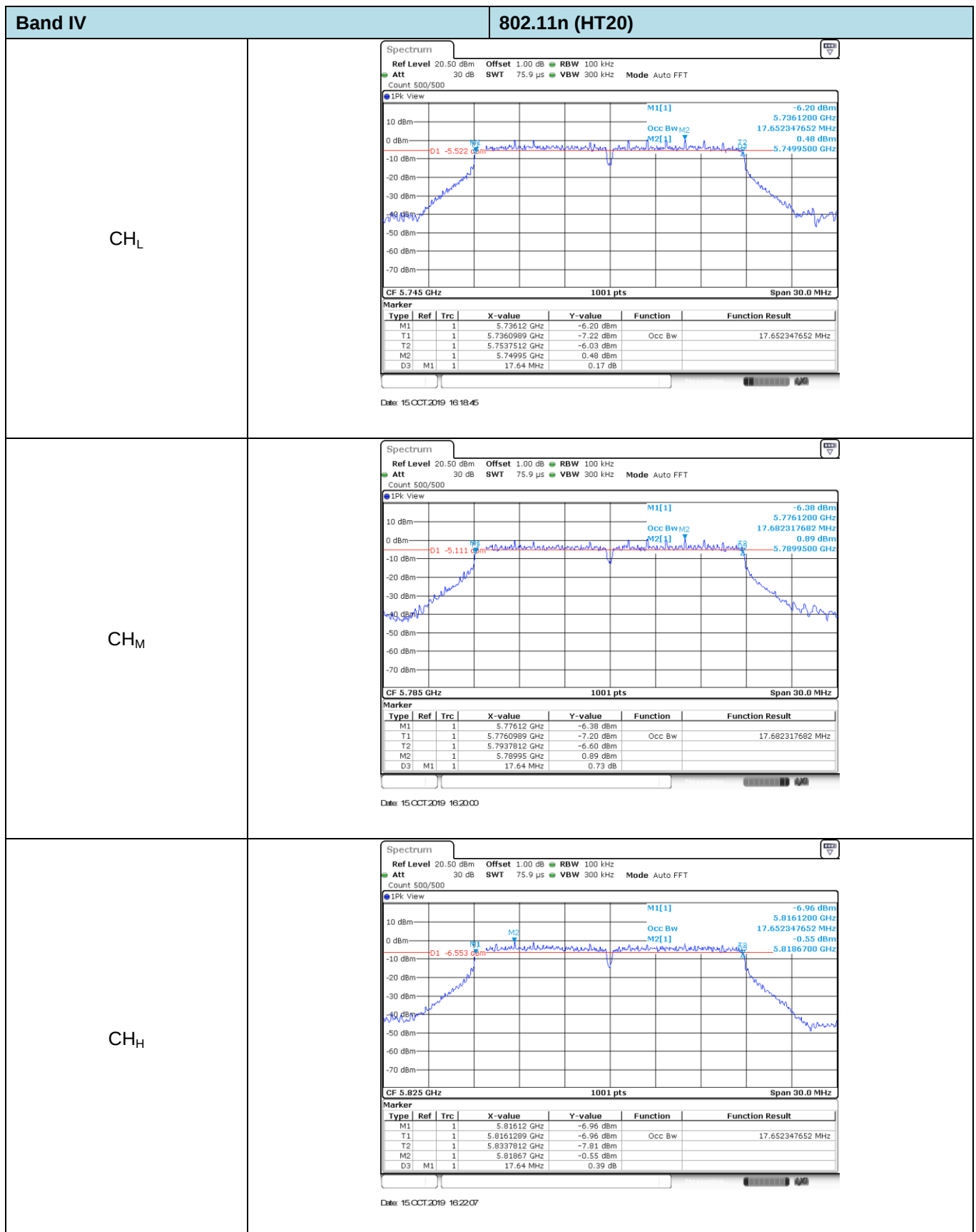
Please refer to the clause 3.3

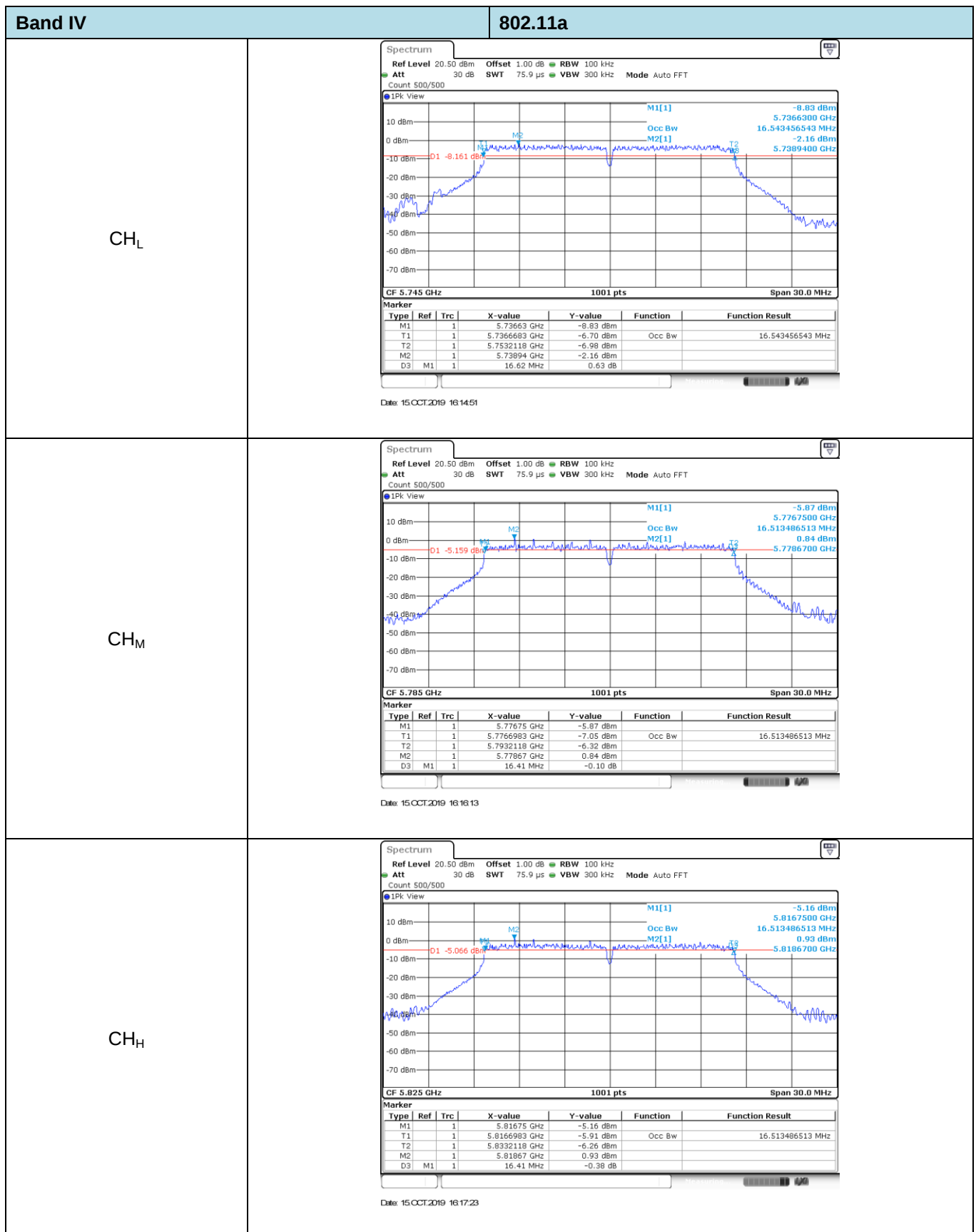
### TEST RESULTS

☒ Passed      ☐ Not Applicable

| Band | Bandwidth (MHz) | Type     | Channel         | 6dB bandwith (MHz) | 99% Occupy bandwith (MHz) | Result |
|------|-----------------|----------|-----------------|--------------------|---------------------------|--------|
| IV   | 20              | 802.11ac | CH <sub>L</sub> | 17.64              | 17.68                     | Pass   |
|      |                 |          | CH <sub>M</sub> | 17.67              | 17.68                     |        |
|      |                 |          | CH <sub>H</sub> | 17.64              | 17.68                     |        |
|      |                 | 802.11n  | CH <sub>L</sub> | 17.64              | 17.65                     | Pass   |
|      |                 |          | CH <sub>M</sub> | 17.64              | 17.68                     |        |
|      |                 |          | CH <sub>H</sub> | 17.64              | 17.65                     |        |
|      |                 | 802.11a  | CH <sub>L</sub> | 16.62              | 16.54                     | Pass   |
|      |                 |          | CH <sub>M</sub> | 16.41              | 16.51                     |        |
|      |                 |          | CH <sub>H</sub> | 16.41              | 16.51                     |        |
|      | 40              | 802.11ac | CH <sub>L</sub> | 35.28              | 35.90                     | Pass   |
|      |                 |          | CH <sub>H</sub> | 35.34              | 35.84                     |        |
|      |                 | 802.11n  | CH <sub>L</sub> | 35.30              | 35.86                     | Pass   |
|      |                 |          | CH <sub>H</sub> | 35.39              | 35.86                     |        |
|      | 80              | 802.11ac | CH <sub>M</sub> | 71.64              | 74.69                     | Pass   |

