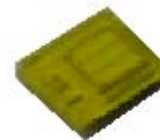
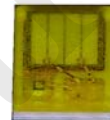


# T2016L-CNN1

## High Power LED

### Introduction

The T2016L-CNN1 LED from Semileds brings industry leading technology to the solid state lighting market with its high quality and performance. With a silicone lens, T2016L-CNN1 LEDs from Semileds feature very high brightness and efficacy, as well as excellent lifetime.



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**RoHS Compliant**

## Characteristics

### Absolute Maximum Ratings (T<sub>j</sub> = 25°C)

Parameter	Rating
	White Series
DC Forward Current (mA)	350mA
Peak Pulse Current (mA)	T2016L-CNN1-G0C11N 700mA (100ms ON, 900ms OFF)
	T2016L-CNN1-A1E11H, T2016L-CNN1-A1G11H, T2016L-CNN1-A1J11H 1500mA (100ms ON, 900ms OFF)
LED Junction Temperature	150°C
LED Operating Temperature	-40°C ~ 85°C
Storage Temperature	-40°C ~ 115°C
Soldering Temperature	Max. 260°C / Max. 10sec. (JEDEC 020c)
ESD Sensitivity	6,000 V HBM (MIL-STD-883G)
Reverse Voltage	Not designed to be driven in reverse bias (V <sub>R</sub> ≤ 5V)

### General Characteristics at 350mA

Part number	Color	Correlated Color Temperature, CCT		2θ <sub>1/2</sub>	Temperature Coefficient of V <sub>f</sub> (mV/°C)	Thermal Resistance Junction to Pad (°C/W)
		Min	Max		ΔV <sub>f</sub> / ΔT <sub>J</sub>	R <sub>θ<sub>J-L</sub></sub>
T2016L-CNN1 -G0C11N	Cool white	5000	8000	140	-2~-4	13

### General Characteristics at 500mA

Part number	Color	Correlated Color Temperature, CCT		2θ <sub>1/2</sub>	Temperature Coefficient of V <sub>f</sub> (mV/°C)	Thermal Resistance Junction to Pad (°C/W)
		Min	Max		ΔV <sub>f</sub> / ΔT <sub>J</sub>	R <sub>θ<sub>J-L</sub></sub>
T2016L-CNN1 -A1E11H	Cool white	5000	8000	140	-2~-4	10

**General Characteristics at 1000mA**

Part number	Color	Correlated Color Temperature, CCT		$2\theta_{1/2}$	Temperature Coefficient of Vf (mV/°C)	Thermal Resistance Junction to Pad (°C/W)
		Min	Max		$\Delta V_f / \Delta T_J$	$R_{\theta_{J-L}}$
T2016L-CNN1 -A1G11H, T2016L-CNN1 -A1J11H	Cool white	5000	8000	140	-2~-4	6

**Luminous Flux and Forward Voltage (Tj = 25°C)**

Part number	Color	Performance at Test Current (350mA)			
		Group	Minimum Luminous Flux (lm)	VF	
				Min	Max
T2016L-CNN1 -G0C11N (350mA)	Cool White	NND	62.0	3.2	4.2
		NPB	67.2	3.2	4.2
		NPC	73.9	3.2	4.2
		NPD	80.6	3.2	4.2
		NQB	87.4	3.2	4.2

- Note: 1. Luminous Flux is measured with an accuracy of  $\pm 10\%$   
 2. The forward voltage is measured with an accuracy of  $\pm 0.2V$

**Luminous Flux and Forward Voltage (Tj = 25°C)**

Part number	Color	Performance at Test Current (500mA)			
		Group	Minimum Luminous Flux (lm)	VF	
				Min	Max
T2016L-CNN1 -A1E11H (500mA)	Cool White	NQB	87.5	2.8	3.8
		NQC	93.9	2.8	3.8
		NQD	100	2.8	3.8
		NQE	107	2.8	3.8
		NRB	114	2.8	3.8

- Note: 1. Luminous Flux is measured with an accuracy of  $\pm 10\%$   
 2. The forward voltage is measured with an accuracy of  $\pm 0.2V$

**Luminous Flux and Forward Voltage (T<sub>j</sub> = 25°C)**

Part number	Color	Performance at Test Current (1000mA)			
		Group	Minimum Luminous Flux (lm)	VF	
				Min	Max
T2016L-CNN1 -A1G11H (1000mA)	Cool White	ND1	180	3.0	4.2
		ND2	200	3.0	4.2
		ND3	220	3.0	4.2
		ND4	240	3.0	4.2

