# Bridgelux® SMD 3030 0.3W 3V

**Product Data Sheet DS650**

BXEM-40E

# Introduction

SMD 3030

The Bridgelux SMD 3030 UVA offers exceptional performance in a compact LED package. This mid power LED is hot-color targeted which ensures that the LEDs fall within their specified color bin at the typical application conditions of 85˚C. With its broad lumen coverage and wide range of CCT and CRI options, the SMD 3030 provides unparalleled design-in flexibility for indoor and outdoor lighting applications. Its high flux capability reduces the number of LEDs and enables industry leading system level lumen per dollar. The SMD 3030 is ideal as a drop in replacement for emitters with an industry standard 3.0mm x 3.0mm footprint.

## Features

- Industry-standard 3030 footprint
- Excellent color maintenance
- 5 bin color control
- Superior luminous flux at maximum current for reduced LED count
- Hot-color targeting ensures that color is within the ANSI bin at the typical application conditions of 85˚C
- Enables 3- and 6-step MacAdam ellipse custom binning kits
- RoHS compliant and lead free

## Benefits

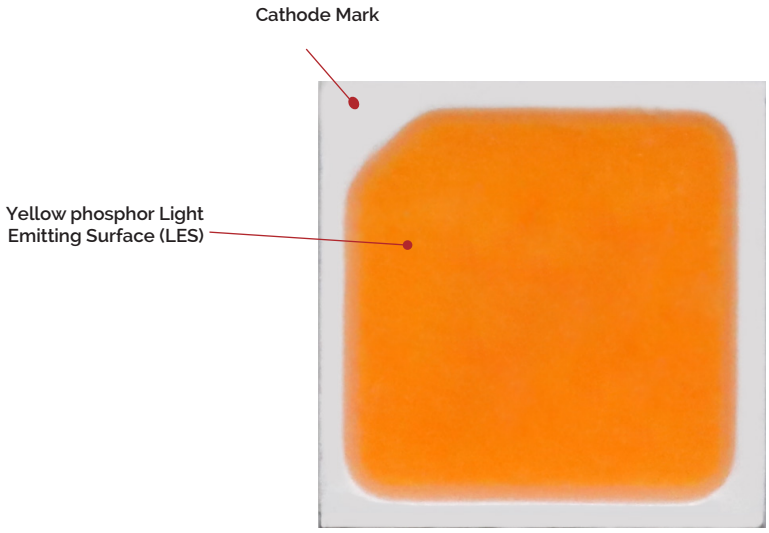
- Lower operating and manufacturing cost
- Ease of design and rapid go-to-market
- Uniform consistent white light
- Reliable and constant white point
- Compliant with environmental standards
- Design flexibility

Pb free RoHS

# Contents

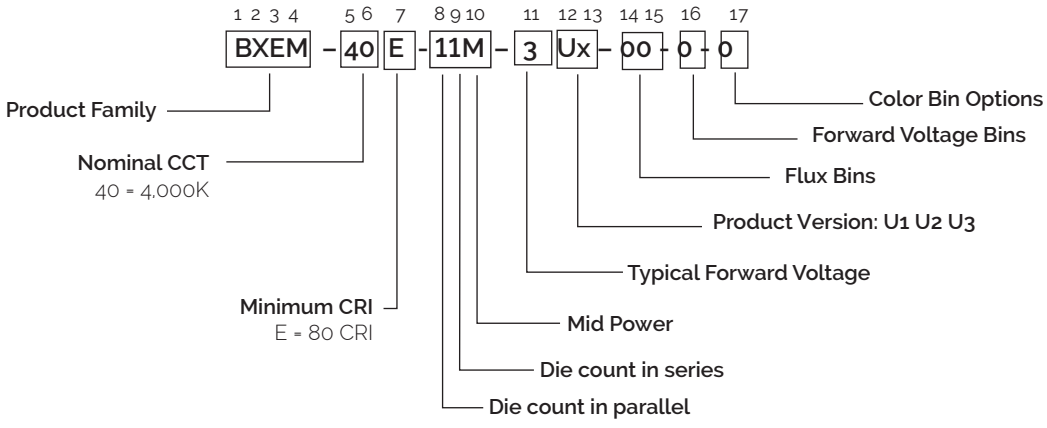
# Product Feature Map

Bridgelux SMD LED products come in industry standard package sizes and follow ANSI binning standards. These LEDs are optimized for cost and performance, helping to ensure highly competitive system lumen per dollar performance while addressing the stringent efficacy and reliability standards required for modern lighting applications.




## Product Nomenclature

The part number designation for Bridgelux SMD 3030 UVA is explained as follows:




## Product Test Conditions

Bridgelux SMD 3030 LEDs are tested and binned with a 10ms pulse of 100mA at $T_j$ (junction temperature)=$T_{sp}$ (solder point temperature) =25°C. Forward voltage and luminous flux are binned at a $T_j$=$T_{sp}$=25°C, while color is hot targeted at a $T_{sp}$ of 85°C.

