



8-Channel Multifunction Ethernet Data Acquisition Module

OM-NET-1608



- ✓ 16-Bit High-Speed Ethernet Device
- ✓ Sample Rates up to 250 kS/s
- ✓ 4 Differential (DIFF) or 8 Single-Ended (SE) Analog Inputs
- ✓ Two 16-Bit Analog Outputs
- ✓ Eight Individually-Configurable Digital I/O Lines
- ✓ One 32-Bit Counter Input
- ✓ Includes a Built-In 10/100 BASE-T Auto-Negotiation, High-Speed Communication Port
- ✓ Requires a TCP/IP and UDP Connection to a Network or Computer
- ✓ Includes CAT-6 Ethernet Cable and 5V Power Supply Adaptor (Required to Provide External Power)
- ✓ TracerDAQ® Software Included for Acquiring and Displaying Data and Generating Signals
- ✓ Universal Library Includes Support for Visual Studio® and Visual Studio.NET, Including Examples for Visual C++®, Visual C#®, Visual Basic®, and Visual Basic® .NET
- ✓ Comprehensive Drivers for DASyLab® and NI LabVIEW™
- ✓ InstaCal Software Utility for Installing, Calibrating, and Testing
- ✓ Supported Operating Systems: Windows® VISTA/7/8/10 (32- and 64-Bit)

The Ethernet-based OM-NET-1608 is a low-cost, high-speed, multifunction I/O data acquisition device that measures eight analog channels at 250 kS/s aggregate with 16-bit resolution. This device also offers two analog outputs, eight digital I/O channels, and one counter input.

Ethernet Interface

The OM-NET-1608 has a built-in 10/100 BASE-T auto-negotiation, high-speed communication port. The networking protocols are TCP/IP and UDP. Once connected to the network, the device can be remotely accessed and configured through software from anywhere on the network. Only one user at a time can access the OM-NET-1608. Software is required to actively communicate with the OM-NET-1608 over Ethernet. The device does not operate as a stand-alone data logger.



OM-NET-1608 shown smaller than actual size.

Analog Input

The OM-NET-1608 provides 16-bit analog inputs that are software-selectable as four differential (DIFF) or eight single-ended (SE) inputs. The device supports input ranges of $\pm 10V$, $\pm 5V$, $\pm 2V$, and $\pm 1V$ that are software-selectable per channel.

Analog Output

The OM-NET-1608 has two 16-bit, software-paced analog outputs that can be updated at a rate of 500 S/s. The output range is fixed at $\pm 10V$.

Trigger Input

The OM-NET-1608 has an external digital trigger input. The trigger mode is software-selectable for edge- or level-sensitive mode. You can configure edge-sensitive mode for either rising or falling edge. In level-sensitive mode, you can configure for either high or low level. The default setting at power up is edge-sensitive, rising edge.

Digital I/O

Eight bi-directional digital I/O bits are individually-configurable for input or output. The digital I/O terminals can detect the state of any TTL-level input. You can configure for pull-up (5V) or pull-down (0V) with an onboard jumper.

Counter Input

One 32-bit event counter can count TTL pulses. The counter accept inputs of up to 10 MHz.

Clock I/O

The OM-NET-1608 has one external clock input and one clock output for analog inputs.

Calibration

OM-NET-1608 devices are factory-calibrated. Specifications are guaranteed for one year. For calibration beyond one year, return the device to the factory for recalibration.



