

1750 nm High Power Femtosecond Fiber Laser



Applications

- Multiphoton microscopy
- Optical metrology
- Bioimaging
- Materials characterization
- Deep tissue interactions
- Nonlinear spectroscopy

Features

- High power stability (up to 1 W)
- < 80 fs pulse widths
- Outstanding beam quality ($M^2 < 1.2$)
- All air-cooled, no chiller required
- Optional 1550 nm output
- Remote system diagnostics

The Carmel X-series is a range of high power, air-cooled, fiber-based femtosecond lasers with output powers from 0.2 to greater than 2.5 W and pulse widths of less than 90 fs in the industry's most compact, user-friendly package. The Carmel X-1750 is the latest member of the X-series and is the first dedicated 1750 nm femtosecond source designed for deep tissue imaging. It can be configured for dual wavelength output to enable alternating access to 1750 and 1550 nm outputs.

The system features a rack mountable controller with front panel controls and a robust armored cable interface to the compact laser head. It is over 100 times smaller than competitive Ti:sapphire laser/optical parametric oscillator systems that can offer similar output power levels at 1750 nm. A simple key switch interface provides for manual operation with an RS-232 interface for remote data logging, power monitoring, system diagnostics and automated adjustments for prolonged lifetime.

The building block of the X-series is Calmar's renowned ultrafast fiber seed laser platform, which utilizes the proprietary Mendocino saturable absorber technology developed and perfected over a twenty year period to deliver reproducible and reliable mode-locking at turn-on. The system provides an output pulse width of < 80 fs and excellent long term pulse-to-pulse stability (< 1% rms) over a wide operating temperature range (20-30°C). An exceptional output beam quality ($M^2 < 1.2$) enables a near diffraction-limited spot size with suitable microscope objectives for demanding multiphoton fluorescence and harmonic imaging applications. The repetition rate is 80 MHz with an RF synchronization output provided as a trigger signal.

The wavelength region between 1600 and 1850 offers a unique high transmission window for brain tissue because of reduced scattering and absorption. The Carmel X-1750 is the first fixed wavelength femtosecond source designed for operation in this near infra-red region and enables multiphoton imaging and tissue interactions at unprecedented penetration depths.

If the performance parameters do not quite fit your application requirements, please contact us at sales@calmarlaser.com to discuss a customized solution.

1750 nm High Power Fiber Based Femtosecond Laser

Technical Specifications¹

| Model Number | CFL-10WFF |
|---|---|
| OPTICAL | |
| Central Wavelength ² (nm) | ~ 1750 |
| Pulse Width ³ (fs) | < 80 |
| Average Power (W) | > 1.0 |
| Repetition Rate (MHz) | 80 |
| Pulse Energy (nJ) | > 12.5 |
| Spectrum Width (FWHM, nm) | ~ 50 |
| Power Stability over 8 hours ⁴ (% , RMS) | < 1.0 |
| Beam Quality, M ² | < 1.2 |
| Beam Diameter at Exit (typical, mm) | ~ 1.2 (beam roundness > 90%) |
| Polarization Extinction Ratio (dB) | > 20 |
| Output/Termination | Free space, collimated beam |
| ELECTRICAL | |
| Electrical Synchronization (V) | ~ 0.5, SMA connector |
| Supply Voltage | 85 - 264 VAC at 47 – 63 Hz, autoranging |
| Power consumption (W) | 200 |
| MECHANICAL | |
| Operating Temperature (°C) | 20 - 30 |
| Storage Temperature (°C) | 0 - 50 |
| Connection between Controller and Head | ~ 30 cm fixed armored cable |
| Laser Head Dimensions (cm) | 9.0(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) | 15 (typical) |
| I/O CONTROL | |
| Communication Interface ⁸ | 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.

