

**FCC 47 CFR PART 15 SUBPART E****TEST REPORT****For****Wearable Camera****Model: Narrative Clip 2****Trade Name: Narrative***Issued to***Narrative AB  
Agatan 55A, 582 22 Linköping, Sweden***Issued by***Compliance Certification Services Inc.  
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Issued Date: March 28, 2016**

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**Revision History**

| Rev. |  | Issue Date     |  | Revisions                                                        | Effect Page      | Revised By |
|------|--|----------------|--|------------------------------------------------------------------|------------------|------------|
| 00   |  | March 28, 2016 |  | Initial Issue                                                    | ALL              | Becca Chen |
| 01   |  | May 9, 2016    |  | 1. Modify Band Edges data.                                       | P25 ~ P40        | Becca Chen |
| 02   |  | May 27, 2016   |  | 1. Added note.<br>2. Modify test Configuration & test procedure. | P25 ~ P40<br>P21 | Becca Chen |

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## 1. TEST RESULT CERTIFICATION

**Applicant:** Narrative AB  
Agatan 55A, 582 22 Linköping, Sweden

**Equipment Under Test:** Wearable Camera

**Model Number:** Narrative Clip 2

**Trade Name:** Narrative

**Date of Test:** February 26 ~ March 25, 2016

| APPLICABLE STANDARDS         |                         |
|------------------------------|-------------------------|
| STANDARD                     | TEST RESULT             |
| FCC 47 CFR Part 15 Subpart E | No non-compliance noted |

### We hereby certify that:

Compliance Certification Services Inc. tested the above equipment. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407 and Industry Canada RSS-247 Issue 1.

The test results of this report relate only to the tested sample identified in this report.

*Approved by:*

*Reviewed by:*



\_\_\_\_\_  
Miller Lee  
Manager  
Compliance Certification Services Inc.



\_\_\_\_\_  
Angel Cheng  
Section Manager  
Compliance Certification Services Inc.

## 2. EUT DESCRIPTION

|                                                |                                                                                                    |                        |                       |                    |                  |
|------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------|-----------------------|--------------------|------------------|
| Product                                        | Wearable Camera                                                                                    |                        |                       |                    |                  |
| Model Number                                   | Narrative Clip 2                                                                                   |                        |                       |                    |                  |
| Trade Name                                     | Narrative                                                                                          |                        |                       |                    |                  |
| Model Discrepancy                              | N/A                                                                                                |                        |                       |                    |                  |
| Received Date                                  | February 26, 2016                                                                                  |                        |                       |                    |                  |
| EUT Power Rating                               | 1. Power from host device via USB Cable<br>2. Power from Li-ion BATTERY:<br>Rating: 315mAh, 1.20Wh |                        |                       |                    |                  |
| Operating Frequency Range & Number of Channels |                                                                                                    | Mode                   | Frequency Range (MHz) | Number of Channels |                  |
|                                                | UNII Band I                                                                                        | IEEE 802.11a           | 5180 ~ 5240           | 4 Channels         |                  |
|                                                |                                                                                                    | IEEE 802.11n HT 20 MHz | 5180 ~ 5240           | 4 Channels         |                  |
|                                                |                                                                                                    | IEEE 802.11n HT 40 MHz | 5190 ~ 5230           | 2 Channels         |                  |
| Transmit Power                                 |                                                                                                    | Mode                   | Frequency Range (MHz) | Output Power (dBm) | Output Power (w) |
|                                                | UNII Band I                                                                                        | IEEE 802.11a           | 5180 ~ 5240           | 13.07              | 0.0203           |
|                                                |                                                                                                    | IEEE 802.11n HT 20 MHz | 5180 ~ 5240           | 11.94              | 0.0156           |
|                                                |                                                                                                    | IEEE 802.11n HT 40 MHz | 5190 ~ 5230           | 12.14              | 0.0164           |
| Modulation Technique                           | OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)                                                            |                        |                       |                    |                  |
| Antenna Specification                          | PCB Antenna / 2.9 dBi                                                                              |                        |                       |                    |                  |

**Remark:** The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

### **3. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR 47 Part 15.207, 15.209, 15.407, KDB 644545 D03 v01 and KDB 789033 D02 v01r01 General UNII Test Procedures New Rules v01.

#### **3.1 EUT CONFIGURATION**

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

#### **3.2 EUT EXERCISE**

The EUT is operated in the engineering mode to fix the Tx frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

#### **3.3 GENERAL TEST PROCEDURES**

##### **Conducted Emissions**

According to the requirements in ANSI C63.10: 2013, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Quasi-Peak detector mode.

##### **Radiated Emissions**

The EUT is placed on the turntable, which is 1.5 m above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in ANSI C63.10: 2013.

### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz                        | MHz                 | MHz             | GHz              |
|----------------------------|---------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423      | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614       | 5.35 - 5.46      |
| 2.1735 - 2.1905            | 16.80425 - 16.80475 | 960 - 1240      | 7.25 - 7.75      |
| 4.125 - 4.128              | 25.5 - 25.67        | 1300 - 1427     | 8.025 - 8.5      |
| 4.17725 - 4.17775          | 37.5 - 38.25        | 1435 - 1626.5   | 9.0 - 9.2        |
| 4.20725 - 4.20775          | 73 - 74.6           | 1645.5 - 1646.5 | 9.3 - 9.5        |
| 6.215 - 6.218              | 74.8 - 75.2         | 1660 - 1710     | 10.6 - 12.7      |
| 6.26775 - 6.26825          | 108 - 121.94        | 1718.8 - 1722.2 | 13.25 - 13.4     |
| 6.31175 - 6.31225          | 123 - 138           | 2200 - 2300     | 14.47 - 14.5     |
| 8.291 - 8.294              | 149.9 - 150.05      | 2310 - 2390     | 15.35 - 16.2     |
| 8.362 - 8.366              | 156.52475 -         | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.52525           | 2655 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 156.7 - 156.9       | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 162.0125 - 167.17   | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 167.72 - 173.2      | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 240 - 285           | 3600 - 4400     | ( <sup>2</sup> ) |
| 13.36 - 13.41              | 322 - 335.4         |                 |                  |

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

### 3.5 DESCRIPTION OF TEST MODES

The EUT (model: Narrative Clip 2) had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

#### **UNII Band I:**

##### **IEEE 802.11a for 5180 ~ 5240MHz:**

Channel Low (5180MHz), Channel Mid (5220MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for full testing.

##### **IEEE 802.11n HT 20 MHz for 5180 ~ 5240MHz:**

Channel Low (5180MHz), Channel Mid (5220MHz) and Channel High (5240MHz) with 6.5Mbps data rate were chosen for full testing.

##### **IEEE 802.11n HT 40 MHz Channel for 5190 ~ 5230MHz:**

Channel Low (5190MHz) and Channel High (5230MHz) with 13.5Mbps data rate were chosen for full testing.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (X axis) and the worst case was recorded.

## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

**Remark:** Each piece of equipment is scheduled for calibration once a year and Loop Antenna is scheduled for calibration once three years.

| Conducted Emissions Test Site |               |           |               |                 |
|-------------------------------|---------------|-----------|---------------|-----------------|
| Name of Equipment             | Manufacturer  | Model     | Serial Number | Calibration Due |
| Spectrum Analyzer             | Agilent       | E4446A    | US42510252    | 12/07/2016      |
| Thermostatic/Humidity Chamber | TAICHY        | MHG-150LF | 930619        | 10/07/2016      |
| AC Power Source               | EXTECH        | 6205      | 1140845       | N.C.R           |
| DC Power Supply               | ABM           | 8301HD    | D011531       | N.C.R           |
| Power Meter                   | Anritsu       | ML2495A   | 1012009       | 07/07/2016      |
| Power Sensor                  | Anritsu       | MA2411A   | 0917072       | 07/07/2016      |
| Spectrum Analyzer             | ROHDE&SCHWARZ | FSV40     | 101073        | 07/19/2016      |

| Wugu 966 Chamber A |                    |                     |               |                 |
|--------------------|--------------------|---------------------|---------------|-----------------|
| Name of Equipment  | Manufacturer       | Model               | Serial Number | Calibration Due |
| Spectrum Analyzer  | Agilent            | E4446A              | US42510268    | 02/14/2017      |
| EMI Test Receiver  | R&S                | ESCI                | 100064        | 06/03/2016      |
| Bilog Antenna      | Sunol Sciences     | JB3                 | A030105       | 08/05/2016      |
| Horn Antenna       | EMCO               | 3117                | 00055165      | 02/23/2017      |
| Horn Antenna       | EMCO               | 3116                | 26370         | 01/14/2017      |
| Turn Table         | CCS                | CC-T-1F             | N/A           | N.C.R           |
| Antenna Tower      | CCS                | CC-A-1F             | N/A           | N.C.R           |
| Controller         | CCS                | CC-C-1F             | N/A           | N.C.R           |
| Pre-Amplifier      | MITEQ              | 1652-3000           | 1490939       | 08/09/2016      |
| Pre-Amplifier      | EMC                | EMC 012635          | 980151        | 06/04/2016      |
| Pre-Amplifier      | MITEQ              | AMF-6F-260400-40-8P | 985646        | 01/13/2017      |
| Coaxial Cable      | Huber+Suhner       | 102                 | 29212/2       | 01/11/2017      |
| Coaxial Cable      | Huber+Suhner       | 102                 | 29406/2       | 01/11/2017      |
| Test S/W           | EZ-EMC (CCS-3A1RE) |                     |               |                 |

| Conducted Emission room #B |              |           |               |                 |
|----------------------------|--------------|-----------|---------------|-----------------|
| Name of Equipment          | Manufacturer | Model     | Serial Number | Calibration Due |
| EMI Test Receiver          | R&S          | ESCI      | 101073        | 09/08/2016      |
| LISN                       | R&S          | ENV216    | 101054        | 06/06/2016      |
| LISN                       | SCHWARZBECK  | NSLK 8127 | 8127-541      | 11/22/2016      |
| Capacitive Voltage Probe   | FCC          | F-CVP-1   | 100185        | 03/08/2017      |
| Test S/W                   | CCS-3A1-CE   |           |               |                 |

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R. = No Calibration Request.

### 4.3 MEASUREMENT UNCERTAINTY

| PARAMETER                             | UNCERTAINTY |
|---------------------------------------|-------------|
| Powerline Conducted Emission          | +/- 1.2575  |
| 3M Semi Anechoic Chamber / 30M~200M   | +/- 4.0138  |
| 3M Semi Anechoic Chamber / 200M~1000M | +/- 3.9483  |
| 3M Semi Anechoic Chamber / 1G~8G      | +/- 2.5975  |
| 3M Semi Anechoic Chamber / 8G~18G     | +/- 2.6112  |
| 3M Semi Anechoic Chamber / 18G~26G    | +/- 2.7389  |
| 3M Semi Anechoic Chamber / 26G~40G    | +/- 2.9683  |

**Remark:** This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

- ☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.  
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029
- ☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)  
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045
- ☐ No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan  
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10: 2013 and CISPR Publication 22.

### 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, ridged waveguide, horn and/or Loop. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

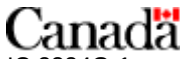
Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 5.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324G-1 for 3M Semi Anechoic Chamber A, 2324G-2 for 3M Semi Anechoic Chamber B.

## 5.4 TABLE OF ACCREDITATIONS AND LISTINGS

| Country | Agency          | Scope of Accreditation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Logo                                                                                                            |
|---------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| USA     | FCC             | 3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <br>FCC MRA: TW1039          |
| Taiwan  | TAF             | LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310<br>IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17<br>FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959<br>FCC Method -47 CFR Part 15 Subpart B<br>IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11 |                              |
| Canada  | Industry Canada | 3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <br>IC 2324G-1<br>IC 2324G-2 |

\* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.

## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

| No | Equipment   | Brand | Model      | Series No. | FCC ID | Data Cable | Power Cord                                                                |
|----|-------------|-------|------------|------------|--------|------------|---------------------------------------------------------------------------|
| 1  | Notebook PC | IBM   | 7663 (T61) | L3E9812    | N/A    | N/A        | AC I/P:<br>Unshielded, 1.8m<br>DC O/P:<br>Unshielded, 1.8m<br>with a core |

**Remark:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

## 7. FCC PART 15 REQUIREMENTS

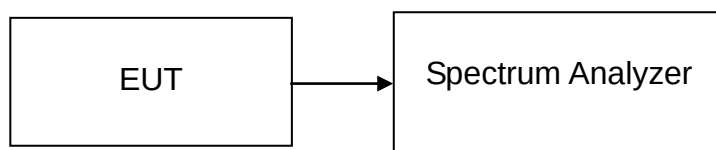
### 7.1 26 DB EMISSION BANDWIDTH

#### LIMIT

Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

#### Test Configuration

#### TEST PROCEDURE



1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low-loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW > 1%EBW, VBW > RBW, Span >26dB bandwidth, and Sweep = auto.
4. Mark the peak frequency and -26dB (upper and lower) frequency.
5. Repeat until all the rest channels were investigated.

#### TEST RESULTS

*No non-compliance noted*

**Test Data****Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz**

| Channel | Frequency (MHz) | 26db Bandwidth (MHz) |
|---------|-----------------|----------------------|
| Low     | 5180            | 22.7210              |
| Mid     | 5220            | 21.4910              |
| High    | 5240            | 20.0430              |

**Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz**

| Channel | Frequency (MHz) | 26db Bandwidth (MHz) |
|---------|-----------------|----------------------|
| Low     | 5180            | 19.6820              |
| Mid     | 5220            | 21.5630              |
| High    | 5240            | 21.3460              |

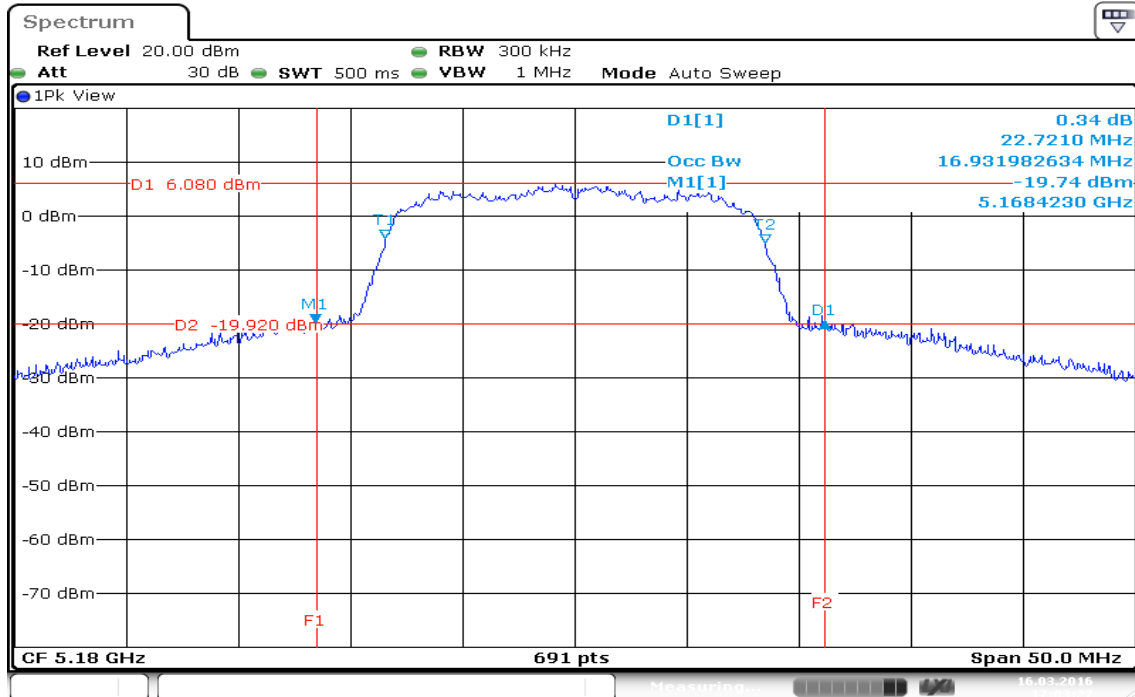
**Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz**

| Channel | Frequency (MHz) | 26db Bandwidth (MHz) |
|---------|-----------------|----------------------|
| Low     | 5190            | 46.310               |
| High    | 5230            | 48.510               |

## Test Plot

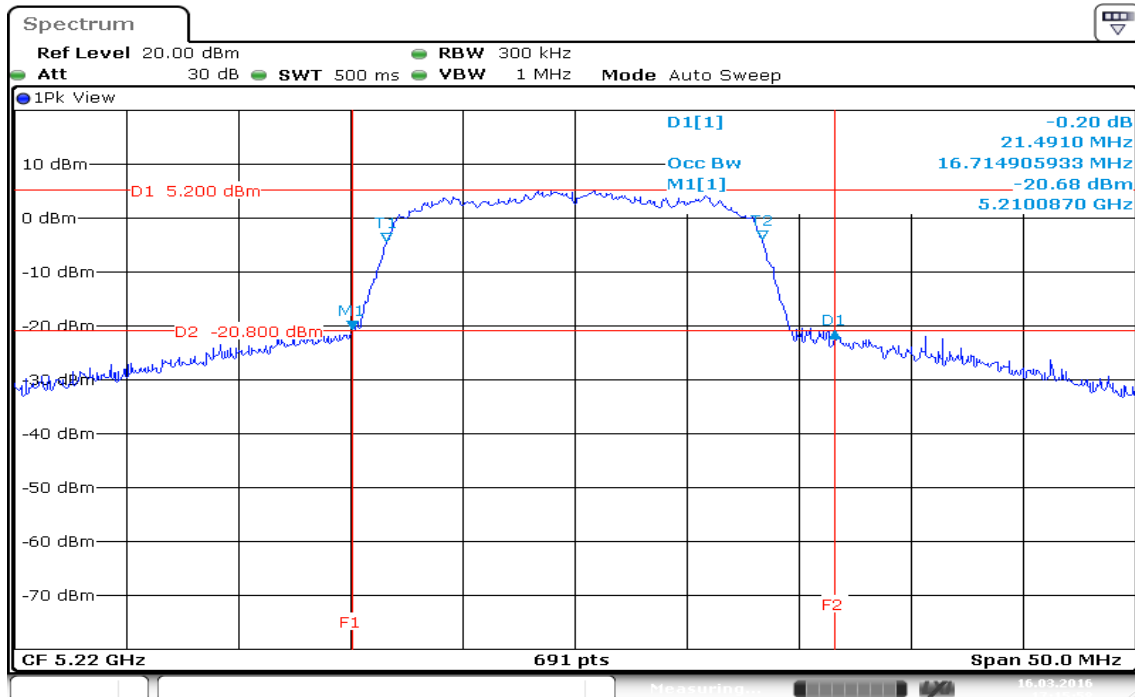
### IEEE 802.11a for 5180 ~ 5240MHz

#### CH Low



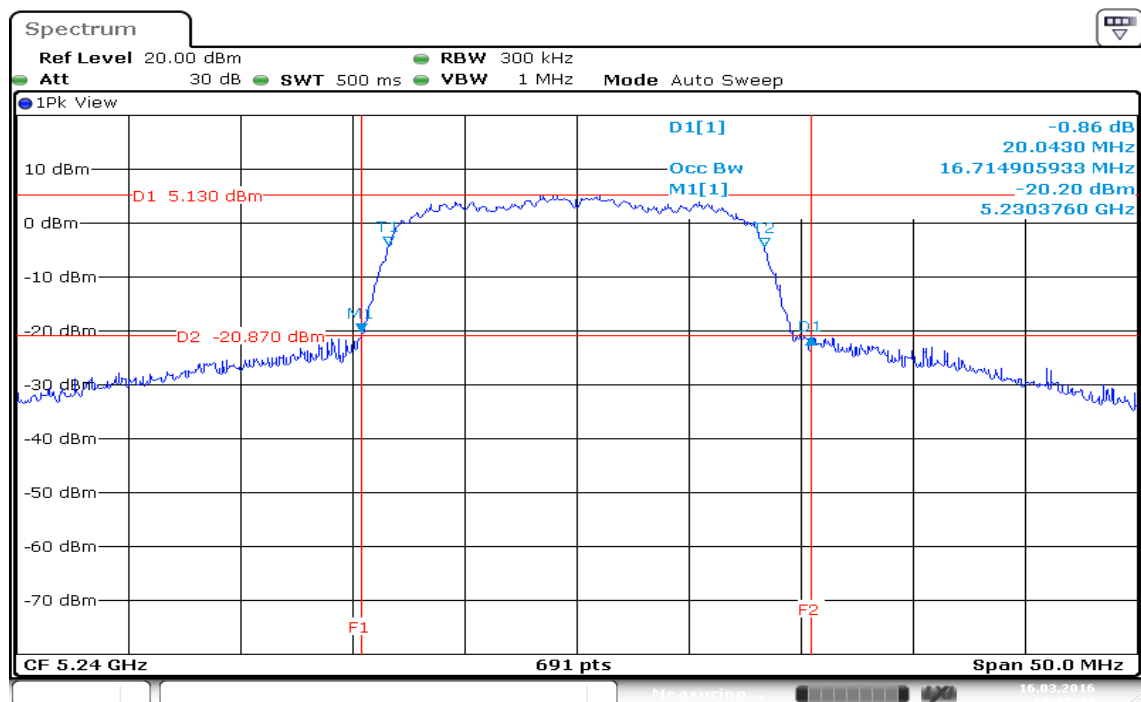
Date: 16.MAR.2016 17:03:27

#### CH Mid

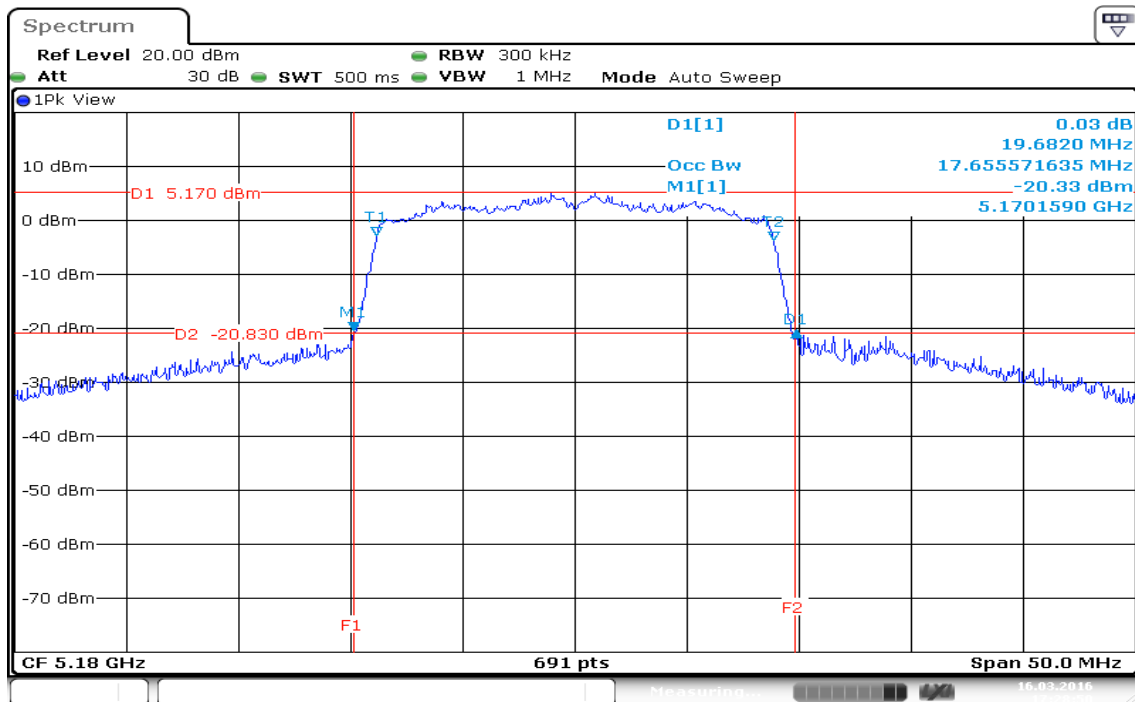
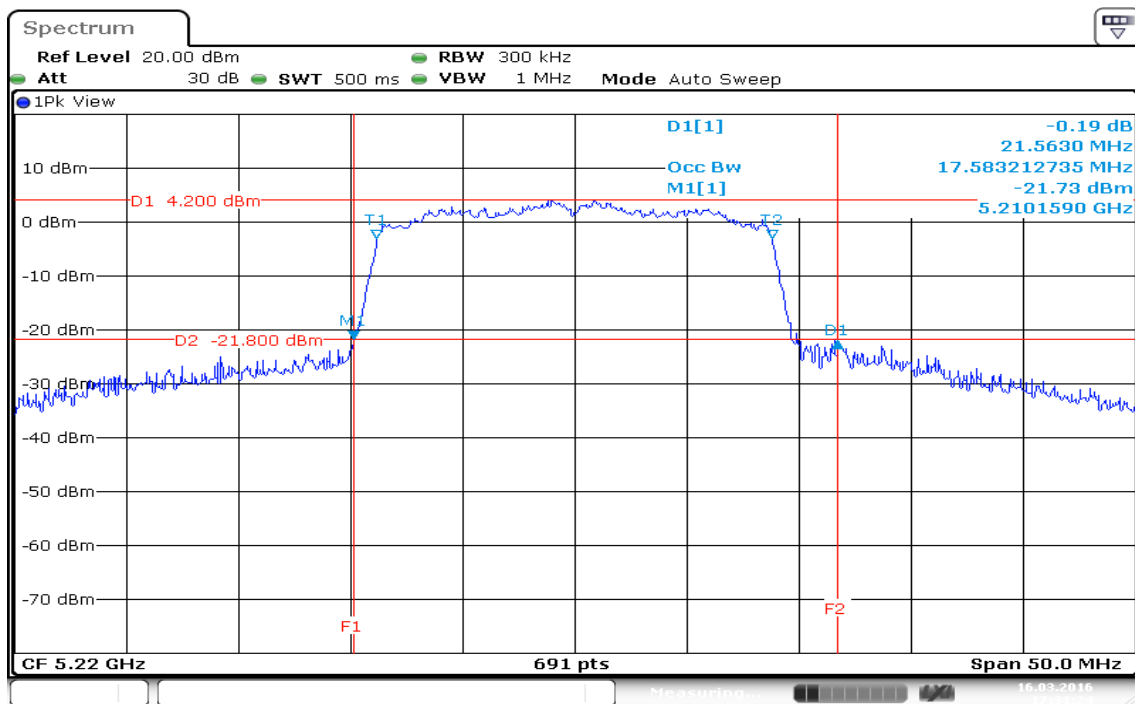


