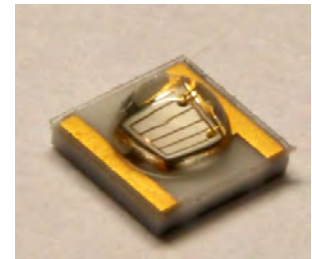


# C35L-X-A

## High Power LED

### Introduction

The C35L-X-A LED from SemiLEDs brings industry leading technology to the solid state lighting market with its high quality and performance. With a silicone lens, C35L-X-A LEDs from SemiLEDs feature very high brightness and efficacy, as well as excellent lifetime.



C35L-X-A LEDs also feature a special design to fit secondary optics for various lighting applications. The user can easily get uniform light with any secondary optics.

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### RoHS Compliant

## Characteristics

### Absolute Ratings

Parameter	Rating
	White / Royal Blue / Blue / Green / Cyan / Amber / Red
DC Forward Current (mA)	700 mA
LED Junction Temperature	150°C (White / Royal Blue / Blue /Green /Cyan)
LED Junction Temperature	125°C (Red, Amber)
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 design to be driven in reverse bias (VR ≤ 5V)
Preconditioning	Acc. to JEDEC Level 2

### General Characteristics at 350mA

Part number	Color	Dominant Wavelength $\lambda_d$ Peak Wavelength $\lambda_p$ * Correlated Color Temperature, CCT		$2\theta_{1/2}$	Temperature Coefficient of Vf (mV/°C)	Thermal Resistance Junction to Pad (°C/W) $R\theta_{J-L}$
		Min	Max			
C35L-W-A	Daylight	4750K	7000K	135	-3	8
C35L-W-A	Neutral White	3700K	4750K	130	-3	8
C35L-W-A	Warm White	2600K	3700K	130	-3	8
C35L-U-A	UV	390	420	125	-4	8
C35L-R	Red	620	635	125	-	-
C35L-A	Amber	580	600	125	-	-
C35L-G-A	Green	520	535	125	-3	8
C35L-C-A	Cyan	500	510	125	-3	8
C35L-B-A	Blue	460	470	125	-3	8
C35L-D-A	Royal Blue	440	460*	125	-3	8

Notes:

- The peak/dominant wavelength is measured with an accuracy of  $\pm 1\text{nm}$
- SemiLEDs maintains a tolerance of  $\pm 2$  on CRI measurements.  
Typical CRI for Cool White (4750 K – 10,000 K CCT) is 70.  
Typical CRI for Neutral White (3700 K – 4750 K CCT) is 75.  
Minimum CRI for Warm White (2600 K – 3700 K CCT) is 80.

**Luminous Flux and Forward Voltage**

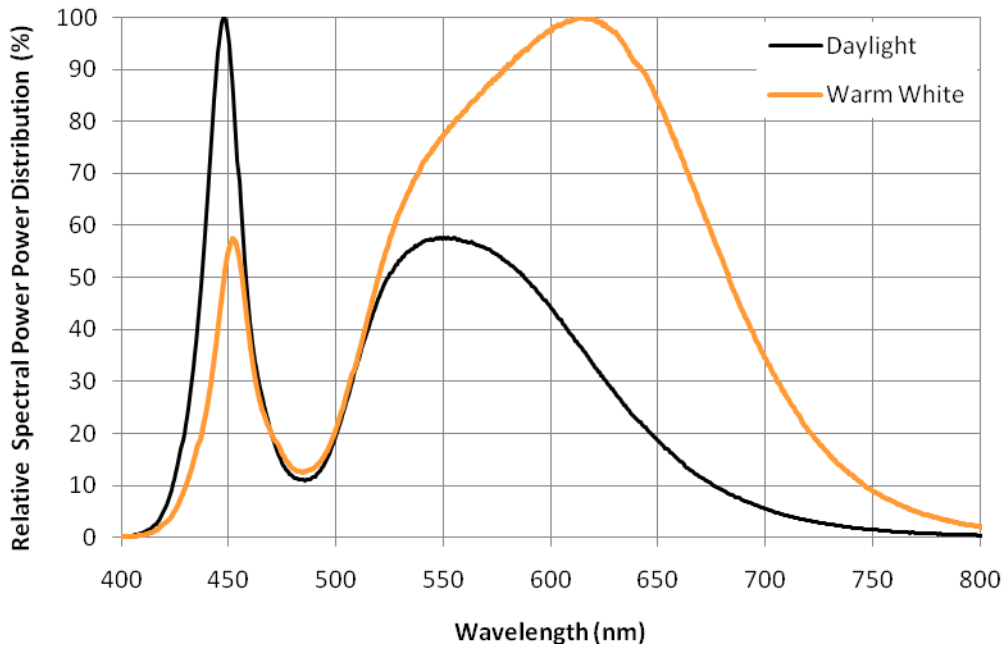
Part number	Color	Performance at Test Current (350mA)				Performance at 700mA
		Group	Minimum Luminous Flux (lm) or Radiometric Power* (mW)	VF		Typical Luminous Flux (lm) or Radiometric Power* (mW)
				Min	Max	
C35L-W-A	Daylight	QE	107	2.8	3.6	185
		RB	114	2.8	3.6	200
		RC	122	2.8	3.6	215
	Neutral White	QD	100	2.8	3.6	168
		QE	107	2.8	3.6	180
	Warm White	PD	80.6	2.8	3.6	145
		QB	87.4	2.8	3.6	150
QC		93.9	2.8	3.6	163	
C35L-U-A	U50 (390~400nm)	D2	240*	3.0	4.0	410*
		D3	280*	3.0	4.0	475*
	U60 (400~410nm)	D2	240*	3.0	4.0	410*
		D3	280*	3.0	4.0	475*
		D4	320*	3.0	4.0	545*
	U70 (410~420nm)	D3	280*	3.0	4.0	475*
		D4	320*	3.0	4.0	545*
D5		360*	3.0	4.0	610*	
C35L-R	Red	NB	51.7	2.0	3.0	96
		NC	56.8	2.0	3.0	105
C35L-A	Amber	NB	51.7	2.0	3.0	96
		NC	56.8	2.0	3.0	105
C35L-G-A	Green	PB	67.2	2.8	3.6	118
		PC	73.9	2.8	3.6	130
C35L-C-A	Cyan	PB	67.2	2.8	3.6	118
		PC	73.9	2.8	3.6	130
C35L-B-A	Blue	JB	18	2.8	3.6	33
		JC	23.5	2.8	3.6	43
C35L-D-A	Royal Blue	E1	400*	2.8	3.6	712*
		E2	440*	2.8	3.6	783*

Note:

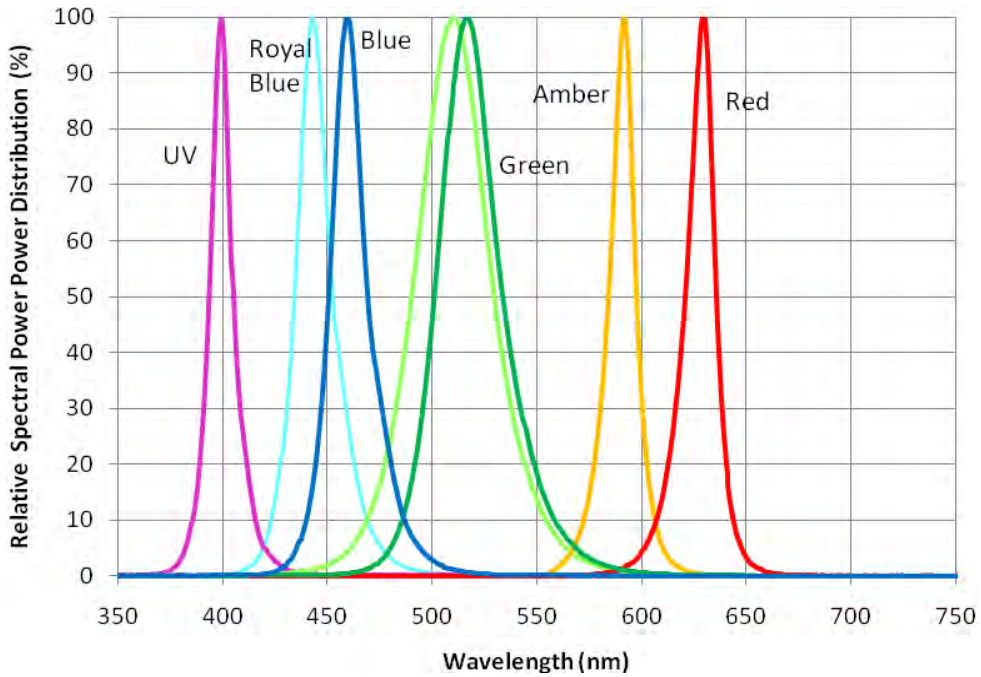
1. Luminous flux is measured with an accuracy of ±10%
2. The forward voltage is measured with an accuracy of ±0.1V

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

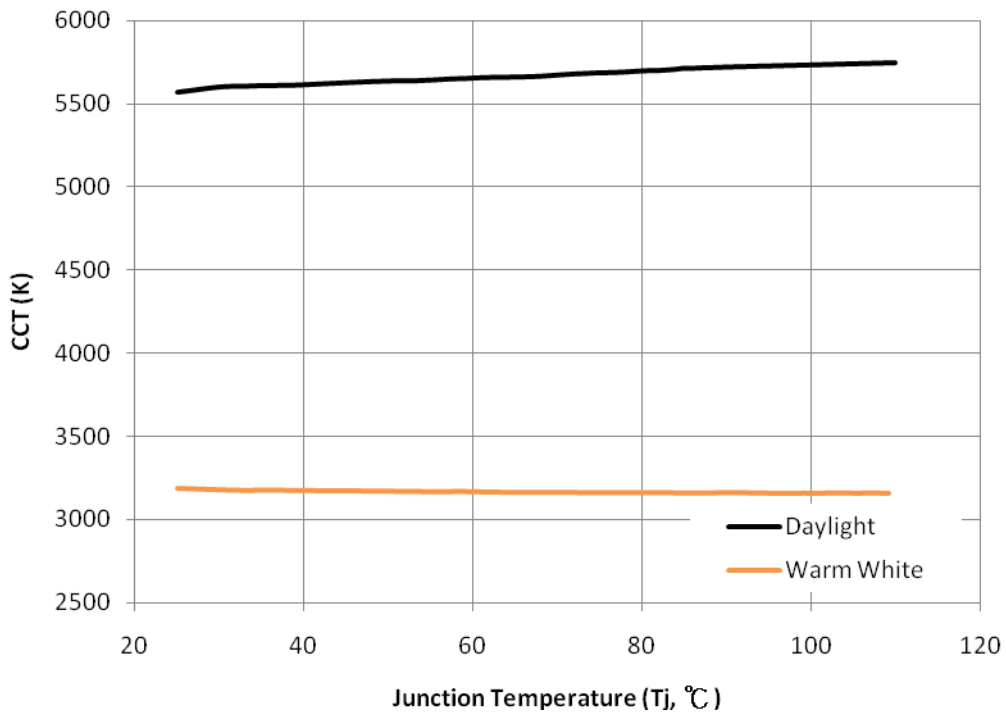
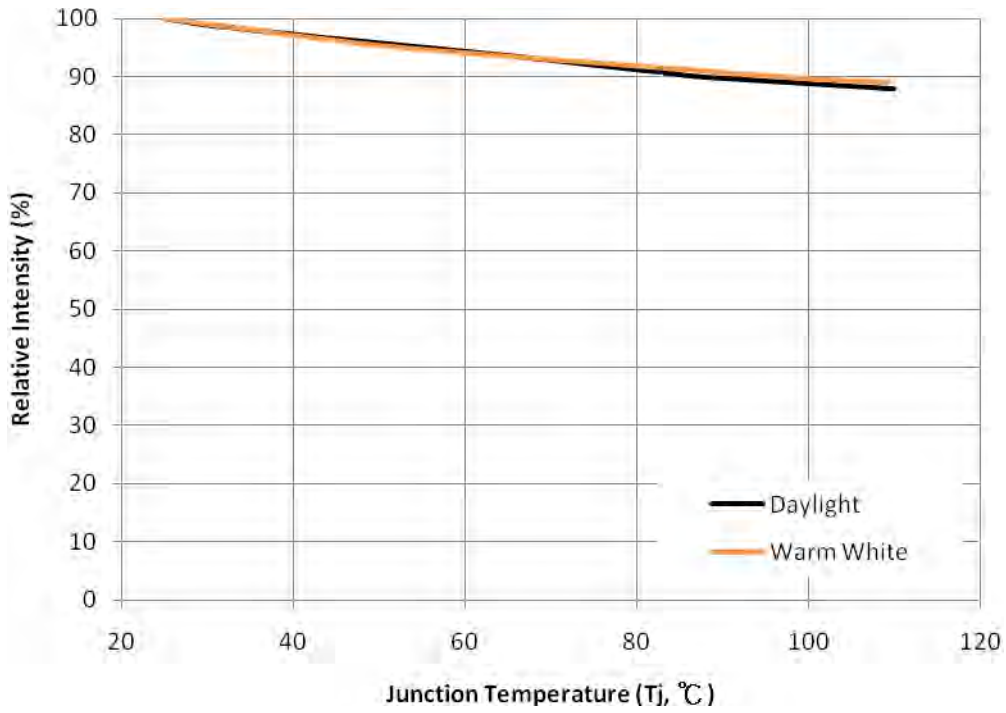
### White light



