

32-Channel High Speed Digital I/O USB Data Acquisition Module



OM-USB-32DIO



OM-USB-32DIO shown smaller than actual size.

- ✓ 32 Bits of Bidirectional TTL Digital I/O
- ✓ Pattern Detection and Generation
- ✓ Input Scan Rate up to 8 MS/s
- ✓ Update Rate up to 8 MS/s
- ✓ Independent Input and Output Scan Clocks
- ✓ 24 mA Source, 10 mA Sink Output Current
- ✓ External Trigger and Clock Inputs

The OM-USB-32DIO provides 32 bits of high-speed digital I/O, and features independent input and output scan clocks, hardware and software triggering, and pattern detection/generation.

Digital I/O

The 32 DIO bits are available as two 16-bit ports that are bit-configurable for input or output. Each port is configured independently, so both software polling and hardware scanning operations can be performed at the same time.

When performing software polling, the port can contain any combination of input or output bits. When performing hardware-paced output scans, all bits in the port must be set for output. For input scans, however, the current state of any bits in the port that are configured for output are read.

Digital Output Scanning

Either port can output a 16-bit digital pattern. The pattern is updated at a rate up to 8 MS/s, and clocked using the output scan clock. Use both ports to output a 32-bit digital pattern. Data from one port is read and stored in the FIFO buffer until the second port is read. Both ports are output simultaneously on the rising edge of the next pacer clock signal.

Data Transfer

The OM-USB-32DIO uses a delay between the output scan clock and the data transfer pin, which allows an external device that is receiving the data to know that the data is stable at that point, and ensures a coherent data transfer between devices.

Pull-Up/Down Configuration

The DIO bits can be pulled up to 5V or down to 0V through 47 kΩ resistors via onboard jumpers.

Clock I/O

Users can pace input scanning operations with the onboard input scan clock or with an external signal. The input clock frequency is 8 MHz, maximum. A duty cycle of 50% is maintained when the internal input clock paces operations. When using an external clock, the signal is output immediately after the external clock input is received.

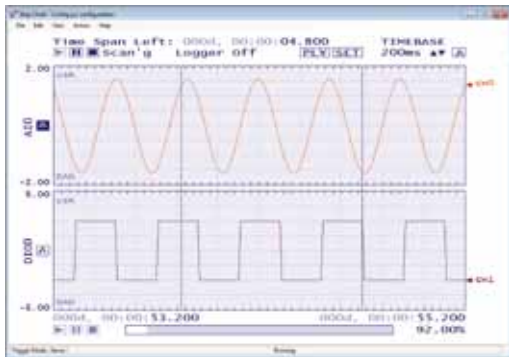
Triggering

Digital and pattern triggering are supported. The TRIG pin is used for external TTL level triggering, and can be used to trigger input or output scans. Trigger latency is less than 1 μs. The trigger mode is software-selectable for edge or level sensitive, and high or low logic. Either digital port can be used for pattern triggering. A scan is triggered when a specified pattern is detected. Specific bits can be masked or ignored. Trigger latency is 1 scan clock period. You can input or output a digital pattern under the timing control of a clock signal.



Software

The OM-USB-32DIO module ships with an impressive array of software, including TracerDAQ®, a full-featured, out-of-the-box data logging, viewing, and analysis application. Driver support and detailed example programs are included for Universal Library programming libraries for Microsoft® Visual Studio® programming languages, and other languages, including DASyLab®, and ULx for NI LabVIEW® (comprehensive library of VIs and example programs compatible with 32-bit and 64-bit LabVIEW 2010 or later) and InstaCal™ installation, calibration and test utility-powerful solutions for programmers and nonprogrammers alike. These modules operate under Microsoft Windows® VISTA/7/8/10 (32-bit and 64-bit) operating systems.



TracerDAQ Strip Chart.

