

## **FCC 15.247& RSS-247 2.4 GHz Test Report**

**for**

**LG Electronics Inc.**

**222, LG-ro Jinwi-myeon, Pyeongtaek-Si, Gyeonggi-Do,  
451-713, Korea**

**Product Name : Notebook Computer**  
**Model Name : (1)15Z990 (2)15ZD990 (3)15ZB990  
(4)15ZG990 (5)LG15Z99**  
**Brand : LG**  
**FCC ID : BEJNT-15Z990**  
**IC : 2703H-15Z990**

**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.

## TABLE OF CONTENTS

| Description                                              | Page      |
|----------------------------------------------------------|-----------|
| TEST REPORT CERTIFICATION.....                           | 4         |
| <b>1. REVISION RECORD OF TEST REPORT .....</b>           | <b>5</b>  |
| <b>2. SUMMARY OF TEST RESULTS .....</b>                  | <b>6</b>  |
| <b>3. GENERAL INFORMATION .....</b>                      | <b>7</b>  |
| 3.1. Description of Application .....                    | 7         |
| 3.2. Description of EUT .....                            | 8         |
| 3.3. Antenna Information .....                           | 9         |
| 3.4. EUT Specifications Assessed in Current Report ..... | 10        |
| 3.5. Description of Key Components .....                 | 11        |
| 3.6. Test Configuration .....                            | 14        |
| 3.7. Tested Supporting System List .....                 | 15        |
| 3.8. Setup Configuration .....                           | 15        |
| 3.9. Operating Condition of EUT .....                    | 15        |
| 3.10. Description of Test Facility .....                 | 16        |
| 3.11. Measurement Uncertainty .....                      | 16        |
| <b>4. MEASUREMENT EQUIPMENT LIST .....</b>               | <b>17</b> |
| 4.1. Conducted Emission Measurement .....                | 17        |
| 4.2. Radiated Emission Measurement .....                 | 17        |
| 4.3. RF Conducted Measurement .....                      | 17        |
| <b>5. CONDUCTED EMISSION .....</b>                       | <b>18</b> |
| 5.1. Block Diagram of Test Setup .....                   | 18        |
| 5.2. Conducted Emission Limit .....                      | 18        |
| 5.3. Test Procedure .....                                | 18        |
| 5.4. Test Results .....                                  | 18        |
| <b>6. RADIATED EMISSION .....</b>                        | <b>19</b> |
| 6.1. Block Diagram of Test Setup .....                   | 19        |
| 6.2. Radiated Emission Limits .....                      | 20        |
| 6.3. Test Procedure .....                                | 21        |
| 6.4. Measurement Result Explanation .....                | 22        |
| 6.5. Test Results .....                                  | 22        |
| <b>7. 20dB BANDWIDTH .....</b>                           | <b>23</b> |
| 7.1. Block Diagram of Test Setup .....                   | 23        |
| 7.2. Specification Limits .....                          | 23        |
| 7.3. Test Procedure .....                                | 23        |
| 7.4. Test Results .....                                  | 23        |
| <b>8. CARRIER FREQUENCY SEPARATION .....</b>             | <b>24</b> |
| 8.1. Block Diagram of Test Setup .....                   | 24        |
| 8.2. Specification Limits .....                          | 24        |
| 8.3. Test Procedure .....                                | 24        |
| 8.4. Test Results .....                                  | 24        |
| <b>9. TIME OF OCCUPANCY .....</b>                        | <b>25</b> |
| 9.1. Block Diagram of Test Setup .....                   | 25        |
| 9.2. Specification Limits .....                          | 25        |
| 9.3. Test Procedure .....                                | 25        |



**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City 244, Taiwan

**Tel: +886 2 26099301**  
**Fax: +886 2 26099303**

---

|                                                   |           |
|---------------------------------------------------|-----------|
| 9.4. Test Results .....                           | 25        |
| <b>10. NUMBER OF HOPPING CHANNELS .....</b>       | <b>26</b> |
| 10.1. Block Diagram of Test Setup .....           | 26        |
| 10.2. Specification Limits.....                   | 26        |
| 10.3. Test Procedure .....                        | 26        |
| 10.4. Test Results .....                          | 26        |
| <b>11. MAXIMUM PEAK OUTPUT POWER .....</b>        | <b>27</b> |
| 11.1. Block Diagram of Test Setup .....           | 27        |
| 11.2. Specification Limits.....                   | 27        |
| 11.3. Test Procedure .....                        | 27        |
| 11.4. Test Results .....                          | 27        |
| <b>12. EMISSION LIMITATIONS .....</b>             | <b>28</b> |
| 12.1. Block Diagram of Test Setup .....           | 28        |
| 12.2. Specification Limits.....                   | 28        |
| 12.3. Test Procedure .....                        | 28        |
| 12.4. Test Results .....                          | 28        |
| <b>13. DEVIATION TO TEST SPECIFICATIONS .....</b> | <b>29</b> |

APPENDIX A TEST DATA AND PLOTS  
APPENDIX B TEST PHOTOGRAPHS



**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City 244, Taiwan

**Tel: +886 2 26099301**  
**Fax: +886 2 26099303**

## TEST REPORT CERTIFICATION

Applicant : LG Electronics Inc.  
Factory : LG Electronics Nanjing New Technology Co., Ltd.  
EUT Description  
(1) Product : Notebook Computer  
(2) Model : (1)15Z990 (2)15ZD990 (3)15ZB990 (4)15ZG990 (5)LG15Z99  
(3) Brand : LG  
(4) Power Rating : DC 19V, 2.53A

