
I2C-MUX9548M**I2C Bus Multiplexer 1-Channel to 8-Channel****1 Features**

- Bidirectional switcher: 1-Channel to 8-Channel
- I2C bus multiplexer chips: TCA9548A
- I2C bus speed: 400kHz (Fast mode)
- Configurable I2C bus pull-up resistors
- Address by 3 jumpers for use of up to 8 addresses
- Operating voltage: 1.65V to 5.5V
- Inverse polarity protection circuits for TCA9548A
- Mountable on DIN-Rail PCB holder
- PCB dimensions: 42.50 x 72.00 mm

Today, many electronic devices such as sensors and actuators interface with microcontrollers through the I2C bus. However, the I2C bus has some limitations, including the number of available addresses and the bus capacitance. All devices on the same bus must have a unique address, but many devices are manufactured with identical addresses, even when produced by different companies.

Another limitation is bus capacitance, which depends on the number of devices connected to the bus and the length of the cables. Increasing the number of I2C buses can solve these issues. However, if a microcontroller does not provide enough I2C buses, bus multiplexing can offer a practical solution.

The **I2C-MUX9548M** is an 8-channel bidirectional I2C bus multiplexer. It is designed based on the TCA9548A, which can switch the SCL and SDA lines of a master I2C bus to eight different channels. The signals on the master SCL and SDA lines can be routed to individual channels or to any combination of channels.

The I2C-MUX9548M supports bus frequencies up to 400 kHz and includes selectable pull-up resistors for the SDA and SCL lines of both the master bus and each individual channel. The board also provides a RESET pin with a pull-up resistor.

For protection, the board includes reverse-polarity circuitry to prevent damage to the TCA9548A caused by incorrect power supply connections.

The I2C-MUX9548M supports a wide operating-voltage range, making it suitable for use with both low-voltage microcontrollers and standard 5V microcontrollers.

For industrial applications, the board can be mounted on a DIN-Rail PCB holder.

2 Diagram

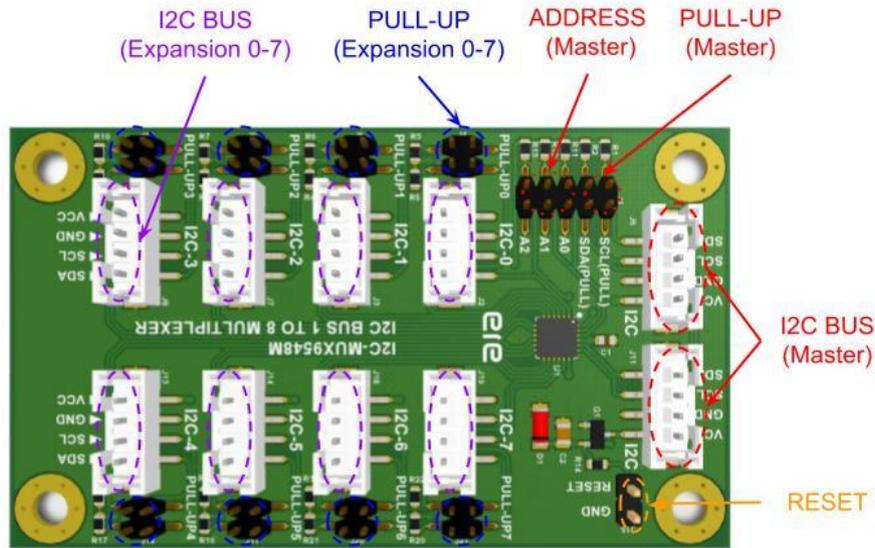


Figure 1: Board layout

In the board layout shown in Figure 1, the I2C master bus is highlighted in RED, the expansion channels are shown in PURPLE, and the pull-up resistors for the SCL and SDA lines of each expansion channel are marked in BLUE.

3 I2C bus pull-up resistors

The I2C bus always requires two pull-up resistors for the SCL and SDA lines. The board includes a pair of 10 k Ω pull-up resistors for the main bus and for all expansion channels, which can be enabled by closing the jumpers. These resistors should be enabled only if no other pull-up resistors are present on the bus. Typically, a single pair of pull-up resistors is sufficient. When multiple boards are connected on the same bus, adding additional pull-up resistors can strengthen the bus, which is beneficial for high-frequency operation. A 10 k Ω pull-up value is suitable for I2C bus speeds up to 100 kHz.

