



# HyperRapid NX SmartCleave

Coherent HyperRapid NX is the world leading industrial high power picosecond platform. Since its release in 2016, it has set the benchmark for high-end applications in 24/7 production environment.

Combining cutting edge laser technology with Coherent's patented SmartCleave® process, HyperRapid NX SmartCleave delivers unmatched performance in high-speed transparent and brittle material cutting applications.

Coherent SmartCleave is a kerf-less cutting process allowing for superior cutting speed and quality on arbitrarily curved outer or inner contours in substrate thicknesses up to several millimeters. The laser performance has been optimized to cut a wide range of transparent and brittle materials, such as strengthened and unstrengthened glass, sapphire or transparent ceramics at industry leading speeds up to 2 m/s with excellent edge quality.

HyperRapid NX SmartCleave delivers over 100W output power, with burst energy above 720  $\mu$ J at repetition rate up to 140 kHz. The 1064-50 model is optimal for cost-sensitive applications, while the 1064-100 enables high speed applications.

HyperRapid NX SmartCleave features HyperRapid NX market-leading triggering capabilities and compact system design. It also offers a fully specified burst mode operation space to guarantee repeatable cutting performance in large installation.

Right of use the Coherent SmartCleave IP is included, therefore offering peace of mind to our customers developing business in this highly competitive area of applications.

## FEATURES

- Single wavelength output: 1064 nm
- Power over 100W with single pulse energy above 250  $\mu$ J
- Burst energy over 720  $\mu$ J
- Fully specified burst mode operation for repeatable performance in volume manufacturing
- Compact and light weight, same interfacing for all models

## APPLICATIONS

- Specifically optimized for high-speed and high-quality cutting of transparent and brittle materials (strengthened/unstrengthened glass, sapphire, ceramics) with Coherent patented SmartCleave process
- Scribing and drilling of strengthened glass, sapphire, ceramics and other tough materials, also composites



SPECIFICATIONS <sup>1,2,3,4,5</sup>	HyperRapid NX	
	1064-50	1064-100
Single Wavelength Output (nm)	1064	
Amplifier Single Pulse Repetition Rate (kHz)	170 to 1000	400 to 1000
Output Pulse Repetition Rate Range (kHz)	0 to 1000	
Pulse Duration (ps)	<15	
Average Power (W)	≥50 <sup>6</sup>	≥100
Average Power Stability <sup>7</sup> (RMS 1σ, %)	≤1	
Pulse Energy (μJ)	≥250	
Pulse-to-Pulse Energy Stability (RMS 1σ, %)	≤1	
Beam Quality Parameter (M <sup>2</sup> )	≤1.3	
Beam Diameter, 1 m in Front of Laser (mm)	5.0 ±0.5	
Beam Divergence, Full Angle (mrad)	≤1	
Beam Circularity, 1 m in Front of Laser (%)	≥85	
Beam-Pointing Stability (μrad/°C)	≤50 (peak-to-peak)	
Bore Sight Accuracy		
Lateral (mm) (beam to specified exit location)	≤1	
Angular (mrad) (beam to specified exit direction)	≤5	
Direction of Polarization	Vertical	
Polarization Ratio	>100:1	
Warm-up Time from Chiller Start (minutes)	<45	
Electrical Supply	100 to 230V AC/50 to 60 Hz/2.5 kW	
Mounting Orientation	Horizontal	
Chiller	Water-to-Air or Water-to-Water	
Dimensions		
Laser Head (mm)	600 x 780 x 245	
TDK Power Supply	19" rack	
SMC Chiller (mm)	500 x 317 x 615	
Weight (kg)		
Laser Head	~70	
TDK Power Supply	16	
SMC Chiller	43	
BURST MODE OPERATION		
Number of Pulses in the Burst	2 to 10	
Burst Mode Operation Range (kHz)	See table on next page	
Total Energy in the Burst (μJ)	See table on next page	
OPERATING SPECIFICATIONS		
Allowed Temperature Range During Operation (°C)	+15 to +30 (free of condensation)	
Humidity (%)	[0-90] RH, non-condensing,	
Dew-point (°C)	<22	

<sup>1</sup> At lowest amplifier pulse repetition rate, unless stated otherwise.

