# RF Exposure Evaluation declaration

Product Name : Digital Set Top Box
Model No. : STB-2200
FCC ID : BJM-STB2200

Applicant : TATUNG CO.
Address : 22, Chungshan N. Rd., 3rd Sec. Taipei, Taiwan, 104, R.O.C.

Date of Receipt : May 10, 2007
Date of Declaration : July 05, 2007
Report No. : 075L080-RFUSP05V01

# 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 : Digital Set Top Box
Test Item : RF Exposure Evaluation
Test Site : No.3 OATS

**Use PIFA Antenna Gain**

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.5 dBi in logarithm scale.

**802.11b (PIFA)**

**Output Power Into Antenna & RF Exposure Evaluation Distance (1.5 dBi):**

| Channel | Frequency (MHz) | Output Power to Antenna (mW) | Power Density at R = 20 cm (mW/cm2) |
|---|---|---|---|
| 1 | 2412.00 | 39.9945 | 0.0112 |
| 6 | 2437.00 | 56.3638 | 0.0158 |
| 11 | 2462.00 | 72.6106 | 0.0204 |

**802.11g (PIFA)**

**Output Power Into Antenna & RF Exposure Evaluation Distance (1.5 dBi):**

| Channel | Frequency (MHz) | Output Power to Antenna (mW) | Power Density at R = 20 cm (mW/cm2) |
|---|---|---|---|
| 1 | 2412.00 | 73.6207 | 0.0207 |
| 6 | 2437.00 | 95.7194 | 0.0269 |
| 11 | 2462.00 | 129.7179 | 0.0365 |

The distance r ($4^{th}$ column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.

**Use Dipole Antenna Gain**

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2 dBi in logarithm scale.

**802.11b (Dipole)**

**Output Power Into Antenna & RF Exposure Evaluation Distance (2 dBi):**

| Channel | Frequency (MHz) | Output Power to Antenna (mW) | Power Density at R = 20 cm (mW/cm2) |
|---|---|---|---|
| 1 | 2412.00 | 39.9945 | 0.0126 |
| 6 | 2437.00 | 56.3638 | 0.0178 |
| 11 | 2462.00 | 72.6106 | 0.0229 |

**802.11g (Dipole)**

**Output Power Into Antenna & RF Exposure Evaluation Distance (2 dBi):**

| Channel | Frequency (MHz) | Output Power to Antenna (mW) | Power Density at R = 20 cm (mW/cm2) |
|---|---|---|---|
| 1 | 2412.00 | 73.6207 | 0.0232 |
| 6 | 2437.00 | 95.7194 | 0.0302 |
| 11 | 2462.00 | 129.7179 | 0.0409 |

The distance r ($4^{th}$ column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.