

# I-core™ (IC) LED

## SL-V-B45AK

### High Power BLUE LED

## BLUE LED

### Introduction

The advantages of the patented and proprietary I-core MvpLED™ design, especially in Thermal management and Optical efficacy, are realized in light quality, lifetime, color consistency, reliability and overall efficiency of the luminaire. The I-core™ (IC) LED delivers significant improvements in brightness as its sleek robust design maximizes light extraction. The advantages of the IC™ LED are further realised in improved reliability which is delivered through the optimization of stress management at high current operation. Featuring new electrodes convenient for wire bonding, the IC™ LED is available in Blue, Green and UV

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 conducted. This is a major advantage for any lamp or luminaire manufacturer. No matter how good a thermal design is, if the contact material to the junction is a poor conductor then the cooling effects of the heat-sink are significantly reduced.

Using a proprietary surface texturing technique, SemiLEDs LEDs maximize light extraction and efficiency. Coupled with a minimal use of Sapphire and a 90% efficient Reflective Layer, SemiLEDs chips exhibit an almost perfect Lambertian radiation pattern.

SemiLEDs' patented and unique process uses a limited amount 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

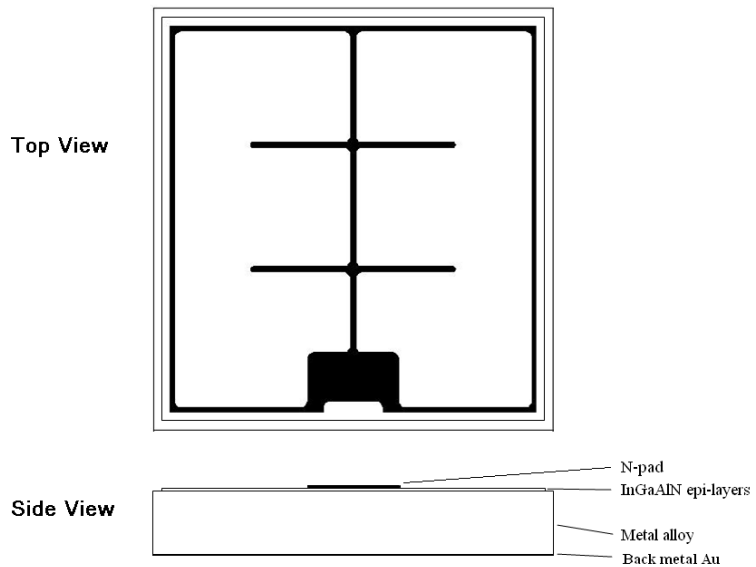
## Feature

Metal alloy device-----	Low cost high thermal conductivity
Thickness 145 $\mu\text{m}$ -----	Consolidated metal alloy
P-N junction high at 140 $\mu\text{m}$ -----	Silver epoxy die attachment compatible
One pad structure-----	Low package cost
Nearly Perfect Lambert an emission pattern -----	Ideal for white light design
Patterned surface -----	Maximum light extraction

## Applications

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	1050 $\mu\text{m}$ X 1050 $\mu\text{m}$	$\pm 20 \mu\text{m}$
Base area	1200 $\mu\text{m}$ X 1200 $\mu\text{m}$	$\pm 50 \mu\text{m}$
Chip thickness	145 $\mu\text{m}$	$\pm 15 \mu\text{m}$
Bond pad size	140 $\mu\text{m}$ X 280 $\mu\text{m}$	$\pm 15 \mu\text{m}$
Bond pad thickness	2.5 $\mu\text{m}$	$\pm 0.5 \mu\text{m}$
Junction height	140 $\mu\text{m}$	$\pm 15 \mu\text{m}$

Note: The bond pad size is design for single wire or two wire bonding. We recommend using gold ball bonding as an electrical connection. The gold ball can't bond over the pad area. We recommend controlling the gold ball size  $\leq 120\mu\text{m}$ .

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

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	Vf		3.2	3.6	Volt
Spectra half width	$\Delta\lambda$		20	40	nm
Reverse current	Ir			2 $\mu$ A	Vr= 5 Volt

Measured by SemiLEDs on bare chip

## Absolute Maximum Ratings, Ta at 25°C

Forward Current (DC)	500 mA
Peak Forward Current (1/10 duty cycle @ 1KHz)	800 mA
LED Junction Temperature	125°C
Reverse Voltage	5 V
Operating Temperature	-40°C to +110°C
Storage Temperature	-40°C to +110°C
Temperature during packaging (reflow)	280°C < 10 sec

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

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

Wd Range(nm)	400-450mW	450-500mW	500-550mW	550-600mW
450-452.5		AH	AI	AJ
452.5-455		BH	BI	BJ
455-457.5		CH	CI	CJ
457.5-460		DH	DI	DJ
460-462.5		EH	EI	EJ
462.5-465		FH	FI	FJ
465-467.5	GG	GH	GI	
467.5-470	HG	HH	HI	
470-472.5	IG	IH	II	
472.5-475	JG	JH	JI	

