

780 nm High Power Femtosecond Fiber Laser With Integrated AOM and Pre-chirp Compensation



Applications

- Multiphoton microscopy
- Optical metrology
- Materials characterization
- 3D-microprinting
- Nonlinear spectroscopy
- Replacement of a Ti:sapphire laser

Features

- High power > 0.8 W
- < 95 fs pulse widths
- Outstanding beam quality ($M^2 < 1.2$)
- Optional negative GVD pre-chirp up to $-17,000 \text{ fs}^2$
- All air-cooled, no chiller required
- Remote system diagnostics

The X-780-AOM now offers as a new option: the ability to full integrated AOM pulse picker and incorporate a negative pre-chirp of up to $-17,000 \text{ fs}^2$ in the output pulses. Its AOM pulse picker has throughput of > 80%, ON-OFF Ratio > 30 dB, and modulation bandwidth > 1 MHz. AOM option is especially useful for many imaging applications. For many application, femtosecond pulses can be significantly broadened by the optical beam delivery system. This is especially true for multiphoton bio-imaging applications, which use highly dispersive microscope objective lenses resulting in the use of higher average powers for optimum signal intensity with potential sample damage. The Carmel X-780 output pulses can now be tailored with up to $-17,000 \text{ fs}^2$ of group velocity dispersion (GVD) to compensate for the positive GVD effects of downstream microscope components. This is accomplished in the same compact laser head and ensures the shortest optical pulses for optimal signal intensity are obtained at the sample region, resulting in the highest signal levels at the lowest average power.

The Carmel X-780 provides the perfect 780 nm source for a wide range of ultrafast laser applications, including bio-imaging, multiphoton microscopy, optical metrology, 3D-micro/nanoprinting, terahertz imaging and ophthalmology. It is offered as both a scientific version with front panel controls and an OEM version controlled through an RS-232 interface.

The system features a rack mountable controller with a robust armored cable interface to the compact laser head, which facilitates its incorporation into OEM designs. It is over 100 times smaller than many Ti:sapphire lasers with a similar output power level. A simple key switch interface provides for manual operation with full remote access through computer control. The X-series includes the capability of remote data logging, power monitoring, system diagnostics, and automated adjustments for prolonged lifetime and OEM preventative maintenance. The rugged design supports 24/7 operation with an expected lifetime of > 10,000 hours.

For multiphoton microscopy applications, the Carmel X-780 provides an ideal ultrafast laser solution for optimum two-photon fluorescence and second harmonic cellular tissue imaging with minimal scatter and reduced risk of photodamage. The compact laser head and associated armored fiber cable make for straight forward integration into existing microscopes with minimal delivery optics. including 2 photon mesoscope to image blue fluorescent proteins.

If the performance parameters do not quite fit your application requirements or to learn more, please contact us at sales@calmarlaser.com

Technical Specifications¹ (Preliminary)

Model Number	CFL-10RFF-AOM
OPTICAL	
Central Wavelength (nm)	780 ± 3
Pulse Width ² (fs)	< 95
Optional Pre-chirp in Output Pulse ³ (fs ²)	0 to -17,000
Average Power (W)	0.8
Repetition Rate (MHz)	80
Pulse Energy (nJ)	> 10
Spectrum Width (FWHM, nm)	~ 10
Power Stability over 8 hours (% , RMS)	< 1.0
Beam Quality (M ²)	< 1.2
Beam Diameter at Exit (typical, mm)	1.25
Beam Roundness (%)	> 90
Polarization Extinction Ratio (dB)	> 20
AOM ON-OFF Ratio (dB)	> 30
ELECTRICAL	
Electrical Synchronization (V)	~ 0.5, SMA connector
Supply Voltage	85 - 264 VAC at 47 – 63 Hz, autoranging
AOM ON-OFF Drive (V)	0-5V TTL, via SMA Connector
MECHANICAL	
Operating Temperature (°C)	17 - 38
Storage Temperature (°C)	0 - 50
Connection between Controller and Head	1 m fixed armored cable
Laser Head Dimensions (cm)	9.7(W) x 18(D) x 3.5(H)
Laser Controller Dimensions (cm)	48.2(W) x 46.7(D) x 10(H); 19 inch 2U
Laser Head Weight (kg)	0.8 (typical)
Laser Controller Weight (kg)	13.6 (typical)
Cooling	Controller air-cooled by low noise fan
Warm-up Time (min)	~ 10
I/O CONTROL	
Communication Interface	RS-232 Serial Port, Monitor Port
Front Panel Control Interface	Power Switch, Laser Key Switch, Emergency Stop Button