# Product Selection Guide

The following product configurations are available:

**Table 1:** Selection Guide, Pulsed Measurement Data at 100mA ($T_j$=$T_{sp}$=25˚C)

| Part Number[1,6] | Nominal CCT[2] (K) | CRI[3, 5] | Nominal Drive Current (mA) | Forward Voltage[4, 5] (V) | | | Typical Pulsed Flux (lm)[4, 5] | Typical Power (W) | Typical Efficacy (lm/W) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typical | Max | | | |
| BXEM-40E-11M-3U1-00-0-0 | 4000 | 80 | 100 | 2.8 | 3.2 | 3.4 | 27 | 0.32 | 84 |
| BXEM-40E-11M-3U2-00-0-0 | 4000 | 80 | 100 | 2.8 | 3.2 | 3.4 | 35.5 | 0.32 | 111 |
| BXEM-40E-11M-3U3-00-0-0 | 4000 | 80 | 100 | 2.8 | 3.2 | 3.4 | 39.5 | 0.32 | 123 |

**Table 2:** Selection Guide, Pulsed Test Performance ($T_{sp}$ = 85˚C)

| Part Number[1,6] | Nominal CCT[2] (K) | CRI[3, 5] | Nominal Drive Current (mA) | Forward Voltage[4, 5] (V) | | | Typical Pulsed Flux (lm)[4, 5] | Typical Power (W) | Typical Efficacy (lm/W) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typical | Max | | | |
| BXEM-40E-11M-3U1-00-0-0 | 4000 | 80 | 100 | 2.7 | 3.1 | 3.3 | 24.0 | 0.31 | 77 |
| BXEM-40E-11M-3U2-00-0-0 | 4000 | 80 | 100 | 2.7 | 3.1 | 3.3 | 33.4 | 0.31 | 108 |
| BXEM-40E-11M-3U3-00-0-0 | 4000 | 80 | 100 | 2.7 | 3.1 | 3.3 | 36.8 | 0.31 | 119 |

Notes for Tables 1 & 2:

1. The last 6 characters (including hyphens '-') refer to flux bins, forward voltage bins, and color bin options, respectively. "00-0-0" denotes the full distribution of flux, forward voltage, and 6 SDCM color.
   Example: BXEM-40E-11M-3U1-00-0-0 refers to the full distribution of flux, forward voltage, and color within a 4000K 6-step ANSI standard chromaticity region with a minimum of 80CRI, 1x1 die configuration, 3.2V typical forward voltage.
2. Product CCT is the nominal CCT at Tsp = 85˚C as defined by ANSI C78.377-2011.
3. Listed CRIs are minimum values at Tsp = 85˚C and include test tolerance.
4. Products tested under pulsed condition (10ms pulse width) at nominal drive current where Tj=Tsp=25˚C.
5. Bridgelux maintains a ±7.5% tolerance on luminous flux measurements, ±0.1V tolerance on forward voltage measurements, and ±2 tolerance on CRI measurements for the SMD 3030.
6. Refer to Table 5 and Table 6 for Bridgelux SMD 3030 Luminous Flux Binning and Forward Voltage Binning information.
7. Typical pulsed test performance values are provided as reference only and are not a guarantee of performance.
8. Typical performance is estimated based on operation under pulsed current with LED emitter mounted onto a heat sink with thermal interface material and the solder point temperature maintained at 85˚C. Based on Bridgelux test setup, values may vary depending on the thermal design of the luminaire and/or the exposed environment to which the product is subjected.

# Electrical Characteristics

**Table 3:** Electrical Characteristics

| Part Number [1] | Drive Current (mA) | Forward Voltage (V) [2,3] | | | Typical Temperature Coefficient of Forward Voltage $\Delta V_f/\Delta T$ (mV/°C) | Typical Thermal Resistance Junction to Solder Point [4,5] $R_{j\text{-}sp}$ (C/W) |
|---|---|---|---|---|---|---|
| | | Minimum | Typical | Maximum | | |
| BXEM-40E-11M-3Ux-00-0-0 | 100 | 2.8 | 3.2 | 3.4 | -1.0 to -1.5 | 16 |

Notes for Table 3:

1. The last 6 characters (including hyphens '-') refer to flux, forward voltage, and color bins, respectively. "00-0-0" denotes the full distribution of flux, forward voltage, and 6 SDCM color.

   Example: BXEM-40E-11M-3UX-00-0-0 refers to the full distribution of flux, forward voltage, and color within a 4000K 6-step ANSI standard chromaticity region with a minimum of 80CRI. 1x1 die configuration, mid power, 3.2V typical forward voltage.
2. Bridgelux maintains a tolerance of ± 0.1V on forward voltage measurements. Voltage minimum and maximum values at the nominal drive current are guaranteed by 100% test.
3. Products tested under pulsed condition (10ms pulse width) at nominal drive current where $T_{sp}$ = 25°C.
4. Thermal Resistance values based on 4000K 80CRI product.
5. Thermal resistance value was calculated using total electrical input power; optical power was not subtracted from input power.

# Absolute Maximum Ratings

**Table 4:** Maximum Ratings

| Parameter | Maximum Rating |
|---|---|
| LED Junction Temperature ($T_j$) | 125˚C |
| Storage Temperature | -40˚C to +105˚C |
| Operating Solder Point Temperature ($T_{Sp}$) | -40˚C to +105˚C |
| Soldering Temperature | 260˚C or lower for a maximum of 10 seconds |
| Maximum Drive Current | 200mA |
| Maximum Peak Pulsed Forward Current[1] | 250mA |
| Maximum Reverse Voltage[2] | - |
| Moisture Sensitivity Rating | MSL 3 |
| Electrostatic Discharge | 2kV HBM. JEDEC-JS-001-HBM and JEDEC-JS-001-2012 |

Notes for Table 4:

1. Bridgelux recommends a maximum duty cycle of 10% and pulse width of 10 ms when operating LED SMD at maximum peak pulsed current specified. Maximum peak pulsed currents indicate values where LED SMD can be driven without catastrophic failures.
2. Light emitting diodes are not designed to be driven in reverse voltage and will not produce light under this condition. no rating is provided.

# Product Bin Definitions

Table 5 lists the standard photometric luminous flux bins for Bridgelux SMD 3030 UVA LEDs. Although several bins are outlined, product availability in a particular bin varies by production run and by product performance.

