

Description

CE Marking: Starting July 22nd, 2014, some US Digital products will contain the CE Marking. The USB4 will not contain a CE Marking and will not be available for shipping to CE Mark required countries (for example, all countries within the European Union (EU)) after July 10th, 2014. See the Product Change Notification PCN 4464 for more information, or contact a US Digital representative at sales@usdigital.com.

The USB4 is a data acquisition device designed to record data from 4 incremental encoders, 8 digital inputs and 4 analog input channels. In addition, the USB4 provides 8 digital outputs and 4 analog output channels. The 8 digital outputs also have a latching emergency stop (E-Stop) input. When the E-Stop input is activated, the 8 digital outputs will turn off immediately. The analog input/output channels provide 12-bit data conversions at rates up to 44 kHz per channel. All communication between the USB4 and the host PC is sent over a USB interface. To handle continuous streaming of data over USB to the host PC, the USB4 has a 32 Mbyte FIFO buffer.

The digital input port can handle input logic levels from +3V to +25V and the digital output port has open drain MOSFET outputs to switch up to 1A at +25V. The range of the analog input/output channels is 0V to +5V. Four independent incremental encoder interfaces are implemented in hardware on the USB4. Each encoder channel has a 24-bit up/down counter that is easily reconfigured for various counting modes such as modulo-N, non-recycle, range-limit and normal counter mode. Quadrature input modes of x1, x2, x4, clock/direction, and indexing modes can be selected. Each encoder channel can measure the pulse width and pulse period of its "A" input while simultaneously decoding the quadrature state. This feature allows RPM speed measurements to be made from the encoder input or interfacing to sensors with PWM (pulse width modulated) outputs.

The USB4 can capture data once per clock cycle of a user programmable 32-bit clock generator or on every rising or falling edge of the input port pins. Data capture can be programmed to run continuously or to start only when certain conditions are met such as the encoder count matching a certain value, or if there is encoder movement in a certain direction. Encoder events can also output on the output port to trigger external devices. Trigger conditions can be set for the analog input and PWM input channels; in addition, the USB4 can be configured to have the input port pins serve as a trigger to start data acquisition. The input port triggering allows the user to form the final trigger from a combination of conditions on the input port with up to 2 levels of triggering.

Software and documentation needed to use the USB4 is available on the US Digital website. A PC demo application allows the user to configure and explore various features of the USB4 using a graphical user interface. A library with a detailed Application Programming Interface is included so users can develop their own applications. US Digital provides several examples that demonstrate how to use the FIFO, how to log data, etc. For users that prefer lower level control, a documented register based interface is provided so the USB4's...



Features

- ▶ Real-time tracking of up to 4 incremental encoders with or without index (up to 5 MHz encoder input frequency)
- ▶ 4 channel pulse width, pulse period and RPM measurement
- ▶ Available with single-ended or differential encoder inputs, optional DIN rail mounting
- ▶ 8 digital outputs, 8 digital inputs, 4 A/D inputs, 4 D/A outputs
- ▶ Flexible triggering modes and 32 Mbyte RAM buffer for data capture
- ▶ Programmable sampling period from 2 μ s to approx. 2 hours
- ▶ Digital input levels up to +25V
- ▶ Digital outputs with open drain FET for up to 1A switching
- ▶ Easy to use demo software, Windows DLLs for C++/C#/Visual Basic and example source code provided

Description (Continued)

... internal registers can be configured at the bit level.

Software

- ▶ www.usdigital.com/support/software/usb4-software
- ▶ www.usdigital.com/assets/USDProducts.zip (.zip file with installer)

Mechanical Drawing

Environmental

| Parameter | Min. | Max. | Units |
|-----------------------|------|------|-------|
| Operating Temperature | 0 | 70 | C |

