

## TL-1000

timing stabilization unit



### Timing stabilization unit TL-1000

GIGAOPTICS offers the timing stabilization unit TL-1000 as integral accessory to the GIGAJET high-speed femtosecond oscillator series. TL-1000 allows to tightly phase-lock the oscillator repetition rate to an external reference, i.e., a synthesizer or another modelocked laser, with a residual timing jitter below 100 fs. The optional ASOPS feature enables a repetition rate offset-lock between two 1 GHz femtosecond oscillators (e.g. contained in a GIGAJET TWIN) at a repetition rate difference between 2 kHz and 20 kHz.

### Applications

Repetition rate stabilization is essential for applications requiring a well-defined timing relation between a femtosecond oscillator and a reference signal. Such applications are, e.g., two-color pump-probe spectroscopy using two synchronized modelocked lasers, or optical experiments synchronized to a pulsed electron source. A recently developed technique requiring two femtosecond oscillators with a stabilized repetition rate offset is high-speed asynchronous optical sampling (ASOPS). It permits ultrafast time-domain spectroscopy without moving mechanical parts (e.g. motorized delay stages) at data acquisition rates that are otherwise impossible.

TL-1000 is specifically designed to serve these applications. Repetition rate fluctuations of a free-running oscillator are sup-

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pressed to a few mHz with a residual timing jitter of below 100 fs in a frequency range from 0.1 Hz to 100 kHz. The ASOPS option permits high-speed ASOPS based ultrafast time-domain spectroscopy using two 1 GHz femtosecond oscillators with better than 60 fs time-delay resolution.

### System components

#### Standard TL-1000

- Photoreceiver for repetition rate pickup
- Error signal generation unit
- Adjustable loop-amplifier with fast and slow control output
- High-voltage amplifier, single-channel
- Two piezo-backed, light-weight cavity mirrors (typ. 1/4" Ø, 4 mm thickness) in customer's GIGAJET series femtosecond oscillator

#### ASOPS option

- Additional photoreceiver for repetition rate pickup
- High-voltage amplifier, dual-channel
- TTL trigger signal generation at repetition rate offset



TL-1000-ASOPS control unit.

### Technical specifications/system requirements

(subject to changes without notice)

repetition rate range	0.5 to 1.5 GHz (define upon order)
timing jitter	$\leq 100$ fs (0.1 Hz to 100 kHz) <sup>*1,*2</sup>
power requirement	110/220 VAC (60/50 Hz)

#### ASOPS option

repetition rate offset	2 to 20 kHz
time resolution in high-speed ASOPS experiment	<60 fs
trigger signal	TTL level at offset frequency $\leq 10$ ns rise time

<sup>\*1</sup> relative to customer provided reference signal at +7 dBm, 50 Ohm with <-125 dBc/Hz phase-noise above 10 kHz offset from carrier

<sup>\*2</sup> if used with a femtosecond oscillator of the GIGAJET series and suitable built-in piezo-backed cavity mirror(s)

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