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

FCC 15.247 & RSS-247
2.4 GHz Test Report

for

LG Electronics Inc.

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

Product Name	**:**	**Notebook PC**
Model Name	**:**	**15Z980**
Brand	**:**	**LG**
FCC ID	**:**	**BEJNT-15Z980**
IC	**:**	**2703H-15Z980**

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

Testing Laboratory
1724

TESTING
NVLAP LAB CODE 200077-0

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TEST REPORT CERTIFICATION

Applicant	:	LG Electronics Inc.
Factory	:	LG Electronics Nanjing New Technology Co., Ltd.
EUT Description		
(1) Product	:	Notebook PC
(2) Model	:	15Z980
(3) Brand	:	LG
(4) Power Rating	:	DC 19V, 2.53A

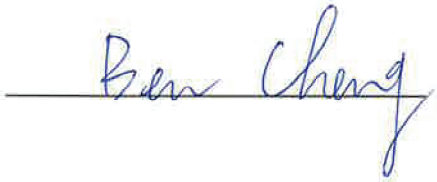
Applicable Standards:

47 CFR FCC Part 15 Subpart C
RSS-Gen (Issue 4), November 2014
RSS-247 (Issue 2), February 2017
ANSI C63.10:2013
KDB 558074 D01 DTS Meas Guidance v04

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: 2017. 11. 30

Reviewed by: (Annie Yu/Administrator)

Approved by:  (Ben Cheng/Manager)

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1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2017. 11. 30	Original Report	EM-F170749

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2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	**PASS**
15.247(d)/ 15.205	RSS-Gen §8.9 RSS-247 §5.5	Radiated Band Edge and Radiated Spurious Emission	**PASS**
15.247(a)(2)	RSS-247 §5.2(1)	6dB Bandwidth	**PASS**
15.247(b)(3)	RSS-247 §5.4(4)	Maximum Peak Output	**PASS**
15.247(d)	RSS-247 §5.5	Conducted Band Edges and Conducted Spurious Emission	**PASS**
15.247 (e)	RSS-247 §5.2(2)	Peak Power Spectral Density	**PASS**
15.203	RSS-Gen §8.3	Antenna Requirement	**Compliance**

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3. GENERAL INFORMATION

3.1. Description of Application

Applicant	LG Electronics Inc. 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713 Korea.
Factory	LG Electronics Nanjing New Technology Co., Ltd. No.346,Yaoxin Road, Economic & Technical Development Zone, Nanjing, China.
Product	Notebook PC
Model	15Z980
Brand	LG

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3.2. Description of EUT

<table>
<tr><td>Test Model</td><td>15Z980</td></tr>
<tr><td>Serial Number</td><td>N/A</td></tr>
<tr><td>Power Rating</td><td>DC 19V, 2.53A</td></tr>
<tr><td>RF Features</td><td>WLAN:802.11a/b/g/n/ac
Bluetooth: BT and BLE</td></tr>
<tr><td>Transmit Type</td><td>
<table>
<tr><th colspan="2">2.4 GHz</th></tr>
<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>
</table>
<table>
<tr><th colspan="2">UNII Bands</th></tr>
<tr><td>802.11a</td><td>1T1R</td></tr>
<tr><td>802.11n-HT20/
802.11ac-VHT20</td><td>2T2R</td></tr>
<tr><td>802.11n-HT40/
802.11ac-VHT40</td><td>2T2R</td></tr>
<tr><td>802.11ac-VHT80</td><td>2T2R</td></tr>
</table>
</td></tr>
<tr><td>Sample Status</td><td>Production</td></tr>
<tr><td>Date of Receipt</td><td>2017. 11. 21</td></tr>
<tr><td>Date of Test</td><td>2017. 11. 23~ 30</td></tr>
<tr><td>I/O Ports List</td><td>• One SD Card Slot
• One Earphone Port
• Three USB 3.0 Ports
• One USB Type C Port
• One HDMI Port
• One DC Input Port</td></tr>
<tr><td>Accessories Supplied</td><td>• AC Adapter</td></tr>
</table>

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3.3. Antenna Information

2.4G Antenna					
No.	**Antenna Part Number**	**Manufacture**	**Antenna Type**	**Frequency (MHz)**	**Max Gain (dBi)**
1	WA-F-LBLB-04-056 (Main)	INPAQ	FPCB	2400	1.39
2				2450	1.54
3				2500	2.06
4	WA-F-LBLB-04-056 (AUX)		FPCB	2400	1.41
5				2450	1.40
6				2500	1.83

