

## FCC Test Report

**Report No.:** RF150814E01-1

**FCC ID:** RRK-EA-7HW03AP1

**Test Model:** EA-7HW03AP1W

**Series Model:** EA-7HW03AP1T

**Received Date:** Aug. 14, 2015

**Test Date:** Aug. 24 to Nov. 04, 2015

**Issued Date:** Dec. 24, 2015

**Applicant:** Alpha Networks Inc.

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
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### Release Control Record

| Issue No.     | Description       | Date Issued   |
|---------------|-------------------|---------------|
| RF150814E01-1 | Original release. | Dec. 24, 2015 |

## 1 Certificate of Conformity

**Product:** Wireless LAN Access Point

**Brand:** Panasonic

**Test Model:** EA-7HW03AP1W

**Series Model:** EA-7HW03AP1T

**Sample Status:** R&D SAMPLE

**Applicant:** Alpha Networks Inc.

**Test Date:** Aug. 24 to Nov. 04, 2015

**Standard:** 47 CFR FCC Part 15, Subpart E (Section 15.407)  
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :**



**Date:**

Dec. 24, 2015

Midoli Peng / Specialist

**Approved by :**



**Date:**

Dec. 24, 2015

May Chen / Manager

## 2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart E (SECTION 15.407) |                                            |        |                                                                                                |
|------------------------------------------------|--------------------------------------------|--------|------------------------------------------------------------------------------------------------|
| FCC Clause                                     | Test Item                                  | Result | Remarks                                                                                        |
| 15.407(b)(6)                                   | AC Power Conducted Emissions               | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -4.93dB at 0.29453MHz.             |
| 15.407(b)(1/2/3/4/6)                           | Radiated Emissions & Band Edge Measurement | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -0.3dB at 5725.00MHz & 5150.00MHz. |
| 15.407(a)(1/2/3)                               | Max Average Transmit Power                 | PASS   | Meet the requirement of limit.                                                                 |
| 15.407(a)(1/2/3)                               | Peak Power Spectral Density                | PASS   | Meet the requirement of limit.                                                                 |
| 15.407(e)                                      | 6dB bandwidth                              | PASS   | Meet the requirement of limit.<br>(U-NII-3 Band only)                                          |
| 15.407(g)                                      | Frequency Stability                        | PASS   | Meet the requirement of limit.                                                                 |
| 15.203                                         | Antenna Requirement                        | PASS   | Antenna connector is I-PEX not a standard connector.                                           |

**NOTE:** The EUT was operating in 2400 ~ 2483.5MHz, 5150~5250MHz and 5725~5850MHz frequencies band. This report was recorded the RF parameters including 5150~5250MHz and 5725~5850MHz. For the 2400 ~ 2483.5MHz RF parameters was recorded in another test report.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement                        | Frequency      | Expended Uncertainty (k=2) (±) |
|------------------------------------|----------------|--------------------------------|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 2.86 dB                        |
| Radiated Emissions up to 1 GHz     | 30MHz ~ 1GHz   | 5.37 dB                        |
| Radiated Emissions above 1 GHz     | 1GHz ~ 6GHz    | 3.72 dB                        |
|                                    | 6GHz ~ 18GHz   | 4.00 dB                        |
|                                    | 18GHz ~ 40GHz  | 4.11 dB                        |

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product               | Wireless LAN Access Point                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Brand                 | Panasonic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Test Model            | EA-7HW03AP1W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Series Model          | EA-7HW03AP1T                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Status of EUT         | R&D SAMPLE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Power Supply Rating   | DC 24V from power adapter or DC 48V from POE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Modulation Type       | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM<br>256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Modulation Technology | DSSS, OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Transfer Rate         | 802.11b: up to 11Mbps<br>802.11a/g: up to 54Mbps<br>802.11n: up to 800Mbps<br>802.11ac: up to 1733.3Mbps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Operating Frequency   | <b>For 15.407</b><br>5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                       | <b>For 15.247</b><br>2.412 ~ 2.462GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Number of Channel     | <b>For 15.407</b><br>9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20)<br>4 for 802.11n (HT40), 802.11ac (VHT40)<br>2 for 802.11ac (VHT80)                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                       | <b>For 15.247</b><br>11 for 802.11b, 802.11g, 802.11n (HT20), VHT20<br>7 for 802.11n (HT40), VHT40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Output Power          | <b>For 15.407(5.18 ~ 5.24GHz)</b><br><b>CDD Mode</b><br>802.11a: 390.156mW<br>802.11ac (VHT20): 366.747mW<br>802.11ac (VHT40): 392.29mW<br>802.11ac (VHT80): 57.137mW<br><b>Beamforming Mode</b><br>802.11ac (VHT20): 358.26mW<br>802.11ac (VHT40): 384.651mW<br>802.11ac (VHT80): 54.684mW<br><b>For 15.407(5.745 ~ 5.825GHz)</b><br><b>CDD Mode</b><br>802.11a: 797.673mW<br>802.11ac (VHT20): 811.076mW<br>802.11ac (VHT40): 594.859mW<br>802.11ac (VHT80): 139.783mW<br><b>Beamforming Mode</b><br>802.11ac (VHT20): 390.657mW<br>802.11ac (VHT40): 390.921mW<br>802.11ac (VHT80): 121.874mW |
|                       | <b>For 15.247</b><br>802.11b: 973.865mW<br>802.11g: 851.922mW<br>802.11n(HT20): 801.309mW<br>802.11n(HT40): 206.802mW                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Antenna Type          | Refer to Note                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Antenna Connector     | Refer to Note                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

|                     |            |
|---------------------|------------|
| Accessory Device    | Adapter x1 |
| Data Cable Supplied | NA         |

Note:

- There are 2.4GHz and 5GHz technology used for the EUT.
- 2.4GHz & 5GHz technology can transmit at same time.
- The EUT has two model names, which are identical to each other in all aspects except for the following table:

| Brand     | Product Name              | Model No.    | Difference                                                                                                            |
|-----------|---------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------|
| Panasonic | Wireless LAN Access Point | EA-7HW03AP1W | 1. Different of color :<br>Model: EA-7HW03AP1W (white)<br>Model: EA-7HW03AP1T (brown)<br>2. For marketing requirement |
|           |                           | EA-7HW03AP1T |                                                                                                                       |

From the above models, model: **EA-7HW03AP1W** was selected as representative model for the test and their data were recorded in this report.

- The EUT must be supplied with POE or a power adapter as following table:

| Adapter                       |             |                                                                                                                                              |
|-------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Brand Name                    | Model No.   | Spec.                                                                                                                                        |
| TAMURA                        | DVW2415N    | Input: 100-240V, 1.0A, 50/60Hz<br>AC input cable: 1.3m, unshielded<br>Output: 24V, 1.5A<br>DC output cable: 1.25m, unshielded, with one core |
| POE (test only, not for sale) |             |                                                                                                                                              |
| Brand Name                    | Model No.   | Spec.                                                                                                                                        |
| SGP                           | GRT-480125A | Input: 100-240V, 50/60Hz<br>Output: 48V                                                                                                      |

- The antennas provided to the EUT, please refer to the following table:

| Transmitter Circuit | Brand                       | Model     | Antenna Type | Antenna Gain (dBi) |      | Connector type |
|---------------------|-----------------------------|-----------|--------------|--------------------|------|----------------|
|                     |                             |           |              | 2.4GHz             | 5GHz |                |
| Chain (0)           | Hong Lin INDUSTRIAL CO.,LTD | 290-20211 | PIFA         | 3                  | 4    | I-PEX          |
| Chain (1)           |                             | 290-20211 |              | 3                  | 4    |                |
| Chain (2)           |                             | 290-20212 |              | 3                  | 4    |                |
| Chain (3)           |                             | 290-20212 |              | 3                  | 4    |                |

- The EUT was pre-tested under following test modes :

| Pre-test Mode | Power           |
|---------------|-----------------|
| Mode A        | Adapter mode    |
| <b>Mode B</b> | <b>POE mode</b> |

From the above modes, the worst radiated emission was found in **Mode B**. Therefore only the test data of the modes were recorded in this report.

7. The EUT incorporates a MIMO function with beamforming.

| 2.4GHz Band      |                 |                       |     |
|------------------|-----------------|-----------------------|-----|
| MODULATION MODE  | DATA RATE (MCS) | TX & RX CONFIGURATION |     |
| 802.11b          | 1 ~ 11Mbps      | 4TX                   | 4RX |
| 802.11g          | 6 ~ 54Mbps      | 4TX                   | 4RX |
| 802.11n (HT20)   | MCS 0~7         | 4TX                   | 4RX |
|                  | MCS 8~15        | 4TX                   | 4RX |
|                  | MCS 16~23       | 4TX                   | 4RX |
|                  | MCS 24~31       | 4TX                   | 4RX |
| 802.11n (HT40)   | MCS 0~7         | 4TX                   | 4RX |
|                  | MCS 8~15        | 4TX                   | 4RX |
|                  | MCS 16~23       | 4TX                   | 4RX |
|                  | MCS 24~31       | 4TX                   | 4RX |
| VHT20            | MCS0~8 Nss=1    | 4TX                   | 4RX |
|                  | MCS0~8 Nss=2    | 4TX                   | 4RX |
|                  | MCS0~9 Nss=3    | 4TX                   | 4RX |
|                  | MCS0~8 Nss=4    | 4TX                   | 4RX |
| VHT40            | MCS0~9 Nss=1    | 4TX                   | 4RX |
|                  | MCS0~9 Nss=2    | 4TX                   | 4RX |
|                  | MCS0~9 Nss=3    | 4TX                   | 4RX |
|                  | MCS0~9 Nss=4    | 4TX                   | 4RX |
| 5GHz Band        |                 |                       |     |
| MODULATION MODE  | DATA RATE (MCS) | TX & RX CONFIGURATION |     |
| 802.11a          | 6 ~ 54Mbps      | 4TX                   | 4RX |
| 802.11n (HT20)   | MCS 0~7         | 4TX                   | 4RX |
|                  | MCS 8~15        | 4TX                   | 4RX |
|                  | MCS 16~23       | 4TX                   | 4RX |
|                  | MCS 24~31       | 4TX                   | 4RX |
| 802.11n (HT40)   | MCS 0~7         | 4TX                   | 4RX |
|                  | MCS 8~15        | 4TX                   | 4RX |
|                  | MCS 16~23       | 4TX                   | 4RX |
|                  | MCS 24~31       | 4TX                   | 4RX |
| 802.11ac (VHT20) | MCS0~8 Nss=1    | 4TX                   | 4RX |
|                  | MCS0~8 Nss=2    | 4TX                   | 4RX |
|                  | MCS0~9 Nss=3    | 4TX                   | 4RX |
|                  | MCS0~8 Nss=4    | 4TX                   | 4RX |
| 802.11ac (VHT40) | MCS0~9 Nss=1    | 4TX                   | 4RX |
|                  | MCS0~9 Nss=2    | 4TX                   | 4RX |
|                  | MCS0~9 Nss=3    | 4TX                   | 4RX |
|                  | MCS0~9 Nss=4    | 4TX                   | 4RX |
| 802.11ac (VHT80) | MCS0~9 Nss=1    | 4TX                   | 4RX |
|                  | MCS0~9 Nss=2    | 4TX                   | 4RX |
|                  | MCS0~9 Nss=3    | 4TX                   | 4RX |
|                  | MCS0~9 Nss=4    | 4TX                   | 4RX |

Note: 1. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report.

2. All of modulation mode support beamforming function except 2.4GHz & 802.11a/n modulation mode.

8. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

### 3.2 Description of Test Modes

#### FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 36      | 5180 MHz  | 44      | 5220 MHz  |
| 40      | 5200 MHz  | 48      | 5240 MHz  |

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 38      | 5190 MHz  | 46      | 5230 MHz  |

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency |
|---------|-----------|
| 42      | 5210MHz   |

#### FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 149     | 5745MHz   | 161     | 5805MHz   |
| 153     | 5765MHz   | 165     | 5825MHz   |
| 157     | 5785MHz   |         |           |

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 151     | 5755MHz   | 159     | 5795MHz   |

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency |
|---------|-----------|
| 155     | 5775MHz   |

### 3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT CONFIGURE MODE | APPLICABLE TO |       |     |      | DESCRIPTION  |
|--------------------|---------------|-------|-----|------|--------------|
|                    | RE $\geq$ 1G  | RE<1G | PLC | APCM |              |
| 1                  | -             | -     | √   | -    | With adapter |
| 2                  | √             | √     | √   | √    | With POE     |

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz

**RE<1G**: Radiated Emission below 1GHz

**PLC**: Power Line Conducted Emission

**APCM**: Antenna Port Conducted Measurement

**NOTE**: 1. The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **X-plane (below 1GHz) & Y-plane (above 1GHz)**

2. "-" means no effect.

#### Radiated Emission Test (Above 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| CDD Mode         |                  |                   |                |                       |                 |                  |
|------------------|------------------|-------------------|----------------|-----------------------|-----------------|------------------|
| MODE             | FREQ. BAND (MHz) | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| 802.11a          | 5180-5240        | 36 to 48          | 36, 40, 48     | OFDM                  | BPSK            | 6                |
| 802.11ac (VHT20) |                  | 36 to 48          | 36, 40, 48     | OFDM                  | BPSK            | 6.5              |
| 802.11ac (VHT40) |                  | 38 to 46          | 38, 46         | OFDM                  | BPSK            | 13.5             |
| 802.11ac (VHT80) |                  | 42                | 42             | OFDM                  | BPSK            | 29.3             |
| 802.11a          | 5745-5825        | 149 to 165        | 149, 157, 165  | OFDM                  | BPSK            | 6                |
| 802.11ac (VHT20) |                  | 149 to 165        | 149, 157, 165  | OFDM                  | BPSK            | 6.5              |
| 802.11ac (VHT40) |                  | 151 to 159        | 151, 159       | OFDM                  | BPSK            | 13.5             |
| 802.11ac (VHT80) |                  | 155               | 155            | OFDM                  | BPSK            | 29.3             |

#### Radiated Emission Test (Below 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| CDD Mode         |                  |                   |                |                       |                 |                  |
|------------------|------------------|-------------------|----------------|-----------------------|-----------------|------------------|
| MODE             | FREQ. BAND (MHz) | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| 802.11ac (VHT20) | 5180-5240        | 36 to 48          | 157            | OFDM                  | BPSK            | 6.5              |
|                  | 5745-5825        | 149 to 165        |                |                       |                 |                  |

### Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| CDD Mode         |                  |                   |                |                       |                 |                  |
|------------------|------------------|-------------------|----------------|-----------------------|-----------------|------------------|
| MODE             | FREQ. BAND (MHz) | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) |
| 802.11ac (VHT20) | 5180-5240        | 36 to 48          | 157            | OFDM                  | BPSK            | 6.5              |
|                  | 5745-5825        | 149 to 165        |                |                       |                 |                  |

### Antenna Port Conducted Measurement:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| CDD Mode         |                     |                      |                   |                          |                    |                     |
|------------------|---------------------|----------------------|-------------------|--------------------------|--------------------|---------------------|
| MODE             | FREQ. BAND<br>(MHz) | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | DATA RATE<br>(Mbps) |
| 802.11a          | 5180-5240           | 36 to 48             | 36, 40, 48        | OFDM                     | BPSK               | 6                   |
| 802.11ac (VHT20) |                     | 36 to 48             | 36, 40, 48        | OFDM                     | BPSK               | 6.5                 |
| 802.11ac (VHT40) |                     | 38 to 46             | 38, 46            | OFDM                     | BPSK               | 13.5                |
| 802.11ac (VHT80) |                     | 42                   | 42                | OFDM                     | BPSK               | 29.3                |
| 802.11a          | 5745-5825           | 149 to 165           | 149, 157, 165     | OFDM                     | BPSK               | 6                   |
| 802.11ac (VHT20) |                     | 149 to 165           | 149, 157, 165     | OFDM                     | BPSK               | 6.5                 |
| 802.11ac (VHT40) |                     | 151 to 159           | 151, 159          | OFDM                     | BPSK               | 13.5                |
| 802.11ac (VHT80) |                     | 155                  | 155               | OFDM                     | BPSK               | 29.3                |
| Beamforming Mode |                     |                      |                   |                          |                    |                     |
| MODE             | FREQ. BAND<br>(MHz) | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | DATA RATE<br>(Mbps) |
| 802.11ac (VHT20) | 5180-5240           | 36 to 48             | 36, 40, 48        | OFDM                     | BPSK               | 6.5                 |
| 802.11ac (VHT40) |                     | 38 to 46             | 38, 46            | OFDM                     | BPSK               | 13.5                |
| 802.11ac (VHT80) |                     | 42                   | 42                | OFDM                     | BPSK               | 29.3                |
| 802.11ac (VHT20) | 5745-5825           | 149 to 165           | 149, 157, 165     | OFDM                     | BPSK               | 6.5                 |
| 802.11ac (VHT40) |                     | 151 to 159           | 151, 159          | OFDM                     | BPSK               | 13.5                |
| 802.11ac (VHT80) |                     | 155                  | 155               | OFDM                     | BPSK               | 29.3                |

### Test Condition:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER  | TESTED BY     |
|---------------|--------------------------|--------------|---------------|
| RE $\geq$ 1G  | 24deg. C, 67%RH          | 120Vac, 60Hz | Robert Cheng  |
| RE $<$ 1G     | 24deg. C, 69%RH          | 120Vac, 60Hz | Weiwei Lo     |
| PLC           | 26deg. C, 76%RH          | 120Vac, 60Hz | Jyunchun Lin  |
| APCM          | 25deg. C, 60%RH          | 120Vac, 60Hz | Anderson Chen |

### 3.3 Duty Cycle of Test Signal

If duty cycle of test signal is  $\geq 98\%$ , duty factor is not required.

If duty cycle of test signal is  $< 98\%$ , duty factor shall be considered.

