



# DX UV/Green Series Nanosecond Lasers

## High Power ns Lasers

A pioneer of intracavity UV generation with 25 + years of manufacturing experience and well over ten thousand shipments worldwide, Photonics Industries offers the broadest nanosecond (ns) UV product selection from 1W\* to 55W at 355nm and Green product selection from 2W\* to 100W at 532nm.

With new revolutionary packaging, our new DX Series has smaller form factor, higher performance, shorter pulse widths compared to its ancestor, the DSH series, providing the most compact 15W to 55W of UV and 25W to 100W of Green output power with short pulse width -- in addition to longer pulse versions.

Owing to key patented technologies that provide non-consumable THG crystals with no indexing required, intracavity harmonic generation is an inherently more efficient harmonic conversion that provides better pulse-to-pulse stability and mode quality in a simple, compact laser configuration.

With standard Total Pulse Control features such as PEC and Duty Control, pulse energy and pulse width, which can be held constant over wide ranges of repetition rates for tight process control at fast speeds. Higher power and faster throughput contributes to a low cost of operation.

The All-In-One (AIO) design combines common optical, electrical and command interfaces in a rugged industrial package for simple integration into 24/7 precision micromachining in extended production cycle environments.

\*For lower power air cooled models please see the DX Air-Cooled Series.



## PI Advantages

- ❖ High Power (up to 55W) UV and (up to 100W) Green laser
- ❖ The most compact rugged All-in-One ns laser
- ❖ The Highest Pulse Energy UV ns laser on the market >1mJ@50kHz
- ❖ The highest wall plug efficiency ns laser:
  - ~17% for green
  - ~10% for UV
- ❖ Patented intracavity UV generation
- ❖ Excellent TEM<sub>00</sub> beam with typical M<sup>2</sup> < 1.2
- ❖ Superior stability < 2%
- ❖ Exceptional Beam Pointing Stability < 25 μrad
- ❖ Total pulse control (PEC, Duty Control, etc.)

## Applications

- ❖ ITO Patterning
- ❖ Flex PCB de-paneling, cutting and PCB drilling
- ❖ Via Hole Drilling
- ❖ Ceramic scribing, cutting and drilling
- ❖ Solar Cell Scribing and PERC Processing
- ❖ Silicon Wafer Scribing and Singulation
  - Full-cut wafer dicing
  - Low-k dielectric grooving
- ❖ UV reel to reel on the fly Converting process
- ❖ Metal foil cutting and Copper processing
- ❖ Glass and ceramic processing, cutting and drilling
- ❖ UV Welding Carbon Fiber (CFRP)



