PRODUCT DATASHEET

C3535X-INx1 Series
High Power Infrared LED

Introduction

The C3535X-INx1 series LED from TSLC brings industry leading technology to the infrared applications market with its high reliability and performance. With an Al2O3 ceramic substrate and a 140/90/60/30 degree view angle primary lens, the C3535X-INx1 series LED is a perfect solution for security cameras, surveillance systems, machine vision and general purpose IR applications.

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RoHS Compliant

Characteristics

Absolute Maximum Ratings (Tj = 25°C)

Parameter	Rating
	IR Series
DC Forward Current (mA)	600 mA (C3535X-INx1 A series) 1000 mA (C3535X-INx1 B series)
LED Junction Temperature	115℃
LED Operating Temperature	-40℃~85℃
Storage Temperature	-40℃~115℃
Soldering Temperature	Max. 260℃ / 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 – IN X 1

1 2~5 6 7~8 9 10

Code 1: Substrate composition, C: Ceramic Al2O3

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

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

Code 7.8: Wavelength Class, IN: IR (840~870nm)

Code 9: Lens type, L: 140 degree, A: 90 degree, F: 60 degree, S: 30 degree

Code 10: Lens versi

General Characteristics (C3535X-INx1 A series) at 350mA

Part Number	Peak Wavelength Wp		$2\theta_{1/2}$	Temperature Coefficient of Vf (mV/℃)	Thermal Resistance Junction to Pad (℃/W)
	Min	Max		ΔVF /ΔTJ	$R\Theta_{J-L}$
C3535X-INL1	840	870	120	-2~-4	11.5
C3535X-INA1			80	-2~-4	11.5
C3535X-INF1			45	-2~-4	11.5
C3535X-INS1			30	-2~-4	11.5

Notes:

1. The peak wavelength is measured with an accuracy of ±1nm
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.

General Characteristics (C3535X-INx1 B series) at 700mA

Part Number	Peak Wavelength Wp		$2\theta_{1/2}$	Temperature Coefficient of Vf (mV/℃)	Thermal Resistance Junction to Pad (℃/W)
	Min	Max		ΔVF /ΔTJ	$R\Theta_{J-L}$
C3535X-INL1	840	870	135~140	-2~-4	11
C3535X-INA1			90	-2~-4	11
C3535X-INF1			60	-2~-4	11
C3535X-INS1			30	-2~-4	11

Notes:

1. The peak wavelength is measured with an accuracy of ±1nm
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 (Tj = 25°C) (C3535X-INx1 A series) at 350mA

Part Number	Performance at Test Current (350mA)					Performance at 600mA
	Group	Radiometric Power (mW)		Vf		* Calculated Minimum Radiometric Power
		Min	Max	Min	Max	mW
C3535X-INL1 series	NC5	180	200	1.4	2.4	310
	ND1	200	240	1.4	2.4	360
	ND2	240	280	1.4	2.4	425
	ND3	280	320	1.4	2.4	490
	ND4	320	360	1.4	2.4	555
	ND5	360	400	1.4	2.4	620
C3535X-INA1 series	NC4	160	180	1.4	2.4	275
	NC5	180	200	1.4	2.4	310
	ND1	200	240	1.4	2.4	360
	ND2	240	280	1.4	2.4	425
	ND3	280	320	1.4	2.4	490
	ND4	320	360	1.4	2.4	555
C3535X-INF1 series	NC3	140	160	1.4	2.4	245
	NC4	160	180	1.4	2.4	275
	NC5	180	200	1.4	2.4	310
	ND1	200	240	1.4	2.4	360
	ND2	240	280	1.4	2.4	425
	ND3	280	320	1.4	2.4	490
C3535X-INS1 series	NC2	120	140	1.4	2.4	212
	NC3	140	160	1.4	2.4	245
	NC4	160	180	1.4	2.4	277
	NC5	180	200	1.4	2.4	310
	ND1	200	240	1.4	2.4	359
	ND2	240	280	1.4	2.4	424

Note: 1. Radiometric power is measured with an accuracy of ±10%

2. The forward voltage is measured with an accuracy of ±0.2V

* Calculated values are for reference only.

Radiometric Power and Forward Voltage (Tj = 25°C) (C3535X-INx1 B series) at 700mA

Part Number	Performance at Test Current (700mA)					Performance at 1000mA
	Group	Radiometric Power (mW)		Vf		* Calculated Minimum Radiometric Power
		Min	Max	Min	Max	mW
C3535X-INL1 series	NE1	400	440	1.4	2.4	588
	NE2	440	480	1.4	2.4	644
	NE3	480	520	1.4	2.4	700
	NE4	520	560	1.4	2.4	756
	NE5	560	600	1.4	2.4	812
	NF1	600	650	1.4	2.4	868
	NF2	650	700	1.4	2.4	924
	NF3	700	750	1.4	2.4	980
	NF4	750	800	1.4	2.4	1036
C3535X-INA1 series	ND5	360	400	1.4	2.4	532
	NE1	400	440	1.4	2.4	588
	NE2	440	480	1.4	2.4	644
	NE3	480	520	1.4	2.4	700
	NE4	520	560	1.4	2.4	756
	NE5	560	600	1.4	2.4	812
	NF1	600	650	1.4	2.4	868
	NF2	650	700	1.4	2.4	924
C3535X-INF1 series	ND5	360	400	1.4	2.4	532
	NE1	400	440	1.4	2.4	588
	NE2	440	480	1.4	2.4	644
	NE3	480	520	1.4	2.4	700
	NE4	520	560	1.4	2.4	756
	NE5	560	600	1.4	2.4	812
	NF1	600	650	1.4	2.4	868
	NF2	650	700	1.4	2.4	924

Radiometric Power and Forward Voltage (Tj = 25°C) (C3535X-INx1 B series) at 700mA

Part Number	Performance at Test Current (700mA)					Performance at 1000mA
	Group	Radiometric Power (mW)		Vf		* Calculated Minimum Radiometric Power
		Min	Max	Min	Max	mW
C3535X-INS1 series	ND4	320	360	1.4	2.4	475
	ND5	360	400	1.4	2.4	530
	NE1	400	440	1.4	2.4	590
	NE2	440	480	1.4	2.4	645
	NE3	480	520	1.4	2.4	700
	NE4	520	560	1.4	2.4	756
	NE5	560	600	1.4	2.4	812
	NF1	600	650	1.4	2.4	868

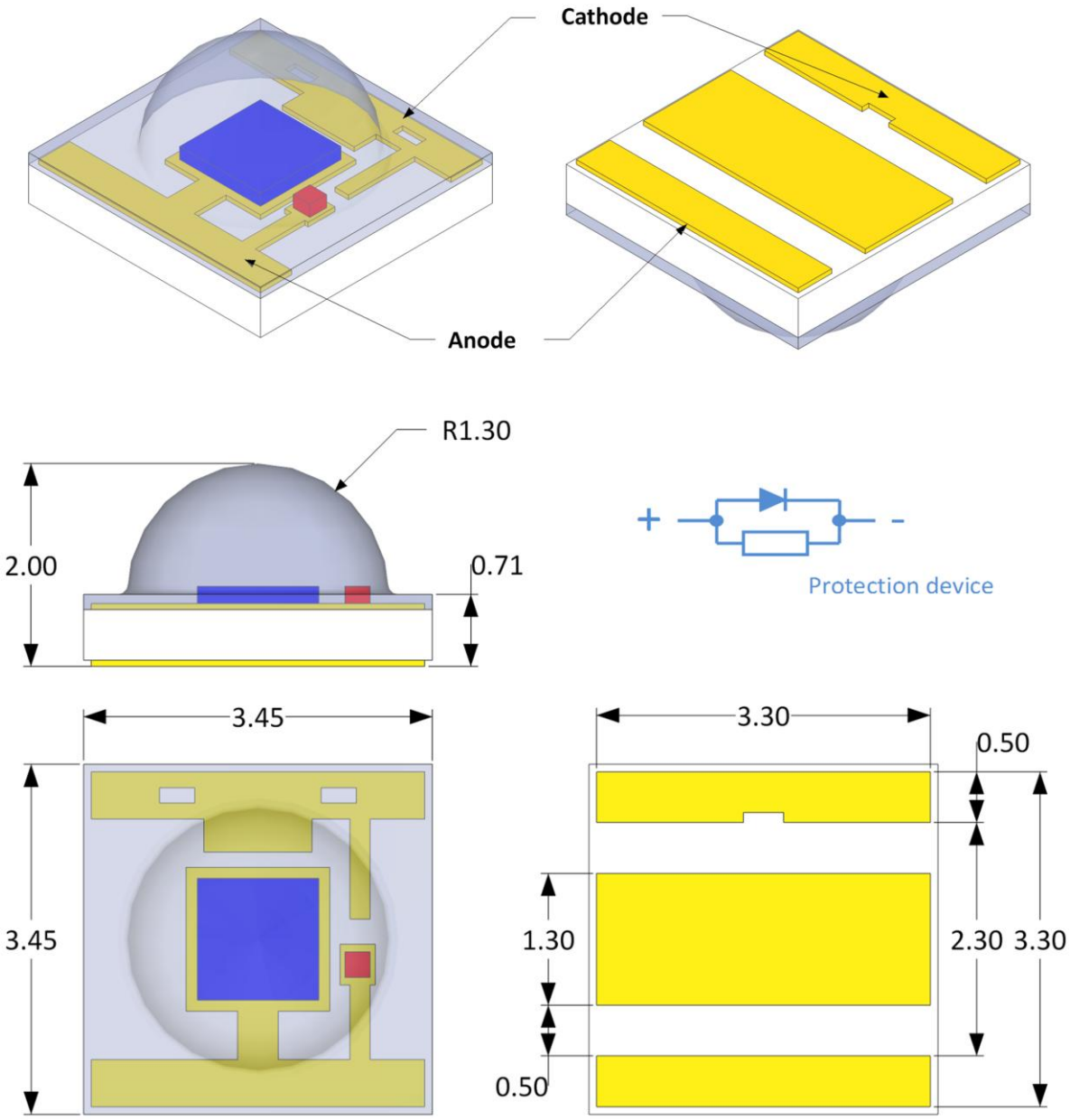
Note: 1. Radiometric power is measured with an accuracy of ±10%

2. The forward voltage is measured with an accuracy of ±0.2V

* Calculated values are for reference only.

