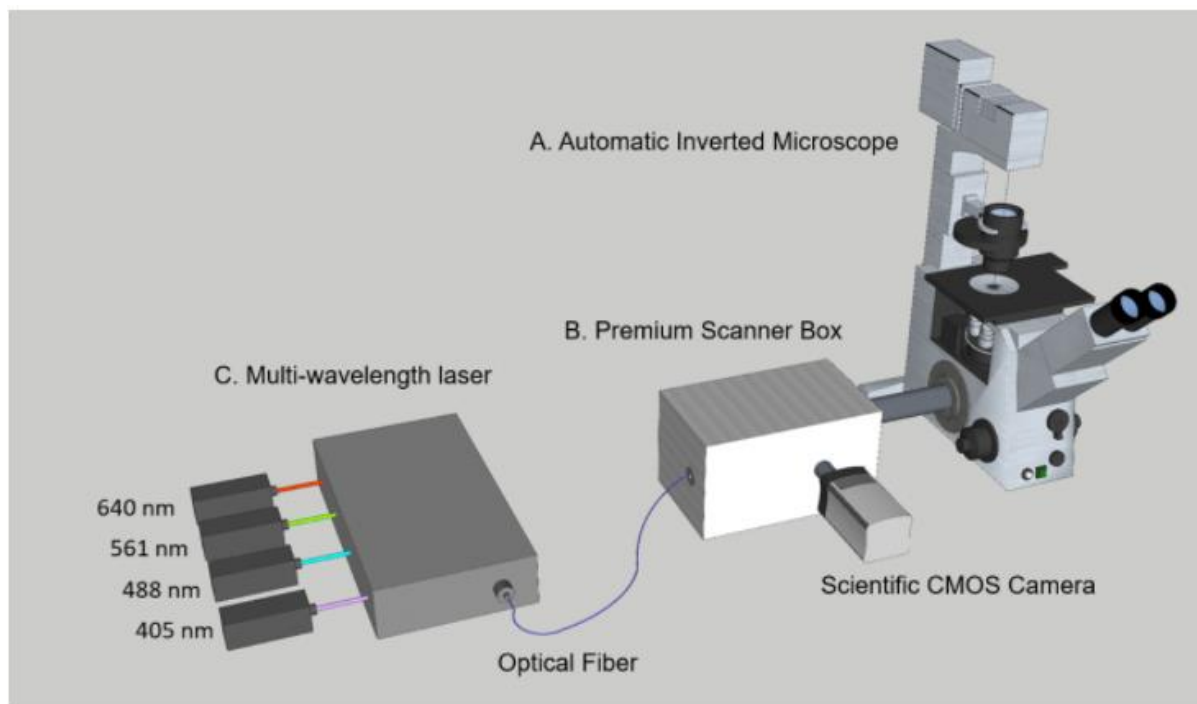


## High-speed Thick Tissue Confocal Imaging Platform



LSFMM is a high-speed, high-contrast multi-dimensional imaging platform capable of three key imaging advantages. At its core is a focal modulation module for high-contrast imaging. It significantly reduces the background signal caused by multiple scattering and effectively picks up the high-resolution signal related to the ballistic excitation light. Consequently, the signal to background ratio and the spatial resolution can be maintained to a deeper penetration depth, which is about two to four times deeper than conventional confocal microscopes. High acquisition speed is the second feature of LSFMM. Capturing at speeds at least 100x faster than conventional confocal technology, LSFMM is the optimal solution for live cell and tissue imaging, providing low phototoxicity and photobleaching, or perfect for fast volume acquisition of fixed samples and even small live animals.

The third characteristic is large field of view (FOV) available. Our scientific CMOS camera can offer up to 5.5 Megapixel sensor, yielding the largest available field of view with 60x objectives(0.36 mm) and 40x objectives(0.54 mm). Maximizing view in fluorescence microscopy is of increasing relevance across a wide range of applications, including high content screening of large fields of cells, imaging of the developing embryo, neuron mapping and tissue imaging.

