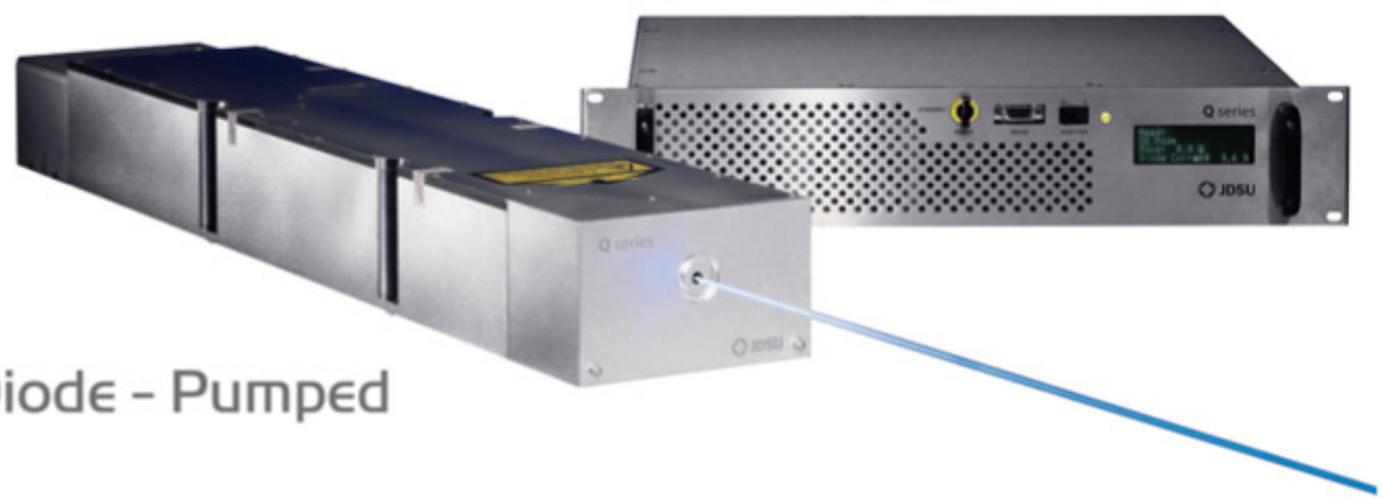
方全有限公司
Rapitech Enterprise Co.,Ltd.

脉动式固态激光器
Pulsed Solid-State Laser

JDSU



高功率脉冲UV激光器

High - Power Q - Switched Diode - Pumped UV Laser - Q Series

Key Features

- Highest commercially available pulse energy and peak power
- Tighter process control due to superior energy stabil ity enabled by unique intracavity harmonic generatio
- Capable of processing widest range of materials due to wide range of pulse energies and repetition rates
- High reliability due to low fluence in harmonic crystals and no cavity optic coatings exposed to UV
- 355 or 532 nm outputs available

Applications

- Solar cell processing
- Wafer scribing
- Full-cut thin wafer dicing
- Low-k dielectric grooving
- Micro via drilling
- Micromachining of silicon and metals

Q Series Laser Head Specifications

Parameter	Q301-HD	Q302-HD	Q303-HD	Q304-HD
Wavelength	355 nm	355 nm	355 nm	355 nm
Spatial mode	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}
M-squared *1	<1.2	<1.2	<1.2	<1.2
Waist location *1 (internal, from beam exit)	42±0.4 cm	42±0.4 cm	42±0.4 cm	42±0.4 cm
Waist diameter *1, $1/e^2$	0.26 mm nominal	0.26 mm nominal	0.26 mm nominal	0.26 mm nominal
Beam divergence *1, full angle	1.8±0.35 mrad	1.8±0.35 mrad	1.8±0.35 mrad	2.0±0.35 mrad
Beam pointing drift, full angle	<10 µrad/°C	<10 µrad/°C	<10 µrad/°C	<10 µrad/°C
Pointing drift, over 8 hours, full angle*2	<50 µrad	<50 µrad	<50 µrad	<50 µrad
Beam position accuracy, unit to unit	<2.5 mm from nominal	<2.5 mm from nominal	<2.5 mm from nominal	<2.5 mm from nominal
Beam pointing accuracy, unit to unit	<1° from nominal	<1° from nominal	<1° from nominal	<1° from nominal
Repetition rate				
Internally triggered	5 to 250 kHz	5 to 250 kHz	5 to 250 kHz	5 to 250 kHz
Externally triggered	0 to 250 kHz	0 to 250 kHz	0 to 250 kHz	0 to 250 kHz
Constant pulse energy range	<10 kHz	<30 kHz	<50 kHz	<40 kHz

