

Precision, Long-life Compact 12mm Size Optical Encoder

Features

- Package Size (12 X 14 X 7 mm)
- 3 Million life cycles (No detent)
- 1 Million life cycles (With detent)
- Durable Metal Shaft & Bushing
- Optional momentary switch
- Multiple options for terminations, resolution, cables, voltage
- RoHS Compliant



Electrical and Mechanical Specifications

Encoder:

Operating Voltage

5.0 $\pm$ 0.25 VDC
3.3 $\pm$ 0.125 VDC

Supply Current

5.0 VDC @ 30mA maximum
3.3 VDC @ 24mA maximum

Output Code

2-Bit Quadrature
Channel A leads channel B by 90°
electrically during clockwise rotation
of the shaft

Minimum Sink Current

2.0 mA for 5.0 VDC
1.0 mA for 3.3 VDC

Power Consumption

150 mW maximum for 5.0 VDC
80 mW maximum for 3.3 VDC

Rotational Torque

Running: 20 $\pm$ 10 gf-cm
Detent: 140 $\pm$ 50 gf-cm (24 Detents)
100 $\pm$ 50 gf-cm (16, 32 Detents)

Detent Options

0, 16, 24, 32

Resolution

4, 6, 8, 24 Pulses per Revolution

Rotational Life (@30 RPM)

3 Million cycles (No detent)
1 Million cycles (With detent)

Temperature Range

Operating: - 40°C to 85°C
Storage: - 55°C to 100°C

Push-Pull Strength of Shaft

20 kg minimum for 10 seconds

Terminal Pull-out Strength

6 kg minimum for 10 seconds

Solder Heat Resistance

350°C for 5 seconds

Mechanical Vibration

15G (MIL-STD-883F-2004)

Mechanical Shock

100G (MIL-STD-883F-2004)

Note:

Consult CTS for other common standard
features not listed.

Electrical and Mechanical Specifications (continued)

Optional Momentary Switch:

Switch Contact Resistance
10 Ω maximum

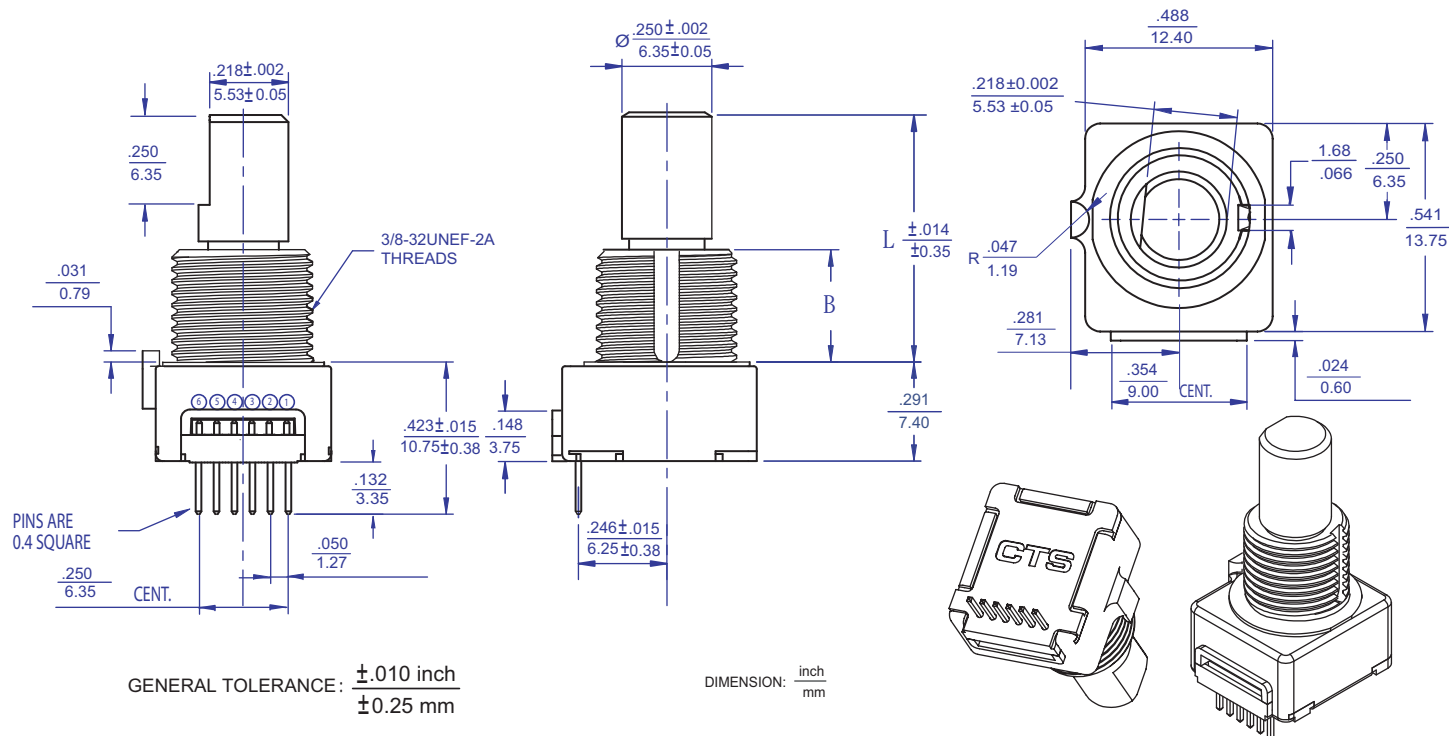
Switch Rating
5 VDC @ 10 mA

Switch Travel
0.5 $\pm$ 0.25 mm

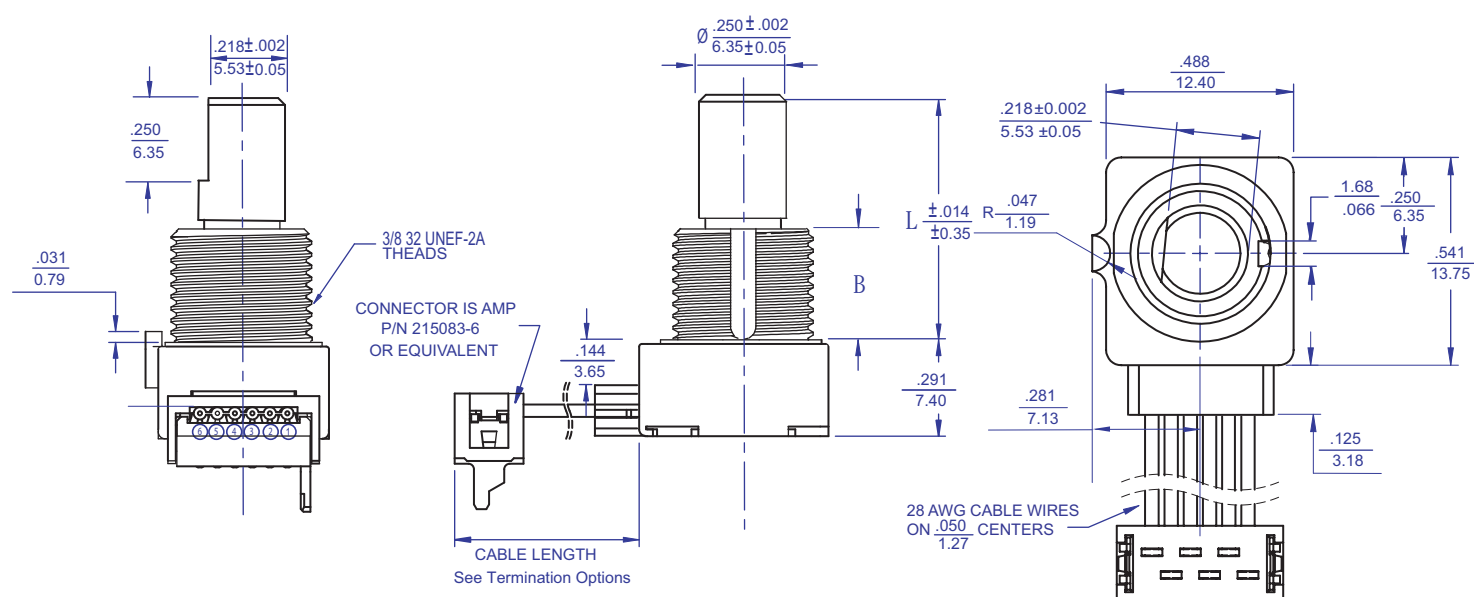
Actuation Force
510 $\pm$ 110 grams

Switch Life
Standard: 1 Million actuations minimum
Special: Consult CTS for custom life requirements.