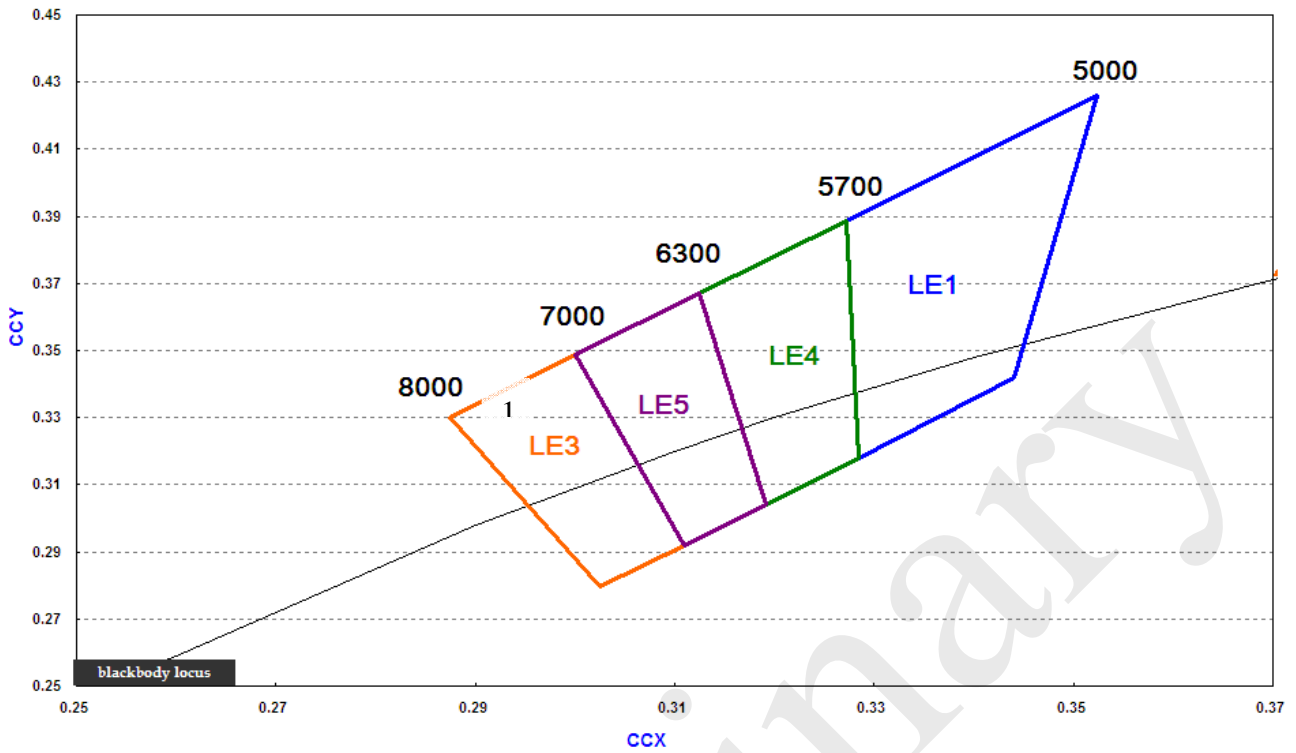
- Note: 1. Luminous Flux is measured with an accuracy of  $\pm 10\%$   
 2. The forward voltage is measured with an accuracy of  $\pm 0.2V$

**Luminous Flux and Forward Voltage (T<sub>j</sub> = 25°C)**

Part number	Color	Performance at Test Current (1000mA)			
		Group	Minimum Luminous Flux (lm)	VF	
				Min	Max
T2016L-CNN1 -A1J11H (1000mA)	Cool White	ND2	220	3.0	4.2
		ND3	240	3.0	4.2
		ND4	260	3.0	4.2
		ND5	280	3.0	4.2