The OM-USB-32DIO data acquisition module is supplied with TracerDAQ software which is a collection of four virtual instrument applications used to graphically display and store input data and generate output signals:

- Strip Chart—Log and graph values acquire from analog inputs, digital inputs, temperature inputs and counter inputs
- Oscilloscope—Display values acquired from analog inputs
- Function Generator—Generate waveforms for analog outputs
- Rate Generator—Generate waveforms for counter outputs

TracerDAQ PRO is an enhanced version of TracerDAQ and is available as a purchased upgrade (SWD-TRACERDAQ-PRO). A comparison of some of the features included in TracerDAQ vs TracerDAQ PRO is featured below.



TracerDAQ Pro Strip Chart with Measurements.

Features Comparison Strip Chart

Feature	TracerDAQ	TracerDAQ Pro
Channel Types	Analog input, temperature input, digital input, event counter	
Number of Channels	8	48
Number of Lanes	2	8
Maximum Samples per Channel	32,000	1 million
Alarm Conditions	No	Yes
Measurements Window	No	Yes
Enter Annotations	No	Yes
Software Triggering	No	Yes
Hardware Triggering	No	Yes
Time-of-Day Triggering	No	Yes
Linear Scaling	No	Yes

Oscilloscope

Feature	TracerDAQ	TracerDAQ Pro
Channel Type	Analog input	
Number of Channels	2	4
Measurements Window	No	Yes
Reference Channel	No	Yes
Math Channel	No	Yes

Rate Generator

Feature	TracerDAQ	TracerDAQ Pro
Channel Type	Counter output	
Number of Channels	1	20

Function Generator

Feature	TracerDAQ	TracerDAQ Pro
Channel Type	Analog output	
Number of Channels	1	16
Waveform Types	Sine	Sine, square, triangle, flat, pulse, ramp, random, arbitrary
Duty Cycle	No	Yes
Phase	No	Yes
Gate Ratio	No	Yes
Rate Multiplier	No	Yes
Sweep (Linear and Exponential)	No	Yes



Specifications

DIGITAL INPUT/OUTPUT

Digital Type: TTL

Number of I/O: 32 (2 ports of 16-bits)

Configuration: Bit-configurable as input (power on default) or output

Pull-Up Configuration: Each port has two 47 kΩ resistors configurable as a pull-up or pull-down (default) with an internal jumper

Each jumper Configures 8 Digital Bits:

Jumper W3: Configures port 0 bit 0 to bit 7

Jumper W4: Configures port 0 bit 8 to bit 15

Jumper W5: Configures port 1 bit 0 to bit 7

Jumper W6: Configures port 1 bit 8 to bit 15

Digital I/O Transfer Rate:

System-Paced, Asynchronous: 33 to 8000 port reads/writes or single bit reads/writes per second typical, system dependent

Synchronous: 0.022 Hz to 8 MHz, based on the internal clock speed of 96 MHz

Digital Input Pacing: Onboard clock, external input scan clock (ICLKI)

Digital Input Trigger Source: External single channel digital trigger (TRIG) or Pattern Detection

Digital Output Pacing: Onboard clock, external output scan clock (OCLKI)

Digital Output Trigger Source: External single channel digital trigger (TRIG) or Pattern Detection

Input High Voltage: 2.0V min, 5.0V absolute max

Input Low Voltage: 0.8V max, 0V recommended min

Output High Voltage: 4.4V min (IOH = -50 μA), 2.96V min (IOH = -24 mA)

Output Low Voltage: 0.1V max (IOL = 50 μA), 0.77V max (IOL = 10 mA)

Output Current: 24 mA source, 10 mA sink max per pin, constrained to 384 mA across all output pins (digital outputs, pacer clock outputs, and +VO)

EXTERNAL TRIGGER

Trigger Source: External digital; TRIG terminal

Trigger Mode: Software-selectable for edge or level

sensitive, rising or falling edge, high or low level

Retrigger Mode: Trigger is rearmed after each trigger event

Trigger Latency: 100 ns max

Trigger Pulse Width: 100 ns min

Input Type: Schmitt trigger, 47 kΩ pull-down to ground with 33 Ω in series

Schmitt Trigger Hysteresis: 0.76V typ, 0.4V min, 1.2V max

Input High Voltage Threshold: 1.74V typ, 1.3V min, 2.2V max

Input High Voltage Limit: 5.5V absolute max

Input Low Voltage Threshold: 0.98V typ, 0.6V min, 1.5V max

Input Low Voltage Limit: -0.5V absolute min, 0V recommended min

PATTERN TRIGGER

Trigger Source: Port 0 or Port 1

Trigger Types: Above pattern, Below pattern, Equal pattern, or Not equal pattern

Trigger Stability: Digital port must be stable for 31.25 ns to be recognized as a pattern

