



**FCC 47 CFR PART 15 SUBPART C &  
INDUSTRY CANADA RSS-210  
(Class II Permissive Change)**

**TEST REPORT**

**For**

**802.11a/b/g/n/ac WLAN + Bluetooth 4.0 NGFF2230 Mini Card**

**Model: BCM943162ZP**

**Trade Name: Broadcom**

*Issued to*

**Broadcom Corporation**  
190 Mathilda Avenue, Sunnyvale, CA 94086

*Issued by*

**Compliance Certification Services Inc.**

No.11, Wugong 6th Rd., Wugu Dist.,  
New Taipei City 24891, Taiwan. (R.O.C.)

<http://www.ccsrf.com>

[service@ccsrf.com](mailto:service@ccsrf.com)

**Issued Date: February 6, 2015**



---

**Note:** This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document.



**Revision History**

| Rev. |  | Issue Date       |  | Revisions     | Effect Page | Revised By  |
|------|--|------------------|--|---------------|-------------|-------------|
| 00   |  | February 6, 2015 |  | Initial Issue | ALL         | Kelly Cheng |



## TABLE OF CONTENTS

|                                                                        |           |
|------------------------------------------------------------------------|-----------|
| <b>1. TEST RESULT CERTIFICATION.....</b>                               | <b>4</b>  |
| <b>2. EUT DESCRIPTION .....</b>                                        | <b>5</b>  |
| <b>3. TEST METHODOLOGY .....</b>                                       | <b>6</b>  |
| 3.1 EUT CONFIGURATION .....                                            | 6         |
| 3.2 EUT EXERCISE.....                                                  | 6         |
| 3.3 GENERAL TEST PROCEDURES .....                                      | 6         |
| 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS .....               | 7         |
| 3.5 DESCRIPTION OF TEST MODES.....                                     | 8         |
| <b>4. INSTRUMENT CALIBRATION.....</b>                                  | <b>9</b>  |
| 4.1 MEASURING INSTRUMENT CALIBRATION .....                             | 9         |
| 4.2 MEASUREMENT EQUIPMENT USED.....                                    | 9         |
| 4.3 MEASUREMENT UNCERTAINTY .....                                      | 10        |
| <b>5. FACILITIES AND ACCREDITATIONS .....</b>                          | <b>11</b> |
| 5.1 FACILITIES .....                                                   | 11        |
| 5.2 EQUIPMENT .....                                                    | 11        |
| 5.3 LABORATORY ACCREDITATIONS AND LISTING.....                         | 11        |
| 5.4 TABLE OF ACCREDITATIONS AND LISTINGS.....                          | 12        |
| <b>6. SETUP OF EQUIPMENT UNDER TEST .....</b>                          | <b>13</b> |
| 6.1 SETUP CONFIGURATION OF EUT.....                                    | 13        |
| 6.2 SUPPORT EQUIPMENT .....                                            | 13        |
| <b>7. FCC PART 15.247 REQUIREMENTS &amp; RSS-210 REQUIREMENTS.....</b> | <b>14</b> |
| 7.1 MAXIMUM OUTPUT POWER .....                                         | 14        |
| 7.2 BAND EDGES MEASUREMENT .....                                       | 16        |
| 7.3 RADIATED EMISSIONS .....                                           | 34        |
| <b>APPENDIX I PHOTOGRAPHS OF TEST SETUP.....</b>                       | <b>51</b> |



## 1. TEST RESULT CERTIFICATION

**Applicant:** Broadcom Corporation  
190 Mathilda Avenue, Sunnyvale, CA 94086

**Manufacturer:** Broadcom Corporation  
190 Mathilda Avenue, Sunnyvale, CA 94086

**Equipment Under Test:** 802.11a/b/g/n/ac WLAN + Bluetooth 4.0 NGFF2230 Mini Card

**Trade Name:** Broadcom

**Model:** BCM943162ZP

**Date of Test:** January 31~February 2, 2015

| APPLICABLE STANDARDS                                                                |                         |
|-------------------------------------------------------------------------------------|-------------------------|
| STANDARD                                                                            | TEST RESULT             |
| FCC 47 CFR Part 15 Subpart C<br>&<br>Industry Canada RSS-210 Issue 8 December, 2010 | No non-compliance noted |

### We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247 and Industry Canada RSS-210.

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

*Approved by:*

*Reviewed by:*

---

Miller Lee  
Section Manager  
Compliance Certification Services Inc.

---

Angel Cheng  
Section Manager  
Compliance Certification Services Inc.



## 2. EUT DESCRIPTION

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 |                            |                          |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------|--------------------------|
| Product                    | 802.11a/b/g/n/ac WLAN + Bluetooth 4.0 NGFF2230 Mini Card                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                            |                          |
| Trade Name                 | Broadcom                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                            |                          |
| Model Number               | BCM943162ZP                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 |                            |                          |
| Received Date              | January 12, 2015                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                            |                          |
| Frequency Range            | 2412 ~ 2462 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 |                            |                          |
| Transmit Power             | Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Frequency Range | Average output power (dBm) | Average output power (W) |
|                            | 802.11b                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2412 - 2462     | 16.90                      | 0.0490                   |
|                            | 802.11g                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2412 - 2462     | 21.20                      | 0.1318                   |
|                            | 802.11n Standard-20 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2412 - 2462     | 20.80                      | 0.1202                   |
|                            | 802.11n Standard-40 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2422 - 2452     | 17.10                      | 0.0513                   |
| Modulation Technique       | IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mbps)<br>IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mbps)<br>IEEE 802.11n HT 20 MHz mode: OFDM (6.5, 7.2, 13, 14.4, 14.44, 19.5, 21.7, 26, 28.89, 28.9, 39, 43.3, 43.33 52, 57.78, 57.8, 58.5, 65.0, 72.2, 78, 86.67, 104, 115.56, 117, 130, 144.44 Mbps)<br>IEEE 802.11n HT 40 MHz mode: OFDM (13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps) |                 |                            |                          |
| Number of Channels         | IEEE 802.11b/g mode: 11 Channels<br>IEEE 802.11n HT 20 MHz mode: 11 Channels<br>IEEE 802.11n HT 40 MHz mode: 7 Channels                                                                                                                                                                                                                                                                                                                                                |                 |                            |                          |
| Antenna Specification      | 1. High-Tek Electronics Co.,Ltd<br>P/N: 025.9006N.0011 (Main) / -0.71 dBi<br>025.9006O.0011 (Aux) / -0.82 dBi<br>2. Wistron NeWeb Corporation<br>P/N: 025.9006N.0001 (Main) / 1.44 dBi<br>025.9006O.0001 (Aux) / -1.51 dBi                                                                                                                                                                                                                                             |                 |                            |                          |
| Host Brand                 | lenovo                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Host Model Name | Flex 3-1570                |                          |
|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 | Flex 3-1535                |                          |
| Class II Permissive Change | Adding portable platforms Flex 3-1570, Flex 3-1535, These hosts have the same antenna type as originally approved with lower gains.                                                                                                                                                                                                                                                                                                                                    |                 |                            |                          |

### Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **QDS-BRCM1075 & IC: 4324A-BRCM1075** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



### **3. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.4: 2009 and FCC CFR 47 Part 15.207, 15.209, 15.247 and DA00-705.

The tests documented in this report were performed in accordance with IC RSS-210, IC RSS-Gen, IC RSS-102, IC RSS-212, and ANSI C63.4.

This submittal(s) (test report) is intended for IC Certification with Industry Canada RSS-210.

#### **3.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### **3.2 EUT EXERCISE**

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

The tests documented in this report were performed in accordance with IC RSS-210, IC RSS-Gen, IC RSS-102, and ANSI C63.4.

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

##### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



### 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: BCM943162ZP) had been tested under operating condition.

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

After verification, all tests carried out are with the worst-case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode.

#### **IEEE 802.11b mode:**

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate were chosen for full testing.

#### **IEEE 802.11g mode:**

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate were chosen for full testing.

#### **IEEE 802.11n HT 20 MHz mode:**

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6.5Mbps data rate were chosen for full testing.

#### **IEEE 802.11n HT 40 MHz mode:**

Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with 13.5Mbps data rate were chosen for full testing.

.



## 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.

| Wugu 966 Chamber A |                    |         |               |                 |
|--------------------|--------------------|---------|---------------|-----------------|
| Name of Equipment  | Manufacturer       | Model   | Serial Number | Calibration Due |
| Spectrum Analyzer  | Agilent            | E4446A  | US42510268    | 01/25/2016      |
| EMI Test Receiver  | R&S                | ESCI    | 100064        | 05/30/2015      |
| Bilog Antenna      | Sunol Sciences     | JB3     | A030105       | 08/19/2015      |
| Horn Antenna       | EMCO               | 3117    | 00055165      | 01/26/2016      |
| 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           |
| Test S/W           | EZ-EMC (CCS-3A1RE) |         |               |                 |



### 4.3 MEASUREMENT UNCERTAINTY

| PARAMETER                             | UNCERTAINTY |
|---------------------------------------|-------------|
| 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., Lujhu Township, Taoyuan County 33841, TAIWAN, R.O.C.

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 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, and/or ridged waveguide, horn. 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.

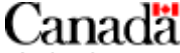
All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### **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 | <br>Testing Laboratory<br>1309 |
| 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 II 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 | Flex 3-1570 | N/A   | FCC DOC    | Lenovo | N/A        | AC I/P:<br>Unshielded, 1.8m<br>DC O/P:<br>Unshielded, 1.7m<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.



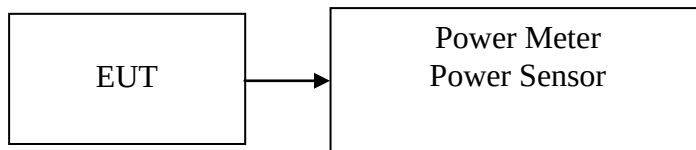
## 7. FCC PART 15.247 REQUIREMENTS & RSS-210 REQUIREMENTS

### 7.1 MAXIMUM OUTPUT POWER

#### LIMIT

None; for reporting purposes only.

#### Test Configuration



#### TEST PROCEDURE

The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.

