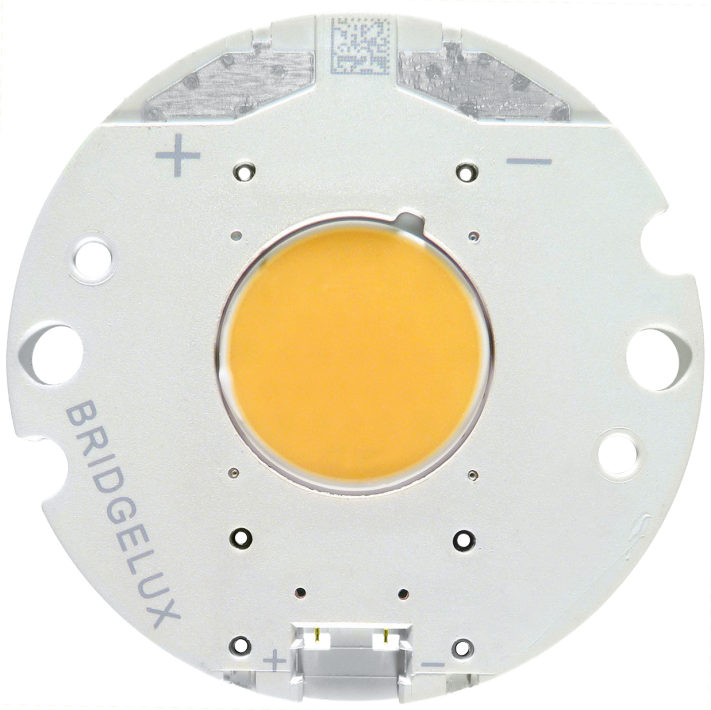


Bridgelux® Vero® 13 Array Series

Product Data Sheet DS31

10 TEN YEAR Warranty™

BXRC-27x2000 | 30x2000 | 35x2000 | 40x2000 | 50x2000

Introduction

Vero

Vero represents a revolutionary advancement in chip on board (COB) light source technology and innovation. Vero LED light sources simplify luminaire design and manufacturing processes, improve light quality, and define a platform for future functionality integration.

Vero is available in four different light emitting surface (LES) configurations and has been engineered to reliably operate over a broad current range, enabling new degrees of flexibility in luminaire design optimization. Vero 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 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

- Market leading efficacy of 130 lm/W typical
- Vero 13 lumen output performance ranges from 600 to 4,150 lumens
- Broad range of CCT options from 2700K to 5000K
- CRI options include; minimum 70, 80, and 90
- 2 and 3 SDCM color control for 2700K-4000K CCT
- 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

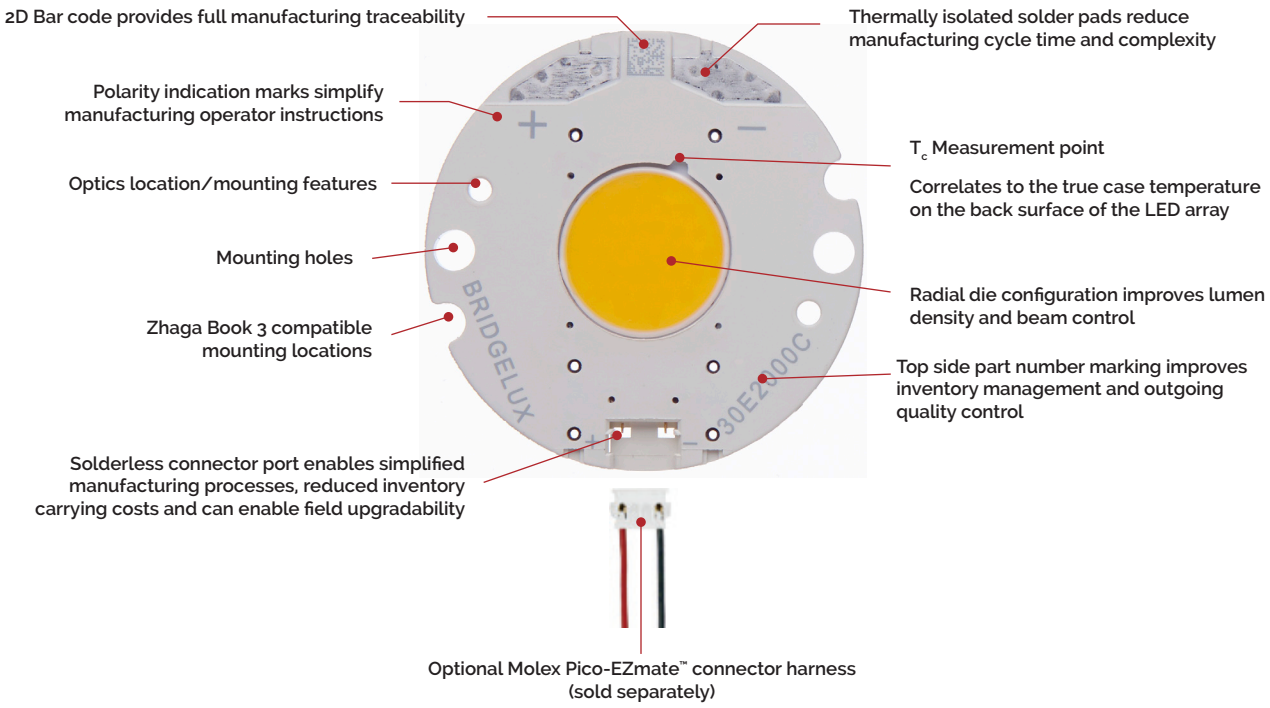
Benefits

- Broad application coverage for interior and exterior lighting
- 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
- Solderless connectivity enables plug & play installation and field upgradability
- Improved inventory management and quality control

Contents

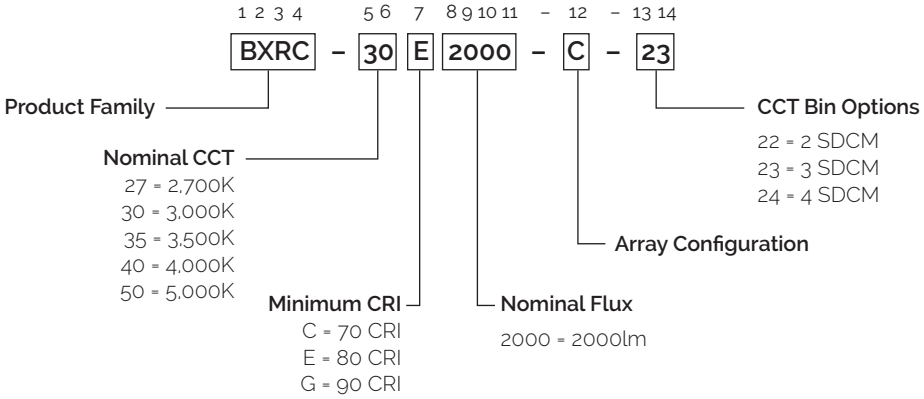
Product Feature Map

Vero 13 is the second smallest form factor in the Vero family of the next generation solid state light sources. In addition to delivering the performance and light quality required for many lighting applications, Vero incorporates several features to simplify the design integration and manufacturing process, accelerate time to market and reduce system costs. Please visit www.bridgelux.com for more information on the Vero family of products.



