

# SME-08 series Encoder Evaluation Kits

## Contents

SME-08ASx Overview .....	2
SME-08BDx Overview .....	2
Handling Precautions .....	3
SME-08xxx Digital Pinout.....	4
SME-08BD0 Analog Pinout.....	5
SME-08xxx Evaluation Kit Parts List (BOM) .....	6
Typical Application Schematic .....	6
Board Diagrams .....	7
Scale Mounting .....	8
Linear Scale Mounting .....	9
Rotary Scale Mounting .....	10
VC America Electronics Scales.....	12
VC America Electronics Support.....	13

## SME-08ASx Overview

The SME-08ASx is a 3-channel optical encoder IC with A/B digital output and digital Z index output.

The encoder utilizes an LED and OEIC (Opto-Electric Integrated Circuit) in a single package. The light emitted from the LED projected onto the scale or code wheel, and the encoder photodiodes sense the reflected light to determine relative position and movement between encoder IC and code wheel, rotary, or linear scale.

Z-phase index outputs when detecting a single wider track pattern.

SME-08ASx built-in pin-selectable interpolation circuit is set for one (1x), two (2x), or four (4x) -times resolution.

SME-08AS1 output pulse width is 90°.

SME-08AS2 output pulse width is 180°.

SME-08AS3 output pulse width is 360°.

## SME-08BDx Overview

The SME-08BDx is a 3-channel optical encoder IC with A/B digital output and digital Z index output.

SME-08BD0 has two (2) Analog A/B outputs and one (1) digital Index (Z) output. The other versions of SME-08BDx (x=1, 2, or 3) outputs are all digital outputs.

The encoder utilizes an LED and OEIC (Opto-Electric Integrated Circuit) in a single package. The light emitted from the LED projected onto the scale or code wheel, and the encoder photodiodes sense the reflected light to determine relative position and movement between encoder IC and code wheel, rotary, or linear scale.

Z-phase or index outputs when detecting a dual index track pattern.

SME-08BDx built-in pin-selectable interpolation circuit is set for four (4x), eight (8x), or sixteen (16x) times resolution.

SME-08BD0 has two (2) analog A-B differential outputs for external interpolation, and one (1) digital output of index pulse. The digital index detection uses a dual index pattern on the code wheel.

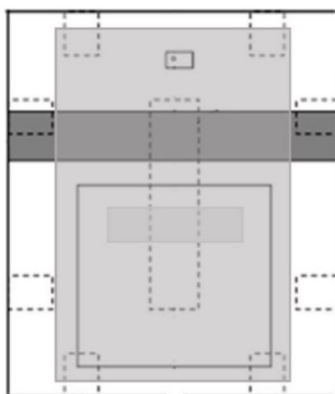
SME-08BD1 output pulse width is 90°.

SME-08BD2 output pulse width is 180°.

SME-08BD3 output pulse width is 360°.

## Handling Precautions

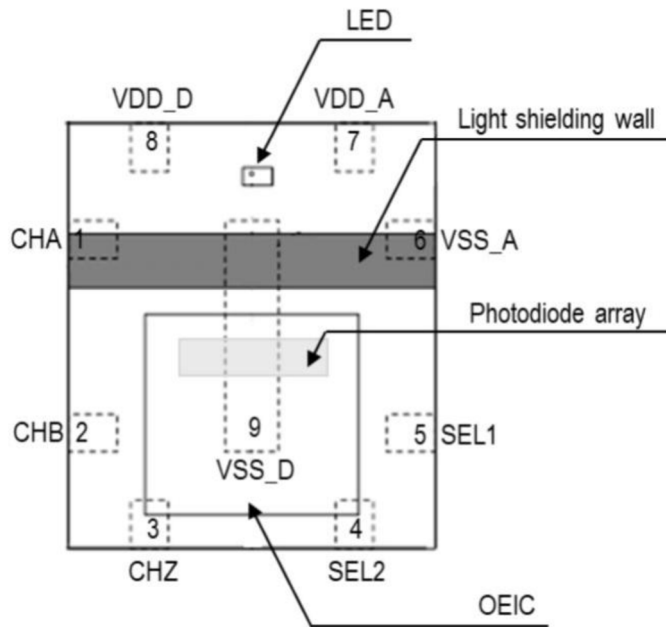
- Avoid direct contact with the SME-08xxx and scale when handling, installing, or adjusting.
- Ensure the gray portion containing the LED and OEIC, shown in the figure below, is clean and free from dust and other contaminants. If it is dirty, gently wipe the surface with a clean, soft cloth dipped in methanol or ethanol to remove all contaminants. The use of other liquids or wiping vigorously may cause scratching, clouding, or otherwise damage the surface of the encoder. Exercise caution when cleaning the device surface.
- Ensure that the operating temperature of any unit or housing containing the SME-08xxx will not exceed the temperature specifications of the device.
- Please note that there is the potential that strong localized light sources may affect the encoder output.
- The light intensity of the SME-08xxx built-in LED does not exceed the value for Class 1 standard visible LED eye safety as prescribed by IEC60825-1.



