

Prediction of MPE at a given distance

1. Limits

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
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
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
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
300-1,500			f/1500	30
1,500-100,000			1.0	30

2. Test Procedure

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

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

Where:

S = power density

P = power input to the antenna

G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna

3. Result

Mode	Frequency Range	ANT Gain		Output Power		Evaluation	Power Density	MPE Limit
	MHz	dBi	Numeric	dBm	mW			
802.11b	2412-2462	1.0	1.26	7.0	5.01	50	0.00020	1.00
BT	2402-2480	1.0	1.26	3	2.00	50	0.00008	1.00
GPRS 850	824.2-848.8	2.0	1.58	33	1995.26	50	0.10071	0.55
GPRS 1900	1850.2-1909.8	1.5	1.41	31	1258.93	50	0.05663	1.00
WCDMA (Band II)	1852.4-1907.6	0.0	1.00	24	251.19	50	0.00800	1.00
WCDMA (Band IV)	1712.4-1752.6	0.0	1.00	24	251.19	50	0.00800	1.00
WCDMA (Band V)	826.4-846.6	0.5	1.12	24	251.19	50	0.00898	0.55
UHF	406.0-470.0	1.5	1.41	30.5	1122.02	50	0.05047	0.27
MPE total	0.37							
Formula: $MPE1/limit1 + MPE2/limit2 + MPE3/limit3 + \dots \leq 1.0$								

The tune-up power and the intentional operation distance were declared by the manufacturer, the details as following:

WLAN:

802.11b: 6.0±1dBm;

802.11g: 5.0±1dBm;

802.11n (HT20): 4.5±1dBm;

BT:

2.0±1.0dBm

WWAN:

GPRS 850: 32±1dBm;

GPRS 1900: 30±1dBm;

WCDMA (Band II): 23±1 dBm;

WCDMA (Band IV): 23±1 dBm;

WCDMA (Band V): 23±1 dBm

UHF: 30±0.5 dBm

The operation distance for the intentional use: 50cm.

(2) The WLAN antenna, WWAN antenna and UHF antenna can realize Simultaneous transmission, considering all the transmitting combinations, the worst mode was reported as below:

Wi-Fi (802.11b)+GPRS850+UHF.

And the worst Simultaneous MPE evaluation:

$$MPE1/limit1 + MPE2/limit2 + MPE3/limit3 \leq 1.0$$

$$0.0002/1.0 + 0.10071/0.55 + 0.05047/0.27 = 0.370 \leq 1.0$$

(conclusion: no requirement for Simultaneous MPE)