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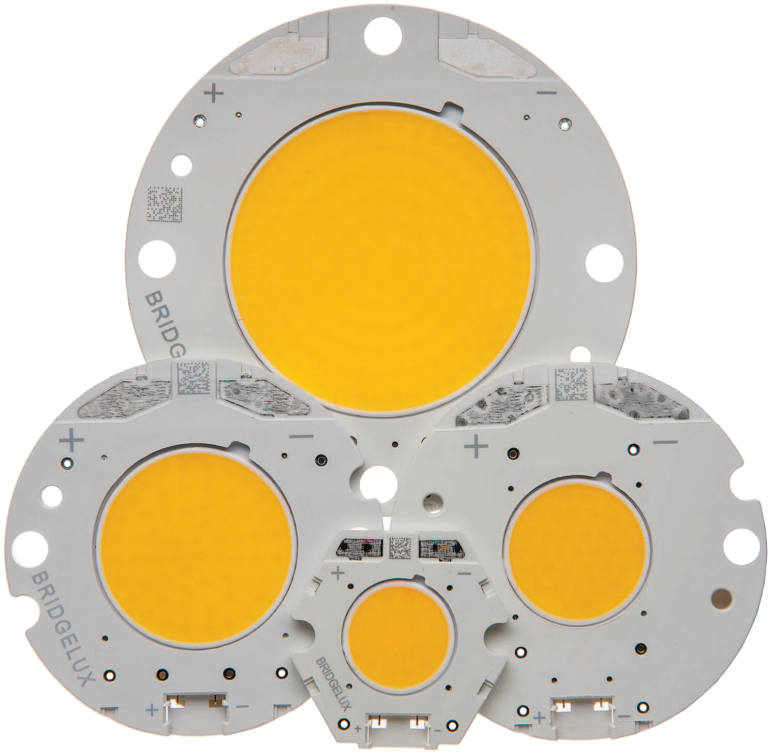
bridgelux®




# Bridgelux® Decor Series™

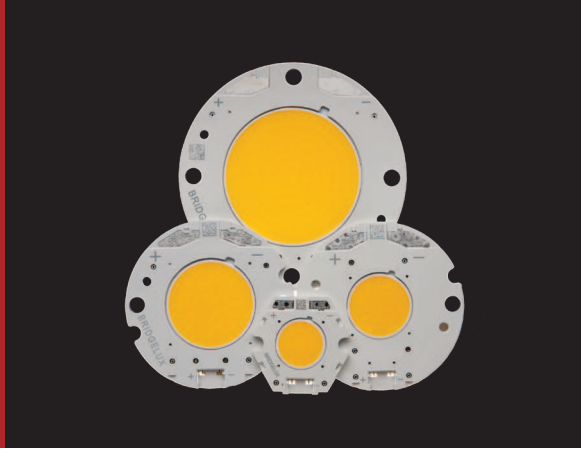
**Product Data Sheet DS34**

10 TEN YEAR Warranty™

| | | | | | |
|---|---|---|---|---|---|
| BXRC-27H1000 | 27H2000 | 27H4000 | 30H1000 | 30H2000 | 30H4000 |
| BXRC-17E4000 | 25E4000 | 56G4000 | 17E10K0 | 25E10K0 | 56G10K0 |

# Introduction

Vero



The Bridgelux Décor Series™ line of products produce unmatched quality of light with brilliant color rendering options designed specifically for high end, niche applications. The Bridgelux Décor line of specialty LED products is available on the Bridgelux Vero Series of chip on board products.

**Décor Series™ Ultra** products provide a high CRI of 97, befitting of the most luxurious retail shops and world renowned museums.

**Décor Series™ Food** products offer color points developed to address the unique requirements of the food, grocery, and restaurant industries. Highlighting the distinctive colors and nuanced patterns found in meats and breads, the Décor Food products are a must have for any butcher counter or bakery.

**Décor Series™ Specialty** products provide color points developed specifically for the healthcare and entertainment industries. The 5600K color point combined with a CRI of 90 provides the bright white required by these industries.

The Vero platform represents a revolutionary advancement in chip on board (COB) light source technology and innovation. Vero simplifies luminaire design and manufacturing processes, improves light quality, and defines a platform for future functionality integration.

The Vero Series products are available in four different LES (light emitting surface) configurations and have been engineered to reliably operate over a broad current range, enabling new degrees of flexibility in luminaire design optimization. These industry leading arrays deliver increased lumen density to enable improved beam control and precision lighting with 2 and 3 SDCM color control standard for clean and consistent uniform lighting. Vero also includes an on board connector port to enable solder free electrical interconnect and simple easy to use mounting features to enable plug-and-play installation.

## Features

- Typical 97 CRI with a 95 CRI minimum (Décor Series Ultra)
- Application specific color points
- Typical R9 value of 98 for brilliant rendering of red colors and skin tones (Décor Series Ultra)
- 2 and 3 SDCM color control
- Reliable operation at up to 2X nominal drive current
- Radial die pattern and improved lumen density
- Thermally isolated solder pads
- Onboard connector port
- Top side part number markings

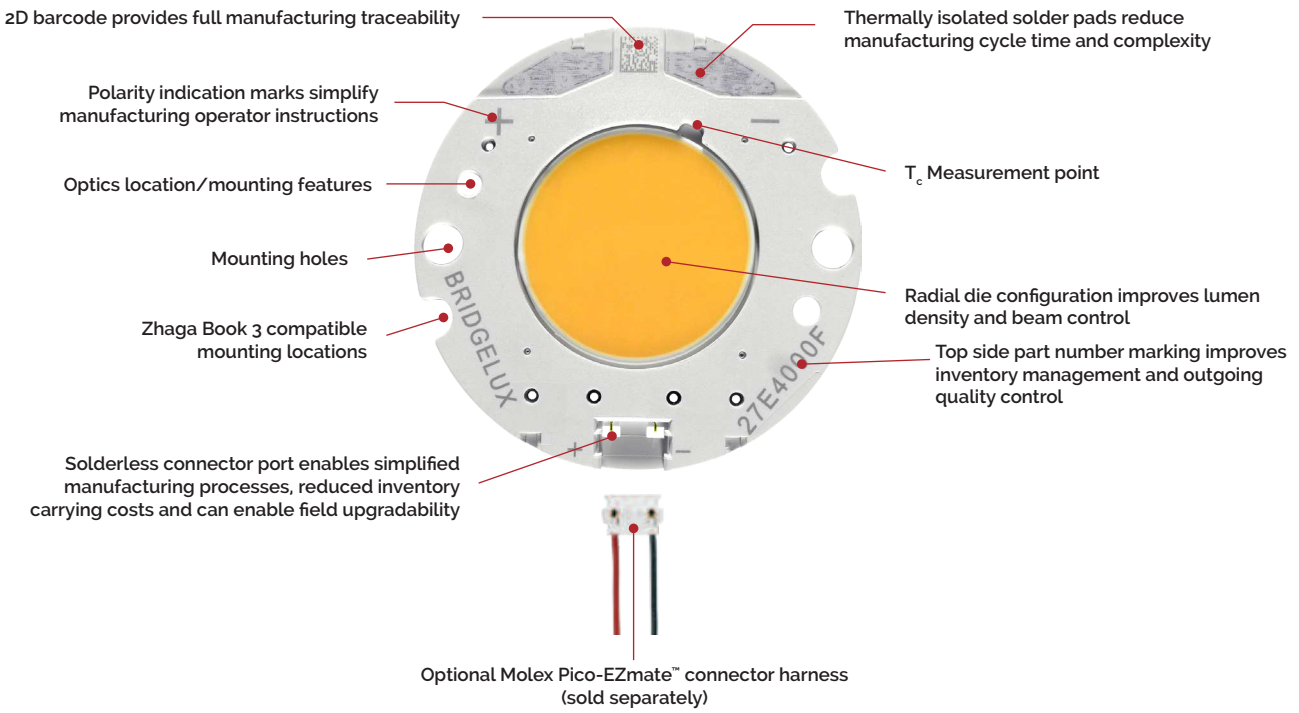
## Benefits

- Broad application coverage for interior lighting requiring state of the art color rendering
- Flexibility for application driven lighting design requirements
- High quality true color reproduction
- Uniform consistent white light
- Flexibility in design optimization
- Improved optical control
- Enhanced ease of use and manufacturability
- Solder-less connectivity enables plug & play installation and field upgradability
- Improved inventory management and quality control

# Contents

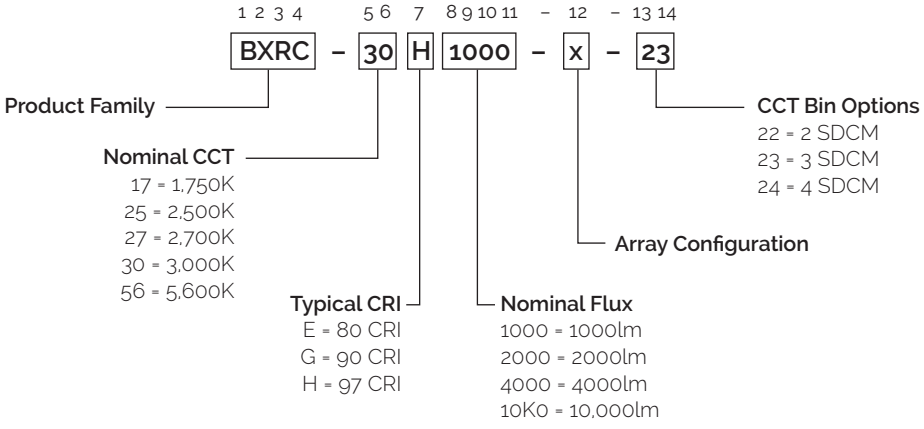
# Product Feature Map

In addition to delivering the performance and light quality required for many lighting applications, Décor Series LED arrays incorporate several features to simplify the design integration and manufacturing process, accelerate time to market and reduce system costs.




## Product Nomenclature

The part number designation for Bridgelux Vero Decor Series LED arrays is explained as follows:



# Product Selection Guide

The following product configurations are available:

**Table 1:** Selection Guide, Pulsed Measurement Data ($T_j$ = $T_c$ = 25˚C)

| Product | Part Number | Nominal CCT[1] (K) | CRI[2] | Nominal Drive Current[3] (mA) | Typical Pulsed Flux[4,5,6] $T_c$ = 25°C (lm) | Minimum Pulsed Flux[6,7] $T_c$ = 25°C (lm) | Typical $V_f$ (V) | Typical Power (W) | Typical Efficacy (lm/W) |
|---|---|---|---|---|---|---|---|---|---|
| Décor Ultra Vero 10 | BXRC-27H1000-B-2x | 2700 | 97 | 350 | 766 | 698 | 26.5 | 9.3 | 83 |
| Décor Ultra Vero 10 | BXRC-30H1000-B-2x | 3000 | 97 | 350 | 799 | 731 | 26.5 | 9.3 | 86 |
| Décor Ultra Vero 13 | BXRC-27H2000-C-2x | 2700 | 97 | 500 | 1331 | 1232 | 32.3 | 16.2 | 82 |
| Décor Ultra Vero 13 | BXRC-30H2000-C-2x | 3000 | 97 | 500 | 1435 | 1304 | 32.3 | 16.2 | 89 |
| Décor Ultra Vero 18 | BXRC-27H4000-F-2x | 2700 | 97 | 1050 | 2534 | 2368 | 29.5 | 31.0 | 82 |
| Décor Ultra Vero 18 | BXRC-30H4000-F-2x | 3000 | 97 | 1050 | 2724 | 2519 | 29.5 | 31.0 | 88 |
| Décor Food Vero 18 | BXRC-17E4000-F-24 | 1750 | 80 | 1050 | 2254 | 2100 | 29.5 | 31.0 | 73 |
| Décor Food Vero 18 | BXRC-25E4000-F-24 | 2500 | 80 | 1050 | 3651 | 3283 | 29.5 | 31.0 | 118 |
| Décor Specialty Vero 18 | BXRC-56G4000-F-24 | 5600 | 90 | 1050 | 3888 | 3421 | 29.5 | 31.0 | 126 |
| Décor Food Vero 29 | BXRC-17E10K0-L-24 | 1750 | 80 | 2100 | 5406 | 4930 | 38.0 | 79.8 | 68 |
| Décor Food Vero 29 | BXRC-25E10K0-L-24 | 2500 | 80 | 2100 | 9298 | 8706 | 38.0 | 79.8 | 117 |
| Décor Specialty Vero 29 | BXRC-56G10K0-L-24 | 5600 | 90 | 2100 | 9948 | 8903 | 38.0 | 79.8 | 125 |

