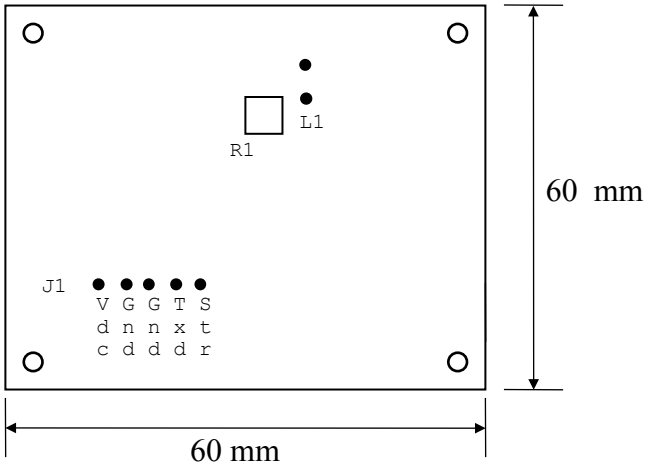
TR-RO1-OEM

RFID Reader Module Board for OEMs

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



Features	Reader/decoder for 125 kHz ASK Manchester 64-bit RF identification tags
Data 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 x 60 x 15 mm (2.375 x 2.375 x 0.625 inches)
Operating Temperature	0 to +85 ºC
Humidity	non-condensing
Connections	J1: 4 or 5 pin 0.1-inch header L1: 2 pin 0.1-inch header
Part Number	TR-RO1-OEM-*Jx-Ly-LED-SS-TTL* *-Jx: x=0 for no J1 header; x=4 for 4-pin J1 header; x=5 for 5-pin J1 header (no LED for J5 option)* *-Ly: y=0 for no L1 header on board; y=1 for L1 header on board* *-LED: for on-board LED (cannot have both J5 and LED)* *-SS: connectors on solder side (otherwise connectors are on component side)* *-TTL: for TTL interface (otherwise interface is RS232)*
Price	$95.00 each for standard TR-RO1-OEM-J4-L1-LED board (contact us for volume pricing and other options)

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General Description

The TR-RO1-OEM board performs all the functions necessary for an 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, and 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

Connector J1 is a 4-pin (or 5-pin) 0.1-inch spacing single row male header:

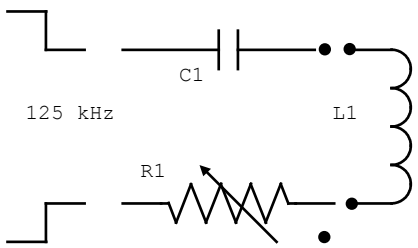
1. +VDC: Connect to positive side of power supply. A linear (low-noise) positive 9 to 12 VDC regulated supply is required (60 mA minimum). A 9 volt battery can also be used. Although the board offers some protection, be sure to check for proper polarity before applying power.
2. GND: Connect to ground (-) 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 +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. An LED is normally soldered on board, and uses this signal to give a visual indication of reads.

Connector L1 is a 2 pin 0.2-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. Based on calculation with the on-board 1nF capacitor, the board requires 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 x 9 cm with 83 turns (about 30 meters of 0.254 mm diameter (30 AWG) wire. Its inductance is 1.58 mH with 10 ohm DC resistance. The read 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.

Data Transmission *(firmware version 1.3 and greater)*

The information is sent using a 2 wire (TxD and Gnd) RS232 (or TTL) interface operating at 9600 baud (8N1). The serial number in a typical tag is 40 bits long (5 bytes). The data packet is comprised of 1 start byte, 10 data bytes in ASCII, 2 checksum bytes, and one stop byte.

The start byte is always a '**:**' (58d, 3Ah). The 10 data bytes 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 will 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.