Mechanical Dimensions

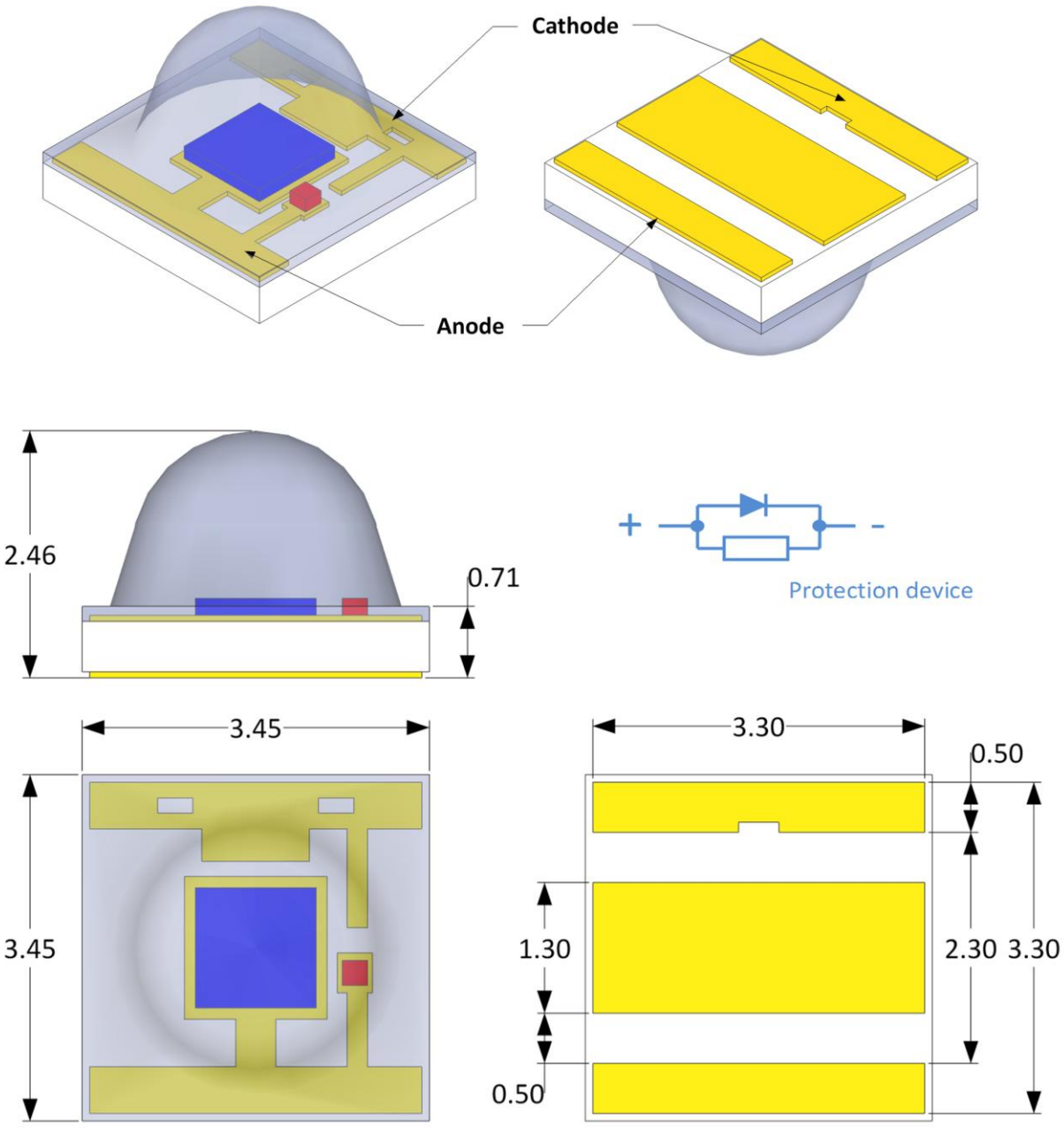
C3535X-INL1 series



Notes:

1. Drawing is not to scale
2. All dimensions are in millimeter
3. Dimensions are ±0.13mm unless otherwise indicated

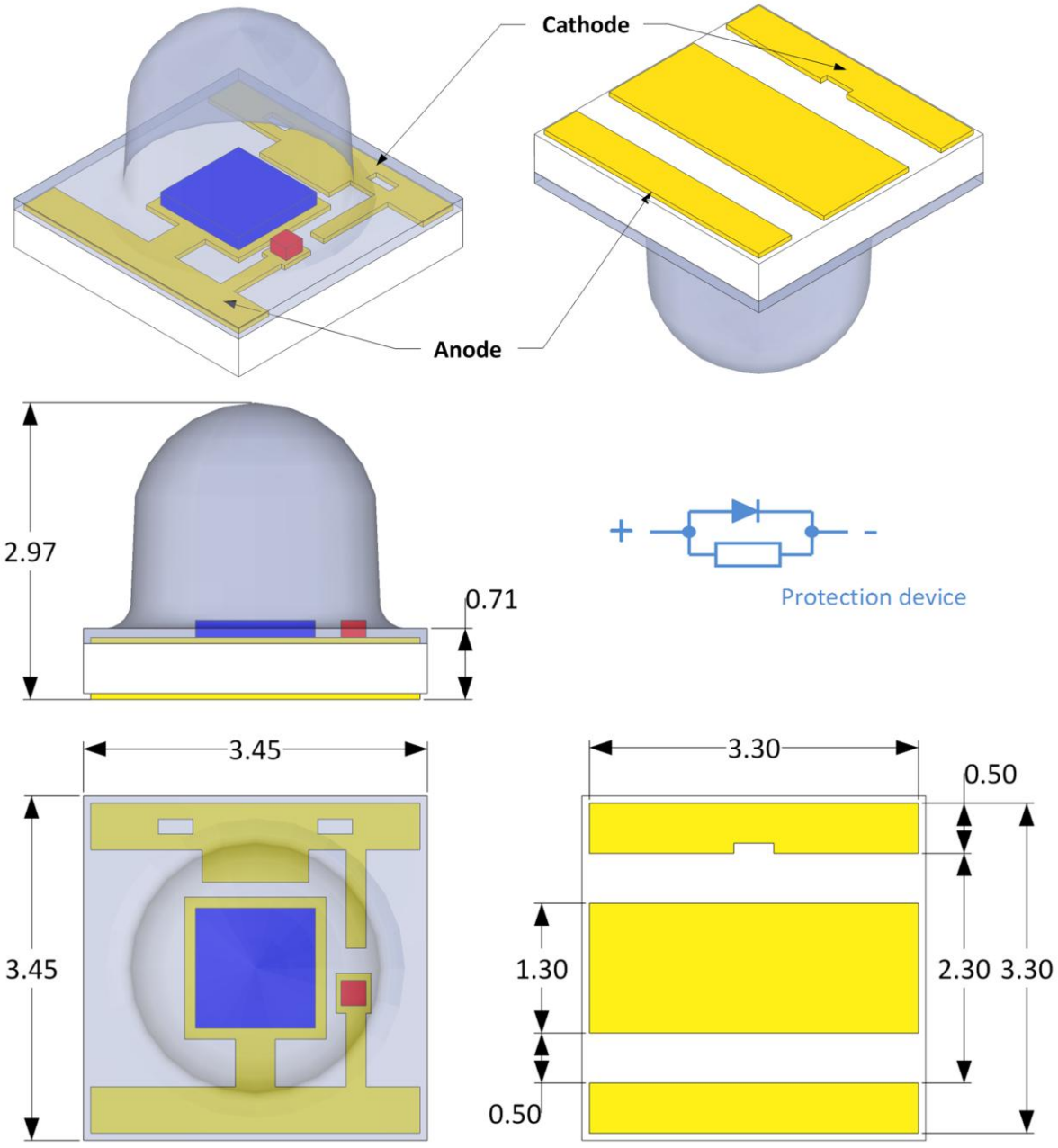
C3535X-INA1 series



Notes:

1. Drawing is not to scale
2. All dimensions are in millimeter
3. Dimensions are ±0.13mm unless otherwise indicated

C3535X-INF1 series



Notes:

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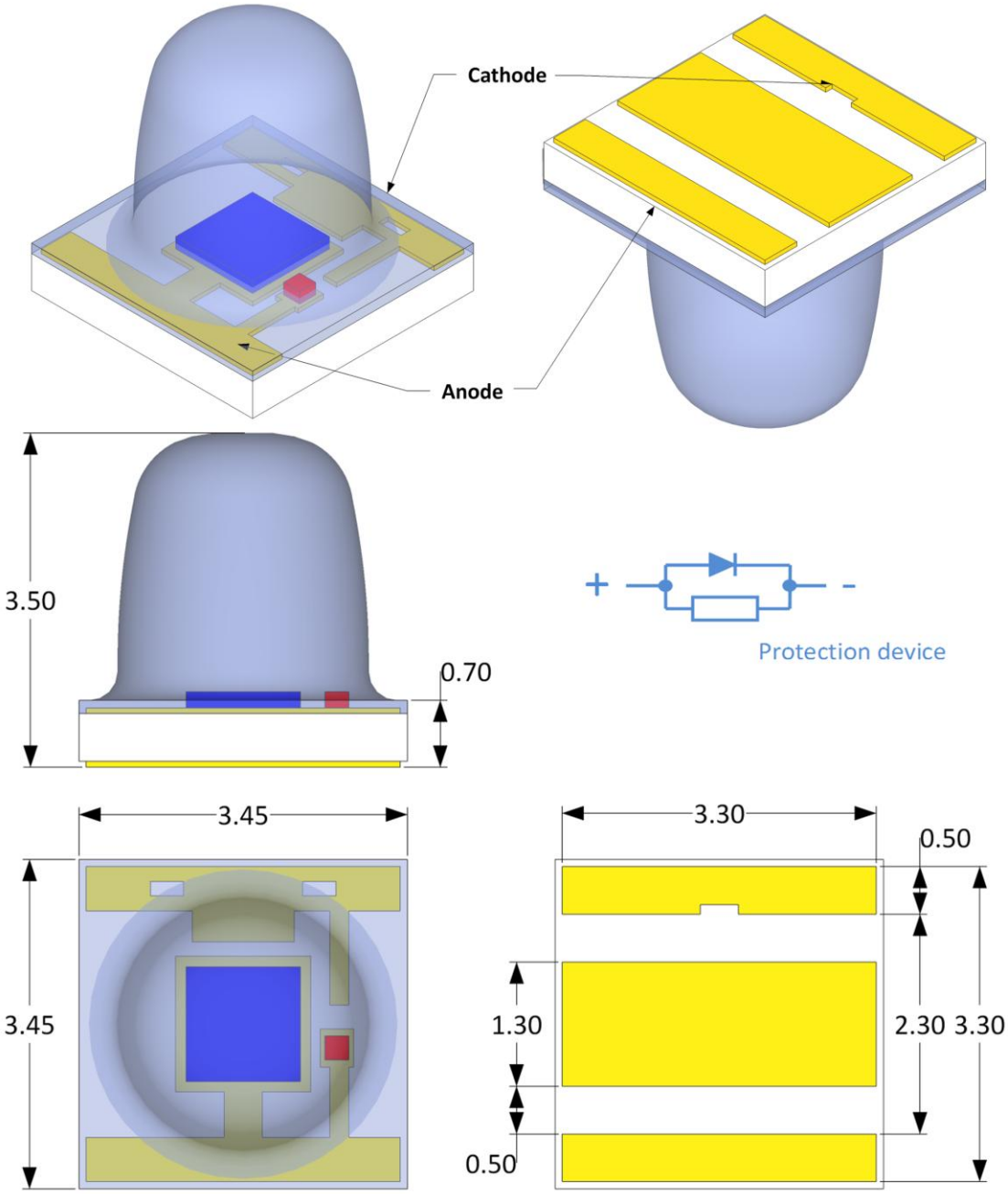
2. All dimensions are in millimeter
3. Dimensions are ±0.13mm unless otherwise indicated

C3535X-INS1 series



Notes:

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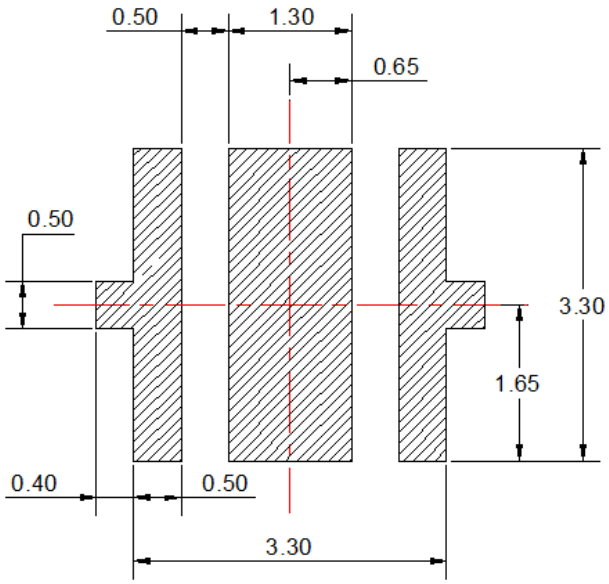
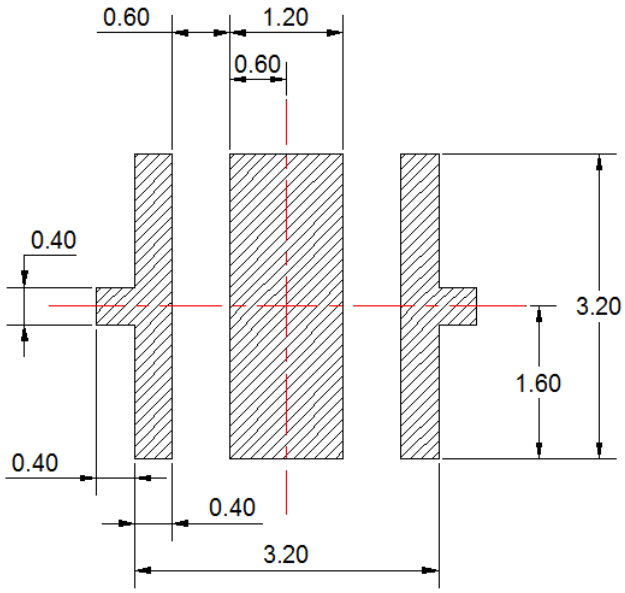
2. All dimensions are in millimeter
3. Dimensions are ±0.13mm unless otherwise indicated

Recommended Solder Pad Design

Recommended Soldering Pad Design



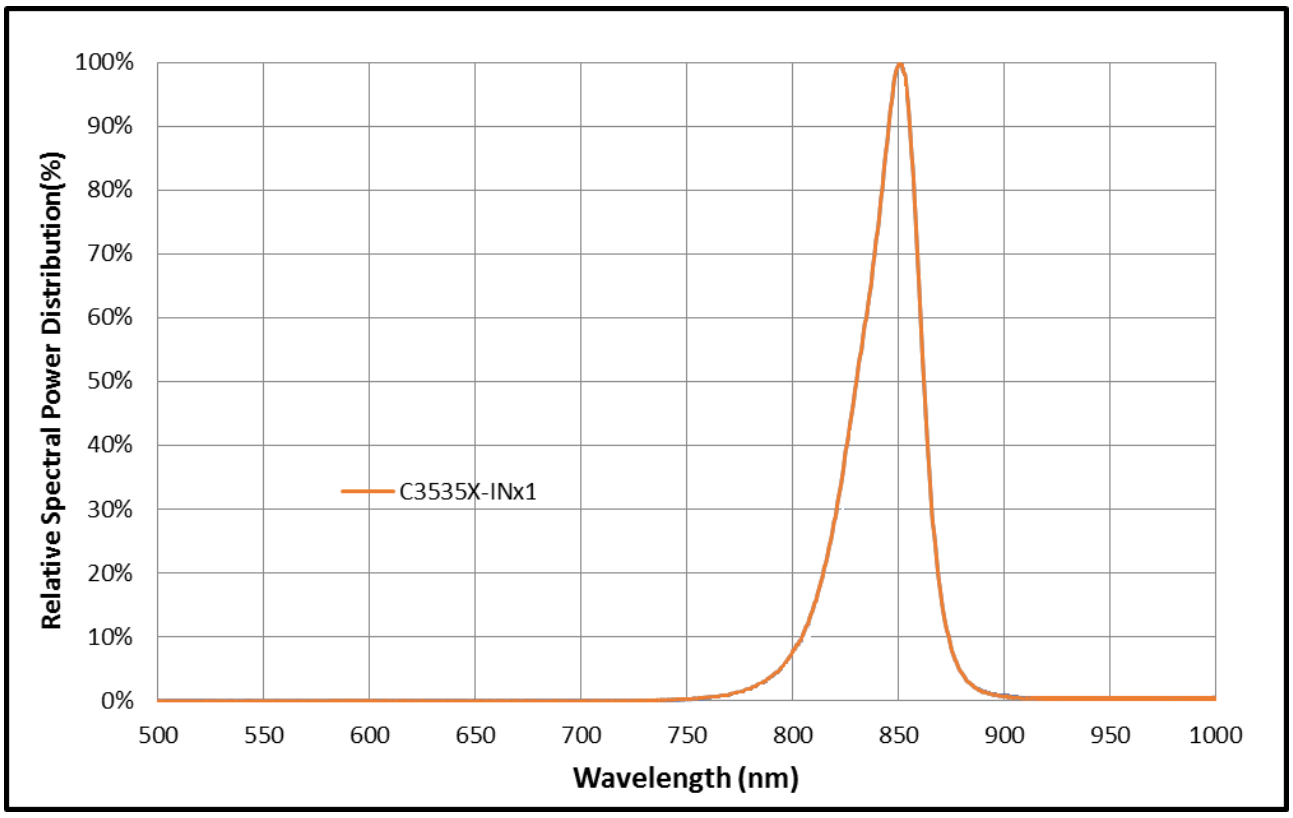
Recommended Stencil Pattern Design (Marked Area is Opening)



