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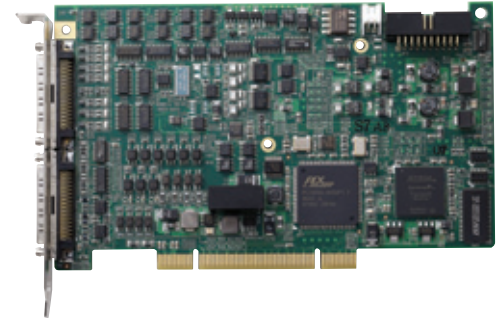
# PCI-9524

## 24-Bit Precision Load Cell Input Card

### Features

- **Transducer Inputs** for precise measurement of large-scale transducers
    - 4-CH strain gauge-based transducer inputs
    - Accuracy up to 1/200,000 counts at full-scale
    - Sensitivity from 1.0 mV/V to 4.0 mV/V
    - 2.5 / 10 Vdc excitation voltage
    - Internal 24-bit A/D resolution
  - **Motion Controller** for stepper and hydraulic system control
    - 3-axis motion controller with OUT/DIR and CW/CCW pulse output options
    - 2-CH 16-bit analog outputs
    - A-B phase encoder input with 24-bit counter
  - **General-Purpose Analog Inputs** for accurate measurements of LVDT<sup>1</sup> and linear wire potentiometer signals
    - 4-CH analog input with 24-bit resolution
    - Programmable gains of +/-1.25 V, +/-2.5 V, +/-5 V, +/-10 V
    - Up to 30 kS/s sampling rate (single channel)
  - **Supported Operating Systems**
    - Windows Vista/XP/2000/2003
    - Linux
  - **Recommended Application Environments**
    - VB.NET/VC.NET/VB/VC++/BCB/Delphi
    - DAQBench
  - **Driver Support**
    - DAQPilot for Windows
    - DAQ-LVIEW PnP for LabVIEW™
    - DAQ-MTLB for MATLAB®
    - PCIS-DASK for Windows
    - PCIS-DASK/X for Linux
  - **Application**
    - Material test system
- Combination of these main features makes PCI-9524 an ideal solution for material testing system, CNC machine and civil testing equipment. With all the required functions of measurement and control, PCI-9524 speeds up system development and integration.

Note 1: LVDT: Linear Variable Displacement Transducer



### Introduction

The PCI-9524 is a robust, multi-purpose module designed for turnkey material test systems (MTS). Equipped with four strain gauge-based transducer input channels, four general purpose analog input channels, and a 3-axis motion controller, the PCI-9524 delivers a complete hardware solution for MTS manufacturers. The PCI-9524 easily integrates physical quantity measurement and implements strategy of close-loop control in a single module package. For transducer measurement, the PCI-9524 supports sensitivity from 1.0 mV/V to 4.0 mV/V and provides a 1/200000 accuracy of measurement of full scale. These features make the PCI-9524 suitable for precise measurement in large-scale transducers.

The PCI-9524 is also equipped with four, 24-bit general purpose analog input channels that allow accurate measurements of the LVDT (Linear Variable Differential Transducer) and Linear wire potentiometer signals to achieve high-resolution of displacement.

With motion control capability and 16-bit DA channels, the PCI-9524 comes with three stepper/servo motor axes and two channels of hydraulic system control function. The built-in incremental encoder feedback channels enable the PCI-9524 to implement the stratagem of MTS' closed-loop control.

The impressive PCI-9524 features permit easy implementation of required control or measurement functionalities with just a single module, saving precious development and integration time for MTS manufacturers.

### Specifications

#### 4-channel strain gauge transducer input

- Excitation voltage: 2.5 V/10 Vdc
- Internal A/D resolution: 24 bit
- Update speed when Auto-zero Disabled
  - Up to 30 KSPS (single channel)
  - Up to 4 KSPS (multi-channel)
- Update speed when Auto-zero Enabled
  - Up to 800 SPS (single channel or multi-channel)
- Transducer sensitivity: 1.0 mV/V to 4.0 mV/V
- Number of channels: 4
- Accuracy: 1/200000 of full scale (with remote sense & auto zero enabled)
- Onboard 256 samples A/D FIFO

#### Motion Control

- Number of axis: 3
- Pulse output options: OUT/DIR, CW/CCW (26LS31, differential line driver, driving current: up to 20 mA)
- Maximum output frequency: 500 kHz
- Encoder Input: 24-bit up/down counter for incremental encoder feedback

#### General Purpose Analog Input

- Resolution: 24-bit
- Programmable range: +/-1.25 V, +/-2.5 V, +/-5 V, +/-10 V
- Number of channels: 4
- Sampling rate: 30 kS/s (non-multiplexing)
- Onboard 256 samples A/D FIFO

#### Isolated Digital Input

- Number of channels: 8
- Maximum input range (non-polarity): 0 V to 24 V
- Input resistance: 2.7 KΩ

#### Isolated Digital Output

- Number of channels: 8
- Output type: Power MOSFET
- Sink current: Up to 300 mA/channel

#### Analog Output

- Resolution: 16-bit
- Output range: +/-10 V
- Number of channels: 2
- Update rate: Up to 5 kS/s
- Onboard 1 K samples D/A FIFO
- Driving capability: 5 mA

### Termination Board

#### ■ DIN-68S-01

Termination board with one 68-pin SCSI-II connector and DIN-Rail Mounting (Cables are not included. For more information on mating cables, refer to Section 12.)

