

# P2N LED

## High Power LED

### Introduction

The P2N LED brings industry leading technology to the solid state lighting market with its high quality and performance. With a silicone lens, P2N LEDs feature very high brightness and efficacy, as well as excellent lifetime. P2N LEDs are reflow solderable and the light output decay is less than 10% under crucial test conditions (700mA, ambient 85°C and 85%RH).



With special phosphor technology, warm white P2N LEDs have very good color stability under high temperature conditions. The typical CCT change is less than 50K when the junction temperature reaches 100°C.

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### RoHS Compliant

## Features

-  Excellent Operating Life
-  High Efficacy
-  Low Thermal Resistance
-  Superior ESD Protection
-  No UV
-  SMD Device
-  Instant Light
-  Fully Dimmable
-  RoHS Compliant

## Characteristics

### Absolute Ratings

Parameter	Rating
	White Series / Royal Blue / Blue / Green / Amber / Red
DC Forward Current (mA)	700 mA
LED Junction Temperature	125°C
LED Operating Temperature	-40°C~110°C
Storage Temperature	-40°C~110°C
Soldering Temperature	Max. 260°C / Max. 10sec. (JEDEC 020c)
ESD Sensitivity	2,000 V HBM (JESD-22A-114-B)
Reverse Voltage	Not designed to be driven in reverse bias ( $V_R \leq 5V$ )
Preconditioning	Acc. to JEDEC Level 2

## General Characteristics at 350Ma

Part number	Color	Typ CRI	Dominant Wavelength $\lambda_d$ Peak Wavelength $\lambda_p$ *		$2\theta_{1/2}$ degree	Temperature Coefficient of Vf (mV/°C) $\Delta V_F / \Delta T_J$	Thermal Resistance Junction to Lead (°C/W) $R_{\theta_{J-L}}$
			Min	Max			
P2N-W	Daylight	70	4750K	7000K	150	-3	10
	Warm White	80	2600K	3700K	125	-3	10
P2N-R	Red	-	620	635	140	-	10
P2N-S	Super Red	-	655*	665*	140	-	10
P2N-A	Amber	-	580	600	140	-	10
P2N-G	Green	-	520	535	140	-3	10
P2N-B	Blue	-	460	470	140	-3	10
P2N-D	Royal Blue	-	440*	460*	140	-3	10

Notes :

1. The CCT is measured with an accuracy of  $\pm 200K$
2. The peak/dominant wavelength is measured with an accuracy of  $\pm 1nm$

## Luminous Flux and Forward Voltage

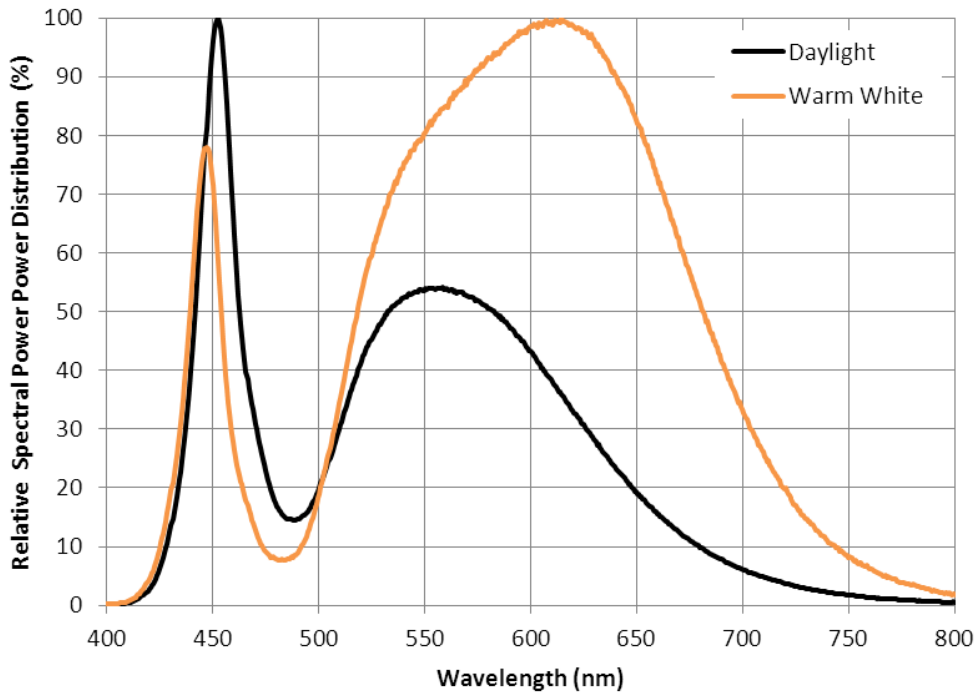
Part number	Color	Performance at Test Current (350mA)				Performance at 700mA
		Group	Minimum Luminous Flux (lm)	VF		Typical Luminous Flux (lm) or
				Min	Max	
P2N-W	Daylight	U3	100	2.8	3.8	170
		VA	110	2.8	3.8	185
		VB	120	2.8	3.8	200
		VC	130	2.8	3.8	220
		VD	140	2.8	3.8	240
	Warm white	UA	80	2.8	3.8	141
		U2	90	2.8	3.8	160
		U3	100	2.8	3.8	170
VA		110	2.8	3.8	185	
P2N-R	Red	S1	50	2	3.4	95
		S2	55	2	3.4	100
		T1	65	2	3.4	125
		TU	75	2	3.4	145
P2N-S	Super Red	D1	200*	2	3.4	395*
		D2	240*	2	3.4	460*
		D3	280*	2	3.4	540*
		D4	320*	2	3.4	615*
P2N-A	Amber	R2	45	2	3.4	85
		S1	50	2	3.4	95
		S2	55	2	3.4	100
		T1	65	2	3.4	125
P2N-G	Green	T1	65	2.8	3.8	125
		TU	75	2.8	3.8	145
		U2	90	2.8	3.8	175
		U3	100	2.8	3.8	195
P2N-B	Blue	N0	18	2.8	3.8	33
		P1	22	2.8	3.8	40
		P2	26	2.8	3.8	47
		Q1	30	2.8	3.8	54
P2N-D	Royal Blue	E2	440*	2.8	3.8	780*
		E3	480*	2.8	3.8	850*
		E4	520*	2.8	3.8	920*
		E5	560*	2.8	3.8	990*

