

# RX GRN Series

RX Picosecond Lasers

## TEM<sub>00</sub>, Green, Picosecond Lasers

With over 15 years of expertise in developing and refining picosecond laser features, performance, and reliability, after delivering thousands of these RX series lasers, RX Series picosecond lasers deliver exceptional performance, precision, and durability, making them ideal for advanced industrial and scientific applications. our RX series excels in precision manufacturing, scientific research, and ultrafast laser processing. While maintaining consistent reliability and accuracy.

Photronics Industries has earned a reputation as a global leader in ultrafast laser technology. Each laser is built to rigorous quality standards, reflecting our commitment to innovation and customer satisfaction. Our proven track record demonstrates our ability to address complex challenges and deliver solutions that empower cutting-edge industries and research.



### APPLICATIONS

- Marking & Scribing
- Medical Device Laser Micro processing
- Thin Film Removal and Processing
- PCB & Polymer Cutting & Drilling
- Selective Annealing and Doping
- Solar Cell Manufacturing
- Semiconductor Processing
- Micromachining Transparent Materials

### FEATURES

- Up to ~290μJ Pulse Energy at 600kHz
- True TEM<sub>00</sub> Output, M<sup>2</sup> < 1.3
- Exceptional point stability (<25urad)
- Ultra-Short Pulse Widths ~7ps
- Burst Mode for Pulse Control
- Robust & Compact Form Factor
- Dynamic **Pulse Energy Control - PEC**
- **Position Synchronized Output - PSO**
- Power Monitoring and Self-Calibration

Specifications – RX Series <sup>1,2,3,4</sup>			
	RX-532-20	RX-532-70	RX-532-100
Wavelength Output (nm)	532		
Average Power (W)	20	70	100
Pulse Energy (μJ)	100	175	160
Specification PRF (kHz)	200	400	600
Pulse Width (ps)	~7		
Pulse repetition rate (kHz) <sup>5</sup>	Single Shot to 2000		
Pulse-to-pulse stability (RMS %)	<2		
Long-term power stability (RMS %) <sup>6</sup>	≤1		
Beam spatial mode & M <sup>2</sup> <sup>8</sup>	TEM <sub>00</sub> - M <sup>2</sup> <1.2		
Beam Diameter (mm)	1 ± 0.5		2 ± 0.2
Beam Divergence (nominal) (mrad)	<1.5		
Beam Circularity (%)	>90		
Beam Pointing Stability (μrad)	<25		
Beam Bore Sight Accuracy	≤ 1 mm lateral (to specified exit location), ≤ 5 mrad angular (to specified exit direction)		
Polarization ratio	Horizontal; >100:1		
	<b>Burst Mode</b>		
MegaHz Burst Mode (kHz)	Single Shot to 2000		
Max Sub-pulses in Burst <sup>9</sup>	20		
	<b>Operational Specifications and Characteristics</b>		
Interface	RS232, Ethernet, Software GUI, External TTL Triggering		
Warm-up time	< 5 minutes from standby, <15 minutes from cold start		
Electrical requirement	100-240 V AC		200-240 V AC
Line frequency (Hz)	50-60		
Power consumption (W)	<500	<900	<1300
Dimensions	16 x 8.5 x 4.5 in. [406.4 x 215.9 x 114.3mm]	20 x 8.5 x 4.5 in. [508 x 215.9 x 114.3mm]	20 x 10 x 4.5 in. [508 x 254 x 114.3mm]
Weight	~38lbs [17.2kg]	~47lbs [21.3kg]	~57lbs [25.9kg]
	<b>Environmental Requirements</b>		
Ambient temperature <sup>2</sup>	Ambient 15°C to 30°C (59°F to 86°F) Operating Range		
	Relative humidity 0% to 80% max, non-condensing		
Storage conditions	-10°C to 40°C; sea level to 12000 m		
	0% to 80% relative Humidity, non-condensing		
Cooling system	Water-Cooled [20-22°C ± 0.1°C]		

**Notes:**

[1] After warm-up time, steady state chiller temperature

[2] Steady-state operation (no pulse gating or constant no gating or PRF change).

[3] Single pulse operation [Burst = 1]

[4] Maximum power with PEC = 100.

[6] Option up to 15 MHz

[7] Measured over 8 hours ± 1°C, for operation of the laser outside of the specified temperature range, contact PI.

[8] ALL beam parameters and stability are at specification repetition rate.

