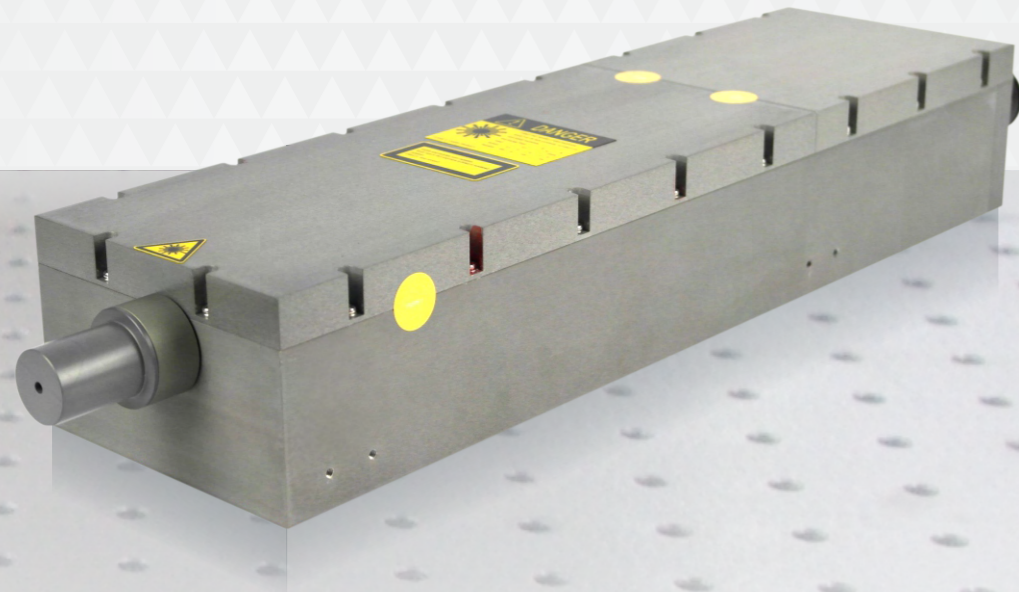


# Low Power DPSS Green Lasers

## 全固态小功率绿光激光器



Huaray-Spruce Low Power DPSS Green Lasers(7W/10W) are characterized by high stability, high repetition rate, high pulse-to-pulse stability and convenient operation. Apart from unique compact structure and high-quality laser beam, their short pulse width and high-peak power can reduce thermal damage zone, and long-lived laser diode can promote lower operating cost, which are particularly well suited for micro-machining field.

Huaray-Spruce小功率绿光激光器（7W/10W），采用独特的紧凑结构设计。具备高可靠性，高重复频率，高脉冲稳定性及操作便捷等特点，其短脉宽高峰值功率使材料加工热影响区域小，长寿命LD带来低运行成本，特别适合于精细加工领域。

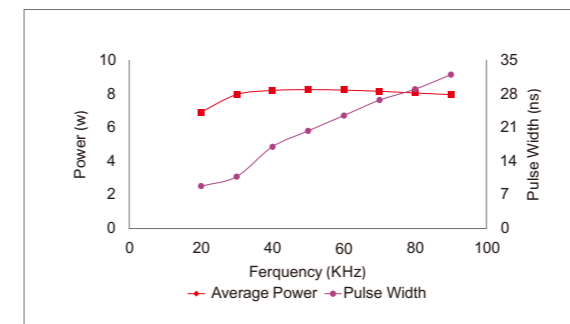
They are used principally to the surface processing of metallic and nonmetallic materials, coating film processing, such as hardware, ceramics, consumer electronic industry, plastics; thin-film solar cells manufacture; LED chips marking; internal memory recovery; laser resistor trimming and so on. Particularly they are suitable for FPD and thin film solar materials processing areas.

主要应用于金属和非金属材料的表面加工或者镀膜层的加工，如五金、陶瓷、3C电子、塑料、硅晶等的加工、薄膜太阳能电池制造、LED芯片打标、FPD和太阳能薄膜材料加工领域。

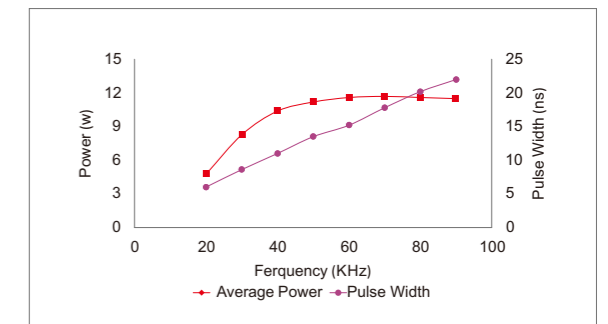
### DataSheet

Model	Spruce-532/7	Spruce-532/10
Wavelength	532nm	532nm
Average Power	> 7W@50kHz	> 10W@50kHz
Pulse Repetition Rate	20kHz-200kHz	20kHz-200kHz
Spatial Mode	TEM <sub>00</sub> (M <sup>2</sup> ≤1.2)	TEM <sub>00</sub> (M <sup>2</sup> ≤1.2)
Beam Roundness	≥90%	≥90%
Pulse Width	< 15ns@50kHz	< 15ns@50kHz
Working Material	Nd:YVO <sub>4</sub>	Nd:YVO <sub>4</sub>
Beam-pointing	<25μrad	<25μrad
Pulse Stability	≤3%rms	≤3%rms
Long-Term Stability	≤3%rms	≤3%rms
Beam Diameter	≤7mm (A Series) ≤1.2mm (B Series)	≤7mm (A Series) ≤1.2mm (B Series)
Beam Divergence	≤2mrad	≤2mrad
Cooling	water	water
Polarization Ratio	Vertical, >100:1	Vertical, >100:1
Power Consumption	500W	600W
Classification	Class 4	Class 4