## *Features & Benefits*

- ✓ High-speed acquisition
- ✓ Strong optical sectioning
- ✓ Single molecule imaging
- ✓ Multi-color fluorescence
- ✓ High sensitivity
- ✓ Large field of view
- ✓ Low photobleaching and phototoxicity
- ✓ Super-resolution
- ✓ Intuitive software

## The product configurations comparison:

Hardware Feature	Hardware Feature	LSFMM Premium (FP-10-P)	LSFMM Advance (FP-10-A)	LSFMM Standard (FP-10-S)
High-speed line-scan laser confocal imaging	Up to 600 fps for fast cell dynamics At least 100 x faster than conventional confocal	✓	✓	✓
FMM image contrast enhancement	Imaging deeper in cells and tissue At least 2-4 times deeper than conventional confocal 20-40 dB enhancement in image signal-to-background ratio	✓	✓	✓
Large field of view	Capture more in a single image Matches large sCMOS sensors	✓	✓	✓
Low noise level	Acquire noise-free images with weak fluorescence	✓	✓	-
16-bit dynamic range	Capture both weak and bright signals without saturation	✓	-	-
Multi-color fluorescence imaging	Choice of 4 wavelengths up to 640 nm Any two colours simultaneously - match penetration depth of two labelled targets instantly	✓	Optional	Optional
Super-resolution	Acquire higher resolution images than the diffraction limit	✓	-	-
Z-motorized stage	Acquire volumetric images automatically	✓	✓	-

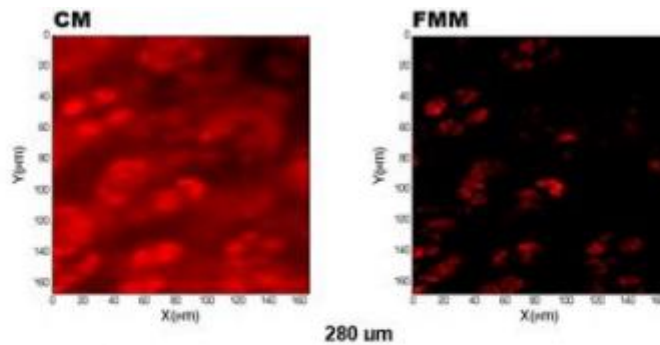
Software Feature	Benefits
Automatical image acquisition GUI software	<ul style="list-style-type: none"> <li>Microscope configuration, image acquisition, 3D image visualization and rendering</li> <li>Immediate visual feedback on experimental progress to evaluate data and make appropriate decisions in real-time</li> </ul>
Imaris file format	<ul style="list-style-type: none"> <li>Easy transfer of data to Imaris for comprehensive downstream multi-dimensional analysis</li> </ul>