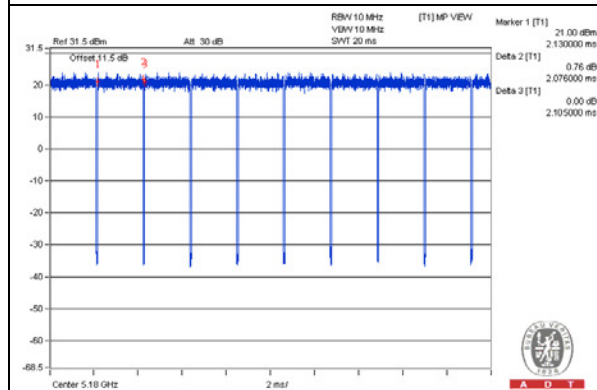
**802.11a:** Duty cycle =  $2.076 \text{ ms} / 2.105 \text{ ms} = 0.986$

**802.11ac (VHT20):** Duty cycle =  $5.032 \text{ ms} / 5.107 \text{ ms} = 0.985$

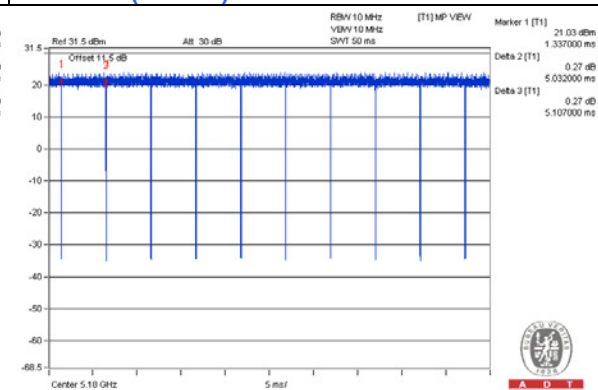
**802.11ac (VHT40):** Duty cycle =  $2.42 \text{ ms} / 2.512 \text{ ms} = 0.963$ , Duty factor =  $10 * \log(1/0.963) = 0.16$

**802.11ac (VHT80):** Duty cycle =  $1.142 \text{ ms} / 1.214 \text{ ms} = 0.941$ , Duty factor =  $10 * \log(1/0.941) = 0.27$

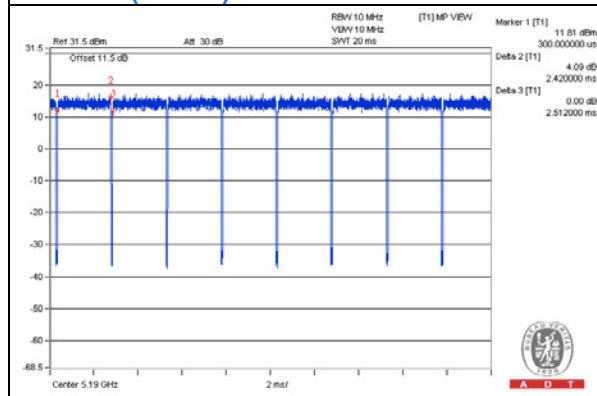
**802.11a**



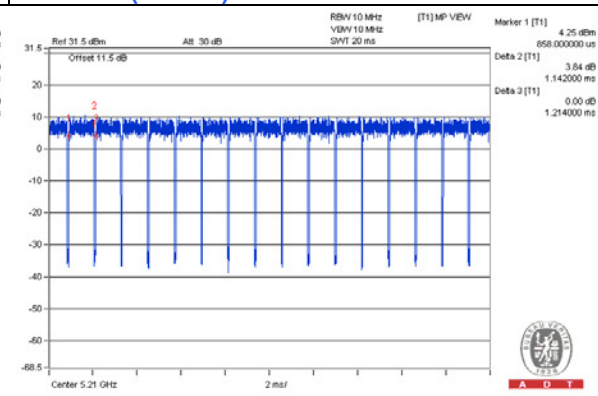
**802.11ac (VHT20)**



**802.11ac (VHT40)**



**802.11ac (VHT80)**



### 3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| ID | Product           | Brand     | Model No.   | Serial No.    | FCC ID  | Remarks            |
|----|-------------------|-----------|-------------|---------------|---------|--------------------|
| A. | NOTEBOOK COMPUTER | DELL      | E6440       | F9LYQ32       | FCC DoC | Provided by Lab    |
| B. | HUB               | ZyXEL     | ES-116P     | S060H02000215 | FCC DoC | Provided by Lab    |
| C. | POE               | SGP       | GRT-480125A | NA            | NA      | Supplied by Client |
| D. | USB 3.0 DONGLE    | Transcend | NA          | NA            | NA      | Provided by Lab    |
| E. | USB 3.0 DONGLE    | Transcend | NA          | NA            | NA      | Provided by Lab    |

Note:

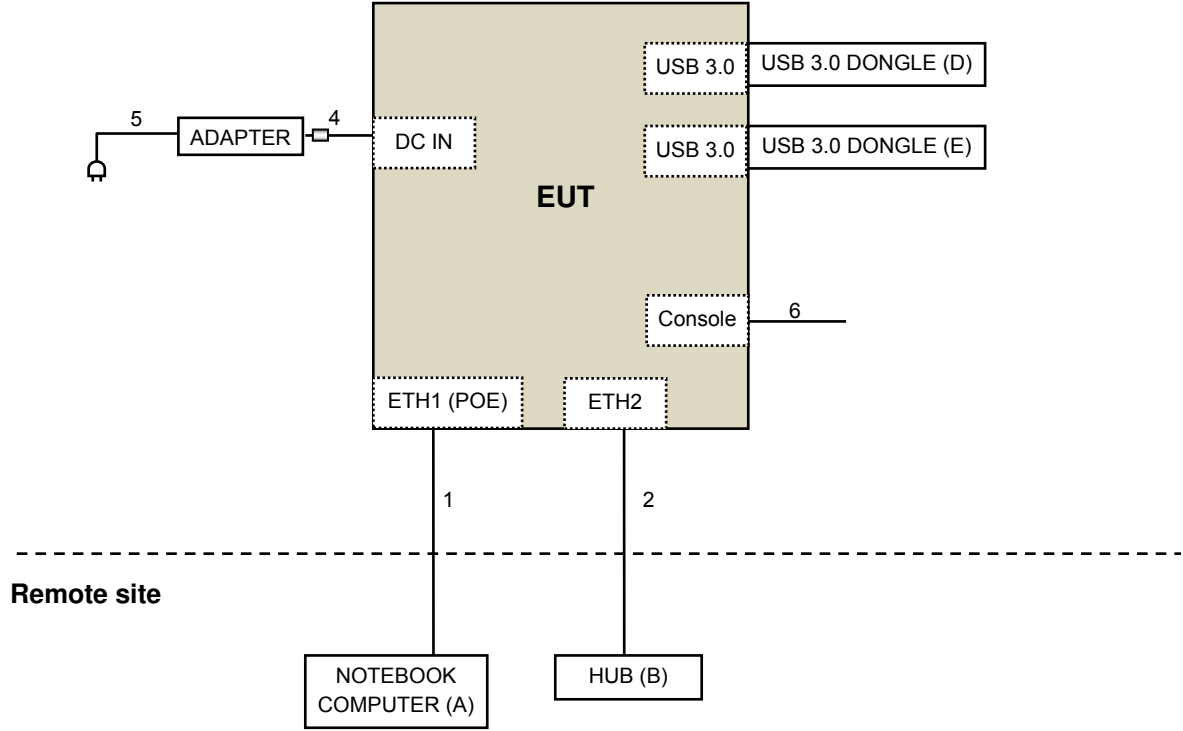
1. All power cords of the above support units are non-shielded (1.8m).

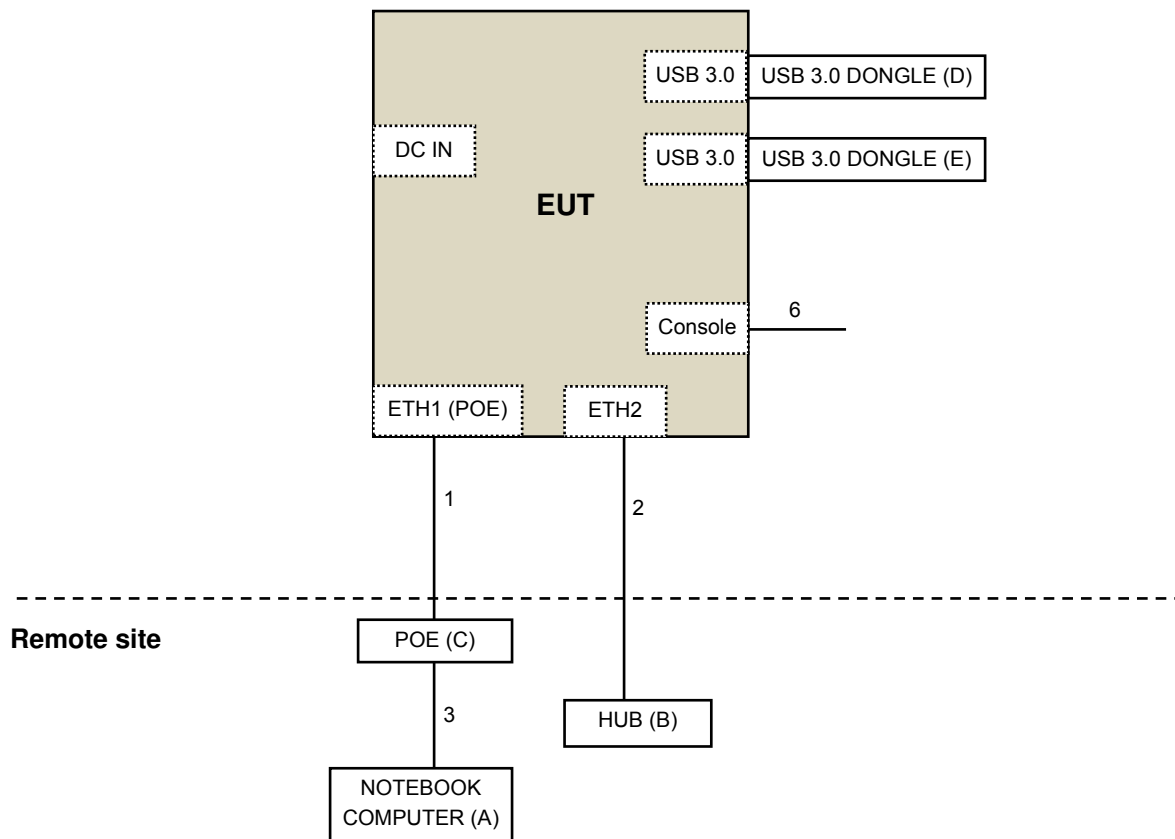
| ID | Descriptions    | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks            |
|----|-----------------|------|------------|--------------------|--------------|--------------------|
| 1. | RJ45            | 1    | 10         | No                 | 0            | Provided by Lab    |
| 2. | RJ45            | 1    | 10         | No                 | 0            | Provided by Lab    |
| 3. | RJ45            | 1    | 1          | No                 | 0            | Provided by Lab    |
| 4. | DC              | 1    | 1.25       | No                 | 1            | Supplied by client |
| 5. | AC              | 1    | 1.3        | No                 | 0            | Supplied by client |
| 6. | RJ45 to Console | 1    | 1.5        | No                 | 0            | Provided by Lab    |

Note: The core(s) is(are) originally attached to the cable(s).

### 3.4.1 Configuration of System under Test

#### Adapter Mode:



**POE Mode:**

### 3.5 General Description of Applied Standard

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart E (15.407)**

**KDB 789033 D02 General UNII Test Procedure New Rules v01r01**

**KDB 662911 D01 Multiple Transmitter Output v02r01**

**ANSI C63.10-2013**

All test items have been performed and recorded as per the above standards.

## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

#### 4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (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                             |

#### NOTE:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

#### LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

| APPLICABLE TO                                           | LIMIT                                                            |                                                                  |
|---------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|
| 789033 D02 General UNII Test Procedure New Rules v01r01 | FIELD STRENGTH AT 3m                                             |                                                                  |
|                                                         | PK:74 (dBuV/m)                                                   | AV:54 (dBuV/m)                                                   |
| APPLICABLE TO                                           | EIRP LIMIT                                                       | EQUIVALENT FIELD STRENGTH AT 3m                                  |
| 15.407(b)(1)                                            | PK:-27 (dBm/MHz)                                                 | PK:68.2(dBuV/m)                                                  |
| 15.407(b)(2)                                            |                                                                  |                                                                  |
| 15.407(b)(3)                                            |                                                                  |                                                                  |
| 15.407(b)(4)                                            | PK:-27 (dBm/MHz) <sup>*1</sup><br>PK:-17 (dBm/MHz) <sup>*2</sup> | PK: 68.2(dBuV/m) <sup>*1</sup><br>PK:78.2 (dBuV/m) <sup>*2</sup> |

**NOTE:** <sup>\*1</sup> beyond 10MHz of the band edge <sup>\*2</sup> within 10 MHz of band edge

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

#### 4.1.2 Test Instruments

##### For below 1GHz:

| DESCRIPTION & MANUFACTURER              | MODEL NO.                | SERIAL NO.                           | CALIBRATED DATE | CALIBRATED UNTIL |
|-----------------------------------------|--------------------------|--------------------------------------|-----------------|------------------|
| Test Receiver<br>Agilent                | N9038A                   | MY51210105                           | July 24, 2015   | July 23, 2016    |
| Pre-Amplifier<br>Mini-Circuits          | ZFL-1000VH2<br>B         | AMP-ZFL-03                           | Nov. 12, 2014   | Nov. 11, 2015    |
| Trilog Broadband Antenna<br>SCHWARZBECK | VULB 9168                | 9168-360                             | Feb. 06, 2015   | Feb. 05, 2016    |
| RF Cable                                | 8D-FB                    | CHGCAB-001<br>-1<br>CHGCAB-001<br>-2 | Oct. 04, 2014   | Oct. 03, 2015    |
|                                         | RF-141                   | CHGCAB-004                           | Oct. 04, 2014   | Oct. 03, 2015    |
| Software                                | ADT_Radiated<br>_V8.7.07 | NA                                   | NA              | NA               |
| Antenna Tower & Turn Table<br>CT        | NA                       | NA                                   | NA              | NA               |

##### Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. G.
3. The FCC Site Registration No. is 966073.
4. The VCCI Site Registration No. is G-137.
5. The CANADA Site Registration No. is IC 7450H-2.
6. Tested Date: Sep. 01, 2015

**For above 1GHz:**

| DESCRIPTION & MANUFACTURER       | MODEL NO.                | SERIAL NO.                                | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------------|--------------------------|-------------------------------------------|-----------------|------------------|
| Test Receiver<br>Agilent         | N9038A                   | MY51210202                                | Dec. 12, 2014   | Dec. 11, 2015    |
| Horn_Antenna<br>AISI             | AIH.8018                 | 0000220091110                             | Feb. 06, 2015   | Feb. 05, 2016    |
| Pre-Amplifier<br>Agilent         | 8449B                    | 3008A01923                                | Oct. 28, 2014   | Oct. 27, 2015    |
| RF Cable                         | NA                       | 131206<br>131213<br>131215<br>SNMY23685/4 | Jan. 16, 2015   | Jan. 15, 2016    |
| Spectrum Analyzer<br>R&S         | FSV40                    | 100964                                    | Jun. 26, 2015   | Jun. 25, 2016    |
| Pre-Amplifier<br>SPACEK LABS     | SLKKa-48-6               | 9K16                                      | Dec. 12, 2014   | Dec. 11, 2015    |
| Horn_Antenna<br>SCHWARZBECK      | BBHA 9170                | 9170-424                                  | Feb. 05, 2015   | Feb. 04, 2016    |
| RF Cable                         | NA                       | 329751/4<br>RF104-204                     | Dec. 11, 2014   | Dec. 10, 2015    |
| Software                         | ADT_Radiated<br>_V8.7.07 | NA                                        | NA              | NA               |
| Antenna Tower & Turn Table<br>CT | NA                       | NA                                        | NA              | NA               |

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. H.
3. The FCC Site Registration No. is 797305.
4. The CANADA Site Registration No. is IC 7450H-3.
5. Tested Date: Aug. 26, 2015

#### 4.1.3 Test Procedure

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

**Note:**

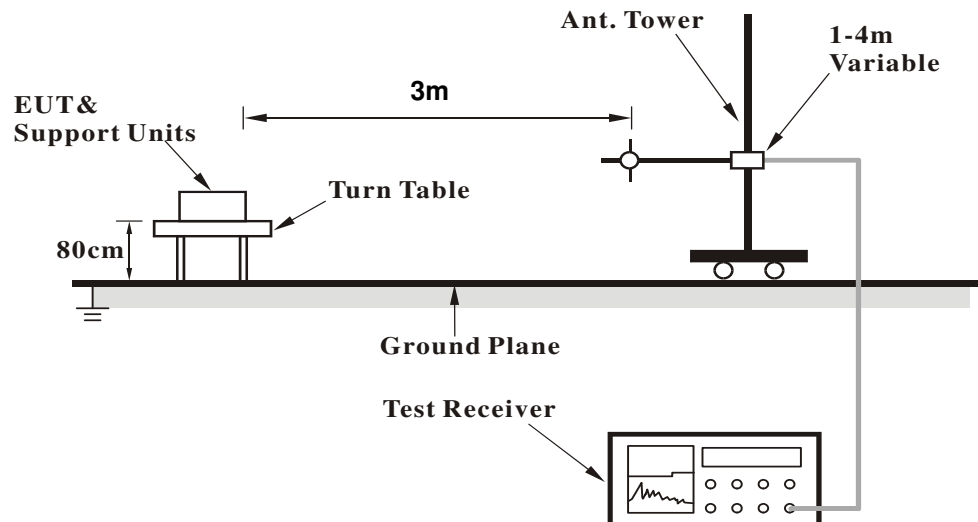
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ( $10 \log(1/\text{duty cycle})$ ).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

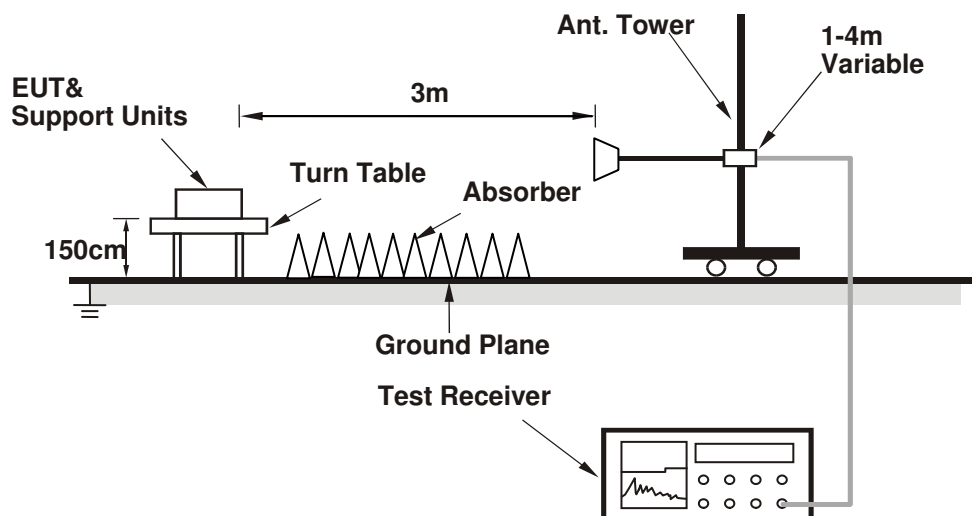
No deviation.

