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Kalem-RS485-5V-Basic

Non-isolated 3.3 V RS-485 transceiver module based on MAX3485

1. Overview

The Kalem-RS485-3.3V-Basic is a compact, non-isolated RS-485 transceiver module built around the MAX3485 half-duplex differential transceiver.

It provides a simple way to interface 3.3 V microcontrollers, PLCs, or other logic devices to RS-485 networks using a 2-wire A/B differential bus.

The module integrates bus termination, failsafe biasing, ESD/surge protection and decoupling capacitors.

2. Features

- Supply voltage: 3.3 V (recommended 3 V to 3.6 V)
- MAX3485-based, half-duplex, 2-wire RS-485 transceiver
- Non-isolated module
- On-board 120 Ω termination resistor, selectable by jumper
- On-board failsafe bias network (680 Ω pull-up on A, 680 Ω pull-down on B)
- SM712 TVS diode pair for A/B line surge and ESD protection
- Decoupling capacitors on VCC (100 nF + 10 µF)
- 2.54 mm pin header on MCU side, screw terminal on RS-485 bus side
- Compact PCB footprint suitable for breadboard, proto-board and panel mounting

3. Order Information

Order code: Kalem-RS485-3.3V-Basic

Description: 3.3 V non-isolated MAX3485 RS-485 transceiver module with onboard termination, failsafe biasing and TVS protection, designed for easy connection between microcontrollers and industrial RS-485 networks.

4. Pinout and Connections

4.1 MCU-side pin header (2.54 mm, top to bottom):

RO - Receiver output (from bus to MCU RX)

RE - Receiver enable (active LOW, internally bridged to DE)

DE - Driver enable (active HIGH, internally bridged to RE)

DI - Driver input (from MCU TX to bus)

Note:

On this module, DE and /RE are connected together by default through a solder bridge and routed to a single DIR control signal.

Set DIR = 0 for receive mode, DIR = 1 for transmit mode.

If you need separate control of DE and /RE, cut the solder bridge and wire them individually.

4.2 RS-485 bus screw terminal + headers:

3.3V - Module supply voltage (3.3 V)

B - RS-485 B (–) line

A - RS-485 A (+) line

GND - Ground

5. Direction Control (DIR)

The module uses a single DIR signal to control data direction by tying DE and /RE together:

DIR = 0 Receiver enabled, driver disabled RECEIVE mode

DIR = 1 Driver enabled, receiver disabled TRANSMIT mode

During normal operation, the microcontroller should:

• Set DIR = 1 only while transmitting data on DI.

• Wait until the UART transmission is complete, then set DIR = 0 to return to receive mode.

This prevents bus contention on half-duplex RS-485 networks.

6. RS-485 Network Guidelines

• Use twisted-pair cable for the A/B differential pair (e.g. shielded twisted pair).

• RS-485 lines should be terminated only at the two ends of the cable with 120 O resistors.

• The module has an on-board 120 Ω termination resistor that can be connected by a jumper. Use this termination only if the module is physically located at one end of the bus cable.

• The on-board 680 Ω bias resistors (pull-up on A, pull-down on B) provide failsafe biasing so that the bus floats to a defined idle state when no driver is active.

• Ensure that all nodes share a common reference (GND) to keep the bus common-mode voltage within the allowed range of the MAX3485.

• Keep A/B traces on the PCB short and routed as a differential pair where possible.

7. Mechanical Dimensions

• PCB size: 32.766 mm × 12.700 mm

• Pin header pitch: 2.54 mm

• Distance between MCU header and bus screw terminal row: 25.4 mm

8. Absolute Maximum Ratings (summary)

Values are limited by the MAX3485 transceiver and SM712 TVS diode characteristics:

• VCC: –0.3 V to +3.6 V

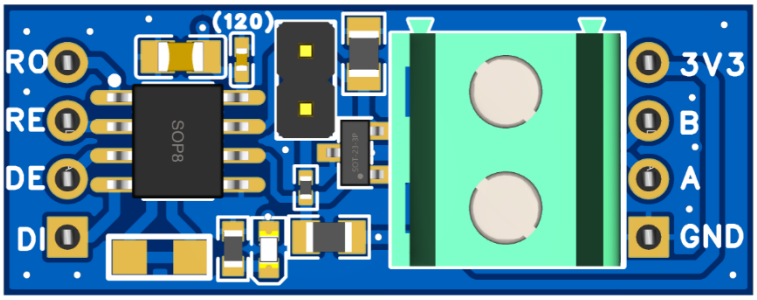
• Voltage on A or B: –7 V to +12 V (transient protection handled by SM712)

• Operating ambient temperature: –40 °C to +85 °C (industrial range)

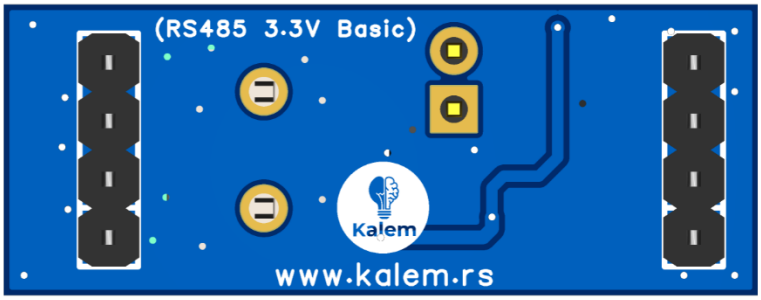
These are stress ratings only. Prolonged operation at absolute maximum ratings is not recommended.

9. Board Views and Mechanical Drawing

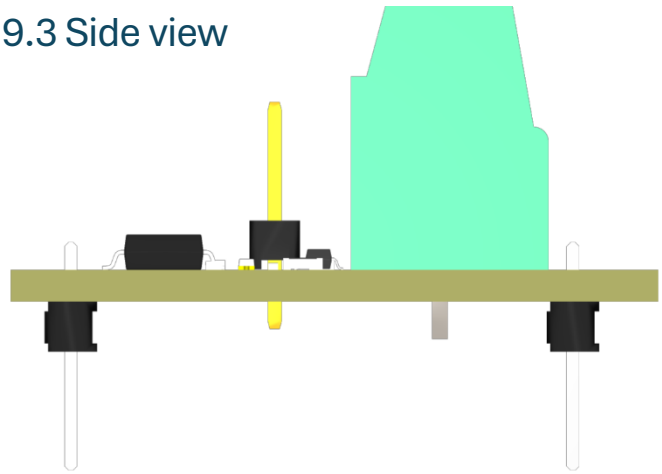
9.1 Top view



9.2 Bottom view



9.3 Side view



9.4 Technical drawing