# Technical Data

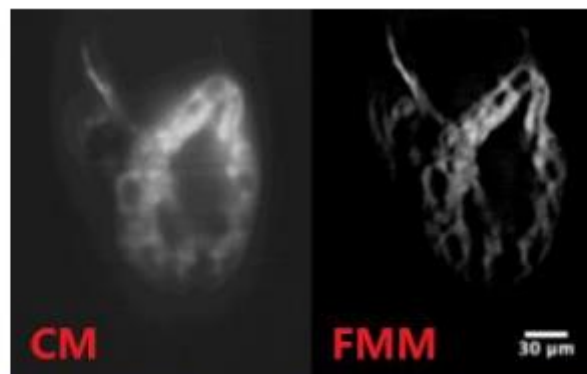
	LSFMM premium (FP-10-P)	LSFMM Advance (FP-10-A)	LSFMM Standard (FP-10-S)
Laser combiner	405nm, 488nm, 561nm, 640nm (original configuration); Laser wavelengths are optional according to user requirement.	488nm, 561nm (original configuration); Laser wavelengths are optional according to user requirement.	488nm (original configuration); Laser wavelengths are optional according to user requirement.
Laser power	50 mW maximum for combined wavelengths		
Frame rate	42 fps (2560 x 500 pixels) 210 fps (2560 x 100 pixels) Fast scan mode: 168 fps (2560 x 500 pixels)	8 fps (1936 x 500 pixels) 40 fps (1936 x 100 pixels) Fast scan mode: 32 fps (1936 x 500 pixels) 160 fps (1936 x 100 pixels)	60 fps (1280 x 1024 pixels) 600 fps (1280 x 100 pixels)
Image resolution	100 x 100 pixels to 2560 x 2560 pixels	100 x 100 pixels to 1936 x 1936 pixels	100 x 100 pixels to 1280 x 1024 pixels
Image format	8/16 bit	8/12-bit	10 bit
Noise level	0.9e-	6.2e-	12e-
Noise level(count in photons)	1.5 photons	8.8 photons	20 photons
FMM modulation	line-by-line	frame-by-frame	
Lateral resolution	1.2-1.4 fold over optical diffraction limit	Optical diffraction limit	
Number of fluorescence channel	>4	>2	>1
Microscope stage	Fully-motorized and automated stage with piezo z scanner	Semi-motorized stage with piezo z scanner	Mechanical stage with focal spiral(can upgrade to piezo z scanner)

## Technical Features Explained

LSFMM is a novel microscopy method that has been developed to achieve a deeper penetration depth on the basis of confocal microscopy. Equivalently selective excitation is achieved by modulating the light intensity at the focal point only. Fluorescence emission or backscattered light are collected and demodulated. As a result, only focal signals are decoded and thus significantly reducing the background signals. Specially, we add a cylindrical lens to generate a line-focus at the sample and achieve line-scan imaging. Therefore, the imaging acquisition speed is improved significantly compared with conventional point-scan confocal microscopes.



Chicken chondrocytes labelled with a lipid tracer



3-day post-fertilized zebrafish heart labelled by EGFP

Comparison with other conventional confocal microscope models					
	LSFMM Premium (FP-10-P)	Olympus FV3000	Nikon C2+	ZEISS LSM 980	LEICA TCS SP8
Typical frame rate	Up to 210 fps	1.8 fps	2 fps	13 fps	7 fps
Imaging depth	Up to 500 $\mu\text{m}$	typically 50-200 $\mu\text{m}$			
FMM contrast enhancement	20-30 dB	NA			
Noise level	1.5 photons	17 photons at 10 $\mu\text{s}$ pixel time; 7.6 photons at 2 $\mu\text{s}$ pixel time			

## Creating the Optimum Products for You

### Step 1: Select the LSFMM Scan Box You Require

- **LSFMM Premium (FP-10-P)**
- **LSFMM Advance (FP-10-A)**
- **LSFMM Standard (FP-10-S)**

### Step 2: Choose Laser Combination for Your Selected LSFMM Model

Many combinations of the following laser lines can be supported. For specific laser wavelength configurations please speak to your Sales Engineer.

Available Wavelengths (nm)	Power (Mw)
<b>405</b>	>20
<b>445</b>	>20
<b>488</b>	>20
<b>514</b>	>20

Available Wavelengths (nm)	Power (Mw)
<b>532</b>	>20
<b>561</b>	>20
<b>640</b>	>20
<b>785</b>	>20

### Step 3: Select the Inverted Microscope Model

#### Recommended Microscope Models

Olympus	Nikon	Zeiss	Leica
Olympus IX73	Nikon Ti-E	Zeiss AxioObserver	Leica DMI6000
Olympus IX83	Nikon Ti-U		Leica DMI8
	Nikon Ti2-E		
	Nikon Ti2-A		
	Nikon Ti2-U		

### Step 4: Select the Required Accessories

Please discuss any additional requirements, such as motorized XY and Z stage control, incubation and accessories for your specific application needs with your Sales Engineer.