LUXEON XR-3020

Linear LED module on an ultra-slim and rigid substrate enabling high efficacy designs

LUXEON XR-3020 products are ultra-slim linear LED modules optimized for narrow (20mm wide) lighting applications such as fluorescent replacements. The integrated solution comes in 1 or 2 foot versions with 24 or 48 LEDs mounted on a CEM3 thermally conductive substrate. LUXEON XR-3020 is designed for ease of system integration, simplified supply chain and faster time to market.

FEATURES AND BENEFITS

- 1100 or 2200 lumen packages at 100mA/LED and 45°C board temperature
- 160lm/W for maximum light output and low power consumption
- 1ft (24-up) or 2ft (48-up) length and Zhaga defined screw hole locations
- A range of CCT options available in 80 or 90CRI (3000–5000K)
- Uses the industry’s most compact, highest drive current 3V mid power LEDs—LUXEON 3020
- >50k hours LED lifetime (L70)
- LED performance matching to support the best light output uniformity, forward voltage, and color control
- 5 year limited warranty

PRIMARY APPLICATIONS

- Architectural
- Indoor Area Lighting
  - T-LEDs
  - Troffers
- Specialty Lighting
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General Product Information

Product Test Conditions
LUXEON XR-3020 products are specified using a forward DC drive current of 200mA and a board temperature, $T_c$, of 45°C. The LEDs are electrically configured in series strings of 12 with 2 or 4 parallel strings.

The LUXEON 3020 LEDs on LUXEON XR-3020 are tested using a DC drive current at 120mA at a junction temperature, $T_j$, of 25°C. The minimum, typical and maximum performance numbers for LUXEON XR-3020 in this datasheet are derived from individual LED measurements. The confidence level on all minimum and maximum performance parameters in this datasheet is 99% to within individual LED tolerance.

Part Number Nomenclature
Part numbers for LUXEON XR-3020 follow the convention below:

\[
\text{L } 2 \ 1 \ 8 - \ A \ A \ B \ B \ 0 \ D \ D \ C \ E \ 0 \ 0 \ 0 \ 0
\]

Where:
- $A\ A$ – designates nominal CCT (30=3000K, 35=3500K, 40=4000K, 50=5000K)
- $B\ B$ – designates minimum CRI (80=80CRI, 90=90CRI)
- $D\ D$ – designates number of LEDs on board (24 or 48)
- $E$ – designates board length (3=280mm, 0=560mm)

Therefore, the following part number is used for a LUXEON XR-3020, 3000K, 80CRI with 24 LEDs and length of 280mm:

\[
\text{L } 2 \ 1 \ 8 - 3 \ 0 \ 8 \ 0 \ 0 \ 2 \ 4 \ C \ 3 \ 0 \ 0 \ 0
\]

For LUXEON XR-3020 CCT/CRI combinations not listed in this datasheet, contact your local Lumileds Sales Representative or Technical Solutions Manager.

Lumen Maintenance
Please contact your local Sales Representative or Lumileds Technical Solutions Manager for more information about the long-term performance of this product.

Environmental Compliance
Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON XR-3020 is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS Directive 2011/65/EU and REACH Regulation (EC) 1907/2006. Lumileds LLC will not intentionally add the following restricted materials to its products: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).
Performance Characteristics

Product Selection Guide

Table 1. Product performance of LUXEON XR-3020 at 100mA/LED, $T_c=45^\circ C$.

