

# RF Exposure Evaluation declaration

Product Name : ROS Home Center

Model No. : ROS-2000

FCC ID : BJM-ROS2000

Applicant : TATUNG CO.

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

Date of Receipt : Jul. 23, 2008

Date of Declaration : Aug. 12, 2008

Report No. : 087373R-RFUSP05V01

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## 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 <sup>2</sup> )	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:  $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

$P_d$  = power density in  $\text{mW/cm}^2$

$P_{out}$  = 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

$P_d$  is the limit of MPE,  $1 \text{ mW/cm}^2$ . 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:  $18^\circ\text{C}$  and 78% RH.

### 1.3. Test Result of RF Exposure Evaluation

Product : ROS Home Center  
Test Item : RF Exposure Evaluation  
Test Site : CTR1

#### Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.84dBi(2.4GHz band) and 1.15dBi(5GHz band) in logarithm scale.

#### 802.11b (2412~2462MHz)

##### Output Power Into Antenna & RF Exposure Evaluation Distance (2.84dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	2412.00	75.5092	0.028889
6	2437.00	81.2831	0.031098
11	2462.00	94.6237	0.036202

The distance r (4<sup>th</sup> column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.

#### 802.11g (2412~2462MHz)

##### Output Power Into Antenna & RF Exposure Evaluation Distance (2.84dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mw)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	2412.00	82.2243	0.031458
6	2437.00	99.5405	0.038083
11	2462.00	100.0000	0.038259

The distance r (4<sup>th</sup> column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.

**802.11a (5180~5240MHz)**
**Output Power Into Antenna & RF Exposure Evaluation Distance (1.15dBi):**

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	5180.00	44.8745	0.011634
3	5220.00	42.4620	0.011009
4	5240.00	40.1791	0.010417

The distance r (4<sup>th</sup> column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.

**802.11a (5745~5825MHz)**
**Output Power Into Antenna & RF Exposure Evaluation Distance (1.15dBi):**

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	5745.00	56.3638	0.014613
3	5785.00	45.4988	0.011796
5	5825.00	60.9537	0.015803

The distance r (4<sup>th</sup> column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.

**802.11n – 20BW (5180~5240MHz) -Antenna A+B**
**Output Power Into Antenna & RF Exposure Evaluation Distance (1.15dBi):**

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	5180.00	41.0712	0.010648
3	5220.00	27.3578	0.007093
4	5240.00	33.0773	0.008576

The distance r (4<sup>th</sup> column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.

**802.11n – 40BW (5190~5230MHz) -Antenna A+B**
**Output Power Into Antenna & RF Exposure Evaluation Distance (1.15dBi):**

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	5190.00	42.4969	0.011018
2	5230.00	42.0161	0.010893

The distance r (4<sup>th</sup> column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.

**802.11n - 20BW (2412~2462MHz) - Antenna A+B**
**Output Power Into Antenna & RF Exposure Evaluation Distance (2.84dBi):**

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	2412.00	94.3104	0.036082
6	2437.00	93.8595	0.035909
11	2462.00	98.3815	0.037640

The distance r (4<sup>th</sup> column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.

**802.11n - 40BW (2422~2452MHz) - Antenna A+B**
**Output Power Into Antenna & RF Exposure Evaluation Distance (2.84dBi):**

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	2422.00	83.1938	0.031829
4	2437.00	98.5987	0.037723
7	2452.00	86.6646	0.033157

The distance r (4<sup>th</sup> column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.

**802.11n - 20BW (5745~5825MHz) - Antenna A+B****Output Power Into Antenna & RF Exposure Evaluation Distance (1.15dBi):**

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	5745.00	41.7027	0.010812
3	5785.00	33.9702	0.008807
5	5825.00	53.6783	0.013916

The distance r (4<sup>th</sup> column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.

**802.11n - 40BW (5755~5795MHz) - Antenna A+B****Output Power Into Antenna & RF Exposure Evaluation Distance (1.15dBi):**

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	5755.00	56.5022	0.014649
2	5795.00	56.0218	0.014524

The distance r (4<sup>th</sup> column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.