



Bridgelux Vero® SE 13 F90 Array

Product Data Sheet DS358-3



BXRC-27G | 30G | 35G | 40G

Introduction

Vero SE F90



The Vero® SE Series is a revolutionary light source system that integrates Bridgelux's eighth generation COB technology with poke-in connectivity, enabling solder-free installation. Vero SE LED light sources streamline assembly processes, lower manufacturing costs, simplify the luminaire design process, improve light quality, and increase design flexibility.

Vero SE is available in four different light emitting surface (LES) configurations that operate reliably over a broad current range. With Vero SE, secondary connector and holder components are not required, allowing for rapid integration of arrays into fixtures, and an efficient field replaceable solution. Vero SE arrays deliver increased lumen density for improved beam control and precision lighting, with 2 and 3 SDCM color control standards for clean and consistent uniform lighting.

The F90 Vero® SE 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® SE Series product.

Features

- Efficacy of 178 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

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



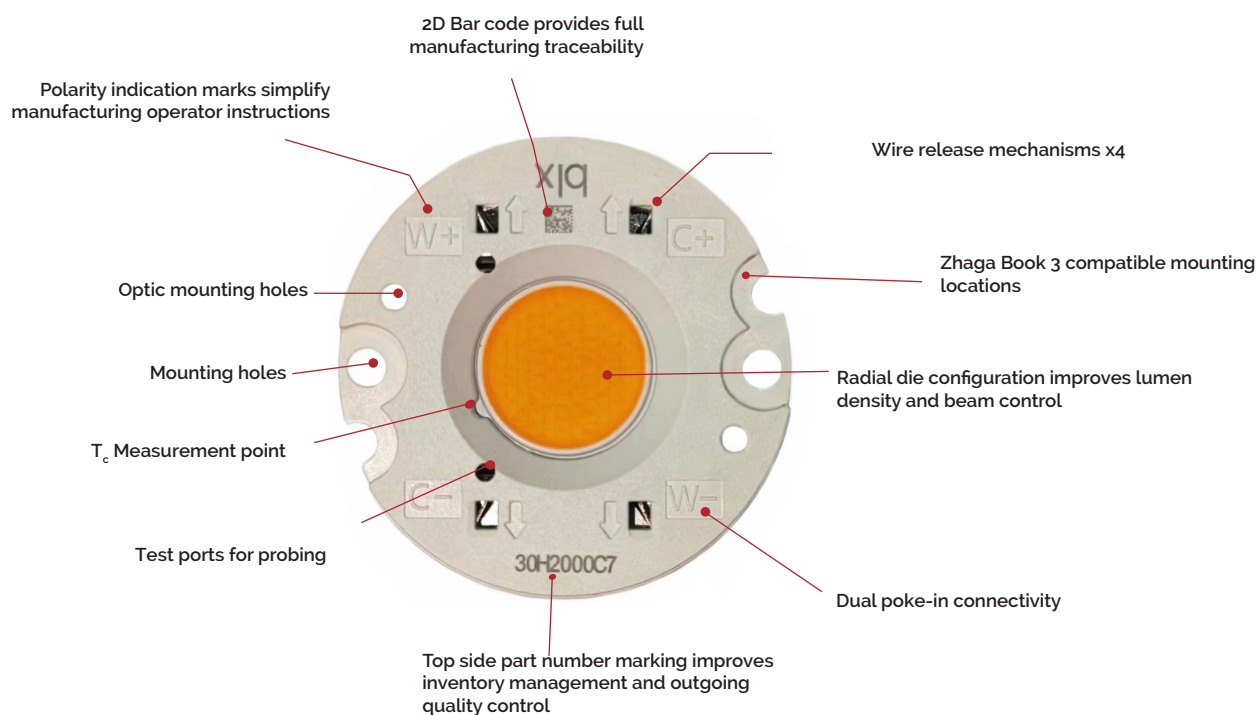
Contents

Product Feature Map	2
Product Nomenclature	2
Product Selection Guide	3
European Product Registry for Energy Labeling	4
Performance at Commonly Used Drive Currents	5
Electrical Characteristics	7
Eye Safety	8
Absolute Maximum Ratings	9
Performance Curves	10
Typical Radiation Pattern	11
Typical Color Spectrum	12
Product Bin Definitions	13
Mechanical Dimensions	14
Packaging and Labeling	15
Design Resources	17
Precautions	17
Disclaimers	17
About Bridgelux	18

