

# ENC-A5SI Single-Ended Encoder with Index Channel



FEATURES

- 50 to 5,000 Cycles Per Revolution (CPR)
- Tracks 0 to 300,000 Cycles Per Second
- 200 to 20,000 Pulses Per Revolution (PPR)
- Powered From a Single +5VDC Power Supply
- Accepts +/- 0.010" Axial Shaft Play
- 2-Channel Quadrature TTL Squarewave Outputs
- Third Index Channel
- Operating Temperature of -40° to +100° C
- RoHS Compliant and REACH Certified



DESCRIPTION

The ENC-A5SI is a single-ended, transmissive optical encoder module designed to detect the rotary position with a code wheel. The ENC-A5SI requires a minimum shaft length of .445" and can be attached to the end of any shaft size ranging from .079" to .394" in diameter to provide digital feedback information. This single-ended encoder consists of a LED source lens and a monolithic detector IC enclosed in a small polymer package. These modules implement phased array detector technology providing superior performance and tolerances over traditional aperture mask type encoders. The ENC-A5SI series provides digital quadrature squarewave outputs on all resolutions and are capable of sinking or sourcing 8 mA each. These encoders are powered from a single +5VDC power supply.

ORDERING INFORMATION

## ENC - A5SI - 0050 - 394 - H - G

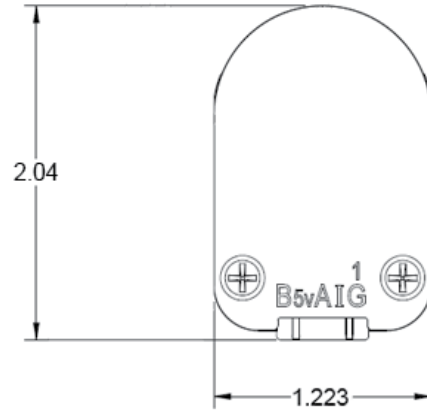
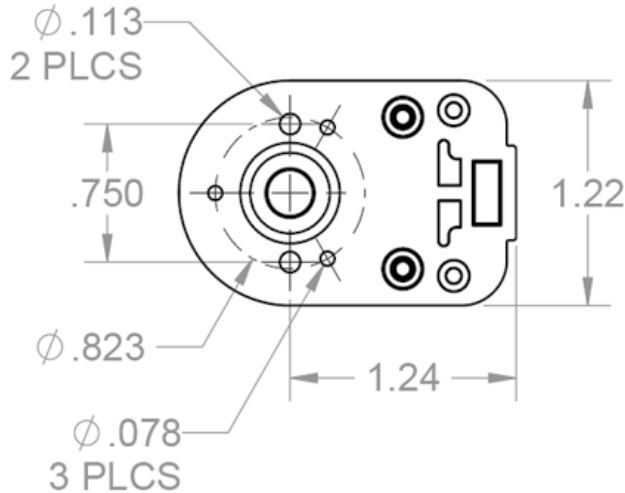
Index	CPR			Bore Size		Cover Options
I = Index (3rd Channel)	50	400	1250	079 = 2mm	236 = 6mm	E = Cover Extension
	96	500	2000	118 = 3mm	250 = 1/4"	H = Hole in Cover
	100	512	2048	125 = 1/8"	276 = 7mm	Blank = Default
	192	540	2500	156 = 5/32"	313 = 5/16"	
	200	720	4000	157 = 4mm	315 = 8mm	
	250	900	4096	188 = 3/16"	375 = 3/8"	
	256	1000	5000	197 = 5mm	394 = 10mm	
	360	1024				

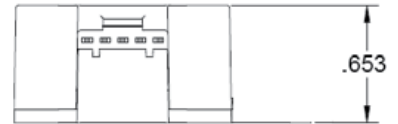
Base Options
3 = Base Mounting Holes Become 0.125"
A = Adds Self-Aligning Shoulder to Base
G = Adds 1.812" Mounting Ears to Base
R = Adds 3-Slot Adapter to Bottom of Base
T = Transfer Adhesive
Blank = Default

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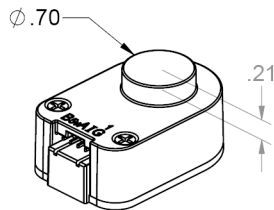
**DEFAULT OPTION:**



