I2C-RL812MV2, I2C-RL812MAV2
I2C-RL824MV2, I2C-RL824MAV2
I2C Bus 8-Relay Boards Manual

1 Features

- 8 relays on a board
- PCF8574 (for I2C-RL8xxM) and PCF8574A (for I2C-RL8xxMA) I2C bus controllers
- 100kHz I2C bus frequency
- Address by 3 jumpers for use of up to 8 different addresses
- Up to 16 boards on a single bus
- Board power supply voltage 2.5–5.5Vdc
- Relay coil voltage 12Vdc and 24Vdc
- Relay contact rating 10A 120Vac/24Vdc or 6A 250Vac
- Compatible with most microcontrollers
- On board Inverse Polarity Protection circuits
- PCB size fits on DIN-Rail mount supports
- PCB size 72x87.5mm

2 Descriptions

These are I2C bus relay boards. The boards for remote 8-relay expanders for I2C buses based on PCF8574 and PCF8574A I2C bus controllers. Making it ideal as relay outputs expander for I2C bus.

The PCF8574 and PCF8574A are the I2C bus controllers which talk to microcontrollers and then take commands to the relays. The PCF8574 and PCF8574A support 100kHz bus frequency. And they can be connected to 2.5Vdc – 5.5Vdc external logic. This means that they can be connected to many microcontrollers that have 2.5Vdc – 5.5Vdc logic voltage of I2C port.

The boards are addressed by 3 jumpers to make 8 different addresses. So that 8 boards can be connected on a single bus. Moreover 16 boards can be connected on a single bus when they have 16 different addresses. By this way, 8 boards of the PCF8574 and 8 boards of the PCF8574A can be connected on a single bus. Because the PCF8574 doesn't have the same address as PCF8574A.

All power supply voltages have inverse polarity protection circuits to prevent damage from a mistake of connection. To reduce power consumption of the boards, Version2 of boards doesn’t have LEDs to show the status of those input voltages.

Boards have a PCB size fits on 72x87.5mm DIN-Rail PCB mount supports. So that the boards can be installed on DIN-Rail easily. Din-Rail is the most use of enclosures for industrial.

The relays require input voltages 12Vdc and 24Vdc depending on board models. The relay contact rating is 10A at 120Vac/24Vdc or 6A at 250Vac.

