



# SPORTON International Inc.

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## FCC RADIO TEST REPORT

|                            |                                                                                                 |
|----------------------------|-------------------------------------------------------------------------------------------------|
| Applicant's company        | ASUSTeK COMPUTER INC.                                                                           |
| Applicant Address          | 4F, No. 150, Li-Te Rd., Peitou, Taipei 112, Taiwan                                              |
| FCC ID                     | MSQ-RTOM00                                                                                      |
| Manufacturer's company (1) | ASKEY TECHNOLOGH(JIANGSU)LTD.                                                                   |
| Manufacturer Address (1)   | N0.1388, JiaoTong Road, WuKiang Economic-Technological Development Area, Jangus Province, P.R.C |
| Manufacturer's company (2) | Compal Networking (KunShan) Co., LTD.                                                           |
| Manufacturer Address (2)   | No. 520, Nabbang Rd., Economic & Technical Development Zone Kunshan, Jiangsu Province China     |

|                   |                                         |
|-------------------|-----------------------------------------|
| Product Name      | Wireless-AC3200 Tri-band Gigabit Router |
| Brand Name        | ASUS                                    |
| Model No.         | RT-AC3200, RT-AC3200R, RT-AC3200W       |
| Test Rule Part(s) | 47 CFR FCC Part 15 Subpart E § 15.407   |
| Test Freq. Range  | 5150 ~ 5250 MHz / 5725 ~ 5850 MHz       |
| Received Date     | Jul. 17, 2014                           |
| Final Test Date   | May 11, 2016                            |
| Submission Type   | Class II Change                         |

### Statement

**Test result included is for the IEEE 802.11n and IEEE 802.11a/ac of the product.**

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2013, 47 CFR FCC Part 15 Subpart E, KDB789033 D02 v01r02, KDB662911 D01 v02r01, KDB644545 D03 v01, ET Docket No. 13-49; FCC 16-24.**  
The test equipment used to perform the test is calibrated and traceable to NML/ROC.



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## History of This Test Report

| REPORT NO.  | VERSION | DESCRIPTION             | ISSUED DATE  |
|-------------|---------|-------------------------|--------------|
| FR471703-01 | Rev. 01 | Initial issue of report | May 23, 2016 |
|             |         |                         |              |
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|             |         |                         |              |

## 1. VERIFICATION OF COMPLIANCE

Product Name : Wireless-AC3200 Tri-band Gigabit Router  
Brand Name : ASUS  
Model No. : RT-AC3200, RT-AC3200R, RT-AC3200W  
Applicant : ASUSTeK COMPUTER INC.  
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart E § 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Jul. 17, 2014 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.



Sam Chen

SPORTON INTERNATIONAL INC.

## 2. SUMMARY OF THE TEST RESULT

| Applied Standard: 47 CFR FCC Part 15 Subpart E |              |                                                    |          |             |
|------------------------------------------------|--------------|----------------------------------------------------|----------|-------------|
| Part                                           | Rule Section | Description of Test                                | Result   | Under Limit |
| 4.1                                            | 15.407(a)    | 26dB Spectrum Bandwidth and 99% Occupied Bandwidth | Complies | -           |
| 4.2                                            | 15.407(a)    | Maximum Conducted Output Power                     | Complies | 2.74 dB     |
| 4.3                                            | 15.407(a)    | Power Spectral Density                             | Complies | 1.43 dB     |
| 4.4                                            | 15.407(b)    | Radiated Emissions                                 | Complies | 7.21 dB     |
| 4.5                                            | 15.407(b)    | Band Edge Emissions                                | Complies | 1.01 dB     |
| 4.6                                            | 15.407(g)    | Frequency Stability                                | Complies | -           |
| 4.7                                            | 15.203       | Antenna Requirements                               | Complies | -           |

Note: This device supports Bridge Mode in Band 1 and Band 4.

### 3. GENERAL INFORMATION

#### 3.1. Product Details

| Items                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Type             | WLAN (3TX, 3RX)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Radio Type               | Intentional Transceiver                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Power Type               | From power adapter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Modulation               | IEEE 802.11a: OFDM<br>IEEE 802.11n/ac: see the below table                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Data Modulation          | IEEE 802.11a/n: OFDM (BPSK / QPSK / 16QAM / 64QAM)<br>IEEE 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Data Rate (Mbps)         | IEEE 802.11a: OFDM (6/9/12/18/24/36/48/54)<br>IEEE 802.11n/ac: see the below table                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Frequency Range          | 5150 ~ 5250 MHz / 5725 ~ 5850 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Channel Number           | 9 for 20MHz bandwidth ; 4 for 40MHz bandwidth<br>2 for 80MHz bandwidth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Channel Band Width (99%) | <p><b>&lt;For Non-Beamforming Mode&gt;</b></p> <p>Band 1:</p> <p>IEEE 802.11a: 16.59 MHz</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT20): 17.80 MHz</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT40): 36.04 MHz</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT80): 75.54 MHz</p> <p>Band 4:</p> <p>IEEE 802.11a: 24.75 MHz</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT20): 25.62 MHz ;</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT40): 47.90 MHz ;</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT80): 76.12 MHz</p> <p><b>&lt;For Beamforming Mode&gt;</b></p> <p>Band 1:</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT20): 17.97 MHz</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT40): 36.76 MHz</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT80): 75.83 MHz</p> <p>Band 4:</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT20): 17.97 MHz ;</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT40): 37.19 MHz ;</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT80): 76.12 MHz</p> |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maximum Conducted Output Power | <p><b>&lt;For Non-Beamforming Mode&gt;</b></p> <p>Band 1:</p> <p>IEEE 802.11a: 26.04 dBm</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT20): 26.00 dBm</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT40): 26.07 dBm</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT80): 16.05 dBm</p> <p><b>&lt;For Beamforming Mode&gt;</b></p> <p>Band 1:</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT20): 25.12 dBm</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT40): 23.50 dBm</p> <p>IEEE 802.11ac MCS0/Nss1 (VHT80): 16.25 dBm</p> |
| Carrier Frequencies            | Please refer to section 3.4                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Antenna                        | Please refer to section 3.3                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Items                | Description                                                                         |                                              |
|----------------------|-------------------------------------------------------------------------------------|----------------------------------------------|
| Communication Mode   | <input checked="" type="checkbox"/> IP Based (Load Based)                           | <input type="checkbox"/> Frame Based         |
| Beamforming Function | <input checked="" type="checkbox"/> With beamforming for 802.11n/ac in 2.4GHz/5GHz. | <input type="checkbox"/> Without beamforming |
| Operate Condition    | <input checked="" type="checkbox"/> Indoor                                          | <input type="checkbox"/> Outdoor             |

### Antenna and Band width

| Antenna         | Three (TX) |        |        |
|-----------------|------------|--------|--------|
| Band width Mode | 20 MHz     | 40 MHz | 80 MHz |
| IEEE 802.11a    | V          | X      | X      |
| IEEE 802.11n    | V          | V      | X      |
| IEEE 802.11ac   | V          | V      | V      |

### IEEE 11n/ac Spec.

| Protocol         | Number of Transmit Chains (NTX) | Data Rate / MCS |
|------------------|---------------------------------|-----------------|
| 802.11n (HT20)   | 3                               | MCS 0-23        |
| 802.11n (HT40)   | 3                               | MCS 0-23        |
| 802.11ac (VHT20) | 3                               | MCS 0-9/Nss1-3  |
| 802.11ac (VHT40) | 3                               | MCS 0-9/Nss1-3  |
| 802.11ac (VHT80) | 3                               | MCS 0-9/Nss1-3  |

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput).

Then EUT supports HT20 and HT40.

Note 2: IEEE Std. 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160 (VHT: Very High Throughput). Then EUT supports VHT20, VHT40 and VHT80.

Note 3: Modulation modes consist of below configuration:

HT20/HT40: IEEE 802.11n, VHT20/VHT40/VHT80: IEEE 802.11ac

### 3.2. Accessories

| Power                         | Brand | Model No.  | Rating                                             |
|-------------------------------|-------|------------|----------------------------------------------------|
| Adapter 1<br>(Fixed plug)     | PI    | AD883J20   | Input: 100-240V~50/60Hz 1.0A<br>Output: 19V, 2.37A |
| Adapter 2<br>(Fixed plug)     | Delta | ADP-45BW B | Input: 100-240V~50-60Hz 1.2A<br>Output: 19V, 2.37A |
| Others                        |       |            |                                                    |
| RJ-45 Cable*1: Shielded, 1.5m |       |            |                                                    |

### 3.3. Table for Filed Antenna

| Ant. | Brand  | Model Name         | Antenna Type | Connector    | Gain (dBi) |               |               | Remark              |
|------|--------|--------------------|--------------|--------------|------------|---------------|---------------|---------------------|
|      |        |                    |              |              | 2.4GHz     | 5GHz (Band 1) | 5GHz (Band 4) |                     |
| 1    | M.gear | C660-510331-A      | Dipole Ant.  | Reversed-SMA | -          | -             | 3.47          | support single band |
| 2    | M.gear | C660-510331-A      | Dipole Ant.  | Reversed-SMA | -          | -             | 3.47          | support single band |
| 3    | PSA    | RFDPA181300SBLB805 | Dipole Ant.  | Reversed-SMA | 2.6        | 3.37          | 2.89          | support dual band   |
| 4    | M.gear | C660-510331-A      | Dipole Ant.  | Reversed-SMA | -          | -             | 3.47          | support single band |
| 5    | M.gear | C660-510324-A      | Dipole Ant.  | Reversed-SMA | 1.87       | 3.23          | 3.33          | support dual band   |

Note 1: Above antennas are the same type antenna, thus only the highest antenna gain Ant. 3 for 2.4GHz/5GHz band1 and Ant. 1, 2, 4 for 5GHz band 4 tested and recorded in the report.

Note 2: <For 2.4GHz and 5GHz Band 1>

**For IEEE 802.11b/g/a/n/ac mode (3TX/3RX)**

Chain 3, Chain 5 and Chain 6 can be used as transmitting/receiving antenna.

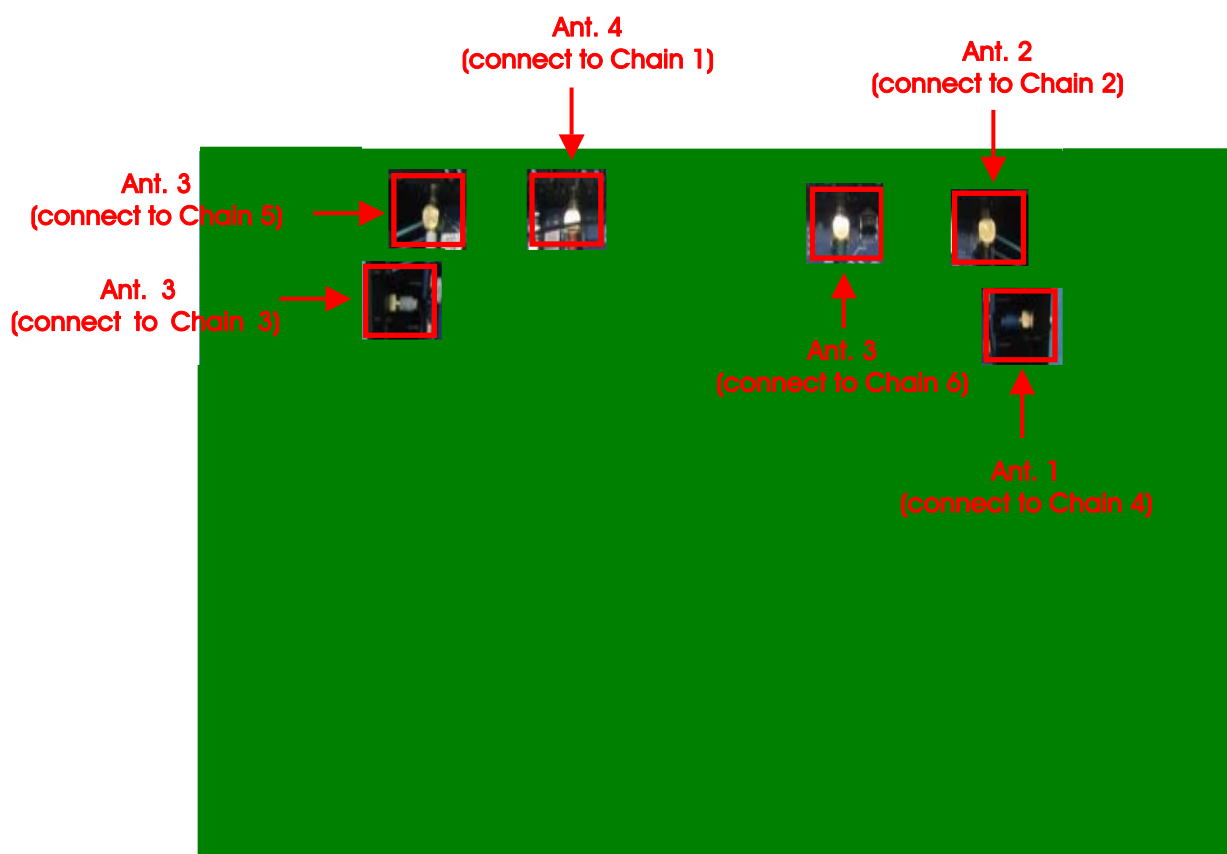
Chain 3, Chain 5 and Chain 6 could transmit/receive simultaneously.

<For 5GHz Band 4>

**For IEEE 802.11a/n/ac mode (3TX/3RX):**

Chain 1, Chain 2 and Chain 4 can be used as transmitting/receiving antenna.

Chain 1, Chain 2 and Chain 4 could transmit/receive simultaneously.



### 3.4. Table for Carrier Frequencies

There are three bandwidth systems.

For 20MHz bandwidth systems, use Channel 36, 40, 44, 48, 149, 153, 157, 161, 165.

For 40MHz bandwidth systems, use Channel 38, 46, 151, 159.

For 80MHz bandwidth systems, use Channel 42, 155.

| Frequency Band          | Channel No. | Frequency | Channel No. | Frequency |
|-------------------------|-------------|-----------|-------------|-----------|
| 5150~5250 MHz<br>Band 1 | 36          | 5180 MHz  | 44          | 5220 MHz  |
|                         | 38          | 5190 MHz  | 46          | 5230 MHz  |
|                         | 40          | 5200 MHz  | 48          | 5240 MHz  |
|                         | 42          | 5210 MHz  | -           | -         |
| 5725~5850 MHz<br>Band 4 | 149         | 5745 MHz  | 157         | 5785 MHz  |
|                         | 151         | 5755 MHz  | 159         | 5795 MHz  |
|                         | 153         | 5765 MHz  | 161         | 5805 MHz  |
|                         | 155         | 5775 MHz  | 165         | 5825 MHz  |

### 3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

For Band 1:

| Test Items                                                         | Mode                       |        | Data Rate | Channel  | Chain |
|--------------------------------------------------------------------|----------------------------|--------|-----------|----------|-------|
| Max. Conducted Output Power                                        | <For Non-Beamforming Mode> |        |           |          |       |
|                                                                    | 11a/BPSK                   | Band 1 | 6Mbps     | 36/40/48 | 3+5+6 |
|                                                                    | 11ac VHT20                 | Band 1 | MCS0/Nss1 | 36/40/48 | 3+5+6 |
|                                                                    | 11ac VHT40                 | Band 1 | MCS0/Nss1 | 38/46    | 3+5+6 |
|                                                                    | 11ac VHT80                 | Band 1 | MCS0/Nss1 | 42       | 3+5+6 |
|                                                                    | <For Beamforming Mode>     |        |           |          |       |
|                                                                    | 11ac VHT20                 | Band 1 | MCS0/Nss1 | 36/40    | 3+5+6 |
|                                                                    | 11ac VHT40                 | Band 1 | MCS0/Nss1 | 38/46    | 3+5+6 |
|                                                                    | 11ac VHT80                 | Band 1 | MCS0/Nss1 | 42       | 3+5+6 |
| Power Spectral Density                                             | <For Non-Beamforming Mode> |        |           |          |       |
|                                                                    | 11a/BPSK                   | Band 1 | 6Mbps     | 36/40/48 | 3+5+6 |
|                                                                    | 11ac VHT20                 | Band 1 | MCS0/Nss1 | 36/40/48 | 3+5+6 |
|                                                                    | 11ac VHT40                 | Band 1 | MCS0/Nss1 | 38/46    | 3+5+6 |
|                                                                    | 11ac VHT80                 | Band 1 | MCS0/Nss1 | 42       | 3+5+6 |
|                                                                    | <For Beamforming Mode>     |        |           |          |       |
|                                                                    | 11ac VHT20                 | Band 1 | MCS0/Nss1 | 36/40    | 3+5+6 |
|                                                                    | 11ac VHT40                 | Band 1 | MCS0/Nss1 | 38/46    | 3+5+6 |
|                                                                    | 11ac VHT80                 | Band 1 | MCS0/Nss1 | 42       | 3+5+6 |
| 26dB Spectrum Bandwidth &<br>99% Occupied Bandwidth<br>Measurement | <For Non-Beamforming Mode> |        |           |          |       |
|                                                                    | 11a/BPSK                   | Band 1 | 6Mbps     | 36/40/48 | 3+5+6 |
|                                                                    | 11ac VHT20                 | Band 1 | MCS0/Nss1 | 36/40/48 | 3+5+6 |
|                                                                    | 11ac VHT40                 | Band 1 | MCS0/Nss1 | 38/46    | 3+5+6 |
|                                                                    | 11ac VHT80                 | Band 1 | MCS0/Nss1 | 42       | 3+5+6 |
|                                                                    | <For Beamforming Mode>     |        |           |          |       |
|                                                                    | 11ac VHT20                 | Band 1 | MCS0/Nss1 | 36/40    | 3+5+6 |
|                                                                    | 11ac VHT40                 | Band 1 | MCS0/Nss1 | 38/46    | 3+5+6 |
|                                                                    | 11ac VHT80                 | Band 1 | MCS0/Nss1 | 42       | 3+5+6 |

|                              |                            |        |           |          |       |
|------------------------------|----------------------------|--------|-----------|----------|-------|
| Radiated Emission Above 1GHz | <For Non-Beamforming Mode> |        |           |          |       |
|                              | 11a/BPSK                   | Band 1 | 6Mbps     | 36/40/48 | 3+5+6 |
|                              | 11ac VHT20                 | Band 1 | MCS0/Nss1 | 36/40/48 | 3+5+6 |
|                              | 11ac VHT40                 | Band 1 | MCS0/Nss1 | 38/46    | 3+5+6 |
|                              | 11ac VHT80                 | Band 1 | MCS0/Nss1 | 42       | 3+5+6 |
|                              | <For Beamforming Mode>     |        |           |          |       |
|                              | 11ac VHT20                 | Band 1 | MCS0/Nss1 | 36/40    | 3+5+6 |
|                              | 11ac VHT40                 | Band 1 | MCS0/Nss1 | 38/46    | 3+5+6 |
|                              | 11ac VHT80                 | Band 1 | MCS0/Nss1 | 42       | 3+5+6 |
| Band Edge Emission           | <For Non-Beamforming Mode> |        |           |          |       |
|                              | 11a/BPSK                   | Band 1 | 6Mbps     | 36/40/48 | 3+5+6 |
|                              | 11ac VHT20                 | Band 1 | MCS0/Nss1 | 36/40/48 | 3+5+6 |
|                              | 11ac VHT40                 | Band 1 | MCS0/Nss1 | 38/46    | 3+5+6 |
|                              | 11ac VHT80                 | Band 1 | MCS0/Nss1 | 42       | 3+5+6 |
|                              | <For Beamforming Mode>     |        |           |          |       |
|                              | 11ac VHT20                 | Band 1 | MCS0/Nss1 | 36/40    | 3+5+6 |
|                              | 11ac VHT40                 | Band 1 | MCS0/Nss1 | 38/46    | 3+5+6 |
|                              | 11ac VHT80                 | Band 1 | MCS0/Nss1 | 42       | 3+5+6 |
| Frequency Stability          | 20 MHz                     | Band 1 | -         | 40       | 3     |
|                              | 40 MHz                     | Band 1 | -         | 38       | 3     |
|                              | 80 MHz                     | Band 1 | -         | 42       | 3     |

**For Band 4:**

| Test Items                                                         | Mode                       |        | Data Rate | Channel     | Chain |
|--------------------------------------------------------------------|----------------------------|--------|-----------|-------------|-------|
| Power Spectral Density                                             | <For Non-Beamforming Mode> |        |           |             |       |
|                                                                    | 11a/BPSK                   | Band 4 | 6Mbps     | 149/157/165 | 1+2+4 |
|                                                                    | 11ac VHT20                 | Band 4 | MCS0/Nss1 | 149/157/165 | 1+2+4 |
|                                                                    | 11ac VHT40                 | Band 4 | MCS0/Nss1 | 151/159     | 1+2+4 |
|                                                                    | 11ac VHT80                 | Band 4 | MCS0/Nss1 | 155         | 1+2+4 |
|                                                                    | <For Beamforming Mode>     |        |           |             |       |
|                                                                    | 11ac VHT20                 | Band 4 | MCS0/Nss1 | 149/157/165 | 1+2+4 |
|                                                                    | 11ac VHT40                 | Band 4 | MCS0/Nss1 | 151/159     | 1+2+4 |
|                                                                    | 11ac VHT80                 | Band 4 | MCS0/Nss1 | 155         | 1+2+4 |
| 26dB Spectrum Bandwidth &<br>99% Occupied Bandwidth<br>Measurement | <For Non-Beamforming Mode> |        |           |             |       |
|                                                                    | 11a/BPSK                   | Band 4 | 6Mbps     | 149/157/165 | 1+2+4 |
|                                                                    | 11ac VHT20                 | Band 4 | MCS0/Nss1 | 149/157/165 | 1+2+4 |
|                                                                    | 11ac VHT40                 | Band 4 | MCS0/Nss1 | 151/159     | 1+2+4 |
|                                                                    | 11ac VHT80                 | Band 4 | MCS0/Nss1 | 155         | 1+2+4 |
|                                                                    | <For Beamforming Mode>     |        |           |             |       |
|                                                                    | 11ac VHT20                 | Band 4 | MCS0/Nss1 | 149/157/165 | 1+2+4 |
|                                                                    | 11ac VHT40                 | Band 4 | MCS0/Nss1 | 151/159     | 1+2+4 |
|                                                                    | 11ac VHT80                 | Band 4 | MCS0/Nss1 | 155         | 1+2+4 |
| Frequency Stability                                                | 20 MHz                     | Band 4 | -         | 157         | 2     |
|                                                                    | 40 MHz                     | Band 4 | -         | 151         | 2     |
|                                                                    | 80 MHz                     | Band 4 | -         | 155         | 2     |

Note 1: VHT20/VHT40 covers HT20/HT40, due to same modulation.

Note 2: There are two modes of EUT, one is beamforming mode, and the other is non-beamforming mode for 802.11n/ac in 2.4GHz / 5GHz. Beamforming mode and non-beamforming mode has been test and record in this test report.

The following test modes were performed for all tests:

**For Radiated Emission test:**

Mode 1. CTX - EUT

### 3.6. Table for Testing Locations

| Test Site Location |                                                                            |          |                     |             |              |
|--------------------|----------------------------------------------------------------------------|----------|---------------------|-------------|--------------|
| Address:           | No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C. |          |                     |             |              |
| TEL:               | 886-3-656-9065                                                             |          |                     |             |              |
| FAX:               | 886-3-656-9085                                                             |          |                     |             |              |
| Test Site No.      | Site Category                                                              | Location | FCC Designation No. | IC File No. | VCCI Reg. No |
| 03CH01-CB          | SAC                                                                        | Hsin Chu | TW0006              | IC 4086D    | -            |
| TH01-CB            | OVEN Room                                                                  | Hsin Chu | -                   | -           | -            |

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

### 3.7. Table for Multiple Listing

The EUT has three model names which are identical to each other in all aspects except for the following table:

| Brand Name | Model Name | Description                                                                                           |
|------------|------------|-------------------------------------------------------------------------------------------------------|
| ASUS       | RT-AC3200  | All the models are identical, the difference model for difference brand served as marketing strategy. |
|            | RT-AC3200R |                                                                                                       |
|            | RT-AC3200W |                                                                                                       |

From the above models, model: RT-AC3200 was selected as representative model for the test and its data was recorded in this report.

### 3.8. Table for SKU List

The EUT has two SKU which are identical to each other in all aspects except for the following table:

| SKU | Description                                               |
|-----|-----------------------------------------------------------|
| 1   | The difference between SKU 1 and SKU 2 is LAN transformer |
| 2   |                                                           |

### 3.9. Table for Housing List

The EUT has two housing and which are identical to each other in all aspects except for the following table:

| Housing | With Hole | Without Hole |
|---------|-----------|--------------|
| 1       | V         | X            |
| 2       | X         | V            |

From the above models, model: housing 2 was selected as representative model for the test and its data was recorded in this report.

### 3.10. Table for Class II Change

This product is an extension of original report under Sporton project number: FR471703AA and FR471703AB.

Below is the table for the change of the product with respect to the original one.

| Modifications                                                                                                                                                                    | Performance Checking                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| For Band 1:<br>Consider the component with precision and make sure each device in mass production to comply with regulation rule.<br>Test it by mass product, not golden sample. | After evaluating, retesting all channels except 802.11ac MCS0/Nss1 VHT20 CH48 (For Beamforming Mode).<br>1. 26dB Bandwidth and 99% Occupied Bandwidth<br>2. Maximum Conducted Output Power<br>3. Power Spectral Density<br>4. Radiated Emissions above 1GHz<br>5. Band Edge Emissions<br>6. Frequency Stability |
| For Band 4:<br>Updating test rule of 5GHz band 4 to "15.407 (b)(4)(ii) of New Rules (ET Docket No. 13-49; FCC 16-24)" from "Old Rules".                                          | 1. 26dB Spectrum Bandwidth and 99% Occupied<br>2. Power Spectral Density.<br>3. Frequency Stability.<br>Note: The above test items will be based on original output power to re-test.                                                                                                                           |

### 3.11. Table for Supporting Units

<For Non-Beamforming Mode>

For Test Site No: 03CH01-CB <Above 1GHz>

| Support Unit | Brand | Model | FCC ID |
|--------------|-------|-------|--------|
| NB           | DELL  | E4300 | DoC    |

<For Beamforming Mode>

For Test Site No: 03CH01-CB <Above 1GHz>

| Support Unit | Brand   | Model | FCC ID     |
|--------------|---------|-------|------------|
| NB*2         | DELL    | E4300 | DoC        |
| WLAN Dongle  | Netgear | A6200 | PY31220200 |

For Test Site No: TH01-CB

| Support Unit | Brand | Model | FCC ID |
|--------------|-------|-------|--------|
| NB           | DELL  | E4300 | DoC    |

### 3.12. Table for Parameters of Test Software Setting

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

#### <For Non-Beamforming Mode>

| Test Software Version    | Mtool_2.0.1.8        |          |          |          |          |          |
|--------------------------|----------------------|----------|----------|----------|----------|----------|
| Mode                     | Test Frequency (MHz) |          |          |          |          |          |
|                          | NCB: 20MHz           |          |          |          |          |          |
|                          | 5180 MHz             | 5200 MHz | 5240 MHz | 5745 MHz | 5785 MHz | 5825 MHz |
| 802.11a                  | 74                   | 73       | 85       | 102      | 99       | 99       |
| 802.11ac MCS0/Nss1 VHT20 | 72                   | 71       | 84       | 102      | 99       | 99       |
| Mode                     | NCB: 40MHz           |          |          |          |          |          |
| 802.11ac MCS0/Nss1 VHT40 | 5190 MHz             |          | 5230 MHz |          | 5755 MHz |          |
|                          | 52                   |          | 83       |          | 97       |          |
| 802.11ac MCS0/Nss1 VHT40 | 5795 MHz             |          | 101      |          |          |          |
|                          |                      |          |          |          |          |          |
| Mode                     | NCB: 80MHz           |          |          |          |          |          |
| 802.11ac MCS0/Nss1 VHT80 | 5210 MHz             |          |          | 5775 MHz |          |          |
|                          | 43                   |          |          | 89       |          |          |

#### <For Beamforming Mode>

| Test Software Version    | Mtool_2.0.1.8        |          |          |          |          |
|--------------------------|----------------------|----------|----------|----------|----------|
| Mode                     | Test Frequency (MHz) |          |          |          |          |
|                          | NCB: 20MHz           |          |          |          |          |
|                          | 5180 MHz             | 5200 MHz | 5745 MHz | 5785 MHz | 5825 MHz |
| 802.11ac MCS0/Nss1 VHT20 | 75                   | 80       | 91       | 89       | 89       |
| Mode                     | NCB: 40MHz           |          |          |          |          |
| 802.11ac MCS0/Nss1 VHT40 | 5190 MHz             |          | 5230 MHz |          | 5755 MHz |
|                          | 55                   |          | 78       |          | 92       |
| 802.11ac MCS0/Nss1 VHT80 | 5210 MHz             |          |          | 5775 MHz |          |
|                          | 46                   |          |          | 88       |          |

### 3.13. EUT Operation during Test

For non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

For beamforming mode:

For Conducted Mode:

The EUT was programmed to be in continuously transmitting mode.

