

For NEW designs consider these replacement products:

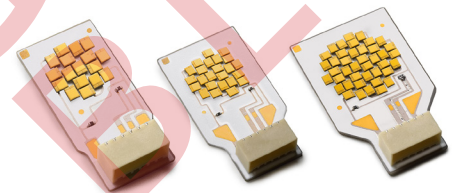
- LUXEON CoB Core Range
- LUXEON CoB Core Range – High Density
- Matrix Platform light engines



LUXEON S

Best punch and easy integration

LUXEON S is a rigid fully integrated solution optimized for lighting applications requiring punch for high center beam intensity and uniformity. The turnkey solution minimizes time to market and simplifies supply chain by reducing optical and mechanical design efforts with electrical connectors. Combined with LUXEON Z ES LEDs, LUXEON S provides the same powerful optical performance guaranteed by LUXEON LEDs. The overall solution delivers optimized performance in combination with the quality of light needed for distributed light source applications.



FEATURES AND BENEFITS

- 1000 to 8000 lumen packages for a range of options
- Greater than 80 R9, lights merchandises up with vivid color
- 3-step MacAdam ellipse color binning ensures uniform optical performance
- On board connectors allow solderless assembly
- High efficacy for sustainable design
- UL approved solderless mounting clamp for simple assembly

PRIMARY APPLICATIONS

- Architectural
- Spotlights

Table of Contents

| | |
|---|----|
| General Information | 2 |
| Product Nomenclature | 2 |
| Average Lumen Maintenance Characteristics | 3 |
| Environmental Compliance | 3 |
| Product Selection | 4 |
| Optical Characteristics | 5 |
| Electrical Characteristics | 6 |
| Absolute Maximum Ratings | 6 |
| Mechanical Dimensions | 7 |
| Relative Spectral Distribution vs. Wavelength Characteristics | 10 |
| Relative Light Output Characteristics over Temperature | 11 |
| Typical Forward Current Characteristics | 12 |
| Typical Relative Luminous Flux vs. Forward Current | 13 |
| Typical Radiation Patterns | 14 |
| Color Bin Definition | 15 |
| Final Packaging | 16 |

General Information

Product Nomenclature

LUXEON S2000/3000/5000 is tested and binned hot at $T_j = 85^\circ\text{C}$ and 700mA DC.

The part number designation is explained as follows:

L X S A – B C D D – 0 0 E E (F)

Where:

- A — designates minimum CRI (value 0 for Royal Blue, value 7 for 70, 8 for 80 and 9 for 90)
- B — designates radiation pattern (value P for Lambertian)
- C — designates color (W for White and R for Royal Blue)
- DD — designates nominal CCT (00 for Royal Blue, 27 for 2700K, 30 for 3000K, 35 for 3500K, 40 for 4000K, 50 for 5000K and 57 for 5700K)
- EE — designates product configuration by total LED count (17 for S2000, 24 for S3000 and 41 for S5000)
- F — designates product connector configuration (N for no connectors, left empty with no notation for parts with connectors)

Therefore 3000K, 80 CRI LUXEON S2000 with connector will be:

L X S 8 – P W 3 0 – 0 0 | 7

Therefore 5700K, 70CRI LUXEON S5000 with no connector will be:

L X S 7 - P W 5 7 - 0 0 4 | N

Therefore Royal Blue LUXEON S3000 with connector will be:

L X S 0 - P R 0 0 - 0 0 2 4

Average Lumen Maintenance Characteristics

Lumen maintenance for solid-state lighting devices (LEDs) is typically defined in terms of the percentage of initial light output remaining after a specified period of time. Lumileds projects that LUXEON S2000/S3000/S5000 products will deliver, on average, 70% lumen maintenance (L70) at >35,000 hours of operation at a forward current of up to 700mA. Please visit the following website for detailed operating conditions:

www.lumileds.com

Or contact your local Lumileds Technical Solutions Manager for TM-21 extrapolations or other support. Observation of design limits included in this data sheet is required in order to achieve this projected lumen maintenance.

Environmental Compliance

Lumileds is committed to providing environmentally friendly products to the solid-state lighting market.

LUXEON S2000/3000/5000 is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS and REACH directives. Lumileds will not intentionally add the following restricted material to the LUXEON S2000/3000/5000: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

Product Selection

Product Performance and Characterization Guide

Table 1. Performance Characteristics for LUXEON S2000 / LXSx-PWxx-0017(N) at $T_j = 85^\circ\text{C}$, $I_f = 700\text{mA}$

| Nominal CCT | Part Number | Luminous Flux (Lm) @ 700mA, 85°C (V) | | CRI | | R9 | |
|-------------|-------------------|--------------------------------------|---------|---------|---------|---------|---------|
| | | Minimum | Typical | Minimum | Typical | Minimum | Typical |
| 2700K | LXS9-PW27-0017(N) | 2350 | 2550 | >90 | 96 | >80 | 87 |
| 2700K | LXS8-PW27-0017(N) | 2700 | 2850 | >80 | 83 | >10 | 18 |
| 3000K | LXS9-PW30-0017(N) | 2400 | 2600 | >90 | 96 | >80 | 87 |
| 3000K | LXS8-PW30-0017(N) | 2725 | 2900 | >80 | 83 | >10 | 18 |
| 3500K | LXS8-PW35-0017(N) | 3000 | 3200 | >80 | 83 | >10 | 18 |
| 4000K | LXS7-PW40-0017(N) | 3375 | 3600 | >70 | 72 | n/a | n/a |
| 4000K | LXS8-PW40-0017(N) | 3100 | 3300 | >80 | 83 | >10 | 18 |
| 5000K | LXS7-PW50-0017(N) | 3550 | 3800 | >70 | 72 | n/a | n/a |
| 5000K | LXS8-PW50-0017(N) | 3100 | 3300 | >80 | 83 | >10 | 18 |
| 5700K | LXS7-PW57-0017(N) | 3550 | 3800 | >70 | 72 | n/a | n/a |

Note for Table 1:

1. Lumileds maintains a tolerance of $\pm 6.5\%$ on luminous flux and ± 2 on CRI measurements.

Table 2. Performance Characteristics for LUXEON S3000 / LXSx-PWxx-0024(N) at $T_j = 85^\circ\text{C}$, $I_f = 700\text{mA}$

| Nominal CCT | Part Number | Luminous Flux (Lm) @ 700mA, 85°C (V) | | CRI | | R9 | |
|-------------|-------------------|--------------------------------------|---------|---------|---------|---------|---------|
| | | Minimum | Typical | Minimum | Typical | Minimum | Typical |
| 2700K | LXS9-PW27-0024(N) | 3300 | 3350 | >90 | 96 | >80 | 87 |
| 2700K | LXS8-PW27-0024(N) | 3800 | 4050 | >80 | 83 | >10 | 18 |
| 3000K | LXS9-PW30-0024(N) | 3350 | 3600 | >90 | 96 | >80 | 87 |
| 3000K | LXS8-PW30-0024(N) | 3850 | 4100 | >80 | 83 | >10 | 18 |
| 3500K | LXS8-PW35-0024(N) | 4250 | 4550 | >80 | 83 | >10 | 18 |
| 4000K | LXS7-PW40-0024(N) | 4775 | 5100 | >70 | 72 | n/a | n/a |
| 4000K | LXS8-PW40-0024(N) | 4375 | 4650 | >80 | 83 | >10 | 18 |
| 5000K | LXS7-PW50-0024(N) | 5000 | 5400 | >70 | 72 | n/a | n/a |
| 5000K | LXS8-PW50-0024(N) | 4375 | 4650 | >80 | 83 | >10 | 18 |
| 5700K | LXS7-PW57-0024(N) | 5000 | 5400 | >70 | 72 | n/a | n/a |

