



Assembly Precautions for the NVSW219C-V2 LED

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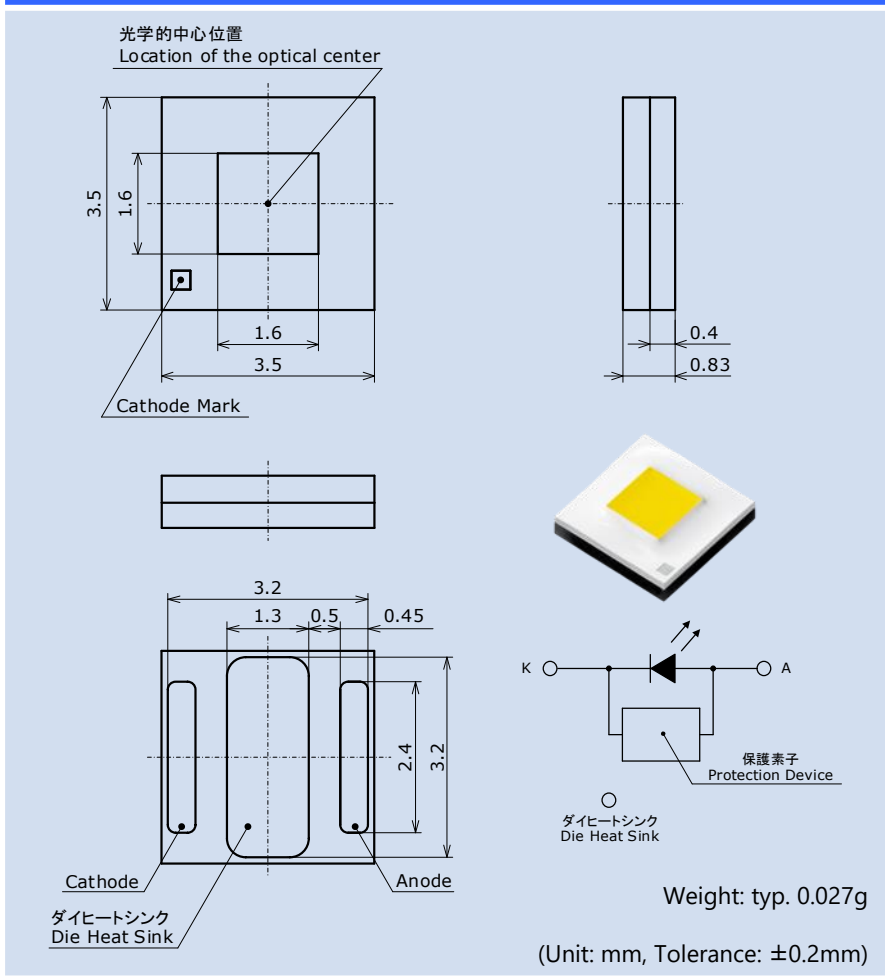
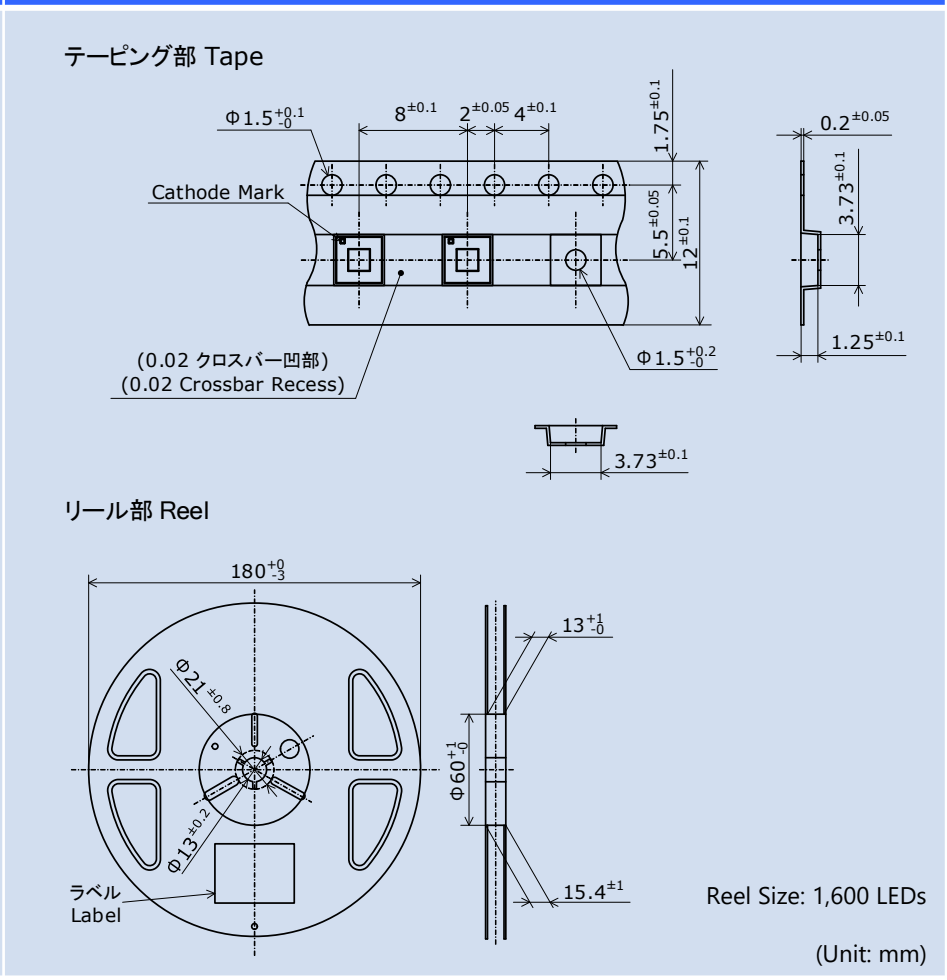
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Assembly Precautions for the NVSW219C-V2 LEDs