For Radiated Mode:

During the test, the following programs under WIN XP were executed.

The program was executed as follows:

1. During the test, the EUT operation to normal function.
2. Executed command fixed test channel under DOS.
3. Executed "Lantest.exe " to link with the remote workstation to receive and transmit packet by WLAN Dongle and transmit duty cycle no less 98%

### 3.14. Duty Cycle

For non-beamforming mode:

| Mode                     | On Time<br>(ms) | On+Off Time<br>(ms) | Duty Cycle<br>(%) | Duty Factor<br>(dB) | 1/T Minimum VBW<br>(kHz) |
|--------------------------|-----------------|---------------------|-------------------|---------------------|--------------------------|
| 802.11a                  | 2.040           | 2.090               | 97.61             | 0.11                | 0.49                     |
| 802.11ac MCS0/Nss1 VHT20 | 1.907           | 1.952               | 97.70             | 0.10                | 0.52                     |
| 802.11ac MCS0/Nss1 VHT40 | 0.932           | 0.984               | 94.72             | 0.24                | 1.07                     |
| 802.11ac MCS0/Nss1 VHT80 | 0.440           | 0.488               | 90.16             | 0.45                | 2.27                     |

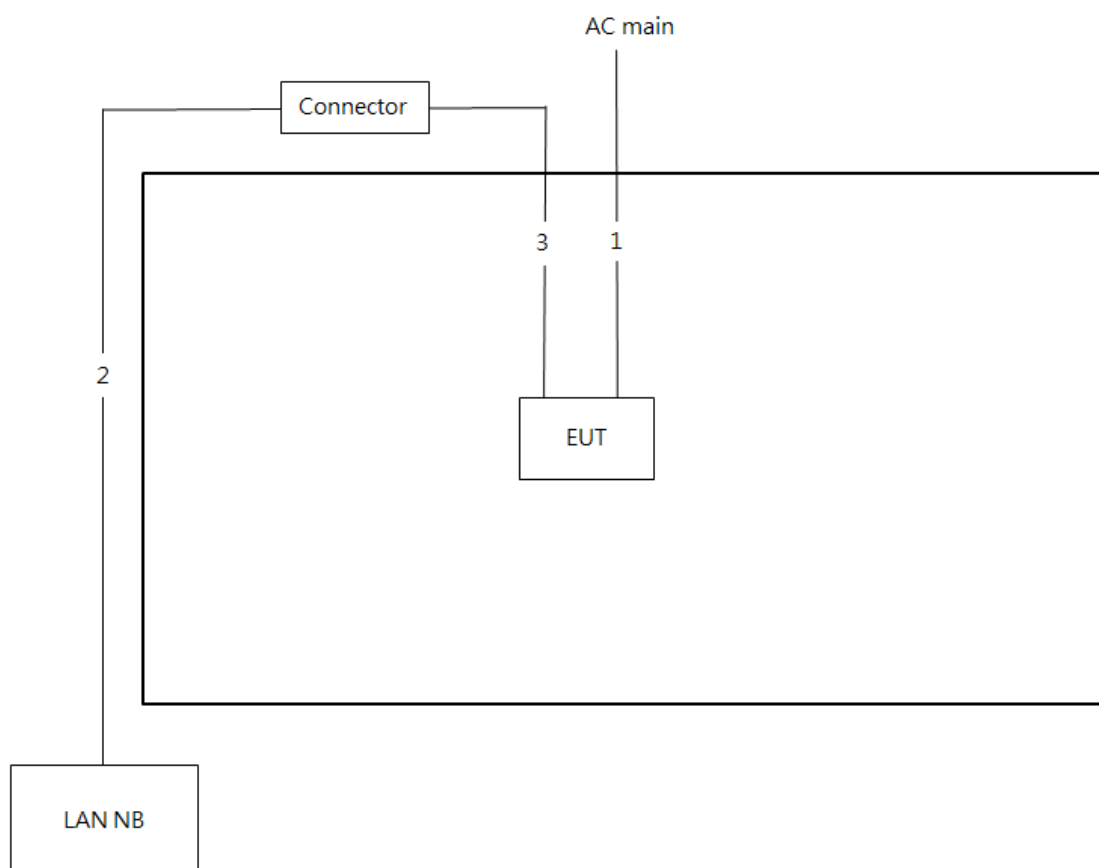
For beamforming mode:

| Mode                     | On Time<br>(ms) | On+Off Time<br>(ms) | Duty Cycle<br>(%) | Duty Factor<br>(dB) | 1/T Minimum VBW<br>(kHz) |
|--------------------------|-----------------|---------------------|-------------------|---------------------|--------------------------|
| 802.11ac MCS0/Nss1 VHT20 | 3.810           | 3.940               | 96.70             | 0.15                | 0.26                     |
| 802.11ac MCS0/Nss1 VHT40 | 3.650           | 3.790               | 96.31             | 0.16                | 0.27                     |
| 802.11ac MCS0/Nss1 VHT80 | 4.663           | 4.775               | 97.65             | 0.10                | 0.21                     |

### 3.15. Test Configurations

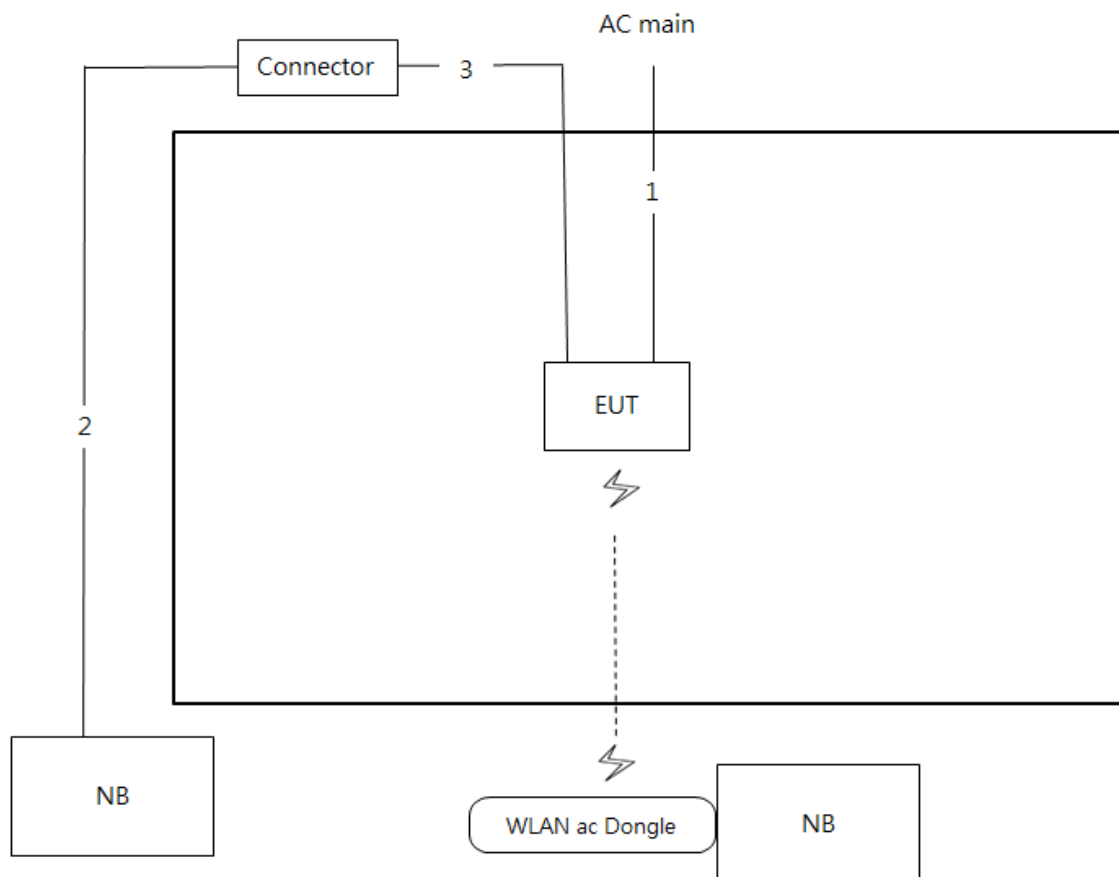
#### 3.15.1. Radiation Emissions Test Configuration

<For Non-Beamforming Mode>



| Item | Connection  | Shielded | Length |
|------|-------------|----------|--------|
| 1    | Power cable | No       | 2.2m   |
| 2    | RJ-45 cable | Yes      | 10m    |
| 3    | RJ-45 cable | Yes      | 1.5m   |

<For Beamforming Mode>



| Item | Connection  | Shielded | Length |
|------|-------------|----------|--------|
| 1    | Power cable | No       | 2.2m   |
| 2    | RJ-45 cable | Yes      | 10m    |
| 3    | RJ-45 cable | Yes      | 1.5m   |

## 4. TEST RESULT

### 4.1. 26dB Bandwidth and 99% Occupied Bandwidth Measurement

#### 4.1.1. Limit

No restriction limits.

#### 4.1.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| 26dB Bandwidth         |                                            |
|------------------------|--------------------------------------------|
| Spectrum Parameters    | Setting                                    |
| Attenuation            | Auto                                       |
| Span Frequency         | > 26dB Bandwidth                           |
| RBW                    | Approximately 1% of the emission bandwidth |
| VBW                    | VBW > RBW                                  |
| Detector               | Peak                                       |
| Trace                  | Max Hold                                   |
| Sweep Time             | Auto                                       |
| 99% Occupied Bandwidth |                                            |
| Spectrum Parameters    | Setting                                    |
| Span                   | 1.5 times to 5.0 times the OBW             |
| RBW                    | 1 % to 5 % of the OBW                      |
| VBW                    | $\geq 3 \times \text{RBW}$                 |
| Detector               | Peak                                       |
| Trace                  | Max Hold                                   |

#### 4.1.3. Test Procedures

For Radiated 26dB Bandwidth and 99% Occupied Bandwidth Measurement:

1. The transmitter was radiated to the spectrum analyzer in peak hold mode.
2. Measure the maximum width of the emission that is 26 dB down from the peak of the emission.  
Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

#### 4.1.4. Test Setup Layout

For Radiated 26dB Bandwidth and 99% Occupied Bandwidth Measurement:

This test setup layout is the same as that shown in section 4.4.4.

#### 4.1.5. Test Deviation

There is no deviation with the original standard.

#### 4.1.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 4.1.7. Test Result of 26dB Bandwidth and 99% Occupied Bandwidth

|               |          |          |     |
|---------------|----------|----------|-----|
| Temperature   | 26°C     | Humidity | 63% |
| Test Engineer | Gary Chu |          |     |

For Band 1:

<For Non-Beamforming Mode>

| Mode                        | Frequency | 26dB Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|-----------------------------|-----------|----------------------|------------------------------|
| 802.11a                     | 5180 MHz  | 20.52                | 16.59                        |
|                             | 5200 MHz  | 20.70                | 16.59                        |
|                             | 5240 MHz  | 20.78                | 16.59                        |
| 802.11ac<br>MCS0/Nss1 VHT20 | 5180 MHz  | 20.35                | 17.71                        |
|                             | 5200 MHz  | 20.26                | 17.80                        |
|                             | 5240 MHz  | 20.52                | 17.80                        |
| 802.11ac<br>MCS0/Nss1 VHT40 | 5190 MHz  | 39.86                | 35.89                        |
|                             | 5230 MHz  | 40.29                | 36.04                        |
| 802.11ac<br>MCS0/Nss1 VHT80 | 5210 MHz  | 81.16                | 75.54                        |

<For Beamforming Mode>

| Mode                        | Frequency | 26dB Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|-----------------------------|-----------|----------------------|------------------------------|
| 802.11ac<br>MCS0/Nss1 VHT20 | 5180 MHz  | 20.96                | 17.97                        |
|                             | 5200 MHz  | 21.22                | 17.97                        |
| 802.11ac<br>MCS0/Nss1 VHT40 | 5190 MHz  | 41.01                | 36.76                        |
|                             | 5230 MHz  | 40.73                | 36.61                        |
| 802.11ac<br>MCS0/Nss1 VHT80 | 5210 MHz  | 81.16                | 75.83                        |

|               |            |          |     |
|---------------|------------|----------|-----|
| Temperature   | 24°C       | Humidity | 62% |
| Test Engineer | Eddie Weng |          |     |

For Band 4:

<For Non-Beamforming Mode>

| Mode                        | Frequency | 26dB Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|-----------------------------|-----------|----------------------|------------------------------|
| 802.11a                     | 5745 MHz  | 37.30                | 24.75                        |
|                             | 5785 MHz  | 37.39                | 20.75                        |
|                             | 5825 MHz  | 40.00                | 23.53                        |
| 802.11ac<br>MCS0/Nss1 VHT20 | 5745 MHz  | 41.83                | 25.62                        |
|                             | 5785 MHz  | 36.70                | 20.67                        |
|                             | 5825 MHz  | 36.44                | 23.53                        |
| 802.11ac<br>MCS0/Nss1 VHT40 | 5755 MHz  | 80.44                | 38.35                        |
|                             | 5795 MHz  | 85.51                | 47.90                        |
| 802.11ac<br>MCS0/Nss1 VHT80 | 5775 MHz  | 104.35               | 76.12                        |

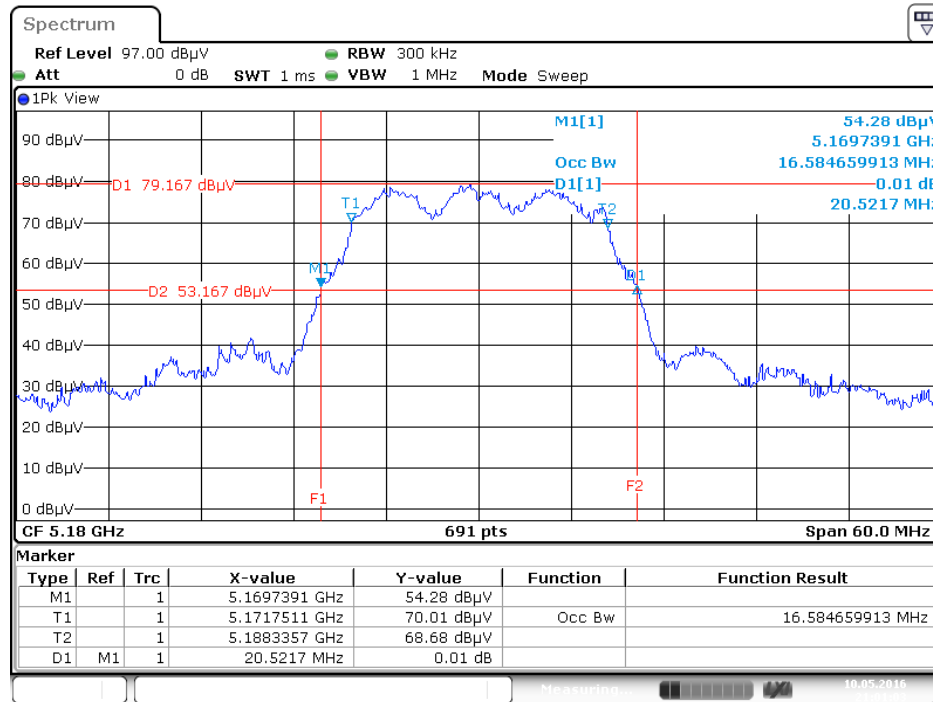
<For Beamforming Mode>

| Mode                        | Frequency | 26dB Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|-----------------------------|-----------|----------------------|------------------------------|
| 802.11ac<br>MCS0/Nss1 VHT20 | 5745 MHz  | 21.91                | 17.97                        |
|                             | 5785 MHz  | 21.73                | 17.97                        |
|                             | 5825 MHz  | 21.47                | 17.97                        |
| 802.11ac<br>MCS0/Nss1 VHT40 | 5755 MHz  | 56.81                | 37.19                        |
|                             | 5795 MHz  | 56.66                | 36.90                        |
| 802.11ac<br>MCS0/Nss1 VHT80 | 5775 MHz  | 112.17               | 76.12                        |

For Band 1:

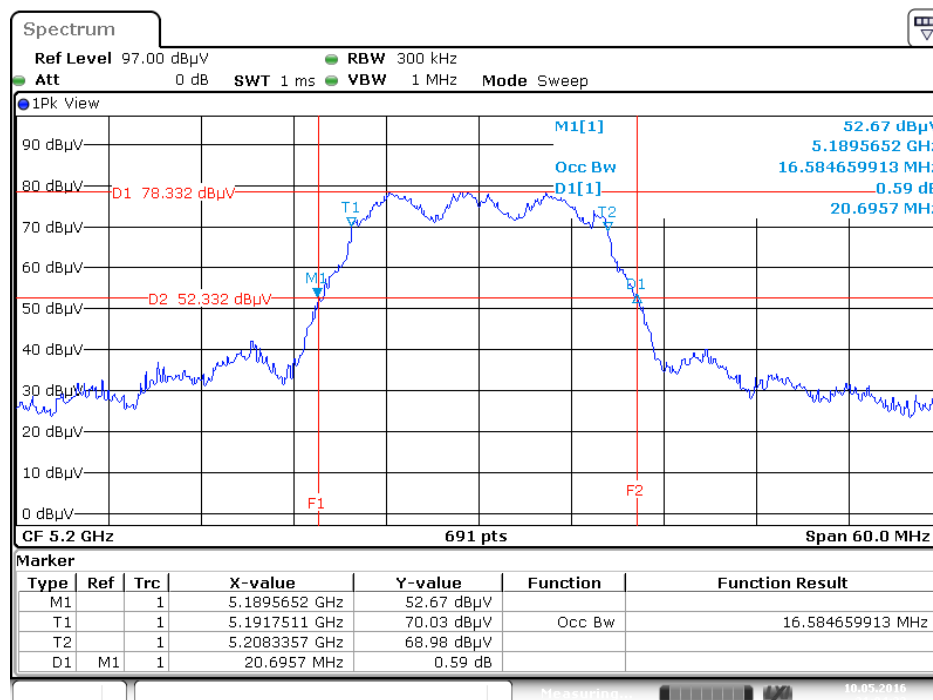
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 5  
+ Chain 6 / 5180 MHz



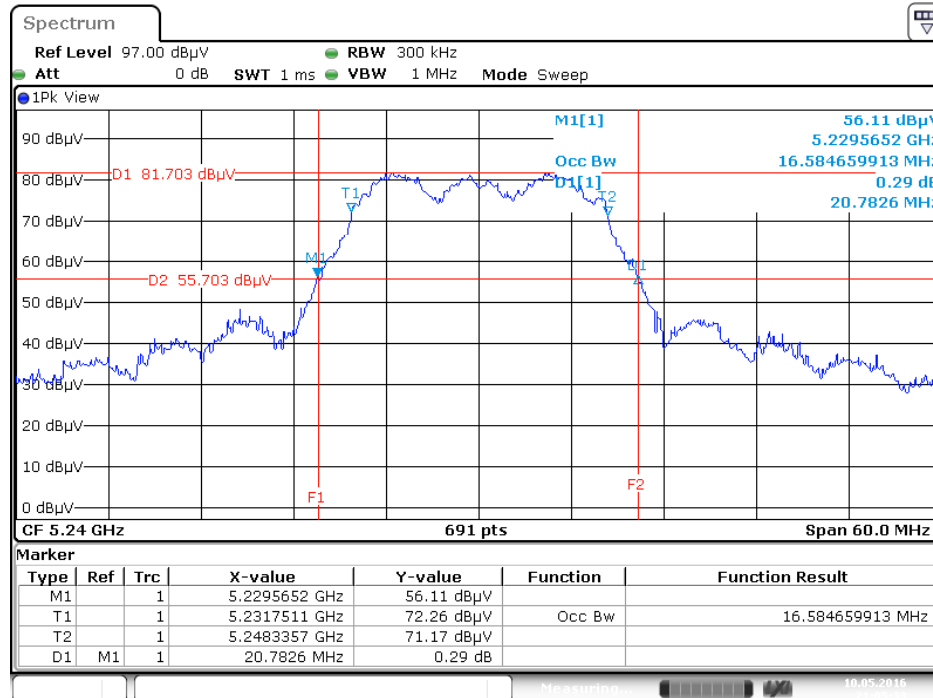
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 5  
+ Chain 6 / 5200 MHz



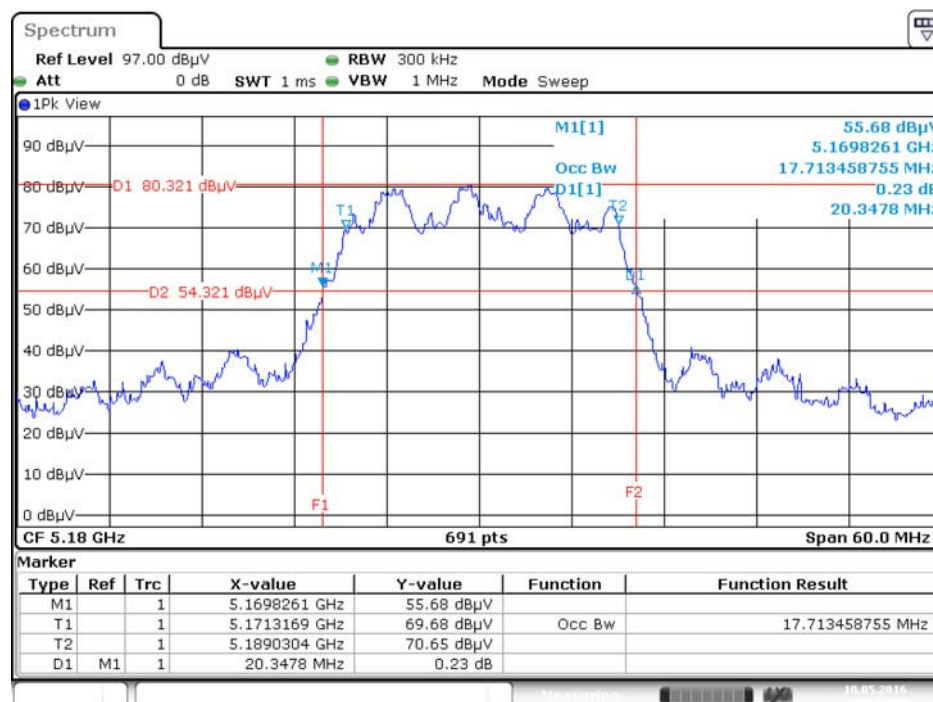
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# 26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 + Chain 5 + Chain 6 / 5240 MHz



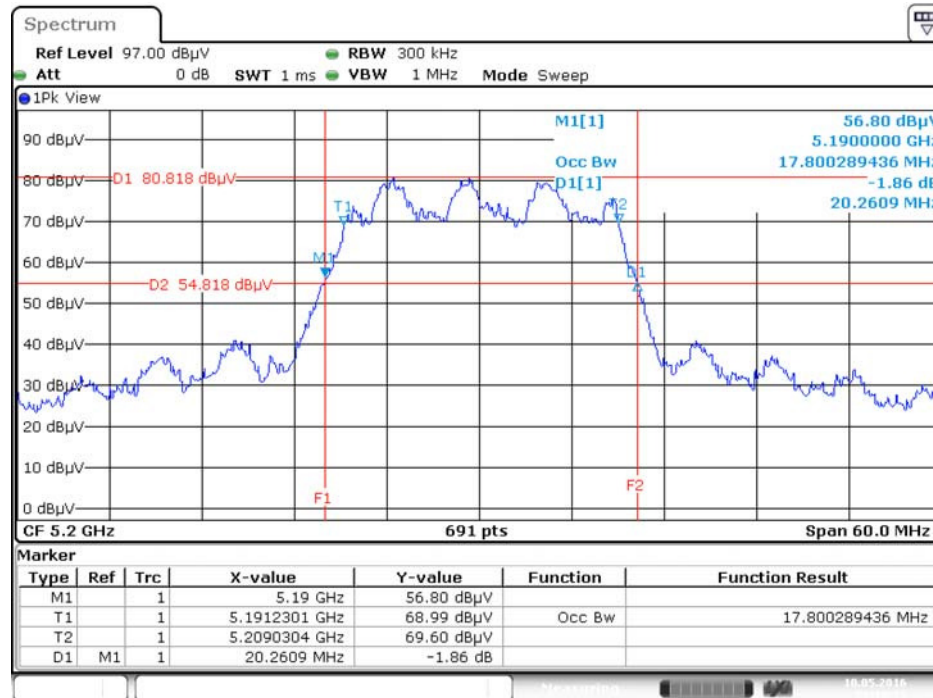
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# 26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 5 + Chain 6 / 5180 MHz



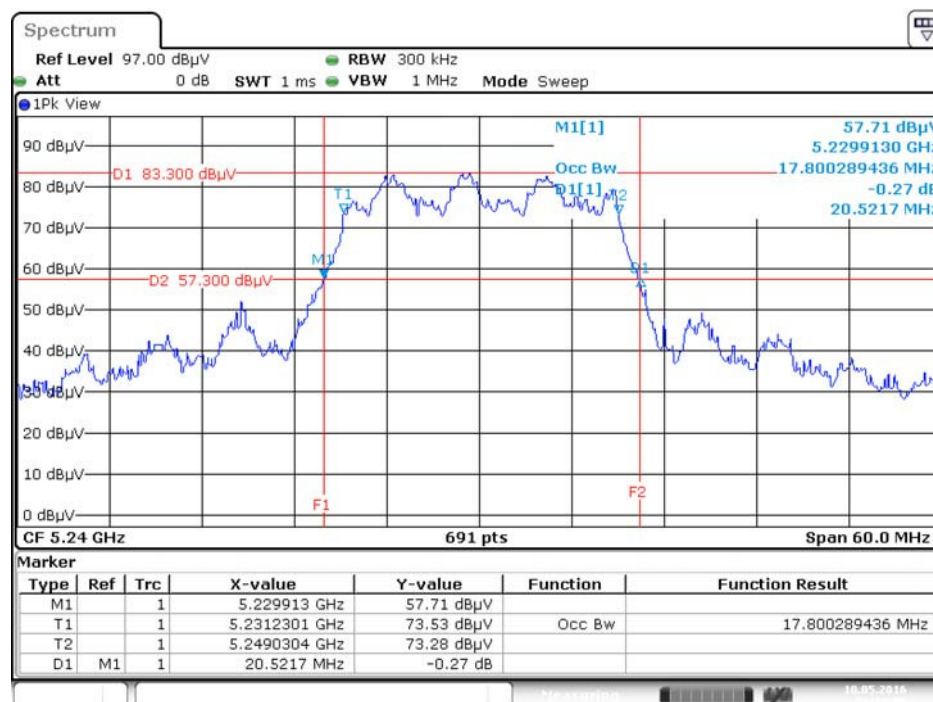
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 5 + Chain 6 / 5200 MHz



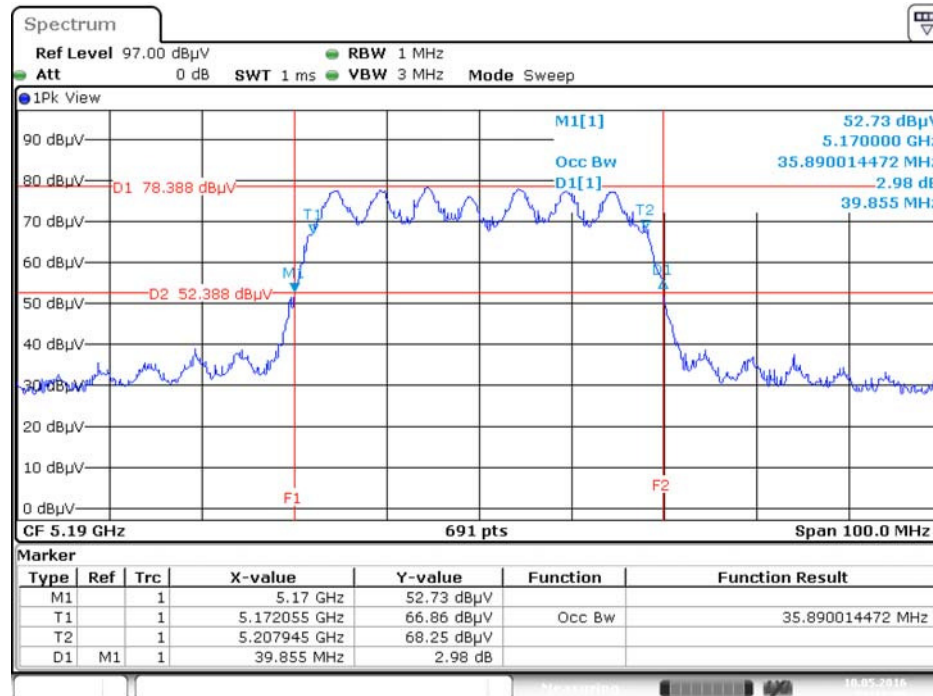
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 5 + Chain 6 / 5240 MHz



