



Testing Laboratory
3787

RADIO EXPOSURE TEST REPORT

FCC ID : MSQ-RTBE7000
Equipment : BE7200 Dual Band Wi-Fi Router
Brand Name : ASUS
Model Name : RT-BE88U, RT-BE7200
Applicant : ASUSTeK COMPUTER INC.
1F., No. 15, Lide Rd., Beitou, Taipei City 112, Taiwan
Standard : 47 CFR Part 2.1091

The product was received on Aug. 28, 2023, and testing was started from Dec. 21, 2023 and completed on Feb. 21, 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

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

TEL : 886-3-656-9065
FAX : 886-3-656-9085
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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: Sophia Shiung



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) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
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) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)



1.2 Antenna Information

Set	Ant.	Port		Brand	Model Name	Antenna Type	Connector	Gain (dBi)
		2.4GHz	5GHz					
1	1	4	1	M.gear	C660-510411-A	Dipole Antenna	Reversed-SMA	Note 1
	2	3	2				Reversed-SMA	
	3	2	3				Reversed-SMA	
	4	1	4				Reversed-SMA	
2	1	4	1	PSA	RFDPA171300SBLB820	Dipole Antenna	Reversed-SMA	
	2	3	2				Reversed-SMA	
	3	2	3				Reversed-SMA	
	4	1	4				Reversed-SMA	

Note 1:

Set	Ant.	Port		Gain (dBi)				Cable loss(dB)		Net Gain (dBi)			
		2.4GHz	5GHz	2.4GHz	5GHz UNII 1/ UNII 2A	5GHz UNII 2C	5GHz UNII 3	2.4GHz	5GHz	2.4GHz	5GHz UNII 1/ UNII 2A	5GHz UNII 2C	5GHz UNII 3
1	1	4	1	1.94	2.33	2.35	1.94	0.51	0.86	1.43	1.47	1.49	1.08
	2	3	2					0.41	0.73	1.53	1.6	1.62	1.21
	3	2	3					0.61	1.12	1.33	1.21	1.23	0.82
	4	1	4					0.69	1.2	1.25	1.13	1.15	0.74
2	1	4	1	1.85	2.24	2.32	1.86	0.51	0.86	1.34	1.38	1.46	1
	2	3	2					0.41	0.73	1.44	1.51	1.59	1.13
	3	2	3					0.61	1.12	1.24	1.12	1.2	0.74
	4	1	4					0.69	1.2	1.16	1.04	1.12	0.66

Note 2: The above information was declared by manufacturer.

Note 3: There's only set 1 selected to test and recorded in the report due to the same antenna type and highest gain.



Note 4: Directional gain information

Type	Maximum Output Power	Power Spectral Density
Non-BF	Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$
BF	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

$$N_{SS1}(g_{1,1}) = 10^{G_1/20} ; N_{SS1}(g_{1,2}) = 10^{G_2/20} ; N_{SS1}(g_{1,3}) = 10^{G_3/20} ; N_{SS1}(g_{1,4}) = 10^{G_4/20}$$

$$g_{j,k} = (N_{SS1}(g_{1,1}) + N_{SS1}(g_{1,2}) + N_{SS1}(g_{1,3}) + N_{SS1}(g_{1,4}))^2$$

$$DG = 10 \log[(N_{SS1}(g_{1,1}) + N_{SS1}(g_{1,2}) + N_{SS1}(g_{1,3}) + N_{SS1}(g_{1,4}))^2 / N_{ANT}] \Rightarrow 10$$

$$\log[(10^{G_1/20} + 10^{G_2/20} + 10^{G_3/20} + 10^{G_4/20})^2 / N_{ANT}]$$

Where ;

2.4G G1= 1.43 dBi ; G2= 1.53 dBi ; G3= 1.33 dBi ; G4= 1.25 dBi

5G UNII-1 G1 = 1.47 dBi; G2 = 1.60 dBi; G3 = 1.21 dBi; G4 = 1.13 dBi

5G UNII-2A G1 = 1.47 dBi; G2 = 1.60 dBi; G3 = 1.21 dBi; G4 = 1.13 dBi

5G UNII-2C G1 = 1.49 dBi; G2 = 1.62 dBi; G3 = 1.23 dBi; G4 = 1.15 dBi

5G UNII-3 G1 = 1.08 dBi; G2 = 1.21 dBi; G3 = 0.82 dBi; G4 = 0.74 dBi

Nss1

2.4G DG = 7.41 dBi

5G UNII-1 DG = 7.38 dBi

5G UNII-2A DG = 7.38 dBi

5G UNII-2C DG = 7.40 dB

5G UNII-3 DG = 6.99 dBi

Nss2

2.4G DG = 4.40 dBi

5G UNII-1 DG = 4.37 dBi

5G UNII-2A DG = 4.37 dBi

5G UNII-2C DG = 4.39 dB

5G UNII-3 DG = 3.98 dBi

Note 5: **For 2.4GHz function:**

For IEEE 802.11 b/g/n/VHT/ax/be (4TX/4RX):

Port 1~4 can be used as transmitting/receiving antenna.

