Series 291

Precision, Long-life 12mm Optical Encoder

- Available with 4, 6, 8, 24 Pulses per Revolution
- Optional Momentary Switch
- Multiple options for terminations, resolution, cable lengths, and operating voltage

Description

The 291 Series allows versatility in design applications by providing highly reliable, precise digital output and long rotational life with our non-contacting design. This product provides flexibility in resolution, power consumption, and operating temperatures. The options of Schmitt trigger, detents, momentary switch, shaft & bushing length, dual shaft, termination styles, torque, operating voltage, and IP ratings provide flexibility to meet your exacting design requirements.

Ordering Information

Series	Termination	Bushing Length	Shaft Length	Shaft Trim	Output Combination	Operating Voltage	Switch	Schmitt Trigger &Locating Lug
291	V1	0	22	F	832	A	B	A

Code	Termination
V1	.050” pitch pins Rear facing .132” length
P1	.10” pitch pins Rear facing .236” length
*C4	4” ribbon cable With .050” pitch connector terminals
*C5	5” ribbon cable With .050” pitch connector terminals
*C6	6” ribbon cable With .050” pitch connector terminals

Code	Bushing Length “B”
0	.312” For single shaft construction
D	.256” For dual shaft construction

Code	Shaft Length “L”
Single shaft structure	
22	.687”
Dual shaft structure	
DD	Outer shaft: .685” Inner shaft: 1.059”

(Not available with locating lug, see page 8 for additional details)

Code	Spec.
F	Flat

Output	Combination
832	8 PPR, 32 Detents
624	6 PPR, 24 Detents
416	4 PPR, 16 Detents
800	8 PPR, No Detents
600	6 PPR, No Detents
400	4 PPR, No Detents
X00	24 PPR, No Detents (only available with Schmitt trigger)
X24	24 PPR, 24 Detents (only available with Schmitt trigger)

Code	Spec.
A	None
B	Momentary

Code	Spec.
A	Without Schmitt trigger, Without locating lug
BLANK	Without Schmitt trigger, With locating lug
S	With Schmitt trigger, Without locating lug
B	With Schmitt trigger, With locating lug

Code	Spec.
A	5.0V
B	3.3V

Note: * Cable connector is AMP P/N 215083-6 or Equivalent

Electrical Specifications

Parameter	Conditions & Remarks	Min	Nominal	Max	Unit
Operating Temperature Range		-40	50	+85	°C

Encoder Function

Voltage		4.75 3.175	5.0 3.3	5.25 3.425	V_{DC}
Output Code	2-Bit Quadrature Channel A leads Channel B by 90° during clockwise rotation				
Sink Current	5.0 Vdc 3.3 Vdc	2.0mA 1.0mA			
Power Consumption	5.0 Vdc 3.3 Vdc			150 80	mW mW
Rotational Torque	Running	10	20	30	gf-cm
Rotational Torque	24 Detents	90	140	190	gf-cm
Rotational Torque	16,32 Detents	50	100	150	gf-cm
Detent Options	0, 16, 24, 32				
Resolution	4, 6, 8, 24				Pulses per Revolution
Rotational Life	No detent @30 RPM			3 Million	cycles
Rotational Life	With detent @30 RPM			1 Million	cycles
Push-Pull Strength of Shaft	10 seconds	20			kg
Terminal Pull-out Strength	10 seconds	6			kg

Mechanical and Environmental

Manual Soldering	Maximum temperature of 350°C for 5 seconds
RoHS	Lead-Free. Fully compliant to RoHS Directive
Shock :	Per MIL-STD-883F (100G's)
Vibration :	Per MIL-STD-883F (15G's)
Packaging :	Standard anti-static tray packaging
Storage Temperature:	-55°C to +100°C

Optional Momentary Switch Function:

Parameter	Conditions & Remarks	Min.	Nominal	Max	Unit
Switch contact resistance				10	ohms
Switch rating	5 VDC @10 mA				
Switch travel		0.25	0.5	0.75	mm
Actuation Force		400	510	620	grams
Switch Life	Standard	1 Million			actuations
Switch Life		Consult CTS for custom life requirements			

Mechanical Specifications

Figure 1 – 291V1… – Without Schmitt Trigger, With Left Locating Lug, .050” Pitch Pins Facing Rear

