



Measurement of MPE

1. Foreword

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *anechoic chamber*. The *maximum total power to the antenna* is to be recorded. By adopting the ***Friis Transmission Formula*** and the *power gain of the antenna*, we can find the distance right away from the product, where the limit of the MPE is.

2. Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f ²	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f ²	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30



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According to **OET BULLETIN 56 Fourth Edition/August 1999, Equation for Predicting RF Fields:**

Power density at the specific separation (portable):
$$S = \frac{PG}{4\pi R^2} = \frac{60.39 \times 1.48}{4\pi(20)^2} = 0.0178mW / cm^2$$

Where: S = power density (in appropriate units, in mW / cm^2)

P = power input to the antenna (in appropriate units, in mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

$\pi = 3.1416$

R = distance between observation point and center of the radiator in cm

S is the limit of MPE, $1mW / cm^2$. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance R where the MPE limit is reached.

The Numeric gain G of antenna with a gain specified in dB is determined by:

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

$$G = \text{Log}^{-1} (1.69 / 10) = 1.48$$

Note: The power density at a distance of 20cm calculated from the Friis Transmission formula is far below the limit of $1mW / cm^2$. The EUT is classified as mobile product. So, RF exposure limit warning or SAR test are not required.