

**FCC 15.407 NII  
(Class II Permissive Change)  
5 GHz Test Report**

**for**

**LG Electronics Inc.**

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

**Product Name : Wi-Fi/Bluetooth Dongle**  
**Model Name : AN-WF500**  
**Brand : LG**  
**FCC ID : BEJWF500**

**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, TAF or any agency of the Federal Government.

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## TEST REPORT CERTIFICATION (Class II Permissive Change)

Applicant : LG Electronics Inc.  
Manufacturer : LG Electronics Inc.  
Factory : Compal Networking (Kunshan) Co., Ltd.  
EUT Description  
(1) Product : Wi-Fi/Bluetooth Dongle  
(2) Model : AN-WF500  
(3) Brand : LG  
(4) Power Supply : DC 5V (Powered by Notebook PC)

Applicable Standards:

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

**Audix Technology Corp.** tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report. **Audix Technology Corp.** does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2018. 02. 08

Reviewed by:

Sabrina Wang

(Sabrina Wang/Administrator)

Approved by:

Ben Cheng

(Ben Cheng/Manager)

## 1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2018. 02. 08	Original Report	EM-F180044

## 2. SUMMARY OF TEST RESULTS

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

### 3. GENERAL INFORMATION

#### 3.1. Description of Application

Applicant	LG Electronics Inc. 222, LG-ro Jinwi-myeon, Pyeongtaek-Si, Gyeonggi-Do, 451-713, Korea
Manufacturer	LG Electronics Inc. 222, LG-ro Jinwi-myeon, Pyeongtaek-Si, Gyeonggi-Do, 451-713, Korea
Factory	Compal Networking (Kunshan) Co., Ltd. No.520, Nanbang Rd., Economic & Technical Development Zone, Kunshan, Jiangsu Province, China.
Product	Wi-Fi/Bluetooth Dongle
Model	AN-WF500
Brand	LG

**3.2. Description of EUT**

Test Model	AN-WF500																				
Serial Number	N/A																				
Power Rating	DC 5V (Powered by Notebook PC)																				
RF Features	WLAN: 802.11 a/b/g/n Bluetooth: BT and BLE																				
Transmit Type	<table border="1"> <thead> <tr> <th colspan="2">2.4 GHz</th> </tr> </thead> <tbody> <tr> <td>802.11b</td> <td>1T1R</td> </tr> <tr> <td>802.11g</td> <td>1T1R</td> </tr> <tr> <td>802.11n-HT20</td> <td>2T2R</td> </tr> <tr> <td>802.11n-HT40</td> <td>2T2R</td> </tr> <tr> <td>BT/BLE</td> <td>1T1R</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">UNII Bands</th> </tr> </thead> <tbody> <tr> <td>802.11a</td> <td>2T2R</td> </tr> <tr> <td>802.11n-HT20</td> <td>2T2R</td> </tr> <tr> <td>802.11n-HT40</td> <td>2T2R</td> </tr> </tbody> </table>	2.4 GHz		802.11b	1T1R	802.11g	1T1R	802.11n-HT20	2T2R	802.11n-HT40	2T2R	BT/BLE	1T1R	UNII Bands		802.11a	2T2R	802.11n-HT20	2T2R	802.11n-HT40	2T2R
2.4 GHz																					
802.11b	1T1R																				
802.11g	1T1R																				
802.11n-HT20	2T2R																				
802.11n-HT40	2T2R																				
BT/BLE	1T1R																				
UNII Bands																					
802.11a	2T2R																				
802.11n-HT20	2T2R																				
802.11n-HT40	2T2R																				
Device Category	<input type="checkbox"/> Outdoor Access Point <input type="checkbox"/> Fixed point-to-point Access Point <input type="checkbox"/> Indoor Access Point <input checked="" type="checkbox"/> Mobile and Portable client device																				
Sample Status	Production																				
Date of Receipt	2018. 02. 06																				
Date of Test	2018. 02. 07 ~ 08																				
Interface Ports of EUT	<ul style="list-style-type: none"> <li>One USB Port</li> </ul>																				
Accessories Supplied	<ul style="list-style-type: none"> <li>USB Cable: Shielded, Detachable, 0.5m</li> </ul>																				
Information for Class II Change Permissive	<p>The EUT is an addition version with original FCC ID: BEJWF500.</p> <p>The difference with original report is as follow:</p> <ol style="list-style-type: none"> <li>To apply U-NII band III for new rule (Reference FCC FIRST report and order: FCC 14-30).</li> </ol>																				