### Applicable Standards:

47CFR FCC Part 15 Subpart C  
RSS-Gen (Issue 5), April 2018  
RSS-247 (Issue 2), February 2017  
ANSI C63.10:2013

**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. 01

Reviewed by: Annie Yu (Annie Yu/Administrator)

Approved by: Ben Cheng (Ben Cheng/Manager)



**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City 244, Taiwan

**Tel: +886 2 26099301**  
**Fax: +886 2 26099303**

## 1. REVISION RECORD OF TEST REPORT

| Edition No | Issued Date  | Revision Summary | Report Number |
|------------|--------------|------------------|---------------|
| 0          | 2018. 11. 01 | Original Report  | EM-F180489    |

## 2. SUMMARY OF TEST RESULTS

| Rule              |                              | Description                                             | Results           |
|-------------------|------------------------------|---------------------------------------------------------|-------------------|
| FCC               | IC                           |                                                         |                   |
| 15.207            | RSS-Gen §8.8                 | Conducted Emission                                      | <b>PASS</b>       |
| 15.247(d)/15.205  | RSS-Gen §8.9<br>RSS-247 §5.5 | Radiated Band Edge and<br>Radiated Spurious Emission    | <b>PASS</b>       |
| 15.247(a)(1)      | RSS-247 §5.1(2)              | 20dB Bandwidth                                          | <b>PASS</b>       |
| 15.247(a)(1)      | RSS-247 §5.1(2)              | Carrier Frequency Separation                            | <b>PASS</b>       |
| 15.247(a)(1)(iii) | RSS-247 §5.1(4)              | Time of Occupancy                                       | <b>PASS</b>       |
| 15.247(a)(1)(iii) | RSS-247 §5.1(4)              | Number of Hopping Channels                              | <b>PASS</b>       |
| 15.247(b)(1)      | RSS-247 §5.1(2)              | Maximum Peak Output Power                               | <b>PASS</b>       |
| 15.247(d)         | RSS-247 §5.5                 | Conducted Band Edges and<br>Conducted Spurious Emission | <b>PASS</b>       |
| 15.203            | RSS-Gen §8.3                 | Antenna Requirement                                     | <b>Compliance</b> |



**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City 244, Taiwan

**Tel: +886 2 26099301**  
**Fax: +886 2 26099303**

### 3. GENERAL INFORMATION

#### 3.1. Description of Application

|           |                                                                                                                                   |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------|
| Applicant | LG Electronics Inc.<br>222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713 Korea.                                         |
| Factory   | LG Electronics Nanjing New Technology Co., Ltd.<br>No.346, Yaoxin Road, Economic & Technical Development Zone,<br>Nanjing, China. |
| Product   | Notebook Computer                                                                                                                 |
| Brand     | LG                                                                                                                                |
| Model     | (1)15Z990 (2)15ZD990 (3)15ZB990 (4)15ZG990 (5)LG15Z99<br>The difference between all models is different in the sales customers.   |

### 3.2. Description of EUT

| Test Model                      | 15Z990                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--|---------|------|---------|------|--------------|------|--------------|------|--------|------|------------|--|---------|------|---------------------------------|------|---------------------------------|------|----------------|------|-----------------|------|
| Serial Number                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| Power Rating                    | DC 19V, 2.53A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| 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>802.11n-HT40</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> <tr> <td>802.11ac-VHT160</td><td>2T2R</td></tr> </tbody> </table> | 2.4 GHz |  | 802.11b | 1T1R | 802.11g | 1T1R | 802.11n-HT20 | 2T2R | 802.11n-HT40 | 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 | 802.11ac-VHT160 | 2T2R |
| 2.4 GHz                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| 802.11b                         | 1T1R                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| 802.11g                         | 1T1R                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| 802.11n-HT20                    | 2T2R                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| 802.11n-HT40                    | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| 802.11ac-VHT160                 | 2T2R                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| Sample Status                   | Production                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| Date of Receipt                 | 2018. 10. 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| Date of Test                    | 2018. 10. 16 ~ 11. 01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| Interface Ports of EUT          | <ul style="list-style-type: none"> <li>• One Micro SD Card Slot</li> <li>• One Earphone Port</li> <li>• Three USB 3.0 Ports</li> <li>• One USB Type C Port</li> <li>• One HDMI Port</li> <li>• One DC Input Port</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |
| Accessories Supplied            | <ul style="list-style-type: none"> <li>• AC Adapter</li> <li>• LAN Gender</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |  |         |      |         |      |              |      |              |      |        |      |            |  |         |      |                                 |      |                                 |      |                |      |                 |      |



### 3.3. Antenna Information

| 2.4G Antenna |                                 |              |              |                 |                |
|--------------|---------------------------------|--------------|--------------|-----------------|----------------|
| No.          | Antenna Part Number             | Manufacture  | Antenna Type | Frequency (MHz) | Max Gain (dBi) |
| 1            | WA-F-LBLB-04-056<br>(Main)      | INPAQ        | FPCB         | 2400            | 1.39           |
|              |                                 |              |              | 2450            | 1.54           |
|              |                                 |              |              | 2500            | 2.06           |
| 2            | WA-F-LBLB-04-056<br>(AUX)       | INPAQ        | FPCB         | 2400            | 1.41           |
|              |                                 |              |              | 2450            | 1.40           |
|              |                                 |              |              | 2500            | 1.83           |
| 3            | 15Z980 ANTENNA<br>ASM<br>(Main) | LUXSHARE-ICT | PIFA         | 2400-2500       | -1.21          |
| 4            | 15Z980 ANTENNA<br>ASM<br>(AUX)  | LUXSHARE-ICT | PIFA         | 2400-2500       | -0.8           |