<sup>2</sup> Maximum output power (variable attenuator and process shutter at maximum transmission).

<sup>3</sup> After warm-up time.

<sup>4</sup> Steady-state (no pulse gating or change of pulse repetition rate).

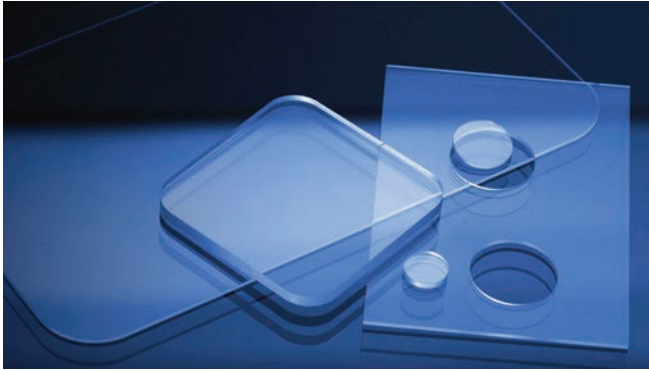
<sup>5</sup> Single-pulse operation (burst number = 1).

<sup>6</sup> At 500 kHz.

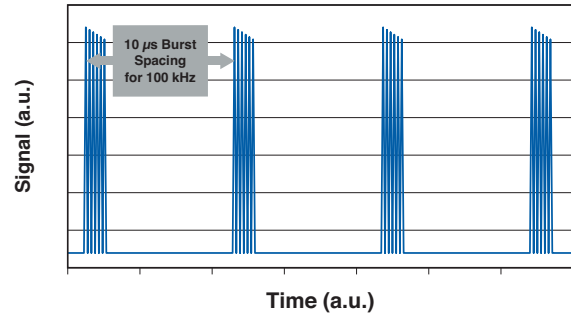
<sup>7</sup> Over 8 hours, ± 1°C ambient temperature.

TYPICAL PERFORMANCE CHARTS

Example of Glass Parts Laser Cut with SmartCleave



Oscilloscope Trace Showing 5 Pulses in the Burst at 100 kHz Repetition Rate. The Pulses in the Burst are Separated by 25 ns.

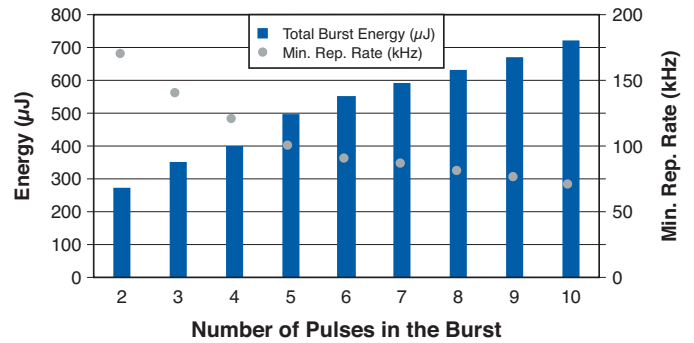


Specifications: HRNX 1064-50 SmartCleave

Number of Pulses in the Burst	Burst Energy <sup>1</sup> (μJ)	Min. Rep. Rate (kHz)	Max. Rep. Rate (kHz)
2	275	170	1000
3	350	140	1000
4	400	120	1000
5	500	100	1000
6	550	90	830
7	590	85	710
8	630	80	620
9	670	75	550
10	720	70	500

<sup>1</sup> Burst energy specification is given at the minimum repetition rate.