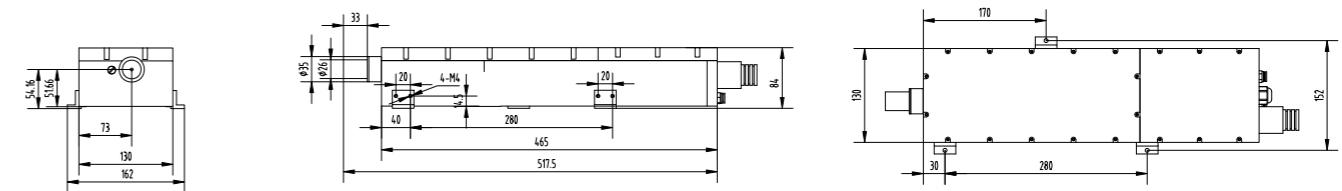
Pulse Width and Power Chart  
Spruce-532/7



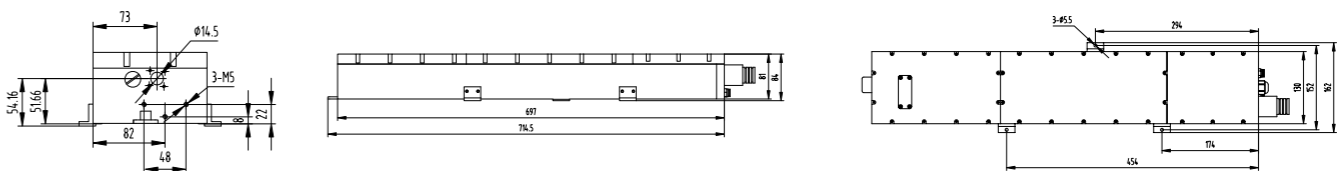
Pulse Width and Power Chart  
Spruce-532/10



### Product Size(mm) of B series

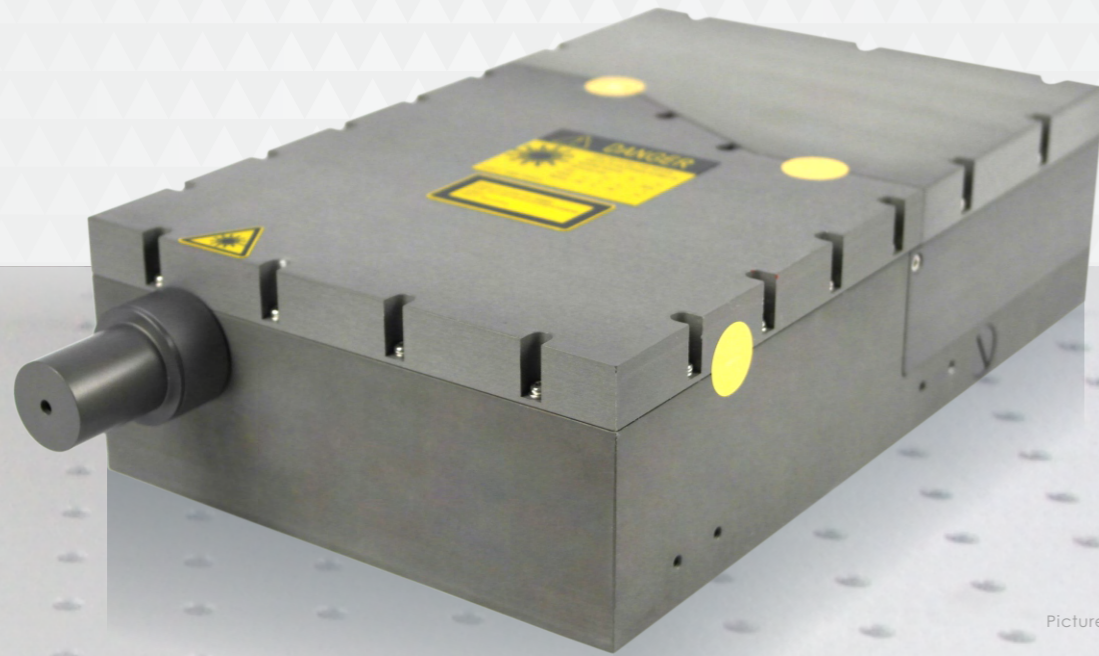


### Product Size(mm) of A series



# Low Power DPSS UV Lasers

## 全固态小功率紫外激光器



图片仅供参考  
Pictures for reference only

Huaray-Spruce Low-power DPSS UV Lasers(1W/3W/5W) is featured with compact structure with extremely convenient installation and debugging. They have adopted the built-in laser diode technology to avoid the effect of fiber shaking on output laser. Besides, the beam quality is excellent enough to ensure the stability and reliability for mass production, which can meet the special manufacturing and processing demand in harsh industrial working condition.

Huaray-Spruce 小功率紫外激光器 (1W/3W/5W), 是一款久经市场考验的全固态紫外激光器, 激光器结构紧凑, 光束传输性能极佳, 并可保证良好的光学质量。该激光器可满足严苛条件下的工业加工需求, 安装调试极其方便, 可以节省和降低客户在设备集成上的时间和难度。

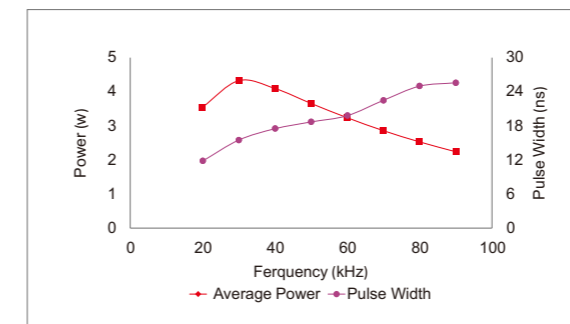
They are widely used in 3C industry marking, as well as industrial micro machining, including marking for a diversity of materials, LED scribing, laser rapid prototyping, removal of metal and non-metal coating, silicon wafer processing and so on.

