ACTIVE OPTICAL SYSTEMS

Fast Steering Mirror (FSM)
PZT Actuated

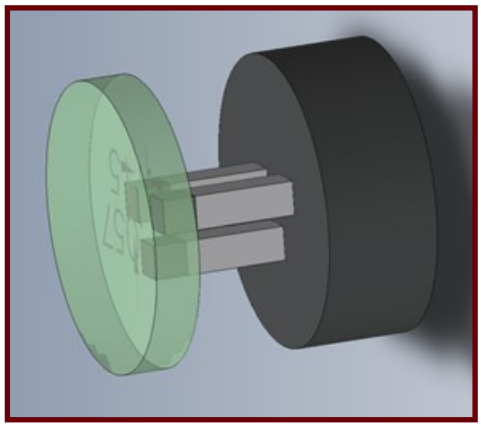
FEATURES

- High Optical Quality Continuous Surface
- Capable of Receiving Any High Reflectivity Coating
- Diameters: typically 1” – 2” (25.4mm-50.8mm), Can be produced from .5” – 7” (12.7mm-177.8mm)
- Customizable Mirror Substrate
- FSM First Resonance: ~9kHz
- Rise Time: ~100µs
- All Digital Tunable Controller with Ethernet Interface
- Microradian Accuracy with Milliradian Stroke
- Compatible with AOS AO Controllers
- PZT custom controllers with a notch to damp oscillation

PZT FSM

APPLICATIONS

- Laser communications
- Atmospheric Tilt Compensation
- Laser Beam Automatic Alignment Systems
- Astronomical Adaptive Optics



PZT FSM Architecture

DESCRIPTION

AOS primarily manufactures FSMs to address the laser pointing control market, although our FSMs can be employed in communication or image stabilization systems. Our FSMs can address a wide variety of tilt needs from atmosphere aberration compensation to mechanical jitter rejection.

AOS PZT FSMs are scalable with .5”- 7” diameters mirrors (12.7mm-177.8mm) and can be produced to accommodate extreme angles of incidence and varied beam size. FSM mirror coatings are customizable and capable of receiving any high reflectivity coating. AOS FSMs are digitally controlled, eliminating the traditional drawbacks of analog adjustment. FSMs are available with or without exterior packaging, and in either anodized or uncoated finishes, to accommodate physical space or vacuum requirements.

AOS produces FSMs in two distinct architectures contingent upon intended application. The VCA Production Line employs voice coils and features larger diameter mirrors and has been used effectively within HEL Directed Energy Systems. Due to their architecture, VCA FSMs allow for increased tilt. The PZT line is designed to address small size and high speed requirements.

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SPECIFICATIONS

Parameter	Value	Units	Notes
Clear Aperture / Diameter	**.5" - 7"**	in	12.7 - 177.8 mm
Coating Type	**Any**	-	Coated with the same coatings as the rest of the optics in the system
Substrate	**Silicon, Glass (Fused Silica)**	-	Can be Customized and/or Customer Provided
Angular Stroke*	**36**	µm	
Angular Accuracy*	**3**	µm	
Bandwidth*	**9**	kHz	On 1" FSM. Adjustable through digital Ethernet interface
Angle of Incidence	**0 - 45**	degrees	Typically 10-degrees for High Power Coatings
Laser Power Handling	**Tested up to 240kW and 1MW/cm2**	-	120kW (20kW/cm2) for 5s resulted in <1oC heating
Vacuum Bake	**10**	µtorr	Low Outgassing Materials

**Note: Specifications scale with aperture diameter and other design specifications*

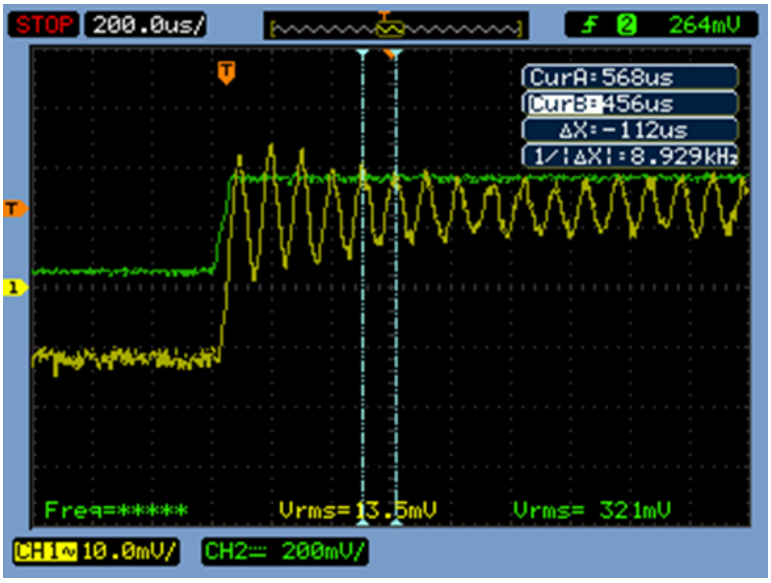

Image shows Raw Step Response
Rise Time: ~100µs

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9019 Washington St. NE, Suite B2, Albuquerque, NM 87113 • (505) 207-4202 • www.aos-llc.com