

**FCC 15.247 & RSS-247  
(Permissive Change)  
2.4GHz 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)17Z90R (2)17ZB90R  
(3)17ZD90R (4)17ZG90R**  
**Brand : LG**  
**FCC ID : BEJNT-17Z90R**  
**IC : 2703H-17Z90R**

**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.

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## 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)17Z90R (2)17ZB90R (3)17ZD90R (4)17ZG90R  
(3) Brand : LG  
(4) Power Supply: DC 20V, 3.25A

Applicable Standards:

**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: 2023. 07. 19

Reviewed by:



(Sabrina Wang/Administrator)

Approved by:



(Johnny Hsueh/Section Manager)



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## 1. REVISION RECORD OF TEST REPORT

Edition No	Issued Date	Revision Summary	Report Number
0	2023. 07. 19	Original Report	EM-F230334

## 2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	<b>PASS</b>
15.247(d)/15.205	RSS-Gen §8.9 RSS-247 §5.5	Radiated Band Edge and Radiated Spurious Emission	<b>PASS</b>
15.247(a)(1)	RSS-247 §5.1(2)	20dB/Occupied Bandwidth	<b>N/A</b> <sup>Note3</sup>
15.247(a)(1)	RSS-247 §5.1(2)	Carrier Frequency Separation	<b>N/A</b> <sup>Note3</sup>
15.247(a)(1)(iii)	RSS-247 §5.1(4)	Time of Occupancy	<b>N/A</b> <sup>Note3</sup>
15.247(a)(1)(iii)	RSS-247 §5.1(4)	Number of Hopping Channels	<b>N/A</b> <sup>Note3</sup>
15.247(b)(1)	RSS-247 §5.1(2)	Maximum Peak Output Power	<b>PASS</b> <sup>Note4</sup>
15.247(d)	RSS-247 §5.5	Conducted Band Edges and Conducted Spurious Emission	<b>N/A</b> <sup>Note3</sup>
15.203	---	Antenna Requirement	<b>Compliance</b>

Note:

1. Decision rule according to the limit of the test standard chapter, the test value is lower than the limit specified in the test chapter, and it is judged as Pass.
2. The uncertainties value is not used in determining the result.
3. Due to add components can't influence on RF circuit, so it is unnecessary to re-test.
4. Due to add Touch Board for Panel and new Antenna. We did spot check for output power and all output power values keep identical original grant power and original ISED Certificate power.

### 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)17Z90R (2)17ZB90R (3)17ZD90R (4)17ZG90R The difference between all models is different in the sales customers and color difference. Note: Model 17Z90R is for ISED application.
Configuration (HVIN)	17Z90R-K, 17Z90R-N, 17Z90R-A, 17Z90R-R, 17Z90R-Q, 17Z90R-H, 17Z90R-T
Brand	LG

The model 17Z90R has following different configuration and components, and the details are as follows:

Configuration(HVIN) Difference	Original				Permissive Change		
	17Z90R-A	17Z90R-R	17Z90R-K	17Z90R-N	17Z90R-Q	17Z90R-H	17Z90R-T
TPM (Trusted Platform Module)	Not Support	Support	Not Support	Support	Support	Support	Support
CPU	i7-1360P, i5-1340P				i7-1370P i5-1350P	i7-1360P, i5-1340P	
Antenna	WA-P-LELE-04-011, L1LRF009-CS-H					<b>WA-P-LBLB-04-108</b>	
LCD Panel (Include Touch Board)	Without					<b>With</b>	
Main Board	ROYAL NVIDIA MAIN B/D Note: Main Board (PM)		ROYAL MAIN B/D Note: Main Board (GM)				
GPU	NVIDIA GeForce RTX 3050			Intel Iris Xe Graphics			
Battery	LBV122CM(90 Wh)			LBV7227E (80 Wh)			