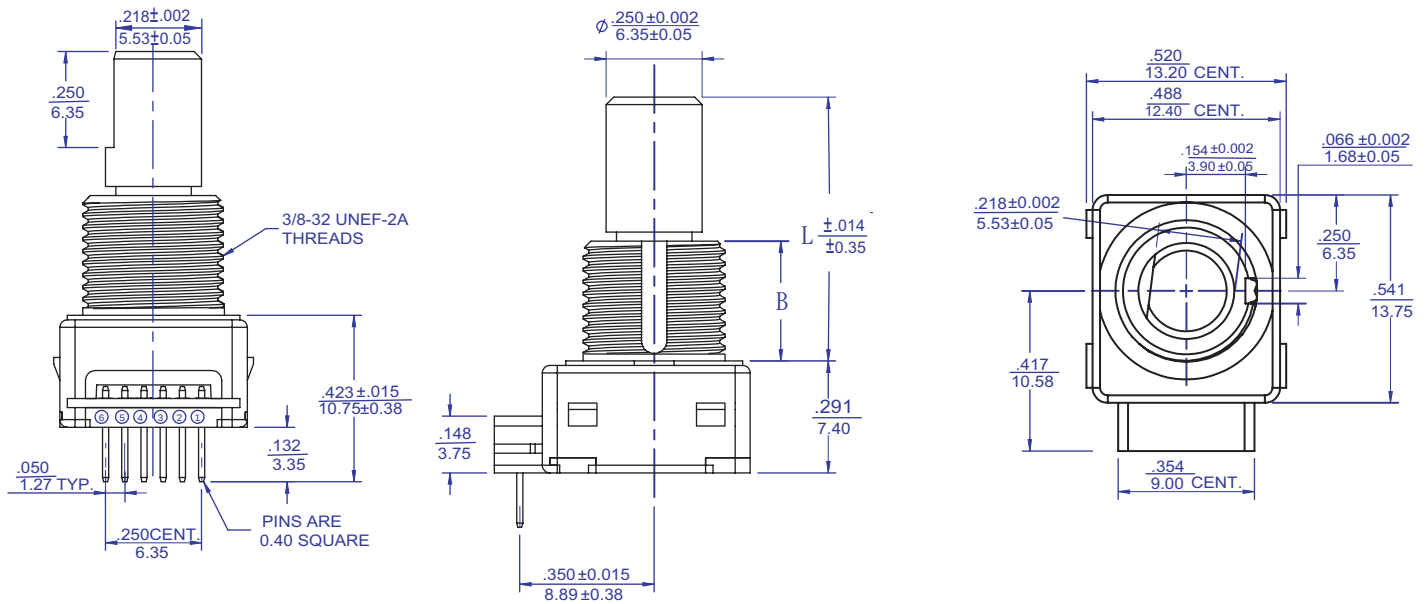
TYPE 291V1... 2-Bit Encoder Without Schmitt Trigger, With Left Locating Lug, 0.05" Pitch Pins Formed to Rear



TYPE 291C... 2-Bit Encoder Without Schmitt Trigger, With Left Locating Lug, With Cable and Connector 291C...B 2-Bit Encoder With Schmitt Trigger, With Left Locating Lug, With Cable and Connector