### 3.3. Information for Class II Change Permissive

- The EUT is an addition version with original FCC ID: BEJWF500.
- The difference between old and new U-NII bands rule

Test Item	UNII Band I Limit		UNII Band III Limit	
	Old rule (FCC 15.407)	New rule (FCC 15.407)	Old rule (FCC 15.247)	New rule (FCC 15.407)
Output Power	< 50mW (Indoor use only)	< 250mW (Mobile and portable device) < 1W (Outdoor/Indoor use and Fixed point-to-point Access Point)	<b>1W</b>	<b>1W</b>
Power Density	4dB/MHz	< 11dB/MHz (Mobile and portable device) < 17dBm (Outdoor/Indoor use and Fixed point-to-point Access Point)	<b>8dBm/3kHz</b>	<b>30dBm/500kHz</b>
Power Excursion	< 13dB	No requirement	<b>No requirement</b>	<b>No requirement</b>
Emission Bandwidth	26dB BW	26dB BW	<b>26dB BW</b>	<b>6dB BW ≥ 500kHz</b>
Note: 1. For UNII Band I, the previously test data has been complied new rule. 2. For UNII Band III, we have been re-test to complied new rule.				

### 3.4. Antenna Information

No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
<b>Wi-Fi Antenna</b>					
1.	120800011700J (ANT#0)	arcadyan	PIFA Antenna	2.400 GHz	-0.60 dBi (peak)
				2.450 GHz	-1.85 dBi (peak)
				2.500 GHz	-2.20 dBi (peak)
				5.150 GHz	0.42 dBi (peak)
				5.250 GHz	-0.43 dBi (peak)
				5.350 GHz	-0.97 dBi (peak)
				5.470 GHz	0.23 dBi (peak)
				5.600 GHz	0.27 dBi (peak)
				5.725 GHz	-0.69 dBi (peak)
				5.785 GHz	-0.77 dBi (peak)
2.	120800011800J (ANT#1)	arcadyan	PIFA Antenna	2.400 GHz	1.44 dBi (peak)
				2.450 GHz	0.83 dBi (peak)
				2.500 GHz	0.80 dBi (peak)
				5.150 GHz	0.61 dBi (peak)
				5.250 GHz	0.12 dBi (peak)
				5.350 GHz	0.37 dBi (peak)
				5.470 GHz	1.56 dBi (peak)
				5.600 GHz	0.73 dBi (peak)
				5.725 GHz	-0.87 dBi (peak)
5.785 GHz	-0.98 dBi (peak)				
<b>BT Antenna</b>					
1.	---	arcadyan	PCB Antenna	2.400 GHz	-5.64 dBi (peak)
				2.450 GHz	-5.03 dBi (peak)
				2.500 GHz	-3.28 dBi (peak)

### 3.5.EUT Specifications Assessed in Current Report

Mode	UNII Band	Fundamental Range (MHz)	Channel Number
802.11a	I	5180-5240	4
	III	5745-5825	5
802.11n-HT20	I	5180-5240	4
	III	5745-5825	5
802.11n-HT40	I	5190-5230	2
	III	5755-5795	2

Mode	Modulation	Data Rate (Mbps)
802.11a	OFDM (BPSK/QPSK/16QAM/64QAM)	Up to 54
802.11n-HT20	OFDM (BPSK/QPSK/16QAM/64QAM)	Up to 144.4
802.11n-HT40		Up to 300

Channel List					
802.11a/802.11n-HT20					
UNII Band	Channel Number	Frequency (MHz)	UNII Band	Channel Number	Frequency (MHz)
I	36	5180	III	149	5745
	40	5200		153	5765
	44	5220		157	5785
	48	5240		161	5805

Channel List					
802.11n-HT40					
UNII Band	Channel Number	Frequency (MHz)	UNII Band	Channel Number	Frequency (MHz)
I	38	5190	III	151	5755
	46	5230		159	5795

Note Test modes are presented at section 3.8.