**Table 2:** Selection Guide, Stabilized DC Performance ($T_c$ = 85˚C) [8,9]

| Product | Part Number | Nominal CCT[1] (K) | CRI[2] | Nominal Drive Current[3] (mA) | Typical DC Flux $T_c$ = 85°C (lm) | Minimum DC Flux[10] $T_c$ = 85°C (lm) | Typical $V_f$ (V) | Typical Power (W) | Typical Efficacy (lm/W) |
|---|---|---|---|---|---|---|---|---|---|
| Décor Ultra Vero 10 | BXRC-27H1000-B-2x | 2700 | 97 | 350 | 632 | 576 | 25.8 | 9.0 | 70 |
| Décor Ultra Vero 10 | BXRC-30H1000-B-2x | 3000 | 97 | 350 | 669 | 612 | 25.8 | 9.0 | 74 |
| Décor Ultra Vero 13 | BXRC-27H2000-C-2x | 2700 | 97 | 500 | 1105 | 1023 | 31.5 | 15.7 | 70 |
| Décor Ultra Vero 13 | BXRC-30H2000-C-2x | 3000 | 97 | 500 | 1189 | 1080 | 31.5 | 15.7 | 76 |
| Décor Ultra Vero 18 | BXRC-27H4000-F-2x | 2700 | 97 | 1050 | 2093 | 1956 | 28.8 | 30.2 | 69 |
| Décor Ultra Vero 18 | BXRC-30H4000-F-2x | 3000 | 97 | 1050 | 2288 | 2116 | 28.8 | 30.2 | 76 |
| Décor Food Vero 18 | BXRC-17E4000-F-24 | 1750 | 80 | 1050 | 2004 | 1867 | 28.8 | 30.2 | 66 |
| Décor Food Vero 18 | BXRC-25E4000-F-24 | 2500 | 80 | 1050 | 3242 | 2915 | 28.8 | 30.2 | 107 |
| Décor Specialty Vero 18 | BXRC-56G4000-F-24 | 5600 | 90 | 1050 | 3407 | 2998 | 28.8 | 30.2 | 113 |
| Décor Food Vero 29 | BXRC-17E10K0-L-24 | 1750 | 80 | 2100 | 4803 | 4381 | 36.8 | 77.3 | 62 |
| Décor Food Vero 29 | BXRC-25E10K0-L-24 | 2500 | 80 | 2100 | 8047 | 7535 | 36.8 | 77.3 | 104 |
| Décor Specialty Vero 29 | BXRC-56G10K0-L-24 | 5600 | 90 | 2100 | 8830 | 7903 | 36.8 | 77.3 | 114 |

Notes for Tables 1 & 2:

1. Nominal CCT as defined by ANSI C78.377-2011.
2. Minimum CRI for 97 CRI products is 95 CRI, all other CRI values are minimums. Minimum R9 value for 80 CRI products is 0, the minimum R9 values for 90 CRI products is 50.
3. Drive current is referred to as nominal drive current.
4. Products tested under pulsed condition (10ms pulse width) at nominal test current where $T_j$ (junction temperature) = $T_c$ (case temperature) = 25˚C.
5. Typical performance values are provided as a reference only and are not a guarantee of performance.
6. Bridgelux maintains a ± 7% tolerance on flux measurements.
7. Minimum flux values at the nominal test current are guaranteed by 100% test.
8. Typical stabilized DC performance values are provided as reference only and are not a guarantee of performance.
9. Typical performance is estimated based on operation under DC (direct current) with LED array mounted onto a heat sink with thermal interface material and the case 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.
10. Minimum flux values at elevated temperatures are provided for reference only and are not guaranteed by 100% production testing. 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.

# Performance at Commonly Used Drive Currents

Vero LED arrays are tested to the specifications shown using the nominal drive currents in Table 1. Vero may also be driven at other drive currents dependent on specific application design requirements. The performance at any drive current can be derived from the current vs. voltage characteristics shown in Figure 3-6 and the flux vs. current characteristics shown in Figures 7-10. The performance at commonly used drive currents is summarized in Table 3.

**Table 3:** Product Performance at Commonly Used Drive Currents

| Product | Part Number | CRI | Drive Current[1] (mA) | Typical $V_f$ $T_c$ = 25°C (V) | Typical Power $T_j$ = 25°C (W) | Typical Flux[2] $T_c$ = 25°C (lm) | Typical DC Flux[3] $T_c$ = 85°C (lm) | Typical Efficacy $T_j$ = 25°C (lm/W) |
|---|---|---|---|---|---|---|---|---|
| Décor Ultra Vero 10 | BXRC-27H1000-B-2x | 97 | 175 | 25.3 | 4.4 | 406 | 335 | 92 |
| | | | **350** | **26.5** | **9.3** | **766** | **632** | **83** |
| | | | 500 | 27.4 | 13.7 | 1039 | 858 | 76 |
| | | | 700 | 28.4 | 19.9 | 1354 | 1118 | 68 |
| Décor Ultra Vero 10 | BXRC-30H1000-B-2x | 97 | 175 | 25.3 | 4.4 | 423 | 355 | 96 |
| | | | **350** | **26.5** | **9.3** | **799** | **669** | **86** |
| | | | 500 | 27.4 | 13.7 | 1084 | 908 | 79 |
| | | | 700 | 28.4 | 19.9 | 1412 | 1183 | 71 |
| Décor Ultra Vero 13 | BXRC-27H2000-C-2x | 97 | 175 | 30.2 | 5.3 | 503 | 417 | 95 |
| | | | 350 | 31.4 | 11.0 | 964 | 801 | 88 |
| | | | **500** | **32.3** | **16.2** | **1331** | **1105** | **82** |
| | | | 700 | 33.4 | 23.4 | 1783 | 1481 | 76 |
| | | | 1050 | 35.1 | 36.9 | 2464 | 2046 | 67 |
| Décor Ultra Vero 13 | BXRC-30H2000-C-2x | 97 | 175 | 30.2 | 5.3 | 542 | 449 | 103 |
| | | | 350 | 31.4 | 11.0 | 1039 | 861 | 95 |
| | | | **500** | **32.3** | **16.2** | **1435** | **1189** | **89** |
| | | | 700 | 33.4 | 23.4 | 1923 | 1593 | 82 |
| | | | 1050 | 35.1 | 36.9 | 2657 | 2202 | 72 |
| Décor Ultra Vero 18 | BXRC-27H4000-F-2x | 97 | 500 | 28.1 | 14.1 | 1282 | 1059 | 91 |
| | | | 700 | 28.7 | 20.1 | 1751 | 1446 | 87 |
| | | | **1050** | **29.5** | **31.0** | **2534** | **2093** | **82** |
| | | | 1400 | 30.2 | 42.3 | 3249 | 2684 | 77 |
| | | | 2100 | 31.6 | 66.4 | 4530 | 3741 | 68 |
| Décor Ultra Vero 18 | BXRC-30H4000-F-2x | 97 | 500 | 28.1 | 14.1 | 1379 | 1158 | 98 |
| | | | 700 | 28.7 | 20.1 | 1882 | 1581 | 94 |
| | | | **1050** | **29.5** | **31.0** | **2724** | **2288** | **88** |
| | | | 1400 | 30.2 | 42.3 | 3493 | 2934 | 83 |
| | | | 2100 | 31.6 | 66.4 | 4869 | 4089 | 73 |

Notes for Table 3:

1. Alternate drive currents in Table 3 are provided for reference only and are not a guarantee of performance.
2. Bridgelux maintains a ± 7% tolerance on flux measurements.
3. Typical stabilized DC performance values are provided as reference only and are not a guarantee of performance.

# Performance at Commonly Used Drive Currents

**Table 3:** Product Performance at Commonly Used Drive Currents (continued)

| Product | Part Number | CRI | Drive Current[1] (mA) | Typical $V_f$ $T_c$ = 25°C (V) | Typical Power $T_j$ = 25°C (W) | Typical Flux[2] $T_c$ = 25°C (lm) | Typical DC Flux[3] $T_c$ = 85°C (lm) | Typical Efficacy $T_j$ = 25°C (lm/W) |
|---|---|---|---|---|---|---|---|---|
| Décor Food Vero 18 | BXRC-17E4000-F-24 | 80 | 500 | 28.1 | 14.1 | 1141 | 1014 | 81 |
| | | | 700 | 28.7 | 20.1 | 1557 | 1384 | 78 |
| | | | **1050** | **29.5** | **31.0** | **2254** | **2004** | **73** |
| | | | 1400 | 30.2 | 42.3 | 2890 | 2569 | 68 |
| | | | 2100 | 31.6 | 66.4 | 4029 | 3581 | 61 |
| Décor Food Vero 18 | BXRC-25E4000-F-24 | 80 | 500 | 28.1 | 14.1 | 1848 | 1641 | 132 |
| | | | 700 | 28.7 | 20.1 | 2522 | 2240 | 126 |
| | | | **1050** | **29.5** | **31.0** | **3651** | **3242** | **118** |
| | | | 1400 | 30.2 | 42.3 | 4682 | 4157 | 111 |
| | | | 2100 | 31.6 | 66.4 | 6526 | 5796 | 98 |
| Décor Specialty Vero 18 | BXRC-56G4000-F-24 | 90 | 500 | 28.1 | 14.1 | 1968 | 1725 | 140 |
| | | | 700 | 28.7 | 20.1 | 2686 | 2354 | 134 |
| | | | **1050** | **29.5** | **31.0** | **3888** | **3407** | **126** |
| | | | 1400 | 30.2 | 42.3 | 4985 | 4369 | 118 |
| | | | 2100 | 31.6 | 66.4 | 6950 | 6091 | 105 |
| Décor Food Vero 29 | BXRC-17E10K0-L-24 | 80 | 500 | 35.1 | 17.6 | 1450 | 1289 | 82 |
| | | | 700 | 35.6 | 24.9 | 1982 | 1761 | 80 |
| | | | 1050 | 36.4 | 38.2 | 2887 | 2565 | 76 |
| | | | **2100** | **38** | **79.8** | **5406** | **4803** | **68** |
| | | | 2800 | 39 | 109.2 | 6936 | 6163 | 64 |
| | | | 3150 | 39.5 | 124.4 | 7650 | 6797 | 61 |
| | | | 4200 | 40.4 | 169.7 | 9601 | 8531 | 57 |
| Décor Food Vero 29 | BXRC-25E10K0-L-24 | 80 | 500 | 35.1 | 17.6 | 2494 | 2159 | 142 |
| | | | 700 | 35.6 | 24.9 | 3409 | 2950 | 137 |
| | | | 1050 | 36.4 | 38.2 | 4966 | 4298 | 130 |
| | | | **2100** | **38** | **79.8** | **9298** | **8047** | **117** |
| | | | 2800 | 39 | 109.2 | 11929 | 10325 | 109 |
| | | | 3150 | 39.5 | 124.4 | 13157 | 11388 | 106 |
| | | | 4200 | 40.4 | 169.7 | 16513 | 14292 | 97 |
| Décor Specialty Vero 29 | BXRC-56G10K0-L-24 | 90 | 500 | 35.1 | 17.6 | 2669 | 2369 | 152 |
| | | | 700 | 35.6 | 24.9 | 3647 | 3237 | 146 |
| | | | 1050 | 36.4 | 38.2 | 5313 | 4716 | 139 |
| | | | **2100** | **38** | **79.8** | **9948** | **8830** | **125** |
| | | | 2800 | 39 | 109.2 | 12763 | 11329 | 117 |
| | | | 3150 | 39.5 | 124.4 | 14077 | 12495 | 113 |
| | | | 4200 | 40.4 | 169.7 | 17668 | 15682 | 104 |

Notes for Table 3:

1. Alternate drive currents in Table 3 are provided for reference only and are not a guarantee of performance.
2. Bridgelux maintains a ± 7% tolerance on flux measurements.
3. Typical stabilized DC performance values are provided as reference only and are not a guarantee of performance.

