bridgelux®

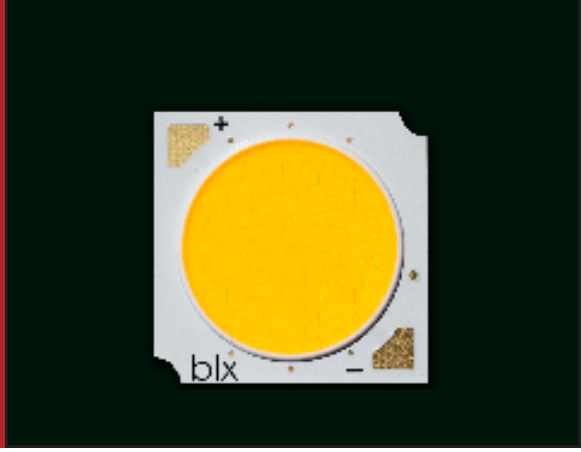
Bridgelux® Gen8 V13 F90 Array Series

Product Data Sheet DS447

FIVE YEAR Warranty™

Introduction

V Series



The V Series™ LED Array products deliver high quality light in a compact and cost-effective solid-state lighting package. These chip on board (CoB) arrays can be efficiently driven up to three two times the nominal drive current, enabling design flexibility not previously possible. These high flux density light sources are designed to support a wide range of high quality, low cost directional luminaires and replacement lamps for both interior and exterior commercial and residential applications.

The F90 V Series COB is a high efficacy product that use narrow band red phosphor to significantly improve the spectrum efficacy. F90 V Series COB CRI 90 product can get equivalent or better efficacy compare to the nitride based CRI 80 COB

The V13 LED Array is available in a variety of electrical, CCT, and CRI combinations providing substantial design flexibility and energy efficiency advantages.

Lighting system designs incorporating these LED arrays deliver increased system level efficacy and a longer service life. Typical applications include replacement lamps and task, accent, spot, track, wide area, security, wall packs and down lights.

Features

- Efficacy of 187 lm/W typical, 3000K 90 CRI
- Wide selection of CCT options (2700K-5000K) with minimum 90 CRI options
- Uniform high-quality illumination
- 2 and 3 SDCM binning options (2700K – 4000K)
- 3 and 4 SDCM binning options (5000K)
- Forward voltage bin codes and backside marking
- Instant light with unlimited dimming
- 5-Year warranty

Benefits

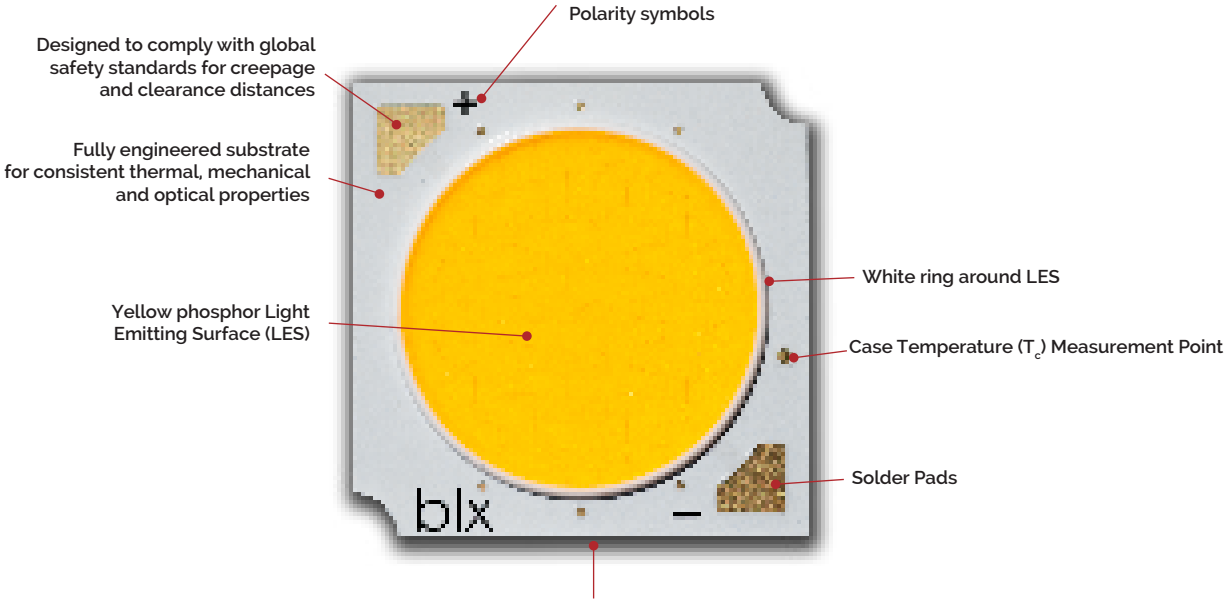
- Enables high efficiency lighting systems and lower operating costs
- Supports the trend toward luminaire miniaturization and delivers enhanced optical control
- Design flexibility for a broad range of lighting applications
- Clean white light without pixelation
- Uniform consistent white light
- Design flexibility for multi-source applications
- Easy to use with daylight and motion sensors to increase energy savings
- Design with confidence

