MICROWAVE RADIO COMMUNICATIONS

101 Billerica Ave., Bldg. 6
N. Billerica, MA 01862-1256
Tel: (978) 671-5700
Fax: (978) 671-5800

MPE CALCULATION

RF Exposure

Microwave communications Inc. provides this warning for safety purposes with the intent to inform the user the potential hazard to RF exposure. The following guidelines for safe operation are derived from reference of OET bulletin 65, August 1997 as recommended by the Federal Communication Commission.

The 6.4 – 7.125 GHz STRATA transmitter is a mobile transmitter designed to provide services to broadcast ENG users under CFR 74 subpart F § 74.601 TV pickup stations. This unit operated without an antenna will not create RF energy exceeding 1.0 mW/cm² the FCC limit for exposure. Once connected to an antenna the RF energy thus the potential for harmful exposure will be greatly enhanced.

In this situation, a certain distance from the radiator is to be maintained. Calculations need to be performed to understand what that safe margin for exposure is, this is known as the MPE limit.
The calculations provided are for common antennas often utilized in the ENG environment.
Figure one and two show the minimum exposure distance for various antennas. One plot utilizing the maximum permissible output of the STRATA transmitter for analog modulation, and the other digital.
The following formula used is that suggested by OET 65.

Calculating MPE

(Maximum Permissible Exposure)

$$S = \frac{P\ G\ (\text{or EIRP})}{4\ \pi\ R^2}$$

EIRP = P * (10 ^ (G / 10)) = (antilog of G/10) * P

P = RF power delivered to the antenna in mW
G = Power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna in centimeters
S = MPE in mW/cm² (milliwatts per square centimeters)

Conversions
dBi to numeric gain = Antilog (dBi/10)
Feet to centimeters = Feet * 30.48
Centimeters to Feet = cm * .0328
4 π = 12.57

User Input
RF power delivered to the antenna = Watts
Antenna gain (referenced to isotropic antenna) = dBi
Distance from the center of radiation = Feet

Calculation steps:

1. [P] RF power input. Convert watts to milliwatts = Watts * 1000
2. [G] Antenna gain dBi. Convert to numeric gain = Antilog (dBi/10)
3. [EIRP] Multiply P * G
4. [R] Convert centimeters to feet = Centimeters * .0328
5. Square R
6. Multiply R² * 4π
7. [S] Divide (R² * 4π) into EIRP

S = Power Density in milliwatts per square centimeters. Note: At frequencies above 1500 MHz, S must not be greater than 1

Reference
FCC OET Bulletin 65, August 1997 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