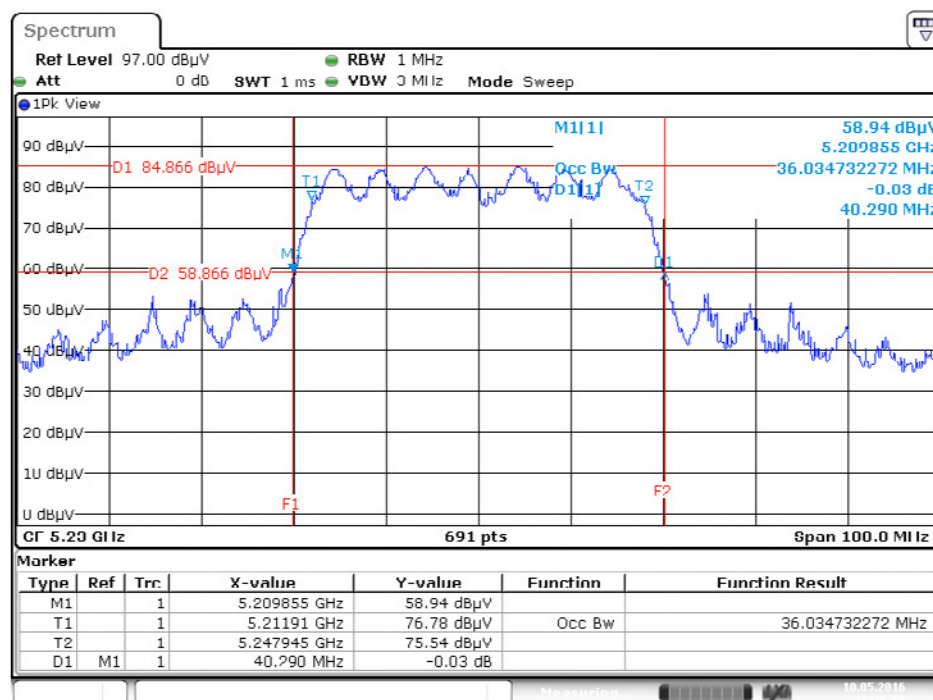
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 5 + Chain 6 / 5190 MHz



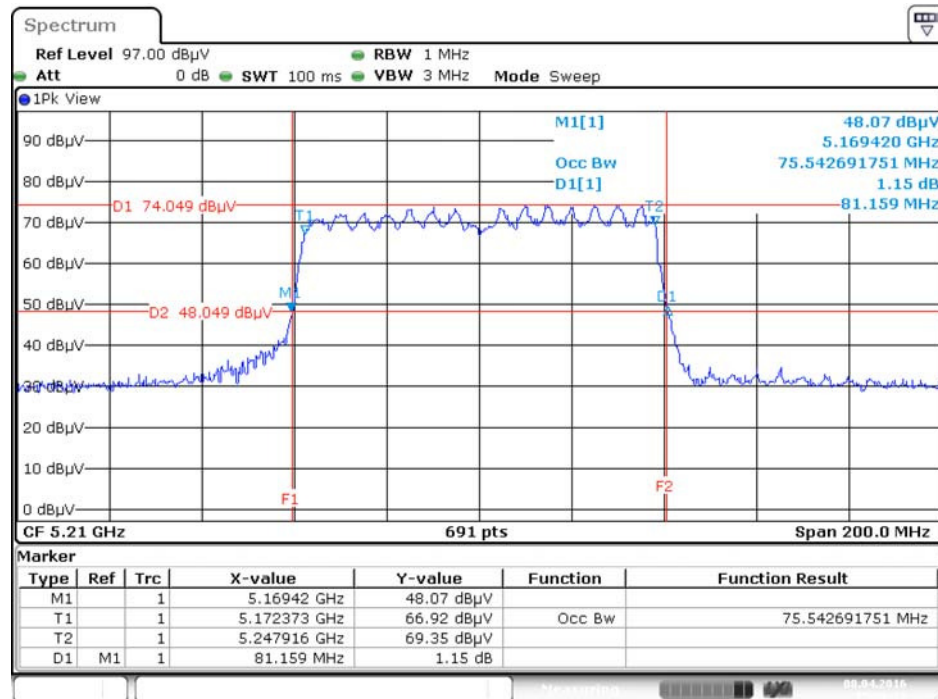
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 5 + Chain 6 / 5230 MHz



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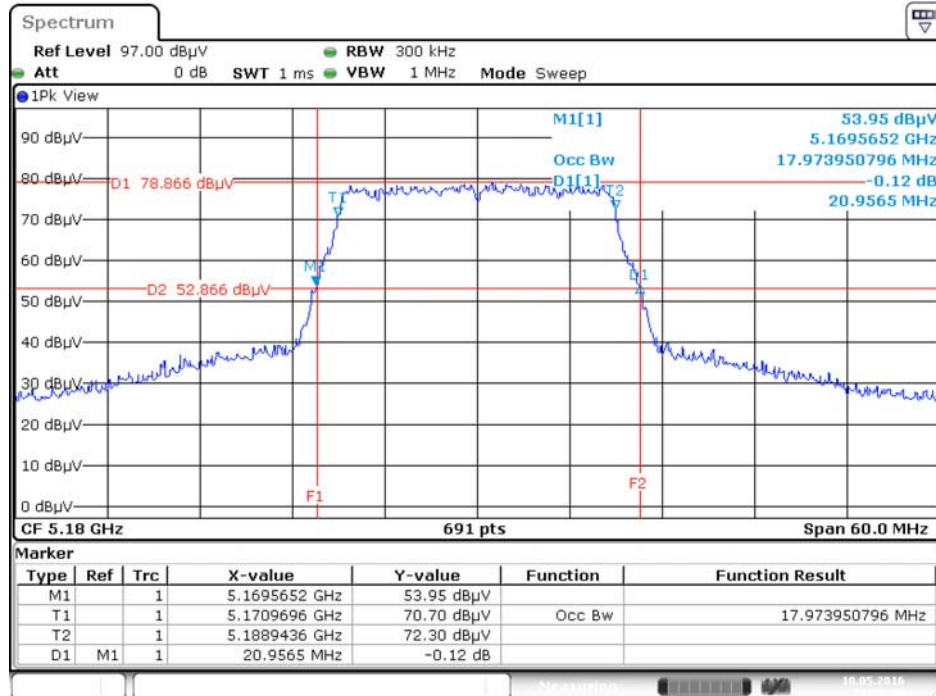
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 5 + Chain 6 / 5210 MHz



Date: 8.APR.2016 15:36:22

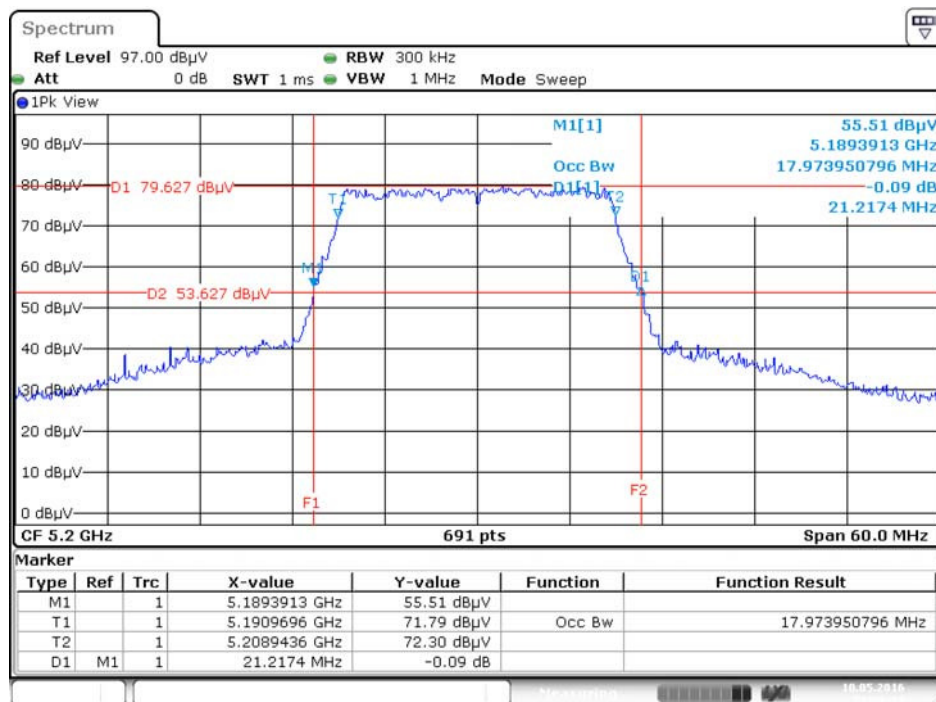
<For Beamforming Mode>

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 5 + Chain 6 / 5180 MHz



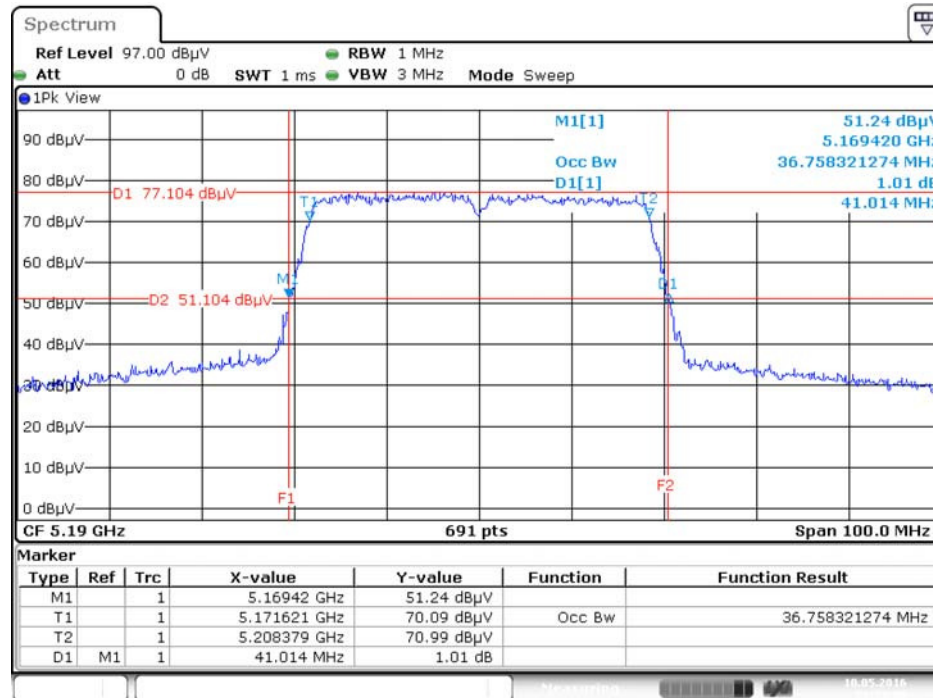
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 5 + Chain 6 / 5200 MHz



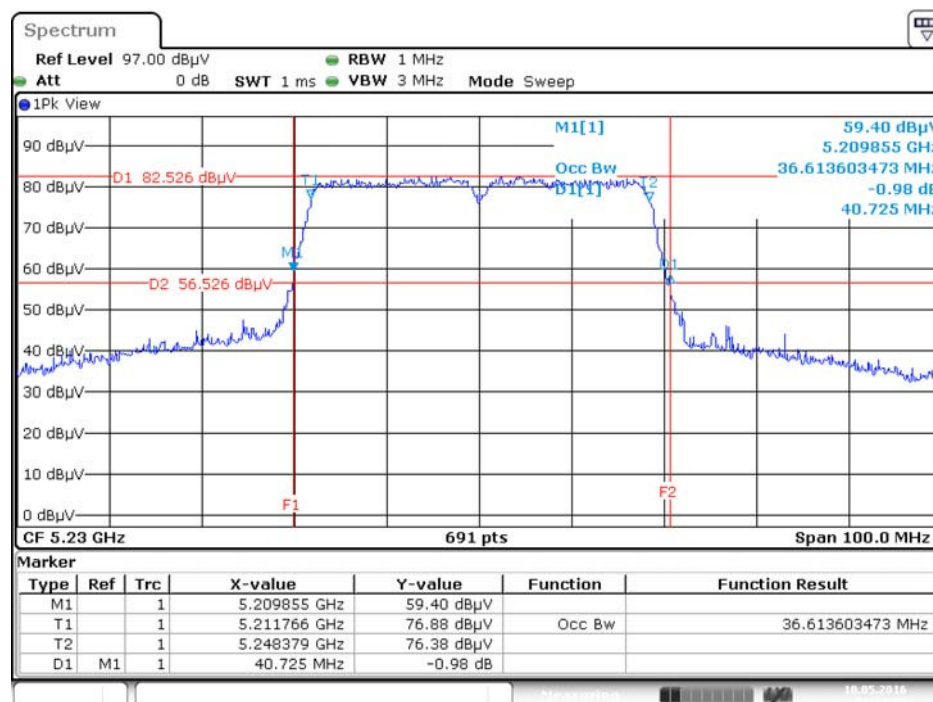
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 5 + Chain 6 / 5190 MHz



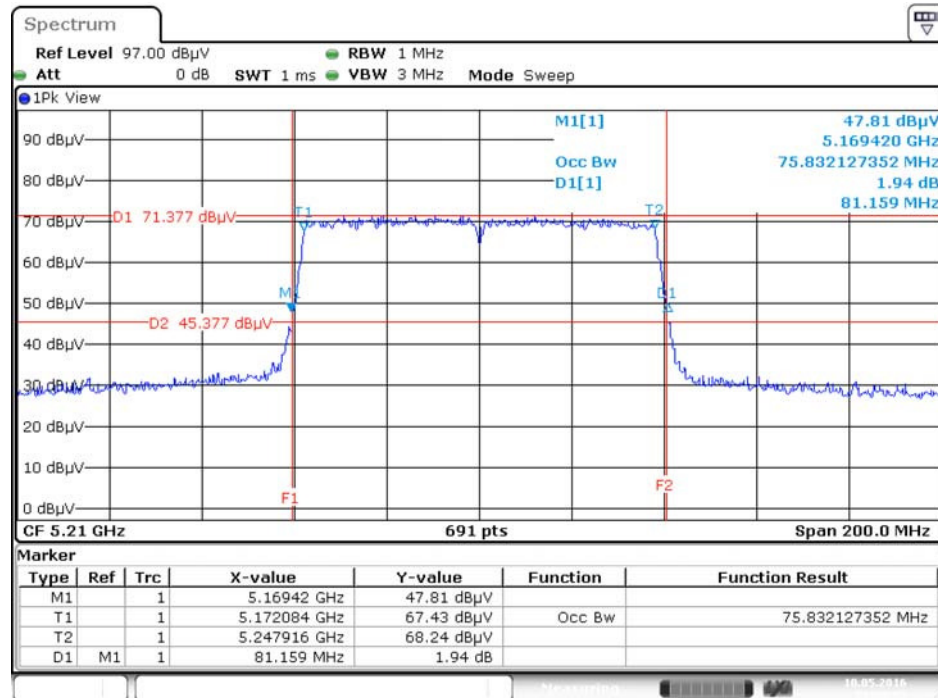
Date: 10.MAY.2016 21:23:09

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 5 + Chain 6 / 5230 MHz



Date: 10.MAY.2016 21:23:54

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 5 + Chain 6 / 5210 MHz



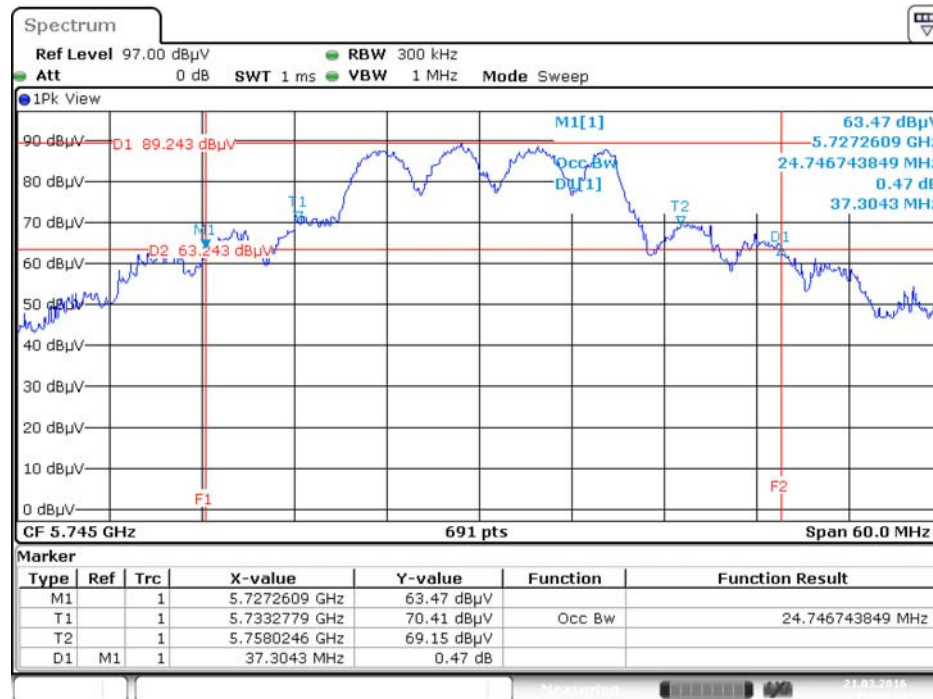
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For Band 4:

<For Non-Beamforming Mode>

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2

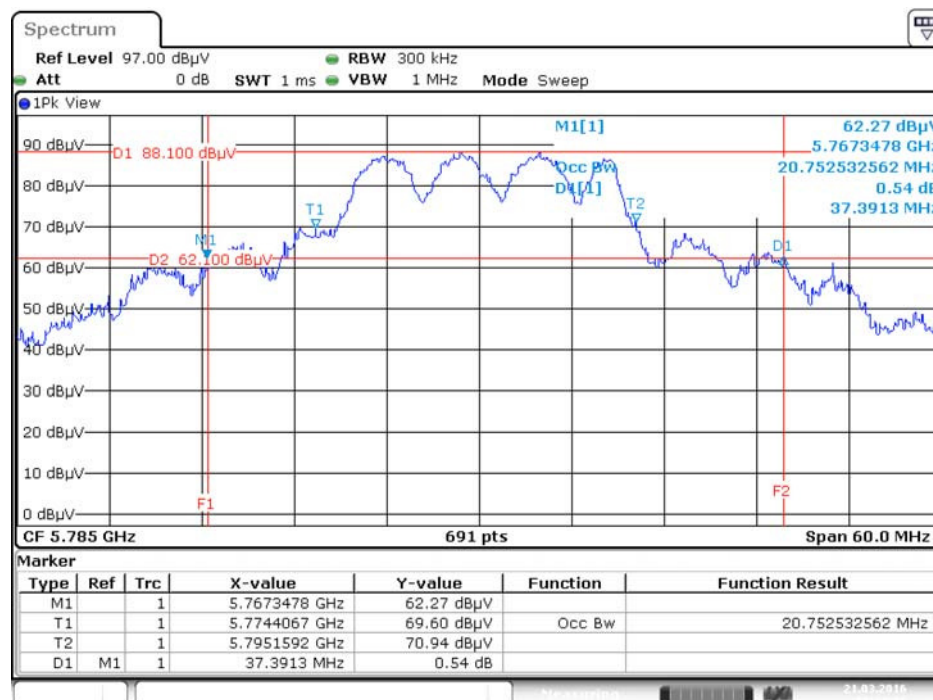
+ Chain 4 / 5745 MHz



Date: 21.MAR.2016 17:30:35

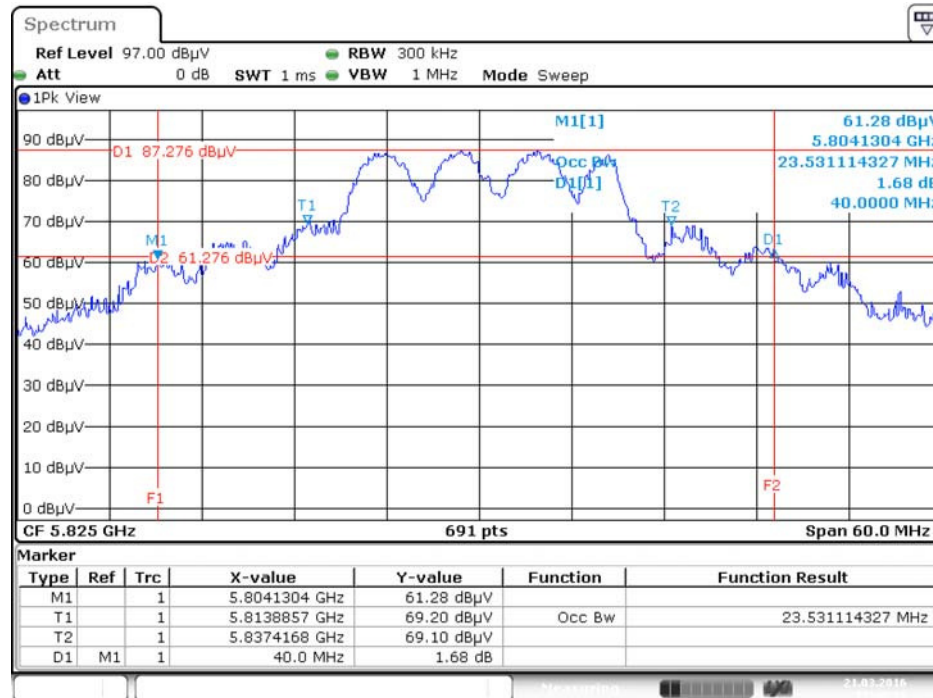
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2

+ Chain 4 / 5785 MHz



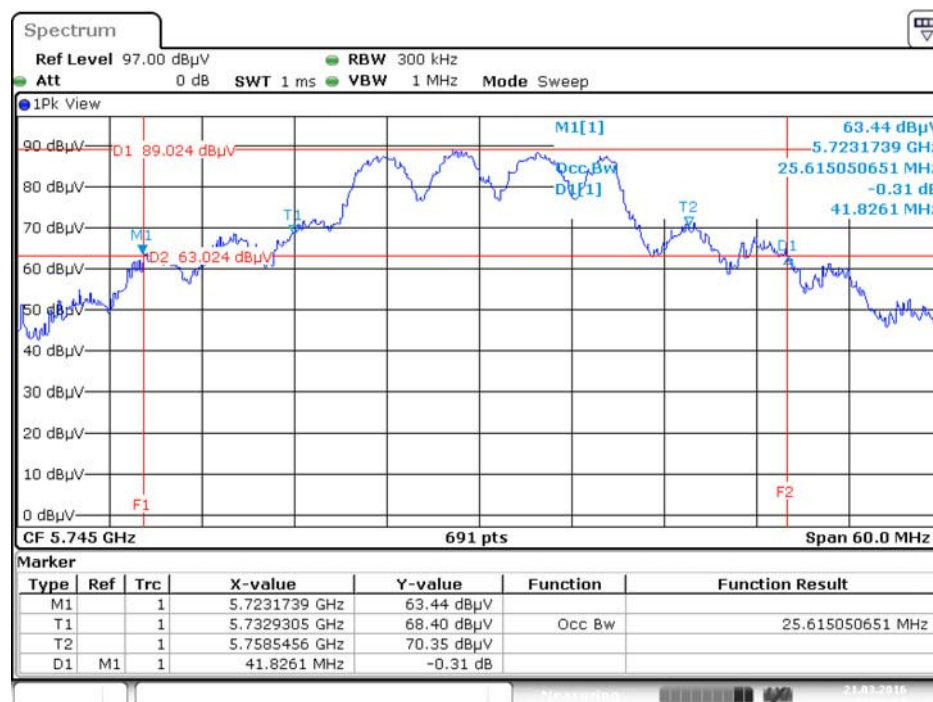
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## 26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 4 / 5825 MHz



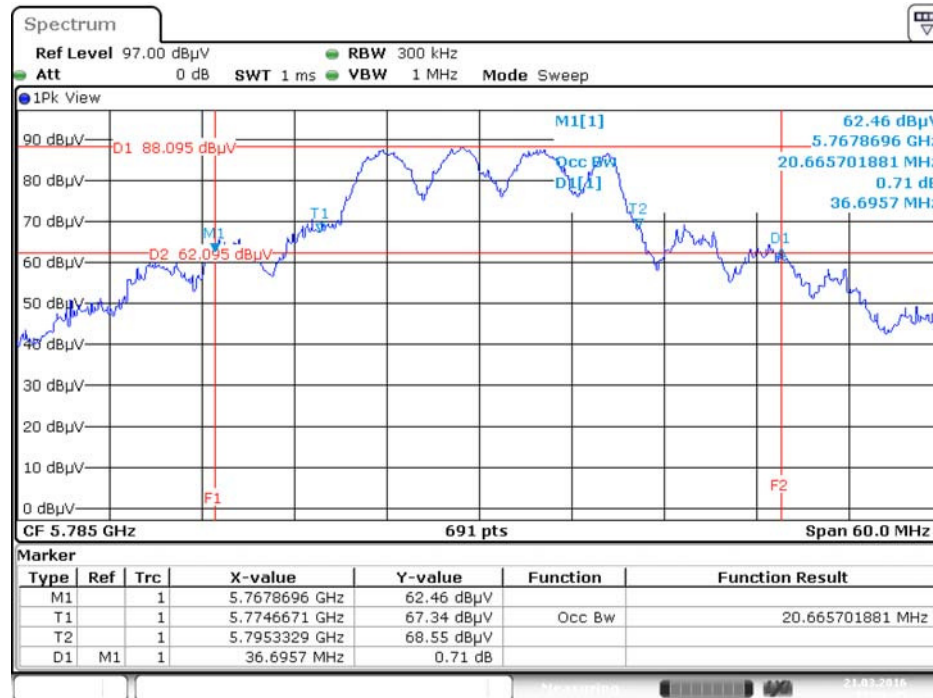
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## 26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 4 / 5745 MHz



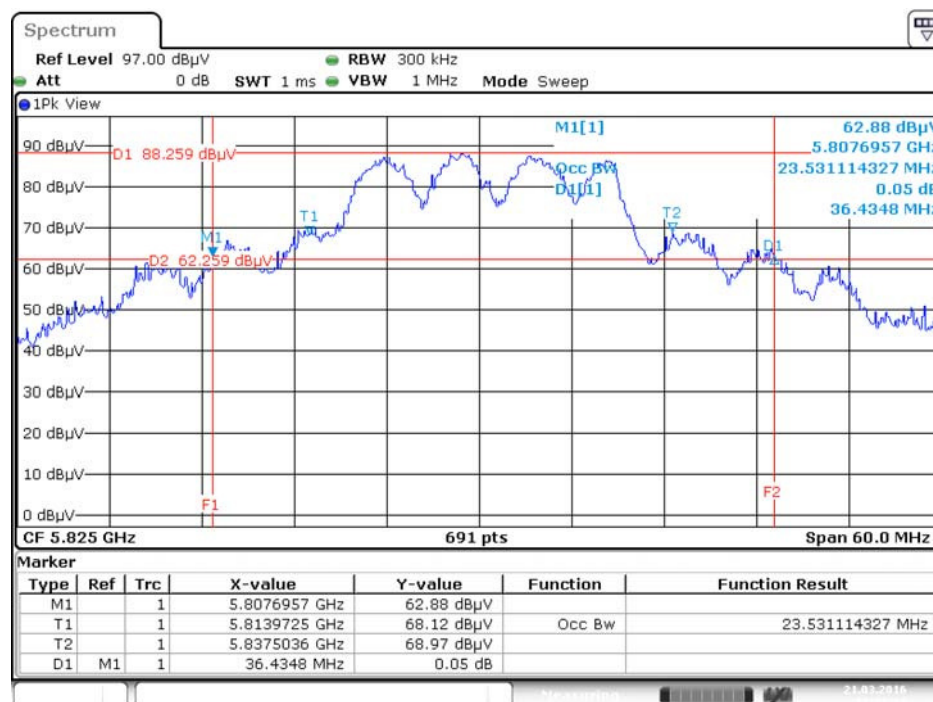
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 4 / 5785 MHz