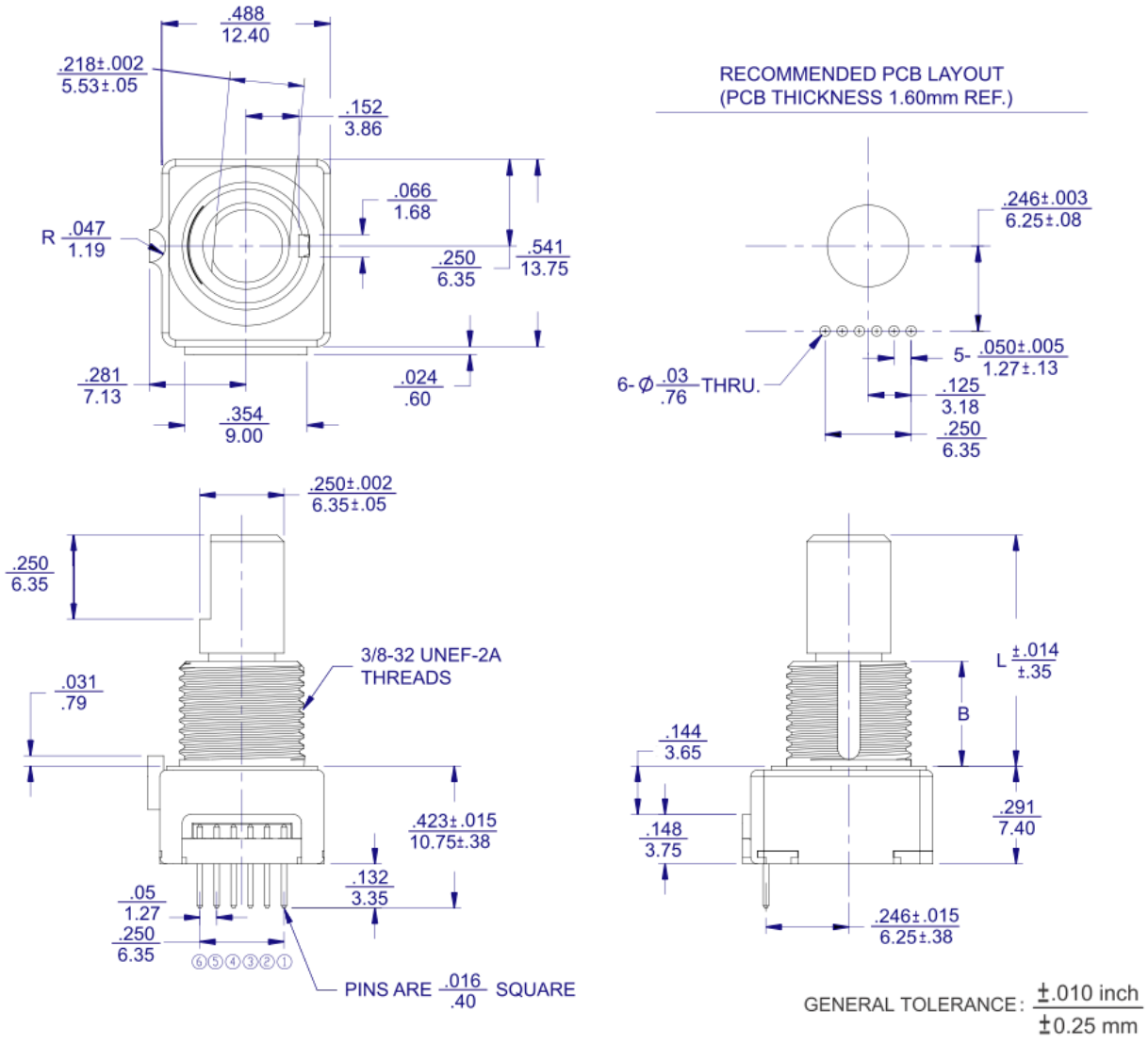


Figure 2 – 291V1…S – With Schmitt Trigger, Without Locating Lug, .050” Pitch Pins Facing Rear

