RF Exposure Evaluation declaration

Product Name ： Dual-band Wireless-N Adapter
Model No. ： USB-N66
FCC ID. ： MSQ-USBN66

Applicant : ASUSTeK COMPUTER INC.
Address : No. 15, Li-Te Rd., Peitou, Taipei 112, Taiwan R.O.C.

Date of Receipt : 2012/02/04
Date of Declaration : 2012/03/16
Report No. : 122108R-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	Dual-band Wireless-N Adapter
Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2dBi or 1.58 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11b			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (W)	Power Density at R = 20 cm (W/m^2)
1	2412	0.101	0.03194
6	2437	0.094	0.02974
11	2462	0.085	0.02688

IEEE 802.11g			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (W)	Power Density at R = 20 cm (W/m^2)
1	2412	0.15885	0.04993
6	2437	0.09484	0.02981
11	2462	0.11092	0.03486

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 10 W/m^2.

Product	Dual-band Wireless-N Adapter
Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2dBi or 1.58 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 (W)	Power Density at R = 20 cm (W/m^2)
1	2412	0.25763	0.08098
6	2437	0.13490	0.04240
11	2462	0.25119	0.07896

IEEE 802.11n (40MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (W)	Power Density at R = 20 cm (W/m^2)
3	2422	0.43351	0.13627
6	2437	0.51761	0.16270
9	2452	0.47315	0.14873

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 10 W/m^2.

Product	Dual-band Wireless-N Adapter
Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4dBi or 2.512 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11a			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (W)	Power Density at R = 20 cm (W/m^2)
36	5180	0.03141	0.01568
40	5220	0.03133	0.01565
44	5240	0.03097	0.01547

IEEE 802.11a			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (W)	Power Density at R = 20 cm (W/m^2)
149	5745	0.08318	0.04153
153	5785	0.07980	0.03985
165	5825	0.07396	0.03693

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 10 W/m^2.

Product	Dual-band Wireless-N Adapter
Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4dBi or 2.512 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(20MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (W)	Power Density at R = 20 cm (W/m^2)
36	5180	0.03228	0.01612
40	5220	0.03148	0.01572
44	5240	0.03155	0.01575

IEEE 802.11 n(20MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (W)	Power Density at R = 20 cm (W/m^2)
149	5745	0.17061	0.0852
153	5785	0.17061	0.0852
165	5825	0.19364	0.0967

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 10 W/m^2.

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Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4dBi or 2.512 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11 n(40MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (W)	Power Density at R = 20 cm (W/m^2)
38	5190	0.04808	0.02401
46	5230	0.04920	0.02457

IEEE 802.11 n(40MHz)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (W)	Power Density at R = 20 cm (W/m^2)
151	5755	0.19320	0.09647
159	5795	0.17539	0.08758

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 10 W/m^2.