

**FCC 15.407
(Permissive Change)
WLAN 6GHz Test Report**

for

LG Electronics Inc.

**222, LG-ro, Jinwi-myeon Pyeongtaek-Si, Gyeonggi-Do,
17709 Republic of Korea**

Product Name : Notebook Computer
**Model Name : (1)17Z90Q (2)17ZB90Q
(3)17ZD90Q (4)17ZG90Q**
Brand : LG
FCC ID : BEJNT-17Z90Q

**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.

TABLE OF CONTENTS

Description	Page
TEST REPORT.....	3
1. REVISION RECORD OF TEST REPORT	4
2. SUMMARY OF TEST RESULTS	5
3. GENERAL INFORMATION	6
3.1. Description of Application	6
3.2. Description of EUT	7
3.3. Reference Test Guidance.....	8
3.4. Information for Change Permissive.....	9
3.5. Antenna Information	10
3.6. EUT Specifications Assessed in Current Report	11
3.7. Description of Key Components	14
3.8. Test Configuration.....	16
3.9. Output Power Setting	21
3.10. Tested Supporting System List.....	22
3.11. Setup Configuration.....	22
3.12. Operating Condition of EUT	23
3.13. Description of Test Facility	23
3.14. Measurement Uncertainty	24
4. MEASUREMENT EQUIPMENTLIST.....	25
4.1. Conducted Emission Measurement	25
4.2. Radiated Emission Measurement	26
4.3. RF Conducted Measurement	26
5. CONDUCTED EMISSION.....	27
5.1. Block Diagram of Test Setup	27
5.2. Conducted Emission Limit	27
5.3. Test Procedure	27
5.4. Test Results	27
6. RADIATED EMISSION	28
6.1. Block Diagram of Test Setup	28
6.2. Radiated Emission Limits.....	30
6.3. Test Procedure	31
6.4. Measurement Result Explanation.....	33
6.5. Test Results	33
7. MAXIMUM CONDUCTED OUTPUT POWER	34
7.1. Block Diagram of Test Setup	34
7.2. Specification Limits.....	34
7.3. Test Procedure	34
7.4. Test Results	34
8. DEVIATION TO TEST SPECIFICATIONS	35

APPENDIX A TEST DATA AND PLOTS

APPENDIX B TESTPHOTOGRAPHS

TEST REPORT (Permissive Change)

Applicant : LG Electronics Inc.
Manufacturer : LG Electronics Inc.
Factory : LG Electronics Nanjing New Technology Co., Ltd.
EUT Description
(1) Product : Notebook Computer
(2) Model : (1)17Z90Q (2)17ZB90Q (3)17ZD90Q (4)17ZG90Q
(3) Brand : LG
(4) Power Supply: DC 20V

Applicable Standards:

Title 47 FCC CFR Part 15 Subpart E

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.

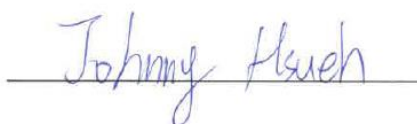
Date of Report: 2022. 07. 04

Reviewed by:



(Tina Huang/Section Manager)

Approved by:



(Johnny Hsueh/Section Manager)

1. REVISION RECORD OF TEST REPORT

Edition No	Issued Date	Revision Summary	Report Number
0	2022. 07. 04	Original Report	EM-F220385

2. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Description	Results
15.207	Conducted Emission	PASS
15.205/15.209 15.407 (b)(6)	Radiated Band Edge and Radiated Spurious Emission	N/A, Note 2 & 3
15.407(a)(8)	Maximum Power Spectral Density	N/A, Note 2
15.407(a)(8)	Maximum Conducted Output Power	PASS
2.1049 15.407(a)(10)	Emission/Occupied Bandwidth	N/A, Note 2
15.407(b)(6)	Undesirable emission limits: Spurious Emission (Conducted)	N/A, Note 2
15.407(b)(7)	In-Band Emission (Channel Mask)	N/A, Note 2
15.407(d)(6)	Contention Based Protocol	N/A, Note 2
15.203	Antenna Requirement	Compliance
Note: 1. The uncertainties value is not used in determining the result. 2. To add new Configuration with new components is not influence on this item 3. Due to the above difference, it is unnecessary to test Radiated Band Edge.		

3. GENERAL INFORMATION

3.1. Description of Application

Applicant	LG Electronics Inc. 222, LG-ro, Jinwi-myeon Pyeongtaek-Si, Gyeonggi-Do, 17709 Republic of Korea
Manufacturer	LG Electronics Inc. 222, LG-ro, Jinwi-myeon Pyeongtaek-Si, Gyeonggi-Do, 17709 Republic of Korea
Factory	LG Electronics Nanjing New Technology Co., Ltd. No.346, Yaoxin Road, Economic & Technical Development Zone, Nanjing, China.
Product	Notebook Computer
Model	(1)17Z90Q (2)17ZB90Q (3)17ZD90Q (4)17ZG90Q The difference between all models is different in the sales customers.
Configuration	17Z90Q-K, 17Z90Q-N, 17Z90Q-A, 17Z90Q-R
Brand	LG

The difference list for Configuration:

Difference Configuration	Main Board	GPU	TPM (Trusted Platform Module)
17Z90Q-K	Queen MAIN B/D PCB	Intel Iris Xe UHD Graphics	Not Support
17Z90Q-N	Queen MAIN B/D PCB	Intel Iris Xe UHD Graphics	Support
17Z90Q-A	QUEEN NVIDIA MAIN B/D PCB	NVIDIA RTX2050	Not Support
17Z90Q-R	QUEEN NVIDIA MAIN B/D PCB	NVIDIA RTX2050	Support

