I2C-16IO™ I²C 16-Bit I/O User Manual

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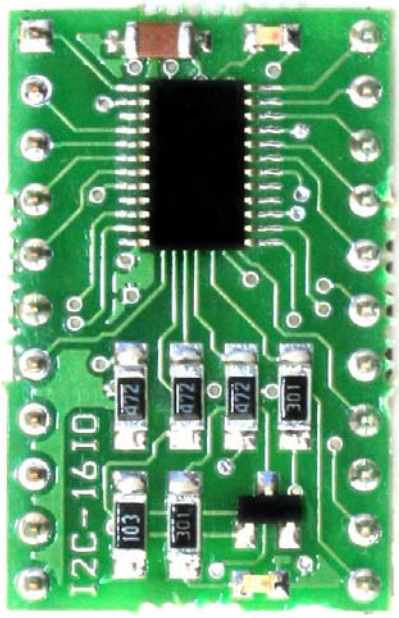

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Description

The I2C-16IO board is a 22-pin CMOS device that provides 16 bits of General Purpose parallel Input/Output (GPIO) expansion using I²C bus. There are no external components required. Only two signal lines SDA and SCL plus supply voltage and ground are required to be connected. This makes it perfect for embedded systems that require more input/output ports.

This board features innovations that set it apart from other port expander module. Innovations feature like on-board I²C address jumpers, pull-up resistors, power and interrupt LEDs. The module can be quickly connected directly on to the breadboard. The board is small and compact in size 0.70 x 1.10 inches.

The I2C-16IO is designed base on PCA9535 IC. The module consists of two 8-bit configuration. Each bit can be configuring as input or output by writing to the I/O configuration bits. The data for each Input or Output is kept in the corresponding Input or Output register. The polarity of the read register can be inverted with the Polarity Inversion Register. All registers can be read by the system master.

The module open-drain interrupt output is activated when any input state differs from its corresponding input port register state and is used to indicate to the system master that an input state has changed.

Three jumper pins vary the fixed I²C address and allow up to eight devices to share the same I²C bus. That is total of 128 I/O pins!

Features

- Stand alone module, no external components required
- On-board I²C address jumpers, pull-up resistors, power and interrupt LEDs
- Decoupling supply voltage
- Design easy for breadboard
- High quality double sided PCB
- All SMT components
- Small and compact in size 0.70 x 1.10 inches
- Dual row 0.6” width, 0.1” pitch header pins
- Operating power supply voltage range of 2.3V to 5.5V
- Suitable for 2.5V, 3.3V or 5.0V microcontroller
- Active LOW interrupt output
- Low stand-by current
- Noise filter on SCL/SDA inputs
- No glitch on power-up
- Internal power-on reset
- 16 I/O pins which default to 16 inputs
- 0kHz to 400kHz clock frequency
- ESD protection exceeds 2000V HBM per JESD22-A114, 200V MM per JESD22-A115 and 1000V CDM per JESD22-C101

Applications

- General Purpose parallel Input/Output expander for your favorite microcontroller or project board.

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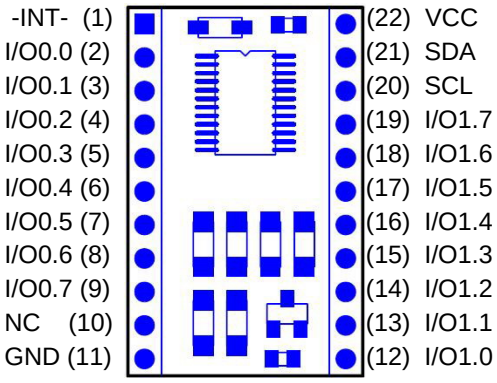
Pin Configuration



Pin No.	Name	Type	Description
1	-INT-	Output	Interrupt output (open drain)
2-9	I/O0.0 – I/O0.7	I/O	I/O0.0 to I/O0.7
10	NC	NC	No connect
11	GND	PWR	Supply ground
12-19	I/O1.0 – I/O1.7	I/O	I/O1.0 to I/O1.7
20	SCL	Input	Serial clock line
21	SDA	I/O	Serial data line
22	VCC	PWR	Supply voltage

Interfaces

Power:

The I2C-16IO board needs an external 2.3VDC – 5.5VDC supply.

