Ultrabright 0603 SMD LED

DESCRIPTION
The new 0603 LED series have been designed in the smallest SMD package. This innovative 0603 LED technology opens the way to
• smaller products of higher performance
• more design in flexibility
• enhanced applications
The 0603 LED is an obvious solution for small-scale, high power products that are expected to work reliability in an arduous environment.
The reflector inside this package is filled with a mixture of epoxy and yellow converter.
This yellow converter converts the blue emission partially to yellow, which mixes the remaining blue to give white.

PRODUCT GROUP AND PACKAGE DATA
• Product group: LED
• Package: SMD 0603
• Product series: standard
• Angle of half intensity: ± 80°

FEATURES
• High efficient InGaN technology
• Smallest SMD package 0603 with exceptional brightness 1.6 mm x 0.8 mm x 0.6 mm (L x W x H)
• High reliability lead frame based
• Temperature range -40 °C to +100 °C
• Chromaticity coordinate categorized according to CIE1931 per packing unit
• Typical color temperature 5500 K
• EIA and ICE standard package
• Compatible to IR reflow soldering
• Available in 8 mm tape reel
• Preconditioning according to JEDEC® level 2
• ESD-withstand voltage: up to 1 kV according to JESD22-A114-B
• AEC-Q101 qualified
• Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS
• Automotive: backlighting in dashboards, switches, and keypads
• Telecommunication: indicator and backlighting in telephone and fax
• Backlighting for audio, and video equipment
• Backlighting in office equipment
• Indoor and outdoor message boards
• Flat backlight for LCDs, switches, and symbols

PARTS TABLE

<table>
<thead>
<tr>
<th>PART</th>
<th>COLOR</th>
<th>LUMINOUS INTENSITY (mcd) at IF (mA)</th>
<th>COORDINATE (x, y) at IF (mA)</th>
<th>FORWARD VOLTAGE (V) at IF (mA)</th>
<th>TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MIN.</td>
<td>TYP.</td>
<td>MAX.</td>
<td>MIN.</td>
</tr>
<tr>
<td>VLMW11R2S2-5K8L-08</td>
<td>White</td>
<td>140</td>
<td>-</td>
<td>280</td>
<td>10</td>
</tr>
</tbody>
</table>

ABSOLUTE MAXIMUM RATINGs (Tamb = 25 °C, unless otherwise specified)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse voltage (1)</td>
<td>Ir max. = 10 μA</td>
<td>Vr</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>DC forward current</td>
<td>Tamb ≤ 60 °C</td>
<td>If</td>
<td>20</td>
<td>mA</td>
</tr>
<tr>
<td>Surge forward current</td>
<td>tp ≤ 10 μs</td>
<td>IfSM</td>
<td>0.1</td>
<td>A</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>Pp</td>
<td>Pp</td>
<td>80</td>
<td>mW</td>
</tr>
<tr>
<td>Junction temperature</td>
<td>Tj</td>
<td>Tj</td>
<td>110</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>Tstg</td>
<td>Tstg</td>
<td>-40 to +100</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>Tamb</td>
<td>Tamb</td>
<td>-40 to +100</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal resistance junction/ambient</td>
<td>mounted on PC board (pad size &gt; 16 mm²)</td>
<td>RthJA</td>
<td>480</td>
<td>K/W</td>
</tr>
</tbody>
</table>

Note
(1) Driving the LED in reverse direction is suitable for short term application
**OPTICAL AND ELECTRICAL CHARACTERISTICS** (T\(_{\text{amb}}\) = 25 °C, unless otherwise specified)

