Bridgelux® Gen. 7 V9 HD Array

Product Data Sheet DS402

Introduction

V Series HD

V Series™ HD LED array product, an ultra-high lumen density COB product line, is designed for high intensity spotlights used in commercial and retail settings. V Series HD arrays offer industry leading color over angle uniformity, and replace ceramic metal halide lamps by providing equal or greater center beam candle power at lower power and at greater lifetimes. Their tight beam control and exceptional quality of light is well suited for demanding directional spot applications.

The V9 HD LED array is available in a variety of CCT and CRI combinations providing substantial design flexibility and energy efficiencies.

Lighting system designs incorporating these LED arrays deliver increased system level efficacy and longer service life. Typical applications include, but are not limited to, commercial and residential down lights, accent, spot and track lights.

Bridgelux Décor Series™ is our state of the art color line designed specifically for premium applications, producing unmatched LED light quality with brilliant color-rendering options and offer pleasing and inspiring lighting palettes. Bridgelux Décor Series color points are available on Vero® SE Series, Vero® Series, V Series™ and V Series™ HD.

Décor Series Class A is based on human response testing, providing color points with a combined GAI and CRI metric.

Décor Series™ Ultra products provide a high CRI of 97 and a minimum R9 value of 91, which emphasizes the reds and color tones to which the human eye is most receptive - perfect for the most luxurious retail shops and world renowned museums. Décor Series Ultra is designed as a replacement for halogen.

Décor Series™ Showcase is the optimal solution for replacing ceramic metal halide lamps, incorporating the same pure white light with enhanced spectrum coverage and higher efficacy.

Features

- Efficacy of 134 lm/W typical
- Compact high flux density light source
- Uniform high quality illumination
- Minimum 80, 90 and 95 CRI options
- Streamlined thermal path
- ENERGY STAR® / ANSI compliant color binning structure with 3 SDCM options
- More energy efficient than incandescent, halogen and fluorescent lamps
- Low voltage DC operation
- Instant light with unlimited dimming
- V_f bin code backside marking

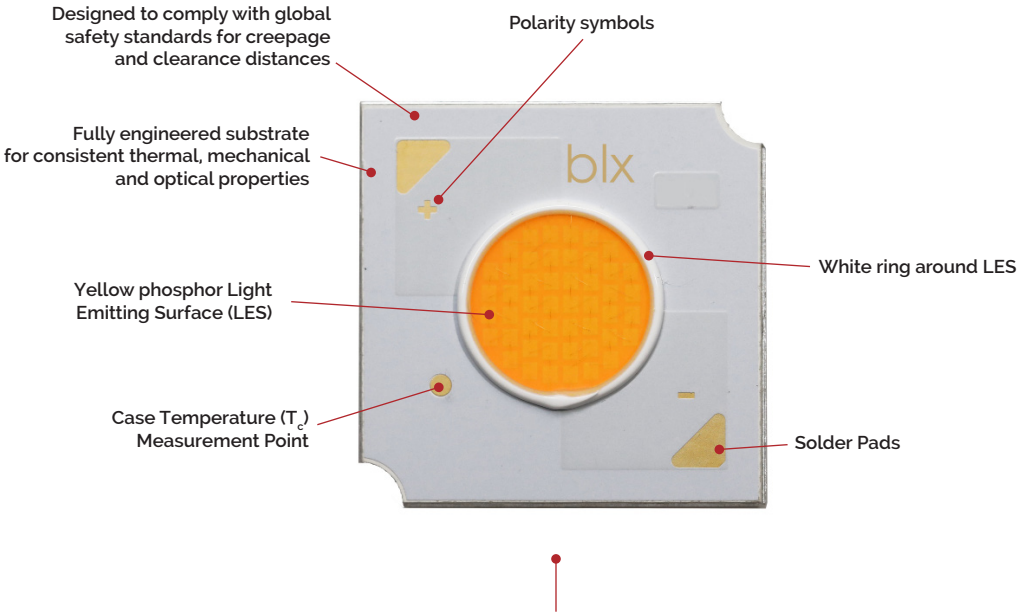
Benefits

- Enhanced optical control
- Clean white light without pixelation
- High quality true color reproduction
- Significantly reduced thermal resistance and increased operating temperatures
- Uniform consistent white light
- Lower operating costs
- Easy to use with daylight and motion detectors to enable increased energy savings
- Reduced maintenance costs
- Environmentally friendly, no disposal issue

Contents

Product Feature Map

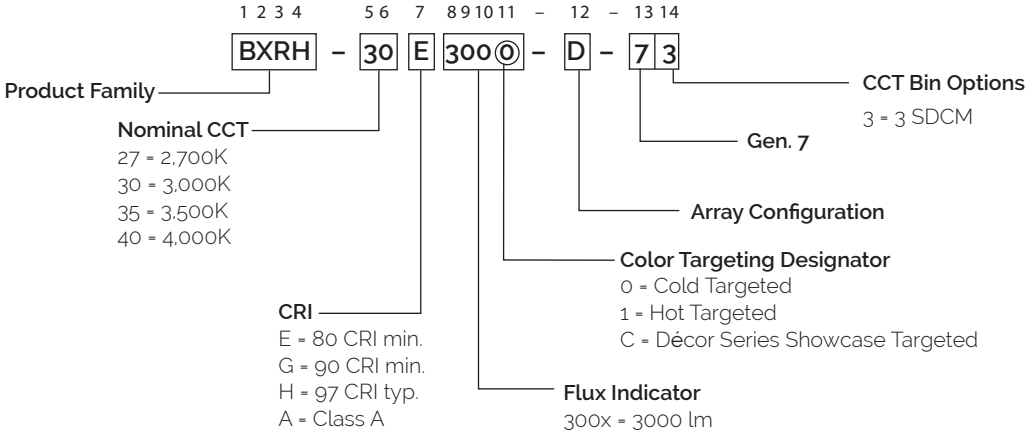
Bridgelux arrays are fully engineered devices that provide consistent thermal and optical performance on an engineered mechanical platform. The V Series HD arrays are the most compact chip-on-board devices across all of Bridgelux's LED Array products. The arrays incorporate several features to simplify design integration and assembly. Please visit www.bridgelux.com for more information on the V Series HD family of products.