5G Antenna					
No.	**Antenna Part Number**	**Manufacture**	**Antenna Type**	**Frequency (MHz)**	**Max Gain (dBi)**
1	WA-F-LBLB-04-056 (Main)	INPAQ	FPCB	5100	2.49
2				5400	2.93
3				5800	1.59
4	WA-F-LBLB-04-056 (AUX)		FPCB	5100	2.57
5				5400	2.97
6				5800	2.84

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number
802.11b	2412-2472	13
802.11g		13
802.11n-HT20		13
802.11n-HT40	2422-2462	9
BLE	2402-2480	40

Mode	Modulation	Data Rate (Mbps)
802.11b	DSSS (DBPSK/DQPSK/CCK)	Up to 11
802.11g	OFDM (BPSK/QPSK/16QAM/64QAM)	Up to 54
802.11n-HT20		Up to 144.4
802.11n-HT40		Up to 300
BLE	GFSK	1

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Channel List			
802.11 b/g/n-HT20		802.11n-HT40	
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
1	2412		
2	2417		
3	2422	3	2422
4	2427	4	2427
5	2432	5	2432
6	2437	6	2437
7	2442	7	2442
8	2447	8	2447
9	2452	9	2452
10	2457	10	2457
11	2462	11	2462
12	2467		
13	2472		

Channel List (BLE)			
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
37	2402	18	2442
00	2404	19	2444
01	2406	20	2446
02	2408	21	2448
03	2410	22	2450
04	2412	23	2452
05	2414	24	2454
06	2416	25	2456
07	2418	26	2458
08	2420	27	2460
09	2422	28	2462
10	2424	29	2464
38	2426	30	2466
11	2428	31	2468
12	2430	32	2470
13	2432	33	2472
14	2434	34	2474
15	2436	35	2476
16	2438	36	2478
17	2440	39	2480

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RMS Output Power (dBm)				
Channel	802.11b	802.11g	802.11n-HT20	802.11n-HT40
1	19	17	16	
2	19	19	17	
3	19	19	17	14
4	19	19	17	14.5
5	19	19	17	16
6	19	19	17	16
7	19	19	17	16
8	19	19	17	16
9	19	19	17	14
10	19	19	17	10.5
11	19	16.5	15	-5.5
12	15.5	10.5	9	
13	7.5	-3.5	-7	

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3.5. Descriptions of Key Components

3.5.1. For the All Component Lists

Item	Vendor	Model name	Description
System	Microsoft	Windows 10 Home	---
Main Board	LG	14/15Z980 Main B/D PCB	(with Thunderbolt) Manufacturer: (1) Elec & Eltek Company (MCO) Limited (2) Hannstar Board Tech(Jiang Yin) Corp.,Ltd. (3) LG Innotek Co., Ltd.
	LG	14/15Z980 Main B/D PCB	(without Thunderbolt) Manufacturer: (1) Elec & Eltek Company (MCO) Limited (2) Hannstar Board Tech(Jiang Yin) Corp.,Ltd. (3) LG Innotek Co., Ltd.
SUB Board	LG	15Z980 WLAN SUB B/D	(with Finger Printer) Manufacturer: (1) Hannstar Board Tech(Jiang Yin) Corp.,Ltd. (2) HYUNWOO
	LG	15Z980 WLAN SUB B/D	(without Finger Printer) Manufacturer: (1) Hannstar Board Tech(Jiang Yin) Corp.,Ltd. (2) HYUNWOO
CPU (Socket: BGA1356)	Intel	i7-8550U	1.80GHz, up to 4.0GHz
	Intel	i5-8250U	1.60GHz, up to 3.4GHz
15.6” LCD Panel	LG Display	LP156WFA(SP)(G1)	Resolution: 1920 x 1080, 60Hz FHD IPSW/ Touch (AIT Including touch)
	LG Display	LP156WF9(SP)(N1)	Resolution: 1920 x 1080, 60Hz FHD IPS (Normal Non touch)
Storage (SSD)	SK hynix	HFS512G39TND-N210A BB	512GB (SATA)
	SK hynix	HFS256G39TND-N210A BB	256GB (SATA)
Memory (RAM) (On Board)	SK hynix	H5ANAG6NAMR-UHC	16GB DDR4 2400MHz * 4ea
	Samsung	K4A8G165WB-BCRC	8GB DDR4 2400MHz * 4ea
Memory (RAM)	SK hynix	HMA81GS6AFR8N-UHN0	8GB DDR4 2400MHz
	Samsung	M471A5244CB0-CRC	4GB DDR4 2400MHz
Battery Pack	LG	LBS1224E	DC 7.7V, 72Wh, Typ 9450mAh

