III. MPE Limits

A. Limits for Maximum Permissible Exposure (MPE)

Requirements: FCC Guidelines for evaluating exposure to RF Emissions, from the FCC OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields.

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz *Plane-wave equivalent power density

B. Calculating MPE Distance from Antenna

MPE Limit Calculation: EUT's operating frequencies @ 851.0125 MHz; highest conducted power = 12.04 *dBm* therefore, **Limit for Uncontrolled Exposure: 0.567 mW/cm^2**

EUT maximum antenna gain = 3 *dBi.*

Equation from page 18 of OET 65, Edition 97-01

$S = PG / 4\pi R^2$ or $R = \sqrt{PG / 4\pi S}$

where, R = Distance (20 cm)
P = Power Input to antenna (15.996 mW)
G = Antenna Gain (2 numeric)

S = (15.996*2) / (4* π *400)
S = (31.992) / (5026.544)
S = 0.00636 **mW/cm^2**

Calculation for 851 – 869 MHz Band

MPE Limit Calculation: EUT's operating frequencies @ 869.2 MHz; highest conducted power = 21.87 *dBm* therefore, **Limit for Uncontrolled Exposure: 0.579 mW/cm^2**

EUT maximum antenna gain = 3 *dBi.*

Equation from page 18 of OET 65, Edition 97-01

$S = PG / 4\pi R^2$ or $R = \sqrt{PG / 4\pi S}$

where, R = Distance (20 cm)
P = Power Input to antenna (153.815 mW)
G = Antenna Gain (2 numeric)

S = (153.815*2) / (4* π *400)
S = (307.63) / (5026.544)
S = 0.0612 **mW/cm^2**

Calculation for 869 – 894 MHz Band

MPE Limit Calculation: EUT's operating frequencies @ 1960 MHz; highest conducted power = 22.01 *dBm* therefore, **Limit for Uncontrolled Exposure: 1 mW/cm^2**

EUT maximum antenna gain = 4 *dBi.*

Equation from page 18 of OET 65, Edition 97-01

$S = PG / 4\pi R^2$ or $R = \sqrt{PG / 4\pi S}$

where, R = Distance (20 cm)
P = Power Input to antenna (158.855 mW)
G = Antenna Gain (2.52 numeric)

S = (158.855*2.52) / (4* π *400)
S = (400.3146) / (5026.544)
S = 0.0796 **mW/cm^2**

Calculation for 1930 -1990 MHz Band