



N3535U-UNxx Series High Power UV LED

Introduction

The N3535U-UNxx 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 N3535U-UNxx is ideal for all UV curing and general UV applications.



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RoHS Compliant

Characteristics

Absolute Maximum Ratings ($T_j=25^{\circ}\text{C}$)

Parameter	Rating
	N3535U-UNxx Series
DC Forward Current (mA)	1000 mA
LED Junction Temperature	150 $^{\circ}\text{C}$
LED Operating Temperature	-40 $^{\circ}\text{C}$ ~85 $^{\circ}\text{C}$
Storage Temperature	-40 $^{\circ}\text{C}$ ~125 $^{\circ}\text{C}$
Soldering Temperature	Max. 260 $^{\circ}\text{C}$ / Max. 10sec. (JEDEC 020)
ESD Sensitivity	2,000 V HBM (JESD-22A-114-B)
Reverse Voltage	Not designed to be driven in reverse bias ($V_R \leq 5\text{V}$)
Preconditioning	Acc. to JEDEC Level 1

General Characteristics at 500mA

Part number	Color	Peak Wavelength λ_p		$2\theta_{1/2}$	Temperature Coefficient of V_f (mV/ $^{\circ}\text{C}$)	Thermal Resistance Junction to Pad ($^{\circ}\text{C}/\text{W}$)
		Min	Max		$\Delta V_f / \Delta T_j$	$R_{\theta_{J-L}}$
N3535U-UNLx	U40	380	390	125	-2~-4	4.4
	U50	390	400	125	-2~-4	4.4
	U60	400	410	125	-2~-4	4.4
	U70	410	420	125	-2~-4	4.4
	U80	420	430	155	-2~-4	4.4
N3535U-UNFx	U40	380	390	55	-2~-4	4.4
	U50	390	400	55	-2~-4	4.4
	U60	400	410	55	-2~-4	4.4
	U70	410	420	55	-2~-4	4.4
	U80	420	430	55	-2~-4	4.4

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.
4. 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.
5. Do not drive at rated current for more than 5 seconds without proper thermal management.

- 6. Always follow thermal design recommendations in the relevant Application Note.
- 7. Lens discoloration may occur with prolonged exposure to UN/NUV light. Additional lens material will need to be tested for UN/NUV light compatibility and durability.

Radiometric Power and Forward Voltage (T_j=25°C)

Part number	Color	Performance at Test Current (500mA)					Performance at 700mA
		Group	Radiometric Power (mW)		VF		Calculated Minimum Radiometric Power* (mW)
			Min	Max	Min	Max	
N3535U-UNLx (beam angle 125°)	U40 (380-390nm)	NF1	600	650	3.0	4.2	840
		NF2	650	700	3.0	4.2	910
		NF3	700	750	3.0	4.2	980
		NF4	750	800	3.0	4.2	1050
		NF5	800	850	3.0	4.2	1120
		NG1	850	900	3.0	4.2	1190
		NG2	900	950	3.0	4.2	1260
		NG3	950	1000	3.0	4.2	1330
	U50 (390-400nm)	NF1	600	650	3.2	3.8	840
		NF2	650	700	3.2	3.8	910
		NF3	700	750	3.0	4.2	980
		NF4	750	800	3.0	4.2	1050
		NF5	800	850	3.0	4.2	1120
		NG1	850	900	3.0	4.2	1190
		NG2	900	950	3.0	4.2	1260
		NG3	950	1000	3.0	4.2	1330
		NH1	1000	1100	3.0	4.2	1400
	U60 (400-410nm)	NF1	600	650	3.2	3.8	840
		NF2	650	700	3.2	3.8	910
		NF3	700	750	3.0	4.2	980
		NF4	750	800	3.0	4.2	1050
		NF5	800	850	3.0	4.2	1120
		NG1	850	900	3.0	4.2	1190
		NG2	900	950	3.0	4.2	1260
		NG3	950	1000	3.0	4.2	1330
		NH1	1000	1100	3.0	4.2	1400
	U70 (410-420nm)	NF1	600	650	3.2	3.8	840
		NF2	650	700	3.2	3.8	910



		NF3	700	750	3.2	3.8	980
		NF4	750	800	3.0	4.2	1050
		NF5	800	850	3.0	4.2	1120
		NG1	850	900	3.0	4.2	1190
		NG2	900	950	3.0	4.2	1260
		NG3	950	1000	3.0	4.2	1330
	U80 (420-430nm)	ND5	360	400	3.0	4.2	505
		NE1	400	440	3.0	4.2	560
		NE2	440	480	3.0	4.2	615
		NE3	480	520	3.0	4.2	670
		NE4	520	560	3.0	4.2	730
		NE5	560	600	3.2	3.8	785
		NF1	600	650	3.2	3.8	840
		NF2	650	700	3.2	3.8	910
		NF3	700	750	3.2	3.8	980
		NF4	750	800	3.0	4.2	1050
		NF5	800	850	3.0	4.2	1120
		NG1	850	900	3.0	4.2	1190
		NG2	900	950	3.0	4.2	1260
		NG3	950	1000	3.0	4.2	1330

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.