### 3.6.Description of Key Components

None

**3.7.Data Rate Relative to Output Power**

802.11a							
Channel	Modulation	Date Rate	Power (dBm)	Channel	Modulation	Date Rate	Power (dBm)
36	BPSK	6	<b>9.52</b>	149	BPSK	6	<b>13.58</b>
36	BPSK	9	<b>9.39</b>	149	BPSK	9	<b>13.24</b>
36	QPSK	12	<b>9.41</b>	149	QPSK	12	<b>13.14</b>
36	QPSK	18	<b>9.44</b>	149	QPSK	18	<b>13.07</b>
36	16-QAM	24	<b>9.46</b>	149	16-QAM	24	<b>12.99</b>
36	16-QAM	36	<b>9.43</b>	149	16-QAM	36	<b>12.86</b>
36	64-QAM	48	<b>9.26</b>	149	64-QAM	48	<b>12.53</b>
36	64-QAM	54	<b>9.32</b>	149	64-QAM	54	<b>12.46</b>

802.11n-HT20							
Channel	Modulation	Date Rate	Power (dBm)	Channel	Modulation	Date Rate	Power (dBm)
36	BPSK	6.5	<b>9.40</b>	149	BPSK	6.5	<b>19.39</b>
36	QPSK	13	<b>9.34</b>	149	QPSK	13	<b>19.27</b>
36	QPSK	19.5	<b>9.31</b>	149	QPSK	19.5	<b>19.22</b>
36	16-QAM	26	<b>9.25</b>	149	16-QAM	26	<b>19.09</b>
36	16-QAM	39	<b>9.21</b>	149	16-QAM	39	<b>18.90</b>
36	64-QAM	52	<b>9.05</b>	149	64-QAM	52	<b>18.74</b>
36	64-QAM	58.6	<b>9.13</b>	149	64-QAM	58.6	<b>18.23</b>
36	64-QAM	65	<b>9.03</b>	149	64-QAM	65	<b>18.13</b>

802.11n-HT40							
Channel	Modulation	Date Rate	Power (dBm)	Channel	Modulation	Date Rate	Power (dBm)
38	BPSK	6.5	<b>12.21</b>	151	BPSK	13.5	<b>18.28</b>
38	QPSK	13	<b>12.09</b>	151	QPSK	27	<b>18.14</b>
38	QPSK	19.5	<b>12.07</b>	151	QPSK	40.5	<b>18.03</b>
38	16-QAM	26	<b>12.15</b>	151	16-QAM	54	<b>17.96</b>
38	16-QAM	39	<b>11.91</b>	151	16-QAM	81	<b>17.88</b>
38	64-QAM	52	<b>11.86</b>	151	64-QAM	108	<b>17.51</b>
38	64-QAM	58.6	<b>11.63</b>	151	64-QAM	121.5	<b>17.29</b>
38	64-QAM	65	<b>11.61</b>	151	64-QAM	135	<b>17.02</b>

Note: Above results are assessed in average power.

### 3.8. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Cumulative On (ms)	Duty Cycle Factor (dB)
802.11a	0.947	1.420	1.500	0.24
802.11n-HT20	0.880	0.660	0.750	0.56
802.11n-HT40	0.799	0.345	0.432	0.98

