



Bridgelux® Vero18 F90 BBBL Array

Product Data Sheet DS437-2



Introduction

Vero® F90



The Vero® Series is a revolutionary advancement in chip on board (COB) light source technology and innovation, simplifying the luminaire design and manufacturing processes. Vero Chip on Board (COB) LED arrays are available in four LES configurations, engineered to enable new degrees of flexibility and reliability over a broad range of electrical currents. 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 products include an onboard connector port that enables a solder-free electrical interconnect, and simple mounting features for plug-and-play installation.

The F90 Vero Series COB is a high efficacy product that uses narrow band red phosphor to significantly improve the spectrum efficacy. The improved spectrum efficacy results in the 90 CRI product of the F90 Series delivering better or equivalent efficacy as that of our traditional 80 CRI Vero Series product.

Features

- Efficacy of 177 lm/W typical, 3000K 90 CRI
- Wide selection of CCT options (2700K-4000K) with minimum 90 CRI options
- Uniform high-quality illumination
- 2 and 3 SDCM binning options (2700K – 4000K)
- Forward voltage bin codes and backside marking
- Instant light with unlimited dimming
- Thermally isolated solder pads
- 10-Year warranty

Benefits

- Solder free installation and field upgradability
- Improved inventory management and quality control
- Enables high efficiency lighting systems and lower operating costs
- Supports the trend toward luminaire miniaturization and delivers enhanced optical control
- Design flexibility for a broad range of lighting applications
- Clean white light without pixelation
- Uniform consistent white light
- Design flexibility for multi-source applications
- Enhanced ease of use and installation



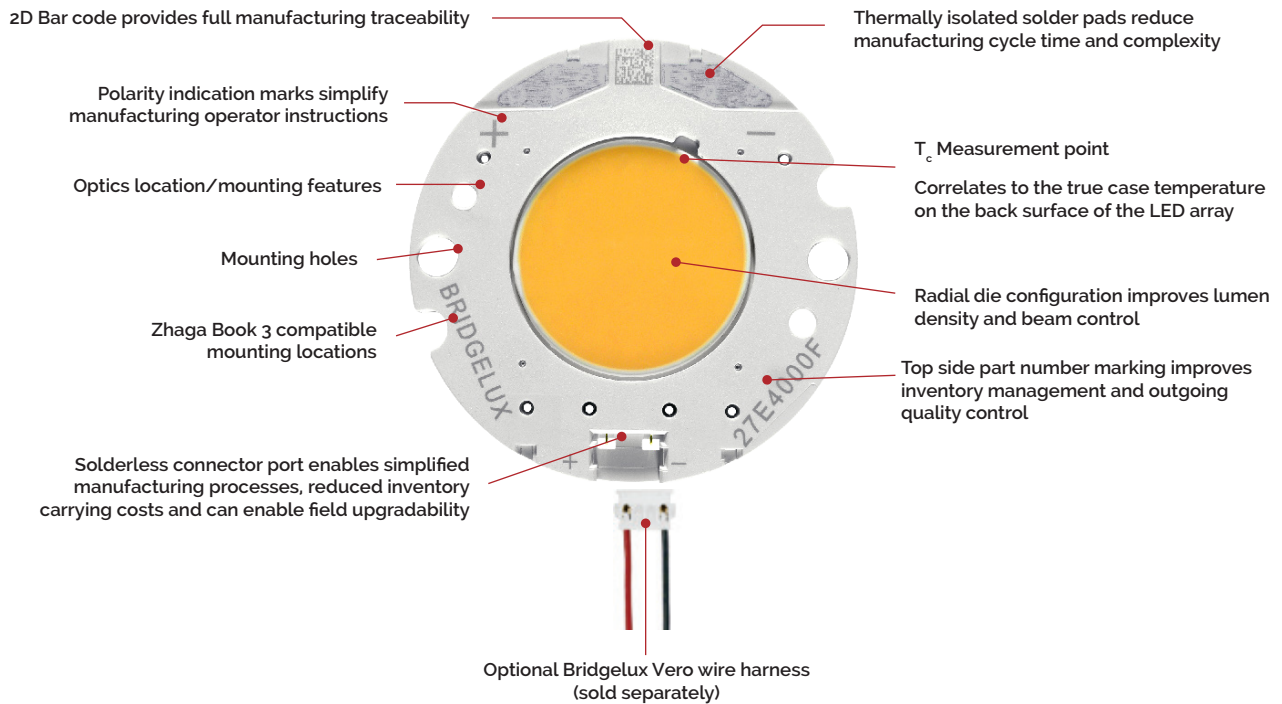
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Product Feature Map

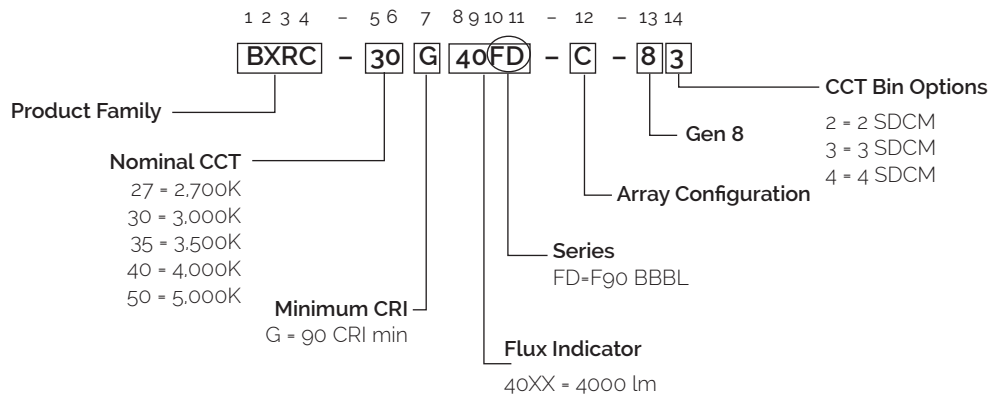
Vero 18 is the second largest form factor in the Vero family of the next generation solid state light sources. In addition to delivering the performance and light quality required for many lighting applications, Vero incorporates

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 Series family of products.



