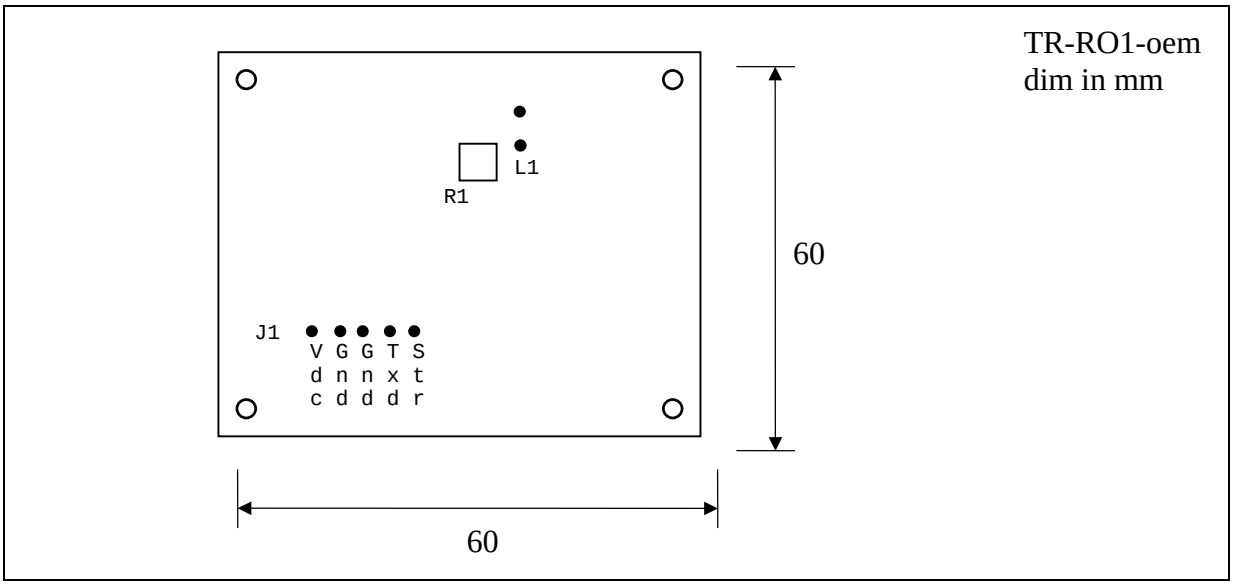
TR-RO1-oem

The TR-RO1-oem is a small, inexpensive and easy to use reader/decoder board for passive RF identification tags. It is intended for OEM applications. A power source and an antenna is all that is required to use the reader. It can read Manchester encoded ASK type transponders such as the IT30RO. Its low-power requirements permit battery operation and can be integrated into hand held devices.



Specifications

Function	Reader/decoder for 125 kHz ASK Manchester 64 bit RF identification tags
Interface	RS232 or TTL, 9600 baud, 8 data bits, no parity, 1 stop bit
Antenna type	1.62 mH coil (calculated, see note)
Read range	Antenna and tag dependent, practical maximum about 90 cm
Power requirements	9 - 12 VDC regulated, 60 mA
Dimensions	60 mm x 60 mm x 15 mm (2.375 inches x 2.375 inches x 0.625 inches)
Operating temperature	0 to +85 C
Humidity	non-condensing
Connections	Standard: 4-5 pin .1 header (J1), 2 pin .1 header (L1) *see ordering info*

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General Description

The TR-RO1-oem board performs all the functions necessary for a RFID reading station. It continuously powers, reads and decodes transponders that are within its reading range. When a transponder tag passes within range of the reader antenna, the RF magnetic field generated by the reader powers the tag. The tag then transmits its data. The reader board demodulates and decodes the data. The data is then sent as a packet using a two-wire RS232 (or TTL) interface. While the tag remains within reading range it will be continuously powered and the reader will continuously transmit its data.

Connections

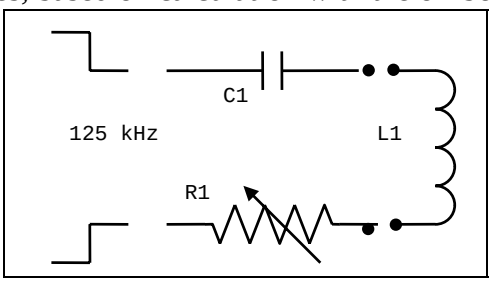
The standard connector J1 is a 4 (or 5 pin) 0.100 inch spacing single row male header.