1. LED Outline Dimensions/Tape Dimensions

Table 1. Product Specifications

LED	Embossed Carrier Tape
 <p>光学的中心位置 Location of the optical center</p> <p>3.5 1.6 1.6 3.5 Cathode Mark</p> <p>0.4 0.83</p> <p>3.2 1.3 0.5 0.45 2.4 3.2 Cathode Anode ダイヒートシンク Die Heat Sink</p> <p>保護素子 Protection Device</p> <p>ダイヒートシンク Die Heat Sink</p> <p>Weight: typ. 0.027g (Unit: mm, Tolerance: ±0.2mm)</p>	 <p>テーピング部 Tape</p> <p>Φ1.5^{+0.1}₋₀ 8^{±0.1} 2^{±0.05} 4^{±0.1} 1.75^{±0.1} 5.5^{±0.05} 12 Φ1.5^{+0.2}₋₀ 0.2^{±0.05} 3.73^{±0.1} 1.25^{±0.1}</p> <p>Cathode Mark</p> <p>(0.02 クロスバー凹部) (0.02 Crossbar Recess)</p> <p>リール部 Reel</p> <p>180⁺⁰₋₃ Φ21^{+0.8} Φ13^{+0.2} 13⁺¹₀ Φ60⁺¹₀ 15.4^{±1} ラベル Label</p> <p>Reel Size: 1,600 LEDs (Unit: mm)</p>

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Assembly Precautions for the NVSW219C-V2 LEDs

2. Handling Precautions

2-1. Handling with Bare Hands

Do not handle the LEDs with bare hands:

- this may contaminate the LED surface and have an effect on the optical characteristics,
- this may cause the LED to deform and/or the internal connection to fail causing a catastrophic failure (i.e. the LED not to illuminate).

2-2. Handling with Tweezers

Ensure that when handling the LEDs with tweezers, excessive force is not applied to the LED. Otherwise, it may cause damage to the resin (e.g. cut, scratch, chip, crack, delamination and deformation) and/or the internal connection to fail causing a catastrophic failure.

2-3. ESD Precautions

The LEDs are sensitive to transient excessive voltages (e.g. ESD, lightning surge). If this excessive voltage occurs in the circuit, it may cause the LED to be damaged causing issues (e.g. the LED to become dimmer or not to illuminate [i.e. catastrophic failure]). When handling the LEDs, ensure that necessary measures have been taken to protect them from transient excess voltages. Refer to the applicable specification for more details.