Part number	Color	Performance at Test Current (500mA)					Performance at 700mA
		Group	Radiometric Power (mW)		VF		Calculated Minimum Radiometric Power* (mW)
			Min	Max	Min	Max	
N3535U-UNFx (beam angle 55°)	U40 (380-390nm)	NE5	560	600	3.0	4.2	785
		NF1	600	650	3.0	4.2	840
		NF2	650	700	3.0	4.2	910
		NF3	700	750	3.0	4.2	980
		NF4	750	800	3.0	4.2	1050
		NF5	800	850	3.0	4.2	1120

		NG1	850	900	3.0	4.2	1190
		NG2	900	950	3.0	4.2	1260
		NG3	950	1000	3.0	4.2	1330
	U50 (390-400nm)	NE5	560	600	3.2	3.8	785
		NF1	600	650	3.2	3.8	840
		NF2	650	700	3.2	3.8	910
		NF3	700	750	3.0	4.2	980
		NF4	750	800	3.0	4.2	1050
		NF5	800	850	3.0	4.2	1120
		NG1	850	900	3.0	4.2	1190
		NG2	900	950	3.0	4.2	1260
		NG3	950	1000	3.0	4.2	1330
		NH1	1000	1100	3.0	4.2	1400
	U60 (400-410nm)	NE5	560	600	3.2	3.8	785
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		NE5	560	600	3.2	3.8	785
		NF1	600	650	3.2	3.8	840
		NF2	650	700	3.2	3.8	910
		NF3	700	750	3.0	4.2	980
		NF4	750	800	3.0	4.2	1050
		NF5	800	850	3.0	4.2	1120
		NG1	850	900	3.0	4.2	1190
NG2		900	950	3.0	4.2	1260	
U80 (420-430nm)	NG3	950	1000	3.0	4.2	1330	
	NE5	560	600	3.2	3.8	785	
	NF1	600	650	3.2	3.8	840	
		NF2	650	700	3.2	3.8	910

		NF3	700	750	3.2	3.8	980
		NF4	750	800	3.0	4.2	1050
		NF5	800	850	3.0	4.2	1120
		NG1	850	900	3.0	4.2	1190
		NG2	900	950	3.0	4.2	1260
		NG3	950	1000	3.0	4.2	1330

Note:

1. Radiometric power is measured with an accuracy of $\pm 10\%$
2. The forward voltage is measured with an accuracy of $\pm 0.2V$

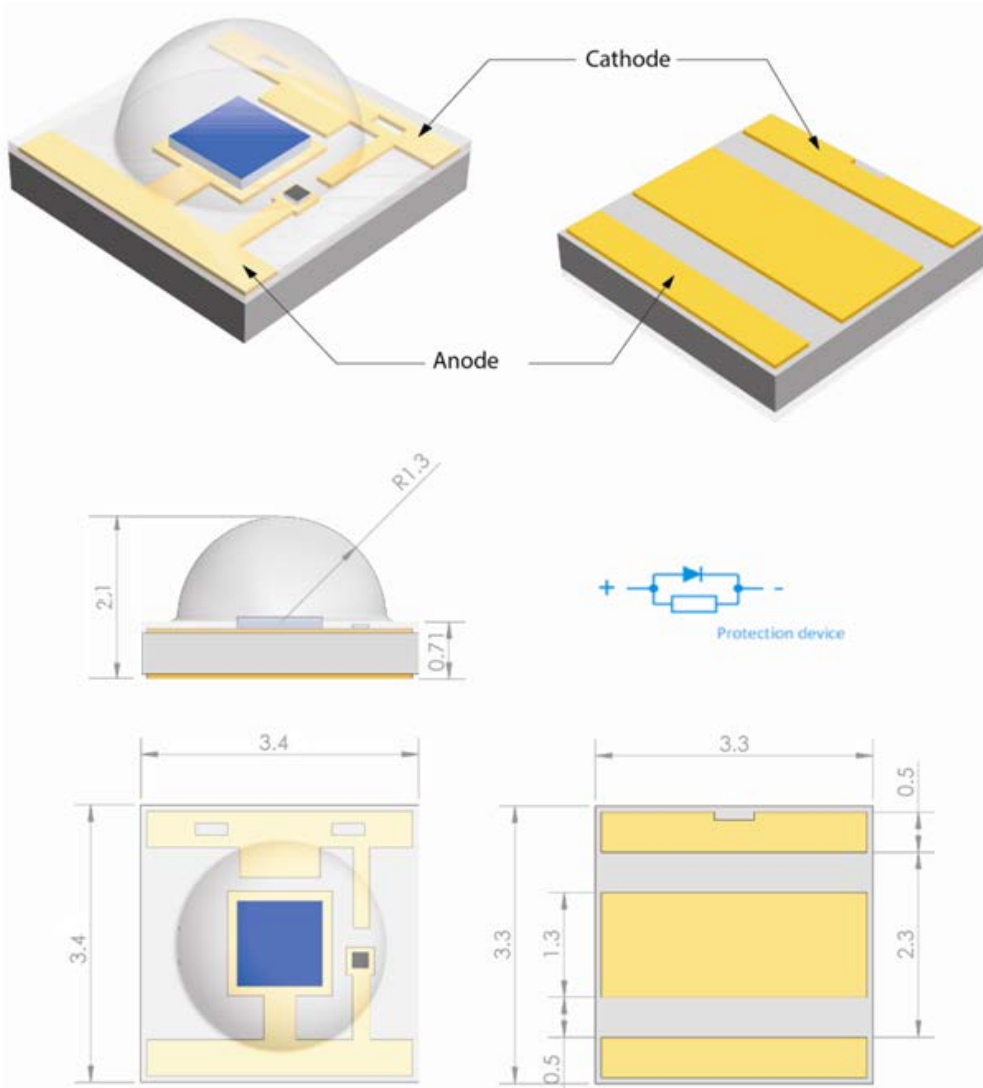
* Calculated values are for reference only.

