



C3535U-UNx1

High Power UV LED

Introduction

The C3535U-UNx1 Series LED from TSLC brings industry leading technology to the UV lighting market with its high reliability and performance. With a ceramic substrate and a 125/55 degree viewing angle primary optic, the C3535U-UNx1 is ideal for all UV curing and general UV applications.

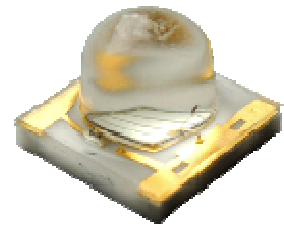
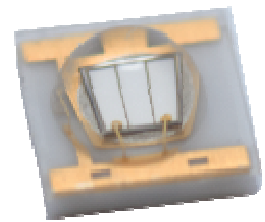


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RoHS Compliant

Characteristics

Absolute Maximum Ratings (T_j=25°C)

Parameter	Rating
	C3535U-UNx1 Series
DC Forward Current (mA)	800 mA
LED Junction Temperature	150°C
LED Operating Temperature	-40°C~85°C
Storage Temperature	-40°C~125°C
Soldering Temperature	Max. 260°C / Max. 10sec. (JEDEC 020)
ESD Sensitivity	8,000 V HBM (MIL-STD-883G)
Reverse Voltage ³	Not designed to be driven in reverse bias (VR ≤ 5V)
Peak Pulse Forward Current ⁶ (I _{FP})	1000mA, Pulse Width ≤10ms, duty cycle ≤10%
Preconditioning	Acc. to JEDEC Level 1

Notes:

- UV LEDs are not meant to be driven in reverse bias.
- Do not drive at rated current for more than 5 seconds without proper thermal management.
- When the LEDs are illuminating, operating current should be decided after considering the packages maximum temperature.
- Caution: These devices emit high intensity UV/NUV light. Necessary precautions must be taken during operation. Do not look directly into the light or look through the optical system when in operation. Protective eyewear should be worn at all times during operation.
- Lens discoloration may occur with prolonged exposure to UV/NUV light. Lens material will need to be tested for UV/NUV light compatibility and durability.
- UV LEDs are not recommended for peak pulse operations. Above maximum ratings are only for reference.
- 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.
- Minimum and maximum values refer to the limits and set-up of TSLC's testers and conditions. Values may vary depending on the conditions of other testing equipment. All measurements within this datasheet are defined as long-term production mean values and are only given for reference.**

General Characteristics at 500mA

Part number	Peak Wavelength λ_p		$2\theta_{1/2}$	Temperature Coefficient of Vf (mV/°C)	Thermal Resistance Junction to Pad (°C/W)
	Min	Max		$\Delta V_f / \Delta T_J$	$R\theta_{J-L}$
C3535U-UNL1-A1G11H-U40	380	390	125	-2~-4	8
C3535U-UNL1-A1G11H-U50	390	400	125	-2~-4	8
C3535U-UNL1-A1G11H-U60	400	410	125	-2~-4	8
C3535U-UNL1-A1G11H-U70	410	420	125	-2~-4	8
C3535U-UNL1-A1G11H-U80	420	430	125	-2~-4	8
C3535U-UNF1-A1G11H-U40	380	390	55	-2~-4	8
C3535U-UNF1-A1G11H-U50	390	400	55	-2~-4	8
C3535U-UNF1-A1G11H-U60	400	410	55	-2~-4	8
C3535U-UNF1-A1G11H-U70	410	420	55	-2~-4	8
C3535U-UNF1-A1G11H-U80	420	430	55	-2~-4	8

Notes: The peak wavelength is measured with an accuracy of $\pm 1\text{nm}$

Radiometric Power and Forward Voltage ($T_j=25^{\circ}\text{C}$)

Part number	Performance at Test Current (500mA)					Performance at 1000mA
	Group	Radiometric Power (mW)		VF		Calculated Minimum Radiometric Power* (mW)
		Min	Max	Min	Max	
C3535U-UNL1-A1G11H-U40 (380-390nm)	NF1	600	650	3.2	4.2	1100
	NF2	650	700	3.2	4.2	1200
	NF3	700	750	3.2	4.2	1300
	NF4	750	800	3.2	4.2	1400
	NF5	800	750	3.2	4.2	1500
C3535U-UNL1-A1G11H-U50 (390-400nm)	NF3	700	750	3.2	4.2	1300
	NF4	750	800	3.2	4.2	1400
	NF5	800	850	3.2	4.2	1500
	NG1	850	900	3.2	4.2	1600
	NG2	900	1000	3.2	4.2	1700
	NG3	1000	1100	3.2	4.2	1800
C3535U-UNL1-A1G11H-U60 (400-410nm)	NF3	700	750	3.2	4.2	1300
	NF4	750	800	3.2	4.2	1400
	NF5	800	850	3.2	4.2	1500
	NG1	850	900	3.2	4.2	1600
	NG2	900	1000	3.2	4.2	1700
	NG3	1000	1100	3.2	4.2	1800
C3535U-UNL1-A1G11H-U70 (410-420nm)	NF3	700	750	3.2	4.2	1300
	NF4	750	800	3.2	4.2	1400
	NF5	800	850	3.2	4.2	1500
	NG1	850	900	3.2	4.2	1600
	NG2	900	1000	3.2	4.2	1700
	NG3	1000	1100	3.2	4.2	1800
C3535U-UNL1-A1G11H-U80 (420-430nm)	NF3	700	750	3.2	4.2	1300
	NF4	750	800	3.2	4.2	1400
	NF5	800	850	3.2	4.2	1500
	NG1	850	900	3.2	4.2	1600
	NG2	900	1000	3.2	4.2	1700
	NG3	1000	1100	3.2	4.2	1800