### 3.2. Description of EUT

Test Model	17Z90R		
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).		
Test Sample	Sample No.	Test Item	Firmware
	03	AC Conduction, RSE, Output Power	N/A
Sample Status	Trial sample		
Date of Receipt	2023. 06. 13		
Date of Test	2023. 06. 26 ~ 07. 18		
Interface Ports of EUT	<ul style="list-style-type: none"> <li>• One HDMI Port</li> <li>• Two USB Type C Port</li> <li>• One Earphone Port</li> <li>• One Micro SD Card Slot</li> <li>• Two USB 3.0 Ports</li> </ul>		
Accessories Supplied	<ul style="list-style-type: none"> <li>• AC Adapter</li> <li>• USB C Cable</li> <li>• LAN Gender</li> </ul>		

Note: Pursuant ISO 17025:2017 section 7.8.2, Audix Technology Corp. does not assume responsibility for all EUT's information including RF features, transmit type, antenna information...etc are provided by customer.

### 3.3. Reference Test Guidance

ANSI C63.10:2013

### 3.4. Information for Permissive Change

- The EUT is an addition version with original FCC ID: BEJNT-17Z90R and IC: 2703H-17Z90R are as following.
  - (a) To add new Configuration (HVIN) 17Z90R-Q, 17Z90R-H and 17Z90R-T for FCC application.
  - (b) To add new Configuration (HVIN) 17Z90R-H and 17Z90R-T for ISED application.
  - (c) To add Touch Board for Panel and new Antenna for Main Board (GM) for new Configuration (HVIN) 17Z90R-H and 17Z90R-T.
- The differences between this application and original's ID as clarify in following list.

Configuration(HVIN) Difference	Original				Permissive Change		
	17Z90R-A	17Z90R-R	17Z90R-K	17Z90R-N	17Z90R-Q	17Z90R-H	17Z90R-T
TPM (Trusted Platform Module)	Not Support	Support	Not Support	Support	Support	Support	Support
CPU	i7-1360P, i5-1340P				i7-1370P i5-1350P	i7-1360P, i5-1340P	
Antenna	WA-P-LELE-04-011, L1LRF009-CS-H					<b>WA-P-LBLB-04-108</b>	
LCD Panel (Include Touch Board)	Without					<b>With</b>	
Main Board	ROYAL NVIDIA MAIN B/D Note: Main Board (PM)			ROYAL MAIN B/D Note: Main Board (GM)			
GPU	NVIDIA GeForce RTX 3050			Intel Iris Xe Graphics			
Battery	LBY122CM(90 Wh)			LBV7227E (80 Wh)			

- 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	Manufacturer	Antenna Type	Frequency (MHz)	Max Gain(dBi)		Directional Gain
					Aux	Main	
1.	WA-P-LBLB-04-108	INPAQ	Mono-Pole	2400-2500	2.90	3.10	3.00
				5150-5350	2.80	-2.10	1.01
				5470-5725	5.70	2.50	4.39
				5725-5850	5.30	5.20	5.25
				5925-6425	3.70	4.80	4.28
				6425-6525	-1.00	1.00	0.11
				6525-6875	2.80	1.60	2.24
				6875-7125	-1.40	2.90	1.26

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  
 We chose the antenna gain corresponding to the frequency listed on the table which is closer to center frequency of WLAN.

### 3.6.EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (Mbps)
Bluetooth	2402-2480	79	FHSS (GFSK, $\pi/4$ DQPSK, 8-DPSK)	1/2/3

Channel List							
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
00	2402	20	2422	40	2442	60	2462
01	2403	21	2423	41	2443	61	2463
02	2404	22	2424	42	2444	62	2464
03	2405	23	2425	43	2445	63	2465
04	2406	24	2426	44	2446	64	2466
05	2407	25	2427	45	2447	65	2467
06	2408	26	2428	46	2448	66	2468
07	2409	27	2429	47	2449	67	2469
08	2410	28	2430	48	2450	68	2470
09	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