3.2. Description of EUT

Test Model	17Z90Q	
Serial Number	N/A	
Power Rating	DC 20V, 3.25A	
Software Version	XY (X, Y can be 0 to 9 for different SW version not influence RF parameter)	
RF Features	WLAN:802.11 a/b/g/n/ac/ax Bluetooth: BT and BLE (BT 5.1)	
Transmit Type	2.4 GHz	
	802.11b	1T1R
	802.11g	1T1R
	802.11n-HT20	2T2R
	802.11n-HT40	2T2R
	802.11ax-HE20	2T2R
	802.11ax-HE40	2T2R
	BT/BLE	1T1R
	U-NII Bands	
	802.11a	1T1R
	802.11n-HT20/802.11ac-VHT20/802.11ax-HE20	2T2R
	802.11n-HT40/802.11ac-VHT40/802.11ax-HE40	2T2R
	802.11ac-VHT80/802.11ax-HE80	2T2R
	802.11ac-VHT160/802.11ax-HE160	2T2R
	The MIMO is uncorrelated and supported SDM(Spatial Division Multiplexing) mode only. This radio device doesn't support beamforming and Cyclic Delay Diversity (CDD).	
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	
Test Sample	Sample No.	Test Item
	03	AC Conduction, Radiated, RF Conducted
	04	
	Firmware	N/A
Sample Status	Trial sample	
Date of Receipt	2022. 03. 24	
Date of Test	2022. 05. 26 ~ 07. 01	

Interface Ports of EUT	<ul style="list-style-type: none">• One Micro SD Card Slot• Two USB 3.0 Ports• One HDMI Port• Two USB Type C Port• One Earphone Port
Accessories Supplied	<ul style="list-style-type: none">• AC Adapter• LAN Gender

3.3. Reference Test Guidance

ANSI C63.10:2013

KDB 789033 D02 v02r01, KDB 662911 D01 v02r01, KDB 987594 D02 v01r01

3.4. Information for Change Permissive

- The EUT is an addition version with original FCC ID: BEJNT-17Z90Q is to add new Configuration and components, and the detail for component list please refer to section 3.7.1
- The differences between this application and original's ID as clarify in following list.

Difference		Main Board	GPU	TPM (Trusted Platform Module)
Original	17Z90Q	Queen MAIN B/D PCB	Intel Iris Xe UHD Graphics	Not Support
		Queen MAIN B/D PCB	Intel Iris Xe UHD Graphics	Support
Permissive Change	17Z90Q-K	Queen MAIN B/D PCB	Intel Iris Xe UHD Graphics	Not Support
	17Z90Q-N	Queen MAIN B/D PCB	Intel Iris Xe UHD Graphics	Support
	17Z90Q-A	QUEEN NVIDIA MAIN B/D PCB	NVIDIA RTX2050	Not Support
	17Z90Q-R	QUEEN NVIDIA MAIN B/D PCB	NVIDIA RTX2050	Support

Note: 1. The Configuration 17Z90Q-K and 17Z90Q-N with original components were measured in the original application.
2 The Configuration 17Z90Q-A and 17Z90Q-R with new components were measured in this Permissive Change application.

- Due to above different item, there have some test item should be re-tested (see section 2), the test data are recorded in this report.

3.5. Antenna Information

No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain(dBi)	
					Main	AUX
1.	WA-P-LELE-04-011	INPAQ	Mono-Pole	2400	2.2	1.1
				2450	3.0	1.6
				2500	2.7	1.5
				5150	4.1	3.8
				5400	4.0	3.7
				5850	3.7	3.3
				5925	3.5	3.2
				6525	2.7	2.5
				7125	2.5	2.1
<p>According to KDB 662911 D01 d) ii), transmit signals are completely uncorrelated, then Directional gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10})/N_{ANT}]$ dBi Note 1. 2.4G: Directional gain = $10 \log[(10^{3.0/10} + 10^{1.6/10})/2]$ = 2.36dBi Note 2. UNII Band (WLAN 5G): Directional gain = $10 \log[(10^{4.1/10} + 10^{3.8/10})/2]$ = 3.95dBi Note 3. UNII Band (WLAN 6G): 5925MHz: Directional gain = $10 \log[(10^{3.5/10} + 10^{3.2/10})/2]$ = 3.35dBi 6525MHz: Directional gain = $10 \log[(10^{2.7/10} + 10^{2.5/10})/2]$ = 2.60dBi 7125MHz: Directional gain = $10 \log[(10^{2.5/10} + 10^{2.1/10})/2]$ = 2.30dBi</p>						
2.	L1LRF009-CS-H	LUXSHARE-ICT	Mono-Pole	2400	-1.45	2.89
				2450	0.26	-0.07
				2500	2.15	-6.91
				5150	5.24	3.64
				5400	0.55	1.11
				5850	4.96	2.88
				5925	5.85	2.48
				6525	1.19	1.38
				7125	3.99	1.89
<p>According to KDB 662911 D01 d) ii), transmit signals are completely uncorrelated, then Directional gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10})/N_{ANT}]$ dBi Note 1. 2.4G: Directional gain = $10 \log[(10^{2.15/10} + 10^{2.89/10})/2]$ = 2.54dBi Note 2. UNII Band (WLAN 5G): Directional gain = $10 \log[(10^{5.24/10} + 10^{3.64/10})/2]$ = 4.51dBi Note 3. UNII Band (WLAN 6G): 5925MHz: Directional gain = $10 \log[(10^{5.85/10} + 10^{2.48/10})/2]$ = 4.48dBi 6925MHz: Directional gain = $10 \log[(10^{1.19/10} + 10^{1.38/10})/2]$ = 1.29dBi 7125MHz: Directional gain = $10 \log[(10^{3.99/10} + 10^{1.89/10})/2]$ = 3.07dBi</p>						

