8-Channel Voltage Input USB Data Acquisition Modules

OM-USB-1208FS/OM-USB-1408FS/OM-USB-1608FS

• 8 Analog Voltage Inputs
• 12-Bit (OM-USB-1208FS), 14-Bit (OM-USB-1408FS) or 16-Bit (OM-USB-1608FS) Resolution
• Two 12-Bit Analog Outputs (OM-USB-1208FS, OM-USB-1408FS)
• 8 Digital I/O (USB-1608FS) or 16 Digital I/O (USB-1208FS, USB-1408FS)
• One 32-Bit Counter
• No External Power Supply Required

The OM-USB-1208FS, OM-USB-1408FS and OM-USB-1608FS 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 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. The OM-USB-1208FS and OM-USB-1408FS feature eight analog voltage input channels that are processed through a single A/D converter. The analog inputs to the OM-USB-1208FS are software configurable for either eight 11-bit single-ended or four 12-bit differential inputs. The analog inputs to the OM-USB-1408FS are software configurable for either eight 13-bit single-ended or four 14-bit differential inputs.

The OM-USB-1608FS offers true simultaneous sampling of up to eight 16-bit single-ended analog voltage input channels which is accomplished through the use of an individual A/D converter per channel. Models USB-1208FS and USB-1408FS have 8 independent digital I/O channels and model OM-USB-1608FS has 16 digital I/O.

All modules have one 32-bit counter channel. The digital I/O channels are software programmable for input or output. Additionally, models OM-USB-1208FS and OM-USB-1408FS have two 12-bit analog outputs.

The packaging for the OM-USB-1208FS, OM-USB-1408FS and OM-USB-1608FS ensures ease of use in a variety of applications.

### Software

The OM-USB-1208FS, OM-USB-1408FS and OM-USB-1608FS 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-1208FS, OM-USB-1408FS and OM-USB-1608FS 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 features included in TracerDAQ vs TracerDAQ PRO is shown on the next page.

<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution</th>
<th>Analog Inputs</th>
<th>Digital I/O</th>
<th>Counter</th>
<th>Analog Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>OM-USB-1208FS</td>
<td>12-bit</td>
<td>4 DE/8 SE</td>
<td>16</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>OM-USB-1408FS</td>
<td>14-bit</td>
<td>4 DE/8 SE</td>
<td>16</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>OM-USB-1608FS</td>
<td>16-bit</td>
<td>8 SE</td>
<td>8</td>
<td>1</td>
<td>–</td>
</tr>
</tbody>
</table>

OM-USB-1208FS shown actual size.
Features Comparison

**Strip Chart**

<table>
<thead>
<tr>
<th>Feature</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>Feature</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>

**Rate Generator**

<table>
<thead>
<tr>
<th>Feature</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>
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</tbody>
</table>

**Function Generator**

<table>
<thead>
<tr>
<th>Feature</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>
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</table>
DC Voltage Ranges and Absolute Accuracy at 25°C (mV, typical)

<table>
<thead>
<tr>
<th>Range</th>
<th>OM-USB-1208FS</th>
<th>OM-USB-1408FS</th>
<th>OM-USB-1208FS</th>
<th>OM-USB-1408FS</th>
<th>OM-USB-1608FS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single-Ended</td>
<td>Differential</td>
<td>Single-Ended</td>
<td>Differential</td>
<td></td>
</tr>
<tr>
<td>± 20V</td>
<td>–</td>
<td>–</td>
<td>± 11.0 mV</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>± 10V</td>
<td>–</td>
<td>–</td>
<td>± 7.3 mV</td>
<td>± 5.7 mV</td>
<td>–</td>
</tr>
<tr>
<td>± 5V</td>
<td>± 11.0 mV</td>
<td>± 3.7 mV</td>
<td>± 3.0 mV</td>
<td>± 3.0 mV</td>
<td>± 3.0 mV</td>
</tr>
<tr>
<td>± 4V</td>
<td>–</td>
<td>± 2.9 mV</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>± 2.5V</td>
<td>–</td>
<td>± 1.8 mV</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>± 2V</td>
<td>–</td>
<td>± 1.7 mV</td>
<td>–</td>
<td>–</td>
<td>± 1.3 mV</td>
</tr>
<tr>
<td>± 1.5V</td>
<td>–</td>
<td>± 1.2 mV</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>± 1V</td>
<td>–</td>
<td>± 1.1 mV</td>
<td>–</td>
<td>–</td>
<td>± 0.7 mV</td>
</tr>
</tbody>
</table>

