

## FCC 15.407 NII 5GHz Test Report

for

**Qisda Corporation**

**157, Shan-Ying Road, Gueishan,  
Taoyuan 333, Taiwan, R.O.C.**

**Product Name : LCD Monitor**  
**Model Name : (1)HSD-0015-Q (2)OMEN X 65  
(3)Omen X Emperium 65  
Display (4)OMEN X Emperium  
65 with NVIDIA G-SYNC HDR  
(5)OMEN X Emperium 65 Big  
Format Gaming Display with  
NVIDIA G-SYNC HDR**  
**Brand : HP**  
**REF. No. : RL-24029, RL-24472**  
**FCC ID : VRSHSD-0015-Q**

**Prepared by : AUDIX Technology Corporation,  
EMC Department**



The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

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APPENDIX A TEST DATA AND PLOTS  
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## TEST REPORT CERTIFICATION

Applicant : Qisda Corporation  
Manufacturer : Qisda Corporation  
Factory #1 : Qisda (Suzhou) Co., Ltd.  
Factory #2 : Qisda Czech s.r.o.  
Factory #3 : Qisda Czech s.r.o.  
Factory #4 : Qisda Optronics (Suzhou) Co., Ltd.  
Factory #5 : Shanghai Hewlett-Packard Co., Ltd.  
Factory #6 : HP Singapore Personal Service Division Asia.  
Factory #7 : Hewlett-Packard Company

EUT Description

(1) Product : LCD Monitor  
(2) Model : (1)HSD-0015-Q (2)OMEN X 65 (3)Omen X Emperium 65 Display  
(4)OMEN X Emperium 65 with NVIDIA G-SYNC HDR  
(5)OMEN X Emperium 65 Big Format Gaming Display with  
NVIDIA G-SYNC HDR  
(3) Brand : HP  
(4) Ref. No : RL-24029, RL-24472  
(5) Power Rating : AC 100-240V, 50/60Hz

### Applicable Standards:

47CFR FCC Part 15 Subpart E  
ANSI C63.10:2013  
KDB 789033 D02 General UNII Test Procedures New Rules v02r01

**Audix Technology Corp.** tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

**Audix Technology Corp.** does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2018. 11.28

Reviewed by: Annie Yu (Annie Yu/Administrator)

Approved by: Ben Cheng (Ben Cheng/Manager)

## 1. REVISION RECORD OF TEST REPORT

| Edition No | Issued Date  | Revision Summary | Report Number |
|------------|--------------|------------------|---------------|
| 0          | 2018. 11. 28 | Original Report  | EM-F180514    |

## 2. SUMMARY OF TEST RESULTS

| Rule                   | Description   | Results    |
|------------------------|---|------------|
| 15.207                 | Conducted Emission                                      | PASS       |
| 15.205/15.209          | Radiated Band Edge and<br>Radiated Spurious Emission    | PASS       |
| 15.407(a)(5)/15.407(e) | Emission Bandwidth Measurement                          | PASS       |
| 15.407(a)              | Maximum Output Power                                    | PASS       |
| 15.407(b)              | Conducted Band Edges and<br>Conducted Spurious Emission | PASS       |
| 15.407(a)              | Power Spectral Density                                  | PASS       |
| 15.203                 | Antenna Requirement                                     | Compliance |
| 15.407                 | Frequency Stability                                     | PASS       |

### 3. GENERAL INFORMATION

#### 3.1. Description of Application

|              |  |
|--------------|--|
| Applicant    | Qisda Corporation<br>157, Shan-Ying Road, Gueishan, Taoyuan 333, Taiwan, R.O.C.  |
| Manufacturer | Qisda Corporation<br>NO. 157 & 159, SHANYING RD., GUEISHAN DIST., TAOYUAN CITY 33341, TAIWAN, R.O.C.   |
| Factory #1   | Qisda (Suzhou) Co., Ltd.<br>No. 169, Zhujiang Road, New District, Suzhou, Jiangsu Province, P.R. China   |
| Factory #2   | Qisda Czech s.r.o.<br>Turanka 114, 62700 BmoSlatina Czech Republic   |
| Factory #3   | Qisda Czech s.r.o.<br>Turanka 98B, 62700 BmoSlatina Czech Republic   |
| Factory #4   | Qisda Optronics(Suzhou)Co., Ltd<br>No. 169, Zhujiang Road, New District, Suzhou, Jiangsu Province, P.R. China  |
| Factory #5   | Shanghai Hewlett-Packard Co., Ltd.<br>25 Yun Qiao Rd., Pudong, 201206 Shanghai, China.   |
| Factory #6   | HP Singapore Personal Service Division Asia.<br>452 ALEXSNDRA ROAD SINGAPORE 119961  |
| Factory #7   | Hewlett-Packard Company<br>11445 Compaq Center Drive West Houston, TX77070, U.S.A.   |
| Product      | LCD Monitor  |
| Brand        | HP   |
| Model        | (1)HSD-0015-Q (2)OMEN X 65 (3)Omen X Emperium 65 Display (4)OMEN X Emperium 65 with NVIDIA G-SYNC HDR (5)OMEN X Emperium 65 Big Format Gaming Display with NVIDIA G-SYNC HDR<br>The difference between above models is in sales marketing. |

### 3.2. Description of EUT

| Test Model                      | HSD-0015-Q  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
|---------------------------------|---|---------|--|---------|------|---------|------|--------------|------|--------|------|------------|--|---------|------|---------------------------------|------|---------------------------------|------|----------------|------|
| Serial Number                   | N/A   |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| Power Rating                    | AC 100-240, 50/60Hz   |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| RF Features                     | WLAN:802.11a/b/g/n/ac<br>Bluetooth: BT and BLE  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| Transmit Type                   | <table border="1"> <thead> <tr> <th colspan="2">2.4 GHz</th> </tr> </thead> <tbody> <tr> <td>802.11b</td> <td>1T1R</td> </tr> <tr> <td>802.11g</td> <td>1T1R</td> </tr> <tr> <td>802.11n-HT20</td> <td>2T2R</td> </tr> <tr> <td>BT/BLE</td> <td>1T1R</td> </tr> <tr> <th colspan="2">UNII Bands</th> </tr> <tr> <td>802.11a</td> <td>1T1R</td> </tr> <tr> <td>802.11n-HT20/<br/>802.11ac-VHT20</td> <td>2T2R</td> </tr> <tr> <td>802.11n-HT40/<br/>802.11ac-VHT40</td> <td>2T2R</td> </tr> <tr> <td>802.11ac-VHT80</td> <td>2T2R</td> </tr> </tbody> </table> | 2.4 GHz |  | 802.11b | 1T1R | 802.11g | 1T1R | 802.11n-HT20 | 2T2R | BT/BLE | 1T1R | UNII Bands |  | 802.11a | 1T1R | 802.11n-HT20/<br>802.11ac-VHT20 | 2T2R | 802.11n-HT40/<br>802.11ac-VHT40 | 2T2R | 802.11ac-VHT80 | 2T2R |
| 2.4 GHz                         |   |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| 802.11b                         | 1T1R  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| 802.11g                         | 1T1R  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| 802.11n-HT20                    | 2T2R  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| BT/BLE                          | 1T1R  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| UNII Bands                      |   |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| 802.11a                         | 1T1R  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| 802.11n-HT20/<br>802.11ac-VHT20 | 2T2R  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| 802.11n-HT40/<br>802.11ac-VHT40 | 2T2R  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| 802.11ac-VHT80                  | 2T2R  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| Device Category                 | <input type="checkbox"/> Outdoor Access Point<br><input type="checkbox"/> Fixed point-to-point Access Point<br><input type="checkbox"/> Indoor Access Point<br><input checked="" type="checkbox"/> Mobile and Portable client device  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| Sample Status                   | Production  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| Date of Receipt                 | 2018. 09. 29  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| Date of Test                    | 2018. 10. 08 ~ 11. 20   |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| Interface Ports of EUT          | <p><b>Left Side View</b></p> <ul style="list-style-type: none"> <li>• One RJ-45 Port</li> <li>• Two USB Type A Down Stream Ports</li> <li>• One Display Port</li> <li>• Two HDMI Ports</li> <li>• One HDMI (ARC) Port</li> <li>• One S/PDIF Port</li> <li>• One Headphone out Port</li> </ul> <p><b>Right Side View</b></p> <ul style="list-style-type: none"> <li>• Two USB Type A Charge Port</li> </ul> <p><b>Back View</b></p> <ul style="list-style-type: none"> <li>• One DC In Port</li> </ul>   |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |
| Accessories Supplied            | <ul style="list-style-type: none"> <li>• Display Cable</li> <li>• HDMI Cable</li> <li>• AC Power Cord (3C)</li> <li>• SHIELD Remote (FCC ID:VOB -P2930/IC: 7361A-P2930)</li> </ul>  |         |  |         |      |         |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |



### 3.3. Antenna Information

| 2.4G Antenna |                        |             |              |                 |                |
|--------------|------------------------|-------------|--------------|-----------------|----------------|
| No.          | Antenna Part Number    | Manufacture | Antenna Type | Frequency (MHz) | Max Gain (dBi) |
| 1            | AEM6Y-100000<br>(Main) | ACON        | PIFA         | 2400            | -0.07          |
|              |                        |             |              | 2450            | -0.42          |
|              |                        |             |              | 2500            | -0.57          |
| 2            | AEM6Y-100001<br>(AUX)  | ACON        | PIFA         | 2400            | 2.73           |
|              |                        |             |              | 2450            | 2.43           |
|              |                        |             |              | 2500            | 2.53           |

| 5G Antenna |                        |             |              |                 |                |
|------------|------------------------|-------------|--------------|-----------------|----------------|
| No.        | Antenna Part Number    | Manufacture | Antenna Type | Frequency (MHz) | Max Gain (dBi) |
| 1          | AEM6Y-100000<br>(Main) | ACON        | PIFA         | 5150            | 2.89           |
|            |                        |             |              | 5350            | 2.77           |
|            |                        |             |              | 5470            | 2.98           |
|            |                        |             |              | 5850            | 1.32           |
| 2          | AEM6Y-100001<br>(AUX)  | ACON        | PIFA         | 5150            | 3.86           |
|            |                        |             |              | 5350            | 2.93           |
|            |                        |             |              | 5470            | 2.64           |
|            |                        |             |              | 5850            | 1.71           |

### 3.4. EUT Specifications Assessed in Current Report

| Mode  | UNII Band | Fundamental Range (MHz) | Channel Number |
|---|-----------|-------------------------|----------------|
| 802.11a   | I         | 5180-5240               | 4              |
|   | II-2A     | 5260-5320               | 4              |
|   | II-2C     | 5500-5700               | 11             |
|   | III       | 5745-5825               | 5              |
| 802.11n-HT20/<br>802.11ac-VHT20   | I         | 5180-5240               | 4              |
|   | II-2A     | 5260-5320               | 4              |
|   | II-2C     | 5500-5700               | 11             |
|   | III       | 5745-5825               | 5              |
| 802.11n-HT40/<br>802.11ac-VHT40   | I         | 5190-5230               | 2              |
|   | II-2A     | 5270-5310               | 2              |
|   | II-2C     | 5510-5670               | 5              |
|   | III       | 5755-5795               | 2              |
| 802.11ac-VHT80  | I         | 5210                    | 1              |
|   | II-2A     | 5290                    | 1              |
|   | II-2C     | 5530-5610               | 2              |
|   | III       | 5775                    | 1              |
| Remark: UNII Band II-2A and II-2C (DFS Function, Slave/no In service monitor, no Ad-Hoc mode) |           |                         |                |

| Mode           | Modulation                          | Data Rate (Mbps) |
|----------------|-------------------------------------|------------------|
| 802.11a        | OFDM (BPSK/QPSK/16QAM/64QAM)        | Up to 54         |
| 802.11n-HT20   | OFDM (BPSK/QPSK/16QAM/64QAM)        | Up to 144.4      |
| 802.11n-HT40   |                                     | Up to 300        |
| 802.11ac-VHT20 | OFDM (BPSK/QPSK/16QAM/64QAM/256QAM) | Up to 173.3      |
| 802.11ac-VHT40 |                                     | Up to 400        |
| 802.11ac-VHT80 |                                     | Up to 866.7      |

| Channel List                        |                |                 |           |                |                 |
|-------------------------------------|----------------|-----------------|-----------|----------------|-----------------|
| 802.11a/802.11n-HT20/802.11ac-VHT20 |                |                 |           |                |                 |
| UNII Band                           | Channel Number | Frequency (MHz) | UNII Band | Channel Number | Frequency (MHz) |
| I                                   | 36             | 5180            | II-2C     | 120            | 5600            |
|                                     | 40             | 5200            |           | 124            | 5620            |
|                                     | 44             | 5220            |           | 128            | 5640            |
|                                     | 48             | 5240            |           | 132            | 5660            |
| II-2A                               | 52             | 5260            |           | 136            | 5680            |
|                                     | 56             | 5280            |           | 140            | 5700            |
|                                     | 60             | 5300            | III       | 149            | 5745            |
|                                     | 64             | 5320            |           | 153            | 5765            |
| II-2C                               | 100            | 5500            |           | 157            | 5785            |
|                                     | 104            | 5520            |           | 161            | 5805            |
|                                     | 108            | 5540            | 165       | 5825           |                 |
|                                     | 112            | 5560            |           |                |                 |
|                                     | 116            | 5580            |           |                |                 |

| Channel List                |                |                 |           |                |                 |
|-----------------------------|----------------|-----------------|-----------|----------------|-----------------|
| 802.11n-HT40/802.11ac-VHT40 |                |                 |           |                |                 |
| UNII Band                   | Channel Number | Frequency (MHz) | UNII Band | Channel Number | Frequency (MHz) |
| I                           | 38             | 5190            | II-2C     | 118            | 5590            |
|                             | 46             | 5230            |           | 126            | 5630            |
| II-2A                       | 54             | 5270            |           | 134            | 5670            |
|                             | 62             | 5310            | III       | 151            | 5755            |
| II-2C                       | 102            | 5510            |           | 159            | 5795            |
|                             | 110            | 5550            |           |                |                 |

| Channel List   |                |                 |           |                |                 |
|----------------|----------------|-----------------|-----------|----------------|-----------------|
| 802.11ac-VHT80 |                |                 |           |                |                 |
| UNII Band      | Channel Number | Frequency (MHz) | UNII Band | Channel Number | Frequency (MHz) |
| I              | 42             | 5210            | III       | 155            | 5775            |
| II-2A          | 58             | 5290            |           |                |                 |
| II-2C          | 106            | 5530            |           |                |                 |
|                | 122            | 5610            |           |                |                 |

Note: Test modes are presented at section 3.8.