Electrical Characteristics

Part number	Performance at Test Current (500mA)		
	Vf Group	Minimum (V)	Maximum (V)
N3535U-UNLx (beam angle 125°) N3535U-UNFx (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

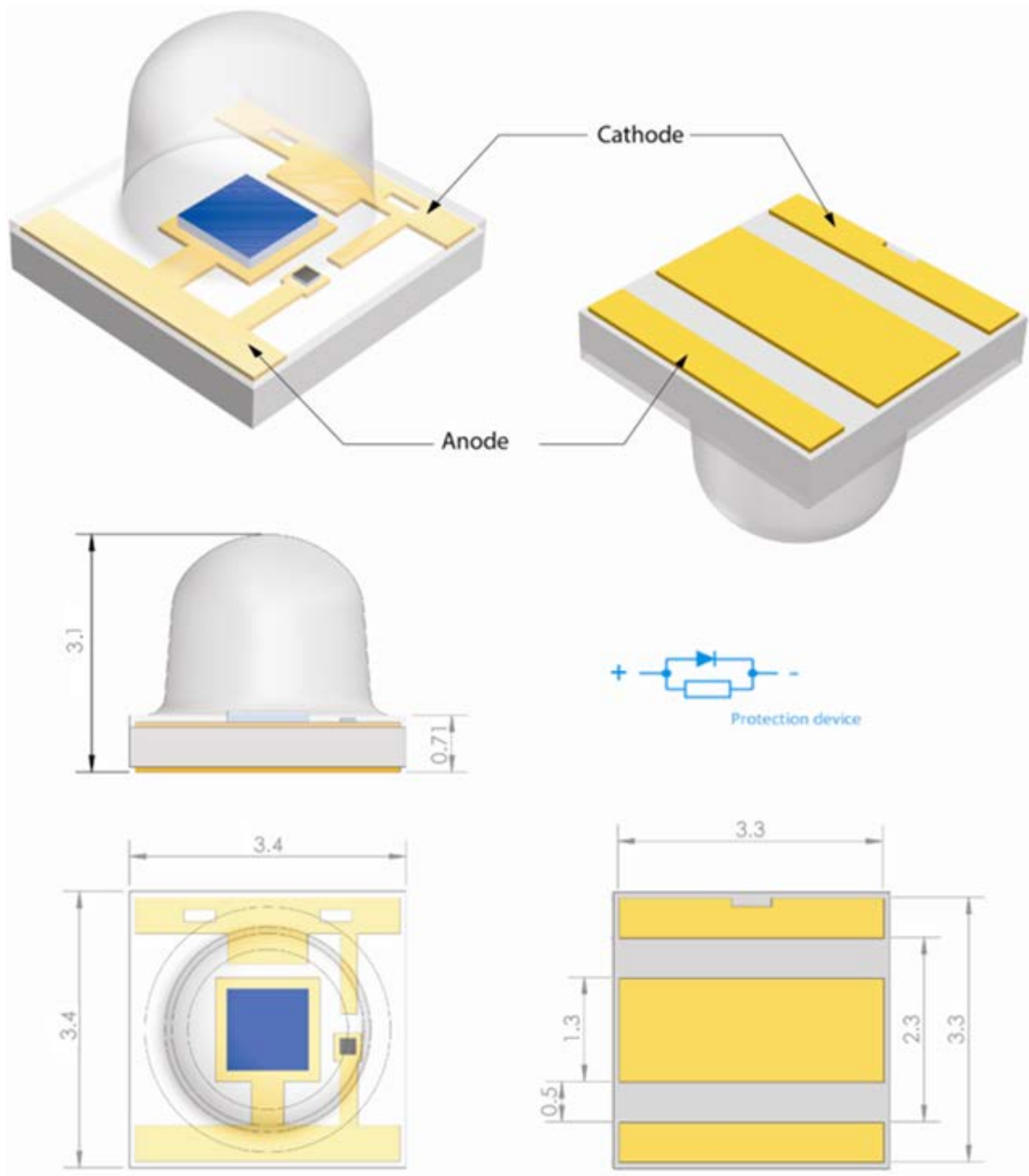
N3535U-UNLx (beam angle 125°)