Date: 16.MAR.2016 17:15:59

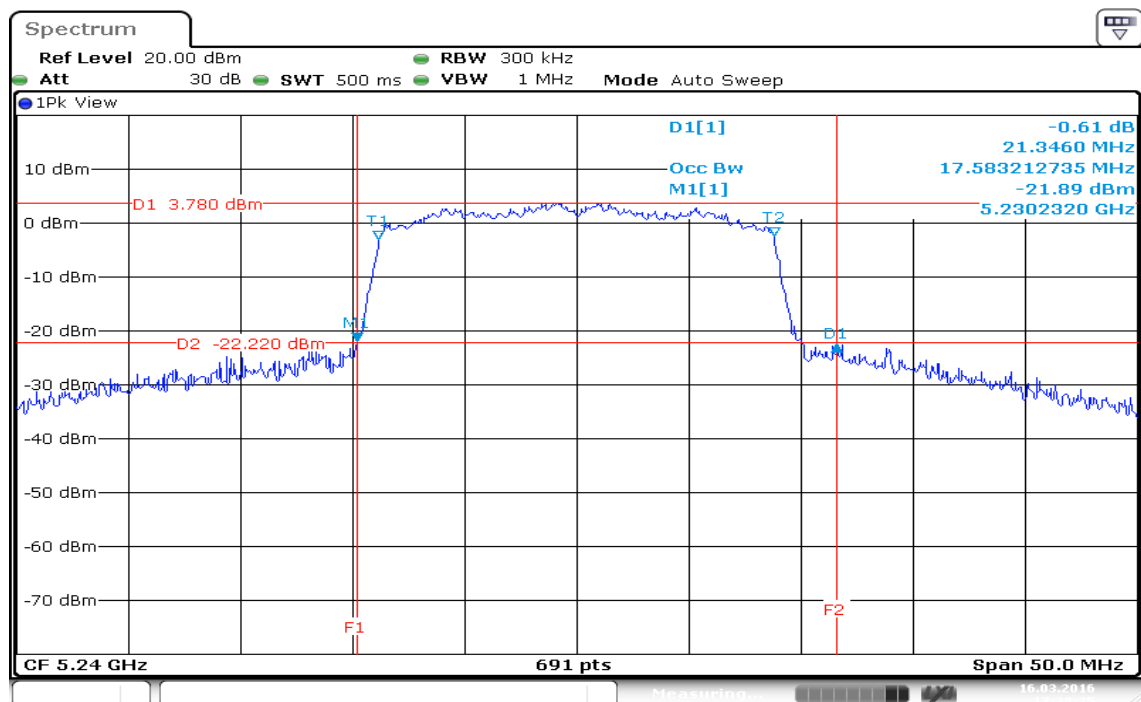
## CH High



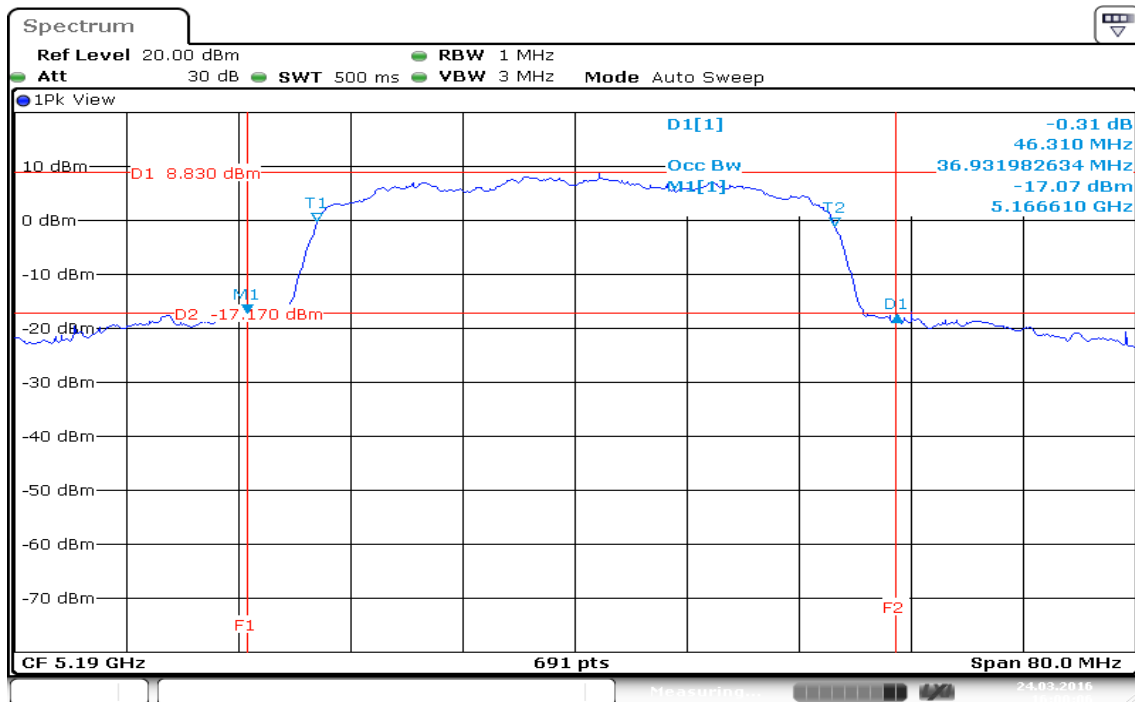
Date: 16.MAR.2016 17:18:34

**IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz****CH Low****CH Mid**

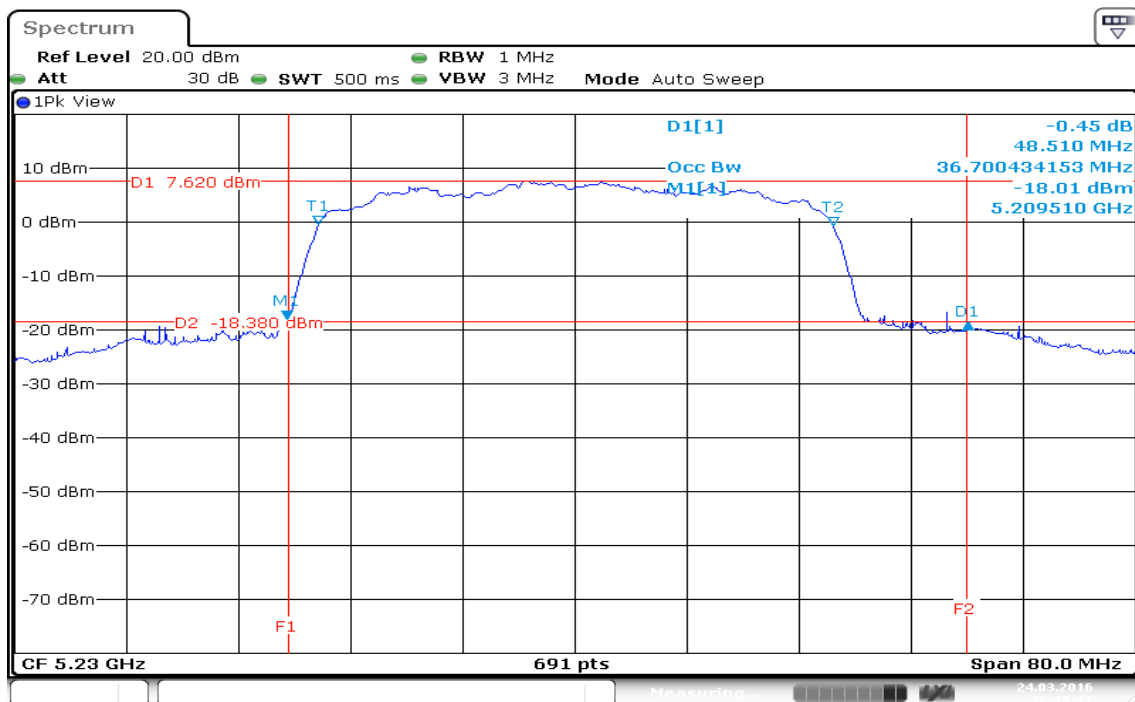
## CH High



Date: 16.MAR.2016 17:39:35

**IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz****CH Low**

Date: 24.MAR.2016 16:00:06

**CH High**

Date: 24.MAR.2016 16:15:11

## 7.2 MAXIMUM CONDUCTED OUTPUT POWER

### LIMIT

According to §15.407(a)

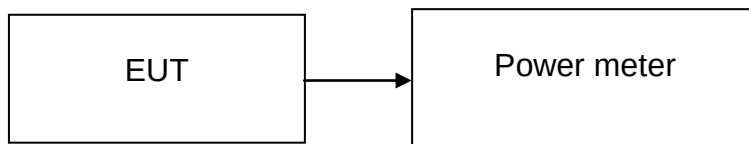
For the band 5.15-5.25 GHz, 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10\log B$ , where B is the 26 dB emission bandwidth in MHz.

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

*In addition, devices with maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W. The peak power shall not exceed the limit as follow:*

### Test Configuration

*The EUT was connected to a Power meter through a 50Ω RF cable.*



### TEST PROCEDURE

The transmitter output is connected to the Power Meter. The Power Meter is set to the avg power detection. The EUT is configured to transmit continuously.

## **TEST RESULTS**

*No non-compliance noted*

### **Test Data**

#### **ANT 1**

**Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz**

| Channel | Frequency (MHz) | Maximum Conducted Output Power (dBm) | FCC Limit (dBm) |
|---------|-----------------|--------------------------------------|-----------------|
| Low     | 5180            | <b>*13.07</b>                        | 24.00           |
| Mid     | 5220            | 13.04                                | 24.00           |
| High    | 5240            | 12.91                                | 24.00           |

**Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz**

| Channel | Frequency (MHz) | Maximum Conducted Output Power (dBm) | FCC Limit (dBm) |
|---------|-----------------|--------------------------------------|-----------------|
| Low     | 5180            | <b>*11.94</b>                        | 24.00           |
| Mid     | 5220            | 10.54                                | 24.00           |
| High    | 5240            | 11.83                                | 24.00           |

**Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz**

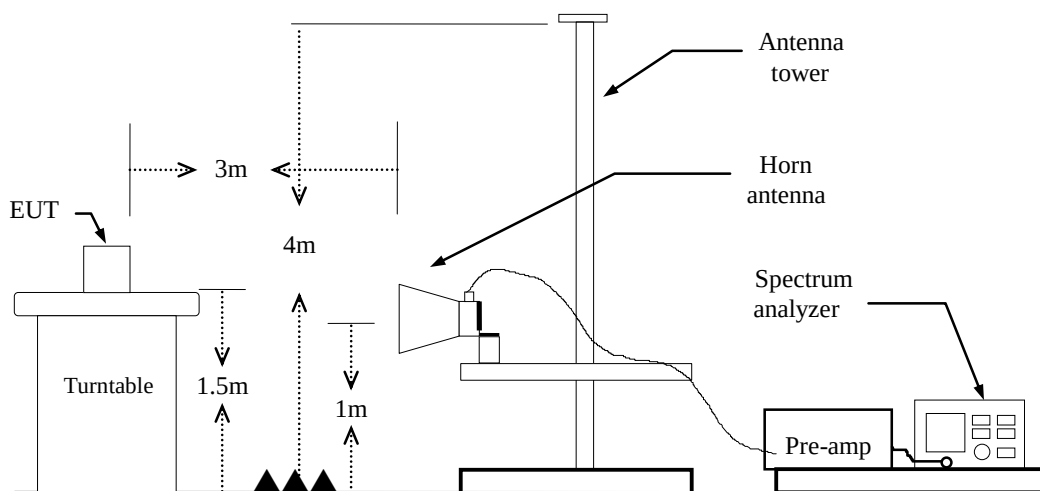
| Channel | Frequency (MHz) | Maximum Conducted Output Power (dBm) | FCC Limit (dBm) |
|---------|-----------------|--------------------------------------|-----------------|
| Low     | 5190            | <b>*12.14</b>                        | 24.00           |
| High    | 5230            | 10.95                                | 24.00           |

## 7.3 BAND EDGES MEASUREMENT

### LIMIT

According to §15.407, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

### Test Configuration



## **TEST PROCEDURE**

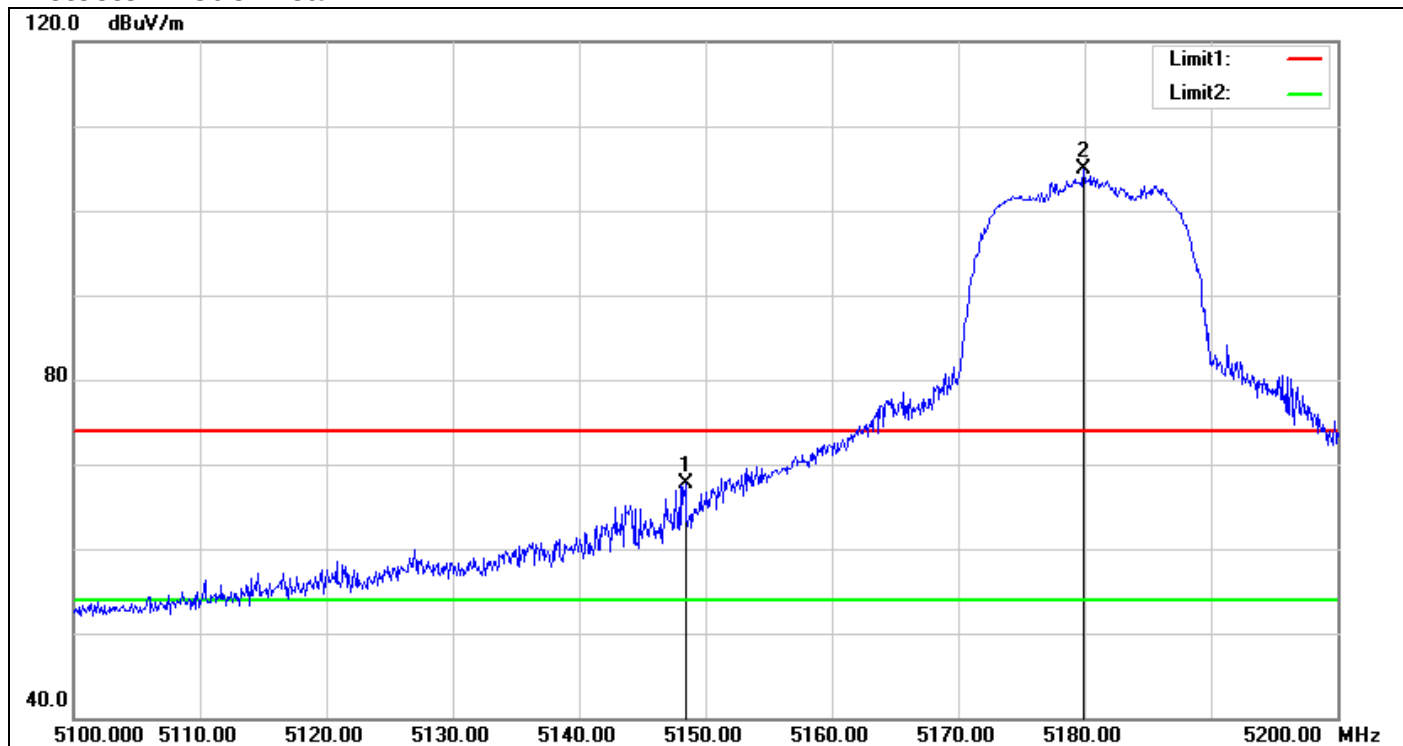
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz,  
if duty cycle  $\geq 98\%$ , VBW=10Hz.  
if duty cycle  $< 98\%$  VBW=1/T.  
**IEEE 802.11a mode:**  $\geq 98\%$ , VBW=10Hz  
**IEEE 802.11n HT 20 MHz mode:**  $\approx 97\%$ , VBW=1.5kHz  
**IEEE 802.11n HT 40 MHz mode:**  $\geq 98\%$ , VBW=10Hz
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.
6. Result = Spectrum Reading + cable loss(spectrum to Amp) - Amp Gain + Cable loss(Amp to receive Ant)+ Receive Ant

## **TEST RESULTS**

Refer to attach spectrum analyzer data chart.

## Band Edges (IEEE 802.11a mode / CH 5180 MHz)

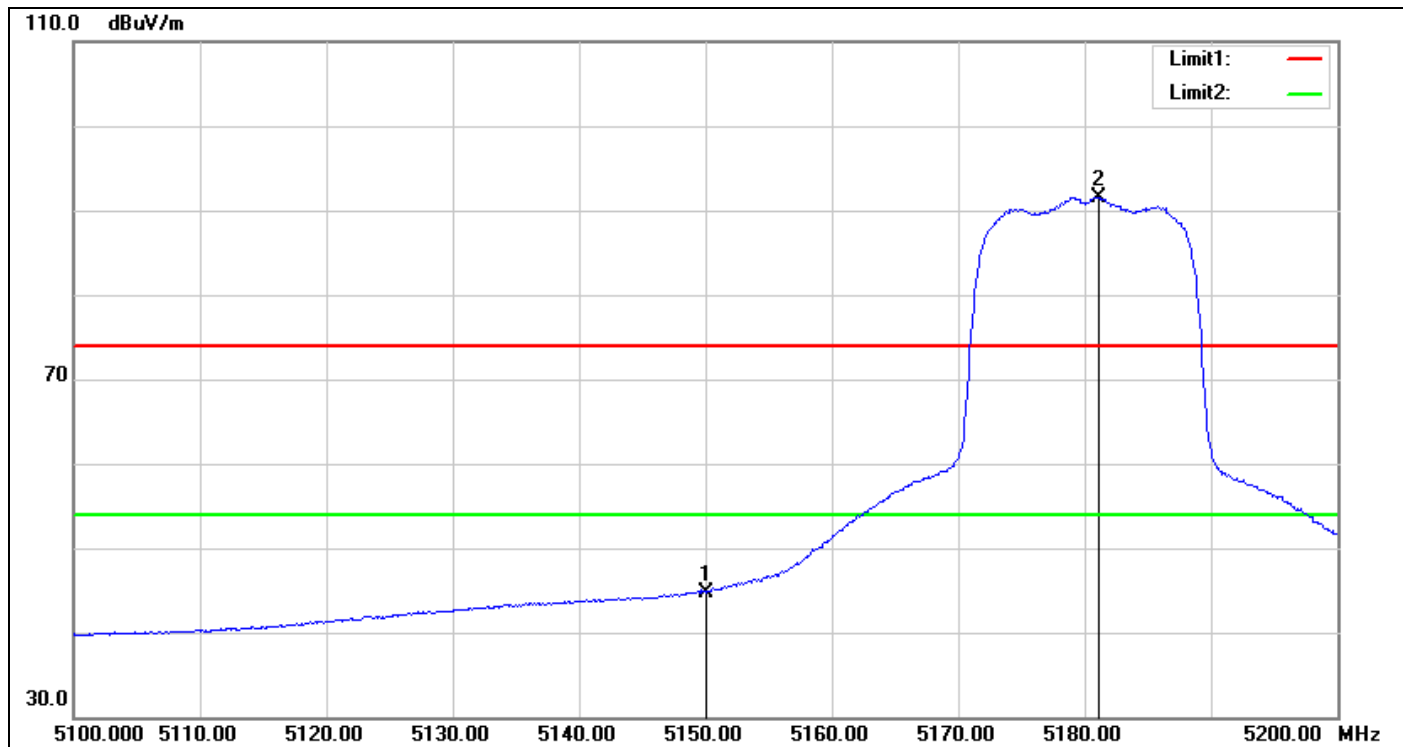
Detector mode: Peak



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 5148.400           | 64.58             | 3.03                    | 67.61              | 74.00             | -6.39          | peak   |
| 2   | 5179.900           | 101.04            | 3.91                    | 104.95             | --                | --             | peak   |

**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

**Detector mode: Average**

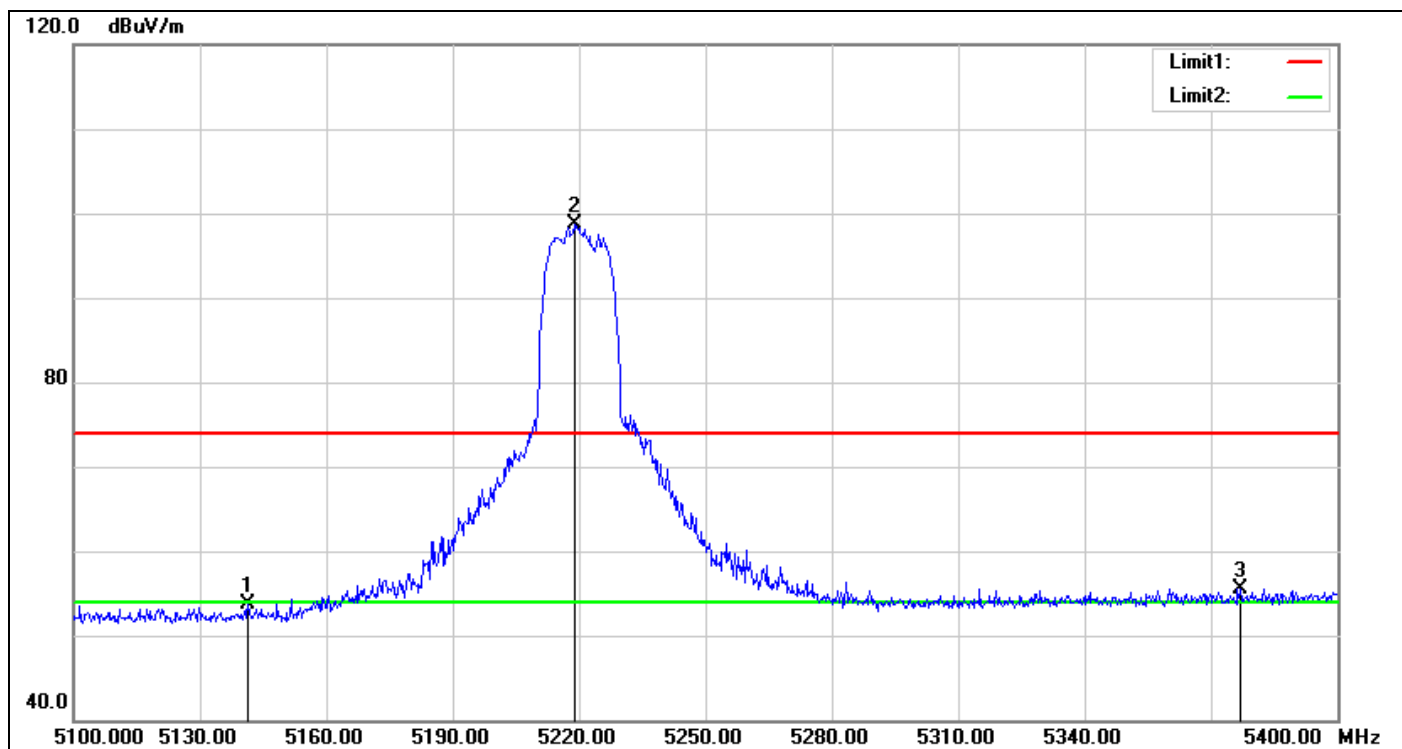


| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 5150.000           | 41.72             | 3.04                    | 44.76              | 54.00             | -9.24          | AVG    |
| 2   | 5181.100           | 87.65             | 3.94                    | 91.59              | --                | --             | AVG    |