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Item	Vendor	Model name	Description
WLAN Combo Card	Intel	8265D2W	802.11a/b/g/n/ac 2.4GHz/5GHz + BT 4.2 BLE
WLAN Combo Antenna	LG (INPAQ)	WA-F-LBLB-04-056	FPCB Type Main: Black, Aux: Gray
Keyboard	LG	SN3870	Black: BL, White: BL 1
Web Camera	Lite-On	7BF109N2	With two MIC
Finger Print	SUNTEL	SFPC-L0016A(White)	---
	SUNTEL	SFPC-L0016B(Black)	---
LAN Gender (Type C to LAN)	LG	80-5946-111 (White)	10/100 Megabit Ethernet Manufacturer: SUZHOU MEC ELECTRONICS
		80-5946-101 (Black)	
	LG	GD-08MF-36-WH-LP05 (White)	10/100 Megabit Ethernet Manufacturer: ARIN TECH CO. LTD
		GD-08MF-36-BK-LP06 (Black)	
	Type C to LAN: Shielded, Undetached, 0.12m		
AC Adapter	LG (Lite-on)	PA-1650-43	I/P: AC 100-240V, 50/60Hz, 1.6A, O/P: DC 19V, 3.42A
	DC Power Cord: Non-Shielded, Undetached, 1.8m, Bonded a ferrite core AC Power Cord: Non-Shielded, Detached, 1.0m (3C)		

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

3.5.2. For the All Component Lists

SKU #1	
Main Board	LG, 14/15Z980 Main B/D PCB(with Thunderbolt)
SUB Board	LG, 15Z980 WLAN SUB B/D/(with Finger Printer)
CPU	Intel, i7-8550U
15.6" LCD Panel	LG Display, LP156WFA(SP)(G1)/(AIT Including touch)
Storage (SSD)	SK hynix, 512GB*2
Memory (RAM) (On Board)	SK hynix, 16GB
Memory (RAM)	SK hynix, 8G
Battery Pack	LG, LBS1224E
WLAN Combo Card	Intel, 8265D2W
WLAN Combo Antenna	LG (INPAQ), WA-F-LBLB-04-056
Keyboard	LG, SN3870
Web Camera	Lite-On, 7BF109N2
Finger Print	SUNTEL, SFPC-L0016B(Black)
LAN Gender (Type C to LAN)	LG, 80-5946-111 (White)
AC Adapter	LG (Lite-on), PA-1650-43

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3.6. Data Rate Relative to Output Power

Channel	Modulation	Date Rate(Mbps)	Power(dBm)
1	DBPSK	1	18.86
1	DQPSK	2	18.73
1	CCK	5.5	18.69
1	CCK	11	18.65

802.11g			
Channel	Modulation	Date Rate(Mbps)	Power(dBm)
1	BPSK	6	16.89
1	BPSK	9	16.85
1	QPSK	12	16.81
1	QPSK	18	16.78
1	16-QAM	24	16.75
1	16-QAM	36	16.61
1	64-QAM	48	16.57
1	64-QAM	54	16.53

802.11n-HT20				802.11n-HT40			
Channel	Modulation	Date Rate (Mbps)	Power (dBm)	Channel	Modulation	Date Rate (Mbps)	Power (dBm)
1	BPSK	MCS8	19.15	3	BPSK	MCS8	17.10
1	QPSK	MCS9	19.08	3	QPSK	MCS9	17.02
1	QPSK	MCS10	19.02	3	QPSK	MCS10	16.95
1	16-QAM	MCS11	18.98	3	16-QAM	MCS11	16.87
1	16-QAM	MCS12	18.93	3	16-QAM	MCS12	16.73
1	64-QAM	MCS13	18.85	3	64-QAM	MCS13	16.62
1	64-QAM	MCS14	18.80	3	64-QAM	MCS14	16.57
1	64-QAM	MCS15	17.88	3	64-QAM	MCS15	16.44

BLE			
Channel	Modulation	Date Rate(Mbps)	Power(dBm)
0	GFSK	1	2.44

Note: Above results are assessed in peak power.

