
Subject: **Base Station Radio and Outstation RF Radiation Exposure Levels**

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1 Summary

This document outlines RF radiation exposure level calculations for the AMPY base station radio and outstation. Levels are specified as a power density.

Limits are those defined in FCC § 1.1310 *Radiofrequency radiation exposure limits*.

In summary, for both the base station radio and the outstation, the RF radiation exposure levels at a distance of 20 cm are below the specified FCC limits.

2 FCC § 1.1310 Limits

2.1 Limits for Occupational/Controlled Exposures

This is appropriate for the base station radio since it is deployed by trained personnel in areas that the general public do not have access to.

Limit:

$$PD_{\text{lim}} = \frac{f}{300} \text{ mW/cm}^2, \text{ where } f \text{ is the frequency in MHz.}$$

At 902 MHz, the limit is 3.007 mW/cm².

2.2 Limits for General Population/Uncontrolled Exposure

This is appropriate for the outstation since it is typically deployed on the side of residential property.

Limit:

$$PD_{\text{lim}} = \frac{f}{1500} \text{ mW/cm}^2, \text{ where } f \text{ is the frequency in MHz.}$$

At 902 MHz, the limit is 0.601 mW/cm².

3 RF Radiated Exposure Calculations

3.1 Power Density Expression

The power density, PD , at a range R from the transmitter with an effective isotropic radiated power $EIRP$, is given by:

$$PD = \frac{EIRP}{4\pi R^2}.$$

To calculate the closest range at which the power density reaches the FCC limits, the following expression is used.

$$R = \sqrt{\frac{EIRP}{4\pi PD_{\text{lim}}}}.$$

3.2 Base Station Radio

3.2.1 Power Density at 20 cm

A worst case EIRP of 4 W is assumed for the base station radio. At 20 cm, the power density is 0.796 mW/cm², which is below the FCC limit of 3.007 mW/cm².

3.2.2 Closest Range

Assuming a worst case EIRP of 4 W, the power density meets the FCC limit at a range of 10.3 cm.

3.3 Outstation

3.3.1 Power Density at 20 cm

A worst case EIRP of 100 mW is assumed for the outstation. At 20 cm, the power density is 0.020 mW/cm², which is below the FCC limit of 0.601 mW/cm².

3.3.2 Closest Range

Assuming a worst case EIRP of 100 mW, the power density meets the FCC limit at a range of 3.6 cm.