



RF Exposure Considerations for the Egatel S.L. Satellite Terminal Equipment

FCC ID: 2AGKM820003-02

For this fixed piece of equipment, there is an intended separation distance greater than 20cm between the user and the antenna. This means that the RF exposure performance can be assessed by the Maximum Permissible Exposure (MPE) calculation using the limits defined in FCC rule part §1.1310, table B1 for the general population / uncontrolled exposure category.

This satellite earth station operates in the band 13.75GHz to 14.5GHz

MPE CALCULATIONS

The following MPE calculation is used to calculate the safe operating distance for the user.

$$S = \text{EIRP} / 4 \pi R^2$$

Where

S = Power density

EIRP = Effective Isotropic Radiated Power (EIRP = P x G)

P = Conducted Transmitter Power

G = Antenna Gain (relative to an isotropic radiator)

R = distance to the centre of radiation of the antenna (safe operating distance)

The antenna is installed to ensure that the antenna main beam is at an angle of between 10 - 90 degrees to the horizontal.

The worst-case configuration is with the antenna installed with the antenna main beam at its minimum elevation angle of 10 degrees.

Two MPE calculations are generated for this configuration:

- Main beam.
- Horizontal: -10 degrees off-axis

Common Calculation Values:

S = 1 mW/cm² (FCC rule part §1.1310, table B1, 1500 to 100000MHz)

P = 33dBm (independent of frequency across operating band)

=1995.3 mW

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MPE calculation: Main Beam

Main beam values

$G = 39.4\text{dBi}$ {8709.6} (Main beam)

$\text{EIRP} = 1995.3 \times 8709.6\text{mW}$

$= 17378265 \text{ mW}$ (Main beam)

Calculation:

$$S = \text{EIRP} / 4 \pi R^2$$

$$R^2 = \text{EIRP} / 4 \pi S$$

$$R^2 = 17378265 / 12.56 \times 1$$

$$R^2 = 1383620$$

$$R = 1176 \text{ cm } \{11.76\text{m}\}$$

MPE calculation: Horizontal: -10 degrees off-axis

Horizontal: -10 degrees off-axis values

$G = 6.7\text{dBi}$ {4.7} (Horizontal: -10 degrees off-axis)

{The off axis gain is obtained from the Operational Description exhibit: Antenna Information, figure 5 filed as part of the initial FCC application for FCC ID: 2AGKM820003-02}

$\text{EIRP} = 1995.3 \times 4.7$

$= 9377.9\text{mW}$ (Horizontal: -10 degrees off-axis)

Calculation:

$$S = \text{EIRP} / 4 \pi R^2$$

$$R^2 = \text{EIRP} / 4 \pi S$$

$$R^2 = 9377.9 / 12.56 \times 1$$

$$R^2 = 746.6$$

$$R = 27\text{cm } \{0.27\text{m}\}$$

Conclusion

The calculation above show that the Egatel S. L. Smart LNB complies with the RF exposure limits for General Population / Uncontrolled Exposure limit of $1\text{mW}/\text{cm}^2$ at a minimum user / antenna separation distance of 11.76m (antenna main beam) and 27cm (horizontal: -10 degrees off-axis).

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