*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

# FCC 15.249
# 2.4 GHz Report

## *for*

## Duke Energy Business Services LLC

## 526 S. Church St, Charlotte, North Carolina, 28202 United States

| | | |
|---|---|---|
| **Product Name** | : | **Duke Energy Gateway** |
| **Model Name** | : | **DK-GW001-A01-C001** |
| **Brand** | : | **DUKE ENERGY** |
| **FCC ID** | : | **2AUYW-A010001** |

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

Testing Laboratory
1724

TESTING
NVLAP LAB CODE 200077-0

The statement 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.



***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

# TABLE OF CONTENTS

Description Page

TEST REPORT CERTIFICATION ..... 3
**1. REVISION RECORD OF TEST REPORT ..... 4**
**2. SUMMARY OF TEST RESULTS ..... 5**
**3. GENERAL INFORMATION ..... 6**
3.1. Description of Application ..... 6
3.2. Description of EUT ..... 7
3.3. Antenna Information ..... 8
3.4. EUT Specifications Assessed in Current Report ..... 8
3.5. Description of Key Components ..... 8
3.6. Test Configuration ..... 9
3.7. Tested Supporting System List ..... 10
3.8. Setup Configuration ..... 10
3.9. Operating Condition of EUT ..... 10
3.10. Description of Test Facility ..... 11
3.11. Measurement Uncertainty ..... 12
**4. MEASUREMENT EQUIPMENT LIST ..... 13**
4.1. Conducted Emission Measurement ..... 13
4.2. Radiated Emission Measurement ..... 14
4.3. RF Conducted Measurement ..... 14
**5. CONDUCTED EMISSION MEASUREMET ..... 15**
5.1. Block Diagram of Test Setup ..... 15
5.2. Conducted Emission Limit ..... 15
5.3. Test Procedure ..... 15
5.4. Test Results ..... 15
**6. RADIATED EMISSION ..... 16**
6.1. Block Diagram of Test Setup ..... 16
6.2. Radiated Emission Limits ..... 17
6.3. Test Procedure ..... 18
6.4. Measurement Result Explanation ..... 19
6.5. Test Results ..... 19
**7. EMISSION BANDWIDTH MEASUREMENT ..... 20**
7.1. Block Diagram of Test Setup ..... 20
7.2. Test Procedure ..... 20
7.3. Test Results ..... 20
**8. DEVIATION TO TEST SPECIFICATIONS ..... 21**

APPENDIX A TEST PHOTOGRAPHS
APPENDIX B EUT PHOTOGRAPHS



***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

# TEST REPORT CERTIFICATION

| | | |
|---|---|---|
| Applicant | : | Duke Energy Business Services LLC |
| Manufacturer | : | Duke Energy Corporation |
| EUT Description | | |
| (1) Product | : | Duke Energy Gateway |
| (2) Model | : | DK-GW001-A01-C001 |
| (3) Brand | : | DUKE ENERGY |
| (4) Power Rating | : | DC 5V, 3A |

Applicable Standards:

47 CFR FCC Part 15 Subpart C
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: 2019. 12. 27

Reviewed by: Tina Huang (Tina Huang/Administrator)

Approved by: Johnny Hsueh (Johnny Hsueh/Section Manager)


***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, 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. 12. 27 | Original Report | EM-F190516 |



***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

# 2. SUMMARY OF TEST RESULTS

| Rule | Description | Results |
|---|---|---|
| 15.207 | Conducted Emission | **PASS** |
| 15.205/<br>15.209/<br>15.249(a) | Radiated Band Edge and<br>Radiated Spurious Emission<br>Fundamental Frequency | **PASS** |
| 15.215 | Emission Bandwidth | **PASS** |
| 15.203 | Antenna Requirement | **PASS** |


***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

# 3. GENERAL INFORMATION

## 3.1. Description of Application

| | |
|---|---|
| Applicant | Duke Energy Business Services LLC<br>526 S. Church St, Charlotte, North Carolina, United States, 28202 United States |
| Manufacturer | Duke Energy Corporation<br>550 South Tryon Street Charlotte, NC 28202 United States |
| Product | Duke Energy Gateway |
| Model | DK-GW001-A01-C001 |
| Brand | DUKE ENERGY |


*This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.*

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

## 3.2. Description of EUT

| | |
|---|---|
| Test Model | DK-GW001-A01-C001 |
| Serial Number | N/A |
| Power Rating | DC 5V, 3A |
| RF Features | WLAN:802.11 a/b/g/n/ac<br>Bluetooth: BT and BLE<br>ZigBee<br>Z-Wave |
| Transmit Type | WLAN: 1T1R<br>Bluetooth: 1T1R<br>ZigBee: 1T1R<br>Z-Wave: 1T1R |
| Sample Status | Mass production |
| Date of Receipt | 2019. 11. 06 |
| Date of Test | 2019. 11. 27 ~ 12. 10 |
| Interface Ports of EUT | • One LAN Port<br>• One USB Port<br>• One DC Input Port |
| Accessories Supplied | • AC Adapter<br>• Ethernet Cord |


***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan
Tel: +886 2 26099301
Fax: +886 2 26099303

## 3.3. Antenna Information

| WLAN/ZigBee/BT Antenna | | | | |
|---|---|---|---|---|
| Antenna Part Number | Manufacture | Antenna Type | Frequency (MHz) | Max Gain(dBi) |
| RFA-DB1-AP609-70-100 | ARISTOTLE. | PCB | 2400-2500 | 3.73 |
| | | | 5150-5875 | 3.92 |

| Z-Wave Antenna | | | | |
|---|---|---|---|---|
| Antenna Part Number | Manufacture | Antenna Type | Frequency (MHz) | Max Gain(dBi) |
| RFA-ZW-AP856-100-R2 | ARISTOTLE. | PCB | 868-928 | 3.15 |

## 3.4. EUT Specifications Assessed in Current Report

| Mode | Operating Frequency Range | Channel Number | Modulation | Data Rate |
|---|---|---|---|---|
| Z-Wave | 908.4 to 916MHz | 3 | 2-Key FSK/GFSK | Up to 100kbps |

| Channel List | |
|---|---|
| Z-Wave | |
| Channel | Frequency (MHz) |
| 1 | 908.4 |
| 2 | 912 |
| 3 | 916 |

## 3.5. Description of Key Components

| Item | Supplier | Model / Type | Character |
|---|---|---|---|
| CPU | Intel | E3805 | 1.33GHz |
| Storage (SSD ) | Kingston. | EMMC16G-TB28 | eMMC flash 16GB |
| Memory (RAM) | NANYA. | NT5CC256M16EP-EK | 4GB DDR3 |
| WLAN/BT Combo Card | AMPAK. | AP6255 | --- |
| Z-Wave Chip | SIGMA. | ZM5101A-CME3R | --- |
| ZigBee Chip | Silicon Labs | EFR32MG1B232F256GM32-C0 | --- |
| Z-Wave Antenna | ARISTOTLE | RFA-ZW-AP856-100-R2 | --- |
| Wi-Fi/BT/ ZigBee Antenna | ARISTOTLE | RFA-DB1-AP609-70-100 | --- |
| AC Adapter (Wall-mount, 2C) | SUNNY COMPUTER TECHNOLOGY CO., LTD | SYS1639-1505-W2 | I/P: 100-240Vac, 50-60Hz, 1.0A O/P: 5Vdc, 3A 15W MAX |
| | DC Cable: Unshielded, Detachable, 1.4m | | |
| Cable | Ethernet Cord: Unshielded, Detachable, 0.9m | | |