3 Board diagram

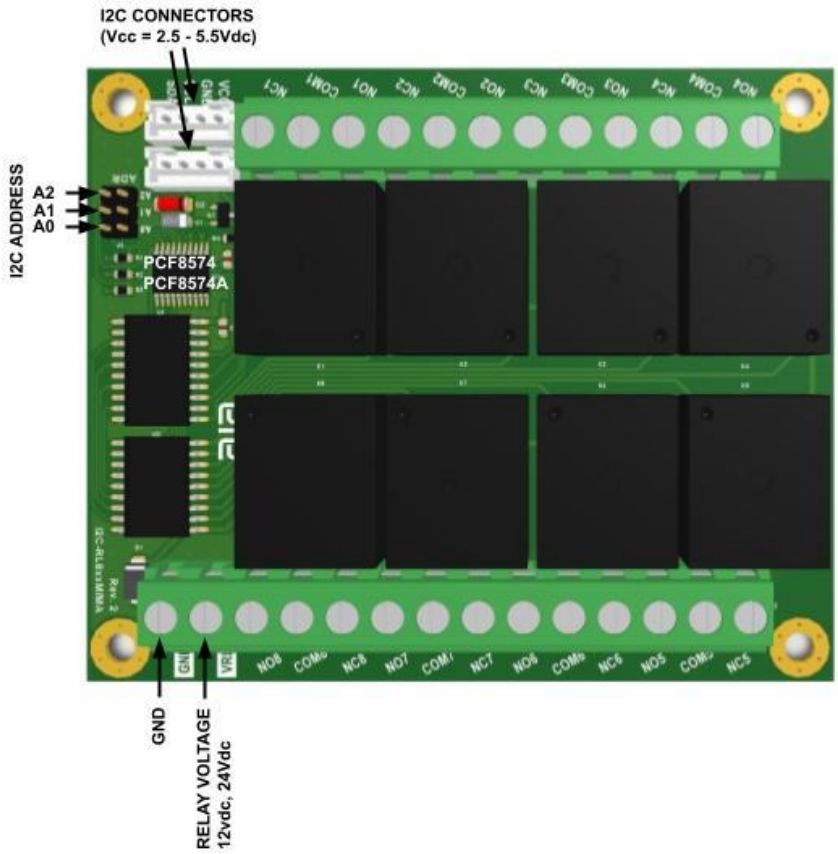


Figure 1: Board diagram

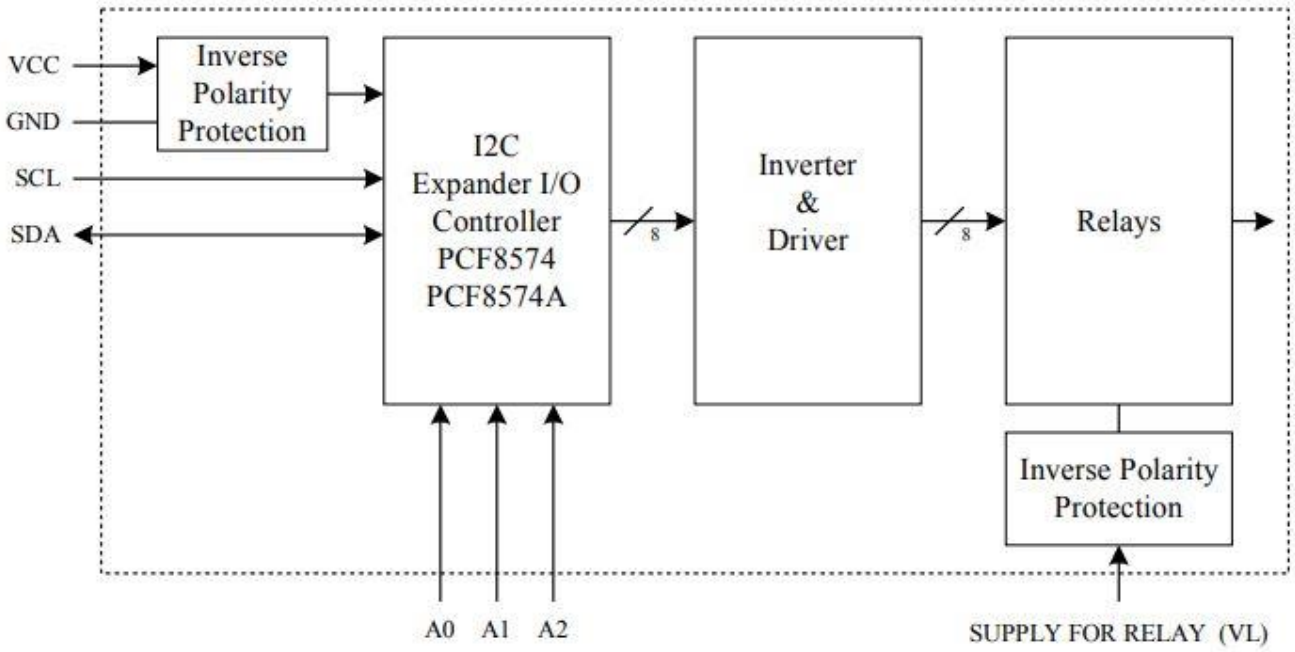


Figure 2: Block diagram

4 Board Connectors

There are 2 connectors for I2C bus signals and board input voltage. The two connectors have the same pins. They are 4-pin 2.00mm connectors. The pins are VCC, GND, SCL and SDA.

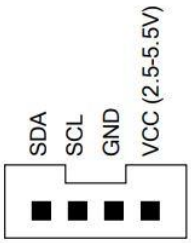


Figure 3: Connector

4.1 Board Input Voltage

The VCC and GND need input voltage 2.5Vdc-5.5Vdc Also, the board has an inverse polarity protection circuit to prevent damage from a mistake of connection.

4.2 Bus Signals

There are 2 signals for I2C bus, SCL and SDA. They must be connected to SCL and SDA of microcontroller respectively.

