RF Exposure Evaluation declaration

Product Name ： 802.11g Wireless ADSL2+ 4-port Gateway
Model No. ： P-660HW-D1 v2, P-660HW-D1 v2, P-660HW-D1 v2, 401619
FCC ID. ： I88P660HWD1V2

Applicant : ZyXEL Communications Corporation
Address : No. 6, Innovation Rd II, Science-Based Industrial Park, Hsin-Chu, Taiwan, R.O.C.

Date of Receipt : 2006/09/15
Date of Declaration : 2006/10/05
Report No. : 069H035-RF-US-Exp

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	802.11g Wireless ADSL2+ 4-port Gateway
Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3 dBi or 2 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11b			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412.00	88.1049	0.0350
6	2437.00	362.243	0.0553
11	2462.00	83.9460	0.0333

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	802.11g Wireless ADSL2+ 4-port Gateway
Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3 dBi or 2 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11g			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)
1	2412.00	90.1571	0.0358
6	2437.00	797.9946	0.1625
11	2462.00	87.4984	0.0347

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.