3.6. EUT Specifications Assessed in Current Report

Mode	U-NII Band	Fundamental Range (MHz)	Channel Number
802.11ax-HE20	5	5955-6415	24
	6	6435-6515	5
	7	6535-6855	17
	8	6875-7115	13
802.11ax-HE40	5	5965-6405	12
	6	6445-6485	2
	7	6525-6845	9
	8	6885-7085	6
802.11ax-HE80	5	5985-6385	6
	6	6465-6545	2
	7	6625-6785	3
	8	6865-7025	3
802.11ax-HE160	5	6025-6345	3
	6	6505	1
	7	6665	1
	8	6825-6985	2

Mode	Modulation	Data Rate (Mbps)
802.11ax-HE20	OFDMA (BPSK/ QPSK/ 16QAM/ 64QAM/ 256QAM/1024QAM)	Up to 287
802.11ax-HE40		Up to 574
802.11ax-HE80		Up to 1201
802.11ax-HE160		Up to 2402

Channel List								
802.11ax-HE20								
U-NII Band	Channel Number	Freq. (MHz)	U-NII Band	Channel Number	Freq. (MHz)	U-NII Band	Channel Number	Freq. (MHz)
5	2	5955	5	81	6335	7	161	6755
	5	5975		85	6375		165	6775
	9	5995		89	6395		169	6795
	13	6015		93	6415		173	6815
	17	6035		97	6435		177	6835
	21	6055	6	101	6455	181	6855	
	25	6075		105	6475	185	6875	
	29	6095		109	6495	189	6895	
	33	6115		113	6515	193	6915	
	37	6135		117	6535	197	6935	
	41	6155	7	121	6555	201	6955	
	45	6175		125	6575	205	6975	
	49	6195		129	6595	209	6995	
	53	6215		133	6615	213	7015	
	57	6235		137	6635	217	7035	
	61	6255		141	6655	221	7055	
	65	6275		145	6675	225	7075	
	69	6295		149	6695	229	7095	
	73	6315		153	6715	233	7115	
	77	6335		157	6735			

Channel List								
802.11ax-HE40								
U-NII Band	Channel Number	Freq. (MHz)	U-NII Band	Channel Number	Freq. (MHz)	U-NII Band	Channel Number	Freq. (MHz)
5	3	5965	5	83	6365	7	163	6765
	11	6005		91	6405		171	6805
	19	6045		99	6445		179	6845
	27	6085	6	107	6485	8	187	6885
	35	6125		115	6525		195	6925
	43	6165	7	123	6565		203	6965
	51	6205		131	6505		211	7005
	59	6245		139	6645		219	7045
	67	6285		147	6685		227	7085
	75	6325		155	6725			

Channel List								
802.11ax-HE80								
U-NII Band	Channel Number	Freq. (MHz)	U-NII Band	Channel Number	Freq. (MHz)	U-NII Band	Channel Number	Freq. (MHz)
5	7	5985	5	87	6385	7	167	6785
	23	6065	6	103	6465	8	183	6865
	39	6145		119	6545		199	6945
	55	6225	7	135	6625		215	7025
	71	6305		151	6705			

Channel List					
802.11ax-HE160					
U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)
5	15	6025	7	143	6665
	47	6185	8	175	6825
	79	6345		207	6985
6	111	6505			

Note: Test modes are presented at section 3.6.

3.7. Description of Key Components

3.7.1. For the All Component Lists

Item	Supplier	Model / Type	Character
System	Microsoft	Win11 Home	---
Main Board	LG	Queen MAIN B/D PCB	Main Board (GM) Manufacturer: #1 Hannstar Board Tech(Jiang Yin) Corp.,Ltd. #2 Elec & Eltek Company (MCO) Limited.
		QUEEN NVIDIA MAIN B/D PCB*	Main Board (PM) Manufacturer: #1 Hannstar Board Tech(Jiang Yin) Corp.,Ltd. #2 Elec & Eltek Company (MCO) Limited.
WLAN SUB Board	LG	17Z90Q Sub B/D	Manufacturer: #1 Hannstar Board Tech(Jiang Yin) Corp.,Ltd. #2 Elec & Eltek Company (MCO) Limited. #3 JiangSu HuaShen Electronic co.,ltd (HXF)
CPU (Socket: BGA1744)	Intel	i7-1260P	2.5GHz
	Intel	i5-1240P	2.1GHz
17" LCD Panel	LG Display	LP170WQ1(SP)(F2)	Resolution: 2560 x 1600, 60Hz WQXGAIPS (Non Touch)
Storage (SSD)	SK hynix	HFM001TD3JX013N	1TB
		HFM512GD3JX013N	512GB
		HFM256GD3JX013N	256GB
	Samsung	MZ-VL21T00	1TB
		MZ-VL25120	512GB
		MZ-VL22560	256GB
		MZ-VL22T00	2TB*
Memory (RAM)	Samsung	---	16GB LPDDR5x(On Board)
		---	8GB LPDDR5x(On Board)
		---	32GB LPDDR5x(On Board)*
	SK Hynix	---	16GB LPDDR5x(On Board)
		---	8GB LPDDR5x(On Board)
		---	32GB LPDDR5x(On Board)*
Battery Pack	LG	LBV7227E	80Wh, DC 7.74V, 80Wh Typ 10336mAh
	LG	LBY122CM	90Wh, DC 7.76V, 90Wh Typ 11600mAh
WLAN Combo Card	Intel	AX211D2W	WLAN and BT, 2x2 PCIe M.2 1216 SD adapter card FCC ID: PD9AX211D2 IC: 1000M-AX211D2
WLAN Combo Antenna	LG (INPAQ)	WA-P-LELE-04-011	PCB, Mono-pole Type Main: Black, Aux: Gray
	LG (LUXSHARE-ICT)	L1LRF009-CS-H	PCB, Mono-pole Type Main: Black, Aux: Gray