#### 4.1.5 Test Setup

##### <Frequency Range below 1GHz>



##### <Frequency Range above 1GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT Operating Condition

1. Connect the EUT with the support unit A (Notebook Computer) which is placed on remote site.
2. Controlling software (QCART.EXE V3.0.93.0) has been activated to set the EUT on specific status.

#### 4.1.7 Test Results

##### Above 1GHz Data

##### 802.11a

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 36 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 5150.00        | 68.6 PK                       | 74.0              | -5.4           | 1.88 H                   | 4                          | 62.13                  | 6.47                           |
| 2                                                   | 5150.00        | 53.2 AV                       | 54.0              | -0.8           | 1.88 H                   | 4                          | 46.73                  | 6.47                           |
| 3                                                   | *5180.00       | 116.1 PK                      |                   |                | 1.56 H                   | 360                        | 109.45                 | 6.65                           |
| 4                                                   | *5180.00       | 105.9 AV                      |                   |                | 1.56 H                   | 360                        | 99.25                  | 6.65                           |
| 5                                                   | #10360.00      | 54.6 PK                       | 74.0              | -19.4          | 1.45 H                   | 107                        | 40.39                  | 14.21                          |
| 6                                                   | #10360.00      | 43.2 AV                       | 54.0              | -10.8          | 1.45 H                   | 107                        | 28.99                  | 14.21                          |
| 7                                                   | 15540.00       | 63.0 PK                       | 74.0              | -11.0          | 1.31 H                   | 229                        | 44.24                  | 18.76                          |
| 8                                                   | 15540.00       | 49.9 AV                       | 54.0              | -4.1           | 1.31 H                   | 229                        | 31.14                  | 18.76                          |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 5150.00        | 63.6 PK                       | 74.0              | -10.4          | 1.50 V                   | 349                        | 57.13                  | 6.47                           |
| 2                                                   | 5150.00        | 48.7 AV                       | 54.0              | -5.3           | 1.50 V                   | 349                        | 42.23                  | 6.47                           |
| 3                                                   | *5180.00       | 114.2 PK                      |                   |                | 1.50 V                   | 342                        | 107.55                 | 6.65                           |
| 4                                                   | *5180.00       | 103.8 AV                      |                   |                | 1.50 V                   | 342                        | 97.15                  | 6.65                           |
| 5                                                   | #10360.00      | 54.3 PK                       | 74.0              | -19.7          | 2.04 V                   | 131                        | 40.09                  | 14.21                          |
| 6                                                   | #10360.00      | 43.2 AV                       | 54.0              | -10.8          | 2.04 V                   | 131                        | 28.99                  | 14.21                          |
| 7                                                   | 15540.00       | 65.9 PK                       | 74.0              | -8.1           | 2.05 V                   | 126                        | 47.14                  | 18.76                          |
| 8                                                   | 15540.00       | 50.1 AV                       | 54.0              | -3.9           | 2.05 V                   | 126                        | 31.34                  | 18.76                          |

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 40 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *5200.00       | 115.8 PK                      |                   |                | 1.62 H                   | 360                        | 109.03                 | 6.77                           |
| 2                                                   | *5200.00       | 105.4 AV                      |                   |                | 1.62 H                   | 360                        | 98.63                  | 6.77                           |
| 3                                                   | #10400.00      | 54.8 PK                       | 74.0              | -19.2          | 1.39 H                   | 110                        | 40.58                  | 14.22                          |
| 4                                                   | #10400.00      | 43.2 AV                       | 54.0              | -10.8          | 1.39 H                   | 110                        | 28.98                  | 14.22                          |
| 5                                                   | 15600.00       | 64.2 PK                       | 74.0              | -9.8           | 1.26 H                   | 226                        | 45.86                  | 18.34                          |
| 6                                                   | 15600.00       | 50.3 AV                       | 54.0              | -3.7           | 1.26 H                   | 226                        | 31.96                  | 18.34                          |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *5200.00       | 114.0 PK                      |                   |                | 1.47 V                   | 339                        | 107.23                 | 6.77                           |
| 2                                                   | *5200.00       | 103.8 AV                      |                   |                | 1.47 V                   | 339                        | 97.03                  | 6.77                           |
| 3                                                   | #10400.00      | 53.8 PK                       | 74.0              | -20.2          | 2.10 V                   | 144                        | 39.58                  | 14.22                          |
| 4                                                   | #10400.00      | 43.2 AV                       | 54.0              | -10.8          | 2.10 V                   | 144                        | 28.98                  | 14.22                          |
| 5                                                   | 15600.00       | 65.2 PK                       | 74.0              | -8.8           | 2.00 V                   | 111                        | 46.86                  | 18.34                          |
| 6                                                   | 15600.00       | 49.9 AV                       | 54.0              | -4.1           | 2.00 V                   | 111                        | 31.56                  | 18.34                          |

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 48 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *5240.00       | 116.1 PK                      |                   |                | 1.57 H                   | 360                        | 109.28                 | 6.82                           |
| 2                                                   | *5240.00       | 106.0 AV                      |                   |                | 1.57 H                   | 360                        | 99.18                  | 6.82                           |
| 3                                                   | 5350.00        | 58.2 PK                       | 74.0              | -15.8          | 1.57 H                   | 360                        | 51.16                  | 7.04                           |
| 4                                                   | 5350.00        | 43.1 AV                       | 54.0              | -10.9          | 1.57 H                   | 360                        | 36.06                  | 7.04                           |
| 5                                                   | #10480.00      | 54.0 PK                       | 74.0              | -20.0          | 1.36 H                   | 117                        | 40.01                  | 13.99                          |
| 6                                                   | #10480.00      | 43.1 AV                       | 54.0              | -10.9          | 1.36 H                   | 117                        | 29.11                  | 13.99                          |
| 7                                                   | 15720.00       | 62.9 PK                       | 74.0              | -11.1          | 1.40 H                   | 236                        | 43.87                  | 19.03                          |
| 8                                                   | 15720.00       | 49.3 AV                       | 54.0              | -4.7           | 1.40 H                   | 236                        | 30.27                  | 19.03                          |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *5240.00       | 114.2 PK                      |                   |                | 1.52 V                   | 343                        | 107.38                 | 6.82                           |
| 2                                                   | *5240.00       | 104.1 AV                      |                   |                | 1.52 V                   | 343                        | 97.28                  | 6.82                           |
| 3                                                   | 5350.00        | 58.1 PK                       | 74.0              | -15.9          | 1.52 V                   | 343                        | 51.06                  | 7.04                           |
| 4                                                   | 5350.00        | 42.8 AV                       | 54.0              | -11.2          | 1.52 V                   | 343                        | 35.76                  | 7.04                           |
| 5                                                   | #10480.00      | 54.2 PK                       | 74.0              | -19.8          | 2.06 V                   | 142                        | 40.21                  | 13.99                          |
| 6                                                   | #10480.00      | 43.2 AV                       | 54.0              | -10.8          | 2.06 V                   | 142                        | 29.21                  | 13.99                          |
| 7                                                   | 15720.00       | 65.5 PK                       | 74.0              | -8.5           | 2.01 V                   | 103                        | 46.47                  | 19.03                          |
| 8                                                   | 15720.00       | 50.4 AV                       | 54.0              | -3.6           | 2.01 V                   | 103                        | 31.37                  | 19.03                          |

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |                |                              |              |
|------------------------|----------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 149 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz   |                              | Average (AV) |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

| NO. | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | #5715.00       | 69.5 PK                       | 74.0              | -4.5           | 1.19 H                   | 92                         | 62.12                  | 7.38                           |
| 2   | #5715.00       | 53.1 AV                       | 54.0              | -0.9           | 1.19 H                   | 92                         | 45.72                  | 7.38                           |
| 3   | #5725.00       | 77.9 PK                       | 78.2              | -0.3           | 1.00 H                   | 324                        | 70.52                  | 7.38                           |
| 4   | *5745.00       | 113.5 PK                      |                   |                | 1.24 H                   | 271                        | 106.12                 | 7.38                           |
| 5   | *5745.00       | 104.4 AV                      |                   |                | 1.24 H                   | 271                        | 97.02                  | 7.38                           |
| 6   | 11490.00       | 54.7 PK                       | 74.0              | -19.3          | 1.36 H                   | 96                         | 40.18                  | 14.52                          |
| 7   | 11490.00       | 43.4 AV                       | 54.0              | -10.6          | 1.36 H                   | 96                         | 28.88                  | 14.52                          |
| 8   | #17235.00      | 63.6 PK                       | 74.0              | -10.4          | 1.40 H                   | 226                        | 39.84                  | 23.76                          |
| 9   | #17235.00      | 49.9 AV                       | 54.0              | -4.1           | 1.40 H                   | 226                        | 26.14                  | 23.76                          |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

| NO. | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | #5715.00       | 67.1 PK                       | 74.0              | -6.9           | 1.50 V                   | 338                        | 59.72                  | 7.38                           |
| 2   | #5715.00       | 49.8 AV                       | 54.0              | -4.2           | 1.50 V                   | 338                        | 42.42                  | 7.38                           |
| 3   | #5725.00       | 73.7 PK                       | 78.2              | -4.5           | 1.52 V                   | 341                        | 66.32                  | 7.38                           |
| 4   | *5745.00       | 111.1 PK                      |                   |                | 1.55 V                   | 350                        | 103.72                 | 7.38                           |
| 5   | *5745.00       | 102.1 AV                      |                   |                | 1.55 V                   | 350                        | 94.72                  | 7.38                           |
| 6   | 11490.00       | 54.0 PK                       | 74.0              | -20.0          | 2.00 V                   | 120                        | 39.48                  | 14.52                          |
| 7   | 11490.00       | 42.9 AV                       | 54.0              | -11.1          | 2.00 V                   | 120                        | 28.38                  | 14.52                          |
| 8   | #17235.00      | 65.3 PK                       | 74.0              | -8.7           | 2.04 V                   | 111                        | 41.54                  | 23.76                          |
| 9   | #17235.00      | 50.1 AV                       | 54.0              | -3.9           | 2.04 V                   | 111                        | 26.34                  | 23.76                          |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |                |                              |              |
|------------------------|----------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 157 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz   |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | #5715.00       | 58.1 PK                       | 74.0              | -15.9          | 1.44 H                   | 345                        | 50.72                  | 7.38                           |
| 2                                                   | #5715.00       | 47.6 AV                       | 54.0              | -6.4           | 1.44 H                   | 345                        | 40.22                  | 7.38                           |
| 3                                                   | #5725.00       | 63.9 PK                       | 78.2              | -14.3          | 1.44 H                   | 345                        | 56.52                  | 7.38                           |
| 4                                                   | *5785.00       | 118.4 PK                      |                   |                | 1.18 H                   | 352                        | 111.02                 | 7.38                           |
| 5                                                   | *5785.00       | 107.1 AV                      |                   |                | 1.18 H                   | 352                        | 99.72                  | 7.38                           |
| 6                                                   | #5850.00       | 57.4 PK                       | 78.2              | -20.8          | 1.28 H                   | 78                         | 50.15                  | 7.25                           |
| 7                                                   | #5860.00       | 54.4 PK                       | 74.0              | -19.6          | 1.28 H                   | 78                         | 47.18                  | 7.22                           |
| 8                                                   | #5860.00       | 43.0 AV                       | 54.0              | -11.0          | 1.28 H                   | 78                         | 35.78                  | 7.22                           |
| 9                                                   | 11570.00       | 54.5 PK                       | 74.0              | -19.5          | 1.40 H                   | 117                        | 39.93                  | 14.57                          |
| 10                                                  | 11570.00       | 42.8 AV                       | 54.0              | -11.2          | 1.40 H                   | 117                        | 28.23                  | 14.57                          |
| 11                                                  | #17355.00      | 64.3 PK                       | 74.0              | -9.7           | 1.22 H                   | 155                        | 40.24                  | 24.06                          |
| 12                                                  | #17355.00      | 50.1 AV                       | 54.0              | -3.9           | 1.22 H                   | 155                        | 26.04                  | 24.06                          |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                               | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                 | #5715.00       | 55.2 PK                       | 74.0              | -18.8          | 1.46 V                   | 344                        | 47.82                  | 7.38                           |
| 2                                                 | #5715.00       | 44.3 AV                       | 54.0              | -9.7           | 1.46 V                   | 344                        | 36.92                  | 7.38                           |
| 3                                                 | #5725.00       | 59.8 PK                       | 78.2              | -18.4          | 1.47 V                   | 351                        | 52.42                  | 7.38                           |
| 4                                                 | *5785.00       | 115.6 PK                      |                   |                | 1.53 V                   | 336                        | 108.22                 | 7.38                           |
| 5                                                 | *5785.00       | 104.7 AV                      |                   |                | 1.53 V                   | 336                        | 97.32                  | 7.38                           |
| 6                                                 | #5850.00       | 54.3 PK                       | 78.2              | -23.9          | 1.54 V                   | 347                        | 47.05                  | 7.25                           |
| 7                                                 | #5860.00       | 51.4 PK                       | 74.0              | -22.6          | 1.47 V                   | 351                        | 44.18                  | 7.22                           |
| 8                                                 | #5860.00       | 39.9 AV                       | 54.0              | -14.1          | 1.47 V                   | 351                        | 32.68                  | 7.22                           |
| 9                                                 | 11570.00       | 54.1 PK                       | 74.0              | -19.9          | 1.98 V                   | 129                        | 39.53                  | 14.57                          |
| 10                                                | 11570.00       | 43.2 AV                       | 54.0              | -10.8          | 1.98 V                   | 129                        | 28.63                  | 14.57                          |
| 11                                                | #17355.00      | 65.3 PK                       | 74.0              | -8.7           | 2.00 V                   | 111                        | 41.24                  | 24.06                          |
| 12                                                | #17355.00      | 50.2 AV                       | 54.0              | -3.8           | 2.00 V                   | 111                        | 26.14                  | 24.06                          |

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |                |                              |              |
|------------------------|----------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 165 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz   |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *5825.00       | 114.8 PK                      |                   |                | 1.10 H                   | 274                        | 107.49                 | 7.31                           |
| 2                                                   | *5825.00       | 106.3 AV                      |                   |                | 1.10 H                   | 274                        | 98.99                  | 7.31                           |
| 3                                                   | #5850.00       | 76.2 PK                       | 78.2              | -2.0           | 1.18 H                   | 358                        | 68.95                  | 7.25                           |
| 4                                                   | #5860.00       | 67.3 PK                       | 68.2              | -0.9           | 1.20 H                   | 265                        | 60.08                  | 7.22                           |
| 5                                                   | 11650.00       | 54.6 PK                       | 74.0              | -19.4          | 1.46 H                   | 103                        | 39.93                  | 14.67                          |
| 6                                                   | 11650.00       | 43.2 AV                       | 54.0              | -10.8          | 1.46 H                   | 103                        | 28.53                  | 14.67                          |
| 7                                                   | #17475.00      | 63.7 PK                       | 74.0              | -10.3          | 1.22 H                   | 207                        | 39.68                  | 24.02                          |
| 8                                                   | #17475.00      | 50.3 AV                       | 54.0              | -3.7           | 1.22 H                   | 207                        | 26.28                  | 24.02                          |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *5825.00       | 112.1 PK                      |                   |                | 1.58 V                   | 335                        | 104.79                 | 7.31                           |
| 2                                                   | *5825.00       | 103.9 AV                      |                   |                | 1.58 V                   | 335                        | 96.59                  | 7.31                           |
| 3                                                   | #5850.00       | 73.2 PK                       | 78.2              | -5.0           | 1.52 V                   | 349                        | 65.95                  | 7.25                           |
| 4                                                   | #5860.00       | 64.8 PK                       | 68.2              | -3.4           | 1.51 V                   | 328                        | 57.58                  | 7.22                           |
| 5                                                   | 11650.00       | 53.6 PK                       | 74.0              | -20.4          | 2.02 V                   | 127                        | 38.93                  | 14.67                          |
| 6                                                   | 11650.00       | 42.6 AV                       | 54.0              | -11.4          | 2.02 V                   | 127                        | 27.93                  | 14.67                          |
| 7                                                   | #17475.00      | 64.8 PK                       | 74.0              | -9.2           | 2.01 V                   | 99                         | 40.78                  | 24.02                          |
| 8                                                   | #17475.00      | 49.8 AV                       | 54.0              | -4.2           | 2.01 V                   | 99                         | 25.78                  | 24.02                          |

