RADIO EXPOSURE TEST REPORT

FCC ID	:	MSQ-RTAX0600
Equipment	:	AX3000 Dual Band WiFi Router
Brand Name	:	ASUS
Model Name	:	XD5, XD4 Pro
Applicant	:	ASUSTeK COMPUTER INC. 1F., No. 15, Lide Rd., Beitou, Taipei 112, Taiwan
Manufacturer (1)	:	GEMTEK TECHNOLOGY CO., LTD. No. 15-1, Zhonghua Road, Hsinchu Industrial Park, Hukou, Hsinchu 30352, Taiwan, R.O.C.
Manufacturer (2)	:	GEMTEK VIETNAM CORPORATION LIMITED. Dong Van II Industrial Zone, Duy Minh Ward, Duy Tien Town, Ha Nam Province, Vietnam (ZIP 400000)
Manufacturer (3)	:	GEMTEK ELECTORNICS (CHANGSHU) CO., LTD. No. 1, Zheng Wen Road, New & High Tech Industrial Park, Changshu Economic Development Zone, Jiangsu Province 215500, P.R.China
Manufacturer (4)	:	GEMTEK ELECTRONICS (KUNSHAN) CO., LTD. No. 88, Xin Zhu Road, Comprehensive Bonded Zone, Kun Shan, Jiangsu Province 215300, P. R. China
Manufacturer (5)	:	Lih Rong Electronic Enterprise Co.,Ltd. 3F, No. 1, Gaoxia Rd., Zhongli Dist., 32061 Taoyuan City, TAIWAN
Manufacturer (6)	:	Lukisen Electronic Corp. 3F.,No.236,Bo”ai St., Shulin Dist., New Taipei City 23845, Taiwan
Manufacturer (7)	:	Datamax Electronics(DongGuan) Co., Ltd. Niu Shan Foreign Economic Industrial Park,Dong Cheng District,Dong Guan City,Guang Dong,China
Standard	:	47 CFR Part 2.1091

The product was received on May 07, 2021, and testing was started from May 21, 2021 and completed on Jun. 14, 2022. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

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Photographs of EUT v01

History of this test report

Report No.	Version	Description	Issued Date
FA143018	01	Initial issue of report	Jun. 27, 2022

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Declaration of Conformity:
1. The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results. 2. The measurement uncertainty please refer to report "Measurement Uncertainty".
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Viola Huang

1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	**Frequency Range (MHz)**	**Operating Frequency (MHz)**	**Modulation Type**
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5250 5250-5320 5500-5720 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)

1.2 Antenna Information

Ant.	2.4GHz Port	5GHz Port	Brand Name	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	1	Airgain	N03ASAFC-PH-LB1 X85BUI	PCB	I-PEX	Note 1
2	2	2	Airgain	N03ASAFC-PH-LG 1X120BUI	PCB	I-PEX	

Note 1:

Ant.	Gain (dBi)				
	2.4GHz	UNII 1	UNII 2A	UNII 2C	UNII 3
1	2.72	2.52	3.1	3.38	3.11
2	3.6	2.13	2.98	2.6	3.37
Max Gain (dBi)	3.6	2.52	3.1	3.38	3.37
DG (2T1S) (dBi)	5.37	5.06	5.44	5.32	6.05
DG (2T2S) (dBi)	3.6	2.52	3.1	3.38	3.37

Note 2: The EUT has two antennas.

Note 3: The brand/model/antenna type information was declared by manufacturer.

Note 4: Maximum Directional Gain following KDB662911 D03.

The antenna report is provided in the operational description for this application.

For 2.4GHz function:

For IEEE 802.11 b/g/n/VHT/ax mode (2TX/2RX)

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11a/n/ac/ax mode (2TX/2RX)

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

1.3 Table for EUT supports function

Function
AP Router
Mesh

Note: The AP Router mode has been tested and recorded in this test report.

1.4 Table for Multiple Listing

Model Name	Description
XD5	All the models are identical, the different model names served as marketing strategy.
XD4 Pro	

Note: From the above models, model: XD5 was selected as representative model for the test and its data was recorded in this report.

1.5 Accessories

Accessories			
Equipment Name	**Brand Name**	**Model Name**	**Rating**
Adapter 1	DVE	DSA-18PFR-12 FUS 120150	Input: 100-240V ~ 50-60Hz, 0.6A Output: 12.0V, 1.5A, 18.0W
Adapter 2	LEI	MU18D1120150-A1	Input: 100-240V ~ 50/60Hz, 0.6A Output: 12V, 1.5A
Others			
RJ-45 cable*1, non-shielded, 2m			

1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2.1091
- KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- 47 CFR Part 1.1307
- 47 CFR Part 1.1310

1.7 Testing Location

Testing Location Information		
Test Lab.：Sporton International Inc. Hsinchu Laboratory		
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)	
(TAF: 3787)	TEL: 886-3-656-9065	FAX: 886-3-656-9085
	Test site Designation No. TW3787 with FCC.	
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.	

2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|²,|H|² or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f^2)	<6
30-300	61.4	0.163	1.0	<6
300-1500	-	-	f/300	<6
1500-100,000	-	-	5	<6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|²,|H|² or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f^2)	<30
30-300	27.5	0.073	0.2	<30
300-1500	-	-	f/1500	<30
1500-100,000	-	-	1.0	<30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 50 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd = $\frac{30 \times P \times G}{377 \times d^2}$

2.3 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance R between the person and the antenna / radiating structure, where R > λ / 2 π.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	**Threshold ERP (watts)**
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.
Note: R is in meters, f is in MHz.	

2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm^2)	S Limit (mW/cm^2)
2.4G;G1D	3.60	29.95	33.55	0.50	34.05	2.54097	50	0.08088	1.00000
5.2G;D1D	5.06	29.86	34.92	0.50	35.42	3.48337	50	0.11088	1.00000
5.3G;D1D	5.44	23.94	29.38	0.50	29.88	0.97275	50	0.03096	1.00000
5.6G;D1D	5.32	23.97	29.29	0.50	29.79	0.95280	50	0.03033	1.00000
5.8G;D1D	6.05	29.89	35.94	0.05	35.99	3.97192	50	0.12643	1.00000

MPE Exemption Option C							
Frequency (MHz)	λ/2π (m)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
2437	0.0196	0.5	34.05	31.90	1.549	4.800	Complies
5755	0.0083		35.99	33.84	2.421	4.800	Complies

Simultaneous Transmission Analysis Mode: WLAN 2.4GHz+WLAN 5GHz

Simultaneous Transmissions Option C							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
2437	0.5	34.05	31.90	1.549	4.800	0.83	<= 1
5755		35.99	33.84	2.421	4.800		

———THE END———