



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	Code Shaft Length "L"		Code Spec.		Code Spec.		
V1	.050" pitch pins Rear facing .132" length	Single shaft structure 22 .687"		F Flat		A None B Momentary		
P1	.10" pitch pins Rear facing .236" length	Dual shaft structure DD Outer shaft: .685" Inner shaft: 1.059"						
*C4	4" ribbon cable With .050" pitch connector terminals	(Not available with locating lug, see page 8 for additional details)		Output Combination				Code Spec.
*C5	5" ribbon cable With .050" pitch connector terminals			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				A Without Schmitt trigger, Without locating lug BLANK Without Schmitt trigger, With locating lug
*C6	6" ribbon cable With .050" pitch connector terminals			X00 24 PPR, No Detents (only available with Schmitt trigger)				S With Schmitt trigger, Without locating lug B With Schmitt trigger, With locating lug
				X24 24 PPR, 24 Detents (only available with Schmitt trigger)				
↓		Code Bushing Length "B"						Code Spec.
		0 .312" For single shaft construction D .256" For dual shaft construction						A 5.0V B 3.3V

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

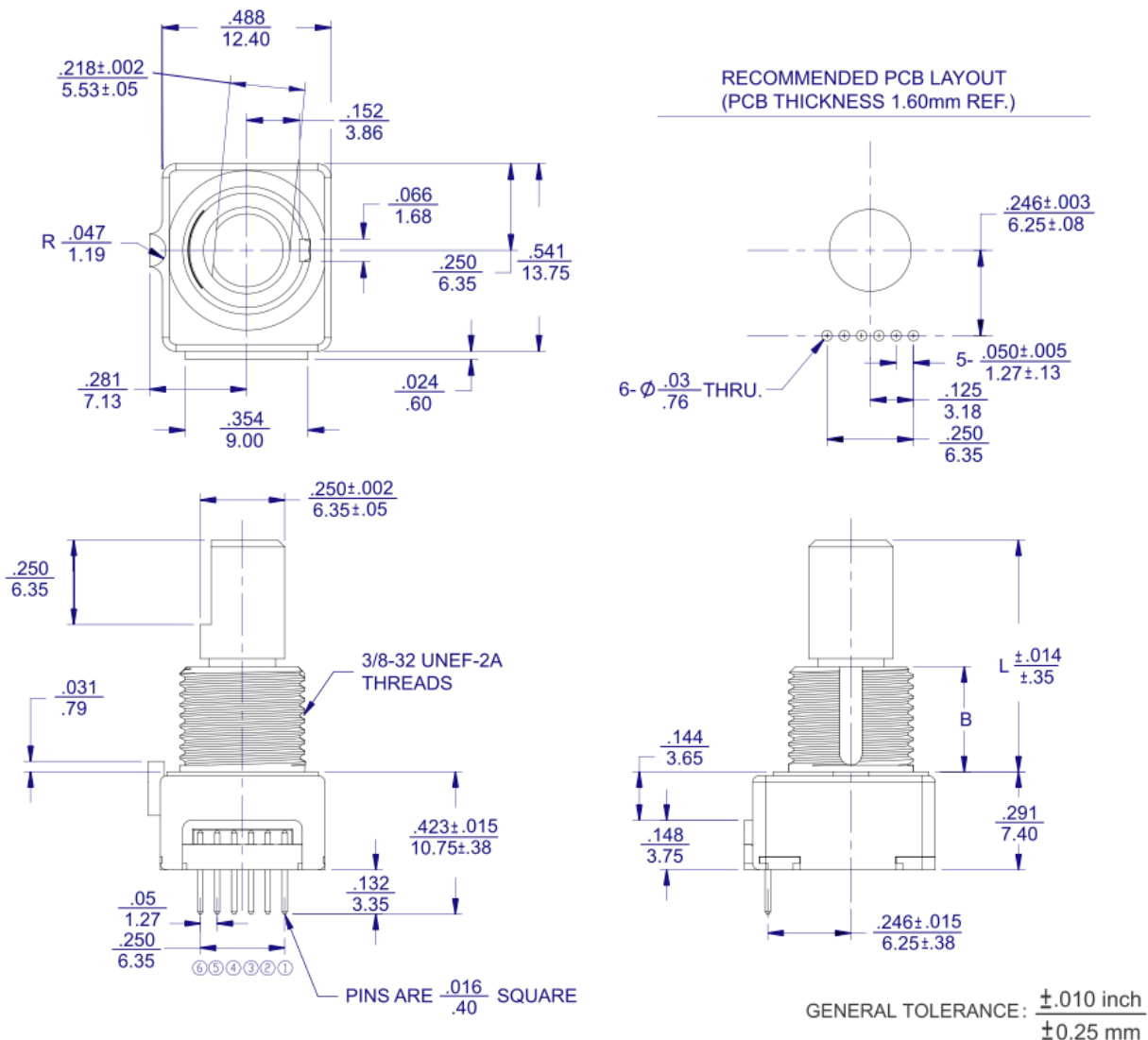
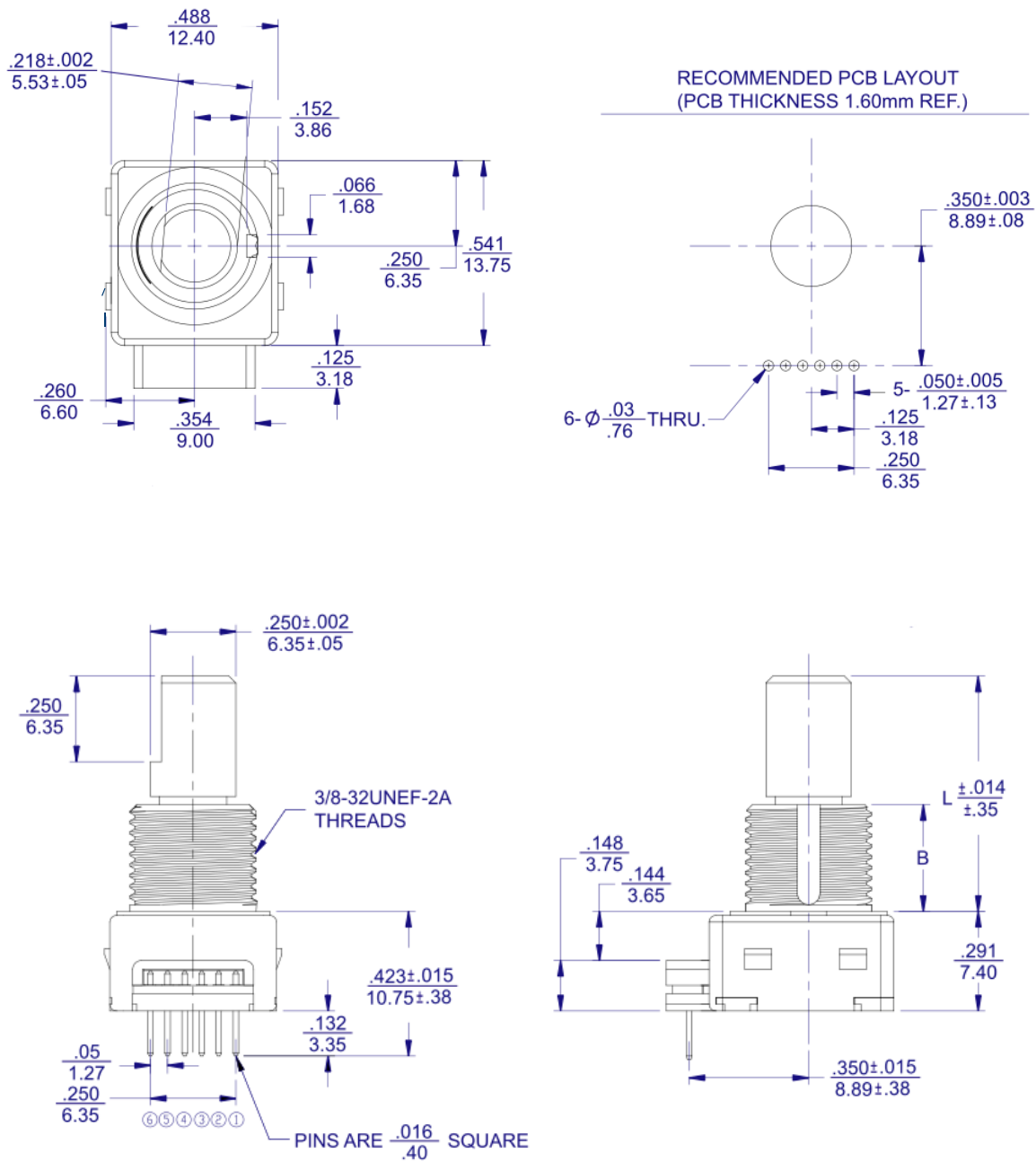