### 3.7. Description of Key Components

#### 3.7.1. For the All Component Lists

Item	Supplier	Model / Type	Character
System	Microsoft	Win 10	---
		Win 10 Pro	---
		Win11 Home	---
Main Board	LG	ROYAL NVIDIA MAIN B/D PCB	Main Board (PM) Manufacturer: #1 Hannstar Board Tech (Jiang Yin) Corp.,Ltd. #2 Elec&Eltek Company (MCO) Limited.
		ROYAL MAIN B/D PCB	Main Board (GM) Manufacturer: #1 Hannstar Board Tech (Jiang Yin) Corp.,Ltd. #2 Elec&Eltek Company (MCO) Limited.
WLAN SUB Board	LG	17Z90R SUB B/D	Manufacturer: #1 Hannstar Board Tech (Jiang Yin) Corp.,Ltd. #2 JiangSuHuaShen Electronic co.,ltd (HXF) #3 Elec&Eltek Company (MCO) Limited.
CPU (Socket: BGA1744)	Intel	i7-1360P	2.2GHz
	Intel	i5-1340P	1.9GHz
	Intel	i7-1370P	1.9GHz
	Intel	i5-1350P	1.9GHz
17" LCD Panel	LG Display	LP170WQ1-SPF2	Resolution: 2560 x 1600, 60Hz WQXGA IPS #1 Without Touch #2 With Touch
		LP170WQ2-SPB1	Resolution: 2560 x 1600, 144Hz WQXGA IPS
Storage (SSD)	SK hynix	---	2TB
		---	1TB
		---	512GB
		---	256GB
	Samsung	---	2TB
		---	1TB
---	512GB		
---	256GB		
Memory (RAM)	Samsung	---	32GB LPDDR4x(On Board)
		---	16GB LPDDR4x(On Board)
	SK Hynix	---	32GB LPDDR4x(On Board)
		---	16GB LPDDR4x(On Board)
Battery Pack	LG	LBV122CM	DC7.76V, 90Wh Typ 11600 mAh
	LG	LBV7227E	DC7.74V, 80Wh Typ 10336 mAh
WLAN Combo Card	Intel	AX211D2W	WLAN and BT, 2x2 PCIe M.2 1216 SD adapter card FCC ID: PD9AX211D2 IC: 1000M-AX211D2

Item	Supplier	Model / Type	Character
WLAN Combo Antenna	LG (INPAQ)	WA-P-LELE-04-011	PCB, Mono-pole Type Main: Black, Aux: Gray
	<b>LG (INPAQ)</b>	<b>WA-P-LBLB-04-108*</b>	<b>PCB, Mono-pole Type</b> <b>Main: Black, Aux: Gray</b>
	LG (LUXSHARE-ICT)	L1LRF009-CS-H	PCB, Mono-pole Type Main: Black, Aux: Gray
Touch Pad	LITE-ON	SP8001(SG-A0630-00A)	---
	ELAN	SD081A-36H0	---
Keyboard	TIC	KT0120B9	---
	LITE ON	SN8B02	---
Web Camera	Chicony	CKFLF26	---
	Luxvisions	1BF225N3	---
LAN Gender (Type C to LAN)	SUZHOU MEC ELECTRONICS	80-5946-111	(White) 10/100Megabit Ethernet
		80-5946-101	(Black) 10/100 Megabit Ethernet
	ARIN TECH CO. LTD	GD-08MF-36-WH-LP10	(White) 10/100Megabit Ethernet
		GD-08MF-36-BK-LP11	(Black) 10/100 Megabit Ethernet
	HUIZHOU DEHONG TECHNOLOGY CO.,LTD.	370-50713	(White) 10/100Megabit Ethernet
		370-50714	(Black) 10/100 Megabit Ethernet
Type C to LAN: Shielded, Undetached, 0.12m			
AC Adapter	LG (PI ELECTRONICS)	LP65WFC20P-NJ W	(White) I/P: AC 100-240V, 1.6A, 50-60Hz O/P:DC5V,3A(15W) or DC9V, 3A(27W)or 15V,3A (15W) or 20V,3.25A (65W) Wall-Mounted: (2C)
	LG (PI ELECTRONICS)	LP65WFC20P-NJ B	(Black) I/P: AC 100-240V, 1.6A, 50-60Hz O/P:DC5V,3A(15W) or DC9V, 3A(27W)or 15V,3A (15W) or 20V,3.25A (65W) Wall-Mounted: (2C)
Type C Cable	LG (LUXSHARE-ICT)	Type C to C Data Cable ASS'Y	Shielded, Detached, 2.0m
<b>Note: “*” Standing for adding new configuration.</b>			