Part number	Performance at Test Current (500mA)					Performance at 1000mA
	Group	Radiometric Power (mW)		VF		Calculated Minimum Radiometric Power* (mW)
		Min	Max	Min	Max	
C3535U-UNF1-A1G11H-U40 (380-390nm)	NE4	520	560	3.2	4.2	960
	NE5	560	600	3.2	4.2	1000
	NF1	600	650	3.2	4.2	1100
	NF2	650	700	3.2	4.2	1200
	NF3	700	750	3.2	4.2	1300
C3535U-UNF1-A1G11H-U50 (390-400nm)	NF1	600	650	3.2	4.2	1100
	NF2	650	700	3.2	4.2	1200
	NF3	700	750	3.2	4.2	1300
	NF3	700	750	3.2	4.2	1300
	NF4	750	800	3.2	4.2	1400
	NF5	800	850	3.2	4.2	1500
	NG1	850	900	3.2	4.2	1600
C3535U-UNF1-A1G11H-U60 (400-410nm)	NF1	600	650	3.2	4.2	1100
	NF2	650	700	3.2	4.2	1200
	NF3	700	750	3.2	4.2	1300
	NF3	700	750	3.2	4.2	1300
	NF4	750	800	3.2	4.2	1400
	NF5	800	850	3.2	4.2	1500
	NG1	850	900	3.2	4.2	1600
C3535U-UNF1-A1G11H-U70 (410-420nm)	NF1	600	650	3.2	4.2	1100
	NF2	650	700	3.2	4.2	1200
	NF3	700	750	3.2	4.2	1300
	NF3	700	750	3.2	4.2	1300
	NF4	750	800	3.2	4.2	1400
	NF5	800	850	3.2	4.2	1500
	NG1	850	900	3.2	4.2	1600

C3535U-UNF1-A1G11H-U80 (420-430nm)	NF1	600	650	3.2	4.2	1100
	NF2	650	700	3.2	4.2	1200
	NF3	700	750	3.2	4.2	1300
	NF3	700	750	3.2	4.2	1300
	NF4	750	800	3.2	4.2	1400
	NF5	800	850	3.2	4.2	1500
	NG1	850	900	3.2	4.2	1600

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

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

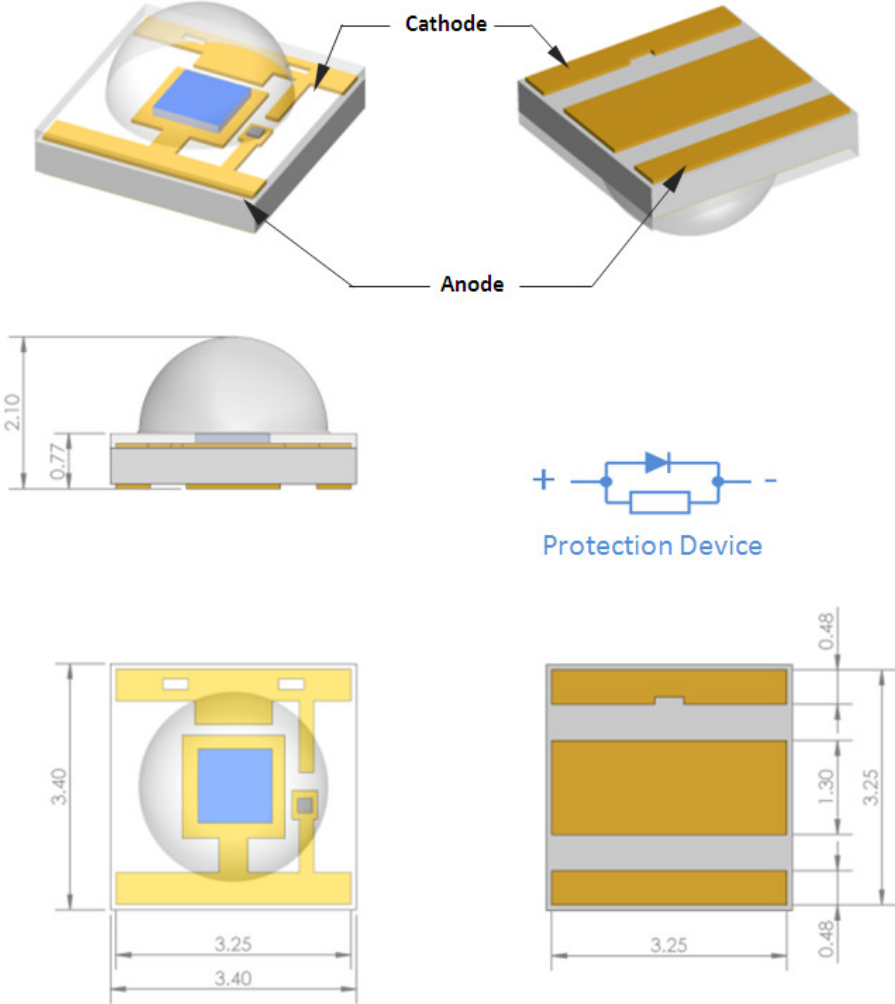
* Calculated values are for reference only.

Electrical Characteristics

Part number	Performance at Test Current (500mA)		
	Vf Group	Minimum (V)	Maximum (V)
C3535U-UNL1 series (beam angle 125°) C3535U-UNF1 series (beam angle 55°)	V32	3.2	3.4
	V34	3.4	3.6
	V36	3.6	3.8
	V38	3.8	4.0
	V40	4.0	4.2