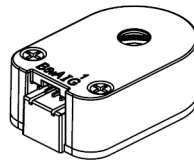
Note: Dimensions are in inches



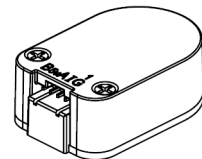
**E-Option:**



**H-Option:**



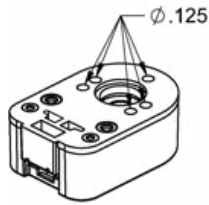
**Default Option:**



Note: Dimensions are in inches

Cover Options:	Description
E - Option	E-Option provides a cylindrical extension cover for larger shafts. The required shaft length is .445" to .750". Note: E-option + R-Option the required shaft length is .570" to .875".
H - Option	Shafts 2mm to 1/4", a .295" diameter hole is supplied. Shafts 5/16" to 10mm, a .438" diameter hole is supplied. Required shaft length > 0.445" Note: H-Option + R-Option the required shaft length is > .570"
Default Option	The required length is .445" to .570" Note: Default Option + R-Option the required shaft length is .570" to .695"

**3-OPTION:**



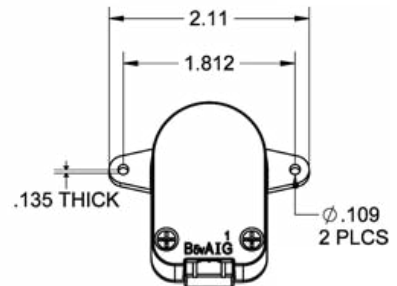
3-Option: Makes all five hole diameters .125"

**T-OPTION:**



T-Option: A pre-applied transfer adhesive (with peel-off backing) is available for "stick-on" mounting.

**G-OPTION:**



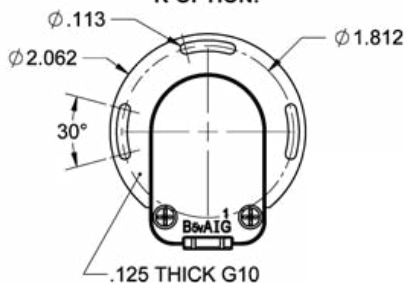
G-Option: Includes molded ears which enables it to be mounted to a 1.812" diameter bolt circle. Mounting holes are designed to fit 4-40 screws. Will work with shaft lengths of .445" to .570" and does not add to the required shaft length.

**A-OPTION:**



A-Option: Adds a .497" diameter alignment shoulder designed to slip into a .500" diameter recess in the mounting surface centered around the shaft.

**R-OPTION:**



R-Option: Adapter is an 1/8" thick fiberglass adapter which is pre-mounted to the base of the encoder. It allows the encoder to rotate +/- 15 degrees.  
\*This option adds 1/8" to the required shaft length.

Note: All dimensions are in inches

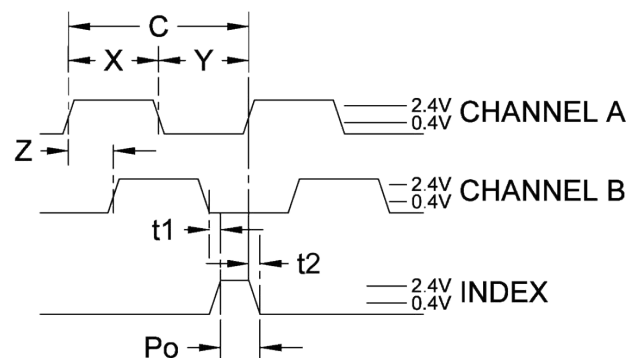
(Note: Base Mounting Screws are NOT included. #2-56 or #4-40 screws can be used to mount the base to your mounting surface.)