1. +VDC: Connect to positive side of power supply. A 9 to 12 VDC regulated supply is required. A 9 volt battery can also be used (positive + terminal). Although the board offers some protection, be sure to check for proper polarity.
2. GND: Connect to ground (-) side of power supply.
3. GND: Connect to common ground of RS232 receiver.
4. TXD: Connect to RXD (receive) of RS232 terminal. It is used to serially transmit the data packet.
5. STR: The STR signal is a +5VDC TTL level (positive logic). It can be used as an interrupt signal to warn the terminal device that a data packet is about to be sent. A LED is normally soldered on board, using this signal, to give a visual indication of reads.

The standard connector L1 is a 2 pin 0.200 inch spacing single row male header. It is used to connect the antenna.

Antenna Design

A single antenna is required for powering and reading the transponders. The antenna is used in a series resonant circuit, formed by C1, L1, and R1. The board requires, based on calculation with the on-board 1nF capacitor, an antenna with an inductance of 1.62 milliHenries. Proper value and shape of the antenna are installation dependent and must be determined by the user. The nominal resonant frequency is 125 kHz. To improve the reading range, the board will automatically adjust the driver's frequency to the resonance of the antenna circuit. The antenna can be a simple air wound coil. As an example, the demo kit antenna is a square antenna 9 cm x 9 cm with 83 turns (about 30 meters of 0.254 mm diameter (30 AWG)) wire; its inductance is 1.58mH with 10 ohm DC resistance. The reading range is spherical with the antenna located at the equator. Minimum and maximum read range is determined, in great part by the size of both the reader and tag antennas



Read Range Adjustments

The read range can be adjusted using the trimmer potentiometer, R1. This changes the Quality factor of the series resonant circuit. Although increasing the Q factor of the circuit increases the read range, it also increases the amount of spurious signal received. Therefore the boards should be individually adjusted with each attached antenna in their final environment.

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Data Transmission *firmware version 1.3 and greater*
The information is sent using a 2 wire (txd and gnd) RS232 (or TTL) interface. It operates at 9600 baud 8N1. The serial number in a tag such as our IT30RO is 40 bits long, ie. 5 bytes. The data packet is comprised of 1 start byte, 10 data byte in ASCII, 2 checksum byte, and one stop byte.

The start byte is always a '**:**' (58d, 3Ah). The 10 data byte are an ASCII representation of the ten hexadecimal serial code digits (5 numbers) stored in the tag that has just been read. The checksum is two bytes long. It is an ASCII representation of the 8 bit sum of the 10 data byte sent. The stop byte is always an ASCII 'carriage return' (13d, 0Dh).

As an example, when tag serial number 7,234,567,890 decimal (01 AF 36 BE D2 hexadecimal) is decoded, the following 14 byte packet would then be transmitted (shown in hexadecimal):

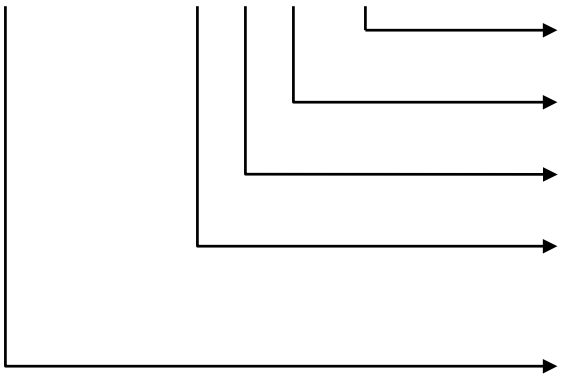
3A	30 31 41 46 33 36 42 45 44 32	34 45	0D
start byte	*ASCII codes of the data (5 numbers - 10 digits)*	*checksum*	*stop byte*

The data packet is sent every time a tag is detected. If a tag remains in the reading field, its data will be sent continuously.

The STR line can be used to signal to the receiving terminal that data is about to be sent. The STR line is raised (high logic level, +5VDC) for about 1 milliseconds before the data packet is sent. The STR line remains high for the duration of the transmission of the data packet. It is brought down (low logic level, 0 VDC) after the last bit is sent. This signal could be used to interrupt a microcontroller, which would then gather the 14 bytes of incoming data.

Ordering information

TR-RO1-OEM- Jx-Lx-LED-SS



SS: Connectors on solder side.
Connectors on component side.
LED: if LED on board
if not on board
Lx : x = 0 if L1 header not on board
x = 1 if L1 header on board
Jx: x = 0 if J1 header not on board
x = 4 if J1 on board 4 pin header
x = 5 if J1 on board 5 pin header (no LED).
Base part number

As of 1 April 2005 TTL interface is no longer available see TRRO2OEM instead.

Example: TR-RO1-OEM-J4-L1-LED *(this is our standard board).*

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