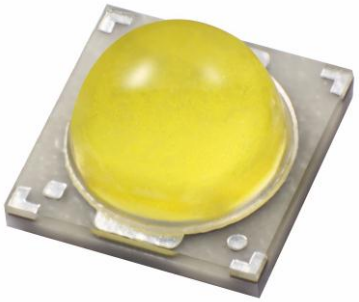
TS3 Emitter Data Sheet



Product Highlight

The TSMC Solid State Lighting Ltd. ("TSMC SSL") TS3 emitter is a high performance white light LED that offers the following features:

- **High Junction Temperature**
- **Low Thermal Resistance**
- **Long Floor Life**
- **Industry Standard ANSI Color Binning**

TS3 emitter is suitable for general lighting products in applications such as outdoor lighting.

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Flux Characteristics (T_a = 25°C)

The table shows basic flux characteristics for TSMC SSL TS3 emitters:

Table of Flux Characteristics

Nominal CCT	Defined Color	CRI [1]	Bin Group [2]	Minimum Luminous Flux at 350 mA		Minimum Luminous Flux at 700 mA [4]	
				Ts = 25 °C	Ts = 85 °C [3]	Ts = 25 °C	Ts = 85 °C [3]
6500 K & 5700 K	Cool White	70 min.	G6	139 lm	122 lm	253 lm	218 lm
			G5	130 lm	114 lm	237 lm	204 lm
			G4	122 lm	107 lm	222 lm	191 lm
5000 K	Cool White	70 min.	G6	139 lm	122 lm	253 lm	218 lm
			G5	130 lm	114 lm	237 lm	204 lm
			G4	122 lm	107 lm	222 lm	191 lm
4000 K	Neutral White	70 min.	G6	139 lm	122 lm	253 lm	218 lm
			G5	130 lm	114 lm	237 lm	204 lm
			G4	122 lm	107 lm	222 lm	191 lm
			G3	114 lm	100 lm	207 lm	178 lm
3000 K	Warm White	80 min	G4	122 lm	107 lm	222 lm	191 lm
			G3	114 lm	100 lm	207 lm	178 lm
			G2	107 lm	94 lm	194 lm	166 lm

Notes:

[1] CRI tolerance is ±2

[2] Refer to Binning, Labeling & Order Information

[3] Flux values @ 85°C are calculated for reference only.

[4] 700mA flux values are calculated for reference only.

TSMC SSL measures flux characteristics under Ambient Temperature (Ta) and defines TS3 emitters into all Correlated Color Temperature (CCT) region categories; each CCT region can be separated into several flux bin groups listed in this chart.

Characteristic Ratings (T_a = 25°C)

The table below shows related characteristic rating for TSMC SSL TS3 emitters.

Table of Characteristic Rating

Characteristics	Typical
DC Forward Voltage (V_F) @ 350 mA	3.1 V
Thermal Resistance, Junction to Solder Pad	5° C/W
View Angle (FWHM)- White	130°
DC Forward Current* (I_F)	Maximum 1100 mA
ESD Classification (HBM per Mil-Std-883D)	Maximum 8 KV
Junction Temperature (T_j)	Maximum 150 °C

Notes:

* Refer to Chart (9) Maximum Current vs. Solder Pad Temperature

Ratings in this chart have been derived from careful testing, and are believed to be reliable and accurate ratings for a typical TSMC SSL TS3 emitter. This characteristic rating is measured under ambient temperature.

Relative Power/ Spectral Distribution (T_a = 25°C)

The following charts show typical relative performance of TSMC SSL TS3 emitters.

