RF Exposure Evaluation declaration

Product Name	:	Dual-Band Wireless-AC PCI-E Adapter
Trade Name	:	ASUS
Model No.	:	PCE-AC51
FCC ID.	:	MSQ-PCEAC1N00

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

Date of Receipt	:	Aug. 22, 2016
Date of Declaration	:	Sep. 20, 2016
Report No.	:	1680463R-RF-US-Exp
Report Version	:	V1.0

Testing Laboratory
3024

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-AC PCI-E Adapter
Test Mode	Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.05dBi or 1.60 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11b (ANT 0)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	131.2200	0.04177
6	2437	176.6038	0.05621
11	2462	90.5733	0.02883

IEEE 802.11g (ANT 0)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	44.5656	0.01419
6	2437	157.7611	0.05022
11	2462	37.9315	0.01207

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

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.05dBi or 1.60 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11b (ANT 1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	64.7143	0.02060
6	2437	187.4995	0.05968
11	2462	111.9438	0.03563

IEEE 802.11g (ANT 1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412	34.1979	0.01089
6	2437	101.6249	0.03235
11	2462	47.6431	0.01517

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Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.05 dBi or 1.60 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	57.4916	0.01830
6	2437	182.6155	0.05813
11	2462	52.9739	0.01686

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	32.0316	0.01020
6	2437	60.6804	0.01932
9	2452	29.2858	0.00932

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
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is: 3.61dBi or 2.30 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11a (ANT 0)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
36	5180	61.3762	0.02808
40	5220	65.3131	0.02989
44	5240	38.4592	0.01760

IEEE 802.11a (ANT 0)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
149	5745	190.5461	0.08719
157	5785	207.0141	0.09472
165	5825	201.3724	0.09214

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

Antenna Gain: The maximum Gain measured in fully anechoic chamber is: 3.61dBi or 2.30 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11a (ANT 1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
36	5180	42.3643	0.01938
40	5220	84.1395	0.03850
44	5240	65.9174	0.03016

IEEE 802.11a (ANT 1)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
149	5745	138.6756	0.06345
157	5785	181.1340	0.08288
165	5825	159.2209	0.07285

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

Antenna Gain: The maximum Gain measured in fully anechoic chamber is: 3.61dBi or 2.30 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	109.9828	0.05032
40	5220	36.6887	0.01679
44	5240	32.3181	0.01479

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	276.6810	0.12660
157	5785	339.6737	0.15542
165	5825	303.3070	0.13878

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

Antenna Gain: The maximum Gain measured in fully anechoic chamber is: 3.61dBi or 2.30 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	75.5092	0.03455
46	5230	179.8871	0.08231

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	230.2339	0.10535
159	5795	261.1455	0.11949

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

Antenna Gain: The maximum Gain measured in fully anechoic chamber is: 3.61dBi or 2.30 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	71.2910	0.03262

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	97.2879	0.04452

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.