Product Feature Map

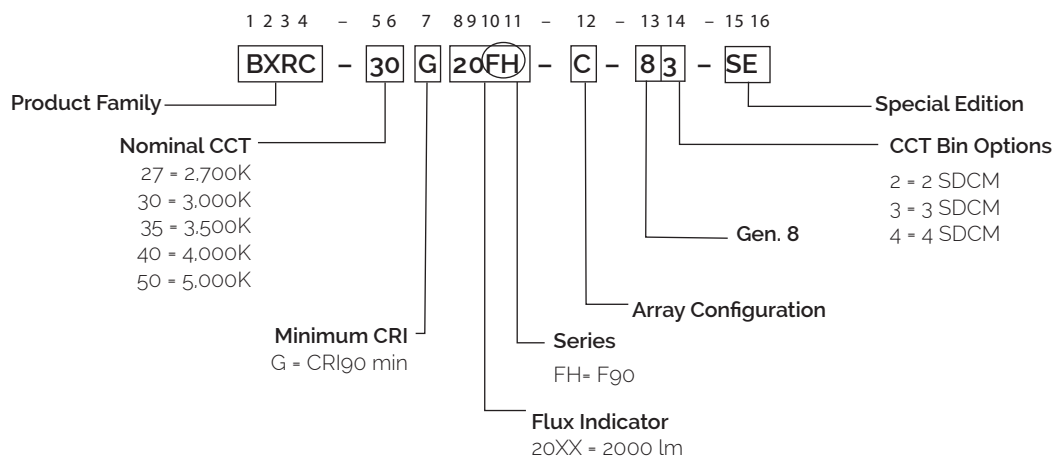
Vero SE 13 is the second smallest form factor in the product family of the next generation solid state light sources. In addition to delivering the performance and light quality required for many lighting applications,

Vero SE 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 SE 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-27G20FH-B-8x-SE	2700	90	350	2091	1882	34.3	12.0	174
BXRC-27G20FH-C-8x-SE	2700	90	500	2975	2678	34.3	17.2	173
BXRC-30G20FH-B-8x-SE	3000	90	350	2134	1920	34.3	12.0	178
BXRC-30G20FH-C-8x-SE	3000	90	500	3036	2732	34.3	17.2	177
BXRC-35G20FH-B-8x-SE	3500	90	350	2120	1908	34.3	12.0	177
BXRC-35G20FH-C-8x-SE	3500	90	500	3018	2716	34.3	17.2	176
BXRC-40G20FH-B-8x-SE	4000	90	350	2142	1928	34.3	12.0	178
BXRC-40G20FH-C-8x-SE	4000	90	500	3050	2745	34.3	17.2	178

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

Part Number	Nominal CCT ¹ (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-27G20FH-B-8x-SE	2700	90	350	1955	1760	33.9	11.8	165
BXRC-27G20FH-C-8x-SE	2700	90	500	2782	2504	33.9	16.9	164
BXRC-30G20FH-B-8x-SE	3000	90	350	1995	1795	33.9	11.8	168
BXRC-30G20FH-C-8x-SE	3000	90	500	2839	2555	33.9	16.9	168
BXRC-35G20FH-B-8x-SE	3500	90	350	1983	1784	33.9	11.8	167
BXRC-35G20FH-C-8x-SE	3500	90	500	2822	2540	33.9	16.9	167
BXRC-40G20FH-B-8x-SE	4000	90	350	2003	1803	33.9	11.8	169
BXRC-40G20FH-C-8x-SE	4000	90	500	2851	2566	33.9	16.9	168

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 Rg value for 90 CRI products is 50. Bridgelux maintains a ± 3 tolerance on CRI and Rg 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.


European Product Registry for Energy Labeling

The European Product Registry for Energy Labeling (EPREL) is defined in the EU Regulation 2017/1369 to provide important energy efficiency information to consumers. Together with Energy Labeling Regulation ELR (EU) 2019/2015 which was amended by regulation (EU) 2021/340 for energy labelling of light sources, manufacturers are required to declare an energy class based on key technical specifications from each of their product and register it in an open data base managed by EPREL. It is now a legal requirement for a vendor of light sources to upload information about their products into the EPREL database before placing these products on the market in the EU.

Table 3 below provides a list of part numbers that are in compliance with ELR and are currently listed in the EPREL database.

At Bridgelux, we are fully committed to supplying products that are compliant with pertinent laws, rules, and obligation imposed by relevant government bodies including the European Energy Labeling regulation. Customers can use these products with full confidence for any projects that fall under the ELR.

Table 3: Part numbers registered in European Product Registry for Energy Labeling

PART NUMBER ¹	CCT (K)	CRI	Current ² (mA)	Vf (V)	Useful flux ³ (Φ_{use}) at 85C (lm)	Power (W)	Efficacy (lm/W)	Energy efficiency class ⁴ 	Registration No	URL to Product Information Sheet in EPREL Database
BXRC-30G20FH-B-83-SE	3000	90	900	38.6	3854	35	111	E	1442019	https://eprelec.europa.eu/qr/1442019
BXRC-40G20FH-B-83-SE	4000	90	900	38.6	3871	35	111	E	1442020	https://eprelec.europa.eu/qr/1442020

Notes for Table 3:

1. All device listed here must be disposed as e-waste upon its end of life according to local country guideline in each country.
2. For information on performance values at alternative drive conditions, please refer to the Product Selection Guide, Absolute Maximum Rating Table and Performance Curves in this data sheet.
3. For a definition of useful luminous flux (Φ_{use}), please see the ELR regulations at <https://tinyurl.com/4b6zvt4m>.
4. EPREL requires an arrow symbol containing the letter of the energy efficiency class to be displayed, on technical promotional material. Refer to this energy efficiency class column for specific energy efficiency class on each part number.

