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

FCC 15.209
Wireless Power Transfer Report

for

Hitachi-LG Data Storage Korea, Inc.

189, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea.

Product Name	**:**	**Super multi wireless charger**
Model Name	**:**	**(1)HLW-TNMP7 (2)HLW-TNMP7A (3)HLW-TNMP7B (4)HLW-TNMP7C (5)HLW-TNMP7***
Brand	**:**	**H • L Data Storage**
FCC ID	**:**	**2AQ9F-HLW-TNMP7-R1**

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

Testing Laboratory
1724

TESTING
NVLAP LAB CODE 200077-0

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.

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 4
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 6
3.3. EUT Specifications Assessed in Current Report 7
3.4. Antenna Information 7
3.5. Description of Key Components 7
3.6. Test Configuration 7
3.7. Tested Supporting System List 8
3.8. Setup Configuration 9
3.9. Operating Condition of EUT 9
3.10. Description of Test Facility 10
3.11. Measurement Uncertainty 10
4. MEASUREMENT EQUIPMENT LIST 11
4.1. Conducted Emission Measurement 11
4.2. Radiated Emission Measurement 11
4.3. RF Conducted Measurement 11
5. CONDUCTED EMISSION 12
5.1. Block Diagram of Test Setup 12
5.2. Conducted Emission Limit 12
5.3. Test Procedure 12
5.4. Test Results 12
6. RADIATED SPURIOUS EMISSION 13
6.1. Block Diagram of Test Setup 13
6.2. Radiated Emission Limits 14
6.3. Test Procedure 14
6.4. Measurement Limit Formula 15
6.5. Test Results 15
7. 20dB BANDWIDTH 16
7.1. Block Diagram of Test Setup 16
7.2. Specification Limits 16
7.3. Test Procedure 16
7.4. Test Results 16
8. DEVIATION TO TEST SPECIFICATIONS 17

APPENDIX A TEST DATA AND PLOTS
APPENDIX B TEST PHOTOGRAPHS

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	:	Hitachi-LG Data Storage Korea, Inc.
Manufacture	:	#1 Hitachi-LG Data Storage (Huizhou), Ltd.
		#2 HITACHI ELECTRONIC PRODUCTS (M) SDN. BHD.
EUT Description		
(1) Product	:	Super multi wireless charger
(2) Model	:	(1)HLW-TNMP7 (2)HLW-TNMP7A
		(3)HLW-TNMP7B (4)HLW-TNMP7C (5)HLW-TNMP7*
(3) Brand	:	H・L Data Storage
(4) Power Rating	:	DC 5V ~ 12V

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. 04. 22

Reviewed by: Tina Huang (Tina Huang/Administrator)

Approved by: Ben Cheng (Ben Cheng/Manager)

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. 04. 22	Original Report	EM-F180412

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
FCC		
15.207	Conducted Emission	**PASS**
15.209	Radio Spurious Emission	**PASS**
15.215 (c)	20dB Bandwidth	**PASS**
15.203	Antenna Requirement	**Compliance**

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	Hitachi-LG Data Storage Korea, Inc. 189, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea.
Manufacture	#1 Hitachi-LG Data Storage (Huizhou), Ltd. #2 HITACHI ELECTRONIC PRODUCTS (M) SDN. BHD.
Product	Super multi wireless charger
Model	(1)HLW-TNMP7 (2)HLW-TNMP7A (3)HLW-TNMP7B (4)HLW-TNMP7C (5)HLW-TNMP7* (Where symbol "*" can be any number, character or blank)
Brand	H・L Data Storage

3.2. Description of EUT

Test Model	HLW-TNMP7
Serial Number	N/A
Power Rating	DC 5 ~ 12V
RF Features	Wireless Power Transfer
I/O Ports List	• USB Port x1
Accessories	• USB Type-C Cable
Date of Receipt	2019. 03. 22
Date of Test	2019. 03. 25

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

3.3. EUT Specifications Assessed in Current Report

Mode	Fundamental Range	Modulation
WPC	115-130kHz	FSK

3.4. Antenna Information

No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
1	---	---	Loop	---	---

3.5. Description of Key Components

None.

3.6. Test Configuration

AC Conduction	
Test Case	5W Charge with AC 5V Adapter
	10W Charge with AC 9V Adapter
	15W Charge with AC 12V Adapter

Item		Test Frequency	Mode
Radiated Test Case	Radiated Spurious Emission	127.72kHz	5W Charge with DC 5V Adapter
		127.58kHz	10W Charge with DC 9V Adapter
		127.58kHz	15W Charge with DC 12V Adapter
Conducted Test Case	20dB Bandwidth	127.6kHz	5W Charge with DC 5V Adapter
		115.8kHz	10W Charge with DC 9V Adapter
		126.5kHz	15W Charge with DC 12V Adapter

Note 1:

■ Mobile Device:.

☐ Portable Device, and 3 axis were assessed.

- ☐ Lie
- ☐ Side
- ☐ Stand

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	Supplier or Brand	Model No.	Serial No.	Approval
1.	Simulator with 9.6Ω R-Load	Hitachi-LG	N/A	N/A	N/A
	Simulator with 5.6Ω R-Load	Hitachi-LG	N/A	N/A	N/A
	Simulator with 14.6Ω R-Load	Hitachi-LG	N/A	N/A	N/A
2	Adapter (O/P: 12V)	Samsung	EP-TA300	N/A	N/A
	Adapter (O/P: 9V)	LG	MCS-H06KR	N/A	N/A
	Adapter (O/P: 5V)	Samsung	EP-TA12KWK	N/A	N/A

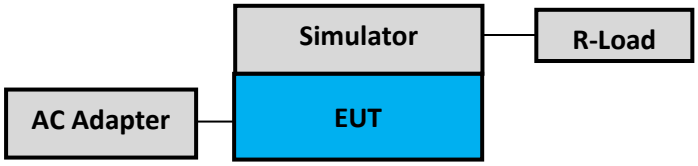
3.7.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	Data Cable: Unshielded, Detachable, 0.28m (For 9.6Ω R-Load) Data Cable: Unshielded, Detachable, 0.35m (For 5.6Ω R-Load) Data Cable: Unshielded, Detachable, 0.56m (For 14.6Ω R-Load)
2.	N/A

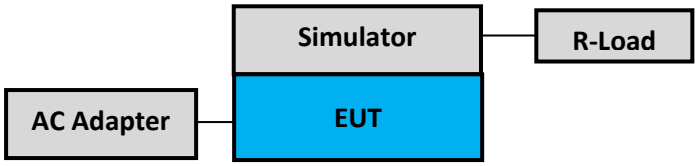
Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan
Tel: +886 2 26099301
Fax: +886 2 26099303

3.8. Setup Configuration

3.8.1. For AC Conduction Test



3.8.2. For Radiated Spurious Emission Test



3.9. Operating Condition of EUT

To Set EUT on RF function under continues transmitting.