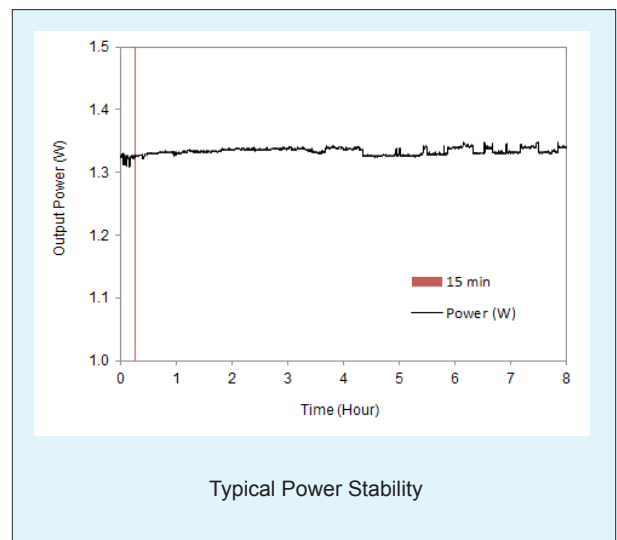
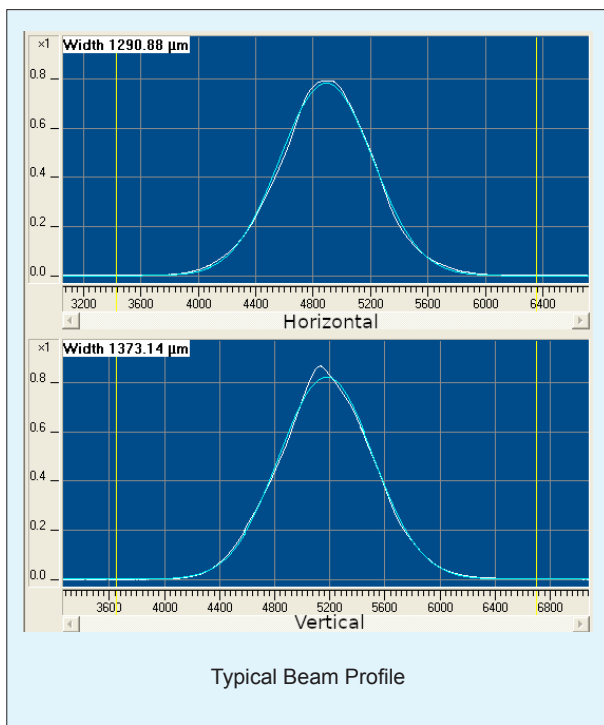
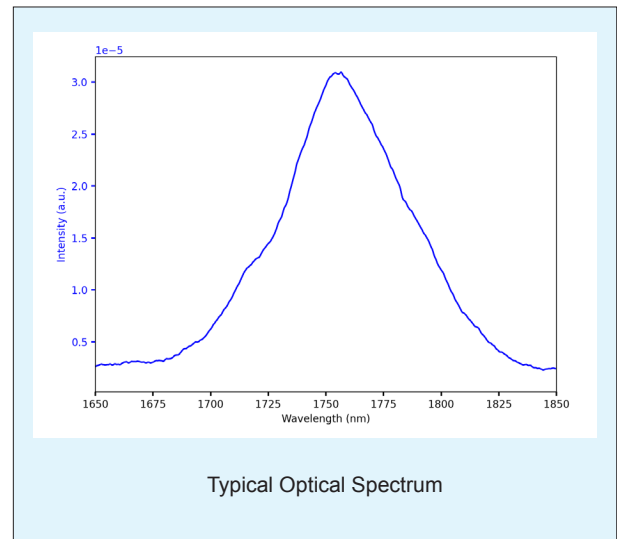
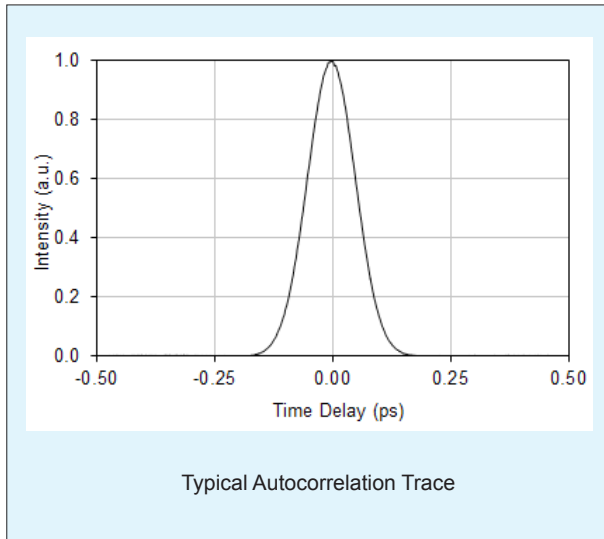
2. For optional second output at 1550 nm, please contact sales@calmarlaser.com.

