

I2C-OC805M, I2C-OC805MA**DIN-Rail I2C-Bus 8-Output Open Collectors****1 Features**

- PCF8574 and PCF8574A I2C-bus I/O expander boards
- 8-output open collectors
- Operating voltage 2.5Vdc to 5.5Vdc
- On board inverse polarity protection circuits
- 100kHz I2C bus frequency
- Address by 3 jumpers for use of up to 8 addresses
- Up to 16 boards on a single bus (connected PCF8574 and PCF8574A)
- Compatible with most microcontrollers
- Maximum load voltage 50Vdc
- 500mA rated collector current (single output or share of all outputs)
- DIN-Rail supports
- PCB size 42.5x72mm

2 Description

This is an I2C bus output board for a remote 8-output expander via I2C bus based on PCF8574 and PCF8574A. Making it ideal as an open collector expander for I2C-bus. The board can stack on a DIN-Rail PCB Holder.

The PCF8574 and the PCF8574A are the I2C bus controllers which receive commands from a microcontroller and then set and clear output ports. They support 100kHz bus frequency. And they can be connected to the I2C port of most microcontrollers.

The boards use ULN2803 for an output driver. Each board has 8 open collectors. Each output supports 500mA when using single output. And the maximum voltage for loads is 50Vdc.

The board is addressed by 3 jumpers to make 8 different addresses. So that 8 boards can be connected on a single I2C bus. Moreover 16 boards can be connected on a single bus when each board has a different address. By this way, 8 boards of the PCF8574 and 8 boards of the PCF8574A can be connected on a single bus. Because the PCF8574 and the PCF8574A have different addresses.

The boards have inverse polarity protection circuit for power supply input voltage to prevent damage from a mistake of connection.

The difference between the I2C-OC805M and the I2C-OC805MA is that the I2C-OC805M uses PCF8574, but the I2C-OC805MA uses PCF8574A.

Power dissipation of an ULN2803A chip is an importance for each application. So, it must be calculated for each application. Load current must not make a temperature of the chip rise over the limit of the power dissipation.