Figure 2 – 291V1...S – With Schmitt Trigger, Without Locating Lug, .050" Pitch Pins Facing Rear



GENERAL TOLERANCE: $\pm .010$ inch
 ± 0.25 mm

Series 291

Compact Optical Encoder

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

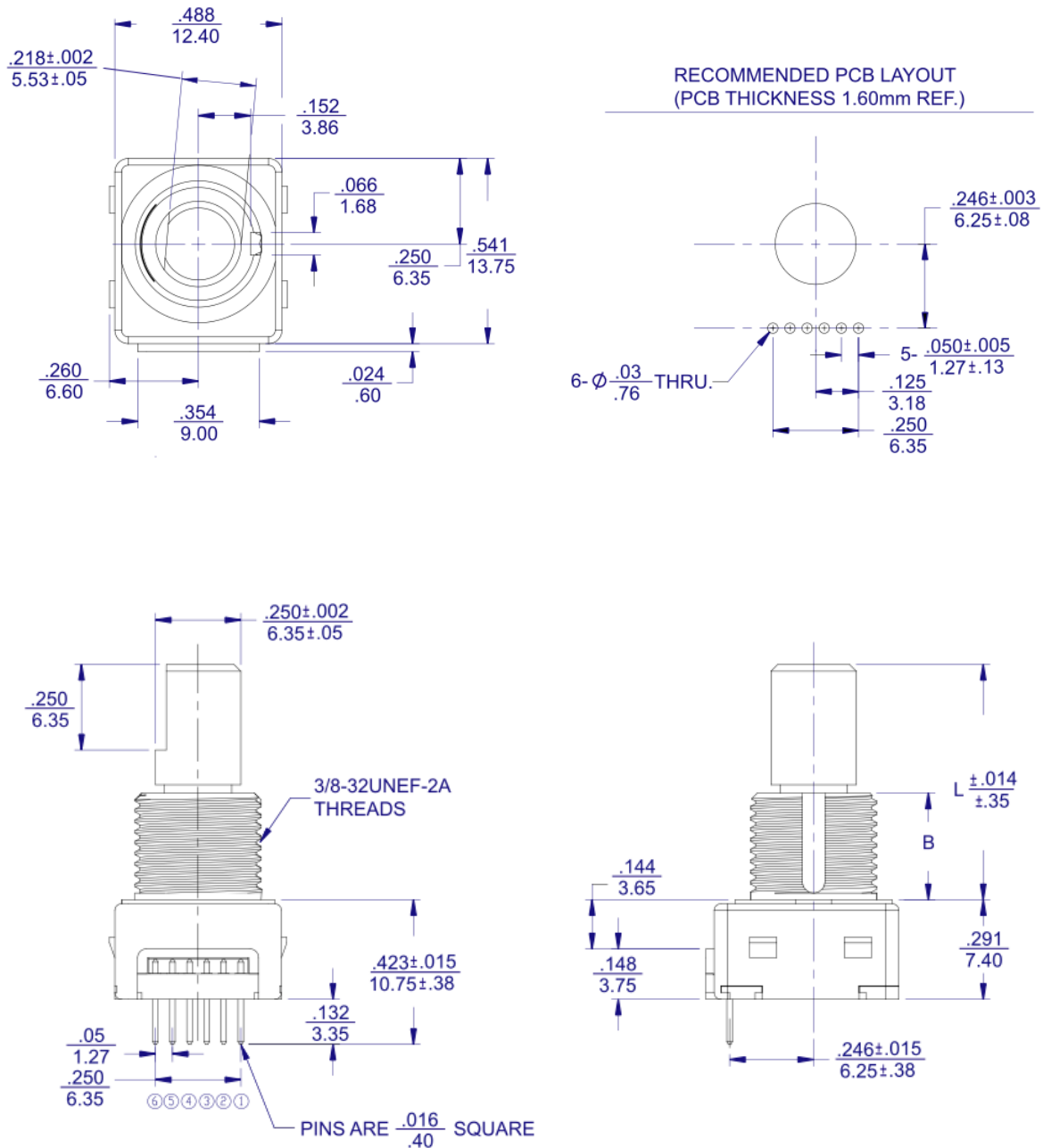


Figure 4 – 291V1...B – With Schmitt Trigger, With Locating Lug, .050" Pitch Pins Facing Rear

