

# RF Exposure Evaluation Declaration

Product Name : Wireless-AC1900 Dual Band Gigabit Router  
Trade Name : ASUS  
Model No. : RT-AC68U V3  
FCC ID : MSQ-RTACIB00

Applicant : ASUSTeK COMPUTER INC.

Address : 1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan

Date of Receipt : Mar. 30, 2020  
Date of Declaration : Jun. 04, 2020  
Report No. : 2030813R-RF-US-Exp  
Report Version : V1.0



The declaration results relate only to the samples calculated.

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Applicant : ASUSTeK COMPUTER INC.  
Address : 1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan  
Manufacturer : ASUSTeK COMPUTER INC.  
Address : 1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan  
Trade Name : ASUS  
Model No. : RT-AC68U V3  
FCC ID : MSQ-RTACIB00  
Applicable Standard : FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.  
Test Lab : Hsin Chu Laboratory  
Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C.  
TEL: +886-3-582-8001 / FAX: +886-3-582-8958  
Test Result : Complied

Tested By :



( Scott Chang / Engineer )

Approved By :



( Louis Hsu / Deputy Manager )

### Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Jun. 04, 2020

## 1.1. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required	Test Site
Temperature (°C)	Peak Output Power	15 - 35	3
Humidity (%RH)		25 - 75	

Note: Test site information refers to Laboratory Information.

### Laboratory Information

**USA** : FCC Registration Number: TW3024  
**Canada** : IC Registration Number: 22397-1 / 22397-2 / 22397-3

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: <http://www.dekra.com.tw>

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	<ol style="list-style-type: none"> <li>No. 75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan, R.O.C.</li> <li>No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.</li> <li>No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.</li> </ol>
Phone number	<ol style="list-style-type: none"> <li>+886-3-592-8858</li> <li>+886-3-582-8001</li> <li>+886-3-582-8001</li> </ol>
Fax number	<ol style="list-style-type: none"> <li>+886-3-592-8859</li> <li>+886-3-582-8958</li> <li>+886-3-582-8958</li> </ol>
Email address	<a href="mailto:info.tw@dekra.com">info.tw@dekra.com</a>
Website	<a href="http://www.dekra.com.tw">http://www.dekra.com.tw</a>

## 1.2. List of Test Equipment

Peak Output Power / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2019/12/02	2020/12/01
Pulse Power Sensor	Anritsu	MA2411B	1531043	2019/12/02	2020/12/01
Pulse Power Sensor	Anritsu	MA2411B	1531044	2019/12/02	2020/12/01
Power Meter	Keysight	8990B	MY51000248	2019/05/21	2020/05/20
Power Sensor	Keysight	N1923A	MY57240005	2019/05/21	2020/05/20

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

## 1.3. Uncertainty

Test item	Uncertainty
Peak Output Power	$\pm 2.26$ dB

Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

## 2. RF Exposure Evaluation

### 2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

#### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

#### RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m <sup>2</sup> )	Reference Period (minutes)
0.003-1023	170	180	-	Instantaneous*
0.1-10	-	1.6/ <i>f</i>	-	6**
1.29-10	193/ <i>f</i> 0.5	-	-	6**
10-20	61.4	0.163	10	6
20-48	129.8/ <i>f</i> 0.25	0.3444/ <i>f</i> 0.25	44.72/ <i>f</i> 0.5	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 <i>f</i> 0.25	0.04138 <i>f</i> 0.25	0.6455 <i>f</i> 0.5	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/ <i>f</i> 1.2
150000-300000	0.354 <i>f</i> 0.5	9.40 x 10 <sup>-4</sup> <i>f</i> 0.5	3.33 x 10 <sup>-4</sup> <i>f</i>	616000/ <i>f</i> 1.2

**Note:** *f* is frequency in MHz. \*Based on nerve stimulation (NS). \*\* Based on specific absorption rate (SAR).

## Friis Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

$P_d$  = power density in  $mW/cm^2$

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

$R$  = distance between observation point and center of the radiator in cm

$P_d$  is the limit of MPE,  $1 mW/cm^2$ . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance  $r$  where the MPE limit is reached.

## 2.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

### 2.3. Test Result of RF Exposure Evaluation

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit_CDD mode
Test Condition	RF Exposure Evaluation

**Antenna Gain:** The maximum antenna gain is 1.33dBi.

#### Output Power into Antenna & RF Exposure Evaluation Distance:

WLAN Function					
2.4GHz Band					
Mode	Frequency (MHz)	Conducted Output Power		Power Density at R = 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
		dBm	mW		
802.11b	2412	27.506	563.119	0.152	1.000
	2437	29.006	795.426	0.215	1.000
	2462	26.166	413.619	0.112	1.000
802.11g	2412	22.004	158.635	0.043	1.000
	2437	29.012	796.526	0.215	1.000
	2462	19.451	88.125	0.024	1.000
802.11n (20MHz)	2412	18.870	77.090	0.021	1.000
	2437	28.305	676.862	0.183	1.000
	2462	19.334	85.783	0.023	1.000
802.11n (40MHz)	2422	17.702	58.911	0.016	1.000
	2437	19.655	92.363	0.025	1.000
	2452	16.216	41.841	0.011	1.000

