SMD LED
Product Data Sheet
LTSA-S008EGBWU
Spec No. :
Created Date: 2017/10/16
Revision: (PRELIMINARY) - 3.0
SMD LED
LTSA-S008EGBWU(PRELIMINARY)

SMD LED
LTSA-S008EGBWU

<table>
<thead>
<tr>
<th>Rev</th>
<th>Description</th>
<th>By</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New datasheet</td>
<td>Ryan Chen</td>
<td>01/14/2017</td>
</tr>
<tr>
<td>2</td>
<td>1. Modify RGB location on P2</td>
<td>Ryan Chen</td>
<td>09/25/2017</td>
</tr>
<tr>
<td></td>
<td>2. Modify RGB IV and B Wd on P4&amp;5</td>
<td>Ryan Chen</td>
<td>09/25/2017</td>
</tr>
<tr>
<td>3</td>
<td>1. Modify B IV on P4&amp;5</td>
<td>Ryan Chen</td>
<td>10/16/2017</td>
</tr>
</tbody>
</table>

Above data for PD and Customer tracking only

Customer Name:
Customer Signature:  
Print Name:

LiteON Sales Signature:  
Print Name:
1. Description

The LTW (LiteOn White LED) is a revolutionary, energy efficient and ultra-compact new light source, combining the lifetime and reliability advantages of Light Emitting Diodes with the brightness of conventional lighting. It gives you total design freedom and unmatched brightness, creating a new opportunities for solid state lighting to displace conventional lighting technologies.

1.1 Features

- Meet ROHS
- Package in 12mm tape on 7" diameter reels
- Preconditioning: accelerate to JEDEC level 2a
- Qualification is based on AEC-Q101 Ver. D
- EIA STD package
- I.C. compatible
- Compatible with automatic placement equipment
- Compatible with infrared reflow solder process

1.2 Applications

- Automotive: accessory applications

2. Package Dimensions

2.1 Form Factor of 008RGB

2.2 Coplanarity

Notes:

1. All dimensions are in millimeters.
2. Tolerance is ±0.1 mm (.004") unless otherwise noted.
3. Coplanarity: The stand-off from PPA to solder surface of leads is limited by USL: 0.08mm; LSL: 0.00mm means the solder surface of leads is higher 0.00mm or lower 0.08mm than PPA in limit.
4. The size of burr which is vertical to solder surface must lower than 0.08mm in limit.
3. Rating and Characteristics

3.1 Absolute Maximum Ratings at Ta=25°C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>LTSA-S008EGBWU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Red</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>72</td>
</tr>
<tr>
<td>Peak Forward Current (tp=10μs, D=0.05)</td>
<td>100</td>
</tr>
<tr>
<td>DC Forward Current</td>
<td>30</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>-40°C to +100°C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>-40°C to +100°C</td>
</tr>
<tr>
<td>Maximum Junction Temperature (Tj)</td>
<td>125°C</td>
</tr>
</tbody>
</table>

3.2 Suggest IR Reflow Condition for Pb Free Process:

![IR-Reflow Soldering Profile](image-url)
### 3.3 Electro-Optical Characteristics at Ta=25°C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>LTSA-S008EGBWU</th>
<th>Test Condition</th>
<th>Unit</th>
</tr>
</thead>
</table>
| Luminous Flux \(^1\)      | \(\Phi_v\) | \(\begin{array}{c}
\text{Min} \\
\text{Typ.} \\
\text{Max.}
\end{array}\) | \(\begin{array}{c}
1.47 \\
1.65 \\
2.50 \\
(240\text{mcd}) \\
(640\text{mcd}) \\
(960\text{mcd})
\end{array}\) | \(I_F = 20\text{mA}\) | \(\text{lm} (\text{mcd})\) |
| Viewing Angle              | \(2\theta_{1/2}\) | Typ. | 130 | \(I_F = 20\text{mA}\) | ° |
| Dominant Wavelength        | \(\lambda_d\) | \(\begin{array}{c}
\text{Min} \\
\text{Typ.} \\
\text{Max.}
\end{array}\) | \(\begin{array}{c}
618 \\
1.7 \\
630 \\
(520\text{nm}) \\
(2.6\text{nm}) \\
(535\text{nm})
\end{array}\) | \(I_F = 20\text{mA}\) | \(\text{nm}\) |
| Forward Voltage \(^3\)     | \(V_F\) | \(\begin{array}{c}
\text{Min} \\
\text{Typ.} \\
\text{Max.}
\end{array}\) | \(\begin{array}{c}
1.7 \\
2.0 \\
2.5 \\
(2.6\text{V}) \\
(3.0\text{V}) \\
(3.4\text{V})
\end{array}\) | \(I_F = 20\text{mA}\) | \(\text{V}\) |
| Spectrum Radiation Bandwidth | \(\Delta\lambda\) | Typ. | \(\begin{array}{c}
20 \\
35 \\
25
\end{array}\) | \(I_F = 20\text{mA}\) | \(\text{nm}\) |
| Reverse Current            | \(I_R\) | Max. | 10 | \(V_{\text{bias}}=5\text{V}\) | \(\mu\text{A}\) |