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 No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2005 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	FCC OET Designation Number under APEC MRA by NCC is : TW1724 (1) No. 8 Shielding Room (2) No. 1 Semi-Anechoic Chamber (IC Test Site Registration No.: 5183B-1) (3) RF Test Room

3.11.Measurement Uncertainty

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

Remark：Uncertainty = $ku_c(y)$

Test Item	Uncertainty
20dB Bandwidth	± 0.2kHz

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	2018. 11. 14	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2018. 12. 19	1 Year
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. Due
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2018. 09. 11	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2018. 06. 20	1 Year
3.	Amplifier	HP	8447D	2944A06305	2019. 01. 30	1 Year
4.	Loop Antenna	R&S	HFH2-Z2	891847/27	2017. 12. 18	2 Years
5.	Bilog Antenna	CHASE	CBL6112D	33821	2019. 01. 19	1 Year
6.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2018. 04. 20	1 Year
7.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2018. 09. 11	1 Year
2.	Amplifier	HP	8447D	2944A06305	2019. 01. 30	1 Year
3.	Loop Antenna	R&S	HFH2-Z2	891847/27	2017. 12. 18	2 Years
4.	Bilog Antenna	CHASE	CBL6112D	33821	2019. 01. 19	1 Year
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2018. 04. 20	1 Year
6.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

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

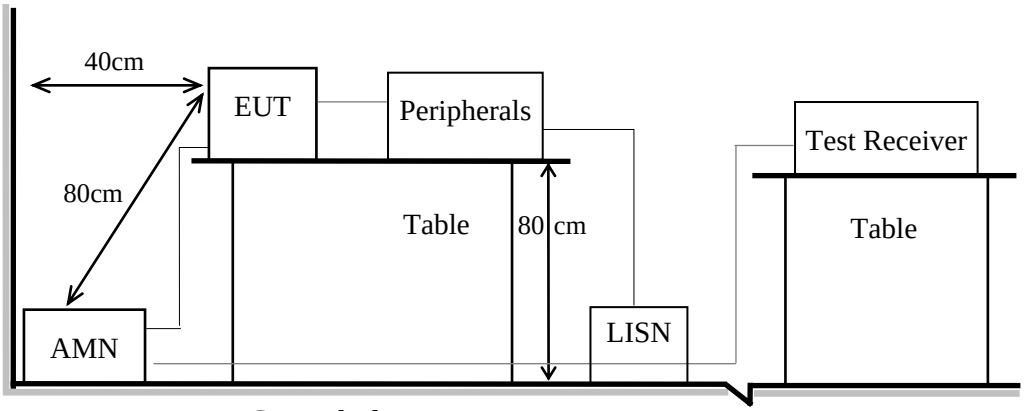
5. CONDUCTED EMISSION

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 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. 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.

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

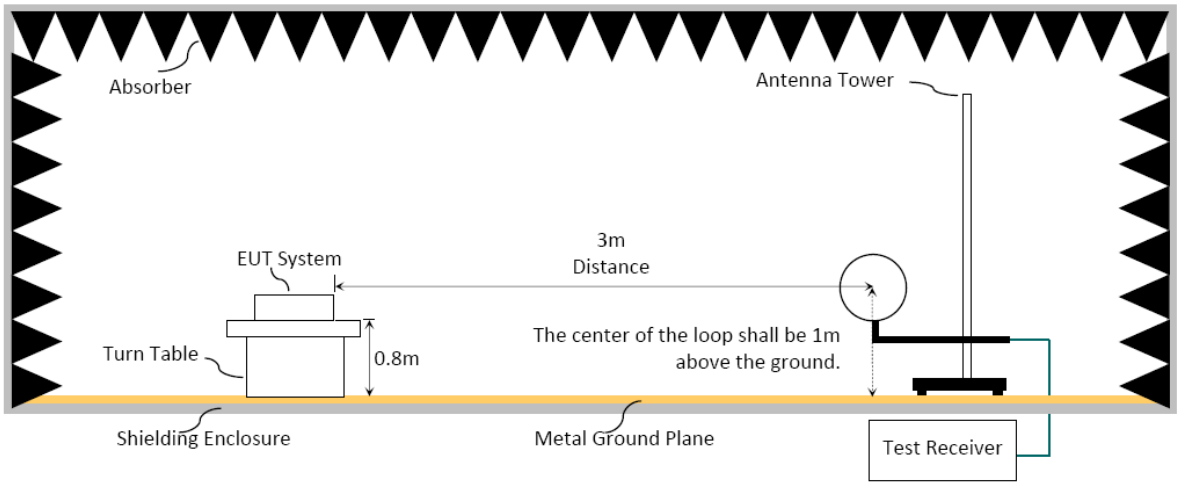
6. RADIATED SPURIOUS EMISSION

6.1. Block Diagram of Test Setup

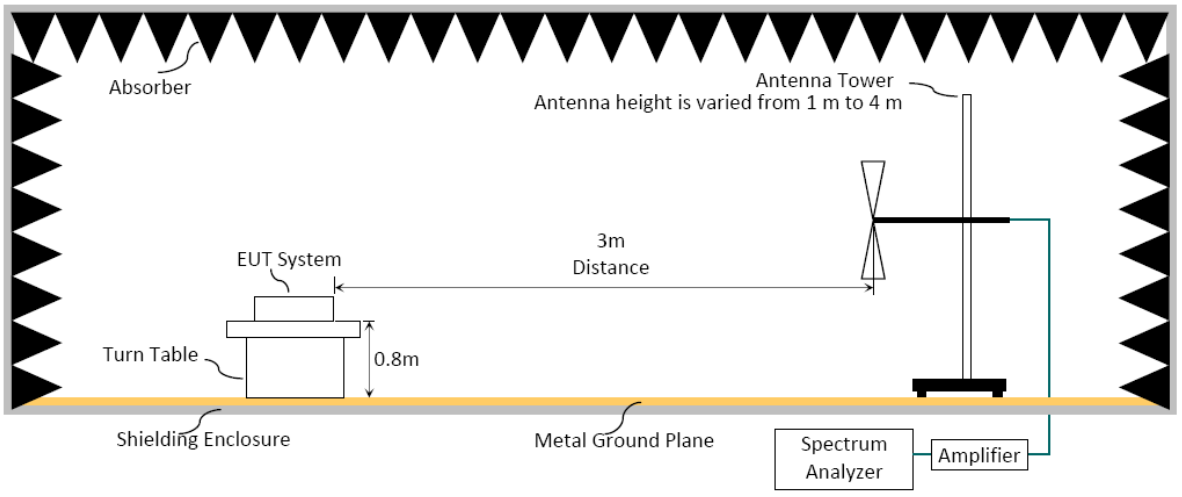
6.1.1. Block Diagram of EUT

Indicated as section 3.8

6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000 MHz



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

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 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	2400/kHz
0.490 - 1.705	30	87.6	24000/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) 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.

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 (10kHz-490kHz)
Q.P. (490kHz-30MHz)

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

Frequency Range 30MHz ~ 1000MHz:
The EUT setup on the turn table which has 0.8 m 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.

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 finally measurement.

6.4. Measurement Limit Formula

Frequency (MHz)	Formula
0.009 - 0.490MHz	3 Limit (dBμV/m) = 20log(2400/F^{Note})+ 40log(300m/3m)
0.490 - 1.705MHz	3 Limit (dBμV/m) = 20log(24000/F^{Note})+ 40log(300m/3m)
1.750- 30MHz	3 Limit (dBμV/m) = 20log(30)+ 40log(300m/3m)
Note: F is test frequency	

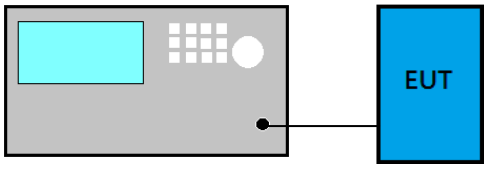
6.5. Test Results

Please refer to Appendix A.

