Bridgelux ES Star Array Series

Product Data Sheet DS23

BXRA-xxx0540, BXRA-xxx0740, BXRA-40E0600
BXRA-40E0810, BXRA-xxC0700, BXRA-xxC1000

Introduction

The Bridgelux family of LED Array products delivers high performance, compact and cost-effective solid-state lighting solutions to serve the general lighting market. These products combine the higher efficacy, lifetime, and reliability benefits of LEDs with the light output levels of many conventional lighting sources. The Bridgelux ES Array Series has been specified to enable lamp and luminaire designs surpassing efficacy and quality of light requirements driven by regulatory standards with reasonable system design margins, enabling lighting product compliance to Energy Star, Title 24, Part L and other global standards.

The Bridgelux ES Star Array products provide a high performance alternative to conventional solid state solutions, delivering between 450 and 1000 lumens under application conditions in warm, neutral and cool white color temperatures. These compact high flux density light sources deliver uniform high quality illumination without pixilation or the multiple shadow effect caused by LED component based solutions. To simplify system design for appropriate light output, Bridgelux LED Arrays are specified to deliver performance under typical use conditions.

These integrated plug and play solutions reduce system complexity and enable miniaturized cost-effective lamp and luminaire designs. Lighting system designs incorporating these LED Arrays deliver comparable performance to that of 40-60 Watt incandescent and halogen and 7-13 Watt compact fluorescent based luminaires and feature increased system level efficacy and service life. Typical applications include replacement lamps, task, accent, spot, track, down light, wide area, security, and wall pack.

Features

- Compact high flux density light source
- Uniform high quality illumination
- Minimum 70, 80 and 90 CRI options
- Streamlined thermal path
- Energy Star / ANSI compliant color binning structure with 3SDCM options
- More energy efficient than incandescent, halogen and fluorescent lamps
- Low voltage DC operation
- Instant light with unlimited dimming
- 5-Year warranty
- RoHS compliant and Pb free

Benefits

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

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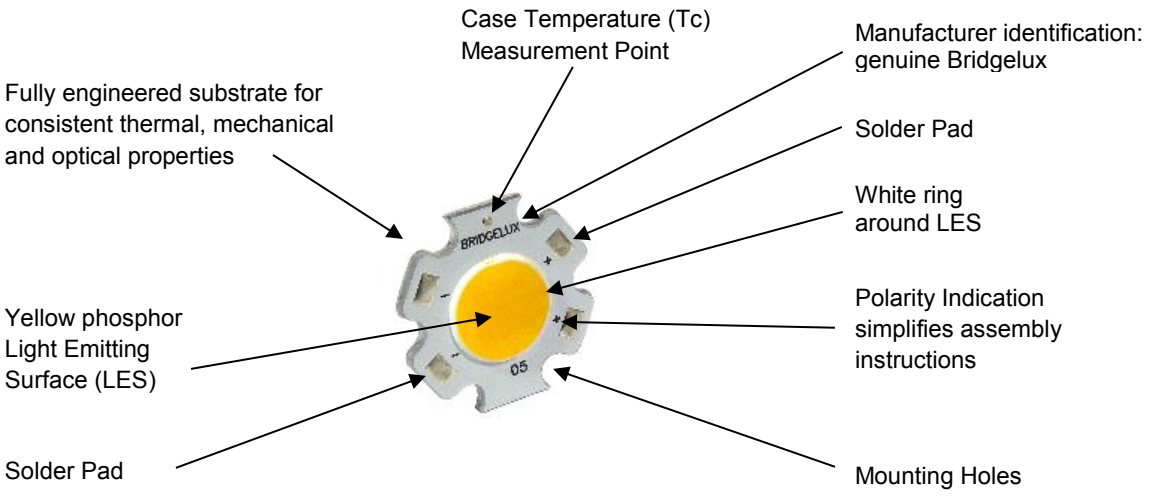
Typical Product Features

Bridgelux arrays are fully engineered devices that provide consistent thermal and optical performance on an engineered mechanical platform. The ES Star array is the smallest chip-on-board device in the BXRA LED Array product series. The arrays incorporate several features to simplify design integration and assembly.

Figure 1: Array Features



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

Product Nomenclature

The part number designation for Bridgelux LED Arrays is explained as follows:

BXRA – AB C DEFG – H – IJ

Where:

B X R A – Designates product family

A B – Designates the nominal ANSI color temperature; 27 = 2700K; 30 = 3000K, etc.

C - Designates minimum CRI; C = 70, E = 80, G = 90

D E F G - Designates Nominal Flux; 0540 = 540lm, 0740 = 740lm, 1000=1000lm, etc.

H – Designates configuration

I J – Designates CCT color binning
- 03 = 3SDCM or 3-step
- 04 = 4SDCM or 4-step
- 00 = 7SDCM or 7-step

Lumen Maintenance Characteristics

Bridgelux projects that its family of LED Array products will deliver, on average, greater than 70% lumen maintenance after 50,000 hours of operation at the rated forward test current. This performance assumes constant current operation at the nominal drive current with case temperature maintained at or below 85°C. For use beyond these typical operating conditions please consult your Bridgelux sales representative for further assistance.

These projections are based on a combination of package test data, semiconductor chip reliability data, a fundamental understanding of package related degradation mechanisms, and performance observed from products installed in the field using Bridgelux die technology. Bridgelux conducts lumen maintenance tests per LM80. Observation of design limits is required in order to achieve this projected lumen maintenance.

Environmental Compliance

Bridgelux is committed to providing environmentally friendly products to the solid state lighting market. Bridgelux LED Arrays comply with the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS directive. Bridgelux does not intentionally add the following restricted materials to LED Array products: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

UL Recognition

Bridgelux secures UL recognition for all the LED Array products. Please refer to the UL file E350613 for the latest list of UL recognized Arrays. Bridgelux uses UL recognized materials with suitable flammability ratings in the LED Array to streamline the process for customers to secure UL listing of the final luminaire product.

CE Recognition

In accordance with the relevant European Union directives, the family of LED Array products conform to the applicable requirements of the IEC/EN 62031:2008 (LED Modules for General Lighting Safety Specifications) and IEC 62471:2006 (Photobiological Safety of Lamps and Lamp Systems). Bridgelux maintains a CE Declaration of Conformity statement on its website and displays the CE mark on product packing labels.

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.

Case Temperature Measurement Point

A case temperature (T_c) measurement point location is included on the top surface of the Bridgelux LED Arrays. The location of this measurement point is indicated in the mechanical dimensions section of this data sheet.

The purpose of this measurement point is to allow the user access to a measurement point closely linked to the true case temperature on the back surface of the LED Array. Once the LED Array is installed, it is challenging to measure the back surface of the array, or true case temperature.

Bridgelux has provided the case temperature measurement location in a manner which closely ties it to the true case temperature of the LED Array under steady state operation. Deviations between thermal measurements taken at the point indicated and the back of the LED Array differ by less than 1°C, providing a robust method to testing thermal operation once the product is installed.

Cautionary Statements

CAUTION: CONTACT WITH OPTICAL AREA

Avoid any contact with the optical area. Do not touch the optical area of the LED Array or apply mechanical stress to the yellow phosphor resin area – it could damage the LED Array.

Optics and reflectors must not be mounted in contact with the yellow phosphor resin area (LES) or the white ring that surrounds the yellow phosphor area. Using the white ring to secure optics can result in damage to the LED Array as the ring is not designed to act as a mechanical locating feature. Optical devices may be mounted on the top surface of the LED Array substrate outside of the white ring maximum OD as specified in the product data sheet. Use the mechanical features of the LED Array substrate edges and/or mounting holes to locate and secure the optical device as needed.

CAUTION: EYE SAFETY

Eye safety classification for the use of Bridgelux LED Arrays is in accordance with IEC specification EN62471; Photobiological Safety of Lamps and Lamp Systems. Bridgelux LED Arrays are classified as Risk Group 1 (Low Risk) when operated at or below their rated test current. Please use appropriate precautions. It is important that employees working with LEDs are trained to use them safely.

CAUTION: RISK OF BURN

Do not touch the LED Array or resin area during operation. Allow the LED Array to cool for a sufficient period of time before handling. The LED Array may reach elevated temperatures such that it can burn skin when touched.

CAUTION: CHEMICAL EXPOSURE HAZARD

Exposure to some chemicals commonly used in luminaire manufacturing and assembly can cause damage to the LED Array. Please consult Application Note AN11 for additional information.