Performance at Commonly Used Drive Currents

Vero SE LED arrays are tested to the specifications shown using the nominal drive currents in Table 1. Vero SE 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-27G20FH-B-8x-SE	90	175	33	5.8	1051	1015	182
		260	33.6	8.7	1562	1481	179
		350	34.3	12.0	2091	1955	174
		450	35	15.8	2660	2459	169
		700	36.6	25.6	4003	3624	156
		900	37.7	33.9	4996	4472	147
BXRC-27G20FH-C-8x-SE	90	250	33	8.3	1513	1445	183
		375	33.6	12.6	2271	2128	180
		500	34.3	17.2	2975	2782	173
		630	34.9	22.0	3753	3437	171
		1000	36.6	36.6	5750	5152	157
		1260	37.7	47.5	7049	6234	148
BXRC-30G20FH-B-8x-SE	90	175	33	5.8	1072	1035	186
		260	33.6	8.7	1594	1511	182
		350	34.3	12.0	2134	1994	178
		450	35	15.8	2715	2510	172
		700	36.6	25.6	4086	3699	159
		900	37.7	33.9	5098	4564	150
BXRC-30G20FH-C-8x-SE	90	250	33	8.3	1544	1475	187
		375	33.6	12.6	2317	2171	184
		500	34.3	17.2	3036	2839	177
		630	34.9	22.0	3829	3507	174
		1000	36.6	36.6	5869	5259	160
		1260	37.7	47.5	7193	6361	151
BXRC-35G20FH-B-8x	90	175	33	5.8	1066	1029	185
		260	33.6	8.7	1586	1503	181
		350	34.3	12.0	2120	1983	177
		450	35	15.8	2698	2494	171
		700	36.6	25.6	4062	3677	159
		900	37.7	33.9	5069	4537	149
BXRC-35G20FH-C-8x-SE	90	250	33	8.3	1535	1466	186
		375	33.6	12.6	2304	2159	183
		500	34.3	17.2	3018	2821	176
		630	34.9	22.0	3807	3486	173
		1000	36.6	36.6	5836	5229	159
		1260	37.7	47.5	7152	6325	151

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-40G20FH-B-8x-SE	90	175	33	5.8	1076	1039	186
		260	33.6	8.7	1602	1518	183
		350	34.3	12.0	2142	2003	178
		450	35	15.8	2725	2519	173
		700	36.6	25.6	4102	3713	160
		900	37.7	33.9	5120	4582	151
BXRC-40G20FH-C-8x-SE	90	250	33	8.3	1550	1481	188
		375	33.6	12.6	2327	2181	185
		500	34.3	17.2	3050	2852	178
		630	34.9	22.0	3845	3522	175
		1000	36.6	36.6	5893	5282	161
		1260	37.7	47.5	7223	6390	152

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-xxx20Fx-B-8x-SE	350	32.2	34.3	36.3	-11	0.22	31.4	37.1
	900	35.5	37.7	40.0	-12	0.34	34.6	40.8
BXRC-xxx20Fx-C-8x-SE	500	32.2	34.3	36.3	-11	0.19	31.4	37.1
	1260	35.4	37.7	39.9	-12	0.29	34.6	40.7

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-xxx20Fx-B-8x-SE	710	RG1	RG1
	900	RG1	RG2
BXRC-xxx20Fx-C-8x-SE	740	RG1	RG1
	1260	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-xxx20Fx-B-8x-SE	BXRC-xxx20Fx-C-8x-SE
Maximum Drive Current ⁴	900 mA at $\leq 85^\circ\text{C}$ 675 mA at 95°C	1260 mA at $\leq 85^\circ\text{C}$ 945 mA at 95°C
Maximum Peak Pulsed Drive Current ⁵	1290 mA	1800 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: Bridgelux Vero SE Array Design Guide.
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: Vero SE 13B Drive Current vs. Voltage