Contents

Product Feature Map

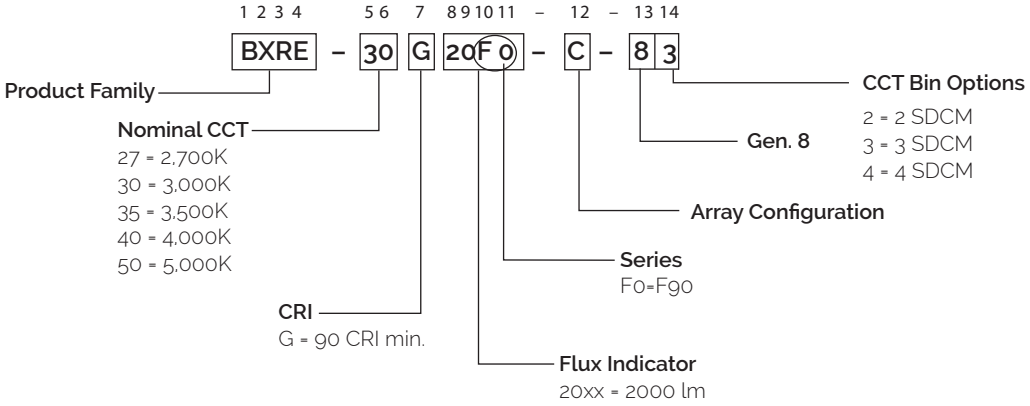
Bridgelux arrays are fully engineered devices that provide consistent thermal and optical performance on an engineered mechanical platform. The V Series arrays are the most compact chip-on-board devices across all of Bridgelux's LED Array products.

The arrays incorporate several features to simplify design integration and assembly. Please visit www.bridgelux.com for more information on the V Series family of products.



Product Nomenclature

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



Product Selection Guide

The following product configurations are available:

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

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)
BXRE-27G20F0-B-8x	2700	90	350	2211	1989	34.2	12.0	185
BXRE-27G20F0-C-8x	2700	90	500	3146	2832	34.2	17.1	184
BXRE-30G20F0-B-8x	3000	90	350	2256	2030	34.2	12.0	189
BXRE-30G20F0-C-8x	3000	90	500	3210	2889	34.2	17.1	188
BXRE-35G20F0-B-8x	3500	90	350	2278	2050	34.2	12.0	191
BXRE-35G20F0-C-8x	3500	90	500	3242	2918	34.2	17.1	190
BXRE-40G20F0-B-8x	4000	90	350	2301	2071	34.2	12.0	192
BXRE-40G20F0-C-8x	4000	90	500	3275	2947	34.2	17.1	192
BXRE-50G20F0-B-8x	5000	90	350	2233	2010	34.2	12.0	187
BXRE-50G20F0-C-8x	5000	90	500	3178	2860	34.2	17.1	186

Notes for Table 1:

1. Nominal CCT as defined by ANSI C78.377-2011.
2. CRI values are minimums and tested at $T_j = T_c = 85°C$. Minimum R9 value for 90 CRI products is 50.Bridgelux maintains a ± 3 tolerance on CRI and R9 values.
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.

Product Selection Guide

Table 2: Selection Guide, Stabilized DC Performance (T_c = 85°C) [4,5]

Part Number	Nominal CCT[1] (K)	CRI[2]	Nominal Drive Current[3] (mA)	Typical DC Flux[4,5] T_c = 85°C (lm)	Minimum DC Flux[6] T_c = 85°C (lm)	Typical V_f (V)	Typical Power (W)	Typical Efficacy (lm/W)
BXRE-27G20F0-B-8x	2700	90	350	2034	1830	33.3	11.7	174
BXRE-27G20F0-C-8x	2700	90	500	2894	2605	33.3	16.7	174
BXRE-30G20F0-B-8x	3000	90	350	2075	1868	33.3	11.7	178
BXRE-30G20F0-C-8x	3000	90	500	2954	2658	33.3	16.7	177
BXRE-35G20F0-B-8x	3500	90	350	2096	1886	33.3	11.7	180
BXRE-35G20F0-C-8x	3500	90	500	2983	2685	33.3	16.7	179
BXRE-40G20F0-B-8x	4000	90	350	2117	1905	33.3	11.7	181
BXRE-40G20F0-C-8x	4000	90	500	3013	2711	33.3	16.7	181
BXRE-50G20F0-B-8x	5000	90	350	2054	1849	33.3	11.7	176
BXRE-50G20F0-C-8x	5000	90	500	2924	2632	33.3	16.7	175

Notes for Table 2:

1. Nominal CCT as defined by ANSI C78.377-2011.
2. CRI values are minimums and tested at T_j - T_c - 85°C. Minimum R9 value for 90 CRI products is 50,
3. Drive current is referred to as nominal drive current.
4. Typical stabilized DC performance values are provided as reference only and are not a guarantee of performance.
5. 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.
6. 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.

