| SERVICE BULLETIN | |
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# Use of Coolant Interlock

## Product

Laser Diode Modules

## Special Information

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**NOTE:** The data contained in the bulletin was obtained using an RBAT24-1C4 module operated at 25 A drive current. Other module types and configurations may have differing results and should be taken into consideration when applying the information in this bulletin.

## Purpose

Laser diodes are usually the most expensive component in a solid-state laser system. The most frequent cause for failure of NG CEO products is operating without adequate coolant. Without proper cooling, the temperature of the diode arrays increases rapidly causing solder re-flow, and electrical shorting resulting in catastrophic failure.

**Figure 1** shows the effect of thermal damage on the array. The top array experienced thermal damage as indicated by the black temperature dot, and the presence of solder balls from solder reflow. In most cases, thermal damage is difficult to detect.

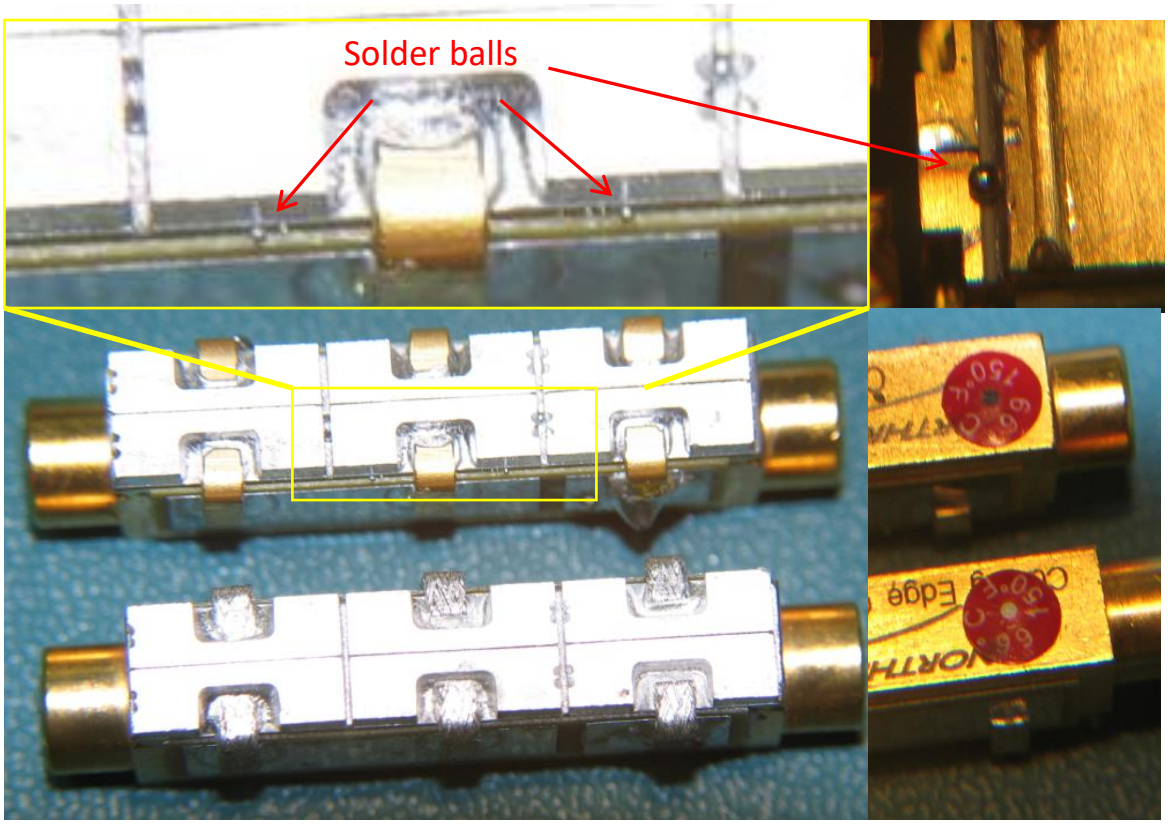


**Figure 1** Thermal Effects and Array Solder Reflow

NG CEO has performed extensive testing to determine the time to failure for diode arrays operated without any coolant and with non-circulating coolant. As shown in **Figure 2** below, diode array temperatures increase drastically when water flow is interrupted.