Selection Guide

The following configurations are available:

Table 1: Selection Guide for ES Star Arrays

Part Number [1]	CCT [2] (Kelvin)	CRI [3,4]	Test Current [5] (mA)	Typical Voltage (V)	Typical Flux [6] (lm)		Typical Power[4] (W)	Typical Efficacy[4] (lm/W)
					T_j = 25ºC	T_{case} = 85ºC		
BXRA-27E0540-A-03	2700	80	350	18.2	580	505	6.4	91
BXRA-27E0740-A-03	2700	80	350	27.3	850	740	9.6	89
BXRA-27G0540-A-03	2700	90	350	18.2	480	415	6.4	75
BXRA-27G0740-A-03	2700	90	350	27.3	720	625	9.6	75
BXRA-30E0540-A-03	3000	80	350	18.2	630	550	6.4	99
BXRA-30E0740-A-03	3000	80	350	27.3	920	800	9.6	96
BXRA-30G0540-A-03	3000	90	350	18.2	530	460	6.4	83
BXRA-30G0740-A-03	3000	90	350	27.3	780	680	9.6	82
BXRA-40E0600-A-03	4000	80	350	18.2	680	590	6.4	107
BXRA-40E0810-A-03	4000	80	350	27.3	1030	895	9.6	108
BXRA-50C1000-A-xx	5000	70	350	27.3	1150	1000	9.6	120
BXRA-56C0700-A-xx	5600	70	350	18.2	790	685	6.4	124
BXRA-56C1000-A-xx	5600	70	350	27.3	1150	1000	9.6	120

Note for Table 1 through 5 (additional specific notes following Table 2 through 5):

1. Part numbers with "-xx" suffix are available with multiple color control options (4 SDCM or 7 SDCM for example).
2. Nominal CCT as defined by ANSI C78.377-2011.
3. Values are mimimum.
4. Minimum R9 value for 90 CRI products is 50.
5. Products tested under pulsed condition (10ms pulse width) at rated test current where $T_{junction}$ = T_{case} = 25°C.
6. Typical performance values are provided as a reference only and are not a guarantee of performance.
7. Bridgelux maintains a ±7% tolerance on flux measurements.
8. Operating these LED Arrays at or below the drive currents listed in Table 2 and 5, with a case temperature maintained at or below 85°C, will enable the average lumen maintenance projection outlined earlier in this Product Data Sheet.

Typical Performance at Alternative Drive Currents

Customers may drive the LED Arrays at alternative drive currents dependent on the specific application. The typical performance at any drive current can be derived from the current vs. voltage characteristics shown in Figures 2 and 3 and from the flux versus current characteristics shown in Figure 8 and 9. The typical performance at common drive currents is summarized in Table 2.

Table 2: Typical Product Performance at Alternative Drive Currents

Part Number [1]	**CCT & CRI**	**Test Current** [9] (mA)	**Typical Voltage** [6] (V)	**Typical Power** [6] (W)	**Typical Flux** [6] (lm)		**Typical Efficacy** [6] (lm/W)
			T_j = 25ºC	**T_j = 25ºC**	**T_j = 25ºC**	**T_{case} = 85ºC**	**T_j = 25ºC**
BXRA-27E0540-A-03	2700K 80 CRI	115	16.9	1.9	200	170	103
		250	17.7	4.4	430	370	97
		350	18.2	6.4	580	505	91
		500	19.0	9.5	795	695	84
BXRA-27E0740-A-03	2700K 80 CRI	115	25.3	2.9	290	255	100
		250	26.5	6.6	625	545	94
		350	27.3	9.6	850	740	89
		500	28.4	14.2	1170	1015	82
BXRA-27G0540-A-03	2700K 90 CRI	115	16.9	1.9	165	140	85
		250	17.7	4.4	355	305	80
		350	18.2	6.4	480	415	75
		500	19.0	9.5	660	570	70
BXRA-27G0740-A-03	2700K 90 CRI	115	25.3	2.9	245	215	84
		250	26.5	6.6	530	460	80
		350	27.3	9.6	720	625	75
		500	28.4	14.2	990	860	70
BXRA-30E0540-A-03	3000K 80 CRI	115	16.9	1.9	215	190	111
		250	17.7	4.4	465	405	105
		350	18.2	6.4	630	550	99
		500	19.0	9.5	865	755	91
BXRA-30E0740-A-03	3000K 80 CRI	115	25.3	2.9	315	275	108
		250	26.5	6.6	680	590	103
		350	27.3	9.6	920	800	96
		500	28.4	14.2	1265	1100	89

Table 2 Continued

Part Number [1]	CCT & CRI	Current [9] (mA)	Typical Voltage [6] (V)	Typical Power [6] (W)	Typical Flux [6] (lm)		Typical Efficacy [6] (lm/W)
			T_j = 25ºC	T_j = 25ºC	T_j = 25ºC	T_{case} = 85ºC	T_j = 25ºC
BXRA-30G0540-A-03	3000K 90 CRI	115	16.9	1.9	180	155	93
		250	17.7	4.4	390	340	88
		350	**18.2**	**6.4**	**530**	**460**	**83**
		500	19.0	9.5	730	630	77
BXRA-30G0740-A-03	3000K 90 CRI	115	25.3	2.9	265	230	91
		250	26.5	6.6	575	500	87
		350	**27.3**	**9.6**	**780**	**680**	**82**
		500	28.4	14.2	1070	935	75
BXRA-40E0600-A-03	4000K 80 CRI	115	16.9	1.9	230	200	119
		250	17.7	4.4	500	435	113
		350	**18.2**	**6.4**	**680**	**590**	**107**
		500	19.0	9.5	935	810	99
BXRA-40E0810-A-03	4000K 80 CRI	115	25.3	2.9	350	305	120
		250	26.5	6.6	760	660	115
		350	**27.3**	**9.6**	**1030**	**895**	**108**
		500	28.4	14.2	1415	1230	100
BXRA-50C1000-A-xx	5000K 70 CRI	115	25.3	2.9	395	340	136
		250	26.5	6.6	850	735	128
		350	**27.3**	**9.6**	**1150**	**1000**	**120**
		500	28.4	14.2	1580	1375	111
BXRA-56C0700-A-xx	5600K 70 CRI	115	16.9	1.9	270	235	139
		250	17.7	4.4	580	505	131
		350	**18.2**	**6.4**	**790**	**685**	**124**
		500	19.0	9.5	1085	940	115
BXRA-56C1000-A-xx	5600K 70 CRI	115	25.3	2.9	395	340	136
		250	26.5	6.6	850	735	128
		350	**27.3**	**9.6**	**1150**	**1000**	**120**
		500	28.4	14.2	1580	1375	111

Notes for Table 2:

9. Values in **bold** correspond to rated test currents from Table 1. Alternate values are provided for reference only and are not guaranteed.

Flux Characteristics

Table 3: Flux Characteristics

Part Number [1]	CCT [2] (Kelvin)	CRI [3]	Test Current [5] (mA)	Minimum Flux [5] (lm)	Minimum Flux [10] (lm)	Typical Flux [6] (lm)	Typical CBCP [11] (cd)
				T_j = 25ºC	T_{case} = 85ºC	T_{case} = 85ºC	T_j = 25ºC
BXRA-27E0540-A-03	2700	80	350	520	455	505	185
BXRA-27E0740-A-03	2700	80	350	750	655	740	270
BXRA-27G0540-A-03	2700	90	350	430	370	415	155
BXRA-27G0740-A-03	2700	90	350	640	555	625	230
BXRA-30E0540-A-03	3000	80	350	560	490	550	200
BXRA-30E0740-A-03	3000	80	350	810	705	800	295
BXRA-30G0540-A-03	3000	90	350	480	415	460	170
BXRA-30G0740-A-03	3000	90	350	690	600	680	250
BXRA-40E0600-A-03	4000	80	350	600	520	590	215
BXRA-40E0810-A-03	4000	80	350	910	790	895	330
BXRA-50C1000-A-xx	5000	70	350	1020	885	1000	365
BXRA-56C0700-A-xx	5600	70	350	700	605	685	250
BXRA-56C1000-A-xx	5600	70	350	1020	885	1000	365

Notes for Table 3:

10. Minimum flux values at elevated temperatures are provided for reference only and are not guaranteed by 100% production testing. Based on Bridgelux test setup, values may vary depending on the thermal design of the luminaire and/or the environment in which the product is operated.
11. Center beam candle power is a calculated value based on a Lambertian radiation pattern at the rated test current.