## Notes:

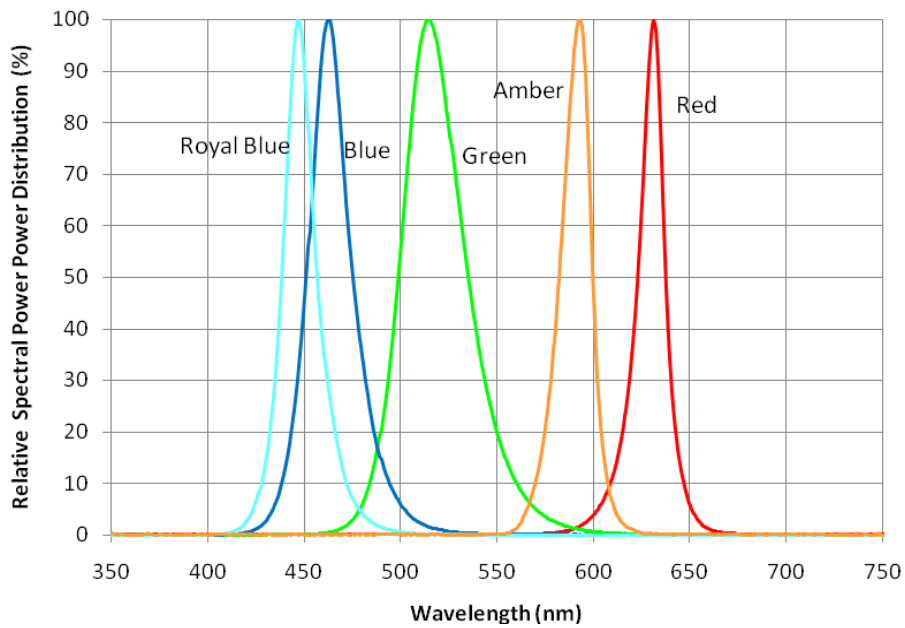
1. Luminous flux is measured with an accuracy of  $\pm 10\%$
2. The forward voltage is measured with an accuracy of  $\pm 0.1V$

## Relative Spectral Power Distribution, Ta=25 °C

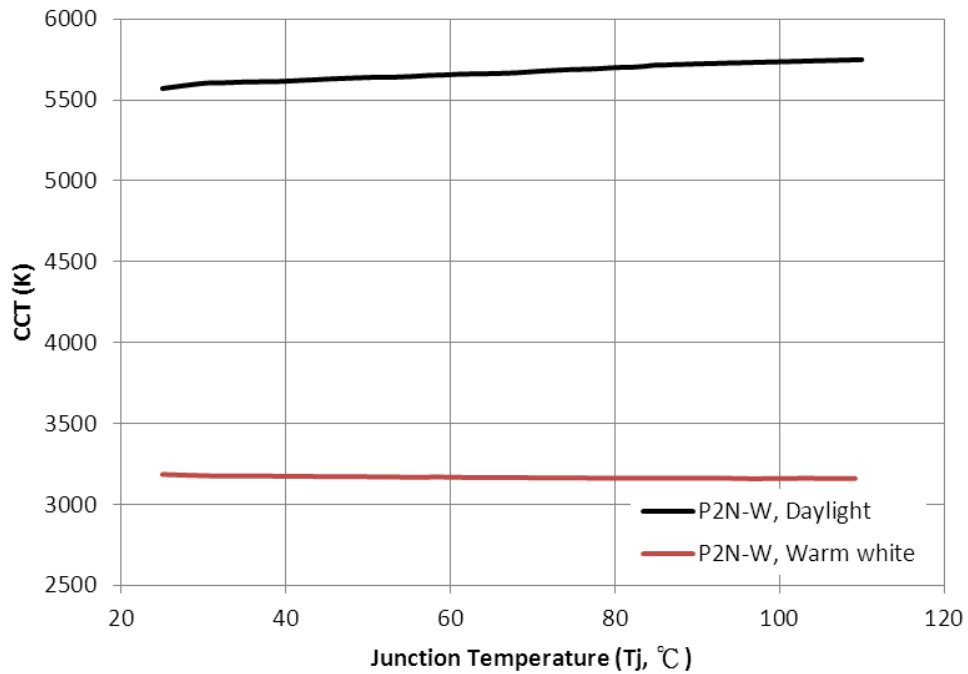
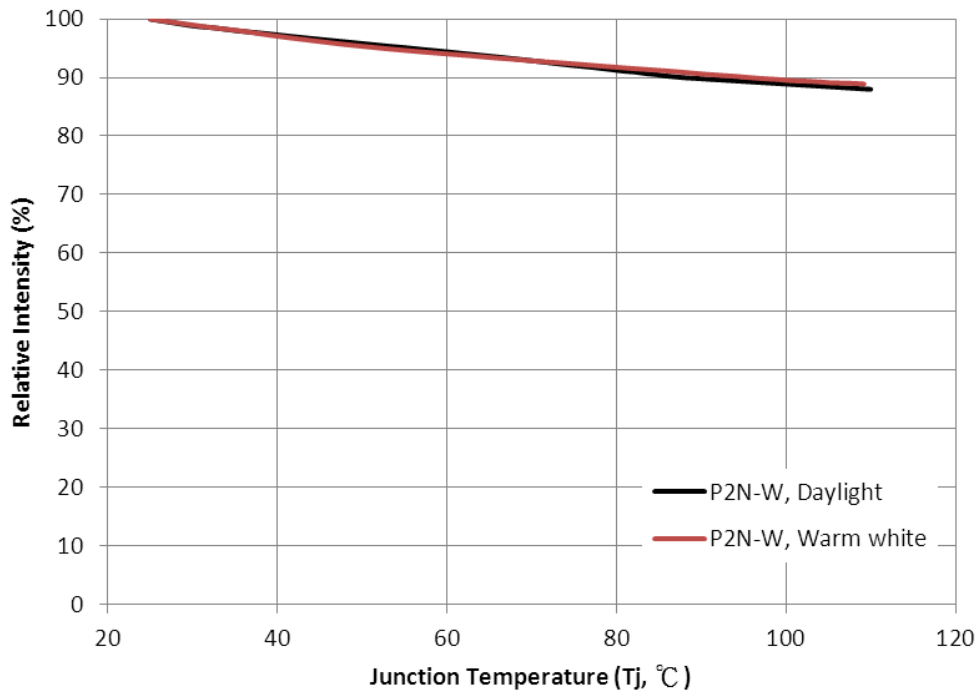
### White light



