8-Channel High Speed Voltage Input USB Data Acquisition Modules

OM-USB-1208HS, OM-USB-1208HS-2AO, OM-USB-1208HS-4AO

- 4 Differential/8 Single-Ended Analog Voltage Inputs
- 13-Bit Resolution
- Up to 4 Analog Outputs
- 16 Digital I/O
- Two 32-Bit Counters
- No External Power Supply Required

The OM-USB-1208HS, OM-USB-1208HS-2AO and OM-USB-1208HS-4AO are USB 2.0 full-speed voltage input data acquisition modules (fully compatible with both USB 1.1 and USB 2.0 ports). These are stand-alone plug-and-play modules which draw power from the USB cable—no external power supply is required. All configurable options (including individual channel ranges) are software programmable, and the modules are fully software calibrated. All three OM-USB-1208HS modules provide 13-bit resolution, and 4 differential or 8 single-ended analog inputs. These modules support software programmable ranges from ±5 to ±20V in a differential configuration, and ±2.5 to ±10V, and 0 to 10V in a single-ended configuration. In software-paced mode, these modules can sample at a maximum of 4 kS/s. In hardware-paced mode, they can sample at a maximum of 1 MS/s.

The OM-USB-1208HS-2AO provides two 12-bit analog outputs, and the OM-USB-1208HS-4AO provides four 12-bit analog outputs. Both modules offer an output range of ±10V. Analog outputs update at a maximum rate of 5 kS/s in software-paced mode; in hardware-paced mode, each analog output updates at a maximum rate of 1 MS/s.

On these modules, 16 digital I/O can be programmed on each individual bit as either inputs or outputs. Each module supports two 32-bit TTL-level counters that accept frequency inputs of up to 20 MHz.

The packaging for the OM-USB-1208HS, OM-USB-1208HS-2AO and OM-USB-1208HS-4AO ensures ease of use in a variety of applications. The modules can easily be DIN-rail mounted for rack applications.

Software
The OM-USB-1208HS, OM-USB-1208HS-2AO, and OM-USB-1208HS-4AO modules ship with an impressive array of software, including the new 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 v8.5 through 2012) and InstaCal™ installation, calibration and test utility-powerful solutions for programmers and nonprogrammers alike. These modules operate under Microsoft Windows® XP (32-bit only) and VISTA/7/8 (32-bit and 64-bit) operating systems.

The OM-USB-1208HS, OM-USB-1208HS-2AO and OM-USB-1208HS-4AO data acquisition modules are 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. A comparison of some of the feature included in TracerDAQ vs TracerDAQ PRO is shown on the next page.
### Features Comparison

#### Strip Chart

<table>
<thead>
<tr>
<th>Features</th>
<th>TracerDAQ</th>
<th>TracerDAQ Pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Types</td>
<td>Analog input, temperature input, digital input, event counter</td>
<td>Analog input, temperature input, digital input, event counter</td>
</tr>
<tr>
<td>Number of Channels</td>
<td>8</td>
<td>48</td>
</tr>
<tr>
<td>Number of Lanes</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Maximum Samples per Channel</td>
<td>32,000</td>
<td>1 million</td>
</tr>
<tr>
<td>Alarm Conditions</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Measurements Window</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Enter Annotations</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Software Triggering</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Hardware Triggering</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Time-of-Day Triggering</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Linear Scaling</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### Oscilloscope

<table>
<thead>
<tr>
<th>Features</th>
<th>TracerDAQ</th>
<th>TracerDAQ Pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Type</td>
<td>Analog input</td>
<td>Analog input</td>
</tr>
<tr>
<td>Number of Channels</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Measurements Window</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference Channel</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Math Channel</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### Function Generator

<table>
<thead>
<tr>
<th>Features</th>
<th>TracerDAQ</th>
<th>TracerDAQ Pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Type</td>
<td>Analog output</td>
<td>Analog output</td>
</tr>
<tr>
<td>Number of Channels</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Waveform Types</td>
<td>Sine</td>
<td>Sine, square, triangle, flat, pulse, ramp, random, arbitrary</td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Phase</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Gate Ratio</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Rate Multiplier</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Sweep (Linear and Exponential)</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### Rate Generator

<table>
<thead>
<tr>
<th>Features</th>
<th>TracerDAQ</th>
<th>TracerDAQ Pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Type</td>
<td>Counter output</td>
<td>Counter output</td>
</tr>
<tr>
<td>Number of Channels</td>
<td>1</td>
<td>20</td>
</tr>
</tbody>
</table>
DATA ACQUISITION SYSTEMS