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	
Main Board (GM)	LG, ROYAL MAIN B/D PCB	V	
WLAN SUB Board	LG, 17Z90R SUB B/D	V	
CPU	Intel, i7-1360P	V	
<b>17" LCD Panel</b>	<b>LG Display, LP170WQ1-SPF2 with Touch</b>	V	
Storage (SSD)	Samsung, 2TB	V	
	Samsung, 256GB	V	
Memory (RAM)	Samsung, 32GB	V	
Battery Pack	LG, 80Wh (for Main Board (GM))	V	
Touch Pad	LITE-ON	V	
Keyboard	TIC	V	
Web Camera	Chicony	V	
WLAN Combo Card	Intel, AX211D2W	V	
<b>WLAN Combo Antenna</b>	<b>LG (INPAQ), WA-P-LBLB-04-108</b>	V	
Type C #1	AC Adapter	LG(PI ELECTRONICS), LP65WGC20P-EK W	V
Type C #2	Link to LAN Gender	MEC (White) (10/100Mbps)	V

### 3.8. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Duty Cycle Correction Factor (dB)
BT	N/A	2.90	N/A

AC Conduction
Normal operation

Item	Mode	Data Rate	Test Channel
Radiated Test Case Radiated Spurious Emission (30MHz~1GHz)	GFSK	1Mbps	78

Item	Mode	Data Rate	Test Channel	
Radiated Test Case	Radiated Band Edge <sup>Note 1 &amp; 2</sup>	GFSK	1Mbps	00/78
		8-DPSK	3Mbps	00/78
	Radiated Spurious Emission <sup>Note 1</sup>	GFSK	1Mbps	00/39/78

Item	Mode	Data Rate	Test Channel	
Conducted Test Case (SPOT Check)	Maximum Peak Output Power	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78

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: We performed testing of the highest and lowest data rate.

### 3.9. Description of Key Components

Centre Frequency (MHz)	Power Setting	
	GFSK	8-DPSK
2402	12	7
2441	12	7
2480	12	7

### 3.10. Tested Supporting System List

#### 3.10.1. Support Peripheral Unit

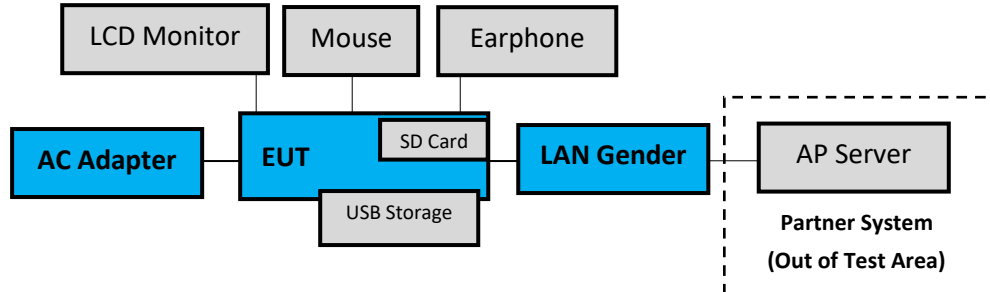
No.	Product	Brand	Model No.	Serial No.	Approval
1.	LCD Monitor	DELL	P2418D	CN-0P7KK0-TV200-8BJ -021T	N/A
2.	USB Mouse	hp	MOFYUO	FCMHH0AKZBD7LC	N/A
3.	Earphone	APPLE	N/A	N/A	N/A
4.	SD Card	ADATA	MicroSDHC Card	N/A	N/A
5.	USB Storage	SanDisk	SDCZ48-032G	N/A	N/A
<b>Partner System</b>					
6	AP Server	ASUS	RT-AX88U	N/A	FCC ID: MSQ-RTAXHP00 IC: 3568A-RTAXHP00

