



# HyperRapid NX

## The Next Generation High Power Industrial Picosecond Laser

HyperRapid NX is Coherent's latest high power industrial picosecond laser platform. It combines over 15 years of experience pioneering this market with the latest technological innovations.

HyperRapid NX delivers over 250  $\mu\text{J}$  pulse energy with 10 ps duration at repetition rates up to 1 MHz. Output power is over 100W in the IR, 50W in the visible and 30W in the UV. These performance levels help reducing the Total Cost of Ownership for a production process in micromachining applications, for instance by simultaneously feeding 2 work stations within one machine.

HyperRapid NX enables the most advanced applications with state-of-the-art pulse control and synchronization features. Pulses can be triggered on-demand with low jitter (<25 ns) and trigger-to-pulse delay.

The fast process shutter allows both on/off control and energy attenuation for each individual pulse.

Burst mode can be selected to determine how many 10 ps-pulses with 25 ns separation should be released in an envelope. Processing with bursts enhances the ablation rate on many materials and increases the process efficiency.

The HyperRapid NX laser head is a self-contained system where all optical elements, control electronics and thermo-mechanical management are integrated. Its compact, lightweight design complies with state-of-the-art international safety regulation.

Choose HyperRapid NX and be part of the industrial photonics revolution.

### FEATURES

- Single wavelength output: 1064 nm, 532 nm, or 355 nm
- High power and burst mode for high throughput at significantly reduced TCO
- High energy at high repetition rates up to 1 MHz
- Time and amplitude control of each individual pulse
- Extended lifetime performance, also at high power in the UV
- Compact and light weight, same interfacing for all models

### APPLICATIONS

- Cutting and drilling of strengthened glass, sapphire, ceramics and other tough materials, also composites
- Cutting, drilling, selective removal of complex composite structures from dissimilar materials, including oxides, plastics, organics
- Micromachining and structuring of large surfaces with line focusing or multiple beams



SPECIFICATIONS <sup>1,2,3,4,5</sup>	HyperRapid NX					
	1064-50	532-25	355-15	1064-100	532-50	355-30
Single Wavelength Output (nm)	1064	532	355	1064	532	355
Amplifier Pulse Repetition Rate (kHz)	200 to 1000		400 to 1000			
Output Pulse Repetition Rate (kHz)	0 to 1000					
Pulse Duration (ps)	<15					
Average Power (W)	≥50 <sup>6</sup>	≥25	≥15	≥100	≥50	≥30
Average Power Stability <sup>7</sup> (RMS 1σ, %)	≤1					
Pulse Energy (μJ)	≥220	≥125	≥75	≥250	≥125	≥75
Pulse-to-Pulse Energy Stability (RMS 1σ, %)	≤1	≤2	≤2	≤1	≤2	≤2
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 (beam to specified exit location)						
Lateral (mm)	≤1					
Angular (mrad)	≤5					
Direction of Polarization (Vertical/Horizontal)	V	H	H	V	H	H
Polarization Ratio	>100:1					
Humidity	0 to 90% RH, non-condensing, Dew-point <22 °C					
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	~57					
TDK Power Supply	16					
SMC Chiller	43					
Burst Mode Operation						
Burst Mode Operation Range (kHz)	100 to 1000		200 to 1000			
Total Energy in the Burst <sup>8</sup> (μJ)	≥500	N/A	N/A	≥500	N/A	N/A
Maximum Number of Bursts <sup>9</sup>	10					
OPERATING SPECIFICATIONS						
Allowed Temperature Range During Operation (°C)	+15 to +30 (free of condensation)					
Humidity	[0 to 90]% RH, non-condensing, Dew-point <22°C					

<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.

