

## Variant FCC Test Report

**Report No.:** RF170425C26A-7

**FCC ID:** MSQZ01KD

**Test Model:** ASUS\_Z01KD

**Received Date:** Aug. 24, 2017

**Test Date:** Sep. 18, 2017 ~ Sep. 19, 2017

**Issued Date:** Nov. 13, 2017

**Applicant:** ASUSTek COMPUTER INC.

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

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( R.O.C )

**Test Location (1):** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan  
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**Test Location (2):** No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan,  
R.O.C



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### Release Control Record

| Issue No.      | Description      | Date Issued   |
|----------------|------------------|---------------|
| RF170425C26A-7 | Original Release | Nov. 13, 2017 |

## 1 Certificate of Conformity

**Product:** ASUS Phone

**Brand:** ASUS

**Test Model:** ASUS\_Z01KD

**Sample Status:** Production Unit

**Applicant:** ASUSTek COMPUTER INC.

**Test Date:** Sep. 18, 2017 ~ Sep. 19, 2017

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

This report is issued as a supplementary report to BV CPS report no.: RF170425C26-8. This report shall be used by combining with its original report.

**Prepared by :** Ivonne Wu , **Date:** Nov. 13, 2017  
Ivonne Wu / Supervisor

**Approved by :** Dylan Chiou , **Date:** Nov. 13, 2017  
Dylan Chiou / Project Engineer

## 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. Minimum passing margin is -16.71 dB at 0.19400 MHz. |
| 15.407(b)(1/2/3/4(i/ii)/6)                     | Radiated Emissions & Band Edge Measurement | Pass   | Meet the requirement of limit. Minimum passing margin is -1.1 dB at 5350.99 MHz.   |
| 15.407(a)(1/2/3)                               | Max Average Transmit Power                 | N/A    | Refer to Note                                                                      |
| 15.407(a)(1/2/3)                               | Peak Power Spectral Density                | N/A    | Refer to Note                                                                      |
| 15.407(e)                                      | 6 dB Bandwidth                             | N/A    | Refer to Note                                                                      |
| 15.407(g)                                      | Frequency Stability                        | N/A    | Refer to Note                                                                      |
| 15.203                                         | Antenna Requirement                        | Pass   | No antenna connector is used.                                                      |

**Note:** Only conducted emission and radiated emissions tests had been performed for the addendum. Refer to original report for other test data.

### 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          | Expanded Uncertainty (k=2) ( $\pm$ ) |
|------------------------------------|--------------------|--------------------------------------|
| Conducted Emissions at mains ports | 150 kHz ~ 30 MHz   | 2.44 dB                              |
| Radiated Emissions up to 1 GHz     | 30 MHz ~ 200 MHz   | 2.0153 dB                            |
|                                    | 200 MHz ~ 1000 MHz | 2.0224 dB                            |
| Radiated Emissions above 1 GHz     | 1 GHz ~ 18 GHz     | 1.0121 dB                            |
|                                    | 18 GHz ~ 40 GHz    | 1.1508 dB                            |

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

|                              |                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product</b>               | ASUS Phone                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Brand</b>                 | ASUS                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Test Model</b>            | ASUS_Z01KD                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>SKU</b>                   | BR/NA/SA-2CA US/BR/CO/PE/CL                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Status of EUT</b>         | Production Unit                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Power Supply Rating</b>   | 5.0 Vdc or 9 Vdc (adapter)<br>5.0 Vdc (host equipment)<br>3.85 Vdc (Li-ion battery)                                                                                                                                                                                                                                                                                                                           |
| <b>Modulation Type</b>       | 256QAM, 64QAM, 16QAM, QPSK, BPSK                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Modulation Technology</b> | OFDM                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Transfer Rate</b>         | 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0 Mbps<br>802.11n: up to MCS7<br>802.11ac: up to V9                                                                                                                                                                                                                                                                                                       |
| <b>Operating Frequency</b>   | 5180 ~ 5240 MHz, 5260 ~ 5320 MHz, 5500 ~ 5700 MHz,<br>5745 ~ 5825 MHz                                                                                                                                                                                                                                                                                                                                         |
| <b>Number of Channel</b>     | 5180 ~ 5240 MHz: 4 for 802.11a, 802.11n (HT20)<br>2 for 802.11n (HT40)<br>1 for 802.11ac (VHT80)<br>5260 ~ 5320 MHz: 4 for 802.11a, 802.11n (HT20)<br>2 for 802.11n (HT40)<br>1 for 802.11ac (VHT80)<br>5500 ~ 5700 MHz: 11 for 802.11a, 802.11n (HT20)<br>5 for 802.11n (HT40)<br>2 for 802.11ac (VHT80)<br>5745 ~ 5825 MHz: 5 for 802.11a, 802.11n (HT20)<br>2 for 802.11n (HT40)<br>1 for 802.11ac (VHT80) |
| <b>Antenna Type</b>          | PIFA antenna with -0.03 dBi gain (5180 ~ 5240 MHz)<br>PIFA antenna with 1.42 dBi gain (5260 ~ 5320 MHz)<br>PIFA antenna with 1.08 dBi gain (5500 ~ 5700 MHz)<br>PIFA antenna with -0.62 dBi gain (5745 ~ 5825 MHz)                                                                                                                                                                                            |
| <b>Antenna Connector</b>     | N/A                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Accessory Device</b>      | Refer to Note as below                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Data Cable Supplied</b>   | Refer to Note as below                                                                                                                                                                                                                                                                                                                                                                                        |

**Note:**

1. This report is issued as a supplementary report to BV CPS report no.: RF170425C26-8. The difference compared with original report is adding 2<sup>nd</sup> source of front camera and rear camera. Therefore, only conducted emission and radiated emissions tests had been performed for this report.
2. The EUT provides one transmitter and receiver.

| Modulation Mode  | Tx Function |
|------------------|-------------|
| 802.11a          | 1TX         |
| 802.11n (HT20)   | 1TX         |
| 802.11n (HT40)   | 1TX         |
| 802.11ac (HT20)  | 1TX         |
| 802.11ac (HT40)  | 1TX         |
| 802.11ac (VHT80) | 1TX         |

\* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for HT20 / HT40, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

3. The EUT's accessories list refers to Ext. Pho.
4. 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 ~ 5240 MHz

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

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

2 channels are provided for 802.11n (HT40):

