

N5050U-UNx2

High Power UV LED

Introduction

The N5050U-UNx2 product series is a compact, high quality and reliable 4-chip UV LED. Featuring high radiometric power density and design flexibility – the N5050U-UNx2 spectrum can be tailored to your application.



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RoHS Compliant

Characteristics

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

| Parameter | Rating |
|---------------------------|---|
| | N5050U-UNx2 Series |
| DC Forward Current (mA) | 700 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 020c) |
| ESD Sensitivity | 2,000 V HBM (JESD-22A-114-B) |
| Reverse Voltage | Not designed to be driven in reverse bias ($V_R \leq 5V$) |
| Preconditioning | Acc. to JEDEC Level 1 |

Notes:

1. Never operate the LEDs in reverse bias.
2. Do not drive at rated current for more than 5 seconds without proper thermal management.
3. When the LEDs are illuminating, operating current should be decided after considering the packages maximum temperature.
4. 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.
5. 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.

General Characteristics at 350mA

| Part number | Color | Peak Wavelength λ_p | | $2\theta_{1/2}$ | Thermal Resistance Junction to Pad (°C/W) |
|------------------------|-------|-----------------------------|-----|-----------------|---|
| | | Min | Max | | $R_{\theta_{J-L}}$ |
| N5050U- UNL2-A1G41H | U40 | 380 | 390 | 135 | 1.5 |
| | U50 | 390 | 400 | 135 | 1.5 |
| | U60 | 400 | 410 | 135 | 1.5 |
| | U70 | 410 | 420 | 135 | 1.5 |
| N5050U- UNF2-A1G41H | U40 | 380 | 390 | 65 | 1.5 |
| | U50 | 390 | 400 | 65 | 1.5 |
| | U60 | 400 | 410 | 65 | 1.5 |
| | U70 | 410 | 420 | 65 | 1.5 |

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

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

| Part number | Color | Performance at Test Current (350mA) | | | | | Performance at 700mA |
|---|--------------------|-------------------------------------|------------------------|------|-----|-----|--|
| | | Group | Radiometric Power (mW) | | VF | | Calculated Minimum Radiometric Power* (mW) |
| | | | Min | Max | Min | Max | |
| N5050U-UNL2-A1G41H (beam angle 135°) | U40 (380-390nm) | NHP | 1000 | 1200 | 11 | 15 | 1800 |
| | | NHQ | 1200 | 1400 | 11 | 15 | 2200 |
| | | NHR | 1400 | 1600 | 11 | 15 | 2500 |
| | U50 (390-400nm) | NHQ | 1200 | 1400 | 11 | 15 | 2200 |
| | | NHR | 1400 | 1600 | 11 | 15 | 2500 |
| | | NHS | 1600 | 1800 | 11 | 15 | 2900 |
| | | NI1 | 1800 | 2000 | 11 | 15 | 3200 |
| | U60 (400-410nm) | NHR | 1400 | 1600 | 11 | 15 | 2500 |
| | | NHS | 1600 | 1800 | 11 | 15 | 2900 |
| | | NI1 | 1800 | 2000 | 11 | 15 | 3200 |
| | | NI2 | 2000 | 2200 | 11 | 15 | 3600 |
| | U70 (410-420nm) | NHR | 1400 | 1600 | 11 | 15 | 2500 |
| | | NHS | 1600 | 1800 | 11 | 15 | 2900 |
| | | NI1 | 1800 | 2000 | 11 | 15 | 3200 |
| | | NI2 | 2000 | 2200 | 11 | 15 | 3600 |

