

# RF Exposure Evaluation declaration

Product Name : IN-Band MMDS Two-Way Transceiver  
Model No. : TRX-200  
FCC ID. : OUP960400101

Applicant : TRANSYSTEM INC.

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Date of Receipt : 2008/08/21  
Date of Declaration : 2008/09/22  
Report No. : 088323R-RF-US-Exp  
Version : V1.0

The declaration results relate only to the samples calculated.

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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 mW/cm<sup>2</sup>

$P_{out}$  = 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 mW/cm<sup>2</sup>. 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°C and 78% RH.

### 1.3. Test Result of RF Exposure Evaluation

Product	IN-Band MMDS Two-Way Transceiver
Test Mode	Mode 1: Transmit
Test Condition	RF Exposure Evaluation

#### Antenna Gain

Antenna Lists:

Corner Reflector antenna : gain=12dBi, which is 15.85 in linear scale.

Spotbeam antenna : gain=15dBi, which is 31.62 in linear scale.

Mesh antenna : gain=21~25dBi, which is 125.89~316.22 in linear scale.

#### Output Power into Antenna & RF Exposure Evaluation Distance for antenna gain=12dBi:

16QAM (160 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
2500	69.3426	0.219
2515	120.5036	0.380
2530	79.2501	0.250

16QAM (320 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
2500	77.0903	0.243
2515	131.2199	0.414
2530	82.6037	0.260

16QAM (640 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
2500	86.4967	0.273
2515	116.6809	0.368
2530	83.1763	0.262

16QAM (1280 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
2500	83.7529	0.264
2515	131.5224	0.415
2530	95.7194	0.302

16QAM (2560 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
2500	79.0679	0.249
2515	133.9677	0.422
2530	87.9023	0.277

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<sup>2</sup>.

**Output Power into Antenna & RF Exposure Evaluation Distance for antenna gain=15dBi:**

16QAM (160 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
2500	69.3426	0.436
2515	120.5036	0.758
2530	79.2501	0.499

16QAM (320 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
2500	77.0903	0.485
2515	131.2199	0.825
2530	82.6037	0.520

16QAM (640 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
2500	86.4967	0.544
2515	116.6809	0.734
2530	83.1763	0.523

16QAM (1280 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
2500	83.7529	0.527
2515	131.5224	0.827
2530	95.7194	0.602

**Output Power into Antenna & RF Exposure Evaluation Distance for antenna gain=25dBi:**

16QAM (160 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 58.5 cm (mW/cm <sup>2</sup> )
2500	69.3426	0.510
2515	120.5036	0.886
2530	79.2501	0.583

16QAM (320 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 58.5 cm (mW/cm <sup>2</sup> )
2500	77.0903	0.567
2515	131.2199	0.965
2530	82.6037	0.607

16QAM (640 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 58.5 cm (mW/cm <sup>2</sup> )
2500	86.4967	0.636
2515	116.6809	0.858
2530	83.1763	0.612

16QAM (1280 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 58.5 cm (mW/cm <sup>2</sup> )
2500	83.7529	0.616
2515	131.5224	0.967
2530	95.7194	0.704

16QAM (2560 ksps)		
Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 58.5 cm (mW/cm <sup>2</sup> )
2500	79.0679	0.581
2515	133.9677	0.985
2530	87.9023	0.646

The power density Pd (4th column) at a distance of 58.5 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm<sup>2</sup>.