Product Nomenclature

The part number designation for Bridgelux Vero 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)

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)
BXRC-27E2000-C-2X	2700	80	500	2019	1856	32.3	16.2	125
BXRC-27G2000-C-2X	2700	90	500	1680	1549	32.3	16.2	104
BXRC-30E2000-C-2X	3000	80	500	2120	1921	32.3	16.2	131
BXRC-30G2000-C-2X	3000	90	500	1760	1570	32.3	16.2	109
BXRC-35E2000-C-2X	3500	80	500	2150	1964	32.3	16.2	133
BXRC-35G2000-C-2X	3500	90	500	1841	1701	32.3	16.2	114
BXRC-40E2000-C-2X	4000	80	500	2213	2022	32.3	16.2	137
BXRC-40G2000-C-2X	4000	90	500	1900	1786	32.3	16.2	118
BXRC-50C2000-C-24	5000	70	500	2342	2134	32.3	16.2	145
BXRC-50E2000-C-24	5000	80	500	2245	1990	32.3	16.2	139
BXRC-50G2000-C-24	5000	90	500	2015	1809	32.3	16.2	125

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

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)
BXRC-27E2000-C-2X	2700	80	500	1849	1700	31.3	15.6	118
BXRC-27G2000-C-2X	2700	90	500	1478	1363	31.3	15.6	95
BXRC-30E2000-C-2X	3000	80	500	1910	1730	31.3	15.6	122
BXRC-30G2000-C-2X	3000	90	500	1549	1382	31.3	15.6	99
BXRC-35E2000-C-2X	3500	80	500	1947	1779	31.3	15.6	124
BXRC-35G2000-C-2X	3500	90	500	1620	1497	31.3	15.6	104
BXRC-40E2000-C-2X	4000	80	500	1996	1824	31.3	15.6	128
BXRC-40G2000-C-2X	4000	90	500	1672	1572	31.3	15.6	107
BXRC-50C2000-C-24	5000	70	500	2061	1878	31.3	15.6	132
BXRC-50E2000-C-24	5000	80	500	1976	1751	31.3	15.6	126
BXRC-50G2000-C-24	5000	90	500	1773	1592	31.3	15.6	113

Notes for Tables 1 & 2:

1. Nominal CCT as defined by ANSI C78.377-2011.
2. 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 1 and the flux vs. current characteristics shown in Figure 2. The performance at commonly used drive currents is summarized in Table 3.

Table 3: Product Performance at Commonly Used Drive Currents

Part Number	CRI	Drive Current[1] (mA)	Typical V_f T_c = 25°C (V)	Typical Power T_c = 25°C (W)	Typical Flux[2] T_c = 25°C (lm)	Typical DC Flux[3] T_c = 85°C (lm)	Typical Efficacy T_c = 25°C (lm/W)
BXRC-27E2000-C-2x	80	175	30.2	5.3	774	708	146
		350	31.4	11.0	1473	1348	134
		500	**32.3**	**16.2**	**2019**	**1849**	**125**
		700	33.4	23.4	2679	2460	115
		1050	35.1	36.9	3627	3349	98
BXRC-27G2000-C-2x	90	175	30.2	5.3	644	566	122
		350	31.4	11.0	1226	1078	112
		500	**32.3**	**16.2**	**1680**	**1478**	**104**
		700	33.4	23.4	2229	1967	95
		1050	35.1	36.9	3018	2678	82
BXRC-30E2000-C-2x	80	175	30.2	5.3	812	731	154
		350	31.4	11.0	1547	1392	141
		500	**32.3**	**16.2**	**2120**	**1910**	**131**
		700	33.4	23.4	2813	2540	120
		1050	35.1	36.9	3809	3459	103
BXRC-30G2000-C-2x	90	175	30.2	5.3	674	593	128
		350	31.4	11.0	1284	1129	117
		500	**32.3**	**16.2**	**1760**	**1549**	**109**
		700	33.4	23.4	2335	2060	100
		1050	35.1	36.9	3162	2805	86
BXRC-35E2000-C-2x	80	175	30.2	5.3	824	746	156
		350	31.4	11.0	1569	1419	143
		500	**32.3**	**16.2**	**2150**	**1947**	**133**
		700	33.4	23.4	2853	2590	122
		1050	35.1	36.9	3863	3527	105
BXRC-35G2000-C-2x	90	175	30.2	5.3	705	620	133
		350	31.4	11.0	1343	1181	122
		500	**32.3**	**16.2**	**1841**	**1620**	**114**
		700	33.4	23.4	2443	2155	104
		1050	35.1	36.9	3307	2934	90

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)

Part Number	CRI	Drive Current[1] (mA)	Typical V_f T_c = 25°C (V)	Typical Power T_c = 25°C (W)	Typical Flux[2] T_c = 25°C (lm)	Typical DC Flux[3] T_c = 85°C (lm)	Typical Efficacy T_c = 25°C (lm/W)
BXRC-40E2000-C-2x	80	175	30.2	5.3	848	764	160
		350	31.4	11.0	1615	1455	147
		500	**32.3**	**16.2**	**2213**	**1996**	**137**
		700	33.4	23.4	2936	2655	126
		1050	35.1	36.9	3976	3615	108
BXRC-40G2000-C-2x	90	175	30.2	5.3	728	640	138
		350	31.4	11.0	1386	1219	126
		500	**32.3**	**16.2**	**1900**	**1672**	**118**
		700	33.4	23.4	2521	2224	108
		1050	35.1	36.9	3413	3028	93
BXRC-50C2000-C-24	70	175	30.2	5.3	897	789	170
		350	31.4	11.0	1709	1502	155
		500	**32.3**	**16.2**	**2342**	**2061**	**145**
		700	33.4	23.4	3107	2742	133
		1050	35.1	36.9	4207	3733	114
BXRC-50E2000-C-24	80	175	30.2	5.3	860	757	163
		350	31.4	11.0	1638	1440	149
		500	**32.3**	**16.2**	**2245**	**1976**	**139**
		700	33.4	23.4	2979	2628	127
		1050	35.1	36.9	4033	3578	109
BXRC-50G2000-C-24	90	175	30.2	5.3	772	679	146
		350	31.4	11.0	1470	1292	134
		500	**32.3**	**16.2**	**2015**	**1773**	**125**
		700	33.4	23.4	2674	2359	114
		1050	35.1	36.9	3620	3212	98

