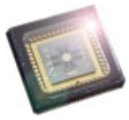
EGISMOS

E165PC

Dual Axis MEMS Scanning Mirror (Preliminary)

E165PC is a dual axis MEMS scanning mirror (MEMS scanner) providing two dimensional light beam scanning in a single silicon chip.



Dual axis MEMS scanner chip

Features

- Provide light beam scanning in horizontal & vertical directions simultaneously
- Aluminum coated mirror to maximize optical reflectivity for visual wavelength range
- Monolithic mirror & micro-actuator driven by electrostatic principle
- Single-crystal silicon structure operated without mechanical wear
- Resonant operation for low scan jitter
- Low power consumption
- Compact and lightweight
- Standard PLCC (plastic leadless chip carrier) package
- Shock tolerant
- ROHS compliant

Applications

- Laser scan display with VGA 640x480 resolution
- Laser area sensing
- Bio-medical scan inspection
- LADAR (laser detection and range sensing)
- Non contact measurement and sensing
- Applications requiring area scan of laser beam

Contact

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*MEMS: Micro-Electro-Mechanical Systems, device fabricated by silicon micromachining processes

Specifications (Preliminary)

Mirror plate size	1.2 mm dia. / circular
Mirror reflectivity	~80% (400nm~700nm)
Mirror metallization	Aluminum
Power consumption	< 40 mW
Fast axis:	
Resonant frequency	16,500Hz +/-5%
Typical drive voltage	70 VAC p-p unipolar
Maximum drive voltage	75 VAC p-p unipolar
Typical scan angle	+/-10° (optical)
Maximum scan angle	+/-15° (optical)
Scan trajectory	Sinusoidal
Drive principle	Electrostatic
Slow axis:	
Resonant frequency	1,700Hz +/-5%
Typical drive voltage	70 VAC p-p unipolar
Maximum drive voltage	75 VAC p-p unipolar
Typical scan angle	+/-10° (optical)
Maximum scan angle	+/-12° (optical)
Scan trajectory	Sinusoidal
Drive principle	Electrostatic
Operating temperature	0°~60°C
Operating humidity	10%~85%
Package footprint	10x10 mm^2
Package	PLCC48

1. Mirror is resonantly operated
2. Scan angle adjustable by controlling amplitude or duty ratio of drive voltage signal
3. Exceeding maximum scan angle or maximum drive voltage may cause permanent damage to the mirror
4. Mirror oscillation frequency is half of the frequency of the applied drive voltage signal

TYPICAL PERFORMANCE CURVES:

Fast Axis (Mirror)

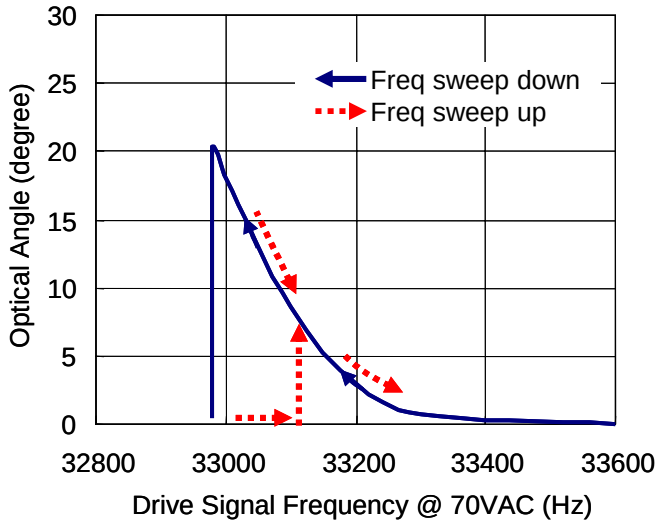

Figure 1. Optical Scan Angle vs. Drive Frequency of Fast Axis (High Frequency Axis) With Constant Drive Voltage

(Note the hysteresis behavior of frequency sweeping)

