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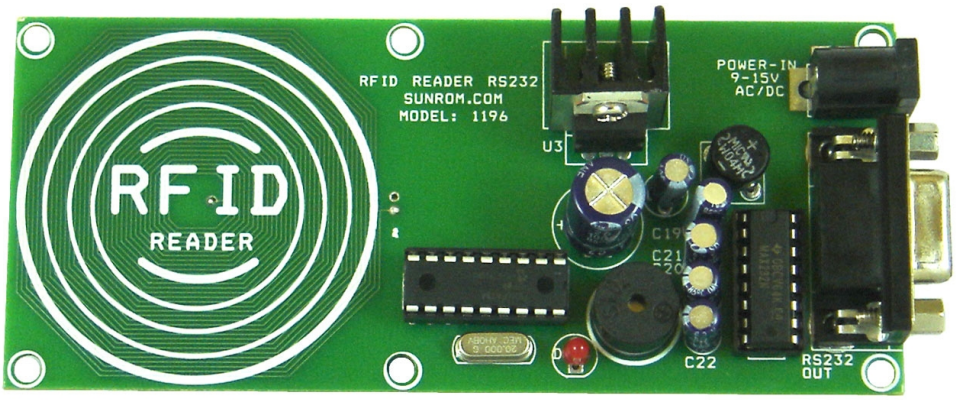
RFID Reader

Radio Frequency Identification (RFID) Card Readers provide a low-cost solution to read passive RFID transponder tags up to 2 inches away. The RFID Card Readers can be used in a wide variety of hobbyist and commercial applications, including access control, automatic identification, robotics navigation, inventory tracking, payment systems, and car immobilization. The RFID card reader read the RFID tag in range and outputs unique identification code of the tag at baud rate of 9600. The data from RFID reader can be interfaced to be read by microcontroller or PC.

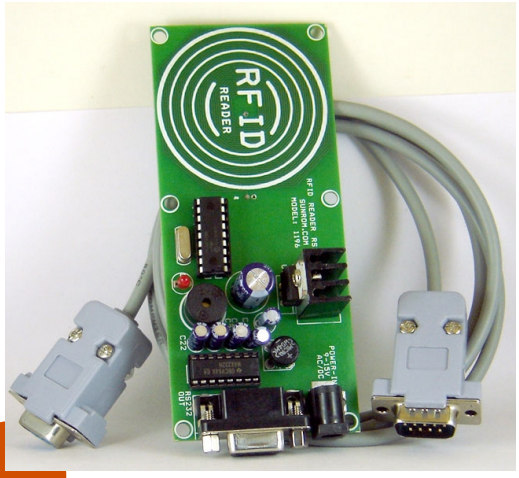


Features

- Low-cost method for reading passive RFID transponder tags
- 9600 bps serial interface at RS232 level
- Buzzer & LED indicate valid RFID Tag detection
- RS232 interface connects directly to PC, Mac or Linux machine and requires no additional wiring.

Our RFID Reader Package Includes

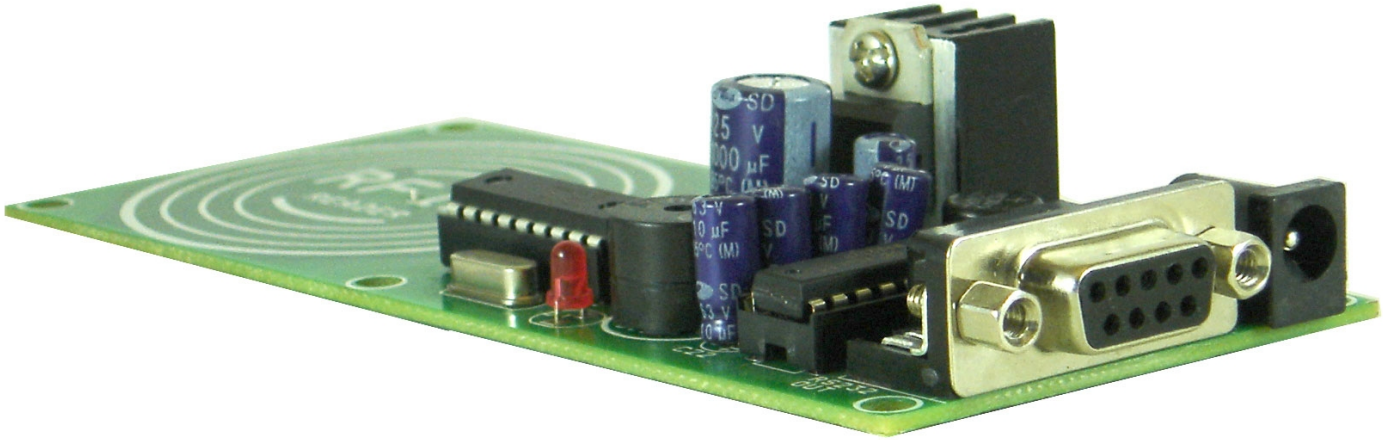
- RFID Reader (Assembled & Tested with 1 year warranty)
- Serial Cable



