

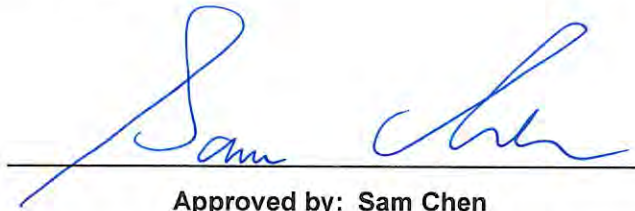


RADIO EXPOSURE TEST REPORT

FCC ID : MSQ-RTAXE4P00
Equipment : AXE11000 Tri Band WiFi Router
Brand Name : ASUS
Model Name : ET12, ZenWiFi ET12, ASUS ZenWiFi ET12
Applicant : ASUSTeK COMPUTER INC.
1F., No. 15, Lide Rd., Beitou, Taipei 112, Taiwan
Standard : 47 CFR Part 2.1091

The product was received on Jul. 19, 2021, and testing was started from Jul. 21, 2021 and completed on Apr. 19, 2024. 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 variant 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	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sam Chen

Report Producer: Vicky 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)
6GHz	5925-7125	6115-7095	802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Bluetooth	2400-2483.5	2402-2480	BR / EDR: FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK) LE: GFSK



1.2 Antenna Information

Ant.	Port				Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	Bluetooth					
1	-	-	3	-	WHA YU	C660-510565-A	PIFA	I-PEX	Note1
2	-	-	2	-	WHA YU	C660-510565-A	PIFA	I-PEX	
3	-	-	1	-	WHA YU	C660-510565-A	PIFA	I-PEX	
4	-	-	4	-	WHA YU	C660-510565-A	PIFA	I-PEX	
5	3	2	-	-	WHA YU	C660-510565-A	PIFA	I-PEX	
6	4	1	-	-	WHA YU	C660-510565-A	PIFA	I-PEX	
7	1	4	-	-	WHA YU	C660-510565-A	PIFA	I-PEX	
8	2	3	-	-	WHA YU	C660-510565-A	PIFA	I-PEX	
9	-	-	-	1	YAGEO	ANT3216A063R2400A	Chip	N/A	

Note1:

Ant.	Port				Antenna Gain (dBi)											
	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	Bluetooth	WLAN 2.4GHz	WLAN 5GHz				WLAN 6GHz				Bluetooth		
						UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 5	UNII 6	UNII 7	UNII 8			
1	-	-	3	-	-	-	-	-	-	0.97	0.81	1.07	1.14	-		
2	-	-	2	-	-	-	-	-	-					-	-	-
3	-	-	1	-	-	-	-	-	-					-	-	-
4	-	-	4	-	-	-	-	-	-					-	-	-
5	3	2	-	-	3.03	3.63	3.43	3.18	4.44	-	-	-	-	-		
6	4	1	-	-	2.13	4.04	3.59	2.73	3.14	-	-	-	-	-		
7	1	4	-	-	2.34	2.76	3.12	3.17	3.46	-	-	-	-	-		
8	2	3	-	-	3.67	4.17	4.44	4.41	4.94	-	-	-	-	-		
9	-	-	-	1	-	-	-	-	-	-	-	-	-	1.69		

Directional Gain (dBi)									
WLAN 2.4GHz		WLAN 5GHz UNII 1		WLAN 5GHz UNII 2A		WLAN 5GHz UNII 2C		WLAN 5GHz UNII 3	
4T1S	4T2S	4T1S	4T2S	4T1S	4T2S	4T1S	4T2S	4T1S	4T2S
6.66	3.67	4.32	4.17	5.3	4.44	4.83	4.41	5.09	4.94

Note2: The above information was declared by manufacturer.

WLAN 6GHz: The directional gain is calculated which follows the procedure of KDB 662911 D01.

WLAN 2.4GHz/5GHz: The directional gain is measured which follows the procedure of KDB 662911 D03.



For 2.4GHz function:

For IEEE 802.11b/g/n/VHT/ax (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 (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 6GHz function:

For IEEE 802.11ax (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 Bluetooth Function:

For Bluetooth mode (1TX/1RX)

Only Port 1 can be use as transmit and receive antenna.

1.3 Table for Multiple Listing

Brand Name	Model Name	Description
ASUS	ET12	All the models are identical, the different model names served as a marketing strategy.
	ZenWiFi ET12	
	ASUS ZenWiFi ET12	

Note1: From the above model: ET12 was selected as representative model for the test and its data was recorded in this report.

Note2: The above information was declared by manufacturer.

1.4 Table for Components Source Information

Items	Main Source	Second Source
Transceiver (2.5G LAN)	Brand: MAXLINEAR Model: GPY211	Brand: Broadcom Model: BCM50991
MLCC on the path of the CPU (Location: CA15,CA16,CA17,CA18,CB15,CB16, CB17,CB18,CE15,CE16,CE17,CE18)	Brand: MURATA Model: GRM0335C1E100JA01D	Brand: WALSIN Model: RF03N100J250CT
MLCC on the path of the CPU (Location: CA281,CA282,CB121,CB221,CB281, CB282,CB321,CB421,CC117,CC119, CC121,CC217,CC219,CC221,CC317, CC319,CC321,CC417,CC419,CC421, CE281,CE282)	Brand: WALSIN Model: RF03N1R0B250CT	Brand: MURATA Model: GRM0335C1E1R0BA01D

Note: The above information was declared by manufacturer.