[9] Pulse repetition rate x number of burst cannot exceed 15 MHz

Specifications – RX Series <sup>1,2,3,4</sup>		
	RX-532-150	RX-532-175
Wavelength Output (nm)	532	
Average Power (W)	150	175
Pulse Energy (μJ) <sup>5</sup>	250	290
Specification PRF	600	
Pulse Width (ps)	~7	
Pulse repetition rate (kHz) <sup>6</sup>	Single Shot to 2000	
Pulse-to-pulse stability (RMS %)	<2	
Long-term power stability (RMS %) <sup>7</sup>	≤1	
Beam spatial mode & M <sup>2</sup> <sup>8</sup>	TEM <sub>00</sub> - M <sup>2</sup> <1.2	
Beam Diameter (mm)	2.5 ± 0.5	
Beam Divergence (nominal) (mrad)	<1.5	
Beam Circularity (%)	>90	
Beam Pointing Stability (μrad)	<25	
Beam Bore Sight Accuracy	≤ 1 mm lateral (to specified exit location), ≤ 5 mrad angular (to specified exit direction)	
Polarization ratio	Horizontal; >100:1	
	<b>Burst Mode</b>	
MegaHz Burst Mode (kHz)	Single Shot to 2000	
Max Sub-pulses in Burst <sup>10</sup>	20	
	<b>Operational Specifications and Characteristics</b>	
Interface	RS232, Ethernet, Software GUI, External TTL Triggering	
Warm-up time	< 5 minutes from standby, <15 minutes from cold start	
Electrical requirement	208-240 V AC	
Line frequency (Hz)	50-60	
Power consumption (kW)	<1.8	<2.6
Dimensions	23 x 12 x 4.5in [584.3 x 304.8 x 114.3mm]	28 x 14 x 4.5 in. [711.2 x 355.6 x 114.3mm]
Weight	~65lbs	~100lbs
	<b>Environmental Requirements</b>	
Ambient temperature <sup>2</sup>	Ambient 15°C to 30°C (59°F to 86°F) Operating Range	
	Relative humidity 0% to 80% max, non-condensing	
Storage conditions	-10°C to 40°C; sea level to 12000 m	
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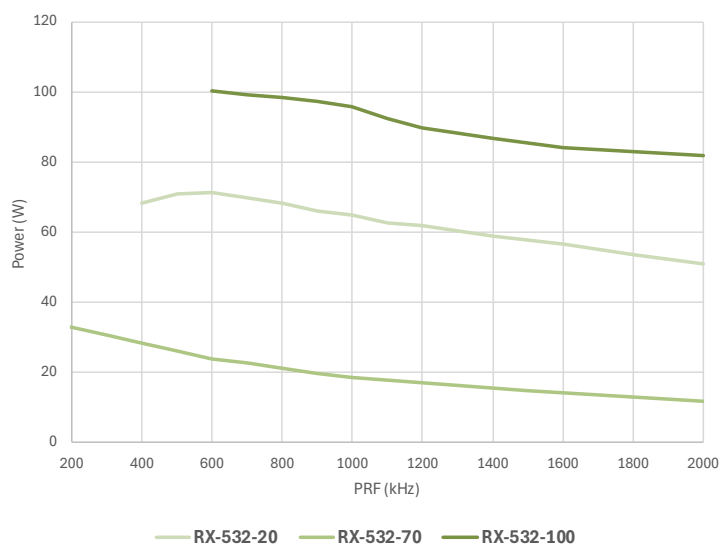
[8] ALL beam parameters and stability are at specification repetition rate.