Product Nomenclature

The part number designation for Bridgelux COB arrays is explained as follows:



Product Selection Guide

The following product configurations are available:

Table 1: Selection Guide, Pulsed Measurement Data ($T_c = 25^\circ\text{C}$)

Part Number	Nominal CCT ¹ (K)	CRI ²	Nominal Drive Current ³ (mA)	Typical Pulsed Flux ^{4,5,6} $T_c = 25^\circ\text{C}$ (lm)	Minimum Pulsed Flux ^{6,7} $T_c = 25^\circ\text{C}$ (lm)	Typical V_f (V)	Typical Power (W)	Typical Efficacy (lm/W)
BXRC-27G40FD-B-8x	2700	90	700	4193	3773	34.6	24.2	173
BXRC-27G40FD-C-8x	2700	90	1050	6286	5658	34.9	36.6	172
BXRC-30G40FD-B-8x	3000	90	700	4279	3851	34.6	24.2	177
BXRC-30G40FD-C-8x	3000	90	1050	6415	5774	34.9	36.6	175
BXRC-35G40FD-B-8x	3500	90	700	4256	3830	34.6	24.2	176
BXRC-35G40FD-C-8x	3500	90	1050	6380	5742	34.9	36.6	174
BXRC-40G40FD-B-8x	4000	90	700	4297	3867	34.6	24.2	177
BXRC-40G40FD-C-8x	4000	90	1050	6443	5799	34.9	36.6	176

Table 2: Selection Guide, Stabilized DC Test Performance ($T_c = 65^\circ\text{C}$)^{4,5,6}

Part Number	Nominal CCT (K)	CRI ²	Nominal Drive Current ³ (mA)	Typical DC Flux ^{4,5} $T_c = 65^\circ\text{C}$ (lm)	Minimum DC Flux ⁶ $T_c = 65^\circ\text{C}$ (lm)	Typical V_f (V)	Typical Power (W)	Typical Efficacy (lm/W)
BXRC-27G40FD-B-8x	2700	90	700	3920	3528	34.2	23.9	164
BXRC-27G40FD-C-8x	2700	90	1050	5878	5290	34.4	36.2	163
BXRC-30G40FD-B-8x	3000	90	700	4001	3601	34.2	23.9	167
BXRC-30G40FD-C-8x	3000	90	1050	5998	5398	34.4	36.2	166
BXRC-35G40FD-B-8x	3500	90	700	3979	3581	34.2	23.9	166
BXRC-35G40FD-C-8x	3500	90	1050	5965	5369	34.4	36.2	165
BXRC-40G40FD-B-8x	4000	90	700	4018	3616	34.2	23.9	168
BXRC-40G40FD-C-8x	4000	90	1050	6024	5422	34.4	36.2	167

Notes for Table 1 & 2:

1. Nominal CCT as defined by ANSI C78.377-2011.
2. CRI values are minimums and tested at $T_j = T_c = 65^\circ\text{C}$. Minimum R_g value for 90 CRI products is 50. Bridgelux maintains a ± 3 tolerance on CRI and R_g values.
3. Drive current is referred to as nominal drive current.
4. Products tested under pulsed condition (10ms pulse width) at nominal drive 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 $\pm 7\%$ tolerance on flux measurements.
7. Minimum flux values at the nominal drive current are guaranteed by 100% test.

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 Figures 1 & 2 and the flux vs. current characteristics shown in Figures 3 & 4. The performance at commonly used drive currents is summarized in Table 4.

Table 4: Product Performance at Commonly Used Drive Currents

Part Number	CRI	Drive Current ¹ (mA)	Typical V_f $T_c = 25^\circ\text{C}$ (V)	Typical Power $T_c = 25^\circ\text{C}$ (W)	Typical Flux ² $T_c = 25^\circ\text{C}$ (lm)	Typical DC Flux ³ $T_c = 65^\circ\text{C}$ (lm)	Typical Efficacy $T_c = 25^\circ\text{C}$ (lm/W)
BXRC-27G40FD-B-8x	90	350	33.2	11.6	2147	2044	185
		525	33.9	17.8	3176	3004	178
		700	34.6	24.2	4193	3920	173
		900	35.4	31.9	5340	4919	168
		1400	37.2	52.1	8141	7212	156
		1620	38	61.6	9342	8142	152
BXRC-27G40FD-C-8x	90	525	33.4	17.5	3331	3083	190
		785	34.1	26.8	4912	4502	184
		1050	34.9	36.6	6286	5878	172
		1170	35.3	41.3	7217	6478	175
		2100	37.9	79.6	12597	10716	158
		2160	38	82.1	12936	10968	158
BXRC-30G40FD-B-8x	90	350	33.2	11.6	2191	2086	189
		525	33.9	17.8	3241	3065	182
		700	34.6	24.2	4279	4001	177
		900	35.4	31.9	5449	5019	171
		1400	37.2	52.1	8307	7359	160
		1620	38	61.6	9533	8308	155
BXRC-30G40FD-C-8x	90	525	33.4	17.5	3399	3145	194
		785	34.1	26.8	5013	4594	187
		1050	34.9	36.6	6415	5998	175
		1170	35.3	41.3	7364	6610	178
		2100	37.9	79.6	12854	10935	162
		2160	38	82.1	13199	11191	161
BXRC-35G40FD-B-8x	90	350	33.2	11.6	2179	2075	188
		525	33.9	17.8	3223	3049	181
		700	34.6	24.2	4256	3979	176
		900	35.4	31.9	5419	4992	170
		1400	37.2	52.1	8262	7319	159
		1620	38	61.6	9481	8263	154
BXRC-35G40FD-C-8x	90	525	33.4	17.5	3381	3129	193
		785	34.1	26.8	4986	4570	186
		1050	34.9	36.6	6380	5965	174
		1170	35.3	41.3	7324	6574	177
		2100	37.9	79.6	12785	10875	161
		2160	38	82.1	13127	11130	160

