DIAMOND J-1000

Liquid-Cooled, RF-Excited OEM Industrial CO₂ Laser

DIAMOND J-1000 Series are sealed, pulsed CO₂ lasers offering maximum powers up to 1 kW in a fully integrated and compact package. By incorporating the RF power supply within the laser head the J-Series completely eliminates the RF umbilical increasing laser reliability and simplifying integration into a workstation or robotic tool.

Available at both 10.6 μ m and 9.4 μ m wavelengths, the unique J-1000 Series design packs a host of high performance features making it uniquely suited for use in space-sensitive applications involving converting, cutting, engraving, perforating and drilling of paper, plastic films, plastics, glass, carbon composites, textiles, wood and even thin metals. The RF power module is field serviceable with no soldering. A full suite of on-board diagnostics (accessible via the Internet) enables proactive service management.



FEATURES

- Wide operating power range
- Typical peak power >3 kW
- Pulse frequency from single-shot to 200 kHz
- Fast rise/fall time
- Outstanding beam quality
- Excellent power stability
- Low-cost OEM configuration
- Integrated but detachable RF power supply
- Compact design
- Equipped with on-board internetaccessible diagnostics

APPLICATIONS

- High Speed Digital Converting
- Through-cutting, Kiss-cutting, and Perforation
- Engraving
- Die Board Cutting
- Glass Cutting and Thermal Processing
- · Ceramic Drilling and Scribing
- Automotive: Interiors and Airbag Cutting, E-Mobility processes
- 3D Printing
- Semiconductor Processing