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

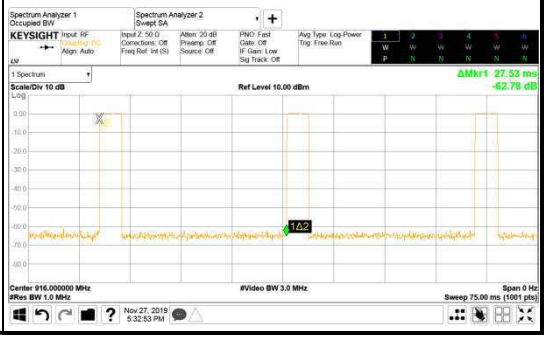

This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.

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

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

## 3.6. Test Configuration

| Mode | $TX_{on}$ (ms) | 1/ $TX_{on}$ (kHz) | Duty Cycle (x) | Duty Cycle Factor [10log(1/x)] (dB) |
|---|---|---|---|---|
| Z-Wave | 3.225 | 0.31 | 0.12 | N/A |

| Mode | Duty Cycle (x) | |
|---|---|---|
| Z-Wave | $TX_{on}$ | $TX_{on+off}$  |

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

| Item | | Mode | Test Frequency (MHz) |
|---|---|---|---|
| Radiated Test Case | Radiated Spurious Emission (30MHz-1GHz) Note1 | Z-Wave | 908.4/912/916 |
| | Radiated Spurious Emission (Above 1GHz) Note1 | Z-Wave | 908.4/912/916 |
| | Fundamental Frequency | Z-Wave | 908.4/912/916 |
| | Occupied Bandwidth 99% Power | Z-Wave | 908.4/912/916 |

Note : ■Mobile Device

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



***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan
Tel: +886 2 26099301
Fax: +886 2 26099303

## 3.7. Tested Supporting System List

### 3.7.1. Support Peripheral Unit

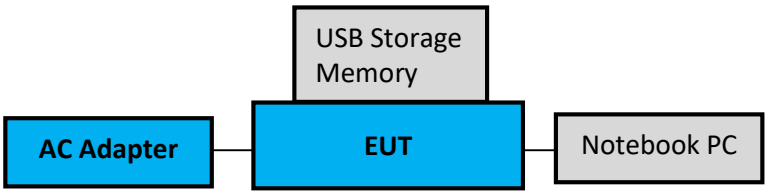
| No. | Product | Brand | Model No. | Serial No. | Approval |
|---|---|---|---|---|---|
| 1. | Notebook PC | hp | TPN-Q189 | N/A | N/A |
| 2. | USB Storage Memory (128GB) | SanDisk | N/A | N/A | N/A |

### 3.7.1.Cable Lists

| No. | Cable Description Of The Above Support Units |
|---|---|
| 1. | AC Adapter: hp, M/N PPP-012C-S,<br>DC Power Cord: Unshielded, Undetachable, 1.8m, Bonded a ferrite core<br>AC Power Cord: Unshielded, Detachable, 1.0m |
| 2. | USB Cable: Unshielded, Undetachable, 1.8m |

## 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 “putty” is used for enabling EUT WLAN function under continues transmitting and choosing data rate/ channel.



This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

## 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 17025:2017<br>(1) NVLAP(USA)<br>NVLAP Lab Code 200077-0<br>(2) TAF(Taiwan)<br>No. 1724<br>(3) FCC OET Designation<br>No. TW1724 |
| Test Facilities | FCC OET Designation Number under APEC MRA by NCC is : TW1724<br>ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724<br>(1) No.8 Shielded Room<br>(2) No.1 3m Semi Anechoic Chamber<br>(3) Fully Anechoic Chamber |


***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan
Tel: +886 2 26099301
Fax: +886 2 26099303

## 3.11.Measurement Uncertainty

| Test Items/Facilities | | Frequency Range | Uncertainty |
|---|---|---|---|
| Conduction Test | | 150kHz~30MHz | ±3.50dB |
| Radiation Test | No.1 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±3.9dB |
| | | 200MHz-1000MHz, 3m, Horizontal | ±4.3dB |
| | | 30MHz-200MHz, 3m, Vertical | ±4.5dB |
| | | 200MHz-1000MHz, 3m, Vertical | ±4.1dB |
| | | 1GHz-6GHz, 3m | ±5.1dB |
| | | 6GHz-18GHz, 3m | ±5.5dB |
| | No.3 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±4.7dB |
| | | 200MHz-1000MHz, 3m, Horizontal | ±4.5dB |
| | | 30MHz-200MHz, 3m, Vertical | ±4.3dB |
| | | 200MHz-1000MHz, 3m, Vertical | ±4.1dB |
| | No.4 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±4.1dB |
| | | 200MHz-1000MHz, 3m, Horizontal | ±4.4dB |
| | | 30MHz-200MHz, 3m, Vertical | ±4.2dB |
| | | 200MHz-1000MHz, 3m, Vertical | ±5.0dB |
| | | 1GHz-6GHz, 3m | ±4.4dB |
| | | 6GHz-18GHz, 3m | ±4.1dB |
| | No.5 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±4.0dB |
| | | 200MHz-1000MHz, 3m, Horizontal | ±4.0dB |
| | | 30MHz-200MHz, 3m, Vertical | ±4.2dB |
| | | 200MHz-1000MHz, 3m, Vertical | ±4.4dB |
| | | 1GHz-6GHz, 3m | ±4.3dB |
| | | 6GHz-18GHz, 3m | ±4.6dB |
| | Fully Anechoic Chamber | 30MHz~1000MHz | ±4.7dB |
| | | 1GHz~18GHz | ±5.3dB |

Remark：Uncertainty = $ku_c(y)$

| Test Item | Uncertainty |
|---|---|
| Occupied Bandwidth 99% Power | ± 1kHz |


This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

# 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. 23 | 1 Year |
| 2. | A.M.N. | R&S | ENV4200 | 100169 | 2019. 11. 13 | 1 Year |
| 3. | L.I.S.N. | Kyoritsu | KNW-407 | 8-855-9 | 2019. 12 .10 | 1 Year |
| 4. | Pulse Limiter | R&S | ESH3-Z2 | 100354 | 2019. 01. 12 | 1 Year |
| 5. | Signal Cable | Yeida | RG/58AU | CE-08 | 2019. 09. 20 | 1 Year |
| 6. | Digital Thermo-Hygro Meter | iMax | HTC-1 | No.8 S/R | 2019. 04. 20 | 1 Year |
| 7. | Test Software | Audix | e3 | V6.120619c | N.C.R. | N.C.R. |