4.3 Pull-Up Resistors

When the I2C bus is working at 100khz bus frequency. It needs 10K pull-up resistors for SCL and SDA lines. Then two 10K resistors must be connected to SCL and SDA pins to VCC.

5 Interfacing

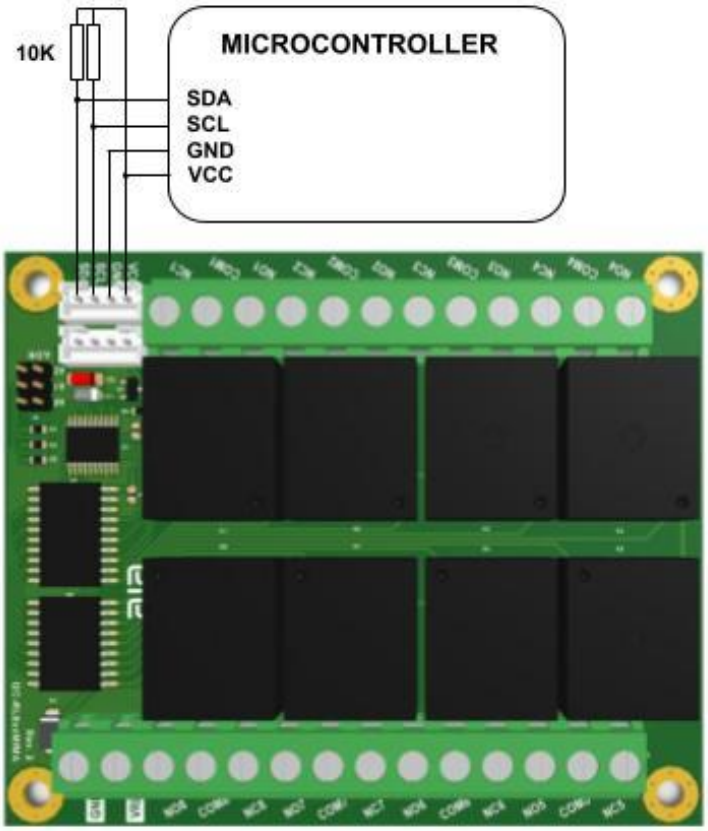


