

## Features

- RoHS compliant\*
- HCMOS, CMOS and TTL compatible
- Compact package size
- High rotational cycle life
- Ball bearing shaft support
- Recommended for machine/machine interface applications (MMI)



## ES14 - 14 mm Rotary Optical Encoder

### Electrical Characteristics

Electrical Output .....	2-bit quadrature code
Resolution .....	8 to 64 pulses per revolution (PPR)
Supply Voltage (VCC) .....	5.0 VDC $\pm$ 0.25 VDC
Supply Current (ICC) .....	26 mA maximum
Output Voltage	
Low (VCE(sat)), per Channel .....	800 mV maximum at I(SINK) = 25 mA
High (VO(HI)), per Channel .....	4.0 VDC minimum @ VCC = 4.75 VDC
Output Current I(SINK), per Channel .....	25 mA minimum
Rise/Fall Time .....	200 ns typical
Power Dissipation .....	167 mW maximum
Pulse Width (per Channel) .....	180 $\mu$ s typical
Phase Angle (Channel A Leads Channel B, Clockwise Rotation) .....	90 $\mu$ s $\pm$ 72 $\mu$ s
Insulation Resistance @ 500 VDC .....	1,000 megohms minimum
Operating RPM .....	1000 maximum

### Environmental Characteristics

Operating Temperature Range @ 5.0 VDC .....	-40 $^{\circ}$ C to +70 $^{\circ}$ C (-40 $^{\circ}$ F to +158 $^{\circ}$ F)
Storage Temperature Range .....	-55 $^{\circ}$ C to +125 $^{\circ}$ C (-67 $^{\circ}$ F to +257 $^{\circ}$ F)
Vibration .....	15 G
Shock .....	50 G
Humidity .....	MIL-STD-202, Method 103, Condition B
Flammability .....	Conforms to UL 94HB
IP Rating .....	IP 54**

### Mechanical Characteristics

Mechanical Angle .....	360 $^{\circ}$ Continuous
Torque	
Starting/Running .....	1.05 N-mm (0.15 oz.-in.) maximum
Rotational Life .....	50,000,000 cycles (100,000,000 revolutions)
Shaft Radial Play .....	0.003 in. maximum
Shaft Axial Structural Strength .....	35 lbs. minimum
Mounting Torque .....	2.0 N-m (18 lb.-in.) maximum

### Materials and Finishes

Terminals .....	Sn plated PC pins
Soldering Condition	
Manual Soldering .....	96.5Sn/3.0Ag/0.5Cu solid wire or no-clean rosin cored wire 370 $^{\circ}$ C (700 $^{\circ}$ F) max. for 3 seconds
Wave Soldering .....	96.5Sn/3.0Ag/0.5Cu solder with no-clean flux 260 $^{\circ}$ C (500 $^{\circ}$ F) max. for 5 seconds
Wash processes .....	Not recommended
Mounting Hardware	
Nut .....	Brass, hex (metric)/Nickel-plated brass, hex (SAE)
Lockwasher .....	Nickel-plated spring steel, internal tooth
Marking .....	Manufacturer's symbol, model number, product code, terminal style and date code
Standard Packaging .....	Anti-static plastic tube (25 pcs./tube)

\*\*When device is mounted by normal mounting means.

\*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.

Specifications are subject to change without notice.

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Users should verify actual device performance in their specific applications.

## Additional Features

- Cable/connector option
- Optional bracket

# ES14 - 14 mm Rotary Optical Encoder

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### Part Numbering System

**E S 1 4 A 0 D - E 2 8 - L 0 3 2 N**

MODEL NO. DESIGNATOR	
ES14	14 mm Rotary Optical Encoder

BUSHING DESIGNATOR	
Code	Description
A	3/8 " D x 3/8 " L Threaded

DETENT OPTION	
Code	Description
0	No Detent

ANTI-ROTATION LUG/BACKET OPTION	
Code	Description
A	A/R Lug
B	Bracket (No hardware/no cable or connector)
D	None

SHAFT STYLE (See Outline Drawing for Details)		
Code	Description	Available w/ Bushing
E	1/8 " Dia. Slotted End	A

SHAFT LENGTH DESIGNATOR		
Code	Length (FMS)	Available w/Bushing
28	7/8 "	A

SWITCH OPTION	
Code	Description
N	No Switch

RESOLUTION (Pulses Per Revolution)	
Code	Description
08	8 PPR
16	16 PPR
32	32 PPR
64	64 PPR

CABLE/CONNECTOR OPTION	
Code	Description
0	No Cable/Connector
1	6 " Cable with Female Connector (0.049 "/1.25 mm pitch centers in-line) and stripped/tinned leads
2	6 " Cable with Female Connector (0.049 "/1.25 mm pitch centers in-line) on both ends
3	12 " Cable with Female Connector (0.049 "/1.25 mm pitch centers in-line) and stripped/tinned leads
4	12 " Cable with Female Connector (0.049 "/1.25 mm pitch centers in-line) on both ends

TERMINAL CONFIGURATION	
Code	Description
L	Axial Multi-Purpose Pin
R	Radial Multi-Purpose Pin

#### Cable and Connector Options:

- H-290-4 = 6 " Cable with Female Connector (0.049 "/1.25 mm pitch centers in-line) and stripped/tinned leads
- H-290-1 = 6 " Cable with Female Connector (0.049 "/1.25 mm pitch centers in-line) on both ends
- H-290-2 = 12 " Cable with Female Connector (0.049 "/1.25 mm pitch centers in-line) and stripped/tinned leads
- H-290-3 = 12 " Cable with Female Connector (0.049 "/1.25 mm pitch centers in-line) on both ends

For other cable and connector options, please contact the factory.