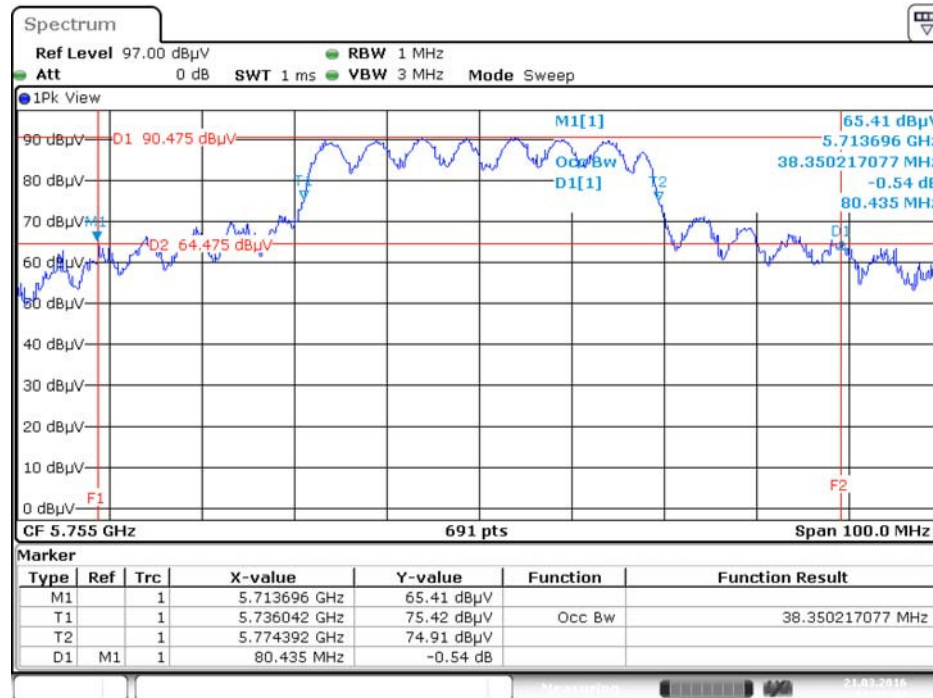
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 4 / 5825 MHz



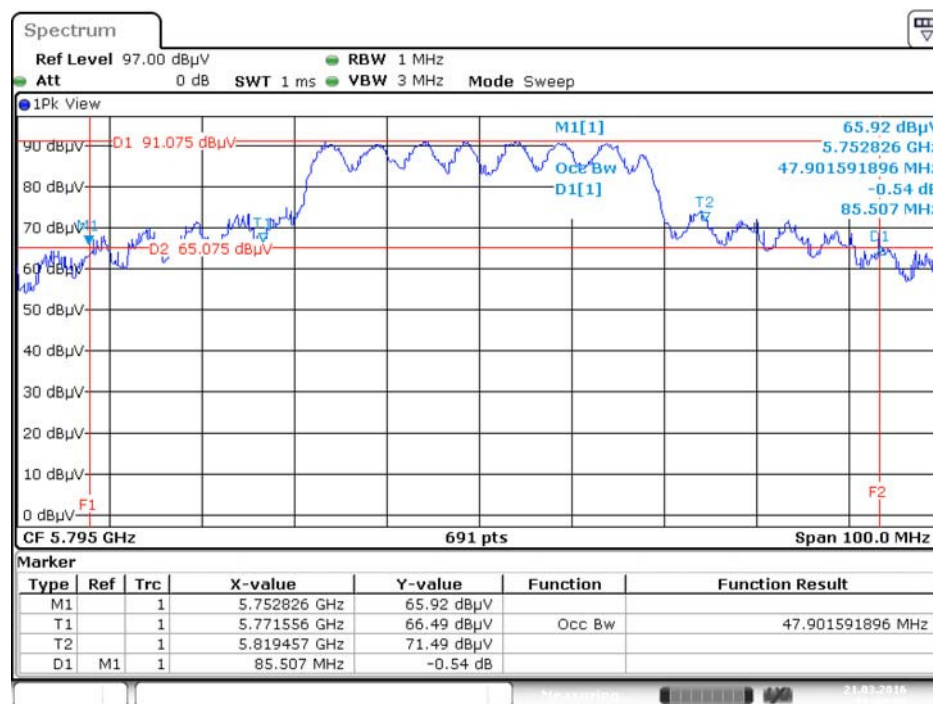
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 4 / 5755 MHz



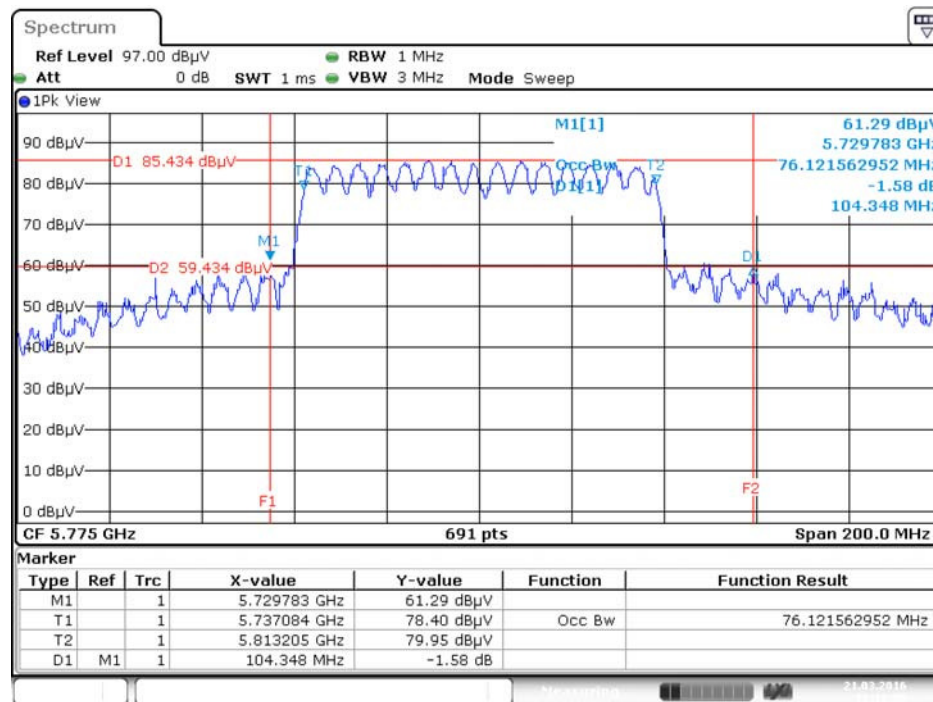
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 4 / 5795 MHz



Date: 21.MAR.2016 18:00:28

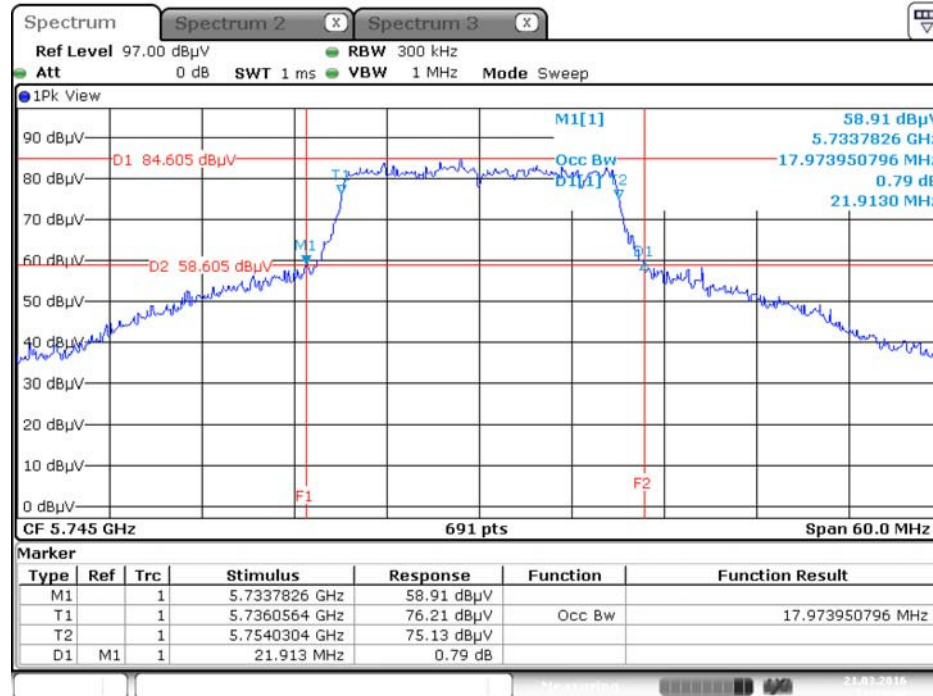
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 4 / 5775 MHz



Date: 21.MAR.2016 18:18:50

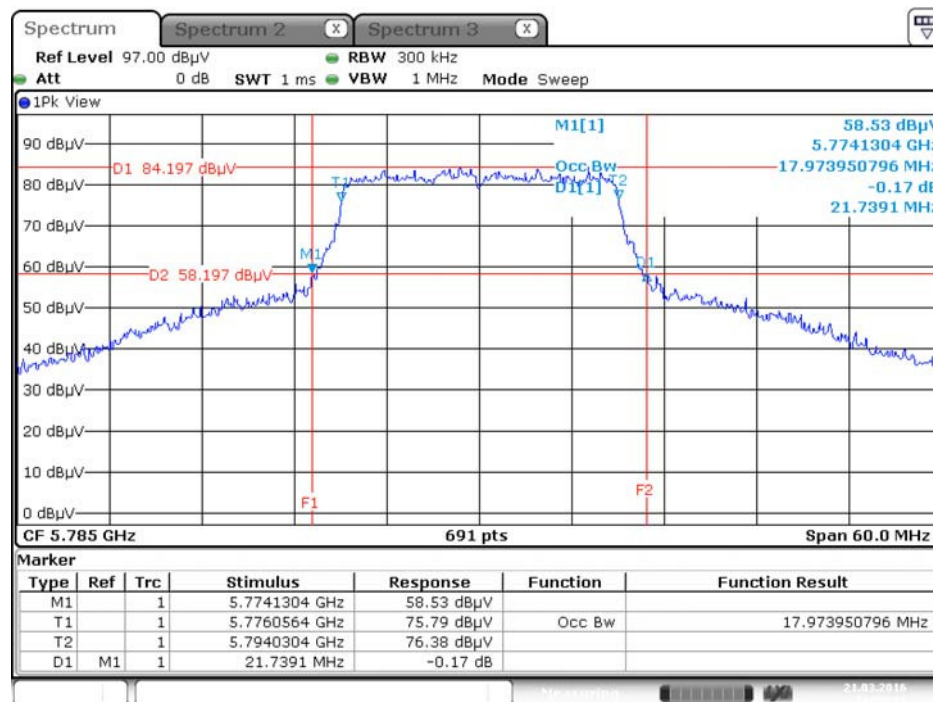
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 4 / 5745 MHz



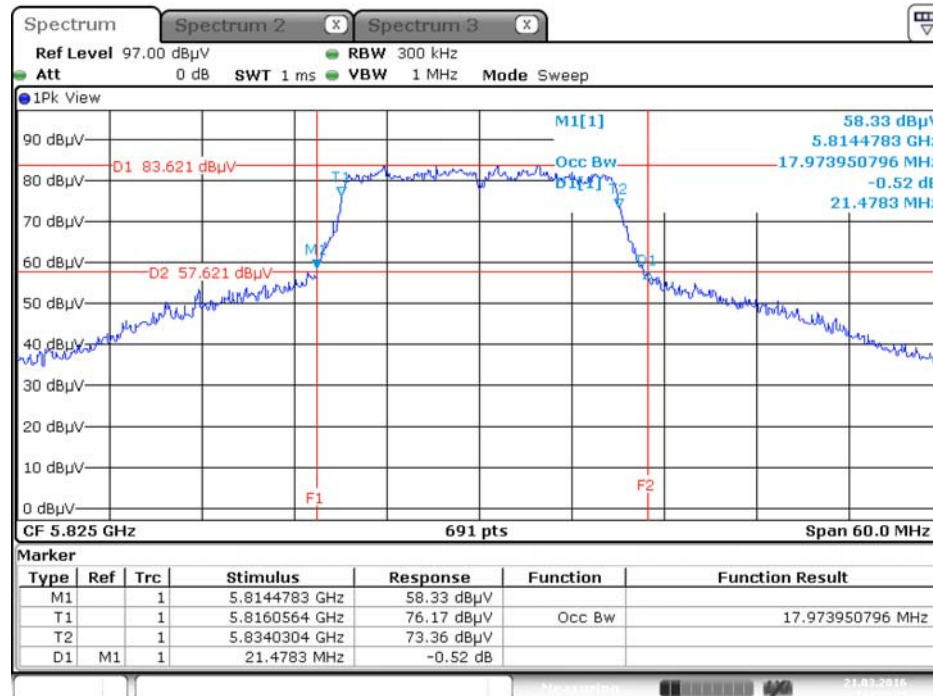
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26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 4 / 5785 MHz



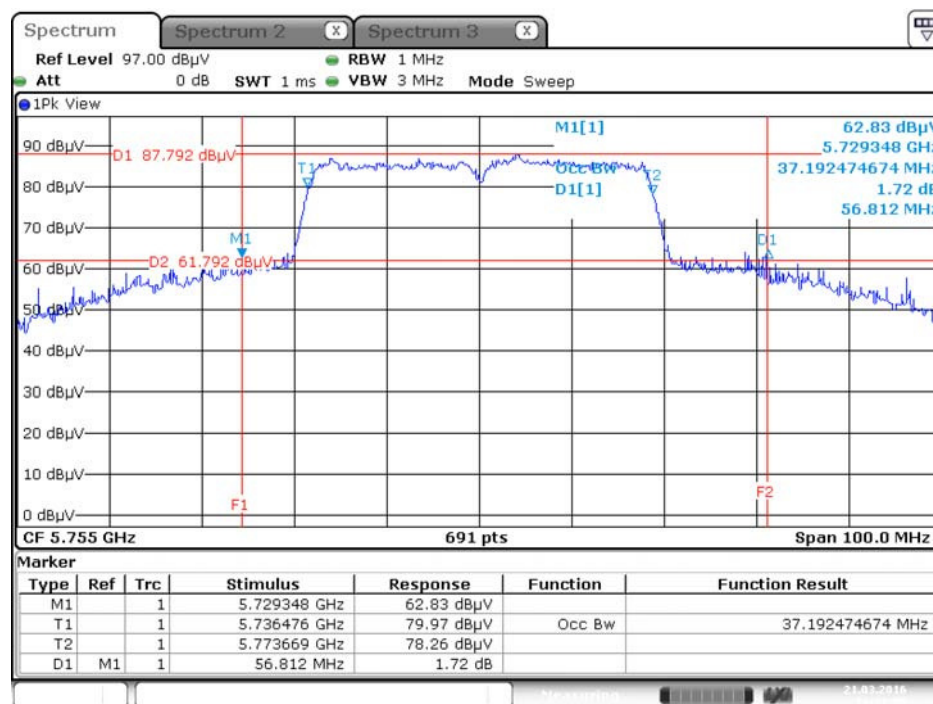
Date: 21.MAR.2016 19:25:11

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 4 / 5825 MHz



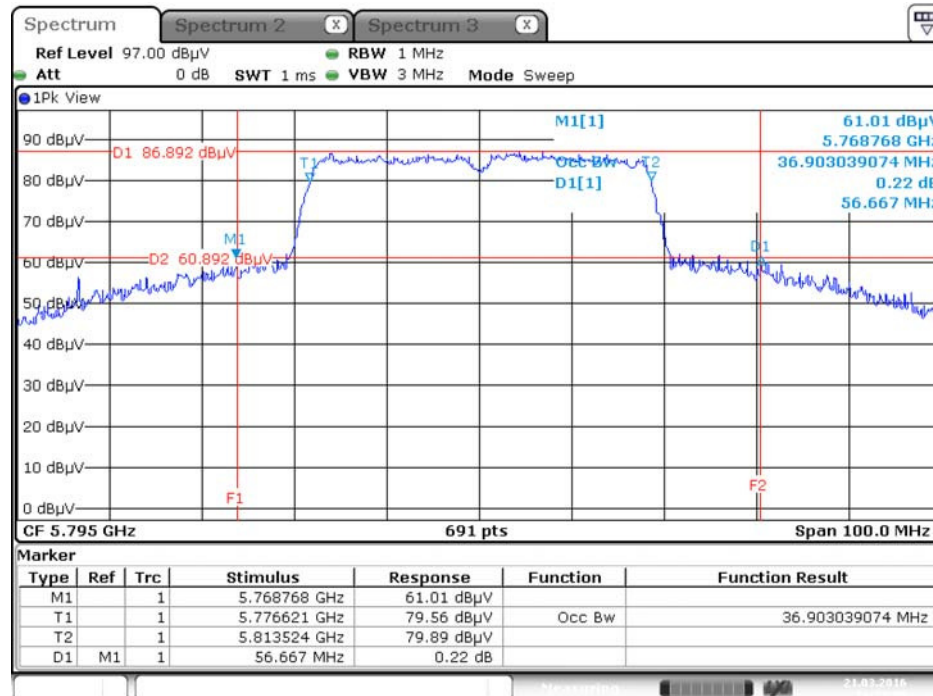
Date: 21.MAR.2016 19:25:46

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 4 / 5755 MHz



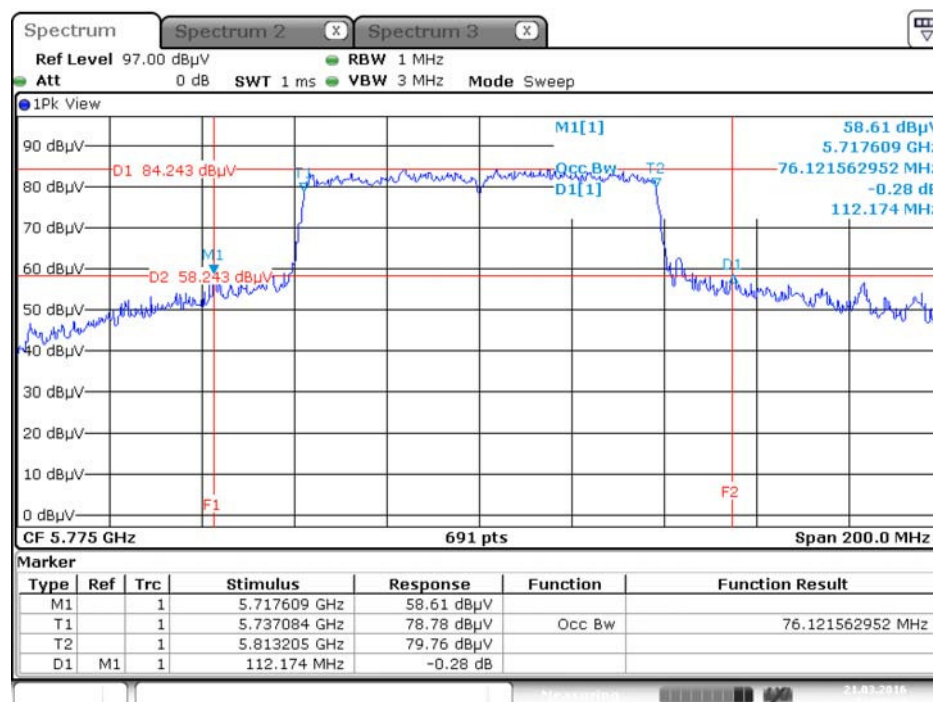
Date: 21.MAR.2016 19:22:59

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 4 / 5795 MHz



Date: 21.MAR.2016 19:23:29

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 4 / 5775 MHz



Date: 21.MAR.2016 19:20:34

## 4.2. Maximum Conducted Output Power Measurement

### 4.2.1. Limit

| Frequency Band                      |                                                             | Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | 5.15~5.25 GHz                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                     | Operating Mode                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                     | <input type="checkbox"/> Outdoor access point               | The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).                      |
|                                     | <input checked="" type="checkbox"/> Indoor access point     | The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.                                                                                                                                                 |
|                                     | <input type="checkbox"/> Fixed point-to-point access points | The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. |
|                                     | <input type="checkbox"/> Client devices                     | The maximum conducted output power over the frequency band of operation shall not exceed 250 mW (24dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.                                                                                                                                              |

|   |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ☒ | 5.725~5.85 GHz | The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. |
|---|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### 4.2.2. Measuring Instruments and Setting

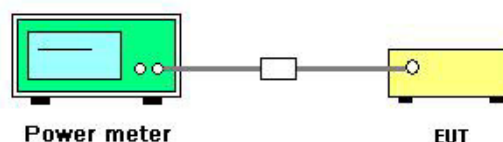
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

| Power Meter Parameter | Setting |
|-----------------------|---------|
| Detector              | AVERAGE |

#### 4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the power meter.
2. Test was performed in accordance with KDB789033 D02 v01r02 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (E) Maximum conducted output power =>3. Measurement using a Power Meter (PM) =>b) Method PM-G (Measurement using a gated RF average power meter).
3. Multiple antenna systems was performed in accordance with KDB662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. When measuring maximum conducted output power with multiple antenna systems, add every result of the values by mathematic formula.

#### 4.2.4. Test Setup Layout



#### 4.2.5. Test Deviation

There is no deviation with the original standard.

#### 4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 4.2.7. Test Result of Maximum Conducted Output Power

|               |          |           |              |
|---------------|----------|-----------|--------------|
| Temperature   | 26°C     | Humidity  | 63%          |
| Test Engineer | Gary Chu | Test Date | May 10, 2016 |

##### <For Non-Beamforming Mode>

| Mode                           | Frequency | Conducted Power (dBm) |         |         |       | Max. Limit (dBm) | Result   |
|--------------------------------|-----------|-----------------------|---------|---------|-------|------------------|----------|
|                                |           | Chain 3               | Chain 5 | Chain 6 | Total |                  |          |
| 802.11a                        | 5180 MHz  | 18.15                 | 18.35   | 19.05   | 23.31 | 30.00            | Complies |
|                                | 5200 MHz  | 17.86                 | 17.78   | 18.07   | 22.68 | 30.00            | Complies |
|                                | 5240 MHz  | 21.05                 | 21.32   | 21.43   | 26.04 | 30.00            | Complies |
| 802.11ac<br>MCS0/Nss1<br>VHT20 | 5180 MHz  | 18.01                 | 18.12   | 18.35   | 22.93 | 30.00            | Complies |
|                                | 5200 MHz  | 18.01                 | 18.11   | 18.39   | 22.94 | 30.00            | Complies |
|                                | 5240 MHz  | 21.05                 | 21.15   | 21.48   | 26.00 | 30.00            | Complies |
| 802.11ac<br>MCS0/Nss1<br>VHT40 | 5190 MHz  | 13.15                 | 13.25   | 13.58   | 18.10 | 30.00            | Complies |
|                                | 5230 MHz  | 21.05                 | 21.25   | 21.59   | 26.07 | 30.00            | Complies |
| 802.11ac<br>MCS0/Nss1<br>VHT80 | 5210 MHz  | 11.05                 | 11.19   | 11.59   | 16.05 | 30.00            | Complies |

##### <For Beamforming Mode>

| Mode                           | Frequency | Conducted Power (dBm) |         |         |       | Max. Limit (dBm) | Result   |
|--------------------------------|-----------|-----------------------|---------|---------|-------|------------------|----------|
|                                |           | Chain 3               | Chain 5 | Chain 6 | Total |                  |          |
| 802.11ac<br>MCS0/Nss1<br>VHT20 | 5180 MHz  | 19.34                 | 19.51   | 19.79   | 24.32 | 27.86            | Complies |
|                                | 5200 MHz  | 20.12                 | 20.33   | 20.59   | 25.12 | 27.86            | Complies |
| 802.11ac<br>MCS0/Nss1<br>VHT40 | 5190 MHz  | 13.66                 | 13.82   | 14.08   | 18.63 | 27.86            | Complies |
|                                | 5230 MHz  | 18.32                 | 18.76   | 19.07   | 23.50 | 27.86            | Complies |
| 802.11ac<br>MCS0/Nss1<br>VHT80 | 5210 MHz  | 11.26                 | 11.31   | 11.84   | 16.25 | 27.86            | Complies |

Note:  $Directional\ Gain = 10 \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{K=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right] = 8.14 \text{ dBi} > 6 \text{ dBi}$ , so Limit =  $30 - (8.14 - 6) = 27.86 \text{ dBm}$ .

### 4.3. Power Spectral Density Measurement

#### 4.3.1. Limit

The following table is power spectral density limits and decrease power density limit rule refer to section 4.2.1.

| Frequency Band                      |                                    | Limit         |
|-------------------------------------|------------------------------------|---------------|
| <input checked="" type="checkbox"/> | 5.15~5.25 GHz                      |               |
|                                     | Operating Mode                     |               |
| <input type="checkbox"/>            | Outdoor access point               | 17 dBm/MHz    |
| <input checked="" type="checkbox"/> | Indoor access point                | 17 dBm/MHz    |
| <input type="checkbox"/>            | Fixed point-to-point access points | 17 dBm/MHz    |
| <input type="checkbox"/>            | Client devices                     | 11 dBm/MHz    |
| <input checked="" type="checkbox"/> | 5.725~5.85 GHz                     | 30 dBm/500kHz |

#### 4.3.2. Measuring Instruments and Setting

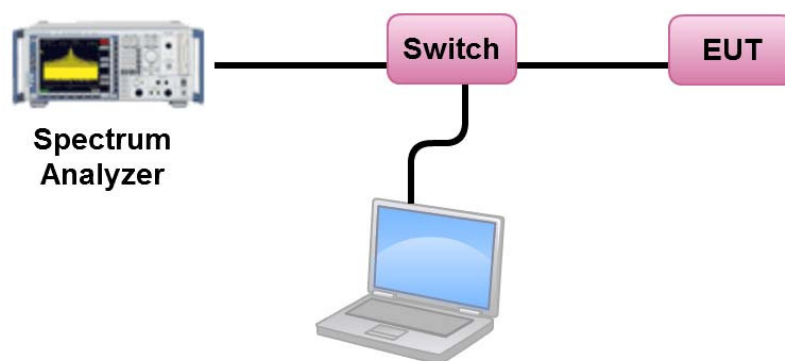
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameter                                                                                                                                                                                                                                    | Setting                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Attenuation                                                                                                                                                                                                                                           | Auto                                                         |
| Span Frequency                                                                                                                                                                                                                                        | Encompass the entire emissions bandwidth (EBW) of the signal |
| RBW                                                                                                                                                                                                                                                   | 1000 kHz                                                     |
| VBW                                                                                                                                                                                                                                                   | 3000 kHz                                                     |
| Detector                                                                                                                                                                                                                                              | RMS                                                          |
| Trace                                                                                                                                                                                                                                                 | AVERAGE                                                      |
| Sweep Time                                                                                                                                                                                                                                            | Auto                                                         |
| Trace Average                                                                                                                                                                                                                                         | 100 times                                                    |
| Note: If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/\text{RBW})$ to the measured result, whereas RBW ( $< 500$ kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement. |                                                              |

#### 4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected RF switch to the spectrum analyzer.
2. Test was performed in accordance with KDB789033 D02 v01r02 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (F) Maximum Power Spectral Density (PSD).
3. Multiple antenna systems was performed in accordance KDB662911 D01 v02r01 in-Band Power Spectral Density (PSD) Measurements and sum the spectra across the outputs.
4. For 5.725~5.85 GHz, the measured result of PSD level must add  $10\log(500\text{kHz}/\text{RBW})$  and the final result should  $\leq 30$  dBm.

#### 4.3.4. Test Setup Layout



#### 4.3.5. Test Deviation

There is no deviation with the original standard.