| 5G Antenna |                                 |              |              |                 |                |
|------------|---------------------------------|--------------|--------------|-----------------|----------------|
| No.        | Antenna Part Number             | Manufacture  | Antenna Type | Frequency (MHz) | Max Gain (dBi) |
| 1          | WA-F-LBLB-04-056<br>(Main)      | INPAQ        | FPCB         | 5100            | 2.49           |
|            |                                 |              |              | 5400            | 2.93           |
|            |                                 |              |              | 5800            | 1.59           |
| 2          | WA-F-LBLB-04-056<br>(AUX)       | INPAQ        | FPCB         | 5100            | 2.57           |
|            |                                 |              |              | 5400            | 2.97           |
|            |                                 |              |              | 5800            | 2.84           |
| 3          | 15Z980 ANTENNA<br>ASM<br>(Main) | LUXSHARE-ICT | PIFA         | 5150-5350       | -2.1           |
|            |                                 |              |              | 5470-5725       | -1.3           |
|            |                                 |              |              | 5725-5850       | -1.1           |
| 4          | 15Z980 ANTENNA<br>ASM<br>(AUX)  | LUXSHARE-ICT | PIFA         | 5150-5350       | -2.8           |
|            |                                 |              |              | 5470-5725       | -2.0           |
|            |                                 |              |              | 5725-5850       | -3.5           |

### 3.4. EUT Specifications Assessed in Current Report

| Mode      | Fundamental Range (MHz) | Channel Number | Modulation                         | Data Rate (Mbps) |
|-----------|-------------------------|----------------|------------------------------------|------------------|
| Bluetooth | 2402-2480               | 79             | FHSS (GFSK, $\pi/4$ DQPSK, 8-DPSK) | 1/2/3            |

| Channel List   |                 |                |                 |                |                 |                |                 |
|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|
| Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) |
| 00             | 2402            | 20             | 2422            | 40             | 2442            | 60             | 2462            |
| 01             | 2403            | 21             | 2423            | 41             | 2443            | 61             | 2463            |
| 02             | 2404            | 22             | 2424            | 42             | 2444            | 62             | 2464            |
| 03             | 2405            | 23             | 2425            | 43             | 2445            | 63             | 2465            |
| 04             | 2406            | 24             | 2426            | 44             | 2446            | 64             | 2466            |
| 05             | 2407            | 25             | 2427            | 45             | 2447            | 65             | 2467            |
| 06             | 2408            | 26             | 2428            | 46             | 2448            | 66             | 2468            |
| 07             | 2409            | 27             | 2429            | 47             | 2449            | 67             | 2469            |
| 08             | 2410            | 28             | 2430            | 48             | 2450            | 68             | 2470            |
| 09             | 2411            | 29             | 2431            | 49             | 2451            | 69             | 2471            |
| 10             | 2412            | 30             | 2432            | 50             | 2452            | 70             | 2472            |
| 11             | 2413            | 31             | 2433            | 51             | 2453            | 71             | 2473            |
| 12             | 2414            | 32             | 2434            | 52             | 2454            | 72             | 2474            |
| 13             | 2415            | 33             | 2435            | 53             | 2455            | 73             | 2475            |
| 14             | 2416            | 34             | 2436            | 54             | 2456            | 74             | 2476            |
| 15             | 2417            | 35             | 2437            | 55             | 2457            | 75             | 2477            |
| 16             | 2418            | 36             | 2438            | 56             | 2458            | 76             | 2478            |
| 17             | 2419            | 37             | 2439            | 57             | 2459            | 77             | 2479            |
| 18             | 2420            | 38             | 2440            | 58             | 2460            | 78             | 2480            |
| 19             | 2421            | 39             | 2441            | 59             | 2461            |                |                 |

### 3.5. Description of Key Components

#### 3.5.1. For the All Component Lists

| Item                     | Supplier   | Model / Type                          | Character                                                                                                                         |
|--------------------------|------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| System                   | Microsoft  | Win10 Home                            | ---                                                                                                                               |
|                          | Microsoft  | Win10 Pro                             | ---                                                                                                                               |
| Main Board               | LG         | 14/15Z990 Main B/D PCB                | (without Thunderbolt)<br>Manufacturer:<br>#1 Hannstar Board Tech(Jiang Yin)Corp.,Ltd.<br>#2 Elec & Eltek Company (MCO) Limited    |
|                          | LG         | 14/15Z990 Main B/D PCB                | (with Thunderbolt)<br>Manufacturer:<br>#1 Hannstar Board Tech(Jiang Yin)Corp.,Ltd.<br>#2 Elec & Eltek Company (MCO) Limited       |
| SUB Board                | LG         | 15Z990 WLAN SUB B/D                   | (with Finger Printer)<br>Manufacturer:<br>#1 Hannstar Board Tech(Jiang Yin)Corp.,Ltd.<br>#2 Elec & Eltek Company (MCO) Limited    |
|                          | LG         | 15Z990 WLAN SUB B/D                   | (without Finger Printer)<br>Manufacturer:<br>#1 Hannstar Board Tech(Jiang Yin)Corp.,Ltd.<br>#2 Elec & Eltek Company (MCO) Limited |
| CPU<br>(Socket: BGA1528) | Intel      | i7-8565U                              | 1.8GHz, up to 4.6GHz                                                                                                              |
|                          | Intel      | i5-8265U                              | 1.6GHz, up to 3.9GHz                                                                                                              |
| 15.6" LCD Panel          | LG Display | LP156WFA(SP)(G1)                      | Resolution: 1920 x 1080, 60Hz<br>FHD IPS Touch<br>(Touch)                                                                         |
|                          | LG Display | LP156WF9(SP)(N1)                      | Resolution: 1920 x 1080, 60Hz<br>FHD IPS<br>(Normal Non touch)                                                                    |
| Storage (SSD)            | Samsung    | MZ-NLN128C<br>(P/N MZNLN128HAHQ-0000) | 128GB (SATA)                                                                                                                      |
|                          | SK Hynix   | P/N HFS512G39TNF                      | 512GB (SATA)                                                                                                                      |
|                          |            | P/N HFS128G39TNF                      | 128GB (SATA)                                                                                                                      |
|                          |            | P/N HFS256G39TNF                      | 256GB (SATA)                                                                                                                      |

