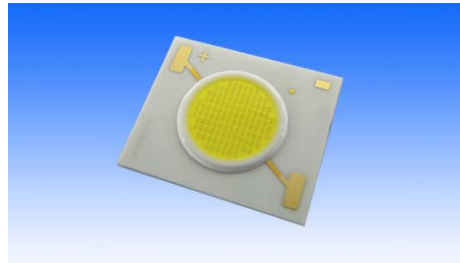


COB

Assembly and Handling



Contents (Index)

1. Introduction
2. Product Features
3. Example of applied product
4. Assembling Method
5. Handling Precautions
6. Thermal Management

1. Introduction

This document contains the instructions regarding assembly and handling precautions for the COB (Chip on Board) made by Nichia Corporation.

2. Product Features

COB is an abbreviation of Chip on Board, and the chips are mounted directly to the ceramic board. Figure 1 shows the structure of the COB.

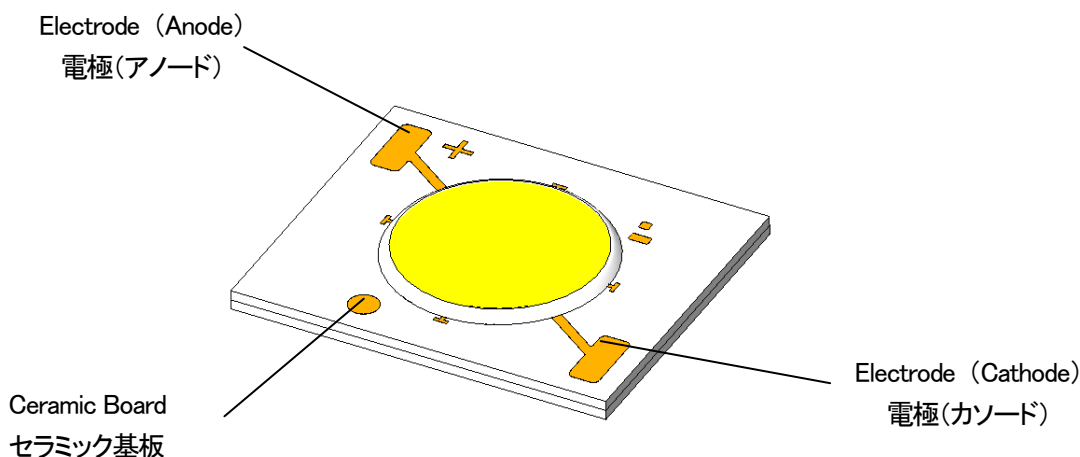


Figure 1 Structure of COB (NSBxL110)

The features of the COB include the followings:

① Able to directly attach a heat sink to the COB

The conventional LED is attached to a heat sink after being soldered to a printed circuit board.

For COBs, they can be directly attached to a heat sink as shown in Figure 2.

Therefore, the printed circuit board, and the reflow process become unnecessary.

The thermal resistance of the COB and the board is lower compared to the conventional LED, allowing for better heat radiation efficiency.