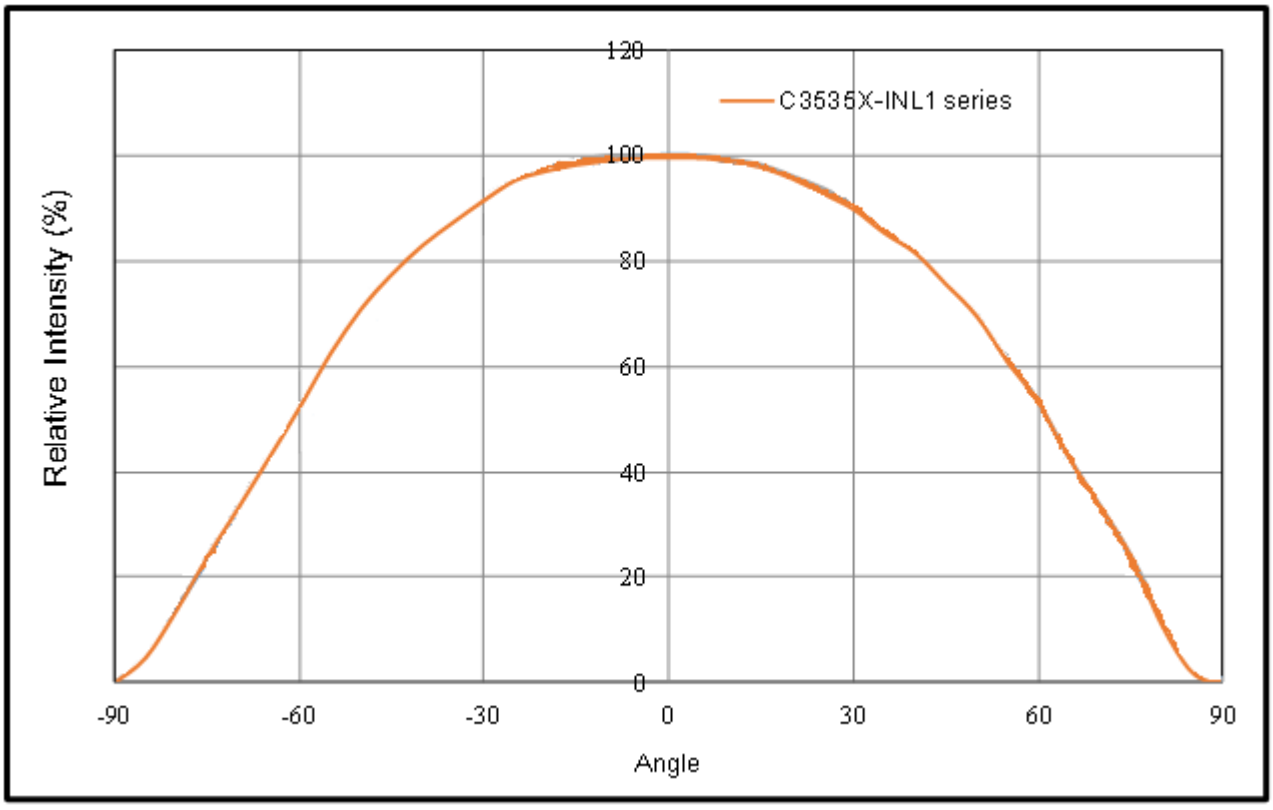
Notes:

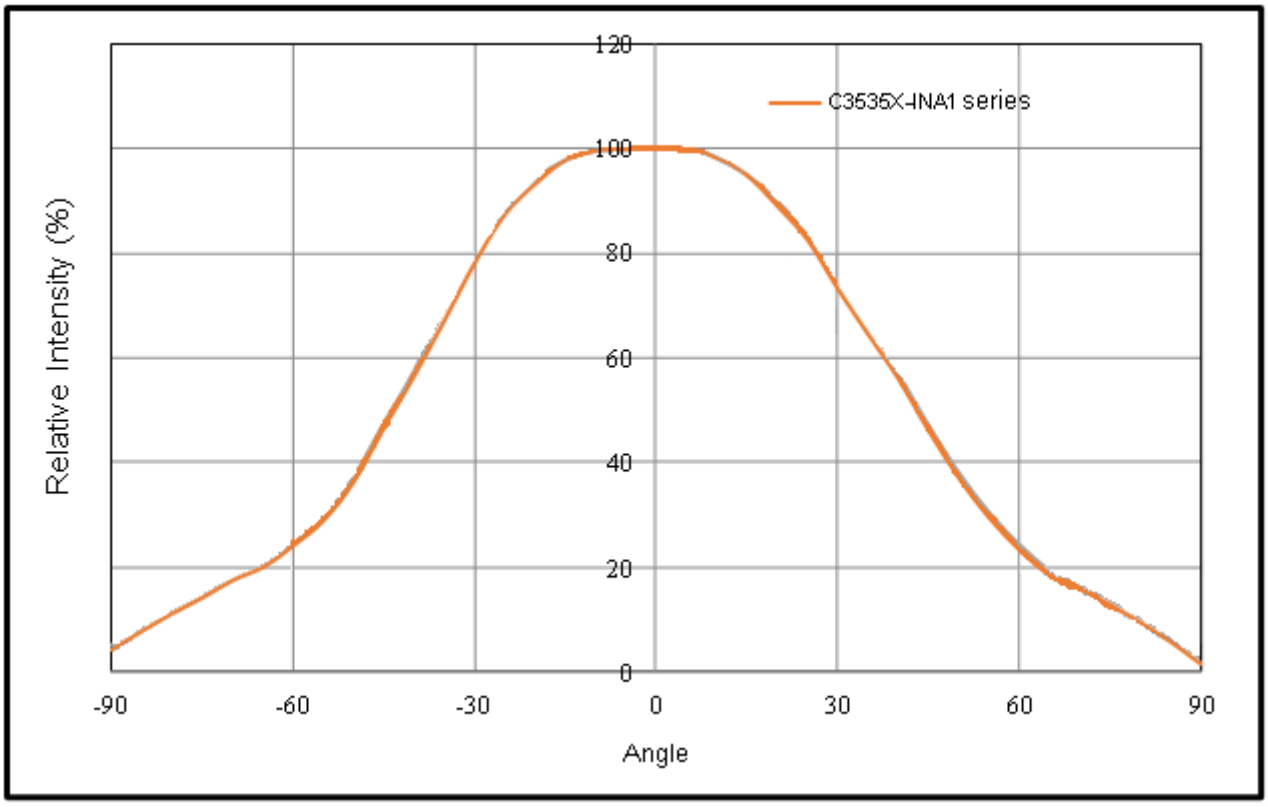
1. Drawing is not to scale
2. All dimensions are in millimetre
3.