| Item                          | Supplier                                                                                                                                                                                              | Model / Type                      | Character                                           |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------|
| Memory (RAM)                  | Samsung                                                                                                                                                                                               | K4AAG16 5WB MCRC                  | 8GB DDR4(On Board)                                  |
|                               |                                                                                                                                                                                                       | K4A8G16 5WC-BCTD                  | 4GB DDR4(On Board)                                  |
|                               | SK hynix                                                                                                                                                                                              | H5ANAG6NAMR                       | 8GB DDR4 (On Board)                                 |
|                               |                                                                                                                                                                                                       | H5AN8G6NAFR                       | 4GB DDR4(On Board)                                  |
|                               | Samsung                                                                                                                                                                                               | M471A5244CB0-CRC                  | 4GB DDR4 SODIMM(on Card)                            |
|                               |                                                                                                                                                                                                       | M471A5244CB0-CTD                  | 4GB DDR4 SODIMM(on Card)                            |
|                               |                                                                                                                                                                                                       | M471A1K43CB1-CTD                  | 8GB DDR4 SODIMM (on Card)                           |
|                               |                                                                                                                                                                                                       | M471A1K43CB1-CRC                  | 8GB DDR4 SODIMM (on Card)                           |
| SK hynix                      | HMA81GS6AFR8N-UH                                                                                                                                                                                      | 8GB DDR4 2400MHz SODIMM (on Card) |                                                     |
|                               | HMA851S6AFR6N-UH                                                                                                                                                                                      | 4GB DDR4 2400MHz SODIMM (on Card) |                                                     |
| Battery Pack                  | LG                                                                                                                                                                                                    | LBS1224E                          | 72Wh, DC7.7V, 9450mAh                               |
| WLAN Combo Card               | Intel                                                                                                                                                                                                 | 9560D2W                           | 802.11a/b/g/n/ac 2.4GHz/5GHz + BT+BLE 5.0           |
| WLAN Combo Antenna            | LG (INPAQ)                                                                                                                                                                                            | WA-F-LBLB-04-056                  | FPCB Type<br>Main: Black, Aux: Gray                 |
|                               | LG (LUXSHARE-ICT)                                                                                                                                                                                     | 15Z980 ANTENNA ASM                | PIFA Type<br>Main: Black, Aux: Gray                 |
| Keyboard                      | LG                                                                                                                                                                                                    | SN3870BL                          | 15Z980 Black KBD                                    |
|                               |                                                                                                                                                                                                       | SN3870BL1                         | 15Z980 White KBD                                    |
| Web Camera                    | Chicony                                                                                                                                                                                               | CKFIH2821005290LH                 | With two microphones                                |
|                               |                                                                                                                                                                                                       | CKFIH28-121005290LH               | With One microphone                                 |
|                               | Luxvisions                                                                                                                                                                                            | 7BF109N2DC                        | With two microphones                                |
|                               |                                                                                                                                                                                                       | 7BF109N2DD                        | With One microphone                                 |
| Finger Print                  | SUNTEL                                                                                                                                                                                                | SFPA-L002STA(White)               | ---                                                 |
|                               | SUNTEL                                                                                                                                                                                                | SFPA-L002STB(Black)               | ---                                                 |
| LAN Gender<br>(Type C to LAN) | SUZHOU MEC ELECTRONICS                                                                                                                                                                                | 80-5946-111 (White)               | 10/100 Megabit Ethernet                             |
|                               |                                                                                                                                                                                                       | 80-5946-101 (Black)               |                                                     |
|                               | ARIN TECH CO. LTD                                                                                                                                                                                     | GD-08MF-36-WH-LP10 (White)        | 10/100 Megabit Ethernet                             |
|                               |                                                                                                                                                                                                       | GD-08MF-36-BK-LP11 (Black)        |                                                     |
|                               | Type C to LAN: Shielded, Undetached, 0.12m                                                                                                                                                            |                                   |                                                     |
| AC Adapter (48W)              | LG (HONOR)                                                                                                                                                                                            | ADS-48MS-19-2 19048E              | I/P: AC 100-240V, 50-60Hz, 1.5A, O/P: DC 19V, 2.53A |
|                               | DC Power Cord: Non-Shielded, Undetached, 1.8m<br>AC Power Cord: Non-Shielded, Detached, 1.0m (2C) (For Other Countries)<br>AC Power Cord: Non-Shielded, Detached, 1.55m (2C) (For US, Canada, Mexico) |                                   |                                                     |

Remark: For more detailed features description, please refer to the manufacturer's specifications or the user manual.