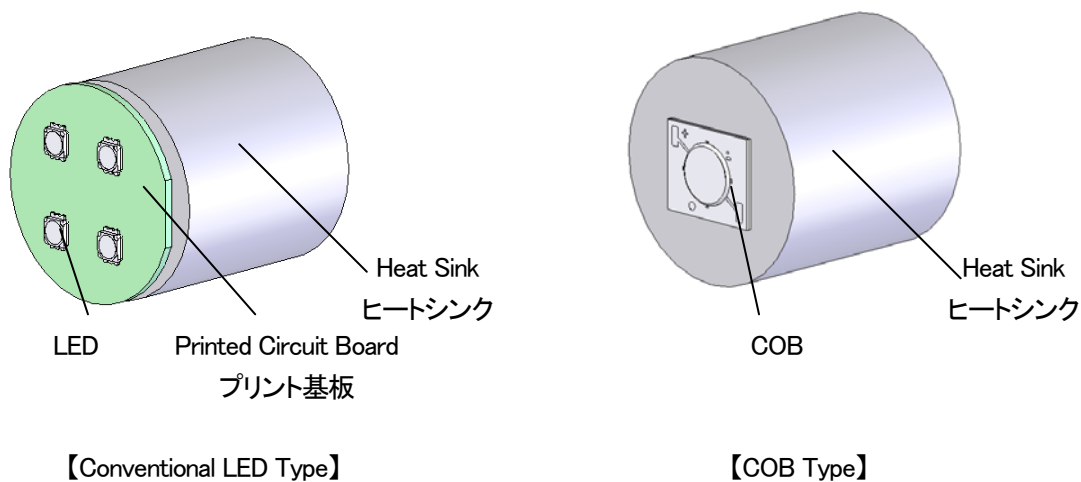


Figure 2 Assembly image drawing to the heat sink

②The miniaturization of the lighting equipment is possible

When producing a high luminous flux product, the number of components in the product can be reduced by using a single COB instead of using multiple low wattage LEDs.

3. Example of Applied Products



Figure 3 Example of applied products using COB

Applications suitable for using the COB are luminaries such as electric bulbs, street lights, down lights, and spotlights as shown in Figure 3. The examples below show the COB for the electric bulb and spotlight applications.