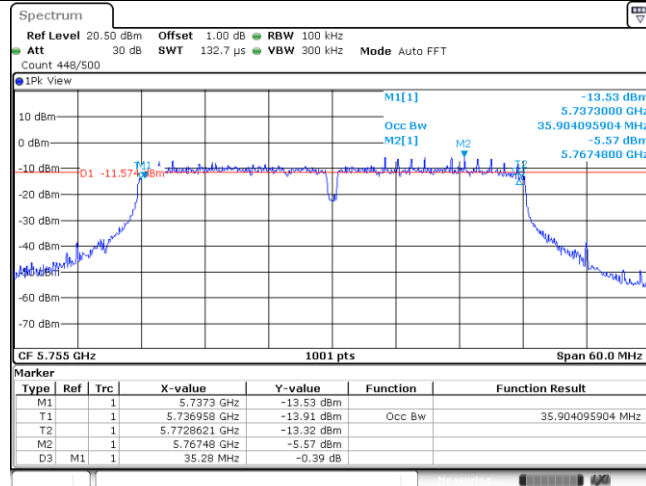




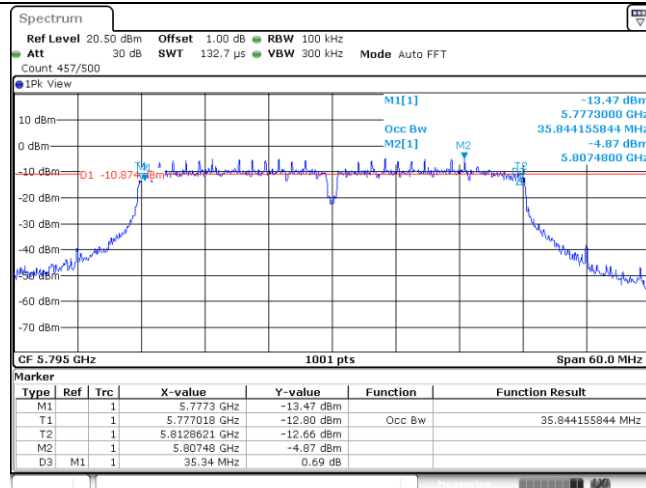


## Band IV

## 802.11ac (HT40)

CH<sub>L</sub>

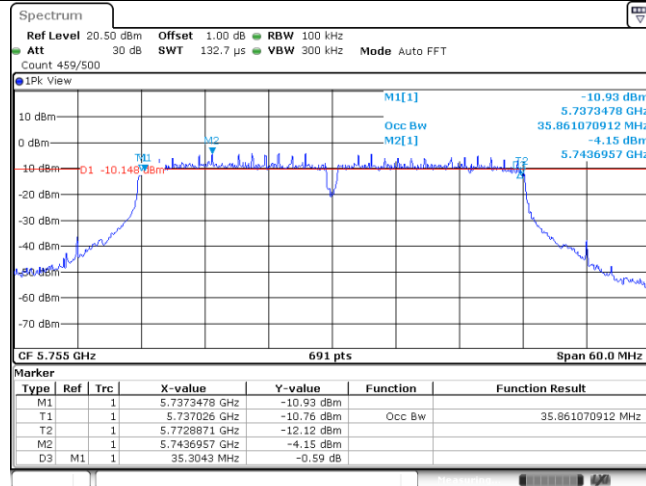
Date: 15 OCT.2019 16:42:03

CH<sub>H</sub>

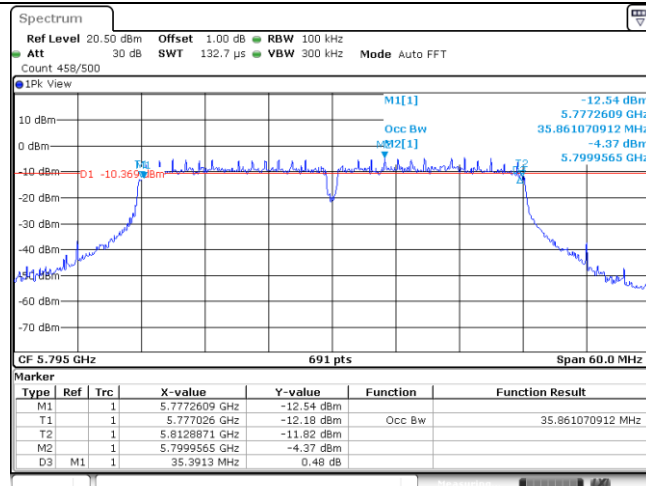
Date: 15 OCT.2019 16:43:31

## Band IV

## 802.11n (HT40)

CH<sub>L</sub>

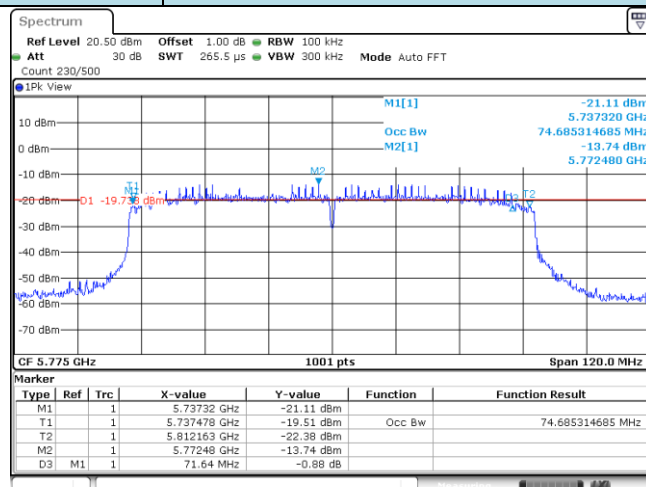
Date: 15 OCT 2019 16:23:49

CH<sub>H</sub>

Date: 15 OCT 2019 16:25:24

## Band IV

## 802.11ac (HT80)

CH<sub>M</sub>

Date: 15 OCT 2019 16:37:11

## 5.7. Band edge

### LIMIT

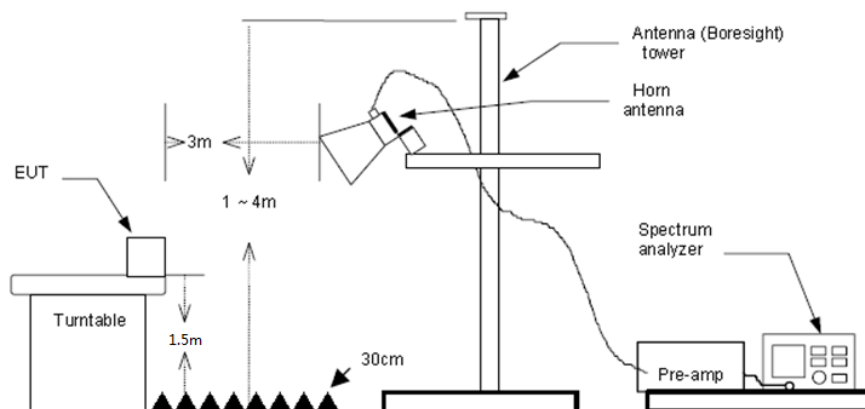
FCC CFR Title 47 Part 15 Subpart E Section 15.407(b)

| Un-restricted band emissions above 1GHz |                   |                                                                |       |
|-----------------------------------------|-------------------|----------------------------------------------------------------|-------|
| Operating Band                          | Frequency         | EIRP Limit                                                     | Value |
| 5150-5250MHz                            | Above 1GHz        | -27dBm/MHz (68.2dBuV/m@3m)                                     | Peak  |
| 5250-5350MHz                            | Above 1GHz        | -27dBm/MHz (68.2dBuV/m@3m)                                     | Peak  |
| 5470-5725MHz                            | Above 1GHz        | -27dBm/MHz (68.2dBuV/m@3m)                                     | Peak  |
| 5725-5850 MHz                           | 1GHz-5.65GHz      | -27dBm/MHz (68.2dBuV/m@3m)                                     | Peak  |
|                                         | 5.65GHz-5.7GHz    | -27*dBm/MHz to 10dBm/MHz<br>(68.2* dBuV/m to 105.6dBuV/m@3m)   | Peak  |
|                                         | 5.7GHz-5.72GHz    | 10*dBm/MHz to 15.6dBm/MHz<br>(105.6*dBuV/m to 110.8dBuV/m@3m)  | Peak  |
|                                         | 5.72GHz-5.725GHz  | 15.6*dBm/MHz to 27dBm/MHz<br>(110.8dBuV/m to* 122.2dBuV/m@3m)  | Peak  |
|                                         | 5.85GHz-5.855GHz  | 27dBm/MHz to 15.6*dBm/MHz<br>(122.2dBuV/m to110.8* dBuV/m@3m)  | Peak  |
|                                         | 5.855GHz-5.875GHz | 15.6dBm/MHz to 10*dBm/MHz<br>(110.8dBuV/m to 105.6* dBuV/m@3m) | Peak  |
|                                         | 5.875GHz-5.925GHz | 10dBm/MHz to -27*dBm/MHz<br>(105.6dBuV/m to 68.2* dBuV/m@3m)   | Peak  |
