

Fast-steering Mirrors

Model - 3G



3G mirrors come standard with a 60mm glass substrate. These mirrors are electronically controlled and can be used in computer-controlled operations or by remote manual control. They have become key components in diverse applications such as industrial instrumentation, astronomy, laser communication, imaging systems, experimental optical bench setups and research and development projects.

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Features

The Model 3G is a compact, two-axis, highly responsive assembly designed for extended field-of-view steering applications. The 3G utilizes a unique suspension device that provides for rotations about the center, front surface of the mirror and allows for the increase in mass associated with using a glass substrate. Control electronics provide the analog command/monitor interface to the customer, the signal conditioning for the sensor readout and the actuator drive currents. Closed-loop servo control drives the actuators in response to the customer command and position sensor feedback.

Custom requirements and specifications are welcome and will be quoted on a case-by-case basis.

Features	Values
Mirror Assembly	
Number of Axes	2 (tip - tilt)
Aperture	60 mm (2.36 in)
Angular Range	± 17.5 mrad (± 1.0 deg)
Angular Velocity Capability	3.3 rad/sec
Angular Acceleration Capability	620 rad/sec ²
Mirror Assembly Envelope	129 mm x 127 mm x 30 mm (5" x 5.06" x 1.19")
Mirror Assembly Mass	550 grams (1.02 lbm)
Operating Temperature Range	0° C to 40° C (32° F to 104° F)
Sensor Warm-up Time for Boresight (Null) Stability	10 minutes
Boresight (Null) Thermal Drift	≤ 9 μ rad/°C
Boresight (Null) Stability Over Time, 25° C	≤ 0.5 mrad/month
Storage Temperature Range	-20° C to 55° C (-4° F to 131° F)
Optical Characteristics	
Mirror Substrate (Standard)	Glass protected Aluminum or Gold
Reflectivity	95%, visible
Optical Surface	$\leq \lambda/20$ rms
Surface Roughness	≤ 50 Å
Scratch and Dig	60/40
Electronics Assembly	
Command and Readout Interface	Analog, ± 10 V = ± 17 mrad
Resolution, Noise Equivalent Angle	1 μ rad rms
Quiescent Power at FSM Assembly	≤ 3.5 W
Peak Operating Power	10 W
Recommended Power Supply	± 15 VDC, ± 2 A
Operating Temperature Range	0° C to 40° C (32° F to 104° F)
Storage Temperature Range	-20° C to 55° C (-4° F to 131° F)
Electronics Envelope	VME 6U x 4 HP x 160 mm
Control Characteristics	
Small Signal Control Bandwidth (closed loop -3 dB)	250 Hz, 100 μ rad capability
Response Flatness	peaking < 6 dB
Boresight (Null) Offset, Electronic Adjustment Range	± 1.5 mrad
Accuracy (Maximum Deviation From Ideal Position), 25° C	1% of full scale (250 μ rad)
Jitter/Wobble	≤ 0.5 μ rad rms
Small Angle Step Response, steps < 250 μ rad)	
rise time to 90%	2 msec
settling time within 5%	5 msec
Large Angle Step Response, 10 mrad step	
rise time to 90%	10 msec
settling time within 5%	20 msec
Disturbance Rejection Bandwidth	70 dB at 1Hz
Cross-axis Coupling	$\leq 0.1\%$