TekLaser™

QTekLaser™ 506 – 556 nm Fiber Laser

Product Description

The QTekLaser™ 506 – 556 nm Fiber Laser class is a green-wavelength system using second-harmonic generation (SHG) to deliver stable, narrow-linewidth (<10 kHz), polarization-maintaining light up to 3 W, ideal for optical tweezer arrays. With <1% power stability and an IoT-enabled interface in a compact 4U 19" rack-mount chassis, it is easily integrated into any system.



Up to 3 W Power | <10 kHz Linewidth | <-125 dBc/Hz Relative Intensity Noise (RIN)

Features

- High output power up to 3 W
- High reliability
- Narrow linewidth (<10 kHz)
- Excellent power stability (<1%)
- User-friendly interface via IoT technology
- 4U 19" Rack mount
- Certified to IEC 60825-1:2014 safety standards

Applications

- Quantum computing
- Optical tweezer arrays
- Dynamic atom rearrangement
- Optical lattice and dipole trapping
- Light-shift engineering and species- or state-selective trapping
- Two-photon and specialized entanglement schemes
- 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 1; 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.

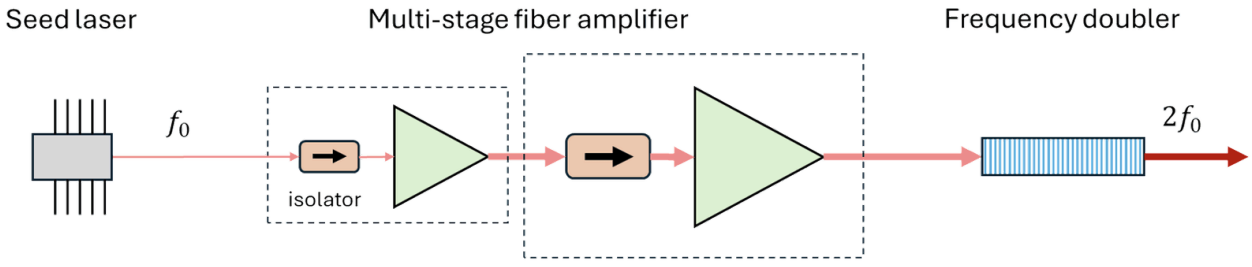


Figure 1. QTekLaser™ fiber laser system with an integrated frequency doubler.

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	SF-AMP-Yb² (506 – 556 nm)	SF-AMP-Tm² (865 – 1030 nm)	SF-AMP-Yb (1012 – 1112 nm)	SF-AMP-Er (1530 – 1610 nm)	SF-AMP-Tm (1730 – 2060 nm)
SF-AMP-Yb² (506 – 556 nm)	253 – 278 nm				
SF-AMP-Tm² (865 – 1030 nm)	319 – 361 nm	432 – 515 nm			
SF-AMP-Yb (1012 – 1112 nm)	304 – 371 nm	466 – 535 nm	506 – 556 nm		
SF-AMP-Er (1530 – 1610 nm)	380 – 413 nm	553 – 628 nm	609 – 658 nm	765 – 805 nm	
SF-AMP-Tm (1730 – 2060 nm)	391 – 438 nm	576 – 687 nm	638 – 722 nm	812 – 904 nm	865 – 1030 nm

Table 1. Wavelength extension of QTekLaser™ products via nonlinear frequency conversion. Yb² and Tm² denote frequency-doubled Yb and Tm amplifiers. Red: harmonic generation (SHG, or FHG via two cascaded SHG stages). Blue: sum-frequency generation (SFG), including cascaded SHG+SFG.