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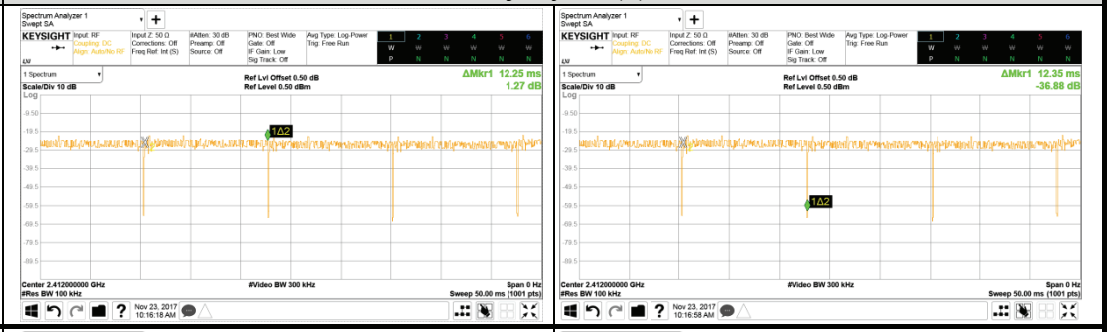
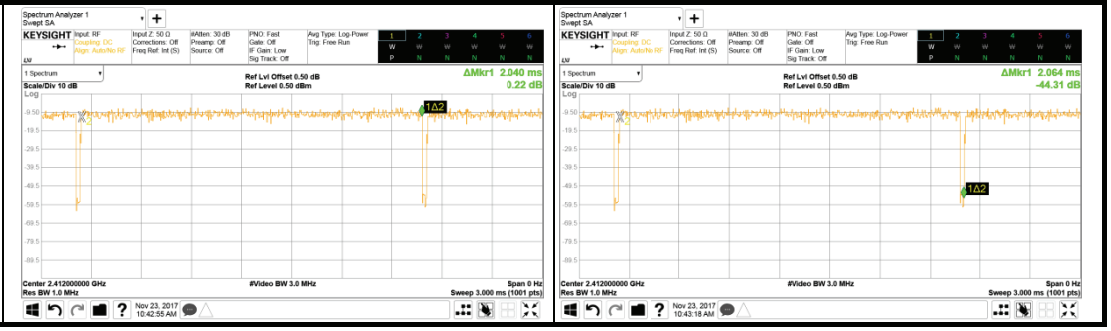
3.7. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Duty Cycle Factor (dB)
802.11b	1.00	12.25	0
802.11g	1.00	2.040	0
802.11n-HT20	0.95	1.899	0.223
802.11n-HT40	0.96	0.927	0.177
BLE	0.86	2.130	0.71

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

Mode	Duty Cycle (x)
802.11b	
802.11g	

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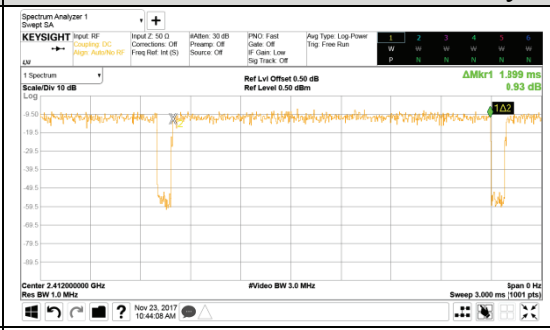
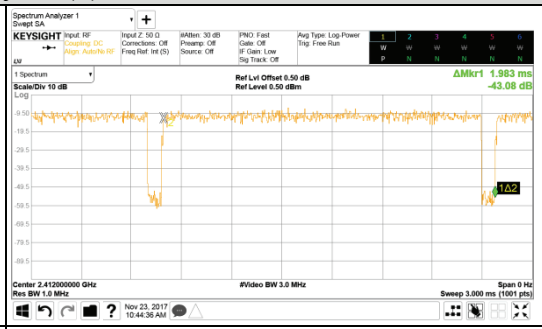
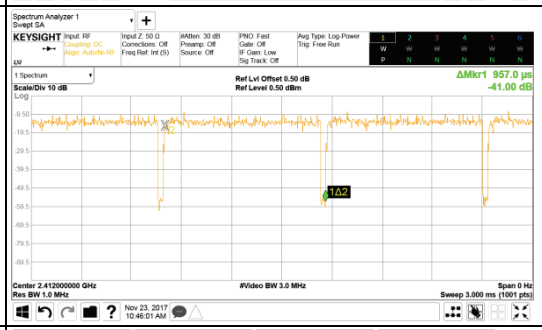
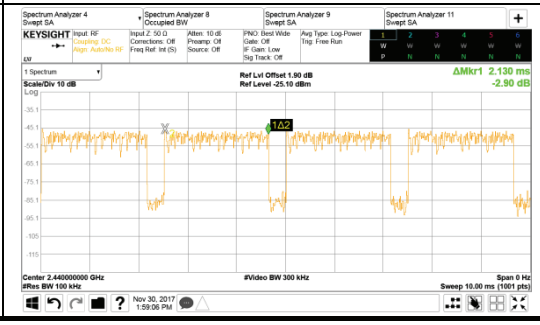
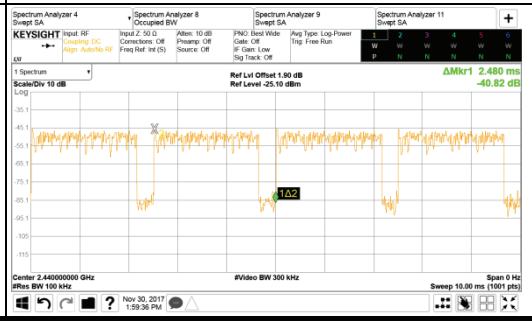
Mode	Duty Cycle (x)	
802.11n-HT20		
802.11n-HT40		
BLE		