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] (Φuse) at 85C (lm)	Power (W)	Efficacy (lm/W)	Energy efficiency class[4]	Registration No	URL to Product Information Sheet in EPREL Database

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 (Φuse), 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

V Series LED arrays are tested to the specifications shown using the nominal drive currents in Table 1. V Series 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°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)
BXRE-27G20F0-B-8x	90	175	32.9	5.8	1111	1040	193
		260	33.5	8.7	1652	1534	190
		350	**34.2**	**12.0**	**2211**	**2034**	**185**
		450	34.8	15.7	2812	2561	179
		700	36.4	25.5	4233	3757	166
		900	37.6	33.8	5283	4591	156
BXRE-27G20F0-C-8x	90	250	32.9	8.2	1600	1498	195
		375	33.5	12.6	2401	2228	191
		500	**34.2**	**17.1**	**3146**	**2894**	**184**
		630	34.8	21.9	3968	3617	181
		1000	36.5	36.5	6081	5398	167
		1260	37.5	47.3	7454	6490	158
BXRE-30G20F0-B-8x	90	175	32.9	5.8	1134	1061	197
		260	33.5	8.7	1686	1565	193
		350	**34.2**	**12.0**	**2256**	**2075**	**189**
		450	34.8	15.7	2870	2614	183
		700	36.4	25.5	4320	3834	169
		900	37.6	33.8	5391	4685	159
BXRE-30G20F0-C-8x	90	250	32.9	8.2	1633	1528	199
		375	33.5	12.6	2450	2274	195
		500	**34.2**	**17.1**	**3210**	**2954**	**188**
		630	34.8	21.9	4049	3691	185
		1000	36.5	36.5	6206	5508	170
		1260	37.5	47.3	7606	6622	161
BXRE-35G20F0-B-8x	90	175	32.9	5.8	1145	1072	199
		260	33.5	8.7	1703	1581	195
		350	**34.2**	**12.0**	**2278**	**2096**	**191**
		450	34.8	15.7	2898	2640	185
		700	36.4	25.5	4363	3872	171
		900	37.6	33.8	5445	4732	161
BXRE-35G20F0-C-8x	90	250	32.9	8.2	1649	1543	201
		375	33.5	12.6	2474	2296	197
		500	**34.2**	**17.1**	**3242**	**2983**	**190**
		630	34.8	21.9	4089	3728	187
		1000	36.5	36.5	6268	5563	172
		1260	37.5	47.3	7682	6688	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 ± 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°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)
BXRE-40G20F0-B-8x	90	175	32.9	5.8	1156	1082	201
		260	33.5	8.7	1720	1596	197
		350	**34.2**	**12.0**	**2301**	**2117**	**192**
		450	34.8	15.7	2927	2666	187
		700	36.4	25.5	4406	3911	173
		900	37.6	33.8	5499	4779	162
BXRE-40G20F0-C-8x	90	250	32.9	8.2	1665	1559	203
		375	33.5	12.6	2499	2319	199
		500	**34.2**	**17.1**	**3275**	**3013**	**192**
		630	34.8	21.9	4130	3765	188
		1000	36.5	36.5	6330	5618	174
		1260	37.5	47.3	7758	6755	164
BXRE-50G20F0-B-8x	90	175	32.9	5.8	1122	1051	195
		260	33.5	8.7	1669	1550	192
		350	**34.2**	**12.0**	**2233**	**2054**	**187**
		450	34.8	15.7	2841	2588	181
		700	36.4	25.5	4276	3796	168
		900	37.6	33.8	5337	4638	158
BXRE-50G20F0-C-8x	90	250	32.9	8.2	1616	1513	197
		375	33.5	12.6	2425	2251	193
		500	**34.2**	**17.1**	**3178**	**2924**	**186**
		630	34.8	21.9	4008	3654	183
		1000	36.5	36.5	6144	5453	168
		1260	37.5	47.3	7530	6556	159

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 ± 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°C (V) [1, 2, 3, 8]			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 = 95°C (V)	V_f Max. Cold T_c = -40°C (V)
BXRE-xxG20F0-B-8x	350	32.1	34.2	36.2	-12	0.22	31.3	37.0
	900	35.3	37.6	39.9	-12	0.34	34.5	40.6
BXRE-xxG20F0-C-8x	500	32.1	34.2	36.2	-13	0.19	31.2	37.0
	1260	35.3	37.5	39.8	-13	0.29	34.4	40.6

Notes for Table 5:

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 90 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.
8. This product has been designed and manufactured per IEC 62031:2018. This product has passed dielectric withstand voltage testing at 1140 V. The working voltage designated for the insulation is 70V 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[5]		
		2700K/3000K	4000K[2]	5000K[3]
BXRE-xxx20Fx-B-8x	800	RG1	RG1	RG1
	900	RG1	RG1	RG1
BXRE-xxx20Fx-C-8x	800	RG1	RG1	RG1
	1110	RG1	RG1	RG1
	1260	RG1	RG1	RG2

Notes for Table 6:

1. Eye safety classification for the use of Bridgelux V Series 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 4000K, Ethr= 1980 lx.
3. For products classified as RG2 at 5000K Ethr= 1530 lx.
4. For products classified as RG2 at 6500K, Ethr= 1170 lx.
5. 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	-40˚C to +95˚C	
Operating Case Temperature[1] (T_c)	95˚C	
Soldering Temperature[2]	300˚C or lower for a maximum of 6 seconds	
	BXRE-xxx20F0-B-8x	BXRE-xxx20F0-C-8x
Maximum Drive Current[3]	900 mA	1260 mA
Maximum Peak Pulsed Drive Current[4]	1290 mA	1800 mA
Maximum Reverse Voltage[5]	-60V	-60V

Notes for Table 7:

1. For IEC 62717 requirement, please consult your Bridgelux sales representative.
2. Refer to Bridgelux Application Note AN101: Handling and Assembly of Bridgelux V Series LED Arrays
3. Arrays may be driven at higher currents however lumen maintenance may be reduced and warranty will not apply.
4. 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.
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