Note: Part number and lot codes are scribed on back of array

Product Nomenclature

The part number designation for Bridgelux V Series HD 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)
BXRH-27E3000-D-73	2700	80	700	3246	2792	36.4	25.5	127
BXRH-27G3000-D-73	2700	90	700	2699	2322	36.4	25.5	106
BXRH-27H3000-D-73	2700	97	700	2392	2057	36.4	25.5	94
BXRH-30E3000-D-73	3000	80	700	3417	2939	36.4	25.5	134
BXRH-30G3000-D-73	3000	90	700	2870	2468	36.4	25.5	113
BXRH-30G300C-D-73	3000	90	700	2631	2263	36.4	25.5	103
BXRH-30H3000-D-73	3000	97	700	2529	2175	36.4	25.5	99
BXRH-35A3001-D-73	3500	93	700	2870	2468	36.4	25.5	113
BXRH-35G3000-D-73[8,9]	3500	90	700	2939	2527	36.4	25.5	115
BXRH-40E3000-D-73	4000	80	700	3554	3056	36.4	25.5	139
BXRH-40G3000-D-73	4000	90	700	3007	2586	36.4	25.5	118

Notes for Table 1:

1. Nominal CCT as defined by ANSI C78.377-2011.
2. CRI values are typical for Decor Series Ultra and Decor Series Class A products. CRI values are minimums for all other products. Minimum R9 value for 80 CRI products is 0, the minimum R9 values for 90 CRI products is 50, the minimum R9 values for 97 CRI products is 91. 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.
8. Nominal CCT is defined by the Lighting Research Center's Class A definition. The center of the Class A color bin is on the corresponding isothermal line.
9. GAI value is 80. To help ensure optimal fixture level performance, GAI is measured at the fixture level, on axis, at a case temperature of 70˚C. GAI may vary depending on fixture design and performance.

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)
BXRH-27E3000-D-73	2700	80	700	2857	2457	35.4	24.8	115
BXRH-27G3000-D-73	2700	90	700	2375	2043	35.4	24.8	96
BXRH-27H3000-D-73	2700	97	700	2105	1810	35.4	24.8	85
BXRH-30E3000-D-73	3000	80	700	3007	2586	35.4	24.8	121
BXRH-30G3000-D-73	3000	90	700	2526	2172	35.4	24.8	102
BXRH-30G300C-D-73	3000	90	700	2315	1991	35.4	24.8	93
BXRH-30H3000-D-73	3000	97	700	2225	1914	35.4	24.8	90
BXRH-35A3001-D-73[7,8]	3500	93	700	2526	2172	35.4	24.8	102
BXRH-35G3000-D-73	3500	90	700	2586	2224	35.4	24.8	104
BXRH-40E3000-D-73	4000	80	700	3127	2689	35.4	24.8	126
BXRH-40G3000-D-73	4000	90	700	2646	2276	35.4	24.8	107

Notes for Table 2:

1. Nominal CCT as defined by ANSI C78.377-2011.
2. All CRI values are measured at T_j = T_c = 25˚C. CRI values are typical for Decor Series Ultra and Decor Series Class A products. CRI values are minimums for all other products. Minimum R9 value for 80 CRI products is 0, the minimum R9 values for 90 CRI products is 50, the minimum R9 values for 97 CRI products is 91. Bridgelux maintains a ± 3 tolerance on CRI and R9 values.
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.
7. Nominal CCT is defined by the Lighting Research Center's Class A definition. The center of the Class A color bin is on the corresponding isothermal line.
8. GAI value is 80. To help ensure optimal fixture level performance, GAI is measured at the fixture level, on axis, at a case temperature of 70˚C. GAI may vary depending on fixture design and performance.