**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

## Band Edges (IEEE 802.11a mode / CH 5220 MHz)

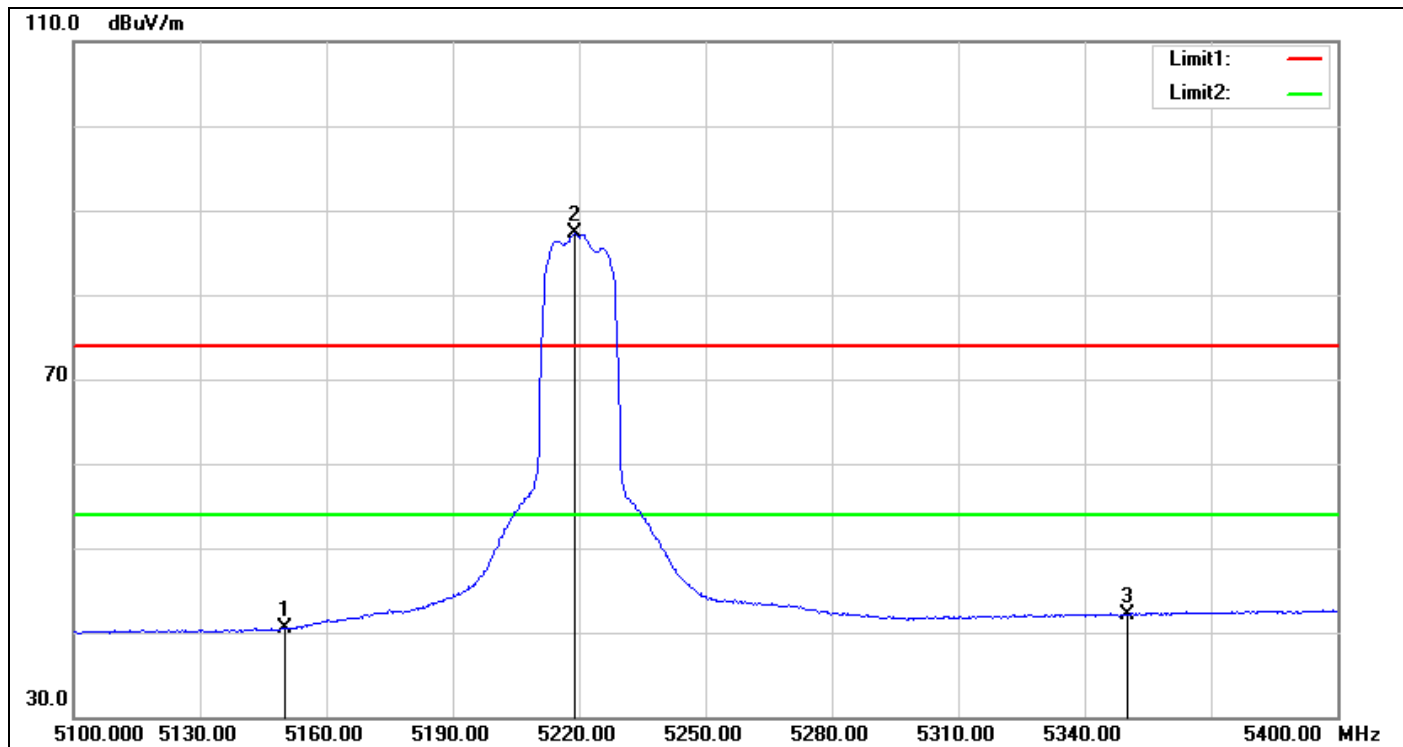
Detector mode: Peak



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 5141.400           | 50.70             | 2.98                    | 53.68              | 74.00             | -20.32         | peak   |
| 2   | 5218.800           | 94.17             | 4.55                    | 98.72              | --                | --             | peak   |
| 3   | 5376.900           | 50.07             | 5.53                    | 55.60              | 74.00             | -18.40         | peak   |

**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

**Detector mode: Average**

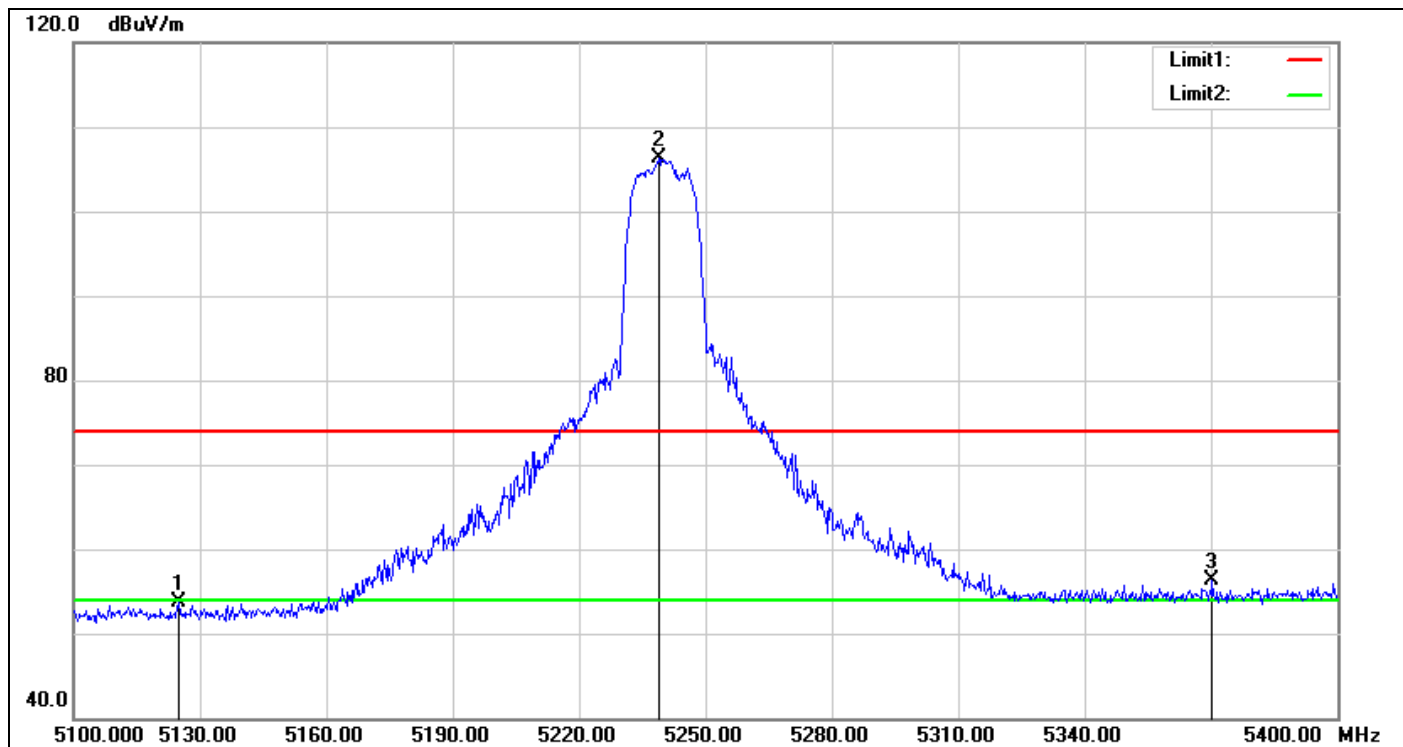


| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 5150.000           | 37.42             | 3.04                    | 40.46              | 54.00             | -13.54         | AVG    |
| 2   | 5218.800           | 82.81             | 4.55                    | 87.36              | --                | --             | AVG    |
| 3   | 5350.000           | 36.83             | 5.31                    | 42.14              | 54.00             | -11.86         | AVG    |

**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

## Band Edges (IEEE 802.11a mode / CH 5240 MHz)

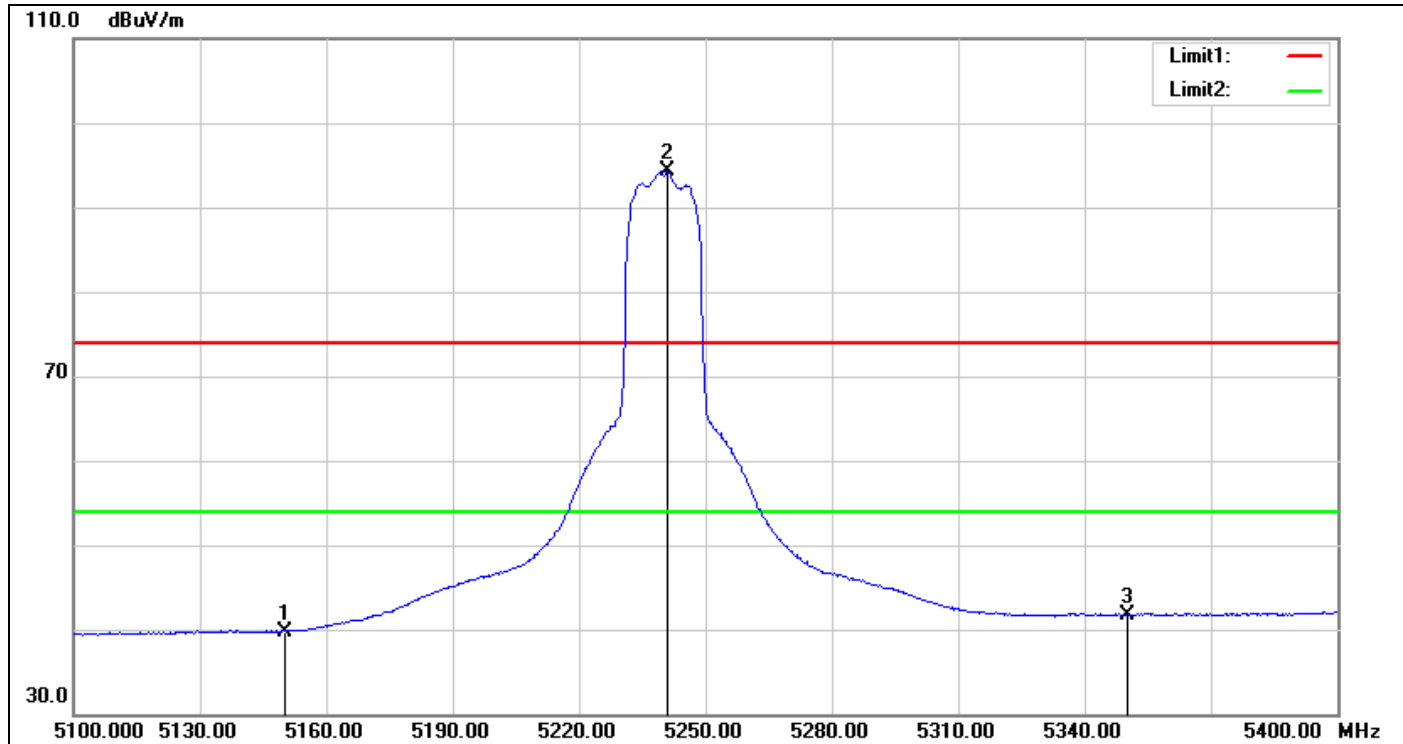
Detector mode: Peak



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 5124.900           | 50.87             | 2.87                    | 53.74              | 74.00             | -20.26         | peak   |
| 2   | 5238.900           | 101.62            | 4.62                    | 106.24             | --                | --             | peak   |
| 3   | 5370.300           | 50.75             | 5.48                    | 56.23              | 74.00             | -17.77         | peak   |

**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

## Detector mode: Average

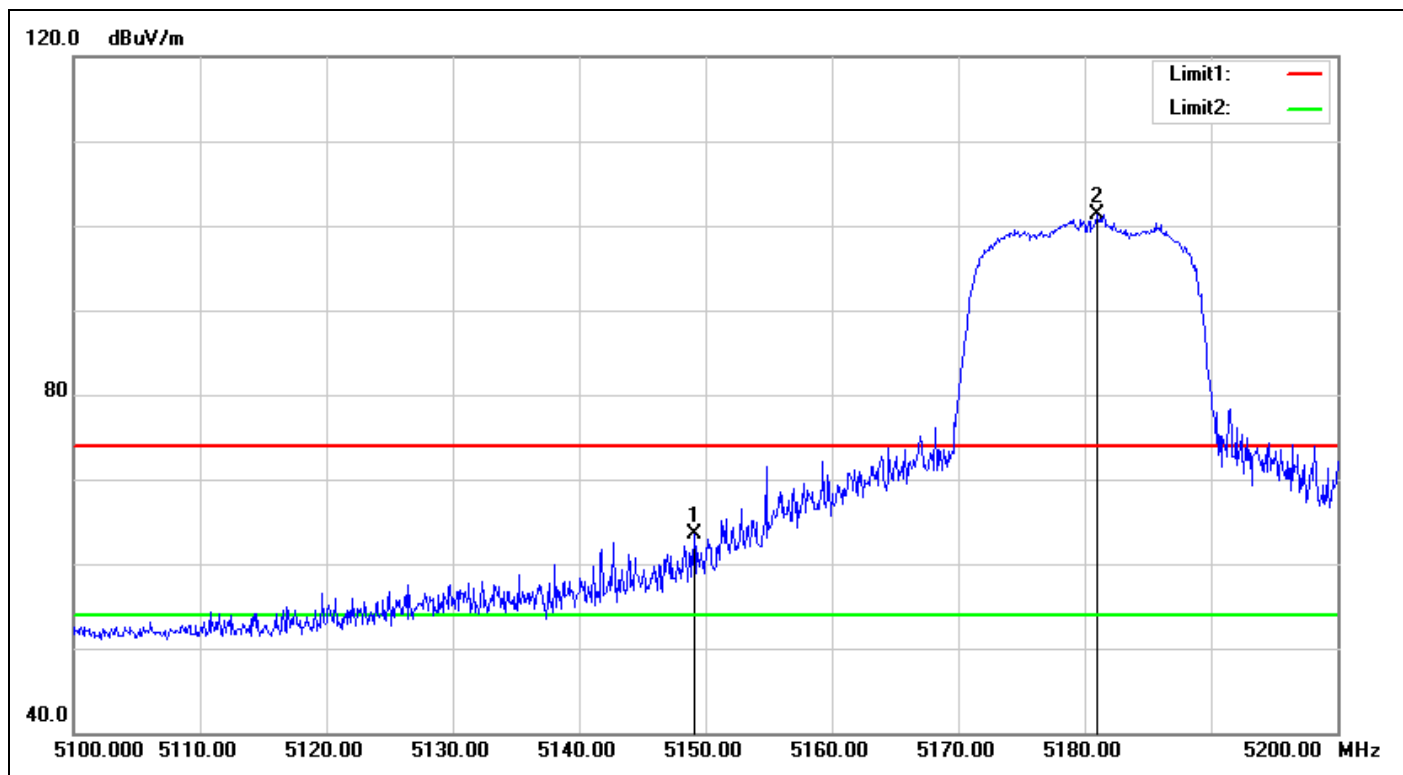


| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 5150.000           | 36.76             | 3.04                    | 39.80              | 54.00             | -14.20         | AVG    |
| 2   | 5241.000           | 89.69             | 4.63                    | 94.32              | --                | --             | AVG    |
| 3   | 5350.000           | 36.47             | 5.31                    | 41.78              | 54.00             | -12.22         | AVG    |

**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

## Band Edges (IEEE 802.11n HT 20 MHz mode / CH 5180 MHz)

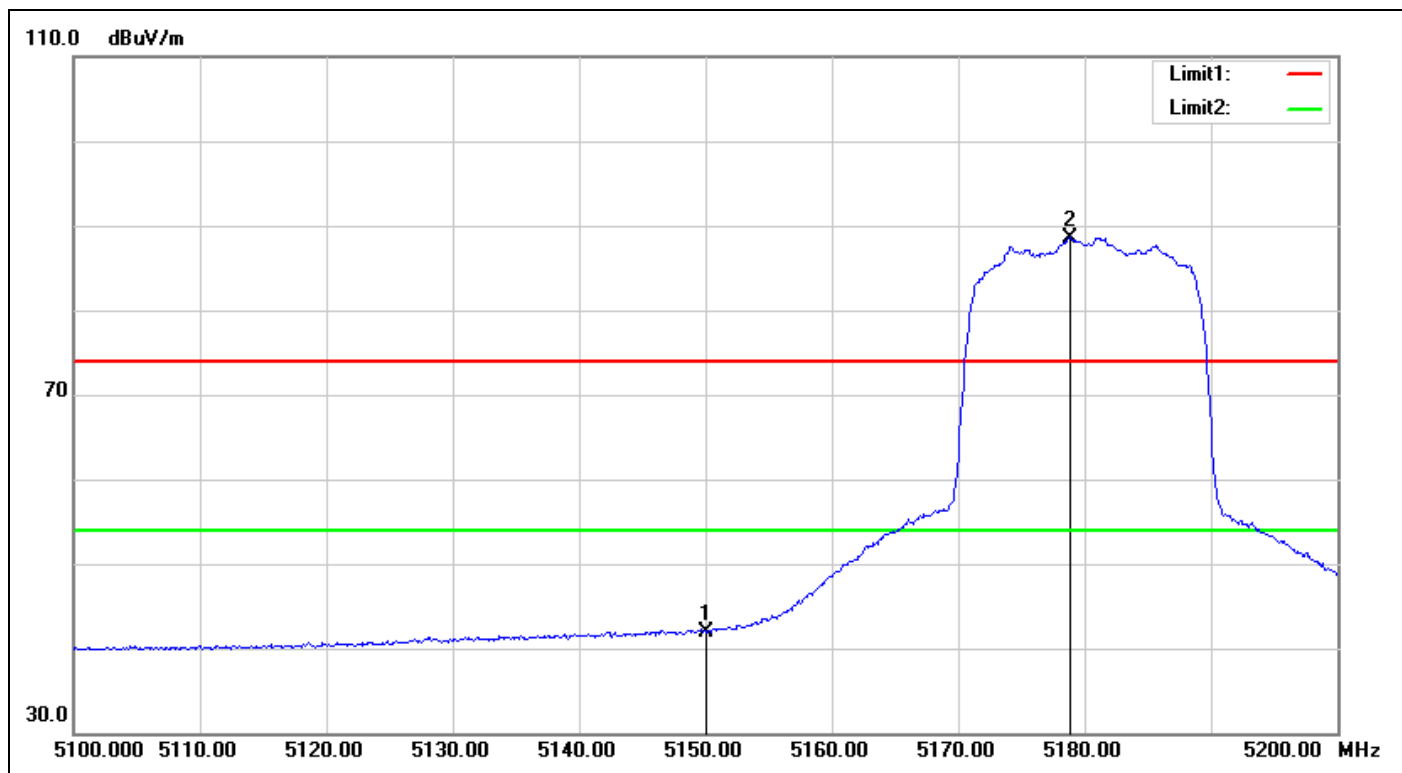
Detector mode: Peak



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 5149.100           | 60.41             | 3.03                    | 63.44              | 74.00             | -10.56         | peak   |
| 2   | 5181.000           | 97.34             | 3.94                    | 101.28             | --                | --             | peak   |

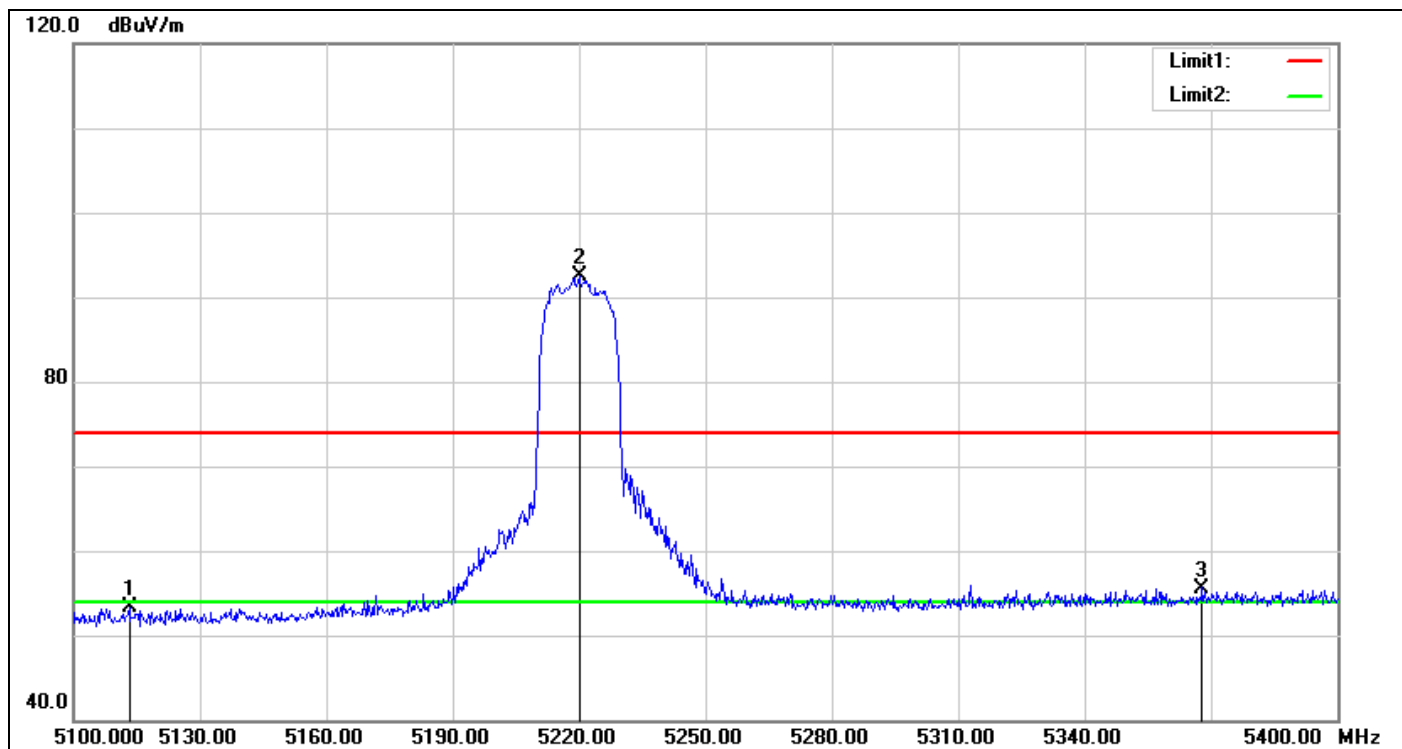
**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

## Detector mode: Average



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 5150.000           | 38.91             | 3.04                    | 41.95              | 54.00             | -12.05         | AVG    |
| 2   | 5178.800           | 84.72             | 3.88                    | 88.60              | --                | --             | AVG    |

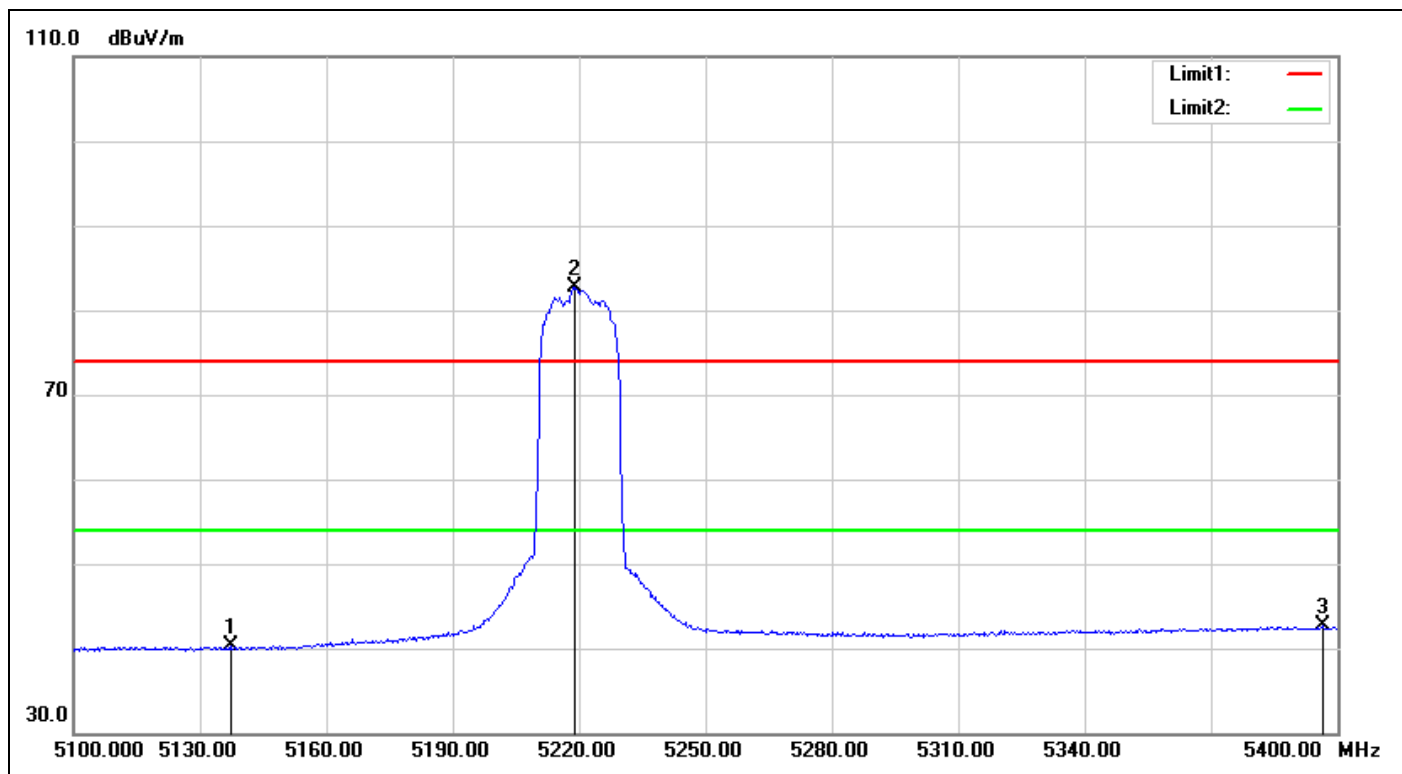
**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

