

300 Watt Laser Diode Mount and Heatsink Assembly TEC-Based Heat Removal and Temperature Management



OCP-300 Heatsink

- o Up to 300 Watts Heat Removal Capacity
- o TEC Heat-Pumps for Temperature Control and Stabilization
- o Nickel-plated Copper Cold Plate
- o Custom Mounting Hole Drilling Available
- o Custom Mounting Plates Available

VERSATILE AND HIGH EFFICIENCY HEAT SINK

The OCP-300 is a high performance thermoelectric cooling module designed for OEM applications for high power laser products, medical equipment, and semiconductor processing. It is a convenient solution for cooling common high power fiber-coupled lasers in a laboratory environment.



PRINCIPLE OF OPERATION

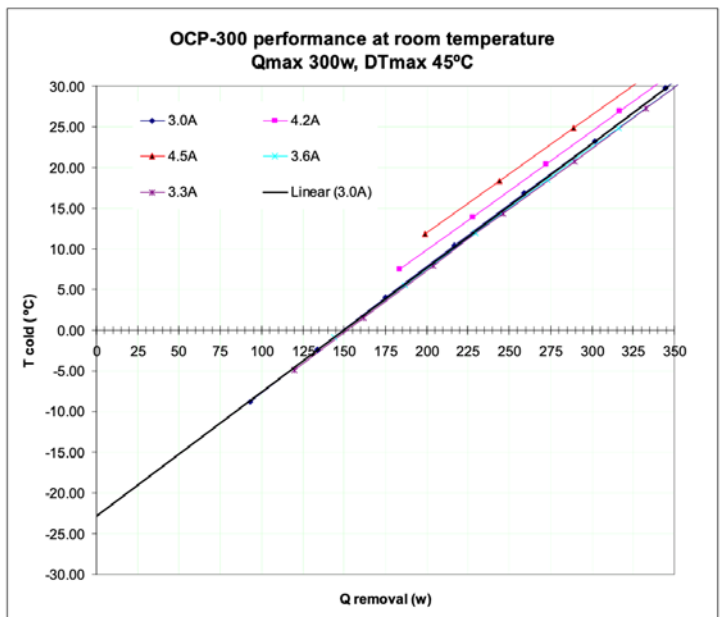
The OCP-300 heatsink base is our Model HS-004 passive heatsink, which has heat pipes embedded to minimize heat spreading resistance. The heat pipes and the heatsink are nickel plated and soldered together for maximum conductivity.

Two sets of TECs are mounted to the base of the heatsink, contacting the heat pipes. The nickel-plated copper cold plate is mounted above the TECs to form a complete heat transfer stack from the thermal load to the ducted fan-cooled heatsink in the base of the unit.

HIGH PERFORMANCE HEAT CONTROL

The following curve illustrates the performance of the OCP-300 at various current in room ambient temperature. The X-axis is the heat load to the cold plate, the Y-axis is the cold plate temperature at the heat load. The cold plate temperature is an average figure. The test data indicates the optimum current to individual TEC is 3.0 A – 3.6 A (12 A – 15 A at the terminal block). The heat transfer capacity, optimum current, and maximum rating all depend on the heat load, cold side temperature setpoint, and ambient temperature.

The temperature of the cold plate is very uniform with an evenly distributed heat load (<0.5°C). When used to cool high power laser diode, the temperature directly underneath the diode source will be slightly higher than the edge of the cold plate.



TEC SPECIFICATIONS

Two sets of TECs are pre-wired in parallel, and the wires are routed to the terminal block. The maximum operating current is 15 A, and maximum voltage is 40 VDC. Exceeding the specified maximum current may reduce the performance and degrade the reliability of TECs.

Users are advised to manually ramp the TEC driving current after assembling the diode on the cold plate to identify the optimum current, and then set the current limit accordingly so that the TEC current will not run away.

The thermal resistance from TEC to ambient of OCP-300 heatsink is 0.04oC/w

The TECs are environmentally sealed for operation below dew point. The maximum rated operating temperature for the TECs is 150°C.