Port 1~4 could transmit/receive simultaneously.



For 5GHz function:

For IEEE 802.11 a/n/ac/ax/be (4TX/4RX):

Port 1~4 can be used as transmitting/receiving antenna.

Port 1~4 could transmit/receive simultaneously.

1.3 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

Brand Name	Model Name	Description
ASUS	RT-BE88U	All the models are identical; the different model names served as marketing strategy.
	RT-BE7200	

Note 1: From the above models, model: RT-BE88U was selected as representative model for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

1.4 Table for Component Source

Source	5G RF chip (Location: UF1)	
	Brand Name	Model Name
Main source	BROADCOM	BCM6726
Second source	BROADCOM	BCM67263

Note: The chipset model "BCM6726" and "BCM67263" use the same silicon die. The RF SoC design is the same for both chipsets. There is no difference in radio parameters between them.

Note: The above information was declared by manufacturer.

1.5 Table for EUT Information

EUT	5G RF Chip (Location: UF1)
1	Main source
2	Second source

Note: The above information was declared by manufacturer.

1.6 Table for EUT supports functions

Function	Support Type
AP Router	Master
Bridge	Slave without radar detection
Repeater	Master
Mesh	Master

Note 1: The USB port on this device supports both storage and WWAN functionality.

Note 2: 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: FA382332.

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

Modifications	Performance Checking
1. Add EUT 2 (Please refer to section 1.4 & 1.5 for detailed information.)	After evaluation, it does not need to re-test.
2. Changing the distance to 53cm from 51cm and 247cm.	All RF exposure

1.8 Accessories

Accessories				
Equipment Name	Brand Name	Model Name	Rating	DC Power Line
Adapter 1	ACBEL	ADH011	Input: 100-240V~1.4A, 50-60Hz Output: 19.5V, 2.31A, 45.0W MAX.	Non-shielded,1.5m
Adapter 2	LEADER	MU60B3120500-A1	Input: 100V-240V~50/60Hz, 1.5A Output: 12.0V, 5.0A	-
Others				
Power cord*1: Non-shielded, 0.8m for Adapter 1 use				
RJ-45 cable 1*1: Shielded, 1.5m				
RJ-45 cable 2*1: Shielded, 1.5m				
RJ-45 cable 3*1: 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 (TAF: 3787)	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.) TEL: 886-3-656-9065 FAX: 886-3-656-9085 Test site Designation No. TW3787 with FCC. Conformity Assessment Body Identifier (CABID) TW3787 with ISCED.



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 53 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

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, <= P_{th}.

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

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^2f .
1,500-100,000	19.2 R^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)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	7.41	28.51	33.77	0.07	2421.029	53	C	5393.3	0.4491
5.2G;D1D	7.38	28.60	33.83	0.01	2421.029	53	C	5393.3	0.4491
5.3G;D1D	7.38	22.58	27.81	0.03	608.135	53	C	5393.3	0.1128
5.6G;D1D	7.40	22.56	27.81	0.03	608.135	53	C	5393.3	0.1128
5.8G;D1D	6.99	28.94	33.78	0.06	2421.029	53	C	5393.3	0.4491
Band26;G7D	0.00	24.00	21.85	0.50	171.791	53	C	2513.3	0.0684

Simultaneous Transmission Analysis Mode:

Test Mode 1: WLAN 2.4GHz + WLAN 5GHz

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	7.41	28.51	33.77	0.07	2421.029	53	C	5393.3	0.4491
5.2G;D1D	7.38	28.60	33.83	0.01	2421.029	53	C	5393.3	0.4491
Sum TL Ratio_C	0.8982								
Ratio Limit	1								

Test Mode 2: WLAN 2.4GHz + WLAN 5GHz + WWAN

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	7.41	28.51	33.77	0.07	2421.029	53	C	5393.3	0.4491
5.2G;D1D	7.38	28.60	33.83	0.01	2421.029	53	C	5393.3	0.4491
Band26;G7D	0.00	24.00	21.85	0.50	171.791	53	C	2513.3	0.0684
Sum TL Ratio_C	0.9666								
Ratio Limit	1								

Note: The above antenna gain was declared by manufacturer.

————THE END————