ORPHEUS-MIR (Preliminary datasheet)

Ultrafast source for broadband mid-IR pulses

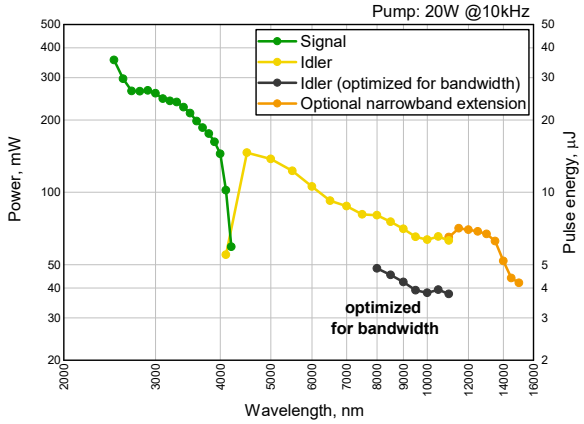
FEATURES

- Broad bandwidth 200 cm^{-1} – 500 cm^{-1}
- Broad tuning range 2500 nm – 11000 nm
- Short pulse duration <100 fs
- Up to 40 W pump power, up to 2 mJ pump energy
- Auxiliary broadband output at ~2000 nm
- Optional narrowband extension up to 15000 nm
- Optional CEP stability

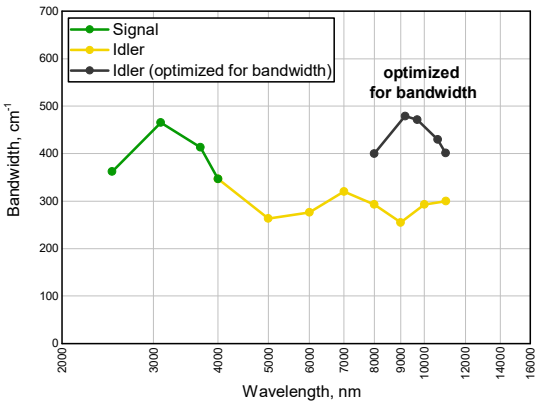
APPLICATIONS

- Broadband vibrational sum-frequency generation (SFG) spectroscopy
- Time- and angle-resolved photoemission spectroscopy (TR-ARPES)
- Two-dimensional infrared (2D IR) spectroscopy
- High-harmonic generation (HHG) in solids
- Other infrared spectroscopy and strong-field physics applications

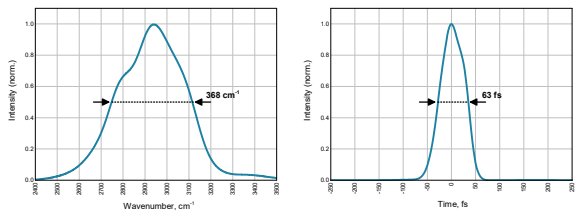
ORPHEUS-MIR is a versatile system optimized for the efficient generation of broadband mid-IR pulses. In general, it is a two-channel optical parametric amplifier (OPA), followed by a difference frequency generation (DFG) stage. The system provides broadband pulses in the tuning range of 2.5 – 11 µm, and up to 15 µm with optional narrowband extension. Signal and Idler outputs are available simultaneously, but they are a signal-idler pair; thus, their wavelengths are linked. The system architecture is well-suited for high energy and high power PHAROS and CARBIDE lasers.



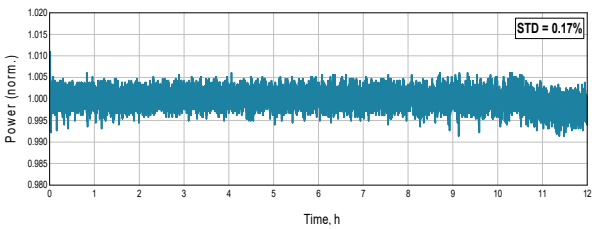
Typical tuning curve of **ORPHEUS-MIR.**
Pump: 20 W, 2 mJ, 10 kHz