|                                         | Above 5.925GHz    | -27dBm/MHz (68.2dBuV/m@3m)                                     | Peak  |

\* Increase/Decreases with the linearity of the frequency.

For emission above 1GHz and in restricted band, according to FCC KDB 789033 D02 General UNII Test Procedure, all emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.  $E[dBuV/m] = EIRP[dBm] + 95.2$ , for  $d = 3$  meters.

### TEST CONFIGURATION



**TEST PROCEDURE**

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:  
RBW=1MHz, VBW=3MHz PEAK detector for Peak value.  
RBW=1MHz, VBW=3MHz RMS detector for Average value.

**TEST MODE:**

Please refer to the clause 3.3

**TEST RESULTS**

☒ **Passed**      ☐ **Not Applicable**

| Band: I&II      |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>L</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 5150.00         | 17.89             | 26.78               | 54.00               | 27.22             | 8.89                          | Vertical   | Average      |
| 5150.00         | 24.84             | 33.73               | 68.20               | 34.47             | 8.89                          | Vertical   | Peak         |
| 5150.00         | 18.70             | 27.59               | 54.00               | 26.41             | 8.89                          | Horizontal | Average      |
| 5150.00         | 25.31             | 34.20               | 68.20               | 34.00             | 8.89                          | Horizontal | Peak         |

| Band: I&II      |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>H</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 5350.00         | 17.92             | 26.46               | 54.00               | 27.54             | 8.54                          | Vertical   | Average      |
| 5350.00         | 25.13             | 33.67               | 68.20               | 34.53             | 8.54                          | Vertical   | Peak         |
| 5350.00         | 17.66             | 26.20               | 54.00               | 27.80             | 8.54                          | Horizontal | Average      |
| 5350.00         | 23.82             | 32.36               | 68.20               | 35.84             | 8.54                          | Horizontal | Peak         |

