
ZT-10 ACTIVE RFID TAG v4.5

Features:



- Small size
- Long battery life
- 2.4 GHz operation
- Re-writable user memory (256 bytes = 2Kbit)
- Up to 7 sensor inputs
- 2-way communication protocol
- Fully configurable via user commands
- 70 meter range with 5 dbi omni antenna

Radio, protocol specs:

- Industry standard IEEE 802.15.4 (PHY and MAC layer for Zigbee)
- Operating frequency range – from 2.400 to 2.483 GHz (DSS spread spectrum)
- 250 Kbps data rate per tag.
- CSMA for anti-collision
- Does not interfere with WLAN (Wi-Fi) Networks
- Support for 128 bit AES-CCM security suite for high data security
- Readers available in both PCMCIA and USB form factors for PDA and PC's

Applications:

- Asset tracking and monitoring, prisoners, livestock
- Remote sensing and monitoring, secure locks
- Process monitoring, location
- Tagging of pallets, vehicles, people, animals, and buildings



USER MEMORY

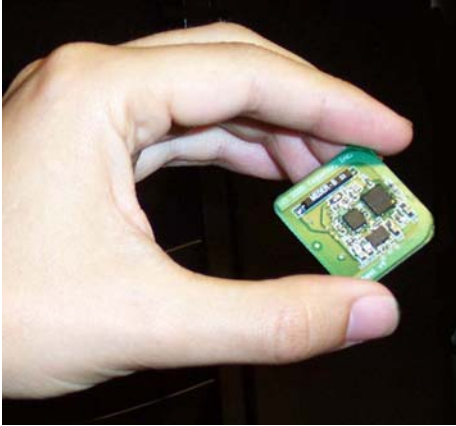
User Memory:

In addition to its 2-byte network ID, the ZT-10 tag also contains 256 bytes of programmable user memory. This memory is organized into 16 banks (0-15) of 16 bytes each. It possible to read and write to specific banks in memory through the reader commands.

Bank	Data
0	AABBCCDDEEFFAABBCCDDEEFFAABBCCDD
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

User memory screen from the demo software that is included with the Active RFID Evaluation kit.

BASIC SPECIFICATIONS



The ZT-10 is an active tag that communicates via the industry standard protocol IEEE 802.15.4.

This tag can be easily mounted on a variety of assets and used for tracking or monitoring of sensors.

The operating frequency of 2.45 GHz enabled this tag to have a small size antenna and long range (>70 meters).

The 802.15.4 protocol is the most advanced tagging protocol used today and includes bidirectional communication between the tag and other tags or between the tag and the reader. This enables faster and more efficient communications when multiple tags are present (anti-collision) and also extends battery life.

Each tag contains 2 indicator LEDs (red/green) on the top side.

SPECIFICATIONS

- Frequency:
2.400 - 2.483 GHz
- 250 Kbps data rate (max)
- Operating Voltage: 2 - 5 V
- Current consumption:
 - <2uA when idle
 - < 20 mA when communicating
- Operating Temperature:
-10C – 80C
(lower temperatures are possible with reduced timing precision)
- Shock and vibration
Resistant
- 12-bit sensor precision

ZT-10 SPECIFICATIONS

- Battery: CR2032
- Battery Capacity: 220 mAh
- Battery life: ~12-15 months
 - Using maximum transmit power of 1 milliwatt (battery life will be longer using lower transmit power)
 - Using transmit interval of 15 minutes
 - Using 128 byte packet
- Transmission distance at full power: >70 meters
- Size: 1.25 x 1.25 x 0.25 in.

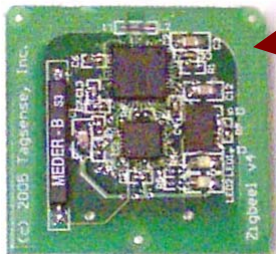
ANTENNA AND PERFORMANCE

Tag Frequency: 2.4 GHz vs 433 MHz

Although most active RFID tags operate at 433 MHz (for historical reasons), TagSense has chosen the frequency of 2.4 GHz for its active RFID tags. 2.4 GHz has many advantages over 433 MHz:

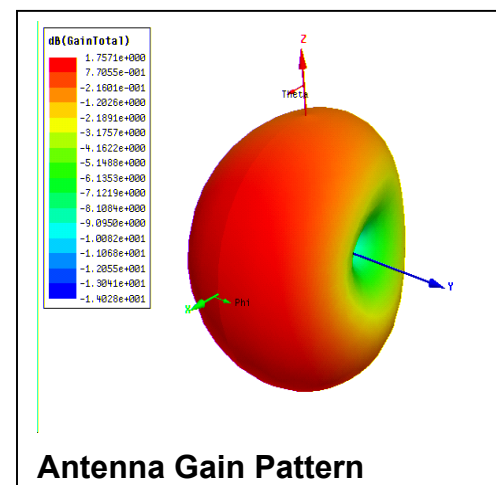
- 8X smaller antennas than 433 MHz
- many choices for reader antennas are commercially available
- 2.4 GHz propagates better indoors and through narrow openings because the wavelength is smaller
- 2.4 GHz radio chips have more advanced protocols and better radio performance (IEEE 802.15.4)