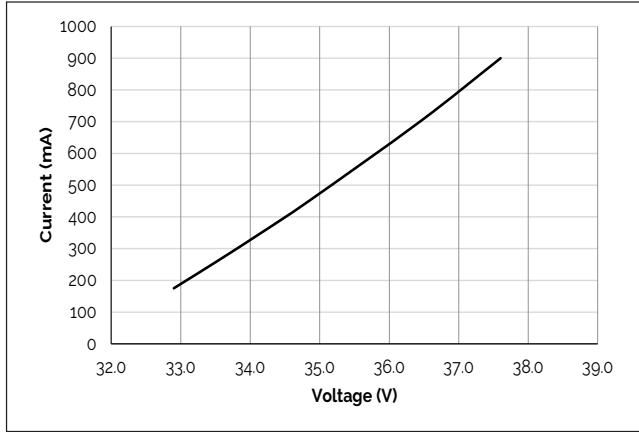


Figure 2: Vero SE 13C Drive Current vs. Voltage

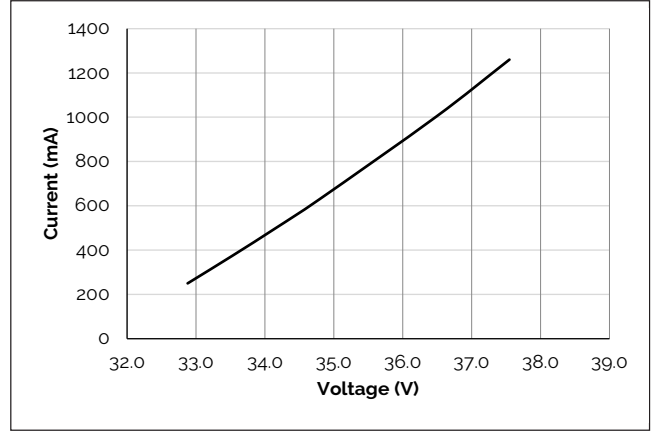


Figure 3: Vero SE 13B Typical Relative Flux vs. Current

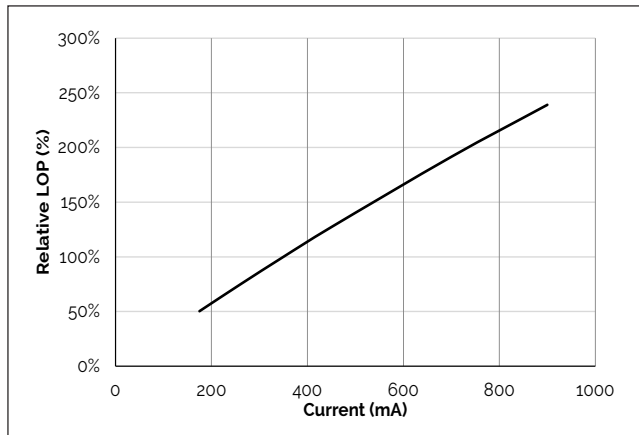


Figure 4: Vero SE 13C Typical Relative Flux vs. Current

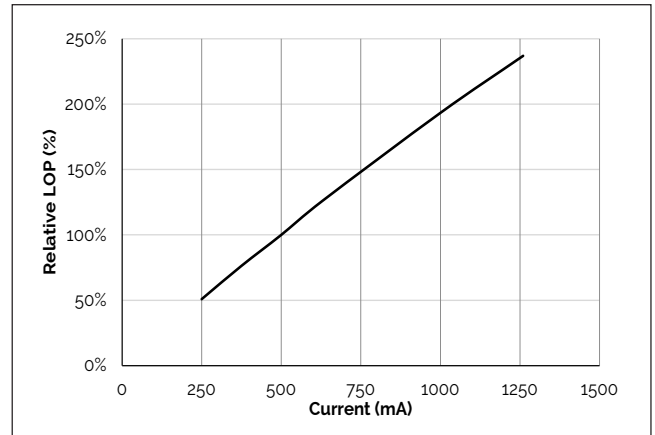


Figure 5: Typical DC Flux vs. Case Temperature

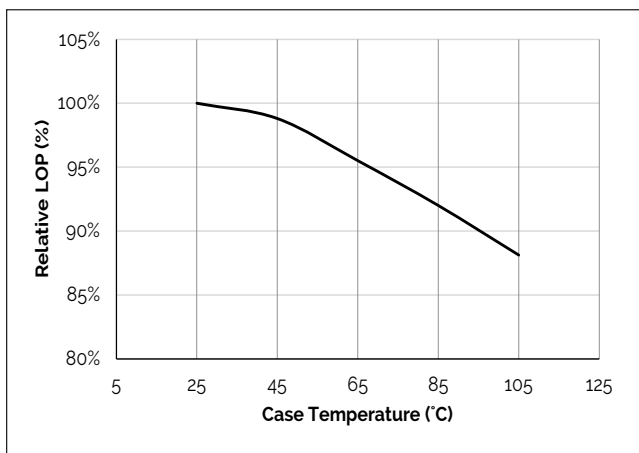
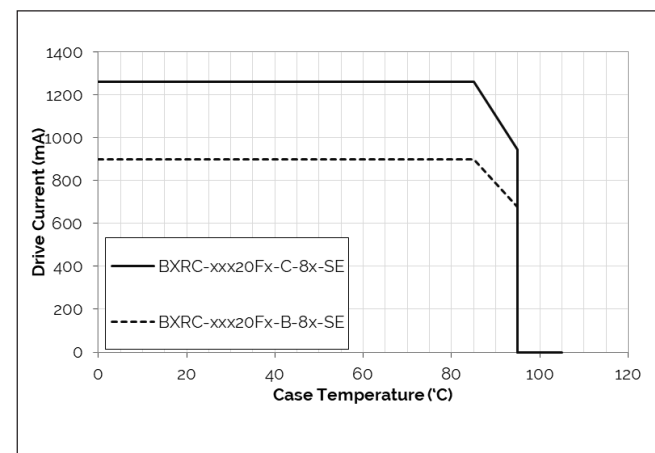