**Notes:**

1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. \(\theta_{1/2}\) is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, \(\lambda_d\) is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device. Dominant Wavelength Tolerance is +/- 1nm.
4. Forward Voltage Tolerance is +/- 0.1 volt.
5. Reverse voltage (VR) condition is applied to IR test only. The device is not designed for reverse operation.
4. Bin Rank

Batch Description on Label: Red IV Green IV Blue IV/ Red WD Green WD Blue WD (Ex. FA/R5G7B1)

4.1 IV Rank

<table>
<thead>
<tr>
<th>Luminous Intensity</th>
<th>Color</th>
<th>Bin Code</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Red</td>
<td>F</td>
<td>1.40 (500mcd)</td>
<td>1.90 (720mcd)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>G</td>
<td>1.90 (720mcd)</td>
<td>2.50 (960mcd)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Luminous Intensity</th>
<th>Color</th>
<th>Bin Code</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Green</td>
<td>I</td>
<td>4.60 (1700mcd)</td>
<td>7.20 (2500mcd)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H</td>
<td>7.20 (2500mcd)</td>
<td>9.20 (3200mcd)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Luminous Intensity</th>
<th>Color</th>
<th>Bin Code</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blue</td>
<td>A</td>
<td>0.40 (150mcd)</td>
<td>1.00 (390mcd)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>1.00 (390mcd)</td>
<td>1.40 (500mcd)</td>
</tr>
</tbody>
</table>

Tolerance on each Intensity bin is +/- 11%

4.2 Color Rank

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Red</td>
<td>R5</td>
<td>618.0</td>
<td>630.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Green</td>
<td>G6</td>
<td>520.0</td>
<td>525.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>G7</td>
<td>525.0</td>
<td>530.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>G8</td>
<td>530.0</td>
<td>535.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blue</td>
<td>B1</td>
<td>450.0</td>
<td>455.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B2</td>
<td>455.0</td>
<td>460.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B3</td>
<td>460.0</td>
<td>465.0</td>
</tr>
</tbody>
</table>

Tolerance on each Wavelength bin is +/- 1 nm
5. Typical Electrical / Optical Characteristics Curves.

(25°C Ambient Temperature Unless Otherwise Noted)

- **Fig. 1**: Relative Intensity vs Dominant Wavelength
- **Fig. 2**: Forward Current vs Forward Voltage
- **Fig. 3**: Forward Current Derating Curve
- **Fig. 4**: Relative Luminous Intensity vs Forward Current
- **Fig. 5**: Luminous Intensity vs Board Temperature
- **Fig. 6**: Spatial Distribution

T<sub>S</sub>RGB: Soldering Pin Temperature
T<sub>J</sub>: Junction Temperature
T<sub>b</sub>: Board Temperature
6. User Guide

6.1 Cleaning
Do not use unspecified chemical liquid to clean LED they could harm the package. If cleaning is necessary, immerse the LED in ethyl alcohol or isopropyl alcohol at normal temperature for less one minute.

6.2 Recommend Printed Circuit Board Attachment Pad

Infrared / vapor phase
Reflow Soldering

6.3 Package Dimensions of Tape & Reel

Note: All dimensions are in millimeters
6.4 Package Dimensions of Reel

![Diagram of package dimensions]

**Notes**

1. Empty component pockets sealed with top cover tape.
2. 7 inch reel maximum 2000 and minimum 500 pieces per reel.
3. The maximum number of consecutive missing lamps is two.
4. In accordance with EIA-481-1-B specifications.
7. Cautions

7.1 Application

The LEDs described here are intended to be used for ordinary electronic equipment (such as office equipment, communication equipment and household applications). Consult Liteon's Sales in advance for information on applications in which exceptional reliability is required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health (such as in aviation, transportation, traffic control equipment, medical and life support systems and safety devices).