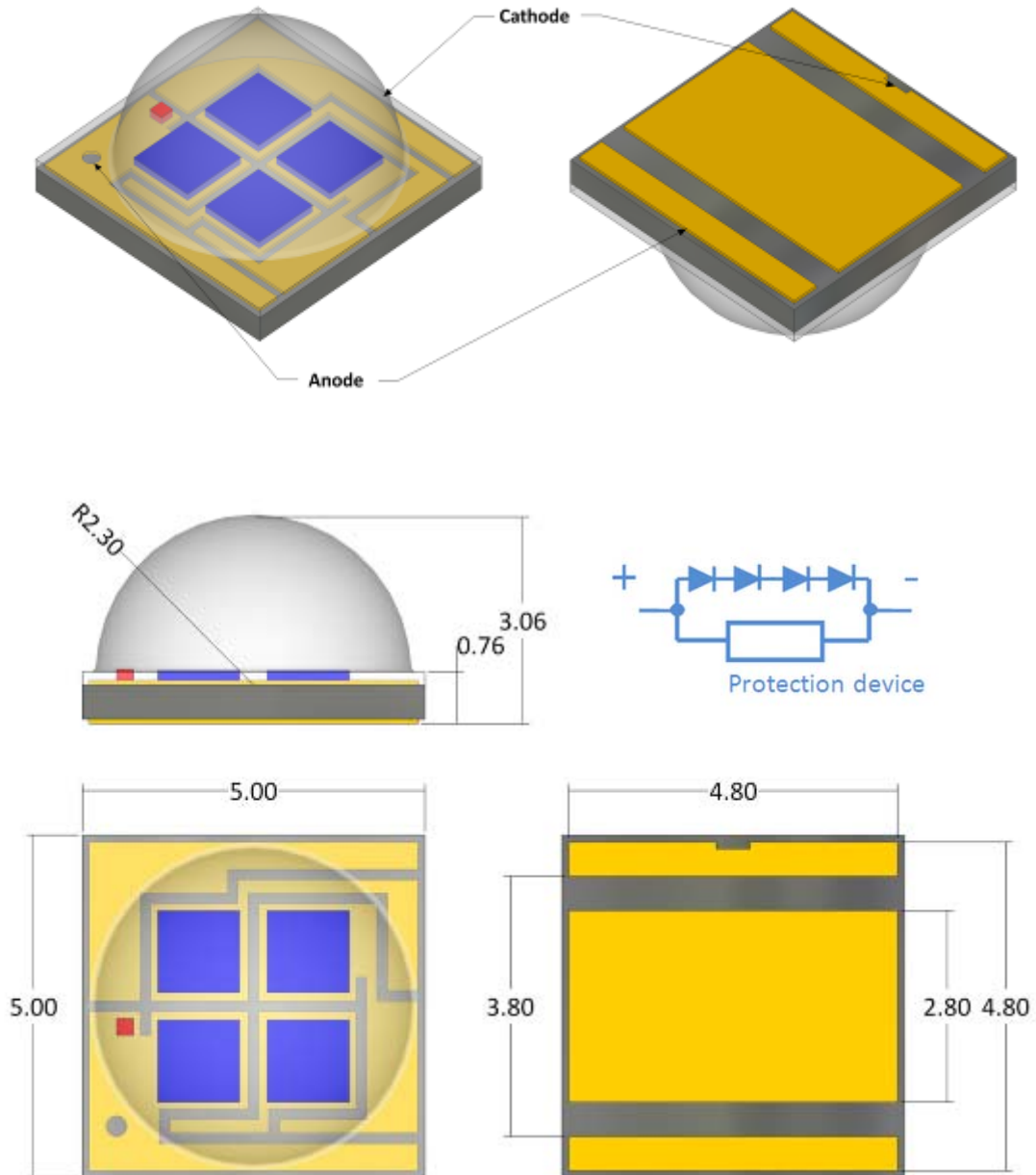
- Note: 1. Radiometric power is measured with an accuracy of ±10%
 2. The forward voltage is measured with an accuracy of ±0.2V
 * Calculated values are for reference only.

| Part number | Color | Performance at Test Current (350mA) | | | | | Performance at 700mA |
|--|--------------------|-------------------------------------|------------------------|------|-----|-----|--|
| | | Group | Radiometric Power (mW) | | VF | | Calculated Minimum Radiometric Power* (mW) |
| | | | Min | Max | Min | Max | |
| N5050U-UNF2-A1G41H (beam angle 65°) | U40 (380-390nm) | NHP | 1000 | 1200 | 11 | 15 | 1800 |
| | | NHQ | 1200 | 1400 | 11 | 15 | 2200 |
| | | NHR | 1400 | 1600 | 11 | 15 | 2500 |
| | U50 (390-400nm) | NHQ | 1200 | 1400 | 11 | 15 | 2200 |
| | | NHR | 1400 | 1600 | 11 | 15 | 2500 |
| | | NHS | 1600 | 1800 | 11 | 15 | 2900 |
| | | NI1 | 1800 | 2000 | 11 | 15 | 3200 |
| | U60 (400-410nm) | NHR | 1400 | 1600 | 11 | 15 | 2500 |
| | | NHS | 1600 | 1800 | 11 | 15 | 2900 |
| | | NI1 | 1800 | 2000 | 11 | 15 | 3200 |
| | | NI2 | 2000 | 2200 | 11 | 15 | 3600 |
| | U70 (410-420nm) | NHR | 1400 | 1600 | 11 | 15 | 2500 |
| | | NHS | 1600 | 1800 | 11 | 15 | 2900 |
| | | NI1 | 1800 | 2000 | 11 | 15 | 3200 |
| | | NI2 | 2000 | 2200 | 11 | 15 | 3600 |