#### TEST RESULTS

*No non-compliance noted*

**Test Data****Test mode: IEEE 802.11b mode**

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|---------|-----------------|--------------------|------------------|-----------|
| Low     | 2412            | 16.10              | 0.0407           | 1.00      |
| Mid     | 2442            | 16.30              | 0.0427           | 1.00      |
| High    | 2462            | <b>*16.90</b>      | 0.0490           | 1.00      |

**Test mode: IEEE 802.11g mode**

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|---------|-----------------|--------------------|------------------|-----------|
| Low     | 2412            | 17.80              | 0.0603           | 1.00      |
| Mid     | 2442            | <b>*21.20</b>      | 0.1318           | 1.00      |
| High    | 2462            | 17.10              | 0.0513           | 1.00      |

**Test mode: IEEE 802.11n HT 20 MHz mode**

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|---------|-----------------|--------------------|------------------|-----------|
| Low     | 2412            | 17.50              | 0.0562           | 1.00      |
| Mid     | 2442            | <b>*20.80</b>      | 0.1202           | 1.00      |
| High    | 2462            | 16.60              | 0.0457           | 1.00      |

**Test mode: IEEE 802.11n HT 40 MHz mode**

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|---------|-----------------|--------------------|------------------|-----------|
| Low     | 2422            | 14.30              | 0.0269           | 1.00      |
| Mid     | 2442            | <b>*17.10</b>      | 0.0513           | 1.00      |
| High    | 2452            | 15.10              | 0.0324           | 1.00      |



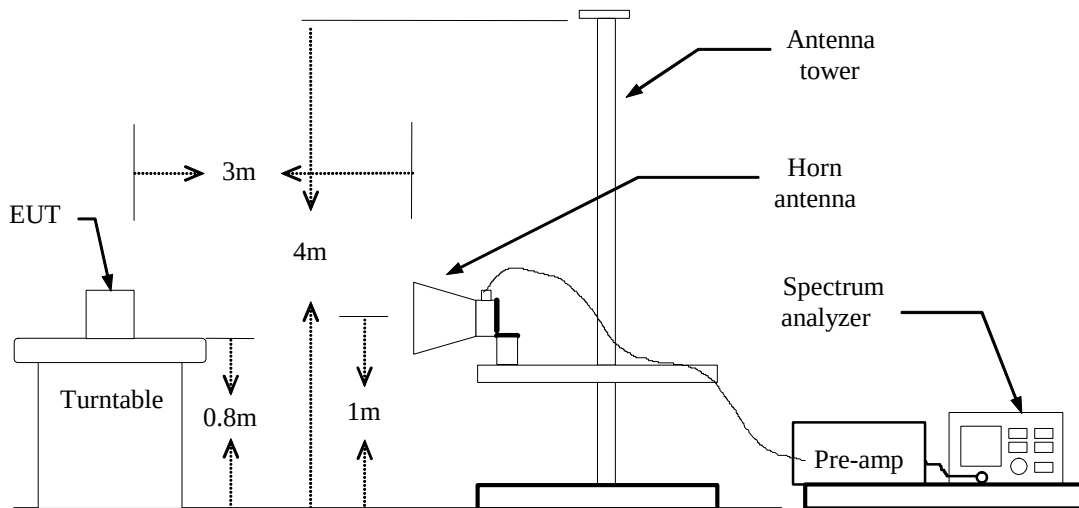
## 7.2 BAND EDGES MEASUREMENT

### LIMIT

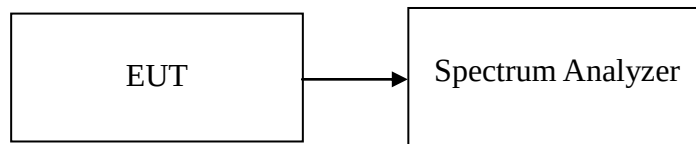
According to §15.247(d) & RSS-210 §A8.5, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band 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

#### For Radiated



#### For Conducted





## **TEST PROCEDURE**

### **For Radiated**

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=3MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz,  
if duty cycle  $\geq 98\%$ , VBW=10Hz.  
if duty cycle  $< 98\%$  VBW=1/T.  
**IEEE 802.11b mode:**  $\geq 98\%$ , VBW=10Hz  
**IEEE 802.11g mode:**  $\geq 98\%$ , VBW=10Hz  
**IEEE 802.11n HT 20 MHz mode:**  $\geq 98\%$ , VBW=10Hz  
**IEEE 802.11n HT 40 MHz mode:** 96%=VBW 2kHz
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

### **For Conducted**

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

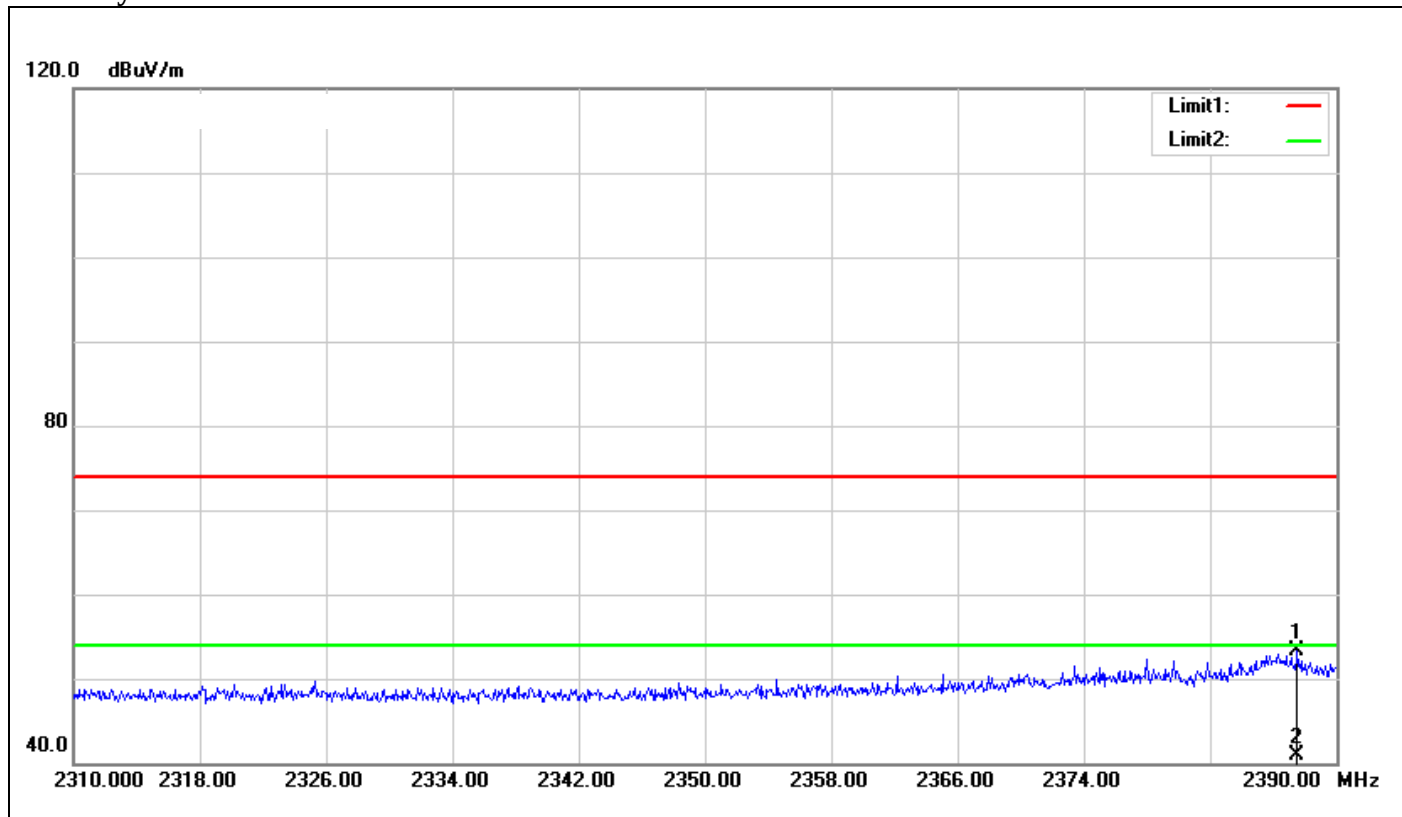
## **TEST RESULTS**

Refer to attach spectrum analyzer data chart.



Band Edges (IEEE 802.11b mode / CH 2412)

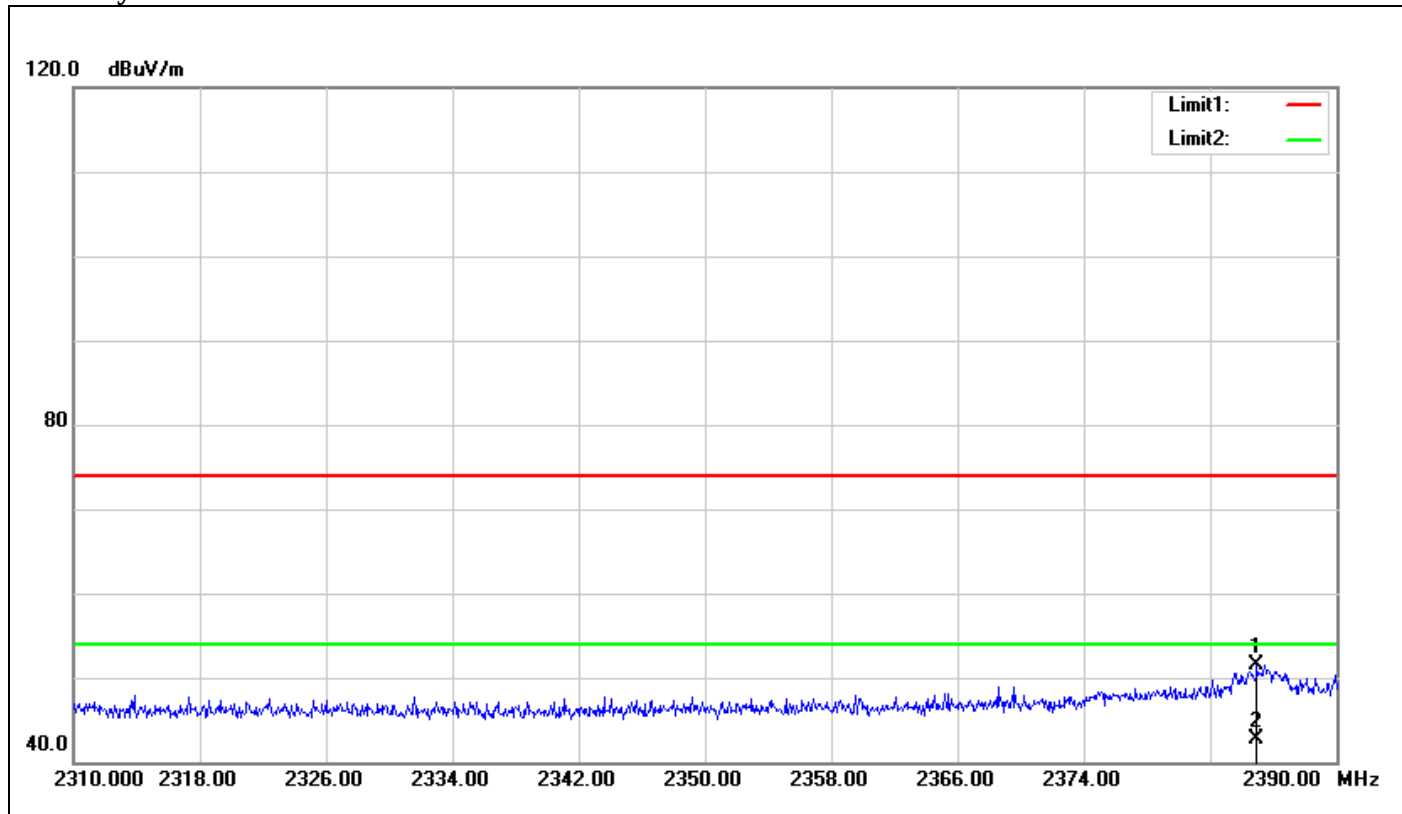
Polarity: Vertical



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>( ° ) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|-----------------|--------|
| 1   | 2387.520           | 57.09             | -3.79                   | 53.30              | 74.00             | -20.70         | 100            | 145             | peak   |
| 2   | 2387.520           | 44.70             | -3.79                   | 40.91              | 54.00             | -13.09         | 100            | 145             | AVG    |