7.2 Storage

The package is sealed:
- The LEDs should be stored at 30°C or less and 70%RH or less. And the LEDs are limited to use within one year, while the LEDs is packed in moisture-proof package with the desiccants inside.
- The package is opened:
  - The storage ambient for the LEDs should not exceed 30°C temperature and 60% relative humidity.
  - It is recommended that LEDs out of their original packaging are IR-reflowed within 4 weeks.
  - For extended storage out of their original packaging, it is recommended that the LEDs be stored in a sealed container with appropriate desiccant, or in a desiccators with nitrogen ambient.
  - LEDs stored out of their original packaging for more than 4 weeks should be baked at about 60 °C for at least 48 hours before solder assembly.

7.3 Cleaning

Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LED if necessary.

7.4 Soldering

Recommended soldering conditions:

<table>
<thead>
<tr>
<th>Reflow soldering</th>
<th>Soldering iron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-heat</td>
<td>Temperature</td>
</tr>
<tr>
<td>Pre-heat time</td>
<td>150~200°C</td>
</tr>
<tr>
<td>Peak temperature</td>
<td>120 sec. Max.</td>
</tr>
<tr>
<td>Soldering time</td>
<td>260°C Max.</td>
</tr>
<tr>
<td></td>
<td>10 sec. Max. (Max. two times)</td>
</tr>
<tr>
<td></td>
<td>300°C Max.</td>
</tr>
<tr>
<td></td>
<td>3 sec. Max. (one time only)</td>
</tr>
</tbody>
</table>

Notes:

Because different board designs use different number and types of devices, solder pastes, reflow ovens, and circuit boards, no single temperature profile works for all possible combinations.

However, you can successfully mount your packages to the PCB by following the proper guidelines and PCB-specific characterization.

LITE-ON Runs both component-level verification using in-house KYRAMX98 reflow chambers and board-level assembly. The results of this testing are verified through post-reflow reliability testing. Profiles used at LITE-ON are based on JEDEC standards to ensure that all packages can be successfully and reliably surface mounted.

Figure on page3 shows a sample temperature profile compliant to JEDEC standards. You can use this example as a generic target to set up your reflow process. You should adhere to the JEDEC profile limits as well as specifications and recommendations from the solder paste manufacturer to avoid damaging the device and create a reliable solder joint.
7.5 Drive Method

A LED is a current-operated device. In order to ensure intensity uniformity on multiple LEDs connected in parallel in an application, it is recommended that a current limiting resistor be incorporated in the drive circuit, in series with each LED as shown in Circuit A below.

![Circuit model A](image1)

Circuit model A

![Circuit model B](image2)

Circuit model B

(A) Recommended circuit.
(B) The brightness of each LED might appear different due to the differences in the I-V characteristics of those LEDs.

7.6 ESD (Electrostatic Discharge)

Static Electricity or power surge will damage the LED.

Suggestions to prevent ESD damage:

- Use of a conductive wrist band or anti-electrostatic glove when handling these LEDs.
- All devices, equipment, and machinery must be properly grounded.
- Work tables, storage racks, etc. should be properly grounded.
- Use ion blower to neutralize the static charge which might have built up on surface of the LED’s plastic lens as a result of friction between LEDs during storage and handling.

ESD-damaged LEDs will exhibit abnormal characteristics such as high reverse leakage current, low forward voltage, or “no lightup” at low currents.