<table>
<thead>
<tr>
<th>CONFIGURATION</th>
<th>NOMINAL CCT</th>
<th>MINIMUM CRI[1]</th>
<th>LUMINOUS FLUX[2] (lm)</th>
<th>TYPICAL LUMINOUS EFFICACY (lm/W)</th>
<th>TYPICAL DRIVE CURRENT (mA)</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>MINIMUM</td>
<td>TYPICAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>280mm, 24-up</td>
<td>3000K</td>
<td>80</td>
<td>1012</td>
<td>1050</td>
<td>151</td>
<td>200</td>
</tr>
<tr>
<td>(2 parallel x</td>
<td>3500K</td>
<td>80</td>
<td>1029</td>
<td>1070</td>
<td>153</td>
<td>200</td>
</tr>
<tr>
<td>12 series)</td>
<td>4000K</td>
<td>80</td>
<td>1049</td>
<td>1088</td>
<td>156</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>5000K</td>
<td>80</td>
<td>1049</td>
<td>1088</td>
<td>156</td>
<td>200</td>
</tr>
<tr>
<td>560mm, 48-up</td>
<td>4000K</td>
<td>90</td>
<td>850</td>
<td>890</td>
<td>127</td>
<td>200</td>
</tr>
<tr>
<td>(4 parallel x</td>
<td>3000K</td>
<td>80</td>
<td>2024</td>
<td>2100</td>
<td>151</td>
<td>400</td>
</tr>
<tr>
<td>12 series)</td>
<td>3500K</td>
<td>80</td>
<td>2058</td>
<td>2140</td>
<td>153</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>4000K</td>
<td>80</td>
<td>2098</td>
<td>2176</td>
<td>156</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>5000K</td>
<td>80</td>
<td>2098</td>
<td>2176</td>
<td>156</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>4000K</td>
<td>90</td>
<td>1700</td>
<td>1780</td>
<td>127</td>
<td>400</td>
</tr>
</tbody>
</table>

Notes for Table 1:
1. Lumileds maintains a tolerance of ±2 on CRI measurements.
2. Lumileds maintains a tolerance of ±6.5% on luminous flux measurements.

Electrical and Thermal Characteristics

Table 2. Electrical and thermal characteristics for LUXEON XR-3020 at 100mA/LED, $T_c=45^\circ C$.

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>FORWARD VOLTAGE (V)[1]</th>
<th>TYPICAL THERMAL RESISTANCE — JUNCTION TO HEAT SINK (°C/W)</th>
<th>TYPICAL THERMAL RESISTANCE — JUNCTION TO SOLDER PAD (°C/W)[2]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MINIMUM</td>
<td>TYPICAL</td>
<td>MAXIMUM</td>
</tr>
<tr>
<td>L218-xxxx024C30000</td>
<td>34</td>
<td>34.8</td>
<td>36</td>
</tr>
<tr>
<td>L218-xxxx048C00000</td>
<td>34</td>
<td>34.8</td>
<td>36</td>
</tr>
</tbody>
</table>

Notes for Table 2:
1. Lumileds maintains a tolerance of ±0.1V on forward voltage measurements.
2. Typical thermal resistance — junction to solder pad, is per LED.
Absolute Maximum Ratings

Table 3. Absolute maximum ratings for LUXEON XR-3020.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>MAXIMUM PERFORMANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Forward Current[^1,^2]</td>
<td>480mA for L218-xxxx024C30000, 960mA for L218-xxxx048C00000</td>
</tr>
<tr>
<td>Peak Pulsed Forward Current[^1,^3]</td>
<td>600mA for L218-xxxx024C30000, 1200mA for L218-xxxx048C00000</td>
</tr>
<tr>
<td>LED Junction Temperature[^1] (DC &amp; Pulse)</td>
<td>125°C</td>
</tr>
<tr>
<td>ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)</td>
<td>IEC 61000-4-2 Level 4 (8/15 kV contact/air discharge)</td>
</tr>
<tr>
<td>Operating Temperature at Tc point[^4]</td>
<td>-40 to 85°C</td>
</tr>
<tr>
<td>LED Module Storage Temperature</td>
<td>-40 to 105°C</td>
</tr>
<tr>
<td>Reverse Voltage (V_{reverse})</td>
<td>LUXEON LEDs are not designed to be driven in reverse bias</td>
</tr>
</tbody>
</table>

Notes for Table 3:
1. Proper current derating must be observed to maintain the junction temperature below the maximum.
2. Residual periodic variations due to power conversion from alternating current (AC) to direct current (DC), also called “ripple,” with frequencies ≥100Hz and amplitude ≤15% of the maximum allowable DC forward current are acceptable, assuming the average current throughout each cycle does not exceed the maximum allowable DC Forward Current at the corresponding maximum junction temperature.
3. Pulsed operation with a peak drive current equal to the stated Peak Pulsed Forward Current is acceptable if the pulse on-time is ≤5ms per cycle and the duty cycle is ≤50%.
4. Measured at Tc point next to LED. Some manufacturers refer to Tc as Ts. See AB209 LUXEON 3020 Application Brief for details.
5. Per IEC 62031, T_{eth}=2215 Lux.