Performance at Commonly Used Drive Currents

V Series HD LED arrays are tested to the specifications shown using the nominal drive currents in Table 1. V Series HD LED arrays 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)
BXRH-27E3000-D-73	80	350	34.2	12.0	1722	1515	144
		500	35.2	17.6	2400	2112	136
		700	**36.4**	**25.5**	**3246**	**2857**	**127**
		875	37.4	32.7	3943	3470	120
		960	37.9	36.4	4262	3751	117
BXRH-27G3000-D-73	90	350	34.2	12.0	1432	1260	120
		500	35.2	17.6	1996	1757	113
		700	**36.4**	**25.5**	**2699**	**2375**	**106**
		875	37.4	32.7	3279	2886	100
		960	37.9	36.4	3545	3119	97
BXRH-27H3000-D-73	97 (typical)	350	34.2	12.0	1269	1117	106
		500	35.2	17.6	1769	1556	100
		700	**36.4**	**25.5**	**2392**	**2105**	**94**
		875	37.4	32.7	2905	2557	89
		960	37.9	36.4	3141	2764	86
BXRH-30E3000-D-73	80	350	34.2	12.0	1813	1595	151
		500	35.2	17.6	2527	2223	143
		700	**36.4**	**25.5**	**3417**	**3007**	**134**
		875	37.4	32.7	4151	3653	127
		960	37.9	36.4	4487	3948	123
BXRH-30G3000-D-73	90	350	34.2	12.0	1523	1340	127
		500	35.2	17.6	2122	1868	120
		700	**36.4**	**25.5**	**2870**	**2526**	**112**
		875	37.4	32.7	3487	3068	106
		960	37.9	36.4	3769	3317	104
BXRH-30G300C-D-73	90	350	34.2	12.0	1396	1228	117
		500	35.2	17.6	1946	1712	110
		700	**36.4**	**25.5**	**2631**	**2315**	**103**
		875	37.4	32.7	3196	2812	98
		960	37.9	36.4	3455	3040	95
BXRH-30H3000-D-73	97 (typical)	350	34.2	12.0	1341	1180	112
		500	35.2	17.6	1870	1645	106
		700	**36.4**	**25.5**	**2529**	**2225**	**99**
		875	37.4	32.7	3071	2703	94
		960	37.9	36.4	3320	2922	91
BXRH-35A1001-D-73	93 (typical)	350	34.2	12.0	1523	1340	127
		500	35.2	17.6	2122	1868	120
		700	**36.4**	**25.5**	**2870**	**2526**	**112**
		875	37.4	32.7	3487	3068	106
		960	37.9	36.4	3769	3317	104

Notes for Table 3:

1. Alternate drive currents 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)
BXRH-35G3000-D-73	90	350	34.2	12.0	1559	1372	130
		500	35.2	17.6	2173	1912	123
		700	**36.4**	**25.5**	**2939**	**2586**	**115**
		875	37.4	32.7	3570	3141	109
		960	37.9	36.4	3859	3396	106
BXRH-40E3000-D-73	80	350	34.2	12.0	1885	1659	157
		500	35.2	17.6	2628	2312	149
		700	**36.4**	**25.5**	**3554**	**3127**	**139**
		875	37.4	32.7	4317	3799	132
		960	37.9	36.4	4666	4106	128
BXRH-40G3000-D-73	90	350	34.2	12.0	1595	1404	133
		500	35.2	17.6	2223	1957	126
		700	**36.4**	**25.5**	**3007**	**2646**	**118**
		875	37.4	32.7	3653	3214	112
		960	37.9	36.4	3948	3475	109

Notes for Table 3:

1. Alternate drive currents 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, 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 = 105°C (V)	V_f Max. Cold T_c = -40°C (V)
BXRH-xxx300x-D-73	700	34.1	36.4	39.1	-13.7	0.18	33.0	40.0
	960	35.2	37.8	40.4	-13.7	0.19	34.1	41.3

Notes for Table 4:

1. Parts are tested in pulsed conditions, T_c = 25°C. Pulse width is 10ms.
2. Voltage minimum and maximum are provided for reference only and are not a guarantee of performance.
3. Bridgelux maintains a tester tolerance of ± 0.10V on forward voltage measurements.
4. Typical coefficient of forward voltage tolerance is ± 0.1mV for nominal current.
5. Thermal resistance values are based from test data of a 3000K 80 CRI product.
6. Thermal resistance value was calculated using total electrical input power; optical power was not subtracted from input power. The thermal interface material used during testing is not included in the thermal resistance value.
7. V_f min hot and max cold values are provided as reference only and are not guaranteed by test. These values are provided to aid in driver design and selection over the operating range of the product.
8. This product has been designed and manufactured per IEC 62031:2014. This product has passed dielectric withstand voltage testing at 500 V. The working voltage designated for the insulation is 50V d.c. The maximum allowable voltage across the array must be determined in the end product application.

Eye Safety

Table 5: Eye Safety Risk Group (RG) Classifications

Part Number	Drive Current[3] (mA)	CCT[1,3]	
		2700K/3000K	4000K[2]
BXRH-xxx300x-D-73	700	RG1	RG2
	960	RG1	RG2

Notes for Table 5:

1. Eye safety classification for the use of Bridgelux V Series HD 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, E_{thr} = 1760 lx.
3. Please contact your Bridgelux sales representative for E_{thr} values at specific drive currents and CCTs not listed.

Absolute Maximum Ratings

Table 6: Maximum Ratings

Parameter	Maximum Rating
LED Junction Temperature (T_j)	125˚C
Storage Temperature	-40˚C to +105˚C
Operating Case Temperature[1] (T_c)	105˚C
Soldering Temperature[2]	300˚C or lower for a maximum of 6 seconds
Maximum Drive Current[3]	960mA
Maximum Peak Pulsed Drive Current[4]	1370mA
Maximum Reverse Voltage[5]	-60V

Notes for Table 6:

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 product warranty will be void.
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: Drive Current vs. Voltage[2]

