

Maiman

Diamond series high energy lasers

Redefining Diamond Processing

Maiman

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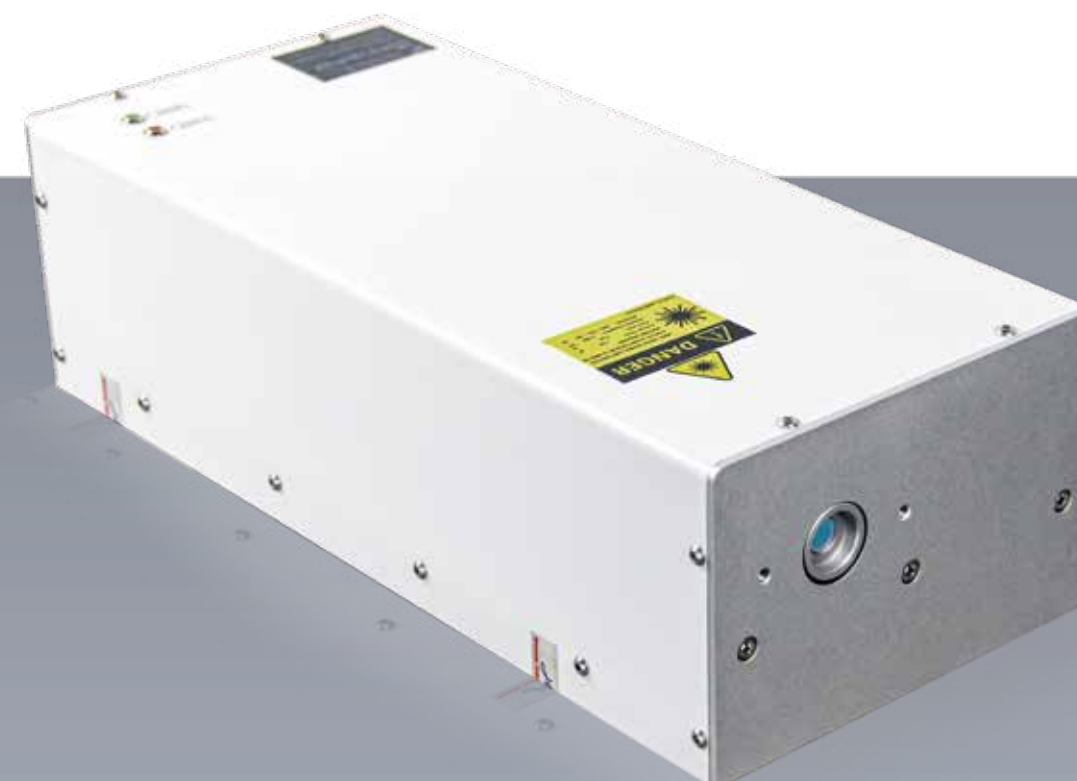
Web: www.Shinetechnologies.co.in



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$M^2 < 1.3$
Beam quality



IP65
Protection grade



20000hrs+
Service life

Diamond series high energy lasers

20ns IR/Green/UV lasers



Features

- Single pulse energy >2mj
- Superior beam quality $M^2 < 1.3$
- Ultra-long service life and power stability
- All-in-one compact design

Model No.	MMEPU-355-10-HE-D20	MMEPG-532-16-HE-D20	MMEPG-532-20-HE-D20	MMEPG-1064-18-HE-D20	MMEPA-1064-25-HE-D20
Wavelength (nm)	355nm	532nm	532nm	1064nm	1064nm
Average Power (W)	>10W@10kHz	>16W@10kHz	>20W@10kHz	>18W@10kHz	>25W@10kHz
Single Pulse Energy (uJ)	~1000uJ@10kHz	~1600uJ@10kHz	~2000uJ@10kHz	~1800uJ@10kHz	~2500uJ@10kHz
Pulse Width (ns)	<20ns@10kHz				
Repetition Rate	10kHz-100kHz	7kHz-100kHz			
Pulse Stability	<3% rms				
Long Term Stability	<±3%				
Polarization Ratio	Horizontal;>100:1	Vertical;>100:1		Horizontal;>100:1	
Beam Diameter	~0.9mm(at exit)				
Beam Circularity	>90%				
Spatial Mode	TEM ₀₀ , M ² <1.3				
Operating Specifications					
Warm-up Time	<15 minutes from cold start				
Electrical Requierment	DC17.5V,350W				
Ambient Temperature	10-35°C, RH<80%				
Storage Conditions	-10-40°C, RH<90%				
Cooling System	Water-Cooled				
Water Temperature (laser inlet)	25°C				