Parameter		Q301-HD	Q302-HD	Q303-HD	Q304-HD
Average output power *3					
At 10, 20, and 30 kHz		≥10.0,8.0 and 6.0 W	-	-	-
At 30, 50, and 70 kHz		-	≥8.0,6.8,and 5.0 W	-	-
At 70, 100, and 130 kHz		-	-	≥6.5,4.5,and 2.9 W	-
At 40, 60, and 90 kHz		-	-	-	≥11.0,9.5,6.3 W
Pulse width *4					
At 10, 20, and 30 kHz		34±10,52±15,69±15 ns	-	-	-
At 30, 50, and 70 kHz		-	78±20,107±20,135±30 ns	-	-
At 70, 100, and 130 kHz		-	-	135±35,180±45,225±60 ns	-
At 40, 60, and 90 kHz		-	-	-	95±30,130±35,180±50 ns
Pulse energy fluctuations *5					
At 10, 20, and 30 kHz		<1.0%,10 – 30 kHz	-	-	-
At 30, 50, and 70 kHz		-	<1.5%,30 – 50 kHz	-	-
At 70, 100, and 130 kHz		-	-	<1.5%,<2.0%,<2.5%	-
At 40, 60, and 90 kHz		-	-	-	<1.5%,40 – 90 kHz
Power drift over 8 hours *2,6		<±2%	<±2%	<±2%	<±2%
Beam roundness		>85% circular	>85% circular	>85% circular	>85% circular
Polarization		>100:1,horizontal	>100:1,horizontal	>100:1,horizontal	>100:1,horizontal
Warm-up time	From cold start	<20 minutes	<20 minutes	<20 minutes	<20 minutes
	From standby	<10 minutes	<10 minutes	<10 minutes	<10 minutes
Operating ambient temperature		15 to 35°C	15 to 35°C	15 to 35°C	15 to 35°C
Relative humidity, non-condensing		10 to 80%	10 to 80%	10 to 80%	10 to 80%
Weight		14.5 kg	14.5 kg	14.5 kg	14.5 kg

*1. Specifications hold over different repetition rate ranges, depending on the laser model, as follows: Q301 from 10 to 30 kHz, for Q302 from 30 to 70 kHz, for Q303 from 70 to 130 kHz, and Q304 from 40 to 90 kHz.
*2. Ambient temperature constant ±2°C.
*3. Averaged for 1 hour after >80 minutes of continuous operation.
*4. Pulse duration measured according to method detailed in JDSU application note titled “Optical Pulse Width Measurement Techniques for Q-Series Lasers.”
*5. Pulse Energy Fluctuations = $\sigma / \mu \times 100\%$, σ = standard deviation, μ = average pulse energy.
*6. Measured after more than 80 minutes of continuous operation.

Product Code	Description
Q301-HD	355 nm, 10 W class, 10 to 30 kHz
Q302-HD	355 nm, 10 W class, 30 to 70 kHz
Q303-HD	355 nm, 10 W class, 70 to 130 kHz
Q304-HD	355 nm, 11 W class, 40 to 90 kHz