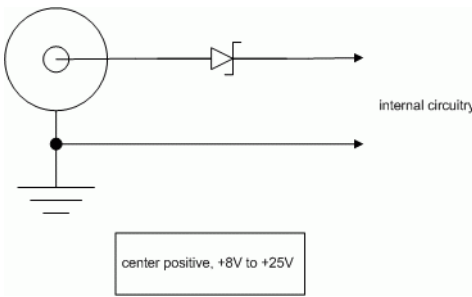
Electrical

| Parameter | Value |
|---------------------|------------------------------------------------------------------|
| Supply Voltage | 8V to 25V |
| Digital Output Pins | Open drain voltage, 25V max. Open drain sink current, 1A max. |

| | |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Digital Input Pins | VIL(max) = 0.8V VIH(min) = 2.0V with approx. 100 mV of hysteresis VIH(max) = 24V |
| Analog Output Range | 12-bit DAC, 0V to 5V |
| Analog Input Range | 12-bit ADC, 0V to 5V |
| Power consumption | 115 mA @ 8 V, 77 mA @ 12 V or 42 mA @ 24V typical. (USB connected, no encoders connected, all LED's off) |
| Max. current drawn from +5V outputs | 550 mA (combined current of all +5V output terminals) |
| Max. encoder input frequency | 5 MHz |
| Max. FIFO write speed (Time Based Triggering) | 500 kHz |
| Max. FIFO write speed (Event Based Triggering) | Counter - 200 kHz, Input Port - 100 kHz |

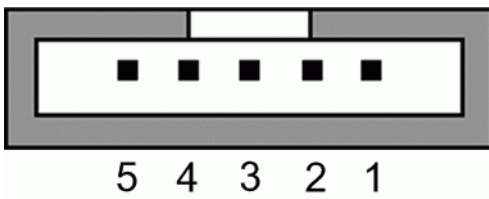
Power Input

J9:



Single Ended Encoder Inputs

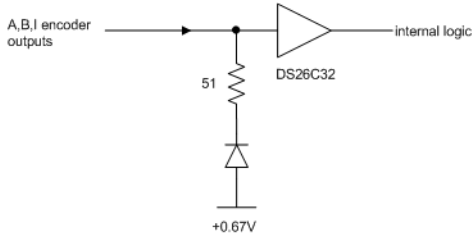
Encoder Channel 3,2,1,0 (J3, J4, J5, J6) Pin-out (USB4-S option):



| Pin Number | Description |
|------------|-------------|
| 1 | Ground |
| 2 | Index |

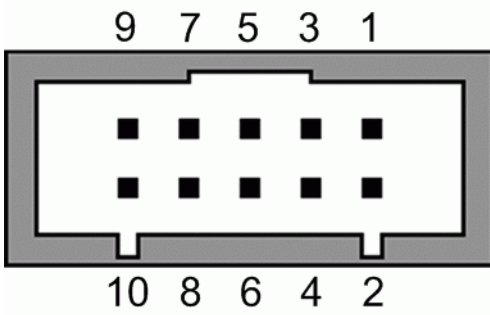
| Pin Number | Description |
|------------|-------------|
| 3 | A Channel |
| 4 | +5V out |
| 5 | B channel |

Single Ended input circuit (internal to USB4):



Differential Encoder Inputs

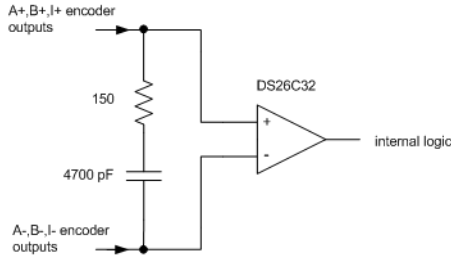
Encoder Channel 3,2,1,0 (J3, J4, J5, J6) Pin-out (USB4-D option):



| Pin Number | Description |
|------------|---------------|
| 1 | No connection |
| 2 | Ground |
| 3 | Index- |
| 4 | Index+ |
| 5 | A- channel |
| 6 | A+ channel |
| 7 | +5V out |

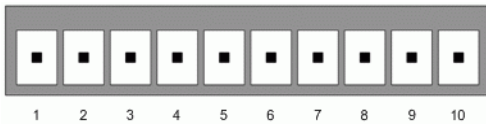
| Pin Number | Description |
|------------|---------------|
| 8 | No connection |
| 9 | B- channel |
| 10 | B+ channel |

Differential Input Circuit (internal to USB4):



