

Diode-pumped air-cooled Q-switched laser



Q-SHIFT laser head

Q-SHIFT is a family of Q-switched lasers with built-in nonlinear wavelength conversion stage that allows to produce wavelengths that are not accessible with conventional solid-state lasers. Nd:YAG or Nd:YLF lasers of Q2 or Q2HE series are used as pump sources.

The wavelengths and maximum pulse energies available are shown in the figure below and datasheets in the next pages.

High peak intensity pulses at visible wavelengths (blue, yellow and red) are provided when Q-SHIFT laser is combined with our attachable SHG or stand-alone H-SMART harmonic generator.



Laser head Q-SHIFT
Front view



Laser head Q-SHIFT
Rear view



Second harmonic generator SHG
attached to Q-SHIFT laser head



FEATURES

- Nonlinear conversions to **1169 nm, 1272 nm, 1551 nm and 1572 nm** wavelengths
- Up to **50 mJ** pulse energy
- Up to **1 W** average power
- Up to **100 Hz** pulse repetition rate
- **Air-cooled** (water-free)
- **2–5 ns** pulse duration
- Guaranteed **> 2 G shot** lifetime of pump-diodes
- Sync pulses for triggering of user equipment
- Remote monitoring and control via built-in **Ethernet** interface

OPTIONAL EQUIPMENT

- Attachable **2nd harmonic generator**, model SHG
- H-SMART series stand-alone **2nd, 3rd or 4th harmonic generators**
- Attachable **motorized attenuator** for fundamental wavelength beam
- Attachable **pulse energy monitor** with analog and/or digital output
- Stand-alone **air-purging unit** for long lifetime of UV optics or operation in harsh environment
- Stand-alone **two-channel pulse generator** for smoothly variable pulse repetition rate, burst, double-pulse and other user-configurable modes of operation

APPLICATIONS

- Eye-safe Light Detection And Ranging (LiDAR)
- Laser micro-machining (LCD repair)
- Laser dermatology (facial renewal, hair removal, acne treatment etc.)
- Semiconductor inspection
- Time-resolved laser spectroscopy

SPECIFICATIONS ¹⁾ at 1159 nm or 1272 nm wavelength

Model ²⁾	Q-SHIFT-W1159			Q-SHIFT-W1272		
	-Bxx	-Dxx	-Fxx	-Bxx	-Dxx	-Fxx
Wavelength ³⁾	1159 nm			1272 nm		
Pulse repetition rate ⁴⁾	up to 100 Hz	up to 50 Hz	up to 20 Hz	up to 100 Hz	up to 50 Hz	up to 20 Hz
Pulse energy	3.5 mJ	14 mJ	25 mJ	2 mJ	8 mJ	14 mJ
Typical pulse duration ⁵⁾	2 – 5 ns					
Pulse energy stability ⁶⁾	< 3 % RMS			< 5 % RMS		
Power drift ⁷⁾	± 3.0 %					
Beam divergence ⁸⁾	< 3.0 mrad					
Typical beam diameter ⁹⁾	3 – 4 mm typical					
Beam profile	bell shaped, > 75 % fit to Gaussian					
Polarization	linear, > 95 %					
Jitter ¹⁰⁾	< 0.5 ns RMS					

Optional harmonics generator ¹¹⁾

Pulse energy ¹²⁾						
579.5 nm / 636 nm	1.2 mJ	5 mJ	9 mJ	0.5 mJ	2 mJ	3.5 mJ
386 nm / 424 nm	0.4 mJ	1.6 mJ	3 mJ	0.16 mJ	0.6 mJ	1.2 mJ
290 nm / 318 nm	0.25 mJ	1 mJ	1.8 mJ	0.1 mJ	0.4 mJ	0.7 mJ

SPECIFICATIONS ¹⁾ at 1551 nm or 1572 nm wavelength

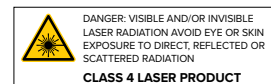
Model ²⁾	Q-SHIFT-W1551 / Q-SHIFT-W1572						
	-Bxx	-Cxx	-Dxx	-Exx	-F20	-F10	-H20
Wavelength ³⁾	1551±1 nm or 1572±1 nm						1551±1 nm
Pulse repetition rate ⁴⁾	up to 100 Hz		up to 50 Hz	up to 33 Hz	up to 20 Hz	10 Hz	20 Hz
Pulse energy	2.5 mJ	5 mJ	10 mJ	16 mJ	18 mJ	22 mJ	50 mJ
Typical pulse duration ⁵⁾	2 – 5 ns						
Pulse energy stability ⁶⁾	< 3.5 % RMS						
Power drift ⁷⁾	± 3.0 %						
Beam divergence ⁸⁾	5.0 mrad typical						< 6 mrad
Typical beam diameter ⁹⁾	3 – 6 mm typical						7 mm
Beam profile	bell shaped, > 75 % fit to Gaussian						
Polarization	linear, > 95 %						
Jitter ¹⁰⁾	< 0.5 ns RMS						

