EQUAD Up / Down Clock to Quadrature Converter

Description:

The **EQUAD** converts any clock source into optical encoder quadrature outputs. When up clock / down clock mode is selected (via DIP SW1) up-clocks generate an A leads B quadrature sequence and down clocks generate a B leads A quadrature sequence. Alternatively, DIP SW1 may be set for clock and direction inputs; each active edge of the clock input will advance or retard the quadrature output according to the level present on the direction input.

The **EQUAD** may be placed in-line between a clock source, such as a PLC or indexer, and will output TTL quadrature signals in response to rising or falling edges on its inputs. In situations where the clocks are generated by mechanical contacts such as switches or relays, an internal debounce digital filtering can be enabled with the DIP switch to debounce those signals and prevent multiple triggers. The filtering works by not recognizing a clock edge unless the level is stable for 9 milliseconds after the edge. The inputs have 5K Ohm pull-up resistors to +5V. The inputs can be driven with TTL levels, or open collector type outputs. The **EQUAD** samples its input at the crystal frequency of 3.58 mHz, which allows the circuit to respond to input frequencies in excess of 800 kHz in 1x mode, and 100 kHz in 4x mode.

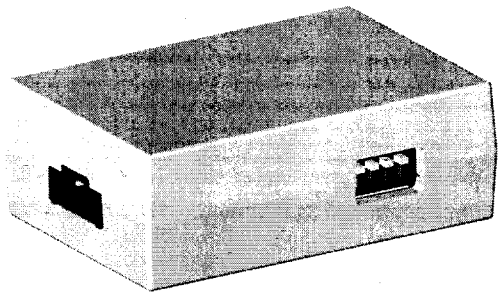
Four DIP switches allow the **EQUAD** to select the input mode, trigger on rising or falling edges, output one or four quadrature state changes per trigger (x1 or x4 mode), and enable or disable the debounce feature.

DIP SW1 selects the input mode, either up clock / down clock, or clock / direction. DIP SW2 selects x1 or x4 mode. In x1 mode, a trigger will generate a single quadrature state change. In x4 mode, a single trigger will generate four quadrature state changes (a full encoder cycle). When in the x4 mode, the time period for each state change is 4.47 microseconds (13.4 microseconds for the full cycle). DIP SW3 optionally inverts the inputs so that a falling edge may be made the active edge. DIP SW4 enables the debounce feature.

The **EQUAD** draws its +5V power from either the input or output connectors. Connectors are 5-pin positive finger-latching. DIN rail mounting is available.

Features:

- Simple in-line installation accepts up and down clocks of step and direction
- DIN rail mounting is available
- Rising or falling edge triggering
- x1 or x4 quadrature mode
- Four or one quad state changes for each input edge
- Compatible with **ED2**, **AD5**, **USB1** and other products that accept quadrature inputs
- US Digital warrants its products against defects in materials and workmanship for two years. See complete warranty for details.2



Absolute Maximum Ratings:

Parameter	Min.	Max.	Units
Storage Temperature	-40	100	°C
Operating Temperature	0	70	°C
Humidity (non-condensing)	0	95	%
Encoder Inputs (diode clamped)	-0.6	5.6	Volts

Applications:

- Transforms non-standard clock events into quadrature.
- Can be driven by a function generator to produce quadrature signals for testing.

DIP Switch:

Switch	Setting		
SW1	Input mode;	down = up clock / down clock;	up = clock / direction
SW2	Output mode;	down = 1x;	up = 4x
SW3	Input clock trigger polarity;	down = falling edge active;	up = rising edge active
SW4	Input filtering;	down = no filtering;	up = 9 msec debounce

Electrical Characteristics:

Parameter	Min.	Typ.	Max.	Units
Supply Voltage (Vcc into **EQUAD**)	4.75	5.0	5.25	Volts
Supply Current	-	120	-	mA
Input Low Voltage	0	-	0.8	Volts
Input High Voltage	2.0	-	Vcc	Volts
Output Low (at 8mA current, sink)	-	-	0.4	Volts
Output High (at -4mA current, source)	2.4	-	-	Volts
Input Frequency - 1x Mode	-	-	800	kHz
Input Frequency - 4x Mode	-	-	60	kHz
Max. Phase Delay - Debounce On	-	-	2.0	usec
Max. Phase Delay - Debounce Off	-	-	9.2	usec
Functional Life	20	-	-	years

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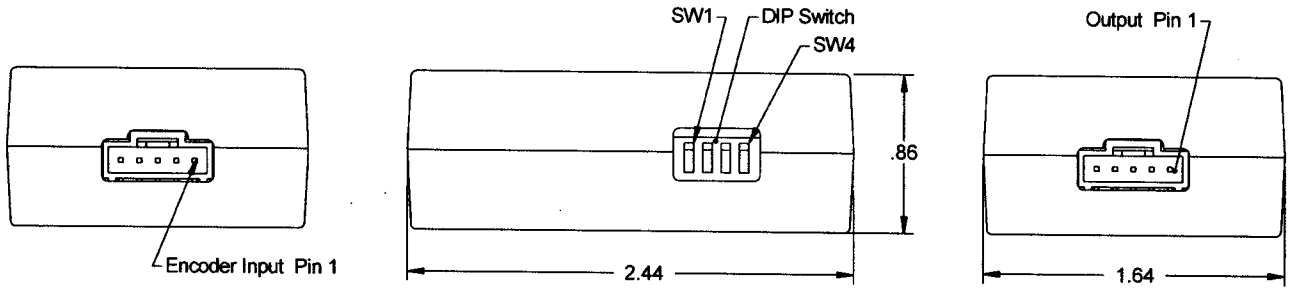
Mechanical Specifications:



Compatible Cables & Connectors:

5-pin Finger-latching:

Part Number	Description
CON-FC5	Connector
CA-3133-1FT	Connector on one end with 4 12" wires
CA-3132-1FT	Connector on one end with 5 12" wires
CA-3131-6FT	Connector on one end with a 6' shielded round cable
CA-3620-6FT	Connectors on both ends of a 6' shielded round cable

Attention:

- Specify cable length when ordering.
- Custom cable lengths are available. See the **Cables & Connectors** data sheet for more information.

Input Pin-out:

Pin	Description
1	Ground
2	NC
3	Up Clock / Clock
4	+5VDC Power
5	Down Clock / Direction

Output Pin-out:

Pin	Description
1	Ground
2	Index (always low)
3	A Channel
4	+5VDC Power
5	B Channel

Ordering Information:

Price:
$99 / 1
$91 / 10
$83 / 50
$76 / 100

Part #:
EQUAD - [ ]
R = DIN rail (35mm wide) mounting.

Cost Modifiers:
- Add $10 for **R**-option.

Technical Data, Rev. 01.08.03, January 2003
All information subject to change without notice.

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