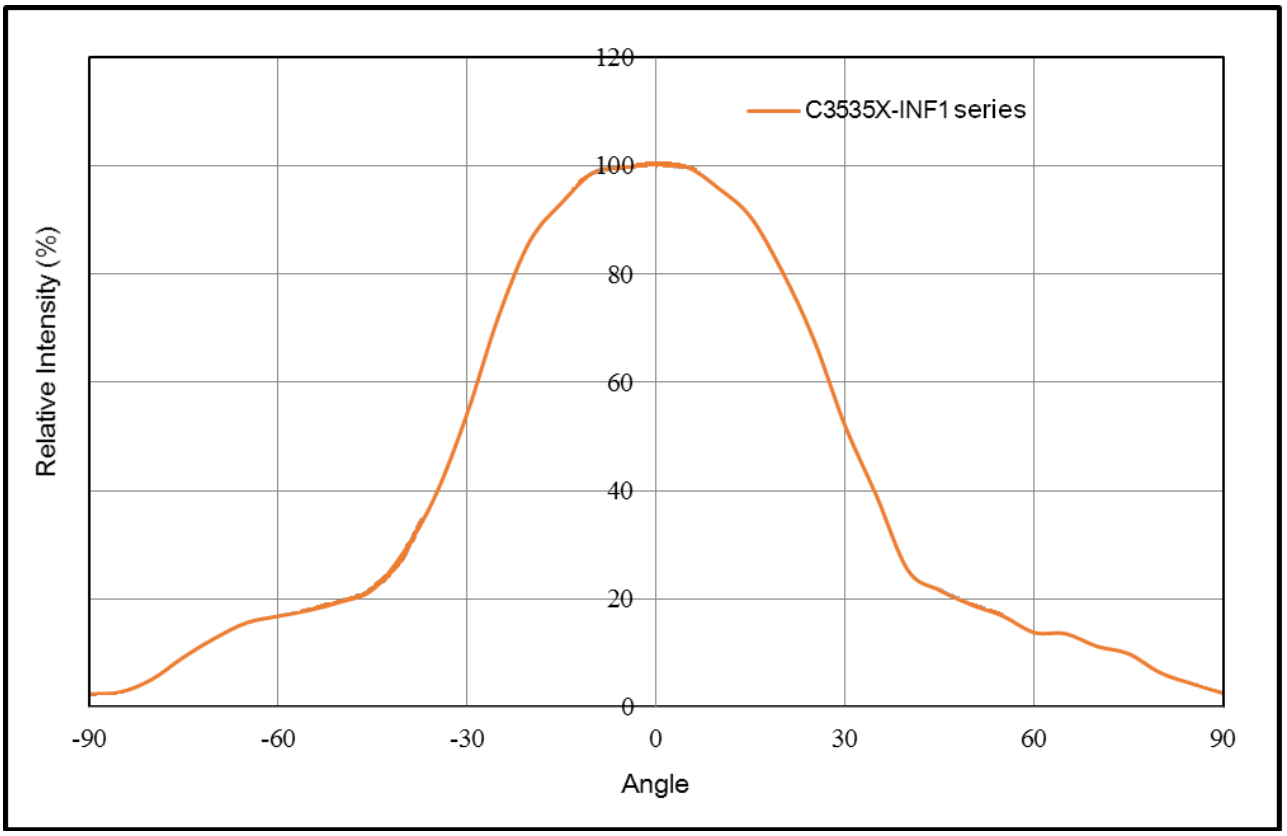
Relative Spectral Power Distribution, Tj=25 ℃