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



AC Conduction	
Test Case	Normal operation

	Item	Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Spurious Emission <small>Note 1 &amp; 2</small>	802.11a	6 Mbps	157
		802.11n-HT20	HT MCS8	149
		802.11n-HT40	HT MCS8	151
Conducted Test Case	Emission Bandwidth	802.11a	6 Mbps	149/157/165
		802.11n-HT20	HT MCS8	149/157/165
		802.11n-HT40	HT MCS8	151/159
	Maximum output power	802.11a	6 Mbps	149/157/165
		802.11n-HT20	HT MCS8	149/157/165
		802.11n-HT40	HT MCS8	151/159
	Emission Limitations	802.11a	6 Mbps	149/157/165
		802.11n-HT20	HT MCS8	149/157/165
		802.11n-HT40	HT MCS8	151/159
	Power spectral density	802.11a	6 Mbps	149/157/165
		802.11n-HT20	HT MCS8	149/157/165
		802.11n-HT40	HT MCS8	151/159

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.

### 3.9. Tested Supporting System List

#### 3.9.1. Support Peripheral Unit

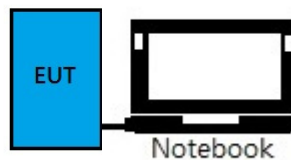
No.	Product	Brand	Model No.	Serial No.	Approval
1.	Notebook PC	ASUS	ASUS N20A	N/A	FCC ID: TLZ-BT253

#### 3.9.2. Cable Lists

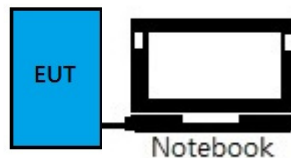
No.	Cable Description Of The Above Support Units
1.	Adapter: ACBEL, M/N AA90PM111 DC Cord: Shielded, Undetachable, 1.8m, Bonded a ferrite core AC Power Cord: Unshielded, Detachable, 1.8m

### 3.10. Setup Configuration

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



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



### 3.11. Operating Condition of EUT

Test program “M Tool” is used for enabling EUT RF function under continues transmitting and choosing channel.

### 3.12. 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 (3) FCC OET Designation No. TW1004 & TW1090 & TW1724
Test Facilities	(1) No. 8 Shielding Room (2) Semi-Anechoic Chamber (IC Test Site Registration No.: 5183B-1) (3) Fully Anechoic Chamber (IC Test Site Registration No.: 5183B-4)

### 3.13. 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
Emission Bandwidth	± 0.2kHz
Maximum output power	± 0.33dB
Power spectral density	± 0.13dB
Conducted Emission Limitations	± 0.13dB



## 4. MEASUREMENT EQUIPMENT LIST

### 4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESCI	101276	2017. 03. 23	1 Year
2.	A.M.N.	R&S	ENV4200	825358/003	2017. 05. 09	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2017. 12. 24	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2018. 01. 16	1 Year
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.8 S/R	2017. 04. 21	1 Year
6.	Test Software	Audix	e3	V.6.120424	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	2017. 09. 13	1 Year
2.	Spectrum Analyzer	Agilent	N9010A-526	MY52220368	2017. 11. 08	1 Year
3.	Test Receiver	R & S	ESCS30	100338	2017. 06. 19	1 Year
4.	Amplifier	HP	8447D	2944A06305	2017. 02. 16	1 Year
5.	Amplifier	Sonoma	310N	187161	2017. 06. 08	1 Year
6.	Loop Antenna	R & S	HFH2-Z2	891847/27	2017. 12. 18	2 Years
7.	Bilog Antenna	TESEQ	CBL6112D	33821	2018. 01. 21	1 Year
8.	Horn Antenna	ETS-Lindgren	3117	00135902	2017. 03. 08	1 Year
9	5G Notch Filter	Microwave Circuits	N0257881	459776	2018. 02. 02	1 Year
10.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2017. 04. 21	1 Year
10.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2017. 04. 21	1 Year
12.	Test Software	Audix	e3	V.6.1206197	N.C.R.	N.C.R.
13.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

### 4.3.RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-507	MY52220264	2017. 08. 10	1 Year
2.	Digital Thermo-Hygro Meter	Datronn	KT-905	RF	2017. 04. 21	1 Year