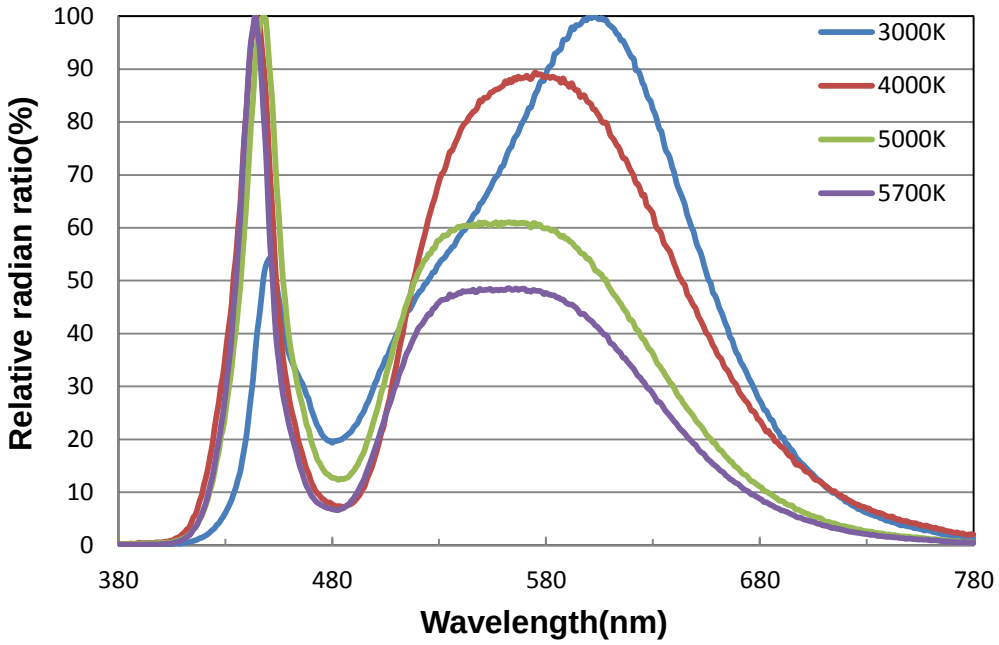


Chart (1) Relative Radiant Power vs. Wavelength

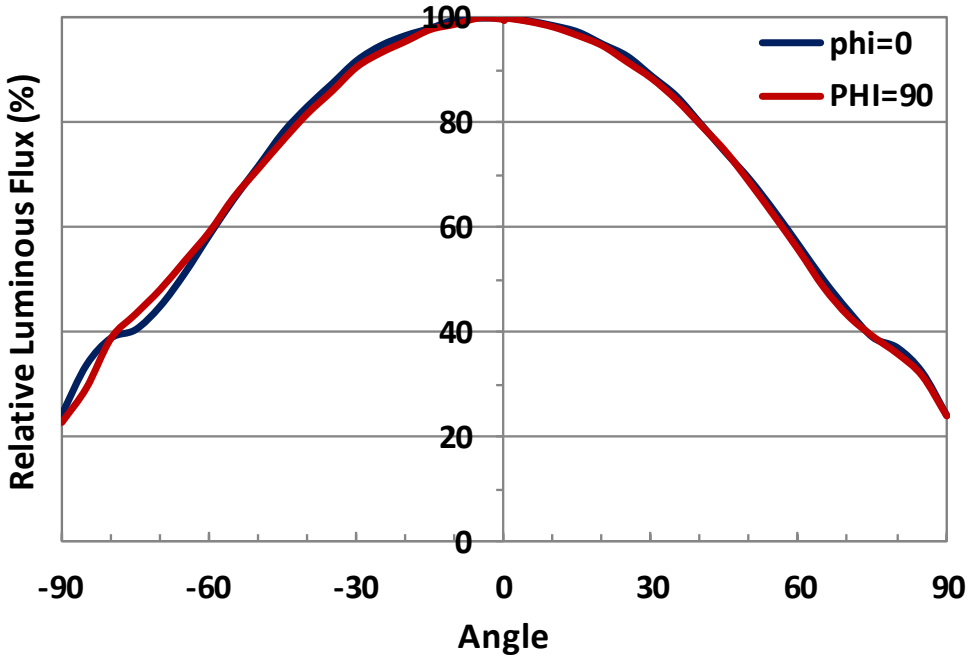


Chart (2) Relative Luminous Flux vs. Angle

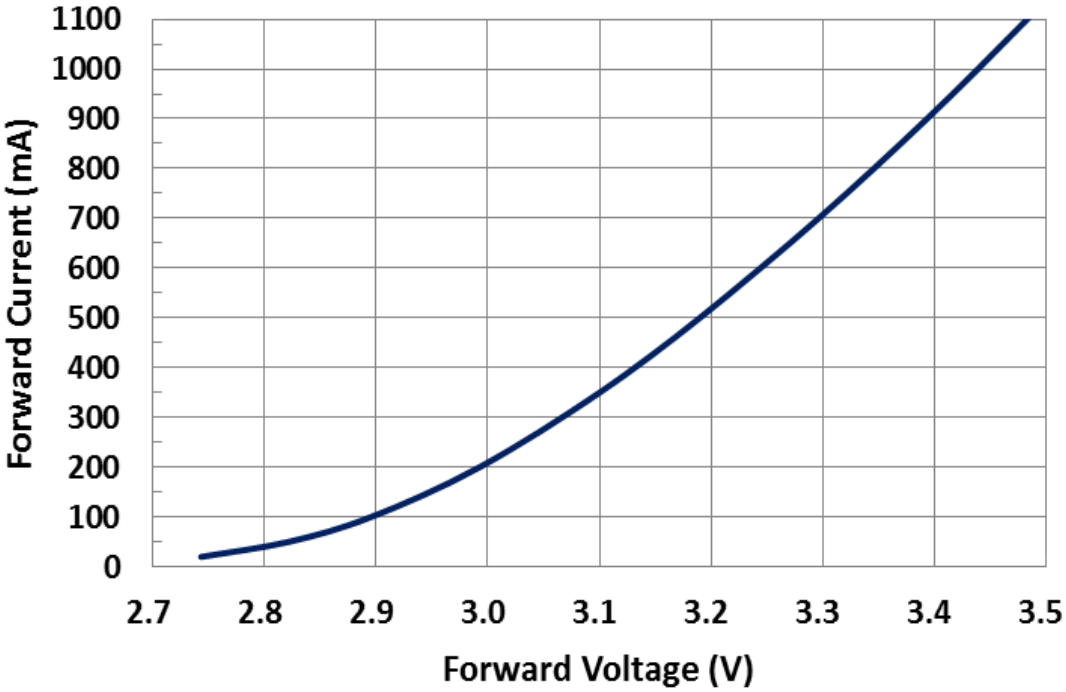


