Q2 series

DIODE PUMPED AIR-COOLED Q-SWITCHED LASER

FEATURES

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

Smoothly variable pulse repetition rate for 1053 nm output wavelength models

> 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 2 – 3 ns pulse duration at up to 60 mJ pulse energy (short cavity version)

Optional attachable attenuator for fundamental wavelength

Optional attachable pulse energy monitor

Optional attachable 2nd harmonic generator

Optional stand-alone 2^{nd} , 3^{rd} , 4^{th} or 5^{th} harmonic generator

APPLICATIONS

Light Induced Breakdown Spectroscopy (LIBS) Light Detection And Ranging (LIDAR) LCD repair Laser ablation/cleaning Time-of-Flight Spectroscopy (TOFS) Light Induced Fluorescence (LIF) Spectroscopy Flash photolysis Pulsed Light Deposition (PLD)



Quantum Light Instruments



Q2 series diode pumped, fully air-cooled, Q-switched laser designed 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 versatile platform that can be configured in many ways. It can be configured for 80 mJ pulse energy at 10 Hz pulse repetition rate. For high repetition rate configuration laser can produce up to 20 mJ at 100 Hz. The laser can configured to emit 1053 nm or 1064 nm wavelength from Nd:YLF or Nd:YAG laser crystals respectively. Due athermal properties of Nd:YLF crystal, at 1053 nm the laser can operate from single shot to maximum pulse repetition rate without changes in beam divergence or profile.

In short cavity configuration pulse duration can be reduced by 50% in comparison to standard configuration. Peak power of pulse can reach more than 30 MW at pulse energy up to 60 mJ.

Thermo-electric cooler based temperature control system eliminate risks associated with water cooling (leaks, organic contamination etc.) and reduce maintenance costs. If requested, standard fan-cooled heatsink can be detached from the laser body and laser can be mounted on user-supplied cold plate or other cooling system. Innovative laser design resulted in compact, user-friendly turnkey system that requires little maintenance. There is no chillers or bulky power supplies that one needs fit under the table. All laser electronics is integrated into Q2 housing and the only external modules are lightweight controller box that provides laser control interfaces and mains adapter that provides 12 or 28 VDC, 30 – 100 W powering (depending on model).

Laser is controlled trough Ethernet port via build-in webserver. There is no need to install control software – any computer or even cell phone with modern web-browser will be able to control Q2. API is also provided for integration with user devices. Low jitter triggering pulses for user equipment are available with up to 300 µs lead in internal triggering mode. In external triggering mode, laser pulsing can be externally triggered from delay generator. Laser functionality can be further extended by wide range of auxiliary equipment:

- > Second harmonic output can be produced from our attachable 2nd harmonic generator, model SHG.
- > Up to fifth harmonic output can be produced from our stand-alone H-SMART series harmonic generators.
- > Pulse energy can be adjusted with our motorized attenuator for fundamental wavelength beam.
- > Pulse energy can be monitored by our attachable pulse energy monitor with analog and/or digital output.

SPECIFICATIONS AT 10	Hz PULSE REPETITION RATE $^{1)}$

MODEL	Q2						
MODEL	-B10	-C10	-E10	-F10			
Wavelength	1053 or 1064 nm			1053 nm			
Pulse repetition rate ²⁾	10 Hz						
Pulse energy	8 mJ	15 mJ	30 mJ	60 mJ	80 mJ		
Typical pulse duration ³⁾	< 8 ns <7 ns <5 n						
Pulse energy stability 4)	< 0.5 % RMS						
Power drift ⁵⁾		± 3.0 %					
Beam profile		Bell-shaped, >80% fit to Gaussian					
Beam divergence 6)			<1 mrad				
Polarization		L	inear, horizont	al			
Typical beam diameter 7)	1.5 mm 2.0 mm 3.0 mm 4.0 mm						
Jitter ⁸⁾			< 0.5 ns RMS				
OPTIONAL HARMONICS GENI	ND ATOD 9)						
	SKATOR '						
Pulse energy	4 T	7 I	15 T	20I	40 T		
526.5 / 532 nm	4 mJ	7 mJ	15 mJ	30 mJ	40 mJ		
351 / 355 nm	2.4 mJ	4.5 mJ	9 mJ	18 mJ	24 mJ		
263 / 266 nm	1.2 mJ	2.5 mJ	5 mJ	10 mJ	12 mJ		
211 / 213 nm	0.4 mJ	1 mJ	2 mJ	4 mJ	5 mJ		
OPTIONAL ATTENUATOR ¹⁰⁾							
Transmission range			0.5 – 95 %				
DIMENSIONS							
Laser head (W×L×H)	$160 \times 230 \times 141 \text{ mm}^3$						
Controller unit (W×L×H)	$108 \times 191 \times 59 \text{ mm}^3$						
Power adapter (W×L×H) ¹¹⁾	$80 \times 120 \times 60 \text{ mm}^3 \text{ typical}$						
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OPERATING REQUIREMENTS	1						
Cooling requirements			Air cooled				
Ambient temperature			15 – 30 °C				
Relative humidity			0 % (non-conde	0			
Mains voltage		90 – 230 VAC	, single phase,	47 – 63 Hz ¹²⁾			
Average power consumption	30	W	40 W	50 W	60 W		

