Melles Griot® Laser Autofocus System

SPEC SHEET

Description

The Melles Griot® Laser Autofocus System is a modular, semi-custom autofocus solution that is tunable for different objectives, sample plane reflectivity and wavelength requirements. The basic laser autofocus platform is offered for low-speed applications (required update rates <60 Hz) and is best suited for imaging scenarios where sample tilt is minimal (or well compensated), the optical path is stable, and high sensitivity to changes in tilt is not a limiting factor.

High-precision, flat-sample imaging

- Semiconductor wafers
- Polished substrates
- Glass slides
- Pattern-flat metrology

Fixed-optics microscopes with rigid mechanical alignment

- Upright or inverted microscopes with stable turret
- Systems where objectives are rarely swapped
- Long-term fixed-focus imaging setup

Product Diagram

The figure to the right of the Laser Autofocus Module shows the basic configuration that is compatible with the majority of objectives. In this configuration, the laser light source is mounted remotely (within the Autofocus Controller or combined with other IDEX-supplied light sources) and fiber coupled to the autofocus module. The figure also shows cabling that is routed to the Autofocus Controller, including autofocus sensor, power monitor and thermistor signals.

Capabilities

Parameter	Current Capability	Under Development
Autofocus Resolution	≤ 1/10th objective depth of focus (DOF)	
Focus Hold Mode / Focus Drift Compensation	supported	
Sample Compatibility	fresnel reflection from sample required multiple reflective interfaces supported	
Standard Laser Wavelengths	450 nm, 785 nm	alternate wavelengths available by request
Laser Classification (assembled module)	Class 1	
Laser Classification (light source only)	Class 3B	
Tilt Sensitivity	focus tracking coupled with sample tilt[1]	focus tracking de-coupled from sample tilt independent sample tilt measurement
Autofocus Update Rate	60 Hz (standard speed)	2 kHz (mid-speed) 10 kHz (high-speed)
Z-Stage Support	step and direction digital signal proportional to focus error	analog voltage signal proportional to focus error
Communication Protocol	Differential SPI	
Software Integration	API supplied	

[1] Changes in sample tilt (or other reflective optics in the optical pathway) will influence focus tracking; the degree of tilt and focus coupling will be dependent on objective. Known flat samples and/or active sample de-tilt techniques are required to meet the specified autofocus resolution.

CAPABILITIES UNDER DEVELOPMENT

An advanced Laser Autofocus system with a similar architecture to the basic system and wavelength options is under development which will have a focus tracking mechanism agnostic to sample type and tilt with low-, mid- and high-speed performance tiers. This configuration will excel in environments where tilt varies, samples aren't perfectly flat, or the optical system changes frequently.

Biological samples including live cells

Biological specimens often introduce local tilt, curvature, or uneven refractive interfaces.
This configuration is tilt-agnostic focus and decoupled focus/tilt detection make it highly robust in these setups

- Large FOV Flow cells, Microfluidics chips
- High-throughput screening (96-, 384-, 1536-well plates).
- Robotics-driven microscopy
- Automated, rapid-position acquisitions

Fast or vibration and temperature prone environments

Instruments affected by environmental drift

- High-speed Z-stacking
- Real-time tracking for live cell imaging

Samples with curve substrates

- Biological tissue sections
- Organoids
- Polymer films

Systems with frequent objective changes

These systems experience micro-tilt from mechanical changes; the tilt neutrality keeps autofocus stable.

- Multi-objective automated microscopes
- Optical systems with beam-splitters, modulators, or filter inserts

Dimensional Drawings

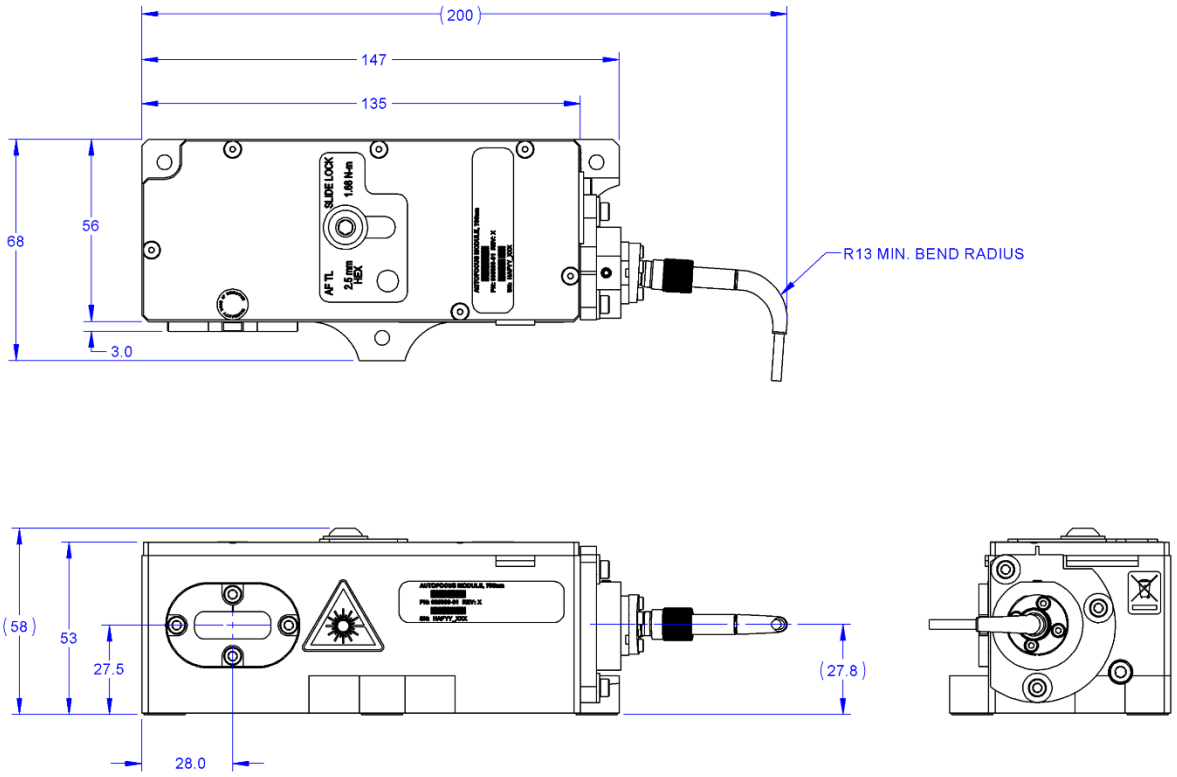

Figure 2. Typical dimension of the Basic Laser Autofocus Module with external laser source.

Interested in configuring to your needs?

Contact IDEX Health & Science at **www.idex-hs.com/autofocus**