Integrated Antenna



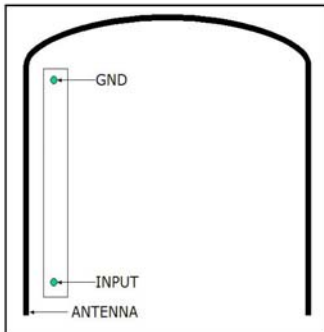
**PCB
integrated
antenna**

To save size and cost, the ZT-10 contains an integrated antenna. The antenna is specifically designed for the ZT-10 and can be read in almost every orientation. In an indoor environment, where there are reflections off the walls, the tag performance will be improved further by such reflections.





CONTACT SWITCH, VIBRATION, AND MAGNET SENSOR



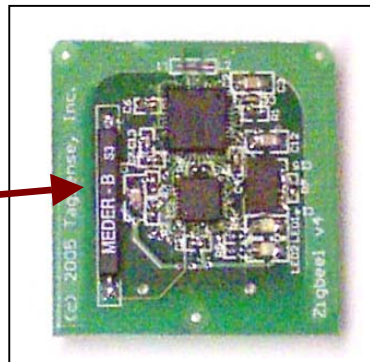
The ZT-10 tag contains solder contacts for connecting an external contact sensor in the form of a Magnetic reed switch or simple contact vibration sensor. These 2 contacts can also be used to connect an external pushbutton or other contact sensor. The ZT-10 monitors the connection between these two pads, and can be programmed to transmit an alert when the contact is broken. This digital input can be used for making security contact switches for secure locks, prisoner bracelets, or tamper detection sensors. The solder pads are shown in the illustration.

Wake-up Sensor:

The contact switch input on the ZT-10 can also be used as a trigger for waking up the tag from sleep. A magnetic reed switch is commonly used to wake up the tag by placing a permanent magnet near the sensor. A vibration sensor can also be used, in which case the tag would wake up by simply shaking the tag. Using the magnet method, the tags will be set to deep sleep mode to conserve battery power during storage or shipping, and can then be woken up by bringing the tag near a magnet.

A photograph of the ZT-10 with a mounted magnetic reed switch is shown below. The reed switch sensor is not included with the ZT-10, but can be requested as an extra option.

**Magnetic
Reed
Switch**



TOP SIDE



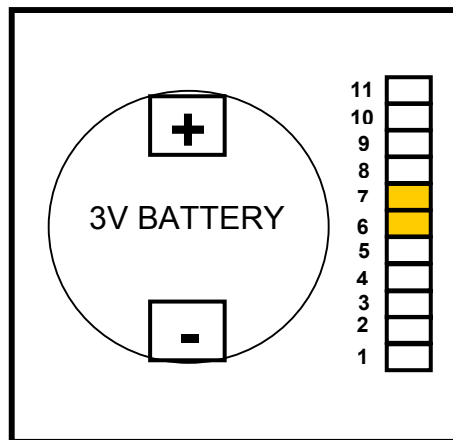
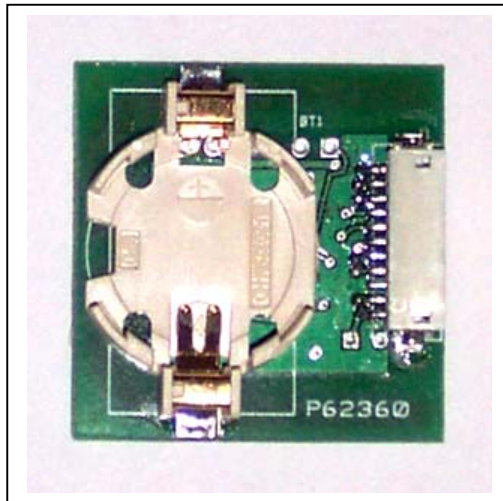
SENSOR/HOST INTERFACE

The ZT-10 active tag provides a flexible hardware interface that can be used to connect the ZT-10 to another circuit board or connect up to 7 external sensors, depending on the version of the circuit board.

On the following pages are several different version of the circuit board that have been sold. Please find the version of the circuit board that you have and you can view the corresponding information for making pin connections.

