4, 8, or 16-Channel Analog Voltage Output USB Data Acquisition Modules

OM-USB-3100 Series

- 4, 8, or 16 Analog Voltage Outputs
- 16-Bit Resolution
- 100 S/s Update Rate
- 8 Digital I/O, One 32-Bit Counter/Timer
- Synchronous DAC Updates

The new OM-USB-3101, OM-USB-3103, and OM-USB-3105 are voltage output USB 2.0 full-speed modules. Each module provides 4, 8, or 16 voltage outputs. All modules provide synchronous and concurrent voltage updates.

All OM-USB-3100 Series modules provide eight digital I/O lines and one 32-bit event counter and are powered by the 5V USB supply from the computer.

**Analog Output**

All OM-USB-3100 Series modules provide either 4, 8, or 16 channels of 16-bit analog output. Each channel is software-selectable for either a bipolar voltage output range of ±10 V or unipolar range of 0 to 10V. Channel outputs can be updated individually or simultaneously.

**Software**

The OM-USB-3100 Series 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 VI's 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 AND 8 (32-bit and 64-bit) operating systems.

**Synchronous DAC Updates**

All OM-USB-3100 Series modules have a synchronous DAC load connection pin (SYNCLD) that simultaneously updates DAC outputs on multiple devices. You can configure this with software as an input (slave mode) or as an output (master mode). In slave mode, the SYNCLD pin receives the D/A LOAD signal from an external source. When the SYNCLD pin receives the trigger signal, the analog outputs are updated simultaneously. In master mode, the internal D/A LOAD signal is sent to the SYNCLD pin. You can then synchronize with a second device of the same type and simultaneously update the DAC outputs on each device. On power up and reset, the SYNCLD pin is set to slave mode (input).

**Digital I/O**

All OM-USB-3100 Series modules have eight bidirectional digital I/O connections. The digital DIO lines can be independently programmed for input or output. All digital pins are floating by default. A screw terminal connection is provided to configure for pull-up (5V) or pull-down (0V).

**Counter Input**

Each OM-USB-3100 Series module has a 32-bit event counter for counting TTL pulses. The counter increments when the TTL levels transition from low to high. The counter accepts frequency inputs of up to 1 MHz.

**SPECIFICATIONS**

**ANALOG VOLTAGE OUTPUT**

**D/A Converter:** DAC8554

**Number of Channels:**
- OM-USB-3101: 4
- OM-USB-3103: 8
- OM-USB-3105: 16

**Output Ranges (Software-Selectable):**
- **Calibrated:** ±10V, 0V to 10V
- **Uncalibrated:** ±10.2V, -0.04V to 10.08V

**Resolution:** 16 bits

**Absolute Accuracy Components—Calibrated Output**

<table>
<thead>
<tr>
<th>Range</th>
<th>% of Reading</th>
<th>Offset</th>
<th>Temperature Drift (%/°C)</th>
<th>Absolute Accuracy at FS</th>
</tr>
</thead>
<tbody>
<tr>
<td>±10V</td>
<td>±0.0183</td>
<td>±1.831 mV</td>
<td>0.00055</td>
<td>±3.661 mV</td>
</tr>
<tr>
<td>0 to 10V</td>
<td>±0.0183</td>
<td>±0.915 mV</td>
<td>0.00055</td>
<td>±2.746 mV</td>
</tr>
</tbody>
</table>

**Absolute Accuracy (Calibrated Output):**
- ±10V: ±4.0 LSB
- 0 to 10V: ±22.0 LSB

**Relative Accuracy (±LSB):**
- ±10V, 0 to 10V: 4.0 typical, 12.0 maximum
Output Transient
(±10V to 0 to 10V or 0 to 10V to ±10V):
Range Selection: The output voltage level defaults to 0V when the output voltage range is reconfigured, the host computer is reset, shut down, or suspended, or a reset command is issued to the device.
  Duration: 5 µs typical
  Amplitude: 5V p-p typical

Host Computer is Reset, Powered On, Suspended, or a Reset Command is Issued to Device:
The duration of this output transient is depends highly on the enumeration process of the host computer. Typically, the output is stable after two seconds.
  Duration: 2 s typical
  Amplitude: 2V p-p typical

