

MSI PC/104 Embedded PC Series

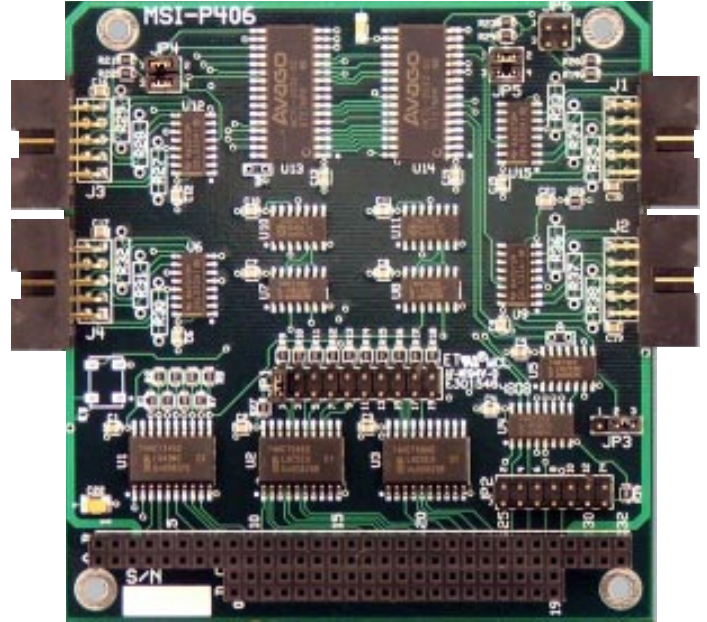
MSI-P406 Quadrature Decoder/Counter Card with Differential Inputs

FEATURES

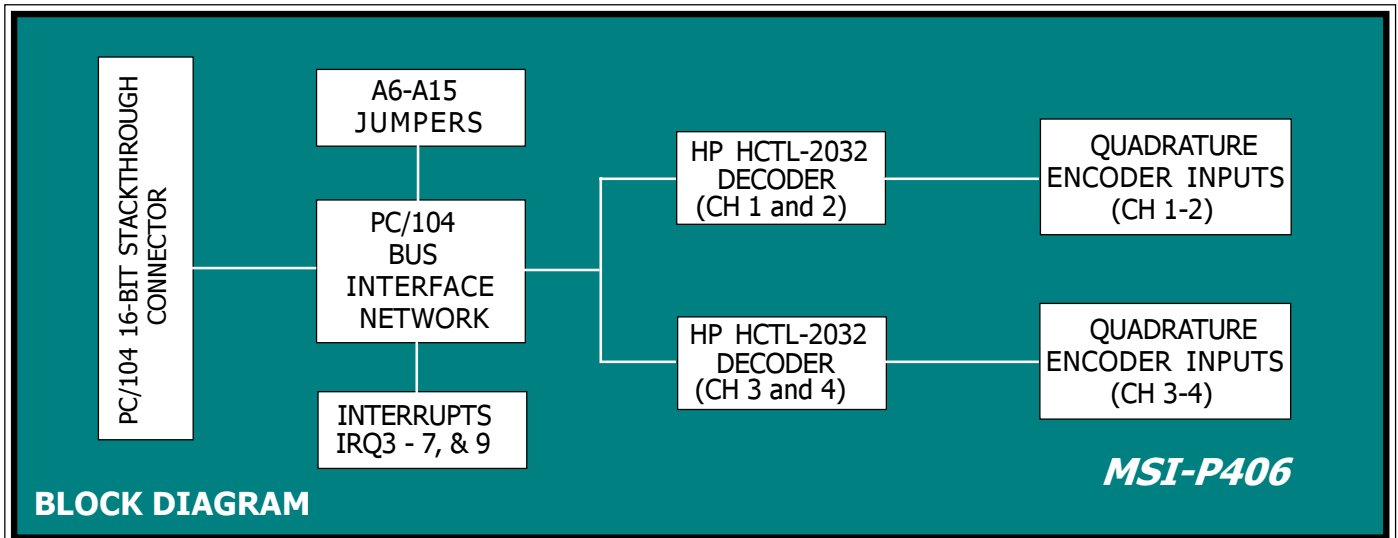
- ◆ 2 or 4 channels of quadrature encoder inputs and channel index inputs.
- ◆ RS-422 Compliant (meets or exceeds ANSI TIA/EIA-422-B).
- ◆ 32-bit binary up/down counter with selectable 1X, 2X or 4X decoding using a Agilent HCTL-2032 decoder IC.
- ◆ Ideal for monitoring shaft positions and rotations in machinery and robotic applications.
- ◆ Individual software reset for each channels.
- ◆ Selectable interrupts IRQ3 thru IRQ9 for processing roll-overs at $\pm 2,147,483,648$ counts.
- ◆ Single +5V operation.
- ◆ 16-bit stackthrough PC/104 Bus with I/O mapped 16-bit addressing.
- ◆ Jumper selectable card addresses.
- ◆ Operating temperature range -40°C to 85°C.
- ◆ Two-year warranty from date of shipment.

