RF Exposure Evaluation declaration

Product Name ： 3G MOBILE Wireless Router
Model No. ： WL-330N3G
FCC ID. ： MSQ-WL330N3G

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

Date of Receipt : 2010/11/09
Date of Declaration : 2010/11/26
Report No. : 10B400R-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	3G MOBILE Wireless Router
Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.6dBi or 1.82 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	291.0717	0.10539
6	2437	228.5599	0.08276
11	2462	181.9701	0.06589

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	567.5446	0.20549
6	2437	527.2299	0.19090
11	2462	540.7543	0.19579

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	3G MOBILE Wireless Router
Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.6dBi or 1.82 in linear scale. IEEE 802.11n (20M)

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	484.1724	0.17531
6	2437	485.2885	0.17571
11	2462	456.0369	0.16512

IEEE 802.11n (40M)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
3	2422	510.5050	0.18484
6	2437	474.2420	0.17171
9	2452	362.2430	0.13116

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.

1.4. Test result of RF Exposure Evaluation (Collocation Mode)

For collocation mode is simulation when EUT insert WWAN card and use maximum output power for this RF Exposure Evaluation.

WWAN:

Output Power into Antenna & RF Exposure Evaluation Distance:

Frequency band	ERP (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit ($f/1500 mW/cm^2$)
850	1500	0.298416	0.5666

Frequency band	EIRP (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm2)
1900	2000	0.397888	1

Result of Collocation Evaluation:

Frequency band	(Pd of WWAN)/(Pd WWAN limit) + (Pd of WLAN)/(Pd WLAN limit)	Limit
850(WWAN)+2412(802.11g)	(0.298416/0.5666) + (0.20549/1) = 0.73216	<1
1900(WWAN)+2412(802.11g)	(0.397888/1) + (0.20549/1) = 0.603378	<1