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

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency (MHz) |
|---------|-----------------|
| 42      | 5210            |

#### For 5260 ~ 5320 MHz

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

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 52      | 5260            | 60      | 5300            |
| 56      | 5280            | 64      | 5320            |

2 channels are provided for 802.11n (HT40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 54      | 5270            | 62      | 5310            |

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency (MHz) |
|---------|-----------------|
| 58      | 5290            |

### For 5500 ~ 5700 MHz

11 channels are provided for 802.11a, 802.11n (HT20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 100     | 5500            | 124     | 5620            |
| 104     | 5520            | 128     | 5640            |
| 108     | 5540            | 132     | 5660            |
| 112     | 5560            | 136     | 5680            |
| 116     | 5580            | 140     | 5700            |
| 120     | 5600            |         |                 |

5 channels are provided for 802.11n (HT40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 102     | 5510            | 126     | 5630            |
| 110     | 5550            | 134     | 5670            |
| 118     | 5590            |         |                 |

2 channels are provided for 802.11ac (VHT80):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 106     | 5530            | 122     | 5610            |

### For 5745 ~ 5825 MHz:

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

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

2 channels are provided for 802.11n (HT40):

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

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency (MHz) |
|---------|-----------------|
| 155     | 5775            |

### 3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT Configure Mode | Applicable To |       |     | Description |
|--------------------|---------------|-------|-----|-------------|
|                    | RE $\geq$ 1G  | RE<1G | PLC |             |
| -                  | √             | √     | √   | -           |

Where **RE $\geq$ 1G**: Radiated Emission above 1 GHz **RE<1G**: Radiated Emission below 1 GHz  
**PLC**: Power Line Conducted Emission

**Note:**

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. "-" means no effect.

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

- ☒ 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.

| EUT Configure Mode | Frequency Band (MHz) | Mode             | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|--------------------|----------------------|------------------|-------------------|----------------|-----------------------|-----------------|------------------|
| -                  | 5180-5240            | 802.11ac (VHT80) | 42                | 42             | OFDM                  | BPSK            | MCS0             |
| -                  | 5260-5320            | 802.11ac (VHT80) | 58                | 58             | OFDM                  | BPSK            | MCS0             |
| -                  | 5500-5700            | 802.11ac (VHT80) | 106 to 122        | 106            | OFDM                  | BPSK            | MCS0             |
| -                  | 5745-5825            | 802.11a          | 149 to 165        | 165            | OFDM                  | BPSK            | 6.0              |

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

- ☒ 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.

| EUT Configure Mode | Frequency Band (MHz) | Mode             | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|--------------------|----------------------|------------------|-------------------|----------------|-----------------------|-----------------|------------------|
| -                  | 5180-5240            | 802.11ac (VHT80) | 42                | 42             | OFDM                  | BPSK            | MCS0             |
| -                  | 5260-5320            | 802.11ac (VHT80) | 58                | 58             | OFDM                  | BPSK            | MCS0             |
| -                  | 5500-5700            | 802.11ac (VHT80) | 106 to 122        | 106            | OFDM                  | BPSK            | MCS0             |
| -                  | 5745-5825            | 802.11a          | 155               | 165            | OFDM                  | BPSK            | 6.0              |

#### **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.

| EUT Configure Mode | Frequency Band (MHz) | Mode             | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|--------------------|----------------------|------------------|-------------------|----------------|-----------------------|-----------------|------------------|
| -                  | 5500-5700            | 802.11ac (VHT80) | 106 to 122        | 106            | OFDM                  | BPSK            | 6.0              |

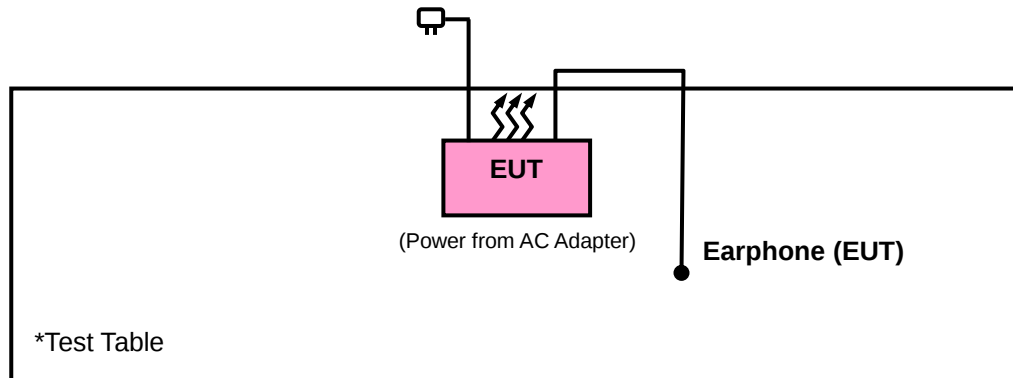
#### **Test Condition:**

| Applicable To | Environmental Conditions | Input Power    | Tested by     |
|---------------|--------------------------|----------------|---------------|
| RE $\geq$ 1G  | 25 deg. C, 65 % RH       | 120 Vac, 60 Hz | Charles Hsiao |
| RE<1G         | 25 deg. C, 65 % RH       | 120 Vac, 60 Hz | Charles Hsiao |
| PLC           | 25 deg. C, 65 % RH       | 120 Vac, 60 Hz | Getaz Yang    |

### 3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

#### 3.3.1 Configuration of System under Test



### 3.4 General Description of Applied Standards

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)**

**789033 D02 General UNII Test Procedures New Rules v01r04**

**644545 D01 Guidance for IEEE 802 11ac v01r02**

ANSI C63.10-2013

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

**Note:** The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC).  
The test report has been issued separately.

## 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. Other emissions shall be at least 20 dB below the highest level of the desired power:

| 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:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, 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 20 dB under any condition of modulation.

