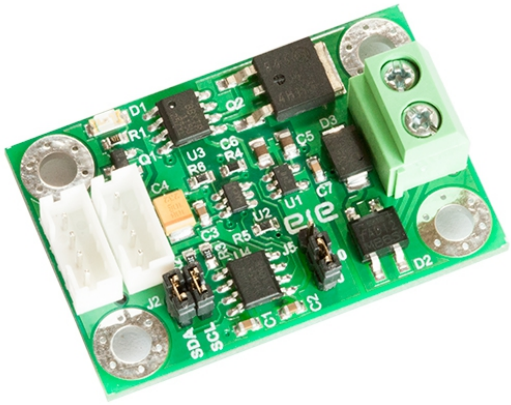
I2C-AO112SIx

I2C Bus 4-20mA Analog Output Boards



Features

- Single channel analog output
- MCP4725 12-Bit digital to analog converter
- 4-20mA current output
- I2C bus interface 100Khz, 400Khz
- On board pull-up resistors for I2C bus
- Two boards on a bus
- Up to 8 boards on a bus, two of each I2C-AO112SIx
- Compatible with most microcontrollers
- I2C bus operating voltage: 3-5V
- Power supply voltage for analog output: 9-36V
- Inverse polarity protection circuits for supply voltage
- Transient voltage protections
- PCB Size 27x41mm

Introduction

The I2C-AO112SIx are a digital to analog output boards. They are designed for 2-wire 4-20mA current loop transmitter. The 4-20mA analog output is controlled by I2C bus. The boards use 12-bit digital to analog. I2C signals on board are isolated from I2C bus signals by isolators. So there is no effect to analog signals when many boards are connected on a bus. Also each board has a surge protector. It protects the board from transient voltage events. I2C bus working voltage for the boards is 3-5V. Power supply voltage for 4-20mA analog output is 9-36V. The polarity protection circuits on board protect a damage from a mistake of connection. Two boards of each model can be connected together on a bus. So it is possible to connect eight boards on a bus when connecting two of each I2C-AO112SI0, I2C-AO112SI1, I2C-AO112SI2 and I2C-AO112SI3 together on a bus. Because they have own different addresses.

