Air-cooled diode-pumped Q-switched laser

Laser head Q2

Q2 series diode-pumped, fully air-cooled, Q-switched laser intended for wide range of applications that require high peak power pulses.

Our innovative water-free laser crystal end-pumping technology allows to produce Gaussian-like, low divergence laser beam. At the same time, Q2 is a versatile platform that can be configured in many ways.

When used with the **H-SMART stand-alone harmonic generator,** the system can provide up to **3 separate output ports** with different harmonics, extending the applicability of the Q2 lasers.

H-SMART harmonics generator with fiber coupler FC
Provides up to 5 harmonics, compatible with the Q2 lasers

Q2

FEATURES

- **1053 nm** or **1064 nm** wavelength from **Nd:YLF** or **Nd:YAG** laser crystals respectively
- Up to **80 mJ** pulse energy and up to **2 W** average power
- Up to **100 Hz** pulse repetition rate
- **Air-cooled** (water-free)
- **5 – 10 ns** pulse duration
- Optional **< 3 ns** pulse duration at up to **40 mJ** pulse energy (short cavity version)
- Weight **< 9 kg** incl. heatsink, controller & AC/DC adapter
- Guaranteed **> 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

Stand alone:

- H-SMART series stand-alone **2nd, 3rd, 4th or 5th** harmonic generators
- **Two-channel pulse generator** for triggering
- **Air-purging unit** for long lifetime of UV optics

Attachable:

- **2nd harmonic generator**, model SHG
- **Beam guiding** module
- **Motorized attenuator** for fundamental wavelength beam
- **Pulse energy monitor** with analog and/or digital output

APPLICATIONS

- Light Detection And Ranging (LIDAR) (Metrology, Military, Astronomy and etc.)
- Spectroscopy (Laser Induced Breakdown (LIBS), Light Induced Fluorescence (LIFS), Flash photolysis and etc.)
- Laser ablation (marking, LCD repair, trimming, scribing and etc.)
- Medical (Ophthalmology, Dermatology, Photoacoustic Imaging (PAI) and etc.)
- Pulsed Laser Deposition (PLD)

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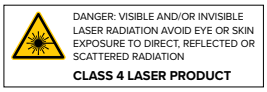
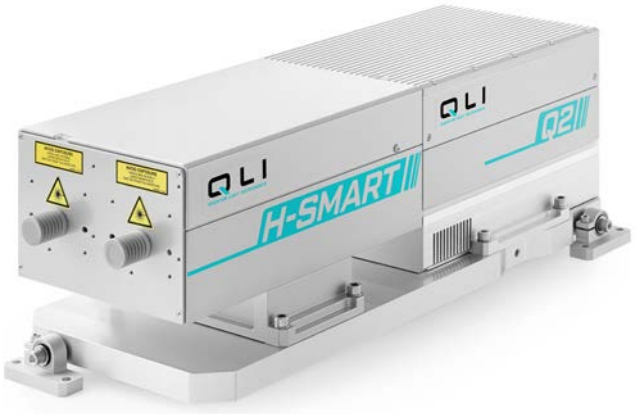
SPECIFICATIONS at 10 Hz pulse repetition rate [1)]

Model	Q2				
	-B10	-C10	-D10	-E10	-F10
Pulse repetition rate [2)]	10 Hz				
Wavelength, nm	1064/1053 nm				1053 nm
Pulse energy [3)]	8/10 mJ	16/20 mJ	32/40 mJ	60/65 mJ	80 mJ
Typical pulse duration [4)]	< 8 ns		< 7 ns		< 5 ns
Beam divergence [5)]	< 1.5 mrad		< 1 mrad		
Typical beam diameter [6)]	1.5 mm		3.0 mm		4.0 mm
Pulse energy stability	< 0.5 % RMS				
Power drift	± 3.0 %				
Beam profile	bell-shaped, > 80 % fit to Gaussian				
Jitter	< 0.5 ns RMS				
Polarization	linear, horizontal				
Optional harmonics generator [7)]					
Pulse energy [3)]					
532/526.5 nm	4/5 mJ	8/10 mJ	16/20 mJ	30/32 mJ	40 mJ
355/351 nm	2.4/3 mJ	4.5/6 mJ	9/12 mJ	18/20 mJ	24 mJ
266/263 nm	1.2/1.5 mJ	2.4/3 mJ	5/6 mJ	9/10 mJ	12 mJ
213/211 nm	0.5 mJ	1 mJ	2 mJ	3.5 mJ	5 mJ
Optional attenuator [8)]					
Transmission range	0.5 – 95 %				
Operating requirements					
Cooling requirements	air-cooled (water-free)				
Ambient temperature	15 – 30 °C				
Relative humidity	10 – 80 % (non-condensing)				
Mains voltage	90 – 230 VAC, single phase, 47 – 63 Hz [9)]				
Average power consumption	30 W		40 W	50 W	60 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. In internal triggering mode repetition rate can be divided by integer number down to f/2, f/3, f/4,... 1 Hz.
3. When pul se energy is presented in xx/yy format, first number is for 1064 nm wavelength version, second – for 1053 nm version.
4. At FWHM level at fundamental wavelength, measured with 350 ps rise time photodiode. Short pulse duration version is available, with pulse duration shorter by approx 50 %. Inquire for detailed specifications.
5. Full angle measured at the 4σ level.
6. Beam diameter is measured 20 cm from laser output at the 4σ level.
7. Q2 is compatible with our attachable second harmonic generator (model SHG) and all models of stand-alone H-SMART harmonics generator. Pulse energies presented here are maximum values. Please refer to harmonic generator datasheets for detailed specifications.
8. Motorized attenuator intended to be attached to the laser housing. Transmission can be changed remotely through laser web-server control interface.
9. Laser can be powered from an appropriate 12 or 28 VDC power source. Please inquire for details.