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	Drive Current (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 T_c = -40°C (V)
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

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 (T_j)	150˚C
Storage Temperature	-40˚C to +105˚C
Operating Case Temperature[1] (T_c)	105˚C
Soldering Temperature[2]	350˚C or lower for a maximum of 10 seconds
Maximum Drive Current[3,4,5]	1050mA
Maximum Peak Pulsed Drive Current[6]	1500mA
Maximum Reverse Voltage[7]	-55V

Notes for Table 5:

1. For IEC 62717 requirement, please consult your Bridgelux sales representative.
2. Refer to Bridgelux Application Note AN31: Assembly Considerations for Bridgelux Vero LED Arrays.
3. DC Forward Current for LM-80 is the maximum drive current for which LM-80 data is currently available.
4. 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 arrays. Contact your Bridgelux sales representatives for LM-80 report.
5. Arrays may be driven at higher currents however lumen maintenance may be reduced.
6. Bridgelux recommends a maximum duty cycle of 10% and pulse width of 20 ms when operating LED Arrays at maximum peak pulsed current specified. Maximum peak pulsed currents indicate values where LED Arrays can be driven without catastrophic failures.
7. 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

Figure 1: Drive Current vs. Voltage ($T_j = T_c = 25°C$)

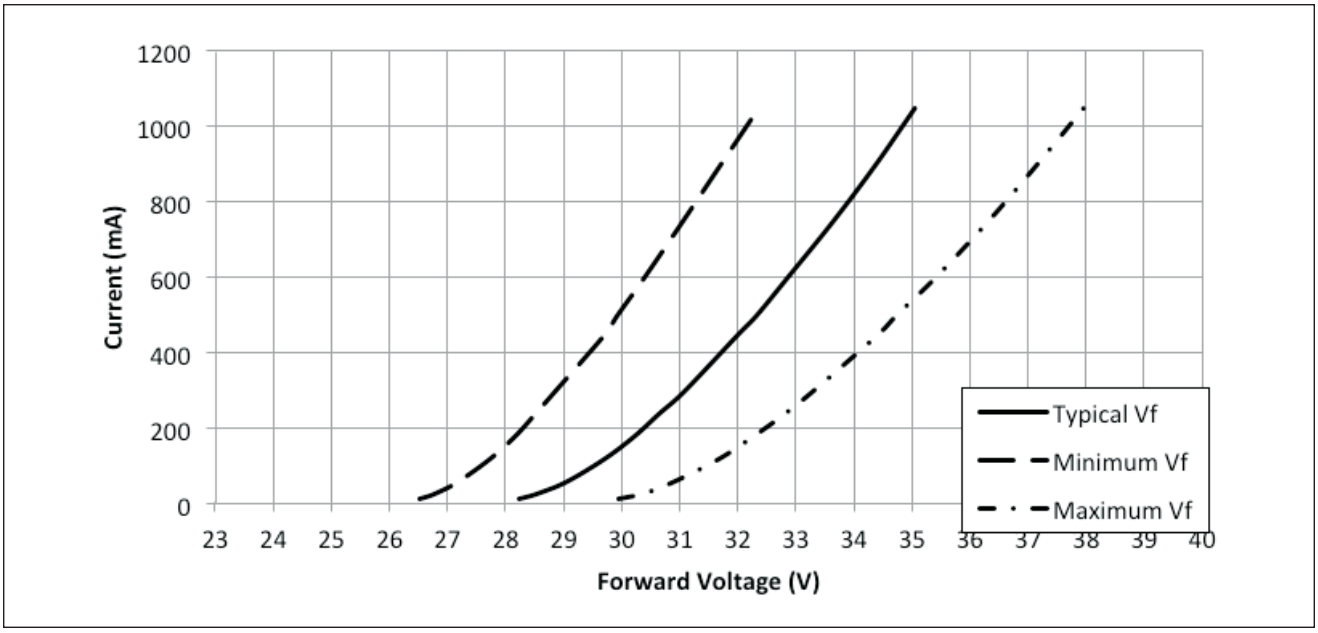
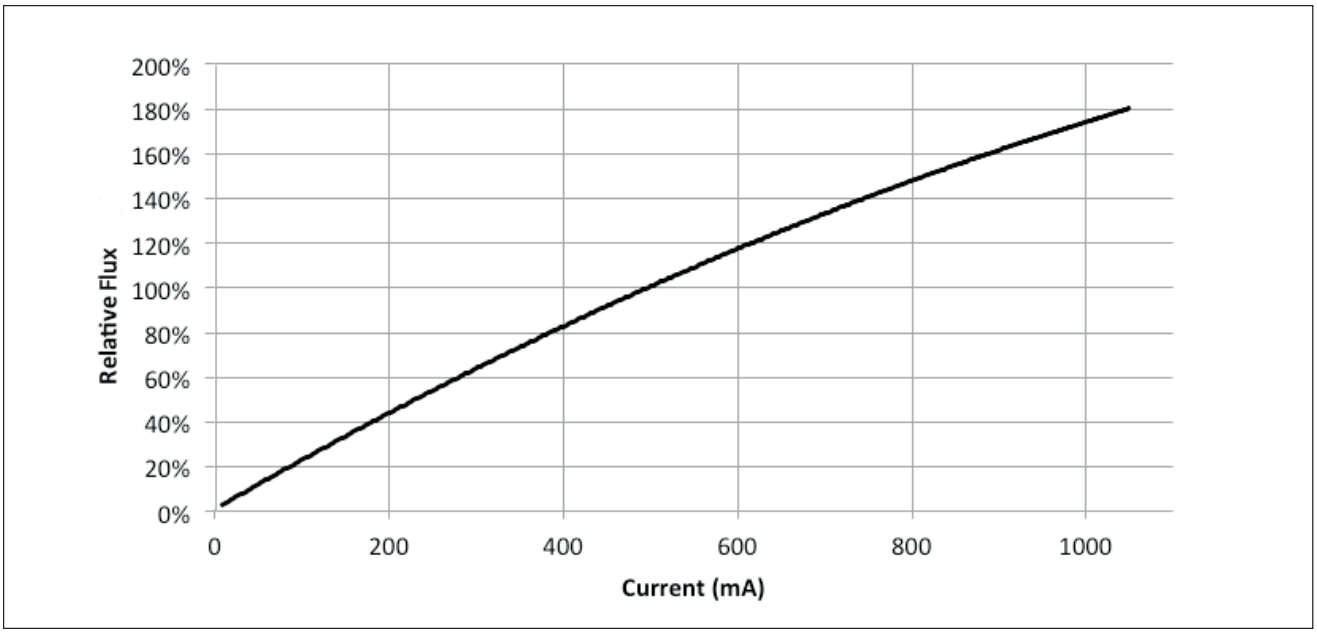


Figure 2: Typical Relative Luminous Flux vs. Current ($T_j = T_c = 25°C$)



Note for Figure 2:

1. Bridgelux does not recommend driving high power LEDs at low currents. Doing so may produce unpredictable results. Pulse width modulation (PWM) is recommended for dimming effects.