Diagram

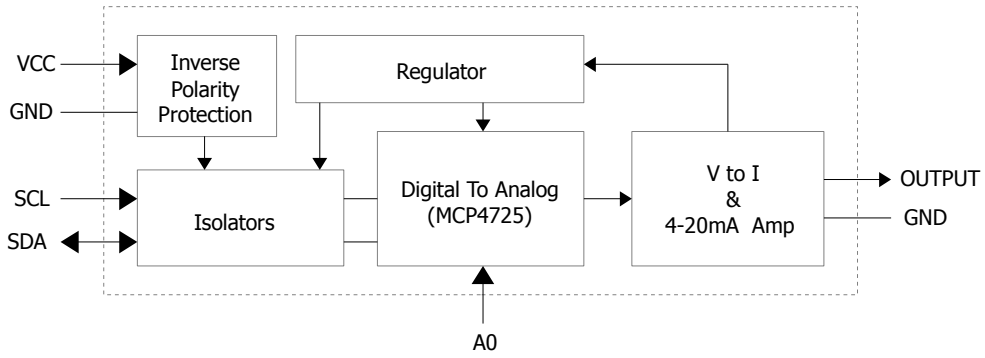


Figure 1: Block Diagram

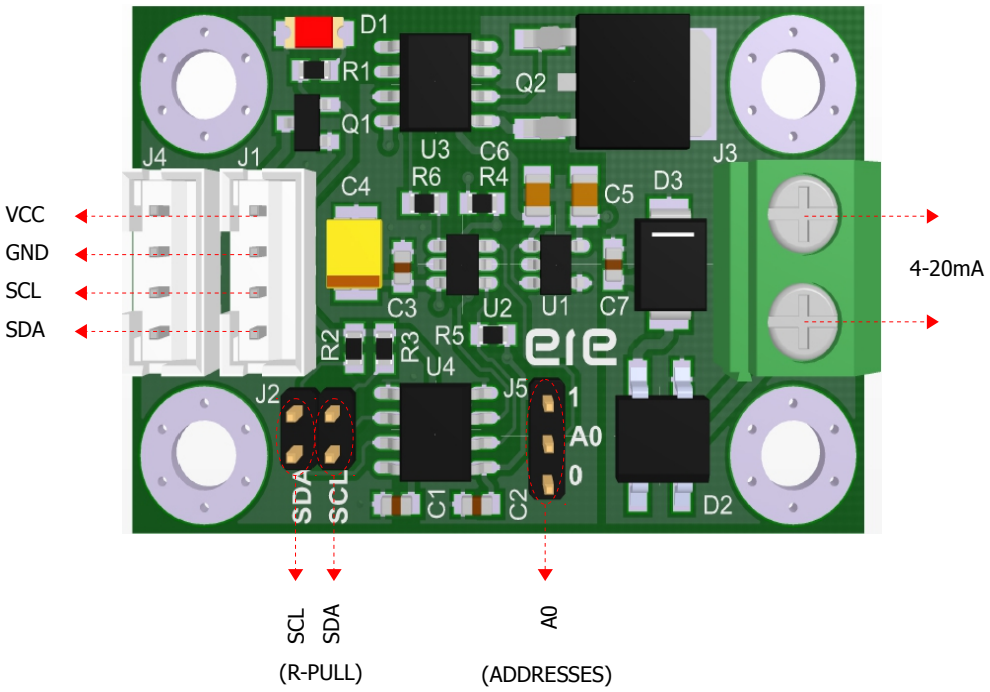


Figure 2: Board Layout

Table 1: Pin Descriptions

Symbol	Description
VCC	Power supply input voltage.
GND	Ground.
SCL	I2C bus serial clock signal.
SDA	I2C bus serial data signal.
R-PULL (SDA)	A jumper for selecting 10K pull-up resistor of SDA.
R-PULL (SCL)	A jumper for selecting 10K pull-up resistor of SCL.
A0	A jumper for selecting address of A0.
4-20mA	4-20mA analog output.

Analog Output

The analog output is single channel 4-20mA. It can be connected to an input of 4-20mA receiver. The power supply voltage for the analog output is 9-36V. The board has a bridge circuit. So users do not worry about polarity of power supply.

Analog output must be connect to 9-36VDC like Figure3 when the DAC (MCP4725) is interfacing to I2C bus. Because the DAC draws current from analog output power supply. It doesn't draw current from I2C bus.

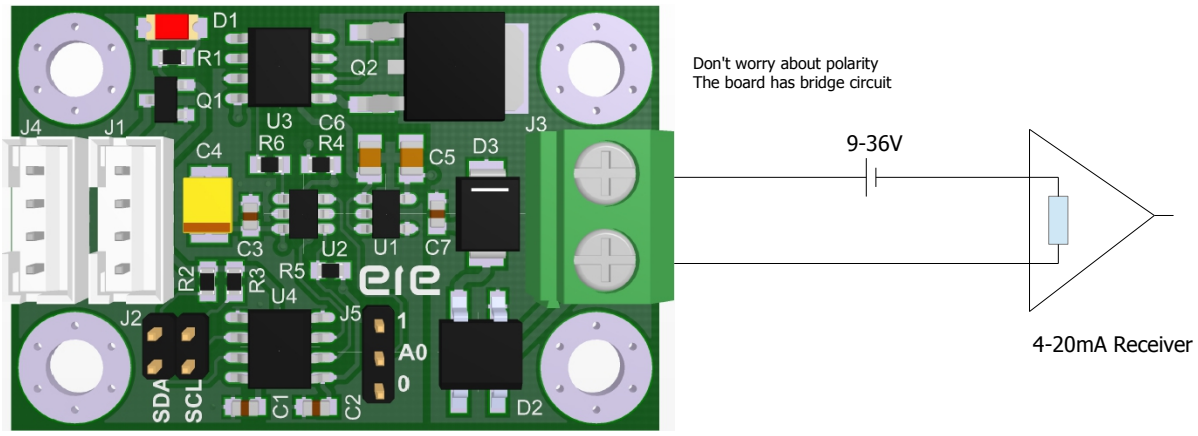


Figure 3: Analog Output Connection

I2C Bus Pull-Up Registers

The I2C bus needs pull-up resistors for SCL and SDA lines. The board has two of 10K ohm resistors for this purpose. These resistors can be enabled by closing jumpers. These resistors have to be enabled if there is no any resistor on the bus.

The bus usually uses only one resistor when boards are connected together on the bus. More resistors make bus stronger. But the strong bus is needed for high frequency bus. The 10K ohm is suitable for 100KHz bus frequency.