[9] Pulse repetition rate x number of burst cannot exceed 15 MHz

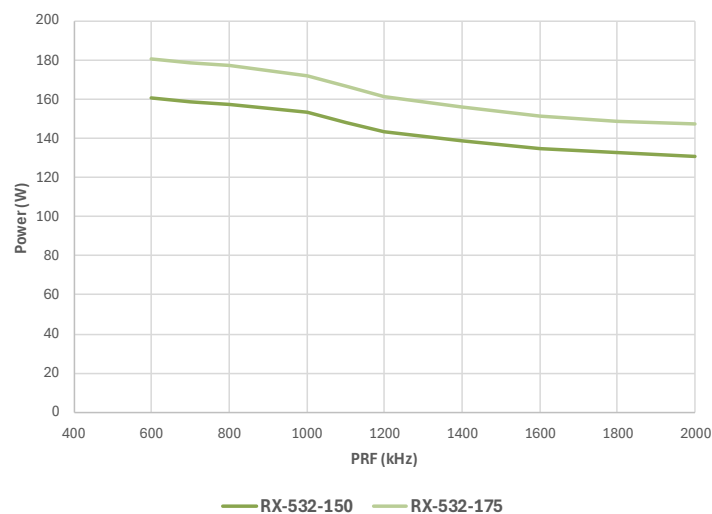
# Power and Pulse Energy vs. PRF Graph

## Standard Model:

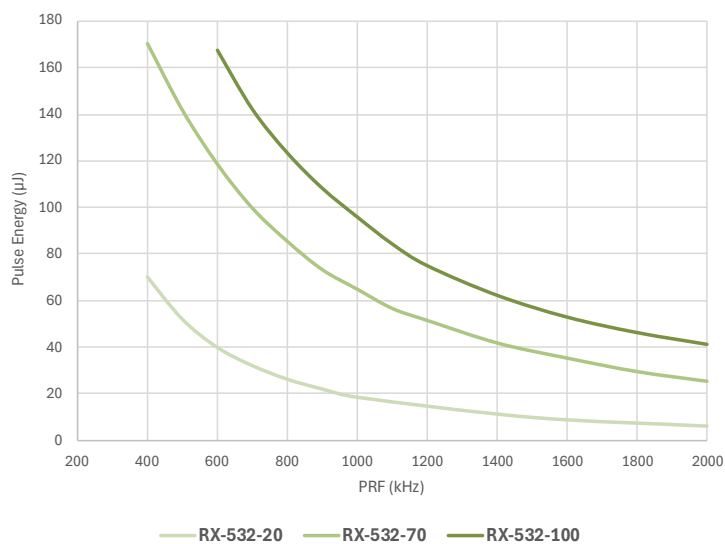
Power Vs. PRF



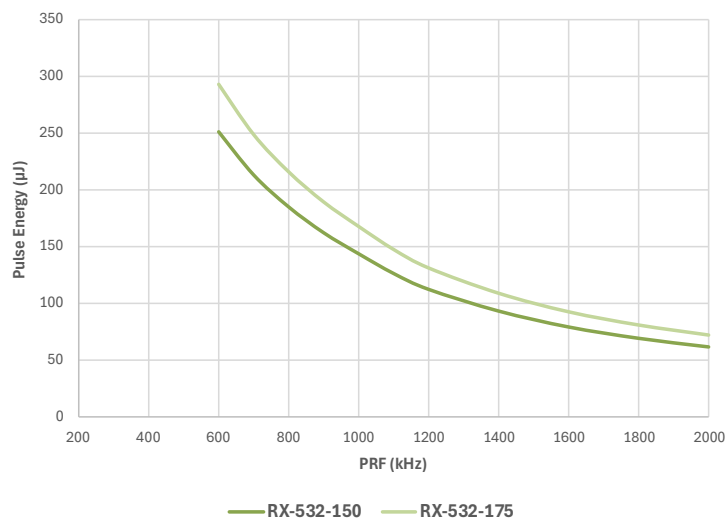
Power Vs. PRF



Pulse Energy Vs. PRF



Pulse Energy Vs. PRF



# RX Series Ultrafast Lasers Pulse Control

## Burst Mode:

Photonics Industries RX Series picosecond laser provides a Burst Mode feature for individually controllable pulses in burst envelopes of up to ten (10) pulses with intra-burst pulse separation of ~31 ns for the RX. The feature is dynamic, allowing for individual control of each pulse amplitude in the burst envelope, such that one can equalize the pulse energy amplitudes ("flat" burst), dynamically modify each individual amplitude for a unique burst envelope suited for the user's need, or even "blank out" pulses in the envelope to effectively lengthen the intra-burst pulse separation.



### HIGH BURST PULSE ENERGIES

- Photonics Industries leading single pulse energies translate into exceptionally high burst pulse energies up to >1mJ in the ultrafast regime.

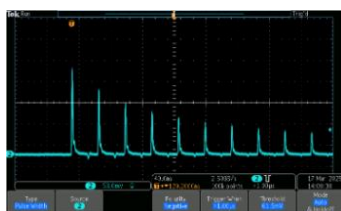
PRF (kHz)	Pulses in the burst (N)	Total burst energy (mJ)	Max PRF (kHz)
200	2	0.47	2000
175	3	0.54	2000
150	4	0.64	2000
130	5	0.73	1928
120	6	0.8	1815
110	7	0.87	1714
100	8	0.95	1624
90	9	1.04	1543
80	10	1.16	1470

Burst mode total pulse energy data is taken from an RX2-1064-100 picosecond laser (IR, 100W).



### CONTROLLABLE INTRA-BURST PULSES

- Equalize pulse energy amplitudes for a "flat" burst envelope.
- Dynamically control each individual pulse energy amplitude in the burst envelope.



## PEC:

PEC (Pulse Energy Control) is a feature that allows users to attenuate the laser's output power or energy via software settings or external analog signals. It is not designed to maintain constant pulse energy across varying repetition rates, but rather to set a fixed attenuation level for stable operation at a given PRF.