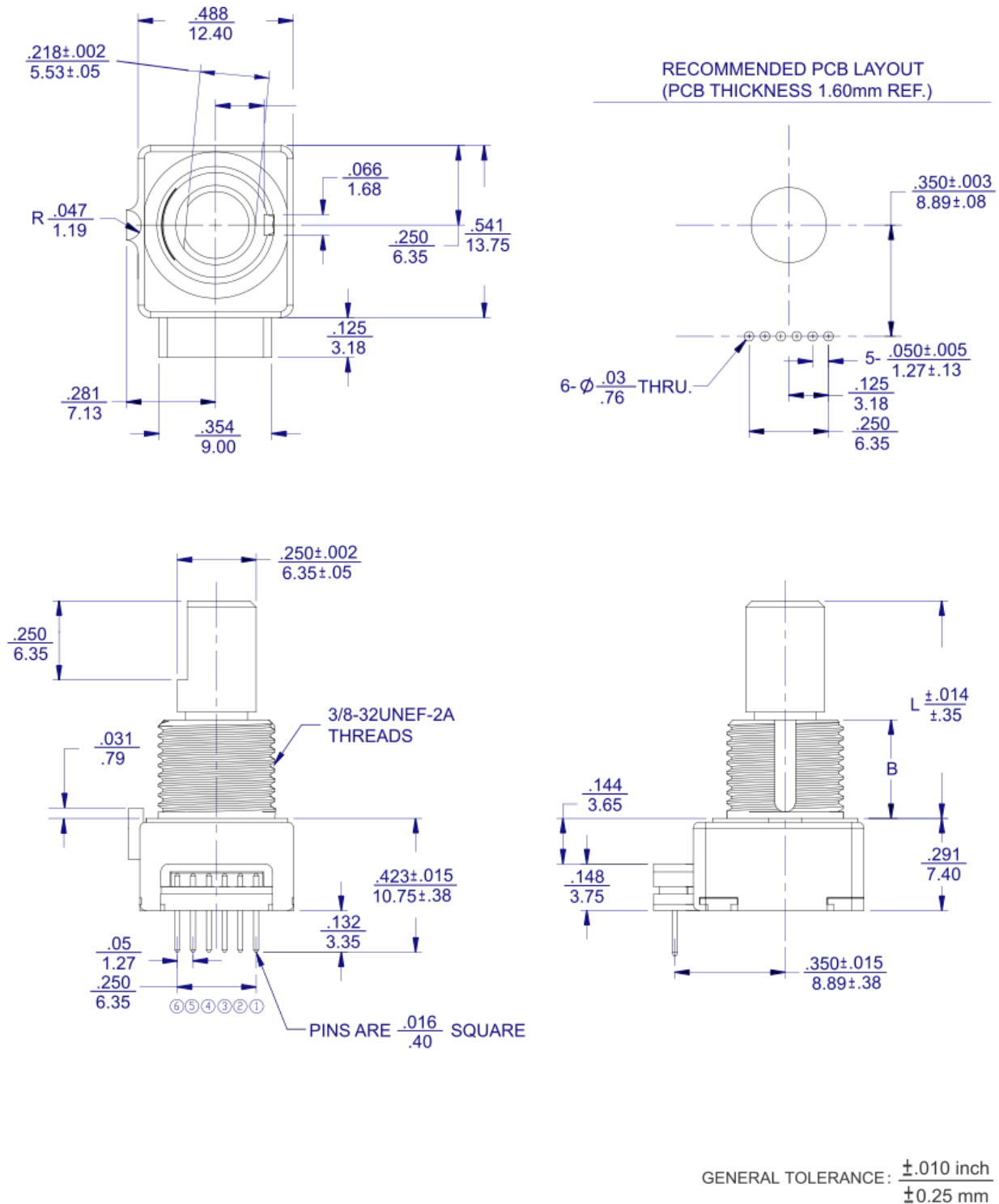


Figure 5 – 291P1...A – Without Schmitt Trigger, Without Locating Lug, .100" Pitch Pins Facing Rear
291P1...S – With Schmitt Trigger, Without Locating Lug, .100" Pitch Pins Facing Rear

