



Powercast *simply wire free™*  
114 North Saint Clair Street  
Ligonier, PA 15658  
[www.powercastco.com](http://www.powercastco.com)

# WHITE PAPER

## HEALTH AND SAFETY FAQ

### Introduction

When a new technology reaches the marketplace, users commonly wonder about its health and safety implications — particularly if the technology's newness precludes having any long-term studies to ensure product safety.

As Powercast rolls out the revolutionary concept of Wire-Free Power™, rest assured that health and safety are of the utmost concern. Fortunately, radio frequency (RF) communication's long history provides us with numerous scientific studies on RF exposure, and RF exposure limits are incorporated into government guidelines. So not only are our Powercaster™ and Powerharvester™ modules designed to be safe, the products that incorporate those modules are mandated to be safe.

Nevertheless, as we introduce the Powercast Wireless Power Platform to clients, investors, and the public at large, health and safety questions arise. Here we answer the most common questions.

### Questions and Answers

#### What is RF?

RF, short for radio frequency, is a subset of a general class of energy-carrying waves defined in the electromagnetic spectrum. Other bands in the spectrum are visible light, ultra-violet light, X-rays, and cosmic rays.

#### Is it safe to be exposed to RF?

Exposure to RF at limited power levels is perfectly safe. In fact, we all are constantly bathed in RF from both man-made and natural sources. Radio, TV, cell and cordless phones, Wi-Fi, the sun, etc., all radiate RF.

#### Who established the power limits?

The power limits were established by the world's leading scientific organizations, including:

**Institute of Electrical and Electronics Engineers** (IEEE: [www.ieee.org](http://www.ieee.org))

**American National Standards Institute** (ANSI: [www.ansi.org](http://www.ansi.org))

**National Council on Radiation Protection and Measurements** (NCRP: [www.ncrponline.org](http://www.ncrponline.org))

**International Commission on Non-ionizing Radiation Protection** (ICNIRP: [www.icnirp.de](http://www.icnirp.de))

#### How were the limits determined?

The limits were determined after decades of research on the biological effects of RF exposure. From that wealth of data scientists were able to pinpoint an RF exposure threshold above which deleterious health effects occur. In a conservative move, the exposure limits for the general public were set at 50 times below that threshold. Subsequent studies have proven that these limits are indeed safe.

#### What are the limits?

The limits are based upon frequency, power, exposure time, and setting. This table outlines FCC guidelines adopted from ANSI/IEEE recommendations. European guidelines are similar.

	FREQUENCY RANGE (MHZ)	POWER DENSITY (mW/cm <sup>2</sup> )	AVERAGING TIME (MINUTES)
OCCUPATIONAL/ CONTROLLED	300-1,500	frequency/300	6
	1,500-100,000	5	6
GENERAL POPULATION	300-1,500	frequency/1500	30
	1,500-100,000	1	30



**Powercast** *simply wire free™*  
114 North Saint Clair Street  
Ligonier, PA 15658  
[www.powercastco.com](http://www.powercastco.com)

# WHITE PAPER

## Questions and Answers *continued*

So if a device utilized the WPT9066 Powercast Wireless Power Platform Powercaster™ module, the maximum allowable power density, averaged over 30 minutes for the general population, would be:

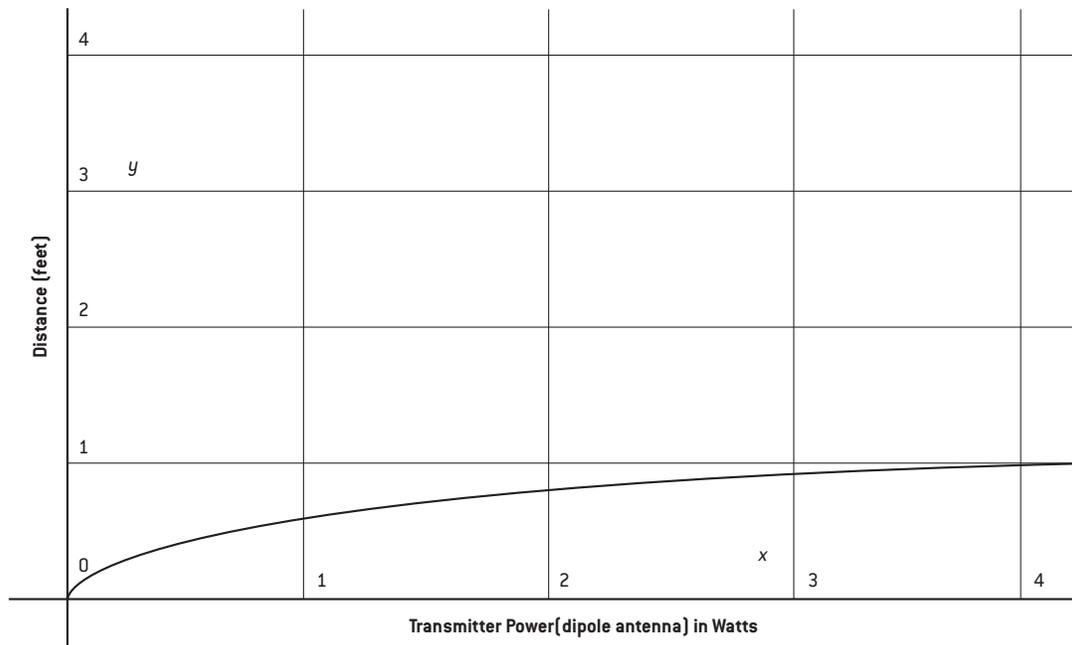
$$\text{Power Density} = \frac{905.8}{1500} = 0.604 \frac{\text{mW}}{\text{cm}^2}$$

### What is power density, and how can I measure it?

In this instance power density refers to the amount of power delivered by a transmitter divided by area. It can be measured with an RF field-strength meter using appropriate antennas.

### Is there a simpler way to think about power limits?

Yes, a much simpler way to understand the power limit is think about it in terms of transmitted power versus distance from the transmitter. The following graph illustrates this safety distance concept for a 905.8MHz transmitter from a WPT9066 Powercaster module. Any point above the curve is in accordance with RF exposure guidelines.



So for a transmitter with an average power of 1 Watt over 30 minutes, the graph shows that one should maintain at least a 6-inch distance from the transmitter. Still too much to think about? Don't worry, *all consumer devices that contain RF transmitters are tested to verify compliance with safety standards.*

### Does the Wireless Power Platform introduce any new health-safety issues?

No. Absolutely none.

## Questions and Answers *continued*

### Is this like an X-ray?

The radio frequency waves that carry energy in the Powercast Wireless Power Platform are significantly lower in energy than X-rays. In fact, X-rays have roughly a billion times more energy (103-105 eV) than radio frequency waves (10-9 to 10-5 eV).

