

Prediction of MPE at a given distance

According to 447498 D04 Interim General RF Exposure Guidance v01

The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form as below. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

“ f ” is in GHz

Simultaneous Transmission with MPE-based Exemptions

For these cases, a device with multiple RF sources transmitting simultaneously will be considered an RF exempt device if the condition of following Formula is satisfied.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

As this equipment:

Distance=20cm

$f=2.462, f=5.795$

So $P_{th}=3060\text{mW}$

Where:

$EIRP = P_m + G_i$

$P_t = 10^{(EIRP/10)}$

P_m = measured transmitter output power in dBm,

P_t = transmitter output power in milliwatts,

G_i = numeric gain of the transmitting antenna (unit-dBi)

Ant gain $G_i=2$ dBi

$P_{m1}=28.29$ dBm, $P_{m2}=22.61$ dBm, $P_{m3}=21.76$ dBm

So $P_{t1}=10^{(28.29/10)} \text{ mW} = 674.53 \text{ mW} < 3060\text{mW}$

$P_{t2}=10^{(22.61/10)} \text{ mW} = 182.39 \text{ mW} < 3060\text{mW}$

$P_{t3}=10^{(21.76/10)} \text{ mW} = 149.97 \text{ mW} < 3060\text{mW}$

$\Sigma = P_{t1}/P_{th} + P_{t2}/P_{th} + P_{t3}/P_{th} = 0.33 < 1$

The MPE-based test exemption condition is meets the requirements.