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-(506 – 556)-3-W-2-2.0-2
Laser Type: Seed laser + Yb-doped fiber amp + SHG

Specifications

Category	Parameter	Value	Unit
Laser	Wavelength	506 – 556	nm
	Operation mode	CW	/
	Max output power	3	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	<-125	dBc/Hz
	Polarization direction	Vertical	/
	Polarization extinction ratio (PER)	>20	dB
	Optical signal-to-noise ratio (OSNR)	>45	dB
Electrical	Max power consumption	200	W
	AC power supply voltage	110	V
	Fuse	6.3 A, 250 VAC, 5×20 mm	/
	Remote interlock voltage	3.3	V
General	Warm-up time	20	min
	Cooling	Chilled water	/
	Room humidity	30 – 60	%
	Room temperature	17 – 25	℃
	Weight	25 (55)	kg (lbs)

Performance

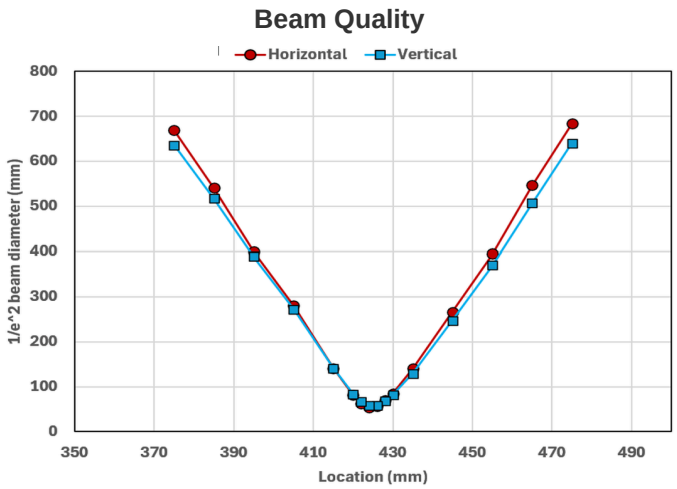


Figure 2. Beam quality: M^2 <1.1.

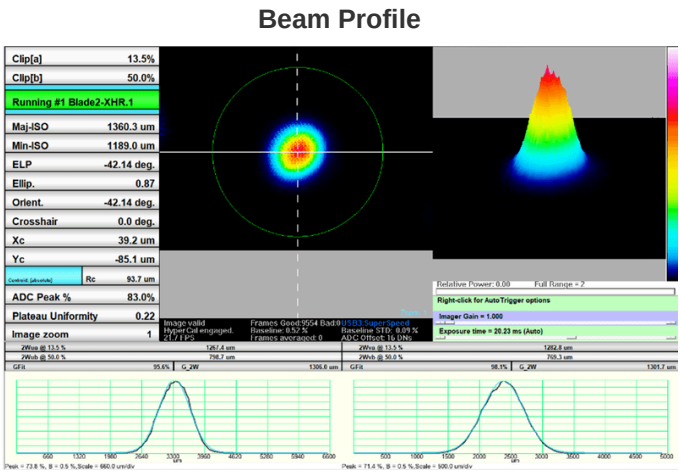


Figure 3. Beam profile. $1/e^2$ beam diameter of 1.3 mm horizontally and 1.3 mm vertically.

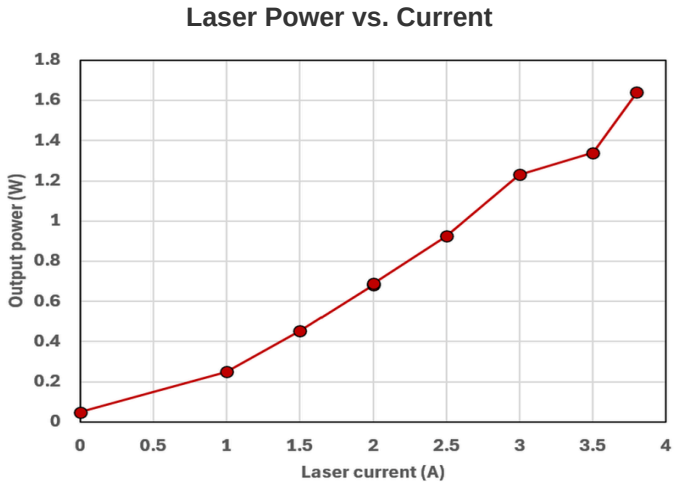


Figure 4. Laser power vs. current.