70ns IR/Green lasers

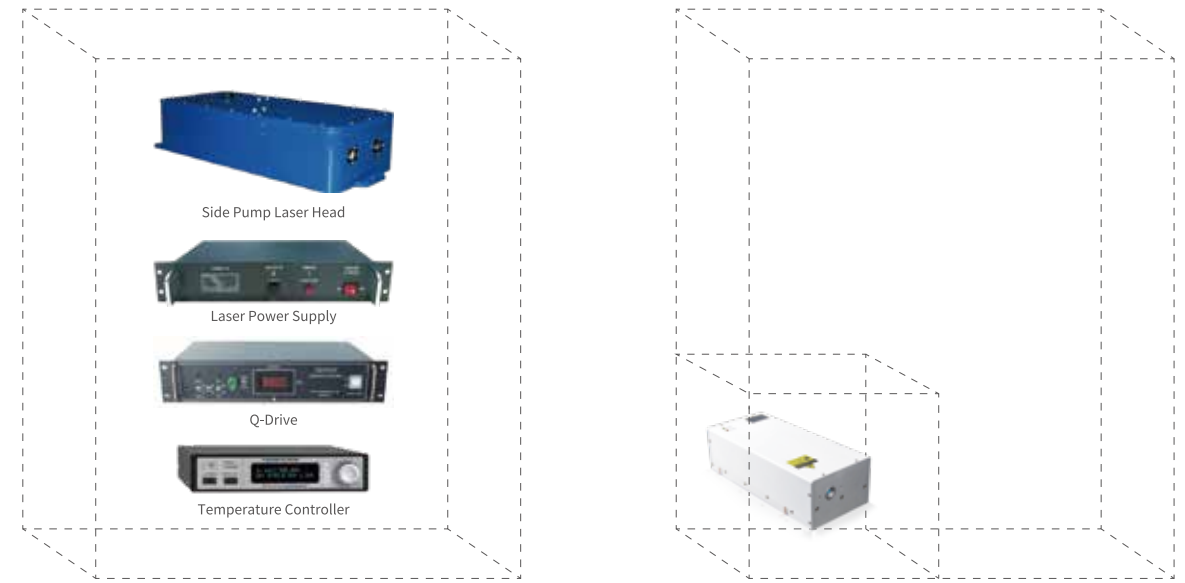


Features

- Single pulse energy >2mj
- Superior beam quality $M^2 < 1.5$
- Ultra-long service life and power stability
- All-in-one compact design

Model No.	MMEPG-532-16-HE-D70	MMEPG-532-20-HE-D70	MMEPG-1064-18-HE-D70	MMEPA-1064-25-HE-D70
Wavelength (nm)	532nm	532nm	1064nm	1064nm
Average Power (W)	>16W@10kHz	>20W@10kHz	>18W@10kHz	>25W@10kHz
Single Pulse Energy (uJ)	~1600uJ@10kHz	~2000uJ@10kHz	~1800uJ@10kHz	~2500uJ@10kHz
Pulse Width (ns)	>70ns@10kHz			
Repetition Rate	7kHz-100kHz			
Pulse Stability	<3% rms			
Long Term Stability	<±3%			
Polarization Ratio	Vertical;>100:1		Random	
Beam Diameter	~0.9mm(at exit)			
Beam Circularity	>90%			
Spatial Mode	TEM ₀₀ , M ² <1.5			
Operating Specifications				
Warm-up Time	<15 minutes from cold start			
Electrical Requierment	DC24V,500W			
Ambient Temperature	10-35°C, RH<80%			
Storage Conditions	-10-40°C, RH<90%			
Cooling System	Water-Cooled			
Water Temperature (laser inlet)	25°C			