### Pin Assignment

#### CN1

|            |       |                |       |                |       |                |       |
|------------|-------|----------------|-------|----------------|-------|----------------|-------|
| AI0+       | 34 68 | AI0-           | 34 68 | VEEXEC0-       | 33 67 | VEEXEC0-       | 33 67 |
| VEEXEC0+   | 32 66 | VEEXEC0-       | 32 66 | VEEXEC0-       | 32 66 | VEEXEC0-       | 32 66 |
| TEDS0(RSV) | 31 65 | TEDS0_GND(RSV) | 31 65 | TEDS0_GND(RSV) | 31 65 | TEDS0_GND(RSV) | 31 65 |
| AI1+       | 30 64 | AI1-           | 30 64 | AI1-           | 30 64 | AI1-           | 30 64 |
| VEEXEC1+   | 29 63 | VEEXEC1-       | 29 63 | VEEXEC1-       | 29 63 | VEEXEC1-       | 29 63 |
| VEEXEC1+   | 28 62 | VEEXEC1-       | 28 62 | VEEXEC1-       | 28 62 | VEEXEC1-       | 28 62 |
| TEDS1(RSV) | 27 61 | TEDS1_GND(RSV) | 27 61 | TEDS1_GND(RSV) | 27 61 | TEDS1_GND(RSV) | 27 61 |
| AI2+       | 26 60 | AI2-           | 26 60 | AI2-           | 26 60 | AI2-           | 26 60 |
| VEEXEC2+   | 25 59 | VEEXEC2-       | 25 59 | VEEXEC2-       | 25 59 | VEEXEC2-       | 25 59 |
| VEEXEC2+   | 24 58 | VEEXEC2-       | 24 58 | VEEXEC2-       | 24 58 | VEEXEC2-       | 24 58 |
| TEDS2(RSV) | 23 57 | TEDS2_GND(RSV) | 23 57 | TEDS2_GND(RSV) | 23 57 | TEDS2_GND(RSV) | 23 57 |
| AI3+       | 22 56 | AI3-           | 22 56 | AI3-           | 22 56 | AI3-           | 22 56 |
| VEEXEC3+   | 21 55 | VEEXEC3-       | 21 55 | VEEXEC3-       | 21 55 | VEEXEC3-       | 21 55 |
| VEEXEC3+   | 20 54 | VEEXEC3-       | 20 54 | VEEXEC3-       | 20 54 | VEEXEC3-       | 20 54 |
| TEDS3(RSV) | 19 53 | TEDS3_GND(RSV) | 19 53 | TEDS3_GND(RSV) | 19 53 | TEDS3_GND(RSV) | 19 53 |
| AGND       | 18 52 | AGND           | 18 52 | AGND           | 18 52 | AGND           | 18 52 |
| AI4+       | 17 51 | AI4-           | 17 51 | AI4-           | 17 51 | AI4-           | 17 51 |
| AI5+       | 16 50 | AI5-           | 16 50 | AI5-           | 16 50 | AI5-           | 16 50 |
| AI6+       | 15 49 | AI6-           | 15 49 | AI6-           | 15 49 | AI6-           | 15 49 |
| AI7+       | 14 48 | AI7-           | 14 48 | AI7-           | 14 48 | AI7-           | 14 48 |
| AGND       | 13 47 | AGND           | 13 47 | AGND           | 13 47 | AGND           | 13 47 |
| AGND       | 12 46 | AGND           | 12 46 | AGND           | 12 46 | AGND           | 12 46 |
| AGND       | 11 45 | AGND           | 11 45 | AGND           | 11 45 | AGND           | 11 45 |
| AGND       | 10 44 | AGND           | 10 44 | AGND           | 10 44 | AGND           | 10 44 |
| AGND       | 9 43  | AGND           | 9 43  | AGND           | 9 43  | AGND           | 9 43  |
| AGND       | 8 42  | AGND           | 8 42  | AGND           | 8 42  | AGND           | 8 42  |
| AGND       | 7 41  | AGND           | 7 41  | AGND           | 7 41  | AGND           | 7 41  |
| AGND       | 6 40  | AGND           | 6 40  | AGND           | 6 40  | AGND           | 6 40  |
| AGND       | 5 39  | AGND           | 5 39  | AGND           | 5 39  | AGND           | 5 39  |
| DA0_OUT    | 4 38  | AGND           | 4 38  | AGND           | 4 38  | AGND           | 4 38  |
| AGND       | 3 37  | AGND           | 3 37  | AGND           | 3 37  | AGND           | 3 37  |
| DA1_OUT    | 2 36  | AGND           | 2 36  | AGND           | 2 36  | AGND           | 2 36  |
| AGND       | 1 35  | AGND           | 1 35  | AGND           | 1 35  | AGND           | 1 35  |