#### 4.1.2 Limits of Unwanted Emission Out of the Restricted Bands

| Applicable To                                               |                  | Limit                                                                                                                               |                                                                                                                                           |
|-------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 789033 D02 General UNII Test Procedures<br>New Rules v01r04 |                  | Field Strength at 3 m                                                                                                               |                                                                                                                                           |
|                                                             |                  | PK: 74 (dBμV/m)                                                                                                                     | AV: 54 (dBμV/m)                                                                                                                           |
| Frequency Band                                              | Applicable To    | EIRP Limit                                                                                                                          | Equivalent Field Strength at 3 m                                                                                                          |
| 5150~5250 MHz                                               | 15.407(b)(1)     | PK: -27 (dBm/MHz)                                                                                                                   | PK: 68.2 (dBμV/m)                                                                                                                         |
| 5250~5350 MHz                                               | 15.407(b)(2)     |                                                                                                                                     |                                                                                                                                           |
| 5470~5725 MHz                                               | 15.407(b)(3)     |                                                                                                                                     |                                                                                                                                           |
| 5725~5850 MHz                                               | 15.407(b)(4)(i)  | PK:-27 (dBm/MHz) <sup>*1</sup><br>PK:10 (dBm/MHz) <sup>*2</sup><br>PK:15.6 (dBm/MHz) <sup>*3</sup><br>PK:27 (dBm/MHz) <sup>*4</sup> | PK: 68.2 (dBμV/m) <sup>*1</sup><br>PK:105.2 (dBμV/m) <sup>*2</sup><br>PK: 110.8 (dBμV/m) <sup>*3</sup><br>PK:122.2 (dBμV/m) <sup>*4</sup> |
|                                                             | 15.407(b)(4)(ii) | Emission limits in section 15.247(d)                                                                                                |                                                                                                                                           |

<sup>\*1</sup> beyond 75 MHz or more above of the band edge.

<sup>\*2</sup> below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

<sup>\*3</sup> below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

<sup>\*4</sup> from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

#### Note:

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

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

#### 4.1.3 Test Instruments

| Description & Manufacturer                     | Model No.       | Serial No. | Date of Calibration | Due Date of Calibration |
|------------------------------------------------|-----------------|------------|---------------------|-------------------------|
| Test Receiver<br>Agilent Technologies          | N9038A          | MY52260177 | Jul. 05, 2017       | Jul. 04, 2018           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ           | FSU43           | 101261     | Dec. 13, 2016       | Dec. 12, 2017           |
| HORN Antenna<br>ETS-Lindgren                   | 3117            | 00143293   | Jun. 26, 2017       | Jun. 25, 2018           |
| HORN Antenna<br>SCHWARZBECK                    | BBHA 9170       | 9170-480   | Dec. 14, 2016       | Dec. 13, 2017           |
| Fixed Attenuator<br>Mini-Circuits              | BW-N10W5+       | NA         | Jul. 07, 2017       | Jul. 06, 2018           |
| Bluetooth Tester                               | CBT             | 100980     | Jun. 28, 2017       | Jun. 27, 2019           |
| Loop Antenna                                   | EM-6879         | 269        | Aug. 11, 2017       | Aug. 10, 2018           |
| Preamplifier<br>Agilent                        | 310N            | 187226     | Jun. 23, 2017       | Jun. 22, 2018           |
| Preamplifier<br>Agilent                        | 83017A          | MY39501357 | Jun. 23, 2017       | Jun. 22, 2018           |
| Software<br>BV ADT                             | E3<br>8.130425b | NA         | NA                  | NA                      |
| Antenna Tower<br>MF                            | NA              | NA         | NA                  | NA                      |
| Turn Table<br>MF                               | NA              | NA         | NA                  | NA                      |
| Antenna Tower & Turn<br>Table Controller<br>MF | MF-7802         | NA         | NA                  | NA                      |

- Note: 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450I-1.

#### 4.1.4 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) 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 detected 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:**

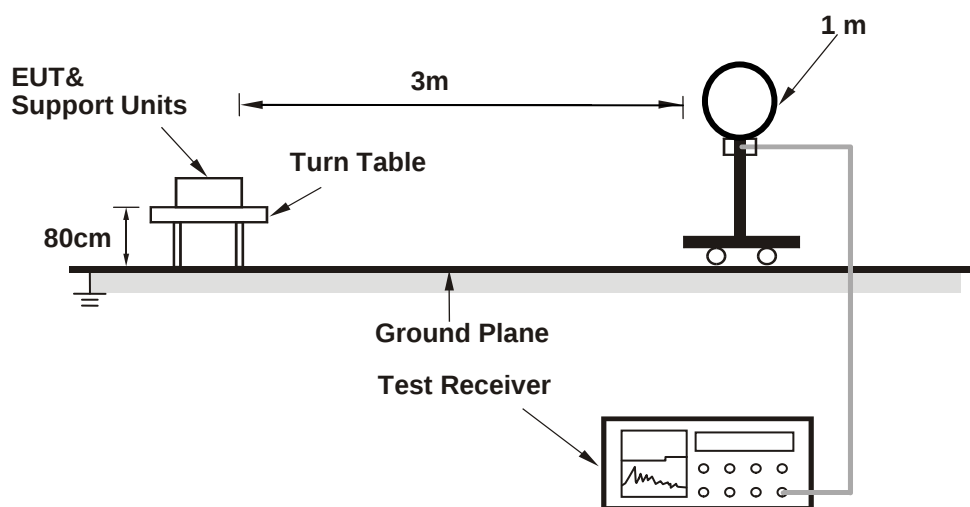
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for Average (Duty cycle < 98 %) detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.5 Deviation from Test Standard

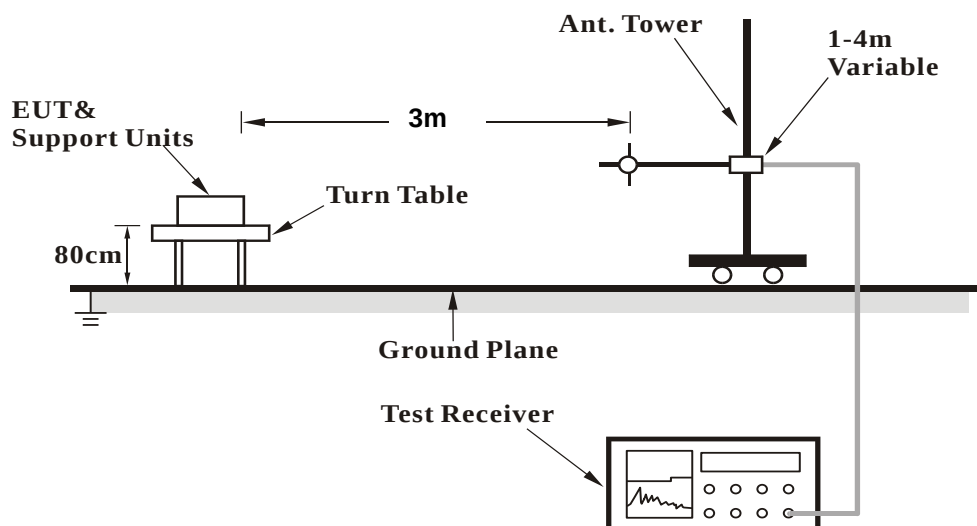
No deviation.