Comparative advantage



• Conventional Laser System

• Maiman High Energy Laser

Shortcomings

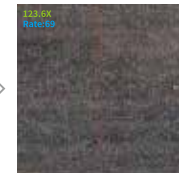
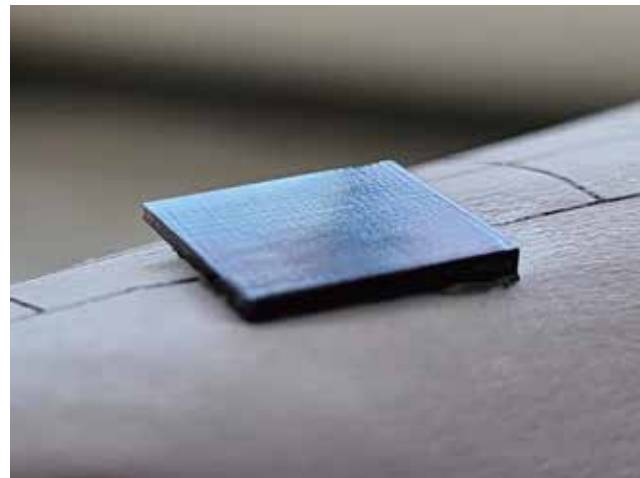
Advantages

	Shortcomings	Advantages
Fault Rate and Lifespan	<p>High Failure Rate and Limited Lifespan</p> <ul style="list-style-type: none"> • The side-pumped module exhibits a high failure rate, resulting in a short lifespan and prone to attenuation, necessitating replacement 1-2 times annually. • Structural susceptibility of the laser leads to deformation and subsequent cutting position discrepancies. • Laser crystal end faces are vulnerable to contamination, leading to crystal damage. • Continuous contact of laser crystal with cooling water makes laser power susceptible to factors like water temperature, quality, and flow. 	<p>Low Failure Rate, Service Life Up to 6 Years</p> <ul style="list-style-type: none"> • Different pump sources offer lifespans greatly exceeding 20,000 hours, 5-6 times that of the side-pumped module. • Mechanical components undergo stress treatment, eliminating deformation and mitigating laser power attenuation, resulting in superior beam pointing. • Triple-layer protection, with an internal protection level of IP67 and an external protection level of IP65, minimizes environmental influences on the laser. • Cooling water solely used for shell cooling, avoiding contact with components. Internal employment of TEC temperature control with precision of ±0.01°C eradicates the impact of cooling water on the laser, and facilitates one chiller supplying multiple lasers.
Maintenance	<p>Frequent Maintenance</p> <ul style="list-style-type: none"> • Regular tuning is required for power maintenance. • Laser deformation causes poor spot directivity, resulting in cutting deviation. 	<p>Maintenance-free</p> <ul style="list-style-type: none"> • Employing a completely new structure, operational methodology, and manufacturing process, with power attenuation within 10% after 8000 hours of operation. • Enhanced beam pointing stability, eliminating cutting deviations attributed to laser deformation.
Dimensions	<p>Bulky Dimensions</p> <ul style="list-style-type: none"> • The laser head, laser power supply, Q driver, and temperature control system are separate entities, leading to larger dimensions and an elevated failure rate, making installation and maintenance more challenging. 	<p>Integrated Design</p> <ul style="list-style-type: none"> • Highly integrated design reduces dimensions by 30%, not only diminishing equipment size, footprint, and costs, but also ensuring greater equipment stability and ease of installation and calibration.
Process Tuning	<p>Complexity</p> <ul style="list-style-type: none"> • Power adjustments via current modulation exhibit a narrow adjustment range resulting in significant power fluctuations. • A majority of side-pumped lasers present poor beam quality, with $M^2 > 3$, uneven energy distribution, potentially leading to inferior cutting surface quality. • A wide pulse width (approximately 100 ns) generates high processing heat, possibly causing diamond breakage. 	<p>Simplicity</p> <ul style="list-style-type: none"> • Distinct power control methodologies allow for broader and more precise laser power adjustments. • Excellent beam quality remains unaffected by power and frequency variations, ensuring consistent performance and resulting in smoother cutting surfaces and straightforward adjustment. • Narrow pulse width, lower processing heat, and elevated diamond yield.
Economic Benefits	<p>Increased Single-machine Power Consumption and Environmental Temperature Control Costs</p> <ul style="list-style-type: none"> • Combined power consumption of a single machine (laser and chiller) amounts to 3,500W. • Chiller cooling requirements are stringent, leading to elevated costs. • Different lasers necessitate distinct water temperatures and require individual matching with chillers, thereby increasing equipment costs. • Chillers contribute to elevated environmental temperatures, consequently escalating environmental temperature control expenses. 	<p>Significant Energy Savings and Reduced Equipment and Environmental Temperature Control Costs through Remote Supply</p> <ul style="list-style-type: none"> • Total power consumption of a single machine is under 1,500W, resulting in annual savings of 17,000kW. • Chillers necessitate lower cooling standards, resulting in reduced costs. • Uniform laser water temperature requirements enable a single chiller to cool multiple lasers, reducing chiller count and noise. • Remote chiller supply significantly reduces equipment heat, effectively lowering environmental temperature control expenses.