Figure 6: Derating Curve



Notes for Figures 1-4:

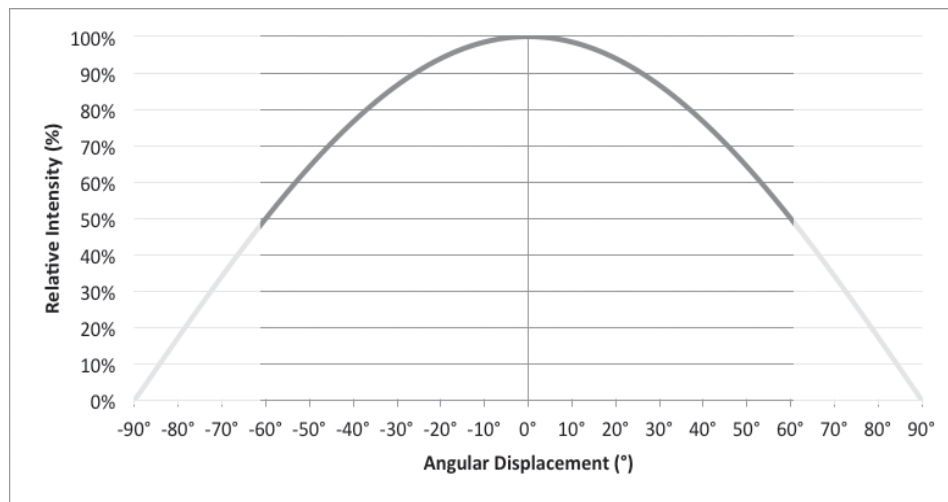
1. Bridgelux does not recommend driving high power LEDs at low currents. Doing so may produce unpredictable results. Pulse width modulation (PWM) is recommended for dimming effects.
2. Products tested under pulsed condition (10ms pulse width) at nominal drive current where T_j (junction temperature)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

Note for Figures 5-6:

1. Characteristics shown for Warm White.

Typical Radiation Pattern

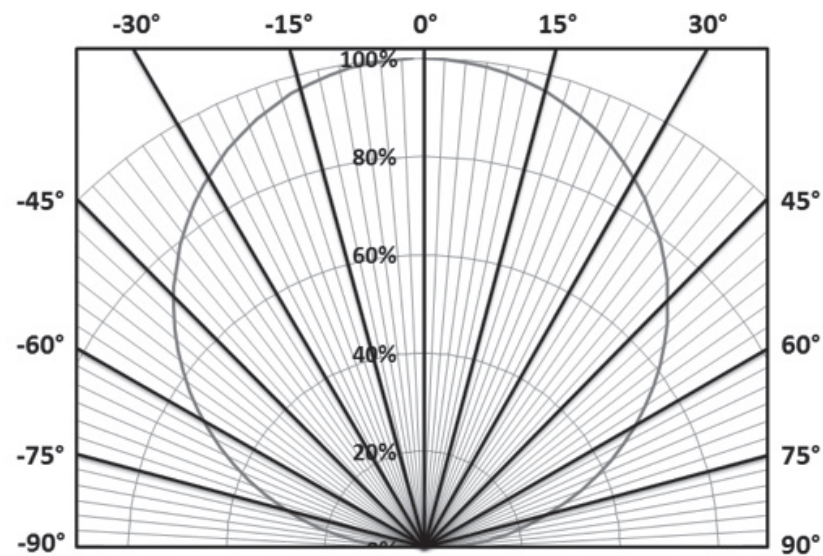
Figure 7: Typical Spatial Radiation Pattern



Notes for Figure 7:

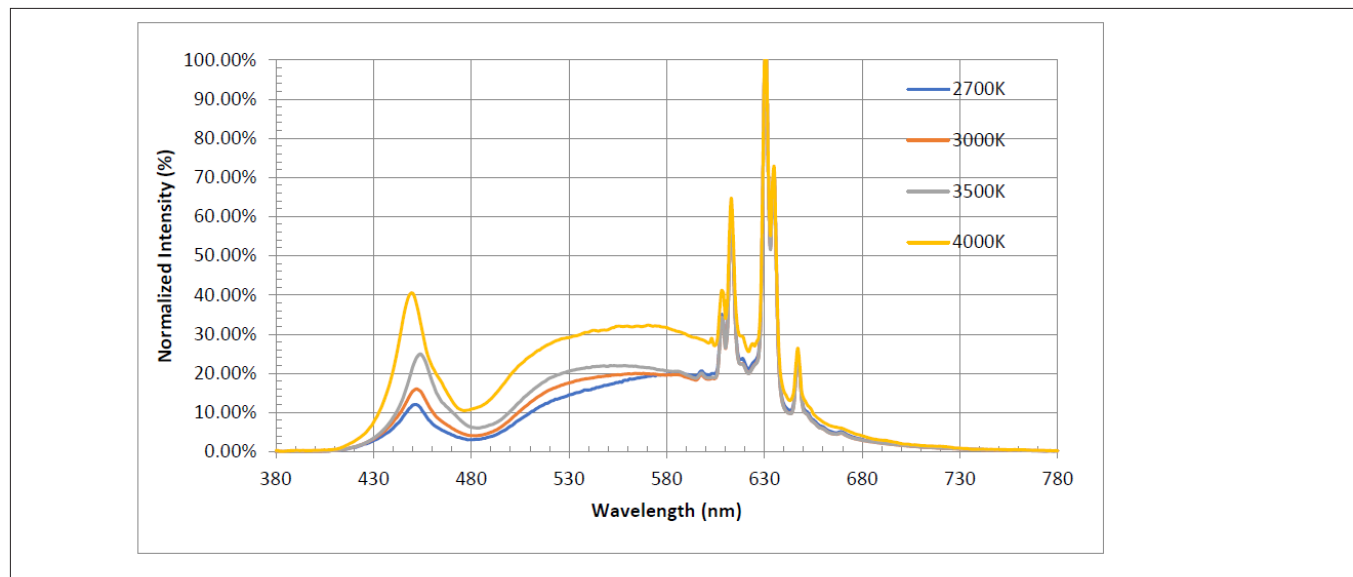
1. Typical viewing angle is 120°.
2. The viewing angle is defined as the off axis angle from the centerline where intensity is $\frac{1}{2}$ of the peak value.

Figure 8: Typical Polar Radiation Pattern



Typical Color Spectrum

Figure 9: Typical Color Spectrum

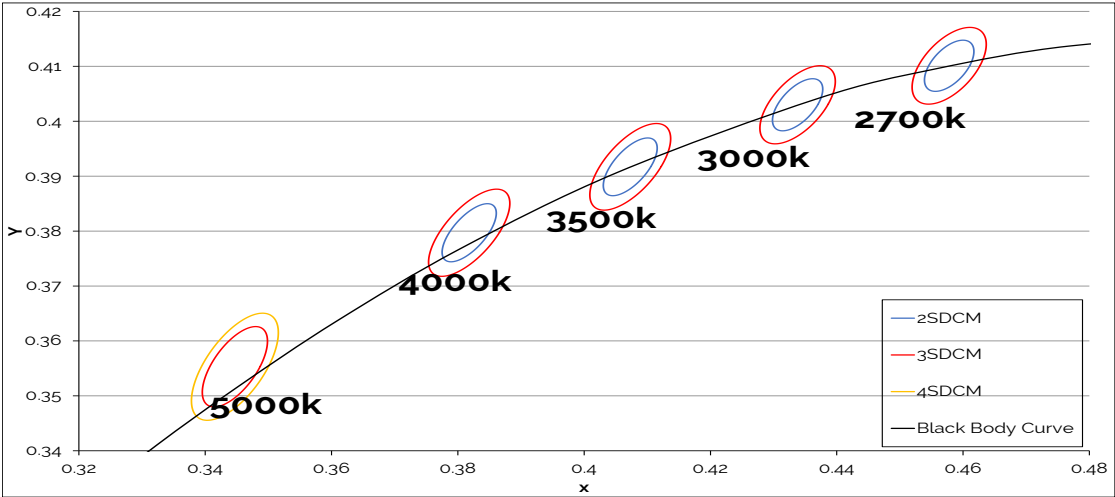


Notes for Figure 9:

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 not targeted to $T_c = 65^\circ\text{C}$)