Wavelength (µm) 10.2 to 10.8 9.1 to 9.5 Output Power? (W) ≥100 Power Range® (W) 100 to 1000 Peak Effective Power* (W) >200 Power Stability® (%) ±5 Mode Quality (M²) 1.2 to 1.2 Near Field Beam Diameter ® at 1/e² (mm) 10 ±1.5 Beam Waist Diameter³a at 1/e² (mm) 10 ±1.5 Full-Angle Beam Divergence? (mrad) 1.6 typical, 2.0 max. Polarization (perpendicular to baseplate) 1.6 typical, 2.0 max. Polarization (perpendicular to baseplate) 1.6 typical, 2.0 max. Polarization Pulse Width Range (µsec) 1.6 typical, 2.0 max. Pulse Frequency (kHz) 50.83, <1.20 Pulse Frequency (kHz) 5.8 typical, 2.0 max. Pulse Frequency (kHz) 5.8 typical, 2.0 max. Pulse Frequency (kHz) 5.8 typical, 2.0 max. Pulse Frequency (kHz) 6.0 typical, 2.0 max. Pulse Frequency (kHz) 5.0 typical, 2.0 max. Polarization Pulse Width Range (µsec) 1.7 typical, 2.0 max. Pulse Frequency (kHz) 5.0 typical, 2.0 typical, 2.0 max. Pulse Frequency (kHz) 5.0 typical, 2.0 typic	Specifications ¹	Diamond J-1000-10.6	Diamond J-1000-9.4	
Power Range® (W) 100 to 1000 Peak Effective Power⁴ (W) >2800 Power Stability® (%) ±5 Mode Quality (M²) <1.2	Wavelength (µm)	10.2 to 10.8	9.1 to 9.5	
Peak Effective Power* (W) >2800	Output Power ² (W)	≥1000		
Power Stability* (%)	Power Range ³ (W)	100 to 1000		
Mode Quality (M²) <1.2	Peak Effective Power⁴ (W)	>2800		
Near Field Beam Diameter 67 at 1/62 (mm) 12 ±1.5 Beam Waist Diameter*8 at 1/62 (mm) 10 ±1.5 Full-Angle Beam Divergence? (mrad) 1.6 typical, 2.0 max. Polarization (perpendicular to baseplate) Linear >100:1 Beam Ellipticity? >0.83, <1.20	Power Stability ⁵ (%)	±5		
Beam Waist Diameter²a at 1/e² (mm) 10 ±1.5 Full-Angle Beam Divergence² (mrad) 1.6 typical, 2.0 max. Polarization (perpendicular to baseplate) Linear >100:1 Beam Ellipticity² >0.83, <1.20	Mode Quality (M²)	<1.2		
Full-Angle Beam Divergence? (mrad) 1.6 typical, 2.0 max. Polarization (perpendicular to baseplate) Linear >100:1 Beam Ellipticity? >0.83, <1.20	Near Field Beam Diameter ^{6,7} at 1/e ² (mm)	12 ±1.5		
Polarization (perpendicular to baseplate) Linear >100:1 Beam Ellipticity7 >0.83, <1.20	Beam Waist Diameter ^{7,8} at 1/e ² (mm)	10 ±1.5		
Beam Ellipticity? >0.83, <1.20	Full-Angle Beam Divergence ⁷ (mrad)	1.6 typical, 2.0 max.		
Pulse Frequency (kHz) Single-shot to 200 RF Excitation Pulse Width Range (μsec) 2 to 1000 Duty Cycle Limit (%) ≤60 Fall Time⁴ (μs) <55	Polarization (perpendicular to baseplate)	Linear >100:1		
RF Excitation Pulse Width Range (μsec) 2 to 1000 Duty Cycle Limit (%) ≤60 Fall Time⁴ (μs) <55	Beam Ellipticity ⁷	>0.83, <1.20		
Duty Cycle Limit (%) ≤60 Fall Time⁴ (µs) <55	Pulse Frequency (kHz)	Single-shot to 200		
Fall Time⁴ (µs) < 55 Weight	RF Excitation Pulse Width Range (µsec)	2 to 1000		
Weight 173 kg (381 lbs.) Dimensions (L x W x H) 1497 x 384 x 471 mm (58.9 x 15.1 x 18.6 in.) Electrical Power Requirements *** CC Input Voltage (VDC) 48 ±1.0% Continuous DC Current (A) ≤425 Peak Current (A) <628 for up to 1 ms	Duty Cycle Limit (%)	≤60		
Dimensions (L x W x H) 1497 x 384 x 471 mm (58.9 x 15.1 x 18.6 in.) Electrical Power Requirements CC Input Voltage (VDC) 48 ±1.0% Continuous DC Current (A) ≤425 Peak Current (A) <628 for up to 1 ms	Fall Time⁴ (μs)	<55		
Electrical Power Requirements CC Input Voltage (VDC) Continuous DC Current (A) Seak Current (A) Coolant Heat Load (kW) Seak Current Stability (max.) Coolant Temperature Stability (max.) Coolant Setpoint Temperature Range Coolant Setpoint Temperature Range Coolant Differential Pressure¹⁰ (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature Sea (11 to 25°C (41 to 113°F) Sea (41 to 113°F) Relative Humidity¹¹ (%)	Weight	173 kg (381 lbs.)		
CC Input Voltage (VDC) Continuous DC Current (A) Peak Current (A) Coolant Heat Load (kW) Coolant Flow Rate (I/min.) Coolant Temperature Stability (max.) Coolant Setpoint Temperature Range Coolant 9 Anti-corrosion treated water Coolant Differential Pressure¹0 (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature 5 to 45°C (41 to 113°F) Relative Humidity¹¹ (%)	Dimensions (L x W x H)	1497 x 384 x 471 mm (58.9 x 15.1 x 18.6 in.)		
Continuous DC Current (A) Peak Current (A) Coolant Heat Load (kW) Coolant Flow Rate (I/min.) Coolant Temperature Stability (max.) Coolant Setpoint Temperature Range Coolant Pressure (kPa) Coolant Differential Pressure (kPa) Environmental Conditions Ambient Temperature Stability (max) Anti-corrosion treated water Stability (nax) Stability (max) Anti-corrosion treated water Stability (nax) Anti-corrosion treated water Stability (nax) Stability (max) Stabili	Electrical Power Requirements			