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

7. 20dB BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

The 20dB bandwidth shall be specified in operating frequency band.

7.3. Test Procedure

Following measurement procedure:

(1) Set RBW close to1% of OBW.
(2) Set the video bandwidth (VBW) ≥ 3 × 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 -20 dB to record the final bandwidth.

7.4. Test Results

Please refer to Appendix A

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】

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: HLW-TNMP7)

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

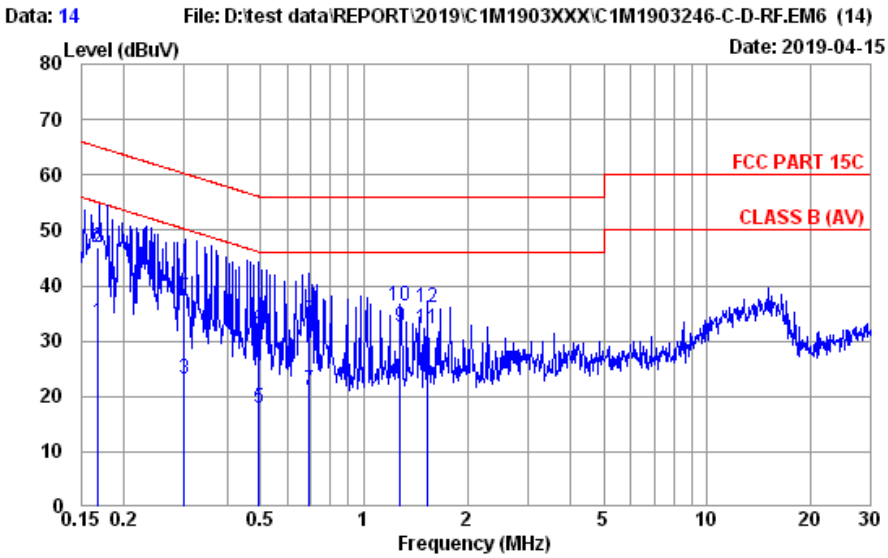
TABLE OF CONTENTS

A.1 CONDUCTED EMISSION 2
A.2 RADIATED SPURIOUS EMISSION 8
A.3 20dB BANDWIDTH 17
A.3.1 20dB Bandwidth Result 17
A.3.2 Measurement Plots 17

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	2019/04/15	Temp./Hum.	22℃/55%
Test Voltage	AC 120V/60Hz (Via DC 5V Adapter)		
Test Mode	5W		



Site no. : No.8 Shielded Room
Condition : ENV4200 100169
Limit : FCC PART 15C
Env. / Ins. : 22*C / 55% ESR3 (1774)
EUT : HLW-TNMP7
Power Rating : 110Vac/60Hz
Test Mode : Operating
5W

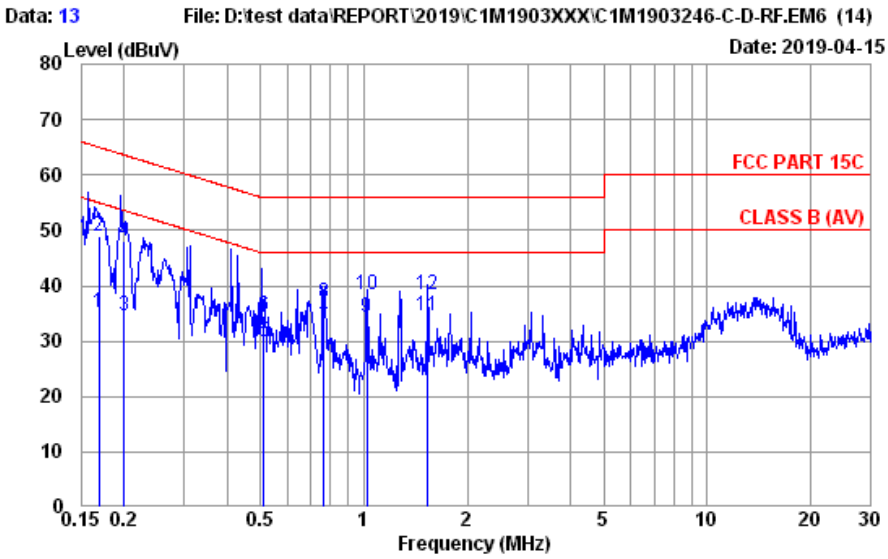
Data no. : 14
LISN Phase : NEUTRAL
Engineer : Xar Zhuo

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.169	10.67	0.03	9.86	12.94	33.50	55.03	21.53	Average
2	0.169	10.67	0.03	9.86	26.32	46.88	65.03	18.15	QP
3	0.300	10.54	0.04	9.86	2.78	23.22	50.23	27.01	Average
4	0.300	10.54	0.04	9.86	19.14	39.58	60.23	20.65	QP
5	0.494	10.49	0.04	9.86	-2.44	17.95	46.10	28.15	Average
6	0.494	10.49	0.04	9.86	11.64	32.03	56.10	24.07	QP
7	0.694	10.48	0.05	9.86	0.57	20.96	46.00	25.04	Average
8	0.694	10.48	0.05	9.86	13.39	33.78	56.00	22.22	QP
9	1.277	10.48	0.06	9.86	12.09	32.49	46.00	13.51	Average
10	1.277	10.48	0.06	9.86	15.90	36.30	56.00	19.70	QP
11	1.533	10.49	0.06	9.86	11.94	32.35	46.00	13.65	Average
12	1.533	10.49	0.06	9.86	15.63	36.04	56.00	19.96	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.

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

Test Date	2019/04/15	Temp./Hum.	22℃/55%
Test Voltage	AC 120V/60Hz (Via DC 5V Adapter)		
Test Mode	5W		



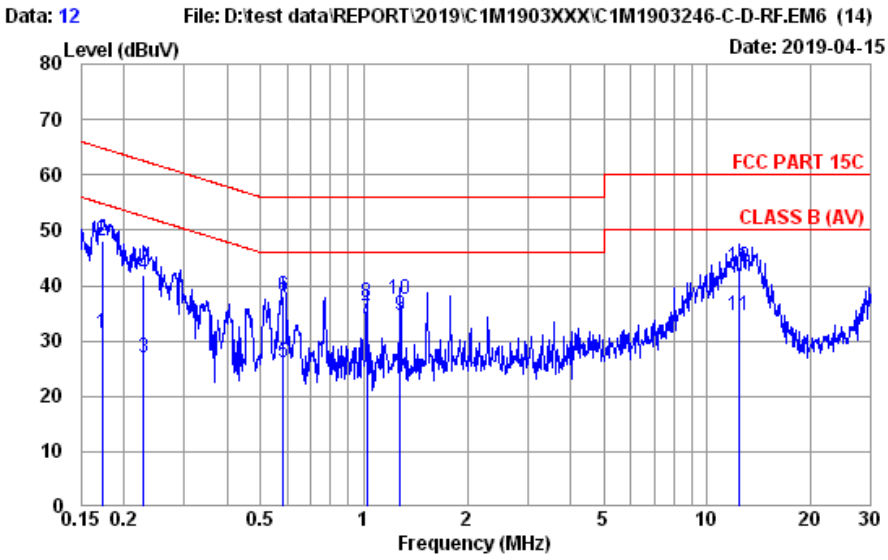
Site no. : No.8 Shielded Room Data no. : 13
Condition : ENV4200 100169 LISN Phase : LINE
Limit : FCC PART 15C
Env. / Ins. : 22°C / 55% ESR3 (1774) Engineer : Xar Zhuo
EUT : HLW-TNMP7
Power Rating : 110Vac/60Hz
Test Mode : Operating
5W