Polarity: Horizontal

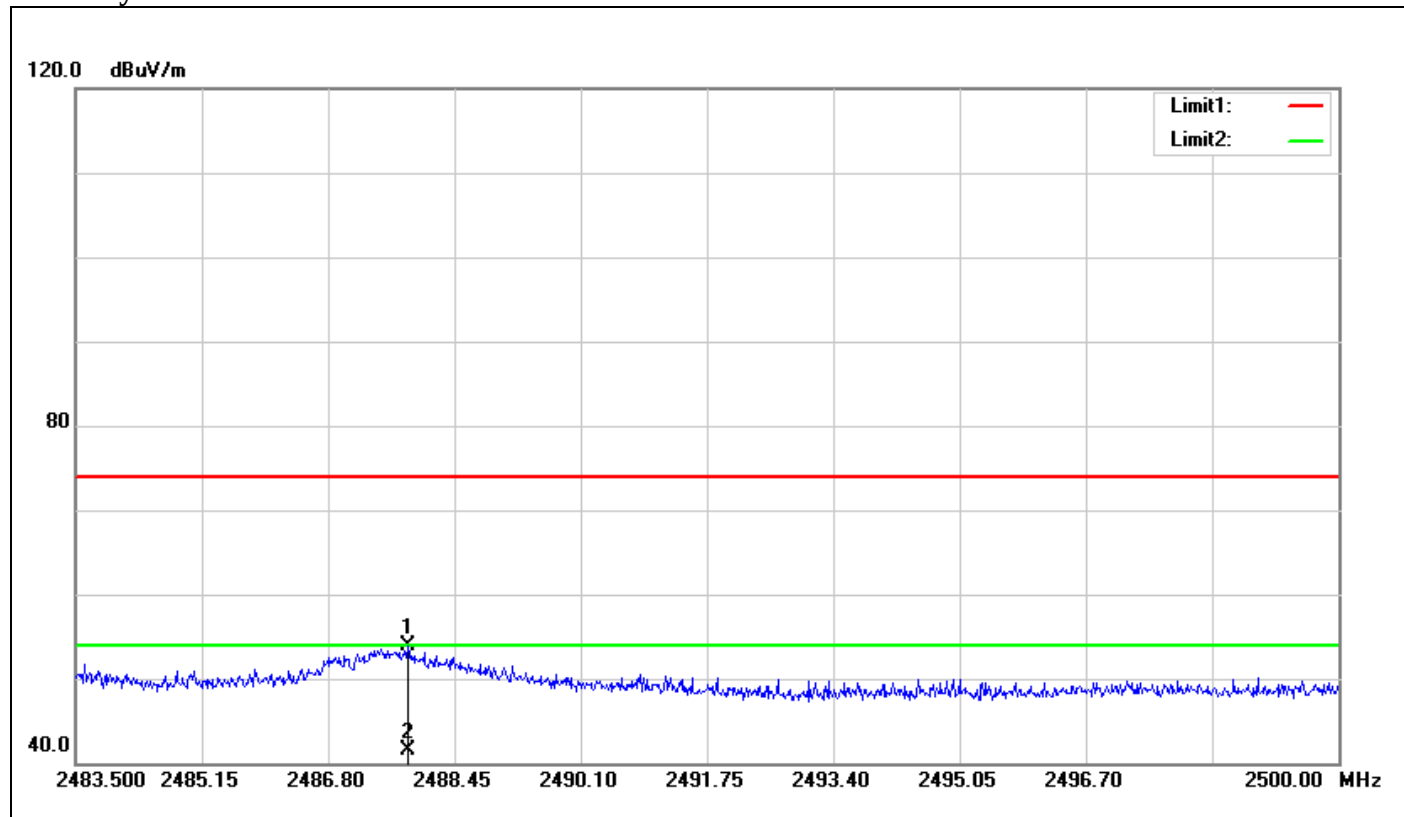


| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|---------------|--------|
| 1   | 2384.960           | 55.40             | -3.82                   | 51.58              | 74.00             | -22.42         | 100            | 245           | peak   |
| 2   | 2384.960           | 46.51             | -3.82                   | 42.69              | 54.00             | -11.31         | 100            | 245           | AVG    |



Band Edges (IEEE 802.11b mode / CH 2462)

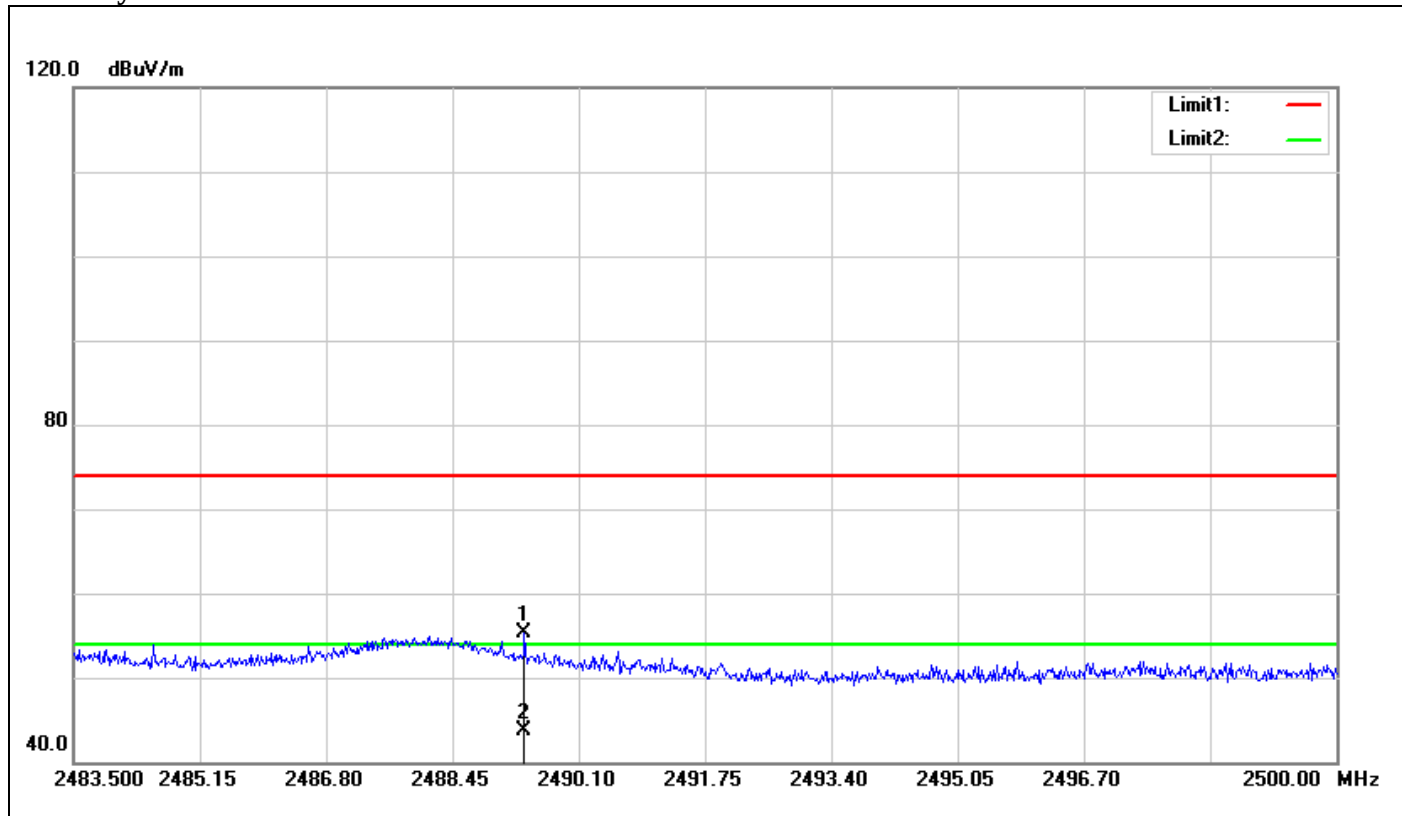
Polarity: Vertical



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|---------------|--------|
| 1   | 2487.840           | 57.04             | -3.23                   | 53.81              | 74.00             | -20.19         | 100            | 86            | peak   |
| 2   | 2487.840           | 44.74             | -3.23                   | 41.51              | 54.00             | -12.49         | 100            | 86            | AVG    |



Polarity: Horizontal

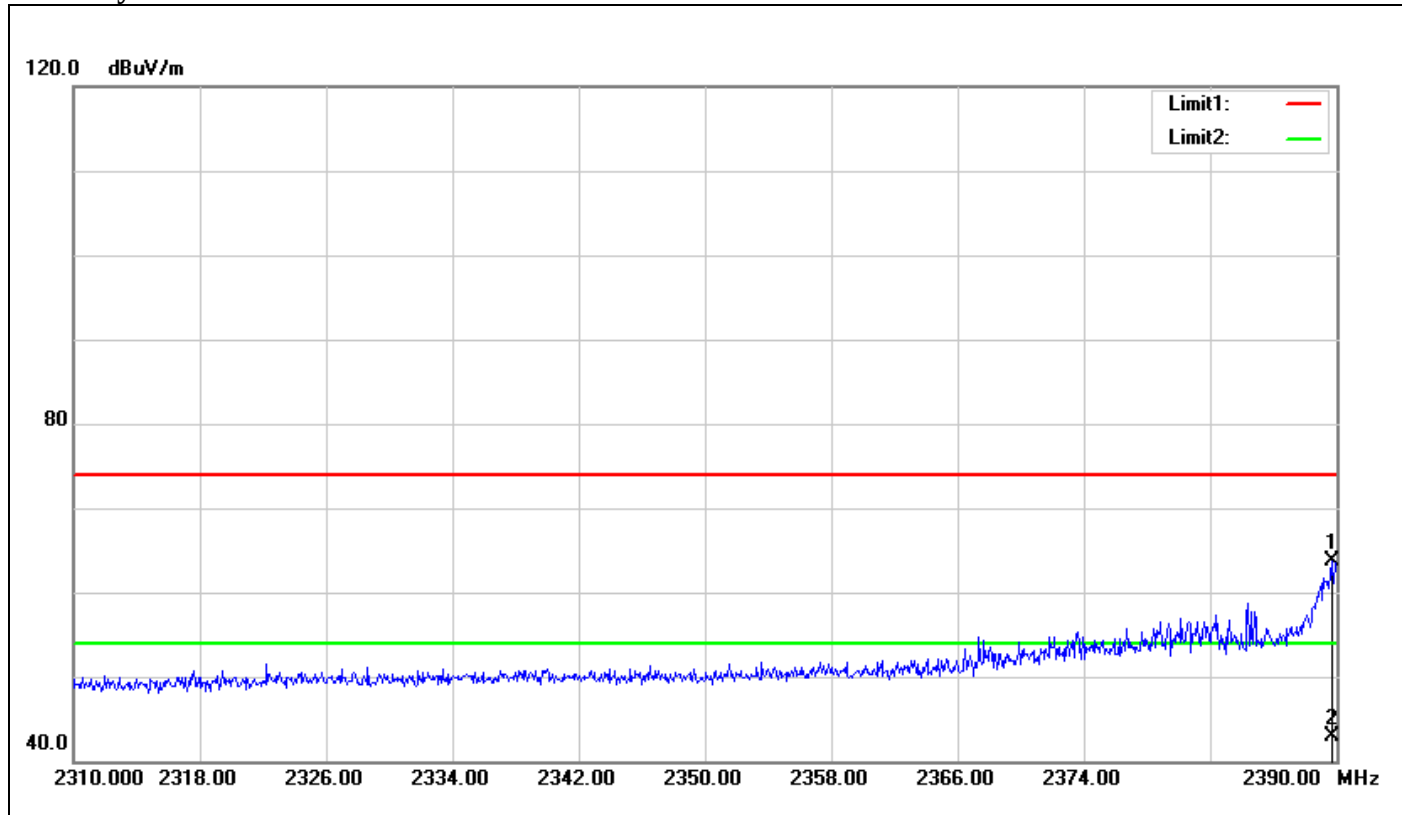


| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 2489.390        | 58.50          | -3.22                | 55.28           | 74.00          | -18.72      | 100         | 130        | peak   |
| 2   | 2489.390        | 46.91          | -3.22                | 43.69           | 54.00          | -10.31      | 100         | 130        | AVG    |



Band Edges (IEEE 802.11g mode / CH 2412)

