

# Enhanced Vertical™ EV-B53T High Power BLUE LED

## Introduction

The Enhanced Vertical (EV™) LED series is the latest innovation in high brightness LED chips, an ideal light source for general lighting applications, including street lighting, commercial and residential lighting. 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, color consistency, reliability and overall efficiency of the luminaire. 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.

Among pure metals at room temperature, copper has the second highest electrical and thermal conductivity after silver. Furthermore, due to the high thermal conductivity of the copper alloy layer, the heat generated in our device is effectively removed. This is a major advantage for any lamp or luminaire manufacturer when using SemiLEDs EV LED chip.

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

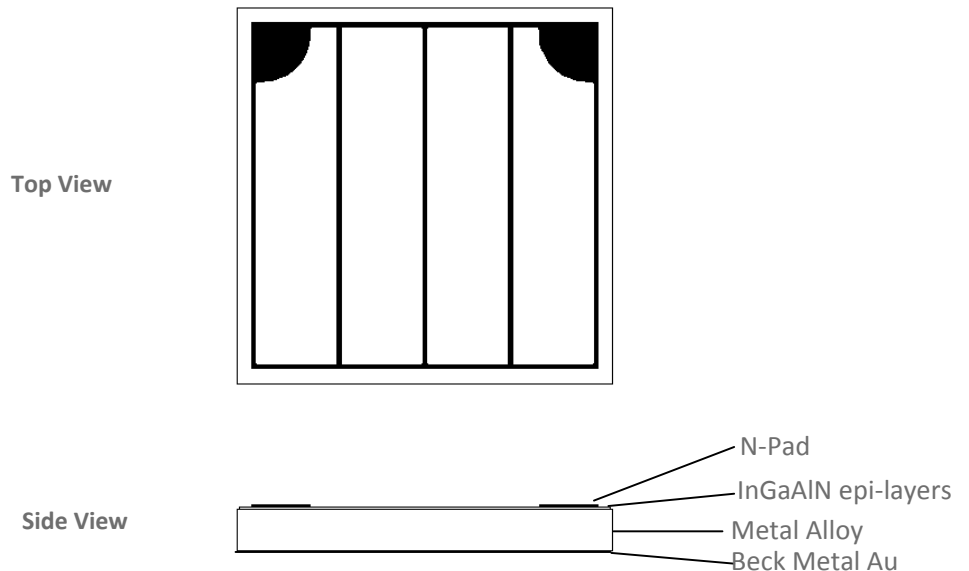
## Feature

- 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 white light design
- Patterned Surface . . . . . Maximum light extraction
- Enhanced Vertical Structure . . . . . Eutectic die attach compatible**

## Applications

- General Lighting
- LCD backlight
- Digital Camera Flash light
- High Power LED
- Automotive lighting
- Signalling
- Signage
- Miniature Light Engine

## Chip Mechanical Diagram



## Mechanical Specifications

P-N junction area	1210 μm X 1210 μm	± 20 μm
Base area	1330 μm X 1330 μm	± 50 μm
Chip thickness	145 μm	± 15 μm
Bond pad size	210 μm X 210 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 or two-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 700mA, T<sub>a</sub> at 25°C

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	V <sub>f</sub>		3.25	3.8	Volt
Spectra half width	Δλ		20	40	nm
Reverse current	I <sub>r</sub>			2 μA	V <sub>r</sub> = 5 Volt

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

## Absolute Maximum Ratings, T<sub>a</sub> at 25°C

Forward Current (DC)	1500 mA
LED Junction Temperature	150°C
Reverse Voltage	5 V
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)

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.

## BIN Table (Output Power at 700mA, T<sub>a</sub> at 25°C)

IS(mW)/Wd(nm)	447.5-450	450-452.5	452.5-455	455-457.5	457.5-460
700-750	BDG0	BEG0	BFG0	BGG0	BHG0
750-800	BDG5	BEG5	BFG5	BGG5	BHG5
800-900	BDH0	BEH0	BFH0	BGH0	BHH0
900-1000	BDJ0	BEJ0	BFJ0	BGJ0	BHJ0
1000-1100	BDK0	BEK0	BFK0	BGK0	BHK0
1100-1200	BDL0	BELO	BFLO		