**Band Edges (IEEE 802.11n HT 20 MHz mode / CH 5220 MHz)****Detector mode: Peak**

| No. | Frequency | Reading | Correct      | Result   | Limit    | Margin | Remark |
|-----|-----------|---------|--------------|----------|----------|--------|--------|
|     | (MHz)     | (dBuV)  | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB)   |        |
| 1   | 5113.200  | 50.43   | 2.79         | 53.22    | 74.00    | -20.78 | peak   |
| 2   | 5220.000  | 88.02   | 4.56         | 92.58    | --       | --     | peak   |
| 3   | 5367.900  | 50.14   | 5.46         | 55.60    | 74.00    | -18.40 | peak   |

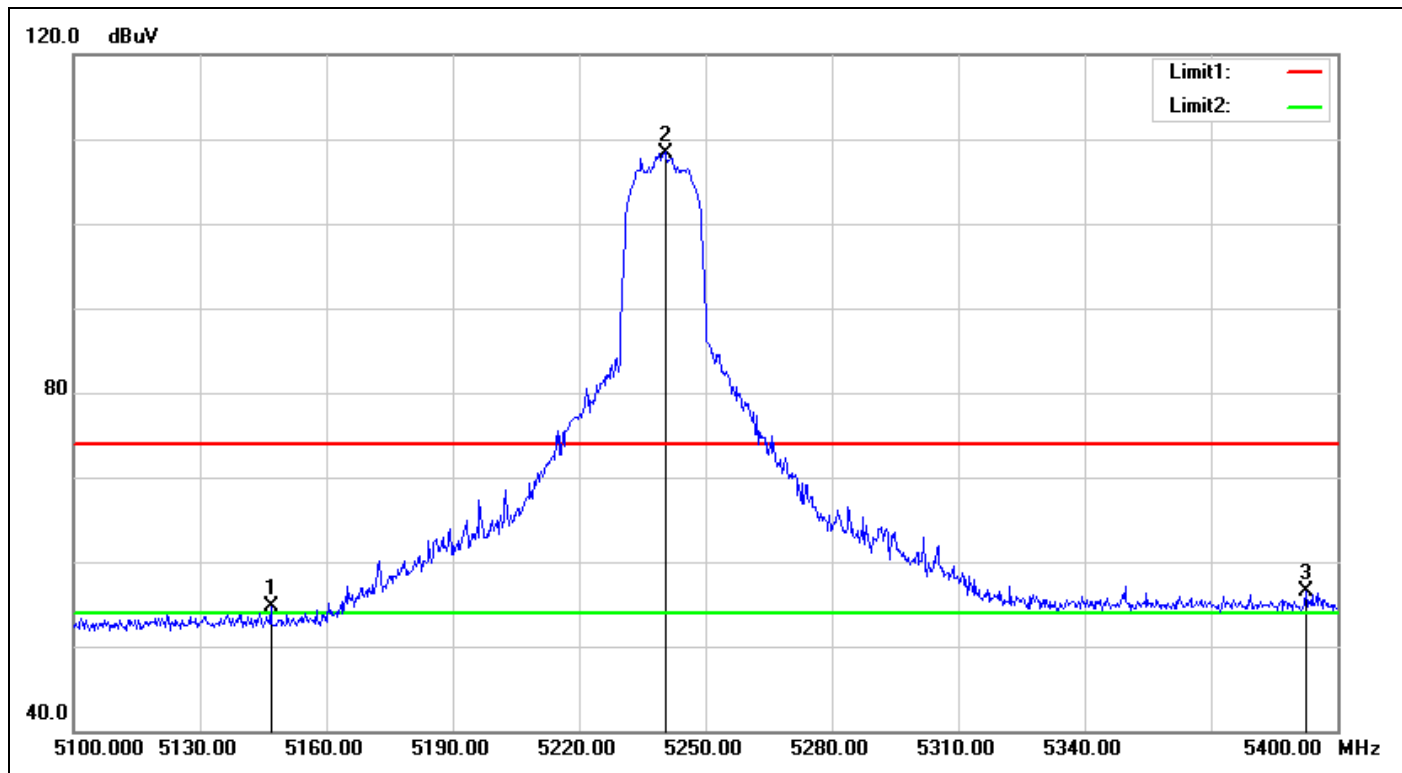
**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

## Detector mode: Average



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 5137.200           | 37.31             | 2.95                    | 40.26              | 54.00             | -13.74         | AVG    |
| 2   | 5218.800           | 78.14             | 4.55                    | 82.69              | --                | --             | AVG    |
| 3   | 5396.400           | 36.98             | 5.69                    | 42.67              | 54.00             | -11.33         | AVG    |

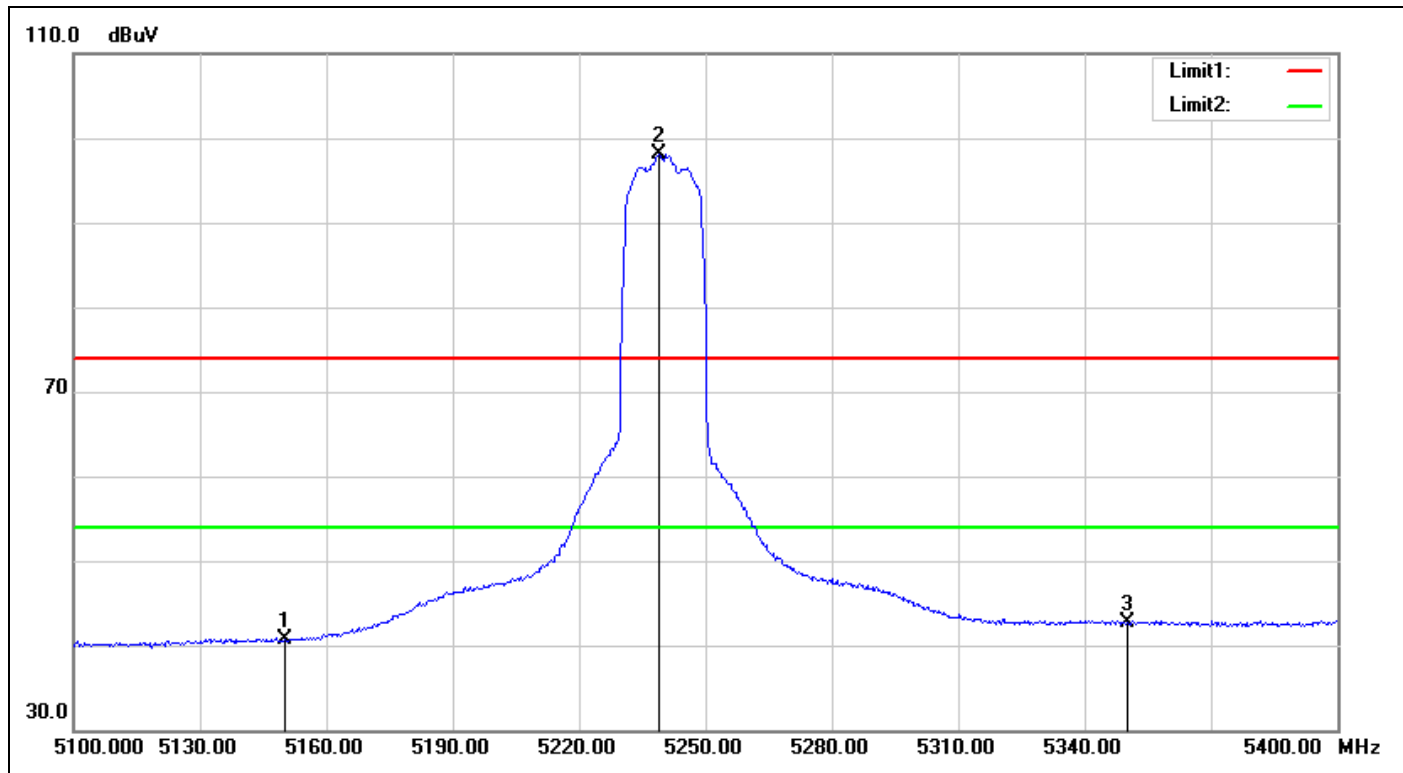
**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

**Band Edges (IEEE 802.11n HT 20 MHz mode / CH 5240 MHz)****Detector mode: Peak**

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------|------------------|-----------------|----------------|--------|
| 1   | 5146.800           | 51.60             | 3.02                  | 54.62            | 74.00           | -19.38         | peak   |
| 2   | 5240.400           | 103.77            | 4.63                  | 108.40           | --              | --             | peak   |
| 3   | 5392.500           | 50.79             | 5.66                  | 56.45            | 74.00           | -17.55         | peak   |

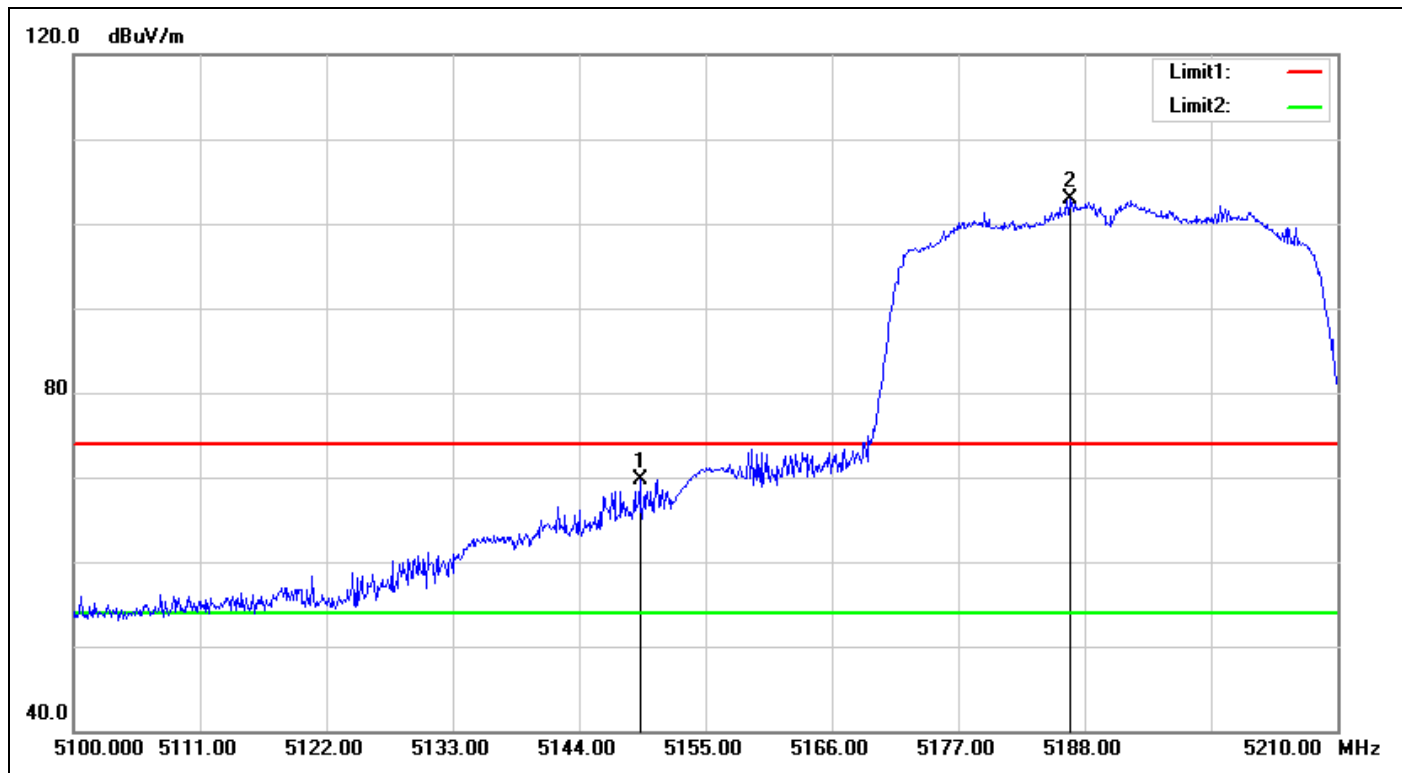
**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

## Detector mode: Average



| No. | Frequency | Reading | Correct    | Result | Limit  | Margin | Remark |
|-----|-----------|---------|------------|--------|--------|--------|--------|
|     | (MHz)     | (dBuV)  | Factor(dB) | (dBuV) | (dBuV) | (dB)   |        |
| 1   | 5150.000  | 37.57   | 3.04       | 40.61  | 54.00  | -13.39 | AVG    |
| 2   | 5238.900  | 93.56   | 4.62       | 98.18  | --     | --     | AVG    |
| 3   | 5350.000  | 37.29   | 5.31       | 42.60  | 54.00  | -11.40 | AVG    |

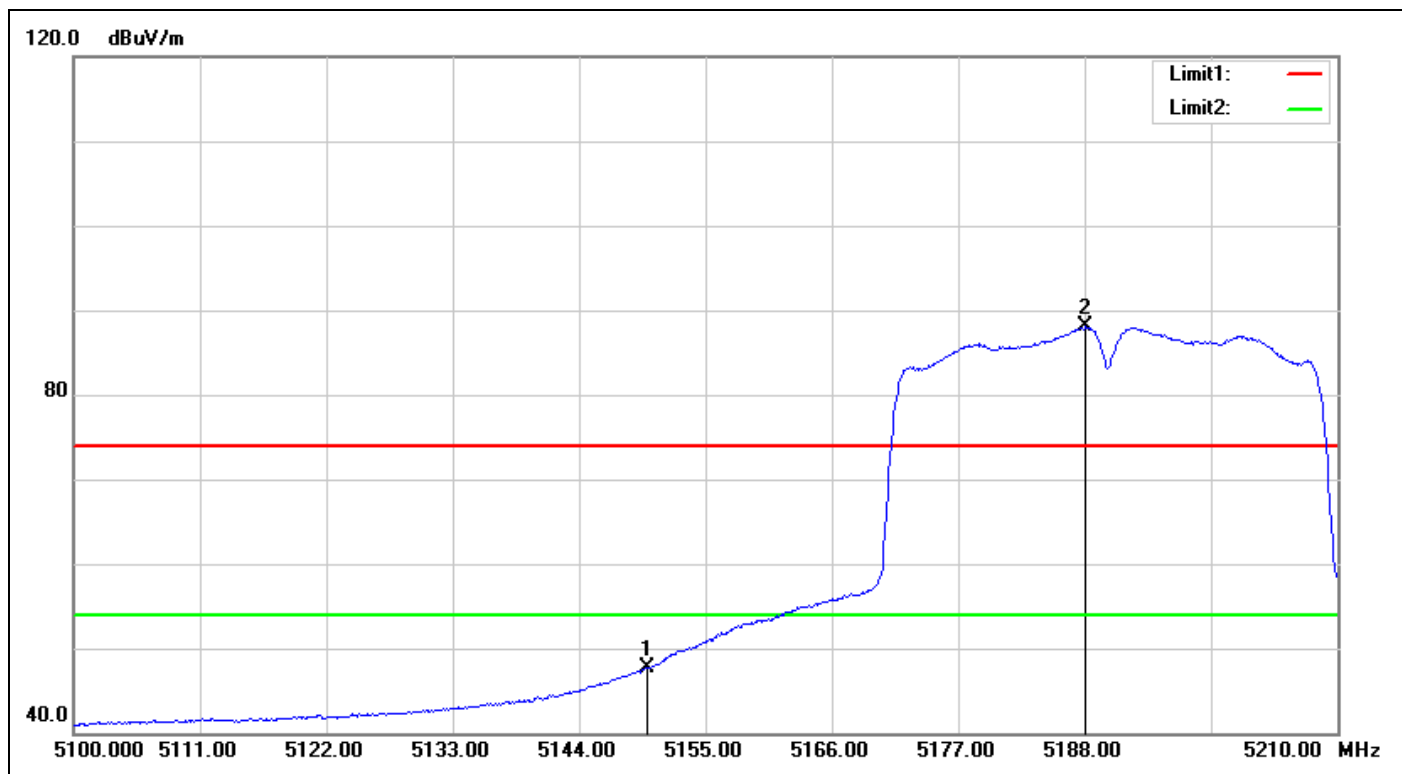
**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

**Band Edges (IEEE 802.11n HT 40 MHz mode / CH 5190 MHz)****Detector mode: Peak**

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 5149.280           | 66.70             | 3.04                    | 69.74              | 74.00             | -4.26          | peak   |
| 2   | 5186.680           | 98.83             | 4.10                    | 102.93             | --                | --             | peak   |

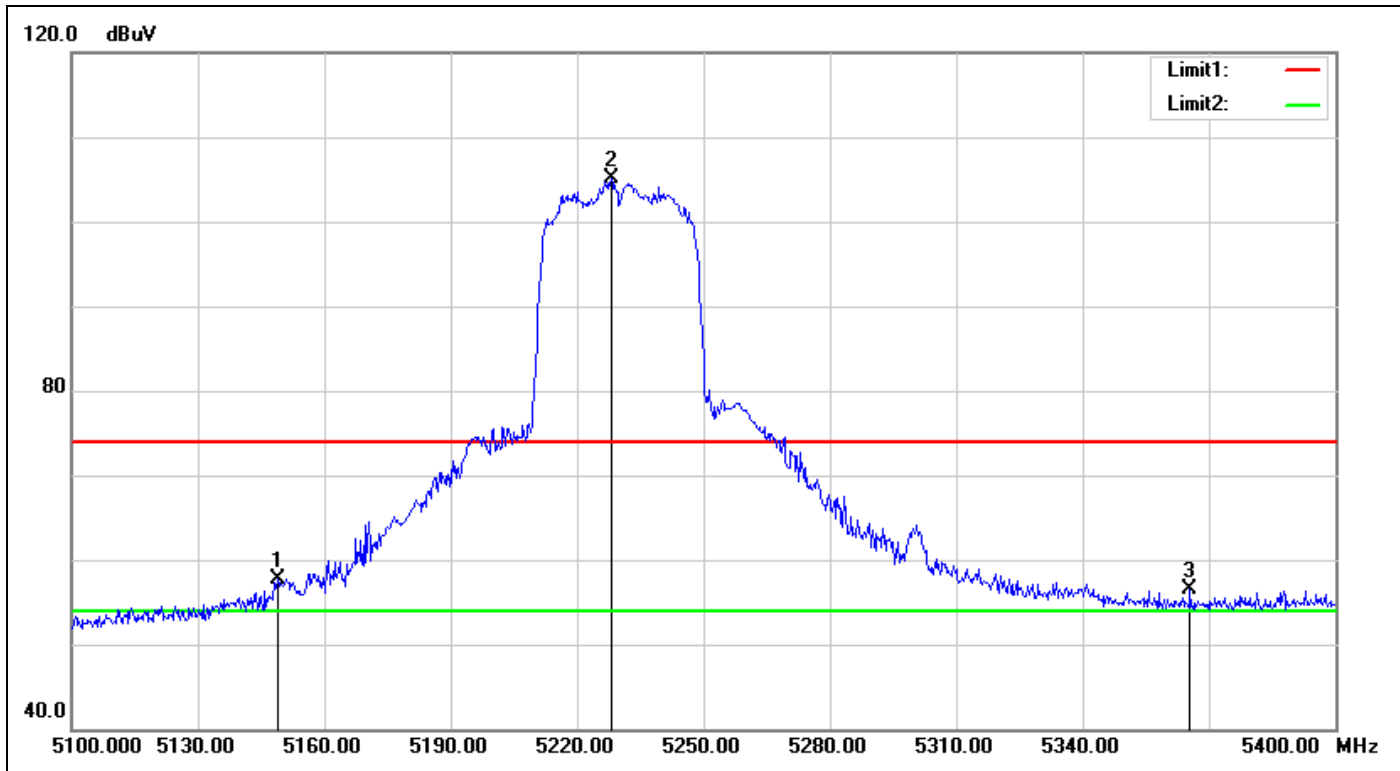
**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

## Detector mode: Average



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 5150.000           | 44.73             | 3.04                    | 47.77              | 54.00             | -6.23          | AVG    |
| 2   | 5188.110           | 83.91             | 4.15                    | 88.06              | --                | --             | AVG    |

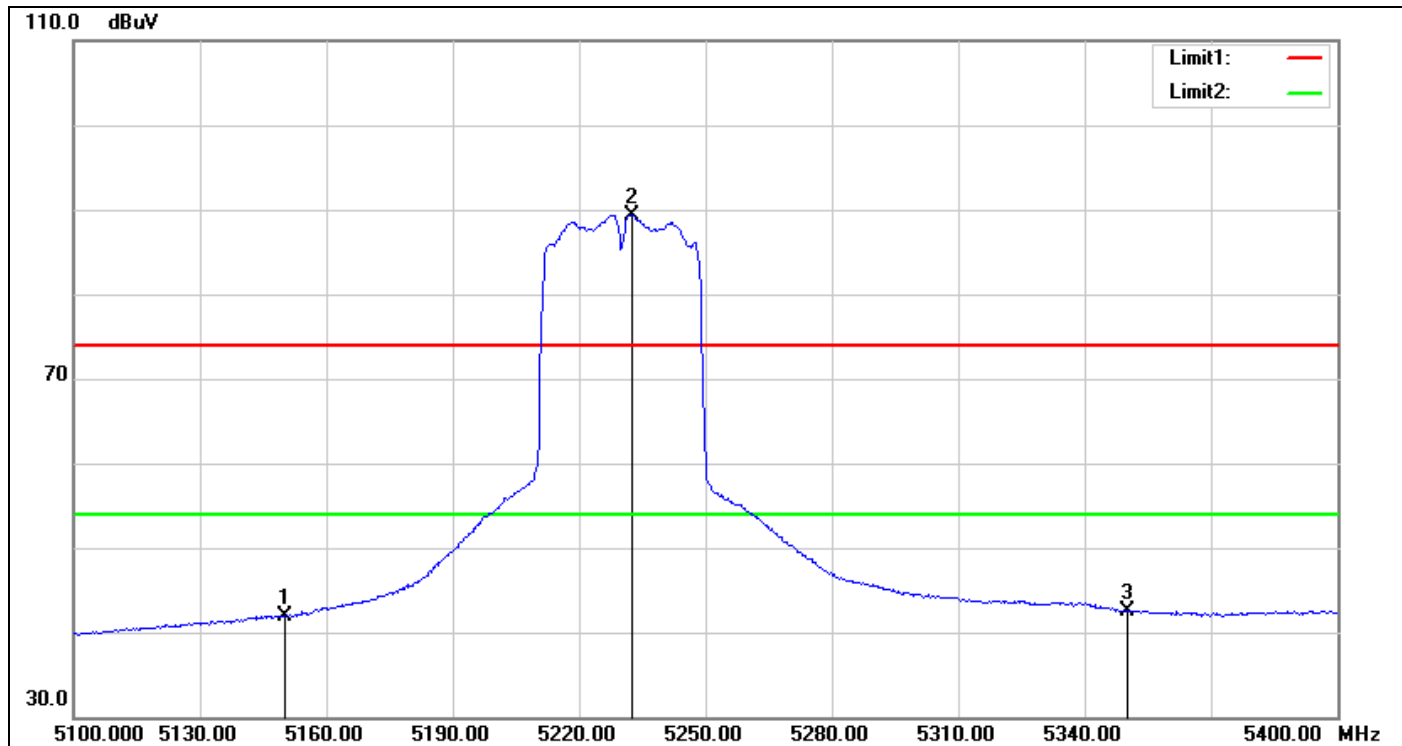
**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

**Band Edges (IEEE 802.11n HT 40 MHz mode / CH 5230 MHz)****Detector mode: Peak**

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------|------------------|-----------------|----------------|--------|
| 1   | 5148.900           | 54.69             | 3.03                  | 57.72            | 74.00           | -16.28         | peak   |
| 2   | 5228.100           | 100.51            | 4.59                  | 105.10           | --              | --             | peak   |
| 3   | 5365.500           | 51.04             | 5.44                  | 56.48            | 74.00           | -17.52         | peak   |

**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

## Detector mode: Average



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------|------------------|-----------------|----------------|--------|
| 1   | 5150.000           | 38.90             | 3.04                  | 41.94            | 54.00           | -12.06         | AVG    |
| 2   | 5232.600           | 84.78             | 4.60                  | 89.38            | --              | --             | AVG    |
| 3   | 5350.000           | 37.22             | 5.31                  | 42.53            | 54.00           | -11.47         | AVG    |

**Note: For in band it is not required to satisfy the -27 dBm emission limit.**

## 7.4 PEAK POWER SPECTRAL DENSITY

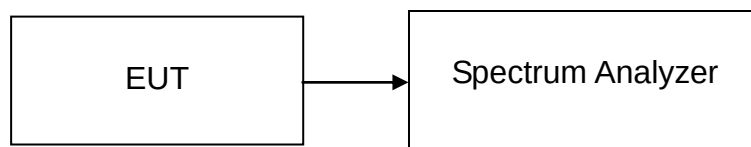
### LIMIT

According to §15.407(a)

- (1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 11dBm in any 1MHz band.
- (2) For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11dBm in any 1MHz band.