#### 3.10.2. Cable Lists

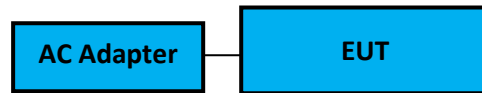
No.	Cable Description Of The Above Support Units
1.	HDMI Cable: Shielded, Detachable, 1.8m AC Power Cord: Unshielded, Detachable, 1.8m
2.	USB Cable: Unshielded, Undetachable, 1.8m
3.	Earphone Cable: Unshielded, Undetachable, 1.2m
4.	N/A
5.	USB Cable: Unshielded, Undetachable, 1.8m
6	AC adapter: M/N:WA-30B12, Cable: Unshielded, Detachable, 1.2m LAN cable: Unshielded, Detachable, 3.0m
7	LAN cable: Unshielded, Detachable, 1.8m

### 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 BT function under continues transmitting and choosing data rate/ channel.

### 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

The measurement uncertainty levels have been estimated as specified in ETSI TR 100 028-2001

Test Items/Facilities		Frequency Range	Uncertainty
Conduction Test	<input type="checkbox"/>	No. 7 Shielded Room	9kHz-150kHz ±3.7dB
			150kHz-30MHz ±3.4dB
	<input checked="" type="checkbox"/>	No. 8 Shielded Room	9kHz-150kHz ±3.7dB
			150kHz-30MHz ±3.5dB
Radiation Test	<input checked="" type="checkbox"/>	No.1 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal ±3.6dB
			200MHz-1000MHz, 3m, Horizontal ±4.3dB
			30MHz-200MHz, 3m, Vertical ±4.4dB
			200MHz-1000MHz, 3m, Vertical ±4.8dB
			1GHz-6GHz, 3m ±4.8dB
			6GHz-18GHz, 3m ±4.5dB
	<input type="checkbox"/>	No.3 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal ±4.0dB
			200MHz-1000MHz, 3m, Horizontal ±4.4dB
			30MHz-200MHz, 3m, Vertical ±4.7dB
			200MHz-1000MHz, 3m, Vertical ±4.5dB
			1GHz-6GHz, 3m ±4.8dB
			6GHz-18GHz, 3m ±4.5dB
	<input type="checkbox"/>	No.4 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal ±4.3dB
			200MHz-1000MHz, 3m, Horizontal ±4.2dB
			30MHz-200MHz, 3m, Vertical ±4.8dB
			200MHz-1000MHz, 3m, Vertical ±4.7dB
			1GHz-6GHz, 3m ±4.6dB
			6GHz-18GHz, 3m ±4.4dB
	<input type="checkbox"/>	No.5 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal ±4.6dB
			200MHz-1000MHz, 3m, Horizontal ±4.4dB
			30MHz-200MHz, 3m, Vertical ±4.5dB
			200MHz-1000MHz, 3m, Vertical ±4.9dB
			1GHz-6GHz, 3m ±4.9dB
			6GHz-18GHz, 3m ±4.6dB
	Radiated emissions (18GHz-40GHz)	18GHz-40GHz, 3m ±3.4dB	