主要应用于3C行业标记及工业化精细加工领域, 包括各种材料的标记、表层毛化; 金属或非金属镀层去除; 各类材料的划线, 盲槽处理; 新兴超薄金属箔片微孔制作等。

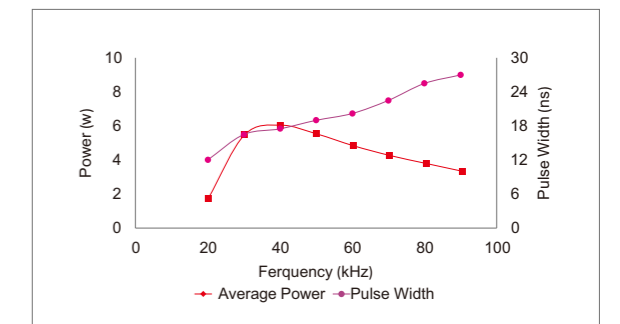
## DataSheet

Model	Spruce-355/1	Spruce-355/3	Spruce-355/5
Wavelength	355nm	355nm	355nm
Average Power	>1W@50kHz	>3W@40kHz	>5W@40kHz
Pulse Repetition Rate	20kHz-200kHz	20kHz-200kHz	20kHz-200kHz
Spatial Mode	TEM <sub>00</sub> (M <sup>2</sup> ≤1.2)	TEM <sub>00</sub> (M <sup>2</sup> ≤1.2)	TEM <sub>00</sub> (M <sup>2</sup> ≤1.2)
Beam Roundness	≥90%	≥90%	≥90%
Pulse Width	<10ns@50kHz	<15ns@40kHz	<15ns@40kHz
Working Material	Nd:YVO <sub>4</sub>	Nd:YVO <sub>4</sub>	Nd:YVO <sub>4</sub>
Beam-pointing	<25 μ rad	<25 μ rad	<25 μ rad
Pulse Stability	≤3%rms	≤3%rms	≤3%rms
Long-Term Stability	≤3%rms	≤3%rms	≤3%rms
Beam Diameter	≤8mm (A Series) ≤0.7mm (B Series)	≤8mm (A Series) ≤0.7mm (B Series)	≤8mm (A Series) ≤0.7mm (B Series)
Beam Divergence	≤2mrad	≤2mrad	≤2mrad
Cooling	Water	Water	Water
Polarization Ratio	horizontal, >100:1	horizontal, >100:1	horizontal, >100:1
Power Consumption	500W	500W	600W
Classification	Class 4	Class 4	Class 4

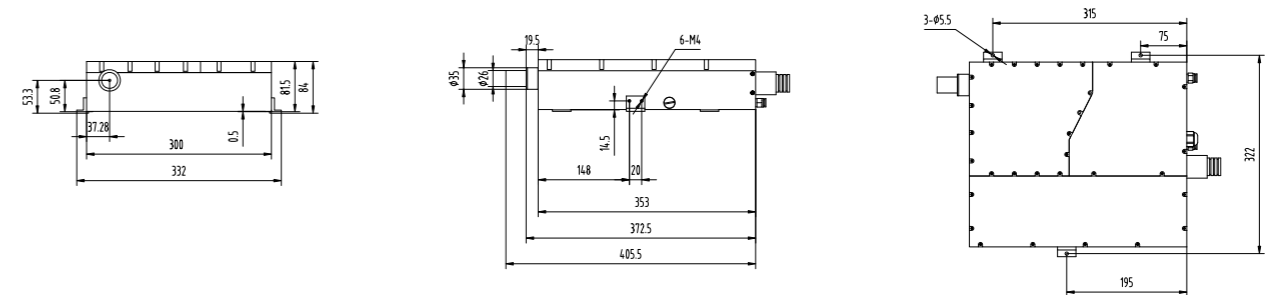
### Pulse Width and Power Chart Spruce-355/3



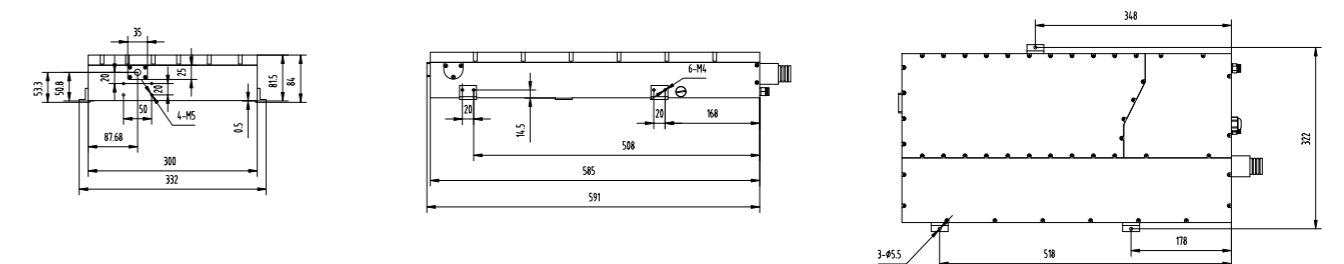
### Pulse Width and Power Chart Spruce-355/5



### Product Size(mm) of B series

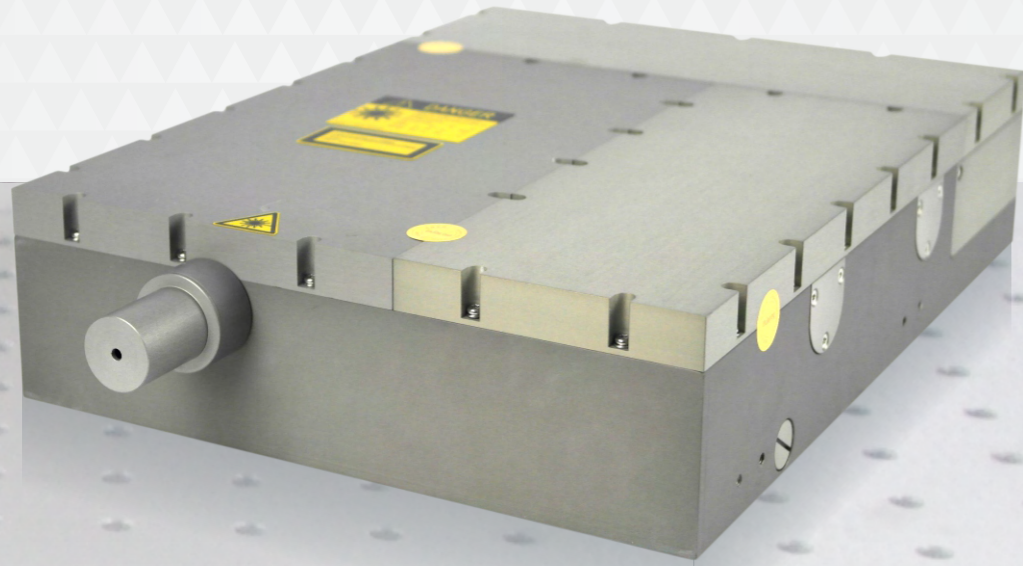


### Product Size(mm) of A series



# Mid Power DPSS Green Lasers

## 全固态中功率绿光激光器



Huaray-Spruce Mid Power DPSS Green Lasers(20W) especially designed for industrial micro-machining field, have the best reliability in industrial field, which is suitable for industrial manufacturing environment. Meanwhile, they are characterized by long lifetime, shortest average maintenance time and low usage cost. They are particularly well suited for ceramic cutting, silicon wafer marking, electronic packaging and other fields.

