

RAPID NX

Industrial ps-Laser

The RAPID NX is an industrial grade laser designed for 24/7 use under a diverse set of environmental conditions. With an adjustable repetition rate between 50 kHz and 1000 kHz, the user can dial in the best repetition rate for the process. In addition, the RAPID NX allows for seeder burst operation, providing a burst of pulses with only 25 ns time separation between pulses.

The RAPID NX distinguishes itself by a significantly reduced footprint, weight and operating cost. As a standard feature, the RAPID NX offers pulse-on-demand. In this mode, a user can send an external trigger pulse and expect the optical pulse with a timing uncertainty of less than ± 13 ns. This precision is sufficient for even the most demanding beam deflection systems such as polygon scanners.



FEATURES & BENEFITS

- 7 W at 1064 nm
- Repetition rate range from 50 kHz to 1000 kHz
- Up to 50 μ J pulse energy
- Pulse on demand
- Seeder burst mode
- High beam quality $M^2 < 1.3$
- Superior beam parameter and pointing stability across the complete PRF range
- Fully field serviceable
- Low maintenance

APPLICATIONS

- Drilling Small Apertures or Structures (for electrical, bio-medical or fluidic devices) into difficult to machine materials
- Cutting or Repairing Masks for processes in the semiconductor, display, or OLED technology
- Structuring Solar Cells
- Specialty Marking
- LED Dicing

SYSTEM SPECIFICATIONS		RAPID NX	
Fundamental Center Wavelength (nm)		1064.5 ±0.5	
Output Energy ¹		7 µJ at 1064 nm, 1 MHz (7 W) 12 µJ at 1064 nm, 500 kHz (6 W) 25 µJ at 1064 nm, 200 kHz (5 W) 40 µJ at 1064 nm, 100 kHz (4 W) 50 µJ at 1064 nm, 50 kHz (2.5 W)	
Repetition Rate ²		50 kHz to 1 MHz	
Pulse Width ³ (ps)		10 to 15	
Mode Quality		M ² <1.3	
Beam Waist Diameter (mm)		1 ±0.2	
Beam Waist Location		At output port ±25% of RR	
Astigmatism		±25% of Rayleigh Range	
Ellipticity		0.85 < e < 1.15	
Polarization Ratio		100:1	
Polarization Direction		Vertical ±3° IR	
Contrast Ratio ⁴		100:1	
Beam Pointing Stability (µrad/°K)		±25	
Pulse Stability ⁵ (%) (RMS)		<1 at 1 MHz	
Power Stability ⁶ (%)		<±1 over 8 hours	
Operation Temperature Stability within the Operating Temperature Band (°C)		±1	
Warm-up Time (minutes)			
Cold Start		<15	
Warm Start		<10	
Long-term Pointing Stability at Fixed Rep-rate (µrad)		<±25 over 8 hours	
Pulse Control		Process pulse picker as standard to deliver dynamic pulse control	
Head Weight		28 kg (61.7 lbs.)	
PSU Dimensions		19" rack mounted – 3U	
External Comms ⁷		RS-232, Ethernet	
Power Consumption (VAC) (typical)		100 to 240, <500 W	
OPERATING SPECIFICATIONS			
Temperature (non-condensing)			
Laser Head		+15 to 30°C (59 to 86°F)	
Power Supply		+15 to 30°C (59 to 86°F)	
Vibration (g)		<0.05	
SHIPPING SPECIFICATIONS			
Temperature		-20 to +50°C (-4 to 122°F)	
Temperature Gradient		15°C (59°F) per hour	
Relative Humidity (%)		5 to 90	
Shock (g)			
Vertical		5 in 30 ms	
Horizontal		5 in 30 ms	

1 At 1064 nm.

2 Seed pulse frequency is in the range 40-42 MHz and any integer divisor of this seed clock frequency in the specified repetition rate range is accessible.

3 Assuming a sech² fit.

4 Defined as the energy ratio of the main pulse and first post pulse.

5 Measured over 1000 pulses – 1 sigma.

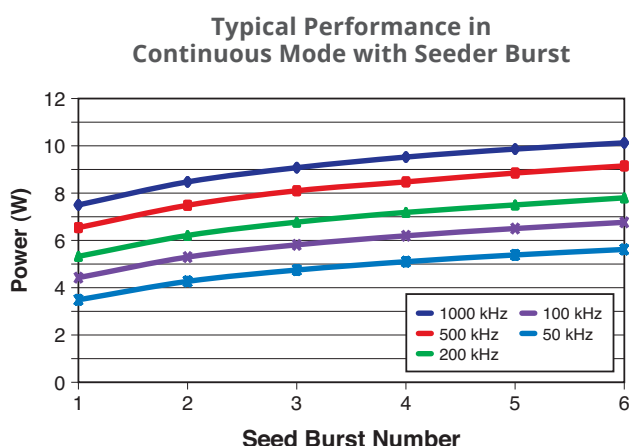
6 Pk-to-pk variation of the rolling average power (average power measured every 30 seconds and averaged over 5 minutes).