Notes:

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

N3535U-UNFx (beam angle 55°)

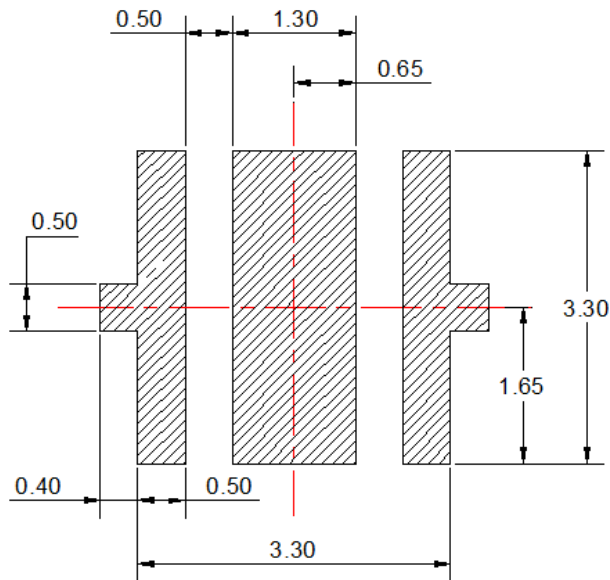


Notes:

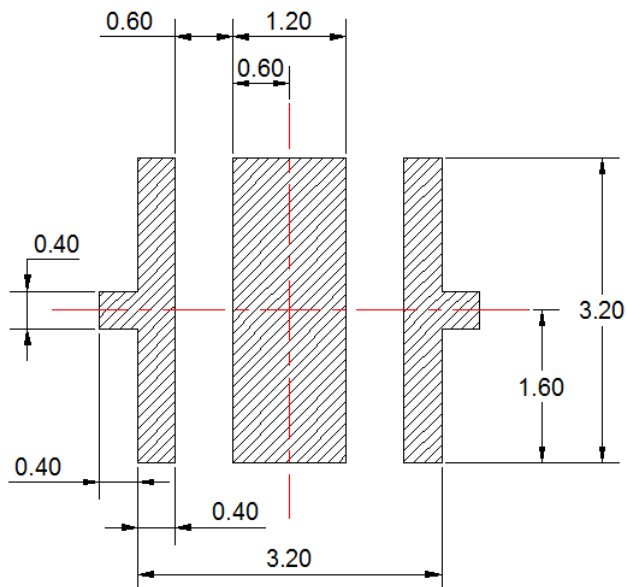
1. Drawing is not to scale
2. All dimensions are in millimeter
3. Dimensions are $\pm 0.13\text{mm}$ unless otherwise indicated