# Electrical Characteristics

**Table 4:** Electrical Characteristics

| Part Number | Nominal Drive Current [1] (mA) | Forward Voltage Pulsed, $T_c$ = 25°C (V) [1, 2,3] | | | Typical Coefficient of Forward Voltage[4] $\Delta V_f/\Delta T_c$ (mV/°C) | Typical Thermal Resistance Junction to Case[5,6] $R_{J-c}$ (C/W) | Driver Selection Voltages[7] (V) | |
|---|---|---|---|---|---|---|---|---|
| | | Minimum | Typical | Maximum | | | $V_f$ Min. Hot $T_c$ = 105°C (V) | $V_f$ Max. Cold[4] $T_c$ = -40°C (V) |
| BXRC-xxx1000-B-2x | 350 | 24.5 | 26.5 | 28.5 | -14 | 0.47 | 23.4 | 29.4 |
| | 700 | 26.5 | 29.0 | 31.2 | -14 | 0.59 | 25.4 | 32.1 |
| BXRC-xxx2000-C-2x | 500 | 29.9 | 32.3 | 34.7 | -17 | 0.22 | 28.5 | 35.8 |
| | 1050 | 32.0 | 35.1 | 37.9 | -17 | 0.28 | 30.6 | 39.0 |
| BXRC-xxx4000-F-2x | 1050 | 27.3 | 29.5 | 31.7 | -15 | 0.13 | 26.1 | 32.7 |
| | 2100 | 29.2 | 31.6 | 34.2 | -15 | 0.17 | 28.0 | 35.2 |
| BXRC-xxx10K0-L-2x | 2100 | 35.2 | 38.0 | 40.9 | -20 | 0.06 | 33.6 | 42.2 |
| | 4200 | 37.3 | 40.4 | 44.0 | -20 | 0.07 | 35.7 | 45.3 |

Notes for Table 4:

1. Parts are tested in pulsed conditions, $T_c$ = 25°C. Pulse width is 10ms.
2. Voltage minimum and maximum are provided for reference only and are not a guarantee of performance.
3. Bridgelux maintains a tester tolerance of ± 0.10V on forward voltage measurements.
4. Typical coefficient of forward voltage tolerance is ± 0.1mV for nominal current.
5. Thermal resistance values are based from test data of a 3000K 80 CRI product.
6. Thermal resistance value was calculated using total electrical input power; optical power was not subtracted from input power. The thermal interface material used during testing is not included in the thermal resistance value.
7. $V_f$ min hot and max cold values are provided as reference only and are not guaranteed by test. These values are provided to aid in driver design and selection over the operating range of the product.

# Absolute Maximum Ratings

**Table 5:** Maximum Ratings

| Parameter | Maximum Rating | | | |
|---|---|---|---|---|
| LED Junction Temperature | 150˚C | | | |
| Storage Temperature | -40˚C to +105˚C | | | |
| Operating Case Temperature[1,2] | 105˚C | | | |
| Soldering Temperature[3] | 350˚C or lower for a maximum of 10 seconds | | | |
| | BXRC-xxx1000-B-2x | BXRC-xxx2000-C-2x | BXRC-xxx4000-F-2x | BXRC-xxx10K0-L-2x |
| Maximum Drive Current[1] | 700 mA | 1050 mA | 2100 mA | 4200 mA |
| Maximum Peak Pulsed Drive Current[4] | 1500 mA | 1500 mA | 3000 mA | 6000 mA |
| Maximum Reverse Voltage[5] | -45V | -55 V | -55 V | -65 V |

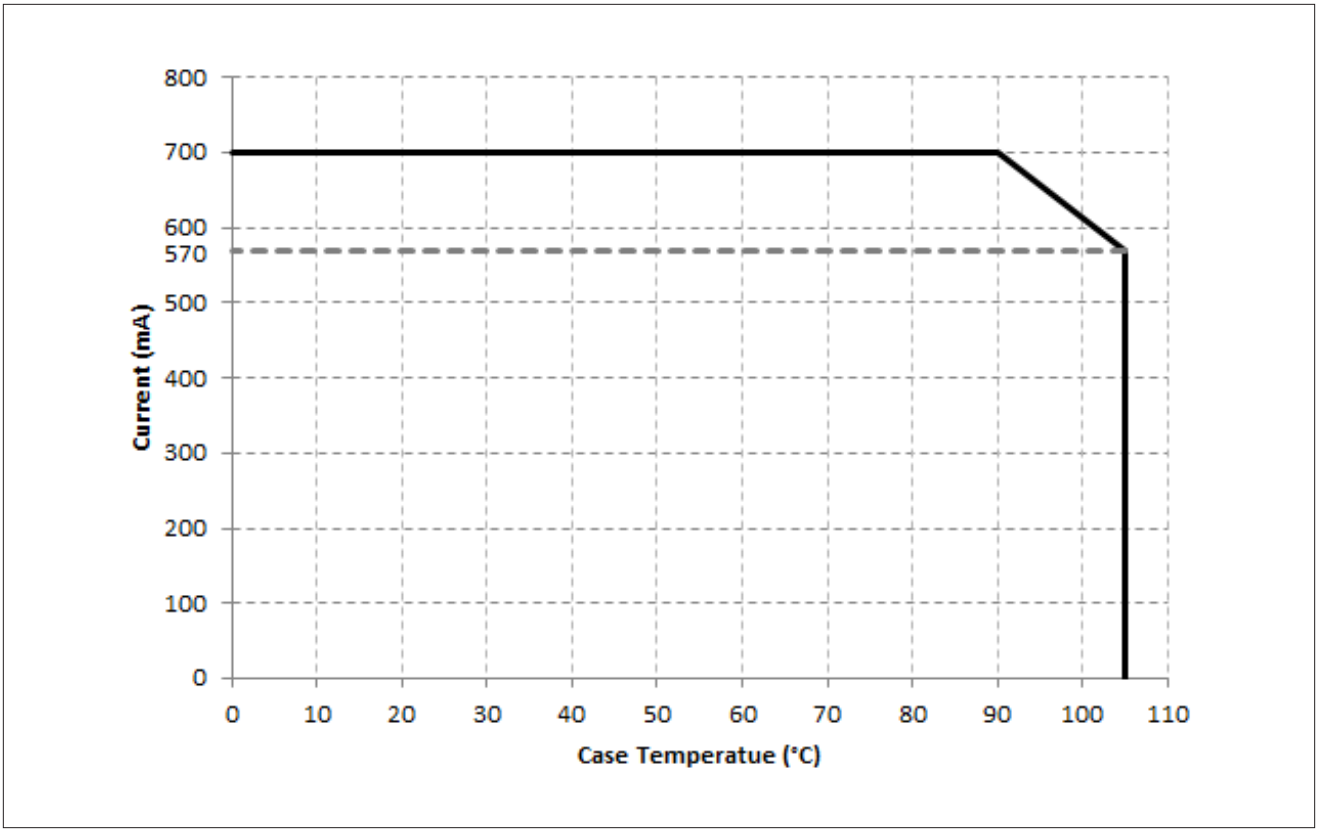
Notes for Table 5:

1. Please refer to Figures 1 and 2 for drive current derating curve for Vero 10 and Vero 29. Vero 13 and Vero 18 may be driven at 2 times nominal current upto 105˚C.
2. For IEC 62717 requirement, please contact Bridgelux Sales Support.
3. See Bridgelux Application Note AN31, Assembly Considerations for Vero LED arrays, for more information.
4. Bridgelux recommends a maximum duty cycle of 10% and pulse width of 20ms when operating LED Arrays at the maximum peak pulsed current specified. Maximum peak pulsed current indicate values where the LED array can be driven without catastrophic failures.
5. Light emitting diodes are not designed to be driven in reverse voltage and will not produce light under this condition. Maximum rating provided for reference only.

# Performance Curves

The maximum allowable drive current for the Vero 10 and Vero 29 product families is dependent on the operating case temperature. Please refer to the Product Feature Map (page 2) for the location of the $T_c$ Point.

**Figure 1: Vero 10 Drive Current Derating Curve**

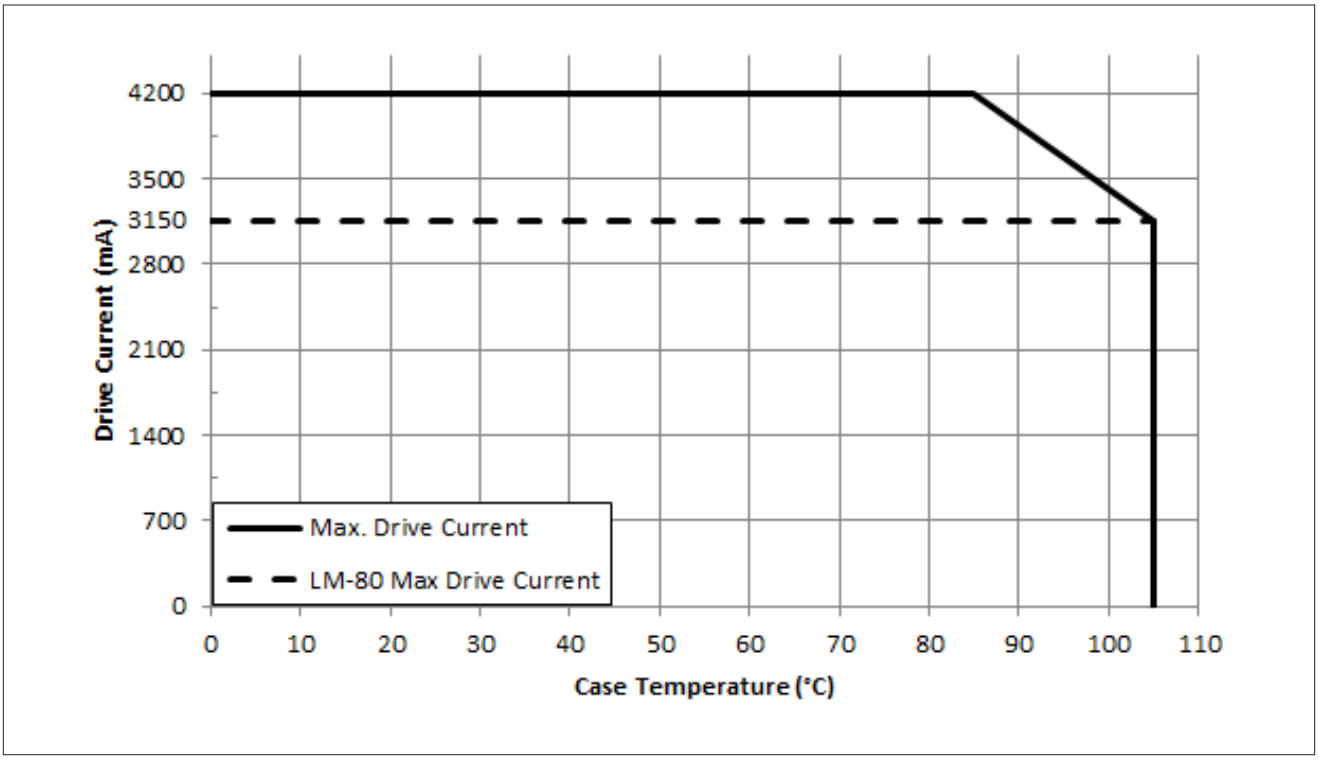



Notes for Figure 1:

1. In order to meet LM-80 lifetime projections Vero 10 may be driven up to 700mA at case temperatures up to 90°C. Operating conditions above case temperatures of 90°C driving conditions must follow the Vero 10 Drive Current Derating Curve.
2. Lumen maintenance (L70) and lifetime predictions are valid for drive current and case temperature conditions used for LM-80 testing as included in the applicable LM-80 test report for these products. Contact your Bridgelux sales representative for LM-80 report.

