

# Scanning MEMS Mirror – 0.6, 1.5, 2.0 mm Diameter

(Single and Dual-Axis, Up To 7 Degree, High Precision, High Repeatability)



The SMEM series of scanning two axis (tip-tilt) and one axis tilt MEMS mirror provide 2D and 1D optical beam-steering functions. The SMEMS features faster scanning, very low power consumption, high precision, and high repeatability. The MEMS is made of single-crystal silicon with flat and smooth mirror coated with a highly refractive gold thin film. The SMEM is hermetically packaged with an optical window designed for 25 years continuously operation. Driving PCB is also offered for convenient evaluations. For volume application contact sales

## Features

- Compact
- High Reliability
- Low Power Consumption
- High Repeatability

## Applications

- Optical Devices
- Sensors
- Instrumentation

## Specifications

Parameter	Min	Typical	Max	Unit	
Mirror Diameter	0.6	1.5	2	mm	
Operation Wavelength	450		2600	nm	
Reflectivity (@1260-1660nm)	95		96	%	
Tilt Angle	0.6mm@60V	± 2.2	± 2.5	± 2.7	degree
	1.0mm @58V	± 2.7	± 2.8	± 3.0	
	1.5mm@67V	± 6.8	± 7	± 7.6	
	2.0mm@200V	± 5.9	± 6	± 6.2	
Damage Voltage	0.6mm		70	V	
	1.0mm		65		
	1.5mm		70		
	2mm X-axis		220		
Resonance Frequency	2mm Y-axis		100	Hz	
	0.6mm		600		
	1.0mm		550		
	1.5mm		750		
	2mm X-axis		500		
2mm Y-axis		1000			
Response Time		5	10	ms	
Optical Power Handling		500		mW	
Durability	10 <sup>10</sup>			Cycle	
Device Resistance	2			MOhm	
Power Consumption			0.5	mW	
Operating Temperature	-40		75	°C	
Storage Temperature	-40		85	°C	
Reliability	Telcordia 1209 and 1221				
Package Leak Rate	<10 <sup>-9</sup>			Pa.m <sup>3</sup> /s	

**Note:** The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link](#):

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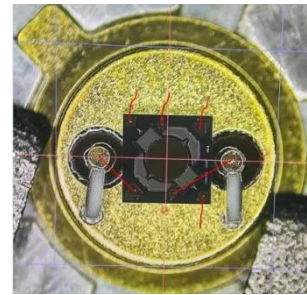
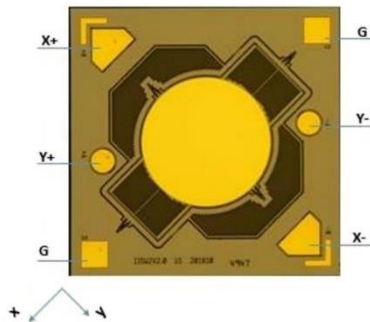
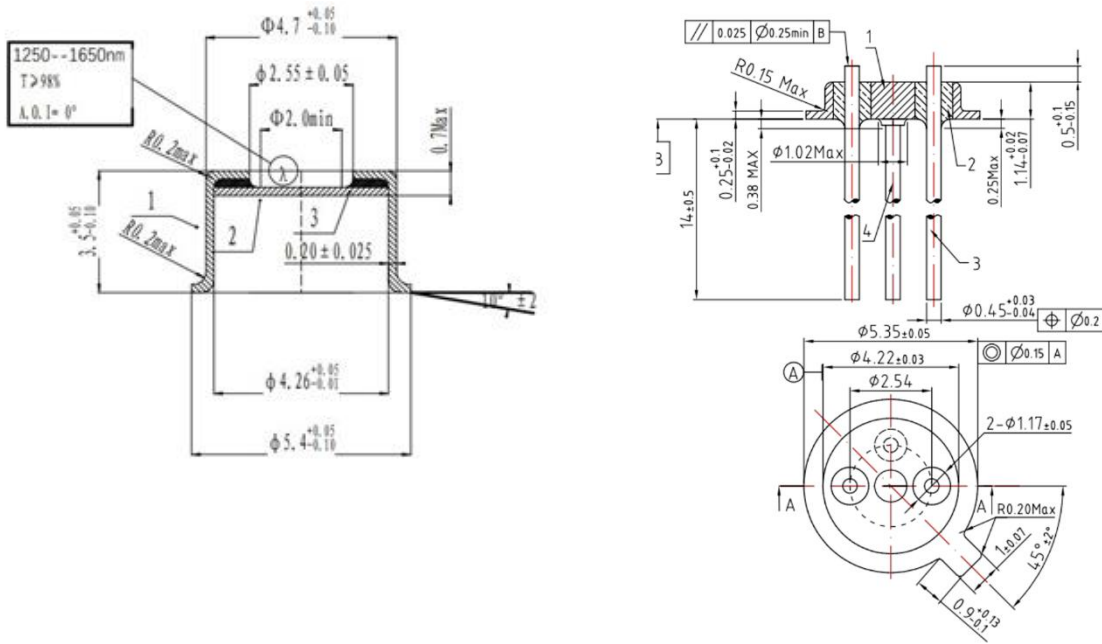
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## DATASHEET