### 3.5. Description of Key Components

None

### 3.6. Data Rate Relative to Output Power

| 802.11a |            |           |             | 802.11ac-VHT20 |            |           |             |
|---------|------------|-----------|-------------|----------------|------------|-----------|-------------|
| Channel | Modulation | Date Rate | Power (dBm) | Channel        | Modulation | Date Rate | Power (dBm) |
| 36      | BPSK       | 6         | 18.21       | 36             | BPSK       | HT MCS8   | 20.88       |
| 36      | QPSK       | 9         | 18.17       | 36             | QPSK       | HT MCS9   | 20.84       |
| 36      | QPSK       | 12        | 18.15       | 36             | QPSK       | HT MCS10  | 20.82       |
| 36      | 16-QAM     | 18        | 18.11       | 36             | 16-QAM     | HT MCS11  | 20.79       |
| 36      | 16-QAM     | 24        | 18.13       | 36             | 16-QAM     | HT MCS12  | 20.74       |
| 36      | 64-QAM     | 36        | 18.12       | 36             | 64-QAM     | HT MCS13  | 20.75       |
| 36      | 64-QAM     | 48        | 18.07       | 36             | 64-QAM     | HT MCS14  | 20.72       |
| 36      | 64-QAM     | 54        | 18.09       | 36             | 64-QAM     | HT MCS15  | 20.73       |

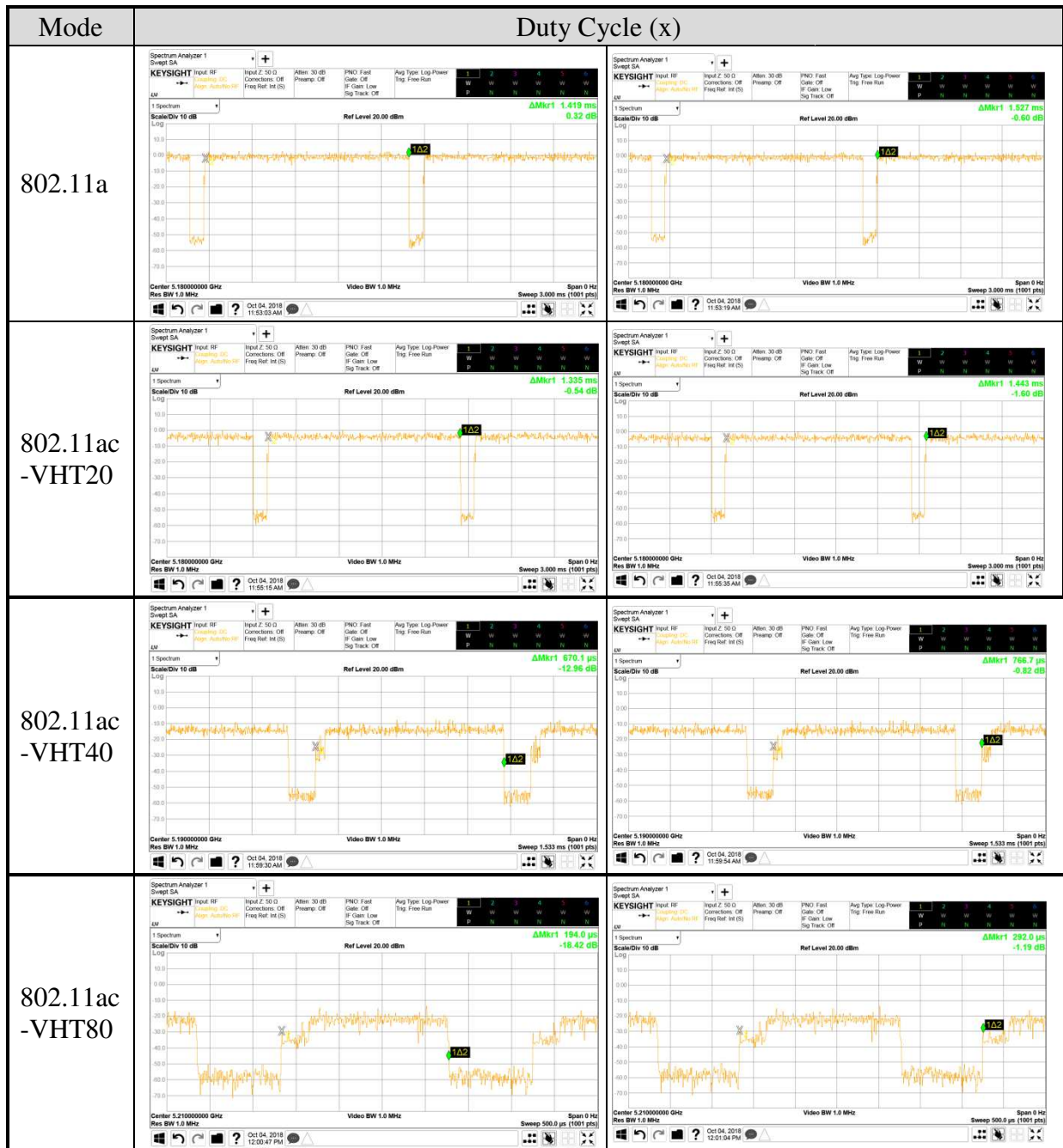
| 802.11ac-VHT40 |            |           |             | 802.11ac-VHT80 |            |           |             |
|----------------|------------|-----------|-------------|----------------|------------|-----------|-------------|
| Channel        | Modulation | Date Rate | Power (dBm) | Channel        | Modulation | Date Rate | Power (dBm) |
| 38             | BPSK       | HT MCS8   | 17.59       | 42             | BPSK       | VHT MCS0  | 17.70       |
| 38             | QPSK       | HT MCS9   | 17.55       | 42             | QPSK       | VHT MCS1  | 17.63       |
| 38             | QPSK       | HT MCS10  | 17.53       | 42             | QPSK       | VHT MCS2  | 17.65       |
| 38             | 16-QAM     | HT MCS11  | 17.56       | 42             | 16-QAM     | VHT MCS3  | 17.59       |
| 38             | 16-QAM     | HT MCS12  | 17.54       | 42             | 16-QAM     | VHT MCS4  | 17.56       |
| 38             | 64-QAM     | HT MCS13  | 17.45       | 42             | 64-QAM     | VHT MCS5  | 17.58       |
| 38             | 64-QAM     | HT MCS14  | 17.47       | 42             | 64-QAM     | VHT MCS6  | 17.60       |
| 38             | 64-QAM     | HT MCS15  | 17.41       | 42             | 64-QAM     | VHT MCS7  | 17.59       |
|                |            |           |             | 42             | 256-QAM    | VHT MCS8  | 17.62       |
|                |            |           |             | 42             | 256-QAM    | VHT MCS9  | 17.66       |

Note: Above results are assessed in average power.

### 3.7. Test Configuration

| Mode           | Duty Cycle (x) | T (ms) | Duty Cycle Factor (dB) |
|----------------|----------------|--------|------------------------|
| 802.11a        | 0.929          | 1.419  | 0.32                   |
| 802.11ac-VHT20 | 0.925          | 1.335  | 0.34                   |
| 802.11ac-VHT40 | 0.874          | 0.6701 | 0.58                   |
| 802.11ac-VHT80 | 0.664          | 0.194  | 1.78                   |

Note: When duty cycle is less than 98% (0.98) that duty cycle factor  $10\log(1/x)$  is needed to add in conducted test items measured in average detector.



| AC Conduction |                  |
|---------------|------------------|
| Test Case     | Normal operation |

| Item                | Mode   | Data Rate      | Test Channel |   |
|---------------------|--|----------------|--------------|---|
| Radiated Test Case  | Radiated Band Edge <sup>Note1</sup>                | 802.11a        | 6 Mbps       | 36/64/100/140                             |
|                     |  | 802.11ac-VHT20 | HT MCS8      | 36/64/100/140                             |
|                     |  | 802.11ac-VHT40 | HT MCS8      | 38/62/102/134                             |
|                     |  | 802.11ac-VHT80 | VHT MCS0     | 42/58/106                                 |
|                     | Radiated Spurious Emission <sup>Note1&amp; 2</sup> | 802.11a        | 6 Mbps       | 48/52/116/165                             |
|                     |  | 802.11ac-VHT20 | HT MCS8      | 48/52/100/165                             |
|                     |  | 802.11ac-VHT40 | HT MCS8      | 46/54/110/159                             |
|                     |  | 802.11ac-VHT80 | VHT MCS0     | 42/58/106/155                             |
| Conducted Test Case | Emission Bandwidth                                 | 802.11a        | 6 Mbps       | 36/40/48/52/60/64/100/116/140/149/157/165 |
|                     |  | 802.11ac-VHT20 | HT MCS8      | 36/40/48/52/60/64/100/116/140/149/157/165 |
|                     |  | 802.11ac-VHT40 | HT MCS8      | 38/46/54/62/102/110/134/159               |
|                     |  | 802.11ac-VHT80 | HT MCS0      | 42/58/106/122/155                         |
|                     | Maximum output power                               | 802.11a        | 6 Mbps       | 36/40/48/52/60/64/100/116/140/149/157/165 |
|                     |  | 802.11ac-VHT20 | MCS8         | 36/40/48/52/60/64/100/116/140/149/157/165 |
|                     |  | 802.11ac-VHT40 | MCS8         | 38/46/54/62/102/110/134/159               |
|                     |  | 802.11ac-VHT80 | MCS0         | 42/58/106/122/155                         |
|                     | Emission Limitations                               | 802.11a        | 6 Mbps       | 149/165                                   |
|                     |  | 802.11ac-VHT20 | MCS8         | 149/165                                   |
|                     |  | 802.11ac-VHT40 | MCS8         | 151/159                                   |
|                     |  | 802.11ac-VHT80 | MCS0         | 155                                       |
|                     | Power spectral density                             | 802.11a        | 6 Mbps       | 36/40/48/52/60/64/100/116/140/149/157/165 |
|                     |  | 802.11ac-VHT20 | MCS8         | 36/40/48/52/60/64/100/116/140/149/157/165 |
|                     |  | 802.11ac-VHT40 | MCS8         | 38/46/54/62/102/110/134/159               |
|                     |  | 802.11ac-VHT80 | MCS0         | 42/58/106/122/155                         |