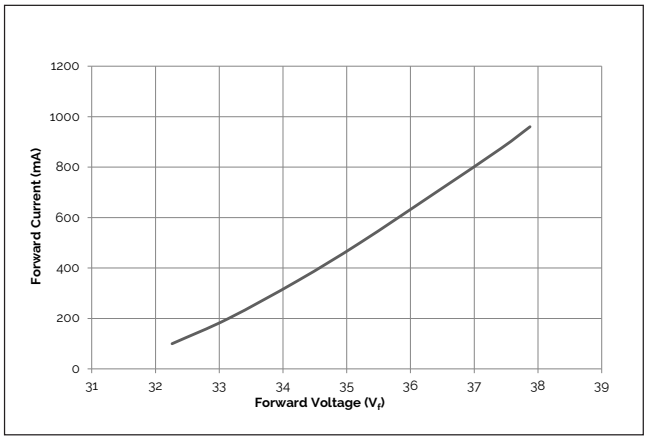


Figure 2: Typical Relative Flux vs. Current[1,2]

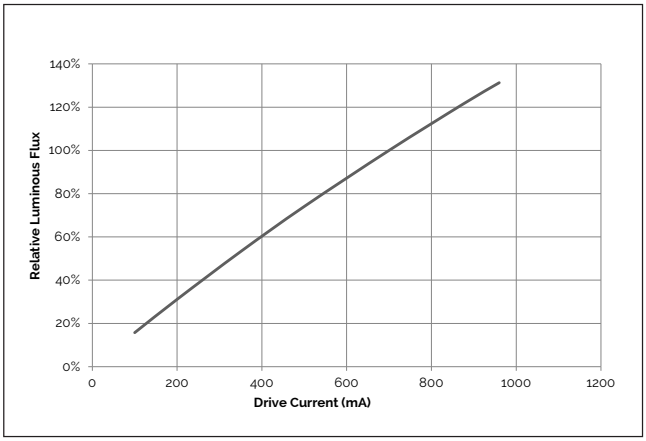


Figure 3: Typical DC Flux vs. Case Temperature[3]

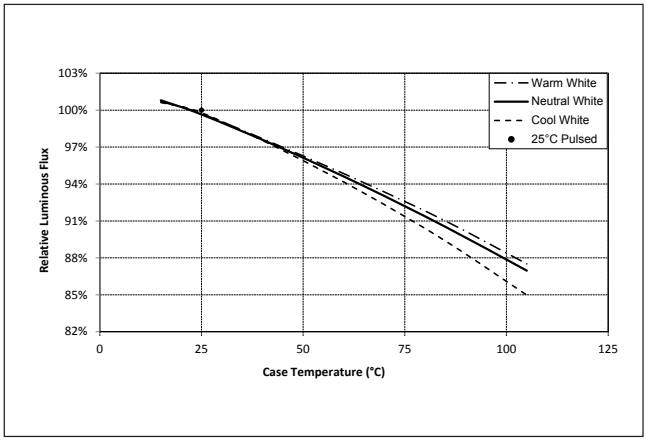


Figure 4: Typical DC ccx Shift vs. Case Temperature[4]

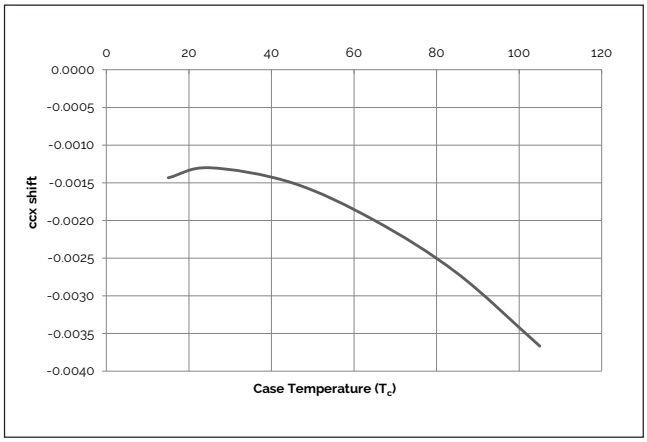
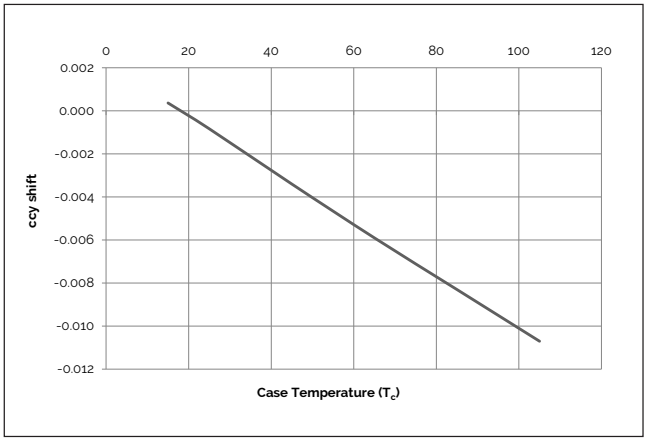


Figure 5: Typical DC ccy Shift vs. Case Temperature[4]



Notes for Figures 1-5:

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.
3. Characteristics shown for warm white based on 3000K and 80 CRI. Characteristics shown for neutral white based on 4000K and 80 CRI. Characteristics shown for warm white includes Decor Series Class A
4. For other color SKUs, the shift in color will vary. Please contact your Bridgelux Sales Representative for more information.