DESCRIPTION

The MSI-P406 is a 32-Bit quadrature decoder/counter PC/104 card designed for monitoring up to 4 differential quadrature encoder inputs and index inputs used for monitoring shaft positions and rotations. Each channel provides a 32-bit binary up/down counter with selectable



1X, 2X or 4X decoding using an Agilent HCTL-2032 decoder IC. This device provides a digital noise filter network, decoding logic, a 32-bit counter, and a 32-bit latched output for two quadrature decoder channels. A block diagram of the card is shown below. Inputs from quadrature encoders are applied via an input connectors (J1-J4) that each require a frequency and a reference signal input. Index inputs can be individually disabled. Inputs signals are RS-422 compliant. The clock employed for processing the input signals is selectable from SYSCLK (6 to 8.33 MHz,



depending on the processor card used, or OSC at 14.318 MHz) of the PC/104 bus. As an option, clock oscillators from 2 to 33 MHz are available. In addition to the frequency, reference and index quadrature inputs, +5V and GND connections are provided on the input connector (J1) for supplying power to the encoder of each channel. A shield ground is also provided for a cable shield that is capacitively connected to the PC/104 BUS ground to isolate dc voltage levels of the shield.

The maximum frequency that can be applied to either a frequency or reference input is

$$f_{\max} = \text{CLK}/7$$

Therefore, for CLK = 8.33 MHz, $f_{\max} = 1.19$ MHz and for CLK = 14.318 MHz, $f_{\max} = 2.045$ MHz.

Each channel has a 32-bit up/down counter and an output latch. When the frequency input leads the reference input (nominally by 90 degrees), the counter counts up. Conversely, when the reference input leads the frequency input (nominally by 90 degrees), the counter counts down. Counts range from 0 to FFFFFFFF hexadecimal -2,147,483,648 to 2,147,483,647 decimal counts. Data reads require four I/O Byte reads to acquire the 32-bit count of each channel. Roll-over occurs for 0-to-FFFFFFF and FFFFFFFF-to-0 count transitions. These transitions are OR'ed together for use with interrupts IRQ3 thru IRQ7 and IRQ9 if required. The monitoring software must account for the roll-over events.

A software reset is provided for each channel that sets the count to 0. The card is an 16-bit stackthrough unit that requires +5V from the PC/104 bus.

SPECIFICATIONS

PC/104

16-bit, stackthrough

Quadrature Encoder & Index Inputs

Freq, Ref and Index (Quadrature inputs for each channel)

Meets or exceeds ANSI TIA/EIA-422-B
Max. Diff. Input Voltage +/-25V

Input Frequency

$f_{\max} = \text{SYSCLK}/7$

$f_{\max} = 1.19$ MHz for SYSCLK = 8.33 MHz

$f_{\max} = 2.045$ MHz for SYSCLK = 14.318 MHz

Base Address, Interrupt, Count Mode, and Clock Selection Jumpers (JP1-JP6)

Base Address Selection for A6 thru A15 (JP1)
Interrupts IRQ3 thru IRQ7 and IRQ9 (JP2)
Clock Selection SYSCLK or OSC of PC104 BUS (JP3)
Enable/Disable Index Inputs (JP4 & JP5)
Count Mode 1X, 2X, and 4X (JP6)

0.025" square posts, 0.1" grid

Input Connector (J1 thru J4)

Quadrature Inputs (Freq, Ref, Index, Shield_GND)
+5V and GND

3M 30310-5002 or equivalent.

Electrical & Environmental

+5V @ 250 mA typical
-40° to 85° C

Models

MSI-P406-2, 2 Channels

MSI-P406-4, 4 Channels



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