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.169	10.59	0.03	9.86	14.71	35.19	55.02	19.83	Average
2	0.169	10.59	0.03	9.86	28.47	48.95	65.02	16.07	QP
3	0.200	10.54	0.03	9.86	14.09	34.52	53.61	19.09	Average
4	0.200	10.54	0.03	9.86	27.49	47.92	63.61	15.69	QP
5	0.511	10.44	0.05	9.86	9.43	29.78	46.00	16.22	Average
6	0.511	10.44	0.05	9.86	14.33	34.68	56.00	21.32	QP
7	0.766	10.43	0.05	9.86	12.22	32.56	46.00	13.44	Average
8	0.766	10.43	0.05	9.86	16.51	36.85	56.00	19.15	QP
9	1.021	10.42	0.06	9.86	14.00	34.34	46.00	11.66	Average
10	1.021	10.42	0.06	9.86	17.97	38.31	56.00	17.69	QP
11	1.533	10.44	0.06	9.86	14.21	34.57	46.00	11.43	Average
12	1.533	10.44	0.06	9.86	18.06	38.42	56.00	17.58	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.

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

Test Date	2019/04/15	Temp./Hum.	22℃/55%
Test Voltage	AC 120V/60Hz (Via DC 9V Adapter)		
Test Mode	10W		



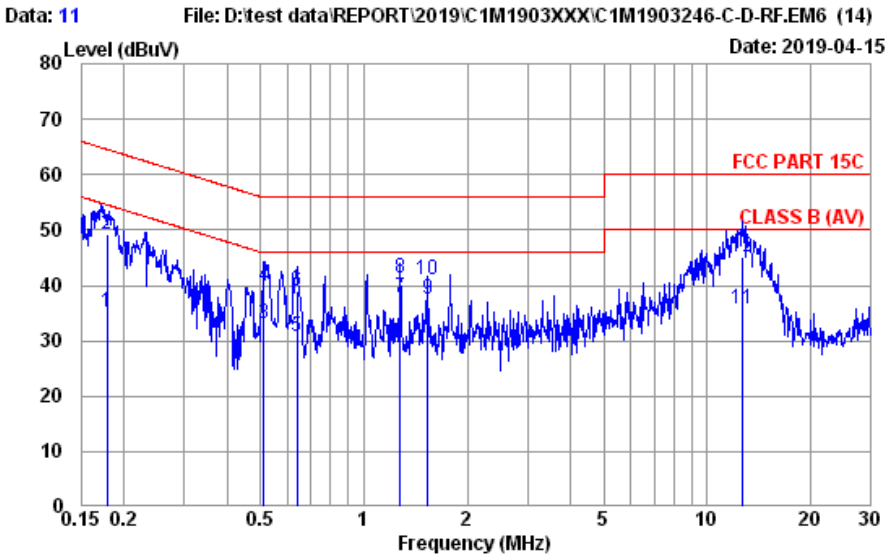

```
Site no.      : No.8 Shielded Room          Data no.   : 12
Condition     : ENV4200 100169              LISN Phase : NEUTRAL
Limit         : FCC PART 15C
Env. / Ins.   : 22*C / 55% ESR3 (1774)      Engineer   : Xar Zhuo
EUT           : HLW-TNMP7
Power Rating  : 110Vac/60Hz
Test Mode     : Operating
                10W
```

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.173	10.66	0.03	9.86	10.85	31.40	54.81	23.41	Average
2	0.173	10.66	0.03	9.86	27.53	48.08	64.81	16.73	QP
3	0.228	10.60	0.03	9.86	6.53	27.02	52.52	25.50	Average
4	0.228	10.60	0.03	9.86	21.39	41.88	62.52	20.64	QP
5	0.582	10.48	0.05	9.86	5.76	26.15	46.00	19.85	Average
6	0.582	10.48	0.05	9.86	17.81	38.20	56.00	17.80	QP
7	1.021	10.47	0.06	9.86	13.64	34.03	46.00	11.97	Average
8	1.021	10.47	0.06	9.86	16.43	36.82	56.00	19.18	QP
9	1.277	10.48	0.06	9.86	14.13	34.53	46.00	11.47	Average
10	1.277	10.48	0.06	9.86	17.04	37.44	56.00	18.56	QP
11	12.384	12.04	0.21	9.91	12.51	34.67	50.00	15.33	Average
12	12.384	12.04	0.21	9.91	21.32	43.48	60.00	16.52	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.
```

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

Test Date	2019/04/15	Temp./Hum.	22℃/55%
Test Voltage	AC 120V/60Hz (Via DC 9V Adapter)		
Test Mode	10W		



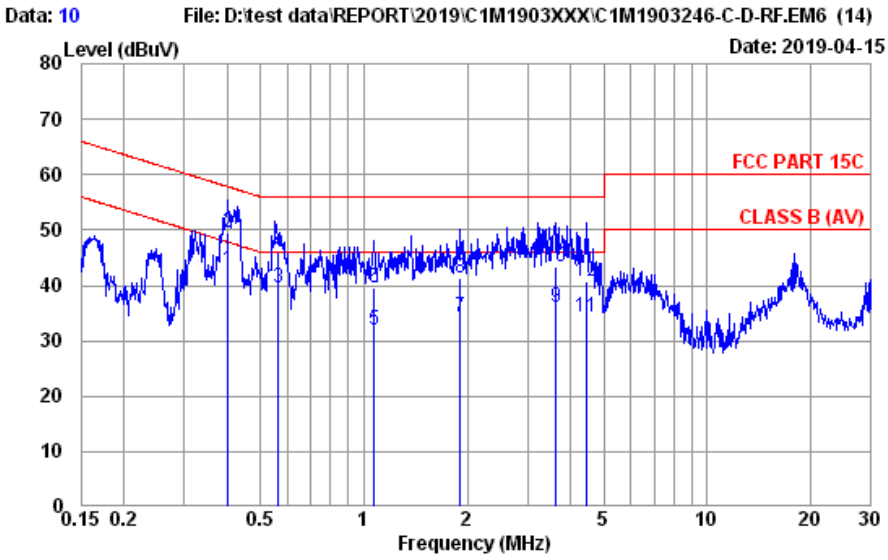