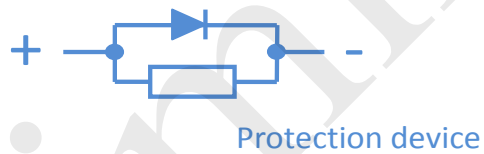
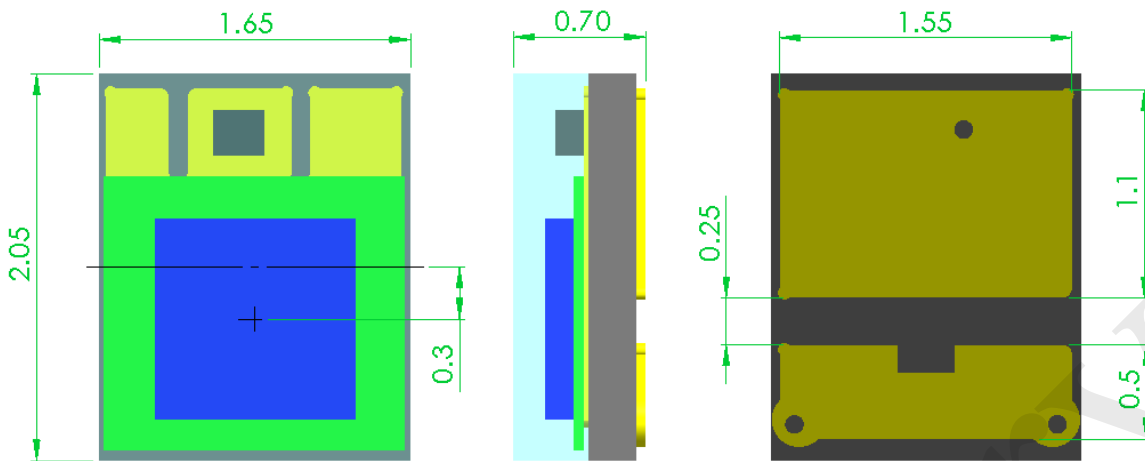
- Note: 1. Luminous Flux is measured with an accuracy of  $\pm 10\%$   
 2. The forward voltage is measured with an accuracy of  $\pm 0.2V$

### CCT Binning



Bin Code	CIE x	CIE y	CCT Range	Bin Code	CIE x	CIE y	CCT Range
LE1	0.3272	0.3888	5000-5700K	LE5	0.3000	0.3486	6300-7000K
	0.3524	0.4261			0.3124	0.3669	
	0.3440	0.3420			0.3192	0.3041	
	0.3285	0.3178			0.3110	0.2920	
LE4	0.3124	0.3669	5700-6300K	LE3	0.2875	0.3301	7000-8000K
	0.3272	0.3888			0.3000	0.3486	
	0.3285	0.3178			0.3110	0.2920	
	0.3192	0.3041			0.3025	0.2795	

## Mechanical Dimensions

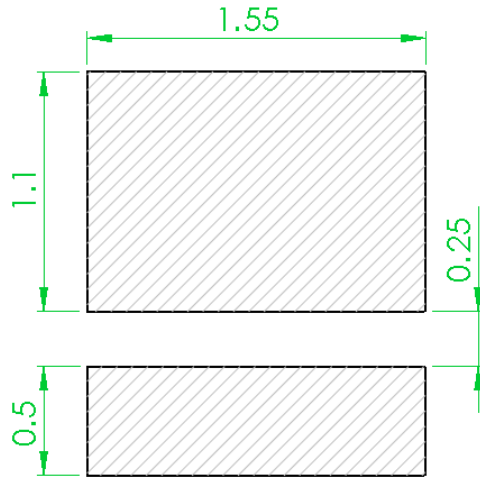


Notes :

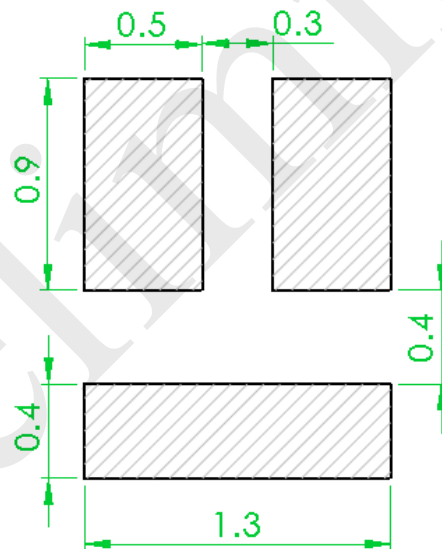
1. Drawing is not to scale
2. All dimensions are in millimeter
3. Dimensions are  $\pm 0.13\text{mm}$  unless otherwise indicated

