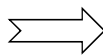


EXPOSURE LIMITS FOR ELECTROMAGNETIC RADIATION

Referenced Documents	"Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300GHz)" ICNIRP Guidelines. Health Physics 74 (4); 1998
	FCC Part 47 of CFR, 1 October 2004, paragraph 1.1307
	IEEE C95.1-2005 IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz -Description Table 8 and Table 9
EN 62311:2008	

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$$d = \frac{2.D^2}{\lambda} \quad P_d = \frac{t.x.P.G}{4.\pi.R^2}$$



$$R = \sqrt{\frac{t.x.P.G}{4.\pi.P_d}}$$

t = time exposure correction factor (referenced to 3.5 minutes)

near/far field boundary	d	16.95	m
Wavelength	λ	0.0174	m
maximum dimension of the antenna	D	0.384	m
Transmit Power	P	6	W
Maximum Duty Cycle correction factor	x	0.94	
Mean Tx Power (inc. duty cycle)		5.64	W
Gain of Antenna	G	26	dBi
Linear Gain of Antenna		398.1071706	
Exposure Limit		10	W/m ²
		1	mW/cm ²
Power Density @ d (d=R)	P_d	0.0622	mW/cm ²
Safety margin @d		72.1	dB
Exposure Limit in near field see note 1		3.3333	W/m ²
		0.3333	mW/cm ²
Safe Distance from Antenna	R	7.32	m

x = 69% Maximum Duty Cycle (general 5km), 84% duty cycle (normal 8km), max duty cycle 94% (Fast 8km mode) ref. 8BT3t

Taken from ICNIRP report. IEEE quote this as 10mW/cm²

Note 1: Applies 300% uncertainty factor for calculations in near field

Worst case scenario - Unscanning beam, 3.5 minutes exposure.

SAFE DISTANCE MATRIX		Safe Distance Matrix (m)				
		FCC (Part 47 of CFR, para 1.1307) & ICNIRP		IEEE C95.1-2005		
Exposure Duration (e) (seconds)	t [e/210]	Uncontrolled Exposure (1mW/cm ²)	Controlled Exposure (5mW/cm ²)	Uncontrolled Exposure (1mW/cm ²)	Controlled Exposure (10mW/cm ²)	
In Front of Antenna (26dBi antenna gain)		1	5	1	10	
Scanned (Does not take into account 300% uncertainty factor in near field)	2	0.01	0.42	0.19	0.42	0.13
	10	0.05	0.94	0.42	0.94	0.30
	30	0.15	1.62	0.73	1.62	0.51
	60	0.29	2.29	1.03	2.29	0.73
	120	0.59	3.24	1.45	3.24	1.03
	180	0.88	3.97	1.78	3.97	1.26
Unscanned (Does take into account 300% uncertainty factor in near field)	2	0.01	0.73	0.32	0.73	0.23
	10	0.05	1.62	0.73	1.62	0.51
	30	0.15	2.81	1.26	2.81	0.89
	60	0.29	3.97	1.78	3.97	1.26
	120	0.59	5.62	2.51	5.62	1.78
	180	0.88	6.88	3.08	6.88	2.18
Behind Antenna (0dBi antenna gain assumed)		1.00	5.00	1.00	10.00	
Scanned (Does not take into account 300% uncertainty factor in near field)	2	0.01	0.02	0.01	0.02	0.01
	10	0.05	0.05	0.02	0.05	0.01
	30	0.15	0.08	0.04	0.08	0.03
	60	0.29	0.11	0.05	0.11	0.04
	120	0.59	0.16	0.07	0.16	0.05
	180	0.88	0.20	0.09	0.20	0.06
Unscanned (Does take into account 300% uncertainty factor in near field)	2	0.01	0.21	0.09	0.21	0.07
	2	0.01	0.04	0.02	0.04	0.01
	10	0.05	0.08	0.04	0.08	0.03
	30	0.15	0.14	0.06	0.14	0.04
	60	0.29	0.20	0.09	0.20	0.06
	120	0.59	0.28	0.13	0.28	0.09
	180	0.88	0.34	0.15	0.34	0.11
	204	1.00	0.37	0.16	0.37	0.12

Typical walk-by exposure time

Typical walk-by exposure time

Continuous exposure (i.e. Not time limited)

Typical walk-by exposure time

Typical walk-by exposure time

Assumptions	
Scanned	Beam scanning across frequency range. Scanning is expected to average out any local maximum, therefore can lose the 300% uncertainty in near field
Unscanned	Use 300% uncertainty for near field measurement
Exposure Duration {t}	Any frequency above 10GHz has to use a mean power averaged over a 68/t ^{1.05} minute (3.5mins) period in the calculation. This exposure duration is converted to a fraction of 3.5 minutes.
Uncontrolled Exposure	General public exposure
Controlled Exposure	Occupational exposure
WiFi	The WLAN transmitter and Antenna gain are not significant in this calculation (0.14W & 4dBi).