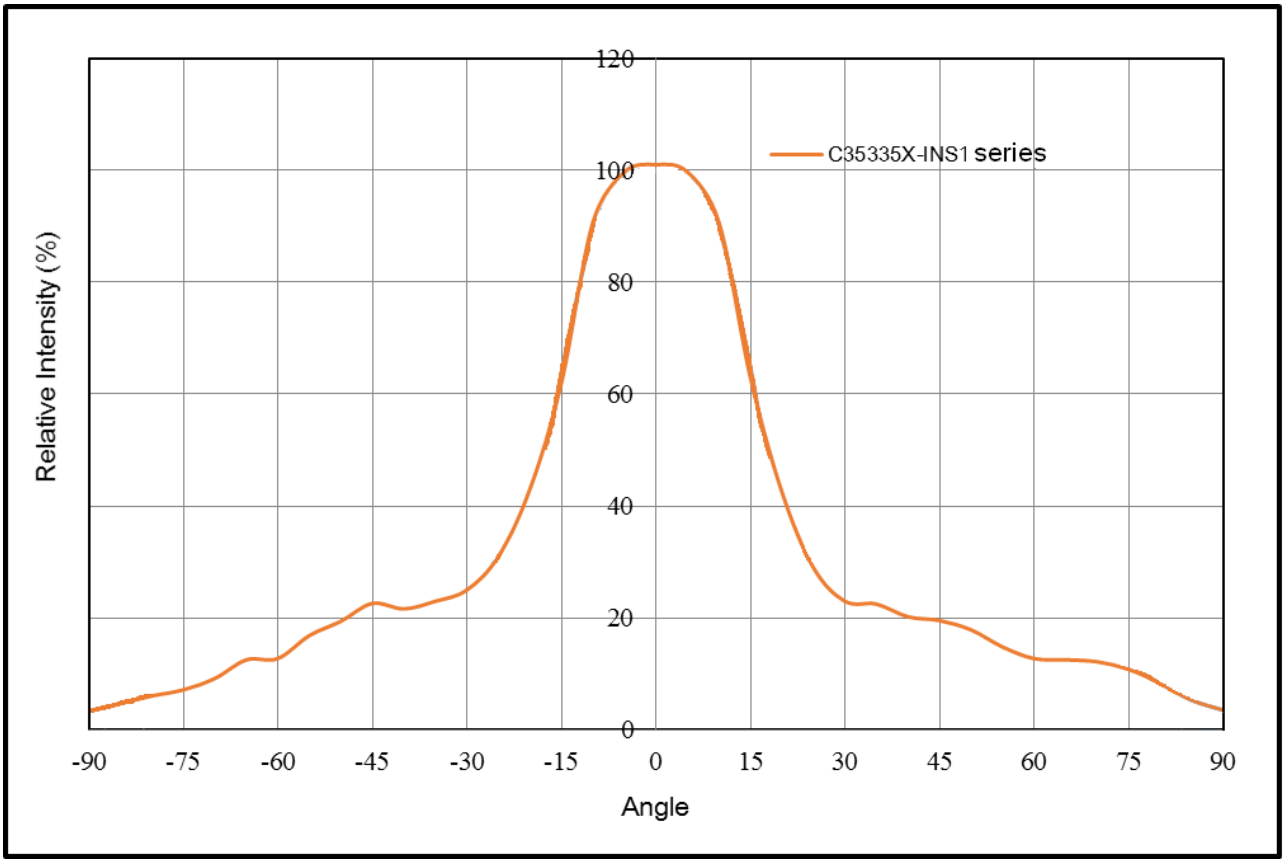


Typical Spatial Radiation Pattern, Tj=25 ℃



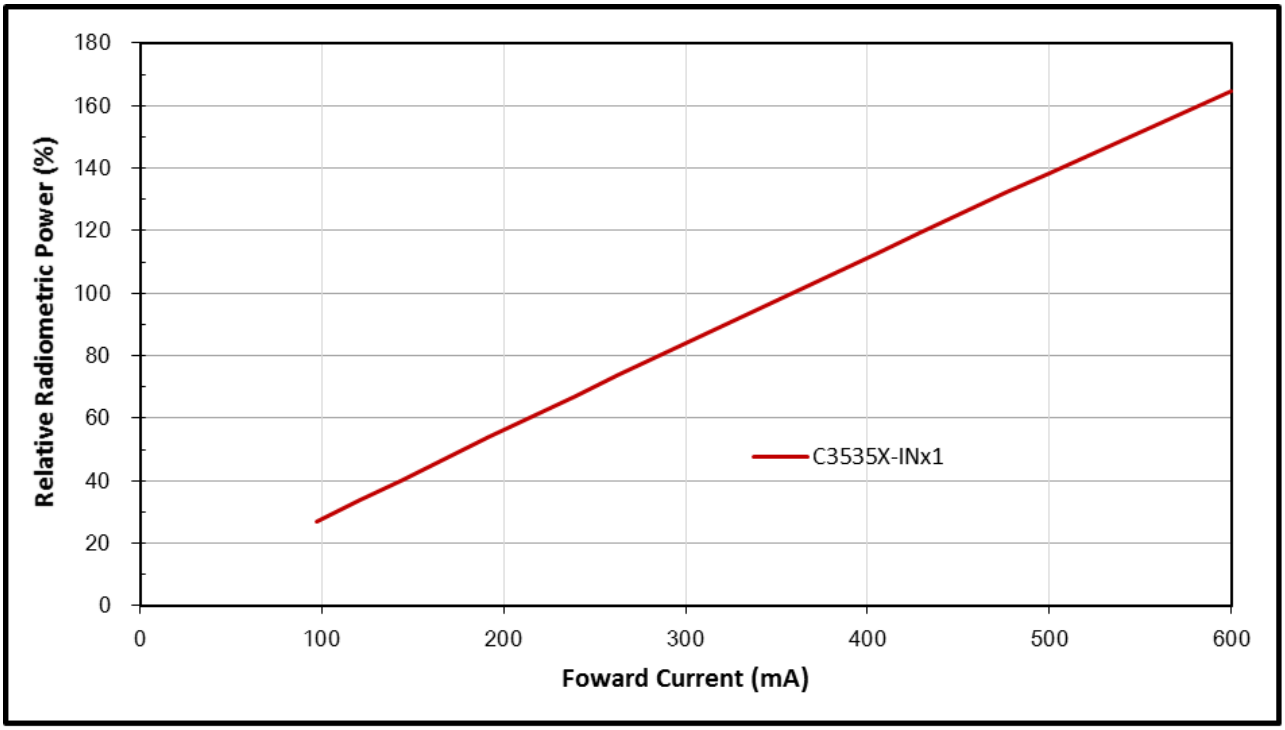




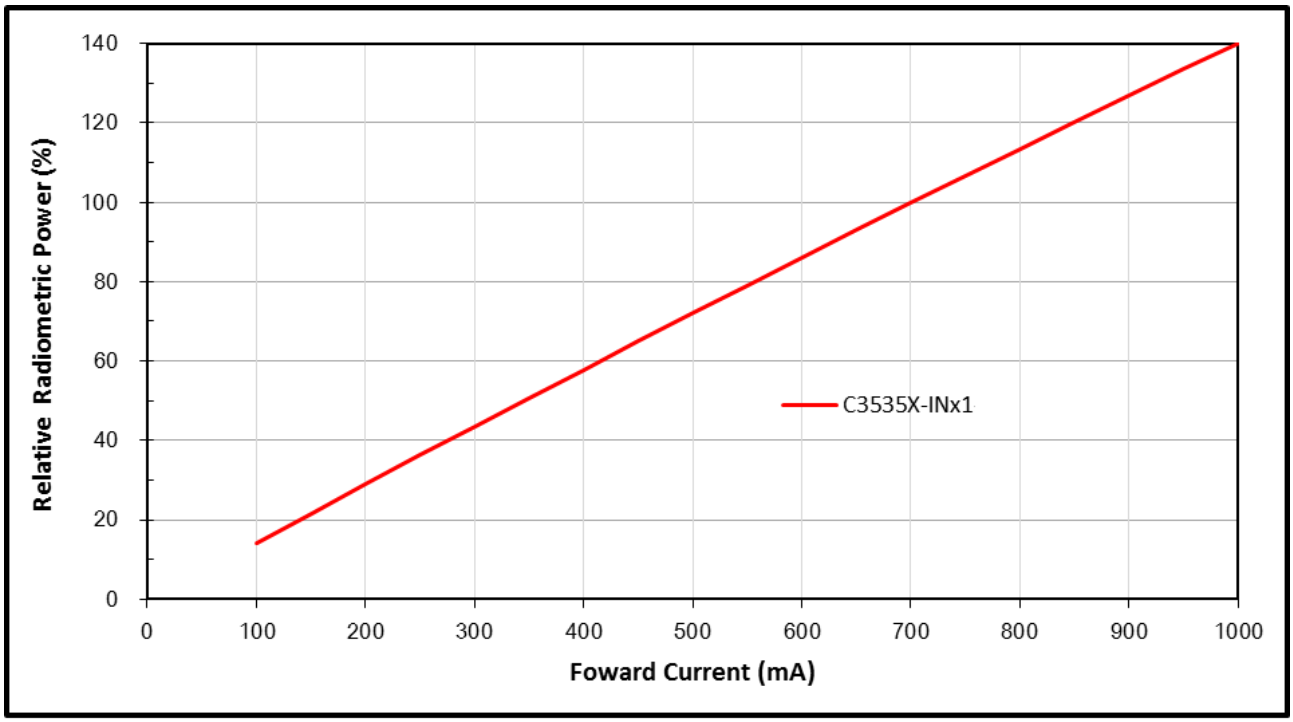


Typical Forward L-I Characteristics, Tj=25 ℃

C3535X-INx1 A series

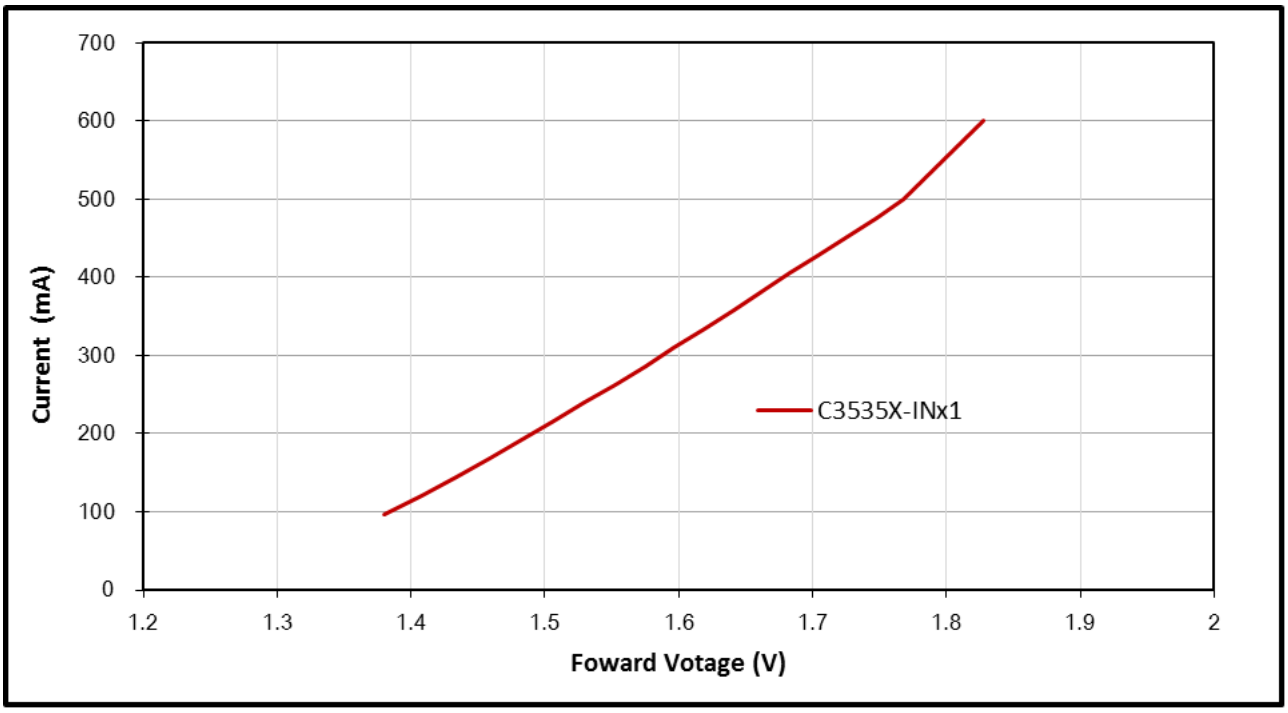


C3535X-INx1 B series

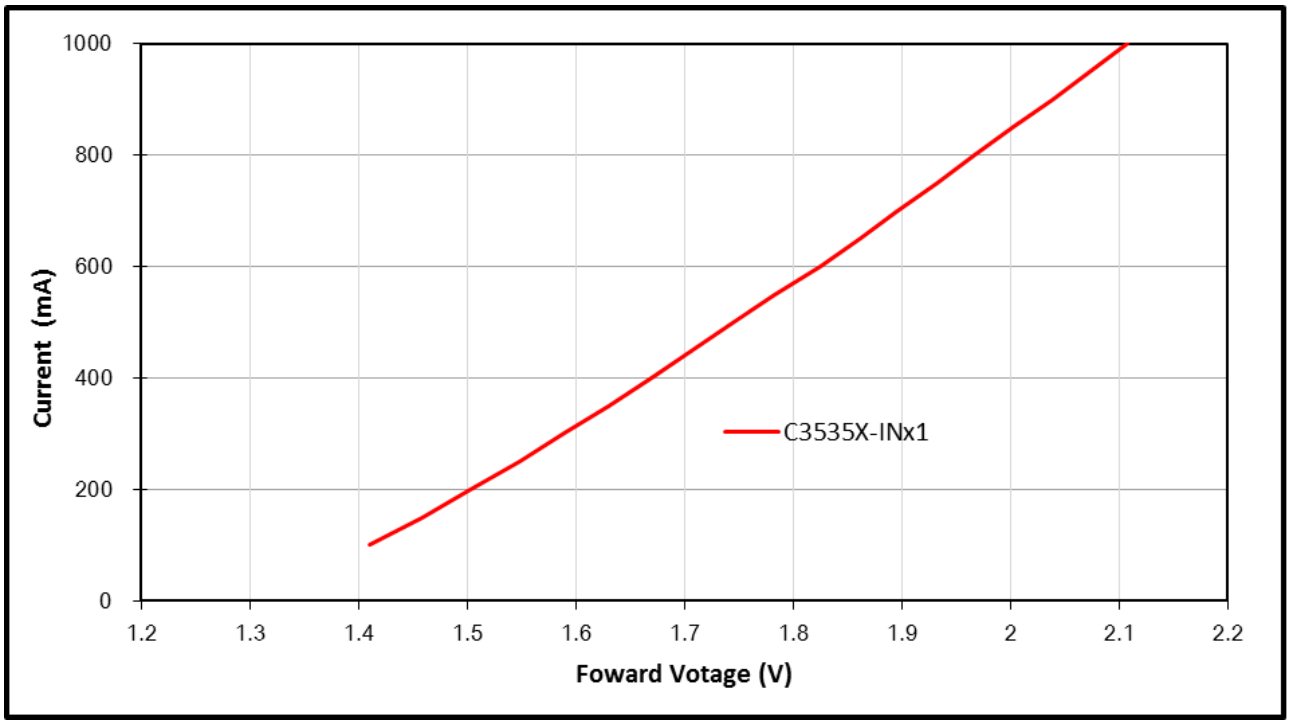


Typical Forward I-V Characteristics, Tj=25 ℃

C3535X-INx1 A series

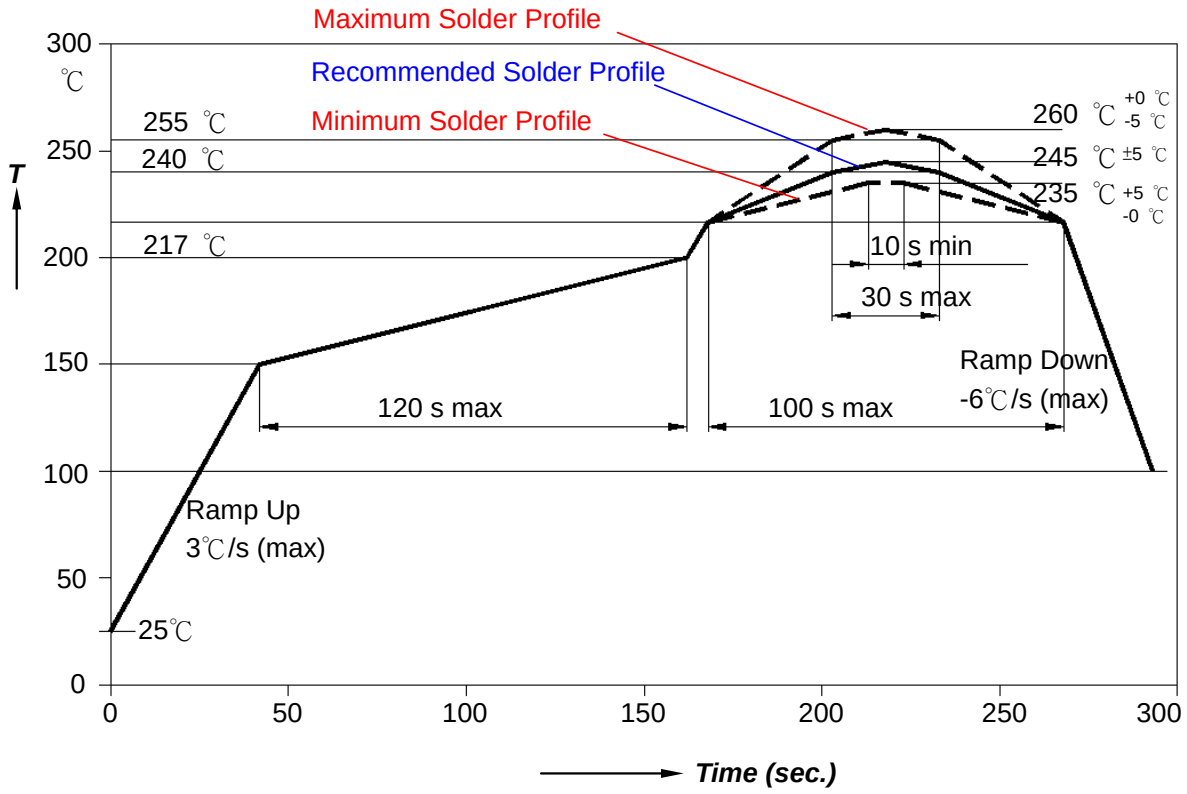


C3535X-INx1 B series



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.

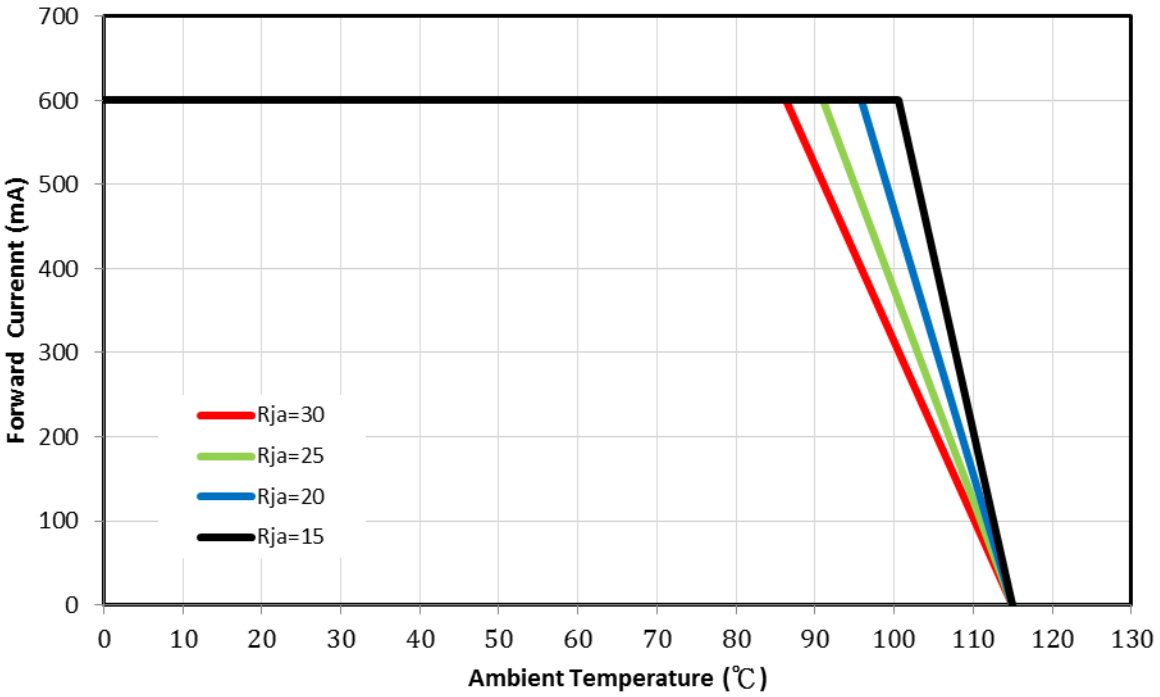


Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-up Rate (Ts_{max} to Tp)	3℃/second max.	3℃/second max.
