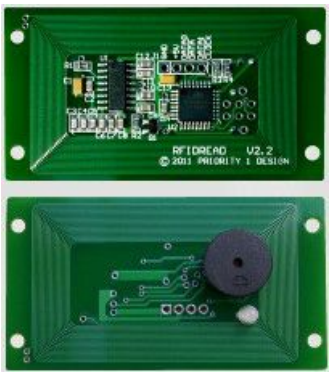
RFIDREAD-4100
RFID reader module

Designed for embedding into products manufactured by third-parties, the RFIDREAD-4100 Module is a 125Khz RFID Card reader in a printed circuit board form factor.

- **Reads EM4100 compatible transponders.**
  64bit Read Only (Manchester Encoded at 64cyc/bit)
- **Read Distance: 6cm for cards, and 4cm for keytags.**
- **Small Form factor, unit size: 66mm x 34mm**
- **On board duel color LED (Red/Green) for Pass indication.**
- **On board Buzzer for Pass indication.**
- **Integrated RFID Coil Antenna.**
- **Serial TTL Uart**



Description –
The RFIDREAD-4100 is designed to read the popular range of EM4100 compatible proximity cards and transponders available on the general market. EM4100 compatible transponders contain 64 bits of Read Only memory and are suitable for such applications as Access Control, Inventory Tracking, and other numerous applications where remote identification of items is required.

The RFID reader module is interfaced via 4 lines carrying supply and data outputs. In addition an on board duel color led, and buzzer give audio and visual PASS indications when a transponder comes within reading range. The RFIDREAD-4100 comes with a serial ASCII output and input at 9600 baud.

The LED and buzzer can be controlled by setting various options. This is done by sending serial commands to the serial input line.

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ABSOLUTE MAXIMUM RATINGS (1)

V+ to GND	-0.3V to 6.0V
Digital Inputs to GND	–0.3V to 5.3V
Operating Current	85mA (2)
Operating Temperature Range	0° C to 85°C
Storage Temperature Range	0° C to 85°C

NOTE: (1) Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. Exposure to absolute maximum conditions for extended periods may affect unit reliability.
NOTE: (2) May vary due to component variations.

Connector Pin Description

Interface is via 4 line connection. Table 1. describes the pin connections to the unit.

Pin.	Label.	Description.
1	GND	System ground. Connect to power supply's ground (GND) terminal.
2	+5V	System power, +5V DC input. **(2)**
3	DATA0/DATA	Uart Tx **(1)**
4	DATA1/CLOCK	Uart Rx **(1)**

Table 1. 4 line interface.

NOTE: (1) The uart input and output have voltage ranges at standard TTL level. Care must be taken to ensure that voltages outside the range of –0.3V to 5.3V are not applied to these lines. If a RS232 interface is required then the use of an appropriate level translation circuit should be used.
NOTE: (2) A clean and stable +5V supply is required in order to insure proper operation of the Reader module. Any additional noise introduced into the supply line will reduce the reading range of the module.

Principle of Operation:

The RFIDREAD-4100 reader generates a magnetic field through its integrated antenna at 125kHz. Passive RFID transponders also have an integrated antenna that are tuned to the same frequency. When they are within range of the reader unit they are able to draw sufficient power from the electromagnetic field to power their own internal electronics. Once powered they are able to modulate the incident magnetic field which is detected by the reader. In this way the Transponders are able to transmit their data to the reader.

There are many different types of transponders designed to operate at various frequencies, and their functions and the amount of information they carry can also vary. The RFIDREAD-4100 is able to read Transponders optimized for 125kHz and carrying 64 bits of read only data, manchester encoded at 64 cycles/bit.

In general operation the reader will continually scan for any transponders that come within range and transmit their data to the reader. As EM4100 compatible transponders do not have collision avoidance algorithms only one card can be scanned within the range of the reader at any one time.

When a transponder is read the reader will decode and transmit the received data via ASCII coded serial Output.

Serial Output Format description:

When a successful read of a transponder takes place the unit will transmit a string of information of 10 ASCII coded Hexidecimal characters followed by the ASCII code $0D (carriage return) as a string end marker.
For example, when reading a EM4100 compatible card with the Version Number of $06, and a card data of $001259E3 the following string is transmitted:

06001259E3<crn> where <crn> is serial ASCII code $0D

The card information is transmitted once and a new string will not be sent until the transponder moves outside of the scanning range, and it, or another transponder enters scanning range again.