- 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

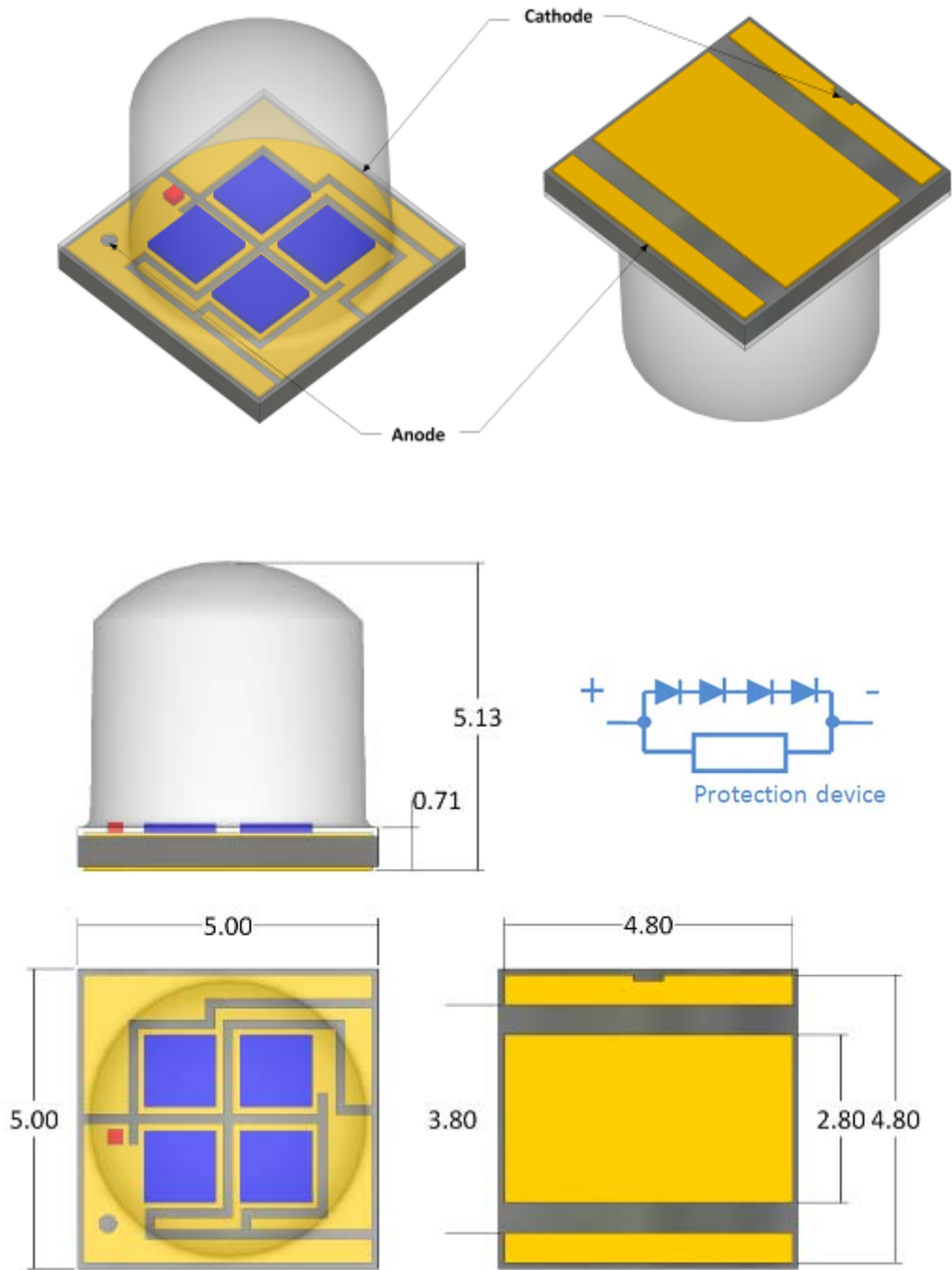
N5050U-UNL2-A1G41H (beam angle 135°)



Notes :

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

N5050U-UNF2-A1G41H (beam angle 65°)

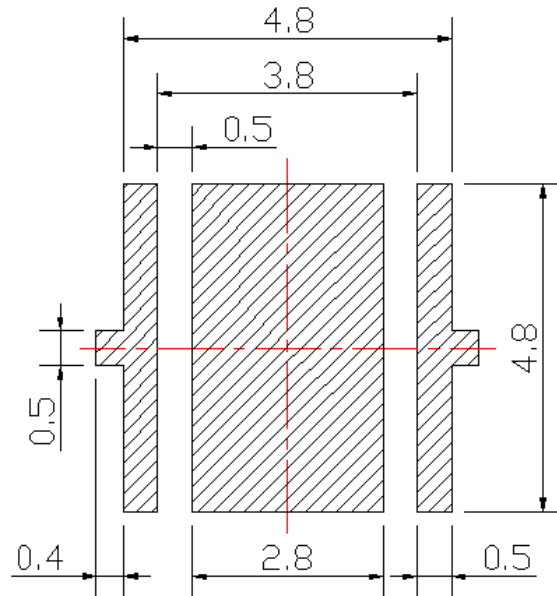


Notes :

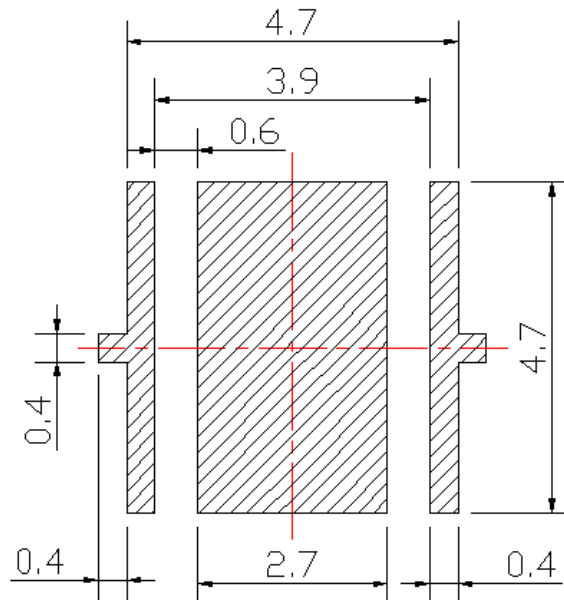
1. Drawing is not to scale
2. All dimensions are in millimeter
3. Dimensions are $\pm 0.13\text{mm}$ unless otherwise indicated