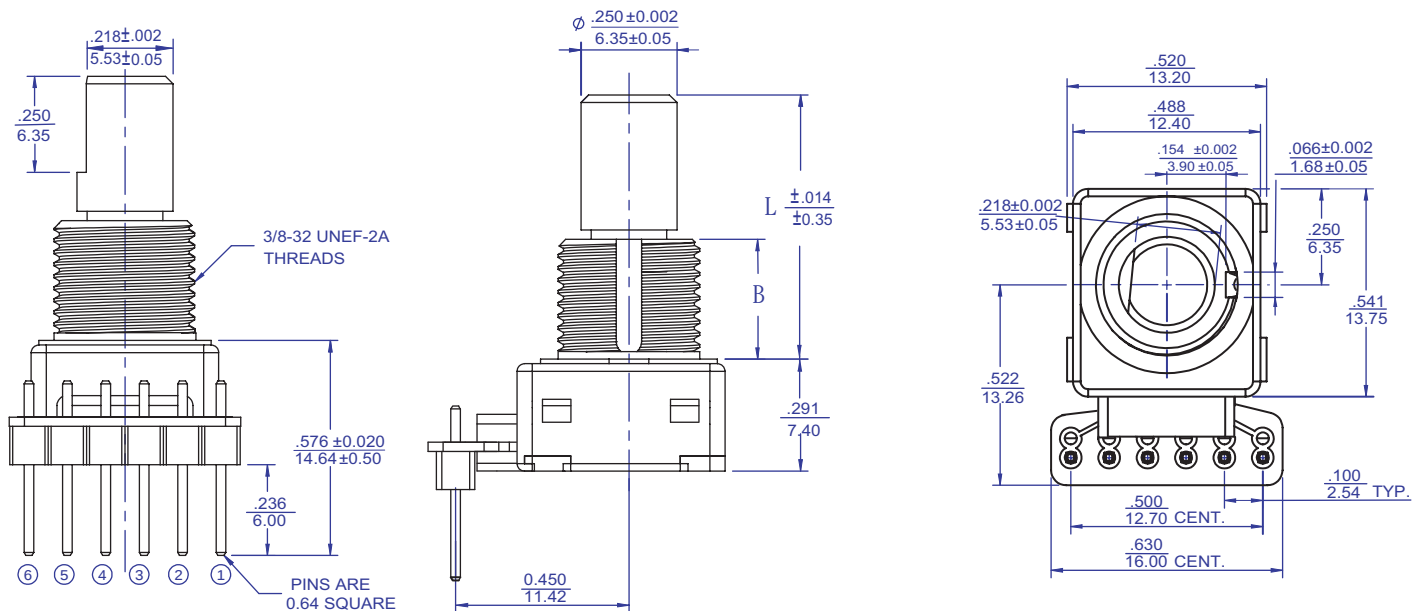


TYPE 291V1...S 2-Bit Encoder With Schmitt Trigger, Without Locating Lug, 0.05" Pitch Pins Formed to Rear



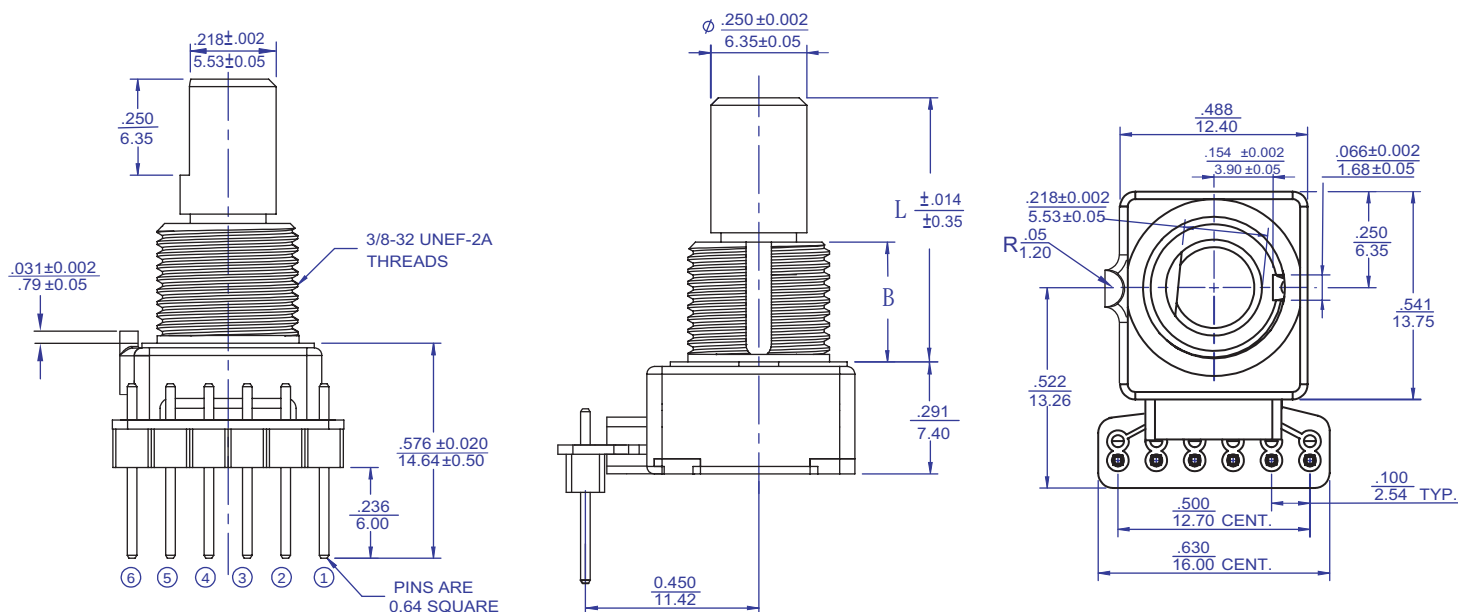
GENERAL TOLERANCE: $\pm .010$ inch
 ± 0.25 mm