- 3.5.2. The EUT collocates with following worst components, which are used to establish a basic configuration of system during test:

| SKU                           |                                                   |
|-------------------------------|---------------------------------------------------|
| Main Board                    | LG, 14/15Z990 Main B/D PCB (with Thunderbolt)     |
| SUB Board                     | LG, 15Z990 WLAN SUB B/D (with Finger Printer)     |
| CPU                           | Intel, i7-8565U                                   |
| 15.6" LCD Panel               | LG Display, LP156WFA(SP)(G1) (Touch)              |
| Storage (SSD)                 | Sk hynix, 512GB                                   |
|                               | Sk hynix, 128GB                                   |
| Memory (RAM)                  | Sk hynix, 8GB (On Board)                          |
|                               | SK hynix, 8GB (On Card)                           |
| Battery Pack                  | LG, LBS1224E                                      |
| WLAN Combo Card               | Intel, 9560D2W                                    |
| WLAN Combo Antenna            | LG (INPAQ), WA-F-LBLB-04-056                      |
|                               | LG (LUXSHARE-ICT), 15Z980 ANTENNA ASM             |
| Keyboard                      | LG, SN3870BL1                                     |
| Web Camera                    | Chicony, CKFIH2821005290LH (With two microphones) |
| Finger Print                  | SUNTEL, SFPA-L002STA(White)                       |
| LAN Gender<br>(Type C to LAN) | SUZHOU MEC ELECTRONICS, 80-5946-111 (White)       |
| AC Adapter                    | LG (HONOR), ADS-48MS-19-2 19048E                  |

### 3.6. Test Configuration

| Mode | Duty Cycle (x) | T (ms) | Duty Cycle Factor (dB) |
|------|----------------|--------|------------------------|
| BT   | N/A            | 2.890  | N/A                    |

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

| Item                                 |                                             | Antenna            | Modulation | Data Rate | Test Channel |
|--------------------------------------|---------------------------------------------|--------------------|------------|-----------|--------------|
| Radiated Test Case                   | Radiated Band Edge <sup>Note1</sup>         | WA-F-LBLB-04-056   | GFSK       | 1Mbps     | 00/78        |
|                                      |                                             |                    | 8-DPSK     | 3Mbps     | 00/78        |
|                                      |                                             | 15Z980 ANTENNA ASM | GFSK       | 1Mbps     | 00/78        |
|                                      |                                             |                    | 8-DPSK     | 3Mbps     | 00/78        |
|                                      | Radiated Spurious Emission <sup>Note1</sup> | WA-F-LBLB-04-056   | GFSK       | 1Mbps     | 00/39/78     |
|                                      |                                             | 15Z980 ANTENNA ASM | GFSK       | 1Mbps     | 00/39/78     |
| Conducted Test Case <sup>Note2</sup> | 20dB Bandwidth                              |                    | GFSK       | 1Mbps     | 00/39/78     |
|                                      |                                             |                    | 8-DPSK     | 3Mbps     | 00/39/78     |
|                                      | Carrier Frequency Separation                |                    | GFSK       | 1Mbps     | 00/39/78     |
|                                      |                                             |                    | 8-DPSK     | 3Mbps     | 00/39/78     |
|                                      | Time of Occupancy                           |                    | GFSK       | 1Mbps     | 00/39/78     |
|                                      |                                             |                    | 8-DPSK     | 3Mbps     | 00/39/78     |
|                                      | Number of Hopping Channels                  |                    | GFSK       | 1Mbps     | Hopping      |
|                                      |                                             |                    | 8-DPSK     | 3Mbps     | Hopping      |
|                                      | Maximum Peak Output Power                   |                    | GFSK       | 1Mbps     | 00/39/78     |
|                                      |                                             |                    | 8-DPSK     | 3Mbps     | 00/39/78     |
|                                      | Band Edges                                  |                    | GFSK       | 1Mbps     | 00/78        |
|                                      |                                             |                    | 8-DPSK     | 3Mbps     | 00/78        |
|                                      | Spurious Emission                           |                    | GFSK       | 1Mbps     | 00/39/78     |
|                                      |                                             |                    | 8-DPSK     | 3Mbps     | 00/39/78     |

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: We performed testing of the highest and lowest data rate.

### 3.7. Tested Supporting System List

#### 3.7.1. Support Peripheral Unit

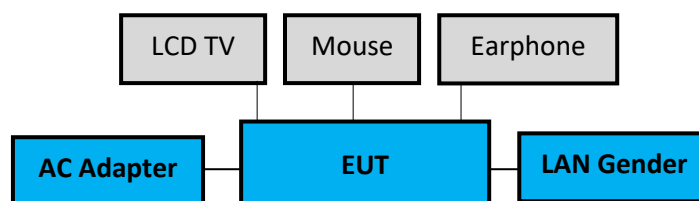
| No. | Product   | Brand | Model No.  | Serial No.               | Approval   |
|-----|-----------|-------|------------|--------------------------|------------|
| 1.  | LCD TV    | LG    | 22LK330-DB | N/A                      | N/A        |
| 2.  | USB Mouse | DELL  | MS111-L    | CN-09RRC7-48723-2B7-0H3M | FCC By DoC |
| 3.  | Earphone  | SAMPO | EK-Y1251MP | N/A                      | N/A        |

#### 3.7.2. Cable Lists

| No. | Cable Description Of The Above Support Units                                          |
|-----|---------------------------------------------------------------------------------------|
| 1.  | HDMI Cable: Shielded, Detachable, 1.8m<br>AC Power Cord: Unshielded, Detachable, 1.8m |
| 2.  | USB Cable: Unshielded, Undetachable, 1.8m                                             |
| 3.  | Earphone Cable: Unshielded, Undetachable, 2.0m                                        |