| Item                |                     | Mode | Data Rate | Test Channel |
|---------------------|---------------------|------|-----------|--------------|
| Conducted Test Case | Frequency Stability | ---  | ---       | 36           |

Note 1:  Mobile Device

Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow:  Lie  Side  Stand

Note 2: Low, mid, and high channels were measured, only the worst channel of each modulation was presented in this report.

### 3.8. Tested Supporting System List

#### 3.8.1. Support Peripheral Unit

| No. | Product         | Brand   | Model No.                        | Serial No.        | Approval   |
|-----|-----------------|---------|----------------------------------|-------------------|--|
| 1.  | PC System       | FUJITSU | ESPRIMO P757/E94+                | S26361-K1444-V220 | FCC By DoC   |
|     |                 | HP      | HP ProDesk 490 G1 MT Business PC | SGH437TNKC        | FCC By DoC   |
| 2.  | Notebook PC     | Lenovo  | TP00034A                         | 895097            | FCC By DoC   |
| 3.  | Notebook PC     | HP      | P7Q52PA                          | N/A               | Contains FCC ID:PD98260NG                              |
| 4.  | USB Keyboard    | HP      | KB-0316                          | N/A               | FCC By DoC   |
| 5.  | USB Mouse       | HP      | M-UAE96                          | FATSK0K8FYKADW    | FCC By DoC   |
| 6.  | Printer         | HP      | Deskjet 2000                     | CN25N13K36        | FCC By DoC   |
| 7.  | I-POD Player    | APPLE   | A1204                            | 4H722TFVVTE       | FCC By DoC   |
| 8.  | USB 3.0 HDD #1  | SONY    | HD-B1                            | BBW3DEK78041FC8   | FCC By DoC   |
|     | USB 3.0 HDD #2  | SONY    | HD-B1                            | BBW3DEK78041FC3   | FCC By DoC   |
|     | USB 3.0 HDD #3  | SONY    | HD-B1                            | BBW3DEK78041FEF   | FCC By DoC   |
|     | USB 3.0 HDD #4  | SONY    | HD-B1                            | BBW3DEK78041FE7   | FCC By DoC   |
| 9.  | DVD Player #1   | SONY    | BDP-S370                         | 3213944           | N/A  |
|     | DVD Player #2   | SONY    | BDP-S780                         | 3201205           | N/A  |
| 10. | Speaker         | Edifier | S330D                            | N/A               | N/A  |
| 11. | Earphone        | LGITON  | FS-99                            | N/A               | N/A  |
| 12. | Wireless Router | D-Link  | DIR-868L                         | R3WE1D7002319     | FCC ID:KA2IR868LA1<br>Contains FCC ID: RRK2012060056-1 |

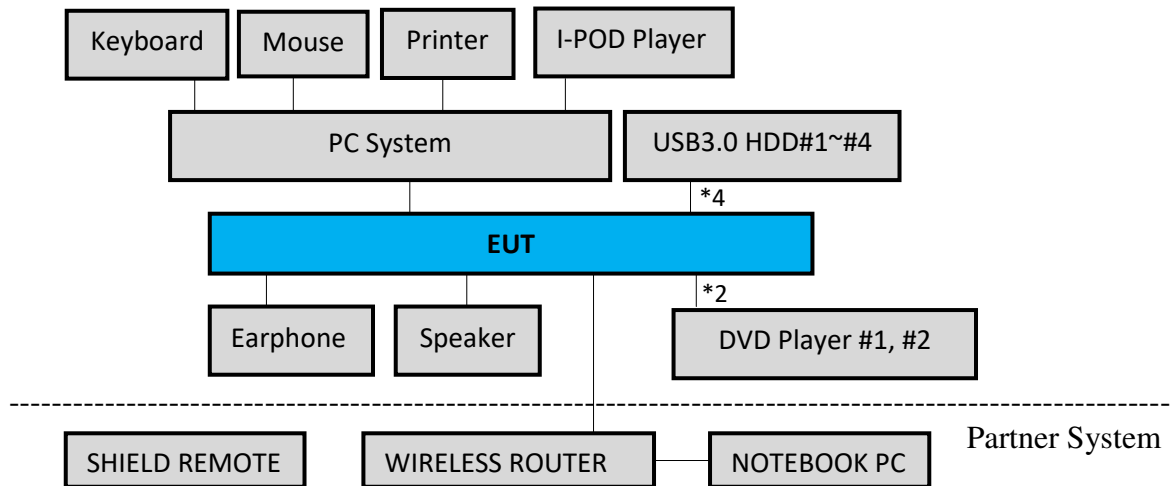
### 3.8.2. Cable Lists

| No. | Cable Description Of The Above Support Units   |
|-----|--|
| 1.  | HDMI Cable: Shielded, Detachable, 1.8m, Bonded two ferrite cores<br>DP Cable: Shielded, Detachable, 1.8m<br>AC Power Cord: Unshielded, Detachable, 1.8m                                  |
| 2.  | LAN Cable: Unshielded, Detachable, 3m  |
| 3.  | USB Cable: Unshielded, Detachable, 1.5m<br>Adapter: HP, M/N HSTNN-CA40,<br>DC Cord : Shielded, Undetachable, 1.8m, Bonded a ferrite core<br>AC Power Cord : Unshielded, Detachable, 1.8m |
| 4.  | PS2 Cable: Shielded, Detachable, 1.8m  |
| 5.  | USB Cable: Shielded, Detachable, 1.8m  |
| 6.  | USB Cable: Unshielded, Detachable, 1.5m  |
| 7.  | USB Cable: Unshielded, Detachable, 1.0m  |
| 8.  | USB Cable: Unshielded, Detachable, 1.1m  |
| 9.  | HDMI Cable: Shielded, Detachable, 1.8m   |
| 10. | Optical Cable: Unshielded, Detachable, 1.5m  |
| 11. | Audio Cable: Unshielded, Detachable, 1.1m  |
| 12. | LAN Cable: Unshielded, Detachable, 10m   |

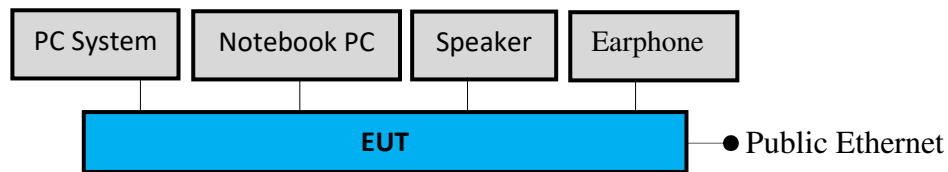


### 3.9. Setup Configuration

#### 3.9.1. EUT Configuration for Power Line



#### 3.9.2. EUT Configuration for Radiated Emission



#### 3.9.3. EUT Configuration for RF Conducted Test Items



### 3.10. Operating Condition of EUT

Test program “cmd” is used for enabling EUT WLAN function under continues transmitting and choosing data rate/ channel.