SPECIFICATIONS
ANALOG INPUT
A/D Converter: Successive approximation type
Input Ranges: Software selectable per channel
  Differential: ±20V, ±10V, ±5V
  (the voltage level on each individual AIN input is limited to ±14V)
  Single Ended: ±10V, ±5V, ±2.5V, 0 to 10V
Number of Channels: 4 differential/8 single-ended
Input Configuration: Multiplexed
Channel Gain Queue: 8 unique consecutive elements, software-configurable range for each channel
Absolute Maximum Input Voltage: CHx IN to GND
  Power On: ±25V maximum
  Power Off: ±12V maximum
Input Impedance: 35 MΩ minimum
Input Bandwidth (-3 dB): All input ranges, 2 MHz typical
Input Leakage Current: ±250 nA typ
Input Capacitance: 32 pf typical
Maximum Working Voltage: (Signal + Common Mode)
  ±20V: ±14V
  ±10V: ±11V
  ±5V: ±5.5V
Sampling Rate: 1 S/s to 1 MS/s, software programmable
Sample Clock Source: Internal A/D clock or AICKI
Burst Mode: Software-selectable, burst rate = 1 µs
Throughput
  Software-Paced: 33 to 4000 S/s type, system-dependent
  Hardware-Paced: 1 MS/s maximum
Resolution: 13-bits
A/D No Missing Codes
  (Uncalibrated) Differential (Mode): 13-bits
  Single Ended (Mode): 12-bits
CMRR: 60 Hz, 74 dB typical

ANALOG OUTPUT
D/A Converter: DAC7553
Number of Channels: 4 independent
Resolution: 12-bits
Output Range
  Calibrated: ±10V
  Uncalibrated: ±10.2V
D/A Update Rate
  Software Paced: 33 to 5000 S/s typ, system dependent
  Hardware Paced: 1 MHz maximum (per channel)

DC Voltage Analog Input Ranges and Absolute Accuracy
(Single-Ended Mode)

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Absolute Accuracy (LSB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>±10V</td>
<td>±5.10 typ, ±8.06 maximum</td>
</tr>
<tr>
<td>±5V</td>
<td>±2.63 typ, ±4.03 maximum</td>
</tr>
<tr>
<td>±2.5V</td>
<td>±1.59 typ, ±2.70 maximum</td>
</tr>
<tr>
<td>0 to 10V</td>
<td>±3.29 typ, ±5.13 maximum</td>
</tr>
</tbody>
</table>

Sample Clock Source: Internal D/A clock or AOCKI (AO external clock input pin)
Monotonicity: 12-bits
Output Current: ±3 mA maximum per channel
Power Up and Reset State: 0V
Output Noise: 0.53 mV rms
Absolute Accuracy: ±0.1%
Slew Rate: 6.7V/µs typical

DIGITAL I/O
Digital Type: CMOS
Number of I/O: 16
Configuration: Each bit may be configured as input (power on default) or output
Pull-Up Configuration: The port has 47 kΩ resistors configurable as pull-ups or pull-downs by an internal jumper (default setting is pull-up)
Digital I/O Transfer Rate (System Paced): 33 to 8000 port reads/writes or single-bit reads/writes per second typical, system dependent.
Input High Voltage: 2.0V minimum, 5.5V absolute maximum
Input Low Voltage: 0.8V maximum -0.5V absolute minimum, 0V recommended minimum
Output High Voltage: 4.4V minimum (IOH = -50 µA), 3.76V minimum (IOH = -24 mA)
Output Low Voltage: 0.1V maximum (IOL = 50 µA), 0.44V maximum (IOL = 24 mA)
Output Current: ±24 mA maximum per terminal

EXTERNAL TRIGGER
Trigger Source: TRIG input
Trigger Mode: Software configurable for edge- or level-sensitive, rising or falling edge, high or low level. Power on default is edge sensitive, rising edge.
Trigger Latency: 1 µs + 1 clock cycle maximum
Trigger Pulse Width: 100 ns minimum
Input Type: Schmitt trigger, 33 Ω series resistor and 47 kΩ pull-down to ground

DC Voltage Analog Input Ranges and Absolute Accuracy
(Differential Mode)

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Absolute Accuracy (LSB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>±20V</td>
<td>±9.55 typ, ±13.18 maximum</td>
</tr>
<tr>
<td>±10V</td>
<td>±4.59 typ, ±6.23 maximum</td>
</tr>
<tr>
<td>±5V</td>
<td>±2.25 typ, ±2.75maximum</td>
</tr>
</tbody>
</table>

Schmitt Trigger Hysteresis: 0.4 to 1.2V
Input High Voltage: 2.2V minimum, 5.5V absolute maximum
Input Low Voltage: 1.5V maximum, -0.5V absolute minimum, 0V recommended minimum

EXTERNAL ACQUISITION
SCAN CLOCK I/O
Terminal Names: AICKI, AICKO, AOCKI, AOCKO
Terminal Types
AxCCKI: Input, active on rising edge
AxCCKO: Output, power on default is 0V, active on rising edge
Terminal Descriptions
AxCCKI: Receives sampling clock from external source
AxCCKO: Outputs internal sampling clock (D/A or A/D clock) or pulse generated from AxCCKI when in external clock mode
Input Clock Rate: 1 MHz maximum
Clock Pulse Width
  AxCCKI: 400 ns minimum
  AxCCKO: 400 ns minimum
Input Type: Schmitt trigger, 33 Ω series resistor, 47 kΩ pull-down to ground
Schmitt Trigger Hysteresis: 0.4 to 1.2V
Input High Voltage: 2.2V minimum, 5.5V absolute maximum
Input Low Voltage: 1.5V maximum, -0.5V absolute minimum, 0V recommended minimum
Output High Voltage: 4.4V minimum (IOH = -50 µA), 3.76V minimum (IOH = -24 mA)
Output Low Voltage: 0.1V maximum (IOL = 50 µA), 0.44V maximum (IOL = 24 mA)
Output Current: ±24 mA maximum per terminal