- **VCC:** is an input power 2.3VDC – 5.5VDC to I2C-16IO board.
- **GND:** is a common ground for every pin. This pin MUST be connected to ground of the external power supply.

I/O pins:

Each I/O pin can be configured as input or output. Please refer to PCA9535 datasheet for more information.

-INT- pin:

The open-drain interrupt output is activated when one of the port pins change state and the pin is configured as an input. The interrupt is deactivated when the input returns to its previous state or the input port register is read. A pin configured as an output cannot cause an interrupt. Since each 8-bit port

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is read independently, the interrupt caused by Port 0 will not be cleared by a read of Port 1 or the other way around.

Note that changing an I/O from an output to an input may cause a false interrupt to occur if the state of the pin does not match the contents of the Input Port register.

I²C pins:

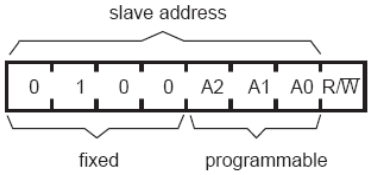
Only two signal lines SDA and SCL are required for I²C bus. Please refer to I²C specification for more information.

Module Configuration

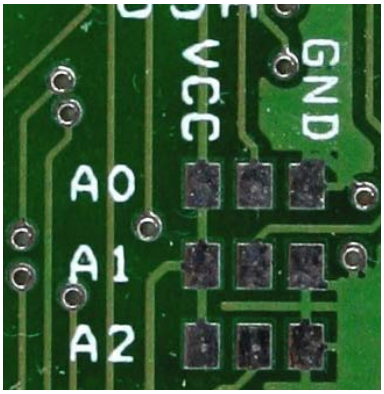
I²C address:

Default address shipped from the manufacture is 0x40 for write and 0x41 for read.

A2 = 0
A1 = 0
A0 = 0



The address can be easily change by solder the bridge between the corresponding address pin to VCC or GND at the bottom of the module. These eight combinations allow up to eight devices to share the same I²C bus. That is total of 128 I/O pins!



Power-on LED:

The green LED on the module is illuminating when the power applied. The power-on LED is enabled from the manufacture. It can be disabling for light sensitive or low current requirement application by remove the solder bridge on “PWLED” at the bottom of the module.

Interrupt pull-up resistor:

Since the interrupt pin is an open-drain, there is a pull-up resistor on the module. The pull-up resistor is enabled from the manufacture. It can be disabling by remove the solder bridge on “INTPU” at the bottom of the module.

I²C pull-up resistors:

I²C bus specification required to have pull-up resistors on SDA and SCL pin. I2C-16IO come with these two pull-up resistors enabled from the manufacture. It can be disabling when connect to I²C bus that already have pull-up resistors by remove the solder bridge on “I2CPU” at the bottom of the module.

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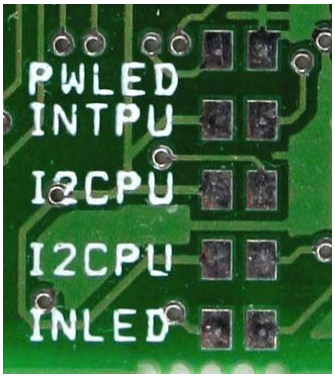
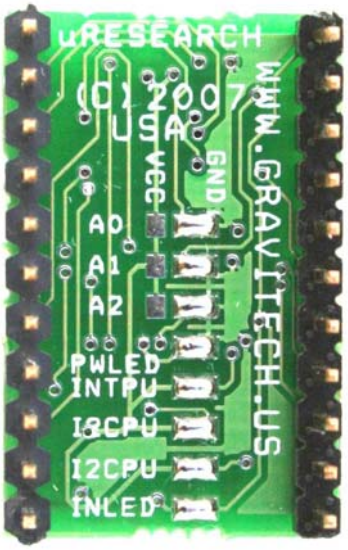
Interrupt LED:

I2C-16IO equipped with an interrupt indicator yellow LED. It is a visual way to indicate that one of the input port pins change state. The interrupt LED is enabled from the manufacture. It can be disabling for light sensitive or low current requirement application by remove the solder bridge on “INLED” at the bottom of the module.

In order for the interrupt LED to work properly, “INTPU” must be enable.



Below is the default setting from the manufacture.



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