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

## 802.11ac (VHT20)

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 36 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 5150.00        | 65.3 PK                       | 74.0              | -8.7           | 1.06 H                   | 360                        | 58.83                  | 6.47                           |
| 2                                                   | 5150.00        | 53.7 AV                       | 54.0              | -0.3           | 1.06 H                   | 360                        | 47.23                  | 6.47                           |
| 3                                                   | *5180.00       | 116.2 PK                      |                   |                | 1.19 H                   | 23                         | 109.55                 | 6.65                           |
| 4                                                   | *5180.00       | 107.1 AV                      |                   |                | 1.19 H                   | 23                         | 100.45                 | 6.65                           |
| 5                                                   | #10360.00      | 54.1 PK                       | 74.0              | -19.9          | 1.51 H                   | 113                        | 39.89                  | 14.21                          |
| 6                                                   | #10360.00      | 42.8 AV                       | 54.0              | -11.2          | 1.51 H                   | 113                        | 28.59                  | 14.21                          |
| 7                                                   | 15540.00       | 63.6 PK                       | 74.0              | -10.4          | 1.32 H                   | 230                        | 44.84                  | 18.76                          |
| 8                                                   | 15540.00       | 50.0 AV                       | 54.0              | -4.0           | 1.32 H                   | 230                        | 31.24                  | 18.76                          |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 5150.00        | 63.1 PK                       | 74.0              | -10.9          | 1.52 V                   | 345                        | 56.63                  | 6.47                           |
| 2                                                   | 5150.00        | 48.2 AV                       | 54.0              | -5.8           | 1.52 V                   | 345                        | 41.73                  | 6.47                           |
| 3                                                   | *5180.00       | 114.5 PK                      |                   |                | 1.54 V                   | 337                        | 107.85                 | 6.65                           |
| 4                                                   | *5180.00       | 104.1 AV                      |                   |                | 1.54 V                   | 337                        | 97.45                  | 6.65                           |
| 5                                                   | #10360.00      | 53.1 PK                       | 74.0              | -20.9          | 1.95 V                   | 121                        | 38.89                  | 14.21                          |
| 6                                                   | #10360.00      | 42.2 AV                       | 54.0              | -11.8          | 1.95 V                   | 121                        | 27.99                  | 14.21                          |
| 7                                                   | 15540.00       | 65.6 PK                       | 74.0              | -8.4           | 2.05 V                   | 99                         | 46.84                  | 18.76                          |
| 8                                                   | 15540.00       | 50.2 AV                       | 54.0              | -3.8           | 2.05 V                   | 99                         | 31.44                  | 18.76                          |

## REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " \* ": Fundamental frequency.
- " # ": The radiated frequency is out of the restricted band.

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 40 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz  |                              | Average (AV) |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                |                               |                   |                |                          |                            |                        |                                |
|----------------------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                            | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                              | *5200.00       | 116.0 PK                      |                   |                | 1.19 H                   | 11                         | 109.23                 | 6.77                           |
| 2                                                              | *5200.00       | 106.9 AV                      |                   |                | 1.19 H                   | 11                         | 100.13                 | 6.77                           |
| 3                                                              | #10400.00      | 53.5 PK                       | 74.0              | -20.5          | 1.49 H                   | 123                        | 39.28                  | 14.22                          |
| 4                                                              | #10400.00      | 42.5 AV                       | 54.0              | -11.5          | 1.49 H                   | 123                        | 28.28                  | 14.22                          |
| 5                                                              | 15600.00       | 63.9 PK                       | 74.0              | -10.1          | 1.21 H                   | 238                        | 45.56                  | 18.34                          |
| 6                                                              | 15600.00       | 49.9 AV                       | 54.0              | -4.1           | 1.21 H                   | 238                        | 31.56                  | 18.34                          |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                            | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                              | *5200.00       | 114.4 PK                      |                   |                | 1.52 V                   | 330                        | 107.63                 | 6.77                           |
| 2                                                              | *5200.00       | 104.2 AV                      |                   |                | 1.52 V                   | 330                        | 97.43                  | 6.77                           |
| 3                                                              | #10400.00      | 53.4 PK                       | 74.0              | -20.6          | 2.00 V                   | 116                        | 39.18                  | 14.22                          |
| 4                                                              | #10400.00      | 42.5 AV                       | 54.0              | -11.5          | 2.00 V                   | 116                        | 28.28                  | 14.22                          |
| 5                                                              | 15600.00       | 64.9 PK                       | 74.0              | -9.1           | 2.00 V                   | 115                        | 46.56                  | 18.34                          |
| 6                                                              | 15600.00       | 50.0 AV                       | 54.0              | -4.0           | 2.00 V                   | 115                        | 31.66                  | 18.34                          |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 48 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *5240.00       | 115.8 PK                      |                   |                | 1.20 H                   | 11                         | 108.98                 | 6.82                           |
| 2                                                   | *5240.00       | 106.8 AV                      |                   |                | 1.20 H                   | 11                         | 99.98                  | 6.82                           |
| 3                                                   | 5350.00        | 57.6 PK                       | 74.0              | -16.4          | 1.20 H                   | 11                         | 50.56                  | 7.04                           |
| 4                                                   | 5350.00        | 47.5 AV                       | 54.0              | -6.5           | 1.20 H                   | 11                         | 40.46                  | 7.04                           |
| 5                                                   | #10480.00      | 54.6 PK                       | 74.0              | -19.4          | 1.46 H                   | 75                         | 40.61                  | 13.99                          |
| 6                                                   | #10480.00      | 43.2 AV                       | 54.0              | -10.8          | 1.46 H                   | 75                         | 29.21                  | 13.99                          |
| 7                                                   | 15720.00       | 63.2 PK                       | 74.0              | -10.8          | 1.32 H                   | 253                        | 44.17                  | 19.03                          |
| 8                                                   | 15720.00       | 49.8 AV                       | 54.0              | -4.2           | 1.32 H                   | 253                        | 30.77                  | 19.03                          |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *5240.00       | 113.6 PK                      |                   |                | 1.54 V                   | 329                        | 106.78                 | 6.82                           |
| 2                                                   | *5240.00       | 103.3 AV                      |                   |                | 1.54 V                   | 329                        | 96.48                  | 6.82                           |
| 3                                                   | 5350.00        | 47.6 PK                       | 74.0              | -26.4          | 1.54 V                   | 329                        | 40.56                  | 7.04                           |
| 4                                                   | 5350.00        | 46.8 AV                       | 54.0              | -7.2           | 1.54 V                   | 329                        | 39.76                  | 7.04                           |
| 5                                                   | #10480.00      | 54.7 PK                       | 74.0              | -19.3          | 2.02 V                   | 147                        | 40.71                  | 13.99                          |
| 6                                                   | #10480.00      | 43.4 AV                       | 54.0              | -10.6          | 2.02 V                   | 147                        | 29.41                  | 13.99                          |
| 7                                                   | 15720.00       | 65.9 PK                       | 74.0              | -8.1           | 1.94 V                   | 107                        | 46.87                  | 19.03                          |
| 8                                                   | 15720.00       | 50.6 AV                       | 54.0              | -3.4           | 1.94 V                   | 107                        | 31.57                  | 19.03                          |

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |                |                              |              |
|------------------------|----------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 149 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz   |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | #5715.00       | 65.7 PK                       | 74.0              | -8.3           | 1.48 H                   | 360                        | 58.32                  | 7.38                           |
| 2                                                   | #5715.00       | 53.2 AV                       | 54.0              | -0.8           | 1.48 H                   | 360                        | 45.82                  | 7.38                           |
| 3                                                   | #5725.00       | 77.9 PK                       | 78.2              | -0.3           | 1.07 H                   | 325                        | 70.52                  | 7.38                           |
| 4                                                   | *5745.00       | 113.0 PK                      |                   |                | 1.18 H                   | 274                        | 105.62                 | 7.38                           |
| 5                                                   | *5745.00       | 104.5 AV                      |                   |                | 1.18 H                   | 274                        | 97.12                  | 7.38                           |
| 6                                                   | 11490.00       | 54.3 PK                       | 74.0              | -19.7          | 1.48 H                   | 102                        | 39.78                  | 14.52                          |
| 7                                                   | 11490.00       | 42.8 AV                       | 54.0              | -11.2          | 1.48 H                   | 102                        | 28.28                  | 14.52                          |
| 8                                                   | #17235.00      | 63.9 PK                       | 74.0              | -10.1          | 1.33 H                   | 242                        | 40.14                  | 23.76                          |
| 9                                                   | #17235.00      | 50.5 AV                       | 54.0              | -3.5           | 1.33 H                   | 242                        | 26.74                  | 23.76                          |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | #5715.00       | 63.2 PK                       | 74.0              | -10.8          | 1.51 V                   | 326                        | 55.82                  | 7.38                           |
| 2                                                   | #5715.00       | 48.3 AV                       | 54.0              | -5.7           | 1.51 V                   | 326                        | 40.92                  | 7.38                           |
| 3                                                   | #5725.00       | 74.8 PK                       | 78.2              | -3.4           | 1.47 V                   | 340                        | 67.42                  | 7.38                           |
| 4                                                   | *5745.00       | 109.7 PK                      |                   |                | 1.54 V                   | 347                        | 102.32                 | 7.38                           |
| 5                                                   | *5745.00       | 101.1 AV                      |                   |                | 1.54 V                   | 347                        | 93.72                  | 7.38                           |
| 6                                                   | 11490.00       | 53.8 PK                       | 74.0              | -20.2          | 2.00 V                   | 145                        | 39.28                  | 14.52                          |
| 7                                                   | 11490.00       | 42.5 AV                       | 54.0              | -11.5          | 2.00 V                   | 145                        | 27.98                  | 14.52                          |
| 8                                                   | #17235.00      | 65.1 PK                       | 74.0              | -8.9           | 1.98 V                   | 115                        | 41.34                  | 23.76                          |
| 9                                                   | #17235.00      | 50.2 AV                       | 54.0              | -3.8           | 1.98 V                   | 115                        | 26.44                  | 23.76                          |

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |                |                              |              |
|------------------------|----------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 157 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz   |                              | Average (AV) |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                |                               |                   |                |                          |                            |                        |                                |
|----------------------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                            | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                              | *5785.00       | 120.5 PK                      |                   |                | 1.52 H                   | 344                        | 113.12                 | 7.38                           |
| 2                                                              | *5785.00       | 109.3 AV                      |                   |                | 1.52 H                   | 344                        | 101.92                 | 7.38                           |
| 3                                                              | 11570.00       | 54.2 PK                       | 74.0              | -19.8          | 1.46 H                   | 98                         | 39.63                  | 14.57                          |
| 4                                                              | 11570.00       | 43.0 AV                       | 54.0              | -11.0          | 1.46 H                   | 98                         | 28.43                  | 14.57                          |
| 5                                                              | #17355.00      | 63.1 PK                       | 74.0              | -10.9          | 1.37 H                   | 238                        | 39.04                  | 24.06                          |
| 6                                                              | #17355.00      | 50.4 AV                       | 54.0              | -3.6           | 1.37 H                   | 238                        | 26.34                  | 24.06                          |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                            | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                              | *5785.00       | 117.4 PK                      |                   |                | 1.50 V                   | 337                        | 110.02                 | 7.38                           |
| 2                                                              | *5785.00       | 106.1 AV                      |                   |                | 1.50 V                   | 337                        | 98.72                  | 7.38                           |
| 3                                                              | 11570.00       | 54.4 PK                       | 74.0              | -19.6          | 1.97 V                   | 106                        | 39.83                  | 14.57                          |
| 4                                                              | 11570.00       | 43.6 AV                       | 54.0              | -10.4          | 1.97 V                   | 106                        | 29.03                  | 14.57                          |
| 5                                                              | #17355.00      | 65.5 PK                       | 74.0              | -8.5           | 2.04 V                   | 109                        | 41.44                  | 24.06                          |
| 6                                                              | #17355.00      | 50.1 AV                       | 54.0              | -3.9           | 2.04 V                   | 109                        | 26.04                  | 24.06                          |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |                |                              |              |
|------------------------|----------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 165 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz   |                              | Average (AV) |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

| NO. | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | *5825.00       | 113.8 PK                      |                   |                | 1.00 H                   | 354                        | 106.49                 | 7.31                           |
| 2   | *5825.00       | 105.4 AV                      |                   |                | 1.00 H                   | 354                        | 98.09                  | 7.31                           |
| 3   | #5850.00       | 72.2 PK                       | 78.2              | -6.0           | 1.03 H                   | 335                        | 64.95                  | 7.25                           |
| 4   | #5860.00       | 67.8 PK                       | 68.2              | -0.4           | 1.21 H                   | 273                        | 60.58                  | 7.22                           |
| 5   | 11650.00       | 53.9 PK                       | 74.0              | -20.1          | 1.37 H                   | 121                        | 39.23                  | 14.67                          |
| 6   | 11650.00       | 43.0 AV                       | 54.0              | -11.0          | 1.37 H                   | 121                        | 28.33                  | 14.67                          |
| 7   | #17475.00      | 62.5 PK                       | 74.0              | -11.5          | 1.34 H                   | 253                        | 38.48                  | 24.02                          |
| 8   | #17475.00      | 49.9 AV                       | 54.0              | -4.1           | 1.34 H                   | 253                        | 25.88                  | 24.02                          |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

| NO. | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | *5825.00       | 110.2 PK                      |                   |                | 1.52 V                   | 320                        | 102.89                 | 7.31                           |
| 2   | *5825.00       | 101.9 AV                      |                   |                | 1.52 V                   | 320                        | 94.59                  | 7.31                           |
| 3   | #5850.00       | 67.5 PK                       | 78.2              | -10.7          | 1.49 V                   | 355                        | 60.25                  | 7.25                           |
| 4   | #5860.00       | 63.5 PK                       | 68.2              | -4.7           | 1.48 V                   | 333                        | 56.28                  | 7.22                           |
| 5   | 11650.00       | 53.2 PK                       | 74.0              | -20.8          | 2.05 V                   | 140                        | 38.53                  | 14.67                          |
| 6   | 11650.00       | 42.2 AV                       | 54.0              | -11.8          | 2.05 V                   | 140                        | 27.53                  | 14.67                          |
| 7   | #17475.00      | 64.7 PK                       | 74.0              | -9.3           | 2.04 V                   | 104                        | 40.68                  | 24.02                          |
| 8   | #17475.00      | 49.8 AV                       | 54.0              | -4.2           | 2.04 V                   | 104                        | 25.78                  | 24.02                          |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

## 802.11ac (VHT40)

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 38 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 5150.00        | 64.6 PK                       | 74.0              | -9.4           | 1.31 H                   | 4                          | 58.13                  | 6.47                           |
| 2                                                   | 5150.00        | 53.6 AV                       | 54.0              | -0.4           | 1.31 H                   | 4                          | 47.13                  | 6.47                           |
| 3                                                   | *5190.00       | 110.2 PK                      |                   |                | 1.30 H                   | 77                         | 103.50                 | 6.70                           |
| 4                                                   | *5190.00       | 102.1 AV                      |                   |                | 1.30 H                   | 77                         | 95.40                  | 6.70                           |
| 5                                                   | #10380.00      | 54.7 PK                       | 74.0              | -19.3          | 1.42 H                   | 99                         | 40.49                  | 14.21                          |
| 6                                                   | #10380.00      | 43.2 AV                       | 54.0              | -10.8          | 1.42 H                   | 99                         | 28.99                  | 14.21                          |
| 7                                                   | 15570.00       | 62.7 PK                       | 74.0              | -11.3          | 1.38 H                   | 224                        | 44.15                  | 18.55                          |
| 8                                                   | 15570.00       | 50.0 AV                       | 54.0              | -4.0           | 1.38 H                   | 224                        | 31.45                  | 18.55                          |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 5150.00        | 63.5 PK                       | 74.0              | -10.5          | 1.47 V                   | 335                        | 57.03                  | 6.47                           |
| 2                                                   | 5150.00        | 49.1 AV                       | 54.0              | -4.9           | 1.47 V                   | 335                        | 42.63                  | 6.47                           |
| 3                                                   | *5190.00       | 108.0 PK                      |                   |                | 1.46 V                   | 344                        | 101.30                 | 6.70                           |
| 4                                                   | *5190.00       | 98.9 AV                       |                   |                | 1.46 V                   | 344                        | 92.20                  | 6.70                           |
| 5                                                   | #10380.00      | 54.3 PK                       | 74.0              | -19.7          | 2.07 V                   | 123                        | 40.09                  | 14.21                          |
| 6                                                   | #10380.00      | 43.4 AV                       | 54.0              | -10.6          | 2.07 V                   | 123                        | 29.19                  | 14.21                          |
| 7                                                   | 15570.00       | 65.0 PK                       | 74.0              | -9.0           | 1.99 V                   | 117                        | 46.45                  | 18.55                          |
| 8                                                   | 15570.00       | 50.1 AV                       | 54.0              | -3.9           | 1.99 V                   | 117                        | 31.55                  | 18.55                          |

## REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " \* ": Fundamental frequency.
- " # ": The radiated frequency is out of the restricted band.