```
Site no.      : No.8 Shielded Room          Data no.   : 11
Condition     : ENV4200 100169              LISN Phase : LINE
Limit         : FCC PART 15C
Env. / Ins.   : 22°C / 55% ESR3 (1774)      Engineer   : Xar Zhuo
EUT           : HLW-TNMP7
Power Rating  : 110Vac/60Hz
Test Mode     : Operating
                10W
```

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.178	10.57	0.03	9.86	14.61	35.07	54.56	19.49	Average
2	0.178	10.57	0.03	9.86	28.82	49.28	64.56	15.28	QP
3	0.510	10.44	0.05	9.86	12.82	33.17	46.00	12.83	Average
4	0.510	10.44	0.05	9.86	19.49	39.84	56.00	16.16	QP
5	0.637	10.43	0.05	9.86	10.55	30.89	46.00	15.11	Average
6	0.637	10.43	0.05	9.86	18.76	39.10	56.00	16.90	QP
7	1.276	10.43	0.06	9.86	17.32	37.67	46.00	8.33	Average
8	1.276	10.43	0.06	9.86	21.03	41.38	56.00	14.62	QP
9	1.532	10.44	0.06	9.86	17.08	37.44	46.00	8.56	Average
10	1.532	10.44	0.06	9.86	20.80	41.16	56.00	14.84	QP
11	12.716	11.83	0.22	9.91	13.89	35.85	50.00	14.15	Average
12	12.716	11.83	0.22	9.91	23.18	45.14	60.00	14.86	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.

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

Test Date	2019/04/15	Temp./Hum.	22℃/55%
Test Voltage	AC 120V/60Hz (Via DC 12V Adapter)		
Test Mode	15W		



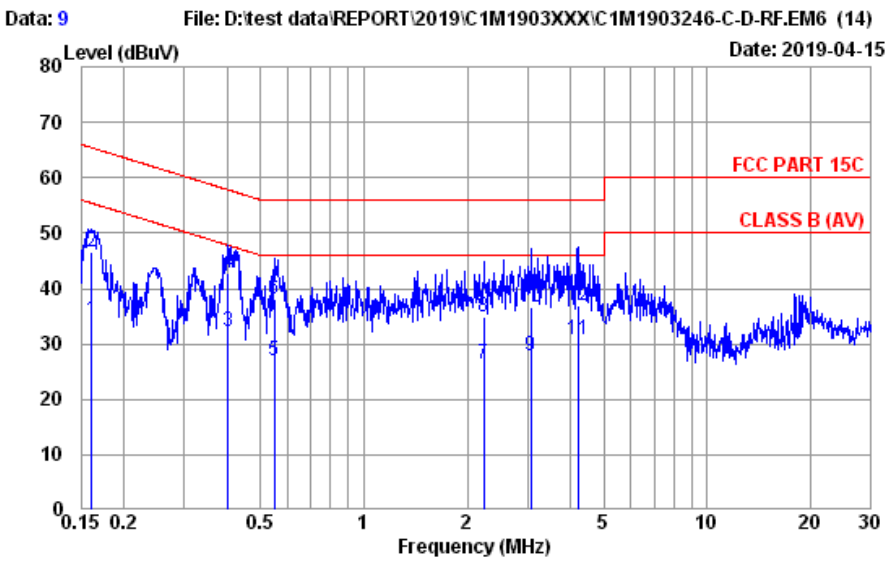
Site no. : No.8 Shielded Room Data no. : 10
Condition : ENV4200 100169 LISN Phase : NEUTRAL
Limit : FCC PART 15C
Env. / Ins. : 22*C / 55% ESR3 (1774) Engineer : Xar Zhuo
EUT : HLW-TNMP7
Power Rating : 110Vac/60Hz
Test Mode : Operating
15W

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.401	10.49	0.04	9.86	22.48	42.87	47.83	4.96	Average
2	0.401	10.49	0.04	9.86	29.09	49.48	57.83	8.35	QP
3	0.563	10.48	0.05	9.86	19.03	39.42	46.00	6.58	Average
4	0.563	10.48	0.05	9.86	25.63	46.02	56.00	9.98	QP
5	1.071	10.47	0.06	9.86	11.68	32.07	46.00	13.93	Average
6	1.071	10.47	0.06	9.86	19.14	39.53	56.00	16.47	QP
7	1.908	10.51	0.08	9.86	13.78	34.23	46.00	11.77	Average
8	1.908	10.51	0.08	9.86	20.85	41.30	56.00	14.70	QP
9	3.617	10.62	0.11	9.87	15.48	36.08	46.00	9.92	Average
10	3.617	10.62	0.11	9.87	22.79	43.39	56.00	12.61	QP
11	4.430	10.72	0.12	9.87	13.69	34.40	46.00	11.60	Average
12	4.430	10.72	0.12	9.87	19.99	40.70	56.00	15.30	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.

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

Test Date	2019/04/15	Temp./Hum.	22℃/55%
Test Voltage	AC 120V/60Hz (Via DC 12V Adapter)		
Test Mode	15W		