Huaray-Spruce中功率绿光激光器（20W），特别为精细工业加工领域而设计，光束质量好，适应于24/7的工业制造环境，拥有最佳的工业级可靠性，具备长寿命、最短的平均维修时间和低使用成本的优势。

They are used principally to the surface processing of metallic and nonmetallic materials, coating film processing, such as hardware, ceramics, consumer electronic industry, plastics; thin-film solar cells manufacture; LED chips marking; internal memory recovery; laser resistor trimming and so on.

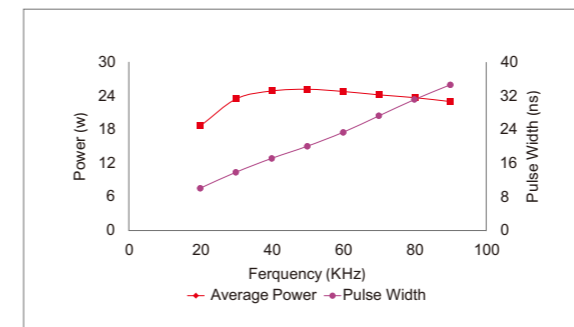
Particularly they are suitable for FPD and thin film solar materials processing areas.

主要应用于陶瓷打孔划片，玻璃/晶圆切割，电子封装分隔单体等应用；特定金属材料的微孔制作；表面薄膜的清除、非晶硅薄膜与太阳能电池板镀膜的划线等，并适用于大多数金属和非金属材料表面加工或者镀膜层的加工。

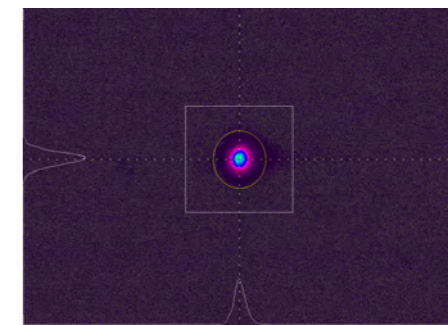
### DataSheet

Model	Spruce-532/20
Wavelength	532nm
Average Power	> 20W@50kHz
Pulse Repetition Rate	20kHz-200kHz
Spatial Mode	TEM <sub>00</sub> (M <sup>2</sup> ≤1.2)
Beam Roundness	≥90%
Pulse Width	<20ns@50kHz
Working Material	Nd:YVO <sub>4</sub>
Beam-pointing	<25 μ rad
Pulse Stability	≤3%rms
Long-Term Stability	≤3%rms
Beam Diameter	≤7mm (A Series) ≤1.2mm (B Series)
Beam Divergence	≤2mrad
Cooling	water
Polarization Ratio	Vertical, >100:1
Power Consumption	800W
Classification	Class 4

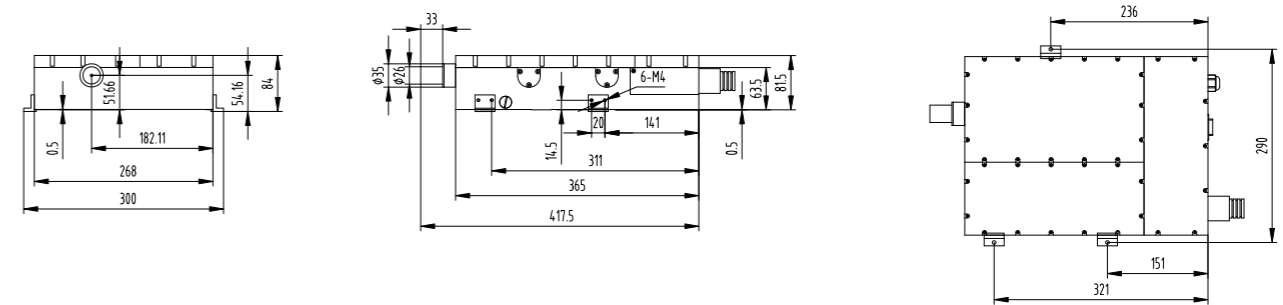
### Pulse Width and Power Chart Spruce-532/20



