AC Frequency and Period¹

<table>
<thead>
<tr>
<th>Range</th>
<th>Frequency Range</th>
<th>Mode</th>
<th>Resolution Digits</th>
<th>1 Year Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mV to 300 V</td>
<td>3 Hz to 1.5 MHz</td>
<td>Slow</td>
<td>6½</td>
<td>0.3 PPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>5½</td>
<td>60 PPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fast</td>
<td>4½</td>
<td>60 PPM, Offset 30.0 PPM</td>
</tr>
</tbody>
</table>

Notes: 1. Input signal > 10% of range.

System Speed

<table>
<thead>
<tr>
<th>Event</th>
<th>DCV/DCI</th>
<th>ACV</th>
<th>AG (0.01 A &amp; 0.1 A)</th>
<th>DVM/VNA</th>
<th>2-W resistance (&lt;1 MΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function Change</td>
<td>9/s</td>
<td>1/s</td>
<td>0.4/s, high filter</td>
<td>0.25/s, high filter</td>
<td></td>
</tr>
<tr>
<td>Range Change</td>
<td>300/s</td>
<td>300/s</td>
<td>-1.25/s, high filter</td>
<td>-0.3/s, high filter</td>
<td></td>
</tr>
<tr>
<td>Auto Range Time</td>
<td>&lt; 30 ms</td>
<td>&lt; 60 ms</td>
<td>&lt; 0.2/s, high filter</td>
<td>&lt; 4.0/s, high filter</td>
<td></td>
</tr>
<tr>
<td>Max. Reading Rate³</td>
<td>2000/s</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Internal Trigger Rate³</td>
<td>2000/s</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Ext. Trig. Rate to Memory³</td>
<td>2000/s</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1. Auto-zero off, trigger and sample delay = 0, 0.01 PLC.

ACV & ACI Reading Rate

<table>
<thead>
<tr>
<th>Filter Setting</th>
<th>Reading Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>3 readings/second, Auto-zero ON, sample delay = 10 PLC</td>
</tr>
<tr>
<td>Medium</td>
<td>20 readings/second, Auto-zero ON, sample delay = 10 PLC</td>
</tr>
<tr>
<td>High</td>
<td>2000 readings/second, Auto-zero OFF, sample delay = 0, 0.01 PLC</td>
</tr>
</tbody>
</table>

Front Panel Connector

<table>
<thead>
<tr>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 banana jacks</td>
</tr>
</tbody>
</table>
EX1200-1538 Multifunction I/O Card with Enhanced Frequency Counter

OVERVIEW

The EX1200-1538 is a high-performance multifunction card that provides 8 channels of independent 32-bit counters, 16 channels of isolated digital I/O, and 2 channels of isolated analog output (DAC) on a single card. The wide range of measurement functions make this card suitable for both electronic functional test (EFT), as well as precision data acquisition applications. Combining the EX1200-1538 with the DMM and switch capabilities allows for a complete measurement, control, and distribution system in a small 1U rack space.

The electronic counter utilizes a 50 MHz high-stability (1 ppm), TCXO base clock oscillator along with a 32-bit counter to measure time domain and frequency domain parameters of repetitive and non-repetitive waveforms. It uses a reciprocal counting method to achieve a wide frequency measurement range spanning from 0.05 Hz to 1 MHz while ensuring high resolution and accuracy even if the input signals are low frequency and not synchronized to the aperture window.

Counter channels accept both analog and digital inputs ranging from ±48 V of true differential voltages which makes it suitable to use with almost any real-world signal without the need for external signal conditioning. Programmable hysteresis and threshold levels over the entire input voltage range can help to extract the fundamental frequency from the noisiest analog input signals.

Electronic counter channels can directly measure the RPM from tooth wheel and other types of sensors. The EX1200-1538’s unique functionality prevents the frequency bumps caused by missing extra tooth used for marking the reference. Counter channels can measure position and speed from quadrature encoder signal pairs, including index channel (A, B and Z).