Preheat - Temperature Min(Ts_{min}) - Temperature Max(Ts_{max}) - Time(ts_{min} to ts_{max})	 100℃ 150℃ 60-120 seconds	 150℃ 200℃ 60-180 seconds
Time maintained above: - Temperature(T_L) - Time(t_L)	 183℃ 60-150 seconds	 217℃ 60-150 seconds
Peak/classification Temperature(Tp)	215℃	260℃
Time within 5℃ of actual Peak Temperature(tp)	10-30 seconds	20-40 seconds
Ramp-Down Rate	6℃/second max.	6℃/second max.
Time 25℃ to Peak Temperature	6 minutes max.	8 minutes max.

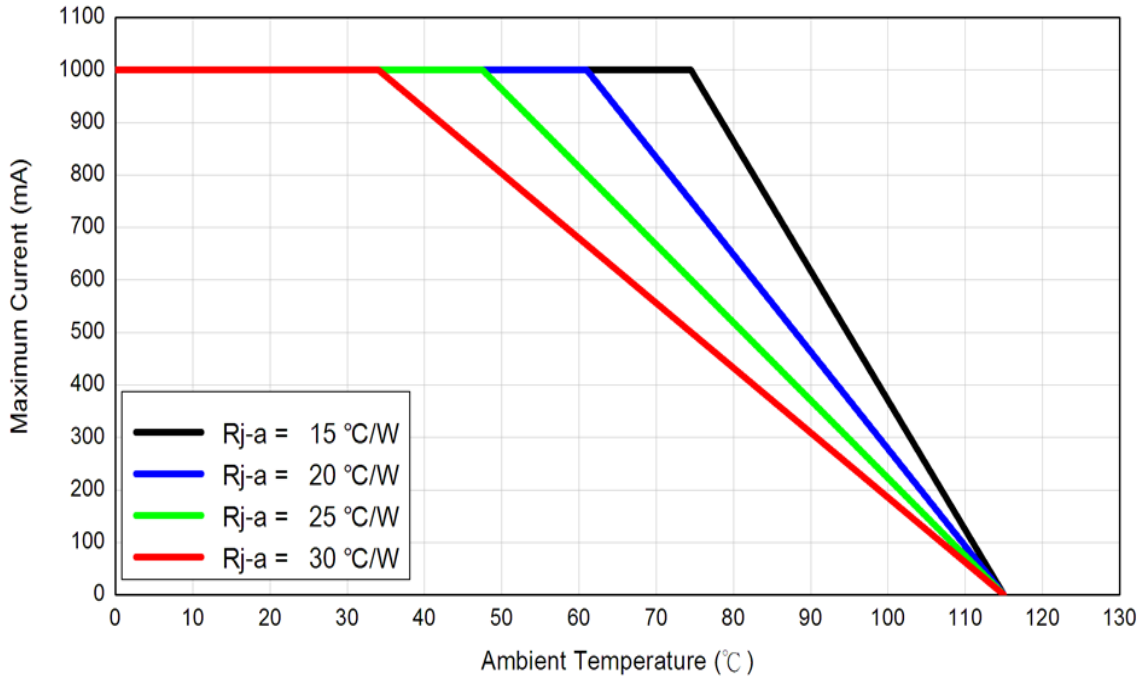
Thermal Design

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.

C3535X-INx1 A series



C3535X-INx1 B series



The junction temperature can be correlated to the thermal resistance between the junction and ambient (Rja) by the following equation.