Mechanical Dimensions

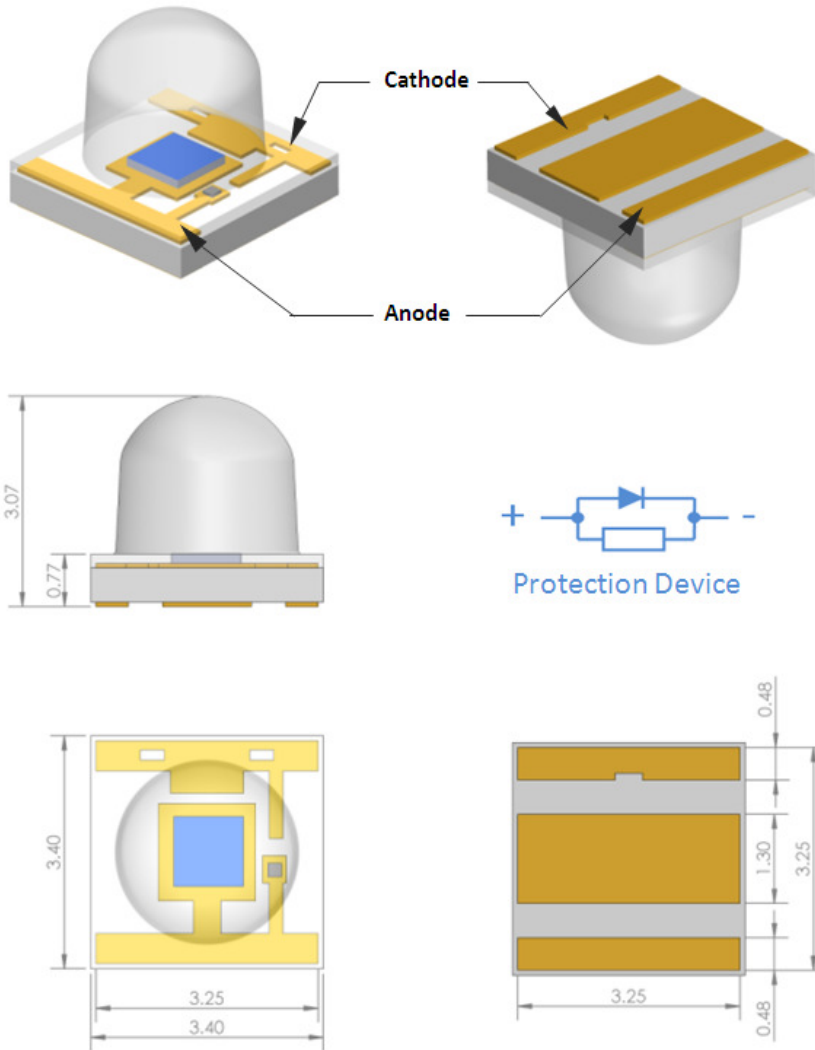
C3535U-UNL1 series (beam angle 125°)



Notes :

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

C3535U-UNF1 series (beam angle 55°)

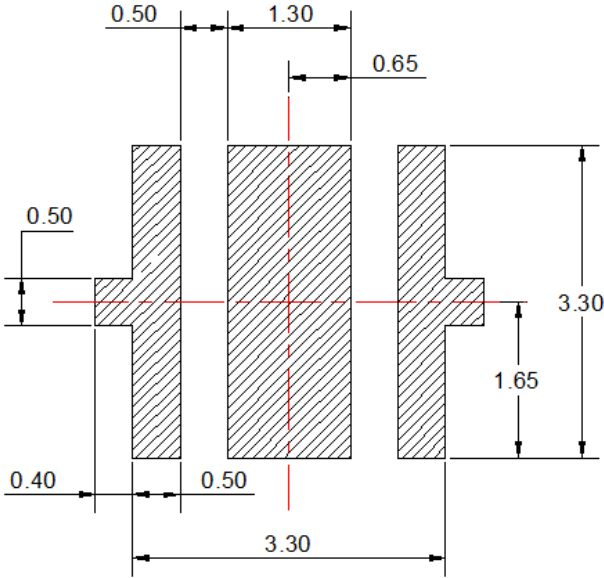


Notes :

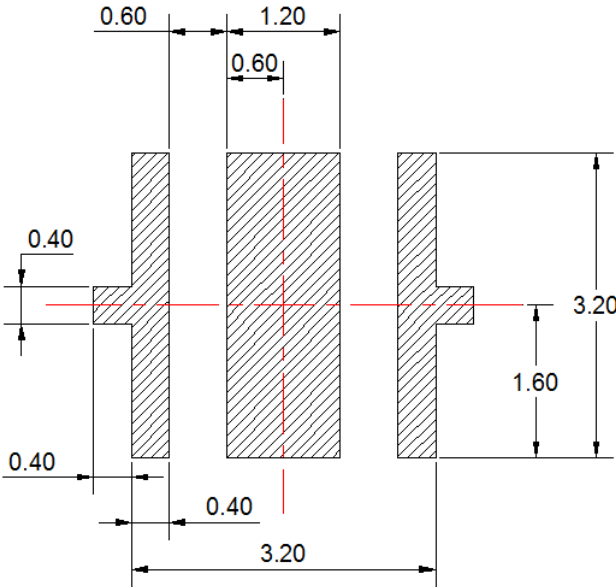
- 1. Drawing is not to scale
- 2. All dimensions are in millimeter
- 3. Dimensions are $\pm 0.13\text{mm}$ unless otherwise indicated

