

# Enhanced Vertical™ EV-U40A 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

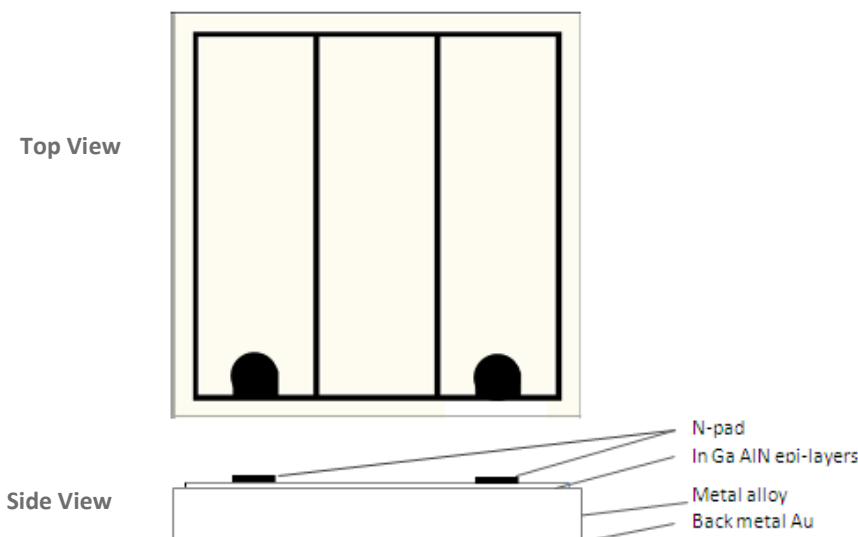
## Features

- 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	970 μm X 970 μm	± 20 μm
Base area	1070 μm X 1070 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		3.3	3.6	Volt
Spectra half width	$\Delta\lambda$		12	25	nm

Measured by SemiLEDs on bare chip and is only given for information.

## 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)	375-380	380-385	385-390	390-395	395-400	400-405	405-410	410-415	415-420	420-425
75-80	UD75	UE75	UF75							
80-90	UD80	UE80	UF80							
90-100	UD90	UE90	UF90							
100-110	UDA0	UEA0	UFA0							
110-120	UDA1	UEA1	UFA1	UGA1	UHA1					
120-130	UDA2	UEA2	UFA2	UGA2	UHA2					
130-140	UDA3	UEA3	UFA3	UGA3	UHA3					
140-160	UDA4	UEA4	UFA4	UGA4	UHA4					
160-180	UDA6	UEA6	UFA6	UGA6	UHA6	UJA6	UKA6	ULA6	UMA6	
180-200	UDA8	UEA8	UFA8	UGA8	UHA8	UJA8	UKA8	ULA8	UMA8	
200-220	UDB0	UEB0	UFB0	UGB0	UHB0	UJB0	UKB0	ULB0	UMB0	UNB0
220-240	UDB2	UEB2	UFB2	UGB2	UHB2	UJB2	UKB2	ULB2	UMB2	UNB2
240-260		UEB4	UFB4	UGB4	UHB4	UJB4	UKB4	ULB4	UMB4	UNB4
260-280		UEB6	UFB6	UGB6	UHB6	UJB6	UKB6	ULB6	UMB6	UNB6
280-300				UGB8	UHB8	UJB8	UKB8	ULB8	UMB8	UNB8
300-320				UGC0	UHC0	UJC0	UKC0	ULC0	UMC0	UNC0
320-340				UGC2	UHC2	UJC2	UKC2	ULC2	UMC2	UNC2
340-360										UNC4
360-380										UNC6