## Recommended Solder Pad Design

### Recommended Soldering Pad Design



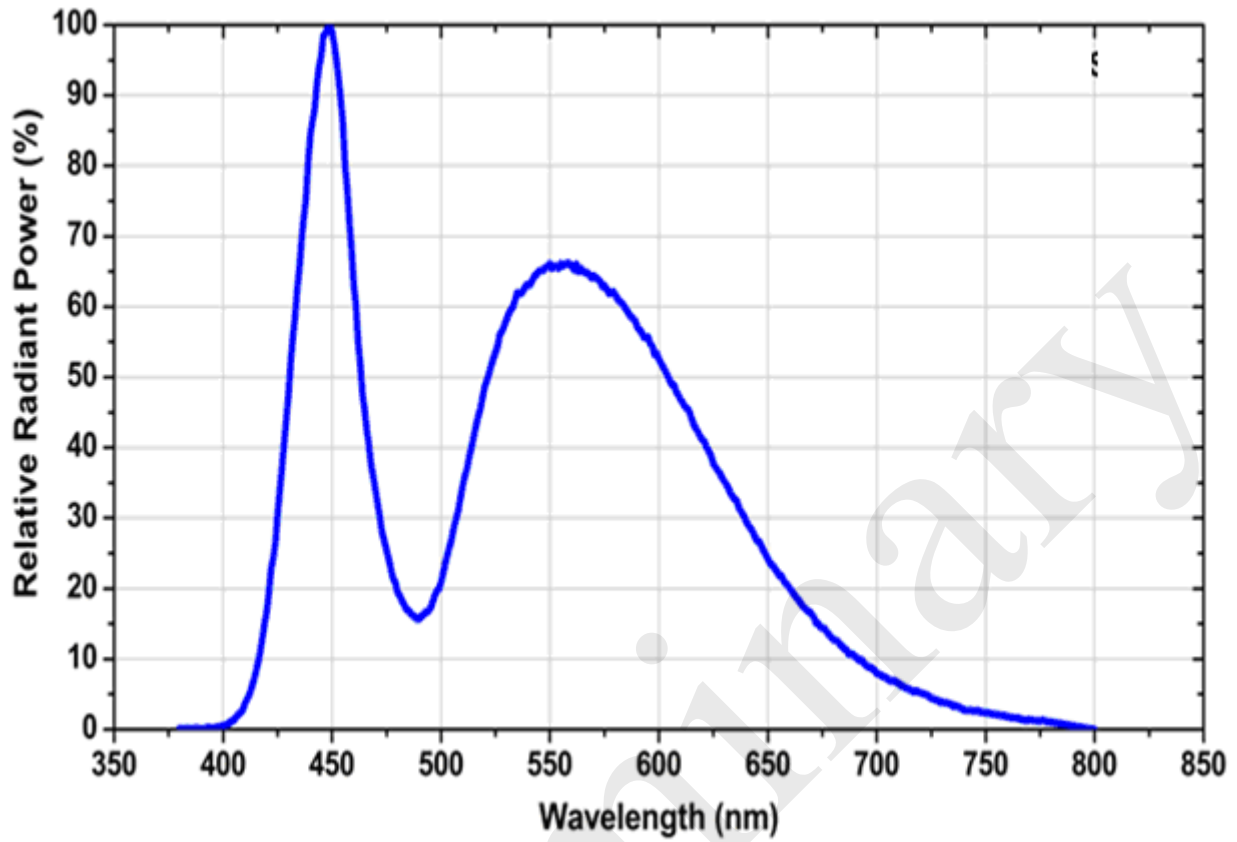
### Recommended Stencil Pattern Design (Marked Area is Opening)



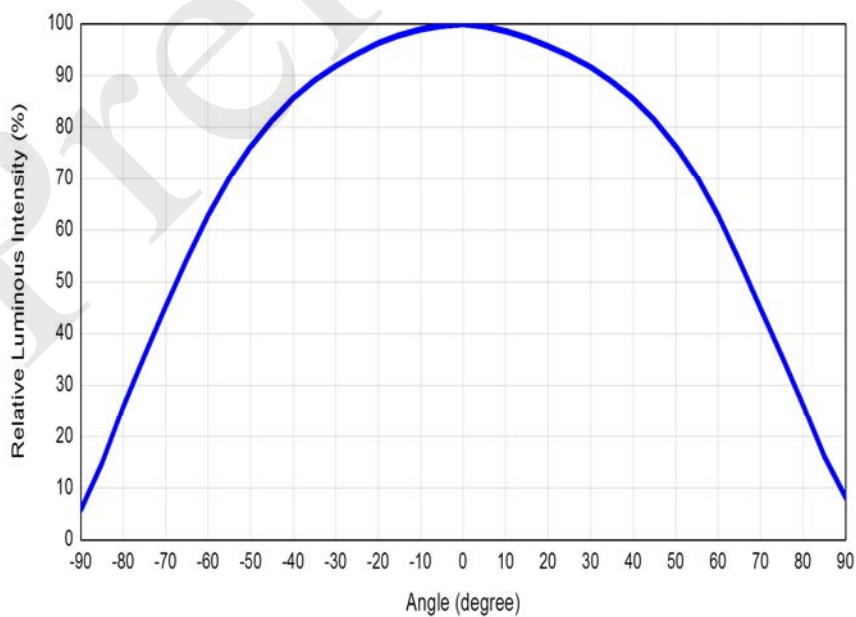
Notes :