| Band: III       |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>L</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 5470.00         | 17.37             | 26.36               | 54.00               | 27.64             | 8.99                          | Vertical   | Average      |
| 5470.00         | 23.87             | 32.86               | 68.20               | 35.34             | 8.99                          | Vertical   | Peak         |
| 5470.00         | 19.03             | 28.02               | 54.00               | 25.98             | 8.99                          | Horizontal | Average      |
| 5470.00         | 24.82             | 33.81               | 68.20               | 34.39             | 8.99                          | Horizontal | Peak         |

| Band: III       |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>H</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 5725.00         | 17.58             | 26.58               | 54.00               | 27.42             | 9.00                          | Vertical   | Average      |
| 5725.00         | 23.55             | 32.55               | 68.20               | 35.65             | 9.00                          | Vertical   | Peak         |
| 5725.00         | 18.78             | 27.78               | 54.00               | 26.22             | 9.00                          | Horizontal | Average      |
| 5725.00         | 25.02             | 34.02               | 68.20               | 34.18             | 9.00                          | Horizontal | Peak         |

| Band: IV        |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>L</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 5725.00         | 18.90             | 27.90               | 54.00               | 26.10             | 9.00                          | Vertical   | Average      |
| 5725.00         | 25.02             | 34.02               | 68.20               | 34.18             | 9.00                          | Vertical   | Peak         |
| 5725.00         | 19.05             | 28.05               | 54.00               | 25.95             | 9.00                          | Horizontal | Average      |
| 5725.00         | 26.25             | 35.25               | 68.20               | 32.95             | 9.00                          | Horizontal | Peak         |

| Band: IV        |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>H</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 5850.00         | 18.47             | 28.24               | 54.00               | 25.76             | 9.77                          | Vertical   | Average      |
| 5850.00         | 25.54             | 35.31               | 68.20               | 32.89             | 9.77                          | Vertical   | Peak         |
| 5850.00         | 17.39             | 27.16               | 54.00               | 26.84             | 9.77                          | Horizontal | Average      |
| 5850.00         | 24.38             | 34.15               | 68.20               | 34.05             | 9.77                          | Horizontal | Peak         |

## Remark:

1. Final Level = Receiver Read level + Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Test 802.11a, 802.11n, 802.11ac mode, all modulations have been tested, only worst case is reported

## 5.8. Radiated Spurious Emissions

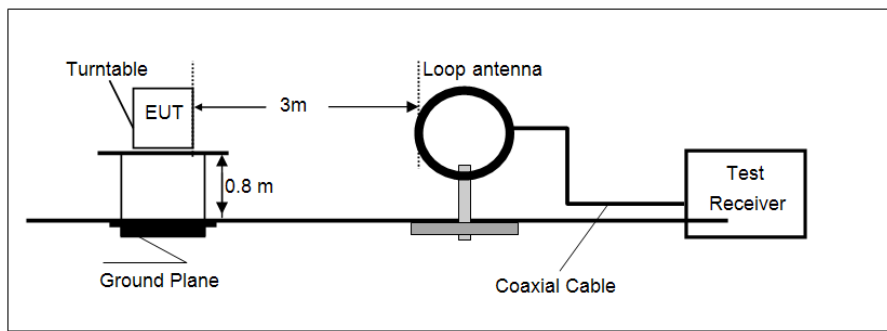
### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209 and Part 15 Subpart E Section 15.407

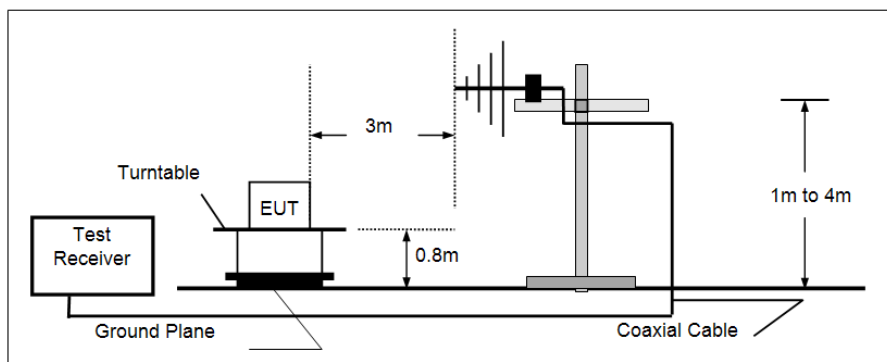
| Unwanted emissions below 1GHz and Restricted band emissions above 1GHz |                    |            |
|------------------------------------------------------------------------|--------------------|------------|
| Frequency                                                              | Limit (dBuV/m @3m) | Value      |
| 30MHz-88MHz                                                            | 40.00              | Quasi-peak |
| 88MHz-216MHz                                                           | 43.50              | Quasi-peak |
| 216MHz-960MHz                                                          | 46.00              | Quasi-peak |
| 960MHz-1GHz                                                            | 54.00              | Quasi-peak |
| Above 1GHz                                                             | 54.00              | Average    |
|                                                                        | 74.00              | Peak       |

### TEST CONFIGURATION

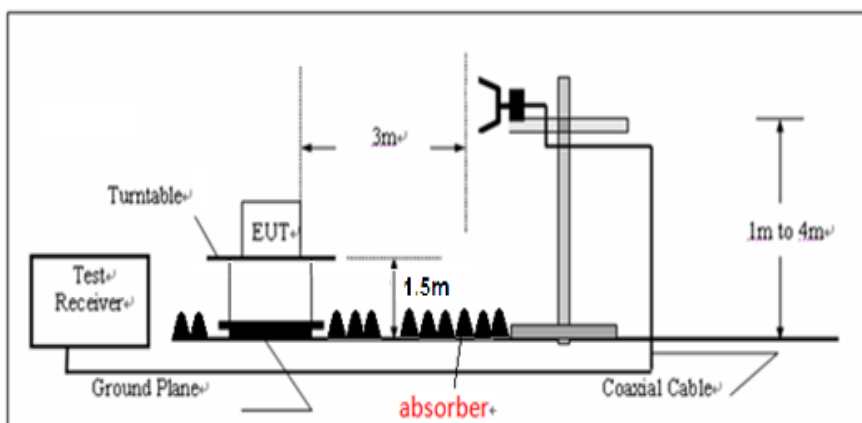
- 9KHz ~30MHz



- 30MHz ~ 1GHz



- Above 1GHz



**TEST PROCEDURE**

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Below 1 GHz:  
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;  
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
  - (3) From 1 GHz to 10<sup>th</sup> harmonic:  
RBW=1MHz, VBW=3MHz Peak detector for Peak value.  
RBW=1MHz, VBW=3MHz RMS detector for Average value.