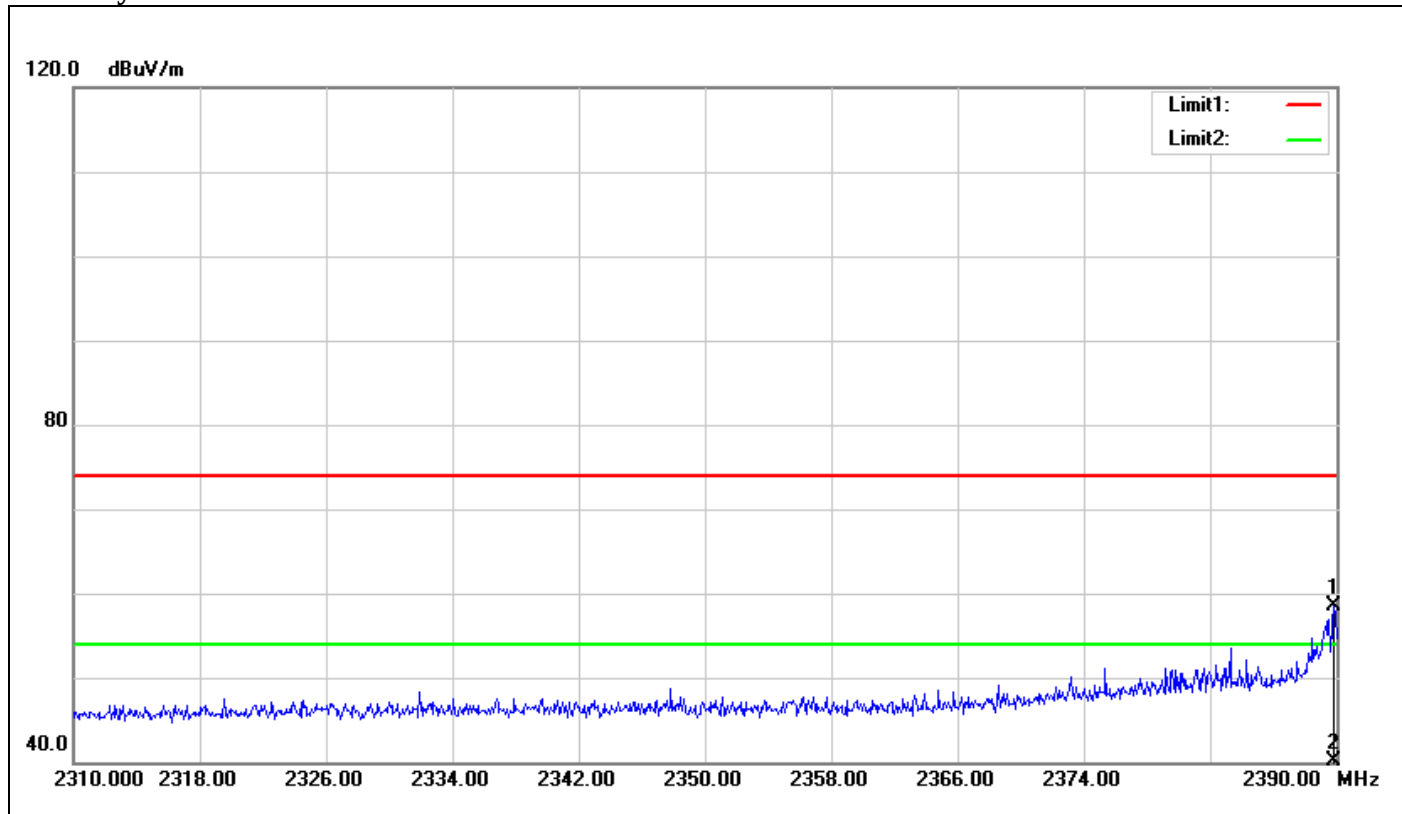
Polarity: Vertical



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>( ° ) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|-----------------|--------|
| 1   | 2389.680           | 67.57             | -3.77                   | 63.80              | 74.00             | -10.20         | 100            | 325             | peak   |
| 2   | 2389.680           | 46.72             | -3.77                   | 42.95              | 54.00             | -11.05         | 100            | 325             | AVG    |



Polarity: Horizontal

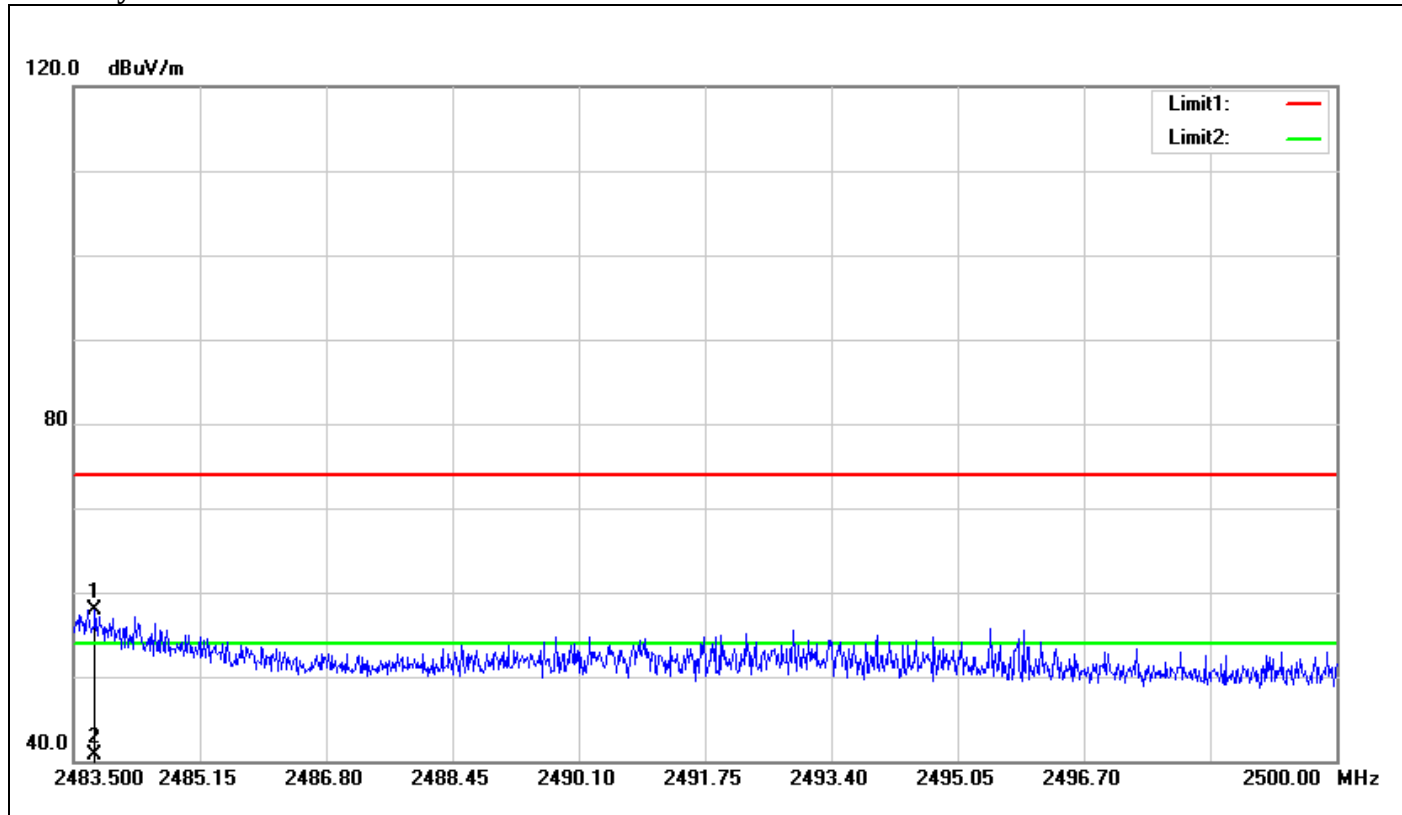


| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|---------------|--------|
| 1   | 2389.840           | 62.18             | -3.77                   | 58.41              | 74.00             | -15.59         | 100            | 166           | peak   |
| 2   | 2389.840           | 43.94             | -3.77                   | 40.17              | 54.00             | -13.83         | 100            | 166           | AVG    |



Band Edges (IEEE 802.11g mode / CH 2462)

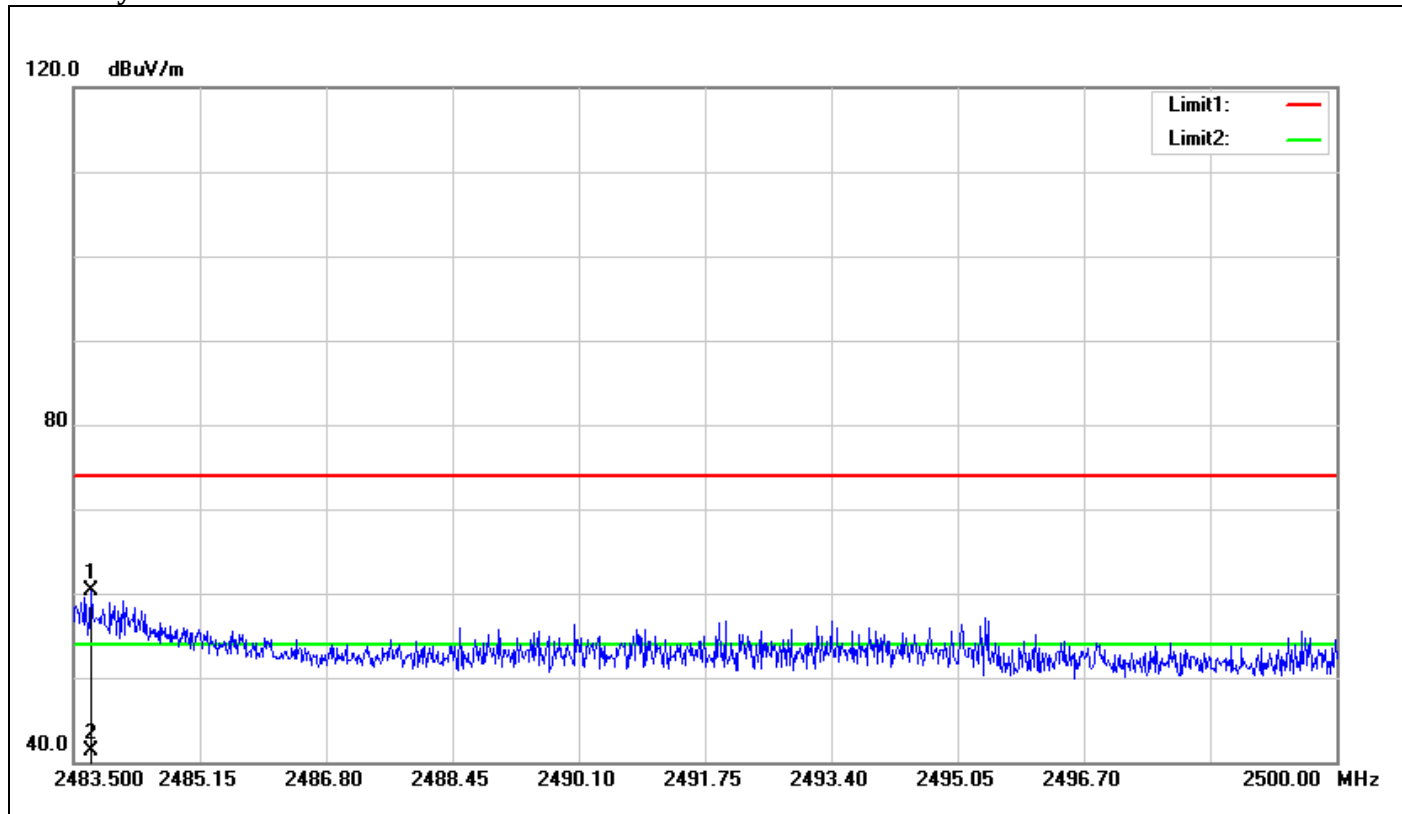
Polarity: Vertical



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>( ° ) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|-----------------|--------|
| 1   | 2483.780           | 61.16             | -3.27                   | 57.89              | 74.00             | -16.11         | 100            | 112             | peak   |
| 2   | 2483.780           | 44.02             | -3.27                   | 40.75              | 54.00             | -13.25         | 100            | 112             | AVG    |