**Photonics Industries**  
International, Inc.

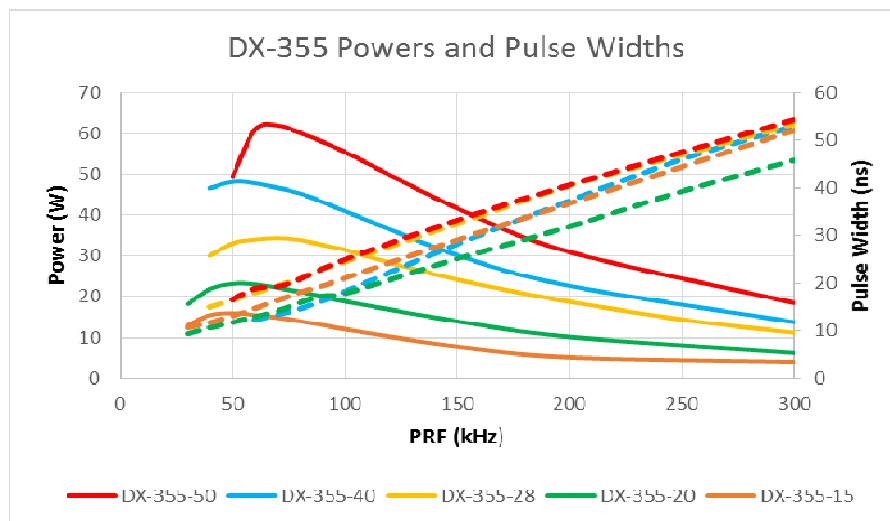
# DX System Specifications @ 355nm

Model	DX-355-15	DX-355-20	DX-355-28	DX-355-40	DX-355-50
<b>Output Characteristics</b>					
Average Power	<b>15W at 50kHz</b> 10W at 100kHz 5W at 200kHz	<b>20W at 50kHz</b> 18W at 100kHz 10W at 200kHz	<b>28W at 60kHz</b> 23W at 100kHz 18W at 200kHz	<b>40W at 60kHz</b> 40W at 100kHz 22W at 200kHz	<b>50W at 70kHz</b> 50W at 100kHz 30W at 200kHz
Pulse Energy	~0.3mJ	~0.4mJ	~0.6mJ	~1mJ	~1mJ
Pulse Width (nominal)	12 ± 3ns@50kHz 20 ± 3ns@100kHz		12 ± 3ns@50kHz 20 ± 4ns@100kHz		
Repetition Rate†	Single Shot to 200 kHz (Option to 300kHz)				
Pulse to Pulse Stability	< 2% rms				
Long Term Stability (8 hr ± 1° C)	< ±2%				
<b>Beam Characteristics</b>					
Polarization Ratio	Horizontal; > 100:1				
4σ Beam Diameter @ exit (nominal)	~ 0.6 mm**		~ 2.5 mm		
Beam Divergence (Full Angle Far Field)	<1.5 mrad				<1 mrad
Beam Circularity	~ 90%				
Spatial Mode	TEM <sub>00</sub> M <sup>2</sup> <1.2				
Beam Pointing Stability	< 25 μrad				
<b>Operating Specifications</b>					
Interface	Ethernet / RS 232 / GUI / External TTL Triggering				
Warm Up Time	<15 minutes from stand by, < 30 minutes from cold start				
Electrical Requirement	100 to 240V AC				
Line Frequency	50 to 60 Hz				
Relative Humidity	Non-condensing, 90% Max				
Power Consumption (excluding chiller)	< 240 W typical	< 320 W typical	< 420 W typical	< 600 W typical	< 600 W typical
Ambient Temperature	15°C to 35°C (59° to 95°F) Operating Range				
Storage Conditions	-10°C to 40°C; Sea Level to 12,000 m; 0% to 90% RH, non-condensing				
<b>Physical Characteristics</b>					
Dimensions (W x H x L)	7.5 in x 3.75 in x 16 in			8.5 in x 3.75 in x 20 in	
Weight	29 lbs			43 lbs	