AC Conduction		
Test Case	with PCB antenna	Normal operation

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Item		Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge Note1	802.11b	1Mbps	1/2/10/11/12/13
		802.11g	6Mbps	1/2/10/11/12/13
		802.11n-HT20	MCS8	1/2/10/11/12/13
		802.11n-HT40	MCS8	3/4/8/9/10/11
		BLE	1Mbps	37/39
	Radiated Spurious Emission Note1 & 2	802.11b	1Mbps	6
		802.11g	6Mbps	6
		802.11n-HT20	MCS8	6
		802.11n-HT40	MCS8	6
		BLE	1Mbps	37/17/39
Conducted Test Case	6dB Bandwidth	802.11b	1Mbps	1/6/11/13
		802.11g	6Mbps	1/6/11/13
		802.11n-HT20	MCS8	1/6/11/13
		802.11n-HT40	MCS8	3/6/9/11
		BLE	1Mbps	37/17/39
	Peak Power Spectral Density	802.11b	1Mbps	1/6/11/13
		802.11g	6Mbps	1/6/11/13
		802.11n-HT20	MCS8	1/6/11/13
		802.11n-HT40	MCS8	3/6/9/11
		BLE	1Mbps	37/17/39
	Peak Output Power	802.11b	1Mbps	1/2/6/10/11/12/13
		802.11g	6Mbps	1/2/6/10/11/12/13
		802.11n-HT20	MCS8	1/2/6/10/11/12/13
		802.11n-HT40	MCS8	3/4/6/10/11
		BLE	1Mbps	37/17/39
	Band Edge	802.11b	1Mbps	1/11/13
		802.11g	6Mbps	1/11/13
		802.11n-HT20	MCS8	1/11/13
		802.11n-HT40	MCS8	3/9/11
		BLE	1Mbps	37/39
	Spurious Emission	802.11b	1Mbps	1/11/13
		802.11g	6Mbps	1/11/13
		802.11n-HT20	MCS8	1/11/13
		802.11n-HT40	MCS8	3/9/11
		BLE	1Mbps	37/17/39

Note 1:
■Mobile Device.
□Portable Device, and 3 axis were assessed.
- □ Lie
- □ Side
- □ Stand

Note 2: Low, mid, and high channels were measured, only the worst channel of each modulation was presented in this report.

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3.8. Tested Supporting System List

3.8.1. Support Peripheral Unit

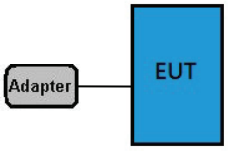
No.	Product	Brand	Model No.	Serial No.	Approval
1.	LCD Monitor	ASUS	VE228	N/A	FCC By DoC
2.	USB Mouse	Lenovo	45J4886	N/A	FCC By DoC
3.	Earphone	APPLE	N/A	N/A	FCC By DoC

3.8.2. Cable Lists

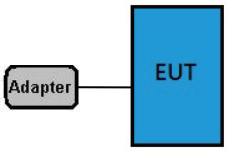
No.	Cable Description Of The Above Support Units
1.	HDMI Cable: Shielded, Detachable, 1.8m AC Power Cord: Unshielded, Detachable, 1.8m
2.	USB Cable: Unshielded, Undetachable, 1.8m
3.	Earphone Cable: Unshielded, Undetachable, 2.0m

3.9. Setup Configuration

3.9.1. EUT Configuration for Power Line & Radiated Emission



3.9.2. EUT Configuration for RF Conducted Test Items



3.10. Operating Condition of EUT

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

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3.11.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. 7 Shielding Room (2) Semi-Anechoic Chamber (IC Test Site Registration No.: 5183B-1) (3) Fully Anechoic Chamber (IC Test Site Registration No.: 5183B-4)