### 3.8. Setup Configuration

#### 3.8.1. EUT Configuration for Power Line & Radiated Emission



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



### 3.9. Operating Condition of EUT

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

### 3.10. 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. 8 Shielding Room<br>(2) Semi-Anechoic Chamber<br>(IC Test Site Registration No.:5183B-1)<br>(3) Fully Anechoic Chamber<br>(IC Test Site Registration No.:5183B-4)   |

### 3.11. Measurement Uncertainty

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

Remark : Uncertainty =  $ku_c(y)$

| Test Item                      | Uncertainty          |
|--------------------------------|----------------------|
| 20dB Bandwidth                 | $\pm 0.2\text{kHz}$  |
| Carrier Frequency Separation   | $\pm 0.2\text{kHz}$  |
| Time of Occupancy              | $\pm 0.03\text{sec}$ |
| Maximum peak Output power      | $\pm 0.52\text{dB}$  |
| Conducted Emission Limitations | $\pm 0.13\text{dB}$  |



## 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          | ESR3      | 101774     | 2018. 01. 24 | 1 Year        |
| 2.   | A.M.N.                      | R&S          | ENV4200   | 100169     | 2017. 11. 12 | 1 Year        |
| 3.   | L.I.S.N.                    | Kyoritsu     | KNW-407   | 8-855-9    | 2017. 12. 14 | 1 Year        |
| 4.   | Pulse Limiter               | R&S          | ESH3-Z2   | 100354     | 2018. 01. 16 | 1 Year        |
| 5.   | Signal Cable                | Yeida        | RG/58AU   | CE-08      | 2018. 09. 21 | 1 Year        |
| 6.   | Digital Thermo- Hygro Meter | iMax         | HTC-1     | No.8 S/R   | 2018. 04. 20 | 1 Year        |

### 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. 12 | 1 Year        |
| 2.   | Spectrum Analyzer          | Agilent      | N9030A-526             | MY53310269  | 2018. 02. 01 | 1 Year        |
| 3.   | Test Receiver              | R & S        | ESCS30                 | 100338      | 2018. 06. 20 | 1 Year        |
| 4.   | Amplifier                  | HP           | 8447D                  | 2944A06305  | 2018. 01. 30 | 1 Year        |
| 5.   | Amplifier                  | HP           | 8449B                  | 3008A02678  | 2018. 03. 06 | 1 Year        |
| 6.   | Loop Antenna               | R&S          | HFH2-Z2                | 891847/27   | 2017. 12. 18 | 1 Year        |
| 7.   | Bilog Antenna              | CHASE        | CBL6112D               | 33821       | 2018. 01. 21 | 1 Year        |
| 8.   | Horn Antenna               | COM-POWER    | AH-840                 | 101092      | 2018. 05. 07 | 1 Year        |
| 9.   | Horn Antenna               | ETS-Lindgren | 3117                   | 00135902    | 2018. 03. 08 | 1 Year        |
| 10.  | 2.4GHz Notch Filter        | K&L          | 7NSL10-2441.5E130.5-00 | 1           | 2018. 07. 24 | 1 Year        |
| 11.  | 3GHz High-Pass Filter      | Microwave    | H3G018G1               | 484796      | 2018. 08. 22 | 1 Year        |
| 12.  | Digital Thermo-Hygro Meter | iMax         | HTC-1                  | No.1 3m A/C | 2018. 04. 20 | 1 Year        |
| 13.  | Digital Thermo-Hygro Meter | iMax         | E-512                  | RF-02       | 2018. 04. 20 | 1 Year        |
| 14.  | 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. Interval |
|------|----------------------------|------------------------------|------------|------------|--------------|---------------|
| 1.   | Spectrum Analyzer          | Keysight                     | N9010B-544 | MY55460198 | 2018. 04. 26 | 1 Year        |
| 2.   | Digital Thermo-Hygro Meter | Shenzhen Datronn Electronics | KT-905     | RF         | 2018. 04. 20 | 1 Year        |

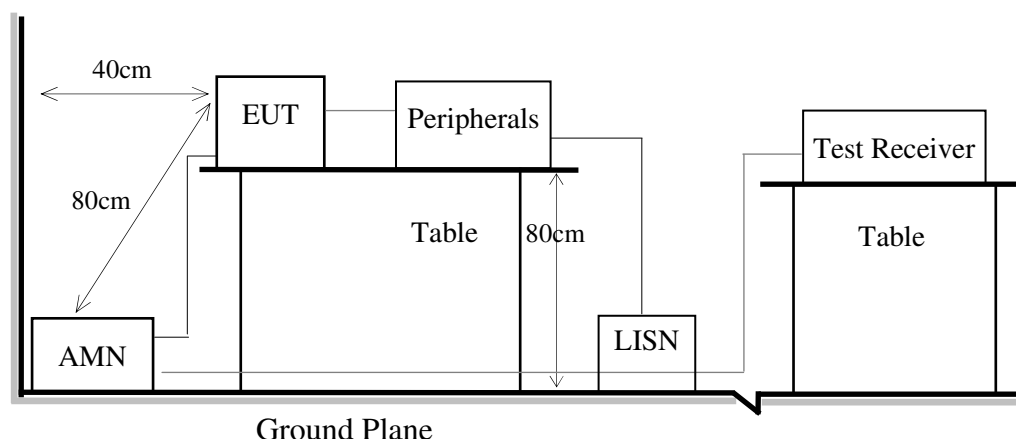
## 5. CONDUCTED EMISSION

### 5.1. Block Diagram of Test Setup

#### 5.1.1. Block Diagram of EUT

Indicated as section 3.8

#### 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      |

Remark 1.: 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.