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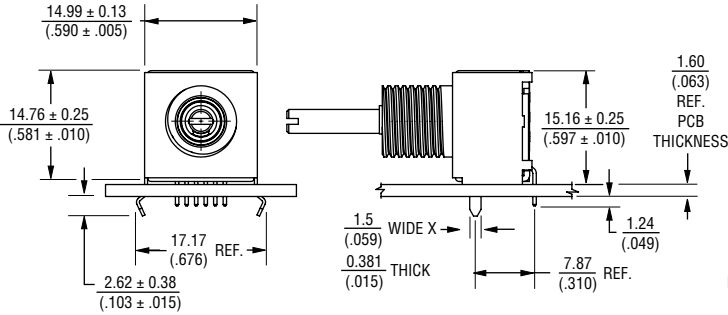


# ES14 - 14 mm Rotary Optical Encoder

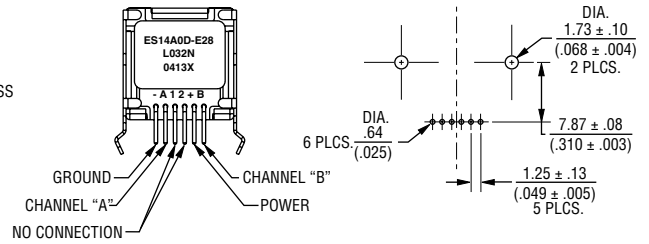
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## Terminal Configurations

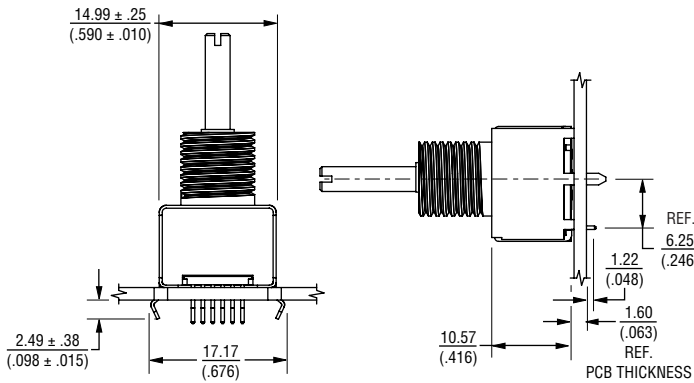
### Radial (shown with optional mounting bracket)



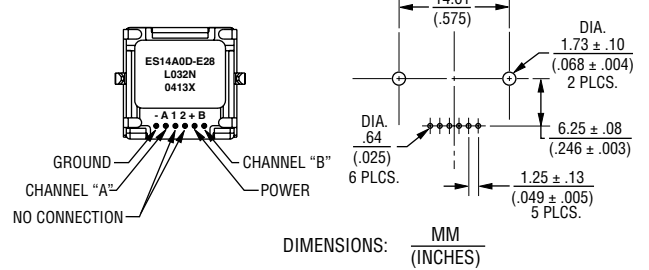
### Recommended PCB Layout



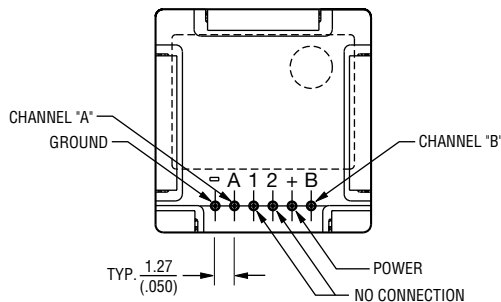
### Axial (shown with optional mounting bracket)



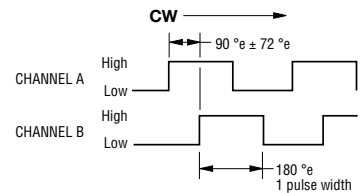
### Recommended PCB Layout



## Terminal Diagram



## Quadrature Output

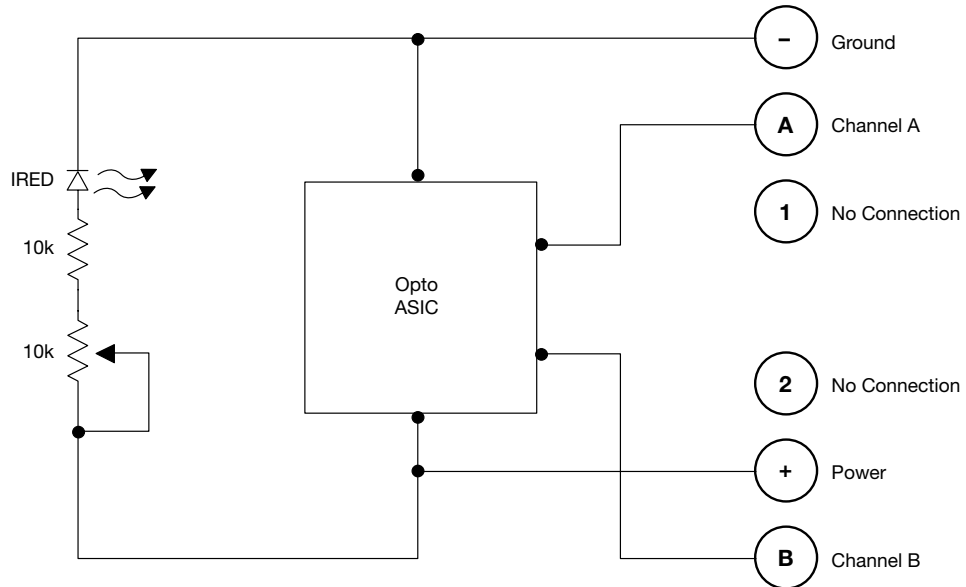


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## Electrical Block Diagram



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