***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan
Tel: +886 2 26099301
Fax: +886 2 26099303

## 4.2. Radiated Emission Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | Spectrum Analyzer | Agilent | N9010A-526 | MY53400071 | 2019. 09. 11 | 1 Year |
| 2. | Spectrum Analyzer | Keysight | N9010B-544 | MY55460198 | 2019. 05. 06 | 1 Year |
| 3. | Test Receiver | R & S | ESCS30 | 100338 | 2019. 06. 12 | 1 Year |
| 4. | Amplifier | HP | 8447D | 2944A06305 | 2019. 01. 30 | 1 Year |
| 5. | Amplifier | HP | 8449B | 3008A02678 | 2019. 03. 07 | 1 Year |
| 6. | Amplifier | Keysight | 83051A | MY53010042 | 2019. 08. 08 | 1 Year |
| 7. | Bilog Antenna | TESEQ | CBL6112D | 33821 | 2019. 01. 19 | 1 Year |
| 8. | Loop Antenna | R&S | HFH2-Z2 | 891847/27 | 2017. 12. 18 | 2 Years |
| 9 | Double-Ridged Waveguide Horn | ETS-Lindgren | 3117 | 00135902 | 2019. 03. 13 | 1 Year |
| 10. | Horn Antenna | COM-POWER | AH-840 | 101092 | 2019 .05. 14 | 1 Year |
| 11. | 2.4GHz Notch Filter | K&L | 7NSL10-2441.5/E130.5-O/O | 1 | 2019. 07. 24 | 1 Year |
| 12. | 3GHz Notch Filter | Microwave | H3G018G1 | 484796 | 2019. 08. 21 | 1 Year |
| 13. | Coaxial Cable | MIYAZAKI | 5D2W | RE-11 | 2019. 02. 01 | 1 Year |
| 14. | Coaxial Cable | HUBER+SUHNER | SUCOFLEX 104 | RF CABLE-01 | 2019. 09. 20 | 1 Year |
| 15. | Coaxial Cable | HUBER+ SUHNER | SUCOFLEX 102 | No.1 18-40GHz Cable | 2019. 09. 20 | 1 Year |
| 16. | Digital Thermo-Hygro Meter | iMax | HTC-1 | No.1 3m A/C | 2019. 04. 20 | 1 Year |
| 17. | Digital Thermo-Hygro Meter | EVERY DAY | E-512 | RF-02 | 2019. 04. 20 | 1 Year |
| 18. | Test Software | Audix | e3 | V6.120619c | N.C.R. | N.C.R. |
| 19. | Test Software | Audix | e3 | V6.110601 | N.C.R. | N.C.R. |

## 4.3. RF Conducted Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---|---|---|---|---|---|---|
| 1. | Spectrum Analyzer | Keysight | N9020B-544 | MY57120357 | 2019.01.17 | 1 Year |
| 2. | Digital Thermo-Hygro Meter | Shenzhen Datronn Electronics | KT-905 | RF | 2019. 04. 20 | 1 Year |


This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan
Tel: +886 2 26099301
Fax: +886 2 26099303

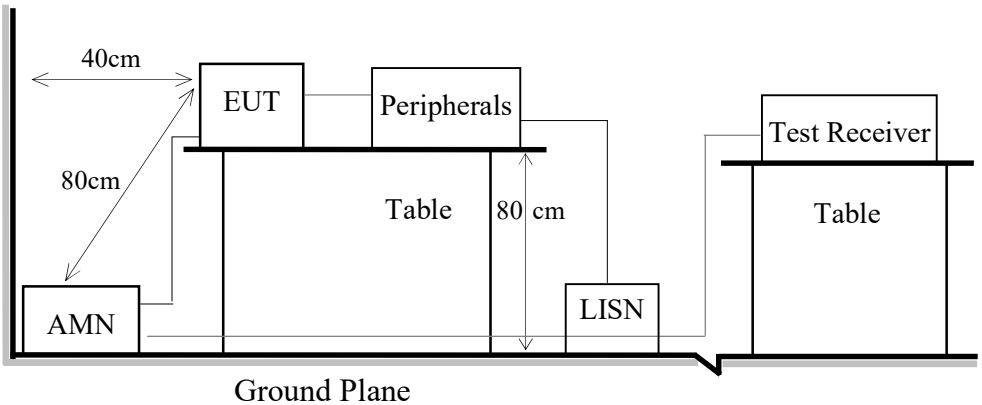
# 5. CONDUCTED EMISSION MEASUREMET

## 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 dBμV | 56 ~ 46 dBμV |
| 500kHz ~ 5MHz | 56 dBμV | 46 dBμV |
| 5MHz ~ 30MHz | 60 dBμV | 50 dBμV |

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. To Check 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.