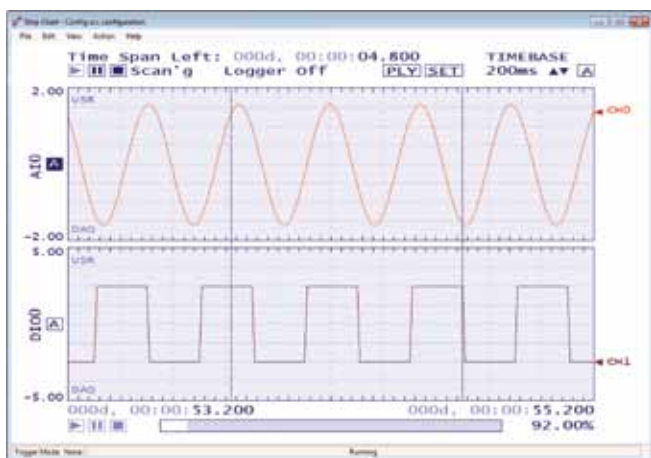
Software

The OM-NET-1608 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- and 64-bit) operating systems.

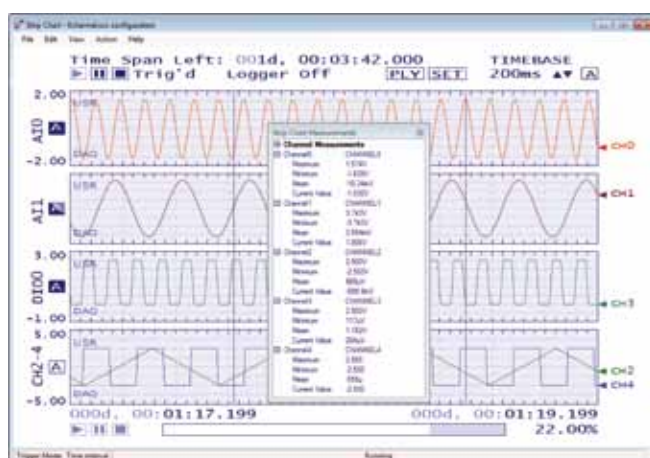
The OM-NET-1608 data acquisition module is supplied with TracerDAQ software which is a collection of four virtual instrument applications used to graphically display and store input data and generate output signals:

- 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 shown below.



TracerDAQ Strip Chart.



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

ANALOG INPUT

A/D Converter Type: Successive approximation

ADC Resolution: 16-bits

Number of Channels: 4 differential (DIFF)/8 single-ended (SE), software-selectable

Input Voltage Range: $\pm 10V$, $\pm 5V$, $\pm 2V$, $\pm 1V$ (software-selectable per channel)

Absolute Max Input Voltage (CHx relative to AGND): $\pm 20V$ max (power on), $\pm 12V$ max (power off)

Input Impedance: 1 G Ω (power on), 1200 Ω (power off)

Input Bias Current: ± 10 nA

Input Bandwidth (All Input Ranges, Small Signal [-3 dB]): 700 kHz

Input Capacitance: 60 pF

Max Working Voltage (Signal + Common Mode):

$\pm 10V$ Range: $\pm 10.2V$ max relative to AGND

$\pm 5V$ Range: $\pm 10.2V$ max relative to AGND

$\pm 2V$ Range: $\pm 9.5V$ max relative to AGND

$\pm 1V$ Range: $\pm 9.0V$ max relative to AGND

Common Mode Rejection Ratio ($f_{IN} = 60$ Hz, All Input Ranges): 86 dB

Crosstalk (Adjacent Differential Mode Channels, DC to 10 kHz): -75 dB

Input Coupling: DC

Sample Rate: 0.019 Hz to 250 kHz, software-selectable

Trigger Source: TRIG (see External Trigger)

Sample Clock Source: Internal A/D clock or external A/D clock (AICKI pin)

Internal Sample Clock Stability: ± 50 ppm

Internal Sample Clock Timebase: 80 MHz timer with 32-bit period (available frequencies are 80 MHz/integer period)

Throughput: This is the typical throughput when the device and host are both connected by Ethernet to the same local network; the throughput can vary significantly if a wireless connection is involved or data is sent over the internet and is not guaranteed

Software Paced: 1000 to 5000 S/s typ, on local network

Hardware Paced: 250 kS/s max

Channel Gain Queue (Up To 8 Elements): Software-selectable channel and range for each queue element