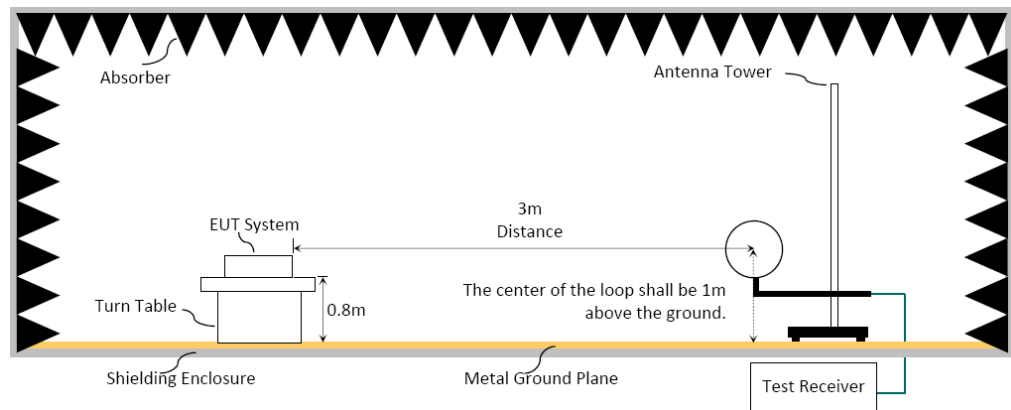
## 6. RADIATED EMISSION

### 6.1. Block Diagram of Test Setup

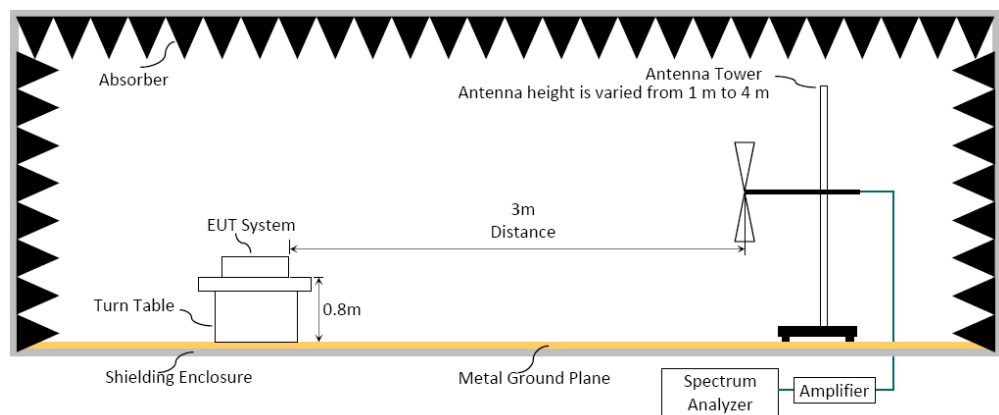
#### 6.1.1. Block Diagram of EUT

Indicated as section 3.8

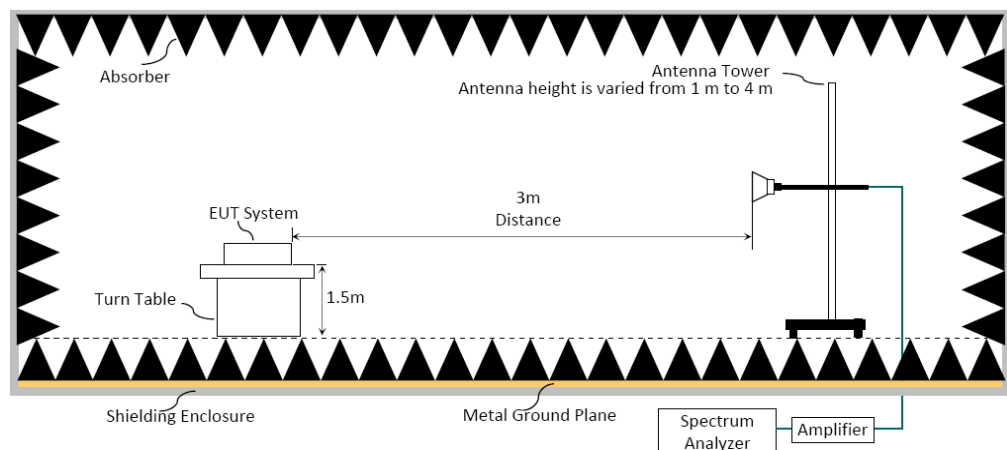
#### 6.1.2. Setup Diagram for 9kHz-30MHz



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



#### 6.1.4. Setup Diagram for above 1GHz



## 6.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified as below.

| Frequency (MHz) | Distance(m) | Limits                                      |             |
|-----------------|-------------|---------------------------------------------|-------------|
|                 |             | dBμV/m                                      | μV/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 dBμV/m (Peak)<br>54.0 dBμV/m (Average) |             |

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

- (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.

### 6.3. 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 ~ 25GHz:**

The EUT setup on the turn table which has 80 cm (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 25 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  $\geq 1/T$ .
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) 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 3.6

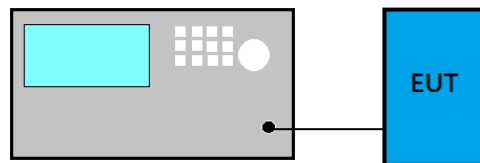
□ ERP = Peak Emission Level - 95.2dB - 2.14dB

**6.5. Test Results**

Please refer to Appendix A.

