



Assembly Precautions for the Nichia B35 Series LEDs

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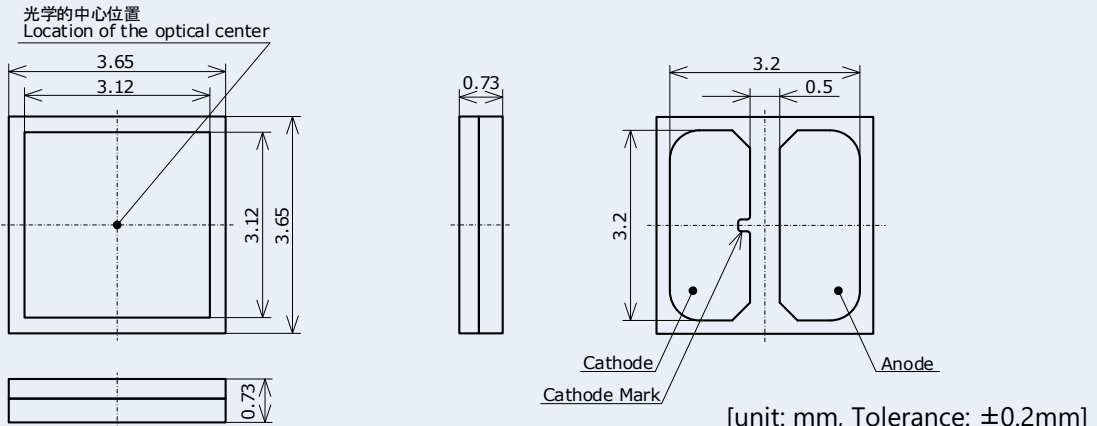
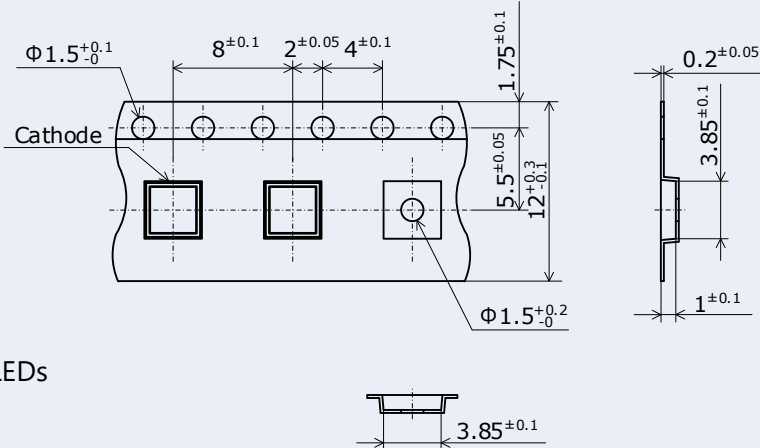
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The part number NV4WB35AM, NV4WB35AR in this document are the part number of our products, and do not have any relevance or similarity to other companies' products that may have trademark rights.

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1. LED Outline Dimensions/Tape Dimensions

Table 1. Product Specifications

Part Number	NV4WB35AM, NV4WB35AR
LED	 <p style="text-align: center;">[unit: mm, Tolerance: ±0.2mm]</p>
Embossed Carrier Tape	 <p style="text-align: center;">[unit: mm]</p>

Reel Size: 2,000 LEDs

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2. Handling Precautions

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 wire to break causing a catastrophic failure (i.e. the LED not to illuminate),
 - the lead frame may cause injuries when the LED is handled with bare hands.

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 the internal connection to fail causing a catastrophic failure (i.e. the LED not to illuminate).

ESD Precautions

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 have a reduction in the radiant flux 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.

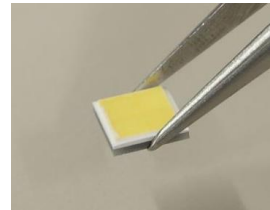
Stacking assembled PCBs together

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 (i.e. the LED not to illuminate).

Baking

The storage/package requirements for the Nichia B35 Series LEDs 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.

