Fig. 8

4. Lead forming should only be done with proper tools such as a jig and/or radio pliers. The upper section of the leads should be secured firmly such that the bending force is not exerted on the LED body. Refer to below diagram (Fig. 9) for recommended lead bending method.

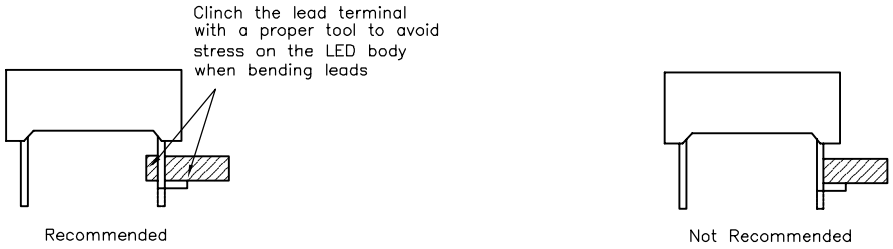

Fig. 9

ESD Precautions

InGaN/GaN material LEDs are sensitive to electrostatic discharge (ESD) and other transient voltage spikes. ESD and voltage spikes can affect the component's performance due to increased reverse current and/or decreased forward voltage. This may result in reduced light intensity and/or component failure. Static discharge may occur when static sensitive LEDs come in contact with the user or other conductive devices. ESD sensitive LEDs must incorporate protective circuitry to prevent ESD and to control voltage spikes in order to stay within the maximum voltage specified.

SunLED products are stored in anti-static bags for protection during transportation and storage. However, below anti-static measures should always be noted when handling static sensitive components.

1. Operators must wear anti-static wristbands.
2. Operators must wear anti-static suits when entering work areas with conductive machinery and materials.
3. All test instruments and production machinery must be grounded.
4. Avoid static build up by minimizing friction between the LED and its surroundings.
5. Relative Humidity between 40% ~ 60% is recommended in ESD-protected work areas to reduce static build up. Reference JEDEC/J-STD-033 and JEDEC/JESD625-A standards.
6. All workstations that handle ESD sensitive components must maintain an electrostatic condition of 150V or less.
7. Anti-static material/packaging should be used when parts are being stored and/or transported.
8. All anti-static measures noted above should be periodically checked and inspected to ensure proper functionality.

Design Notes

1. Protective current-limiting resistors should be used in conjunction with LEDs to ensure parts are operating within specified current range.
2. The driving circuit should be designed to avoid reverse voltages and transient voltage spikes when the circuit is in both on & off states. Prolonged reverse bias may cause metal migration leading to an increase in leakage current or causing a short circuit.

3. Prevent exposure of LEDs to environments containing high moisture or corrosive gases.
4. Excess operating temperature and/or forward current should be avoided as it may lead to accelerated degradation or failure of the LED. Always refer to the most updated datasheet for driving conditions.
5. When LEDs are mounted in a parallel configuration, there should be individual current-limiting resistors in series with each LED. Refer to below diagram (Fig.10) for an example of a recommended set up.

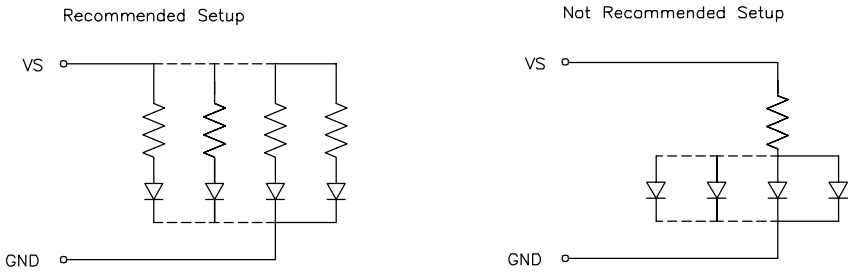

Fig. 10

6. Mounting direction of SMD components should be placed perpendicular to the direction of PCB travel. This will ensure the solder wets on each lead simultaneously during reflow and prevent shifting of LEDs. Refer to below diagram (Fig.11) for examples of recommended mounting direction.

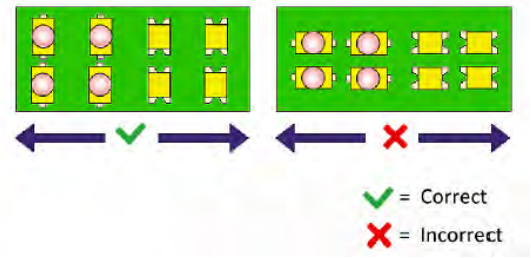

Fig. 11

7. High-power LED devices require optimization of heat dissipation. Increasing the size of metal mounting surface and proper application of thermal conductive paste will help improve heat dissipation. Refer to below diagram (Fig.12) and product datasheets for specific design recommendations.

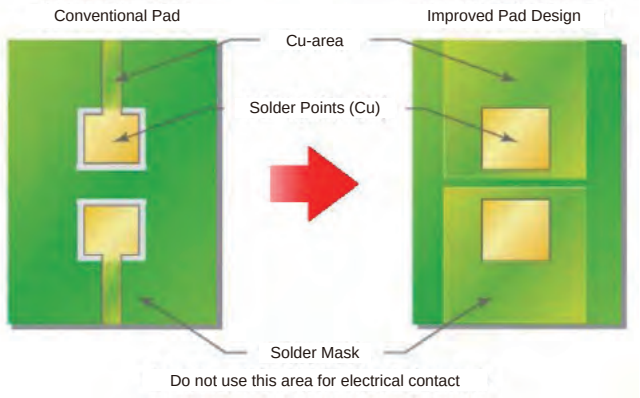

Fig. 12

8. High temperatures may reduce component's performance and reliability. Please refer to individual product datasheets for specific details on operable temperature range and effects of temperature on the LED.