**KEY FEATURES:**

- 250kHz sampling rate
- 16 single-ended or 8 differential inputs
- 11 software/hardware selectable ranges
- Unique channel by channel programmable gain of 1, 2, 5, and 10
- 2K sample data FIFO for A/D
- Auto calibration
- Two 12-bit D/A outputs and 16 digital I/O

**FACTORY OPTIONS:**

- FIFO up to 32K samples
- Programmable amplifier with gains of 1, 10, 100, and 1000
- +5VDC only operation
- 0 to 70°C and -40 to +85°C versions available

The 104-AIO16-16E is an economical 16-bit resolution board which provides speeds up to 250kHz for 16 single-ended or 8 true differential analog input channels. This multifunction board features an excellent price/performance value for precision PC/104-based data acquisition, control, or signal analysis of standalone environmental test stations, compact production test equipment, portable testers, avionics and other applications.

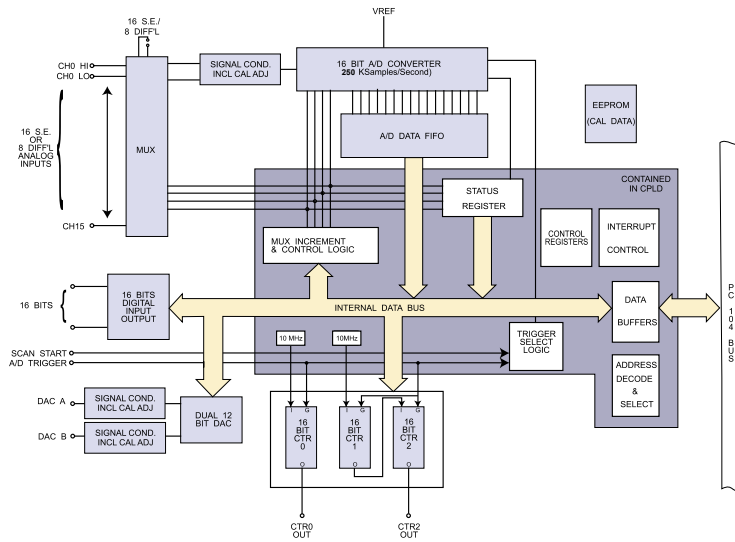
The 104-AIO16-16E features 11 standard analog input ranges and a filtered, extremely quiet front end. The module also offers on-board hardware oversampling for additional noise reduction. In addition to direct data transfers, the board's ability to trigger the A/D in real time assures synchronized sampling that is unaffected by other computer operations—an essential requirement for signal, vibration and transient analysis where high data rates must be sustained for short periods of time. The 250kHz sampling rate is supported by a 2K-sample data FIFO (optional, up to 32K samples) for reducing processor overhead. Sixteen parallel bits of digital I/O and two 12-bit D/A outputs allow for a complete, high-performance data

acquisition solution.

**SOFTWARE**

The 104-AIO16-16E is supported for use in most operating systems and includes a free DOS, Linux and Windows 95/98/Me/NT/2000/XP/2003 compatible software package. This contains sample programs and source code in "C" and Pascal for DOS, and Visual Basic, Delphi, C++ Builder, and Visual C++ for Windows. Also included is a graphical setup program in Windows. Linux support includes installation files and basic samples for programming from any user level via an open source kernel driver.

Block Diagram & Pin Configuration



ANALOG I/O HEADER

|                   |    |    |                    |
|-------------------|----|----|--------------------|
| AIN0+ / AIN0 S.E. | 01 | 02 | AIN0- / AIN8 S.E.  |
| AGND              | 03 | 04 | AIN1- / AIN9 S.E.  |
| AIN1+ / AIN1 S.E. | 05 | 06 | AGND               |
| AIN2+ / AIN2 S.E. | 07 | 08 | AIN2- / AIN10 S.E. |
| AGND              | 09 | 10 | AIN3- / AIN11 S.E. |
| AIN3+ / AIN3 S.E. | 11 | 12 | AGND               |
| AIN4+ / AIN4 S.E. | 13 | 14 | AIN4- / AIN12 S.E. |
| AGND              | 15 | 16 | AIN5- / AIN13 S.E. |
| AIN5+ / AIN5 S.E. | 17 | 18 | AGND               |
| AIN6+ / AIN6 S.E. | 19 | 20 | AIN6- / AIN14 S.E. |
| AGND              | 21 | 22 | AIN7- / AIN15 S.E. |
| AIN7+ / AIN7 S.E. | 23 | 24 | AGND               |
| AOUT0             | 25 | 26 | AOUT1              |

