

1. Introduction

ECP-046 is a high performance cooling module with ETE’s proprietary DCS (Distributed-Cooling-System) technology. It has 1 high performance fans mounted on high efficiency heatsinks. There is high performance TEC sandwiched between the cold plate and the heatsink. The cold plate is made of copper with electrolytic tin. The cold plate has mounting patterns that matches the most popular high power lasers modules.

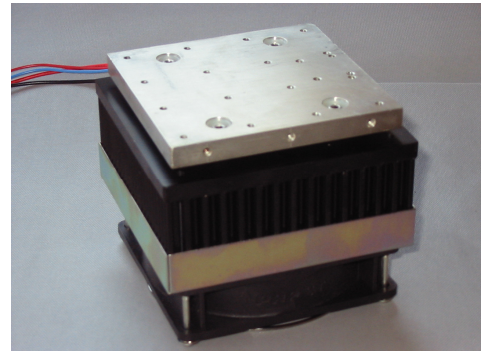
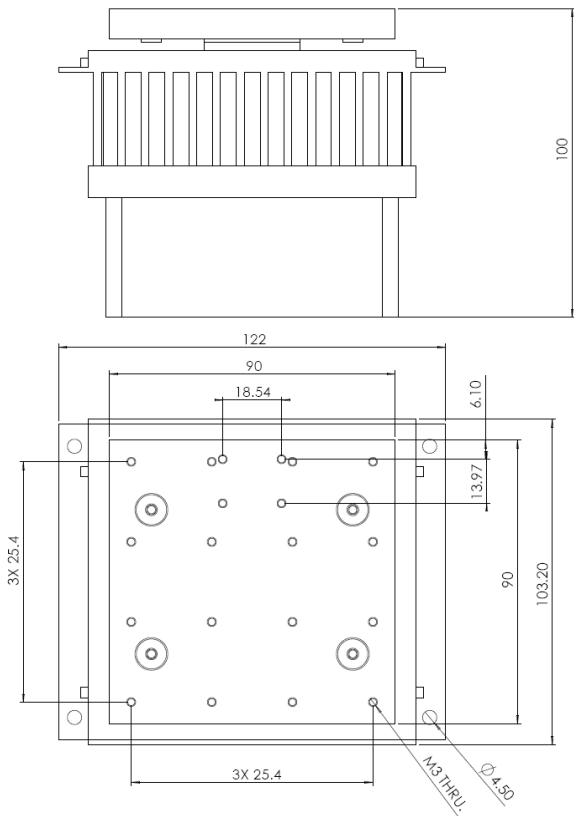


Figure 1 below outlines the functional hole patterns. All dimensions are in millimeters.

ECP-046 is designed primarily for cooling standard CS diodes and the mounting holes are provided as standard. It also provides M3 threaded mounting holes at 1 inch pattern for clamping any diodes, please contact ETE for custom diode mounting options.

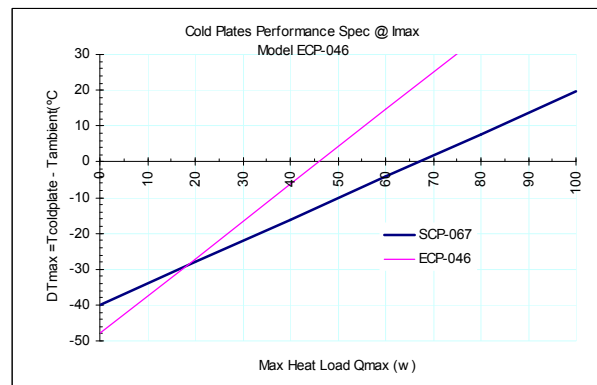
ETE offers mounting kits for electrically isolating CS diode from the cold plate. It comes with few options. The basic kit come with one AlN plate and 4 nylon shoulder washers. More options include indium foil, and Belleville washers. Please visit our website for more detail and pricing information.



2. Performance curve

The following curve illustrates the performance of ECP-046. The X-axis is the heat load to the cold plate, the Y-axis shows lowest cold plate below ambient should be at a given heat load. Please notice that the cold plate temperature is an average figure, the temperature directly underneath the diode source will be higher and the edge of the cold plate will be lower.

Please notice that ECP-046 is for high delta T low heat load diodes. It is advantageous when the heat load is below 17 watts; SCP-067 works better at higher heat loads as illustrated in the performance curve.



3. Cooling Approach

The fans draw air from the bottom and blow air directly to the bottom of the heatsink; this cooling scheme is commonly called “impingement cooling”. To ensure the performance of the cooling module, we highly recommend 25mm minimum clearance around all 4 sides and the bottom of the module so that the cooling air can move in and out of the heatsink freely.

4. Cooling Fan Specifications

The cooling fans require 24 VDC power, and they draw 0.22A each. We recommend driving the fans in parallel to ensure equally distributed cooling. Higher performance version of this module may use 12 VDC fans and they draw 1A each.

| Parameters | Standard | Option: High flow fan available upon request |
|-------------------------|-----------|--|
| Rated voltage | 24VDC | 12VDC |
| Operating voltage range | 12~28 VDC | 7.0~13.8 VDC |
| Input power | 5.3w | 12.5w |
| Rated current | .22A | 1A |
| Noise | 47dBA | 56.4dBA |

The high flow fan has an output cable for fan RPM detection. And the wires are connectorized with stand power connectors for PCs.

5. TEC specifications

The maximum operating current for the TEC is 6.5 A, and maximum voltage is 12VDC at room temperature. Exceeding the specified maximum current will reduce the performance and degrade the reliability of TECs.

The typical optimum current for each TEC is about 6 Amps depends on the set temperature, heat load, interface quality between the diode and cold plate, and ambient temperature.

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

6. Diode Cooling Interface Guidelines

The actual performance of the cooling module is extremely sensitive to the quality of the thermal interface between the cold plate and the diode. For high power laser modules with large footprints, it is very difficult to maintain uniform high quality interface. Our cold plate is made of copper with very low spreading resistance so that the user can focus the attention primarily to the area directly underneath the laser diodes.

If diode set temperature is significantly below ambient, we highly recommend using thermal insulation materials such as silicone foam or ceramic based insulation to insulate laser from ambient.

7. Contacts

If you need further information or clarification, please contact ETE in any of the following options:

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