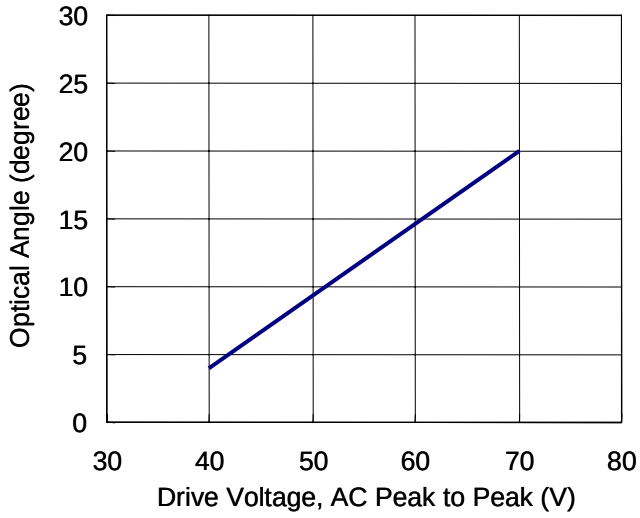

Figure 2. Scan Angle vs. Drive Voltage of Fast Axis (High Frequency Axis) With Constant Drive Signal Frequency

Slow Axis (Gimbal Frame)

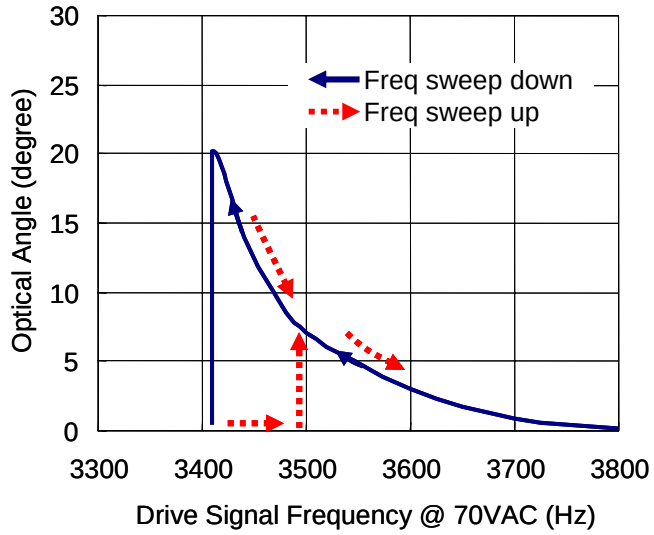

Figure 3. Optical Scan Angle vs. Drive Frequency of Slow Axis (Low Frequency Axis) With Constant Drive Voltage

(Note the hysteresis behavior of frequency sweeping)

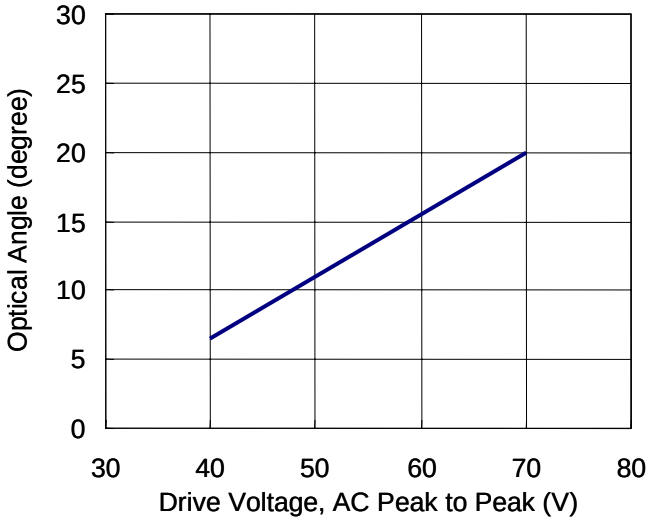

Figure 4. Scan Angle vs. Drive Voltage of Slow Axis (Low Frequency Axis) With Constant Drive Signal Frequency

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MIRROR SCAN TRAJECTORY & DRIVE SIGNAL