#### 4.1.6 Test Set Up

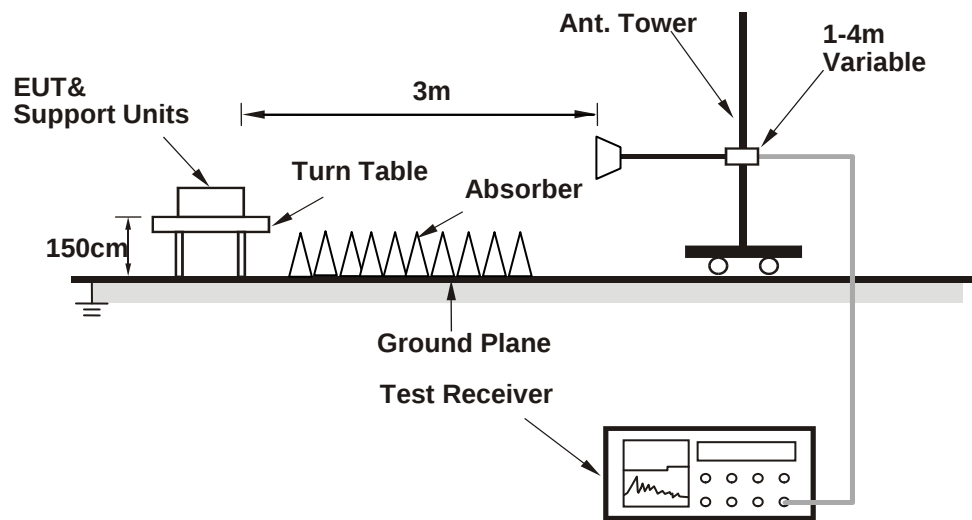
##### <Radiated emission below 30MHz>



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



### <Frequency Range above 1 GHz>



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

#### 4.1.7 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

#### 4.1.8 Test Results

Above 1 GHz Data :

802.11ac (VHT80)

| EUT Test Condition       |                    | Measurement Detail |                           |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel                  | Channel 42         | Frequency Range    | 1 GHz ~ 40 GHz            |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Charles Hsiao             |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 5149.4                                              | 52.12                   | 43.87             | 54             | -1.88       | 34.12                 | 8.13            | 34                 | 218                 | 301                  | Average |
| 5149.4                                              | 62.99                   | 54.74             | 74             | -11.01      | 34.12                 | 8.13            | 34                 | 218                 | 301                  | Peak    |
| 5210                                                | 92.58                   | 84.22             |                |             | 34.17                 | 8.19            | 34                 | 218                 | 301                  | Average |
| 5210                                                | 99.03                   | 90.67             |                |             | 34.17                 | 8.19            | 34                 | 218                 | 301                  | Peak    |
| 5358.03                                             | 44.34                   | 35.71             | 54             | -9.66       | 34.28                 | 8.38            | 34.03              | 218                 | 301                  | Average |
| 5358.03                                             | 55.08                   | 46.45             | 74             | -18.92      | 34.28                 | 8.38            | 34.03              | 218                 | 301                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 5149.55                                             | 49.45                   | 41.2              | 54             | -4.55       | 34.12                 | 8.13            | 34                 | 110                 | 260                  | Average |
| 5149.55                                             | 59.19                   | 50.94             | 74             | -14.81      | 34.12                 | 8.13            | 34                 | 110                 | 260                  | Peak    |
| 5210                                                | 88.62                   | 80.26             |                |             | 34.17                 | 8.19            | 34                 | 110                 | 260                  | Average |
| 5210                                                | 95.65                   | 87.29             |                |             | 34.17                 | 8.19            | 34                 | 110                 | 260                  | Peak    |
| 5360.34                                             | 43.7                    | 35.07             | 54             | -10.3       | 34.28                 | 8.38            | 34.03              | 110                 | 260                  | Average |
| 5360.34                                             | 54.48                   | 45.85             | 74             | -19.52      | 34.28                 | 8.38            | 34.03              | 110                 | 260                  | Peak    |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5210 MHz: Fundamental Frequency

# 802.11ac (VHT80)

| EUT Test Condition       |                    | Measurement Detail |                           |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel                  | Channel 58         | Frequency Range    | 1 GHz ~ 40 GHz            |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Charles Hsiao             |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 5125.4                                              | 43.71                   | 35.49             | 54             | -10.29      | 34.11                 | 8.1             | 33.99              | 212                 | 296                  | Average |
| 5125.4                                              | 54.28                   | 46.06             | 74             | -19.72      | 34.11                 | 8.1             | 33.99              | 212                 | 296                  | Peak    |
| 5290                                                | 93.65                   | 85.12             |                |             | 34.23                 | 8.32            | 34.02              | 212                 | 296                  | Average |
| 5290                                                | 100.63                  | 92.1              |                |             | 34.23                 | 8.32            | 34.02              | 212                 | 296                  | Peak    |
| 5350.99                                             | 52.9                    | 44.27             | 54             | -1.1        | 34.28                 | 8.38            | 34.03              | 212                 | 296                  | Average |
| 5350.99                                             | 67.81                   | 59.18             | 74             | -6.19       | 34.28                 | 8.38            | 34.03              | 212                 | 296                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 5057.15                                             | 43.56                   | 35.46             | 54             | -10.44      | 34.05                 | 8.03            | 33.98              | 100                 | 245                  | Average |
| 5057.15                                             | 53.74                   | 45.64             | 74             | -20.26      | 34.05                 | 8.03            | 33.98              | 100                 | 245                  | Peak    |
| 5290                                                | 90.65                   | 82.12             |                |             | 34.23                 | 8.32            | 34.02              | 100                 | 245                  | Average |
| 5290                                                | 97.12                   | 88.59             |                |             | 34.23                 | 8.32            | 34.02              | 100                 | 245                  | Peak    |
| 5350.11                                             | 48.78                   | 40.15             | 54             | -5.22       | 34.28                 | 8.38            | 34.03              | 100                 | 245                  | Average |
| 5350.11                                             | 60.4                    | 51.77             | 74             | -13.6       | 34.28                 | 8.38            | 34.03              | 100                 | 245                  | Peak    |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5290 MHz: Fundamental Frequency

