Audix Technology Corp.
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FCC 15.407
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)17G90Q (2)17GB90Q (3)17GD90Q (4)17GG90Q**
Brand		**LG**
FCC ID	**:**	**BEJNT-17G90Q**

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

Testing Laboratory
1724

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.

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TEST REPORT

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)17G90Q (2)17GB90Q (3)17GD90Q (4)17GG90Q
(3) Brand	:	LG
(4) Power Supply	:	DC 19.5V, 10.8A

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. 04. 20

Reviewed by: Sabrina Wang (Sabrina Wang/Administrator)

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

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1. REVISION RECORD OF TEST REPORT

Edition No	Issued Date	Revision Summary	Report Number
0	2022. 04. 20	Original Report	EM-F220016

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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	**PASS**
15.407(a)(8)	Maximum Power Spectral Density	**PASS**
15.407(a)(8)	Maximum Conducted Output Power	**PASS**
2.1049 15.407(a)(10)	Occupied Bandwidth/26dB Bandwidth	**PASS**
15.407(b)(6)	Undesirable emission limits: Band edge / Spurious Emission (Conducted)	**PASS**
15.407(b)(7)	In-Band Emission (Channel Mask)	**PASS**
15.407(d)(6)	Contention Based Protocol	**PASS**
15.203	Antenna Requirement	**PASS**
Note: The uncertainties value is not used in determining the result.		

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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, 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)17G90Q (2)17GB90Q (3)17GD90Q (4)17GG90Q The difference between all models is different in the sales customers.
Brand	LG

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3.2. Description of EUT

<table>
<tr><td>Test Model</td><td>17G90Q</td></tr>
<tr><td>Serial Number</td><td>N/A</td></tr>
<tr><td>Power Rating</td><td>DC 19.5V, 10.8A</td></tr>
<tr><td>Software Version</td><td>XY (X, Y can be 0 to 9 for different SW version not influence RF parameter)</td></tr>
<tr><td>RF Features</td><td>WLAN:802.11 a/b/g/n/ac/ax
Bluetooth: BT and BLE (BT 5.1)</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>802.11ax-HE20</td><td>2T2R</td></tr>
<tr><td>802.11ax-HE40</td><td>2T2R</td></tr>
<tr><td>BT/BLE</td><td>1T1R</td></tr>
</table>
<table>
<tr><th colspan="2">U-NII Bands</th></tr>
<tr><td>802.11a</td><td>1T1R</td></tr>
<tr><td>802.11n-HT20/802.11ac-VHT20/802.11ax-HE20</td><td>2T2R</td></tr>
<tr><td>802.11n-HT40/802.11ac-VHT40/802.11ax-HE40</td><td>2T2R</td></tr>
<tr><td>802.11ac-VHT80/802.11ax-HE80</td><td>2T2R</td></tr>
<tr><td>802.11ac-VHT160/802.11ax-HE160</td><td>2T2R</td></tr>
</table>
The MIMO is uncorrelated and supported SDM (Spatial Division Multiplexing) mode only. It supports neither beamforming nor Cyclic Delay Diversity (CDD).</td></tr>
<tr><td>Device Category</td><td>☐Outdoor Access Point
☐Fixed point-to-point Access Point
☐Indoor Access Point
■Mobile and Portable client device</td></tr>
<tr><td>Test Sample</td><td>
<table>
<tr><th>Sample No.</th><th>Test Item</th><th>Firmware</th></tr>
<tr><td>01</td><td>AC Conduction, Radiated, RF Conducted</td><td>N/A</td></tr>
</table></td></tr>
<tr><td>Sample Status</td><td>Trial sample</td></tr>
<tr><td>Date of Receipt</td><td>2021. 12. 13</td></tr>
<tr><td>Date of Test</td><td>2021. 12. 22 ~ 2022. 04. 20</td></tr>
<tr><td>Interface Ports of EUT</td><td>• One Micro SD Card Slot
• One Earphone Port
• Two USB 3.0 Ports
• Two USB Type C Ports
• One HDMI Port
• One LAN Port
• One DC In Port</td></tr>
<tr><td>Accessories Supplied</td><td>• AC Adapter</td></tr>
</table>

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3.3. Reference Test Guidance

ANSI C63.10:2013
KDB 789033 D02 v02r01, KDB 662911 D01 v02r01, KDB 987594 D02 v01r01

3.4. Antenna Information

No.	Antenna Part Number	Manufacturer	Antenna Type	Frequency (MHz)	Max Gain(dBi)	
					Main	AUX
1.	WA-P-LELE-04-005	INPAQ	Mono-Pole	2400	2.4	0.7
				2450	2.9	**2.0**
				2500	**3.6**	1.6
				5150	1.0	**0.6**
				5470	**3.0**	-0.1
				5850	2.8	-0.2
				5925	1.3	-2.7
				6525	1.1	-3.0
				7125	**3.4**	**0.1**

According to KDB 662911 D01 d) ii), transmit signals are completely uncorrelated, then
Directional gain = 10 log[($10^{G1/10}$ + $10^{G2/10}$ + … + $10^{GN/10}$)/N_{ANT}] dBi
Note 1. 2.4G: Directional gain = 10 log[($10^{3.6/10}$ +$10^{2.0/10}$)/2]= 2.87dBi
Note 2. UNII Band (WLAN 5G): Directional gain = 10 log[($10^{3.0/10}$ +$10^{0.6/10}$)/2]= 1.96dBi
Note 3. UNII Band (WLAN 6G):
5925MHz: Directional gain = 10 log[($10^{1.3/10}$ +$10^{-2.7/10}$)/2]= -0.25dBi
6525MHz: Directional gain = 10 log[($10^{1.1/10}$ +$10^{-3.0/10}$)/2]= -0.48dBi
7125MHz: Directional gain = 10 log[($10^{3.4/10}$ +$10^{0.1/10}$)/2]= 2.06dBi

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3.5. EUT Specifications Assessed in Current Report

Mode	U-NII Band	Fundamental Range (MHz)	Channel Number
802.11a/ 802.11n-HT20/ 802.11ac-VHT2/ 802.11ax-HE20	5	5955-6415	24
	6	6435-6515	5
	7	6535-6855	17
	8	6875-7115	13
802.11n-HT40/ 802.11ac-VHT40/ 802.11ax-HE40	5	5965-6405	12
	6	6445-6485	2
	7	6525-6845	9
	8	6885-7085	6
802.11ac-VHT80/ 802.11ax-HE80	5	5985-6385	6
	6	6465-6545	2
	7	6625-6785	3
	8	6865-7025	3
802.11ac-VHT160/ 802.11ax-HE160	5	6025-6345	3
	6	6505	1
	7	6665	1
	8	6825-6985	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
802.11ac-VHT20	OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)	Up to 173.3
802.11ac-VHT40		Up to 400
802.11ac-VHT80		Up to 866.7
802.11ac-VHT160		Up to 1733.3
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

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Channel List											
802.11a/802.11n-HT20/802.11ac-VHT20/802.11ax-HE20											
U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)
5	1	5955	6	97	6435	7	117	6535	8	185	6875
	5	5975		101	6455		121	6555		189	6895
	9	5995		105	6475		125	6575		193	6915
	13	6015		109	6495		129	6595		197	6935
	17	6035		113	6515		133	6615		201	6955
	21	6055					137	6635		205	6975
	25	6075					141	6655		209	6995
	29	6095					145	6675		213	7015
	33	6115					149	6695		217	7035
	37	6135					153	6715		221	7055
	41	6155					157	6735		225	7075
	45	6175				7	161	6755		229	7095
	49	6195					165	6775		233	7115
	53	6215					169	6795			
	57	6235					173	6815			
	61	6255					177	6835			
	65	6275					181	6855			
	69	6295									
	73	6315									
	77	6335									
	81	6335									
	85	6375									
	89	6395									
	93	6415									