# SME-08xxx Digital Pinout

This pinout applies to all versions of SME-08 except SME-08BD0 which has analog output.

[TOP VIEW]

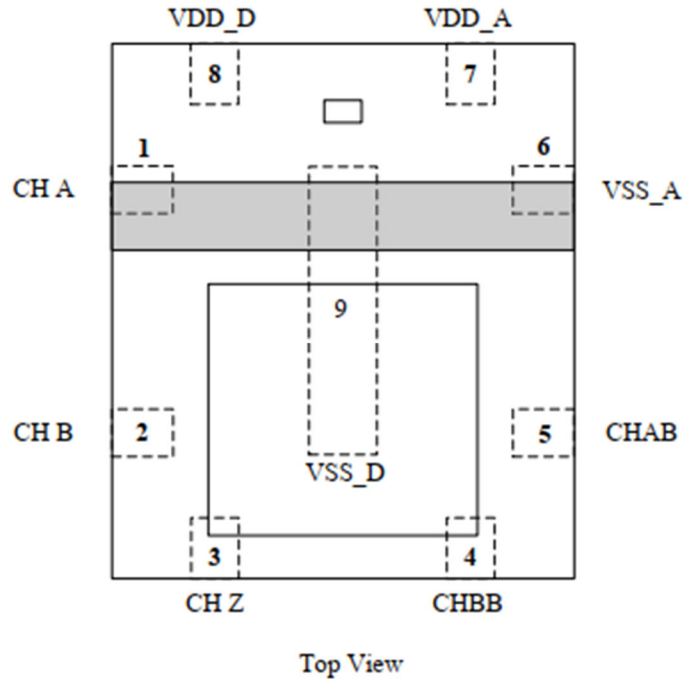


No.	Name	I/O	Function
1	CHA	O	A-phase digital incremental signal
2	CHB	O	B-phase digital incremental signal
3	CHZ	O	Z-phase digital origin signal
4	SEL2	I	Interpolation setting input 2
5	SEL1	I	Interpolation setting input 1
6	VSS_A	-	Ground
7	VDD_A	-	Supply voltage
8	VDD_D	-	Supply voltage
9	VSS_D	-	Ground

I/O type I: Input O: Output

# SME-08BD0 Analog Pinout

SME-08BD0 has analog outputs for external interpolation.



No.	Name	I/O	Function
1	CHA	O	A-phase analog signal (A phase) output
2	CHB	O	B-phase analog signal (B phase) output
3	CHZ	O	Z-phase digital signal output
4	CHBB	O	B-phase inverting analog signal (BB phase) output
5	CHAB	O	A-phase inverting analog signal (AB phase) output
6	VSS_A	-	Ground
7	VDD_A	-	Supply voltage
8	VDD_D	-	Supply voltage
9	VSS_D	-	Ground