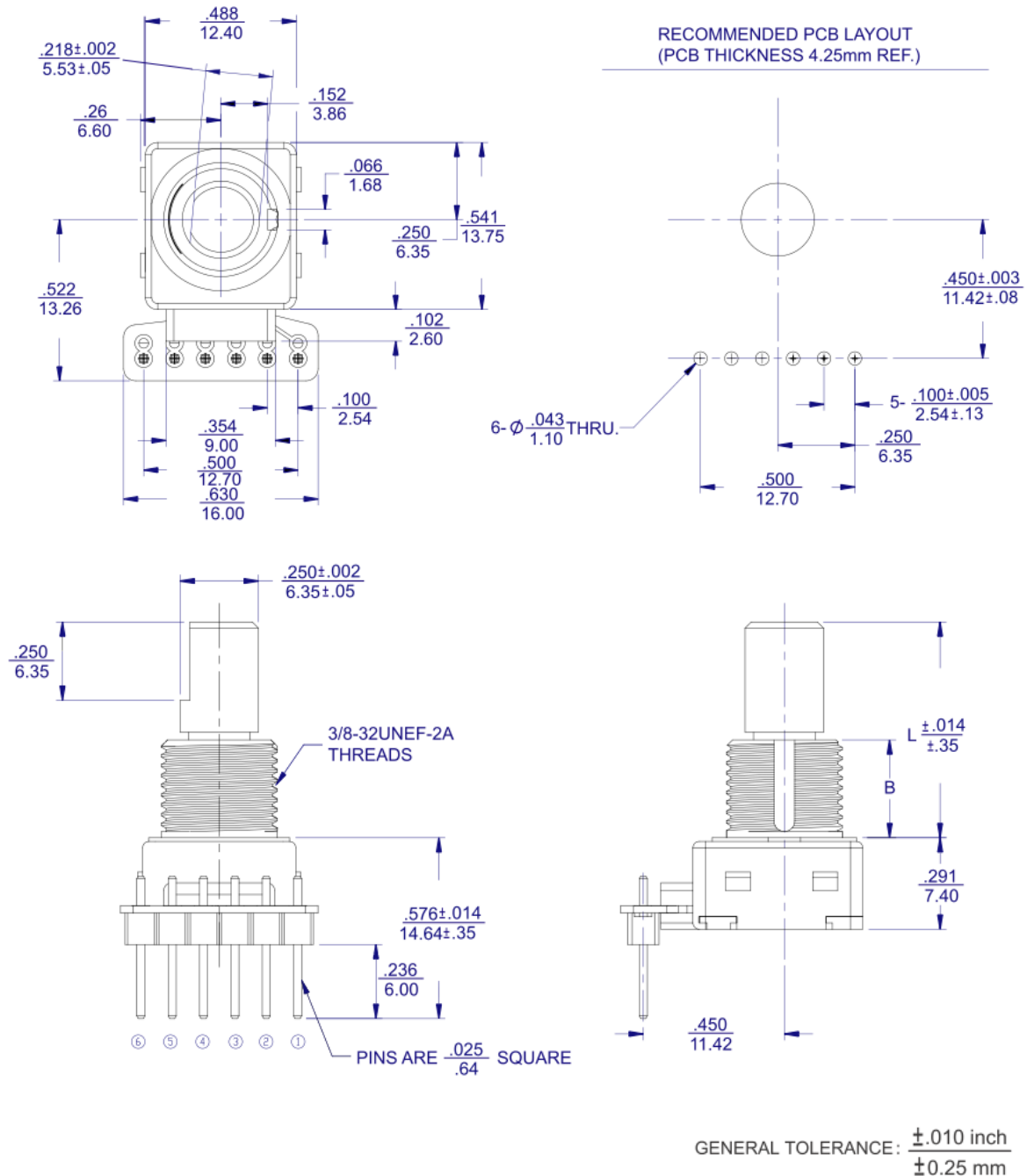