### 3.11. Description of Test Facility

|                   |   |
|-------------------|---|
| Name of Test Firm | Audix Technology Corporation / EMC Department<br>No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan<br>Tel: +886-2-26092133<br>Fax: +886-2-26099303<br>Website : www.audixtech.com<br>Contact e-mail: attemc_report@audixtech.com |
| Accreditations    | The laboratory is accredited by following organizations under ISO/IEC 17025:2005<br>(1) NVLAP(USA)<br>NVLAP Lab Code 200077-0<br>(2) TAF(Taiwan)<br>No. 1724  |
| Test Facilities   | FCC OET Designation Number under APEC MRA by NCC is : TW1724<br>(1) No. 7 Shielding Room<br>(2) Semi-Anechoic Chamber<br>(IC Test Site Registration No.:5183B-1)  |

### 3.12. Measurement Uncertainty

| Test Item                        | Frequency Range | Uncertainty |
|----------------------------------|-----------------|-------------|
| Conduction Test                  | 150kHz~30MHz    | ±3.50dB     |
| Radiation Test<br>(Distance: 3m) | 30MHz~1000MHz   | ± 3.68dB    |
|                                  | Above 1GHz      | ±5.82dB     |

Remark : Uncertainty =  $ku_c(y)$

| Test Item                      | Uncertainty |
|--------------------------------|-------------|
| Emission Bandwidth             | ± 0.2kHz    |
| Maximum output power           | ± 0.33dB    |
| Power spectral density         | ± 0.13dB    |
| Conducted Emission Limitations | ± 0.13dB    |

## 4. MEASUREMENT EQUIPMENT LIST

### 4.1. Conducted Emission Measurement

| Item | Type                       | Manufacturer | Model No. | Serial No. | Cal. Date    | Cal. Interval |
|------|----------------------------|--------------|-----------|------------|--------------|---------------|
| 1.   | Test Receiver              | R&S          | ESCI      | 101276     | 2018. 03. 21 | 1 Year        |
| 2.   | A.M.N.                     | R&S          | ESH2-Z5   | 100366     | 2018. 07. 18 | 1 Year        |
| 3.   | L.I.S.N.                   | Kyoritsu     | KNW-407   | 8-1539-3   | 2018. 01. 09 | 1 Year        |
| 4.   | Pulse Limiter              | R&S          | ESH3-Z2   | 101495     | 2018. 01. 16 | 1 Year        |
| 5.   | Signal Cable               | Thermax/CDT  | RG-142    | CE-07      | 2018. 05. 24 | 1 Year        |
| 6.   | Digital Thermo-Hygro Meter | iMax         | HTC-1     | No.7 S/R   | 2018. 04. 20 | 1 Year        |
| 7.   | Test Software              | Audix        | e3        | V.120619C  | N.C.R.       | N.C.R.        |

### 4.2. Radiated Emission Measurement

| Item | Type                       | Manufacturer       | Model No.  | Serial No.  | Cal. Date    | Cal. Interval |
|------|----------------------------|--------------------|------------|-------------|--------------|---------------|
| 1.   | Spectrum Analyzer          | Agilent            | N9010A-526 | MY53400071  | 2018. 09. 13 | 1 Year        |
| 2.   | Test Receiver              | R & S              | ESCS30     | 100338      | 2018. 06. 20 | 1 Year        |
| 3.   | Amplifier                  | HP                 | 8447D      | 2944A06305  | 2018. 01. 30 | 1 Year        |
| 4.   | Microwave Amplifier        | Keysight           | 83051A     | MY53010042  | 2018. 09. 09 | 1 Year        |
| 5.   | Loop Antenna               | R&S                | HFH2-Z2    | 891847/27   | 2017. 12. 18 | 1 Year        |
| 6.   | Bilog Antenna              | CHASE              | CBL6112D   | 33821       | 2018. 01. 21 | 1 Year        |
| 7.   | Horn Antenna               | EMCO               | 3115       | 9609-4927   | 2018. 06. 22 | 1 Year        |
| 8.   | Horn Antenna               | COM-POWER          | AH-840     | 101092      | 2018. 05. 07 | 1 Year        |
| 9.   | 5G Notch Filter            | Microwave Circuits | N0452502   | 459775      | 2018. 01. 05 | 1 Year        |
| 10.  | 5G Notch Filter            | Microwave Circuits | N0555983   | 459481      | 2018. 05. 21 | 1 Year        |
| 11.  | 5G Notch Filter            | Microwave Circuits | N0257881   | 459776      | 2018. 08. 22 | 1 Year        |
| 12.  | Digital Thermo-Hygro Meter | iMax               | HTC-1      | No.1 3m A/C | 2018. 04. 20 | 1 Year        |
| 13.  | Test Software              | Audix              | e3         | V.6.110601  | N.C.R.       | N.C.R.        |

### 4.3. RF Conducted Measurement

| Item | Type                       | Manufacturer                 | Model No.  | Serial No. | Cal. Date    | Cal. Due |
|------|----------------------------|------------------------------|------------|------------|--------------|----------|
| 1.   | Spectrum Analyzer          | Keysight                     | N9010B-544 | MY55460198 | 2018. 04. 26 | 1 Year   |
| 2.   | Power Meter                | Anritsu                      | ML2495A    | 1145008    | 2018. 11. 07 | 1 Year   |
| 3.   | Power Sensor               | Anritsu                      | MA2411B    | 1126096    | 2018. 11. 07 | 1 Year   |
| 4.   | Digital Thermo-Hygro Meter | Shenzhen Datronn Electronics | KT-905     | RF         | 2018. 04. 20 | 1 Year   |

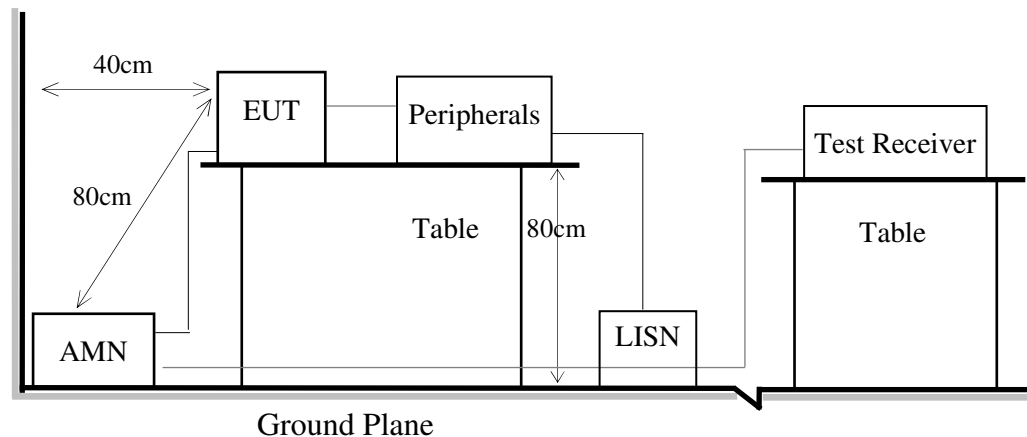
## 5. CONDUCTED EMISSION

### 5.1. Block Diagram of Test Setup

#### 5.1.1. Block Diagram of EUT

Indicated as section 3.9

#### 5.1.2. Shielded Room Setup Diagram



### 5.2. Conducted Emission Limit

| Frequency       | Conducted Limit    |                    |
|-----------------|--------------------|--------------------|
|                 | Quasi-Peak Level   | Average Level      |
| 150kHz ~ 500kHz | 66 ~ 56 dB $\mu$ V | 56 ~ 46 dB $\mu$ V |
| 500kHz ~ 5MHz   | 56 dB $\mu$ V      | 46 dB $\mu$ V      |
| 5MHz ~ 30MHz    | 60 dB $\mu$ V      | 50 dB $\mu$ V      |

Remark1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

### 5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150kHz to 30 MHz and record the emission which does not have 20 dB below limit.