Specification

Parameter	Value
Input Voltage	9 to 15 V AC or DC
Output Data Speed	9600 BPS 8 Bit Data/No-Parity/1 Stop Bit
Output Data Level	RS232
Detection Range	2" Inches contact-less
Valid Tag in Range	Indicated by Buzzer and LED

Side View of reader



Information

Each transponder tag contains a unique identifier (one of 2^{40}, or 1,099,511,627,776 possible combinations) that is read by the RFID Card Reader and transmitted to the host via a simple serial interface. It means no two tags are same. Each tag has different value. This value if read by reader.

Communication

When the RFID Card Reader is active and a valid RFID transponder tag is placed within range of the activated reader, the unique ID will be transmitted as a 12-byte printable ASCII string serially to the host in the following format:

Start Byte (0x0A)	Unique ID Digit 1	Unique ID Digit 2	Unique ID Digit 3	Unique ID Digit 4	Unique ID Digit 5	Unique ID Digit 6	Unique ID Digit 7	Unique ID Digit 8	Unique ID Digit 9	Unique ID Digit 10	Stop Byte (0x0D)

The start byte and stop byte are used to easily identify that a correct string has been received from the reader (they correspond to a line feed and carriage return characters, respectively). The middle ten bytes are the actual tag's unique ID.

For example, for a tag with a valid ID of 0F0184F07A, the following ASCII data would be sent
0F0184F07A
Same data in HEX bytes can be interpreted as:
0x0A, 0x30, 0x46, 0x30, 0x31, 0x38, 0x34, 0x46, 0x30, 0x37, 0x41, 0x0D

All communication is 8 data bits, no parity, 1 stop bit, and least significant bit first (8N1). The baud rate is configured for 9600 bps, a standard communications speed supported by most any microprocessor or PC, and cannot be changed. The RFID Card Reader initiates all communication. This allows easy access to the serial data stream from any programming language that can open a COM port.

Using RFID Reader

When powered on the RFID reader will activate a RF field waiting for a tag to come into its range. Once tag is detected, its unique ID number is read and data is sent via serial interface. The valid tag detecting is indicated by LED blink and Buzzer beep. The face of the RFID tag should be held parallel to the front of the antenna (where the majority of RF energy is focused). If the tag is held sideways (perpendicular to the antenna) you may have difficulty getting the tag to be read. Only one transponder tag should be held up to the antenna at any time. The use of multiple tags at one time will cause tag collisions and confuse the reader. The tags available with us have a read distance of approximately 2 inches. Actual distance may vary slightly depending on the size of the transponder tag and environmental conditions of the application.

On PC you can use software like hyper terminal which can show ASCII data at 9600 baud rate.

You can also develop software in any language which can connect to serial port and listen for incoming ASCII data.