### Royal Blue / Blue / Green / Amber / Red

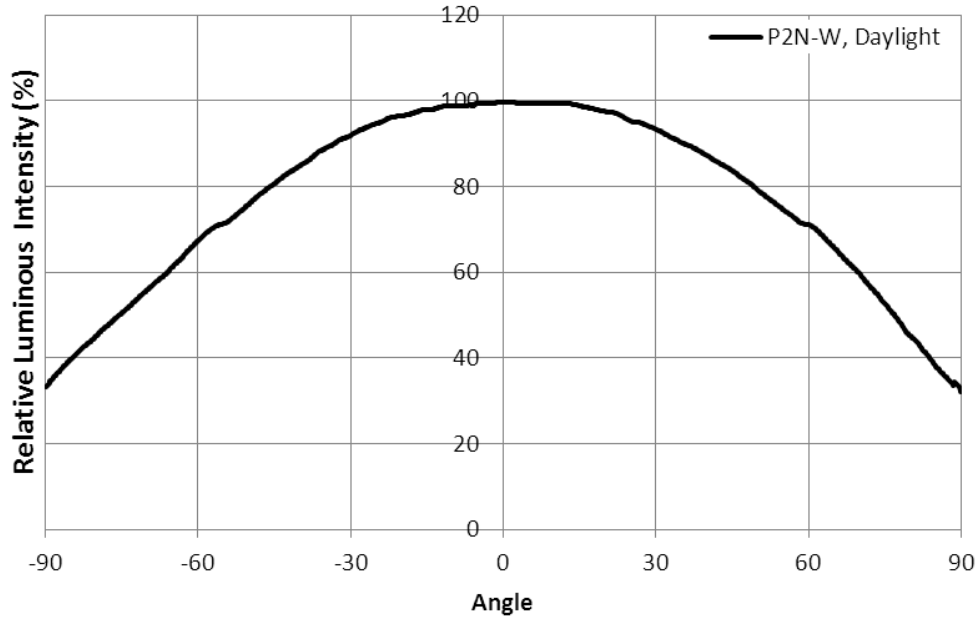


## Typical Light Output Characteristics Vs. Temperature

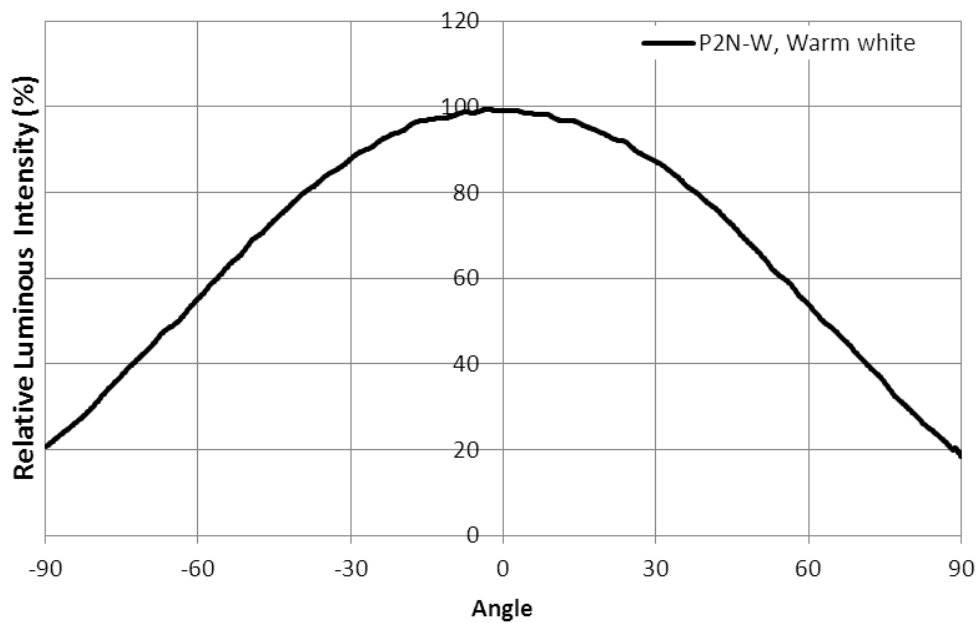


## Typical Spatial Radiation Pattern

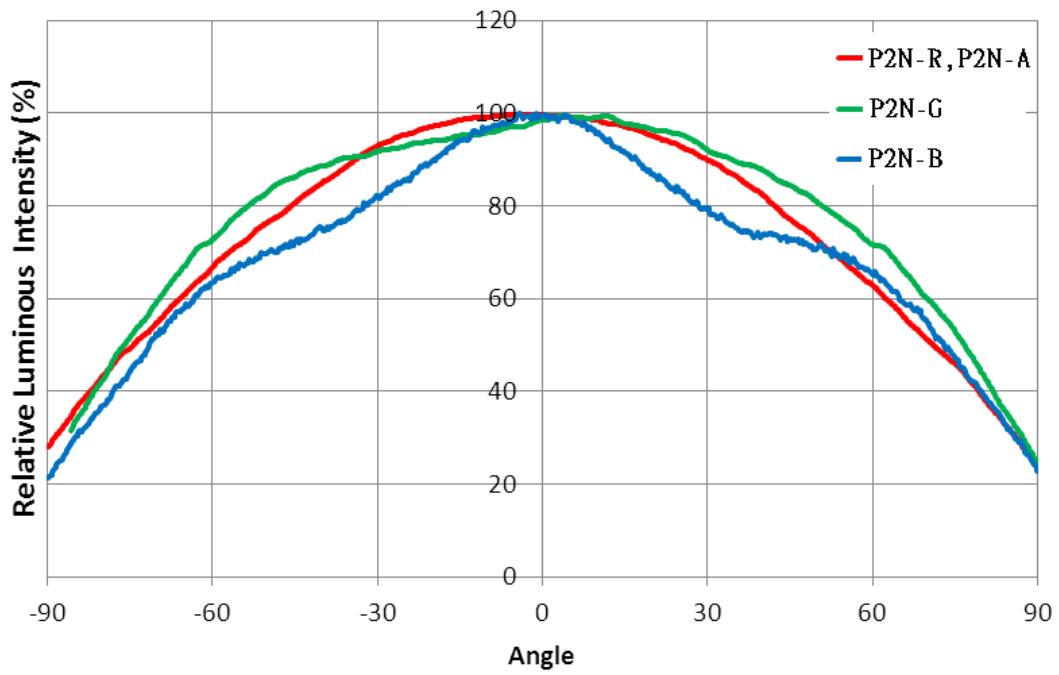
P2N-W, Daylight



P2N-W, Warm White



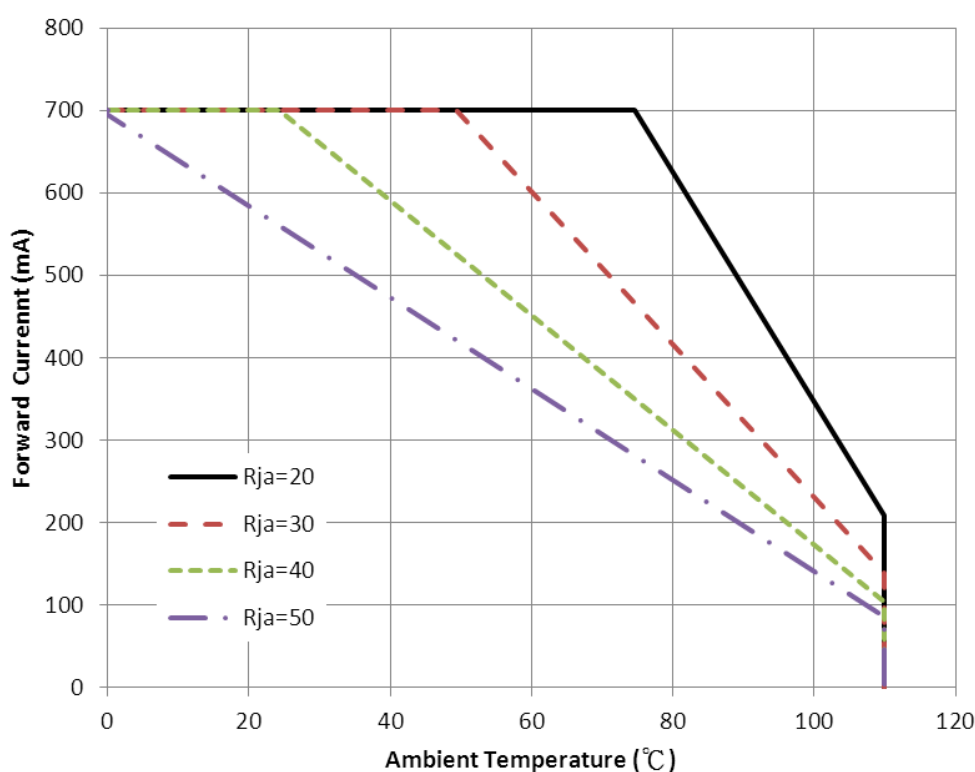
P2N-R, P2N-A, P2N-G, P2N-B





## Thermal Design

Thermal design of the end product is important. The thermal resistance between the junction and the solder point ( $R_{\theta_{J-L}}$ ) is  $10^{\circ}\text{C}/\text{W}$ , and the end product should be designed to minimize the thermal resistance from the solder point to ambient in order to optimize the emitter life and optical characteristics. The maximum operation current is determined by the plot of Allowable Forward Current vs. Ambient Temperature.