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 46 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz  |                              | Average (AV) |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

| NO. | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | 5150.00        | 63.5 PK                       | 74.0              | -10.5          | 1.67 H                   | 3                          | 57.03                  | 6.47                           |
| 2   | 5150.00        | 53.6 AV                       | 54.0              | -0.4           | 1.67 H                   | 3                          | 47.13                  | 6.47                           |
| 3   | *5230.00       | 115.2 PK                      |                   |                | 1.33 H                   | 79                         | 108.39                 | 6.81                           |
| 4   | *5230.00       | 106.9 AV                      |                   |                | 1.33 H                   | 79                         | 100.09                 | 6.81                           |
| 5   | 5350.00        | 59.8 PK                       | 74.0              | -14.2          | 1.33 H                   | 79                         | 52.76                  | 7.04                           |
| 6   | 5350.00        | 49.4 AV                       | 54.0              | -4.6           | 1.33 H                   | 79                         | 42.36                  | 7.04                           |
| 7   | #10460.00      | 53.5 PK                       | 74.0              | -20.5          | 1.45 H                   | 123                        | 39.45                  | 14.05                          |
| 8   | #10460.00      | 42.4 AV                       | 54.0              | -11.6          | 1.45 H                   | 123                        | 28.35                  | 14.05                          |
| 9   | 15690.00       | 62.5 PK                       | 74.0              | -11.5          | 1.36 H                   | 244                        | 43.63                  | 18.87                          |
| 10  | 15690.00       | 50.0 AV                       | 54.0              | -4.0           | 1.36 H                   | 244                        | 31.13                  | 18.87                          |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

| NO. | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | 5150.00        | 62.9 PK                       | 74.0              | -11.1          | 1.50 V                   | 314                        | 56.43                  | 6.47                           |
| 2   | 5150.00        | 48.1 AV                       | 54.0              | -5.9           | 1.50 V                   | 314                        | 41.63                  | 6.47                           |
| 3   | *5230.00       | 112.7 PK                      |                   |                | 1.37 V                   | 356                        | 105.89                 | 6.81                           |
| 4   | *5230.00       | 103.8 AV                      |                   |                | 1.37 V                   | 356                        | 96.99                  | 6.81                           |
| 5   | 5350.00        | 58.1 PK                       | 74.0              | -15.9          | 1.37 V                   | 356                        | 51.06                  | 7.04                           |
| 6   | 5350.00        | 48.2 AV                       | 54.0              | -5.8           | 1.37 V                   | 356                        | 41.16                  | 7.04                           |
| 7   | #10460.00      | 53.8 PK                       | 74.0              | -20.2          | 2.00 V                   | 117                        | 39.75                  | 14.05                          |
| 8   | #10460.00      | 42.7 AV                       | 54.0              | -11.3          | 2.00 V                   | 117                        | 28.65                  | 14.05                          |
| 9   | 15690.00       | 65.9 PK                       | 74.0              | -8.1           | 1.96 V                   | 106                        | 47.03                  | 18.87                          |
| 10  | 15690.00       | 50.5 AV                       | 54.0              | -3.5           | 1.96 V                   | 106                        | 31.63                  | 18.87                          |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |                |                              |              |
|------------------------|----------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 151 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz   |                              | Average (AV) |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

| NO. | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | #5715.00       | 67.2 PK                       | 68.2              | -1.0           | 1.41 H                   | 349                        | 59.82                  | 7.38                           |
| 2   | #5725.00       | 71.5 PK                       | 78.2              | -6.7           | 1.56 H                   | 360                        | 64.12                  | 7.38                           |
| 3   | *5755.00       | 108.2 PK                      |                   |                | 1.29 H                   | 335                        | 100.82                 | 7.38                           |
| 4   | *5755.00       | 99.3 AV                       |                   |                | 1.29 H                   | 335                        | 91.92                  | 7.38                           |
| 5   | 11510.00       | 55.1 PK                       | 74.0              | -18.9          | 1.44 H                   | 91                         | 40.60                  | 14.50                          |
| 6   | 11510.00       | 43.7 AV                       | 54.0              | -10.3          | 1.44 H                   | 91                         | 29.20                  | 14.50                          |
| 7   | #17265.00      | 62.4 PK                       | 74.0              | -11.6          | 1.28 H                   | 227                        | 38.88                  | 23.52                          |
| 8   | #17265.00      | 50.2 AV                       | 54.0              | -3.8           | 1.28 H                   | 227                        | 26.68                  | 23.52                          |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

| NO. | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | #5715.00       | 64.3 PK                       | 68.2              | -3.9           | 1.50 V                   | 338                        | 56.92                  | 7.38                           |
| 2   | #5725.00       | 68.2 PK                       | 78.2              | -10.0          | 1.45 V                   | 327                        | 60.82                  | 7.38                           |
| 3   | *5755.00       | 105.7 PK                      |                   |                | 1.43 V                   | 328                        | 98.32                  | 7.38                           |
| 4   | *5755.00       | 96.4 AV                       |                   |                | 1.43 V                   | 328                        | 89.02                  | 7.38                           |
| 5   | 11510.00       | 54.4 PK                       | 74.0              | -19.6          | 2.00 V                   | 134                        | 39.90                  | 14.50                          |
| 6   | 11510.00       | 43.1 AV                       | 54.0              | -10.9          | 2.00 V                   | 134                        | 28.60                  | 14.50                          |
| 7   | #17265.00      | 65.3 PK                       | 74.0              | -8.7           | 2.05 V                   | 100                        | 41.78                  | 23.52                          |
| 8   | #17265.00      | 50.2 AV                       | 54.0              | -3.8           | 2.05 V                   | 100                        | 26.68                  | 23.52                          |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |                |                              |              |
|------------------------|----------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 159 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz   |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *5795.00       | 111.5 PK                      |                   |                | 1.36 H                   | 332                        | 104.12                 | 7.38                           |
| 2                                                   | *5795.00       | 102.8 AV                      |                   |                | 1.36 H                   | 332                        | 95.42                  | 7.38                           |
| 3                                                   | #5850.00       | 71.3 PK                       | 78.2              | -6.9           | 1.37 H                   | 338                        | 64.05                  | 7.25                           |
| 4                                                   | #5860.00       | 67.8 PK                       | 68.2              | -0.4           | 1.43 H                   | 81                         | 60.58                  | 7.22                           |
| 5                                                   | 11590.00       | 54.9 PK                       | 74.0              | -19.1          | 1.41 H                   | 109                        | 40.29                  | 14.61                          |
| 6                                                   | 11590.00       | 43.4 AV                       | 54.0              | -10.6          | 1.41 H                   | 109                        | 28.79                  | 14.61                          |
| 7                                                   | #17385.00      | 62.9 PK                       | 74.0              | -11.1          | 1.40 H                   | 249                        | 38.41                  | 24.49                          |
| 8                                                   | #17385.00      | 50.1 AV                       | 54.0              | -3.9           | 1.40 H                   | 249                        | 25.61                  | 24.49                          |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | *5795.00       | 108.7 PK                      |                   |                | 1.49 V                   | 350                        | 101.32                 | 7.38                           |
| 2                                                   | *5795.00       | 99.6 AV                       |                   |                | 1.49 V                   | 350                        | 92.22                  | 7.38                           |
| 3                                                   | #5850.00       | 66.9 PK                       | 78.2              | -11.3          | 1.46 V                   | 323                        | 59.65                  | 7.25                           |
| 4                                                   | #5860.00       | 64.2 PK                       | 68.2              | -4.0           | 1.38 V                   | 342                        | 56.98                  | 7.22                           |
| 5                                                   | 11590.00       | 54.2 PK                       | 74.0              | -19.8          | 1.96 V                   | 129                        | 39.59                  | 14.61                          |
| 6                                                   | 11590.00       | 43.0 AV                       | 54.0              | -11.0          | 1.96 V                   | 129                        | 28.39                  | 14.61                          |
| 7                                                   | #17385.00      | 65.1 PK                       | 74.0              | -8.9           | 1.97 V                   | 124                        | 40.61                  | 24.49                          |
| 8                                                   | #17385.00      | 50.2 AV                       | 54.0              | -3.8           | 1.97 V                   | 124                        | 25.71                  | 24.49                          |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

## 802.11ac (VHT80)

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 42 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 5150.00        | 62.6 PK                       | 74.0              | -11.4          | 1.32 H                   | 0                          | 56.13                  | 6.47                           |
| 2                                                   | 5150.00        | 53.4 AV                       | 54.0              | -0.6           | 1.32 H                   | 0                          | 46.93                  | 6.47                           |
| 3                                                   | *5210.00       | 102.0 PK                      |                   |                | 1.18 H                   | 77                         | 95.22                  | 6.78                           |
| 4                                                   | *5210.00       | 94.4 AV                       |                   |                | 1.18 H                   | 77                         | 87.62                  | 6.78                           |
| 5                                                   | 5350.00        | 58.2 PK                       | 74.0              | -15.8          | 1.18 H                   | 77                         | 51.16                  | 7.04                           |
| 6                                                   | 5350.00        | 49.3 AV                       | 54.0              | -4.7           | 1.18 H                   | 77                         | 42.26                  | 7.04                           |
| 7                                                   | #10420.00      | 53.8 PK                       | 74.0              | -20.2          | 1.42 H                   | 116                        | 39.65                  | 14.15                          |
| 8                                                   | #10420.00      | 42.9 AV                       | 54.0              | -11.1          | 1.42 H                   | 116                        | 28.75                  | 14.15                          |
| 9                                                   | 15630.00       | 63.1 PK                       | 74.0              | -10.9          | 1.34 H                   | 232                        | 44.58                  | 18.52                          |
| 10                                                  | 15630.00       | 50.2 AV                       | 54.0              | -3.8           | 1.34 H                   | 232                        | 31.68                  | 18.52                          |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 5150.00        | 63.6 PK                       | 74.0              | -10.4          | 1.54 V                   | 322                        | 57.13                  | 6.47                           |
| 2                                                   | 5150.00        | 48.6 AV                       | 54.0              | -5.4           | 1.54 V                   | 322                        | 42.13                  | 6.47                           |
| 3                                                   | *5210.00       | 99.6 PK                       |                   |                | 1.51 V                   | 338                        | 92.82                  | 6.78                           |
| 4                                                   | *5210.00       | 91.8 AV                       |                   |                | 1.51 V                   | 338                        | 85.02                  | 6.78                           |
| 5                                                   | 5350.00        | 60.1 PK                       | 74.0              | -13.9          | 1.51 V                   | 338                        | 53.06                  | 7.04                           |
| 6                                                   | 5350.00        | 46.2 AV                       | 54.0              | -7.8           | 1.51 V                   | 338                        | 39.16                  | 7.04                           |
| 7                                                   | #10420.00      | 54.1 PK                       | 74.0              | -19.9          | 2.08 V                   | 139                        | 39.95                  | 14.15                          |
| 8                                                   | #10420.00      | 43.0 AV                       | 54.0              | -11.0          | 2.08 V                   | 139                        | 28.85                  | 14.15                          |
| 9                                                   | 15630.00       | 65.5 PK                       | 74.0              | -8.5           | 1.95 V                   | 124                        | 46.98                  | 18.52                          |
| 10                                                  | 15630.00       | 50.3 AV                       | 54.0              | -3.7           | 1.95 V                   | 124                        | 31.78                  | 18.52                          |

## REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                        |                |                              |              |
|------------------------|----------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 155 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 40GHz   |                              | Average (AV) |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

| NO. | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | #5715.00       | 67.4 PK                       | 68.2              | -0.8           | 1.26 H                   | 280                        | 60.02                  | 7.38                           |
| 2   | #5725.00       | 63.7 PK                       | 78.2              | -14.5          | 1.30 H                   | 348                        | 56.32                  | 7.38                           |
| 3   | *5775.00       | 104.1 PK                      |                   |                | 1.38 H                   | 355                        | 96.72                  | 7.38                           |
| 4   | *5775.00       | 95.9 AV                       |                   |                | 1.38 H                   | 355                        | 88.52                  | 7.38                           |
| 5   | #5850.00       | 65.7 PK                       | 78.2              | -12.5          | 1.41 H                   | 345                        | 58.45                  | 7.25                           |
| 6   | #5860.00       | 63.5 PK                       | 68.2              | -4.7           | 1.32 H                   | 360                        | 56.28                  | 7.22                           |
| 7   | 11550.00       | 54.1 PK                       | 74.0              | -19.9          | 1.49 H                   | 109                        | 39.55                  | 14.55                          |
| 8   | 11550.00       | 42.9 AV                       | 54.0              | -11.1          | 1.49 H                   | 109                        | 28.35                  | 14.55                          |
| 9   | #17325.00      | 62.7 PK                       | 74.0              | -11.3          | 1.30 H                   | 224                        | 39.08                  | 23.62                          |
| 10  | #17325.00      | 50.1 AV                       | 54.0              | -3.9           | 1.30 H                   | 224                        | 26.48                  | 23.62                          |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

| NO. | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1   | #5715.00       | 64.2 PK                       | 68.2              | -4.0           | 1.53 V                   | 317                        | 56.82                  | 7.38                           |
| 2   | #5725.00       | 59.7 PK                       | 78.2              | -18.5          | 1.51 V                   | 337                        | 52.32                  | 7.38                           |
| 3   | *5775.00       | 101.1 PK                      |                   |                | 1.43 V                   | 339                        | 93.72                  | 7.38                           |
| 4   | *5775.00       | 93.4 AV                       |                   |                | 1.43 V                   | 339                        | 86.02                  | 7.38                           |
| 5   | #5850.00       | 61.4 PK                       | 78.2              | -16.8          | 1.52 V                   | 314                        | 54.15                  | 7.25                           |
| 6   | #5860.00       | 58.4 PK                       | 68.2              | -9.8           | 1.42 V                   | 327                        | 51.18                  | 7.22                           |
| 7   | 11550.00       | 54.5 PK                       | 74.0              | -19.5          | 2.03 V                   | 123                        | 39.95                  | 14.55                          |
| 8   | 11550.00       | 43.4 AV                       | 54.0              | -10.6          | 2.03 V                   | 123                        | 28.85                  | 14.55                          |
| 9   | #17325.00      | 65.4 PK                       | 74.0              | -8.6           | 2.01 V                   | 100                        | 41.78                  | 23.62                          |
| 10  | #17325.00      | 50.1 AV                       | 54.0              | -3.9           | 2.01 V                   | 100                        | 26.48                  | 23.62                          |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

## Below 1GHz Data

### 802.11ac (VHT20)

|                        |                |                              |                 |
|------------------------|----------------|------------------------------|-----------------|
| <b>CHANNEL</b>         | TX Channel 157 | <b>DETECTOR<br/>FUNCTION</b> | Quasi-Peak (QP) |
| <b>FREQUENCY RANGE</b> | Below 1GHz     |                              |                 |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|-----------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 102.94         | 31.7 QP                       | 43.5              | -11.8          | 2.00 H                   | 68                         | 48.73                  | -17.07                         |
| 2                                                   | 149.02         | 30.8 QP                       | 43.5              | -12.7          | 2.00 H                   | 38                         | 43.70                  | -12.93                         |
| 3                                                   | 271.97         | 36.2 QP                       | 46.0              | -9.8           | 1.00 H                   | 55                         | 49.18                  | -13.01                         |
| 4                                                   | 600.02         | 31.7 QP                       | 46.0              | -14.3          | 1.50 H                   | 360                        | 36.03                  | -4.30                          |
| 5                                                   | 625.00         | 34.9 QP                       | 46.0              | -11.2          | 1.50 H                   | 360                        | 38.59                  | -3.74                          |
| 6                                                   | 749.98         | 30.7 QP                       | 46.0              | -15.3          | 1.50 H                   | 360                        | 31.89                  | -1.21                          |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                 | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                   | 149.31         | 29.6 QP                       | 43.5              | -13.9          | 1.00 V                   | 269                        | 42.54                  | -12.93                         |
| 2                                                   | 251.40         | 32.4 QP                       | 46.0              | -13.6          | 1.50 V                   | 312                        | 46.37                  | -13.97                         |
| 3                                                   | 599.97         | 29.3 QP                       | 46.0              | -16.7          | 1.50 V                   | 359                        | 33.58                  | -4.30                          |
| 4                                                   | 625.00         | 34.8 QP                       | 46.0              | -11.2          | 1.00 V                   | 195                        | 38.54                  | -3.74                          |
| 5                                                   | 749.98         | 30.9 QP                       | 46.0              | -15.1          | 1.50 V                   | 38                         | 32.10                  | -1.21                          |
| 6                                                   | 875.02         | 32.4 QP                       | 46.0              | -13.6          | 1.00 V                   | 0                          | 32.19                  | 0.24                           |

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

| Frequency (MHz) | Conducted Limit (dBuV) |         |
|-----------------|------------------------|---------|
|                 | Quasi-peak             | Average |
| 0.15 - 0.5      | 66 - 56                | 56 - 46 |
| 0.50 - 5.0      | 56                     | 46      |
| 5.0 - 30.0      | 60                     | 50      |

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 4.2.2 Test Instruments

| DESCRIPTION & MANUFACTURER                                         | MODEL NO.               | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|--------------------------------------------------------------------|-------------------------|------------|-----------------|------------------|
| Test Receiver<br>R&S                                               | ESCS 30                 | 100287     | Apr. 17, 2015   | Apr. 16, 2016    |
| Line-Impedance<br>Stabilization Network<br>(for EUT)<br>R&S        | ENV216                  | 100071     | Nov. 10, 2014   | Nov. 09, 2015    |
| RF Cable                                                           | 5D-FB                   | COACAB-001 | May 25, 2015    | May 24, 2016     |
| 50 ohms Terminator                                                 | 50                      | 3          | Oct. 17, 2014   | Oct. 16, 2015    |
| 50 ohms Terminator                                                 | N/A                     | EMC-04     | Oct. 21, 2014   | Oct. 20, 2015    |
| Software<br>BVADT                                                  | BVADT_Cond_<br>V7.3.7.3 | NA         | NA              | NA               |
| Line-Impedance<br>Stabilization Network<br>(for Peripheral)<br>R&S | ENV216                  | 100072     | June 11, 2015   | June 10, 2016    |

#### Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.
4. Tested Date: Aug. 24, 2015

#### 4.2.3 Test Procedure

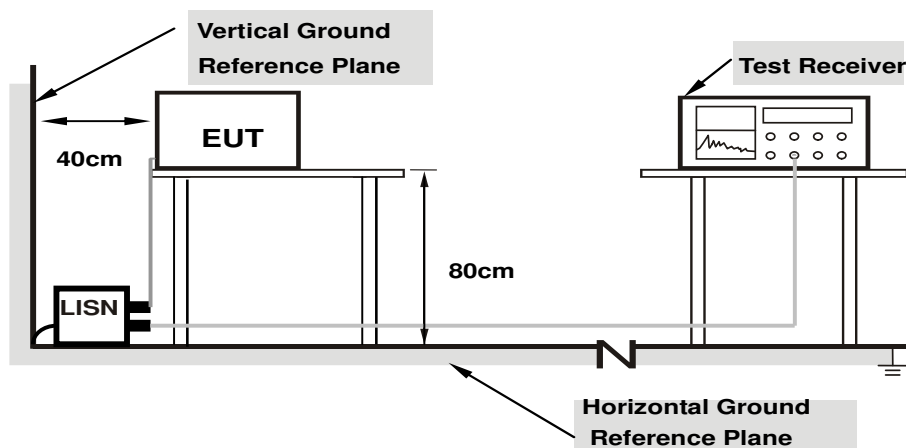
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.2.4 Deviation from Test Standard

No deviation.