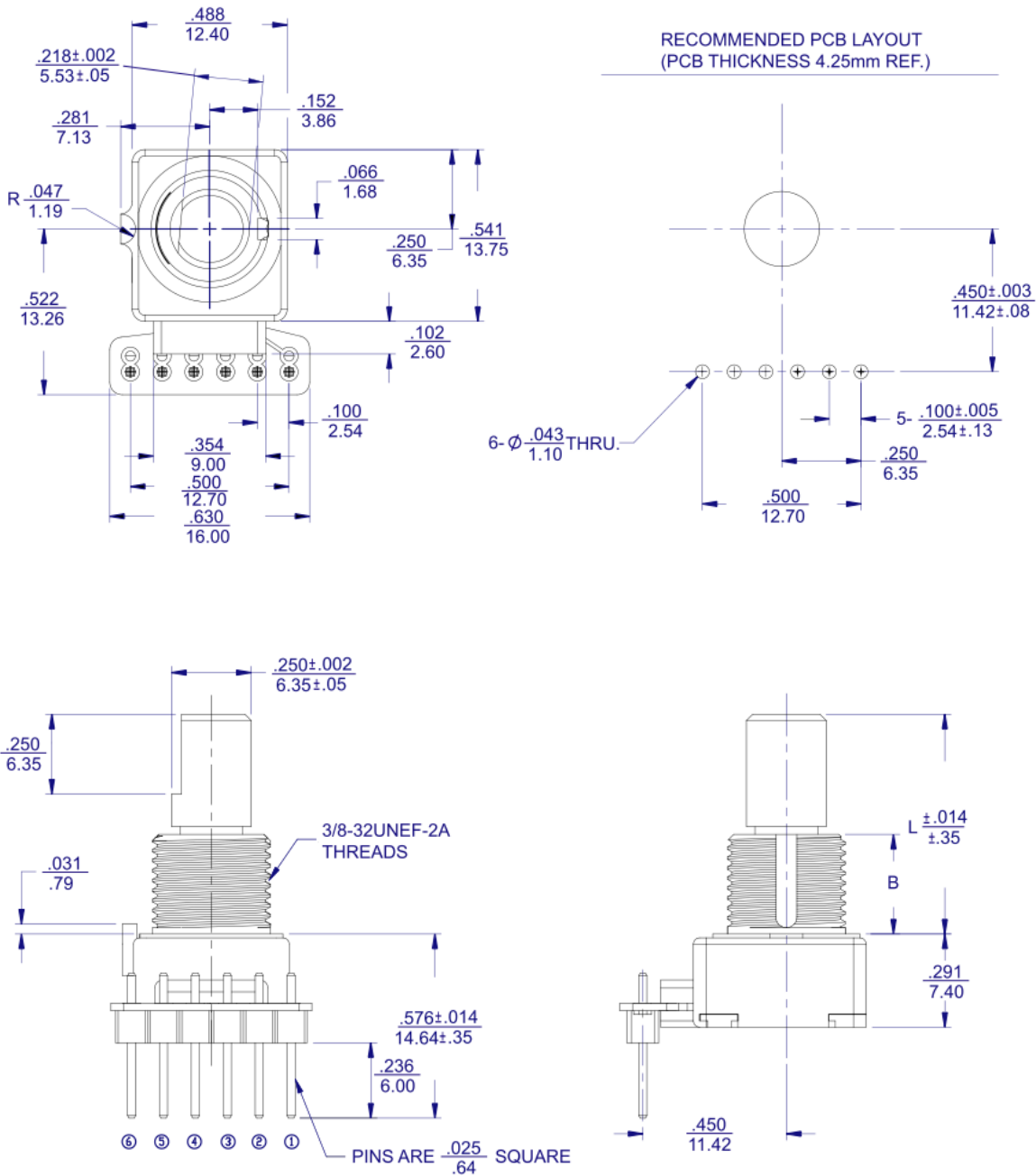