**Table 5:** Luminous Flux Bin Definitions at 100mA, $T_{sp}$=25˚C

| Bin Code | Minimum | Maximum | Unit | Condition |
|---|---|---|---|---|
| 1B | 24 | 26 | lm | $I_F$=100mA |
| 1C | 26 | 28 | | |
| 1D | 28 | 30 | | |
| 1E | 30 | 32 | | |
| 1F | 32 | 34 | | |
| 1G | 34 | 36 | | |
| 1H | 36 | 38 | | |
| 1J | 38 | 40 | | |
| 1K | 40 | 42 | | |
| 1L | 42 | 44 | | |

Note for Table 5:

1. Bridgelux maintains a tolerance of ± 7.5% on luminous flux measurements.

**Table 6:** Forward Voltage Bin Definition at 100mA, $T_{sp}$=25˚C

| Bin Code | Minimum | Maximum | Unit | Condition |
|---|---|---|---|---|
| A | 2.8 | 2.9 | V | $I_F$=100mA |
| B | 2.9 | 3.0 | | |
| C | 3.0 | 3.1 | | |
| D | 3.1 | 3.2 | | |
| E | 3.2 | 3.3 | | |
| F | 3.3 | 3.4 | | |

Note for Table 6:

1. Bridgelux maintains a tolerance of ± 0.1V on forward voltage measurements.

# Product Bin Definitions

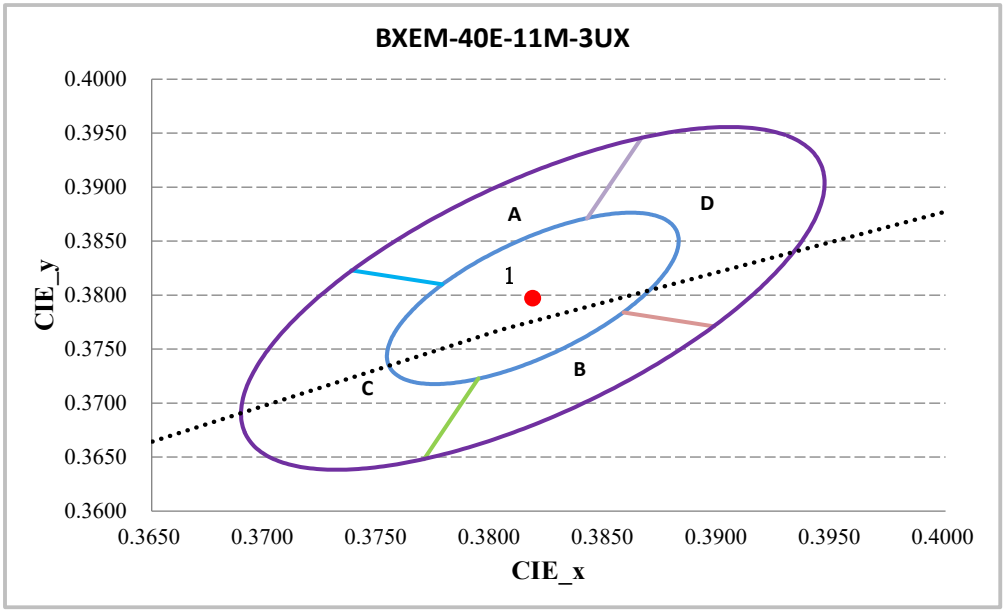
**Table 7:** 3- and 6-step MacAdam Ellipse Color Bin Definitions

| Part Number | Color Space | Center Point | | Major Axis | Minor Axis | Ellipse Rotation Angle | Color Bin |
|---|---|---|---|---|---|---|---|
| | | X | Y | | | | |
| BXEM-40E-11M-3UX-00-0-0 | 3 SDCM | 0.3818 | 0.3797 | 0.00939 | 0.00402 | 53.72 | 1 |
| | 6 SDCM | 0.3818 | 0.3797 | 0.01878 | 0.00804 | 53.72 | 1/A/B/C/D |

Notes for Table 7:

1. Color binning at $T_{sp}$=85˚C
2. Bridgelux maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

**Figure 1:** C.I.E. 1931 Chromaticity Diagram (5 Color Bin Structure, Hot-color Targeted at $T_{sp}$=85˚C)



# Performance Curves

**Figure 2:** Drive Current vs. Voltage ($T_{sp}$=25˚C)

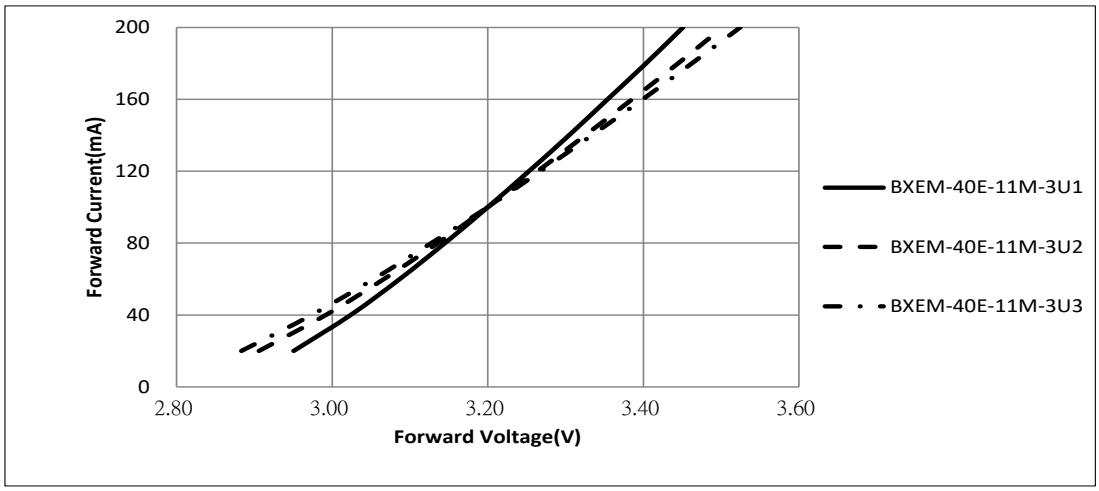
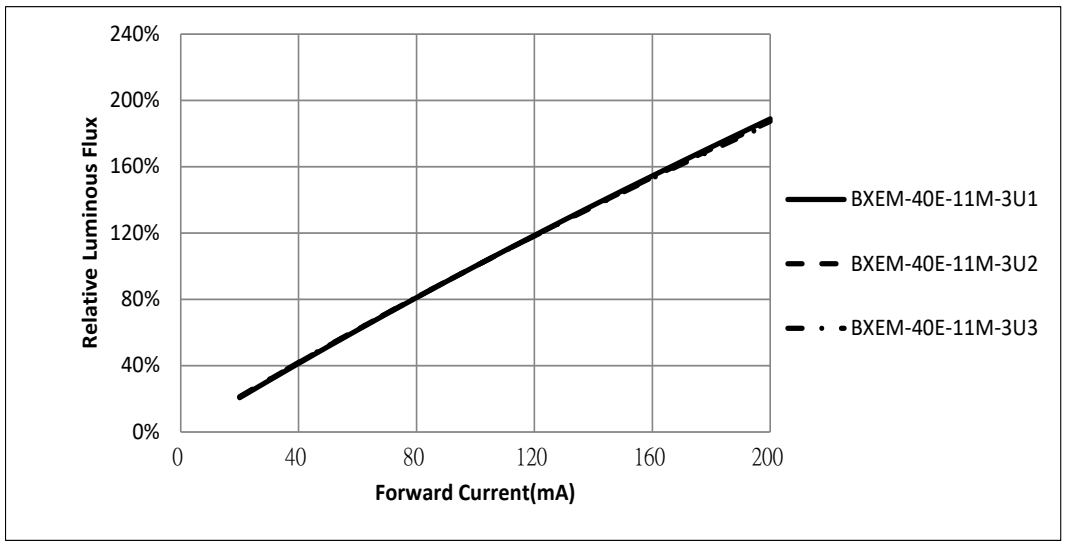



**Figure 3:** Typical Relative Luminous Flux vs. Drive Current ($T_{sp}$=25˚C)



# Performance Curves

**Figure 4:** Typical Relative DC Flux vs. Solder Point Temperature

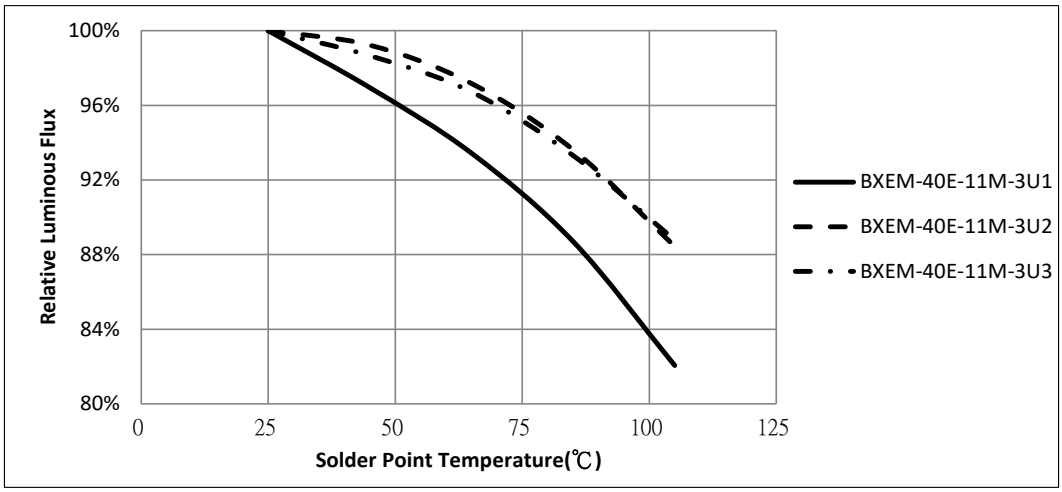
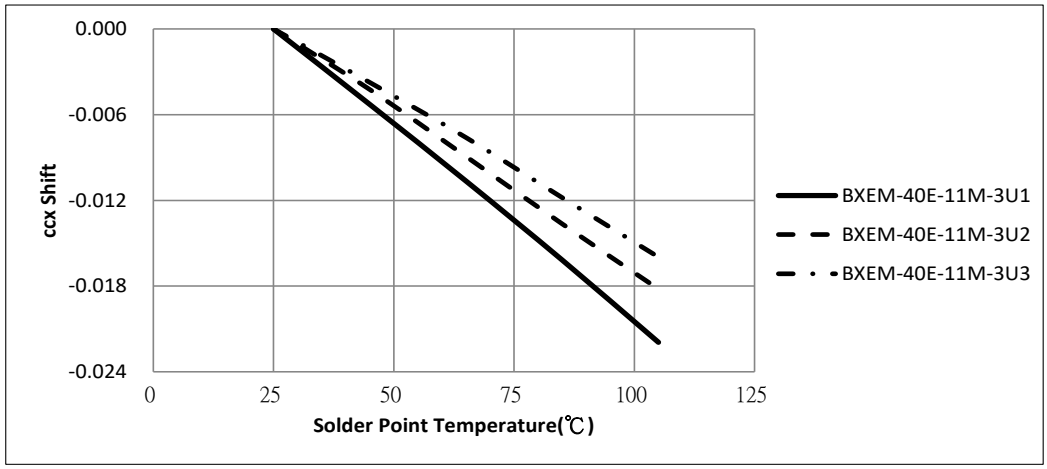
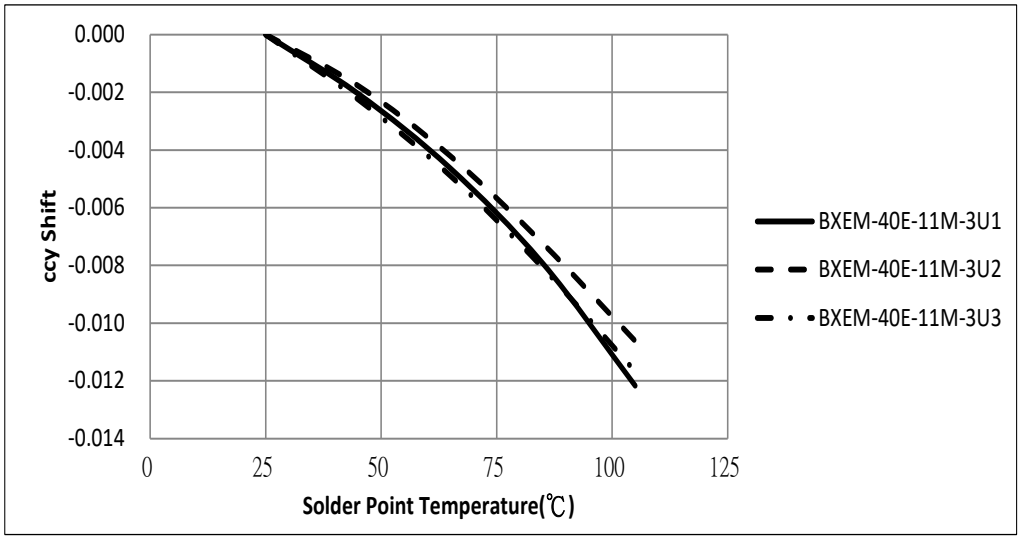



