

MPE calculation RFID Reader ST 500

Regulation

15.247(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Result

The EUT will only be used with a separation of 20 centimetres or greater between the antenna and the body of the user. The MPE calculation for this exposure is shown below.

The peak radiated output power (EIRP) is calculated as follows:

EIRP = P + G EIRP = 27.1 dBm	Where, P = Power input to the antenna (mW) G = Power gain of the antenna (dBi)
--	--

The numeric gain (G) of the antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1} (\text{dB antenna gain} / 10)$$

$$G = \text{Log}^{-1} (xx / 10)$$

$$G = xx$$

Power density at the specific separation:

$S = PG / (4R^2\pi)$ $S = (512.86) / (4 * 20^2 * \pi)$ S = 0.102 mW/cm²	Where, S = Maximum power density (mW/cm ²) P = Power input to the antenna (mW) G = Numeric power gain of the antenna R = Distance to the center of the radiation of the antenna (20cm = limit for MPE)
---	---

The maximum permissible exposure (MPE) for the general population is 1 mW/cm².

The power density at 20cm does not exceed the 1 mW/cm² limit.

Estimated safe separation:

$R = \sqrt{PG/4\pi}$ $R = \sqrt{(512.86/4\pi)}$ R = 6.39 cm R = 2.02 cm	Where, P = Power input to the antenna (mW) G = Numeric power gain of the antenna R = Distance to the center of the radiation of the antenna (20cm = limit for MPE) R = Distance to the backside of the radiation of the antenna (EIRP 10 dB below the center of radiation) (20cm = limit for MPE)
--	---