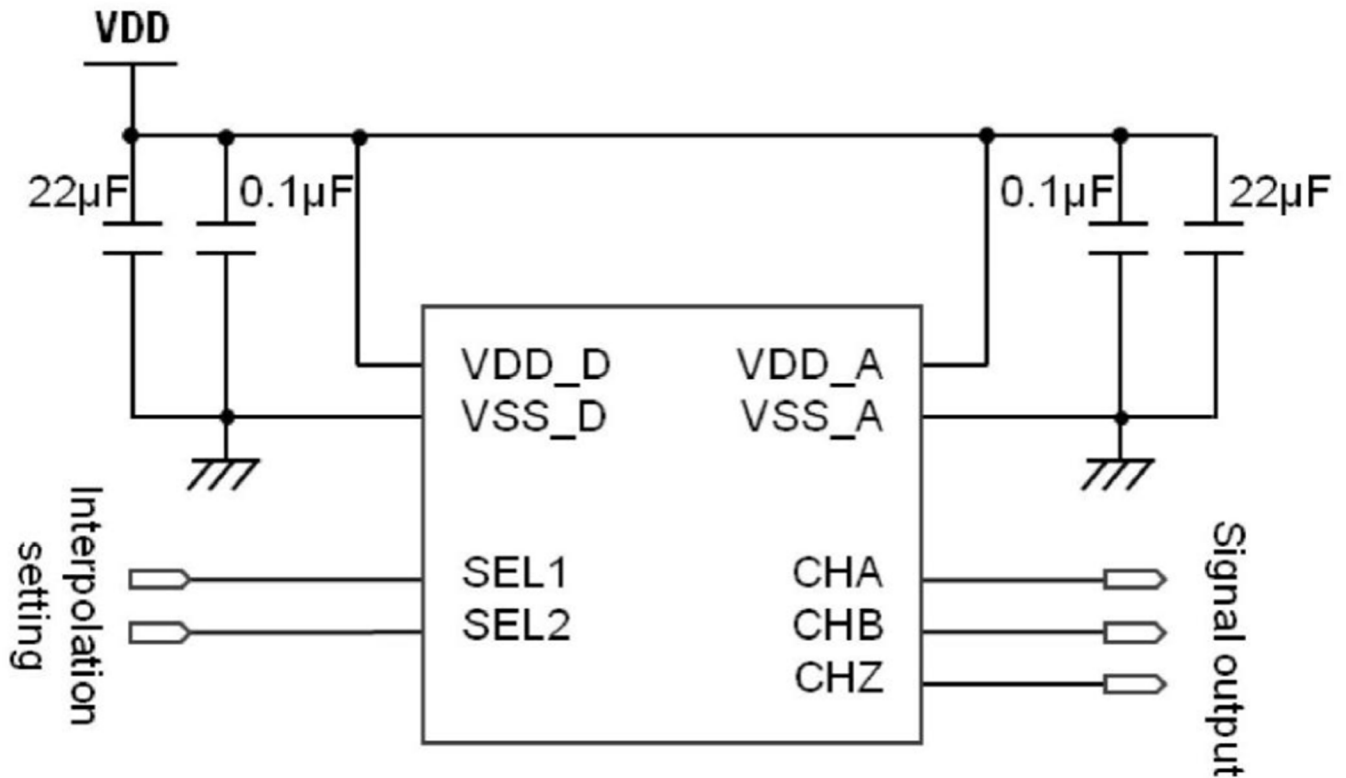
I/O type I: Input O: Output

# SME-08xxx Evaluation Kit Parts List (BOM)

Included are the PCB with mounted SME-08xxx encoder, FFC cable, and breakout board to connect power and signals for testing.

Item Name	Part number	BOM Qty	Description
Evaluation Scale		1	SME-08xxx compatible scale Linear or Rotary based on your kit
Evaluation PCB		1	Mounted SME-08xxx