Recommended Solder Pad Design

Recommended Soldering Pad Design



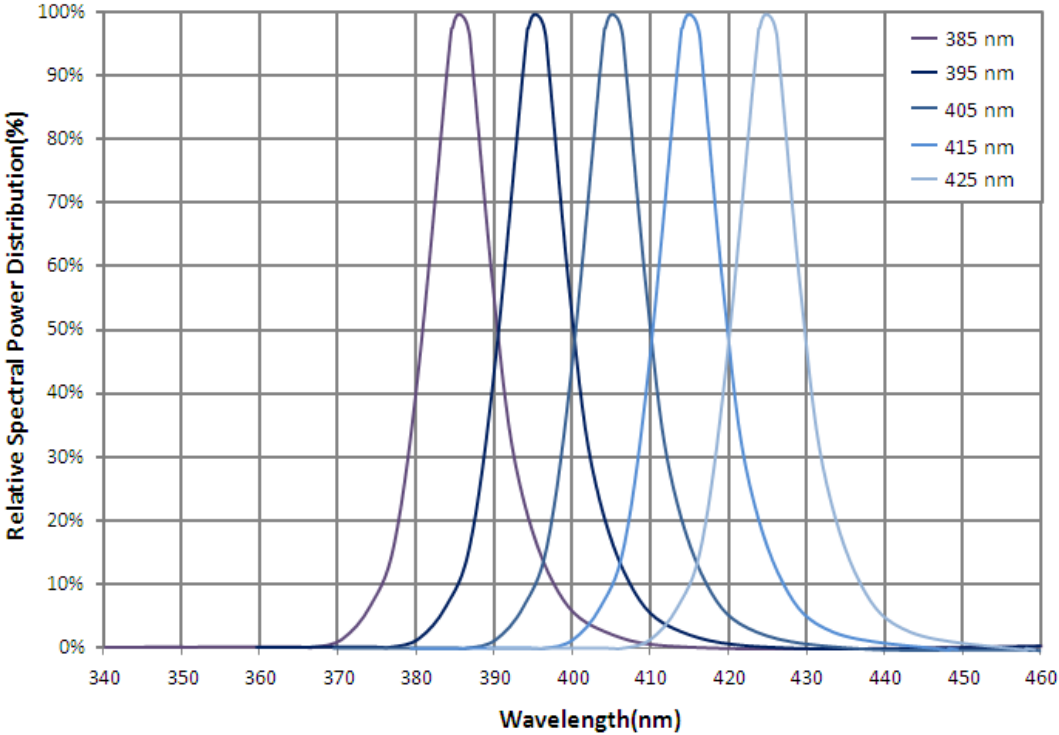
Recommended Stencil Pattern Design (Marked Area is Opening)



Notes :

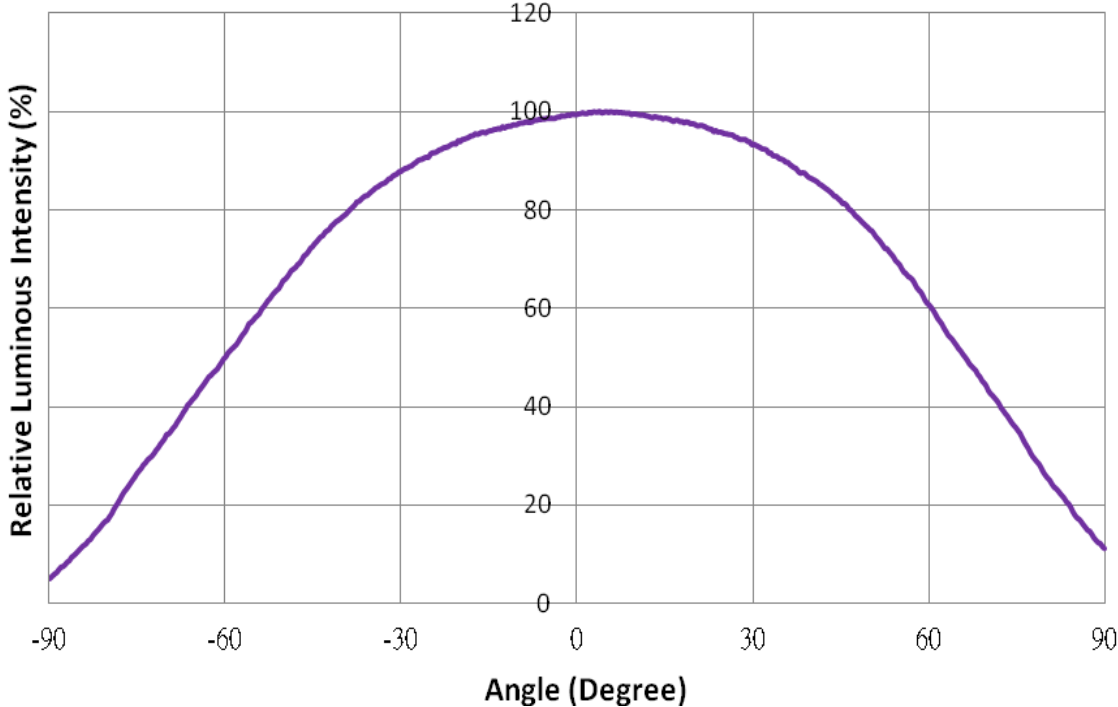
- 1. Drawing is not to scale
- 2. All dimensions are in millimeter

