

Digital IO Port Datasheet

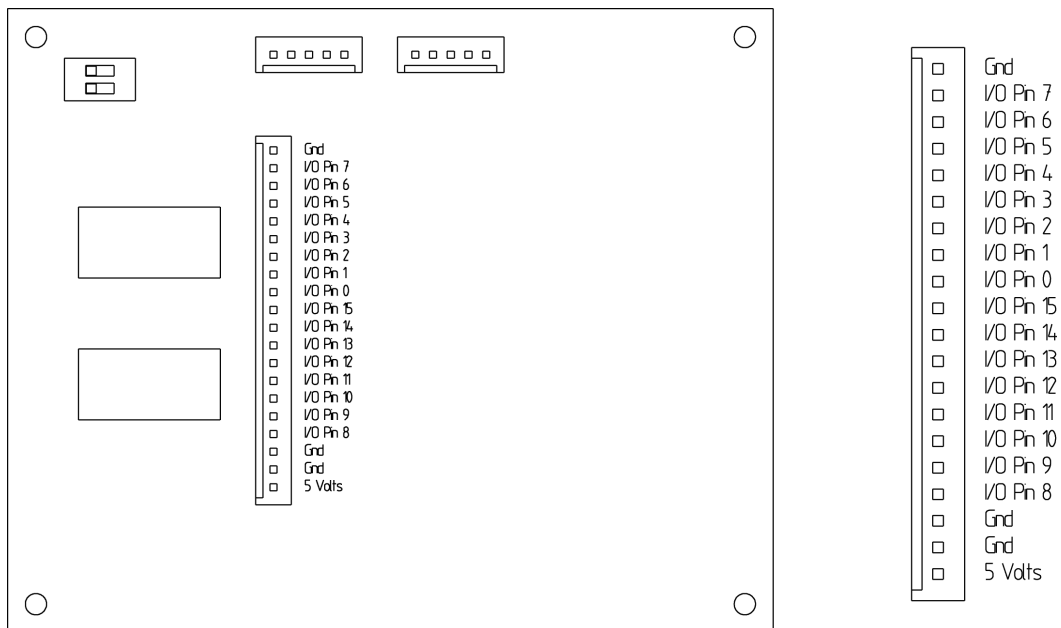
Introduction

The Digital I/O Port provides 16 digital input/output signals at 5-volt logic levels. Up to four Digital I/O Ports may be connected to a single I²C Bus, giving up to 64 digital I/O channels per bus.

If more than four ports are required on a single bus, alternative driver chips (PCF8574A) can be fitted to the extra ports, giving a maximum of eight ports (128 I/Os) per bus.

The Digital I/O Port plugs directly into one of the I²C Bus connectors on an Application Board.

Connection to the digital port signals is via a 20 way 0.1" MOLEX 6410 header or via the prototyping area (60mm square).



Unpacking

The package should contain:

- 1 off Digital IO Port
- 1 off 5 way lead
- These Instructions

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Connecting the Digital IO Port

- Turn off the controller.
- Plug the five-way lead into one of the five-way I²C connectors on the digital IO port and into the I²C connector on the application board.
- Check that both switches on the Digital IO port are in the 'ON' position. This puts the 16 digital channels onto channels 128-143
- Turn on the controller, and get the '-->' prompt.

Accessing the Digital IO Port

To make sure the Digital IO Board is connected, you can use the following:

```
-->PRINT net
                2
Devices on the I C network:

Number   Channels   Device   Description
-----   -
        64     128-135   PCF8574   8 Digital I/O lines
        64     136-143   PCF8574   8 Digital I/O lines
-->
```

The output from the VM-1 shows the 16 channels of digital I/O. There may be other lines in the list detailing other devices connected to the I²C Bus.

The following will turn the first digital output (I/O Pin 0) on, and then off again. Note that the **MAKE** command should only be executed once. If you look at the output with a meter or an oscilloscope, you will see the voltage on the output drop to near zero when the output is turned on, and rise to near 5 volts when it is turned off.

```
-->MAKE dig_io Digital(128)
-->dig_io . On
-->dig_io . Off
```

The digital I/O channels on the board are pseudo tri-state – that is they cannot be made into true inputs. Instead they rely on the fact that in the HIGH output state, the channel only pulls high very weakly (see spec.). Most devices will be able to drive the channel low if necessary. Therefore in order to read the channel it is first necessary to put it into the high state. This may be done using any one of the **Off**, **High**, or **Output** messages, and then the value of the input may be read using **Asserteds**:

```
-->dig_io . Off
-->PRINT dig_io . Asserteds
                0
-->
```

Asserteds will return -1 (TRUE) when the channel is in the ON state (low voltage) and zero (FALSE) when the channel is in the OFF state (high voltage).

Note that the VM-1 has the facility to set and read groups of up to 8 digital I/O channels as a single entity. See Digital in the Tutorial or Object Reference Manual for details.

Trouble Shooting

If the Digital IO Port does not seem to work, then check the electrical connections and the switch settings. If this does not work, contact your supplier.

Installation

The I²C bus may be up to 2m long and should be kept away from cables carrying high voltages, currents or frequencies. Do not connect anything to the Digital IO Port that will generate voltages outside the limits given in the 'Ratings' section below.

More Than One Digital IO Port

If you wish to connect more than one Digital IO Port to a VM-1, the I²C cable can be 'daisy-chained'. The switch settings determine which range of digital outputs the board responds to.

For example, if the switch settings are Switch 1 On, Switch 2 Off, then I/O pin 0 is digital channel 160, and I/O pin 1 is digital channel 161, and so on.

Note that other boards also use digital channels. You should make sure that none of the modules use the same range of digital channels.

In order to make the second set of 64 digital I/O channels available, you will need to remove the two PCF8574 IC's from the board and replace them with a pair of PCF8574AP's.

Switch 1	Switch 2	Digitals	Using PCF8574AP
On	On	128-143	192-207
On	Off	144-159	208-223
Off	On	160-175	224-239
Off	Off	176-191	240-255

Absolute Maximum Ratings

Quantity	Symbol	Min	Max	Unit
Supply Voltage	Vdd	-0.5	7.0	V
Input Voltage	Vi	Vss-0.5	Vdd+0.5	V
DC Input Current	Ii	-	20	mA
DC Output Current	Io	-	25	mA
Vdd or Vss Current	Idd, Iss	-	100	mA
Total Power Dissipation	Ptot	-	400	mW
Dissipation per Output	Po	-	100	mW
Operation Temperature	Tamb	-40	85	°C
Storage Temperature	Tstg	-65	150	°C

Characteristics

Quantity	Sym.	Test Condition	Min	Typ	Max	Unit
Supply Voltage	Vdd		2.5		6.0	V
Supply Current	Idd			40	100	µA
Input Voltage Low	Vil		-0.5		0.3Vdd	V
Input Voltage High	Vih		0.7Vdd		Vdd+0.5	V
Output Current Low	Iol	Vol = 1V	10	25		mA
Output Current High	Ioh	Voh = Vss	30		300	µA

When reading an Input, the channel is pulled high by the Output Current High.

Mechanical

Size	130 x 93 x 26 mm
Mounting	4 off ø3.6 mm on 120 x 81 mm
Weight	120 grams