HyperRapid NX SmartCleave 1064-50

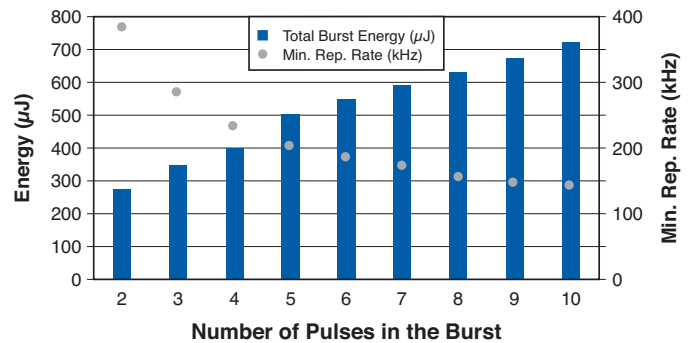


Specifications: HRNX 1064-100 SmartCleave

Number of Pulses in the Burst	Burst Energy <sup>1</sup> (μJ)	Min. Rep. Rate (kHz)	Max. Rep. Rate (kHz)
2	275	380	1000
3	350	280	1000
4	400	230	1000
5	500	200	1000
6	550	180	830
7	590	170	710
8	630	150	620
9	670	145	550
10	720	140	500

<sup>1</sup> Burst energy specification is given at the minimum repetition rate.

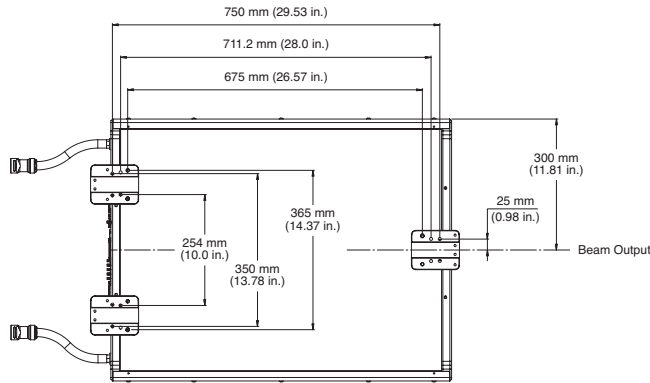
HyperRapid NX SmartCleave 1064-100



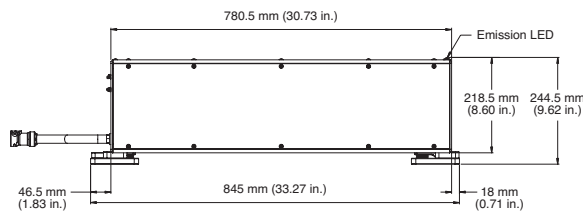
**MECHANICAL SPECIFICATIONS**

**Laser Head**

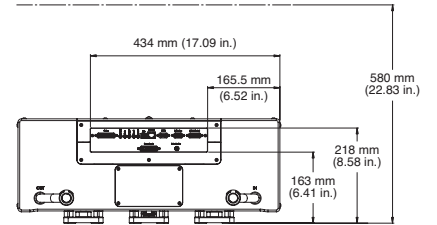
**Top View**



**Side View**

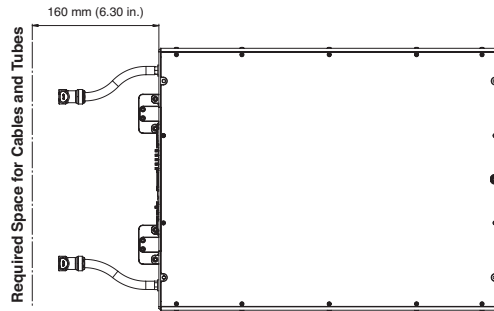
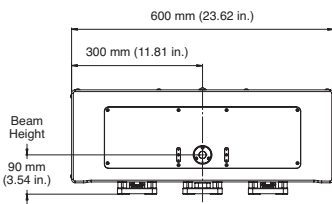


**Required Space for Service**



**Rear View**

**Front View**



**Bottom View**



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Coherent follows a policy of continuous product improvement. Specifications are subject to change without notice.

Coherent offers a limited warranty for all HyperRapid lasers. For full details of this warranty coverage, please refer to the Service section at [www.Coherent.com](http://www.Coherent.com) or contact your local Sales or Service Representative. Printed in the U.S.A. MC-XXX-17-0M0717 Copyright ©2017 Coherent, Inc.

