

## **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 : Lighting Gateway**  
**Model Name : 9GW97185D6**  
**Brand : LG**  
**FCC ID : BEJ9GW97185D6**  
**IC : 2703H-9GW97185D6**

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

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

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APPENDIX A TEST DATA AND PLOTS  
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## TEST REPORT CERTIFICATION

Applicant : LG Electronics Inc.  
Manufacturer : LG Electronics Inc.  
EUT Description  
(1) Product : Lighting Gateway  
(2) Model : 9GW97185D6  
(3) Brand : LG  
(4) Power Rating : DC 5V

### Applicable Standards:

47 CFR FCC Part 15 Subpart C  
RSS-Gen (Issue 5), April 2018  
RSS-247 (Issue 2), February 2017  
ANSI C63.10:2013  
KDB 558074 D01 DTS Meas Guidance v05r01

**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: 2019. 04. 01

Reviewed by:



(Sabrina Wang/Administrator)

Approved by:



(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 Data  | Revision Summary | Report Number |
|------------|--------------|------------------|---------------|
| 0          | 2019. 04. 01 | Original Report  | EM-F190101    |

## 2. SUMMARY OF TEST RESULTS

| Rule                 |                              | Description                                             | Results           |
|----------------------|------------------------------|---------------------------------------------------------|-------------------|
| FCC                  | IC                           |                                                         |                   |
| 15.207               | RSS-Gen §8.8                 | Conducted Emission                                      | <b>PASS</b>       |
| 15.247(d)/<br>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)(2)         | RSS-247 §5.2(1)              | 6dB Bandwidth                                           | <b>PASS</b>       |
| 15.247(b)(3)         | RSS-247 §5.4(4)              | Maximum Peak Output                                     | <b>PASS</b>       |
| 15.247(d)            | RSS-247 §5.5                 | Conducted Band Edges and<br>Conducted Spurious Emission | <b>PASS</b>       |
| 15.247 (e)           | RSS-247 §5.2(2)              | Peak Power Spectral Density                             | <b>PASS</b>       |
| 15.203               | RSS-Gen §8.3                 | Antenna Requirement                                     | <b>Compliance</b> |

### 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 |
| Manufacturer | LG Electronics Inc.<br>222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713 Korea |
| Product      | Lighting Gateway                                                                         |
| Brand        | LG                                                                                       |
| Model        | 9GW97185D6                                                                               |

#### 3.2. Description of EUT

|                        |                                                                                            |
|------------------------|--------------------------------------------------------------------------------------------|
| Test Model             | 9GW97185D6                                                                                 |
| Serial Number          | N/A                                                                                        |
| Power Rating           | DC 5V (Refer to AC adapter rating)                                                         |
| RF Features            | ZigBee (IEEE 802.15.4)                                                                     |
| Transmit Type          | 1T1R                                                                                       |
| Sample Status          | Production                                                                                 |
| Date of Receipt        | 2019. 03. 05                                                                               |
| Date of Test           | 2019. 03. 06 ~ 04. 01                                                                      |
| Interface Ports of EUT | <ul style="list-style-type: none"><li>• One PoE Port</li><li>• One DC Input Port</li></ul> |
| Accessories Supplied   | <ul style="list-style-type: none"><li>• AC Adapter</li><li>• USB DC Cable</li></ul>        |

### 3.3. Antenna Information

| Antenna Part Number | Manufacture | Antenna Type | Frequency   | Max Gain |
|---------------------|-------------|--------------|-------------|----------|
| ---                 | BLUECOM     | PCB          | 2.4GHz Band | 1.74dBi  |

### 3.4. EUT Specifications Assessed in Current Report

| Mode                   | Fundamental Range (MHz) | Channel Number | Modulation    | Data Rate (Mbps) |
|------------------------|-------------------------|----------------|---------------|------------------|
| ZigBee (IEEE 802.15.4) | 2405-2480               | 16             | DSSS (O-QPSK) | 0.25             |

| Channel List           |                 |                |                 |                |                 |                |                 |
|------------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|
| ZigBee (IEEE 802.15.4) |                 |                |                 |                |                 |                |                 |
| Channel Number         | Frequency (MHz) | Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) |
| 11                     | 2405            | 15             | 2425            | 19             | 2445            | 23             | 2465            |
| 12                     | 2410            | 16             | 2430            | 20             | 2450            | 24             | 2470            |
| 13                     | 2415            | 17             | 2435            | 21             | 2455            | 25             | 2475            |
| 14                     | 2420            | 18             | 2440            | 22             | 2460            | 26             | 2480            |

### 3.5. Descriptions of Key Components

| Item                           | Supplier                                   | Model / Type | Character                                                       |
|--------------------------------|--------------------------------------------|--------------|-----------------------------------------------------------------|
| AC Adapter<br>(Wall-mount, 2C) | LG                                         | MCS-H06WP    | I/P: 100-240Vac, 50/60Hz, 0.5A<br>O/P: 9Vdc, 1.8A or 5Vdc, 1.8A |
|                                | USB DC Cable: Unshielded, Detachable, 1.2m |              |                                                                 |

### 3.6. Test Configuration

| Item                         | ZigBee                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Duty Cycle                   | <ul style="list-style-type: none"><li>- This product has a correction factor based on the computed worst-case value for an 802.15.4-compliant ZigBee stack, which is 66%. Note that the 66% measurement assumes worst-case values achieved in several randomization functions, so your observed, real-world application performance will almost certainly be less than this number.</li><li>- This product usually use a duty cycle(On time/total time) is 3.93/100ms that 13.76% and the actual worst case possible is a full data payload, with three consecutive ACK and one NACK is 17.04/100ms that is 17%.</li></ul> |
| Duty Cycle Correction Factor | -15.37dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

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

| Item                | Mode                                                | Test Channel |
|---------------------|-----------------------------------------------------|--------------|
| Radiated Test Case  | Radiated Band Edge <sup>Note1</sup>                 | ZigBee       |
|                     | Radiated Spurious Emission <sup>Note1 &amp; 2</sup> | ZigBee       |
| Conducted Test Case | 6dB Bandwidth                                       | ZigBee       |
|                     | Peak Output Power                                   | ZigBee       |
|                     | Band Edge                                           | ZigBee       |
|                     | Spurious Emission                                   | ZigBee       |
|                     | Peak Power Spectral Density                         | ZigBee       |

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.

### 3.7. Tested Supporting System List

#### 3.7.1. Support Peripheral Unit

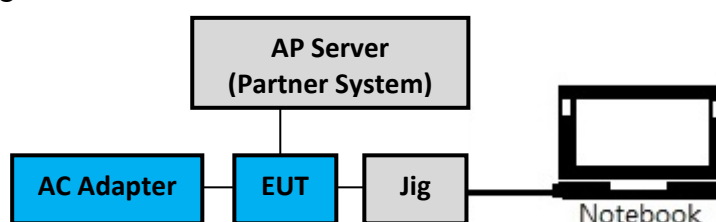
| No. | Product      | Brand | Model No. | Serial No. | Approval                               |
|-----|--------------|-------|-----------|------------|----------------------------------------|
| 1.  | Notebook PC  | acer  | MS2362    | N/A        | Contains FCC ID:<br>PPD-AAR5B225       |
| 2.  | Test Jig     | N/A   | N/A       | N/A        | N/A                                    |
| 3.  | Power Socket | N/A   | N/A       | N/A        | N/A                                    |
| 4.  | AP Server    | ASUS  | RT-N18U   | N/A        | FCC ID: MSQ-RTN18U<br>IC: 3568A-RTN18U |

#### 3.7.2. Cable Lists

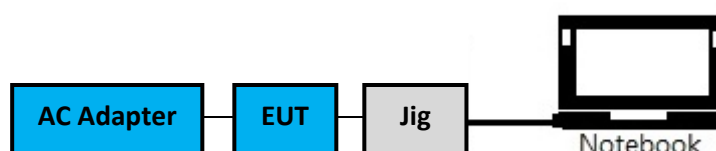
| No. | Cable Description Of The Above Support Units                                                                                                                                                  |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | LAN Cable: Shielded, Detachable, 1.0m<br>Adapter: Chicony, M/N CPA09-A065N1,<br>DC Cord: Shielded, Undetachable, 1.8m, Bonded a ferrite core<br>AC Power Cord: Non-Shielded, Detachable, 1.8m |
| 2.  | BUS Cable: Non-Shielded, Detachable, 0.1m<br>USB Cable: Shielded, Detachable, 1.8m                                                                                                            |
| 3.  | Power Cord: Non-Shielded, Detachable, 1.8m                                                                                                                                                    |
| 4.  | AC Adapter: CWT, M/N:CAP018121<br>DC Cord: Unshielded, Undetachable, 1.5m<br>LAN Cable: Shielded, Detachable, 10.0m with a core                                                               |

### 3.8. Setup Configuration

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



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



### 3.9. Operating Condition of EUT

Test program “ember.desktop” is used for enabling EUT RF 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    | ±3.50dB     |
| Radiation Test<br>(Distance: 3m) | 30MHz~1000MHz   | ± 3.68dB    |
|                                  | Above 1GHz      | ±5.82dB     |

Remark : Uncertainty =  $ku_c(y)$

| Test Item                      | Uncertainty |
|--------------------------------|-------------|
| 6dB Bandwidth                  | ± 0.05kHz   |
| Maximum peak 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          | ESR3      | 101774     | 2019.01.22 | 1 Year        |
| 2.   | A.M.N.                      | R&S          | ENV4200   | 100169     | 2018.11.14 | 1 Year        |
| 3.   | L.I.S.N.                    | Kyoritsu     | KNW-407   | 8-855-9    | 2018.12.19 | N.C.R.        |
| 4.   | Pulse Limiter               | R&S          | ESH3-Z2   | 100354     | 2019.01.12 | 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        |
| 7.   | Test Software               | Audix        | e3        | V6.120619c | 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  | 2018.09.12 | 1 Year        |
| 2.   | Spectrum Analyzer          | Agilent      | N9030A-526             | MY53310269  | 2019.01.30 | 1 Year        |
| 3.   | Test Receiver              | R & S        | ESCS30                 | 100338      | 2018.06.20 | 1 Year        |
| 4.   | Amplifier                  | HP           | 8447D                  | 2944A06305  | 2019.01.30 | 1 Year        |
| 5.   | Amplifier                  | HP           | 8449B                  | 3008A02678  | 2019.03.07 | 1 Year        |
| 6.   | Loop Antenna               | R&S          | HFH2-Z2                | 891847/27   | 2017.12.18 | 2 Years       |
| 7.   | Bilog Antenna              | CHASE        | CBL6112D               | 33821       | 2019.01.19 | 1 Year        |
| 8.   | Horn Antenna               | COM-POWER    | AH-840                 | 101092      | 2018 05.07 | 1 Year        |
| 9.   | Horn Antenna               | ETS-Lindgren | 3117                   | 00135902    | 2019.03.13 | 1 Year        |
| 10.  | 2.4GHz Notch Filter        | K&L          | 7NSL10-2441.5E130.5-00 | 1           | 2018.07.24 | 1 Year        |
| 11.  | 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.   | 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        |