 **Correct**



 **Incorrect**

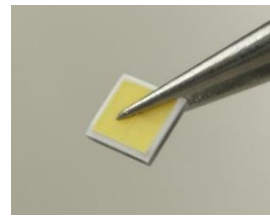


Figure 1. Example of an Improper Holding Position

Table 2. Storage/Baking Conditions

Conditions		Temperature	Humidity	Time
Storage	Before Opening Aluminum Bag	≤ 30°C	≤ 90% RH	Within 1 Year from Delivery Date
	After Opening Aluminum Bag	≤ 30°C	≤ 70% RH	≤ 168 hours
Baking		65±5°C	-	≥24 hours

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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

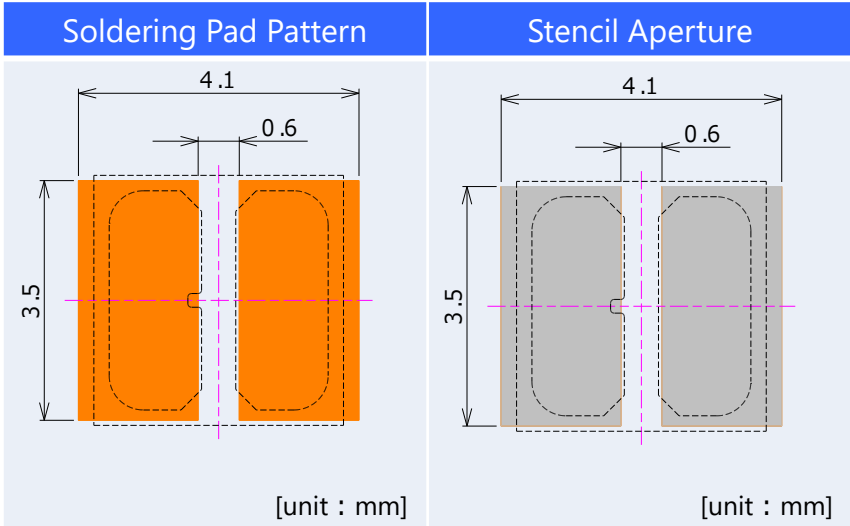
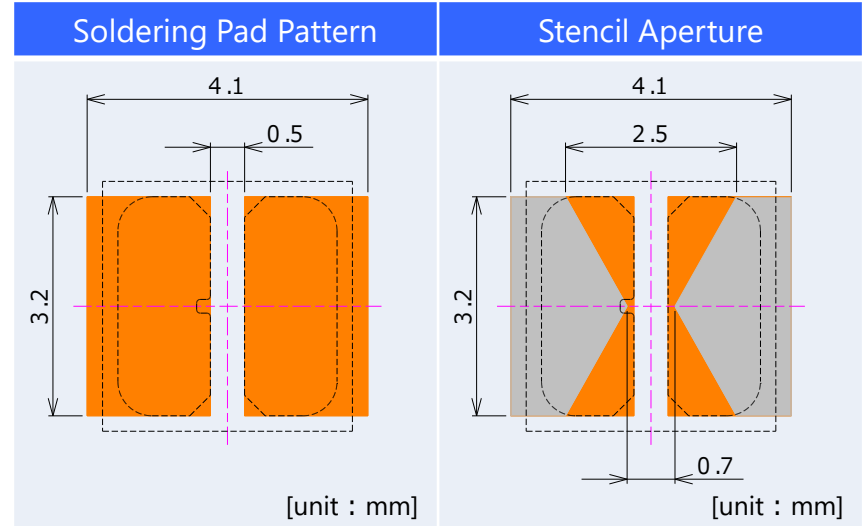


Table 4. Modified Soldering Pad Pattern /Metal Solder Stencil Aperture



... LED outline
 ■ Soldering Pad Pattern
 ■ Stencil Aperture

Table 5. Recommended Solder/Metal Solder Stencil Conditions

Item	Recommended Conditions
Solder Stencil Thickness	120 [μm]
Solder Paste	Sn-3.0Ag-0.5Cu

- The Modified Solder Pad Pattern and Stencil Aperture should be used to control LED tilting and solder balling.