Figure 4: Interfacing

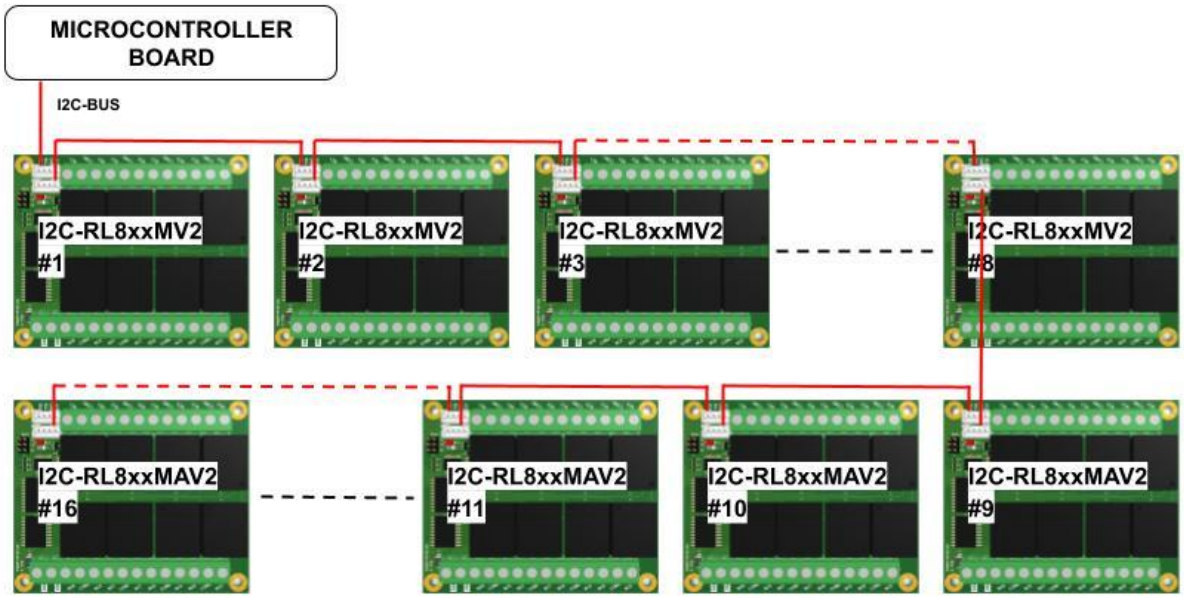


Figure 5: Multiple boards on a single bus

6 Addressing

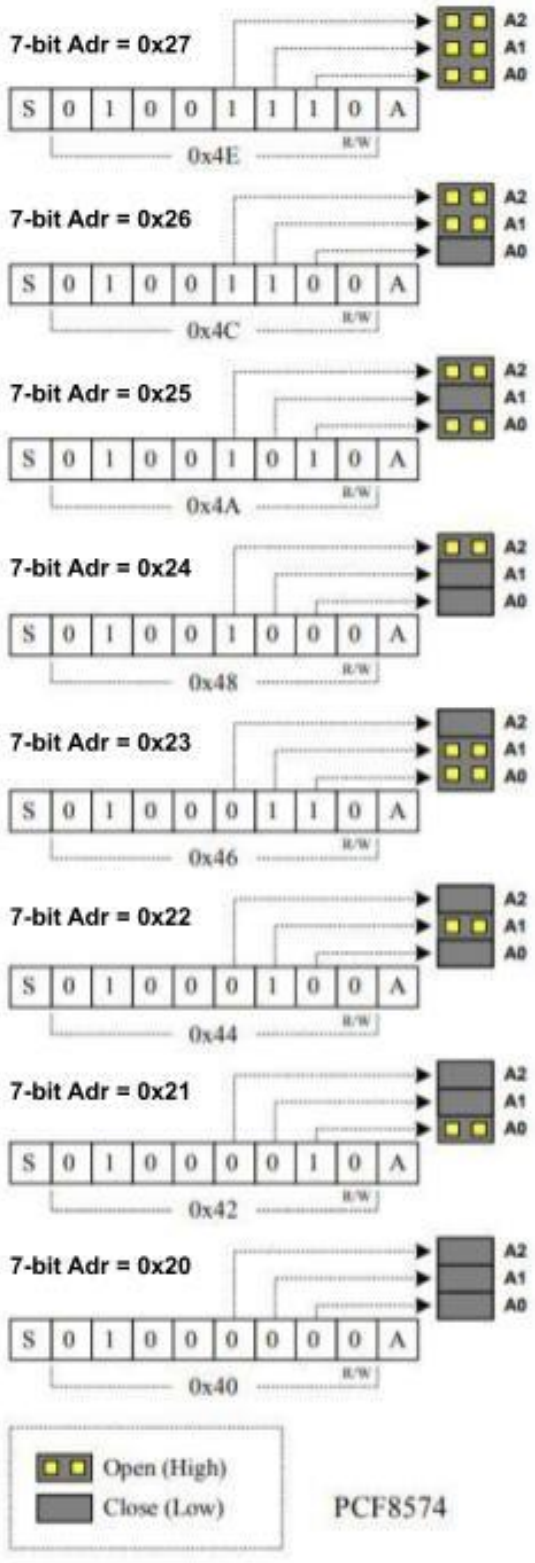
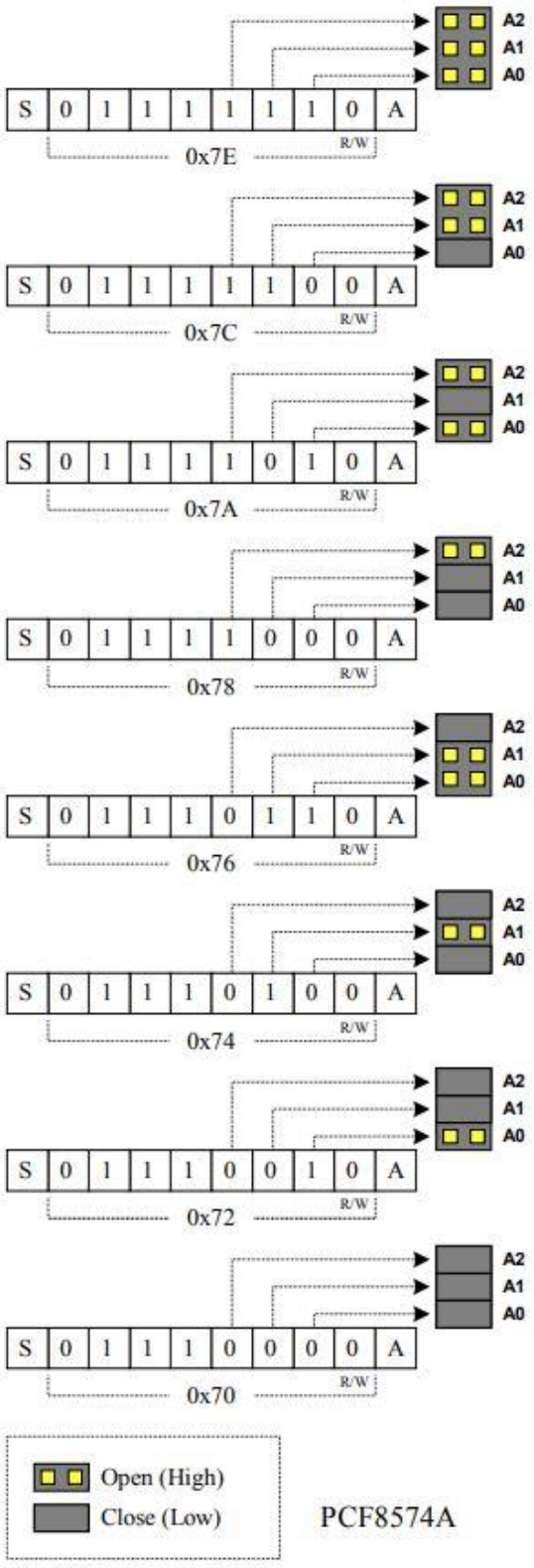
I2C-RL812MV2 and I2C-RL824MV2	I2C-RL812MAV2 and I2C-RL824MAV2
	