**TEST MODE:**

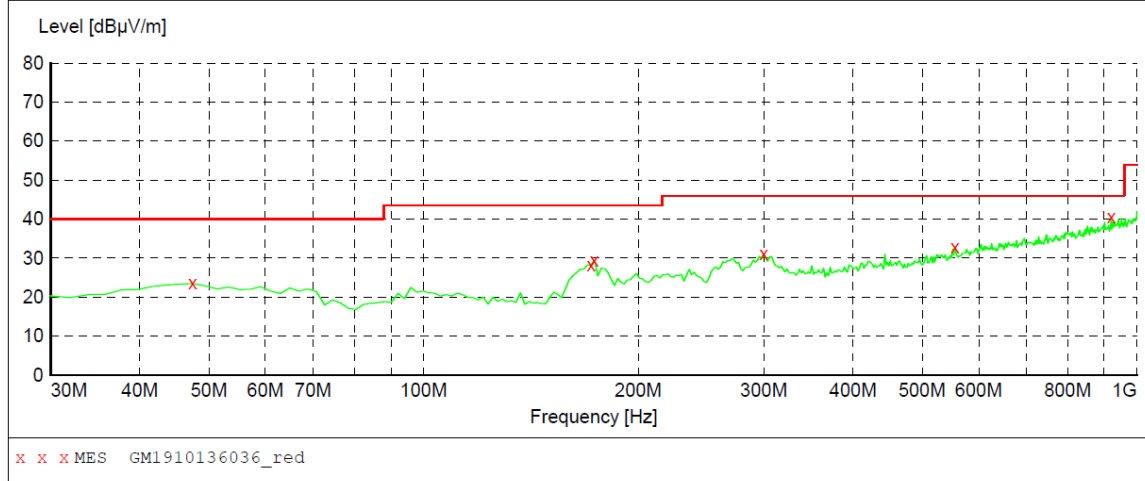
Please refer to the clause 3.3

**TEST RESULTS**

☒ **Passed**      ☐ **Not Applicable**

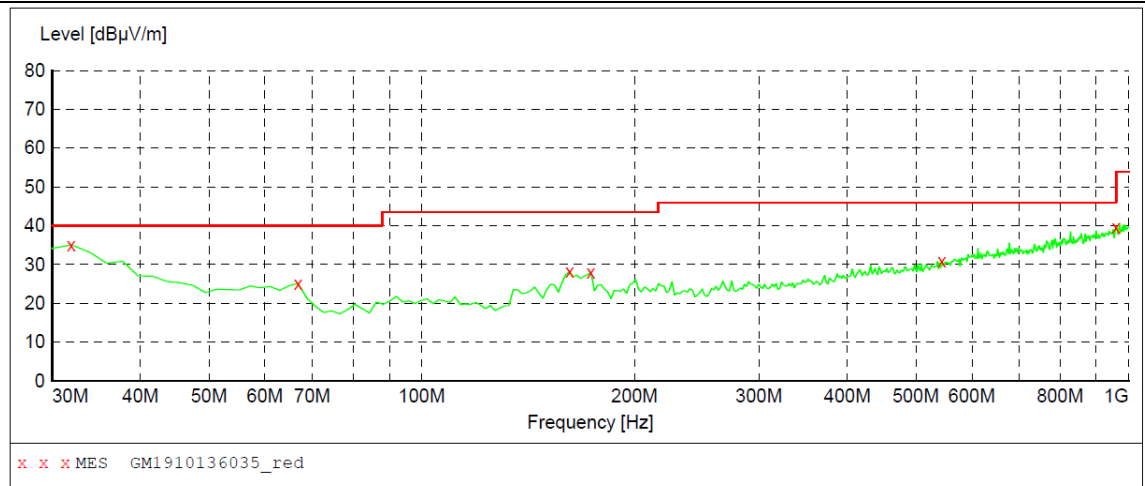
**Measurement data:**■ **9kHz ~ 30MHz**

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

■ **30MHz ~ 1GHz****MEASUREMENT RESULT: "GM1910136036\_red"**

10/13/2019 4:37PM

| Frequency<br>MHz | Level<br>dBμV/m | Transd<br>dB | Limit<br>dBμV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 47.460000        | 23.50           | -4.6         | 40.0            | 16.5         | QP   | 300.0        | 14.00          | HORIZONTAL   |
| 171.620000       | 28.20           | -8.5         | 43.5            | 15.3         | QP   | 100.0        | 85.00          | HORIZONTAL   |
| 173.560000       | 29.50           | -8.4         | 43.5            | 14.0         | QP   | 100.0        | 96.00          | HORIZONTAL   |
| 299.660000       | 31.10           | -2.4         | 46.0            | 14.9         | QP   | 100.0        | 285.00         | HORIZONTAL   |
| 555.740000       | 32.90           | 4.3          | 46.0            | 13.1         | QP   | 100.0        | 96.00          | HORIZONTAL   |
| 920.460000       | 40.50           | 11.6         | 46.0            | 5.5          | QP   | 300.0        | 239.00         | HORIZONTAL   |

**MEASUREMENT RESULT: "GM1910136035\_red"**

10/13/2019 4:33PM

| Frequency<br>MHz | Level<br>dBμV/m | Transd<br>dB | Limit<br>dBμV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 31.940000        | 35.00           | -8.7         | 40.0            | 5.0          | QP   | 100.0        | 250.00         | VERTICAL     |
| 66.860000        | 25.10           | -7.7         | 40.0            | 14.9         | QP   | 100.0        | 0.00           | VERTICAL     |
| 161.920000       | 28.20           | -8.6         | 43.5            | 15.3         | QP   | 100.0        | 285.00         | VERTICAL     |
| 173.560000       | 28.00           | -8.4         | 43.5            | 15.5         | QP   | 100.0        | 285.00         | VERTICAL     |
| 544.100000       | 31.00           | 4.0          | 46.0            | 15.0         | QP   | 100.0        | 285.00         | VERTICAL     |
| 959.260000       | 39.60           | 12.4         | 46.0            | 6.4          | QP   | 100.0        | 131.00         | VERTICAL     |