Light Emitting Diode

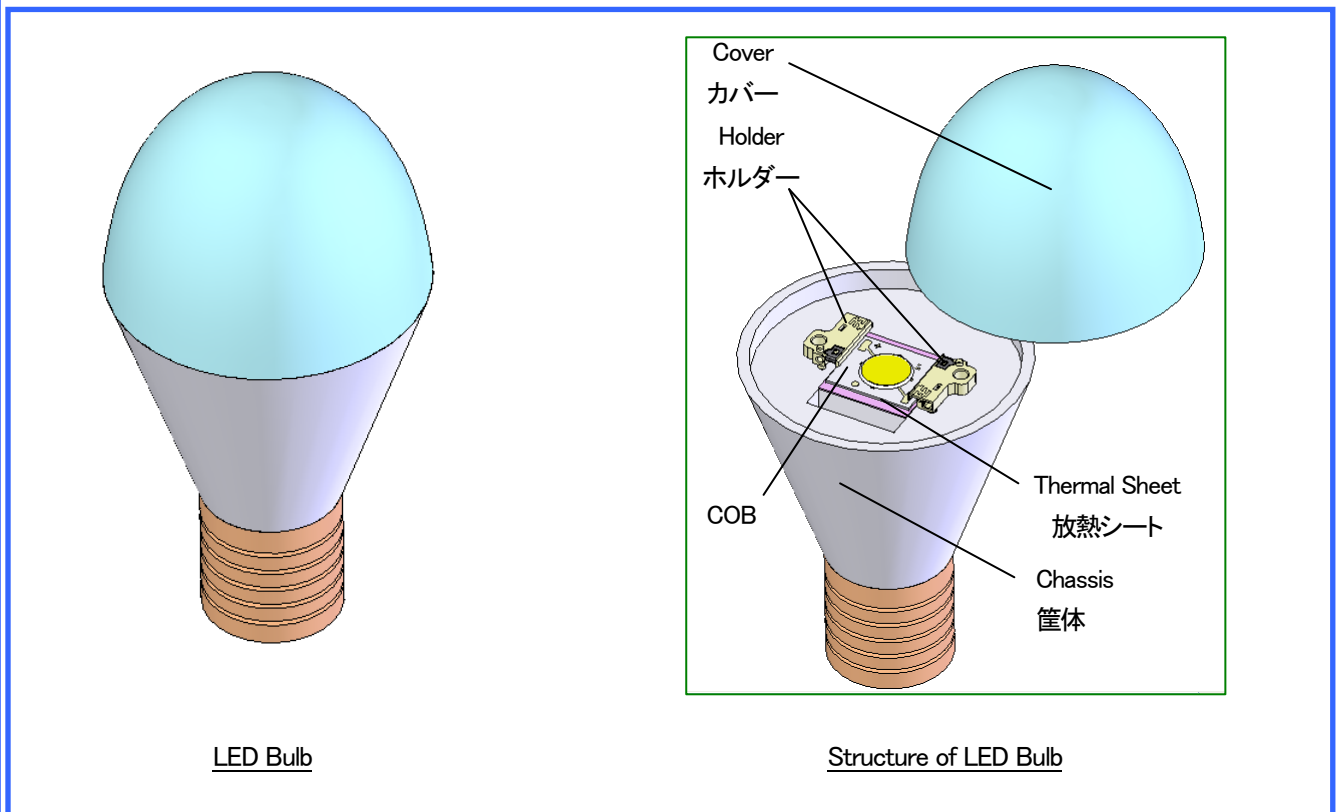


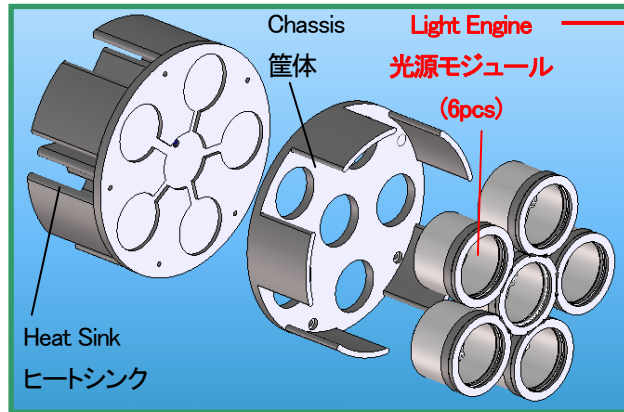
Figure 4 LED Bulb (Example of reference)

Figure 4 shows the LED bulb with 1 COB. This LED bulb does not use a printed circuit board and assembles the COB directly to the chassis.

The thermal sheet is put between the chassis and COB, and uses the holder to connect the COB. (The detailed contents for the holder are discussed in the following section, "4. Assembly Method".)



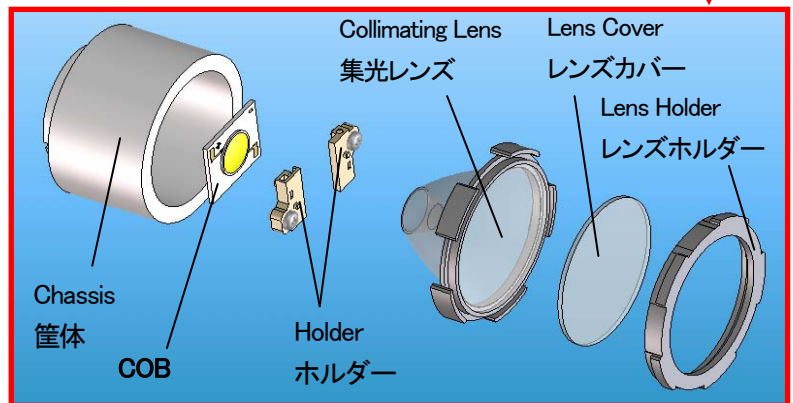
Spotlight



Components of a Spotlight

Specification (Reference)

Dimension	Φ 120mm × 90mm
LED	NSBLL110 × 6
Luminous Flux	4,900lm
Color Temperature	3,000K
Directivity	28°
Power Consumption	60W



Components of a Light Engine

Figure 5 An Example of a spotlight with the Collimating lens

Figure 5 shows a spotlight with the collimating lens using 6 COBs.

This module attaches COB directly to the chassis, it consists of the collimating lens, lens cover and lens holder.