Chart (3) Forward Current vs. Forward Voltage

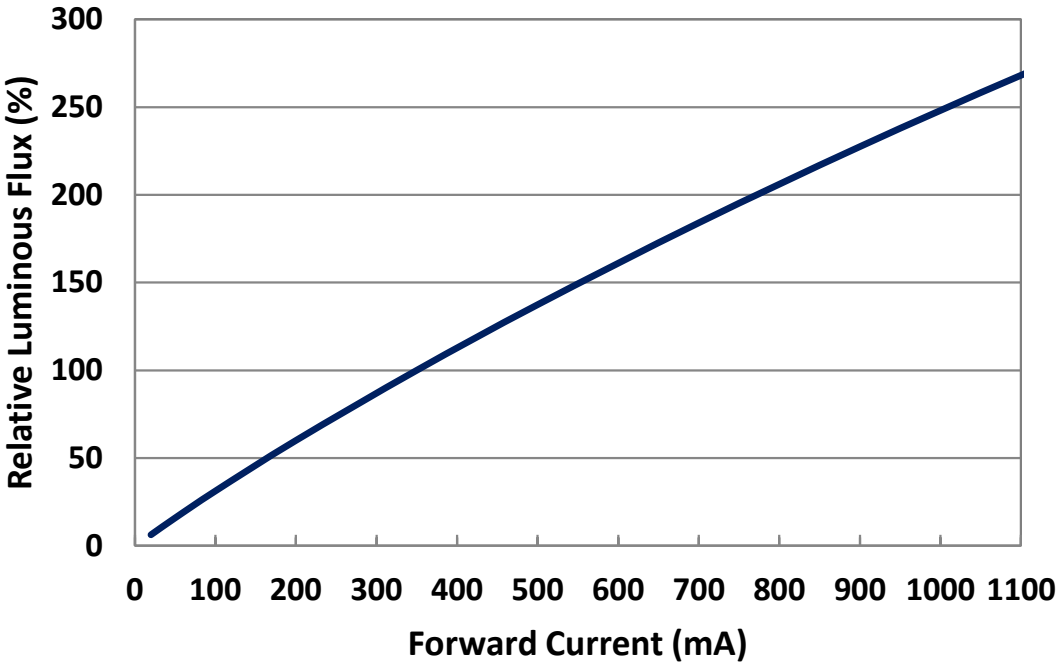


Chart (4) Relative Luminous Flux vs. Forward Current

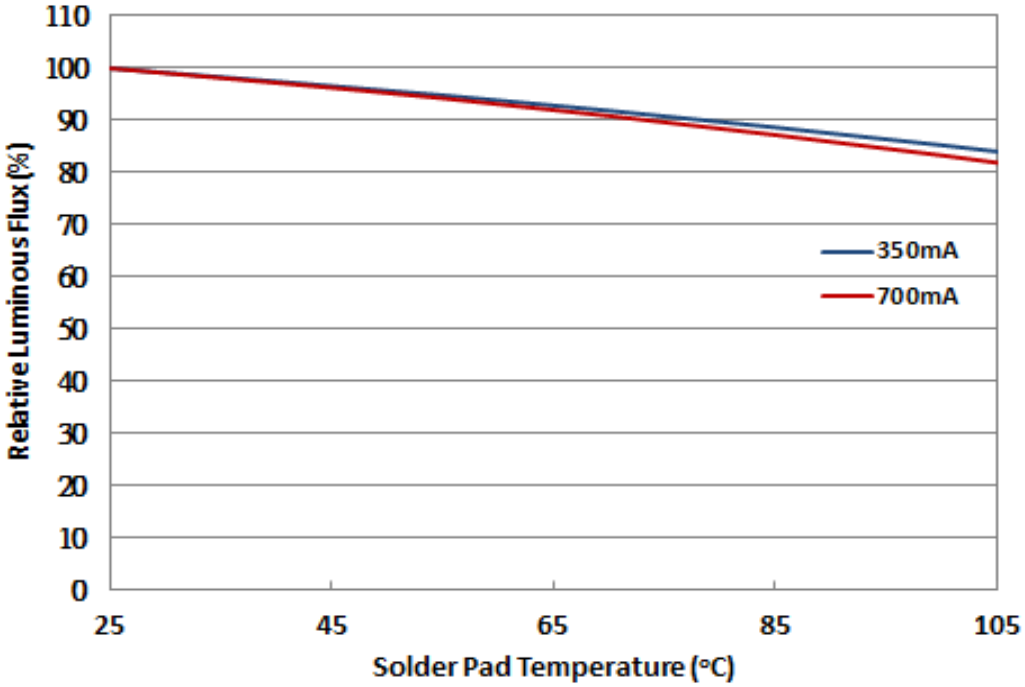


Chart (5) Relative Luminous Flux vs. Solder Pad Temperature