Channel List											
802.11n-HT40/802.11ac-VHT40/802.11ax-HE40											
U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)
5	3	5965	6	99	6445	7	115	6525	8	187	6885
	11	6005		107	6485		123	6565		195	6925
	19	6045					131	6505		203	6965
	27	6085					139	6645		211	7005
	35	6125					147	6685		219	7045
	43	6165					155	6725		227	7085
	51	6205					163	6765			
	59	6245					171	6805			
	67	6285					179	6845			
	75	6325									
	83	6365									
	91	6405									

Channel List											
802.11ac-VHT80/802.11ax-HE80											
U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)
5	7	5985	6	103	6465	7	135	6625	8	183	6865
	23	6065		119	6545		151	6705		199	6945
	39	6145					167	6785		215	7025
	55	6225									
	71	6305									
	87	6385									

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Channel List											
802.11ac-VHT160/802.11ax-HE160											
U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)	U-NII Band	Channel Number	Frequency (MHz)
5	15	6025	6	111	6505	7	143	6665	8	175	6825
	47	6185								207	6985
	79	6345									

Note: Test modes are presented at section 3.6.

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3.6. Description of Key Components

3.6.1. For the All Component Lists

Item	Supplier	Model / Type	Character
System	Microsoft	Windows 11	---
Main Board	LG	17G90Q MAIN B/D	Manufacturer: #1 Hannstar Board Tech(Jiang Yin) Corp.,Ltd. #2 Elec & Eltek Company (MCO) Limited.
SUB Board	LG	17G90Q SUB B/D	Manufacturer: #1 Hannstar Board Tech(Jiang Yin) Corp.,Ltd. #2 Elec & Eltek Company (MCO) Limited.
CPU (Socket: BGA1787)	Intel	I7-11800H	2.3GHz
GPU	NVIDIA	RTX3080 (GN20-E7)	---
	NVIDIA	RTX3060 (GN20-E3)	---
17.3” LCD Panel	LG Display	LP173WFG(SP)(V4)	17.3" FHD(1920*1080) 300Hz
Storage (SSD)	Samsung	---	NVMe 256GB / 512GB /1TB Gen4
	Samsung	---	NVMe 256GB / 512GB /1TB Gen3
	SK hynix	---	NVMe 256GB / 512GB /1TB Gen3
Memory (RAM)	SK Hynix	---	16GB+16GB (On Card)
	Samsung	---	16GB+16GB (On Card)
	Samsung	---	8GB+8GB (On Card)
Battery Pack	LG	LBW222AM	DC 11.4V, 93Wh Typ 8184mAh
Touch Pad	LITE ON	SP8001	
	Elan	SD081A-36H0	
Keyboard	LITE ON	SN8102	
Web Camera	Chicony	CKFLF26	---
	Chicony	CKFLF12	
WLAN Combo Card	Intel	AX210D2W	FCC ID: PD9AX210D2 IC: 1000M-AX210D2
WLAN Combo Antenna	LG (INPAQ)	WA-P-LELE-04-005	PCB, Mono-pole Type Main: Black, Aux: Gray
AC Adapter	LG	ACC-LATP1	I/P: AC 100-240V, 50-60Hz, 3.0A O/P: DC 19.5V, 10.8A
	LG	ACC-LATP2	I/P: AC 100-240V, 50-60Hz, 2.5A O/P: DC 19.5V, 10.8A
	DC Power Cord: Non-Shielded, Undetached, 1.5m, Bonded a ferrite core AC Power Cord: Non-Shielded, Detached, 1.55m(3C)		

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

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

SKU (Mode) 1	
Main Board	LG, 17G90Q MAIN B/D
SUB Board	LG, 17G90Q SUB B/D
CPU	Intel, I7-11800H, 2.3GHz
GPU	NVIDIA, RTX3080 (GN20-E7)
17.3” LCD Panel	LG Display, LP173WFG(SP)(V4)
Storage (SSD) #1	Samsung, 1TB
Storage (SSD) #2	SK Hynix, 256GB
Memory (RAM) (On Card)	SK Hynix, 16GB+16GB
Battery Pack	LG, LBW222AM, 93Wh
Touch Pad	LITE ON, SP8001
Keyboard	LITE ON, SN8102
Web Camera	Chicony, CKFLF26
WLAN Combo Card	Intel, AX210D2W
WLAN Combo Antenna	LG (INPAQ), WA-P-LELE-04-005
AC Adapter	LG, ACC-LATP1

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3.7. Test Configuration

Mode	TX_{on} (ms)	1/ TX_{on} (kHz)	TX_{on+off} (ms)	Duty Cycle (x)	Duty Cycle Factor [10log(1/x)] (dB)
802.11a	2.090	0.478	2.130	1.000	N/A
802.11n-HT20	3.960	0.253	4.035	1.000	N/A
802.11n-HT40	3.975	0.252	4.020	1.000	N/A
802.11ac-VHT80	3.975	0.252	4.020	1.000	N/A
802.11ac-VHT160	2.790	0.358	2.830	1.000	N/A
802.11ax-HE20	3.940	0.254	4.000	1.000	N/A
802.11ax-HE40	3.940	0.254	4.000	1.000	N/A
802.11ax-HE80	3.960	0.253	4.020	1.000	N/A
802.11ax-HE160	2.280	0.439	2.320	1.000	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.

