Maximum Permissible Exposure

FCCID: 2AD99BGRDA

Applicable Standard

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

(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 Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100000			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 Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100000			1.0	30

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

MPE Calculation Method

$E \text{ (V/m)} = (30*P*G)^{0.5}/d$ Power Density: $Pd \text{ (W/m}^2) = E^2/377$

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd $= (30*P*G) / (377*d^2)$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

Calculated Result and Limit

WIFI Mode:

Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
1.995	20.61	115.1	0.046	1	Compiles

Note: 802.11b was the worse case

RFID Mode:

Power and distance are rounded to the nearest mW and mm before calculation
The result is rounded to one decimal place for comparison

eirp = pt x gt = (EXd)^2/30
where:
  pt = transmitter output power in watts,
  gt = numeric gain of the transmitting antenna (unitless),
E = electric field strength in V/m,   --- $10^{((dBuV/m)/20)}/10^6$
d = measurement distance in meters (m)---3m
So pt = (EXd)^2/30 x gt

Field strength =   78.24dBuV/m @3m
Ant gain =3dBi ; so Ant numeric gain= 1.995

So pt= $\{[10^{(78.24/20)}/10^6 x3]^2/30/1.995\}X1000=0.01mW$

Antenna Gain (Numeric)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
1.995	0.01	0.000004	1	Compiles