

APPENDIX A: MAXIMUM PERMISSIBLE EXPOSURE – PLASTIC HOUSING AND METAL HOUSING

FCC Rules and Regulations Part 1.1307, 1.1310, 2.1091, 2.1093: RF Exposure Compliance

1. GENERAL INFORMATION:

- FCCID: GU67410
- Environment: General Population/Uncontrolled Exposure
- Device category: Mobile per Part 2.1093

2. OPERATING CONFIGURATIONS AND TEST CONDITIONS:

2.1 ANTENNA TYPE(S):

Manufacturer	Antenna Type	Gain (dBi)
MAXRAD	Duck -90° angle	2
MAXRAD	Stub	Unity

3. OPERATING CONDITIONS:

The 7410 is a wireless print server containing a PCMCIA card connected to a right angle antenna or to a stub antenna to transmit in the frequency range 2412-2462 MHz, and the peak conducted and peak radiated (ERP) output power does not exceed 100 mW.

4. TEST SIGNAL, TIME-AVERAGING, MAX. MEASURED OUTPUT POWER:

Modulation Type/Modes: DSSS

Frequency Range	Frequency Tolerance (ppm)	Emission Designator
2412-2462 MHz	N/A	N/A

	Output Power (Watt/dBm)	High (Watt)	High (dBm)	Time averaging (% Duty Cycle)
EUT	ERP	N/A	N/A	N/A
	Conducted	0.037	15.68	N/A

From FCC 1.1310 table 1A, the maximum permissible RF exposure for an uncontrolled environment is 1 mW/cm². The Electric field generated for a 1 mW/cm² exposure (S) is calculated as follows:

$$S = E^2/Z$$

where:

S = Power density

E = Electric field

Z = Impedance.

$$E = \sqrt{S \cdot Z}$$

$$1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

The impedance of free space is 377 ohms, where E and H fields are perpendicular.

Thus:

$$E = \sqrt{10 \cdot 377} = 61.4 \text{ V/m which is equivalent to } 1 \text{ mW/cm}^2$$

Using the relationship between Electric field E, Power in watts P, and distance in meters d, the corresponding Antenna numeric gain G and the transmitter output power.

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power density: } P_d(mW/cm^2) = \frac{E^2}{3770}$$

MPE Calculation:

The maximum distance, from the antenna at which MPE is met or exceeded, is calculated from the equation relating field strength E in V/m, transmit power P in Watts, transmit antenna numeric gain G, and separation distance in meters above and solving for d below:

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

The limit for general population/uncontrolled exposure environment from 300 to 1500MHz is $\leq 1/1500 \text{ mW/cm}^2$.

SEPARATION DISTANCE:

Plastic Housing		Metal Housing	
Highest Antenna Gain = 1.58 Power ^B (Watt) = 0.037		Highest Antenna Gain = Unity Power ^B (Watt) = 0.037	
Separation Distance ^A		Separation Distance ^A	
(in)	(cm)	(in)	(cm)
0.8	0.22	0.6	0.20

Notes:

^A = Distances are calculated for the largest (worst-case) separation distance as applicable

^B = Measured output power conducted