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

Table 6. Cautions/Suggestions for setting up equipment

Item	Recommended Conditions/Specifications	Cautions/Suggestions
Pick-and-place machine ¹	Modular mounter	
Pick-and-place nozzle	Smaller than the emission area(< □3.12mm)	See "Pick-and-Place Nozzle" on Page 6 for the details.
Tape-and-reel feeder	Electrical (motorized) feeder Tape width: 12mm Feed length: 8mm	See "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 the top surface of the embossed carrier tape pocket.	See "Recommended Nozzle Height for Pick-up Operations" on Page 7 for the details.
Nozzle height for placement operations (i.e. placement depth)	0.2mm for placement depth	See "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 "Imaging-based Automatic Inspection" on Page 8 for the details.

Note:

¹ The recommended conditions/specifications above have been determined under the following verification conditions:

- Pick-and-place machine (modular mounter):
- YS100 High-Speed General-Purpose Modular (manufactured by Yamaha Motor Co., Ltd.)

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4-1. Pick-and-Place Nozzle

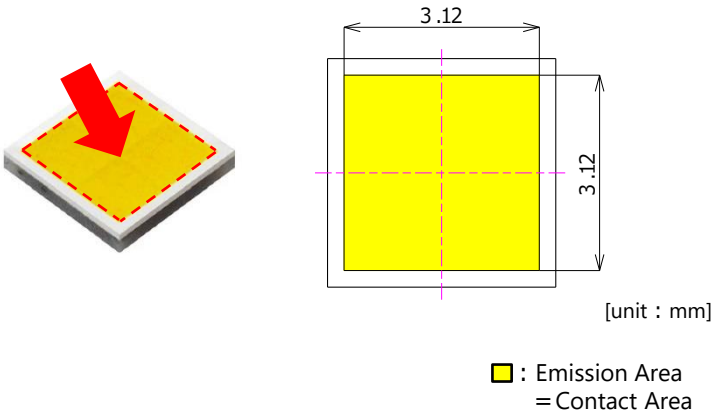


Figure 2. Emission Area of NICHIA B35 Series

- Nozzle suction area should be smaller than the emission area of the LED(3.12mm×3.12mm).
- Contact on the emission area.