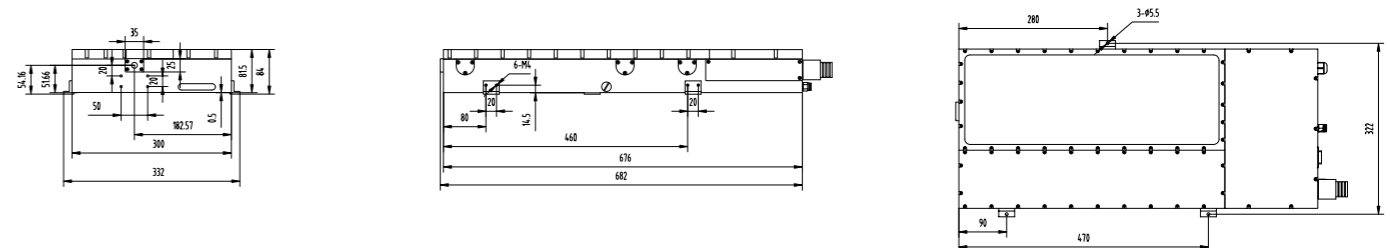
### Beam Quality



### Product Size(mm) of B series

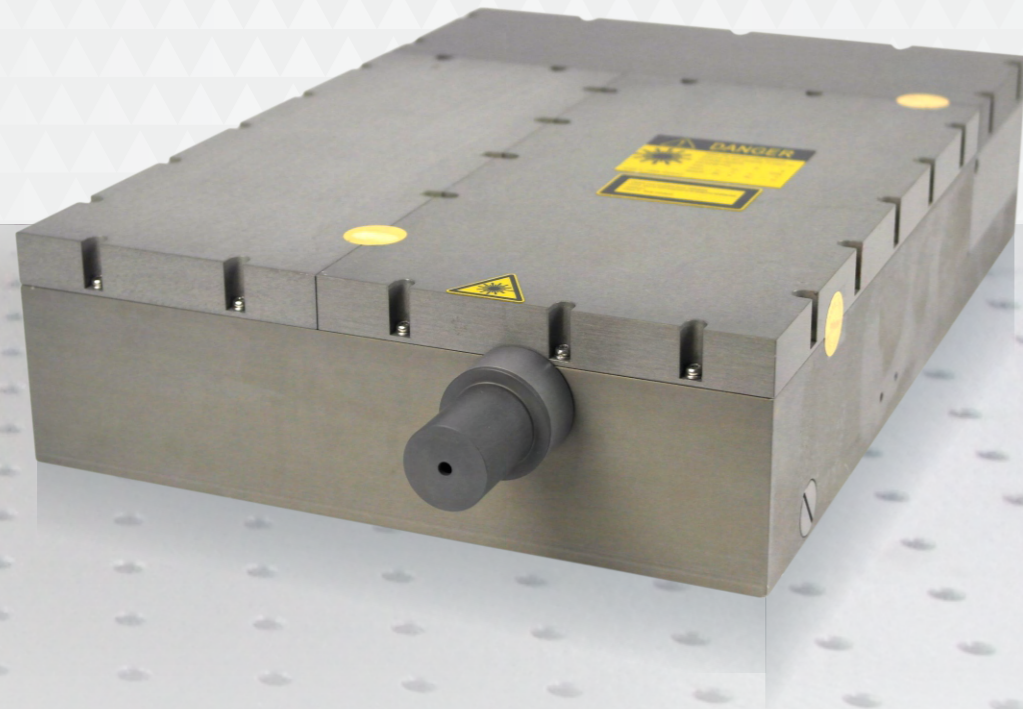


### Product Size(mm) of A series



# Mid Power DPSS UV Lasers

## 全固态中功率紫外激光器



Huaray-Spruce Mid Power DPSS UV Lasers(8W/10W) especially designed for industrial micro-machining field, have adopted unique folded cavity construction which is secure and reliable. Meanwhile, they are characterized by high stability, low power consumption, long - term stability and high-quality laser beam. In addition, the special designed laser output window can be exchanged on site, which fits for arduous conditions in industrial processing applications

Huaray-Spruce中功率紫外激光器（8W/10W），特别为工业精细化加工领域而设计，采用独特的折叠腔结构，稳固可靠，同时具备稳定性高、整体功耗低、长时间工作稳定性和光束质量好的特点。特别适合恶劣的工业加工环境，并可长时间连续工作。

They are used in micromachining high-end market, including FPC cutting, ceramic punching and scribing, glass cutting, touch screen processing, silicon wafer processing and so on. Particularly they are suitable for punching, scribing, cutting of high precision micromachining and other fields.

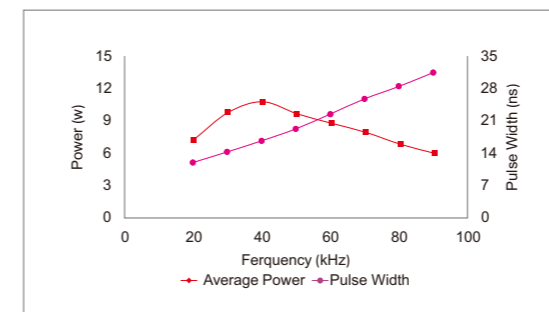
主要应用于超精细加工的高端市场，包括PCB/FPC切割与分板；陶瓷打孔划片；玻璃/蓝宝石/晶圆切割；特别适用于高精细加工的打孔、划线、切割等领域。

### DataSheet

Model	Spruce-355/8	Spruce-355/10
Wavelength	355nm	355nm
Average Power	> 8W@40kHz	> 10W@40kHz
Pulse Repetition Rate	20kHz-200kHz	20kHz-200kHz
Spatial Mode	TEM <sub>00</sub> (M <sup>2</sup> ≤1.2)	TEM <sub>00</sub> (M <sup>2</sup> ≤1.2)
Beam Roundness	≥90%	≥90%
Pulse Width	<20ns@40kHz	<20ns@40kHz
Working Material	Nd:YVO <sub>4</sub>	Nd:YVO <sub>4</sub>
Beam-pointing	<25μrad	<25μrad
Pulse Stability	≤3%rms	≤3%rms
Long-Term Stability	≤3%rms	≤3%rms
Beam Diameter	≤8mm (A Series) ≤1.2mm (B Series)	≤8mm (A Series) ≤1.2mm (B Series)
Beam Divergence	≤2mrad	≤2mrad
Cooling	water	water
Polarization Ratio	horizontal, >100:1	horizontal, >100:1
Power Consumption	800W	800W
Classification	Class 4	Class 4

