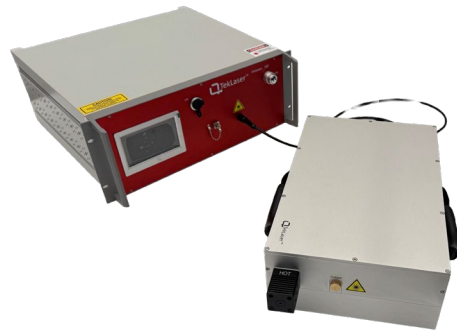


# QTekLaser™ 780 nm Fiber Laser

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## Product Description

The QTekLaser™ 780 nm Fiber Laser delivers stable, narrow-linewidth (<5 kHz) output at power levels >10 W from a reliable all-fiber, polarization-maintaining architecture. Designed for demanding quantum, precision measurement, and advanced photonics applications, the system combines exceptional spectral purity with long-term operational stability. Optimized for rubidium-based atomic systems and quantum technologies, the 780 nm wavelength is widely used in neutral-atom quantum computing, laser cooling, atom interferometry, atomic clocks, precision spectroscopy, and ultra-sensitive magnetometry. The laser's narrow linewidth and robust PM fiber design make it ideal for frequency stabilization, coherent manipulation, and high-precision atomic control. An intuitive IoT-enabled control system provides streamlined remote operation and monitoring from a compact laser head to a 4U 19" rack-mount chassis. Built for continuous operation in challenging laboratory and production environments, system delivers the performance, reliability, and stability required for next-generation quantum and precision measurement systems..



## Features

- High output power (>10 W)
- High reliability with all-fiber design
- Narrow linewidth (<5 kHz)
- Excellent power stability (<1%)
- User-friendly interface via IoT technology
- 4U 19" Rack mount to a laser head
- Certified to IEC 60825-1:2014 safety standards

## Applications

- Quantum computing
- Laser cooling and trapping
- Optical pumping / state preparation
- State detection
- Precision measurement

## Second-Harmonic Generation (SHG) Technology

QTekLaser™ offers laser systems with extended wavelength range by combining nonlinear frequency conversion technologies. Through second-harmonic generation (SHG) we achieve significant laser power at the visible and NIR regime (figure 2; red-shaded cells of table 1). With periodic poled crystal technology and the associated waveguide technology, nonlinear frequency conversion has become a powerful tool to extend the application scope of fiber lasers. The max power of the converted laser light is constrained by the damage threshold of commercially available nonlinear crystals, which is typically several tens of watts.

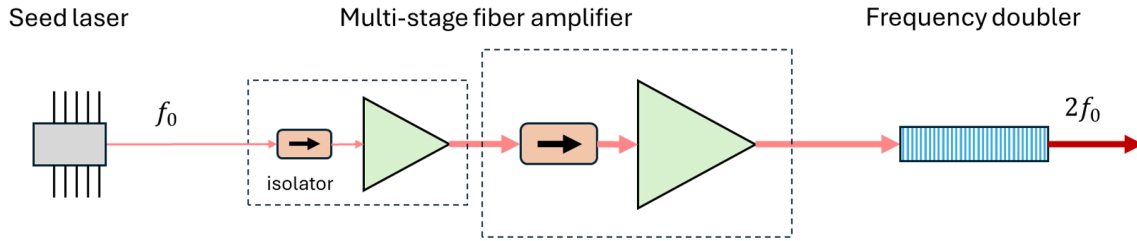


Figure 2 – Laser system with integrated frequency doubler.

Table 1 – Wavelength extension of QTekLaser™ products using nonlinear frequency conversion.

