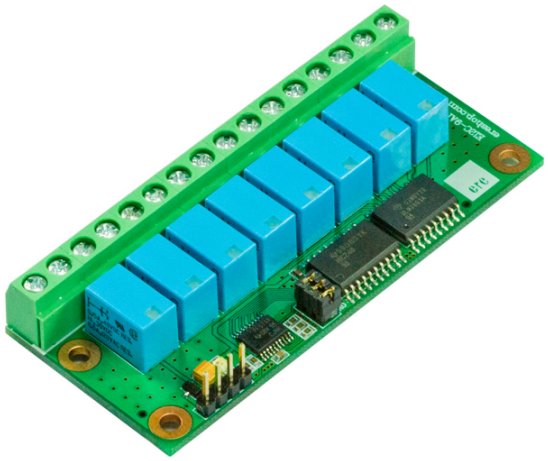
EI2C-9AI, EI2C-9AIA

I2C Bus Small 5V 8-Relay Boards



Features

- 8 Relays
- PCF8574, PCF8574A I2C bus I/O expander
- 100kHz I2C bus frequency
- Address by 3 jumpers for use of up to 8 addresses
- Up to 16 boards on one bus
- Operating voltage 4.5V-5.5V
- Inverse polarity protection circuit
- Compatible with almost microcontrollers
- No need another input voltage for relay coils
- Relay contact rating 0.5A/120Vac, 1A/30Vdc, 0.15A/48Vdc
- Small board, PCB size 81.45x34.79mm

Description

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

The PCF8574 and PCF8574A are the I2C bus controllers which talk to microcontroller and then take commands to the relays. The PCF8574 and the PCF8574A support 100kHz bus frequency.

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

The boards have inverse polarity protection circuit to prevent damage from a mistake of connection. And There is an LED to show status of the input voltage.

The relays also draw power from I2C bus input power supply. So that, the relays don't want another input voltage for them. They have contact rating 0.5A/120Vac, 0.15A/48Vdc and 1A/30Vdc.

Because the I2C bus controllers and relays use the same one input voltage VCC. Even though the I2C bus controllers can operate at voltage between 2.5V and 5.5V and the relays can operate at voltage between 3.5V and 5.5V. But the boards need to operate at voltage between 4.5V and 5.5V. Because relay drivers drop a part of voltage. However the boards work well at standard 5V.

Board is designed for small size, the PCB size is 81.45x34.79mm.