Figure 1: V13B Drive Current vs. Voltage

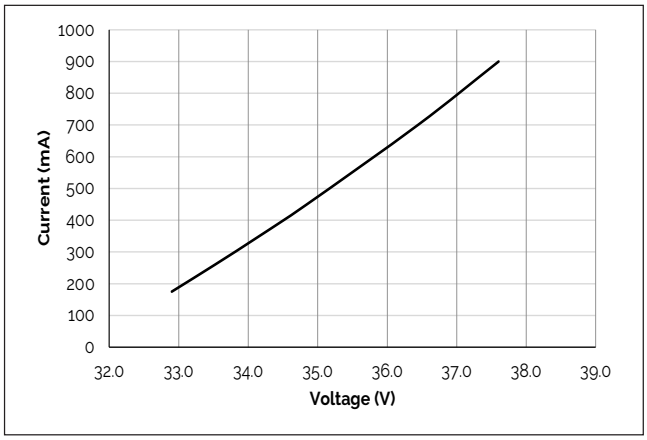


Figure 2: V13C Drive Current vs. Voltage

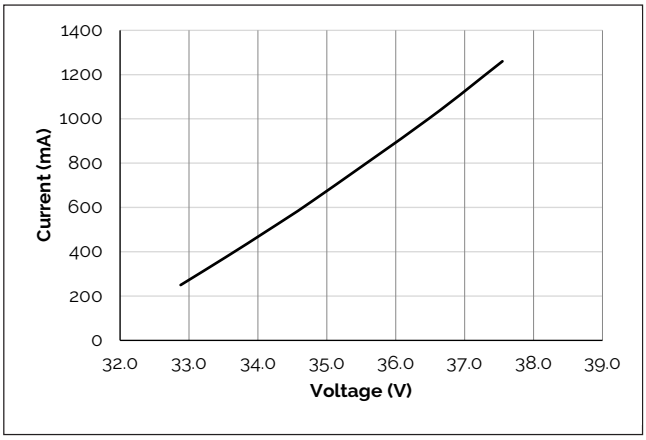


Figure 3: V13B Typical Relative Flux vs. Current

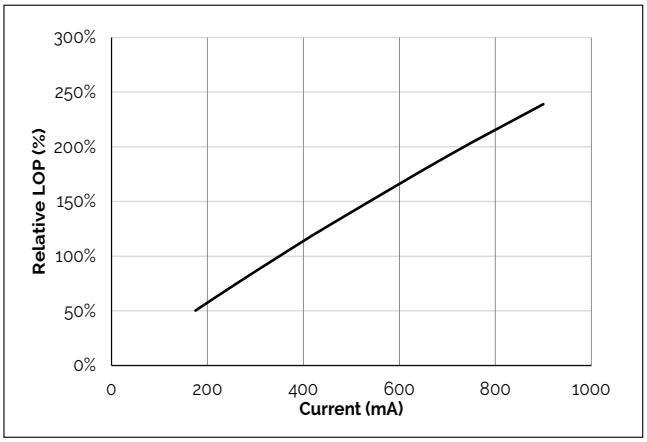
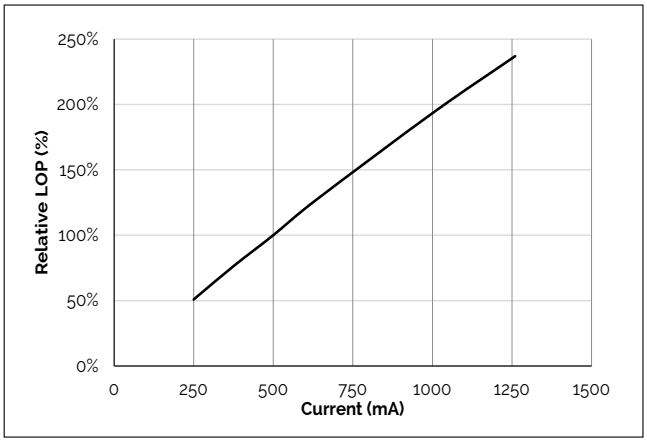


Figure 4: V13C Typical Relative Flux vs. Current



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 test current where T_j (junction temperature) = T_c (case temperature) = 25˚C.