**Figure 5:** Typical DC ccx Shift vs. Solder Point Temperature



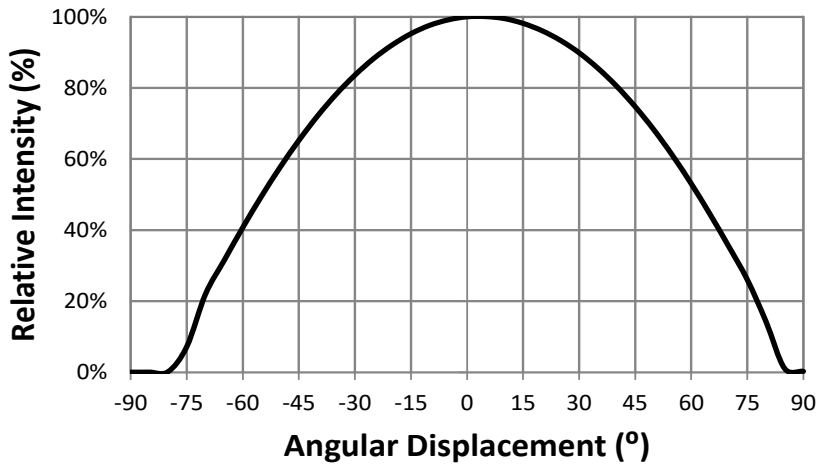
# Performance Curves

**Figure 6:** Typical DC ccy Shift vs. Solder Point Temperature



# Typical Radiation Pattern

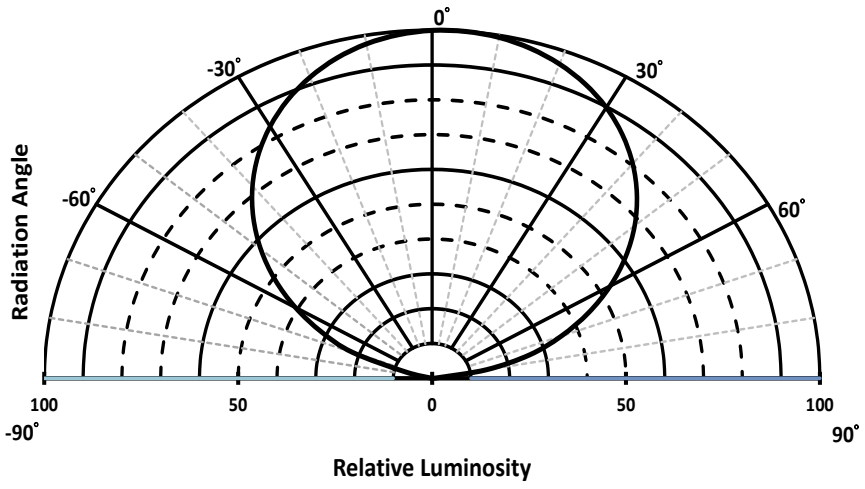
**Figure 7: Typical Spatial Radiation Pattern at 100mA, $T_{sp}$=25˚C**




Notes for Figure 7:

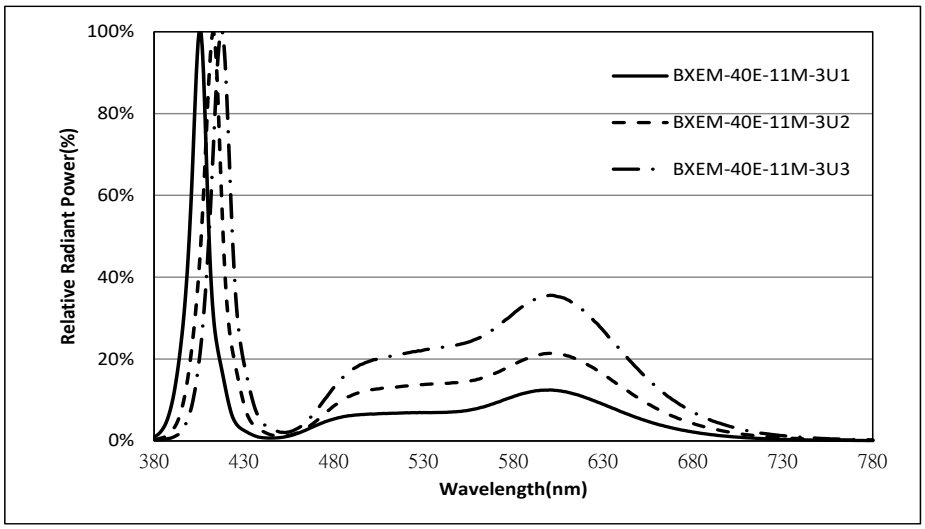
1. Typical viewing angle is 117˚.
2. The viewing angle is defined as the off axis angle from the centerline where Iv is ½ of the peak value.

**Figure 8: Typical Polar Radiation Pattern at 100mA, $T_{sp}$=25˚C**



# Typical Color Spectrum

**Figure 9: Typical Color Spectrum**

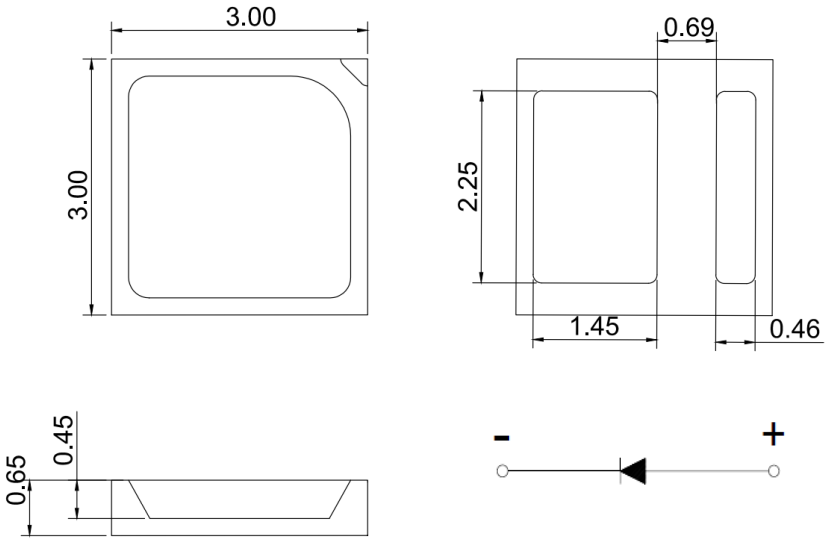



Note for Figure 9:

1. Color spectra measured at nominal current for $T_{sp}$ = 25°C
2. Color spectra shown for 80 CRI products.

# Mechanical Dimensions

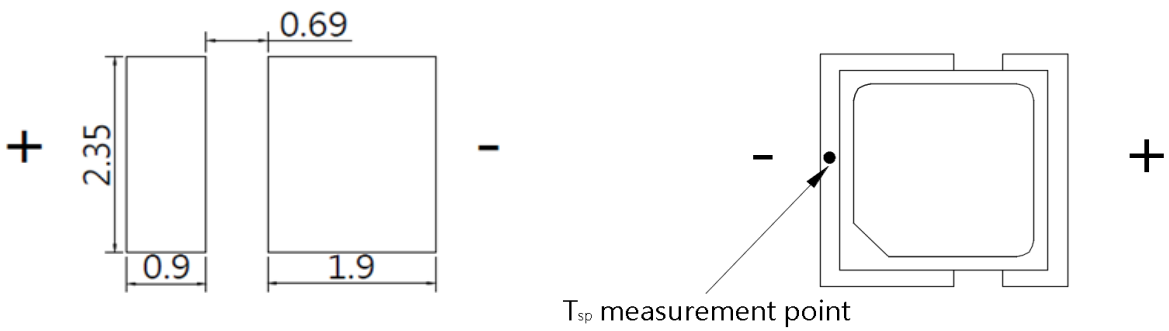
**Figure 10:** Drawing for SMD 3030




Notes for Figure 10:

1. Drawings are not to scale.
2. Drawing dimensions are in millimeters.
3. Unless otherwise specified, tolerances are ± 0.10mm.
4. The optical center of the LED emitter is nominally defined by the mechanical center of the emitter. The light emitting surface (LES) is centered on the mechanical center of the LED emitter to a tolerance of ± 0.2 mm