Item	Supplier	Model / Type	Character	
Keyboard	TIC	KT0120B8E	---	
	LITE ON	SN8101	---	
Web Camera	Chicony	CKFLF26	---	
	Luxvisions	1BF225N3	---	
LAN Gender (Type C to LAN)	SUZHOU MEC ELECTRONICS	80-5946-111	(White) 10/100 Megabit Ethernet	
		80-5946-101	(Black) 10/100 Megabit Ethernet	
		80-5946-230	(White) 10/100/1000 Megabit Ethernet	
		80-5946-240	(Black) 10/100/1000 Megabit Ethernet	
	Type C to LAN: Shielded, Undetached, 0.12m			
	ARIN TECH CO. LTD	GD-08MF-36-WH-LP10	(White) 10/100 Megabit Ethernet	
		GD-08MF-36-BK-LP11	(Black) 10/100 Megabit Ethernet	
		GD-08MF-50-WH-LP12	(White) 10/100/1000 Megabit Ethernet	
		GD-08MF-50-BK-LP13	(Black) 10/100/1000 Megabit Ethernet	
	Type C to LAN: Shielded, Undetached, 0.12m			
AC Adapter (65W)	LG (HONOR)	ADT-65DSU-D03-2	I/P: AC 100-240V, 1.6A, 50-60Hz O/P: DC 20V, 3.25A	
	DC Power Cord: Non-Shielded, Undetached, 1.5m			
	AC Power Cord: Non-Shielded, Detached, 1.0m (2C) (For Other Countries) AC Power Cord: Non-Shielded, Detached, 1.55m (2C) (For US, Canada, Mexico)			
Note: “*” Standing for adding new configuration.				

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

3.7.2. The EUT collocates with following worst components, which are used to establish a basic configuration of system during test:

SKU (Mode)		1	2	
Main Board	LG, QUEEN NVIDIA MAIN B/D PCB (with TPM)	V		
	LG, QUEEN NVIDIA MAIN B/D PCB (w/o TPM)		V	
SUB Board	LG, 17Z90Q Sub B/D (Type A)	V	V	
CPU	Intel, i7-1260P	V	V	
17” LCD Panel	LG Display, LP170WQ1(SP)(F2)	V	V	
Storage (SSD)	Samsung, 2TB	V	V	
	SK hynix, 1TB	V	V	
Memory (RAM)	32GB	V	V	
Battery Pack	LG, 90Wh	V	V	
Keyboard	TIC, KT0120B8E	V	V	
Web Camera	Chicony, CKFLF26	V	V	
WLAN Combo Card	Intel, AX211D2W	V	V	
WLAN Combo Antenna	LG (INPAQ), WA-P-LELE-04-011	V		
	LG (LUXSHARE-ICT), L1LRF009-CS-H		V	
Type C #1	AC Adapter	LG (HONOR), ADT-65DSU-D03-2	V	V
Type C #2	Link to LAN Gender	MEC	V	V

3.8. Test Configuration

● OFDM Modulation

Mode	TX _{on} (ms)	1/ TX _{on} (kHz)	TX _{on} +off (ms)	Duty Cycle (x)	Duty Cycle Factor [10log(1/x)] (dB)
802.11ax-HE20	2.570	0.389	2.610	0.984	N/A
802.11ax-HE40	2.570	0.389	2.610	0.984	N/A
802.11ax-HE80	2.580	0.388	2.620	0.984	N/A
802.11ax-HE160	2.280	0.439	2.310	0.987	N/A

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.



● OFDMA Modulation

Mode	T _{Xon} (ms)	1/T _{Xon} (kHz)	T _{Xon+off} (ms)	Duty Cycle (x)	Duty Cycle Factor [10log(1/x)] (dB)
802.11ax-HE20	5.460	0.183	5.640	0.968	0.141
802.11ax-HE40	5.480	0.182	5.640	0.972	0.123
802.11ax-HE80	5.480	0.182	5.660	0.968	0.141
802.11ax-HE160	5.460	0.183	5.640	0.968	0.141

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.



AC Conduction	
SKU #1	Normal operation (with INPAQ Antenna)
SKU #2	Normal operation (with LUXSHARE-ICT Antenna)

Item		Mode	Data Rate	Test Channel	
Radiated Test Case	SKU #1	Radiated Spurious Emission (30MHz~1GHz)	802.11ax-HE160	HE0	47
	SKU #2		802.11ax-HE160	HE0	47

● OFDM Modulation

Item		Mode	Data Rate	Test Channel	
Radiated Test Case	SKU #2	Radiated Spurious Emission (Above 1GHz) ^{Note 3}	802.11ax-HE160	HE0	47
		Band Edge	802.11ax-HE20	HE0	2
			802.11ax-HE40	HE0	3/227
			802.11ax-HE80	HE0	7/215
			802.11ax-HE160	HE0	15/207
Band Edge-Marker Delta	802.11ax-HE20	HE0	233		

Item		Mode	Data Rate	Test Channel	
Conducted Test Case	SKU #1/ SKU #2	Maximum Power	802.11ax-HE20	HE0	2/45/93/97/105/1 13/117/149/181/ 185/209/233
			802.11ax-HE40	HE0	3/43/91/99/107/1 15/147/179/187/ 211/227
			802.11ax-HE80	HE0	7/39/87/103/119/ 135/151/16/183/ 199/215
			802.11ax-HE160	HE0	15/47/79/111/14 3/175/207

● OFDMA Modulation ^{Note 6}

Item		Tones	RU Index	Mode	Data Rate	Test Channel	
Radiated Test Case	SKU #2	Radiated Spurious Emission (Above 1GHz) ^{Note 3}	996T	67	802.11ax-HE80	HE0	7
		Band Edge	26T	0	802.11ax-HE20	HE0	2
				37	802.11ax-HE40	HE0	3
			52T	52	802.11ax-HE160	HE0	207
				53	802.11ax-HE20	HE0	2
			106T	60	802.11ax-HE160	HE0	207
				61	802.11ax-HE160	HE0	15
			242T	64	802.11ax-HE160	HE0	207
				65	802.11ax-HE40	HE0	3
			484T	S66	802.11ax-HE160	HE0	207
				67	802.11ax-HE80	HE0	7
	996T	S67	802.11ax-HE160	HE0	207		
Band Edge-Marker Delta	26T	8	802.11ax-HE20	HE0	233		