TYPE 291P1...A 2-Bit Encoder Without Schmitt Trigger, Without Locating Lug, 0.1" Pitch Pins Formed to Rear 291P1...S 2-Bit Encoder With Schmitt Trigger, Without Locating Lug, 0.1" Pitch Pins Formed to Rear



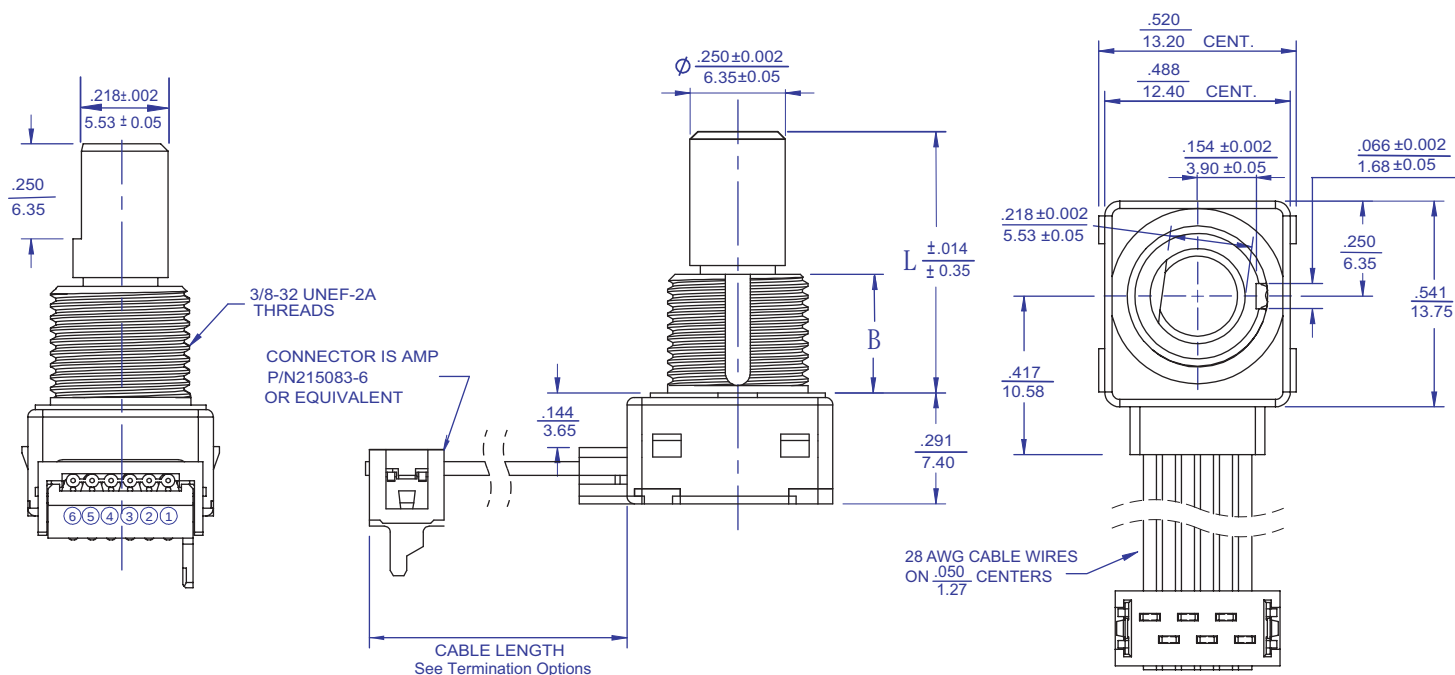
GENERAL TOLERANCE: $\pm .010$ inch
 ± 0.25 mm

TYPE 291P1... 2-Bit Encoder Without Schmitt Trigger, With Left Locating Lug, 0.1" Pitch Pins Formed to Rear
291P1...B 2-Bit Encoder With Schmitt Trigger, With Locating Lug, 0.1" Pitch Pins Formed to Rear