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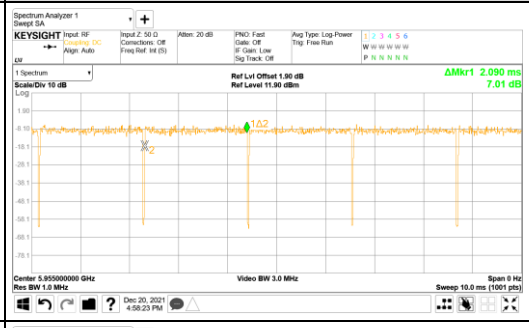
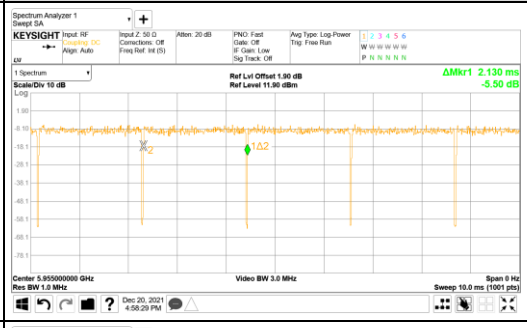
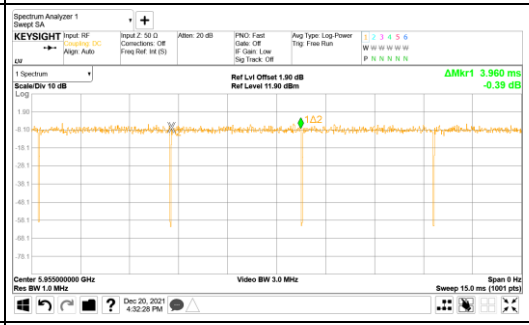
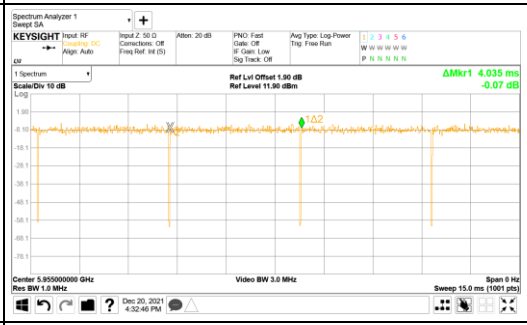
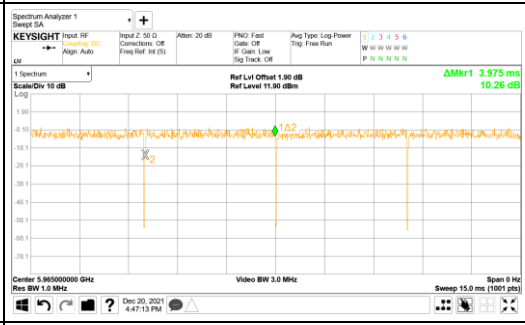
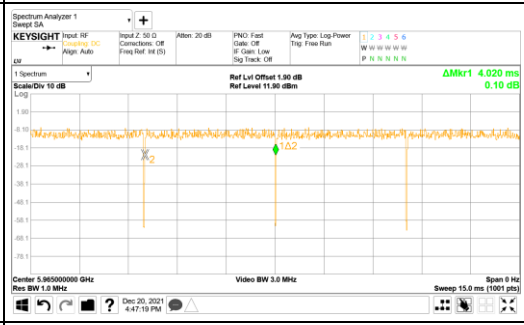
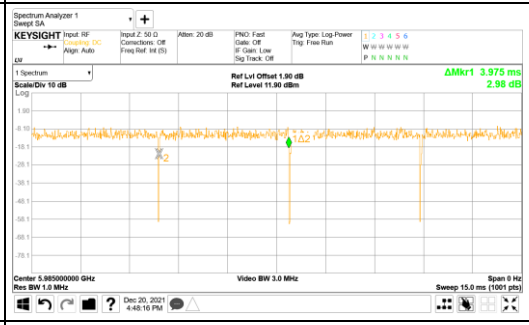
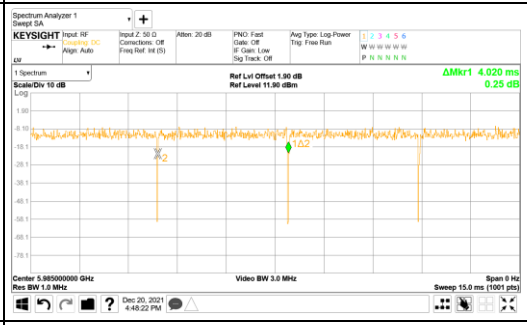
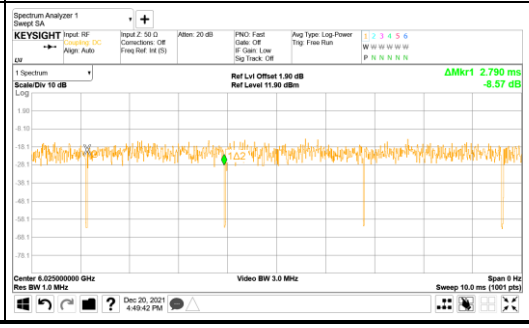
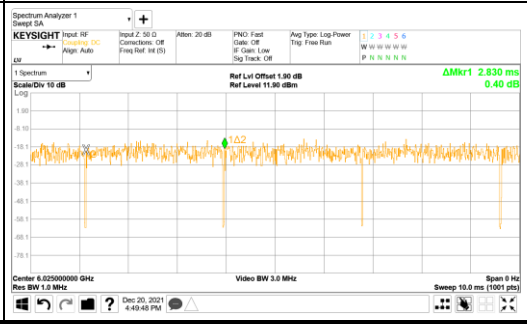
Mode	TX_{on} (ms)	$T_{on}+T_{off}$ (ms)
802.11a		
802.11n-HT20		
802.11n-HT40		
802.11ac-VHT80		
802.11ac-VHT160		

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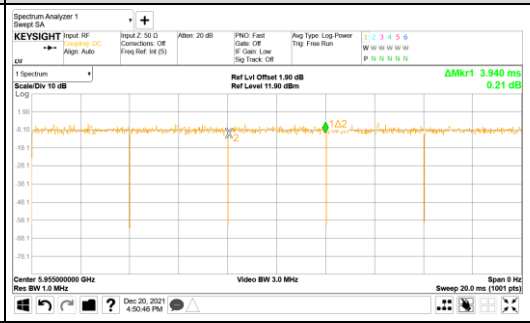
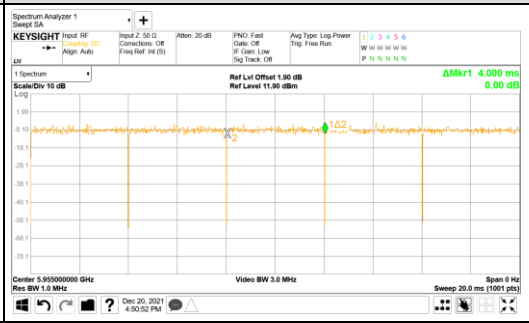
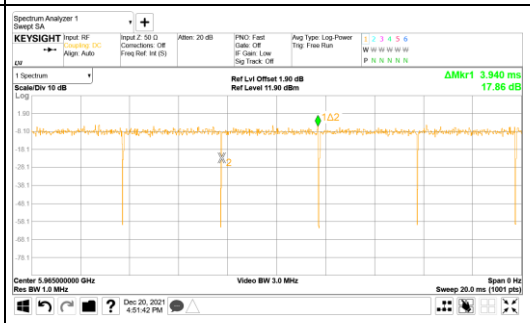
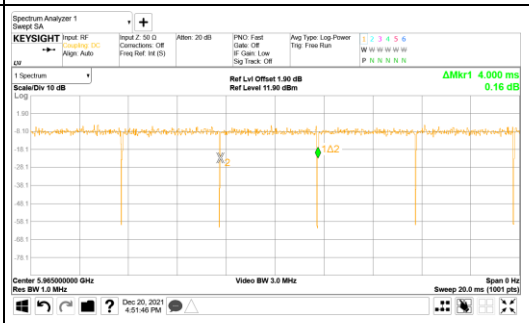
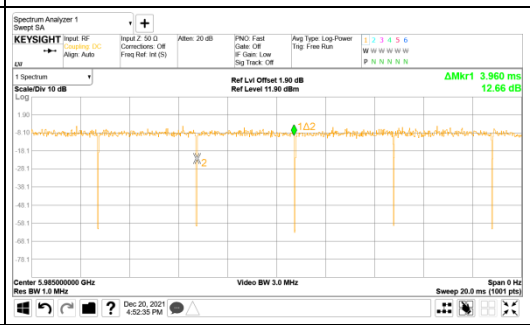
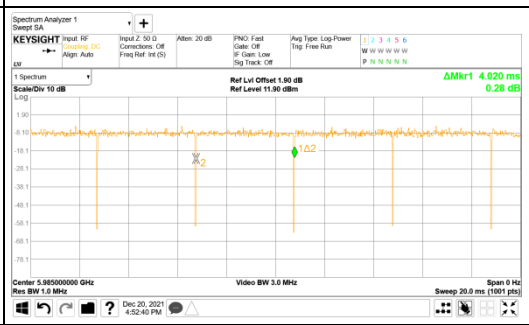
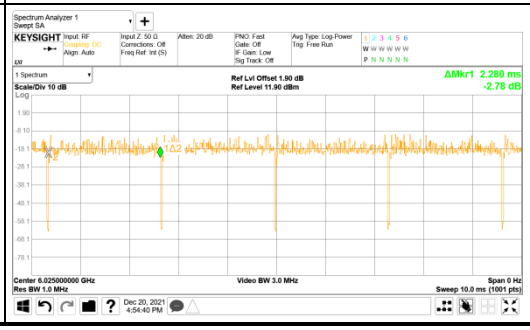
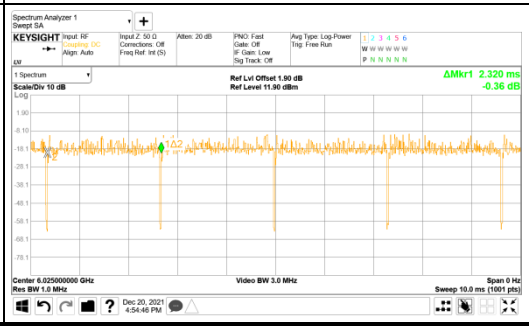
Mode	TX_{on} (ms)	$T_{on}+T_{off}$(ms)
802.11ax-HE20		
802.11ax-HE40		
802.11ax-HE80		
802.11ax-HE160		