The junction temperature can be correlated to the thermal resistance between the junction and ambient ( $R_{ja}$ ) by the following equation.

$$T_j = T_a + R_{ja} * W$$

$T_j$ : LED junction temperature

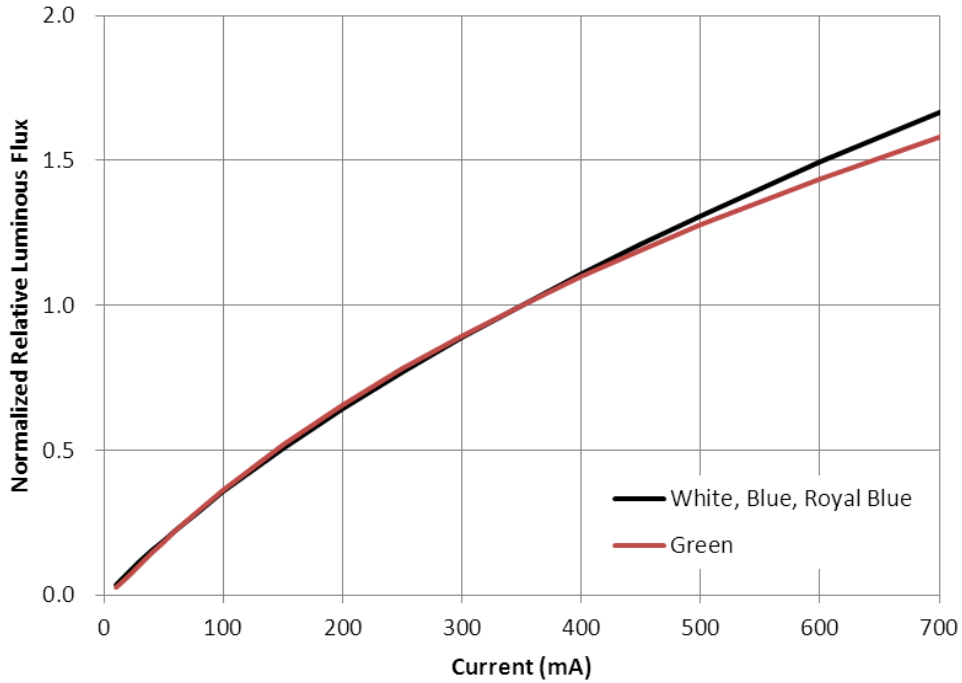
$T_a$ : Ambient temperature

$R_{ja}$ : Thermal resistance between the junction and ambient

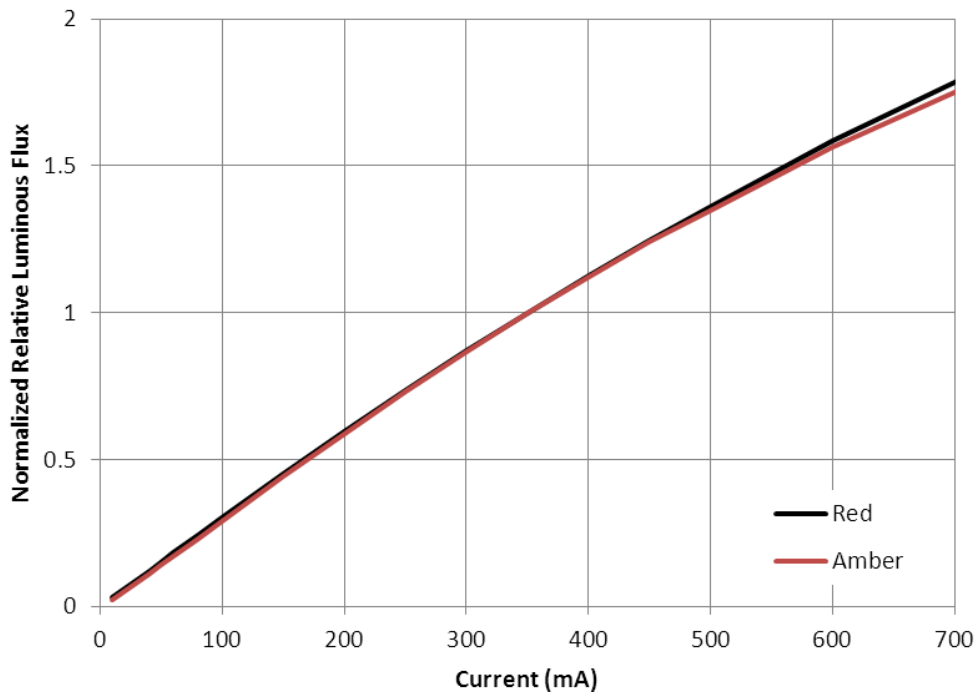
$W$ : Input power ( $I_F * V_F$ )

