RF Exposure Evaluation Declaration

Product Name ： Dual-band Wireless-AC1200 Gigabit Router

Model No. ： RT-AC56U/ RT-AC56R

FCC ID. ： MSQ-RTAC56UA

Applicant : ASUSTeK COMPUTER INC.

Address ： 4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan

Date of Receipt ： 2013/08/22

Date of Declaration ： 2013/09/03

Report No. ： 139121R-RF-US-Exp

Report Version ： V1.0

Testing Laboratory
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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	Dual-band Wireless-AC1200 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 3.71dBi or 2.35 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	319.1538	0.14921
6	2437	320.6269	0.14990
11	2462	314.7748	0.14716

IEEE 802.11g(ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	261.2161	0.12212
6	2437	328.0953	0.15339
11	2462	276.0578	0.12906

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	Dual-band Wireless-AC1200 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 3.71dBi or 2.35 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11n (20MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	185.3532	0.08666
6	2437	341.1929	0.15951
11	2462	158.8547	0.07427

IEEE 802.11n (40MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
3	2422	103.5142	0.04839
6	2437	115.6112	0.05405
9	2452	46.7735	0.02187

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	Dual-band Wireless-AC1200 Gigabit Router
Test Mode	Transmit (CDD mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber are 3.71dBi(or 2.35) and 3.07dBi(or 2.03) 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	23.6048	0.00952
40	5220	23.2809	0.00939
44	5240	22.9087	0.00924

IEEE 802.11a (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
149	5745	479.7334	0.22810
157	5785	492.0395	0.23395
165	5825	487.5285	0.23181

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 (CDD mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber are 3.71dBi(or 2.35) and 3.07dBi(or 2.03) in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(20MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
36	5180	25.0611	0.01011
40	5220	24.4343	0.00986
44	5240	25.9418	0.01046

IEEE 802.11 n(20MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
149	5745	492.0395	0.23395
157	5785	489.7788	0.23288
165	5825	481.9478	0.22915

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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Antenna Gain

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Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(40MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
38	5190	42.7563	0.01725
46	5230	41.2098	0.01662

IEEE 802.11 n(40MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
151	5755	500.0345	0.20194
159	5795	494.3107	0.19963

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	Dual-band Wireless-AC1200 Gigabit Router
Test Mode	Transmit (CDD mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber are 3.71dBi(or 2.35) and 3.07dBi(or 2.03) in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11ac (80MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
42	5210	40.8319	0.01647

IEEE 802.11ac (80MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
155	5775	460.2566	0.18588

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	Dual-band Wireless-AC1200 Gigabit Router
Test Mode	Transmit (Beamforming mode)
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber are 6.71dBi(or 4.89) and 6.07dBi(or 4.05) 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	23.6048	0.00952
40	5220	23.2809	0.00939
44	5240	22.9087	0.00924

IEEE 802.11a (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
149	5745	429.5364	0.40847
157	5785	441.5704	0.41991
165	5825	437.5221	0.41606

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	Dual-band Wireless-AC1200 Gigabit Router
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Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber are 6.71dBi(or 4.89) and 6.07dBi(or 4.05) in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(20MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
36	5180	25.0611	0.01011
40	5220	24.4343	0.00986
44	5240	25.9418	0.01046

IEEE 802.11 n(20MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
149	5745	481.9478	0.45831
157	5785	479.7334	0.45620
165	5825	469.8941	0.44685

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 Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber are 6.71dBi(or 4.89) and 6.07dBi(or 4.05) in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(40MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
38	5190	42.7563	0.01725
46	5230	41.2098	0.01662

IEEE 802.11 n(40MHz) (ANT 0+1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
151	5755	470.9773	0.44788
159	5795	493.1738	0.46898

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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IEEE 802.11ac (80MHz) (ANT 0+1)			
WLAN Function			
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Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
155	5775	426.5795	0.40566

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.