Recommended Solder Pad Design

Recommended Soldering Pad Design



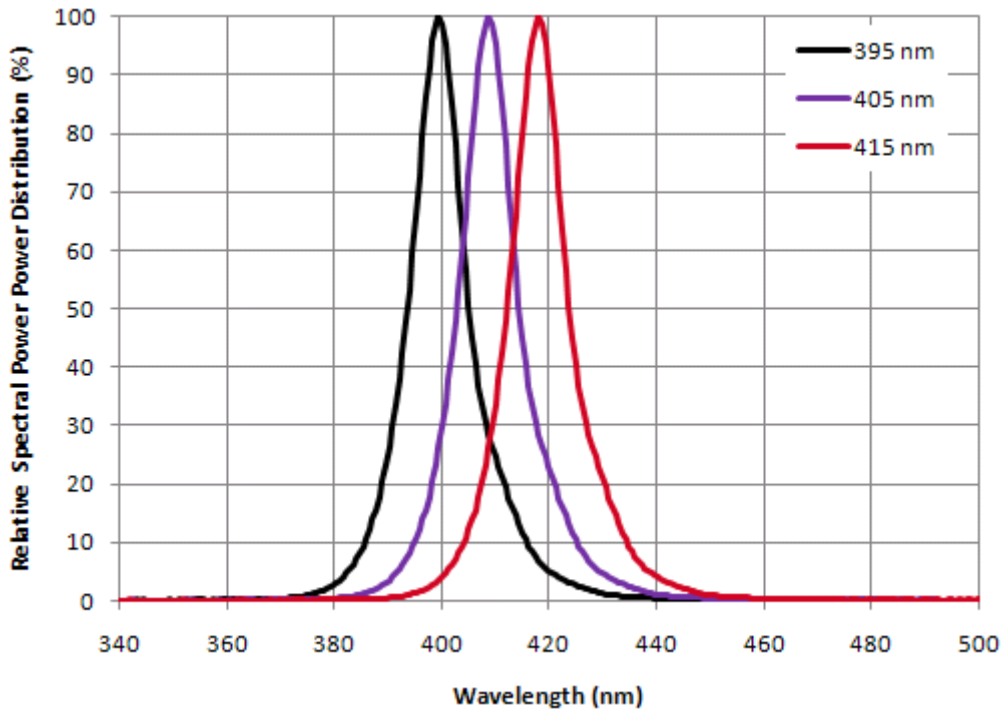
Recommended Stencil Pattern Design (Marked Area is Opening)



Notes :

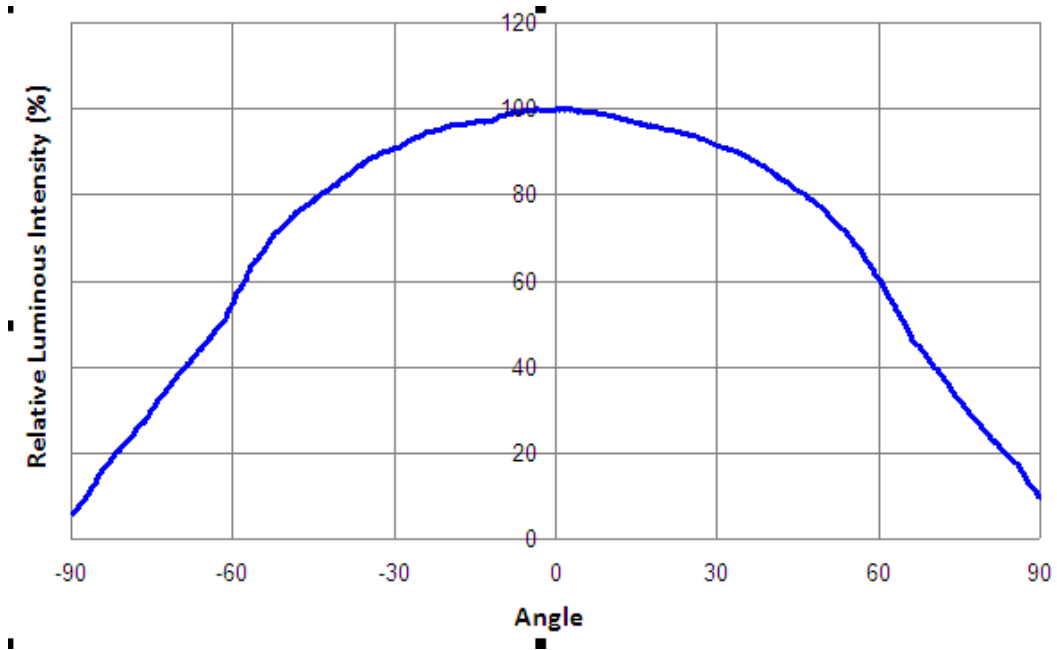
1. Drawing is not to scale
2. All dimensions are in millimeter