Trigger Bit Width: Up to 16, adjustable through bitmask

Trigger Latency: Up to 1 scan period

CLOCK INPUT/OUTPUT

Terminal Names:

ICLKI, ICLKO, OCLKI, OCLKO

Terminal Type:

ICLKI: Input scan clock input, active on rising edge

ICLKO: Input scan clock output, power on default 0V, active on rising edge

OCLKI: Output scan clock input, active on rising edge

OCLKO: Output scan clock output, power on default 0V, active on rising edge

Input Clock Frequency: 8 MHz max

Input Clock Pulse Width: 10.417 ns min

Input Type: Schmitt trigger, 47 kΩ pull-down to ground with 33 Ω in series

Input Schmitt Trigger Hysteresis: 0.76V typ, 0.4V min, 1.2 V max

Input High Voltage Threshold: 1.74V typ, 1.3V min, 2.2V max

Input High Voltage Limit: 5.5V absolute max

Input Low Voltage Threshold: 0.98V typ, 0.6V min, 1.5V max

Input Low Voltage Limit: -0.5V absolute min, 0V recommended min

Output Clock Frequency: 8 MHz max

Output Clock Pulse Width: Minimum 62.5 ns at 8 MHz, but varies according to the sample rate; always maintains a 50% duty cycle when using the internal clock; when using the external clock, it follows the external clock input

Output High Voltage: 4.4 V min (IOH = -50 μA), 2.96V min (IOH = -24 mA)

Output Low Voltage: 0.1V max (IOL = 50 μA), 0.77V max (IOL = 10 mA)

Output Current: 24 mA source, 10 mA sink max per pin, constrained to 384 mA across all output pins (digital outputs, pacer clock outputs, and +VO)

Handshaking: The TXACK output will have an 83.33 ns delay from the OCLKO signal to ensure coherent data transfers between devices

POWER

Supply Current, USB Source:

During Enumeration: <100 mA

After USB Enumeration: <500 mA

+VO Voltage Output Range: After USB enumeration: 5V, ± 5%

+VO Output Current: After USB enumeration: 24 mA max per pin, constrained to 384 mA across all output pins (digital outputs, pacer clock outputs, and +VO)

USB

USB Device Type: USB 2.0 (high-speed)

Device Compatibility: USB 1.1, USB 2.0, USB 3.0

USB Cable Length: 3 m (9.84') max

ENVIRONMENTAL

Operating Temperature Range: 0 to 50°C (32 to 122°F)

Storage Temperature Range: -40 to 70°C (-40 to 158°F)

Humidity: 0 to 90% RH non-condensing

MECHANICAL

Signal I/O Connector: 2 banks of screw-terminals

Wire Gauge Range: 16 to 30 AWG

Dimensions: 128.52 L x 88.39 W x 35.56 mm H

(5.06 x 3.48 x 1.43")

Weight: 0.49 kg (1.08 lb)



OMEGACARESM extended warranty program is available for models shown on this page. Ask your sales representative for full details when placing an order. OMEGACARESM covers parts, labor and equivalent loaners.

To Order	
Model No.	Description
OM-USB-32DIO	32-channel high speed digital I/O USB data acquisition module
SWD-TRACERDAQ-PRO	TracerDAQ PRO Software

Comes complete with 1.8 m (6') USB cable and software and operator's manual on CD.

Ordering Example: OM-USB-32DIO 32-channel digital I/O USB data acquisition module and OCW-1 OMEGACARESM 1-year extended warranty for OM-USB-32DIO, (adds 1 year to standard 1-year warranty).