

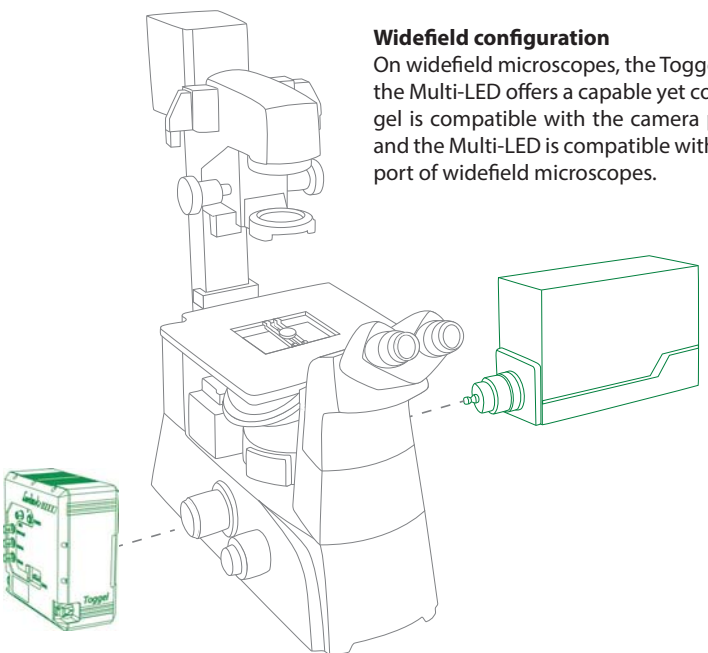
LIFA components

The standard LIFA configuration includes the items below. If your application requires a different configuration then please get in touch with our sales team to discuss your requirements.

Toggel modulated CCD camera
Multi-LED and/or Multi-LASER light source(s)
LIFA software package
Computer with Camera Link frame grabber
Installation by a Lambert Instruments engineer at your lab
One day of hands-on training
Phone, email and remote-desktop support

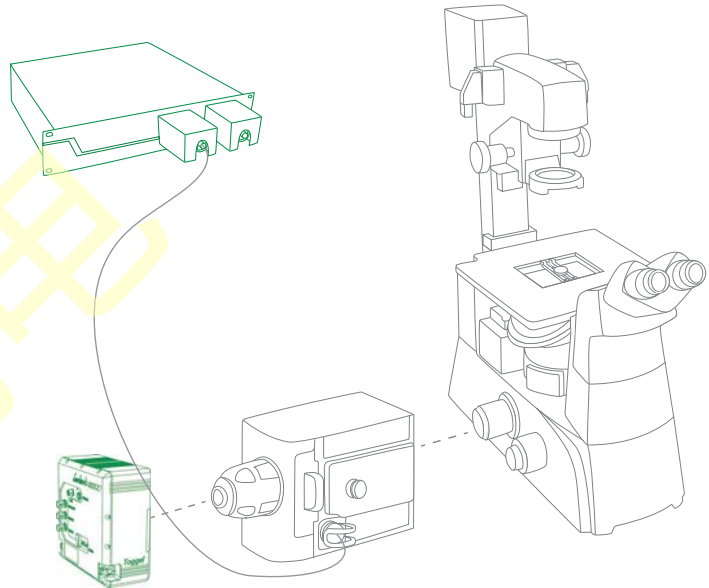
Widefield configuration

On widefield microscopes, the Toggel camera in combination with the Multi-LED offers a capable yet compact FLIM solution. The Toggel is compatible with the camera port of widefield microscopes and the Multi-LED is compatible with the standard epifluorescence port of widefield microscopes.



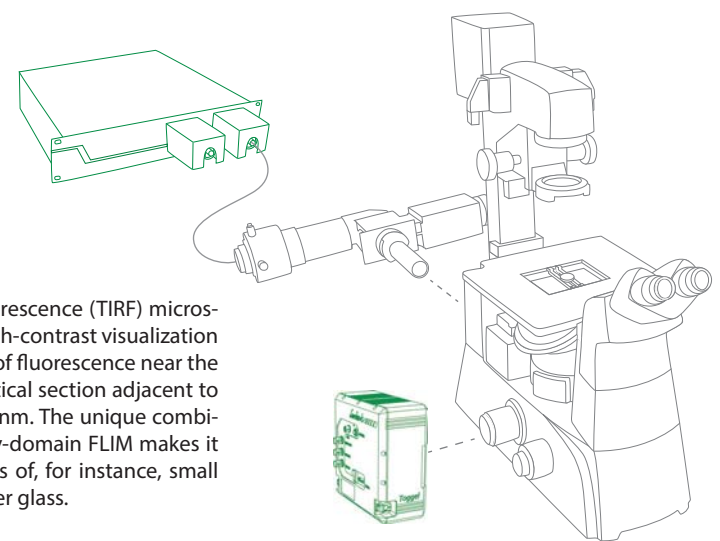
Spinning-disk confocal configuration

Being a camera-based system, the Lambert Instruments LIFA system for frequency-domain FLIM is compatible with multi-beam confocal microscopy techniques, most notably the Yokogawa CSU spinning disk series (based on the Nipkow disk scanner), and the VTInfinity series by Visitech International.