Performance Curves

Figure 3: Typical DC Flux vs. Case Temperature

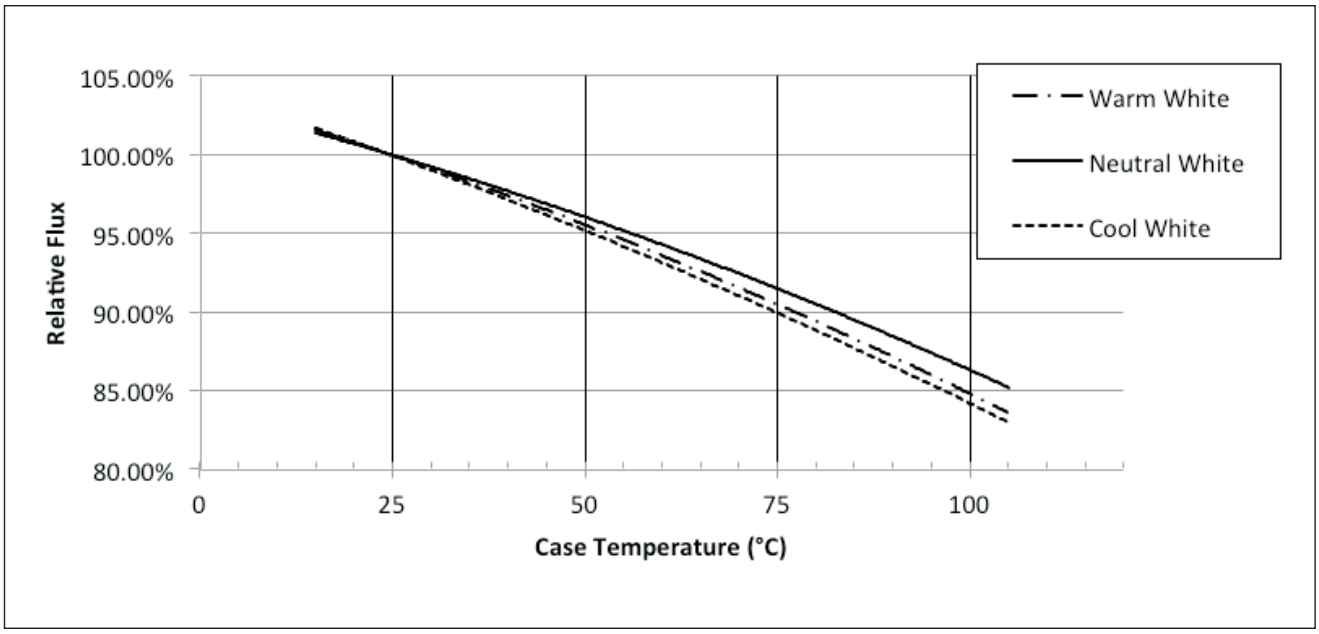
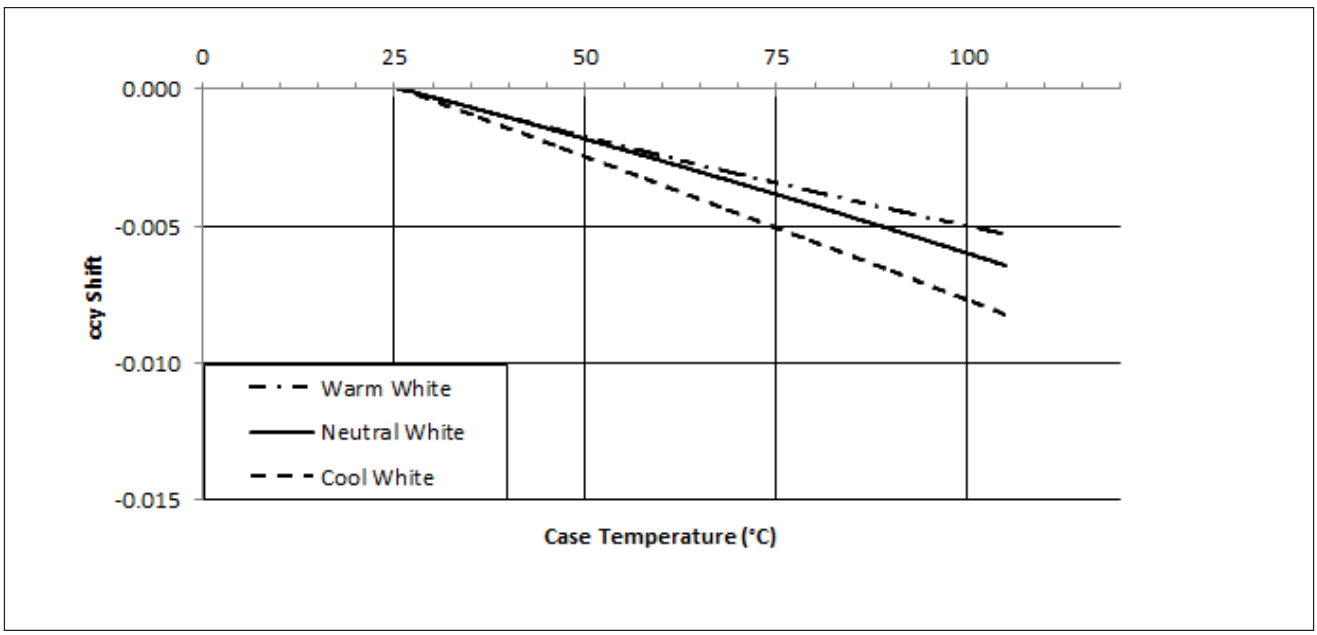