Introduction

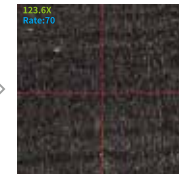
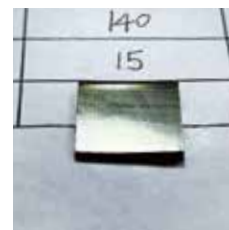
A higher peak power of the laser enables greater processing capability and efficiency, particularly in cutting ultra-hard materials like SiC and diamond. The laser system is highly integrated, incorporating the laser, power supply, Q-switch drive, temperature controller, and protection circuits into a compact and easy-to-install unit, facilitating maintenance. The internal resonator cavity is equipped with a self-cleaning system and stable cavity design, addressing power attenuation issues and ensuring an extended lifespan.

Test data



Data1

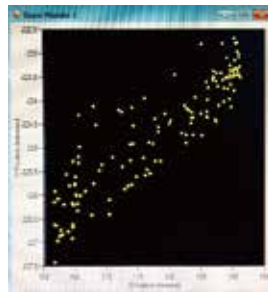
Single side cutting
Frequency: 10kHz
Stone Height: 10.3mm
Opening: 226um
Production: 27min



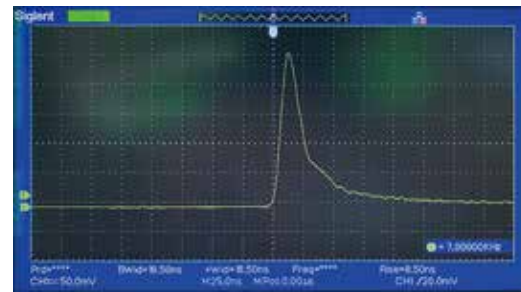
Data2

Single side cutting
Frequency: 10kHz
Stone Height: 7.6mm
Opening: 140um
Production: 15min

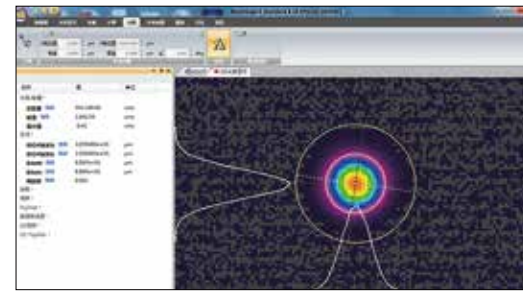
Performance diagram



① Laser pointing stability



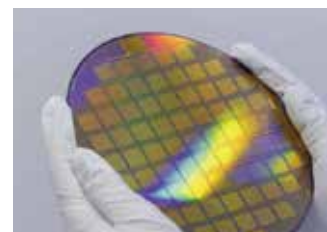
② Pulse width reading



③ Beam profile

Applications

- Diamond slicing & coring
- Carbon fiber cutting
- Super hard material cutting
- Diamond shape cutting
- SiC wafer dicing



Diamond series mini UV laser

Mini UV laser



Introduction

Small size, can be held up with one hand; the pulse width 6-8ns, ultra-high peak power perfectly to realize the surface marking of electronic products.

Features

- The laser power 1W;
- Solve power attenuation and meet 7*24 hours of work;
- The service life exceeds 20,000 hours, maintenance-free, no need for regular commissioning;
- Split machine, laser head compatible with optical path of fiber laser;
- Air-cooled and easy to integrate.

Model No.	MMEPU-D-355-1
Optical Characteristics	
Wavelength (nm)	355nm ± 1nm
Average Power (W)	>1W@20kHz
Single Pulse Energy (uJ)	~50uJ@20kHz
Pulse Width (ns)	~7ns@20kHz
Repetition Rate	Uncontrollable, range15-20kHz
Pulse Stability	<3% rms
Long Term Stability	<±3%
Beam Characteristics	
Polarization Ratio	Vertical;>100:1
Beam Diameter	7mm
Beam Circularity	>90%
Spatial Mode	TEM ₀₀ , M ² <1.2
Operating Specifications	
Warm-up Time	<15 minutes from cold start
Electrical Requirement	DC12V, >200W
Ambient Temperature	10-35°C, RH<80%
Storage Conditions	-10-40°C, RH<90%
Physical Characteristics	
Cooling System	Air-Cooled

Applications

- Diamond girdle code marking
- Precision marking on plastic and metal



Diamond series mini IR laser

Mini IR laser



Introduction

Superior beam quality and peak power ensure to achieve clear and shallow marks on the diamond and minimize the damage to the diamond.

