

R-OEM-LF-M800
125 kHz OEM RFID Module Series
Hardware Manual

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1 Introduction

1.1 About the OEM RFID Module

The controller module allows the reading and writing of the main types of tags based on 125 kHz technology. It supports Hitag 1 and 2, EM4x02, EM 4x50.

Using an external antenna and a serial interface it can easily be connected to a host or a PC.

1.2 Available Interface Versions

Interface	Order code (old)	Order code (new)
TTL	R-OEM-LF-880-TTL	R-OEM-LF-M800-TTL
RS232	R-OEM-LF-880-232	R-OEM-LF-M800-232
RS485	R-OEM-LF-880-485	R-OEM-LF-M800-485

Important Notes

- The R-OEM-LF-M800-485 uses a different communication protocol and cannot be operated with the software described in this manual.
- The available operating voltages (5 Vdc or 12 Vdc) are not encoded in the order code. Please specify when ordering!

1.3 Reference Documents

- Communication Protocol LF-RFID_x.y_EN · Communication Protocol of TTL and RS232-Version
- Communication Protocol LF-RFID RS485_x.y_EN.docx · Communication Protocol of RS485 Version

1.4 Mechanics

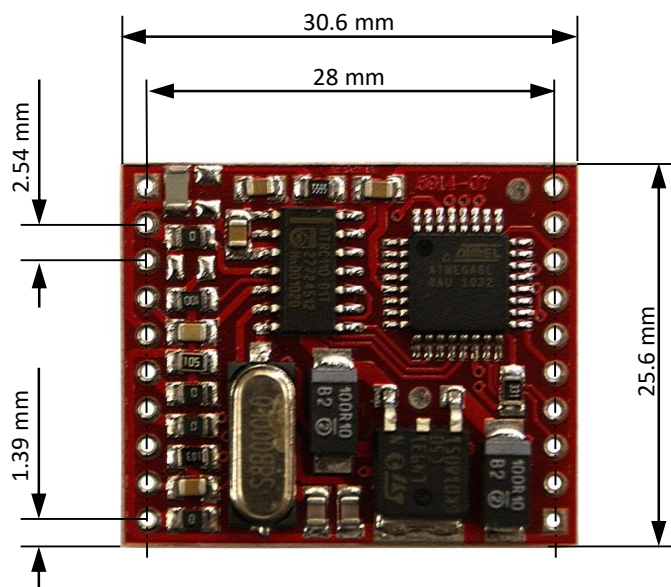


Figure 1 Dimensional Drawing of OEM Module, view onto upper side with RFID reader IC

1.5 Hardware Identification

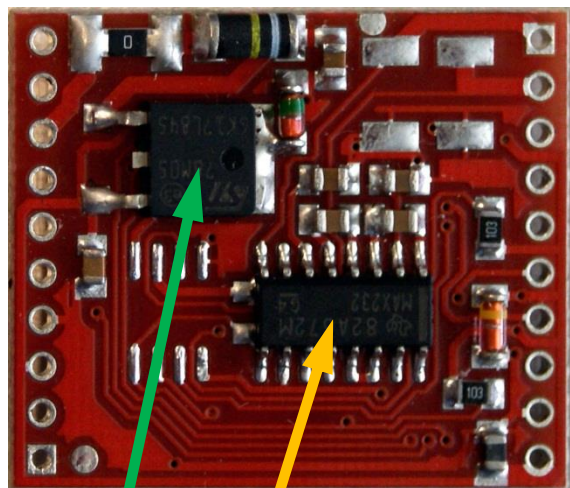
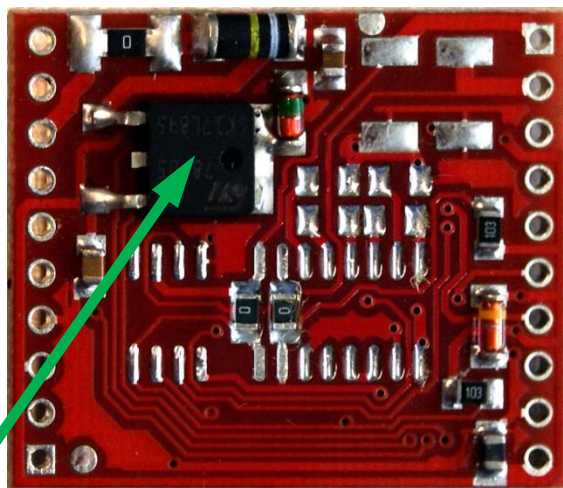