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

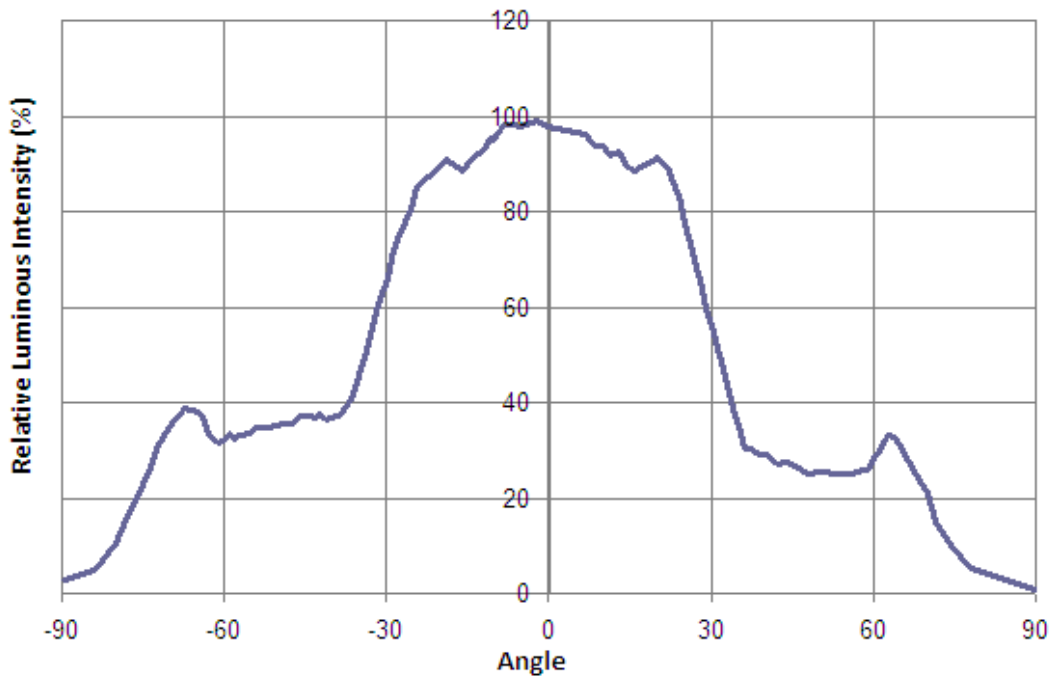


Typical Spatial Radiation Pattern

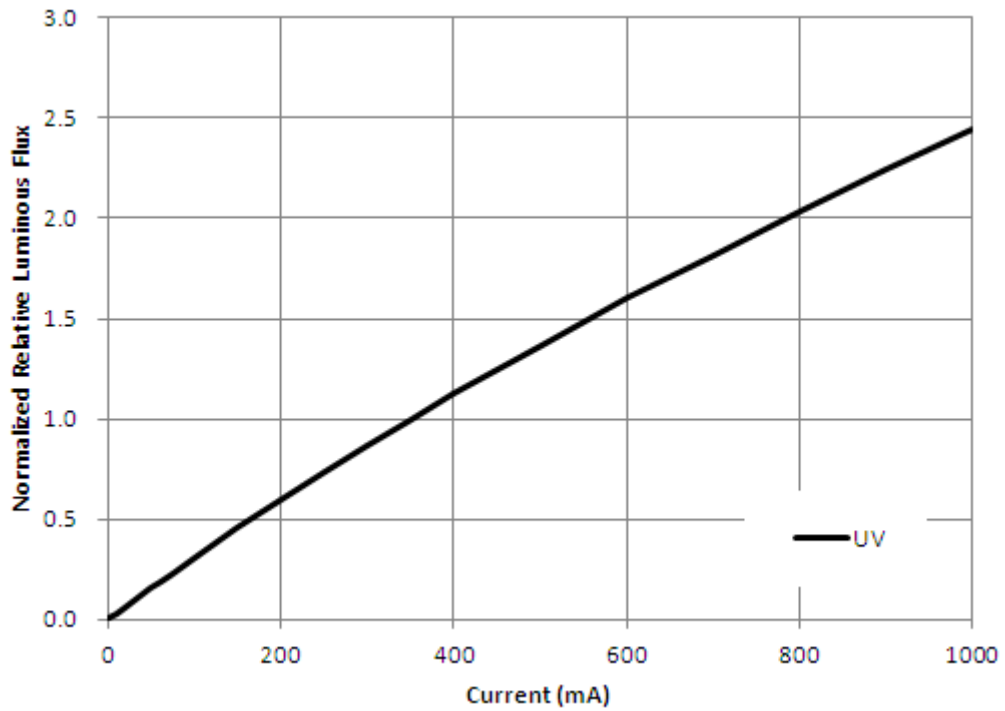
N5050U-UNL2-A1G41H (beam angle 135°)