Performance Curves

Figure 6: 2700K, 97 CRI Color Shift vs. Case Temperature[1]

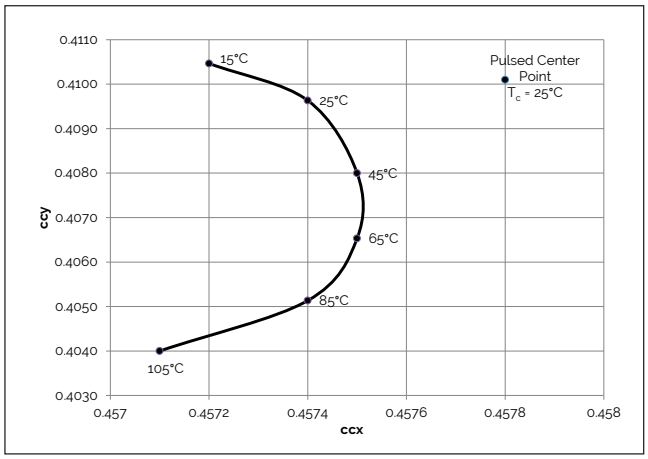


Figure 7: 3000K, 97 CRI Color Shift vs. Case Temperature[1]

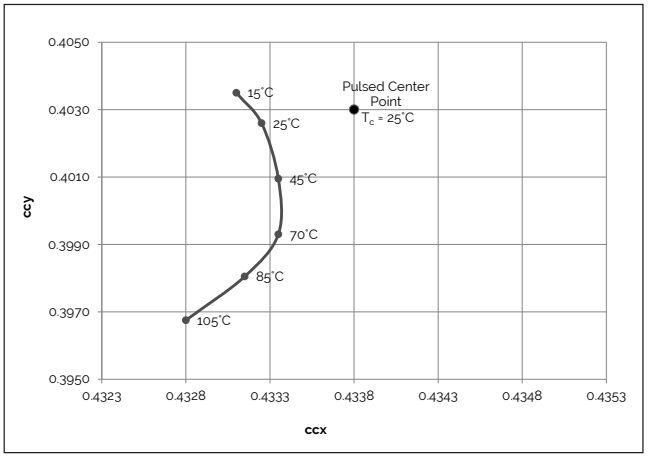


Figure 8: 3500K Class A Color Shift vs. Case Temperature[1]

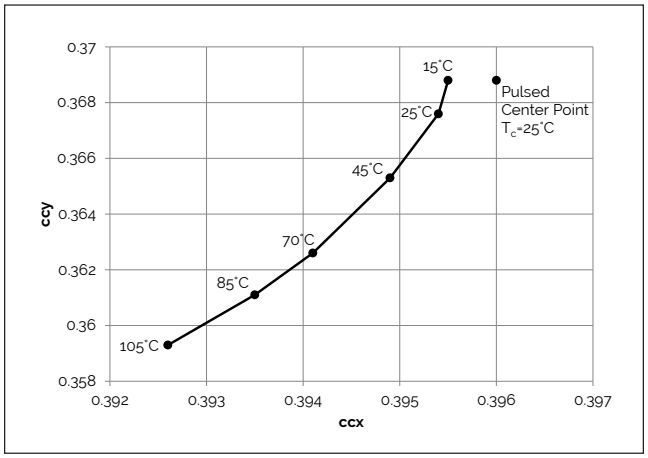
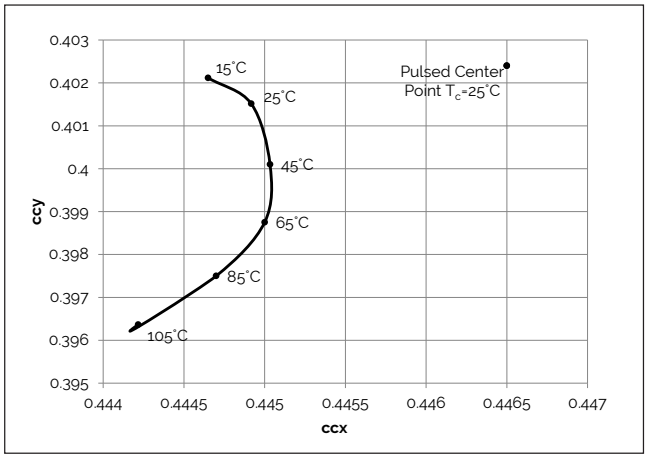


Figure 9: 3000K, 90 CRI Color Shift vs. Case Temperature[3]