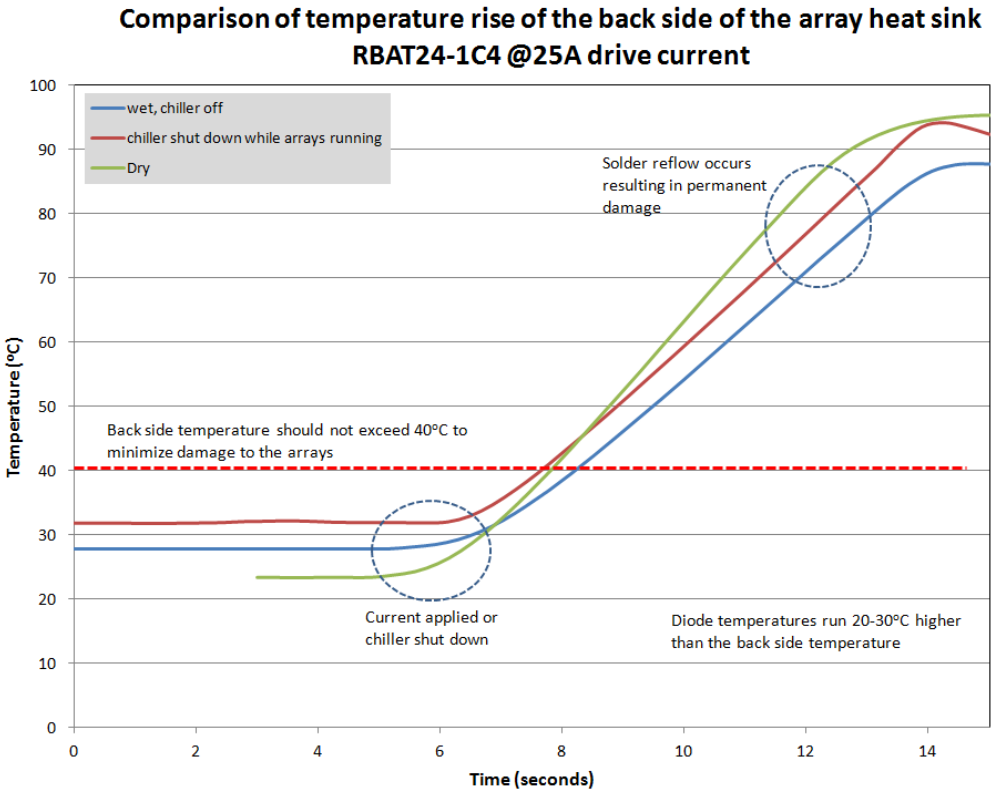


**Figure 2**. Time to Failure Graph

It is recommended that the coolant flow interlock system shut down current to the arrays in less than 1 second to minimize diode damage.

## Solution

The use of a properly designed and integrated flow interlock system is critical to protect arrays, modules, and lasers from thermal damage in the event of coolant flow interruption.

Please refer to **Figure 3** for a typical flow interlock system.

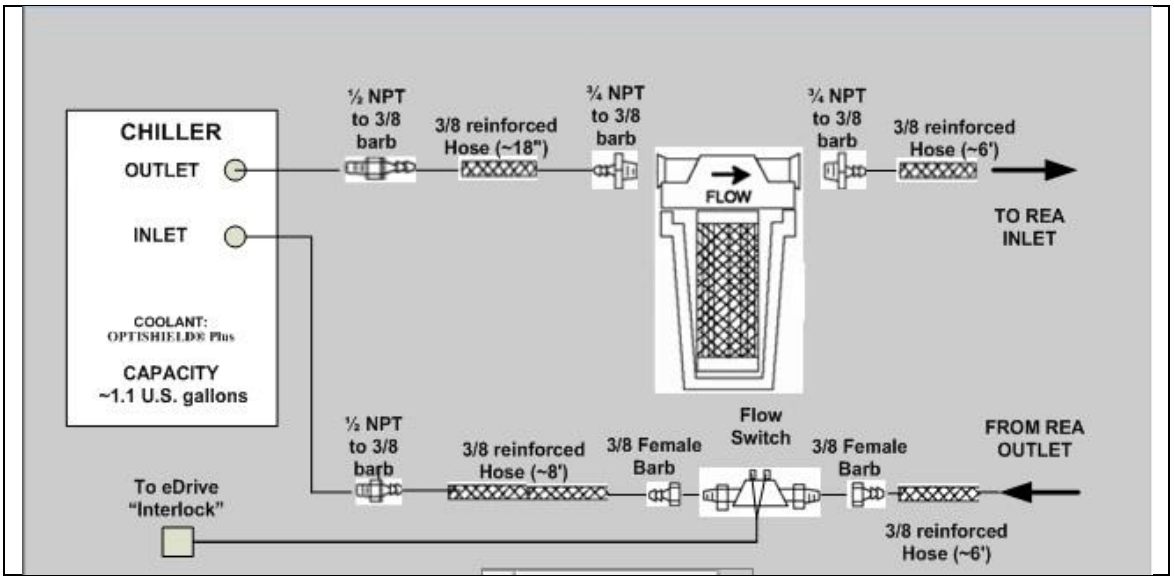


**Figure 3**. Typical Flow Interlock System

For RBAT and REA series modules, NG CEO recommends using a 0.5 gpm, normally open flow switch, PN 32776-00. This flow switch can be purchased through Cole Parmer, www.coleparmer.com.

Additional components (Q-switch, shutter, etc) may be incorporated into the interlock system as an additional safety.

NG CEO is available to review the design and application of your interlock system. Please contact a technical service representative at ngceoservice@ngc.com.

### Interlock Verification Test

NG CEO recommends performing this test EVERY time power is going to be applied to the diodes to verify the interlock is working properly.

1. Turn on the chiller.
2. Verify coolant temperature and flow rate are correct.
3. Turn power switch to on position on the drive electronics.
4. Ensure there is 0 current going to the diodes.
5. Shut off the chiller, and verify that the coolant fault interlock comes on within 1 second.
6. If the coolant fault interlock does not come on, DO NOT proceed until the issue is resolved.
7. When the coolant interlock comes on, restart chiller, and clear the faults.
8. Your system is now ready for operation.