Item		Tones	RU Index	Mode	Data Rate	Test Channel	
Conducted Test Case	SKU #1/ SKU #2	Maximum Conducted Output power	26T	0/4/8	802.11ax-HE20	HE0	2/45/93/97/105/ 113/117/149/ 181/185/209/ 233
			52T	37/39/40			
			106T	53/54			
			242T	61			
			26T	0/8/17	802.11ax-HE40	HE0	3/43/91/99/107/ 115/147/179/ 187/211/227
			52T	37/40/44			
			106T	53/54/56			
			242T	61/62			
			484T	65	802.11ax-HE80	HE0	7/39/87/103/119 /135/151/16/183 /199/215
			26T	0/18/36			
			52T	37/44/52			
			106T	53/56/60			
			242T	61/62/64	802.11ax-HE160	HE0	15/47/79/111/ 143/175/207
			484T	65/66			
			996T	67			
			26T	0/18/36 S0/S18/S36			
			52T	37/44/52 S37/S44/S52	802.11ax-HE160	HE0	15/47/79/111/ 143/175/207
			106T	53/56/60 S53/S56/S60			
			242T	61/62/64 S61/S62/S64			
			484T	65/66 S65/S66			
996T	65/S67						

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.

Note 3: Both of the antennas are the same type, the max-gain condition MIMO is SKU #2 for U-NII Band 5, we estimated the worst case at maximum power on each OFDM and OFDMA Configuration. The MIMO is uncorrelated and supported SDM mode only.

Note 4: The modulation and bandwidth are similar for 802.11n mode for HT20/HT40 and 802.11ac mode for VHT20/VHT40, therefore investigated worst case to representative mode in the test report.

Note 5: The data rates were selected based on preliminary testing that identified rate as the worst case for output power.

Note 6: After preliminary test, we present worst case with maximum power of each RU type.

Note 7: We estimated the worst case at maximum power.

3.9. Output Power Setting

Mode	U-NII Band	Centre Frequency (MHz)	Power Setting		Mode	U-NII Band	Centre Frequency (MHz)	Power Setting	
			Chain A (AUX)	Chain B (Main)				Chain A (AUX)	Chain B (Main)
802.11ax-HE20	5	5955	1.500	1.500	802.11ax-HE20	7	6535	0.750	0.750
		6175	1.500	1.500			6695	0.750	0.750
		6415	1.500	1.500			6855	0.750	0.750
	6	6435	1.500	1.500		8	6875	0.750	0.750
		6475	1.500	1.500			6995	0.750	0.750
		6515	1.500	1.500			7115	-3.000	-3.000

Mode	U-NII Band	Centre Frequency (MHz)	Power Setting		Mode	U-NII Band	Centre Frequency (MHz)	Power Setting	
			Chain A (AUX)	Chain B (Main)				Chain A (AUX)	Chain B (Main)
802.11ax-HE40	5	5965	4.750	4.750	802.11ax-HE0	7	6525	4.750	4.750
		6165	4.750	4.750			6685	4.000	4.000
		6405	4.750	4.750			6845	4.000	4.000
	6	6445	4.750	4.750		8	6885	4.000	4.000
		6485	4.750	4.750			7005	4.000	4.000
							7085	4.500	4.500

Mode	U-NII Band	Centre Frequency (MHz)	Power Setting		Mode	U-NII Band	Centre Frequency (MHz)	Power Setting	
			Chain A (AUX)	Chain B (Main)				Chain A (AUX)	Chain B (Main)
802.11ax-HE80	5	5985	7.250	7.250	802.11ax-HE80	7	6625	6.500	6.500
		6145	7.250	7.250			6705	6.500	6.500
		6385	7.25	7.250			6785	6.500	6.500
	6	6465	7.250	7.250		8	6865	6.500	6.500
		6545	7.250	7.250			6945	6.500	6.500
							7025	6.500	6.500

Mode	U-NII Band	Centre Frequency (MHz)	Power Setting		Mode	U-NII Band	Centre Frequency (MHz)	Power Setting	
			Chain A (AUX)	Chain B (Main)				Chain A (AUX)	Chain B (Main)
802.11ax-HE160	5	6025	10.000	10.000	802.11ax-HE160	7	6665	9.250	9.250
		6185	10.000	10.000			6825	9.250	9.250
		6345	10.000	10.000			8	6985	9.250
	6	6505	10.000	10.000					

3.10. Tested Supporting System List

3.10.1. Support Peripheral Unit

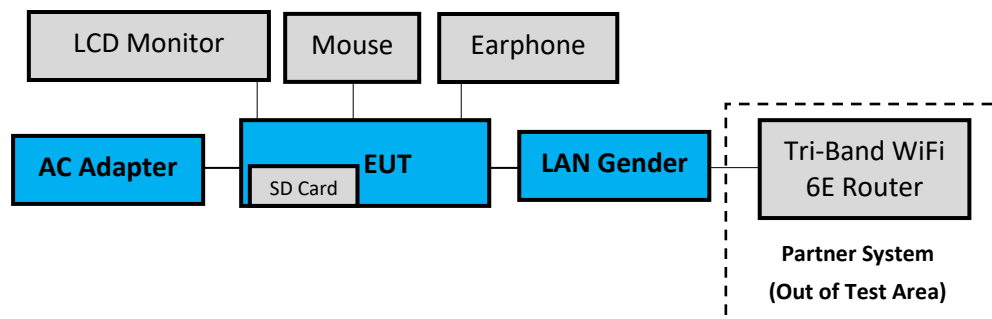
No.	Product	Brand	Model No.	Serial No.	Approval
1.	TV	LG	22LK330-DB	N/A	N/A
2.	USB Mouse	DENGEKI	P012 (MS-P12)	N/A	N/A
3.	Earphone	APPLE	N/A	N/A	N/A
4.	SD Card	ADATA	MicroSDHC Card	N/A	N/A
Partner System					
5.	Tri-Band WiFi 6E Router	NETGEAR	RAXE500	N/A	FCC ID: PY320300508
For Contention Based Protocol Test only					
6.	Wireless-AXE11000 Tri-band Gigabit Router	ASUS	GT-AXE1100	N/A	FCC ID: MSR-RTAXJF0