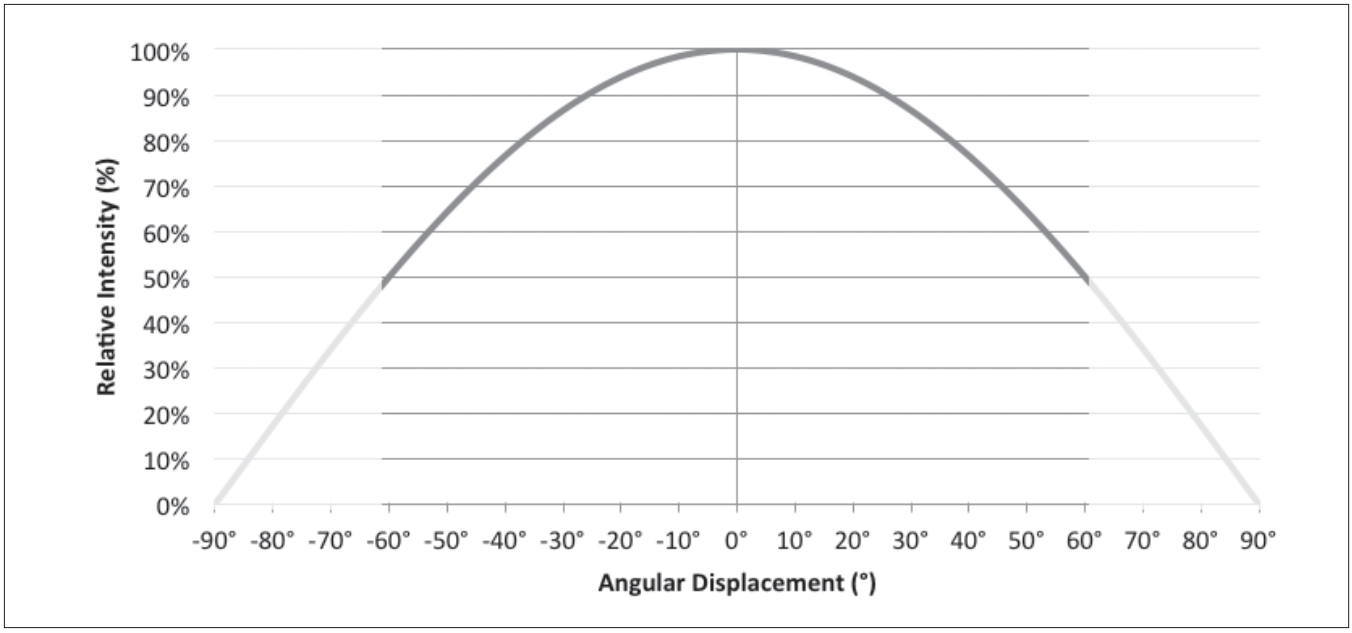


Note for Figures 6-9:

1. Measurements made under DC test conditions at the nominal drive current.
2. Typical color shift is shown with a tolerance of ±0.002.
3. Characteristics shown for Decor Series Showcase products, BXRH-30G300C-x-73

Typical Radiation Pattern

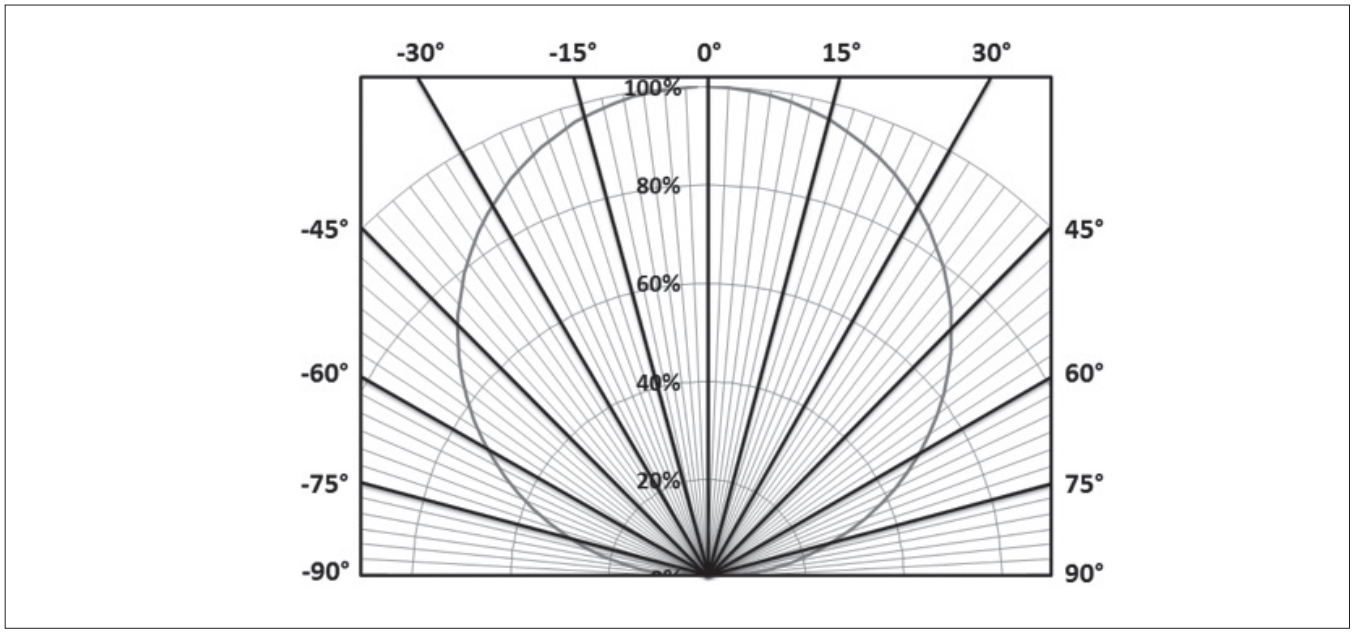
Figure 10: Typical Spatial Radiation Pattern



Note for Figure 10:

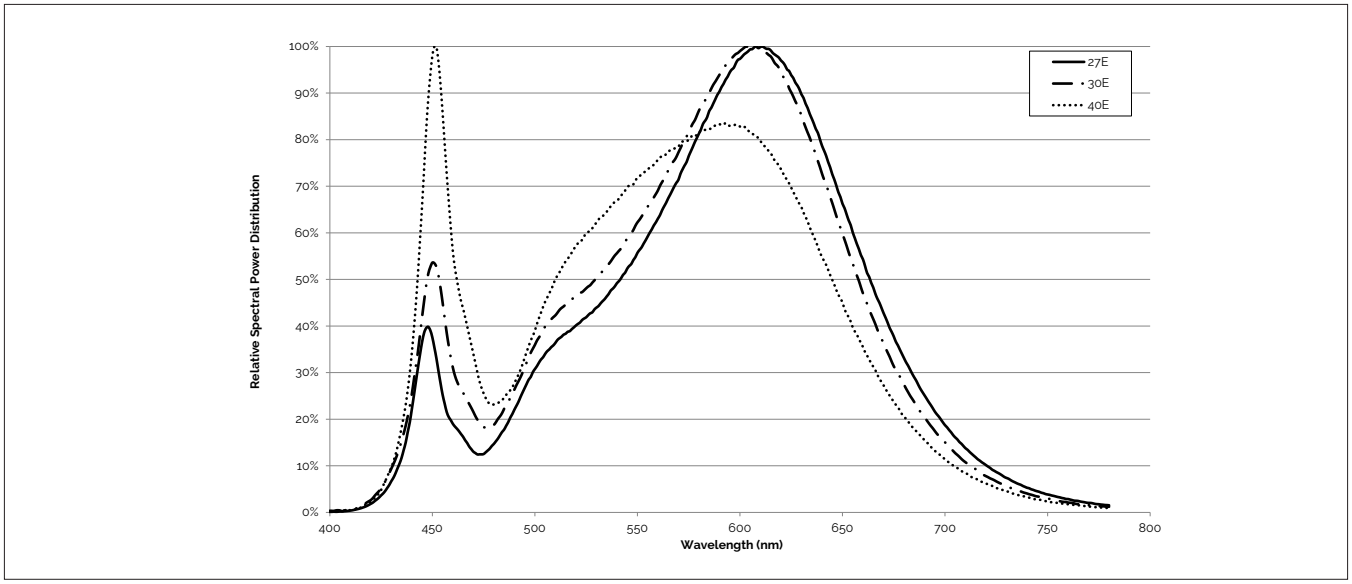
1. Typical viewing angle is 120°.
2. The viewing angle is defined as the off axis angle from the centerline where intensity is ½ of the peak value.

Figure 11: Typical Polar Radiation Pattern



Typical Color Spectrum

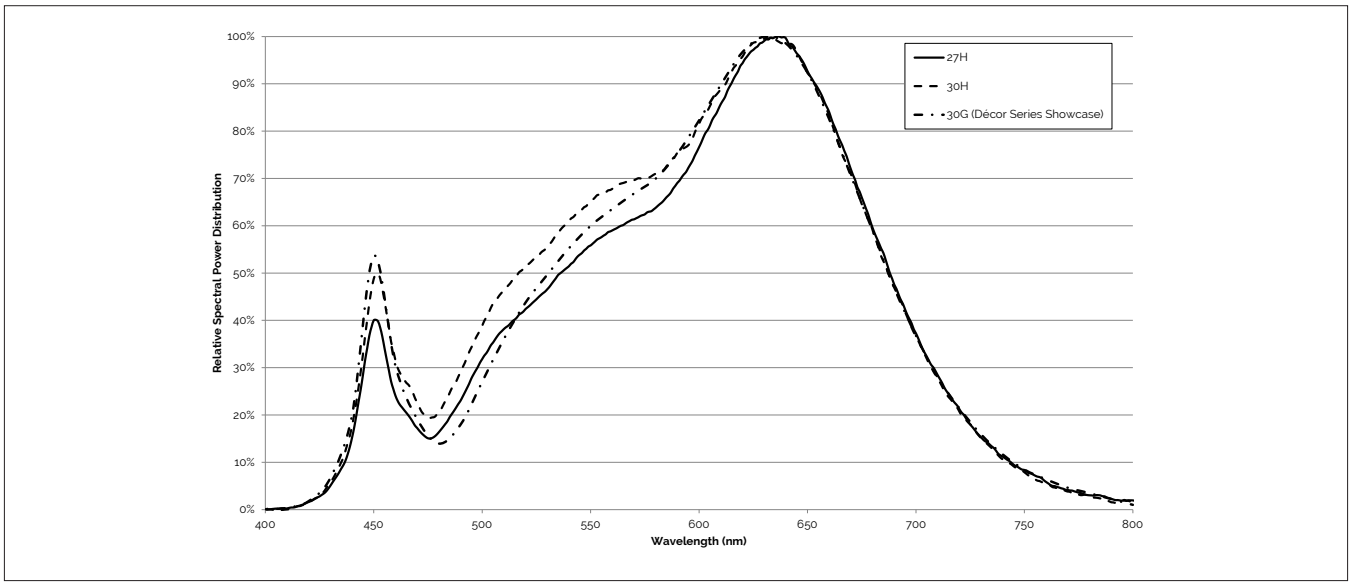
Figure 12: Typical Color Spectrum



Note for Figure 12:

1. Color spectra measured at nominal current for T_j = T_c = 25°C.
2. Color spectra shown is 2700K and 80 CRI.
3. Color spectra shown is 3000K and 80 CRI.
4. Color spectra shown is 4000K and 80 CRI.

