



# 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 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: Muse Chan**



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

Ex.

Directional Gain (NSS1) formula :

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

$$NSS1(g1,1) = 10^{G1/20} ; NSS1(g1,2) = 10^{G2/20} ; NSS1(g1,3) = 10^{G3/20} ; NSS1(g1,4) = 10^{G4/20}$$

$$g_{j,k} = (NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2$$

$$DG = 10 \log[(NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2 / N_{ANT}] => 10$$

$$\log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$$

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 difference model for difference model 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 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.

### 1.5 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				





### 1.6 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

<b>Testing Location Information</b>	
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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	<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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	<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 Mode 1: 51 cm and Mode 2: 247 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 <sup>2</sup> .
1.34-30	3,450 R <sup>2</sup> /f <sup>2</sup> .
30-300	3.83 R <sup>2</sup> .
300-1,500	0.0128 R <sup>2</sup> f.
1,500-100,000	19.2R <sup>2</sup> .

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



## 2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For 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	51	C	4994.0	0.4850
5.2G;D1D	7.38	28.60	33.83	0.01	2421.029	51	C	4994.0	0.4850
5.3G;D1D	7.38	22.58	27.81	0.03	608.135	51	C	4994.0	0.1218
5.6G;D1D	7.40	22.56	27.81	0.03	608.135	51	C	4994.0	0.1218
5.8G;D1D	6.99	28.94	33.78	0.06	2421.029	51	C	4994.0	0.4850

Simultaneous Transmission Analysis Mode:

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	51	C	4994.0	0.4850
5.2G;D1D	7.38	28.60	33.83	0.01	2421.029	51	C	4994.0	0.4850
Sum TL Ratio_C	0.97								
Ratio Limit	1								

For 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	247	C	117138.3	0.0207
5.2G;D1D	7.38	28.60	33.83	0.01	2421.029	247	C	117138.3	0.0207
5.3G;D1D	7.38	22.58	27.81	0.03	608.135	247	C	117138.3	0.0052
5.6G;D1D	7.40	22.56	27.81	0.03	608.135	247	C	117138.3	0.0052
5.8G;D1D	6.99	28.94	33.78	0.06	2421.029	247	C	117138.3	0.0207
Band26;G7D	0.00	49.5	47.35	0.49	60813.500	247	C	63621.7	0.9562

Simultaneous Transmission Analysis Mode:

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	247	C	117138.3	0.0207
5.2G;D1D	7.38	28.60	33.83	0.01	2421.029	247	C	117138.3	0.0207
Band26;G7D	0.00	49.5	47.35	0.49	60813.500	247	C	63621.7	0.9562
Sum TL Ratio_C	0.9976								
Ratio Limit	1								

Note: The above antenna gain was declared by manufacturer.

————THE END————