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AC Conduction
Normal operation

Item		Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Spurious Emission (30MHz~1GHz)	802.11ac-VHT160	HE0	79

- OFDM Modulation

Item		Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Spurious Emission (Above 1GHz)	802.11a	6Mbps	1/105/117/209
		802.11n-HT20	MCS8	1/105/181/209
		802.11n-HT40	MCS8	3/107/115/227
		802.11ac-VHT80	MCS0	7/119/135/215
		802.11ac-VHT160	MCS0	79/111/143/207
		802.11ax-HE20	HE0	1/105/181/185
		802.11ax-HE40	HE0	3/107/115/211
		802.11ax-HE80	HE0	7/119/135/215
		802.11ax-HE160	HE0	79/111/143/207

Item		Mode	Data Rate	Test Channel
Conducted Test Case	Maximum Power Spectral Density/ Maximum Conducted Output power/ Occupied Bandwidth/ 26dB bandwidth	802.11a	6Mbps	1/45/93/97/105/113/ 117/149/181/185/209/233
		802.11n-HT20	MCS8	
		802.11ax-HE20	HE0	
		802.11n-HT40	MCS8	3/43/91/99/107/ 115/147/179/187/211/227
		802.11ax-HE40	HE0	
		802.11ac-VHT80	MCS0	7/39/87/103/119/ 135/151/167/183/199/215
		802.11ax-HE80	HE0	
		802.11ac-VHT160	MCS0	15/47/79/111/ 143/175/207
		802.11ax-HE160	HE0	
	Undesirable Emission Limits: Band Edge	802.11a	6Mbps	1/233
		802.11n-HT20	MCS8	
		802.11n-HT40	MCS8	3/227
		802.11ax-HE40	HE0	
		802.11ac-VHT80	MCS0	7/215
		802.11ax-HE80	HE0	
		802.11ac-VHT160	MCS0	15/207
		802.11ax-HE160	HE0	
	Spurious Emission	802.11a	6Mbps	1/105/117/209
		802.11n-HT20	MCS8	1/105/181/209
		802.11n-HT40	MCS8	3/107/115/227
		802.11ac-VHT80	MCS0	7/119/135/215
		802.11ac-VHT160	MCS0	79/111/143/207
		802.11ax-HE20	HE0	1/105/181/185
		802.11ax-HE40	HE0	3/107/115/211
		802.11ax-HE80	HE0	7/119/135/215
		802.11ax-HE160	HE0	79/111/143/207
	In-Band Emission (Channel Mask)	802.11a	6Mbps	1/45/93/97/105/113/ 117/149/181/185/209/233
		802.11n-HT20	MCS8	
		802.11ax-HE20	HE0	
		802.11n-HT40	MCS8	3/43/91/99/107/ 115/147/179/187/211/227
		802.11ax-HE40	HE0	
		802.11ac-VHT80	MCS0	7/39/87/103/119/ 135/151/167/183/199/215
		802.11ax-HE80	HE0	
		802.11ac-VHT160	MCS0	15/47/79/111/ 143/175/207
		802.11ax-HE160	HE0	
	Contention Based Protocol	802.11ax-HE20	HE0	45/105/149/209
		802.11ax-HE160	HE0	47/111/143/207

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- OFDMA Modulation [Note 5]

Item		Tones	RU Index	Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Spurious Emission (Above 1GHz)	26T	18	802.11ax- HE80	HE0	215
		52T	37	802.11ax- HE40	HE0	227
		106T	53	802.11ax- HE40	HE0	227
		242T	S61	802.11ax- HE160	HE0	207
		484T	S65	802.11ax- HE160	HE0	207
		996T	67	802.11ax- HE160	HE0	207

Item		Tones	RU Index	Mode	Data Rate	Test Channel
Conducted Test Case	Maximum Power Spectral Density/ Occupied Bandwidth/ 26dB bandwidth/ Out of Band	26T	18	802.11ax- HE80	HE0	215
		52T	37	802.11ax- HE40	HE0	227
		106T	53	802.11ax- HE40	HE0	227
		242T	S61	802.11ax- HE160	HE0	207
		484T	S65	802.11ax- HE160	HE0	207
		996T	67	802.11ax- HE160	HE0	207

Item		Tones	RU Index	Mode	Data Rate	Test Channel
Conducted Test Case	Maximum Conducted Output power	26T	0/4/8	802.11ax-HE20	HE0	1/45/93/97/105/113/ 117/149/181/185/209/233
			0/8/17	802.11ax-HE40	HE0	3/43/91/99/107/ 115/147/179/187/211/227
			0/18/36	802.11ax-HE80	HE0	7/39/87/103/119/ 135/151/167/183/199/215
			0/18/36	802.11ax-HE160(80L)	HE0	15/47/79/111/ 143/175/207
			S0/S18/S36	802.11ax-HE160(80H)	HE0	
		52T	37/39/40	802.11ax-HE20	HE0	1/45/93/97/105/113/ 117/149/181/185/209/233
			37/40/44	802.11ax-HE40	HE0	3/43/91/99/107/ 115/147/179/187/211/227
			37/44/52	802.11ax-HE80	HE0	7/39/87/103/119/ 135/151/167/183/199/215
			37/44/52	802.11ax-HE160(80L)	HE0	15/47/79/111/ 143/175/207
			S37/S44/S52	802.11ax-HE160(80H)	HE0	
		106T	53/54	802.11ax-HE20	HE0	1/45/93/97/105/113/ 117/149/181/185/209/233
			53/54/56	802.11ax-HE40	HE0	3/43/91/99/107/ 115/147/179/187/211/227
			53/56/60	802.11ax-HE80	HE0	7/39/87/103/119/ 135/151/167/183/199/215
			53/56/60	802.11ax-HE160(80L)	HE0	15/47/79/111/ 143/175/207
			A53/S56/S60	802.11ax-HE160(80H)	HE0	
		242T	61	802.11ax-HE20	HE0	1/45/93/97/105/113/ 117/149/181/185/209/233
			61/62	802.11ax-HE40	HE0	3/43/91/99/107/ 115/147/179/187/211/227
			61/62/64	802.11ax-HE80	HE0	7/39/87/103/119/ 135/151/167/183/199/215
			61/62/64	802.11ax-HE160(80L)	HE0	15/47/79/111/ 143/175/207
			S61/S62/S64	802.11ax-HE160(80H)	HE0	
		484T	65	802.11ax-HE40	HE0	3/43/91/99/107/ 115/147/179/187/211/227
			65/66	802.11ax-HE80	HE0	7/39/87/103/119/ 135/151/167/183/199/215
			65/66	802.11ax-HE160(80L)	HE0	15/47/79/111/ 143/175/207
			S65/S66	802.11ax-HE160(80H)	HE0	
		996T	67	802.11ax-HE160(80L)	HE0	15/47/79/111/ 143/175/207
			67/S67	802.11ax-HE160(80H)	HE0	

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

Note 5: After preliminary test, we present worst case with maximum power of each RU type.