#### 4.2.5 Test Setup



**Note:** 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.2.6 EUT Operating Condition

Same as 4.1.6.

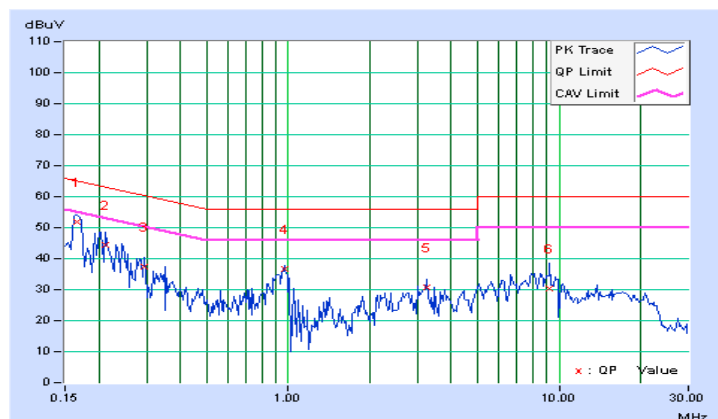
#### 4.2.7 Test Results (Mode 1)

| Phase | Line (L) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|----------|-------------------|--------------------------------|
|-------|----------|-------------------|--------------------------------|

| Phase Of Power : Line (L) |                 |                        |                      |       |                       |       |              |       |             |        |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                        | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                           |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                         | 0.16562         | 0.10                   | 51.66                | 40.21 | 51.76                 | 40.31 | 65.18        | 55.18 | -13.42      | -14.87 |
| 2                         | 0.21250         | 0.10                   | 44.52                | 29.65 | 44.62                 | 29.75 | 63.11        | 53.11 | -18.48      | -23.35 |
| 3                         | 0.29453         | 0.13                   | 37.42                | 25.05 | 37.55                 | 25.18 | 60.40        | 50.40 | -22.85      | -25.22 |
| 4                         | 0.96641         | 0.23                   | 36.35                | 35.83 | 36.58                 | 36.06 | 56.00        | 46.00 | -19.42      | -9.94  |
| 5                         | 3.23438         | 0.32                   | 30.51                | 23.96 | 30.83                 | 24.28 | 56.00        | 46.00 | -25.17      | -21.72 |
| 6                         | 9.25391         | 0.52                   | 29.90                | 22.13 | 30.42                 | 22.65 | 60.00        | 50.00 | -29.58      | -27.35 |

#### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

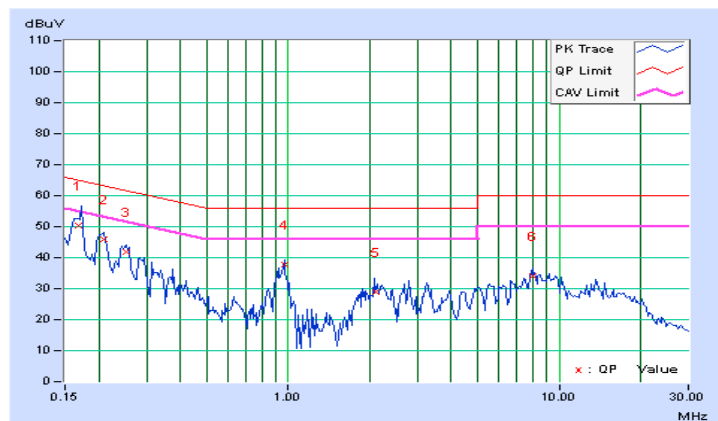


|       |             |                   |                                |
|-------|-------------|-------------------|--------------------------------|
| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|-------------|-------------------|--------------------------------|

| Phase Of Power : Neutral (N) |                 |                        |                      |       |                       |       |              |       |             |        |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                           | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                              |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                            | 0.16819         | 0.09                   | 50.25                | 39.23 | 50.34                 | 39.32 | 65.05        | 55.05 | -14.71      | -15.73 |
| 2                            | 0.20859         | 0.10                   | 45.93                | 33.80 | 46.03                 | 33.90 | 63.26        | 53.26 | -17.23      | -19.36 |
| 3                            | 0.25156         | 0.11                   | 41.65                | 28.12 | 41.76                 | 28.23 | 61.71        | 51.71 | -19.94      | -23.47 |
| 4                            | 0.96641         | 0.21                   | 37.64                | 37.56 | 37.85                 | 37.77 | 56.00        | 46.00 | -18.15      | -8.23  |
| 5                            | 2.10006         | 0.26                   | 28.58                | 26.77 | 28.84                 | 27.03 | 56.00        | 46.00 | -27.16      | -18.97 |
| 6                            | 7.97656         | 0.44                   | 33.56                | 29.57 | 34.00                 | 30.01 | 60.00        | 50.00 | -26.00      | -19.99 |

#### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



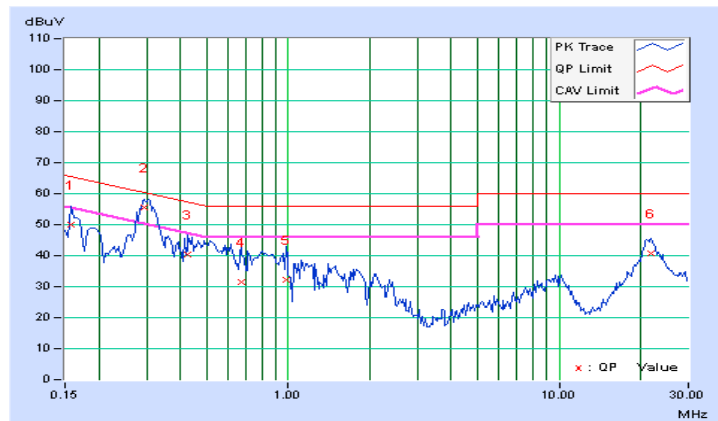
#### 4.2.8 Test Results (Mode 2)

| Phase | Line (L) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|----------|-------------------|--------------------------------|
|-------|----------|-------------------|--------------------------------|

| Phase Of Power : Line (L) |                 |                        |                      |              |                       |              |              |              |              |              |
|---------------------------|-----------------|------------------------|----------------------|--------------|-----------------------|--------------|--------------|--------------|--------------|--------------|
| No                        | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |              | Emission Level (dBuV) |              | Limit (dBuV) |              | Margin (dB)  |              |
|                           |                 |                        | Q.P.                 | AV.          | Q.P.                  | AV.          | Q.P.         | AV.          | Q.P.         | AV.          |
| 1                         | 0.15781         | 0.10                   | 49.85                | 38.81        | 49.95                 | 38.91        | 65.58        | 55.58        | -15.63       | -16.67       |
| 2                         | <b>0.29453</b>  | <b>0.13</b>            | <b>55.34</b>         | <b>43.34</b> | <b>55.47</b>          | <b>43.47</b> | <b>60.40</b> | <b>50.40</b> | <b>-4.93</b> | <b>-6.93</b> |
| 3                         | 0.42734         | 0.16                   | 40.34                | 30.12        | 40.50                 | 30.28        | 57.30        | 47.30        | -16.80       | -17.02       |
| 4                         | 0.66953         | 0.19                   | 31.38                | 20.77        | 31.57                 | 20.96        | 56.00        | 46.00        | -24.43       | -25.04       |
| 5                         | 0.97813         | 0.23                   | 31.97                | 21.34        | 32.20                 | 21.57        | 56.00        | 46.00        | -23.80       | -24.43       |
| 6                         | 21.96094        | 0.80                   | 40.03                | 34.78        | 40.83                 | 35.58        | 60.00        | 50.00        | -19.17       | -14.42       |

#### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

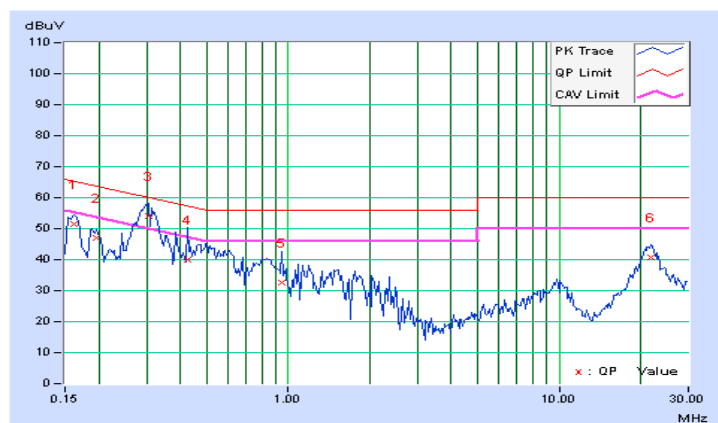


|       |             |                   |                                |
|-------|-------------|-------------------|--------------------------------|
| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|-------------|-------------------|--------------------------------|

| Phase Of Power : Neutral (N) |                 |                        |                      |       |                       |       |              |       |             |        |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                           | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                              |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                            | 0.16172         | 0.09                   | 51.46                | 40.31 | 51.55                 | 40.40 | 65.38        | 55.38 | -13.83      | -14.98 |
| 2                            | 0.19687         | 0.10                   | 47.05                | 36.57 | 47.15                 | 36.67 | 63.74        | 53.74 | -16.59      | -17.07 |
| 3                            | 0.30625         | 0.13                   | 53.83                | 38.68 | 53.96                 | 38.81 | 60.07        | 50.07 | -6.12       | -11.27 |
| 4                            | 0.42344         | 0.15                   | 39.80                | 28.66 | 39.95                 | 28.81 | 57.38        | 47.38 | -17.43      | -18.57 |
| 5                            | 0.94688         | 0.20                   | 32.41                | 22.22 | 32.61                 | 22.42 | 56.00        | 46.00 | -23.39      | -23.58 |
| 6                            | 21.80469        | 0.79                   | 39.77                | 34.54 | 40.56                 | 35.33 | 60.00        | 50.00 | -19.44      | -14.67 |

#### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



### 4.3 Transmit Power Measurement

#### 4.3.1 Limits of Transmit Power Measurement

| Operation Band | EUT Category |                                   | LIMIT                                                                                                                       |
|----------------|--------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| U-NII-1        |              | Outdoor Access Point              | 1 Watt (30 dBm)<br>(Max. e.i.r.p $\leq$ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon) |
|                |              | Fixed point-to-point Access Point | 1 Watt (30 dBm)                                                                                                             |
|                | √            | Indoor Access Point               | 1 Watt (30 dBm)                                                                                                             |
|                |              | Mobile and Portable client device | 250mW (24 dBm)                                                                                                              |
| U-NII-2A       | ---          |                                   | 250mW (24 dBm) or 11 dBm+10 log B*                                                                                          |
| U-NII-2C       | ---          |                                   | 250mW (24 dBm) or 11 dBm+10 log B*                                                                                          |
| U-NII-3        | √            |                                   | 1 Watt (30 dBm)                                                                                                             |

\*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

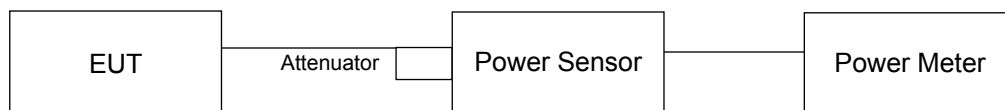
Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \leq 4$ ;

Array Gain = 0 dB (i.e., no array gain) for channel widths  $\geq 40$  MHz for any  $N_{ANT}$ ;

Array Gain =  $5 \log(N_{ANT}/N_{SS})$  dB or 3 dB, whichever is less for 20-MHz channel widths with  $N_{ANT} \geq 5$ .

For power measurements on all other devices: Array Gain =  $10 \log(N_{ANT}/N_{SS})$  dB.

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| Power meter<br>Anritsu     | ML2495A   | 0824006    | May 25, 2015    | May 24, 2016     |
| Power sensor<br>Anritsu    | MA2411B   | 0738172    | May 25, 2015    | May 24, 2016     |

#### Note:

- NOTE:**
1. The test was performed in Oven room 1.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: Nov. 04, 2015

#### 4.3.4 Test Procedure

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

#### 4.3.7 Test Result

##### POWER OUTPUT

##### CDD Mode

##### 802.11a

| Chan. | Freq.<br>(MHz) | Maximum Conducted Power (dBm) |         |         |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Pass /<br>Fail |
|-------|----------------|-------------------------------|---------|---------|---------|------------------------|----------------------|----------------------|----------------|
|       |                | CHAIN 0                       | CHAIN 1 | CHAIN 2 | CHAIN 3 |                        |                      |                      |                |
| 36    | 5180           | 19.32                         | 19.37   | 19.77   | 20.91   | 390.156                | 25.91                | 30                   | Pass           |
| 40    | 5200           | 19.11                         | 19.39   | 19.81   | 20.86   | 385.984                | 25.87                | 30                   | Pass           |
| 48    | 5240           | 19.07                         | 19.53   | 19.77   | 20.68   | 382.259                | 25.82                | 30                   | Pass           |
| 149   | 5745           | 19.69                         | 20.50   | 20.11   | 21.87   | 461.693                | 26.64                | 30                   | Pass           |
| 157   | 5785           | 21.59                         | 23.61   | 23.57   | 22.93   | 797.673                | 29.02                | 30                   | Pass           |
| 165   | 5825           | 21.35                         | 22.57   | 22.61   | 22.83   | 691.432                | 28.40                | 30                   | Pass           |

##### 802.11ac (VHT20)

| Chan. | Freq.<br>(MHz) | Maximum Conducted Power (dBm) |         |         |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Pass /<br>Fail |
|-------|----------------|-------------------------------|---------|---------|---------|------------------------|----------------------|----------------------|----------------|
|       |                | CHAIN 0                       | CHAIN 1 | CHAIN 2 | CHAIN 3 |                        |                      |                      |                |
| 36    | 5180           | 18.93                         | 19.05   | 19.45   | 20.57   | 360.646                | 25.57                | 30                   | Pass           |
| 40    | 5200           | 18.95                         | 19.21   | 19.51   | 20.52   | 363.943                | 25.61                | 30                   | Pass           |
| 48    | 5240           | 19.21                         | 19.31   | 19.39   | 20.46   | 366.747                | 25.64                | 30                   | Pass           |
| 149   | 5745           | 19.67                         | 20.33   | 19.79   | 21.73   | 444.794                | 26.48                | 30                   | Pass           |
| 157   | 5785           | 21.96                         | 23.95   | 23.44   | 22.67   | 811.076                | 29.09                | 30                   | Pass           |
| 165   | 5825           | 21.68                         | 22.57   | 23.52   | 22.64   | 736.507                | 28.67                | 30                   | Pass           |

##### 802.11ac (VHT40)

| Chan. | Freq.<br>(MHz) | Maximum Conducted Power (dBm) |         |         |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Pass /<br>Fail |
|-------|----------------|-------------------------------|---------|---------|---------|------------------------|----------------------|----------------------|----------------|
|       |                | CHAIN 0                       | CHAIN 1 | CHAIN 2 | CHAIN 3 |                        |                      |                      |                |
| 38    | 5190           | 15.21                         | 15.07   | 15.45   | 16.71   | 147.282                | 21.68                | 30                   | Pass           |
| 46    | 5230           | 19.16                         | 19.48   | 19.98   | 20.85   | 392.29                 | 25.94                | 30                   | Pass           |
| 151   | 5755           | 16.63                         | 17.17   | 16.84   | 18.71   | 220.753                | 23.44                | 30                   | Pass           |
| 159   | 5795           | 20.33                         | 21.79   | 21.91   | 22.57   | 594.859                | 27.74                | 30                   | Pass           |

##### 802.11ac (VHT80)

| Chan. | Freq.<br>(MHz) | Maximum Conducted Power (dBm) |         |         |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Pass /<br>Fail |
|-------|----------------|-------------------------------|---------|---------|---------|------------------------|----------------------|----------------------|----------------|
|       |                | CHAIN 0                       | CHAIN 1 | CHAIN 2 | CHAIN 3 |                        |                      |                      |                |
| 42    | 5210           | 10.56                         | 10.61   | 11.78   | 12.83   | 57.137                 | 17.57                | 30                   | Pass           |
| 155   | 5775           | 14.32                         | 14.89   | 15.07   | 16.97   | 139.783                | 21.45                | 30                   | Pass           |

## Beamforming Mode

### 802.11ac (VHT20)

| Chan. | Freq.<br>(MHz) | Maximum Conducted Power (dBm) |         |         |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Pass /<br>Fail |
|-------|----------------|-------------------------------|---------|---------|---------|------------------------|----------------------|----------------------|----------------|
|       |                | CHAIN 0                       | CHAIN 1 | CHAIN 2 | CHAIN 3 |                        |                      |                      |                |
| 36    | 5180           | 18.42                         | 18.61   | 18.49   | 18.73   | 287.39                 | 24.58                | 25.98                | Pass           |
| 40    | 5200           | 19.32                         | 19.42   | 19.52   | 19.81   | 358.26                 | 25.54                | 25.98                | Pass           |
| 48    | 5240           | 19.27                         | 19.32   | 19.54   | 19.77   | 354.827                | 25.50                | 25.98                | Pass           |
| 149   | 5745           | 19.72                         | 19.83   | 19.92   | 20.11   | 390.657                | 25.92                | 25.98                | Pass           |
| 157   | 5785           | 19.76                         | 19.77   | 19.81   | 20.02   | 385.647                | 25.86                | 25.98                | Pass           |
| 165   | 5825           | 19.64                         | 19.71   | 19.78   | 19.96   | 379.729                | 25.79                | 25.98                | Pass           |

Note: Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power limit shall be reduced to 30-(10.02-6) = 25.98dBm.