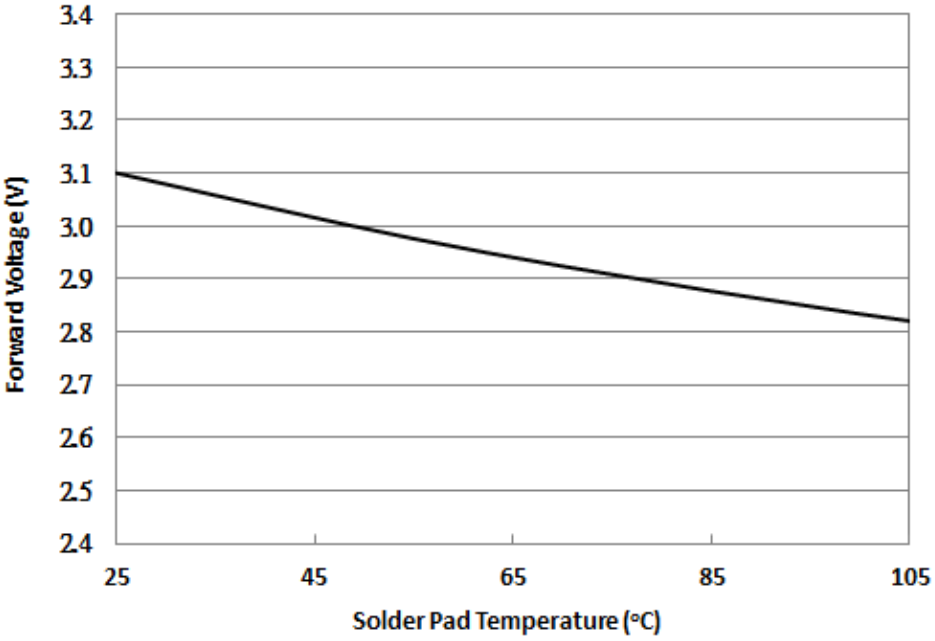


Chart (6) Forward Voltage vs. Solder Pad Temperature

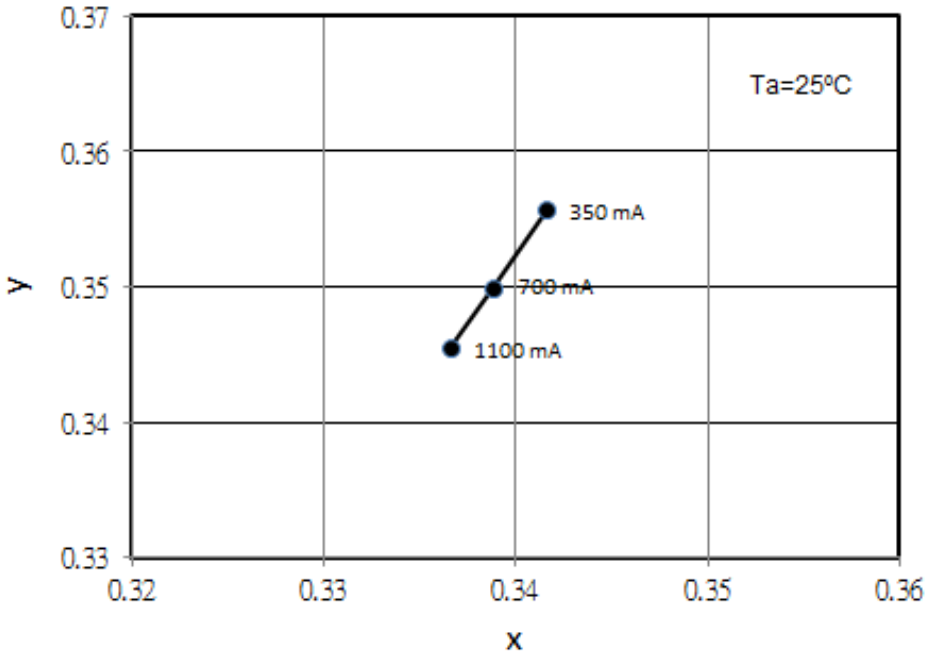


Chart (7) Forward Current vs. Chromaticity Coordinate

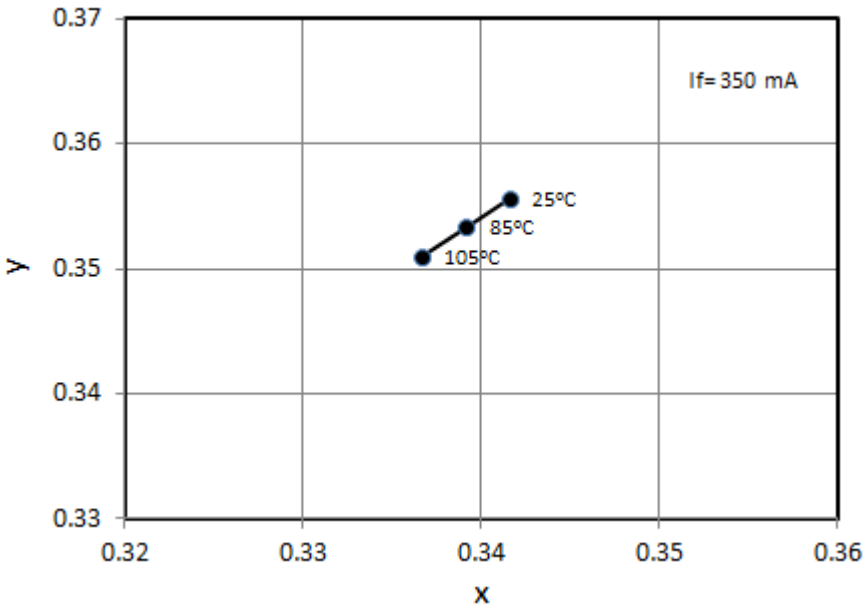


