



# C3535X-FNxx Series High Power Infrared LED

## Introduction

The C3535X-FNxx LED from TSLC brings industry leading technology to the infrared applications market with its high reliability and performance. With a ceramic substrate and a 140/90/65 degree view angle primary lens, the C3535X-FNxx LED is a perfect solution for horticulture, security cameras, surveillance systems, machine vision and general purpose IR applications.



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## Characteristics

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

Parameter	Rating
	IR Series
DC Forward Current (mA)	1000mA
LED Junction Temperature	115°C
LED Operating Temperature	-40°C~85°C
Storage Temperature	-40°C~115°C
Soldering Temperature	Max. 260°C / Max. 10sec. (JEDEC 020)
ESD Sensitivity	2,000 V HBM (JESD-22A-114-B)
Reverse Voltage	Not designed to be driven in reverse bias (VR ≤ 5V)
Preconditioning	Acc. to JEDEC Level 1

### Product Name

**C 3535 X - FN    X    X**

1      2~5   6      7~8    9      10

Code 1: Substrate composition, C: Ceramic Al<sub>2</sub>O<sub>3</sub>

Code 2.3.4.5: Package size, 3535: 3.5\*3.5mm

Code 6: X: Product Class, IR (>700nm)

Code 7.8: Wavelength Class, FN: IR (720~750nm)

Code 9: Lens type, L: 140 degree, A: 90 degree, F: 65 degree

Code 10: Internal code

## General Characteristics at 700mA

Part number	Peak Wavelength $\lambda_p$		$2\theta_{1/2}$	Temperature Coefficient of Vf (mV/°C)	Thermal Resistance Junction to Pad
	Min	Max		$\Delta V_f / \Delta T_J$	(°C/W) $R_{\theta_{J-L}}$
C3535X-FNLx	720	750	140	-2~-4	10
C3535X-FNAX			90	-2~-4	10
C3535X-FNFx			65	-2~-4	10

## Notes:

1. The peak wavelength is measured with an accuracy of  $\pm 1\text{nm}$
2. All values stated are subject to the limits and set up of TSLC's testers. All other measurement data are defined as long-term production mean values and are only given for reference.
3. 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 TSLC Corporation.

Radiometric Power and Forward Voltage (T<sub>j</sub> = 25°C)

Part Number	Color	Performance at Test Current (700mA)					Performance at 1000mA
		Group	Radiometric Power (mW)		VF		Calculated Minimum Radiometric Power* (mW)
			Min	Max	Min	Max	
C3535X-FNLx (beam angle 140°)	F20 (720-730nm)	NE1	400	440	1.6	3.0	540
		NE2	440	480	1.6	3.0	594
		NE3	480	520	1.6	3.0	648
		NE4	520	560	1.6	3.0	702
		NE5	560	600	1.6	3.0	756
		NF1	600	650	1.6	3.0	810
		NF2	650	700	1.6	3.0	878
	F30 (730-740nm)	NF3	700	750	1.6	3.0	945
		NE1	400	440	1.6	3.0	540
		NE2	440	480	1.6	3.0	594
		NE3	480	520	1.6	3.0	648
		NE4	520	560	1.6	3.0	702
		NE5	560	600	1.6	3.0	756
		NF1	600	650	1.6	3.0	810
	F40 (740-750nm)	NF2	650	700	1.6	3.0	878
		NF3	700	750	1.6	3.0	945
		NE1	400	440	1.6	3.0	540
		NE2	440	480	1.6	3.0	594
		NE3	480	520	1.6	3.0	648
		NE4	520	560	1.6	3.0	702
		NE5	560	600	1.6	3.0	756
		NF1	600	650	1.6	3.0	810
	NF2	650	700	1.6	3.0	878	
	NF3	700	750	1.6	3.0	945	

Note: 1. Radiometric power is measured with an accuracy of  $\pm 10\%$

2. The forward voltage is measured with an accuracy of  $\pm 0.2V$

\*Calculated values are for reference only.

Radiometric Power and Forward Voltage (T<sub>j</sub> = 25°C)

Part Number	Color	Performance at Test Current (700mA)					Performance at 1000mA
		Group	Radiometric Power (mW)		VF		Calculated Minimum Radiometric Power* (mW)
			Min	Max	Min	Max	
C3535X-FNxx (beam angle 90°)	F20 (720-730nm)	NE1	400	440	1.6	3.0	540
		NE2	440	480	1.6	3.0	594
		NE3	480	520	1.6	3.0	648
		NE4	520	560	1.6	3.0	702
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Radiometric Power and Forward Voltage (T<sub>j</sub> = 25°C)

Part Number	Color	Performance at Test Current (700mA)					Performance at 1000mA
		Group	Radiometric Power (mW)		VF		Calculated Minimum Radiometric Power* (mW)
			Min	Max	Min	Max	
C3535X-FNFx (beam angle 65°)	F20 (720-730nm)	NE1	400	440	1.6	3.0	540
		NE2	440	480	1.6	3.0	594
		NE3	480	520	1.6	3.0	648
		NE4	520	560	1.6	3.0	702
		NE5	560	600	1.6	3.0	756
		NF1	600	650	1.6	3.0	810
		NF2	650	700	1.6	3.0	878
	NF3	700	750	1.6	3.0	945	
	F30 (730-740nm)	NE1	400	440	1.6	3.0	540
		NE2	440	480	1.6	3.0	594
		NE3	480	520	1.6	3.0	648
		NE4	520	560	1.6	3.0	702
		NE5	560	600	1.6	3.0	756
		NF1	600	650	1.6	3.0	810
		NF2	650	700	1.6	3.0	878
	NF3	700	750	1.6	3.0	945	
	F40 (740-750nm)	NE1	400	440	1.6	3.0	540
		NE2	440	480	1.6	3.0	594
		NE3	480	520	1.6	3.0	648
		NE4	520	560	1.6	3.0	702
		NE5	560	600	1.6	3.0	756
		NF1	600	650	1.6	3.0	810
		NF2	650	700	1.6	3.0	878
	NF3	700	750	1.6	3.0	945	