Laser head Q2 and H-SMART harmonics generator on BSP2 base plate

SPECIFICATIONS at 20 – 33 Hz pulse repetition rate [1)]

Model	Q2						
	-B20	-C20	-D20	-E20	-F20	-D33	-E33
Pulse repetition rate [2)]	20 Hz					33 Hz	
Wavelength, nm	1064/1053 nm				1053 nm	1064/1053 nm	1064 nm
Pulse energy [3)]	8/10 mJ	16/20 mJ	32/40 mJ	60/65 mJ	70 mJ	40 mJ	60 mJ
Typical pulse duration [4)]	< 7 ns		< 5 ns				
Beam divergence [5)]	< 1.5 mrad		< 1 mrad				
Typical beam diameter [6)]	1.5 mm		3.0 mm	4.0 mm			
Pulse energy stability	< 0.5 % RMS						
Power drift	± 3.0 %						
Beam profile	bell-shaped, > 80 % fit to Gaussian						
Jitter	< 0.5 ns RMS						
Polarization	linear, horizontal						
Optional harmonics generator [7)]							
Pulse energy [3)]							
532/526.5 nm	4/5 mJ	8/10 mJ	16/20 mJ	30/32 mJ	35 mJ	20 mJ	30 mJ
355/351 nm	2.4/3 mJ	4.5/6 mJ	9/12 mJ	18/20 mJ	21 mJ	12 mJ	18 mJ
266/263 nm	1.2/1.5 mJ	2.4/3 mJ	5/6 mJ	9/10 mJ	11 mJ	6 mJ	9 mJ
213/211 nm	0.5 mJ	1 mJ	2 mJ	3.5 mJ	4.2 mJ	2 mJ	2.5 mJ
Optional attenuator [8)]							
Transmission range	1 – 95 %						
Operating requirements							
Cooling requirements	air-cooled (water-free)						
Ambient temperature	15 – 30 °C						
Relative humidity	10 – 80 % (non-condensing)						
Mains voltage	90 – 230 VAC, single phase, 47 – 63 Hz [9)]						
Average power consumption	30 W	40 W	70 W	80 W			100 W

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4. At FWHM level at fundamental wavelength, measured with 350 ps rise time photodiode. Short pulse duration version is available, with pulse duration shorter by approx 50 %. Inquire for detailed specifications.
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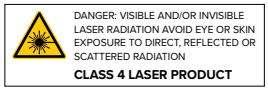

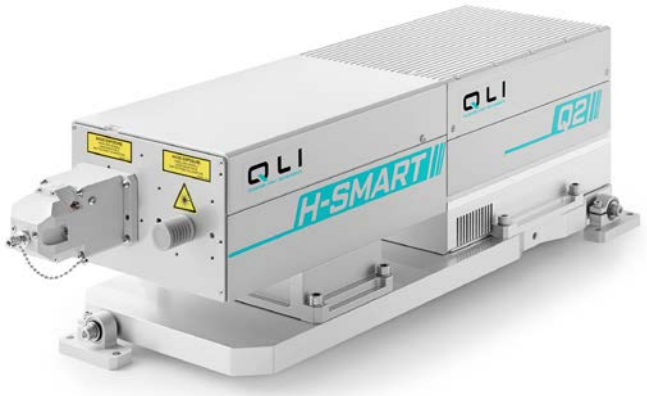

Laser head Q2 and H-SMART harmonics generator with FC fiber coupler on BSP2 base plate

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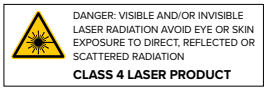
SPECIFICATIONS at 50 – 200 Hz pulse repetition rate [1]