Performance Curves

Figure 5: Typical DC Flux vs. Case Temperature

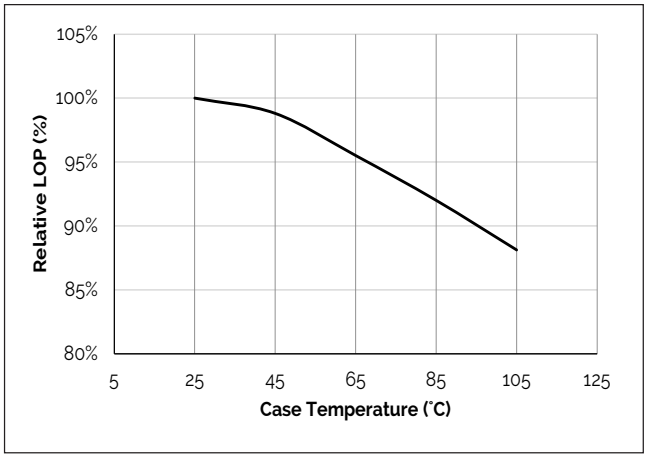


Figure 6: Typical DC ccx Shift vs. Case Temperature

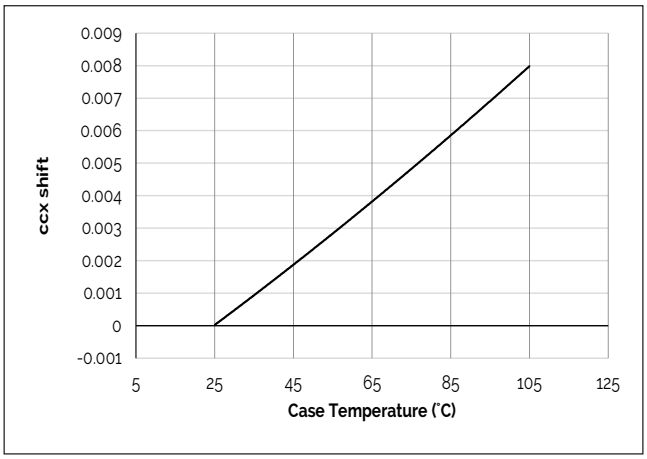


Figure 7: Typical DC ccy Shift vs. Case Temperature

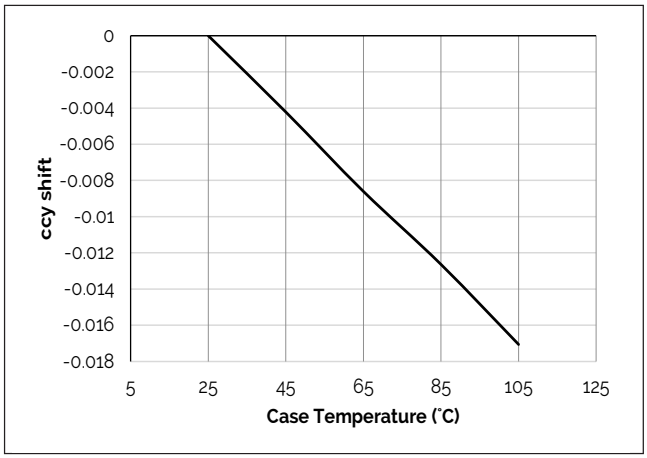


Figure 8: V13C Drive Current vs. ccx Shift

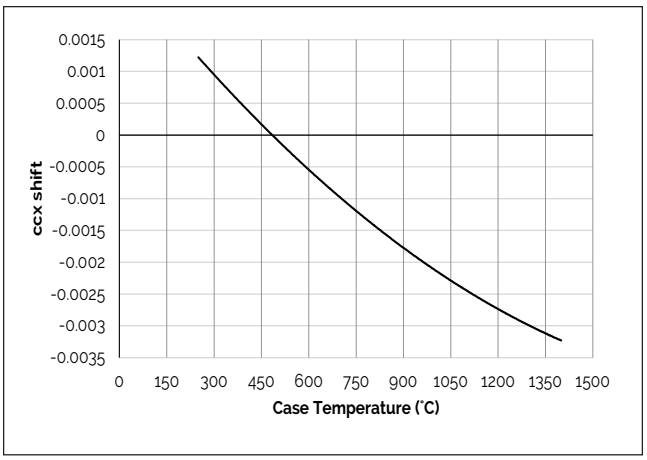


Figure 9: V13C Drive Current vs. ccy Shift

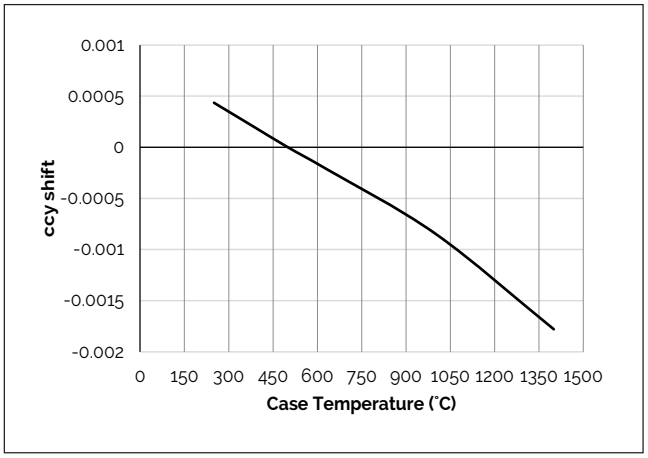
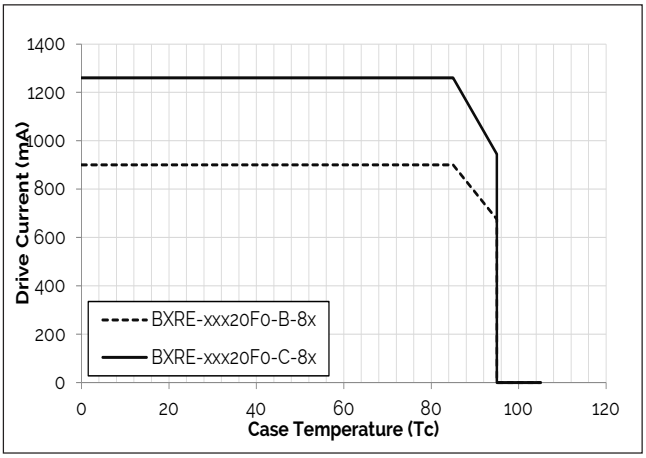


