

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



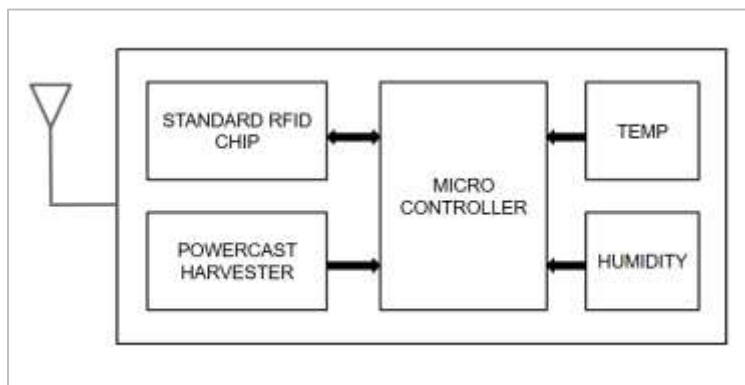
Powercast products and technology are covered by one or more patents with other patents pending. All patent and trademark information can be found at <http://www.powercastco.com/IP/>

PCT300

RFID Sensor Tag Datasheet



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.

$$T(^{\circ}\text{C}) = -45 + (35 * T/13107)$$

$$T(^{\circ}\text{F}) = -49 + (21 * T/4369)$$

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 0x7A becomes 0x7A00). Then convert the sensor values from hexadecimal to decimal and enter the number into the formula for RH.

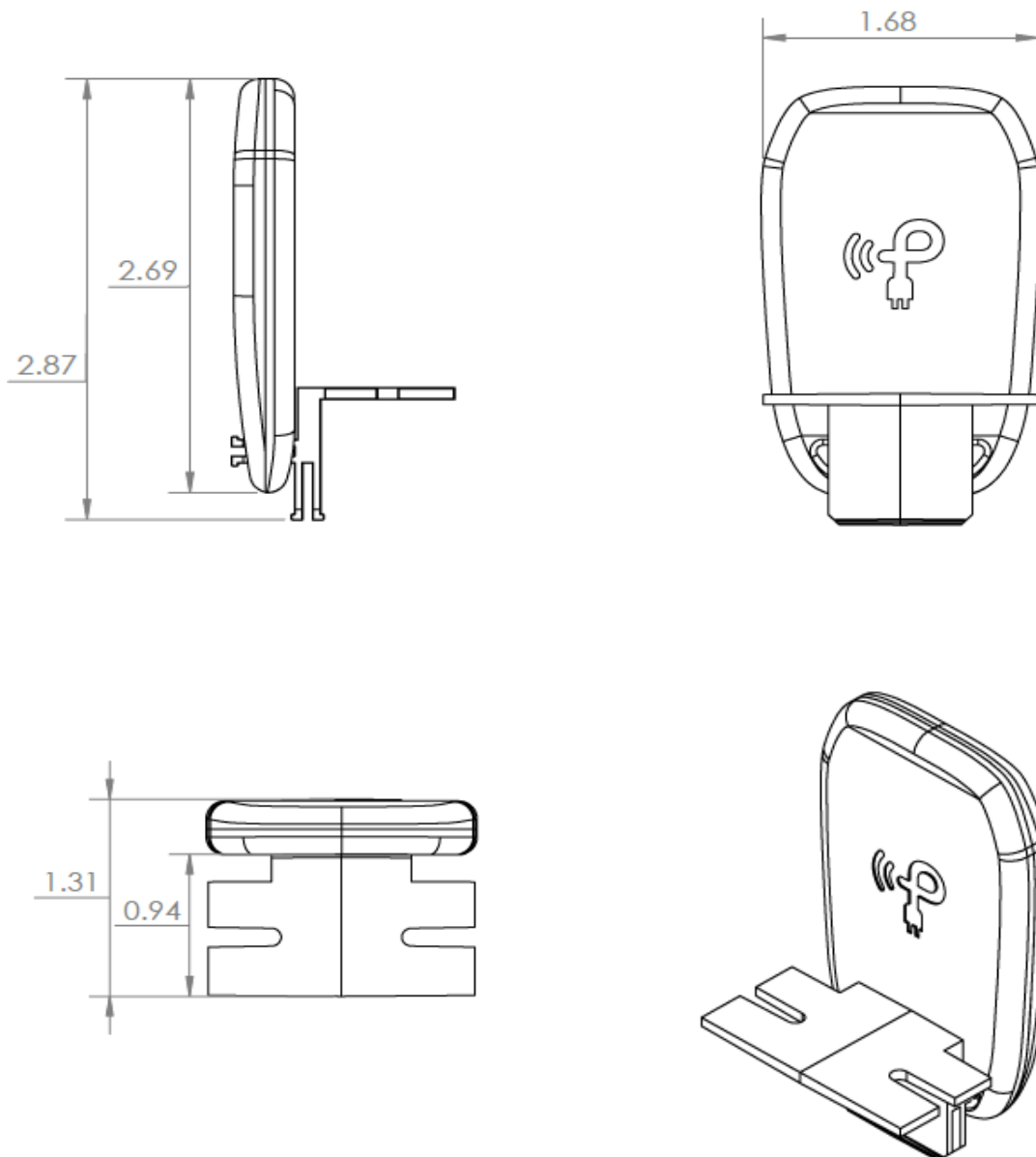
$$\text{RH}(\%) = (20 * \text{RH}/13107)$$

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DIMENSIONS



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

COMPLIANCE STATEMENTS

1. This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
 - This device may not cause harmful interference, and
 - This device must accept any interference received, including interference that may cause undesired operation.

2. Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
 - Reorient or relocate the receiving antenna.
 - Increase the separation between the equipment and receiver.
 - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
 - Consult the dealer or an experienced radio/TV technician for help.

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