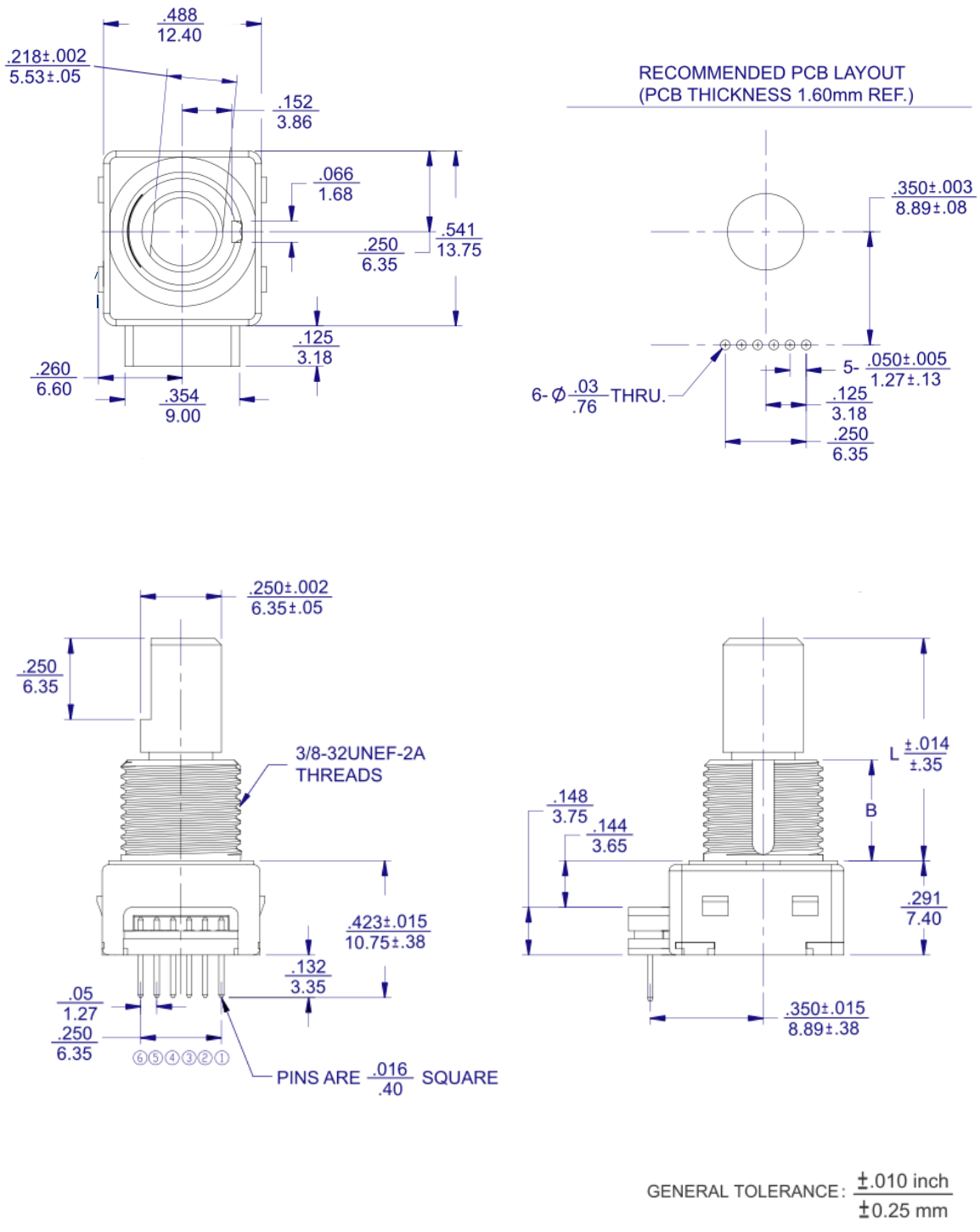


Figure 3 – 291V1…A – Without Schmitt Trigger, Without Locating Lug, .050” Pitch Pins Facing Rear

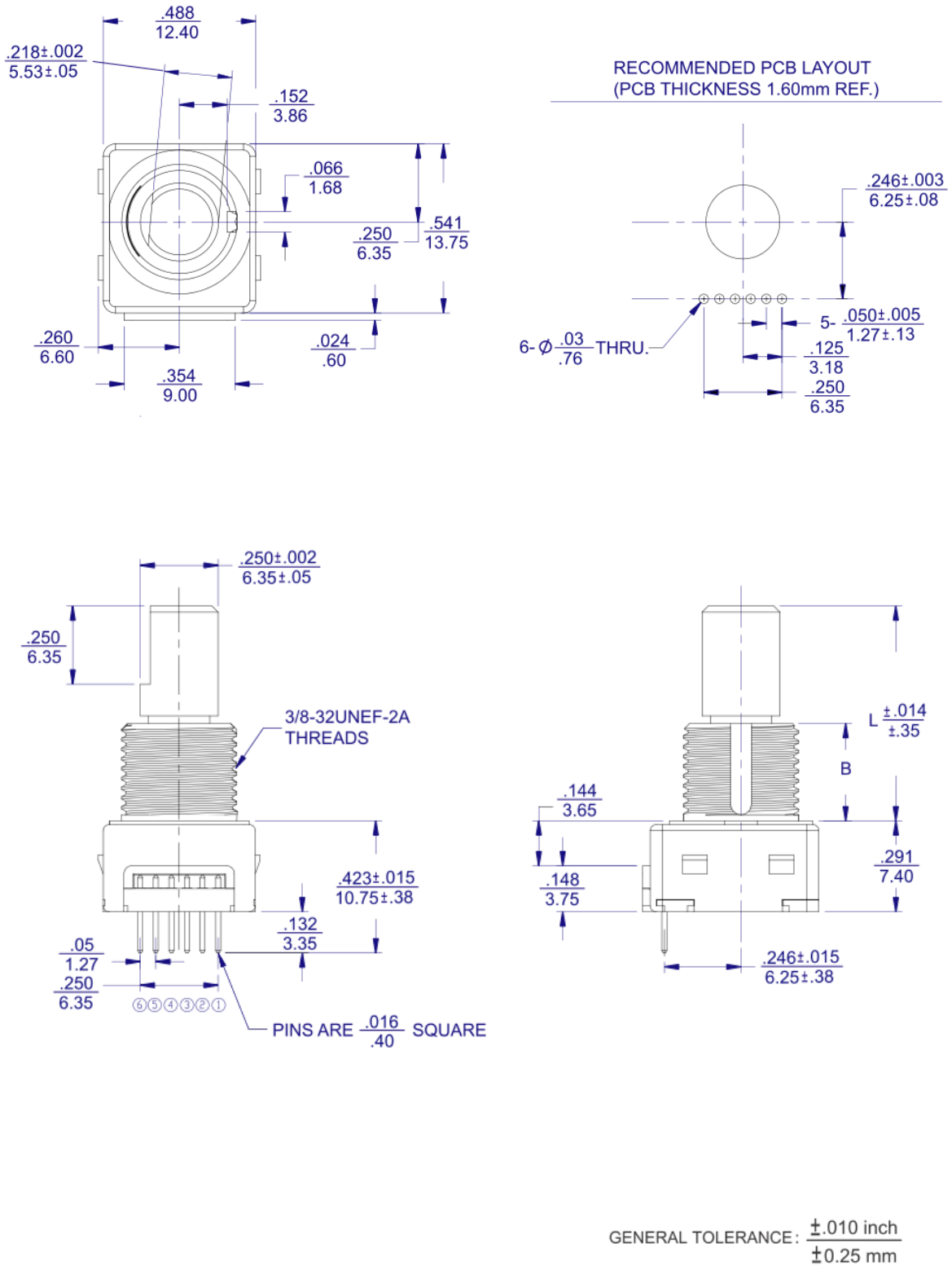


Figure 4 – 291V1…B – With Schmitt Trigger, With Locating Lug, .050” Pitch Pins Facing Rear