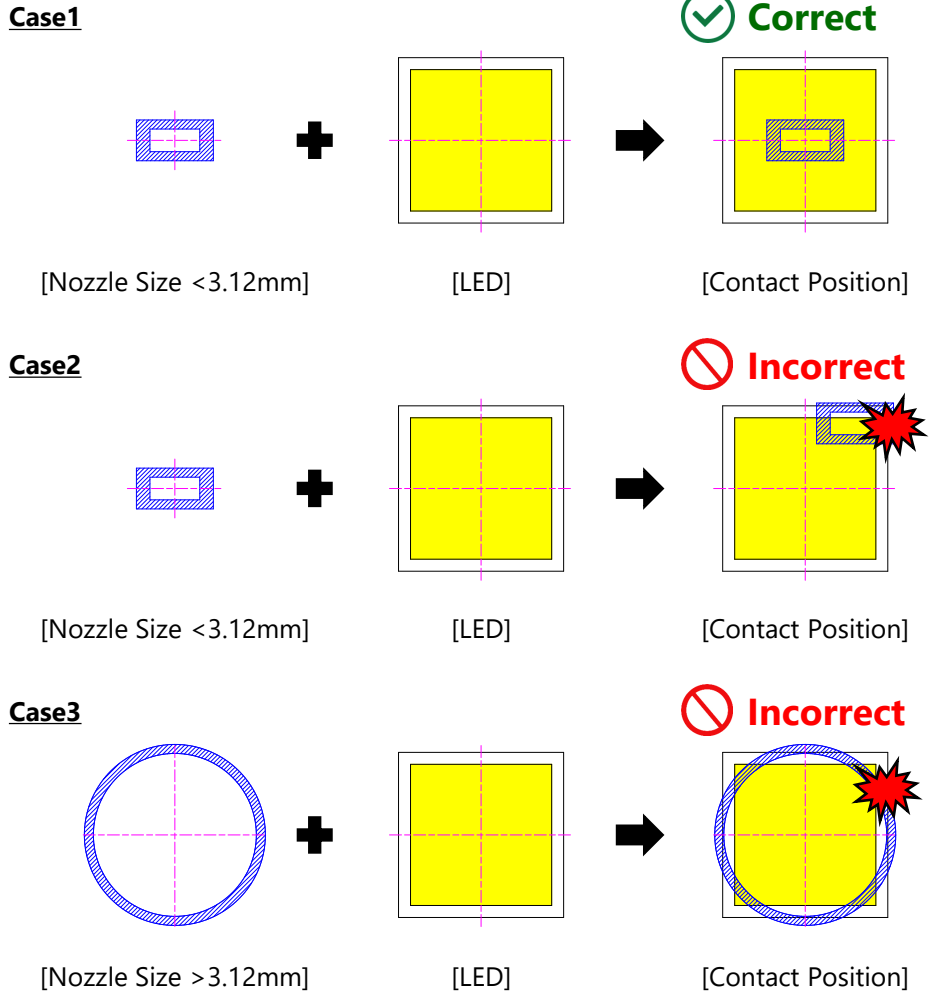
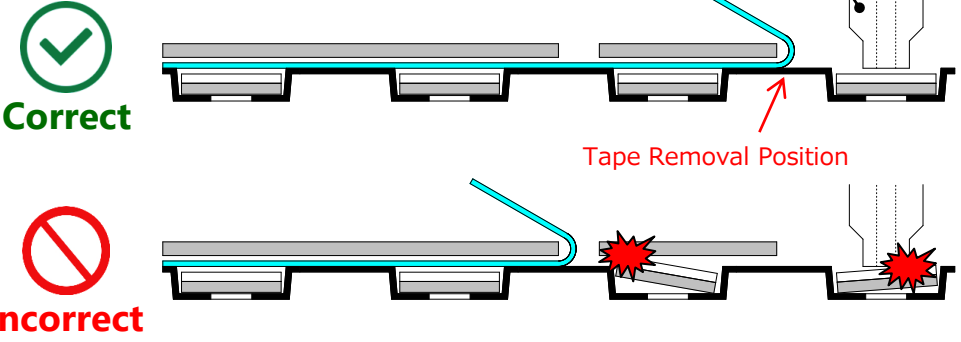


Figure 3. Example of the pick-up by different nozzle and contact position.

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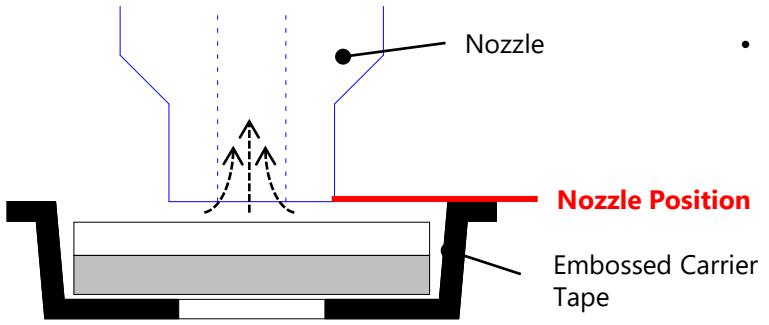
4-2. Tape-and-Reel Feeder



- Tape width:12mm / Feed length:8mm
- The chosen tape feeder should be one that has a slower feeding speed (e.g. electrical feeders).
- The recommended tape removal position is right next to where the pick-and-place nozzle picks up the LEDs to prevent the LEDs from tilting within the tape pocket and becoming damaged by the feeder shutter and/or nozzle.