Figure 6 –291P1... – Without Schmitt Trigger, With Locating Lug, .100" Pitch Pins Facing Rear
291P1...B – With Schmitt Trigger, With Locating Lug, .100" Pitch Pins Facing Rear



GENERAL TOLERANCE: $\pm .010$ inch
 ± 0.25 mm

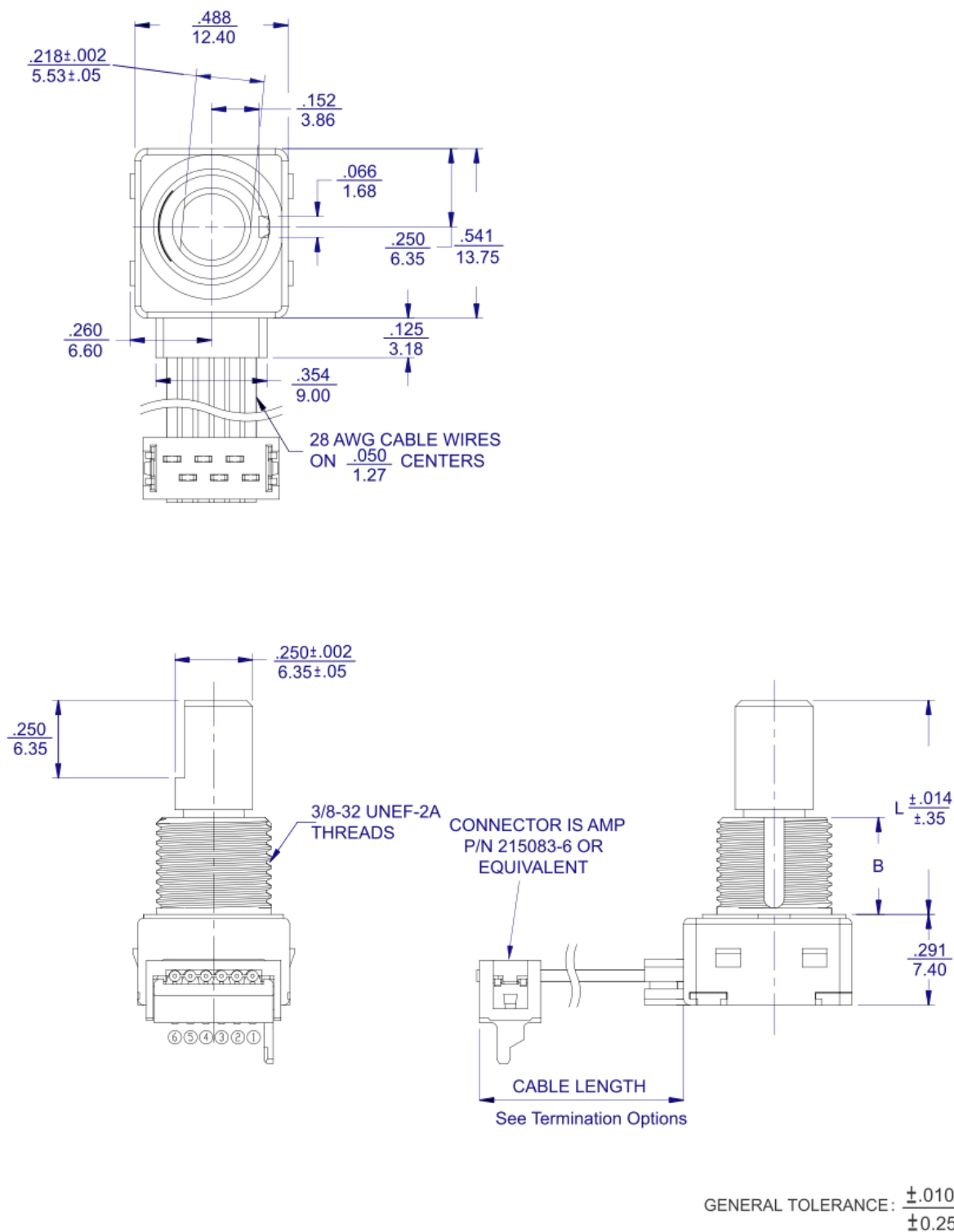
Compact Optical Encoder

291C...B – With Schmitt Trigger, With Locating Lug, With Ribbon Cable

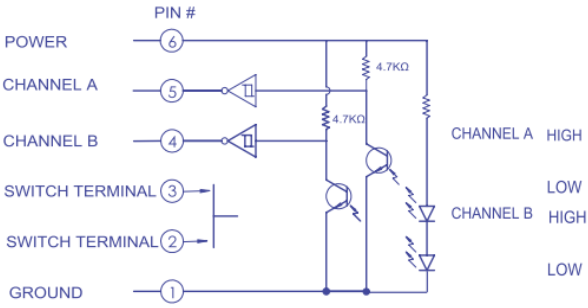


Compact Optical Encoder

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



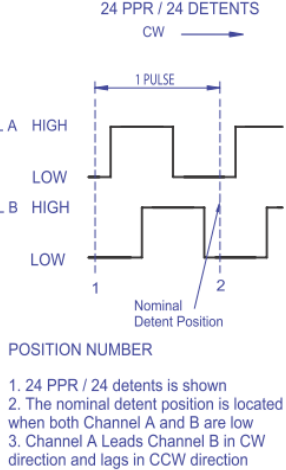
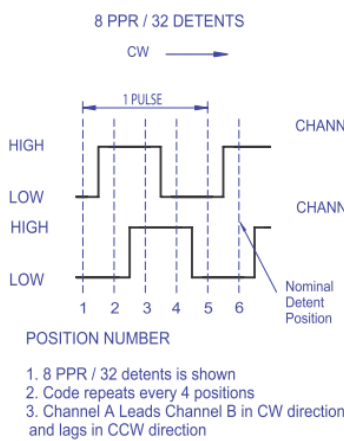
Electric Circuit And Waveform
(Without Schmitt Trigger Design)



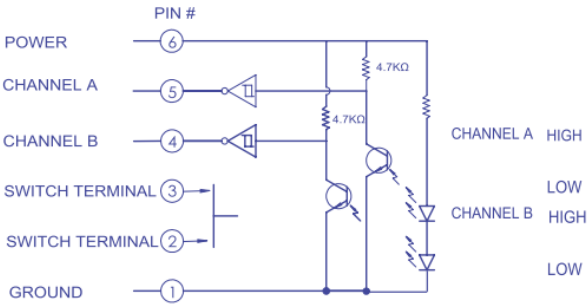
* Schmitt trigger and pull-up resistors (4.7KΩ) are integrated inside CTS optical encoder, so it's not necessary to have external pull-up resistors for application circuit.