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

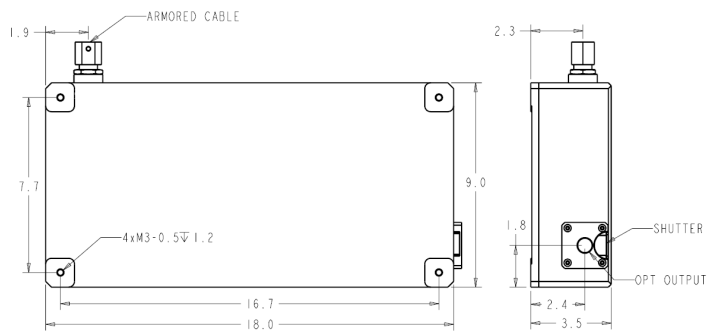
4. Requires an ambient temperature control of ± 1.0°C and appropriate mounting for the laser head.



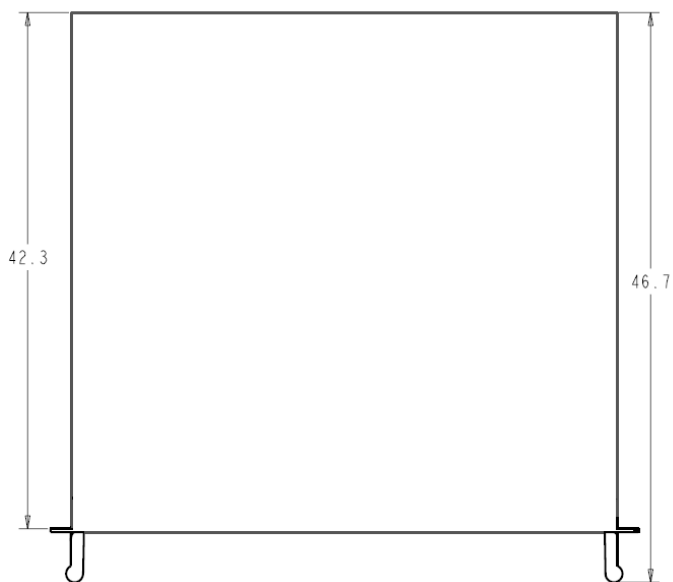
Optical Characterization



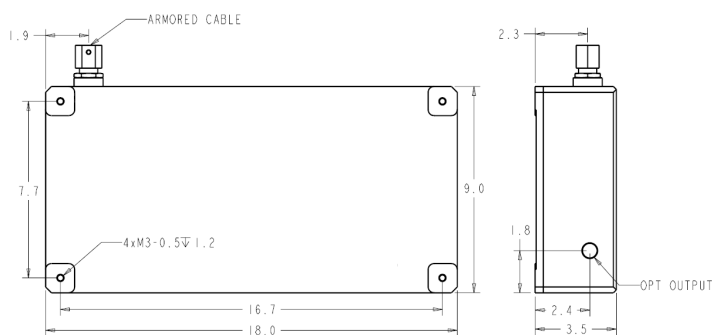
Mechanical Dimensions



Dimensions of Laser Head for Scientific Model (cm)



Dimensions of Laser Controller (cm)



Dimensions of Laser Head for OEM Model (cm)