# 802.11ac (VHT80)

| EUT Test Condition       |                    | Measurement Detail |                           |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel                  | Channel 106        | Frequency Range    | 1 GHz ~ 40 GHz            |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Charles Hsiao             |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 5460                                                | 50.85                   | 42.03             | 54             | -3.15       | 34.36                 | 8.51            | 34.05              | 169                 | 185                  | Average |
| 5460                                                | 60.89                   | 52.07             | 74             | -13.11      | 34.36                 | 8.51            | 34.05              | 159                 | 148                  | Peak    |
| *5469.25                                            | 51.24                   | 42.41             | 54             | -2.76       | 34.37                 | 8.51            | 34.05              | 169                 | 185                  | Average |
| *5469.25                                            | 61.85                   | 53.02             | 74             | -12.15      | 34.37                 | 8.51            | 34.05              | 159                 | 148                  | Peak    |
| 5530                                                | 93.12                   | 84.19             |                |             | 34.42                 | 8.58            | 34.07              | 113                 | 254                  | Average |
| 5530                                                | 99.86                   | 90.93             |                |             | 34.42                 | 8.58            | 34.07              | 113                 | 254                  | Peak    |
| *5725.08                                            | 43.25                   | 34.09             | 54             | -10.75      | 34.62                 | 8.65            | 34.11              | 166                 | 195                  | Average |
| *5725.08                                            | 52.49                   | 43.33             | 74             | -21.51      | 34.62                 | 8.65            | 34.11              | 166                 | 195                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 5460                                                | 47.21                   | 38.39             | 54             | -6.79       | 34.36                 | 8.51            | 34.05              | 119                 | 125                  | Average |
| 5460                                                | 55.84                   | 47.02             | 74             | -18.16      | 34.36                 | 8.51            | 34.05              | 114                 | 152                  | Peak    |
| *5469.11                                            | 49.24                   | 40.41             | 54             | -4.76       | 34.37                 | 8.51            | 34.05              | 119                 | 125                  | Average |
| *5469.11                                            | 57.17                   | 48.34             | 74             | -16.83      | 34.37                 | 8.51            | 34.05              | 114                 | 152                  | Peak    |
| 5530                                                | 89.15                   | 80.22             |                |             | 34.42                 | 8.58            | 34.07              | 157                 | 184                  | Average |
| 5530                                                | 96.42                   | 87.49             |                |             | 34.42                 | 8.58            | 34.07              | 157                 | 184                  | Peak    |
| *5726.33                                            | 41.57                   | 32.41             | 54             | -12.43      | 34.62                 | 8.65            | 34.11              | 158                 | 174                  | Average |
| *5726.33                                            | 50.56                   | 41.4              | 74             | -23.44      | 34.62                 | 8.65            | 34.11              | 158                 | 174                  | Peak    |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5530 MHz: Fundamental Frequency
- \*: Out of Restricted Band

## 802.11a

| EUT Test Condition       |                    | Measurement Detail |                           |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel                  | Channel 165        | Frequency Range    | 1 GHz ~ 40 GHz            |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Charles Hsiao             |

### <Spurious Emission>

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 5825                                                | 99.62                   | 90.33             |                |             | 34.73                 | 8.69            | 34.13              | 200                 | 292                  | Average |
| 5825                                                | 106.65                  | 97.36             |                |             | 34.73                 | 8.69            | 34.13              | 200                 | 292                  | Peak    |
| 11650                                               | 46.55                   | 31.02             | 54             | -7.45       | 38.09                 | 12.8            | 35.36              | 155                 | 125                  | Average |
| 11650                                               | 55.41                   | 39.88             | 74             | -18.59      | 38.09                 | 12.8            | 35.36              | 155                 | 125                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 5825                                                | 95.42                   | 86.13             |                |             | 34.73                 | 8.69            | 34.13              | 100                 | 173                  | Average |
| 5825                                                | 102.2                   | 92.91             |                |             | 34.73                 | 8.69            | 34.13              | 100                 | 173                  | Peak    |
| 11650                                               | 47.1                    | 31.57             | 54             | -6.9        | 38.09                 | 12.8            | 35.36              | 136                 | 152                  | Average |
| 11650                                               | 56.42                   | 40.89             | 74             | -17.58      | 38.09                 | 12.8            | 35.36              | 136                 | 152                  | Peak    |

### <Out of Band Emission (OOBE)>

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |        |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|--------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| *5640.175                                           | 54.5                    | 45.43             | 68.2           | -13.7       | 34.54                 | 8.62            | 34.09              | 200                 | 292                  | Peak   |
| 5654.35                                             | 54.04                   | 44.95             | 71.42          | -17.38      | 34.56                 | 8.63            | 34.1               | 200                 | 292                  | Peak   |
| 5920                                                | 52.81                   | 43.43             | 71.9           | -19.09      | 34.81                 | 8.73            | 34.16              | 200                 | 292                  | Peak   |
| *5989.825                                           | 54.48                   | 45                | 68.2           | -13.72      | 34.9                  | 8.75            | 34.17              | 200                 | 292                  | Peak   |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |        |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| *5599.75                                            | 54.49                   | 45.47             | 68.2           | -13.71      | 34.5                  | 8.6             | 34.08              | 100                 | 173                  | Peak   |
| 5655.4                                              | 52.82                   | 43.73             | 72.2           | -19.38      | 34.56                 | 8.63            | 34.1               | 100                 | 173                  | Peak   |
| 5919.475                                            | 52.27                   | 42.89             | 72.29          | -20.02      | 34.81                 | 8.73            | 34.16              | 100                 | 173                  | Peak   |
| *5986.15                                            | 54.72                   | 45.26             | 68.2           | -13.48      | 34.88                 | 8.75            | 34.17              | 100                 | 173                  | Peak   |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5825 MHz: Fundamental Frequency
- \*: Out of Restricted Band