Note for Table 2:

1. Lumileds maintains a tolerance of $\pm 6.5\%$ on luminous flux and ± 2 on CRI measurements.

Table 3. Performance Characteristics for LUXEON S5000 / LXSx-PWxx-0041 (N) at $T_j = 85^\circ\text{C}$, $I_f = 700\text{mA}$

| Nominal CCT | Part Number | Luminous Flux (Lm) @ 700mA, 85°C (V) | | CRI | | R9 | |
|-------------|--------------------|--------------------------------------|---------|---------|---------|---------|---------|
| | | Minimum | Typical | Minimum | Typical | Minimum | Typical |
| 2700K | LXS9-PW27-0041 (N) | 5650 | 6000 | >90 | 96 | >80 | 87 |
| 2700K | LXS8-PW27-0041 (N) | 6500 | 6900 | >80 | 83 | >10 | 18 |
| 3000K | LXS9-PW30-0041 (N) | 5700 | 6050 | >90 | 96 | >80 | 87 |
| 3000K | LXS8-PW30-0041 (N) | 6600 | 7000 | >80 | 83 | >10 | 18 |
| 3500K | LXS8-PW35-0041 (N) | 7300 | 7750 | >80 | 83 | >10 | 18 |
| 4000K | LXS7-PW40-0041 (N) | 8175 | 8700 | >70 | 72 | n/a | n/a |
| 4000K | LXS8-PW40-0041 (N) | 7500 | 8000 | >80 | 83 | >10 | 18 |
| 5000K | LXS7-PW50-0041 (N) | 8600 | 9200 | >70 | 72 | n/a | n/a |
| 5000K | LXS8-PW50-0041 (N) | 7500 | 8000 | >80 | 83 | >10 | 18 |
| 5700K | LXS7-PW57-0041 (N) | 8600 | 9200 | >70 | 72 | n/a | n/a |

Note for Table 3:

1. Lumileds maintains a tolerance of $\pm 6.5\%$ on luminous flux and ± 2 on CRI measurements.

Table 4. Royal Blue Performance Summary at $T_j = 85^\circ\text{C}$, $I_f = 700\text{mA}$

| Nominal CCT | Part Number | @ $I_f = 700\text{mA}$, $T_j = 85^\circ\text{C}$ | | |
|-------------|--------------------|---|--------------------------------|------------------------------|
| | | Minimum Radiometric Power (mW) | Typical Radiometric Power (mW) | Typical Radiant Efficacy (%) |
| Royal Blue | LXV0-PR00-0017(N) | 12925 | 13860 | 42.3% |
| Royal Blue | LXV0-PR00-0024(N) | 18250 | 19600 | 42.3% |
| Royal Blue | LXV0-PR00-0041 (N) | 31200 | 34000 | 42.3% |

Note for Table 4:

1. Lumileds maintains a tolerance of $\pm 6.5\%$ on luminous flux.

Optical Characteristics

Optical Characteristics at $T_j = 85^\circ\text{C}$, $I_f = 700\text{mA}$

Table 5. Optical Characteristics at $T_j = 85^\circ\text{C}$, $I_f = 700\text{mA}$

| Nominal CCT | Color Temperature @ 700 mA, 85°C CCT ^[1,2] | | | Typical Total Included Angle ^[3] (degrees) $\theta_{90\%}$ | Typical Viewing Angle ^[4] (degrees) $2\theta_{1/2}$ |
|-------------|---|---------|---------|---|--|
| | Minimum | Typical | Maximum | | |
| 2700K | 2602 | 2725 | 2847 | 129 | 105 |
| 3000K | 2898 | 3072 | 3220 | 129 | 105 |
| 3500K | 3309 | 3465 | 3620 | 129 | 105 |
| 4000K | 3805 | 3985 | 4164 | 129 | 105 |
| 5000K | 4801 | 5028 | 5254 | 129 | 105 |
| 5700K | 5410 | 5665 | 5919 | 129 | 105 |

Notes for Table 5:

1. Measured at $T_j = 85^\circ\text{C}$, $I_f = 700\text{mA}$.
2. CCT $\pm 5.00\%$ tester tolerance.
3. Total angle at which 90% of total luminous flux is captured.
4. Viewing angle is the off axis angle from lamp centerline where the luminous intensity is $1/2$ of the peak value.

Electrical Characteristics

Electrical Characteristics at $T_j = 85^\circ\text{C}$, $I_f = 700\text{mA}$

Table 6. Electrical Characteristics at $T_j = 85^\circ\text{C}$, $I_f = 700\text{mA}$

| Part Number | Forward Voltage V_f ^[1] (V) | | | Typ. Temperature Coefficient of Forward Voltage ^[2] (mV/°C) $\Delta V_f / \Delta T_j$ | Typical Thermal Resistance Junction to Thermal Pad (°C/W) $R_{\theta_{j-c}}$ |
|-------------------|--|---------|---------|--|--|
| | Minimum | Typical | Maximum | | |
| LXSx-Pxxx-0017(N) | 45.0 | 47.0 | 50.0 | -28 to -32 | 0.85 |
| LXSx-Pxxx-0024(N) | 65.0 | 67.5 | 70.0 | -41 to -46 | 0.50 |
| LXSx-Pxxx-0041(N) | 112 | 115 | 119 | -71 to -87 | 0.40 |

Notes for Table 6:

1. Tolerance of $\pm 0.06\text{V}$ per single emitter ($\pm 1.02\text{V}$ for LXSx-PWxx-0017, $\pm 1.44\text{V}$ for LXSx-PWxx-0024, $\pm 2.46\text{V}$ for LXSx-PWxx-0041).
2. Measured at $25^\circ\text{C} < T_j < 105^\circ\text{C}$ at $I_f = 700\text{mA}$.
3. Junction temperature to back of the PCB.

Absolute Maximum Ratings

Table 7. Operating Condition and Ratings

| Parameter | Maximum Performance |
|---|--|
| DC Forward Current | 1050mA ^[2] |
| Peak Pulsed Forward Current | 1250mA ^[3] |
| ESD Sensitivity | < 8000V Human Body Model (HBM) Class 3A JESD22-A114-E < 400V Machine Model (MM) Class B JESD22-A115-B |
| Storage Temperature | -40°C - 120°C |
| LED Junction Temperature ^[1] | 135°C |
| Operating Case Temperature at 700mA | -40°C - 120°C |
| Reverse Voltage | LUXEON S LEDs are not designed to be driven in reverse bias |

Notes for Table 7:

1. Proper current derating must be observed to maintain junction temperature below the maximum, please see preliminary application brief for additional information on thermal measurement guidelines.
2. Residual periodic variations due to power conversion from alternating current (AC) to direct current (DC), also called "ripple", with frequencies $\geq 100\text{Hz}$ and amplitude $\leq 200\text{mA}$ are acceptable, assuming the average current throughout each cycle does not exceed 1050mA.
3. Pulsed operation with a peak drive current of 1250mA is acceptable if the pulse on-time is $\leq 5\text{ms}$ per cycle and the duty cycle is ≤ 50 .