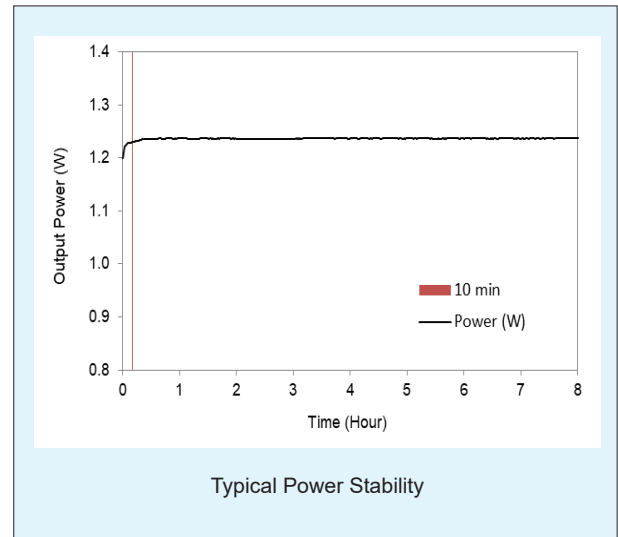
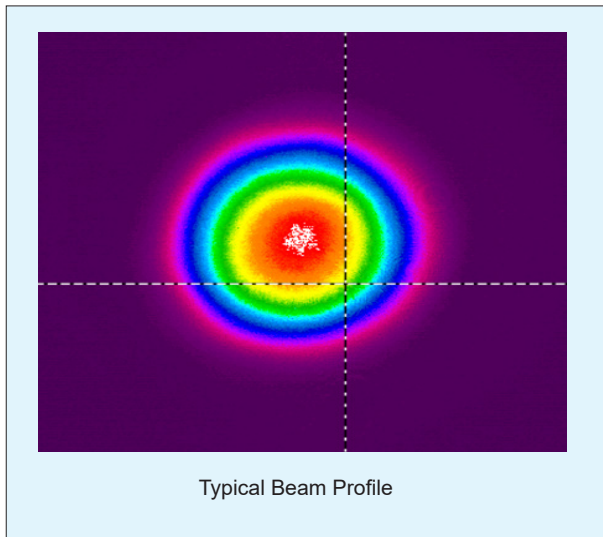
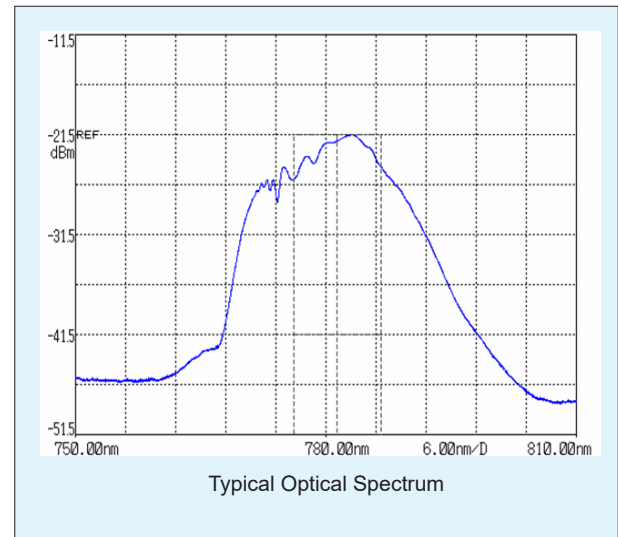
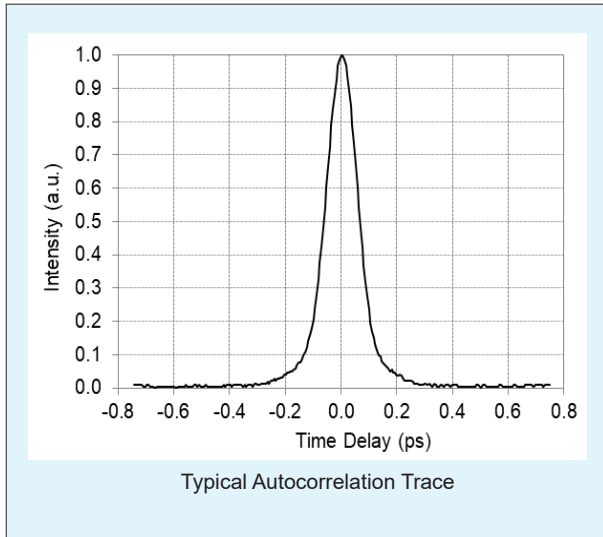
1. Due to our continuous improvement philosophy, all product specifications are subject to change without prior notice. Please contact sales@calmarlaser.com for customized specifications.