Site no. : No.8 Shielded Room Data no. : 9
Condition : ENV4200 100169 LISN Phase : LINE
Limit : FCC PART 15C
Env. / Ins. : 22°C / 55% ESR3 (1774) Engineer : Xar Zhuo
EUT : HLW-TNMP7
Power Rating : 110Vac/60Hz
Test Mode : Operating
15W

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.161	10.60	0.03	9.86	13.84	34.33	55.43	21.10	Average
2	0.161	10.60	0.03	9.86	26.25	46.74	65.43	18.69	QP
3	0.402	10.45	0.04	9.86	11.81	32.16	47.81	15.65	Average
4	0.402	10.45	0.04	9.86	22.41	42.76	57.81	15.05	QP
5	0.549	10.44	0.05	9.86	6.75	27.10	46.00	18.90	Average
6	0.549	10.44	0.05	9.86	17.77	38.12	56.00	17.88	QP
7	2.237	10.47	0.08	9.86	5.89	26.30	46.00	19.70	Average
8	2.237	10.47	0.08	9.86	14.47	34.88	56.00	21.12	QP
9	3.058	10.51	0.10	9.87	7.23	27.71	46.00	18.29	Average
10	3.058	10.51	0.10	9.87	16.07	36.55	56.00	19.45	QP
11	4.212	10.58	0.11	9.87	10.27	30.83	46.00	15.17	Average
12	4.212	10.58	0.11	9.87	16.23	36.79	56.00	19.21	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.

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

A.2 RADIATED SPURIOUS EMISSION

Test Date	2019/03/25	Temp./Hum.	23℃/50%
Test Voltage	AC 120V/60Hz (Via DC 5V Adapter)		
Test Mode	5W		
Test Frequency	TX 127.72kHz		

A.2.1. Frequency 9kHz~30MHz

Antenna at 0 Degree

Test Frequency (kHz)	Test Result (dBμV/m at 3m)	Limits (dBμV/m at 3m)	Margin (dB)	Detector
127.720	91.90	105.48	13.58	Peak
383.160	65.10	95.94	30.84	Peak
638.600	50.30	71.50	21.20	QP
894.040	41.50	68.58	27.08	QP

Antenna at 90 Degree

Test Frequency (kHz)	Test Result (dBμV/m at 3m)	Limits (dBμV/m at 3m)	Margin (dB)	Detector
127.720	86.80	105.48	18.68	Peak
383.160	62.40	95.94	33.54	Peak
638.600	49.20	71.50	22.30	QP
894.040	40.90	68.58	27.68	QP

Note: 1. All emissions are lower than the ambient level cannot be measured.
2. The Peak value has been compliance with Average limit, thus measurement with Average is not needed.

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

Test Date	2019/03/25	Temp./Hum.	23℃/50%
Test Voltage	AC 120V/60Hz (Via DC 9V Adapter)		
Test Mode	10W		
Test Frequency	TX 127.58kHz		

Antenna at 0 Degree

Test Frequency (kHz)	Test Result (dBμV/m at 3m)	Limits (dBμV/m at 3m)	Margin (dB)	Detector
127.580	92.40	105.49	13.09	Peak
382.740	57.60	95.95	38.35	Peak
637.900	54.30	71.51	17.21	QP
893.060	46.40	68.59	22.19	QP

Antenna at 90 Degree

Test Frequency (kHz)	Test Result (dBμV/m at 3m)	Limits (dBμV/m at 3m)	Margin (dB)	Detector