Notes for Table 4:

1. Alternate drive currents in Table 4 are provided for reference only and are not a guarantee of performance.
2. Bridgelux maintains a $\pm 7\%$ 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 4: Product Performance at Commonly Used Drive Currents (Continued)

Part Number	CRI	Drive Current ¹ (mA)	Typical V_f $T_c = 25^\circ\text{C}$ (V)	Typical Power $T_c = 25^\circ\text{C}$ (W)	Typical Flux ² $T_c = 25^\circ\text{C}$ (lm)	Typical DC Flux ³ $T_c = 65^\circ\text{C}$ (lm)	Typical Efficacy $T_c = 25^\circ\text{C}$ (lm/W)
BXRC-40G40FD-B-8x	90	350	33.2	11.6	2201	2095	189
		525	33.9	17.8	3255	3079	183
		700	34.6	24.2	4297	4018	177
		900	35.4	31.9	5473	5041	172
		1400	37.2	52.1	8344	7392	160
		1620	38	61.6	9574	8344	156
BXRC-40G40FD-C-8x	90	525	33.4	17.5	3413	3159	195
		785	34.1	26.8	5035	4614	188
		1050	34.9	36.6	6443	6024	176
		1170	35.3	41.3	7396	6639	179
		2100	37.9	79.6	12911	10983	162
		2160	38	82.1	13257	11240	162

Notes for Table 4:

1. Alternate drive currents in Table 4 are provided for reference only and are not a guarantee of performance.
2. Bridgelux maintains a $\pm 7\%$ 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 5: Electrical Characteristics

Part Number	Drive Current (mA)	Forward Voltage Pulsed, $T_c = 25^\circ\text{C}$ (V) ^{1, 2, 3, 8}			Typical Coefficient of Forward Voltage ⁴ $\Delta V_f / \Delta T_c$ (mV/ $^\circ\text{C}$)	Typical Thermal Resistance Junction to Case ^{5,6} R_{j-c} ($^\circ\text{C}/\text{W}$)	Driver Selection Voltages ⁷ (V)	
		Minimum	Typical	Maximum			V_f Min. Hot $T_c = 105^\circ\text{C}$ (V)	V_f Max. Cold $T_c = -40^\circ\text{C}$ (V)
BXRC-xxx40Fx-B-8x	700	32.5	34.6	36.7	-10	0.14	31.8	37.3
	1620	35.7	38.0	40.3	-11	0.23	35.0	41.0
BXRC-xxx40Fx-C-8x	1050	32.8	34.9	37.0	-10	0.12	32.1	37.7
	2160	35.8	38.0	40.3	-11	0.20	35.0	41.1

Notes for Table 5:

- Parts are tested in pulsed conditions, $T_c = 25^\circ\text{C}$. Pulse width is 10ms.
- Voltage minimum and maximum are provided for reference only and are not a guarantee of performance.
- Bridgelux maintains a tester tolerance of $\pm 0.10\text{V}$ on forward voltage measurements.
- Typical coefficient of forward voltage tolerance is $\pm 0.1\text{mV}$ for nominal current.
- Thermal resistance values are based from test data of a 3000K 80 CRI product.
- 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.
- 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.
- This product has been designed and manufactured per IEC 62031:2018. This product has passed dielectric withstand voltage testing at 1160 V. The working voltage designated for the insulation is 80V d.c. The maximum allowable voltage across the array must be determined in the end product application.

Eye Safety

Table 6: Eye Safety Risk Group (RG) Classifications

Part Number	Drive Current (mA)	CCT ³	
		2700K/3000K	3500K-5000K ²
BXRC-xxx40Fx-B-8x	1360	RG1	RG1
	1620	RG1	RG2
BXRC-xxx40Fx-C-8x	1405	RG1	RG1
	2160	RG1	RG2

Notes for Table 6:

1. Eye safety classification for the use of Bridgelux Vero SE LED arrays is in accordance with specification IEC/TR 62778: Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires.
2. For products classified as RG2 at 5000K Ethr= 1530 lx.
3. Please contact your Bridgelux sales representative for Ethr values at specific drive currents and CCTs not listed.

Absolute Maximum Ratings

Table 7: Maximum Ratings

Parameter	Maximum Rating	
LED Junction Temperature (T _j)	150°C	
Storage Temperature ¹	-40°C to +95°C	
Operating Case Temperature ² (T _c)	95°C	
Soldering Temperature ³	300°C or lower for a maximum of 6 seconds	
	BXRC-xxx40Fx-B-8x	BXRC-xxx40Fx-C-8x
Maximum Drive Current ⁴	1620 mA at ≤85°C 1215 mA at 95°C	2160 mA at ≤85°C 1620 mA at 95°C
Maximum Peak Pulsed Drive Current ⁵	2320mA	3090 mA
Maximum Reverse Voltage ⁶	-60V	-60V

Notes for Table 7:

1. The F90 product is robust enough to pass our internal humidity test but it is still more sensitive compared to regular LED array product. The product needs to be stored in a dry environment. It is not recommended to use the product in a damp environment that directly exposes it to moisture.
2. For IEC 62717 requirement, please consult your Bridgelux sales representative.
3. Refer to Bridgelux Application Note AN31: Assembly Considerations for Bridgelux Vero LED Arrays.
4. Arrays may be driven at higher currents however lumen maintenance may be reduced and warranty will not apply.
5. 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.
6. 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: Vero18B Drive Current vs. Voltage

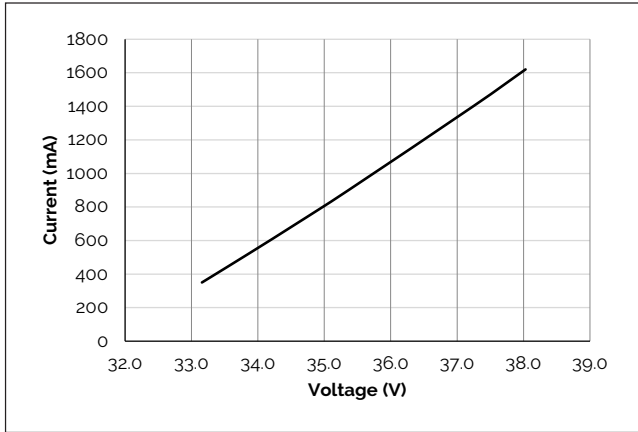


Figure 2: Vero18C Drive Current vs. Voltage

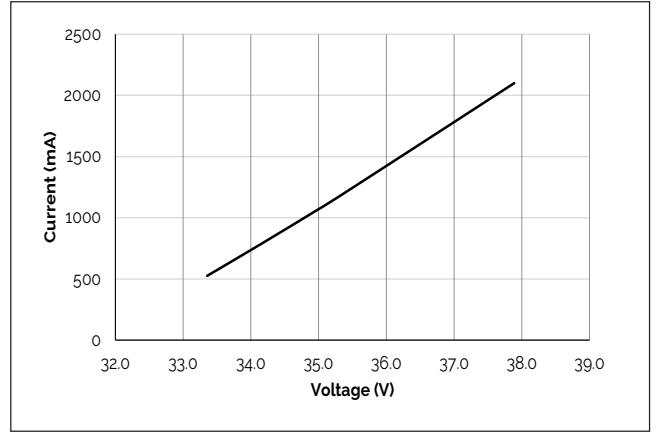


Figure 3: Vero18B Typical Relative Flux vs. Current

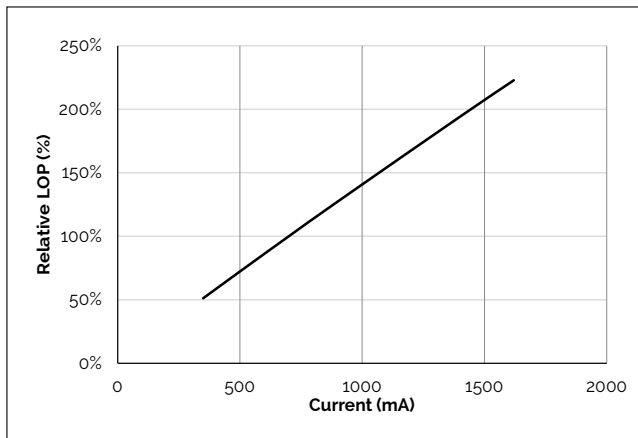


Figure 4: Vero18C Typical Relative Flux vs. Current

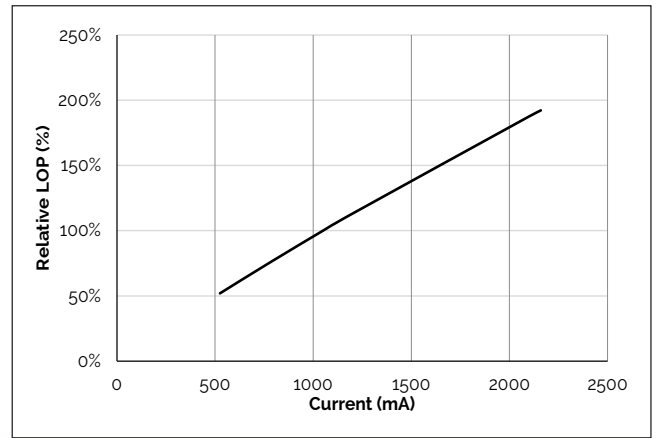


Figure 5: Typical DC Flux vs. Case Temperature

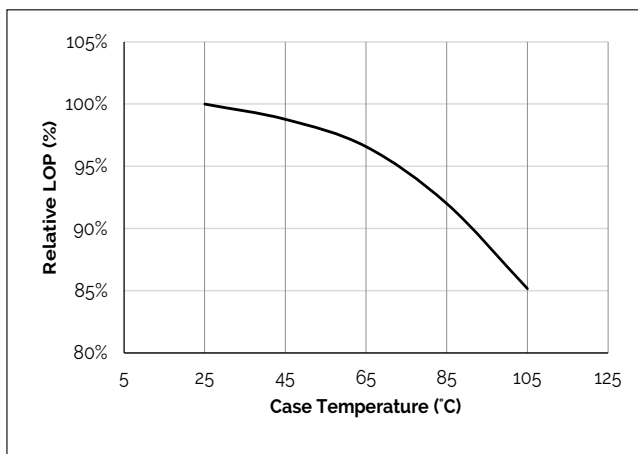
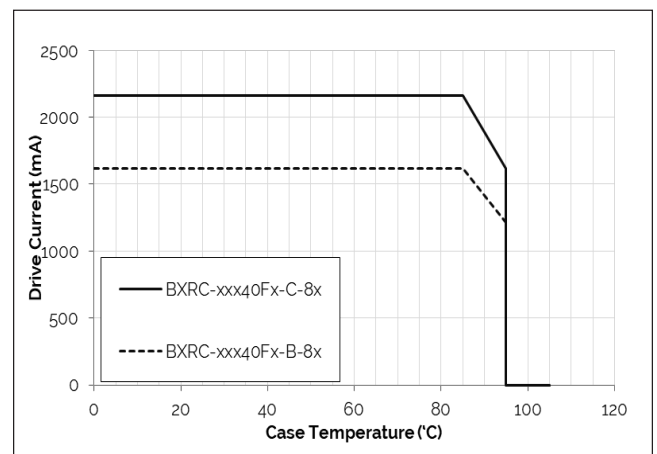