#### 4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 4.3.7. Test Result of Power Spectral Density

|               |          |          |     |
|---------------|----------|----------|-----|
| Temperature   | 26°C     | Humidity | 63% |
| Test Engineer | Gary Chu |          |     |

For Band 1:

<For Non-Beamforming Mode>

Configuration IEEE 802.11a / Chain 3 + Chain 5 + Chain 6

| Channel | Frequency | Power Density (dBm/MHz) | Max. Limit (dBm/MHz) | Result   |
|---------|-----------|-------------------------|----------------------|----------|
| 36      | 5180 MHz  | 10.16                   | 14.86                | Complies |
| 40      | 5200 MHz  | 9.50                    | 14.86                | Complies |
| 48      | 5240 MHz  | 12.80                   | 14.86                | Complies |

Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 5 + Chain 6

| Channel | Frequency | Power Density (dBm/MHz) | Max. Limit (dBm/MHz) | Result   |
|---------|-----------|-------------------------|----------------------|----------|
| 36      | 5180 MHz  | 9.87                    | 14.86                | Complies |
| 40      | 5200 MHz  | 9.94                    | 14.86                | Complies |
| 48      | 5240 MHz  | 12.76                   | 14.86                | Complies |

Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 5 + Chain 6

| Channel | Frequency | Power Density (dBm/MHz) | Max. Limit (dBm/MHz) | Result   |
|---------|-----------|-------------------------|----------------------|----------|
| 38      | 5190 MHz  | 2.01                    | 14.86                | Complies |
| 46      | 5230 MHz  | 9.78                    | 14.86                | Complies |

Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 5 + Chain 6

| Channel | Frequency | Power Density (dBm/MHz) | Max. Limit (dBm/MHz) | Result   |
|---------|-----------|-------------------------|----------------------|----------|
| 42      | 5210 MHz  | -3.23                   | 14.86                | Complies |

Note:  $Directional\ Gain = 10 \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{K=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right] = 8.14 \text{ dBi} > 6 \text{ dBi}$ , so Limit =  $17 - (8.14 - 6) = 14.86 \text{ dBm/MHz}$ .

<For Beamforming Mode>

Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 5 + Chain 6

| Channel | Frequency | Power Density (dBm/MHz) | Max. Limit (dBm/MHz) | Result   |
|---------|-----------|-------------------------|----------------------|----------|
| 36      | 5180 MHz  | 11.13                   | 14.86                | Complies |
| 40      | 5200 MHz  | 12.02                   | 14.86                | Complies |

Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 5 + Chain 6

| Channel | Frequency | Power Density (dBm/MHz) | Max. Limit (dBm/MHz) | Result   |
|---------|-----------|-------------------------|----------------------|----------|
| 38      | 5190 MHz  | 2.40                    | 14.86                | Complies |
| 46      | 5230 MHz  | 7.31                    | 14.86                | Complies |

Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 5 + Chain 6

| Channel | Frequency | Power Density (dBm/MHz) | Max. Limit (dBm/MHz) | Result   |
|---------|-----------|-------------------------|----------------------|----------|
| 42      | 5210 MHz  | -3.48                   | 14.86                | Complies |

Note:  $Directional\ Gain = 10 \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{K=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right] = 8.14 \text{ dBi} > 6 \text{ dBi}$ , so Limit =  $17 - (8.14 - 6) = 14.86 \text{ dBm/MHz}$ .

Note: All the test values were listed in the report.

For plots, only the channel with worse result was shown.

|               |            |          |     |
|---------------|------------|----------|-----|
| Temperature   | 24°C       | Humidity | 62% |
| Test Engineer | Eddie Weng |          |     |

For Band 4:

<For Non-Beamforming Mode>

| Mode                           | Frequency | Power Density (dBm/3kHz) |         |         |       | 10log(500k<br>Hz/RBW)<br>Factor (dB) | Total Power<br>Density<br>(dBm/500kHz) | Power Density<br>Limit<br>(dBm/500kHz) | Result   |
|--------------------------------|-----------|--------------------------|---------|---------|-------|--------------------------------------|----------------------------------------|----------------------------------------|----------|
|                                |           | Chain 1                  | Chain 2 | Chain 4 | Total |                                      |                                        |                                        |          |
| 802.11a                        | 5745 MHz  | -0.85                    | -0.70   | -0.43   | 4.11  | 22.22                                | 26.33                                  | 27.76                                  | Complies |
|                                | 5785 MHz  | -0.67                    | -1.42   | -0.28   | 4.01  | 22.22                                | 26.23                                  | 27.76                                  | Complies |
|                                | 5825 MHz  | -0.97                    | -0.62   | -0.49   | 4.08  | 22.22                                | 26.30                                  | 27.76                                  | Complies |
| 802.11ac                       | 5745 MHz  | -1.38                    | -1.14   | -0.93   | 3.63  | 22.22                                | 25.84                                  | 27.76                                  | Complies |
| MCS0/Nss1<br>VHT20             | 5785 MHz  | -1.30                    | -1.11   | -1.02   | 3.63  | 22.22                                | 25.85                                  | 27.76                                  | Complies |
|                                | 5825 MHz  | -1.35                    | -1.18   | -1.13   | 3.55  | 22.22                                | 25.77                                  | 27.76                                  | Complies |
| 802.11ac<br>MCS0/Nss1<br>VHT40 | 5755 MHz  | -4.84                    | -5.25   | -4.45   | -0.06 | 22.22                                | 22.16                                  | 27.76                                  | Complies |
|                                | 5795 MHz  | -3.44                    | -4.71   | -4.28   | 0.66  | 22.22                                | 22.88                                  | 27.76                                  | Complies |
| 802.11ac<br>MCS0/Nss1<br>VHT80 | 5775 MHz  | -9.30                    | -9.45   | -8.77   | -4.39 | 22.22                                | 17.83                                  | 27.76                                  | Complies |

Note:  $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right] = 8.24\text{dBi} > 6\text{dBi}$ , so Limit = 30 - (8.24 - 6) = 27.76 dBm/500kHz.

<For Beamforming Mode>

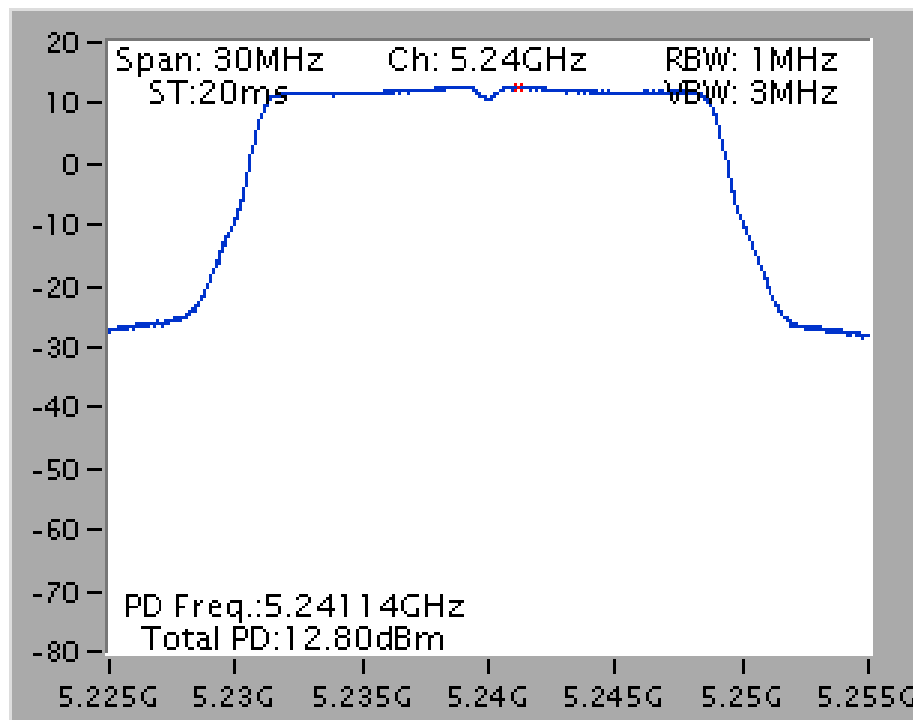
| Mode               | Frequency | Power Density (dBm/3kHz) |         |         |       | 10log(500k<br>Hz/RBW)<br>Factor (dB) | Total Power<br>Density<br>(dBm/500kHz) | Power Density<br>Limit<br>(dBm/500kHz) | Result   |
|--------------------|-----------|--------------------------|---------|---------|-------|--------------------------------------|----------------------------------------|----------------------------------------|----------|
|                    |           | Chain 1                  | Chain 2 | Chain 4 | Total |                                      |                                        |                                        |          |
| 802.11ac           | 5745 MHz  | -3.78                    | -3.68   | -3.14   | 1.25  | 22.22                                | 23.47                                  | 27.76                                  | Complies |
| MCS0/Nss1<br>VHT20 | 5785 MHz  | -3.81                    | -3.42   | -3.01   | 1.37  | 22.22                                | 23.59                                  | 27.76                                  | Complies |
|                    | 5825 MHz  | -3.29                    | -3.13   | -2.59   | 1.78  | 22.22                                | 24.00                                  | 27.76                                  | Complies |
| 802.11ac           | 5755 MHz  | -6.80                    | -6.20   | -6.65   | -1.77 | 22.22                                | 20.45                                  | 27.76                                  | Complies |
| MCS0/Nss1<br>VHT40 | 5795 MHz  | -6.82                    | -6.35   | -6.58   | -1.81 | 22.22                                | 20.41                                  | 27.76                                  | Complies |
|                    | 5775 MHz  | -10.16                   | -10.65  | -9.80   | -5.42 | 22.22                                | 16.80                                  | 27.76                                  | Complies |

Note:  $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right] = 8.24\text{dBi} > 6\text{dBi}$ , so Limit = 30 - (8.24 - 6) = 27.76 dBm/500kHz.

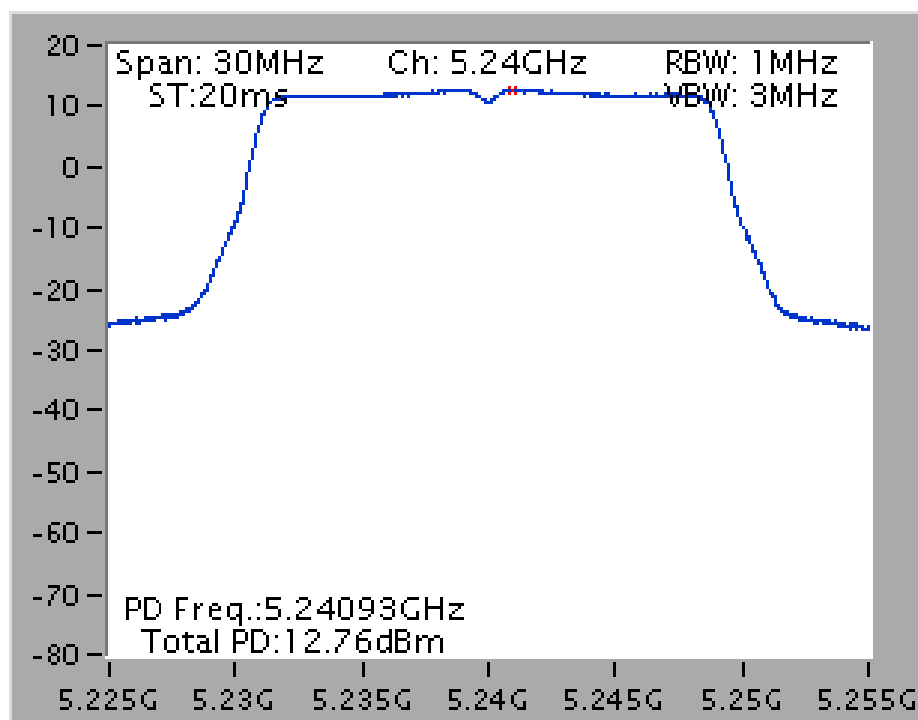
For Band 1:

<For Non-Beamforming Mode>

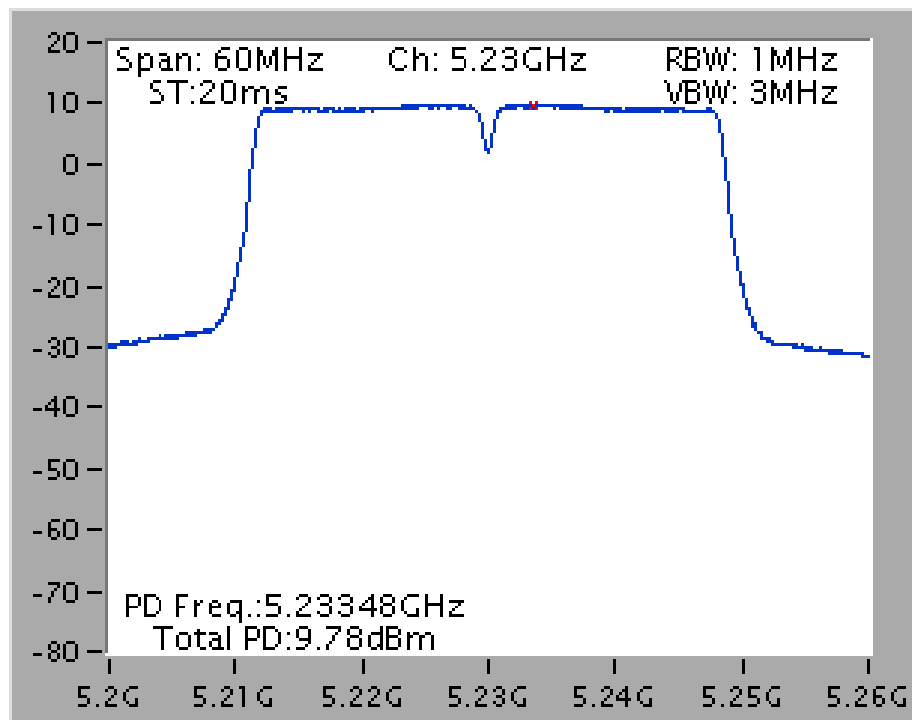
Power Density Plot on Configuration IEEE 802.11a / Chain 3 + Chain 5 + Chain 6 / 5240 MHz



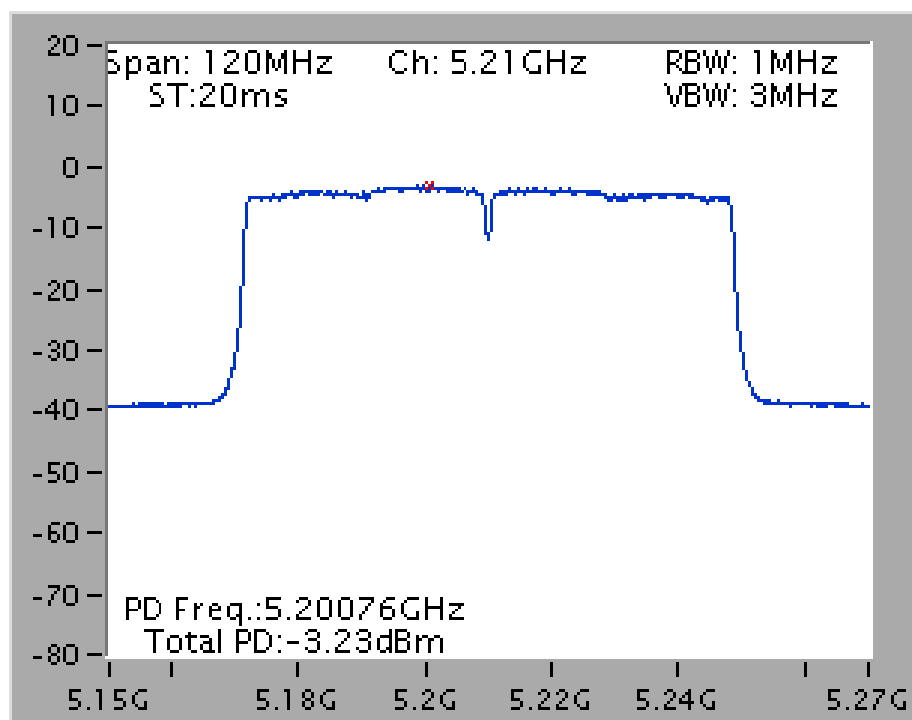
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 5 + Chain 6 / 5240 MHz



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 5 + Chain 6 /  
5230 MHz

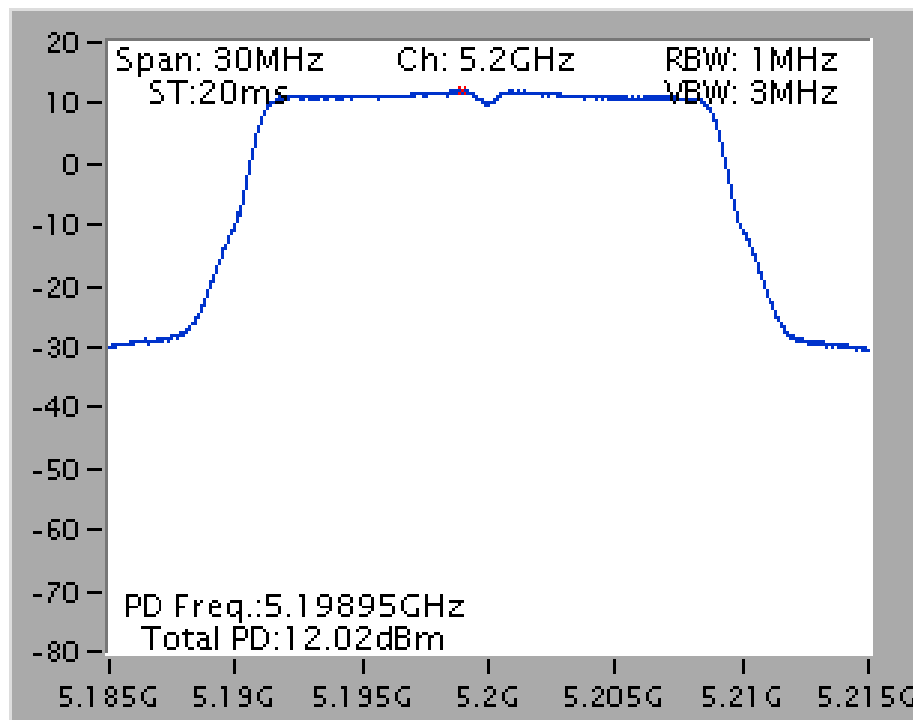


Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 5 + Chain 6 /  
5210 MHz

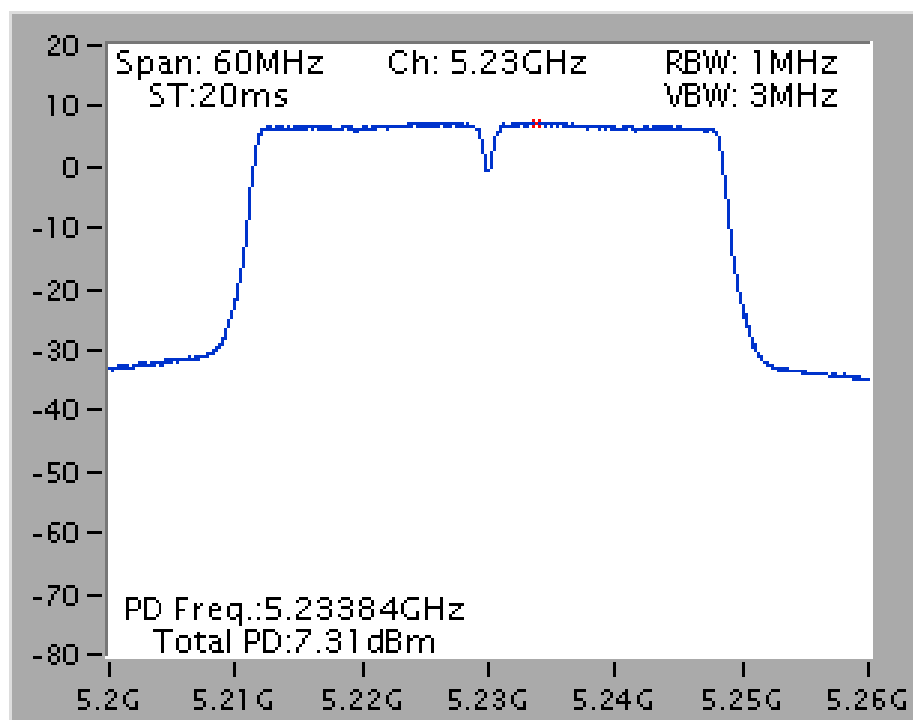


<For Beamforming Mode>

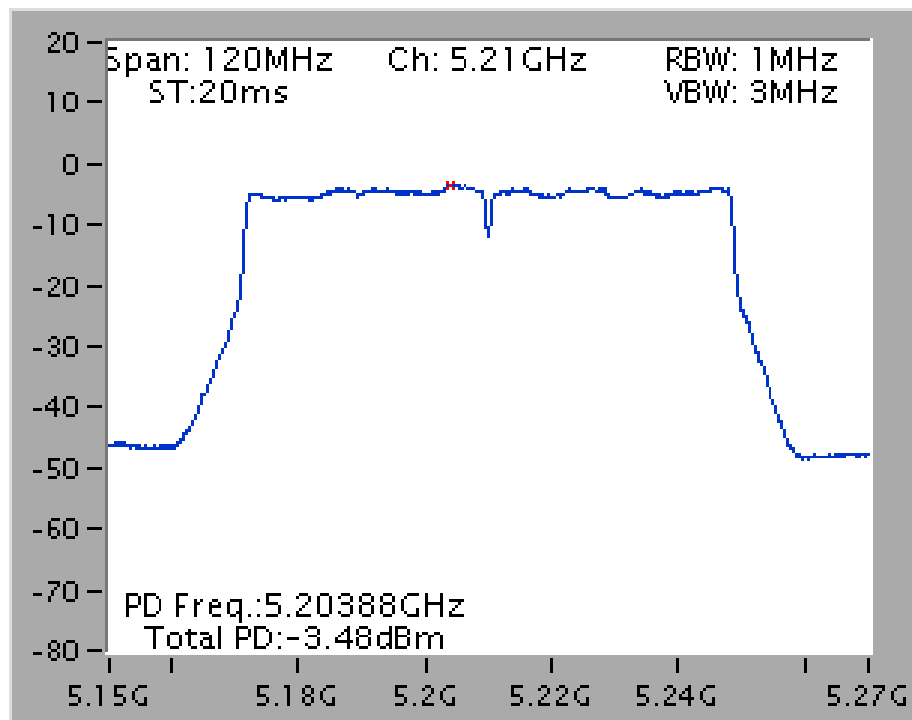
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 5 + Chain 6 /  
5200 MHz



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 5 + Chain 6 /  
5230 MHz



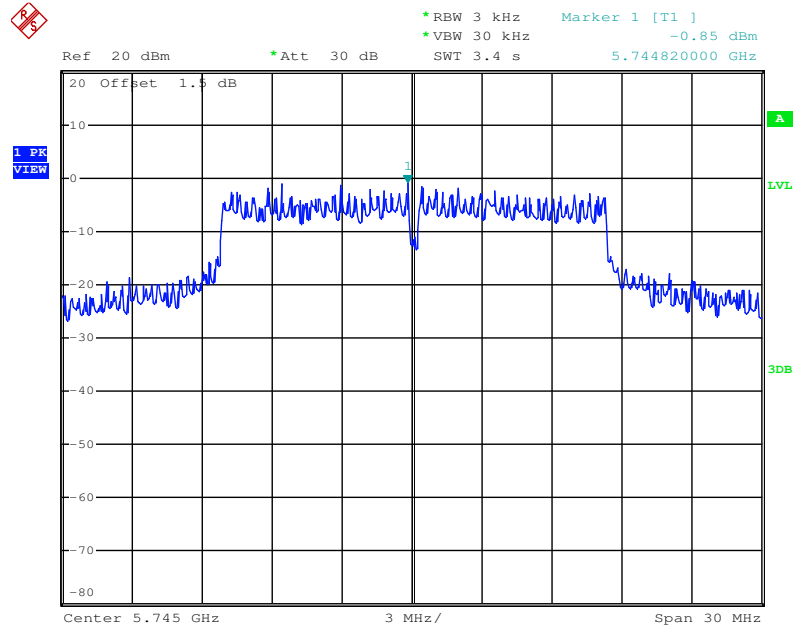
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 5 + Chain 6 /  
5210 MHz



For Band 4:

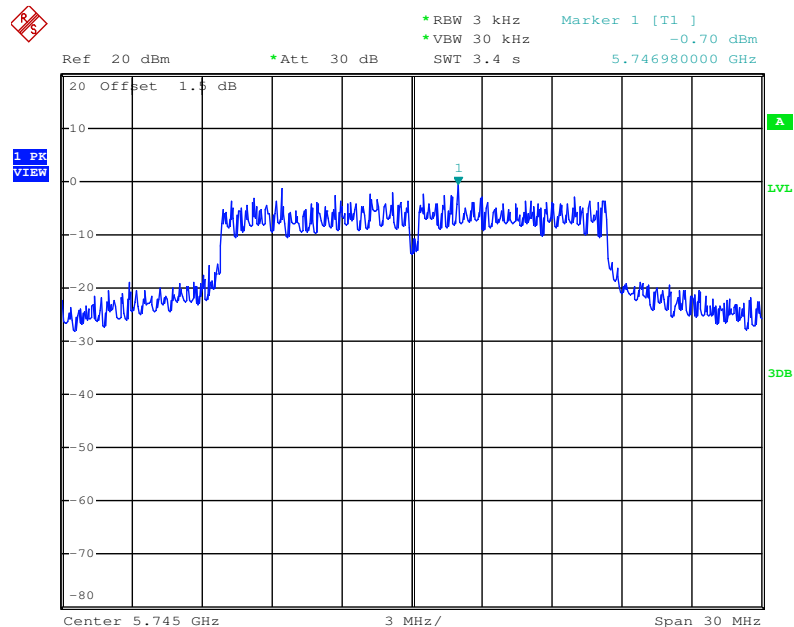
<For Non-Beamforming Mode>

Power Density Plot on Configuration IEEE 802.11a / 5745 MHz / Chain 1



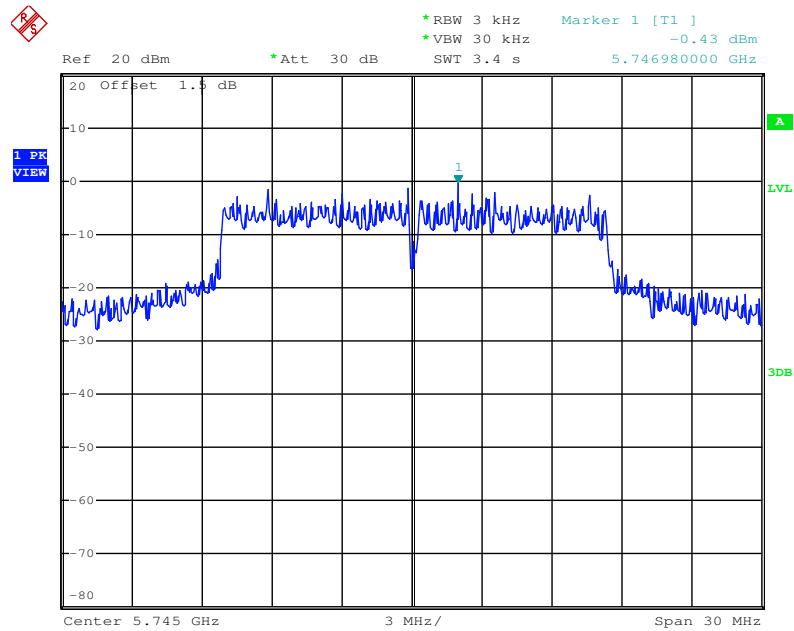
Date: 7.NOV.2014 23:21:12

Power Density Plot on Configuration IEEE 802.11a / 5745 MHz / Chain 2



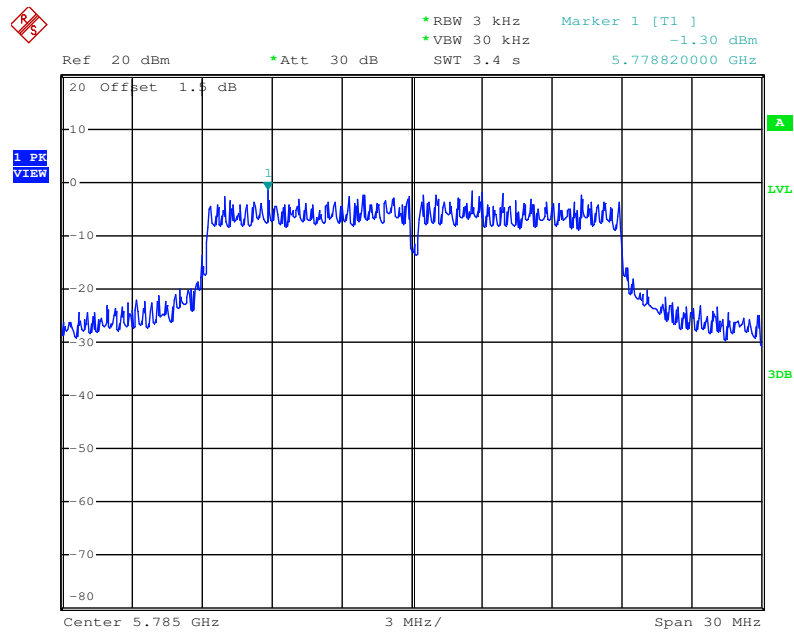
Date: 7.NOV.2014 23:21:23

### Power Density Plot on Configuration IEEE 802.11a / 5745 MHz / Chain 4



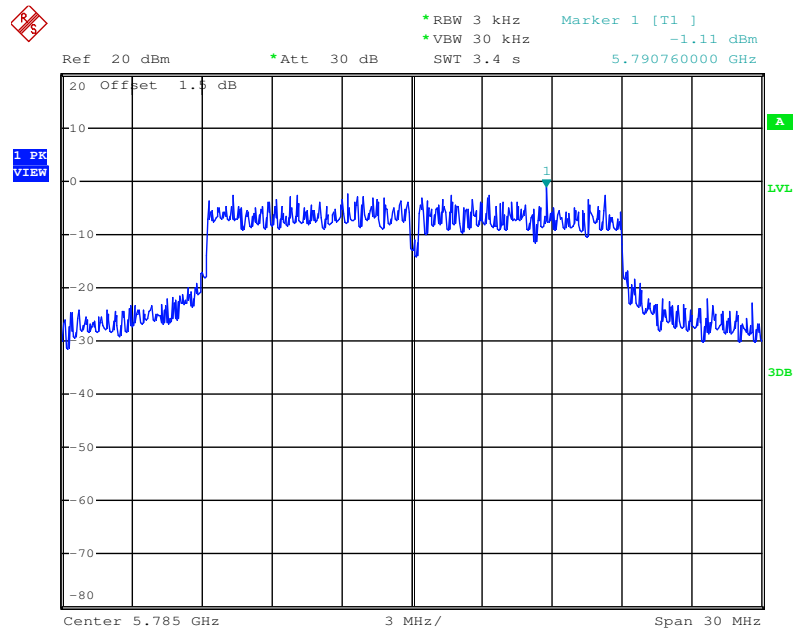
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### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5785 MHz / Chain 1



