

Update to Application for Certification of MMDS Transceiver

Applicant: TranSystem
FCC ID: OUPP-1101-2

Since the original submission, the referenced product has been improved. The output power has increased to a maximum of 25.8 dBm. The modem has been tested at a number of different QPSK and 16QAM modulation rates, as opposed to the single modulation type in the original submission.

Antenna types available with this cpe equipment are the following:

2.12 dBi short dipole antenna
12 dBi corner reflector
15 dBi "Backfire" parabolic antenna
18 dBi yagi

MPE calculations are presented for the 4 antennas, as well as a photograph of the RF hazard label required by paragraph 1.1307.

In order to achieve the new power levels, modifications were made to the circuit. Refer to the attached schematic.

EXHIBIT 6: RF Hazard Information Per Sec. 1.1307

(revised 5 June 2000)

For transmitters operating in the 2.150 - 2.162 GHz frequency range, paragraph 1.1310 limits maximum permissible exposure (MPE) to 1 mW/cm² for uncontrolled environments.

The maximum distance from the antenna at which MPE is met or exceeded is calculated from the equation relating field strength in V/m, transmit power in watts, transmit antenna gain, and separation distance in meters:

$$E, \text{V/m} = (\sqrt{30 \cdot P \cdot G})/d$$

$$\text{Power density, mW/m}^2 = E^2/3770$$

$$E \text{ for MPE } 1 \text{ mW/m}^2 = 61.4 \text{ V/m}$$

The TranSystem transmitter will be used with one of the following antennas, described in the user manual:

2.12 dBi short dipole antenna

12 dBi corner reflector

15 dBi "Backfire" parabolic antenna

18 dBi yagi

Calculated MPE distances from power into antenna:

Exposure, mW/cm²: 1.0

P, dBm	G, dBi	Safe Distance, cm
25.8	2.1	7.0
25.8	12.0	21.9
25.8	15.0	30.9
25.8	18.0	43.7

Basis of Calculations:

$$E^2/3770 = S, \text{ mW/cm}^2$$

$$E, \text{ V/m} = (P_{\text{watts}} \cdot G_{\text{gain}} \cdot 30)^{.5}/d, \text{ meters}$$

$$d = ((P_{\text{watts}} \cdot G \cdot 30)/3770 \cdot S)^{.5}$$

$$P_{\text{watts}} \cdot G_{\text{gain}} = 10^{(P_{\text{dBm}} - 30 + G_{\text{dBi}})/10}$$

The following statement will be included in the users manual and on a label that will be attached to the transverter:

CAUTION: To comply with FCC RF exposure requirements in section 1.1307, a minimum separation distance of 44 cm is required between this antenna and all persons.

The label is placed on the side of the TSI unit on a silver label with 14 point black type.

QPSK Modulation

Symbol rate, kSps	BW, kHz	Maximum Input, dBm	RF output, dBm	Emission Designator
128	100	+4.7	25.8	100KG7W
160	200	+2.0	24.2	200KG7W
320	400	0.0	21.6	400KG7W
512	640	-1.7	21.2	640KG7W
640	800	-4.3	19.5	800KG7W
800*	1000*	-4.0*	18.1*	1M00G7W
1280	1600	-4.7	18.6	1M60G7W
1544	1930	-5.0	18.6	1M93G7W
2048	2100	-5.0	18.6	2M10G7W
2560	3200	-5.0	19.0	3M20G7W

16QAM

Symbol rate, kSps	BW, kHz	Maximum Input, dBm	RF output, dBm	RF output, dBm
160	200	+1.5	23.4	200KD7W
320	400	0.0	21.6	400KD7W
640	800	-4.3	19.5	800KD7W
1280	1600	-4.0	18.6	1M60D7W
2560	3200	-5.0	18.9	3M20D7W

128 kSps QPSK and 800 kSps QPSK modulations were produced using Hybrid Inc. cable modem model WBR-5-231B. The following modems are equivalent , differing in software version:

WBR-20-231B, WBR-60-231B, WBR-5-231, WBR-20-231, WBR-60-231, N-231, CCM-231

The other modulations were produced with an external signal generator:

Rohde & Schwarz SMIQ 03

Filter: cos 0.25

RF Hazard Warning Label

7 cm x 1.5 cm label, 14 point Helvetica