Board Diagram

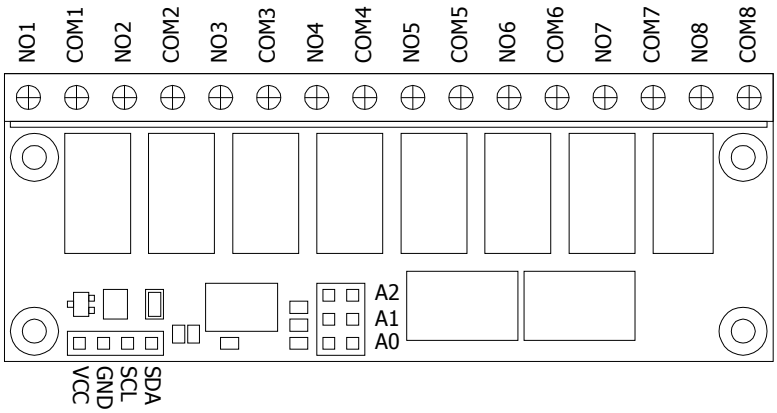


Figure 1: Board Diagram

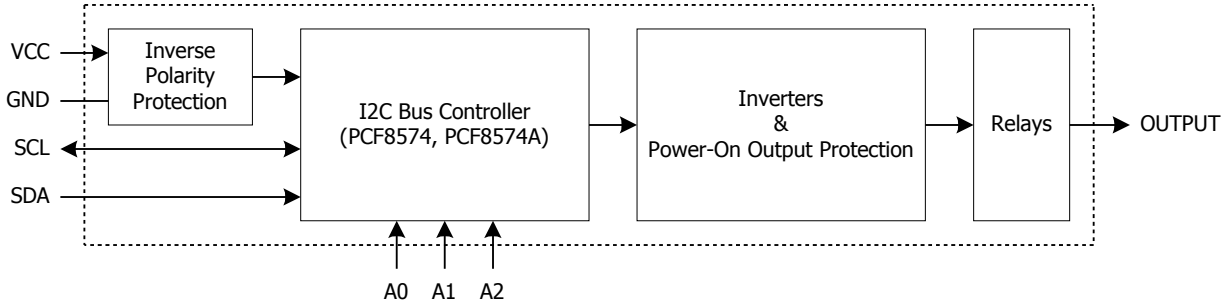


Figure 2: Block Diagram

VCC and I2C Bus Connectors

4-Pin 0.1"(2.54mm) connector consists of VCC, GND, SCL and SDA pins. The VCC pin is power supply input voltage pin which must be connected to external power supply. The board has an inverse polarity protection circuit to prevent damage from inverse polarity of VCC and GND. The SCL and the SDA are I2C bus signals which must be connected to the SCL and the SDA pins of microcontroller.

Interface To Microcontroller

VCC and GND must be supplied from external and also the board has an LED to show status of power supply input voltage. The SCL and the SDA pins must be connected to the SCL and the SDA pins of microcontroller respectively. Remember 10K resistors must be connected to pull-up the SCL and the SDA lines of I2C bus, if there is no the pull-up resistor on the microcontroller board.