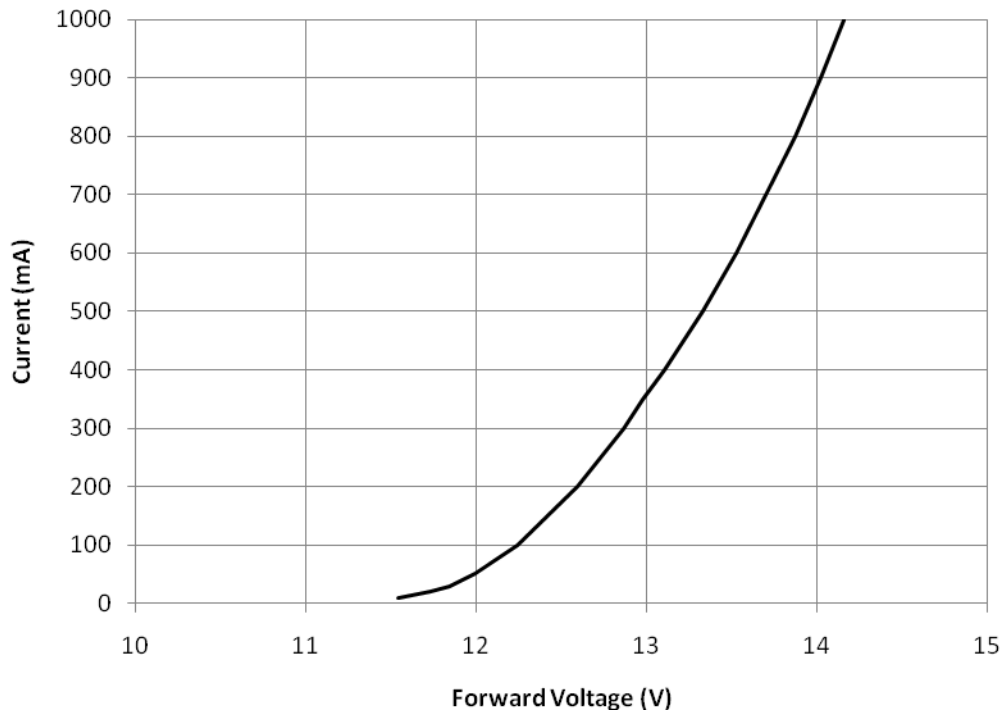
N5050U-UNF2-A1G41H (beam angle 65°)



