PCT300

RFID Sensor Tag Datasheet

DESCRIPTION

The PCT300 is a high performance, wirelessly powered RFID tag capable of measuring temperature and humidity with high accuracy. The tag harnesses the capability of the Powercast Powerharvester® Chipset to enable long range, full-function RFID without the need for an on-board battery. The tags are designed to maximize the RF to DC conversion efficiency of the energy provided by an RFID reader. Using this energy, sensor measurements can be taken and then read back out of the tag's memory using any standard UHF RFID reader. Powercast's technology enables a completely maintenance-free and battery-free sensing and tracking solution for UHF RFID applications and critical monitoring systems.

APPLICATIONS

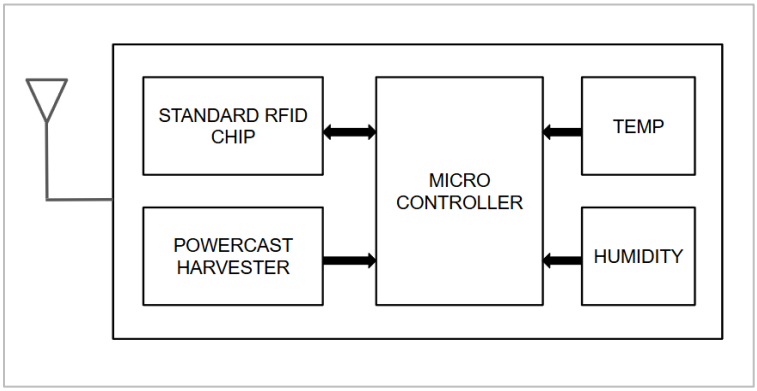
- Server Rack Monitoring
- Medical Asset Tracking & Monitoring
- Smart Grid
- Building Automation
- Logistics & Warehousing
- Asset Monitoring
- Supply Chain Management
- Materials Management
- Industrial Monitoring
- Cold Chain Monitoring

FEATURES

- EPC Gen2 V2 compliant
- ISO/IEC 18000-63 compliant
- 5 meter read range
- High sensor accuracy
- "Find Tag" feature – locate one specific tag by illuminating an on-board LED
- Wide RF range: -16dBm to +20dBm
- Frequency range: 902 MHz - 928 MHz
- Compact hard case packaging with multiple mounting options
- High RF to DC conversion efficiency – up to 75%
- -40 to +85°C operational temperature range
- Completely battery-free
- Data accessible in user memory
- Fast read rate

www.powercastco.com / contact@powercastco.com
+1 (412) 455-5800

FUNCTIONAL BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted.

Parameter	Rating	Unit
RF Input Power	20	dBm
Operating Temperature Range	-40 to 85	°C
Storage Temperature Range	-40 to 85	°C

Exceeding the absolute maximum ratings may cause permanent damage to the device.

SPECIFICATIONS

T_A = 25°C, RF_{IN} = 915MHz, unless otherwise noted

Parameter		Min	Typ	Max	Unit
RF Characteristics	Input Power	-16	-	20	dBm
	Frequency	902	-	928	MHz
Read Distance		0.3	-	5	m
Read Time		-	-	60	s
Temperature	Range	-40	-	85	°C
	Accuracy	-	±0.1	±0.3	°C
Relative Humidity	Range	0	-	100	%RH
	RH Accuracy Temperature Range	0	-	60	°C
	Accuracy 0% to 70% RH	-	±1.0	±2.0	%RH
	Accuracy 0% to 100% RH	-	±1.5	±3.5	%RH
	Long-term Drift	-	±0.19	-	%RH/yr

FUNCTIONAL DESCRIPTION

POWER

The PCT300 tag is powered passively and is completely battery free. It utilizes Powercast's harvesting technology to gather the RF energy produced by an RFID reader, which is then converted into usable DC power. Because of this harvesting technology, the tag can power multiple sensors at one time. The tag stores the DC power until it is significant enough to take a sensor reading and write the results to the RFID chip.

Note that this can cause the time between sensor reads to vary with distance. The minimum read time will be around 5s when you are close to the reader and increase as you move away from the reader.