In addition, the luminaire is assembled by connecting 6 sets of these light engines to a heat sink.

4. Assembling Method

Using a thermal sheet or thermal grease between the COB and the chassis is recommended to improve the COB's heat radiation characteristics.

※Please confirm if there are any corrosive gases in the atmosphere prior to using a thermal sheet or thermal grease.

The board may break when excessive force is applied to the ceramic substance of the COB

It is necessary to confirm that the COB will be placed on a flat surface. When placing the COB on the surface, it is recommended to use COB holders.

The types of COB holders are discussed below.

(1) Solderless LED Socket Type N

Below is a COB holder with electrical contacts.

Figure 6 shows the specification drawings of the COB Holder,

Figure 7 shows the recommended dimensions of COB and Chassis.

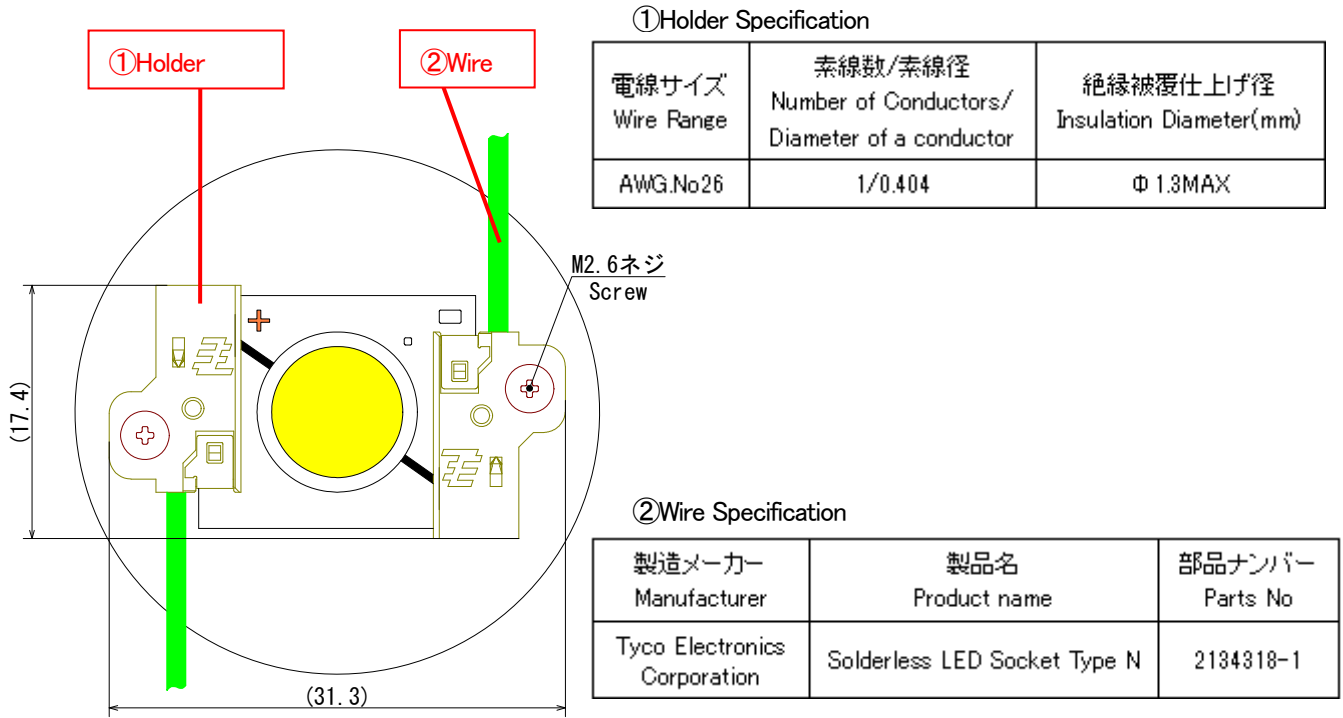


Figure 6 Specification drawing of the COB holder (Solderless LED Socket Type N)

