SST-90-W LEDs

Features:
- Extremely high optical output White LED: up to 4,000 lm at 18 A
- 5700K Daylight and 6500K Cool White color points available.
- High thermal conductivity package - junction to case thermal resistance of only 0.5 °C/W
- Large, monolithic chip with uniform emitting area of 9 mm²
- Variable drive currents: less than 1 A through 18 A continuous waveform.
- Electrically isolated thermal path
- Environmentally friendly: RoHS compliant

Applications
- Machine vision
- High-output strobing applications
- Beacons, obstruction Lighting
- Industrial Applications
- Portable Lighting
- Medical Lighting
- Emergency Vehicle Lighting
- Displays and Signage
- High-output, directional transportation lighting
- Search Lights
- Work Lights
Technology Overview

Luminus LEDs™ benefit from a suite of innovations in the fields of chip technology, packaging and thermal management. These breakthroughs allow illumination engineers and designers to achieve solutions that are high brightness and high efficiency.

Luminus Technology

Luminus’ technology enables large area LED chips with uniform brightness over the entire LED chip surface. The optical power and brightness produced by these large monolithic chips enable solutions which replace arc and halogen lamps where arrays of traditional high power LEDs cannot.

Packaging Technology

Thermal management is critical in high power LED applications. With a thermal resistance from junction to case of 0.5º C/W, Luminus SST-90-W LEDs have the lowest thermal resistance of any LED on the market. This allows the LED to be driven at higher current densities while maintaining a low junction temperature, thereby resulting in brighter solutions and longer lifetimes.

Reliability

Designed from the ground up, Luminus LEDs are one of the most reliable light sources in the world today. Luminus LEDs have passed a rigorous suite of environmental and mechanical stress tests, including mechanical shock, vibration, temperature cycling and humidity, and have been fully qualified for use in extreme high power and high current applications. With very low failure rates and median lifetimes that typically exceed 60,000 hours, Luminus LEDs are ready for even the most demanding applications.

Environmental Benefits

Luminus LEDs help reduce power consumption and the amount of hazardous waste entering the environment. All LED products manufactured by Luminus are RoHS compliant and free of hazardous materials, including lead and mercury.

Understanding Luminus LED Test Specifications

Every Luminus LED is fully tested to ensure that it meets the high quality standards expected from Luminus’ products.

Testing Temperature

Luminus surface mount LEDs are typically tested with a 20mSec input pulse and a junction temperature of 25ºC. Expected flux values in real world operation can be extrapolated based on the information contained within this product data sheet.

Large Operating Range

The tables on the following pages provide typical optical and electrical characteristics. Since the LEDs can be operated over a wide range of drive conditions (currents from less than 1.0 A to 18.0 A, and duty cycle from <1% to 100%), multiple drive conditions are listed.

SST-90-W LEDs are production tested at 3.15 A. The values shown at other 6.3 A and 9.0 A are for additional reference at other possible drive conditions.
**SST-90-W White Binning Structure**

SST-90-W white LEDs are tested for luminous flux and chromaticity at a drive current of 3.15 A (350 mA/mm²) and placed into one of the following luminous flux (FF) and chromaticity (WW) bins. Please note that single bins cannot be ordered. Refer to ordering information to see the highest minimum bin orderable.

### Flux Bins

<table>
<thead>
<tr>
<th>Flux Bin (FF)</th>
<th>Minimum Flux (lm) @ 3.15A</th>
<th>Maximum Flux (lm) @ 3.15A</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2</td>
<td>900</td>
<td>950</td>
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<td>N3</td>
<td>950</td>
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<td>P</td>
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*Note: Luminus maintains a +/- 6% tolerance on flux measurements.*

### Chromaticity Bins

Luminus’ Standard Chromaticity Bins: 1931 CIE Curve

![Chromaticity Bins Diagram](image-url)
The following tables describe the four chromaticity points that bound each chromaticity bin. Chromaticity bins are grouped together based on the color temperature.

### 6500K Chromaticity Bins

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### 5700K Chromaticity Bins

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<th>Bin Code (WW)</th>
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</tbody>
</table>

*Sub-bins within ANSI defined quadrangles per ANSI C78.377-2008

Note: CIE Measurement uncertainty for white devices is estimated to be +/- 0.01
## Ordering Information

### SST-90-W and SSR-90-W Bin Kit Order Codes

The following table describes the bin kit ordering codes for the SST-90-W and SSR-90-W. Each kit specifies a minimum flux and allowed chromaticity bins. A maximum flux is not specified. Within each kit, Luminus may ship any part meeting or exceeding the minimum flux specification as well as chromaticity specification but no specific mix of bins is guaranteed.