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

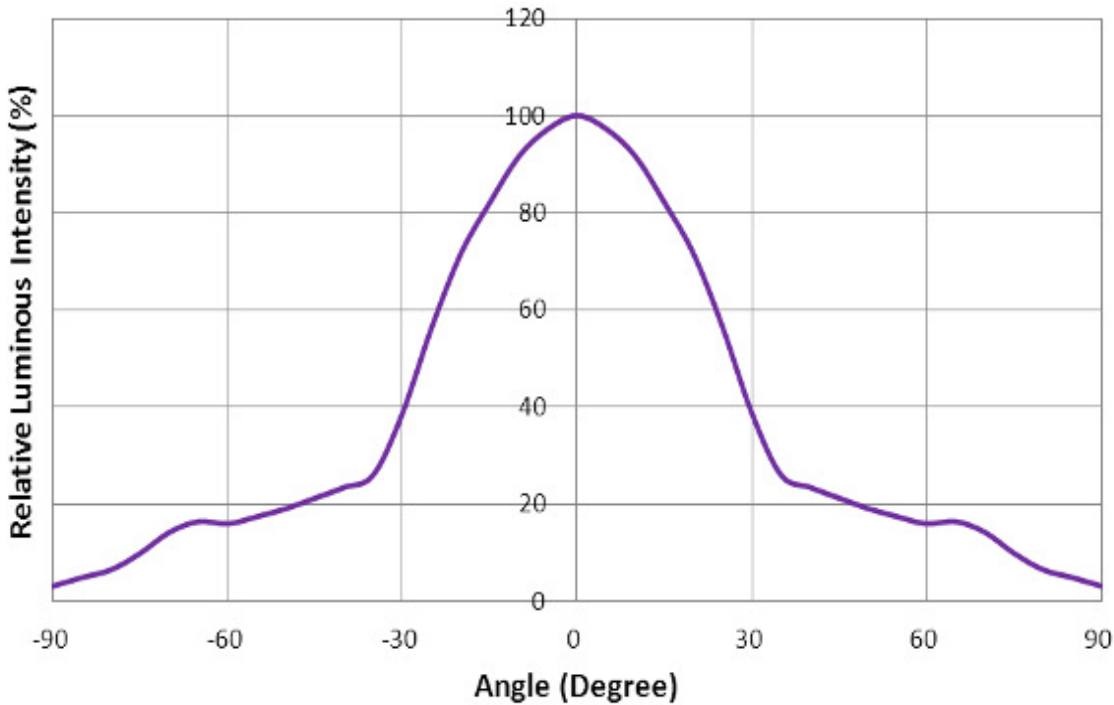


Typical Spatial Radiation Pattern

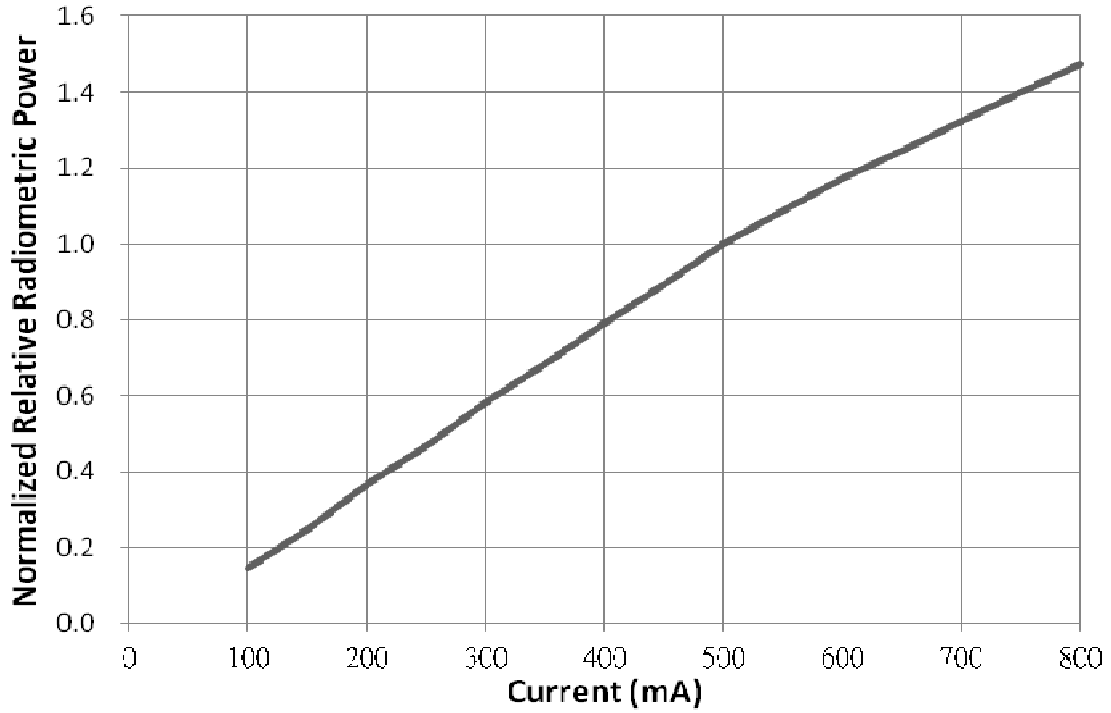
C3535U-UNL1 series (beam angle 125°)



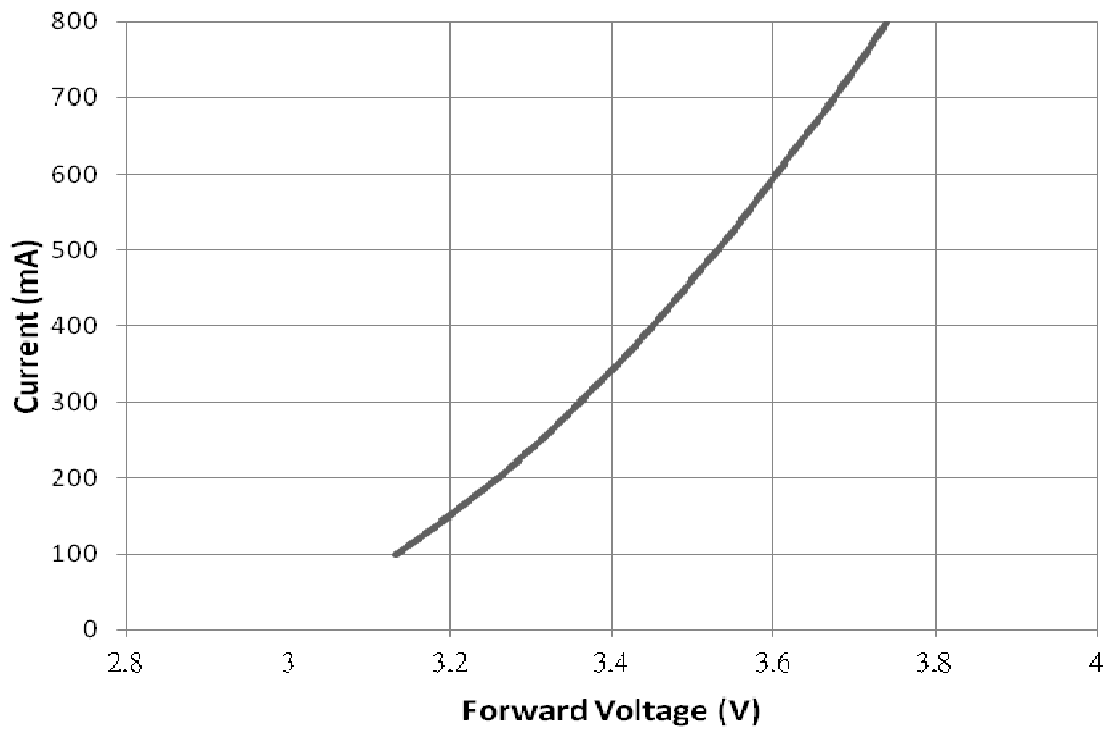
C3535U-UNF1 series (beam angle 55°)