## 7. 20dB BANDWIDTH

### 7.1. Block Diagram of Test Setup



### 7.2. Specification Limits

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

### 7.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

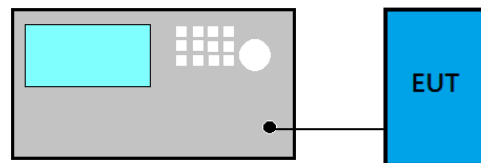
- (1) Set RBW close to 1% to 5% of OBW.
- (2) Set  $VBW \geq 3RBW$ .
- (3) Detector = Peak.
- (4) Trace mode = Max hold.
- (5) Sweep = Auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

### 7.4. Test Results

Please refer to Appendix A

## 8. CARRIER FREQUENCY SEPARATION

### 8.1. Block Diagram of Test Setup



### 8.2. Specification Limits

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output no greater than 125mW.

### 8.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

- (1) Span = Wide enough to capture the peaks of two adjacent channels
- (2) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- (3)  $VBW \geq RBW$
- (4) Sweep = Auto
- (5) Detector function = Peak
- (6) Trace = Max hold
- (7) Allow the trace to stabilize.

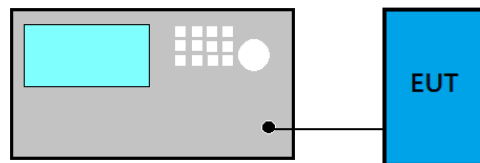
### 8.4. Test Results

Please refer to Appendix A



## 9. TIME OF OCCUPANCY

### 9.1. Block Diagram of Test Setup



### 9.2. Specification Limits

Frequency hopping systems in the 2400-2483.5MHz shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by number of hopping channels employed.

### 9.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

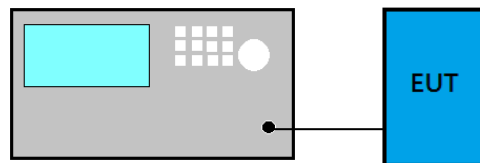
- (1) Span: Zero span, centered on a hopping channel.
- (2) RBW shall be  $\leq$  channel spacing and where possible RBW should be set  $\gg 1/T$ , where T is the expected dwell time per channel.
- (3) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
- (4) Detector function = Peak
- (5) Trace = Max hold

### 9.4. Test Results

Please refer to Appendix A

## 10. NUMBER OF HOPPING CHANNELS

### 10.1. Block Diagram of Test Setup



### 10.2. Specification Limits

Frequency hopping systems which use fewer than 20 hopping frequencies may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels.

### 10.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

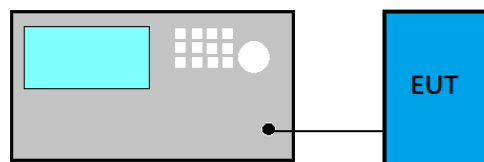
- (1) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- (2) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- (3) VBW  $\geq$  RBW
- (4) Sweep = Auto
- (5) Detector function = Peak
- (6) Trace = m=Max hold
- (7) Allow the trace to stabilize.

### 10.4. Test Results

Please refer to Appendix A

## 11. MAXIMUM PEAK OUTPUT POWER

### 11.1. Block Diagram of Test Setup



### 11.2. Specification Limits

The Limits of maximum Peak Output Power for frequency hopping systems in 2400-2483.5MHz is: 0.125Watt. (21dBm)

### 11.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

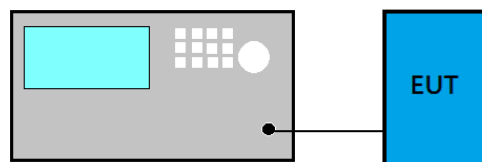
- (a) Use the following spectrum analyzer settings
  - (1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
  - (2) RBW > 20 dB bandwidth of the emission being measured.
  - (3) VBW  $\geq$  RBW
  - (4) Sweep: Auto
  - (5) Detector function: Peak
  - (6) Trace: Max hold
- (b) Allow trace to stabilize.
- (c) Use the marker-to-peak function to set the marker to the peak of the emission.

### 11.4. Test Results

Please refer to Appendix A

## 12. EMISSION LIMITATIONS

### 12.1. Block Diagram of Test Setup



### 12.2. Specification Limits

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in Section 15.209(a)/RSS-Gen Section 8.9 table 4 is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a)/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified in Section 15.209(a)/RSS-Gen Section 8.9 table 4 (See Section 15.205(c)).

### 12.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

- (1) Set span wide enough to capture the peak level of the in-band emission and all spurious emissions; up to 10<sup>th</sup> harmonic.
- (2) RBW = 100 kHz
- (3) VBW  $\geq$  RBW
- (4) Sweep = Auto
- (5) Detector function = Peak
- (6) Trace = Max hold

### 12.4. Test Results

Please refer to Appendix A



**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City 244, Taiwan

**Tel: +886 2 26099301**  
**Fax: +886 2 26099303**

---

## **13.DEVIATION TO TEST SPECIFICATIONS**

**【NONE】**



**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City 244, Taiwan

---

**APPENDIX A**

**Tel: +886 2 26099301**  
**Fax: +886 2 26099303**

# APPENDIX A

## TEST DATA AND PLOTS

(Model: 15Z990)



**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City 244, Taiwan

---

**APPENDIX B**

**Tel: +886 2 26099301**  
**Fax: +886 2 26099303**

# APPENDIX B

## TEST PHOTOGRAPHS

(Model: 15Z990)