Power density calculation according to CFR47 1.1310

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P_S = Max.power density according to **CFR47 1.1310** and OET Bulletin 65, Supplement C for

General Population/Uncontrolled Exposure (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

G_{dB} = power gain of the antenna in dB.

R = distance from point of power density to the center of radiation of the antenna (appropriate units, e.g., cm)

$G_{dB} := 3$ $\quad P := 100mW$ $\quad$ 100mW = 20dBm = Class1

$G := 10^{\frac{G_{dB}}{10}}$ $\quad P_S := 1\frac{mW}{cm^2}$

$EIPR := P \cdot G$ $\quad P_S = \frac{EIPR}{4 \cdot \pi \cdot R^2}$

Solving for R, gives:

$$R := \begin{bmatrix} \frac{1}{\left(2 \cdot P_S \cdot \pi\right)} \cdot \left(P_S \cdot \pi \cdot EIPR\right)^{\left(\frac{1}{2}\right)} \\ \frac{-1}{\left(2 \cdot P_S \cdot \pi\right)} \cdot \left(P_S \cdot \pi \cdot EIPR\right)^{\left(\frac{1}{2}\right)} \end{bmatrix} \qquad R = \begin{pmatrix} 3.985 \\ -3.985 \end{pmatrix} cm$$

From the above calculation (disregard the negative value) it can be seen that the minimum distance to the antenna inorder to comply with the maksimum power density as described in CFR47 1.1310 and OET 65, supplement C, is 4cm.

The calculation is based on the far-field formula, whereby the prediction is more conservative and will overpredict the power density in the near-field, making this a "worst-case" prediction.

$mW := 10^{-3} \cdot W$

$cm := 10^{-2} m$