Air-cooled short-pulse Q-switched laser

Q SPARK

Q-SPARK laser head

Q-SPARK is a diode-pumped, water-free, Q-switched laser designed for applications requiring sub-nanosecond pulse durations. Its optimized water-free end-pumping technology delivers Gaussian-like, low-divergence pulses in the sub-nanosecond or nanosecond range, with peak power up to **20 MW**, all within a compact and energy-efficient platform.

The passively Q-switched configuration can provide pulse durations down to **750 ps**.

The laser is monitored and controlled via an Ethernet interface with a built-in web server and an API is available for integration into user systems.

FEATURES

- Short **sub-nanosecond** pulse duration down to **750 ps** and **> 5 mJ** pulse
- Up to **20 mJ** pulse energy at **1064 nm**, up to **20 MW** peak power
- **Air-cooled** (water-free)
- Up to **100 Hz** repetition rate
- **> 2 G shot** lifetime of pump-diodes
- Built-in sync pulse generator for triggering of user equipment
- Remote monitoring and control via built-in **Ethernet** interface

OPTIONAL EQUIPMENT

- Built-in **2nd, 3rd, 4th or 5th harmonic generator**
- Attachable PC controlled **motorized attenuator** with analog and/or digital output
- Attachable **pulse energy monitor**
- **Fiber coupled** output
- Auxiliary **exit port** for residual harmonic generator wavelength access

APPLICATIONS

- Laser Induced Breakdown Spectroscopy (LIBS)
- Light Detection And Ranging (LIDAR)
- Laser ablation/micromachining
- Time-of-Flight Spectroscopy (TOFS)
- Time Resolved Spectroscopy (TRS)
- Raman spectroscopy
- Dermatology (tattoo removal etc.)
- Ophthalmology
- Time domain thermoreflectance (TDTR)

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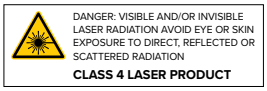
SPECIFICATIONS [1]

Model	Q-SPARK-						
	100PS	20PS	A10PS	A100	A50	B20	C10
Wavelength	1064 nm						
Q-Switch type	Passive, Cr:YAG			Active, Pockels cell			
Pulse repetition rate [2]	100 Hz	20 Hz	10 Hz	100 Hz	50 Hz	20 Hz	10 Hz
Pulse energy, mJ	1 mJ	2 mJ	5 mJ	2 mJ	5 mJ	10 mJ	20 mJ
Typical pulse duration [3]	< 2 ns		< 800 ps	< 2 ns		< 1.5 ns	
Pulse to pulse energy stability [4]	< 1.5 % RMS			< 1.2 % RMS			
Linewidth	SLM [5]			< 0.8 cm^{-1}			
Power drift [6]	± 3.0 %						
Beam profile	nearly TEM_{00}, > 85 % fit to Gaussian						
Beam divergence [7]	< 1.5 mrad					< 1 mrad	
Polarization	linear, horizontal						
Typical beam diameter [8]	1.2 mm		2.0 mm				
Jitter [9]	1 µs RMS			< 0.5 ns RMS			
Optional built-in harmonics generator [10]							
Pulse energy							
532 nm	0.5 mJ	1 mJ	2.5 mJ	1 mJ	2.5 mJ	5 mJ	10 mJ
355 nm	0.25 mJ	0.5 mJ	1.6 mJ	0.5 mJ	1.6 mJ	2.5 mJ	5 mJ
266 nm	0.1 mJ	0.2 mJ	0.8 mJ	0.2 mJ	0.8 mJ	1.5 mJ	2.5 mJ
Optional attenuator [11]							
Transmission range	0.5 – 95 %						
Dimensions							
Laser head (W×L×H)	140× 277 × 135 mm^3						
Controller unit CT (W×L×H)	108× 172 × 59 mm^3						
Power adapter (W×L×H) [12]	50 × 125 × 32 mm^3 typical (for +12 VDC output)						
Operating requirements							
Cooling requirements	air-cooled						
Ambient temperature	15 – 30 °C						
Relative humidity	10 – 80 % (non-condensing)						
Mains voltage	90 – 230 VAC, single phase, 47 – 63 Hz [13]						
Average power consumption	40 W	30 W		50 W	40 W	30 W	

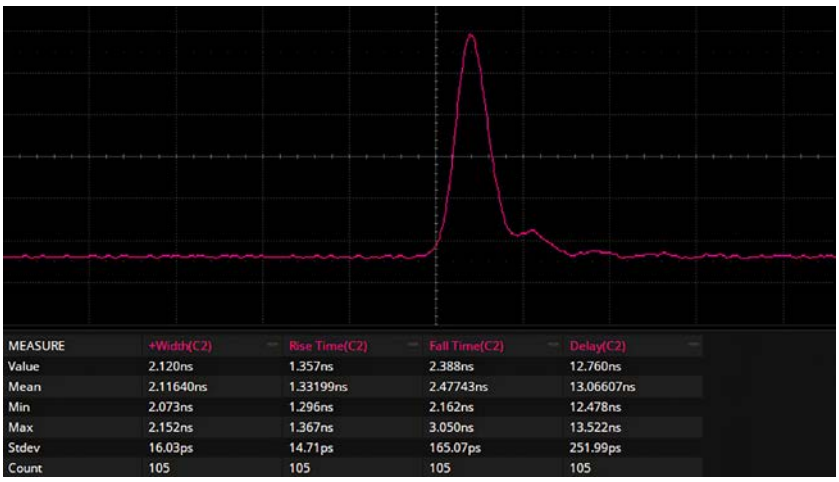
1. Due to continuous improvements all specifications are subject to change. Unless stated otherwise all specifications are measured at fundamental wavelength and maximum pulse repetition rate. The parameters marked typical are not specifications. They are indications of typical performance and will vary with each unit we manufacture.
2. Factory-set pulse repetition rate is fixed at max repetition rate shown in the table.
3. At FWHM level at fundamental wavelength, measured with 350 ps rise time photodiode.
4. Measured during 30 seconds operation after warm-up.
5. SLM pulses are produced for > 95 % of operating time.
6. Over 8 hour period after 20 minutes of warm-up when ambient temperature variation is less than ±2 °C.
7. Full angle measured at the 4σ level.
8. Beam diameter is measured 20 cm from laser output at the 4σ level.
9. In respect to falling edge of pump-diode triggering pulse.
10. Q-SPARK can be configured with built-in harmonics generator and beam separators for selecting single wavelength at the exit port. Two port configuration is available by request.
11. Motorized attenuator intended to be attached to the laser housing. Transmission can be changed remotely through laser web-server control interface.
12. Power adapter dimensions might differ from indicated here, depending on model.
13. Laser can be powered from an appropriate 12 VDC power source. Please inquire for details.