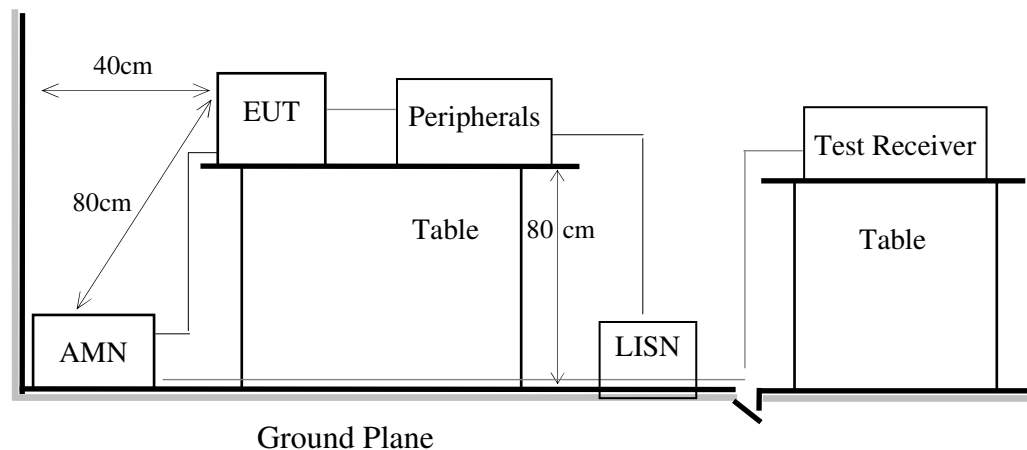
## 5. CONDUCTED EMISSION

### 5.1. Block Diagram of Test Setup

#### 5.1.1. Block Diagram of EUT

Indicated as section 3.10

#### 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.

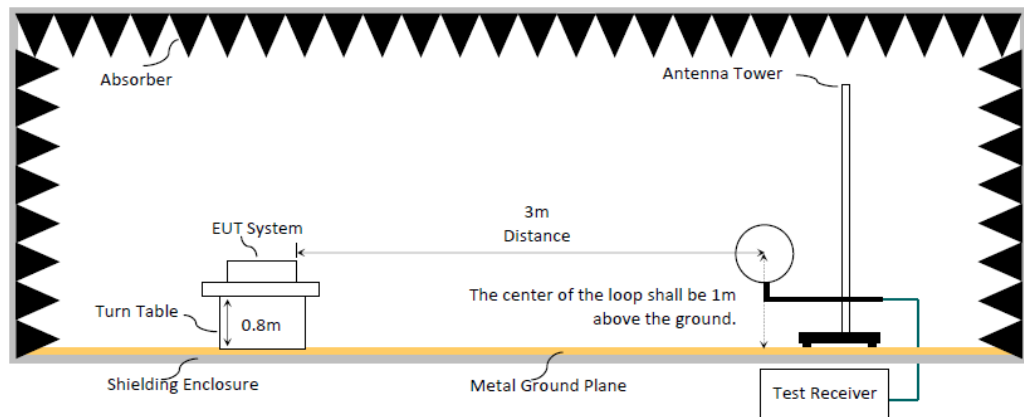
## 6. RADIATED EMISSION

### 6.1. Block Diagram of Test Setup

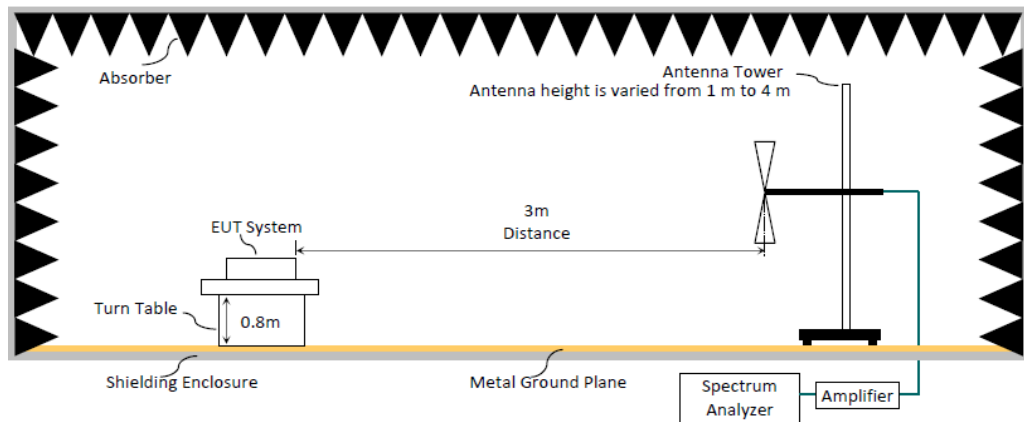
#### 6.1.1. Block Diagram of EUT

Indicated as section 3.10

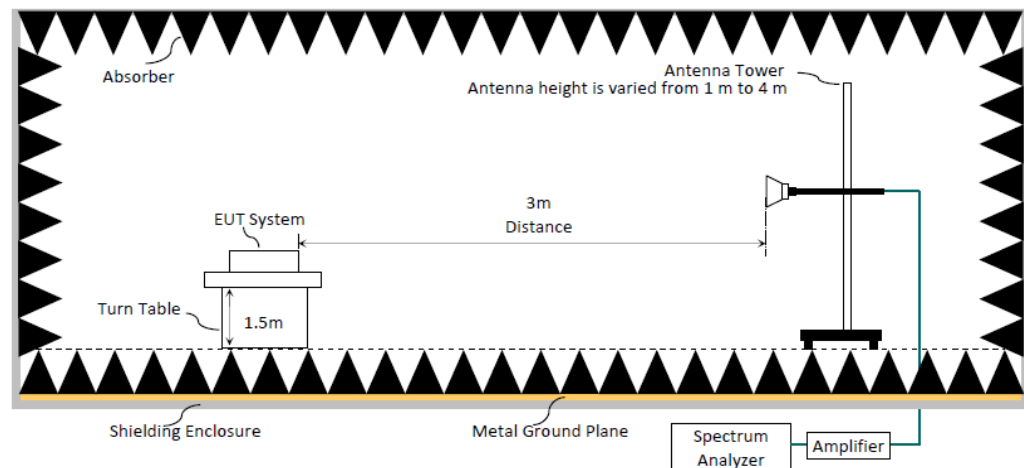
#### 6.1.2. Setup Diagram for 9kHz-30MHz



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



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



## 6.2. Radiated Emission Limits

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