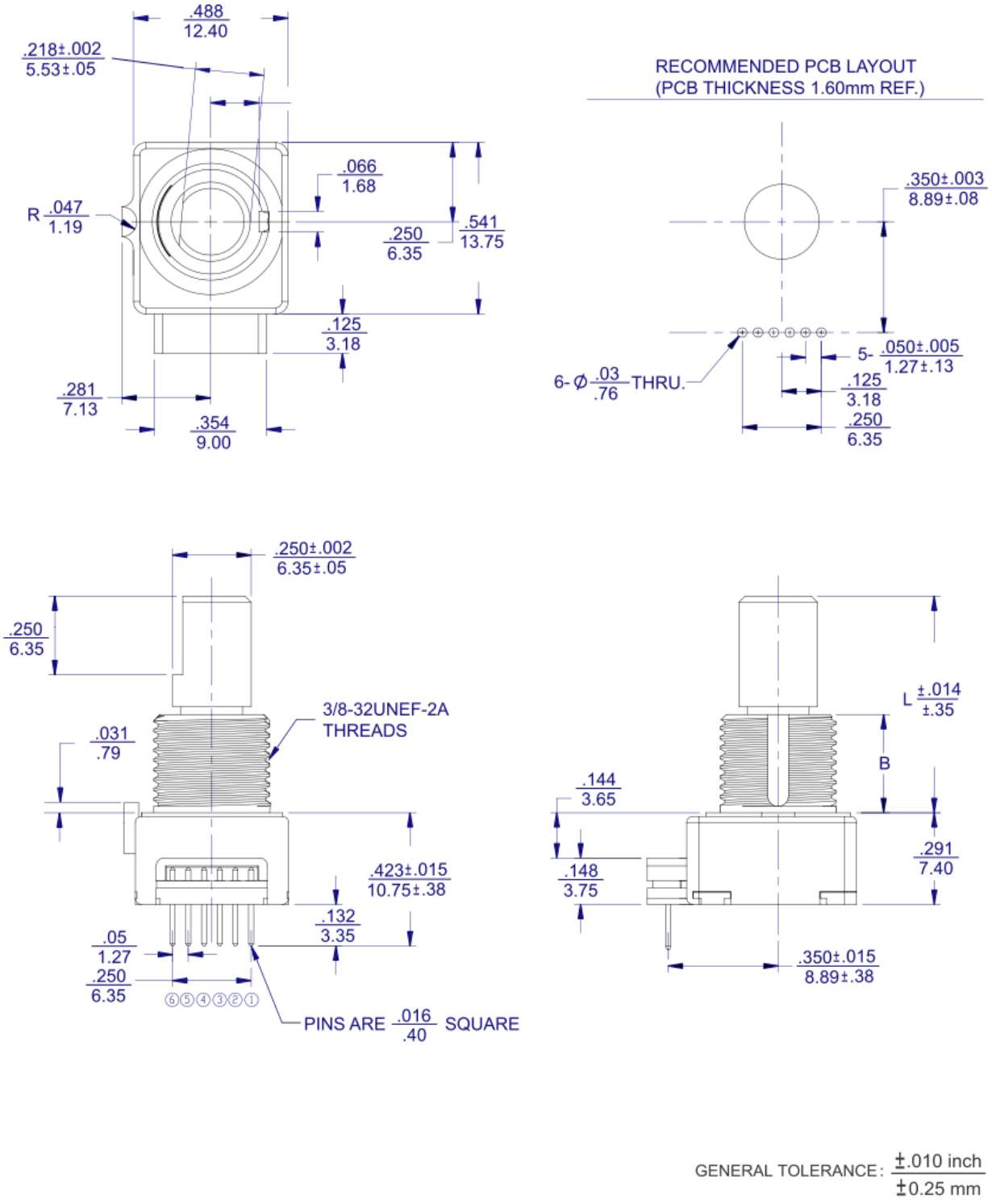


Figure 5 – 291P1…A – Without Schmitt Trigger, Without Locating Lug, .100” Pitch Pins Facing Rear
291P1…S – With Schmitt Trigger, Without Locating Lug, .100” Pitch Pins Facing Rear