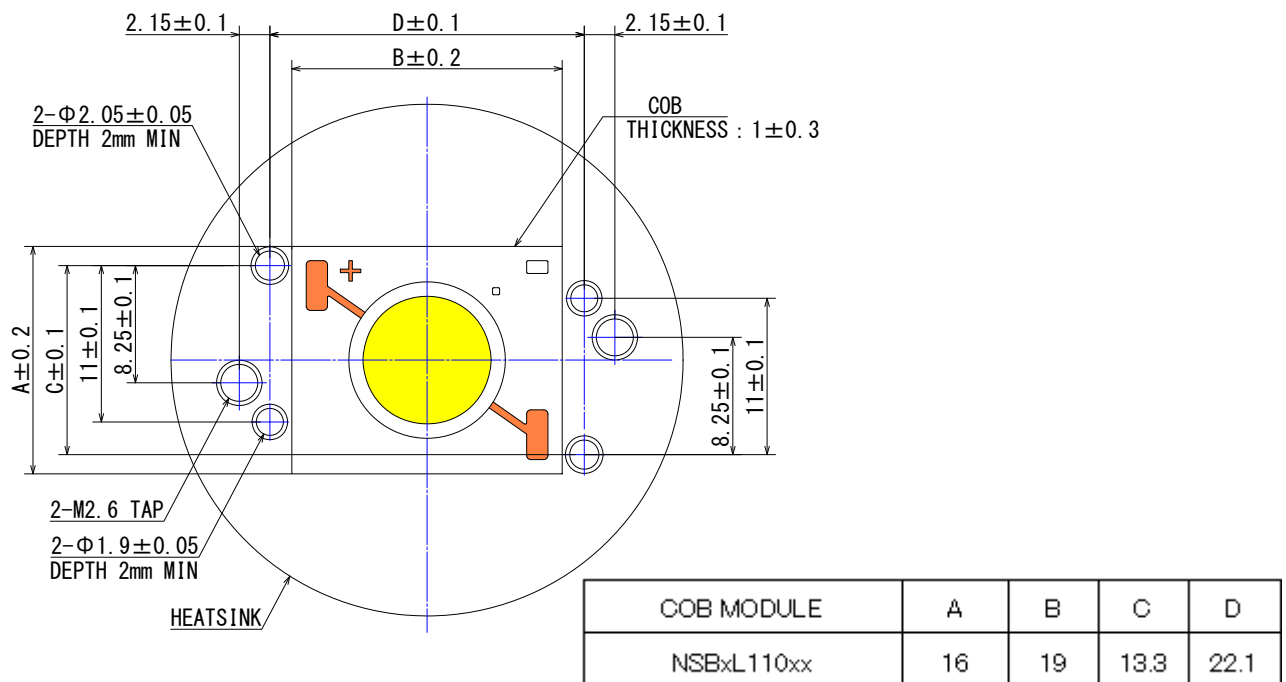


Figure 7 Recommend dimensions of COB and Chassis

This sheet contains tentative information, we may change contents without notice.

(2) Lumispring-N

Below is a COB holder without electrical contacts.

Figure.8 shows the specification drawing of the COB holder, Figure 9 shows the recommended dimensions when using with the COB.

