EXPOSURE LIMITS FOR ELECTROMAGNETIC RADIATION

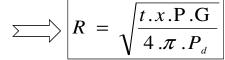
Referenced Documents "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300GHz)" ICNIRP Guidelines. Health Pysics 74 (4); 1998

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

This Document ref: 8BT74301 Last updated 04/04/2010

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



 ${\pmb t}$ = time exposure correction factor (referenced to 3.5 minutes)

1.00 1.05 26 398.1071706 10 1 0.0116 79.4 3.3333 0.3333	W dBi W/m² mW/cm² dB W/m² mW/cm² dB W/m² mW/cm²
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1.05 26	W
1.05	W
1.00	W
1.00	W
	W
	W
1.05	
0.384	m
0.01/4	m
0.0174	m
	16.95 0.0174

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

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

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

Antenna R 3.16 m Worst case scenario - Unscanning beam, 3.5 minutes exposure.

SAFE			Safe Distance Matrix (m)				
DISTANCE MATRIX			FCC (Part 47 of CFR, para 1.1307) & ICNIRP		IEEE C95.1-2005		
	Exposure Duration {e} (seconds)	t {e/210}	Uncontrolled Exposure (1mW/cm²)	Controlled Exposure (5mW/cm²)	Uncontrolled Exposure (1mW/cm²)	Controlled Exposure (10mW/cm²)	
In Front of Antenna (26dBi antenna gain)		1	5	1	10		
	2	0.01	0.18	0.08	0.18	0.06	Typical walk-by exposure time
Scanned	10	0.05	0.40	0.18	0.40	0.13	
(Does not take into	30	0.15	0.70	0.31	0.70	0.22	
account 300% uncertainty	60	0.29	0.99	0.44	0.99	0.31	
factor in near field)	120	0.59	1.40	0.63	1.40	0.44	
	180	0.88	1.71	0.77	1.71	0.54	
	204	1.00	1.82	0.82	1.82	0.58	
	2	0.01	0.31	0.14	0.31	0.10	Typical walk-by exposure time
Unscanned	10	0.05	0.70	0.31	0.70	0.22	1
(Does take into	30	0.15	1.21	0.54	1.21	0.38	
account 300% uncertainty	60	0.29	1.71	0.77	1.71	0.54	
factor in near field)	120	0.59	2.42	1.08	2.42	0.77	
	180	0.88	2.97	1.33	2.97	0.94	
	204	1.00	3.16	1.41	3.16	1.00	Continuous exposure (i.e. Not time limited)
Behind Antenna (0dBi antenna gain assumed)		1.00	5.00	1.00	10.00		
	2	0.01	0.01	0.00	0.01	0.00	Typical walk-by exposure time
Scanned	10	0.05	0.02	0.01	0.02	0.01	1
(Does not take into	30	0.15	0.04	0.02	0.04	0.01	
account 300% uncertainty	60	0.29	0.05	0.02	0.05	0.02	
factor in near field)	120	0.59	0.07	0.03	0.07	0.02	
	180	0.88	0.09	0.04	0.09	0.03	
	204	1.00	0.09	0.04	0.09	0.03	
	2	0.01	0.02	0.01	0.02	0.00	Typical walk-by exposure time
Unscanned	10	0.05	0.04	0.02	0.04	0.01	1
(Does take into	30	0.15	0.06	0.03	0.06	0.02	1
account 300% uncertainty	60	0.29	0.09	0.04	0.09	0.03	
factor in near field)	120	0.59	0.12	0.05	0.12	0.04	1
	180	0.88	0.15	0.07	0.15	0.05	
	204	1.00	0.16	0.07	0.16	0.05	

	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/f ^{1.05} minute (3.5mins) period in the calculation.				
	This expsoure duration is converted to a fraction of 3.5 mintues.				
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).				