

## RX1 Series Picosecond Lasers

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Photonics Industries' RX1 Series low power picosecond lasers offer high performance, high precision, and robust form factor for the most demanding industrial as well as scientific applications. Photonics Industries is proven, with over a thousand picosecond lasers shipped worldwide, to meet and fulfill precision needs in manufacturing, scientific research, and new, emerging requirements necessitating ever smaller pulse widths in the ultrafast regime.



### Applications

- Cutting/Drilling/Scribing Thin Metal/Metal Foil, Ceramic, Glass, Ultra Thin Glass (UTG), Plastic, Glass-reinforced Plastic
- Flat Panel Display, LCD/LED/OLED Repair/Microprocessing
- Ink-Jet Nozzle Hole Drilling, Laser Milling Ink-Jet Nozzle Holes, Laser Ablation Ink-Jet Nozzle Holes
- Brittle Material Microprocessing
- Medical Stents, Medical Device Laser Microprocessing
- Low- $\kappa$  Dielectric Wafers, Silicon Wafers, Flexible Printed Circuit Boards (FPCB), Printed Circuit Boards (PCB) Microprocessing
- Hydrophobic Material Manufacturing, Hydrophilic Material Manufacturing, Ultrafast Laser Assisted Etching (ULAE) Systems

### Features

- High single pulse energy:  
Up to > 250  $\mu$ J at 100 kHz, RX1 IR models
- Short pulse laser:  
 $\sim$ 10 ps for IR,  $\sim$ 7 ps for Green & UV  
Option up to  $\sim$ 30 ps available
- Wide range of wavelengths:  
1064 nm, 532 nm, 355 nm  
MWB, MWS, & 266 nm options on request
- Smallest, all-in-one (AIO), high power picosecond laser on the market:  
Up to 40 W IR, 25 W GRN, or 15 W UV,  
In the small RX1 form factor 21 x 8.5 x 3.75 inches.
- Highest efficiency picosecond laser with the lowest power consumption:  
< 400 W typical
- High repetition rates:  
Options up to 8 MHz or  $\sim$ 32 MHz
- Excellent TEM00 beam, and Pointing Stability:  
Typical  $M^2 < 1.2$ ; < 20  $\mu$ rad
- Exceptional and Versatile Pulse Control:  
PEC (Power or Pulse Energy Control).  
PSO (Position Synchronized Output) mode for external triggering to any arbitrary PRF while maintaining a constant, stable pulse energy with low jitter.  
Burst Mode for individually controllable pulses in burst envelopes of up to 10 pulses with intra-burst pulse separation of  $\sim$ 31 ns.  
POD (Pulse-On-Demand) pulse bursts can be triggered internally, externally, or continuously, while maintaining constant pulse energy.
- Air-cooled option available

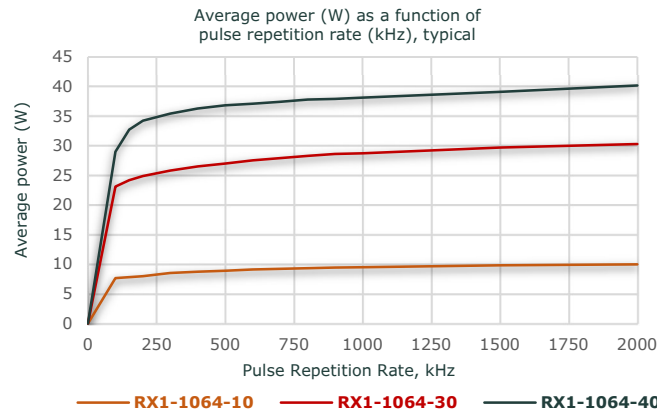
Specifications – **RX1 Series Picosecond Lasers**, Low Power IR Models