Figure 2 Version 12 Vdc, RS232



Version 12 Vdc, TTL

Voltage is determined by this IC (voltage regulator)

Interface (TTL or RS232) is determined by the interface IC (MAX232)

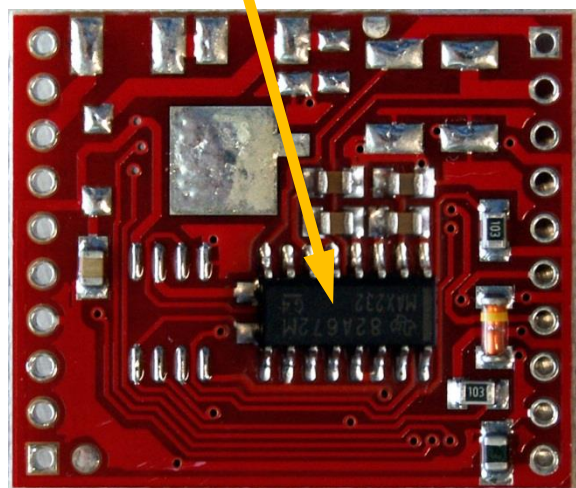
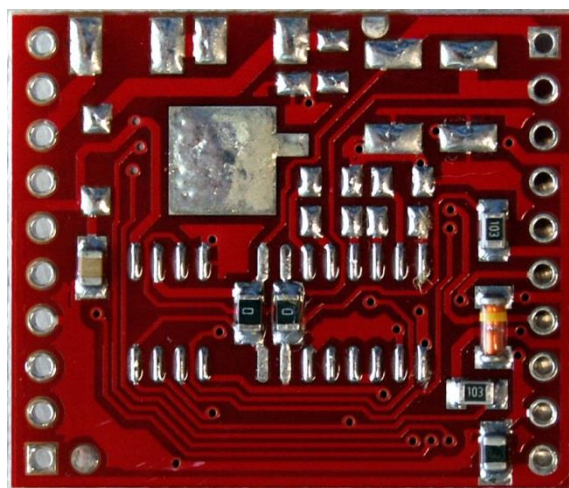


Figure 3 Version 5 Vdc, RS232



Version 5 Vdc, TTL

2 Electrical Installation

2.1 Connector Pinout

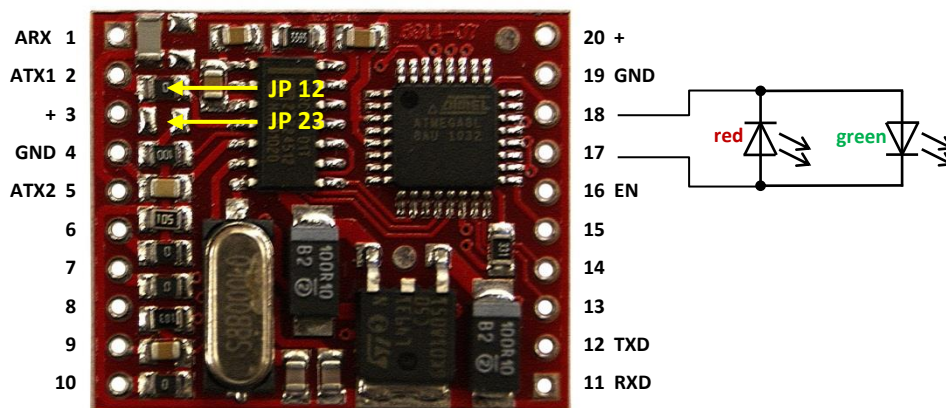


Figure 4 Position and Numbering of Connections

PIN	Name	Description
1	ARX	Antenna RX
2	ATX1	Antenna TX1
3	VDD	+5 Vdc (connect this only on the version for 5 Vdc)
4	GND	Ground
5	ATX2	Antenna TX2
6	GND	Ground
7	RSV	Reserved for future development, DO NOT CONNECT
8	RSV	+12 Vdc (connect this only on the version for 12 Vdc)
9	RSV	Reserved for future development, DO NOT CONNECT
10	RSV	Reserved for future development, DO NOT CONNECT