## **5.4. Test Results**

Please refer to Appendix A.

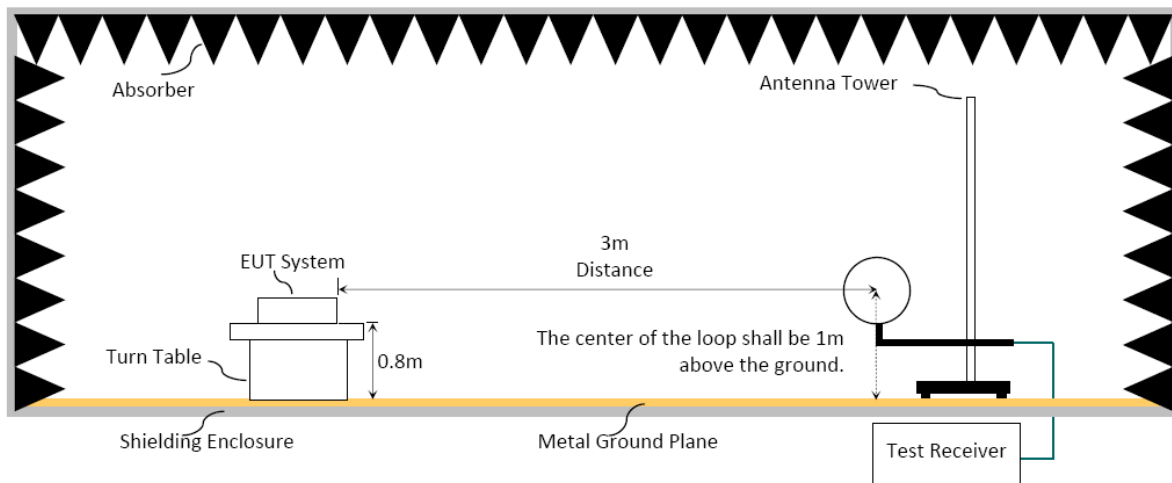
## 6. RADIATED EMISSION

### 6.1. Block Diagram of Test Setup

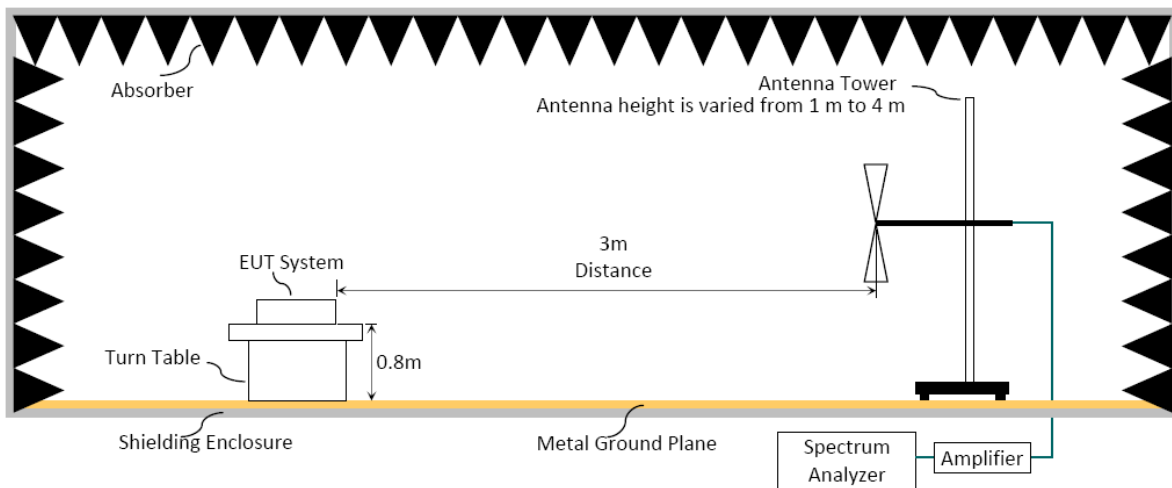
#### 6.1.1. Block Diagram of EUT

Indicated as section 3.9

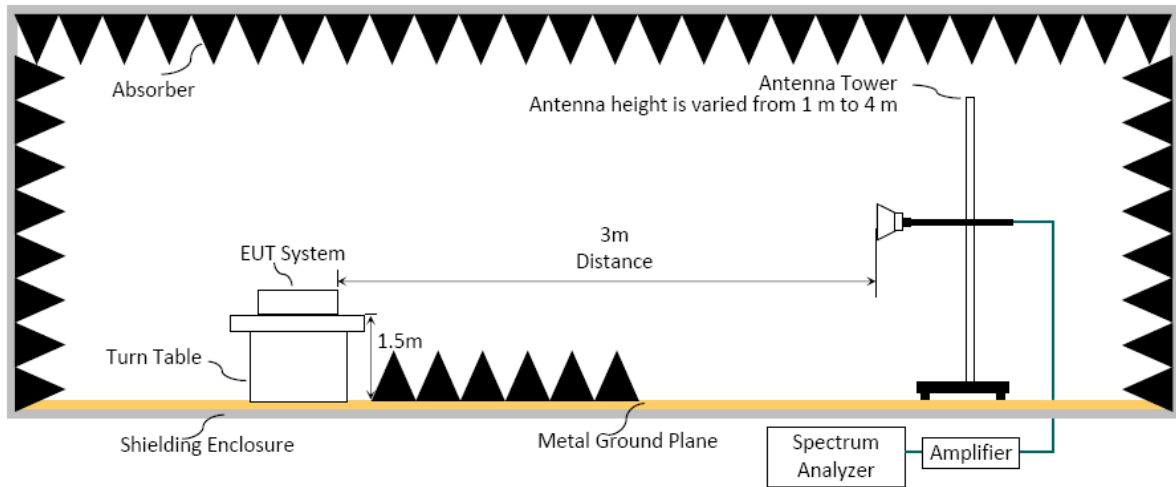
#### 6.1.2. Setup Diagram for 9kHz-30MHz



#### 6.1.3. Setup Diagram for 30-1000MHz



### 6.1.4. Setup Diagram for above 1GHz



## 6.2. Radiated Emission Limits

Radiated emissions fall in restricted bands, as defined in Section 15.205 must be in compliance with the radiated emission limits specified in 15.209 as below.

### 6.2.1. General Limit

| Frequency (MHz) | Distance(m) | Limits  |             |
|-----------------|-------------|---|-------------|
|                 |             | dB $\mu$ V/m  | $\mu$ V/m   |
| 0.009 - 0.490   | 300         | 67.6-20 log f(kHz)                                      | 2400/f kHz  |
| 0.490 - 1.705   | 30          | 87.6-20 log f(kHz)                                      | 24000/f kHz |
| 1.705 - 30      | 30          | 29.5  | 30          |
| 30 - 88         | 3           | 40.0  | 100         |
| 88- 216         | 3           | 43.5  | 150         |
| 216- 960        | 3           | 46.0  | 200         |
| Above 960       | 3           | 54.0  | 500         |
| Above 1000      | 3           | 74.0 dB $\mu$ V/m (Peak)<br>54.0 dB $\mu$ V/m (Average) |             |

Remark : (1) dB $\mu$ V/m = 20 log ( $\mu$ V/m)