Laser controller unit





- 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. Short pulse duration version is available, with pulse duration shorter by approx 50%. Inquire for detailed specifications.
- ⁴⁾ Measured during 30 seconds operation after warm-up.
- ⁵⁾ Over 8 hour period after 20 minutes of warm-up when ambient temperature variation is less than ±2 °C.
- ⁶⁾ Full angle measured at the 4σ level.
- ⁷⁾ Beam diameter is measured 20 cm from laser output at the 4σ level.
- ⁸⁾ In respect to falling edge of pump diode triggering pulse.
- ⁹⁾ 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.
- ¹⁰⁾ Motorized attenuator intended to be attached to the laser housing. Transmission can be changed remotely trough laser web-server control interface.
- ¹¹⁾ Power adapter dimensions might differ from indicated here, depending on model.
- ¹²⁾ Laser can be powered from appropriate 12 or 28 VDC power source. Please inquire for details.





Quantum Light Instruments

Diode Pumped Air-cooled Q-switched Laser Q2

Email: sales@qlinstruments.com

SPECIFICATIONS AT 20/50 Hz pulse repetition rate ¹⁾

MODEL	-B20	-C20	-D20	Q2 -E20	-B50	-C50	-D50
Wavelength		-020 1053 or 1064 nn		1053 nm		r 1064 nm	-D50 1064 nm
Pulse repetition rate ²⁾	20 Hz				1000 0	50 Hz	10011111
Pulse energy	10 mJ	20 mJ	50 mJ	70 mJ	10 mJ	20 mJ	40 mJ
Typical pulse duration ³⁾	<7	,		5 ns	< 7 ns	< 6 ns	<5 ns
Pulse energy stability ⁴⁾	< /	113		< 0.5 % RMS	< 7 113	< 0 113	<5 113
Power drift ⁵⁾				± 3.0 %			
Beam profile			Ball ch	aped, >80% fit to (Zaussian		
Beam divergence ⁶⁾			Dell-Sil	<1 mrad	Jaussian		
Polarization				Linear, horizonta	1		
	1.5.		2.0			2.5	25
Typical beam diameter ⁷⁾ Jitter ⁸⁾	1.5 1	mm	3.0 mm	4.0 mm	1.5 mm	2.5 mm	3.5 mm
Jitter				< 0.5 ns RMS			
OPTIONAL HARMONICS G	ENERATOR ⁹⁾						
Pulse energy							
526.5 / 532 nm	5 mJ	10 mJ	25 mJ	35 mJ	5 mJ	10 mJ	20 mJ
351 / 355 nm	3 mJ	6 mJ	15 mJ	20 mJ	3 mJ	6 mJ	12 mJ
263 / 266 nm	1.5 mJ	3 mJ	7.5 mJ	10 mJ	1.5 mJ	3 mJ	6 mJ
211 / 213 nm	0.5 mJ	1 mJ	2 mJ	3 mJ	0.5 mJ	1 mJ	2 mJ
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OPTIONAL ATTENUATOR ¹	0)						
Transmission range		0.5 -	- 95 %			1 – 95 %	
DIMENSIONS							
Laser head (W×L×H)			1	$60 \times 230 \times 141 \text{ mm}$	m ³		
Controller unit (W×L×H) Power adapter (W×L×H) ¹¹⁾				$\frac{108 \times 191 \times 59 \text{ mm}}{(120 \times 60 \text{ mm}^3 \text{ ty})}$			
Relative humidity Mains voltage				80 % (non-conder AC, single phase, 4	U.		
Average power consumption	30 W	40 W	70 W	80 W	50 W	80 W	100 W
VISILE ANDOR MUSILE LASER RADITON VISILE ANDOR MUSILE LASER RADITON REFLECTED OR SOLT TERED RADITTON REFLECTED OR SOLT TERED RADITTON MON (PA) 4323 4353 2482 218 Max. 100 mL, polar 410 m LB Mon. max 300 W CLASS IV LASER PRODUCT	VISILE ANDOR INV VISILE ANDOR INV REFLECTED OR SOA MALE TO AND A DEVE MALE TO AND A DEVE LD BOOM, MALE AND CLASS VI LASER	ISIBLE LASER RADIATION EXPOSURE TO DIRECT ITERED RADIATION 51, 263, 211 nm 10 ns 0 W	spi Ur arr an Th spi tyy ea 2) Fa	te to continuous improv ccifications are subject t iless stated otherwise al measured at fundame d maximum pulse repe e parameters marked t iccifications. They are in ofical performance and s ch unit we manufacture ctory-set pulse repetitio max repetition rate sho	o change. I specifications ntal wavelength tition rate. vpical are not dications of vill vary with c. n rate is fixed	 time photodiode. S version is available shorter by approx. detailed specificati Measured during 2 after warm-up. Over 8 hour period 	ared with 350 ps riss whort pulse duration p, with pulse duration 50%. Inquire for ons. 80 seconds operation 1 after 20 minutes o nbient temperature an ±2 °C.
DRAWINGS	64 100					 ⁷⁾ Beam diameter is a laser output at the ⁸⁾ In respect to falling triggering pulse. 	measured 20 cm fro 4σ level. g edge of pump diod
Ë				1		Q2 to companion in	vith our attachable generator (model SF tand-alone H-SMA
		175				harmonics general presented here are Please refer to hard datasheets for deta	tor. Pulse energies maximum values. monic generator
				Q2 laser head with SHG mode dimensions (in		harmonics generat presented here are Please refer to hari datasheets for deta ¹⁰⁾ Motorized attenua be attached to the Transmission can	or. Pulse energies maximum values. monic generator tiled specifications. tor intended to laser housing. be changed remotel erver control interfi- nensions might diffe re, depending on