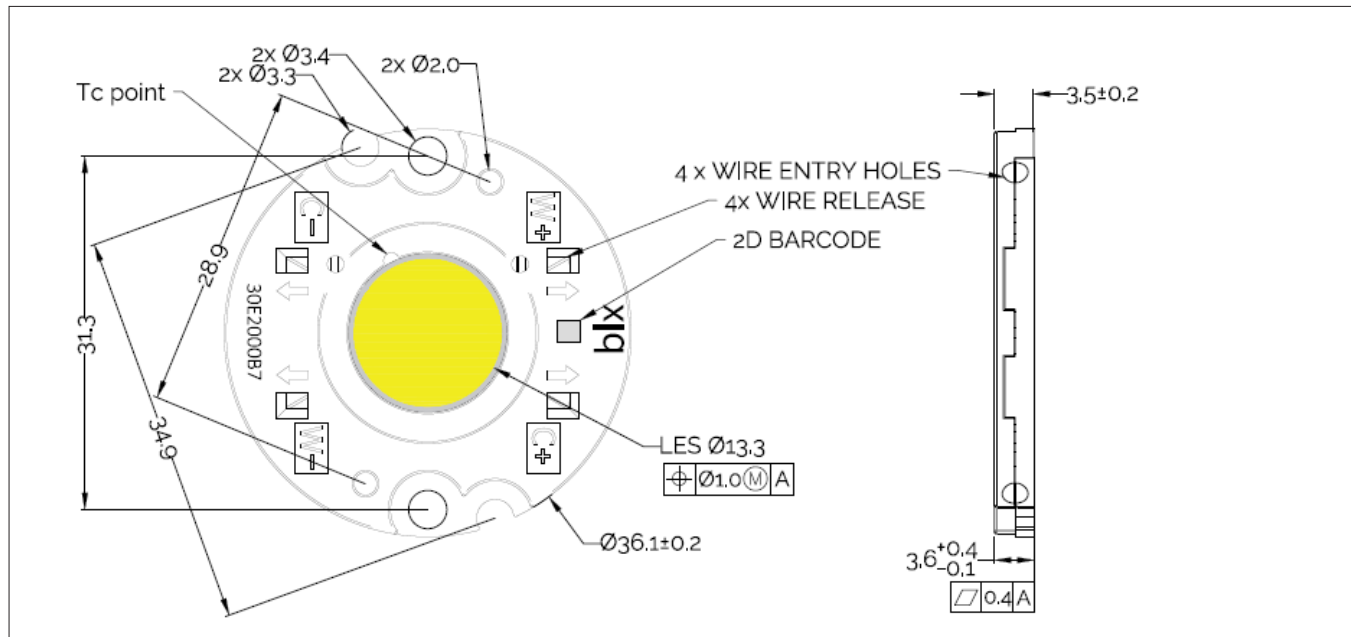
Bin Code	2700K	3000K	3500K	4000K
ANSI Bin (for reference only)	(2580K - 2870K)	(2870K - 3220K)	(3220K - 3710K)	(3710K - 4260K)
83 (3 SDCM)	(2651K - 2794K)	(2968K - 3136K)	(3369K - 3586K)	(3851K - 4130K)
82 (2 SDCM)	(2674K - 2769K)	(2995K - 3107K)	(3404K - 3548K)	(3895K - 4081K)
Center Point (x,y)	(0.4578, 0.4101)	(0.4338, 0.403)	(0.4073, 0.3917)	(0.3818, 0.3797)

