

FCC RF Exposure Requirements

General information:

FCCID: PZODA4000SBR

Device category: Mobile per Part 2.1091 and Fixed per part 1.1307

Environment: General Population/Uncontrolled Exposure

Mobile devices that operate in the Personal Communication Service authorized under subpart H of part 22 and subpart E of part 24 are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if they operate at frequencies of 1.5 GHz or below and their effective radiated power (ERP) is 1.5 watts (2.46WEIRP) or more, or if they operate at frequencies above 1.5 GHz and their ERP is 3 watts (4.92WEIRP) or more.

Otherwise, compliance with the power density limits of 1.1310 is required.

Antenna:

This device has provisions for operation in a vehicle type RV, a boat, or at a fixed location.

Configuration	Antenna p/n	Type	Max. Gain (dBi)
RV	*	Omni	9
Boat	*	Omni	9
Fixed Outdoor**	*	*	9
Fixed Indoor	*	*	0

* Antenna part number are listed in the User's/Installations manual.

** For outdoor antenna the antenna(s) used for this transmitter must be fixed-mounted on outdoor permanent structures. RF exposure compliance is addressed at the time of licensing, as required by the responsible FCC Bureau(s), including antenna co-location requirements of §1.1307(b)(3).

Operating configuration and exposure conditions:

Output Power:

Frequency band	Modulation	MAX Output power Uplink (dBm)	MAX Output power Downlink (dBm)
AMPS band	GSM	32.5	10
	CDMA	22.2	10.2
	TDMA	28.9	9.9
PCS band	GSM	28	10
	CDMA	28.1	10
	TDMA	26.8	10

The maximum conducted output power for the downlink bands is 10mW. The maximum EIRP is 10mW for the unity gain antenna as specified in this filing.

The maximum conducted output power for the uplink PCS and AMPS bands are respectively 646mW and 1.8W.

- RV/Boat Operation:

Cable P/N C277-30

- Length: 30' (9.14m)
- Impedance: 50 Ohm
- RF connectors: N male and mini-UHF male factory attached
- Attenuation at 800 MHz: 4.5 dB per 30'
- Attenuation at 1900 MHz: 7.5 dB per 30'

The Omni antenna rated at 9dBi, if mounted with a "perfect ground" will compute to a real 9dBi+. However, in the applications to which they are being used the real measurement has to be made as one in free space.

Particularly, for the 836MHz (mid-uplink-freq) area that we are concerned with, the wavelength is approximately 14". The antenna is mounted free air at a level of 10' or more above ground, approximately 8.5 wavelengths above a usable ground, and in the vicinity of fiberglass. Virtually any antenna mounted higher than 3 wavelengths above ground receives no benefit of the ground wave/director action of a grounded antenna, therefore a free space rating for the antenna is much more appropriate.

The free space rating for this antenna at the 836MHz band is 5.75dBi. Considering it is connected with a cable having a 4.5dB loss, the resultant gain is 1.25dB. Added to the output power at 32.5dBm (1.8W), this results in 33.75dB EIRP, (2.35W), below the limit of 2.46WEIRP.

MPE Calculation:

The minimum separation distance is calculated as follows:

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d}$$
$$\text{Power density: } P_d(mW/cm^2) = \frac{E^2}{3770}$$

The limit for general population/uncontrolled exposure environment below 1500MHz is 0.55mW/cm² for the worst-case frequency, which is Channel Frequency: 824 MHz

The limit for general population/uncontrolled exposure environment is 1mW/cm² above 1500MHz.

Power Density at 20 cm distance			Max. Antenna Gain (dBi) / Minimum Cable Loss (dB)		
			0dBi (indoor)/0dB	9dBi(RV/boat)/ 4.5dB(800) & 7.5dB(1900)	-
Freq (MHz)	Power EIRP (W)	Duty Cycle (%)	(mW/cm ²)	(mW/cm ²)	(mW/cm ²)
824	0.010	100	0.002	-	-
824	2.371	100	-	0.47	-
1880	0.912	100	-	0.18	-

Conclusion:

The device complies with the MPE requirements by providing a safe separation distance of 20 cm between the antenna, including any radiating structure, and any persons when normally operated.