Estimate of RF Field Maximum Exposure

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Calculations can be made to predict RF power density levels around typical RF sources. For example, in the case of a single radiating antenna, a prediction for power density in the far-field of the antenna can be made by use of the equation below. This equation is generally accurate in the far-field of an antenna but will **over-predict** power density in the near field, where it could be used for making a "**worst case**" or conservative prediction.:

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

where:

S = power density (in appropriate units, e.g. mW/cm^2)
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)
EIRP = equivalent (or effective) isotropically radiated power (in appropriate units, e.g., mW)

Power Density Calculations Using Maximum EIRP Value

The Bluetooth naviPlay Stereo Remote, model NSR.H100, can classified as a Portable Device. As per 47 CFR §2.1091 Portable Devices have their radiating elements operating 20 cm or less from the body of the user or of a nearby person. FCC power density limit for MPE for General Population/Uncontrolled Exposure is $\mathbf{S_{max} = 1.0\ mW/cm^2}$ (OET Bulletin 65 Supplement C, Edition 97-01).

The maximum EIRP of a Bluetooth Class 2 transmitter is 2.5 mW. The power density at the distance of r = 2.5 cm from the antenna is:

$$W = \frac{EIRP}{4\pi r^2} = \frac{2.5}{4\pi \times 2.5^2} = 0.032[mW/cm^2]$$

The power density of the Bluetooth naviPlay iPod Adapter transmitter at 2.5 cm distance is still 30 times less than the FCC exposure limit for General Population.

The maximum power density of 1.0 mW/cm^2 would theoretically be exceeded at a distance of less than 4.5 mm:

$$r = \sqrt{\frac{EIRP}{4\pi W}} = \sqrt{\frac{2.5}{4\pi \times 1.0}} = 0.45[cm]$$