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

### Relative Spectral Power Distribution, $T_j=25^\circ\text{C}$



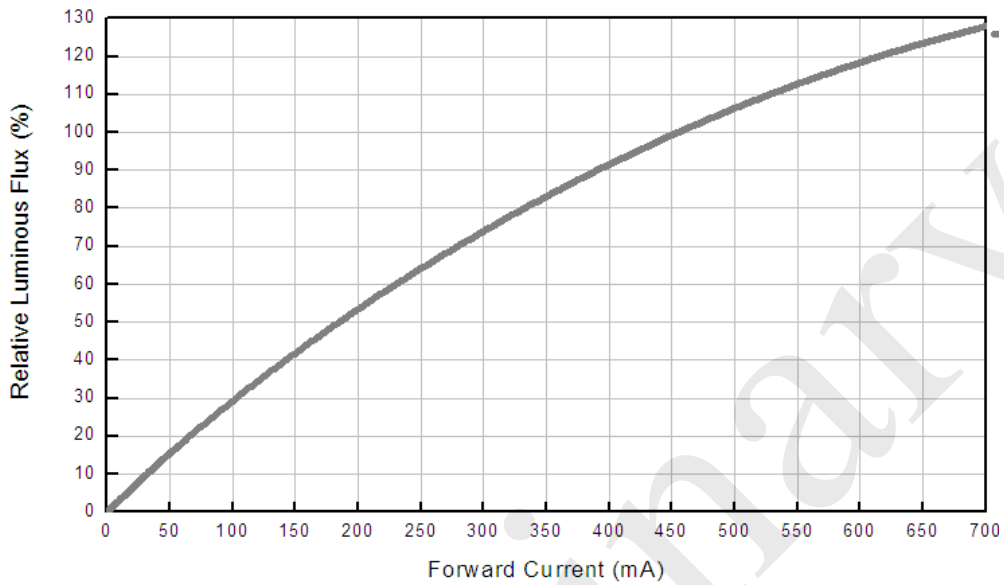
### Typical Spatial Radiation Pattern



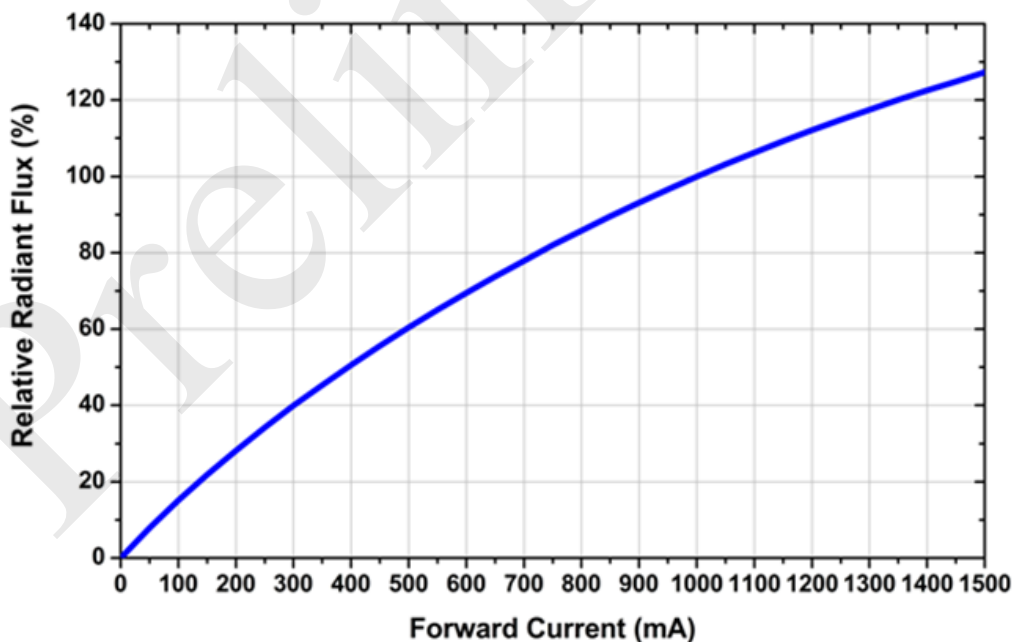


## Typical Forward L-I Characteristics, T<sub>j</sub>=25°C

### T2016L-CNN1-G0C11N

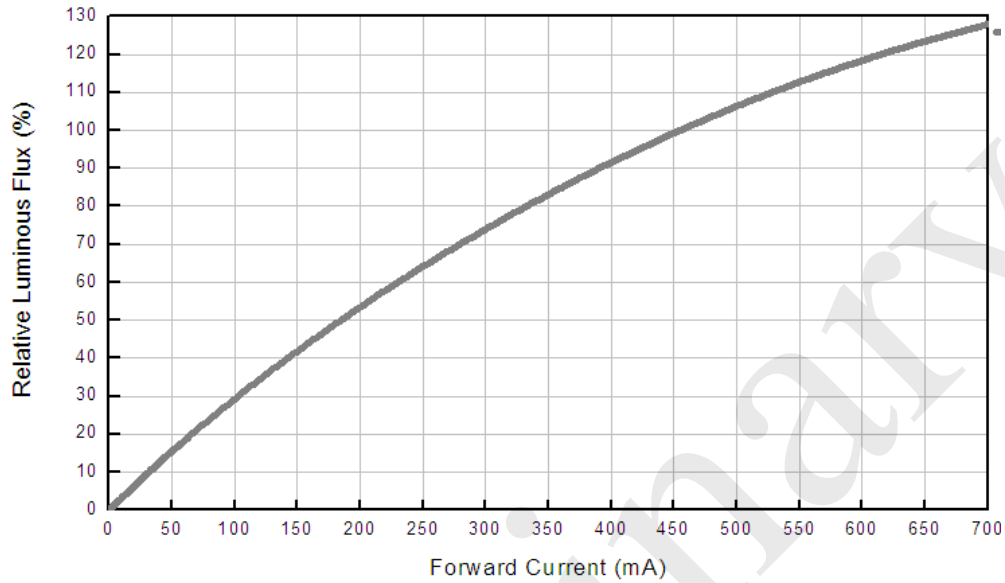


### T2016L-CNN1-A1E11H, T2016L-CNN1-A1G11H, T2016L-CNN1-A1J11H

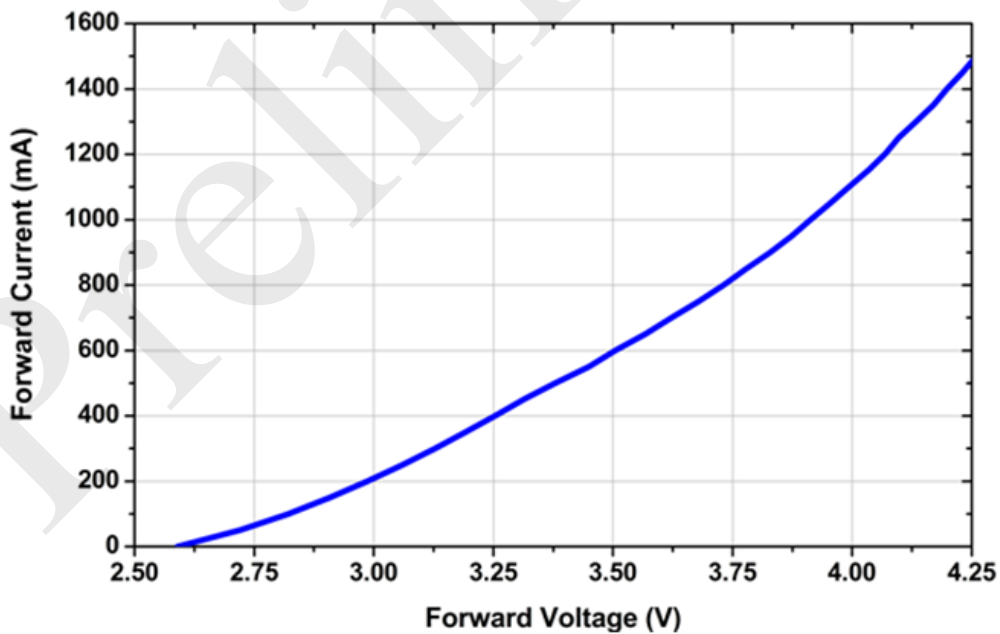