## Recommended PCB Soldering Pad Pattern



# Reliability

**Table 8:** Reliability Test Items and Conditions

| No . | Items | Reference Standard | Test Conditions | Drive Current | Test Duration | Units Failed/Tested |
|---|---|---|---|---|---|---|
| 1 | Moisture/Reflow Sensitivity | J-STD-020E | $T_{sld}$ = 260˚C, 10sec, Precondition: 85˚C, 60%RH, 168hr | | 3 reflows | 0/22 |
| 2 | Low Temperature Storage | JESD22-A119 | $T_a$=-40˚C | | 1000 hours | 0/22 |
| 3 | High Temperature Storage | JESD22-A103D | $T_a$=100˚C | | 1000 hours | 0/22 |
| 4 | Low Temperature Operating Life | JESD22-A108D | $T_a$=-40˚C | 100mA | 1000 hours | 0/22 |
| 5 | Temperature Humidity Operating Life | JESD22-A101C | $T_{sp}$=85˚C, RH=85% | 100mA | 1000 hours | 0/22 |
| 6 | High Temperature Operating Life | JESD22-A108D | $T_{sp}$=105˚C | 200mA | 1000 hours | 0/22 |
| 7 | Power switching | EC62717:2014 | $T_{sp}$= 105˚C 30 sec on, 30 sec off | 200mA | 30000 cycles | 0/22 |
| 8 | Thermal Shock | JESD22-A106B | $T_a$=-40˚C ~100˚C; Dwell : 15min; Transfer: 10sec | | 200 Cycle | 0/22 |
| 9 | Temperature Cycle | JESD22-A104E | $T_a$=-40˚C ~100˚C; Dwell at extreme temperature: 15min; Ramp rate < 105˚C/min | | 200 Cycle | 0/22 |
| 10 | Electrostatic Discharge | JS-001-2012 | HBM, 2KV, 1.5kΩ, 100pF, Alternately positive or negative | - | - | 0/22 |

## Passing Criteria

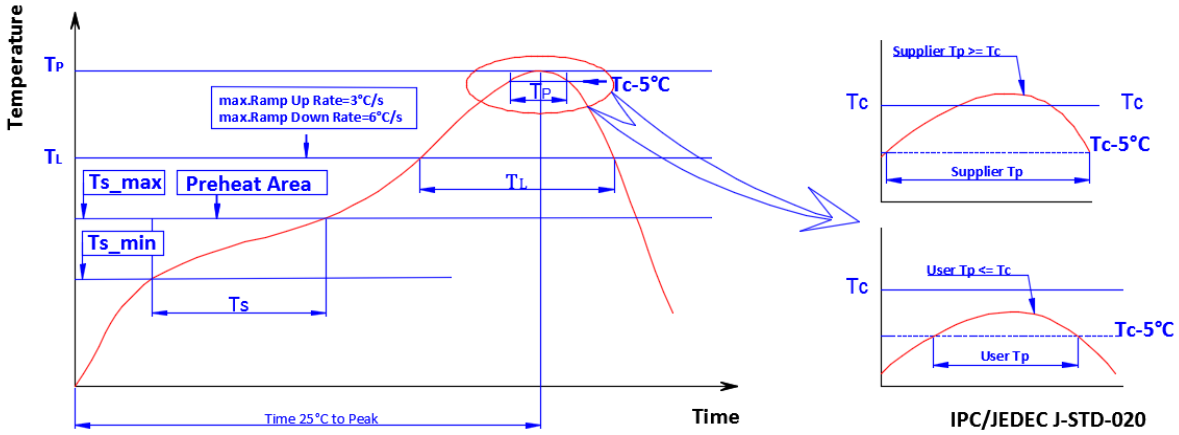
| Item | Symbol | Test Condition | Passing Criteria |
|---|---|---|---|
| Forward Voltage | Vf | 100mA | ΔVf<10% |
| Luminous Flux | Iv | 100mA | ΔIv<30% |
| Chromaticity Coordinates | (x, y) | 100mA | Δu'v'<0.007 |

Notes for Table 8:

1. Measurements are performed after allowing the LEDs to return to room temperature
2. $T_{sld}$ : reflow soldering temperature; $T_a$ : ambient temperature

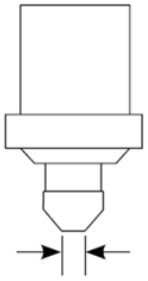
# Reflow Characteristics

**Figure 11 : Reflow Profile**




| Profile Feature | Lead Free Assembly |
|---|---|
| Temperature Min. (Ts_min) | 160˚C |
| Temperature Max. (Ts_max) | 205˚C |
| Time (ts) from Ts_min to Ts_max | 60-150 seconds |
| Ramp-Up Rate (TL to Tp) | 3 ˚C/second |
| Liquidus Temperature (TL) | 220 ˚C |
| Time (TL) Maintained Above TL | 60-150 seconds |
| Peak Temp( Tp) | 260 ˚C max. |
| Time (Tp) Within 5 ˚C of the Specified Classification Temperature (Tc) | 25 seconds max. |
| Ramp-Down Rate (Tp to TL) | 5 ˚C/second max. |
| Time 25 ˚C to Peak Temperature | 10 minutes max. |

**Figure 12 : Pick and Place**



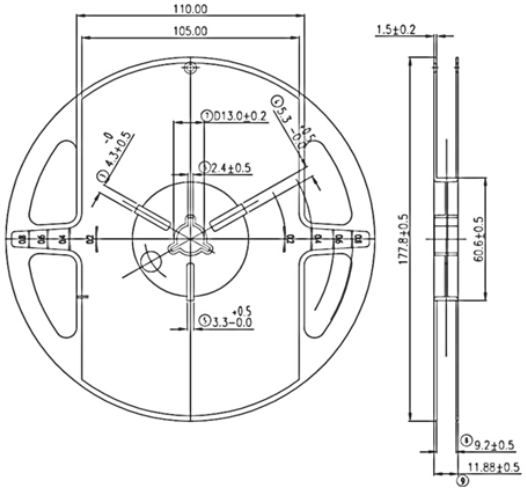
Is greater than LEDs emitting surface

Note for Figure 12:

1. When using a pick and place machine, choose a nozzle that has a larger diameter than the LED's emitting surface. Using a Pick-and-Place nozzle with a smaller diameter than the size of the LEDs emitting surface will cause damage and may also cause the LED to not illuminate.