Mechanical Dimensions

LUXEON S2000 / LXSx-Pxxx-0017

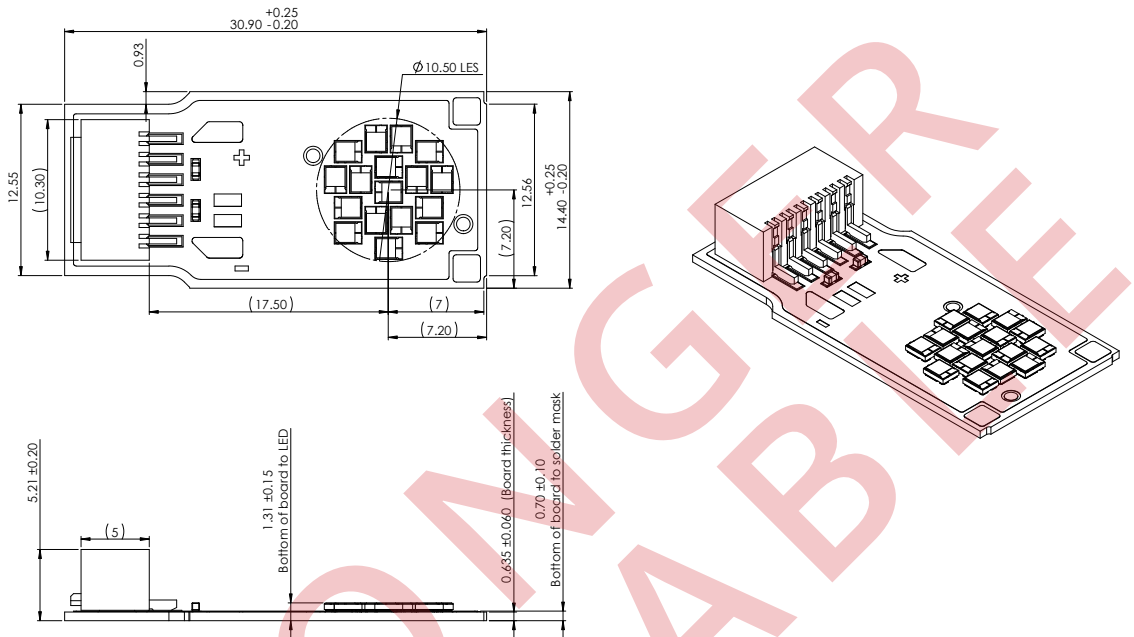


Figure 1. Package outline drawing for LUXEON S2000 / LXSx-Pxxx-0017.

LUXEON S2000 / LXSx-Pxxx-0017N (Connector-less)

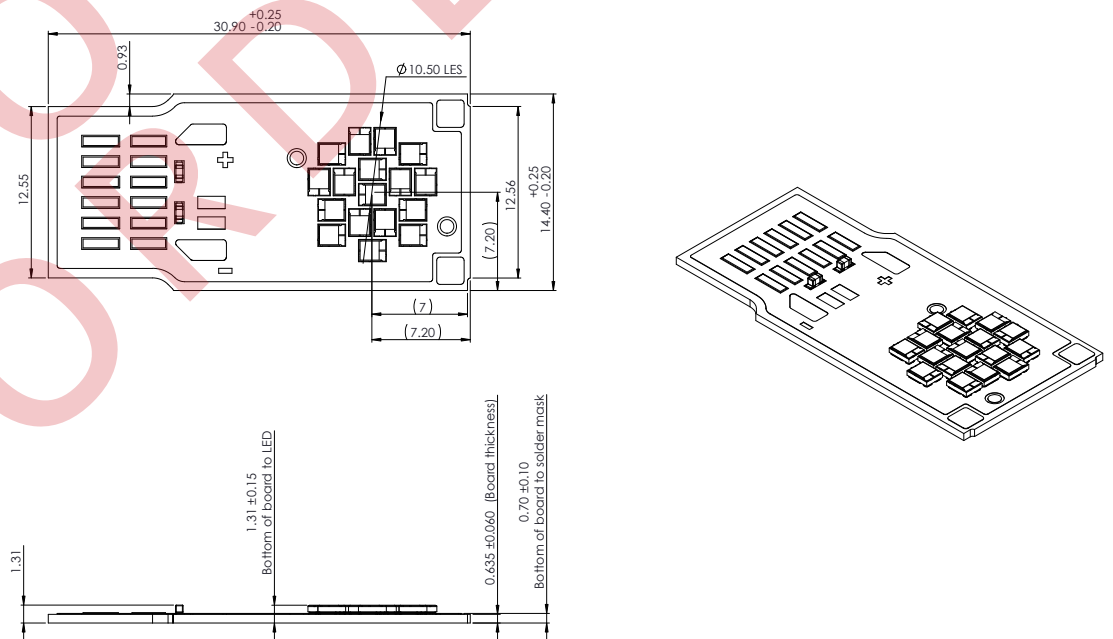


Figure 2. Package outline drawing for LUXEON S2000 / LXSx-Pxxx-0017N (Connector-less).

LUXEON S3000 / LXSx-Pxxx-0024

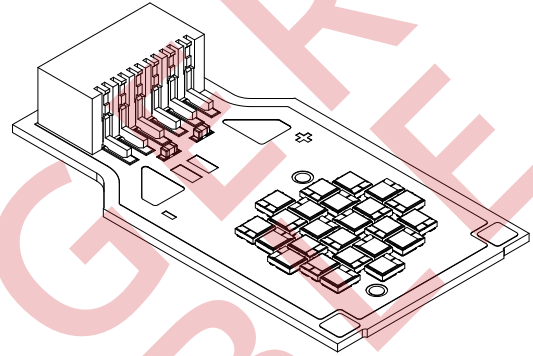
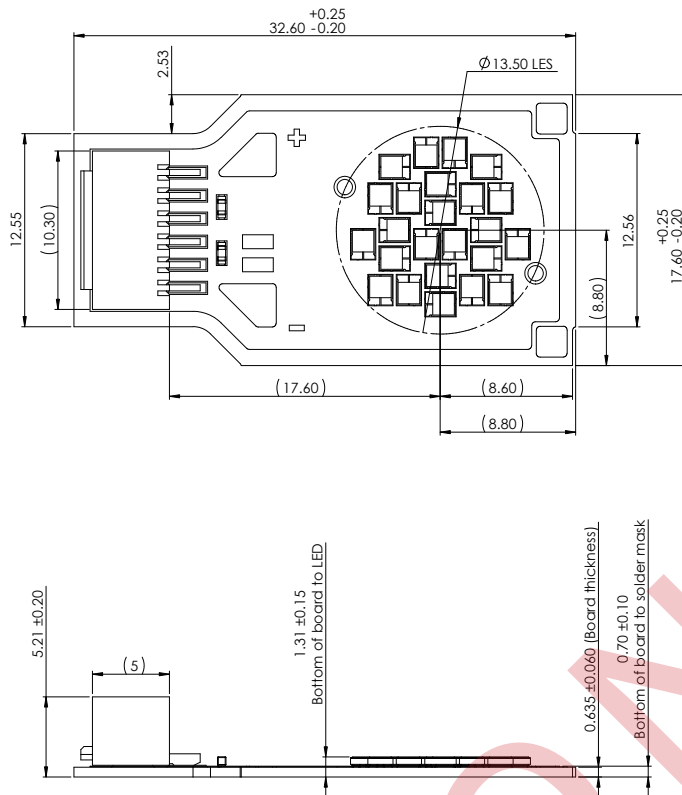


Figure 3. Package outline drawing for LUXEON S3000 / LXSx-Pxxx-0024.