Tj=Ta + Rja*W

Tj: LED junction temperature

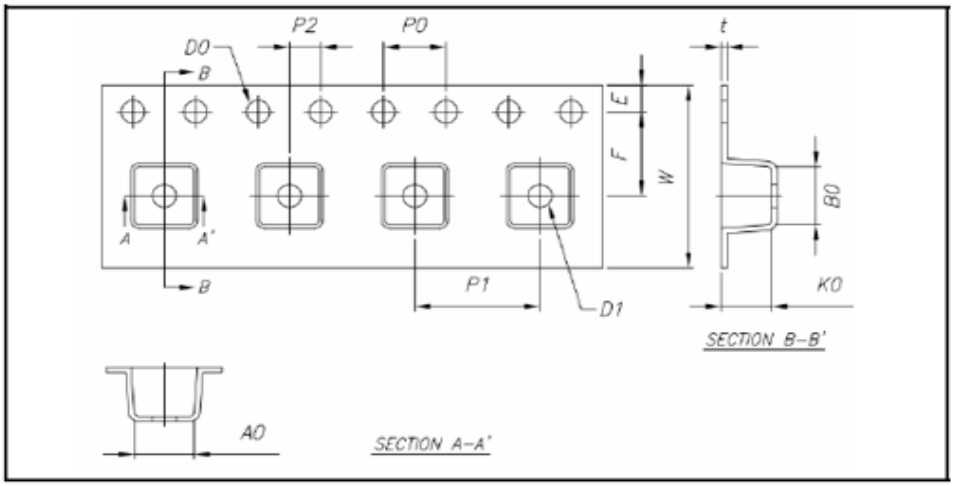
Ta: Ambient temperature

Rja: Thermal resistance between the junction and ambient

W: Input power (I_F*V_F)

Packing Information

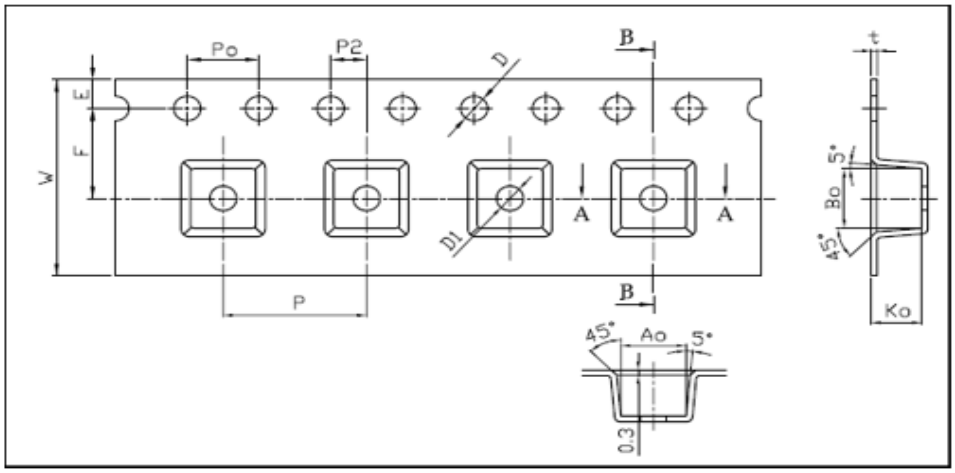
C3535X-INL1 series, Max QTY: 1000ea / roll



Item	Specification	Tol. (+/-)
W	12.00	± 0.30
E	1.75	± 0.10
F	5.50	± 0.10
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	± 0.10
P0 x10	40.00	± 0.20

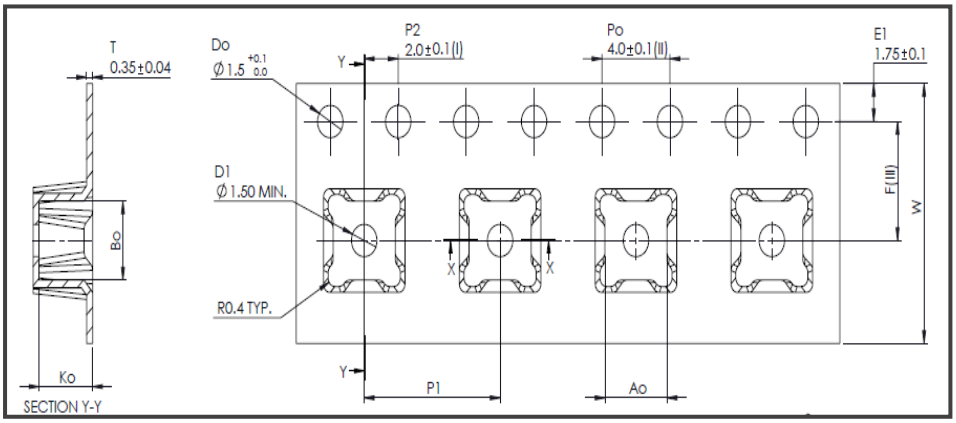
Item	Specification	Tol. (+/-)
t	0.25	±0.05
A0	3.80	±0.10
B0	3.80	±0.10
K0	2.20	±0.10

C3535X-INA1 series, Max QTY: 500ea / roll



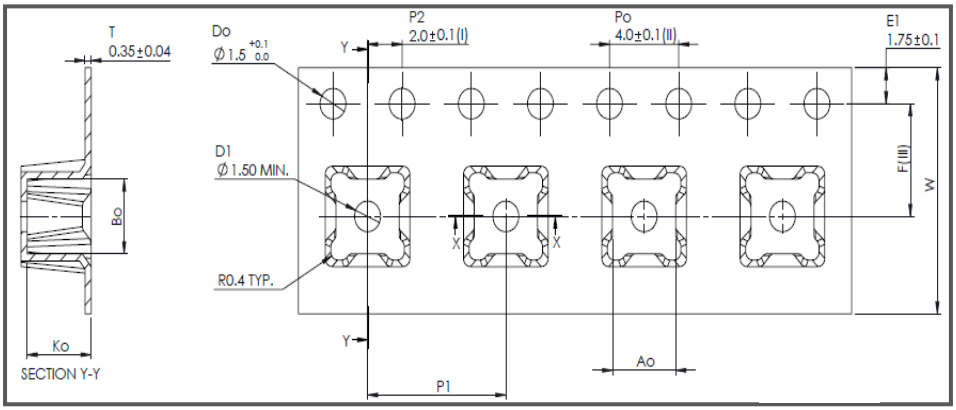
Symbol	Spec.	Tolerance
W	12.00	±0.30
E	1.75	±0.01
F	5.50	±0.01
D	1.50	+0.1/-0.0
D1	1.50	+0.1/-0.0
P0	4.00	±0.10
P	8.00	±0.10
P2	2.00	±0.10
P0*10	40.00	±0.20
A0	3.75	±0.10
B0	3.75	±0.10
K0	2.80	±0.10
t	0.35	±0.05

C3535X-INF1 series, Max QTY: 500ea / roll

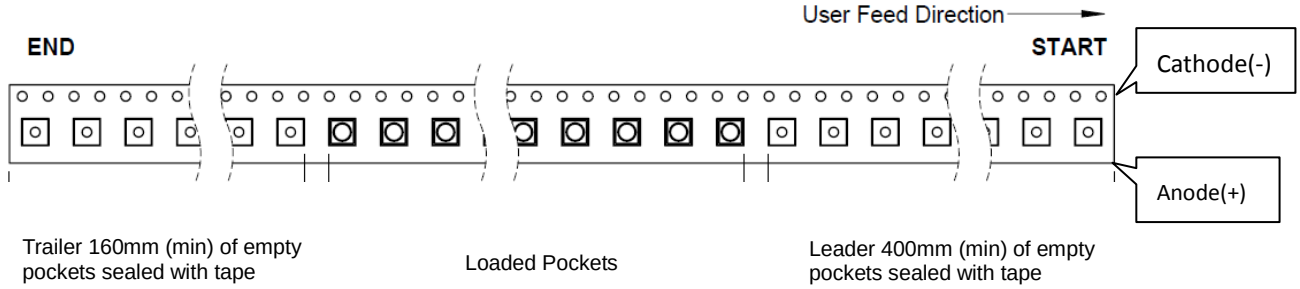


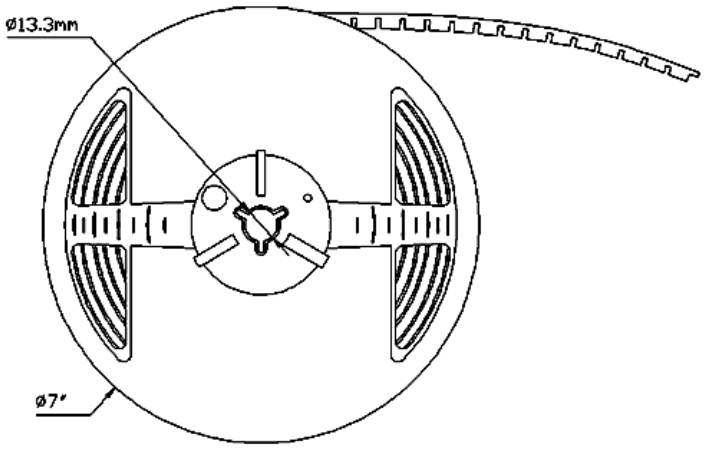
Ao	3.65	+/- 0.10
Bo	3.65	+/- 0.10
Ko	3.15	+/- 0.10
F	5.50	+/- 0.10
P1	8.00	+/- 0.10
W	12.00	+/- 0.30

C3535X-INS1 series, Max QTY: 500ea / roll



Ao	3.65	+/- 0.10
Bo	3.65	+/- 0.10
Ko	3.70	+/- 0.10
F	5.50	+/- 0.10
P_1	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** or please contact **sales@ tslc.com.tw.**

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