This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

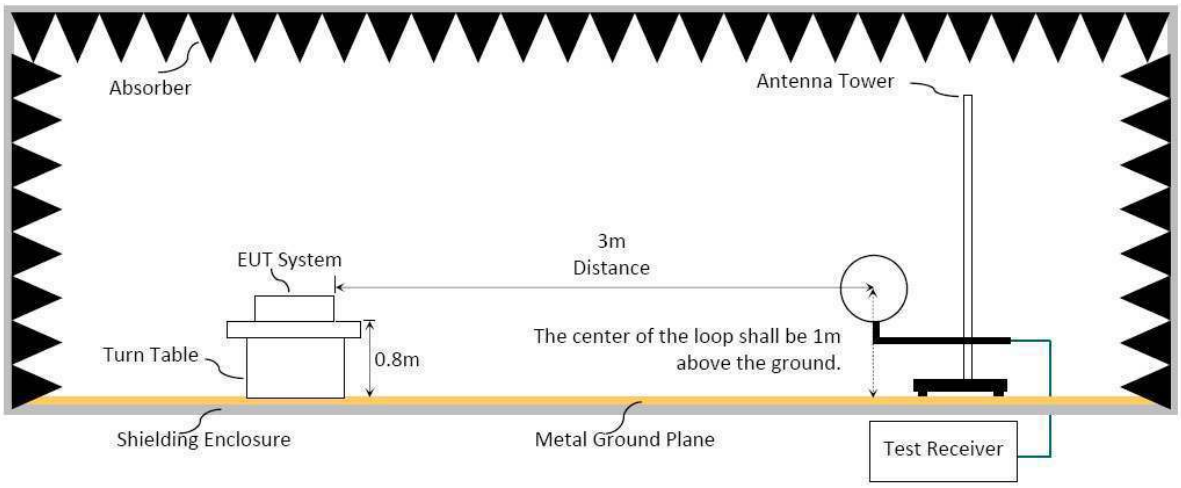
# 6. RADIATED EMISSION

## 6.1. Block Diagram of Test Setup

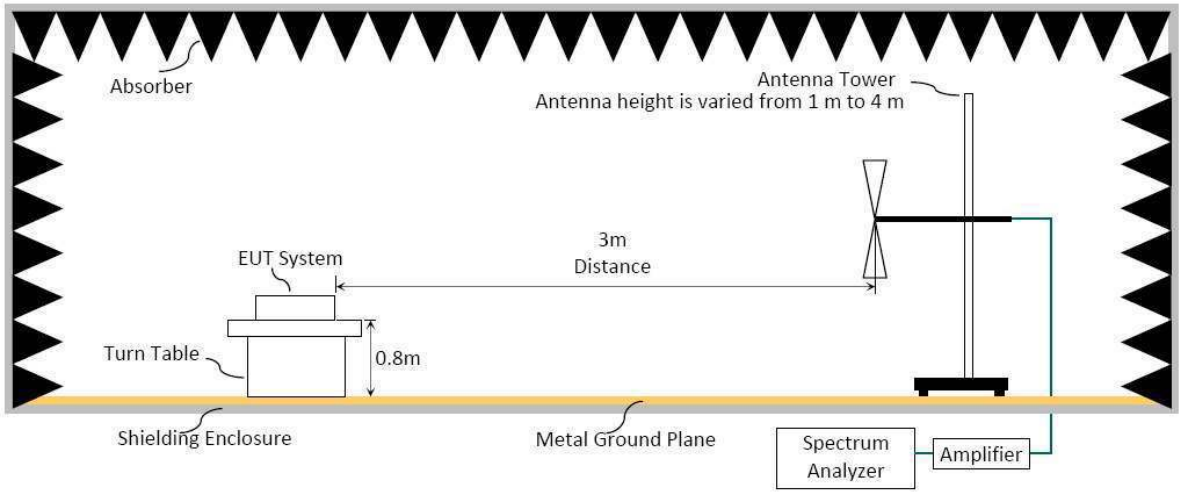
### 6.1.1. Block Diagram of EUT

Indicated as section 3.8

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




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

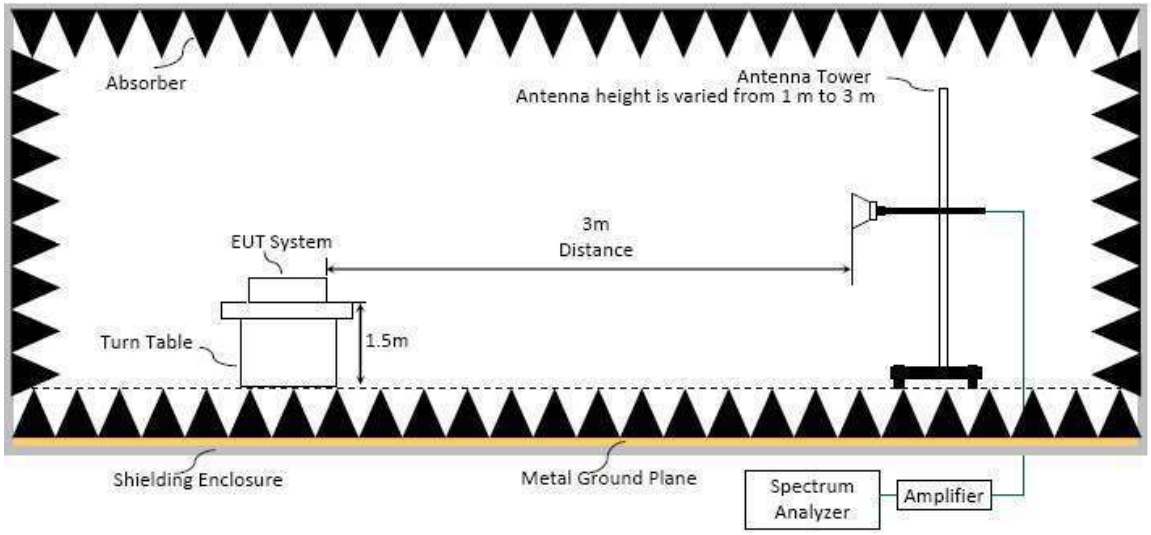





***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

6.1.4. Setup Diagram for above 1GHz




## 6.2. Radiated Emission Limits

6.2.1. General Limit

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 FCC Section 15.205, 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) dBμV/m = 20 log (μV/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.


***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan
Tel: +886 2 26099301
Fax: +886 2 26099303

6.2.2. Limite for Fundamental & Harmonics Frequency

| Fundamental Frequency | Field strength of fundamental | | Field strength of harmonics | |
|---|---|---|---|---|
| | mV/m | dBμV/m | mV/m | dBμV/m |
| 902-928MHz | 50 | 94 (Quasi-Peak) | 500 | 74 (Peak) |
| | | | | 54 (Average) |
| 2400-2483.5MHz | 50 | 114 (Peak) | 500 | 74 (Peak) |
| | | 94 (Average) | | 54 (Average) |
| 5725-5875MHz | 50 | 114 (Peak) | 500 | 74 (Peak) |
| | | 94 (Average) | | 54 (Average) |
| 24.0-24.25GHz | 250 | 128 (Peak) | 2500 | 88 (Peak) |
| | | 108 (Average) | | 68 (Average) |

Remark: mV/m=1000μV/m; dBμV/m = 20 log (μV/m)

## 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 ≥ 3 x 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.


This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

**Frequency above 1GHz to 10th harmonic (up to 25 GHz):**
**Peak Detector:**
(1)RBW = 1MHz
(2)VBW ≥ 3 x 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 ≥ 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 Meter Reading= Spectrum Analyzer Reading - Preamp factor
■Average Emission Level l=Antenna Factor + Cable Loss + Meter Reading Meter Reading= Spectrum Analyzer Reading - Preamp factor
□Average Emission Level= Peak Emission Level+ DCCF
Duty Cycle Correction Factor (DCCF)= 20log ($TX_{on}/TX_{on+off}$) presented in section 3.6
□ERP= Peak Emission Level-95.2dB-2.14dB

## 6.5. Test Results

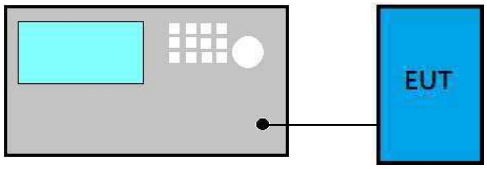
Please refer to Appendix A.


***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

# 7. EMISSION BANDWIDTH MEASUREMENT

## 7.1. Block Diagram of Test Setup




## 7.2. Test Procedure

(1) Set RBW close to 1-5 % of OBW.
(2) Set VBW≥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.

