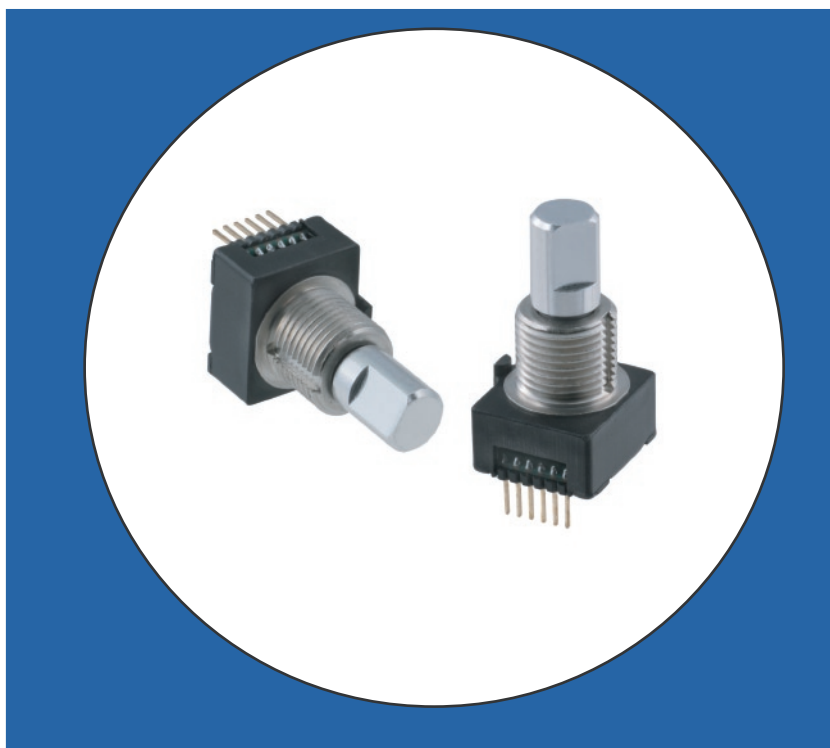


### Precision, Long-life Compact 12mm Size Optical Encoder

#### 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 ± 0.25 VDC  
3.3 ± 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 ± 10 gf-cm  
Detent: 140 ± 50 gf-cm (24 Detents)  
100 ± 50 gf-cm (32 Detents)

##### Detent Options

0, 24, 32

##### Resolution

6, 8 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)

##### Special

Consult CTS for custom 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 ± 0.25 mm