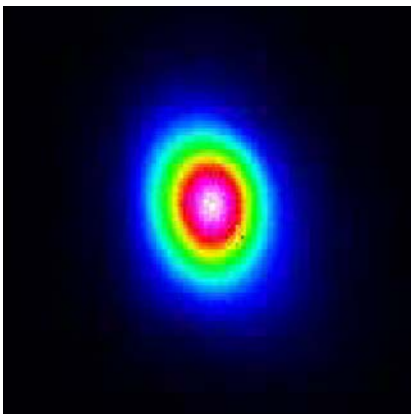
WEIGHT

Unit	Weight
Laser head	6.5 kg
Controller CT	0.8 kg
AC/DC power adapter	0.25 kg
Air-purging unit APU2	7.5 kg

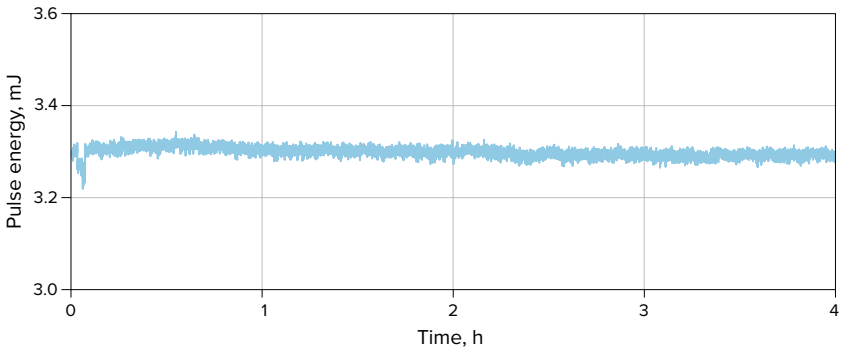
PERFORMANCE



Typical temporal waveform of Q-SPARK-A100 laser



Beam profile of Q-SPARK-A100-1064
Axis length (X, Y) – (1.64, 1.43) mm, effective diameter – 1.54 mm, ellipticity – 87.0 %



Long term stability of Q-SPARK-A100

PART NUMBERS

Q-SPARK-A10PS-FH-AT1

Model

Pulse energy level
- no letter → 0.1 – 4 mJ
- A → 5 – 9 mJ
- B → 10 – 19 mJ
- C → > 20 mJ

Default pulse repetition rate in Hz

- **PS** → passive Q-switch
- **no letter** → active Q-switch

Optional items
- AT1/AT2/AT3/AT4 → motorized attenuator
- EM1/EM2/EM3/EM4 → pulse energy monitor
- RE → additional output port for residual wavelengths
- TM → low jitter sync pulse
- APU2 → air-purging unit

Built-in harmonic generator
- SH → second harmonic
- TH → third harmonic
- FH → fourth harmonic

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

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IMAGES

Q-SPARK laser head
Front view

Q-SPARK laser head
Rear view

Q-SPARK laser head

Attenuator AT1 and pulse energy monitor EM1

Fiber coupler FC

Laser controller CT

Laser controller CT.
Front view

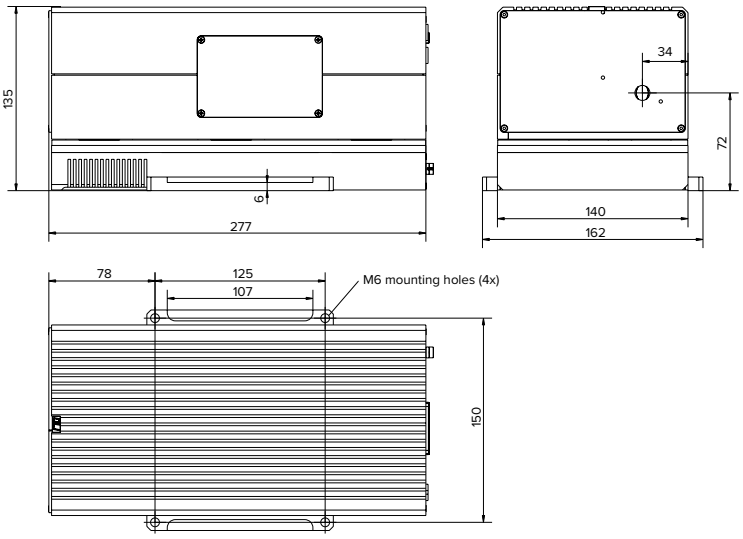
Laser controller CT.
Rear view

Laser controller with air-purging unit CTA19

Front view of CTA19

Rear view of CTA19

DRAWINGS



Outline drawings of Q-SPARK laser head
(dimension in mm)