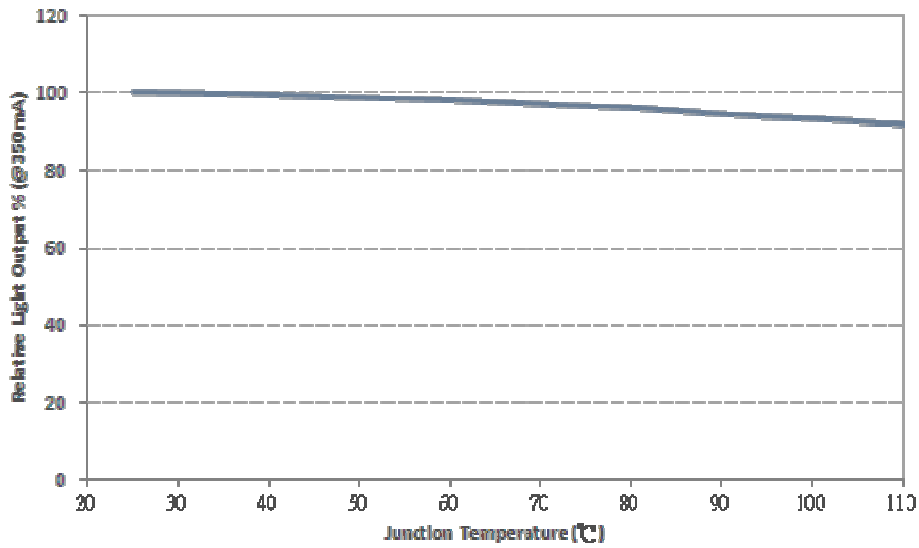
Typical Forward L-I Characteristics, $T_j=25^\circ\text{C}$



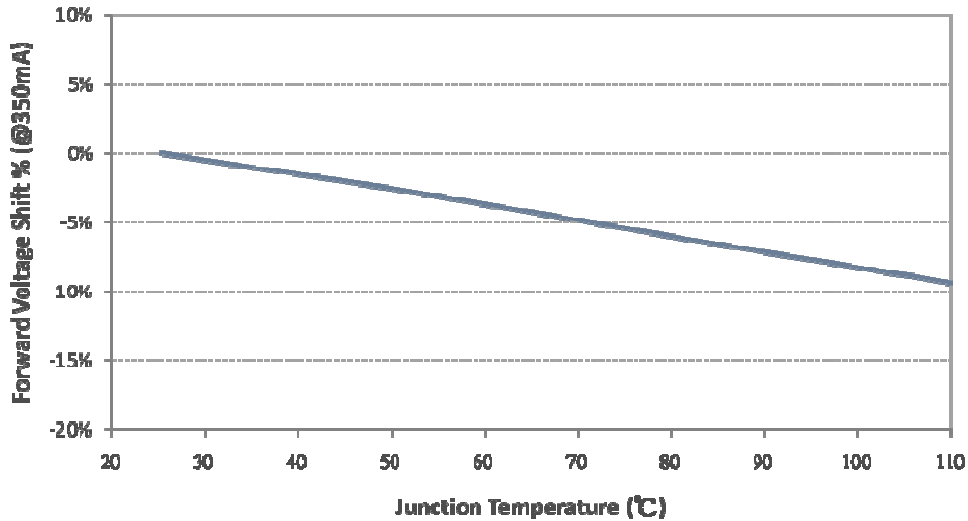
Typical Forward I-V Characteristics, $T_j=25^\circ\text{C}$



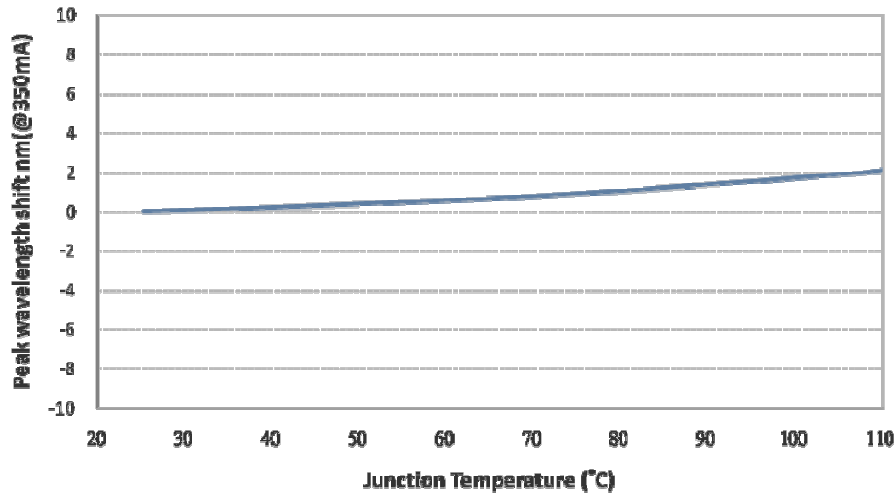
Typical Light Output vs. T_j Characteristics