Figure 6: Derating Curve



Notes for Figures 1-4:

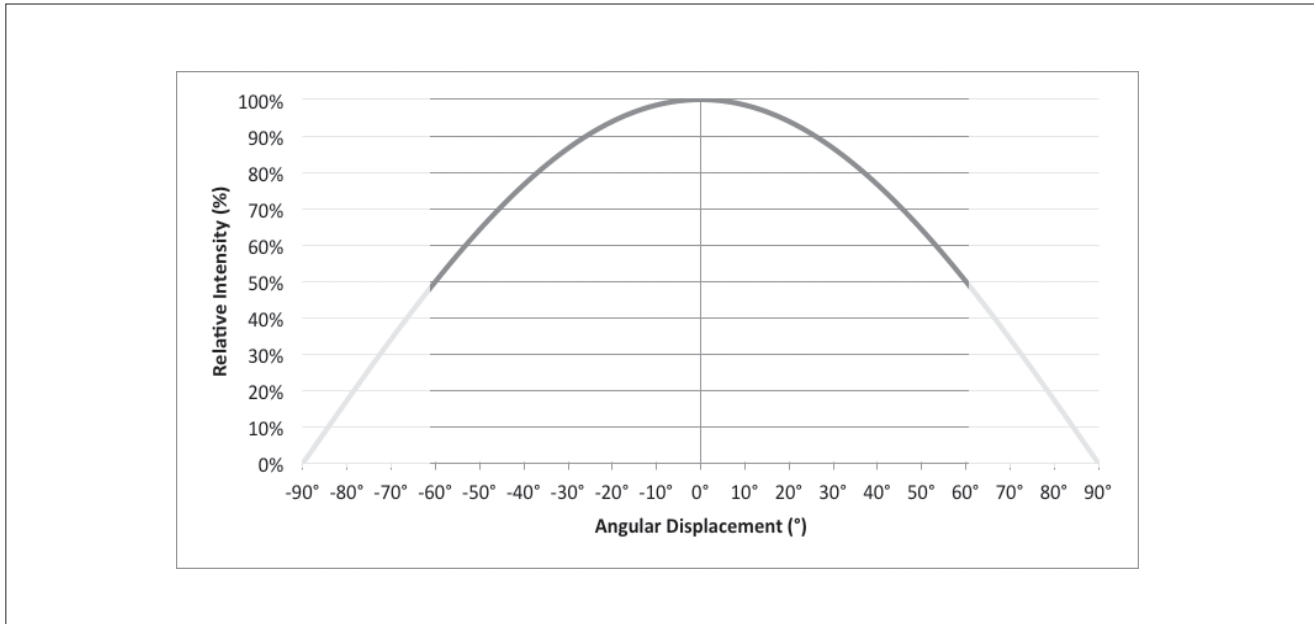
1. Bridgelux does not recommend driving high power LEDs at low currents. Doing so may produce unpredictable results. Pulse width modulation (PWM) is recommended for dimming effects.
2. Products tested under pulsed condition (10ms pulse width) at nominal drive current where T_j (junction temperature) - T_c (case temperature) = 25°C.

Note for Figures 5-6:

1. Characteristics shown for Warm White.

Typical Radiation Pattern

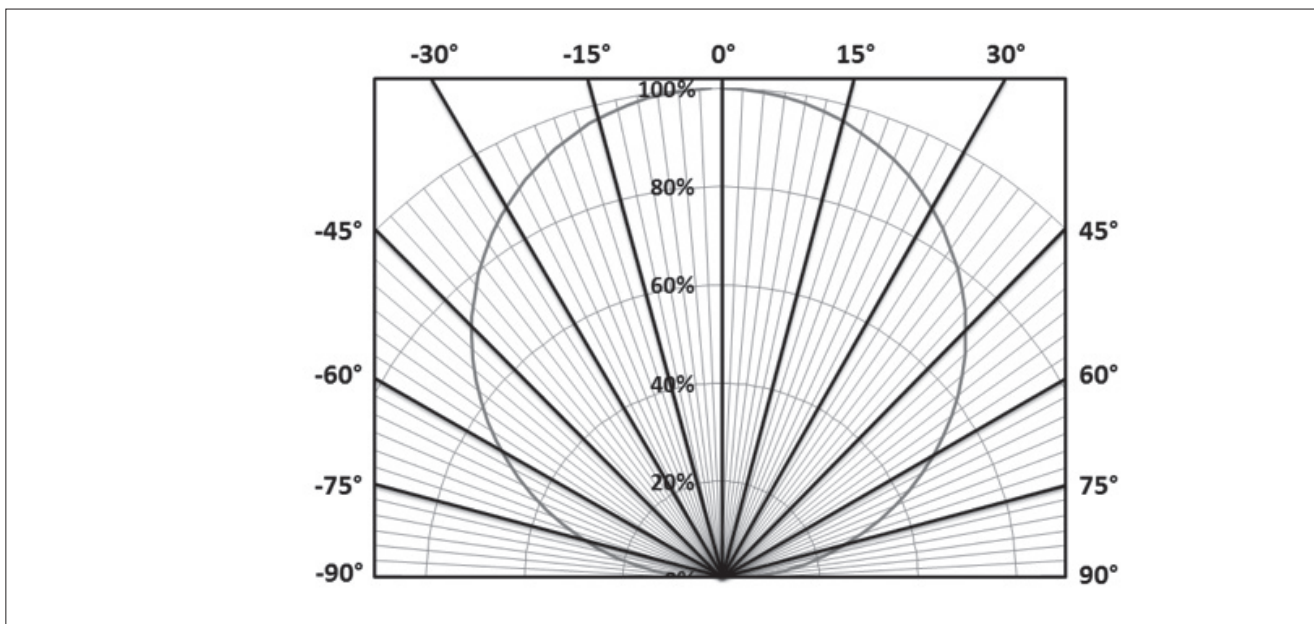
Figure 7: Typical Spatial Radiation Pattern