COUNTERS
Counter Terminal Names: CTR0, CTR1
Counter Type: Event counter
Number of Channels: 2
Input Type: Schmitt trigger, 33 Ω series resistor, 47 kΩ pull-down to ground
### Data Acquisition Systems

**Schmitt Trigger Hysteresis:**
0.4 to 1.2V

**Input High Voltage:** 2.2V minimum, 5.5V absolute maximum

**Input Low Voltage:** 1.5V maximum, -0.5V absolute minimum, 0V recommended minimum

**Resolution:** 32-bits

**Maximum Input Frequency:** 20 MHz

**Counter Read/Write Rates (Software Paced):** 33 to 8000 reads/writes per second typ, system dependent

**High Pulse Width:** 25 ns minimum

**Low Pulse Width:** 25 ns minimum

### TIMER

**Timer Terminal Name:** TMR

**Timer Type:** PWM output with count, period, delay, and pulse width registers

**Output Value:** Default state is idle low with pulses high, software-selectable output invert

**Internal Clock Frequency:** 40 MHz

**Register Widths:** 32-bits

**High Pulse Width:** 20 ns minimum

**Low Pulse Width:** 20 ns minimum

**Output High Voltage:** 4.4V minimum (IOH = -50 µA), 3.76V minimum (IOH = -24 mA)

**Output Low Voltage:** 0.1V maximum (IOL = 50 µA), 0.44V maximum (IOL = 24 mA)

**Output Current:** ±24 mA maximum per pin

### MEMORY

**Data FIFO:** 4 kS analog input/4 kS analog output

**Non-Volatile Memory:** 32 KB (16 KB firmware storage, 16 KB calibration/user data)

### POWER

**Operating Modes:** Bus-powered, USB 5V supply

**Supply Current:** Total current consumption including 5V, and digital output and analog output currents

- **Suspend Mode:** <2.5 mA
- **Enumeration:** <100 mA
- **Run Mode:** <500 mA

**Power Consumption Excluding Analog and Digital Outputs**

- **Run Mode:** 1.175 W maximum (235 mA input current)

**Power Available for 5V, AICKO, AOCKO, TMR, Analog Outputs, Digital I/O:**

- **Run Mode:** 1.325 W maximum

**+5 V Output Voltage Range:**

- **Run Mode:** 4.5V minimum, 5.25V maximum

**Suspend Mode, Enumeration:** 0V

**+5V Output Current (Run Mode, No Other Output Loads):**

- 265 mA maximum (1.325 W)

### USB SPECIFICATIONS

**USB Device Type:** USB 2.0 (high-speed)

**USB Device Compatibility:**

- USB 1.1, 2.0

**USB Cable Length:** 5 m (16.4') maximum

### GENERAL

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

**Storage Temperature Range:** -40 to 85°C (-40 to 185°F)

**Humidity:** 0 to 90% RH non-condensing

**Communications:**

- USB 2.0 (high-speed)

**Acquisition Data Buffer:** 4 kS

**Signal I/O Connector:** 2 banks of screw-terminal blocks

**Dimensions:**

- 127 L x 89.9 W x 35.6 mm H (5.00 x 3.53 x 1.40”)

**Weight:** 160 g (5.6 oz)

---

To Order Visit [omega.com/om-usb-1208hs_series](http://omega.com/om-usb-1208hs_series) for Pricing and Details

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OM-USB-1208HS</td>
<td>High speed multifunction USB data acquisition module with eight 13-bit 1 MS/s analog inputs</td>
</tr>
<tr>
<td>OM-USB-1208HS-2AO</td>
<td>1 high speed multifunction USB data acquisition module with eight 13-bit 1 MS/s analog inputs and two 12-bit 1 MS/s analog outputs</td>
</tr>
<tr>
<td>OM-USB-1208HS-4AO</td>
<td>High speed multifunction USB data acquisition module with eight 13-bit 1 MS/s analog inputs and four 12-bit 1 MS/s analog outputs</td>
</tr>
<tr>
<td>SWD-TRACERDAQ-PRO</td>
<td>TracerDAQ Pro software</td>
</tr>
</tbody>
</table>

**OCW-1** OMEGACARE™ 1 year extended warranty (adds 1 year to standard 1 year warranty).

---

**To Order, Call ** [1-800-327-4333](tel:1-800-327-4333) **or Shop Online at [omega.com](http://omega.com)**