### UV / Royal Blue / Blue / Cyan / Green / Amber / Red

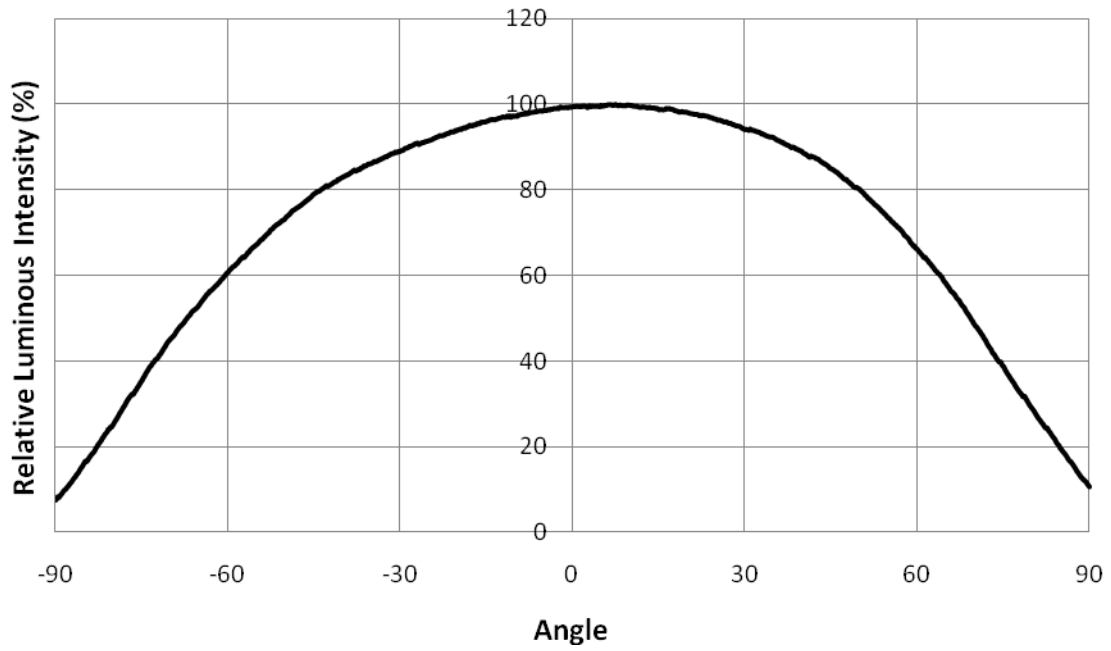


## Typical Light Output Characteristics Vs. Temperature

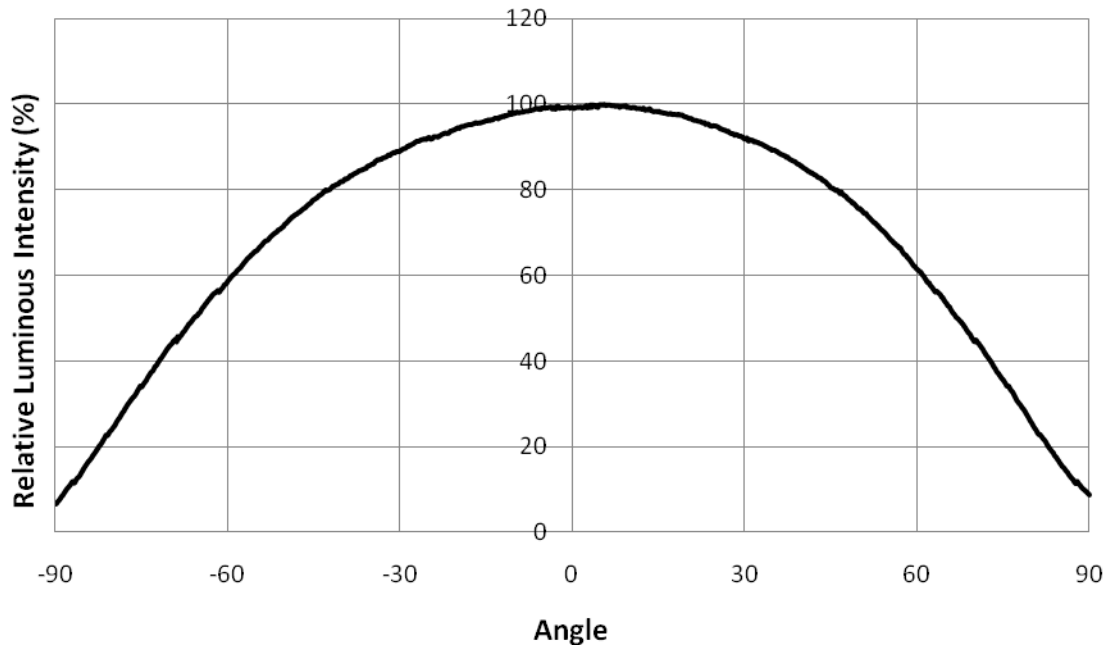


## Typical Spatial Radiation Pattern

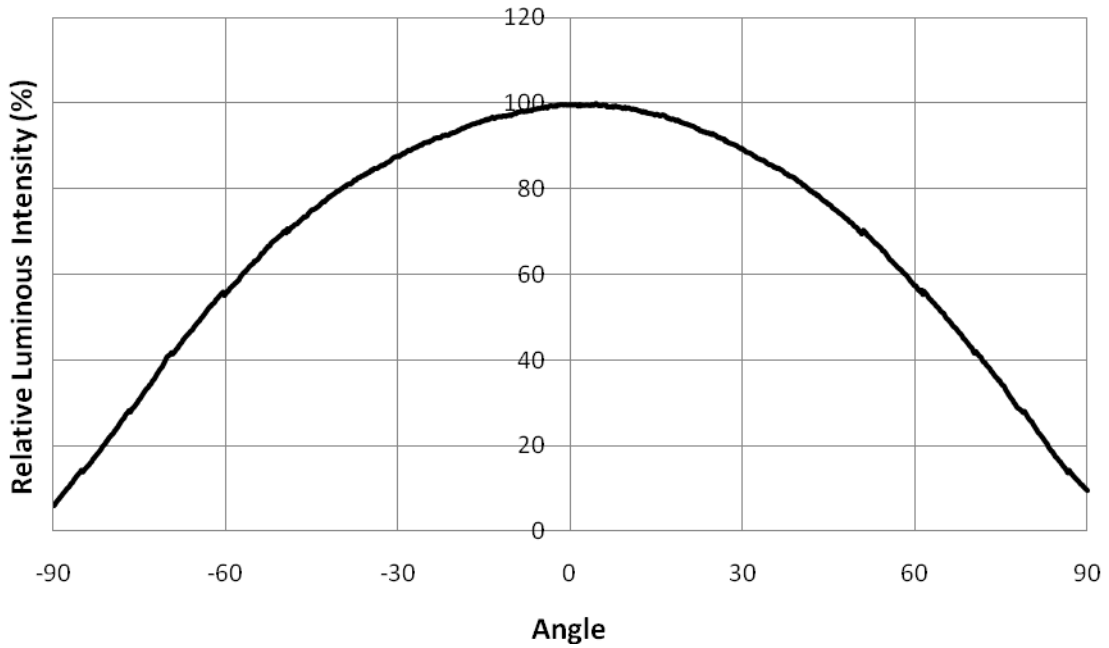
C35L-W-A Daylight



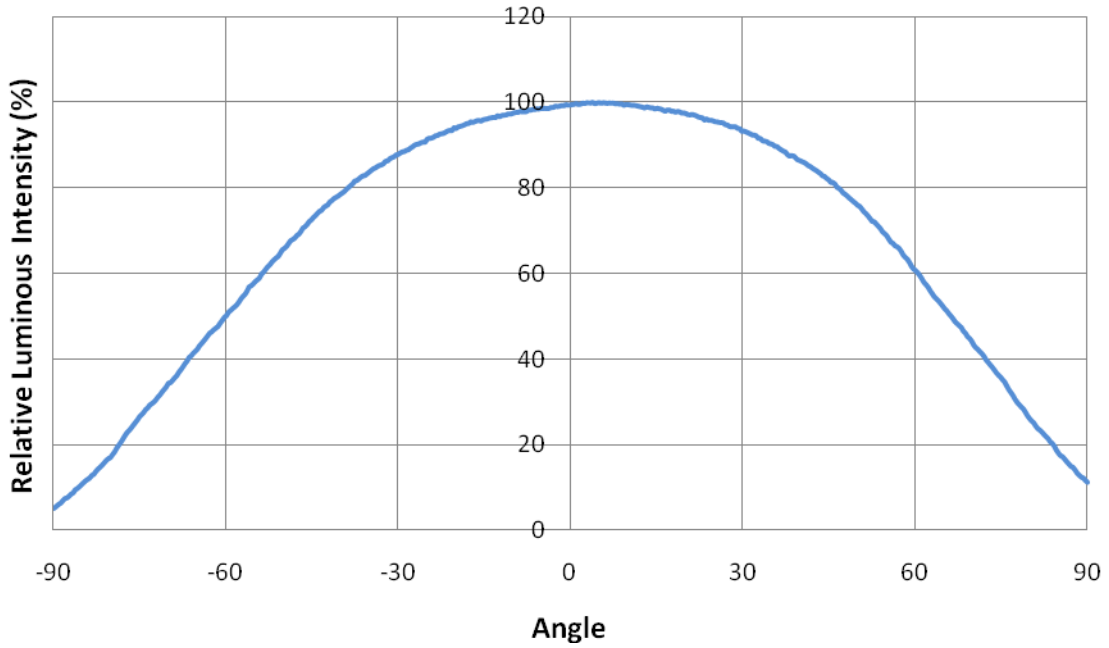
C35L-W-A Neutral White



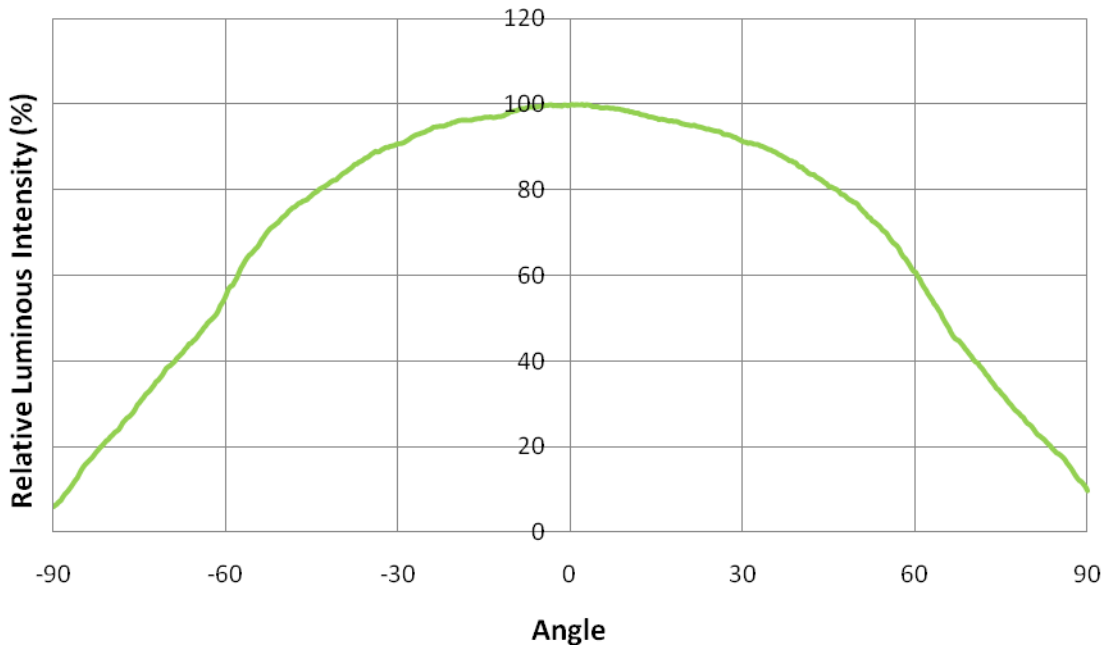