## 7.3. Test Results

Please refer to Appendix A


***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

*AUDIX Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

# 8. DEVIATION TO TEST SPECIFICATIONS

【NONE】



*This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.*

**Audix Technology Corp.**
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
**Tel: +886 2 26099301**
**Fax: +886 2 26099303**

# APPDNDIX A

## TEST DATA AND PLOTS

(Model: DK-GW001-A01-C001)



***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

**Audix Technology Corp.**
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
**Tel: +886 2 26099301**
**Fax: +886 2 26099303**

# TABLE OF CONTENTS

**A.1 CONDUCTED EMISSION ..... 2**
**A.2 RADIATED EMISSION ..... 4**
A.2.1 Emissions Applied to General Requirement ..... 4
A.2.2 Fundamental Frequency ..... 9
**A.3 EMISSION BANDWIDTH MEASUREMENT ..... 12**
A.3.1 Emission Bandwidth ..... 12
A.3.2 Measurement Plots ..... 12

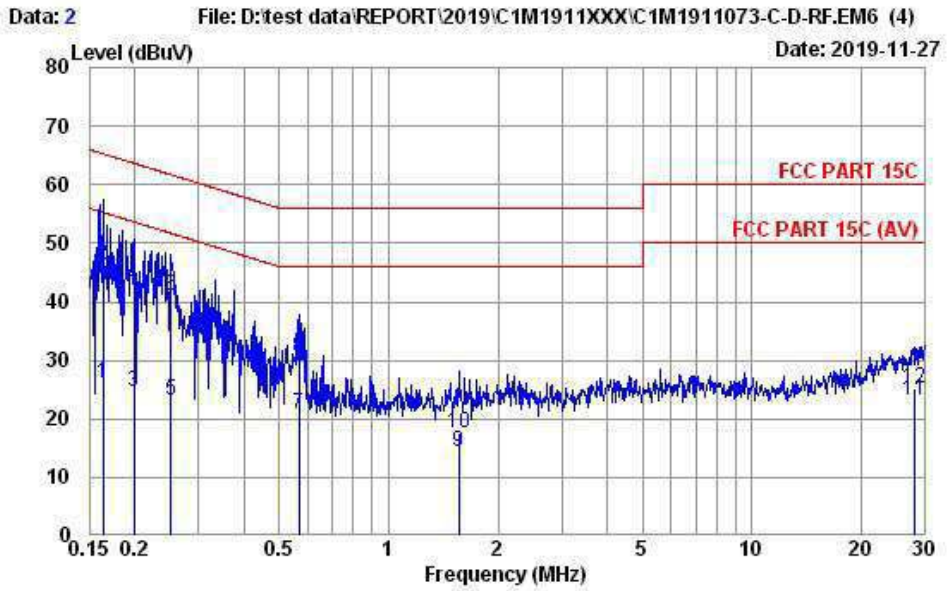

***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

**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 Phase | Neutral | Test Result | Pass |
|---|---|---|---|
| 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 PART 15C
Env. / Ins.   : 25°C / 53% ESR3 (1774)      Engineer    : Chucky Chiu
EUT           : DK-GW001-A01-C001
Power Rating  : AC 120V/60Hz
Test Mode     : Operating
```

| | Freq. (MHz) | AMN Factor (dB) | Cable Loss (dB) | Pulse Att. (dB) | Reading (dBμV) | Emission Level (dBμV) | Limits (dBμV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.163 | 10.68 | 0.04 | 9.86 | 5.40 | 25.98 | 55.30 | 29.32 | Average |
| 2 | 0.163 | 10.68 | 0.04 | 9.86 | 25.67 | 46.25 | 65.30 | 19.05 | QP |
| 3 | 0.199 | 10.62 | 0.04 | 9.86 | 4.17 | 24.69 | 53.67 | 28.98 | Average |
| 4 | 0.199 | 10.62 | 0.04 | 9.86 | 22.20 | 42.72 | 63.67 | 20.95 | QP |
| 5 | 0.252 | 10.58 | 0.04 | 9.86 | 2.72 | 23.20 | 51.69 | 28.49 | Average |
| 6 | 0.252 | 10.58 | 0.04 | 9.86 | 20.49 | 40.97 | 61.69 | 20.72 | QP |
| 7 | 0.567 | 10.48 | 0.04 | 9.86 | 0.49 | 20.87 | 46.00 | 25.13 | Average |
| 8 | 0.567 | 10.48 | 0.04 | 9.86 | 10.23 | 30.61 | 56.00 | 25.39 | QP |
| 9 | 1.560 | 10.50 | 0.06 | 9.86 | -5.94 | 14.48 | 46.00 | 31.52 | Average |
| 10 | 1.560 | 10.50 | 0.06 | 9.86 | -2.77 | 17.65 | 56.00 | 38.35 | QP |
| 11 | 28.003 | 15.79 | 0.24 | 10.00 | -2.90 | 23.13 | 50.00 | 26.87 | Average |
| 12 | 28.003 | 15.79 | 0.24 | 10.00 | -0.87 | 25.16 | 60.00 | 34.84 | QP |

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

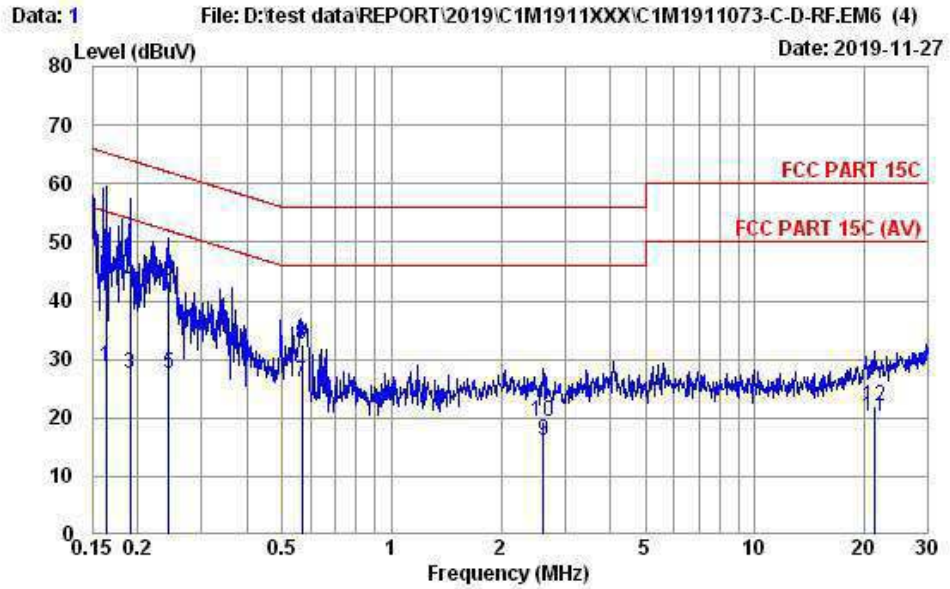


***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

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

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

| Test Phase | Line | Test Result | Pass |
|---|---|---|---|
| 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 PART 15C
Env. / Ins.   : 25°C / 53% ESR3 (1774)      Engineer    : Chucky Chiu
EUT           : DK-GW001-A01-C001
Power Rating  : AC 120V/60Hz
Test Mode     : Operating
```

| | Freq. (MHz) | AMN Factor (dB) | Cable Loss (dB) | Pulse Att. (dB) | Reading (dBμV) | Emission Level (dBμV) | Limits (dBμV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.163 | 10.60 | 0.04 | 9.86 | 8.26 | 28.76 | 55.30 | 26.54 | Average |
| 2 | 0.163 | 10.60 | 0.04 | 9.86 | 25.64 | 46.14 | 65.30 | 19.16 | QP |
| 3 | 0.190 | 10.55 | 0.04 | 9.86 | 7.24 | 27.69 | 54.02 | 26.33 | Average |
| 4 | 0.190 | 10.55 | 0.04 | 9.86 | 22.75 | 43.20 | 64.02 | 20.82 | QP |
| 5 | 0.244 | 10.51 | 0.04 | 9.86 | 7.03 | 27.44 | 51.95 | 24.51 | Average |
| 6 | 0.244 | 10.51 | 0.04 | 9.86 | 22.83 | 43.24 | 61.95 | 18.71 | QP |
| 7 | 0.567 | 10.44 | 0.04 | 9.86 | 5.66 | 26.00 | 46.00 | 20.00 | Average |
| 8 | 0.567 | 10.44 | 0.04 | 9.86 | 12.27 | 32.61 | 56.00 | 23.39 | QP |
| 9 | 2.622 | 10.49 | 0.08 | 9.87 | -4.38 | 16.06 | 46.00 | 29.94 | Average |
| 10 | 2.622 | 10.49 | 0.08 | 9.87 | -1.07 | 19.37 | 56.00 | 36.63 | QP |
| 11 | 21.260 | 13.52 | 0.20 | 9.96 | -3.60 | 20.08 | 50.00 | 29.92 | Average |
| 12 | 21.260 | 13.52 | 0.20 | 9.96 | -1.77 | 21.91 | 60.00 | 38.09 | QP |