7 Inputs on the PSU – USB as an option.

RAPID NX PULSE CONTROL MODES

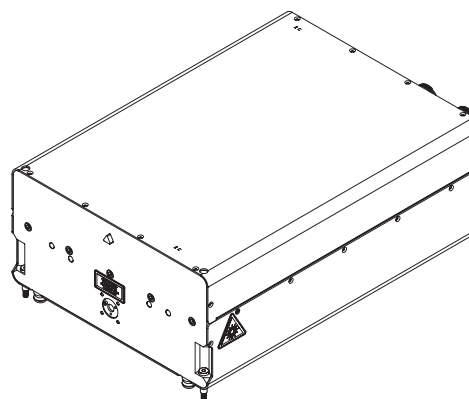
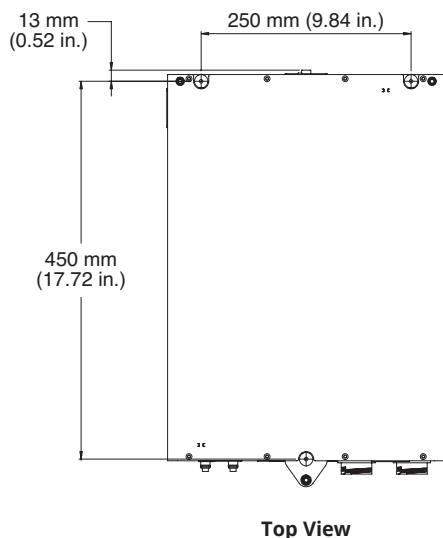
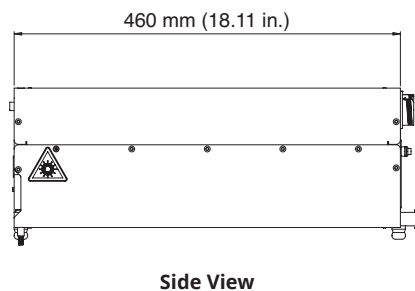
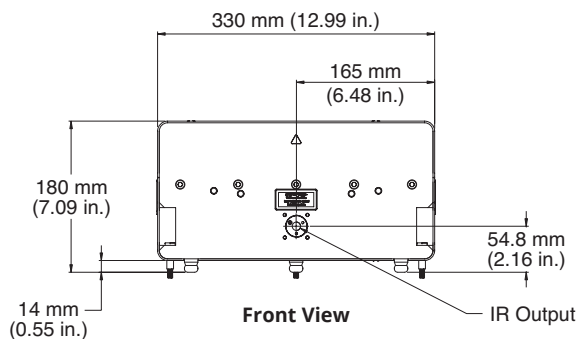
CONTROL MODE	Description	
Continuous	A continuous pulse train is emitted from the seed laser and amplified in the power amplifier at a fixed repetition rate within the specified range. This continuous pulse train can be turned off/on using the process pulse picker gate input.	50 kHz to 1 MHz
Process Burst	A continuous pulse train is emitted from the seed laser and amplified in the power amplifier at a fixed repetition rate within the specified range. A burst of m pulse is emitted from the pulse picker on a trigger input. If m = 1 then a single pulse is ejected on a trigger input.	50 kHz to 1 MHz $1 \leq m \leq 2^{16}$
Divided	A continuous pulse train is emitted from the seed laser and amplified in the power amplifier at a fixed repetition rate within the specified range. The pulse train is divided down using the process pulse picker to generate a pulse train at rep-rate/d.	50 kHz to 1 MHz $1 \leq d \leq 64,000$
Continuous with Seed Burst	A burst of n pulses separated by 25 ns is emitted from the seed and amplified in the power amplifier at a fixed repetition rate within the specified range. This continuous pulse train can be turned off/on using the process pulse picker gate input.	50 kHz to 1 MHz $1 \leq n \leq 6$ seed pulses in burst
Process Burst with Seed Burst	A burst of n pulses separated by 25 ns is emitted from the seed and amplified in the power amplifier at a fixed repetition rate within the specified range. A burst of m pulses (each containing n seed pulses) is emitted from the pulse picker on a trigger input. If m = 1 then a single pulse is ejected on a trigger input.	50 kHz to 1 MHz $1 \leq n \leq 6$ seed pulses in burst $1 \leq m \leq 216$ pulses in burst
Divided with Seed Burst	A burst of n pulses separated by 25 ns is emitted from the seed and amplified in the power amplifier at a fixed repetition rate within the specified range. The pulse train is divided down using the pulse picker to generate a pulse train at rep-rate/m.	50 kHz to 1 MHz $1 \leq n \leq 6$ seed pulses in burst $1 \leq d \leq 64,000$

TYPICAL PERFORMANCE DATA



MECHANICAL SPECIFICATIONS

RAPID NX



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Coherent follows a policy of continuous product improvement. Specifications are subject to change without notice. Coherent's scientific and industrial lasers are certified to comply with the Federal Regulations (21 CFR Subchapter J) as administered by the Center for Devices and Radiological Health on all systems ordered for shipment after August 2, 1976.
Coherent offers a limited warranty for all RAPID NX 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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