Chart (8) Solder Pad Temperature vs. Chromaticity Coordinate

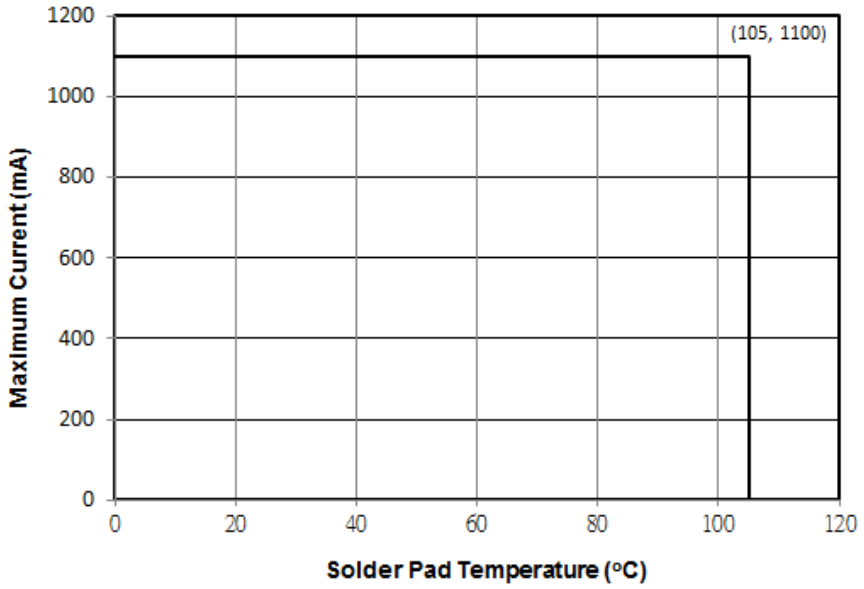


Chart (9) Maximum Current vs. Solder Pad Temperature

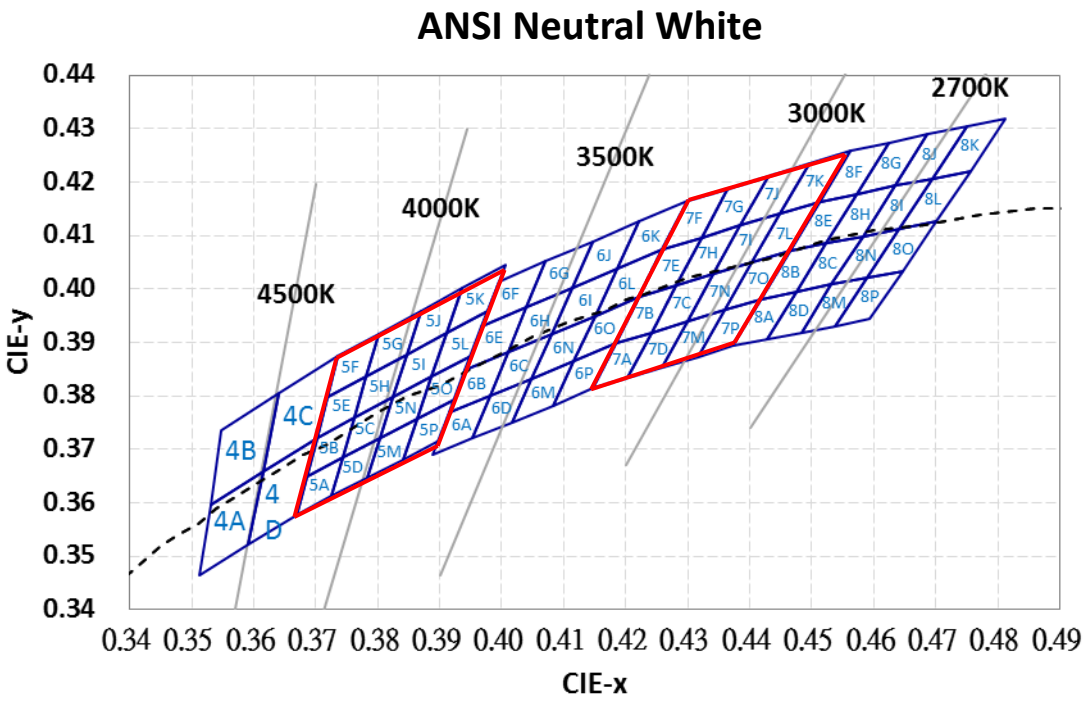
Notes:

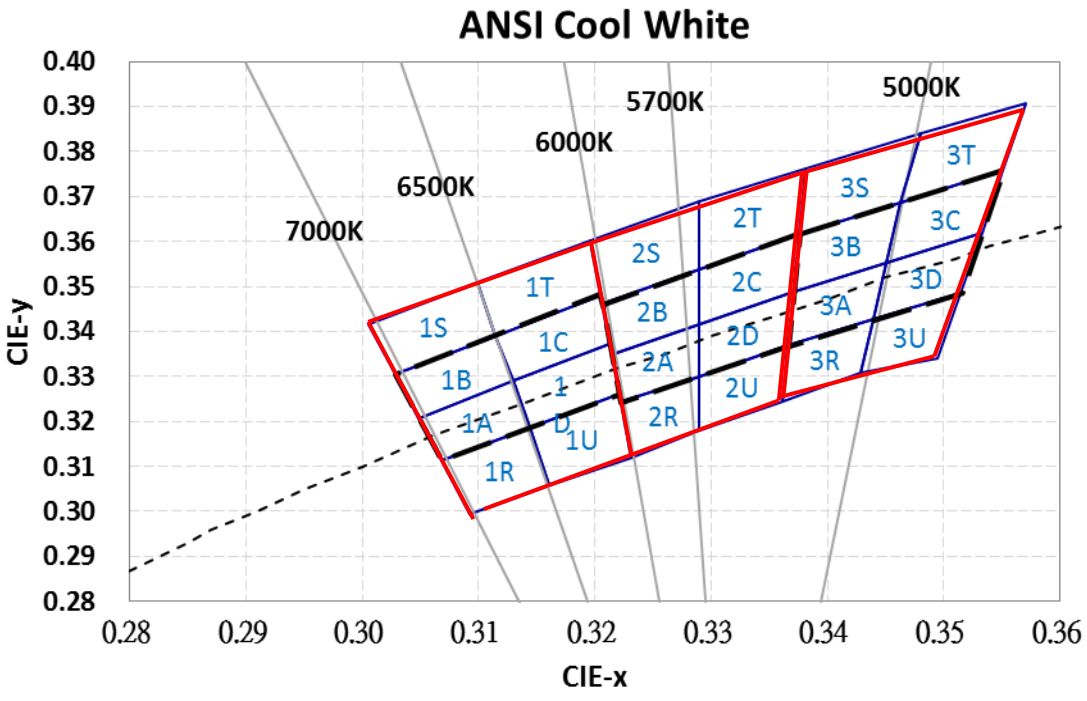
All data in these charts may vary within CCT ranges as shown in the Table of Flux Characteristics. These charts showing Relative Power/ Spectral Distribution are measured either under ambient temperature or Forward Current (I_F) at 350mA.

Product Binning (T_a = 25°C)

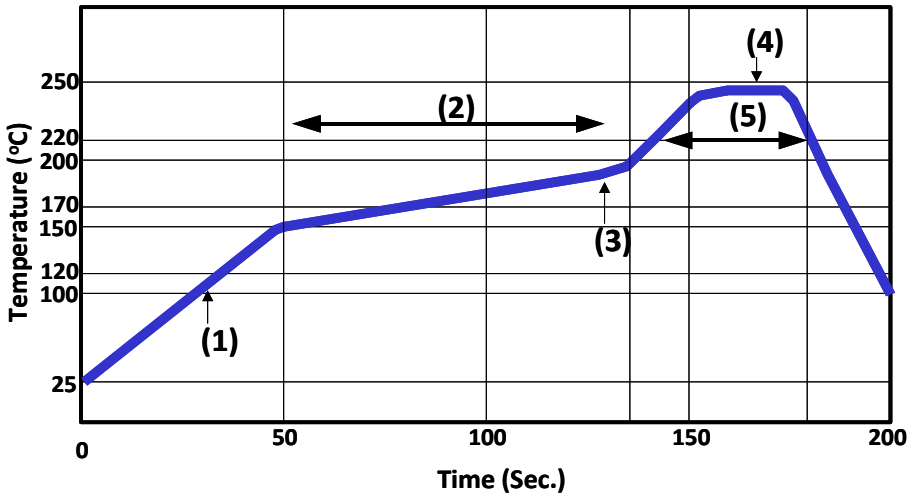
The following is color bin group of TSMC SSL TS3 emitters.

Table of CIE bin group at 350mA





Reflow Soldering Profile



A) Preheat

-Set the rising temperature rate (1) at 1 ~ 4 °C per second.

-A suggested preheat time (2) ranges from 60 ~ 180 seconds.

-Pre-heat ending temperature (3) ranges from 150 ~ 210 °C is appropriate.

B) Heating

-Set the peak temperature (4) in the range from 235 ~ 245 °C.

-The melting time at over 220 °C, (5) is between 30 ~ 60 seconds.

C) Cooling

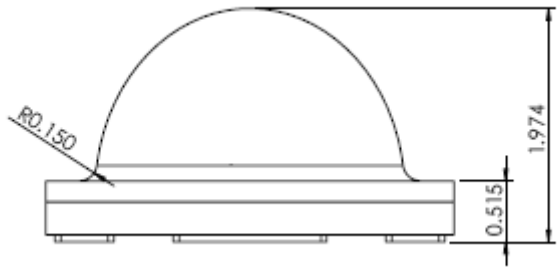
-Be careful when using a slow-cooling method for it may cause parts to shift and weak adhesion strength.