Notes for Figure 7:

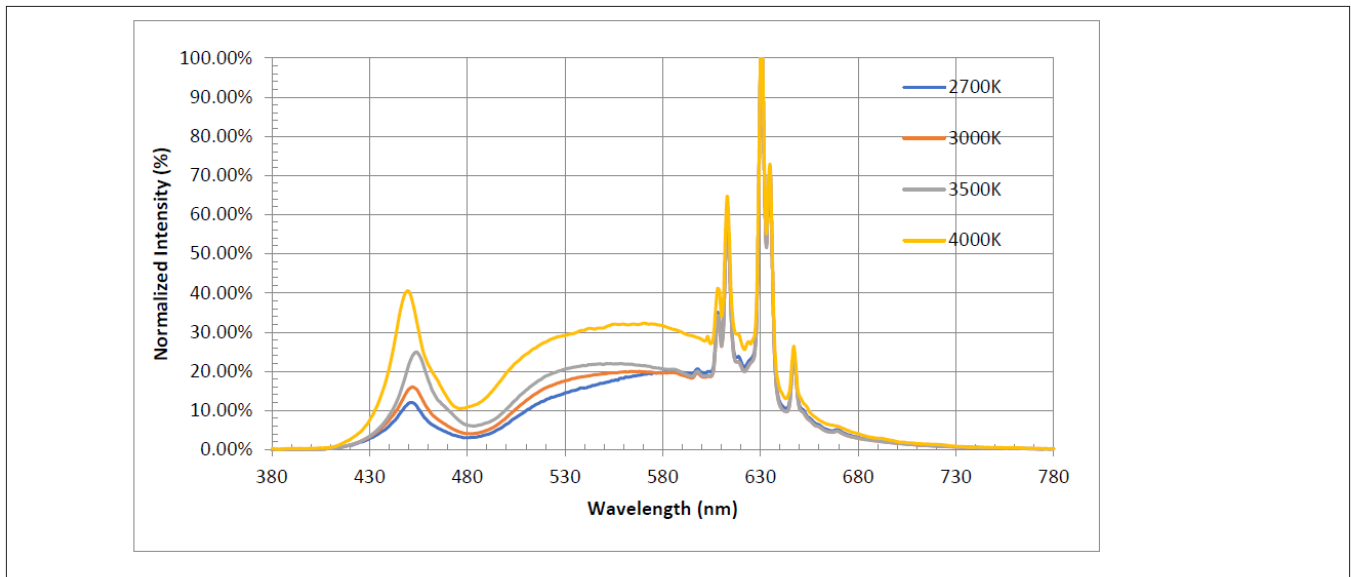
1. Typical viewing angle is 120°.
2. The viewing angle is defined as the off axis angle from the centerline where intensity is ½ of the peak value.

Figure 8: Typical Polar Radiation Pattern



Typical Color Spectrum

Figure 9: Typical Color Spectrum

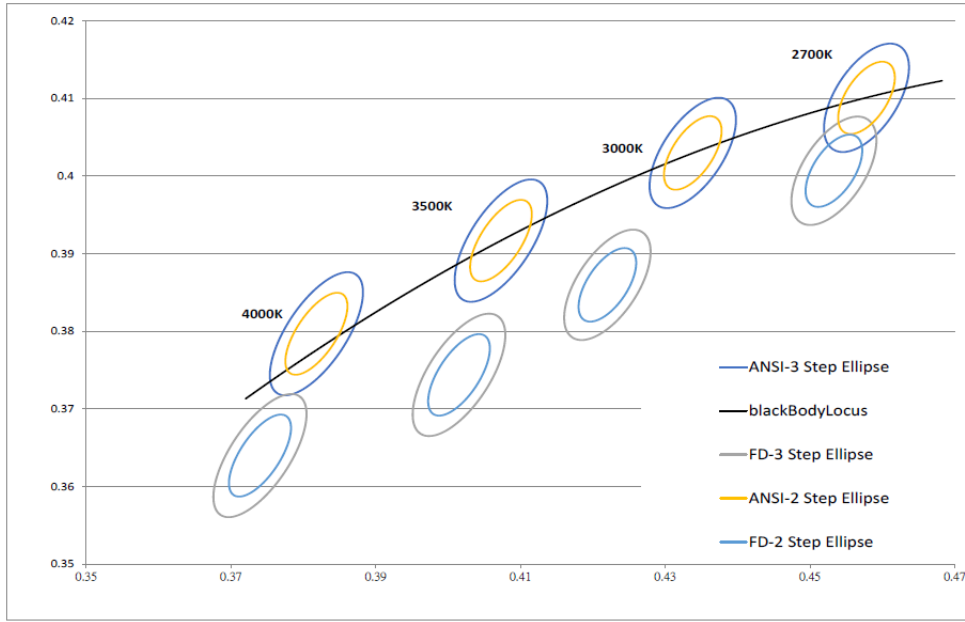


Notes for Figure 9:

1. Color spectra measured at nominal current for $T_j = T_c = 65^\circ\text{C}$.
2. Color spectra shown is 2700K and 90CRI.
3. Color spectra shown is 3000K and 90 CRI.
4. Color spectra shown is 3500K and 90 CRI.
5. Color spectra shown is 4000K and 90 CRI.