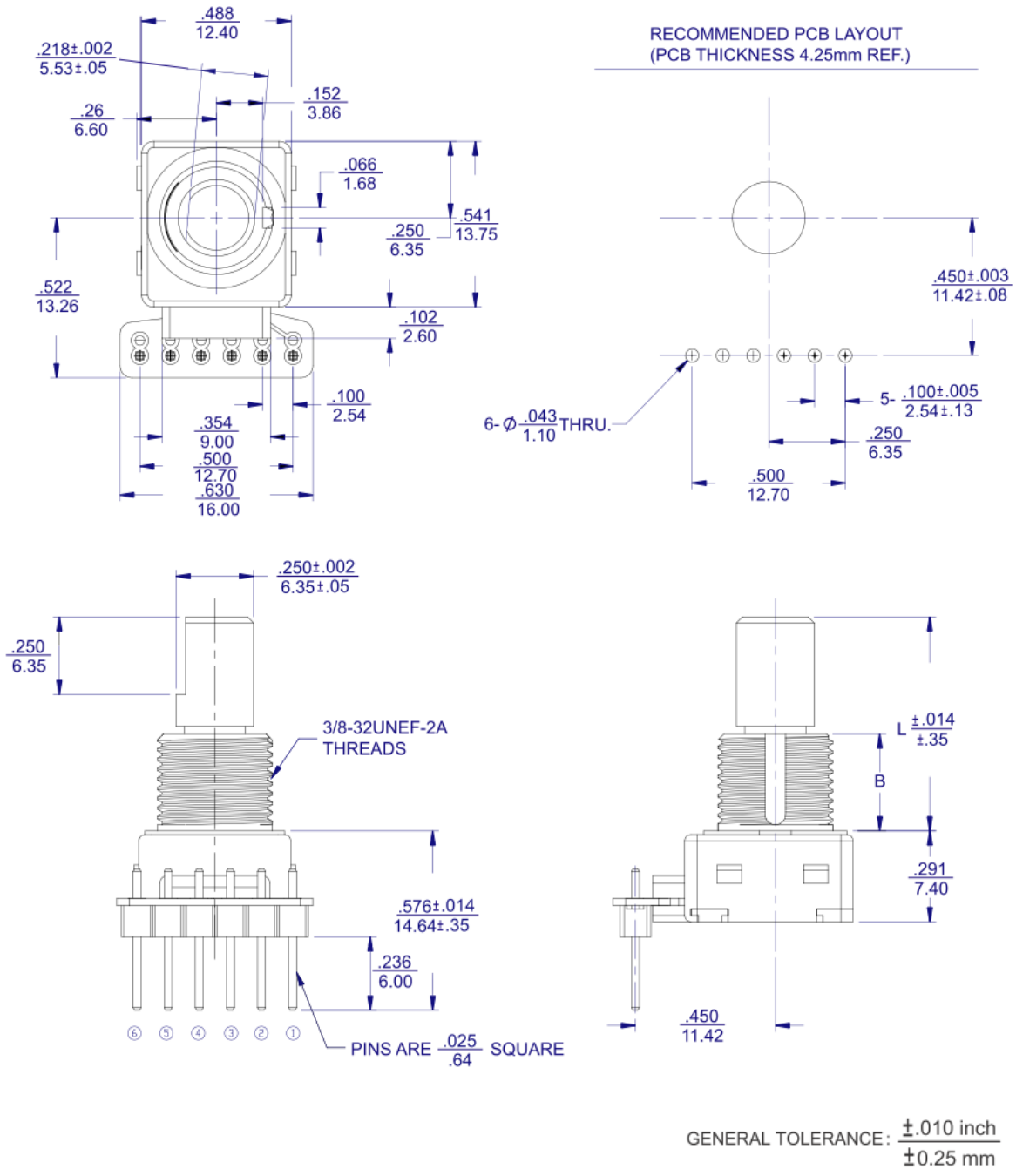


Figure 6 –291P1… – Without Schmitt Trigger, With Locating Lug, .100” Pitch Pins Facing Rear
291P1…B – With Schmitt Trigger, With Locating Lug, .100” Pitch Pins Facing Rear