3.12.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
6dB Bandwidth	± 0.05kHz
Maximum peak output power	± 0.33dB
Power spectral density	± 0.13dB
Conducted Emission Limitations	± 0.13dB

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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	ESH2-Z5	100366	2017. 07. 20	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-881-13	2016. 12. 28	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	101495	2017. 01. 16	1 Year
5.	Test Software	Audix	e3	V.120619C	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2017. 09. 13	1 Year
2.	Spectrum Analyzer	Agilent	N9010A-526	MY52220368	2016. 12. 01	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.	Bilog Antenna	CHASE	CBL6112D	33821	2017. 01. 21	1 Year
7.	Loop Antenna	R&S	HFH2-Z2	891847/27	2016. 12. 23	1 Year
8.	Double-Ridged Waveguide Horn	ETS-Lindgren	3117	00135902	2017. 03. 08	1 Year
9.	2.4GHz Notch Filter	K&L	7NSL10-244 1.5E130.5-00	1	2017. 07. 26	1 Year
10.	3GHz Notch Filter	Microwave	H3G018G1	484798	2017. 08. 25	1 Year
11.	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	Keysight	N9010B-544	MY55460198	2017. 04. 18	1 Year
2.	Power Meter	Anritsu	ML2495A	1145008	2017. 11. 03	1 Year
3.	Power Sensor	Anritsu	MA2411B	1126096	2017. 11. 03	1 Year

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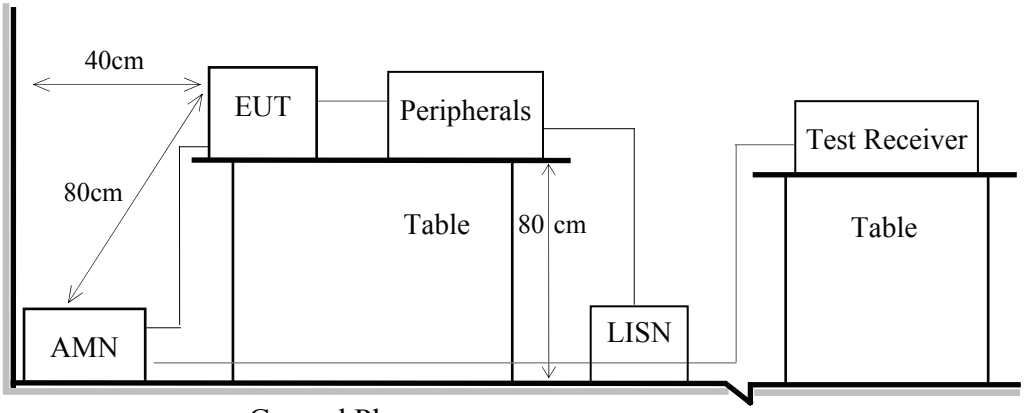
5. CONDUCTED EMISSION

5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.9

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.

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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.

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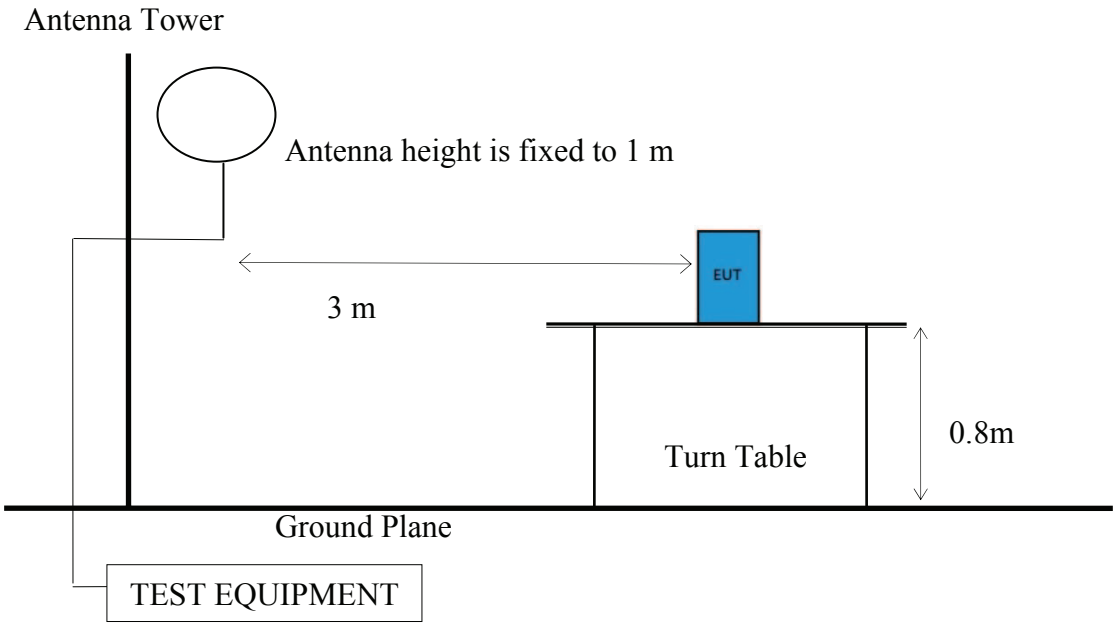
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