	<b>RX1-1064-10</b>	<b>RX1-1064-30</b>	<b>RX1-1064-40</b>
<b>Beam and output specifications</b>			
Wavelength <sup>Ⓢ</sup>	1064 nm		
Average power	10 W at 2 MHz	30 W at 2 MHz	40 W at 2 MHz
Maximum single pulse energy <sup>1,Ⓢ</sup>	> 70 μJ at 100 kHz	> 225 μJ at 100 kHz	> 250 μJ at 100 kHz
Pulse width <sup>Ⓢ</sup>	~10 ps		
Pulse repetition rate <sup>2,Ⓢ</sup>	Single shot to 2 MHz (option up to 8 MHz)		
Pulse-to-pulse stability <sup>3</sup>	< 1% rms		
Long term power stability <sup>4</sup>	≤ 1% rms		
Beam diameter, at exit	~1.5 mm		
Beam spatial mode	TEM <sub>00</sub> M <sup>2</sup> ~1.2		
Beam pointing stability	< 20 μrad		
Beam divergence	< 2 mrad		
Beam roundness	> 90%		
Beam bore sight accuracy	≤ 1 mm lateral (to specified exit location), ≤ 5 mrad angular (to specified exit direction)		
Polarization	Vertical >100:1		
<b>Operational specifications and system characteristics</b>			
Interface	RS232, Ethernet, Software GUI, External TTL Triggering		
Warm-up time	< 15 minutes		
Electrical requirement	100-240 V AC; or 32 V DC, 10 A		
Line frequency	50-60 Hz		
Climate	Ambient 15°C to 30°C (59°F to 86°F) Operating Range, Relative Humidity 90% Maximum, non-condensing		
Power consumption <sup>5</sup>	< 400 W		
Dimensions (LxWxH) <sup>6</sup>	21 x 8.5 x 3.75 in.		
Weight	~50 lbs		
Vibrational tolerance	Up to 3g		
Cooling system <sup>Ⓢ</sup>	Closed-loop chiller		

Ⓢ See options in below table.

[1.] Typical single pulse energy performance. Higher pulse energies available utilizing the Burst Mode feature. [2.] Lower repetition rates, down to single shot, achieved by utilizing PSO or POD features. [3.] Measured at a pulse repetition rate of 1 MHz, and at an ambient temperature of ± 2°C. [4.] Measured over 8 hours ± 1°C. [5.] Power consumption data does not include an external chiller's power consumption. [6.] RX Series picosecond lasers are all-in-one (AIO) and do not require a separate controller or utility module. All connections for operation and control of the laser can be found on the back panel of the AIO laser.

<b>Options</b>	<b>Designation</b>
Pulse width ~30 ps, Long pulse option	-LP e.g., RX1-1064-10-LP
Increased maximum single pulse energy at 100 kHz, High single pulse energy option	-HP e.g., RX1-1064-10-HP
Single shot to 8 MHz, High pulse repetition rate option	-8M e.g., RX1-1064-10-8M
Fixed pulse repetition rate ~32 MHz, Quasi-CW (continuous-wave) operation option	-QCW e.g., RX1-1064-10-QCW
Multi-wavelength blended or selectable output option	-MWB, or -MWS e.g., RX1-1064-10-MWB
Air-cooled option	-AC e.g., RX1-1064-10-AC



Specifications – **RX1 Series Picosecond Lasers**, Low Power GRN Models

	<b>RX1-532-5</b>	<b>RX1-532-20</b>	<b>RX1-532-25</b>
<b>Beam and output specifications</b>			
Wavelength <sup>Ⓟ</sup>	532 nm		
Average power	-L 5 W at 200 kHz	20 W at 200 kHz	25 W at 200 kHz
	-M 5 W at 400 kHz	20 W at 400 kHz	25 W at 400 kHz
	-H 5 W at 1 MHz	20 W at 1 MHz	25 W at 1 MHz
Pulse width <sup>Ⓟ</sup>	~7 ps		
Pulse repetition rate <sup>1,Ⓟ</sup>	Single shot to 2 MHz (option up to 8 MHz)		
Pulse-to-pulse stability <sup>2</sup>	~1% rms		
Long term power stability <sup>3</sup>	≤ 1% rms		
Beam diameter, at exit	~1 mm	~1.5 mm	
Beam spatial mode	TEM <sub>00</sub> M <sup>2</sup> < 1.2		
Beam pointing stability	< 20 μrad		
Beam divergence	≤ 1 mrad		
Beam roundness	> 90%		
Beam bore sight accuracy	≤ 1 mm lateral (to specified exit location), ≤ 5 mrad angular (to specified exit direction)		
Polarization	Horizontal >100:1		
<b>Operational specifications and system characteristics</b>			
Interface	RS232, Ethernet, Software GUI, External TTL Triggering		
Warm-up time	< 15 minutes		
Electrical requirement	100-240 V AC; or 32 V DC, 10 A		
Line frequency	50-60 Hz		
Climate	Ambient 15°C to 30°C (59°F to 86°F) Operating Range, Relative Humidity 90% Maximum, non-condensing		
Power consumption <sup>4</sup>	< 400 W		
Dimensions (LxWxH) <sup>5</sup>	21 x 8.5 x 3.75 in.		
Weight	~50 lbs		
Vibrational tolerance	Up to 3g		
Cooling system <sup>Ⓟ</sup>	Closed-loop chiller		

Ⓟ See options in below table.