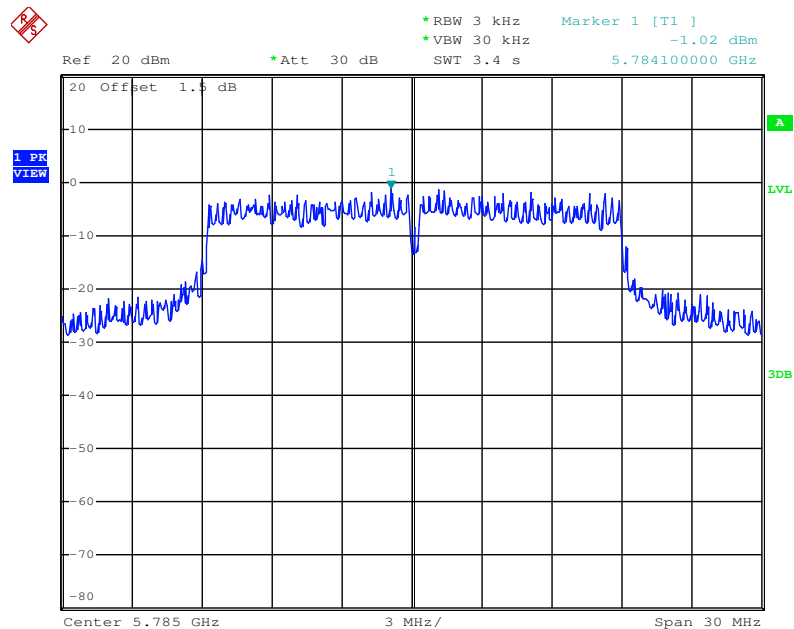
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### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5785 MHz / Chain 2



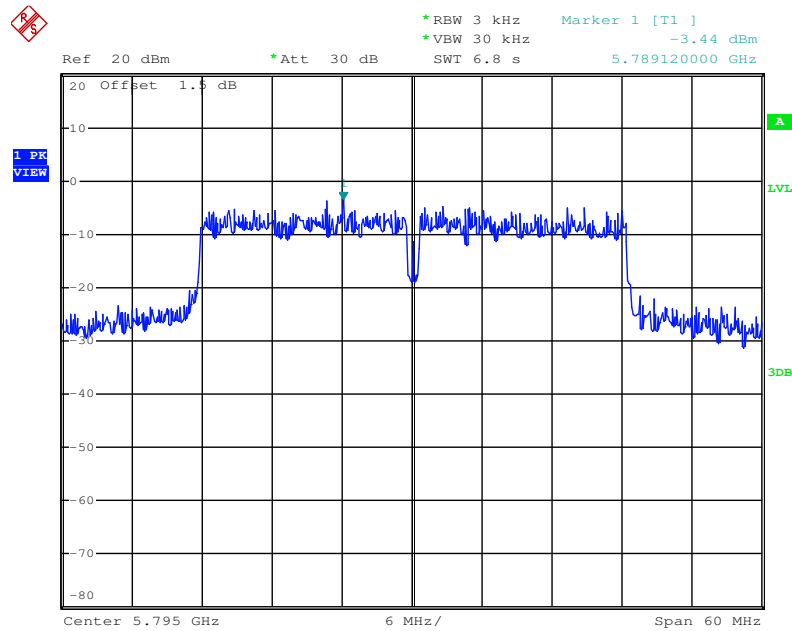
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### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5785 MHz / Chain 4



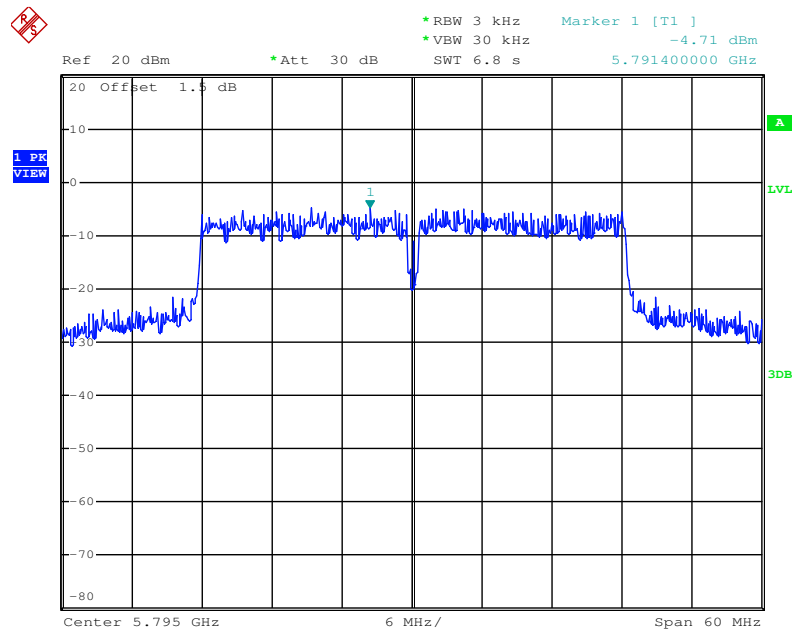
Date: 7.NOV.2014 23:31:32

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5795 MHz / Chain 1



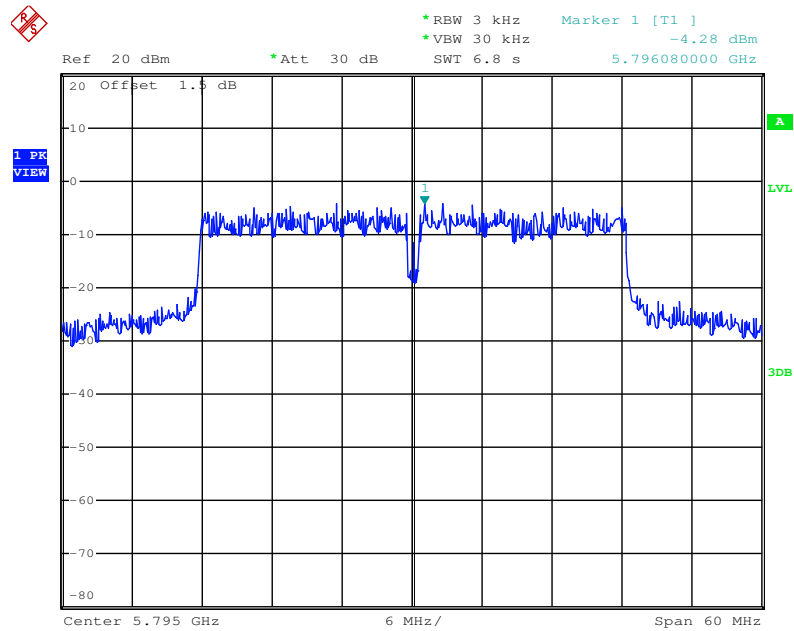
Date: 7.NOV.2014 23:43:39

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5795 MHz / Chain 2



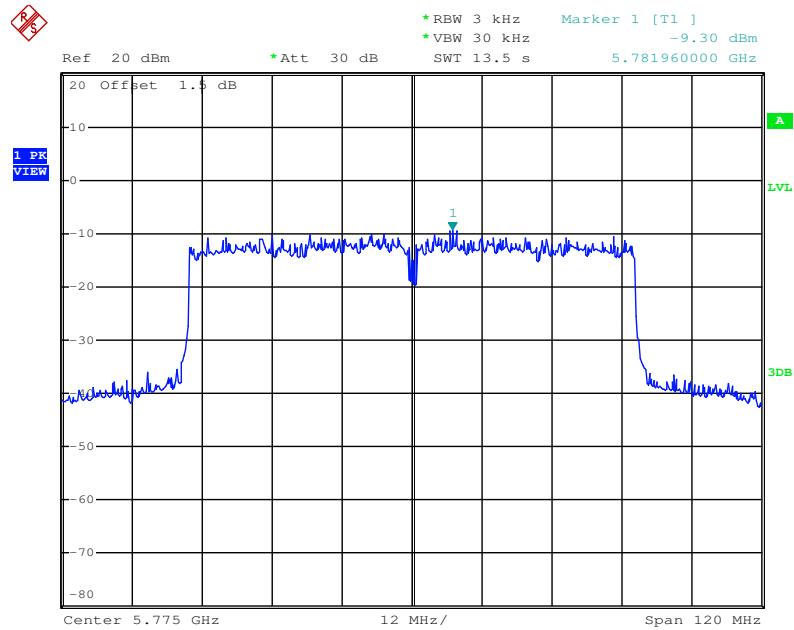
Date: 7.NOV.2014 23:43:57

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5795 MHz / Chain 4



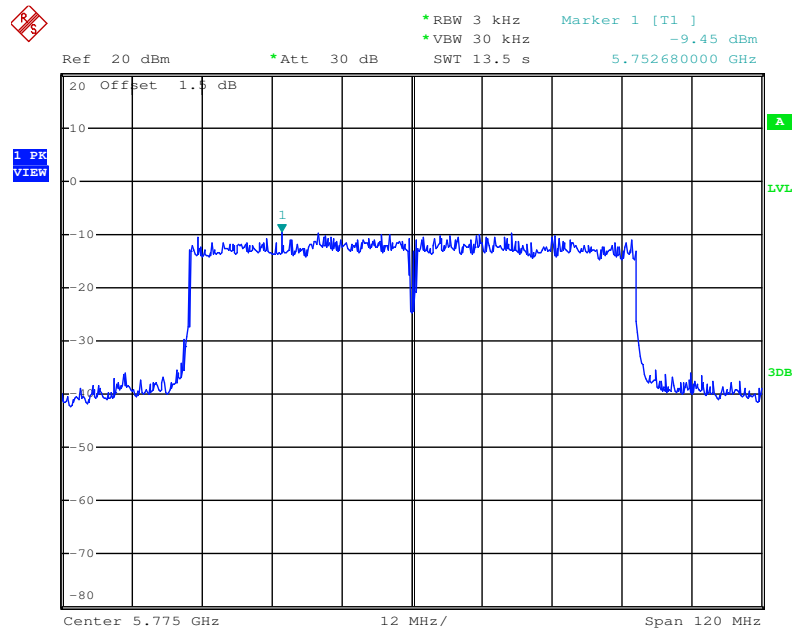
Date: 7.NOV.2014 23:43:22

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 1



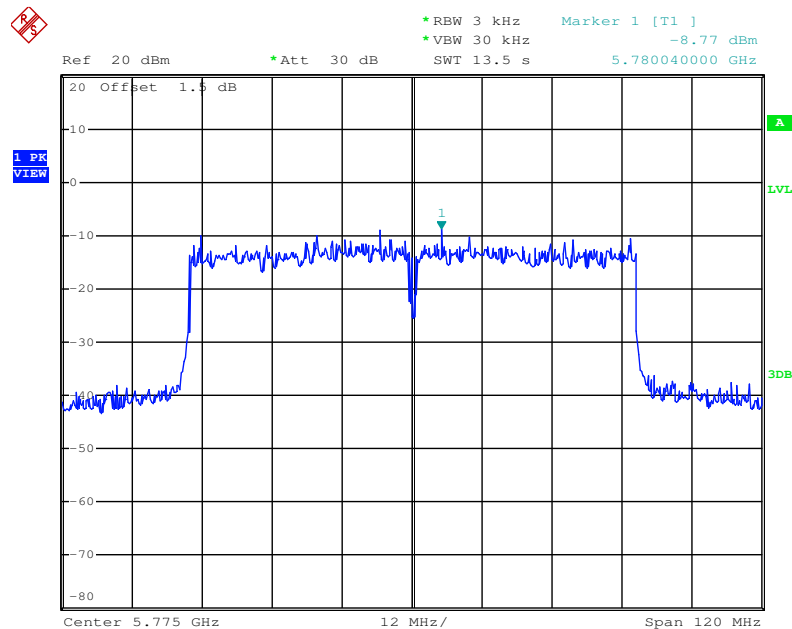
Date: 7.NOV.2014 23:49:46

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 2



Date: 7.NOV.2014 23:51:11

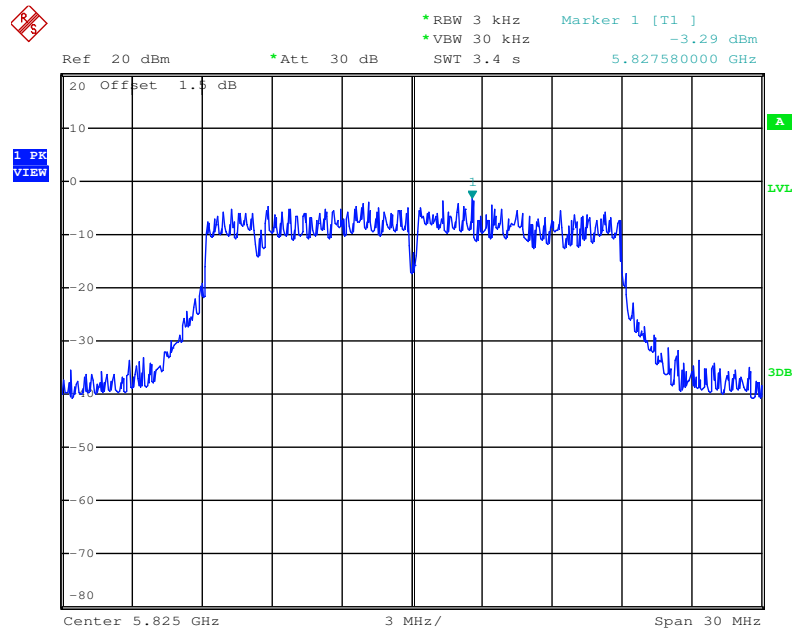
### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 4



Date: 7.NOV.2014 23:48:40

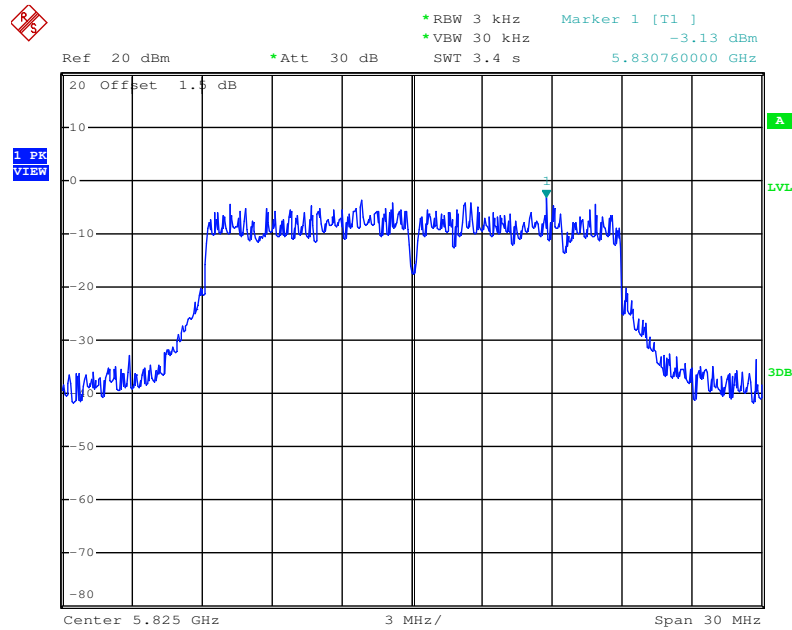
<For Beamforming Mode>

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5825 MHz / Chain 1



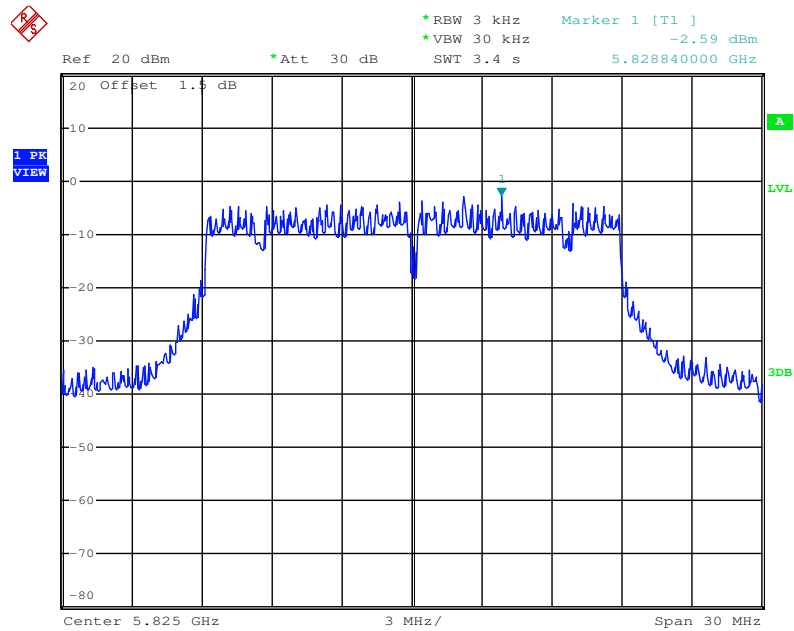
Date: 8.NOV.2014 00:35:53

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5825 MHz / Chain 2



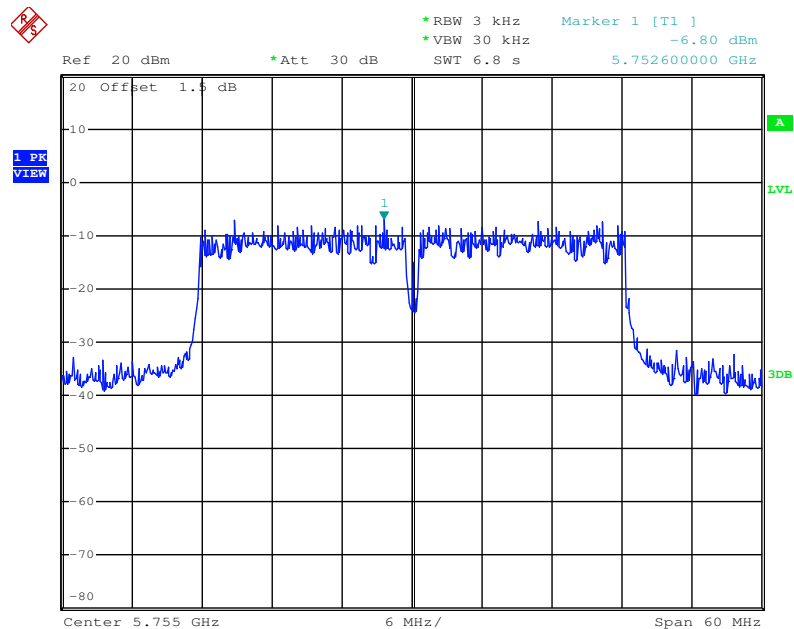
Date: 8.NOV.2014 00:36:03

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5825 MHz / Chain 4



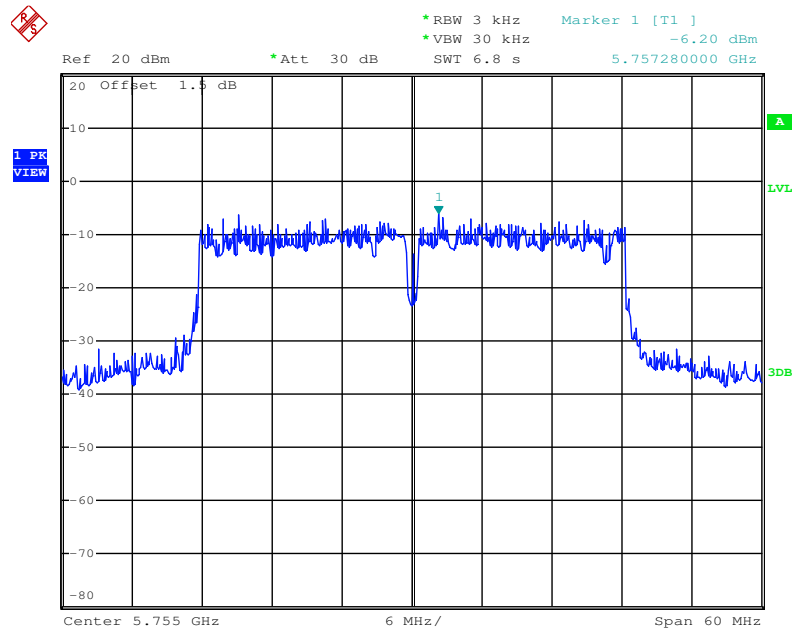
Date: 8.NOV.2014 00:35:43

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5755 MHz / Chain 1



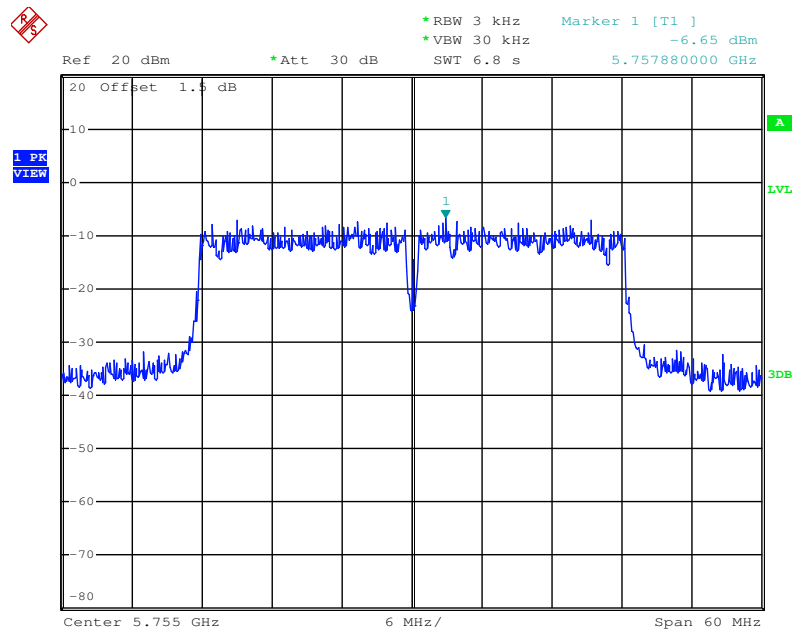
Date: 8.NOV.2014 00:39:10

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5755 MHz / Chain 2



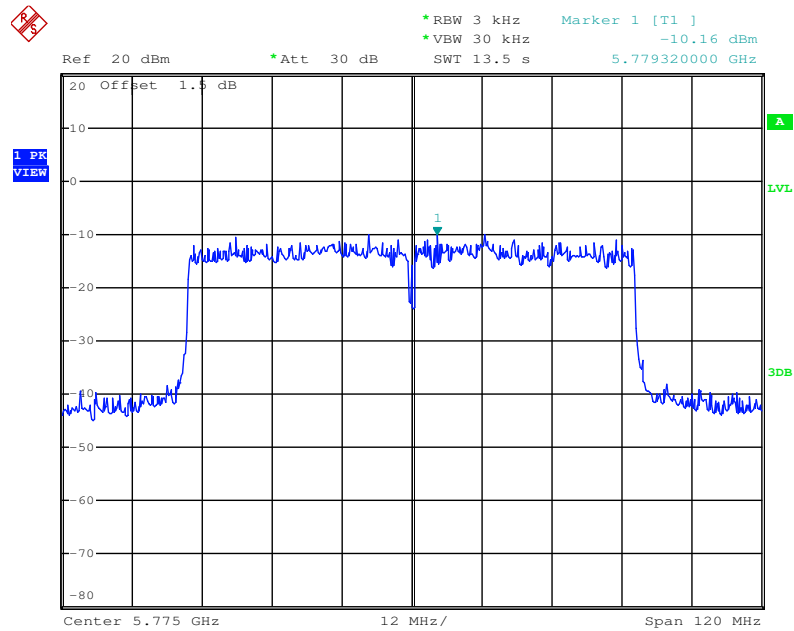
Date: 8.NOV.2014 00:38:34

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5755 MHz / Chain 4



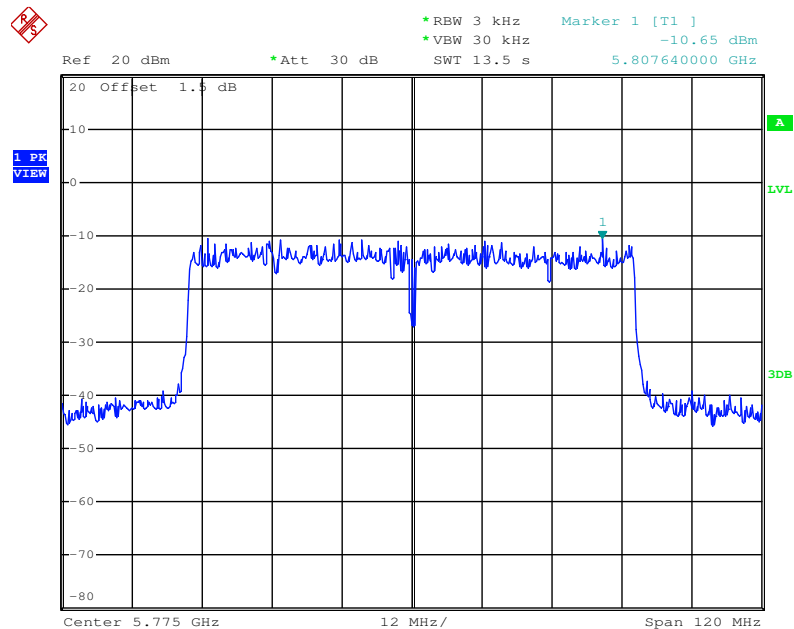
Date: 8.NOV.2014 00:38:58

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 1



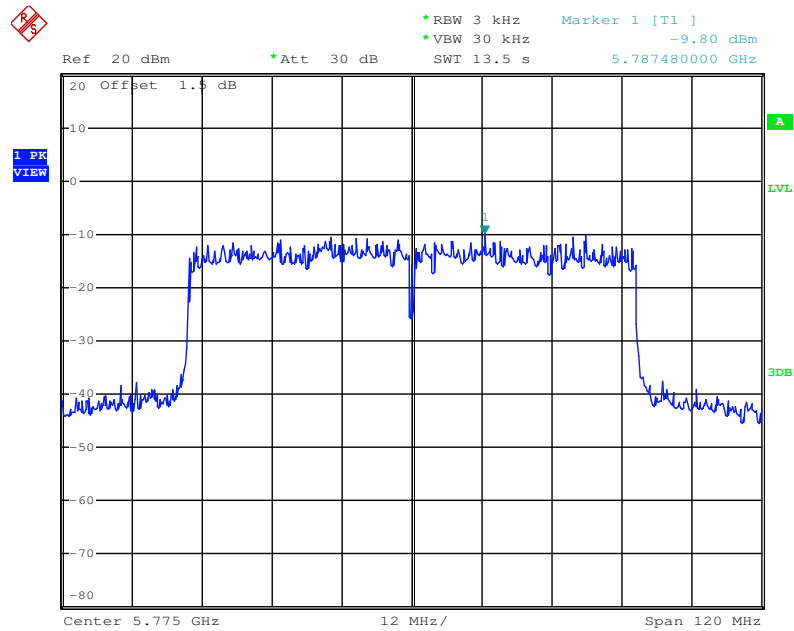
Date: 8.NOV.2014 00:24:46

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 2



Date: 8.NOV.2014 00:25:45

### Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 4



Date: 8.NOV.2014 00:26:12

## 4.4. Radiated Emissions Measurement

### 4.4.1. Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequencies<br>(MHz) | Field Strength<br>(micorvolts/meter) | Measurement Distance<br>(meters) |
|----------------------|--------------------------------------|----------------------------------|
| 0.009~0.490          | 2400/F(kHz)                          | 300                              |
| 0.490~1.705          | 24000/F(kHz)                         | 30                               |
| 1.705~30.0           | 30                                   | 30                               |
| 30~88                | 100                                  | 3                                |
| 88~216               | 150                                  | 3                                |
| 216~960              | 200                                  | 3                                |
| Above 960            | 500                                  | 3                                |

### 4.4.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

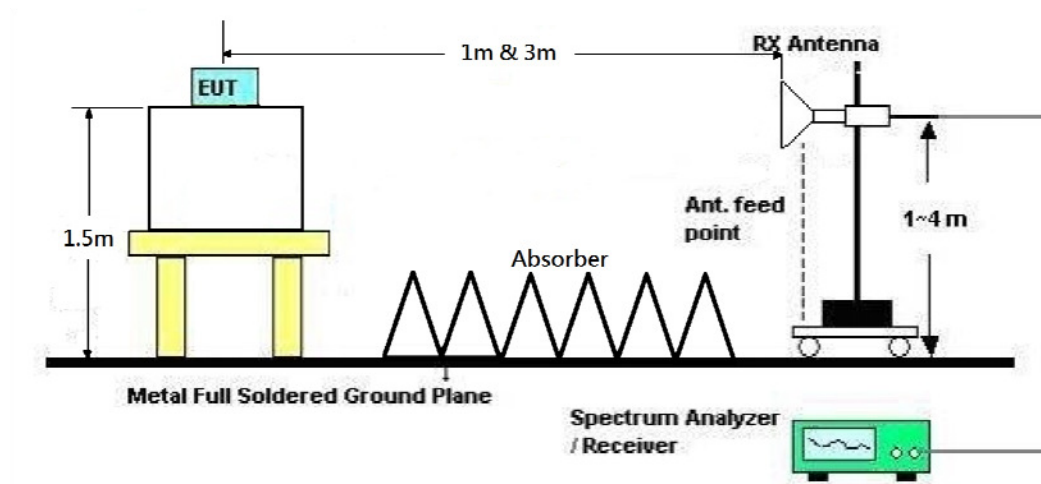
| Spectrum Parameter                          | Setting                                           |
|---------------------------------------------|---------------------------------------------------|
| Attenuation                                 | Auto                                              |
| Start Frequency                             | 1000 MHz                                          |
| Stop Frequency                              | 40 GHz                                            |
| RBW / VBW (Emission in restricted band)     | 1 MHz / 3MHz for Peak,<br>1 MHz / 1/T for Average |
| RBW / VBW (Emission in non-restricted band) | 1 MHz / 3MHz for peak                             |

| Receiver Parameter     | Setting                           |
|------------------------|-----------------------------------|
| Attenuation            | Auto                              |
| Start ~ Stop Frequency | 9kHz~150kHz / RBW 200Hz for QP    |
| Start ~ Stop Frequency | 150kHz~30MHz / RBW 9kHz for QP    |
| Start ~ Stop Frequency | 30MHz~1000MHz / RBW 120kHz for QP |

#### 4.4.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 1/T VBW for average reading in spectrum analyzer.
7. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
8. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
9. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

#### 4.4.4. Test Setup Layout



#### 4.4.5. Test Deviation

There is no deviation with the original standard.

