

# Product Document

## M3-F Focus Module

### Miniature micro-mechatronic smart module for precision focus



#### FEATURES

- **Small:** complete, compact system with integrated controls and firmware – no external control board needed
- **Superior image quality:** micron-precision lens movement with very low tilt
- **Low Voltage, low power use:** runs on 3.3 V DC input, holds focus with power off
- **Simple system integration:** accepts high-level motion commands over standard serial interface (I2C or SPI)
- **Flexible, production-ready system:** compatible with M8 to M12 lenses and standard imager formats (e.g. 1/2" and 1/1.8")
- **Cost-effective system solution:** single-lens system with embedded closed-loop drive circuit for high repeatability with low external processing requirements

#### APPLICATIONS

*Miniature, high-resolution cameras*

- Biometric systems
- Infrared cameras
- Medical diagnostic and inspection systems
- Miniature video cameras and computer cameras
- Projectors
- Targeting systems

### Precision lens control; superior image quality

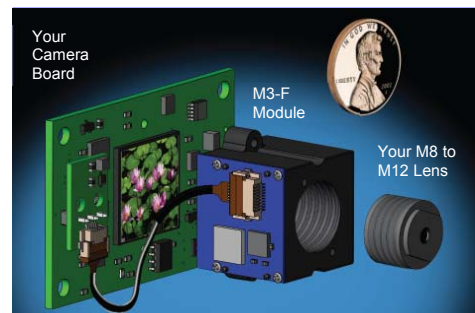
M3-F focus modules add high-resolution lens motion to the smallest OEM cameras. A complete closed-loop motion solution, the M3-F focus module is no larger than a fixed lens holder and has low power requirements for use in battery-powered devices.

The M3-F smart module gives you a single-lens focus solution with minimal external processing requirements, making it simple and cost-effective to integrate focus into your camera system. Precise lens position control (0.5 micron resolution) and best-in-class bi-directional repeatability enable you to capture the sharpest images from your board-mounted camera system.

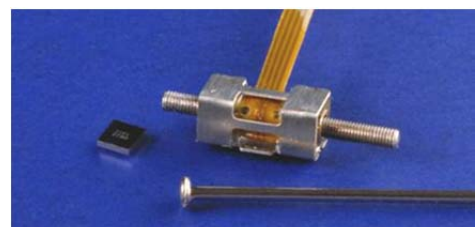
M3-F modules are designed for long life, with high performance that is not susceptible to temperature or power variations.

### The M3 micro-mechatronic platform

New Scale's M3 Micro-Mechatronic Module technology platform provides the smallest, highest resolution and most repeatable closed-loop micro-mechatronic systems available – in easily integrated, customizable packages. M3 smart modules include a patented SQUIGGLE® RV piezo micro motor, an NSD-2101 drive ASIC, an NSE-5310 high-resolution magnetic position sensor, and a microprocessor. These combine to create the world's smallest closed-loop linear motion systems, with performance comparable to much larger systems.



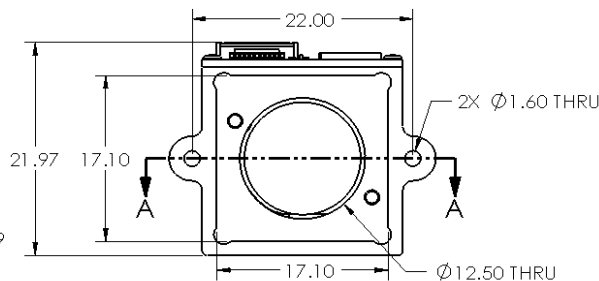
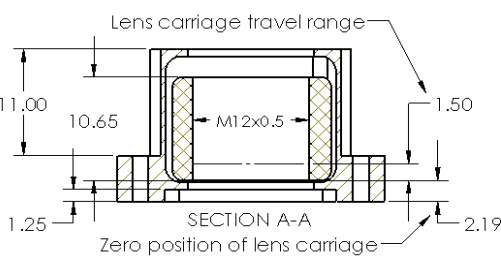
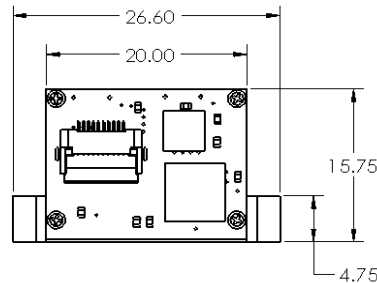
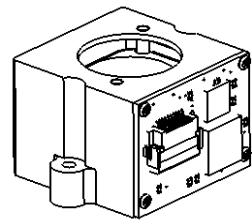
**Flexibility and Precision:** M3-F modules are easily integrated with your camera board and lens. The M3-F is a complete, drop-in focus solution that requires no more space than a fixed lens holder.