[1.] Lower repetition rates, down to single shot, achieved by utilizing PSO or POD features. [2.] Measured at a pulse repetition rate of 1 MHz, and at an ambient temperature of ± 2°C. [3.] Measured over 8 hours ± 1°C. [4.] Power consumption data does not include an external chiller's power consumption. [5.] RX Series picosecond lasers are all-in-one (AIO) and do not require a separate controller or utility module. All connections for operation and control of the laser can be found on the back panel of the AIO laser.

<b>Options</b>	<b>Designation</b>
Pulse width ~20 ps, Long pulse option	-LP e.g., RX1-532-20-L-LP
Single shot to 8 MHz, High pulse repetition rate option	-8M e.g., RX1-532-5-L-8M
Fixed pulse repetition rate ~32 MHz, Quasi-CW (continuous-wave) operation option	-QCW e.g., RX1-532-20-QCW
Multi-wavelength blended or selectable output option	-MWB, or -MWS e.g., RX1-1064-10-MWB
Air-cooled option	-AC e.g., RX1-532-5-AC



Specifications – **RX1 Series Picosecond Lasers**, Low Power UV Models

	<b>RX1-355-3</b>	<b>RX1-355-10</b>	<b>RX1-355-15</b>
<b>Beam and output specifications</b>			
Wavelength <sup>Ⓟ</sup>	355 nm		
Average power	-L 3 W at 200 kHz	10 W at 200 kHz	15 W at 200 kHz
	-M 3 W at 400 kHz	10 W at 400 kHz	15 W at 400 kHz
	-H 3 W at 1 MHz	10 W at 1 MHz	15 W at 1 MHz
Pulse width <sup>Ⓟ</sup>	~7 ps		
Pulse repetition rate <sup>1,Ⓟ</sup>	Single shot to 2 MHz (option up to 8 MHz)		
Pulse-to-pulse stability <sup>2</sup>	< 2% rms		
Long term power stability <sup>3</sup>	≤ 1% rms		
Beam diameter <sup>Ⓟ</sup> , at exit	~0.75 mm		~1 mm
Beam spatial mode	TEM <sub>00</sub> M <sup>2</sup> < 1.2		
Beam pointing stability	< 25 μrad		
Beam divergence	≤ 1 mrad		
Beam roundness	> 90%		
Beam bore sight accuracy	≤ 1 mm lateral (to specified exit location), ≤ 5 mrad angular (to specified exit direction)		
Polarization	Vertical >100:1		
<b>Operational specifications and system characteristics</b>			
Interface	RS232, Ethernet, Software GUI, External TTL Triggering		
Warm-up time	< 15 minutes		
Electrical requirement	100-240 V AC; or 32 V DC, 10 A		
Line frequency	50-60 Hz		
Climate	Ambient 15°C to 30°C (59°F to 86°F) Operating Range, Relative Humidity 90% Maximum, non-condensing		
Power consumption <sup>4</sup>	< 400 W		
Dimensions (LxWxH) <sup>5</sup>	21 x 8.5 x 3.75 in.		
Weight	~50 lbs		
Vibrational tolerance	Up to 3g		
Cooling system <sup>Ⓟ</sup>	Closed-loop chiller		

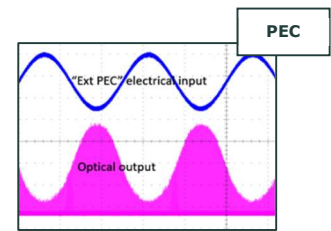
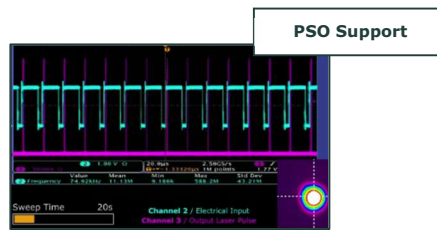
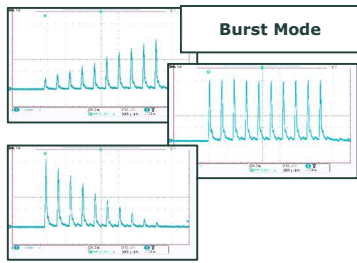
Ⓟ See options in below table.

[1.] Lower repetition rates, down to single shot, achieved by utilizing PSO or POD features. [2.] Measured at a pulse repetition rate of 1 MHz, and at an ambient temperature of ± 2°C. [3.] Measured over 8 hours ± 1°C. [4.] Power consumption data does not include an external chiller's power consumption. [5.] RX Series picosecond lasers are all-in-one (AIO) and do not require a separate controller or utility module. All connections for operation and control of the laser can be found on the back panel of the AIO laser.