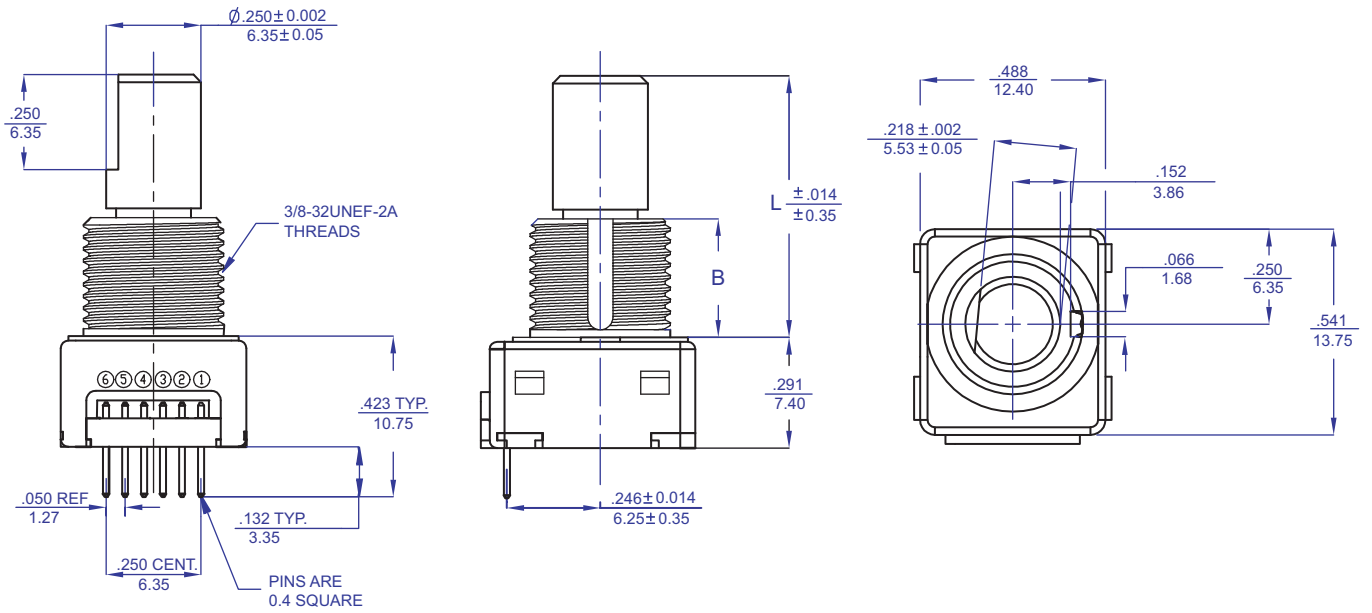
GENERAL TOLERANCE: $\pm .010$ inch
 ± 0.25 mm

TYPE 291C...A 2-Bit Encoder Without Schmitt Trigger, Without Locating Lug, With Cable and Connector
TYPE 291C...S 2-Bit Encoder With Schmitt Trigger, Without Locating Lug, With Cable and Connector



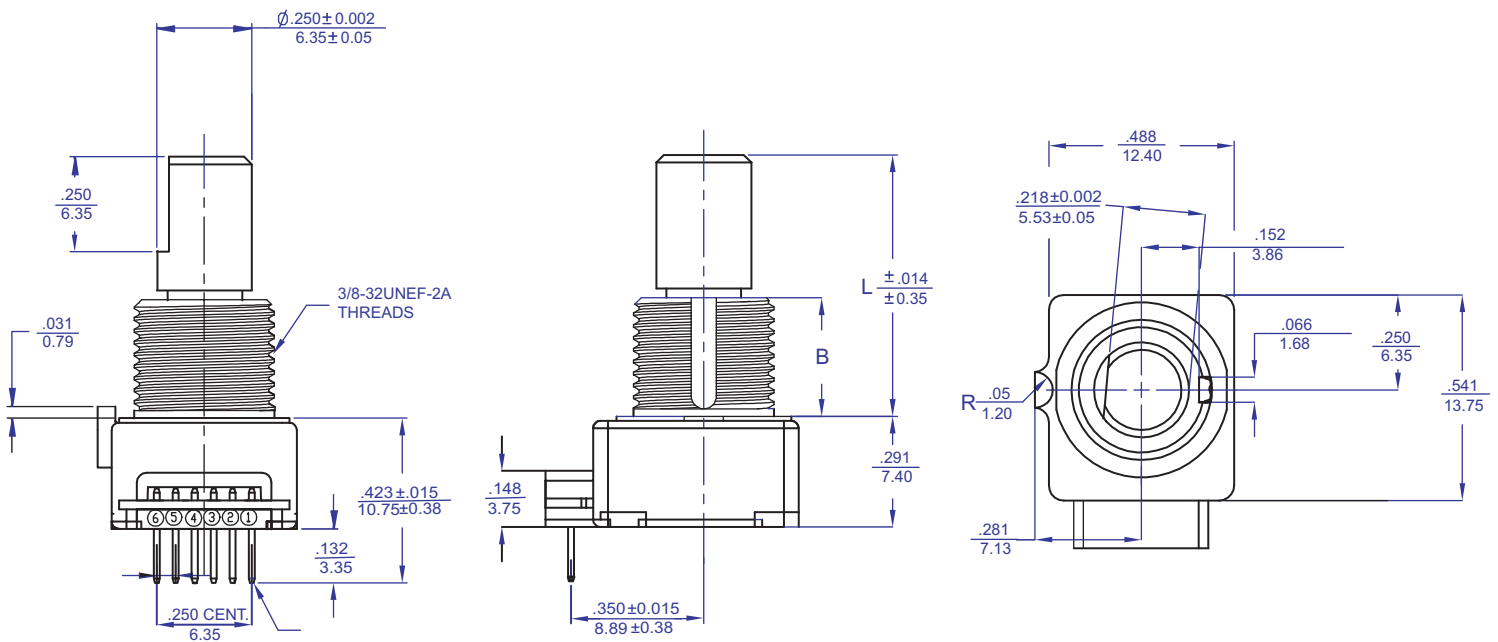
GENERAL TOLERANCE: $\pm .010$ inch
 ± 0.25 mm