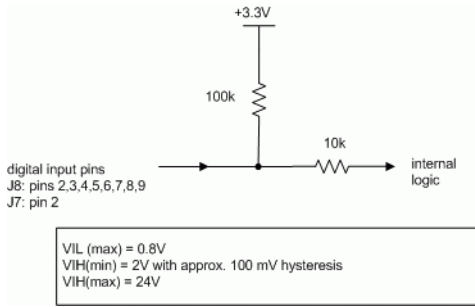
Digital Input Port

J8 Pin-out:



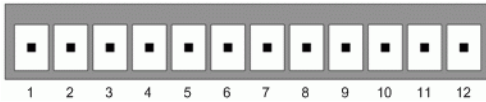
| Pin Number | Description |
|------------|---------------|
| 1 | +5V power out |
| 2 | Din0 (LSB) |
| 3 | Din1 |
| 4 | Din2 |
| 5 | Din3 |
| 6 | Din4 |
| 7 | Din5 |
| 8 | Din6 |
| 9 | Din7 (MSB) |
| 10 | Ground |

Input Port Circuit (internal to USB4):



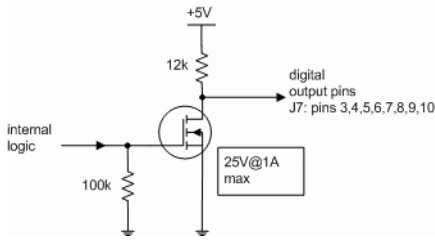
Digital Output Port

J7 Pin-out:



| Pin Number | Description |
|------------|---------------------------|
| 1 | +5V out |
| 2 | E-Stop input (active low) |
| 3 | Dout0 (LSB) |
| 4 | Dout1 |
| 5 | Dout2 |
| 6 | Dout3 |
| 7 | Dout4 |
| 8 | Dout5 |
| 9 | Dout6 |
| 10 | Dout7 (MSB) |
| 11 | Ground |
| 12 | Ground |

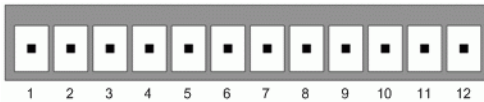
Output Port Circuit (internal to USB4):



Note: When driving inductive loads, add an external reversed biased diode in parallel with the load to protect the USB4 from damage caused by large voltage transients.

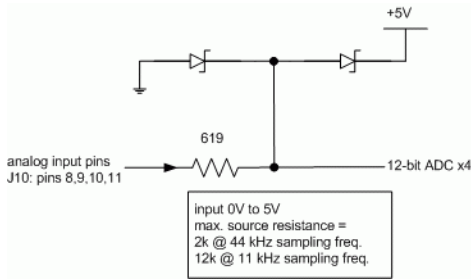
Interface Port

J10 Pin-out:

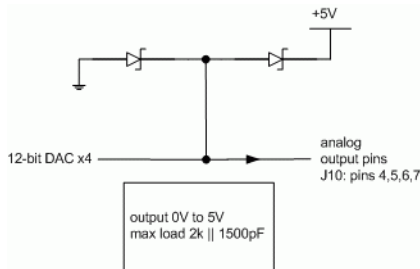


| Pin Number | Description |
|------------|-----------------------|
| 1 | +5V out |
| 2 | Reserved |
| 3 | Reserved |
| 4 | DAC0 (analog outputs) |
| 5 | DAC1 |
| 6 | DAC2 |
| 7 | DAC3 |
| 8 | ADC0 (analog inputs) |
| 9 | ADC1 |
| 10 | ADC2 |
| 11 | ADC3 |
| 12 | Ground |

ADC Input Circuit (internal to USB4):



DAC Output Circuit:



Included Accessories

PS-12 Power supply

Ordering Information

| | | | |
|--------|-------------------------|---|---------------------------------|
| USB4 - | <input type="text"/> | - | <input type="text"/> |
| | Input | | Mounting |
| | <i>S = Single-ended</i> | | <i>D = Default</i> |
| | <i>D = Differential</i> | | <i>R = DIN rail (35mm wide)</i> |

Notes

- Cables and connectors are not included and must be ordered separately.
- US Digital® warrants its products against defects in materials and workmanship for two years. See complete warranty for details.