C35L-W-A Warm White



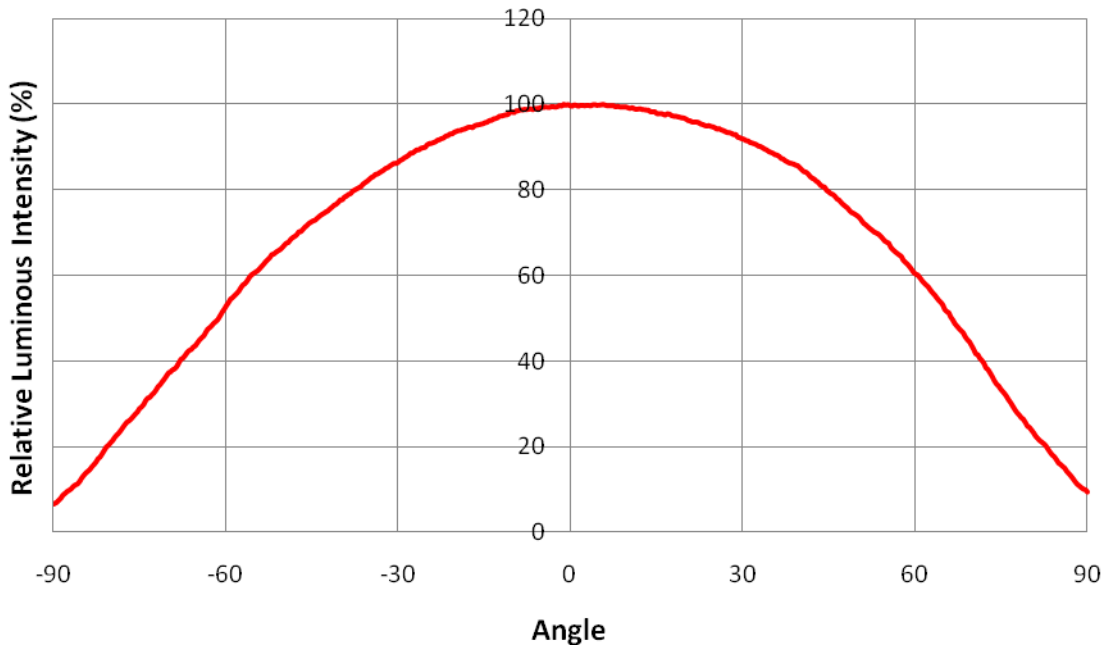
C35L-D-A, C35L-B-A



C35L-G-A, C35L-C-A



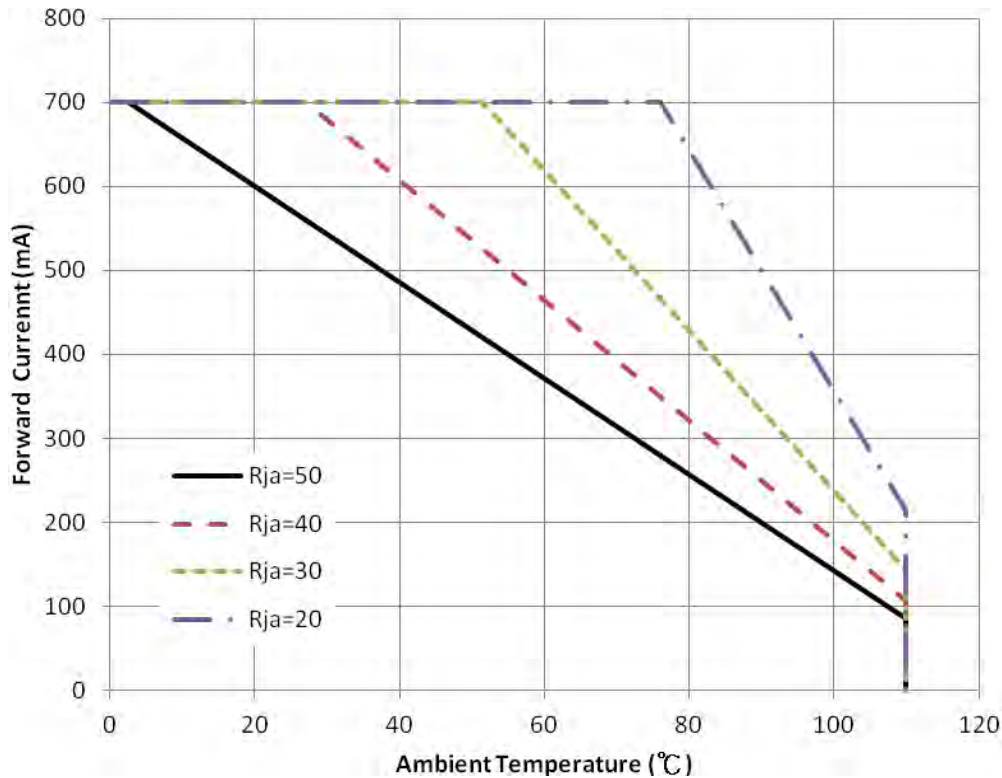
C35L-A, C35L-R





## Thermal Design

Thermal design of the end product is important. The thermal resistance between the junction and the solder point ( $R_{\Theta_{J-P}}$ ) is  $8^{\circ}\text{C}/\text{W}$ , 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