Remark : Uncertainty =  $ku_c(y)$

Test Item	Uncertainty
Maximum peak Output power	± 0.52dB

## 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	2023.01.11	1 Year
2.	A.M.N.	R&S	ENV432	101567	2023.06.02	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2022.12.19	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2022.12.14	1 Year
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.8 S/R	2023.04.13	1 Year
6.	Coaxial Cable	Yeida	RG/58AU	CE-08	2022.09.07	1 Year
7.	Test Software	Audix	e3	V9 18621a	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	Keysight	N9010B-526	MY57410128	2022.12.21	1 Year
2.	Test Receiver	R&S	ESCS30	100338	2023.06.20	1 Year
3.	Amplifier	HP	8447D	2944A06305	2022.12.29	1 Year
4.	Microwave Amplifier	Keysight	83051A	MY56480113	2022.09.07	1 Year
5.	Microwave Amplifier	HP	8449B	3008A01284	2023.06.06	1 Year
6.	Loop Antenna	TESEQ	HLA 6121	60478	2023.02.21	1 Year
7.	Bilog Antenna	TESEQ	CBL6112D	33821	2022.07.01	1 Year
8.	Horn Antenna	EMCO	3115	9112-3775	2023.05.04	1 Year
9.	Horn Antenna	COM-POWER	AH-840	101092	2022.12.30	1 Year
10.	2.4GHz Notch Filter	K&L Microwave	7NSL10-2441.5/ E130.5-O/O	2	2022.07.23	1 Year
11.	3GHz Notch Filter	Microwave	H3G018G1	484796	2022.07.23	1 Year
12.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2023.01.07	1 Year
13.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 106	RE-14	2023.01.07	1 Year
14.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	RE-30	2022.08.22	1 Year
15.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2023.04.13	1 Year
16.	Test Software	Audix	e3	V9 18621a	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	N9020B-544	MY57120357	2023.02.22	1 Year
2.	Power Meter	Anritsu	ML2495A	2127005	2022.12.01	1 Year
3.	Power Meter	Anritsu	ML2495A	2127004	2022.12.07	1 Year
4.	Power Sensor	Anritsu	MA2411B	1911360	2022.12.07	1 Year
5.	Power Sensor	Anritsu	MA2411B	1911356	2022.12.07	1 Year
6.	Digital Thermo-Hygro Meter	iMax	HTC-1	RF-03	2023.04.13	1 Year

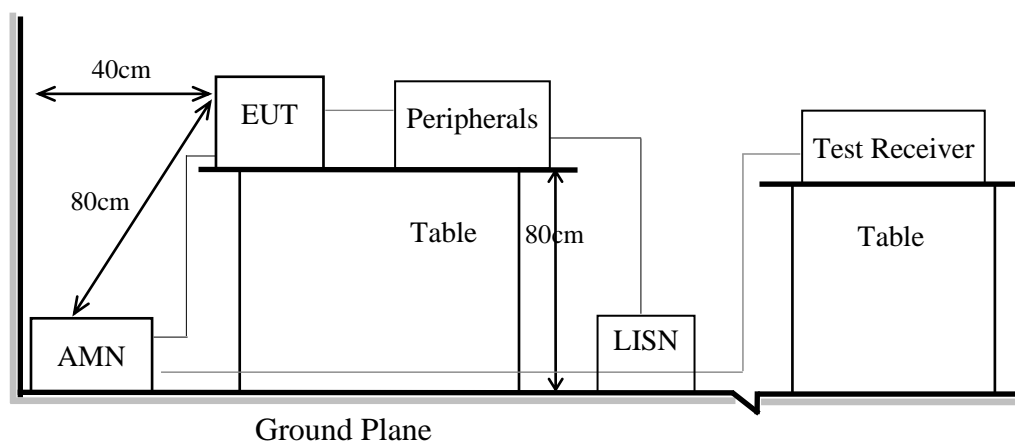
## 5. CONDUCTED EMISSION

### 5.1. Block Diagram of Test Setup

#### 5.1.1. Block Diagram of EUT

Indicated as section 3.11

#### 5.1.2. Shielded Room Setup Diagram



### 5.2. Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB $\mu$ V	56 ~ 46 dB $\mu$ V
500kHz ~ 5MHz	56 dB $\mu$ V	46 dB $\mu$ V
5MHz ~ 30MHz	60 dB $\mu$ V	50 dB $\mu$ V

Remark1.: 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 150kHz to 30 MHz and record the emission which does not have 20 dB below limit.

### 5.4. Test Results

Please refer to Appendix A.