Q Series Laser Head Specifications **Continued**

Parameter		Q331-HD	Q332-HD	Q333-HD
Wavelength		355 nm	355 nm	355 nm
Spatial mode		TEM_{00}	TEM_{00}	TEM_{00}
M-squared *1		<1.2	<1.2	<1.2
Waist location *1 (internal,from beam exit)		42±0.4 cm	42±0.4 cm	42±0.4 cm
Waist diameter *1, $1/e^2$		0.26 mm nominal	0.26 mm nominal	0.26 mm nominal
Beam divergence *1, full angle		1.8±0.35 mrad	1.8±0.35 mrad	1.8±0.35 mrad
Beam pointing drift, full angle		<10 µrad/°C	<10 µrad/°C	<10 µrad/°C
Pointing drift, over 8 hours, full angle *2		<50 µrad	<50 µrad	<50 µrad
Beam position accuracy, unit to unit		<2.5 mm from nominal	<2.5 mm from nominal	<2.5 mm from nominal
Beam pointing accuracy, unit to unit		<1° from nominal	<1° from nominal	<1° from nominal
Repetition rate	Internally triggered	5 to 250 kHz	5 to 250 kHz	5 to 250 kHz
	Externally triggered	0 to 250 kHz	0 to 250 kHz	0 to 250 kHz
Constant pulse energy range		<10 kHz	<30 kHz	<50 kHz
Average output power *3				
At 10, 20, and 30 kHz		≥5.0,4.0 and 3.0 W	-	-
At 30, 50, and 70 kHz		-	≥4.0,3.4,and 2.5 W	-
At 70, 100, and 130 kHz		-	-	≥3.6,2.5,and 1.6 W
Pulse width *4				
At 10, 20, and 30 kHz		34±10,52±15,69±15 ns	-	-
At 30, 50, and 70 kHz		-	78±20,107±20,135±30 ns	-
At 70, 100, and 130 kHz			-	132±30,168±40,204±55 ns
Pulse energy fluctuations *5				
At 10, 20, and 30 kHz		<2.0%,10 – 30 kHz	-	-
At 30, 50, and 70 kHz		-	<3%,30 – 50 kHz	-
At 70, 100, and 130 kHz		-	-	<3%,<2.0%,<2.5%
Power drift over 8 hours *2,6		<±2%	<±2%	<±2%
Beam roundness		>85% circular	>85% circular	>85% circular
Polarization		>100:1,horizontal	>100:1,horizontal	>100:1,horizontal
Warm-up time	From cold start	<20 minutes	<20 minutes	<20 minutes
	From standby	<10 minutes	<10 minutes	<10 minutes
Operating ambient temperature		15 to 35°C	15 to 35°C	15 to 35°C
Relative humidity, non-condensing		10 to 80%	10 to 80%	10 to 80%
Weight		14.5 kg	14.5 kg	14.5 kg

*1. Specification holds over different repetition rate ranges, depending on the laser model, as follows: Q331 from 10 to 30 kHz, for Q332 from 30 to 70 kHz, for Q333 from 70 to 130 kHz.
*2. Ambient temperature constant ±2°C.
*3. Averaged for 1 hour after >80 minutes of continuous operation.
*4. Pulse duration measured according to method detailed in JDSU application note titled "Optical Pulse Width Measurement Techniques for Q-Series Lasers."
*5. Pulse Energy Fluctuations = $\sigma / \mu \times 100\%$, σ = standard deviation, μ = average pulse energy.
*6. Measured after more than 80 minutes of continuous operation.

Product Code	Description
Q331-HD	355 nm, 5 W class, 10 to 30 kHz
Q332-HD	355 nm, 5 W class, 30 to 70 kHz
Q333-HD	355 nm, 5 W class, 70 to 130 kHz

Q-PS-1000R Power Supply

Parameter	Specification
Front panel/display	Power on/offkey Shutter open/closed switch (Status LED) Status Display (4 line x 20 character vacuum fluorescent) RS232 Serial Port Connector (9-pin D-sub)
Rear panel	RS232 Serial Port Connector (Identical to front panel) Interlock connector (2-pin,0.1”spacing) Q switch RF connector (SMA connector) Umbilical connector (multi-pin D-shaped) Chiller communication port (9-pin D-sub) Emission indicator connector (2-pin,0.1”spacing) External control port (10-pin 3M-style) Slot for optional standard or custom interface board (standard with 3 BNC connectors) Ground pin Fuse holder Power Switch Power cord connector
Weight	20.5 lbs (9.3 kg)
Umbilical cable length	Standard:10 ft.(3.0 m);optional:16.4 ft.(5.0 m)
Frequency	100 to 240 V AC,50 – 60 Hz
Power	<550 W (400 W typical)
Input and Ambient	
Voltage,frequency	100 to 240 V AC,50 – 60 Hz
Power	<550 W (400 W typical)
Operating ambient temperature	15 to 35°C
Relative humidity,non-condensing	10 – 80%
Storage temperature	-20 to 55°C

QA-CH Chiller

Parameter	Specification
Cooling capacity	>300 W
Refrigerant	R134a
Coolant	Distilled or tap water
Reservoir volume	<1 gal (3.8 l)
Coolant flow rate	<0.4 gpm at 6 psi (1.5 lpm at 0.4 atm)
Weight,reservoir empty	121 lbs (55 kg)
Hose length	Standard:9.5 ft (2.9 m);optional:16 ft (4.9 m)
Control cable length	10 ft (3.0 m)
Input and Ambient	
Voltage,frequency *1	90 to 110 and 180 to 220 V AC,50 Hz 105 to 125 and 210 to 250 V AC,60 Hz
Power	<1000 W (700 W typical)
Operating ambient temperature	15 to 35°C
Relative humidity,non-condensing	10 to 80%
Storage temperature	-20 to 55°C
Orientation	Upright position only

*1. For 200 / 230 VAC version,the model number is QA-CH-E.

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