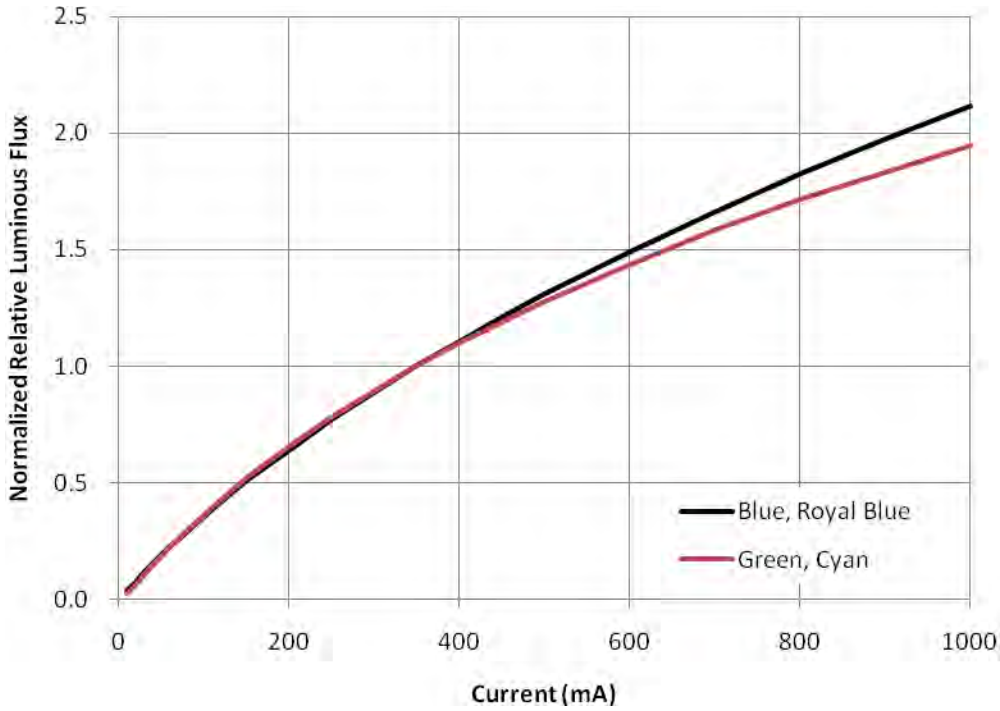
$T_a$ : Ambient temperature

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

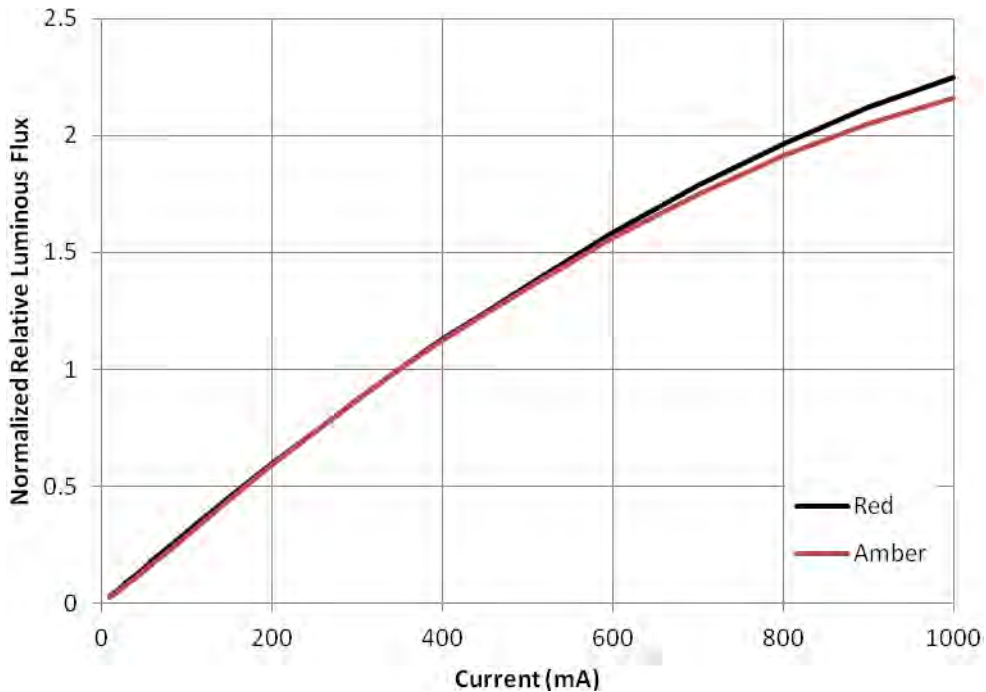
$W$ : Input power ( $I_F * V_F$ )