† Lower rep rates (<30kHz) performance achieved by pulse energy capping

\*\* Larger beam diameters (up to ~3mm) available with expansion option

## Performance Curves

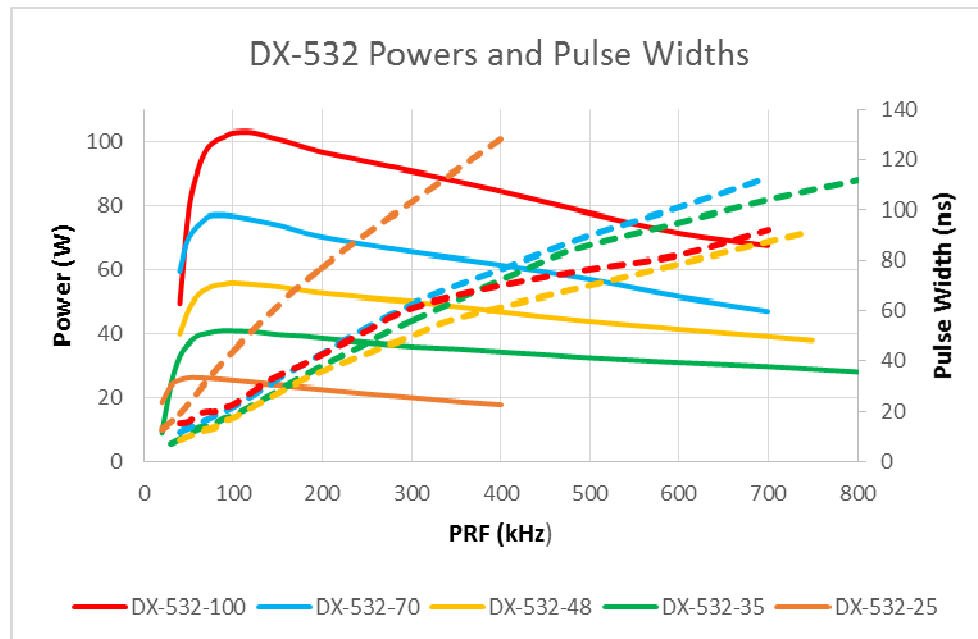


# DX System Specifications @ 532nm

Model	DX-532-25	DX-532-35	DX-532-48	DX-532-70	DX-532-100
<b>Output Characteristics</b>					
Average Power	<b>25W at 50kHz</b> 22W at 200kHz 20W at 300kHz 17W at 400kHz	<b>35W at 100kHz</b> 35W at 200kHz 33W at 300kHz 32W at 400kHz 30W at 500kHz	<b>48W at 100kHz</b> 48W at 200kHz 46W at 300kHz 43W at 400kHz 40W at 500kHz	<b>70W at 100kHz</b> 65W at 200kHz 60W at 300kHz 55W at 400kHz 50W at 500kHz	<b>100W at 100kHz</b> 95W at 200kHz 85W at 300kHz 80W at 400kHz 75W at 500kHz
Pulse Energy	~0.9mJ	~0.6mJ	~1mJ	~1.5mJ	~1.9mJ
Pulse Width (nominal)	22 ± 3ns@50kHz 44 ± 3ns@100kHz	10 ± 3ns@50kHz 17 ± 3ns@100kHz	12 ± 3ns@50kHz 22 ± 3ns@100kHz	15 ± 3ns@50kHz 25 ± 3ns@100kHz	25 ± 3ns@100kHz
Repetition Rate†	Single Shot to 500 kHz (Option to 1.5MHz)				
Pulse to Pulse Stability	< 2% rms				
Long Term Stability (8 hr ± 1° C)	< ±2%				
<b>Beam Characteristics</b>					
Polarization Ratio	Vertical; > 500:1				
4σ Beam Diameter @ exit (nominal)	~0.7 mm				~1 mm
Beam Divergence (Full Angle Far Field)	<1.5 mrad				<3 mrad
Beam Circularity				~ 90%	
Spatial Mode	TEM <sub>00</sub> M <sup>2</sup> <1.1				TEM <sub>00</sub> M <sup>2</sup> <1.2
Beam Pointing Stability	< 25 μrad				
<b>Operating Specifications</b>					
Interface	Ethernet / RS 232 / GUI / External TTL Triggering				
Warm Up Time	<15 minutes from stand by, < 30 minutes from cold start				
Electrical Requirement	100 to 240V AC				
Line Frequency	50 to 60 Hz				
Relative Humidity	Non-condensing, 90% Max				
Power Consumption (excluding chiller)	< 240 W typical	< 320 W typical		< 420 W typical	
Ambient Temperature	15°C to 35°C (59° to 95°F) Operating Range				
Storage Conditions	-10°C to 40°C; Sea Level to 12,000 m; 0% to 90% RH, non-condensing				
<b>Physical Characteristics</b>					
Dimensions (W x H x L)	7.5 in x 3.75 in x 16 in			8.5 in x 3.75 in x 20 in	
Weight	29 lbs			43 lbs	