TYPE 291V1...A 2-Bit Encoder Without Schmitt Trigger, Without Locating Lug, 0.05" Pitch Pins Formed to Rear



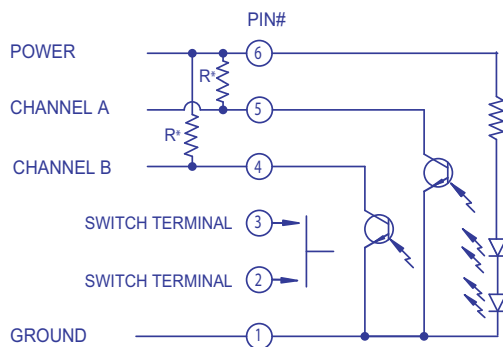
GENERAL TOLERANCE: $\pm .010$ inch
 ± 0.25 mm

TYPE 291V1...B 2-Bit Encoder With Schmitt Trigger, With Left Locating Lug, 0.05" Pitch Pins Formed to Rear



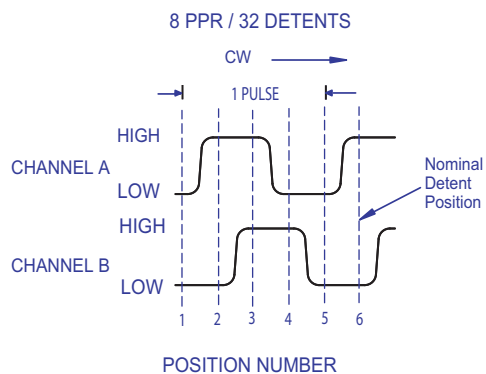
GENERAL TOLERANCE: $\pm .010$ inch
 ± 0.25 mm

ELECTRIC CIRCUIT AND WAVEFORM (WITHOUT SCHMITT TRIGGER DESIGN)



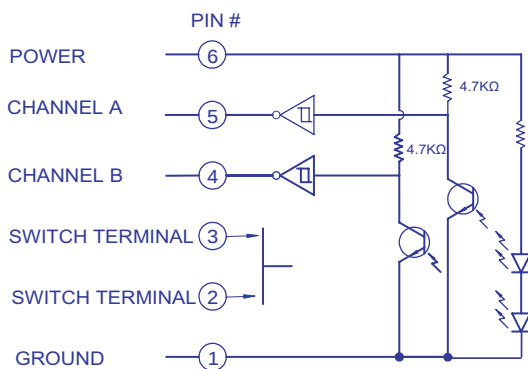
* Require pull-up resistors (2.2K or 4.7K Ω) for application