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

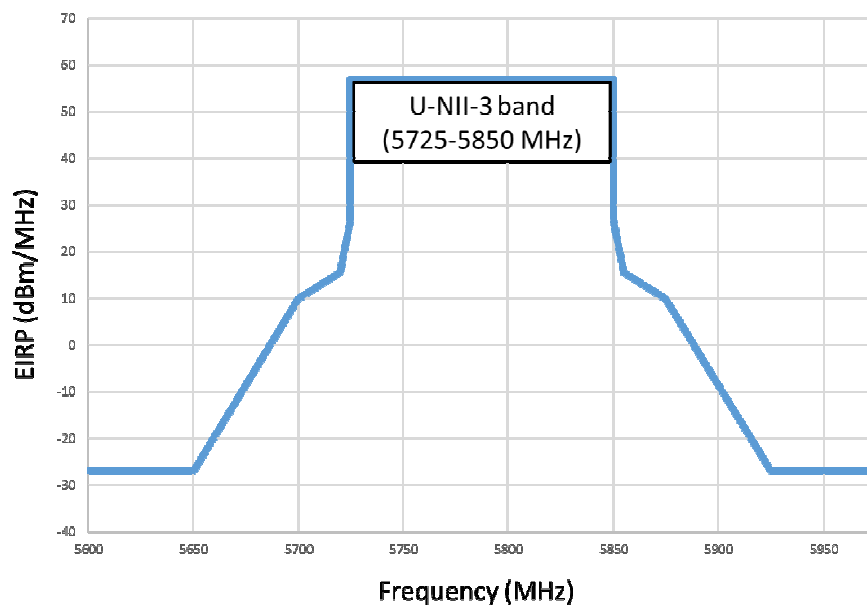


6.2.2. Limit for non-restricted frequency above 1 GHz

| Frequency Band (MHz) | E.I.R.P. Limit | Field Strength Limit at 3 m |
|----------------------|----------------|-----------------------------|
| 5150 to 5250         | -27 dBm        | 68.2                        |
| 5250 to 5350         |                | 68.2                        |
| 5470 to 5725         |                | 68.2                        |

Note: Field Strength at 3 m= E.I.R.P. + 95.2 dB

| Frequency Band (MHz) | Field Strength Limit at 3 m         |   |
|----------------------|-------------------------------------|---|
| 5725 to 5850         | <input checked="" type="checkbox"/> | 15.407(b)(4)(i) All emissions shall be limited to a level of 68.2 dB $\mu$ V/m at 75 MHz or more above or below the band edge increasing linearly to 105.2dB $\mu$ V/m at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 110.8 dB $\mu$ V/m at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 68.2 dB $\mu$ V/m at the band edge.     |
|                      | <input type="checkbox"/>            | 15.407(b)(4)(ii) ,compliance with the emission limits in § 15.247(d) Shall be at least 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,. Attenuation below the general limits specified in §15.209(a) is not required. In addition,radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)) |



### 6.3. Test Procedure

#### Frequency Range 9kHz~30MHz:

The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)  
Q.P. (490kHz-30MHz)

#### Frequency Range 30MHz ~ 40GHz:

The EUT setup on the turn table which has 80cm (for 30-1000MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

#### Frequency below 1GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW  $\geq 3 \times$  RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

#### Frequency above 1GHz to 10th harmonic (up to 40 GHz):

##### Peak Detector:

- (1) RBW = 1MHz
- (2) VBW  $\geq 3 \times$  RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

### Average Detector:

#### Option 1:

(1) RBW = 1MHz

(2) VBW  $\geq$  1/ T.

| Modulation Type | T (ms) | 1/ T (kHz) | VBW Setting (kHz) |
|-----------------|--------|------------|-------------------|
| 802.11a         | 1.419  | 0.705      | 0.68              |
| 802.11ac-VHT20  | 1.335  | 0.749      | 0.75              |
| 802.11ac-VHT40  | 0.6701 | 1.492      | 1.5               |
| 802.11ac-VHT80  | 0.194  | 5.155      | 5.1               |

N/A: 1/ T is not implemented when duty cycle presented in section 3.7 is  $\geq$ 98%.

(1) Detector = Peak.

(2) Sweep time = auto.

(3) Trace mode = max hold.

(4) Allow sweeps to continue until the trace stabilizes.

#### Option 2:

Average Emission Level = Peak Emission Level + D.C.C.F.

## 6.4. Measurement Result Explanation

Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading

Average Emission Level = Antenna Factor + Cable Loss + Meter Reading

Average Emission Level = Peak Emission Level + DCCF

Duty Cycle Correction Factor (DCCF) =  $20\log(TX_{on}/TX_{on+off})$  presented in section 3.7

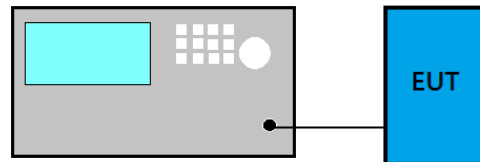
ERP = Peak Emission Level - 95.2dB - 2.14dB

## 6.5. Test Results

Please refer to Appendix A.

## 7. EMISSION BANDWIDTH

### 7.1. Block Diagram of Test Setup



### 7.2. Specification Limits

| Frequency Band (MHz) | Limit                |
|----------------------|----------------------|
| 5150 to 5250         | Reference only       |
| 5250 to 5350         |                      |
| 5470 to 5725         |                      |
| 5725 to 5850         | $\geq 500\text{kHz}$ |

### 7.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

■ Applicable to all bands except to 5725 MHz- 5850 MHz

- (1) Set RBW= 1% of the emission bandwidth
- (2) Set VBW > RBW
- (3) Detector = Peak
- (4) Trace mode = max hold
- (5) Setting channel bandwidth function x dB to -26 dB to record the final bandwidth.

■ 5725 MHz- 5850 MHz

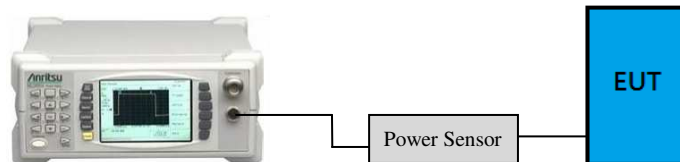
- (1) Set RBW = 100 kHz.
- (2) Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

### 7.4. Test Results

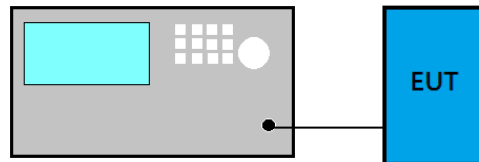
Please refer to Appendix A

## 8. MAXIMUM OUTPUT POWER

### 8.1. Block Diagram of Test Setup



- For 802.11ac-VHT80/VHT160 modes only



### 8.2. Specification Limits

| Frequency Band (MHz) | Category                          | Limit   |
|----------------------|-----------------------------------|---|
| 5150 to 5250         | Outdoor Access Point              | 1 W(30 dBm)/<br>Max e.i.r.p. ≤125 mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon |
|                      | Fixed point-to-point Access Point | 1 W(30 dBm)   |
|                      | Indoor Access Point               | 1 W(30 dBm)   |
|                      | Mobile and Portable client device | 250 mW(24 dBm)  |
| 5250 to 5350         | N/A                               | 250 mW or 11 dBm + 10 log B <sup>Note1</sup>  |
| 5470 to 5725         |                                   | 250 mW or 11 dBm + 10 log B <sup>Note1</sup>  |
| 5725 to 5850         |                                   | 1 W(30 dBm)   |

Note 1: B is the 26 dB emission bandwidth, which presented in section 7 and appendix A.1.