Figure 4: Typical DC ccy Shift vs. Case Temperature

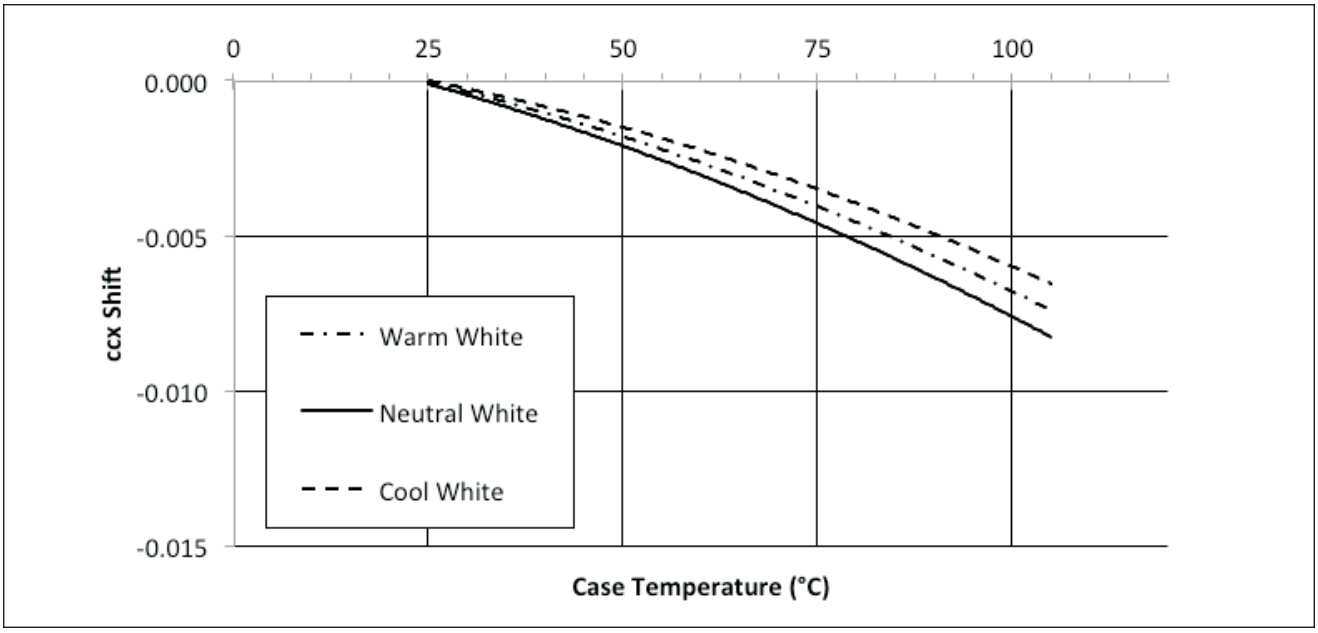


Notes for Figures 3-4:

1. Characteristics shown for warm white based on 3000K and 80 CRI.
2. Characteristics shown for neutral white based on 4000K and 80 CRI.
3. Characteristics shown for cool white based on 5000K and 70 CRI.
4. For other color SKUs, the shift in color will vary. Please contact your Bridgelux Sales Representative for more information.

Performance Curves

Figure 5: Typical DC ccx Shift vs. Case Temperature

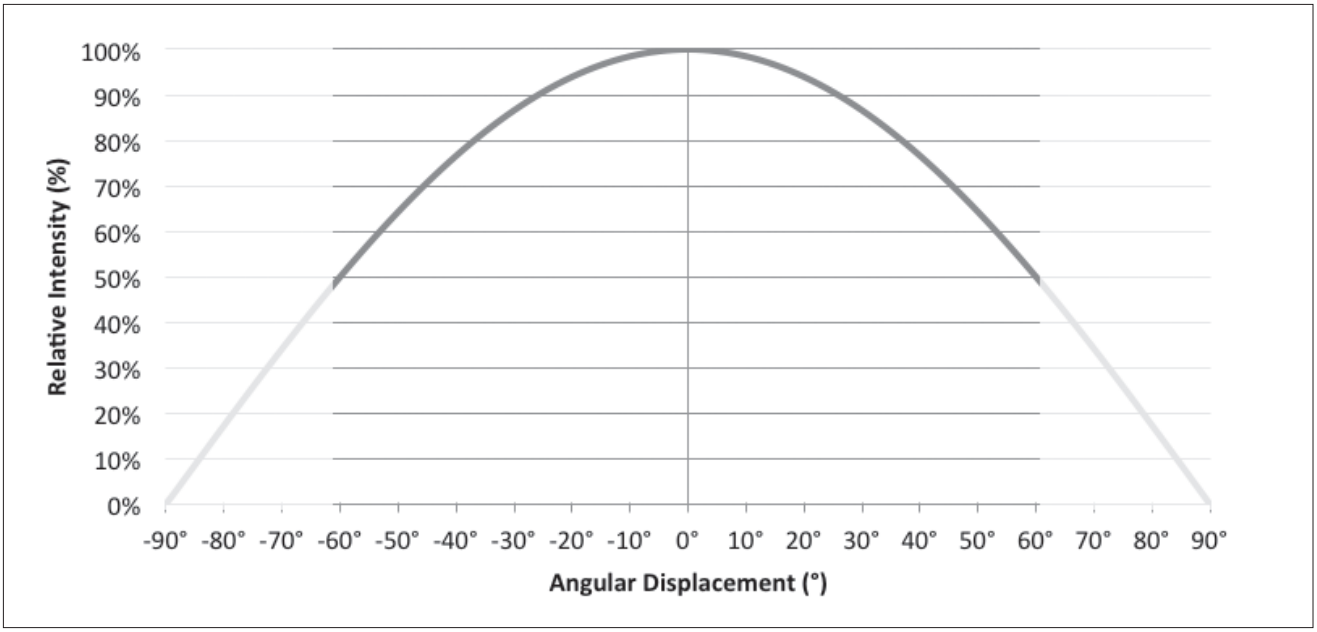


Notes for Figure 5:

1. Characteristics shown for warm white based on 3000K and 80 CRI.
2. Characteristics shown for neutral white based on 4000K and 80 CRI.
3. Characteristics shown for cool white based on 5000K and 70 CRI.
4. For other color SKUs, the shift in color will vary. Please contact your Bridgelux Sales Representative for more information.