### 802.11ac (VHT40)

| Chan. | Freq.<br>(MHz) | Maximum Conducted Power (dBm) |         |         |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Pass /<br>Fail |
|-------|----------------|-------------------------------|---------|---------|---------|------------------------|----------------------|----------------------|----------------|
|       |                | CHAIN 0                       | CHAIN 1 | CHAIN 2 | CHAIN 3 |                        |                      |                      |                |
| 38    | 5190           | 14.96                         | 14.84   | 15.21   | 16.52   | 139.876                | 21.46                | 25.98                | Pass           |
| 46    | 5230           | 19.65                         | 19.77   | 19.83   | 20.06   | 384.651                | 25.85                | 25.98                | Pass           |
| 151   | 5755           | 16.75                         | 17.06   | 16.67   | 18.54   | 216.033                | 23.35                | 25.98                | Pass           |
| 159   | 5795           | 19.72                         | 19.82   | 19.91   | 20.14   | 390.921                | 25.92                | 25.98                | Pass           |

Note: Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power limit shall be reduced to 30-(10.02-6) = 25.98dBm.

### 802.11ac (VHT80)

| Chan. | Freq.<br>(MHz) | Maximum Conducted Power (dBm) |         |         |         | Total<br>Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Pass /<br>Fail |
|-------|----------------|-------------------------------|---------|---------|---------|------------------------|----------------------|----------------------|----------------|
|       |                | CHAIN 0                       | CHAIN 1 | CHAIN 2 | CHAIN 3 |                        |                      |                      |                |
| 42    | 5210           | 11.54                         | 11.47   | 11.13   | 11.28   | 54.684                 | 17.38                | 25.98                | Pass           |
| 155   | 5775           | 14.45                         | 14.89   | 14.77   | 15.21   | 121.874                | 20.86                | 25.98                | Pass           |

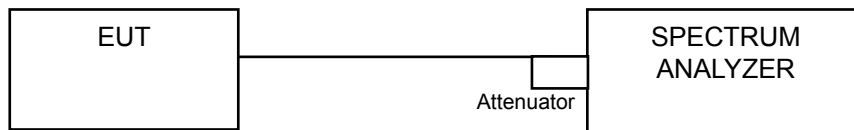
Note: Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power limit shall be reduced to 30-(10.02-6) = 25.98dBm.

#### 4.4 Peak Power Spectral Density Measurement

##### 4.4.1 Limits of Peak Power Spectral Density Measurement

| Operation Band | EUT Category |                                   | LIMIT         |
|----------------|--------------|-----------------------------------|---------------|
| U-NII-1        |              | Outdoor Access Point              | 17dBm/ MHz    |
|                |              | Fixed point-to-point Access Point |               |
|                | √            | Indoor Access Point               |               |
|                |              | Mobile and Portable client device | 11dBm/ MHz    |
| U-NII-2A       | ---          |                                   | 11dBm/ MHz    |
| U-NII-2C       | ---          |                                   | 11dBm/ MHz    |
| U-NII-3        | √-           |                                   | 30dBm/ 500kHz |

##### 4.4.2 Test Setup



##### 4.4.3 Test Instruments

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| Spectrum Analyzer R&S      | FSP40     | 100036     | Jan. 22, 2015   | Jan. 21, 2016    |

##### Note:

- NOTE:**
1. The test was performed in Oven room 1.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: Nov. 04, 2015

#### 4.4.4 Test Procedure

##### For U-NII-1 band:

##### 802.11a, 802 & 11ac (VH20)

Using method SA-1

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 30 kHz, Set VBW  $\geq$  1 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to "free run".
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value

##### 802.11ac (VH40) & 802.11ac (VHT80)

Using method SA-2

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 30 kHz, Set VBW  $\geq$  1 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to "free run".
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value and add  $10 \log (1/\text{duty cycle})$

##### For U-NII-3 band:

##### 802.11a, 802 & 11ac (VH20)

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 300 kHz, Set VBW  $\geq$  1 MHz, Detector = RMS
- 3) Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
- 4) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $\text{BWCF} = 10\log(500 \text{ kHz}/300\text{kHz})$
- 5) Sweep time = auto, trigger set to "free run".
- 6) Trace average at least 100 traces in power averaging mode.
- 7) Record the max value

##### 802.11ac (VH40) & 802.11ac (VHT80)

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 300 kHz, Set VBW  $\geq$  1 MHz, Detector = RMS
- 3) Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
- 4) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $\text{BWCF} = 10\log(500 \text{ kHz}/300\text{kHz})$
- 5) Sweep time = auto, trigger set to "free run".
- 6) Trace average at least 100 traces in power averaging mode.
- 7) Record the max value and add  $10 \log (1/\text{duty cycle})$

#### 4.4.5 Deviation from Test Standard

No deviation.

#### 4.4.6 EUT Operating Condition

Same as Item 4.3.6.

#### 4.4.7 Test Results

##### For U-NII-1 Band 802.11a

| Chan. | Chan. Freq. (MHz) | PSD (dBm) |         |         |         | Total Power Density (dBm) | MAX. Limit (dBm) | Pass / Fail |
|-------|-------------------|-----------|---------|---------|---------|---------------------------|------------------|-------------|
|       |                   | Chain 0   | Chain 1 | Chain 2 | Chain 3 |                           |                  |             |
| 36    | 5180              | 4.80      | 4.89    | 5.05    | 5.52    | 11.09                     | 12.98            | Pass        |
| 40    | 5200              | 4.85      | 5.21    | 5.18    | 5.51    | 11.21                     | 12.98            | Pass        |
| 48    | 5240              | 4.83      | 5.31    | 4.87    | 5.16    | 11.07                     | 12.98            | Pass        |

- Note: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain =  $4\text{dBi} + 10\log(4) = 10.02\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $17-(10.02-6) = 12.98\text{dBm}$ .

##### 802.11ac (VHT20)

| Chan. | Chan. Freq. (MHz) | PSD (dBm) |         |         |         | Total Power Density (dBm) | MAX. Limit (dBm) | Pass / Fail |
|-------|-------------------|-----------|---------|---------|---------|---------------------------|------------------|-------------|
|       |                   | Chain 0   | Chain 1 | Chain 2 | Chain 3 |                           |                  |             |
| 36    | 5180              | 4.41      | 4.83    | 4.60    | 4.97    | 10.73                     | 12.98            | Pass        |
| 40    | 5200              | 4.38      | 5.26    | 4.61    | 5.04    | 10.86                     | 12.98            | Pass        |
| 48    | 5240              | 4.20      | 4.91    | 4.64    | 4.88    | 10.69                     | 12.98            | Pass        |

- Note: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain =  $4\text{dBi} + 10\log(4) = 10.02\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $17-(10.02-6) = 12.98\text{dBm}$ .

### 802.11ac (VHT40)

| Chan. | Chan. Freq. (MHz) | PSD W/O Duty Factor(dBm) |         |         |         | Duty Factor | Total PSD With Duty Factor (dBm) | MAX. Limit (dBm) | Pass / Fail |
|-------|-------------------|--------------------------|---------|---------|---------|-------------|----------------------------------|------------------|-------------|
|       |                   | Chain 0                  | Chain 1 | Chain 2 | Chain 3 |             |                                  |                  |             |
| 38    | 5190              | -1.54                    | -1.38   | -1.72   | -0.88   | 0.16        | 4.82                             | 12.98            | Pass        |
| 46    | 5230              | 2.86                     | 3.16    | 3.26    | 3.28    | 0.16        | 9.33                             | 12.98            | Pass        |

- Note: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain =  $4\text{dBi} + 10\log(4) = 10.02\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $17-(10.02-6) = 12.98\text{dBm}$ .
3. Refer to section 3.3 for duty cycle spectrum plot.

### 802.11ac (VHT80)

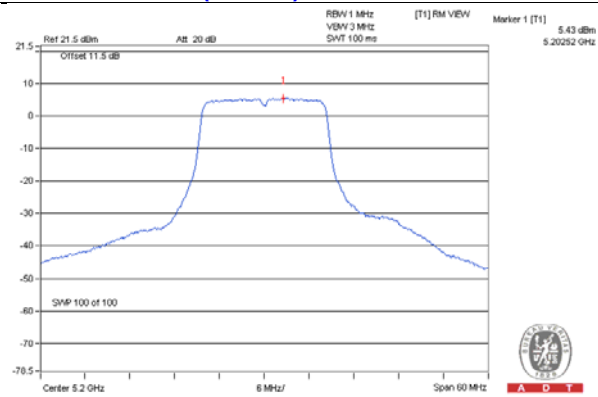
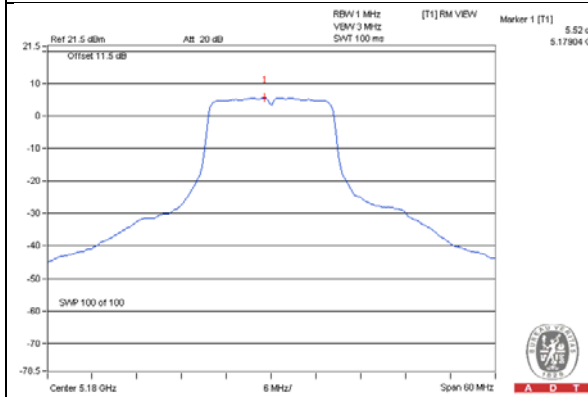
| Chan. | Chan. Freq. (MHz) | PSD W/O Duty Factor(dBm) |         |         |         | Duty Factor | Total PSD With Duty Factor (dBm) | MAX. Limit (dBm) | Pass / Fail |
|-------|-------------------|--------------------------|---------|---------|---------|-------------|----------------------------------|------------------|-------------|
|       |                   | Chain 0                  | Chain 1 | Chain 2 | Chain 3 |             |                                  |                  |             |
| 42    | 5210              | -10.15                   | -9.82   | -9.50   | -9.08   | 0.27        | -3.33                            | 12.98            | Pass        |

- Note: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain =  $4\text{dBi} + 10\log(4) = 10.02\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $17-(10.02-6) = 12.98\text{dBm}$ .
3. Refer to section 3.3 for duty cycle spectrum plot.

# SPECTRUM PLOT OF WORST VALUE

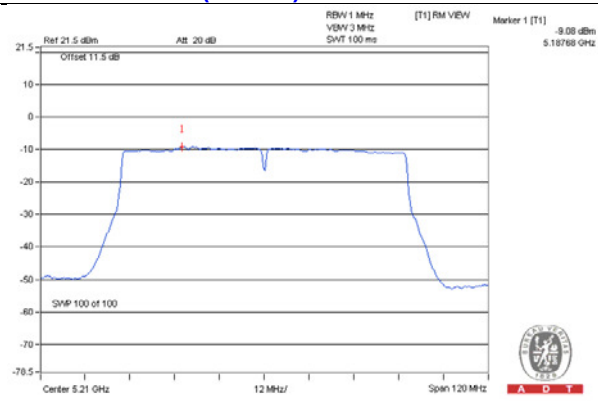
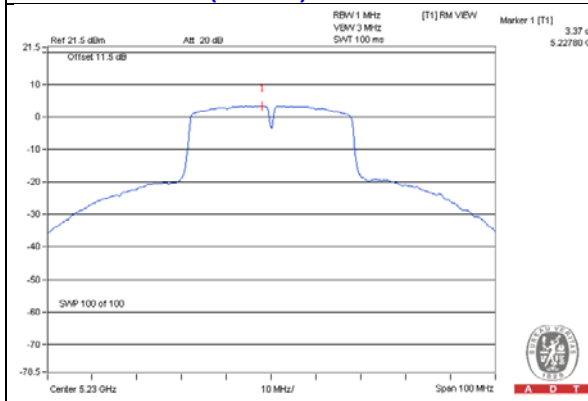
802.11a – Chain 3: CH 36

802.11ac (VHT20) – Chain 1: CH 40



802.11ac (VHT40) – Chain 3: CH 46

802.11ac (VHT80) – Chain 3: CH 42



### For U-NII-3 Band 802.11a

| TX chain | Channel | Freq. (MHz) | PSD (dBm/300kHz) | PSD (dBm/500kHz) | 10 log (N=4) dB | Total PSD (dBm/500kHz) | Limit (dBm/500kHz) | Pass /Fail |
|----------|---------|-------------|------------------|------------------|-----------------|------------------------|--------------------|------------|
| 0        | 149     | 5745        | -1.75            | 0.47             | 6.02            | 6.49                   | 25.98              | Pass       |
|          | 157     | 5785        | 0.74             | 2.96             | 6.02            | 8.98                   | 25.98              | Pass       |
|          | 165     | 5825        | 0.40             | 2.62             | 6.02            | 8.64                   | 25.98              | Pass       |
| 1        | 149     | 5745        | -0.88            | 1.34             | 6.02            | 7.36                   | 25.98              | Pass       |
|          | 157     | 5785        | 2.93             | 5.15             | 6.02            | 11.17                  | 25.98              | Pass       |
|          | 165     | 5825        | 1.39             | 3.61             | 6.02            | 9.63                   | 25.98              | Pass       |
| 2        | 149     | 5745        | -1.84            | 0.38             | 6.02            | 6.40                   | 25.98              | Pass       |
|          | 157     | 5785        | 1.97             | 4.19             | 6.02            | 10.21                  | 25.98              | Pass       |
|          | 165     | 5825        | 1.00             | 3.22             | 6.02            | 9.24                   | 25.98              | Pass       |
| 3        | 149     | 5745        | -0.65            | 1.57             | 6.02            | 7.59                   | 25.98              | Pass       |
|          | 157     | 5785        | 0.47             | 2.69             | 6.02            | 8.71                   | 25.98              | Pass       |
|          | 165     | 5825        | 0.45             | 2.67             | 6.02            | 8.69                   | 25.98              | Pass       |

Note: 1. Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power density limit shall be reduced to 30-(10.02-6) = 25.98dBm.

### 802.11ac (VHT20)

| TX chain | Channel | Freq. (MHz) | PSD (dBm/300kHz) | PSD (dBm/500kHz) | 10 log (N=4) dB | Total PSD (dBm/500kHz) | Limit (dBm/500kHz) | Pass /Fail |
|----------|---------|-------------|------------------|------------------|-----------------|------------------------|--------------------|------------|
| 0        | 149     | 5745        | -2.03            | 0.19             | 6.02            | 6.21                   | 25.98              | Pass       |
|          | 157     | 5785        | 0.16             | 2.38             | 6.02            | 8.40                   | 25.98              | Pass       |
|          | 165     | 5825        | -0.13            | 2.09             | 6.02            | 8.11                   | 25.98              | Pass       |
| 1        | 149     | 5745        | -1.33            | 0.89             | 6.02            | 6.91                   | 25.98              | Pass       |
|          | 157     | 5785        | 2.35             | 4.57             | 6.02            | 10.59                  | 25.98              | Pass       |
|          | 165     | 5825        | 0.98             | 3.20             | 6.02            | 9.22                   | 25.98              | Pass       |
| 2        | 149     | 5745        | -2.24            | -0.02            | 6.02            | 6.00                   | 25.98              | Pass       |
|          | 157     | 5785        | 1.30             | 3.52             | 6.02            | 9.54                   | 25.98              | Pass       |
|          | 165     | 5825        | 0.47             | 2.69             | 6.02            | 8.71                   | 25.98              | Pass       |
| 3        | 149     | 5745        | -0.88            | 1.34             | 6.02            | 7.36                   | 25.98              | Pass       |
|          | 157     | 5785        | 0.18             | 2.40             | 6.02            | 8.42                   | 25.98              | Pass       |
|          | 165     | 5825        | 0.08             | 2.30             | 6.02            | 8.32                   | 25.98              | Pass       |

Note: 1. Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power density limit shall be reduced to 30-(10.02-6) = 25.98dBm.

### 802.11ac (VHT40)

| TX chain | Chan. | Chan. Freq. (MHz) | PSD W/O Duty Factor |              | 10 log (N=4) dB | Duty Factor (dB) | Total PSD With Duty Factor (dBm/500kHz) | Limit (dBm/500kHz) | Pass /Fail |
|----------|-------|-------------------|---------------------|--------------|-----------------|------------------|-----------------------------------------|--------------------|------------|
|          |       |                   | (dBm/300kHz)        | (dBm/500kHz) |                 |                  |                                         |                    |            |
| 0        | 151   | 5755              | -7.43               | -5.21        | 6.02            | 0.16             | 0.97                                    | 25.98              | Pass       |
|          | 159   | 5795              | -2.83               | -0.61        | 6.02            | 0.16             | 5.57                                    | 25.98              | Pass       |
| 1        | 151   | 5755              | -6.71               | -4.49        | 6.02            | 0.16             | 1.69                                    | 25.98              | Pass       |
|          | 159   | 5795              | -1.79               | 0.43         | 6.02            | 0.16             | 6.61                                    | 25.98              | Pass       |
| 2        | 151   | 5755              | -7.62               | -5.40        | 6.02            | 0.16             | 0.78                                    | 25.98              | Pass       |
|          | 159   | 5795              | -2.50               | -0.28        | 6.02            | 0.16             | 5.90                                    | 25.98              | Pass       |
| 3        | 151   | 5755              | -6.49               | -4.27        | 6.02            | 0.16             | 1.91                                    | 25.98              | Pass       |
|          | 159   | 5795              | -2.84               | -0.62        | 6.02            | 0.16             | 5.56                                    | 25.98              | Pass       |

Note: 1. Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power density limit shall be reduced to 30-(10.02-6) = 25.98dBm.