Electrical Characteristics

Table 4: Electrical Characteristics

Part Number [1]	**Test Current** [5] (mA)	**Operating Voltage T_j = 25°C** [5, 12] (V)			**Typical Coefficient of Forward Voltage** [13] (mV/ºC) ΔVf/ΔTj	**Typical Thermal Resistance Junction to Case** (ºC/W) Rθj-c
		Minimum	**Typical**	**Maximum**		
BXRA-27E0540-A-03	350	16.4	18.2	20.0	-6 to -18	2.6
BXRA-27E0740-A-03	350	24.6	27.3	30.0	-9 to -27	1.7
BXRA-27G0540-A-03	350	16.4	18.2	20.0	-6 to -18	2.6
BXRA-27G0740-A-03	350	24.6	27.3	30.0	-9 to -27	1.7
BXRA-30E0540-A-03	350	16.4	18.2	20.0	-6 to -18	2.6
BXRA-30E0740-A-03	350	24.6	27.3	30.0	-9 to -27	1.7
BXRA-30G0540-A-03	350	16.4	18.2	20.0	-6 to -18	2.6
BXRA-30G0740-A-03	350	24.6	27.3	30.0	-9 to -27	1.7
BXRA-40E0600-A-03	350	16.4	18.2	20.0	-6 to -18	2.6
BXRA-40E0810-A-03	350	24.6	27.3	30.0	-9 to -27	1.7
BXRA-50C1000-A-xx	350	24.6	27.3	30.0	-9 to -27	1.7
BXRA-56C0700-A-xx	350	16.4	18.2	20.0	-6 to -18	2.6
BXRA-56C1000-A-xx	350	24.6	27.3	30.0	-9 to -27	1.7

Notes for Table 4:

12. Bridgelux maintains a tester tolerance of ± 0.10 V on forward voltage measurements. Voltage minimum and maximum values at the rated test current are guaranteed by 100% test.
13. Typical Coefficient of Forward Voltage maintains a tolerance of ±0.1 from nominal current.

Absolute Maximum Ratings

Table 5: Maximum Current and Reverse Voltage Ratings [18]

CCT [2] (Kelvin)	**Part Number** [1]	**DC Forward Current for LM-80** (mA) [4,5,6]	**Maximum Peak Pulsed Current** (mA) [14, 16]	**Maximum Reverse Voltage** (Vr) [15]
2700K	BXRA-27E0540-A-03	350	700	-30
	BXRA-27G0540-A-03	350	700	-30
	BXRA-27E0740-A-03	350	700	-45
	BXRA-27G0740-A-03	350	700	-45
3000K	BXRA-30E0540-A-03	350	700	-30
	BXRA-30G0540-A-03	350	700	-30
	BXRA-30E0740-A-03	350	700	-45
	BXRA-30G0740-A-03	350	700	-45
4000K	BXRA-40E0600-A-03	350	700	-30
	BXRA-40E0810-A-03	350	700	-45
5000K	BXRA-50C1000-A-xx	350	700	-45
5600K	BXRA-56C0700-A-xx	350	700	-45
	BXRA-56C1000-A-xx	350	700	-45

Notes for Table 5:

14. Bridgelux recommends a maximum duty cycle of 10% when operating LED Arrays at the maximum peak pulsed current specified.
15. Light emitting diodes are not designed to be driven in reverse voltage.
16. Maximum peak pulsed currents are values at which the LED Array can be driven without catastrophic failures.
17. DC Forward Current for LM-80 are the maximum drive currents for which LM-80 data is currently available.
18. Lumen maintenance (L70) and lifetime predictions are valid for drive current and case temperature conditions used for LM-80 testing as included in the applicable LM-80 test report for these arrays.
19. Arrays may be driven at higher currents but lumen maintenance may be reduced

Table 6: Maximum Ratings

Parameter	**Maximum Rating**
LED Junction Temperature	150°C
Storage Temperature	-40°C to +105°C
Operating Case Temperature	105°C
Soldering Temperature[1]	350°C or lower for a maximum of 3.5 seconds

Note for Table 6:

1. Refer to Bridgelux Application Note AN15: Reflow Soldering of Bridgelux LED Arrays for solder procedure (www.Bridgelux.com

Forward Current versus Voltage Characteristics

Figure 2: Typical Current vs. Voltage

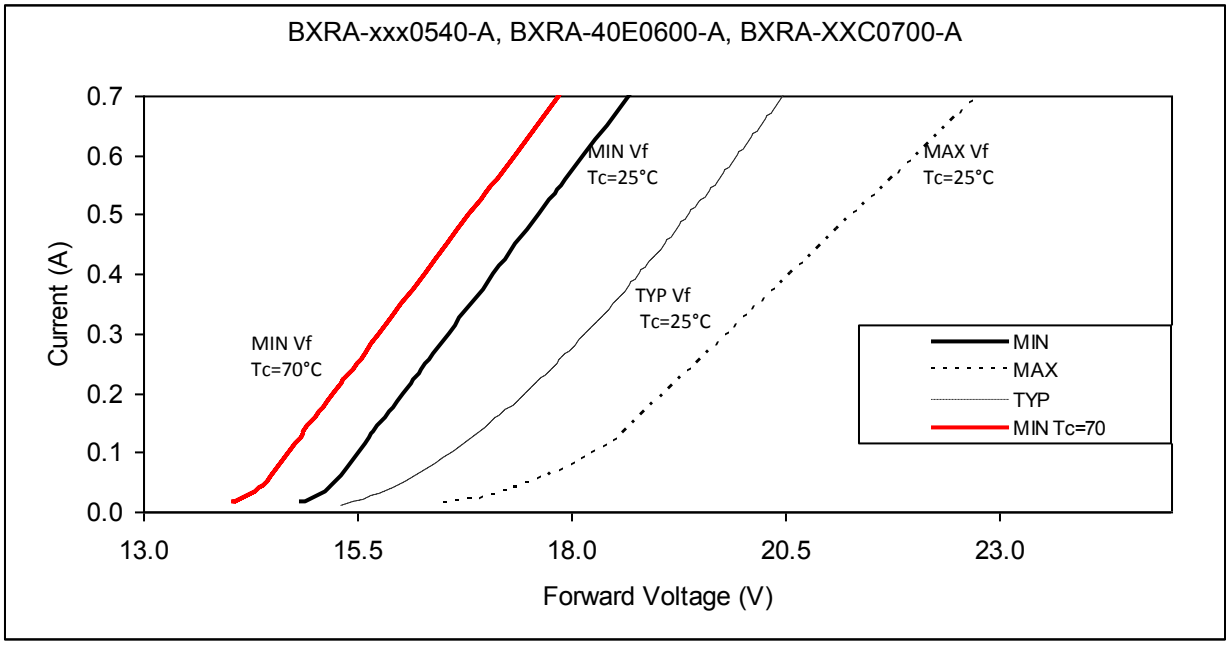
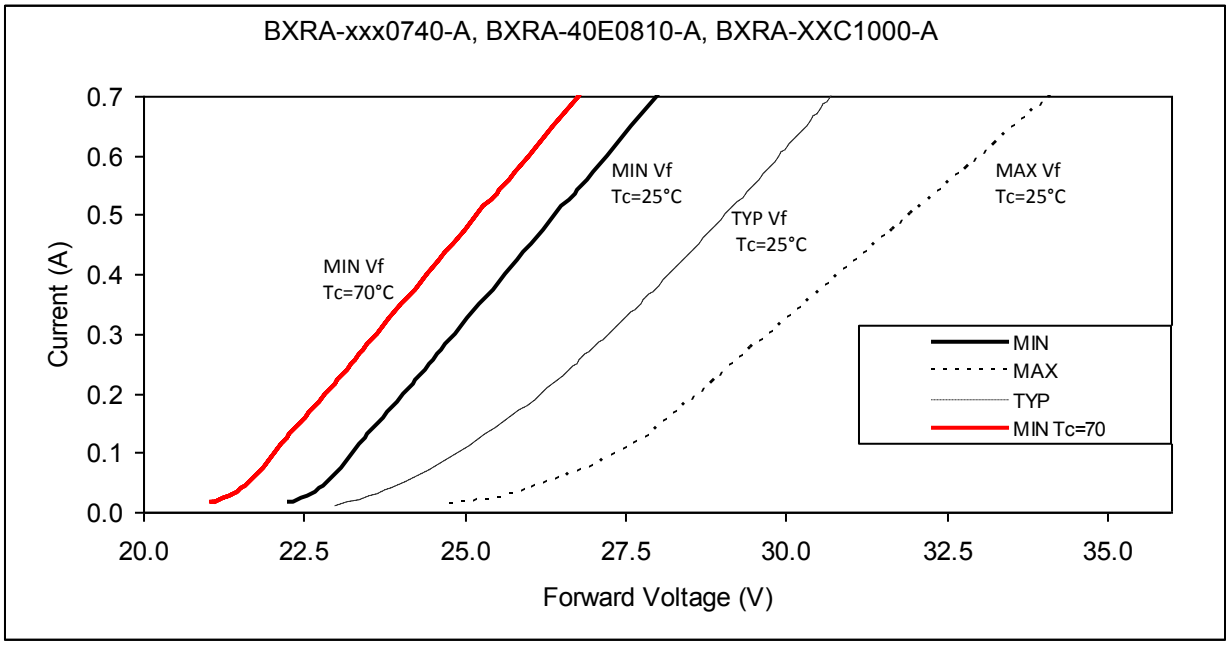