**SQUIGGLE RV micro motor and NSD-2101 drive ASIC** - the world's smallest linear motor system- inside every M3-F smart module.

### M3-F Developer's Kits

M3-F Developer's Kits provide convenient engineering evaluation and demonstration of focus in your camera in just a few minutes. New Scale Pathway™ software allows you to perform manual focus operations immediately from your PC.



All dimensions in mm

### Reference Information

See [www.newscaletech.com/application\\_notes.html](http://www.newscaletech.com/application_notes.html)

- *Checking Optical and Imager Geometry in DK-M3-F* (design note). Lens recommendations, guidelines for image sensor and lens compatibility with the M3-F Developer's Kit module.
- *M3-F focus module in camera system design* (application note). Includes module details as well as repeatability and other performance considerations.

### Order a Developer's Kit



Order online from Digi-Key at <http://www.digikey.com/product-detail/en/DK-M3F-1.8-TRK-1.5-S/DK-M3F-1.8-TRK-1.5-S-ND/2563770>

Model Number	Description
DK-M3-F-1.8-TRK-1.5-S	M3-F Developer's Kit including M3-F module, USB adapter (SPI), connecting cables and New Scale Pathway™ software.

### Application-Specific Solutions

We can quickly create customized focus modules to meet your exact OEM specifications including longer travel, custom lens interface, mounting requirements and unique environmental considerations. Use the specification worksheet at [www.newscaletech.com/micro-mechanics/contact-af-rfp.php](http://www.newscaletech.com/micro-mechanics/contact-af-rfp.php)

M3-F Module Specifications	
<b>Lens Type</b> (Lens not included)	Accepts M12x0.5 mm lens. Accepts smaller lenses to M8x0.35 with adapter from your lens supplier.
<b>Lens Weight *</b>	< 5 grams
<b>Travel Range</b>	Up to 1.5 mm
<b>Housing Dimension</b>	20 x 22 x 16 mm
<b>Max Image Sensor Area</b> (image sensor not included)	17 x 17 x 1.25 mm (including 1/2" and 1/1.8" formats)
<b>Speed</b>	> 5 mm/s
<b>Resolution</b>	0.5 µm
<b>Repeatability</b>	Uni-directional: +/- 8 µm Bi-directional: +/- 20 µm
<b>Linear Accuracy</b>	± 30 µm
<b>Angular Alignment (static tip/tilt)</b>	<± 1 degree
<b>Angular Movement (dynamic tip/tilt)</b>	<± 0.15 degrees
<b>Static Concentricity</b>	<± 0.25 mm
<b>Dynamic Concentricity</b>	<± 0.02 mm
<b>Input Voltage</b>	3.1 to 3.6 V DC
<b>Input Power **</b>	< 0.5 W (5mm/s with 5g mass) < 0.13 W quiescent
<b>Temperature /RH ***</b>	5° to 70°C (lower possible) <70% RH non-condensing
<b>Mean Time Before Failure</b>	>2M cycles (fixed orientation) 500K cycles (random orientation)
<b>Digital Interface</b>	I <sup>2</sup> C or SPI
<b>Weight of module (without lens)</b>	5.8 grams
<b>Compliance</b>	CE / RoHS

\* Fixed orientation will allow for heavier lens operation  
 \*\* Power depends on input voltage, speed & load.  
 \*\*\* Consult the factory for lower temperature requirements.