**Remark:**

Transd=Cable lose+ Antenna factor- Pre-amplifier; Margin=Limit -Level

■ Above 1GHz

| Band: I         |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>L</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 1378.94         | 23.12             | 17.54               | 74.00               | 56.46             | -5.58                         | Vertical   | Peak         |
| 3607.03         | 29.28             | 30.74               | 74.00               | 43.26             | 1.46                          | Vertical   | Peak         |
| 5506.13         | 28.54             | 37.67               | 74.00               | 36.33             | 9.13                          | Vertical   | Peak         |
| 7124.69         | 28.16             | 42.73               | 74.00               | 31.27             | 14.57                         | Vertical   | Peak         |
| 1465.59         | 22.91             | 17.30               | 74.00               | 56.70             | -5.61                         | Horizontal | Peak         |
| 3166.41         | 29.39             | 30.06               | 74.00               | 43.94             | 0.67                          | Horizontal | Peak         |
| 5623.63         | 27.90             | 36.74               | 74.00               | 37.26             | 8.84                          | Horizontal | Peak         |
| 6664.97         | 27.86             | 41.22               | 74.00               | 32.78             | 13.36                         | Horizontal | Peak         |

| Band: I         |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>M</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 2113.31         | 22.60             | 18.73               | 74.00               | 55.27             | -3.87                         | Vertical   | Peak         |
| 4201.88         | 28.42             | 32.24               | 74.00               | 41.76             | 3.82                          | Vertical   | Peak         |
| 6684.06         | 29.02             | 42.44               | 74.00               | 31.56             | 13.42                         | Vertical   | Peak         |
| 9602.47         | 30.56             | 47.66               | 74.00               | 26.34             | 17.10                         | Vertical   | Peak         |
| 1467.06         | 21.43             | 15.82               | 74.00               | 58.18             | -5.61                         | Horizontal | Peak         |
| 3975.69         | 28.02             | 30.95               | 74.00               | 43.05             | 2.93                          | Horizontal | Peak         |
| 5857.16         | 27.41             | 37.21               | 74.00               | 36.79             | 9.80                          | Horizontal | Peak         |
| 6099.50         | 26.56             | 37.28               | 74.00               | 36.72             | 10.72                         | Horizontal | Peak         |

| Band: I         |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>H</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 2000.22         | 21.83             | 17.13               | 74.00               | 56.87             | -4.70                         | Vertical   | Peak         |
| 6440.25         | 27.31             | 39.09               | 74.00               | 34.91             | 11.78                         | Vertical   | Peak         |
| 9589.25         | 29.62             | 46.82               | 74.00               | 27.18             | 17.20                         | Vertical   | Peak         |
| 10991.91        | 28.54             | 46.35               | 74.00               | 27.65             | 17.81                         | Vertical   | Peak         |
| 2258.72         | 22.27             | 19.68               | 74.00               | 54.32             | -2.59                         | Horizontal | Peak         |
| 6440.25         | 28.46             | 40.24               | 74.00               | 33.76             | 11.78                         | Horizontal | Peak         |
| 8722.69         | 29.89             | 46.02               | 74.00               | 27.98             | 16.13                         | Horizontal | Peak         |
| 12397.50        | 28.72             | 45.72               | 74.00               | 28.28             | 17.00                         | Horizontal | Peak         |

| Band: II        |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>L</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 1771.09         | 23.31             | 17.42               | 74.00               | 56.58             | -5.89                         | Vertical   | Peak         |
| 2681.72         | 23.12             | 23.36               | 74.00               | 50.64             | 0.24                          | Vertical   | Peak         |
| 5769.03         | 27.19             | 36.51               | 74.00               | 37.49             | 9.32                          | Vertical   | Peak         |
| 8042.66         | 28.29             | 44.54               | 74.00               | 29.46             | 16.25                         | Vertical   | Peak         |
| 1568.41         | 21.94             | 15.87               | 74.00               | 58.13             | -6.07                         | Horizontal | Peak         |
| 2254.31         | 23.05             | 20.43               | 74.00               | 53.57             | -2.62                         | Horizontal | Peak         |
| 5695.59         | 28.41             | 37.23               | 74.00               | 36.77             | 8.82                          | Horizontal | Peak         |
| 8621.34         | 28.81             | 44.68               | 74.00               | 29.32             | 15.87                         | Horizontal | Peak         |

| Band: II        |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>M</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 1514.06         | 21.54             | 15.82               | 74.00               | 58.18             | -5.72                         | Vertical   | Peak         |
| 2248.44         | 22.25             | 19.59               | 74.00               | 54.41             | -2.66                         | Vertical   | Peak         |
| 4711.53         | 28.12             | 34.58               | 74.00               | 39.42             | 6.46                          | Vertical   | Peak         |
| 11486.88        | 28.44             | 45.87               | 74.00               | 28.13             | 17.43                         | Vertical   | Peak         |
| 1349.56         | 22.08             | 16.51               | 74.00               | 57.49             | -5.57                         | Horizontal | Peak         |
| 2269.00         | 22.57             | 20.04               | 74.00               | 53.96             | -2.53                         | Horizontal | Peak         |
| 6734.00         | 28.96             | 42.34               | 74.00               | 31.66             | 13.38                         | Horizontal | Peak         |
| 8668.34         | 29.16             | 45.23               | 74.00               | 28.77             | 16.07                         | Horizontal | Peak         |

| Band: II        |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>H</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 1706.47         | 22.18             | 16.10               | 74.00               | 57.90             | -6.08                         | Vertical   | Peak         |
| 3233.97         | 30.07             | 30.51               | 74.00               | 43.49             | 0.44                          | Vertical   | Peak         |
| 5638.31         | 27.60             | 36.43               | 74.00               | 37.57             | 8.83                          | Vertical   | Peak         |
| 8069.09         | 29.26             | 45.55               | 74.00               | 28.45             | 16.29                         | Vertical   | Peak         |
| 1568.41         | 23.03             | 16.96               | 74.00               | 57.04             | -6.07                         | Horizontal | Peak         |
| 3495.41         | 28.26             | 29.25               | 74.00               | 44.75             | 0.99                          | Horizontal | Peak         |
| 6291.91         | 27.42             | 38.41               | 74.00               | 35.59             | 10.99                         | Horizontal | Peak         |
| 7951.59         | 29.22             | 45.47               | 74.00               | 28.53             | 16.25                         | Horizontal | Peak         |

| Band: III       |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>L</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 1283.47         | 22.95             | 17.34               | 74.00               | 56.66             | -5.61                         | Vertical   | Peak         |
| 3579.13         | 29.05             | 30.42               | 74.00               | 43.58             | 1.37                          | Vertical   | Peak         |
| 7342.06         | 28.09             | 43.27               | 74.00               | 30.73             | 15.18                         | Vertical   | Peak         |
| 11176.97        | 28.93             | 46.60               | 74.00               | 27.40             | 17.67                         | Vertical   | Peak         |
| 1605.13         | 22.40             | 16.13               | 74.00               | 57.87             | -6.27                         | Horizontal | Peak         |
| 3831.75         | 28.14             | 30.35               | 74.00               | 43.65             | 2.21                          | Horizontal | Peak         |
| 6847.09         | 28.48             | 42.10               | 74.00               | 31.90             | 13.62                         | Horizontal | Peak         |
| 8097.00         | 28.89             | 45.23               | 74.00               | 28.77             | 16.34                         | Horizontal | Peak         |