The onboard memory of EX1200-1538 can store up to 256,000 measurement readings and supports the unified EX1200 triggering system. This makes the data samples time stamped in the IEEE 1588 format for easy correlation with other data from other systems. Measurements can also be paced at a constant rate so that time differential parameters, like acceleration, can be calculated.

The EX1200-1538 isolated digital I/O channels can be configured as input or output on a per channel basis. Each channel is isolated from each other and can accept voltages from 2.5 V to 60 V. The output channels use solid-state switches that work in any polarity. Setting the output logic levels and reading the input logic states are fully controlled through software.

DAC isolated analog output channels are independently configurable as either constant voltage or current mode. The output range is fixed (±10 V in voltage mode and ±20 mA in current mode) and the output levels are programmable with 16-bit resolution. Both channels are isolated from each other and fully protected, providing the capability to be connected in series or parallel for an even wider output range.

The block diagram on the right illustrates the various components and their interconnections within the EX1200-1538 multifunction I/O card.
General Specifications

Frequency/Counter Inputs
- NUMBER OF CHANNELS: 8 (analog/digital)
- Digital Input Signal Range: TTL
- Analog Input Signal Range: ±48 V (differential)
- Sensitivity: ±500 mV
- Input Impedance: 195 kΩ
- Input Coupling: AC/DC
- Common Mode Input Signal Frequency Range: ±500 mV
- Main Time Base Clock: 250 V peak
- Time Base Clock Stability: ±1 ppm
- Counter Type: 32-bit, reciprocal counting type
- Maximum Totalize Tick Count: 4,294,967,295
- Minimum Detectable Pulse: 50 ns on digital channels; 600 ns on analog channels
- RPM Measurement Range: 0.05 Hz – 1 MHz in DC coupling mode; 3 Hz – 1 MHz in AC coupling mode
- Time Base Clock: 50 MHz (TCXO)
- Time Base Clock Stability: ±1 ppm
- Counter Type: 32-bit, reciprocal counting type
- Maximum Totalize Tick Count: 4,294,967,295
- Minimum Detectable Pulse: 50 ns on digital channels; 600 ns on analog channels
- Sampling Frequency: 1,000,000 samples/s
- Moving Average and Simple Average
- Maximum Sample Count: 256
- Software, Immediate, EX1200-Based LXI Triggers
- Two Channels to be paired for each encoder input
- Update Control: Software paced
- DAC Outputs
- Number of Channels: 2
- Output Type: Constant Voltage or Constant Current
- Output Mode: Static Mode or Dynamic Mode (Frequency to Voltage/Current)
- Voltage Mode Range: ±10 V ( bipolar), can supply up to 20 mA per channel
- Current Mode Range: ±20 mA ( bipolar), can drive up to 250 Ω load
- Maximum Output Resolution: 16-bit
- Isolation: Channel-to-channel, galvanic
- Protection: Open and short circuit for continuous duration of time
- 104-pin HD D-sub

Digital Input/Output
- Number of Channels: 16 channels
- Digital Input Signal Level: Logical High 2.5 V to 60 V
- Logical Low < 2.5 V
- Digital Input Isolation: Channel-to-channel, optical isolation
- Optically Isolated Solid-State Switch
- 50 mA sink/source, up to 60 V (AC/DC)
- Software paced

Ordering Information
- EX1200-1538 Multifunction I/O Card with 8 counter, 16 DIO, and 2 DAC channels
- LOOSE MATING CONNECTIVITY ACCESSORIES AND TOOLS
  - 27-0389-104 104-pin HD D-sub mating connector with hood and pins, fixed contacts (no crimp tool required)
  - 27-0390-104 104-pin HD D-sub mating connector, backshell and pins, crimp style
  - 70-2381-001 Crimp tooling, includes handle and positioner, 22 AWG
- PRE-ASSEMBLED, UNTERMINATED WIRING HARNESSSES
  - 70-2363-001 104-pin HD D-sub mating connector and backshell, with 3 ft unterminated 22 AWG wire
- TERMINAL BLOCKS
  - 70-2367-011 Terminal block with mating cable assembly