## 8.4 Maximum Power Spectral Density

▣ **Test requirements**

**Part. 15.407(a)**

**(1) For the band 5.15 - 5.25 GHz.**

(i) For an outdoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band. **note1**

(ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band. note1

(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

**(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band. note1**

**(2) For the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. note1**

**(3) For the band 5.725 - 5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.note1,note2**

**Note1**: If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**Note2**: Fixed point - to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

**- Peak Power Spectral Density Limit Calculation(FCC)**

| Band | Limit [dBm] | Antenna Gain (Worst case) | Determined Limit [dBm] |
|---|---|---|---|
| U-NII 1 | 11 | 2.890 | 11 |
| U-NII 2A | 11 | 2.890 | 11 |
| U-NII 2C | 11 | 2.510 | 11 |
| U-NII 3 | 30 | 5.780 | 30 |

**RSS-247[6.11]**

**(1) For band 5150 - 5250 MHz**
**The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.**

**(2) For band 5250 - 5350 MHz**
**The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.**

**(3) For band 5470 - 5600 MHz and 5650 - 5725 MHz**
**The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.**

**(4) For band 5725 - 5850 MHz**
**The power spectral density shall not exceed 30 dBm in any 500 kHz band.**

**- Peak Power Spectral Density Limit Calculation(IC)**

| Band | Limit [dBm] | Antenna Gain (Worst case) | Determined Limit [dBm] |
|---|---|---|---|
| U-NII 1 | 10 | 2.890 | 10 |
| U-NII 2A | 11 | 2.890 | 11 |
| U-NII 2C | 11 | 2.510 | 11 |
| U-NII 3 | 30 | 5.780 | 30 |

## ▣ TEST CONFIGURATION

Refer to the APPENDIX I.

▣ **Test procedure**

Maximum Power Spectral Density is measured using Measurement Procedure **of KDB789033 D02 V01**

1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA - 1, SA - 2, SA - 3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power…”. (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)

2) Use the peak search function on the instrument to find the peak of the spectrum and record its value.

3) Make the following adjustments to the peak value of the spectrum, if applicable:
**a) If Method SA - 2 or SA - 2 Alternative was used, add 10 log(1 / x), where x is the duty cycle, to the peak of the spectrum.**
b) If Method SA - 3 Alternative was used and the linear mode was used in step II.E.2.g (viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.

4) The result is the Maximum PSD over 1 MHz reference bandwidth.

5) For devices operating in the bands 5.15 - 5.25 GHz, 5.25 - 5.35 GHz, and 5.47 - 5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in §15.407(a)(5). For devices operating in the band 5.725 - 5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1 / T, where T is defined in section II.B.1.a). (Refer to Appendix II)

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log(500 kHz / RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log(1 MHz / RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

**Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections 5.c) and 5.d) above, since RBW = 100 kHz is available on nearly all spectrum analyzers.**

▣ **Test result: Comply**

| Mode | Channel | Frequency [MHz] | Reading [dBm] | T.F [dB] Note 1 | Test Result [dBm] |
|---|---|---|---|---|---|
| 802.11a | 36 | 5180 | -0.410 | 0.320 | -0.090 |
| | 40 | 5200 | -0.370 | | -0.050 |
| | 48 | 5240 | -0.890 | | -0.570 |
| | 52 | 5260 | -1.210 | | -0.890 |
| | 60 | 5300 | -1.120 | | -0.800 |
| | 64 | 5320 | -1.380 | | -1.060 |
| | 100 | 5500 | -2.280 | | -1.960 |
| | 116 | 5580 | -2.350 | | -2.030 |
| | 140 | 5700 | -1.050 | | -0.730 |
| | 149 | 5745 | -10.670 | 7.310 | -3.360 |
| | 157 | 5785 | -11.200 | | -3.890 |
| | 165 | 5825 | -10.290 | | -2.980 |
| 802.11n HT20 | 36 | 5180 | -0.940 | 0.370 | -0.570 |
| | 40 | 5200 | -1.040 | | -0.670 |
| | 48 | 5240 | -1.350 | | -0.980 |
| | 52 | 5260 | -1.700 | | -1.330 |
| | 60 | 5300 | -1.860 | | -1.490 |
| | 64 | 5320 | -1.700 | | -1.330 |
| | 100 | 5500 | -2.760 | | -2.390 |
| | 116 | 5580 | -2.810 | | -2.440 |
| | 140 | 5700 | -1.190 | | -0.820 |
| | 149 | 5745 | -11.130 | 7.360 | -3.770 |
| | 157 | 5785 | -11.440 | | -4.080 |
| | 165 | 5825 | -11.160 | | -3.800 |
| 802.11n HT40 | 38 | 5190 | -9.300 | 0.660 | -8.640 |
| | 46 | 5230 | -9.870 | | -9.210 |
| | 54 | 5270 | -7.720 | | -7.060 |
| | 62 | 5310 | -7.690 | | -7.030 |
| | 102 | 5510 | -10.200 | | -9.540 |
| | 110 | 5550 | -9.990 | | -9.330 |
| | 134 | 5670 | -9.270 | | -8.610 |
| | 151 | 5755 | -18.780 | 7.650 | -11.130 |
| | 159 | 5795 | -18.910 | | -11.260 |
| 802.11ac VHT80 | 42 | 5210 | -11.900 | 1.200 | -10.700 |
| | - | - | - | | - |
| | 58 | 5290 | -11.040 | | -9.840 |
| | - | - | - | | - |
| | 106 | 5530 | -12.910 | | -11.710 |
| | - | - | - | | - |
| | - | - | - | | - |
| | 155 | 5775 | -21.720 | 8.190 | -13.530 |
| | - | - | - | | - |

Note 1: "Band 1, 2, 3 [T.F] = D.C.F"
"Band 4 [T.F] = 10*LOG(500/100) + D.C.F"
For D.C.F., please refer to appendix II.
Note 2: Test Result = Measurement Data + T.F

| Mode | | Channel | Frequency [MHz] | Reading [dBm] | T.F [dB] Note 1 | Test Result [dBm] |
|---|---|---|---|---|---|---|
| **802.11a** | U-NII 2C | 144 | 5720 | -9.230 | 10.320 | 1.09 |
| | U-NII 3 | 144 | 5720 | -9.720 | 7.310 | -2.41 |
| **802.11n HT20** | U-NII 2C | 144 | 5720 | -9.620 | 10.370 | 0.75 |
| | U-NII 3 | 144 | 5720 | -10.380 | 7.360 | -3.02 |
| **802.11n HT40** | U-NII 2C | 142 | 5710 | -17.170 | 10.660 | -6.51 |
| | U-NII 3 | 142 | 5710 | -18.260 | 7.650 | -10.61 |
| **802.11ac VHT80** | U-NII 2C | 138 | 5690 | -20.420 | 11.200 | -9.22 |
| | U-NII 3 | 138 | 5690 | -22.120 | 8.190 | -13.93 |

Note 1: "Band 1, 2, 3 [T.F] = 10*LOG(1000/100) + D.C.F"
"Band 4 [T.F] = 10*LOG(500/100) + D.C.F"
For D.C.F., please refer to appendix II.
Note 2: Test Result = Measurement Data + T.F