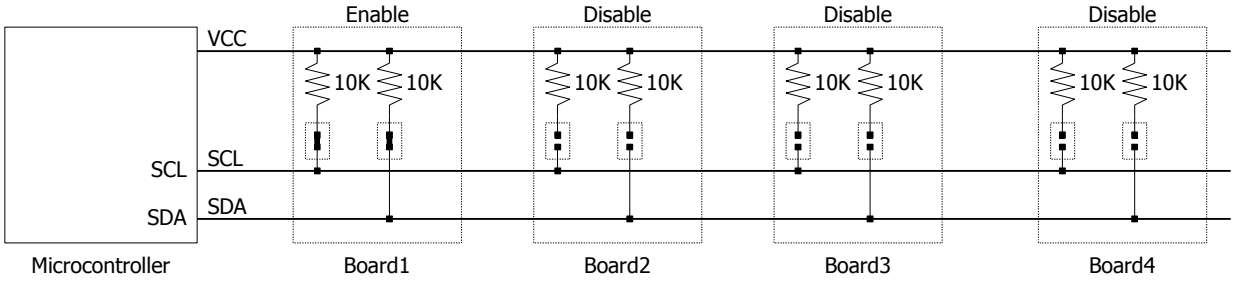


Figure 4: I2C bus resistors

Interfacing

When VCC is supplied into the board. The LED turns on. The SCL and SDA pins must be connected to SCL and SDA pins of microcontroller respectively. Remember pull-up resistors must be enabled when there is no external pull-up resistor on the bus.

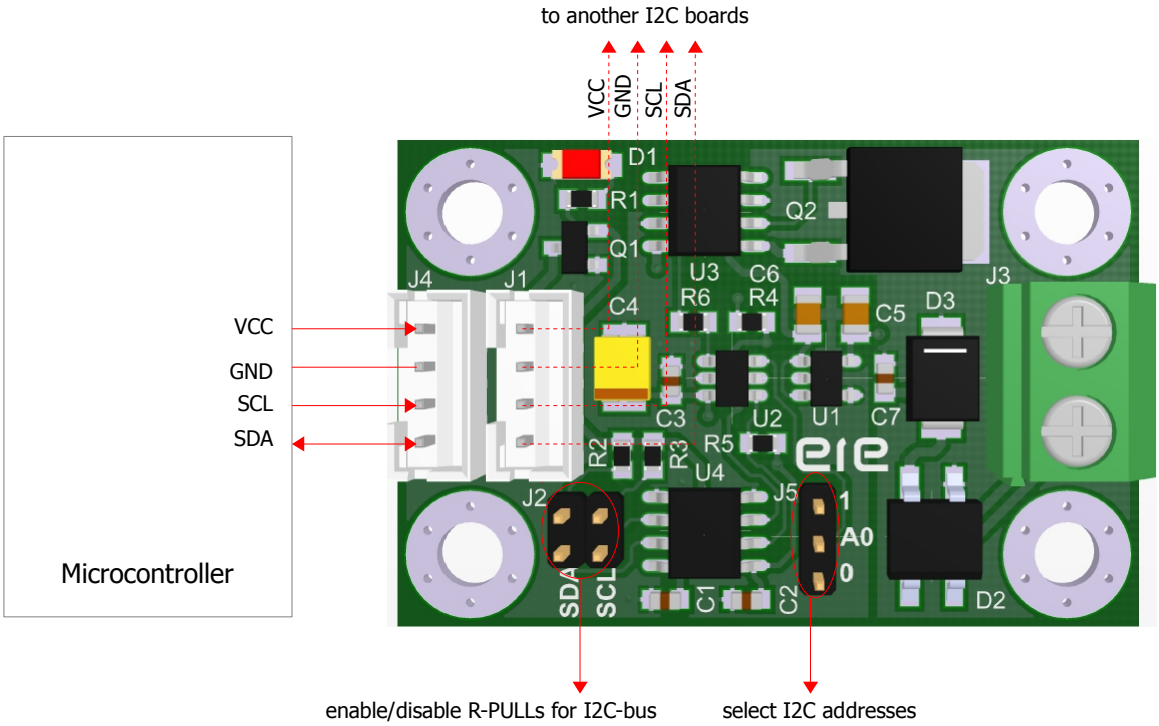


Figure 5: Interfacing

Two boards of each model can be connected on a bus. Jumper A0 of each board must be "0" and "1".