To verify for ESD damage, check for “lightup” and Vf of the suspect LEDs at low currents.
The Vf of “good” LEDs should be >2.0V@0.1mA for InGaN product and >1.4V@0.1mA for AlInGaP product.
8. Reliability Test

8.1 Test Item/Condition (Based on AEC-Q101 Ver. D):

<table>
<thead>
<tr>
<th>No.</th>
<th>Test Item</th>
<th>Test condition</th>
<th># of Lots</th>
<th>Sample size Per Lot</th>
<th>Reference standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Pre-conditioning</td>
<td>MSL 2a&lt;br&gt;1)1120℃, 24 hrs baking&lt;br&gt;2)Moisture Soak 60℃/60% 168 hrs Interval: 15mins ~ 4 hours to do IR-Reflow</td>
<td>3</td>
<td>462</td>
<td>JESD22 A-113</td>
</tr>
<tr>
<td>5b+</td>
<td>High Temperature Forward Bias (HTFB)</td>
<td>Ta=60 ± 2℃&lt;br&gt;IF: 30mA for red dice&lt;br&gt;IF: 25mA for Green and Blue dice 1000 hrs</td>
<td>3</td>
<td>77</td>
<td>JESD22 A-108</td>
</tr>
<tr>
<td>5b</td>
<td>High Temperature Forward Bias (HTFB)</td>
<td>Ta=100 ± 2℃&lt;br&gt;IF: 5mA for each dice 1000 hrs</td>
<td>3</td>
<td>77</td>
<td>JESD22 A-108</td>
</tr>
<tr>
<td>7</td>
<td>Temperature Cycle (TC)</td>
<td>-40°C(+0,-10) to 100°C(+15,-0)&lt;br&gt;10min 10min 10min&lt;br&gt;1000 cycles</td>
<td>3</td>
<td>77</td>
<td>JESD22 A-104 Appendix 6</td>
</tr>
<tr>
<td>9a</td>
<td>High Temperature High Humidity Bias (HTHHB)</td>
<td>Ta=85 ± 2℃, 85 ± 5% RH&lt;br&gt;IF: 20mA for Red&lt;br&gt;15mA for Green and Blue dices 1000 hrs</td>
<td>3</td>
<td>77</td>
<td>JESD22 A-101</td>
</tr>
<tr>
<td>10alt</td>
<td>Power and Temperature Cycle (PTC)</td>
<td>TC : -40°C/85°C&lt;br&gt;10min 20min 10min&lt;br&gt;Red 20mA, B/G 15mA 1 cycle: 2 min. on / 2 min. off&lt;br&gt;all chips on&lt;br&gt;15000 cycles (1000 hrs)</td>
<td>3</td>
<td>77</td>
<td>JESD22 A-105</td>
</tr>
<tr>
<td>11</td>
<td>ESD Characterization</td>
<td>HBM 2000V (Class 2)</td>
<td>1</td>
<td>30</td>
<td>MIL-STD-883E</td>
</tr>
<tr>
<td>20</td>
<td>Resistance to Solder Heat</td>
<td>Tsld=260°C, 10sec. 3times</td>
<td>1</td>
<td>30</td>
<td>JESD22A-111</td>
</tr>
<tr>
<td>21</td>
<td>Solderability</td>
<td>Tsld = 235±5℃, 5sec, Leas-free Solder</td>
<td>1</td>
<td>10</td>
<td>J-STD-002</td>
</tr>
</tbody>
</table>
9. Others

The appearance and specifications of the product may be modified for improvement without prior notice.

10. Suggested Checking List

Training and Certification
1. Everyone working in a static-safe area is ESD-certified?
2. Training records kept and re-certification dates monitored?

Static-Safe Workstation & Work Areas
1. Static-safe workstation or work-areas have ESD signs?
2. All surfaces and objects at all static-safe workstation and within 1 ft measure less than 100V?
3. All ionizer activated, positioned towards the units?
4. Each work surface mats grounding is good?

Personnel Grounding
1. Every person (including visitors) handling ESD sensitive (ESDS) items wears wrist strap, heel strap or conductive shoes with conductive flooring?
2. If conductive footwear used, conductive flooring also present where operator stand or walk?
3. Garments, hairs or anything closer than 1 ft to ESD items measure less than 100V*?
4. Every wrist strap or heel strap/conductive shoes checked daily and result recorded for all DLs?
5. All wrist strap or heel strap checkers calibration up to date?

Note: *50V for InGaN LED.

Device Handling
1. Every ESDS items identified by EIA-471 labels on item or packaging?
2. All ESDS items completely inside properly closed static-shielding containers when not at static-safe workstation?
3. No static charge generators (e.g. plastics) inside shielding containers with ESDS items?
4. All flexible conductive and dissipative package materials inspected before reuse or recyclers?

Others
1. Audit result reported to entity ESD control coordinator?
2. Corrective action from previous audits completed?
3. Are audit records complete and on file?