

# Enhanced Vertical™ EV-D45A High Power UV LED

## Introduction

Market applications using UV LEDs are diverse and represent a significant opportunity for any LED packager or integrator. Traditional mercury lamps have many disadvantages that limit UV applications, and mercury is a notorious pollutant. Features of the LED including form factor, wavelength and lifetime, add flexibility to UV applications. SemiLEDs' portfolio of mercury free UV products will enhance and in some cases revolutionize the way applications are built in UV market segments such as Curing, Currency/Document Verification, Tanning, Medical, and Sterilization.

The Enhanced Vertical (EV™) LED series is the latest innovation in high brightness LED chips, an ideal light source for UV applications requiring high power density. Featuring SemiLEDs' vertical chip structure on a patented metal alloy substrate and manufactured with our proprietary process, the EV LEDs offer advantages in excellent optical output and high thermal conductivity, thereby achieving greater light quality, high efficiency, and reliability. Further design advances of the EV LED structure, offer higher thermal endurance for process temperatures up to 325° Celsius and maximum suggested junction temperature of 150° Celsius.

SemiLEDs' patented and unique process uses a limited quantity of Sapphire, which can be recycled and reused multiple times, significantly reducing the Carbon footprint. The reduced dependence on Sapphire also removes a thermal management bottleneck while providing the most environmentally friendly LED on the market.

## RoHS and REACH Compliant

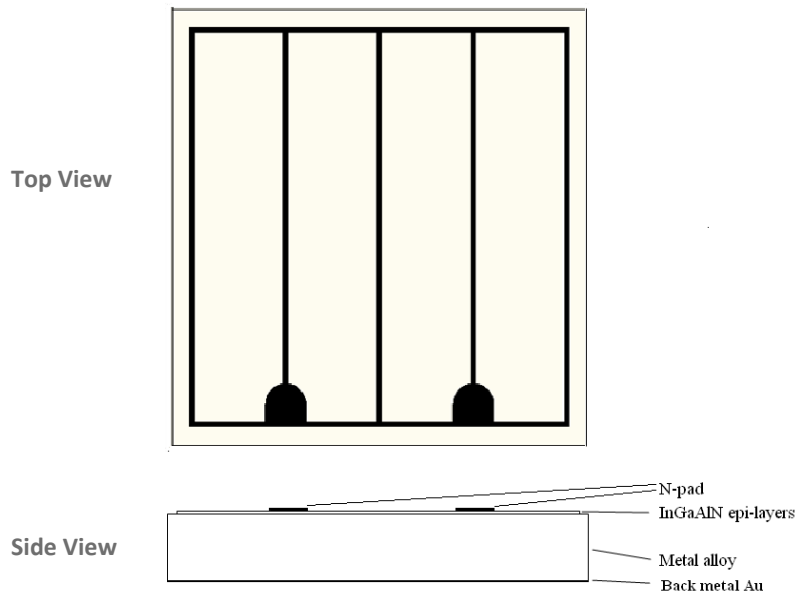
## Feature

Metal alloy device . . . . . High thermal conductivity  
 Thickness 145 μm . . . . . Consolidated metal alloy  
 P-N junction high at 140 μm . . . . . Silver epoxy die attachment compatible  
 Optimized N-pad design. . . . . Better current spreading  
 Nearly Perfect Lambertian emission pattern . . . . . Ideal for high output density  
 Patterned Surface . . . . . Maximum light extraction  
**High Thermal Endurance . . . . . Eutectic die attach compatible**

## Applications

- LED phosphor lighting
- UV air purifier
- Medical applications
- UV activated applications
- Counterfeit detection
- Special chemical detection
- High resolution optics

## Chip Mechanical Diagram



## Mechanical Specifications

P-N junction area	1050 μm X 1050 μm	± 20 μm
Base area	1200 μm X 1200 μm	± 50 μm
Chip thickness	145 μm	± 15 μm
Bond pad size	120 μm X 120 μm	± 15 μm
Bond pad thickness	7.7 μm	± 0.5 μm
Junction height	140 μm	± 15 μm

Note: The bond pad size is designed for single wire bonding per pad. We recommend using gold ball bonding as an electrical connection.

The gold ball must not extend outside of the pad area.