PIN	Name	Description
11	RXD	Receive Data from PC, data input (RS232 TX pin 3 of DB)
12	TXD	Transmit Data to PC, data output (RS232 RX pin 2 of DB)
13	RSV	Reserved for future development, DO NOT CONNECT
14	RSV	Reserved for future development, DO NOT CONNECT
15	RSV	Reserved for future development, DO NOT CONNECT
16	EN	Default Open or 5 V = Enable reader, 0 V = disable reader
17	LEDr	LED red
18	LEDg	LED green (reading received)
19	GND	Ground
20	VDD	+5 Vdc (connect this only on the version for 5 Vdc)

2.2 Antenna Set-Up

Joint	Name
J12	Dual antennas
J23	Single antenna

2.3 Electrical Characteristics

PINs	Name	Electrical	Description	Current (max)
1	ARX	Depends on calibration of the antenna	Antenna Input	200 mApp
2	ATX1		Antenna Output An inductance equal 470µH must be connected between these pins, 27 Ohm (Max).	
5	ATS2		Antenna driver 2 (does not need external connection)	
11	RX	USART*	Transmission of data receipt to TTL, RS232 or RS485 device driver	
12	TX	USART*	Transmission of data receipt to TTL, RS232 or RS485 device driver	
16	EN	Enable	<ul style="list-style-type: none"> Open or 5V = Enable controller (default) 0V disable controller 	
17	LEDr	GND**	Activation LEDs Cathode (–) Led green/ Anode Led red	25 mA
18	LEDg	LED**	Activation LEDs anode led green/ cathode led red Internally connected with 330 Ohms	25 mA
4, 19	GND	0 V	Supply 0 Vdc	
3, 20	VDD	+5 Vdc	Supply +5 Vdc (connect this only on the version for 5 Vdc)	150 mA
8	VDD	+ 12Vdc	Supply +12 Vdc (connect this only on the version for 12 Vdc)	150 mA
7, 8, 9, 10, 13, 14, 15	N.C.	—	Unused, DO NOT CONNECT	

* Universal Synchronous Asynchronous Receiver Transmitter

** The controller is disposed to activate two LEDs (red/green) in anti-parallel connection what permits to activate one at a time. Besides, the green led is activated automatically whenever a noted badge is identified.

3 Antenna Design

3.1 Coil Antenna

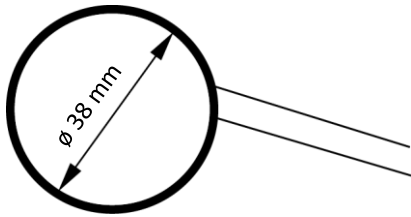


Figure 5 Example of Coil Antenna

Coil of \varnothing 38 mm, 70 turns of 0.22 22/0,355 copper wire, connect to PIN 1 and 2 of reader module

Electrical Data of the Coil Antenna

Inductivity: 390 μ H

Quality: $Q < 15$

Use serial resistor to reduce too high Q and performance. Typical value range is 5 – 100 Ohms.

Technical Data of OEM Module with Coil Antenna

Communication range: 80 mm (4x02 or 4x50 ISO Card)

Power consumption: 30 mA

3.2 PCB Antenna

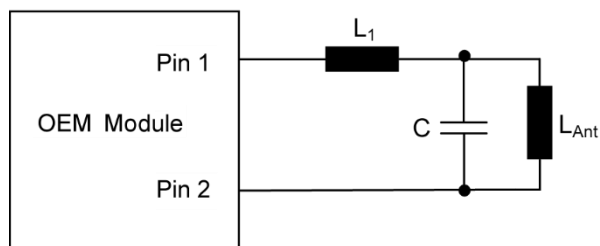


Figure 6 Wiring of PCB Antenna

L1: 470 μ H (core inductor)