## ▣ RESULT PLOTS

### Maximum Power Spectral Density

Test Mode: 802.11a & Ch.36


### Maximum Power Spectral Density

Test Mode: 802.11a & Ch.40

## Maximum Power Spectral Density

Test Mode: 802.11a & Ch.48

## Maximum Power Spectral Density

Test Mode: 802.11a & Ch.52


## Maximum Power Spectral Density

Test Mode: 802.11a & Ch.60

## Maximum Power Spectral Density

Test Mode: 802.11a & Ch.64

## Maximum Power Spectral Density

Test Mode: 802.11a & Ch.100


## Maximum Power Spectral Density

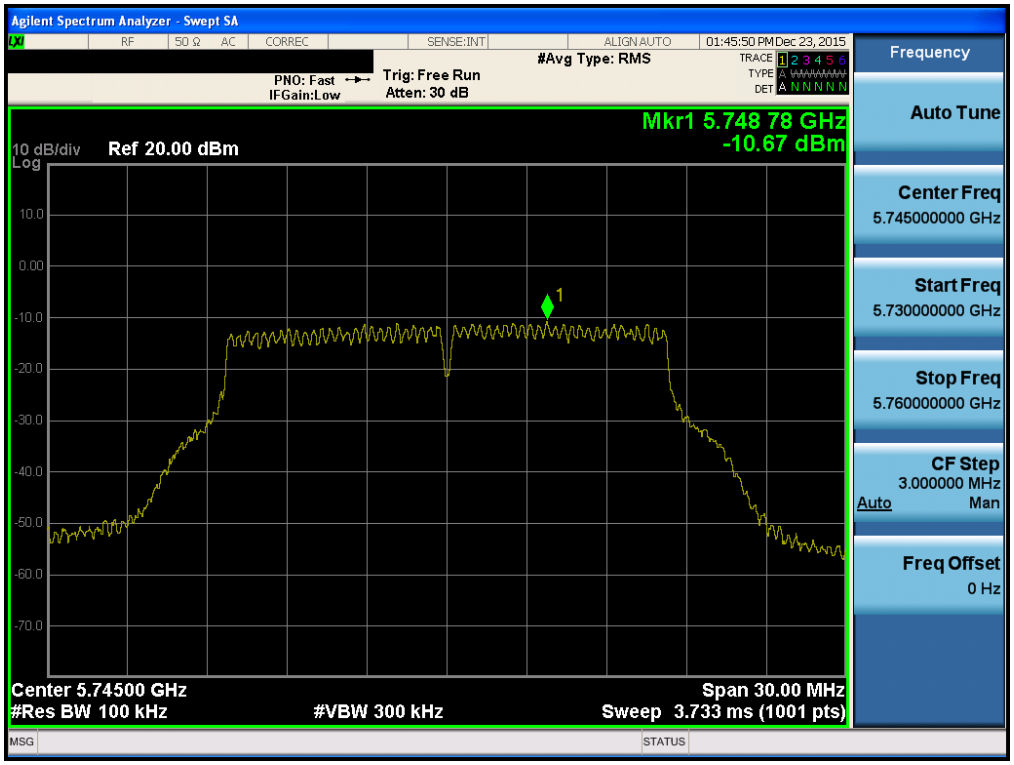
Test Mode: 802.11a & Ch.116

## Maximum Power Spectral Density

Test Mode: 802.11a & Ch.140

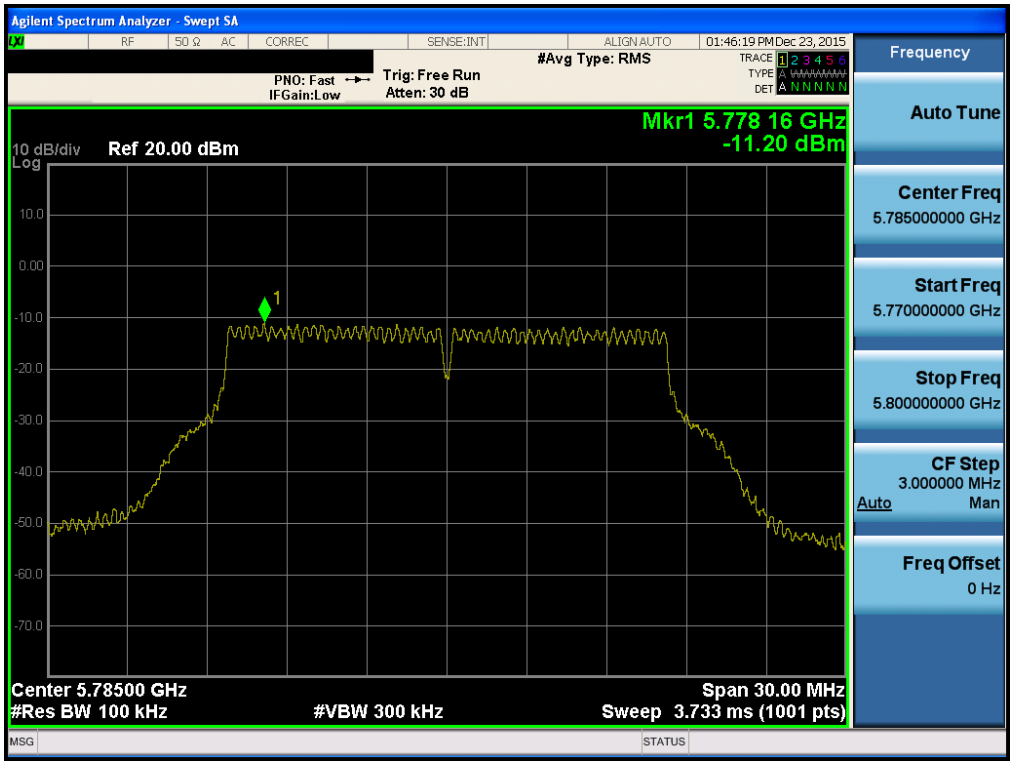
## Maximum Power Spectral Density

Test Mode: 802.11a & Ch.149




## Maximum Power Spectral Density

Test Mode: 802.11a & Ch.157



## Maximum Power Spectral Density

Test Mode: 802.11a & Ch.165

## Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.36


## Maximum Power Spectral Density

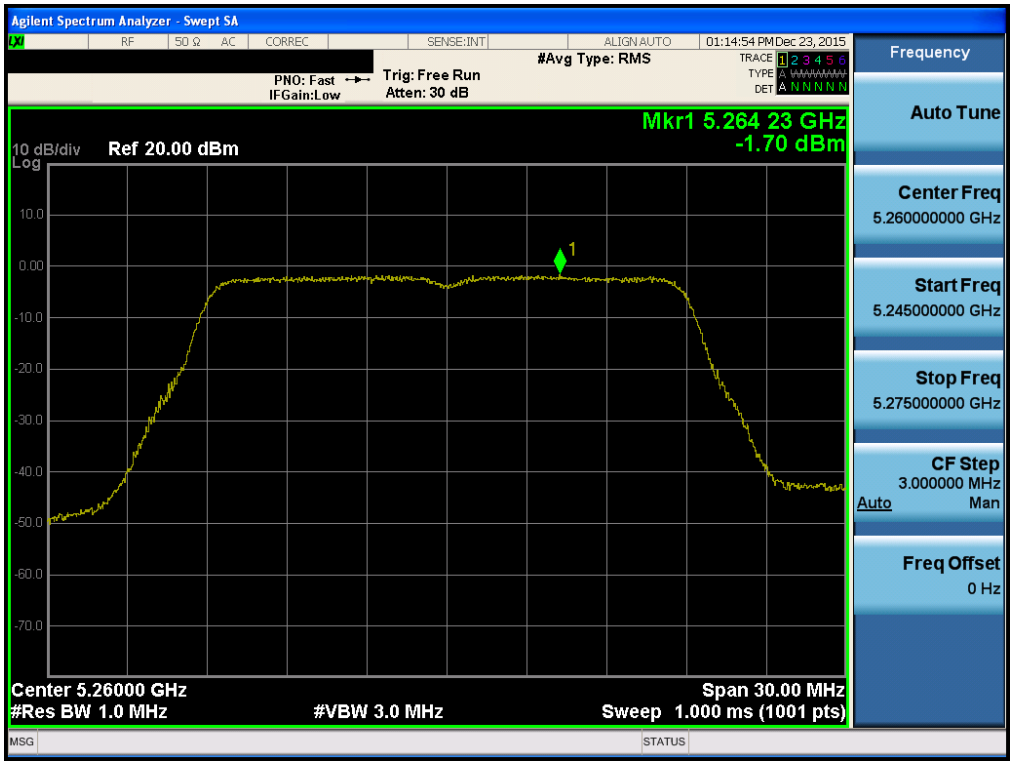
Test Mode: 802.11n(HT20) & Ch.40

## Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.48

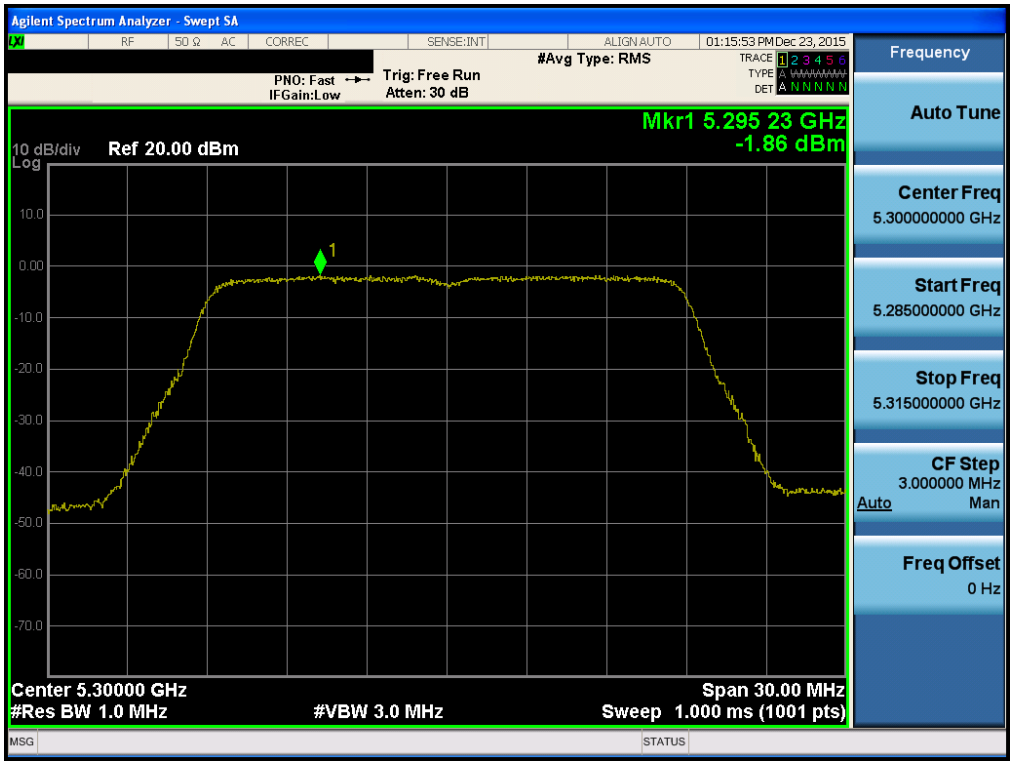
## Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.52




## Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.60



## Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.64

## Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.100


## Maximum Power Spectral Density

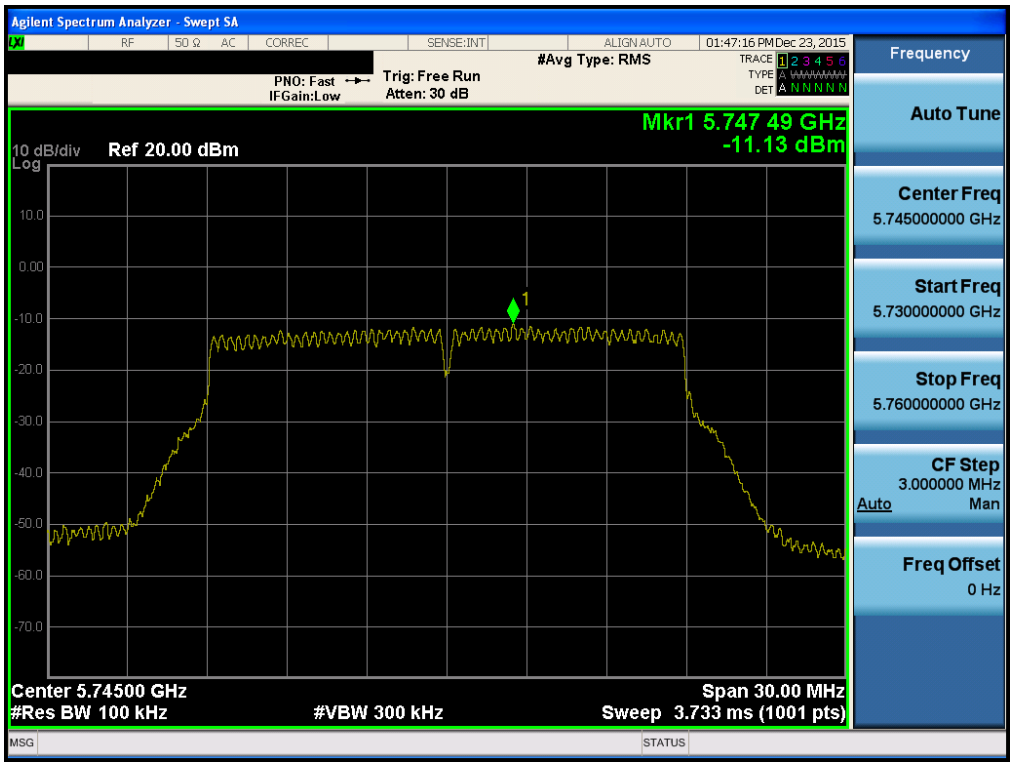
Test Mode: 802.11n HT20 & Ch.116

## Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.140

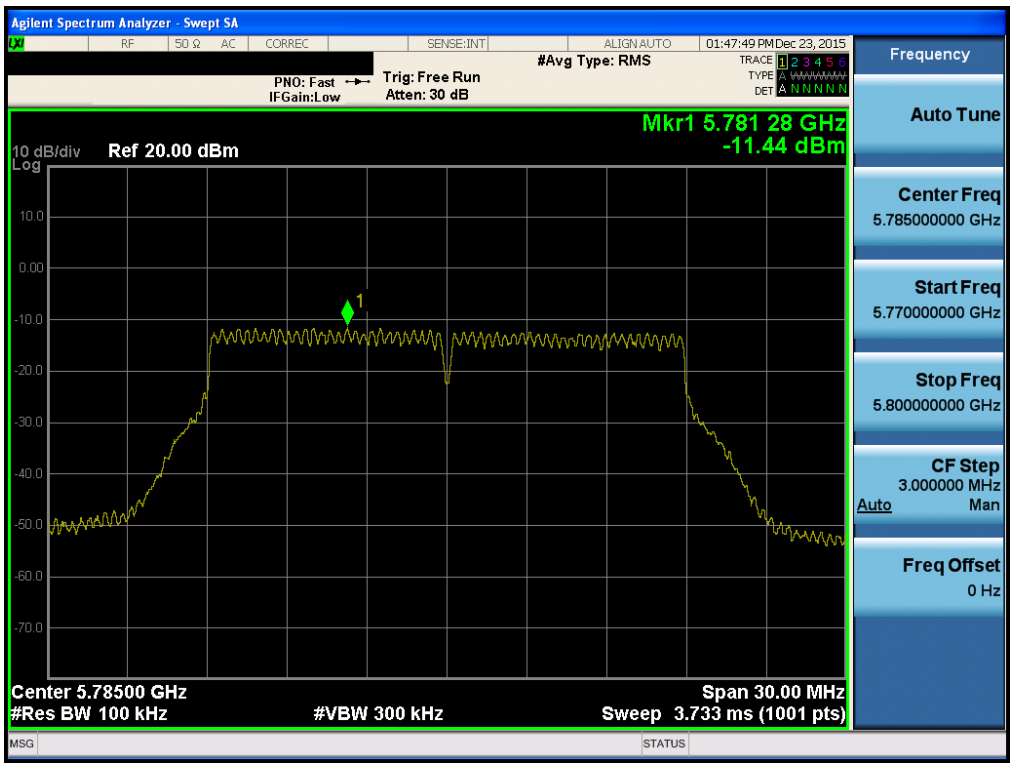
## Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.149




## Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.157

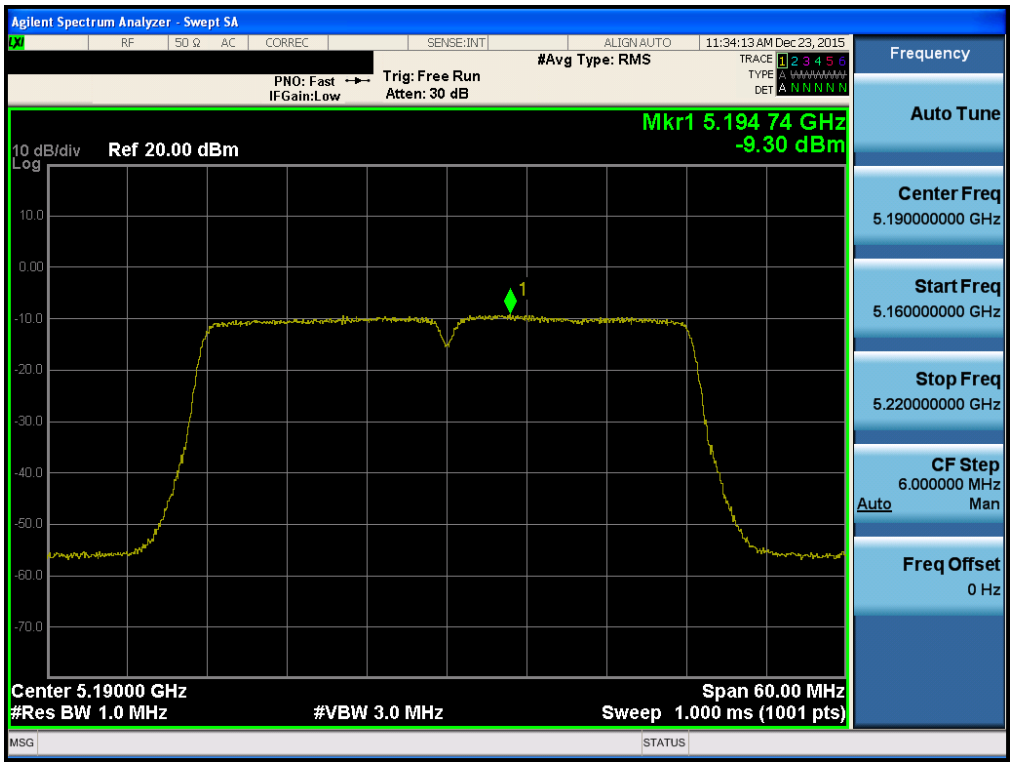


## Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.165

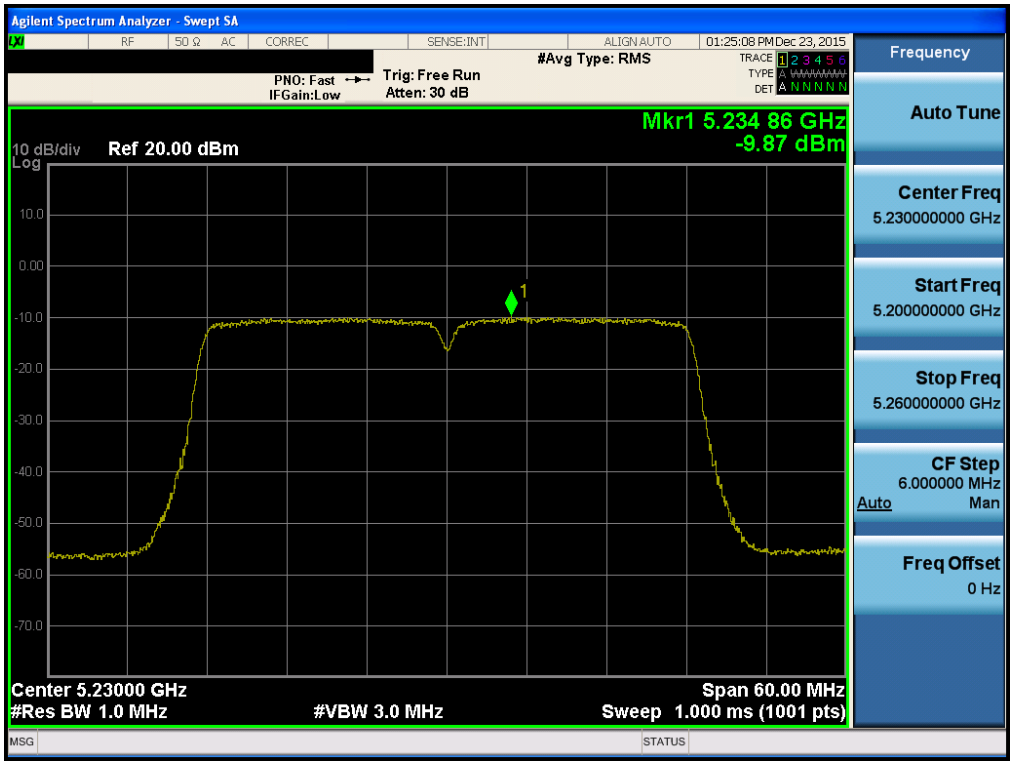
## Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.38



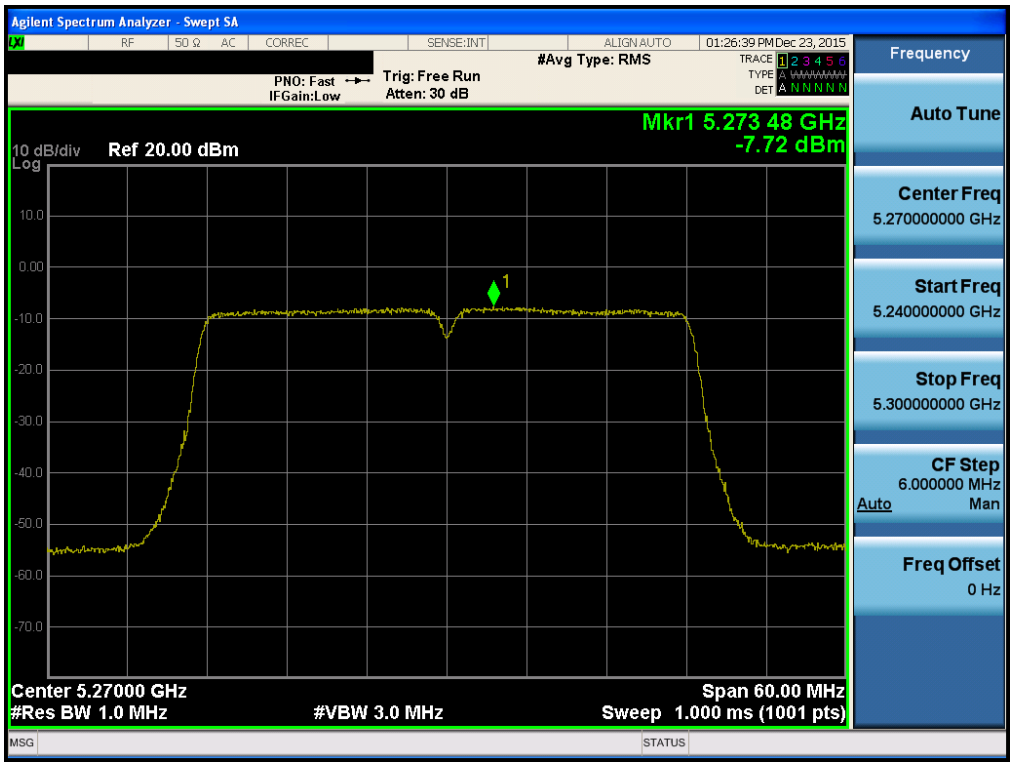

## Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.46



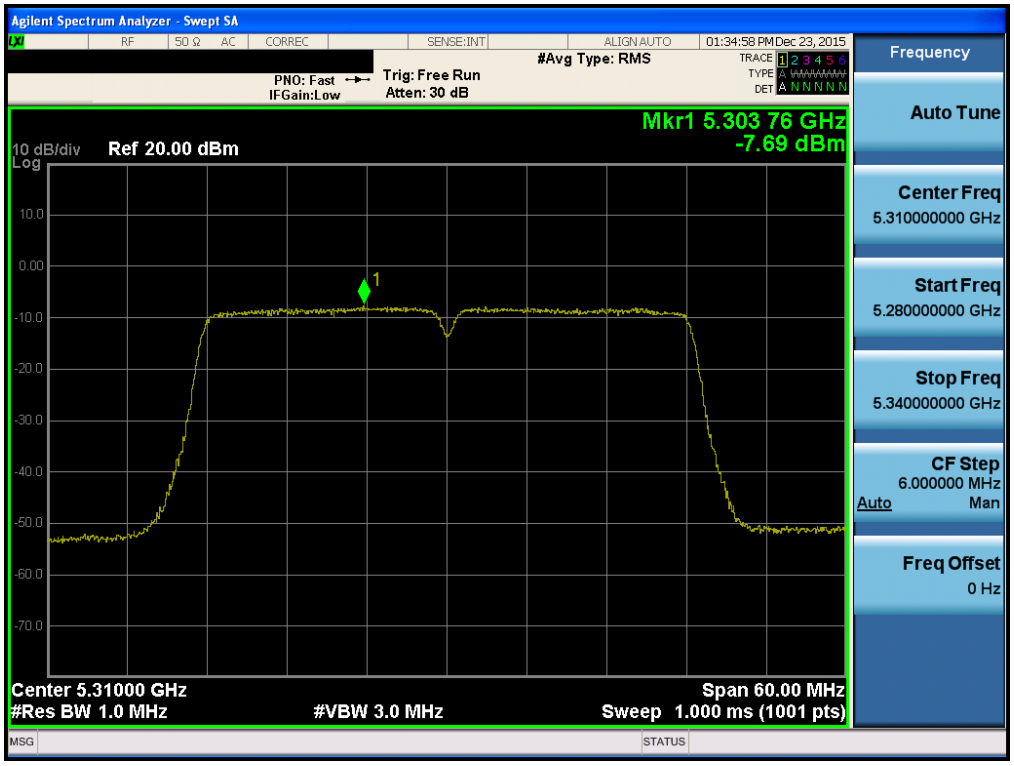
## Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.54



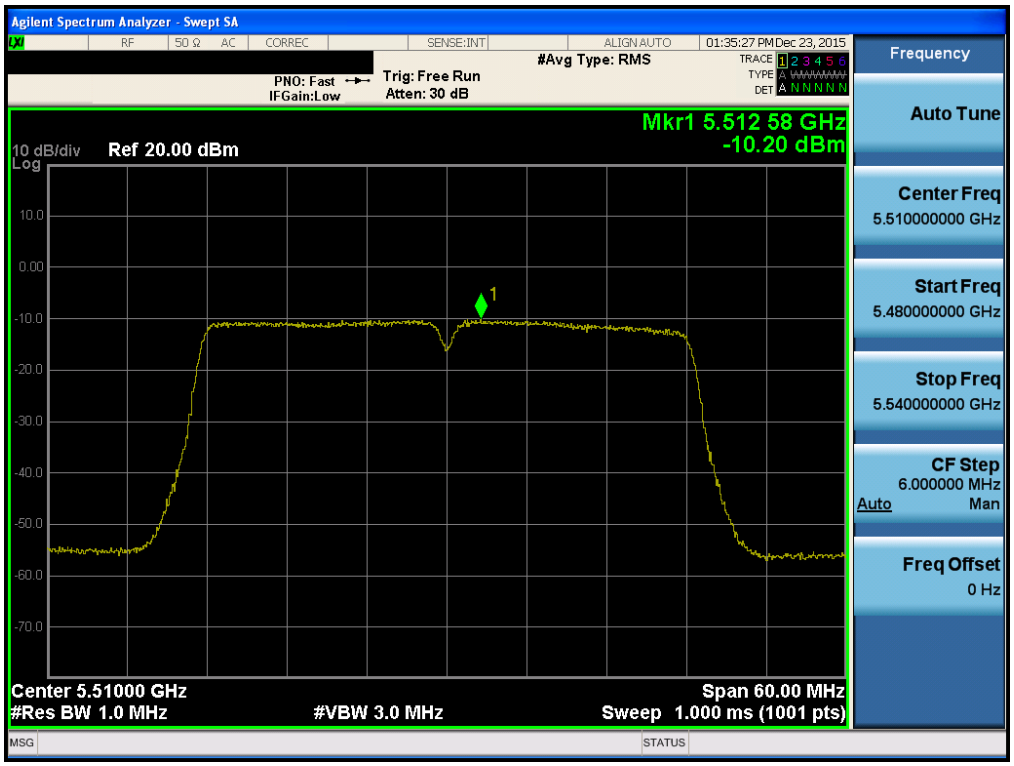

## Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.62



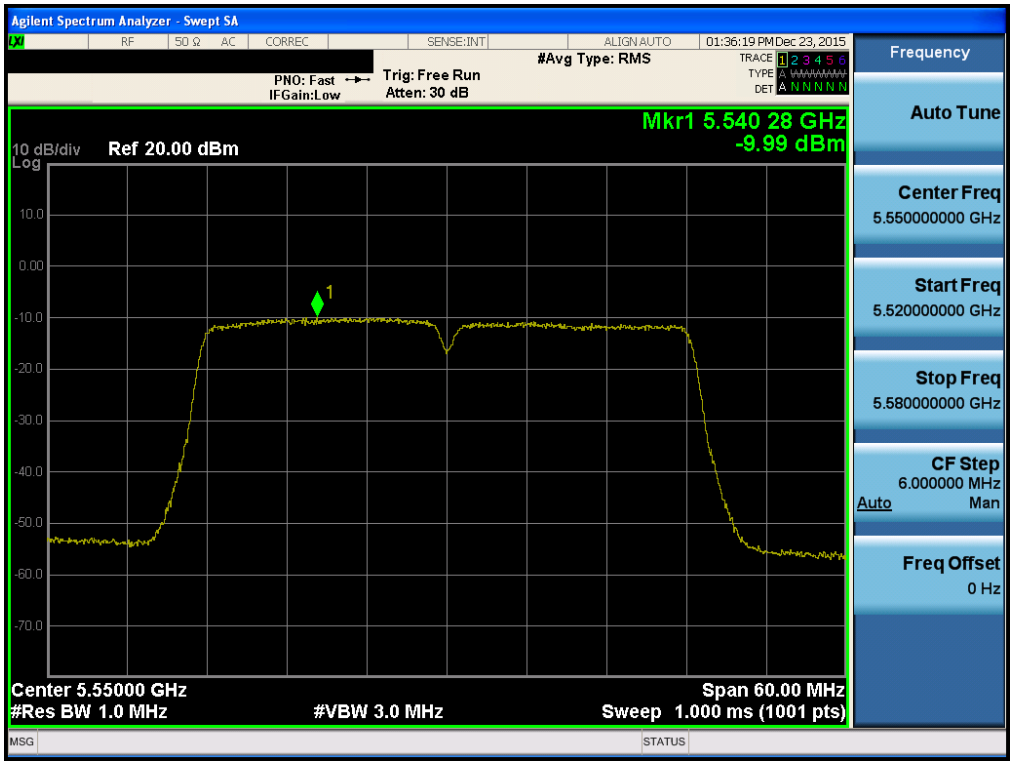
## Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.102