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 Vero SE 13 LED Array

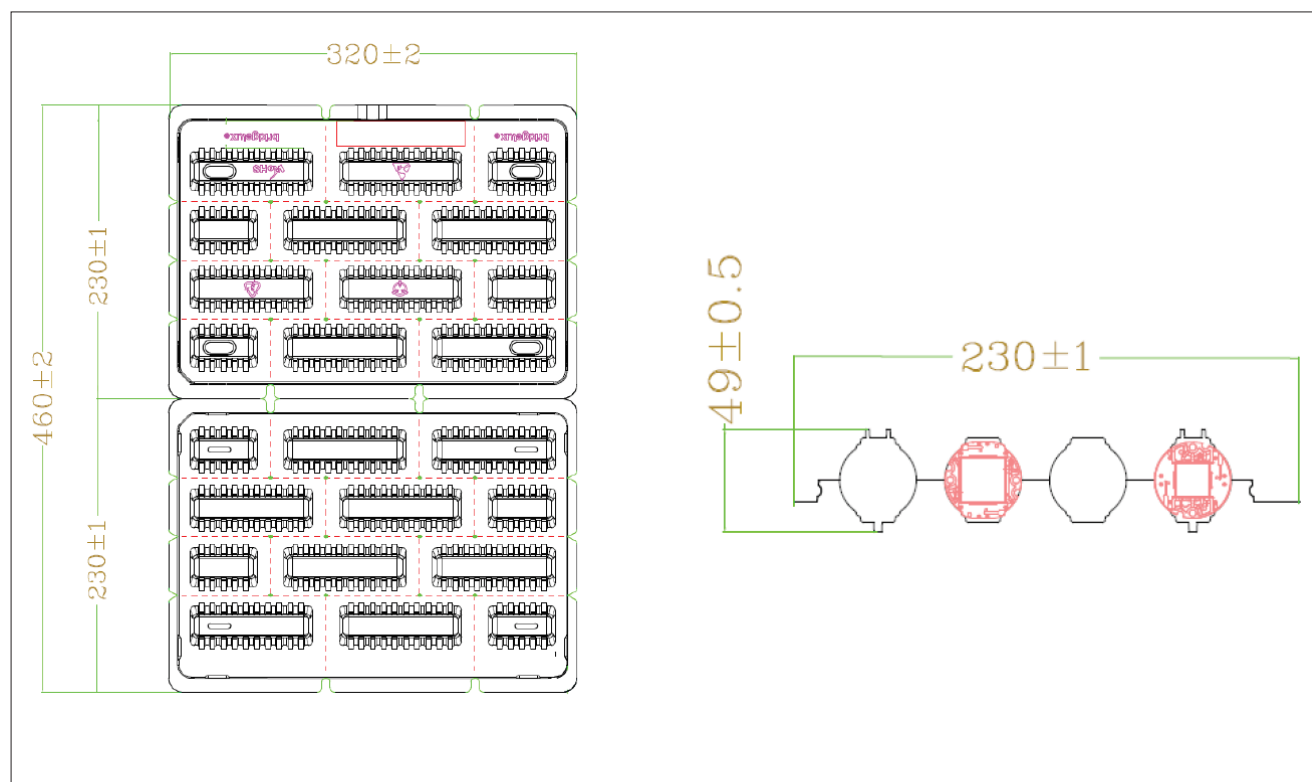


Notes for Figure 11:

1. Drawings are not to scale.
2. Dimensions are in mm.
3. Unless otherwise specified, tolerances are $\pm 0.15\text{mm}$.
4. Mounting holes (2X) are for M3 screws.
5. Bridgelux recommends two tapped holes for mounting screws with $31.3 \pm 0.10\text{mm}$ 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. The optical center of the LED Array is nominally defined by the mechanical center of the array to a tolerance of $\pm 0.2\text{mm}$.
8. Bridgelux maintains a flatness of 0.10mm across the mounting surface of the array.

Packaging and Labeling

Figure 12: Drawing for Vero SE 13 Packaging Tray

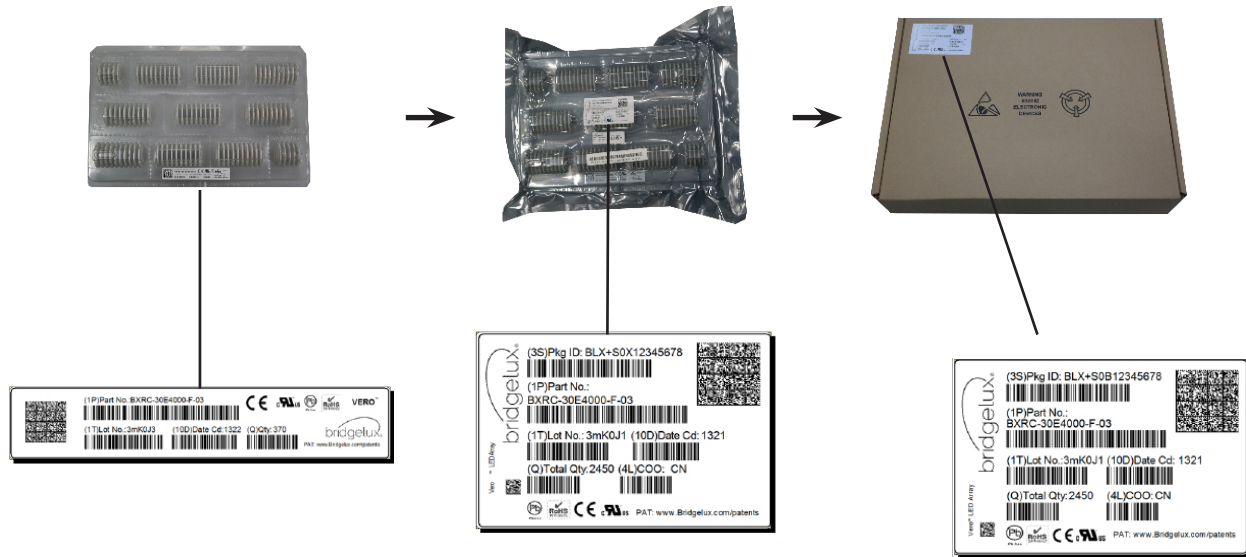


Notes for Figure 12:

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

Packaging and Labeling

Figure 13: Vero SE 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 SE 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 SE 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 AN120 for additional information.

CAUTION: RISK OF BURN

Do not touch the Vero SE LED array during operation. Allow the array to cool for a sufficient period of time before handling. The Vero SE 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 SE 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

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