

Test 8: Maximum Permissible Exposure

Test Requirement: 47 CFR Part 1

Test Specification: 47 CFR Part 1, Section 1.1307

Test Procedure:

Maximum Permissible Exposure limits are as follows:

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

* Plane-wave equivalent power density

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

*Plane-wave equivalent power density

Test Details: This device is considered to possibly be located in either environment. See calculation for assumptions.

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

<u>Transmitter or Device Type¹⁸</u>	<u>Output¹⁹</u>	<u>Applicable Methods to Ensure Compliance²⁰</u>
Transmitters using indoor antennas that operate at 20 cm or more from nearby persons	>2.5 W at 915 MHz	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. If the antennas are professionally

		<p>ensure compliance, warning installed to 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 (ERP) or less at 915 MHz, or at 4 (1.5 W 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>

MPE Calculation with highest EIRP:

Assuming the highest gain antenna intended for use (2.5 dBi gain) and the device is outputting at highest measured power continuously, then the threshold for meeting MPE requirements in an uncontrolled environment is calculated to be 9 cm. The calculation for MPE at 20 cm is shown below. Because this device is less than 2.5 W EIRP, then no special cautions are required.

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

Power Density = $\text{EIRP} / (4 * \pi * R^2)$,

where EIRP = Output Power * Antenna Gain

Limit for **Uncontrolled**
Exposure at Operating
Frequency **6.1 W/m²** - or - **0.61 mW/cm²**

Uncontrolled/Occupational Exposure

Operating Frequency	915 MHz		
Output Power (Peak)	0.2951 Watts		
Antenna Gain	2.5 dB	or (linear)	1.778279 (unitless)
Separation Distance	0.2 m	-or-	7.874 inches

Peak Power Density **1.044 W/m²** - or - **0.1044 mW/cm²**

Exposure %
(over 6 min timespan for
uncontrolled) **100%**

Transmit Duty Cycle
(Peak-to-Average Ratio) **100%**

Average Power Density **1.04399 W/m²** - or - **0.1044 mW/cm²**

Limit for **Uncontrolled**
Exposure at Operating
Frequency **6.1 W/m²** - or - **0.61 mW/cm²**