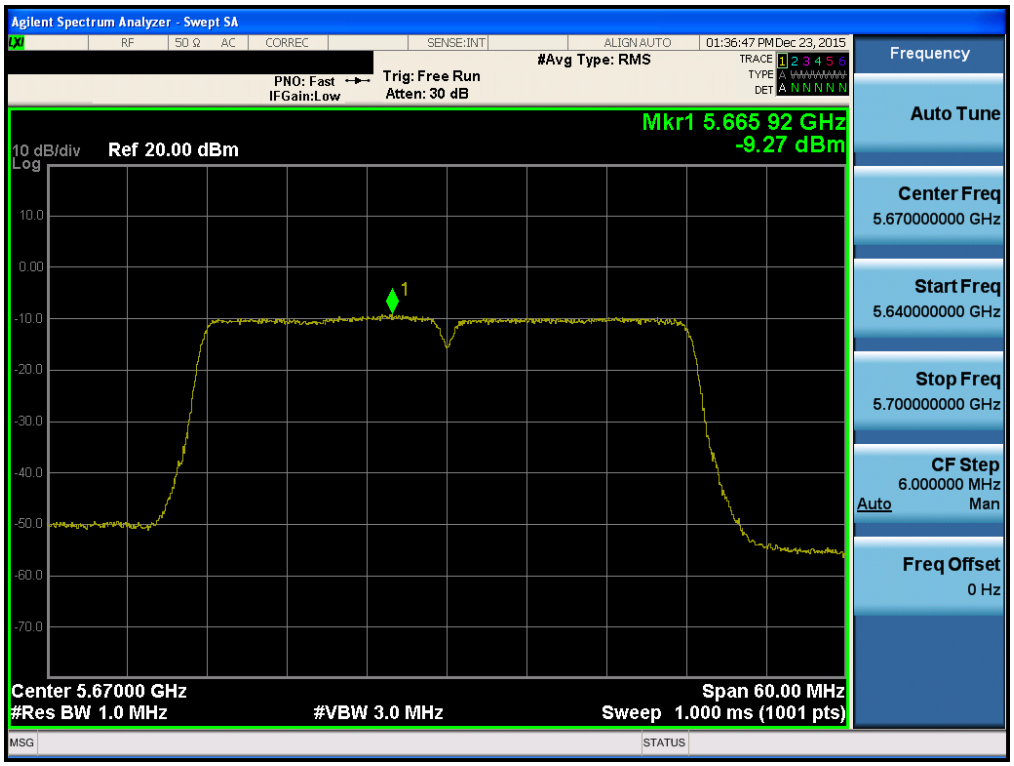

## Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.110



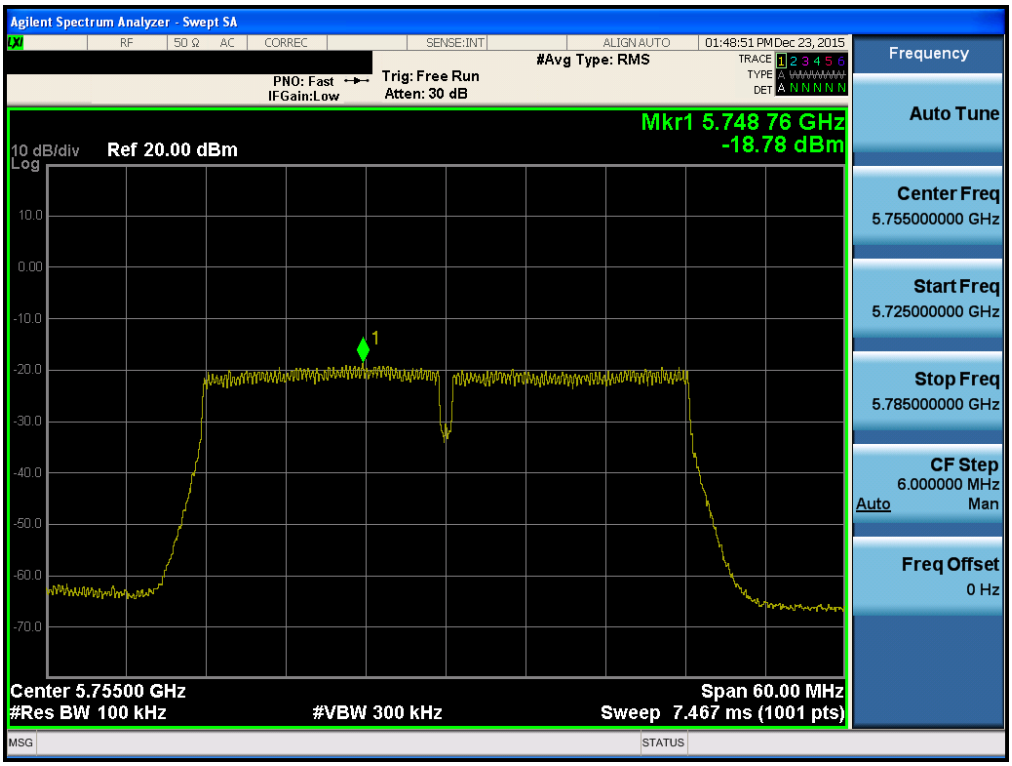
## Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.134



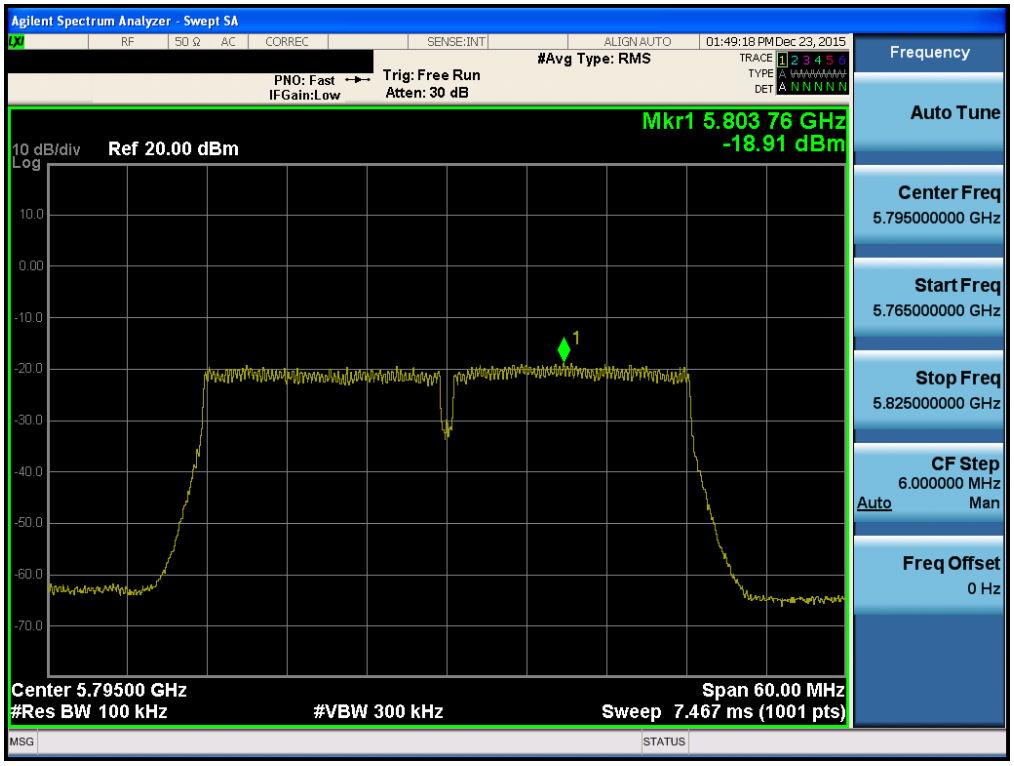
## Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.151