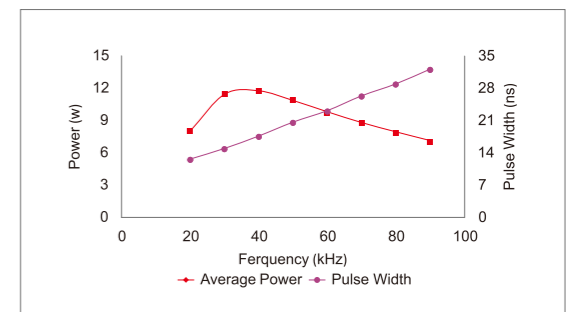
### Pulse Width and Power Chart

Spruce-355/8

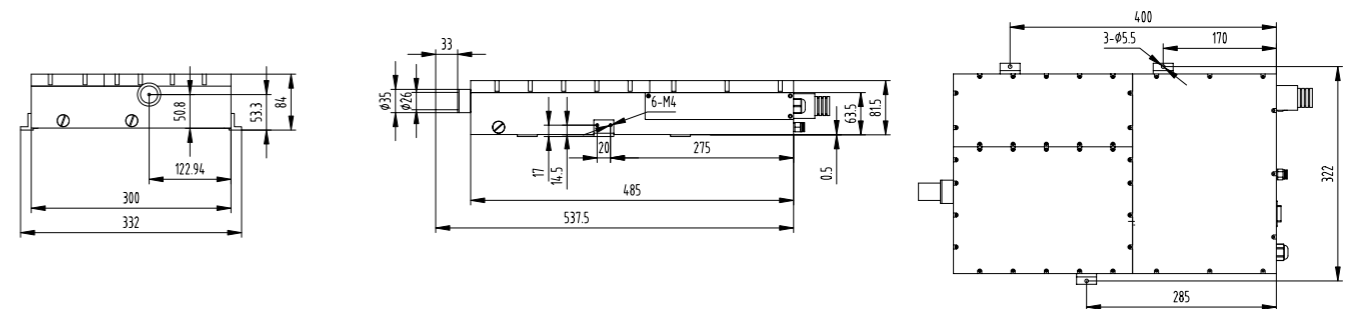


### Pulse Width and Power Chart

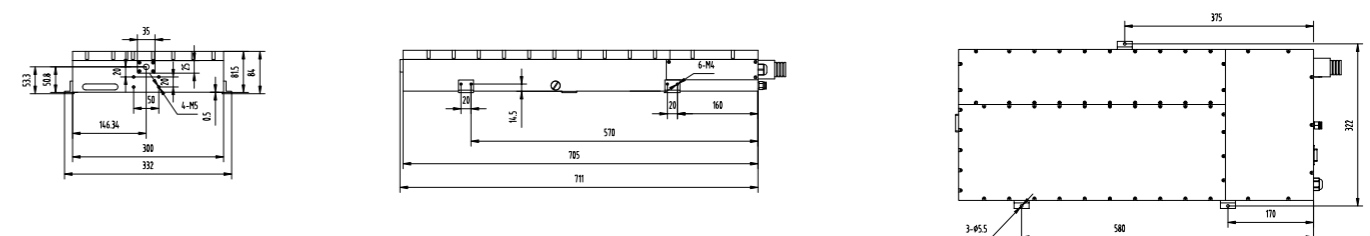
Spruce-355/10



### Product Size(mm) of B series

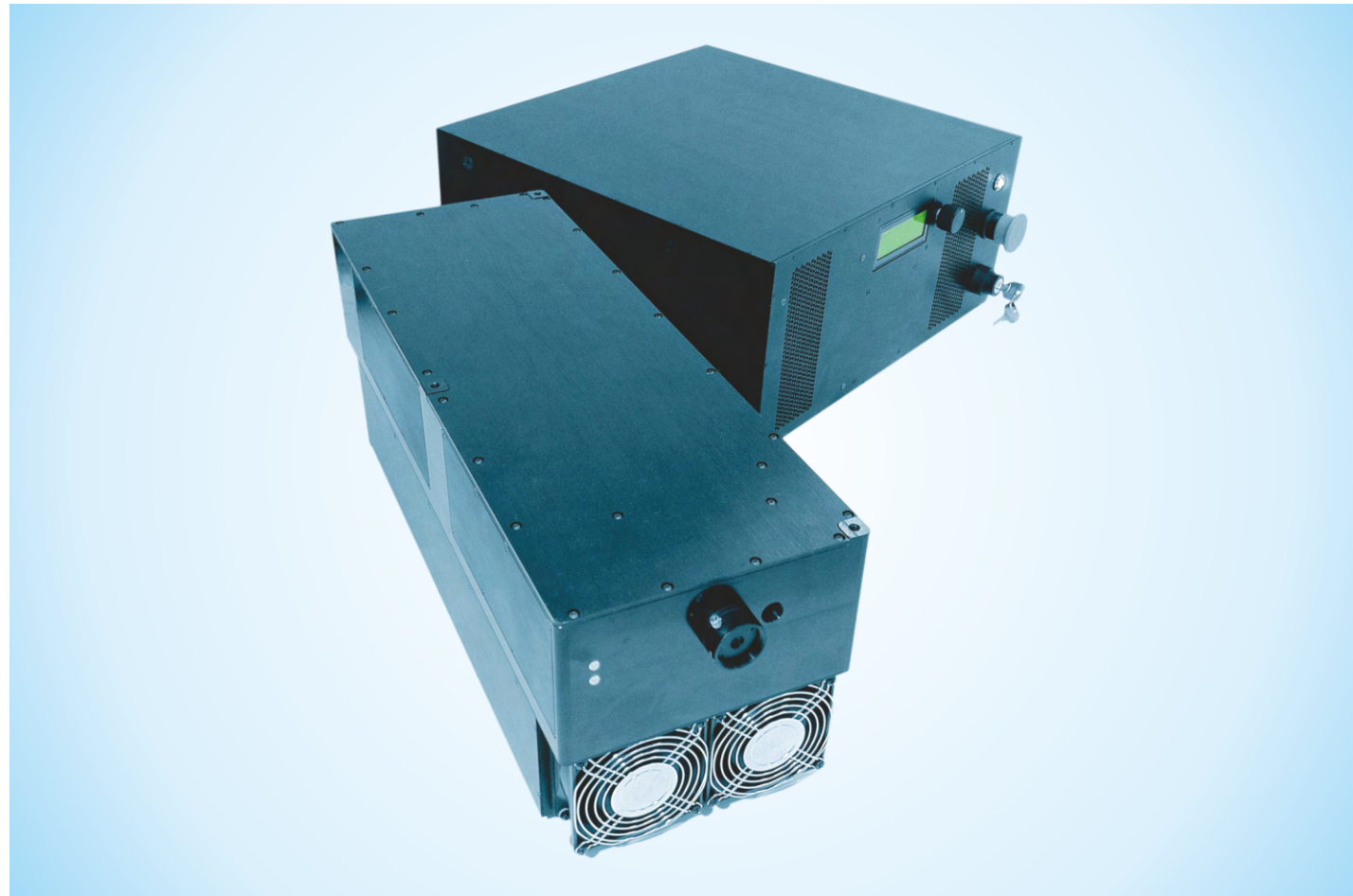


### Product Size(mm) of A series

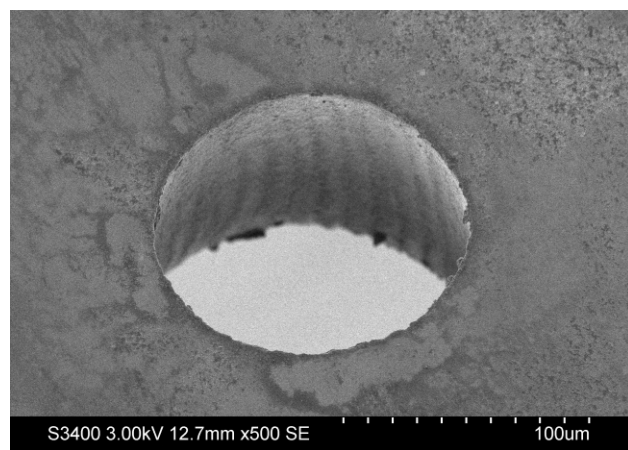


# APL-4000 SERIES

5 ps, 150  $\mu$ J, 4 W, 0-1000 kHz, 1064 nm  
 75  $\mu$ J, 2 W, 0-1000 kHz, 532 nm  
 30  $\mu$ J, 1 W, 0-1000 kHz, 355 nm



COMPACT, RELIABLE, AFFORDABLE, AIR-COOLED PICOSECOND LASER  
 紧凑，可靠，强大的风冷皮秒激光器



Robust and affordable, the APL-4000 laser produces high energy pulses with durations below 8 ps. The laser is based on a hybrid optical amplifier architecture that combines the advantages of fiber laser technology with solid state diode pumped multi-pass amplifiers. Compact and air-cooled, this laser is low maintenance and never needs realignment. Available in 3 standard wavelengths, with pulse energies up to 150  $\mu$ J/pulse, this laser is ideal for fast, high precision material processing at an affordable price.

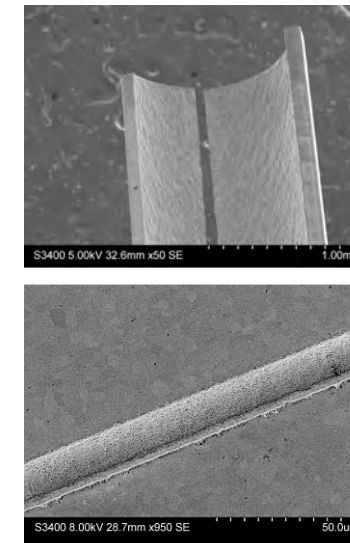
可靠并且性价比高的皮秒激光器APL-4000，能提供高能量激光脉冲且激光脉冲宽小于8皮秒，整个系统基于复合的光学放大器结构，兼具光纤激光器和固体激光器的优点。结构紧凑，风冷制冷，便于维护和集成，并且可以三波长切换使用。基于高达150uJ的单脉冲能量输出和合适的价格，该款激光器是高精密快速加工的理想光源。