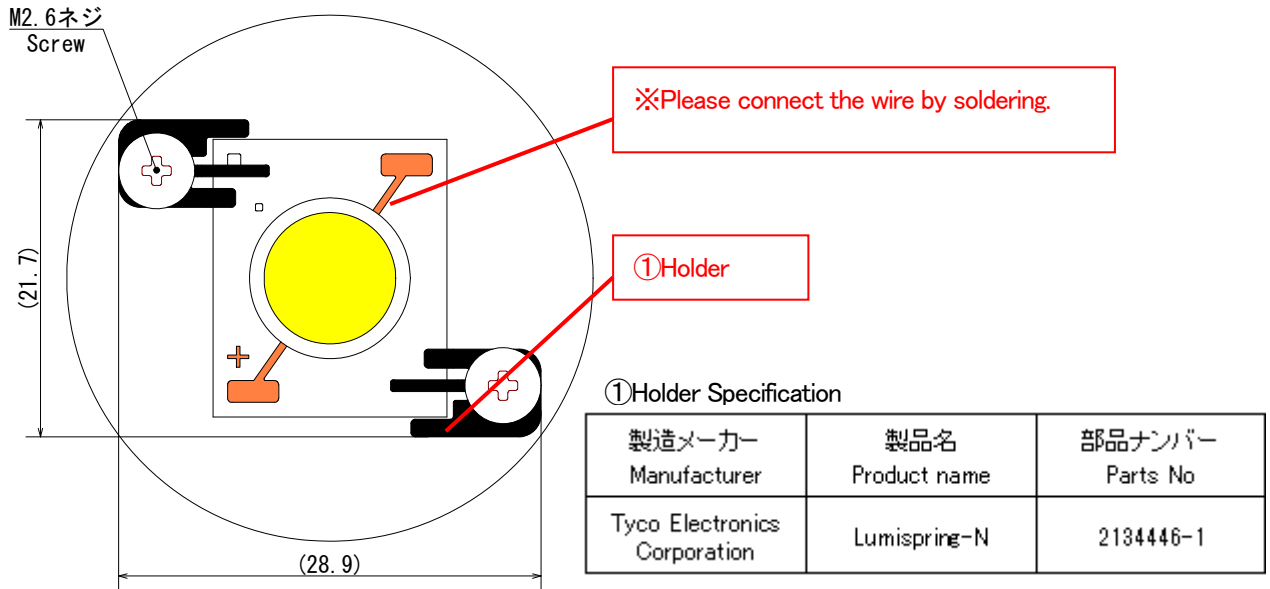


Figure 8 Specification drawing of the COB holder (Lumispring-N)

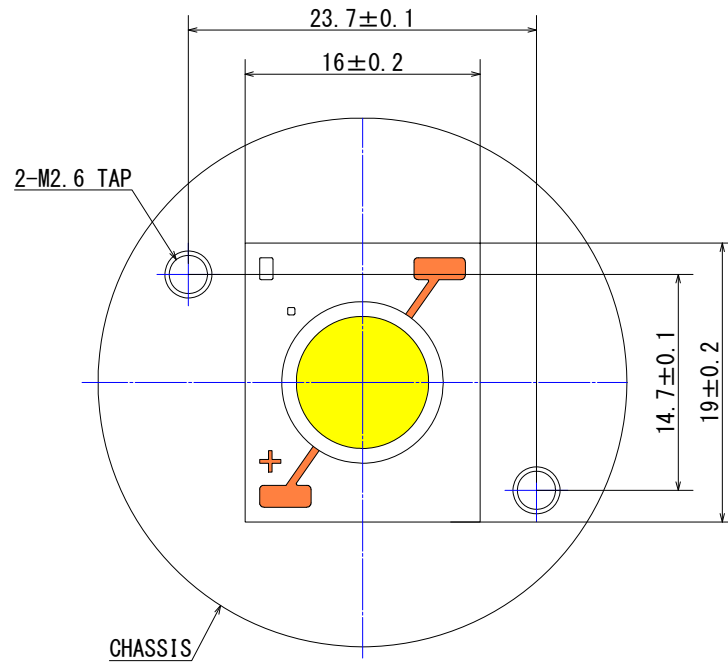


Figure 9 Recommend dimensions of COB and Chassis

For the COB holder above (2), it is necessary to solder an electric wire to the COB's electrode as in Figure 8. Please be careful of the following when soldering.