2-4. Stacking Assembled PCBs Together

Do not stack assembled PCBs together. Otherwise, it may cause damage to the resin (e.g. cut, scratch, chip, crack, delamination and deformation) and the internal connection to fail causing a catastrophic failure.

2-5. Baking

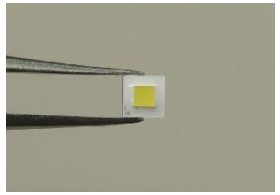
The storage/packaging requirements for this LED are comparable to JEDEC Moisture Sensitivity Level (MSL) 3 or equivalent. Nichia used IPC/JEDEC STD-020 as a reference to rate the MSL of this LED. If the "After Opening" storage time has been exceeded or any pink silica gel beads are found, ensure that the LED are baked before use. Baking should only be done once.

Table 2. Storage Conditions

Conditions		Temperature	Humidity	Time
Storage	Before Opening the Moisture-proof Aluminum Bag	≤30°C	≤90%RH	Within 1 Year from Delivery Date
	After Opening the Moisture-proof Aluminum Bag	≤30°C	≤70%RH	Within 168 Hours
Baking (Remove the reel of the LEDs from the moisture-proof aluminum bag for baking)		65±5°C	-	≥24 Hours

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✓ Correct



✗ Incorrect

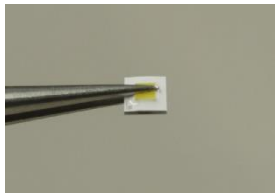


Figure 1. Correct/Incorrect Examples of Handling with Tweezers

Assembly Precautions for the NVSW219C-V2 LEDs

3. Design Recommendations for Optimal Amount of Solder

Soldering Pad Pattern/Metal Solder Stencil Aperture

Table 3. Recommended Soldering Pad Pattern/Metal Solder Stencil Aperture

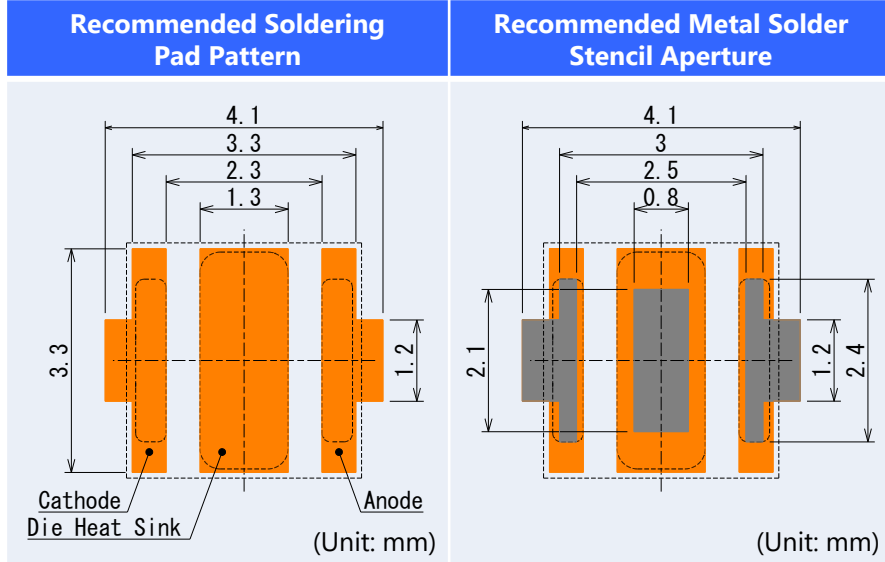


Table 4. Recommended Solder/Metal Solder Stencil Conditions

Item	Recommended Conditions
Metal Solder Stencil (Thickness)	120 (μm)
Solder Paste (Composition)	Sn-3.0Ag-0.5Cu

--- LED Outline + Electrodes
 ■ Soldering Pad Pattern
 ■ Metal Solder Stencil Aperture

The recommended soldering pad pattern, metal solder stencil aperture, and thickness of the metal solder stencil provided in Tables 3 and 4 have been determined under Nichia’s conditions: ensure that there are no issues with the chosen assembly conditions prior to use.

