RF Exposure Evaluation declaration

Product Name : RadiX AXE6600 WiFi 6E Tri-Band Gaming Router

Model No. : GRAXE66

FCC ID : I4L-GRAXE66

Applicant : Micro-Star Int'l Co., Ltd.

Address : No.69, Lide St., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)

Date of Receipt : Jan. 11, 2022

Date of Declaration : Jul. 19, 2022

Report No. : 2210313R-RFUSMPEV02-A

Report Version : V1.0

Testing Laboratory
3023

Issued Date: Jul. 19, 2022
Report No.: 2210313R-RFUSMPEV02-A

Product Name	RadiX AXE6600 WiFi 6E Tri-Band Gaming Router	
Applicant	Micro-Star Int'l Co., Ltd.	
Address	No.69, Lide St., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)	
Manufacturer	LEADER ELECTRONICS INC.	
Model No.	GRAXE66	
FCC ID	I4L-GRAXE66	
Trade Name	msi	
Applicable Standard	KDB 447498 D01 v06	☒ Minimum test separation distance ≥ 20 cm ☐ For low power devices
Test Result	Complied	

Documented By : Joanne Lin

(Senior Project Specialist / Joanne Lin)

Tested By : Ivan Chuang

(Senior Engineer / Ivan Chuang)

Approved By : Jack Hsu

(Senior Engineer / Jack Hsu)

Revision History

Report No.	Version	Description	Issued Date
2210313R-RFUSMPEV02-A	V1.0	Initial issue of report.	Jul. 19, 2022

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	RadiX AXE6600 WiFi 6E Tri-Band Gaming Router
Model No.	GRAXE66
Trade Name	msi
FCC ID	I4L-GRAXE66
Frequency Range	802.11b/g/n/ac/ax-20: 2412-2462MHz, 802.11n/ac/ax-40: 2422-2452MHz 802.11a/n/ac/ax-20MHz: 5180-5320MHz, 5500-5720MHz, 5745-5825MHz 802.11n/ac/ax-40MHz: 5190-5310MHz, 5510-5710MHz, 5755-5795MHz 802.11ac/ax-80MHz: 5210-5290MHz, 5530-5690MHz, 5775MHz 802.11a/ax-20MHz: 6115-7095MHz, 802.11ax-40MHz: 5965-7085MHz 802.11ax-80MHz: 5985-7025MHz, 802.11ax-160MHz: 6025-6985Hz

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain	Directional Gain for Beamforming
1	WIESON	ARY121-0350-005-00	Dipole Antenna	2.46dBi for 2400MHz 4.74dBi for 5150-5250MHz 4.83dBi for 5250-5350MHz 5.64dBi for 5470-5725MHz 5.61dBi for 5725-5850MHz	5.9dBi for 2400MHz 7.75dBi for 5150-5250MHz 7.84dBi for 5250-5350MHz 8.65dBi for 5470-5725MHz 8.62dBi for 5725-5850MHz
2	WIESON	ARY121-0350-006-00	Dipole Antenna	2.89dBi for 2400MHz 2.91dBi for 5150-5250MHz 3.67dBi for 5250-5350MHz 4.68dBi for 5470-5725MHz 5.49dBi for 5725-5850MHz	

No.	Manufacturer	Part No.	Antenna Type	Peak Gain	Directional Gain for Beamforming
1	WIESON	ARY121-0350-003-00	Dipole Antenna	2.32dBi for 5925-6425MHz 1.80dBi for 6425-6525MHz 1.60dBi for 6525-6875MHz 2.17dBi for 6875-7125MHz	8.97dBi for 5925-6425MHz 9.12dBi for 6425-6525MHz 9.12dBi for 6525-6875MHz 9.48dBi for 6875-7125MHz
2	WIESON	ARY121-0350-004-00	Dipole Antenna	2.94dBi for 5925-6425MHz 3.10dBi for 6425-6525MHz 2.48dBi for 6525-6875MHz 3.46dBi for 6875-7125MHz	
3	WIESON	ARY121-0350-001-00	Dipole Antenna	2.60dBi for 5925-6425MHz 2.37dBi for 6425-6525MHz 1.86dBi for 6525-6875MHz 2.94dBi for 6875-7125MHz	
4	WIESON	ARY121-0350-002-00	Dipole Antenna	2.95dBi for 5925-6425MHz 2.89dBi for 6425-6525MHz 1.92dBi for 6525-6875MHz 2.92dBi for 6875-7125MHz	