### 2D 0.6mm Diameter Mirror Mechanical Footprint Dimensions and MEMS Structure (mm)



Rotation	DC +	DC -
X+	Pad X+	Pads G, X-,Y+,Y-
X-	Pad X-	Pads G, X+,Y+,Y-
Y+	Pad Y+	Pads G, X+,X-,Y-
Y-	Pad Y-	Pads G, X+,X-,Y+

#### Note:

- The pins coated with 0.4μm thick Gold

\*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

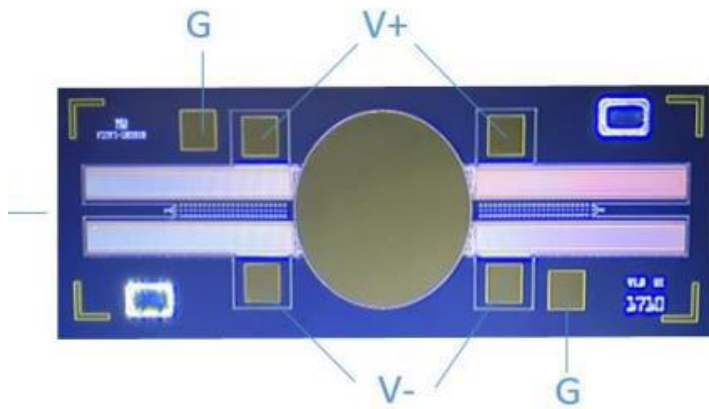
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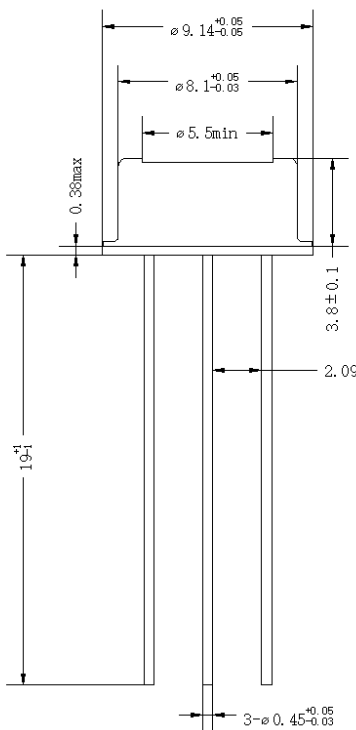