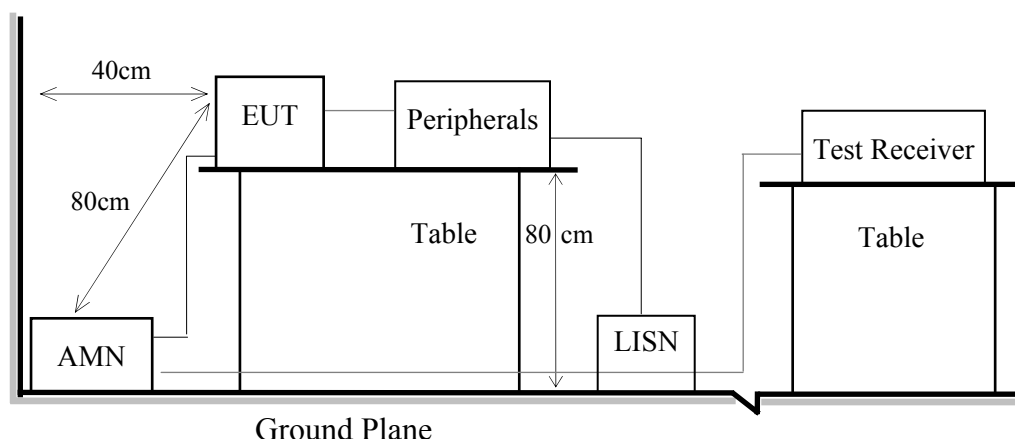
## 5. CONDUCTED EMISSION

### 5.1. Block Diagram of Test Setup

#### 5.1.1. Block Diagram of EUT

Indicated as section 3.8

#### 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 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

### 5.4. Test Results

Please refer to Appendix A.

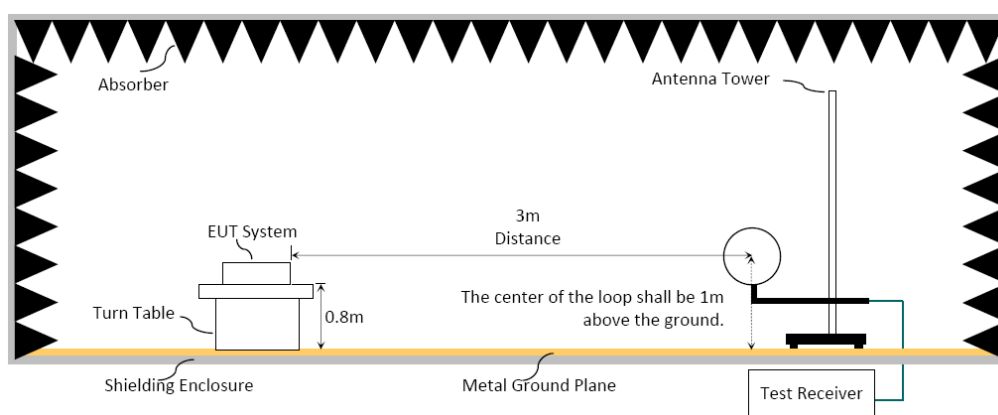
## 6. RADIATED EMISSION

### 6.1. Block Diagram of Test Setup

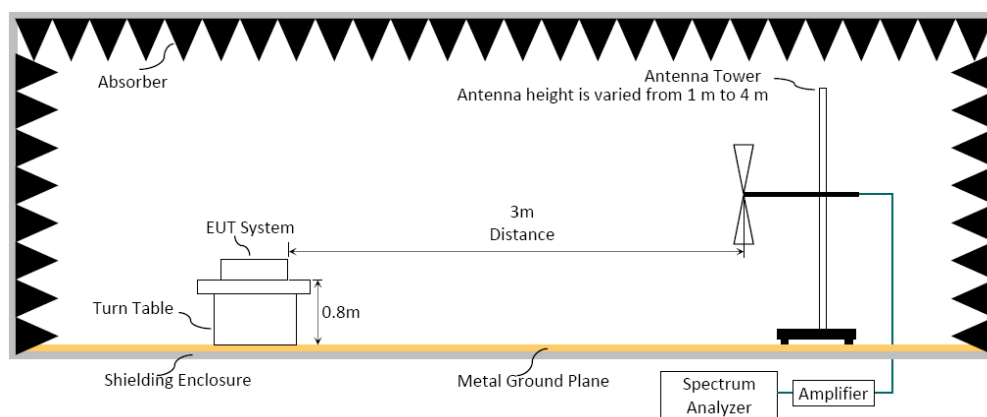
#### 6.1.1. Block Diagram of EUT

Indicated as section 3.8

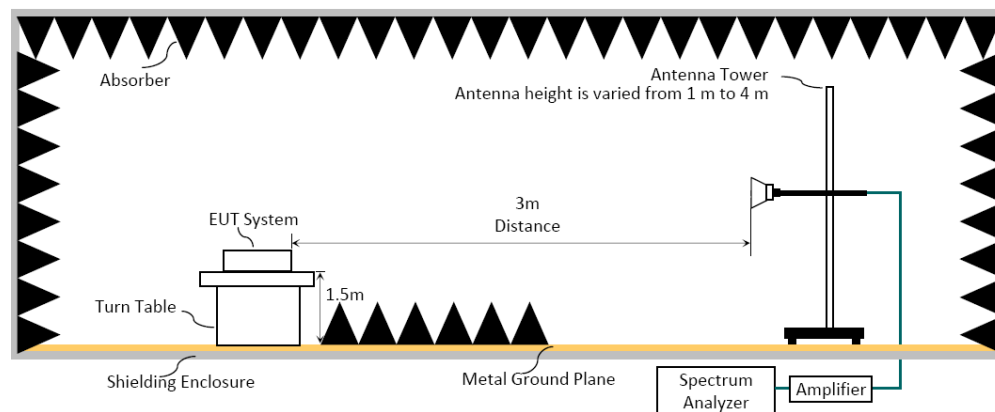
#### 6.1.2. Setup Diagram for 9kHz-30MHz



#### 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                                                  |             |
|-----------------|--------------|---------------------------------------------------------|-------------|
|                 |              | 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.

### 6.3. Test Procedure

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

The EUT setup on the turn table 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 30-1000 MHz) 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 1 GHz:**

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  $\geq 1/T$ .

| Modulation Type | T (ms) | 1/ T (kHz) | VBW Setting (kHz) |
|-----------------|--------|------------|-------------------|
| ZigBee          | ---    | ---        | 10Hz              |

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:**

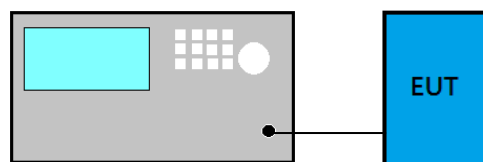
Average Emission Level= Peak Emission Level+ D.C.C.F.

**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+ DCCFDuty 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. 6dB BANDWIDTH

### 7.1. Block Diagram of Test Setup



### 7.2. Specification Limits

The minimum 6dB bandwidth shall be at least 500kHz.

### 7.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05r01:

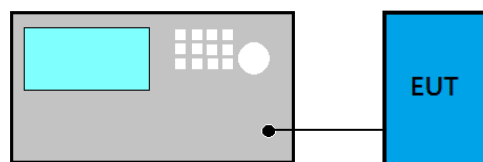
- (1) Set RBW = 100 kHz.
- (2) Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

### 7.4. Test Results

Please refer to Appendix A

## 8. MAXIMUM PEAK OUTPUT POWER

### 8.1. Block Diagram of Test Setup



### 8.2. Specification Limits

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm), and E.I.R.P.: 4Watt (36dBm)

### 8.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05r01:

☐ **PKPM1 Peak power meter method:**

EUT is connected to power sensor and record the maximum output power.

☒ **Maximum peak conducted output power method:**

- (1) Set the RBW  $\geq$  DTS bandwidth
- (2) Set VBW  $\geq 3 \times$  RBW
- (3) Set span  $\geq 3 \times$  RBW.
- (4) Sweep time = auto couple
- (5) Detector = peak.
- (6) Trace mode = max hold.
- (7) Allow trace to fully stabilize.
- (8) Use peak marker function to determine the peak amplitude level.

☐ **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)**

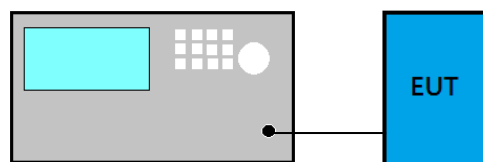
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 -5% of OBW
- (3) Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of 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

### 9.1. Block Diagram of Test Setup



### 9.2. 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)).

### 9.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05r01:

#### ■ Reference Level

- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW : 100 kHz.
- (4) Set the VBW  $\geq 3 \times$  RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize to find the max PSD as reference level.

#### ■ Emission Level Measurement

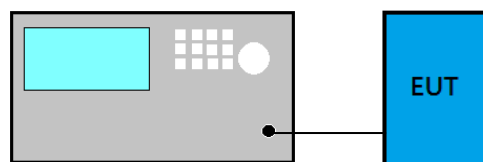
- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW : 100 kHz.
- (4) Set the VBW  $\geq 3 \times$  RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize to find the max level.