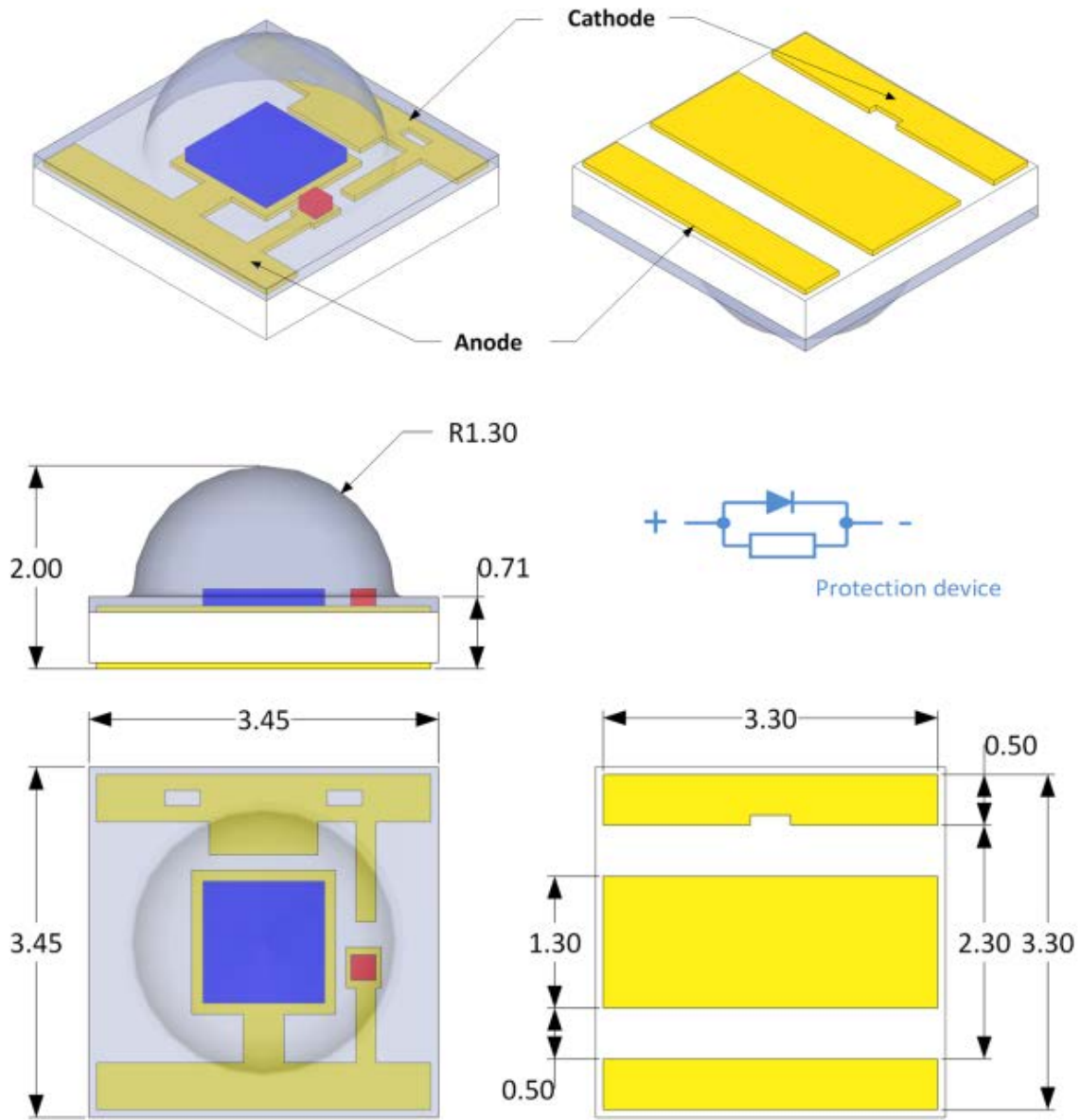
Note: 1. Radiometric power is measured with an accuracy of  $\pm 10\%$

2. The forward voltage is measured with an accuracy of  $\pm 0.2V$

\*Calculated values are for reference only.