## DATASHEET

### 1D 1.5 mm Diameter Mirror Mechanical Footprint Dimensions and MEMS Structure (mm)



Rotation	DC +	DC -
X+	Pad V+	Pads G, Pad V-
X-	Pad V-	Pads G, Pad V+



\*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

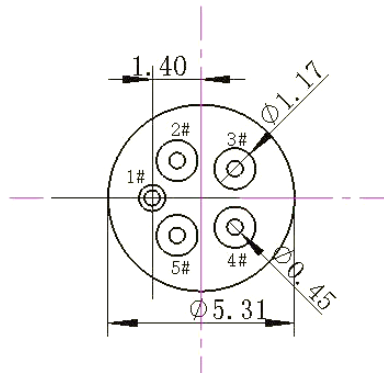
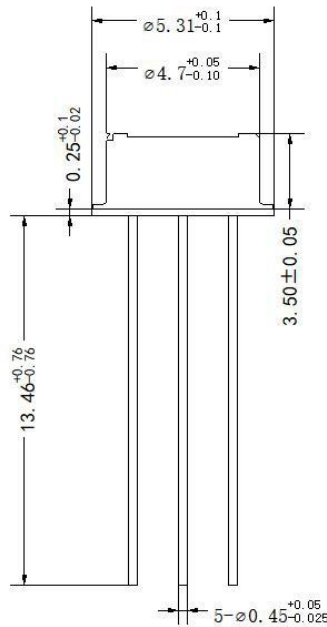
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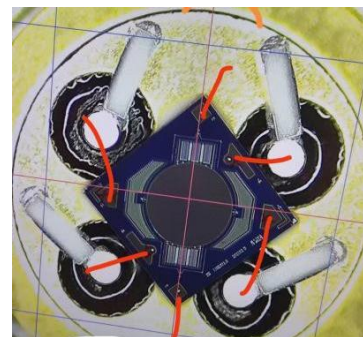
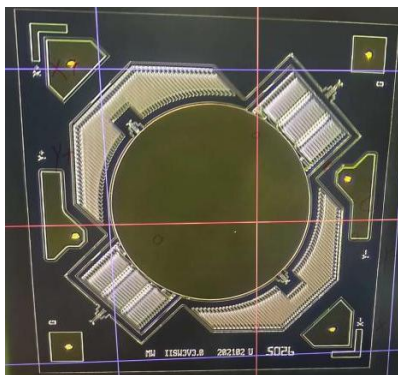
### 2D 0.6mm Diameter Mirror Mechanical Footprint Dimensions and MEMS Structure (mm)



Pin number	Description
1#	GND
2#	Axis x+
3#	Axis Y+
4#	Axis x-
5#	Axis Y-

**Note:**

- The pins coated with 0.4µm thick Gold



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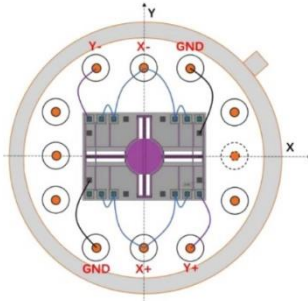
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### 2D 2mm Diameter Mirror Mechanical Footprint Dimensions and MEMS Structure (mm)



### Electronic Driving Instruction

Rotation	DC	GND
X+	Pad X+	
X-	Pad X-	
Y+	Pad Y+	
Y-	Pad Y-	

#### Note:

- The pins coated with 0.4 $\mu$ m thick Gold

# Scanning MEMS Mirror – 0.6, 1.5, 2.0 mm Diameter

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### Ordering Information

	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
Prefix	Mirror Size	Window Coating	Axis	Surface	Chip Package	Tilting Angle °	USB Electric Driver	
SMEM-	∅0.8mm = 8	1230-1650nm = 1 Special = 0	2D = 2	Gold = 1	TOCAN = 1 Bare Chip = 2	X±2.2: Y± 2.7= 23	None = 1 Yes = 2	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
Prefix	Mirror Size	Window Coating	Axis	Surface	Chip Package	Tilting Angle °	USB Electric Driver	
SMEM-	∅1mm = 1	1230-1650nm = 1 Special = 0	2D = 2	Gold = 1	TOCAN = 1 Bare Chip = 2	± 3 = 03	None = 1 Yes = 2	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
Prefix	Mirror Size	Window Coating	Axis	Surface	Chip Package	Tilting Angle °	USB Electric Driver	
SMEM-	∅1.5mm = 5	1230-1650nm = 1 Special = 0	1D = 1	Gold = 1	TOCAN = 1 Bare Chip = 2	± 10 = 10	None = 1 Yes = 2	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
Prefix	Mirror Size	Window Coating	Axis	Surface	Chip Package	Tilting Angle °	USB Electric Driver	
SMEM-	∅2mm = 2	1230-1650nm = 1 Special = 0	2D = 2	Gold = 1	TOCAN = 1 Bare Chip = 2	X±6: Y± 15= 65	None = 1 Yes = 2	