### 9.4. Test Results

Please refer to Appendix A

## 10. POWER SPECTRAL DENSITY

### 10.1. Block Diagram of Test Setup



### 10.2. Specification Limits

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

### 10.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05r01:

#### ☒ Method PKPSD (peak PSD)

- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- (4) Set the VBW  $\geq 3 \times \text{RBW}$ .
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize.
- (9) Use the peak marker function to determine the maximum amplitude level.
- (10) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### ☐ Method AVGPSD-2

- (1) Using peak PSD procedure step 1 to step 4.
- (2) Detector = RMS detector
- (3) Sweep time = auto couple
- (4) Trace mode = trace averaging over a minimum of 100 traces
- (5) Use the peak marker function to determine the maximum amplitude level.
- (6) Duty cycle factor is added when duty cycle presented in section 3.7 < 98%.
- (7) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 10.4. 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

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## 11.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**

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# APPDNDIX A

## TEST DATA AND PLOTS

(Model: 9GW97185D6)

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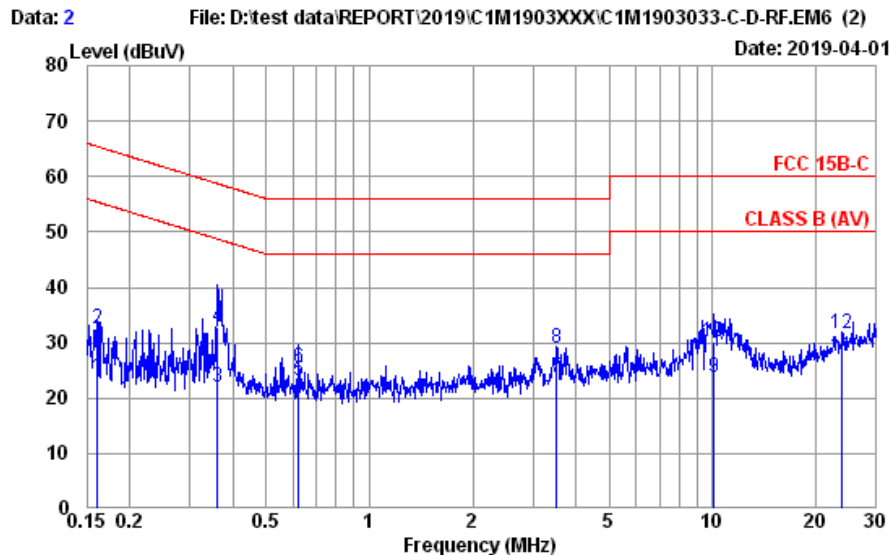
|                                                         |           |
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Audix Technology Corp.  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

## A.1 CONDUCTED EMISSION

|              |                               |            |          |
|--------------|-------------------------------|------------|----------|
| Test Date    | 2019/04/01                    | Temp./Hum. | 25°C/51% |
| Test Voltage | AC 120V 60Hz (Via AC Adapter) |            |          |



Site no. : No.8 Shielded Room Data no. : 2  
Condition : ENV4200 100169 LISN Phase : NEUTRAL  
Limit : FCC 15B-C  
Env. / Ins. : 25°C / 51% ESR3 (1774) Engineer : Xar Zhuo  
EUT : 96W97185D6  
Power Rating : 120Vac/60Hz  
Test Mode : Operating

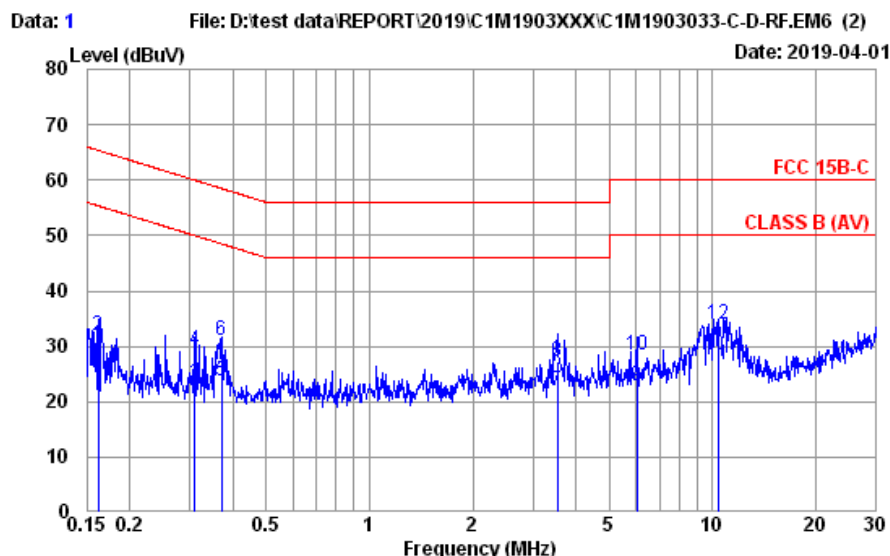
|    | Freq.<br>(MHz) | AMN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Pulse<br>Att.<br>(dB) | Reading<br>(dBμV) | Emission<br>Level<br>(dBμV) | Limits<br>(dBμV) | Margin<br>(dB) | Remark  |
|----|----------------|-----------------------|-----------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.161          | 10.68                 | 0.03                  | 9.86                  | 3.11              | 23.68                       | 55.43            | 31.75          | Average |
| 2  | 0.161          | 10.68                 | 0.03                  | 9.86                  | 12.01             | 32.58                       | 65.43            | 32.85          | QP      |
| 3  | 0.361          | 10.51                 | 0.04                  | 9.86                  | 1.65              | 22.06                       | 48.69            | 26.63          | Average |
| 4  | 0.361          | 10.51                 | 0.04                  | 9.86                  | 12.49             | 32.90                       | 58.69            | 25.79          | QP      |
| 5  | 0.621          | 10.48                 | 0.05                  | 9.86                  | 2.73              | 23.12                       | 46.00            | 22.88          | Average |
| 6  | 0.621          | 10.48                 | 0.05                  | 9.86                  | 5.01              | 25.40                       | 56.00            | 30.60          | QP      |
| 7  | 3.509          | 10.62                 | 0.10                  | 9.87                  | 3.16              | 23.75                       | 46.00            | 22.25          | Average |
| 8  | 3.509          | 10.62                 | 0.10                  | 9.87                  | 8.52              | 29.11                       | 56.00            | 26.89          | QP      |
| 9  | 10.072         | 11.38                 | 0.19                  | 9.89                  | 2.34              | 23.80                       | 50.00            | 26.20          | Average |
| 10 | 10.072         | 11.38                 | 0.19                  | 9.89                  | 8.73              | 30.19                       | 60.00            | 29.81          | QP      |
| 11 | 23.888         | 14.74                 | 0.29                  | 9.97                  | 2.61              | 27.61                       | 50.00            | 22.39          | Average |
| 12 | 23.888         | 14.74                 | 0.29                  | 9.97                  | 6.56              | 31.56                       | 60.00            | 28.44          | QP      |

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.

Audix Technology Corp.  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

|              |                               |            |          |
|--------------|-------------------------------|------------|----------|
| Test Date    | 2019/04/01                    | Temp./Hum. | 25°C/51% |
| Test Voltage | AC 120V 60Hz (Via AC Adapter) |            |          |



Site no. : No.8 Shielded Room Data no. : 1  
Condition : ENV4200 100169 LISN Phase : LINE  
Limit : FCC 15B-C  
Env. / Ins. : 25°C / 51% ESR3 (1774) Engineer : Xar Zhuo  
EUT : 9GW97185D6  
Power Rating : 120Vac/60Hz  
Test Mode : Operating

|    | Freq.<br>(MHz) | AMN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Pulse<br>Att.<br>(dB) | Reading<br>(dBμV) | Emission<br>Level<br>(dBμV) | Limits<br>(dBμV) | Margin<br>(dB) | Remark  |
|----|----------------|-----------------------|-----------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.162          | 10.60                 | 0.03                  | 9.86                  | 3.30              | 23.79                       | 55.38            | 31.59          | Average |
| 2  | 0.162          | 10.60                 | 0.03                  | 9.86                  | 11.38             | 31.87                       | 65.38            | 33.51          | QP      |
| 3  | 0.310          | 10.48                 | 0.04                  | 9.86                  | 2.63              | 23.01                       | 49.97            | 26.96          | Average |
| 4  | 0.310          | 10.48                 | 0.04                  | 9.86                  | 8.84              | 29.22                       | 59.97            | 30.75          | QP      |
| 5  | 0.371          | 10.46                 | 0.04                  | 9.86                  | 3.37              | 23.73                       | 48.47            | 24.74          | Average |
| 6  | 0.371          | 10.46                 | 0.04                  | 9.86                  | 10.63             | 30.99                       | 58.47            | 27.48          | QP      |
| 7  | 3.528          | 10.53                 | 0.10                  | 9.87                  | 1.52              | 22.02                       | 46.00            | 23.98          | Average |
| 8  | 3.528          | 10.53                 | 0.10                  | 9.87                  | 6.70              | 27.20                       | 56.00            | 28.80          | QP      |
| 9  | 6.024          | 10.82                 | 0.14                  | 9.88                  | 2.05              | 22.89                       | 50.00            | 27.11          | Average |
| 10 | 6.024          | 10.82                 | 0.14                  | 9.88                  | 7.67              | 28.51                       | 60.00            | 31.49          | QP      |
| 11 | 10.397         | 11.26                 | 0.19                  | 9.89                  | 5.30              | 26.64                       | 50.00            | 23.36          | Average |
| 12 | 10.397         | 11.26                 | 0.19                  | 9.89                  | 12.56             | 33.90                       | 60.00            | 26.10          | QP      |

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.

