

HyperRapid NX SmartCleave

High-Speed and High-Quality Brittle Material Processing

HyperRapid NX SmartCleave is an industrial high-power picosecond laser that is specifically optimized for high-speed and high-quality cutting of transparent and brittle materials. Using the Coherent patented SmartCleave technology, HyperRapid NX delivers kerf-less cutting on arbitrarily curved outer or inner contours.

HyperRapid NX SmartCleave features 1 millijoule burst energy to cut thick substrate in a single pass with sub-micron edge roughness, therefore enabling new applications in the automotive and consumer electronics markets.

The 50 W average power model is optimal for cost-sensitive applications, while the 100 W version enables high speed applications up to 2 m/s.

FEATURES & BENEFITS

- 1064 nm output
- 100 W power to enable high throughput
- Over 1000 μJ burst energy to cut thicker samples
- Specified burst mode operation for repeatable performance in volume manufacturing
- Compact and light weight, same interfacing as standard HyperRapid NX to allow straightforward integration
- Right of use to the Coherent SmartCleave IP is included

APPLICATIONS

- Cutting of strengthened and unstrengthened glass, sapphire, and ceramics
- Scribing and drilling of glass, sapphire, ceramics, and composite materials



OPTICAL SPECIFICATIONS ^{1,2,3,4,5}	HyperRapid NX SmartCleave 1064-50	HyperRapid NX SmartCleave 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 ⁶	100
Average Power Stability ⁷ (RMS 1 σ ,%)	≤1	
Pulse Energy (μJ)	250	
Pulse-to-Pulse Energy Stability (RMS 1 σ , %)	≤1	
Beam Quality Parameter (M ²)	≤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	600 x 780 x 245 mm (23.6 x 30.7 x 9.6 in.)	
Power Supply	3U 19" rack	
SMC Chiller	500 x 317 x 615 mm (19.7 x 12.5 x 24.2 in.)	
Weight		
Laser Head	70 kg (154.3 lbs.)	
Power Supply	16 kg (35.3 lbs.)	
SMC Chiller	43 kg (94.8 lbs.)	
BURST MODE OPERATION		
Maximum Number of Pulses in the Burst ⁸	20	
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	+15°C to +30°C (free of condensation)	
Humidity (%)	0 to 90 RH, non-condensing, Dew-point <22°C	

1 At lowest amplifier pulse repetition rate, unless stated otherwise.

2 Maximum output power (variable attenuator and process shutter at maximum transmission).

3 After warm-up time.

4 Steady-state (no pulse gating or change of pulse repetition rate).

5 Single-pulse operation.

6 At 500 kHz.

7 Over 8 hours, ± 1°C ambient temperature.

8 Maximum number of pulses in the burst depends on repetition rate.

Specifications: HyperRapid NX SmartCleave 1064-50

Number of Pulses in the Burst	Burst Energy ¹ (μJ)	Min. Rep. Rate (kHz)	Max. Rep. Rate (kHz)
2	400	110	1000
3	520	85	1000
4	600	75	1000
5	700	65	1000
6	750	60	830
7	830	55	710
8	875	55	620
9	925	50	550
10	1000	50	500

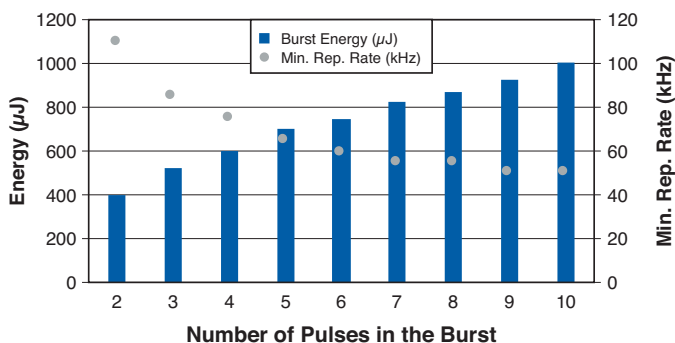
¹ Burst energy specification is given at the minimum repetition rate.

Specifications: HyperRapid NX SmartCleave 1064-100

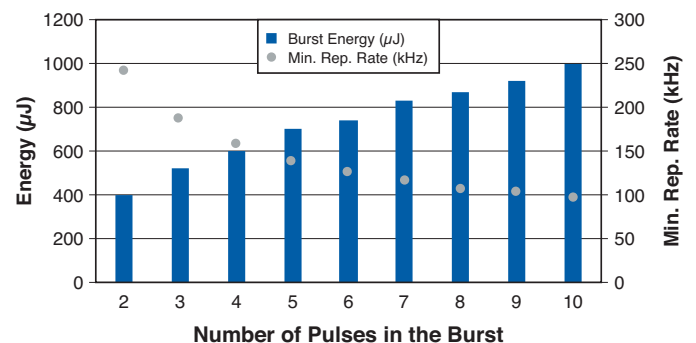
Number of Pulses in the Burst	Burst Energy ¹ (μJ)	Min. Rep. Rate (kHz)	Max. Rep. Rate (kHz)
2	400	240	1000
3	520	185	1000
4	600	155	1000
5	700	135	1000
6	750	125	830
7	830	115	710
8	875	105	620
9	925	100	550
10	1000	95	500

¹ Burst energy specification is given at the minimum repetition rate.