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

*Audix Technology Corp.*
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
*Tel: +886 2 26099301*
*Fax: +886 2 26099303*

# A.2 RADIATED EMISSION

| Test Date | 2019/12/06 ~ 10 | Temp./Hum. | 21-22℃/48-55% |
|---|---|---|---|
| Test Voltage | AC 120V 60Hz (Via AC Adapter) | Tested By | Sean Wang |

A.2.1 Emissions Applied to General Requirement

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 | Z-Wave | Frequency | TX 908.4MHz |
|---|---|---|---|

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 |
|---|---|---|---|---|---|---|---|
| 33.88 | 23.04 | 1.27 | 0.70 | 25.01 | 40.00 | 14.99 | Peak |
| 157.07 | 16.64 | 2.98 | 9.12 | 28.74 | 43.50 | 14.76 | Peak |
| 409.27 | 22.52 | 5.96 | 5.13 | 33.61 | 46.00 | 12.39 | Peak |
| 650.80 | 25.13 | 7.13 | -0.56 | 31.70 | 46.00 | 14.30 | Peak |
| 912.70 | 27.41 | 8.53 | 1.72 | 37.66 | 46.00 | 8.34 | Peak |
| 978.66 | 27.92 | 8.92 | 0.27 | 37.11 | 54.00 | 16.89 | 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 |
|---|---|---|---|---|---|---|---|
| 32.91 | 23.73 | 1.25 | 2.78 | 27.76 | 40.00 | 12.24 | Peak |
| 177.44 | 15.53 | 3.20 | 7.30 | 26.03 | 43.50 | 17.47 | Peak |
| 482.02 | 23.49 | 6.61 | 0.43 | 30.53 | 46.00 | 15.47 | Peak |
| 685.72 | 25.35 | 7.30 | 2.89 | 35.54 | 46.00 | 10.46 | Peak |
| 844.80 | 26.87 | 8.15 | 1.98 | 37.00 | 46.00 | 9.00 | Peak |
| 977.69 | 27.92 | 8.91 | 1.61 | 38.44 | 54.00 | 15.56 | Peak |


***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

**Audix Technology Corp.**
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
**Tel: +886 2 26099301**
**Fax: +886 2 26099303**

| Mode | Z-Wave | Frequency | TX 912MHz |
|---|---|---|---|

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 |
|---|---|---|---|---|---|---|---|
| 78.50 | 13.33 | 2.02 | 4.05 | 19.40 | 40.00 | 20.60 | Peak |
| 265.71 | 19.11 | 4.10 | 6.77 | 29.98 | 46.00 | 16.02 | Peak |
| 447.10 | 23.04 | 6.31 | 0.94 | 30.29 | 46.00 | 15.71 | Peak |
| 606.18 | 24.81 | 6.91 | 0.96 | 32.68 | 46.00 | 13.32 | Peak |
| 806.00 | 26.53 | 7.93 | -0.05 | 34.41 | 46.00 | 11.59 | Peak |
| 975.75 | 27.89 | 8.90 | -0.65 | 36.14 | 54.00 | 17.86 | 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 |
|---|---|---|---|---|---|---|---|
| 51.34 | 14.47 | 1.58 | 9.40 | 25.45 | 40.00 | 14.55 | Peak |
| 150.28 | 16.98 | 2.90 | 4.97 | 24.85 | 43.50 | 18.65 | Peak |
| 347.19 | 21.06 | 5.16 | 0.16 | 26.38 | 46.00 | 19.62 | Peak |
| 539.25 | 24.15 | 6.80 | 0.45 | 31.40 | 46.00 | 14.60 | Peak |
| 728.40 | 25.77 | 7.52 | -0.33 | 32.96 | 46.00 | 13.04 | Peak |
| 981.57 | 27.94 | 8.94 | -0.31 | 36.57 | 54.00 | 17.43 | Peak |

| Mode | Z-Wave | Frequency | TX 916MHz |
|---|---|---|---|

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 |
|---|---|---|---|---|---|---|---|
| 33.88 | 23.04 | 1.27 | -0.01 | 24.30 | 40.00 | 15.70 | Peak |
| 159.98 | 16.50 | 3.01 | 8.57 | 28.08 | 43.50 | 15.42 | Peak |
| 400.54 | 22.40 | 5.88 | 0.76 | 29.04 | 46.00 | 16.96 | Peak |
| 628.49 | 24.98 | 7.02 | -0.50 | 31.50 | 46.00 | 14.50 | Peak |
| 790.48 | 26.40 | 7.85 | 0.29 | 34.54 | 46.00 | 11.46 | Peak |
| 968.96 | 27.84 | 8.86 | 0.26 | 36.96 | 54.00 | 17.04 | 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 |
|---|---|---|---|---|---|---|---|
| 32.91 | 23.73 | 1.25 | 3.14 | 28.12 | 40.00 | 11.88 | Peak |
| 127.00 | 18.24 | 2.62 | 2.57 | 23.43 | 43.50 | 20.07 | Peak |
| 266.68 | 19.13 | 4.11 | 1.23 | 24.47 | 46.00 | 21.53 | Peak |
| 453.89 | 23.14 | 6.37 | 0.39 | 29.90 | 46.00 | 16.10 | Peak |
| 623.64 | 24.93 | 7.00 | -0.21 | 31.72 | 46.00 | 14.28 | Peak |
| 962.17 | 27.79 | 8.82 | -0.33 | 36.28 | 54.00 | 17.72 | Peak |