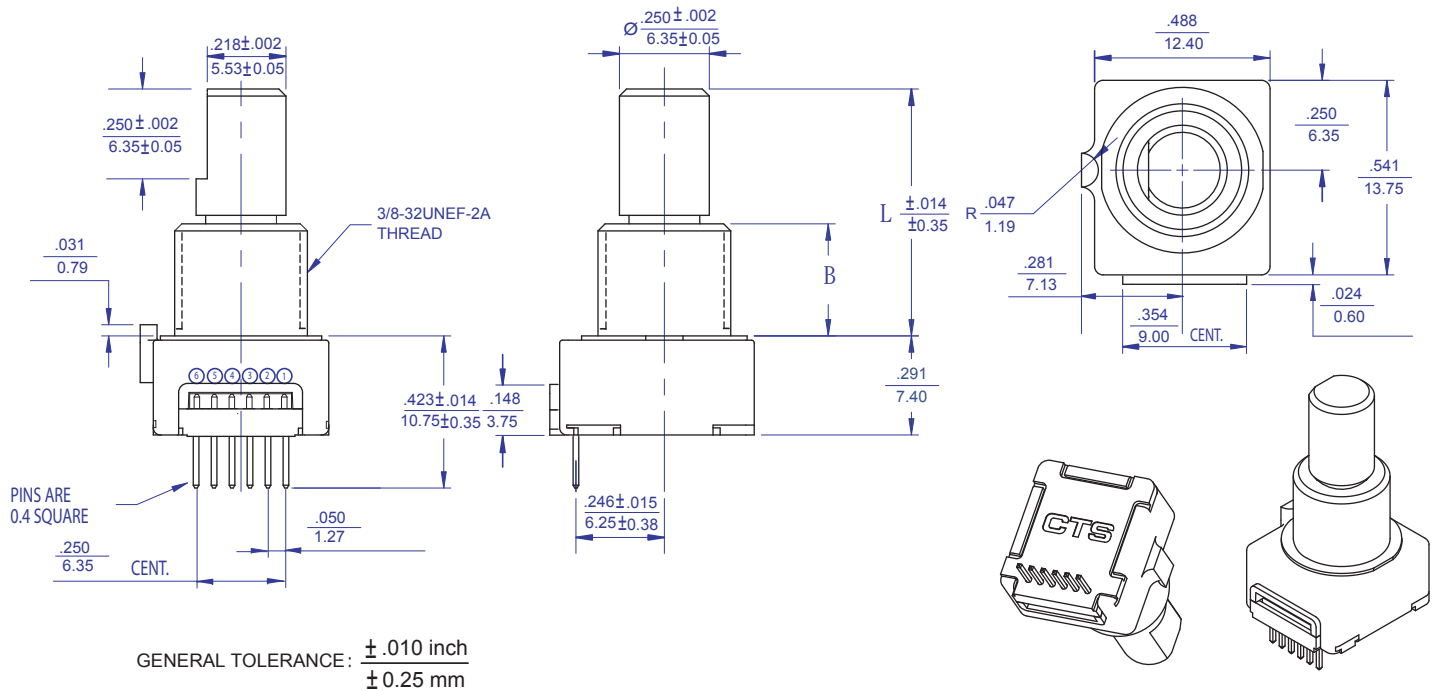
### Actuation Force

510 ± 110 grams

### Switch Life

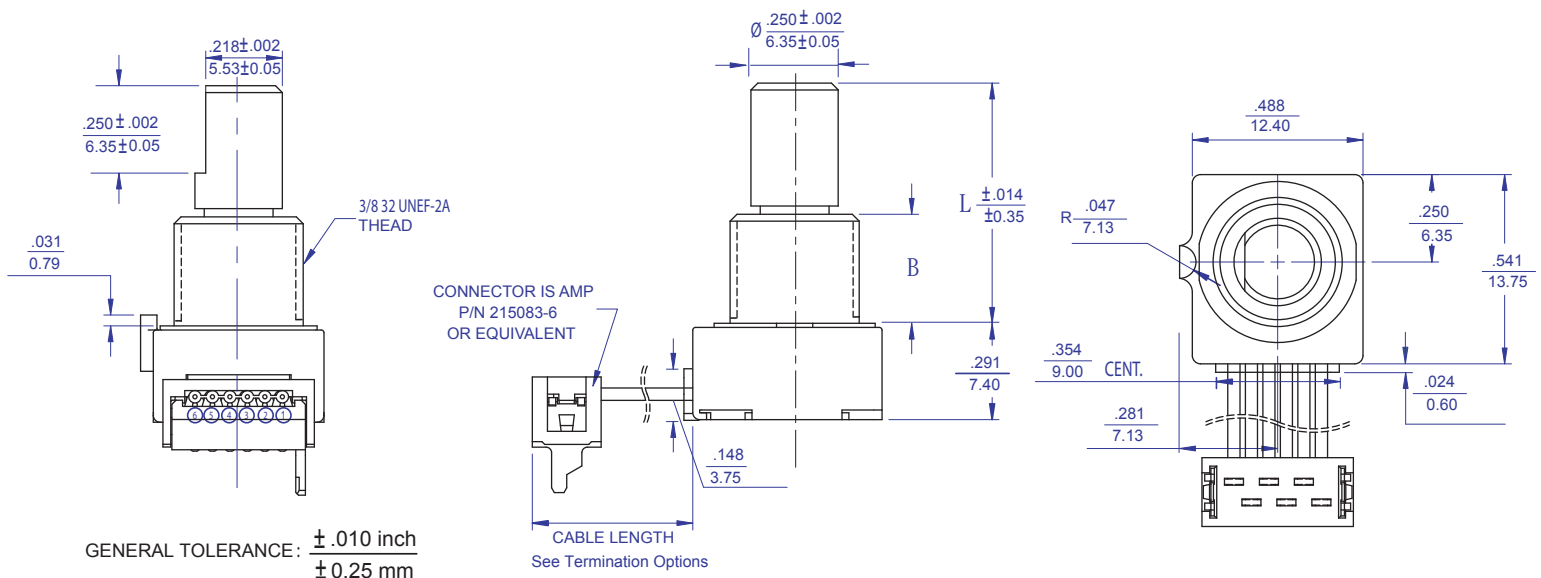
Standard: 1 Million actuations minimum  
Special: Consult CTS for custom life requirements.