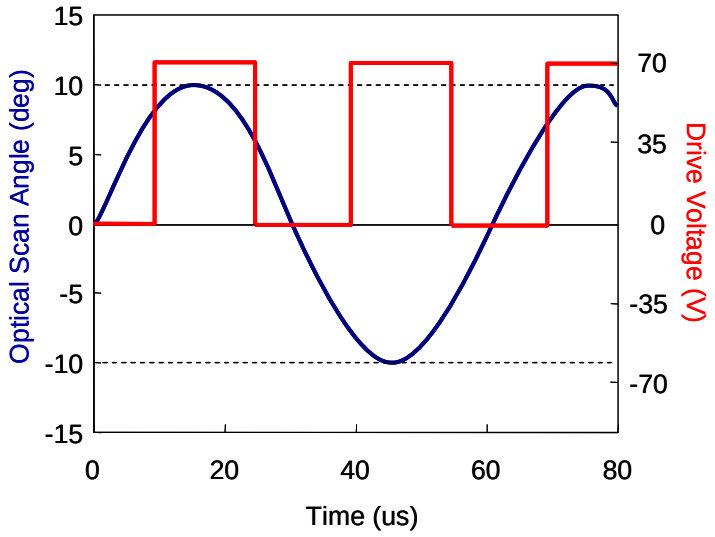

Figure 5. Typical Scan Trajectory Versus Drive Signal

Remarks:

1. Mirror scan trajectory is sinusoidal and scan frequency is half of drive signal frequency.
2. There is an inherent phase difference between drive signal and scan trajectory.
3. Due to hysteresis behavior, mirror scanning can be started by sweeping drive frequency from high to desired operation point.
4. Mirror scanning can also be started by increasing duty ratio from low (5% typical) to 50% with fixed drive frequency.
5. Duty ratio exceeding 50% will not yield higher scan angle.
6. Stability of mirror scan is dominated by the stability of drive signal amplitude and frequency.

PACKAGE OUTLINE & PIN ASSIGNMENT

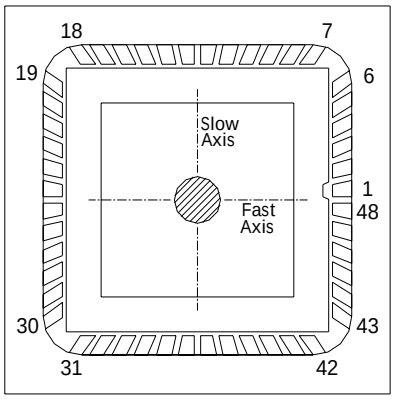

Figure 6. Package Drawing Top View

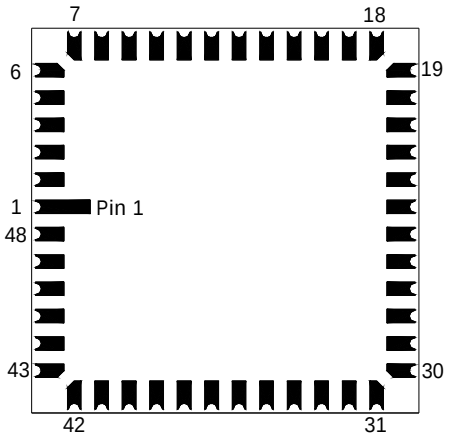

Figure 7. Package Drawing Bottom View

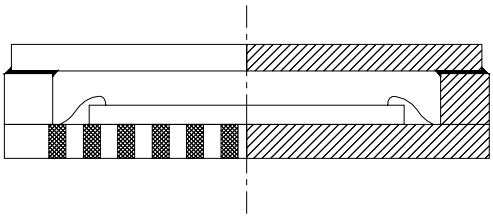

Figure 8. Package Drawing Side View

PIN #	DESCRIPTION
Pin 11	Fast Axis Drive Signal
Pin 8, 14, 32, 38	Slow Axis Drive Signal
Pin 17, 35, 40, 41	Ground
All other pins	Not Connected

Table 1. Pin Assignment