SPECIFICATIONS AT 100/200 Hz pulse repetition rate ¹⁾

MODEL	Q2				
MODEL	-200	-100	-A100	-B100	-C100
Wavelength	1064 nm				
Pulse repetition rate ²⁾	200 Hz	Hz 100 Hz			
Pulse energy	1 mJ	2.5 mJ	5 mJ 10 mJ		20 mJ
Typical pulse duration ³⁾	< 10 ns		<8 ns		<7 ns
Pulse energy stability 4)	< 0.5 % RMS				
Power drift ⁵⁾	± 3.0 %				
Beam profile	Bell-shaped, >80% fit to Gaussian				
Beam divergence 6)	<2 mrad		<1.5 mrad		<1 mrad
Polarization	Linear, horizontal				
Typical beam diameter 7)	1.5	mm	2.0 mm	2.5 mm	3.5 mm
Jitter ⁸⁾	< 0.5 ns RMS				

OPTIONAL HARMONICS GENERATOR 9)

Pulse energy					
532 nm	0.5 mJ	1.25 mJ	2.5 mJ	5 mJ	10 mJ
355 nm	0.25 mJ	0.7 mJ	1.5 mJ	3 mJ	6 mJ
266 nm	0.1 mJ	0.3 mJ	0.7 mJ	1.5 mJ	3 mJ
213 nm	0.02 mJ	0.1 mJ	0.25 mJ	0.5 mJ	1 mJ

OPTIONAL ATTENUATOR ¹⁰⁾

Transmission range

DIMENSIONS

DIMENSIONS	
Laser head (W×L×H)	$160 \times 230 \times 141 \text{ mm}^3$
Controller unit (W×L×H)	$108 \times 191 \times 59 \text{ mm}^3$
Power adapter (W×L×H) ¹¹⁾	$192 \times 178 \times 46 \text{ mm}^3$ typical (for +28 VDC output)

1 - 95 %

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 ¹²⁾				
Average power consumption	40 W	50 W	70 W	80 W	100 W

DRAWINGS







Q2 laser head dimensions (in mm)



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- ¹²⁾ Laser can be powered from appropriate 12 or 28 VDC power source. Please inquire for details.



AUXILIARY EQUIPMENT

Compatible with our attachable 2nd harmonic generator, model SHG.

Compatible with all our H-SMART series harmonic generators

Attachable motorized attenuator for fundamental wavelength beam.

Attachable pulse energy monitor with analog and/or digital output



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