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

### Test Configuration



### TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.  
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span = Sweep= AUTO
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed

### TEST RESULTS

*No non-compliance noted*

**Test Data****Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz**

| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Margin | Result |
|---------|-----------------|------------|-------------|--------|--------|
| Low     | 5180            | 2.88       | 11.00       | -8.12  | PASS   |
| Mid     | 5220            | 2.25       | 11.00       | -8.75  | PASS   |
| High    | 5240            | 2.01       | 11.00       | -8.99  | PASS   |

**Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz**

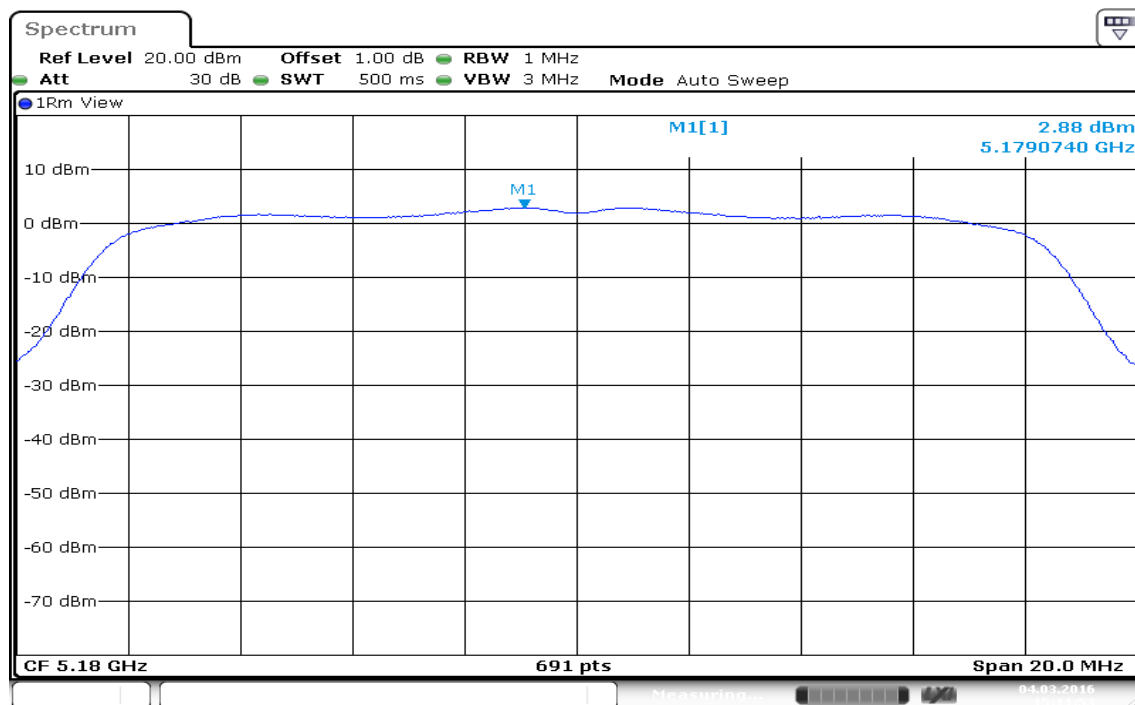
| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Margin | Result |
|---------|-----------------|------------|-------------|--------|--------|
| Low     | 5180            | 1.62       | 11.00       | -9.38  | PASS   |
| Mid     | 5220            | 1.00       | 11.00       | -10.00 | PASS   |
| High    | 5240            | 0.32       | 11.00       | -10.68 | PASS   |

**Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz**

| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Margin | Result |
|---------|-----------------|------------|-------------|--------|--------|
| Low     | 5190            | -1.69      | 11.00       | -12.69 | PASS   |
| High    | 5230            | -2.05      | 11.00       | -13.05 | PASS   |

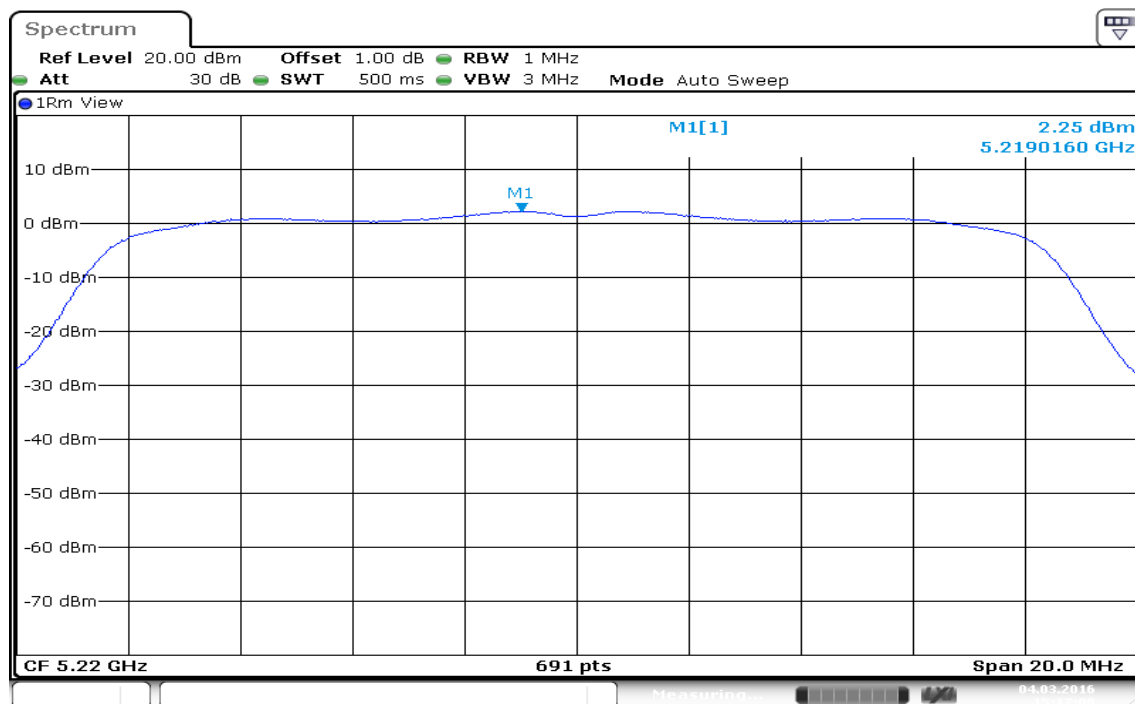
# **Test Plot** **IEEE 802.11a mode / 5180 ~ 5240MHz**

## **CH Low**



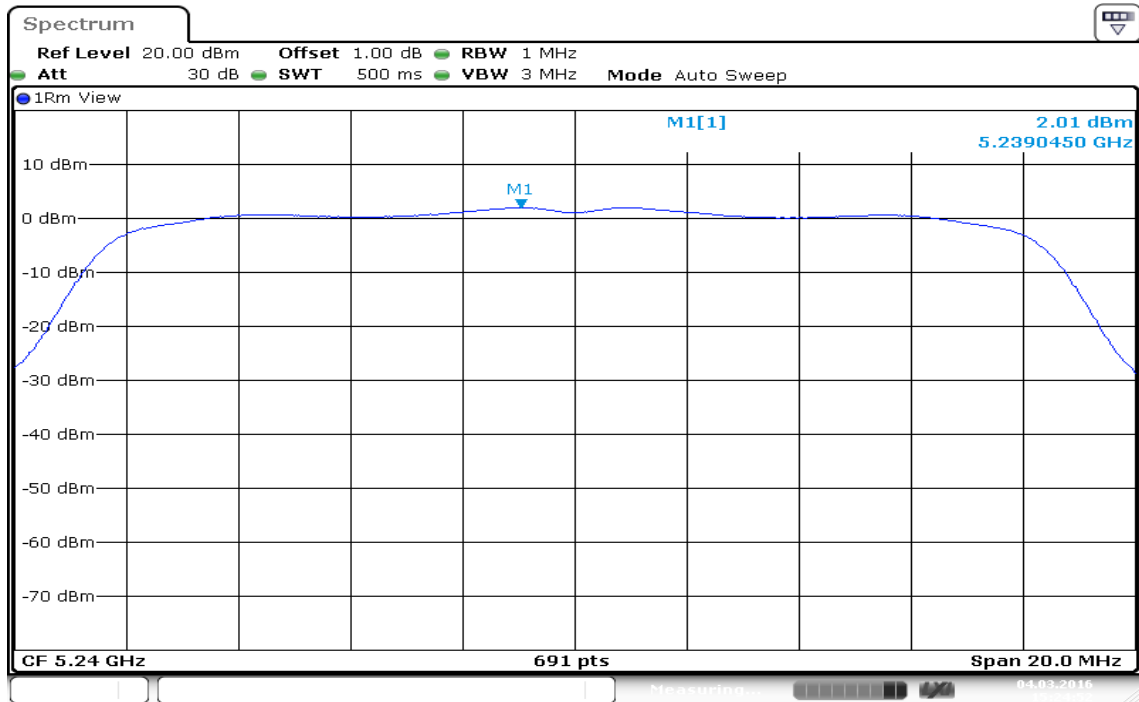
Date: 4.MAR.2016 15:11:52

## **CH Mid**

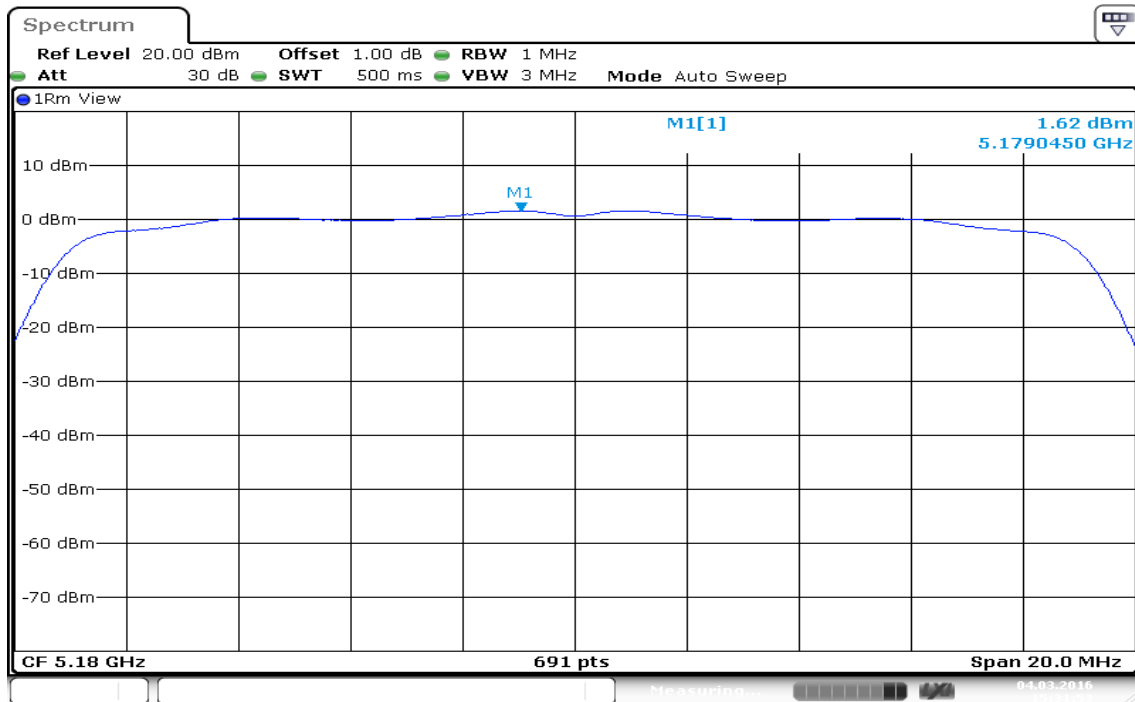


Date: 4.MAR.2016 15:17:08

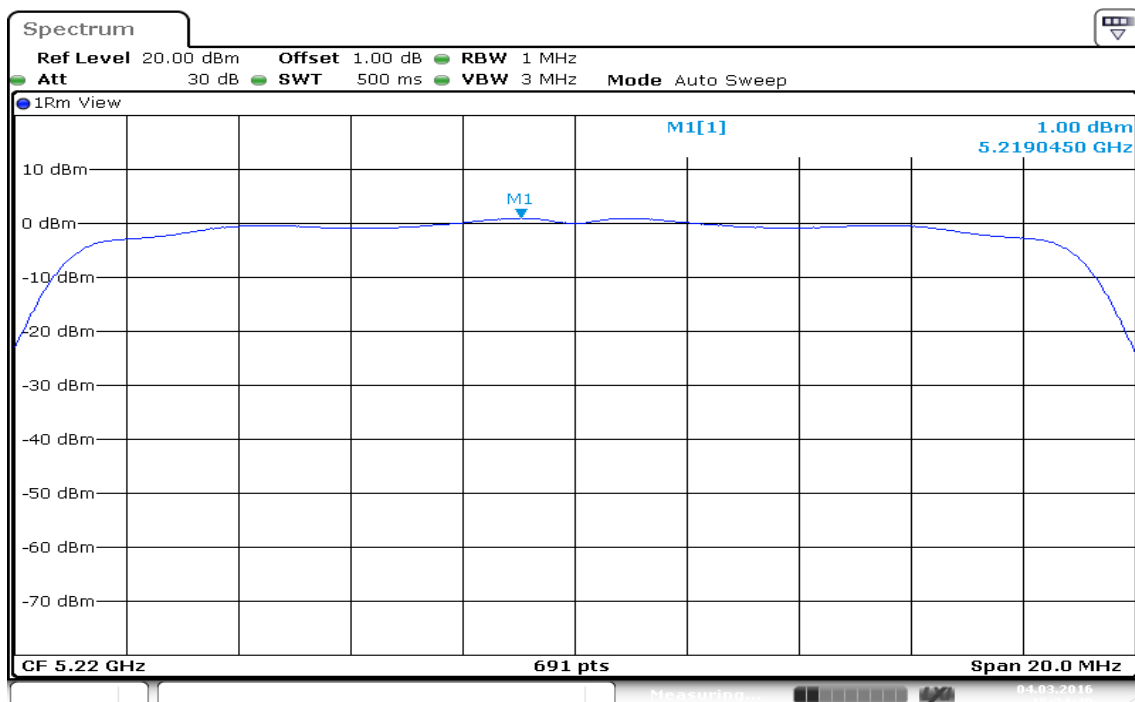
## CH High



Date: 4.MAR.2016 15:24:51

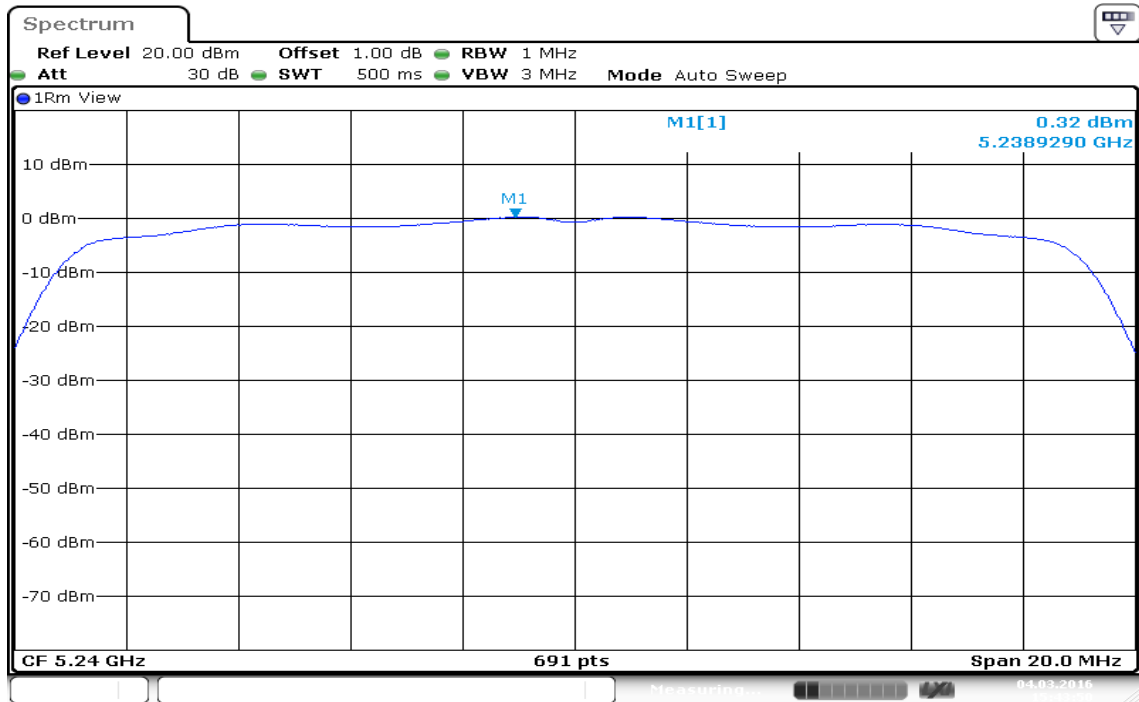
**IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz****CH Low**

Date: 4.MAR.2016 15:31:53

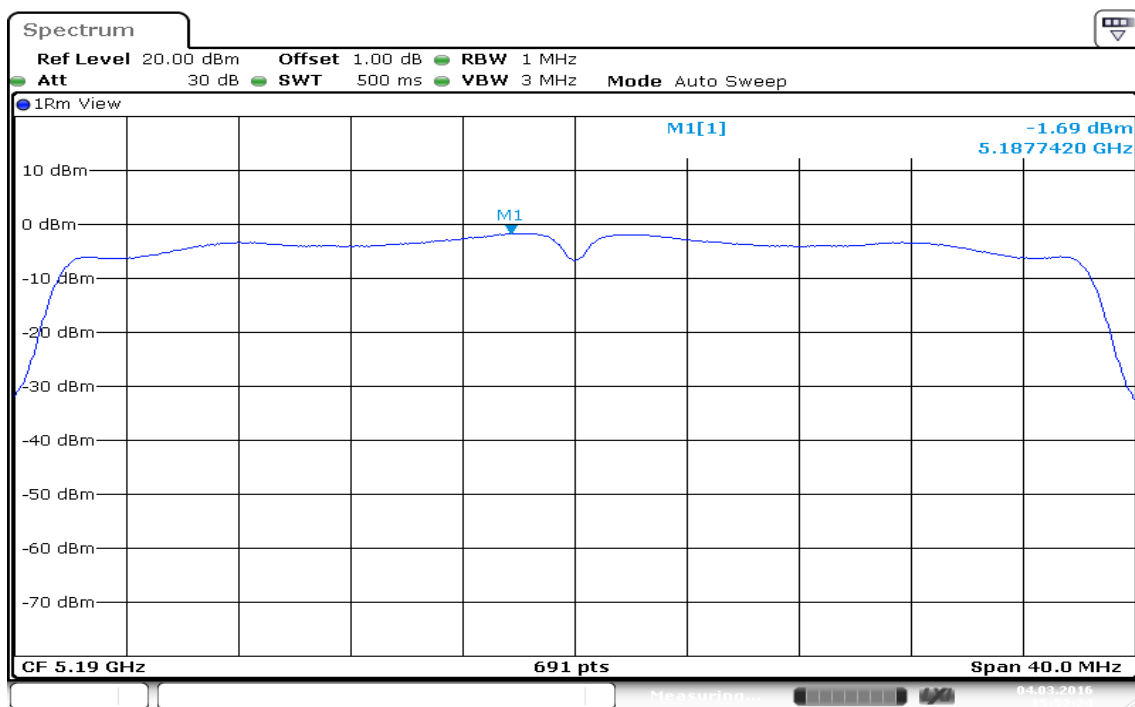
**CH Mid**

Date: 4.MAR.2016 15:34:49

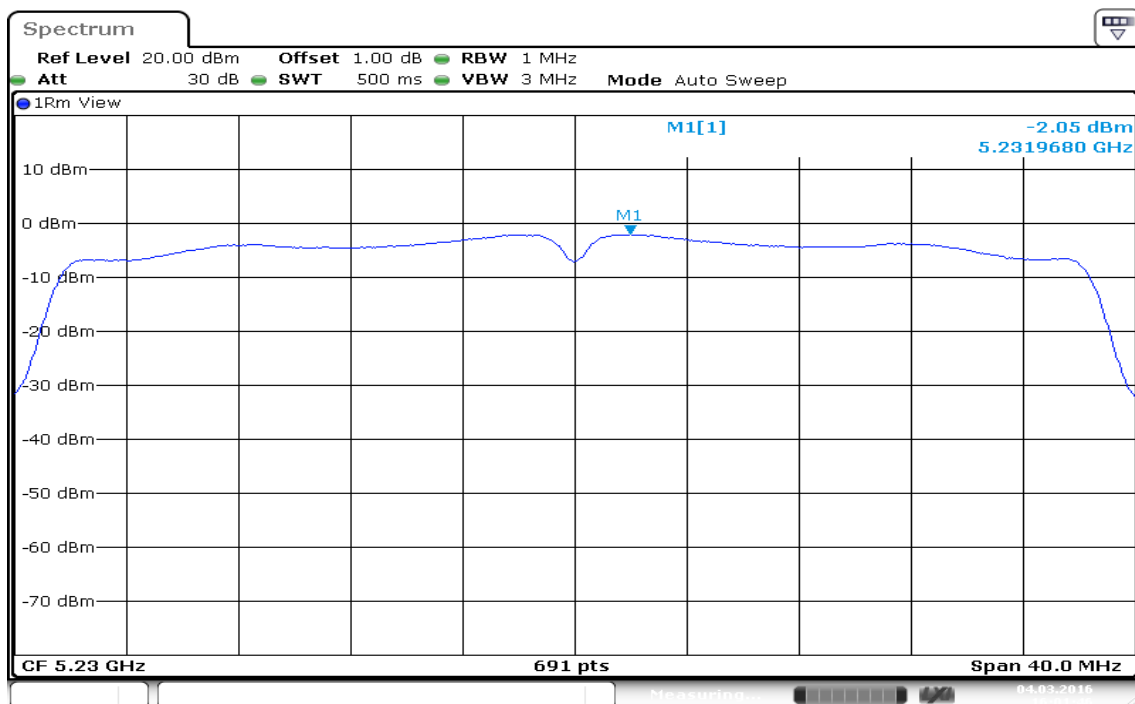
## CH High



Date: 4.MAR.2016 15:43:50

**IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz****CH Low**

Date: 4.MAR.2016 15:52:24

**CH High**

Date: 4.MAR.2016 16:01:46

## 7.5 RADIATED UNDESIRABLE EMISSION

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (μV/m) | Measurement Distance (m) |
|-----------------|-----------------------|--------------------------|
| 30-88           | 100*                  | 3                        |
| 88-216          | 150*                  | 3                        |
| 216-960         | 200*                  | 3                        |
| Above 960       | 500                   | 3                        |

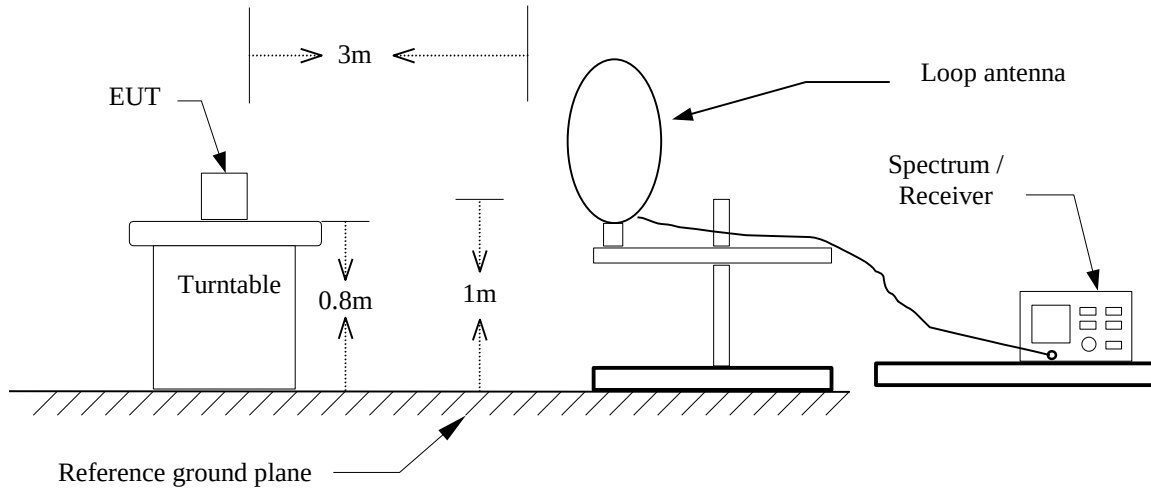
**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections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

2. In the emission table above, the tighter limit applies at the band edges.

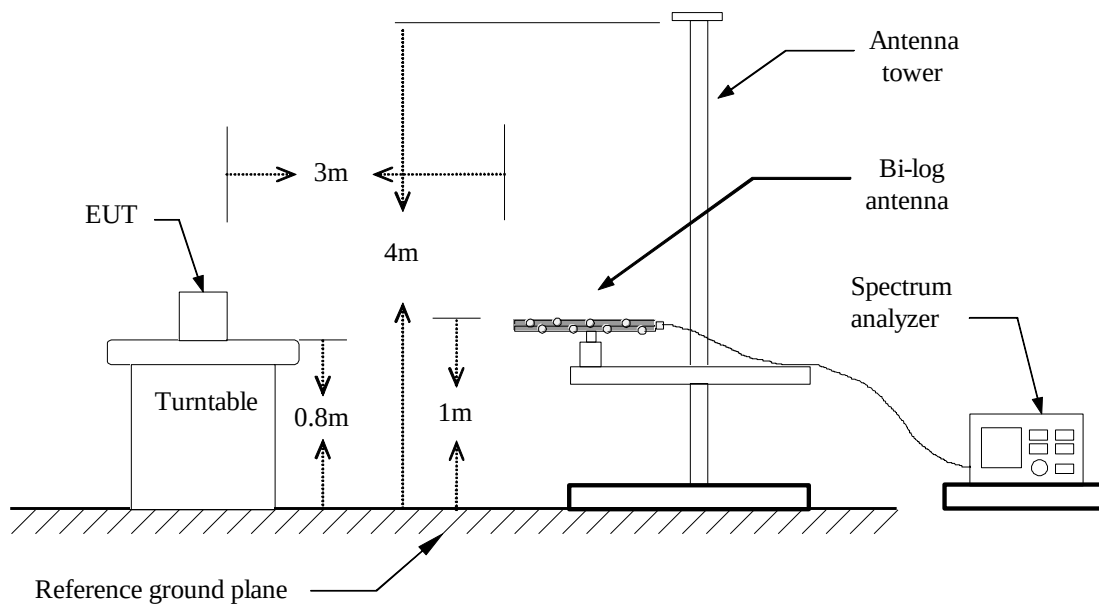
| Frequency (MHz) | Field Strength (μV/m at 3-meter) | Field Strength (dBμV/m at 3-meter) |
|-----------------|----------------------------------|------------------------------------|
| 30-88           | 100                              | 40                                 |
| 88-216          | 150                              | 43.5                               |
| 216-960         | 200                              | 46                                 |
| Above 960       | 500                              | 54                                 |

## Test Configuration

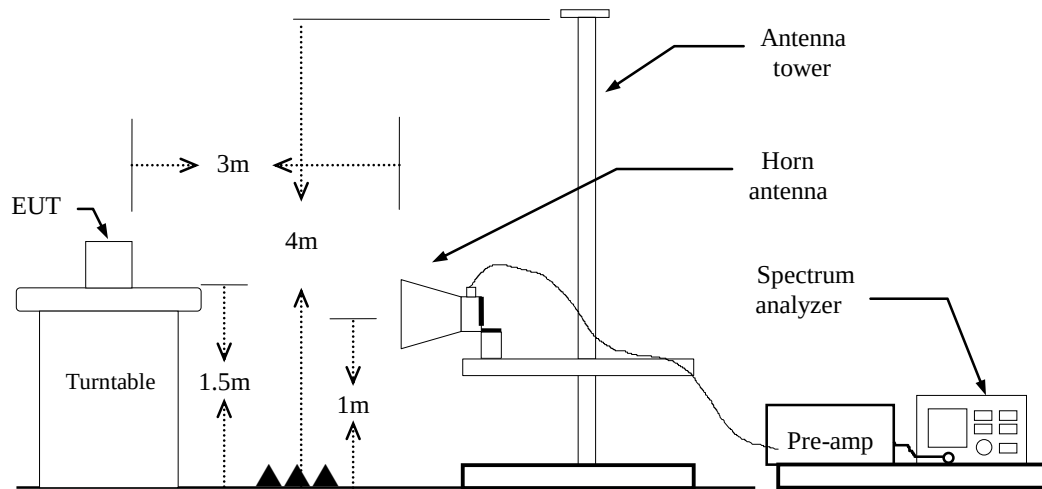
**9kHz ~ 30MHz**



**30MHz ~ 1GHz**



## Above 1 GHz



## **TEST PROCEDURE**

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m high and below 1 GHz is 0.8m high above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m 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. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz,  
if duty cycle  $\geq 98\%$ , VBW=10Hz.

if duty cycle  $< 98\%$  VBW=1/T.