TIRF configuration

Total Internal Reflection Fluorescence (TIRF) microscopy facilitates extremely high-contrast visualization and thereby high sensitivity of fluorescence near the cover glass. Typically, the optical section adjacent to the cover glass is about 100 nm. The unique combination of TIRF and frequency-domain FLIM makes it possible to measure lifetimes of, for instance, small focal adhesions near the cover glass.



Toggel

The Toggel is a next-generation FLIM camera that simplifies experiments for researchers and imaging centers by combining excellent light sensitivity with easy image acquisition and data analysis.

This camera helps you minimize measurement duration, automate image acquisition and simplify data analysis. These factors are of great importance to many of our customers in cell biology, cancer research and high-throughput screening.



FLIM images
30 fps

Large pixels
24 μm

Features

The Toggel features a unique image sensor that combines excellent light sensitivity with advanced fluorescence lifetime imaging capabilities. This image sensor was designed and optimized specifically for fluorescence lifetime imaging applications and enables lifetime imaging at unprecedented frame rates with the single-image fluorescence lifetime imaging microscopy (si-FLIM) method [1].

Imaging modes of the camera include regular frequency-domain FLIM acquisition and time-lapse recordings. Data analysis is done automatically by the LIFA software, which instantly calculates the fluorescence lifetime and presents it to the user as a colorized overlay on the original image.

Specifications are subject to change without prior notice.

Pixel resolution	504 x 512 pixels
Pixel size	24 x 24 μm
Pixel bit depth	14 bit
Full-well capacity	67 000 e ⁻
Readout noise	< 35 e ⁻
Dynamic range	2 000 : 1 (66 dB)
Dark current	400 e ⁻ /s/pixel (at 20°C)
Sensor type	Proprietary CCD sensor
Fill factor	50%
Frame rate	Up to 30 fps (dual images)
Modulation frequencies	13 kHz – 80 MHz
Lifetime range	100 ps - 25 μs
Lifetime resolution	Standard deviation < 5%
Sensor cooling	Stabilized at 20°C
Camera interface	Camera Link

Multi-LED

The Lambert Instruments Multi-LED is a versatile excitation light source for fluorescence lifetime imaging microscopy in the frequency domain. The Multi-LED contains up to 4 LEDs that provide non-phototoxic illumination levels, have a low cost and a long lifespan.

All LEDs are high-quality modulating LEDs with a peak light intensity at wavelengths between 446 and 525 nm, 595 nm, 635 nm and 696 nm. Other wavelengths are available upon request.



Peak wavelengths (nm)	405 (CFP), 445 (cerulean, GFP), 535 (TRITC), 630 (CY5), others upon request
Modulation frequency	Up to at least 80 MHz
Number of LEDs	3 (standard) or 4 (maximum)
Coupling	Compatible with existing Hg and Xe microscope adapters
Temperature stabilization	Heatsinks with optional water circulation input

Multi-LASER

The Multi-LASER is a light source for frequency-domain fluorescence lifetime imaging microscopy. The Multi-LASER contains up to 6 laser diodes with different wavelengths.



Peak wavelengths (nm)	375 (BFP), 405 (CFP), 445 (cerulean, GFP), 488 (GFP), 515 (YFP, Venus), 647 (CY5), others upon request
Modulation frequency	Up to 180 MHz
Modulation depth	250:1 (standard) or 2500000:1 (extreme)
Number of LEDs	3 (standard) to 6 (maximum) all combined into one optical fiber output
Coupling	KineFLEX system, with a single-mode polarization maintaining fiber and either FC-APC, FC-PC or FC-P8 output connector
Power stability	Standard: 2%*, Extreme: 0.5%*
Dimensions (l x w x h)	19" rack housing. MultiLASER-3: 480 x 484 x 88 mm; MultiLASER-4 and 6: 610 x 484 x 132 mm
Input signal	Digital: 0 - 1 V 50 Ω

* Measured using stable fluorescent material with single lifetime component of 3.2 ns