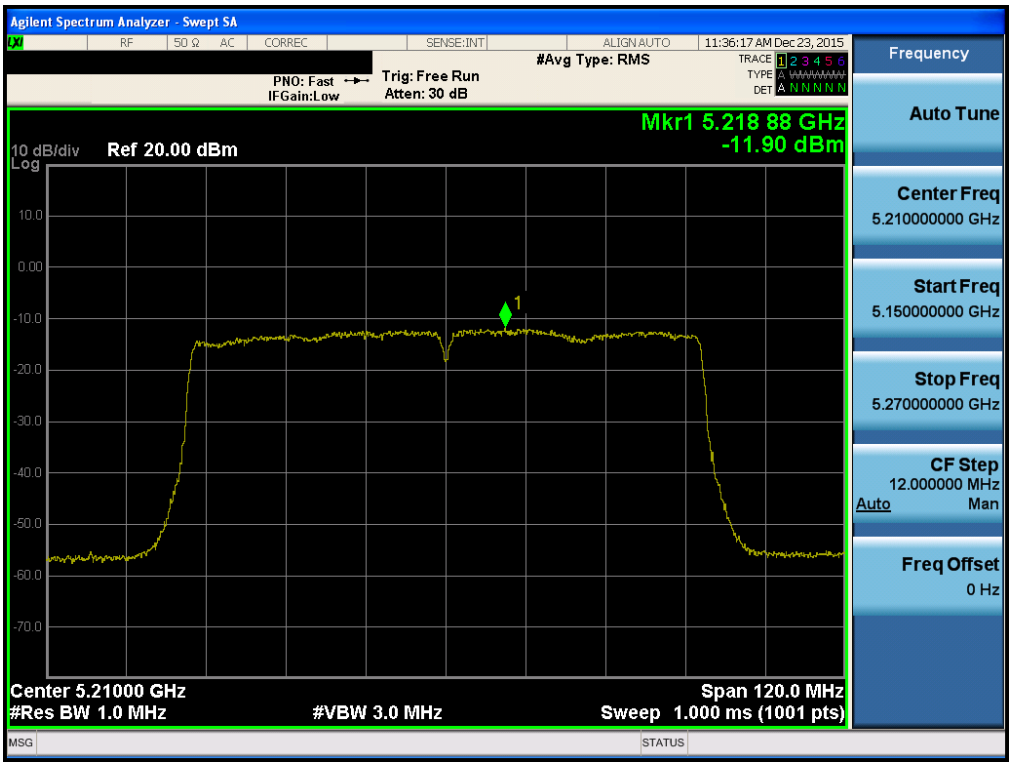

## Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.159



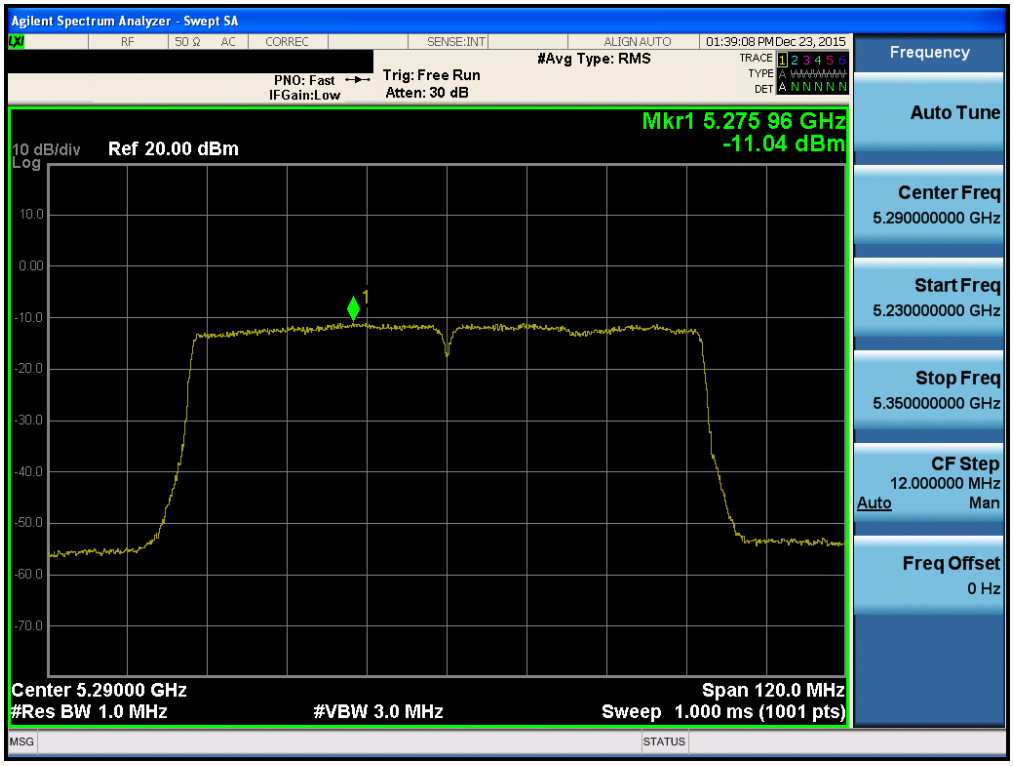
## Maximum Power Spectral Density

Test Mode: 802.11ac VHT80 & Ch.42



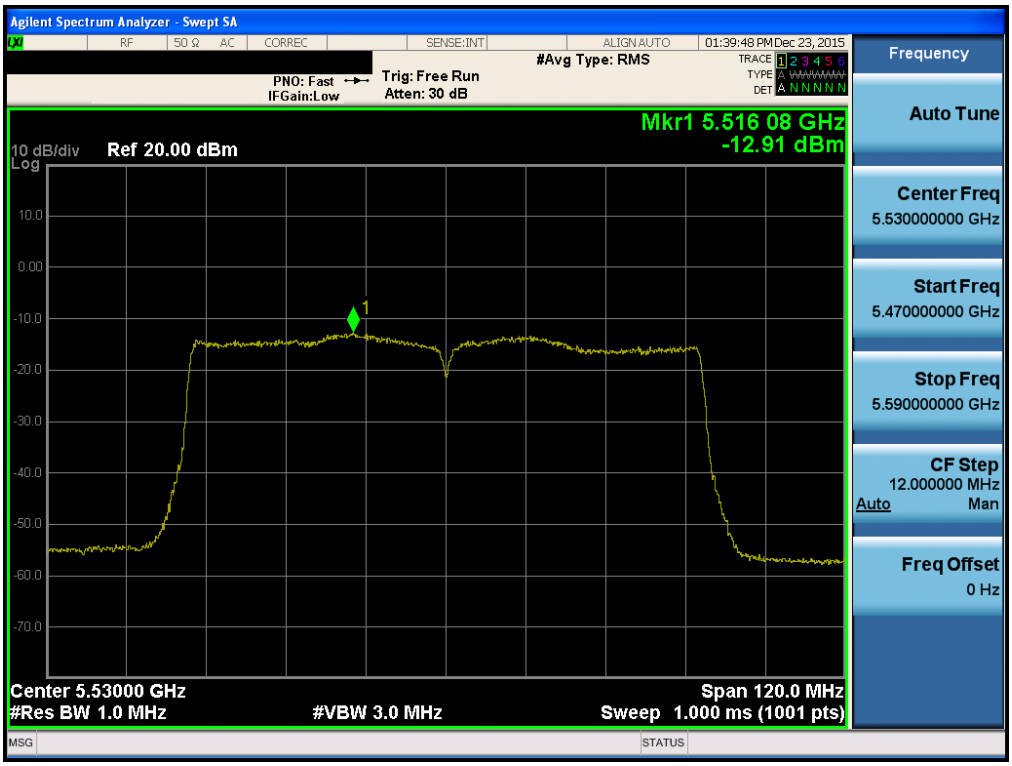

## Maximum Power Spectral Density

Test Mode: 802.11ac VHT80 & Ch.58



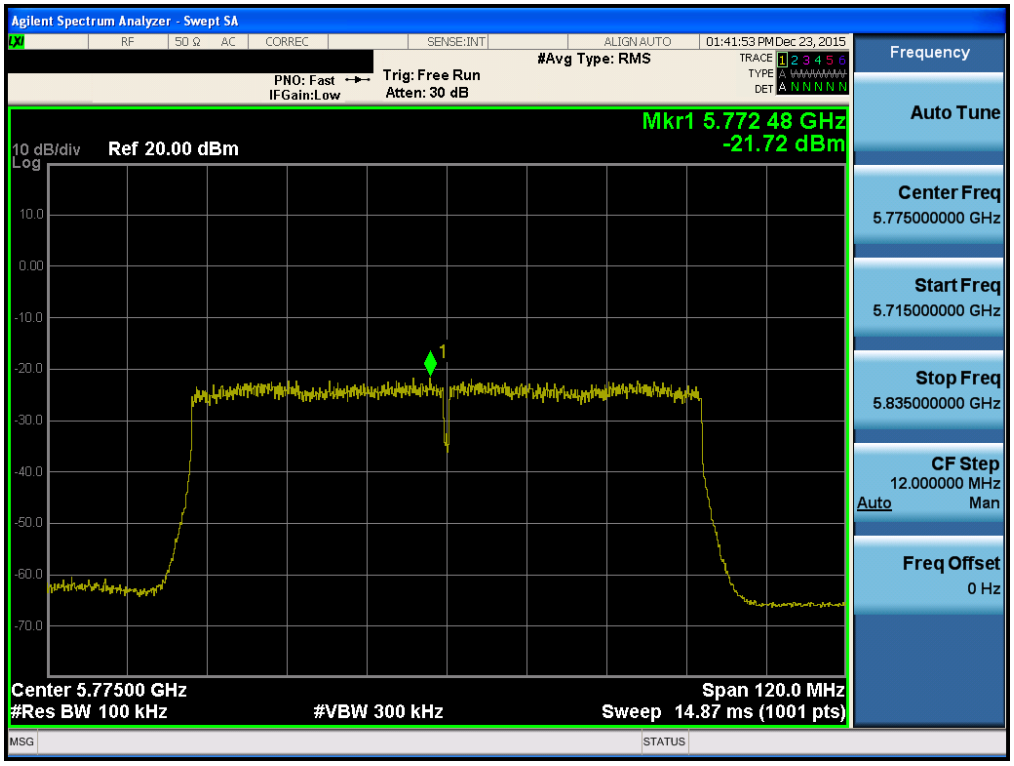
## Maximum Power Spectral Density

Test Mode: 802.11ac VHT80 & Ch.106



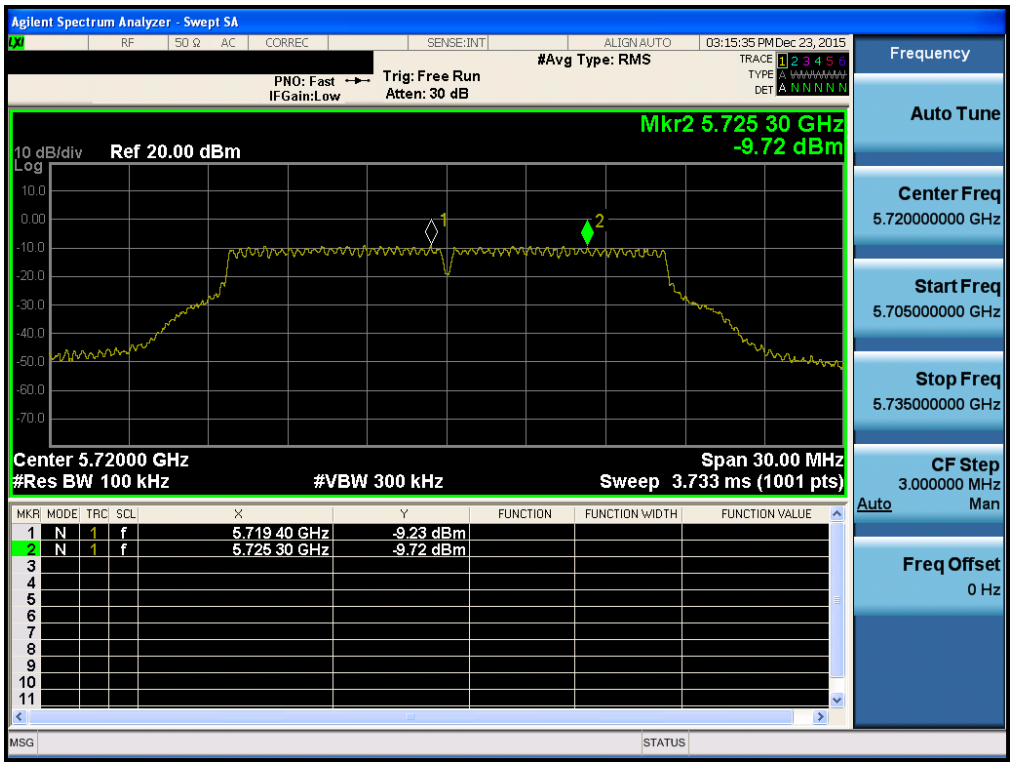

## Maximum Power Spectral Density

Test Mode: 802.11ac VHT80 & Ch.155



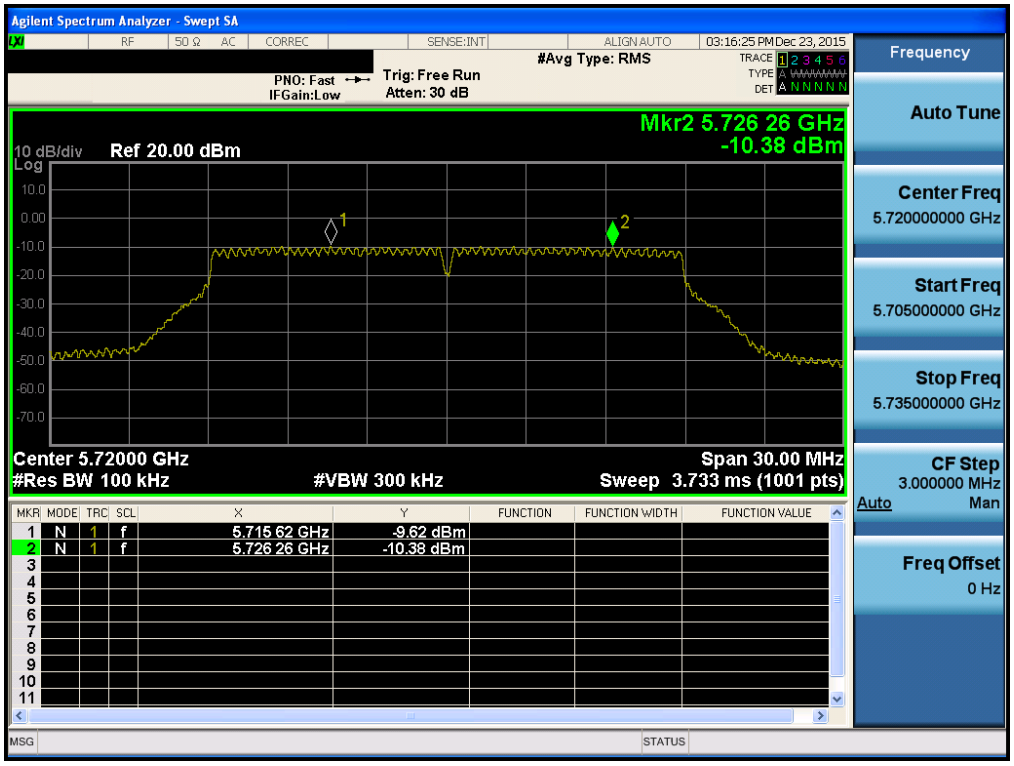
## Maximum Power Spectral Density

Test Mode: 802.11a & Ch.144



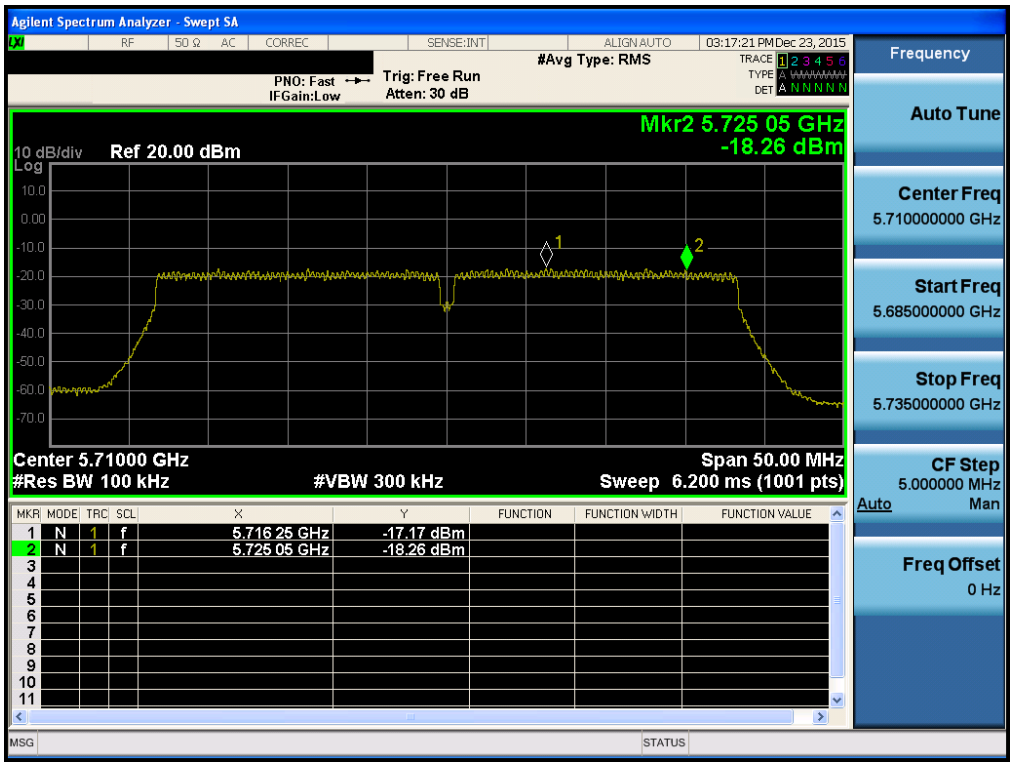

## Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.144



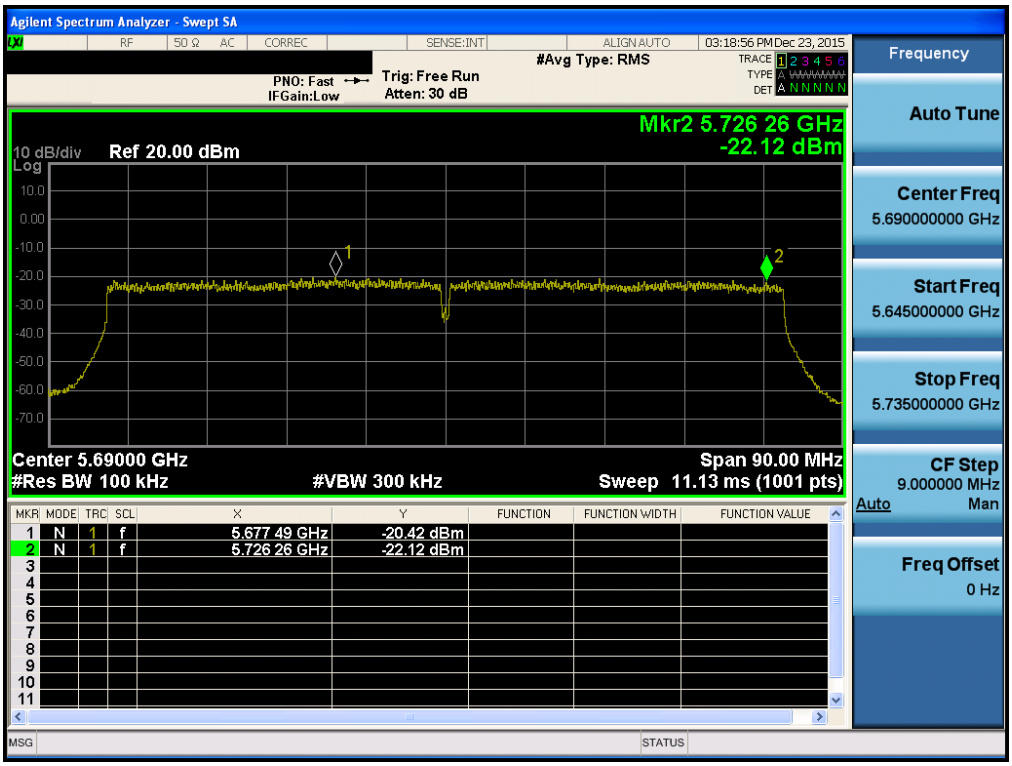
## Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.142