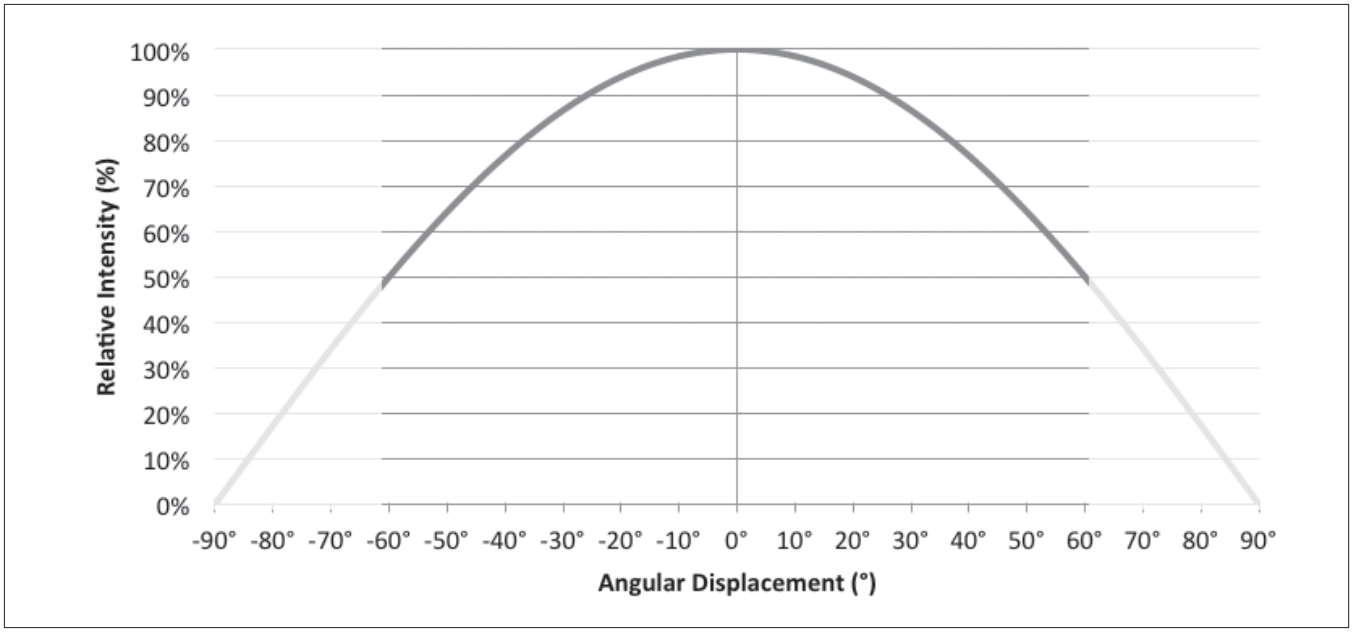
Figure 10: Derating Curve



Note for Figures 5-9:
1. Characteristics shown for Warm White.

Typical Radiation Pattern

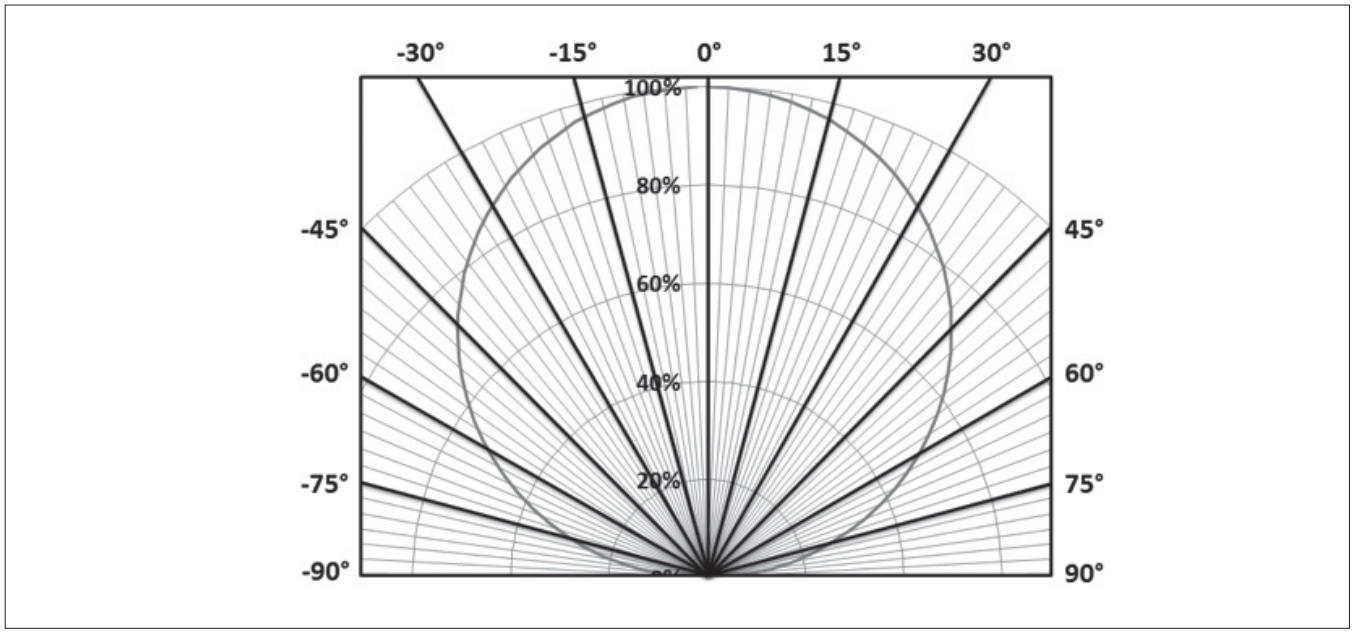
Figure 11: Typical Spatial Radiation Pattern