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3.8. Output Power Setting

802.11a

U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting	
		ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)
5	5955	4.50	4.50	6	6435	4.50	4.50	7	6535	3.75	3.75	8	6875	3.75	3.75
	6175	4.50	4.50		6475	4.50	4.50		6695	3.75	3.75		6995	3.75	3.75
	6415	4.50	4.50		6515	4.50	4.50		6855	3.75	3.75		7115	-1.5	-1.5

802.11n-HT20

U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting	
		ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)
5	5955	1.50	1.50	6	6435	1.50	1.50	7	6535	0.75	0.75	8	6875	0.75	0.75
	6175	1.50	1.50		6475	1.50	1.50		6695	0.75	0.75		6995	0.75	0.75
	6415	1.50	1.50		6515	1.50	1.50		6855	0.75	0.75		7115	-5.25	-5.25

802.11n-HT40

U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting	
		ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)
5	5965	4.75	4.75	6	6445	4.75	4.75	7	6525	4.75	4.75	8	6885	4.00	4.00
	6165	4.75	4.75		6485	4.75	4.75		6685	4.00	4.00		7005	4.00	4.00
	6405	4.75	4.75						6845	4.00	4.00		7085	4.00	4.00

802.11ac-VHT80

U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting	
		ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)
5	5985	7.25	7.25	6	6465	7.25	7.25	7	6625	6.50	6.50	8	6865	6.50	6.50
	6145	7.25	7.25		6545	7.25	7.25		6705	6.50	6.50		6945	6.50	6.50
	6385	7.25	7.25						6785	6.50	6.50		7025	6.50	6.50

802.11ac-VHT160

U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting	
		ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)
5	6025	10.00	10.00	6	6505	10.00	10.00	7	6665	9.25	9.25	8	6985	9.25	9.25
	6185	10.00	10.00						6825	9.25	9.25				
	6345	10.00	10.00												

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802.11ax-HE20

U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting	
		ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)
5	5955	1.50	1.50	6	6435	1.50	1.50	7	6535	0.75	0.75	8	6875	0.75	0.75
	6175	1.50	1.50		6475	1.50	1.50		6695	0.75	0.75		6995	0.75	0.75
	6415	1.50	1.50		6515	1.50	1.50		6855	0.75	0.75		7115	-5.25	-5.25

802.11ax-HE40

U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting	
		ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)
5	5965	4.75	4.75	6	6445	4.75	4.75	7	6525	4.75	4.75	8	6885	4.00	4.00
	6165	4.75	4.75		6485	4.75	4.75		6685	4.00	4.00		7005	4.00	4.00
	6405	4.75	4.75						6845	4.00	4.00		7085	4.00	4.00

802.11ax-HE80

U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting	
		ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)
5	5985	7.25	7.25	6	6465	7.25	7.25	7	6625	6.50	6.50	8	6865	6.50	6.50
	6145	7.25	7.25		6545	7.25	7.25		6705	6.50	6.50		6945	6.50	6.50
	6385	7.25	7.25						6785	6.50	6.50		7025	6.50	6.50

802802.11ax-HE160

U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting		U-NII Band	Frequency (MHz)	Power Setting	
		ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)			ANT A (AUX)	ANT B (Main)
5	6025	10.00	10.00	6	6505	10.00	10.00	7	6665	9.25	9.25	8	6985	9.25	9.25
	6185	10.00	10.00						6825	9.25	9.25				
	6345	10.00	10.00												

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3.9. Tested Supporting System List

3.9.1. 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
5.	Mobile phone	ASUS	ASUS_Z01FD	N/A	N/A
Partner System					
6.	Tri-Band WiFi 6E Router	NETGEAR	RAXE500	N/A	FCC ID: PY320300508
For Contention Based Protocol Test only					
7.	Wireless-AXE11000 Tri-band Gigabit Router	ASUS	GT-AXE1100	N/A	FCC ID: MSR-RTAXJF0

3.9.2. 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.	USB Cable: Unshielded, Undetachable, 1.5m
6.	AC adapter: M/N:2ABS060K, DC Cable: Unshielded, Detachable, 1.8m AC Cord: Wall-mounted: 2C LAN cable: Unshielded, Detachable, 3.0m
7	Adapter: AcBel, ADD011, DC Power cable: Non-shielded, 11.5m, Power Cable: Non-Shielded, 0.9m

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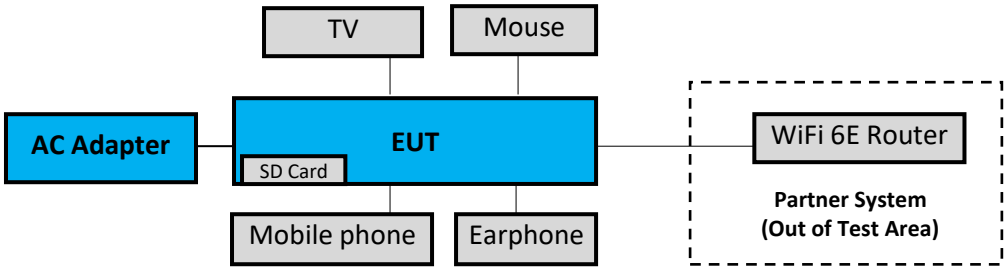
3.10.Setup Configuration

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 "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)].

3.12.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

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3.13.Measurement Uncertainty

Test Items/Facilities			Frequency Range	Uncertainty
Conduction Test			9kHz-150kHz	±3.7dB
			150kHz-30MHz	±3.4dB
Radiation Test	☒	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	±3.52dB
	☐	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
	☐	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
	☐	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%

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4. MEASUREMENT EQUIPMENTLIST

4.1.Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESR3	101774	2021.02.02	1 Year
2.	A.M.N.	R&S	ENV432	101567	2021.04.21	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	2021.01.04	1 Year
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.8 S/R	2021.04.15	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	2021.09.09	1 Year
2.	Spectrum Analyzer	Agilent	N9030A-526	MY53310269	2021.01.14	1 Year
3.	Spectrum Analyzer	Keysight	N9010B-544	MY55460198	2021.04.14	1 Year
4.	Test Receiver	R&S	ESCS30	100039	2021.06.02	1 Year
5.	Amplifier	Sonoma	310N	187161	2021.05.21	1 Year
6.	Microwave Amplifier	Keysight	83051A	MY53010042	2021.07.30	1 Year
7.	Microwave Amplifier	Keysight	83017A	MY53270365	2021.05.27	1 Year
8.	Loop Antenna	ETS	6512	00035867	2021.09.29	1 Year
9.	Bilog Antenna	TESEQ	CBL6112D	33821	2021.07.16	1 Year
10.	Double-Ridged Waveguide Horn	ETS-Lindgren	3115	00114104	2021.04.02	1 Year
11.	Horn Antenna	COM-POWER	AH-840	101092	2021.01.05	1 Year
12.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2021.01.29	1 Year
13	Coaxial Cable	HUBER+ SUHNER	SUCOFLEX 106	RE-14	2021.01.29	1 Year
14.	Coaxial Cable	HUBER+ SUHNER	SUCOFLEX 102	RE-30	2021.05.25	1 Year
15.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2021.04.15	1 Year
16.	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.