Typical Radiation Pattern

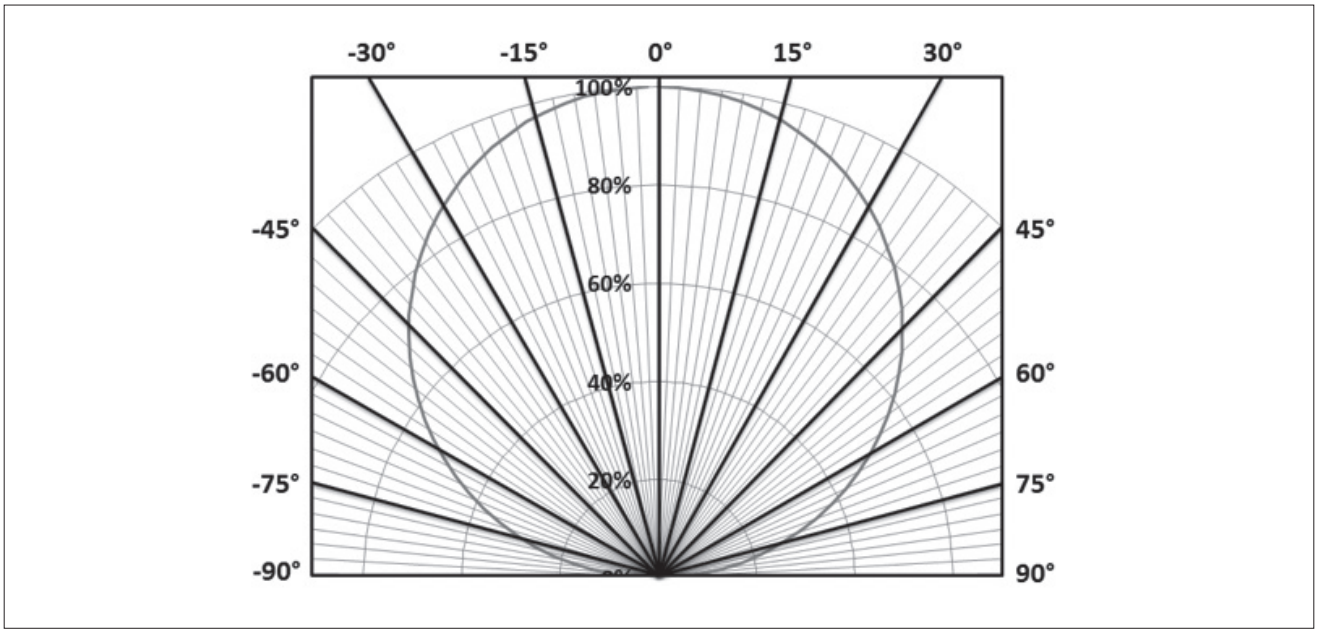
Figure 6: Typical Spatial Radiation Pattern



Note for Figure 6:

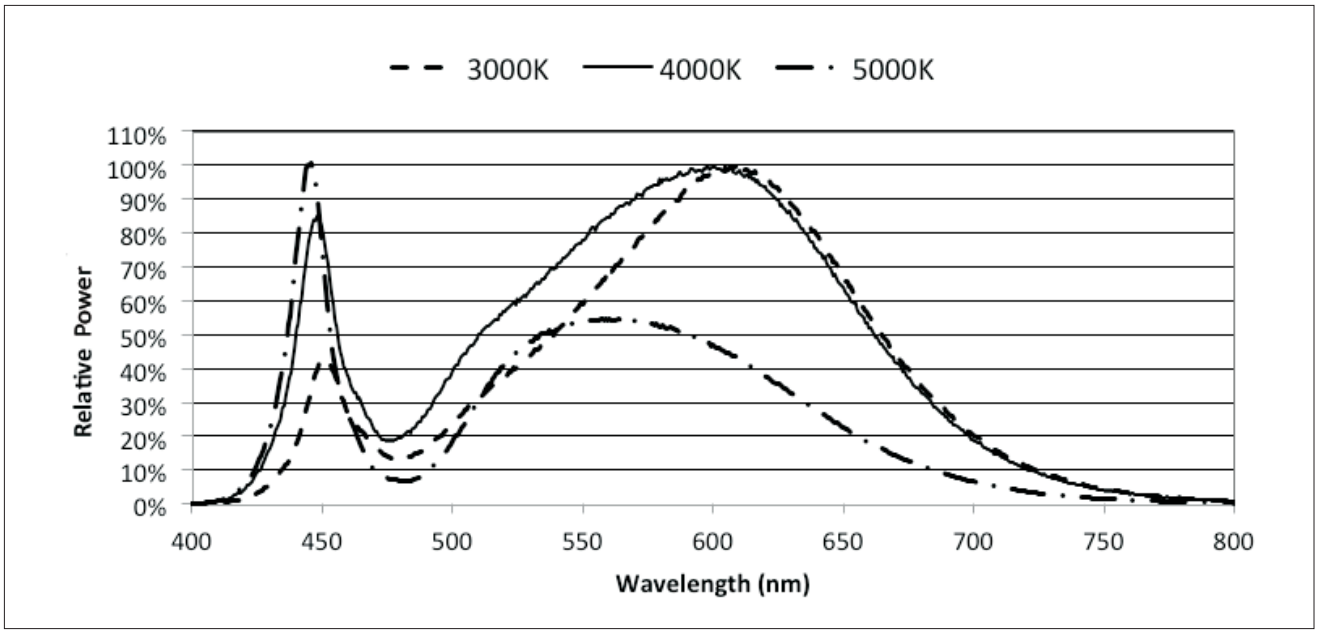
1. Typical viewing angle is 120°.
2. The viewing angle is defined as the off axis angle from the centerline where intensity is ½ of the peak value.