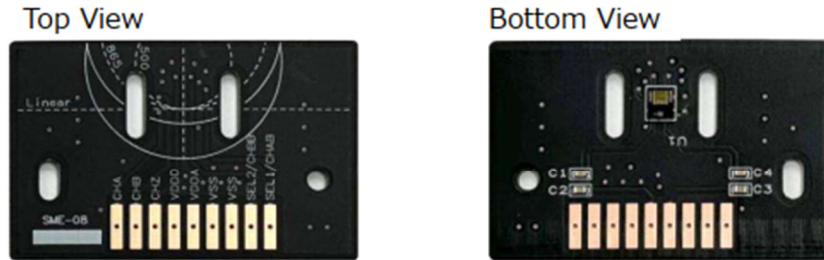
## Typical Application Schematic



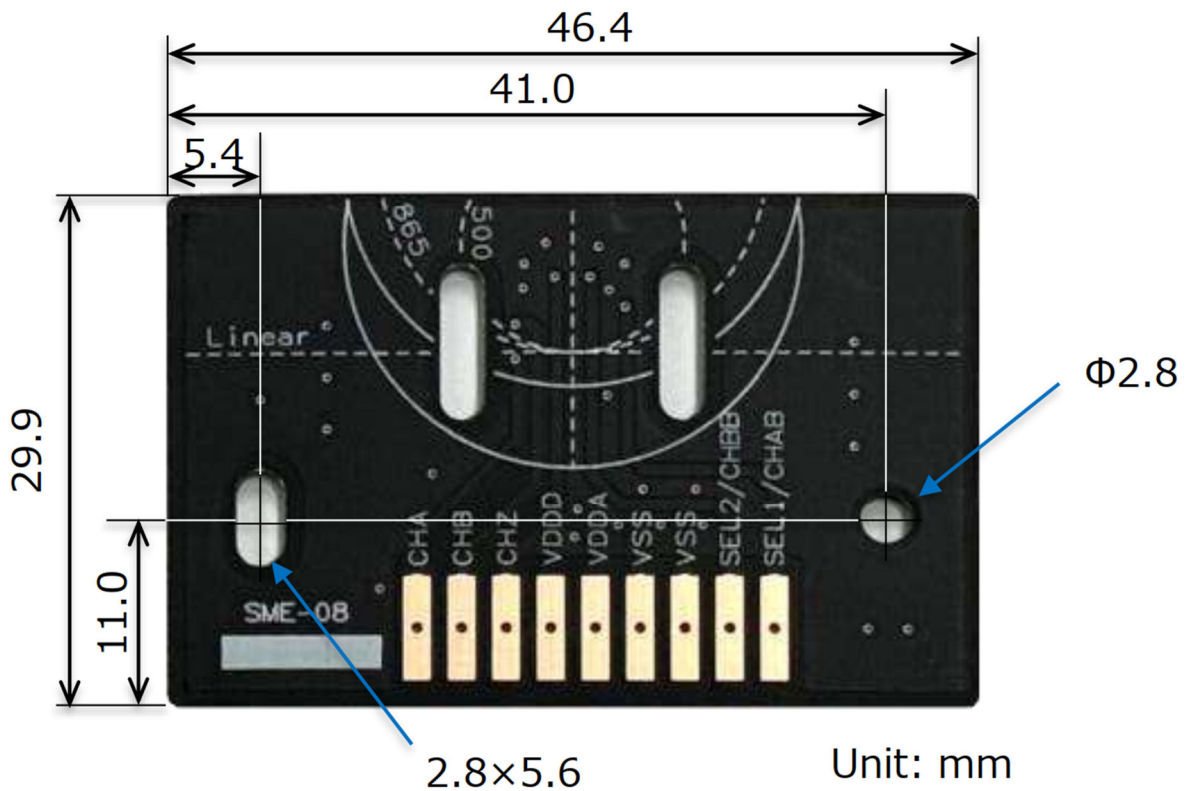
# Board Diagrams

- Signal monitoring wires should be connected to the terminal pattern at the board end.

Evaluation board



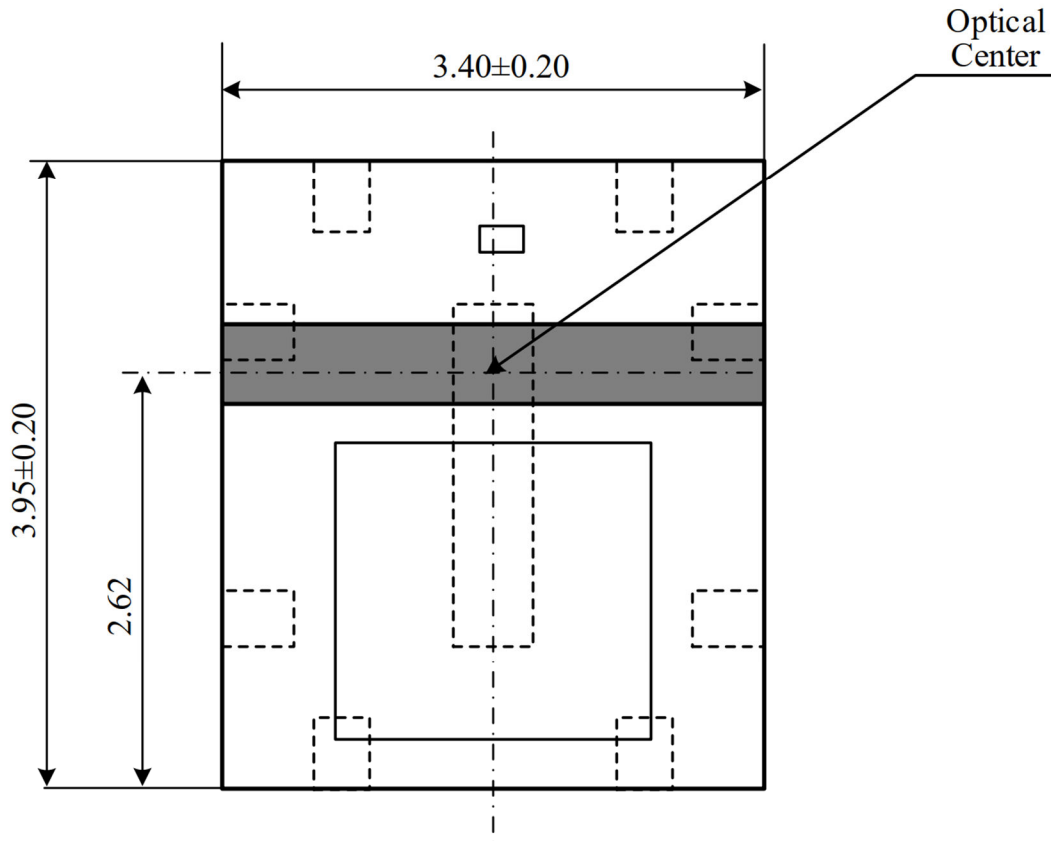
- Guidelines for aligning the NPC evaluation scale are provided on top surface of the evaluation board.
- The dotted line is a guide to the center of scale pattern.
- The solid line is a guide for the outline of the rotary scale.
- The upper circle is a guide for use at 865PPR and the lower circle is a guide for use at 500PPR.