## Mechanical Dimensions

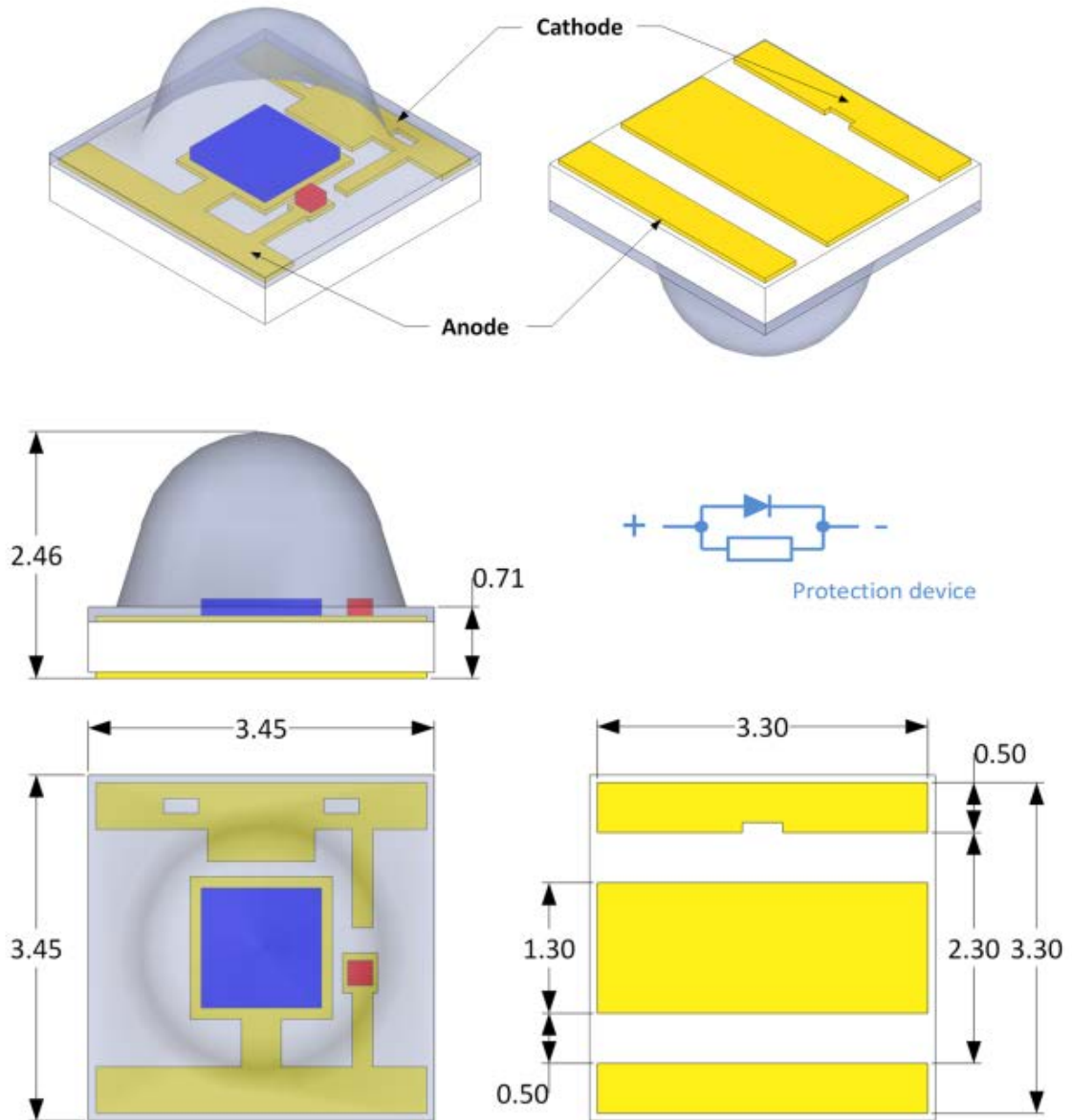
C3535X-FNLx (beam angle 140°)



Notes:

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

C3535X-FNxx (beam angle 90°)

