



## Application Note

### Mounting LEDs on Heatsinks

This application note will provide guidance on the selection of appropriate cooling solutions and the recommended method of mounting an LED on a heatsink.

# Mounting LEDs on Heatsinks

## Overview

LEDs are subject to heat generation and may suffer from early failure and thermal damage if operated without an appropriate thermal management solution. A suitable cooling solution (usually in the form of a heatsink, fanned heatsink, or cold plate) must be utilized to ensure the junction temperature of an LED is maintained within an acceptable range. Operating LEDs at high junction temperatures can reduce the performance and reliability of the device and the system. This guideline is provided as a resource for the selection of appropriate cooling solutions and the proper method of mounting an LED onto a heatsink.

*Disclaimer: Please do not operate Violumas LEDs without a proper cooling solution. Operating the LED without a heatsink may result in immediate failure and Violumas will not be responsible for replacement. Violumas cannot be held responsible for any damages caused by following these guidelines as this document provides generic guidelines for heatsink mounting and does not intend to replace standard engineering practices.*

## Part 1: Selection of Cooling Solutions

A proper cooling solution must be selected by carefully considering the overall wattage, thermal density, and size of the LED or LED array. The LED datasheet should be referred to for information regarding the thermal resistance of the LED and absolute maximum ratings for junction temperature. The absolute maximum ratings for junction temperature should never be exceeded, and keeping the LED junction temperature as low as possible will result in increased reliability and performance.

Violumas provides heatsink products for testing purposes which are suitable for each of the standard LED product lines. For the integration of LEDs and LED arrays into specified systems and enclosures, Violumas provides thermal modeling and design services in order to maintain proper junction temperatures within a specific system.

## Applicable Violumas Products

- 30.1.006770 (Heatsink for VC1X1 COB Series)
- 30.1.006846 (Heatsink for VC2X2 COB Series)
- 30.4988.10 (Heatsink with Fan for VC4X2 or VC2X2 COB Series)
- 30.3.006733 (Heatsink for VC12X1 COB Series)

Please refer to the Violumas Thermal Products Catalog for more information regarding heatsinks and thermal services.

## Part 2: Assembly with Thermal Pads

For testing purposes, Violumas provides thermal kits for its standard product lines VC1X1 COB Series and VC2X2 COB Series. The thermal kit includes: heatsink (1), thermal pad (1), and screws (2) which are suitable for the specified LED product. The following instructions can be utilized for assembly of LEDs to heatsinks with appropriate thermal pad material.

## Necessary Materials

- Violumas LED (COB or SMD mounted on PCB)
- Heatsink with Mounting Screws
- Thermal Pad
- Isopropyl Alcohol

## Step by Step Guidelines

### 1) Inspect the contact surfaces.

- If there is a protective film on the backside of the LED, please remove the film.
- Before assembly, ensure the contact surface of the LED backside and heatsink are smooth.
- If surfaces are not smooth, high resolution sandpaper polish is recommended.
- Gently clean the surfaces with alcohol.

### 2) Apply thermal pad as TIM (thermal interface material).

- Place the thermal pad on the coupling area where the LED is to be mounted onto the heatsink.

### 3) Tighten down the LED onto the heatsink surface via screws.

- M3 or M4 screws are provided to ensure the mechanical pressure is evenly applied.
- Do not overtorque the screws.

## Part 3: Assembly with Thermal Grease

While thermal pads can be easier to install, for high power LED products, such as larger LED arrays with electrical wattages surpassing 10 W, Violumas recommends the use of thermal grease or paste as an enhanced thermal conduction material.

### Necessary Materials

- Violumas LED (COB or SMD mounted on PCB)
- Heatsink with Mounting Screws
- Thermal Grease\*
- Putty Knife
- Isopropyl Alcohol

\*There are many thermal grease product options available. The use of a ceramic-based thermal grease is recommended (as opposed to metal-based thermal grease) due to the lower electrical conductivity. Violumas recommends a minimum thermal conductivity value of 2W/mK. Please contact the Violumas team for specific recommendations on appropriate thermal grease materials.

## Step by Step Guidelines

### 1) Inspect the contact surfaces.

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- Before assembly, ensure the contact surface of the LED backside and heatsink are smooth.
- If surfaces are not smooth, high resolution sandpaper polish is recommended.
- Gently clean the surfaces with alcohol.

### 2) Apply thermal grease as TIM (thermal interface material).

- Apply thermal grease on the backside of the LED and the coupling area on the heatsink.
- Use a putty knife to ensure the thermal grease is as thin and evenly spread as possible.

### 3) Tighten down the LED onto the heatsink surface via screws.

- M3 or M4 screws are provided to ensure the mechanical pressure is evenly applied.
- While tightening the screws, avoid uneven tilting and air bubbles/gaps between the LED and heatsink. Do not overtorque the screws.
- Proper precautions must be taken to ensure proper contact by tightening the screws when the LED is powered on.