Recommended Solder Pad Design

Recommended Soldering Pad Design



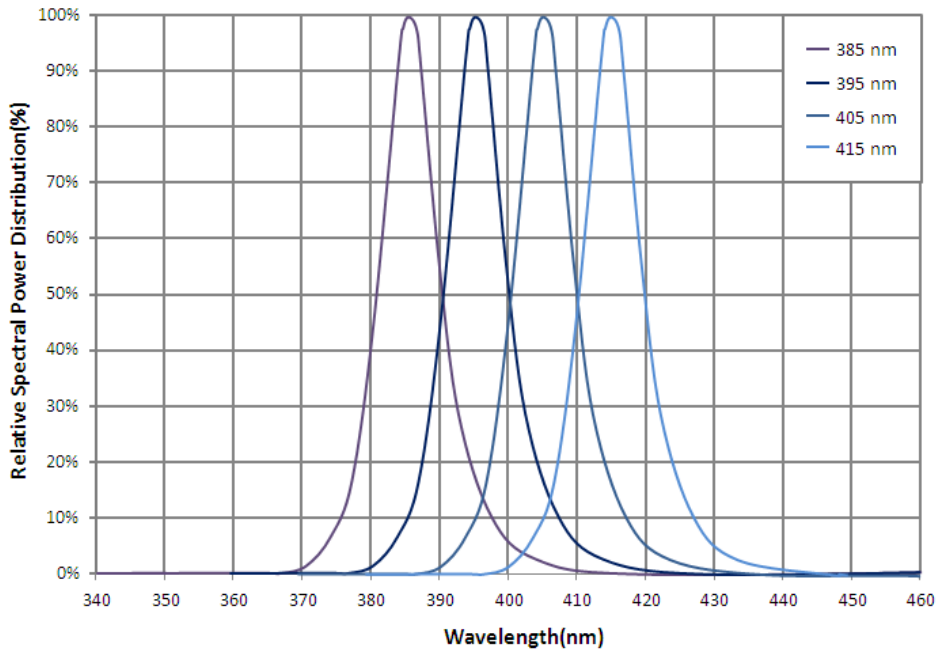
Recommended Stencil Pattern Design (Marked Area is Opening)



Notes:

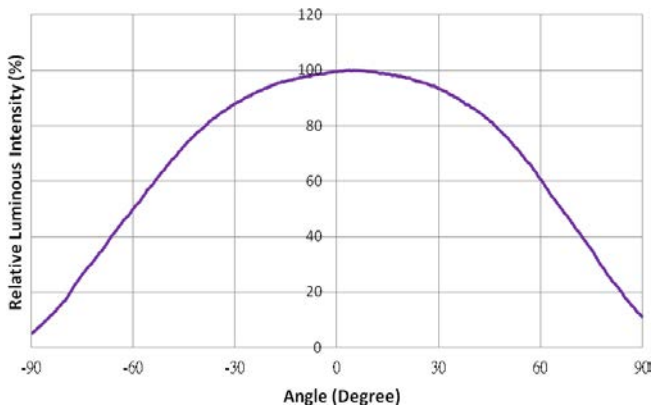
1. Drawing is not to scale
2. All dimensions are in millimeter

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

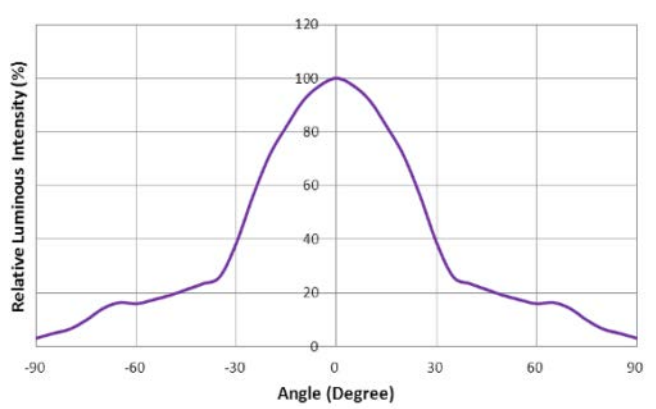


Typical Spatial Radiation Pattern

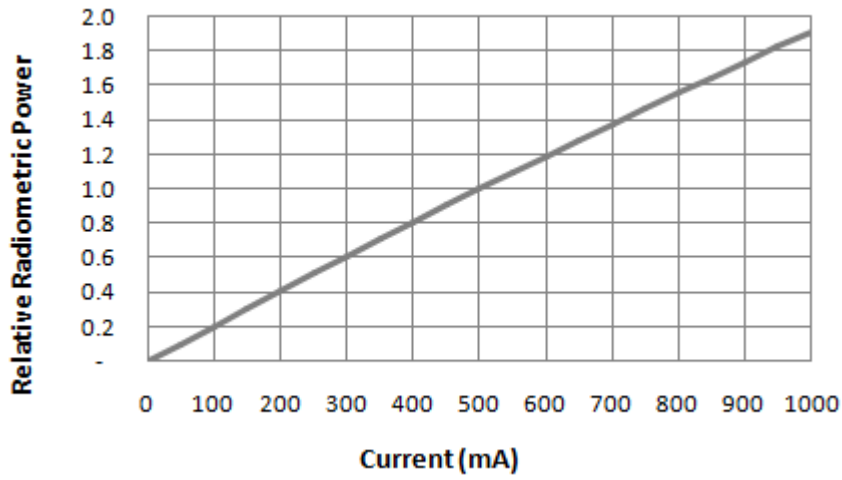
N3535U-UNLx (beam angle 125°)