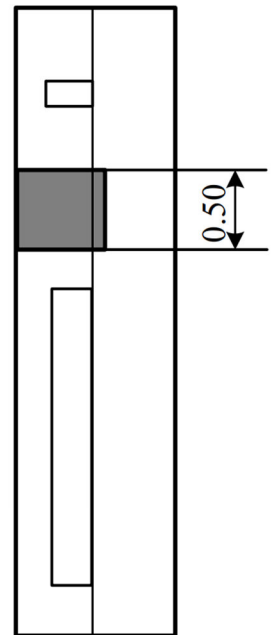
# Scale Mounting

The optical center is located 2.62 mm from the bottom edge of the package on the central axis passing through the midpoint of the top and bottom edges of the package as shown below.

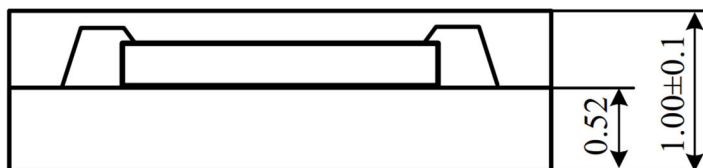
Topview



Sideview2

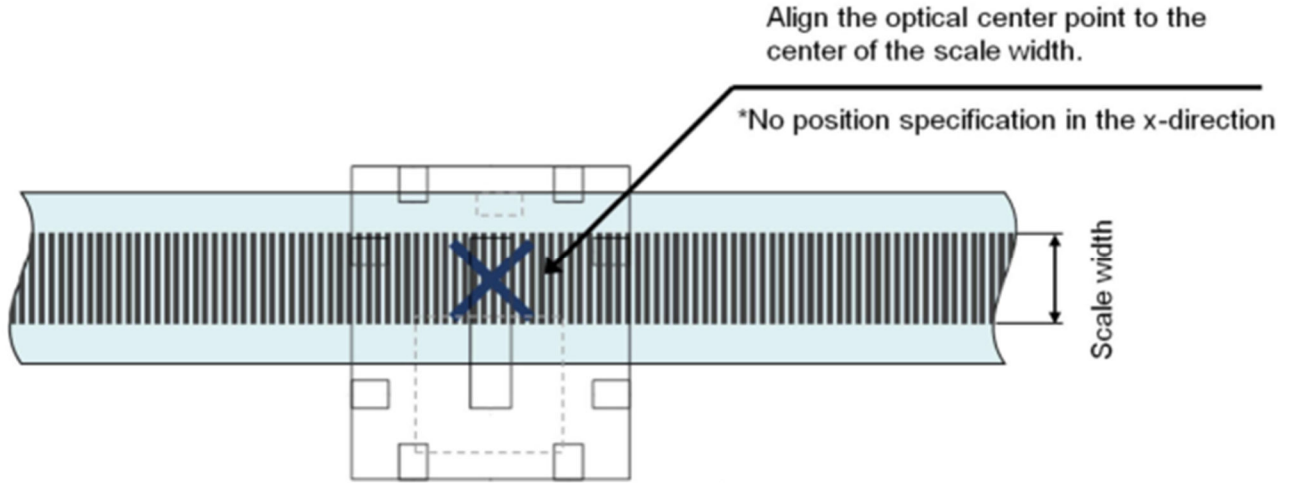


Sideview1

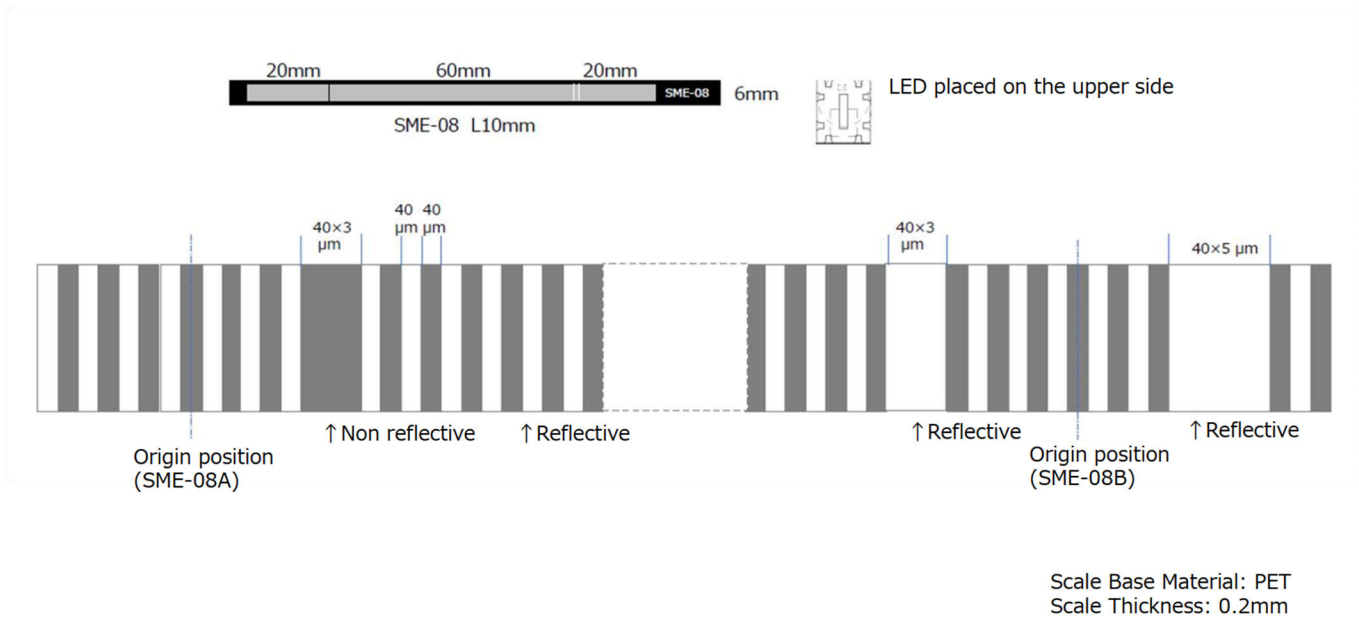


# Linear Scale Mounting

Mounting gap for all SME-08xxx encoders is 0.75mm.