Polarity: Horizontal

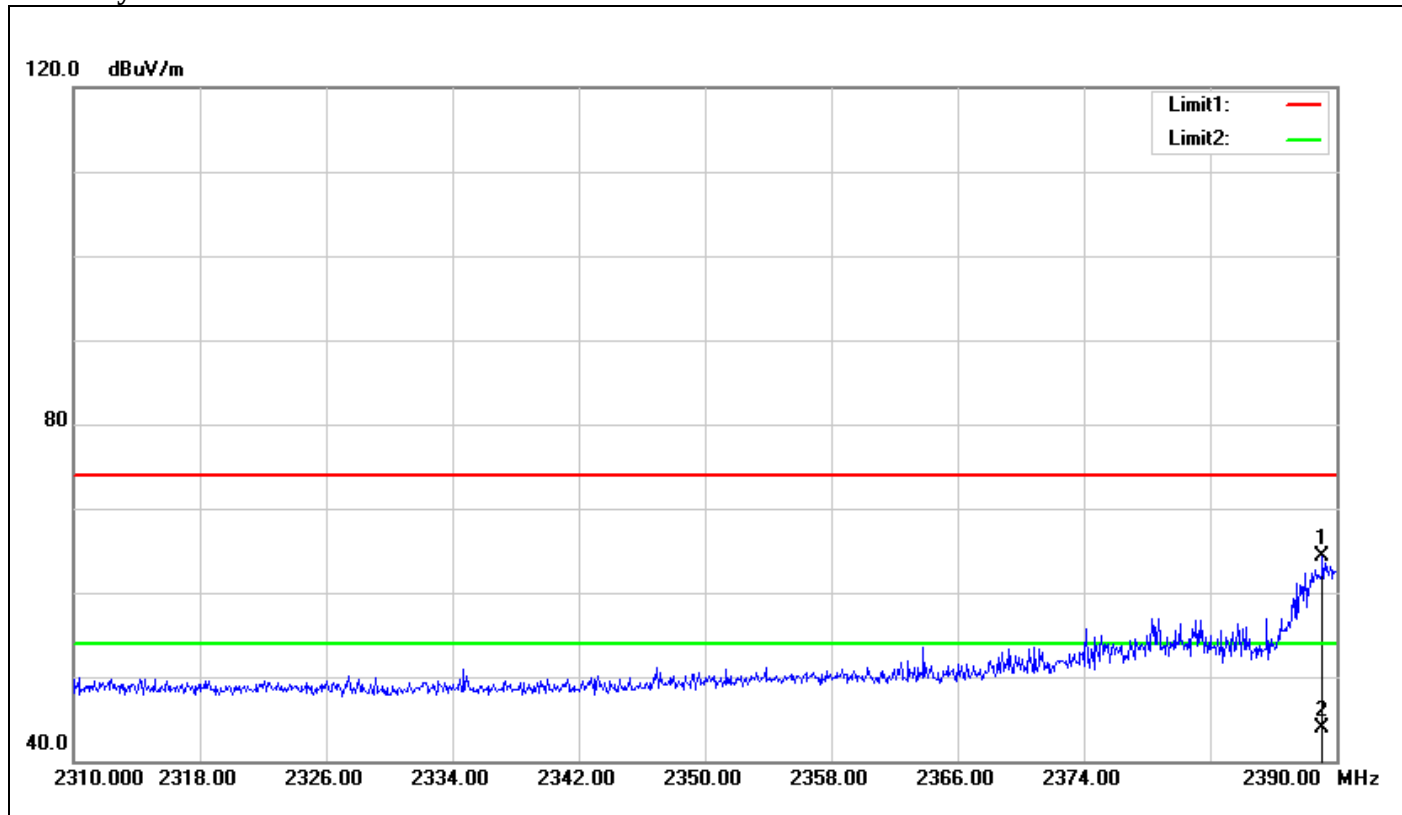


| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 2483.731        | 63.49          | -3.27                | 60.22           | 74.00          | -13.78      | 100         | 166        | peak   |
| 2   | 2483.731        | 44.59          | -3.27                | 41.32           | 54.00          | -12.68      | 100         | 166        | AVG    |



Band Edges (IEEE 802.11n HT 20 MHz mode / CH 2412)

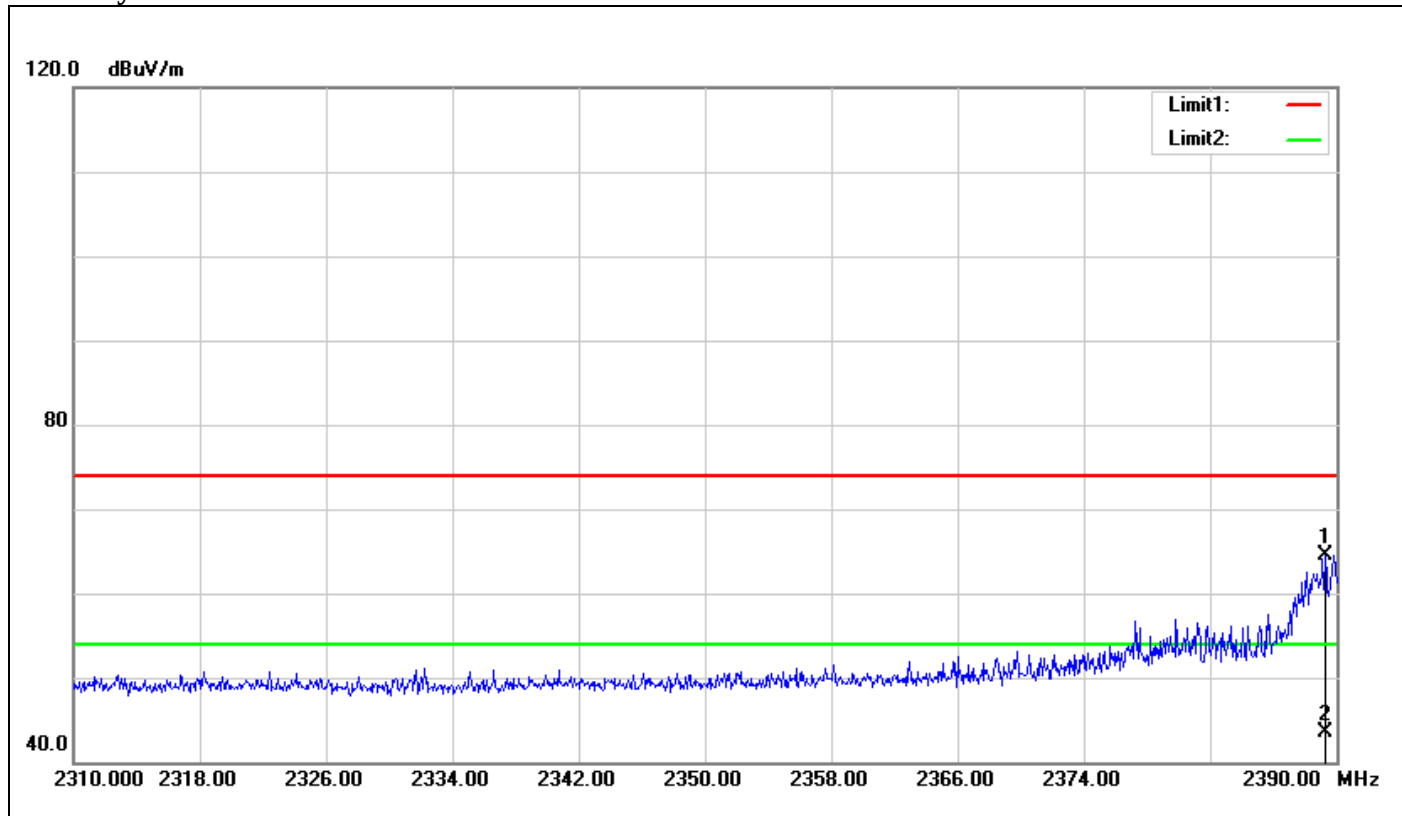
Polarity: Vertical



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>( ° ) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|-----------------|--------|
| 1   | 2389.120           | 68.06             | -3.78                   | 64.28              | 74.00             | -9.72          | 100            | 8               | peak   |
| 2   | 2389.120           | 47.73             | -3.78                   | 43.95              | 54.00             | -10.05         | 100            | 8               | AVG    |



Polarity: Horizontal

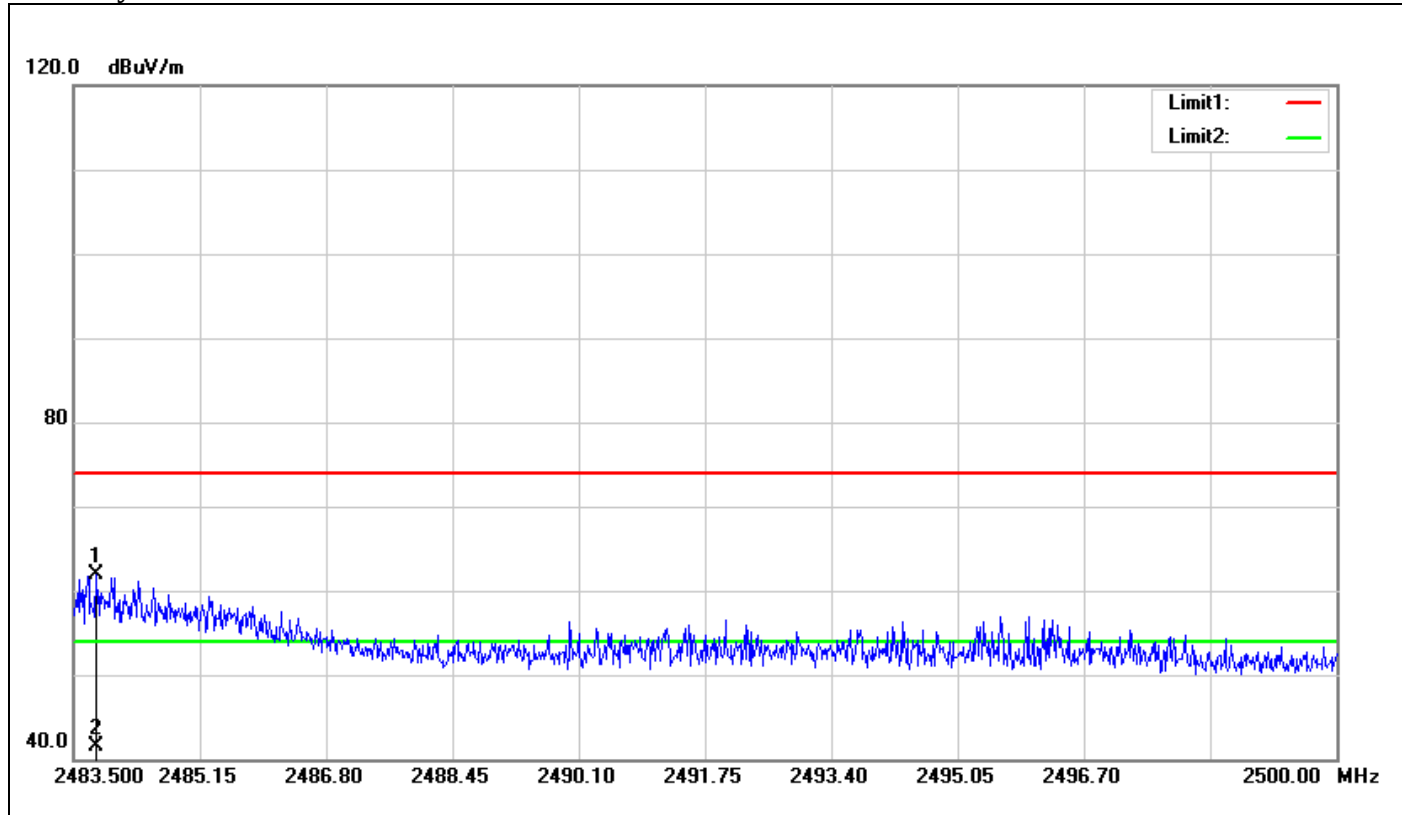


| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|---------------|--------|
| 1   | 2389.280           | 68.25             | -3.78                   | 64.47              | 74.00             | -9.53          | 100            | 2             | peak   |
| 2   | 2389.280           | 47.35             | -3.78                   | 43.57              | 54.00             | -10.43         | 100            | 2             | AVG    |