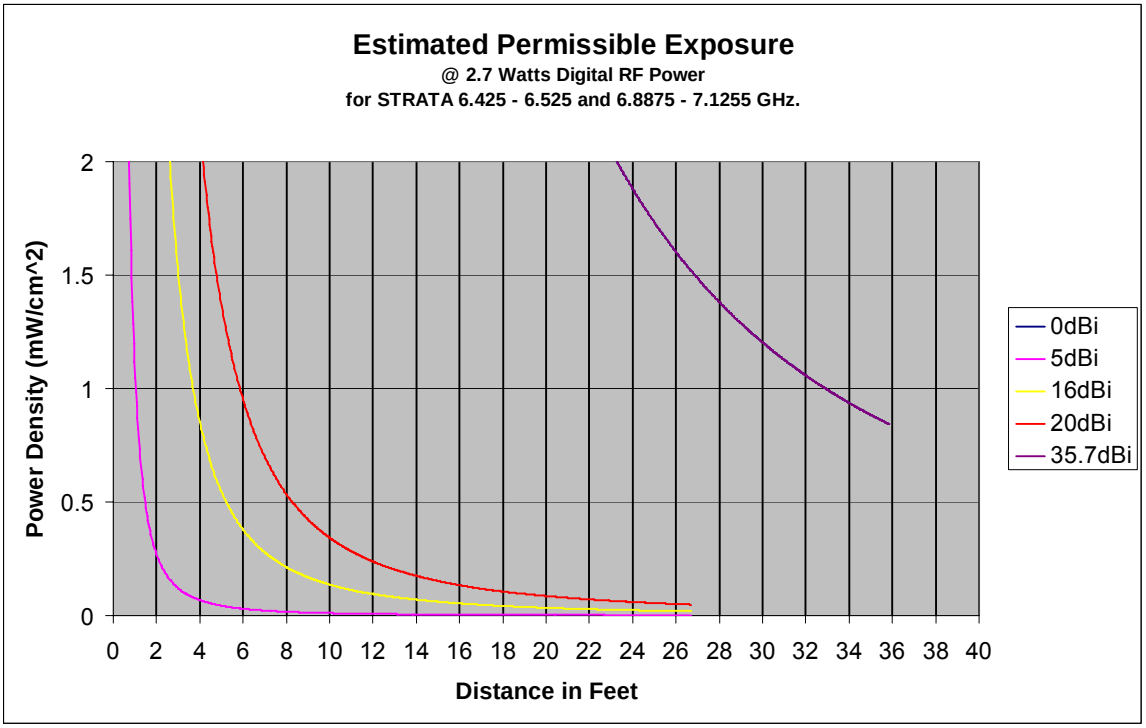

Figure 1

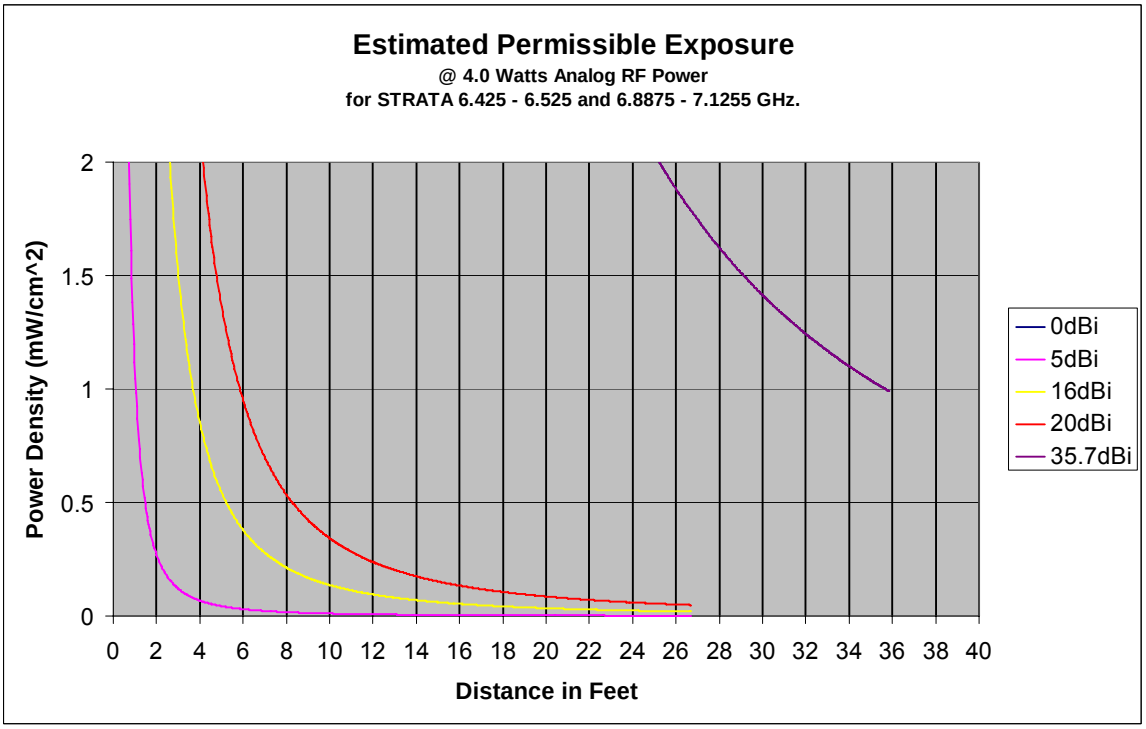

Figure 2

SUMMARY

MRC in accordance with the requirements set for by the FCC provides this information as a guide to the user. It is assumed that the users of this equipment are licensed and qualified to operate the equipment per the guidelines and recommendations contained within the product user guides and in accordance with any FCC rules that may apply.

The following table reflects the graphical representation above.

Antenna Gain (dBi)	Minimum distance from antenna (cm)	Minimum distance from antenna (inch)
0	20	7.87
5	35	13.7
16	112	44.0
20	560	220.4
35.7	1088	428.3

The representation above is for standard antennas such as OMNI (0 – 5dBi) and directional or parabolic designs. Other than Omni direction antennas, the emissions are directed toward the direct fed output of the antenna. Out side of the beam width of a directional antenna RF levels drop significantly