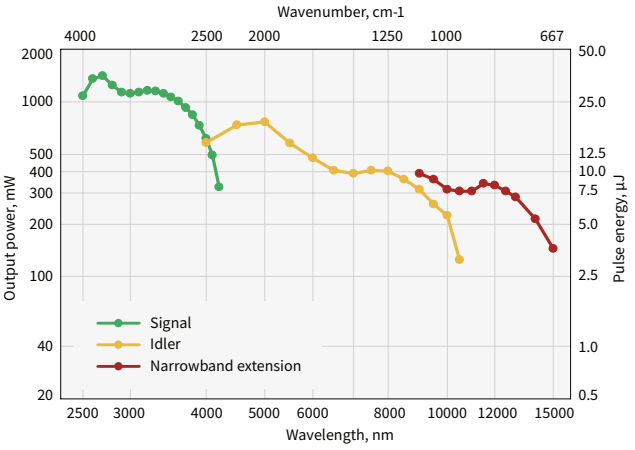
ORPHEUS | MIR

Broad-Bandwidth Mid-Infrared Optical Parametric Amplifier

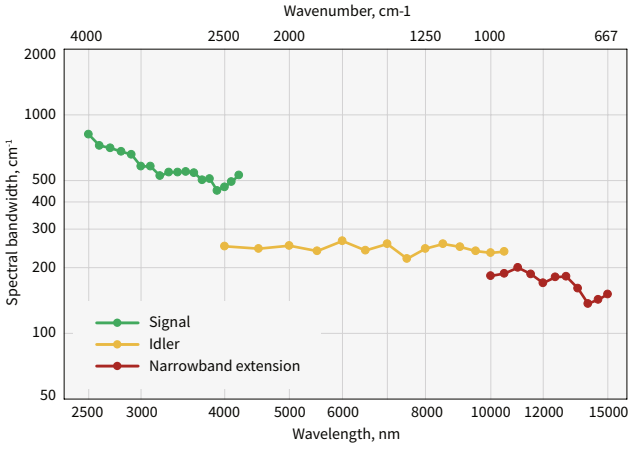
FEATURES

- Broad-bandwidth MIR pulses at high repetition rate
- Continuously tunable in 2500 – 15000 nm range
- Short-pulse high-energy auxiliary output at 2000 nm
- Pumped by industrial-grade lasers for high stability
- CEP-stable option

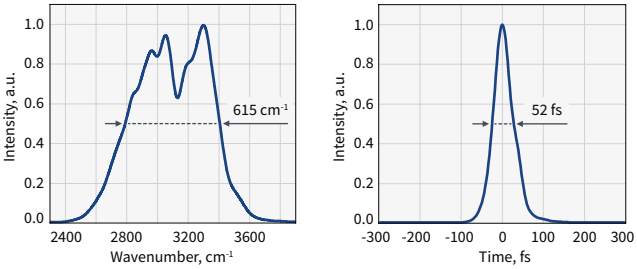
ORPHEUS-MIR is an optical parametric amplifier (OPA) optimized for the efficient generation of broad-bandwidth MIR pulses. The laser system provides ultrashort pulses in the tuning range of 2.5 – 10 µm and reaches up to 15 µm with a narrow-bandwidth extension. Due to the novel system design, ORPHEUS-MIR provides < 100 fs pulses directly at the output. Signal and Idler outputs are available simultaneously. The system architecture is well-suited for high-energy and high-power PHAROS and CARBIDE femtosecond pump lasers. ORPHEUS-MIR serves as an excellent high-repetition-rate source for spectroscopy, such as two-dimensional infrared (2D IR) and vibrational sum-frequency generation (SFG) spectroscopy. Combined with a narrow-bandwidth output of SHBC, it forms a compact laser system for SFG measurements, covering most of the MIR spectrum in a single shot and providing high spectral resolution. In addition, its high output stability is the key to fast and high-quality SFG imaging. Furthermore, for MIR applications requiring CEP-stable pulses, ORPHEUS-MIR provides unique CEP-stable option in the complete 2500 – 15000 nm range.