Optional harmonics generator ¹¹⁾

Pulse energy							
775.5/786 nm	0.63 mJ	1.25 mJ	3 mJ	5 mJ	6 mJ	7 mJ	–
517/524 nm	0.3 mJ	0.6 mJ	1.5 mJ	2.5 mJ	3 mJ	3.5 mJ	
388/393 nm	0.13 mJ	0.25 mJ	0.6 mJ	1 mJ	1.2 mJ	1.4 mJ	

- Due to continuous improvements all specifications are subject to change. Unless stated otherwise all specifications are measured at fundamental wavelength and maximum pulse repetition rate. The parameters marked typical are not specifications. They are indications of typical performance and will vary with each unit we manufacture.
- xx in the model name sets laser repetition rate, for example Q-SHIFT-W1159-B100 laser will have factory-set 100 Hz pulse repetition rate.
- Depend on pump-laser wavelength.
- Standard factory-set repetition rates are 10 Hz, 20 Hz, 33 Hz, 50 Hz and 100 Hz. Specify required pulse repetition rate when ordering, for example -D50 would mean laser with 50 Hz pulse repetition rate.
- At FWHM level at fundamental wavelength, measured with 350 ps rise time photodiode

- Measured during 30 seconds operation after warm-up.
- Over 8 hour period after 20 minutes of warm-up when ambient temperature variation is less than ±2 °C.
- Full angle measured at the 4σ level.
- Beam diameter is measured 20 cm from laser output at the 4σ level.
- In respect to falling edge of pump-diode triggering pulse.
- Q-SHIFT is compatible with our attachable second harmonic generator (model SHG) and stand-alone H-SMART harmonics generator. Pulse energies presented here are maximum values. Please refer to harmonic generator datasheet for detailed specifications.
- Black-labelled pulse energies measured at black-marked wavelength; teal-labelled at teal-marked wavelength.



COMMON SPECIFICATIONS

Operating requirements	
Ambient temperature	15–30 °C
Relative humidity	10–80 % (non-condensing)
Mains voltage ¹⁾	90–230 VAC, single phase, 47–63 Hz
Average power consumption	30–100 W

DIMENSIONS

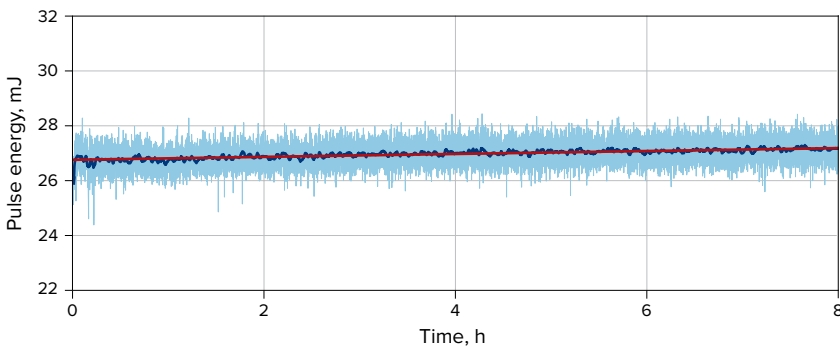
Unit	Dimensions (W×L×H)	Weight
Laser head ²⁾	191 × 408 × 155 mm ³	15–17 kg
Q-SHIFT-H20 laser head	400 × 400 × 200 mm ³	20 kg
Controller CT	108 × 172 × 59 mm ³	0.8 kg
Power adapter	192 × 178 × 46 mm ³	1.6 kg
Controller and power adapter CT19 ³⁾	482 × 460 × 106 mm ³	7.5 kg
Air-purging unit APU2		10.5 kg

OPTIONAL ITEMS

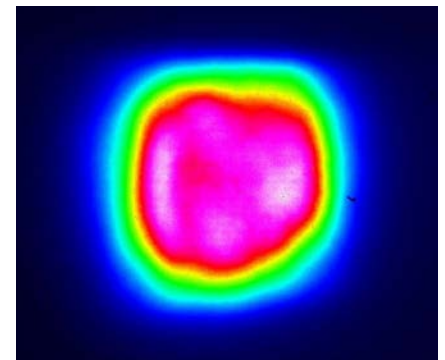
WF	Stand-alone wireless router for wireless laser control
RS	Stand-alone adapter for laser control via RS-232 port
PC	Laptop computer for laser control
EXP	Stand-alone pulse generator for variable repetition rate
CT19	19" mounted controller with integrated AC/DC power supply
CTA19	19" mounted controller with air-purging unit
CTBR	Front/rear panel with brackets for standard controller
PS19	19" form factor AC/DC power supply
APU2	Stand-alone air-purging unit with integrated AC/DC power supply
CST	Custom model

1. Laser can be powered from an appropriate 12 or 28 VDC power source. Please inquire for details.
2. Laser housing size depends on average power at output wavelength.
3. Power adapter dimensions depend on the model.