Figure 3: Typical Current vs. Voltage



Typical Relative Luminous Flux vs. Current, Tj=25°C

Typical performance at any drive current can be derived from the current versus voltage characteristics shown in Figures 2, and 3 and the flux versus current characteristics shown in Figures 4 and 5.

Figure 4: Typical Flux vs. Current

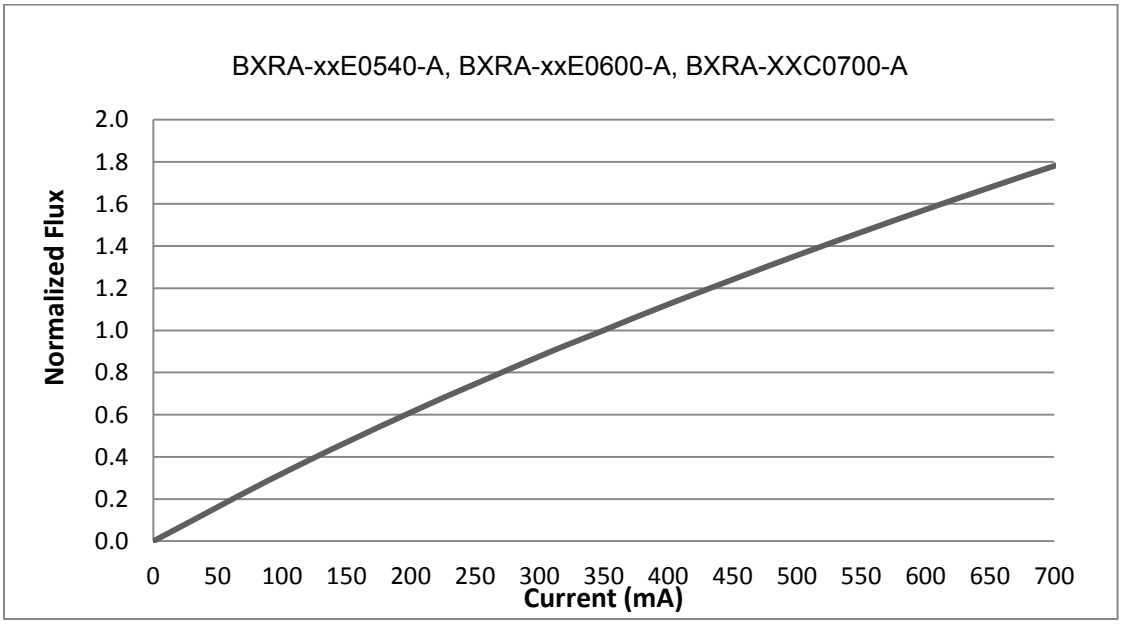
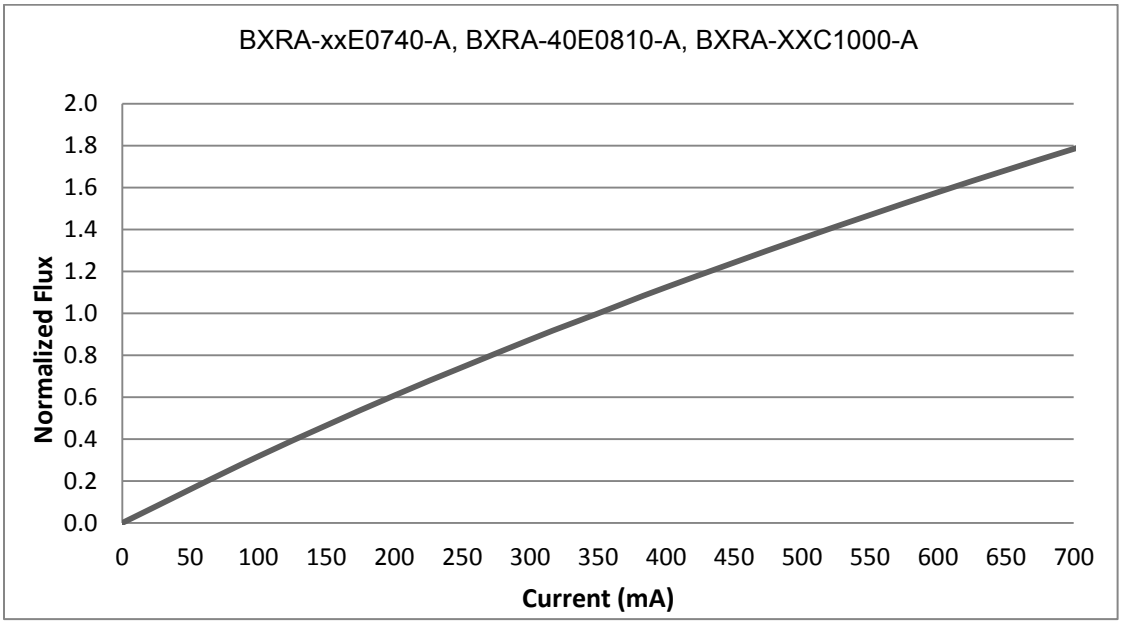


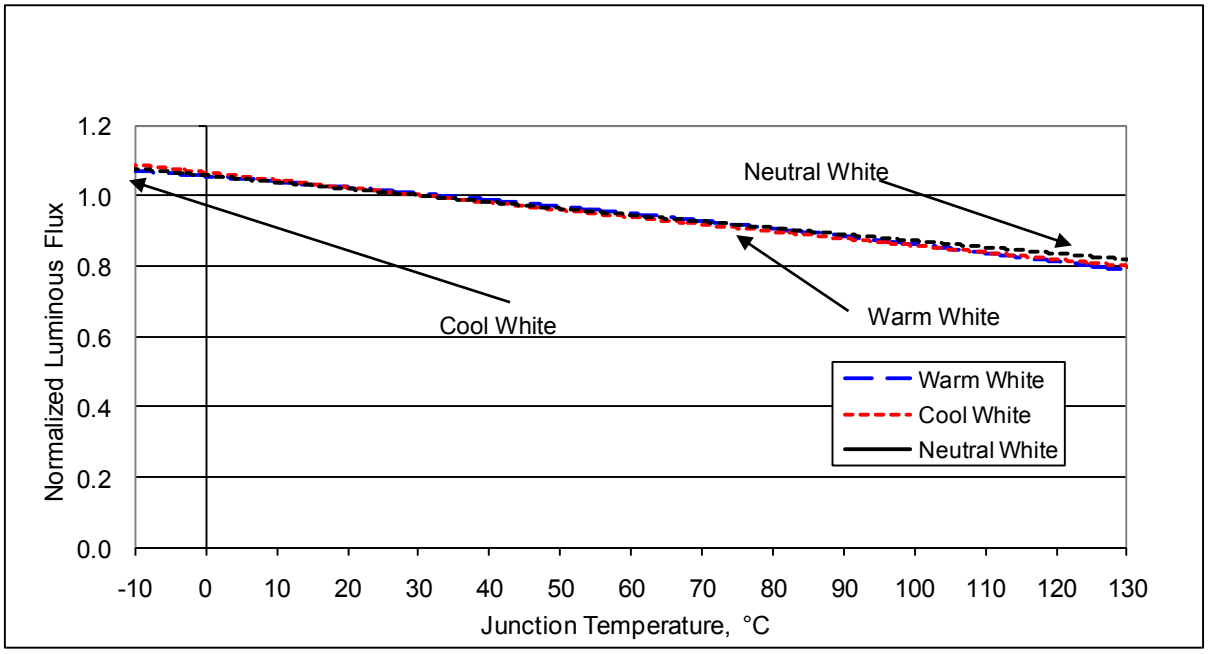
Figure 5: Typical Flux vs. Current



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

Typical Chromaticity Characteristics vs. Temperature

Figure 6: Typical Flux vs. Junction Temperature



Note for figures 6, 7 and 8:

1. Characteristics shown for Warm White 3000K 80CRI
2. Characteristics shown for Neutral White 4000K 80CRI
3. Characteristics shown for Neutral White 4000K 80CRI

Figure 7: Typical ccy Shift vs. Junction Temperature

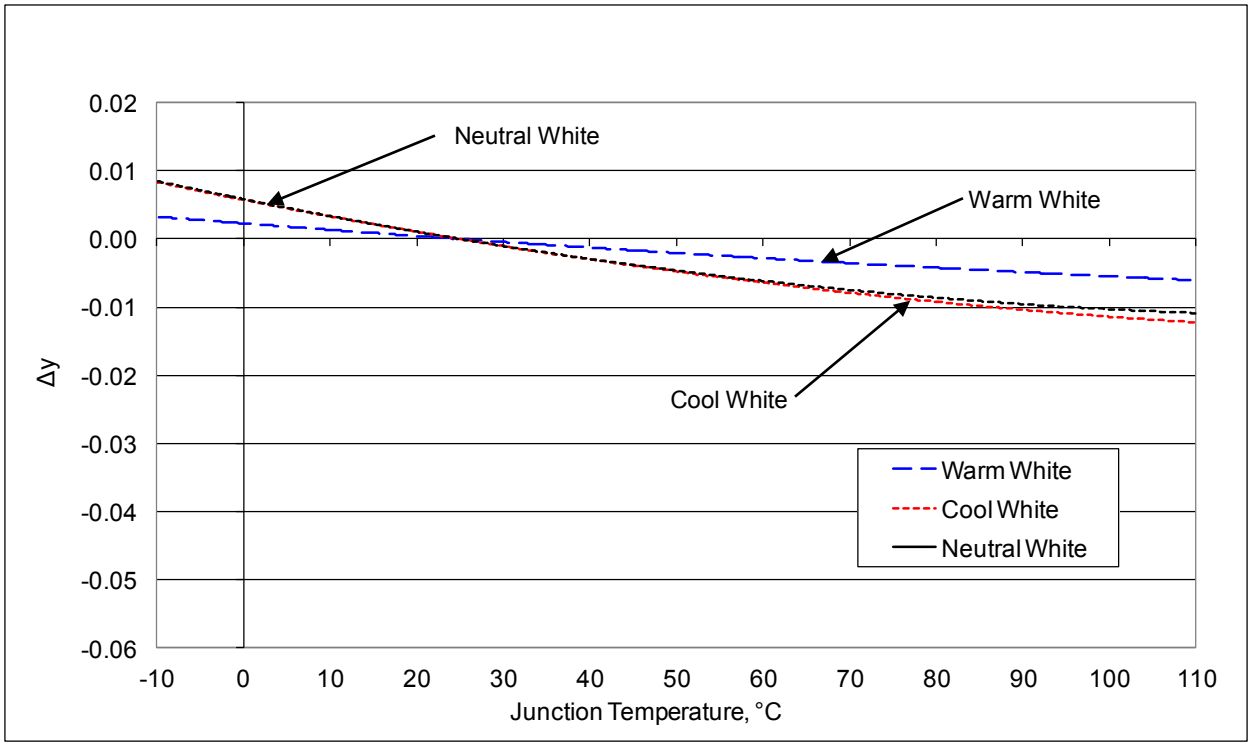
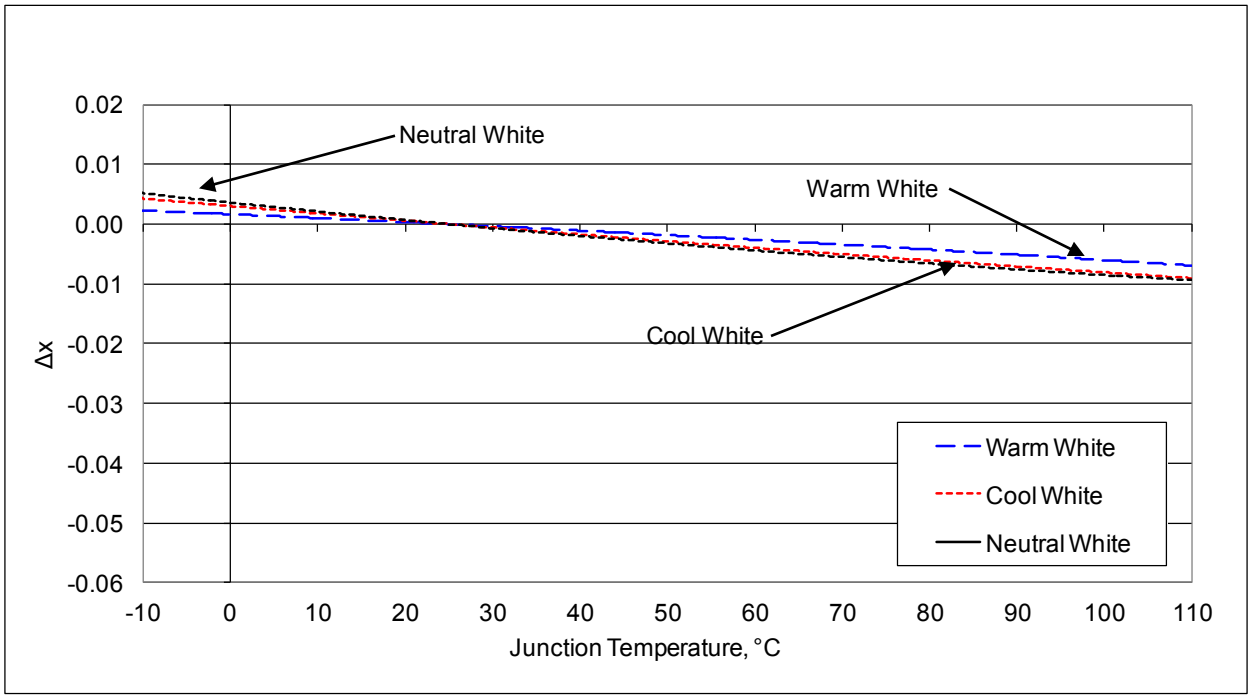
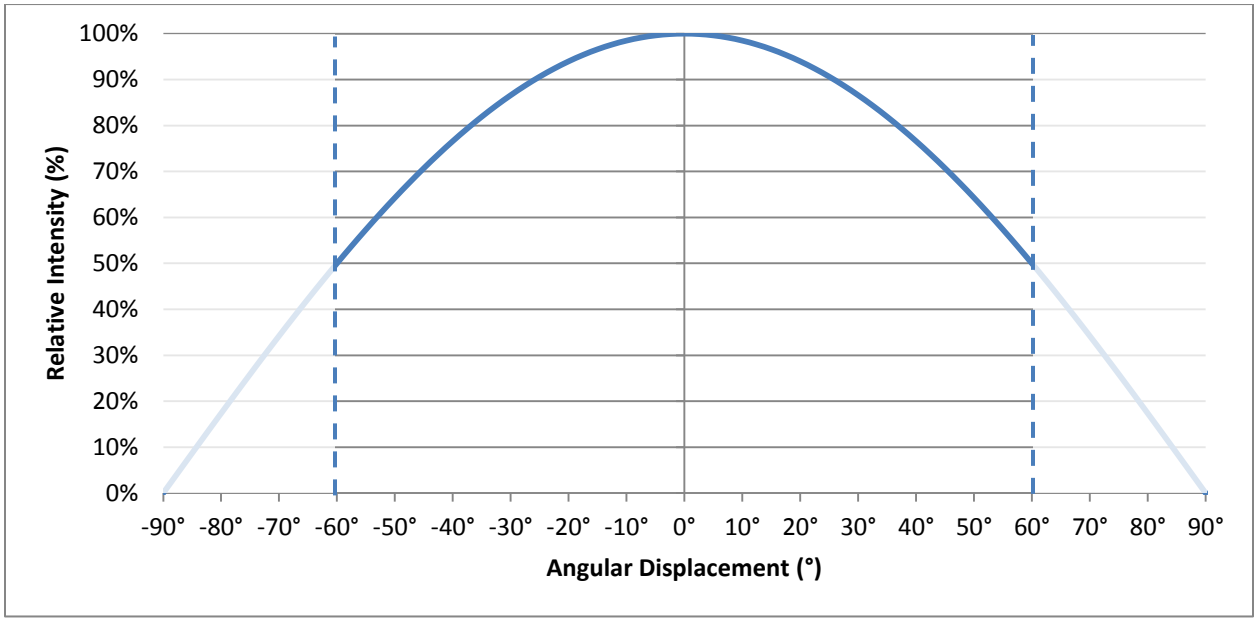