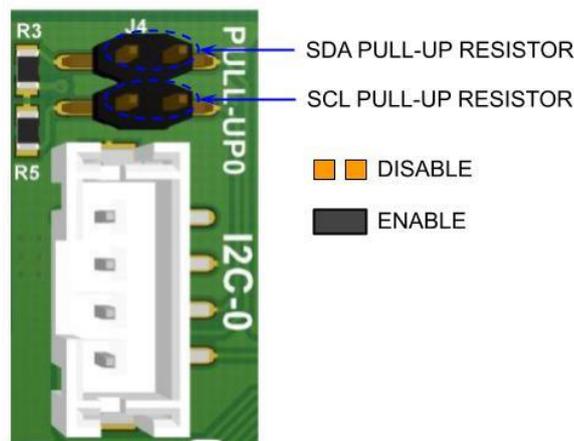


Figure 2: Jumpers for pull-up resistors of expansion channels

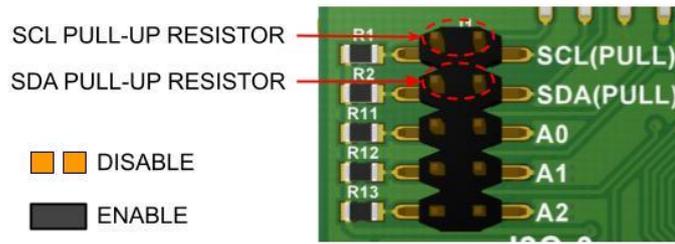


Figure 3: Pull-up resistors for SCL and SDA lines of master bus

4 I2C bus address

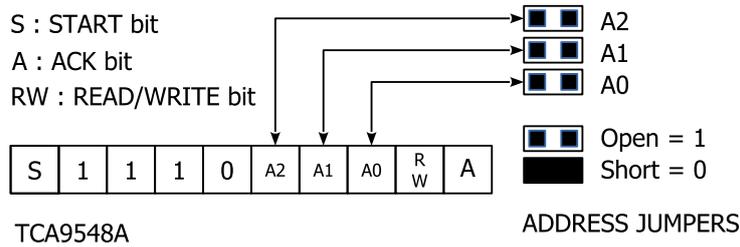


Figure 4: I2C bus addresses

5 Specifications

Parameters	Values
Operating voltage (VCC)	1.65VDC – 5.5VDC
I2C Bus frequency (Maximum)	400kHz
I2C bus pull-up resistance	SDA: 10 kΩ SCL : 10 kΩ <i>These resistors can be enabled and disabled using jumpers.</i>
RESET pull-up resistance	10 kΩ
I2C bus multiplexer chip	TCA9548A
I2C bus connectors	Pin-count: 4-pin Pin-pitch: 2.00mm

Table 1: Specifications

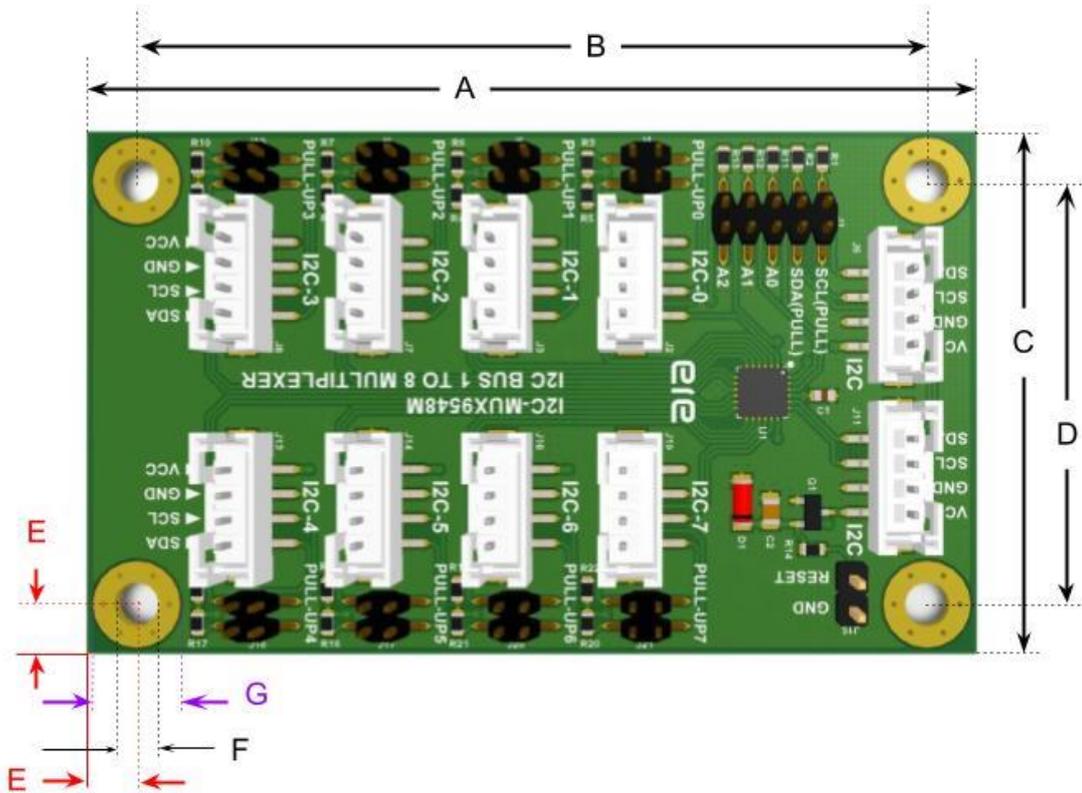
6 Dimensions


Figure 5: Dimensions

	Inch	mm
A	2.8347	72.00
B	2.5197	64.00
C	1.6732	42.50
D	1.3583	34.50
E	0.1575	4.00
F	0.1417	3.60
G	0.2835	7.20

Table 2: Dimensions



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