Trigger Source: Software selectable
Pacer Source: Software selectable

ANALOG OUTPUTS
(OM-USB-1208FS, OM-USB-1408FS Only)
Number of Channels: 2
Resolution: 12-bit (OM-USB-1208FS), 16-bit (OM-USB-1408FS)

OM-USB-1208FS: Eight analog input channels, one 16-bit A/D converter
OM-USB-1408FS: Eight analog input channels, one 16-bit A/D converter

ANALOG INPUTS
A/D Converter: OM-USB-1208FS and OM-USB-1408FS; One successive approximation
A/D Converter: OM-USB-1608FS; Eight successive approximation
A/D converters

Number of Channels: OM-USB-1208FS and OM-USB-1408FS: 8 single-ended/ 4 differential:
OM-USB-1608FS: 8 single-ended

Resolution:
OM-USB-1208FS: 12-bit (differential), 11-bit (single-ended):
OM-USB-1408FS: 14-bit (differential), 13-bit (single-ended):
OM-USB-1608FS: 16-bit (single-ended)

Integral Linearity Error:
OM-USB-1208FS: ±1 LSB typical
OM-USB-1408FS: ±0.5 LSB typical
OM-USB-1608FS: ±1 LSB typical

Input Common-Mode Voltage Range for Linear Operation (Single-Ended Mode):
±10V max

Input Impedance:
OM-USB-1208FS and OM-USB-1408FS: ±28V maximum
OM-USB-1608FS: ±15V maximum

Input Impedance:
OM-USB-1208FS and OM-USB-1408FS: 122 kΩ minimum
OM-USB-1608FS: 100 MΩ minimum

Throughput:
OM-USB-1208FS and OM-USB-1408FS: 250 S/s typical (software paced, PC dependent);
50 kS/s (continuous scan);
OM-USB-1608FS: 500 S/s all channels (software paced);
100 Ks/s divided by the number of channels (50 Ks/s maximum per channel, scan to PC memory);
200 Ks/s divided by the number of channels (50 Ks/s maximum per channel, burst scan to 32K sample FIFO)

Channel Gain Queue: Software configurable channel, range and gain

Trigger Source: Software selectable
Pacer Source: Software selectable

ANALOG OUTPUTS
(OM-USB-1208FS, OM-USB-1408FS Only)
Number of Channels: 2
Resolution: 12-bit (OM-USB-1208FS, OM-USB-1408FS)

OM-USB-1208FS: Eight analog input channels, one 16-bit A/D converter
OM-USB-1408FS: Eight analog input channels, one 16-bit A/D converter

OM-USB-1608FS: Eight analog input channels, one 16-bit A/D converter

Throughput: 500 Ks/s (continuous scan), 250 Ks/s single channel, 100 Ks/s (software paced, PC dependent)

Digital I/O Channels:
OM-USB-1208FS: 16 for OM-USB-1208FS and OM-USB-1408FS
OM-USB-1608FS: 8 for OM-USB-1608FS

Type: CMOS
Configuration: Each DIO bit can be independently configured for input or output. Power on reset is input mode.

Pull-Up/Pull-Down Configuration:
All pins pulled up to 5V via 47 kΩ resistors (default). Pull-down to ground (GND) also available.

Digital I/O Transfer Rate:
(Software Paced): Digital input; 15 mA per D/A channel
Slew Rate: 0.8 V/us typical

DIGITAL I/O
Number of Digital I/O Channels:
16 for OM-USB-1208FS and OM-USB-1408FS
8 for OM-USB-1608FS

Type: CMOS
Configuration: Each DIO bit can be independently configured for input or output. Power on reset is input mode.

Pull-Up/Pull-Down Configuration:
All pins pulled up to 5V via 47 kΩ resistors (default). Pull-down to ground (GND) also available.