1.5 Table for EUT Information

EUT	Transceiver (2.5G LAN)	MLCC on the path of the CPU (Location: CA15,CA16,CA17,CA18,CB15,CB16,CB17,CB18,CE15,CE16,CE17,CE18)	MLCC on the path of the CPU (Location: CA281,CA282,CB121,CB221,CB281,CB282,CB321,CB421,CC117,CC119,CC121,CC217,CC219,CC221,CC317,CC319,CC321,CC417,CC419,CC421,CE281,CE282)
EUT 1	Main Source	Main Source	Main Source
EUT 2	Second Source	Main 0Source	Main Source
EUT 3	Main Source	Second Source	Second Source

Note1: From the above, EUT 3 has been selected as representative mode for the test and its data was recorded in this report.

Note2: The above information was declared by manufacturer.

1.6 Table for EUT Supports Function

Function	Support Type	Remark
AP Router	Master	Support 2.4GHz/5GHz/6GHz
Bridge	Slave without radar detection	Support 2.4GHz/5GHz
Repeater	Master	Support 2.4GHz/5GHz
Mesh	Master	Support 2.4GHz/5GHz/6GHz

Note: The above information was declared by manufacturer.

1.7 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA0D2518-01

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Add the second source for MLCC on the path of the CPU (Location:CA15,CA16,CA17,CA18,CB15,CB16,CB17,CB18,CE15,CE16,CE17,CE18,CA281,CA282,CB121,CB221,CB281,CB282,CB321,CB421,CC117,CC119,CC121,CC217,CC219,CC221,CC317,CC319,CC321,CC417,CC419,CC421,CE281,CE282) 2. Revising the distance from "26cm" to "51cm" for EUT 3.	MPE
3. Removing Manufacturer name and address.	After evaluating, it does not affect the test.

Note: The MPE result of Bluetooth Band were based on the original report.



1.8 Accessories

Accessories				
Equipment Name	Brand Name	Model Name	Rating	Remark
Adapter 1	DELTA	ADP-45FE F	INPUT: 100-240V~1.2A, 50-60Hz OUTPUT: 19.0V, 2.37A, 45.0W	With the DC Power cable: Non-shielded, 1.5m
Adapter 2	AcBel	ADH011	INPUT: 100-240V~1.4A, 50-60Hz OUTPUT: 19.5V, 2.31A, 45.0W	With the DC Power cable: Non-shielded, 1.5m
Others				
Power cable*1: Non-shielded, 0.9m RJ-45 cable*1: Non-shielded, 1.5m				

1.9 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

1.10 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/ 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 51 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 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.

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

Where

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

and

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

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 $R > \lambda / 2 \pi$.

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 ² f.
1,500-100,000	19.2R ² .

Note: R is in meters, f is in MHz.



2.4 Calculated Result and Limit

For EUT 3

Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G:D1D	6.66	29.27	33.78	0.06	2421.029	51	C	4994.0	0.4850
5.2G:D1D	4.32	29.97	32.14	0.50	1836.538	51	C	4994.0	0.3679
5.3G:D1D	5.30	23.95	27.10	0.50	575.440	51	C	4994.0	0.1153
5.6G:D1D	4.83	23.96	26.64	0.50	517.607	51	C	4994.0	0.1037
5.8G:D1D	5.09	29.97	32.91	0.50	2192.805	51	C	4994.0	0.4393
6.2G:D1D	0.97	-	24.53	0.50	318.420	51	C	4994.0	0.0638
6.4G:D1D	0.81	-	24.41	0.50	309.742	51	C	4994.0	0.0620
6.7G:D1D	1.07	-	24.09	0.50	287.740	51	C	4994.0	0.0576
7.0G:D1D	1.14	-	24.21	0.50	295.801	51	C	4994.0	0.0593
2.4G:BT-EDR	1.69	5.64	5.18	0.50	3.698	51	C	4994.0	0.0007
2.4G:BT-LE	1.69	0.22	-0.24	0.50	1.062	51	C	4994.0	0.0002

Simultaneous Transmission Analysis Mode: EUT 3-WLAN 2.4GHz+WLAN 5GHz + WLAN 6E + Bluetooth

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
Co-TX Mode: 1	-	-	-	-	-	-	-	-	-
2.4G:D1D	6.66	29.27	33.78	0.06	2421.029	51	C	4994.0	0.4850
5.8G:D1D	5.09	29.97	32.91	0.50	2192.805	51	C	4994.0	0.4393
6.2G:D1D	0.97	-	24.53	0.50	318.420	51	C	4994.0	0.0638
2.4G:BT-EDR	1.69	5.64	5.18	0.50	3.698	51	C	4994.0	0.0007
Sum TL Ratio_C	0.9888								
Ratio Limit	1								

Note: The above antenna gain was declared by manufacturer.

—————THE END—————