Figure 8: Typical ccx Shift vs. Junction Temperature



Typical Radiation Pattern

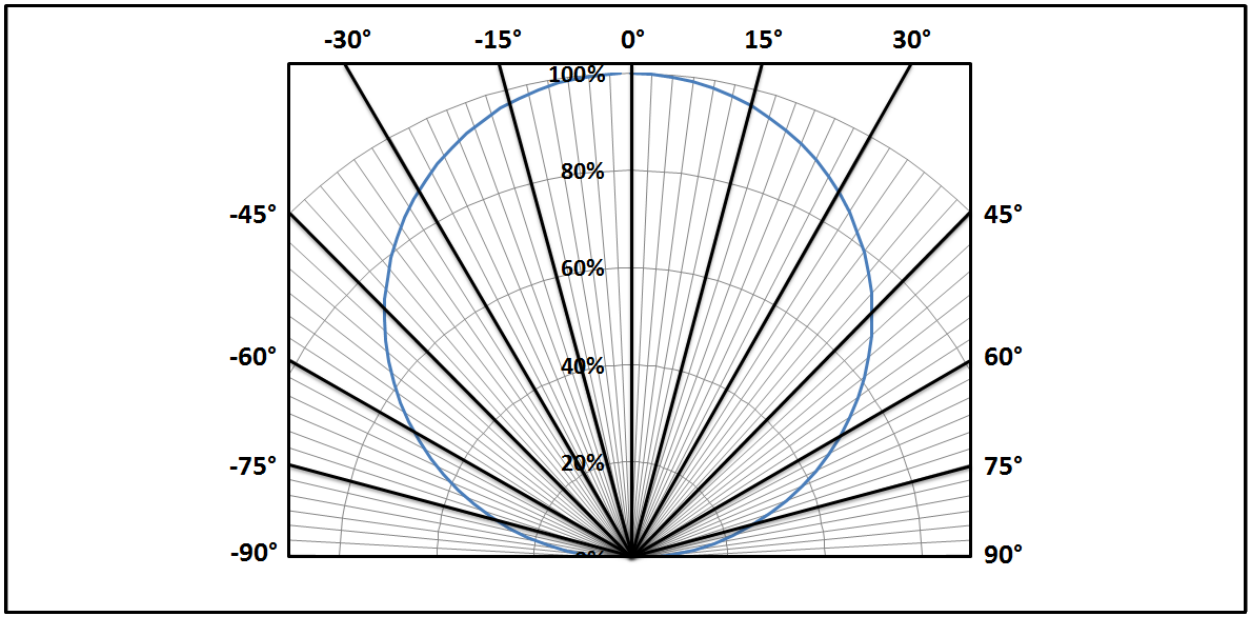
Figure 9: Typical Spatial Radiation Pattern



Notes for figure 9:

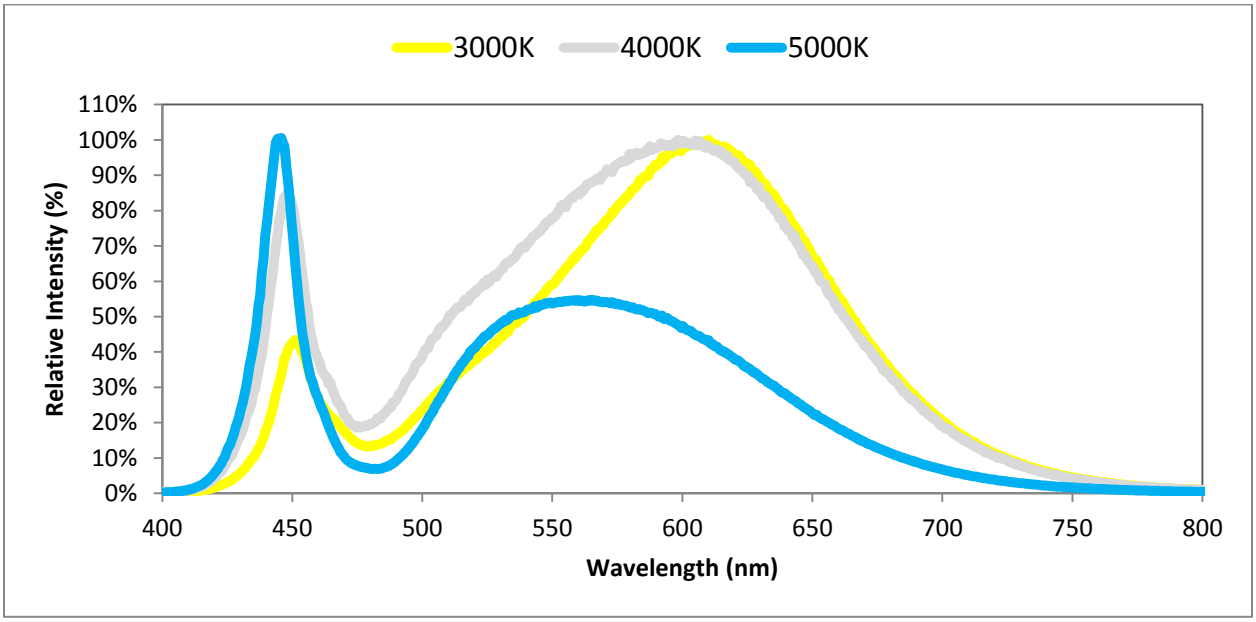
1. Typical viewing angle is 120º.
2. Viewing angle is defined as the off axis angle from the centerline where vertical intensity is ½ of the peak intensity value.