Power Requirement of Receiver

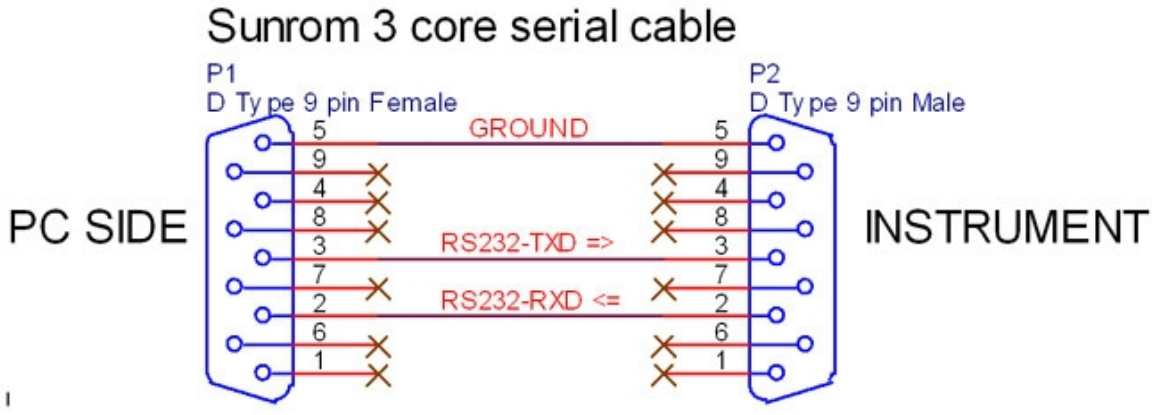
The unit needs around 200mA power to operate at 12V. You can use any readymade 12V 500mA DC Adapter or design a transformer plus rectifier based 12V DC power for the board. You can also use just the 12V transformer as the board has bridge and capacitor to convert to DC.

We recommend SMPS based 12V 1A DC Adapter for 24 hours operation as it is efficient and does not generate heat as compared to transformer based adapters. Product page is here
http://www.sunrom.com/power-supplies/dc-adapters/12v-1a-dc-smps-adapter

There is not polarity for the DC pin as the board has diode bridge onboard.

Serial Cable connections for RS232 interfacing (Provided with product)

To use with a PC serial port, use a serial cable of male-female type with pins 2,3,5 connected to 2,3,5 straight(no cross over cable).



Connecting to PC

Use the supplied serial cable to connect to PC's serial port. Use Hyperterminal software which comes with Windows XP or use any other Terminal software with following settings.

Data Rate: 9600 Data Bits: 8 Parity: None Stop Bit: 1 Flow Control: None

One of the Terminal software can be downloaded from http://www.sunrom.com/files/Terminal.exe

RFID Technology Overview

Radio Frequency Identification (RFID) is a generic term for non-contacting technologies that use radio waves to automatically identify people or objects. There are several methods of identification, but the most common is to store a unique serial number that identifies a person or object on a microchip that is attached to an antenna. The combined antenna and microchip are called an "RFID transponder" or "RFID tag" and work in combination with an "RFID reader" (sometimes called an "RFID interrogator").

An RFID system consists of a reader and one or more tags. The reader's antenna is used to transmit radio frequency (RF) energy. Depending on the tag type, the energy is "harvested" by the tag's antenna and used to power up the internal circuitry of the tag. The tag will then modulate the electromagnetic waves generated by the reader in order to transmit its data back to the reader. The reader receives the modulated waves and converts them into digital data.

There are two major types of tag technologies. "Passive tags" are tags that do not contain their own power source or transmitter. When radio waves from the reader reach the chip's antenna, the energy is converted by the antenna into electricity that can power up the microchip in the tag (known as "parasitic power"). The tag is then able to send back any information stored on the tag by reflecting the electromagnetic waves as described above. "Active tags" have their own power source and transmitter. The power source, usually a battery, is used to run the microchip's circuitry and to broadcast a signal to a reader. Due to the fact that passive tags do not have their own transmitter and must reflect their signal to the reader, the reading distance is much shorter than with active tags. However, active tags are typically larger, more expensive, and require occasional service. The Sunrom RFID Card Reader is designed specifically for passive tags.

Frequency refers to the size of the radio waves used to communicate between the RFID system components. Just as you tune your radio to different frequencies in order to hear different radio stations, RFID tags and readers must be tuned to the same frequency in order to communicate effectively.

There really is no such thing as a "typical" RFID tag. The read range of a tag ultimately depends on many factors: the frequency of RFID system operation, the power of the reader, environmental conditions, physical size of the tags antenna and interference from other RF devices. Balancing a number of engineering trade-offs (antenna size v. reading distance v. power v. manufacturing cost), the Sunrom RFID Card Reader's antenna was designed with a RFID operation at a tag read distance of around 4 inches.