Table 1: Addressing

There are 3 jumpers to make 8 different addresses. So that 8 boards can be connected on a single bus. Moreover 16 boards can be connected on a single bus when they have 16 different addresses. This means that 8 boards of PCF8574 and 8 boards of PCF8574A can be connected on a single bus. Because the PCF8574 doesn't have the same address as the PCF8574A. Raspberry Pi, Arduino and Linux libraries use 7-bit address.

Be careful about long cables and too many boards on a single bus make high capacitance. The high capacitance bus cause communication error at high speed.

7 Relay Input Voltage

Relays need input voltage 12Vdc and 24Vdc depending on board models. Also, there is an inverse polarity protection circuit to prevent damage from the mistake of connection.

8 Specifications

Parameters	Value		Unit
Maximum I2C bus frequency	100		kHz
Logic power supply voltage	2.5 – 5.5		Vdc
Relay power supply voltage	12/24		Vdc
Output channels	8		Relays
Maximum boards on a single bus	8 (16*)		Boards
Relay contact rating	120Vac/24Vdc	10	A
	250Vac	6	

Table 2: Electrical rating

*16-board on a single bus is the connection with I2C-RL8xxM and I2C-RL8xxMA

	I2C-RL812MV2	I2C-RL812MAV2	I2C-RL824MV2	I2C-RL824MAV2
Max bus frequency	100KHz	100KHz	100KHz	100KHz
Logic voltage	2.5 - 5.5Vdc	2.5 - 5.5Vdc	2.5 - 5.5Vdc	2.5 - 5.5Vdc
Relay coil voltage	12Vdc	12Vdc	24Vdc	24Vdc
I2C controller chip	PCF8574	PCF8574A	PCF8574	PCF8574A

