

Radiation Hazard Analysis for Argos-Kinéis terminals

1. Introduction

This analysis demonstrates compliance with applicable radiation limits for Argos-Kinéis terminals. The calculations performed in this analysis comply with the methods described in Federal Communications Commission Office of Engineering & Technology Bulletin, Number 65 (Edition 97-01) ("OET Bulletin 65") and demonstrate compliance with the Maximum Permissible Exposure ("MPE") limits set forth in Section 1.1310 of the Commission's rules.

2. Argos-Kinéis terminals description and operating parameters

The Argos-Kinéis terminals fulfill the criteria for mobile terminals set forth in Section 2.1091(b) of the Commission's rules, as the terminals can be readily relocated and are generally operated a minimum distance of 20 centimeters from the human body. The installation and operating manuals of the Argos-Kinéis terminals will specify a minimum of 20 centimeters separation distance between any person, including the user, and the antenna while operating the terminal.

Section 1.1310 of the Commission's rules and OET Bulletin 65 specify radiation limits for two different scenarios:

- a. Occupational/controlled exposures;
 - b. General population/uncontrolled exposures.
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- a. The limits for occupational/controlled exposure apply when persons are exposed as a consequence of their employment, provided those persons are fully aware of the potential for exposure and can exercise control over their exposure.
 - b. General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully

aware of the potential for exposure or cannot exercise control over their exposure.

The Kinéis terminals will be deployed in a wide variety of commercial and industrial applications. As such, the analysis below reflects the more restrictive general population/uncontrolled exposure limits to demonstrate compliance in all potential deployment environments and scenarios. The applicable MPE limits for general population/uncontrolled exposure for Kinéis terminals are shown in Table 1.

Table 1: MPE limits for general population/uncontrolled exposure for Kinéis terminals.

Frequency (MHz)	range	Power (mW /cm²)	Density	Averaging time E ², H ² or S (minutes)
300-1500		0.267		30

Under Section 2.1091 of the Commission's rules, mobile terminals intended for use in general population or uncontrolled environments, are permitted to use "source-based" time-averaging based on the duty-cycle of a terminal.

The maximum duty cycle of a Kinéis terminal is 0.7% over any fifteen-minute period. The maximum duty cycle over the averaging time of thirty minutes specified in Table 1 is also 0.7%, and the radiation hazard analysis below accounts for this maximum duty cycle value.

3. Analysis

The exposure power density is derived from equation (3) in OET Bulletin 65 which predicts RF field strength and power density levels around a radiating antenna and is used to make a "worst case" prediction:

$$S = \frac{P \cdot G}{4\pi \cdot R^2}$$

where:

S = power density; P= power input to the antenna; G = power gain of the antenna in the direction of interest relative to an isotropic radiator; R = distance to center of radiation of the antenna.

Parameters	Value	Units
Power input to antenna	1000	mW
Antenna gain	0	dBi
Distance to center	20	cm

For evaluation of compliance with the time-averaged power density requirement over thirty minutes (see Table 1), the maximum power density level was multiplied by the maximum duty cycle of 0.7%.

$$S = 0.007 * \frac{1000 * 1}{4\pi * 20^2} = 0.00139 \text{ mW/cm}^2$$

As shown, an Argos-Kinéis terminal operates with a maximum power density of 0.00139 mW/cm² over the applicable averaging time, and therefore does not exceed the MPE limit of 0.267mW/cm² averaged over a thirty-minute period.

4. Conclusions

As demonstrated in the analysis above, the operation of the Kinéis terminals will not result in exposure levels exceeding the applicable radiation hazard limits.