

Introduction

Bridgelux SMD products offer exceptional performance in a compact mid-power LED package. With their broad lumen coverage and wide CCT options, the SMD products provide unparalleled design-in flexibility for indoor outdoor lighting applications. Its high flux capability reduces the number of LEDs and enables industry leading system level lumen per dollar performance.

Optimizing the performance and reliability of a lighting system using Bridgelux SMD products requires careful consideration of thermal management solutions, electronic drivers and secondary optics. It is equally important to use safe handling and appropriate manufacturing procedures, processes and chemicals during the assembly of Bridgelux SMD products into the lighting system. This application note provides guidelines for chemical exposure to avoid damaging the LEDs .



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Chemical Compatibility

Optimizing performance and reliability of a lighting system using Bridgelux SMD products requires safe handling and use of appropriate manufacturing procedures and materials during the assembly of the LED into the lighting system. Careful consideration should be given to the materials and chemicals used when processing the Bridgelux SMD products and to materials that are incorporated into a luminaire. This section provides a list of commonly used chemicals that should be avoided or carefully managed during processing of Bridgelux SMD products and during their subsequent use.

Silicone encapsulation is commonly used by most High Brightness LED manufacturers, including Bridgelux. The silicone encapsulation is permeable to gas molecules. The gas molecules, including volatile organic compounds (VOC's), halogen and sulfur compounds, can interact with silicone and other components that comprise Bridgelux SMD products and cause degradation in performance of the LEDs. The possibility and extent of degradation is dependent on the type of chemical, the concentration of the chemical, the temperature during exposure, and the length of time the LED is exposed to the chemical. Additional considerations should be given to IP (ingress protection) rated or "sealed" luminaires that create "air tight environments" around the Bridgelux SMD products. Luminaires sealed in this fashion can trap potentially damaging gas molecules from manufacturing processes or subsequent out-gassing of materials used in the luminaire which can result in long term exposure of the LEDs to the contaminant.

The source of the gas molecules can be out-gassing from polymeric or other compounds/elements within the materials such as glues, gaskets, paints and/or under-cured materials. Materials used inside a luminaire with a potential to outgas should be characterized as part of the luminaire design to understand the environment that will be surrounding the Bridgelux SMD products during the luminaire lifetime. The silicone encapsulation is also vulnerable to non-polar fluids and solvents commonly used during the manufacturing process of the luminaire such as cleaning, oil assisted drilling, and any processes that would allow the SMD products to come into contact with the fluids or solvents. Care should be taken such that the SMD products are protected from such chemicals to avoid ingress of small non-polar molecules into the encapsulation silicone.

Common chemicals that are known to be harmful to Bridgelux SMD products are listed in Table 1 below. Note that the chemicals listed in Table 1 may be found in various states – liquid, gas, and/or solid. All physical states of these chemicals can be harmful to the Bridgelux SMD products, but those that are in a gaseous state, such as volatile organic compounds (VOCs), can readily permeate the lens material of the LED and damage the LED internally and/or externally.

Table 1: Commonly used chemicals that will cause harm to Bridgelux SMD products.

Classification	Chemical Name	Found In Some
Acids	Hydrochloric Acid Sulfuric Acid Nitric Acid Phosphoric acid	Cleaners, cutting fluids
Organic acids	Acetic acid	RTV silicones, cutting fluids, degreasers, adhesives
Bases	Sodium Hydroxide Potassium hydroxide Amines	Detergents, cleaners
Organic Solvents	Ethers such as glycol ether Ketones such as MEK, MIBK Aldehydes such as formaldehyde	Cleaners, mineral spirits, petroleum, paint, gasoline
Aromatic solvents	Xylene Toluene Benzene	Cleaners
Low Molecular Weight Organics Volatile Organic Compounds (VOC's)	Acetates Acrylates Aldehydes Dienes	Superglue, Loctite adhesives, threadlockers and activators, common glues, conformal coatings
Petroleum Oils	Liquid hydrocarbons	Machine oil, lubricants
Non-petroleum Oils	Siloxanes, fatty acids	Silicone oil, lard, linseed oil, castor oil
Oxidizers/Reducers	Sulfur compounds	gaskets, paints, sealants, petroleum byproducts
Halogen compounds	Cl, F, or Br containing organic and inorganic compounds	solder fluxes/pastes, flame retardants

Since it is impossible to determine all of the chemicals that may be detrimental to the performance of the Bridgelux SMD products the list of chemicals above may not be exhaustive. It is the responsibility of the luminaire manufacturer to ensure that any and all materials used in the luminaire design or manufacturing process does not cause damage to the LEDs.

For additional information on chemicals that are potentially hazardous to LEDs please refer to the following industry resource:

Lighting Industry Association Technical Statement 13

<http://www.thelia.org.uk/technical/technical-documents/>

Disclaimer

This applications note has been prepared to provide guidance on the application of Bridgelux SMD products in customer applications. Bridgelux provides this information in good faith, but does not assume any responsibility or liability for design deficiencies that might exist in a customer design.

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It is the responsibility of the customer to ensure that the design meets all necessary requirements and safety certifications for its intended use.

About Bridgelux

Bridgelux is a leading developer and manufacturer of technologies and solutions transforming the \$40 billion global lighting industry into a \$100 billion market opportunity. Based in Livermore, California, Bridgelux is a pioneer in solid state lighting (SSL), expanding the market for light emitting diode (LED) technologies by driving down the cost of LED lighting systems. Bridgelux's patented light source technology replaces traditional technologies (such as incandescent, halogen, fluorescent and high intensity discharge lighting) with integrated, solid state lighting solutions that enable lamp and luminaire manufacturers to provide high performance and energy efficient white light for the rapidly growing interior and exterior lighting markets, including street lights, commercial lighting and consumer applications. With more than 550 patent applications filed or granted worldwide, Bridgelux is the only vertically integrated LED manufacturer and developer of solid state light sources that designs its solutions specifically for the lighting industry.

For more information about the company, please visit www.bridgelux.com



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