DIODE COOLING INTERFACE GUIDELINES

The heat removal performance of the heat sink is sensitive to the quality of the thermal interface between the cold plate and the laser diode module.

For high power laser modules and thermal loads with a large footprint, it is difficult to maintain a sufficiently uniform high quality interface. The cold plate is made of machined copper with very low spreading resistance, and using dry interface materials* will help considerably to form a uniform heat conduction interface.

If the laser diode set temperature is significantly below ambient, we recommend insulating the module on the top of the cold plate. Thermal insulation materials such as silicone foam or ceramic-based insulation work well to insulate laser from ambient.

* such as Laird's TPLi 210, and GrafTech International HITHERM HT 2505 or 2501

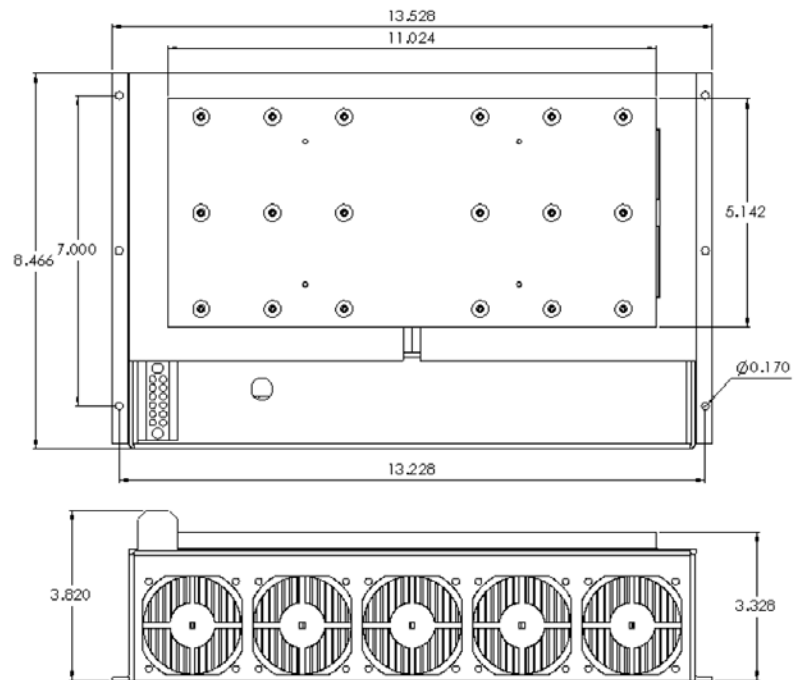
OCP-300 SPECIFICATIONS

GENERAL SPECIFICATIONS Heat Dissipation Capacity: 300 Watts
 TECs: Two Sets Wired In parallel
 Current per TEC Series: 7.5 A
 Voltage per TEC Series: 40 V
 Fan Voltage: 7.0 ~ 13.5 VDC
 Fan Power: 16 W
 Noise Level per Fan: 50 dBA
 Dimensions: Dimensions: 13.528" x 8.466" x 3.820"

HEATSINK DIMENSIONS

Custom mounting hole patterns are available upon request. We also accept customer provided cold plates and will install it in place of our standard cold plate. The location of the mounting holes for the cold plate itself must remain as shown in order to ensure optimum heat-pump efficiency.

The size and material of the cold plate may be changed upon request. Performance may be impacted; contact us to discuss your particular application requirements.



TERMINAL BLOCK CONNECTIONS

Pin	Function	Specification
1	TEC +	15 A x 40 V
2	TEC -	
3		
4		
5	Fan +	4.2 A x 12 V
6	Fan -	

PRODUCT SALES AND SERVICE

Unlimited phone and email support is provided for products purchased through Laser Lab Source. Orders for this product are fulfilled by Laser Lab Source in North America and select international regions.

PRODUCT WARRANTY

This product is sold with a full one-year warranty. It is warrantied to be free from defects in material and/or workmanship for a period of one year from the date of shipment. The warranty does not cover damage to the to the product due to mishandling or use of the product outside of its specified maximum ratings.



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