Note:

1. The antenna information is from the customer declaration.
2. The results are evaluated using the maximum power.



Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit_BF Mode
Test Condition	RF Exposure Evaluation

**Antenna Gain:** The maximum antenna gain is 1.33dBi.

**Output Power into Antenna & RF Exposure Evaluation Distance:**

WLAN Function					
2.4GHz Band					
Mode	Frequency (MHz)	Conducted Output Power		Power Density at R = 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
		dBm	mW		
802.11n (20MHz)	2412	18.870	77.090	0.021	1.000
	2437	27.159	519.876	0.140	1.000
	2462	19.728	93.929	0.025	1.000
802.11n (40MHz)	2422	17.498	56.208	0.015	1.000
	2437	19.769	94.820	0.026	1.000
	2452	15.962	39.464	0.011	1.000

**Note:**

1. The antenna information is from the customer declaration.
2. The results are evaluated using the maximum power.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit_CDD mode
Test Condition	RF Exposure Evaluation

**Antenna Gain:** The maximum antenna gain is 1.85dBi.

**Output Power into Antenna & RF Exposure Evaluation Distance:**

WLAN Function					
5GHz Band					
Mode	Frequency (MHz)	Conducted Output Power		Power Density at R = 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
		dBm	mW		
802.11a	5180	17.503	56.273	0.017	1.000
	5220	17.139	51.749	0.016	1.000
	5240	16.788	47.731	0.015	1.000
	5745	29.017	797.444	0.243	1.000
	5785	29.073	807.793	0.246	1.000
	5825	29.008	795.793	0.242	1.000
802.11ac (20MHz)	5180	18.152	65.343	0.020	1.000
	5220	18.010	63.241	0.019	1.000
	5240	18.264	67.050	0.020	1.000
	5745	28.637	730.634	0.223	1.000
	5785	29.206	832.914	0.254	1.000
	5825	29.502	891.661	0.272	1.000
802.11ac (40MHz)	5190	17.726	59.238	0.018	1.000
	5230	21.695	147.741	0.045	1.000
	5755	26.464	442.996	0.135	1.000
	5795	27.828	606.457	0.185	1.000
802.11ac (80MHz)	5210	16.933	49.351	0.015	1.000
	5775	24.101	257.099	0.078	1.000

**Note:**

1. The antenna information is from the customer declaration.
2. The results are evaluated using the maximum power.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit_BF mode
Test Condition	RF Exposure Evaluation

**Antenna Gain:** The maximum antenna gain is 1.85dBi.

**Output Power into Antenna & RF Exposure Evaluation Distance:**

WLAN Function					
5GHz Band					
Mode	Frequency (MHz)	Conducted Output Power		Power Density at R = 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
		dBm	mW		
802.11ac (20MHz)	5180	16.527	44.947	0.014	1.000
	5220	17.767	59.800	0.018	1.000
	5240	17.611	57.690	0.018	1.000
	5745	27.392	548.530	0.167	1.000
	5785	25.044	319.448	0.097	1.000
	5825	24.599	288.337	0.088	1.000
802.11ac (40MHz)	5190	17.151	51.892	0.016	1.000
	5230	21.284	134.400	0.041	1.000
	5755	25.553	359.170	0.109	1.000
	5795	26.127	409.921	0.125	1.000
802.11ac (80MHz)	5210	19.548	90.116	0.027	1.000
	5775	24.930	311.172	0.095	1.000

Note:

1. The antenna information is from the customer declaration.
2. The results are evaluated using the maximum power.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Collocation Power Density
Test Condition	RF Exposure Evaluation

Power Density for WiFi 2.4GHz (mW/cm <sup>2</sup> )	Power Density for WiFi 5GHz (mW/cm <sup>2</sup> )	Collocation Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
0.215	0.272	0.487	1

Note 1.

The worst value of WLAN 2.4GHz refer to report No. 2030813R-RFUSP26V00 from the DEKRA.  
The worst value of WLAN 5GHz refer to report No. 2030813R-RFUSP57V00 from DEKRA.

Note 2.

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm<sup>2</sup>.

Note 3.

WLAN 2.4GHz: Power Density / Limit =  $0.215 / 1 = 0.215$  (mW/cm<sup>2</sup>)

WLAN 5GHz: Power Density / Limit =  $0.272 / 1 = 0.272$  (mW/cm<sup>2</sup>)

Total Power Density =  $0.215 + 0.272 = 0.487$  (mW/cm<sup>2</sup>)