# Performance Curves

**Figure 2:** Vero 29 Drive Current Derating Curve




Notes for Figure 2:

1. LM-80 Max Drive Current must not be exceeded in order to meet LM-80 lifetime projections.
2. Lumen maintenance (L70) and lifetime predictions are valid for drive current and case temperature conditions used for LM-80 testing as included in the applicable LM-80 test report for these products. Contact your Bridgelux sales representative for LM-80 report.

# Performance Curves

**Figure 3:** Vero 10 Drive Current vs. Forward Voltage ($T_j$=$T_c$=25˚C)

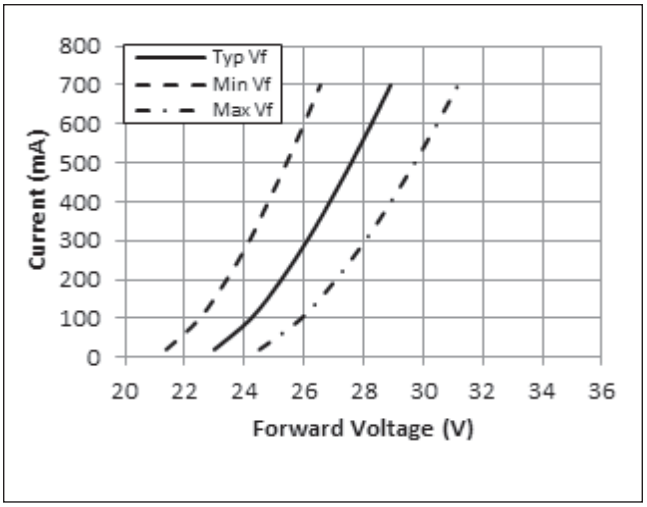



**Figure 4:** Vero 13 Drive Current vs. Forward Voltage ($T_j$=$T_c$=25˚C)

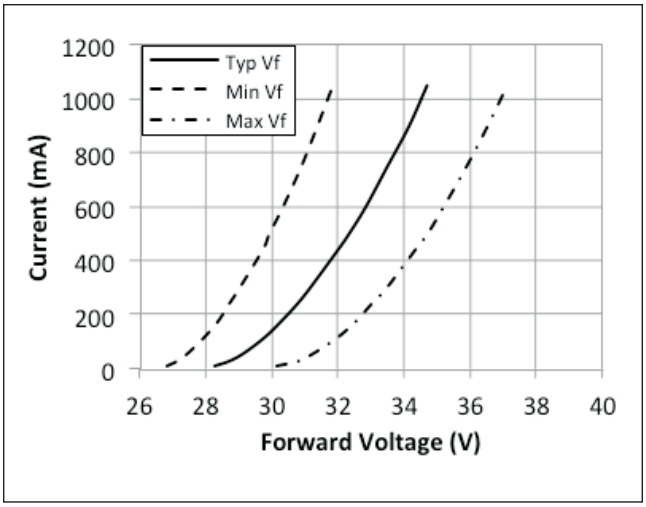



**Figure 5:** Vero 18 Drive Current vs. Forward Voltage ($T_j$=$T_c$=25˚C)

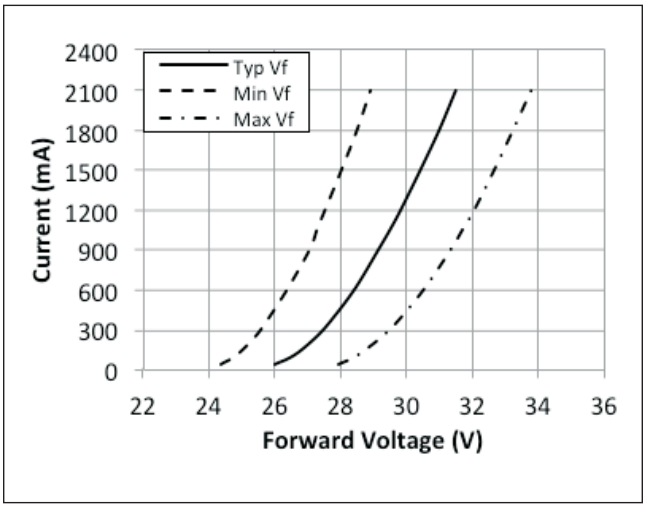
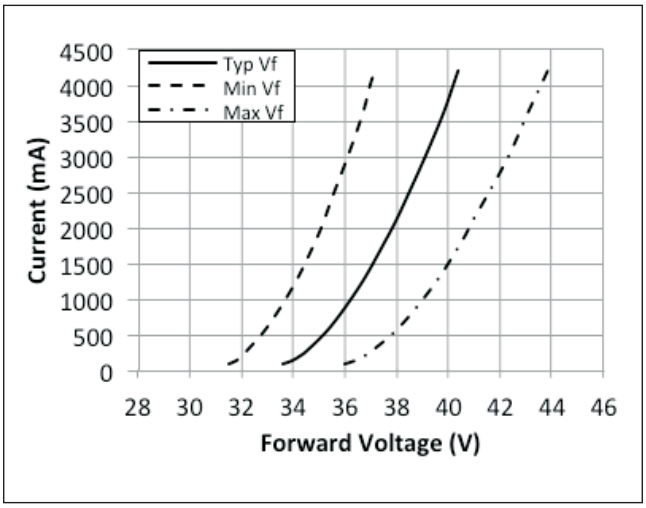



**Figure 6:** Vero 29 Drive Current vs. Forward Voltage ($T_j$=$T_c$=25˚C)



# Performance Curves

**Figure 7:** Vero 10 Typical Relative Luminous Flux vs. Drive Current

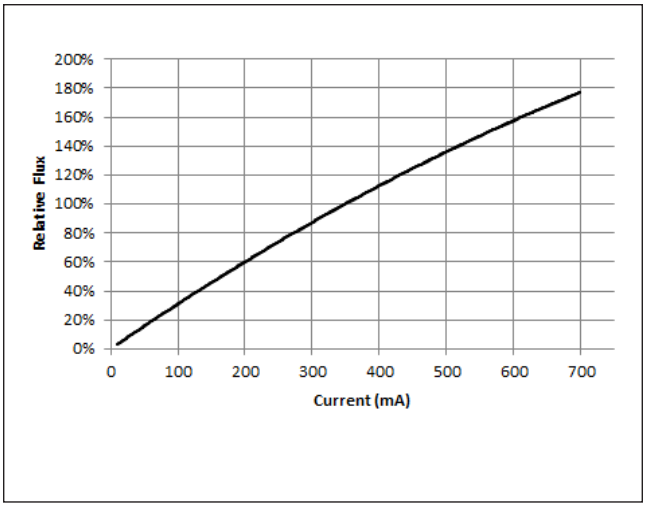



**Figure 8:** Vero 13 Typical Relative Luminous Flux vs. Drive Current

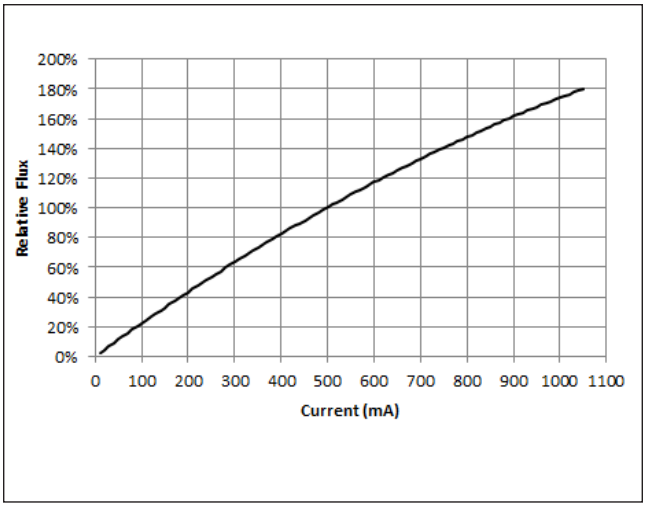



**Figure 9:** Vero 18 Typical Relative Luminous Flux vs. Drive Current

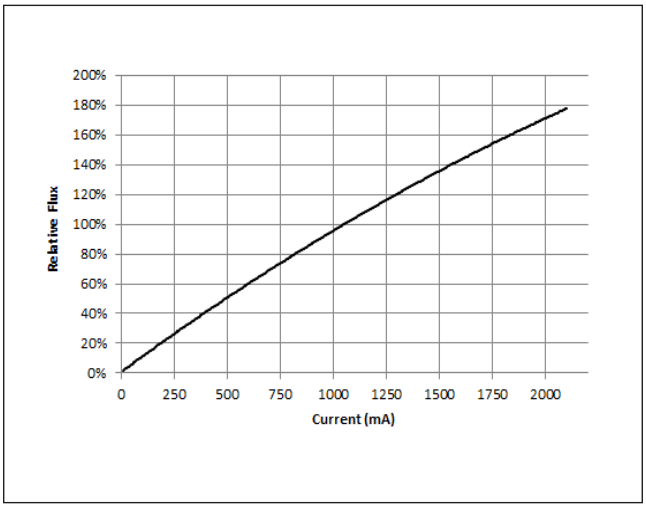
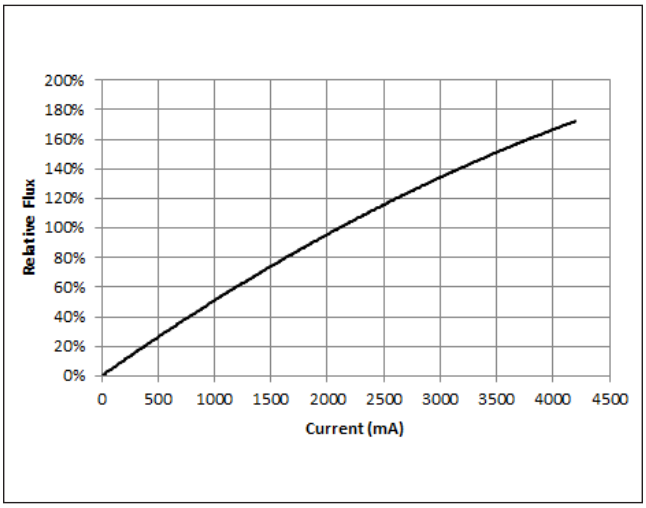