# COMPACT, RELIABLE, AFFORDABLE, AIR-COOLED PICOSECOND LASER

紧凑，可靠，强大的风冷皮秒激光器

# APL-4000 SERIES

5 ps, 150  $\mu$ J, 4 W, 0-1000 kHz, 1064 nm  
 75  $\mu$ J, 2 W, 0-1000 kHz, 532 nm  
 30  $\mu$ J, 1 W, 0-1000 kHz, 355 nm

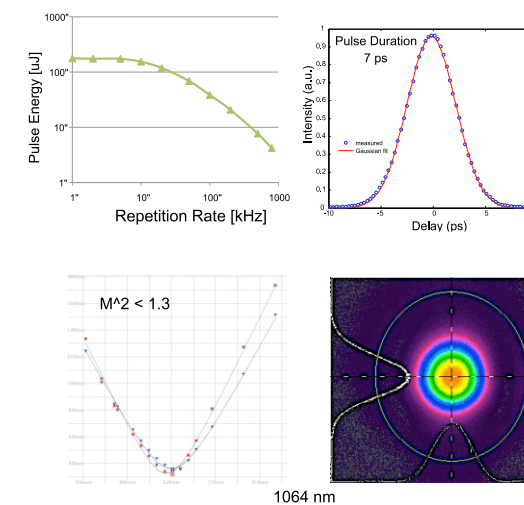


## Features

4-8 picosecond pulses  
 Up to 4W average power  
 Up to 150  $\mu$ J of pulse energy  
 Long term power stability <2% noise  
 High beam quality with  $M^2 < 1.3$   
 Trigger 0 - 1 MHz on demand  
 Serial Interface  
 Fully detachable umbilical up to 10m  
 Air Cooling  
 > 20,000 hr lifetime  
 Available with different wavelengths  
 1064nm, 532 nm, 355 nm

## 特点

窄脉宽，4-8 ps  
 平均功率可达4W  
 脉冲能量可到150uJ  
 长期功率稳定性 < 2%RMS  
 高光束质量  $M^2 < 1.3$   
 输出单脉冲至1MHz  
 串行接口  
 连接线可分离并可延长至10米  
 风冷  
 寿命大于2万小时  
 可实现红外、绿光、紫外波长输出的切换



Parameters	APL-4000
Model	APL-4000
Wavelength	1064nm
Average Power	$\geq 4W$
Pulse Repetition Rate	0-1000kHz
Spatial Mode	$M^2 \leq 1.3$
Pulse Width	<10ps
Working Material	Nd:YVO <sub>4</sub>
Beam-pointing Stability	<25 $\mu$ rad
Beam Roundness	$\geq 90\%$
Beam Diameter	$\leq 1.2mm$
Beam Divergence	$\leq 2mrad$
Pulse-to-Pulse Stability	$\leq 1\%rms$
Long-Term Stability	$\leq 2\%rms$
Ambient Temperature	15-30°C
Cooling	Air Cooling
Polarization Ratio	Vertical, >1000:1
Power Consumption	700W
Classification	Class 4