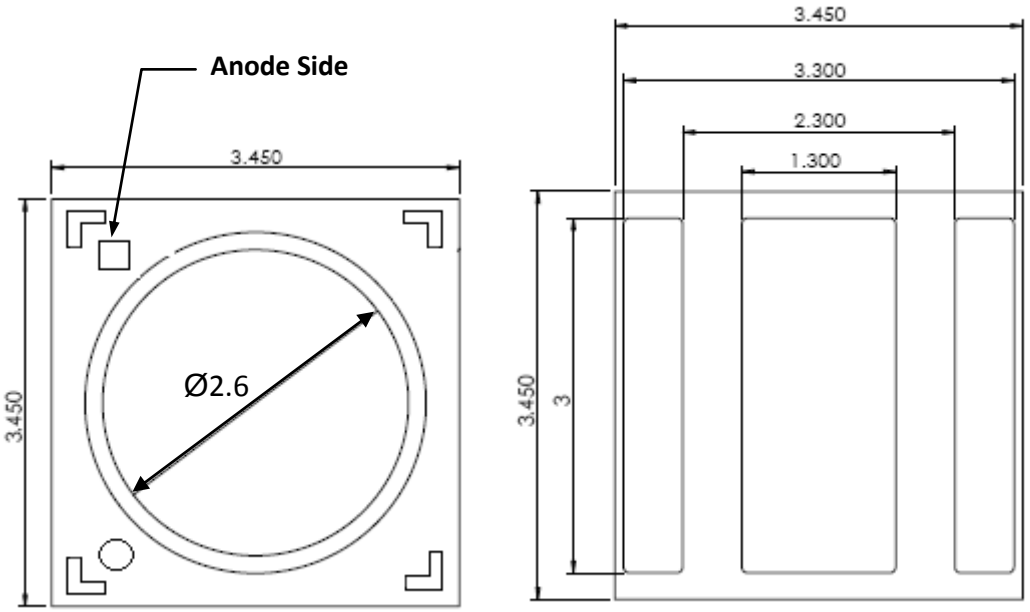
Notes:

Please be bewared that a sudden rise in preheat temperature will cause slumping of solder paste that tends to result in solder balls. The preheat time varies from different types of solder pastes.

