



TOPOL. Femtosecond Optical Parametric Oscillator

- Possible wavelengths from 230 to 4750 nm
- Up to 2 W typical average output power
- Down to 130 fs typical pulse duration
- Up to 4 simultaneous synchronized outputs
- Broad fully-automated tuning range
- Integrated Yb-doped fs pump laser



The TOPOL-1050-C-HP laser system

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 650...4750 nm, with optional external SHG and THG add-ons extending the range down to 230 nm and DFG modules for beyond 5 μm coverage.

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 series femtosecond ytterbium laser system, which allows achieving high average output power of about 2 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 depleted pump radiation (λ 1030 - 1060 nm), as well as its second harmonic (λ 515 - 530 nm), which can be used simultaneously with the main outputs. High-power switchable outputs of full pump radiation are also available in certain models.

The TOPOL-1050-C model features a built-in second harmonic generator module for pump radiation as well as a thermo-stabilized breadboard, 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.

The TOPOL series OPO system includes a built-in microcontroller unit and an integrated spectrometer (-C model only) 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, the TOPOL Control Software allows to:

- display the spectrum and CWL of the signal wave output measured by the built-in spectrometer in real time and save it's spectrum to a file (-C model only), or display the calculated wavelengths based on factory calibration (-D and -E models);
- measure and display the real-time output power of the OPO;
- control optional signal and/or idler SHG extensions with the same software.

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
- 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
- Semiconductor Device Characterization
- Telecommunication Components Characterization
- Optical Switching
- Optical High-Speed Sampling
- Semiconductor Material Studies



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LASERS AND OPTICAL SYSTEMS

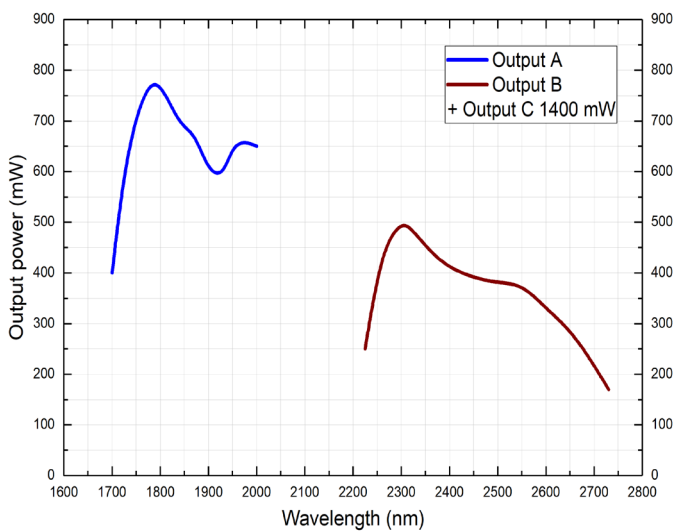
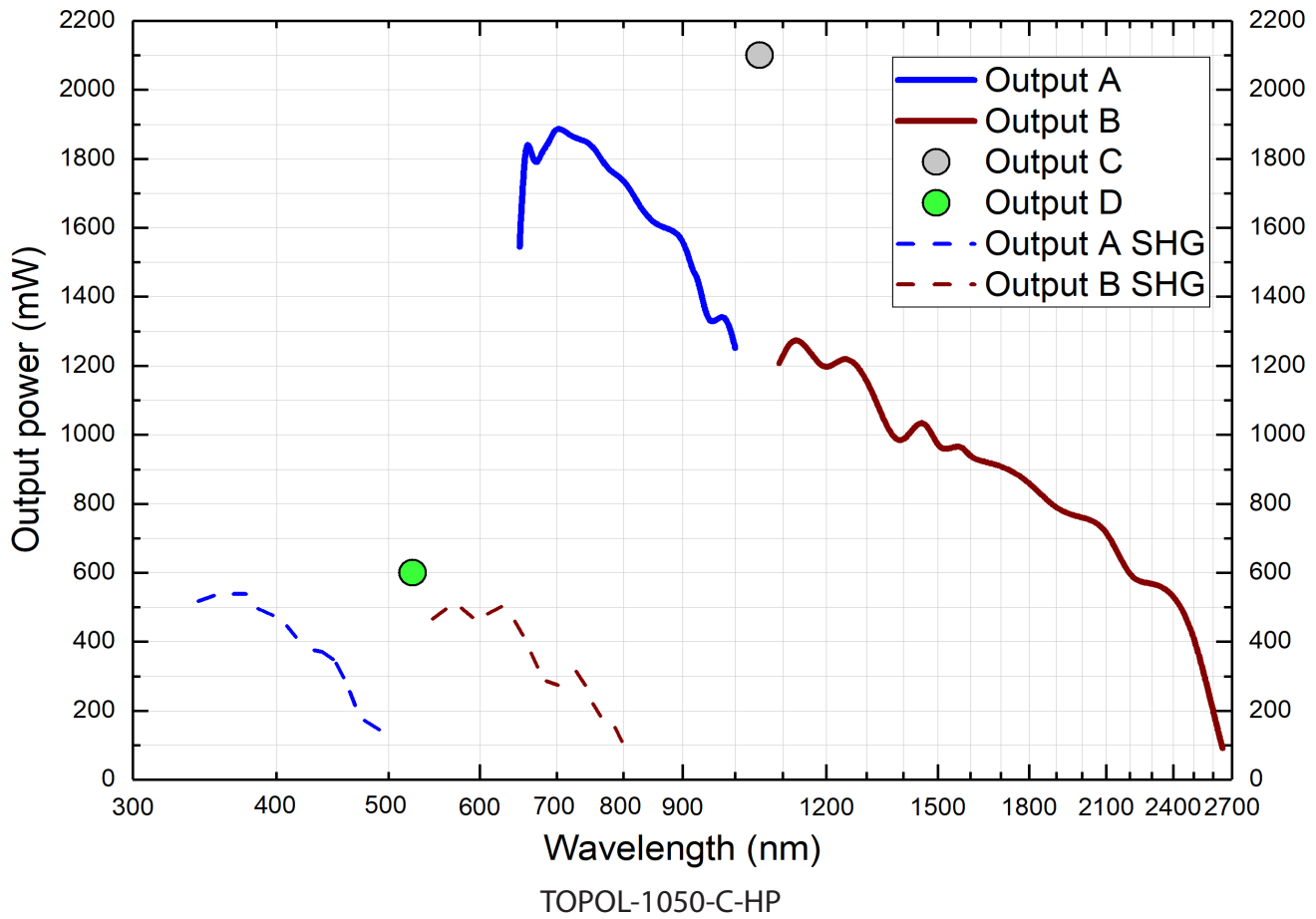