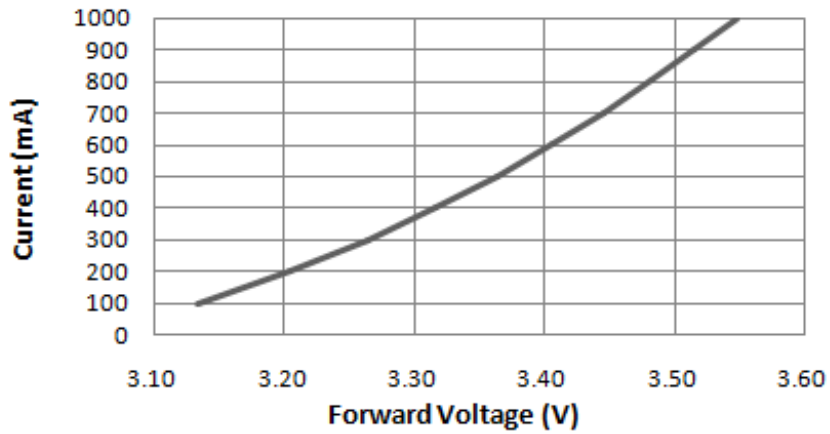
N3535U-UNFx (beam angle 55°)



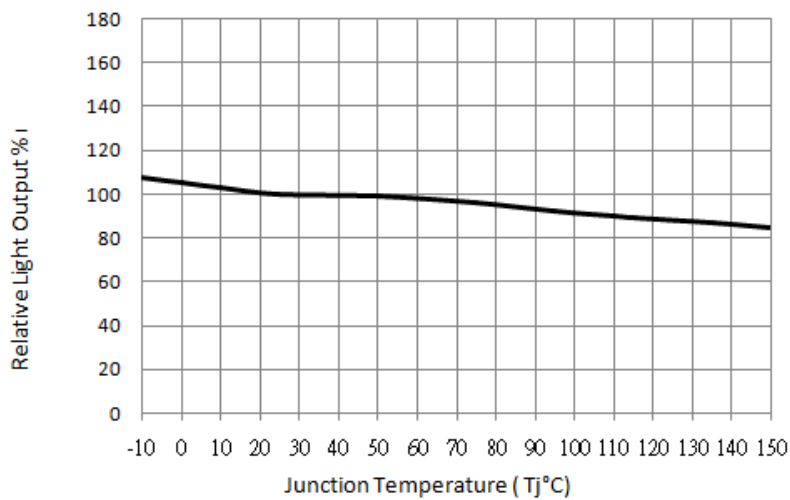
Typical Forward L-I Characteristics, $T_j=25^\circ\text{C}$