<b>Options</b>	<b>Designation</b>
Pulse width ~20 ps, Long pulse option	-LP e.g., RX1-355-3-M-LP
Single shot to 8 MHz, High pulse repetition rate option	-8M e.g., RX1-355-15-H-8M
Fixed pulse repetition rate ~32 MHz, Quasi-CW (continuous-wave) operation option	-QCW e.g., RX1-355-3-QCW
Multi-wavelength blended or selectable output option	-MWB, or -MWS e.g., RX1-1064-10-MWB
Air-cooled option	-AC e.g., RX1-355-3-AC

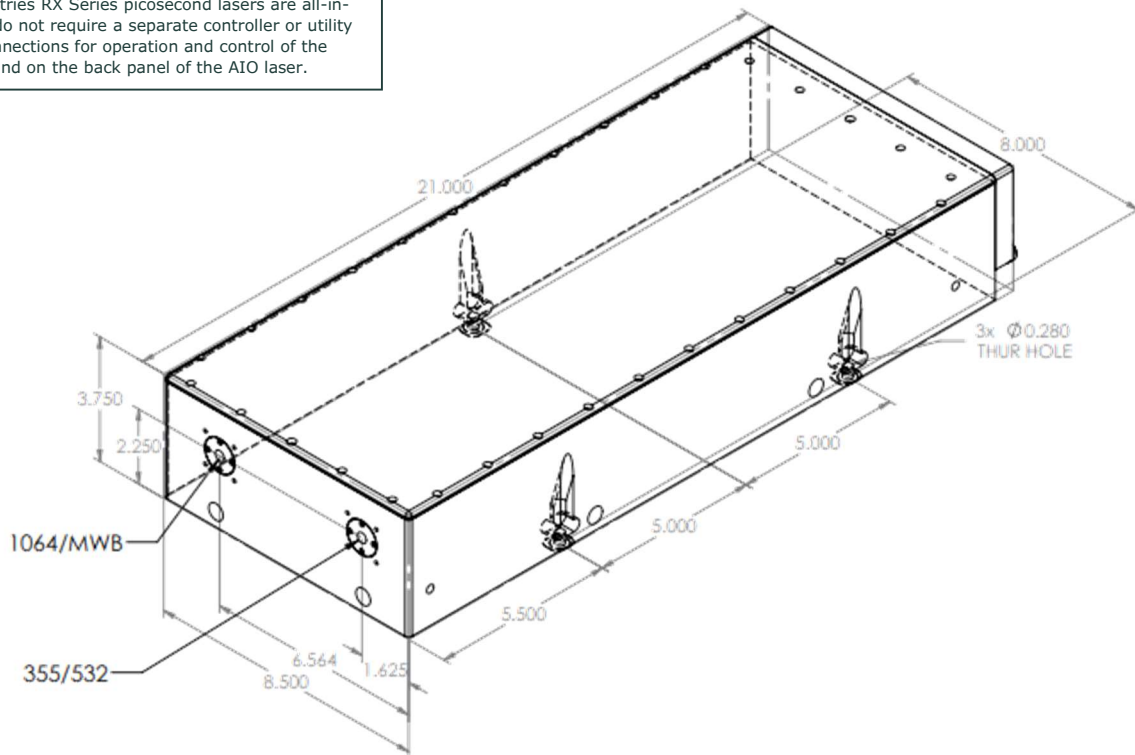


## Features



## Dimensional Drawing

Photonics Industries RX Series picosecond lasers are all-in-one (AIO) and do not require a separate controller or utility module. All connections for operation and control of the laser can be found on the back panel of the AIO laser.



Due to Photonics Industries' commitment to continuous product improvement, specifications and drawings are subject to change without notice.

Photonics Industries conforms to provisions of US 21 CFR 1040.10 & 1040.11 and is made under one or more US patents listed below: 9,531,147, 8,817,831, 7,869,471, 7,346,092, 7,082,149, 7,079,557, 6,999,483, 6,980,574, 6,961,355, 6,842,293, 6,762,405, 6,690,692, 6,587,487, 6,584,134, 6,366,596, 6,356,578, 6,327,281, 6,246,707, 6,229,829, 6,108,356, 6,061,370, 6,028,620, 5,936,983, 5,898,717 and Pending Patents.

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Main Headquarters: 1800 Ocean Ave, Ronkonkoma, New York 11779, United States

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