Digital I/O Transfer Rate:
(Software Paced): Digital input; 15 mA per D/A channel
Slew Rate: 0.8 V/us typical

EXTERNAL TRIGGER
Source: External digital
Mode: Software selectable
Latency: 10 us maximum
Pulse Width: 1 us minimum
Input High Voltage: 4.0V minimum, 5.5V absolute maximum
Input Low Voltage: 1.0V maximum, -0.5V absolute minimum
Input Leakage Current: ±1.0 uA typical

EXTERNAL CLOCK INPUT/OUTPUT
Pin Name: SYNC, software selectable direction (bidirectional); output (default), outputs internal A/D pacer clock; input, receives A/D pacer clock from external source
Input Clock Rate: 50 MHz maximum
Clock Pulse Width: 1 us minimum (input mode), 5 us minimum (output mode)
Input Leakage Current: ±1.0 uA (input mode)

Input High Voltage: 4.0 V minimum, 5.5 V absolute maximum
Input Low Voltage: 1.0 V maximum, -0.5 V absolute minimum
Input High Voltage: 1.0V minimum, 5.5V absolute maximum
Input Low Voltage: 1.0V maximum, -0.5V absolute minimum
Input Leakage Current: ±1.0 uA (input mode)

Input High Voltage: 4.0 V minimum, 5.5 V absolute maximum
Input Low Voltage: 1.0 V maximum, -0.5 V absolute minimum
Input High Voltage: 1.0V minimum, 5.5V absolute maximum
Input Low Voltage: 1.0V maximum, -0.5V absolute minimum
Input Leakage Current: ±1.0 uA (input mode)
### GENERAL

**Power Supply Voltage**  
(Supplied by USB Port):  
4.75 V minimum to 5.25 V maximum  

**Power Supply Current**  
(Supplied by USB Port):  
<100 mA typical (USB enumeration)  

**User 5V Output Voltage Range**  
(connected to self-powered hub or externally powered root port hub):  
- OM-USB-1208FS and OM-USB-1408FS:  
  4.5V minimum to 5.25V maximum  
- OM-USB-1608FS:  
  4.9V minimum to 5.1V maximum  

**User 5V Output Voltage Range**  
(connected to bus powered hub):  
- OM-USB-1208FS and OM-USB-1408FS only:  
  4.1V minimum to 5.25V maximum  

**User 5V Output Current**  
(connected to self-powered hub or externally powered root port hub):  
- OM-USB-1208FS and OM-USB-1408FS:  
  420 mA maximum (total amount current that can be sourced from the USB 5V, analog outputs and digital outputs)  
- OM-USB-1608FS:  
  350 mA maximum (total amount of current that can be sourced from the USB 5V and digital outputs)  

**User 5V Output Current**  
(connected to bus powered hub):  
- OM-USB-1208FS and OM-USB-1408FS only:  
  20 mA maximum (total amount of current that can be sourced from the USB 5V, analog outputs and digital outputs)  

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

**Device Compatibility:**  
USB 1.1, USB 2.0  

**USB Cable Length:** 3 m (10')  

**Dimensions:**  
127 L x 89 W x 36 mm H  
(5.0 x 3.5 x 1.4")  

**Input Connections:** Screw terminal blocks (accept 16 to 30 AWG wire)  

**Operating Temperature:**  
0 to 70°C (32 to 158°F)  

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

**Weight:** 91 g (3.2 oz)

### Model Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OM-USB-1208FS</td>
<td>12-bit voltage input USB data acquisition module (4 DE/8 SE analog input channels, 16 digital I/O, 1 counter, 2 analog outputs)</td>
</tr>
<tr>
<td>OM-USB-1408FS</td>
<td>14-bit voltage input USB data acquisition module (4 DE/8 SE analog input channels, 16 digital I/O, 1 counter, 2 analog outputs)</td>
</tr>
<tr>
<td>OM-USB-1608FS</td>
<td>16-bit voltage input USB data acquisition module (8 SE analog input channels, 8 digital I/O, 1 counter)</td>
</tr>
<tr>
<td>SWD-TRACERDAQ-PRO</td>
<td>TracerDAQ Pro software</td>
</tr>
</tbody>
</table>

All models include a 1.8 m (6') USB cable, software and user manual on CD.

**Ordering Example:** OM-USB-1208FS, 12-bit voltage input USB data acquisition module and OCW-1, 1-year extended warranty adds 1 year to standard 1-year warranty.