ZT-10 BOARD v5.1

This board can connect up to 6 external sensors (5 analog+1 digital). The analog sensor can be attached using the mating connector Hirose DF13-11S-1.25C (Digikey Part #: H2187-ND). A photograph of the connector and the description of the 11-pin interface is given below.

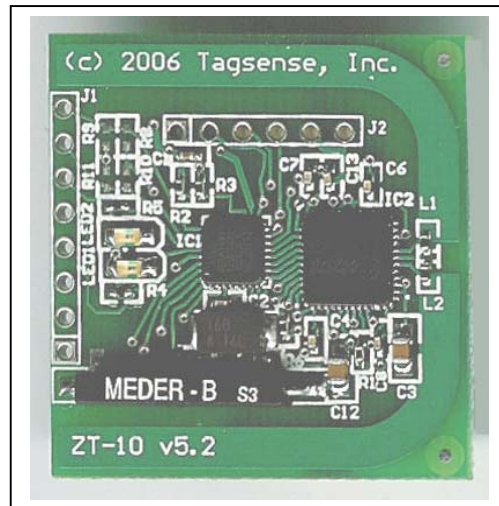


VCC (3.3V)
 INPUT5 – with bias
 INPUT4 – with bias
 INPUT3
 INPUT2
 INPUT1
 OUTPUT1 / LED1
 OUTPUT2 / LED2
 GND
 RX (from host)
 TX (to host)

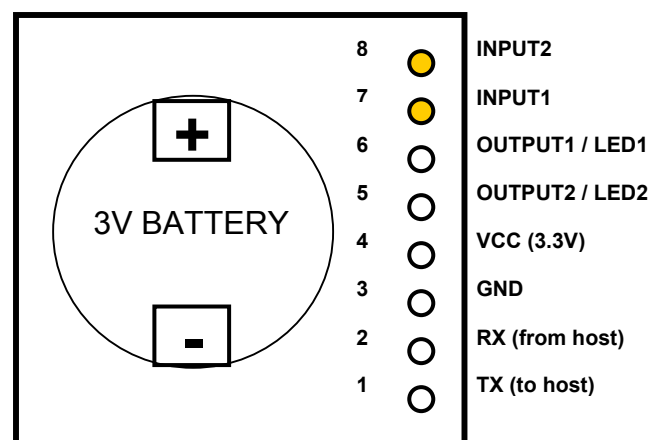
ZT-10 BOARD v5.2

The ZT-10 active tag provides a flexible hardware interface that can be used to connect the ZT-10 to another circuit board or connect up to 4 external sensors (2 analog+2 digital). A photograph of the connector and the description of the 8-pin interface is given below.

FRONT
SIDE



BACK
SIDE



ZT-10 BOARD v5.3

The ZT-10 version 5.3 board contains 2 rows of header vias which provide a very versatile interface to a variety of sensors, input and outputs. Up to 7 analog inputs and 8 digital inputs are possible. A photograph of the connector and the description of the interface is given below.

FRONT
SIDE



A4/D4	8	16	A7 (analog only)
IA3/D3	7	15	A6/D6/LED1
A2/D2	6	14	A5/D5/LED2
A1/D1	5	13	GND
VCC (3.3V)	4	12	VCC (3.3V)
GND	3	11	GND
RX (from host)	2	10	D8/INT2
TX (to host)	1	9	D7/INT1

FRONT
SIDE

A = analog input
D = digital input/output
INT = Interrupt input



HOST INTERFACE

You will also notice that the ZT-10 board also contains certain special function pins. These are used to connect the ZT-10 to an external circuit board. For further information, see the datasheet for the ZT-Link.

PIN #	LABEL	DESCRIPTION
1	TX	TTL RS232 output to external circuit board
2	RX	TTL RS232 input from external circuit board
3, 11	GND	Electrical Ground
4, 12	Vcc (3 V)	This is the battery power.
5	INT1, INT2	These are Interrupt pins that can be used to trigger or wake up the tag. These are used for custom applications.

IMPORTANT NOTE

TagSense also offers a separate version of this product under the name ZT-50. The ZT-50 hardware is identical to the ZT-10, except that it has an additional EEPROM memory chip and also contains completely different firmware. The ZT-50 is programmed to function as a data logger and contains a real-time clock. The datasheet for the ZT-50 is available as a separate download from our web site (www.tagsense.com).

TagSense also offers a third version of this product under the name ZT-Link. The ZT-Link board is programmed to interface this radio module to an external circuit board and microcontroller.

IMPORTANT NOTE:

The ZT-50 contains an additional EEPROM chip to store data. If you have a ZT-10 tag (which does NOT contain an EEPROM chip) you should make sure that the resistor R8 has been removed from the board. This resistor is used only for the EEPROM function and will not affect the operation of the ZT-10. However, if this resistor is present, it will cause the battery to drain faster, so it should be removed.