**Band Edges (IEEE 802.11n HT 20 MHz mode / CH 2462)**

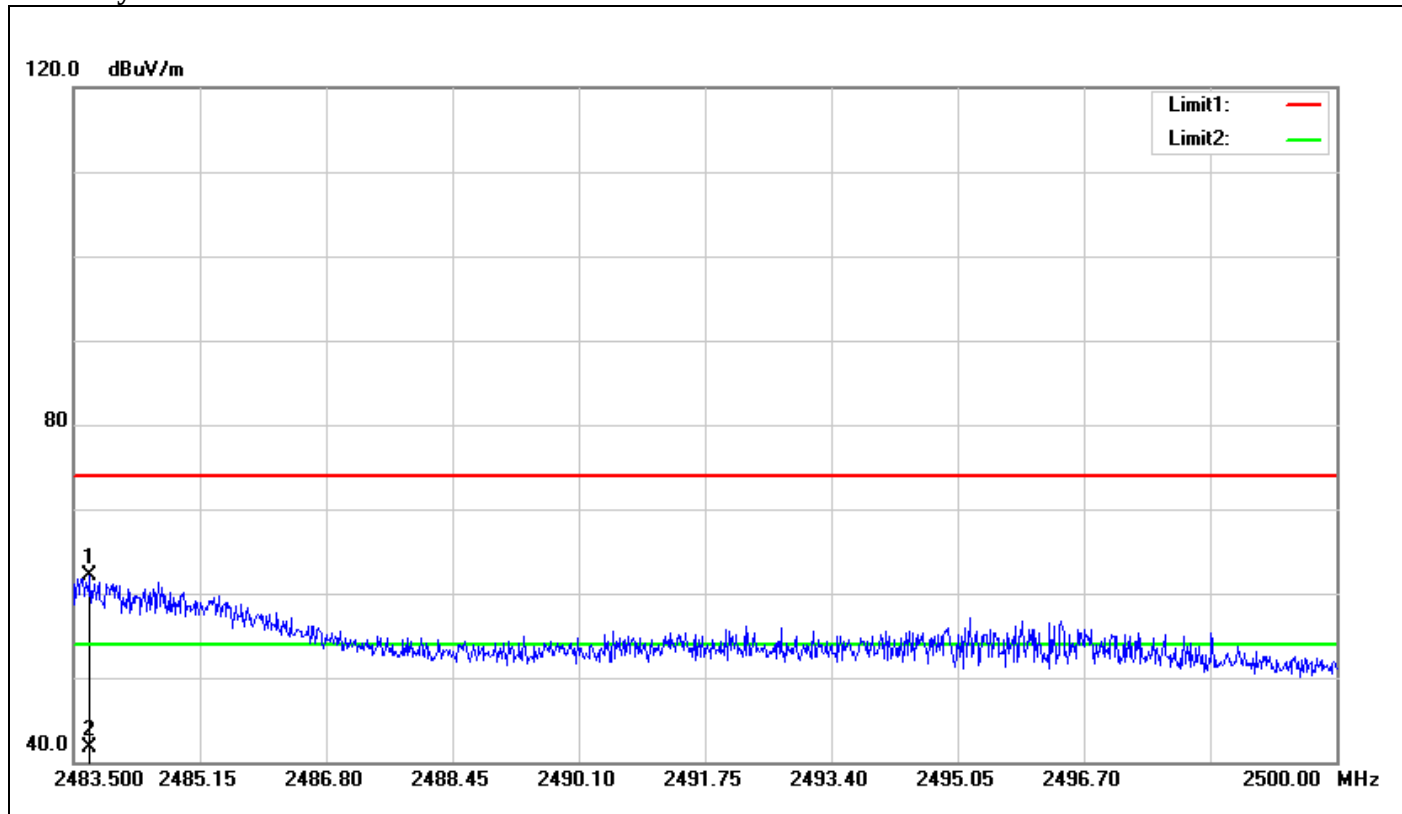
**Polarity: Vertical**



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|---------------|--------|
| 1   | 2483.797           | 65.16             | -3.27                   | 61.89              | 74.00             | -12.11         | 100            | 64            | peak   |
| 2   | 2483.797           | 44.81             | -3.27                   | 41.54              | 54.00             | -12.46         | 100            | 64            | AVG    |



Polarity: Horizontal

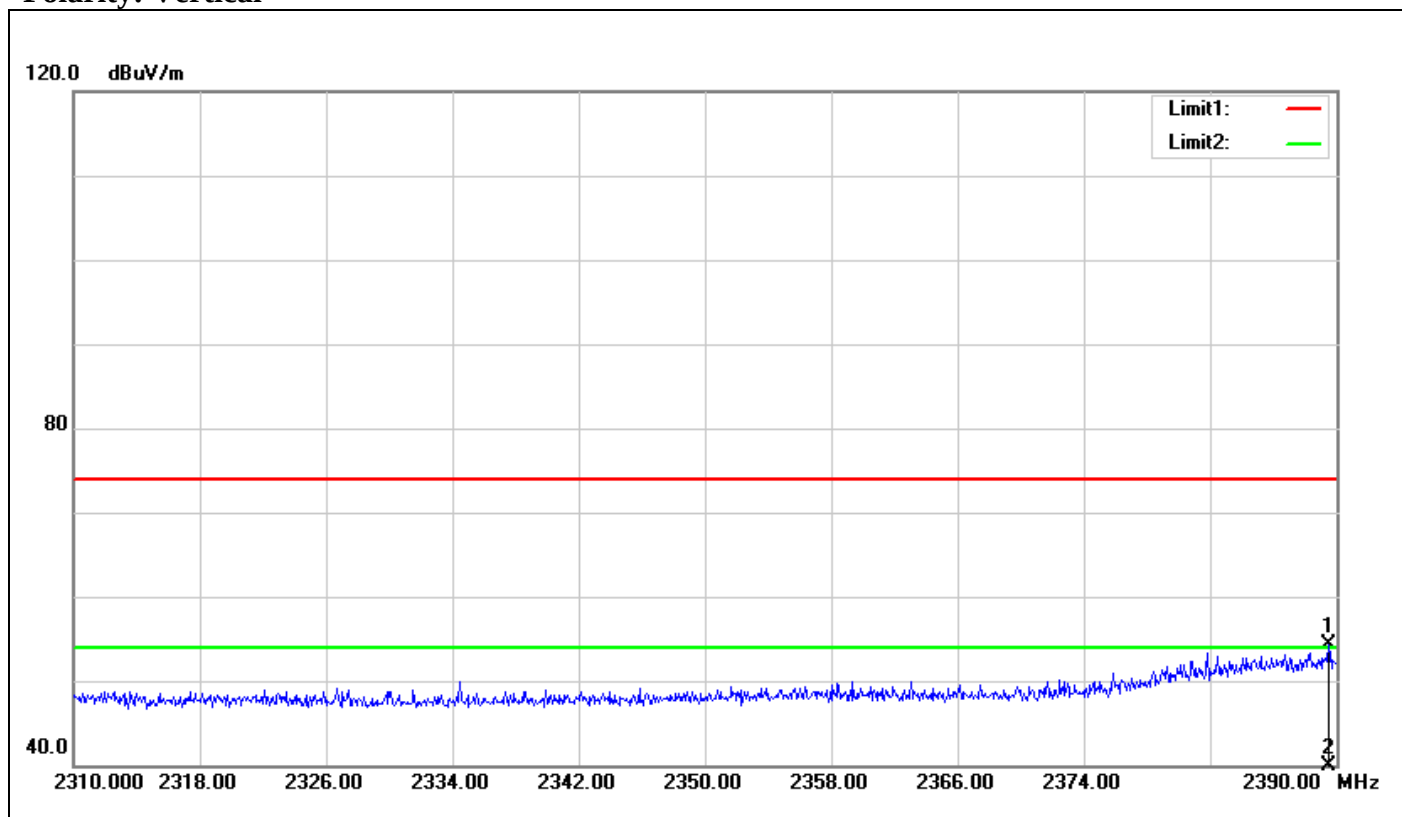


| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|---------------|--------|
| 1   | 2483.715           | 65.28             | -3.27                   | 62.01              | 74.00             | -11.99         | 100            | 148           | peak   |
| 2   | 2483.715           | 44.94             | -3.27                   | 41.67              | 54.00             | -12.33         | 100            | 148           | AVG    |



Band Edges (IEEE 802.11n HT 40 MHz mode / CH 2422)

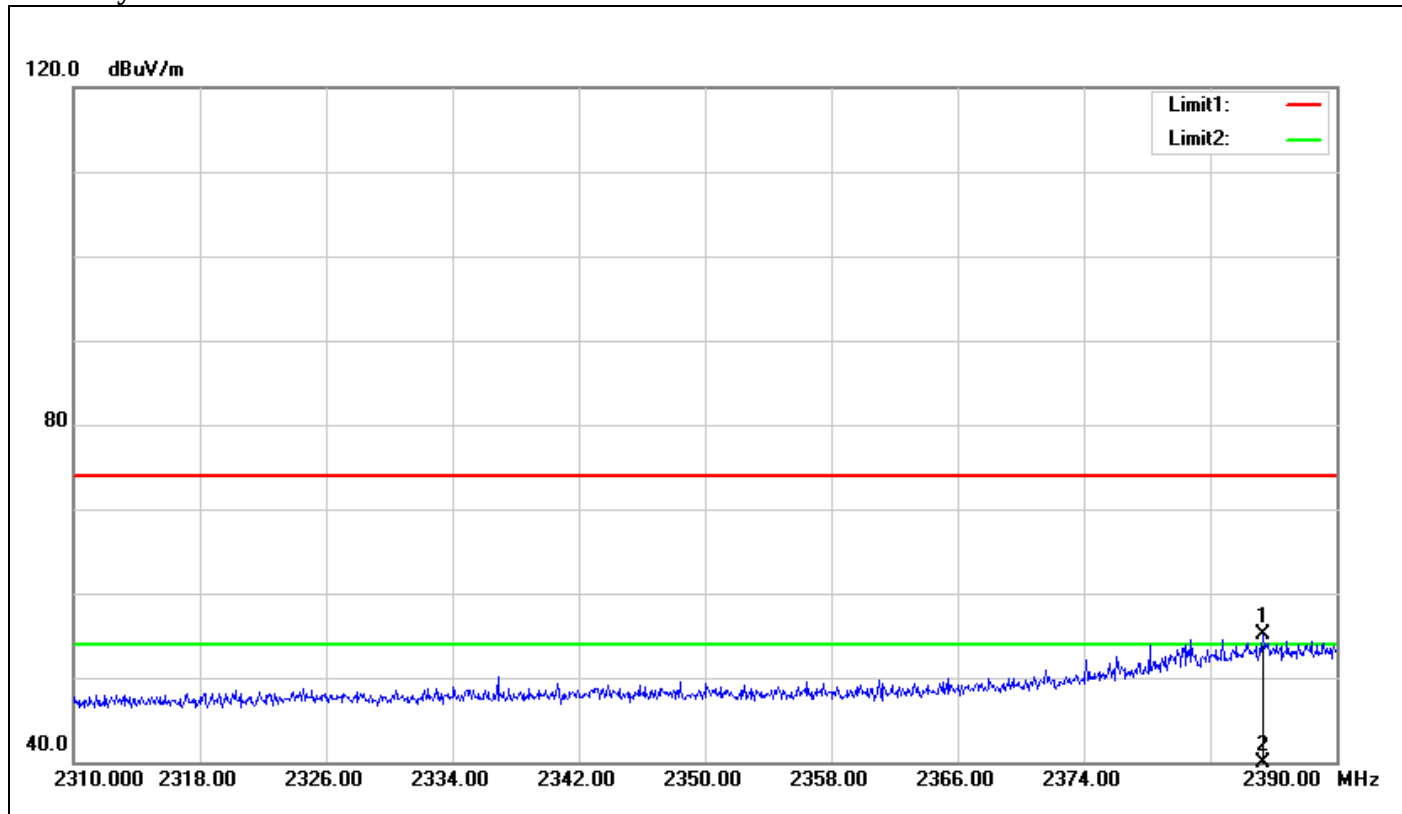
Polarity: Vertical



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>( ° ) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|-----------------|--------|
| 1   | 2389.520           | 58.04             | -3.77                   | 54.27              | 74.00             | -19.73         | 100            | 201             | peak   |
| 2   | 2389.520           | 42.41             | -3.77                   | 38.64              | 54.00             | -15.36         | 100            | 201             | AVG    |