## Typical Forward L-I Characteristics

White Series/ Green / Blue / Royal Blue

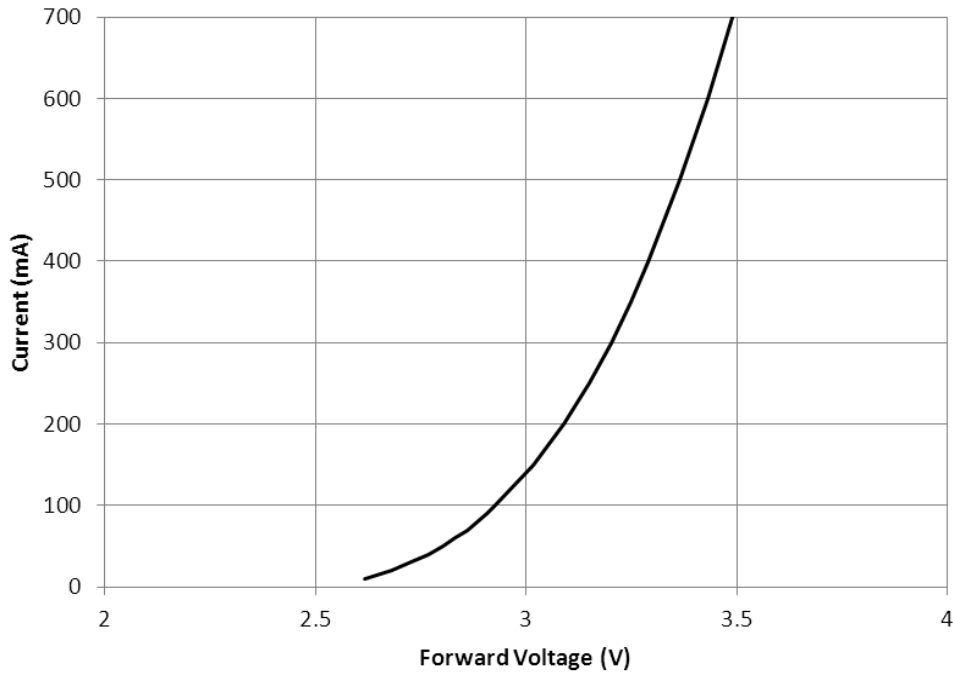


Amber / Red

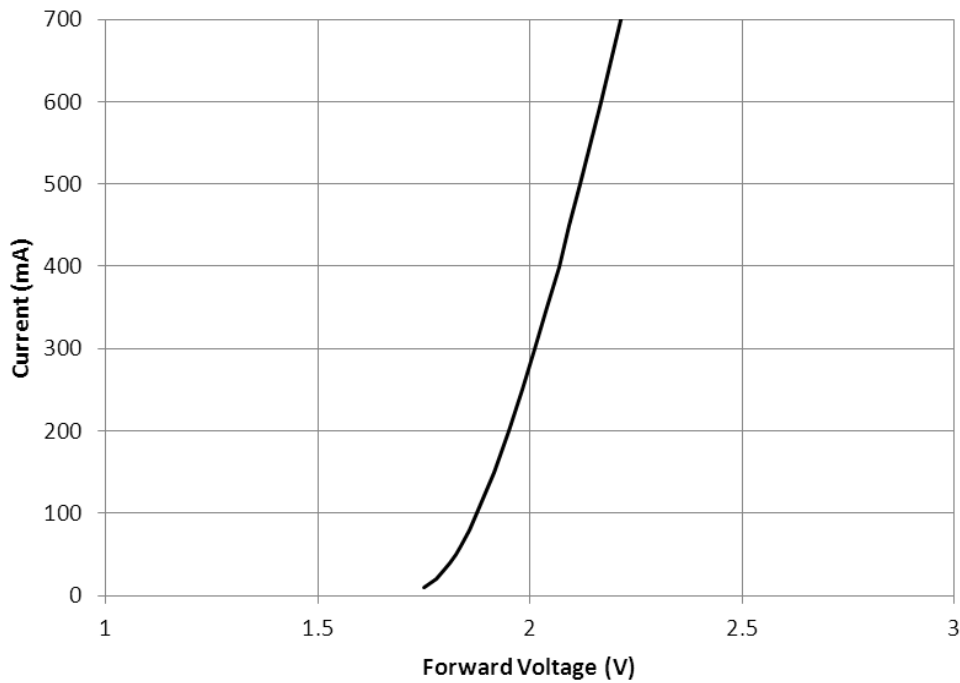


## Typical Forward I-V Characteristics

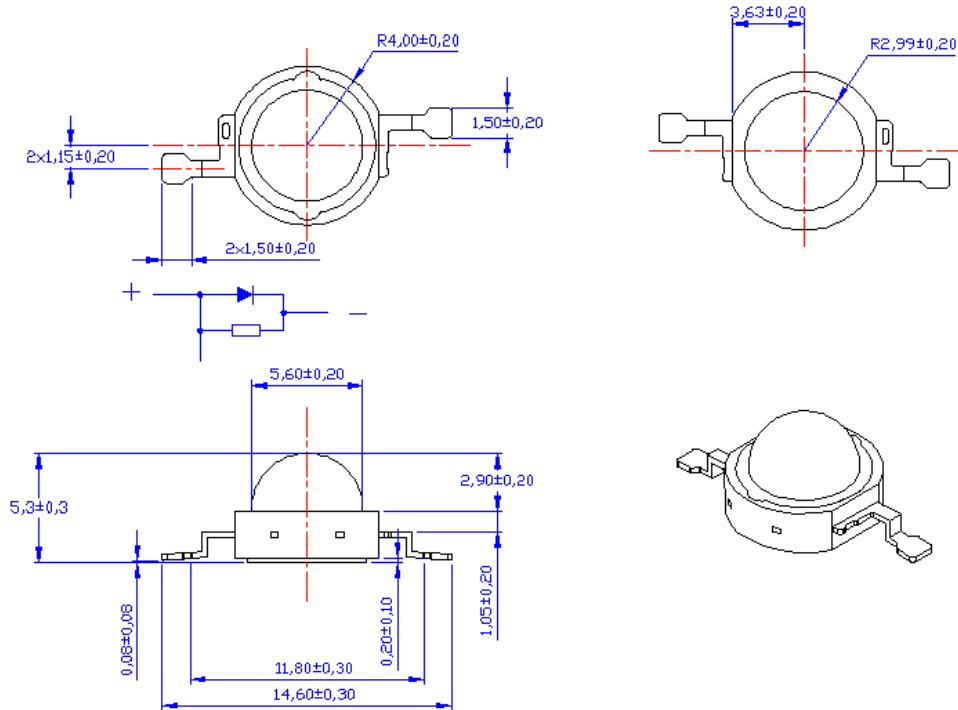
White series/ Green / Blue / Royal Blue



Amber / Red



## Mechanical Dimensions

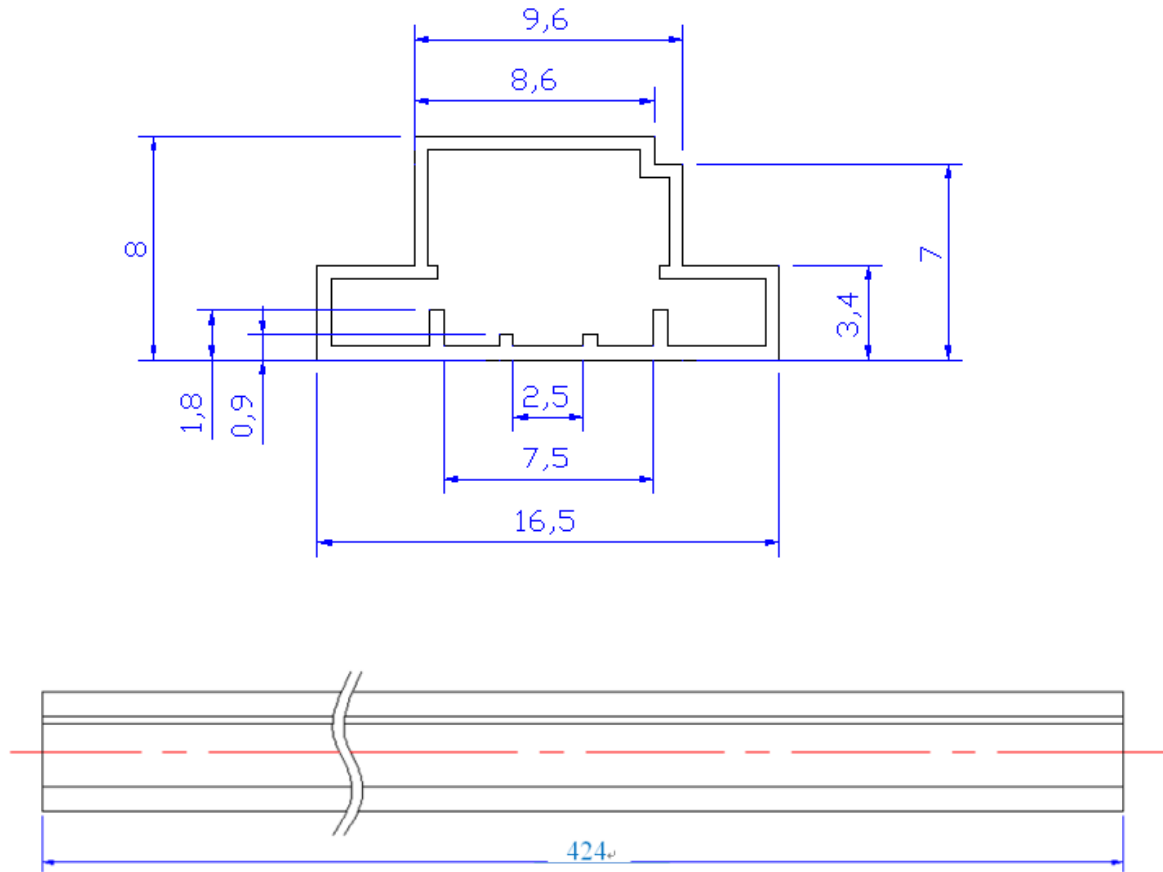


### Notes:

1. Drawing is not to scale
2. All dimensions are in millimeter

## Shipping Package Information

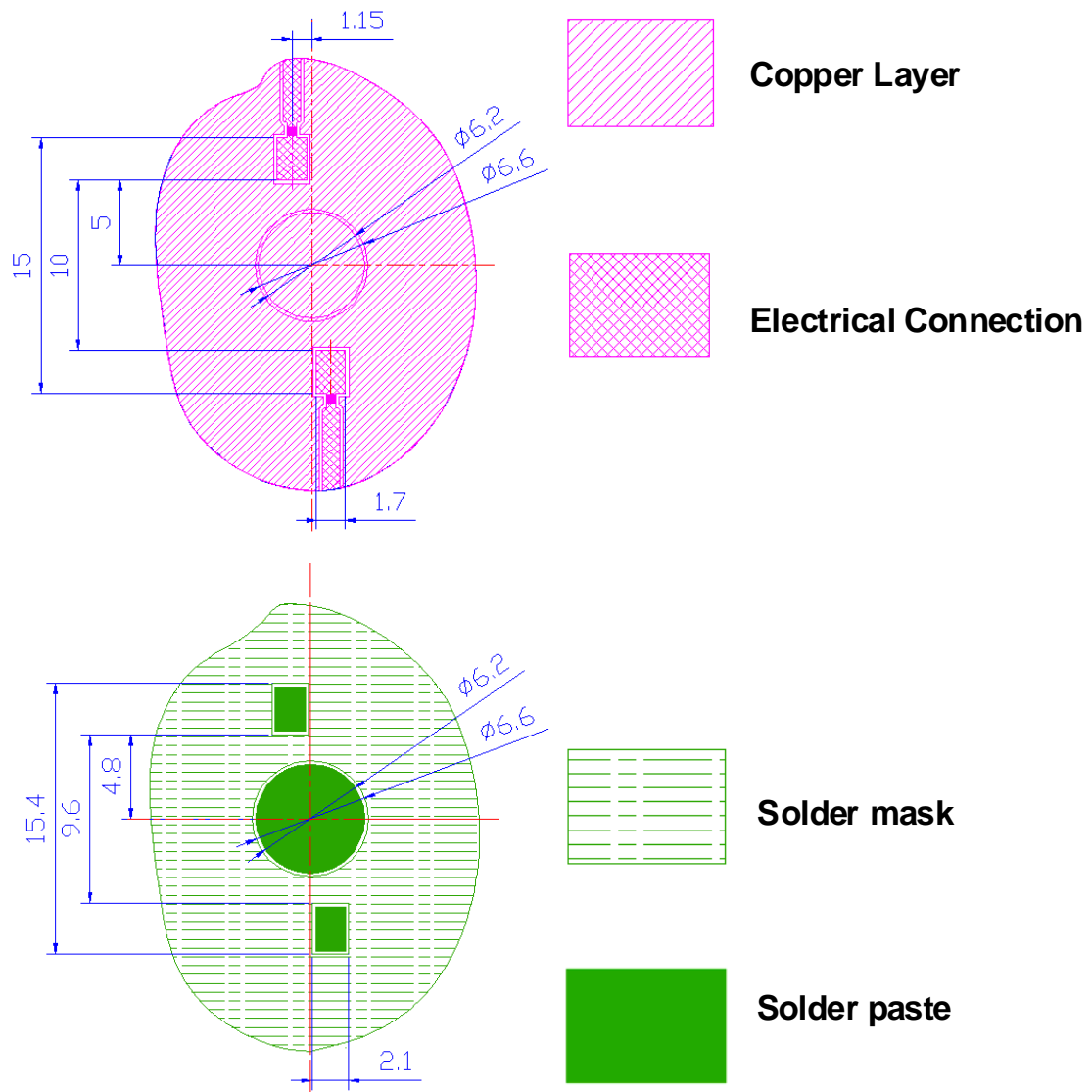
### Tube



All dimensions are in millimeter

	Dimensions (L*W*H)	Emitter Quantity
Tube	424*16.7*10.0 mm	50 EA

## Recommended Solder Pad Design

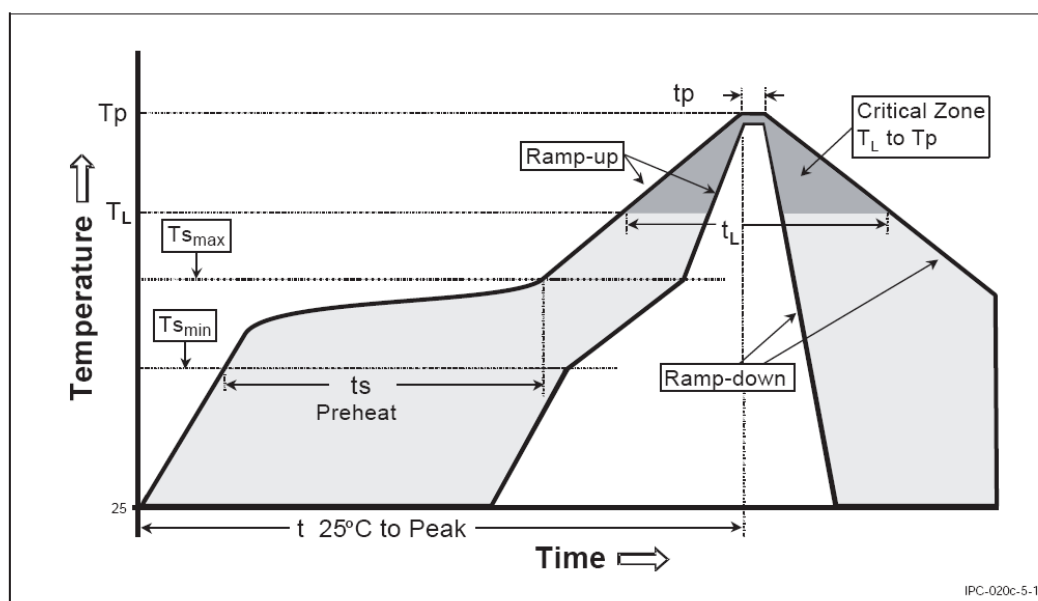


Notes:

1. Drawing is not to scale
2. All dimensions are in millimeter

## Recommended Soldering Profile

The LEDs can be soldered using the parameter listed below. As a general guideline, the users are suggested to follow the recommended soldering profile provided by the manufacturer of the solder paste. Although the recommended soldering conditions are specified in the list, reflow soldering at the lowest possible temperature is preferred for the LEDs.