LUXEON S3000 / LXSx-Pxxx-0024N (Connector-less)

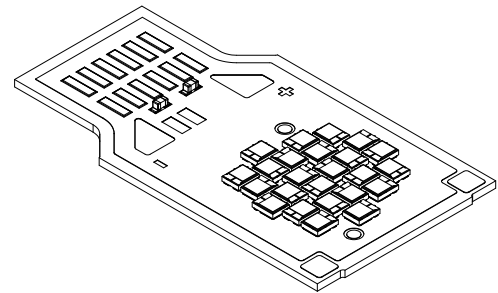
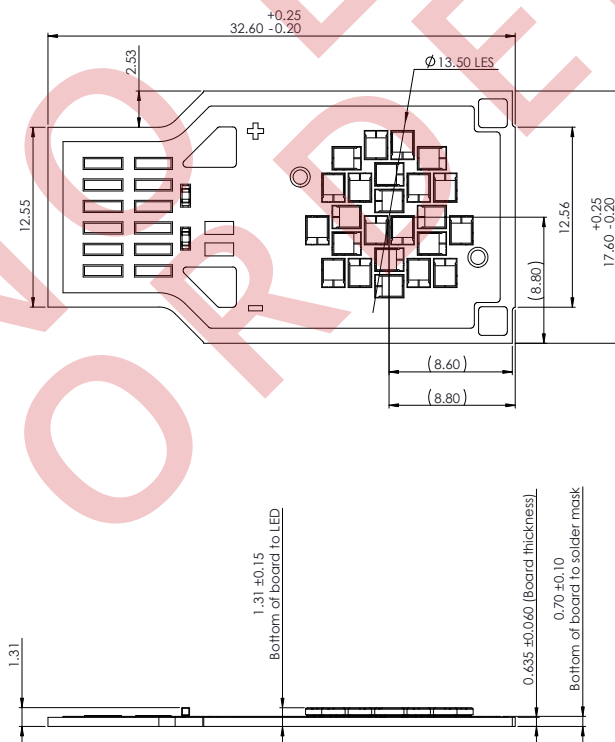


Figure 4. Package outline drawing for LUXEON S3000 / LXSx-Pxxx-0024N (Connector-less).

LUXEON S5000 / LXSx-Pxxx-004I

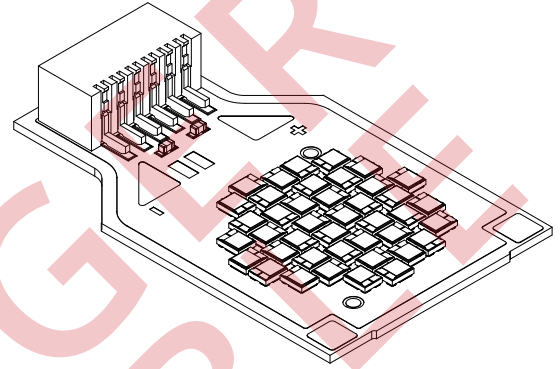
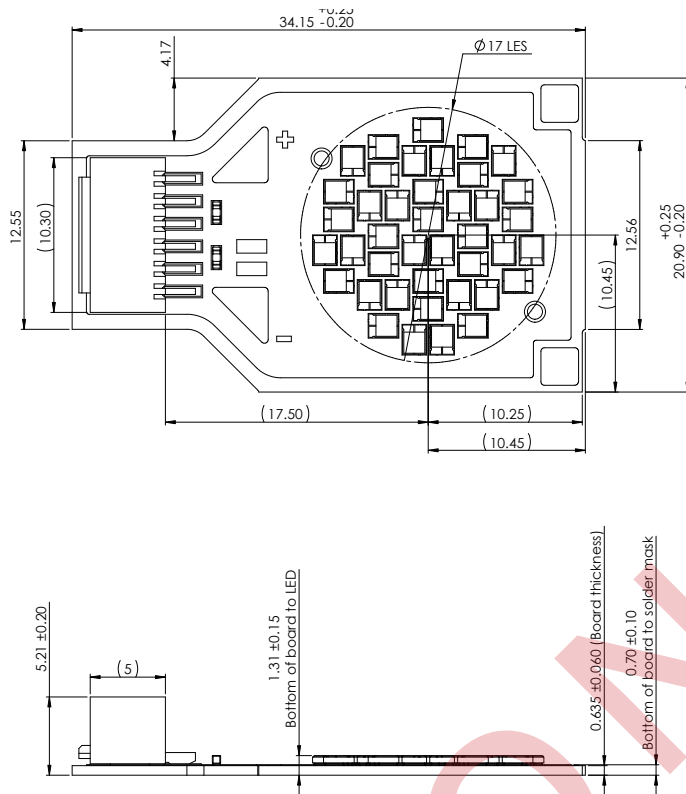


Figure 5. Package outline drawing for LUXEON S5000 / LXSx-Pxxx-004I.

LUXEON S5000 / LXSx-Pxxx-004IN (Connector-less)

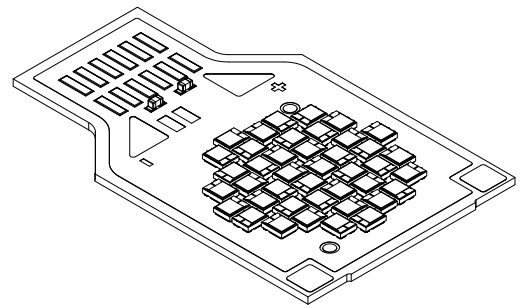
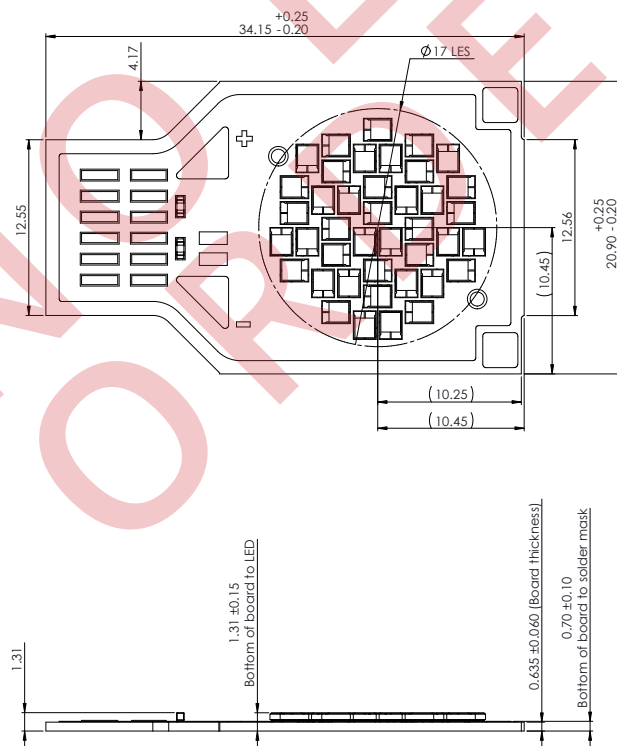


Figure 6. Package outline drawing for LUXEON S5000 / LXSx-Pxxx-004IN (Connector-less).

Relative Spectral Distribution vs. Wavelength Characteristics

LUXEON S2000/3000/5000 90CRI, Junction Temperature = 85°C; Test Current at 700mA

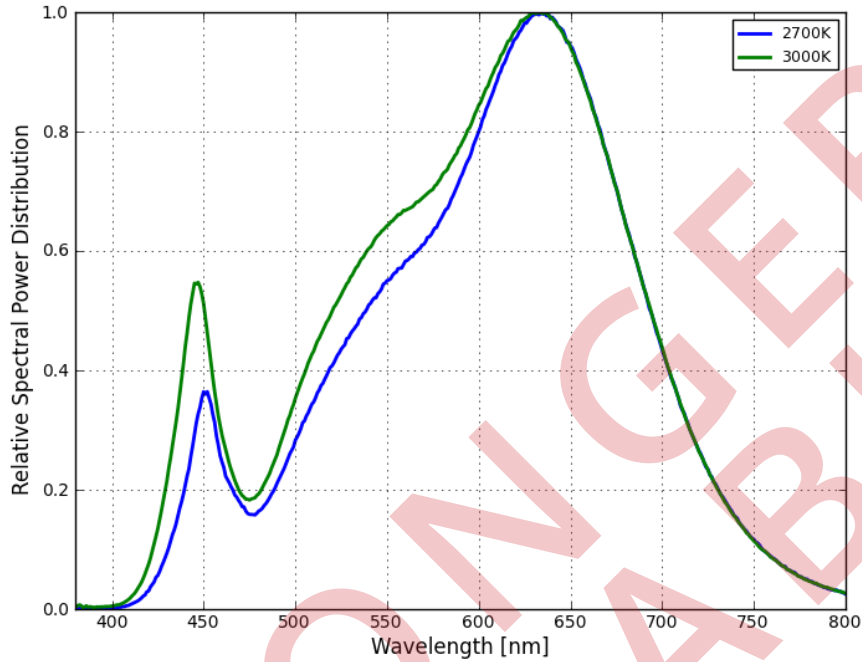


Figure 7. Color spectrum of 90 minimum CRI integrated measurement.