## Optical and Electrical Characteristics at 350mA, Ta at 25°C

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	Vf		3.5	4.2	Volt
Spectra half width	$\Delta\lambda$		12	20	nm

## Absolute Maximum Ratings, Ta at 25°C

Forward Current (DC)	700 mA
LED Junction Temperature	150°C
Reverse Voltage	<b>Note 2</b>
Operating Temperature	-40°C to +110°C
Storage Temperature (Chip)	-40°C to +110°C
Storage Temperature (Chip on tape)	-20°C to + 65 °C
Temperature during packaging (reflow)	325°C (<5sec)

Note:

1. Maximum ratings are strongly package dependent and may differ between different packaged devices. The values given were collected by SemiLEDs' in-house package and are only given for information.

2. UV LEDs should never be operated with reverse bias.

**BIN Table (Output Power at 350mA, Ta at 25°C)**

IS(mW)/Wp(nm)	360-365	365-370	370-375	375-380
60-65	UA60	UB60		
65-70	UA65	UB65		
70-75	UA70	UB70		
75-80	UA75	UB75		
80-90	UA80	UB80		
90-100	UA90	UB90	UC90	UD90
100-110	UAA0	UBA0	UCA0	UDA0
110-120	UAA1	UBA1	UCA1	UDA1
120-130	UAA2	UBA2	UCA2	UDA2
130-140	UAA3	UBA3	UCA3	UDA3
140-160	UAA4	UBA4	UCA4	UDA4
160-180	UAA6	UBA6	UCA6	UDA6
180-200	UAA8	UBA8	UCA8	UDA8
200-220	UAB0	UBB0	UCB0	UDB0
220-240	UAB2	UBB2	UCB2	UDB2
240-260	UAB4	UBB4	UCB4	UDB4
260-280	UAB6	UBB6	UCB6	UDB6
280-300	UAB8	UBB8	UCB8	UDB8
300-320	UAC0	UBC0	UCC0	UDC0
320-340			UCC2	UDC2
340-360			UCC4	UDC4