Initial Power On:
  Duration: 50 ms typical
  Amplitude: 5V peak typical

Differential Nonlinearity: The maximum differential nonlinearity specification applies to the entire operating temperature range. This specification also accounts for the maximum errors due to the software calibration algorithm (in calibrated mode only) and the DAC8554 nonlinearities
  Calibrated: ±1.25 LSB typical, -2 LSB to 1 LSB maximum
  Uncalibrated: ±0.25 LSB typical, ±1 LSB maximum

Output Current (VOUTx Pins): ±3.5 mA typical

Output Short-Circuit Protection (VOUTx Connected to AGND): Indefinite

Output Coupling: DC

Power On and Reset State:
  DACs Cleared to Zero-Scale: 0V, ±50 mV typical
  Output Range: 0 to 10V

Output Noise:
  0 to 10V Range: 14.95 µVrms typical
  ±10V Range: 31.67 µVrms typical

Settling Time (To 1 LSB Accuracy): 25 µS typical

Slew Rate:
  0 to 10V Range: 1.20V/µS typical
  ±10V Range: 1.20V/µS typical

Throughput:
  Single-Channel: 100 S/s maximum, system-dependent
  Multichannel: 100 S/s/#ch maximum, system-dependent

ANALOG OUTPUT CALIBRATION
Recommended Warm-Up Time: 15 minutes minimum on-board precision reference
  DC Level: 5.000V ±1 mV maximum
  Tempco: ±10 ppm/°C maximum
  Long-Term Stability: ±10 ppm/SQRT(1000 hrs)

Calibration Method: Software calibration
Calibration Interval: 1 year

DIGITAL I/O
Digital Logic Type: CMOS
Number of I/O: 8
Schmidt Trigger Hysteresis: 20 to 100 mV
Input Leakage Current: ±1.0 µA typical
Input Frequency: 1 MHz maximum
High Pulse Width: 500 ns minimum
Low Pulse Width: 500 ns minimum
Input High Voltage: 4.0V minimum, 5.5V absolute maximum
Input Low Voltage: 1.0V maximum, -0.5V absolute minimum

MEMORY
EEPROM: 256 bytes
EEPROM Configuration:
  Address Range: 0x000-0x0FF
  Access: Read/write
  Description: 256 bytes user data

MICROCONTROLLER
Type: High performance 8-bit RISC microcontroller
Program Memory: 16,384 words
Data Memory: 2048 bytes

GENERAL
Operating Environment: 0 to 70°C (32 to 158°F), 0 to 90% RH non-condensing
Storage Temperature: -40 to 85°C (-40 to 185°F)
Communications: USB 2.0 full-speed mode (12 Mbps)
Signal I/O Connector: Screw terminals

Power:
Supply Current (USB Enumeration): <100 mA
Supply Current (Quiescent): Total quiescent current requirement includes up to 10 mA for the status LED. This does not include any potential loading of the digital I/O bits, 5V user terminal, or the VOUTx outputs.
OM-USB-3101: 140 mA typical
OM-USB-3103: 160 mA typical
OM-USB-3105: 200 mA typical

5V User Output Voltage Range: 4.5 to 5.25V (assumes USB power supply is within specified limits)
5V User Output Current: 10 mA maximum (refers to the total amount of current that can be sourced from the 5V user terminal for general use; also includes any additional contribution due to DIO loading

Dimensions: 127 L × 88.9 W × 35.6 H mm (5.0 × 3.5 × 1.4")
Weight: 159 g (0.35 lb)

The OM-USB-3100 Series 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 below.

<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>

Features Comparison
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>

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>
</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>
</tr>
</tbody>
</table>

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

To Order

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OM-USB-3101</td>
<td>4-channel, 16-bit analog voltage output USB module</td>
</tr>
<tr>
<td>OM-USB-3103</td>
<td>8-channel, 16-bit analog voltage output USB module</td>
</tr>
<tr>
<td>OM-USB-3105</td>
<td>16-channel, 16-bit analog voltage output USB module</td>
</tr>
<tr>
<td>SWD-TRACERDAQ-PRO</td>
<td>TracerDAQ Pro software</td>
</tr>
</tbody>
</table>

Comes complete with 2 m (6') USB cable and software and operator’s manual on CD.

Ordering Example: OM-USB-3101, 4-channel, 16-bit analog voltage output USB module and OCW-1, OMEGACARE extends standard 1 year warranty to a total of 2 years.