Model	Q2								
	-A50	-B50	-C50	-D50	-200	-100	-A100	-B100	-C100
Pulse repetition rate [2]	50 Hz				200 Hz	100 Hz			
Wavelength	1064/1053 nm		1064 nm						
Pulse energy [3]	5 mJ	8/10 mJ	16/20 mJ	40 mJ	1 mJ	2.5 mJ	5 mJ	10 mJ	20 mJ
Typical pulse duration [4]	< 7 ns		< 6 ns	< 5 ns	< 10 ns		< 8 ns		< 7 ns
Beam divergence [5]	< 1 mrad	< 1.5 mrad	< 1 mrad		< 2 mrad		< 1.5 mrad		< 1 mrad
Typical beam diameter [6]	1.5 mm		2.5 mm	3.5 mm	1.5 mm		2.0 mm	2.5 mm	3.5 mm
Pulse energy stability	< 0.5 % RMS								
Power drift	± 3.0 %								
Beam profile	bell-shaped, > 80 % fit to Gaussian								
Jitter	< 0.5 ns RMS								
Polarization	linear, horizontal								
Optional harmonics generator [7]									
Pulse energy [3]									
532/526.5 nm	2.5 mJ	4/5 mJ	8/10 mJ	16/20 mJ	0.5 mJ	1.25 mJ	2.5 mJ	5 mJ	10 mJ
355/351 nm	1.5 mJ	2.4/3 mJ	4.5/6 mJ	9/12 mJ	0.25 mJ	0.7 mJ	1.5 mJ	3 mJ	6 mJ
266/263 nm	0.7 mJ	1.2/1.5 mJ	2.4/3 mJ	5/6 mJ	0.1 mJ	0.3 mJ	0.7 mJ	1.5 mJ	3 mJ
213/211 nm	0.2 mJ	0.5 mJ	1 mJ	2 mJ	0.02 mJ	0.1 mJ	0.25 mJ	0.5 mJ	1 mJ
Optional attenuator [8]									
Transmission range	1 – 95 %								
Operating requirements									
Cooling requirements	air-cooled (water-free)								
Ambient temperature	15 – 30 °C								
Relative humidity	10 – 80 % (non-condensing)								
Mains voltage	90 – 230 VAC, single phase, 47 – 63 Hz [9]								
Average power consumption	30 W	50 W	80 W	100 W	40 W	50 W	70 W	80 W	100 W



DIMENSIONS

Unit	Dimensions (W×L×H)	Weight
Laser head Q2	160 × 230× 141 mm³	4.8 kg
Controller unit	108 × 172 × 59 mm³	0.8 kg
Power adapter [1]	50 × 125 × 31 mm³	1.3 kg
Harmonic generator	160 × 242 × 141 mm³	4 – 6 kg
SHG module	153 × 78 × 65 mm³	0.7 kg
BSP2 plate	219 × 491 × 32 mm³	3 kg

1. Power adapter dimensions might differ from indicated here, depending on model.

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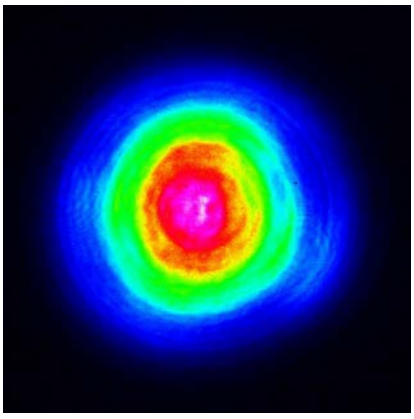
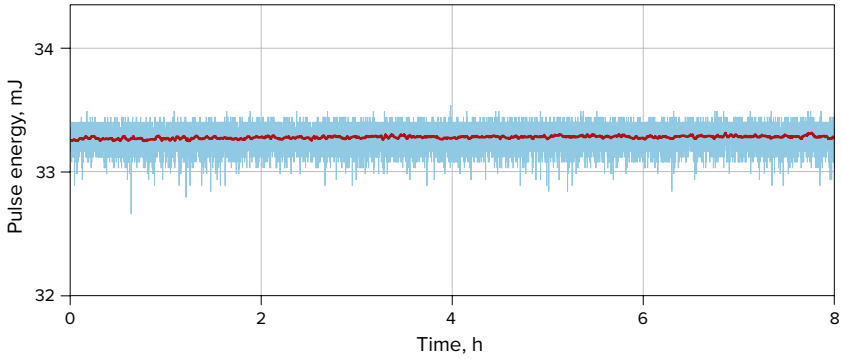
PERFORMANCE