## Typical Forward I-V Characteristics, T<sub>j</sub>=25°C

### T2016L-CNN1-G0C11N

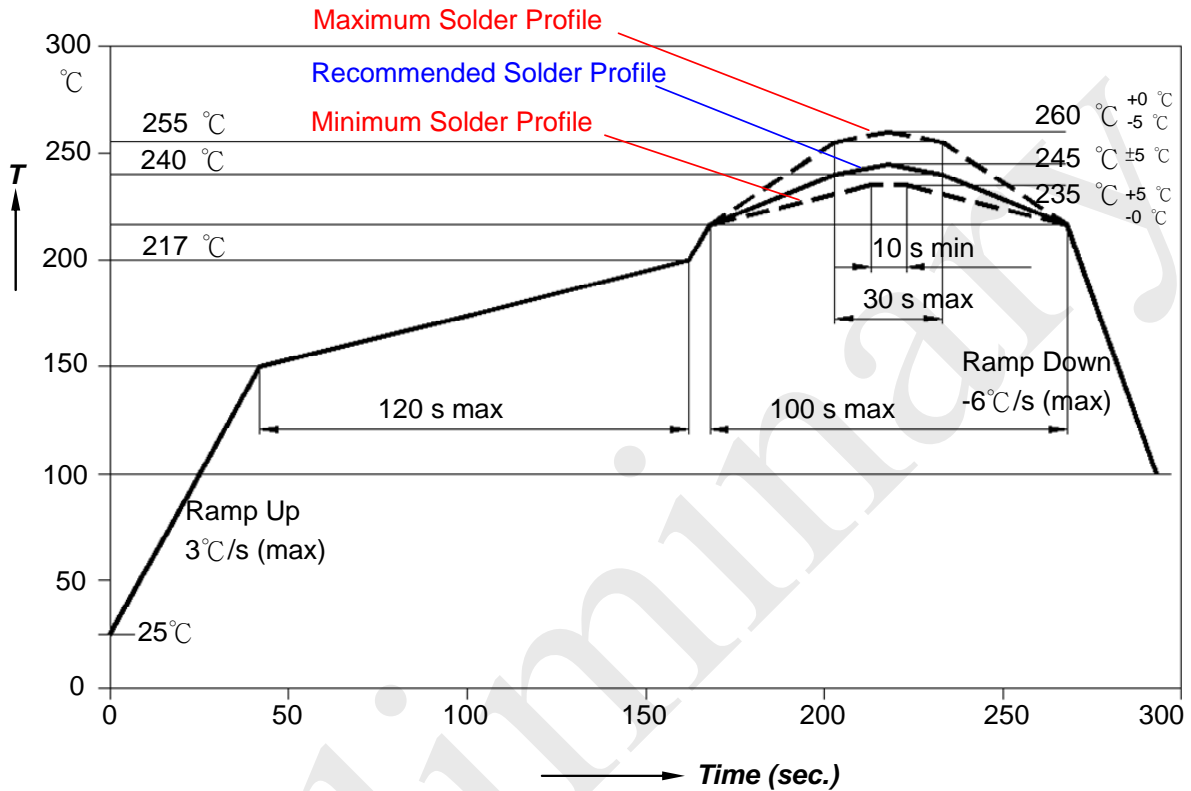


### T2016L-CNN1-A1E11H, T2016L-CNN1-A1G11H, T2016L-CNN1-A1J11H



## Recommended Soldering Profile

The LEDs can be soldered using the parameters 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.

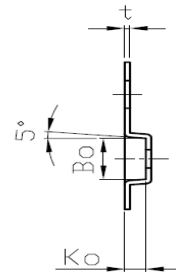
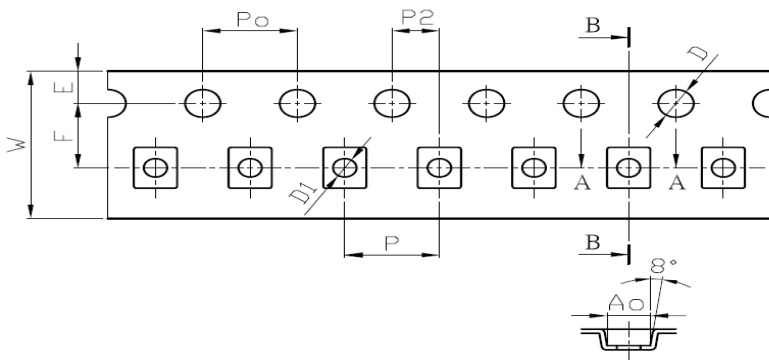


Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-up Rate (T <sub>Smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
- Temperature Min(T <sub>Smin</sub> )	100°C	150°C
- Temperature Max(T <sub>Smax</sub> )	150°C	200°C
- Time(t <sub>Smin</sub> to t <sub>Smax</sub> )	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(T <sub>p</sub> )	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.