## 9 kHz ~ 30 MHz DATA:

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

## 30 MHz ~ 1 GHz WORST-CASE DATA:

### 802.11ac (VHT80)

| EUT Test Condition       |                    | Measurement Detail |                              |
|--------------------------|--------------------|--------------------|------------------------------|
| Channel                  | Channel 42         | Frequency Range    | 30 MHz ~ 1 GHz               |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Quasi-peak (QP) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Charles Hsiao                |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |        |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|--------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 96.15                                               | 24.86                   | 43.87             | 43.5           | -18.64      | 11.75                 | 1.28            | 32.04              | 165                 | 115                  | Peak   |
| 144.75                                              | 17.12                   | 39.63             | 43.5           | -26.38      | 8.38                  | 1.38            | 32.27              | 138                 | 120                  | Peak   |
| 210.9                                               | 16.03                   | 35.48             | 43.5           | -27.47      | 11.16                 | 1.65            | 32.26              | 180                 | 9                    | Peak   |
| 486.2                                               | 15.24                   | 28.57             | 46             | -30.76      | 16.15                 | 2.63            | 32.11              | 185                 | 75                   | Peak   |
| 574.4                                               | 16.44                   | 28.28             | 46             | -29.56      | 17.54                 | 2.82            | 32.2               | 105                 | 14                   | Peak   |
| 849.5                                               | 22.65                   | 29.99             | 46             | -23.35      | 21.02                 | 3.44            | 31.8               | 154                 | 227                  | Peak   |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |        |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 33.78                                               | 28.22                   | 47.89             | 40             | -11.78      | 11.83                 | 0.74            | 32.24              | 154                 | 224                  | Peak   |
| 80.22                                               | 24.89                   | 47.77             | 40             | -15.11      | 8.22                  | 1.11            | 32.21              | 160                 | 332                  | Peak   |
| 201.99                                              | 9.09                    | 28.64             | 43.5           | -34.41      | 11.09                 | 1.65            | 32.29              | 187                 | 199                  | Peak   |
| 473.6                                               | 19.88                   | 33.49             | 46             | -26.12      | 15.95                 | 2.56            | 32.12              | 106                 | 29                   | Peak   |
| 668.9                                               | 18.47                   | 28.79             | 46             | -27.53      | 18.76                 | 3.05            | 32.13              | 114                 | 154                  | Peak   |
| 800.5                                               | 20.73                   | 29.14             | 46             | -25.27      | 20.33                 | 3.32            | 32.06              | 127                 | 207                  | Peak   |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value

# 802.11ac (VHT80)

| EUT Test Condition       |                    | Measurement Detail |                              |
|--------------------------|--------------------|--------------------|------------------------------|
| Channel                  | Channel 58         | Frequency Range    | 30 MHz ~ 1 GHz               |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Quasi-peak (QP) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Charles Hsiao                |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |        |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|--------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 95.61                                               | 27.08                   | 46.09             | 43.5           | -16.42      | 11.75                 | 1.28            | 32.04              | 157                 | 270                  | Peak   |
| 184.17                                              | 16.48                   | 37                | 43.5           | -27.02      | 10.11                 | 1.61            | 32.24              | 164                 | 360                  | Peak   |
| 243.3                                               | 15.1                    | 33.2              | 46             | -30.9       | 12.17                 | 1.85            | 32.12              | 199                 | 198                  | Peak   |
| 553.4                                               | 15.44                   | 27.72             | 46             | -30.56      | 17.16                 | 2.76            | 32.2               | 154                 | 173                  | Peak   |
| 678.7                                               | 19.44                   | 29.59             | 46             | -26.56      | 18.91                 | 3.05            | 32.11              | 120                 | 129                  | Peak   |
| 847.4                                               | 20.79                   | 28.23             | 46             | -25.21      | 20.99                 | 3.38            | 31.81              | 124                 | 227                  | Peak   |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |        |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 47.55                                               | 21.82                   | 38.63             | 40             | -18.18      | 14.51                 | 0.9             | 32.22              | 124                 | 222                  | Peak   |
| 82.11                                               | 26.78                   | 49.17             | 40             | -13.22      | 8.61                  | 1.11            | 32.11              | 186                 | 19                   | Peak   |
| 174.72                                              | 10.72                   | 31.97             | 43.5           | -32.78      | 9.38                  | 1.61            | 32.24              | 174                 | 104                  | Peak   |
| 558.3                                               | 16.32                   | 28.5              | 46             | -29.68      | 17.26                 | 2.76            | 32.2               | 161                 | 310                  | Peak   |
| 689.2                                               | 18.85                   | 28.82             | 46             | -27.15      | 19.08                 | 3.05            | 32.1               | 190                 | 275                  | Peak   |
| 854.4                                               | 22.33                   | 29.57             | 46             | -23.67      | 21.08                 | 3.44            | 31.76              | 125                 | 333                  | Peak   |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value

# 802.11ac (VHT80)

| EUT Test Condition       |                    | Measurement Detail |                              |
|--------------------------|--------------------|--------------------|------------------------------|
| Channel                  | Channel 106        | Frequency Range    | 30 MHz ~ 1 GHz               |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Quasi-peak (QP) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Charles Hsiao                |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |        |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|--------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 102.36                                              | 22.04                   | 40.66             | 43.5           | -21.46      | 12.36                 | 1.28            | 32.26              | 127                 | 229                  | Peak   |
| 145.02                                              | 15.71                   | 38.23             | 43.5           | -27.79      | 8.37                  | 1.38            | 32.27              | 105                 | 104                  | Peak   |
| 243.84                                              | 14.41                   | 32.51             | 46             | -31.59      | 12.17                 | 1.85            | 32.12              | 191                 | 124                  | Peak   |
| 587.7                                               | 16.71                   | 28.33             | 46             | -29.29      | 17.75                 | 2.82            | 32.19              | 160                 | 330                  | Peak   |
| 712.3                                               | 19.49                   | 29.08             | 46             | -26.51      | 19.4                  | 3.11            | 32.1               | 197                 | 198                  | Peak   |
| 853                                                 | 21.81                   | 29.09             | 46             | -24.19      | 21.06                 | 3.44            | 31.78              | 124                 | 111                  | Peak   |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |        |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 57.27                                               | 23.6                    | 41.1              | 40             | -16.4       | 13.83                 | 0.9             | 32.23              | 128                 | 123                  | Peak   |
| 86.16                                               | 24.2                    | 45.56             | 40             | -15.8       | 9.44                  | 1.11            | 31.91              | 180                 | 197                  | Peak   |
| 192.27                                              | 9.02                    | 28.92             | 43.5           | -34.48      | 10.75                 | 1.61            | 32.26              | 164                 | 107                  | Peak   |
| 549.2                                               | 16.11                   | 28.49             | 46             | -29.89      | 17.06                 | 2.76            | 32.2               | 134                 | 111                  | Peak   |
| 605.9                                               | 16.91                   | 28.24             | 46             | -29.09      | 17.99                 | 2.87            | 32.19              | 197                 | 266                  | Peak   |
| 721.4                                               | 19.33                   | 28.75             | 46             | -26.67      | 19.53                 | 3.16            | 32.11              | 127                 | 195                  | Peak   |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value