## Applications

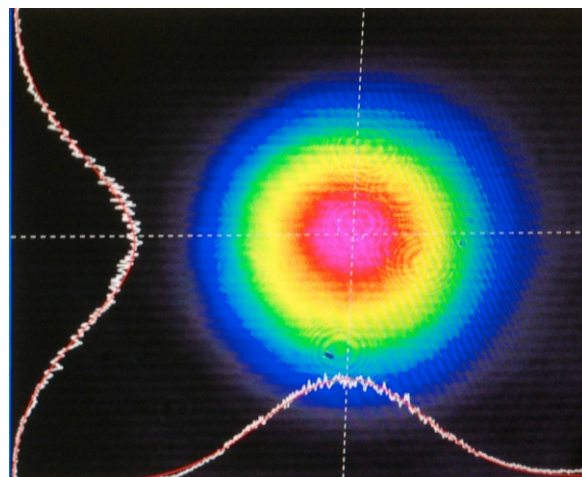
Micro-machining  
 Nonlinear Optics  
 TFT Repair  
 Microscopy  
 Thin Film Patterning  
 Scribing  
 Marking  
 Spectroscopy  
 Dicing  
 Processing Volatile Materials  
 Laser Deposition  
 Machining Hard Materials

## 应用范围

微细加工  
 非线性光学  
 TFT维修  
 显微镜学  
 薄膜成型  
 划线  
 打标  
 光谱学  
 皮革切割  
 挥发性物质处理  
 激光沉积  
 硬材料加工

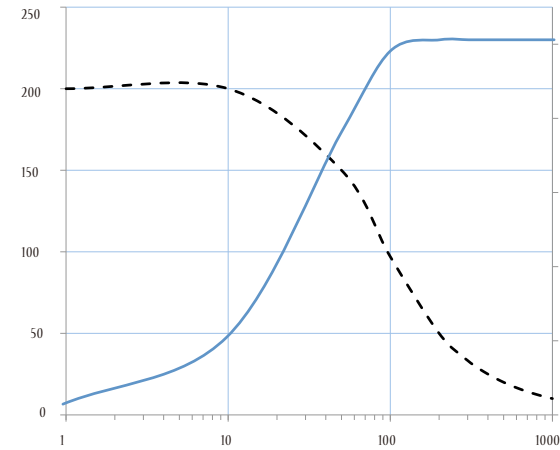


COMPACT, RELIABLE, AFFORDABLE, AIR-COOLED PICOSECOND LASER  
紧凑，可靠，强大的风冷皮秒激光器



The APL-X is a compact and powerful, hybrid fiber/free space amplified ultrafast laser. With pulses shorter than 10ps and energies up to 200 μJ per pulse, this laser is ideal for fast, high precision micromachining and material processing of any material. The robust APL-X combines the advantages of fiber laser technology with solid state diode pumped free space amplification. Compact and air-cooled, this laser is low maintenance and easy to integrate with other equipment. Available with single or multiple wavelength combinations.

APL-X是一款紧凑，强大，结合光纤在极小空间放大的超快激光器。脉宽小于10ps，但是单脉冲能量可达到200uJ，是所有材料微精细加工工艺的理想选择。它集合了光纤激光器和固体端泵激光器的技术优点。结构紧凑，风冷制冷，便于维护和集成，可单个或多个波长切换使用。

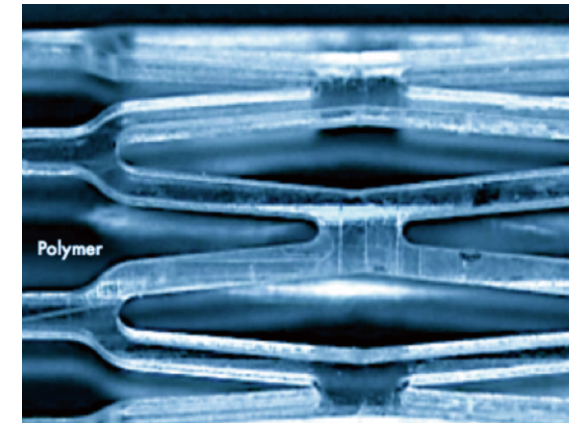


**Features**

- <10 picosecond pulses
- Up to 10W average power
- Up to 200 μJ of pulse energy
- Long term power stability <1% RMS
- High beam quality with M<sup>2</sup> < 1.3
- Programmable pulse bursts
- TTL trigger input.
- Serial remote Interface
- Fully detachable umbilical up to 10m
- Air Cooling (Water cooling optional)
- > 20,000 hr lifetime
- Integrated harmonics with multiple Wavelength combinations and switching

**特点**

- 窄脉宽，< 10ps
- 平均功率可达10W
- 脉冲能量可到200uJ
- 长期功率稳定性 <1%RMS
- 高光束质量 M<sup>2</sup> < 1.3
- 可编程脉冲串
- TTL触发脉冲输入
- 串行接口
- 可完全拆卸并延长高达10m的连接线
- 风冷（水冷可选）
- 寿命大于2万小时
- 可实现多波长输出的转换



**Applications**

- Micro-machining
- Medical Devices
- TFT Repair
- Stent Manufacturing
- Thin Film Patterning
- Scribing
- Marking
- Spectroscopy
- Dicing
- Processing Volatile Materials
- Laser Deposition
- Machining Hard Materials

**应用范围**

- 微细加工
- 医疗设备
- TFT维修
- 支架制造
- 薄膜成型
- 划线
- 打标
- 光谱学
- 皮革切割
- 挥发性物质处理
- 激光沉积
- 硬材料加工

Parameters	APL-X
Model	APL-X
Wavelength	1064nm
Average Power	≥10W
Pulse Repetition Rate	0-1000kHz
Spatial Mode	M <sup>2</sup> ≤ 1.3
Pulse Width	<10ps
Working Material	Nd:YVO <sub>4</sub>
Beam-pointing Stability	<25μrad
Beam Roundness	≥90%
Beam Diameter	≤1.2mm
Beam Divergence	≤2mrad
Pulse-to-Pulse Stability	≤1%rms
Long-Term Stability	≤2%rms
Ambient Temperature	15-27°C
Cooling	Air Cooling/Water
Polarization Ratio	Vertical, >1000:1
Power Consumption	1000W
Classification	Class 4