Figure 4. Examples of Correct/Incorrect Top Cover Tape Removal Positions

4-3. Recommended Nozzle Height for Placement Operations (Placement Depth)



- Ensure that the nozzle only goes down to the top edge of the tape pocket and does not directly come into contact with the LED.
Note: The reference level for the nozzle setting is at the top edge of the tape pocket.
- The recommended nozzle height for pick-up operations has been determined by Nichia under the verification conditions (See Table 6) 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 and/or damage to the LED.

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Figure 5. Recommended Nozzle Height for Pick-up Operations

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

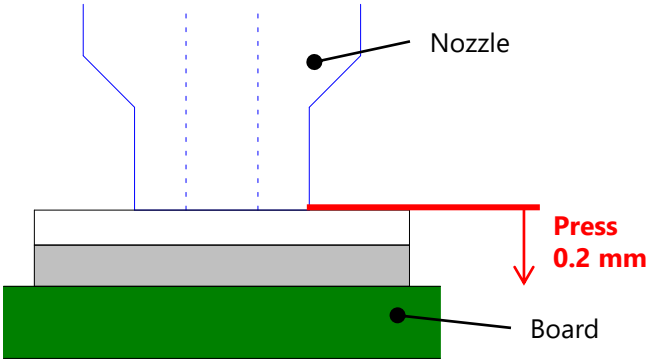


Figure 6. Recommended Nozzle Height for Placement (Placement Depth)

- After the LED is mounted onto solder paste on the PCB, the nozzle should further press the LED 0.2mm into the PCB.

If the press force is too weak,
- Assembly failure may occur since the LED may float on top of the PCB or it may not separate from the nozzle.

If press force is too strong,
- LED may receive excessive stress which may cause the LED to be damaged.

4-5. Imaging-based Automatic Inspection

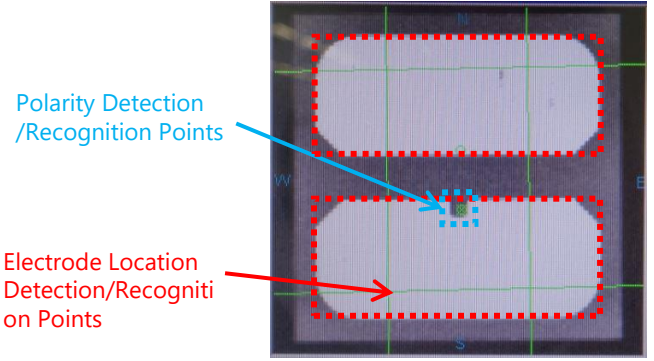


Figure 7. Imaging-based Automatic Inspection

- Nichia recommends using the electrodes as a reference to locate the center of the LED.
- If it cannot be recognized, adjust the recognition conditions such as lighting, size, Threshold.
- If an automatic polarity detector is used for the LEDs, set up the imaging device to detect the cathode mark (fig.7 Recognition Point)

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5. Precautions When Reflow Soldering

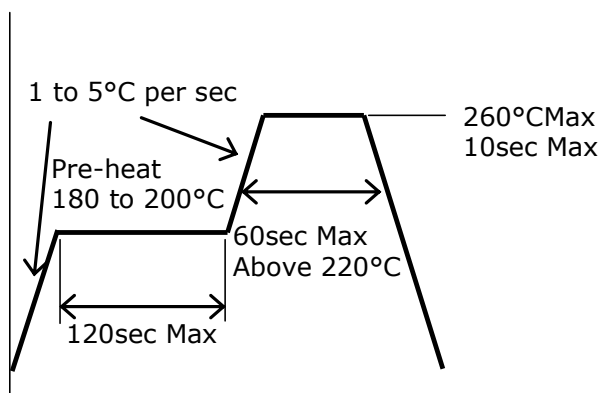


Figure 8. Recommended Reflow Soldering Condition (Lead-free Solder)

- Reflow soldering must not be performed more than twice.
- Using the recommended reflow soldering conditions (See Figure 8 to the left) as a reference, modify if necessary, the recommended reflow conditions specified by the manufacturer of the solder paste being used.

Note:

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

- When cooling the LEDs from the peak temperature a gradual cooling slope is recommended; do not cool the LEDs rapidly.
- 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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