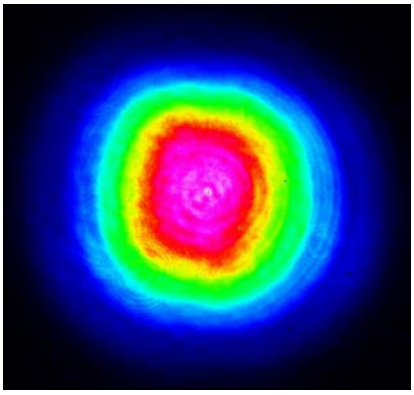
Pulse duration of Q2-D10-1064



Beam profile of Q2-D10-1064
Axis length (X, Y) – (3.16, 3.18) mm,
effective diameter – 3.17 mm,
ellipticity – 99.2 %



Long term stability of Q2-D10-1064
Power drift: +0.1 %; -0.1 %



Q2-F20-1053 1st harmonic beam profile
Axis length (X, Y) – (3.58, 3.47) mm,
effective diameter – 3.53 mm,
ellipticity – 96.9 %

PART NUMBERS

Q2-E20-1064-AT1

Model

Pulse energy level
- no letter → 0.1 – 4 mJ
- A → 5 – 7 mJ
- B → 8 – 15 mJ
- C → 16 – 30 mJ
- D → 31 – 50 mJ
- E → 51 – 69 mJ
- F → 70 – 90 mJ

Default pulse repetition rate in Hz

Laser wavelength
- 1064 → Nd:YAG; 1064.2 nm
- 1053 → Nd:YLF; 1053.0 nm

Optional items
- SHG0, SHG1, SHG2 → attachable second harmonic generator
- AT1 → motorized attenuator
- WH → water-cooled heatsink
- GL → low power CW guiding laser
- FC/NIR → fiber coupled output

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

Laser head Q2.
Front view

Laser head Q2.
Rear view

Fiber coupler FC

Motorized attenuator AT

Laser controller CT

Laser controller CT.
Front view

Laser controller CT.
Rear view

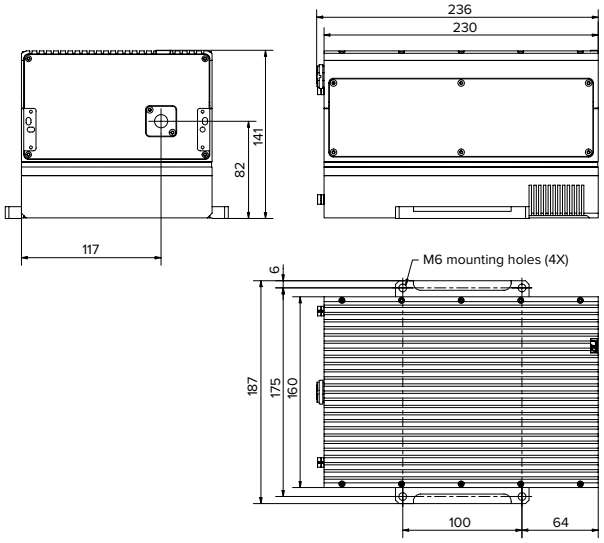
Pulse energy monitor EM/BB

Laser controller with air-purging unit CTA19

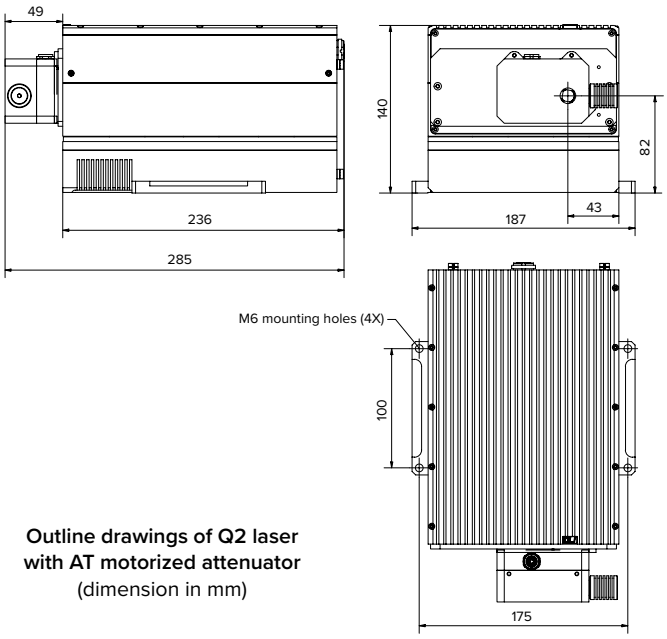
Front view of CTA19

Rear view of CTA19

DRAWINGS



Outline drawings of Q2 laser
(dimension in mm)



Outline drawings of Q2 laser with AT motorized attenuator
(dimension in mm)