3 Diagram

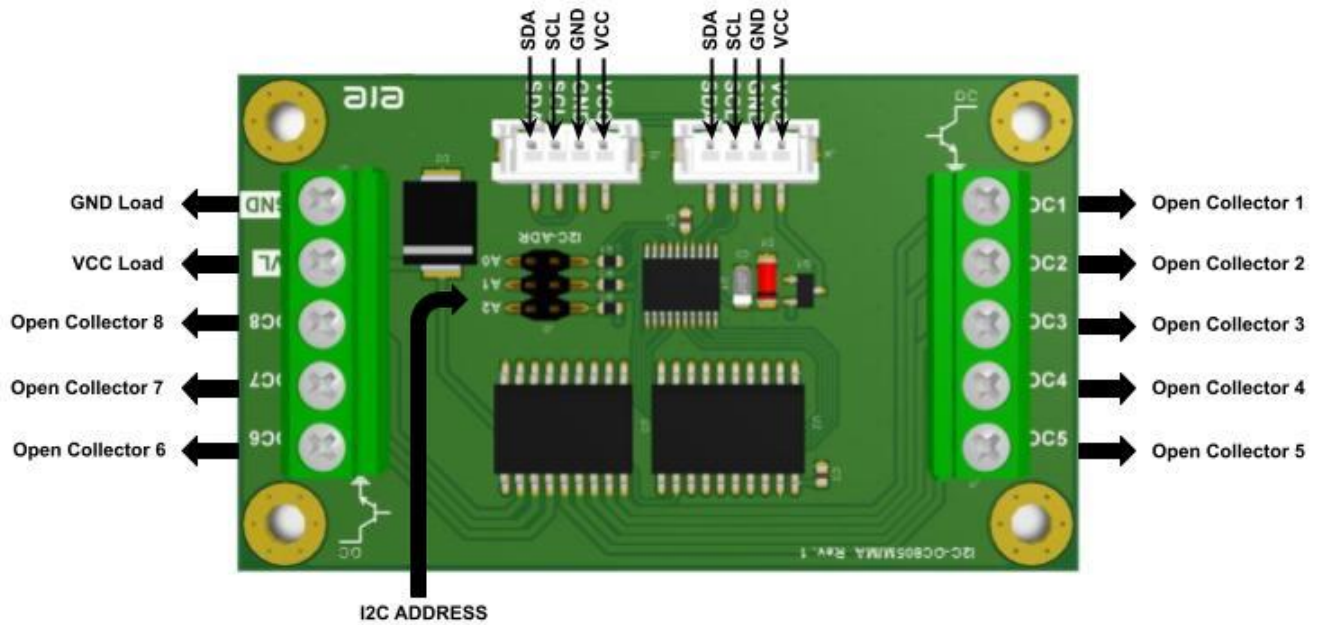


Figure 1: Board Diagram

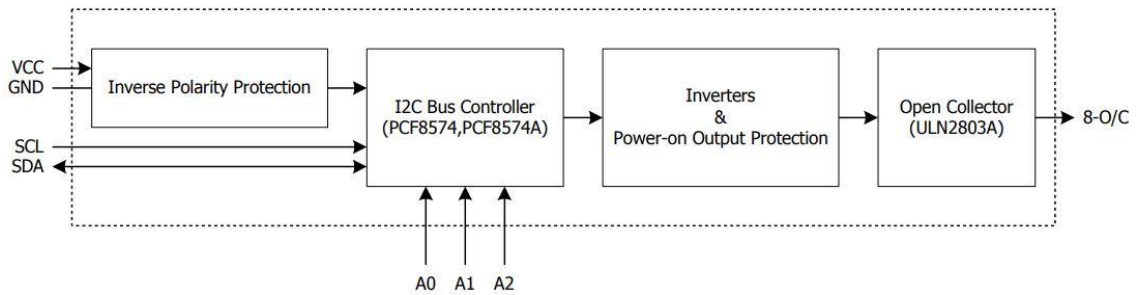


Figure 2: Block Diagram

Table 1: Pin Descriptions

Symbol	Description
VCC	Power supply input voltage 2.5Vdc to 5.5Vdc
GND	Ground
SCL	I2C bus serial clock signal
SDA	I2C bus serial data signal
A0	A jumper for selecting the address of A0
A1	A jumper for selecting the address of A1
A2	A jumper for selecting the address of A2
O/C1... O/C8	Open Collector 1 to Open Collector 8
VCC Load	Power supply input voltage for load (max. 50Vdc)
GND Load	Ground for Load.

4 Interfacing

The VCC, GND, SCL and SDA of the board must be connected to VCC, GND, SCL and SDA pins of a microcontroller respectively.

I2C-OC805M and I2C-OC805MA can be connected on a single bus up to 16 boards.

The I2C bus needs pull-up resistors for SCL and SDA lines. 10Kohm resistors are suitable for pull-up registers for 100KHz bus speed. These resistors must be connected externally.