Polarity: Horizontal

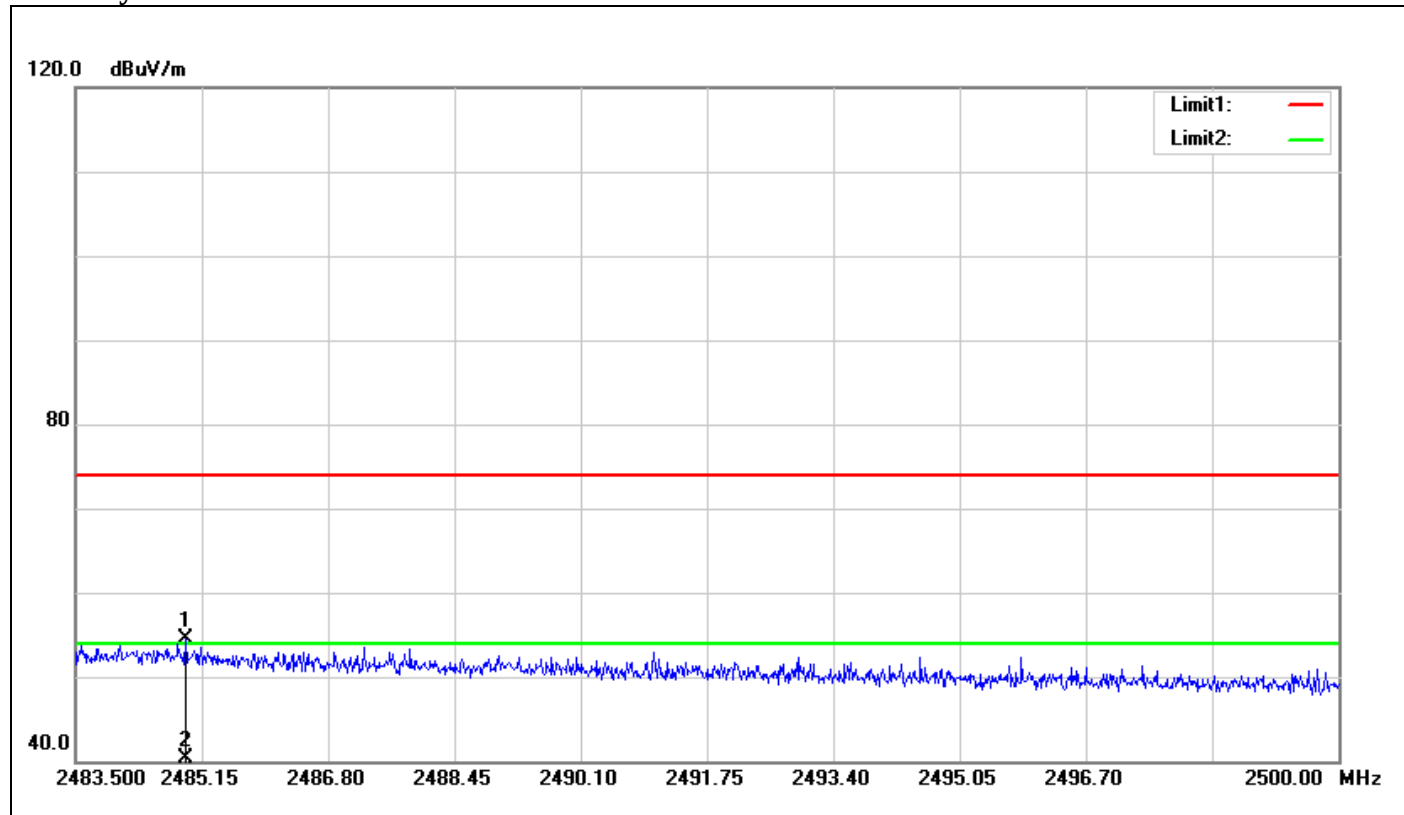


| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 2385.360        | 59.00          | -3.81                | 55.19           | 74.00          | -18.81      | 100         | 119        | peak   |
| 2   | 2385.360        | 43.29          | -3.81                | 39.48           | 54.00          | -14.52      | 100         | 119        | AVG    |



Band Edges (IEEE 802.11n HT 40 MHz mode / CH 2452)

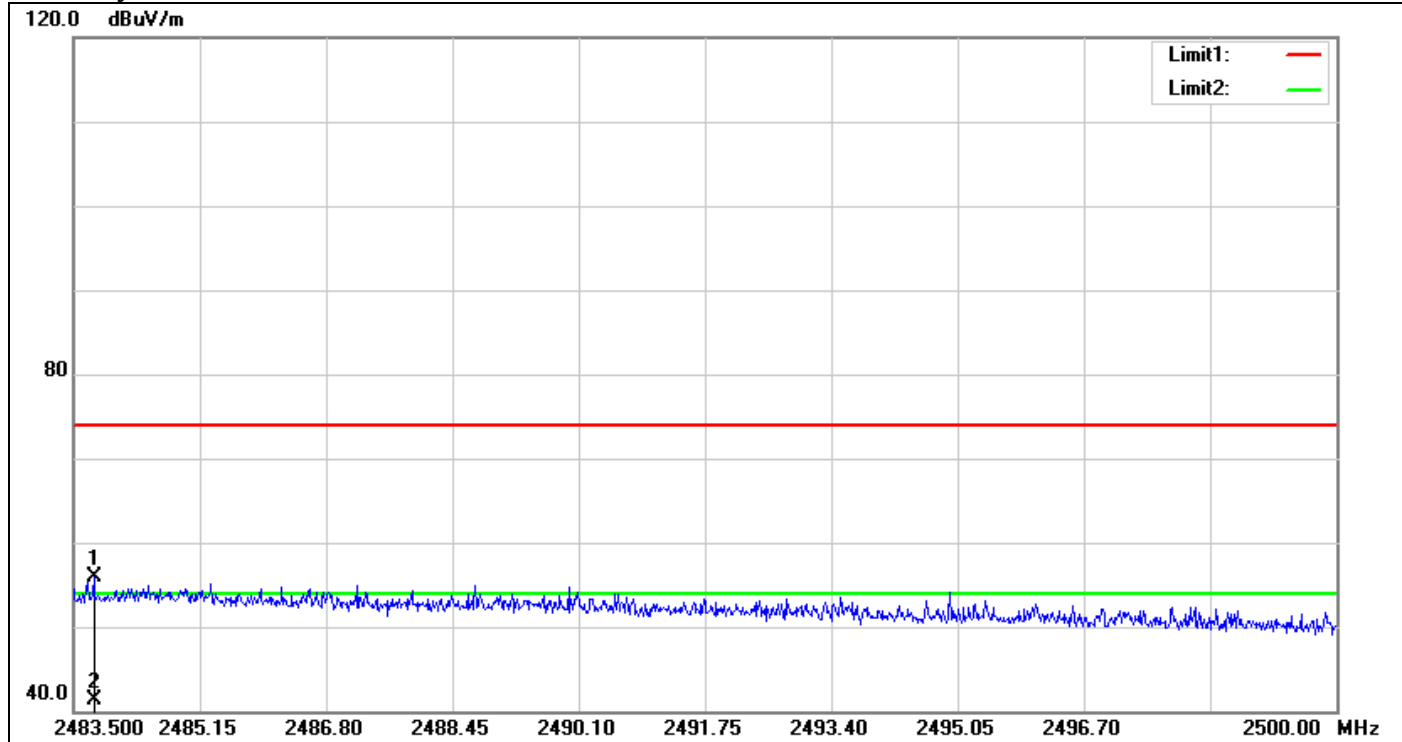
Polarity: Vertical



| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Remark |
|-----|-----------------|----------------|----------------------|-----------------|----------------|-------------|-------------|------------|--------|
| 1   | 2484.936        | 57.69          | -3.26                | 54.43           | 74.00          | -19.57      | 100         | 167        | peak   |
| 2   | 2484.936        | 43.64          | -3.26                | 40.38           | 54.00          | -13.62      | 100         | 167        | AVG    |



Polarity: Horizontal



| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>(cm) | Degree<br>(°) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|----------------|---------------|--------|
| 1   | 2483.764           | 59.19             | -3.27                   | 55.92              | 74.00             | -18.08         | 100            | 233           | peak   |
| 2   | 2483.764           | 44.54             | -3.27                   | 41.27              | 54.00             | -12.73         | 100            | 233           | AVG    |



## 7.3 RADIATED EMISSIONS

### LIMIT

All spurious emissions shall comply with the limits of §15.209(a) and RSS-Gen Table 2 & Table 5.

#### **RSS-Gen Table 2 & Table 5: General Field Strength Limits for Transmitters and Receivers at Frequencies Above 30 MHz** <sup>(Note)</sup>

| Frequency<br>(MHz) | Field Strength<br>microvolts/m at 3 metres (watts, e.i.r.p.) |              |
|--------------------|--------------------------------------------------------------|--------------|
|                    | Transmitters                                                 | Receivers    |
| 30-88              | 100 (3 nW)                                                   | 100 (3 nW)   |
| 88-216             | 150 (6.8 nW)                                                 | 150 (6.8 nW) |
| 216-960            | 200 (12 nW)                                                  | 200 (12 nW)  |
| Above 960          | 500 (75 nW)                                                  | 500 (75 nW)  |

**Note:** \*Measurements for compliance with limits in the above table may be performed at distances other than 3 metres, in accordance with Section 7.2.7.

Transmitting devices are not permitted in Table 1 bands or, unless stated otherwise, in TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz and 614-806 MHz).