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

Standard Quadrature 2-Bit Code
8 PPR / 32 DETENTS



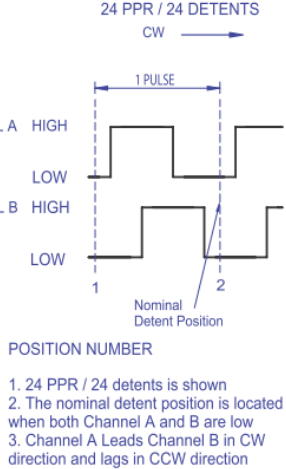
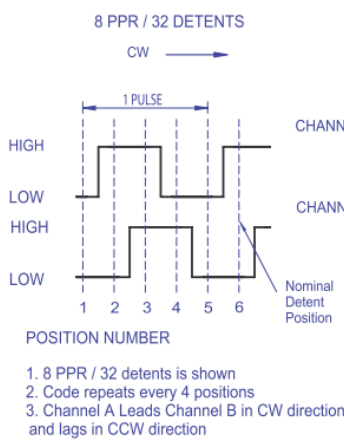
Electric Circuit And Waveform
(With Schmitt Trigger Design)



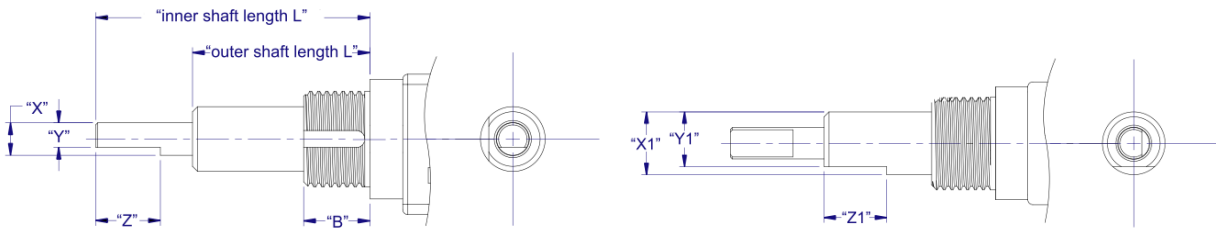
* Schmitt trigger and pull-up resistors (4.7KΩ) are integrated inside CTS optical encoder, so it's not necessary to have external pull-up resistors for application circuit.

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

Standard Quadrature 2-Bit Code



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

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

CTS:

[291P1022F416AB](#) [291V1022FX24ABB](#)