## A.2 RADIATED EMISSION

|              |                                |            |           |
|--------------|--------------------------------|------------|-----------|
| Test Date    | 2019/04/01                     | Temp./Hum. | 22°C /53% |
| Test Voltage | AC 120V, 60Hz (via AC Adapter) |            |           |

### A.2.1 Emissions within Restricted Frequency Bands

#### A.2.1.1 Frequency 9kHz~30MHz

**The emissions (9kHz~30MHz) not reported for there is no emission be found.**

#### A.2.1.2 Frequency Below 1 GHz

|      |        |           |            |
|------|--------|-----------|------------|
| Mode | ZigBee | Frequency | TX 2405MHz |
|------|--------|-----------|------------|

#### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 56.19                    | 13.42                 | 1.96            | 10.11                | 25.49                   | 40.00           | 14.51       | Peak     |
| 176.47                   | 15.70                 | 3.60            | 14.38                | 33.68                   | 43.50           | 9.82        | Peak     |
| 250.19                   | 19.40                 | 3.98            | 18.20                | 41.58                   | 46.00           | 4.42        | Peak     |
| 375.32                   | 21.88                 | 5.46            | 12.41                | 39.75                   | 46.00           | 6.25        | Peak     |
| 749.74                   | 25.91                 | 7.32            | 5.86                 | 39.09                   | 46.00           | 6.91        | Peak     |
| 874.87                   | 27.03                 | 7.96            | 4.75                 | 39.74                   | 46.00           | 6.26        | Peak     |

#### Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 54.25                    | 13.84                 | 1.93            | 18.72                | 34.49                   | 40.00           | 5.51        | Peak     |
| 94.02                    | 16.43                 | 2.55            | 15.46                | 34.44                   | 43.50           | 9.06        | Peak     |
| 125.06                   | 18.57                 | 3.06            | 12.33                | 33.96                   | 43.50           | 9.54        | Peak     |
| 250.19                   | 19.40                 | 3.98            | 12.80                | 36.18                   | 46.00           | 9.82        | Peak     |
| 375.32                   | 21.88                 | 5.46            | 4.72                 | 32.06                   | 46.00           | 13.94       | Peak     |
| 749.74                   | 25.91                 | 7.32            | 3.38                 | 36.61                   | 46.00           | 9.39        | Peak     |

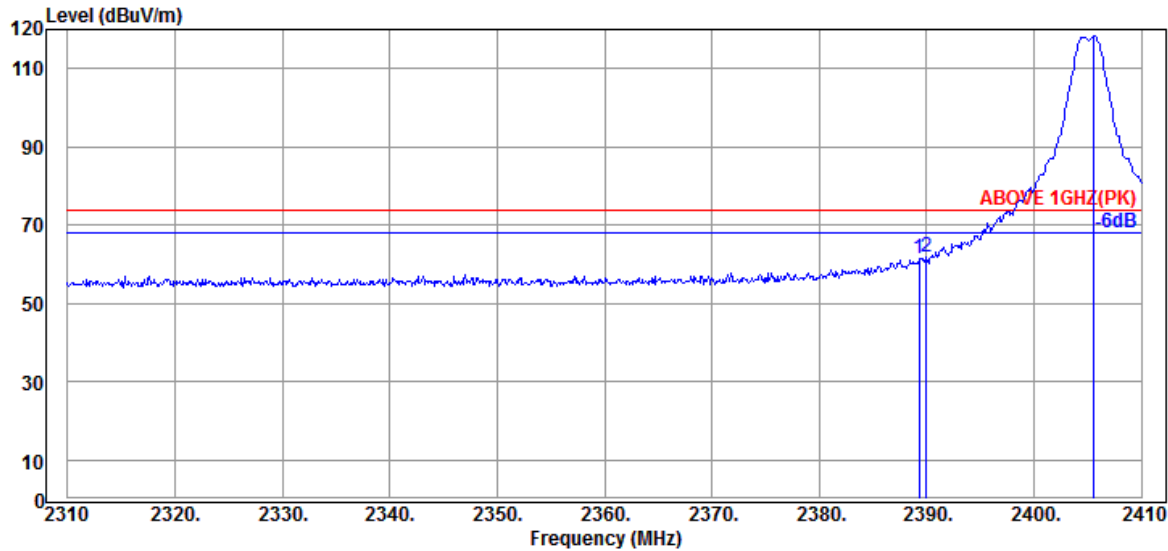
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No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

### A.2.1.3 Frequency Above 1 GHz to 10<sup>th</sup> harmonics

#### Band Edge:

| Mode | ZigBee | Frequency | TX 2405MHz |
|------|--------|-----------|------------|
|------|--------|-----------|------------|



#### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2389.30                  | 32.52                 | 8.17            | 20.92                | 61.61                   | 74.00           | 12.39       | Peak     |
| 2390.00                  | 32.52                 | 8.17            | 21.00                | 61.69                   | 74.00           | 12.31       | Peak     |
| @ 2405.60                | 32.61                 | 8.18            | 77.45                | 118.24                  | ---             | ---         | Peak     |

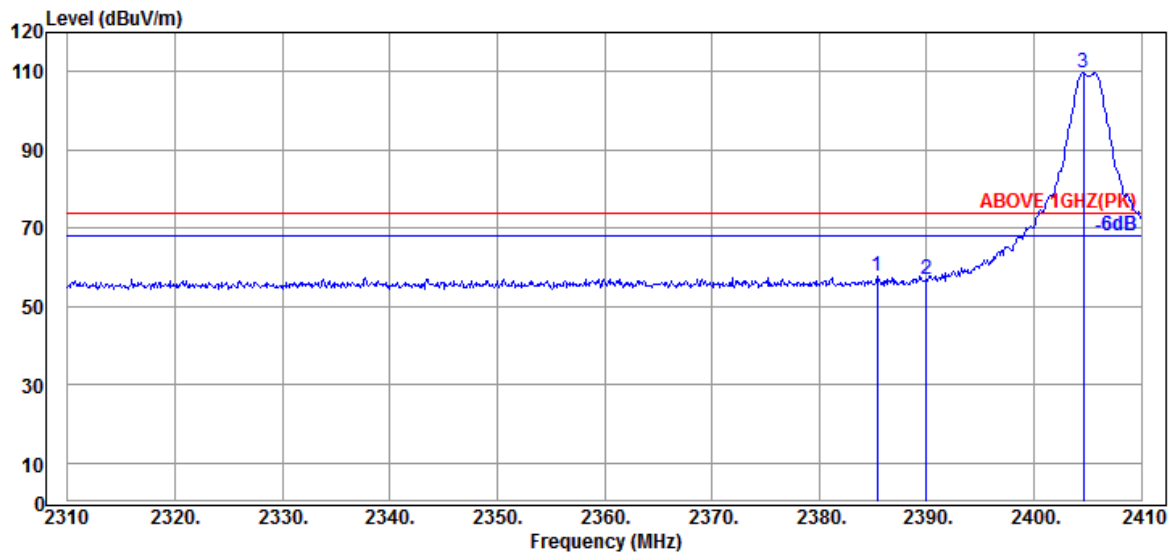
  

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 2389.30                  | 61.61                        | -15.37    | 46.24                           | 54.00           | 7.76        | Average |
| 2390.00                  | 61.69                        | -15.37    | 46.32                           | 54.00           | 7.68        | Average |

**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

|      |        |           |            |
|------|--------|-----------|------------|
| Mode | ZigBee | Frequency | TX 2405MHz |
|------|--------|-----------|------------|



### Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2385.40                  | 32.52                 | 8.17            | 17.17                | 57.86                   | 74.00           | 16.14       | Peak     |
| 2390.00                  | 32.52                 | 8.17            | 16.29                | 56.98                   | 74.00           | 17.02       | Peak     |
| @ 2404.60                | 32.61                 | 8.18            | 68.76                | 109.55                  | ---             | ---         | Peak     |

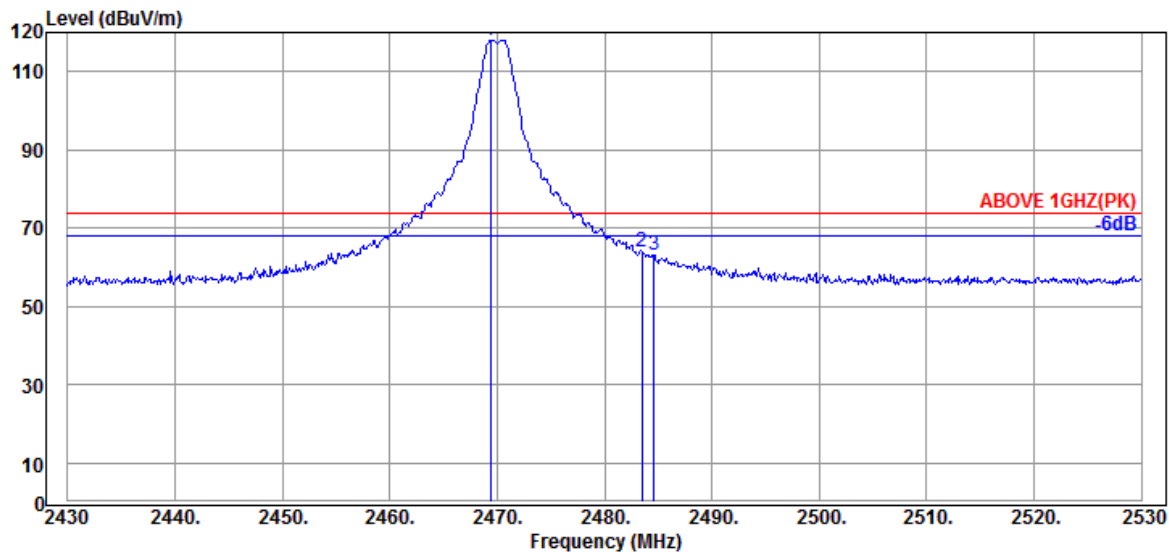
  

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 2385.40                  | 57.86                        | -15.37    | 42.49                           | 54.00           | 11.51       | Average |
| 2390.00                  | 56.98                        | -15.37    | 41.61                           | 54.00           | 12.39       | Average |

**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

| Mode | ZigBee | Frequency | TX 2470MHz |
|------|--------|-----------|------------|
|------|--------|-----------|------------|



#### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| @ 2469.40                | 32.88                 | 8.20            | 77.03                | 118.11                  | ---             | ---         | Peak     |
| 2483.50                  | 32.94                 | 8.20            | 22.92                | 64.06                   | 74.00           | 9.94        | Peak     |
| 2484.60                  | 32.94                 | 8.20            | 22.12                | 63.26                   | 74.00           | 10.74       | Peak     |