Avesta Project Ltd.,
11 Fizicheskaya Street
Troitsk, 108840, Moscow, Russia
Tel.: +7 (495) 241-00-92

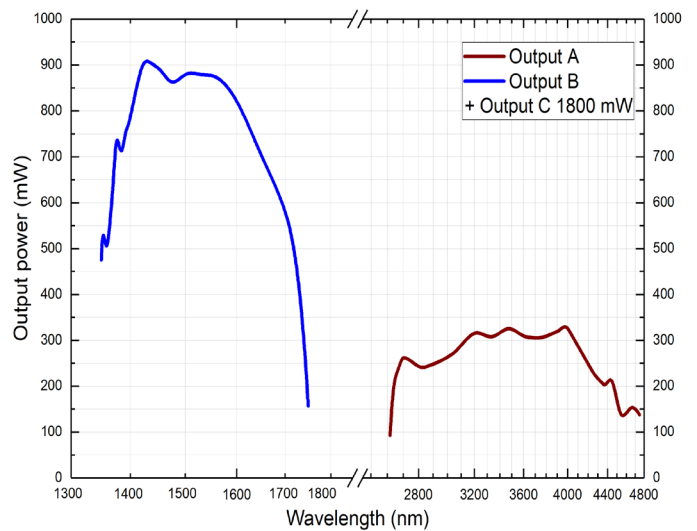
fs@avesta.ru
www.avesta.ru

	TOPOL-1050-C-HP	TOPOL-1050-D	TOPOL-1050-E
Optical parametric oscillator specifications			
Wavelength range (fully automated USB tuning for signal and idler)	522±2 nm (pump SHG, fixed) 650-1000 nm (signal, tunable) 1044±5 nm (pump, fixed) 1100-2650 nm (idler, tunable)	1052±5 (pump, fixed) 1700-2000 nm (signal, tunable) 2250-2750 nm (idler, tunable)	1052±5 (pump, fixed) 1350-1750 nm (signal, tunable) 2650-4750 nm (idler, tunable)
Total number of outputs	6 (4 simultaneous)	4 (3 simultaneous)	4 (3 simultaneous)
Average output optical power (simultaneous outputs unless noted otherwise)	signal: >1.9 W at peak idler: >1.2 W at peak 1044±5 nm (fixed)*: >2 W (>12 W switchable) 522±2 nm (fixed): >600 mW (>7 W switchable)	signal: >750 mW at peak idler: >400 mW at peak 1052±5 nm (fixed)*: >1.4 W (>4.5 W switchable)	signal: >800 mW at peak idler: >300 mW at peak 1052±5 nm (fixed)*: >1.4 W (>4.5 W switchable)
Pulse duration** (FWHM)	130...200 fs	<250 fs	140...230 fs
Dispersion pre-compensation**	-30 000 fs ² at 700 nm -5 000 fs ² at 1000 nm	enquire	enquire
Harmonic modules (optional)	THS1: 230-276 nm THS2: 276-325 nm SHS: 340-500 nm SHI: 550-800 nm	enquire	enquire
Pulse repetition rate	80±5 MHz (fixed)		
Spatial mode and M2	TEM ₀₀ , <1.2		
Beam size (at 1/e²)	2.5±0.5 mm; idler 3...6 mm**		
Ellipticity and astigmatism	0.8-1.2; <25%		
Output power long-term stability	<1% rms		
Dimensions (WxLxH, laser head includes integrated pump laser and control electronics)			
Laser head	927x530x176 mm	962x482x152 mm	
Closed-loop stabilized water-to-air chiller unit	443x484x176 mm (19" 4U)		
Power supply and control unit specifications			
Power supply	single-phase; 100-240 V, 50/60 Hz, <1.5 kW		
Control	USB/Ethernet interface, integrated 650-1000 nm spectrometer (TOPOL-1050-C-HP only); Windows PC software is included; a PC is required (not included)		
* - may be used to pump an additional TOPOL-1050-D or TOPOL-1050-E system, please contact us for details.			
** - depends on exact output wavelength.			