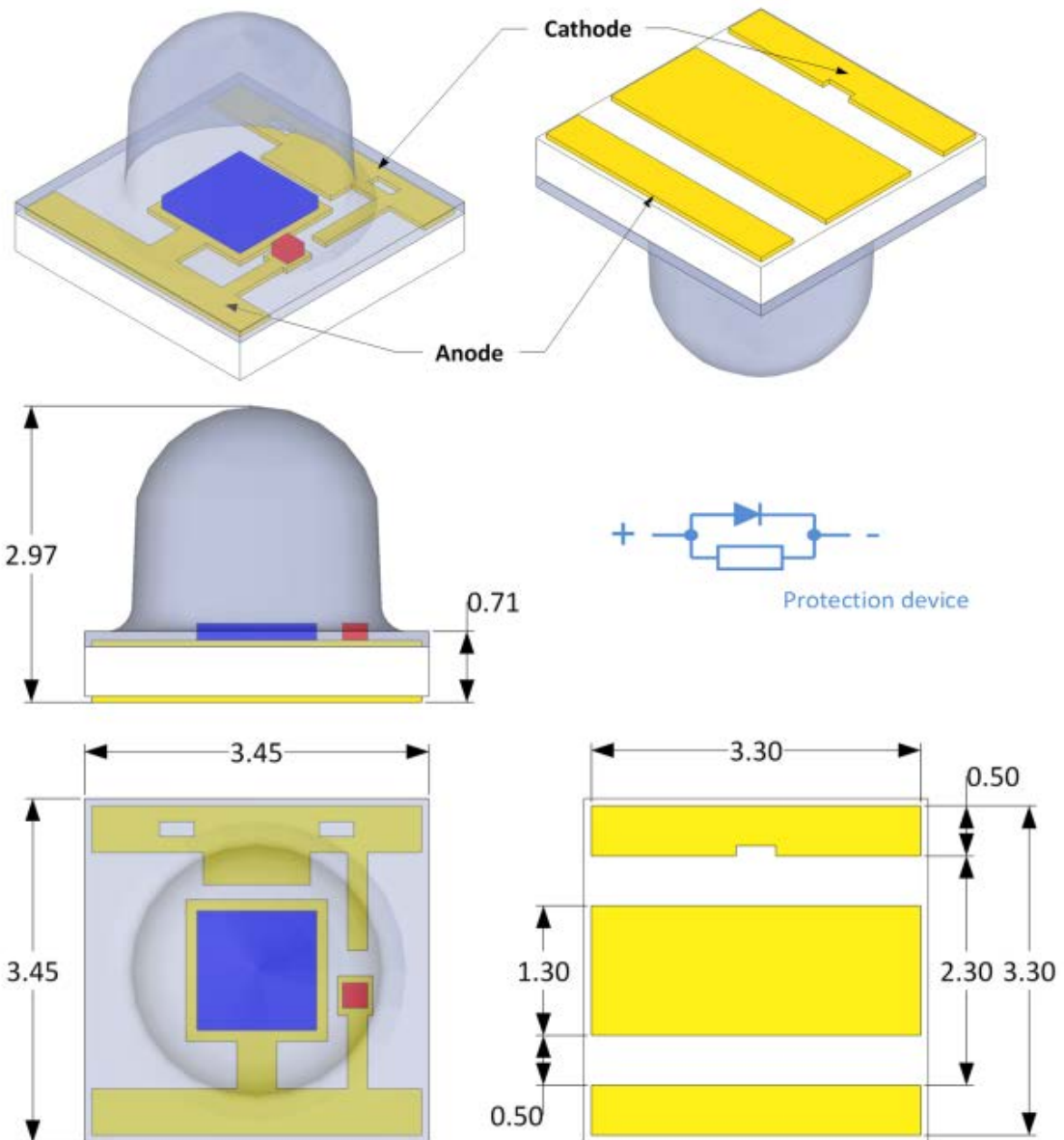


Notes:

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



C3535X-FNFx (beam angle 65°)

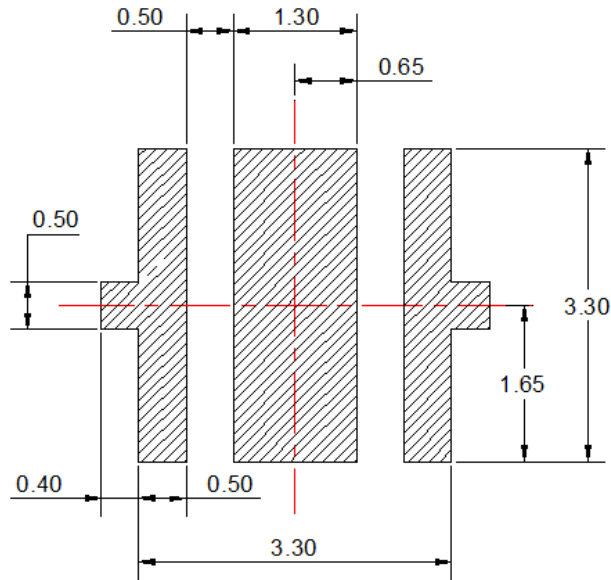


Notes:

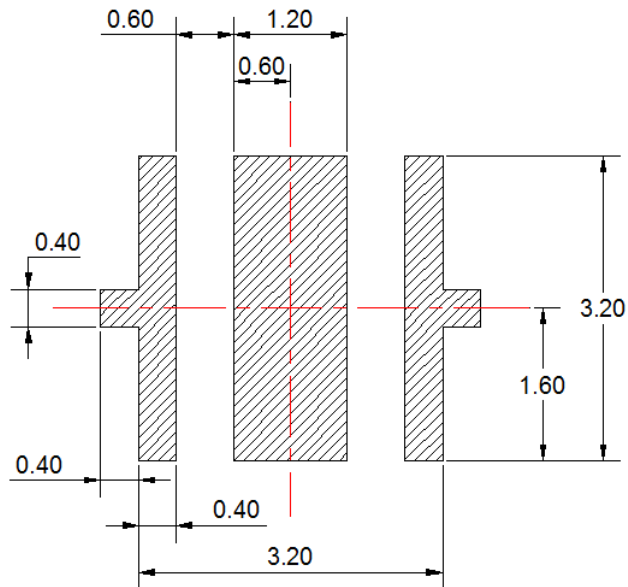
1. Drawing is not to scale
2. All dimensions are in millimeter
3. Dimensions are  $\pm 0.13\text{mm}$  unless otherwise indicated

## Recommended Solder Pad Design

### Recommended Soldering Pad Design



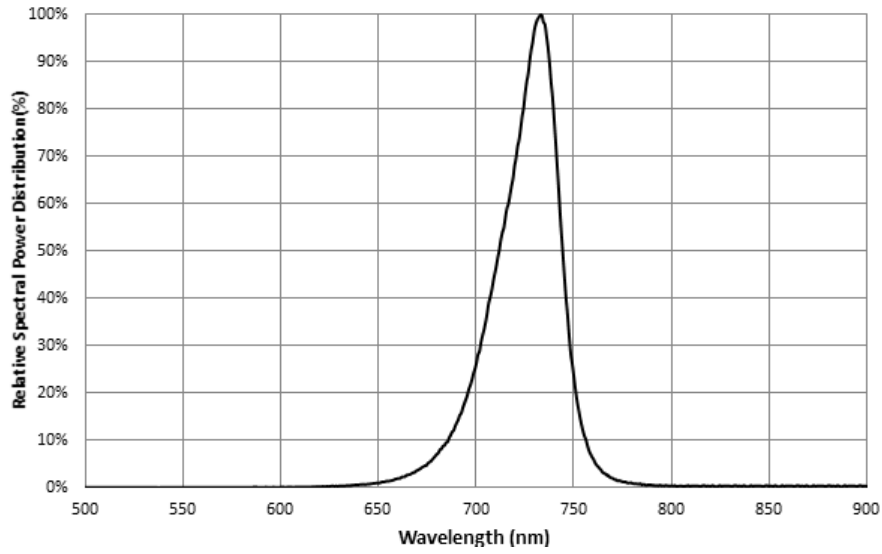
### Recommended Stencil Pattern Design (Marked Area is Opening)