**Figure 10:** Vero 29Typical Relative Luminous Flux vs. Drive Current



# Performance Curves

**Figure 11:** Vero 10 Typical DC Flux vs. Case Temperature

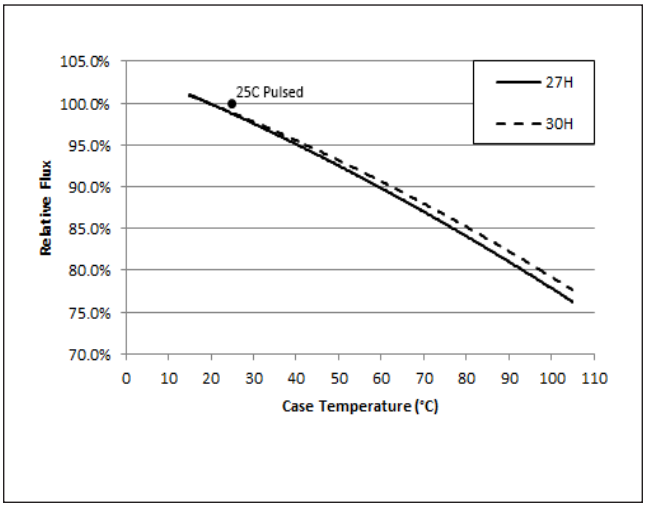



**Figure 12:** Vero 13 Typical DC Flux vs. Case Temperature

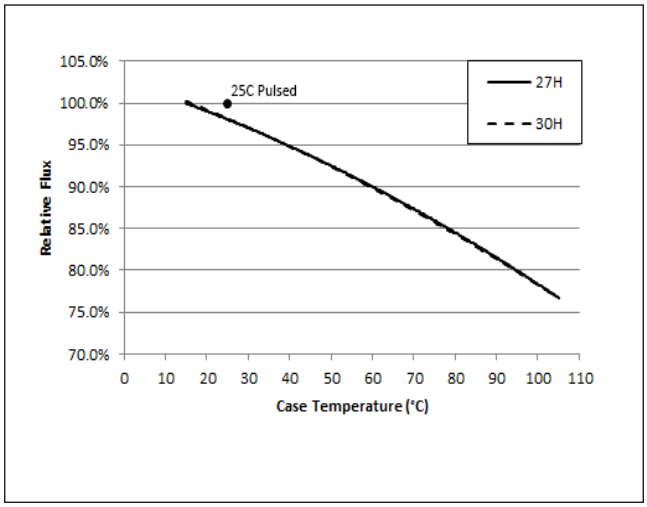



**Figure 13:** Vero 18 Typical DC Flux vs. Case Temperature

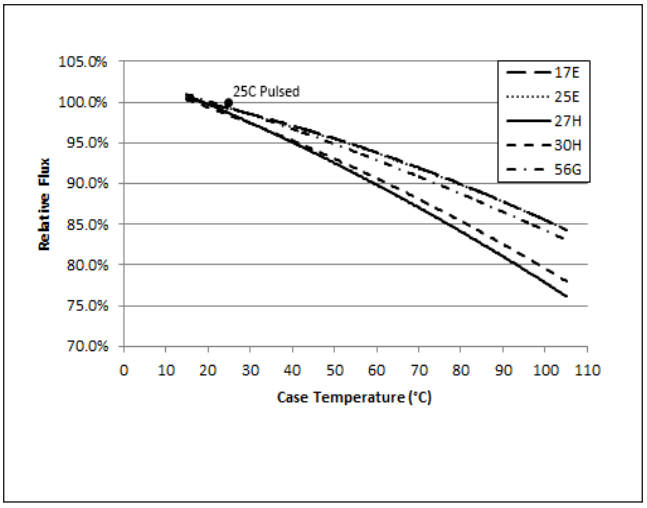
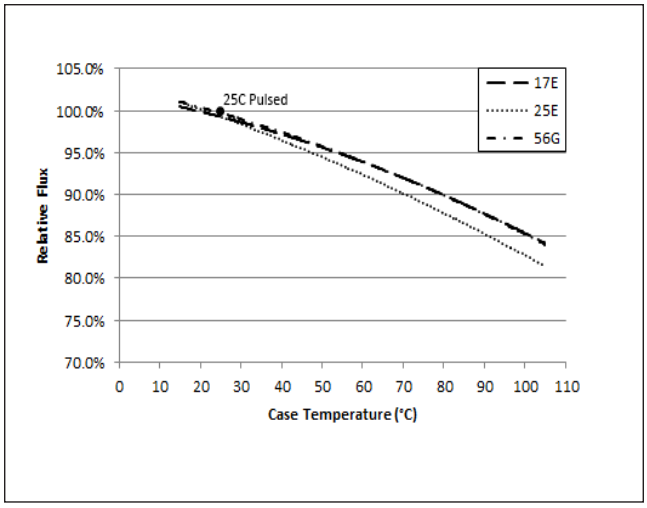



**Figure 14:** Vero 29 Typical DC Flux vs. Case Temperature



# Performance Curves

**Figure 15: 1750K Color Shift vs. Case Temperature[1]**

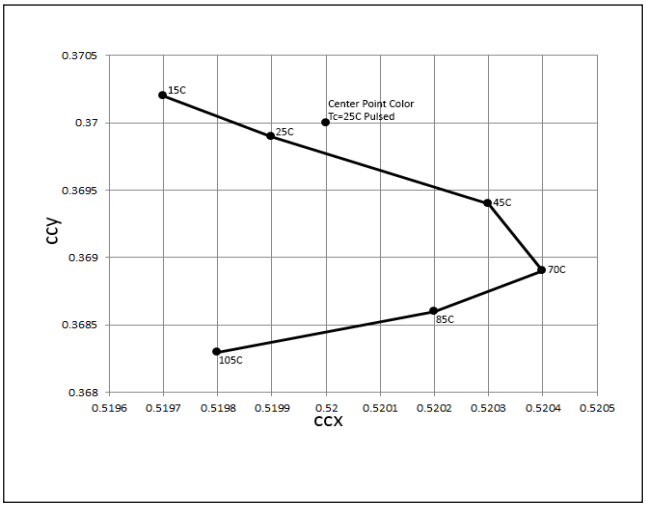



**Figure 16: 2500K Color Shift vs. Case Temperature[1]**

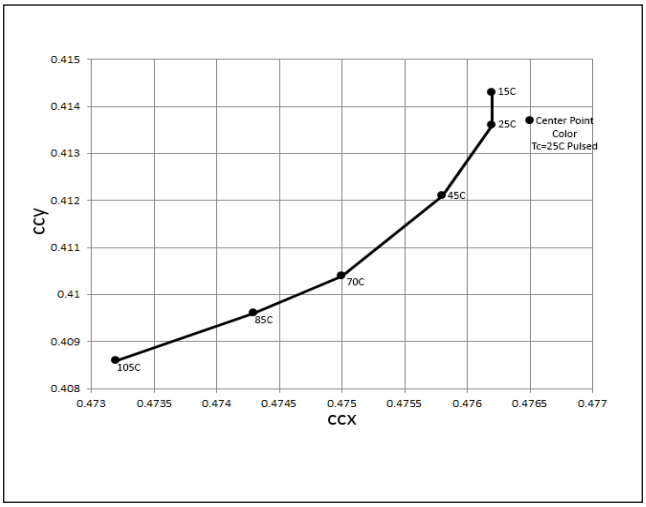



**Figure 17: 2700K Color Shift vs. Case Temperature[1]**

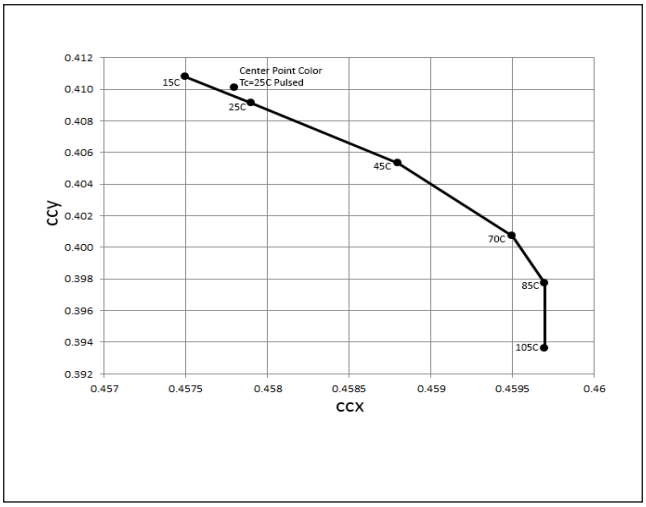
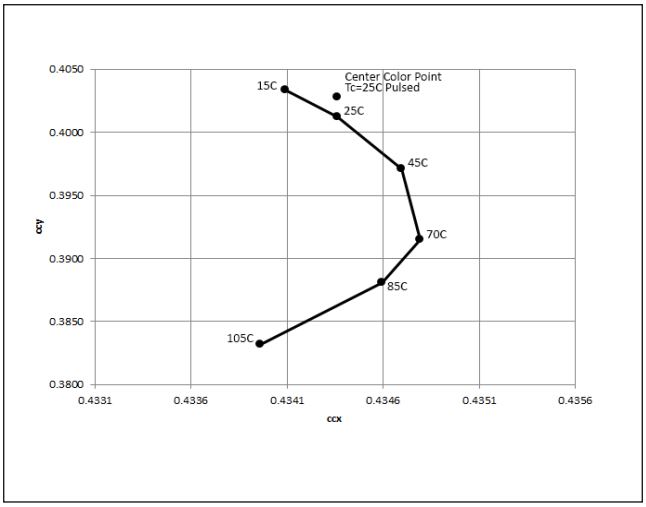



**Figure 18: 3000K Color Shift vs. Case Temperature[1]**

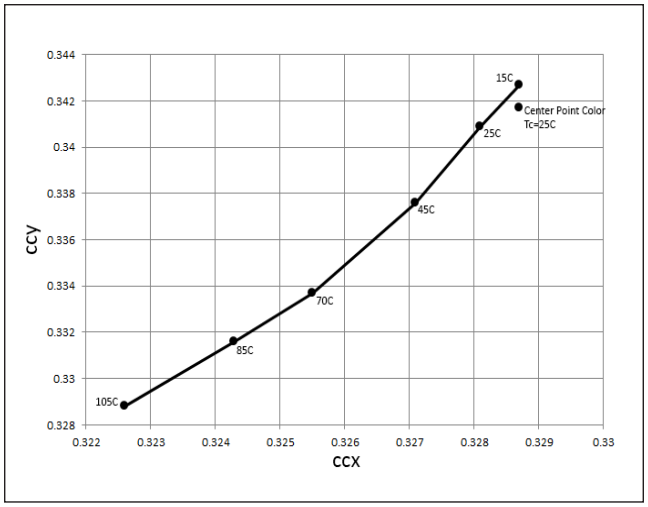



Note for Figures 15-18:

1. Measurements made under DC test conditions at the nominal drive current.
2. Typical color shift is shown with a tolerance of ±0.002.

# Performance Curves

**Figure 19: 5600K Color Shift vs. Case Temperature[1]**

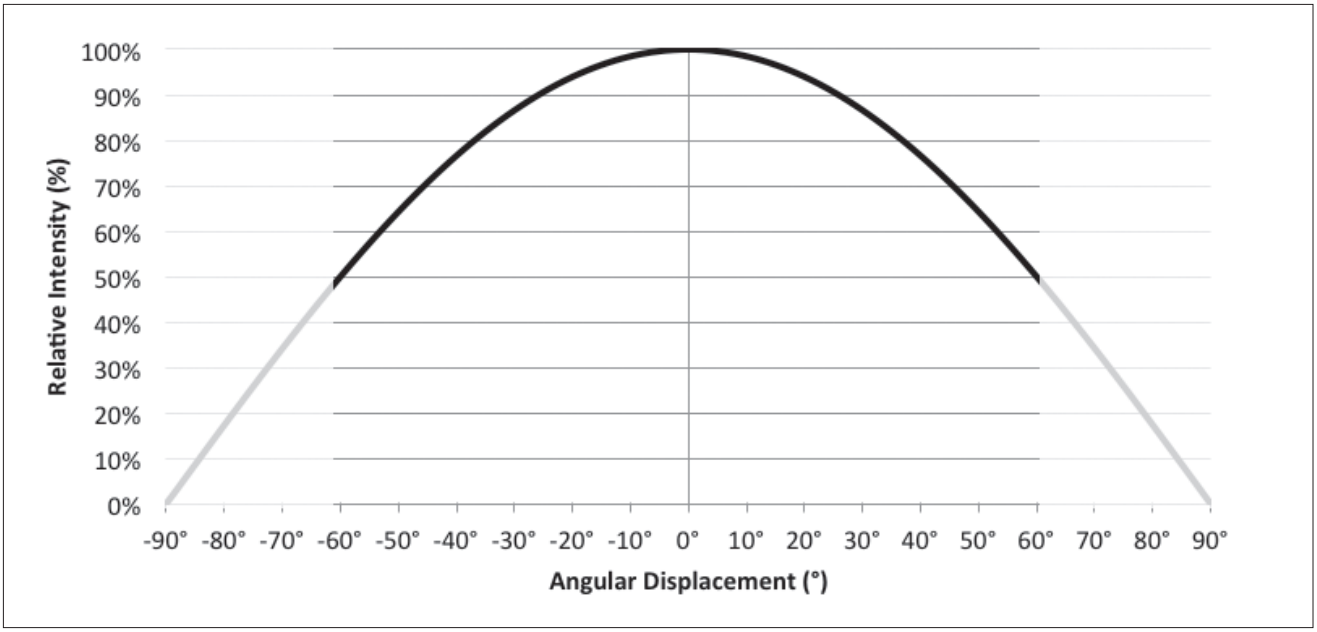



Note for Figures 19:

1. Measurements made under DC test conditions at the nominal drive current.
2. Typical color shift is shown with a tolerance of ±0.002.