### 8.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

■ **Method AVGPM (Measurement using an RF average power meter):**

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

■ **Method AVGSA-2 (Spectrum channel power) for 802.11ac-VHT80/VHT 160 modes only**

- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 MHz
- (3) Set the video bandwidth (VBW)  $\geq$  3 MHz.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
- (8) Duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

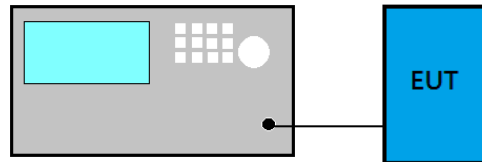
### 8.4. Test Results

Please refer to Appendix A

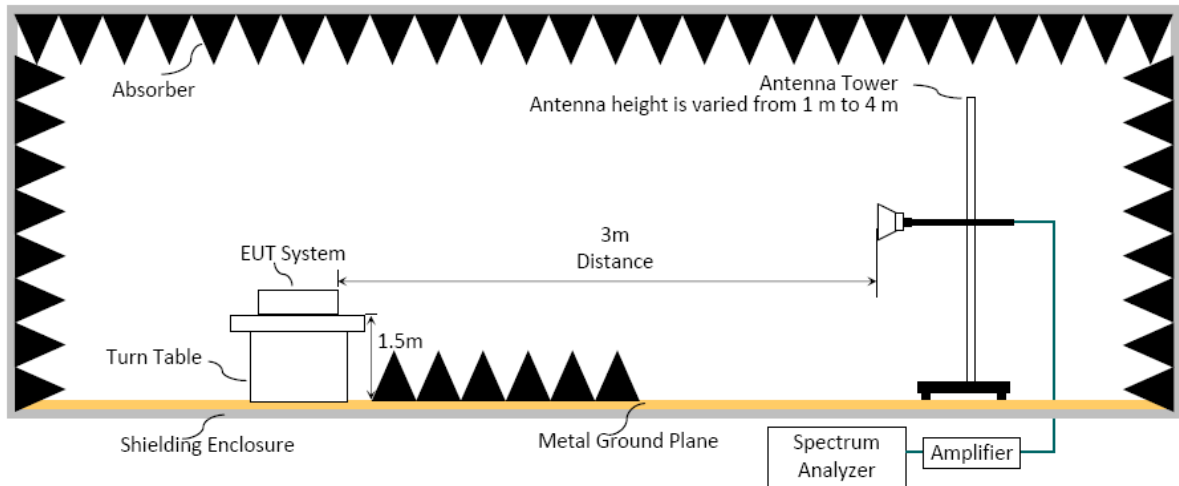
## 9. EMISSION LIMITATIONS MEASUREMENT

### 9.1. Block Diagram of Test Setup

- For band edge



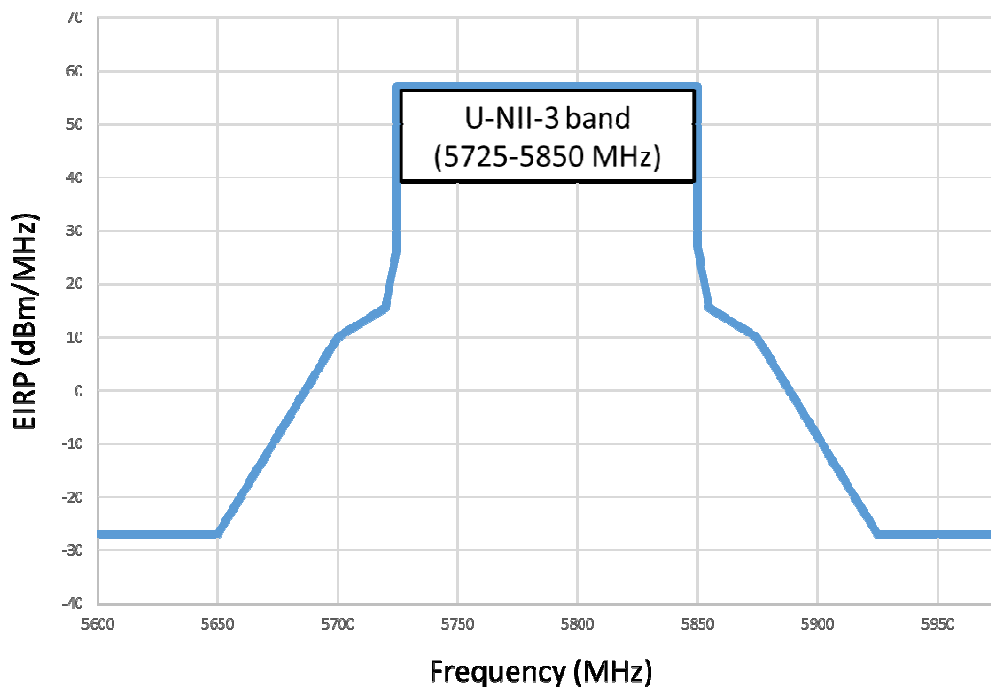
- For outside of the restricted bands



### 9.2. Specification Limits

| Frequency Band (MHz) | E.I.R.P. Limit |
|----------------------|----------------|
| 5150 to 5250         | -27 dBm        |
| 5250 to 5350         |                |
| 5470 to 5725         |                |

| Frequency Band (MHz) | E.I.R.P. Limit                      |  |
|----------------------|-------------------------------------|--|
| 5725 to 5850         | <input checked="" type="checkbox"/> | 15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.                                |
|                      | <input type="checkbox"/>            | 15.407(b)(4)(ii) ,compliance with the emission limits in § 15.247(d) Shall be at least 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)) |





### **9.3. Test Procedure**

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

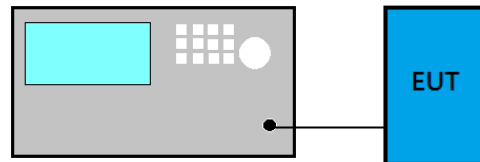
- (1) RBW = 1 MHz
- (2) VBW  $\geq$  3 x RBW
- (3) Detector = Peak
- (4) Sweep time = auto
- (5) Trace mode = max hold
- (6) Allow sweeps to continue until the trace stabilizes.

### **9.4. Test Results**

Please refer to Appendix A

## 10. POWER SPECTRAL DENSITY

### 10.1. Block Diagram of Test Setup



### 10.2. Specification Limits

| Frequency Band (MHz) | Category                          | Limit         |
|----------------------|-----------------------------------|---------------|
| 5150 to 5250         | Outdoor Access Point              | 17dBm/MHz     |
|                      | Fixed point-to-point Access Point |               |
|                      | Indoor Access Point               |               |
|                      | Mobile and Portable client device | 11 dBm/MHz    |
| 5250 to 5350         | N/A                               | 11 dBm/MHz    |
| 5470 to 5725         |                                   | 11 dBm/MHz    |
| 5725 to 5850         |                                   | 30dBm/500 kHz |

### 10.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

#### ■ Method AVGSA-2 (Spectrum channel power)

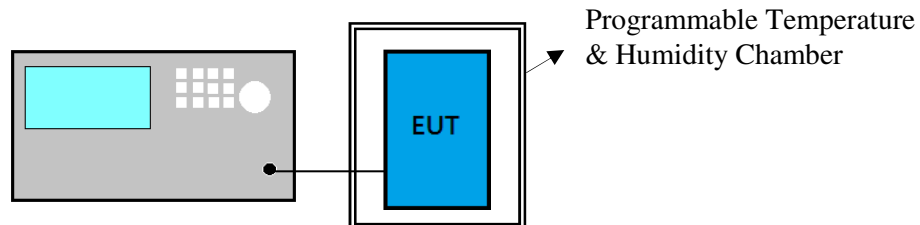
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 MHz
- (3) Set the video bandwidth (VBW)  $\geq$  3 MHz.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Use peak search function to find out the maximum power density.
- (8) Duty cycle factor is added when duty cycle presented in section 3.7 is  $<$  98%.

### 10.4. Test Results

Please refer to Appendix A

## 11. FREQUENCY STABILITY

### 11.1. Block Diagram of Test Setup



### 11.2. Specification Limits

NONE

### 11.3. Test Procedure

- (1) Frequency: Test frequency.
- (2) Span: enough to cover the complete power envelope
- (3) RBW: 1MHz(modulation ON) ; 10KHz(CW)
- (4) VBW: 1MHz(modulation ON) ; 10KHz(CW)
- (5) Detector Mode: Positive Peak
- (6) Indication mode: Max hold
- (7) Find the peak frequency and take calculate by the formula:  
(Measurement Value-declaration frequency)/ declaration frequency)

### 11.4. Test Results

Please refer to Appendix A

## 12. DEVIATION TO TEST SPECIFICATIONS

**【NONE】**



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# APPDNDIX A

## TEST DATA AND PLOTS

(Model: HSD-0015-Q)



# APPDNDIX B

## TEST PHOTOGRAPHS

(Model: HSD-0015-Q)