1.2. Test Facility

USA : FCC Registration Number: TW0033

Canada : CAB Identifier Number: TW3023 / Company Number: 26930

Site Description	:	Accredited by TAF Accredited Number: 3023
Test Laboratory	:	DEKRA Testing and Certification Co., Ltd
Address	:	No. 5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan
Performed Location	:	No. 26, Huaya 1st Rd., Guishan Dist.,Taoyuan City 333411, Taiwan, R.O.C.
Phone number	:	+886-3-275-7255
Fax number	:	+866-3-327-8031
Email address	:	info.tw@dekra.com
Website	:	http://www.dekra.com.tw

2. RF Exposure Evaluation

2.1. Standard Applicable

According to KDB 447498 D01 (7.1), A minimum test separation distance ≥ 20 cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits.

2.2. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
3.0-30	1842/f	4.89/f	$900/f^2$	6
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
1.34-30	824/f	2.19/f	$180/f^2$	30
300-1500	--	--	F/1500	30
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4*pi*r^2)$

Where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0

2.3. Test Result of RF Exposure Evaluation

Product : RadiX AXE6600 WiFi 6E Tri-Band Gaming Router
Test Item : RF Exposure Evaluation for CDD mode

Band	Frequency (MHz)	Conducted maximum Power (dBm)	Antenna Gain (dBi)	Power Density at R = 25 cm (mW/cm2)	Limit (mW/cm2)
2.4GHz	2437	29.76	2.89	0.2344	1

Note: The conducted output power is refer to report No.: 2210313R-RFUSWL2V01-A from the DEKRA.

Band	Frequency (MHz)	Conducted maximum Power (dBm)	Antenna Gain (dBi)	Power Density at R = 25 cm (mW/cm2)	Limit (mW/cm2)
5GHz	5825	29.93	5.64	0.4591	1

Note: The conducted output power is refer to report No.: 2210313R-RFUSWL5V01-A from the DEKRA.

Band	Frequency (MHz)	Conducted maximum Power (dBm)	Antenna Gain (dBi)	Power Density at R = 25 cm (mW/cm2)	Limit (mW/cm2)
6GHz	6985	21.65	3.46	0.0413	1

Note: The conducted output power is refer to report No.: 2210313R-RFUSWL6V01-A from the DEKRA.

Calculations for Multi-Transmitter

Mode	Ratios	Result	Limit
2.4G WLAN	0.2344	0.7348	1
5G WLAN	0.4591		
6G WLAN	0.0413		

Ratios = Power Density / Power Density Limit

Results	PASS

Product : RadiX AXE6600 WiFi 6E Tri-Band Gaming Router
Test Item : RF Exposure Evaluation for Beamforming mode

Band	Frequency (MHz)	Conducted maximum Power (dBm)	Antenna Gain (dBi)	Power Density at R = 25 cm (mW/cm2)	Limit (mW/cm2)
2.4GHz	2437	25.15	5.9	0.1621	1

Note: The conducted output power is refer to report No.: 2210313R-RFUSWL2V01-A from the DEKRA.

Band	Frequency (MHz)	Conducted maximum Power (dBm)	Antenna Gain (dBi)	Power Density at R = 25 cm (mW/cm2)	Limit (mW/cm2)
5GHz	5745	26.92	8.65	0.4591	1

Note: The conducted output power is refer to report No.: 2210313R-RFUSWL5V01-A from the DEKRA

Band	Frequency (MHz)	Conducted maximum Power (dBm)	Antenna Gain (dBi)	Power Density at R = 25 cm (mW/cm2)	Limit (mW/cm2)
6GHz	6985	15.63	9.48	0.0413	1

Note: The conducted output power is refer to report No.: 2210313R-RFUSWL6V01-A from the DEKRA.

Calculations for Multi-Transmitter

Mode	Ratios	Result	Limit
2.4G WLAN	0.1621	0.6625	1
5G WLAN	0.4591		
6G WLAN	0.0413		

Ratios = Power Density / Power Density Limit

Results	PASS