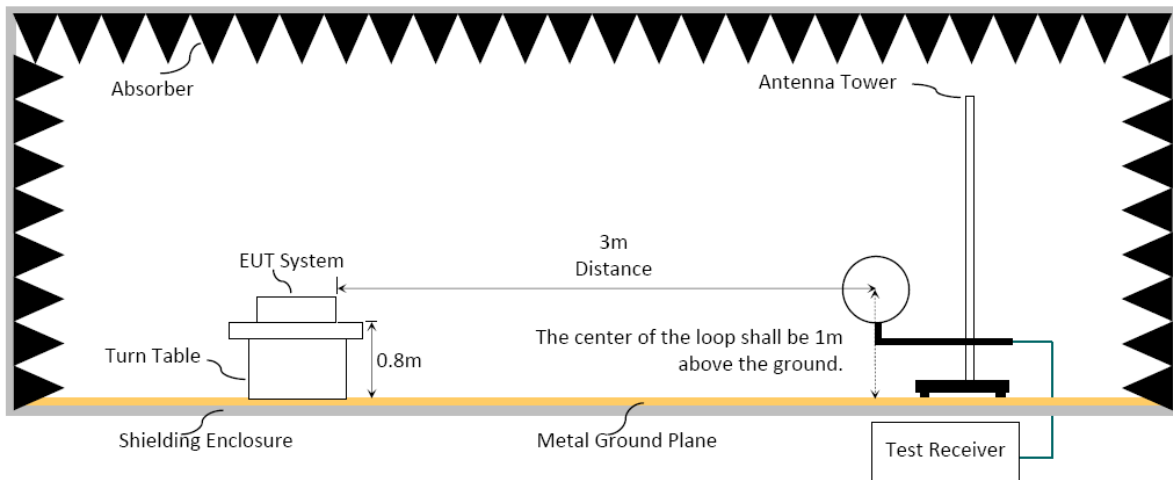
## 6. RADIATED EMISSION

### 6.1. Block Diagram of Test Setup

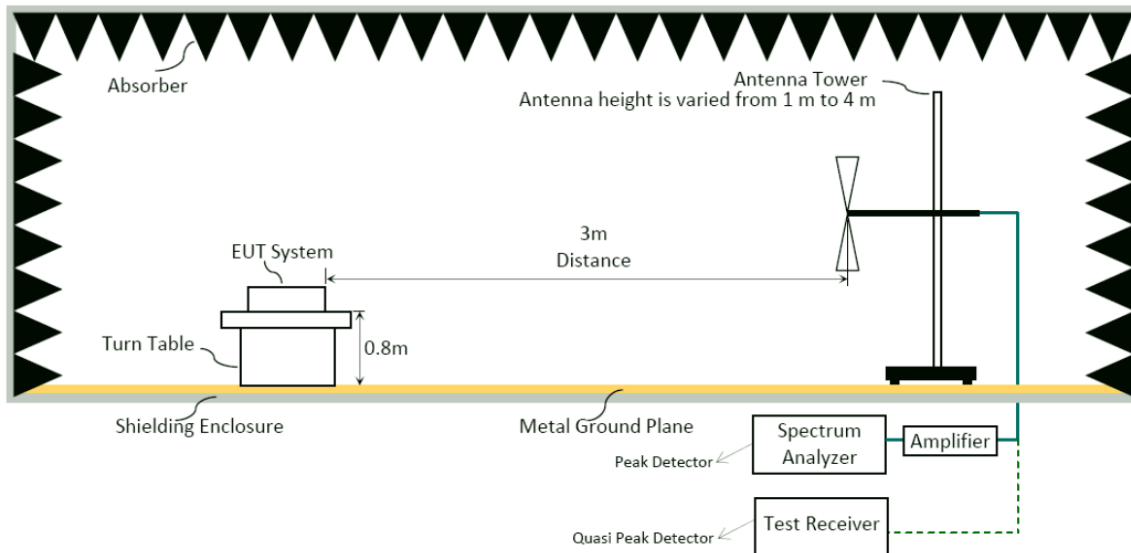
#### 6.1.1. Block Diagram of EUT

Indicated as section 3.11

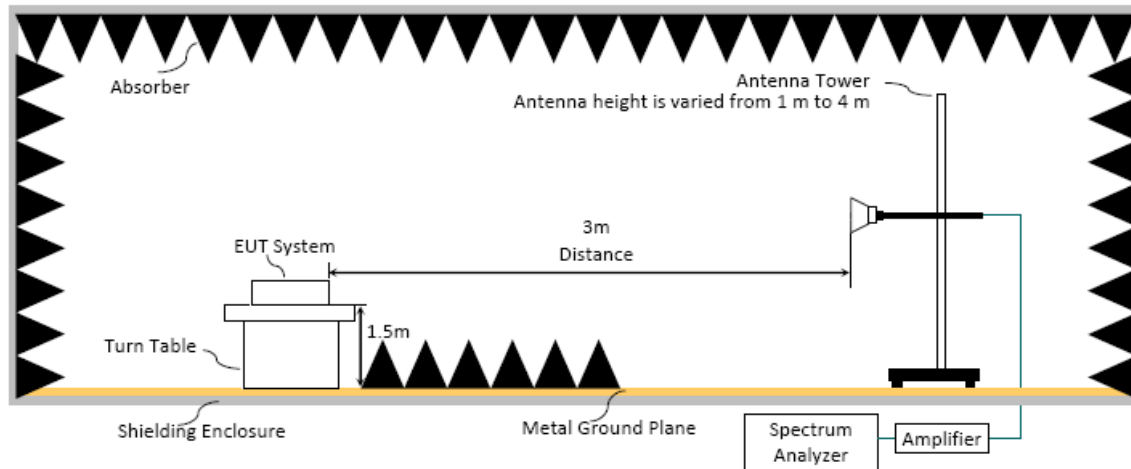
#### 6.1.2. Setup Diagram for 9kHz-30MHz



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



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



## 6.2. Radiated Emission Limits

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	
		dB $\mu$ V/m	$\mu$ 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 $\mu$ V/m (Peak) 54.0 dB $\mu$ V/m (Average)	

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

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

### 6.3. 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 ~ 25GHz:

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  $\geq 3 \times$  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.

#### Frequency above 1GHz to 10th harmonic(up to 25 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

Mode	TX <sub>on</sub> (ms)	1/ TX <sub>on</sub> (kHz)	VBW(>1/ TX <sub>on</sub> ) (kHz)
BT	2.90	0.345	3

(3) Detector = Peak.

(4) Sweep time = auto.

(5) Trace mode = max hold.

(6) 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 (dB $\mu$ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) + Reading (dB $\mu$ V).