### 6.2.1. General Limit

Frequency (MHz)	Distance (m)	Limits	
		dB $\mu$ V/m	$\mu$ V/m
0.009 - 0.490	300	67.6	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 dB $\mu$ V/m (Peak) 54.0 dB $\mu$ V/m (Average)	

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

(2) The tighter limit applies to the edge between two frequency bands.

(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(4) Fundamental and emission fall within operation band are exempted from this section.

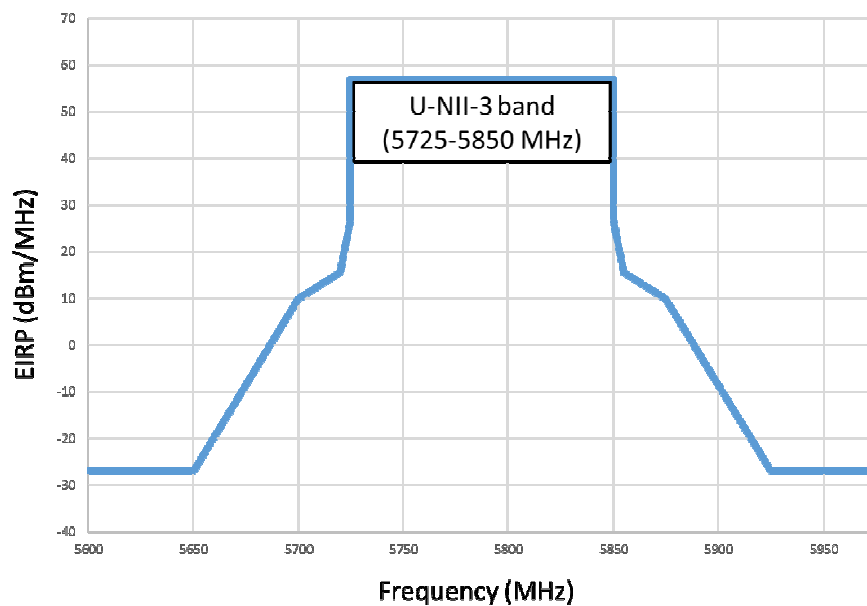
(5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.2.2. Limit for non-restricted frequency above 1 GHz