3.10.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	HDMI Cable: Shielded, Detachable, 1.2m AC Power Cord: Unshielded, Detachable, 1.8m
2.	USB Cable: Unshielded, Undetachable, 1.5m
3.	Earphone Cable: Unshielded, Undetachable, 1.2m
4.	N/A
5.	AC adapter: METGEAR, Model: 2ABS060K, Power Cable: Unshielded, Undetachable, 1.8m LAN cable: Unshielded, Detachable, 3.0m
6.	Adapter: AcBel, ADD011, DC Power cable: Non-shielded, 11.5m, Power Cable: Non-Shielded, 0.9m

3.11. Setup Configuration

3.11.1. EUT Configuration for Power Line & Radiated Emission



3.11.2. EUT Configuration for RF Conducted Test Items



3.12. Operating Condition of EUT

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

[Chain 0 is aux port (A Button in DRTU) Chain 1 is main port (B Button in DRTU)].

3.13. Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 491, Zhongfu Rd., 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 17025:2017 (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 ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724 (1) No.8 Shielded Room (2) No.1 3m Semi Anechoic Chamber

3.14. Measurement Uncertainty

Test Items/Facilities		Frequency Range	Uncertainty	
Conduction Test		9kHz-150kHz	±3.7dB	
		150kHz-30MHz	±3.4dB	
Radiation Test	<input checked="" type="checkbox"/>	No.1 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.8dB
			200MHz-1000MHz, 3m, Horizontal	±4.1dB
			30MHz-200MHz, 3m, Vertical	±4.5dB
			200MHz-1000MHz, 3m, Vertical	±4.5dB
			1GHz-6GHz, 3m	±4.7dB
			6GHz-18GHz, 3m	±4.1dB
			18GHz-40GHz, 3m	±3.52dB
	<input type="checkbox"/>	No.3 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.9dB
			200MHz-1000MHz, 3m, Horizontal	±4.2dB
			30MHz-200MHz, 3m, Vertical	±4.3dB
			200MHz-1000MHz, 3m, Vertical	±4.5dB
	<input type="checkbox"/>	No.4 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.1dB
			200MHz-1000MHz, 3m, Horizontal	±4.5dB
			30MHz-200MHz, 3m, Vertical	±4.4dB
			200MHz-1000MHz, 3m, Vertical	±4.8dB
			1GHz-6GHz, 3m	±5.0dB
			6GHz-18GHz, 3m	±4.7dB
	<input type="checkbox"/>	No.5 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.2dB
			200MHz-1000MHz, 3m, Horizontal	±4.3dB
			30MHz-200MHz, 3m, Vertical	±4.3dB
			200MHz-1000MHz, 3m, Vertical	±4.7dB
			1GHz-6GHz, 3m	±4.8dB
			6GHz-18GHz, 3m	±4.5dB

Remark : Uncertainty = $ku_c(y)$

Test Items	Uncertainty
Maximum Power Spectral Density	± 0.52dB
Maximum Conducted Output Power	± 0.72dB
Emission Bandwidth	± 0.38%
Contention Based Protocol	± 2%

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	2022. 01. 11	1 Year
2.	A.M.N.	R&S	ENV4200	100169	2021. 11. 04	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2021. 12. 19	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2021. 12. 13	1 Year
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.8 S/R	2022. 04. 14	1 Year
6.	Coaxial Cable	Yeida	RG/58AU	CE-08	2021. 09. 13	1 Year
7.	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2021. 09. 19	1 Year
2.	Spectrum Analyzer	Keysight	N9010B-544	MY55460198	2022. 04. 08	1 Year
3.	Test Receiver	R&S	ESCS30	100039	2021. 06. 02	1 Year
4.	Amplifier	HP	8447D	2944A06305	2022. 01. 05	1 Year
5.	Microwave Preamplifier	Keysight	83017A	MY53270365	2021. 05. 27	1 Year
6.	Microwave Amplifier	Keysight	83051A	MY53010042	2021. 07. 30	1 Year
7.	Loop Antenna	ETS-LINDGREN	6512	00035867	2021. 09. 29	2 Years
8.	Bilog Antenna	TESEQ	CBL6112D	33821	2021. 07. 16	1 Year
9.	Double-Ridged Waveguide Horn	ETS-Lindgren	3115	9609-4927	2021. 07. 02	1 Year
10.	Horn Antenna	COM-POWER	AH-840	101092	2022. 01. 06	1 Year
11.	Notch Filter	Warison	WFIL-N5925-6425F	WR61CFWC4 B1	2022. 01. 14	1 Year
12.	Notch Filter	Warison	WFIL-N6425-6525F	WR61CFWC6 B1	2022. 01. 14	1 Year
13.	Notch Filter	Warison	WFIL-N6525-6875F	WR61CFWC8 B1	2022. 01. 14	1 Year
14.	Notch Filter	Warison	WFIL-N6875-7125F	WR61CFWC2 B1	2022. 01. 14	1 Year
15.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2022. 01. 20	1 Year
16.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 106	RE-14	2022. 01. 20	1 Year
17.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	RE-30	2021. 08. 25	1 Year
18.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2022. 04. 14	1 Year
19.	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9030B	MY61330403	2021. 12. 21	1 Year
2.	Power Meter	Anritsu	ML2487A	6K00005406	2022. 04. 26	1 Year
3.	Power Sensor	Anritsu	MA2491A	030873	2022. 04. 27	1 Year
4.	MXG RF Vector Signal Generator	Agilent	N5182B	MY53050409	2022. 02. 15	1 Year
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	RF-03	2022. 04. 14	1 Year