	SF-AMP-Yb (1012 – 1080 nm)	SF-AMP-Er (1530 – 1610 nm)	SF-AMP-Tm (1776 – 2040 nm)
SF-AMP-Yb (1012 – 1080 nm)	506 – 540 nm		
SF-AMP-Er (1530 – 1610 nm)	609 – 646 nm	765 – 805 nm	
SF-AMP-Tm (1776 – 2040 nm)	645 – 706 nm	822 – 900 nm	888 – 1020 nm

## Specifications

Wavelength	780.85 nm
Output power	>10 W
Power stability	<1%
Operation Mode	CW
Laser linewidth	<5 kHz
Wavelength tuning range	>20 pm
Polarization Extinction Ratio (PER)	20 dB
Polarization direction	Vertical
Beam quality	TEM00, M <sup>2</sup> <1.05
Output mode	Free space, collimated with ~2 mm 1/e <sup>2</sup> diameter
Relative Intensity Noise (RIN)	-140 dBc/Hz >10kHz
Optical Signal-to-Noise Ratio (OSNR)	60 dB
Operating temperature	17-25 °C
Warm-up time	~10 min.
Cooling mode	Water cooling

Laser Head Size	15"x10"x4.82"
Chassis	4U 19" Rack mount
Max. power consumption	254 W

### Safety & Retro-Reflection Advisory

The 532 nm laser system complies with 21 CFR Subchapter J, Part 1040 (as enforced by FDA) and IEC 60825-1:2014 safety standards.

Users must ensure that significant light is not retroreflected into the system—doing so may harm performance or damage the laser. Use of an external optical isolator is strongly recommended. Damage from retroreflected light is not covered under warranty.

### Ordering Information

Part Number: QT-LASR-SHG-780-10-W-2-2.0-2

Laser Type: Seed laser + Er-doped fiber amp + SHG

### Performance Figures

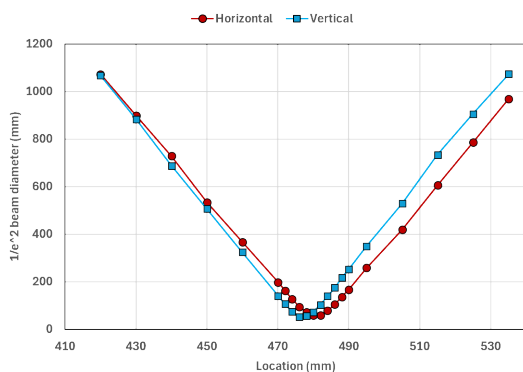


Figure 3 – Beam Quality. The  $M^2$  value is fitted to be  $0.97 \pm 0.05$ .

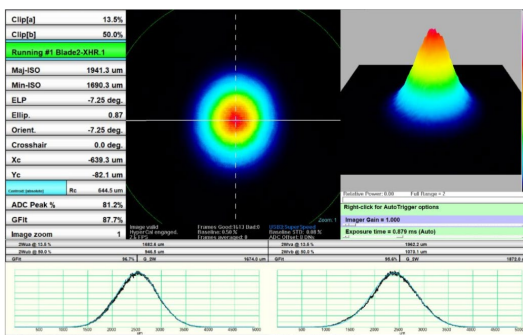


Figure 4 – Beam Profile.  $1/e^2$  beam diameter of 1.7 mm x 2.0 mm.

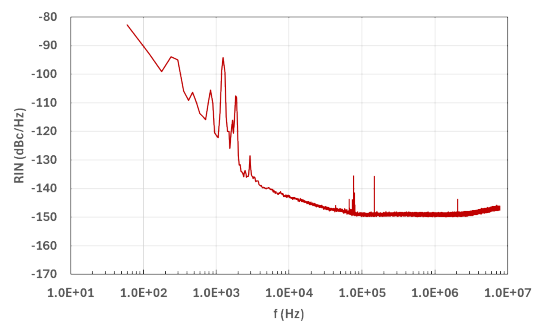


Figure 5 – Relative Intensity Noise (RIN):  $<-140 \text{ dBc/Hz} >10\text{kHz}$

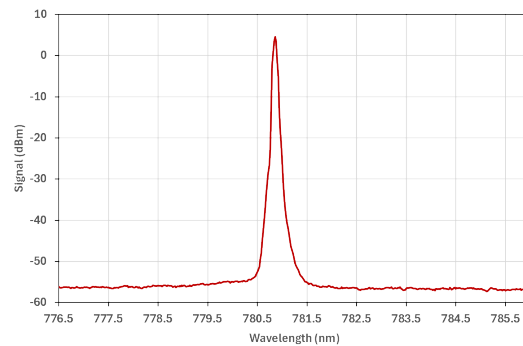


Figure 6– Optical Spectrum: 60 dB OSNR.