Notes for Figure 11:

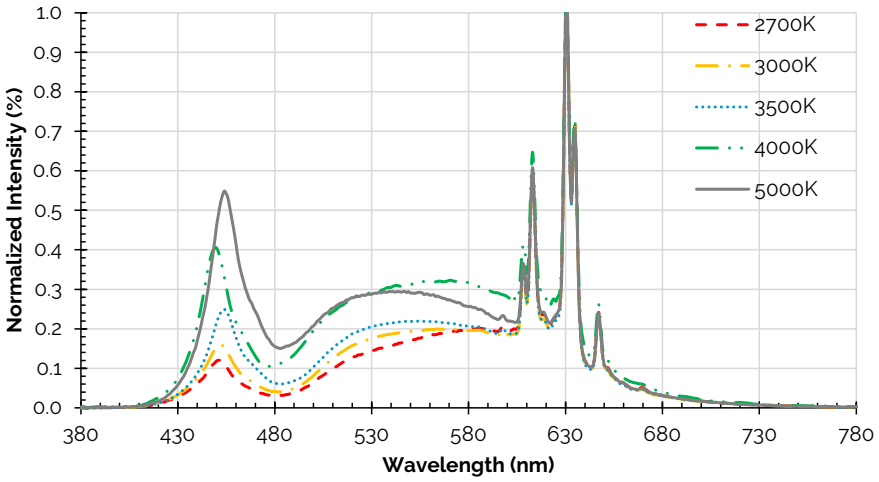
1. Typical viewing angle is 120°.
2. The viewing angle is defined as the off axis angle from the centerline where intensity is ½ of the peak value.

Figure 12: Typical Polar Radiation Pattern



Typical Color Spectrum

Figure 13: Typical Color Spectrum

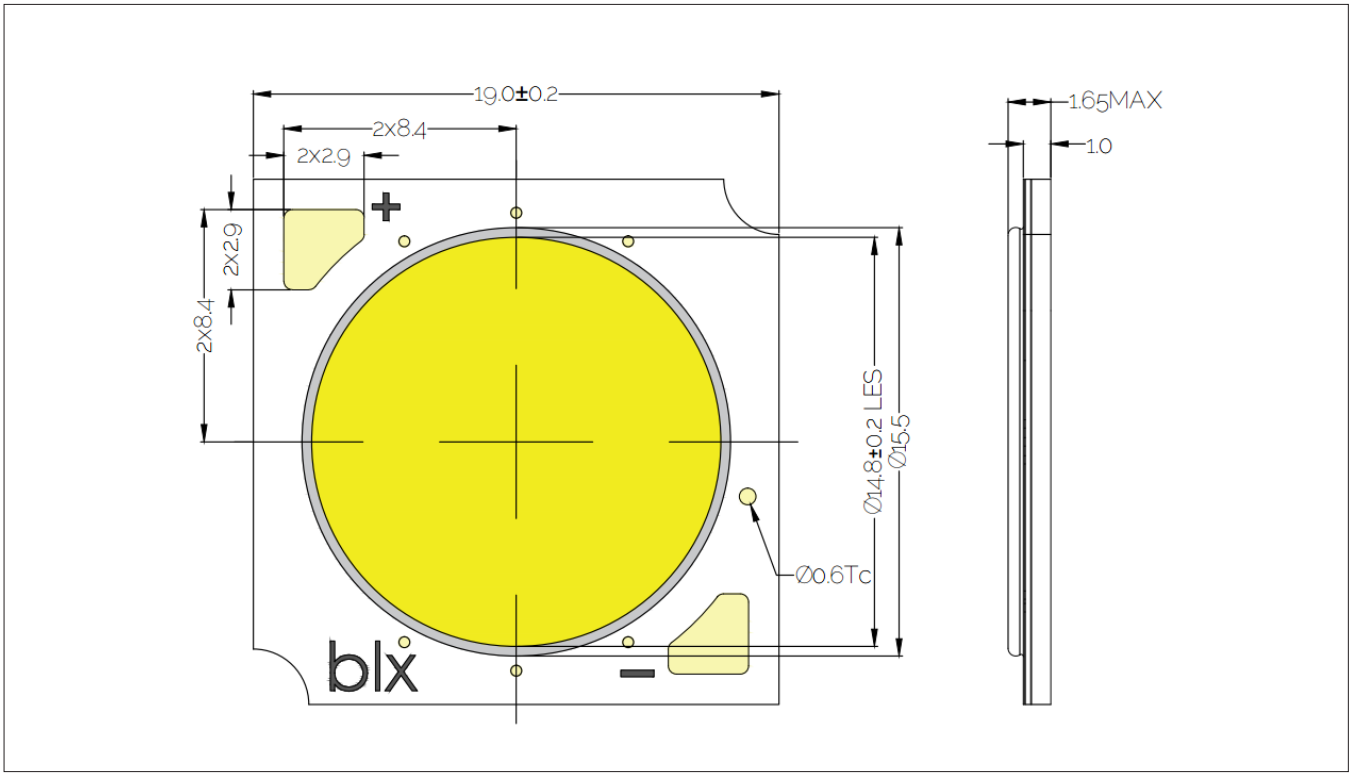


Notes for Figure 13:

1. Color spectra measured at nominal current for T_j = T_c = 85°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.
6. Color spectra shown is 5000K and 90 CRI.