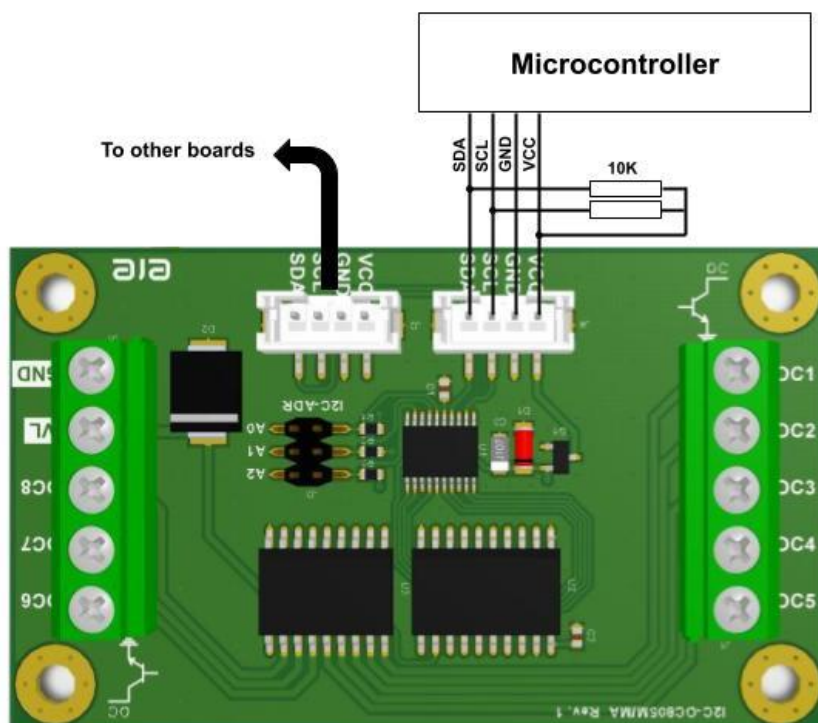


Figure 3: Microcontroller Interfacing

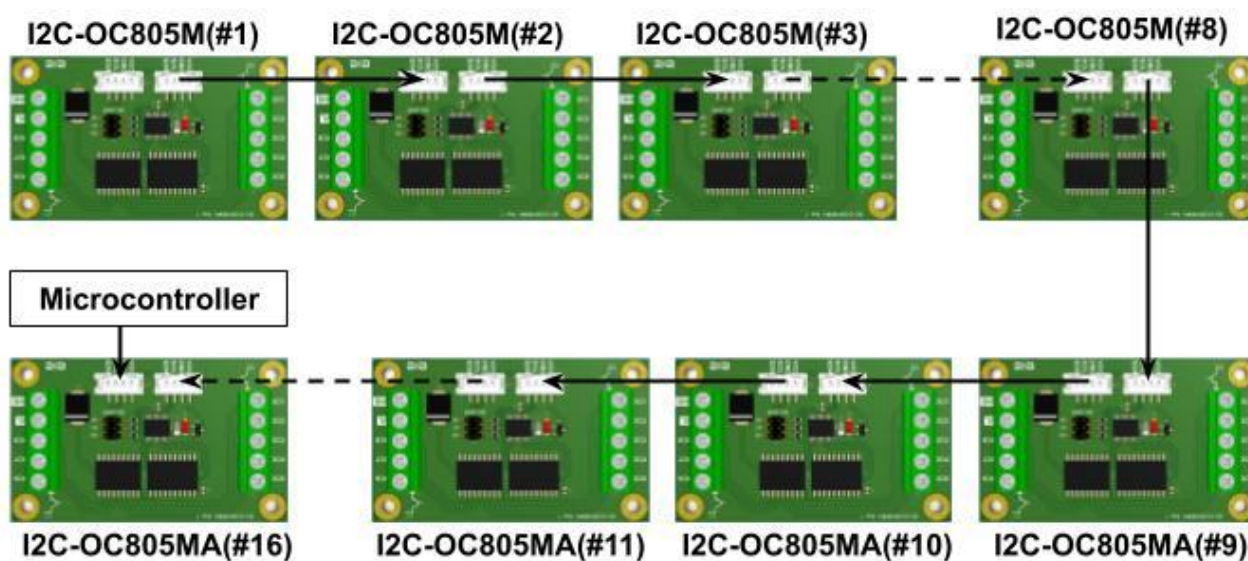


Table 14: Multiple Boards on a Single Bus

5 Addressing

I2C-OC805M (PCF8574)	I2C-OC805MA (PCF8574A)
<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x27.....8-bit (R/W) : 0x4E.....</p> <p>Open Short Jumpers</p>	<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x3F.....8-bit (R/W) : 0x7E.....</p> <p>Open Short Jumpers</p>
<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x26.....8-bit (R/W) : 0x4C.....</p> <p>Open Short Jumpers</p>	<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x3E.....8-bit (R/W) : 0x7C.....</p> <p>Open Short Jumpers</p>
<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x25.....8-bit (R/W) : 0x4A.....</p> <p>Open Short Jumpers</p>	<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x3D.....8-bit (R/W) : 0x7A.....</p> <p>Open Short Jumpers</p>
<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x24.....8-bit (R/W) : 0x48.....</p> <p>Open Short Jumpers</p>	<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x3C.....8-bit (R/W) : 0x78.....</p> <p>Open Short Jumpers</p>
<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x23.....8-bit (R/W) : 0x46.....</p> <p>Open Short Jumpers</p>	<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x3B.....8-bit (R/W) : 0x76.....</p> <p>Open Short Jumpers</p>
<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x22.....8-bit (R/W) : 0x44.....</p> <p>Open Short Jumpers</p>	<p>A : ACK bit S : START bit</p> <p>.....7-bit adr : 0x3A.....8-bit (R/W) : 0x74.....</p> <p>Open Short Jumpers</p>