Notes :

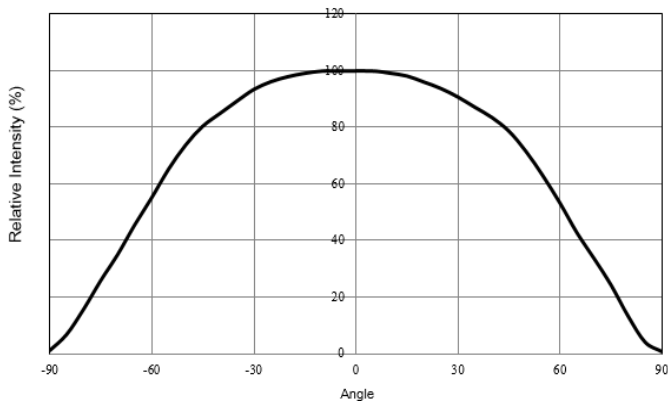
1. Drawing is not to scale
2. All dimensions are in millimeter

## Relative Spectral Power Distribution, T<sub>j</sub>=25°C

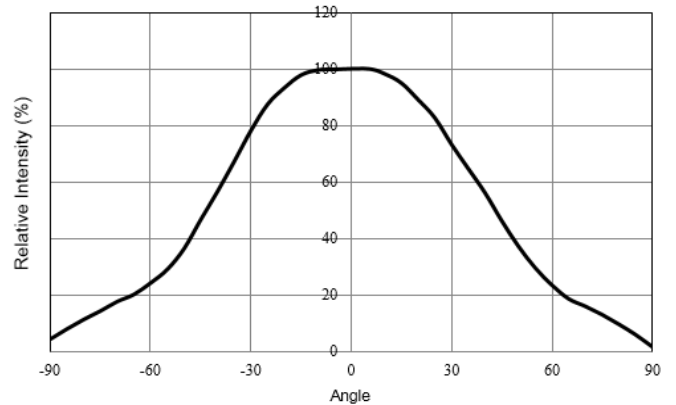


## Typical Spatial Radiation Pattern

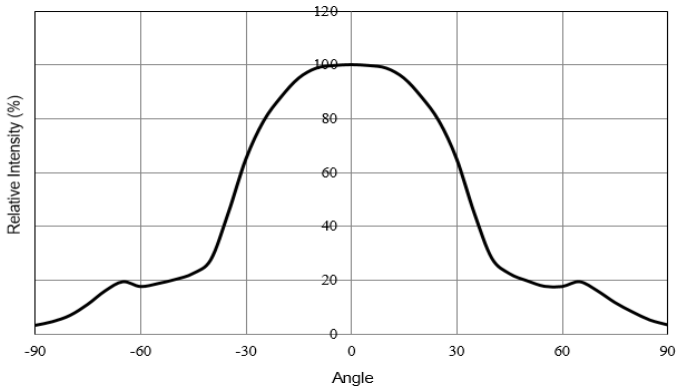
C3535X-FNLx (beam angle 140°)



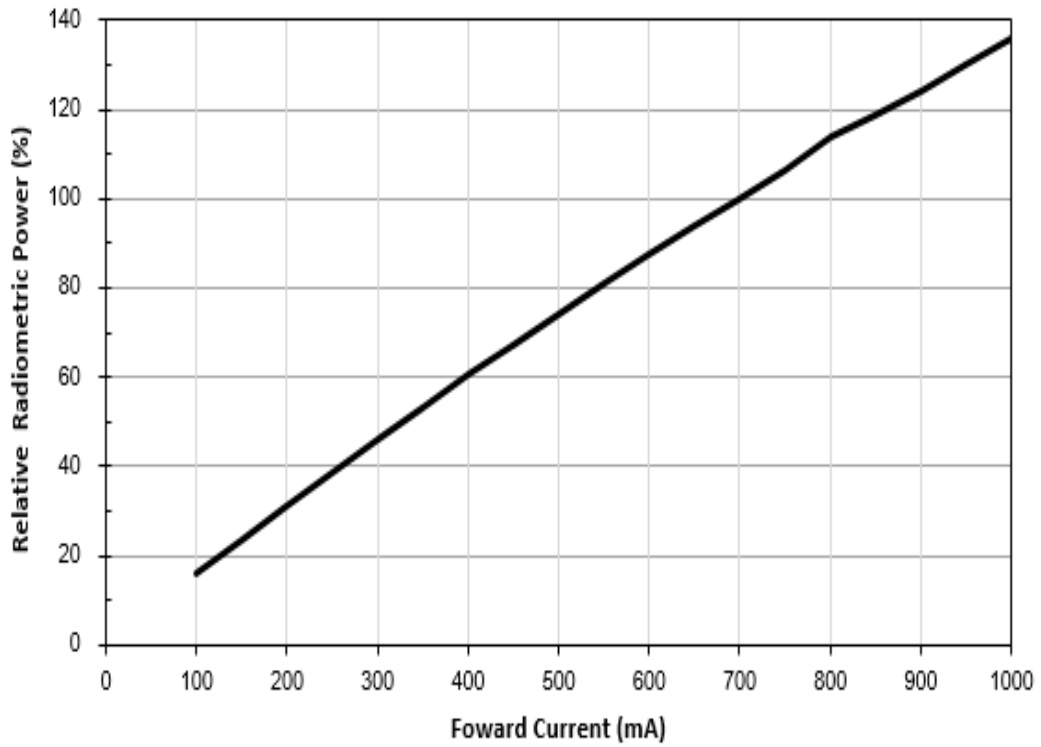
C3535X-FNax (beam angle 90°)