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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	ML2495A	1145008	2021.06.30	1 Year
3.	Power Sensor	Anritsu	MA2411B	1126096	2021.06.30	1 Year
4.	MXG RF Vector Signal Generator	Agilent	N5182B	MY53050409	2021.02.20	1 Year
	MXG RF Vector Signal Generator	Agilent	N5182B	MY53050409	2022.02.15	1 Year
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	RF-03	2021.04.15	1 Year

4.4.Contention Based Protocol Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9030B	MY61330403	2021.12.21	1 Year
2.	MXG RF Vector Signal Generator	Agilent	N5182B	MY53050409	2021.02.20	1 Year
	MXG RF Vector Signal Generator	Agilent	N5182B	MY53050409	2022.02.15	1 Year
3.	Frequency Extender	KEYSIGHT	N5182BX07	MY59362533	2021.11.07	1 Year
4.	CBP Test Unit	KEYSIGHT	N/A	N/A	N.C.R.	N.C.R.
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	RF-03	2021.04.15	1 Year

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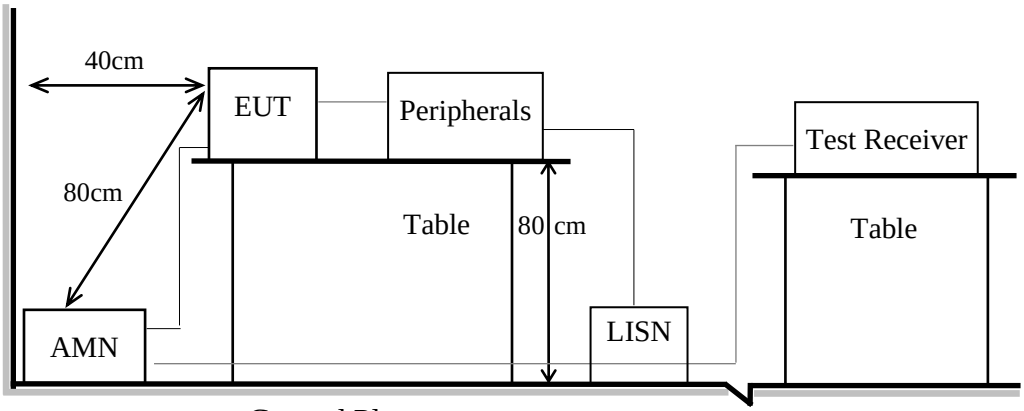
5. CONDUCTED EMISSION

5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.10

5.1.2. Shielded Room Setup Diagram



5.2. Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dBμV	56 ~ 46 dBμV
500kHz ~ 5MHz	56 dBμV	46 dBμV
5MHz ~ 30MHz	60 dBμV	50 dBμV

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

5.3. Test Procedure

5.3.1. To set up the EUT as indicated in ANSI 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.

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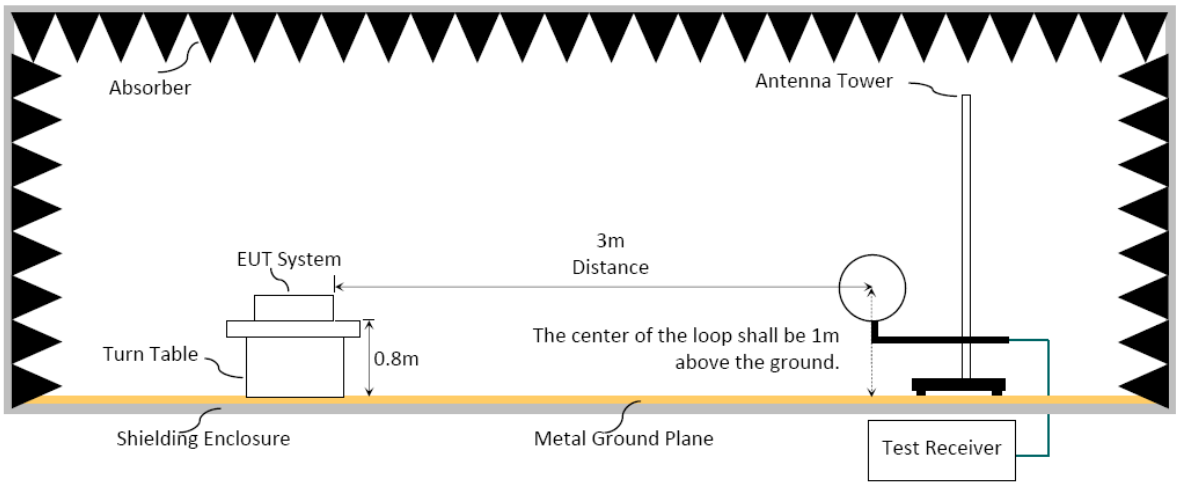
6. RADIATED EMISSION