LUXEON S2000/3000/5000 80CRI, Junction Temperature = 85°C; Test Current at 700mA

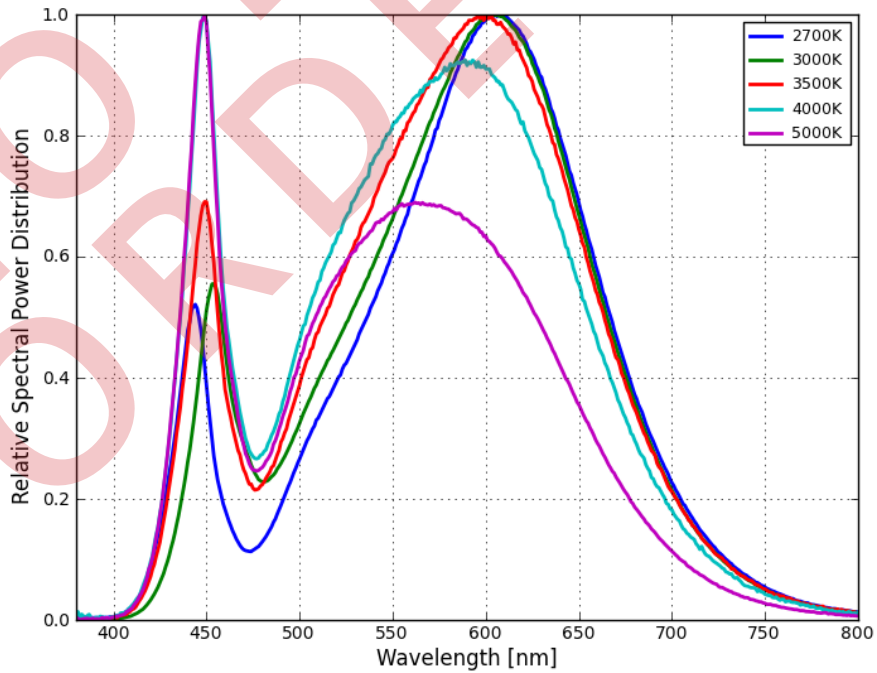


Figure 8. Color spectrum of 80 minimum CRI integrated measurement.

LUXEON S2000/3000/5000 70CRI, Junction Temperature = 85°C; Test Current at 700mA

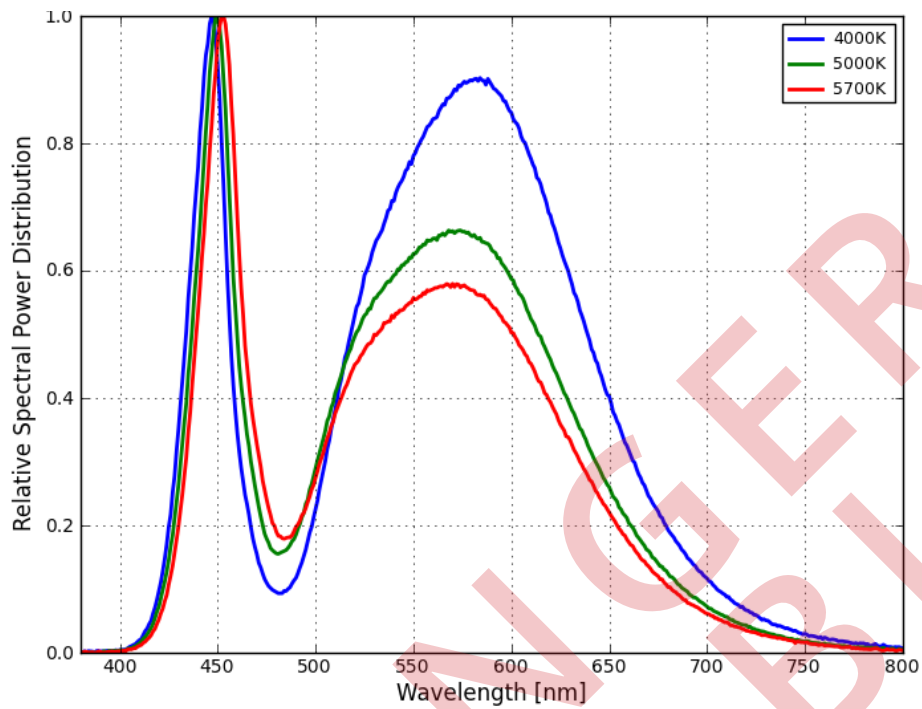


Figure 9. Color spectrum of 70 minimum CRI integrated measurement.

Relative Light Output Characteristics over Temperature

LUXEON S2000/3000/5000, Junction Temperature = 85°C; Test Current at 700mA

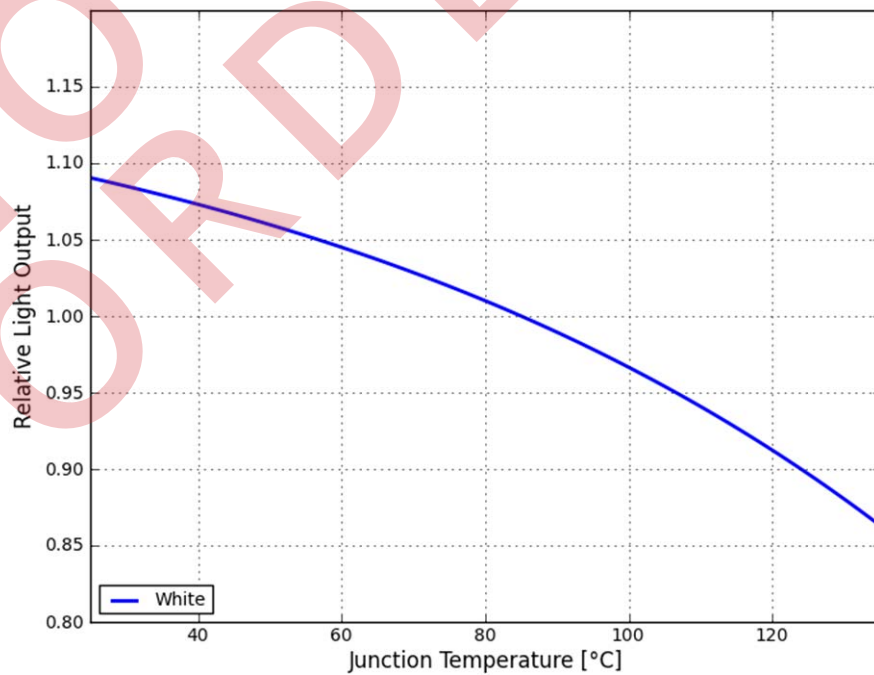


Figure 10. Color spectrum of 70 minimum CRI integrated measurement.