2. Refer to section 3.3 for duty cycle spectrum plot.

### 802.11ac (VHT80)

| TX chain | Chan. | Chan. Freq. (MHz) | PSD W/O Duty Factor |              | 10 log (N=2) dB | Duty Factor (dB) | Total PSD With Duty Factor (dBm/500kHz) | Limit (dBm/500kHz) | Pass /Fail |
|----------|-------|-------------------|---------------------|--------------|-----------------|------------------|-----------------------------------------|--------------------|------------|
|          |       |                   | (dBm/300kHz)        | (dBm/500kHz) |                 |                  |                                         |                    |            |
| 0        | 155   | 5775              | -13.87              | -11.65       | 6.02            | 0.27             | -5.36                                   | 25.98              | Pass       |
| 1        | 155   | 5775              | -12.95              | -10.73       | 6.02            | 0.27             | -4.44                                   | 25.98              | Pass       |
| 2        | 155   | 5775              | -13.90              | -11.68       | 6.02            | 0.27             | -5.39                                   | 25.98              | Pass       |
| 3        | 155   | 5775              | -12.46              | -10.24       | 6.02            | 0.27             | -3.95                                   | 25.98              | Pass       |

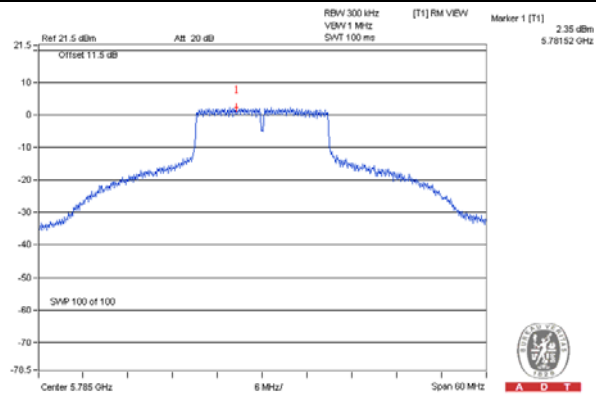
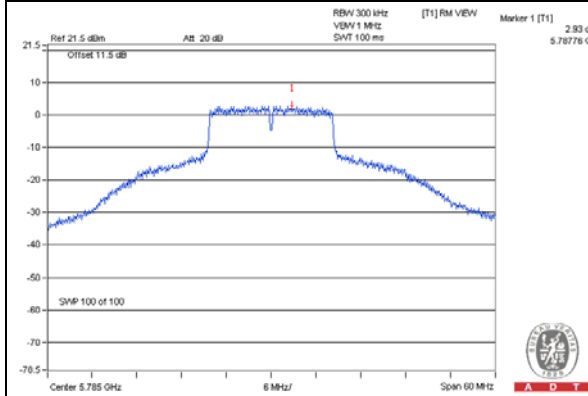
Note: 1. Directional gain = 5.97dBi + 10log(2) = 8.98dBi > 6dBi , so the power density limit shall be reduced to 30-(8.98-6) = 27.02dBm.

2. Refer to section 3.3 for duty cycle spectrum plot.

# SPECTRUM PLOT OF WORST VALUE

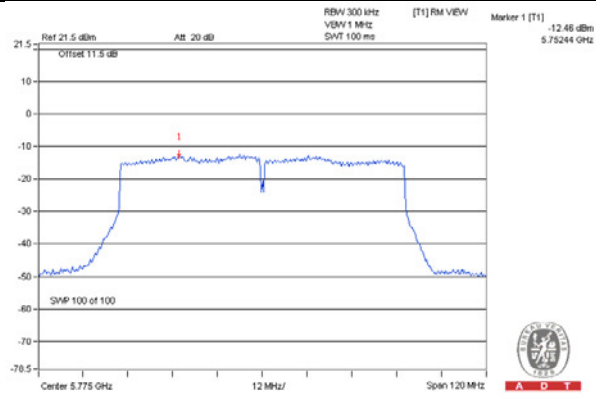
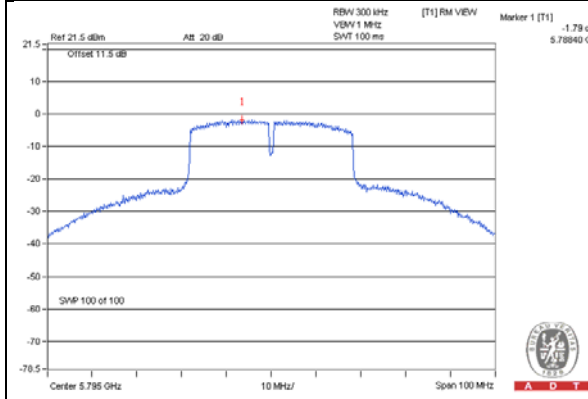
802.11a – Chain 1: CH 157

802.11ac (VHT20) – Chain 1: CH 157



802.11ac (VHT40) – Chain 1: CH 159

802.11ac (VHT80) – Chain 3: CH 155

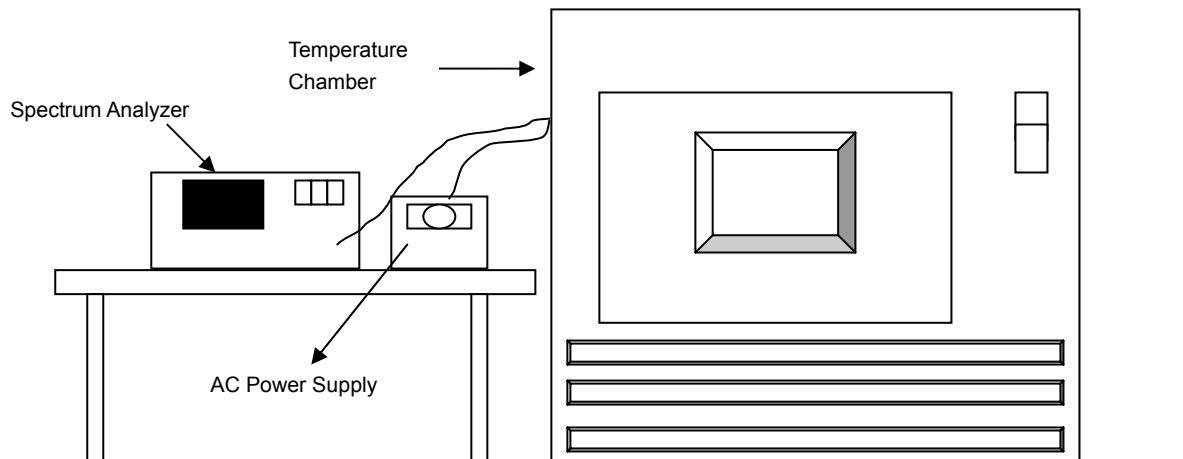


## 4.5 Frequency Stability Measurement

### 4.5.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation

### 4.5.2 Test Setup



### 4.5.3 Test Instruments

| DESCRIPTION & MANUFACTURER               | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|------------------------------------------|-----------|------------|-----------------|------------------|
| Temperature & Humidity Chamber<br>TERCHY | MHU-225AU | 911033     | Dec. 08, 2014   | Dec. 07, 2015    |

#### Note:

- NOTE:**
1. The test was performed in Oven room 1.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: Nov. 04, 2015

### 4.5.4 Test Procedure

- a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- b. Turn the EUT on and couple its output to a spectrum analyzer.
- c. Turn the EUT off and set the chamber to the highest temperature specified.
- d. 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.
- e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

#### 4.5.5 Deviation from Test Standard

No deviation.

#### 4.5.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

#### 4.5.7 Test Results

| FREQUENCY STABILITY VERSUS TEMP. |                          |                                |                           |                                |                           |                                |                           |                                |                           |
|----------------------------------|--------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|
| OPERATING FREQUENCY: 5180MHz     |                          |                                |                           |                                |                           |                                |                           |                                |                           |
| TEMP.<br>(°C)                    | POWER<br>SUPPLY<br>(Vac) | 0 MINUTE                       |                           | 2 MINUTE                       |                           | 5 MINUTE                       |                           | 10 MINUTE                      |                           |
|                                  |                          | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) |
| 50                               | 120                      | 5179.9856                      | -0.00028                  | 5179.9879                      | -0.00023                  | 5179.9856                      | -0.00028                  | 5179.9872                      | -0.00025                  |
| 40                               | 120                      | 5180.0171                      | 0.00033                   | 5180.0188                      | 0.00036                   | 5180.0195                      | 0.00038                   | 5180.0207                      | 0.00040                   |
| 30                               | 120                      | 5180.0022                      | 0.00004                   | 5180.0065                      | 0.00013                   | 5180.0031                      | 0.00006                   | 5180.0066                      | 0.00013                   |
| 20                               | 120                      | 5179.9911                      | -0.00017                  | 5179.9879                      | -0.00023                  | 5179.9913                      | -0.00017                  | 5179.9922                      | -0.00015                  |
| 10                               | 120                      | 5180.006                       | 0.00012                   | 5180.0053                      | 0.00010                   | 5180.0045                      | 0.00009                   | 5180.0033                      | 0.00006                   |
| 0                                | 120                      | 5180.0187                      | 0.00036                   | 5180.0223                      | 0.00043                   | 5180.0192                      | 0.00037                   | 5180.0204                      | 0.00039                   |
| -10                              | 120                      | 5180.004                       | 0.00008                   | 5180.0049                      | 0.00009                   | 5180.0034                      | 0.00007                   | 5180.005                       | 0.00010                   |
| -20                              | 120                      | 5179.9807                      | -0.00037                  | 5179.9788                      | -0.00041                  | 5179.9815                      | -0.00036                  | 5179.9793                      | -0.00040                  |
| -30                              | 120                      | 5180.0223                      | 0.00043                   | 5180.0234                      | 0.00045                   | 5180.0224                      | 0.00043                   | 5180.0223                      | 0.00043                   |

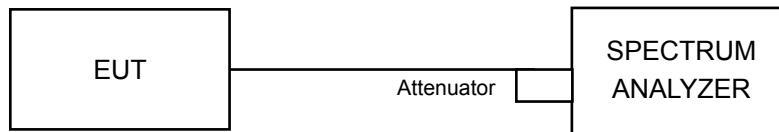
| FREQUENCY STABILITY VERSUS VOLTAGE |                          |                                |                           |                                |                           |                                |                           |                                |                           |
|------------------------------------|--------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|
| OPERATING FREQUENCY: 5180MHz       |                          |                                |                           |                                |                           |                                |                           |                                |                           |
| TEMP.<br>(°C)                      | POWER<br>SUPPLY<br>(Vac) | 0 MINUTE                       |                           | 2 MINUTE                       |                           | 5 MINUTE                       |                           | 10 MINUTE                      |                           |
|                                    |                          | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) |
| 20                                 | 138                      | 5179.9906                      | -0.00018                  | 5179.9871                      | -0.00025                  | 5179.9916                      | -0.00016                  | 5179.9924                      | -0.00015                  |
|                                    | 120                      | 5179.9911                      | -0.00017                  | 5179.9879                      | -0.00023                  | 5179.9913                      | -0.00017                  | 5179.9922                      | -0.00015                  |
|                                    | 102                      | 5179.9915                      | -0.00016                  | 5179.9873                      | -0.00025                  | 5179.9906                      | -0.00018                  | 5179.9919                      | -0.00016                  |

## 4.6 6dB Bandwidth Measurement

### 4.6.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

### 4.6.2 Test Setup



### 4.6.3 Test Instruments

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| Spectrum Analyzer R&S      | FSP40     | 100036     | Jan. 22, 2015   | Jan. 21, 2016    |

#### Note:

- NOTE:**
1. The test was performed in Oven room 1.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: Nov. 04, 2015

### 4.6.4 Test Procedure

#### MEASUREMENT PROCEDURE REF

- a. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

### 4.6.5 Deviation from Test Standard

No deviation.

### 4.6.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

#### 4.6.7 Test Results

##### 802.11a

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) |         |         |         | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|---------------------|---------|---------|---------|---------------------|-------------|
|         |                 | Chain 0             | Chain 1 | Chain 2 | Chain 3 |                     |             |
| 149     | 5745            | 16.31               | 16.31   | 16.37   | 16.38   | 0.5                 | Pass        |
| 157     | 5785            | 15.22               | 15.92   | 15.14   | 16.29   | 0.5                 | Pass        |
| 165     | 5825            | 15.24               | 16.07   | 16.01   | 15.75   | 0.5                 | Pass        |

##### 802.11ac (VHT20)

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) |         |         |         | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|---------------------|---------|---------|---------|---------------------|-------------|
|         |                 | Chain 0             | Chain 1 | Chain 2 | Chain 3 |                     |             |
| 149     | 5745            | 17.27               | 16.34   | 17.58   | 16.58   | 0.5                 | Pass        |
| 157     | 5785            | 17.18               | 17.51   | 17.56   | 16.89   | 0.5                 | Pass        |
| 165     | 5825            | 16.02               | 16.56   | 16.94   | 17.31   | 0.5                 | Pass        |

##### 802.11ac (VHT40)

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) |         |         |         | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|---------------------|---------|---------|---------|---------------------|-------------|
|         |                 | Chain 0             | Chain 1 | Chain 2 | Chain 3 |                     |             |
| 151     | 5755            | 35.17               | 33.86   | 33.74   | 33.82   | 0.5                 | Pass        |
| 159     | 5795            | 35.10               | 35.10   | 34.01   | 34.76   | 0.5                 | Pass        |

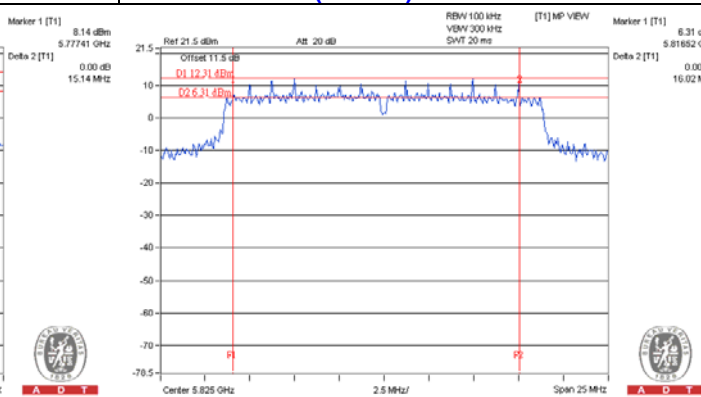
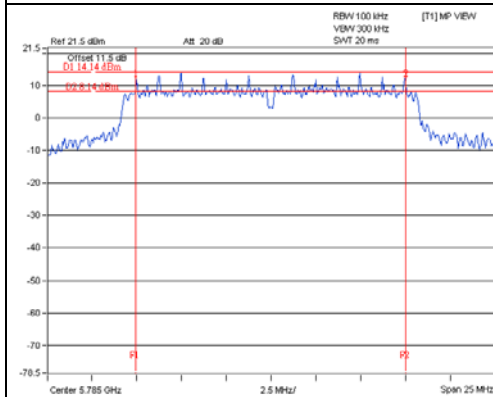
##### 802.11ac (VHT80)

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) |         |         |         | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|---------------------|---------|---------|---------|---------------------|-------------|
|         |                 | Chain 0             | Chain 1 | Chain 2 | Chain 3 |                     |             |
| 155     | 5775            | 75.43               | 75.40   | 75.40   | 75.37   | 0.5                 | Pass        |

# SPECTRUM PLOT OF WORST VALUE

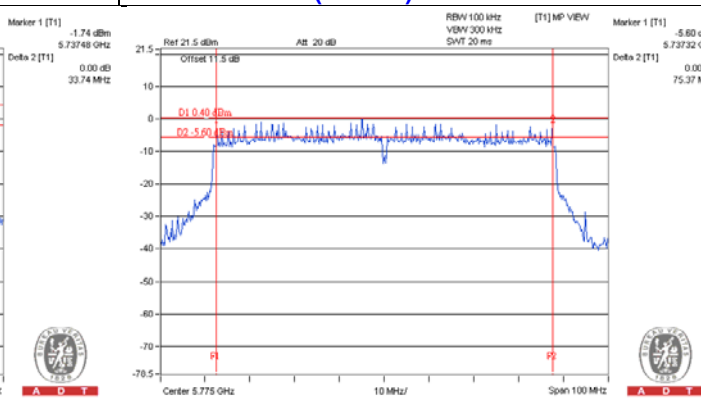
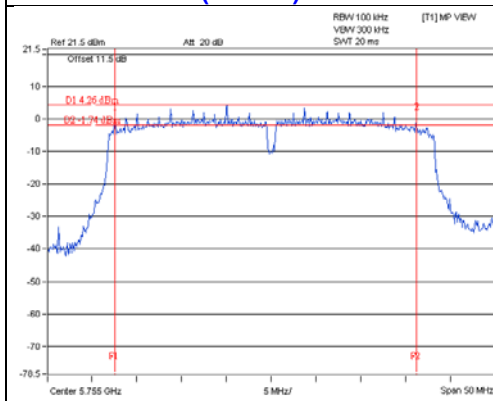
802.11a – Chain 2: CH 157

802.11ac (VHT20) – Chain 0: CH 165



802.11ac (VHT40) – Chain 2: CH 151

802.11ac (VHT80) – Chain 3: CH 155



## 5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

## Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

The address and road map of all our labs can be found in our web site also.

--- END ---