

## Application Note for Thermal Management

### Tj Dependence on Heat Release for NCSU03xx, an ultraviolet emission LED

#### [ Introduction ]

LEDs require higher current for greater light output. However, the higher current is applied to LEDs, the more heat is generated from a LED junction, which leads to light output deterioration. Therefore, thermal management is critical for an effective use of NCSU03xx.

This application note provides examples of heat-releasing (Case 1, 2) for the better use of NCSU03xx.

#### [ Tj Calculation Method ]

The equation used for calculating Tj is:

$$T_j = T_s + R_{j-s} \times P$$

Where

Tj: Temperature of LED junction (°C)

Ts: Temperature of soldering point (°C)\*

Rj-s: Thermal resistance from LED junction to Ts measurement point (°C / W)\*\*

P: Input power (W)



Fig. 1 Using higher heat-conductive grease or adhesive when Tj measured with thermocouples

\*Ts measuring point: the red circled point in Fig.1

\*\*Rj-s for NCSU03xx: 7°C / W

#### [ Tj Measurement Results ]

Case 1. Aluminum board

I <sub>F</sub> (A)	T <sub>s</sub> (°C)	V <sub>F</sub> (V)	T <sub>j</sub> (°C)
0.5	75	3.57	88
0.7	95	3.63	113
1.0	122	3.71	148

Case 2. Aluminum board + Heat sink

I <sub>F</sub> (A)	T <sub>s</sub> (°C)	V <sub>F</sub> (V)	T <sub>j</sub> (°C)
0.5	54	3.62	67
0.7	66	3.70	84
1.0	82	3.80	109



Fig. 1 Aluminum board



Fig. 2 Aluminum board + Heat sink

#### [ Heat Release Equipment ]

##### Heat Release Board

Main Material: Aluminum

Outer Dimension: 30mm×30mm×1.6mm

##### Heat Sink

Product #: 30SQ30H20

Manufacturer: LSI COOLER Co., Ltd.

Manufacturer URL: <http://www.lsi-cooler.co.jp/index.html>

#### Note: Absolute Maximum Rating

Absolute Maximum Rating: I<sub>F</sub>= 0.7A, T<sub>j</sub>=130°C

The operating conditions exceeding the above absolute maximum ratings are not covered by the warranty.