Standard Quadrature 2-Bit Code

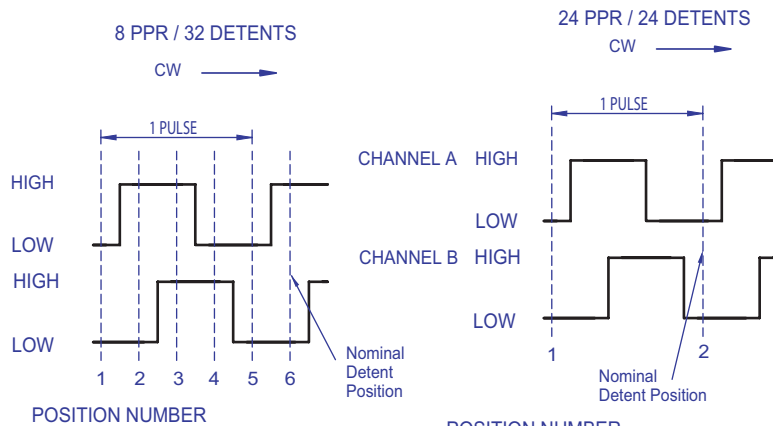


1. 8 PPR / 32 detents is shown
2. Code repeats every 4 positions
3. Channel A Leads Channel B in CW direction and lags in CCW direction

ELECTRIC CIRCUIT AND WAVEFORM (WITH SCHMITT TRIGGER DESIGN)



Standard Quadrature 2-Bit Code



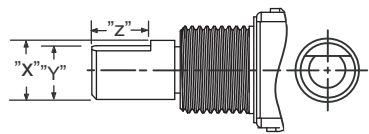
1. 8 PPR / 32 detents is shown
2. Code repeats every 4 positions
3. Channel A Leads Channel B in CW direction and lags in CCW direction

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

* Schmitt trigger and pull-up resistors (4.7K Ω) 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 2.2K Ω pull up resistors.

Single Shaft Construction

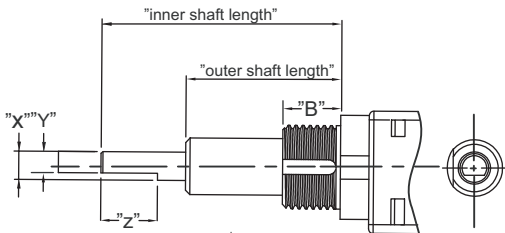


F - FLATTED

	X	Y	Z
Imperial Shaft	.250"	.218"	.250"
Metric Shaft	6.35	5.53	6.35

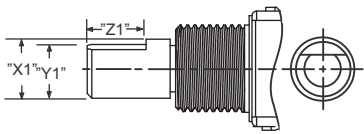
DIMENSION: $\frac{\text{inch}}{\text{mm}}$

Dual Shaft Construction



D - DUAL

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



OUTER FLATTED SHAFT DIMENSION

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

DIMENSION: $\frac{\text{inch}}{\text{mm}}$

Ordering Information

291

V1

TERMINATION

V1 - .050" Pitch Center Pins Formed to Rear with .132 length

P1 - .10" Pitch Center Pins Formed to Rear with .236 length

C4 - .050" Pitch Center 4" Ribbon Cable with Connector

C5 - .050" Pitch Center 5" Ribbon Cable with Connector

C6 - .050" Pitch Center 6" Ribbon Cable with Connector

(Connector is AMP P/N 215083-6 or Equivalent)

0

22

BUSHING LENGTH "B"

SINGLE SHAFT STRUCTURE

0 - .312"

DUAL SHAFT STRUCTURE

D - .256"

3/8-32NEF-2A Dia.

F

832

SHAFT TRIM

F - FLATTED

A

OPERATING VOLTAGE

A - 5.0V

B - 3.3V

B

A

SWITCH

A - NONE

B - MOMENTARY

SHAFT LENGTH "L"

SINGLE SHAFT STRUCTURE

22- .250" Dia., .687" Length

DUAL SHAFT STRUCTURE

DD - Outer Shaft: .250" Dia., .685" Length

Inner Shaft: .125" Dia., 1.059" Length

OUTPUT COMBINATION

832 - 8PPR, 32-DETENTS

624 - 6PPR, 24-DETENTS

416 - 4PPR, 16-DETENTS

800 - 8PPR, NO DETENTS

600 - 6PPR, NO DETENTS

400 - 4PPR, NO DETENTS

*X00 - 24PPR, NO DETENTS

*X24 - 24PPR, 24-DETENTS

SCHMITT TRIGGER& LOCATING LUG

*A- WITHOUT SCHMITT TRIGGER, WITHOUT LOCATING LUG

*BLANK- WITHOUT SCHMITT TRIGGER, WITH LEFT LOCATING LUG

S - WITH SCHMITT TRIGGER, WITHOUT LOCATING LUG

B - WITH SCHMITT TRIGGER, WITH LEFT LOCATING LUG

*24PPR is only available with schmitt trigger version

Note:
Consult CTS for other common features not listed.

AMEYA360

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