## Maximum Power Spectral Density

Test Mode: 802.11ac VHT80 & Ch.138



## 8.5 Frequency Stability

▣ **Test requirements**

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.

▣ **Test Procedure**

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -20 ℃ and +50 ℃. The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

▣ **Test Result : Comply**

**U-NII-1 & U-NII-2 : (5150 MHz ~ 5350 MHz)**

| 26 dB Bandwidth Reference | |
|---|---|
| **Low edge(MHz)** | **High edge(MHz)** |
| 5169.600000 | 5330.360000 |

| Supply Voltage (V DC) | TEMP (℃) | Operating Frequency | | | | | |
|---|---|---|---|---|---|---|---|
| | | 5180 MHz | | | 5320 MHz | | |
| | | Measured Frequency (Hz) | Deviation (%) | 26dBc low edge Note 1 (Hz) | Measured Frequency (Hz) | Deviation (%) | 26dBc High edge Note 2 (Hz) |
| 14.400 | +25(Ref) | 5,180,025,382 | 0.000490 | 5,169,600,000 | 5,320,026,107 | 0.000491 | 5,330,360,000 |
| | +50 | 5,180,034,666 | 0.000669 | 5,169,609,284 | 5,320,036,460 | 0.000685 | 5,330,370,354 |
| | +40 | 5,180,031,323 | 0.000605 | 5,169,605,941 | 5,320,033,086 | 0.000622 | 5,330,366,980 |
| | +30 | 5,180,028,238 | 0.000545 | 5,169,602,856 | 5,320,029,937 | 0.000563 | 5,330,363,831 |
| | +20 | 5,180,024,629 | 0.000475 | 5,169,599,247 | 5,320,027,864 | 0.000524 | 5,330,361,758 |
| | +10 | 5,180,022,872 | 0.000442 | 5,169,597,491 | 5,320,023,029 | 0.000433 | 5,330,356,922 |
| | 0 | 5,180,018,636 | 0.000360 | 5,169,593,254 | 5,320,020,237 | 0.000380 | 5,330,354,131 |
| | -10 | 5,180,015,176 | 0.000293 | 5,169,589,794 | 5,320,017,726 | 0.000333 | 5,330,351,619 |
| | -20 | 5,180,011,871 | 0.000229 | 5,169,586,489 | 5,320,013,113 | 0.000246 | 5,330,347,006 |
| 12.240 | +25 | 5,180,025,827 | 0.000499 | 5,169,600,445 | 5,320,026,422 | 0.000497 | 5,330,360,315 |
| 16.560 | +25 | 5,180,025,173 | 0.000486 | 5,169,599,791 | 5,320,025,978 | 0.000488 | 5,330,359,872 |

Note 1: **26 dB Bandwidth Reference Low edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **26dBc low edge (Hz)**
Note 2: **26 dB Bandwidth Reference High edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **26dBc High edge (Hz)**

**U-NII-3 : (5470 MHz ~ 5725 MHz)**

| 26 dB Bandwidth Reference | |
|---|---|
| **Low edge** | **High edge** |
| 5489.600000 | 5710.640000 |

| Supply Voltage (V DC) | TEMP (℃) | Operating Frequency | | | | | |
|---|---|---|---|---|---|---|---|
| | | 5500 MHz | | | 5700 MHz | | |
| | | Measured Frequency (Hz) | Deviation (%) | 26dBc low edge Note 1 (Hz) | Measured Frequency (Hz) | Deviation (%) | 26dBc high edge Note 2 (Hz) |
| 14.400 | +25(Ref) | 5,500,027,033 | 0.000492 | 5,489,600,000 | 5,700,027,963 | 0.000491 | 5,710,640,000 |
| | +50 | 5,500,036,985 | 0.000672 | 5,489,609,952 | 5,700,038,722 | 0.000679 | 5,710,650,759 |
| | +40 | 5,500,034,767 | 0.000632 | 5,489,607,734 | 5,700,036,196 | 0.000635 | 5,710,648,234 |
| | +30 | 5,500,029,893 | 0.000544 | 5,489,602,860 | 5,700,030,765 | 0.000540 | 5,710,642,803 |
| | +20 | 5,500,025,178 | 0.000458 | 5,489,598,144 | 5,700,025,886 | 0.000454 | 5,710,637,923 |
| | +10 | 5,500,023,723 | 0.000431 | 5,489,596,690 | 5,700,024,432 | 0.000429 | 5,710,636,470 |
| | 0 | 5,500,020,385 | 0.000371 | 5,489,593,352 | 5,700,021,226 | 0.000372 | 5,710,633,264 |
| | -10 | 5,500,017,672 | 0.000321 | 5,489,590,638 | 5,700,018,432 | 0.000323 | 5,710,630,470 |
| | -20 | 5,500,013,897 | 0.000253 | 5,489,586,863 | 5,700,015,128 | 0.000265 | 5,710,627,166 |
| 12.240 | +25 | 5,500,027,369 | 0.000498 | 5,489,600,336 | 5,700,028,223 | 0.000495 | 5,710,640,260 |
| 16.560 | +25 | 5,500,026,889 | 0.000489 | 5,489,599,856 | 5,700,027,836 | 0.000488 | 5,710,639,873 |

Note 1: **26 dB Bandwidth Reference Low edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **26dBc low edge (Hz)**

Note 2: **26 dB Bandwidth Reference High edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **26dBc High edge (Hz)**

**U-NII-4 : (5725 MHz ~ 5850 MHz)**

| 6 dB Bandwidth Reference Note 1 | |
|---|---|
| **Low edge** | **High edge** |
| 5736.800000 | 5833.280000 |

| Supply Voltage (V DC) | TEMP (℃) | Operating Frequency | | | | | |
|---|---|---|---|---|---|---|---|
| | | 5745 MHz | | | 5825 MHz | | |
| | | Measured Frequency (Hz) | Deviation (%) | 6dBc low edge Note 1 (Hz) | Measured Frequency (Hz) | Deviation (%) | 6dBc high edge Note 2 (Hz) |
| 14.400 | +25(Ref) | 5,745,029,111 | 0.000507 | 5,736,800,000 | 5,825,030,127 | 0.000517 | 5,833,280,000 |
| | +50 | 5,745,038,862 | 0.000676 | 5,736,809,751 | 5,825,040,023 | 0.000687 | 5,833,289,896 |
| | +40 | 5,745,036,378 | 0.000633 | 5,736,807,267 | 5,825,038,287 | 0.000657 | 5,833,288,161 |
| | +30 | 5,745,031,795 | 0.000553 | 5,736,802,684 | 5,825,033,640 | 0.000578 | 5,833,283,513 |
| | +20 | 5,745,027,365 | 0.000476 | 5,736,798,254 | 5,825,029,153 | 0.000500 | 5,833,279,026 |
| | +10 | 5,745,025,923 | 0.000451 | 5,736,796,812 | 5,825,028,090 | 0.000482 | 5,833,277,963 |
| | 0 | 5,745,022,318 | 0.000388 | 5,736,793,206 | 5,825,024,029 | 0.000413 | 5,833,273,902 |
| | -10 | 5,745,018,992 | 0.000331 | 5,736,789,881 | 5,825,021,589 | 0.000371 | 5,833,271,462 |
| | -20 | 5,745,016,129 | 0.000281 | 5,736,787,017 | 5,825,018,769 | 0.000322 | 5,833,268,642 |
| 12.240 | +25 | 5,745,029,201 | 0.000508 | 5,736,800,090 | 5,825,029,930 | 0.000514 | 5,833,279,803 |
| 16.560 | +25 | 5,745,029,033 | 0.000505 | 5,736,799,921 | 5,825,030,301 | 0.000520 | 5,833,280,174 |

Note 1: **6 dB Bandwidth Reference Low edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **6dBc low edge (Hz)**

Note 2: **6 dB Bandwidth Reference High edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **6dBc High edge (Hz)**

## 8.6 Radiated Spurious Emission Measurements

### ▣ Test Procedure

▪ **FCC Part 15.209(a) and (b)**

| Frequency (MHz) | Limit (uV/m) | Measurement Distance (meter) |
|---|---|---|
| 0.009 – 0.490 | 2400/F(KHz) | 300 |
| 0.490 – 1.705 | 24000/F(KHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |
| 30 ~ 88 | 100 ** | 3 |
| 88 ~ 216 | 150 ** | 3 |
| 216 ~ 960 | 200 ** | 3 |
| Above 960 | 500 | 3 |

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 - 72 MHz, 76 – 88 MHz, 174 – 216 MHz or 470 – 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

▪ **FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

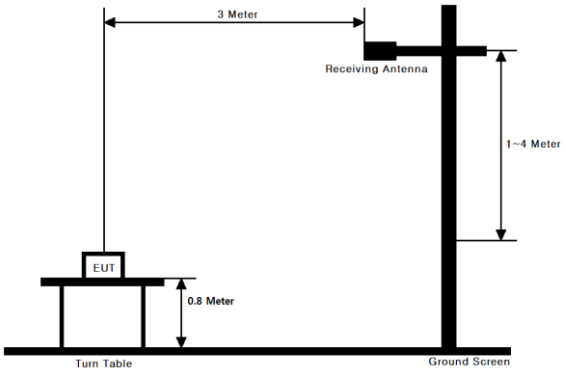
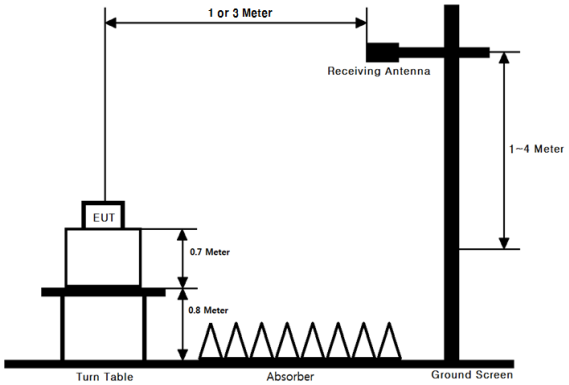
| MHz | MHz | MHz | MHz | GHz | GHz |
|---|---|---|---|---|---|
| 0.009 ~ 0.110 | 8.41425 ~ 8.41475 | 108 ~ 121.94 | 1300 ~ 1427 | 4.5 ~ 5.15 | 14.47 ~ 14.5 |
| 0.495 ~ 0.505 | 12.29 ~ 12.293 | 123 ~ 138 | 1435 ~ 1626.5 | 5.35 ~ 5.46 | 15.35 ~ 16.2 |
| 2.1735 ~ 2.1905 | 12.51975 ~ 12.52025 | 149.9 ~ 150.05 | 1645.5 ~ 1646.5 | 7.25 ~ 7.75 | 17.7 ~ 21.4 |
| 4.125 ~ 4.128 | 12.57675 ~ 12.57725 | 160.52475 ~ | 1660 ~ 1710 | 8.025 ~ 8.5 | 22.01 ~ 23.12 |
| 4.17725 ~ 4.17775 | 13.36 ~ 13.41 | 160.52525 | 1718.8 ~ 1722.2 | 9.0 ~ 9.2 | 23.6 ~ 24.0 |
| 4.20725 ~ 4.20775 | 16.42 ~ 16.423 | 160.7 ~ 160.9 | 2200 ~ 2300 | 9.3 ~ 9.5 | 31.2 ~ 31.8 |
| 6.215 ~ 6.218 | 16.69475 ~ 16.69525 | 162.0125 ~ 167.17 | 2310 ~ 2390 | 10.6 ~ 12.7 | 36.43 ~ 36.5 |
| 6.26775 ~ 6.26825 | 16.80425 ~ 16.80475 | 167.72 ~ 173.2 | 2483.5 ~ 2500 | 13.25 ~ 13.4 | Above 38.6 |
| 6.31175 ~ 6.31225 | 25.5 ~ 25.67 | 240 ~ 285 | 2655 ~ 2900 | | |
| 8.291 ~ 8.294 | 37.5 ~ 38.25 | 322 ~ 335.4 | 3260 ~ 3267 | | |
| 8.362 ~ 8.366 | 73 ~ 74.6 | 399.90 ~ 410 | 3332 ~ 3339 | | |
| 8.37625 ~ 8.38675 | 74.8 ~ 75.2 | 608 ~ 614 | 3345.8 ~ 3358 | | |
| | | 960 ~ 1240 | 3600 ~ 4000 | | |