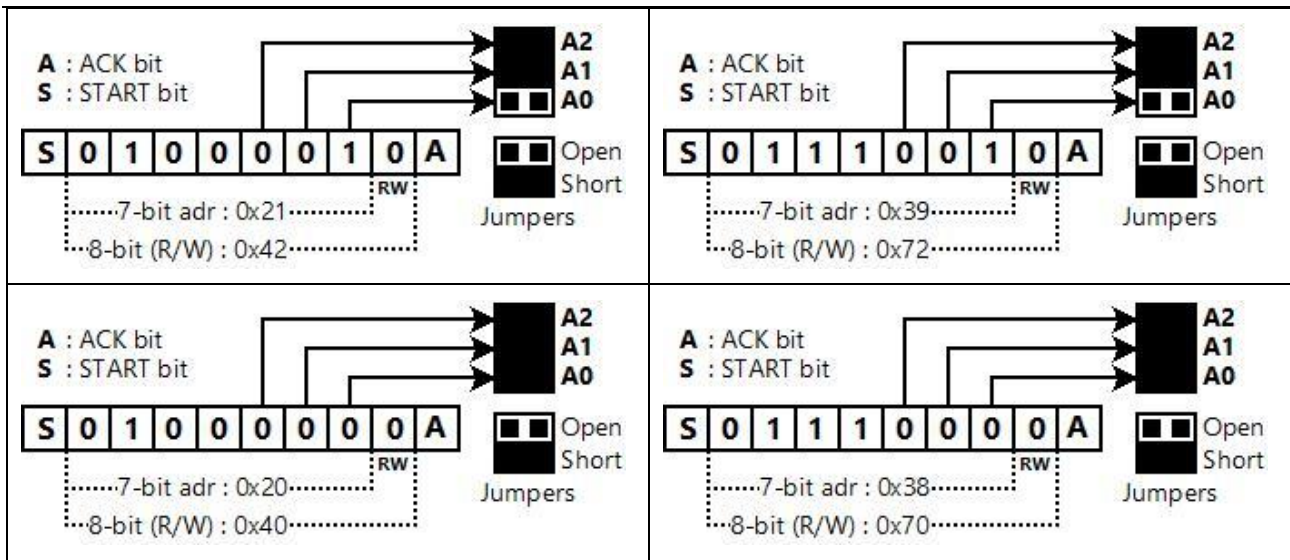


Figure 5: Addressing

6 Output data frame

When a microcontroller sends data to outputs via I2C bus. The first byte is an address byte. The second byte is data for outputs. The bit0 of the second byte controls O/C1. A bit value '1' will turn output OFF but a bit value '0' will turn output ON.

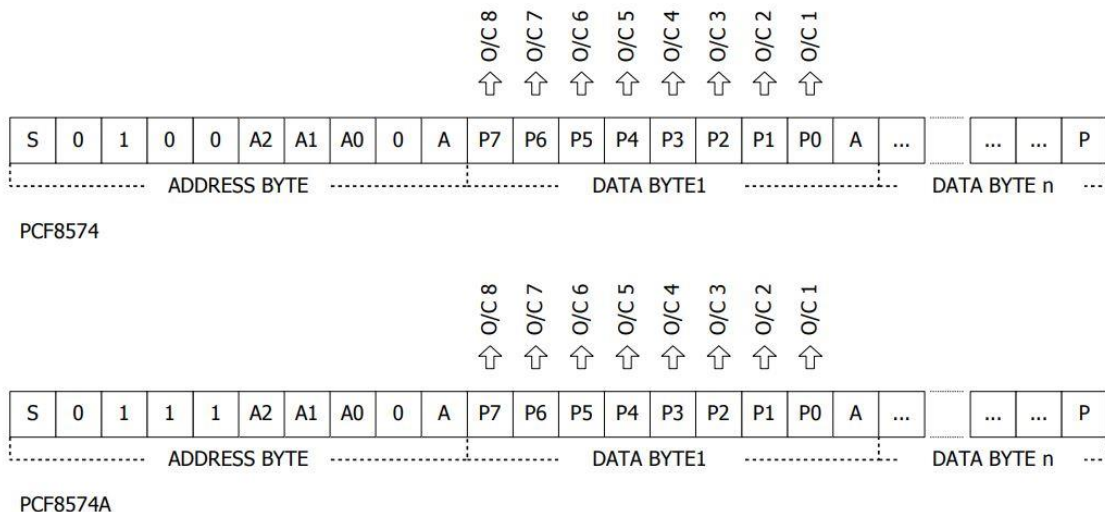


Figure 6: Output Data Frame of PCF8574 and PCF8574A

7 Load Connection

A board has 8 outputs which can be connected to 8 loads. Each output is an open collector of a transistor that can support 500mA of load current and voltage up to 50Vdc. The resistive and inductive loads can be connected to the board outputs directly because there are free-wheeling diodes on each output driver. All free-wheeling diodes must be connected to VCC of the loads. So, the VCC and GND of the loads must be connected to the board's terminals VL and GND respectively.

