

CITILED CLL130 lighting LED Datasheet

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The light-emitting diode of an LED package radiates light and heat according to the input power. However, the surface area of an LED package is quite small, and the package itself is expected to release little heat into the atmosphere. An external radiator such as a heat sink is thus required. The heat dissipation structure up to the connection portion of the external radiator uses mainly heat conduction.

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Heat Dissipation Design



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The cross-sectional structure example, where the package of the CLL130 series is connected to an external laminated circuit board is shown in Figure-1 (a). The package has a laminated structure with a light-emitting diode mounted on a substrate, which has a heat dissipation structure of the through-holes.

specifications, if the ambient temperature becomes higher and/or the driving current is larger. Therefore, use Figure-2 as a guide when selecting the external electrode of the outer shell to solder. The thermal resistance between the junction section of the light-emitting diode and the electrode side of the outer shell is R_{j-s} and the specific thermal resistance value of the package.
Therefore, the following formula is used.

$$T_j = R_{j-s} \cdot P_d + T_s$$

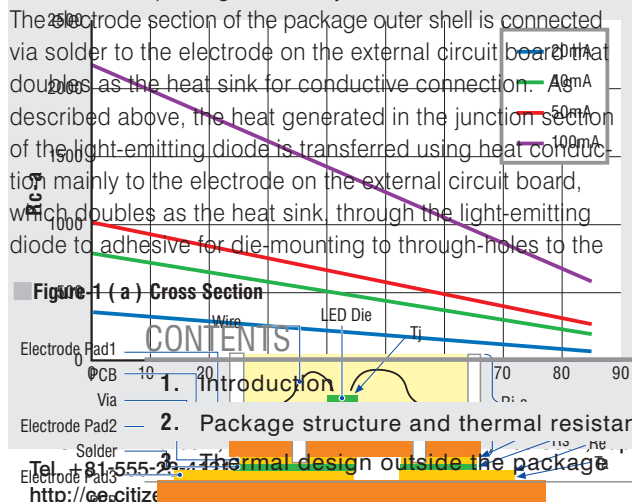
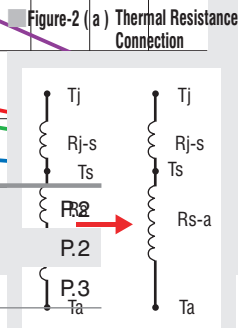
Figure-2 (a) Thermal Resistance Connection
A distinctive point is to be able to conduct the heat generated at the light-emitting diode via through-holes to the outside of the package efficiently.

In addition, the thermal resistance of the solder outside the package is R_s [°C/W], the thermal resistance of the electrodes with the heat sink function is R_e [°C/W], and the ambient temperature is T_a [°C].

Figure-2 (b) indicates the equivalent thermal resistance along the cross-sectional diagram in Figure-2 (a). As indicated, the thermal resistances R_{j-s} , R_s , and R_e are connected in series between the junction temperature T_j and the ambient temperature T_a . The thermal resistances outside the package R_s and R_e can be integrated into the thermal resistance R_{s-a} at this point.

Thus, the following formula is also used

$$T_j = (R_{j-s} + R_{s-a}) \cdot P_d + T_a$$



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Therefore, the following formula is used.

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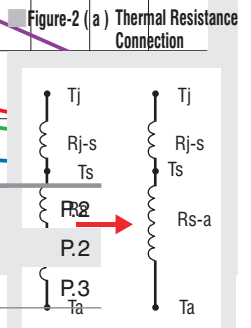
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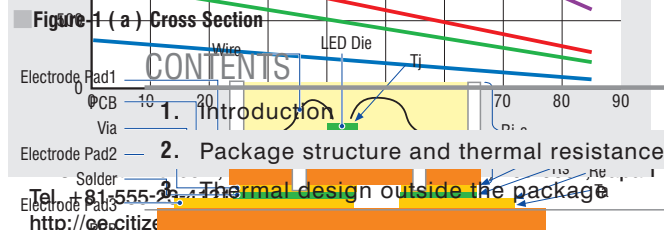
Figure-2 (b) indicates the equivalent thermal resistance along the cross-sectional diagram in Figure-2 (a). As indicated, the thermal resistances R_{j-s} , R_s , and R_e are connected in series between the junction temperature T_j and the ambient temperature T_a . The thermal resistances outside the package R_s and R_e can be integrated into the thermal resistance R_{s-a} at this point.

Thus, the following formula is also used

$$T_j = (R_{j-s} + R_{s-a}) \cdot P_d + T_a$$



The electrode section of the package outer shell is connected via solder to the electrode on the external circuit board that doubles as the heat sink for conductive connection. As described above, the heat generated in the junction section of the light-emitting diode is transferred using heat conduction mainly to the electrode on the external circuit board, which doubles as the heat sink, through the light-emitting diode to adhesive for die-mounting to through-holes to the



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specifications, if the ambient temperature becomes higher and/or the driving current is larger. Therefore, use Figure-2 as a guide when selecting the external electrode of the outer shell to solder. The thermal resistance between the function section of the light-emitting diode and the electrode side of the outer shell is $R_j \cdot s$ and the specific thermal resistance value of the package.

Figure-2 (a) is a reference for the appropriate thermal design. A distinctive point is to be able to conduct the heat generated at the light-emitting diode via through-holes to the outside of the package efficiently.

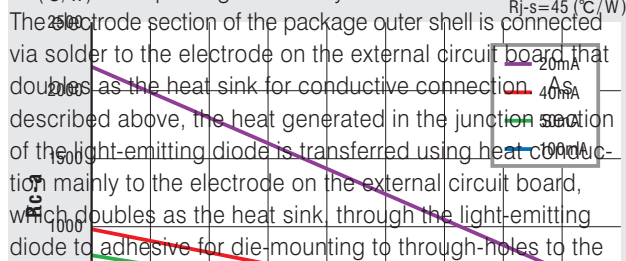


Figure-1 (a) Cross Section

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1. Introduction
2. Package structure and thermal resistance
3. Thermal design outside the package

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Therefore, the following formula is used.

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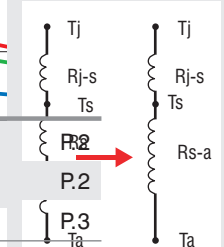
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Figure-2 (b) indicates the equivalent thermal resistance along the cross-sectional diagram in Figure-2 (a). As indicated, the thermal resistances $R_j \cdot s$, R_s , and R_e are connected in series between the function temperature T_j and the ambient temperature T_a . The thermal resistances outside the package R_s and R_e can be integrated into the thermal resistance $R_s \cdot a$ at this point.

Thus, the following formula is also used.

$$T_j = (R_j \cdot s + R_s \cdot a) \cdot P_d + T_a$$

Figure-2 (a) Thermal Resistance Connection



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$$T_j = (R_{j-s} + R_{s-a}) \cdot P_d + T_a$$