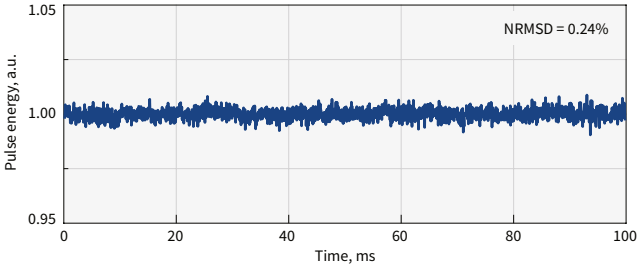
Typical tuning curves of **ORPHEUS-MIR**.
Pump: 80 W, 2 mJ, 40 kHz



Typical spectral bandwidth of **ORPHEUS-MIR**



Typical output spectrum (left) and pulse duration (right).
Measured at ≈ 3000 nm



Pulse-to-pulse energy stability of **ORPHEUS-MIR**.
Measured at ≈ 3000 nm

LIGHT CONVERSION

REV. 230821

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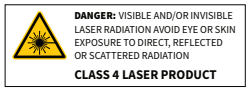
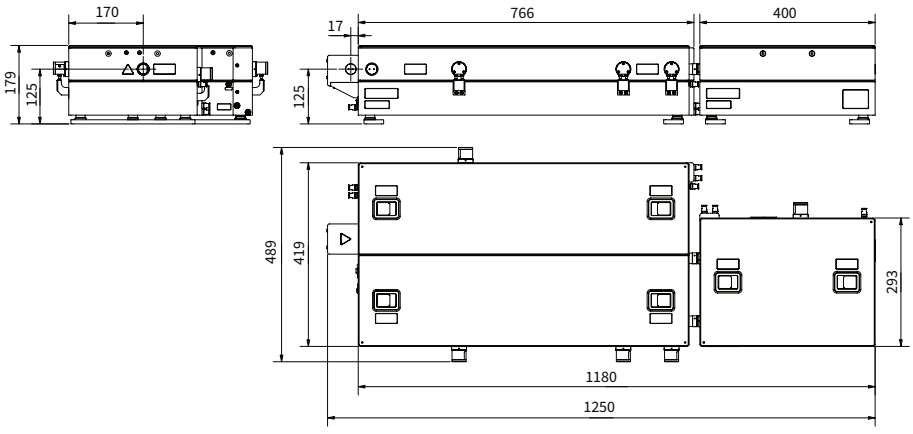
SPECIFICATIONS

Model	ORPHEUS-MIR	
MAIN OUTPUT (2 500 – 10 000 nm)		
Mode of operation	Standard / non-collinear	Collinear [1]
Tuning range	2 500 – 4 000 nm (Signal) 4 000 – 10 000 nm (Idler)	2 500 – 4 500 nm (Signal) 4 500 – 10 000 nm (Idler)
Maximum pump power	80 W	
Pump pulse energy	200 µJ – 3 mJ	
Pulse duration	< 100 fs	< 400 fs (< 100 fs with dispersion compensation) [1]
Conversion efficiency [2]	> 1.2% @ 3 000 nm > 1.0% @ 3 500 nm > 0.6% @ 5 000 nm > 0.3% @ 9 000 nm	
Spectral bandwidth [3]	> 300 cm^{-1} @ 2 500 – 4 000 nm > 200 cm^{-1} @ 4 000 – 10 000 nm	
Long-term power stability, 8 h [4]	< 2% @ 5 000 nm	
Pulse-to-pulse energy stability, 1 min [4]	< 2% @ 5 000 nm	
AUXILIARY OUTPUT 1 (2 000 nm)		
Output wavelength [5]	2000 ± 100 nm	
Pulse duration	< 50 fs	
Conversion efficiency [2]	> 8%	
Spectral bandwidth	> 350 cm^{-1}	
AUXILIARY OUTPUT 2 (1350 – 2 000 nm)		
Tuning range [6]	1 350 – 2 000 nm	
Pulse duration	< 300 fs	
Conversion efficiency [2]	Contact sales@lightcon.com	
Spectral bandwidth	60 – 150 cm^{-1}	
WAVELENGTH EXTENSION (10 000 – 15 000 nm)		
Tuning range [7]	10 000 – 15 000 nm	n/a
Pulse duration	< 300 fs	
Conversion efficiency [2]	> 0.2% @ 12 000 nm	
Spectral bandwidth	100 – 200 cm^{-1}	

[1] *Collinear mode is achieved with additional external separator box. Dispersion compensation is optional.*
[2] *Specified as a percentage of pump power.*
[3] *FWHM (full width at half maximum).*
[4] *Expressed as NRMSD (normalized root mean squared deviation).*
[5] *Not tunable, optimized for best overall performance. Not simultaneous to OPA output.*
[6] *Simultaneous to OPA output. Available on request.*
[7] *Not available in collinear-output configuration.*



DRAWINGS



ORPHEUS-MIR drawings