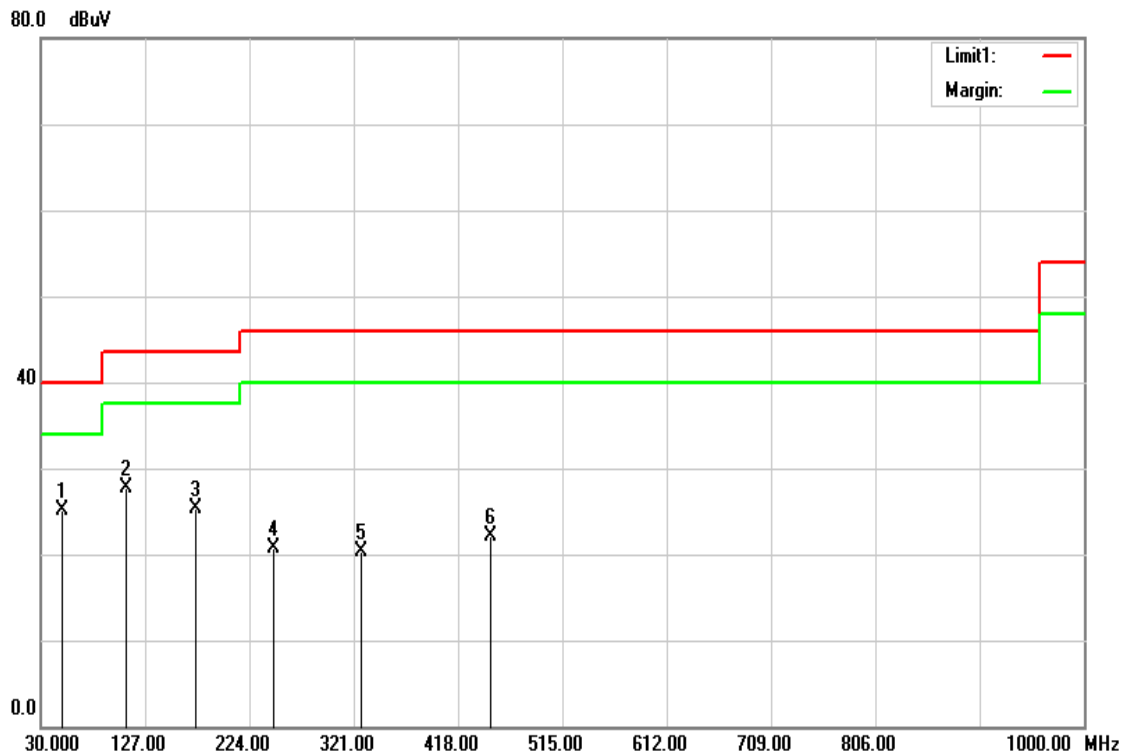
**IEEE 802.11a mode:**  $\geq 98\%$ , VBW=10Hz

**IEEE 802.11n HT 20 MHz mode:**  $\geq 97\%$ , VBW=1.5kHz

**IEEE 802.11n HT 40 MHz mode:**  $\geq 98\%$ , VBW=10Hz

7. Repeat above procedures until the measurements for all frequencies are complete.
8. Result = Spectrum Reading + cable loss(spectrum to Amp) - Amp Gain + Cable loss(Amp to receive Ant)+ Receive Ant

**Note:** We checked every harmonics frequencies from Fundamental frequencies with reduced VBW, and we mark a point to prove pass or not if we find any emission. For this case, there are no emissions hidden in the noise floor.

**Below 1GHz****Operation Mode:** Normal Link**Temperature:** 27°C**Humidity:** 53% RH**Test Date:** March 16, 2016**Tested by:** Jason Lu**Polarity:** Ver.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 50.3700         | 46.27          | -21.11                   | 25.16           | 40.00          | -14.84      | peak   | V               |
| 109.5400        | 45.15          | -17.35                   | 27.80           | 43.50          | -15.70      | peak   | V               |
| 173.5600        | 42.24          | -17.02                   | 25.22           | 43.50          | -18.28      | peak   | V               |
| 246.3100        | 36.97          | -16.36                   | 20.61           | 46.00          | -25.39      | peak   | V               |
| 327.7900        | 33.71          | -13.49                   | 20.22           | 46.00          | -25.78      | peak   | V               |
| 448.0700        | 32.38          | -10.25                   | 22.13           | 46.00          | -23.87      | peak   | V               |

**Remark:**

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).

Operation Mode: Normal Link

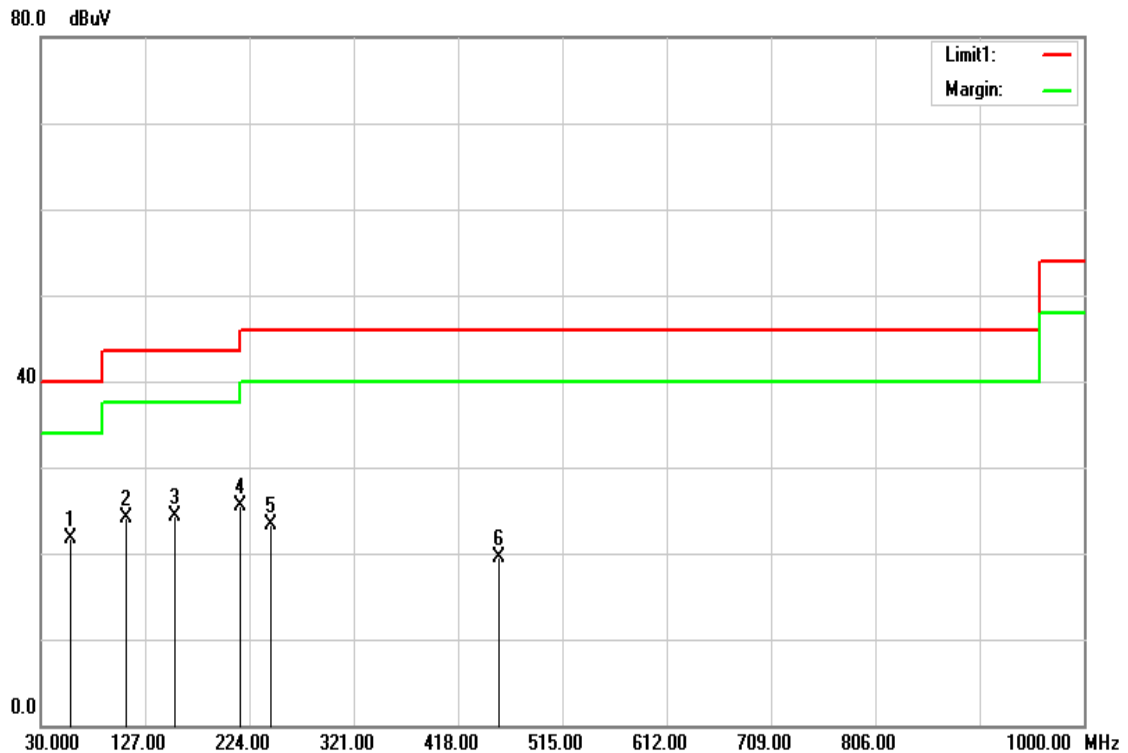
Temperature: 27°C

Humidity: 53% RH

Test Date: March 16, 2016

Tested by: Jason Lu

Polarity: Hor.



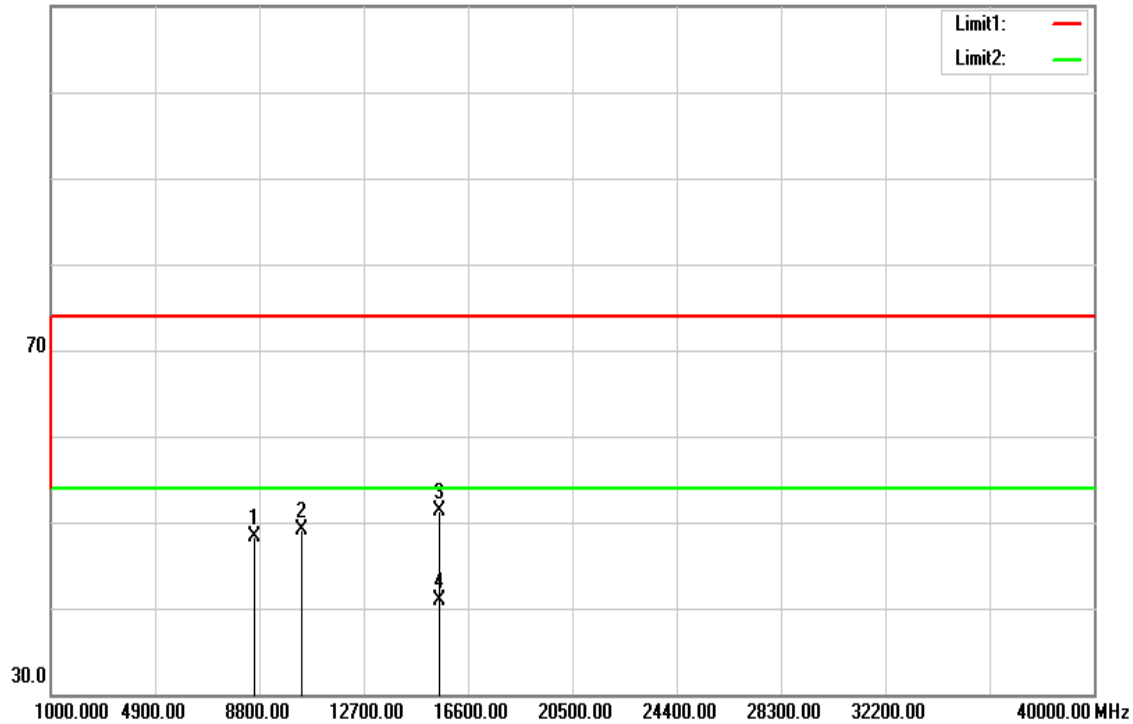
| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 57.1600         | 43.50          | -21.81                   | 21.69           | 40.00          | -18.31      | peak   | H               |
| 109.5400        | 41.41          | -17.35                   | 24.06           | 43.50          | -19.44      | peak   | H               |
| 155.1300        | 40.52          | -16.22                   | 24.30           | 43.50          | -19.20      | peak   | H               |
| 215.2700        | 42.14          | -16.63                   | 25.51           | 43.50          | -17.99      | peak   | H               |
| 243.4000        | 39.68          | -16.43                   | 23.25           | 46.00          | -22.75      | peak   | H               |
| 455.8300        | 29.52          | -10.08                   | 19.44           | 46.00          | -26.56      | peak   | H               |

**Remark:**

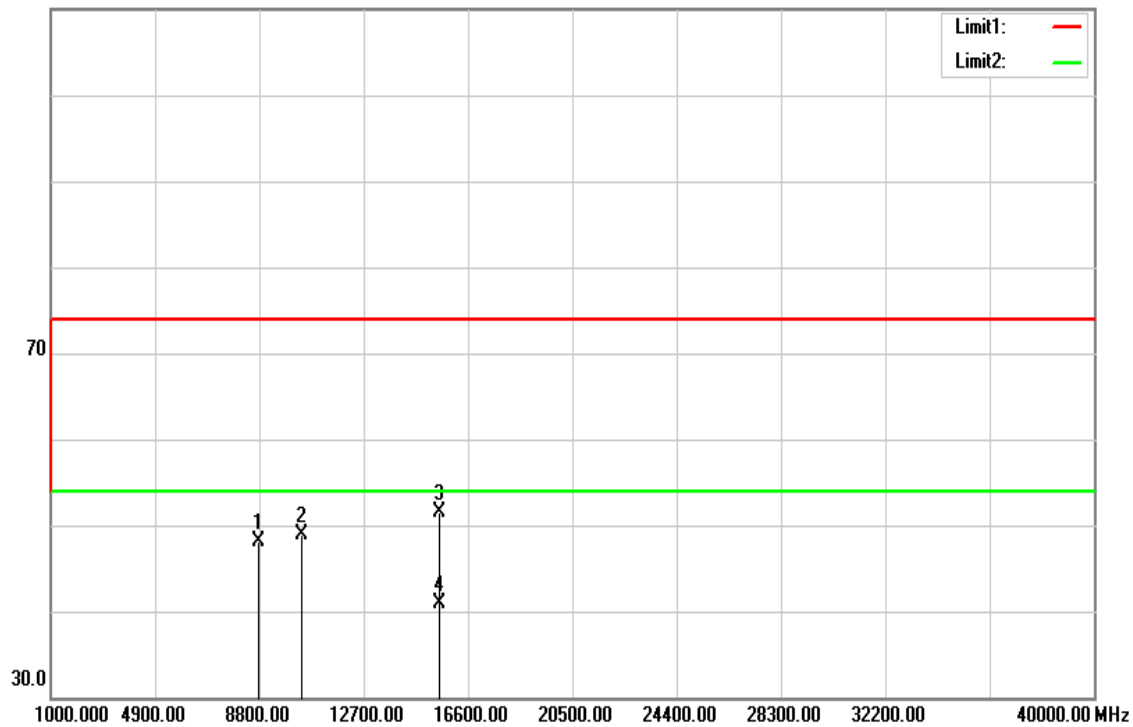
1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).

**Above 1 GHz****Tx / IEEE 802.11a mode / CH Low****Polarity: Vertical**

110.0 dBuV

**Polarity: Horizontal**

110.0 dBuV



**Operation Mode:** Tx / IEEE 802.11a mode / CH Low**Test Date:** March 16, 2016**Temperature:** 27°C**Tested by:** Jason Lu**Humidity:** 53% RH**Polarity:** Ver. / Hor.

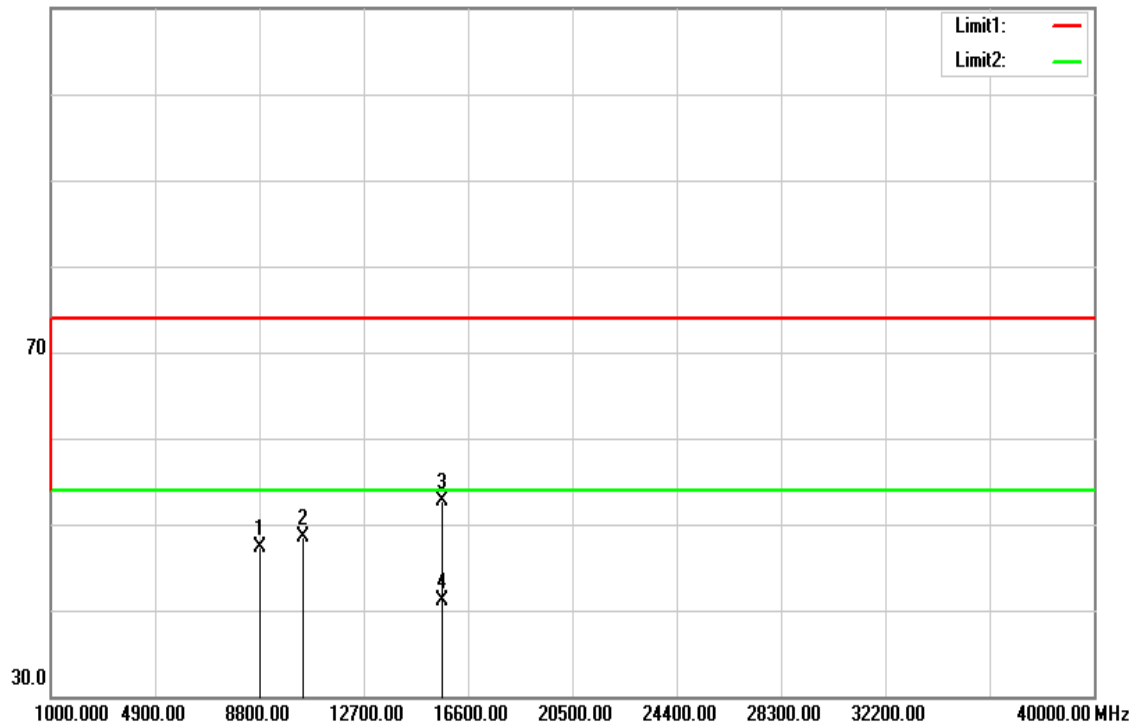
| Frequency (MHz) | Reading (dBuV) | Correction (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant.Pol. (H/V) |
|-----------------|----------------|-------------------|-----------------|----------------|-------------|--------|----------------|
| 8610.000        | 34.57          | 13.69             | 48.26           | 74.00          | -25.74      | peak   | V              |
| 10360.000       | 32.53          | 16.52             | 49.05           | 74.00          | -24.95      | peak   | V              |
| 15540.000       | 32.32          | 19.04             | 51.36           | 74.00          | -22.64      | peak   | V              |
| 15540.000       | 21.81          | 19.04             | 40.85           | 54.00          | -13.15      | AVG    | V              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |
| 8750.000        | 34.37          | 13.75             | 48.12           | 74.00          | -25.88      | peak   | H              |
| 10360.000       | 32.42          | 16.52             | 48.94           | 74.00          | -25.06      | peak   | H              |
| 15540.000       | 32.43          | 19.04             | 51.47           | 74.00          | -22.53      | peak   | H              |
| 15540.000       | 21.82          | 19.04             | 40.86           | 54.00          | -13.14      | AVG    | H              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |

**Remark:**

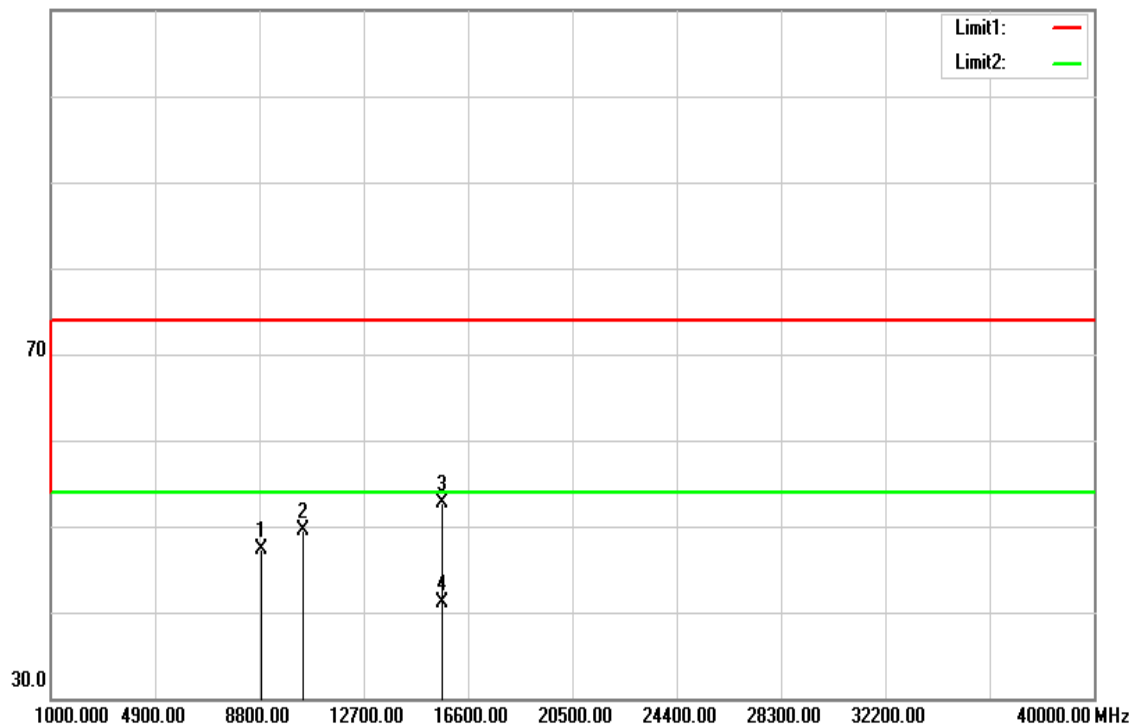
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Tx / IEEE 802.11a mode / CH Mid****Polarity: Vertical**

110.0 dBuV

**Polarity: Horizontal**

110.0 dBuV



**Operation Mode:** Tx / IEEE 802.11a mode / CH Mid

**Test Date:** March 16, 2016

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

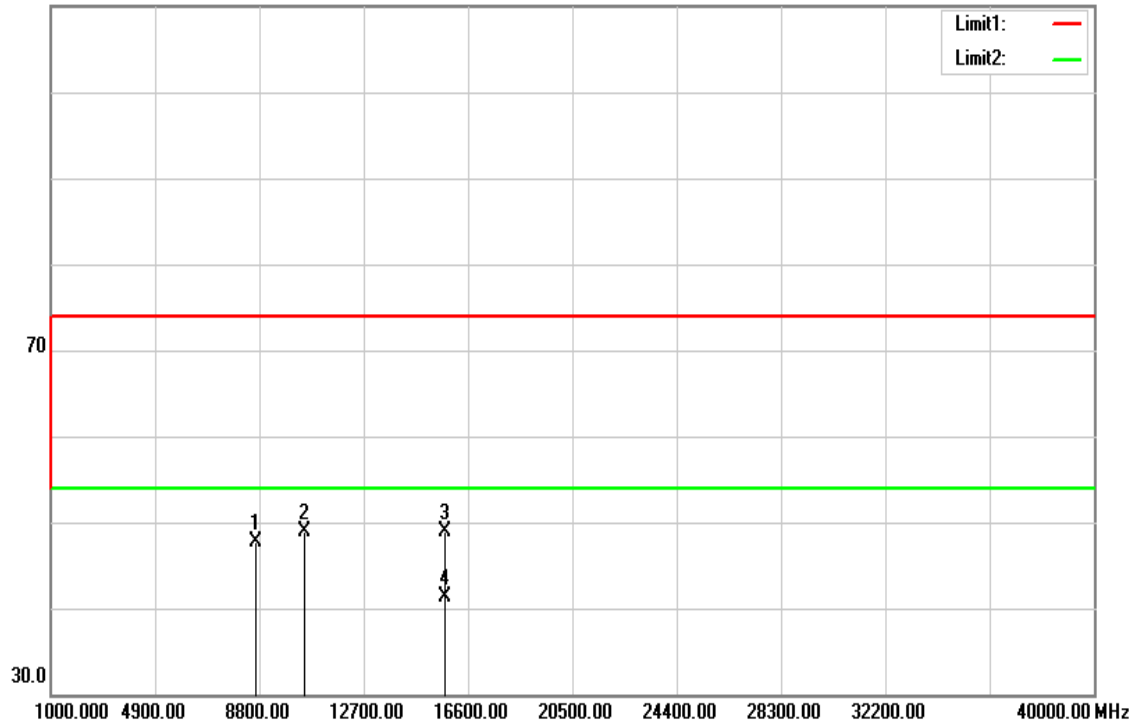
| Frequency (MHz) | Reading (dBuV) | Correction (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant.Pol. (H/V) |
|-----------------|----------------|-------------------|-----------------|----------------|-------------|--------|----------------|
| 8814.000        | 33.47          | 13.78             | 47.25           | 74.00          | -26.75      | peak   | V              |
| 10440.000       | 31.70          | 16.89             | 48.59           | 74.00          | -25.41      | peak   | V              |
| 15660.000       | 33.60          | 19.14             | 52.74           | 74.00          | -21.26      | peak   | V              |
| 15660.000       | 21.97          | 19.14             | 41.11           | 54.00          | -12.89      | AVG    | V              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |
| 8865.000        | 33.46          | 13.81             | 47.27           | 74.00          | -26.73      | peak   | H              |
| 10440.000       | 32.55          | 16.89             | 49.44           | 74.00          | -24.56      | peak   | H              |
| 15660.000       | 33.53          | 19.14             | 52.67           | 74.00          | -21.33      | peak   | H              |
| 15660.000       | 21.97          | 19.14             | 41.11           | 54.00          | -12.89      | AVG    | H              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |