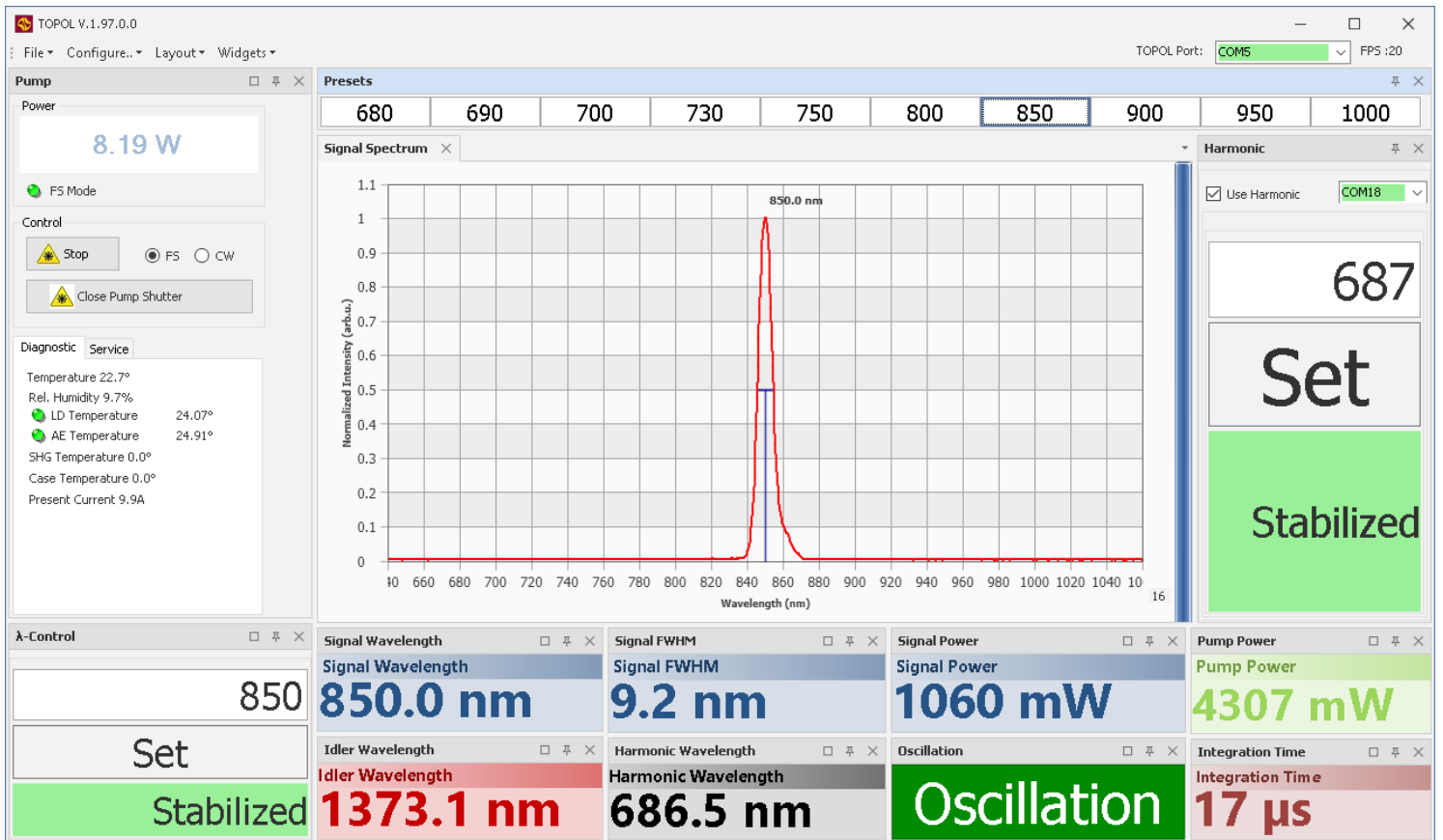
Note: exact tuning profile may vary depending on a system configuration and may typically exceed the given values; please obtain a quotation or offer from us for firmly quoted values



TOPOL-1050-D



TOPOL-1050-E



TOPOL control software screen-shot

(The TOPOL-1050-C and an external idler SHG unit (optional) are controlled by the same software)