

RF Exposure Report



RF Energy Exposure Awareness, Control Information, and Operational Instructions for Compliance with FCC RF Exposure Limits

NOTICE: This power amplifier product is intended for use in environments in which personnel have full knowledge of their exposure and can exercise control over their exposure to meet FCC limits. This power amplifier is NOT authorized for use by the general population, consumer, or for use under conditions where unintended or accidental exposure may occur.

This power amplifier product generates electromagnetic energy in the radio frequency (RF) spectrum to provide communications between users over a distance. RF energy is one specific form of electromagnetic energy. Other forms include, but are not limited to, sunlight and x-rays. RF energy, however, should not be confused with these other forms of electromagnetic energy, which when used improperly, can cause biological damage. Very high levels of x-rays, for example, can damage tissues and genetic material.

Experts in science, engineering, medicine, health, and industry work with organizations to develop standards for safe exposure to RF energy. These standards provide recommended acceptable levels for personnel who may be exposed to RF energy. The RF exposure levels described therein include substantial margins of protection.

When properly installed and used, Crescend power amplifier products meet all government-established RF exposure levels. In addition, Crescend recommends specific operating instructions for users of its power amplifier products. These instructions are important because they inform users about RF energy exposure and provide simple procedures on how to control it.

Please refer to the following Web sites for more information on the nature of RF energy exposure and how to control your exposure to assure compliance with established RF exposure limits.

<http://www.fcc.gov/oet/rfsafety/rf-faqs.html>

<http://www.osha.gov/SLTC/radiofrequencyradiation/index.html>

Federal Communication Commission Regulations

The FCC rules require manufacturers to comply with the FCC RF energy exposure limits for communication devices before they can be marketed in the U.S. The FCC further requires users to be fully aware of and able to control their exposure to meet RF energy exposure limits. This document includes operating instructions and information required to control your RF exposure and to satisfy compliance requirements.

RF Exposure Compliance, Control Guidelines and Operating Instructions

To control exposure to yourself and others and to ensure compliance with the RF exposure limits, always adhere to the following guidelines.

- Crescend power amplifier products are intended for use in fixed communication locations (e.g. base station sites). The antenna installation must comply with the following requirements to ensure optimum performance and compliance with the RF energy exposure limits required by the FCC.

- 1) The antenna should be mounted outside the site building on a roof, tower, or other support structure such that its location is inaccessible to personnel within the Minimum Permissible Exposure radius (see below).

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- 2) The licensee must undertake the responsibility to manage the site in accordance the applicable regulatory requirements. This may include, but is not limited to, providing advisory notices to all personnel who may be exposed to RF energy in the vicinity of the antenna, restricting access to areas adjacent to the antenna, or ceasing use of the power amplifier when RF energy exposure safety cannot be guaranteed.

- When the power amplifier is operating, a front panel LED will be illuminated. The power amplifier will be generating measureable RF energy exposure when transmitting.

- The maximum permissible exposure (MPE) radius is unique to each base site installation and is based on several factors such as the transmitter power output level, antenna gain, feed line loss, etc. It is the responsibility of the licensee to determine the MPE for the base site installation.

- 1) For operation below 300 MHz, the maximum exposure limit is 0.2 mw/cm².
- 2) An example calculation of the MPE radius for a 350 Watt VHF transmitter installation having a 5 dBi gain antenna and 1dB of feedline loss is provided below:

$$P_o = 350000 \quad \text{mWatts} \qquad f = 150 - 174 \quad \text{MHz}$$

$$\text{dBd} = 2.85 \quad \text{antenna gain in dBd}$$

$$G_1 = \text{dBd} + 2.15 \quad \text{gain in dBi} \qquad S = 0.2 \quad \frac{\text{mW}}{\text{cm}^2}$$

$$G_1 = 5 \quad \text{dBi}$$

$$CL = 1.0 \quad \text{dB coax loss}$$

$$G = G_1 - CL \quad \text{effective antenna gain (dB)}$$

$$G_n = 10^{\frac{G}{10}}$$

$$G_n = 2.512 \quad \text{gain (numeric)}$$

$$R = \sqrt{\frac{(P_o \cdot G_n)}{4\pi \cdot S}} \qquad R = 591.5 \quad \text{distance (cm) required for compliance}$$

$$\text{inches} = \frac{R}{2.54} \qquad \text{inches} = 232.9$$

$$\text{feet} = \frac{\text{inches}}{12} \qquad \text{feet} = 19.4$$

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- 3) In instances where the effective antenna gain (antenna gain – feedline loss) differs from the example above, the MPE radius must be calculated by the licensee. The table below presents the results of calculations of the MPE radius for a 350 Watt VHF transmitter having various effective antenna gain values.

Effective Antenna Gain (dBi)	Minimum Safe Distance (meters)	Minimum Safe Distance (feet)
3.0	5.27	17.29
4.0	5.92	19.42
5.0	6.64	21.78
6.0	7.45	24.44
7.0	8.35	27.39
8.0	9.37	30.74
9.0	10.52	34.51
10.0	11.80	38.71

- Warning

Failure to observe the minimum safe distance radius may result in exposure to RF radiated energy in excess of the FCC Maximum Permissible Exposure (MPE) limit. The licensee is responsible for the safe operation of the base site and must ensure that the Maximum Permissible Exposure limits are observed at all times.