**SINGLE-ENDED ENCODER PINOUT**  
TOP OF ENCODER FACING PLUG

Pin #	Function
1	Ground
2	Index
3	Channel A
4	+5VDC Input
5	Channel B

Timing Characteristics	Symbol	Min	Typ	Max	Units
Cycle Error	C	-	3.0	5.5	°e
Symmetry	X,Y	150	180	210	°e
Quadrature	Z	60	90	120	°e
Index Pulse Width	Po	60	90	120	°e
Ch. I Rise After Ch. B or Ch. A Fall	t1	10	100	250	ns
Ch. I Fall After Ch. B or Ch. A Rise	t2	70	150	300	ns

**SINGLE-END ENCODER TIMING DIAGRAMS**



ROTATION:  
CW - A LEADS B, CCW - B LEADS A

Terminology	Description
CPR(N):	The Number of Cycles Per Revolution
One Shaft Rotation:	360 mechanical degrees, N cycles
One Electrical Degree (°e):	1/360th of one cycle
One Cycle (C):	360 electrical degrees (°e). Each cycle can be decoded into 1 or 4 codes, referred to as X1 or X4 resolution multiplication
Symmetry:	A measure of the relationship between (X) and (Y) in electrical degrees, nominally 180 °e
Quadrature (Z):	The phase lag or lead between channels A and B in electrical degrees, nominally 90 °e
Index (CH I):	The Index Output goes high once per revolution, coincident with the low states of channels A and B, nominally 1/4 of one cycle (90°e)

Recommended Operating Conditions	Min	Max	Units
Temperature (CPR < 2000)	-40	100	°C
Temperature (CPR ≥ 2000)	-25	100	°C
Load Capacitance	-	100	pF
Count Frequency (CPR ≤ 1250)	-	300	kHz
Count Frequency (CPR 2000-2500)	-	360	kHz
Count Frequency (CPR 4000+)	-	720	kHz

Parameter	Max	Units
Vibration (5 to 2kHz)	20	g
Shaft Axial Play	+/- 0.01	in.
Shaft Eccentricity Plus Radial Play	0.004	in.
Acceleration	250,000	rad/sec <sup>2</sup>

Parameter	Min	Typ	Max	Units
Supply Voltage	4.5	5.0	5.5	Volts
<b>Supply Current</b>				
CPR < 500, no load	-	27	33	mA
CPR ≥ 500 and < 2000, no load	-	50	62	
CPR ≥ 2000, no load	-	72	85	
<b>Output Low</b>				
I <sub>OL</sub> = 8mA max (CPR < 2000)	-	-	0.5	Volts
I <sub>OL</sub> = 5mA max (CPR ≥ 2000)	-	-	0.5	
no load (CPR ≥ 2000)	-	0.25	-	
<b>Output High*</b>				
I <sub>OL</sub> = -8mA max (CPR < 2000)	2.0	-	-	Volts
I <sub>OL</sub> = -5mA max (CPR ≥ 2000)	2.0	-	-	
no load (CPR < 2000)	-	4.8	-	
no load (CPR ≥ 2000)	-	3.5	-	
<b>Output Current Per Channel (CPR &lt; 2000)</b>	-8.0	-	8.0	mA
<b>Output Current Per Channel (CPR ≥ 2000)</b>	-5.0	-	5.0	mA
<b>Output Rise Time (CPR &lt; 2000)</b>	-	110	-	nS
<b>Output Rise Time (CPR ≥ 2000), ± 5mA load</b>	-	50	-	
<b>Output Fall Time (CPR &lt; 2000)</b>	-	110	-	
<b>Output Fall Time (CPR ≥ 2000), ± 5mA load</b>	-	50	-	nS

\* Unloaded high level output voltage is 4.80V typically, 4.2V minimum.

Speed Calculation		Units
CPR ≤ 1250	18x10 <sup>6</sup> / CPR	RPM
CPR 2000-2500	21.6x10 <sup>6</sup> / CPR	RPM
CPR 4000+	43.2x10 <sup>6</sup> / CPR	RPM

\*60,000 RPM is the maximum RPM due to mechanical limitations.

## Cables:

The following cables are compatible with Anaheim Automation's A5SI series encoder. Select a cable length from the table below:

Cable Part Number	Length
ENC-CBL-AA5939	1 ft.
ENC-CBL-AA5939-5	5 ft.
ENC-CBL-AA5939-10	10 ft.

*NOTE: For pricing and other information on cables and centering tools, please visit Accessories on our website.*

## Centering Tools:

Centering tools are optional, but recommended for a more precise installation.

### ENC-CTOOL - 250

Bore Size	
079=2mm	236=6mm
118=3mm	250=1/4"
125=1/8"	276=7mm
157=4mm	313=5/15"
188=3/16"	375=3/8"
197=5mm	394=10mm