

RF Exposure Evaluation declaration

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

Applicant : TRANSYSTEM INC.

Address : No.1-2, Li-Hsin Rd. 1, Science-Based Industrial
Park, Hsinchu, Taiwan R.O.C.

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.

The declaration shall not be reproduced except in full without the written approval of QuieTek Corporation.

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

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². 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 ²)
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 ²)
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 ²)
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 ²)
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 ²)
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/cm².

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 ²)
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 ²)
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 ²)
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 ²)
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 ²)
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 ²)
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 ²)
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 ²)
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 ²)
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/cm².