<table>
<thead>
<tr>
<th>Color</th>
<th>Bin Kit Flux Code</th>
<th>Min. Flux</th>
<th>Chromaticity Bins</th>
<th>Kit Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>White</strong>&lt;br&gt;W65S&lt;br&gt;6500K, Standard CRI (typ. 70)</td>
<td>N2</td>
<td>900</td>
<td>F4, F3, G4, G3, EF, DG, DE, DF</td>
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<td><strong>White</strong>&lt;br&gt;WDLS&lt;br&gt;6500K &amp; 5700K&lt;br&gt;Standard CRI (typ. 70)</td>
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Product Shipping & Labeling Information

All SST-90-W products are packaged and labeled with their respective bin as outlined in the tables and charts from pages 3 to 4. When shipped, each package will only contain one flux and chromaticity bin. Note the exception: Tape and Reel packaging for SST-90-W65S, SST-90-W57S, and SST-90-WDLS may contain multiple chromaticity bins but only a single flux bin.

Product Label Information:

- Ordering part number (see page 5) - Example: SST-90-W57S-F11-N2201
- Box / Tray / Reel ID (Luminus Internal Use)
- Quantity
- Bin = FF - WW (See pages 3 and 4 for definitions)
Optical and Electrical Characteristics (T<sub>j</sub> = 25 ºC)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Values at Test Currents</th>
<th>Typical Values at Indicated Current&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Unit</th>
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<td>A/mm&lt;sup&gt;2&lt;/sup&gt;</td>
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<td>Forward Voltage</td>
<td>V&lt;sub&gt;f,min&lt;/sub&gt;</td>
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Common Characteristics

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<th>Values</th>
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<tr>
<td>Viewing Angle (Typical)</td>
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<td>Emitting Area</td>
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<td>Minimum Drive Current&lt;sup&gt;4&lt;/sup&gt;</td>
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<td>0.2</td>
<td>A</td>
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<tr>
<td>Maximum Current&lt;sup&gt;5&lt;/sup&gt; (CW)</td>
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<td>18</td>
<td>A</td>
</tr>
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<td>Absolute Maximum Surge Current 25 ms, D ≤ 0.1, T&lt;sub&gt;c&lt;/sub&gt; ≤ 40 C</td>
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<td>A</td>
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<td>Maximum Reverse Current</td>
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<td>Not Designed for Reverse Operation</td>
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<tr>
<td>Maximum Junction Temperature&lt;sup&gt;6&lt;/sup&gt;</td>
<td>T&lt;sub&gt;j,max&lt;/sub&gt;</td>
<td>150</td>
<td>ºC</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td></td>
<td>-40/100</td>
<td>ºC</td>
</tr>
</tbody>
</table>

Note 1: SST-90-W devices can be driven at currents ranging from <1A to 18A and at duty cycles ranging from <1% to 100%. Drive current and duty cycle should be adjusted as necessary to maintain the junction temperature desired to meet application lifetime requirements.

Note 2: Unless otherwise noted, values listed are typical.

Note 3: Sustained operation at absolute maximum currents will result in a reduction of device lifetime. In pulsed operation, rise time from 10-90% of forward current should be larger than 0.5 microseconds. Lifetime dependent on LED junction temperature. Thermal calculations based on input power and thermal management system should be performed to ensure T<sub>j</sub> is maintained below T<sub>j,max</sub> rating or life will be reduced. Refer to APN-001522 for further information.

Note 4: Special design considerations must be observed for operation under 1A. Please contact Luminus for further information.

Note 5: Caution must be taken not to stare at the light emitted from these LEDs. Under special circumstances, the high intensity could damage the eye.

Note 6: Sustained operation at Absolute Maximum Operating Junction Temperature (T<sub>j</sub>max) will result in significantly reduced device life time. Please refer to AN1522 for more information.
Note 1: Yellow squares indicate devices production test point.
Note 1: B10 and B50 median lifetimes refers to 90% and 50% brightness maintenance respectively refer to AN-1522 Application note for more information.

Note 2: Typical spectrum at current density of 0.35 A/mm² in continuous operation.
Typical Angular Radiation Pattern

Thermal Resistance

Typical Thermal Resistance

Note 1: Thermal resistance values are based on FEA model results correlated to measured $R_{\theta j-hs}$ data.

Note 2: Thermal resistance is measured using a SAC305 solder, a Bergquist Al-clad MCPCB, and eGraf 1205 thermal interface material.
Note: Luminus currently ships both an overmolded and a glass lens-based version of the SST-90-W package that are functionally compatible.

