Q2 series

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

Weight < 9 kg incl. heatsink, controller & AC/DC adapter

> 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 2nd, 3rd, 4th or 5th harmonic generator

Optional two-channel pulse generator

Optional attachable beam guiding module

Optional stand-alone air-purging unit for long lifetime of UV optics

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)

Ophthalmology

Time-domain thermoreflectance (TDTR)



Quantum Light Instruments

DIODE PUMPED AIR-COOLED Q-SWITCHED LASER



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 to thermal 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, userfriendly turnkey system that requires little maintenance.

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There are no chillers or bulky power supplies that one needs fit under the table. All laser electronics are 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 or 450 μ s lead in internal triggering mode, depending on lasing wavelength. 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:

- > Attachable second harmonic generator, model SHG.
- > Stand-alone up to fifth harmonic generators of H-SMART series.
- > Attachable motorized attenuator for fundamental wavelength.
- > Attachable pulse energy monitor with analog and/or digital output.
- > Stand-alone two-channel pulse generator for smoothly variable pulse repetition rate, burst, double-pulse and other user-configurable modes of operation.
- > Attachable low power laser beam guiding module.
- > Stand-alone air purging unit for long lifetime of UV optics, when used together with HSMART harmonics generator.

SPECIFICATIONS AT 10 Hz pulse repetition rate ¹⁾

MODEL	Q2						
MODEL	-B10	-C10	-D10	-E10	-F10		
Wavelength		1064 / 1	1053 nm		1053 nm		
Pulse repetition rate ²⁾			10 Hz				
Pulse energy ³⁾	10 mJ	20 mJ	35 / 40 mJ	60 / 65 mJ	80 mJ		
Typical pulse duration 4)	< 8 ns			' ns	< 5 ns		
Pulse energy stability 5)	ulse energy stability ⁵⁾ < 0.5 % RMS						
Power drift ⁶⁾	± 3.0 %						
Beam profile	bell-shaped, >80% fit to Gaussian						
Beam divergence 7)	< 1.5	mrad		< 1 mrad			
Polarization		l	inear, horizonta	al			
Typical beam diameter ⁸⁾	1.5 1	mm	2.0 mm	3.0 mm	4.0 mm		
Jitter ⁹⁾			< 0.5 ns RMS				
OPTIONAL HARMONICS GEN Pulse energy ³⁾	ERATOR ¹⁰⁾						
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 ¹¹⁾							
Transmission range			0.5 – 95 %				
Transmission runge			0.0 90 10				
DIMENSIONS							
Laser head (W×L×H)		160	$0 \times 230 \times 141$ m	1m ³			
Controller unit (W×L×H)		10	$08 \times 191 \times 59 \text{ m}$	m ³			
Power adapter (W×L×H) ¹²⁾		$50 \times$	$125 \times 31 \text{ mm}^3 \text{ t}$	ypical			
OPERATING REQUIREMENTS							
Cooling requirements			air cooled				
Ambient temperature			15 – 30 °C				
Relative humidity		10 - 8	0 % (non-conde	ensing)			
Mains voltage				0,			
	90 – 230 VAC, single phase, 47 – 63 Hz ¹³⁾ 30 W 40 W 50 W		60 W				

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 Due to continuous improvements all specifications are subject to change.

- 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.
- ⁴⁰ 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⁾ Measured during 30 seconds operation after warm-up.
- 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⁾ 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.
- ¹¹⁾ Motorized attenuator intended to be attached to the laser housing. Transmission can be changed remotely trough laser web-server control interface.
- ¹²⁾ Power adapter dimensions might differ from indicated here, depending on model.
- ¹³⁾ Laser can be powered from appropriate 12 or 28 VDC power source. Please inquire for details.