# Typical Radiation Pattern

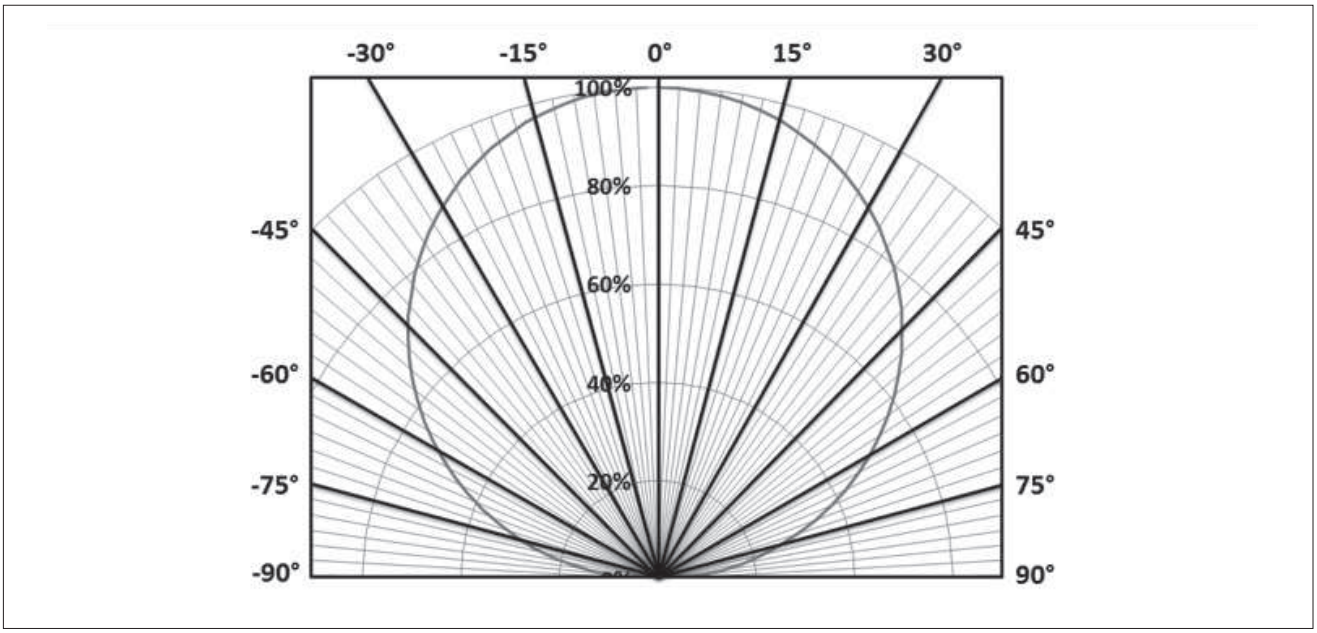
**Figure 20:** Typical Spatial Radiation Pattern




Notes for Figure 20:

1. Typical viewing angle is 120°.
2. The viewing angle is defined as the off axis angle from the centerline where Iv is ½ of the peak value.

**Figure 21:** Typical Polar Radiation Pattern



# Typical Color Spectrum

### 97 CRI- Wavelength & CRI Characteristics at Drive Current, Tc=25°C

The high CRI light delivered by the Bridgelux Vero Décor products reproduces colors faithfully compared with natural light. Figure 22 displays the spectral curve of Décor.

Table 6 compares CRI R values of Décor to other light sources. The typical overall CRI (Ra) of 97 results in excellent color representation - especially for colors which the human eye is particularly sensitive.

Décor delivers high typical values of R9 (98) and R15 (98). These are important attributes for the perception of realistic colors. R9 enhances red colors and R15 enables realistic rendering of human skin tones.

**Figure 22:** Typical Color Spectrum

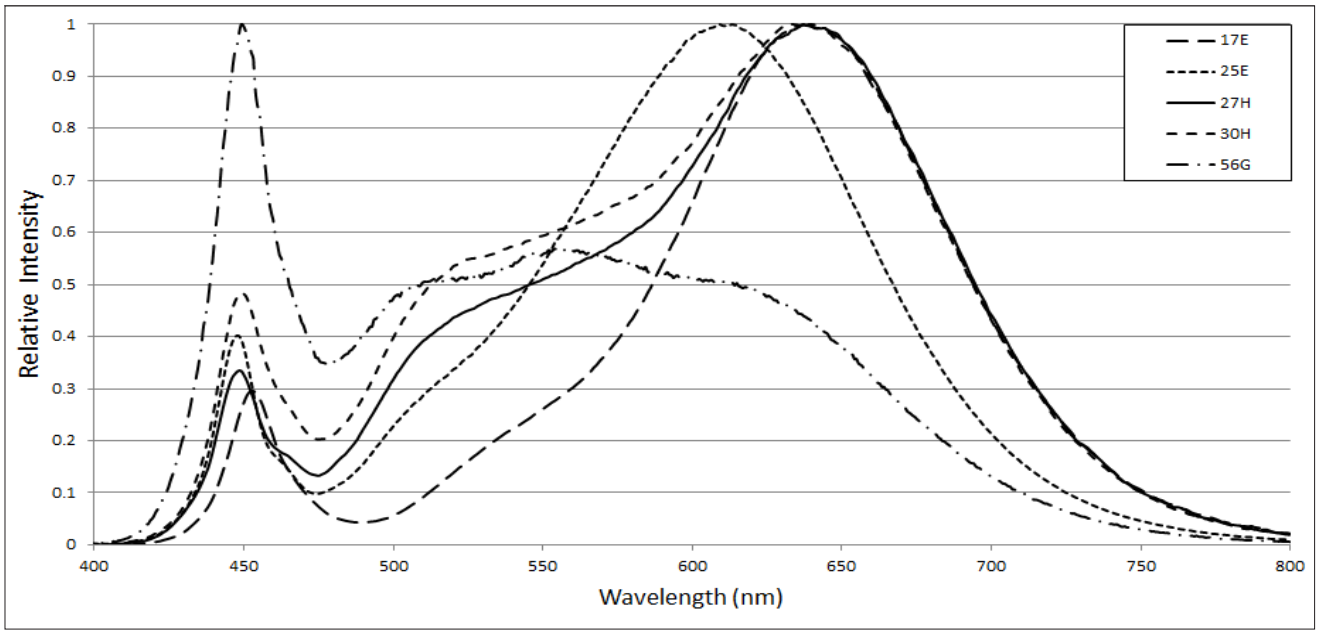
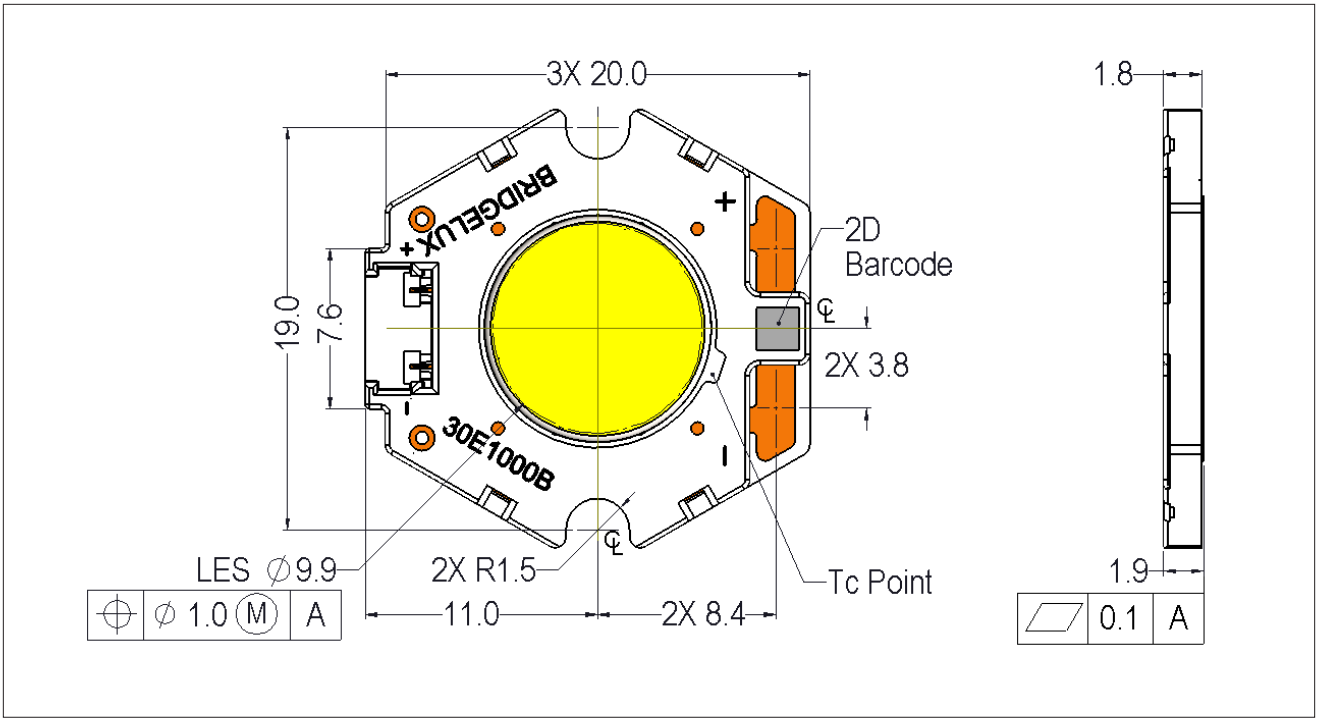



**Table 6:** CRI Spectra for Décor Ultra Products vs. Alternative Light Sources

| Light Source | Ra | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R12 | R13 | R14 | R15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bridgelux Décor Ultra | 97 | 97 | 100 | 96 | 96 | 98 | 98 | 99 | 98 | 98 | 99 | 92 | 87 | 98 | 97 | 98 |
| Typical Halogen | 98 | 98 | 99 | 99 | 99 | 98 | 98 | 99 | 97 | 92 | 97 | 98 | 97 | 98 | 99 | 97 |
| Typcal Metal Halide | 82 | 90 | 94 | 69 | 82 | 81 | 81 | 87 | 71 | 27 | 59 | 62 | 55 | 93 | 78 | 88 |
| Typical Compact Fluorescent | 87 | 91 | 93 | 86 | 91 | 89 | 90 | 88 | 70 | 17 | 76 | 91 | 81 | 93 | 92 | 81 |

# Mechanical Dimensions

**Figure 23:** **Drawing for Vero 10 LED Array**

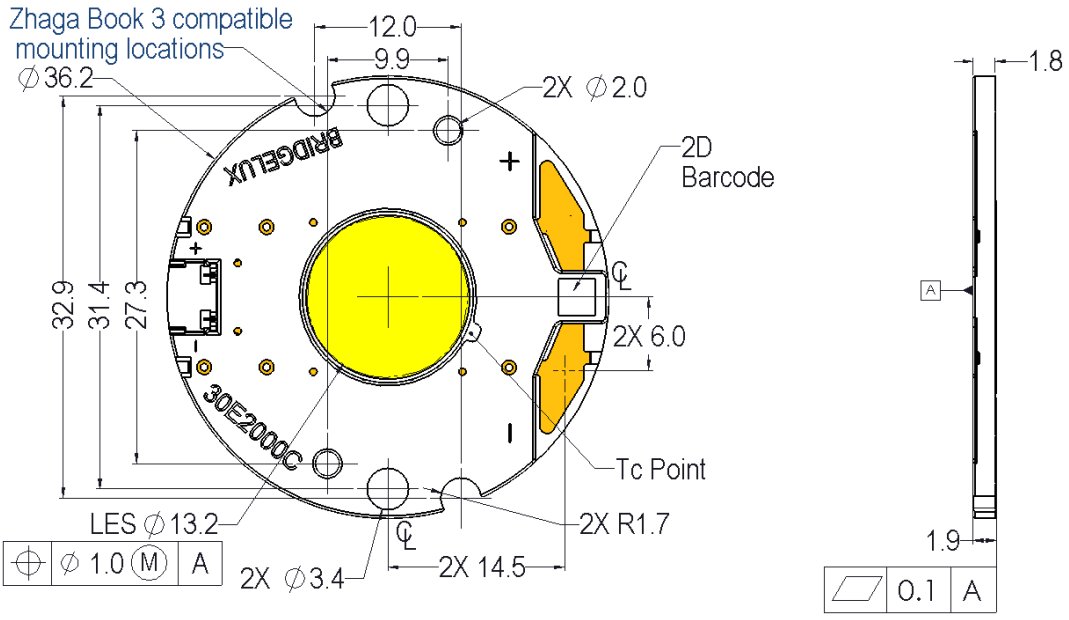



Notes for Figure 23:

1. Drawings are not to scale.
2. Drawing dimensions are in millimeters.
3. Unless otherwise specified, tolerances are ±0.10mm.
4. Mounting slots (2X) are for M2.5 screws.
5. Bridgelux recommends two tapped holes for mounting screws with 19.0 ± 0.10mm center-to-center spacing.
6. Screws with flat shoulders (pan, dome, button, round, truss, mushroom) provide optimal torque control. Do NOT use flat, countersink, or raised head screws.
7. Solder pads and connector port are labeled "+" and "-" to denote positive and negative, respectively.
8. It is not necessary to provide electrical connections to both the solder pads and the connector port. Either set may be used depending on application specific design requirements.
9. Refer to Application Notes AN30 and AN31 for product handling, mounting and heat sink recommendations.
10. The optical center of the LED Array is nominally defined by the mechanical center of the array to a tolerance of ± 0.2mm.
11. Bridgelux maintains a flatness of 0.10mm across the mounting surface of the array.