#### CN2

|            |       |           |       |           |       |           |       |
|------------|-------|-----------|-------|-----------|-------|-----------|-------|
| PULSE0_A+  | 34 68 | PULSE0_A- | 34 68 | PULSE0_A- | 34 68 | PULSE0_A- | 34 68 |
| PULSE0_B+  | 33 67 | PULSE0_B- | 33 67 | PULSE0_B- | 33 67 | PULSE0_B- | 33 67 |
| ISO5VDD    | 32 66 | ISO5VDD   | 32 66 | ISO5VDD   | 32 66 | ISO5VDD   | 32 66 |
| PULSE1_A+  | 31 65 | PULSE1_A- | 31 65 | PULSE1_A- | 31 65 | PULSE1_A- | 31 65 |
| PULSE1_B+  | 30 64 | PULSE1_B- | 30 64 | PULSE1_B- | 30 64 | PULSE1_B- | 30 64 |
| ISO5VDD    | 29 63 | ISO5VDD   | 29 63 | ISO5VDD   | 29 63 | ISO5VDD   | 29 63 |
| PULSE2_A+  | 28 62 | PULSE2_A- | 28 62 | PULSE2_A- | 28 62 | PULSE2_A- | 28 62 |
| PULSE2_B+  | 27 61 | PULSE2_B- | 27 61 | PULSE2_B- | 27 61 | PULSE2_B- | 27 61 |
| ISO5VDD    | 26 60 | ISO5VDD   | 26 60 | ISO5VDD   | 26 60 | ISO5VDD   | 26 60 |
| ENC0_A+    | 25 59 | ENC0_A-   | 25 59 | ENC0_A-   | 25 59 | ENC0_A-   | 25 59 |
| ENC0_B+    | 24 58 | ENC0_B-   | 24 58 | ENC0_B-   | 24 58 | ENC0_B-   | 24 58 |
| ISOPWR     | 23 57 | ISOPWR    | 23 57 | ISOPWR    | 23 57 | ISOPWR    | 23 57 |
| ENC1_A+    | 22 56 | ENC1_A-   | 22 56 | ENC1_A-   | 22 56 | ENC1_A-   | 22 56 |
| ENC1_B+    | 21 55 | ENC1_B-   | 21 55 | ENC1_B-   | 21 55 | ENC1_B-   | 21 55 |
| ISOPWR     | 20 54 | ISOPWR    | 20 54 | ISOPWR    | 20 54 | ISOPWR    | 20 54 |
| ENC2_A+    | 19 53 | ENC2_A-   | 19 53 | ENC2_A-   | 19 53 | ENC2_A-   | 19 53 |
| ENC2_B+    | 18 52 | ENC2_B-   | 18 52 | ENC2_B-   | 18 52 | ENC2_B-   | 18 52 |
| ISOPWR     | 17 51 | ISOPWR    | 17 51 | ISOPWR    | 17 51 | ISOPWR    | 17 51 |
| ID10+      | 16 50 | ID10-     | 16 50 | ID10-     | 16 50 | ID10-     | 16 50 |
| ID11+      | 15 49 | ID11-     | 15 49 | ID11-     | 15 49 | ID11-     | 15 49 |
| ID12+      | 14 48 | ID12-     | 14 48 | ID12-     | 14 48 | ID12-     | 14 48 |
| ID13+      | 13 47 | ID13-     | 13 47 | ID13-     | 13 47 | ID13-     | 13 47 |
| ISOPWR     | 12 46 | ISOPWR    | 12 46 | ISOPWR    | 12 46 | ISOPWR    | 12 46 |
| ID14+      | 11 45 | ID14-     | 11 45 | ID14-     | 11 45 | ID14-     | 11 45 |
| ID15+      | 10 44 | ID15-     | 10 44 | ID15-     | 10 44 | ID15-     | 10 44 |
| ID16+      | 9 43  | ID16-     | 9 43  | ID16-     | 9 43  | ID16-     | 9 43  |
| ID17+      | 8 42  | ID17-     | 8 42  | ID17-     | 8 42  | ID17-     | 8 42  |
| ISOPWR     | 7 41  | ISOPWR    | 7 41  | ISOPWR    | 7 41  | ISOPWR    | 7 41  |
| ID00       | 6 40  | ID01      | 6 40  | ID01      | 6 40  | ID01      | 6 40  |
| ID02       | 5 39  | ID03      | 5 39  | ID03      | 5 39  | ID03      | 5 39  |
| EXT_ISOPWR | 4 38  | ISOGND    | 4 38  | ISOGND    | 4 38  | ISOGND    | 4 38  |
| ISOPWR     | 3 37  | ISOGND    | 3 37  | ISOGND    | 3 37  | ISOGND    | 3 37  |
| ID04       | 2 36  | ID05      | 2 36  | ID05      | 2 36  | ID05      | 2 36  |
| ID06       | 1 35  | ID07      | 1 35  | ID07      | 1 35  | ID07      | 1 35  |

### Ordering Information

- **PCI-9524**  
24-bit Precision Load Cell Input Card