† Lower rep rates (<30kHz) performance achieved by pulse energy capping

## Performance Curves



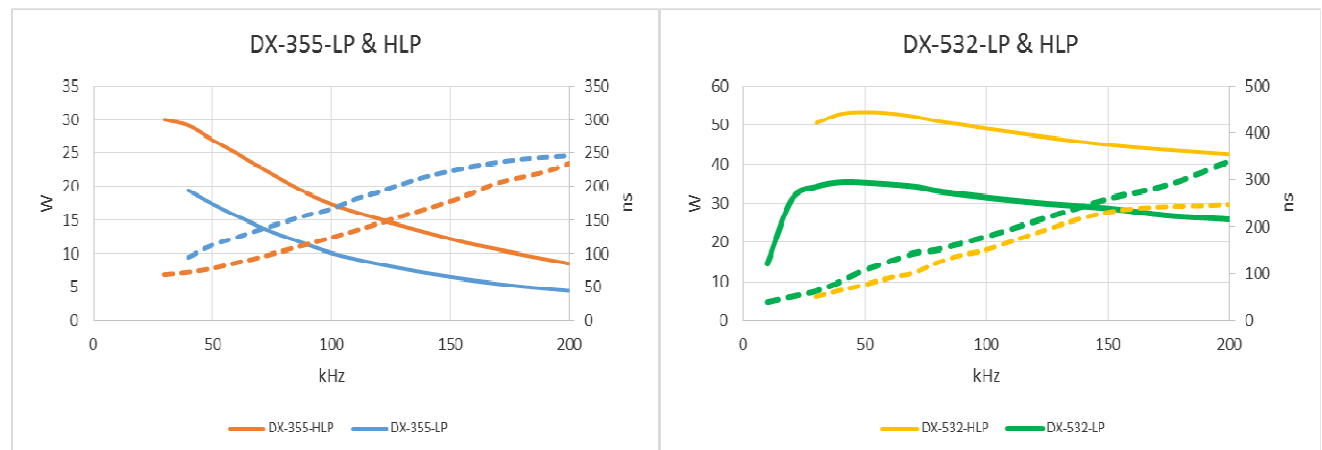
# DX-LP System Specifications

Model	DX-355-LP	DX-355-HLP	DX-532-LP	DX-532-HLP
<b>Output Characteristics</b>				
Wavelength (nm)	355	355	532	532
Average Power (W)	16 W @ 40 kHz	28 W @ 30 kHz	35 W @ 40 kHz	48 W @ 40 kHz
Average Power (W)	4 W @ 200 kHz	7 W @ 200 kHz	25 W @ 200 kHz	40 W @ 200 kHz
Pulse Width @ 40 kHz	~ 95 ns	~ 70 ns	~ 85 ns	~ 65 ns
Pulse Width @ 200 kHz	~245 ns	~220 ns	~340 ns	~250 ns
Repetition Rate†	Single Shot to 200 kHz			
Pulse to Pulse Stability**	< 1.5% rms			
Long Term Stability (8 hr ± 1° C)	±2% rms			
<b>Beam Characteristics</b>				
Polarization Ratio	Horizontal; 100:1		Vertical; 100:1	
Beam Diameter (at exit)	~ 0.8 mm		~ 1 mm	
Beam Divergence	~ 1.7 mrad		~ 2 mrad	
Beam Circularity	> 90% @ 40 kHz			
Spatial Mode	TEM <sub>00</sub> M <sup>2</sup> <1.2			
Beam Pointing Stability	< 25 urad			
<b>Operating Specifications</b>				
Interface	Ethernet / RS 232 / GUI / External TTL Triggering			
Power Consumption (excluding chiller)	< 300 W typical	< 400 W typical	< 300 W typical	< 400 W typical
Warm Up Time	<15 minutes from stand by, < 30 minutes from cold start			
Electrical Requirement	100 to 240 V			
Line Frequency	50 to 60 Hz			
Relative Humidity	Non-condensing, 90% Max			
Ambient Temperature	15°C to 35°C (59° to 95°F) Operating Range			
Storage Conditions	-10°C to 40°C; Sea Level to 12,000 m; 0% to 90% RH, non-condensing			
<b>Physical Characteristics</b>				
Dimensions Laser Head (W x H x L)	7.5 in x 3.75 in x 22.5 in	7.5 in x 3.75 in x 25 in	7.5 in x 3.75 in x 22.5 in	7.5 in x 3.75 in x 25 in
Weight	49 lbs			