NOTE: Although EM4100 compatible transponders contain 64bits of information not all the bits are defined for user data. Some data bits are allocated as parity check bits and for other functions. To see an overview of the EM4100 protocol see https://www.priority1design.com.au/em4100_protocol.html

Following this transmission the reader will also activate the LED and Buzzer for a short period to indicate a transponder has been decoded successfully. There are various selectable options to alter the behavior of the LED and buzzer as a PASS indicator. These options are described in Table 2. LED/Buzzer options.

LED Color While Scanning.	LED color Transponder Read.	Serial Command Code.
RED (default)	GREEN (default)	SL0
GREEN	RED	SL1
LED OFF	GREEN	SL2
LED OFF	RED	SL3
LED OFF	LED OFF	SL4
RED	RED	SL5
GREEN	GREEN	SL6

BUZZER FUNCTION.	Serial Command Code.
BEEP ON READ(default)	SB0
BUZZER DISABLED	SB1

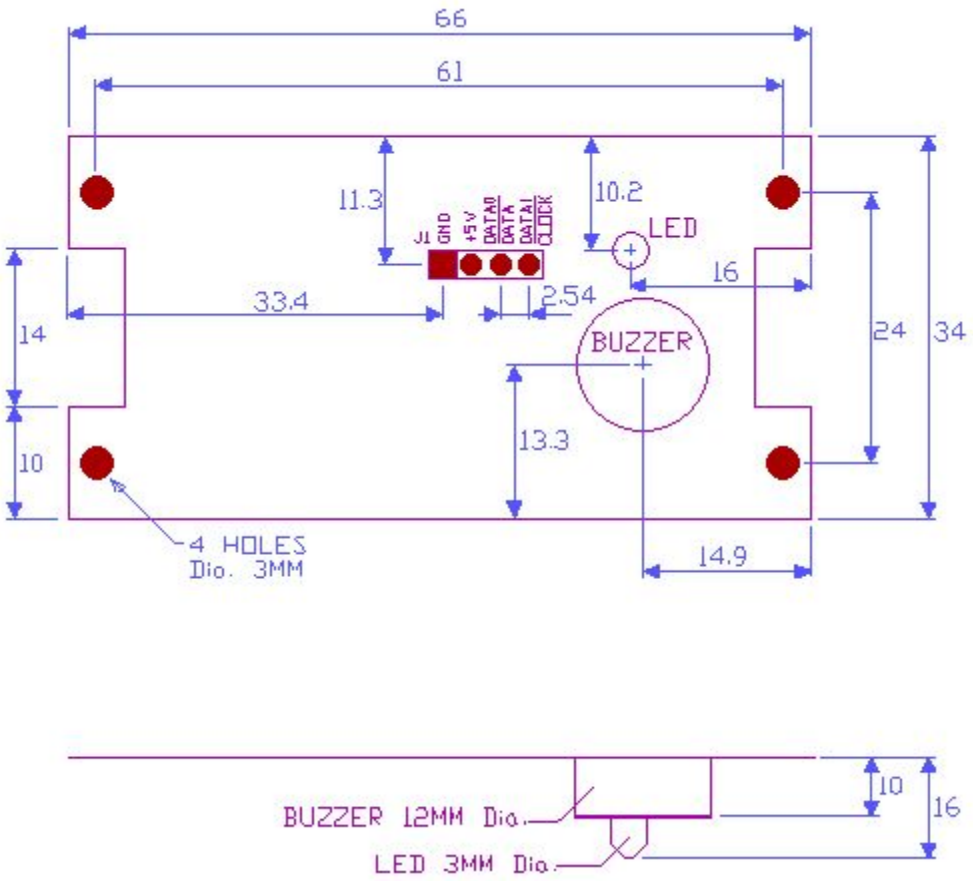
Table 2. LED/Buzzer options.

Serial command codes are sent to the reader via the Uart Rx line on the interface connector. The command structure is a simple 3 character ASCII string as described above. When a command is sent the required option is written to non-volatile memory within the unit and so will be retained even after the unit is turned off.

Serial protocol description:
The protocol for the Serial Input and Output lines is 9600 Baud, 8 data bits, 1 stop bit, no parity.
These lines are TTL level only. If a RS232 interface is required then an appropriate level translation circuit should be used.

Dimensions:

All Dimensions in mm.



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