Typical Forward Voltage vs. T_j Characteristics

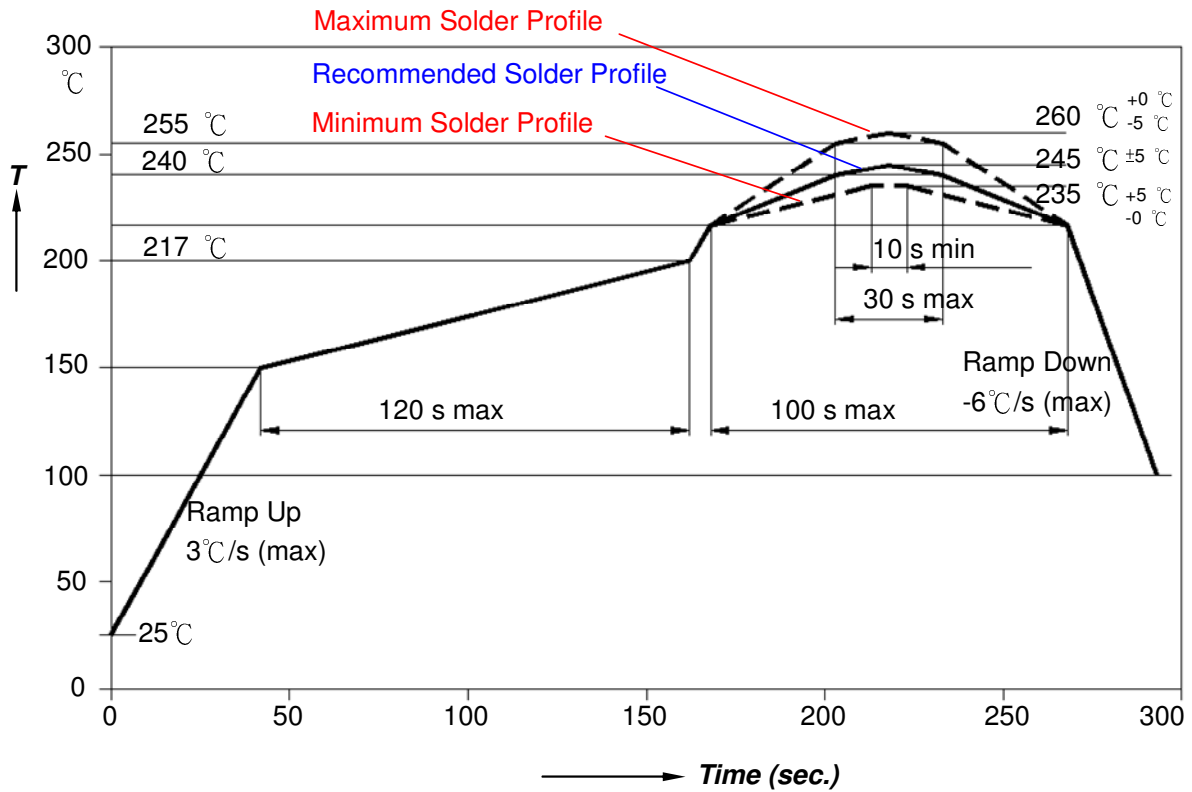


Typical Peak Wavelength vs. T_j Characteristics



Recommended Soldering Profile

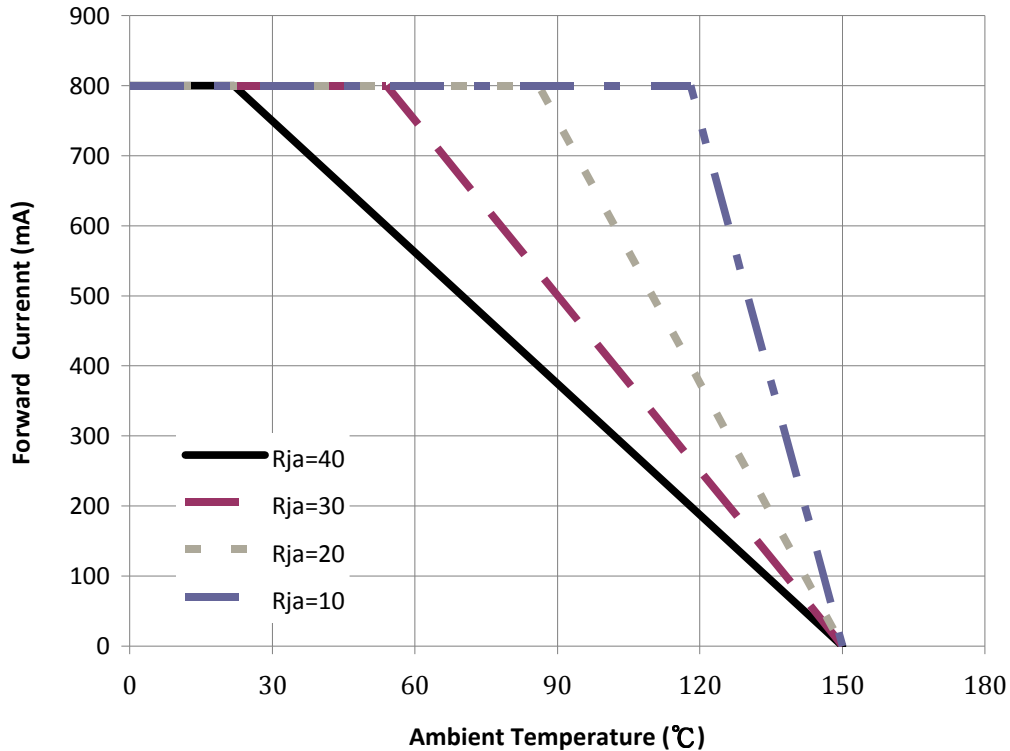
The LEDs can be soldered using the parameters listed below. As a general guideline, the users are suggested to follow the recommended soldering profile provided by the manufacturer of the solder paste. Although the recommended soldering conditions are specified in the list, reflow soldering at the lowest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