Typical Forward Current Characteristics

LUXEON S2000 / LXSx-Pxxx-0017(N), Junction Temperature = 85°C

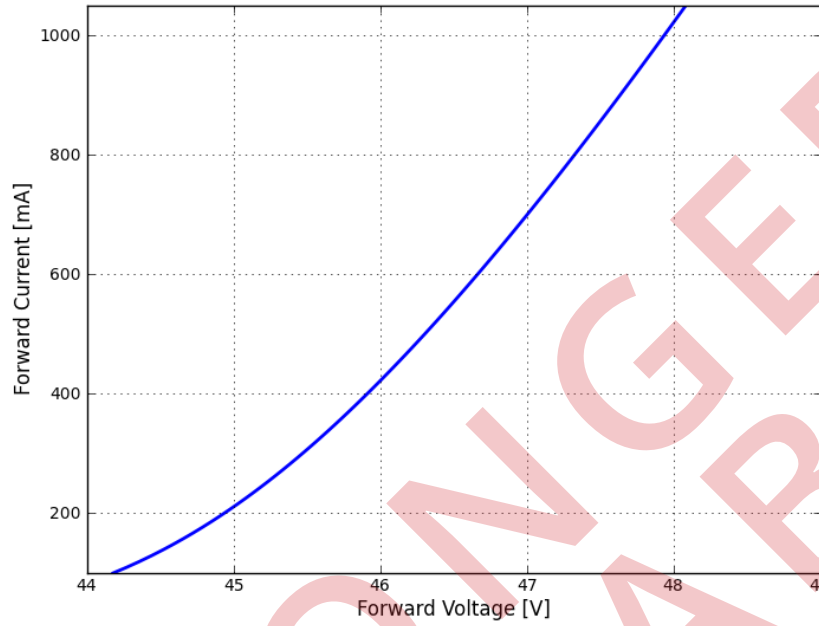


Figure 11. Forward current vs. forward voltage, LUXEON S2000, junction temperature = 85°C.

LUXEON S3000 / LXSx-Pxxx-0024(N), Junction Temperature = 85°C

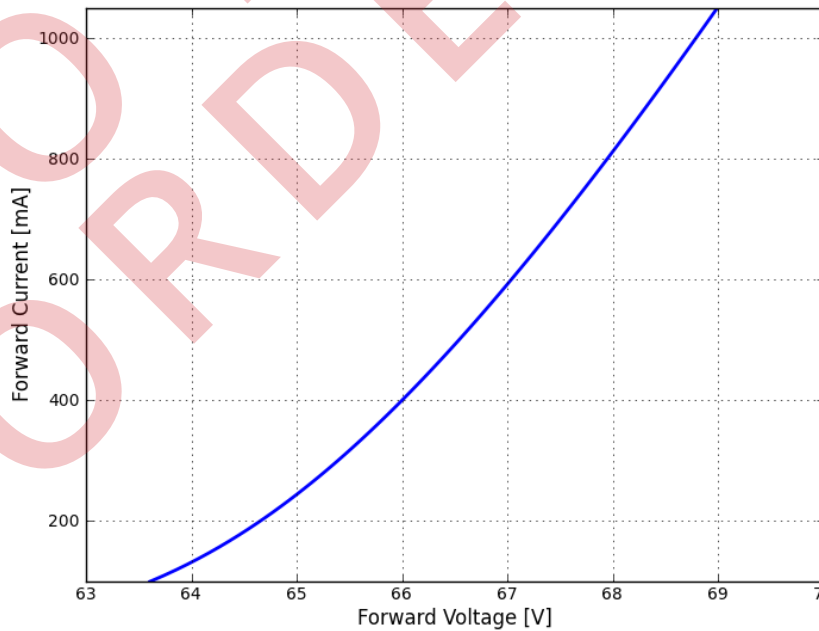


Figure 12. Forward current vs. forward voltage, LUXEON S3000, junction temperature = 85°C.

LUXEON S5000 / LXSx-Pxxx-004I(N), Junction Temperature = 85°C

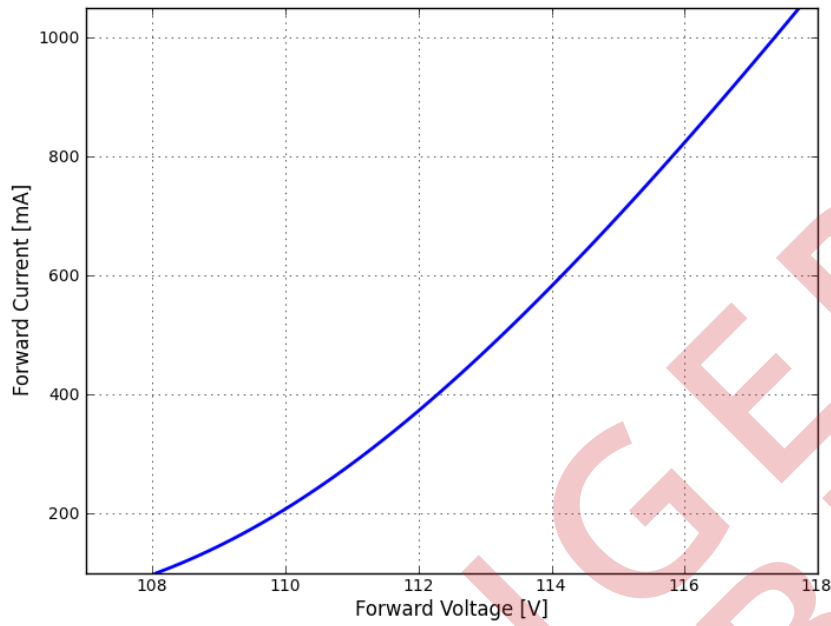


Figure 13. Forward current vs. forward voltage, LUXEON S5000, junction temperature = 85°C.

Typical Relative Luminous Flux vs. Forward Current

LUXEON S2000/3000/5000, Junction Temperature = 85°C

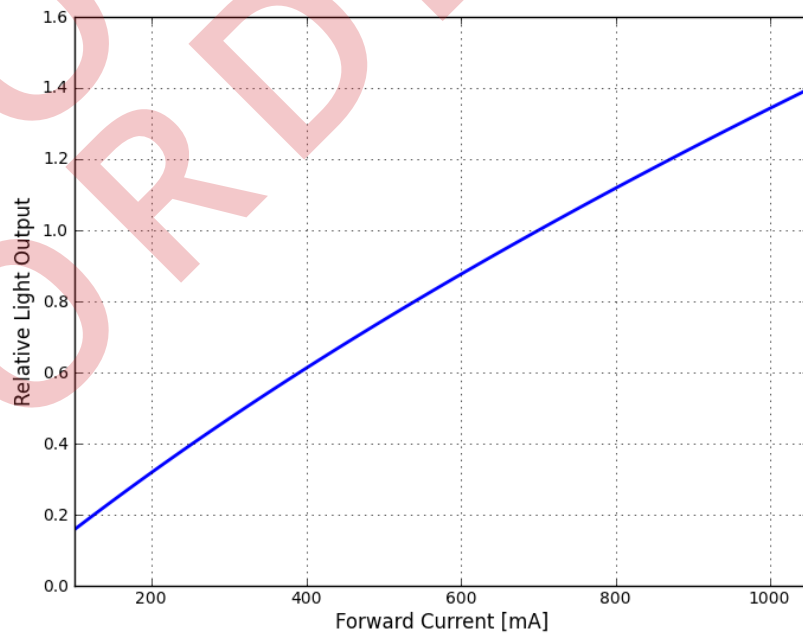


Figure 14. Typical relative luminous flux vs. forward current, junction temperature = 85°C.