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

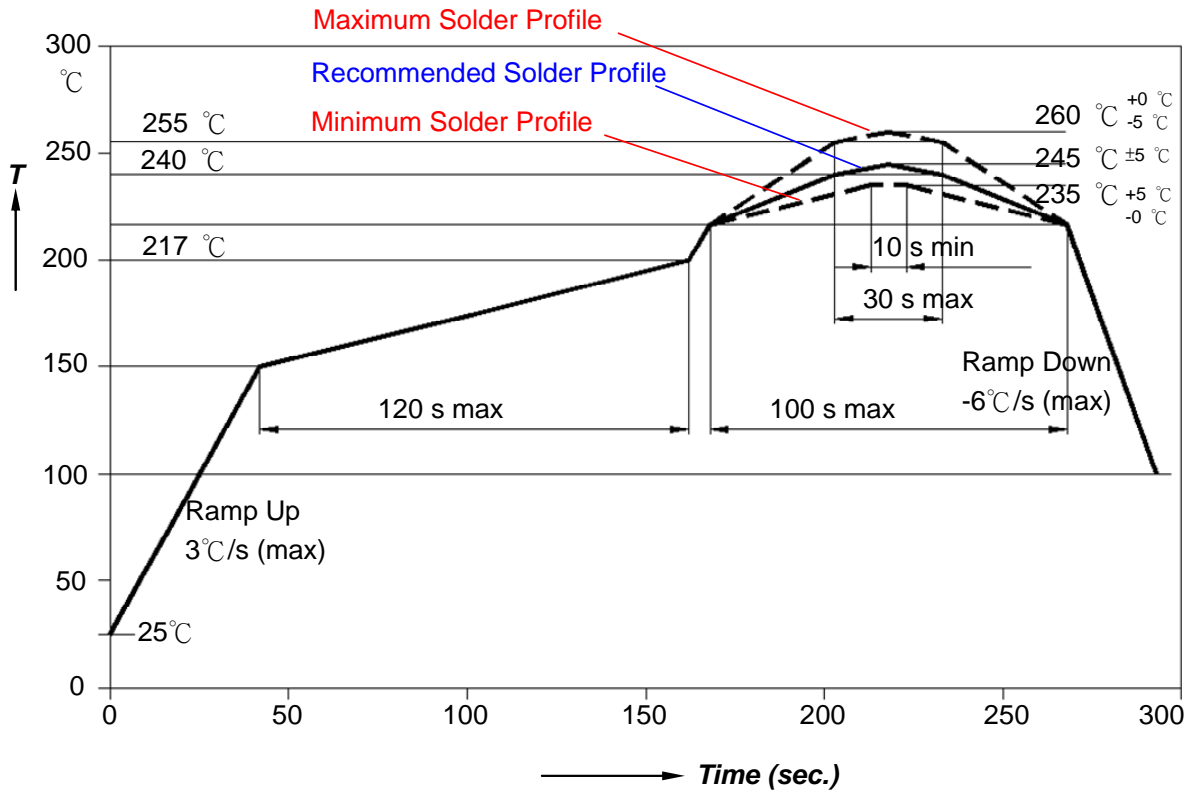


Typical Forward I-V Characteristics, $T_j=25^\circ\text{C}$



Recommended Soldering Profile

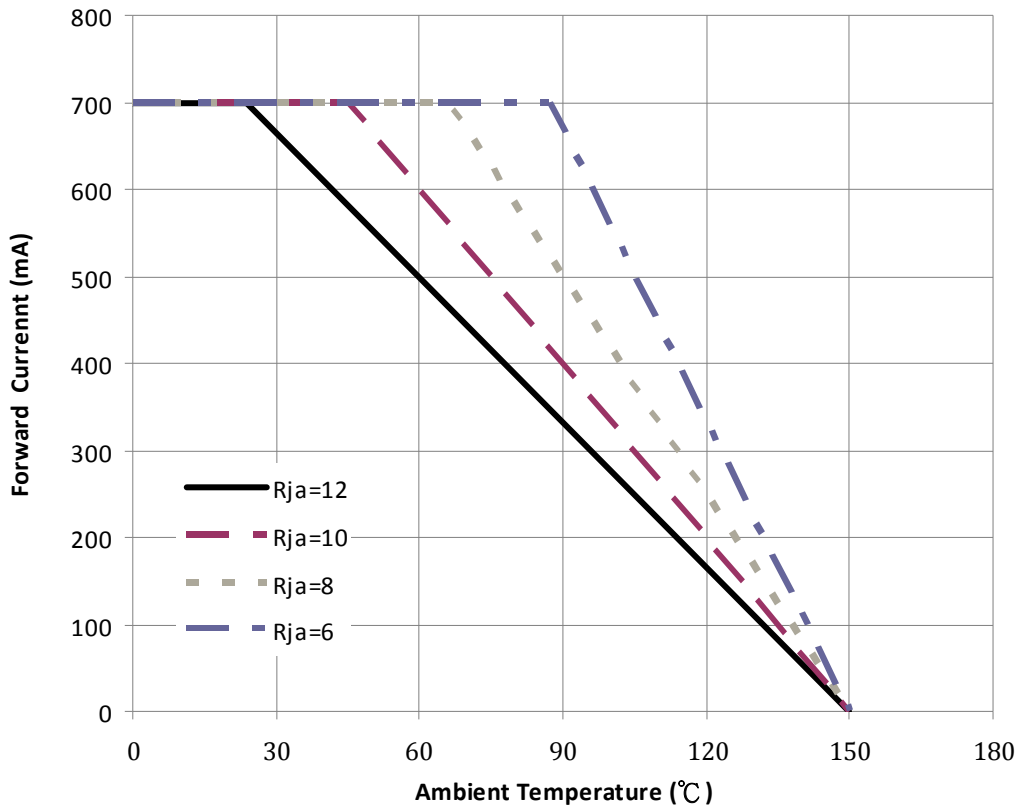
The LEDs can be soldered using the parameters listed below. As a general guideline, the users are suggested to follow the recommended soldering profile provided by the manufacturer of the solder paste. Although the recommended soldering conditions are specified in the list, reflow soldering at the lowest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



| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|---|-------------------------|------------------|
| Average Ramp-up Rate (T _{Smax} to T _p) | 3°C/second max. | 3°C/second max. |
| Preheat | | |
| - Temperature Min(T _{Smin}) | 100°C | 150°C |
| - Temperature Max(T _{Smax}) | 150°C | 200°C |
| - Time(t _{Smin} to t _{Smax}) | 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

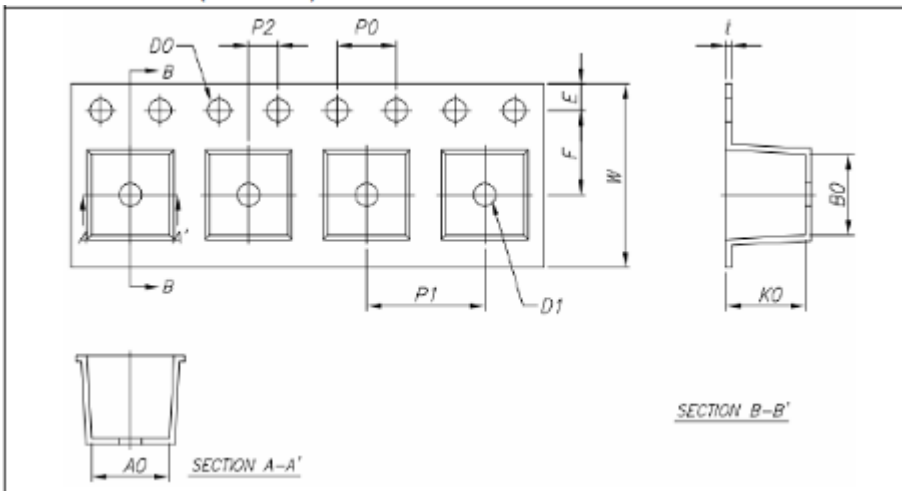
T_a : Ambient temperature

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

W : Input power ($I_F * V_F$)

