

Enhanced Vertical™ EV-U15A 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

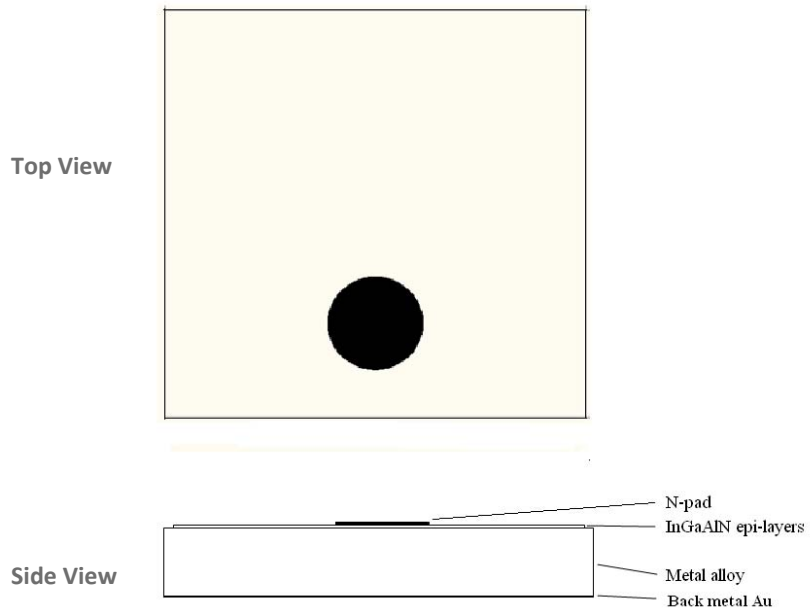
Feature

- Metal alloy device High thermal conductivity
- Thickness 85 μm Consolidated metal alloy
- P-N junction high at 80 μm Silver epoxy die attachment compatible
- One pad structure Low package cost
- 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 | 340 μm X 340 μm | ± 20 μm |
| Base area | 400 μm X 400 μm | ± 25 μm |
| Chip thickness | 85 μm | ± 15 μm |
| Bond pad size | 100 μm | ± 10 μm |
| Bond pad thickness | 7.7 μm | ± 0.5 μm |
| Junction height | 80 μm | ± 15 μm |

Note: The bond pad size is designed for single wire bonding. 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 20mA, Ta at 25°C

| Parameter | Symbol | Min | Typ | Max | Remark |
|--------------------|-----------------|-----|-----|-----|--------|
| Forward voltage: | Vf | | 3.2 | 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) | 50 mA |
| LED Junction Temperature | 150°C |
| Reverse Voltage | Note 2 |
| 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 20mA, 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 |
|---------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 11-12 | UD11 | UE11 | UF11 | | | | | | | |
| 12-13 | UD12 | UE13 | UF12 | | | | | | | |
| 13-14 | UD13 | UE13 | UF13 | | | | | | | |
| 14-15 | UD14 | UE14 | UF14 | | | | | | | |
| 15-16 | UD15 | UE15 | UF15 | UG15 | UH15 | UJ15 | UK15 | | | |
| 16-18 | UD16 | UE16 | UF16 | UG16 | UH16 | UJ16 | UK16 | | | |
| 18-20 | | | | UG18 | UH18 | UJ18 | UK18 | | | |
| 20-22 | | | | UG20 | UH20 | UJ20 | UK20 | UL20 | UM20 | UN20 |
| 22-24 | | | | | | | | UL22 | UM22 | UN22 |
| 24-26 | | | | | | | | UL24 | UM24 | UN24 |
| 26-28 | | | | | | | | UL26 | UM26 | UN26 |
| 28-30 | | | | | | | | UL28 | UM28 | UN28 |

