MAXIMUM PERMISSIBLE EXPOSURE FOR UNII

Calculations

Given

$$E = \sqrt{(30*P*G)} / d$$

and

$$S = E \wedge 2 / 3770$$

where

E= Field Strength in Volts / Meter
P = Power in Watts
G = Numeric antenna gain
d = distance in meters
S = Power Density in milliwatts / square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields

$$d = \sqrt{((30*P*G) / (3770*S))}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and
d (cm) = 100*d (m)

yields

$$d = 100\sqrt{((30*(P/1000)*G) / (3770*S))}$$
$$d = 0.282 * \sqrt{(P*G/S)}$$

where

d = distance in cm
P = Power in mW
G = Numeric Antenna Gain
S = Power Density in mW / cm ^ 2
P (mW) = 10 ^ (P(dBm) /10) and
G (numeric) = 10 ^ (G(dBi)/10)

MAXIMUM PERMISSIBLE EXPOSURE FOR UNII (continued)

yields

d = 0.282*10^((P+G)/20) √S Equation (1)

where

d = MPE safe distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW / cm^2

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields

d = √ ((30*P*G) / (3770*S))

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and
d (cm) = 100*d (m)

yields

d = 100 √ ((30*(P/1000)*G) / (3770*S))
d = 0.282 * √ (P*G/S)

where

d = distance in cm
P = Power in mW
G = Numeric Antenna Gain
S = Power Density in mW / cm^2

Results

EUT output power = 17.46 dBm

Antenna Gain = 5.0 dBi

S = 1.0 mW / cm ^ 2 from 1.1310 Table 1

Substituting these parameters into equation (1) above:

MPE Safe Distance = 3.8 centimeters

Note: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.