**Remark:**

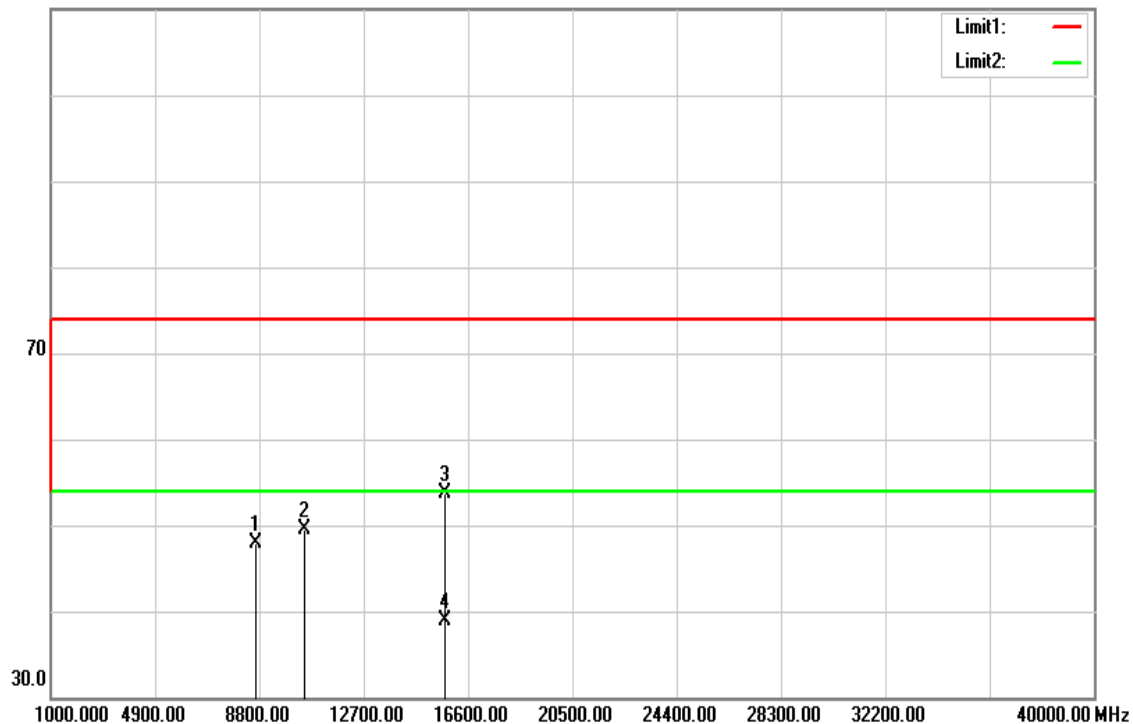
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Tx / IEEE 802.11a mode / CH High****Polarity: Vertical**

110.0 dBuV

**Polarity: Horizontal**

110.0 dBuV



**Operation Mode:** Tx / IEEE 802.11a mode / CH High**Test Date:** March 16, 2016**Temperature:** 27°C**Tested by:** Jason Lu**Humidity:** 53% RH**Polarity:** Ver. / Hor.

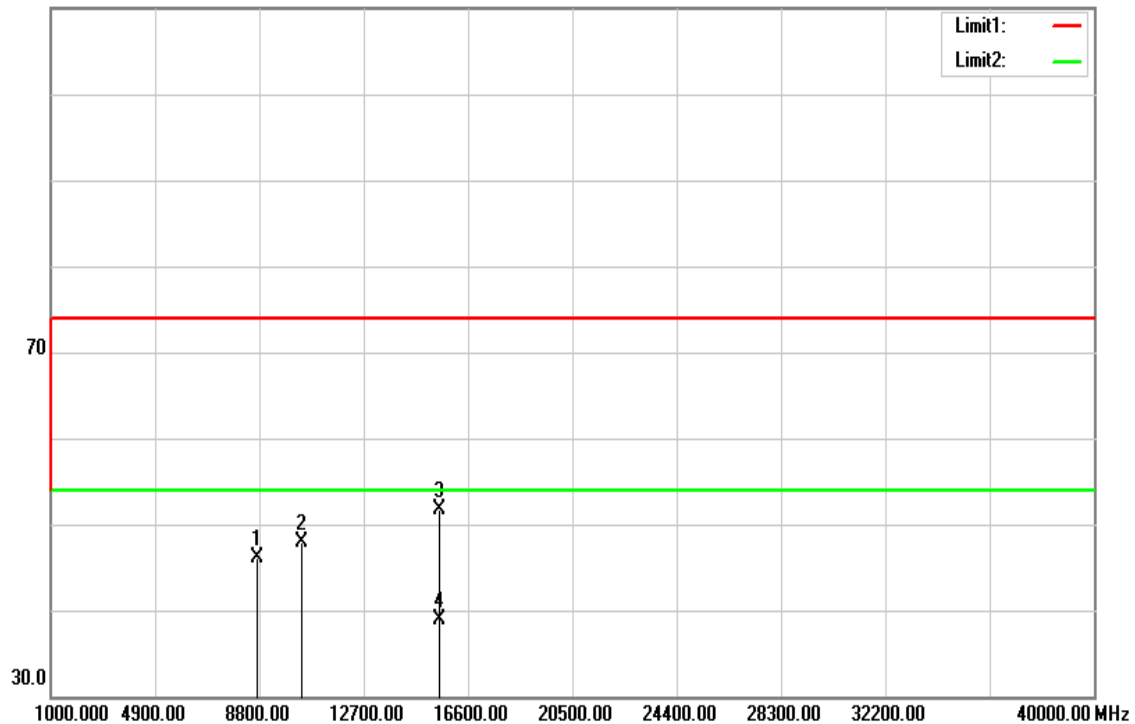
| Frequency (MHz) | Reading (dBuV) | Correction (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant.Pol. (H/V) |
|-----------------|----------------|-------------------|-----------------|----------------|-------------|--------|----------------|
| 8690.000        | 34.02          | 13.73             | 47.75           | 74.00          | -26.25      | peak   | V              |
| 10480.000       | 31.84          | 17.07             | 48.91           | 74.00          | -25.09      | peak   | V              |
| 15720.000       | 29.72          | 19.19             | 48.91           | 74.00          | -25.09      | peak   | V              |
| 15720.000       | 22.04          | 19.19             | 41.23           | 54.00          | -12.77      | AVG    | V              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |
| 8650.000        | 34.12          | 13.71             | 47.83           | 74.00          | -26.17      | peak   | H              |
| 10480.000       | 32.34          | 17.07             | 49.41           | 74.00          | -24.59      | peak   | H              |
| 15720.000       | 34.51          | 19.19             | 53.70           | 74.00          | -20.30      | peak   | H              |
| 15720.000       | 19.65          | 19.19             | 38.84           | 54.00          | -15.16      | AVG    | H              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |

**Remark:**

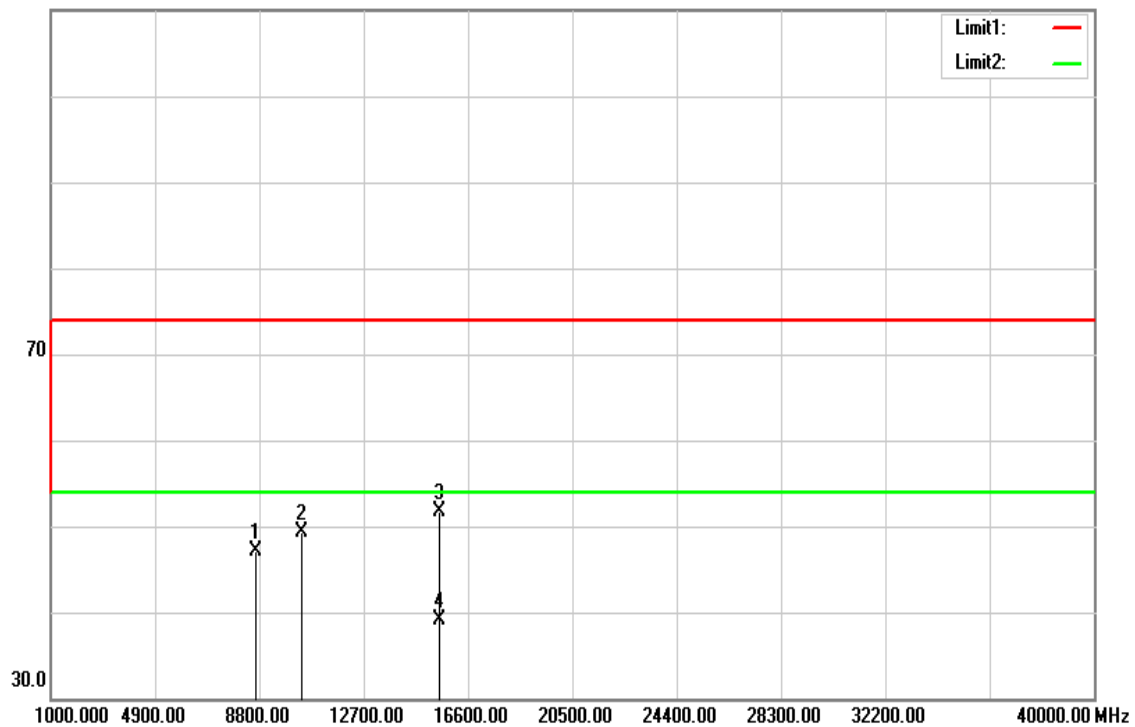
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Tx / IEEE 802.11n HT 20 MHz mode / CH Low****Polarity: Vertical**

110.0 dBuV

**Polarity: Horizontal**

110.0 dBuV



**Operation Mode:** Tx / IEEE 802.11n HT 20 MHz mode / CH Low **Test Date:** March 16, 2016

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant.Pol. (H/V) |
|-----------------|----------------|-------------------|-----------------|----------------|-------------|--------|----------------|
| 8740.000        | 32.44          | 13.75             | 46.19           | 74.00          | -27.81      | peak   | V              |
| 10360.000       | 31.43          | 16.52             | 47.95           | 74.00          | -26.05      | peak   | V              |
| 15540.000       | 32.75          | 19.04             | 51.79           | 74.00          | -22.21      | peak   | V              |
| 15540.000       | 19.91          | 19.04             | 38.95           | 54.00          | -15.05      | AVG    | V              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |
| 8690.000        | 33.36          | 13.73             | 47.09           | 74.00          | -26.91      | peak   | H              |
| 10360.000       | 32.70          | 16.52             | 49.22           | 74.00          | -24.78      | peak   | H              |
| 15540.000       | 32.64          | 19.04             | 51.68           | 74.00          | -22.32      | peak   | H              |
| 15540.000       | 20.06          | 19.04             | 39.10           | 54.00          | -14.90      | AVG    | H              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |

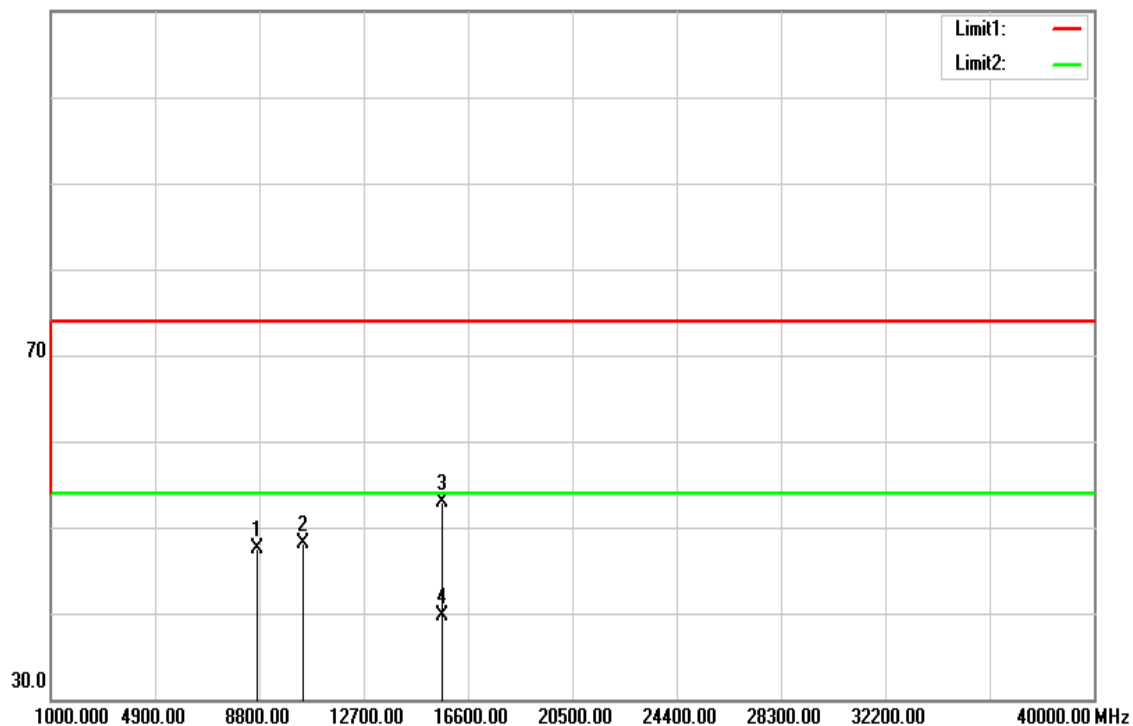
**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Tx / IEEE 802.11n HT 20 MHz Channel mode / CH Mid**

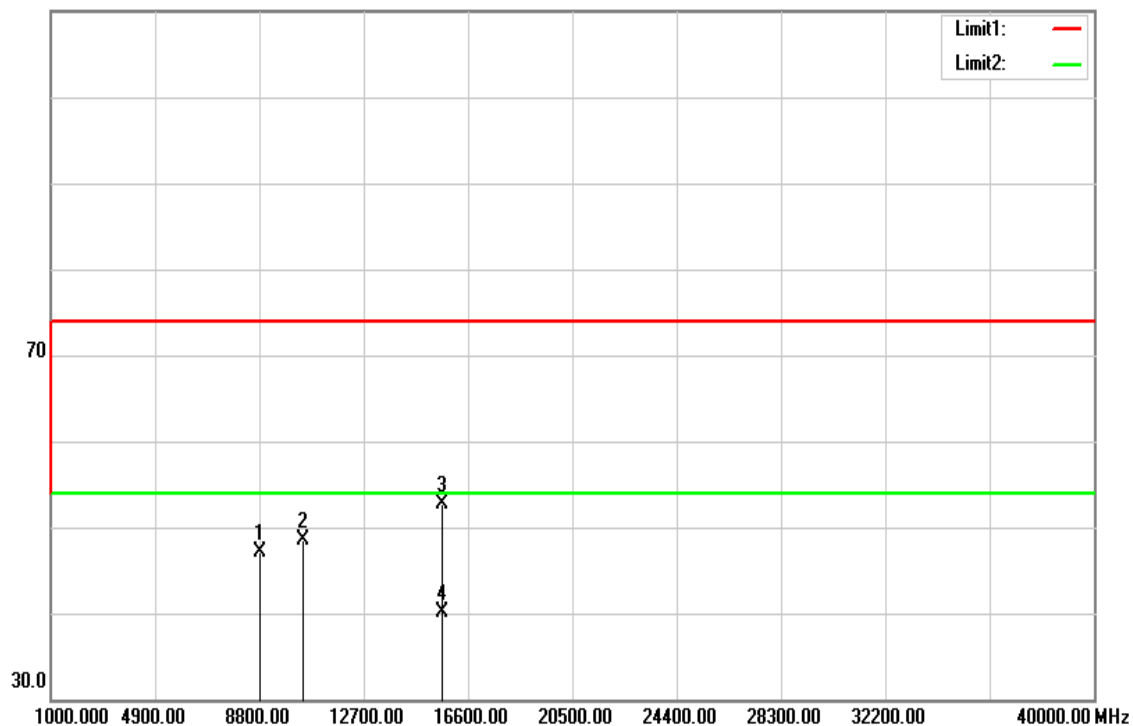
**Polarity: Vertical**

110.0 dBuV



**Polarity: Horizontal**

110.0 dBuV



**Operation Mode:** Tx / IEEE 802.11n HT 20 MHz mode / CH Mid **Test Date:** March 16, 2016

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

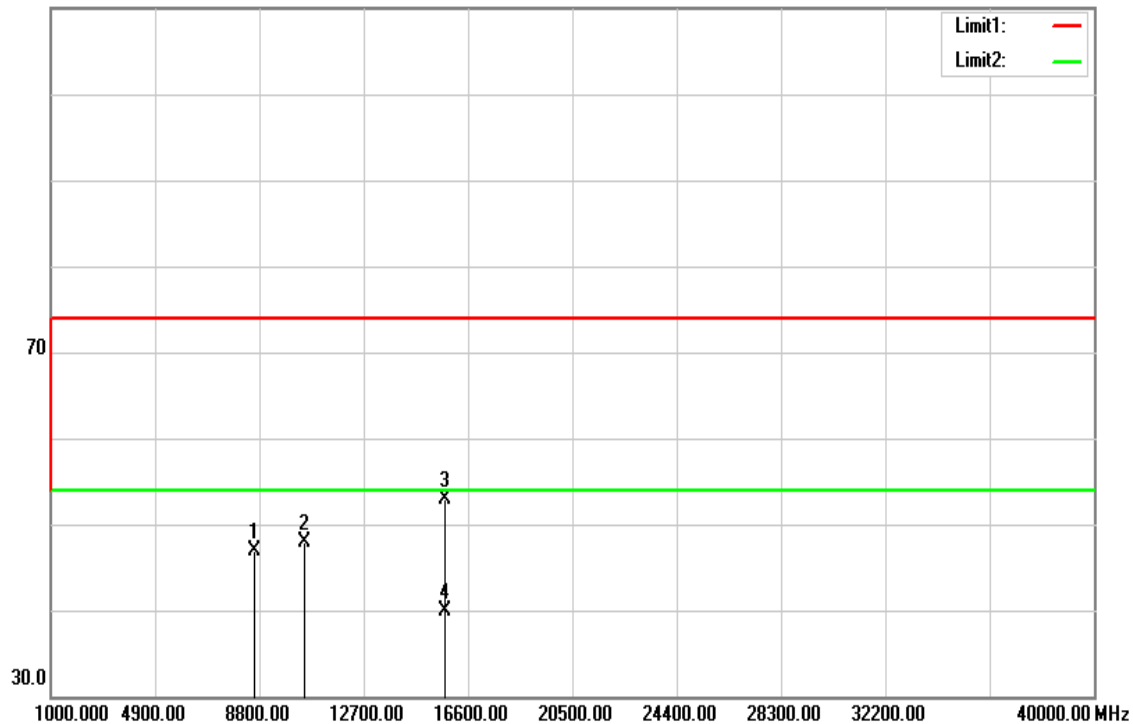
| Frequency (MHz) | Reading (dBuV) | Correction (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant.Pol. (H/V) |
|-----------------|----------------|-------------------|-----------------|----------------|-------------|--------|----------------|
| 8700.000        | 33.83          | 13.73             | 47.56           | 74.00          | -26.44      | peak   | V              |
| 10440.000       | 31.13          | 16.89             | 48.02           | 74.00          | -25.98      | peak   | V              |
| 15660.000       | 33.75          | 19.14             | 52.89           | 74.00          | -21.11      | peak   | V              |
| 15660.000       | 20.66          | 19.14             | 39.80           | 54.00          | -14.20      | AVG    | V              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |
| 8800.000        | 33.26          | 13.78             | 47.04           | 74.00          | -26.96      | peak   | H              |
| 10440.000       | 31.52          | 16.89             | 48.41           | 74.00          | -25.59      | peak   | H              |
| 15660.000       | 33.58          | 19.14             | 52.72           | 74.00          | -21.28      | peak   | H              |
| 15660.000       | 21.03          | 19.14             | 40.17           | 54.00          | -13.83      | AVG    | H              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |

**Remark:**

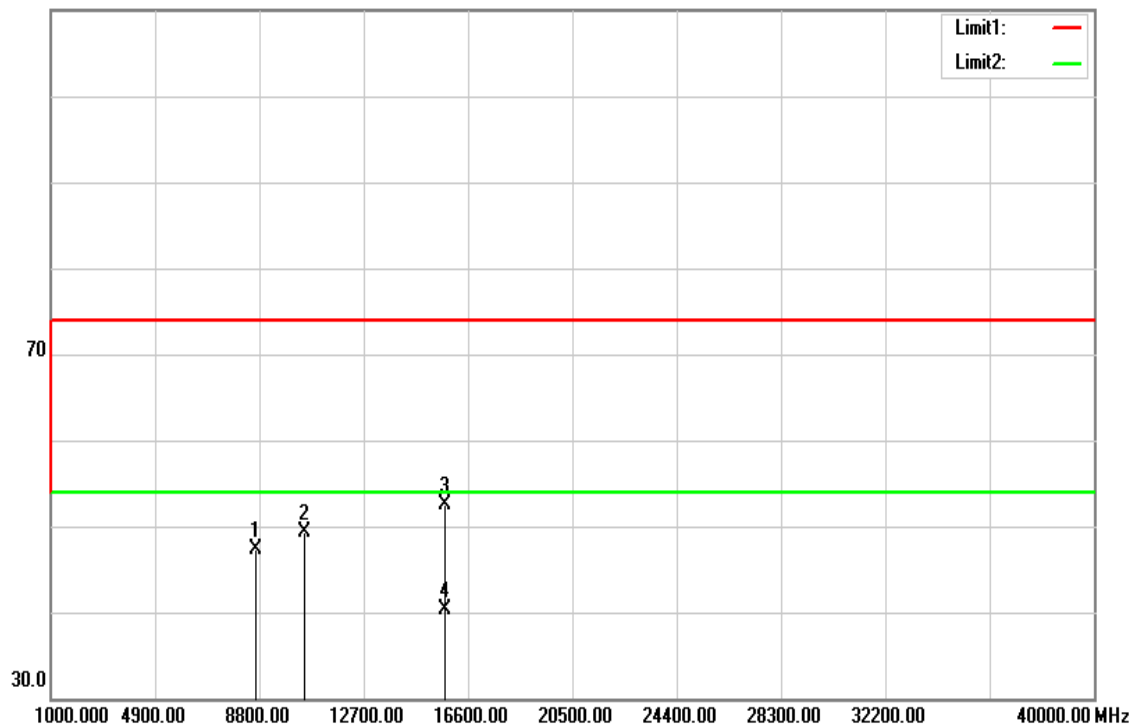
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Tx / IEEE 802.11n HT 20 MHz mode / CH High****Polarity: Vertical**