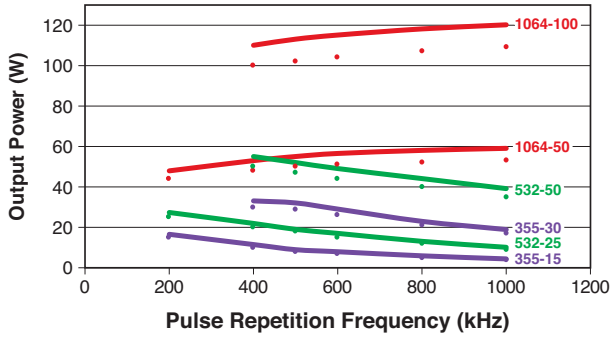
<sup>7</sup> Over 8 hours, ± 1°C ambient temperature.

<sup>8</sup> With 5 pulses in the burst, at the lowest burst mode operation range frequency.

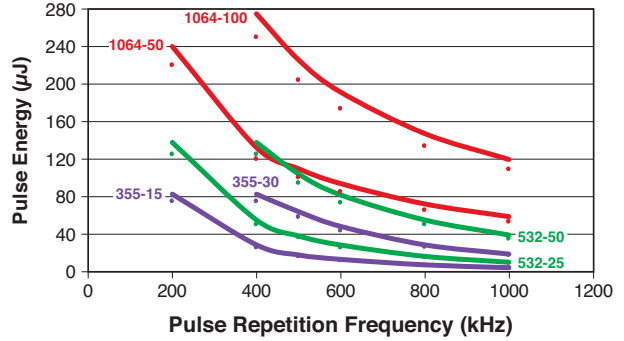
<sup>9</sup> (Pulse repetition rate) x (number of burst) cannot exceed 5 MHz.

## TYPICAL PERFORMANCE CHARTS

**Average Power: Specification Points and Typical Curves**



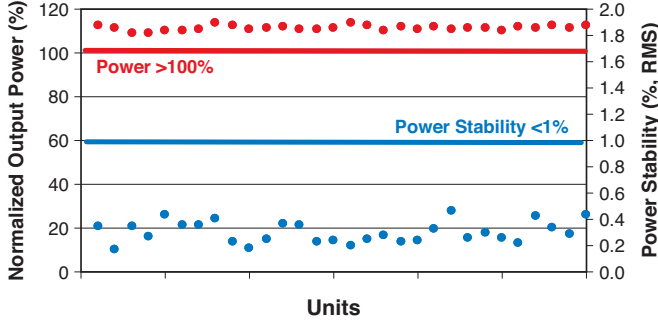
**Single Pulse Energy: Specification Points and Typical Curves**



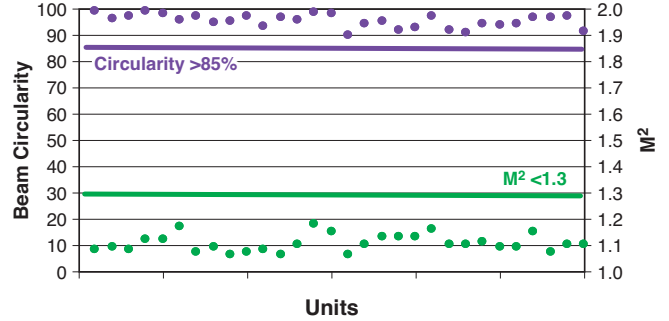
## TYPICAL MANUFACTURING DATA FOR HyperRapid NX 355-30 (30W UV)

HyperRapid NX is able to deliver cutting-edge performance in volume. Manufacturing data shows the excellent performance and reliable consistency across a large number of laser systems.