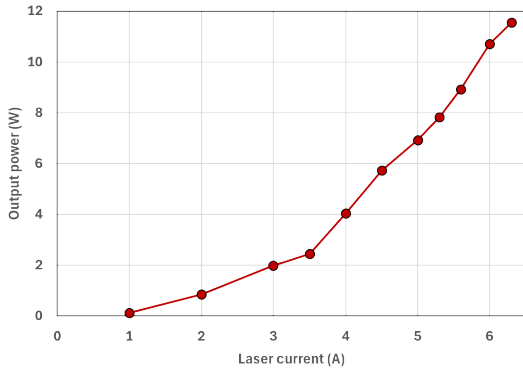


Figure 7 – Laser Power vs Current.

### Mechanical Details

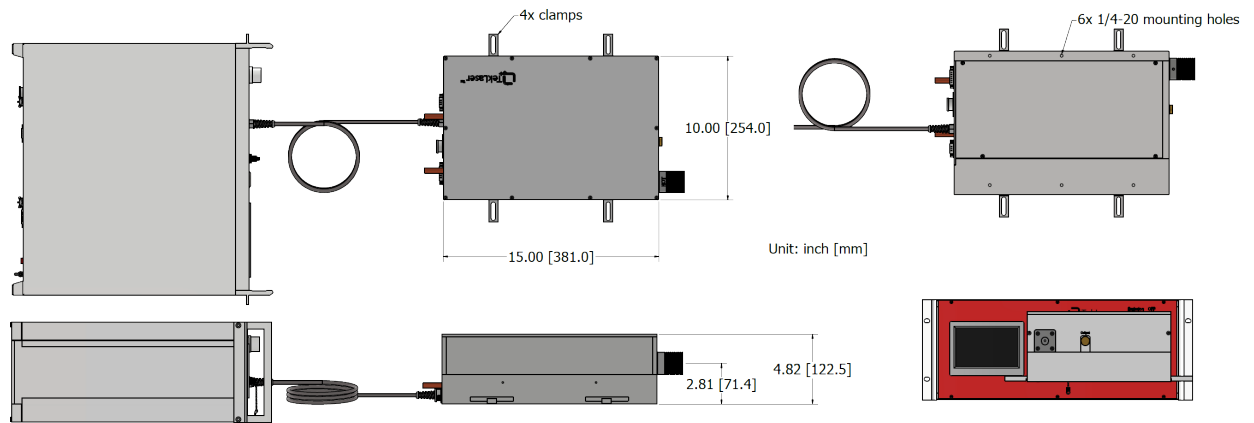


Figure 8 – Mechanical dimensions of the 780 nm fiber-laser system.

### Product Photographs

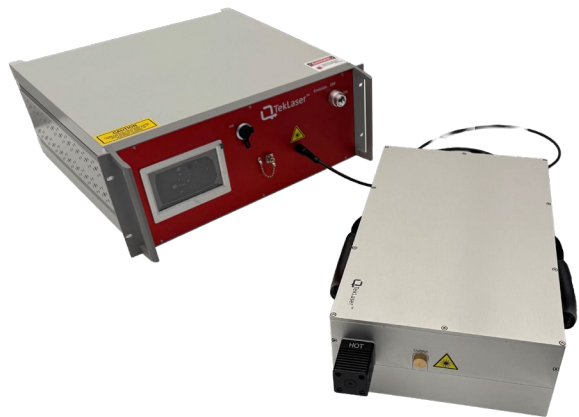


Figure 9 – Front view of the 780 nm fiber laser in 4U chassis.



Figure 10 – Rear panel view of the 4U water-cooled chassis.