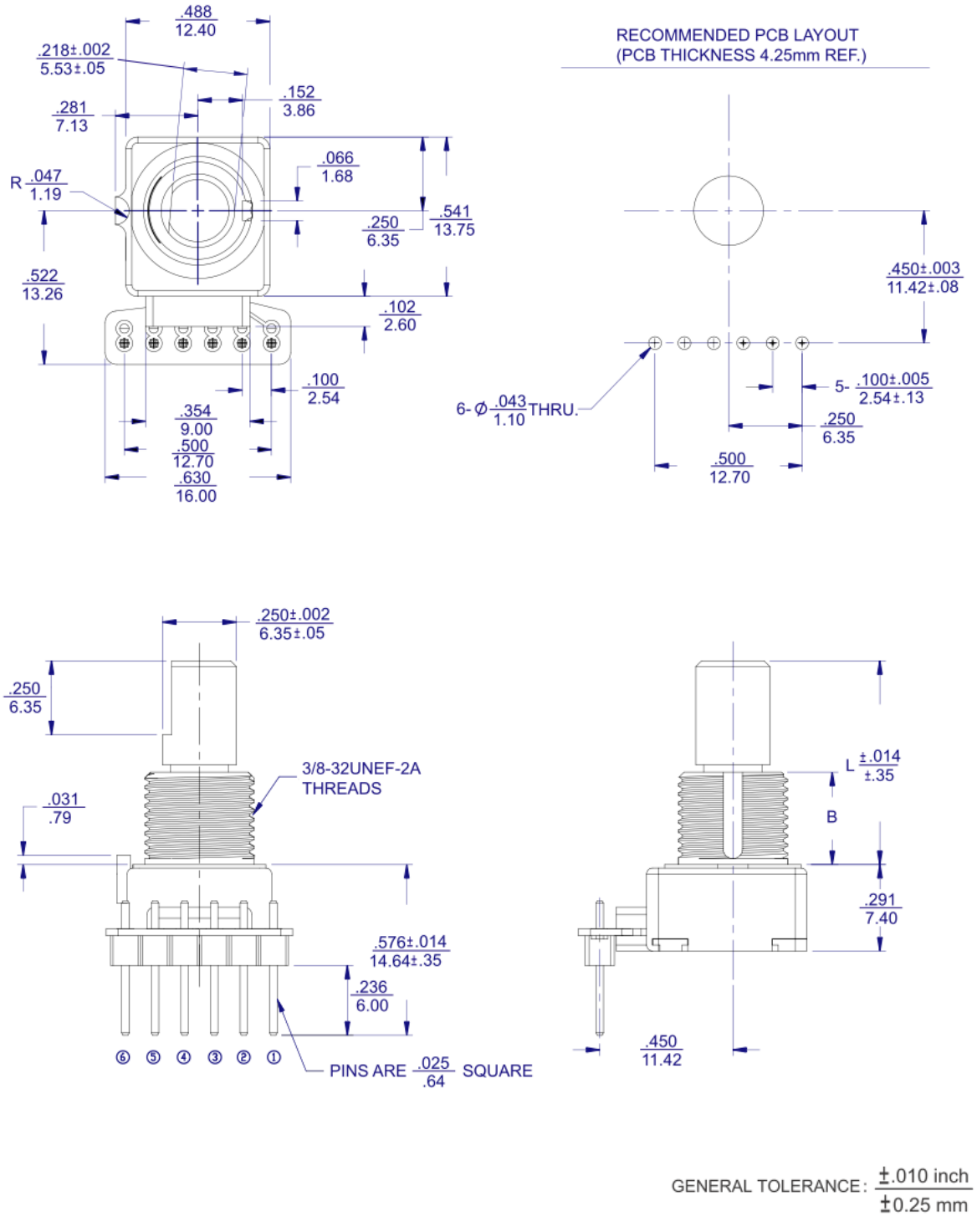


Figure 7 –291C… – Without Schmitt Trigger, With Locating Lug, With Ribbon Cable
291C…B – With Schmitt Trigger, With Locating Lug, With Ribbon Cable