### Performance Diagrams

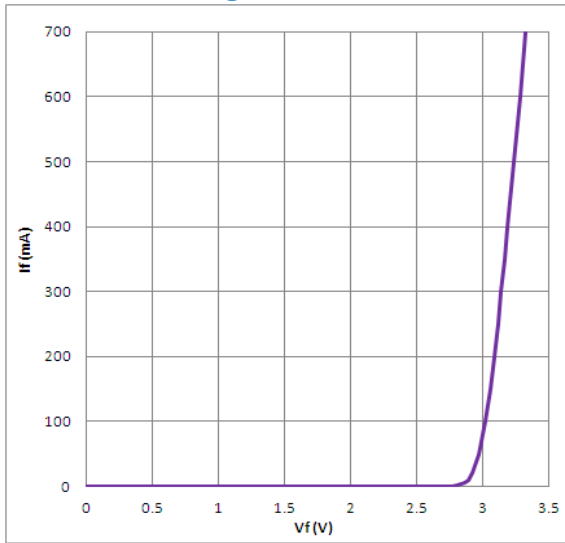


Fig-1 Forward Current vs. Forward Voltage.

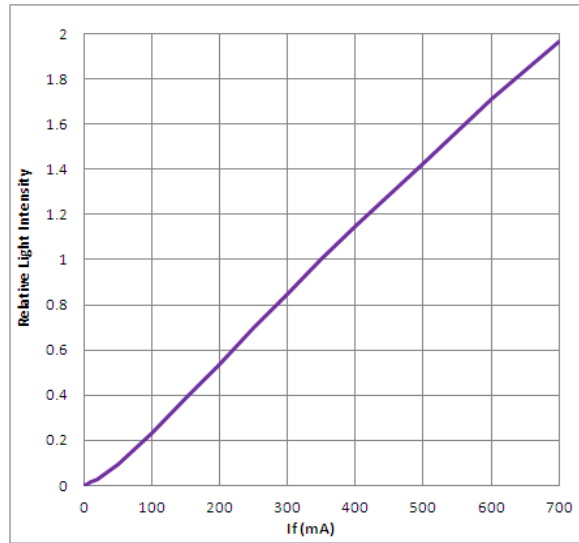


Fig-2 Relative Intensity vs. Forward Current.

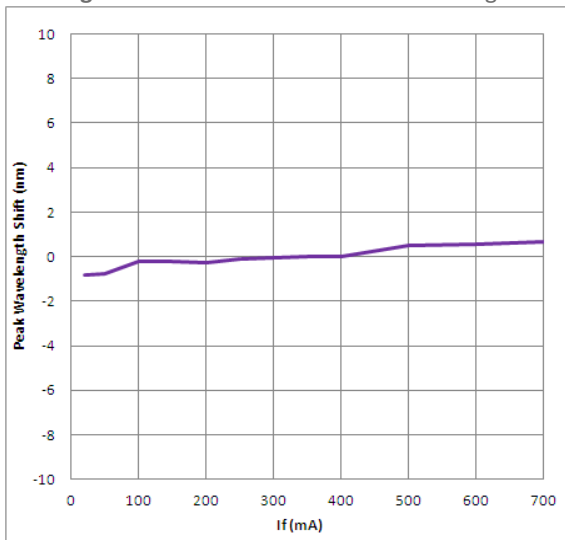


Fig-3 Peak Wavelength Shift vs. Forward Current.

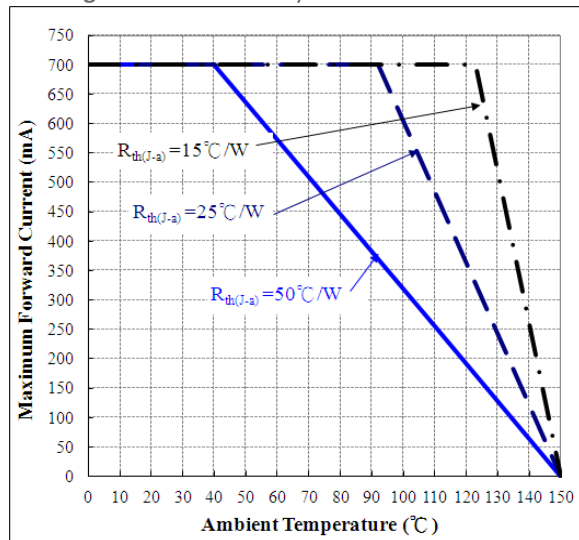


Fig-4 Maximum Forward Current vs. Ambient Temperature.

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 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).



  
**SEMILEDs**

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

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