unit

Quantum Light Instruments

Diode Pumped Air-cooled Q-switched Laser Q2

Nd:YLF 1053, 527, 351, 263, 21

Email: sales@qlinstruments.com

SPECIFICATIONS AT 20-50 Hz pulse repetition rate ¹⁾

MODEL	-B20	-C20	-D20	-E20	Q2 -D33	-E33	-B50	-C50	-D50
Wavelength	-D20		-D20 1064 / 1053 ni		-D35	-E35 1064 nm		.053 nm	-D50 1064 nm
Pulse repetition rate ²⁾			Hz		33 3	Hz	100471	50 Hz	1004 1111
Pulse energy ³⁾	8 / 10 mJ	16 / 20 mJ	32 / 40 mJ	60 / 65 mJ	40 mJ	60 mJ	8 / 10 mJ	16 / 20 mJ	40 mJ
Typical pulse duration ⁴⁾	,	7 ns	02, 10 11	,	5 ns	00 111)	< 7 ns	< 6 ns	< 5 ns
Pulse energy stability ⁵	.,	110			< 0.5 % RMS		() 110		
Power drift ⁶⁾					± 3.0 %				
Beam profile				bell-shape	ed, >80% fit to	Gaussian			
Beam divergence 7)	<1.5	mrad				<1 mrad			
Polarization				liı	near, horizont	al			
Typical beam diameter ⁸⁾	1.5	mm	3.0 mm		4.0 mm		1.5 mm	2.5 mm	3.5 mm
Jitter ⁹⁾					< 0.5 ns RMS				
OPTIONAL HARMONICS G	ENFRATOR	10)							
Pulse energy									
532 / 526.5 nm	4 / 5 mJ	8 / 10 mJ	16 / 20 mJ	30 / 32 mJ	20 mJ	30 mJ	4 / 5 mJ	8 / 10 mJ	20 mJ
355 / 351 nm	2.4 / 3 mJ	4.5 / 6 mJ	9 / 12 mJ	18 / 20 mJ	12 mJ	18 mJ	2.4 / 3 mJ	4.5 / 6 mJ	12 mJ
266 / 263 nm	1.2 / 1.5 mJ	2.4 / 3 mJ	5 / 6 mJ	9 / 10 mJ	6 mJ	9 mJ	1.2 / 1.5 mJ	2.4 / 3 mJ	6 mJ
213 / 211 nm	0.5 mJ	1 mJ	2 mJ	3 mJ	2 mJ	2.5 mJ	0.4 mJ	0.8 mJ	1.5 mJ
	11)								
OPTIONAL ATTENUATOR					1 05 0/				
Transmission range					1 – 95 %				
DIMENSIONS									
Laser head ($W \times L \times H$)				160	$\times 230 \times 141$ r	nm³			
Controller unit (W×L×H)				108	$\times 191 \times 59$ m	nm ³			
Power adapter (W×L×H) ¹²⁾				192 × 1	$78 \times 46 \text{ mm}^3$	typical			
OPERATING REQUIREMEN	JTS								
Cooling requirements					air cooled				
Ambient temperature					15 – 30 °C				
Relative humidity				10 - 80	% (non-cond	ensing)			
Mains voltage			9	00 – 230 VAC,	, single phase,	47 – 63 Hz ¹	3)		
Average power consumption	30 W	40 W	70 W	80	W	100 W	50 W	80 W	100 W
VISBLE ANDOR INVISILE LASER RADATION AND EVE OR SAN EXPOSURE TO DIRECT REFECTOR SAL ATTEMPT NAL YAG 1064. 322, 555, 262, 213 mm NaL YAG 1064. 322, 555, 262, 213 mm LD 800 nm, max 3000 W CLASS W LASER PRODUCT	VISIBLE AN AVOID EYE REFLECTE Nd:YLF 10 Max: 150 n LD 800 nm	NGCR NVISIBLE LASER RADA ON GIVEN DEVOSURE TO DORE ON SACHTERED ANALONO NO SACHTERED ANALONO NO SACHTERED ANALONO N, MAY 3000 W LASER PRODUCT	stron st	ecifications are st ated otherwise ali easured at funda. In a maximum pull- ie parameters ma ecifications. They ecifications. They reformance and w anufacture. actory-set pulse re ax repetition rate ternal triggering	improvements all ubject to change. I specifications ar mental waveleng se repetition rate. ware indications of are indications of vill vary with each expetition rate is fii shown in the tab mode repetition r er number down	Unless e th of typical h unit we xed at ele. In ate can	 xx/yy format 1064 nm wa 1053 nm ver At FWHM le measured wi Short pulse a with pulse di with pulse di warm-up. Over 8 hour 	vel at fundament th 350 ps rise tim luration version i uration shorter by etailed specificati uring 30 seconds o period after 20 m bient temperaturo	for second – for tal wavelength, te photodiode. is available, v approx 50%. ons. operation after tinutes of warm
							 Beam diame output at the output at the In respect to triggering put Q2 is compaa second harm and all mode harmonics ge here are max harmonic ge specification. Motorized at 	falling edge of pu ilse. tible with our atta onic generator (n els of stand-alone enerator. Pulse en cimum values. Pla nerator datasheet s. ttenuator intende	0 cm from laser mp diode nodel SHG) H-SMART tergies presenter ease refer to Is for detailed d to be attachee
	230	140.6		v ⁸¹ / ₁₆	Q2 laser head vith SHG moo limensions (ir		changed rem control inter ¹²⁾ Power adapt indicated her ¹³⁾ Laser can be	ousing. Transmis otely trough laser face. er dimensions mi re, depending on powered from ap ower source. Plea	r web-server ight differ from model. ppropriate 12

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Diode Pumped Air-cooled Q-switched Laser Q2

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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	200 Hz 100 Hz					
Pulse energy 3)	1 mJ	2.5 mJ	5 mJ	10 mJ	20 mJ		
Typical pulse duration 4)	< 1	< 10 ns < 8 ns					
Pulse energy stability ⁵⁾		< 0.5 % RMS					
Power drift 6)		± 3.0 %					
Beam profile		bell-shaped, >80% fit to Gaussian					
Beam divergence 7)	<2 mrad <1.5 mrad				<1 mrad		
Polarization		1	inear, horizonta	վ			
Typical beam diameter ⁸⁾	1.5	mm	2.0 mm	2.5 mm	3.5 mm		
Jitter ⁹⁾		< 0.5 ns RMS					

OPTIONAL HARMONICS GENERATOR¹⁰⁾

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 ¹¹⁾

Transmission range	

D.	IM	EN	٩S.	10	N	S

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) ¹²⁾	$192 \times 178 \times 46 \text{ mm}^3 \text{ typical}$

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 ¹³⁾				
Average power consumption	40 W	50 W	70 W	80 W	100 W	



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

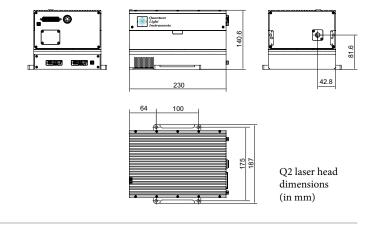
Attachable pulse energy monitor with analog and/or digital output

Stand-alone two-channel pulse generator

Attachable beam guiding module

Optional stand-alone air-purging unit for long lifetime of UV optics

DRAWINGS





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- 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.
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