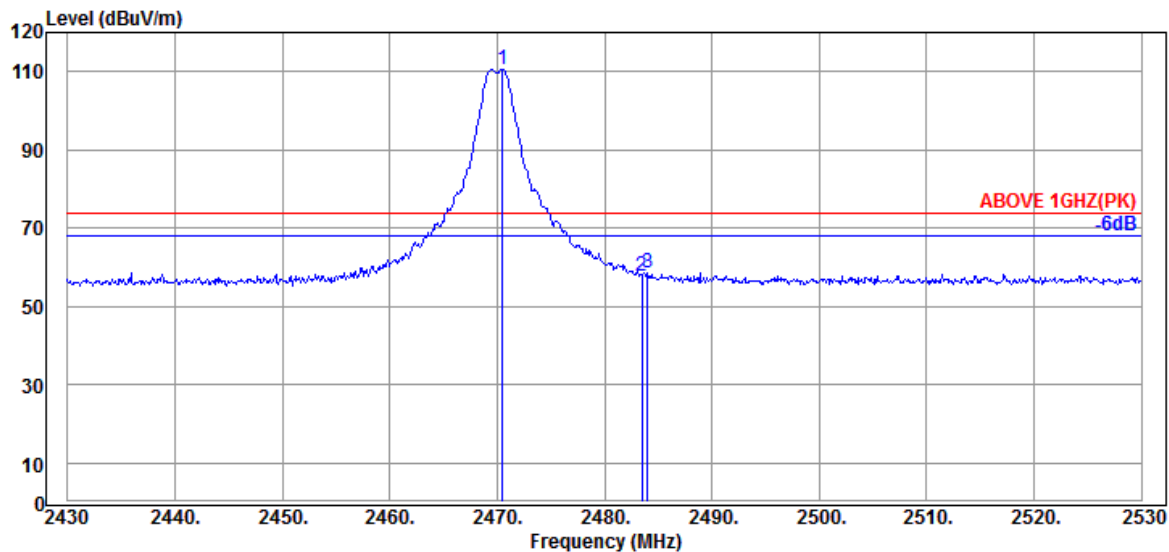
  

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 2483.50                  | 64.06                        | -15.37    | 48.69                           | 54.00           | 5.31        | Average |
| 2484.60                  | 63.26                        | -15.37    | 47.89                           | 54.00           | 6.11        | Average |

**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

|      |        |           |            |
|------|--------|-----------|------------|
| Mode | ZigBee | Frequency | TX 2470MHz |
|------|--------|-----------|------------|



### Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| @ 2470.50                | 32.88                 | 8.20            | 69.36                | 110.44                  | ---             | ---         | Peak     |
| 2483.50                  | 32.94                 | 8.20            | 16.72                | 57.86                   | 74.00           | 16.14       | Peak     |
| 2484.00                  | 32.94                 | 8.20            | 17.53                | 58.67                   | 74.00           | 15.33       | Peak     |

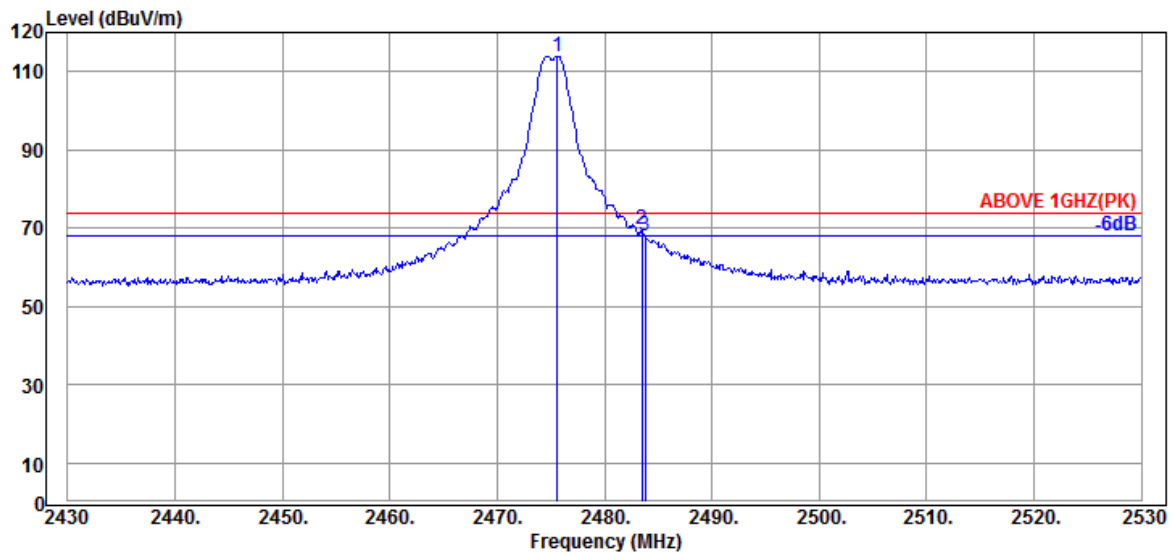
  

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 2483.50                  | 57.86                        | -15.37    | 42.49                           | 54.00           | 11.51       | Average |
| 2484.00                  | 58.67                        | -15.37    | 43.30                           | 54.00           | 10.70       | Average |

**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

| Mode | ZigBee | Frequency | TX 2475MHz |
|------|--------|-----------|------------|
|------|--------|-----------|------------|



#### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| @ 2475.60                | 32.91                 | 8.20            | 72.79                | 113.90                  | ---             | ---         | Peak     |
| 2483.50                  | 32.94                 | 8.20            | 28.42                | 68.56                   | 74.00           | 5.44        | Peak     |
| 2483.80                  | 32.94                 | 8.20            | 27.10                | 67.24                   | 74.00           | 6.76        | Peak     |

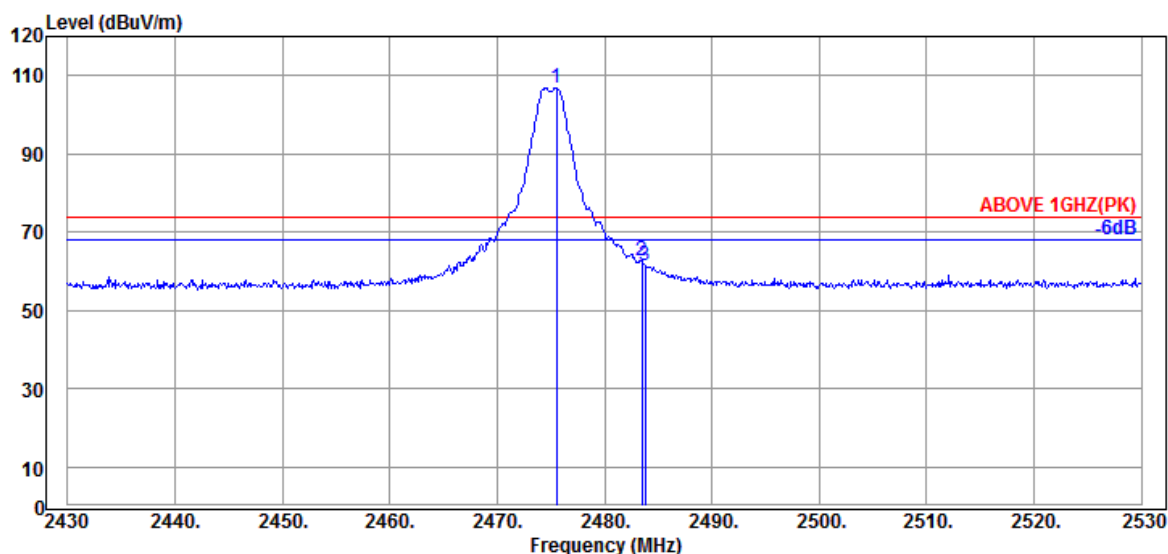
  

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 2483.50                  | 68.56                        | -15.37    | 53.19                           | 54.00           | 0.81        | Average |
| 2483.80                  | 67.24                        | -15.37    | 51.87                           | 54.00           | 2.13        | Average |

**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

|      |        |           |            |
|------|--------|-----------|------------|
| Mode | ZigBee | Frequency | TX 2475MHz |
|------|--------|-----------|------------|



### Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| @ 2475.50                | 32.91                 | 8.20            | 65.70                | 106.81                  | ---             | ---         | Peak     |
| 2483.50                  | 32.94                 | 8.20            | 21.53                | 62.67                   | 74.00           | 11.33       | Peak     |
| 2483.80                  | 32.94                 | 8.20            | 20.28                | 61.42                   | 74.00           | 12.58       | Peak     |

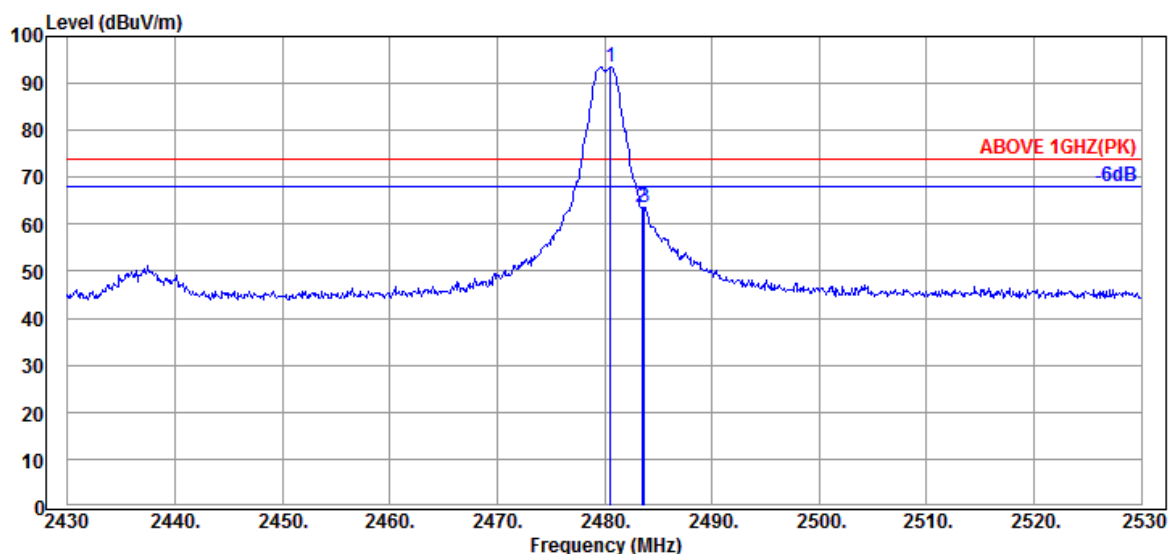
  

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 2483.50                  | 62.67                        | -15.37    | 47.30                           | 54.00           | 6.70        | Average |
| 2483.80                  | 61.42                        | -15.37    | 46.05                           | 54.00           | 7.95        | Average |