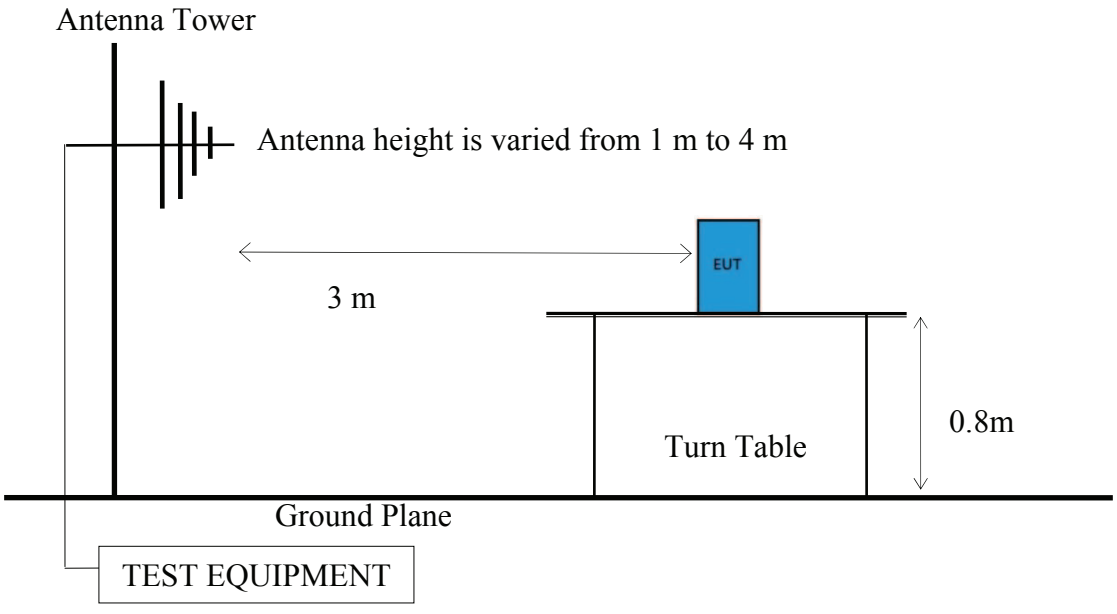
6.1.1. Block Diagram of EUT

Indicated as section 3.9

6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000 MHz



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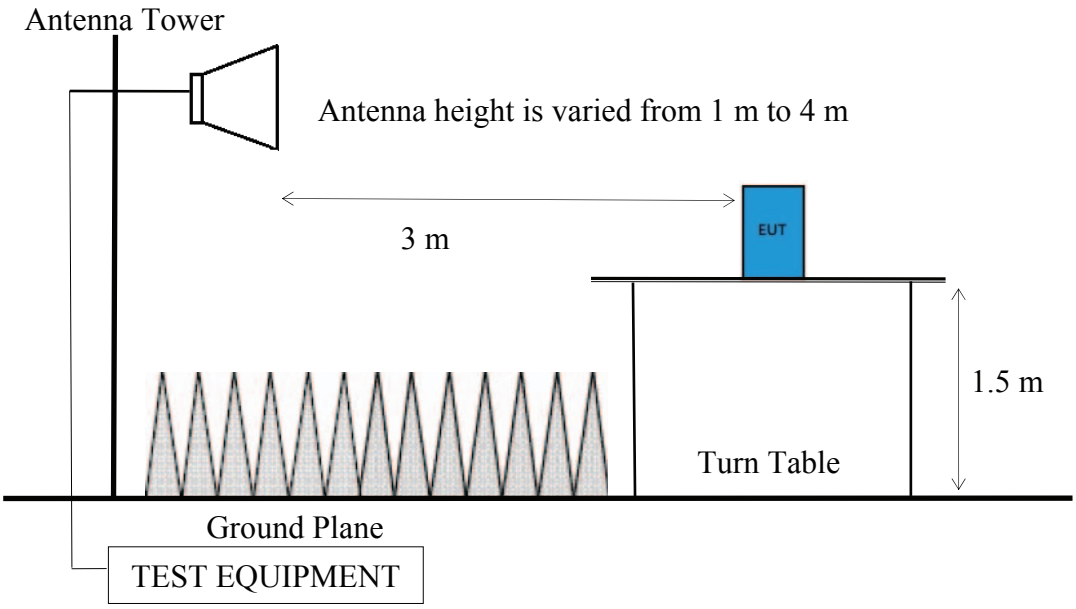
6.1.4. Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