110.0 dBuV

**Polarity: Horizontal**

110.0 dBuV



**Operation Mode:** Tx / IEEE 802.11n HT 20 MHz mode / CH High **Test Date:** March 16, 2016

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

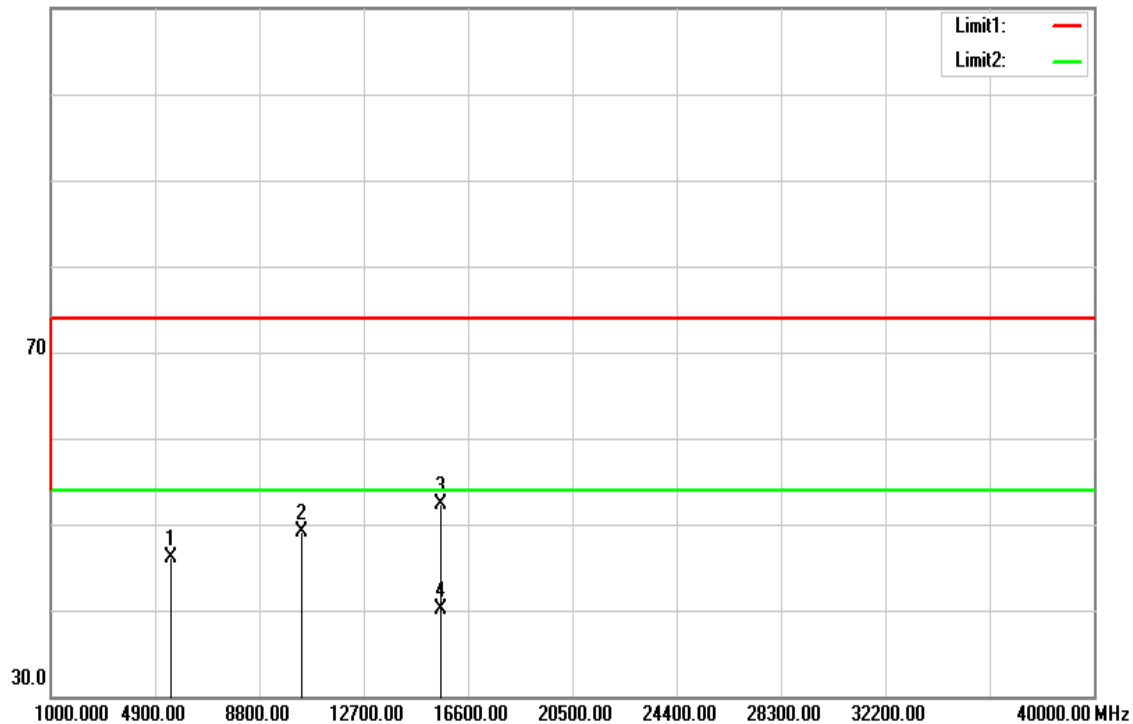
| Frequency (MHz) | Reading (dBuV) | Correction (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant.Pol. (H/V) |
|-----------------|----------------|-------------------|-----------------|----------------|-------------|--------|----------------|
| 8610.000        | 33.19          | 13.69             | 46.88           | 74.00          | -27.12      | peak   | V              |
| 10480.000       | 30.79          | 17.07             | 47.86           | 74.00          | -26.14      | peak   | V              |
| 15720.000       | 33.67          | 19.19             | 52.86           | 74.00          | -21.14      | peak   | V              |
| 15720.000       | 20.65          | 19.19             | 39.84           | 54.00          | -14.16      | AVG    | V              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |
| 8650.000        | 33.56          | 13.71             | 47.27           | 74.00          | -26.73      | peak   | H              |
| 10480.000       | 32.24          | 17.07             | 49.31           | 74.00          | -24.69      | peak   | H              |
| 15720.000       | 33.30          | 19.19             | 52.49           | 74.00          | -21.51      | peak   | H              |
| 15720.000       | 21.01          | 19.19             | 40.20           | 54.00          | -13.80      | AVG    | H              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |

**Remark:**

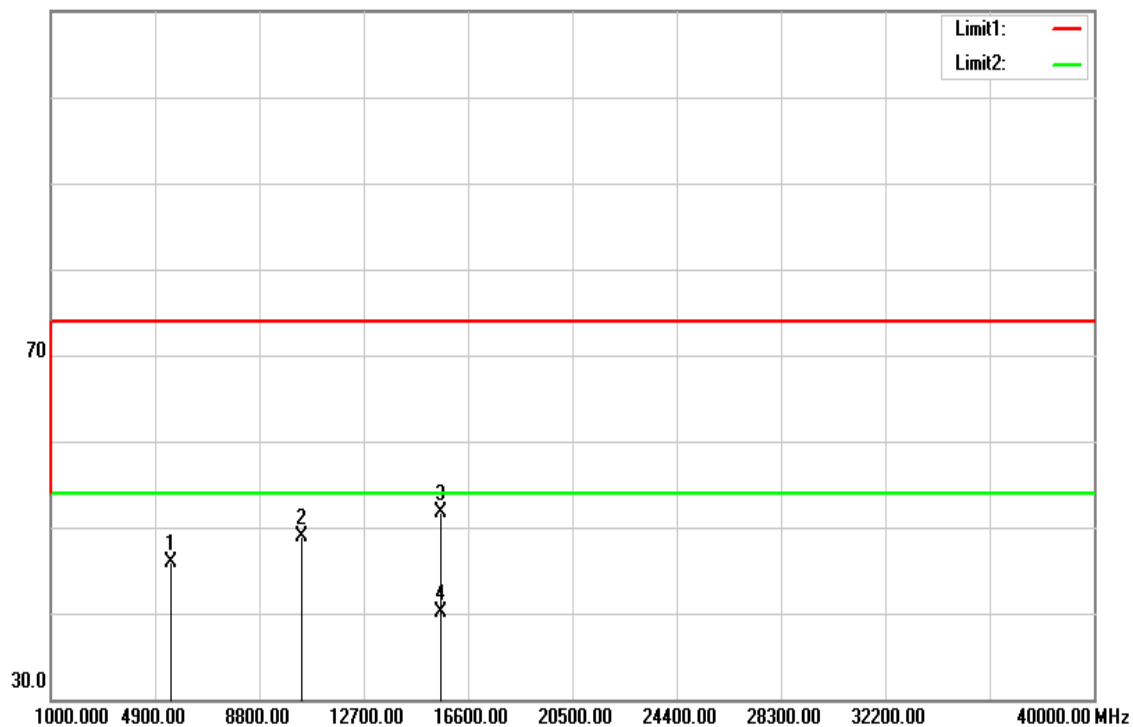
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Tx / IEEE 802.11n HT 40 MHz mode / CH Low****Polarity: Vertical**

110.0 dBuV/m

**Polarity: Horizontal**

110.0 dBuV/m



**Operation Mode:** Tx / IEEE 802.11n HT 40 MHz mode / CH Low **Test Date:** February 26, 2016

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

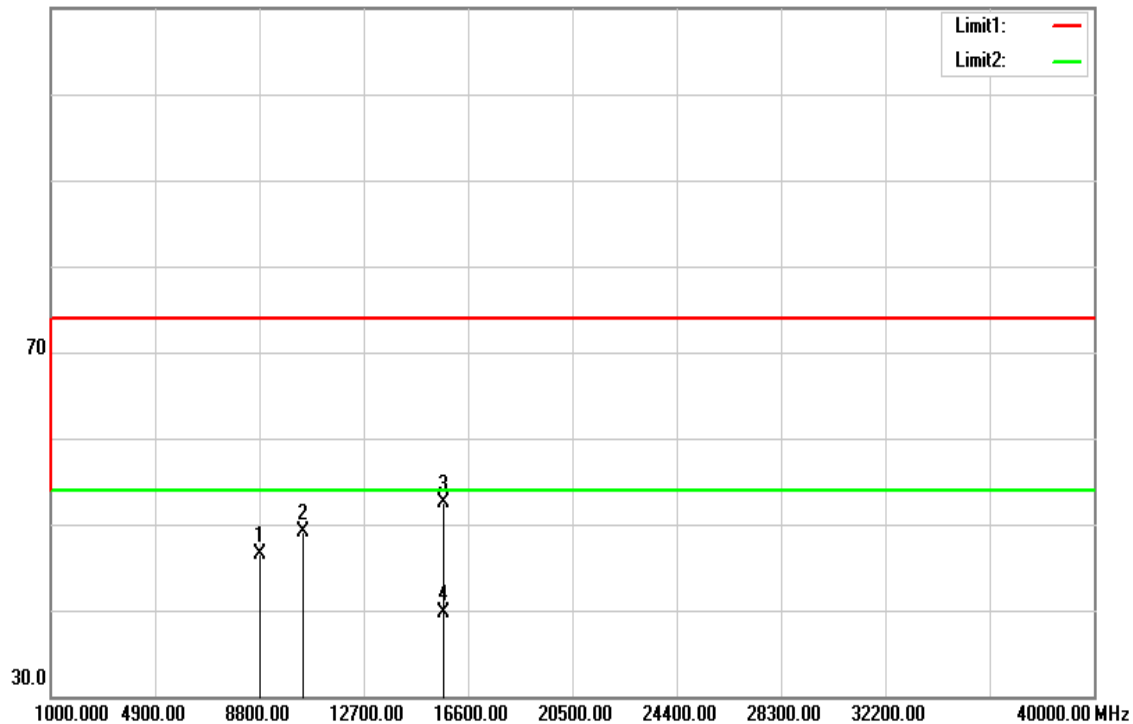
| Frequency (MHz) | Reading (dBuV) | Correction (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant.Pol. (H/V) |
|-----------------|----------------|-------------------|-----------------|----------------|-------------|--------|----------------|
| 5490.000        | 40.82          | 5.30              | 46.12           | 74.00          | -27.88      | peak   | V              |
| 10380.000       | 32.42          | 16.62             | 49.04           | 74.00          | -24.96      | peak   | V              |
| 15570.000       | 33.23          | 19.07             | 52.30           | 74.00          | -21.70      | peak   | V              |
| 15570.000       | 21.08          | 19.07             | 40.15           | 54.00          | -13.85      | AVG    | V              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |
| 5480.000        | 40.52          | 5.34              | 45.86           | 74.00          | -28.14      | peak   | H              |
| 10380.000       | 32.22          | 16.62             | 48.84           | 74.00          | -25.16      | peak   | H              |
| 15570.000       | 32.64          | 19.07             | 51.71           | 74.00          | -22.29      | peak   | H              |
| 15570.000       | 21.07          | 19.07             | 40.14           | 54.00          | -13.86      | AVG    | H              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |

**Remark:**

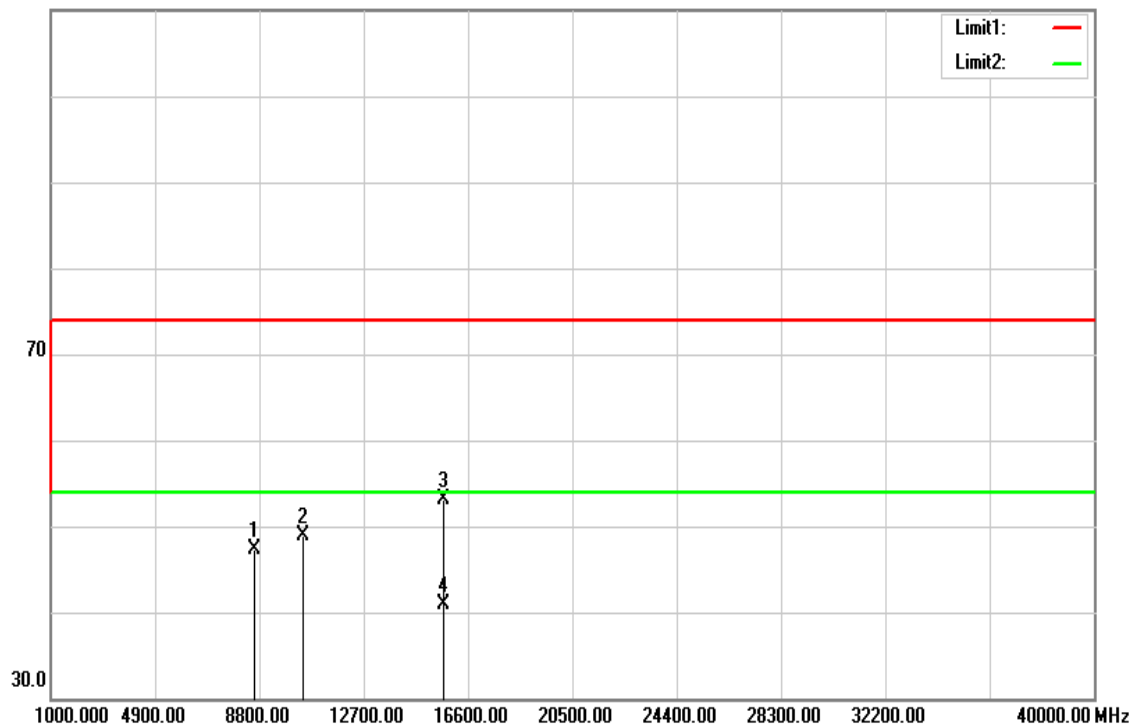
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Tx / IEEE 802.11n HT 40 MHz mode / CH High****Polarity: Vertical**

110.0 dBuV

**Polarity: Horizontal**

110.0 dBuV



**Operation Mode:** Tx / IEEE 802.11n HT 40 MHz mode / CH High **Test Date:** March 16, 2016

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant.Pol. (H/V) |
|-----------------|----------------|-------------------|-----------------|----------------|-------------|--------|----------------|
| 8810.000        | 32.71          | 13.78             | 46.49           | 74.00          | -27.51      | peak   | V              |
| 10460.000       | 32.12          | 16.98             | 49.10           | 74.00          | -24.90      | peak   | V              |
| 15690.000       | 33.24          | 19.17             | 52.41           | 74.00          | -21.59      | peak   | V              |
| 15690.000       | 20.62          | 19.17             | 39.79           | 54.00          | -14.21      | AVG    | V              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |
| 8617.000        | 33.65          | 13.69             | 47.34           | 74.00          | -26.66      | peak   | H              |
| 10460.000       | 32.02          | 16.98             | 49.00           | 74.00          | -25.00      | peak   | H              |
| 15690.000       | 33.88          | 19.17             | 53.05           | 74.00          | -20.95      | peak   | H              |
| 15690.000       | 21.64          | 19.17             | 40.81           | 54.00          | -13.19      | AVG    | H              |
| N/A             |                |                   |                 |                |             |        |                |
|                 |                |                   |                 |                |             |        |                |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

## 7.6 POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a) & RSS-Gen §7.2.4, except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency Range<br>(MHz) | Limits<br>(dBµV) |           |
|--------------------------|------------------|-----------|
|                          | Quasi-peak       | Average   |
| 0.15 to 0.50             | 66 to 56*        | 56 to 46* |
| 0.50 to 5                | 56               | 46        |
| 5 to 30                  | 60               | 50        |

\* Decreases with the logarithm of the frequency.

### Test Configuration

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

### TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

**Test results**

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

**Test Data**

**Operation Mode:** Normal Link      **Test Date:** March 25, 2016  
**Temperature:** 24°C      **Tested by:** Dennis Li  
**Humidity:** 56% RH

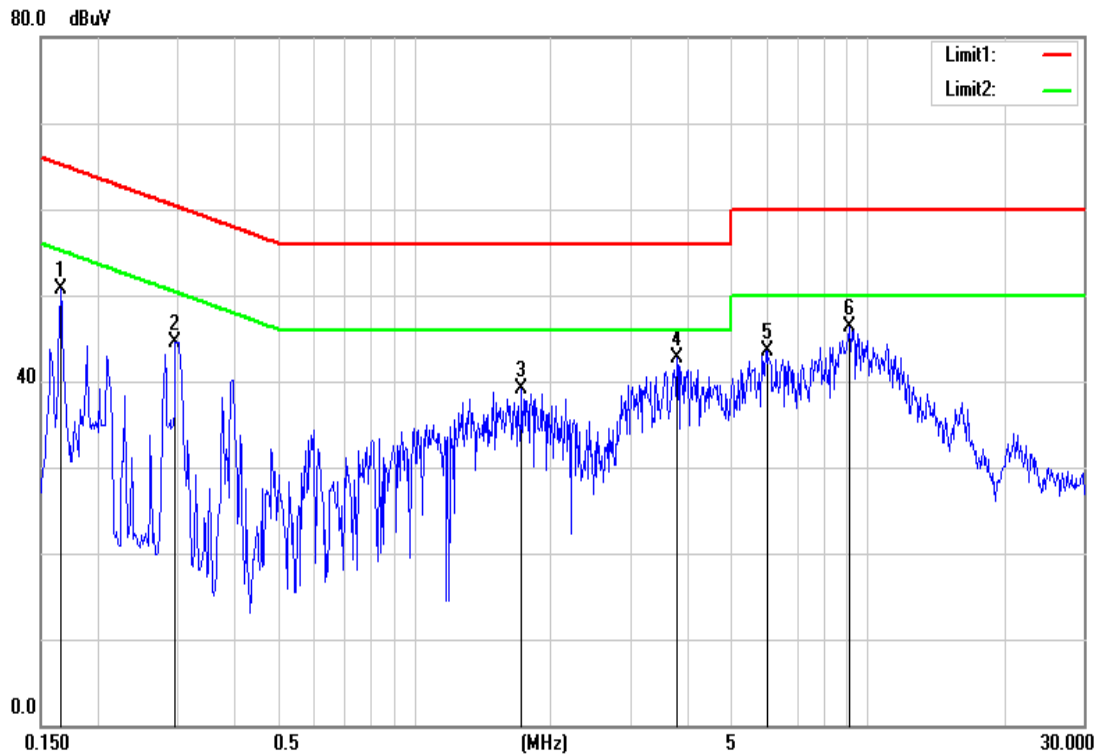
| Freq. (MHz) | QP Reading (dBuV) | AV Reading (dBuV) | Corr. factor (dB/m) | QP Result (dBuV/m) | AV Result (dBuV/m) | QP Limit (dBuV) | AV Limit (dBuV) | QP Margin (dB) | AV Margin (dB) | Note |
|-------------|-------------------|-------------------|---------------------|--------------------|--------------------|-----------------|-----------------|----------------|----------------|------|
| 0.1660      | 41.08             | 41.08             | 9.69                | 50.77              | 50.77              | 65.15           | 55.16           | -14.38         | -4.39          | L1   |
| 0.2980      | 34.85             | 34.85             | 9.68                | 44.53              | 44.53              | 60.30           | 50.30           | -15.77         | -5.77          | L1   |
| 1.7340      | 29.09             | 29.09             | 9.96                | 39.05              | 39.05              | 56.00           | 46.00           | -16.95         | -6.95          | L1   |
| 3.8140      | 32.88             | 32.88             | 9.82                | 42.70              | 42.70              | 56.00           | 46.00           | -13.30         | -3.30          | L1   |
| 6.0140      | 33.71             | 33.71             | 9.86                | 43.57              | 43.57              | 60.00           | 50.00           | -16.43         | -6.43          | L1   |
| 9.1340      | 36.41             | 36.41             | 9.92                | 46.33              | 46.33              | 60.00           | 50.00           | -13.67         | -3.67          | L1   |
| 0.1700      | 40.98             | 40.98             | 9.64                | 50.62              | 50.62              | 64.96           | 54.96           | -14.34         | -4.34          | L2   |
| 0.1900      | 39.24             | 39.24             | 9.64                | 48.88              | 48.88              | 64.03           | 54.04           | -15.15         | -5.16          | L2   |
| 0.2980      | 36.91             | 36.91             | 9.64                | 46.55              | 46.55              | 60.30           | 50.30           | -13.75         | -3.75          | L2   |
| 1.7780      | 29.02             | 29.02             | 9.89                | 38.91              | 38.91              | 56.00           | 46.00           | -17.09         | -7.09          | L2   |
| 8.9020      | 35.95             | 35.95             | 9.89                | 45.84              | 45.84              | 60.00           | 50.00           | -14.16         | -4.16          | L2   |
| 9.6500      | 35.69             | 35.69             | 9.91                | 45.60              | 45.60              | 60.00           | 50.00           | -14.40         | -4.40          | L2   |

**Remark:**

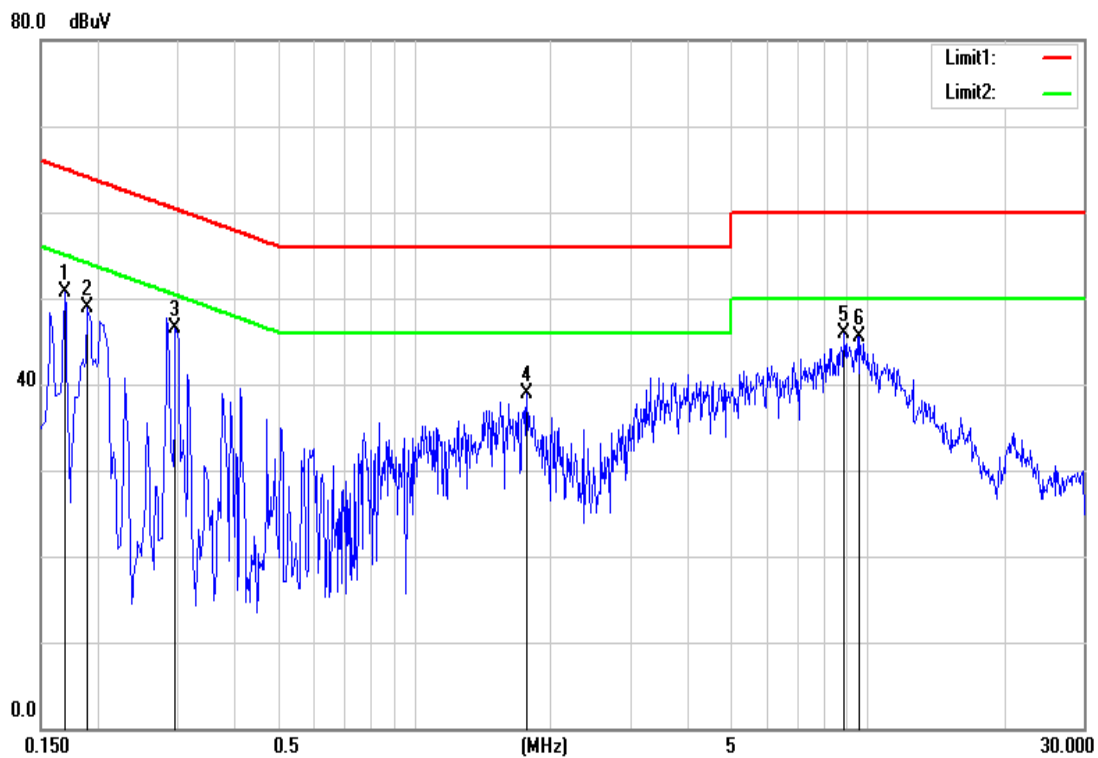
1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10 kHz; the IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9 kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

## Test Plots

### Conducted emissions (Line 1)



### Conducted emissions (Line 2)

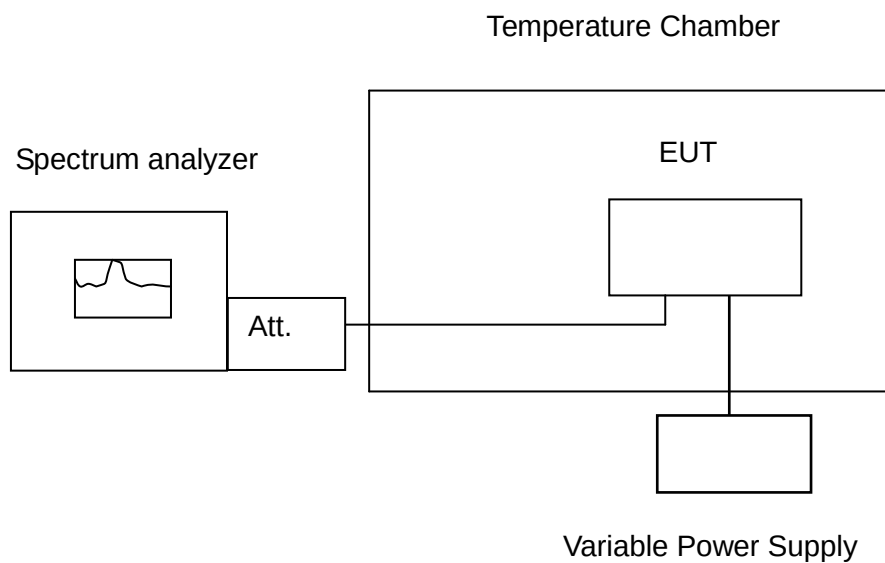


## 7.7 FREQUENCY STABILITY

### LIMIT

According to §15.407(g) & RSS-247, 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 operational description.

### Test Configuration



**Remark:** Measurement setup for testing on Antenna connector

## **TEST PROCEDURE**

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

## **TEST RESULTS**

*No non-compliance noted.*

### **5220 MHz:**

| Operating Frequency: 5220 MHz |             |                          |              |             |
|-------------------------------|-------------|--------------------------|--------------|-------------|
| Environment Temperature (°C)  | Voltage (V) | Measured Frequency (MHz) | Limit        | Result      |
|                               |             |                          | ±20ppm       | (Pass/Fail) |
| 50                            | 5           | 5220.007810              | 1.496168582  | Pass        |
| 40                            | 5           | 5219.981330              | -3.576628353 | Pass        |
| 30                            | 5           | 5219.968740              | -5.988505747 | Pass        |
| 20                            | 5           | 5219.968310              | -6.070881226 | Pass        |
| 10                            | 5           | 5219.976990              | -4.408045977 | Pass        |
| 0                             | 5           | 5219.990880              | -1.747126437 | Pass        |
| -10                           | 5           | 5220.001300              | 0.249042146  | Pass        |
| -20                           | 5           | 5220.014330              | 2.745210728  | Pass        |

| Operating Frequency: 5220 MHz |             |                          |              |             |
|-------------------------------|-------------|--------------------------|--------------|-------------|
| Environment Temperature (°C)  | Voltage (V) | Measured Frequency (MHz) | Limit        | Result      |
|                               |             |                          | ±20ppm       | (Pass/Fail) |
| 20                            | 4.25        | 5219.969180              | -5.904214559 | Pass        |
|                               | 5           | 5219.968310              | -6.070881226 | Pass        |
|                               | 5.75        | 5219.968740              | -5.988505747 | Pass        |