Performance Diagrams

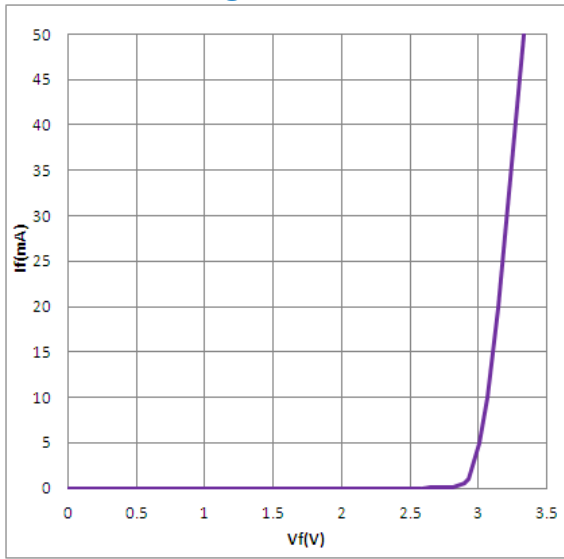


Fig-1 Forward Current vs. Forward Voltage.

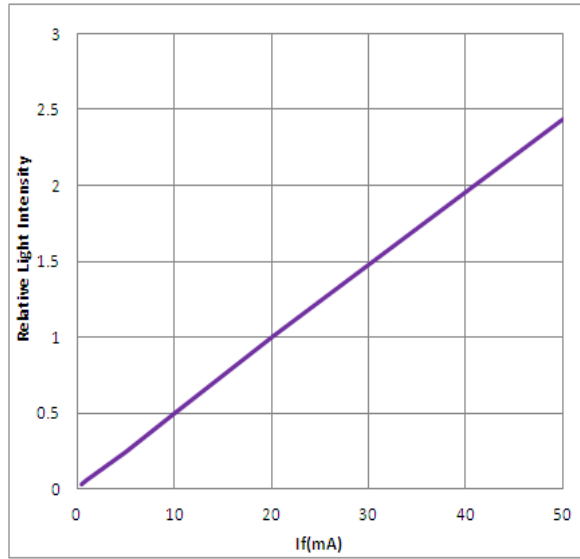


Fig-2 Relative Intensity vs. Forward Current.

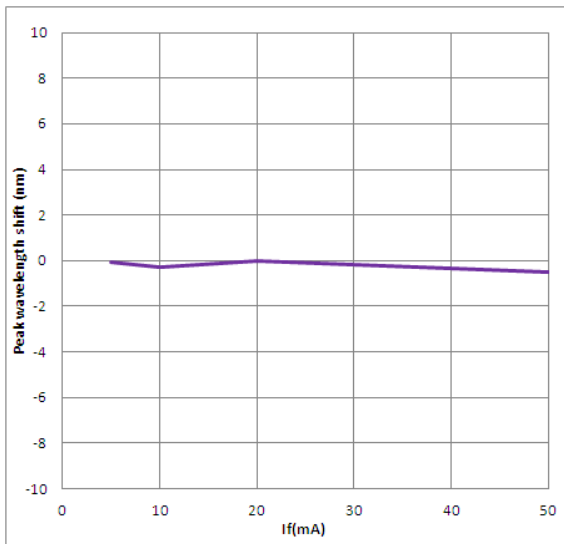


Fig-3 Peak Wavelength Shift vs. Forward Current.

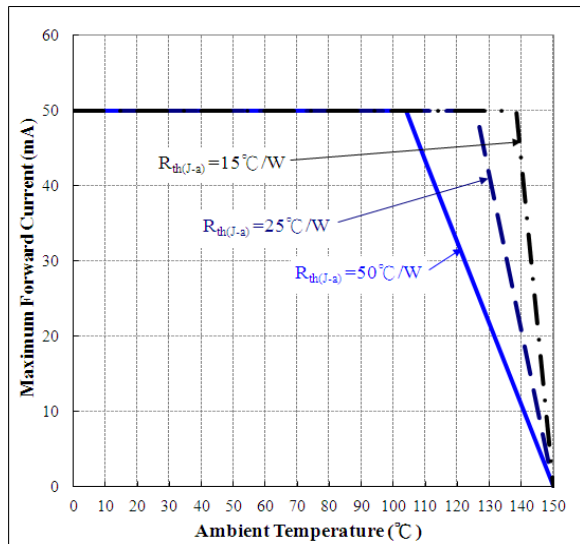


Fig-4 Maximum Forward Current vs. Ambient Temperature.

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.

For further company or product information, please visit us at www.semileds.com or please contact sales@semileds.com.

The logo features a small 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.

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