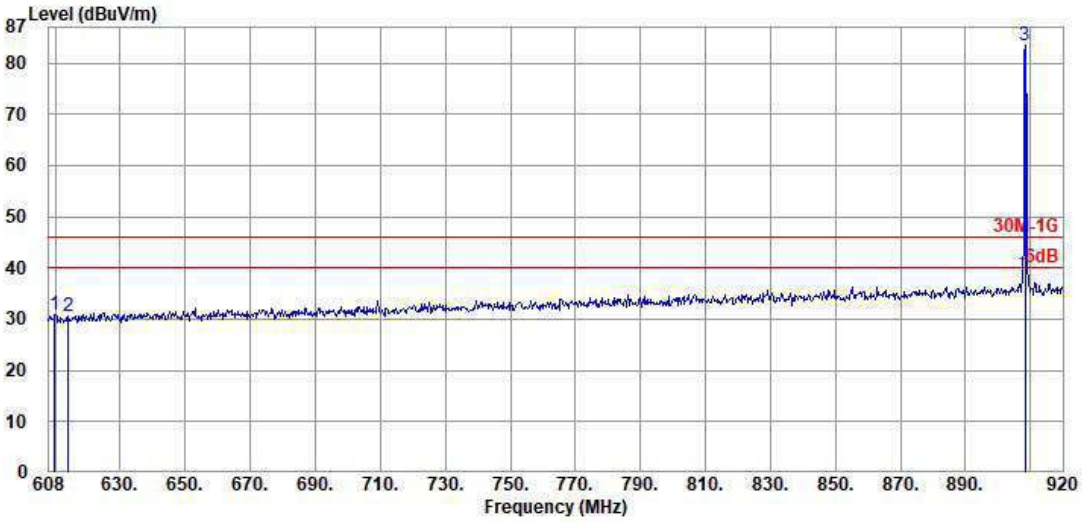
***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

**Audix Technology Corp.**
*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 10th harmonics

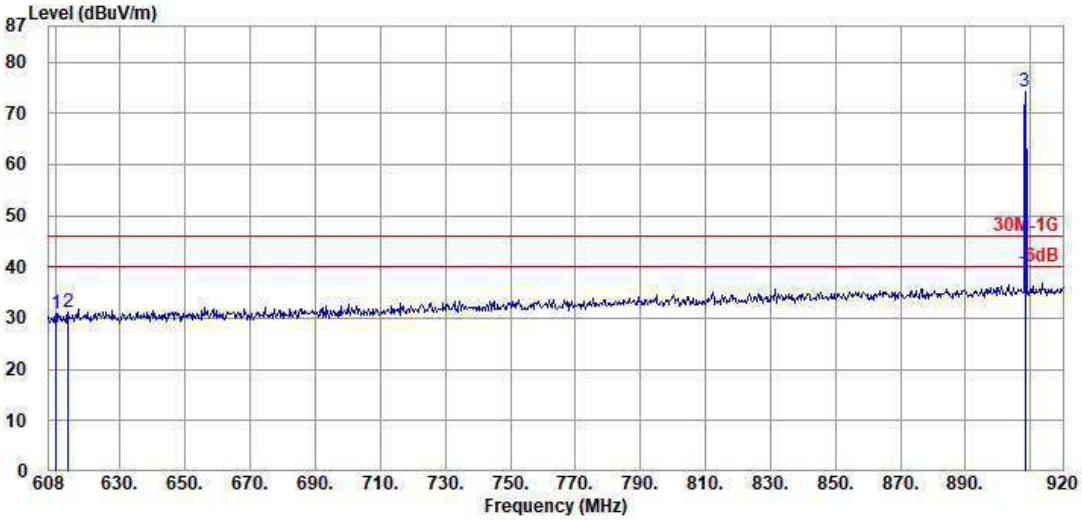
**Band Edge:**

| Mode | Z-Wave | Frequency | TX 908.4MHz |
|---|---|---|---|




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 |
|---|---|---|---|---|---|---|---|---|
| | 609.87 | 18.81 | 6.93 | 5.01 | 30.75 | 46.00 | 15.25 | Peak |
| | 613.93 | 18.84 | 6.95 | 4.71 | 30.50 | 46.00 | 15.50 | Peak |
| @ | 908.46 | 21.51 | 8.50 | 53.54 | 83.55 | --- | --- | 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 |
|---|---|---|---|---|---|---|---|---|
| | 610.18 | 18.81 | 6.93 | 5.06 | 30.80 | 46.00 | 15.20 | Peak |
| | 613.93 | 18.84 | 6.95 | 5.40 | 31.19 | 46.00 | 14.81 | Peak |
| @ | 908.46 | 21.51 | 8.50 | 44.32 | 74.33 | --- | --- | Peak |

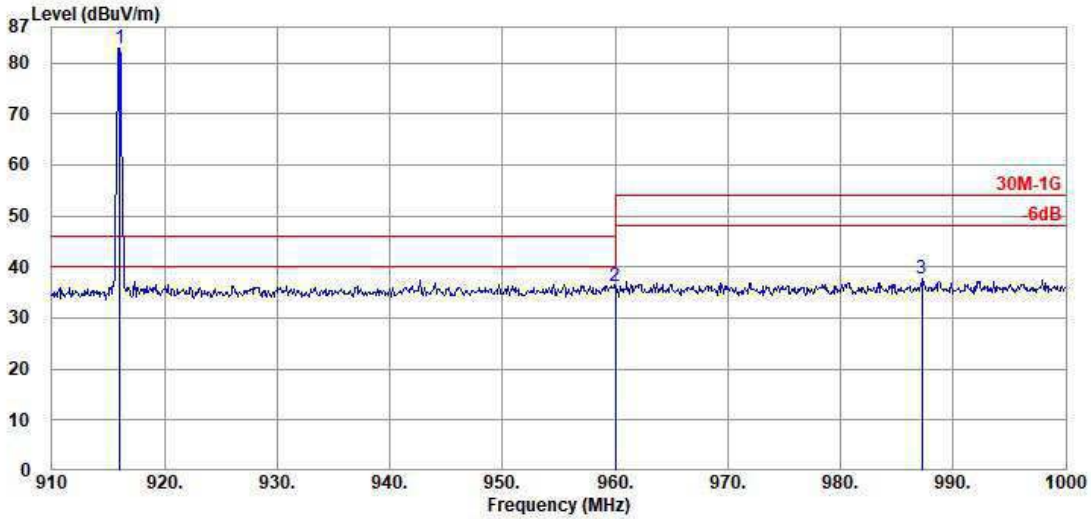
Remark: The "@" means fundamental frequency, it is ignored in this section.



***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

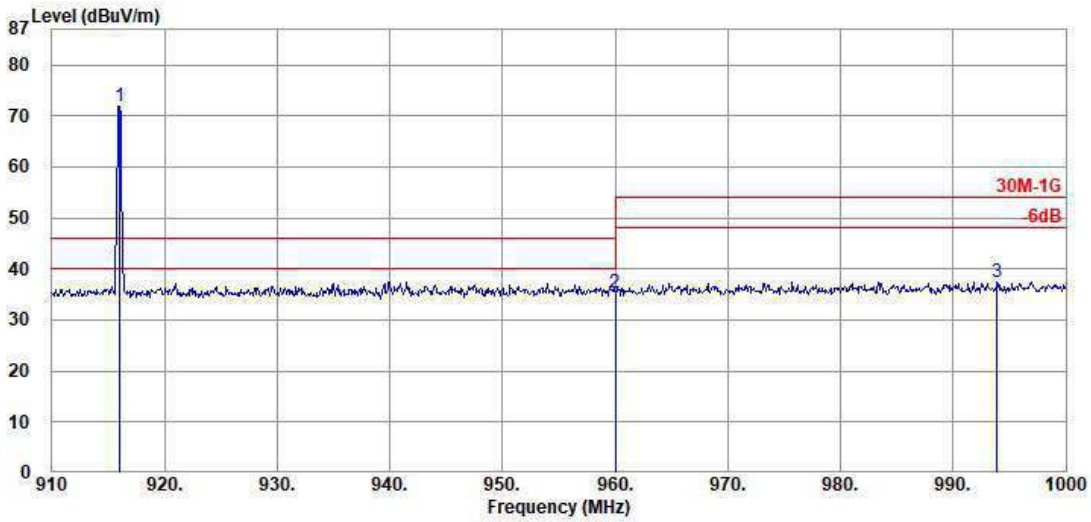
**Audix Technology Corp.**
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
**Tel: +886 2 26099301**
**Fax: +886 2 26099303**