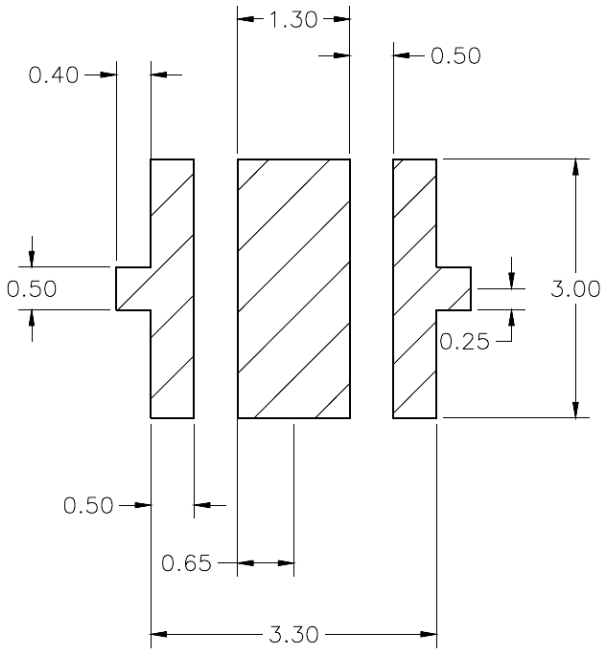
Mechanical Dimensions

All measurement tolerances are ±0.13 mm unless otherwise indicated. **Unit: mm**

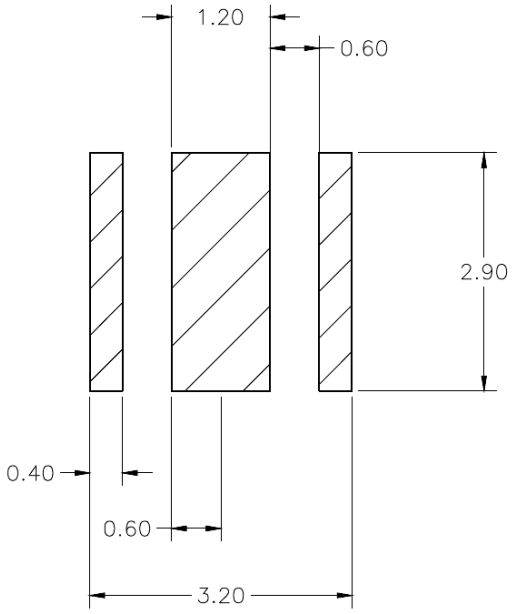




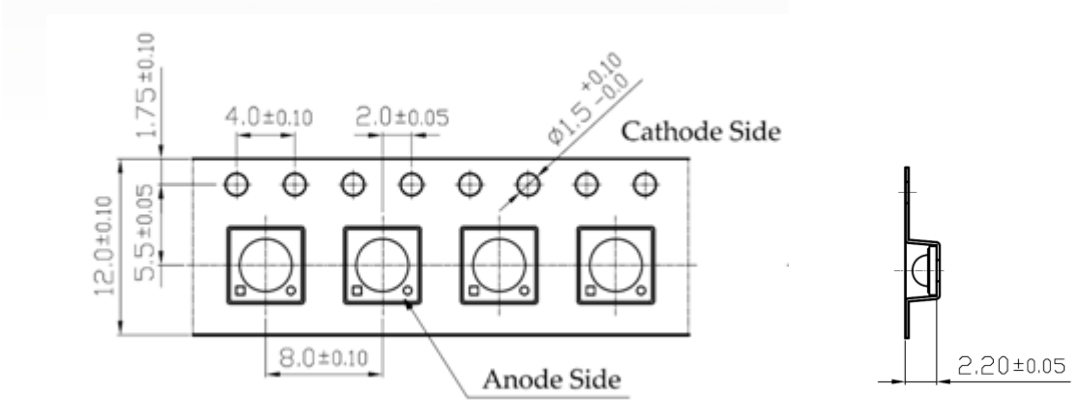
Recommended PCB Solder Pad

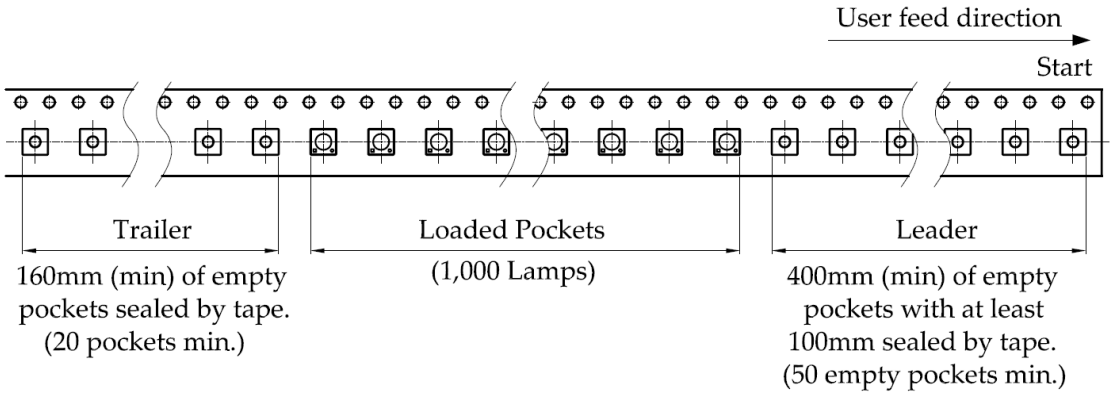


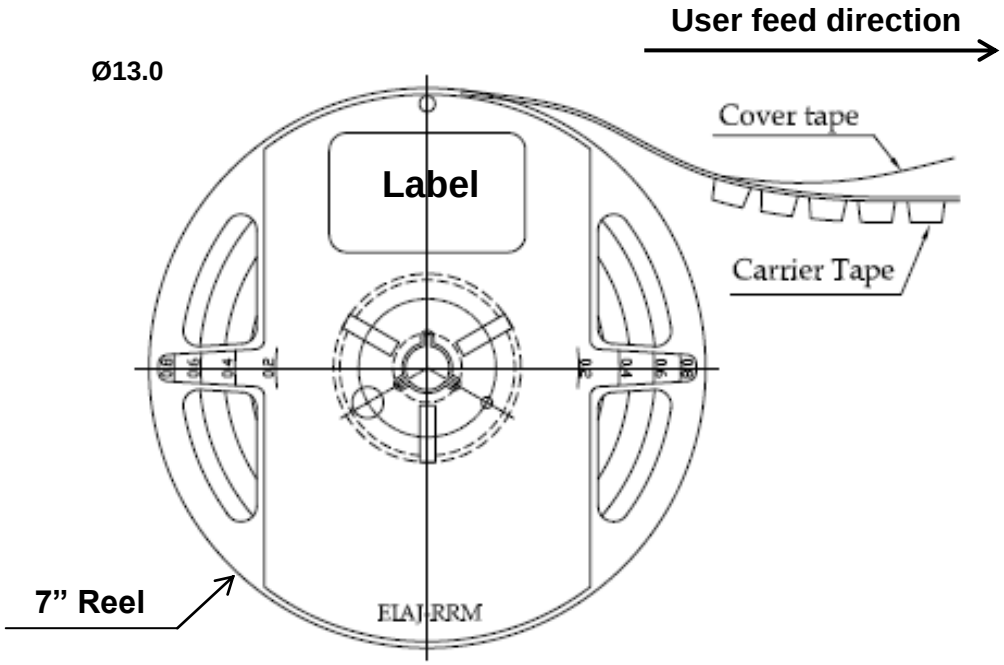
Recommended Stencil Pattern



Tape and Reel







Unit: mm

Usage Precautions

1. Safety Precautions

The strong light output of TS3 emitters may be harmful to human eyes. It is strongly advised to use a shield at all times. Limit direct viewing to less than three seconds with adequate time intervals in between.

2. Storage

TS3 emitters should be stored at under 30°C and 70% relative humidity before opening the tape and reel package. When left un-opened, it is recommended using the TS3 emitters within one year of package bag sealed.
After opening the package bag, TS3 emitters should be kept at under 30°C and 70% relative humidity. It is recommended that the TS3 emitters be used within 72 hours after opening. If unused TS3 emitters remain, it is suggested to store them in a moisture-preventive environment or in the original package bag with desiccant material. A re-sealable package bag is necessary.

If the product exceeds the recommended storage period, or if the desiccant material faded, the TS3 emitters should undergo a baking treatment at 60°C for 24 hours prior to immediate use.

3. Static Electricity Discharge Avoidance

Although TS3 emitters are static electricity discharge protected, we recommend an anti-electrostatic environment and use of anti-electrostatic wristbands when handling the TS3 emitters. Protection design should be incorporated into the driving circuits of your device when using TS3 emitters.