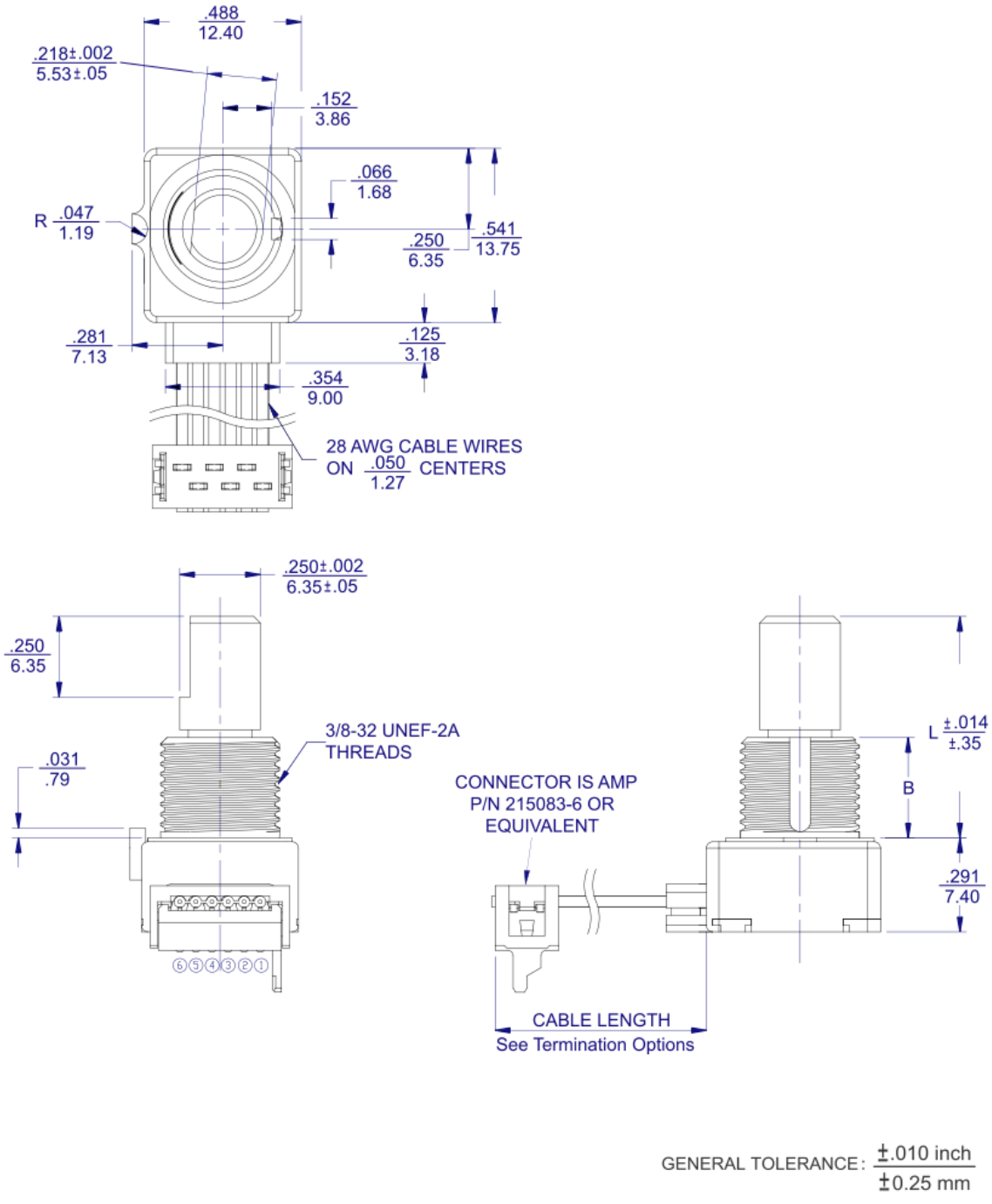
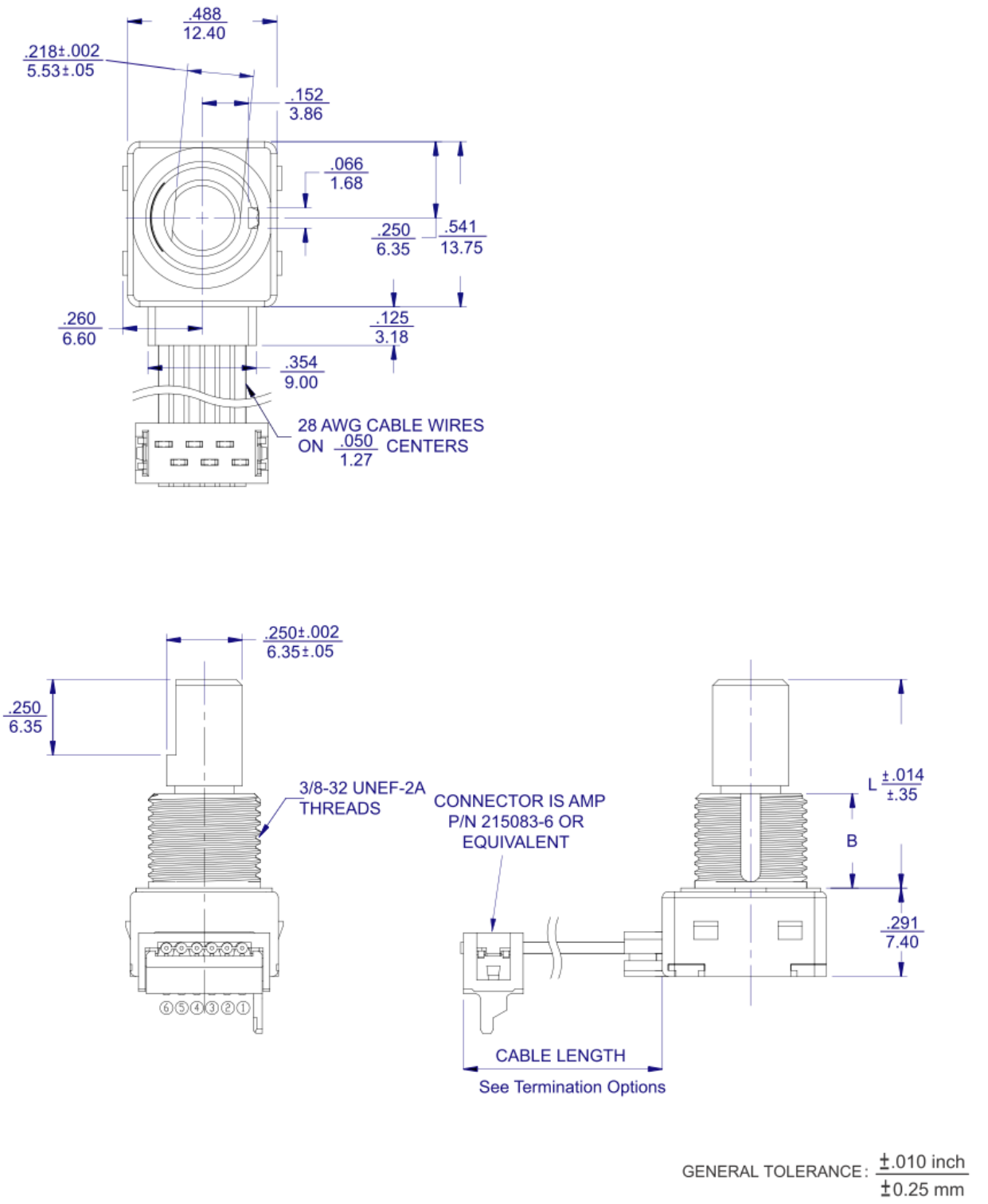
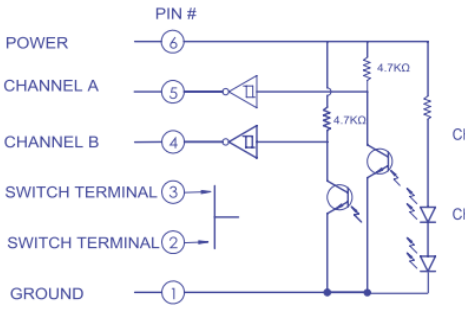


