



TOPOL. Femtosecond Optical Parametric Oscillator

- Down to 150 fs pulse duration
- Possible wavelengths from 715 to 4200 nm
- Up to 1200 mW average output power
- Signal and idler dual output
- Broad fully-automated tuning range without optics exchange
- Optimized for the TEMA-150 Yb-doped pump laser from our company



Optical head of TOPOL-1050-D model

Product overview

The TOPOL series of automated femtosecond optical parametric oscillators (OPOs) offers the widest wavelength tuning range among the entire product line of our company. The TOPOL series includes three models (1050-C, 1050-D and 1050-E), each providing simple and reliable management of the system parameters with the help of an advanced control software and, if combined, covering the spectral range of 715-4200 nm.

Depending on the model, a TOPOL OPO can be pumped by either the fundamental (1050-D, 1050-E) or the second harmonic (1050-C) of a mode-locked femtosecond laser with the central wavelength of 1030-1060 nm and the pulse repetition rate of about 80 MHz. By default, all TOPOL OPOs are optimized for use with the TEMA-150 femtosecond ytterbium laser system, which allows achieving high average output power of about 1 W or even more at any wavelength within the three different tuning ranges spanning across the NIR and MIR spectral regions.

The main difference between the 1050-C, 1050-D and 1050-E is the wavelength tuning range specific to each model (refer to the Specifications chart for detailed information). All three OPOs provide two separate, simultaneously functioning outputs: the signal wave output and the idler wave output. Optional outputs are also available for exhausted pump radiation (@ 1030 - 1060 nm), as well as its second harmonic (@ 515 - 530 nm), which can be used simultaneously with the main outputs.

The 1050-C model features a built-in second harmonic generator module for pump radiation as well as a thermo-stabilized bread-board, which not only provides outstanding long-term stability of the output power, characteristic to 1050-D and 1050-E models, but also ensures high pump beam conversion efficiency over extended periods of time.

Each TOPOL series OPO system includes a built-in microcontroller unit and an integrated spectrometer bundled together with a specially designed TOPOL Control Software ('TCS') for Windows, allowing the single-click approach to wavelength tuning of the OPO. Besides providing the wavelength tuning functionality, TOPOL Control Software allows to:

- display the wavelength of the signal wave output measured by the built-in spectrometer in real time;
- measure and display the real-time output power of the OPO;
- save signal wave spectrum to a file.

The TOPOL OPO grants its user convenient control over the parameters of the output radiation, providing high stability and repeatability of these parameters at the same time. Thanks to the robust design and high degree of automation, the TOPOL OPO allows the user to focus on the primary research task by minimizing the need for maintenance and manual adjustment of the OPO system itself.

Possible applications of the TOPOL series parametric oscillators :

- Multiphoton Microscopy (TPE)
- Three-photon imaging (3-photon)
- SHG/THG (second/third harmonic generation) microscopy
- Time-Resolved Ultrafast Studies
- Optical Coherence Tomography
- Fluorescence Upconversion Spectroscopy
- Fluorescence Spectroscopy of Biological Markers
- Raman Spectroscopy
- Pump-Probe Spectroscopy
- 2D IR Spectroscopy
- Conversion of Laser Radiation
- Parametric Generation
- Laser Systems Design, Integration and Amplification
- Seed Oscillator for Ultrafast Amplifiers
- Telecom and Semiconductor Studies
- Semiconductor Device Characterization
- Telecommunication Components Characterization
- Optical Switching
- Optical High-Speed Sampling
- Semiconductor Material Studies



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	TOPOL-1050-C	TOPOL-1050-D	TOPOL-1050-E
Optical parametric oscillator specifications			
Wavelength tuning range (fully automated USB tuning)	715-1115 nm (signal) 1000-1900 nm (idler*, optional)	1700-2000 nm (signal) 2200-2740 nm (idler)	1400-1700 nm (signal) 2750-4200 nm (idler)
Average output optical power	signal >70 mW @ 715 nm >170 mW @ 720 nm >440 mW @ 740 nm >900 mW @ 780 nm >1050 mW @ 800 nm >1210 mW @ 860 nm >1170 mW @ 900 nm >990 mW @ 950 nm >680 mW @ 1000 nm >340 mW @ 1050 nm >220 mW @ 1100 nm >60 mW @ 1115 nm idler (*optional) >380 mW @ 1000 nm >500 mW @ 1050 nm >740 mW @ 1100 nm >850 mW @ 1150 nm >800 mW @ 1250 nm >630 mW @ 1400 nm >410 mW @ 1600 nm >170 mW @ 1800 nm >100 mW @ 1900 nm	signal >400 mW @ 1700 nm >800 mW @ 1800 nm >550 mW @ 1900 nm >700 mW @ 2000 nm idler >300 mW @ 2200 nm >500 mW @ 2300 nm >400 mW @ 2400 nm >400 mW @ 2500 nm >300 mW @ 2700 nm	signal >400 mW @ 1400 nm >500 mW @ 1410 nm >800 mW @ 1500 nm >500 mW @ 1600 nm >500 mW @ 1700 nm idler >100 mW @ 2750-4200 nm
Pulse duration (FWHM)	<150 fs (signal) <150 fs (idler, optional)	<180 fs (signal) <150 fs (idler)	<200 fs (signal) <250 fs (idler)
Physical specifications			
Dimensions (LxWxH)	950x400x150 mm	500x250x120 mm	
Pump laser requirements			
Central wavelength	1030...1060 nm		
Average power	7...8 W	3 W	
Pulse duration	100...200 fs		
Pulse repetition rate	80+/-1 MHz (fixed, 50...100 MHz upon request)		
Recommended pump laser	TEMA-150		
Power supply, control and cooling specifications			
Power supply	single-phase; 100-240 V, 50/60 Hz, 1 A max		
Control	USB interface, Windows PC software included		
Cooling system	closed-loop stabilized water chiller is supplied with the unit; (a single chiller unit is used when supplying bundled TEMA pump laser and the TOPOL system)		
*- please note that beam direction is shifted in horizontal plane during idler wavelength tuning.			

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TOPOL tuning curves