127.580	88.10	105.49	17.39	Peak
382.740	55.80	95.95	40.15	Peak
637.900	52.70	71.51	18.81	QP
893.060	46.40	68.59	22.19	QP

Note: 1. All emissions are lower than the ambient level cannot be measured.
2. The Peak value has been compliance with Average limit, thus measurement with Average is not needed.

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

Test Date	2019/03/25	Temp./Hum.	23℃/50%
Test Voltage	AC 120V/60Hz (Via DC 12V Adapter)		
Test Mode	15W		
Test Frequency	TX 127.58kHz		

Antenna at 0 Degree

Test Frequency (kHz)	Test Result (dBμV/m at 3m)	Limits (dBμV/m at 3m)	Margin (dB)	Detector
127.580	100.65	105.49	4.84	Peak
382.740	77.53	95.95	18.42	Peak
637.900	64.38	71.51	7.13	QP
893.060	56.26	68.59	12.33	QP

Antenna at 90 Degree

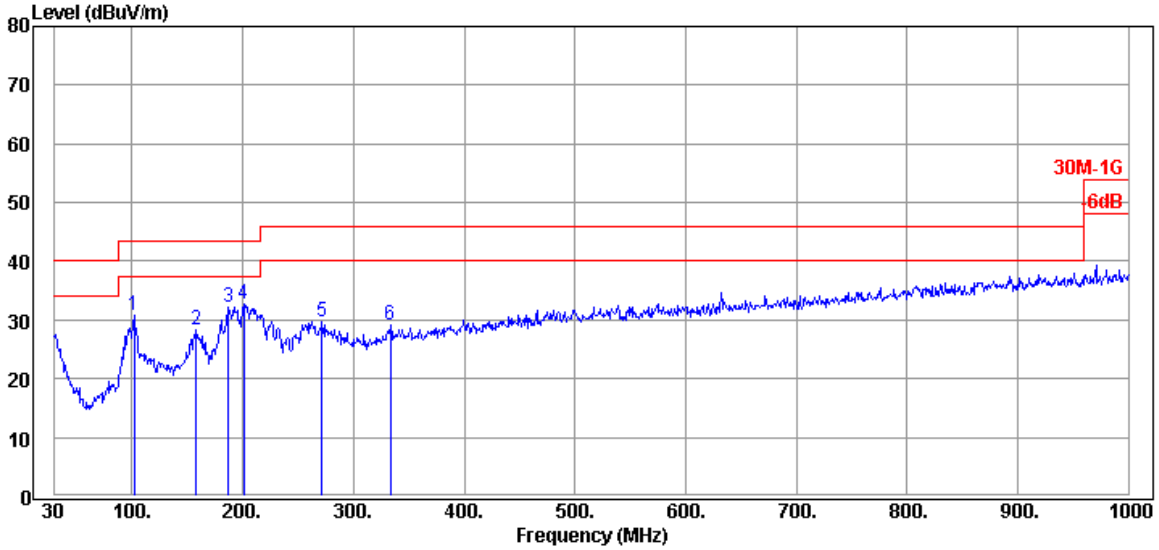
Test Frequency (kHz)	Test Result (dBμV/m at 3m)	Limits (dBμV/m at 3m)	Margin (dB)	Detector
127.580	96.52	105.49	8.97	Peak
382.740	70.88	95.95	25.07	Peak
637.900	60.17	71.51	11.34	QP
893.060	53.74	68.59	14.85	QP

Note: 1. All emissions are lower than the ambient level cannot be measured.
2. The Peak value has been compliance with Average limit, thus measurement with Average is not needed.

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

Test Date	2019/03/25	Temp./Hum.	23℃/50%
Test Voltage	AC 120V/60Hz (Via DC 5V Adapter)		
Test Mode	5W		
Test Frequency	TX 127.72kHz		

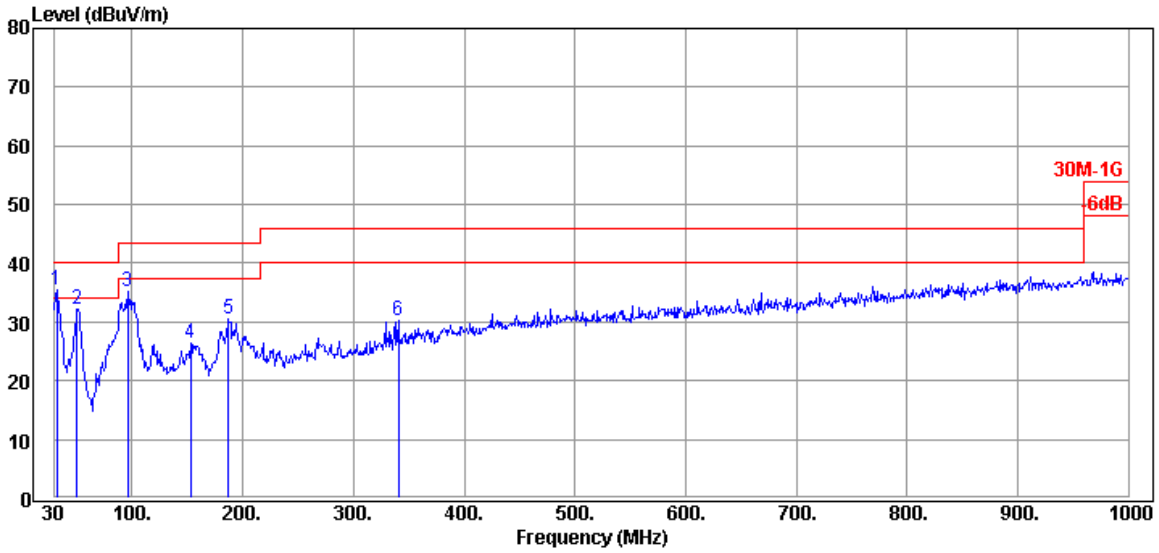
A.2.2. Frequency 30MHz ~ 1000MHz



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
101.78	17.50	2.31	11.01	30.82	43.50	12.68	Peak
158.04	16.59	2.99	8.60	28.18	43.50	15.32	Peak
187.14	15.72	3.30	13.14	32.16	43.50	11.34	Peak
200.72	16.31	3.43	13.00	32.74	43.50	10.76	Peak
271.53	19.21	4.16	6.38	29.75	46.00	16.25	Peak
333.61	20.69	4.96	3.52	29.17	46.00	16.83	Peak

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

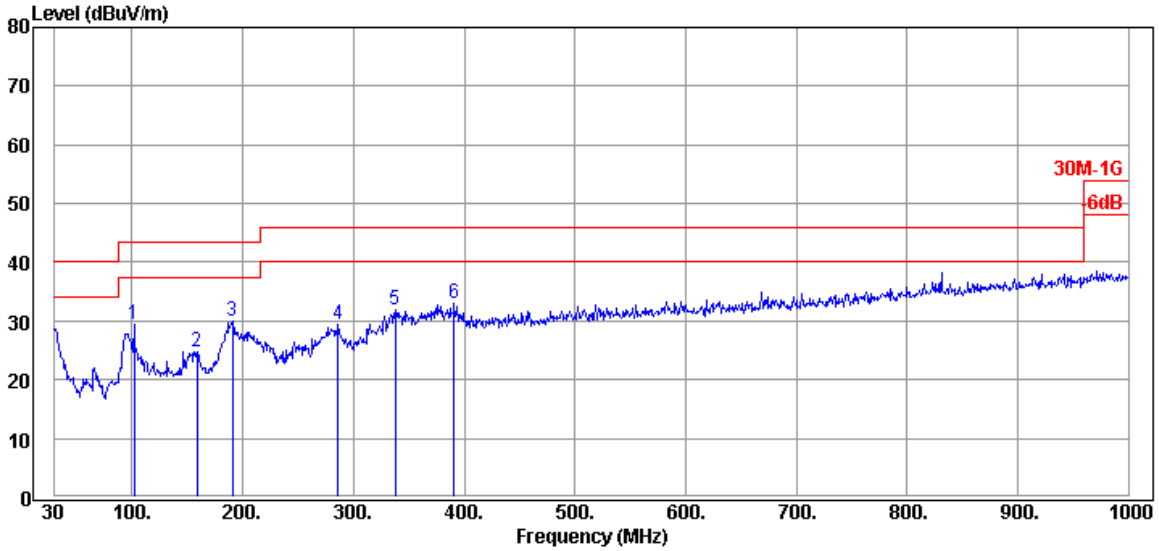


Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
31.94	24.34	1.23	9.77	35.34	40.00	4.66	Peak
50.37	14.69	1.57	16.01	32.27	40.00	7.73	Peak
95.96	16.65	2.24	16.40	35.29	43.50	8.21	Peak
153.19	16.84	2.93	6.69	26.46	43.50	17.04	Peak
187.14	15.72	3.30	11.63	30.65	43.50	12.85	Peak
340.40	20.89	5.06	4.39	30.34	46.00	15.66	Peak

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

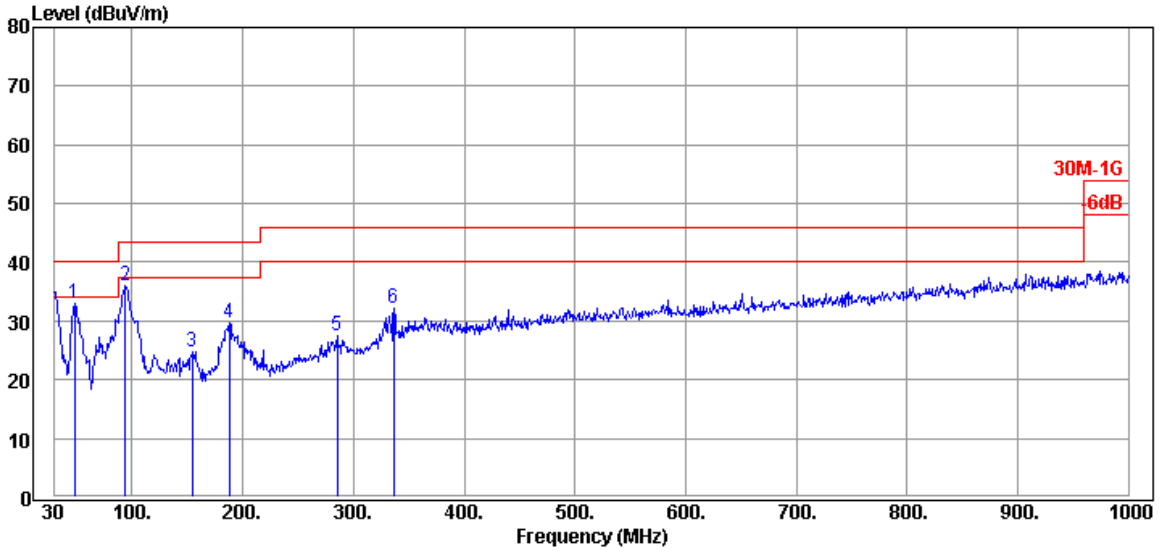
Test Date	2019/03/25	Temp./Hum.	23℃/50%
Test Voltage	AC 120V/60Hz (Via DC 9V Adapter)		
Test Mode	10W		
