

# I-OPA

## Industrial-grade Optical Parametric Amplifier



### FEATURES

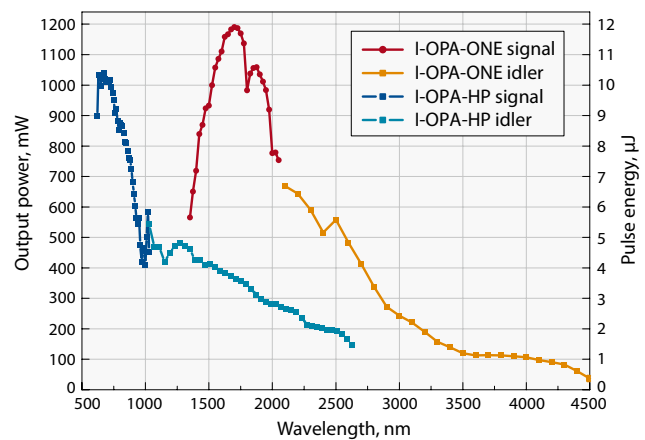
- Automatically tunable or fixed wavelength options
- Robust, integrated mechanical design
- Plug and play installation
- User friendly operation
- Up to 2 MHz repetition rate, down to single shot operation
- Up to 40 W pump power
- Short pulse duration option (< 100 fs)
- Integrated tunable beam splitter for pump laser beam



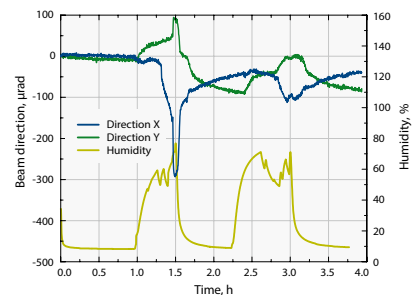
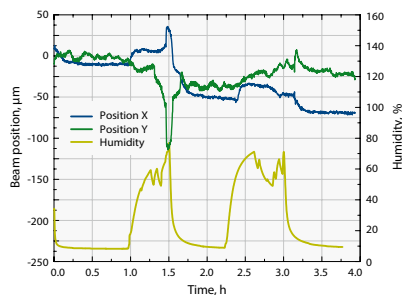
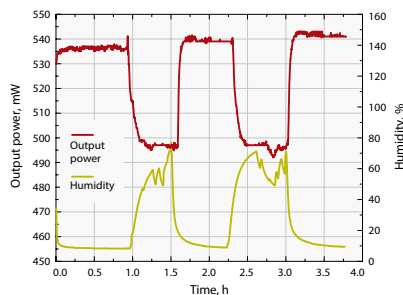
Tunable I-OPA-TW module attached to air-cooled CARBIDE-CB5

I-OPA series of optical parametric amplifiers marks a new era of simplicity in the world of tunable wavelength femtosecond light sources. Based on 10 years of experience producing the ORPHEUS series of optical parametric amplifiers, this solution brings together the flexibility of tunable wavelength with robust industrial-grade design. The original I-OPA is a rugged module attached to our PHAROS laser, providing long term stability comparable to that of the industrial harmonics modules. The new and improved tunable version is designed to be coupled with our PHAROS and CARBIDE series femtosecond lasers and primarily intended to be used with spectroscopy or microscopy applications that demand high stability. The -HP model is targeted to be coupled with our HARPIA series as a pump beam source for ultrafast pump-probe spectroscopy. The -F model is primarily designed to be used as a light source in multiphoton microscopy devices. The -ONE model will be useful in the field of mid-IR spectroscopy, as well as other applications where higher pulse energy is required in the infrared part of the spectrum. All of these models can be used for micromachining and other

industrial applications; the tunable version suited to be the ideal R&D system, while the fixed wavelength I-OPA would be the cost-effective solution for large scale production.



Typical I-OPA module energy conversion curves.  
Pump: PHAROS-10W, 100 µJ, 100 kHz



Fixed wavelength I-OPA-FW beam pointing and output power measurements under harsh environment conditions (humidity and temperature cycling)

## SPECIFICATIONS OF TUNABLE I-OPA

| Model                                            | I-OPA-TW-HP                                                                  | I-OPA-TW-F                                                                                              | I-OPA-TW-ONE                               |
|--------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Based on ORPHEUS model                           | ORPHEUS                                                                      | ORPHEUS-F                                                                                               | ORPHEUS-ONE                                |
| Pump power                                       | Up to 40 W                                                                   |                                                                                                         |                                            |
| Pump pulse energy                                | 10 – 400 $\mu$ J                                                             |                                                                                                         | 20 – 400 $\mu$ J                           |
| Pulse repetition rate                            | Up to 2 MHz                                                                  |                                                                                                         |                                            |
| Tuning range, signal                             | 640 – 1010 nm                                                                | 650 – 900 nm                                                                                            | 1350 – 2060 nm                             |
| Tuning range, idler                              | 1050 – 2600 nm                                                               | 1200 – 2500 nm                                                                                          | 2060 – 4500 nm                             |
| Conversion efficiency at peak, signal wavelength | > 7 % @ 700 nm                                                               |                                                                                                         | > 9 % @ 1550 nm                            |
| Additional options                               | n/a                                                                          | SCMP: Signal pulse compressor<br>ICMP: Idler pulse compressor<br>PCMP: pre-chirp dispersion compensator | n/a                                        |
| Pulse bandwidth <sup>1)</sup>                    | 80 – 220 $\text{cm}^{-1}$ @ 700 – 960 nm                                     | 200 – 750 $\text{cm}^{-1}$ @ 650 – 900 nm<br>150 – 500 $\text{cm}^{-1}$ @ 1200 – 2000 nm                | 60 – 150 $\text{cm}^{-1}$ @ 1450 – 2000 nm |
| Pulse duration <sup>2)</sup>                     | 120 – 250 fs                                                                 | < 55 fs @ 800 – 900 nm<br>< 70 fs @ 650 – 800 nm<br>< 100 fs @ 1200 – 2000 nm                           | 100 – 300 fs                               |
| Wavelength extension options                     | SHS: 320 – 505 nm<br>SHI: 525 – 640 nm<br>Conversion efficiency 1.2% at peak | Contact<br>sales@lightcon.com                                                                           | DFG: 4500 – 10000 nm <sup>3)</sup>         |
| Applications                                     | Micro-machining<br>Microscopy<br>Spectroscopy                                | Nonlinear microscopy<br>Ultrafast spectroscopy                                                          | Mid-IR spectroscopy<br>AFM microscopy      |

<sup>1)</sup> I-OPA-F outputs broad bandwidth pulses which are compressed externally.

<sup>2)</sup> Output pulse duration depends on wavelength and pump laser pulse duration.  
I-OPA-F requires pulse compressors to achieve short pulse duration.

<sup>3)</sup> Up to 16  $\mu$ m tuning range is accessible with external Difference Frequency Generator.