Warm-Up Time: 15 minutes min

Noise Performance: For the peak to peak noise distribution test, a differential input channel is connected to AGND at the input terminal block, and 16384 samples are acquired at the maximum rate available at each setting

Noise Performance Specifications

Range	Counts	LSB _{rms}
$\pm 10V$	6	0.91
$\pm 5V$	6	0.91
$\pm 2V$	7	1.06
$\pm 1V$	9	1.36

Settling Time: Settling time is defined as the accuracy that can be expected after one conversion when switching from a channel with a DC input at one extreme of full scale to another channel with a DC input at the other extreme of full scale; both input channels are configured for the same input range

Input Settling Time Specifications in μS , typical

Range	4 μS Settling Accuracy (% FSR)	6 μS Settling Accuracy (% FSR)	10 μS Settling Accuracy (% FSR)
$\pm 10V$	0.0061	0.0031	0.0015
$\pm 5V$	0.0061	0.0031	0.0015
$\pm 2V$	0.0061	0.0031	0.0015
$\pm 1V$	0.0061	0.0031	0.0015

ANALOG OUTPUT

Number of Channels: 2

Resolution: 16-bits

Output Ranges (Calibrated): $\pm 10V$

Output Transient

Powered On

Duration: 5 ms

Amplitude: 2V p-p

Powered Off

Duration: 400 ms

Amplitude: 10V p-p



Differential Non-Linearity (16-bit Monotonic): ± 0.35 LSB typ, ± 1 LSB max

Output Current (AOUTx Pins): ± 3.5 mA max (leave unused AOUTx output channels disconnected)

Output Coupling: DC

Power On and Reset State: DACs cleared to uncalibrated zero-scale: 0V, ± 50 mV unless the alarm function is enabled for the output; AOUTx defaults to 0V whenever the device is powered on or a reset command is issued to the device, unless the alarm functionality is enabled for the output

Alarm Functionality: Either or both outputs may be configured to go to defined values when an Ethernet connection with a host is established or lost

Slew Rate: 5V/ μ s

Throughput (Software Paced): 1000 to 5000 S/s typ, on local network. This is the typical throughput when the device and host are both connected by Ethernet to the same local network. The throughput can vary significantly, and typical throughput is not guaranteed if a wireless connection is involved or data is sent over the internet

Calibrated Absolute Accuracy (Analog Output)

Range: ± 10 V

Absolute Accuracy: (± 18.7 LSB)

CALIBRATED ABSOLUTE ACCURACY COMPONENTS (ANALOG OUTPUT)

Range: ± 10 V

% of Reading: ± 0.024

Offset: ± 2.2 mV

Offset Tempco: 30.1 μ V/ $^{\circ}$ C

Gain Tempco: 13.2 ppm of range/ $^{\circ}$ C

Relative Accuracy (Analog Output)

Range: ± 10 V

Relative Accuracy (INL): ± 4.0 LSB typ

Analog Input DC Voltage Measurement Accuracy DC Accuracy Components and Specifications. All values are (\pm)

Range	Gain Error (% of reading)	Offset Error (μ V)	INL Error (% of range)	Absolute Accuracy at Full Scale (μ V)	Gain Temperature Coefficient (% reading/ $^{\circ}$ C)	Offset Temperature Coefficient (μ V/ $^{\circ}$ C)
± 10 V	0.024	915	0.0076	4075	0.0014	47
± 5 V	0.024	686	0.0076	2266	0.0014	24
± 2 V	0.024	336	0.0076	968	0.0014	10
± 1 V	0.024	245	0.0076	561	0.0014	5

ANALOG INPUT/OUTPUT CALIBRATION

Recommended Warm-Up Time: 15 minutes min

Calibration Method: Factory

Calibration Interval: 1 year (factory calibration)