**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

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|------|--------|-----------|------------|
| Mode | ZigBee | Frequency | TX 2480MHz |
|------|--------|-----------|------------|



### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| @ 2480.60                | 32.91                 | 8.20            | 52.35                | 93.46                   | ---             | ---         | Peak     |
| 2483.50                  | 32.94                 | 8.20            | 22.30                | 63.44                   | 74.00           | 10.56       | Peak     |
| 2483.70                  | 32.94                 | 8.20            | 22.50                | 63.64                   | 74.00           | 10.36       | Peak     |

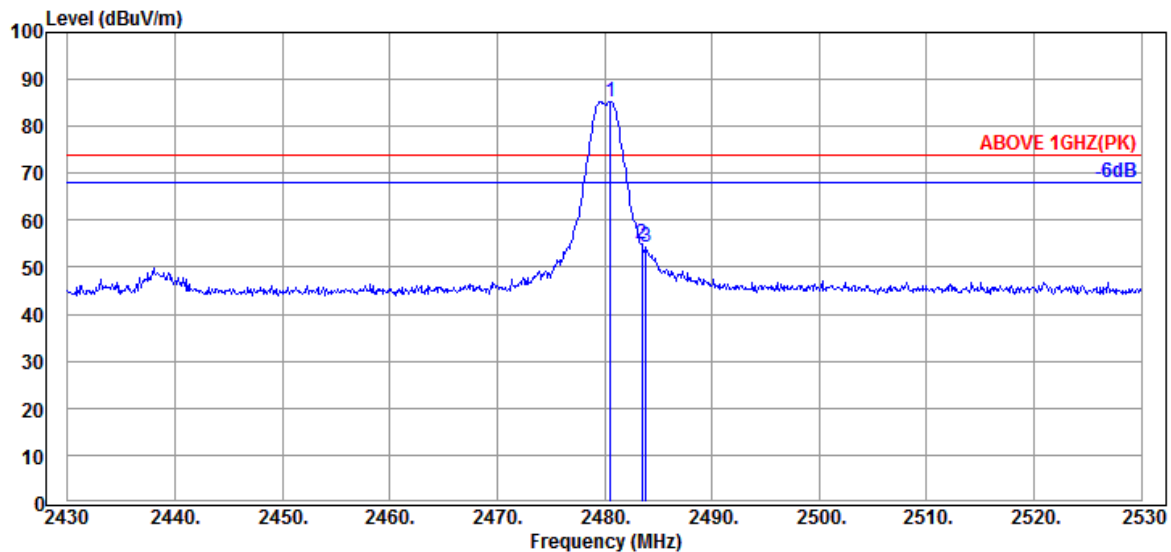
  

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 2483.50                  | 63.44                        | -15.37    | 48.07                           | 54.00           | 5.93        | Average |
| 2483.70                  | 63.64                        | -15.37    | 48.27                           | 54.00           | 5.73        | Average |

**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

|      |        |           |            |
|------|--------|-----------|------------|
| Mode | ZigBee | Frequency | TX 2480MHz |
|------|--------|-----------|------------|



### Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| @ 2480.60                | 32.91                 | 8.20            | 44.28                | 85.39                   | ---             | ---         | Peak     |
| 2483.50                  | 32.94                 | 8.20            | 13.68                | 54.82                   | 74.00           | 19.18       | Peak     |
| 2483.90                  | 32.94                 | 8.20            | 13.22                | 54.36                   | 74.00           | 19.64       | Peak     |

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 2483.50                  | 54.82                        | -15.37    | 39.45                           | 54.00           | 14.55       | Average |
| 2483.90                  | 54.36                        | -15.37    | 38.99                           | 54.00           | 15.01       | Average |

## A.2.2 Emissions outside the frequency band:

The emissions (up to 25GHz) not reported for there is no emission be found.

| Mode | ZigBee | Frequency | TX 2405MHz |
|------|--------|-----------|------------|
|------|--------|-----------|------------|

### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 4812.00                  | 34.19                 | 10.32           | 12.62                | 57.13                   | 74.00           | 16.87       | Peak     |
| 7217.00                  | 35.91                 | 11.92           | 7.73                 | 55.56                   | 74.00           | 18.44       | Peak     |
| 9620.00                  | 37.26                 | 14.33           | 10.55                | 62.14                   | 74.00           | 11.86       | Peak     |

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 4812.00                  | 57.13                        | -15.37    | 41.76                           | 54.00           | 12.24       | Average |
| 7217.00                  | 55.56                        | -15.37    | 40.19                           | 54.00           | 13.81       | Average |
| 9620.00                  | 62.14                        | -15.37    | 46.77                           | 54.00           | 7.23        | Average |

### Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 4812.00                  | 34.19                 | 10.32           | 11.62                | 56.13                   | 74.00           | 17.87       | Peak     |
| 7217.00                  | 35.91                 | 11.92           | 4.72                 | 52.55                   | 74.00           | 21.45       | Peak     |
| 9620.00                  | 37.26                 | 14.33           | 9.47                 | 61.06                   | 74.00           | 12.94       | Peak     |

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 4812.00                  | 56.13                        | -15.37    | 40.76                           | 54.00           | 13.24       | Average |
| 7217.00                  | 52.55                        | -15.37    | 37.18                           | 54.00           | 16.82       | Average |
| 9620.00                  | 61.06                        | -15.37    | 45.69                           | 54.00           | 8.31        | Average |

**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

| Mode | ZigBee | Frequency | TX 2440MHz |
|------|--------|-----------|------------|
|------|--------|-----------|------------|

#### Antenna at Horizontal Polarization

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m)     | Cable<br>Loss<br>(dB) | Meter<br>Reading<br>(dBμV)            | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|---------------------------------|-----------------------|---------------------------------------|-------------------------------|--------------------|----------------|----------|
| 4880.00                        | 34.23                           | 10.38                 | 12.19                                 | 56.80                         | 74.00              | 17.20          | Peak     |
| 7322.00                        | 35.87                           | 12.01                 | 13.25                                 | 61.13                         | 74.00              | 12.87          | Peak     |
| 9760.00                        | 37.45                           | 14.42                 | 11.44                                 | 63.31                         | 74.00              | 10.69          | Peak     |
| Emission<br>Frequency<br>(MHz) | Peak Emission Level<br>(dBμV/m) | DCCF<br>(dB)          | Average Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m)            | Margin<br>(dB)     | Remark         |          |
| 4880.00                        | 56.80                           | -15.37                | 41.43                                 | 54.00                         | 12.57              | Average        |          |
| 7322.00                        | 61.13                           | -15.37                | 45.76                                 | 54.00                         | 8.24               | Average        |          |
| 9760.00                        | 63.31                           | -15.37                | 47.94                                 | 54.00                         | 6.06               | Average        |          |

#### Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m)        | Cable Loss (dB) | Meter Reading (dBμV)            | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|------------------------------|-----------------|---------------------------------|-------------------------|-----------------|-------------|----------|
| 4880.00                  | 34.23                        | 10.38           | 11.18                           | 55.79                   | 74.00           | 18.21       | Peak     |
| 7322.00                  | 35.87                        | 12.01           | 10.17                           | 58.05                   | 74.00           | 15.95       | Peak     |
| 9760.00                  | 37.45                        | 14.42           | 9.42                            | 61.29                   | 74.00           | 12.71       | Peak     |
| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB)       | Average Emission Level (dBμV/m) | Limits (dBμV/m)         | Margin (dB)     | Remark      |          |
| 4880.00                  | 55.79                        | -15.37          | 40.42                           | 54.00                   | 13.58           | Average     |          |
| 7322.00                  | 58.05                        | -15.37          | 42.68                           | 54.00                   | 11.32           | Average     |          |
| 9760.00                  | 61.29                        | -15.37          | 45.92                           | 54.00                   | 8.08            | Average     |          |

| Mode | ZigBee | Frequency | TX 2480MHz |
|------|--------|-----------|------------|
|------|--------|-----------|------------|

#### Antenna at Horizontal Polarization

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Meter<br>Reading<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|----------------------------|-------------------------------|--------------------|----------------|----------|
| 4960.00                        | 34.28                       | 10.45                 | 0.58                       | 45.31                         | 74.00              | 28.69          | Peak     |

| Emission<br>Frequency<br>(MHz) | Peak Emission Level<br>(dBμV/m) | DCCF<br>(dB) | Average Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Remark  |
|--------------------------------|---------------------------------|--------------|---------------------------------------|--------------------|----------------|---------|
| 4960.00                        | 45.31                           | -15.37       | 29.94                                 | 54.00              | 24.06          | Average |

#### Antenna at Vertical Polarization

| Antenna at Vertical Polarization |                              |                 |                                 |                         |                 |             |          |
|----------------------------------|------------------------------|-----------------|---------------------------------|-------------------------|-----------------|-------------|----------|
| Emission Frequency (MHz)         | Antenna Factor (dB/m)        | Cable Loss (dB) | Meter Reading (dBμV)            | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
| 4960.00                          | 34.28                        | 10.45           | 0.66                            | 45.39                   | 74.00           | 28.61       | Peak     |
| Emission Frequency (MHz)         | Peak Emission Level (dBμV/m) | DCCF (dB)       | Average Emission Level (dBμV/m) | Limits (dBμV/m)         | Margin (dB)     | Remark      |          |
| 4960.00                          | 45.39                        | -15.37          | 30.02                           | 54.00                   | 23.98           | Average     |          |

#### A.2.3 Emissions in Non-restricted Frequency Bands:

Pursuant to KDB 558074 D01 DTS Meas Guidance v05r01 that emission levels below the FCC 15.209(a)/RSS-Gen Section 8.9 table 4 general radiated emissions limits is not required.