# 802.11a

| EUT Test Condition       |                    | Measurement Detail |                              |
|--------------------------|--------------------|--------------------|------------------------------|
| Channel                  | Channel 165        | Frequency Range    | 30 MHz ~ 1 GHz               |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Quasi-peak (QP) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Charles Hsiao                |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |        |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|--------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 91.83                                               | 28.32                   | 48.11             | 43.5           | -15.18      | 10.92                 | 1.11            | 31.82              | 124                 | 222                  | Peak   |
| 178.5                                               | 18.01                   | 39.02             | 43.5           | -25.49      | 9.62                  | 1.61            | 32.24              | 190                 | 190                  | Peak   |
| 244.38                                              | 14.09                   | 32.17             | 46             | -31.91      | 12.19                 | 1.85            | 32.12              | 164                 | 355                  | Peak   |
| 545.7                                               | 16.42                   | 28.85             | 46             | -29.58      | 17                    | 2.76            | 32.19              | 124                 | 90                   | Peak   |
| 647.9                                               | 18.5                    | 29.25             | 46             | -27.5       | 18.41                 | 2.99            | 32.15              | 108                 | 1                    | Peak   |
| 827.8                                               | 21.82                   | 29.61             | 46             | -24.18      | 20.74                 | 3.38            | 31.91              | 187                 | 219                  | Peak   |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |        |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 32.97                                               | 31.85                   | 51.62             | 40             | -8.15       | 11.74                 | 0.74            | 32.25              | 138                 | 325                  | Peak   |
| 77.79                                               | 23.08                   | 45.86             | 40             | -16.92      | 8.33                  | 1.11            | 32.22              | 198                 | 21                   | Peak   |
| 92.64                                               | 21.69                   | 41.3              | 43.5           | -21.81      | 11.16                 | 1.11            | 31.88              | 114                 | 131                  | Peak   |
| 462.4                                               | 14.71                   | 28.52             | 46             | -31.29      | 15.76                 | 2.56            | 32.13              | 177                 | 132                  | Peak   |
| 650                                                 | 17.69                   | 28.41             | 46             | -28.31      | 18.44                 | 2.99            | 32.15              | 157                 | 205                  | Peak   |
| 762                                                 | 19.84                   | 28.8              | 46             | -26.16      | 19.94                 | 3.22            | 32.12              | 199                 | 346                  | Peak   |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
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 0.50 MHz.

### 4.2.2 Test Instruments

| Description & Manufacturer                  | Model No.                | Serial No.     | Date Of Calibration | Due Date Of Calibration |
|---------------------------------------------|--------------------------|----------------|---------------------|-------------------------|
| Test Receiver<br>ROHDE & SCHWARZ            | ESCI                     | 100613         | Nov. 21, 2016       | Nov. 20, 2017           |
| RF signal cable (with<br>10dB PAD)<br>Woken | 5D-FB                    | Cable-cond1-01 | Sep. 05, 2017       | Sep. 04, 2018           |
| LISN/AMN<br>ROHDE & SCHWARZ<br>(EUT)        | ESH3-Z5                  | 835239/001     | Mar. 10, 2017       | Mar. 09, 2018           |
| LISN/AMN<br>ROHDE & SCHWARZ<br>(Peripheral) | ESH3-Z5                  | 100311         | Aug. 15, 2017       | Aug. 14, 2018           |
| Software<br>ADT                             | BV ADT_Cond_<br>V7.3.7.3 | 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 HwaYa Shielded Room 1.
  3. The VCCI Site Registration No. is C-2040.

#### 4.2.3 Test Procedures

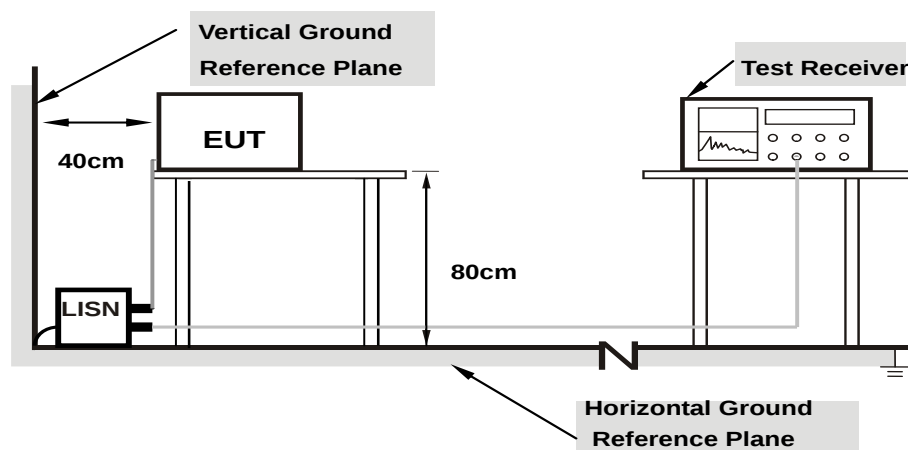
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit -20 dB) 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 Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