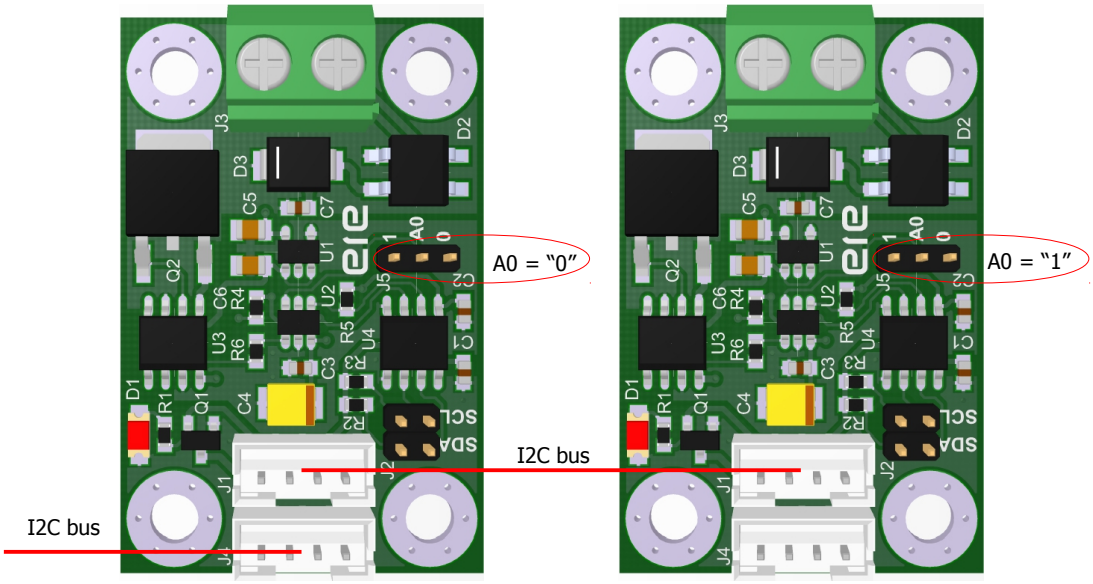


Figure 6: Two boards on a bus for each model

The boards can be connected together up to 8 boards on a single bus.

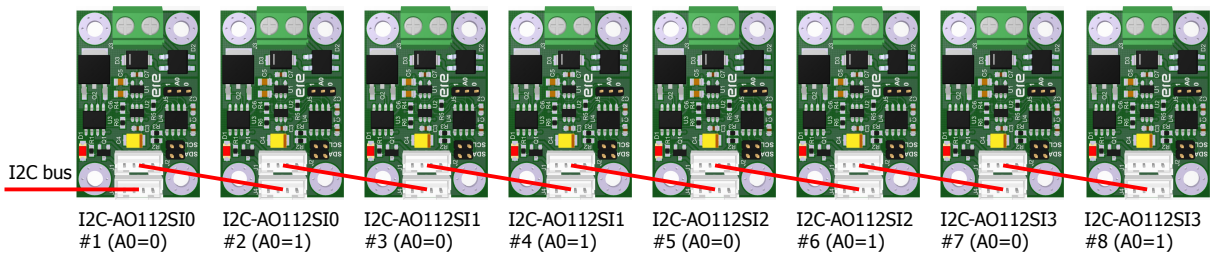


Figure 7: Up to eight board on a bus

Address

The board is addressed by a jumpers to make two different addresses.

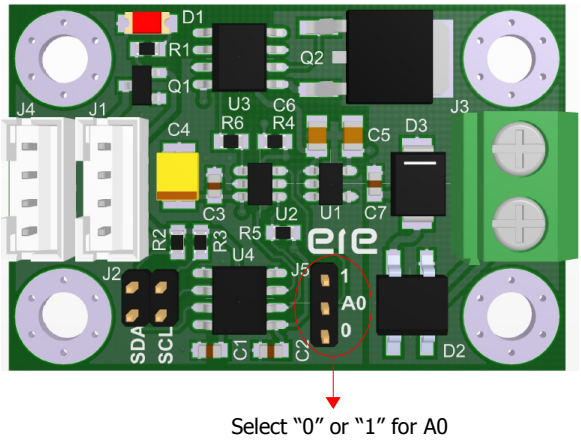


Figure 8: Address Jumpers

Table 2: Address Setting for I2C-AO112SI0

Address Byte for Reading	Address Byte for Writing	Jumper Setting (A0)
A2 A1 A0 R/W S 1 1 0 0 0 0 0 1 A 0xC1	A2 A1 A0 R/W S 1 1 0 0 0 0 0 0 A 0xC0	A0 = 0
A2 A1 A0 R/W S 1 1 0 1 0 0 1 1 A 0xD3	A2 A1 A0 R/W S 1 1 0 1 0 0 1 0 A 0xD2	A0 = 1

Table 3: Address Setting for I2C-AO112SI1

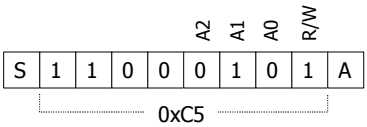
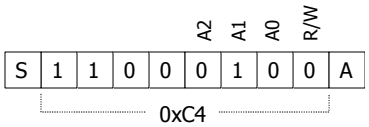
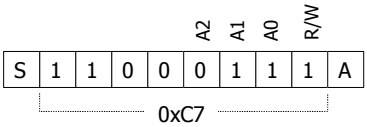
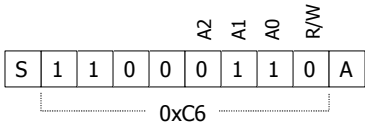
Address Byte for Reading	Address Byte for Writing	Jumper Setting (A0)
		A0 = 0
		A0 = 1