# Packaging

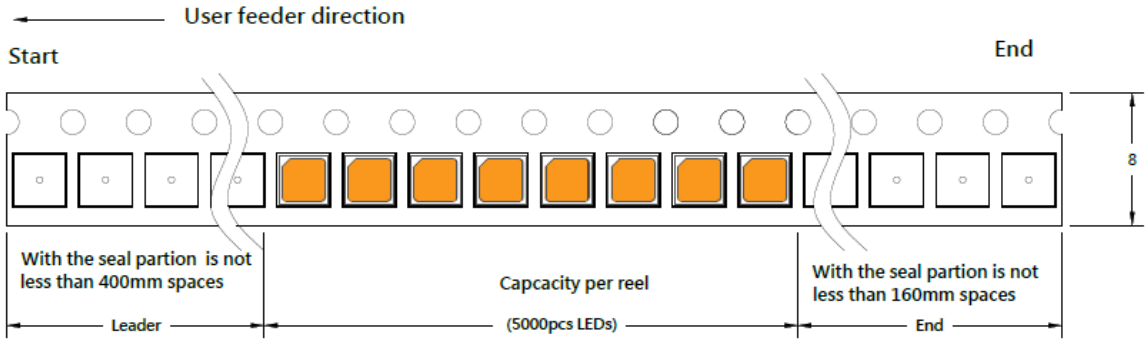
**Figure 13: Emitter Reel Drawings**




Note for Figure 13:

1. Drawings are not to scale. Drawing dimensions are in millimeters.

**Figure 14: Emitter Tape Drawings**

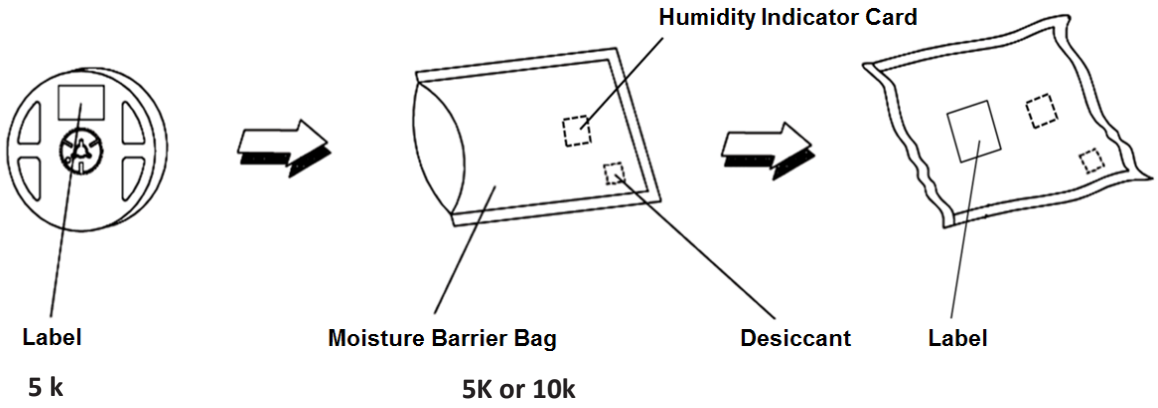



Note for Figure 14:

1. Drawings are not to scale. Drawing dimensions are in millimeters.

# Packaging

**Figure 15: Emitter Reel Packaging Drawings**




Note for Figure 15:

1. Drawings are not to scale.

# Design Resources

### Optical Source Models

Please contact your Bridgelux sales representative for assistance.

# Precautions

### CAUTION: CHEMICAL EXPOSURE HAZARD

Exposure to some chemicals commonly used in luminaire manufacturing and assembly can cause damage to the LED emitter. Please consult Bridgelux Application Note AN51 for additional information.

### CAUTION: EYE SAFETY

Eye safety classification for the use of Bridgelux SMD LED emitter is in accordance with IEC specification EN62471: Photobiological Safety of Lamps and Lamp Systems. SMD LED emitters are classified as Risk Group 1 when operated at or below the maximum drive current. Please use appropriate precautions. It is important that employees working with LEDs are trained to use them safely.

### CAUTION: RISK OF BURN

Do not touch the SMD LED emitter during operation. Allow the array to cool for a sufficient period of time before handling. The SMD LED emitter may reach elevated temperatures such that could burn skin when touched.

## CAUTION

**CONTACT WITH LIGHT EMITTING SURFACE (LES)**

Avoid any contact with the LES. Do not touch the LES of the emitter or apply stress to the LES (yellow phosphor resin area). Contact may cause damage to the emitter

Optics and reflectors must not be mounted in contact with the LES (yellow phosphor resin area).

# Disclaimers

### MINOR PRODUCT CHANGE POLICY

The rigorous qualification testing on products offered by Bridgelux provides performance assurance. Slight cosmetic changes that do not affect form, fit, or function may occur as Bridgelux continues product optimization.

### STANDARD TEST CONDITIONS

Unless otherwise stated, LED emitter testing is performed at the nominal drive current.

# About Bridgelux: Bridging Light and Life™

At Bridgelux, we help companies, industries and people experience the power and possibility of light. Since 2002, we've designed LED solutions that are high performing, energy efficient, cost effective and easy to integrate. Our focus is on light's impact on human behavior, delivering products that create better environments, experiences and returns—both experiential and financial. And our patented technology drives new platforms for commercial and industrial luminaires.

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