SENSOR READS

The PCT300 senses temperature and humidity. Every time the tag takes a sensor reading, it writes the values to the same memory locations on the RFID chip. Therefore, only the most recent sensor values will be stored and read. The memory location for the sensor reads are listed in Table 1. The read count increments every time a new reading is taken to indicate new data is available.

LOCATE TAG

The PCT300 is equipped with a locate tag feature. This helps to find a tag in the field when there are multiple tags. It causes the LED on the tag to blink. The closer you are to the reader, the faster the LED will blink. To set the tag into locate mode, you must update the Locate Tag Blink field with the number of times you want the LED to blink, with a maximum of 30 times. To return to normal operation, you must clear this field or allow the LED to blink as many times as the field was set.

MOUNTING OPTIONS

The PCT300 has several mounting options. The PCT enclosure contains a key ring that can be used with a small cable zip tie to secure the sensor to a server rack or similar. An optional secondary clip can be connected to the PCT key ring which gives additional options for attaching the sensor to a rack or similar so that the best possible RFID performance can be obtained. Reference the Quick Start Guide for a detailed description of preferred mounting options.

DESCRIPTION OF MEMORY

MEMORY MAP

The tags are compatible with EPC Gen2 commands. Data should be read in 16-bit words. The user data is stored in the user memory locations (memory bank 3) starting at byte 00h.

Table 1: Memory Map

Word	Memory Address	Content
0	00h	Product ID
1	02h	Product Configuration (Temperature, Humidity)
2	04h	Locate Tag Blink Count
3	06h	Temperature
4 (MSB)	08h	Read Count
4 (LSB)	09h	Relative Humidity

CONVERSION FORMULAS

The values for each sensor read will be stored on the RFID chip as hexadecimal values. The following are the formulas to convert these values into their respective sensor values.

TEMPERATURE

For temperature, convert the sensor values from hexadecimal to decimal and then enter the number into the formula for T.

$$\mathrm{T(°C)} = -45 + (35 * \mathrm{T}/13107)$$

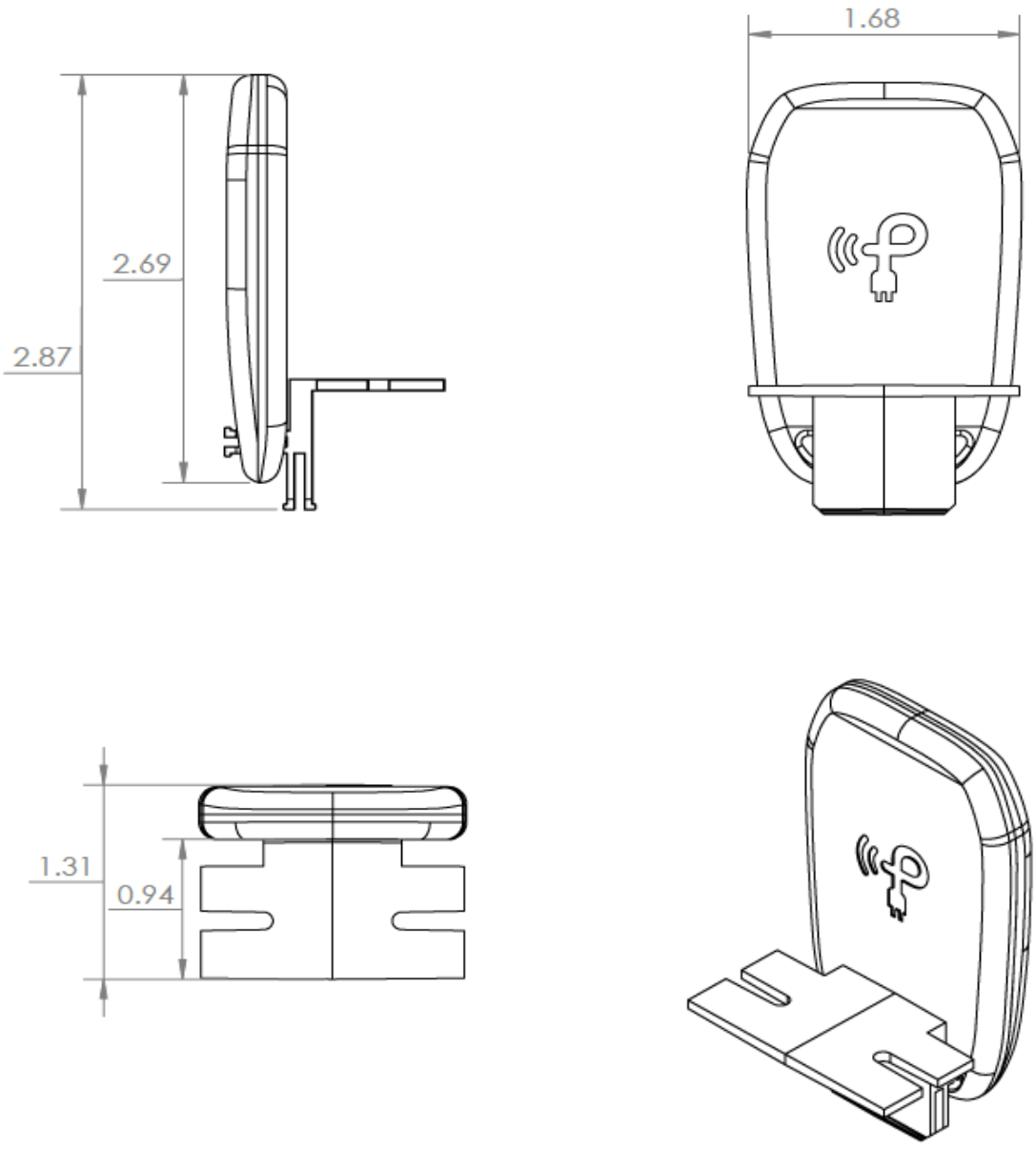
$$\mathrm{T(°F)} = -49 + (21 * \mathrm{T}/4369)$$