Table 3: Board comparison

9 Board dimensions

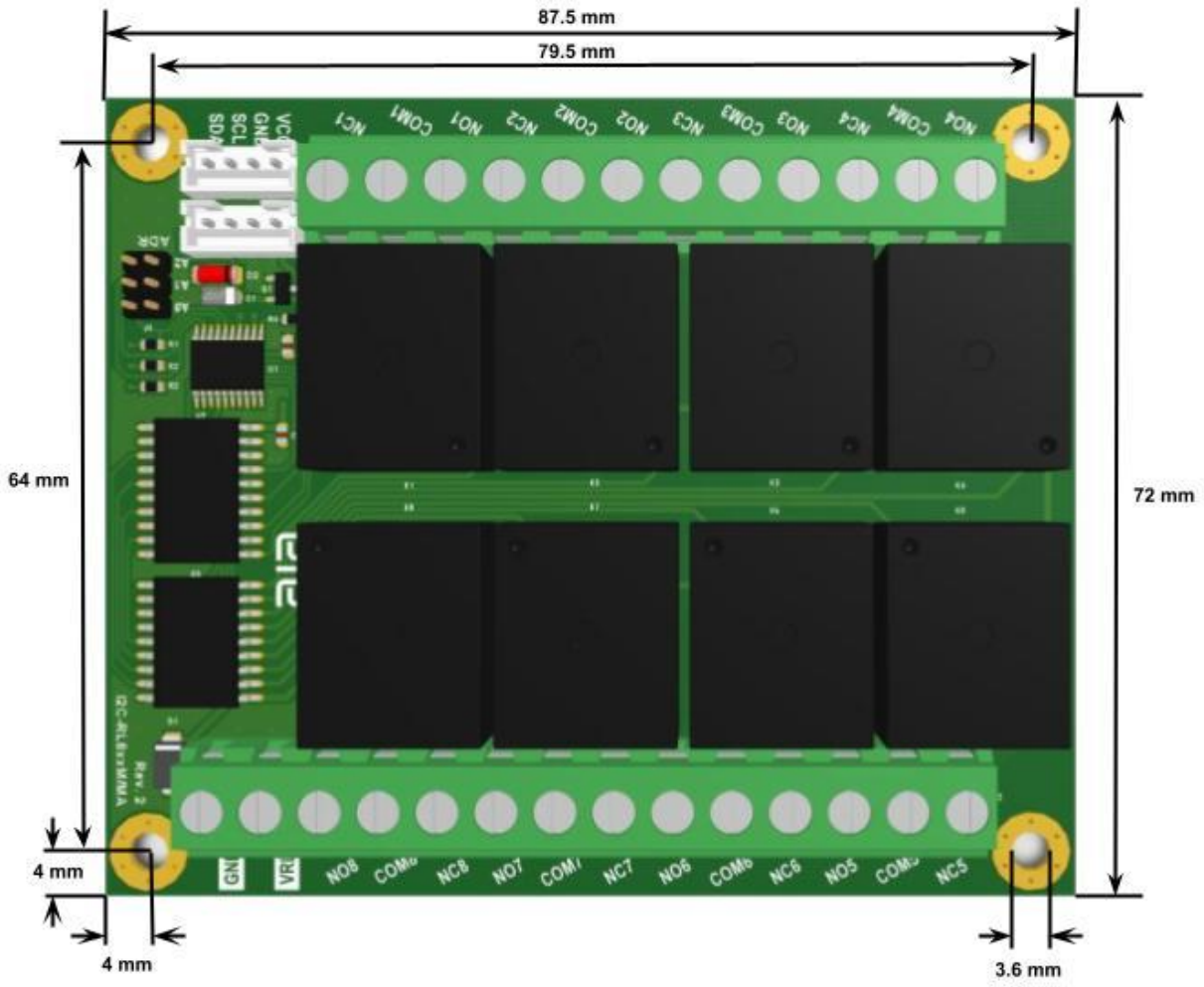


Figure 6: Board dimensions

10 Improvement of version2

	Version1	Version2
Reduce power consumption by removing LEDs	2 LEDs	No LEDs
Increase power rating of connectors	UL 300/8A	UL 300/20A
I2C bus power surge protection diode	No	Yes
Reduce tantalum capacitor size	3528	3216
Update PCB for increasing performance of production	-	Yes

Table 4: Version2 improvement