#### **RSS-Gen Table 6: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)**

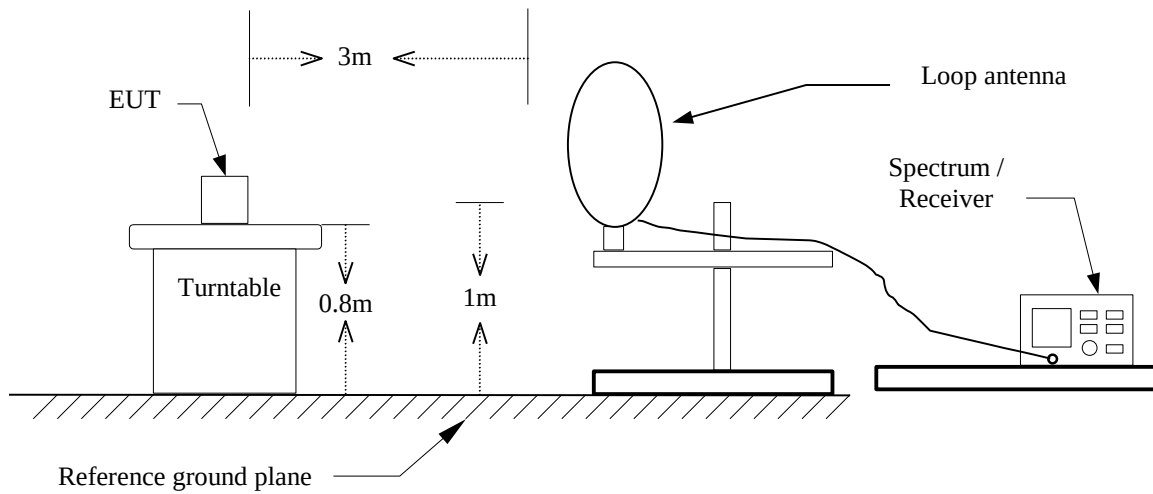
| Frequency     | Field Strength<br>(microvolts/m) | Magnetic<br>H-Field<br>(microamperes/m) | Measurement<br>Distance<br>(metres) |
|---------------|----------------------------------|-----------------------------------------|-------------------------------------|
| 9-490 kHz     | 2,400/F (F in kHz)               | 2,400/377F (F in kHz)                   | 3000                                |
| 490-1,705 kHz | 24,000/F (F in kHz)              | 24,000/377F (F in kHz)                  | 30                                  |
| 1.705-30 MHz  | 30                               | N/A                                     | 30                                  |

**Note:** The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average detector.

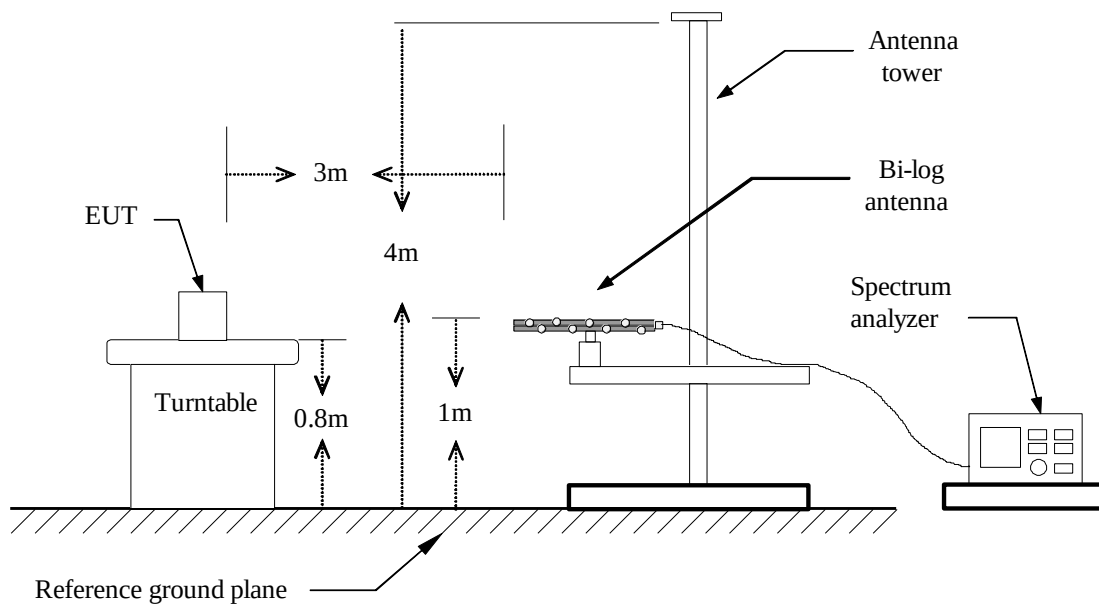


## Test Configuration

9kHz ~ 30MHz

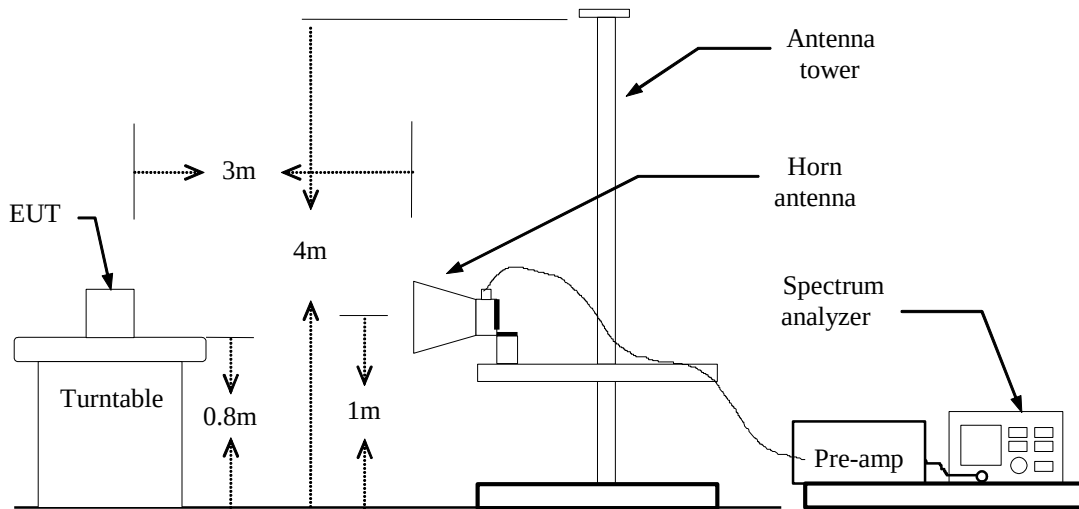


30MHz ~ 1GHz





Above 1 GHz





## **TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 0.8m 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=1MHz, VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz,

if duty cycle  $\geq 98\%$ , VBW=10Hz.

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

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

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

**IEEE 802.11n HT 20 MHz mode:**  $\geq 98\%$ , VBW=10Hz

**IEEE 802.11n HT 40 MHz mode:** 96%=VBW 2kHz

7. Repeat above procedures until the measurements for all frequencies are complete.

**Below 1GHz****Operation Mode:** Normal Link**Test Date:** January 31, 2015**Temperature:** 27°C**Tested by:** Owen Wu**Humidity:** 53% RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 30.9700         | 41.83          | -10.58                   | 31.25           | 40.00          | -8.75       | peak   | V               |
| 206.5400        | 46.75          | -18.01                   | 28.74           | 43.50          | -14.76      | peak   | V               |
| 427.7000        | 49.43          | -13.27                   | 36.16           | 46.00          | -9.84       | peak   | V               |
| 534.4000        | 45.05          | -11.26                   | 33.79           | 46.00          | -12.21      | peak   | V               |
| 597.4500        | 43.04          | -10.53                   | 32.51           | 46.00          | -13.49      | peak   | V               |
| 687.6600        | 38.94          | -8.92                    | 30.02           | 46.00          | -15.98      | peak   | V               |
| 32.9100         | 40.22          | -12.00                   | 28.22           | 40.00          | -11.78      | peak   | H               |
| 229.8200        | 52.03          | -18.81                   | 33.22           | 46.00          | -12.78      | peak   | H               |
| 305.4800        | 48.60          | -16.28                   | 32.32           | 46.00          | -13.68      | peak   | H               |
| 436.4300        | 48.26          | -13.03                   | 35.23           | 46.00          | -10.77      | peak   | H               |
| 833.1600        | 37.15          | -6.98                    | 30.17           | 46.00          | -15.83      | peak   | H               |
| 1000.0000       | 37.77          | -4.68                    | 33.09           | 54.00          | -20.91      | 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****Operation Mode:** TX / IEEE 802.11b / CH 2412**Test Date:** January 29, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53% RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 1346.000        | 50.10          | -8.21                    | 41.89           | 74.00          | -32.11      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 1298.000        | 50.64          | -8.42                    | 42.22           | 74.00          | -31.78      | peak   | 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 or as required by the applicant.
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).

**Operation Mode:** TX / IEEE 802.11b / CH 2437**Test Date:** January 29, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 1336.000        | 49.95          | -8.25                    | 41.70           | 74.00          | -32.30      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 1200.000        | 51.18          | -8.85                    | 42.33           | 74.00          | -31.67      | peak   | 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 or as required by the applicant.
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).

**Operation Mode:** TX / IEEE 802.11b / CH 2462**Test Date:** January 29, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 1614.000        | 50.73          | -6.93                    | 43.80           | 74.00          | -30.20      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 1498.000        | 50.15          | -7.54                    | 42.61           | 74.00          | -31.39      | peak   | 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 or as required by the applicant.
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).

**Operation Mode:** TX / IEEE 802.11g / CH 2412**Test Date:** January 29, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 1922.000        | 53.27          | -5.29                    | 47.98           | 74.00          | -26.02      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 2004.000        | 50.08          | -4.88                    | 45.20           | 74.00          | -28.80      | peak   | 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 or as required by the applicant.
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).

**Operation Mode:** TX / IEEE 802.11g / CH 2437**Test Date:** January 29, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 1966.000        | 50.85          | -5.06                    | 45.79           | 74.00          | -28.21      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 1932.000        | 50.34          | -5.24                    | 45.10           | 74.00          | -28.90      | peak   | 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 or as required by the applicant.
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).

**Operation Mode:** TX / IEEE 802.11g / CH 2462**Test Date:** January 29, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 1926.000        | 50.08          | -5.27                    | 44.81           | 74.00          | -29.19      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 1720.000        | 53.34          | -6.36                    | 46.98           | 74.00          | -27.02      | peak   | 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 or as required by the applicant.
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).

**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH 2412 **Test Date:** January 29, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 1924.000        | 51.12          | -5.28                    | 45.84           | 74.00          | -28.16      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 2146.000        | 49.08          | -4.73                    | 44.35           | 74.00          | -29.65      | peak   | 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 or as required by the applicant.
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).

**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH 2437 **Test Date:** January 29, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 2296.000        | 50.76          | -4.30                    | 46.46           | 74.00          | -27.54      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 1976.000        | 49.55          | -5.01                    | 44.54           | 74.00          | -29.46      | peak   | 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 or as required by the applicant.
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).

**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH 2462 **Test Date:** January 29, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 1804.000        | 49.63          | -5.92                    | 43.71           | 74.00          | -30.29      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 1920.000        | 50.77          | -5.30                    | 45.47           | 74.00          | -28.53      | peak   | 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 or as required by the applicant.
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).



**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode  
/ CH 2422

**Test Date:** January 29, 2015

**Temperature:** 27°C

**Tested by:** Andy Shi

**Humidity:** 53 % RH

**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 1592.000        | 49.86          | -7.04                    | 42.82           | 74.00          | -31.18      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 1820.000        | 49.13          | -5.83                    | 43.30           | 74.00          | -30.70      | peak   | 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 or as required by the applicant.
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).

**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode  
/ CH 2437**Test Date:** January 29, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 1730.000        | 50.13          | -6.31                    | 43.82           | 74.00          | -30.18      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 1194.000        | 55.98          | -8.88                    | 47.10           | 74.00          | -26.90      | peak   | 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 or as required by the applicant.
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).



**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode  
/ CH 2452

**Test Date:** January 29, 2015

**Temperature:** 26°C

**Tested by:** Andy Shi

**Humidity:** 60 % RH

**Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------|-----------------|
| 1994.000        | 50.99          | -4.91                    | 46.08           | 74.00          | -27.92      | peak   | V               |
| N/A             |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
|                 |                |                          |                 |                |             |        |                 |
| 1732.000        | 53.42          | -6.30                    | 47.12           | 74.00          | -26.88      | peak   | 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 or as required by the applicant.
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).