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Assembly Precautions for the NVSW219C-V2 LEDs

4. Precautions for Setting Up a Pick-and-Place Machine/Nozzle

Table 5. Cautions/Suggestions for Setting Up Equipment

Item	Recommended Conditions/Specifications	Cautions/Suggestions
Pick-and-Place Machine	Modular mounter	The recommended conditions/specifications herein have been determined using YS100 High-Speed General-Purpose Modular (manufactured by Yamaha Motor Co., Ltd.).
Pick-and-Place Nozzle	—	See "4-1. Pick-and-Place Nozzle" on Page 6 for details.
Tape-and-Reel Feeder	Electrical (motorized) feeder Tape width: 12mm Feeder pitch: 8mm	See "4-2. Tape-and-Reel Feeder" on Page 7 for the details.
Nozzle Height for Pick-up Operations	The contact surface of the nozzle head for pick operations should be adjusted to 0.4mm below the edge of the embossed carrier tape pocket.	See "4-3. Recommended Nozzle Height for Pick-up Operations" on Page 8 for the details.
Nozzle Height for Placement Operations (i.e. Placement Depth)	0.2mm for placement depth	See "4-4. Recommended Nozzle Height for Placement Operations (Placement Depth)" on Page 8 for the details.
Imaging-based Automatic Inspection	Using the electrode as a reference is recommended to locate the center of the LED.	See "4-5. Imaging-based Automatic Inspection" on Page 9 for the details.

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Assembly Precautions for the NVSW219C-V2 LEDs

4-1. Pick-and-Place Nozzle

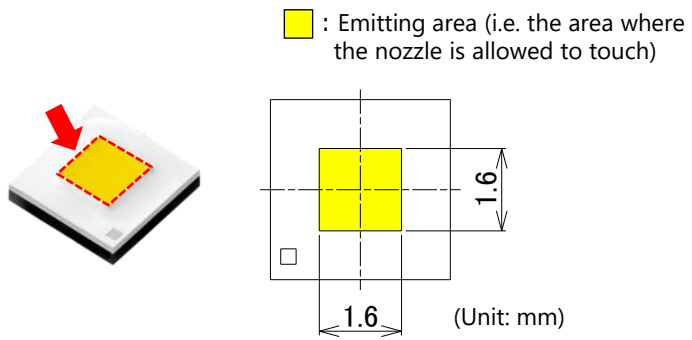


Figure 2. LED Pick-up Position

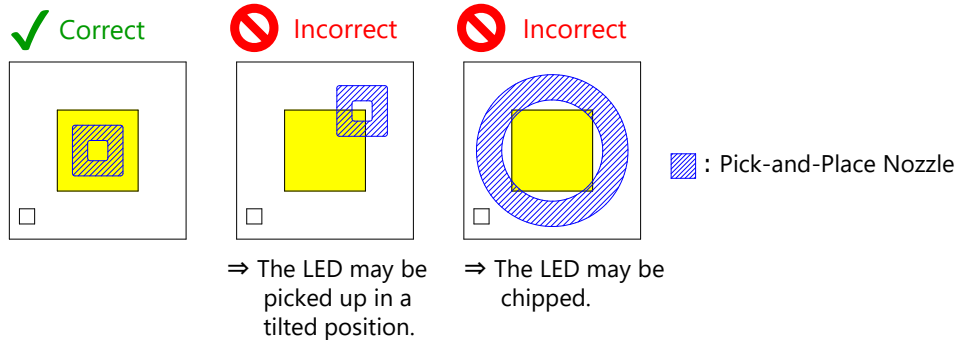


Figure 3. Examples of Correct/Incorrect LED Pick-up Positions

1. Pick up the LED at the center of the emitting area (1.6mm×1.6mm); see Figure 2.
2. Select a pick-and-place nozzle whose size and shape are appropriate for the emitting area of the LED (1.6mm×1.6mm). An example of an appropriate nozzle: a nozzle that is designed for a 1608-size chip component or equivalent.
3. If the LED pick-up position is far from the center of the emitting area or if the size and/or shape of the pick-and-place nozzle being used is inappropriate, it may cause the LED to be picked up in a tilted position and/or chipped; see Figure 3.