**Average Power and Power Stability**

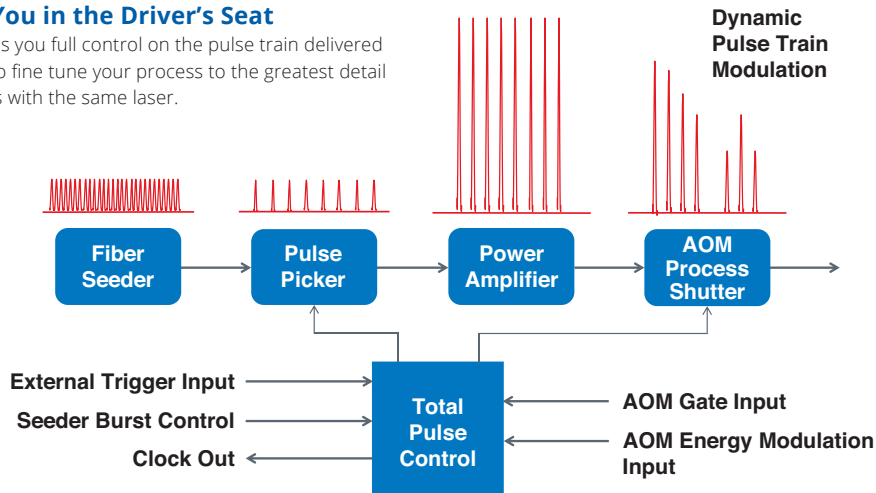


**Beam Quality: M<sup>2</sup> and Beam Circularity**



## SmartPulse™: Placing You in the Driver's Seat

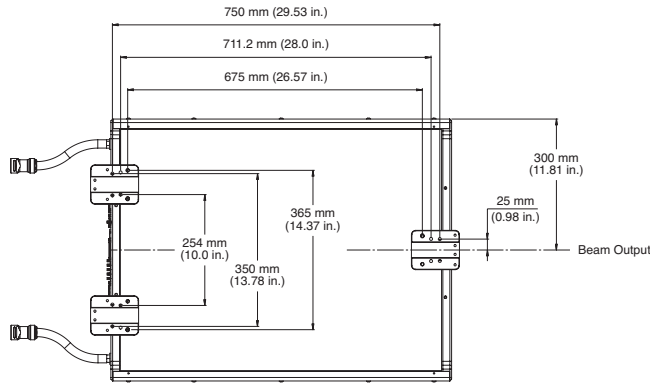
HyperRapid NX architecture gives you full control on the pulse train delivered to the workpiece. You are able to fine tune your process to the greatest detail or address different applications with the same laser.



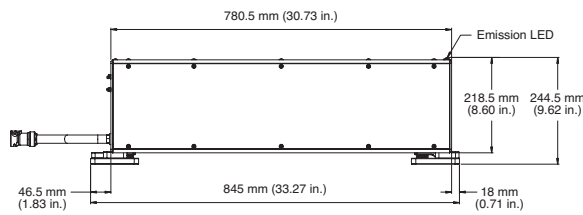
**MECHANICAL SPECIFICATIONS**

**Laser Head**

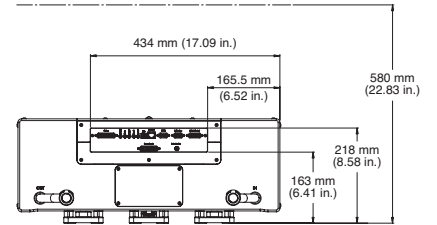
**Top View**



**Side View**

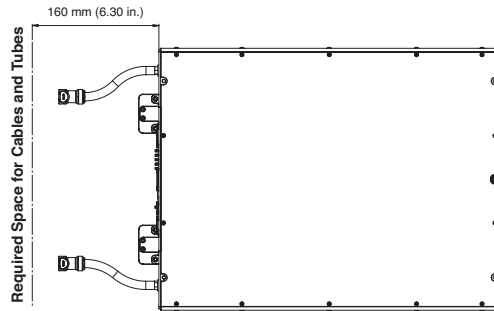
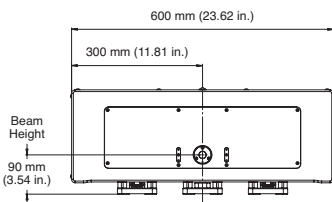


**Required Space for Service**



**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-012-16-0M0117Rev.B Copyright ©2017 Coherent, Inc.

