

IPWireless

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To Whom It May Concern:

RE: Maximum Permissible Exposure (MPE) Information pertaining to IPWireless, Inc. Model AJ base station (Node B) for 2.5 GHz to 2.686 GHz service under 47CFR21 and 74.

Background

The IPWireless Model AJ device is a broadband wireless base station operating under 47CFR21 subpart K and 47CFR74 subpart I. As IPWireless, Inc is the manufacturer of this device and not necessarily the end user, the actual antenna connected to this device is up to the end user. The calculations show below assume a very high gain antenna, which is representative of the upper range of practical base station antennas for the normal installation of this base station.

The MPE limit used in the calculation below is for the occupational/controlled exposure situation since this device will normally be installed in manner that access to the antenna location is controlled and would not be accessible to an uninformed person.

Applicable Limits to RF Exposure

In 47CFR1.1310 limits for RF exposure are established. These limits are established for different frequency ranges and the type of environment the device is expected to be use in. For the IPWireless model AJ broadband wireless basestation, the applicable power density limit is given in Table 1 part (a) as:

5 mW/cm²

The minimum distance from the Model AJ antenna to the power density limit is calculated by the equation below, which takes into account the EIRP of the device and geometric spreading of the device emissions.

Model AJ Device Parameters used in MPE Calculation

The Model AJ maximum power output at the antenna is +34 dBm, and the maximum likely antenna gain is 20 dBi, yielding an EIRP of +54 dBm (+24 dBW). This emission is spread over 12 MHz of channel bandwidth, yielding a power level of +21 dBW in the 6 MHz MMDS channel bandwidth. For purposes of the MPE distance calculation, the +24 dBW EIRP (251.2 Watts) value is used.

47CFR2.1091 (d) (2) specifies that source-based time averaging is allowed in calculating the MPE distance. The IPWireless model AJ base station will be operated with a source-based duty cycle that limits the downlink transmit time to only 2/3 of the total time. Normally, during system operation the base station would not be transmitting at full power on all downlink timeslots, but since this situation could occur, we calculate the MPE distance with the worst case assumption. The source-based averaging adjustment is shown on the sheet below for information only.

Distance to Power Density Limit Calculation

$$\text{MPE distance (cm)} = \text{SQRT} ((\text{EIRP} * \text{source-based duty cycle factor}) / (\text{MPE limit} * 4 * \pi))$$

MPE distance calculation	
Antenna gain (maximum expected)	20 dBi
line loss	0 dB
Effective antenna gain (ratio)	100.000
Model AJ PA output power	34 dBm
Model AJ PA EIRP, 12 MHz (maximum)	251189 mW
MPE limit from 1.1310, MMDS band (occupational, controlled exposure)	5 mW/cm ²
minimum distance = sqrt ((EIRP)/(exposure limit*4*pi))	
minimum distance to meet MPE limit = (100% duty cycle)	63.23 cm 24.89 inches
Source-based duty cycle adjustment	
Total timeslots in frame	15
Timeslots used for UE transmit	10
Percent of time UE is transmitting power control	100% 0 dB
Minimum distance with source-based averaging; (66.6% duty cycle)	51.63 cm 20.33 inches

Conclusion

The distance calculation results show that the MPE is exceeded only at distances from the antenna of less than 24.9 inches. This calculation was performed with several worst-case assumptions, namely;

- No line losses included in EIRP calculation
- No source-based averaging
- Maximum transmitter power assumed (normally, power control will result in lower average power than the full power value).

IPWireless does not provide an antenna for this equipment. The purchaser, a licensee of radio channels in the 2.5 – 2.686 GHz band, is responsible for placing a label on the antenna providing adequate information regarding the MPE distance calculated for the specific site configuration, and including a reference to the applicable FCC regulations.