



RADIO EXPOSURE TEST REPORT

FCC ID : MSQ-RTAX2E01
Equipment : RT-AX89X Dual-band Wi-Fi Router
Brand Name : ASUS
Model Name : RT-AX89X
Applicant : ASUSTeK COMPUTER INC.
1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan
Manufacturer (1) : Datamax Electronics (DongGuan) Co., Ltd.
Niu Shan Foreign Economic Industrial Park, Dong Cheng District, Dong Guan City, Guang Dong, China
Manufacturer (2) : Lukisen Electronic Corp.
3F.,No.236,Boai St., Shulin Dist.,New Taipei City 23845, Taiwan
Manufacturer (3) : Lih Rong Electronic Enterprise Co.,Ltd.
No. 486, Sec. 1, Wanshou Road, Guishan District, Taoyuan City, Taiwan
Manufacturer (4) : ASKEY COMPUTER CORP.
5F,NO.119,JIANKANG RD., ZHONGHE DIST.,NEW TAIPEI CITY 23585, TAIWAN, R.O.C.
Standard : 47 CFR Part 2.1091

The product was received on Jun. 09, 2021, and testing was started from Jun. 22, 2021 and completed on Oct. 09, 2021. 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

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Photographs of EUT v01



Summary of Test Result

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

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

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	5180-5240 5260-5320 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	4	Whayu	C660-510457-A	Dipole	I-PEX	Note 1
2	3	3	Whayu	C660-510458-A	Dipole	I-PEX	
3	2	2	Whayu	C660-510459-A	Dipole	I-PEX	
4	-	8	Whayu	C660-510460-A	Dipole	I-PEX	
5	-	7	Whayu	C660-510461-A	Dipole	I-PEX	
6	-	6	Whayu	C660-510462-A	Dipole	I-PEX	
7	-	5	Whayu	C660-510463-A	Dipole	I-PEX	
8	4	-	Whayu	C660-510464-A	Dipole	I-PEX	
9	-	1	Whayu	C660-510465-A	PIFA	I-PEX	

Note 1:

Ant.	Gain (dBi)				
	2.4GHz	UNII 1	UNII 2A	UNII 2C	UNII 3
1	3.49	3.47	2.68	3.13	2.82
2	3.31	2.72	2.47	1.75	3.44
3	2.67	2.65	2.53	2.27	2.54
4	-	1.92	2.85	1.5	2.63
5	-	2.26	2.11	1.57	2.63
6	-	1.79	2.53	1.7	1.85
7	-	1.14	1.79	0.81	1.09
8	2.72	-	-	-	-
9	-	2.73	3.04	2.26	3.01

Ant.	Directional Gain (dBi)		
	2.4GHz		
	4T1S	4T2S	4T4S
1	5.77	3.49	1.3
2			
3			
4			



Ant.	Directional Gain (dBi)															
	5GHz															
	UNII 1				UNII 2A				UNII 2C				UNII 3			
	8T1S	8T2S	8T4S	8T8S	8T1S	8T2S	8T4S	8T8S	8T1S	8T2S	8T4S	8T8S	8T1S	8T2S	8T4S	8T8S
1																
2																
3																
4																
5	7.19	4.19	3.47	-0.03	7.61	4.61	3.04	-0.03	7.31	4.31	3.13	-0.47	7.04	4.04	3.44	0.37
6																
7																
9																

Note 2: The directional gain is measured which follows the procedure of KDB 662911 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 (4TX/4RX)

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11a/n/ac/ax mode (8TX/8RX)

Port 1 ~ Por 8 can be used as transmitting/receiving antenna.

Port 1 ~ Por 8 could transmit/receive simultaneously.



1.3 Table for EUT supports function

Function	Supports type
AP Router	Master
Bridge	Slave without radar detection
Repeater	Master
Mesh	Master

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

1.4 Accessories

Accessories				
Equipment Name	Brand Name	Model Name	Rating	Remark
Adapter 1	DELTA	ADP-65DE B	INPUT: 100-240V, 1.5A, 50-60Hz OUTPUT: 19.0V, 3.42A, 65.0W	DC power cable, non shielded, 1.5m
Adapter 2	DELTA	ADP-65GD D	INPUT: 100-240V, 50-60Hz, 1.5A OUTPUT: 19.0V, 3.42A, 65.0W	DC power cable, non shielded, 1.6m
Adapter 3	AcBel	ADD011	INPUT: 100-240V, 1.7A, 50-60Hz OUTPUT: 19.5V, 3.33A, 65.0W MAX.	DC power cable, non shielded, 1.5m
Others				
US power cord*1, non shielded, 0.9m				
RJ-45 cable*1, Shieleded, 1.5m				



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/ cm ²)	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/ cm ²)	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 25 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

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 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;D1D	5.77	29.56	35.33	0.50	35.83	3.82825	25	0.48742	1.00000
5.2G;D1D 8T1S	7.19	28.73	35.92	0.07	35.99	3.97192	25	0.50572	1.00000
5.3G;D1D 8T1S	7.61	22.31	29.92	0.07	29.99	0.99770	25	0.12703	1.00000
5.6G;D1D 8T1S	7.31	22.63	29.94	0.05	29.99	0.99770	25	0.12703	1.00000
5.8G;D1D 8T1S	6.44	29.53	35.97	0.02	35.99	3.97192	25	0.50571	1.00000

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

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)	Ratio (S/Limit)
2.4G;D1D	5.77	29.56	35.33	0.50	35.83	3.82825	25	0.48742	1.00000	0.48742
5.8G;D1D 8T1S	6.44	29.53	35.97	0.02	35.99	3.97192	25	0.50571	1.00000	0.50571
									Sum Ratio	0.99313
									Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.

—————THE END—————