Table 4: Address Setting for I2C-AO112SI2

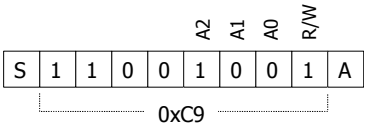
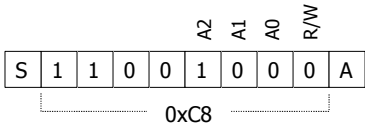
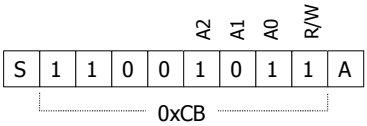
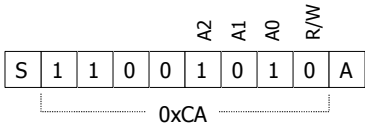
Address Byte for Reading	Address Byte for Writing	Jumper Setting (A0)
		A0 = 0
		A0 = 1

Table 5: Address Setting for I2C-AO112SI3

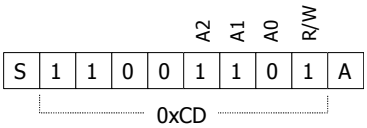
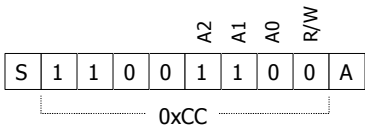
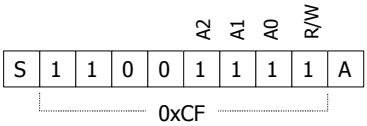
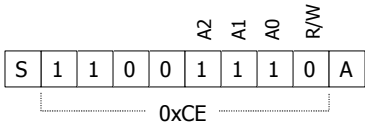
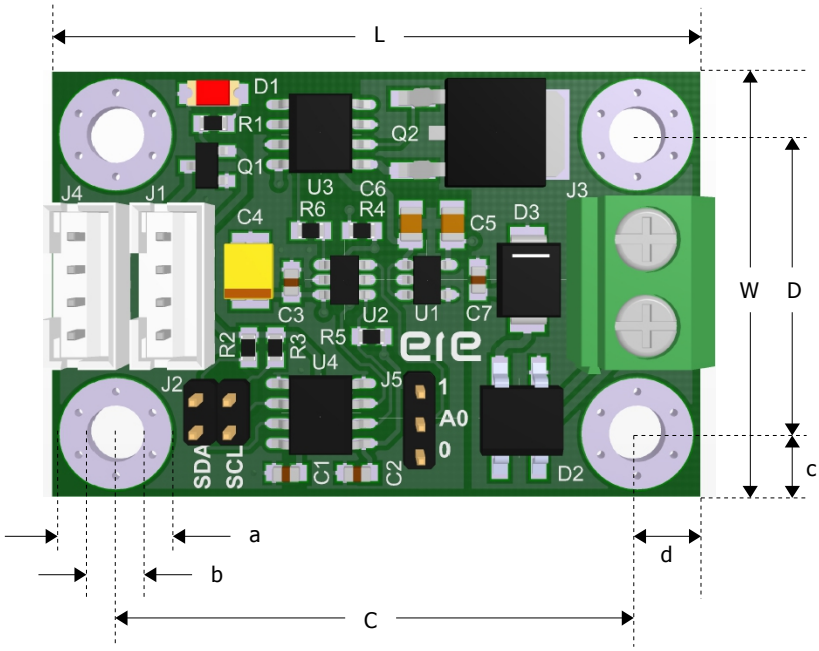
Address Setting for Reading	Address Setting for Writing	Jumper Seting (A0)
		A0 = 0
		A0 = 1

Table 6: Specification

Power supply voltage for I2C bus	3-5V
Power supply voltage for analog output	9-36V
Interface	I2C bus
Max. board on bus	2 boards (8 boards)
Max. bus frequency	100Khz, 400Khz
Output channel	1 channels
Output current range	4-20mA

Dimensions



unit	inch	mm
L	1.614	41.00
W	1.062	27.00
C	1.299	33.00
D	0.748	19.00
a	0.279	7.10
b	0.141	3.60
c	0.157	4.00
d	0.157	4.00

Figure 9: Board Dimensions