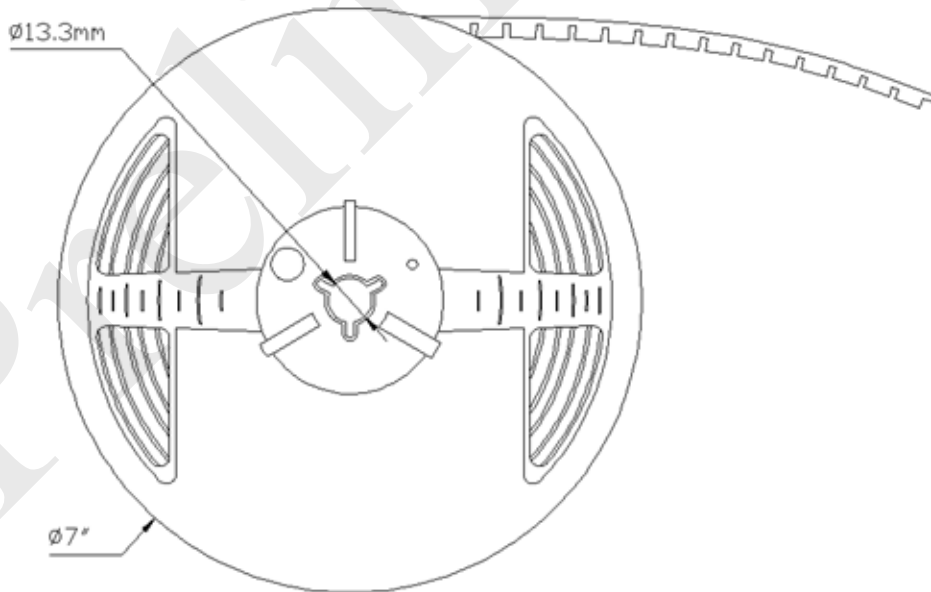
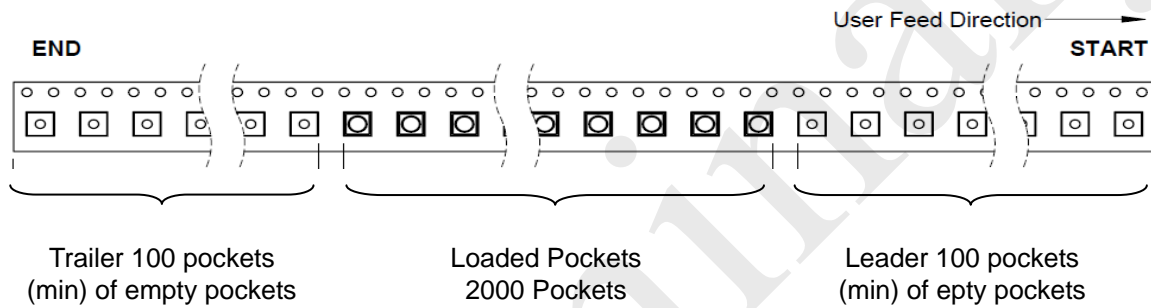
## Reliability Test Plan

No	Items	Test Conditions	Test Hours / Cycles	Sample No.	Ac/Re
1	Room Temperature Operating Life (RTOL)	Temp. 25°C, If : 350mA	168Hrs	20PCS	0/1
2	High Temperature Operating Life (HTOL)	Temp. 60°C, If : 350mA	168Hrs	20PCS	0/1
3	Wet High Temperature operation Life (WHTOL)	60°C/90%RH, If : 350mA	168Hrs	20PCS	0/1
4	Temperature Cycle	H : +125°C 15min ~ 5min L : -40°C 15min	200 Cycle	20PCS	0/1
5	Low Temp. Storage	-40°C	168Hrs	20PCS	0/1
6	High Temp. Storage	100°C	168Hrs	20PCS	0/1
7	Moisture Sensitivity Level 1 (MSL)	125°C => 24hrs 85°C/85% => 168hrs 3 times reflow	3 times	20PCS	0/1
8	Pulsed Operating	If : 1500mA ; 100ms ON, 900ms OFF (10% Duty)	50K Cycle	20PCS	0/1

### Packing Information



Symbol	Spec.	Tolerance
W	8.00	±0.10
P	4.00	±0.10
E	1.75	±0.10
F	3.50	±0.05
P2	2.00	±0.05
D	1.50	+0.01 / -0.00
D1	1.00	±0.10
Po	4.00	±0.10
10Po	40.00	±0.20
Ao	1.88	±0.10
Bo	2.23	±0.10
Ko	0.90	±0.10
t	0.23	±0.05



Note:  
All dimensions are in millimeter.

## 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).



[www.semileds.com](http://www.semileds.com)

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