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

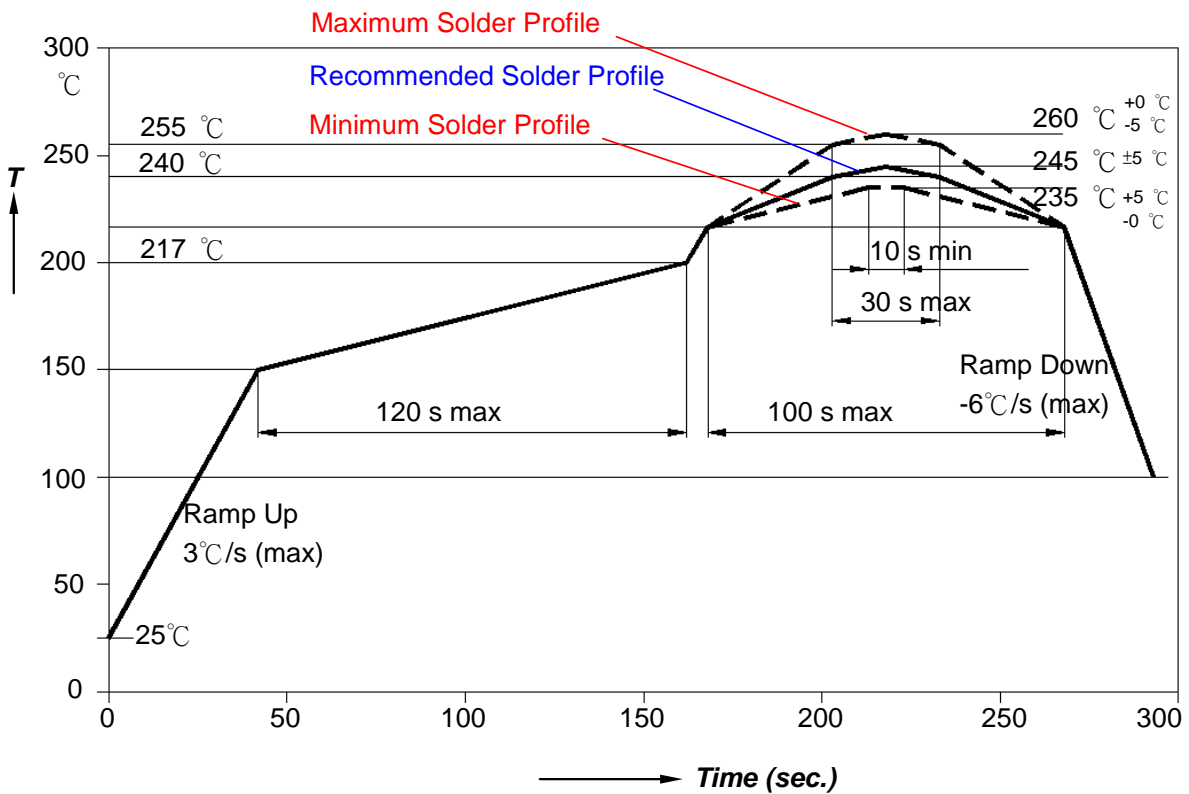


Typical Light Output vs. T_j Characteristics



Recommended Soldering Profile

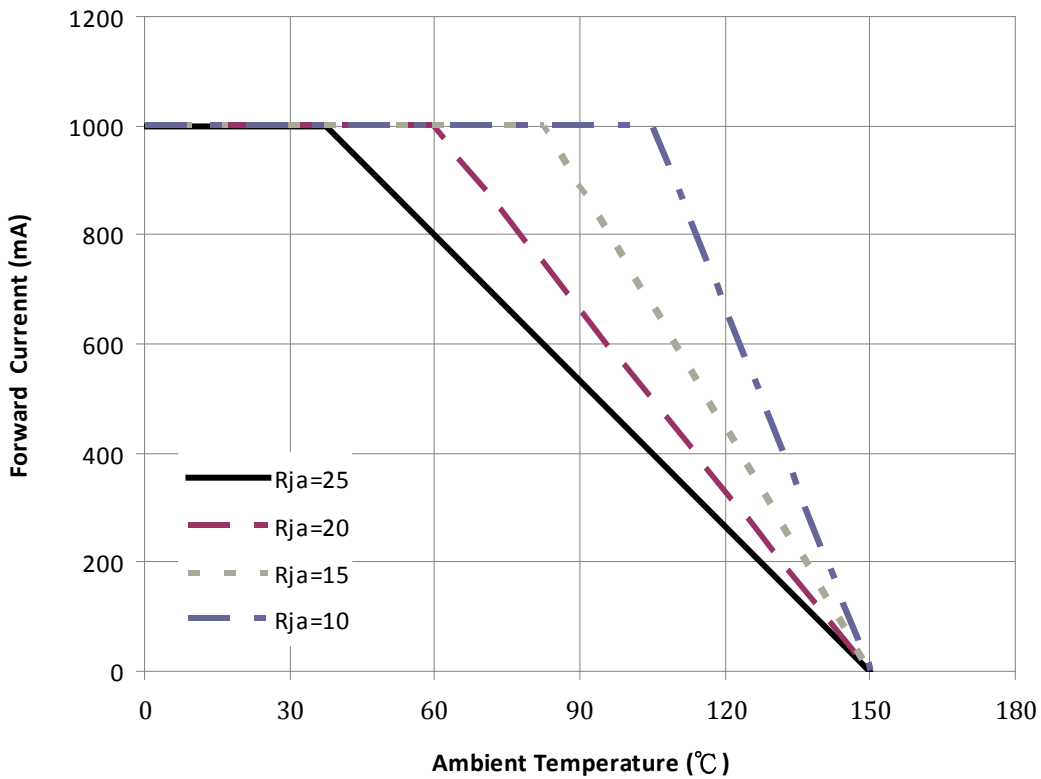
The LEDs can be soldered using the parameters listed below. As a general guideline, the users are suggested to follow the recommended soldering profile provided by the manufacturer of the solder paste. Although the recommended soldering conditions are specified in the list, reflow soldering at the lowest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

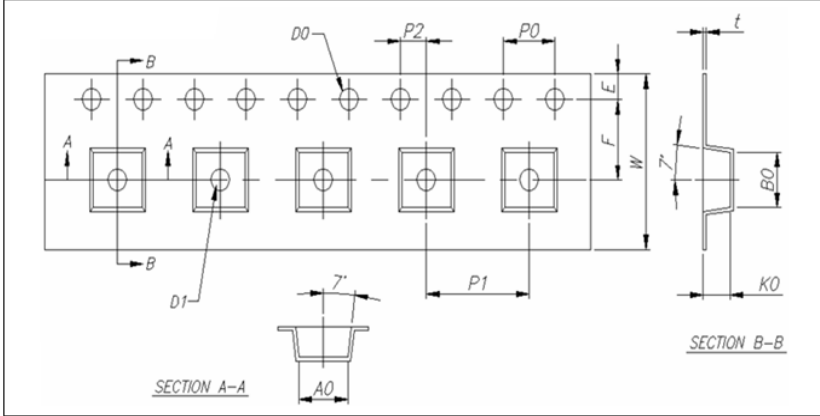
T_a : Ambient temperature

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

W : Input power ($I_F * V_F$)

