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Find the *Abaco Systems / SBS / Greenspring IP-Quadrature* at our website: ***Click HERE***

IP-Quadrature

IndustryPack™ Module with
Four Channel Quadrature Decoder

IP-Quadrature provides high density, cost-effective flexible implementation of four quadrature decoder channels. Channels may also be used as general purpose counters. Four independent channels provide 24-bit resolution, programmable modes, programmable polarity, interrupt capability, differential or single-ended (RS-422 or TTL/CMOS) input, read-on-the-fly capability, and a count frequency of 0 to 10 MHz.

Quadrature encoders are popular sensors that provide accurate, low cost incremental motion sensing. Most commonly, they are shaft encoders that provide 512 to 2048 counts per revolution. They are also commonly used as linear encoders with resolutions down to 0.005 inch. They are available in nearly any length desired. Most encoders are now optical, using molded assemblies consisting of a pair of LEDs, lenses, photo-sensors, and simple electronics. For rotary motion the assembly senses alternating opaque and clear lines on a rotating wheel. For linear motion the alternating lines may be on a fixed bar and the sensor assembly moves, or vice-versa. The pair of LED and photo-sensors are offset about one-half line width so that direction of motion may be sensed by observing the relative phase of the two outputs. Typical quadrature encoder outputs are a pair of digital logic signals that are nominally 90° out of phase. Some encoders also provide an “index” pulse output once per revolution to provide absolute position information. Most modern encoders run from +5 volts and provide CMOS/TTL logic outputs and/or RS-422 differential logic outputs. RS-422 is recommended where possible because of its inherent noise immunity and the ability to run long distances. TTL logic levels should normally be restricted to cables less than ten feet in length. Quadrature encoders are available from Hewlett-Packard, US digital, and other sources.

The general purpose input structure permits differential input from line drivers (RS-422 levels) or single-ended logic level input (“TTL”) directly from most sensors. Programmable TTL resistive terminators provide for flexible high-quality signal termination.

There are three inputs per channel. For normal quadrature operation the two quadrature inputs are called X and Y. These inputs are sometimes called A and B lines from encoders. The X and Y inputs are normally driven 90° out of phase. There is also a control input on each channel called Z. Its function is programmable, but it typically operates, if used, as an index or latch input.

There is a programmable prescaler for each channel that may be set for X1, X2 or X4 operation.

Vectored interrupts are fully supported. Interrupts are individually maskable. Selectable conditions are interrupt on borrow and interrupt on match (compare).

RS-422 differential input lines are normally terminated with 120Ω resistors. Users may remove these socketed resistor networks or replace them with a different value if desired.

Each channel consists of a programmable input section, a 24-bit up/down counter block, a 24-bit capture/match register, and a 24-bit output latch. The output latch permits accurate “on-the-fly” reading of quadrature position values. The capture/match register may be used as either a hardware “capture” register to record exact mechanical position or to provide an interrupt any arbitrary programmable quadrature position value.

The all CMOS design is inherently low power. Up to 16 quadrature channels may be implemented in one host system slot.

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Specifications

Logic Interface	IndustryPack logic Interface, 0.7 compatible Single-high size
Number of Channels	Four
Number of Inputs/Channel	Three: two count inputs and one control input
Count Rate	DC to 10 MHz general purpose counting, DC to 1.2 MHz (4.8 MHz count rate) quadrature
Input Levels	RS-422 differential and Logic (single-ended), selectable
RS-422 Input Termination	120Ω as resistor SIP standard, may be changed or removed by user.
TTL Input Termination	110Ω to 2.85 volts selectable by software
Input Polarity	All inputs have programmable polarity
Counter LSI	LS7166
Counter Bits	24 bits
Counter Registers	Counter, Preset/Compare, Output Latch, all 24-bits
Read Mode	Read-on-the fly supported
Counter Modes	Up, Down, Quadrature, Divide-by-N
Clock Output	8 MHz, RS-422
Control Functions	Load Output Latch Load Counter Reset Counter Gate Counter
Interrupts	Programmable, interrupt on borrow or interrupt on match
Interrupt Vector	8 bits, 6 bits programmable, 2 bits indicate channel
Control Logic LSI	Xilinx®LCA handles bus interface, interrupts, polarity
Wait States	Data read and write: one ID read: zero
Power Dissipation	770 mW typical @ 5.0 V 1.04 W max @ 5.0 V
Temperature Coefficient	0.89 W/°C for uniform heat, component side to solder side
Dimensions	1.800 by 3.900 by 0.340 inches maximum
Environmental	Operating temperature: 0 to 70°C Humidity: 5 to 95% non-condensing Storage: –10 to +85°C

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