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

Frequency (MHz)	Distance (m)	Limits	
		dBμV/m	μV/m
0.009 - 0.490	300	67.6	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.

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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 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 ≥ 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 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 finally measurement.

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Average Detector:

■**Option 1:**

(1)RBW = 1MHz

(2)VBW ≥ 1/ T.

Modulation Type	T (ms)	1/ T (kHz)	VBW Setting (kHz)
802.11b	12.25	0.816	10Hz
802.11g	2.040	0.490	10Hz
802.11n-HT20	1.899	0.527	1kHz
802.11n-HT40	0.927	1.079	2kHz
BLE	2.130	0.469	2.5kHz

N/A: 1/ T is not implemented when duty cycle presented in section 3.7 is ≥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 l=Antenna Factor + Cable Loss + Meter Reading

□Average Emission Level= Peak Emission Level+ DCCF

Duty Cycle Correction Factor (DCCF)= 20log (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.

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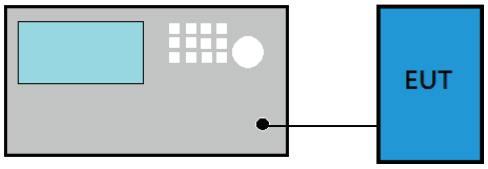
7. 6dB BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

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

7.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

(1) Set RBW = 100 kHz.
(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 -6 dB to record the final bandwidth.

7.4. Test Results

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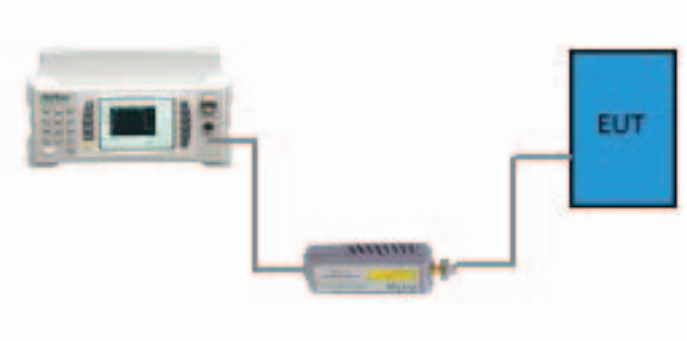
8. MAXIMUM PEAK OUTPUT POWER

8.1. Block Diagram of Test Setup



8.2. Specification Limits

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

8.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

■**PKPM1 Peak power meter method:**

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

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

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

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

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

8.4. Test Results

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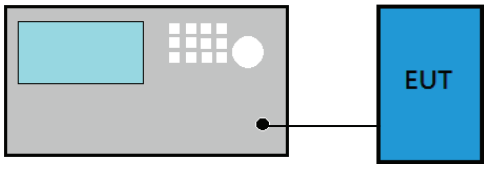
9. EMISSION LIMITATIONS

9.1. Block Diagram of Test Setup



9.2. Specification Limits

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

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

9.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

■Reference Level

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

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■Emission Level Measurement

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

9.4. Test Results

Please refer to Appendix A

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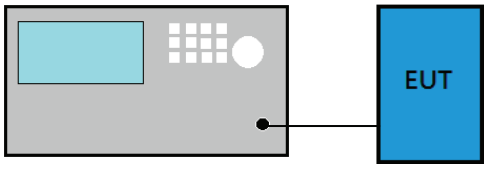
10. POWER SPECTRAL DENSITY

10.1. Block Diagram of Test Setup



10.2. Specification Limits

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

10.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

■Method PKPSD (peak PSD)

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

□Method AVGPSD-2

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

10.4. Test Results

Please refer to Appendix A

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

11. DEVIATION TO TEST SPECIFICATIONS

【NONE】

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

APPDNDIX A

TEST DATA AND PLOTS

(Model: 15Z980)

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

APPDNDIX B

TEST PHOTOGRAPHS

(Model: 15Z980)

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