# Mechanical Dimensions

**Figure 24:** **Drawing for Vero 13 LED Array**

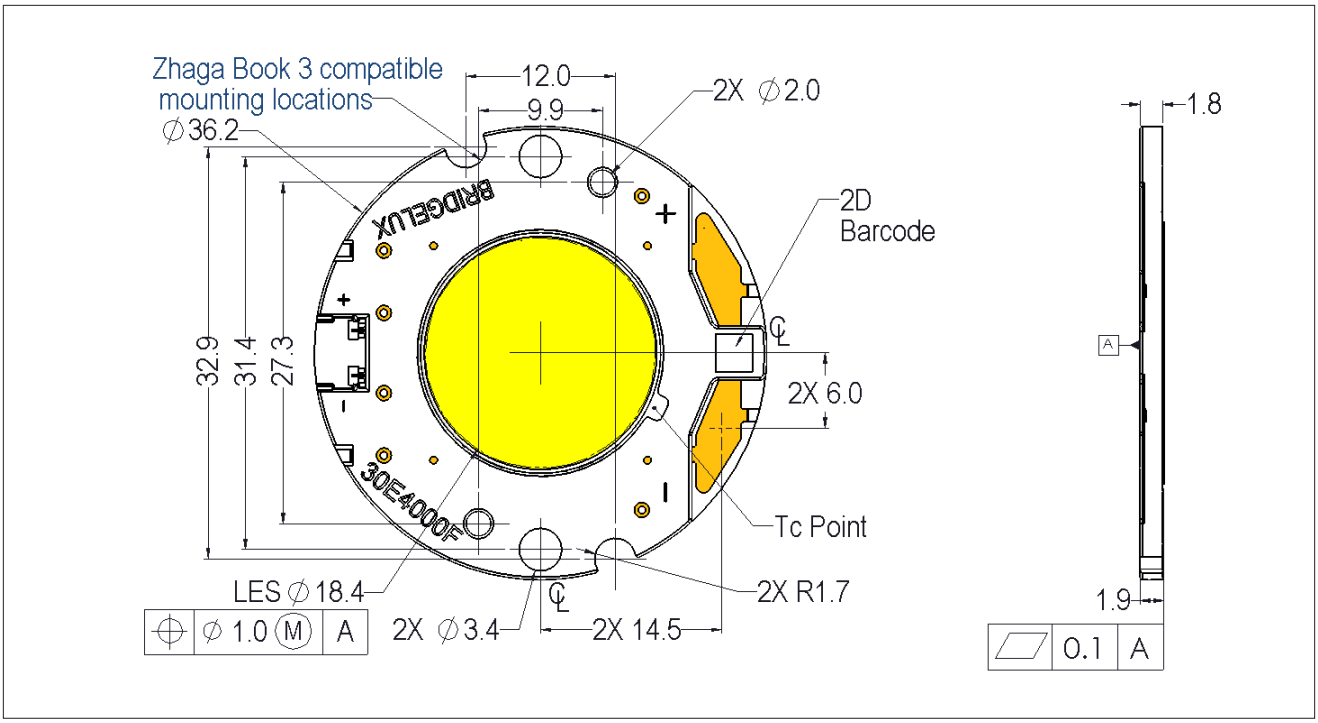



Notes for Figure 24:

1. Drawings are not to scale.
2. Drawing dimensions are in millimeters.
3. Unless otherwise specified, tolerances are ±0.10mm.
4. Mounting holes (2X) are for M2.5 screws.
5. Bridgelux recommends two tapped holes for mounting screws with 31.4 ± 0.10mm center-to-center spacing.
6. Screws with flat shoulders (pan, dome, button, round, truss, mushroom) provide optimal torque control. Do NOT use flat, countersink, or raised head screws.
7. Solder pads and connector port are labeled "+" and "-" to denote positive and negative, respectively.
8. It is not necessary to provide electrical connections to both the solder pads and the connector port. Either set may be used depending on application specific design requirements.
9. Refer to Application Notes AN30 and AN31 for product handling, mounting and heat sink recommendations.
10. The optical center of the LED Array is nominally defined by the mechanical center of the array to a tolerance of ± 0.2mm.
11. Bridgelux maintains a flatness of 0.10mm across the mounting surface of the array.

# Mechanical Dimensions

**Figure 25:** **Drawing for Vero 18 LED Array**

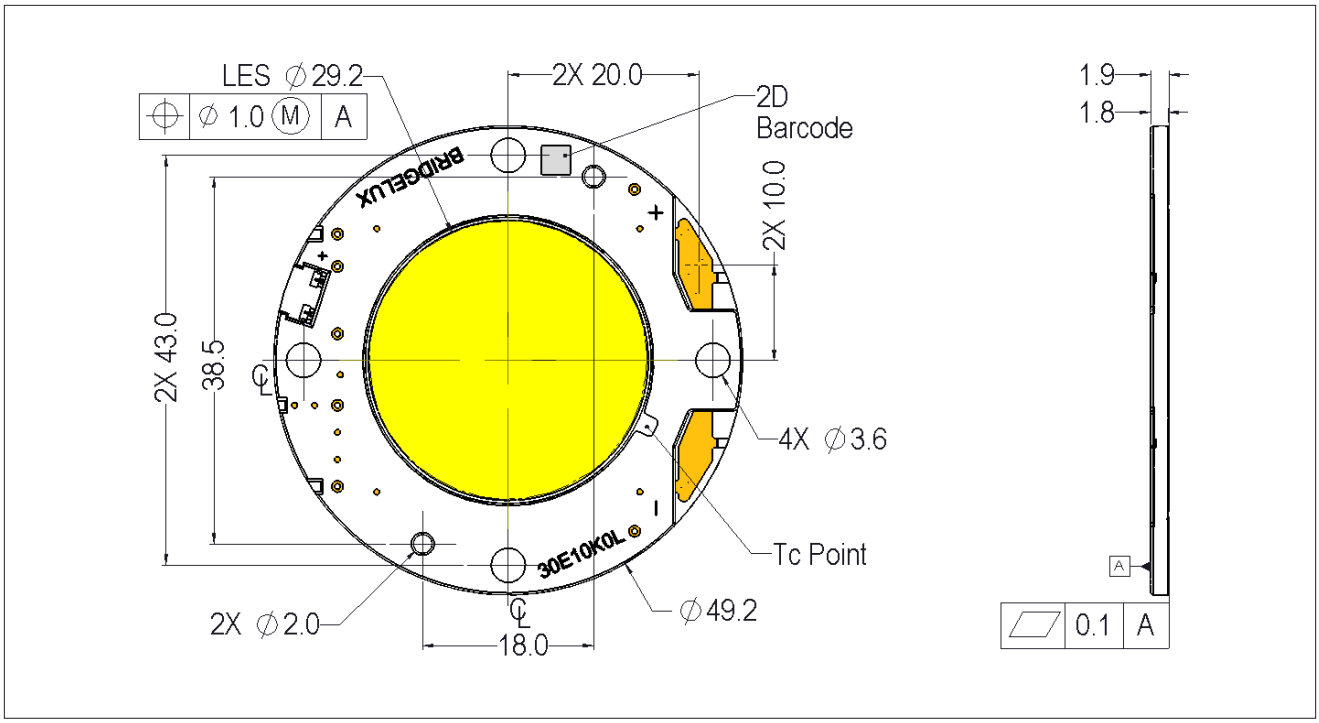



Notes for Figure 25:

1. Drawings are not to scale.
2. Drawing dimensions are in millimeters.
3. Unless otherwise specified, tolerances are ±0.10mm.
4. Mounting holes (2X) are for M2.5 screws.
5. Bridgelux recommends two tapped holes for mounting screws with 31.4 ± 0.10mm center-to-center spacing.
6. Screws with flat shoulders (pan, dome, button, round, truss, mushroom) provide optimal torque control. Do NOT use flat, countersink, or raised head screws.
7. Solder pads and connector port are labeled "+" and "-" to denote positive and negative, respectively.
8. It is not necessary to provide electrical connections to both the solder pads and the connector port. Either set may be used depending on application specific design requirements.
9. Refer to Application Notes AN30 and AN31 for product handling, mounting and heat sink recommendations.
10. The optical center of the LED Array is nominally defined by the mechanical center of the array to a tolerance of ± 0.2mm.
11. Bridgelux maintains a flatness of 0.10mm across the mounting surface of the array.

# Mechanical Dimensions

**Figure 26: Drawing for Vero 29 LED Array**

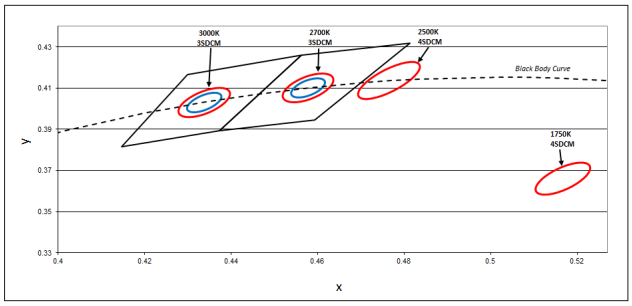



Notes for Figure 26:

1. Drawings are not to scale.
2. Drawing dimensions are in millimeters.
3. Unless otherwise specified, tolerances are ±0.10mm.
4. Mounting holes (2X) are for M3 screws.
5. Bridgelux recommends two tapped holes for mounting screws with 43.0 ± 0.10mm center-to-center spacing.
6. Screws with flat shoulders (pan, dome, button, round, truss, mushroom) provide optimal torque control. Do NOT use flat, countersink, or raised head screws.
7. Solder pads and connector port are labeled "+" and "-" to denote positive and negative, respectively.
8. It is not necessary to provide electrical connections to both the solder pads and the connector port. Either set may be used depending on application specific design requirements.
9. Refer to Application Notes AN30 and AN31 for product handling, mounting and heat sink recommendations.
10. The optical center of the LED Array is nominally defined by the mechanical center of the array to a tolerance of ± 0.2mm.
11. Bridgelux maintains a flatness of 0.10mm across the mounting surface of the array.

