

# Mid-IR Comb

## Mid-Infrared Optical Frequency Comb

**MenloSystems**

### KEY SPECIFICATIONS

- Comb Spacing 100 MHz or 250 MHz
- Accuracy  $10^{-14}$  in 100 s
- Spectral Range 3.1-3.4  $\mu\text{m}$  and 6.5-7.8  $\mu\text{m}$
- High Output Power of up to 120 mW @ 3.1-3.4  $\mu\text{m}$
- Spectral Bandwidth of 200 nm

### APPLICATIONS

- Fourier-Transform Spectroscopy in the Mid-IR
- Spectroscopy in the "Fingerprint Region" of Molecular Science
- Chemical and Biomolecular Sensing of Molecules
- Fast and Precise Detection of Atmospheric Gases

### FEATURES

- Carrier-Envelope Offset Free Frequency Comb
- Femtosecond Laser Pulses in the Mid-Infrared
- Repetition Rate can be Phase Locked

### OPTIONS

- **EOM-PHASE Electro-Optic Phase Modulator**  
Intracavity EOM for high-performance phase locking to an optical reference



World-leading optical frequency comb technology is now available in the mid-infrared region. Taking advantage of Menlo Systems' proprietary figure 9<sup>®</sup> technology for its oscillator, the Mid-IR Comb is a robust and reliable optical synthesizer whose mode frequencies are completely defined by its repetition rate only, as the carrier envelope offset frequency vanishes in the difference frequency generation process. For different user applications, the system design gives access either to the wavelength range around 3.2  $\mu\text{m}$  or 7  $\mu\text{m}$ . The turn-key Mid-IR Comb is an enabling tool for high accuracy spectroscopy in these important fingerprint regions.

### PERFORMANCE DATA FOR 3.2 MICRON COMB

#### Center wavelength

3200 nm

#### Spectral width

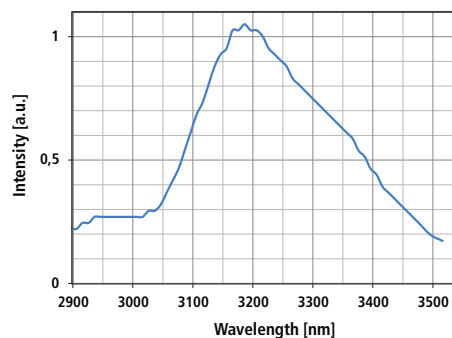
>200 nm

#### Repetition rate

250 MHz

#### Optical output power

120 mW



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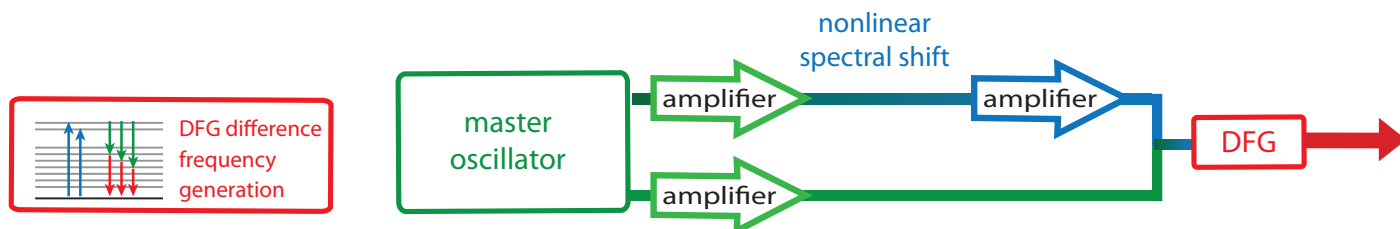
### SPECIFICATIONS

Comb Spacing	100 MHz or 250 MHz
Accuracy	$10^{-14}$ or same as reference, whichever applies first
Stability	$5 \cdot 10^{-13}$ in 1 s or same as reference, whichever applies first
Laser Output	freespace
Center Wavelength	3200 nm or 7000 nm
Spectral Range	>200 nm
Average Output Power	up to 120 mW

### REQUIREMENTS

Input Requirements	10 MHz frequency reference, power level +7 dBm
Operating Voltage	100/115/230 VAC
Frequency	50 to 60 Hz
Power Consumption	
Cooling Requirements	
Operating Temperature	$22 \pm 5$ °C
Optical Unit Dimensions/Weight	706 x 976 x 175 mm <sup>3</sup> / 105 kg
Control Electronics Dimensions/Weight	448 x 437 x 484 mm <sup>3</sup> / 50 kg

### OPTICAL SCHEME



Starting from a figure 9<sup>®</sup> erbium doped femtosecond oscillator, the signal is splitted in two different arms for 1560 nm and either 1040 nm or 2000 nm, both realized by a spectral shift in a highly nonlinear fiber. The radiations are amplified and combined in a difference frequency generation crystal to generate femtosecond pulses in the mid-IR spectral range around 3  $\mu$ m or 7  $\mu$ m with high output powers of up to 120 mW. The actual output wavelength can be adjusted by the temperature and the different poling periods of the periodically poled DFG crystal. For accurate measurements, the comb repetition rate can be easily stabilized and phase locked either on RF or optical references.

### ORDERING INFORMATION

Product Code	Mid-IR Comb
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Please call for pricing. Specifications are subject to change without notice. Custom modifications are available, please inquire.



Invisible laser radiation  
avoid exposure to beam  
Class 4 laser

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