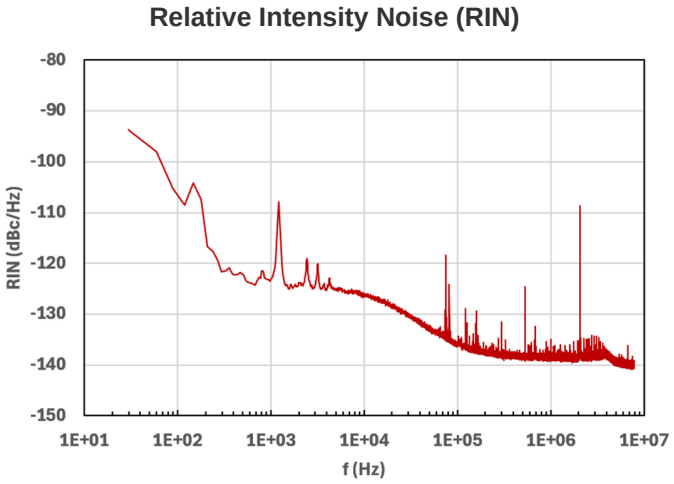


Figure 5. Relative intensity noise (RIN): <-125 dBc/Hz >10 kHz. The spikes observed below 10 kHz and around 2 MHz originate from the ECDL seed laser used during the measurement.

Mechanical Dimensions

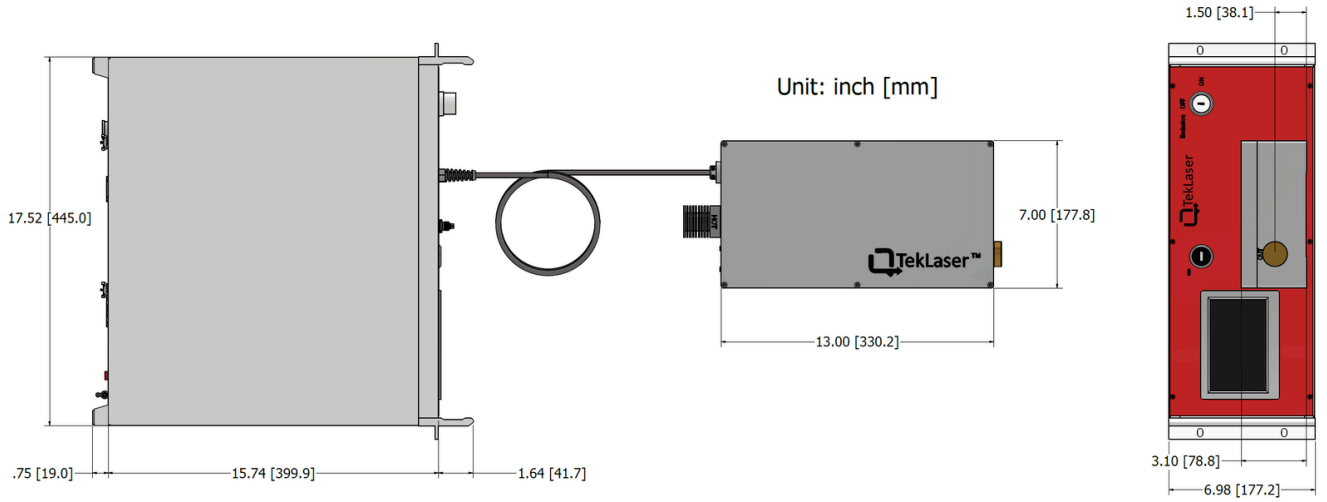


Figure 6. Mechanical dimensions.

Product Images



Figure 7. 4U chassis + laser head, water cooled.



Figure 8. 4U chassis back panel, water cooled.