| Band: III       |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>M</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 1047.00         | 23.13             | 15.86               | 74.00               | 58.14             | -7.27                         | Vertical   | Peak         |
| 2590.66         | 22.15             | 20.75               | 74.00               | 53.25             | -1.40                         | Vertical   | Peak         |
| 5121.31         | 27.60             | 36.44               | 74.00               | 37.56             | 8.84                          | Vertical   | Peak         |
| 7433.13         | 28.29             | 43.67               | 74.00               | 30.33             | 15.38                         | Vertical   | Peak         |
| 1837.19         | 22.96             | 17.15               | 74.00               | 56.85             | -5.81                         | Horizontal | Peak         |
| 3693.69         | 29.84             | 31.42               | 74.00               | 42.58             | 1.58                          | Horizontal | Peak         |
| 7491.88         | 27.84             | 43.25               | 74.00               | 30.75             | 15.41                         | Horizontal | Peak         |
| 9467.34         | 28.73             | 46.52               | 74.00               | 27.48             | 17.79                         | Horizontal | Peak         |

| Band: III       |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>H</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 1984.06         | 22.10             | 17.22               | 74.00               | 56.78             | -4.88                         | Vertical   | Peak         |
| 2753.69         | 24.36             | 25.76               | 74.00               | 48.24             | 1.40                          | Vertical   | Peak         |
| 3978.63         | 27.43             | 30.38               | 74.00               | 43.62             | 2.95                          | Vertical   | Peak         |
| 7180.50         | 27.80             | 42.68               | 74.00               | 31.32             | 14.88                         | Vertical   | Peak         |
| 1555.19         | 21.58             | 15.59               | 74.00               | 58.41             | -5.99                         | Horizontal | Peak         |
| 3703.97         | 28.80             | 30.41               | 74.00               | 43.59             | 1.61                          | Horizontal | Peak         |
| 5813.09         | 26.53             | 36.14               | 74.00               | 37.86             | 9.61                          | Horizontal | Peak         |
| 10784.81        | 28.78             | 46.48               | 74.00               | 27.52             | 17.70                         | Horizontal | Peak         |

| Band: IV        |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>L</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 1506.72         | 21.97             | 16.30               | 74.00               | 57.70             | -5.67                         | Vertical   | Peak         |
| 2327.75         | 22.34             | 19.99               | 74.00               | 54.01             | -2.35                         | Vertical   | Peak         |
| 3812.66         | 28.13             | 30.21               | 74.00               | 43.79             | 2.08                          | Vertical   | Peak         |
| 5269.66         | 27.70             | 36.31               | 74.00               | 37.69             | 8.61                          | Vertical   | Peak         |
| 1126.31         | 22.27             | 15.66               | 74.00               | 58.34             | -6.61                         | Horizontal | Peak         |
| 1765.22         | 22.37             | 16.47               | 74.00               | 57.53             | -5.90                         | Horizontal | Peak         |
| 3151.72         | 29.76             | 30.35               | 74.00               | 43.65             | 0.59                          | Horizontal | Peak         |
| 6073.06         | 26.90             | 37.55               | 74.00               | 36.45             | 10.65                         | Horizontal | Peak         |

| Band: IV        |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>M</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 1543.44         | 21.70             | 15.79               | 74.00               | 58.21             | -5.91                         | Vertical   | Peak         |
| 3151.72         | 29.89             | 30.48               | 74.00               | 43.52             | 0.59                          | Vertical   | Peak         |
| 5153.63         | 27.33             | 36.23               | 74.00               | 37.77             | 8.90                          | Vertical   | Peak         |
| 6056.91         | 27.84             | 38.45               | 74.00               | 35.55             | 10.61                         | Vertical   | Peak         |
| 1492.03         | 21.58             | 15.95               | 74.00               | 58.05             | -5.63                         | Horizontal | Peak         |
| 5075.78         | 27.22             | 35.79               | 74.00               | 38.21             | 8.57                          | Horizontal | Peak         |
| 7775.34         | 27.87             | 43.19               | 74.00               | 30.81             | 15.32                         | Horizontal | Peak         |
| 3824.41         | 28.52             | 30.68               | 74.00               | 43.32             | 2.16                          | Horizontal | Peak         |

| Band: IV        |                   | Worst mode: 802.11a |                     |                   | Test channel: CH <sub>H</sub> |            |              |
|-----------------|-------------------|---------------------|---------------------|-------------------|-------------------------------|------------|--------------|
| Frequency (MHz) | Read Level (dBuV) | Level (dBuV/m)      | Limit Line (dBuV/m) | Margin Limit (dB) | Factor (dB)                   | Test value | Polarization |
| 1644.78         | 21.41             | 15.21               | 74.00               | 58.79             | -6.20                         | Vertical   | Peak         |
| 4502.97         | 27.17             | 32.53               | 74.00               | 41.47             | 5.36                          | Vertical   | Peak         |
| 12077.31        | 28.44             | 45.46               | 74.00               | 28.54             | 17.02                         | Vertical   | Peak         |
| 12669.22        | 28.33             | 45.31               | 74.00               | 28.69             | 16.98                         | Vertical   | Peak         |
| 1461.19         | 22.16             | 16.55               | 74.00               | 57.45             | -5.61                         | Horizontal | Peak         |
| 4219.50         | 28.67             | 32.48               | 74.00               | 41.52             | 3.81                          | Horizontal | Peak         |
| 5147.75         | 27.96             | 36.85               | 74.00               | 37.15             | 8.89                          | Horizontal | Peak         |
| 9204.44         | 28.82             | 45.56               | 74.00               | 28.44             | 16.74                         | Horizontal | Peak         |

## Remark:

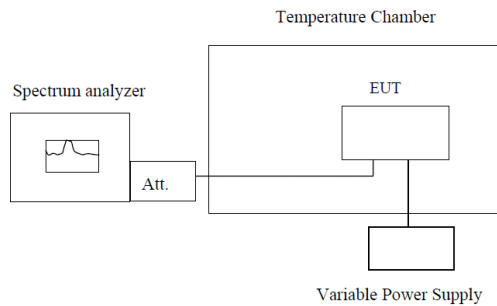
1. Final Level = Receiver Read level + Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Measuring frequencies from 1 GHz to 40GHz.
4. Test 802.11a, 802.11n, 802.11ac mode, all modulations have been tested, only worst case is reported

## 5.9. Frequency stability

### LIMIT

Within Operation Band

### TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

### TEST PROCEDURE

1. The equipment under test was connected to an external power supply.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to -20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