### Performance Diagrams

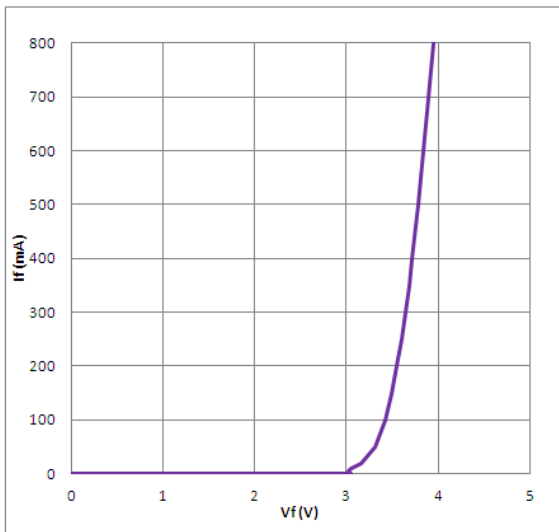


Fig-1 Forward Current vs. Forward Voltage

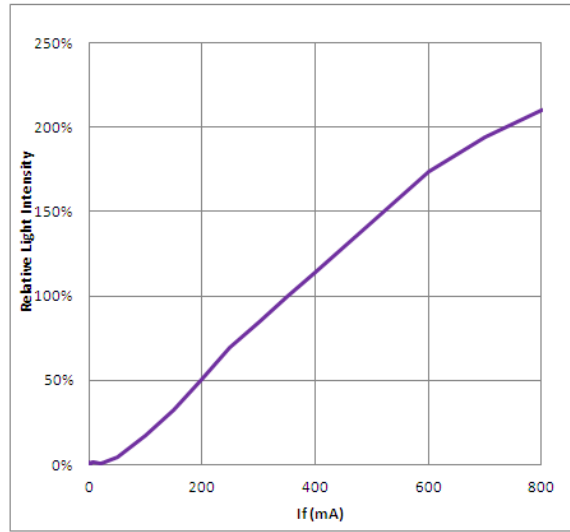


Fig-2 Relative Intensity vs. Forward Current

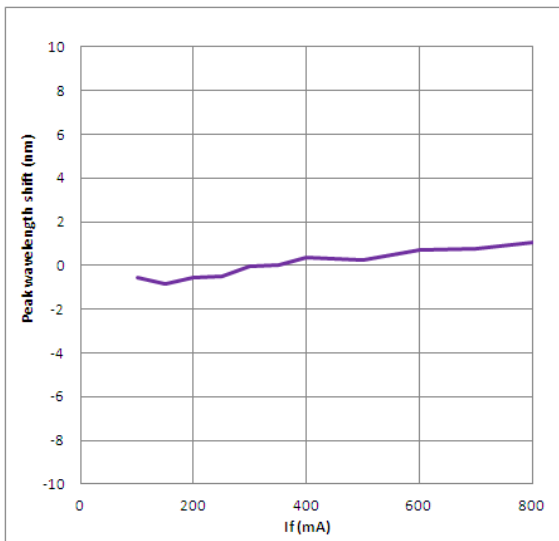


Fig-3 Peak Wavelength vs. Forward Current

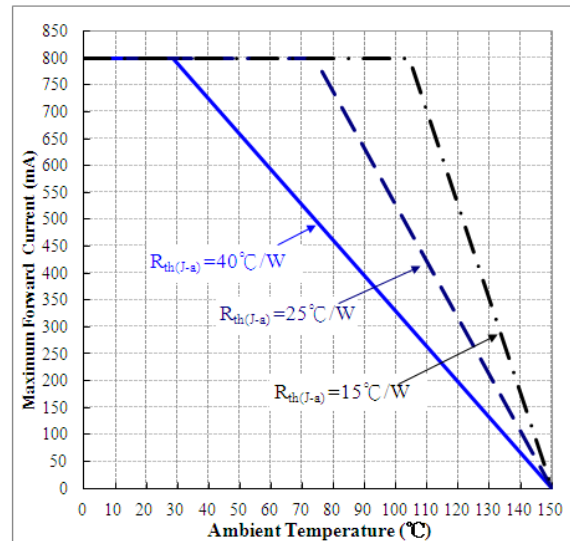


Fig-4 Maximum Forward Current vs. Ambient Temperature

Note:

- a. Minimum and maximum value refers to the limits and set up of SemiLEDs' testers. All other measurement data are defined as long-term production mean values and are only given for reference.
- b. A critical component is a component used in a life-support device or system whose failure can reasonably be expected to cause the failure of that life-support device or system, or to affect its safety or effectiveness of that device or system. Life support devices or systems are intended (i) to be implanted in the human body, or (ii) to support and/or maintain and sustain human life. If they fail, it is reasonable to assume that the health of the user may be endangered. Components used as a critical component must be approved in writing by SemiLEDs.
- c. These devices emit high intensity UV/NUV light. Necessary precautions must be taken during operation. Do not look directly into the light or look through the optical system when in operation. Protective eyewear should be worn at all times during operation.
- d. Lens discoloration may occur with prolonged exposure to UV/NUV light. Lens material will need to be tested for UV/NUV light compatibility and durability.

**Caution:** Users are requested to comply with the laws and public regulations concerning safety.

## About Us

**SemiLEDs Corporation** is a US company that develops and manufactures ultra-high brightness LED chips and components for general lighting, including street lights and commercial, industrial and residential lighting, along with specialty industrial applications such as UV curing, medical/cosmetic, counterfeit detection and horticulture. SemiLEDs specializes in the development and manufacturing of vertical LED chips in blue (white), green, and UV using a patented copper alloy base. This unique design allows for higher performance and longer lumen maintenance. The World Economic Forum recognized SemiLEDs innovations with the 2009 Technology Pioneer Award. SemiLEDs is fully ISO 9001:2008 and ISO 14001:2004 Certified.

SemiLEDs is a publicly traded company on NASDAQ Global Select Market (stock symbol "LEDS"). For investor information, please contact us at [investors@semileds.com](mailto:investors@semileds.com).

For further company or product information, please visit us at [www.semileds.com](http://www.semileds.com) or please contact [sales@semileds.com](mailto:sales@semileds.com).

The logo features a small blue icon of a fan or light rays above the word "SEMILEDs" in a bold, sans-serif font. The "i" in "LEDs" is lowercase and blue, while the rest of the letters are black.

[www.semileds.com](http://www.semileds.com)

[sales@semileds.com](mailto:sales@semileds.com)