## Typical Forward L-I Characteristics

White Series / Blue / Royal Blue / Green / Cyan

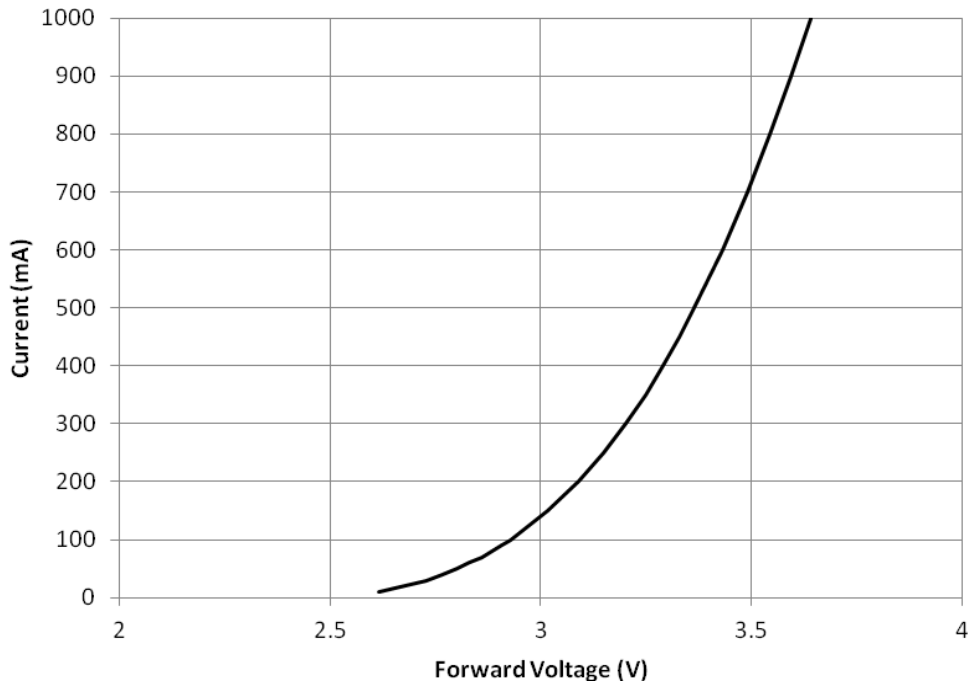


Amber / Red

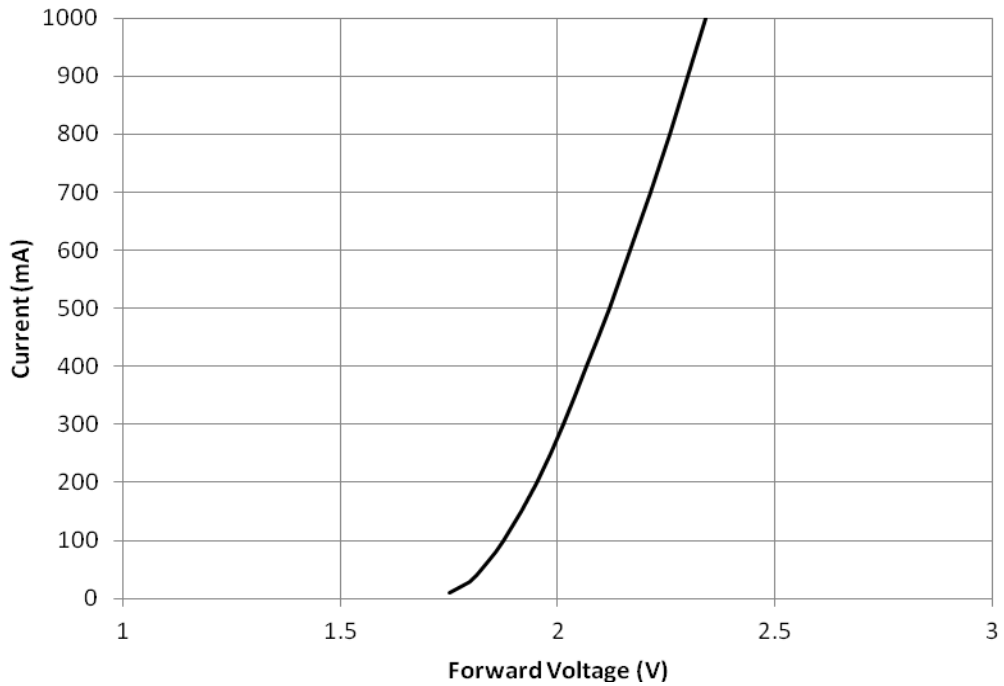


## Typical Forward I-V Characteristics

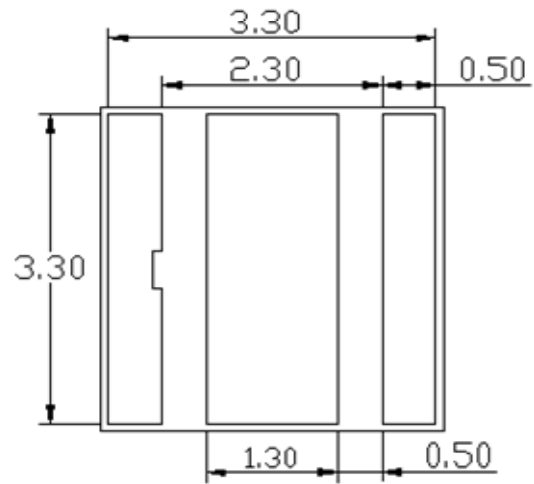
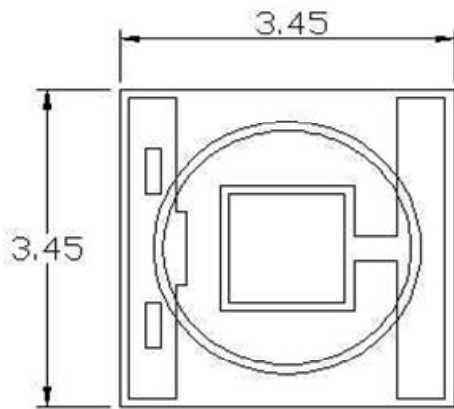
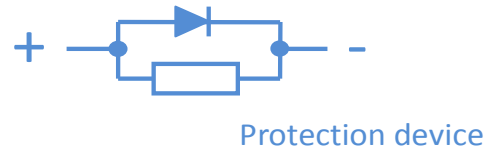
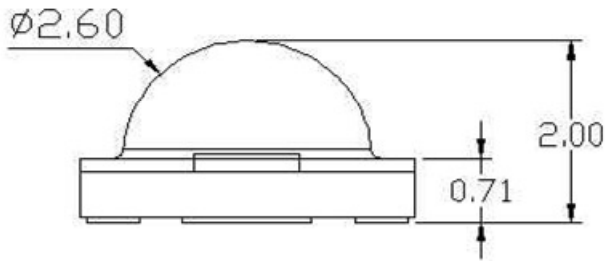