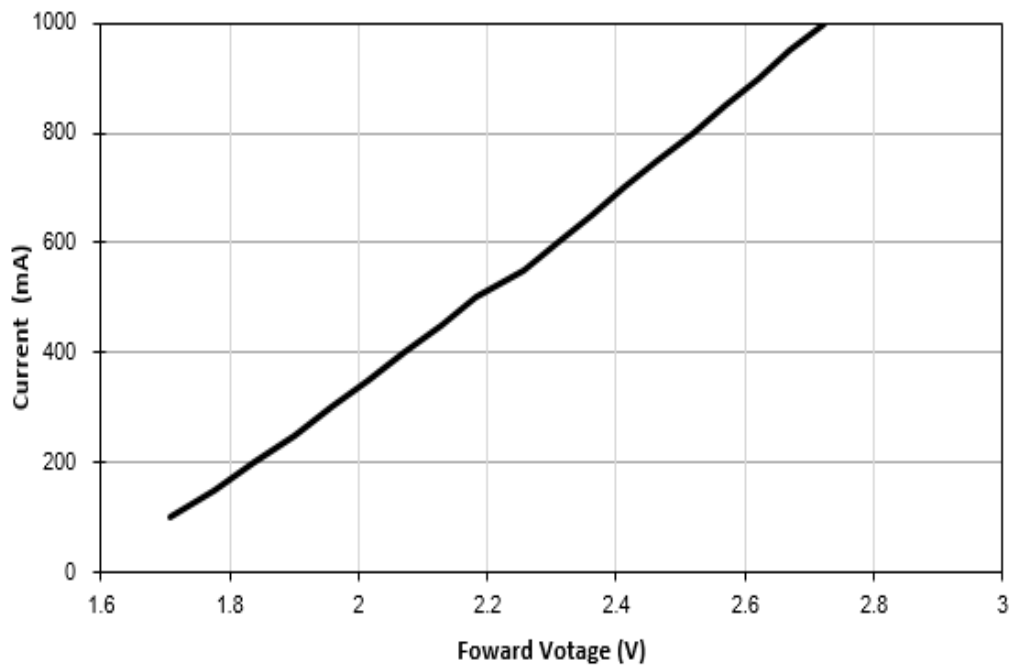
C3535X-FNFx (beam angle 65°)