**Mechanical Dimensions – SST-90-W Over-Molded**

For detailed drawing please refer to DWG-002519 document.
Mechanical Dimensions – SST-90-W with metal frame and glass lens (Original Design)

For detailed drawing please refer to DWG-001359 document
Note 1: Recommended mounting screw: M3 or #4
Note 2: All dimensions in millimeters
Note 3: All anode pads on board are interconnected. All cathode pads on board are interconnected
### Solder Profile

**SAC 305 Reflow Profile Window For Low Density Boards**

<table>
<thead>
<tr>
<th>Temperature (ºC)</th>
<th>Time (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>100</td>
<td>120</td>
</tr>
<tr>
<td>125</td>
<td>150</td>
</tr>
<tr>
<td>150</td>
<td>180</td>
</tr>
<tr>
<td>175</td>
<td>210</td>
</tr>
<tr>
<td>200</td>
<td>240</td>
</tr>
<tr>
<td>225</td>
<td>270</td>
</tr>
<tr>
<td>250</td>
<td>300</td>
</tr>
</tbody>
</table>

Note 1: Temperatures are taken and monitored at the component copper layer.

Note 2: Optimum profile may differ due to oven type, circuit board or assembly layout.

Note 3: Recommended lead free, no-clean solder: AIM NC254-SAC305.

Note 4: Refer to APN-001473 soldering and handling application note for additional solder profiles and details.

Note 5: MSL- Level 2A (Glass Lens); MSL Level 1 (Over Molded Design)

---

**Lead free solder guideline for low density boards**

<table>
<thead>
<tr>
<th>Solder Profile Stage</th>
<th>Lead-Free Solder</th>
<th>Lead-based Solder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile length, Ambient to Peak</td>
<td>2.75 - 3.5 minutes</td>
<td>2.75 - 3.5 minutes</td>
</tr>
<tr>
<td>Time Maintained Above: Temperature</td>
<td>217 ºC</td>
<td>183 ºC</td>
</tr>
<tr>
<td>Time Maintained Above: Time</td>
<td>30 - 60 seconds</td>
<td>30 - 60 seconds</td>
</tr>
<tr>
<td>Cooldown Rate</td>
<td>≤4º C/sec</td>
<td>≤4º C/sec</td>
</tr>
<tr>
<td>Cooldown Duration</td>
<td>45 ± 15 sec</td>
<td>45 ± 15 sec</td>
</tr>
</tbody>
</table>
Tape and Reel Drawing

DIMENSIONS ARE IN mm. (INCH)

TRAILER
Min. 208 mm (13 pockets)

LOADED POCKETS
(100 PCS)

LEADER
Min. 464 mm (29 pockets)

DETAIL A
SCALE 1 : 1

TAPE DIMENSIONS

<table>
<thead>
<tr>
<th>W</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.0</td>
<td>1.5 (.059)</td>
<td>4.0</td>
<td>.157</td>
<td>6.0 (.236)</td>
<td>1.7</td>
<td>.067</td>
</tr>
</tbody>
</table>

UNREELING DIRECTION

LEADER END

POCKETS

UNREELING DIRECTION

REEL DIMENSIONS

<table>
<thead>
<tr>
<th>A_1</th>
<th>W_1</th>
<th>W_2</th>
<th>B_1</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 178 (7)</td>
<td>25 (.984)</td>
<td>27 (1.063)</td>
<td>59 (2.323)</td>
<td>Ø 13.0 (.512)</td>
</tr>
</tbody>
</table>
### History of Changes

<table>
<thead>
<tr>
<th>Rev</th>
<th>Date</th>
<th>Description of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>09/30/2015</td>
<td>- Removed SST-90-G and SST-90-B information (discontinued)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Removed SST-90-R information – it will be documented in a new dedicated datasheet (PDS-002760)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Merged binning and labelling document with datasheet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Updated datasheet information to reflect enhancements from the over-molded design:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Reduced thermal resistance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Increase maximum current</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Updated all parametric curves to reflect latest performance and added additional curves not documented in earlier revisions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Updated spectra and angular distribution to reflect latest characterization data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Added note on Tape and Reel drawing reflecting new reel size of 100 units for overmold design</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Added history of change section</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Editorial fixes</td>
</tr>
<tr>
<td>15</td>
<td>11/16/2015</td>
<td>- Updated tape and reel information to reflect new 7th reel size (100 units)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Editorial fixes page 7 – notes and absolute maximum surge current</td>
</tr>
</tbody>
</table>

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