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

▪ **FCC Part 15.407 (b):** 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 **EIRP of -27 dBm / MHz**.
(2) For transmitters operating in the **5.25 - 5.35 GHz band**: all emissions outside of the **5.15 - 5.35 GHz band** shall not exceed an **EIRP of -27 dBm / MHz**.
(3) For transmitters operating in the **5.47 - 5.725 GHz band**: all emissions outside of the **5.47 - 5.725 GHz band** shall not exceed an **EIRP of -27 dBm / MHz.**
(4) For transmitters operating in the **5.725 - 5.85 GHz band**: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm / MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm / MHz.
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions **below 1 GHz** must comply with the general field strength limits set forth in **Section 15.209**. Further, any U-NII devices using an **AC power line** are required to comply also with the conducted limits set forth in **Section 15.207**.
(7) The provisions of §15.205 apply to intentional radiators operating under this section
(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

## ▣ Test Procedure

| Below 1GHz | Above 1GHz |
|---|---|
|  |  |





## ▣ Test Procedure

1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m.
2. The turn table shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 1 or 3 m away from the receiving antenna, which is varied from 1m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

Radiated spurious emission measured using following Measurement Procedure **of KDB789033 D02 V01**

### ► General Requirements for Unwanted Emissions Measurements

The following requirements apply to all unwanted emissions measurements, both in and outside of the restricted bands:

- EUT Duty Cycle

(1) The EUT shall be configured or modified to **transmit continuously** except as stated in (ii), below. The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (**to no lower than 98 percent**) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

(2) If **continuous transmission (or at least 98 percent duty cycle) cannot be achieved** due to hardware limitations of the EUT (e.g., overheating), the following additions to the measurement and reporting procedures are required:

- The EUT shall be configured to operate at the maximum achievable duty cycle.
- Measure the duty cycle, x, of the transmitter output signal.
- Adjustments to measurement procedures (e.g., increasing test time and number of traces averaged) shall be performed as described in the procedures below.
- The test report shall include the following additional information:
  - The reason for the duty cycle limitation.
  - The duty cycle achieved for testing and the associated transmit duration and interval between transmissions.
  - The sweep time and the amount of time used for trace stabilization during max-hold measurements for peak emission measurements.

(3) **Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.**

### ► Measurements below 1000 MHz

a) Follow the requirements in section II.G.3, “General Requirements for Unwanted Emissions Measurements”.

b) Compliance shall be demonstrated using **CISPR quasi-peak detection**; however, **peak detection** is permitted as an alternative to quasi-peak detection.

► **Measurements Above 1000 MHz (Peak)**

a) Follow the requirements in section II.G.3, “General Requirements for Unwanted Emissions Measurements”.
b) Peak emission levels are measured by setting the analyzer as follows:
(i) **RBW = 1 MHz.**
(ii) **VBW ≥ 3 MHz.**
(iii) **Detector = Peak.**
(iv) Sweep time = Auto.
(v) Trace mode = Max hold.
(vi) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

► **Measurements Above 1000 MHz (Method AD)**

(i) **RBW = 1 MHz.**
(ii) **VBW ≥ 3 MHz.**
(iii) **Detector = RMS**, if span / (# of points in sweep) ≤ RBW / 2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
(iv) Averaging type = power (i.e., RMS)
• As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
(v) Sweep time = Auto.
(vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces shall be averaged.
(vii) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
• **If power averaging (RMS) mode was used in step (iv) above, the correction factor is 10 log(1/x), where x is the duty cycle.**
For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
• If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.
• If a specific emission is demonstrated to be continuous (100 percent duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

## ▣ Measurement Data:

### Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11a & U-NII-1***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 (5180 MHz) | 5149.700 | H | X | PK | 48.25 | 6.93 | N/A | N/A | 55.18 | 74.00 | 18.82 |
| | 5149.700 | H | X | AV | 37.29 | 6.93 | 0.32 | N/A | 44.54 | 54.00 | 9.46 |
| | 10359.250 | H | X | PK | 43.84 | 13.56 | N/A | -9.54 | 47.86 | 68.20 | 20.34 |
| | - | - | - | - | - | - | - | - | - | - | - |
| 40 (5200 MHz) | 10397.450 | H | X | PK | 43.07 | 13.65 | N/A | -9.54 | 47.18 | 68.20 | 21.02 |
| | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - |
| 48 (5240 MHz) | 10481.500 | H | X | PK | 43.87 | 13.83 | N/A | -9.54 | 48.16 | 68.20 | 20.04 |
| | - | - | - | - | - | - | - | - | - | - | - |

### Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11a & U-NII-2A***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 (5260 MHz) | 10518.300 | H | X | PK | 44.51 | 13.90 | N/A | -9.54 | 48.87 | 68.20 | 19.33 |
| | - | - | - | - | - | - | - | - | - | - | - |
| 60 (5300 MHz) | 10600.400 | H | X | PK | 45.00 | 14.01 | N/A | -9.54 | 49.47 | 74.00 | 24.53 |
| | 10600.050 | H | X | AV | 35.12 | 14.01 | 0.32 | -9.54 | 39.91 | 54.00 | 14.09 |
| | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - |
| 64 (5320 MHz) | 5350.700 | H | X | PK | 50.82 | 7.18 | N/A | N/A | 58.00 | 74.00 | 16.00 |
| | 5351.300 | H | X | AV | 40.07 | 7.18 | 0.32 | N/A | 47.57 | 54.00 | 6.43 |
| | 10641.000 | H | X | PK | 45.93 | 14.06 | N/A | -9.54 | 50.45 | 74.00 | 23.55 |
| | 10641.850 | H | X | AV | 34.10 | 14.06 | 0.32 | -9.54 | 38.94 | 54.00 | 15.06 |

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

### Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11a & U-NII-2C***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 (5500 MHz) | 5467.400 | H | X | PK | 46.90 | 7.40 | N/A | N/A | 54.30 | 68.20 | 13.90 |
| | 11000.900 | H | X | PK | 45.95 | 14.53 | N/A | -9.54 | 50.94 | 74.00 | 23.06 |
| | 10999.950 | H | X | AV | 34.98 | 14.53 | 0.32 | -9.54 | 40.29 | 54.00 | 13.71 |
| 116 (5580 MHz) | 11161.400 | H | X | PK | 47.24 | 14.72 | N/A | -9.54 | 52.42 | 74.00 | 21.58 |
| | 11160.800 | H | X | AV | 36.78 | 14.72 | 0.32 | -9.54 | 42.28 | 54.00 | 11.72 |
| 140 (5700 MHz) | 5727.700 | H | X | PK | 49.13 | 8.47 | N/A | N/A | 57.60 | 68.20 | 10.60 |
| | 11400.300 | H | X | PK | 44.96 | 14.99 | N/A | -9.54 | 50.41 | 74.00 | 23.59 |
| | 11399.850 | H | X | AV | 34.51 | 14.99 | 0.32 | -9.54 | 40.28 | 54.00 | 13.72 |

### Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11a & U-NII-3***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 149 (5745 MHz) | 5724.800 | H | X | PK | 56.54 | 8.41 | N/A | N/A | 64.95 | 78.20 | 13.25 |
| | 5712.600 | H | X | PK | 46.70 | 8.41 | N/A | N/A | 55.11 | 68.20 | 13.09 |
| | 11490.350 | H | X | PK | 43.48 | 15.10 | N/A | -9.54 | 49.04 | 74.00 | 24.96 |
| | 11490.900 | H | X | AV | 33.41 | 15.10 | 0.32 | -9.54 | 39.29 | 54.00 | 14.71 |
| 157 (5785 MHz) | 11568.250 | H | X | PK | 43.58 | 15.17 | N/A | -9.54 | 49.21 | 74.00 | 24.79 |
| | 11568.750 | H | X | AV | 32.63 | 15.17 | 0.32 | -9.54 | 38.58 | 54.00 | 15.42 |
| 165 (5825 MHz) | 5853.700 | H | X | PK | 50.87 | 8.33 | N/A | N/A | 59.20 | 78.20 | 19.00 |
| | 5863.000 | H | X | PK | 50.08 | 8.33 | N/A | N/A | 58.41 | 68.20 | 9.79 |
| | 11649.420 | H | X | PK | 42.47 | 15.23 | N/A | -9.54 | 48.16 | 74.00 | 25.84 |
| | 11650.030 | H | X | AV | 31.78 | 15.23 | 0.32 | -9.54 | 37.79 | 54.00 | 16.21 |

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

### Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11n(HT20) & U-NII-1***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 (5180 MHz) | 5149.500 | H | X | PK | 48.29 | 6.93 | N/A | N/A | 55.22 | 74.00 | 18.78 |
| | 5148.900 | H | X | AV | 37.85 | 6.93 | 0.37 | N/A | 45.15 | 54.00 | 8.85 |
| | 10362.050 | H | X | PK | 43.90 | 13.56 | N/A | -9.54 | 47.92 | 68.20 | 20.28 |
| | - | - | - | - | - | - | - | - | - | - | - |
| 40 (5200 MHz) | 10400.750 | H | X | PK | 43.40 | 13.65 | N/A | -9.54 | 47.51 | 68.20 | 20.69 |
| | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - |
| 48 (5240 MHz) | 10479.800 | H | X | PK | 44.56 | 13.83 | N/A | -9.54 | 48.85 | 68.20 | 19.35 |
| | - | - | - | - | - | - | - | - | - | - | - |

### Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11 n(HT20) & U-NII-2A***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 (5260 MHz) | 10523.350 | H | X | PK | 44.49 | 13.90 | N/A | -9.54 | 48.85 | 68.20 | 19.35 |
| | - | - | - | - | - | - | - | - | - | - | - |
| 60 (5300 MHz) | 10598.900 | H | X | PK | 44.83 | 14.01 | N/A | -9.54 | 49.30 | 74.00 | 24.70 |
| | 10599.050 | H | X | AV | 34.59 | 14.01 | 0.37 | -9.54 | 39.43 | 54.00 | 14.57 |
| | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - |
| 64 (5320 MHz) | 5351.100 | H | X | PK | 50.41 | 7.18 | N/A | N/A | 57.59 | 74.00 | 16.41 |
| | 5350.400 | H | X | AV | 39.88 | 7.18 | 0.37 | N/A | 47.43 | 54.00 | 6.57 |
| | 10639.450 | H | X | PK | 44.70 | 14.06 | N/A | -9.54 | 49.22 | 74.00 | 24.78 |
| | 10639.650 | H | X | AV | 34.27 | 14.06 | 0.37 | -9.54 | 39.16 | 54.00 | 14.84 |

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

### Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11n(HT20) & U-NII-2C***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 (5500 MHz) | 5464.000 | H | X | PK | 45.38 | 7.40 | N/A | N/A | 52.78 | 68.20 | 15.42 |
| | 11000.800 | H | X | PK | 44.90 | 14.53 | N/A | -9.54 | 49.89 | 74.00 | 24.11 |
| | 11000.050 | H | X | AV | 34.32 | 14.53 | 0.37 | -9.54 | 39.68 | 54.00 | 14.32 |
| 116 (5580 MHz) | 11161.050 | H | X | PK | 46.44 | 14.72 | N/A | -9.54 | 51.62 | 74.00 | 22.38 |
| | 11161.350 | H | X | AV | 36.29 | 14.72 | 0.37 | -9.54 | 41.84 | 54.00 | 12.16 |
| 140 (5700 MHz) | 5725.400 | H | X | PK | 50.68 | 8.47 | N/A | N/A | 59.15 | 68.20 | 9.05 |
| | 11399.300 | H | X | PK | 44.95 | 14.99 | N/A | -9.54 | 50.40 | 74.00 | 23.60 |
| | 11398.900 | H | X | AV | 34.17 | 14.99 | 0.37 | -9.54 | 39.99 | 54.00 | 14.01 |

### Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11n(HT20) & U-NII-3***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 149 (5745 MHz) | 5724.800 | H | X | PK | 57.12 | 8.41 | N/A | N/A | 65.53 | 78.20 | 12.67 |
| | 5713.300 | H | X | PK | 47.28 | 8.41 | N/A | N/A | 55.69 | 68.20 | 12.51 |
| | 11490.150 | H | X | PK | 43.96 | 15.10 | N/A | -9.54 | 49.52 | 74.00 | 24.48 |
| | 11490.850 | H | X | AV | 33.33 | 15.10 | 0.37 | -9.54 | 39.26 | 54.00 | 14.74 |
| 157 (5785 MHz) | 11571.800 | H | X | PK | 43.45 | 15.17 | N/A | -9.54 | 49.08 | 74.00 | 24.92 |
| | 11572.800 | H | X | AV | 32.59 | 15.17 | 0.37 | -9.54 | 38.59 | 54.00 | 15.41 |
| 165 (5825 MHz) | 5852.700 | H | X | PK | 50.16 | 8.33 | N/A | N/A | 58.49 | 78.20 | 19.71 |
| | 5864.200 | H | X | PK | 49.92 | 8.33 | N/A | N/A | 58.25 | 68.20 | 9.95 |
| | 11651.060 | H | X | PK | 42.97 | 15.23 | N/A | -9.54 | 48.66 | 74.00 | 25.34 |
| | 11651.330 | H | X | AV | 32.20 | 15.23 | 0.37 | -9.54 | 38.26 | 54.00 | 15.74 |

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT40) & U-NII-1***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 38 (5190 MHz) | 5146.400 | H | X | PK | 45.91 | 6.93 | N/A | N/A | 52.84 | 74.00 | 21.16 |
| | 5146.550 | H | X | AV | 35.40 | 6.93 | 0.66 | N/A | 42.99 | 54.00 | 11.01 |
| | 10382.850 | H | X | PK | 43.10 | 13.60 | N/A | -9.54 | 47.16 | 68.20 | 21.04 |
| | - | - | - | - | - | - | - | - | - | - | - |
| 46 (5230 MHz) | 10459.950 | H | X | PK | 43.05 | 13.78 | N/A | -9.54 | 47.29 | 68.20 | 20.91 |
| | - | - | - | - | - | - | - | - | - | - | - |

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11 n(HT40) & U-NII-2A***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 54 (5270 MHz) | 10540.220 | H | X | PK | 42.66 | 13.93 | N/A | -9.54 | 47.05 | 68.20 | 21.15 |
| | - | - | - | - | - | - | - | - | - | - | - |
| 62 (5310 MHz) | 5351.200 | H | X | PK | 53.09 | 7.18 | N/A | N/A | 60.27 | 74.00 | 13.73 |
| | 5351.275 | H | X | AV | 41.44 | 7.18 | 0.66 | N/A | 49.28 | 54.00 | 4.72 |
| | 10619.570 | H | X | PK | 42.46 | 14.03 | N/A | -9.54 | 46.95 | 74.00 | 27.05 |
| | 10619.740 | H | X | AV | 31.82 | 14.03 | 0.66 | -9.54 | 36.97 | 54.00 | 17.03 |

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT40) & U-NII-2C***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 102 (5510 MHz) | 5466.250 | H | X | PK | 49.57 | 7.40 | N/A | N/A | 56.97 | 68.20 | 11.23 |
| | 11019.850 | H | X | PK | 42.95 | 14.55 | N/A | -9.54 | 47.96 | 74.00 | 26.04 |
| | 11020.170 | H | X | AV | 32.18 | 14.55 | 0.66 | -9.54 | 37.85 | 54.00 | 16.15 |
| 110 (5550 MHz) | 11100.720 | H | X | PK | 43.04 | 14.65 | N/A | -9.54 | 48.15 | 74.00 | 25.85 |
| | 11100.650 | H | X | AV | 31.76 | 14.65 | 0.66 | -9.54 | 37.53 | 54.00 | 16.47 |
| 134 (5670 MHz) | 5731.300 | H | X | PK | 45.70 | 8.47 | N/A | N/A | 54.17 | 68.20 | 14.03 |
| | 11340.450 | H | X | PK | 41.44 | 14.92 | N/A | -9.54 | 46.82 | 74.00 | 27.18 |
| | 11341.010 | H | X | AV | 31.13 | 14.92 | 0.66 | -9.54 | 37.17 | 54.00 | 16.83 |

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT40) & U-NII-3***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 151 (5755 MHz) | 5724.700 | H | X | PK | 52.06 | 8.41 | N/A | N/A | 60.47 | 78.20 | 17.73 |
| | 5712.000 | H | X | PK | 49.28 | 8.41 | N/A | N/A | 57.69 | 68.20 | 10.51 |
| | 11509.600 | H | X | PK | 43.01 | 15.12 | N/A | -9.54 | 48.59 | 74.00 | 25.41 |
| | 11509.730 | H | X | AV | 32.77 | 15.12 | 0.66 | -9.54 | 39.01 | 54.00 | 14.99 |
| 159 (5795 MHz) | 5854.200 | H | X | PK | 46.36 | 8.33 | N/A | N/A | 54.69 | 78.20 | 23.51 |
| | 5868.400 | H | X | PK | 45.93 | 8.33 | N/A | N/A | 54.26 | 68.20 | 13.94 |
| | 11589.550 | H | X | PK | 43.37 | 15.18 | N/A | -9.54 | 49.01 | 74.00 | 24.99 |
| | 11589.050 | H | X | AV | 32.29 | 15.18 | 0.66 | -9.54 | 38.59 | 54.00 | 15.41 |

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11ac(VHT80) & U-NII-1***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 (5210 MHz) | 5141.800 | H | X | PK | 45.27 | 6.93 | N/A | N/A | 52.20 | 74.00 | 21.80 |
| | 5142.600 | H | X | AV | 34.74 | 6.93 | 1.20 | N/A | 42.87 | 54.00 | 11.13 |
| | 10419.380 | H | X | PK | 43.22 | 13.69 | N/A | -9.54 | 47.37 | 68.20 | 20.83 |
| | - | - | - | - | - | - | - | - | - | - | - |

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11ac(VHT80) & U-NII-2A***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 58 (5290 MHz) | 5383.000 | H | X | PK | 50.58 | 7.18 | N/A | N/A | 57.76 | 74.00 | 16.24 |
| | 5384.000 | H | X | AV | 38.42 | 7.18 | 1.20 | N/A | 46.80 | 54.00 | 7.20 |
| | 10579.270 | H | X | PK | 42.59 | 13.98 | N/A | -9.54 | 47.03 | 68.20 | 21.17 |
| | - | - | - | - | - | - | - | - | - | - | - |

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11ac(VHT80) & U-NII-2C***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 106 (5530 MHz) | 5461.800 | H | X | PK | 50.74 | 7.40 | N/A | N/A | 58.14 | 68.20 | 10.06 |
| | 11060.450 | H | X | PK | 42.70 | 14.60 | N/A | -9.54 | 47.76 | 74.00 | 26.24 |
| | 11059.740 | H | X | AV | 31.76 | 14.60 | 1.20 | -9.54 | 38.02 | 54.00 | 15.98 |

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11ac(VHT80) & U-NII-3***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 155 (5775 MHz) | 5721.200 | H | X | PK | 48.61 | 8.41 | N/A | N/A | 57.02 | 78.20 | 21.18 |
| | 5712.800 | H | X | PK | 46.95 | 8.41 | N/A | N/A | 55.36 | 68.20 | 12.84 |
| | 11549.380 | H | X | PK | 43.19 | 15.15 | N/A | -9.54 | 48.80 | 74.00 | 25.20 |
| | 11549.520 | H | X | AV | 32.55 | 15.15 | 1.20 | -9.54 | 39.36 | 54.00 | 14.64 |
| | 5852.000 | H | X | PK | 51.58 | 8.33 | N/A | N/A | 59.91 | 78.20 | 18.29 |
| | 5868.990 | H | X | PK | 51.62 | 8.33 | N/A | N/A | 59.95 | 68.20 | 8.25 |

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11a & Cross***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 144 (5720 MHz) | 11437.950 | H | X | PK | 44.34 | 15.04 | N/A | -9.54 | 49.84 | 74.00 | 24.16 |
| | 11437.600 | H | X | AV | 34.25 | 15.04 | 0.32 | -9.54 | 40.07 | 54.00 | 13.93 |
| | - | - | - | - | - | - | - | - | - | - | - |

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT20) & Cross***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 144 (5720 MHz) | 11439.600 | H | X | PK | 45.56 | 15.04 | N/A | -9.54 | 51.06 | 74.00 | 22.94 |
| | 11439.300 | H | X | AV | 34.48 | 15.04 | 0.37 | -9.54 | 40.35 | 54.00 | 13.65 |
| | - | - | - | - | - | - | - | - | - | - | - |

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT40) & Cross***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 142 (5710 MHz) | 11421.540 | H | X | PK | 43.99 | 15.02 | N/A | -9.54 | 49.47 | 74.00 | 24.53 |
| | 11422.010 | H | X | AV | 32.65 | 15.02 | 0.66 | -9.54 | 38.79 | 54.00 | 15.21 |
| | - | - | - | - | - | - | - | - | - | - | - |

**Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11ac(VHT80) & Cross***

| Tested Channel | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 138 (5690 MHz) | 11380.070 | H | X | PK | 42.75 | 14.97 | N/A | -9.54 | 48.18 | 74.00 | 25.82 |
| | 11380.300 | H | X | AV | 31.36 | 14.97 | 1.20 | -9.54 | 37.99 | 54.00 | 16.01 |
| | - | - | - | - | - | - | - | - | - | - | - |

**Note.**

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

## 8.7 AC Conducted Emissions

▣ **TEST PROCEDURE:**

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. Emissions closest to the limit are measured in the quasi-peak mode (QP) and average mode (AV) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

▣ **Measurement Data: N/A**

▣ **Minimum Standard: FCC Part 15.207(a)**

| Frequency Range (MHz) | Conducted Limit (dBuV) | |
|---|---|---|
| | Quasi-Peak | Average |
| 0.15 ~ 0.5 | 66 to 56 * | 56 to 46 * |
| 0.5 ~ 5 | 56 | 46 |
| 5 ~ 30 | 60 | 50 |

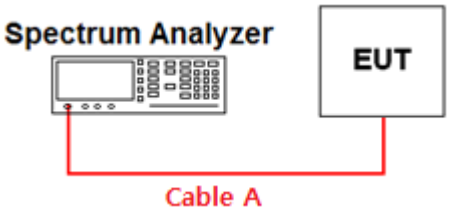
* Decreases with the logarithm of the frequency

## 8.8 Occupied Bandwidth

▣ **Test Requirements**

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured

▣ **Test Configuration**




▣ **Test Procedure :**

**- Procedure: RSS-Gen[6.6]**

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

▣ **Test Result : Comply**

| Mode | Bands | Channel | Frequency [MHz] | Test Result [MHz] |
|---|---|---|---|---|
| 802.11a | U-NII 1 | 36 | 5180 | 17.041 |
| | | 40 | 5200 | 17.035 |
| | | 48 | 5240 | 17.022 |
| | U-NII 2A | 52 | 5260 | 17.018 |
| | | 60 | 5300 | 17.056 |
| | | 64 | 5320 | 16.975 |
| | U-NII 2C | 100 | 5500 | 17.076 |
| | | 116 | 5580 | 17.169 |
| | | 140 | 5700 | 17.074 |
| | U-NII 3 | 149 | 5745 | 16.943 |
| | | 157 | 5785 | 17.165 |
| | | 165 | 5825 | 16.998 |
| 802.11n HT20 | U-NII 1 | 36 | 5180 | 18.061 |
| | | 40 | 5200 | 17.060 |
| | | 48 | 5240 | 18.083 |
| | U-NII 2A | 52 | 5260 | 18.092 |
| | | 60 | 5300 | 18.033 |
| | | 64 | 5320 | 18.062 |
| | U-NII 2C | 100 | 5500 | 18.088 |
| | | 116 | 5580 | 18.123 |
| | | 140 | 5700 | 18.085 |
| | U-NII 3 | 149 | 5745 | 18.063 |
| | | 157 | 5785 | 18.212 |
| | | 165 | 5825 | 17.998 |
| 802.11n HT40 | U-NII 1 | 38 | 5190 | 36.278 |
| | | 46 | 5230 | 36.448 |
| | U-NII 2A | 54 | 5270 | 36.429 |
| | | 62 | 5310 | 36.424 |
| | U-NII 2C | 102 | 5510 | 36.360 |
| | | 110 | 5550 | 36.400 |
| | | 134 | 5670 | 36.356 |
| | U-NII 3 | 151 | 5755 | 36.460 |
| | | 159 | 5795 | 36.433 |
| 802.11ac VHT80 | U-NII 1 | 42 | 5210 | 75.844 |
| | U-NII 2A | 58 | 5290 | 75.840 |
| | U-NII 2C | 106 | 5530 | 76.077 |
| | U-NII 3 | 155 | 5775 | 75.698 |
| 802.11a | Cross Band | 144 | 5720 | 17.043 |
| 802.11n(HT20) | Cross Band | 144 | 5720 | 18.014 |
| 802.11n(HT40) | Cross Band | 142 | 5710 | 36.403 |
| 802.11ac VHT80 | Cross Band | 138 | 5690 | 75.952 |