Red for special order

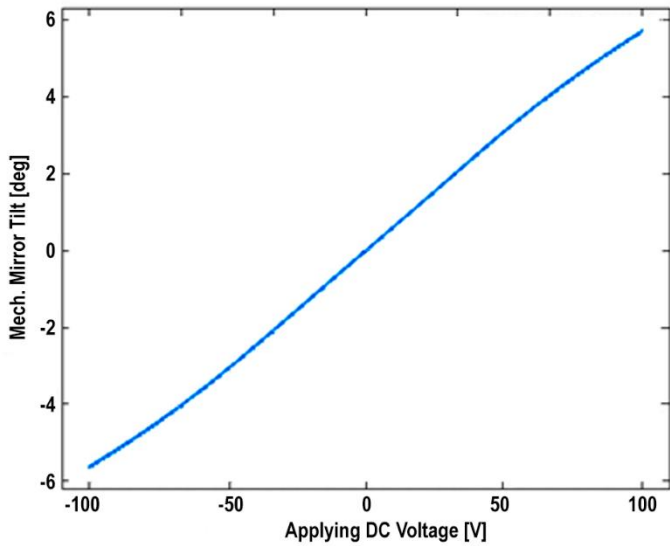
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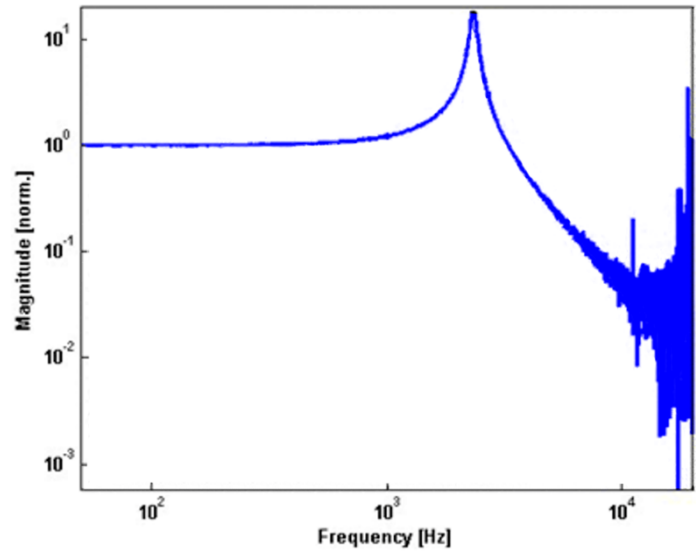


## DATASHEET

Tilting Performance (Typical)



Frequency Response (Typical)



XYZ	Chip Size (mm)	Mirror Diameter (μm)	Rotating Angle	Drive Voltage
X-, X+, Y-, Y+	Typical: 1.7 x 1.7 x 0.61	800	2.2 ~ 2.7 °	< 60
X-, X+	MIN: 5.48 x 1.88 x 0.55 Typical: 5.5 x 1.9 x 0.575 MAX: 5.52 x 1.92 x 0.6	1500	7.5 °	< 70
X-, X+	Typical: 5.5 x 1.9 x 0.62	1500	±10 °	< 110
X-, X+, Y-, Y+	Typical: 7 x 5 x 0.8	2000	X: ±6 ° Y: ±15 °	X < 220 Y < 100
X-, X+, Y-, Y+	Typical: 1.7 x 1.7 x 0.61	800	2.2 ~ 2.7 °	< 60
X-, X+, Y-, Y+	Typical: 1.8 x 1.8 x 0.61	1000	±3.0 °	< 60
X-, X+	Typical: 1.0 x 1.0 x 0.57	595	0.23 ~ 0.33 °	< 6
X+	Typical: 1.7 x 1.7 x 0.57	860	0.28 ° @5V	< 8
X-, X+, Y-, Y+	Typical: 1.9 x 3.2 x 0.62	1000	X: ±2 ° Y: ±4 °	< 60