Color Binning Information

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



Note: Pulsed Test Conditions, $T_c = 65^\circ\text{C}$

Table 8: Warm and Neutral White xy Bin Coordinates and Associated Typical CCT (product is hot targeted to $T_c = 65^\circ\text{C}$)

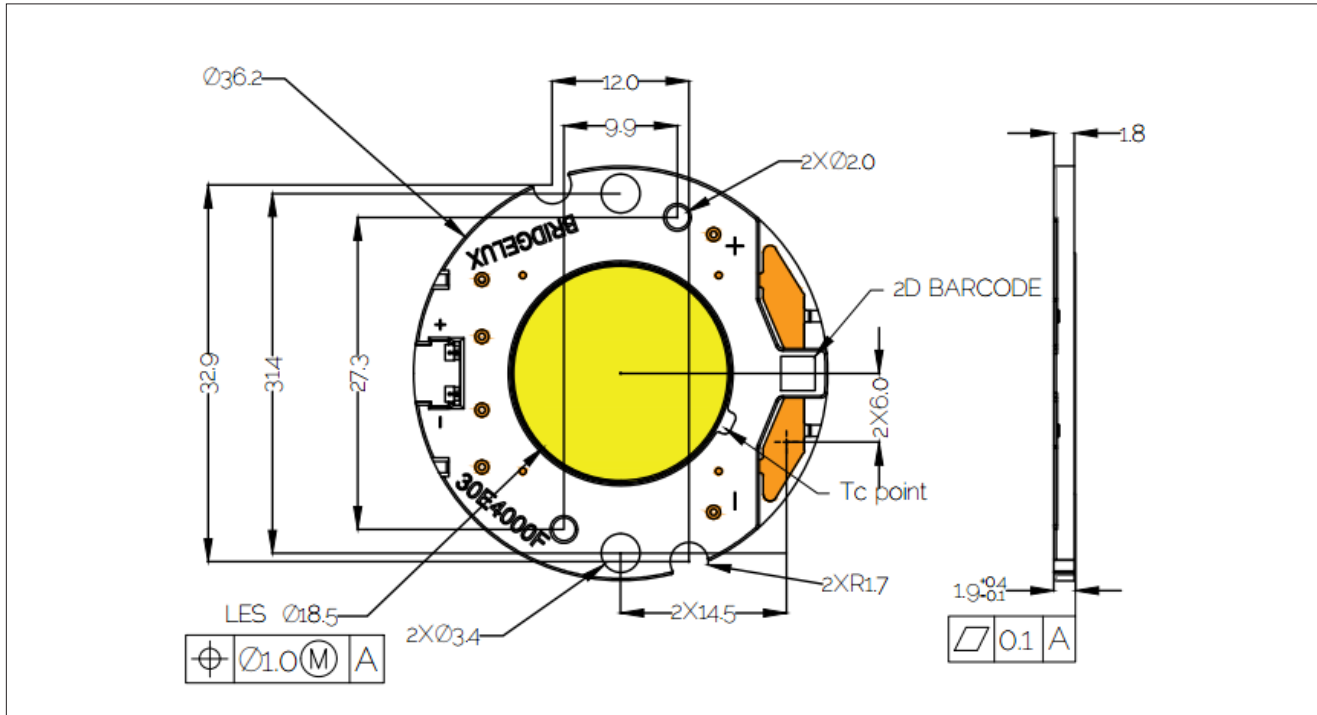
Bin Code	2700K	3000K	3500K	4000K
ANSI Bin (for reference only)	(2580K - 2870K)	(2870K - 3220K)	(3220K - 3710K)	(3710K - 4260K)
83 (3 SDCM)	(2645K - 2788K)	(3025K - 3210K)	(3333K - 3567K)	(3935K - 4254K)
82 (2 SDCM)	(2668K - 2764K)	(3055K - 3178K)	(3370K - 3526K)	(3985K - 4197K)
Center Point (x,y)	(0.4533, 0.4007)	(0.422, 0.386)	(0.4015, 0.3744)	(0.374, 0.364)

Note for Tables 8:

1. Bridgelux maintains a tolerance of +/- 0.007 on x and y color coordinates in the CIE 1931 color Space.

Mechanical Dimensions

Figure 11: Drawing for Vero18 LED Array

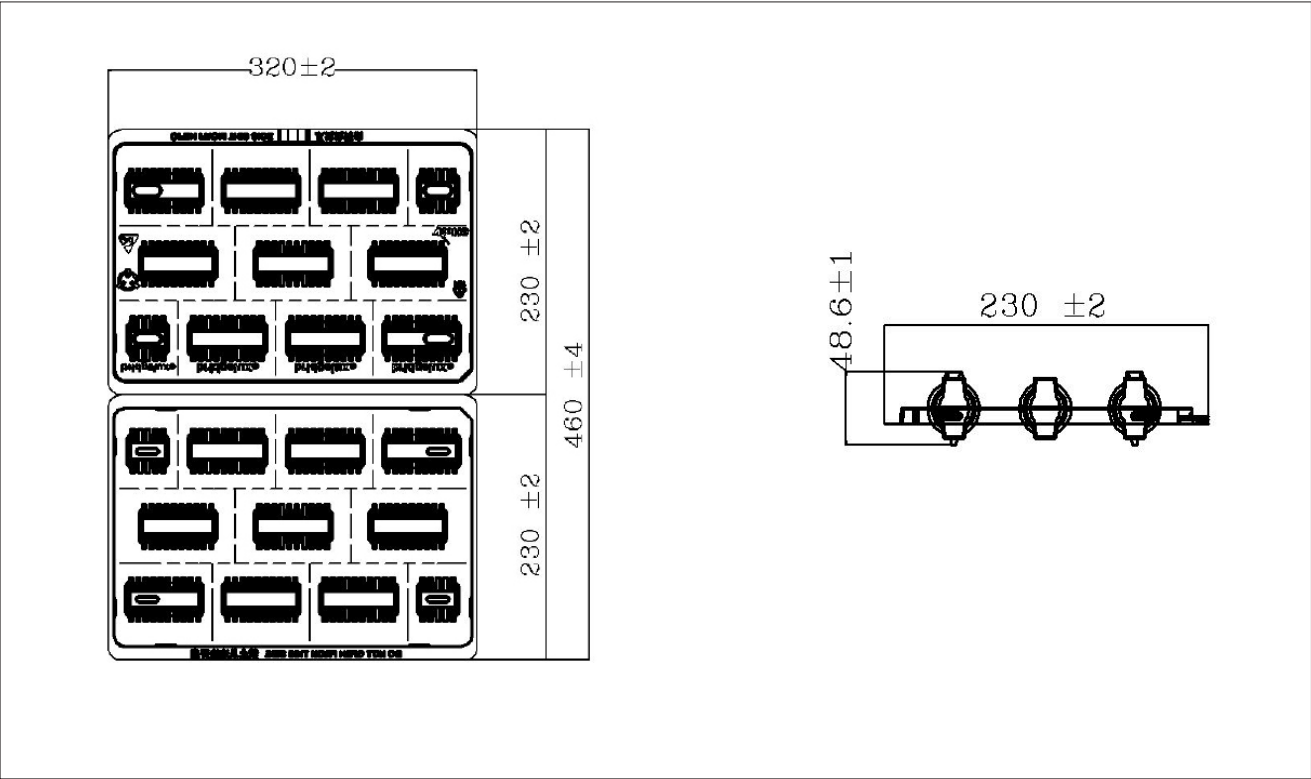


Notes for Figure 11:

1. Drawings are not to scale.
2. Drawing dimensions are in millimeters.
3. Unless otherwise specified, tolerances are $\pm 0.1\text{mm}$.
4. Mounting holes (2X) are for M2.5 screws.
5. Bridgelux recommends two tapped holes for mounting screws with $31.4 \pm 0.10\text{mm}$ 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 $\pm 0.2\text{mm}$.
11. Bridgelux maintains a flatness of 0.10mm across the mounting surface of the array.

Packaging and Labeling

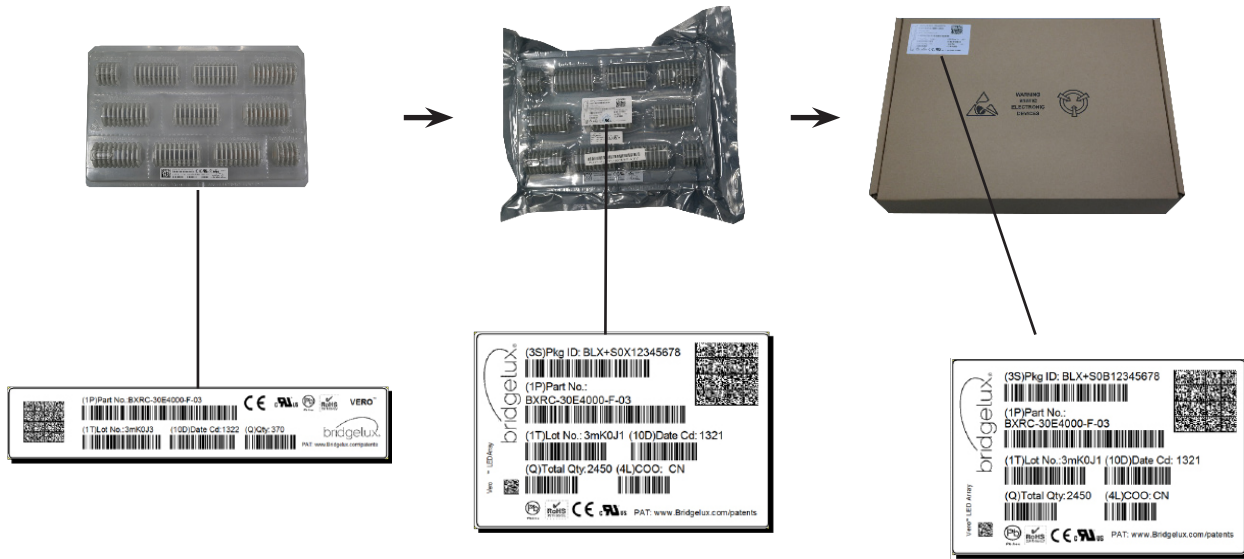
Figure 12: Drawing for Vero 18 Packaging Tray



- 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.

LM80

LM80 testing has been completed and the LM80 report is now available. Please contact your Bridgelux sales representative for LM-80 report.

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: 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: 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.

For more information about the company, please visit

bridgelux.com

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linkedin.com/company/bridgelux-inc-_2

youtube.com/user/Bridgelux

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