I/O HEADER

|          |    |    |             |
|----------|----|----|-------------|
| DIO0     | 01 | 02 | GND         |
| DIO1     | 03 | 04 | GND         |
| DIO2     | 05 | 06 | GND         |
| DIO3     | 07 | 08 | GND         |
| DIO4     | 09 | 10 | GND         |
| DIO5     | 11 | 12 | GND         |
| DIO6     | 13 | 14 | GND         |
| DIO7     | 15 | 16 | GND         |
| DIO8     | 17 | 18 | GND         |
| DIO9     | 19 | 20 | GND         |
| DIO10    | 21 | 22 | GND         |
| DIO11    | 23 | 24 | GND         |
| DIO12    | 25 | 26 | GND         |
| DIO13    | 27 | 28 | GND         |
| DIO14    | 29 | 30 | GND         |
| DIO15    | 31 | 32 | GND         |
| RESERVED | 33 | 34 | GND         |
| GND      | 35 | 36 | SCAN ENABLE |
| GND      | 37 | 38 | SCAN START  |
| RESERVED | 39 | 40 | CTR 2 OUT   |

Specifications

A/D

|                        |  |
|------------------------|--|
| Inputs                 | 16 single-ended or 8 differential  |
| Resolution             | 16-bit resolution  |
| Bipolar ranges         | ±0.5V, ±1V, ±2V, ±2.5V, ±5V, ±10V  |
| Unipolar ranges        | 0-1V, 0-2V, 0-4V, 0-5V, 0-10V  |
| Sampling rate          | Sampling rate: 250kHz  |
| Type                   | Successive approximation   |
| Overvoltage protection | -37 to +52V  |
| Nonlinearity           | ±4 LSB, monotonic  |
| A/D FIFO               | 2K samples, optional 4 and 32K   |
| Calibration            | Offset and gain values stored in EEPROM  |
| Trigger Source         | Software selectable: external trigger, programmable timer, program command, A/D start, single scan start |

Digital I/O

|                |   |
|----------------|---|
| Number of I/O  | 16, programmable as inputs or outputs in groups of 8              |
| Input voltage  | Logic low: 0.0V min, 0.8V max;<br>Logic high: 2.0V min, 5.0V max  |
| Input current  | ±1µA max  |
| Outputs        | Logic low: 0.0V min, 0.55V max;<br>Logic high: 2.4V min, 5.0V max |
| Output current | Logic low: 24mA max sink;<br>Logic high: 24mA max source          |

D/A

|                           |                              |
|---------------------------|------------------------------|
| Outputs                   | 2                            |
| Resolution                | 12-bit resolution            |
| Ranges                    | 0-5V, 0-10V                  |
| Relative accuracy         | ±0.5 LSB                     |
| Diff. Nonlinearity        | ±0.5 LSB                     |
| Settling time/Update rate | 16µs/10kHz                   |
| Output current            | 5mA                          |
| Calibration               | Gain values stored in EEPROM |

Counter/Timers

|                 |              |
|-----------------|--------------|
| Type            | 82C54        |
| A/D Pacer clock | 16 or 32-bit |
| Clock Frequency | 10MHz        |

General

|   |   |
|---|---|
| Power required (using optional DC/DC converter) | +5V at 190mA typ  |
| Power required (using ±12V and +5V)             | +12VDC - 25mA typical, -12VDC - 25mA typical,<br>+5VDC - 65mA typical |
| Operating Temperature                           | 0 to +70°C, optional -40 to +85°C                                     |
| Storage Temperature                             | -50 to +120°C   |
| Humidity  | 5% to 90% RH, non-condensing  |

Ordering Guide

|               |  |
|---------------|--|
| 104-AI016-16E | 16-bit, 16-channel A/D with 12-bit D/A |
|---------------|--|



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