6.1.Block Diagram of Test Setup

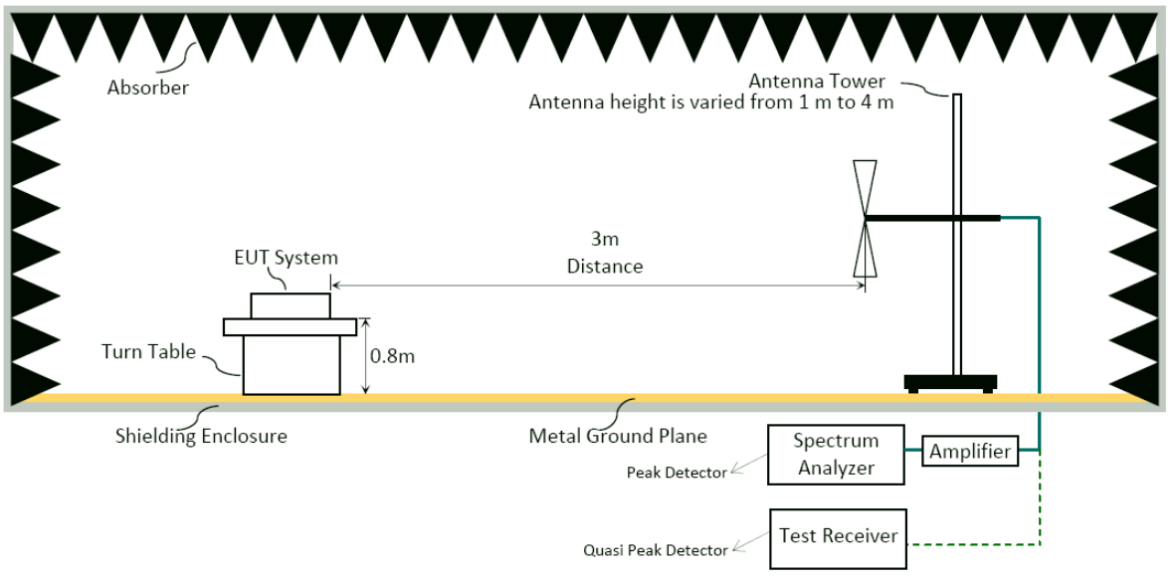
6.1.1. Block Diagram of EUT

Indicated as section 3.10

6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000MHz



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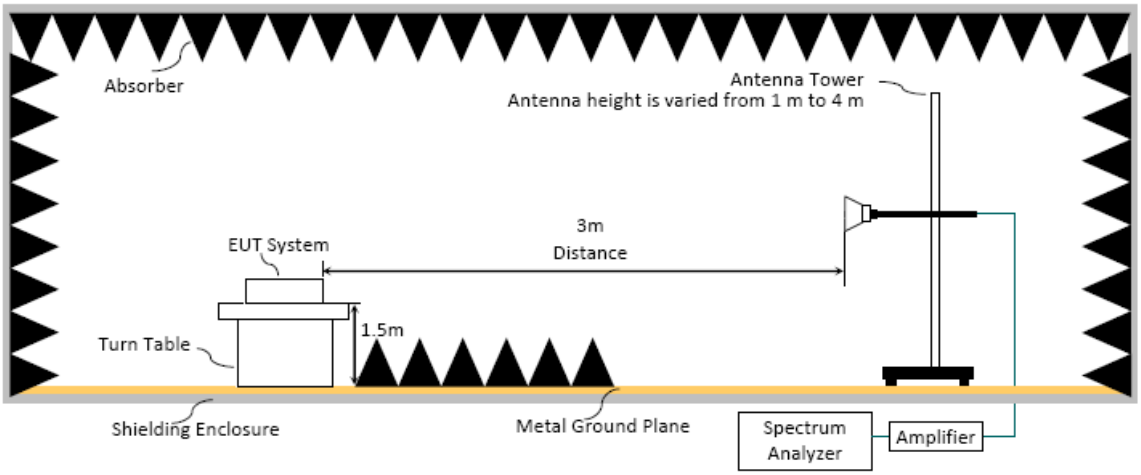
6.1.4. Setup Diagram for above 1GHz



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	
		dBμV/m	μV/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dBμV/m (Peak) 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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6.2.2. 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

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

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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.

Frequency below 1GHz:
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.

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.

Frequency above 1GHz to 10th harmonic(up to 40 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.

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.

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Average Detector:

■**Option 1:**

(1)RBW = 1MHz

(2)VBW ≥ 1/ T.

Modulation Type	TX_{on} (ms)	1/ TX_{on} (kHz)	VBW Setting
802.11a	2.090	0.478	10Hz
802.11n-HT20	3.960	0.253	10Hz
802.11n-HT40	3.975	0.252	10Hz
802.11ac-VHT80	3.975	0.252	10Hz
802.11ac-VHT160	2.790	0.358	10Hz
802.11ax-HE20	3.940	0.254	10Hz
802.11ax-HE40	3.940	0.254	10Hz
802.11ax-HE80	3.960	0.253	10Hz
802.11ax-HE160	2.280	0.439	10Hz

N/A: 1/ TX_{on} is not implemented when duty cycle presented in section 3.6 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 (dBμV/m) =Antenna Factor (dB/m) + Cable Loss (dB) + Meter Reading (dBμV) (including Preamp factor if test used)

■Average Emission Level (dBμV/m) =Antenna Factor (dB/m) + Cable Loss (dB) + Meter Reading (dBμV) (including Preamp factor if test used)

□Average Emission Level (dBμV/m)= Peak Emission Level (dBμV/m)+ DCCF(dB)
Duty Cycle Correction Factor (DCCF)= 20log(TX_{on}/TX_{on+off}) presented in section 3.7.

□ERP= Peak Emission Level (dBμV/m) -95.2dB-2.14dB

6.5.Test Results

Please refer to Appendix A.

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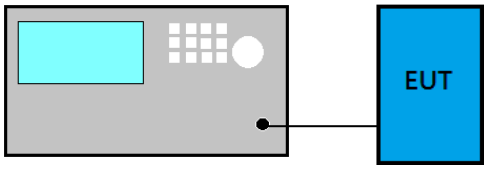
7. MAXIMUM POWER SPECTRAL DENSITY

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 power spectral density must not exceed -1dBm e.i.r.p. in any 1-megahertz band

7.3. 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) ≥ 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 3.6 is < 98%.

For power density emission measurements from multiple outputs of a transmitter or from multiple transmitters: Please refer to KDB 662911 E 2) c).

7.4. Test Results

Please refer to Appendix A

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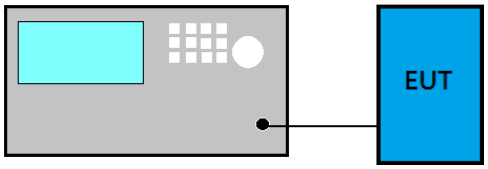
8. MAXIMUM CONDUCTED OUTPUT POWER

8.1. Block Diagram of Test Setup



8.2. 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.

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 3.6 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) ≥ 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

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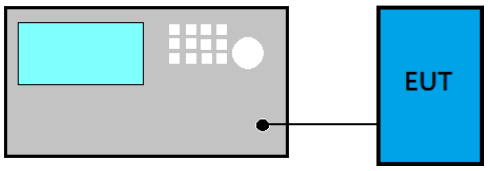
9. OCCUPIED BANDWIDTH/26DB BANDWIDTH

9.1. Block Diagram of Test Setup



9.2. Specification Limits

The maximum transmitter channel bandwidth for U-NII devices in the 5.925-7.125 GHz band is 320 megahertz

9.3. Test Procedure

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

(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.

9.4. Test Results

Please refer to Appendix A

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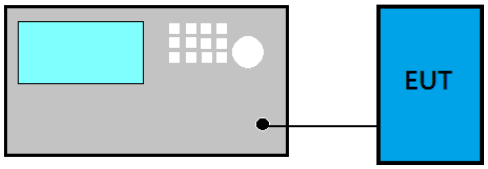
10. UNDESIRABLE EMISSION LIMITS: BAND EDGE / SPURIOUS EMISSION (CONDUCTED)

10.1.Block Diagram of Test Setup



10.2.Band Edge/Spurious Emission Specification Limits

For transmitters operating within the 5.925-7.125 GHz band: Any emissions outside of the 5.925- 7.125 GHz band must not exceed an e.i.r.p. of −27 dBm/MHz.
Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g., see FCC Part §§ 15.250, 15.252, 15.253(d), 15.255, 15.256, and 15.509 through 15.519, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, e.g., the total peak power level

10.3.Test Procedure

- **For Band edge**
  Please refer to KDB 789033 D02 v02r01 G2 and G3 (b) and (d)
  Tests were performed using both RMS and peak detectors.

- **For Spurious Emission**
  Please refer to KDB 789033 D02 v02r01 G5

For spurious emission measurements from multiple outputs of a transmitter or from multiple transmitters: Please refer to KDB 662911 E 3) a) (iii).

10.4.Test Results

Please refer to Appendix A

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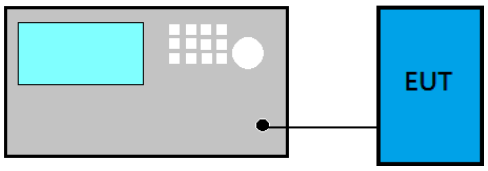
11. IN-BAND EMISSION (CHANNEL MASK)

11.1. Block Diagram of Test Setup



11.2. Specification Limits

For transmitters operating within the 5.925-7.125 GHz bands: Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.