HUMIDITY

For humidity, first add 2 zeros to the end of the sensor hexadecimal value to make the value a full word (for example, a sensor value of 7A becomes 7A00). Then convert the sensor values from hexadecimal to decimal and enter the number into the formula for RH.

$$\mathrm{RH(\%)} = (20 * \mathrm{RH}/13107)$$

DIMENSIONS



Please Note: All dimensions in the figure above are presented in inches (in). Shown with optional mounting bracket.

IMPORTANT NOTICES

Information furnished by Powercast Corporation (Powercast) is believed to be accurate and reliable. However, no responsibility is assumed by Powercast for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications are subject to change without notice.

No license is granted by implication or otherwise under any patent or patent rights of Powercast. Trademarks and registered trademarks are the property of their respective owners.

CRITICAL APPLICATIONS DISCLAIMER

POWERCAST PRODUCTS (INCLUDING HARDWARE AND/OR SOFTWARE) ARE NOT DESIGNED OR INTENDED TO BE FAIL-SAFE, FAULT TOLERANT OR FOR USE IN ANY APPLICATION THAT COULD LEAD TO DEATH, PERSONAL INJURY OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE (INDIVIDUALLY AND COLLECTIVELY, "CRITICAL APPLICATIONS"), SUCH AS LIFE-SUPPORT OR SAFETY DEVICES OR SYSTEMS, CLASS III MEDICAL DEVICES, NUCLEAR FACILITIES, APPLICATIONS THAT AFFECT CONTROL OF A VEHICLE OR AIRCRAFT, APPLICATIONS RELATED TO THE DEPLOYMENT OF AIRBAGS, OR ANY OTHER CRITICAL APPLICATIONS. CUSTOMER AGREES, PRIOR TO USING OR DISTRIBUTING ANY SYSTEMS THAT INCORPORATE POWERCAST PRODUCTS, TO THOROUGHLY TEST THE SAME FOR SAFETY PURPOSES. CUSTOMER ASSUMES THE SOLE RISK AND LIABILITY OF ANY USE OF POWERCAST PRODUCTS IN CRITICAL APPLICATIONS, SUBJECT ONLY TO APPLICABLE LAWS AND REGULATIONS GOVERNING LIMITATIONS ON PRODUCT LIABILITY.

Powercast warrants its products in accordance with Powercast's standard warranty available at www.powercastco.com/terms-conditions

Wireless Power for a Wireless World®

Powercast Corporation
620 Alpha Drive, Suite 1
Pittsburgh, PA, USA 15238
www.powercastco.com
contact@powercastco.com
+1 (412)-455-5800