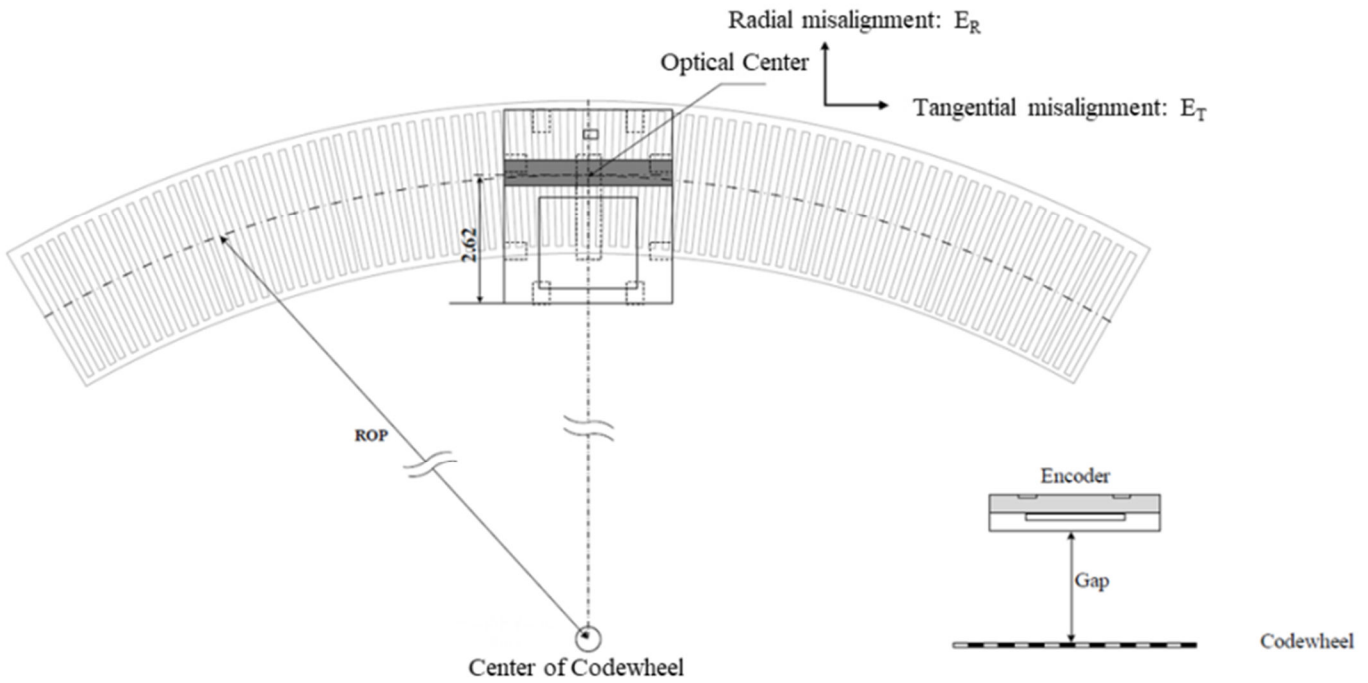


[ SME-08A, SME-08B: PET linear scale ]

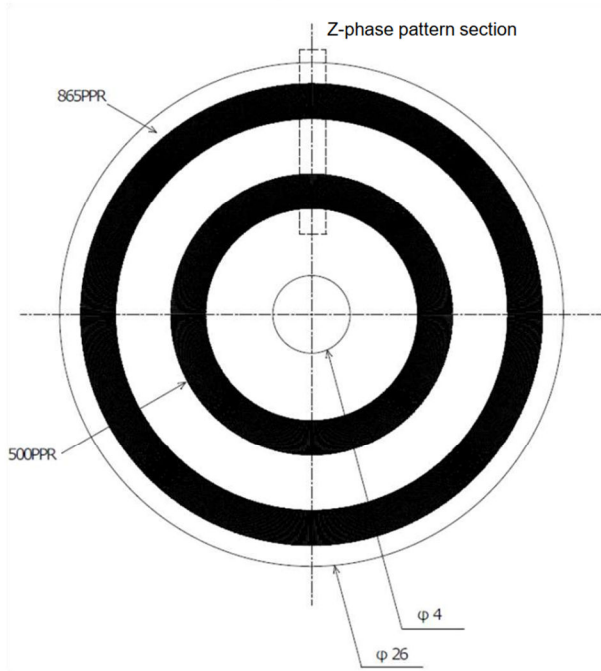


# Rotary Scale Mounting

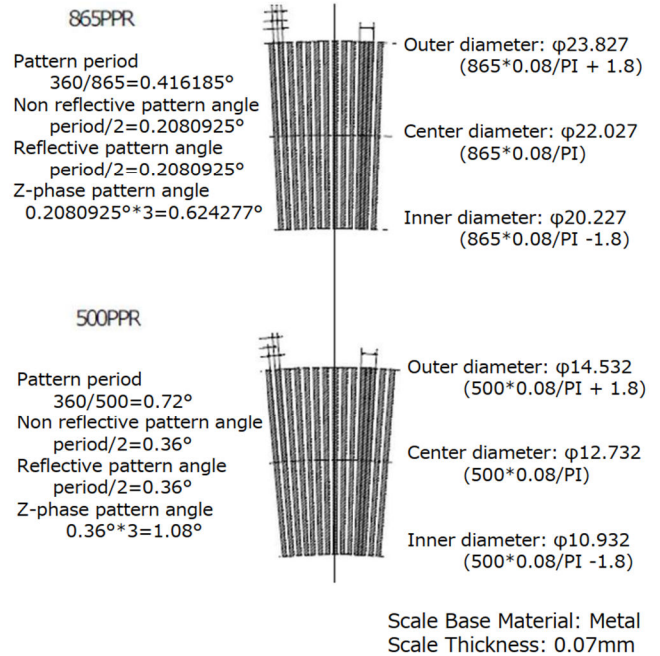
Mounting gap for all SME-08xxx encoders is 0.75mm.



