RF Exposure Evaluation declaration

Product Name : VoIP Ethernet Home Gateway
Model No. : HG2301, HG2302, HG2303
FCC ID. : Y8ZHG2300

Applicant : Tilgin IPRG AB
Address : Finlandsgatan 40, SE-164 74 Kista, Sweden

Date of Receipt : 2010/12/08
Date of Declaration : 2011/01/12
Report No. : 10C154R-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	VoIP Ethernet Home Gateway
Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.8dBi or 1.514 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	104.2317	0.03139
6	2437	102.3293	0.03081
11	2462	101.6249	0.03060

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	238.7811	0.07190
6	2437	217.7710	0.06557
11	2462	208.4491	0.06277

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	VoIP Ethernet Home Gateway
Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

Antenna Gain
Antenna Gain: The maximum Gain measured in fully anechoic chamber is1.8dBi or 1.514 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	434.5102	0.13084
6	2437	438.5307	0.13205
11	2462	409.2607	0.12323

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	454.9881	0.13700
6	2437	426.5795	0.12845
9	2452	429.5364	0.12934

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.