Typical spectral bandwidth of **ORPHEUS-MIR**



Typical output spectrum (left) and pulse duration (right).
Measured at 3450 nm



Long-term power stability of **ORPHEUS-MIR**

SPECIFICATIONS

Model	**ORPHEUS-MIR**

MAIN OUTPUT (2500 – 11000 nm)

Mode of operation	Standard	Optimized for bandwidth**
Tuning range	2500 – 4000 nm (Signal) 4000 – 11000 nm (Idler)	
Maximum input power	40 W	
Input pulse energy	400 µJ – 2 mJ	
Pulse duration	<100 fs	
Pulse energy conversion efficiency*	>1.2% @ 3000 nm >1.0% @ 3500 nm >0.5% @ 6000 nm	
	>0.3% @ 9000 nm	>0.2% @ 9000 nm
Pulse bandwidth	>300 cm^{-1} @ 2500 – 4000 nm >200 cm^{-1} @ 4000 – 8000 nm	
	>200 cm^{-1} @ 8000 – 11000 nm	>350 cm^{-1} @ 8000 – 11000 nm
Long term power stability (8 h)	<2% @ 5000 nm	
Pulse energy stability (1 min)	<2% @ 5000 nm	

AUXILIARY OUTPUT 1 (~2000 nm)

Output wavelength	~2000 nm (not tunable, optimized for best overall performance)
Pulse duration	<50 fs
Pulse energy conversion efficiency*	>8%
Pulse bandwidth	>350 cm^{-1}

AUXILIARY OUTPUT 2 (1350 – 2000 nm)

Tuning range	1350 – 2000 nm
Pulse duration	<300 fs
Pulse energy conversion efficiency*	Contact sales@lightcon.com
Pulse bandwidth	60 – 150 cm^{-1}

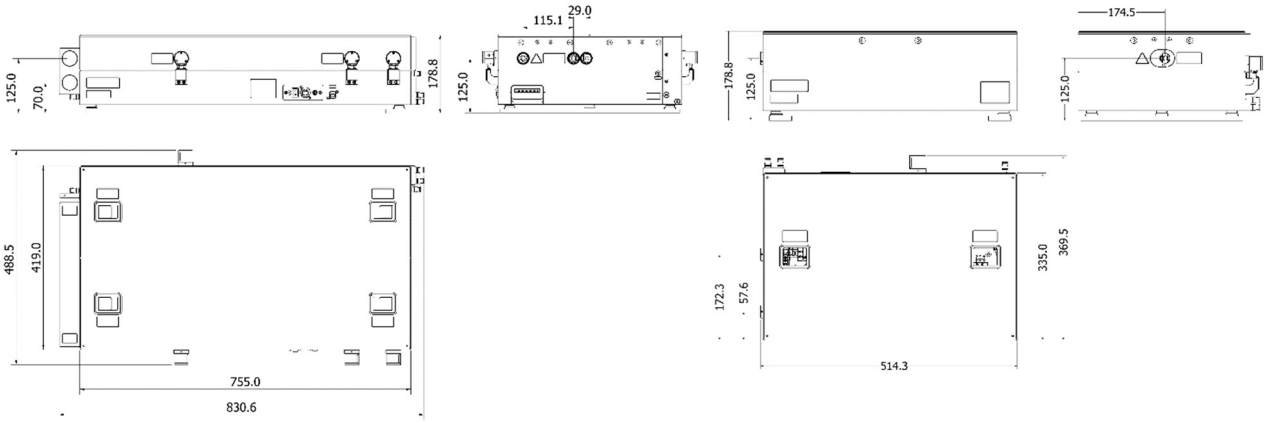
OPTIONAL WAVELENGTH EXTENSION (11000 – 15000 nm)

Tuning range	4000 – 15000 nm
Pulse duration	<300 fs
Pulse energy conversion efficiency*	>0.2% @ 10000 – 15000 nm
Pulse bandwidth	100 – 150 cm^{-1} @ 10000 – 15000 nm

*Specified as percentage of total input power into ORPHEUS-MIR.

**Optimized for maximum spectral bandwidth at expense of pulse energy conversion efficiency.

OUTLINE DRAWINGS



ORPHEUS-MIR, OPA module outline drawings

ORPHEUS-MIR, DFG module outline drawings