

RF Exposure Evaluation Declaration

Product Name : Dual-band Wireless Range Extender
Trade Name : ASUS
Model No. : RP-AC68U
FCC ID. : MSQ-RP0S01

Applicant : ASUSTeK COMPUTER INC.

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

Date of Receipt : May 15, 2015

Date of Declaration : Sep. 24, 2015

Report No. : 1560497R-RF-US-Exp

Report Version : V1.0



The declaration results relate only to the samples calculated.

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

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is the limit of MPE, 1 mW/cm². 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°C and 78% RH.

1.3. Test Result of RF Exposure Evaluation

Product	Dual-band Wireless Range Extender
Test Mode	Mode1: Transmit-CDD Mode
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.57dBi or 2.28 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	347.5362	0.15764
6	2437	916.2205	0.41559
11	2462	254.6830	0.11552

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	176.1976	0.07992
6	2437	555.9043	0.25215
11	2462	134.5860	0.06105

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/cm².

Product	Dual-band Wireless Range Extender
Test Mode	Mode1: Transmit-CDD Mode
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.57dBi or 2.28 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11n (20MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
1	2412	130.6171	0.05925
6	2437	528.4453	0.23970
11	2462	203.2357	0.09219

IEEE 802.11n (40MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
3	2422	87.9023	0.03987
6	2437	219.7860	0.09969
9	2452	127.9381	0.05803

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Product	Dual-band Wireless Range Extender
Test Mode	Mode1: Transmit-CDD Mode
Test Condition	RF Exposure Evaluation

Antenna Gain

5.2G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.31dBi or 2.7 in linear scale.

5.8G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.6 or 2.88 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	275.4229	0.14794
40	5220	417.8304	0.22444
44	5240	413.0475	0.22187

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	760.3263	0.43563
153	5785	571.4786	0.32743
165	5825	567.5446	0.32518

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Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(20MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
36	5180	273.5269	0.14692
40	5220	411.1497	0.22085
44	5240	431.5191	0.23179

IEEE 802.11 n(20MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
149	5745	508.1594	0.29115
153	5785	905.7326	0.51895
165	5825	872.9714	0.50017

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Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(40MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
38	5190	270.3958	0.14524
46	5230	552.0774	0.29655

IEEE 802.11 n(40MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
151	5755	320.6269	0.18371
159	5795	528.4453	0.30278

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/cm².

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Test Condition	RF Exposure Evaluation

Antenna Gain

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5.8G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.6 or 2.88 linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11ac(80MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
42	5210	212.3244	0.11405

IEEE 802.11ac(80MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
155	5775	432.5138	0.24781

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/cm².

Product	Dual-band Wireless Range Extender
Test Mode	Mode2: Transmit-Beamforming Mode
Test Condition	RF Exposure Evaluation

Antenna Gain

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Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11n (20MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
1	2412	107.6465	0.04883
6	2437	397.1915	0.18016
11	2462	105.6818	0.04794

IEEE 802.11n (40MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
3	2422	48.0839	0.02181
6	2437	170.6082	0.07739
9	2452	95.0605	0.04312

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/cm².

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Test Condition	RF Exposure Evaluation

Antenna Gain

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Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(20MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
36	5180	205.5891	0.11043
40	5220	379.3150	0.20375
44	5240	361.4099	0.19413

IEEE 802.11 n(20MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
149	5745	479.7334	0.27487
153	5785	676.0830	0.38737
165	5825	679.2036	0.38915

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/cm².

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Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(40MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
38	5190	138.6756	0.07449
46	5230	451.8559	0.24271

IEEE 802.11 n(40MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
151	5755	345.9394	0.19821
159	5795	511.6818	0.29317

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Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11ac(80MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
42	5210	133.7211	0.07183

IEEE 802.11ac(80MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
155	5775	349.9452	0.20050

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/cm².