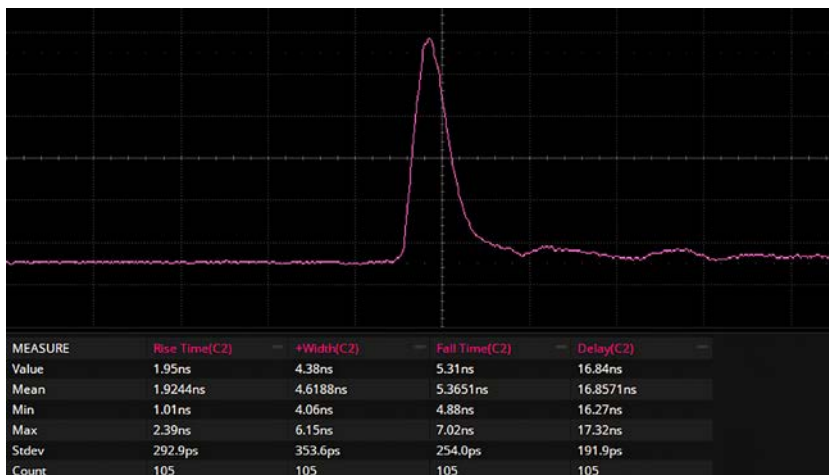
PERFORMANCE



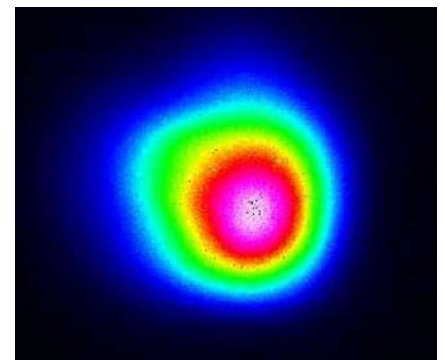
Long term stability of Q-SHIFT-F10-W1551
Power drift: +1.1 %; -1.57 %



Beam profile of Q-SHIFT-W1551-H20
Axis length (X, Y) – (11.8, 11.1) mm,
effective diameter – 11.4 mm,
ellipticity – 94.1 %



Pulse duration of Q-SHIFT-H20 @ 1551 nm



Beam profile of Q-SHIFT-W1551-D10
Axis length (X, Y) – (3.5, 3.3) mm,
effective diameter – 3.4 mm,
ellipticity – 95.6 %

PART NUMBERS

Q-SHIFT-F20-W1551-AT/IR

Model			
Pulse energy level	Default pulse repetition rate in Hz	Laser wavelength	Optional items
no letter → < 1 mJ		W1159 → 1159 nm	SHG0, SHG1, SHG2 → attachable second harmonic generator
A → 1–2 mJ		W1272 → 1272 nm	AT/IR → motorized attenuator for IR range
B → 2–4 mJ		W1551 → 1551 nm	EM/BB → pulse energy monitor
C → 4–8 mJ		W1572 → 1572 nm	WH → water-cooled heatsink
D → 8–16 mJ			FC/IR → fiber coupled output
E → 16–22 mJ			
F → 22–32 mJ			
G → 32–50 mJ			
H → > 50 mJ			

IMAGES



Front view of CTA19



Rear view of CTA19



Laser controller with air-purging unit CTA19



Laser controller CT.
Front view



Laser controller CT.
Rear view



Laser controller CT



Fiber coupler FC



Attenuator AT1 and pulse energy monitor EM1

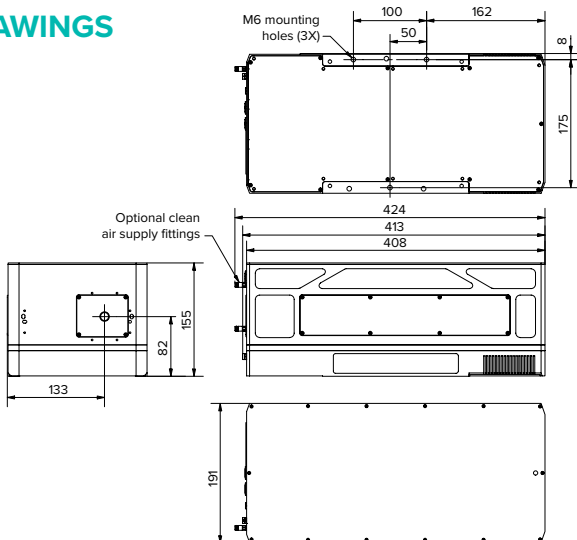


Motorized attenuator AT



H-SMART harmonics generator with fiber coupler FC

DRAWINGS



Outline drawings of Q-SHIFT laser
(dimension in mm)