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Assembly Precautions for the NVSW219C-V2 LEDs

4-2. Tape-and-Reel Feeder

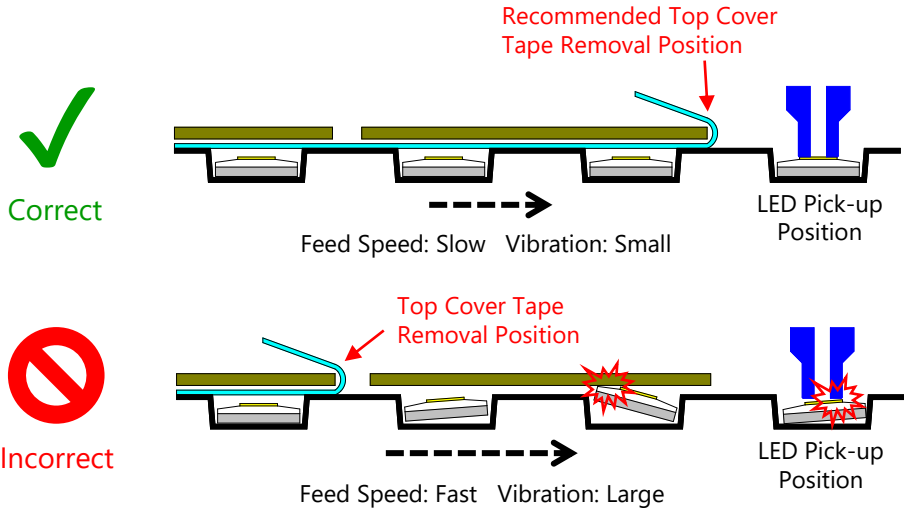


Figure 4. Top Cover Tape Removal Position

1. For the tape-and-reel feeder, the tape width is set to 12mm and the feeder pitch is set to 8mm.
2. Use a tape-and-reel feeder that ensures it does not create excessive vibrations causing assembly issues.
Example: Electric (motorized) feeder
3. It is recommended to remove the top cover tape at the recommended position shown in Figure 4 (i.e. immediately before LED pick-up).
 - If the top cover tape is removed at a point far away from the LED pick-up position, it may cause the LED to be damaged and/or picked up in a tilted position.

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4-3. Recommended Nozzle Height for Pick-up Operations

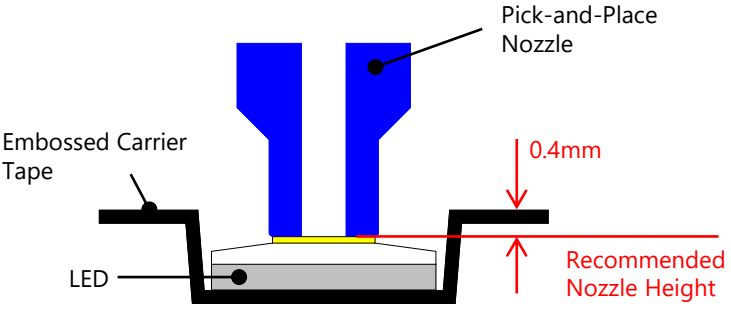


Figure 5. Recommended Nozzle Height for Pick-up Operations

1. Ensure that the nozzle goes down onto the LED in the tape pocket until the tip touches the emitting surface of the LED. Pick-up depth: 0.4mm
Note: If the reference level for the nozzle setting is at the edge of the tape pocket.
2. The recommended nozzle height for pick-up operations has been determined by Nichia under the verification conditions (See Table 5) and may not function as expected with some other pick-and-place machines. If the pick-up operations are unstable even with using the recommended nozzle height, adjust the nozzle height appropriate for the pick-and-place machine being used.

If the pick point of the nozzle is too high,
- it may cause insufficient suction power leading to picking errors (e.g. the nozzle's failure to pick/lift the LED into the air, incorrect picking causing the LED to tilt when in the air).