Typical Radiation Patterns

Typical Spatial Radiation Pattern

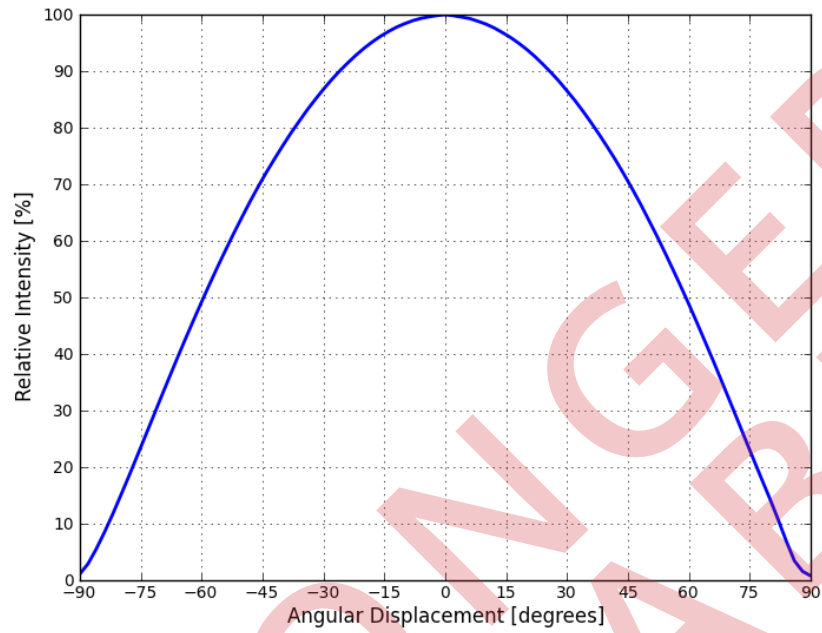


Figure 15. Typical spatial radiation pattern.

Typical Polar Radiation Pattern

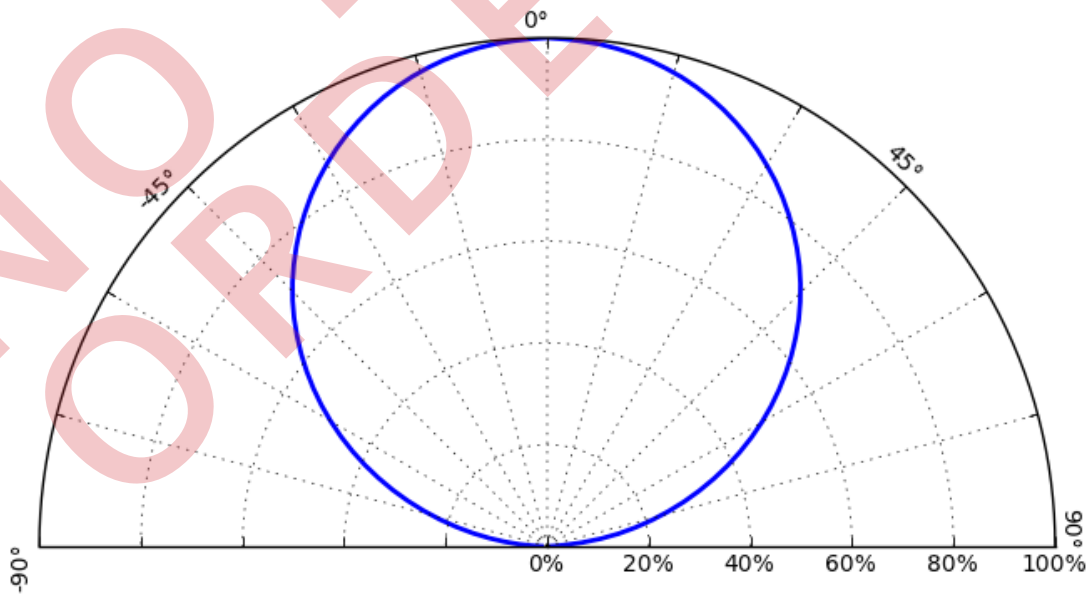


Figure 16. Typical polar radiation pattern.

Color Bin Definition

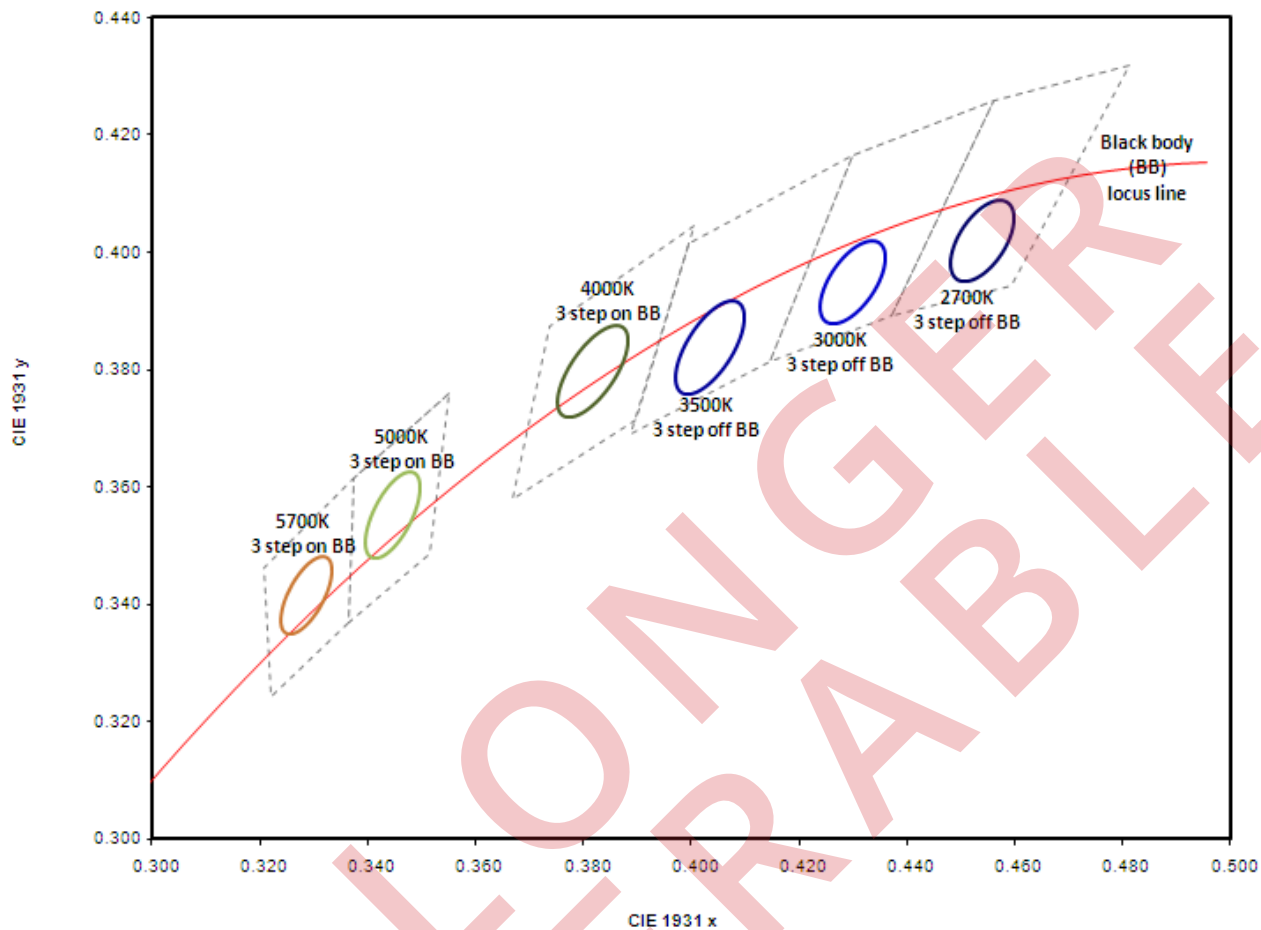


Figure 17. 3-step MacAdams ellipse color bins.