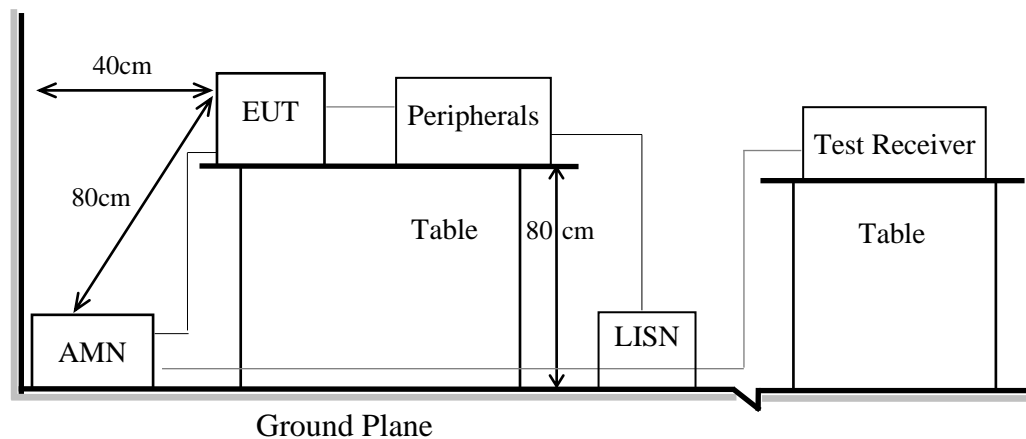
5. CONDUCTED EMISSION

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 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ 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 C63.10. 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.

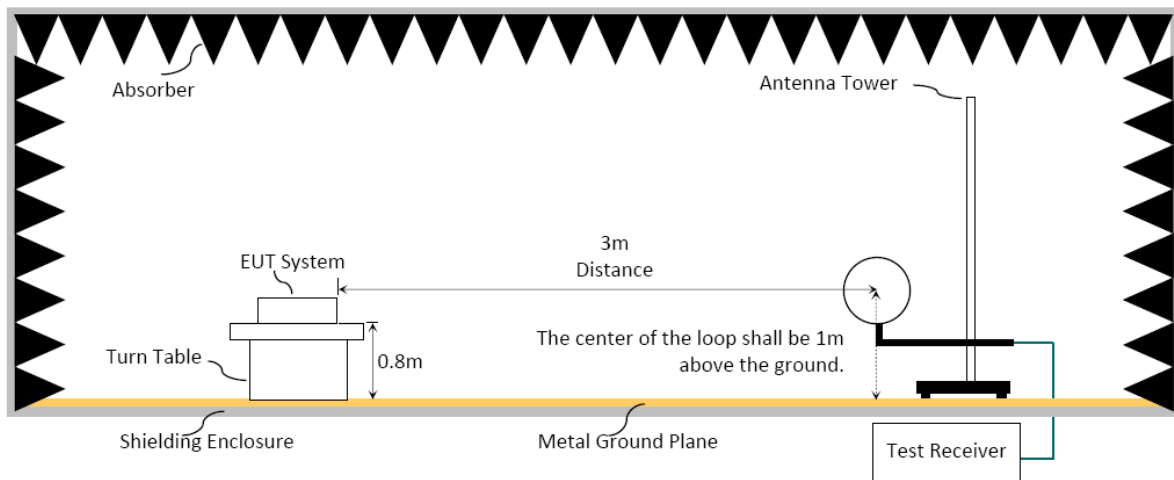
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