Figure 10: Typical Polar Radiation Pattern



Typical Radiation Pattern

Figure 11: Typical Color Spectrum

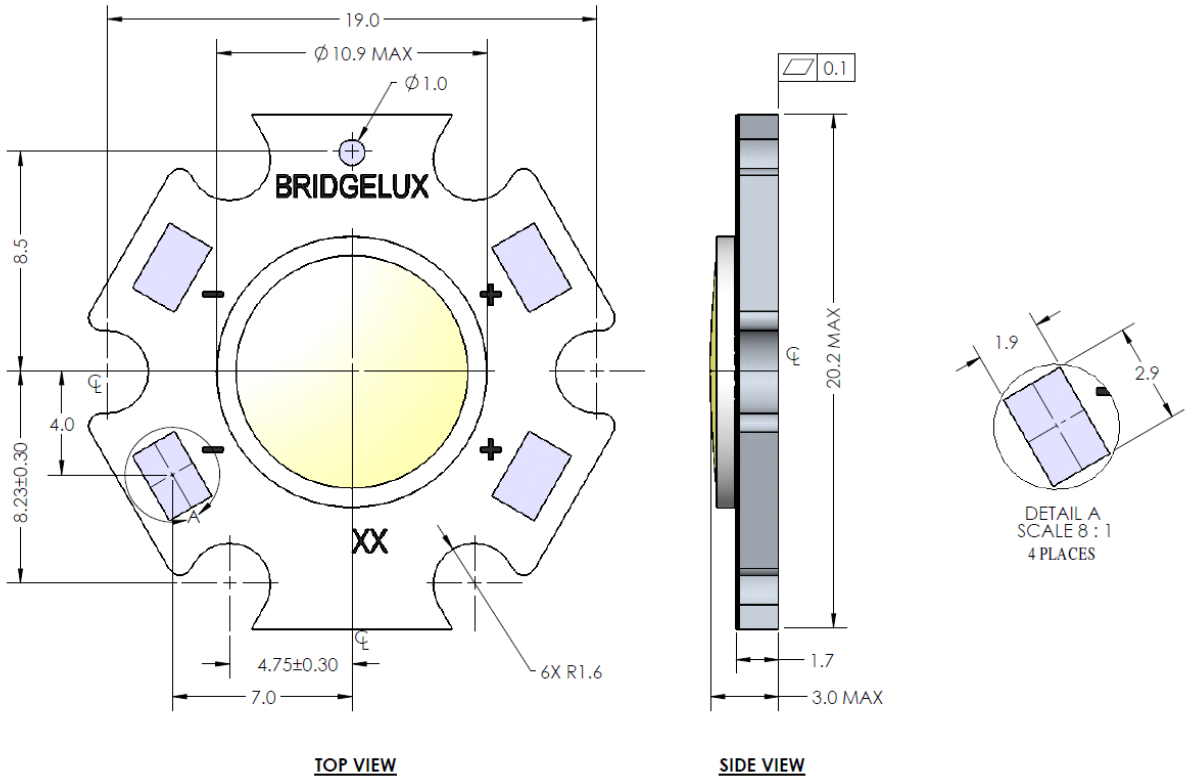


Notes for Figure 11:

1. Color spectra measured at rated current and Tj = 25°C.
2. Color spectrum shown for warm white is 3000K and 80 CRI.
3. Color spectrum shown for neutral white is 4000K and 80 CRI.
4. Color spectrum shown for cool white is 5000K and 70 CRI.

Mechanical Dimensions

Figure 12: Drawing for ES Star Arrays

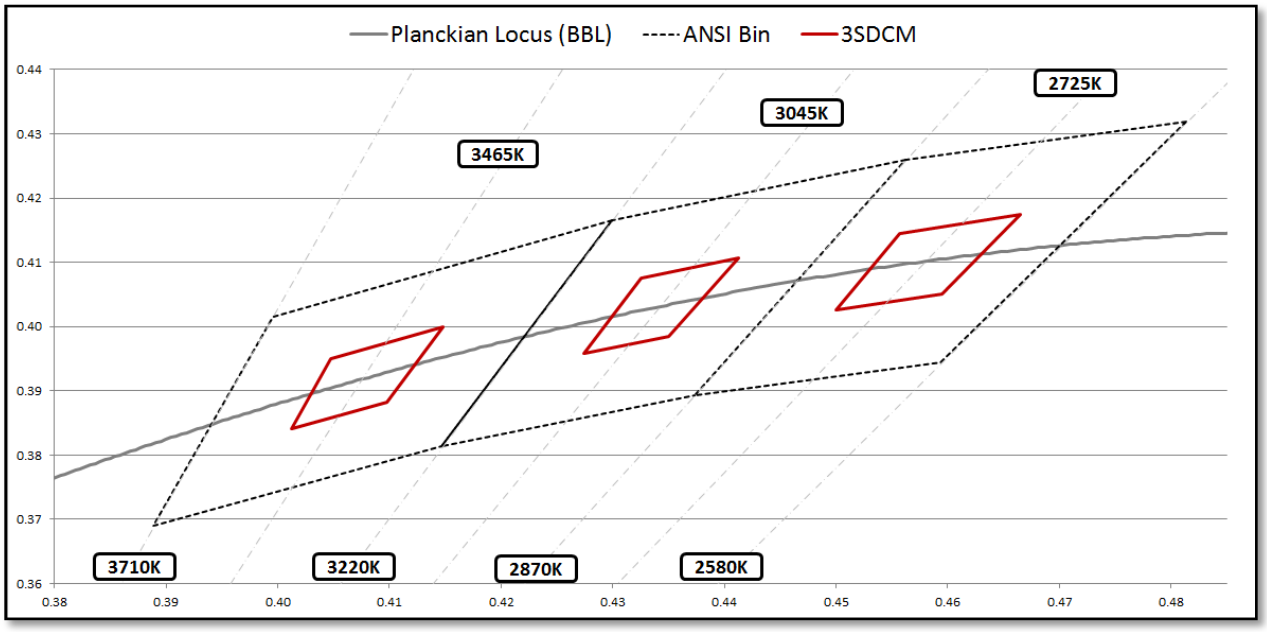


Notes for Figure 12:

1. Mounting holes are for M2.5 or #4 screws.
2. Solder pads are labeled “+” and “-“ to denote positive and negative, respectively.
3. It is not necessary to provide electrical connections to both sets of solder pads. Either set may be used depending on application specific design requirements.
4. Drawings are not to scale.
5. Drawing dimensions are in millimeters.
6. Unless otherwise specified, tolerances are ± 0.10mm.
7. The optical center of the LED Array is nominally defined by the mechanical center of the array. The light emitting surface (LES) is centered on the mechanical center of the array to a tolerance of ± 0.45 mm
8. Bridgelux maintains a flatness of 0.1 mm across the mounting surface of the array. Refer to Application Notes AN10 and AN11 for product handling, mounting and heat sink recommendations.

Color Binning Information

Figure 13: Graph of Warm White Test Bins in xy Color Space



Note: 3SDCM bins are shown inside standard ANSI bins for comparison purposes.

Table 7: Warm White xy Bin Coordinates and Associated Nominal CCT

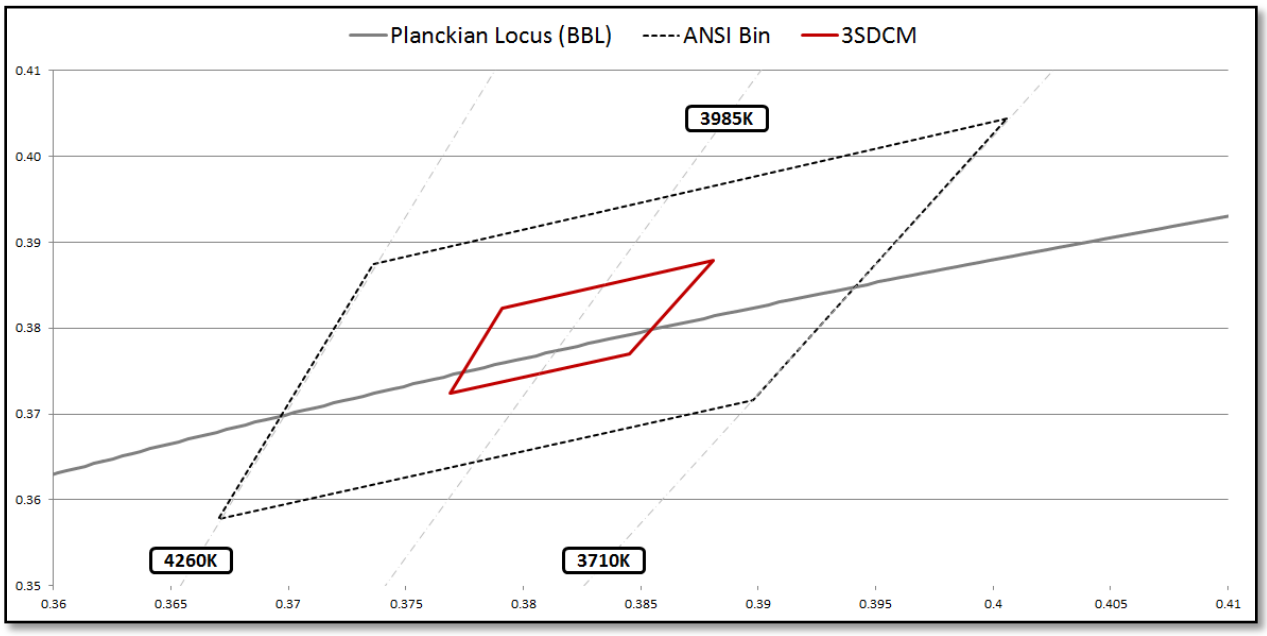
Bin Code	x	y	CCT (K)
X3 (3SDCM)	0.4148 0.4047 0.4012 0.4098	0.4000 0.3950 0.3841 0.3883	3500

Bin Code	x	y	CCT (K)
X3 (3SDCM)	0.4413 0.4325 0.4274 0.4350	0.4107 0.4075 0.3958 0.3984	3000