Packing Information

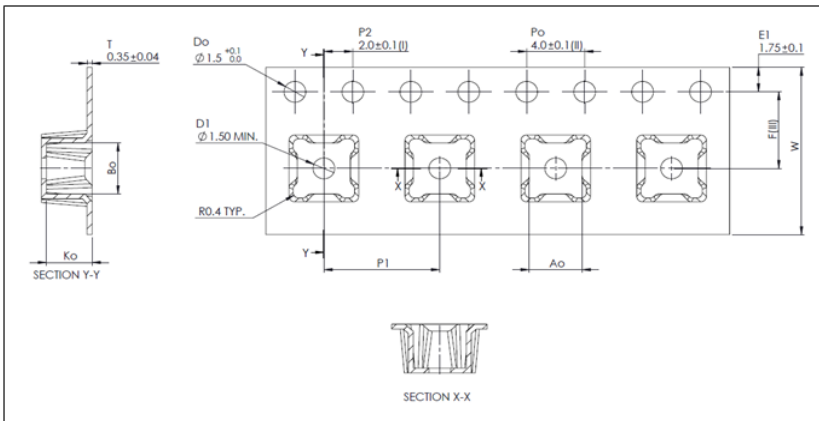
N3535U-UNLx series (beam angle 125°), Max QTY: 1000ea / roll



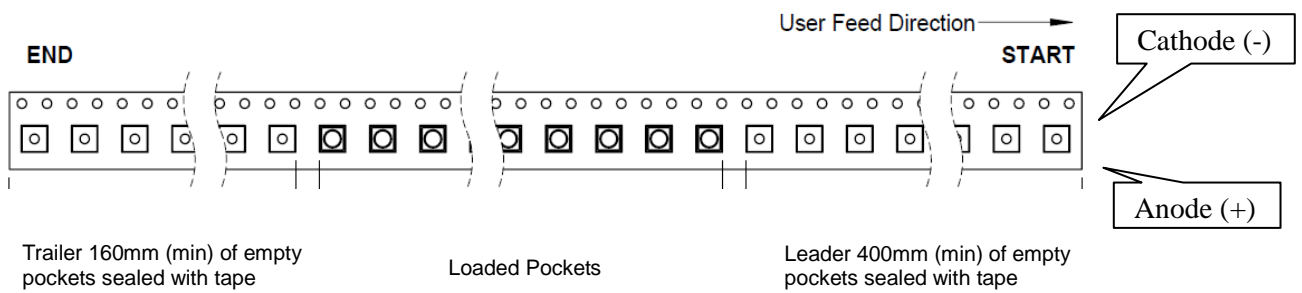
Item	Specification	Tol.(+/-)
W	12.00	±0.20
E	1.75	±0.10
F	5.50	±0.05
D0	1.50	+0.10, -0
D1	1.50	±0.10
P0	4.00	±0.10
P1	8.00	±0.10
P2	2.00	±0.10
P0X10	40.00	±0.20

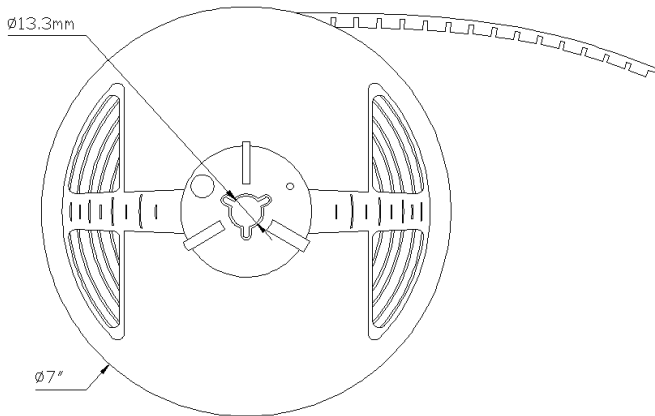
Item	Specification	Tol.(+/-)
t	0.25	±0.05
A0	3.80	±0.10
B0	3.80	±0.10
K0	2.20	±0.10

N3535U-UNFx series (beam angle 55°), Max QTY: 1000ea / 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 or please contact sales@tslc.com.tw.



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