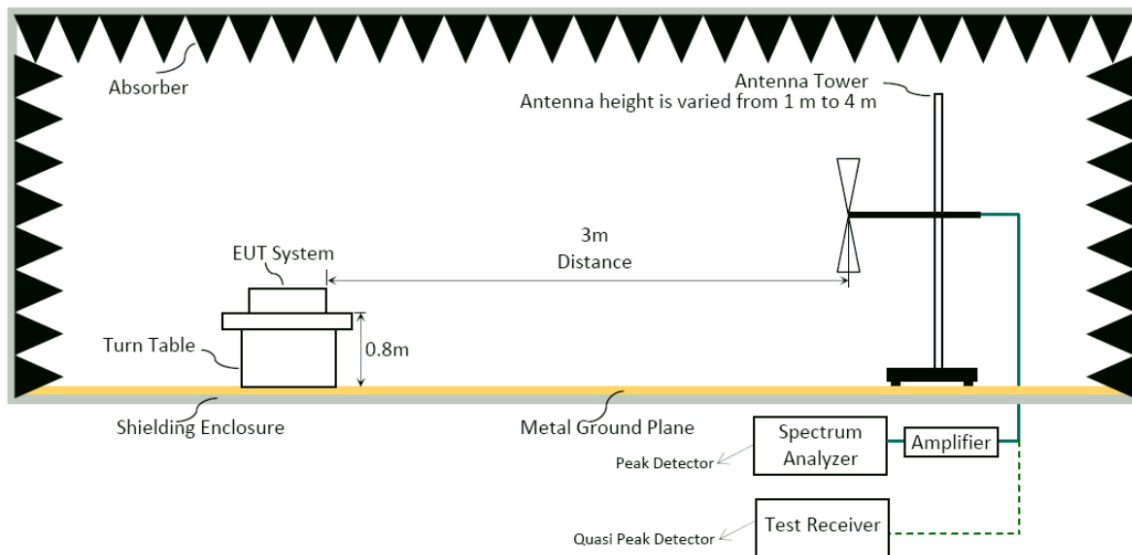
6.1.1. Block Diagram of EUT

Indicated as section 3.9

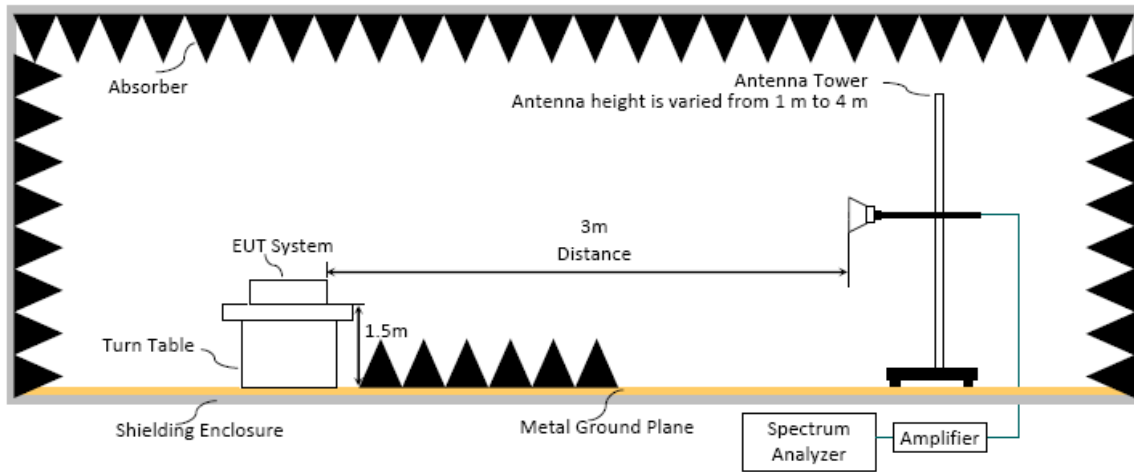
6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000MHz



6.1.4. Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

Radiated emissions fall in restricted bands, as defined in FCC Section 15.205/RSS-Gen Section 8.10 table 7 must be in compliance with the radiated emission limits specified in FCC Section 15.209/RSS-Gen Section 8.9 table 6 as below.

6.2.1. General Limit

Frequency (MHz)	Distance(m)	Limits	
		dB μ V/m	μ V/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dB μ V/m (Peak) 54.0 dB μ V/m (Average)	

Remark : (1) dB μ V/m = 20 log (μ 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
Out of 5925 to 7125	-27 dBm/MHz	68.2 dB μ V/m

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

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turntable 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 table which has 80cm (for 30-1000MHz) 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.

6.3.1. Radiated measurement Spectrum Analyzer Setting

6.3.1.1 Frequency below 1GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120kHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Note 1: When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Note 2: When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

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

Peak Detector:

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

Note: When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

Average Detector: **Option 1:**

- (1) RBW = 1MHz
- (2) VBW $\geq 1/T$. (Duty Cycle < 98%, when duty cycle presented in section 3.8)
- (3) VBW = 10Hz (Duty Cycle $\geq 98\%$, when duty cycle presented in section 3.8)
- (4) Detector = Peak.
- (5) Sweep time = auto.
- (6) Trace mode = max hold.
- (7) Allow sweeps to continue until the trace stabilizes.

 Option 2:

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

6.3.2. Radiated band edge measurement Spectrum Analyzer Setting**For without 99% OBW edge within 2 MHz of the authorized band edge:**

The spectrum analyzer setting, please refer to section 6.3.1.2

For with 99% OBW edge within 2 MHz of the authorized band edge:

Per KDB 789033 Section G.3.d and ANSI C63.10 -2013 6.10.4, SA setting as below:

a. Fundamental field strength of SA setting:

The spectrum analyzer setting, please refer to section 6.3.1.2

b. Delta of SA setting:

- (1) RBW = 1% SPAN but no less than 30 KHz
(In this case, RBW = 500 KHz)
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Correction Factor (Via delta, dB) = Fundamental Emission Level (dB μ V/m) @ RBW 500KHz - Band Edge Emission Level (dB μ V/m) @ RBW 500kHz

Band Edge Emission Level (dB μ V/m) =
Fundamental Emission Level (dB μ V/m) @ RBW 1MHz - Marker Delta (dB)

6.4. Measurement Result Explanation

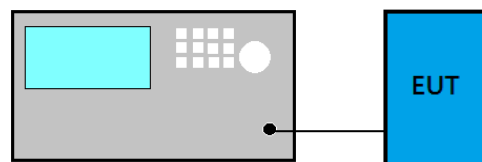
- Peak Emission Level (dB μ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) + Meter Reading (dB μ V) (including Preamp factor if test used)
- Average Emission Level (dB μ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) + Meter Reading (dB μ V) (including Preamp factor if test used)
- Average Emission Level (dB μ V/m) = Peak Emission Level (dB μ V/m) + DCCF (dB)
Duty Cycle Correction Factor (DCCF) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.6.
- ERP = Peak Emission Level (dB μ V/m) - 95.2dB - 2.14dB
- Band Edge Emission Level (dB μ V/m) = Fundamental Emission Level (dB μ V/m) - Maker-Delta (dB)

6.5. Test Results

Please refer to Appendix A.

7. MAXIMUM CONDUCTED OUTPUT POWER

7.1. Block Diagram of Test Setup



7.2. Specification Limits

For client devices operating under the control of an indoor access point in the 5.925-7.125 GHz bands, the maximum e.i.r.p. over the frequency band of operation must not exceed 24 dBm.

7.3. 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 3.6 is < 98%.

■ **Method AVGSA-2 (Spectrum channel power) for 802.11ac-VHT80/160, 802.11ax-HE80/160 modes only**

- (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%.

7.4. Test Results

Please refer to Appendix A



8. DEVIATION TO TEST SPECIFICATIONS

【NONE】



*Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan*

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

APPDNDIX A

TEST DATA AND PLOTS

(Model: 17Z90Q)



*Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan*

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

APPDNDIX B

TEST PHOTOGRAPHS

(Model: 17Z90Q)