Compliance Notes for the FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields

The following demonstrates that FCC ID O2700001-30-30 qualifies for certification under the FCC guidelines for human exposure to RF fields. This evaluation is demonstrated based on OET Bulletin 65, Edition 97-01, hereafter ”the Bulletin”.

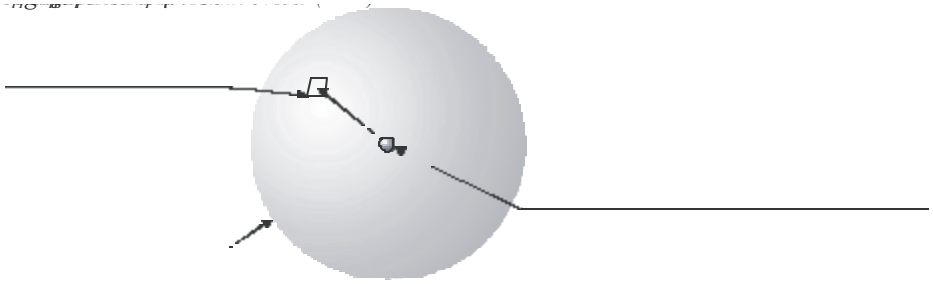
To qualify under Part 15.255, the peak power density of an RF device must be less than 18 ìW/cm^2 at 3 meters and the average power density must be less than 9ìW/cm^2 at 3 meters.

where: $S = \frac{PG}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$

S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

The Equivalent Isotropic Radiation Power (EIRP) is evaluated as 20.35 W for peak and 10.17 W for temporal average power density, based on the equation (3) provided by the Bulletin.

Figure 1. Part 15.255 Device



Maximum Permissible Exposure (MPE) levels of Part 15 device are set for occupational / controlled exposure is 5 mW/cm^2 over a six - minute average. and general public / uncontrolled exposure is 1 mW/cm^2 over a 30-minute average. When the radiation source is at 3 meters or further away from exposed subject, it is evident that safety limit is met Since the 15.255 limits 18 W/cm^2. Let us consider the worse-case scenario, with a point like RF source, the power density increases as the subject approaches the source as a square function of distance and eventually becomes infinite. Even under this worst case the MPE limits are always met farther than 28.4 cm from the radiation source.

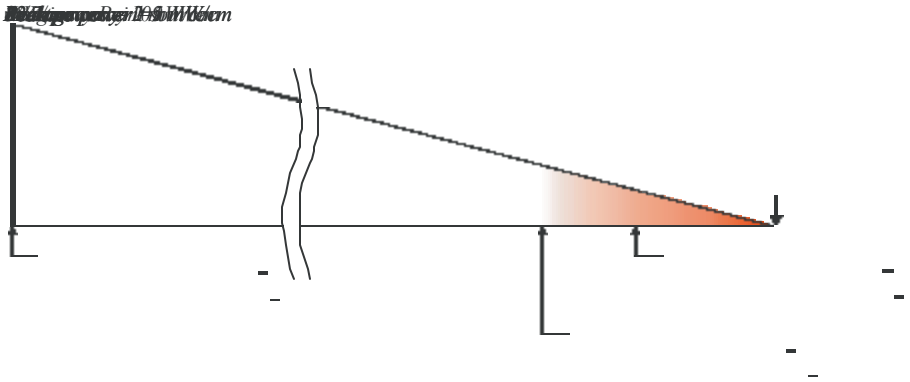


Figure 2. Estimated Maximum Permissible Exposure for Part 15.255 Device

Therefore the safety question arises only at within 28.4 cm from the source.

Approximation method for the power density of the surface of antennae is specified as Equation (11) of the bulletin.

$$S_{surface} = \frac{4P}{A}$$

where: $S_{surface}$= maximum power density at the antenna surface
P = power fed to the antenna
A = physical area of the aperture antenna

Type	Aperture (*A*)	Gain (*G*)	Near Field	Efficiency (ç)	Antenna Injection Power (*P*)
Cassegrain	804 cm^2	40 dBi	545 cm	0.49	10 dbm peak (10 mW max.) 6 dBm Average (4 mW ave.)

The Power density of the Antenna surface= 0.049 mW/cm^2 (peak)
And 0.020 mW/cm^2 (Average)

Therefore the surface of the antenna meets the requirement. Furthermore, the equipment under test has antennas that are covered and sealed with a plastic (ABS) radome covering the surface of the antenna and it is not accessible.

The near field is defined as the Fresnel region provided by the Equation (12) of the bulletin.

The region of the question (less than 28 cm) falls into the defined near field based on the Bulletin.

$$Rnf = \frac{D^2}{4\lambda}$$

where: Rnf = extent of near-field
D = maximum dimension of antenna (diameter if circular)
λ= wavelength

The method for estimating the power density in the near field of antennae is specified as Equation (13) of the bulletin.

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$$S_{nf} = \frac{16\eta P}{\pi D^2}$$

where: S_{nf} = maximum near-field power density
η = aperture efficiency, typically 0.5 - 0.75
P = power fed to the antenna
D = antenna diameter

The Power density at the near field = 0.024 mW/cm^2 (peak)
And 0.096 mW/cm^2 (Average)

Therefore, as long as the device has a radome, and the distribution point of the radiation is covered and is inaccessible to the general public, the device clearly meets MPE requirements.