### Typical Forward L-I Characteristics, $T_j=25^\circ\text{C}$

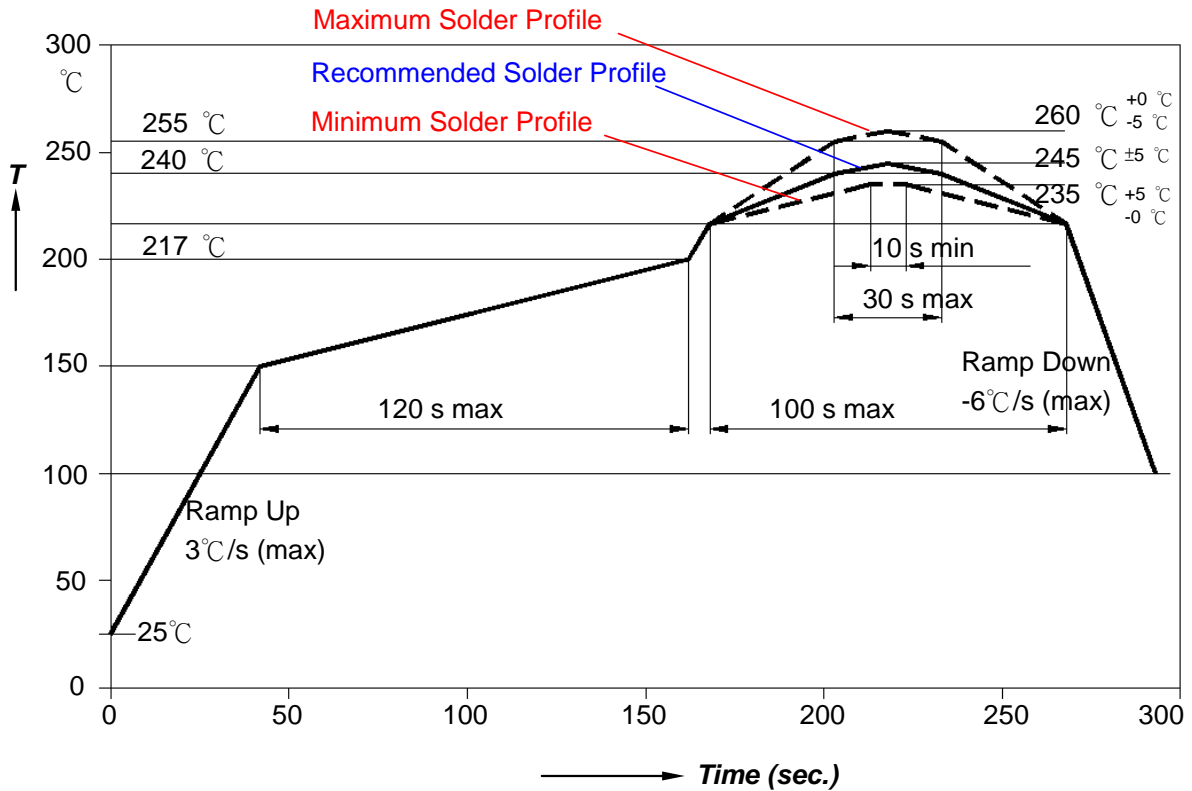


### Typical Forward I-V Characteristics, $T_j=25^\circ\text{C}$



## Recommended Soldering Profile

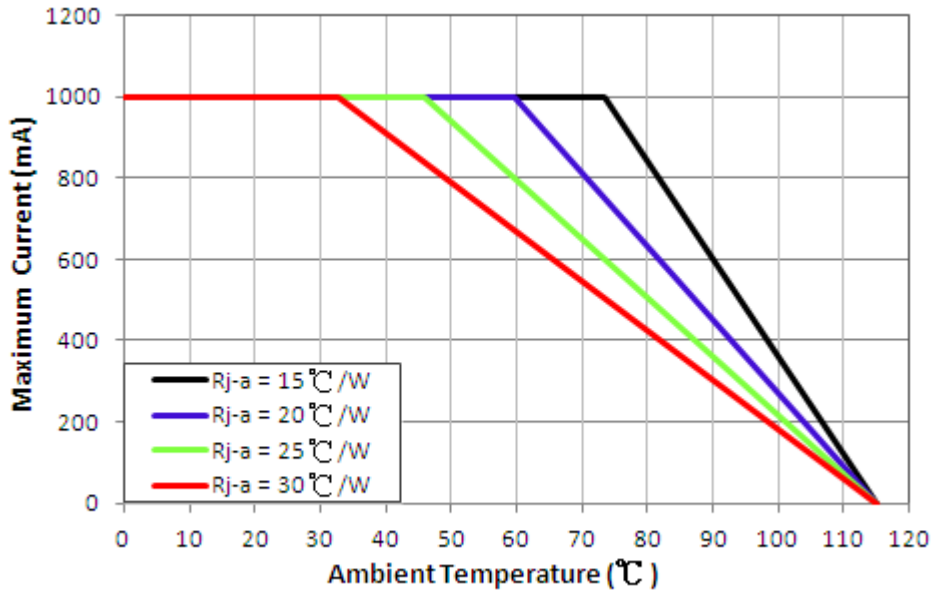
The LEDs can be soldered using the parameters listed below. As a general guideline, the users are suggested to follow the recommended soldering profile provided by the manufacturer of the solder paste. Although the recommended soldering conditions are specified in the list, reflow soldering at the lowest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



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-up Rate (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.

## Thermal Design

Thermal design of the end product is important. The thermal resistance between the junction and the solder point ( $R_{\theta_{j-p}}$ ) 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

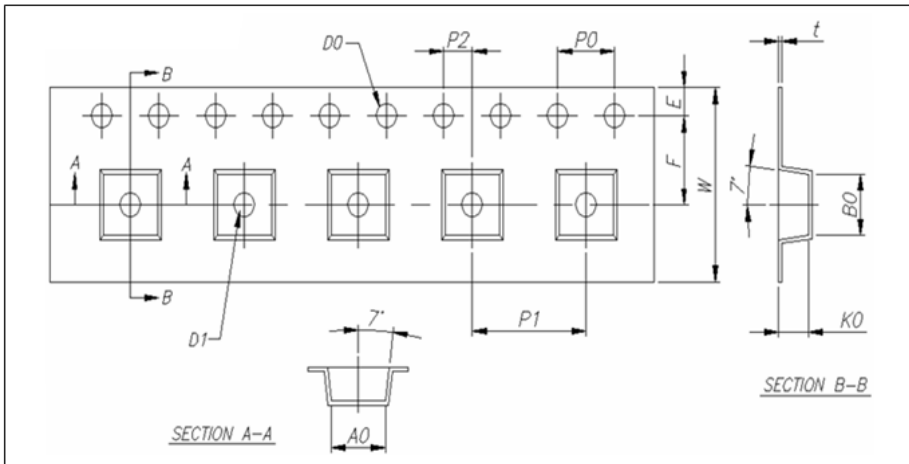
$T_a$ : Ambient temperature

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

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

## Packing Information

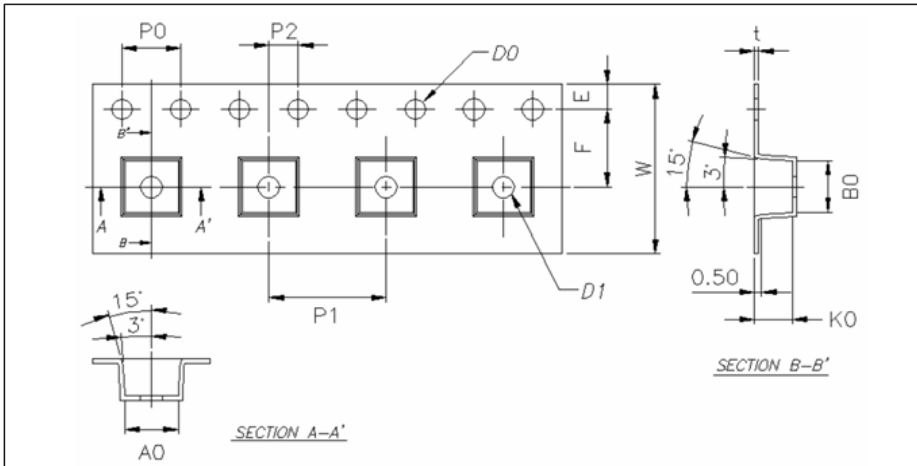
C3535X-FNLx series, Max QTY: 1000ea / roll



Item	Specification	Tol.(+/-)
W	12.00	±0.20
E	1.75	±0.10
F	5.50	±0.05
D0	1.50	+0.10, -0
D1	1.50	±0.10
P0	4.00	±0.10
P1	8.00	±0.10
P2	2.00	±0.10
P0X10	40.00	±0.20

