

# ORPHEUS

## Collinear Optical Parametric Amplifier

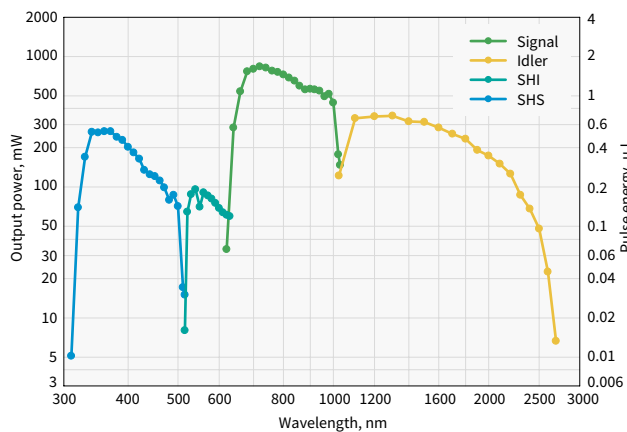
### FEATURES

- 190 – 16000 nm tuning range
- Single-shot – 2 MHz repetition rate
- Up to 80 W pump power
- Up to 2 mJ pump pulse energy
- Completely automated

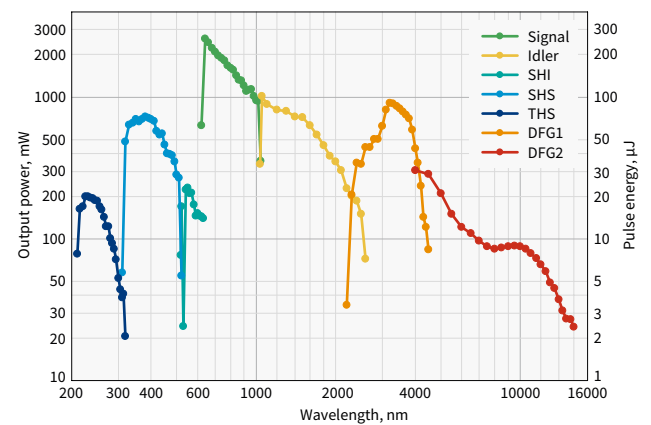


ORPHEUS is a collinear optical parametric amplifier (OPA). Coupled with a PHAROS or CARBIDE femtosecond laser, ORPHEUS emits femtosecond pulses tunable from ultraviolet (UV) to mid-infrared (MIR) at a repetition rate of up to 2 MHz. Thus, it is an invaluable tool for ultrafast spectroscopy, nonlinear microscopy, and microstructuring applications. The ORPHEUS collinear OPA comes in three different configurations to perfectly match the customer needs. The basic ORPHEUS configuration is a cost-effective choice providing a wide and gapless tuning range from 630 to 2600 nm, which is extendable down to 210 nm with an external harmonic generator. If higher pump power and a

higher-level of automation are desired, the ORPHEUS-HP configuration is your choice. It offers complete automation and integrates all of the wavelength extension options into a single thermally-stabilized housing. Its wavelength tuning is completely hands-free and uses automated wavelength separation to ensure the same position and direction for the 190 – 2600 nm output. The spectral range is extendable up to 16  $\mu\text{m}$ ; thus, covering the entire spectrum from UV to MIR. Similar to ORPHEUS-HP, the ORPHEUS-HE configuration brings the aforementioned automation but also accepts high pump pulse energy.



Typical tuning curves of **ORPHEUS**.  
Pump: 8 W, 16  $\mu\text{J}$ , 500 kHz



Typical tuning curves of **ORPHEUS-HE**.  
Pump: 20 W, 2 mJ, 10 kHz

For custom tuning curves visit <http://toolbox.lightcon.com/tools/tuningcurves/>

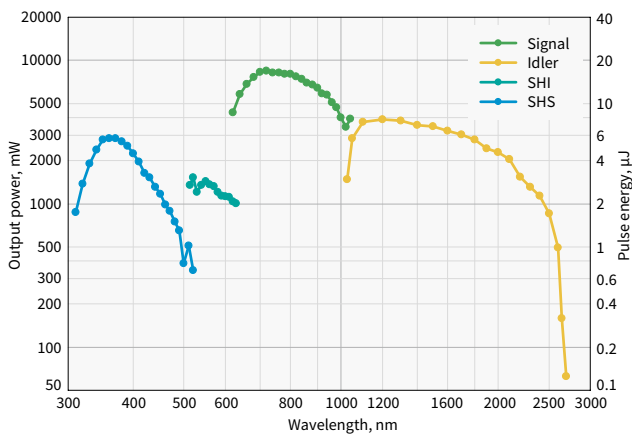
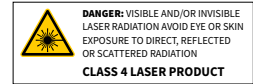
# SPECIFICATIONS