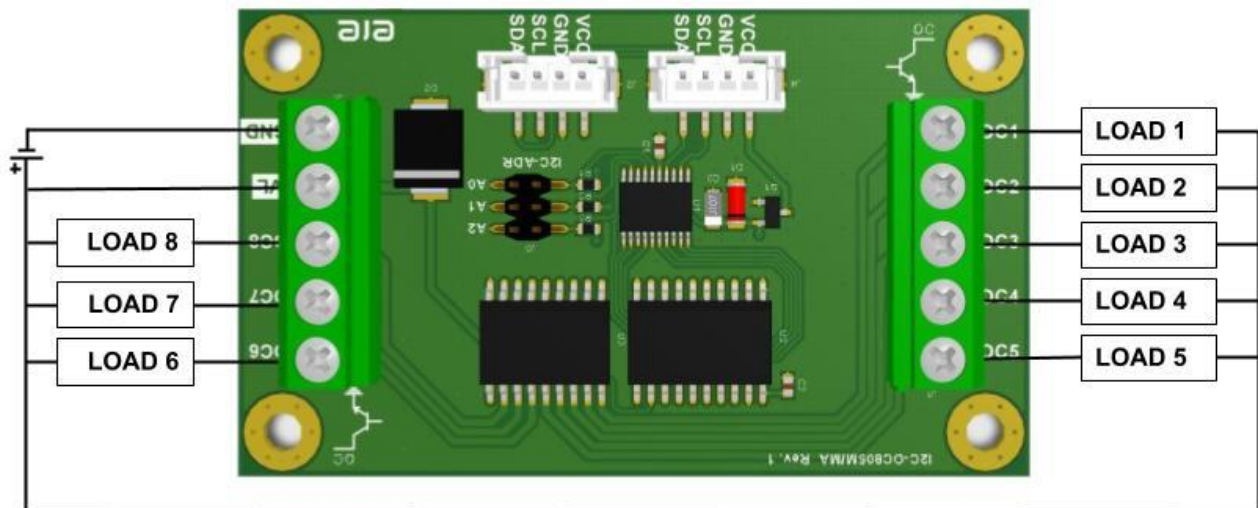


Figure 7: Load Connection

8 Specification

Table 2: Maximum Absolute Rating

Bus frequency	100kHz
Maximum board on bus	8(16) boards
Maximum load voltage	50Vdc
Maximum load current	500mA (single output)
Output channels	8
Power supply input voltage	2.5Vdc – 5.5Vdc

9 Dimensions

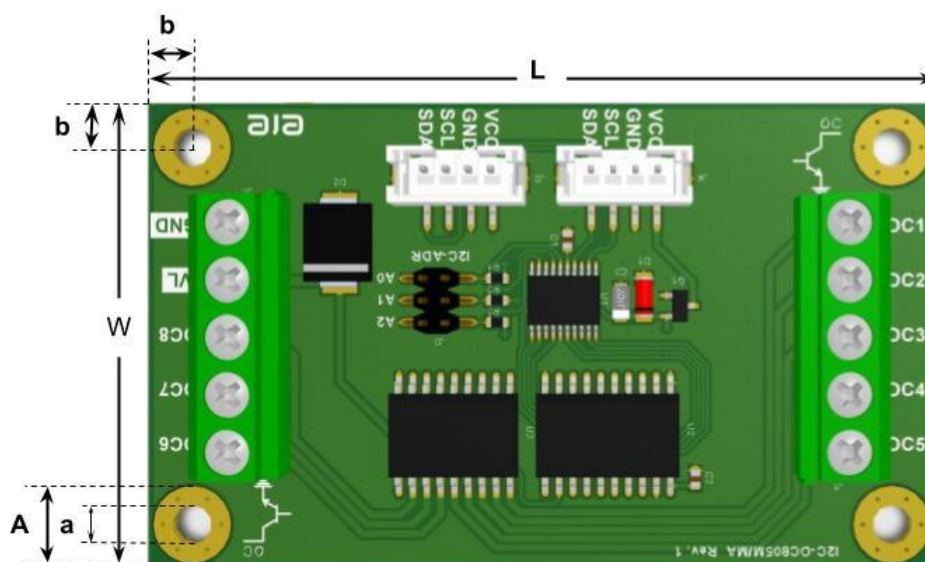


Figure 8: Dimensions

Table 3: Board dimensions

Units	Inch	mm
L	2.8346	72.00
W	1.6732	42.50
A	0.2795	7.10
a	0.1417	3.60
b	0.1574	4.00