Figure 7: Typical Polar Radiation Pattern



Typical Color Spectrum

Figure 8: Typical Color Spectrum

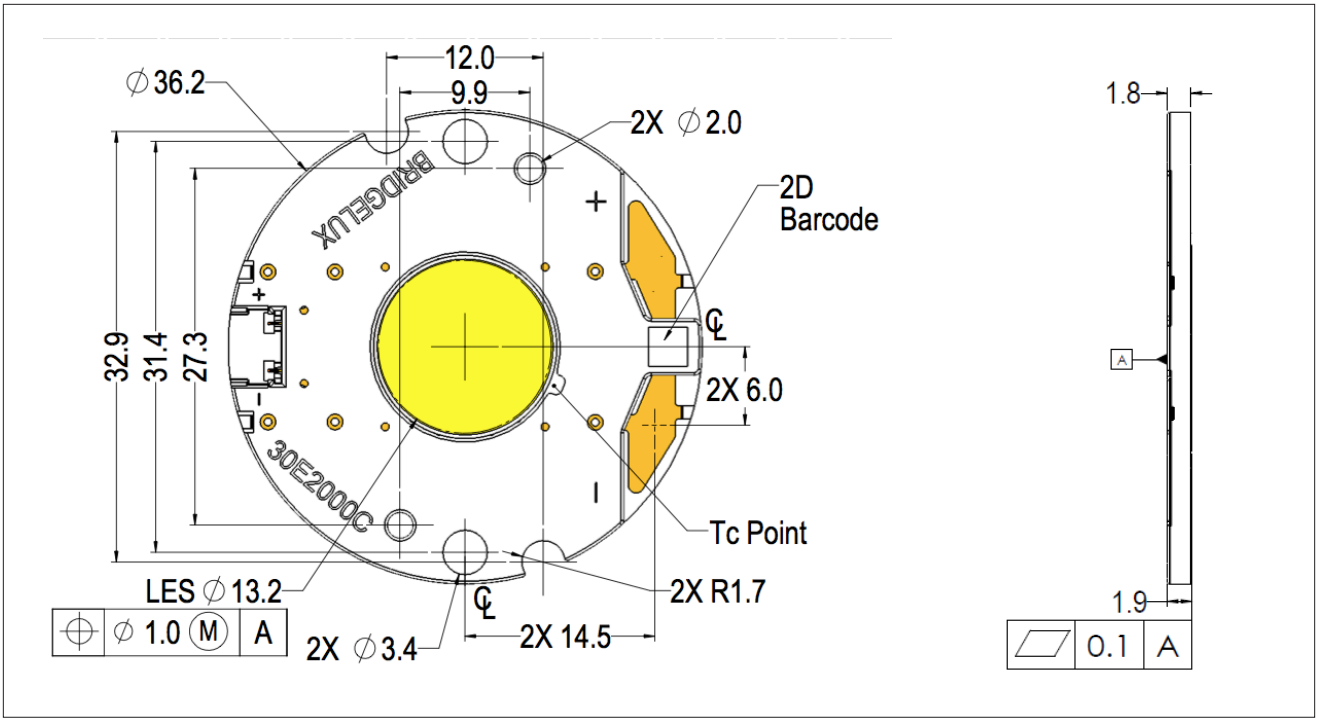


Note for Figure 8:

1. Color spectra measured at nominal current for $T_j = T_c = 25°C$.
2. Color spectra shown is 3000K and 80 CRI.
3. Color spectra shown is 4000K and 80 CRI.
4. Color spectra shown is 5000K and 70 CRI.

Mechanical Dimensions

Figure 9: Drawing for Vero 13 LED Array

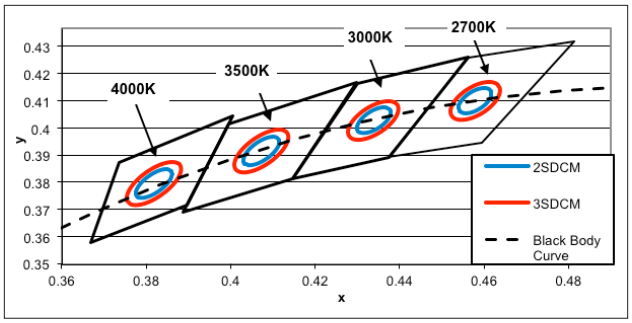


Notes for Figure 9:

1. Drawings are not to scale.
2. Drawing dimensions are in millimeters.
3. Unless otherwise specified, tolerances are ±0.1mm.
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.

Color Binning Information

Figure 10: Graph of Warm and Neutral White Test Bins in xy Color Space

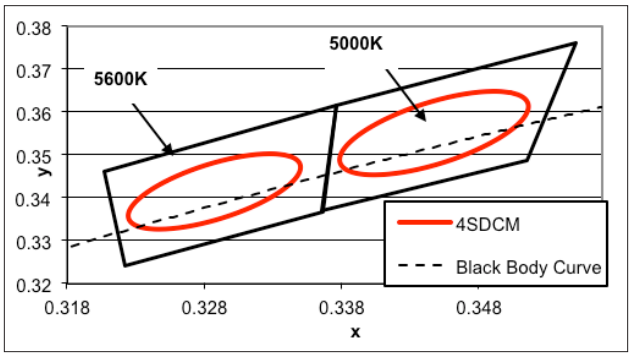


Note: Pulsed Test Conditions, T_c = 25°C

Table 6: Warm and Neutral White xy Bin Coordinates and Associated Typical CCT

Bin Code	2700K	3000K	3500K	4000K
ANSI Bin (for reference only)	(2580K - 2870K)	(2870K - 3220K)	(3220K - 3710K)	(3710K - 4260K)
23 (3SDCM)	(2651K - 2794K)	(2968K - 3136K)	(3369K - 3586K)	(3851K - 4130K)
22 (2SDCM)	(2674K - 2769K)	(2995K - 3107K)	(3404K - 3548K)	(3895K - 4081K)
Center Point (x,y)	(0.4578, 0.4101)	(0.4338, 0.403)	(0.4073, 0.3917)	(0.3818, 0.3797)

Figure 11: Graph of Cool White Test Bins in xy Color Space



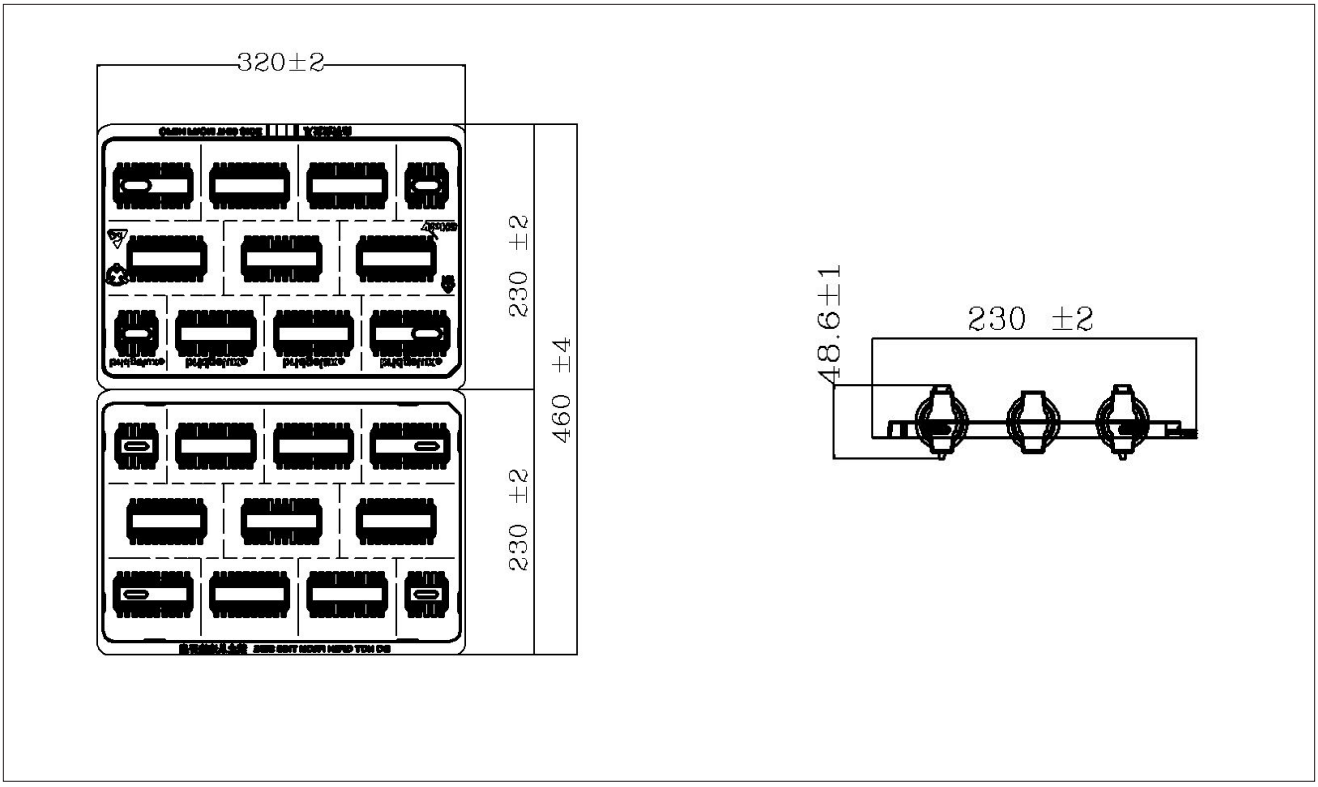
Note: Pulsed Test Conditions, T_c = 25°C

