

QTekLaser™ 783 nm Fiber Laser

Rubidium · Quantum · 8 W · <10 kHz linewidth · <-130 dBc/Hz RIN

Product Description

The QTekLaser™ 783 nm Fiber Laser delivers stable, narrow-linewidth (<5 kHz) 8 W power from a reliable all-fiber, polarization-maintaining architecture. Optimized for atomic applications, it includes an IoT-enabled control system in a 4U 19" rack-mount chassis, allowing for easy integration into any system.



Features

- High output power (8 W)
- High reliability all-fiber design
- Narrow linewidth (<10 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
- Optical lattices
- Optical dipole trapping
- Cavity stabilization
- Atom-photon interfaces
- Research

Second-Harmonic Generation (SHG)

QTekLaser™ offers laser systems with extended wavelength range by combining nonlinear frequency conversion technologies. Through second-harmonic generation (SHG) we achieve significant laser power in the visible and NIR regime (figure 2; red-shaded cells of table 1). With the development of periodically poled crystal technology and the associated waveguide technology, nonlinear frequency conversion has become a powerful tool to extend the application scope of fiber lasers. For QTekLaser™ products, 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.

	SF-AMP-Tm ² (865 – 1030 nm)	SF-AMP-Yb (1012 – 1112 nm)	SF-AMP-Er (1530 – 1610 nm)	SF-AMP-Tm (1730 – 2060 nm)
SF-AMP-Yb (1012 – 1112 nm)	466 – 535 nm	506 – 556 nm		
SF-AMP-Er (1530 – 1610 nm)	553 – 628 nm	609 – 658 nm	765 – 805 nm	
SF-AMP-Tm (1730 – 2060 nm)	576 – 687 nm	638 – 722 nm	812 – 904 nm	865 – 1030 nm

Table 1 – Wavelength extension of QTekLaser™ products via nonlinear frequency conversion. The red-shaded cells represent second-harmonic generation (SHG) and the blue-shaded cells sum-frequency generation (SFG).

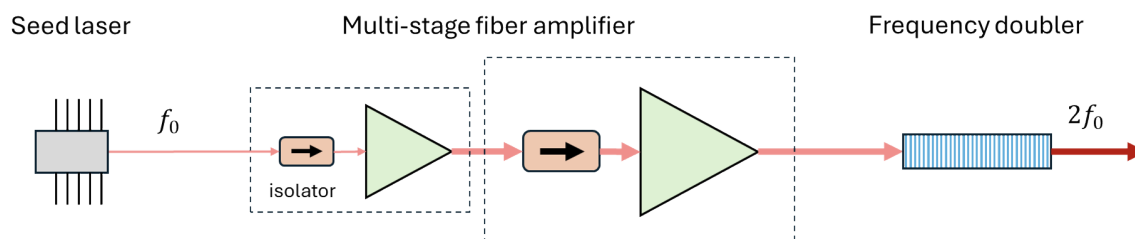


Figure 2 – QTekLaser™ fiber laser system with an integrated frequency doubler.

Specifications

	Parameter	Value	Unit
Laser	Wavelength	783	nm
	Operation mode	CW	/
	Max output power	8	W
	Linewidth	<10	kHz
	Output 1/e ² beam diameter	1-2	mm
	Beam quality (M ²)	<1.1	/
	Relative intensity noise (RIN) for freq. >10 kHz	<-130	dBc/Hz
	Fiber length to chassis	2	m
	Polarization direction	Vertical	/
	Polarization extinction ratio (PER)	>20	dB
	Optical signal-to-noise ratio (OSNR)	60	dB
Electrical	Fuse	6.3 A, 250 VAC, 5×20 mm	/
	Remote interlock voltage	3.3	V
	Max power consumption	254	W
	AC power supply voltage	110	V
General	Warm-up time	20	min
	Cooling	Chilled water	/
	Suggested chiller temperature	19	°C
	Chilled water flow rate	>=0.65	GPM
	Room temperature	17 – 25	°C
	Room humidity	30 – 60	%
	Weight	27.8 (61.3)	kg (lbs)

Safety & Retro-Reflection Advisory



QTekLaser™ lasers comply with Federal Regulations (21 CFR Subchapter J, Part 1040) as administered by the Center for Devices and Radiological Health and are certified to IEC 60825-1:2014 standards.

It is the end user's responsibility to ensure that no significant light is retroreflected back into QTekLaser™ systems as this can degrade performance and potentially damage the lasers. To prevent this, the use of an external optical isolator is strongly recommended. Damage due to retroreflected light is not covered under warranty.

Ordering Information

Part Number: QT-LASR-SHG-783-8-W-2-2.0-2

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

See the QTekLaser™ Product Selection Guide at www.qteklaser.com/product-selection-guide

Performance Figures

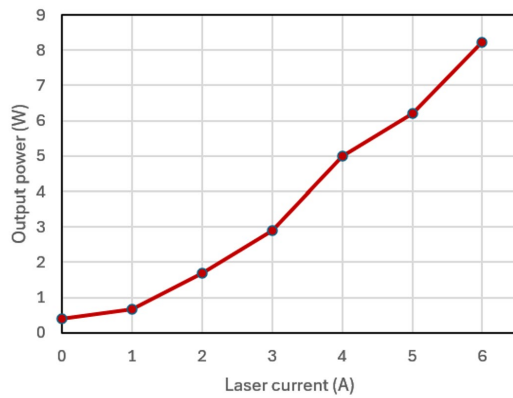


Figure 3 – Laser Power vs. Current: 783 nm.