Hand Soldering :

- Soldering iron temperature < 380 °C
- Soldering must be completed in less than 5 seconds.
- Soldering must only be done once.
- Do not apply stress to COB while soldering.
- Do not readjust the COB location after soldering. When readjusting is necessary, please confirm that the COB will not be damaged by doing so..

5. Handling Precautions

① Bare Hand

Do not handle COBs with bare hands. Doing so can contaminate the COB's surface and affect optical characteristics. Do not touch the resin area directly. Excess pressure can cause the wire bonds to break and damage the COB package, which may cause the COBs not to illuminate. (Refer to Figure 10.)

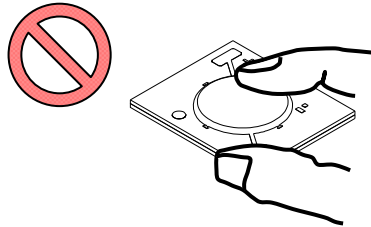


Figure 10 Bare hand

② Tweezers

When handling with tweezers, excessive force cannot be applied to the resin. The resin can be cut, chipped, delaminated, or deformed, causing the wire bonds to break, which may cause the COBs not to illuminate. (Refer to Figure 11.)

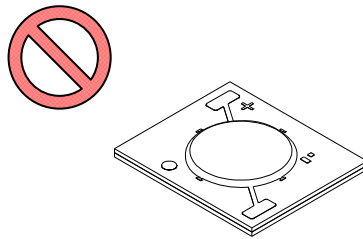


Figure 11 Tweezers

③ Dropping COBs

If the COB is dropped, it may damage. (Refer to Figure 12.)

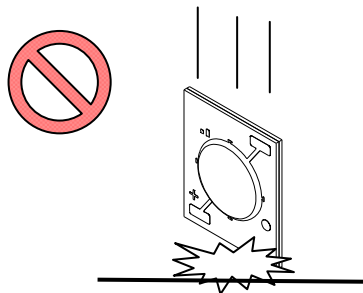


Figure 12 Dropping COBs

④ Stacking COBs

Do not stack the COBs. Force applied to the resin may cause delamination and the wires to deform and/or break, which may cause the COBs not to illuminate. (Refer to Figure 13.)

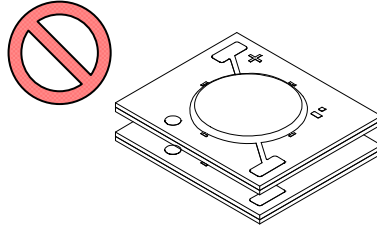


Figure 13 Stacking COBs

6. Thermal Management

Since the COBs generate more heat than the conventional Power LEDs, good thermal management is necessary. The increase in T_j is affected by the thermal resistance of the chassis and the installation environment of the COB.

The COBs must be operated within the maximum rating provided in the specification.

The following equation can be used to calculate the junction temperature of the products.

$$T_j = T_c + R_{thj-c} \times W$$

T_j : Junction Temperature

T_c : Case Temperature

R_{thj-c} : Thermal Resistance from chip to T_c measuring point (Refer to Figure 14.)

※ $R_{thj-c} = 2.1^\circ\text{C}/\text{W}$ (NSBxL110)

W : Input power consumption ($= I_f \times V_f$)

(I_f : Forward current, V_f : Forward voltage)

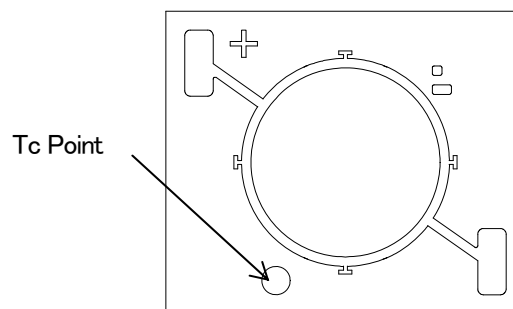


Figure 14 T_c measuring point