Packing Information

Dimensions. (Unit: mm)



Common dimensions

| Item | Specification | Tol. (+/-) |
|-------|---------------|------------|
| W | 12.00 | ±0.20 |
| E | 1.75 | ±0.10 |
| F | 5.50 | ±0.10 |
| D0 | 1.50 | ±0.10 |
| 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 |

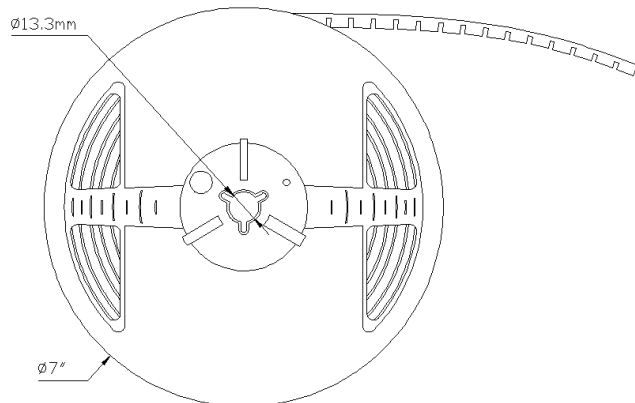
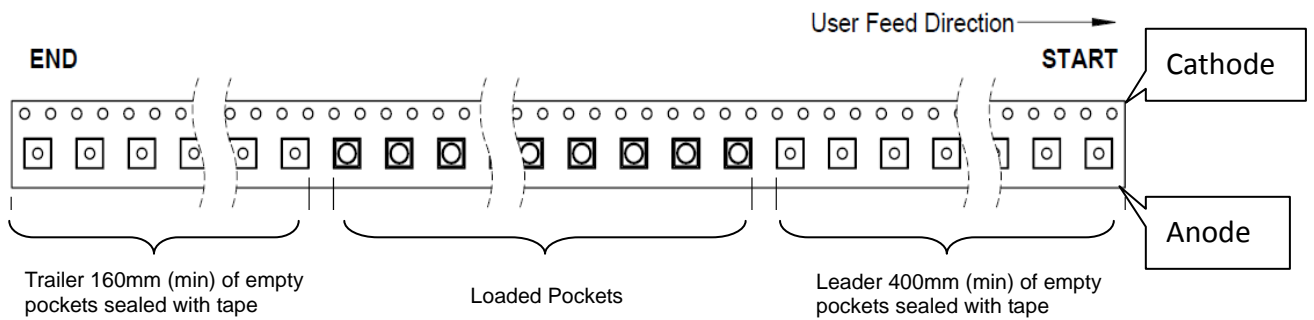
Pocket & other dimensions

N5050U-UNL2 series

| Item | Specification | Tol. (+/-) |
|------|---------------|------------|
| t | 0.28 | ±0.05 |
| A0 | 5.35 | ±0.10 |
| B0 | 5.35 | ±0.10 |
| K0 | 3.40 | ±0.10 |

N5050U-UNF2 series

| Item | Specification | Tol. (+/-) |
|------|---------------|------------|
| t | 0.40 | ±0.05 |
| A0 | 5.30 | ±0.10 |
| B0 | 5.30 | ±0.10 |
| K0 | 5.40 | ±0.10 |



About Us

SemiLEDs is an innovative manufacturer of chip-level and packaged LEDs that enable today's advanced solid state lighting solutions. Fully ISO9001 certified, with state of the art fabrication facilities in Hsinchu Science Park, Taiwan, the company employs patented and proprietary technologies that deliver high performance with increased color stability and lumen maintenance. SemiLEDs visible- and ultraviolet-LEDs are found in a wide variety of general lighting applications, including street lights and commercial, industrial and residential architectural lighting, along with specialty industrial applications such as UV curing, medical/cosmetic, counterfeit detection, and horticulture.

SemiLEDs is a publicly traded company on NASDAQ Global Select Market (stock symbol "LEDS"). For investor information, please contact us at investors@semileds.com.

For further company or product information, please visit us at www.semileds.com or please contact sales@semileds.com.



www.semileds.com

ASIA PACIFIC

3F, No. 11, KeJung Rd.

Chu-Nan Site

Hsinchu Science Park

Chu-Nan 350, Miao-Li County

Taiwan, ROC

Tel: +886-37-586788

Fax: +886-37-582688

sales@semileds.com