### TEST MODE:

Transmitting with unmodulation

### TEST RESULTS

☒ Passed ☐ Not Applicable

**Voltage VS Frequency stability**

| Band: I          |             |                          | Test Frequency: 5180.00MHz |        |
|------------------|-------------|--------------------------|----------------------------|--------|
| Temperature (°C) | Voltage (V) | Frequency Deviation (Hz) | Frequency Deviation (ppm)  | Result |
| 25               | 3.60        | -49000.00                | -9.45946                   | PASS   |
| 25               | 3.80        | -49000.00                | -9.45946                   | PASS   |
| 25               | 4.35        | -50900.00                | -9.82626                   | PASS   |

| Band: II         |             |                          | Test Frequency: 5260.00MHz |        |
|------------------|-------------|--------------------------|----------------------------|--------|
| Temperature (°C) | Voltage (V) | Frequency Deviation (Hz) | Frequency Deviation (ppm)  | Result |
| 25               | 3.60        | -42000.00                | -7.98479                   | PASS   |
| 25               | 3.80        | -40000.00                | -7.60456                   | PASS   |
| 25               | 4.35        | -44000.00                | -8.36502                   | PASS   |

| Band: III        |             |                          | Test Frequency: 5500.00MHz |        |
|------------------|-------------|--------------------------|----------------------------|--------|
| Temperature (°C) | Voltage (V) | Frequency Deviation (Hz) | Frequency Deviation (ppm)  | Result |
| 25               | 3.60        | -45000.00                | -8.18182                   | PASS   |
| 25               | 3.80        | -41000.00                | -7.45455                   | PASS   |
| 25               | 4.35        | -47000.00                | -8.54546                   | PASS   |

| Band: IV         |             |                          | Test Frequency: 5745.00MHz |        |
|------------------|-------------|--------------------------|----------------------------|--------|
| Temperature (°C) | Voltage (V) | Frequency Deviation (Hz) | Frequency Deviation (ppm)  | Result |
| 25               | 3.60        | -48000.00                | -8.35509                   | PASS   |
| 25               | 3.80        | -44000.00                | -7.65883                   | PASS   |
| 25               | 4.35        | -49000.00                | -8.52916                   | PASS   |

**Temperature VS Frequency stability**

| Band: I     |                  |                          | Test Frequency: 5180.00MHz |        |
|-------------|------------------|--------------------------|----------------------------|--------|
| Voltage (V) | Temperature (°C) | Frequency Deviation (Hz) | Frequency Deviation (ppm)  | Result |
| 3.80        | -20              | -51900.00                | -10.01930                  | PASS   |
| 3.80        | -10              | -51900.00                | -10.01930                  | PASS   |
| 3.80        | 0                | -52900.00                | -10.21236                  | PASS   |
| 3.80        | 10               | -52900.00                | -10.21236                  | PASS   |
| 3.80        | 20               | -52900.00                | -10.21236                  | PASS   |
| 3.80        | 30               | -52900.00                | -10.21236                  | PASS   |
| 3.80        | 40               | -52900.00                | -10.21236                  | PASS   |
| 3.80        | 50               | -52900.00                | -10.21236                  | PASS   |

| Band: II    |                  |                          | Test Frequency: 5260.00MHz |        |
|-------------|------------------|--------------------------|----------------------------|--------|
| Voltage (V) | Temperature (°C) | Frequency Deviation (Hz) | Frequency Deviation (ppm)  | Result |
| 3.80        | -20              | -45000.00                | -8.55513                   | PASS   |
| 3.80        | -10              | -45000.00                | -8.55513                   | PASS   |
| 3.80        | 0                | -46000.00                | -8.74525                   | PASS   |
| 3.80        | 10               | -46000.00                | -8.74525                   | PASS   |
| 3.80        | 20               | -46000.00                | -8.74525                   | PASS   |
| 3.80        | 30               | -47000.00                | -8.93536                   | PASS   |
| 3.80        | 40               | -46000.00                | -8.74525                   | PASS   |
| 3.80        | 50               | -47000.00                | -8.93536                   | PASS   |

| Band: III   |                  |                          | Test Frequency: 5500.00MHz |        |
|-------------|------------------|--------------------------|----------------------------|--------|
| Voltage (V) | Temperature (°C) | Frequency Deviation (Hz) | Frequency Deviation (ppm)  | Result |
| 3.80        | -20              | -48000.00                | -8.72727                   | PASS   |
| 3.80        | -10              | -48000.00                | -8.72727                   | PASS   |
| 3.80        | 0                | -48000.00                | -8.72727                   | PASS   |
| 3.80        | 10               | -48000.00                | -8.72727                   | PASS   |
| 3.80        | 20               | -48000.00                | -8.72727                   | PASS   |
| 3.80        | 30               | -49000.00                | -8.90909                   | PASS   |
| 3.80        | 40               | -49000.00                | -8.90909                   | PASS   |
| 3.80        | 50               | -49000.00                | -8.90909                   | PASS   |

| Band: IV    |                  |                          | Test Frequency: 5745.00MHz |        |
|-------------|------------------|--------------------------|----------------------------|--------|
| Voltage (V) | Temperature (°C) | Frequency Deviation (Hz) | Frequency Deviation (ppm)  | Result |
| 3.80        | -20              | -50900.00                | -8.85988                   | PASS   |
| 3.80        | -10              | -50900.00                | -8.85988                   | PASS   |
| 3.80        | 0                | -50900.00                | -8.85988                   | PASS   |
| 3.80        | 10               | -50900.00                | -8.85988                   | PASS   |
| 3.80        | 20               | -50900.00                | -8.85988                   | PASS   |
| 3.80        | 30               | -50900.00                | -8.85988                   | PASS   |
| 3.80        | 40               | -50900.00                | -8.85988                   | PASS   |
| 3.80        | 50               | -50900.00                | -8.85988                   | PASS   |

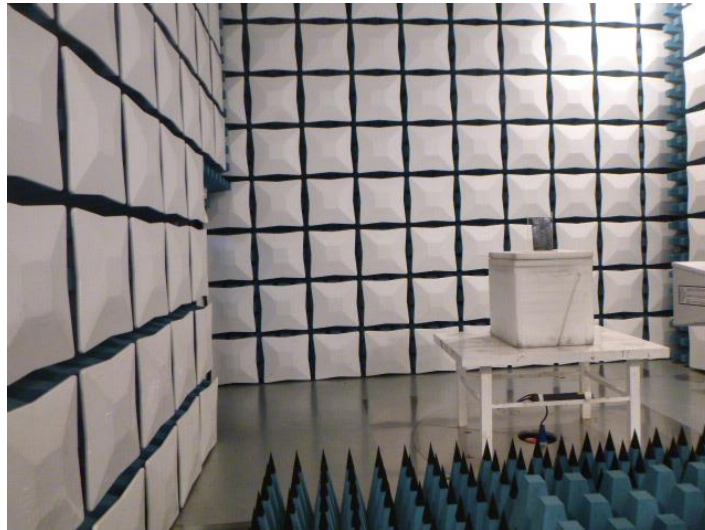
## 6. Test Setup Photos of the EUT

### Conducted Emissions (AC Mains)



### Radiated Emissions





## **7. External and Internal Photos of the EUT**

Reference to the test report No. CHTEW19100128

-----End of Report-----