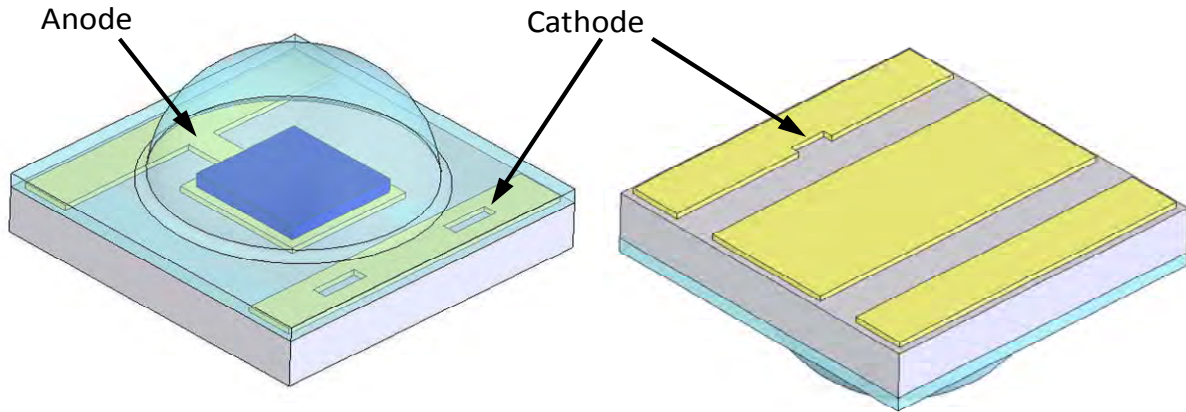
White Series / Blue / Royal Blue / Green / Cyan



Amber / Red



## Mechanical Dimensions

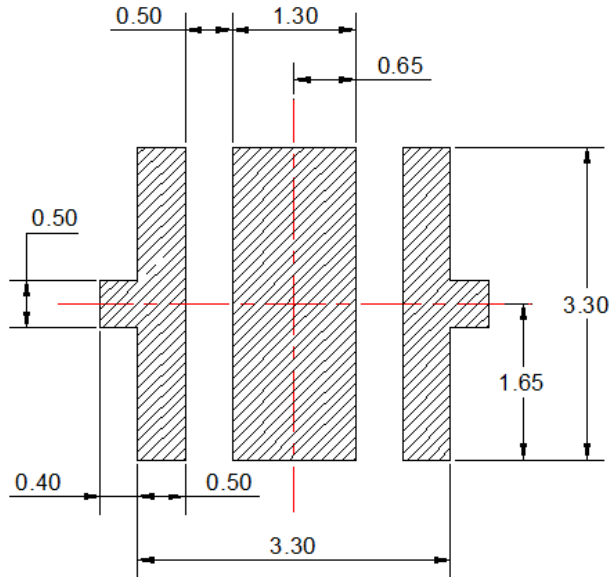


Notes :

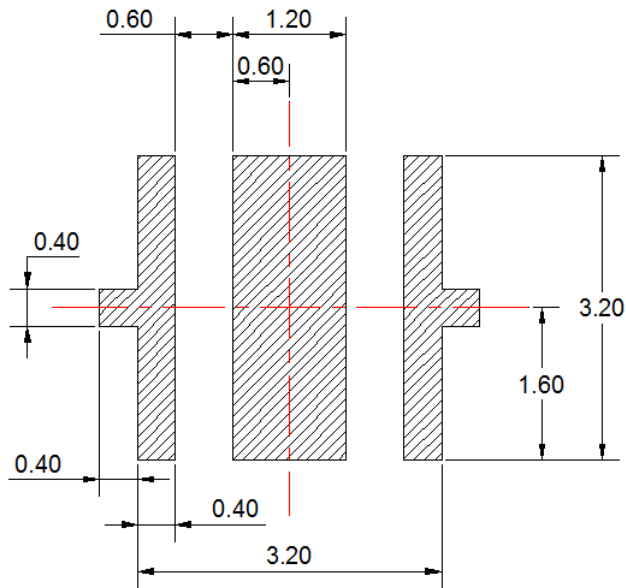
1. Drawing is not to scale
2. All dimensions are in millimeter
3. Dimensions are  $\pm 0.13\text{mm}$  unless otherwise indicated