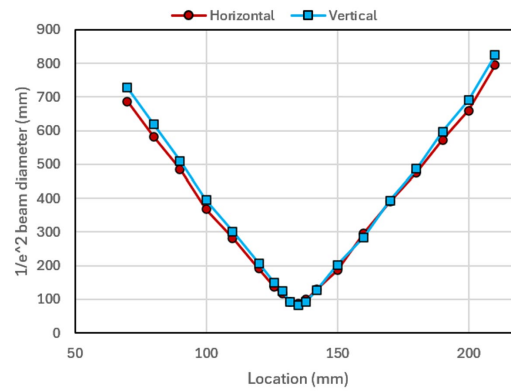


Figure 4 – 783 nm beam quality. The M^2 value is fitted to be 1.02 ± 0.05 .

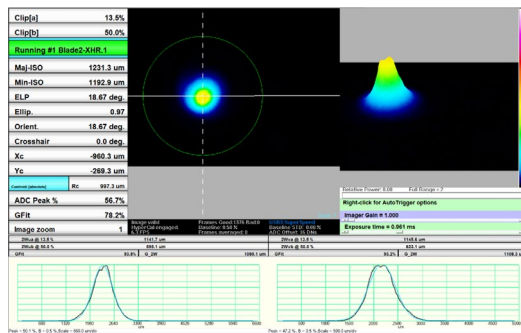


Figure 5 – 783 nm beam profile. Measured at 35 cm from the output window, with $1/e^2$ beam diameter of 1.1 mm horiz. and 1.1 mm vert.

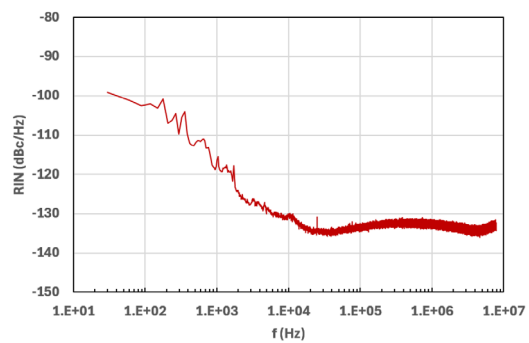


Figure 6 – 783 nm relative intensity noise, < -130 dBc/Hz for freq. > 10 kHz.

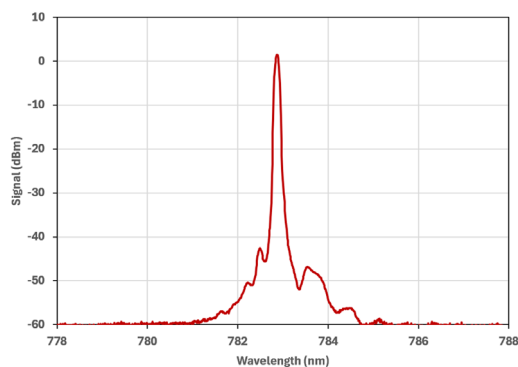


Figure 7 – 783 nm optical spectrum, 60 dB OSNR.

Quantum Applications

In the near-IR, the 783 nm laser is well suited for neutral-atom quantum platforms using rubidium, cesium, and ytterbium. Its narrow-linewidth, low-noise output supports optical-lattice and dipole trapping of ultracold rubidium and ytterbium, as well as blue-detuned nanophotonic traps for cesium atoms near optical waveguides, enabling precise atomic confinement, coherent manipulation, and atom-photon interfaces for quantum computing and quantum networking.

Mechanical Details

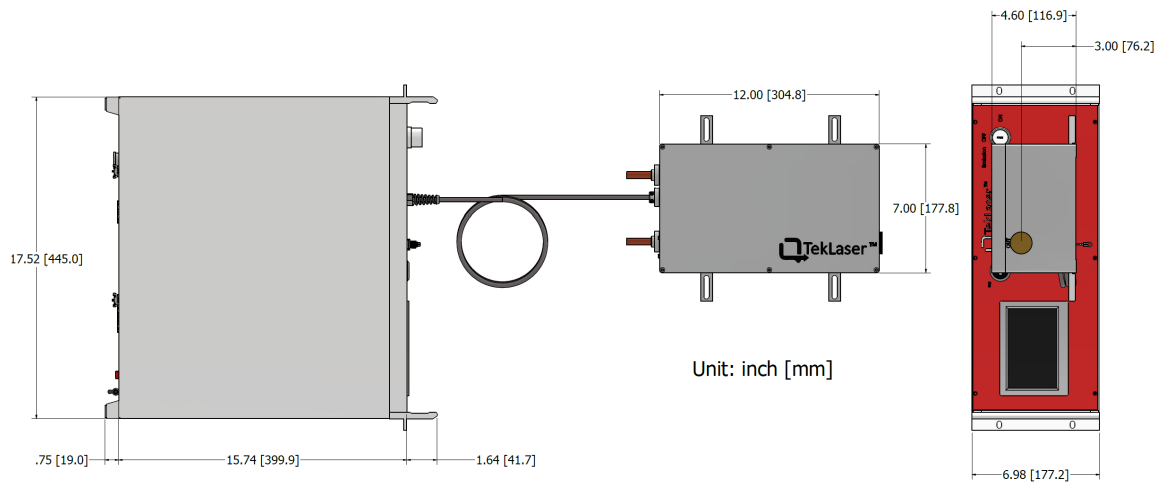


Figure 8 – 783 nm fiber laser mechanical dimensions.

Product Photographs



Figure 9 – 783 nm fiber laser.



Figure 10 – 783 nm fiber laser 4U chassis back panel, water cooled.