DIGITAL INPUT/OUTPUT

Digital Type: 5V TTL input/advanced BiCMOS output

Number of I/O: 8

Configuration: Independently-configured for input or output

Pull-Up Configuration: All pins pulled up to 5V using 47 K resistors (default); can be changed to pull-down using an internal jumper

Digital I/O Transfer Rate (System-Paced): 100 to 5000 port reads/writes or single bit reads/writes per second typ, on local network. This is the typical throughput when the device and host are both connected by Ethernet to the same local network. The throughput can vary significantly, and typical throughput is not guaranteed if a wireless connection is involved or data is sent over the internet.

Alarm Functionality: Any combination of DIO bits may be configured to become outputs and go to defined values when an ethernet connection with a host is established or lost

Power On and Reset State: All bits are input unless the alarm functionality is enabled for them

Input High Voltage Threshold: 2.0V min

Input High Voltage Limit: 5.5V absolute max

Input Low Voltage Threshold: 0.8V max

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

Output High Voltage: 3.8V typ at no load, 3.0V min (IOH = -3 mA), 2.0V min (IOH = -32 mA)

Output Low Voltage: 0.15V typ at no load, 0.55V max (IOL = 64 mA)

Power On and Reset State: Input

EXTERNAL TRIGGER

Trigger Source (External Digital): TRIG

Trigger Mode: Software-selectable edge or level sensitive; user configurable for CMOS-compatible rising or falling edge, high or low level

Trigger Latency: 2 μ s + 1 pacer clock cycle max

Trigger Pulse Width: 1 μ s min

Input Type: Schmitt trigger, 47 k Ω pull-down to ground

Schmitt Trigger Hysteresis: 1.01V typ, 0.6V min, 1.5V max

Input High Voltage Threshold: 2.43V typ, 1.9V min, 3.1V max

Input High Voltage Limit: 5.5V absolute max

Input Low Voltage Threshold: 1.42V typ, 1.0V min, 2.0V max

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

EXTERNAL CLOCK INPUT/OUTPUT

Terminal Names: AICKI, AICKO

Terminal Types

AICKI: Input (receives A/D pacer clock from external source)

AICKO: Output (outputs internal A/D pacer clock)

Input Clock Rate: 250 kHz max

Clock Pulse Width

AICKI: 1 μ s min

AICKO: 1.8 μ s min

Clock Mode: Edge-sensitive, rising

Input Type: Schmitt trigger, 47 k Ω pull-down to ground



Schmitt Trigger Hysteresis: 1.01V typ, 0.6V min, 1.5V max
Input High Voltage Threshold: 2.43V typ, 1.9V min, 3.1V max
Input High Voltage Limit: 5.5V absolute max
Input Low Voltage Threshold: 1.42V typ, 1.0V min, 2.0V max
Input Low Voltage Limit: -0.5V absolute min, 0V recommended min

Output High Voltage: 4.4V min (IOH = -50 μ A), 3.80V min (IOH = -8 mA)
Output Low Voltage: 0.1V max (IOL = 50 μ A), 0.44V max (IOL = 8 mA)

COUNTER

Pin Name: CTR
Counter Type: Event counter
Number of Channels: 1
Input Type: Schmitt trigger, 47 k Ω pull-down to ground
Input Source: CTR screw terminal
Resolution: 32-bits
Schmitt Trigger Hysteresis: 1.01V typ, 0.6V min, 1.5V max
Input High Voltage Threshold: 2.43V typ, 1.9V min, 3.1V max
Input High Voltage Limit: 5.5V absolute max
Input Low Voltage Threshold: 1.42V typ, 1.0V min, 2.0V max
Input Low Voltage Limit: -0.5V absolute min, 0V recommended min
Input Frequency: 10 MHz max
High Pulse Width: 50 ns min
Low Pulse Width: 50 ns min