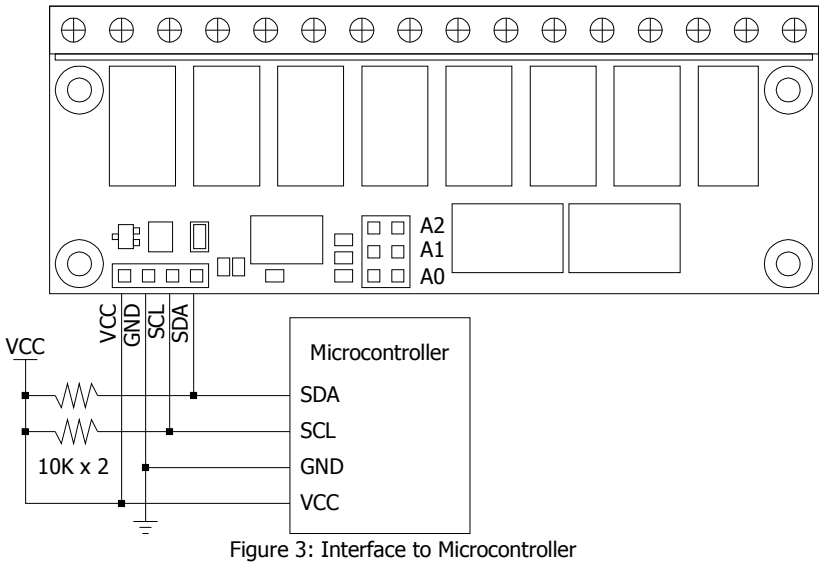


Figure 3: Interface to Microcontroller

I2C Address

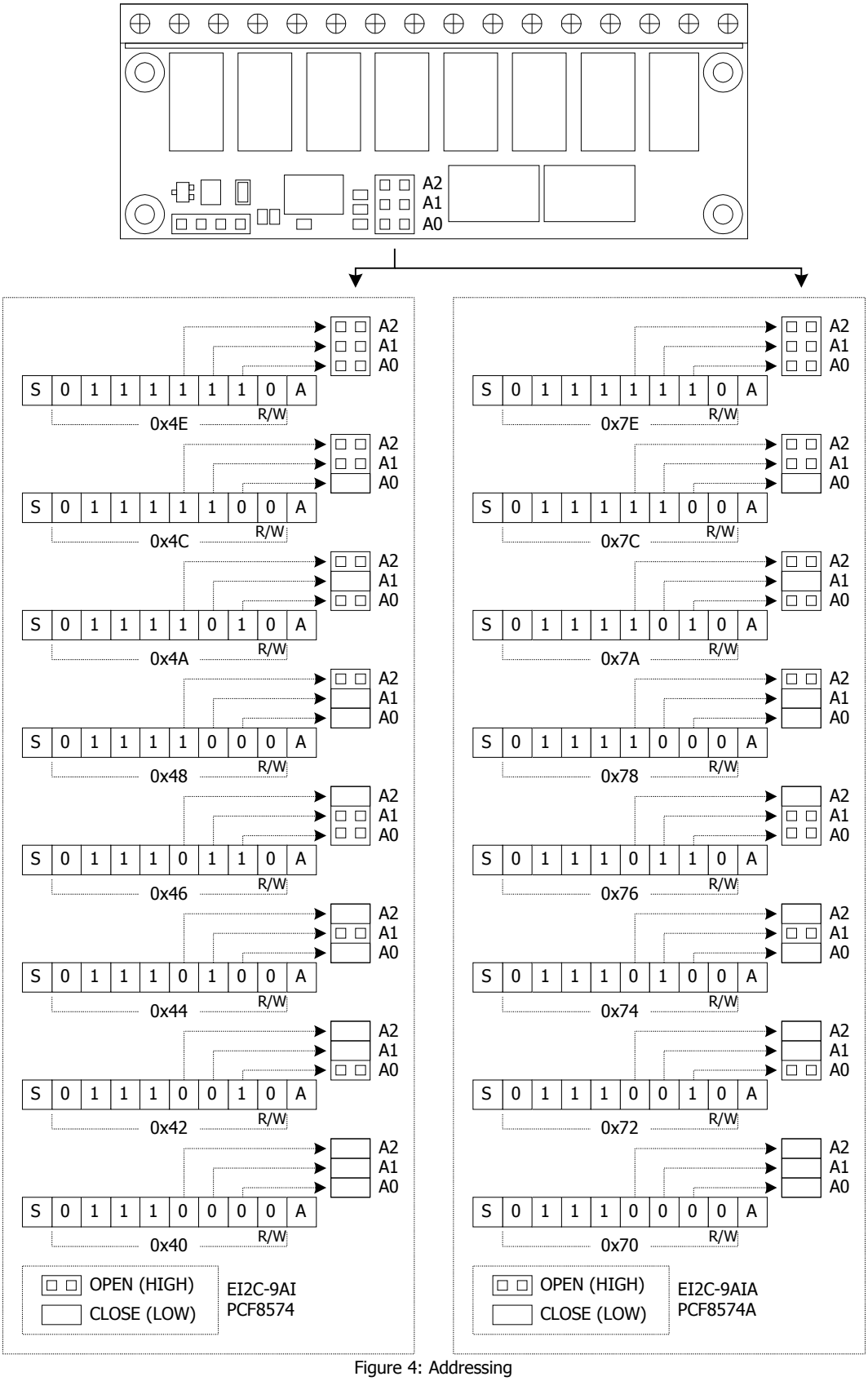


Figure 4: Addressing

The boards use PCF8574 and PCF8574A as remote output expander for I2C bus. The PCF8574 and the PCF8574A have address as above figure. Bit D3, D2 and D1 of data frame are changed by jumpers of A2, A1 and A0 respectively. There are jumpers to make 8 different addresses. So that 8 boards can be connected together on one bus. Moreover 16 boards can be connected on one bus when they have 16 different addresses. This means that 8 boards of the PCF8574 and 8 boards of the PCF8574A can be connected together on one bus. Because the PCF8574 doesn't have same address as the PCF8574A.

Data Frame of Relays

When sending data from microcontroller to relay board via I2C bus. The first byte is address byte and the second byte is data byte for relays. The bit0 of the second byte controls relay1. Bit value '1' means relay 'off' and bit value '0' means relay 'on' because there are inverters between I2C bus controllers and relays.