**VLMW11.., WHITE**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>PART SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luminous intensity</td>
<td>( I_F = 10 \text{ mA} )</td>
<td>VLMW11R2S2</td>
<td>( I_V )</td>
<td>140</td>
<td>-</td>
<td>280</td>
</tr>
<tr>
<td>Chromaticity coordinate x acc. to CIE 1931</td>
<td>( I_F = 10 \text{ mA} )</td>
<td>VLMW111</td>
<td>( x )</td>
<td>-</td>
<td>0.33</td>
<td>-</td>
</tr>
<tr>
<td>Chromaticity coordinate y acc. to CIE 1931</td>
<td>( I_F = 10 \text{ mA} )</td>
<td>VLMW111</td>
<td>( y )</td>
<td>-</td>
<td>0.33</td>
<td>-</td>
</tr>
<tr>
<td>Angle of half intensity</td>
<td>( I_F = 10 \text{ mA} )</td>
<td></td>
<td>( \phi )</td>
<td>-</td>
<td>± 80</td>
<td>-</td>
</tr>
<tr>
<td>Forward voltage</td>
<td>( I_F = 20 \text{ mA} )</td>
<td>( V_F )</td>
<td>2.9</td>
<td>-</td>
<td>4.0</td>
<td>V</td>
</tr>
<tr>
<td>Temperature coefficient of ( V_F )</td>
<td>( I_F = 10 \text{ mA} )</td>
<td>TC(_V_F)</td>
<td>-</td>
<td>-3</td>
<td>-</td>
<td>mV/K</td>
</tr>
<tr>
<td>Temperature coefficient of ( I_V )</td>
<td>( I_F = 10 \text{ mA} )</td>
<td>TC(_I_V)</td>
<td>-</td>
<td>-0.4</td>
<td>-</td>
<td>%/K</td>
</tr>
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</table>

**LUMINOUS INTENSITY CLASSIFICATION**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>LIGHT INTENSITY (mcd)</th>
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</thead>
<tbody>
<tr>
<td>STANDARD</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>R</td>
<td>2</td>
</tr>
<tr>
<td>S</td>
<td>1</td>
</tr>
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<td></td>
<td>2</td>
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**CHROMATICITY COORDINATED GROUPS FOR WHITE SMD LED**

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>5L</th>
<th>7L</th>
<th>7K</th>
<th>8L</th>
<th>8K</th>
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</thead>
<tbody>
<tr>
<td>0.291</td>
<td>0.268</td>
<td>0.291</td>
<td>0.268</td>
<td>0.330</td>
<td>0.330</td>
<td></td>
</tr>
<tr>
<td>0.285</td>
<td>0.279</td>
<td>0.291</td>
<td>0.268</td>
<td>0.330</td>
<td>0.347</td>
<td></td>
</tr>
<tr>
<td>0.307</td>
<td>0.312</td>
<td>0.307</td>
<td>0.297</td>
<td>0.347</td>
<td>0.371</td>
<td></td>
</tr>
<tr>
<td>0.310</td>
<td>0.297</td>
<td>0.307</td>
<td>0.312</td>
<td>0.347</td>
<td>0.352</td>
<td></td>
</tr>
<tr>
<td>5K</td>
<td>0.296</td>
<td>0.307</td>
<td>0.310</td>
<td>0.330</td>
<td>0.330</td>
<td></td>
</tr>
<tr>
<td>0.291</td>
<td>0.297</td>
<td>0.307</td>
<td>0.310</td>
<td>0.330</td>
<td>0.330</td>
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</tr>
<tr>
<td>0.310</td>
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<td>0.307</td>
<td>0.310</td>
<td>0.330</td>
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<td></td>
</tr>
<tr>
<td>6L</td>
<td>0.310</td>
<td>0.307</td>
<td>0.310</td>
<td>0.347</td>
<td>0.367</td>
<td></td>
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<tr>
<td>0.310</td>
<td>0.297</td>
<td>0.310</td>
<td>0.330</td>
<td>0.371</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6K</td>
<td>0.310</td>
<td>0.330</td>
<td>0.330</td>
<td>0.347</td>
<td>0.364</td>
<td></td>
</tr>
<tr>
<td>0.313</td>
<td>0.330</td>
<td>0.330</td>
<td>0.347</td>
<td>0.371</td>
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<td></td>
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<tr>
<td>0.310</td>
<td>0.330</td>
<td>0.330</td>
<td>0.347</td>
<td>0.364</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note**
- Luminous intensity is tested at a current pulse duration of 25 ms and an accuracy of ± 11 %.
- Chromaticity coordinate groups are tested at a current pulse duration of 25 ms and a tolerance of ± 0.01.
TYPICAL CHARACTERISTICS (T\textsubscript{amb} = 25 °C, unless otherwise specified)