## TYPE 291V 2-Bit Encoder With Momentary Switch, Shaft Perpendicular to PC Board



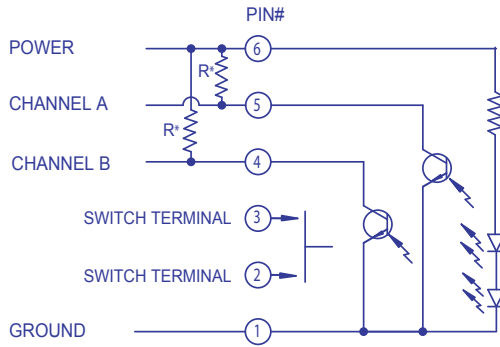
DIMENSION:  $\frac{\text{inch}}{\text{mm}}$

## TYPE 291C 2-Bit Encoder With Momentary Switch, Cable, and Connector

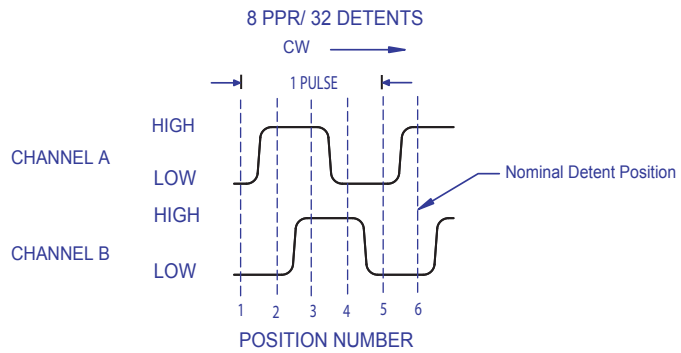


# ELECTRIC CIRCUITRY AND WAVEFORM

# Standard Quadrature 2-Bit Code

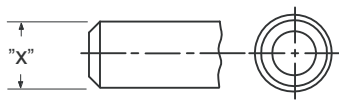


\* External pull-up resistors required for operation(2.2K ohm)



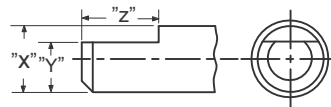
1. 8 PPR/32 detents is shown
2. Code repeats every 4 positions
3. Channel A Leads Channel B in CW direction and lags in CCW direction

## Shaft Trim



R - ROUND

	X
Imperial Shaft	.250"
Metric Shaft	6.35



F - FLATTED

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

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

## Ordering Information

**291**

**V1**

**0**

**22**

**F**

**832**

**A**

**B**

### TERMINATION

- V1** - .050" Pitch Center Pins Form to Rear with .144 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

### "B" BUSHING LENGTH

mm	inch
<b>D</b> - 9.53mm	<b>2</b> - .250"
	<b>3</b> - .375"
	<b>0</b> - .312"
M9X.75P	3/8-32 UNEF-2A

### SHAFT TRIM

- R - ROUND
- F - FLATTED

### "L" SHAFT LENGTH

mm	inch
<b>A5</b> - 15mm	<b>20</b> - .625"
<b>B0</b> - 20mm	<b>22</b> - .688"
<b>B5</b> - 25mm	<b>24</b> - .750"
<b>C0</b> - 30mm	<b>28</b> - .875"
	<b>32</b> - 1.000"
ALL 6.35mm Dia.	ALL .250" Dia.

### OPERATING VOLTAGE

- A** - 5.0V
- B** - 3.3V

### SWITCH

- A** - NONE
- B** - MOMENTARY

### OUTPUT COMBINATION

- 832** - 8PPR, 32-DETENTS
- 624** - 6PPR, 24-DETENTS
- 800** - 8PPR, NO DETENTS
- 600** - 6PPR, NO DETENTS