6.5   Maximum Permissible Exposure – FCC 15.407 (f)

6.5.1 Calculations

$$E = \sqrt{30 \cdot P \cdot G} / d$$

And

$$S = E^2 / 3770$$

Where

E =   Field Strength in Volts/meter
P=   Power In Watts
G =   Numeric Antenna Gain
d =   Distance in Meters
S =   Power Density in mW / square cm

Combining equations and rearranging the terms to express d as a function of the other variables yields:

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

Changing to units of mW and cm::

$$P(mW) = P(W) / 1000$$

And

$$d(cm) = 100 \cdot d(m)$$

Yields

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

Therefore

$$d = 0.282 \cdot \sqrt{P \cdot G / S}$$

Where

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

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Substituting the log form of gain and power:

$$P \text{ (mW)} = 10^{\wedge} (P(dBm)/10)$$

And

$$G \text{ (numeric)} = 10^{\wedge} (G(dBi) / 10)$$

Yields

$d = .282 * 10^{\wedge} ((P+G) / 20) / (SQR\ ROOT\ (S))$

Where

d =   MPE Safe Distance in cm
P=   Power In dBm
G =   Antenna Gain in dBi
S=   Power Density Limit in mW / cm^2

6.5.2   Results

EUT Output Power =   16.68 dBm   (Table 6.3-1)
Antenna Gain =   2.98 dBi   (Section 4.2)
S =   1.0 mW / cm^2 (CFR 47 Part 1.1310)

Minimum MPE safe distance (using equation above) = **1.91 cm**

Safe distance compliant with 20 cm separation distance mandatory for mobile transmitters.

Unit is compliant