† Lower rep rate down to single shot performance achieved by pulse energy capping

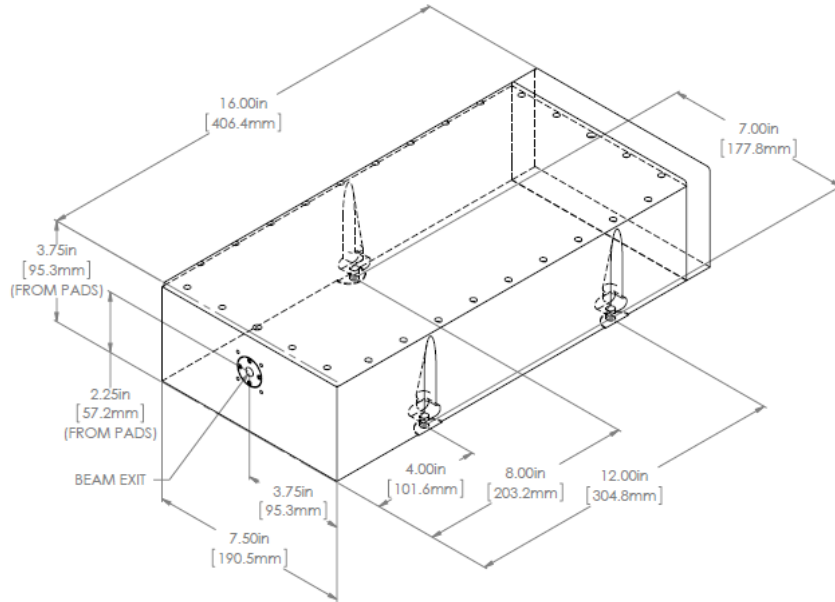
\*\* measured at the optimized pulse repetition rate

