

1.1 Test Conditions and Results – MAXIMUM PERMISSIBLE EXPOSURE

Test Description	Maximum Permissible Exposure calculation is performed to ensure that this device meets RF exposure limits for its intended environment. This device is required to meet the General Population/Uncontrolled exposure limits.			
Basic Standard		47 CFR Part 1.1307 Industry Canada IC Safety Code 6		
FCC 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	1824/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	-	-	5.0	6
FCC 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

Figure 1 MPE - EUT Configuration Settings

Calculation is performed from conducted power and antenna gain measurements documented within this report.

Background: Per the following guidance from OET Bulletin 65 Supplement C required minimum spacings are provided to the professional installer.

Transmitter or Device Type ¹⁸	Output ¹⁹	Applicable Methods to Ensure Compliance ²⁰
Transmitters using indoor antennas that operate at 20 cm or more from nearby persons	>2.5 W at 915 MHz	<p>If the MPE distance is greater than that required for normal operation of the device, operating instructions, warning instructions and/or warning labels may be used to ensure compliance by indicating the minimal separation distance to comply with MPE limits.</p> <p>If the antennas are professionally installed to ensure compliance, warning instructions and warning labels are not necessary.</p>
	=< 2.5 W at 915 MHz or =< 4 W at 2450 MHz	<p>Transmitters operating at 2.5 W EIRP (1.5 W ERP) or less at 915 MHz, or at 4 W EIRP (2.4 W ERP) or less at 2450 MHz, generally are not expected to exceed MPE limits when nearby persons are 20 cm or more from most antennas. Therefore, special instructions and warnings are normally not necessary to ensure compliance.</p>

Figure 2 Duty Cycle Correction Factor

Mode	ON Duration (ms)	Total Duration (ms)	Duty Cycle Correction (dB) $20 \times \log\left(\frac{TX (ms)}{100ms}\right)$	Comments
Short Pulse	14	101.4		
Long Transmission	38	171.6		
Total	52	273.0	-14.4 dB	52ms / 273ms = 19.0%

Figure 3 MPE - Calculation

MPE Calculation with highest EIRP:

The highest conducted power was observed to be 617 mW and this measurement is used for the calculation. Limit is calculated at low channel (902.5 MHz) as exposure limit increases slightly with frequency in the operating band. Duty cycle is 14.4%.

$$S = \text{EIRP} / (4 * \text{Pi} * R^2),$$

Power Density = EIRP / (4 * Pi * R²),

where EIRP = Output Power * Antenna Gain

Uncontrolled/General Exposure
0.617 Watt, 0.00 dBi antenna (Unity Gain), 20 cm spacing

Operating Frequency	902.5 MHz		
Output Power (Peak)	0.617 Watts		
Antenna Gain	-1.0 dB	or (linear)	0.794 (unitless)
Separation Distance	0.2 m	-or-	7.874 inches

Peak Power Density	0.975 W/m ²	- or -	0.0975 mW/cm ²
Exposure % (over 6 min timespan for uncontrolled)	100%		
Transmit Duty Cycle (Peak-to-Average Ratio)	14.4%		

Average Power Density	0.1404 W/m²	- or -	0.01404 mW/cm²
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Limit for Uncontrolled Exposure at Operating Frequency	6.01667 W/m²	- or -	0.60167 mW/cm²
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The product was found to comply with this requirement.