Fig. 1 - Forward Current vs. Ambient Temperature

Fig. 2 - Relative Intensity vs. Wavelength

Fig. 3 - Forward Current vs. Forward Voltage

Fig. 4 - Relative Luminous Intensity vs. Forward Current

Fig. 5 - Relative Luminous Intensity vs. Ambient Temperature

Fig. 6 - Forward Voltage vs. Ambient Temperature
**REEL DIMENSIONS** in millimeters

- **x-Coordinates**
  - 0.25
  - 0.27
  - 0.29
  - 0.31
  - 0.33
  - 0.35
  - 0.37

- **y-Coordinates**
  - 0.20
  - 0.25
  - 0.30
  - 0.35
  - 0.40

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**Fig. 7 - Coordinates of Colorgroups**

**Technical drawings according to DIN specifications**

**drawing-No.:** 9.800-5086.01-4

**Issue:** 1; 29.04.04

**Label area with (111x57) depression (0.25)**

**Critical dimension for IQA.**

**Not indicated tolerances ±0.05**

**Material:** black static dissipative

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**For technical questions, contact:** LED@vishay.com

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**TAPE DIMENSIONS** in millimeters

- **Polarity**
  - Direction of pulling out: Not indicated
  - Tolerance: ± 0.05
- **Material:** Conductive black PC

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**Technical drawing according to DIN specifications**

**Drawing-No.:** 9.700-5290.01-4

**Issue:** 3; 24.09.13
PACKAGE DIMENSIONS in millimeters

SOLDERING PROFILE

IR Reflow Soldering Profile for lead (Pb)-free Soldering
Preconditioning acc. to JEDEC Level 2

max. 2 cycles allowed

BAR CODE PRODUCT LABEL (example)

A. Type of component
B. Manufacturing plant
C. SEL - selection code (bin):
  e.g.: R1 = code for luminous intensity group
  5L = code for chrom. coordinate group
D. Date code year / week
E. Day code (e.g. 4: Thursday)
F. Batch no.
G. Total quantity
H. Company code

Fig. 8 - Vishay Lead (Pb)-free Reflow Soldering Profile
(according to J-STD-020C)
DRY PACKING
The reel is packed in an anti-humidity bag to protect the devices from absorbing moisture during transportation and storage.

FINAL PACKING
The sealed reel is packed into a cardboard box. A secondary cardboard box is used for shipping purposes.

RECOMMENDED METHOD OF STORAGE
Dry box storage is recommended as soon as the aluminum bag has been opened to prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:
• Storage temperature 10 °C to 30 °C
• Storage humidity ≤ 60 % RH max.

After more than 1 year under these conditions moisture content will be too high for reflow soldering.

In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:
192 h at 40 °C + 5 °C / - 0 °C and < 5 % RH (dry air / nitrogen) or
96 h at 60 °C + 5 °C and < 5 % RH for all device containers or
24 h at 100 °C + 5 °C not suitable for reel or tubes.

An EIA JEDEC standard JESD22-A112 level 2 label is included on all dry bags.

ESD PRECAUTION
Proper storage and handling procedures should be followed to prevent ESD damage to the devices especially when they are removed from the antistatic shielding bag. Electro-static sensitive devices warning labels are on the packaging.

VISHAY SEMICONDUCTORS STANDARD BAR CODE LABELS
The Vishay Semiconductors standard bar code labels are printed at final packing areas. The labels are on each packing unit and contain Vishay Semiconductors specific data.
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