## Performance Curves

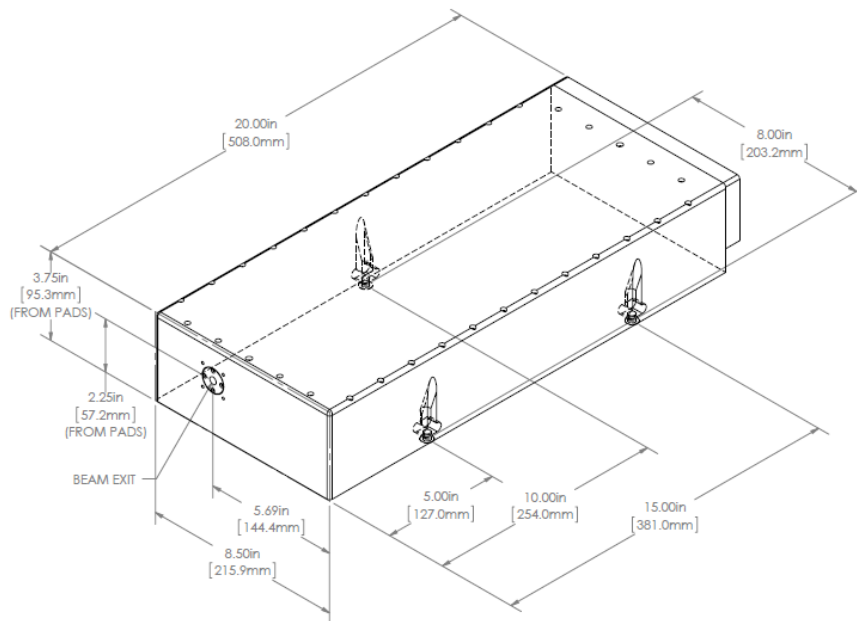


# Dimensional Drawings

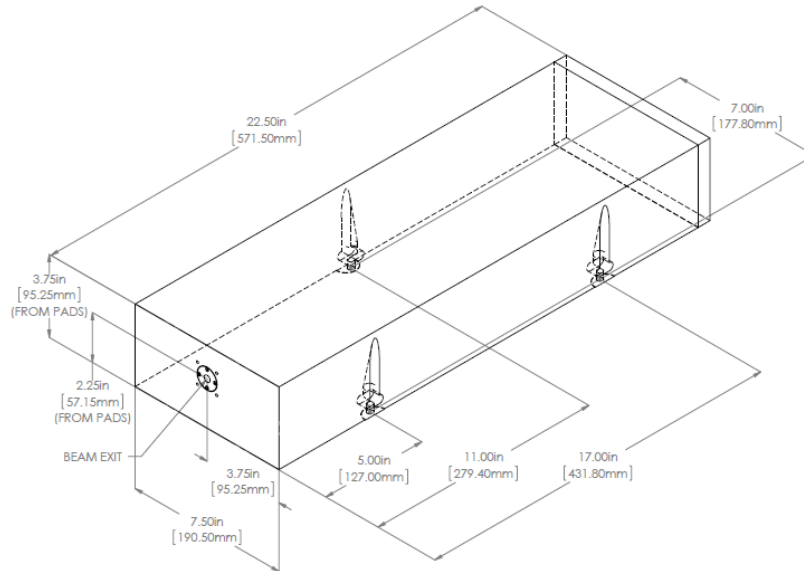
## DX-355-15, 20 & 28, -532-25, 35 & 48 Laser



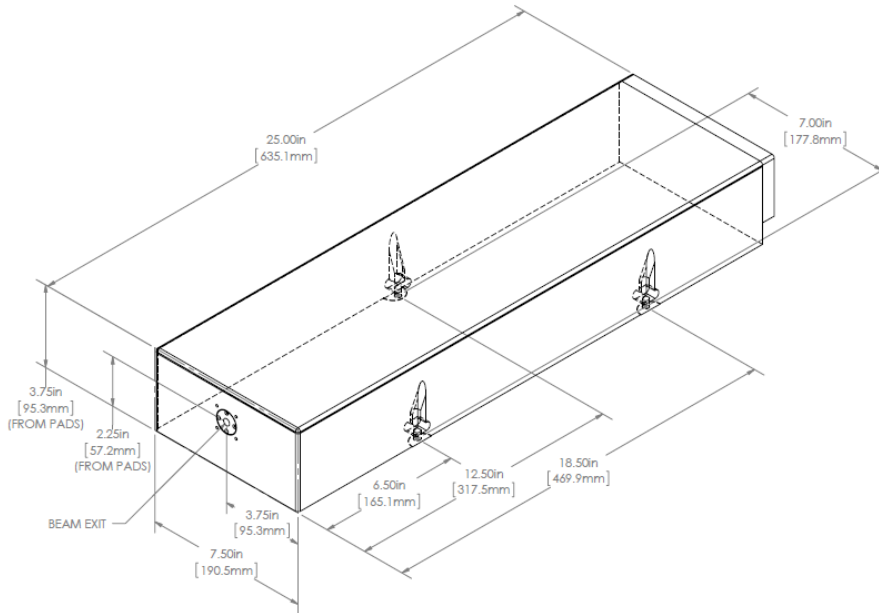
## DX-355-40 & 50, -532-70 & 100 Laser



## DX-355 & -532-LP Laser



## DX-355 & -532-HLP Laser



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



**Photonics Industries**  
International, Inc.

Photonics Industries conforms to provisions of US 21 CFR 1040.10 & 1040.11 and is made under one or more US patents listed below: 9,882,335, 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, 6,587,487, 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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