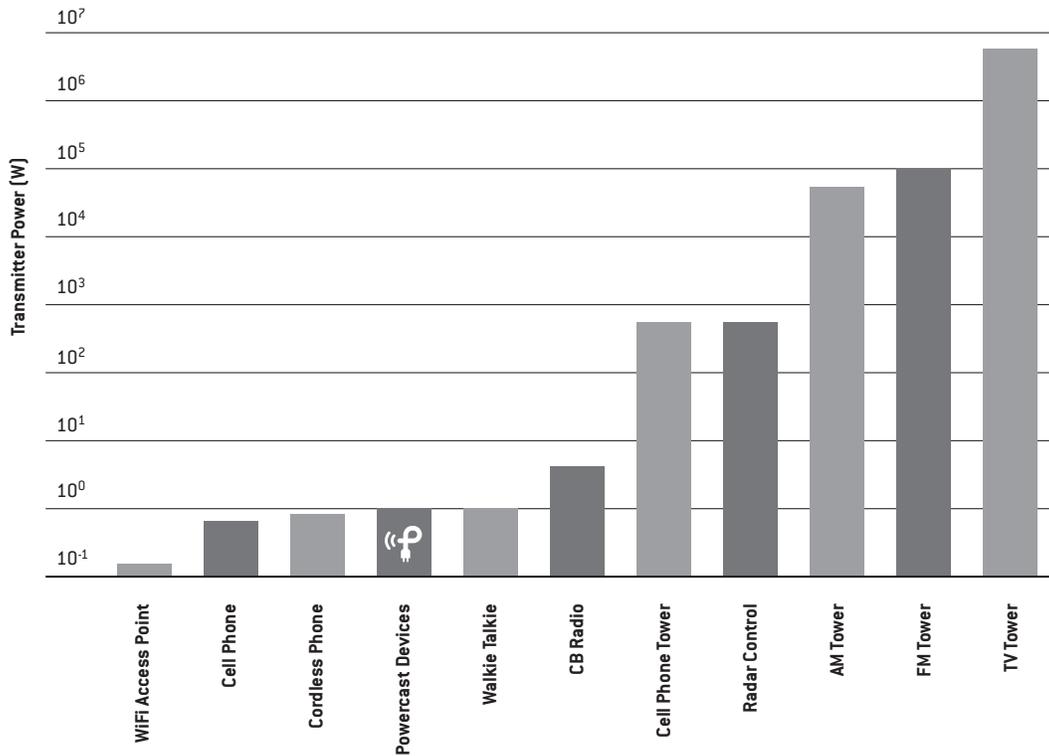
Also, X-rays have the ability to ionize, or rip apart, atoms. This ionization can be destructive to living tissue. RF, however, is physically incapable of causing such ionization.

### What are typical RF power levels in consumer devices?

Most consumer devices that contain RF transmitters, such as cell phones, cordless phones, laptops, etc., have power levels of less than 1 Watt. A few devices, like CB radios, have power levels of up to 4 Watts.

Of the many consumer applications for Powercast technology, the highest-power transmitter identified was just under 2 Watts. Most applications require much less power. For instance, a Powered by Powercast wireless mouse and keyboard are powered by a 0.5 Watt USB transmitter.

This chart shows the average RF power levels for many common sources.





**Powercast** *simply wire free™*  
114 North Saint Clair Street  
Ligonier, PA 15658  
[www.powercastco.com](http://www.powercastco.com)

## WHITE PAPER

### Questions and Answers *continued*

#### Can I be shocked?

No. An electric shock occurs when one is exposed to a high voltage differential. RF waves produce no such differential.

#### Can it be bad for children, pets, plants, etc.?

No. As previously stated, the RF radiation limits were set far below the level of radiation that may be dangerous to any humans, animals, or plants.

#### Where can I find more health and safety information about RF?

**Federal Communications Commission:** [www.fcc.gov/oet/rfsafety](http://www.fcc.gov/oet/rfsafety)

**World Health Organization (WHO):** [www.who.ch/peh-emf](http://www.who.ch/peh-emf)

**U.S. Food and Drug Administration:** [www.fda.gov/cellphones/](http://www.fda.gov/cellphones/)

**IEEE Committee on Man & Radiation:** [ewh.ieee.org/soc/embs/comar/](http://ewh.ieee.org/soc/embs/comar/)

### About Powercast

Powercast, LLC, was founded in 2003 to develop the groundbreaking concept of the Wireless Power Platform. Since its inception, Powercast has broadened its portfolio, grown its skilled management team, and increased its exceptional engineering staff. Today Powercast and its clients are at the forefront of an exciting new wirelessly powered world.

### For More Information

#### Powercast, LLC

114 N. Saint Clair Street

Ligonier, PA 15658

[www.powercastco.com](http://www.powercastco.com)

[info@powercastco.com](mailto:info@powercastco.com)