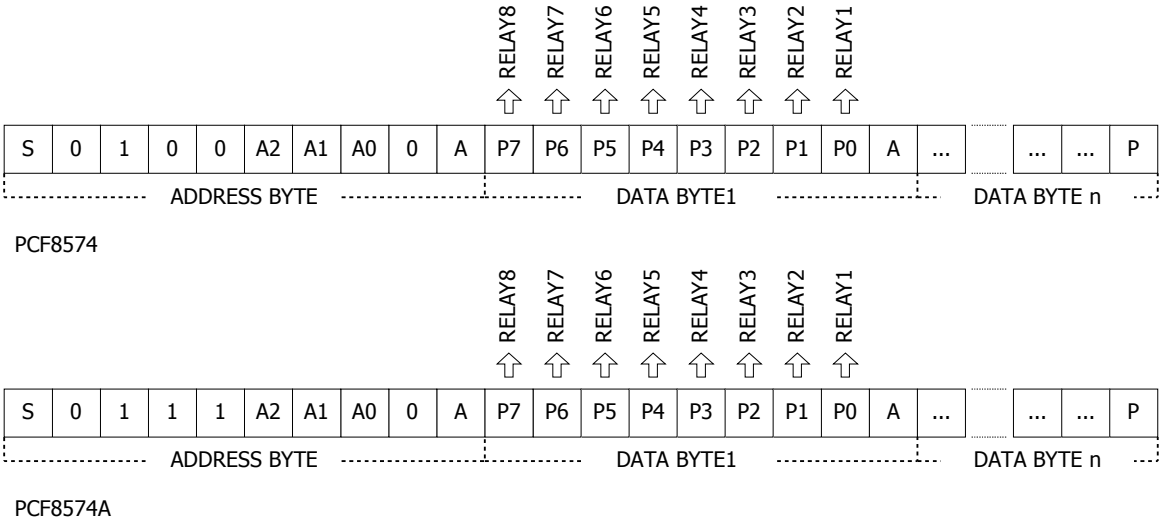


Figure 5: Data Frames

Relay Terminals

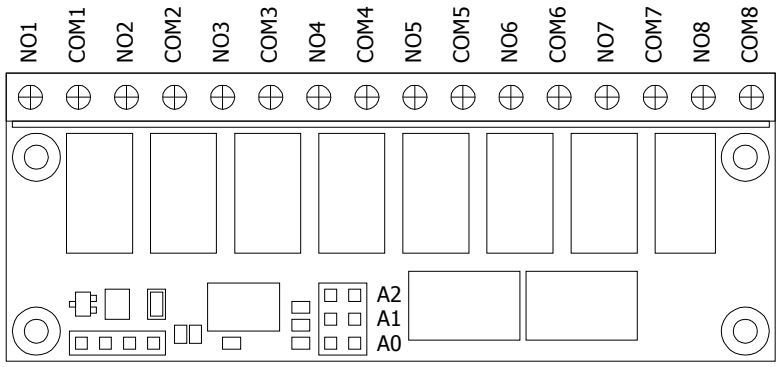


Figure 6: Relay Terminals

Specifications

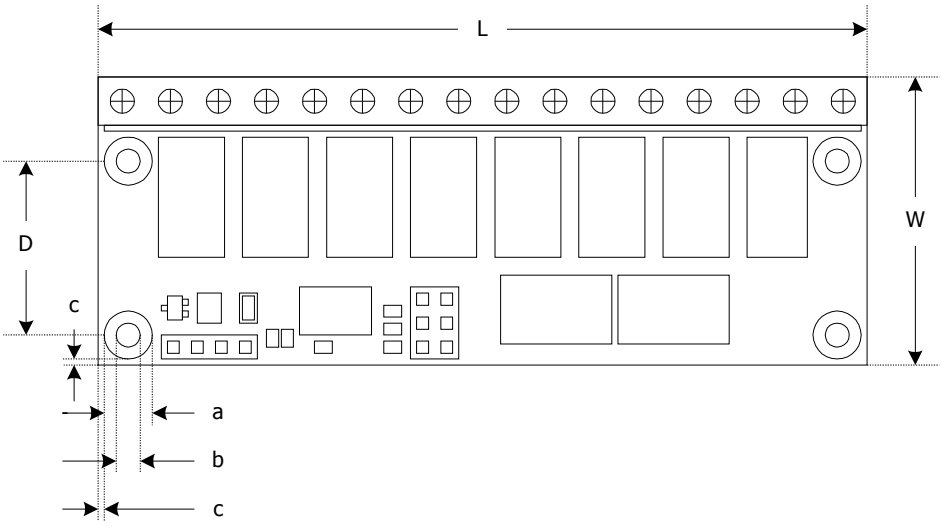
Table 1: Absolute maximum ratings

Parameters	Value		Unit
Max. I2C bus frequency	100		kHz
Power supply voltage	4.5V–5.5V		V
Output channels	8		
Maximum board on one bus	8(16)		
Relay contact rating	120Vac	0.5	A
	30Vdc	1	
	48Vdc	0.15	

Table 2: Board Comparisons

	EI2C-9AI	EI2C-9AIA
Max. bus frequency	100kHz	100kHz
Operating Voltage	4.5V-5.5V	4.5-5.5V
Chip	PCF8574	PCF8574A

Board Dimensions



unit	inch	mm
L	3.207	81.45
W	1.370	34.79
D	0.745	18.92
a	0.250	6.35
b	0.125	3.18
c	0.025	0.63

Figure 7: Board Dimensions