HyperRapid NX SmartCleave 1064-50

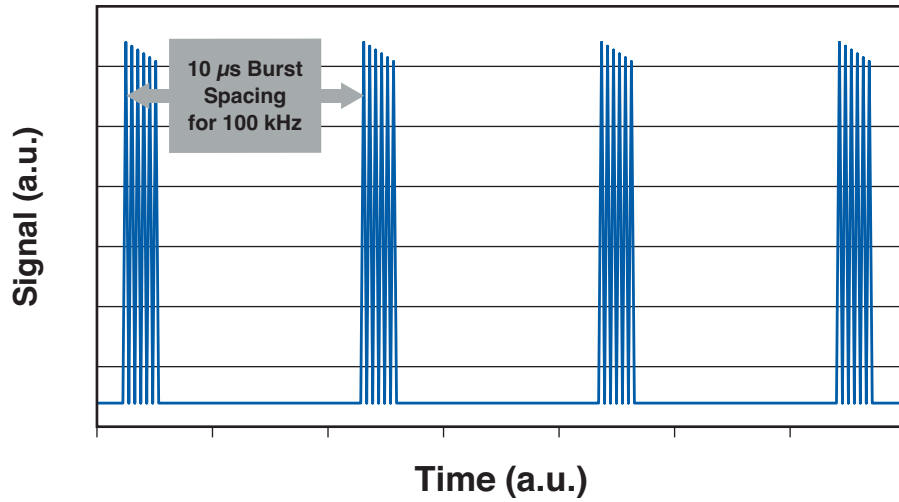


HyperRapid NX SmartCleave 1064-100



HyperRapid NX SmartCleave Burst Mode Operation

Oscilloscope trace showing 5 pulses in the burst at 100 kHz repetition rate. The pulses in the burst are separated by 25 ns



HyperRapid NX SmartCleave Applications

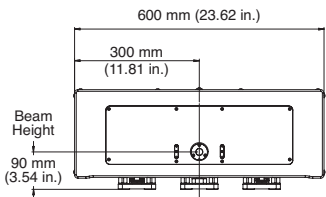
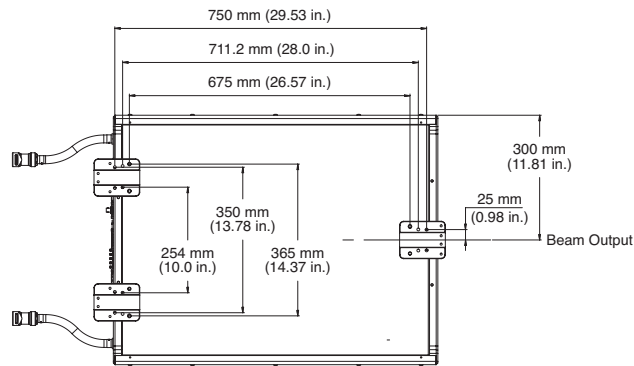
Typical industrial applications served by HyperRapid NX SmartCleave: glass cutting (left), automotive dashboard cutting (right)



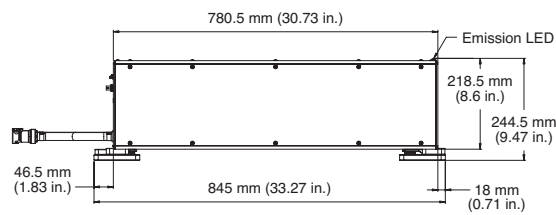
MECHANICAL SPECIFICATIONS

HyperRapid NX SmartCleave

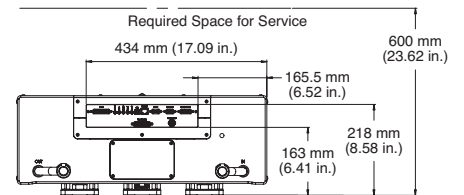
Bottom View



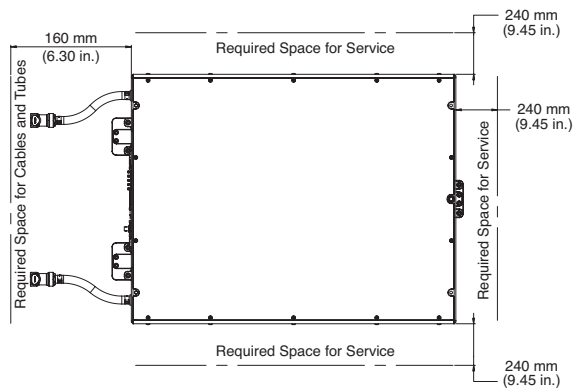
Front View



Side View



Rear View



Top 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 HRNX SmartCleave Lasers. For full details of this warranty coverage, please refer to the Service section at www.coherent.com or contact your local Sales or Service Representative.
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