## Recommended Solder Pad Design

### Recommended Soldering Pad Design



### Recommended Stencil Pattern Design (Mark Area is Opening)

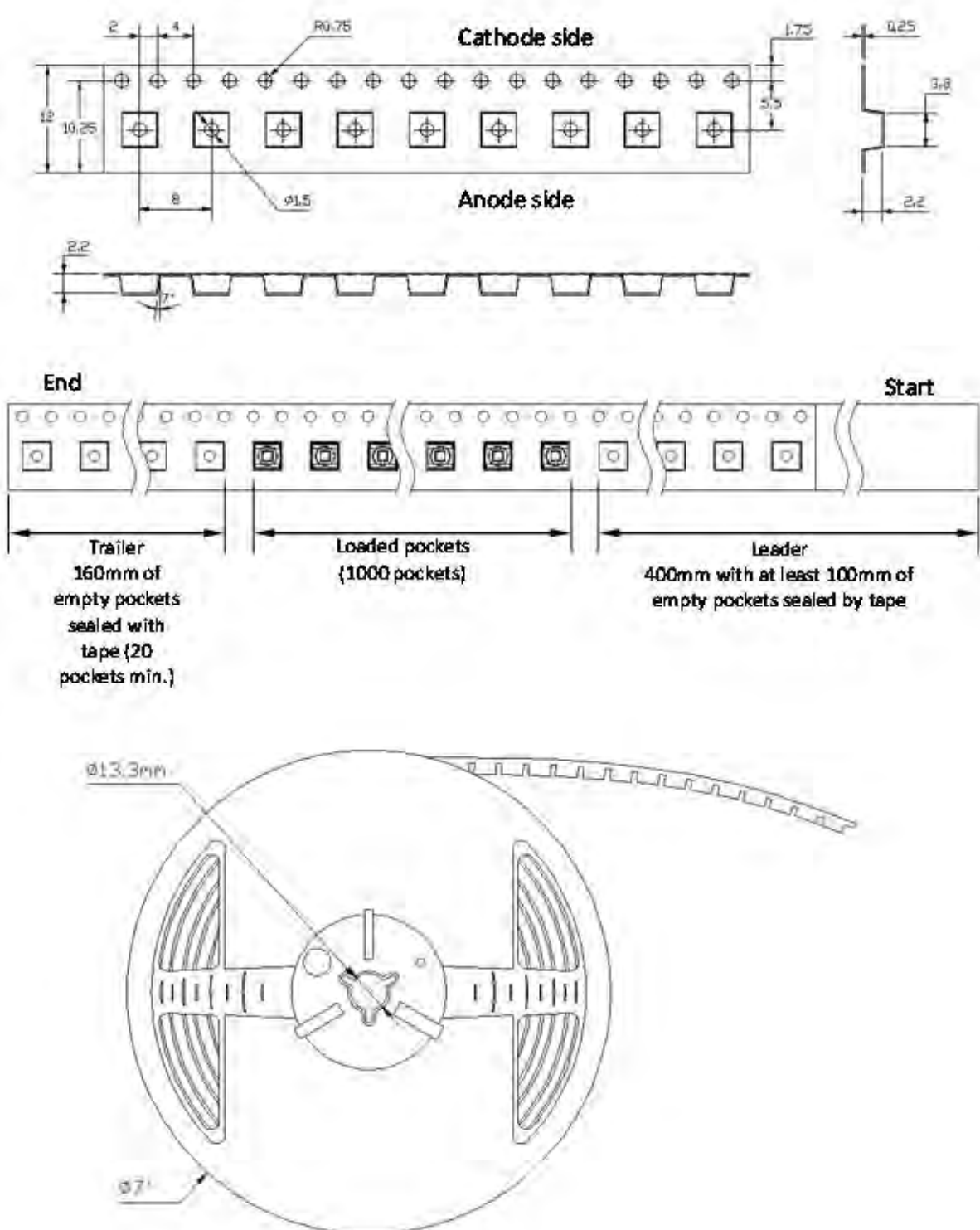


Notes :

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

## Packing Information

The carrier tape conform to EIA-481D.

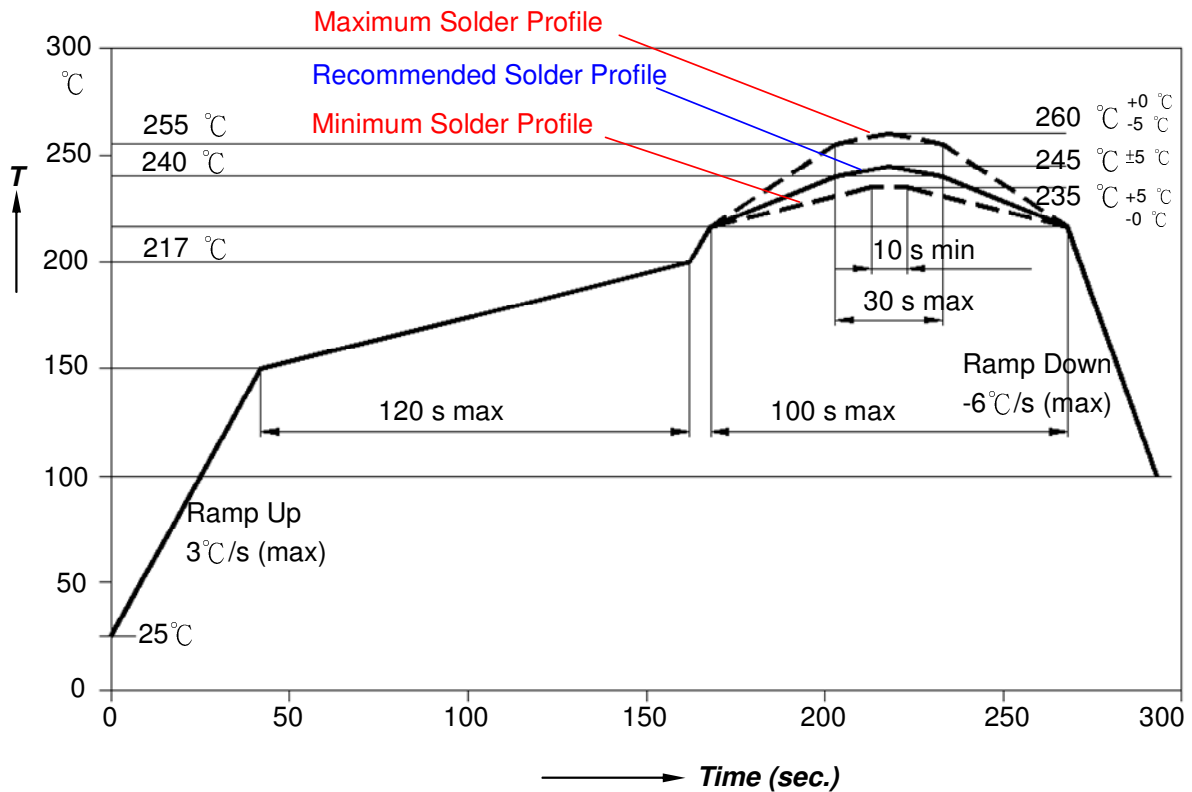


Note:

All dimensions are in millimetre.

## 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 advised for the LEDs.



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-up Rate (Ts <sub>max</sub> to Tp)	3°C/second max.	3°C/second max.
Preheat		
- Temperature Min(Ts <sub>min</sub> )	100°C	150°C
- Temperature Max(Ts <sub>max</sub> )	150°C	200°C
- Time(ts <sub>min</sub> to ts <sub>max</sub> )	60-120 seconds	60-180 seconds
Time maintained above:		
- Temperature(T <sub>L</sub> )	183°C	217°C
- Time(t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak/classification Temperature(Tp)	215°C	260°C
Time within 5°C of actual Peak Temperature(tp)	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)	260°C, 10 sec	

Failure Criteria:

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

Note:

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



## 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 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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