If the pick point of the nozzle is too low,
- it may cause issues (e.g. causing the embossed carrier tape to shake, causing the tape pocket to deform) leading to picking failure.

4-4. Recommended Nozzle Height for Placement Operations (Placement Depth)

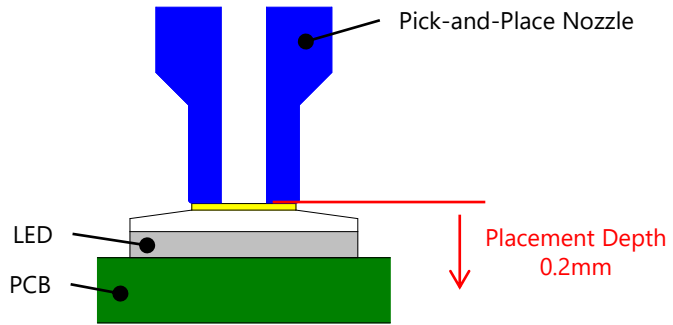


Figure 6. Recommended Nozzle Height for Placement (Placement Depth)

1. The nozzle should further press the LED 0.2mm onto the PCB from the height where the LED first touches solder paste.

If the release point of the nozzle is too high,
- it may cause placement issues (e.g. the LED to stick to the nozzle after placement, the LED to be mounted in an incorrect place/rotated position, the LED to become soldered to the PCB in a tilted position, etc.).

If the release point of the nozzle is too low,
- excessive forces may be applied to the LED during placement and it may cause the LED to become damaged.

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4-5. Imaging-based Automatic Inspection

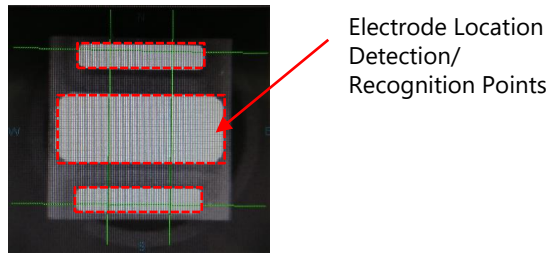


Figure 7. Recommended Reference Points to Detect, Recognize, or Locate the Electrodes

1. Nichia recommends using the electrodes as a reference to locate the center of the LED.
2. If the imaging device has trouble detecting/recognizing the electrodes, adjust the settings (i.e. the brightness of the light, etc.) of the pick-and-place machine.

5. Precautions When Reflow Soldering

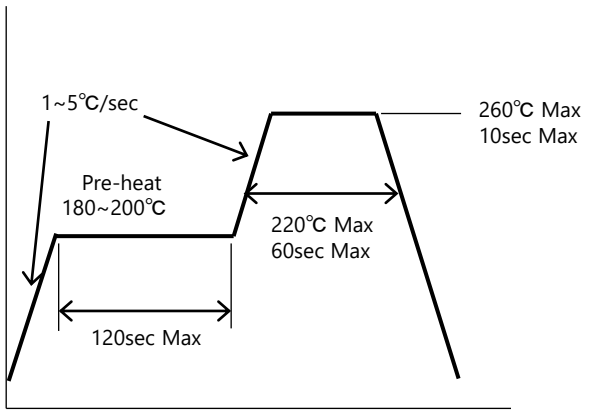


Figure 8. Recommended Reflow Soldering Condition (Lead-free Solder)

1. Reflow soldering must not be performed more than twice.
2. Nichia recommends using the reflow soldering conditions detailed in Figure 8 to the left; use the recommended reflow conditions specified by the manufacturer of the solder paste being used if it works better for the chosen application.

Note: To ensure that these reflow conditions have no negative effect on the LEDs, perform sufficient verification prior to use.

3. When cooling the LEDs from the peak temperature a gradual cooling slope is recommended; do not cool the LEDs rapidly.
4. During reflow soldering, the heat and atmosphere in the reflow oven may cause the optical characteristics to degrade. In particular, reflow soldering performed with an air atmosphere may have a greater negative effect on the optical characteristics than if a nitrogen atmosphere is used; Nichia recommends using a nitrogen reflow atmosphere.

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