MEMORY

Data FIFO (Analog Input): 49,152 samples
Non-Volatile Memory: 2048 bytes (768 bytes for calibration, 256 bytes for user, 1024 bytes for network settings)

POWER

External Power Supply: 5V, 1A (via included AC adaptor)
Supply Current (Quiescent Current): 330 mA typ (this is the total quiescent current requirement for the device that includes the LEDs and does not include any potential loading of the digital I/O bits, +VO terminal, or the AOUTX outputs), 710 mA max including all external loading
User Output Voltage Range (Available at +VO Terminal): 4.40V min to 5.25V max, assumes supplied AC adaptor is used
User Output Current (Available at +VO Terminal): 10 mA max

NETWORK

Ethernet Connection
Ethernet Type: 100 Base-TX, 10 Base-T
Communication Rates: 10/100 Mbps, auto-negotiated
Connector: RJ-45, 8 position
Cable Length: 100 meters max
Additional Parameters: HP Auto-MDIX support

NETWORK INTERFACE

Protocols Used: TCP/IP (IPv4 only), UDP
Network Ports Used: UDP:54211 (discovery), UDP:6234 (bootloader only), TCP:54211 (commands), TCP:54212 (scan data)

Network IP Configuration:

DHCP + link-local, DHCP, static, link-local
Network Name: E-1608-xxxxxx, where xxxxxx are the lower 6 digits of the device MAC address
Network Name Publication: By NBNS (responds to b-node broadcasts, therefore only available on the local subnet)

NETWORK FACTORY DEFAULT SETTINGS

Factory Default IP Address: 192.168.0.101
Factory Default Subnet Mask: 255.255.255.0
Factory Default Gateway: 192.168.0.1
Factory Default DHCP Setting: DHCP + link-local enabled

NETWORK SECURITY

Security Implementation: TCP sockets are not opened unless application sends the correct PIN code (stored in non-volatile memory, may be changed by user, default value 0000)
Number of Concurrent Sessions: 1
Vulnerabilities: TCP sequence number approximation vulnerability

LED DISPLAYS AND THE FACTORY RESET BUTTON

Power LED (Top)

3.3 V < V_{ext} < 5.9 V: On
V_{ext} < 3.3V, V_{ext} > 5.9V: Off (power fault)

Activity LED (Bottom): On when there is a valid host connection and blinks when a command is received or an AInScan is running

ETHERNET CONNECTOR LEDS

Left, Green: Link/activity indicator; on when there is a valid ethernet link and blinks when network activity is detected
Right, Yellow: Speed indicator; on for 100 Mbps, off for 10 Mbps or no link
Factory Reset Button: Used to reset the network configuration settings to the factory default values

ENVIRONMENTAL

Operating Temperature Range: 0 to 55°C max (32 to 131°F)
Storage Temperature Range: -40 to 85°C max (-40 to 185°F)
Humidity: 0 to 90% RH non-condensing max

SCREW TERMINAL CONNECTORS

Connector Type: Screw terminal
Wire Gauge Range: 16 AWG to 30 AWG

MECHANICAL

Dimensions: 117.9 L x 82.8 W x 29.0 mm H (4.64 x 3.26 x 1.14")
Weight: 0.4 kg (0.88 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-NET-1608	8-channel multifunction ethernet data acquisition module
OM-NET-DINRAILKIT	DIN rail mounting kit for OM-NET-1608
OM-NET-PS	Spare AC power adaptor for OM-NET-1608, 100/240 Vac 50/60 Hz input, 5V output (includes field interchangeable plugs for US, UK, Europe and Australia)

Comes complete with 1 m (3.2') CAT-6 ethernet cable, universal AC adaptor, quick start guide, TracerDAQ software and operator's manual on CD.
Ordering Example: OM-NET-1608 8-channel multifunction Ethernet data acquisition module and OCW-1 OMEGACARESM 1-year extended warranty for OM-NET-1608, (adds 1 year to standard 1-year warranty).