Mechanical Dimensions

Figure 14: Drawing for V13 LED Array

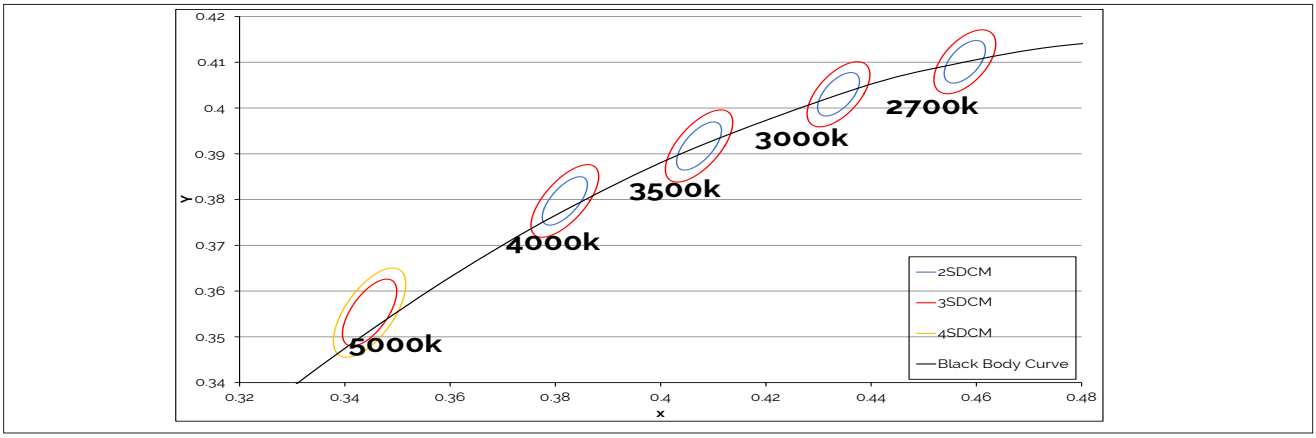


Notes for Figure 14:

1. Drawings are not to scale.
2. Drawing dimensions are in millimeters.
3. Unless otherwise specified, tolerances are ±0.1mm.
4. Solder pad labeled "+" denotes positive contact.
5. Refer to Application Notes AN101 for product handling, mounting and heat sink recommendations.
6. The optical center of the LED Array is nominally defined by the mechanical center of the array to a tolerance of ± 0.2mm.
7. Bridgelux maintains a flatness of 0.10mm across the mounting surface of the array.

Color Binning Information

Figure 15: Warm and Neutral White Test Bins in xy Color Space



Note: Pulsed Test Conditions, T_c = 85˚C

Table 8: Warm and Neutral White xy Bin Coordinates and Associated Typical CCT (product is hot targeted to Tc = 85˚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)

Table 9: Cool White xy Bin Coordinates and Associated Typical CCT (product is hot targeted to T_c = 85˚C)

Bin Code	5000K
ANSI Bin (for reference only)	(4745K - 5311K)
84 (4 SDCM)	(4801K - 5282K)
83 (3 SDCM)	(4835K - 5215K)
Center Point (x,y)	(0.3447, 0.3553)

Note for Tables 8-9:

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

Packaging and Labeling

Figure 16: Drawing for V13 Packaging Tubes

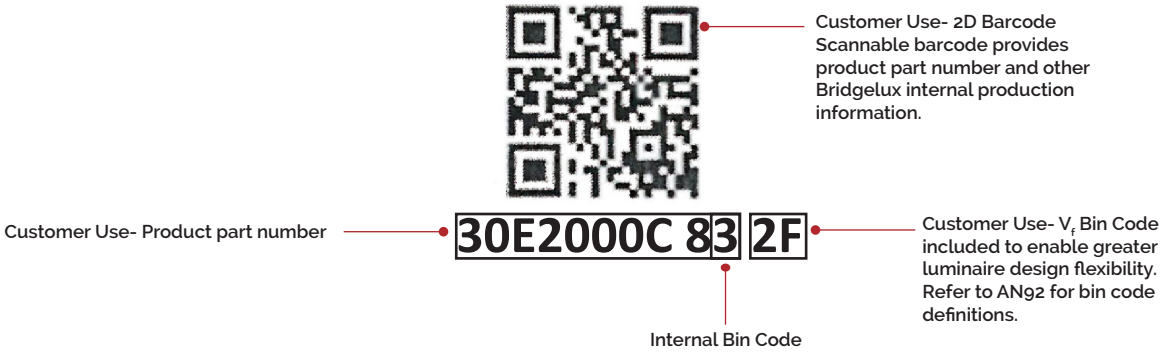
Notes for Figure 16:

1. Each tube holds 25 V13 COB arrays.
2. One tube is sealed in an anti-static bag. Four bags are placed in a shipping box. Depending on quantities ordered, a bigger shipping box, containing four boxes may be used to ship products.
3. Each bag and box is to be labeled as shown above.
4. Dimensions for each tube are 21.3 (W) x 9.5(H) x 505 (L). Dimensions for the anti-static bag are 75 (W) x 615 (L) x 3.1 (T) mm. Dimensions for the shipping box are 58.7 x 13.3 x 7.9 cm.

Packaging and Labeling

Figure 17: **Gen. 8 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 V Series 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 V Series 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 AN101 for additional information.

CAUTION: RISK OF BURN

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

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.

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46410 Fremont Boulevard
Fremont, CA 94538 U.S.A.
Tel (925) 583-8400
www.bridgelux.com