11.3. Test Procedure

Following measurement procedure is reference to KDB 987594 D02 U-NII 6GHz EMC Measurement v01v01:

Measure the power spectral density (which will be used for emissions mask reference) using the following procedure:

(a) Set the span to encompass the entire 26 dB EBW of the signal.
(b) Set RBW = same RBW used for 26 dB EBW measurement.
(c) Set VBW ≥ 3 X RBW
(d) Number of points in sweep ≥ (2 X span / RBW).
(e) Sweep time = auto.
(f) Detector = RMS (i.e., power averaging)
(g) Trace average at least 100 traces in power averaging (rms) mode.
(h) Use the peak search function on the instrument to find the peak of the spectrum.

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(1) Using the measuring equipment limit line function, develop the emissions mask based on the following requirements. The emissions power spectral density must be reduced below the peak power spectral density (in dB) as follows:
   (a) Suppressed by 20 dB at 1 MHz outside of the channel edge.
   (b) Suppressed by 28 dB at one channel bandwidth from the channel center.
   (c) Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel center.

(2) Adjust the span to encompass the entire mask as necessary.

(3) Clear trace.

(4) Trace average at least 100 traces in power averaging (rms) mode.

(5) Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask.

11.4.Test Results

Please refer to Appendix A

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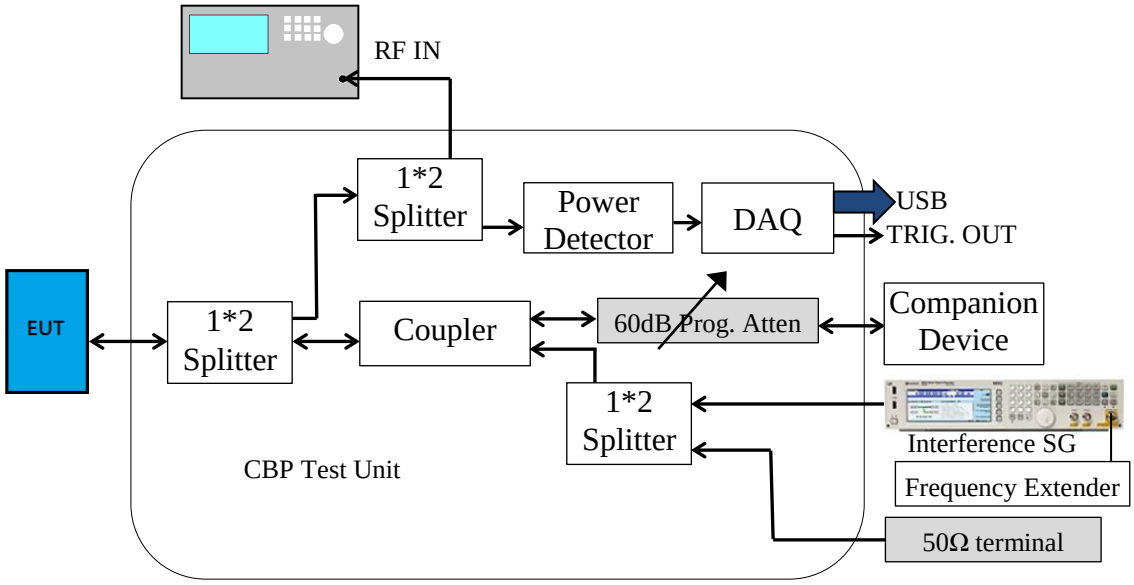
12. CONTENTION BASED PROTOCOL

12.1. Block Diagram of Test Setup



12.2. Specification Limits

Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band must employ a contention-based protocol

FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01v01
Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel (in which incumbent signal is transmitted) and stay off the incumbent channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm)1. The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain

To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

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Table 1. Criteria to determine number of times detection threshold test may be performed

If	Number of Tests	Placement of Incumbent Transmission
$BW_{EUT} \leq BW_{Inc}$	One	Tune incumbent and EUT transmission ($f_{c1}=f_{c2}$)
$BW_{Inc} < BW_{EUT} \leq 2BW_{Inc}$	One	Incumbent transmission is contained within BW_{EUT}
$2BW_{Inc} < BW_{EUT} \leq 4BW_{Inc}$	Twice. Incumbent transmission is contained within BW_{EUT}	Incumbent transmission is located as closely as possible to the lower edge and upper edge, respectively, of the EUT channel
$BW_{EUT} > 4BW_{Inc}$	Three times	Incumbent transmission is located as closely as possible to the lower edge of the EUT channel, in the middle of EUT channel, and as closely as possible to the upper edge of the EUT channel

Where:

BW_{EUT} : Transmission bandwidth of EUT signal
BW_{Inc} : Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal)
f_{c1}: Center frequency of EUT transmission
f_{c2}: Center frequency of simulated incumbent signal

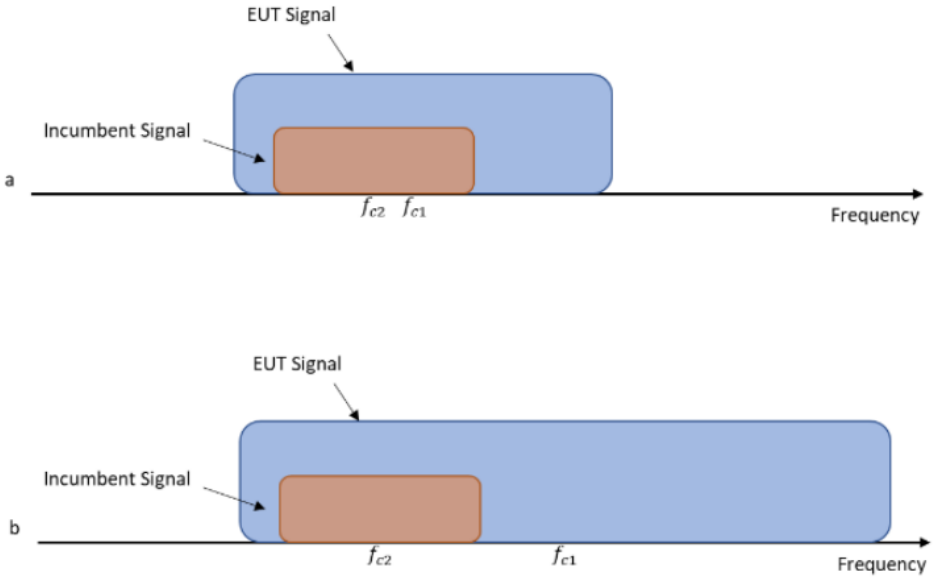

Figure 1. Two possible scenarios where a) center frequency of EUT transmission falls within incumbent's bandwidth, or b) outside of it

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12.3.Test Procedure

Following measurement procedure is reference to KDB 987594 D02 U-NII 6GHz EMC Measurement v01v01:

(1) To ensure EUT reliably detects an incumbent signal in both scenarios shown in Figure 1, the detection threshold test may be repeated more than once with the incumbent signal (having center frequency f_{c2}) tuned to different center frequencies within the UT transmission bandwidth. The criteria specified in Table 1 determines how many times the detection threshold test must be performed

(2) Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use Table 1 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.

(3) Monitor the signal analyzer to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.

(4) (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.

(5) Refer to Table 1 to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 2, choose a different center frequency for the AWGN signal and repeat the process.

(6) The test tool is "LAN test" to let the EUT to transmit with a constant duty cycle.

12.4.Test Results

Please refer to Appendix A

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13. DEVIATION TO TEST SPECIFICATIONS

【NONE】

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APPDNDIX A

TEST DATA AND PLOTS

(Model: 17G90Q)

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APPDNDIX B

TEST PHOTOGRAPHS

(Model: 17G90Q)