Figure 8 – 291C…A – Without Schmitt Trigger, Without Locating Lug, With Ribbon Cable
291C…S – With Schmitt Trigger, Without Locating Lug, With Ribbon Cable



Electric Circuit And Waveform (Without Schmitt Trigger Design)

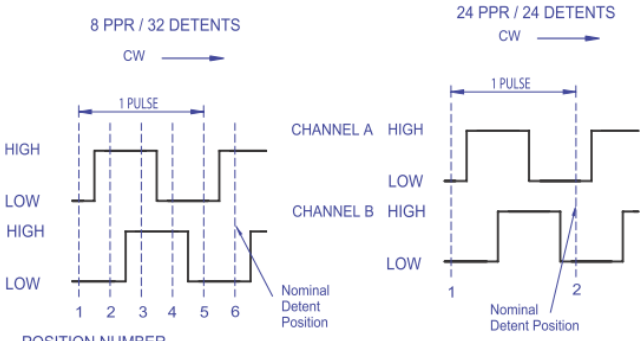


* Schmitt trigger and pull-up resistors (4.7KΩ) are integrated inside CTS optical encoder, so it's not necessary to have external pull-up resistors for application circuit.

* Product will function properly with external 2.2KΩ pull up resistors.

Standard Quadrature 2-Bit Code

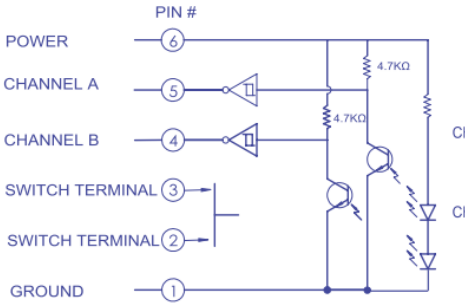
8 PPR/ 32 DETENTS



1. 8 PPR / 32 detents is shown
2. Code repeats every 4 positions
3. Channel A Leads Channel B in CW direction and lags in CCW direction

1. 24 PPR / 24 detents is shown
2. The nominal detent position is located when both Channel A and B are low
3. Channel A Leads Channel B in CW direction and lags in CCW direction

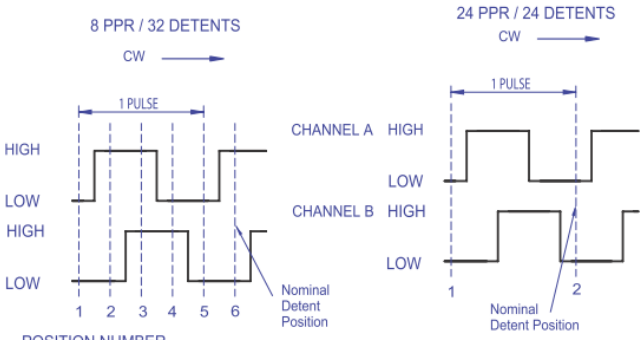
Electric Circuit And Waveform (With Schmitt Trigger Design)



* Schmitt trigger and pull-up resistors (4.7KΩ) are integrated inside CTS optical encoder, so it's not necessary to have external pull-up resistors for application circuit.

* Product will function properly with external 2.2KΩ pull up resistors.

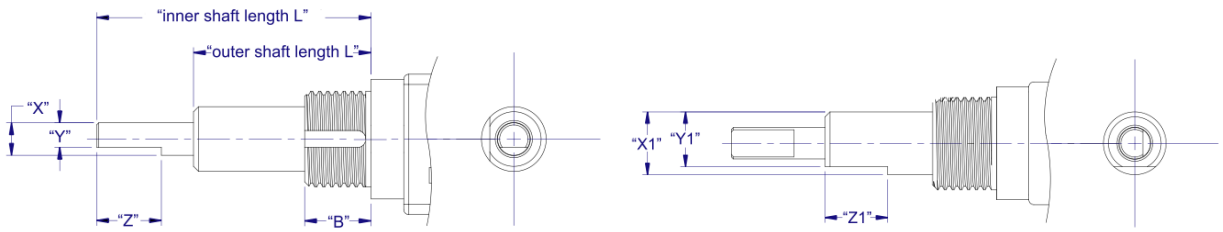
Standard Quadrature 2-Bit Code



1. 8 PPR / 32 detents is shown
2. Code repeats every 4 positions
3. Channel A Leads Channel B in CW direction and lags in CCW direction

1. 24 PPR / 24 detents is shown
2. The nominal detent position is located when both Channel A and B are low
3. Channel A Leads Channel B in CW direction and lags in CCW direction

Dual Shaft Construction



Note: Inner shaft removed for clarity.

D - DUAL

	X	Y	Z	B
Imperial	.125"	.094"	.250"	.256"
Metric	3.18	2.40	6.35	6.50

OUTER FLATTED SHAFT DIMENSION

	X1	Y1	Z1
Imperial	.250"	.218"	.250"
Metric	6.35	5.53	6.35