Item	Specification	Tol.(+/-)
t	0.25	±0.05
A0	3.80	±0.10
B0	3.80	±0.10
K0	2.20	±0.10

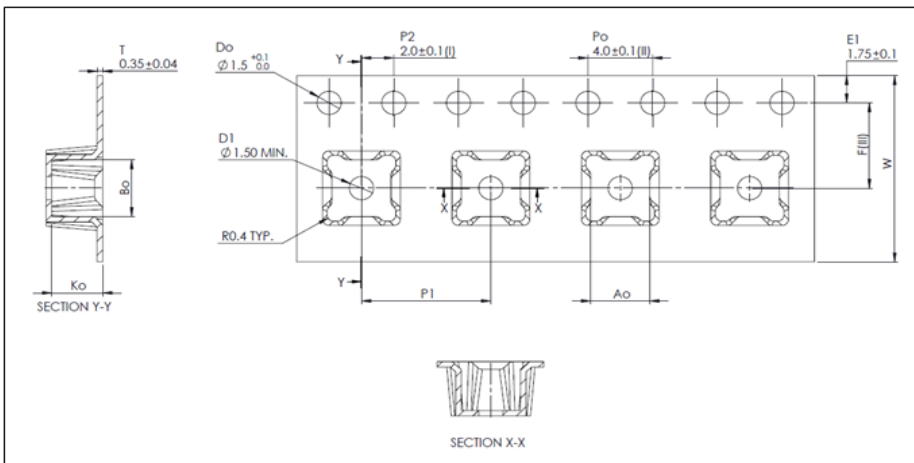
C3535X-FNAX series, Max QTY: 500ea / roll



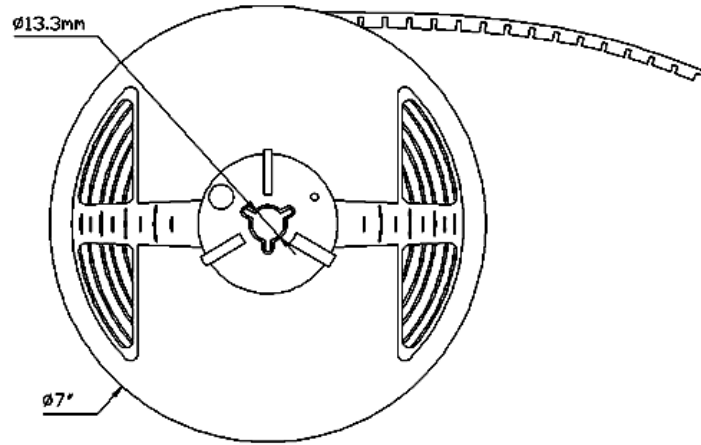
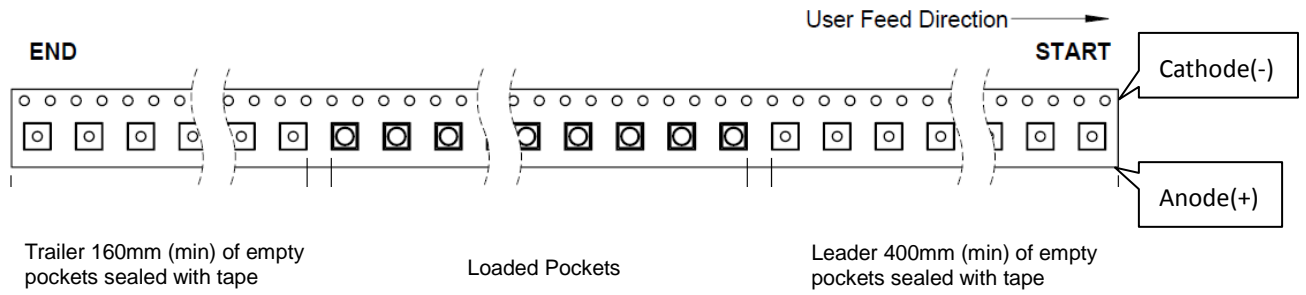
Item	Specification	Tol.(+/-)
W	12.00	±0.30
E	1.75	±0.10
F	5.50	±0.05
D0	1.50	+0.10, -0
D1	1.50	+0.10, -0
P0	4.00	±0.10
P1	8.00	±0.10
P2	2.00	±0.05
P0X10	40.00	±0.20

Item	Specification	Tol.(+/-)
t	0.30	±0.05
A0	3.65	±0.10
B0	3.65	±0.10
K0	2.56	±0.10

C3535X-FNFX series, Max QTY: 500ea / roll



Item	Specification	Tol.(+/-)
A0	3.65	±0.10
B0	3.65	±0.10
K0	3.15	±0.10
F	5.50	±0.10
P1	8.00	±0.10
W	12.00	±0.30



Note:  
All dimensions are in millimeter.



## About Us

**TSLC Corporation** is devoted to developing high-density and multi-size emitters with powerful output to satisfy the needs of every customer.

**TSLC Corporation** is the leader in LED solutions. Unlimited design flexibility for interior and exterior spaces with high-end lighting effect; energy-efficient for UV curing to improve the quality of medical care; horticulture solutions create a better environment for everyone; high-intensity rotatable lightings for the entertainment industry, TSLC is always there for your lighting needs.

For further company or product information, please visit us at [www.tslc.com.tw](http://www.tslc.com.tw) or please contact [sales@tslc.com.tw](mailto:sales@tslc.com.tw).



[www.tslc.com.tw](http://www.tslc.com.tw)

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