## PSO:

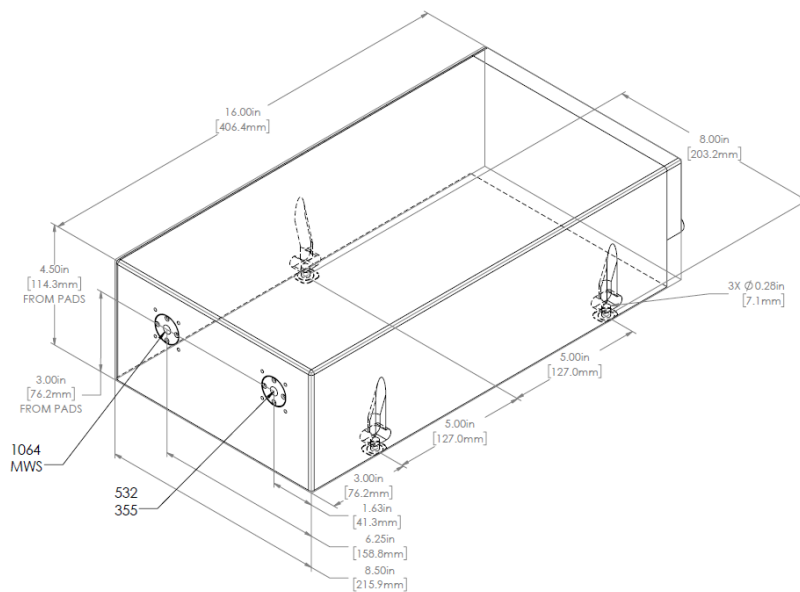
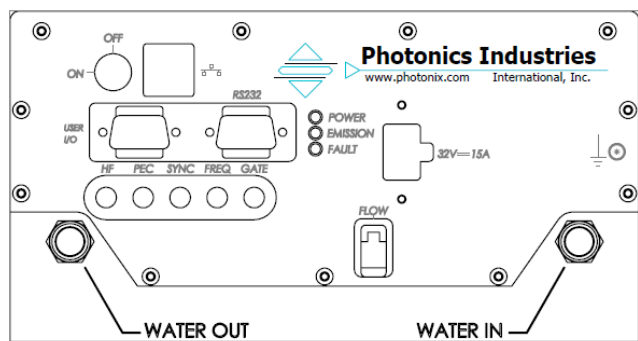
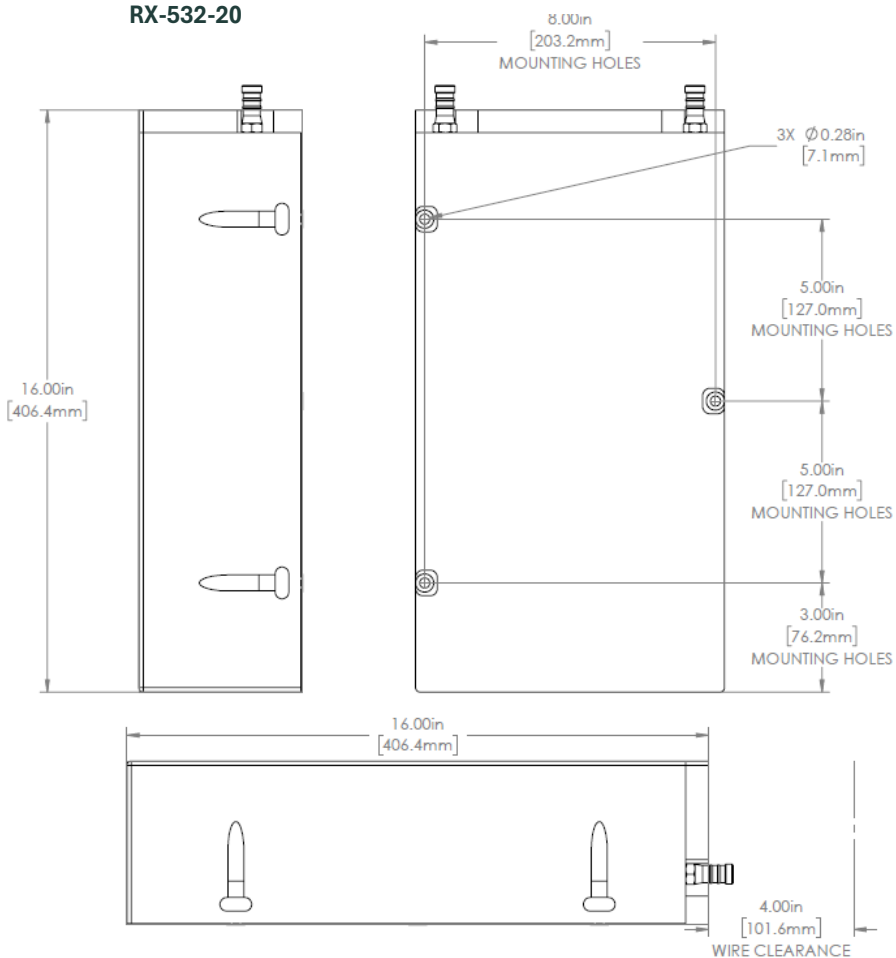
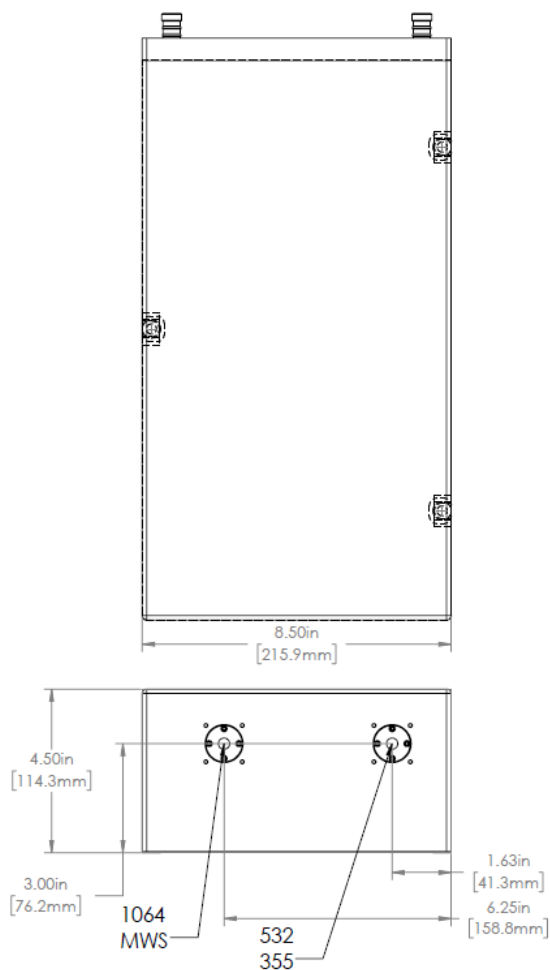
PSO allows the laser to fire pulses in sync with a moving stage, galvo scanner, or conveyor system. This ensures that pulses are only delivered when the laser is exactly over the target location, preventing overlap or missed spots.

