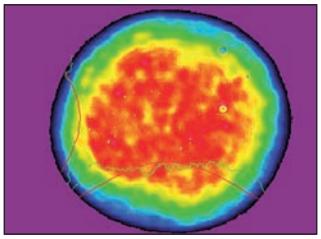
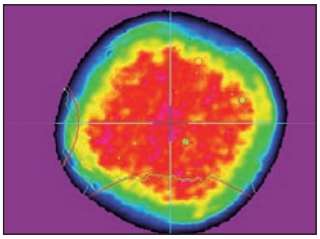
C.F.R.

Compact Folded Resonator
Rugged Q-Switched Nd: YAG oscillator
400mJ at 1064nm, up to 100Hz
Stable or GRM resonator
Up to 4th harmonic available
1.57µm OPO for "Eyesafe" operation
1 flashlamp, air-water heat exchanger
Extremely compact power supply, detachable cables

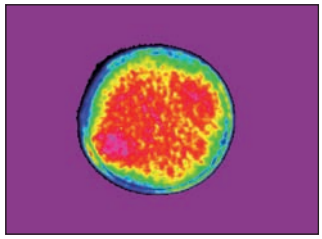
Beam profile in near field @1064 nm, Stable Resonator



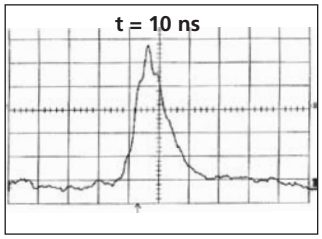
Beam profile in near field @532 nm, Stable Resonator



Beam profile in near field @355 nm, Stable Resonator



Temporal profile @1064 nm, 20 Hz



Optical Laser Head	84 x 323 x 94 3.6 kg	(3.3 x 12.7 x 3.7) (8 lbs)
Integrated Cooling and Electronic		
ICE 450	360 x 435 x 133 14 kg	(14.2 x 17.2 x 5.25) (31 lbs)
ICE 1000 (for High Rep. Rate)	585 x 592 x 286 55 kg	(23.1 x 23.3 x 11.3) (121 lbs)
ICE 450 Rack 19" (optional)	133 x 508 x 483 14.5 kg	(5.25 x 20 x 19) (32 lbs)
Remote Control	195 x 100	(7.7 x 4)
OPTIONS		
Harmonic Generators	installed in the laser head	
Wavelength Separation ω/2ω (WS2)	installed in the laser head	
Wavelength Separation 2 outputs (res*/3ω or 4ω) (WS2)	L = 43 / 0.5 kg	(1.7 / 1 lbs)
Wavelength Separation 3 outputs (WS3)	L = 73 / 1 kg	(2.85 / 2.4 lbs)
High Purity option (WSP)	L = 73 / 1 kg	(2.85 / 2.4 lbs)
OPO	L = 107 / 1.8 kg	(4.2 / 3.9 lbs)

All dimensions HxLxW are in mm (inch), all weights are in kg (lbs).
** residuals*

External synchronization flexibility: flashlamp and Q-Switch control through TTL signals, RS232 or remote box

Dimensions of the Laser Head

ICE 450

ICE 450 Rack 19"

ICE 1000

SPECIFICATIONS

	(nm)	CFR 200											CFR 300				CFR 400					
Resonator[2]		TEM00[1]	Stable					GRM					Stable		GRM		Stable			GRM		
Repetition rate (Hz)		To 100	To 10	To 20	To 30	**To 50	**To 100	10	20	30	**50	**To 100	To 10	To 20	10	20	To 10	To 20	**To 30	10	20	**30
Energy per pulse (mJ)	1064	10	200			125	30	200		180	100	25	300		270		400		330	330		
	532	6	130			70	15	130			60	15					230		190	200		170
	355	2.5	70		50		6	70	60			5					90		80	90	80	
	266	1	50		30		3	50	50	25												
	1.57µm*				35												70	65	65			
Energy stability (%)[3]	1064	<3	<2		<2	<3	<4	<2		<2	<3	<4	<2.5		<2		<2					
	532	<4	<2.5		<2.5	<4	<5	<2.5		<2.5	<4	<5					<2.5					
	355	<5	<2		<3		NA	<2				NA					<2					
	266	<5	<3		<3		NA	<3		<3												
	1.57µm*				<5												<5					
Pulse duration (ns)[4]	1064	11	11		11	15	12	8		9	16	14	9		8		8			9		
	532	12	8		8	14	11	8		8	12	9					7			8		
	355	11	9		8		NA	7				NA					7			7		
	266	11	8		8		NA	8		8												
	1.57µm*				12												9					
Beam divergence (mrad)[5]	1064	<2	<4		<4	<4	<3	<1.5					<5		<1.5		<4.5		<5	<1.5		
	532	<1.5	<4		<4	<3.5	<3	<1.5									<3.5		<4.5	<1.5		
	355	<1	<3.5		<3		NA	<1.5				NA					<3.5		<4	<1.8		
	266	<1	<3.5		<3.5		NA	<1.5														
	1.57µm*				<12												<12					
Beam diameter (mm)	1064	1.5	6.35				3	6.35				3	6.35				7					
Pointing stability (µrad)[6]	All	100																				
Jitter, (+/-ns WRT Q-Switch)[7]	All	<2											<2				<2					
Q-Switch delay (s)[8]	All	2																				

* *other wavelength upon request*
** *power supply: ICE 1000*

The specifications correspond to the selected primary wavelength

[1] TEM00 is delivered only with the smaller diameter rod. Energies are engineering values
[2] Stable systems may operate over a wide range of repetition frequencies; GRM lasers may not have such flexibility
[3] Variation from mean for 99% of shots (RMS)
[4] FWHM +/-2ns
[5] Angle containing 86.5% energy. Other methods can predict lower values for GRM systems
[6] Full angle, 99% of shots
[7] Measured from Q-Switch Sync. Output
[8] Disables Q-Switch until after resonator has stabilized
[9] For IR laser head only. Temperature performance available upon request for higher harmonics
[10] 10% energy drop at 1064 nm
[11] Optional dual dichroic (WS2/WS3)
[12] Optional quad dichroic (WSP) only available on 355 nm or 266 nm

Specifications applying to all 1064 nm systems			
	Energy Drift over 8 hours period	<10%	
	Temperature Range	Operating[9] 10/40°C	Storage 5/70°C
	Ethylene Glycol Option (EGW)[10]	Operating[9] -10/40°C	Storage -30/70°C
	Flash lamps lifetime	> 50 millions shots	
	Max. Altitude	3000 m (10,000 feet)	

Wavelength (nm)	**Polarization**	**Spectral Purity (%)[11]**	**High Spectral Purity (%)[12]**
1064	H		
532	V	> 97	> 99.5
355	V	> 90	> 99.5
266	V	> 85	> 99
1.57 µm	V	> 99.9	

Linewidth (cm^{-1})	
1064 nm	<1
532 nm	<2
355 nm	<3
266 nm	<4
1.57 µm	<20

Service Requirement: Power: 100-240V, 10A, 50/60Hz, single phase
Cable length: 3 m. 0ther lengths available upon request
Options: Wavelength Separation Packages: two or three apertures on request (WS2 or WS3)
High Spectral Purity (WSP)
Motorized Variable Attenuator (MTA) for IR (installed in the laser head). Manual (MNA) version on request
Low Temperature Operation (EGW)
ICE 450 Rack 19”

Note on Beam Divergence: Quantel USA pioneered beam measurement software and measures divergence as angle containing energy. For GRM systems, this returns a figure which can be considerably larger than that given using alternative criteria.

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