2. A sech² pulse shape (deconvolution factor of 0.65) is used to determine the pulse width from the second harmonic autocorrelation trace.

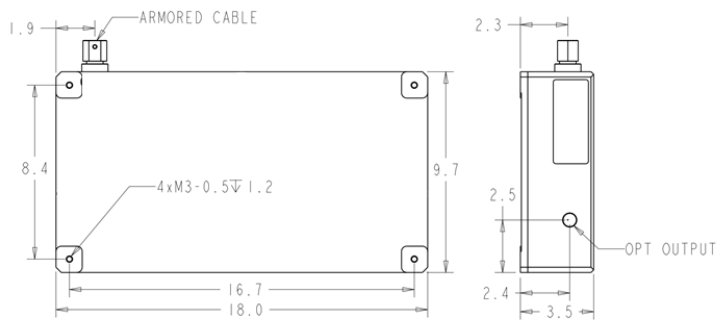
3. The output pulse can be prepared with an optional negative pre-chirp of up to -17,000 fs². This option must be specified at the time of purchase, please contact sales@calmarlaser.com.



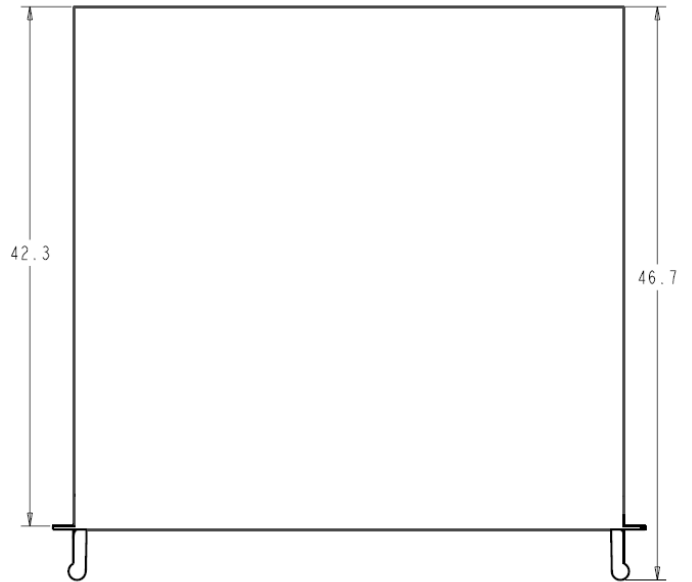
Optical Characterization



Mechanical Dimensions



Dimensions of Laser Head for AOM Model (cm)



Dimensions of Laser Controller (cm)