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-up Rate (T _{S_{max}} to T _p)	3°C/second max.	3°C/second max.
Preheat		
- Temperature Min(T _{S_{min}})	100°C	150°C
- Temperature Max(T _{S_{max}})	150°C	200°C
- Time(t _{S_{min}} to t _{S_{max}})	60-120 seconds	60-180 seconds
Time maintained above:		
- Temperature(T _L)	183°C	217°C
- Time(t _L)	60-150 seconds	60-150 seconds
Peak/classification Temperature(T _p)	215°C	260°C
Time within 5°C of actual Peak Temperature(t _p)	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

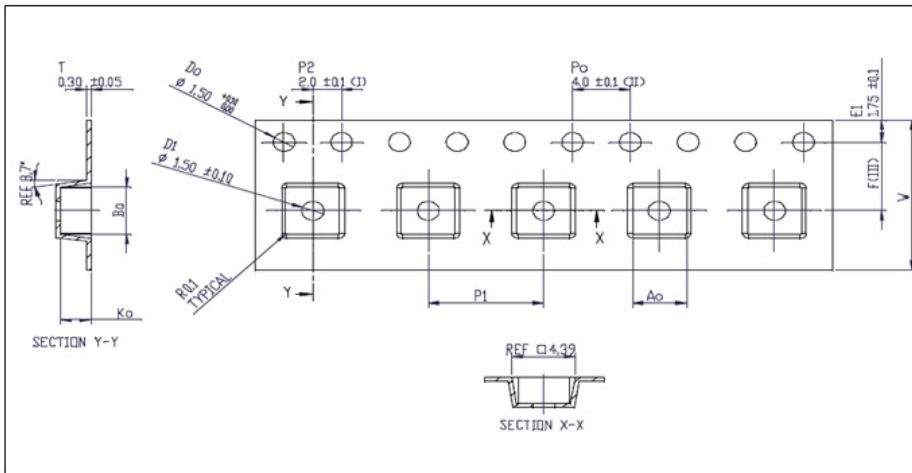
T_a : Ambient temperature

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

W : Input power ($I_F * V_F$)

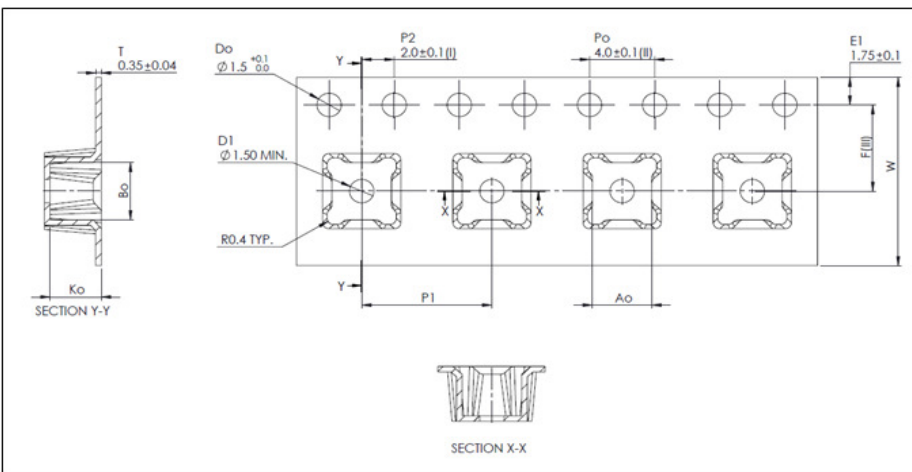
Packing Information

C3535U-UNL1 series, Max QTY: 500ea / roll

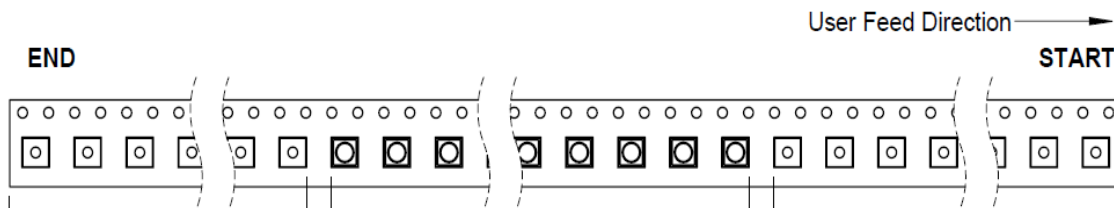


Item	Specification	Tol.(+/-)
A0	3.75	±0.10
B0	3.75	±0.10
K0	2.10	±0.10
F	5.50	±0.10
P1	8.00	±0.10
W	12.00	+0.3/-0.1

C3535U-UNF1 series, Max QTY: 500ea / roll



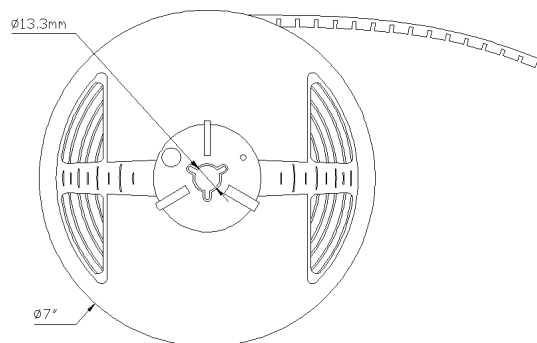
Item	Specification	Tol.(+/-)
A0	3.65	±0.10
B0	3.65	±0.10
K0	3.15	±0.10
F	5.50	±0.10
P1	8.00	±0.10
W	12.00	±0.30



Trailer 160mm (min) of empty pockets sealed with tape

Loaded Pockets

Leader 400mm (min) of empty pockets sealed with tape



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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