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

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

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



### 6.3. Test Procedure

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

The EUT setup on the 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 ~ 40GHz:**

The EUT setup on the turn find 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 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.

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

##### **Peak Detector:**

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

**Average Detector:** **Option 1:**

(1) RBW = 1MHz

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

Modulation Type	T (ms)	1/ T (kHz)	VBW Setting (kHz)
802.11a	1.420	0.704	680Hz
802.11n-HT20	0.660	1.515	1.5kHz
802.11n-HT40	0.345	2.899	3kHz

N/A: 1/ T is not implemented when duty cycle presented in section 3.8 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:**

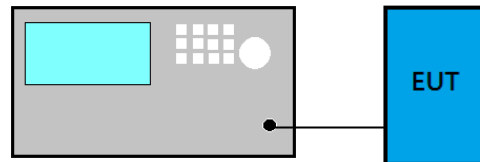
Average Emission Level = Peak Emission Level + D.C.C.F.

**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 3.7 ERP = Peak Emission Level - 95.2dB - 2.14dB**6.5. Test Results**

Please refer to Appendix A.

## 7. EMISSION BANDWIDTH

### 7.1. Block Diagram of Test Setup



### 7.2. Specification Limits

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

### 7.3. Test Procedure

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

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

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

■ 5725 MHz- 5850 MHz

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

### 7.4. Test Results

Please refer to Appendix A



## 8. MAXIMUM OUTPUT POWER

### 8.1. Block Diagram of Test Setup



### 8.2. Specification Limits

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

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

### 8.3. Test Procedure

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

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

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

**Method AVGSA-2 (Spectrum channel power)**

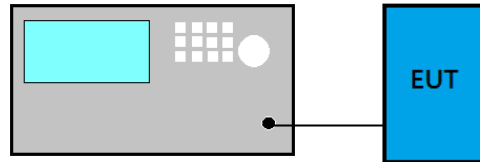
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 MHz
- (3) Set the video bandwidth (VBW)  $\geq$  3 MHz.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using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