## Performance Diagrams

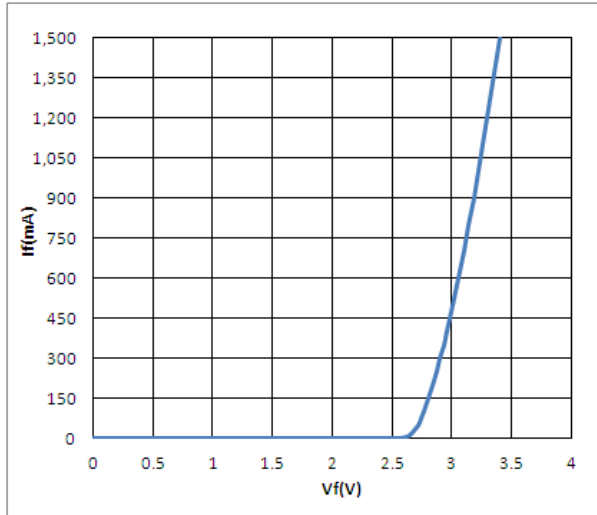


Fig-1 Forward Current vs. Forward Voltage.

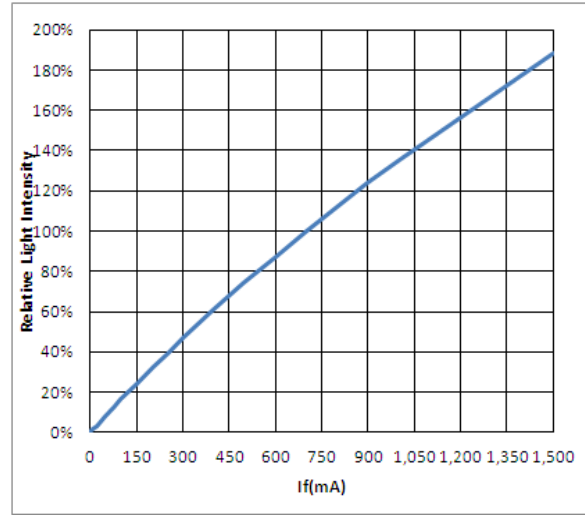


Fig-2 Relative Intensity vs. Forward Current.

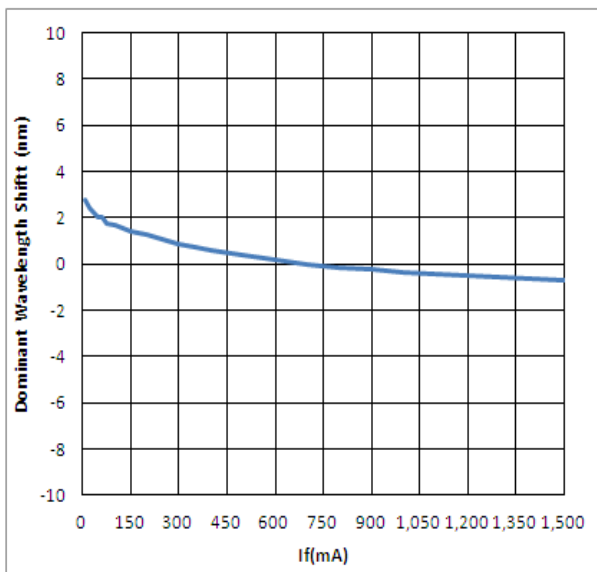


Fig-3 Dominant Wavelength Shift vs. Forward Current.

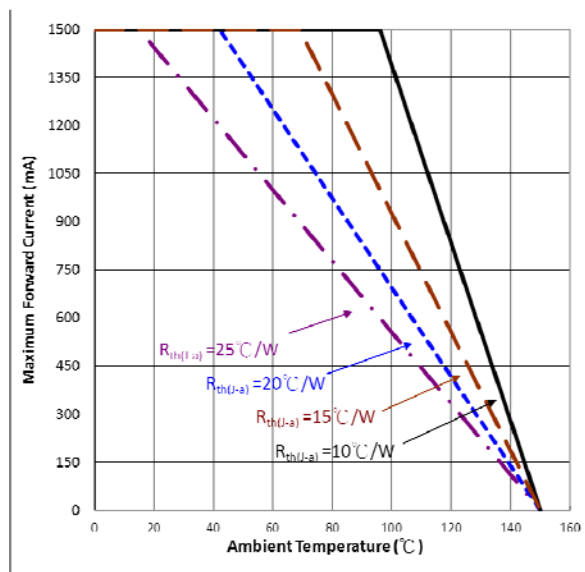


Fig-4 Maximum Forward Current vs. Ambient Temperature.

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.

## 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 stylized blue fan-like icon 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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