Average Emission Level (dB $\mu$ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) + Reading (dB $\mu$ V).

Average Emission Level (dB $\mu$ V/m) = Peak Emission Level (dB $\mu$ V/m) + DCCF (dB) Duty Cycle Correction Factor (DCCF) (dB) =  $20\log(\text{TX}_{\text{on}}/\text{TX}_{\text{on+off}})$  presented in section 3.7.

ERP (dBm) = Peak Emission Level (dB $\mu$ V/m) - 95.2dB - 2.14dB

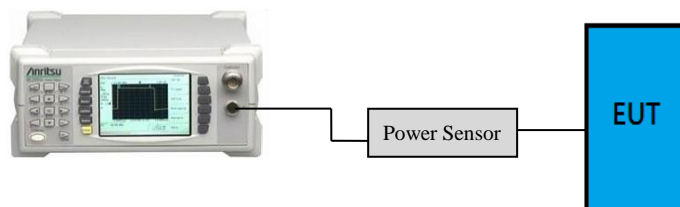
## 6.5. Test Results

Please refer to Appendix A.



## 7. MAXIMUM PEAK OUTPUT POWER

### 7.1. Block Diagram of Test Setup



### 7.2. Specification Limits

The Limits of maximum Peak Output Power for frequency hopping systems in 2400-2483.5MHz is: 0.125Watt. (21dBm)

### 7.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

- (a) Use the following spectrum analyzer settings
  - (1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
  - (2) RBW > 20 dB bandwidth of the emission being measured.
  - (3) VBW  $\geq$  RBW
  - (4) Sweep: Auto
  - (5) Detector function: Peak
  - (6) Trace: Max hold
- (b) Allow trace to stabilize.
- (c) Use the marker-to-peak function to set the marker to the peak of the emission.

### 7.4. Test Results

Please refer to Appendix A



## **8. DEVIATION TO TEST SPECIFICATIONS**

**【NONE】**



# APPENDIX A

## TEST DATA AND PLOTS

(Model: 17Z90R)



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# APPENDIX B

## TEST PHOTOGRAPHS

(Model: 17Z90R)