#### 4.4.6. EUT Operation during Test

For Non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

For beamforming mode:

The EUT was programmed to be in beamforming transmitting mode.

#### 4.4.7. Results for Radiated Emissions (1GHz~40GHz)

<For Non-Beamforming Mode>

|               |                                     |                |                                                     |
|---------------|-------------------------------------|----------------|-----------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                 |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11a CH 36 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 18, 2016                       |                |                                                     |

##### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | Cable | Antenna | Preamp | T/Pos | A/Pos | Remark  | Pol/Phase  |
|---|----------|--------|--------|--------|-------|-------|---------|--------|-------|-------|---------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB    | dB/m    | dB     | deg   | cm    |         |            |
| 1 | 15535.80 | 57.96  | 74.00  | -16.04 | 43.21 | 11.23 | 38.16   | 34.64  | 237   | 150   | Peak    | HORIZONTAL |
| 2 | 15563.20 | 45.56  | 54.00  | -8.44  | 30.77 | 11.24 | 38.23   | 34.68  | 237   | 150   | Average | HORIZONTAL |

##### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | Cable | Antenna | Preamp | T/Pos | A/Pos | Remark  | Pol/Phase |
|---|----------|--------|--------|--------|-------|-------|---------|--------|-------|-------|---------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB    | dB/m    | dB     | deg   | cm    |         |           |
| 1 | 15527.10 | 58.72  | 74.00  | -15.28 | 43.97 | 11.23 | 38.16   | 34.64  | 85    | 150   | Peak    | VERTICAL  |
| 2 | 15560.40 | 45.75  | 54.00  | -8.25  | 30.96 | 11.24 | 38.23   | 34.68  | 85    | 150   | Average | VERTICAL  |

|               |                                     |                |                                                     |
|---------------|-------------------------------------|----------------|-----------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                 |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11a CH 40 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 29, 2016                       |                |                                                     |

### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | A/Pos  | T/Pos | Remark     | Pol/Phase  |
|---|----------|--------|--------|--------|-------|--------------|--------|--------|-------|------------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | Loss         | Factor | Factor | cm    | deg        |            |
| 1 | 15598.72 | 46.40  | 54.00  | -7.60  | 29.82 | 12.30        | 38.05  | 33.77  | 150   | 98 Average | HORIZONTAL |
| 2 | 15602.45 | 59.16  | 74.00  | -14.84 | 42.64 | 12.31        | 37.98  | 33.77  | 150   | 98 Peak    | HORIZONTAL |

### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | A/Pos  | T/Pos | Remark      | Pol/Phase |
|---|----------|--------|--------|--------|-------|--------------|--------|--------|-------|-------------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | Loss         | Factor | Factor | cm    | deg         |           |
| 1 | 15599.00 | 60.44  | 74.00  | -13.56 | 43.86 | 12.30        | 38.05  | 33.77  | 150   | 317 Peak    | VERTICAL  |
| 2 | 15600.62 | 46.47  | 54.00  | -7.53  | 29.95 | 12.31        | 37.98  | 33.77  | 150   | 317 Average | VERTICAL  |

|               |                                     |                |                                                     |
|---------------|-------------------------------------|----------------|-----------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                 |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11a CH 48 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 18, 2016                       |                |                                                     |

### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase  |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |            |
| 1 | 15704.60 | 46.28  | 54.00  | -7.72  | 31.36 | 11.27        | 38.42  | 34.77 | 208   | 150 Average | HORIZONTAL |
| 2 | 15731.50 | 58.83  | 74.00  | -15.17 | 43.95 | 11.27        | 38.42  | 34.81 | 208   | 150 Peak    | HORIZONTAL |

### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |           |
| 1 | 15706.90 | 46.61  | 54.00  | -7.39  | 31.69 | 11.27        | 38.42  | 34.77 | 42    | 150 Average | VERTICAL  |
| 2 | 15721.10 | 59.33  | 74.00  | -14.67 | 44.45 | 11.27        | 38.42  | 34.81 | 42    | 150 Peak    | VERTICAL  |

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 18, 2016                       |                |                                                                      |

### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase  |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |            |
| 1 | 15539.50 | 45.56  | 54.00  | -8.44  | 30.81 | 11.23        | 38.16  | 34.64 | 236   | 150 Average | HORIZONTAL |
| 2 | 15554.50 | 57.93  | 74.00  | -16.07 | 43.18 | 11.23        | 38.16  | 34.64 | 236   | 150 Peak    | HORIZONTAL |

### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |           |
| 1 | 15532.80 | 58.69  | 74.00  | -15.31 | 43.94 | 11.23        | 38.16  | 34.64 | 74    | 150 Peak    | VERTICAL  |
| 2 | 15560.00 | 45.81  | 54.00  | -8.19  | 31.02 | 11.24        | 38.23  | 34.68 | 74    | 150 Average | VERTICAL  |

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 29, 2016                       |                |                                                                      |

#### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | A/Pos  | T/Pos | Remark     | Pol/Phase  |
|---|----------|--------|--------|--------|-------|--------------|--------|--------|-------|------------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | Loss         | Factor | Factor | cm    | deg        |            |
| 1 | 15598.72 | 46.79  | 54.00  | -7.21  | 30.21 | 12.30        | 38.05  | 33.77  | 150   | 99 Average | HORIZONTAL |
| 2 | 15602.45 | 59.38  | 74.00  | -14.62 | 42.86 | 12.31        | 37.98  | 33.77  | 150   | 99 Peak    | HORIZONTAL |

#### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | A/Pos  | T/Pos | Remark      | Pol/Phase |
|---|----------|--------|--------|--------|-------|--------------|--------|--------|-------|-------------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | Loss         | Factor | Factor | cm    | deg         |           |
| 1 | 15599.00 | 60.64  | 74.00  | -13.36 | 44.06 | 12.30        | 38.05  | 33.77  | 150   | 336 Peak    | VERTICAL  |
| 2 | 15600.62 | 46.63  | 54.00  | -7.37  | 30.11 | 12.31        | 37.98  | 33.77  | 150   | 336 Average | VERTICAL  |

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 18, 2016                       |                |                                                                      |

### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase  |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |            |
| 1 | 15698.90 | 46.29  | 54.00  | -7.71  | 31.37 | 11.27        | 38.42  | 34.77 | 259   | 150 Average | HORIZONTAL |
| 2 | 15738.20 | 59.01  | 74.00  | -14.99 | 44.05 | 11.29        | 38.48  | 34.81 | 259   | 150 Peak    | HORIZONTAL |

### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |           |
| 1 | 15705.60 | 46.38  | 54.00  | -7.62  | 31.46 | 11.27        | 38.42  | 34.77 | 97    | 150 Average | VERTICAL  |
| 2 | 15721.60 | 58.98  | 74.00  | -15.02 | 44.10 | 11.27        | 38.42  | 34.81 | 97    | 150 Peak    | VERTICAL  |

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 18, 2016                       |                |                                                                      |

#### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase  |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |            |
| 1 | 15591.70 | 58.33  | 74.00  | -15.67 | 43.54 | 11.24        | 38.23  | 34.68 | 248   | 150 Peak    | HORIZONTAL |
| 2 | 15594.60 | 46.06  | 54.00  | -7.94  | 31.27 | 11.24        | 38.23  | 34.68 | 248   | 150 Average | HORIZONTAL |

#### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |           |
| 1 | 15592.30 | 46.13  | 54.00  | -7.87  | 31.34 | 11.24        | 38.23  | 34.68 | 81    | 150 Average | VERTICAL  |
| 2 | 15593.90 | 59.42  | 74.00  | -14.58 | 44.63 | 11.24        | 38.23  | 34.68 | 81    | 150 Peak    | VERTICAL  |

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 18, 2016                       |                |                                                                      |

### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase  |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |            |
| 1 | 15684.60 | 59.44  | 74.00  | -14.56 | 44.60 | 11.26        | 38.35  | 34.77 | 236   | 150 Peak    | HORIZONTAL |
| 2 | 15700.50 | 46.78  | 54.00  | -7.22  | 31.86 | 11.27        | 38.42  | 34.77 | 236   | 150 Average | HORIZONTAL |

### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |           |
| 1 | 15668.90 | 46.69  | 54.00  | -7.31  | 31.85 | 11.26        | 38.35  | 34.77 | 89    | 150 Average | VERTICAL  |
| 2 | 15687.40 | 59.73  | 74.00  | -14.27 | 44.89 | 11.26        | 38.35  | 34.77 | 89    | 150 Peak    | VERTICAL  |

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 19, 2016                       |                |                                                                      |

### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase  |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |            |
| 1 | 15644.80 | 58.52  | 74.00  | -15.48 | 43.71 | 11.25        | 38.29  | 34.73 | 286   | 150 Peak    | HORIZONTAL |
| 2 | 15667.20 | 46.50  | 54.00  | -7.50  | 31.66 | 11.26        | 38.35  | 34.77 | 286   | 150 Average | HORIZONTAL |

### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | T/Pos | A/Pos | Remark      | Pol/Phase |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | deg   | cm          |           |
| 1 | 15669.80 | 59.43  | 74.00  | -14.57 | 44.59 | 11.26        | 38.35  | 34.77 | 87    | 150 Peak    | VERTICAL  |
| 2 | 15671.20 | 46.71  | 54.00  | -7.29  | 31.87 | 11.26        | 38.35  | 34.77 | 87    | 150 Average | VERTICAL  |

## &lt;For Beamforming Mode&gt;

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 30, 2016                       |                |                                                                      |

## Horizontal

|   | Freq     | Level  | Limit<br>Line | Over<br>Limit | Read<br>Level | CableAntenna<br>Loss | Antenna<br>Factor | Preamp<br>Factor | A/Pos | T/Pos | Remark  | Pol/Phase  |
|---|----------|--------|---------------|---------------|---------------|----------------------|-------------------|------------------|-------|-------|---------|------------|
|   | MHz      | dBuV/m | dBuV/m        | dB            | dBuV          | dB                   | dB/m              | dB               | cm    | deg   |         |            |
| 1 | 15531.35 | 59.05  | 74.00         | -14.95        | 42.37         | 12.28                | 38.13             | 33.73            | 200   | 69    | Peak    | HORIZONTAL |
| 2 | 15534.62 | 45.02  | 54.00         | -8.98         | 28.34         | 12.28                | 38.13             | 33.73            | 200   | 69    | Average | HORIZONTAL |

## Vertical

|   | Freq     | Level  | Limit<br>Line | Over<br>Limit | Read<br>Level | CableAntenna<br>Loss | Antenna<br>Factor | Preamp<br>Factor | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|----------|--------|---------------|---------------|---------------|----------------------|-------------------|------------------|-------|-------|---------|-----------|
|   | MHz      | dBuV/m | dBuV/m        | dB            | dBuV          | dB                   | dB/m              | dB               | cm    | deg   |         |           |
| 1 | 15548.91 | 58.33  | 74.00         | -15.67        | 41.65         | 12.28                | 38.13             | 33.73            | 200   | 267   | Peak    | VERTICAL  |
| 2 | 15549.87 | 45.10  | 54.00         | -8.90         | 28.42         | 12.28                | 38.13             | 33.73            | 200   | 267   | Average | VERTICAL  |

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 30, 2016                       |                |                                                                      |

### Horizontal

|   | Freq     | Level  | Limit<br>Line | Over<br>Limit | Read<br>Level | CableAntenna<br>Loss | Antenna<br>Factor | Preamp<br>Factor | A/Pos | T/Pos | Remark  | Pol/Phase  |
|---|----------|--------|---------------|---------------|---------------|----------------------|-------------------|------------------|-------|-------|---------|------------|
|   | MHz      | dBuV/m | dBuV/m        | dB            | dBuV          | dB                   | dB/m              | dB               | cm    | deg   |         |            |
| 1 | 15601.51 | 57.49  | 74.00         | -16.51        | 40.97         | 12.31                | 37.98             | 33.77            | 200   | 81    | Peak    | HORIZONTAL |
| 2 | 15604.17 | 45.76  | 54.00         | -8.24         | 29.24         | 12.31                | 37.98             | 33.77            | 200   | 81    | Average | HORIZONTAL |

### Vertical

|   | Freq     | Level  | Limit<br>Line | Over<br>Limit | Read<br>Level | CableAntenna<br>Loss | Antenna<br>Factor | Preamp<br>Factor | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|----------|--------|---------------|---------------|---------------|----------------------|-------------------|------------------|-------|-------|---------|-----------|
|   | MHz      | dBuV/m | dBuV/m        | dB            | dBuV          | dB                   | dB/m              | dB               | cm    | deg   |         |           |
| 1 | 15597.24 | 57.80  | 74.00         | -16.20        | 41.22         | 12.30                | 38.05             | 33.77            | 200   | 253   | Peak    | VERTICAL  |
| 2 | 15606.12 | 45.74  | 54.00         | -8.26         | 29.22         | 12.31                | 37.98             | 33.77            | 200   | 253   | Average | VERTICAL  |

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 30, 2016                       |                |                                                                      |

### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | A/Pos | T/Pos | Remark     | Pol/Phase  |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|------------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | cm    | deg        |            |
| 1 | 15563.53 | 56.67  | 74.00  | -17.33 | 40.09 | 12.30        | 38.05  | 33.77 | 200   | 89 Peak    | HORIZONTAL |
| 2 | 15578.88 | 44.77  | 54.00  | -9.23  | 28.19 | 12.30        | 38.05  | 33.77 | 200   | 89 Average | HORIZONTAL |

### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | A/Pos | T/Pos | Remark      | Pol/Phase |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | cm    | deg         |           |
| 1 | 15570.71 | 44.85  | 54.00  | -9.15  | 28.27 | 12.30        | 38.05  | 33.77 | 200   | 239 Average | VERTICAL  |
| 2 | 15576.76 | 57.07  | 74.00  | -16.93 | 40.49 | 12.30        | 38.05  | 33.77 | 200   | 239 Peak    | VERTICAL  |

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 30, 2016                       |                |                                                                      |

#### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | A/Pos | T/Pos | Remark     | Pol/Phase  |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|------------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | cm    | deg        |            |
| 1 | 15687.56 | 57.72  | 74.00  | -16.28 | 41.35 | 12.33        | 37.91  | 33.87 | 200   | 51 Peak    | HORIZONTAL |
| 2 | 15692.85 | 44.90  | 54.00  | -9.10  | 28.58 | 12.35        | 37.84  | 33.87 | 200   | 51 Average | HORIZONTAL |

#### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | A/Pos | T/Pos | Remark      | Pol/Phase |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | cm    | deg         |           |
| 1 | 15692.60 | 58.84  | 74.00  | -15.16 | 42.52 | 12.35        | 37.84  | 33.87 | 200   | 234 Peak    | VERTICAL  |
| 2 | 15693.08 | 44.83  | 54.00  | -9.17  | 28.51 | 12.35        | 37.84  | 33.87 | 200   | 234 Average | VERTICAL  |

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 30, 2016                       |                |                                                                      |

### Horizontal

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | A/Pos | T/Pos | Remark     | Pol/Phase  |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|------------|------------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | cm    | deg        |            |
| 1 | 15622.95 | 58.02  | 74.00  | -15.98 | 41.55 | 12.31        | 37.98  | 33.82 | 200   | 93 Peak    | HORIZONTAL |
| 2 | 15624.10 | 44.59  | 54.00  | -9.41  | 28.12 | 12.31        | 37.98  | 33.82 | 200   | 93 Average | HORIZONTAL |

### Vertical

|   | Freq     | Level  | Limit  | Over   | Read  | CableAntenna | Preamp | A/Pos | T/Pos | Remark      | Pol/Phase |
|---|----------|--------|--------|--------|-------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz      | dBuV/m | dBuV/m | dB     | dBuV  | dB           | dB/m   | dB    | cm    | deg         |           |
| 1 | 15623.37 | 57.48  | 74.00  | -16.52 | 41.01 | 12.31        | 37.98  | 33.82 | 200   | 263 Peak    | VERTICAL  |
| 2 | 15629.20 | 44.76  | 54.00  | -9.24  | 28.29 | 12.31        | 37.98  | 33.82 | 200   | 263 Average | VERTICAL  |

### Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

## 4.5. Band Edge Emissions Measurement

### 4.5.1. Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequencies<br>(MHz) | Field Strength<br>(micorvolts/meter) | Measurement Distance<br>(meters) |
|----------------------|--------------------------------------|----------------------------------|
| 0.009~0.490          | 2400/F(kHz)                          | 300                              |
| 0.490~1.705          | 24000/F(kHz)                         | 30                               |
| 1.705~30.0           | 30                                   | 30                               |
| 30~88                | 100                                  | 3                                |
| 88~216               | 150                                  | 3                                |
| 216~960              | 200                                  | 3                                |
| Above 960            | 500                                  | 3                                |

### 4.5.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameter                                  | Setting                                           |
|-----------------------------------------------------|---------------------------------------------------|
| Attenuation                                         | Auto                                              |
| Span Frequency                                      | 100 MHz                                           |
| RBW / VBW (Emission in restricted band)             | 1 MHz / 3MHz for Peak,<br>1 MHz / 1/T for Average |
| RBW / VBW (Emission in non-restricted band)         | 1 MHz / 3MHz for Peak                             |
| RBW / VBW (30dBc in any 100 kHz bandwidth emission) | 100 kHz / 300 kHz for Peak                        |

### 4.5.3. Test Procedures

For Radiated band edges Measurement:

The test procedure is the same as section 4.4.3.

For Radiated Emissions in non-restricted frequency bands Measurement:

Test was performed in accordance with Clause 11.11 of ANSI C63.10-2013 and/or in Section 11.0 of KDB Publication 558074.

#### 4.5.4. Test Setup Layout

For Radiated band edges Measurement:

This test setup layout is the same as that shown in section 4.4.4.

For Radiated Emissions in non-restricted frequency bands Measurement:

This test setup layout is the same as that shown in section 4.4.4.

#### 4.5.5. Test Deviation

There is no deviation with the original standard.

#### 4.5.6. EUT Operation during Test

For Non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

For beamforming mode:

The EUT was programmed to be in beamforming transmitting mode.

#### 4.5.7. Test Result of Band Edge and Fundamental Emissions

<For Non-Beamforming Mode>

|               |                                     |                |                                                             |
|---------------|-------------------------------------|----------------|-------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                         |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11a CH 36, 40, 48 /<br>Chain 3 + Chain 5 + Chain 6 |
| Test Date     | May 11, 2016                        |                |                                                             |

##### Channel 36

|   | Freq    | Level  | Limit  | Over  | Read   | Cable | Antenna | Preamp | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|--------|-------|--------|-------|---------|--------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB    | dBuV   | Loss  | Factor  | Factor |       |       |         |           |
|   |         |        |        |       |        | dB    | dB/m    | dB     | cm    | deg   |         |           |
| 1 | 5147.15 | 67.28  | 74.00  | -6.72 | 58.63  | 7.96  | 33.74   | 33.05  | 293   | 219   | Peak    | VERTICAL  |
| 2 | 5148.75 | 52.95  | 54.00  | -1.05 | 44.30  | 7.96  | 33.74   | 33.05  | 293   | 219   | Average | VERTICAL  |
| 3 | 5176.80 | 117.92 |        |       | 109.20 | 7.98  | 33.79   | 33.05  | 293   | 219   | Peak    | VERTICAL  |
| 4 | 5177.60 | 107.65 |        |       | 98.93  | 7.98  | 33.79   | 33.05  | 293   | 219   | Average | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5180 MHz.

##### Channel 40

|   | Freq    | Level  | Limit  | Over   | Read   | Cable | Antenna | Preamp | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|--------|--------|--------|-------|---------|--------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV   | Loss  | Factor  | Factor |       |       |         |           |
|   |         |        |        |        |        | dB    | dB/m    | dB     | cm    | deg   |         |           |
| 1 | 5119.07 | 51.82  | 54.00  | -2.18  | 43.25  | 7.93  | 33.69   | 33.05  | 300   | 158   | Average | VERTICAL  |
| 2 | 5119.07 | 62.63  | 74.00  | -11.37 | 54.06  | 7.93  | 33.69   | 33.05  | 300   | 158   | Peak    | VERTICAL  |
| 3 | 5199.20 | 106.39 |        |        | 97.63  | 7.99  | 33.82   | 33.05  | 300   | 158   | Average | VERTICAL  |
| 4 | 5199.20 | 116.27 |        |        | 107.51 | 7.99  | 33.82   | 33.05  | 300   | 158   | Peak    | VERTICAL  |
| 5 | 5359.46 | 52.90  | 54.00  | -1.10  | 43.73  | 8.15  | 34.08   | 33.06  | 300   | 158   | Average | VERTICAL  |
| 6 | 5359.46 | 64.01  | 74.00  | -9.99  | 54.84  | 8.15  | 34.08   | 33.06  | 300   | 158   | Peak    | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5200 MHz.

##### Channel 48

|   | Freq    | Level  | Limit  | Over   | Read   | Cable | Antenna | Preamp | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|--------|--------|--------|-------|---------|--------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV   | Loss  | Factor  | Factor |       |       |         |           |
|   |         |        |        |        |        | dB    | dB/m    | dB     | cm    | deg   |         |           |
| 1 | 5078.14 | 61.99  | 74.00  | -12.01 | 53.52  | 7.90  | 33.62   | 33.05  | 281   | 175   | Peak    | VERTICAL  |
| 2 | 5084.55 | 50.34  | 54.00  | -3.66  | 41.83  | 7.91  | 33.65   | 33.05  | 281   | 175   | Average | VERTICAL  |
| 3 | 5239.20 | 109.34 |        |        | 100.47 | 8.03  | 33.89   | 33.05  | 281   | 175   | Average | VERTICAL  |
| 4 | 5239.20 | 118.86 |        |        | 109.99 | 8.03  | 33.89   | 33.05  | 281   | 175   | Peak    | VERTICAL  |
| 5 | 5399.46 | 52.97  | 54.00  | -1.03  | 43.72  | 8.18  | 34.13   | 33.06  | 281   | 175   | Average | VERTICAL  |
| 6 | 5399.46 | 63.24  | 74.00  | -10.76 | 53.99  | 8.18  | 34.13   | 33.06  | 281   | 175   | Peak    | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5240 MHz.

|               |                                     |                |                                                                              |
|---------------|-------------------------------------|----------------|------------------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                          |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT20 CH 36,<br>40, 48 / Chain 3 + Chain 5 + Chain 6 |
| Test Date     | May 11, 2016                        |                |                                                                              |

#### Channel 36

|   | Freq    | Level  | Limit  | Over  | Read   | CableAntenna | Preamp | A/Pos | T/Pos | Remark      | Pol/Phase |
|---|---------|--------|--------|-------|--------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB    | dBuV   | dB           | dB/m   | dB    | cm    | deg         |           |
| 1 | 5147.95 | 52.98  | 54.00  | -1.02 | 44.33  | 7.96         | 33.74  | 33.05 | 279   | 335 Average | VERTICAL  |
| 2 | 5148.75 | 68.33  | 74.00  | -5.67 | 59.68  | 7.96         | 33.74  | 33.05 | 279   | 335 Peak    | VERTICAL  |
| 3 | 5178.40 | 106.69 |        |       | 97.97  | 7.98         | 33.79  | 33.05 | 279   | 335 Average | VERTICAL  |
| 4 | 5179.20 | 117.37 |        |       | 108.65 | 7.98         | 33.79  | 33.05 | 279   | 335 Peak    | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5180 MHz.

#### Channel 40

|   | Freq    | Level  | Limit  | Over   | Read   | CableAntenna | Preamp | A/Pos | T/Pos | Remark      | Pol/Phase |
|---|---------|--------|--------|--------|--------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV   | dB           | dB/m   | dB    | cm    | deg         |           |
| 1 | 5120.67 | 52.88  | 54.00  | -1.12  | 44.31  | 7.93         | 33.69  | 33.05 | 279   | 345 Average | VERTICAL  |
| 2 | 5121.47 | 63.96  | 74.00  | -10.04 | 55.39  | 7.93         | 33.69  | 33.05 | 279   | 345 Peak    | VERTICAL  |
| 3 | 5200.80 | 108.19 |        |        | 99.43  | 7.99         | 33.82  | 33.05 | 279   | 345 Average | VERTICAL  |
| 4 | 5200.80 | 117.97 |        |        | 109.21 | 7.99         | 33.82  | 33.05 | 279   | 345 Peak    | VERTICAL  |
| 5 | 5361.06 | 52.12  | 54.00  | -1.88  | 42.95  | 8.15         | 34.08  | 33.06 | 279   | 345 Average | VERTICAL  |
| 6 | 5366.67 | 63.33  | 74.00  | -10.67 | 54.16  | 8.15         | 34.08  | 33.06 | 279   | 345 Peak    | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5200 MHz.