Characteristic Curves

Spectral Power Distribution Characteristics

![Spectral Power Distribution Characteristic](image)

Figure 1: Typical normalized power vs. wavelength for LUXEON 3020 at 120mA, T_j=25°C.
Radiation Pattern Characteristics

![Graph](image)

Figure 2: Typical radiation pattern for LUXEON 3020 at 120mA, T<sub>j</sub>=25°C.

Color Bin Definition

![Diagram](image)

Figure 3: 3-step MacAdam ellipse illustration for Table 4.

Table 4. 3-step MacAdam ellipse color bin definitions for LUXEON M at 700mA, T<sub>j</sub>= 85°C.

<table>
<thead>
<tr>
<th>NOMINAL CCT</th>
<th>COLOR SPACE</th>
<th>CENTER POINT (cx, cy)</th>
<th>MAJOR AXIS, a</th>
<th>MINOR AXIS, b</th>
<th>ELLIPSE ROTATION ANGLE, θ</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000K</td>
<td>Single 3-step MacAdam ellipse</td>
<td>(0.4338, 0.4030)</td>
<td>0.00834</td>
<td>0.00408</td>
<td>53.22°*</td>
</tr>
<tr>
<td>3500K</td>
<td>Single 3-step MacAdam ellipse</td>
<td>(0.4073, 0.3917)</td>
<td>0.00927</td>
<td>0.00414</td>
<td>54.00°*</td>
</tr>
<tr>
<td>4000K</td>
<td>Single 3-step MacAdam ellipse</td>
<td>(0.3818, 0.3797)</td>
<td>0.00939</td>
<td>0.00402</td>
<td>53.72°*</td>
</tr>
<tr>
<td>5000K</td>
<td>Single 3-step MacAdam ellipse</td>
<td>(0.3447, 0.3558)</td>
<td>0.00822</td>
<td>0.00354</td>
<td>59.62°*</td>
</tr>
</tbody>
</table>

Notes for Table 4:
1. Lumileds maintains a tolerance of ±0.005 on x and y coordinates in the CIE 1931 color space.
Mechanical Dimensions

Figure 4: Mechanical dimensions for L218-xxxx024C3000.

Notes for Figure 4:
1. Drawings are not to scale.
2. All dimensions are in millimeters.
Packaging Information

Table 5. Packaging information for LUXEON XR-3020.

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>TRAY DIMENSIONS (mm)</th>
<th>QUANTITY PER TRAY</th>
<th>NUMBER OF TRAYS PER BOX</th>
</tr>
</thead>
<tbody>
<tr>
<td>L218-xxxx024C30000</td>
<td>635 x 220</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>L218-xxxx048C00000</td>
<td>635 x 220</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>
Tray Dimensions

![Tray Dimensions Diagram]

Figure 6: Tray dimensions for L218-xxxx0ccCx0000.

Notes for Figure 6:
1. Drawings are not scale.
2. All dimensions are in millimeters.

Product Packaging Considerations—Chemical Compatibility

The LUXEON emitter package contains a silicone overcoat to protect the LED chip and extract the maximum amount of light. As with most silicones used in LED optics, care must be taken to prevent any incompatible chemicals from directly or indirectly reacting with the silicone. Refer to the LUXEON 3020 Application Brief AB209 for guidelines on chemical compatibilities.
About Lumileds

Companies developing automotive, mobile, IoT and illumination lighting applications need a partner who can collaborate with them to push the boundaries of light. With over 100 years of inventions and industry firsts, Lumileds is a global lighting solutions company that helps customers around the world deliver differentiated solutions to gain and maintain a competitive edge. As the inventor of Xenon technology, a pioneer in halogen lighting and the leader in high performance LEDs, Lumileds builds innovation, quality and reliability into its technology, products and every customer engagement. Together with its customers, Lumileds is making the world better, safer, more beautiful—with light.

To learn more about our lighting solutions, visit lumileds.com.