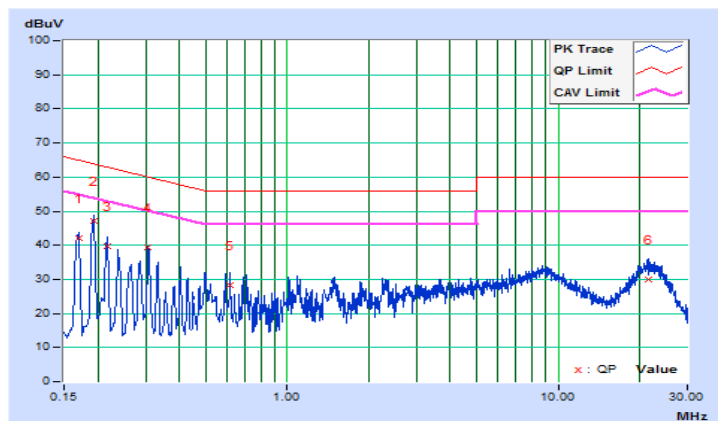
#### 4.2.7 Test Results

|                 |                |                                          |                                      |
|-----------------|----------------|------------------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power     | 120Vac, 60Hz   | Environmental Conditions                 | 25°C, 65%RH                          |
| Tested by       | Getaz Yang     | Test Date                                | 2017/9/19                            |

| 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                         | 0.16977         | 10.39                  | 31.76                | 16.11 | 42.15                 | 26.50 | 64.97        | 54.97 | -22.82      | -28.47 |
| 2                         | 0.19400         | 10.39                  | 36.76                | 20.33 | 47.15                 | 30.72 | 63.86        | 53.86 | -16.71      | -23.14 |
| 3                         | 0.21800         | 10.40                  | 29.36                | 14.64 | 39.76                 | 25.04 | 62.89        | 52.89 | -23.13      | -27.85 |
| 4                         | 0.30630         | 10.40                  | 28.89                | 12.78 | 39.29                 | 23.18 | 60.07        | 50.07 | -20.78      | -26.89 |
| 5                         | 0.61407         | 10.41                  | 17.77                | 5.11  | 28.18                 | 15.52 | 56.00        | 46.00 | -27.82      | -30.48 |
| 6                         | 21.67400        | 11.42                  | 18.71                | 9.41  | 30.13                 | 20.83 | 60.00        | 50.00 | -29.87      | -29.17 |

#### 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

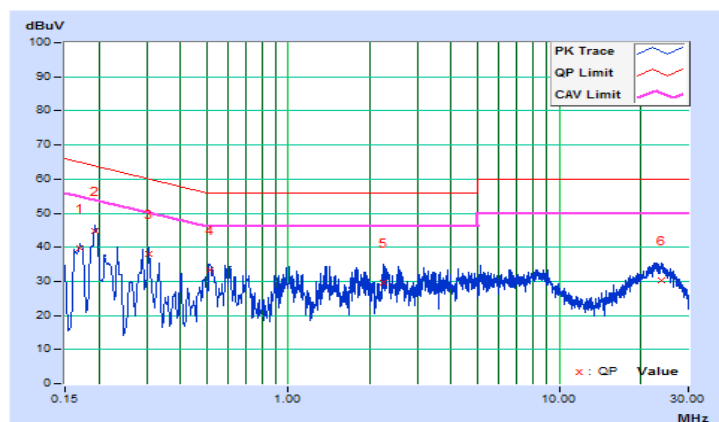


|                 |                |                                          |                                      |
|-----------------|----------------|------------------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power     | 120Vac, 60Hz   | Environmental Conditions                 | 25°C, 65%RH                          |
| Tested by       | Getaz Yang     | Test Date                                | 2017/9/19                            |

| 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                            | 0.17000         | 10.16                  | 29.41                | 14.90 | 39.57                 | 25.06 | 64.96        | 54.96 | -25.39      | -29.90 |
| 2                            | 0.19418         | 10.16                  | 34.71                | 20.05 | 44.87                 | 30.21 | 63.86        | 53.86 | -18.99      | -23.65 |
| 3                            | 0.30600         | 10.17                  | 27.71                | 14.47 | 37.88                 | 24.64 | 60.08        | 50.08 | -22.20      | -25.44 |
| 4                            | 0.51200         | 10.17                  | 23.28                | 14.43 | 33.45                 | 24.60 | 56.00        | 46.00 | -22.55      | -21.40 |
| 5                            | 2.24600         | 10.25                  | 19.48                | 10.31 | 29.73                 | 20.56 | 56.00        | 46.00 | -26.27      | -25.44 |
| 6                            | 23.77400        | 11.07                  | 19.40                | 12.81 | 30.47                 | 23.88 | 60.00        | 50.00 | -29.53      | -26.12 |

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

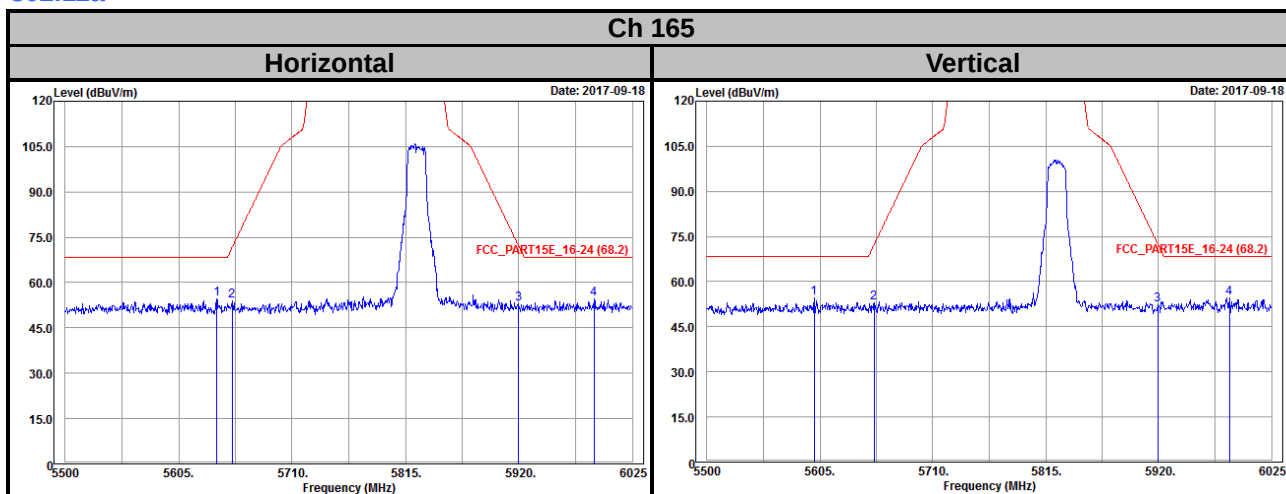


## 5 Pictures of Test Arrangements

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

## Annex A- Radiated Out of Band Emisison (OOBE) Measurement (For U-NII-3 band)

802.11a



## 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 FCC recognized accredited test firms and 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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The address and road map of all our labs can be found in our web site also.

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