LANT: PCB, 6-40 turns, 0.2 -1 mm track width, 2000 - 4000 mm² area

C: capacitor tuned to resonance with LANT (2.2 ... 330 nF)

Operating distance: 60-80 mm (4x50 or 4x02 ISO Card)

Power consumption: 150mA

Example 1

PCB Antenna 64 × 64 mm, 6 turns, 1 mm track width, C = 330 nF COG, L1 = 470 μ H, communication range 70 mm

Example 2

PCB Antenna 84 × 40 mm, 34 turns, 0.2 mm track width, C = 3.6 nF polypropylene 63 V, L1 = 470 μ H

Operating distance: 70 mm

3.3 Inductor Antenna

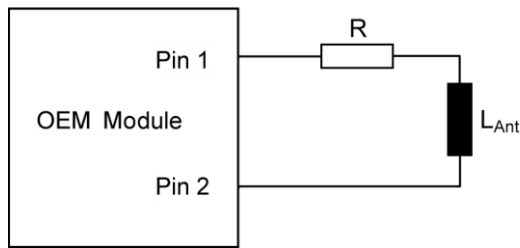


Figure 7 Wiring of Inductor Antenna

R: 5.6 Ohms
 LANT: 470 μ H (core inductor)
 Communication range: 45-50 mm (4x02 or 4x50 ISO Card)
 Power consumption: 140 mA

Example 1

LANT high frequency inductor 470 μ H, available at RS Components, part no. 308-9012

3.4 Mid-Range Coil Antenna

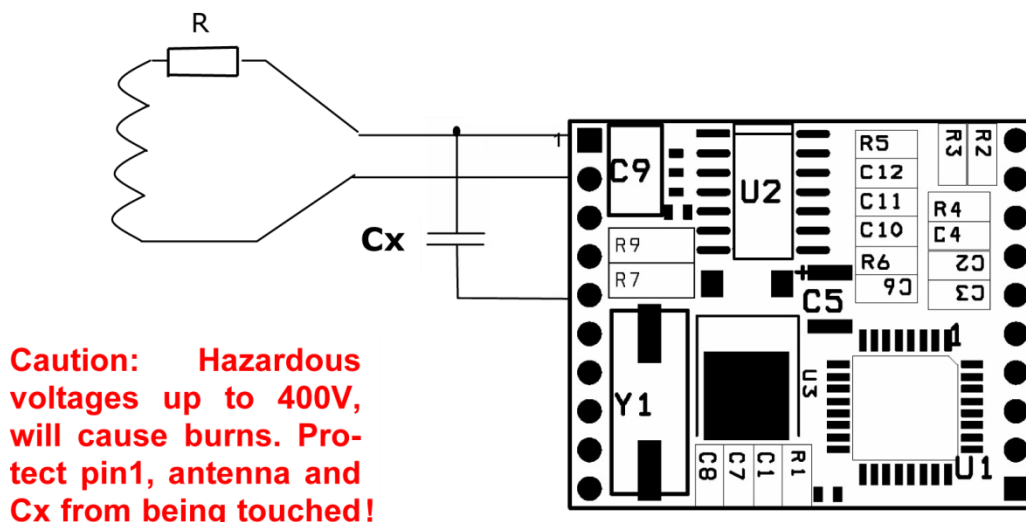


Figure 8 Wiring for Mid-Range Operation

Important Safety Notes

The driver output of the reader module is specified with 200 mApp continuously and 400 mApp pulsed. This results in voltages at Cx (3.3 nF) and antenna of 155 Vpp continuously or 310 Vpp pulsed. Make sure, that humans are protected from those voltages and that the module does not get overloaded. The voltage can be lowered using detuned antennas or by putting an resistor in series (R).

- Hazardous voltages up to 400V, will cause burns.
- Protect pin1, antenna and Cx from being touched!
- Cx = WIMA FKP1 3.3 nF, 630 VDC Polypropylene 5 %
- C09 must be removed

Wire antenna 180 × 180 mm, 28 turns, 0.355 mm copper wire, L = 465 μ H

Communication range: 200 mm (4x02 or 4x50 ISO Card)

Power consumption: 200 mA

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