Table 8. 3-step MacAdams Ellipse Color Definition

| | 2700K | 3000K | 3500K | 4000K | 5000K | 5700K |
|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Center Point (X_{center}, Y_{center}) ^[1] | (0.45398, 0.40207) | (0.42998, 0.39497) | (0.40348, 0.38367) | (0.38180, 0.37970) | (0.34470, 0.35530) | (0.32870, 0.34170) |
| Major Axis, a ^[1] | 0.00810 | 0.00834 | 0.00927 | 0.00939 | 0.00822 | 0.00745 |
| Minor Axis, b ^[1] | 0.00420 | 0.00408 | 0.00414 | 0.00402 | 0.00354 | 0.00319 |
| Ellipse rotation angle, ϕ | 53.70° | 53.22° | 54.00° | 53.72° | 59.62° | 59.09° |

Notes for Table 8:

1. Lumileds maintains a tester tolerance of ± 0.005 on x, y color coordinates.

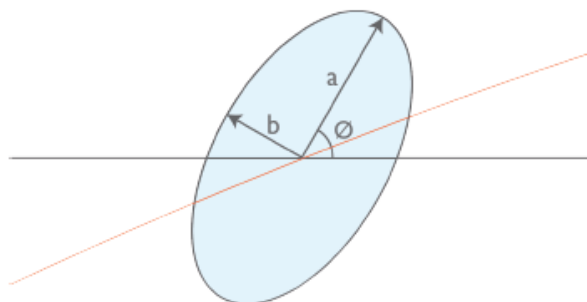


Figure 18. Illustrative figure for MacAdams ellipse color definition.

Final Packaging

Table 9. Packaging Information

| | S2000 LXSx-PWxx-0017(N) | S3000 LXSx-PWxx-0024(N) | S5000 LXSx-PWxx-0041(N) |
|---------------------|----------------------------|----------------------------|----------------------------|
| Total Unit per Tray | 35 | 35 | 30 |
| Total Tray per Box | 8 | 8 | 8 |
| Total Unit per Box | 280 | 280 | 240 |

LUXEON S2000 / LXSx-Pxxx-0017(N)

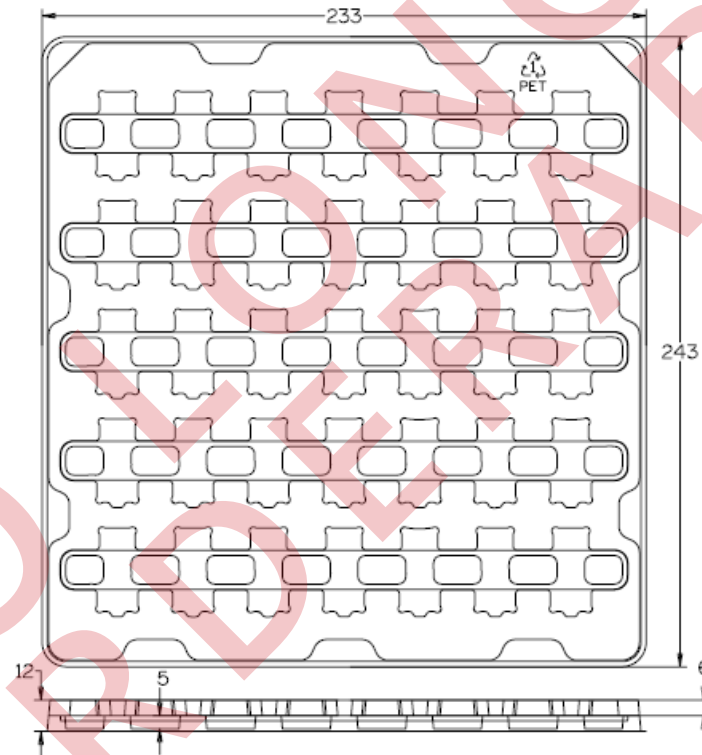


Figure 19. Package ray dimensions for LUXEON S2000 LXSx-Pxxx-0017(N).

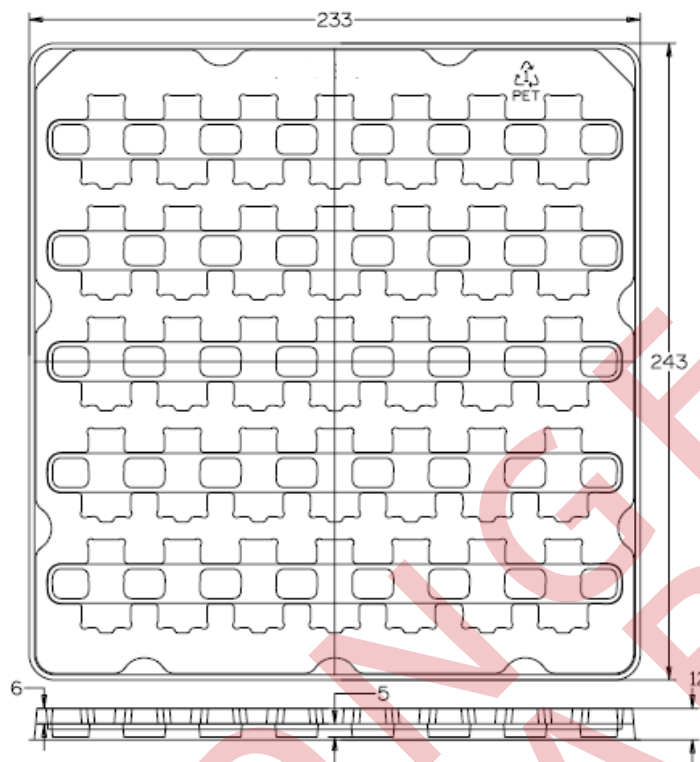


Figure 20. Package ray dimensions for LUXEON S3000 LXSx-Pxxx-0024(N).

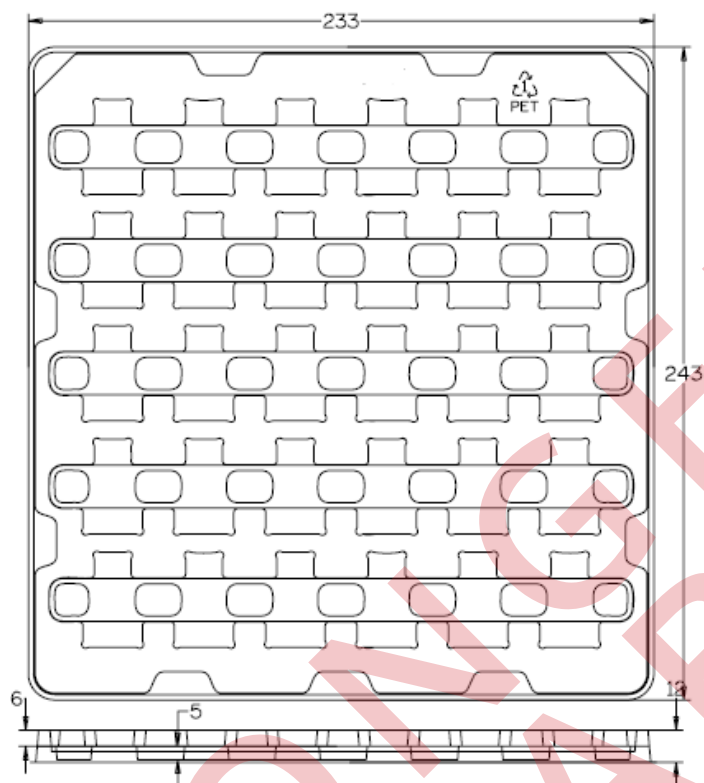


Figure 21. Package tray dimensions for LUXEON S5000 LXSx-Pxxx-0041(N).

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 safer, better and more beautiful—with light.

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

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X-ON Electronics

Largest Supplier of Electrical and Electronic Components

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