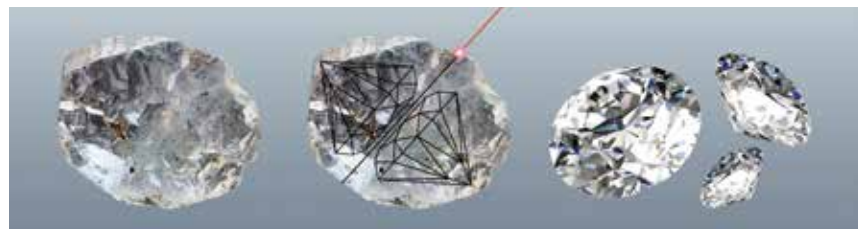
Features

- Dual mode laser emission-parallel laser mode and focusing laser mode, to meet the needs of different planning machines;
- Superior beam quality, minimum laser spot <math><5\mu\text{m}</math>;
- High-precision temperature control to ensure long-term stable operation of the laser;
- Service life over 20000 hours.

Model No.	MMD-YAG-1064-1
Optical Characteristics	
Wavelength (nm)	1064nm \pm 1nm
Average Power (W)	>1W@12kHz
Single Pulse Energy (uJ)	~30uJ@12kHz
Pulse Width (ns)	~12ns@12kHz
Repetition Rate	~12kHz
Pulse Stability	<3% rms
Long Term Stability	< \pm 3%
Beam Characteristics	
Polarization Ratio	Random polarization
Beam Diameter	~0.8mm
Beam Circularity	>90%
Spatial Mode	TEM ₀₀ , M ² <1.2
Operating Specifications	
Warm-up Time	<15 minutes from cold start
Electrical Requirement	AC220V/50Hz
Ambient Temperature	10-35°C, RH<80%
Storage Conditions	-10-40°C, RH<90%
Physical Characteristics	
Cooling System	Air-Cooled

Applications

- Diamond planning
- Diamond girdle code marking



Stone series UV lasers

3-15W UV lasers



Introduction

Stone series, with ultra-high cost performance, can meet 7*24 hours manufacturing; Stone plus series, stronger performance, more adaptable to complex and harsh environments.

Features

- Solve power attenuation and meet 7*24 hours of work;
- The service life exceeds 20,000 hours, maintenance-free, no need for regular commissioning;
- All-in-one design, directly installed with galvanometer;
- 3 layers of protection, protection grade IP65, more suitable for harsh working environment.

Model No. -Stone Series	MMEPU-355-3	MMEPU-355-5	MMEPU-355-8	MMEPU-355-10	MMEPU-355-15
Model No.-Stone Plus Series	MMEPU-355Plus-3	MMEPU-355Plus-5	MMEPU-355Plus-8	MMEPU-355Plus-10	MMEPU-355Plus-15
Optical Characteristics					
Wavelength (nm)	355nm \pm 1nm				
Average Power (W)	>3W@30kHz	>5W@30kHz	>8W@40kHz	>10W@40kHz	>15W@40kHz
Single Pulse Energy (uJ)	~100uJ@30kHz	~160uJ@30kHz	~200uJ@40kHz	~250uJ@40kHz	~375uJ@40kHz
Pulse Width (ns)	~15ns@30kHz		~15ns@40kHz		
Repetition Rate	20-500kHz		40-500kHz		
Pulse Stability	<3% rms				
Long Term Stability	< \pm 3%				
Beam Characteristics					
Polarization Ratio	Horizontal;>100:1				
Beam Diameter	~0.8mm(at exit)/~8mm(X10 beam divergence)				
Beam Circularity	>90%				
Spatial Mode	TEM ₀₀ , M ² <1.3				
Operating Specifications					
Warm-up Time	<15 minutes from cold start				
Electrical Requirement	DC12V,350W		DC15V,350W	DC18V,350W	
Ambient Temperature	10-35°C, RH<80%				
Storage Conditions	-10-40°C, RH<90%				
Physical Characteristics					
Cooling System	Water-Cooled				
Water Temperature (laser inlet)	25°C				

Applications

- Jewelry marking/engraving
- Electronics product marking
- Glass marking/inner engraving
- Wafer cutting/marking
- Medical device marking/drilling