Test Frequency	TX 127.58kHz		



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
101.78	17.50	2.31	9.69	29.50	43.50	14.00	Peak
159.01	16.53	3.00	5.11	24.64	43.50	18.86	Peak
191.02	15.89	3.34	10.70	29.93	43.50	13.57	Peak
286.08	19.47	4.30	5.61	29.38	46.00	16.62	Peak
337.49	20.79	5.02	6.03	31.84	46.00	14.16	Peak
390.84	22.17	5.75	4.97	32.89	46.00	13.11	Peak

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

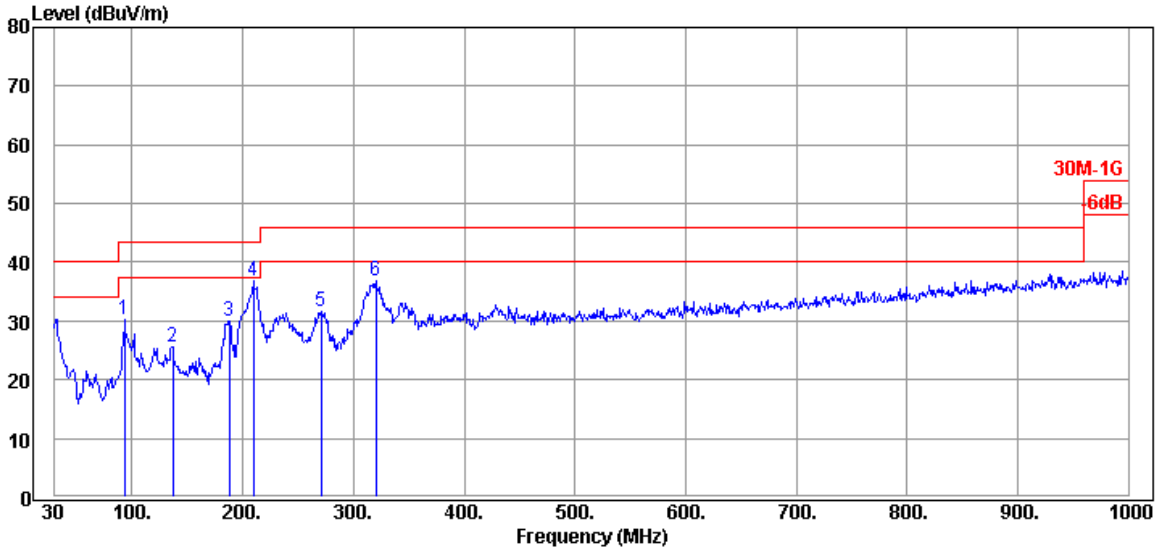


Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
48.43	15.45	1.54	15.98	32.97	40.00	7.03	Peak
94.02	16.25	2.21	17.54	36.00	43.50	7.50	Peak
154.16	16.78	2.94	5.10	24.82	43.50	18.68	Peak
188.11	15.78	3.31	10.70	29.79	43.50	13.71	Peak
285.11	19.45	4.29	3.65	27.39	46.00	18.61	Peak
336.52	20.76	5.01	6.33	32.10	46.00	13.90	Peak

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

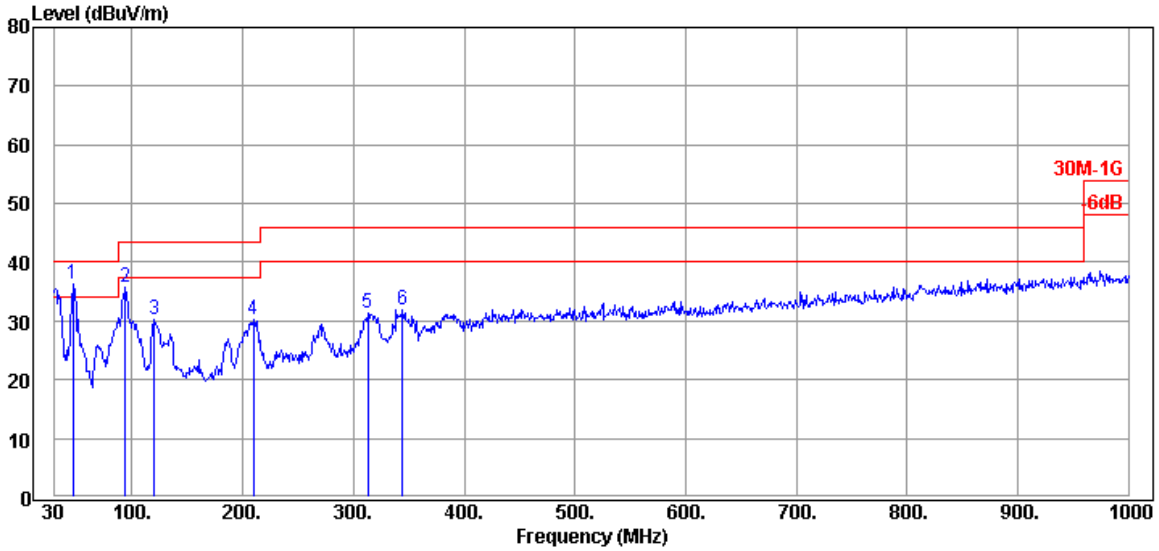
Test Date	2019/03/25	Temp./Hum.	23℃/50%
Test Voltage	AC 120V/60Hz (Via DC 12V Adapter)		
Test Mode	15W		
Test Frequency	TX 127.58kHz		



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
93.05	16.05	2.20	11.98	30.23	43.50	13.27	Peak
136.70	17.73	2.73	5.20	25.66	43.50	17.84	Peak
188.11	15.78	3.31	10.87	29.96	43.50	13.54	Peak
209.45	16.79	3.53	16.58	36.90	43.50	6.60	Peak
270.56	19.20	4.15	8.13	31.48	46.00	14.52	Peak
320.03	20.30	4.75	11.77	36.82	46.00	9.18	Peak

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



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
46.49	16.35	1.50	18.41	36.26	40.00	3.74	Peak
94.02	16.25	2.21	17.29	35.75	43.50	7.75	Peak
120.21	18.63	2.53	9.13	30.29	43.50	13.21	Peak
209.45	16.79	3.53	9.87	30.19	43.50	13.31	Peak
313.24	20.10	4.65	6.49	31.24	46.00	14.76	Peak
344.28	20.99	5.12	5.82	31.93	46.00	14.07	Peak

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

A.3 20dB BANDWIDTH

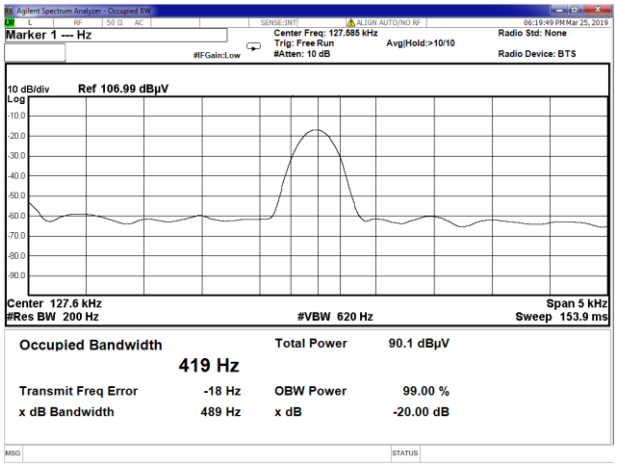
Test Date	2019/03/25	Temp./Hum.	23℃/50%

A.3.1 20dB Bandwidth Result

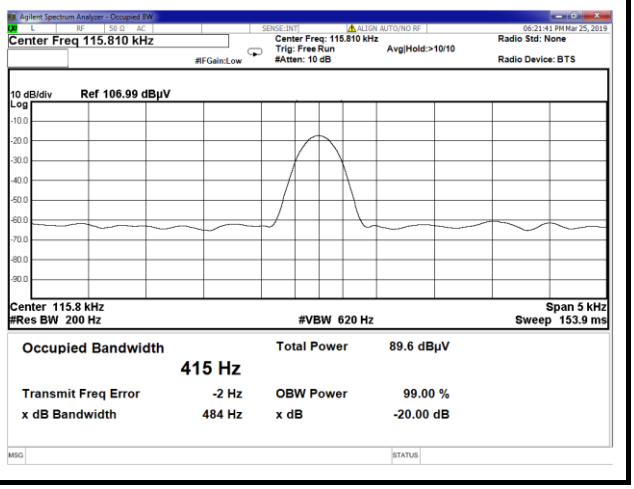
Test Mode	Test Voltage	Centre Frequency (kHz)	20dB Occupied Bandwidth (Hz)	99% Occupied Bandwidth (Hz)
5W	AC 120V/60Hz (Via DC 5V Adapter)	127.6	489	419
10W	AC 120V/60Hz (Via DC 9V Adapter)	115.8	484	415
15W	AC 120V/60Hz (Via DC 12V Adapter)	126.5	488	443

A.3.2 Measurement Plots

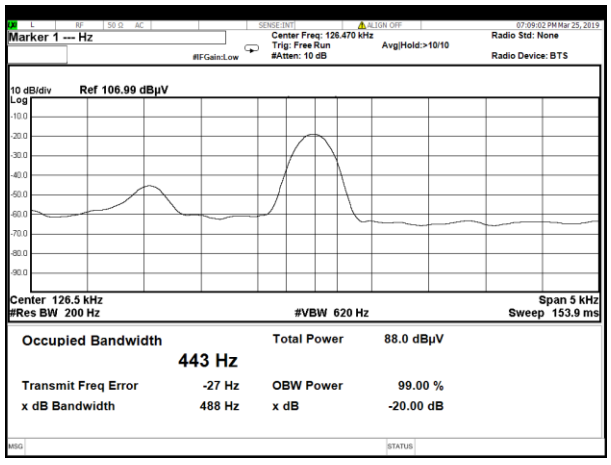
Test Mode: 5W



Test Mode: 10W



Test Mode: 15W



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: HLW-TNMP7)