RF Exposure Evaluation declaration

Product Name : Wireless-AC1900 Dual Band Gigabit Router
Model No. : RT-AC68U, RT-AC68R
FCC ID. : MSQ-RTAC68U

Applicant : ASUSTeK COMPUTER INC.
Address : 4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan

Date of Receipt : 2013/04/09
Date of Declaration : 2013/08/29
Report No. : 134199R-RF-US-Exp
Report Version : V1.0

1. RF Exposure Evaluation

1.1. 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^2)	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

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4*pi*r^2)$

Where

Pd = power density in mW/cm^2

Pout = 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

Pd id 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.

1.2. Test Procedure

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

The temperature and related humidity: 18℃ and 78% RH.

1.3. 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

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.91dBi or 1.55 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11b			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	220.8005	0.06809
6	2437	246.6039	0.07604
11	2462	338.8442	0.10449

IEEE 802.11g			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	255.8586	0.07890
6	2437	765.5966	0.23608
11	2462	191.4256	0.05903

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^2.

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

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.91dBi or 1.55 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11n (20MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	176.1976	0.05433
6	2437	599.7911	0.18495
11	2462	165.1962	0.05094

IEEE 802.11n (40MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
3	2422	133.3521	0.04112
6	2437	220.8005	0.06809
9	2452	107.8947	0.03327

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^2.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit (CDD Mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.04dBi or 2.54 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11a			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
36	5180	16.4816	0.00833
44	5220	17.0608	0.00862
48	5240	16.5196	0.00835

IEEE 802.11a			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
149	5745	831.7638	0.42030
157	5785	939.7233	0.47486
165	5825	905.7326	0.45768

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^2.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit (CDD Mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.04dBi or 2.54 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(20MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
36	5180	16.7109	0.00844
44	5220	16.3305	0.00825
48	5240	16.8267	0.00850

IEEE 802.11 n(20MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
149	5745	801.6781	0.40510
157	5785	957.1941	0.48369
165	5825	933.2543	0.47159

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^2.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit (CDD Mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.04dBi or 2.54 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(40MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
38	5190	37.6704	0.01904
46	5230	35.9749	0.01818

IEEE 802.11 n(40MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
151	5755	695.0243	0.35121
159	5795	895.3648	0.45244

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^2.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit (CDD Mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.04dBi or 2.54 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 ac(80MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
42	5210	47.9733	0.02424

IEEE 802.11 ac(80MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
155	5775	454.9881	0.22991

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^2.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit (Beamforming Mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.91dBi or 1.55 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11b			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	187.4995	0.05782
6	2437	189.2344	0.05835
11	2462	154.5254	0.04765

IEEE 802.11g			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	97.2747	0.03000
6	2437	317.6874	0.09796
11	2462	68.3912	0.02109

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^2.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit (Beamforming Mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.91dBi or 1.55 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11n (20MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	171.0015	0.05273
6	2437	522.3962	0.16109
11	2462	147.2313	0.04540

IEEE 802.11n (40MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
3	2422	140.2814	0.04326
6	2437	497.7371	0.15348
9	2452	81.4704	0.02512

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^2.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit (Beamforming Mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.04dBi or 2.54 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11a			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
36	5180	21.4783	0.01085
44	5220	20.8930	0.01056
48	5240	21.0863	0.01066

IEEE 802.11a			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
149	5745	386.3670	0.19524
157	5785	399.9447	0.20210
165	5825	377.5722	0.19079

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^2.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit (Beamforming Mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.04dBi or 2.54 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(20MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
36	5180	21.6272	0.01093
44	5220	21.7270	0.01098
48	5240	21.7771	0.01100

IEEE 802.11 n(20MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
149	5745	463.4469	0.23419
157	5785	476.4310	0.24075
165	5825	460.2566	0.23257

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^2.

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Test Mode	Transmit (Beamforming Mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.04dBi or 2.54 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(40MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
38	5190	21.0863	0.01066
46	5230	23.3884	0.01182

IEEE 802.11 n(40MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
151	5755	461.3176	0.23311
159	5795	476.4310	0.24075

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^2.

Product	Wireless-AC1900 Dual Band Gigabit Router
Test Mode	Transmit (Beamforming Mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.04dBi or 2.54 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 ac(80MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
42	5210	21.5278	0.01088

IEEE 802.11 ac(80MHz) ANT 0+1+2			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
155	5775	458.1419	0.23151

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^2.