**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

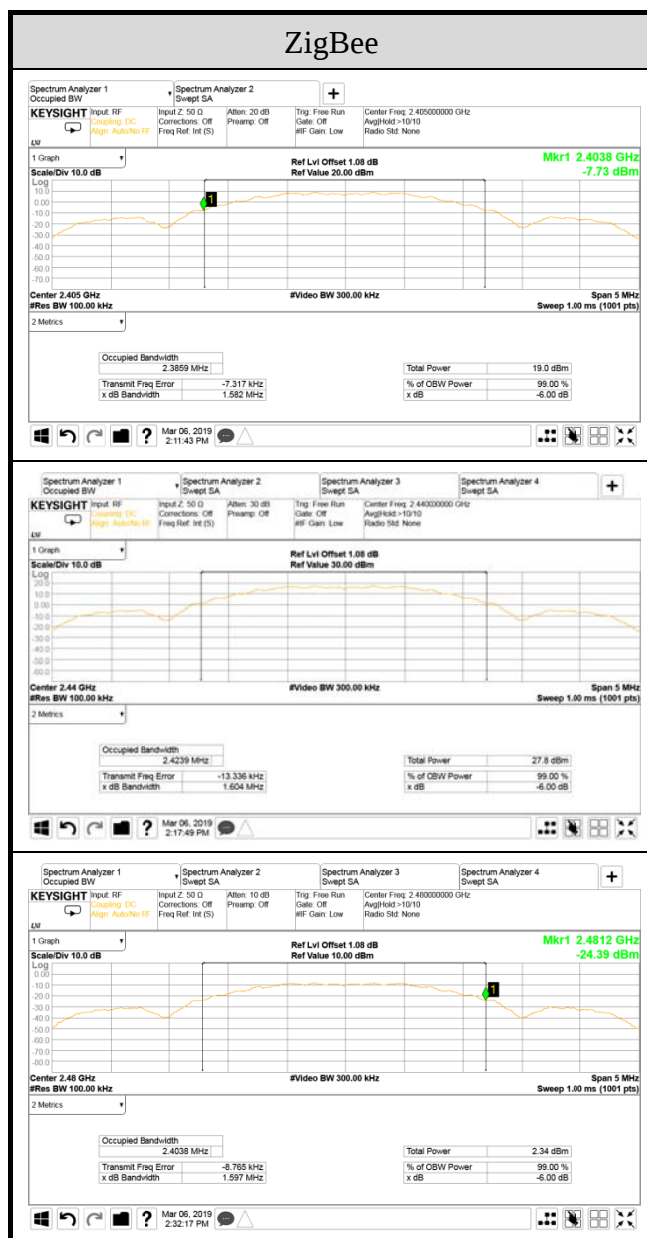
## A.3 6dB BANDWIDTH

|            |            |              |                                |
|------------|------------|--------------|--------------------------------|
| Test Date  | 2019/03/06 | Temp./Hum.   | 24°C/55%                       |
| Cable Loss | 1.08dB     | Test Voltage | AC 120V, 60Hz (via AC Adapter) |

### A.3.1 6dB Bandwidth Result

| Mode   | Centre Frequency (MHz) | 6 dB Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) (Reference only) | Limit   |
|--------|------------------------|----------------------|-----------------------------------------------|---------|
| ZigBee | 2405                   | 1.582                | 2.3859                                        | >500kHz |
|        | 2440                   | 1.604                | 2.4239                                        |         |
|        | 2480                   | 1.597                | 2.4038                                        |         |

### A.3.2 Measurement Plots



## A.4 MAXIMUM PEAK OUTPUT POWER

|            |            |              |                                |
|------------|------------|--------------|--------------------------------|
| Test Date  | 2019/03/06 | Temp./Hum.   | 24°C /55%                      |
| Cable Loss | 1.08dB     | Test Voltage | AC 120V, 60Hz (via AC Adapter) |

### A.4.1 Peak Output Power

| Mode   | Centre Frequency (MHz) | Peak Output Power (dBm) |       | Antenna Gain (dBi) | Output Power (E.I.R.P.) |       | Limit                                                                    |
|--------|------------------------|-------------------------|-------|--------------------|-------------------------|-------|--------------------------------------------------------------------------|
|        |                        | (dBm)                   | (W)   |                    | (dBm)                   | (W)   |                                                                          |
| ZigBee | 2405                   | 18.02                   | 0.063 | 1.74               | 19.76                   | 0.095 | < 30dBm (1W)<br>(Maximum Peak Output Power)<br>< 36dBm (4W)<br>(E.I.R.P) |
|        | 2440                   | 17.95                   | 0.062 |                    | 19.69                   | 0.093 |                                                                          |
|        | 2470                   | 18.02                   | 0.063 |                    | 19.76                   | 0.095 |                                                                          |
|        | 2475                   | 15.60                   | 0.036 |                    | 17.34                   | 0.054 |                                                                          |
|        | 2480                   | -1.68                   | 0.001 |                    | 0.06                    | 0.001 |                                                                          |

Note: The results have been included cable loss.

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

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

## A.4.2 Measurement Plots

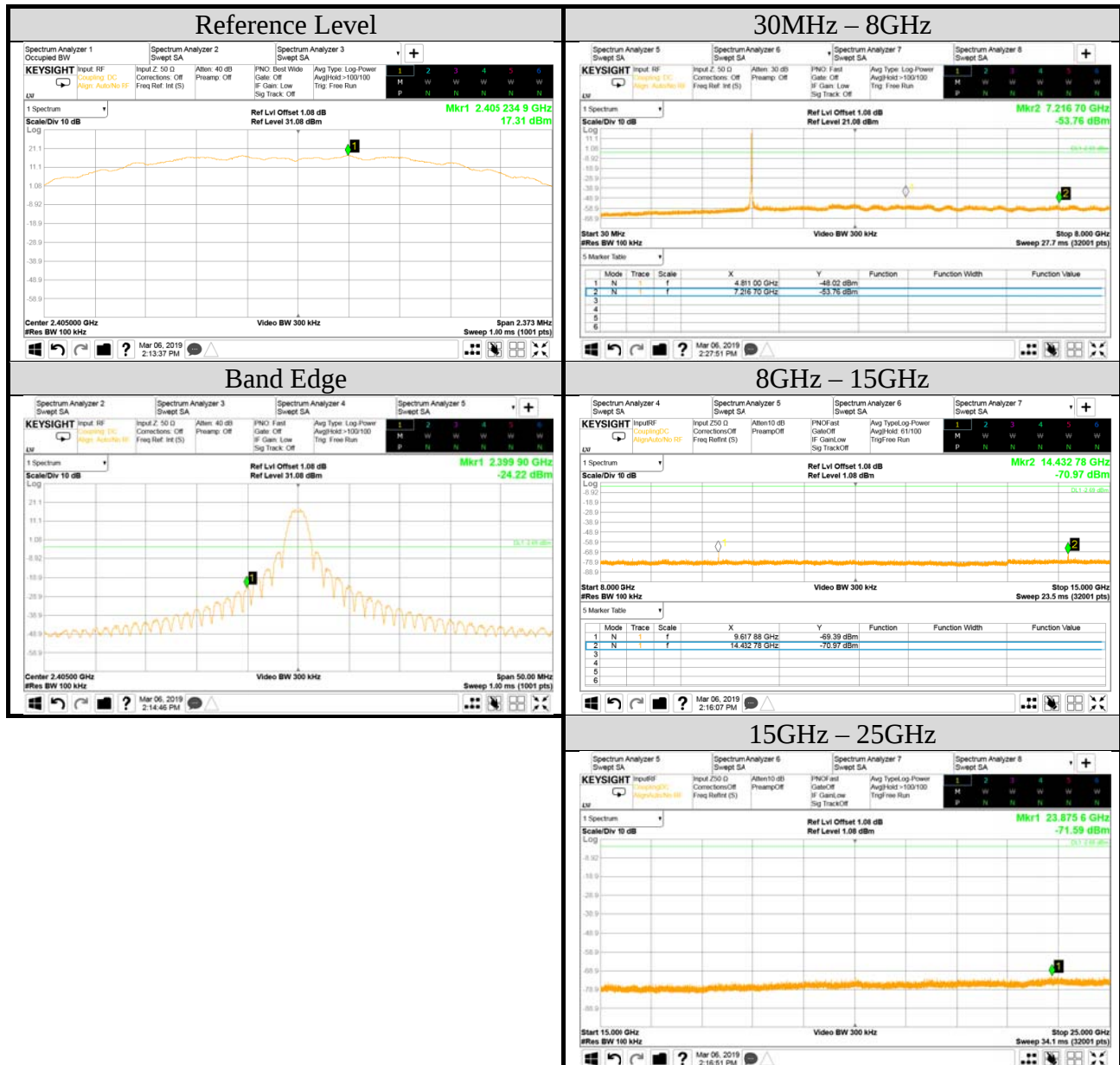


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No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

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

## A.5 EMISSION LIMITATIONS

|                                                            |            |              |                                |
|------------------------------------------------------------|------------|--------------|--------------------------------|
| Test Date                                                  | 2019/03/06 | Temp./Hum.   | 23°C/55%                       |
| Cable Loss                                                 | 1.08dB     | Test Voltage | AC 120V, 60Hz (via AC Adapter) |
| Mode                                                       | ZigBee     | Frequency    | TX 2405MHz                     |
| Simultaneous Factor10 log(n) (Note: "n" is antenna number) | 0          |              |                                |