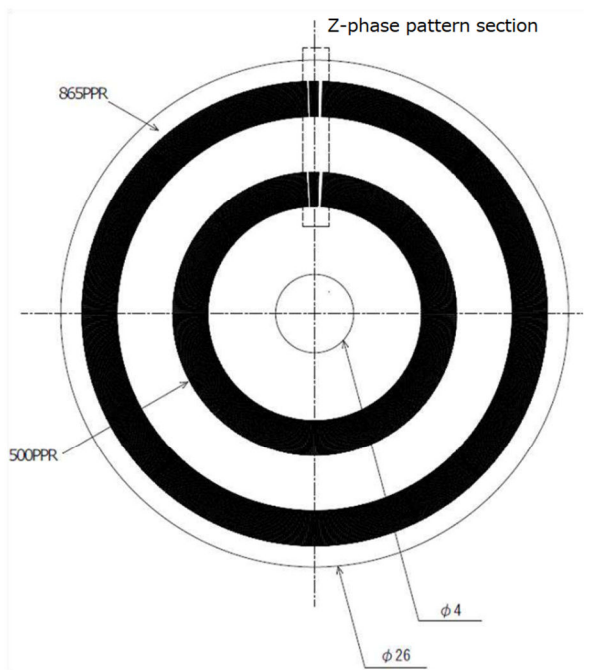
[ SME-08A: Metal rotary scale ]



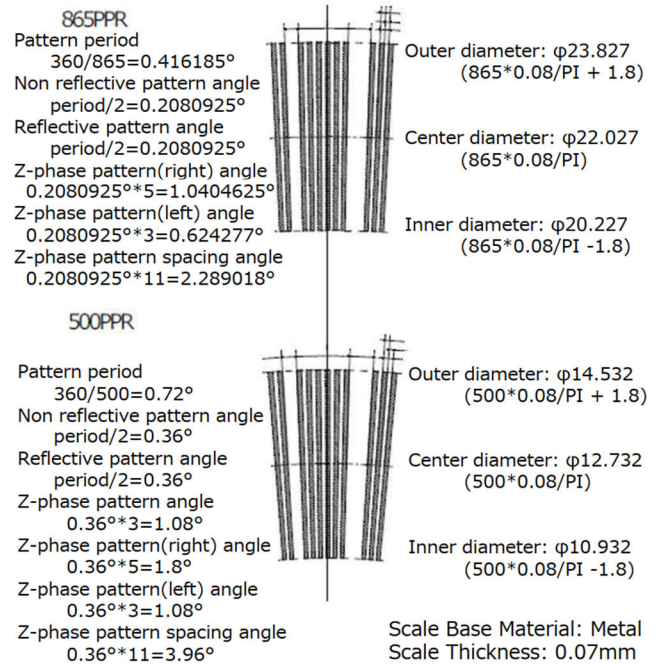
[ Detail view of Z-phase pattern section ]



[ SME-08B: Metal rotary scale ]



[ Detail view of Z-phase pattern section ]



# VC America Electronics Scales

Achieve better accuracy encoding with Seiko NPC encoders and VC America Electronics precision glass scales. High amplitude, low distortion analog output improves repeatability, interpolation, and error correction.

VC America Electronics semiconductor level nanometer photolithographic process creates exceptionally accurate scales with feature size as small as  $1\pm 0.1\mu$ . State of the art equipment, masks, and attention to processes enable us to reduce size and number of defects, which for gratings and scales improve repeatability for high resolution interpolation. Combined with error correction algorithms, customers achieve exceptional high accuracy solutions.

We manufacture Soda-lime glass and chrome coatings for reflective and anti-reflective patterns for standard requirements, and specialized glasses and/or chrome coatings to meet specific customer requirements, (low CTE, specific spectral responses, and more.)

Stainless Steel up to 135mm diameter or length offer alternative for thin scale 0.2mm.

## Rotary

- Scales manufactured to specifications to 700mm diameter.
- Reflective coatings:
  - 50% minimum, optimized for 650nm (Seiko SMD series 20 $\mu$  period)
  - 60% minimum, optimized for 850nm (Seiko SME series 80 $\mu$  period)
- Anti-reflective:
  - None (Clear <5%)
  - Anti-reflective, optimized for 650nm or 850nm (Glass appears near black)
  - Other coatings for Blue, Infrared, and others
- Rotary scales edge.
  - Straight cut
  - Laser cut and saw cut [where required.
  - Beveled with flat or round chamfer.
  - Outside Diameter and/or inside diameter beveling is optional.

## Linear

Glass scales for up to 700mm in length, using same process outlined for rotary scales above; most common is chrome top-side pattern with bottom side Anti-Reflective coating (AR).

Stainless steel scales up to 135mm in length also benefit from our high precision process.

Learn about VC America Electronics scales at <https://www.vcamericaelectronics.com/scales.html>.



# VC America Electronics Support

Visit <https://www.vcamericaelectronics.com> or contact sales and technical staff for more information.

Sales and Technical Support Contact:

Email: [sales@vcamericaelectronics.com](mailto:sales@vcamericaelectronics.com)

Phone: +1-702-763-7199 x1