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-up Rate ( $T_{s_{max}}$ to $T_p$ )	3°C/second max.	3°C/second max.
Preheat		
- Temperature Min( $T_{s_{min}}$ )	100°C	150°C
- Temperature Max( $T_{s_{max}}$ )	150°C	200°C
- Time( $t_{s_{min}}$ to $t_{s_{max}}$ )	60-120 seconds	60-180 seconds
Time maintained above:		
- Temperature( $T_L$ )	183°C	217°C
- Time( $t_L$ )	60-150 seconds	60-150 seconds
Peak/classification Temperature( $T_p$ )	215°C	240°C
Time within 5°C of actual Peak Temperature( $t_p$ )	10-30 seconds	20-40 seconds
Ramp-Down Rate	6°C/second max.	6°C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

## Reliability Information

Stress Test	Stress Condition	Stress Duration
Room Temperature Operating Life (RTOL)	Tb=25°C, If=700mA	1000 hours
High Temperature Operating Life (HTOL)	Tb=85°C, If=700mA	1000 hours
Wet High Temperature Operating Life (WHTOL)	Ta=85°C, RH=85%, If=700mA	1000 hours
Temperature Cycles (TMCL)	-40°C/125°C, 15min dwell, 5min transfer	200 cycles
High Temperature Storage Life (HTSL)	Ta=110°C, non-operating	1000 hours
Low Temperature Storage Life (LTOL)	Ta=-40°C non-operating	1000 hours
Solder Heat Resistance (SHR)	240°C, 10 sec	

Failure Criteria:

1. Brightness attenuate difference <10%
2. Forward voltage difference: ±20%

Notes:

1. Tb: board temperature
2. Ta: ambient temperature

### Notice:

This product is ***not for use, sale, or importation into the United States***. Any agreement, documentation, or communication (in any form, through any medium and for any purpose) related to this product is provided subject to the above disclaimer, and no (and seller hereby disclaims any) indemnification is provided for this product against any infringement claim of intellectual property rights in the United States. The limitations above do not apply to products that are purchased and delivered before October 1, 2012.



## About Us

**SemiLEDs Corporation** is a US based manufacturer of ultra-high brightness LED chips with state of the art fabrication facilities in Hsinchu Science Park, Taiwan. 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. In December 2008, 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).



  
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