| Mode | Z-Wave | Frequency | TX 916MHz |
|---|---|---|---|




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 |
|---|---|---|---|---|---|---|---|---|
| @ | 916.03 | 21.55 | 8.55 | 52.87 | 82.97 | --- | --- | Peak |
| | 960.04 | 21.78 | 8.81 | 5.49 | 36.08 | 54.00 | 17.92 | Peak |
| | 987.22 | 21.93 | 8.97 | 6.91 | 37.81 | 54.00 | 16.19 | 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 |
|---|---|---|---|---|---|---|---|---|
| @ | 916.03 | 21.55 | 8.55 | 41.77 | 71.87 | --- | --- | Peak |
| | 960.04 | 21.78 | 8.81 | 4.84 | 35.43 | 54.00 | 18.57 | Peak |
| | 993.88 | 21.96 | 9.01 | 6.58 | 37.55 | 54.00 | 16.45 | Peak |

Remark: The "@" means fundamental frequency, it is ignored in this section.



***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

**Audix Technology Corp.**
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
**Tel: +886 2 26099301**
**Fax: +886 2 26099303**

A.2.1.4 Frequency Above 1 GHz

| Mode | Z-Wave | Frequency | TX 908.4MHz |
|---|---|---|---|

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 |
|---|---|---|---|---|---|---|---|
| 6360.00 | 36.22 | 11.19 | 1.89 | 49.30 | 54.00 | 4.70 | 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 |
|---|---|---|---|---|---|---|---|
| 6360.00 | 36.22 | 11.19 | 1.08 | 48.49 | 54.00 | 5.51 | Peak |

| Mode | Z-Wave | Frequency | TX 912MHz |
|---|---|---|---|

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 |
|---|---|---|---|---|---|---|---|
| 6385.00 | 36.27 | 11.19 | 1.22 | 48.68 | 54.00 | 5.32 | Peak |
| 9120.00 | 36.48 | 14.18 | -4.05 | 46.61 | 54.00 | 7.39 | 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 |
|---|---|---|---|---|---|---|---|
| 6385.00 | 36.27 | 11.19 | 0.46 | 47.92 | 54.00 | 6.08 | Peak |
| 9120.00 | 36.48 | 14.18 | -2.02 | 48.64 | 54.00 | 5.36 | Peak |

| Mode | Z-Wave | Frequency | TX 916MHz |
|---|---|---|---|

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 |
|---|---|---|---|---|---|---|---|
| 6410.00 | 36.24 | 11.19 | 1.27 | 48.70 | 54.00 | 5.30 | 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 |
|---|---|---|---|---|---|---|---|
| 6410.00 | 36.24 | 11.19 | -0.18 | 47.25 | 54.00 | 6.75 | Peak |



***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

**Audix Technology Corp.**
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
**Tel: +886 2 26099301**
**Fax: +886 2 26099303**

A.2.2 Fundamental Frequency

| Mode | Z-Wave | Frequency | TX 908.4MHz |
|---|---|---|---|

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 |
|---|---|---|---|---|---|---|---|
| 908.38 | 27.39 | 8.50 | 56.45 | 92.34 | 94.00 | 1.66 | Peak |

Remark: Horizontal is the strongest polarization and peak value has complied with average limit, so horizontal won't be listed in test report.



***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

**Audix Technology Corp.**
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
**Tel: +886 2 26099301**
**Fax: +886 2 26099303**

| Mode | Z-Wave | Frequency | TX 912MHz |
|---|---|---|---|

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 |
|---|---|---|---|---|---|---|---|
| 911.98 | 27.41 | 8.52 | 52.25 | 88.18 | 94.00 | 5.82 | Peak |

Remark: Horizontal is the strongest polarization and peak value has complied with average limit, so horizontal won't be listed in test report.



***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

**Audix Technology Corp.**
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
**Tel: +886 2 26099301**
**Fax: +886 2 26099303**

| Mode | Z-Wave | Frequency | TX 916MHz |
|---|---|---|---|

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 |
|---|---|---|---|---|---|---|---|
| 916.02 | 27.44 | 8.55 | 52.75 | 88.74 | 94.00 | 5.26 | Peak |

Remark: Horizontal is the strongest polarization and peak value has complied with average limit, so horizontal won't be listed in test report.



***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

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

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

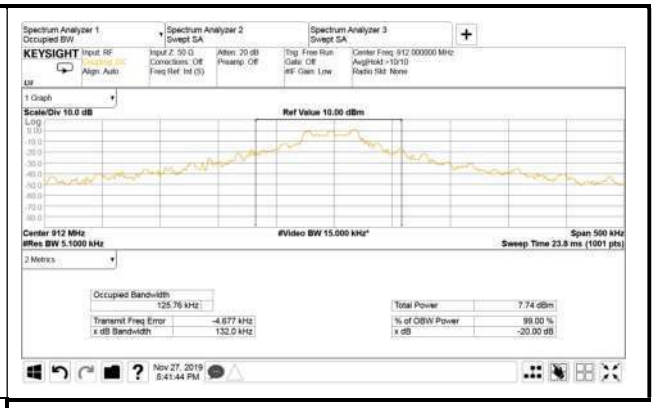
# A.3 EMISSION BANDWIDTH MEASUREMENT

| | | | |
|---|---|---|---|
| Test Date | 2019/11/27 | Temp./Hum. | 24℃/50% |
| Test Voltage | AC 120V 60Hz (Via AC Adapter) | Tested By | Sean Wang |

## A.3.1 Emission Bandwidth

| Mode | Centre Frequency (MHz) | 20dB Occupied Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|---|---|
| Z-Wave | 908.4 | 0.9002 | 0.86599 |
| | 912 | 0.1320 | 0.12576 |
| | 916 | 0.1183 | 0.10855 |

## A.3.2 Measurement Plots









***This test report may be reproduced in full only. The document may only be updated by Audix Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***

**Audix Technology Corp.**
*No. 53-11, Dingfu, Linkou, Dist.,*
*New Taipei City244, Taiwan*
**Tel: +886 2 26099301**
**Fax: +886 2 26099303**

# APPDNDIX B

## TEST PHOTOGRAPHS

(Model: DK-GW001-A01-C001)



***This test report may be reproduced in full only. The document may only be updated by AUDIX Technology Corp. personnel. Any changes will be noted in the Document History section of the report.***