## POD:

POD allows the laser to emit controlled sequences of pulses based on an internal PRF while maintaining the pulse energy associated with that higher PRF. Users can define when and how bursts are triggered, whether continuously or by external command, using settings such as Burst Rate, Burst Count, and Burst Cycles. This enables the laser to effectively output pulses at a lower average PRF while preserving high pulse energy, making it ideal for applications requiring precise energy delivery at specific intervals or positions.

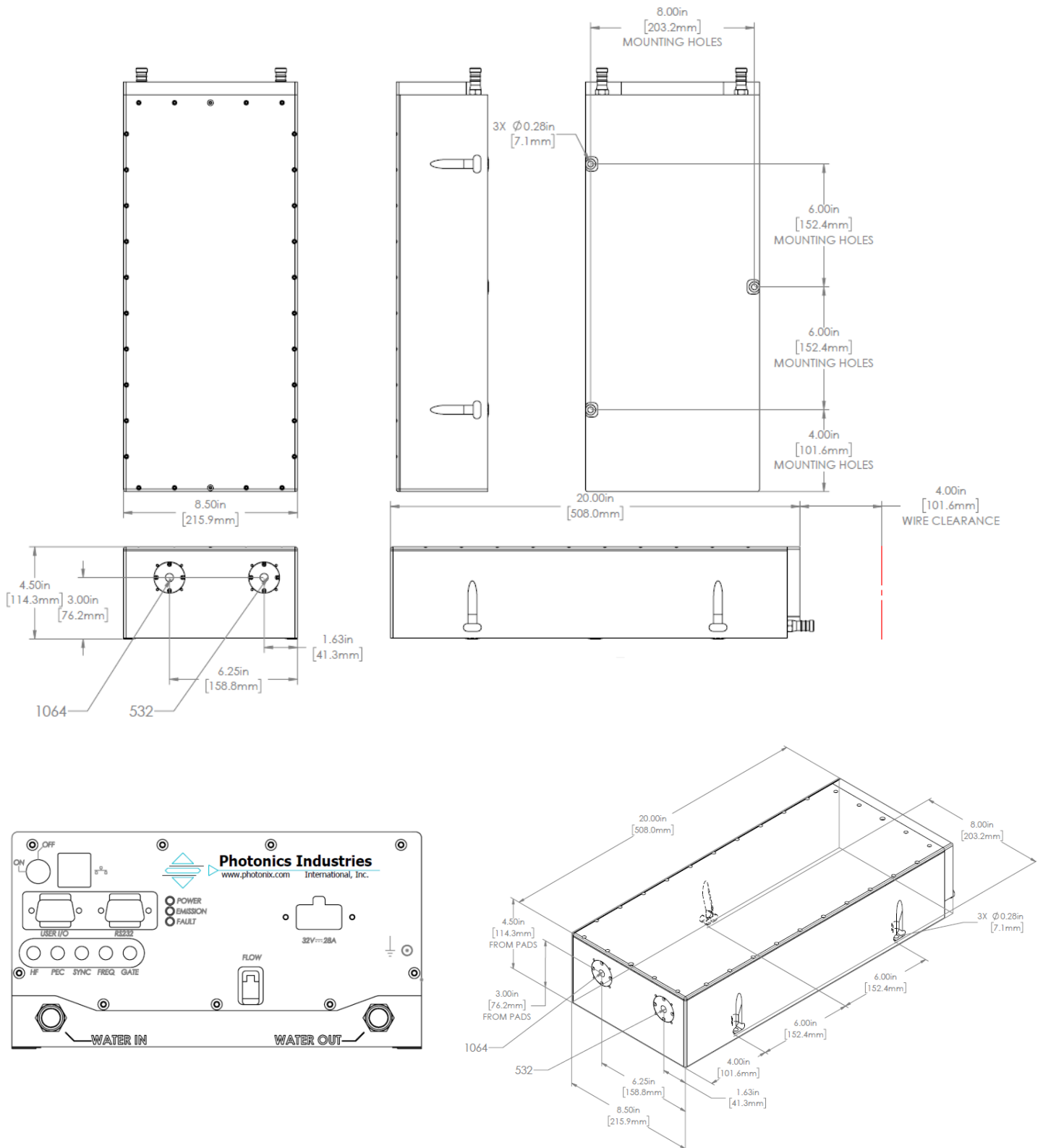
# Dimensional Drawings

## RX-532-20



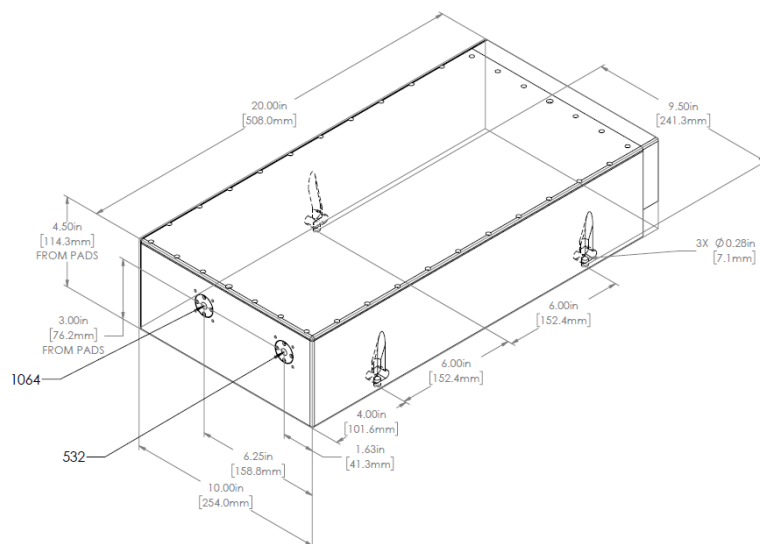
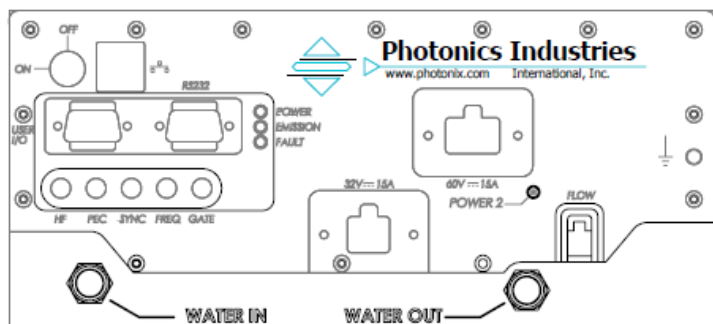
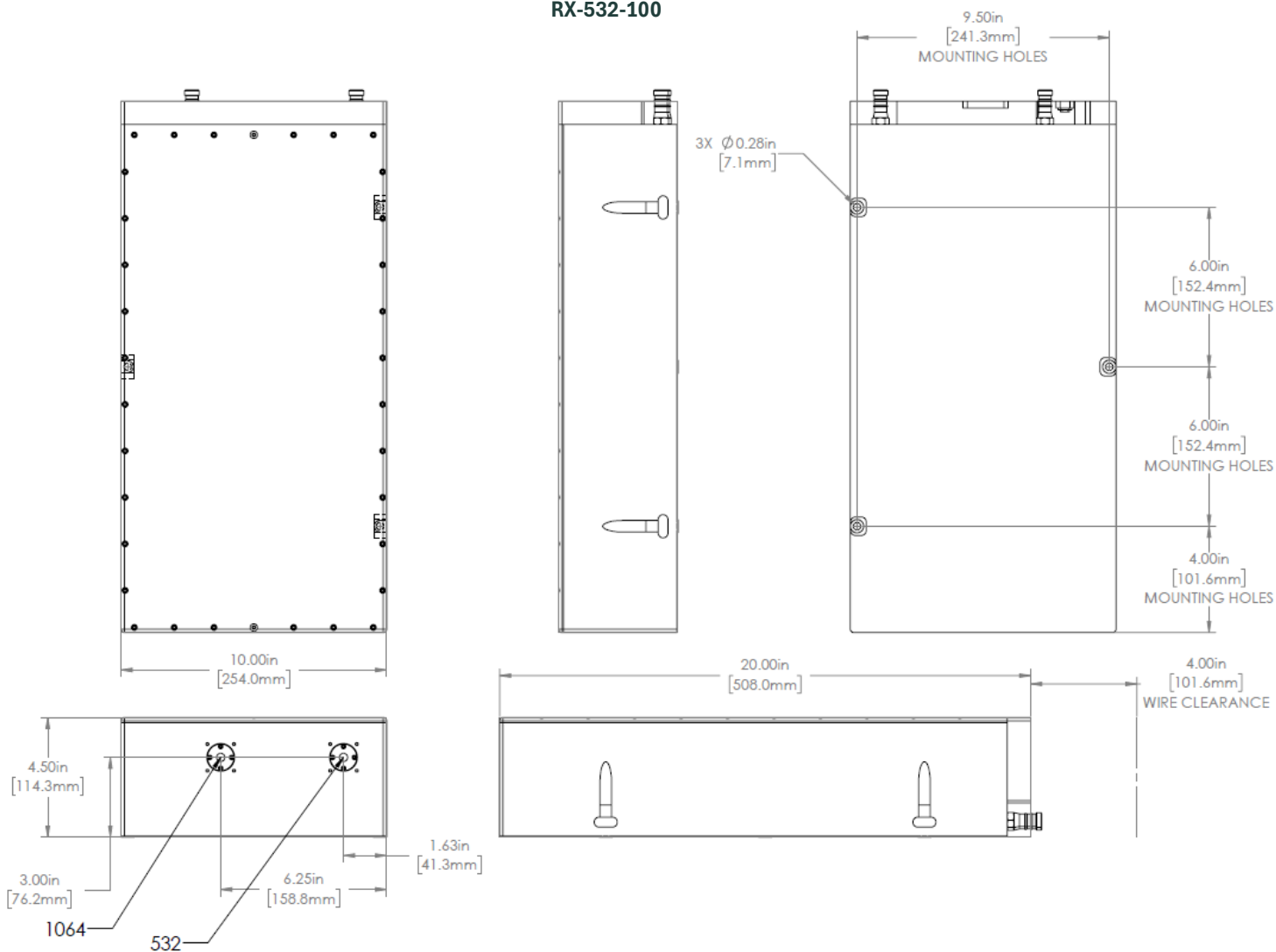
# Dimensional Drawings