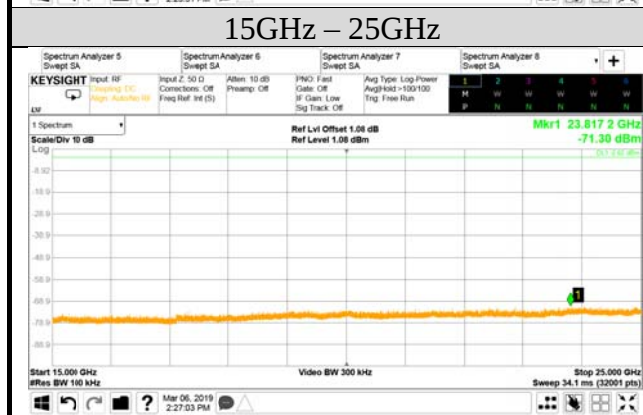
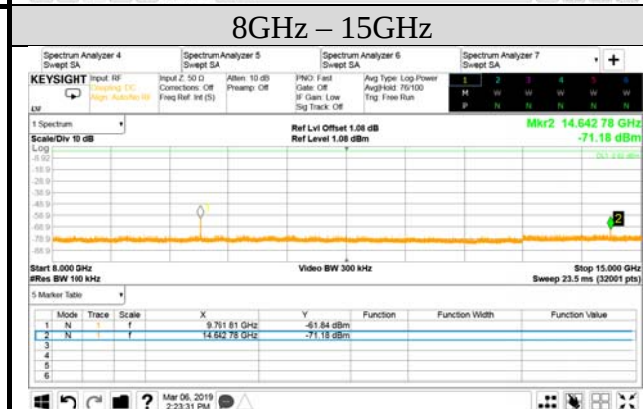
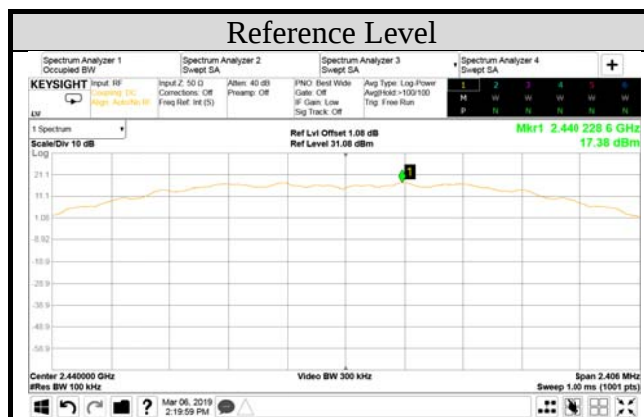


**Audix Technology Corp.**  
No. 53-11, Dingfu, Linkou, Dist.,  
New Taipei City244, Taiwan

**Tel: +886 2 26099301**

**Fax: +886 2 26099303**

|                     |                                         |              |                                |
|---------------------|-----------------------------------------|--------------|--------------------------------|
| Test Date           | 2019/03/06                              | Temp./Hum.   | 23°C/55%                       |
| Cable Loss          | 1.08dB                                  | Test Voltage | AC 120V, 60Hz (via AC Adapter) |
| Mode                | ZigBee                                  | Frequency    | TX 2440MHz                     |
| Simultaneous Factor | 10 log(n) (Note: "n" is antenna number) |              | 0                              |



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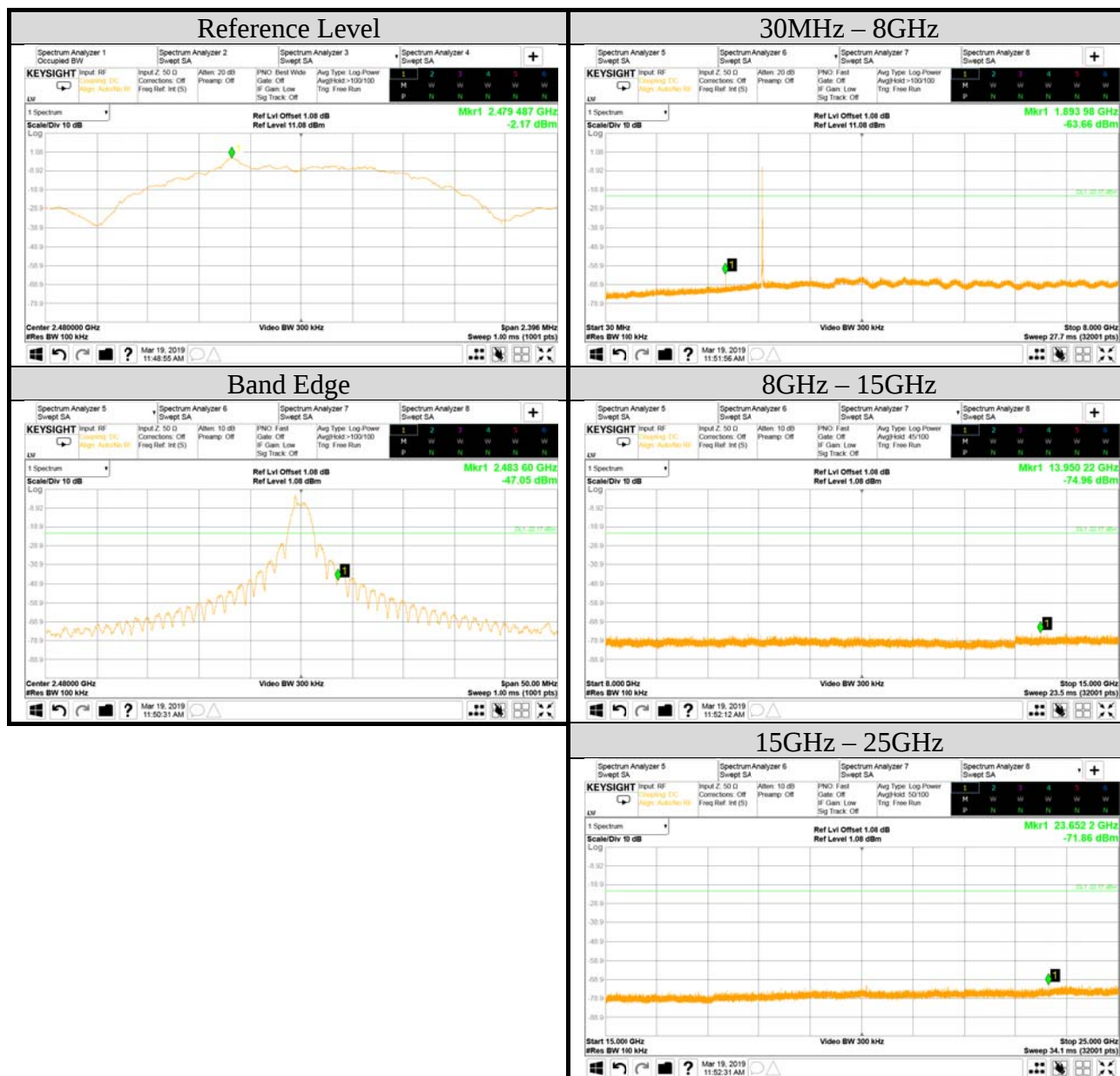
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Tel: +886 2 26099301

Fax: +886 2 26099303

|                                                            |            |              |                                |
|------------------------------------------------------------|------------|--------------|--------------------------------|
| Test Date                                                  | 2019/03/19 | Temp./Hum.   | 22°C/58%                       |
| Cable Loss                                                 | 1.08dB     | Test Voltage | AC 120V, 60Hz (via AC Adapter) |
| Mode                                                       | ZigBee     | Frequency    | TX 2480MHz                     |
| Simultaneous Factor10 log(n) (Note: "n" is antenna number) | 0          |              |                                |



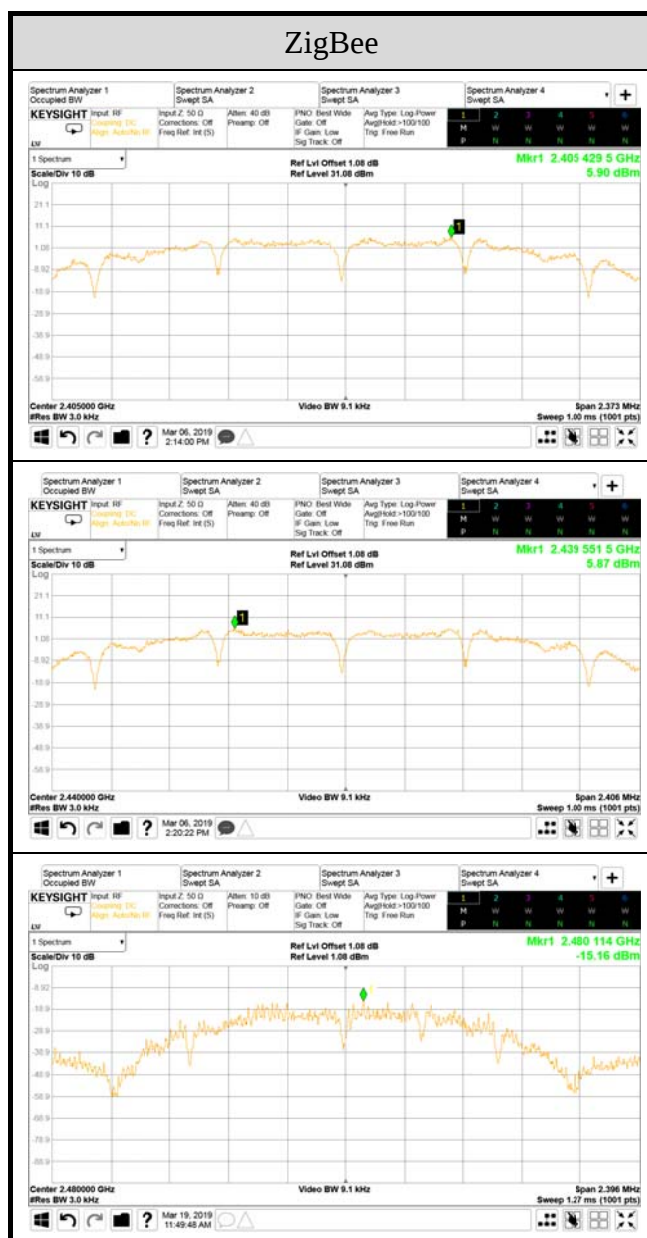
## A.6 POWER SPECTRAL DENSITY

|                     |                                         |              |                                |
|---------------------|-----------------------------------------|--------------|--------------------------------|
| Test Date           | 2019/03/06 ~ 19                         | Temp./Hum.   | 22~23°C /55~58%                |
| Cable Loss          | 1.08dB                                  | Test Voltage | AC 120V, 60Hz (via AC Adapter) |
| Simultaneous Factor | 10 log(n) (Note: "n" is antenna number) |              | 0                              |

### A.6.1 Power Spectral Density Result

| Mode   | Centre Frequency (MHz) | Power Spectral Density (dBm) | Limit        |
|--------|------------------------|------------------------------|--------------|
| ZigBee | 2405                   | 5.90                         | < 8 dBm/3kHz |
|        | 2440                   | 5.87                         |              |
|        | 2480                   | -15.16                       |              |

### A.6.2 Measurement Plots



Note: All results have been included cable loss and Simultaneous Factor.



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

**APPENDIX B**

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

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# APPDNDIX B

## TEST PHOTOGRAPHS

(Model: 9GW97185D6)