#### Channel 48

|   | Freq    | Level  | Limit  | Over   | Read   | CableAntenna | Preamp | A/Pos | T/Pos | Remark      | Pol/Phase |
|---|---------|--------|--------|--------|--------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV   | dB           | dB/m   | dB    | cm    | deg         |           |
| 1 | 5086.15 | 50.95  | 54.00  | -3.05  | 42.44  | 7.91         | 33.65  | 33.05 | 279   | 296 Average | VERTICAL  |
| 2 | 5087.76 | 62.68  | 74.00  | -11.32 | 54.17  | 7.91         | 33.65  | 33.05 | 279   | 296 Peak    | VERTICAL  |
| 3 | 5240.80 | 109.26 |        |        | 100.39 | 8.03         | 33.89  | 33.05 | 279   | 296 Average | VERTICAL  |
| 4 | 5241.60 | 119.37 |        |        | 110.51 | 8.03         | 33.89  | 33.06 | 279   | 296 Peak    | VERTICAL  |
| 5 | 5401.06 | 52.94  | 54.00  | -1.06  | 43.66  | 8.19         | 34.15  | 33.06 | 279   | 296 Average | VERTICAL  |
| 6 | 5406.67 | 63.80  | 74.00  | -10.20 | 54.52  | 8.19         | 34.15  | 33.06 | 279   | 296 Peak    | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5240 MHz.

|               |                                     |                |                                                                          |
|---------------|-------------------------------------|----------------|--------------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                      |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT40<br>CH 38, 46 / Chain 3 + Chain 5 + Chain 6 |
| Test Date     | May 11, 2016                        |                |                                                                          |

### Channel 38

|   | Freq    | Level  | Limit Line | Over Limit | Read Level | Cable Loss | Antenna Factor | Preamp Factor | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|------------|------------|------------|------------|----------------|---------------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m     | dB         | dBuV       | dB         | dB/m           | dB            | cm    | deg   |         |           |
| 1 | 5148.33 | 66.34  | 74.00      | -7.66      | 57.69      | 7.96       | 33.74          | 33.05         | 272   | 339   | Peak    | VERTICAL  |
| 2 | 5149.14 | 52.90  | 54.00      | -1.10      | 44.25      | 7.96       | 33.74          | 33.05         | 272   | 339   | Average | VERTICAL  |
| 3 | 5193.21 | 99.01  |            |            | 90.25      | 7.99       | 33.82          | 33.05         | 272   | 339   | Average | VERTICAL  |
| 4 | 5193.21 | 110.27 |            |            | 101.51     | 7.99       | 33.82          | 33.05         | 272   | 339   | Peak    | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5190 MHz.

### Channel 46

|   | Freq    | Level  | Limit Line | Over Limit | Read Level | Cable Loss | Antenna Factor | Preamp Factor | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|------------|------------|------------|------------|----------------|---------------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m     | dB         | dBuV       | dB         | dB/m           | dB            | cm    | deg   |         |           |
| 1 | 5141.86 | 65.03  | 74.00      | -8.97      | 56.38      | 7.96       | 33.74          | 33.05         | 271   | 14    | Peak    | VERTICAL  |
| 2 | 5147.47 | 52.76  | 54.00      | -1.24      | 44.11      | 7.96       | 33.74          | 33.05         | 271   | 14    | Average | VERTICAL  |
| 3 | 5226.80 | 107.14 |            |            | 98.31      | 8.02       | 33.86          | 33.05         | 271   | 14    | Average | VERTICAL  |
| 4 | 5232.40 | 118.17 |            |            | 109.30     | 8.03       | 33.89          | 33.05         | 271   | 14    | Peak    | VERTICAL  |
| 5 | 5387.05 | 64.28  | 74.00      | -9.72      | 55.03      | 8.18       | 34.13          | 33.06         | 271   | 14    | Peak    | VERTICAL  |
| 6 | 5387.85 | 52.93  | 54.00      | -1.07      | 43.68      | 8.18       | 34.13          | 33.06         | 271   | 14    | Average | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5230 MHz.

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT80<br>CH 42 / Chain 3 + Chain 5 + Chain 6 |
| Test Date     | May 11, 2016                        |                |                                                                      |

#### Channel 42

|   | Freq    | Level  | Limit  | Over   | Read  | Cable | Antenna | Preamp | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|--------|--------|-------|-------|---------|--------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV  | dB    | dB/m    | dB     | cm    | deg   |         |           |
| 1 | 5145.10 | 64.37  | 74.00  | -9.63  | 55.72 | 7.96  | 33.74   | 33.05  | 283   | 348   | Peak    | VERTICAL  |
| 2 | 5150.00 | 52.89  | 54.00  | -1.11  | 44.24 | 7.96  | 33.74   | 33.05  | 283   | 348   | Average | VERTICAL  |
| 3 | 5221.22 | 95.05  |        |        | 86.22 | 8.02  | 33.86   | 33.05  | 283   | 348   | Average | VERTICAL  |
| 4 | 5221.22 | 104.73 |        |        | 95.90 | 8.02  | 33.86   | 33.05  | 283   | 348   | Peak    | VERTICAL  |
| 5 | 5355.83 | 48.24  | 54.00  | -5.76  | 39.07 | 8.15  | 34.08   | 33.06  | 283   | 348   | Average | VERTICAL  |
| 6 | 5357.44 | 60.85  | 74.00  | -13.15 | 51.68 | 8.15  | 34.08   | 33.06  | 283   | 348   | Peak    | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5210 MHz.

<For Beamforming Mode>

|               |                                     |                |                                                                          |
|---------------|-------------------------------------|----------------|--------------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                      |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT20 CH 36,<br>40 / Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 30, 2016                       |                |                                                                          |

Channel 36

|   | Freq    | Level  | Limit  | Over  | Read   | CableAntenna | Preamp | A/Pos | T/Pos | Remark      | Pol/Phase |
|---|---------|--------|--------|-------|--------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB    | dBuV   | dB           | dB/m   | dB    | cm    | deg         |           |
| 1 | 5107.89 | 52.96  | 54.00  | -1.04 | 44.42  | 7.92         | 33.67  | 33.05 | 238   | 165 Average | VERTICAL  |
| 2 | 5150.00 | 66.80  | 74.00  | -7.20 | 58.15  | 7.96         | 33.74  | 33.05 | 238   | 165 Peak    | VERTICAL  |
| 3 | 5187.21 | 110.49 |        |       | 101.73 | 7.99         | 33.82  | 33.05 | 238   | 165 Average | VERTICAL  |
| 4 | 5188.01 | 119.59 |        |       | 110.83 | 7.99         | 33.82  | 33.05 | 238   | 165 Peak    | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5180 MHz.

Channel 40

|   | Freq    | Level  | Limit  | Over   | Read   | CableAntenna | Preamp | A/Pos | T/Pos | Remark      | Pol/Phase |
|---|---------|--------|--------|--------|--------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV   | dB           | dB/m   | dB    | cm    | deg         |           |
| 1 | 5118.27 | 52.53  | 54.00  | -1.47  | 43.96  | 7.93         | 33.69  | 33.05 | 258   | 206 Average | VERTICAL  |
| 2 | 5118.27 | 63.04  | 74.00  | -10.96 | 54.47  | 7.93         | 33.69  | 33.05 | 258   | 206 Peak    | VERTICAL  |
| 3 | 5197.60 | 120.37 |        |        | 111.61 | 7.99         | 33.82  | 33.05 | 258   | 206 Peak    | VERTICAL  |
| 4 | 5198.40 | 110.48 |        |        | 101.72 | 7.99         | 33.82  | 33.05 | 258   | 206 Average | VERTICAL  |
| 5 | 5356.25 | 63.60  | 74.00  | -10.40 | 54.43  | 8.15         | 34.08  | 33.06 | 258   | 206 Peak    | VERTICAL  |
| 6 | 5357.85 | 52.99  | 54.00  | -1.01  | 43.82  | 8.15         | 34.08  | 33.06 | 258   | 206 Average | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5200 MHz.

|               |                                     |                |                                                                          |
|---------------|-------------------------------------|----------------|--------------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                      |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT40<br>CH 38, 46 / Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 30, 2016                       |                |                                                                          |

### Channel 38

|   | Freq    | Level  | Limit  | Over   | Read   | CableAntenna | Preamp | A/Pos | T/Pos | Remark      | Pol/Phase |
|---|---------|--------|--------|--------|--------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV   | dB           | dB/m   | dB    | cm    | deg         |           |
| 1 | 5147.53 | 63.03  | 74.00  | -10.97 | 54.38  | 7.96         | 33.74  | 33.05 | 268   | 165 Peak    | VERTICAL  |
| 2 | 5150.00 | 52.66  | 54.00  | -1.34  | 44.01  | 7.96         | 33.74  | 33.05 | 268   | 165 Average | VERTICAL  |
| 3 | 5181.19 | 110.55 |        |        | 101.83 | 7.98         | 33.79  | 33.05 | 268   | 165 Peak    | VERTICAL  |
| 4 | 5185.19 | 101.43 |        |        | 92.71  | 7.98         | 33.79  | 33.05 | 268   | 165 Average | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5190 MHz.

### Channel 46

|   | Freq    | Level  | Limit  | Over   | Read   | CableAntenna | Preamp | A/Pos | T/Pos | Remark      | Pol/Phase |
|---|---------|--------|--------|--------|--------|--------------|--------|-------|-------|-------------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV   | dB           | dB/m   | dB    | cm    | deg         |           |
| 1 | 5147.47 | 50.92  | 54.00  | -3.08  | 42.27  | 7.96         | 33.74  | 33.05 | 264   | 167 Average | VERTICAL  |
| 2 | 5150.00 | 61.38  | 74.00  | -12.62 | 52.73  | 7.96         | 33.74  | 33.05 | 264   | 167 Peak    | VERTICAL  |
| 3 | 5227.60 | 116.26 |        |        | 107.43 | 8.02         | 33.86  | 33.05 | 264   | 167 Peak    | VERTICAL  |
| 4 | 5228.40 | 106.17 |        |        | 97.34  | 8.02         | 33.86  | 33.05 | 264   | 167 Average | VERTICAL  |
| 5 | 5388.65 | 52.64  | 54.00  | -1.36  | 43.39  | 8.18         | 34.13  | 33.06 | 264   | 167 Average | VERTICAL  |
| 6 | 5388.65 | 63.66  | 74.00  | -10.34 | 54.41  | 8.18         | 34.13  | 33.06 | 264   | 167 Peak    | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5230 MHz.

|               |                                     |                |                                                                      |
|---------------|-------------------------------------|----------------|----------------------------------------------------------------------|
| Temperature   | 25°C                                | Humidity       | 61%                                                                  |
| Test Engineer | Steven Liang/<br>Brian Sun/Peter Wu | Configurations | IEEE 802.11ac MCS0/Nss1 VHT80<br>CH 42 / Chain 3 + Chain 5 + Chain 6 |
| Test Date     | Apr. 30, 2016                       |                |                                                                      |

#### Channel 42

|   | Freq    | Level  | Limit  | Over   | Read  | Cable | Antenna | Preamp | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|--------|--------|-------|-------|---------|--------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV  | dB    | dB/m    | dB     | cm    | deg   |         |           |
| 1 | 5143.49 | 64.00  | 74.00  | -10.00 | 55.35 | 7.96  | 33.74   | 33.05  | 252   | 329   | Peak    | VERTICAL  |
| 2 | 5150.00 | 52.85  | 54.00  | -1.15  | 44.20 | 7.96  | 33.74   | 33.05  | 252   | 329   | Average | VERTICAL  |
| 3 | 5179.55 | 96.10  |        |        | 87.38 | 7.98  | 33.79   | 33.05  | 252   | 329   | Average | VERTICAL  |
| 4 | 5181.96 | 106.29 |        |        | 97.57 | 7.98  | 33.79   | 33.05  | 252   | 329   | Peak    | VERTICAL  |

Item 3, 4 are the fundamental frequency at 5210 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

## 4.6. Frequency Stability Measurement

### 4.6.1. Limit

In-band emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

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

### 4.6.2. Measuring Instruments and Setting

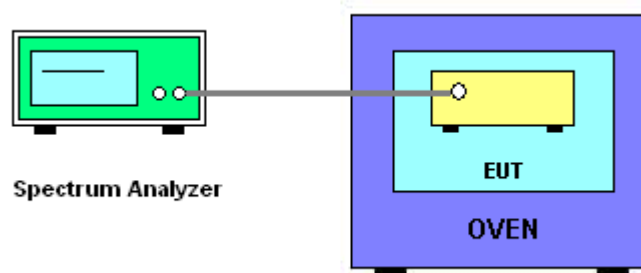
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameter | Setting                                          |
|--------------------|--------------------------------------------------|
| Attenuation        | Auto                                             |
| Span Frequency     | Entire absence of modulation emissions bandwidth |
| RBW                | 10 kHz                                           |
| VBW                | 10 kHz                                           |
| Sweep Time         | Auto                                             |

### 4.6.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5.  $f_c$  is declaring of channel frequency. Then the frequency error formula is  $(f_c - f)/f_c \times 10^6$  ppm and the limit is less than  $\pm 20$  ppm (IEEE 802.11n specification).
6. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
7. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
8. Extreme temperature is  $0^\circ\text{C} \sim 40^\circ\text{C}$ .

### 4.6.4. Test Setup Layout



#### 4.6.5. Test Deviation

There is no deviation with the original standard.

#### 4.6.6. EUT Operation during Test

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

#### 4.6.7. Test Result of Frequency Stability

|               |          |           |              |
|---------------|----------|-----------|--------------|
| Temperature   | 26°C     | Humidity  | 63%          |
| Test Engineer | Gary Chu | Test Date | May 10, 2016 |

For Band 1:

Mode: 20 MHz / Chain 3

Voltage vs. Frequency Stability

| Voltage              | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (V)                  | 5200 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 126.50               | 5199.9719                   | 5199.9713 | 5199.9707 | 5199.9698 |
| 110.00               | 5199.9709                   | 5199.9706 | 5199.9702 | 5199.9694 |
| 93.50                | 5199.9706                   | 5199.9704 | 5199.9696 | 5199.9692 |
| Max. Deviation (MHz) | 0.0294                      | 0.0296    | 0.0304    | 0.0308    |
| Max. Deviation (ppm) | 5.65                        | 5.69      | 5.84      | 5.92      |
| Result               | Complies                    |           |           |           |

Temperature vs. Frequency Stability

| Temperature          | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (°C)                 | 5200 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 0                    | 5199.9731                   | 5199.9721 | 5199.9712 | 5199.9702 |
| 10                   | 5199.9711                   | 5199.9706 | 5199.9699 | 5199.9694 |
| 20                   | 5199.9709                   | 5199.9707 | 5199.9702 | 5199.9697 |
| 30                   | 5199.9048                   | 5199.9042 | 5199.9036 | 5199.9028 |
| 40                   | 5199.9031                   | 5199.9024 | 5199.9021 | 5199.9020 |
| Max. Deviation (MHz) | 0.0969                      | 0.0976    | 0.0979    | 0.0980    |
| Max. Deviation (ppm) | 18.63                       | 18.77     | 18.83     | 18.85     |
| Result               | Complies                    |           |           |           |

Mode: 40 MHz / Chain 3

#### Voltage vs. Frequency Stability

| Voltage              | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (V)                  | 5190 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 126.50               | 5189.9719                   | 5189.9714 | 5189.9706 | 5189.9702 |
| 110.00               | 5189.9709                   | 5189.9702 | 5189.9695 | 5189.9688 |
| 93.50                | 5189.9699                   | 5189.9694 | 5189.9687 | 5189.9686 |
| Max. Deviation (MHz) | 0.0301                      | 0.0306    | 0.0313    | 0.0314    |
| Max. Deviation (ppm) | 5.80                        | 5.89      | 6.03      | 6.05      |
| Result               | Complies                    |           |           |           |

#### Temperature vs. Frequency Stability

| Temperature          | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (°C)                 | 5190 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 0                    | 5189.9717                   | 5189.9711 | 5189.9707 | 5189.9697 |
| 10                   | 5189.9710                   | 5189.9705 | 5189.9697 | 5189.9689 |
| 20                   | 5189.9709                   | 5189.9701 | 5189.9693 | 5189.9691 |
| 30                   | 5189.9048                   | 5189.9039 | 5189.9035 | 5189.9028 |
| 40                   | 5189.9038                   | 5189.9029 | 5189.9020 | 5189.9010 |
| Max. Deviation (MHz) | 0.0962                      | 0.0971    | 0.0980    | 0.0990    |
| Max. Deviation (ppm) | 18.54                       | 18.71     | 18.88     | 19.08     |
| Result               | Complies                    |           |           |           |

Mode: 80 MHz / Chain 3

#### Voltage vs. Frequency Stability

| Voltage              | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (V)                  | 5210 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 126.50               | 5209.9713                   | 5209.9711 | 5209.9708 | 5209.9707 |
| 110.00               | 5209.9709                   | 5209.9705 | 5209.9702 | 5209.9701 |
| 93.50                | 5209.9705                   | 5209.9700 | 5209.9699 | 5209.9691 |
| Max. Deviation (MHz) | 0.0295                      | 0.0300    | 0.0301    | 0.0309    |
| Max. Deviation (ppm) | 5.66                        | 5.76      | 5.78      | 5.93      |
| Result               | Complies                    |           |           |           |

#### Temperature vs. Frequency Stability

| Temperature          | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (°C)                 | 5210 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 0                    | 5209.9714                   | 5209.9707 | 5209.9705 | 5209.9697 |
| 10                   | 5209.9711                   | 5209.9708 | 5209.9703 | 5209.9696 |
| 20                   | 5209.9709                   | 5209.9708 | 5209.9700 | 5209.9696 |
| 30                   | 5209.9048                   | 5209.9047 | 5209.9039 | 5209.9031 |
| 40                   | 5209.9031                   | 5209.9027 | 5209.9024 | 5209.9014 |
| Max. Deviation (MHz) | 0.0969                      | 0.0973    | 0.0976    | 0.0986    |
| Max. Deviation (ppm) | 18.60                       | 18.68     | 18.73     | 18.93     |
| Result               | Complies                    |           |           |           |

|               |            |           |               |
|---------------|------------|-----------|---------------|
| Temperature   | 24°C       | Humidity  | 62%           |
| Test Engineer | Eddie Weng | Test Date | Mar. 21, 2016 |

For Band 4:

Mode: 20 MHz / Chain 2

#### Voltage vs. Frequency Stability

| Voltage              | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (V)                  | 5785 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 126.50               | 5785.0075                   | 5785.0072 | 5785.0067 | 5785.0058 |
| 110.00               | 5785.0072                   | 5785.0065 | 5785.0057 | 5785.0052 |
| 93.50                | 5785.0070                   | 5785.0066 | 5785.0065 | 5785.0056 |
| Max. Deviation (MHz) | 0.0075                      | 0.0072    | 0.0067    | 0.0058    |
| Max. Deviation (ppm) | 1.30                        | 1.24      | 1.16      | 1.00      |
| Result               | Complies                    |           |           |           |

#### Temperature vs. Frequency Stability

| Temperature          | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (°C)                 | 5785 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 0                    | 5785.0056                   | 5785.0050 | 5785.0044 | 5785.0042 |
| 10                   | 5785.0063                   | 5785.0060 | 5785.0051 | 5785.0049 |
| 20                   | 5785.0072                   | 5785.0068 | 5785.0059 | 5785.0050 |
| 30                   | 5785.0087                   | 5785.0080 | 5785.0070 | 5785.0061 |
| 40                   | 5785.0104                   | 5785.0094 | 5785.0084 | 5785.0081 |
| Max. Deviation (MHz) | 0.0118                      | 0.0113    | 0.0112    | 0.0111    |
| Max. Deviation (ppm) | 2.04                        | 1.95      | 1.94      | 1.92      |
| Result               | Complies                    |           |           |           |

Mode: 40 MHz / Chain 2

#### Voltage vs. Frequency Stability

| Voltage              | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (V)                  | 5755 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 126.50               | 5755.0075                   | 5755.0074 | 5755.0065 | 5755.0060 |
| 110.00               | 5755.0072                   | 5755.0067 | 5755.0065 | 5755.0061 |
| 93.50                | 5755.0066                   | 5755.0062 | 5755.0058 | 5755.0057 |
| Max. Deviation (MHz) | 0.0075                      | 0.0074    | 0.0065    | 0.0061    |
| Max. Deviation (ppm) | 1.30                        | 1.29      | 1.13      | 1.06      |
| Result               | Complies                    |           |           |           |

#### Temperature vs. Frequency Stability

| Temperature          | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (°C)                 | 5755 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 0                    | 5755.0036                   | 5755.0031 | 5755.0023 | 5755.0022 |
| 10                   | 5755.0053                   | 5755.0046 | 5755.0044 | 5755.0039 |
| 20                   | 5755.0072                   | 5755.0068 | 5755.0061 | 5755.0054 |
| 30                   | 5755.0087                   | 5755.0077 | 5755.0067 | 5755.0066 |
| 40                   | 5755.0099                   | 5755.0089 | 5755.0083 | 5755.0082 |
| Max. Deviation (MHz) | 0.0104                      | 0.0100    | 0.0096    | 0.0089    |
| Max. Deviation (ppm) | 1.81                        | 1.74      | 1.67      | 1.55      |
| Result               | Complies                    |           |           |           |

Mode: 80 MHz / Chain 2

#### Voltage vs. Frequency Stability

| Voltage              | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (V)                  | 5775 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 126.50               | 5775.0080                   | 5775.0071 | 5775.0070 | 5775.0061 |
| 110.00               | 5775.0072                   | 5775.0071 | 5775.0065 | 5775.0056 |
| 93.50                | 5775.0071                   | 5775.0068 | 5775.0067 | 5775.0066 |
| Max. Deviation (MHz) | 0.0080                      | 0.0071    | 0.0070    | 0.0066    |
| Max. Deviation (ppm) | 1.39                        | 1.23      | 1.21      | 1.14      |
| Result               | Complies                    |           |           |           |

#### Temperature vs. Frequency Stability

| Temperature          | Measurement Frequency (MHz) |           |           |           |
|----------------------|-----------------------------|-----------|-----------|-----------|
| (°C)                 | 5775 MHz                    |           |           |           |
|                      | 0 Minute                    | 2 Minute  | 5 Minute  | 10 Minute |
| 0                    | 5775.0054                   | 5775.0050 | 5775.0049 | 5775.0040 |
| 10                   | 5775.0062                   | 5775.0052 | 5775.0046 | 5775.0043 |
| 20                   | 5775.0072                   | 5775.0066 | 5775.0056 | 5775.0046 |
| 30                   | 5775.0087                   | 5775.0086 | 5775.0077 | 5775.0075 |
| 40                   | 5775.0088                   | 5775.0083 | 5775.0077 | 5775.0067 |
| Max. Deviation (MHz) | 0.0106                      | 0.0099    | 0.0097    | 0.0096    |
| Max. Deviation (ppm) | 1.84                        | 1.71      | 1.68      | 1.66      |
| Result               | Complies                    |           |           |           |

## **4.7. Antenna Requirements**

### **4.7.1. Limit**

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### **4.7.2. Antenna Connector Construction**

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

## 5. LIST OF MEASURING EQUIPMENTS

| Instrument                 | Manufacturer | Model No.        | Serial No.    | Characteristics  | Calibration Date | Remark                |
|----------------------------|--------------|------------------|---------------|------------------|------------------|-----------------------|
| Horn Antenna               | EMCO         | 3115             | 00075790      | 750MHz ~ 18GHz   | Oct. 22, 2015    | Radiation (03CH01-CB) |
| Horn Antenna               | Schwarzbeck  | BBHA 9170        | BBHA9170252   | 15GHz ~ 40GHz    | Jul. 21, 2015    | Radiation (03CH01-CB) |
| Pre-Amplifier              | Agilent      | 8449B            | 3008A02310    | 1GHz ~ 26.5GHz   | Jan. 18, 2016    | Radiation (03CH01-CB) |
| Pre-Amplifier              | WM           | TF-130N-R1       | 923365        | 26GHz ~ 40GHz    | Nov. 13, 2015    | Radiation (03CH01-CB) |
| Spectrum Analyzer          | R&S          | FSP40            | 100056        | 9kHz ~ 40GHz     | Oct. 27, 2015    | Radiation (03CH01-CB) |
| RF Cable-high              | Woken        | High Cable-16    | N/A           | 1 GHz ~ 18 GHz   | Nov. 02, 2015    | Radiation (03CH01-CB) |
| RF Cable-high              | Woken        | High Cable-17    | N/A           | 1 GHz ~ 18 GHz   | Nov. 02, 2015    | Radiation (03CH01-CB) |
| RF Cable-high              | Woken        | High Cable-40G-1 | N/A           | 18GHz ~ 40 GHz   | Nov. 02, 2015    | Radiation (03CH01-CB) |
| RF Cable-high              | Woken        | High Cable-40G-2 | N/A           | 18GHz ~ 40 GHz   | Nov. 02, 2015    | Radiation (03CH01-CB) |
| Test Software              | Audix        | E3               | 6.2009-10-7   | N/A              | N/A              | Radiation (03CH01-CB) |
| Spectrum analyzer          | R&S          | FSP40            | 100019        | 9kHz~40GHz       | Dec. 02, 2013    | Conducted (TH01-CB)   |
| Spectrum analyzer          | R&S          | FSV40            | 100979        | 9kHz~40GHz       | Dec. 09, 2015    | Conducted (TH01-CB)   |
| Temp. and Humidity Chamber | Ten Billion  | TTH-D3SP         | TBN-931011    | -30~100 degree   | Jun. 02, 2015    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | High Cable-7     | -             | 1 GHz – 26.5 GHz | Nov. 17, 2013    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | High Cable-7     | -             | 1 GHz – 26.5 GHz | Nov. 15, 2014    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | RG402            | High Cable-7  | 1 GHz – 26.5 GHz | Nov. 02, 2015    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | High Cable-8     | -             | 1 GHz – 26.5 GHz | Nov. 17, 2013    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | High Cable-8     | -             | 1 GHz – 26.5 GHz | Nov. 15, 2014    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | RG402            | High Cable-8  | 1 GHz – 26.5 GHz | Nov. 02, 2015    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | High Cable-9     | -             | 1 GHz – 26.5 GHz | Nov. 17, 2013    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | High Cable-9     | -             | 1 GHz – 26.5 GHz | Nov. 15, 2014    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | RG402            | High Cable-9  | 1 GHz – 26.5 GHz | Nov. 02, 2015    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | High Cable-10    | -             | 1 GHz – 26.5 GHz | Nov. 17, 2013    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | High Cable-10    | -             | 1 GHz – 26.5 GHz | Nov. 15, 2014    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | RG402            | High Cable-10 | 1 GHz – 26.5 GHz | Nov. 02, 2015    | Conducted (TH01-CB)   |
| RF Cable-high              | Woken        | High Cable-11    | -             | 1 GHz – 26.5 GHz | Nov. 17, 2013    | Conducted (TH01-CB)   |

| Instrument    | Manufacturer | Model No.     | Serial No.   | Characteristics  | Calibration Date | Remark              |
|---------------|--------------|---------------|--------------|------------------|------------------|---------------------|
| RF Cable-high | Woken        | High Cable-11 | -            | 1 GHz – 26.5 GHz | Nov. 15, 2014    | Conducted (TH01-CB) |
| RF Cable-high | Woken        | RG402         | High Cable-6 | 1 GHz – 26.5 GHz | Nov. 02, 2015    | Conducted (TH01-CB) |
| Power Sensor  | Anritsu      | MA2411B       | 1126203      | 300MHz~40GHz     | Oct. 06, 2014    | Conducted (TH01-CB) |
| Power Sensor  | Agilent      | U2021XA       | MY53410001   | 50MHz~18GHz      | Nov. 02, 2015    | Conducted (TH01-CB) |
| Power Meter   | Anritsu      | ML2495A       | 1210004      | 300MHz~40GHz     | Oct. 06, 2014    | Conducted (TH01-CB) |

Note: Calibration Interval of instruments listed above is one year.

## 6. MEASUREMENT UNCERTAINTY

| Test Items                        | Uncertainty | Remark                   |
|-----------------------------------|-------------|--------------------------|
| Radiated Emission (1GHz ~ 18GHz)  | 3.7 dB      | Confidence levels of 95% |
| Radiated Emission (18GHz ~ 40GHz) | 3.5 dB      | Confidence levels of 95% |
| Conducted Emission                | 1.7 dB      | Confidence levels of 95% |