## RX-532-70



# Dimensional Drawings

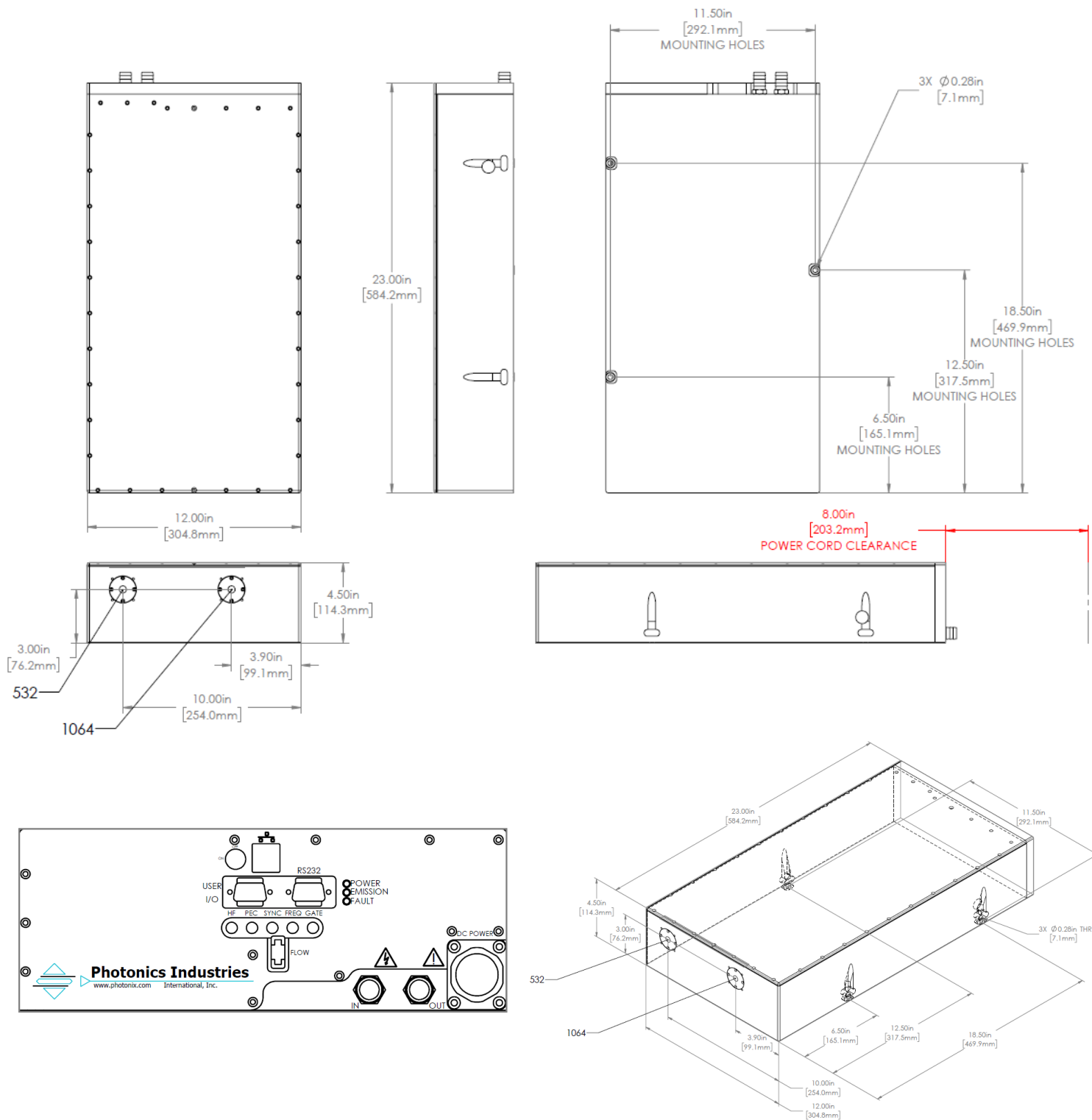
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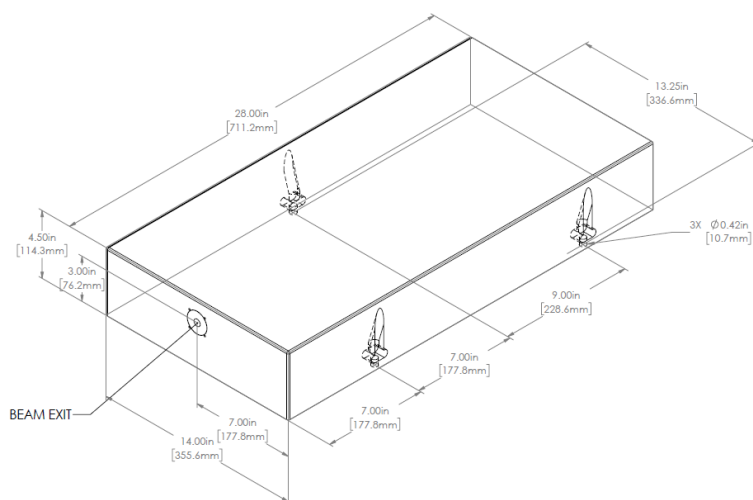
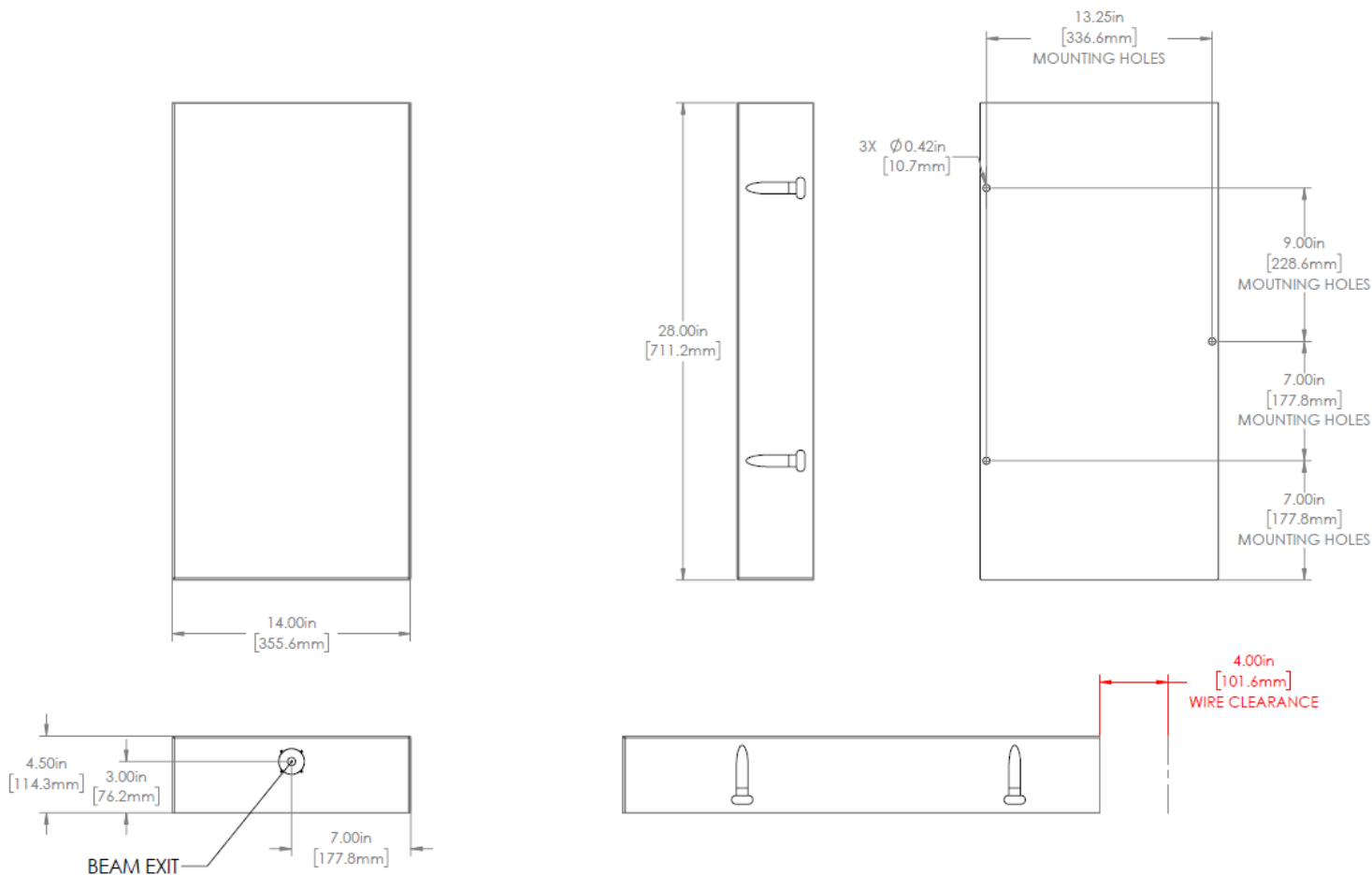


# Dimensional Drawings

## RX-532-150



# Dimensional Drawings RX-532-175



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Photonics Industries International Inc. is the pioneer of intracavity harmonic lasers and is at the forefront of developing, manufacturing, and marketing a wide range of nanosecond, sub-nanosecond, picosecond, and femtosecond lasers for the industrial, scientific, defense and medical industries.

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