## Performance Diagram

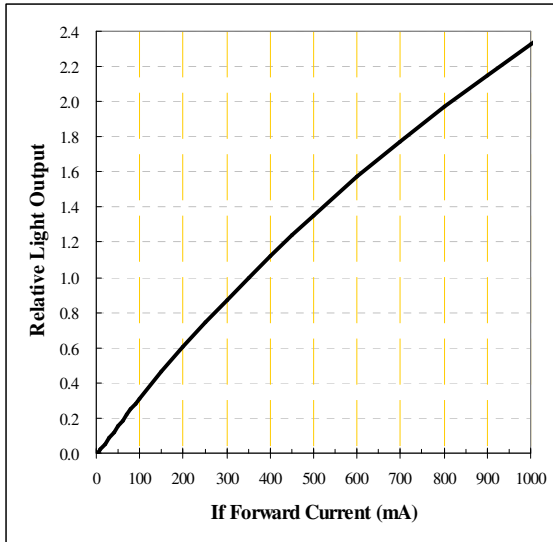


Fig-1 Relative Light Output vs. Forward Current.

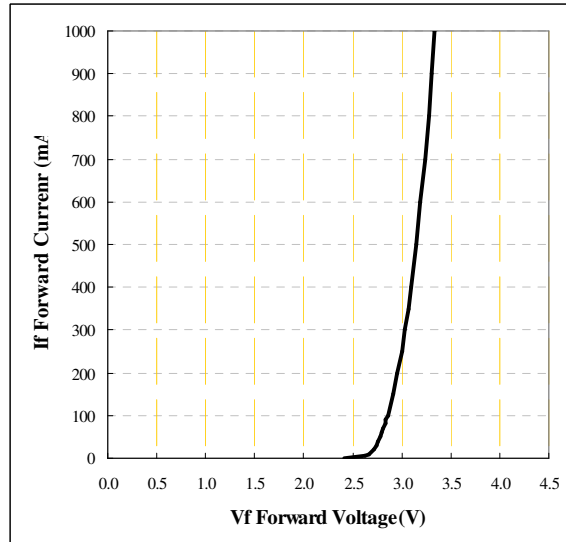


Fig-2 Forward Current vs. Forward Voltage.

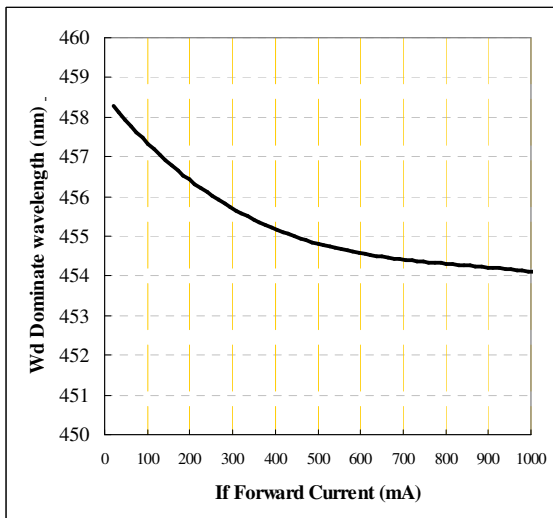


Fig-3 Dominate Wavelength vs. Forward Current.

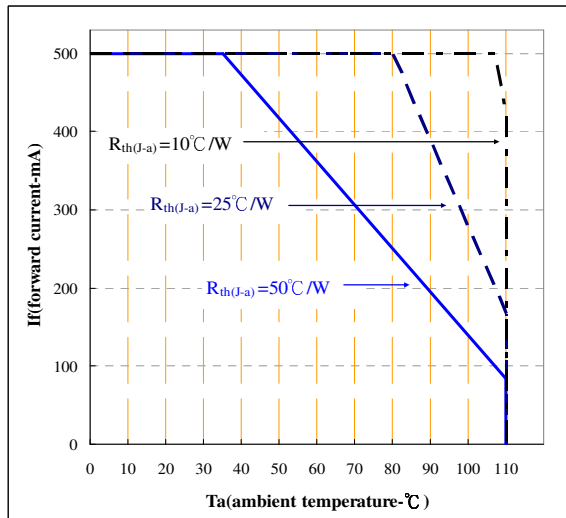


Fig-4 Maximum Driving Forward DC Current vs. Ambient Temperature.

### Note:

- 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 information.
- 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 is a manufacturer of ultra-high bright LED chips with state of the art fabrication facilities in Hsinchu Science Park, Taiwan. SemiLEDs specializes in the development and manufacturing of metal alloy vertical LED chips in blue (white), green and UV using our patented and proprietary MvpLED™ technology. This unique design allows for higher performance and longer lumen maintenance. SemiLEDs new high power I-core MvpLEDs™ can deliver over 120lm/W. In December 2008 The World Economic Forum recognized SemiLEDs innovations with the 2009 Technology Pioneer Award.



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