Peak Current (A) Coolant Heat Load (kW) Supramic Coolant Flow Rate (I/min.) Coolant Temperature Stability (max.) Coolant Setpoint Temperature Range Coolant 9 Coolant Differential Pressure¹o (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature Set Set For up to 1 ms 422 225 226 226 226 227 226 227 227	CC Input Voltage (VDC)	48 ±1.0%		
Coolant Heat Load (kW) Coolant Flow Rate (I/min.) Coolant Temperature Stability (max.) Coolant Setpoint Temperature Range Coolant 9 Anti-corrosion treated water Coolant Differential Pressure (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature Stability (max.) Anti-corrosion treated water 344 (50 psi) at 25 I/min. (6.5 gpm) 827 (120 psi) Environmental Conditions Ambient Temperature 5 to 45°C (41 to 113°F) Relative Humidity" (%)	Continuous DC Current (A)	≤425		
Heat Load (kW)<22Dynamic Coolant Flow Rate (I/min.)>25 (6.5 gpm) CoolantCoolant Temperature Stability (max.)±1.0°C (±1.8°F)Coolant Setpoint Temperature Range21 to 25°C (69.8 to 77°F)Coolant9Anti-corrosion treated waterCoolant Differential Pressure10 (kPa)344 (50 psi) at 25 I/min. (6.5 gpm)Coolant Maximum Static Pressure (kPa)827 (120 psi)Environmental ConditionsAmbient Temperature5 to 45°C (41 to 113°F)Relative Humidity11 (%)<95 (non-condensing)	Peak Current (A)	<628 for up to 1 ms		
Dynamic Coolant Flow Rate (I/min.) Coolant Temperature Stability (max.) £1.0°C (±1.8°F) Coolant Setpoint Temperature Range 21 to 25°C (69.8 to 77°F) Coolant ⁹ Anti-corrosion treated water Coolant Differential Pressure ¹⁰ (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature 5 to 45°C (41 to 113°F) Relative Humidity ¹¹ (%)	Coolant			
Coolant Temperature Stability (max.) Coolant Setpoint Temperature Range 21 to 25°C (69.8 to 77°F) Coolant Anti-corrosion treated water Coolant Differential Pressure¹o (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature 5 to 45°C (41 to 113°F) Relative Humidity¹¹ (%) **Transpart of the set of	Heat Load (kW)	<22		
Coolant Setpoint Temperature Range 21 to 25°C (69.8 to 77°F) Anti-corrosion treated water Coolant Differential Pressure¹o (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature 5 to 45°C (41 to 113°F) Relative Humidity¹¹ (%) 21 to 25°C (69.8 to 77°F) Anti-corrosion treated water 344 (50 psi) at 25 l/min. (6.5 gpm) 827 (120 psi) 5 to 45°C (41 to 113°F) <95 (non-condensing)	Dynamic Coolant Flow Rate (I/min.)	>25 (6.5 gg	>25 (6.5 gpm) Coolant	
Coolant Pressure (kPa) Coolant Differential Pressure (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature S to 45°C (41 to 113°F) Relative Humidity (%) Anti-corrosion treated water 344 (50 psi) at 25 l/min. (6.5 gpm) 827 (120 psi) 5 to 45°C (41 to 113°F) <95 (non-condensing)	Coolant Temperature Stability (max.)	±1.0°C (±1.8°F)		
Coolant Differential Pressure¹⁰ (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature Relative Humidity¹¹ (%) 344 (50 psi) at 25 l/min. (6.5 gpm) 827 (120 psi) 5 to 45°C (41 to 113°F) <95 (non-condensing)	Coolant Setpoint Temperature Range	21 to 25°C (69.8 to 77°F)		
Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature 5 to 45°C (41 to 113°F) Relative Humidity¹¹ (%) September 100 September 200	Coolant ⁹	Anti-corrosion treated water		
Environmental Conditions Ambient Temperature 5 to 45°C (41 to 113°F) Relative Humidity¹¹ (%) <95 (non-condensing)	Coolant Differential Pressure ¹⁰ (kPa)	344 (50 psi) at 25 l/min. (6.5 gpm)		
Ambient Temperature 5 to 45°C (41 to 113°F) Relative Humidity¹¹ (%) <95 (non-condensing)	Coolant Maximum Static Pressure (kPa)	827 (120 psi)		
Relative Humidity ¹¹ (%) <95 (non-condensing)	Environmental Conditions			
, , , , , , , , , , , , , , , , , , ,	Ambient Temperature	5 to 45°C (41 to 113°F)		
Altitude <2000 m (<6500 ft.)	Relative Humidity ¹¹ (%)	<95 (non-condensing)		
	Altitude	<2000 m (<6500 ft.)		

Notes:

- 1. All specifications apply when the product is operated in accordance with the guidelines defined in the operators manual.
- 2. Measured at 60% duty cycle and 10 kHz PRF.
- 3. Output stability specification may not be met at lowest power or at acoustic resonances.
- 4. Measured at 10% duty cycle and 1 kHz PRF.
- Measured as ±(P_{max} P_{min})/2P_{max}.
- 6. Measured at approximately 0.4 m from the laser output.
- 7. Measured at 25% duty cycle and 10 kHz PRF.
- 8. Beam diameter at the waist location, located at approximately 5 m from the laser output.
- 9. See manual for details.
- 10. This differential pressure is from system input to output and does not include the pressure drop from chiller fittings and the supply and return hose.
- 11. Do not operate at or below dew point.



Mechanical Specifications



