



NEW

# Lock-in Amplifier

The A-P-E Lock-in Amplifier (LIA) is a dedicated detector - amplifier combination and was designed specifically for applications that require a very short integration time, yet high sensitivity, such as in Stimulated Raman Scattering (SRS) Microscopy. This combination makes it an ideal tool for video rate imaging applications. It has successfully been used with the *picoEmerald™* S to demonstrate low noise video rate SRS.

The integration time of the amplifier can be set to five distinct values between 100 ns and 20  $\mu$ s.

The integrated silicon-based photodiode has a spectral response between 340 ... 1100 nm making the Lock-in Amplifier suitable for use with optical parametric oscillators as well as Ti:Sa lasers. The LIA has an integrated protection system that issues a warning when the applied power level is too high and could potentially damage the photodiode.

The LIA is controlled via computer through a RS-232 interface and the included Windows based Control Software allows to save settings for time constant, phase etc.; hence once the settings are optimized the amplifier can be setup for usage within seconds.

For applications that require a higher sensitivity, for example SRGOLD the LIA is available with a special 1064 nm enhanced detector.

- Highly sensitive amplifier in the VIS / NIR range
- Integration times down to below 100 ns
- Ideal tool for video rate imaging applications requiring high sensitivity, e.g. Stimulated Raman Scattering



## Specifications

Frequency	8 MHz ... 20 MHz
Amplification	- 4.5 dB ... 43.5 dB
Post Amplifier	12 dB
Time constants	100 ns; 300 ns; 2 µs; 10 µs; 20 µs
LIA-synch signal	100 mV ... 1 V @ 50 Ω
Phase	0 ... 337.5° in steps of 22.5°
Photodiode	Silicon photodiode; 10 x 10 mm active area 340 ... 1100 nm spectral response
Peak sensitivity	960 nm
Maximum laser power	50 mW @ 800 nm (unfocused)
Maximum output level	±1.2 V
Output offset setting	-150 mV ... 150 mV; setting accuracy 1mV

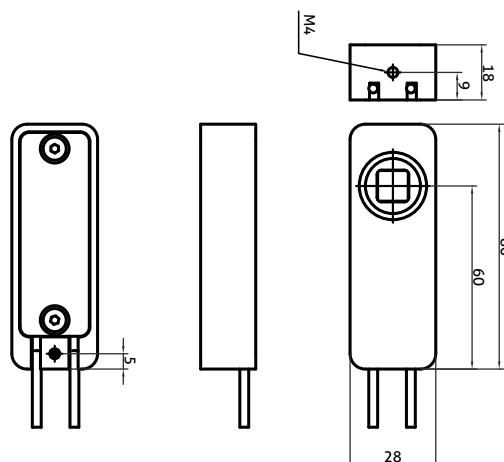
Typical amplification	< 500 mV/µW
Typical sensitivity for shot noise limited laser @ 50 mW / 800 nm	$\Delta I/I = 5 \times 10^{-6}$ for 100 ns integration time $\Delta I/I = 5 \times 10^{-7}$ for 20 µs integration time

## Versions

Version for 1064 nm sensitive enhanced detector available

## Dimensions (in mm)

Amplifier:	105 x 35 x 135 (W x H x D)
Photodiode:	see below



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A-P-E follows a policy of continued product improvement.  
Therefore, specifications are subject to change without notice.  
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