Bin Code	x	y	CCT (K)
X3 (3SDCM)	0.4665 0.4557 0.4500 0.4595	0.4175 0.4145 0.4026 0.4050	2700

Color Binning Information (continued)

Figure 14: Graph of Neutral White Test Bins in xy Color Space



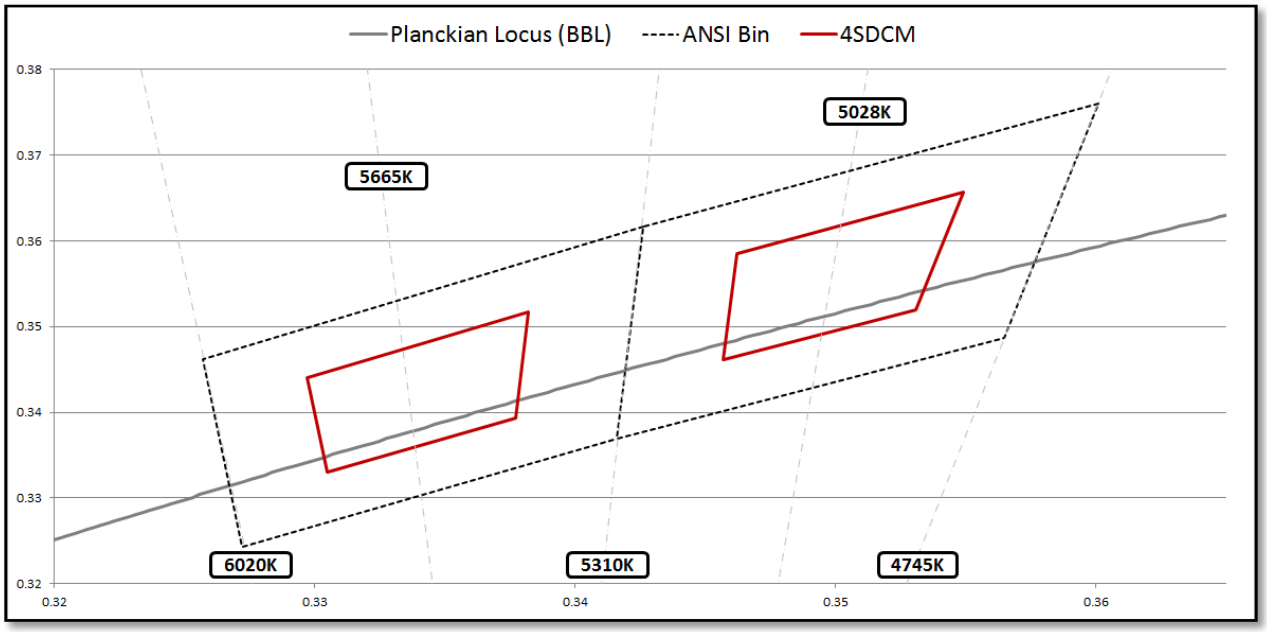
Note: 3SDCM bins are shown inside standard ANSI bins for comparison purposes.

Table 8: Neutral White xy Bin Coordinates and Associated Nominal CCT

Bin Code	X	Y	CCT (K)
X3 3SDCM	0.3881 0.3791 0.3769 0.3845	0.3879 0.3823 0.3724 0.377	4000

Color Binning Information (continued)

Figure 15: Graph of Cool White Test Bins in xy Color Space



Note: 4SDCM bins are shown inside standard ANSI bins for comparison purposes.

Table 9: Cool White xy Bin Coordinates and Associated Nominal CCT

Bin Code	X	Y	ANSI CCT (K)
G3	0.3376 0.3464 0.3452 0.3371	0.3616 0.3688 0.3558 0.3493	5000
G4	0.3371 0.3452 0.3441 0.3366	0.3493 0.3558 0.3428 0.3369	5000
H3	0.3464 0.3551 0.3533 0.3452	0.3688 0.376 0.3624 0.3558	5000
H4	0.3452 0.3533 0.3515 0.3441	0.3558 0.3624 0.3487 0.3428	5000
X4 (4SDCM)	0.3499 0.3412 0.3407 0.3481	0.3657 0.3585 0.3461 0.3520	5000

Bin Code	X	Y	ANSI CCT (K)
E3	0.3215 0.3293 0.3292 0.3207	0.3353 0.3423 0.3539 0.3462	5600
E4	0.3222 0.3294 0.3293 0.3215	0.3243 0.3306 0.3423 0.3353	5600
F3	0.3292 0.3293 0.3371 0.3376	0.3539 0.3423 0.3493 0.3616	5600
F4	0.3294 0.3366 0.3371 0.3293	0.3306 0.3369 0.3493 0.3423	5600
X4 (4SDCM)	0.3332 0.3247 0.3255 0.3327	0.3517 0.3440 0.3330 0.3393	5600

Color Control Options

ES Star LED Series Arrays are available in the following color control options.

Table 10: Color Control Options

Product	CCT	CRI	3SDCM Part Number	4SDCM Part Number	7SDCM Part Number
ES Star	2700K	80	BXRA-27E0540-A-03	Not Available	Not Available
ES Star	2700K	90	BXRA-27G0540-A-03	Not Available	Not Available
ES Star	2700K	80	BXRA-27E0740-A-03	Not Available	Not Available
ES Star	2700K	90	BXRA-27G0740-A-03	Not Available	Not Available
ES Star	3000K	80	BXRA-30E0540-A-03	Not Available	Not Available
ES Star	3000K	90	BXRA-30G0540-A-03	Not Available	Not Available
ES Star	3000K	80	BXRA-30E0740-A-03	Not Available	Not Available
ES Star	3000K	90	BXRA-30G0740-A-03	Not Available	Not Available
ES Star	4000K	80	BXRA-40E0600-A-03	Not Available	Not Available
ES Star	4000K	80	BXRA-40E0810-A-03	Not Available	Not Available
ES Star	5600K	70	Not Available	BXRA-56C0700-A-04	BXRA-56C0700-A-00
ES Star	5600K	70	Not Available	BXRA-56C1000-A-04	BXRA-56C1000-A-00

Design Resources

Bridgelux has developed a comprehensive set of application notes and design resources to assist customers in successfully designing with Bridgelux LED Array products. Included below is a list of available resources which can be downloaded from the Bridgelux web site under the Design Resources section.

These documents are updated regularly as new information becomes available, including complimentary infrastructure products such as commercially available secondary optics and electronic driver solutions.

Application Notes

- AN10: Effective Thermal Management of Bridgelux LED Arrays
- AN11: Assembly Considerations for Bridgelux LED Arrays
- AN12: Electrical Drive Considerations for Bridgelux LED Arrays
- AN14: Reliability Data Sheet for Bridgelux LED Arrays
- AN15: Reflow Soldering of Bridgelux LED Arrays
- AN16: Optical Considerations for Bridgelux LED Arrays

Optical Source Models

Optical source models and ray set files are available for all Bridgelux LED Array products, and can be downloaded directly from the Bridgelux web site. The list below contains the formats currently available. If you require a specific format not included in this list, please contact your Bridgelux sales representative for assistance.

- Zemax
- ASAP
- IESNA
- LightTools
- LucidShape
- OPTIS SPEOS
- PHOTOPIA
- TracePro
- Radiant Imaging Source Model

3D CAD Models

Three dimensional CAD models depicting the product outline of all Bridgelux LED Arrays are available in both SAT and STEP formats. These CAD files can be downloaded directly from the Bridgelux web site.

About Bridgelux

Bridgelux is a leading developer and manufacturer of technologies and solutions transforming the $40 billion global lighting industry into a $100 billion market opportunity. Based in Livermore, California, Bridgelux is a pioneer in solid-state lighting (SSL), expanding the market for light-emitting diode (LED) technologies by driving down the cost of LED lighting systems. Bridgelux's patented light source technology replaces traditional technologies (such as incandescent, halogen, fluorescent and high intensity discharge lighting) with integrated, solid-state lighting solutions that enable lamp and luminaire manufacturers to provide high performance and energy-efficient white light for the rapidly growing interior and exterior lighting markets, including street lights, commercial lighting and consumer applications. With more than 550 patent applications filed or granted worldwide, Bridgelux is the only vertically integrated LED manufacturer and developer of solid-state light sources that designs its solutions specifically for the lighting industry.

For more information about the company, please visit www.bridgelux.com