Model	ORPHEUS		ORPHEUS-HP		ORPHEUS-HE
<b>MAIN OUTPUT (630 – 2600 nm)</b>					
Tuning range	630 – 1030 nm (Signal) 1030 – 2600 nm (Idler)				
Maximum pump power	8 W		80 W		
Pump pulse energy	8 – 20 μJ	20 – 400 μJ	8 – 20 μJ	20 – 400 μJ	400 – 2000 μJ <sup>1)</sup>
Conversion efficiency at peak	> 6% (Signal and Idler combined)	> 12% (Signal and Idler combined)	> 4.5% (Signal) > 2% (Idler)	> 9% (Signal) > 4% (Idler)	
Integrated 2H (515 nm) generation efficiency	> 35% <sup>2)</sup>		not specified		
Pulse duration	120 – 250 fs				
Spectral bandwidth @ 700 – 960 nm	75 – 220 cm <sup>-1</sup>				
Long-term power stability, 8 h <sup>3)</sup>	< 2% @ 800 nm				
Pulse-to-pulse energy stability, 1 min <sup>3)</sup>	< 2% @ 800 nm				

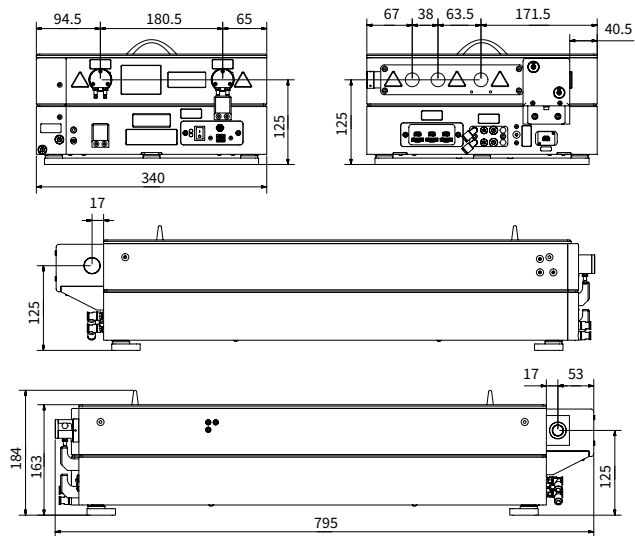
## WAVELENGTH EXTENSIONS (190 – 16000 nm)

Pump pulse energy	8 – 20 μJ	20 – 400 μJ	8 – 20 μJ	20 – 400 μJ	400 – 2000 μJ <sup>1)</sup>
SH package at peak 315 – 515 nm (SHS) 515 – 630 nm (SHI)	> 1.2%	> 3%	> 1.2%	> 2.4%	
210 – 315 nm (THS)	n/a		> 0.4% <sup>4)</sup>	> 0.8% <sup>4)</sup>	
FH package at peak 210 – 258 nm (FHS) 258 – 315 nm (FHI)	Contact sales@lightcon.com		n/a		
190 – 215 nm (DUV)	n/a		> 0.3% <sup>5)</sup>	Contact sales@lightcon.com	
2200 – 4200 nm (DFG1)	Contact sales@lightcon.com		> 1.5% @ 3000 nm	> 3% @ 3000 nm	
4000 – 16 000 nm (DFG2)	Contact sales@lightcon.com		> 0.1% @ 10000 nm	> 0.2% @ 10000 nm	

<sup>1)</sup> Pump energy of up to 5 mJ available; contact sales@lightcon.com for details.  
<sup>2)</sup> At designated output port B; not simultaneous to OPA output.  
<sup>3)</sup> Expressed as NRMSD (normalized root mean squared deviation).  
<sup>4)</sup> Maximum output power of 400 mW.  
<sup>5)</sup> For pump power of < 10 W. Maximum output power of 40 mW @ 200 nm.



Typical tuning curves of **ORPHEUS-HP**.  
 Pump: 80 W, 160 μJ, 500 kHz



ORPHEUS-HP drawings