### 8.4. Test Results

Please refer to Appendix A

## 9. EMISSION LIMITATIONS MEASUREMENT

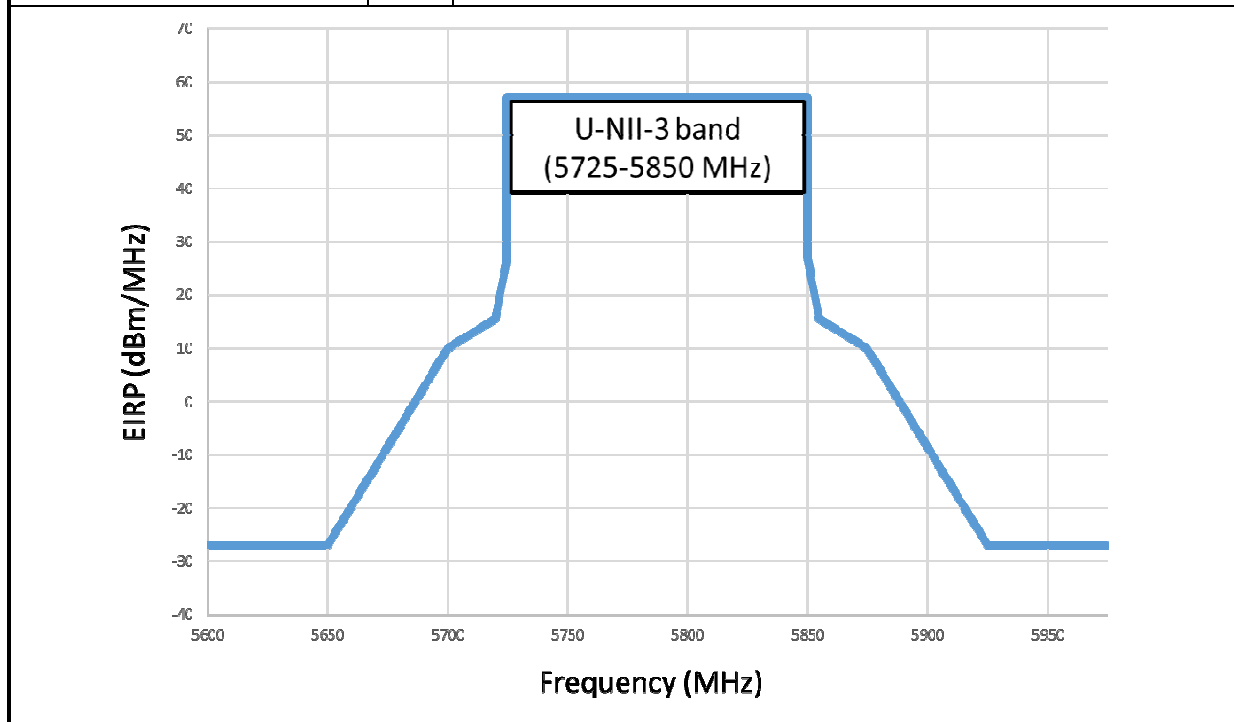
### 9.1. Block Diagram of Test Setup



### 9.2. Specification Limits

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

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



### **9.3. Test Procedure**

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

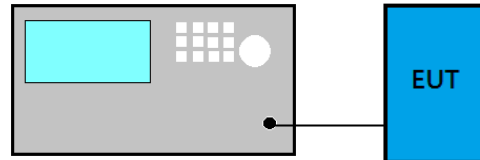
- (1) RBW = 1 MHz
- (2) VBW  $\geq$  3 x RBW
- (3) Detector = Peak
- (4) Sweep time = auto
- (5) Trace mode = max hold
- (6) Allow sweeps to continue until the trace stabilizes.

### **9.4. Test Results**

Please refer to Appendix A

## 10. POWER SPECTRAL DENSITY

### 10.1. Block Diagram of Test Setup



### 10.2. Specification Limits

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

### 10.3. Test Procedure

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

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

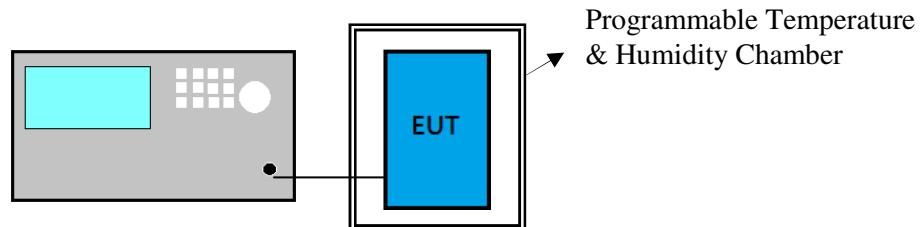
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 MHz
- (3) Set the video bandwidth (VBW)  $\geq$  3 MHz.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Use peak search function to find out the maximum power density.
- (8) Duty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

### 10.4. Test Results

Please refer to Appendix A

## 11. FREQUENCY STABILITY

### 11.1. Block Diagram of Test Setup



### 11.2. Specification Limits

NONE

### 11.3. Test Procedure

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

### 11.4. Test Results

Please refer to Appendix A

## 12. DEVIATION TO TEST SPECIFICATIONS

**【NONE】**





**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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# APPDNDIX A

## TEST DATA AND PLOTS

(Model: AN-WF500)



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

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

# APPDNDIX B

## TEST PHOTOGRAPHS

(Model: AN-WF500)