Figure 13: Typical Color Spectrum for Décor Series

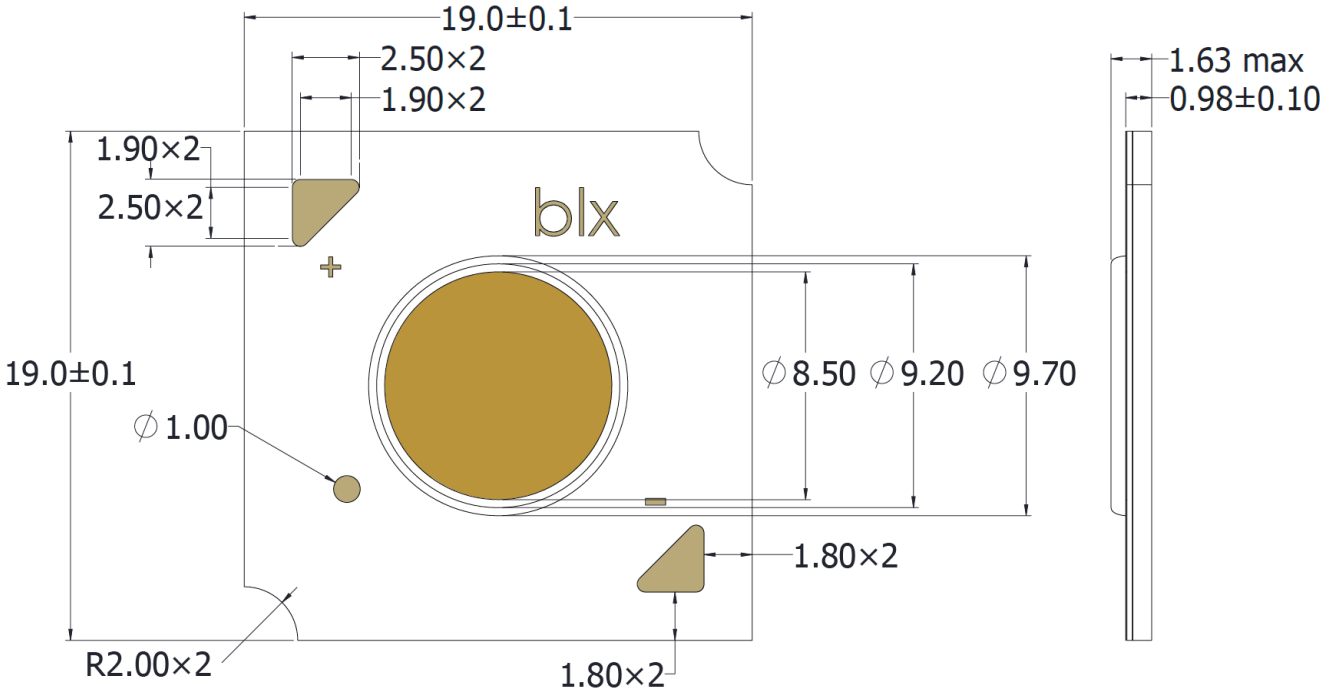


Note for Figure 13:

1. Color spectra measured at nominal current for T_j = T_c = 25°C.

Mechanical Dimensions

Figure 14: Drawing for V9 HD LED Array

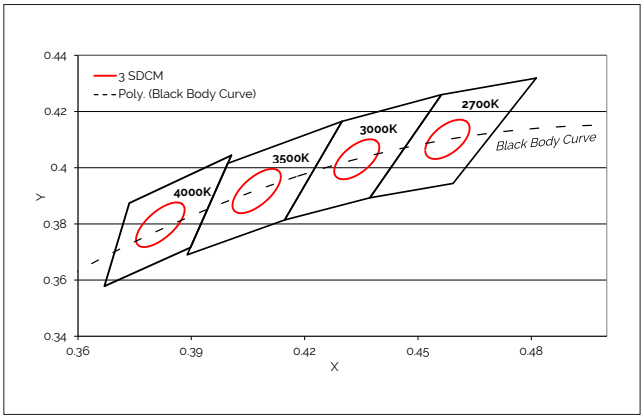


Notes for Figure 14:

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 = 25°C

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

Bin Code	2700K	3000K[1]	3500K[1]	4000K[1]
ANSI Bin (for reference only)	(2580K - 2870K)	(2870K - 3220K)	(3220K - 3710K)	(3710K - 4260K)
73 (3 SDCM)	(2651K - 2794K)	(2968K - 3136K)	(3369K - 3586K)	(3851K - 4130K)
Center Point (x,y)	(0.4578, 0.4101)	(0.4338, 0.403) (0.4465, 0.4024)[2]	(0.4073, 0.3917)	(0.3818, 0.3797)

Note for Table 7:
1. Color Binning information excludes Décor Series Class A products. Please contact your Bridgelux Sales Representative for more information.
2. Center Point for Decor Series Showcase.

Packaging and Labeling

Figure 16: V9 HD Packaging Tube

Notes for Figure 16:

1. Each tube holds 25 V9 HD 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) mm. Dimensions for the anti-static bag are 100 (W) x 625 (L) x 0.075 (T) mm. Dimensions for the shipping box are 58.7 x 13.3 x 7.9 cm

Packaging and Labeling

Figure 17: **V Series HD 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 HD 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 HD 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 HD LED array during operation. Allow the array to cool for a sufficient period of time before handling. The V Series HD 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: 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
youtube.com/user/Bridgelux
linkedin.com/company/bridgelux-inc-_2
WeChat ID: BridgeluxInChina

46430 Fremont Boulevard
Fremont, CA 94538 U.S.A.
Tel (925) 583-8400
www.bridgelux.com