Table 7: Cool White xy Bin Coordinates and Associated Typical CCT

Bin Code	5000K	5600K
ANSI Bin (for reference only)	(4745K - 5311K)	(5310K - 6020K)
24 (4SDCM)	(4801K - 5282K)	(5475K - 5830K)
Center Point (x,y)	(0.3447, 0.3553)	(0.3293, 0.3423)

Packaging and Labeling

Figure 12: Drawing for Vero 13 Packaging Tray

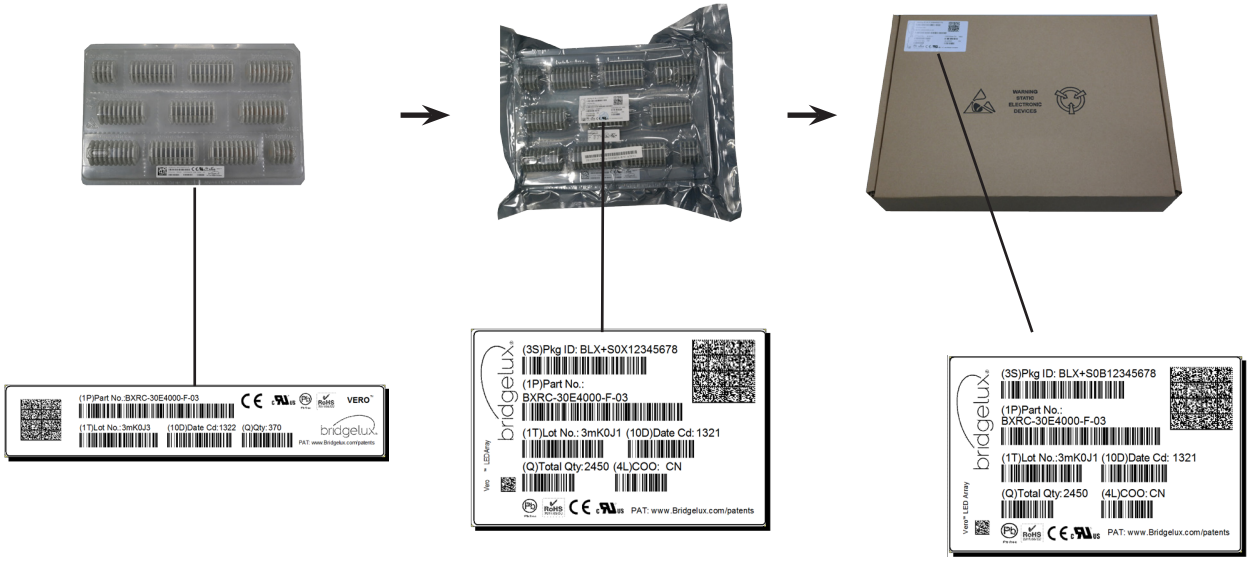


Notes for Figure 12:

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

Packaging and Labeling

Figure 13: Vero Series Packaging and Labeling



Notes for Figure 13:

1. Each tray holds 100 COBs.
2. Each tray is vacuum sealed in an anti-static bag and placed in its own box.
3. Each tray, bag and box is to be labeled as shown above.

Figure 14: Product Labeling

Bridgelux COB arrays have laser markings on the back side of the substrate to help with product identification. In addition to the product identification markings, Bridgelux COB arrays also contain markings for internal Bridgelux manufacturing use only. The image below shows which markings are for customer use and which ones are for Bridgelux internal use only. The Bridgelux internal manufacturing markings are subject to change without notice, however these will not impact the form, function or performance of the COB array.

Design Resources

Application Notes

Bridgelux has developed a comprehensive set of application notes and design resources to assist customers in successfully designing with the Vero product family of LED array products. For all available application notes visit www.bridgelux.com.

Optical Source Models

Optical source models and ray set files are available for all Bridgelux products. For a list of available formats, visit www.bridgelux.com.

3D CAD Models

Three dimensional CAD models depicting the product outline of all Bridgelux Vero LED arrays are available in both IGS and STEP formats. 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 array. Please consult Bridgelux Application Note AN31 for additional information.

CAUTION: EYE SAFETY

Eye safety classification for the use of Bridgelux Vero LED arrays is in accordance with IEC specification EN62471: Photobiological Safety of Lamps and Lamp Systems. Vero LED arrays are classified as Risk Group 1 (Low Risk) 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 Vero LED array during operation. Allow the array to cool for a sufficient period of time before handling. The Vero LED array 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 LED array or apply stress to the LES (yellow phosphor resin area). Contact may cause damage to the LED array.

Optics and reflectors must not be mounted in contact with the LES (yellow phosphor resin area). Optical devices may be mounted on the top surface of the plastic housing of the Vero LED array. Use the mechanical features of the LED array housing, edges and/or mounting holes to locate and secure optical devices as needed.

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, array testing is performed at the nominal drive current.

About Bridgelux: We Build Light That Transforms

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.

For more information about the company, please visit
bridgelux.com
twitter.com/Bridgelux
facebook.com/Bridgelux
WeChat ID: BridgeluxInChina

101 Portola Avenue
Livermore, CA 94551
Tel (925) 583-8400
Fax (925) 583-8410
www.bridgelux.com