# Color Binning Information

**Figure 27:** Graph of Warm and Neutral White Test Bins in xy Color Space

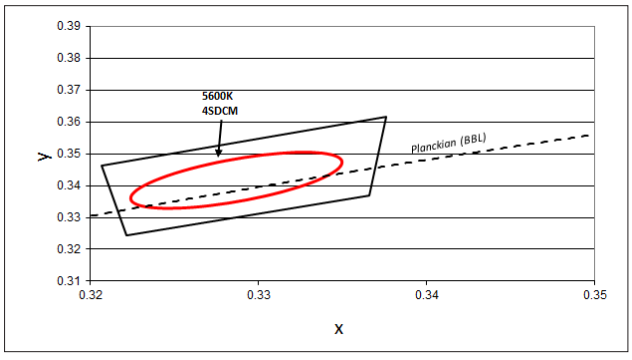



Note: Pulsed Test Conditions, $T_c$ = 25°C

**Table 7:** Warm White xy Bin Coordinates and Associated Typical CCT

| Bin Code | 1750K | 2500K | 2700K | 3000K |
|---|---|---|---|---|
| ANSI Bin (for reference only) | – | – | (2580K - 2870K) | (2870K - 3220K) |
| 23 (3SDCM) | – | – | (2651K - 2794K) | (2968K - 3136K) |
| 22 (2SDCM) | – | – | (2674K - 2769K) | (2995K - 3107K) |
| Center Point (x,y) | (0.5167, 0.336) | (0.4765, 0.4137) | (0.4578, 0.4101) | (0.4338, 0.403) |

**Figure 28:** Graph of Cool White Test Bins in xy Color Space



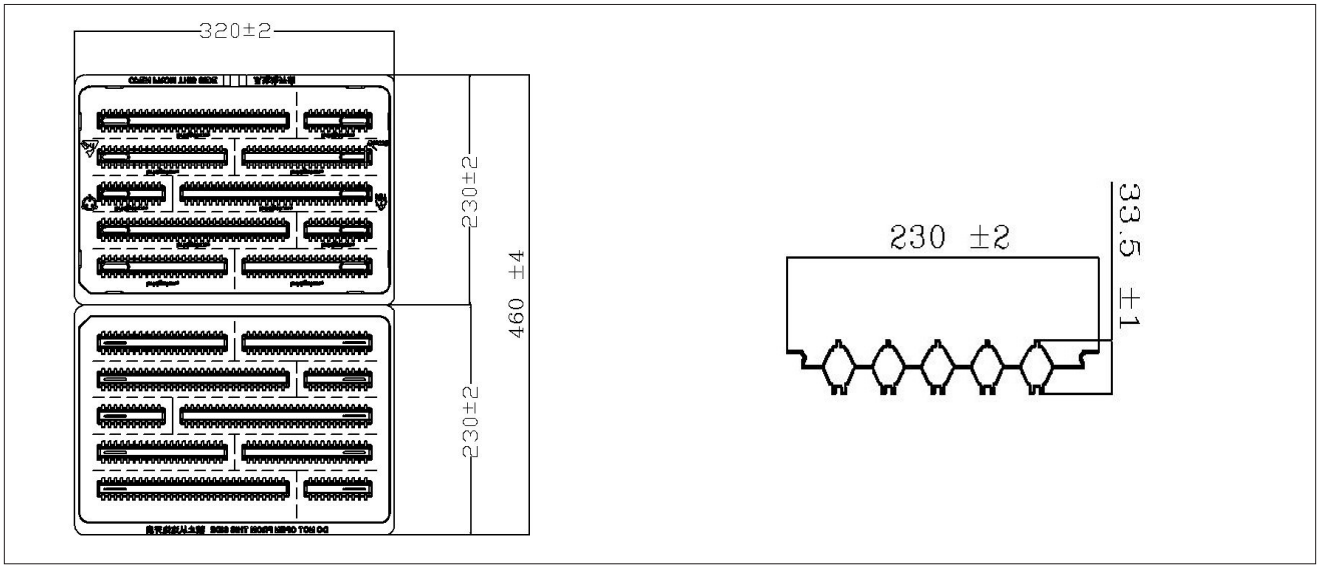

Note: Pulsed Test Conditions, $T_c$ = 25°C

**Table 8:** Cool White xy Bin Coordinates and Associated Typical CCT

| Bin Code | 5600K |
|---|---|
| ANSI Bin (for reference only) | (5310K - 6020K) |
| 24 (4SDCM) | (5475K - 5830K) |
| Center Point (x,y) | (0.3293, 0.3423) |

# Packaging

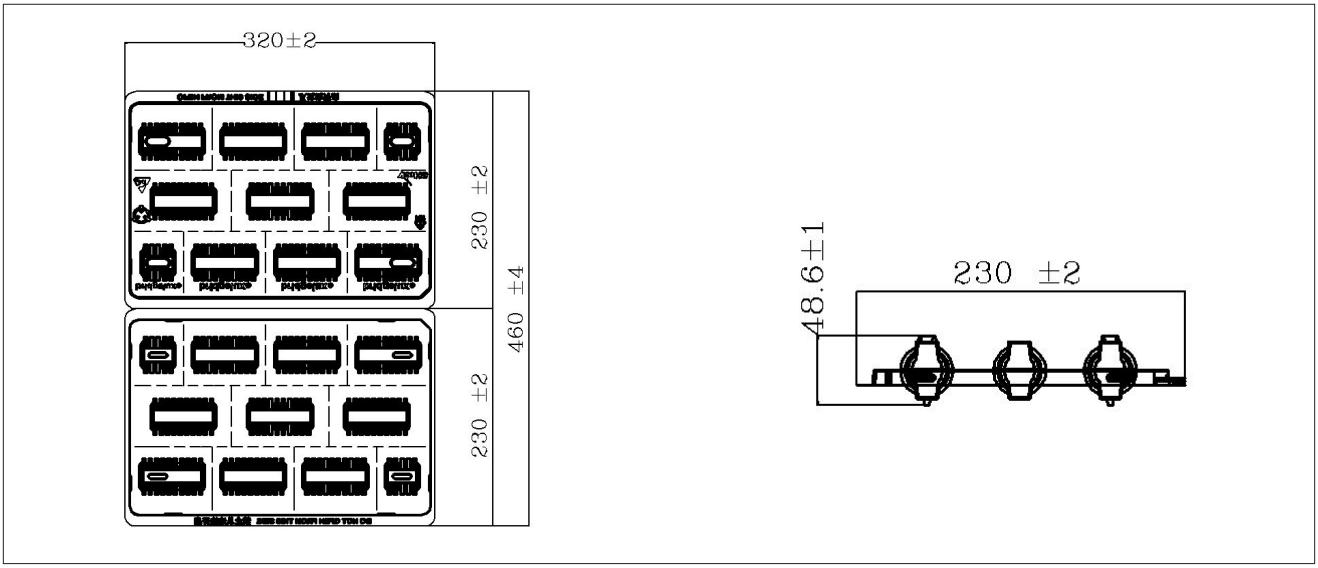
**Figure 29: Drawing for Vero 10 Packaging Tray**




Notes for Figure 29:

1. Dimensions are in millimeters.
2. Drawing is not to scale.

**Figure 30: Drawing for Vero 13 Packaging Tray**

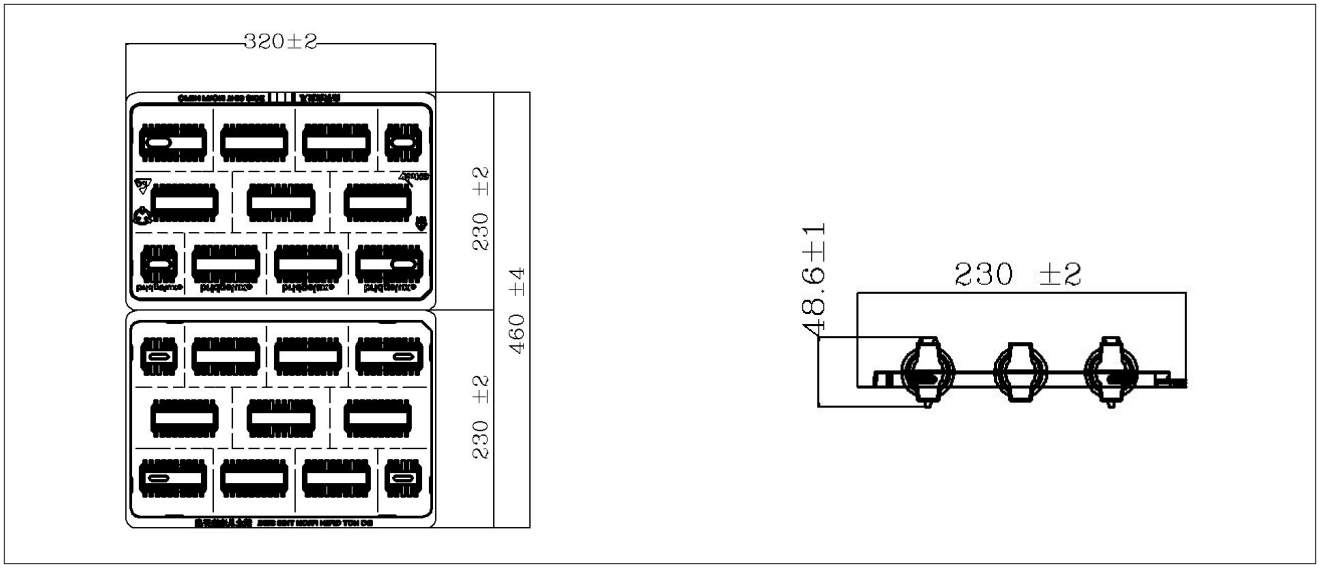



Notes for Figure 30:

1. Dimensions are in millimeters.
2. Drawing is not to scale.

# Packaging

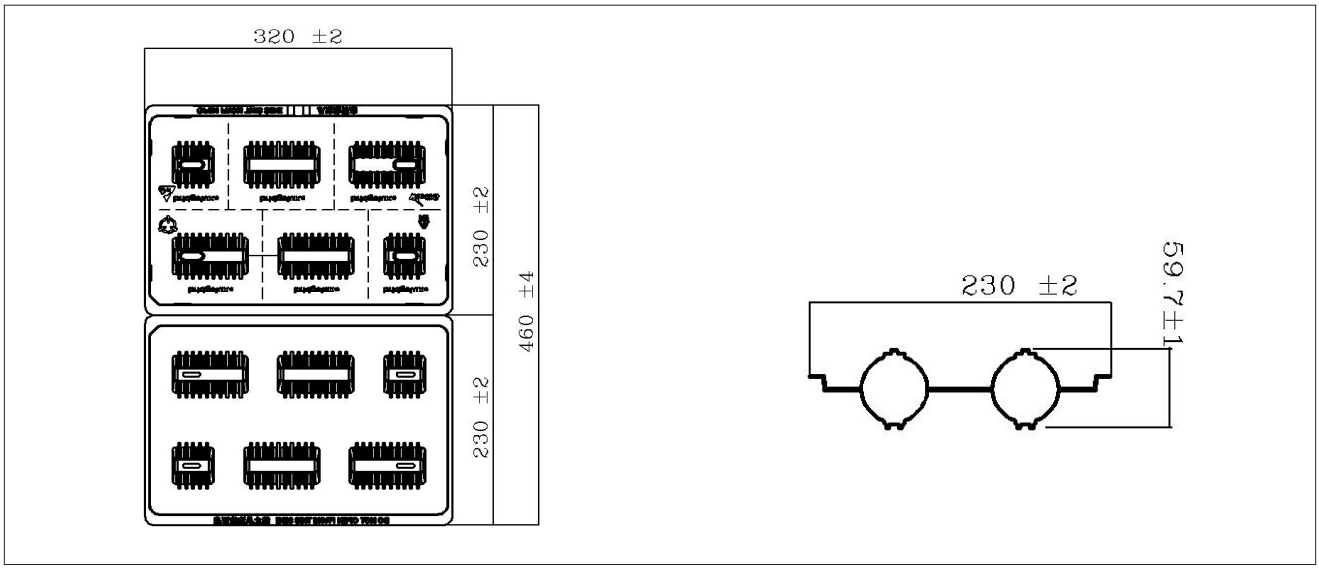
**Figure 31: Drawing for Vero 18 Packaging Tray**




Notes for Figure 31:

1. Dimensions are in millimeters.
2. Drawings are not to scale.

**Figure 32: Drawing for Vero 29 Packaging Tray**




Notes for Figure 32:

1. Dimensions are in millimeters.
2. Drawings are not to scale.