

# Perfect White COB LED Arrays



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## Features:

- Continuous spectrum with enhanced cyan rendering index
- Lumen range from less than 500 lm to over 3,500lm @ Tj = 85°C
- Typical power range from 5W to 60W
- 3 SDCM color binning accuracy
- Excellent optical emission uniformity and color over angle consistency
- Exceptional long term color stability
- Package thermal conductivity more than the industry average
- Environmentally friendly: RoHS and REACH compliant
- UL Recognized, File # E465703



## Applications

- |                               |                            |
|-------------------------------|----------------------------|
| • Spotlights/Track Lights     | • Downlights               |
| • Architectural and Specialty | • Shop Lighting            |
| • Hospitality Lighting        | • Metal Halide Replacement |

## Technology Overview

Luminus Chip-on-Board (COB) LED series offers a complete lighting class solution designed for high performance illumination applications. The Perfect White LED series has been specially design for lighting where require tranquility. The selection covers a lumen range from less than 500lm to over 3,500lm. Enhanced cyan color characterizes these specialty LEDs. These breakthroughs allow illumination engineers and designers to develop beautifully lit spaces without sacrificing efficacy, brightness and overall quality.

### Reliability

Designed from the ground up, the Luminus COB LED is one of the most reliable light sources in the world today. Having passed a rigorous suite of environmental and mechanical stress tests, including mechanical shock, vibration, temperature cycling and humidity. Only then are the devices qualified for use in a wide range of lighting application including some of the most demanding commercial applications. Delivered with fully qualified LM-80 test data and TM-21 lifetime results that certify lumen maintenance at 35,000 hours or more, Luminus COB LEDs are ready for the toughest challenges.

### UL Recognized Compliance

Luminus COB arrays are tested in accordance with ANSI/UL 8750 to ensure safe operation for their intended applications.

### REACH & RoHS Compliance

All LED products manufactured by Luminus are REACH and RoHS compliant and free of hazardous materials, including lead and mercury.

## Understanding Luminus COB LED Test Specifications

Every Luminus LED is fully tested to ensure it meets the high quality standards customers have come to expect from Luminus' products.

### Traceability

Each Luminus COB LED is marked with a 2D bar code that contains a unique serial number. With this serial number, Luminus has the ability to provide customers with actual test data measurements for a specific LED. In addition, the 2D bar code is linked to manufacturing date codes that enables traceability of production processes and materials.

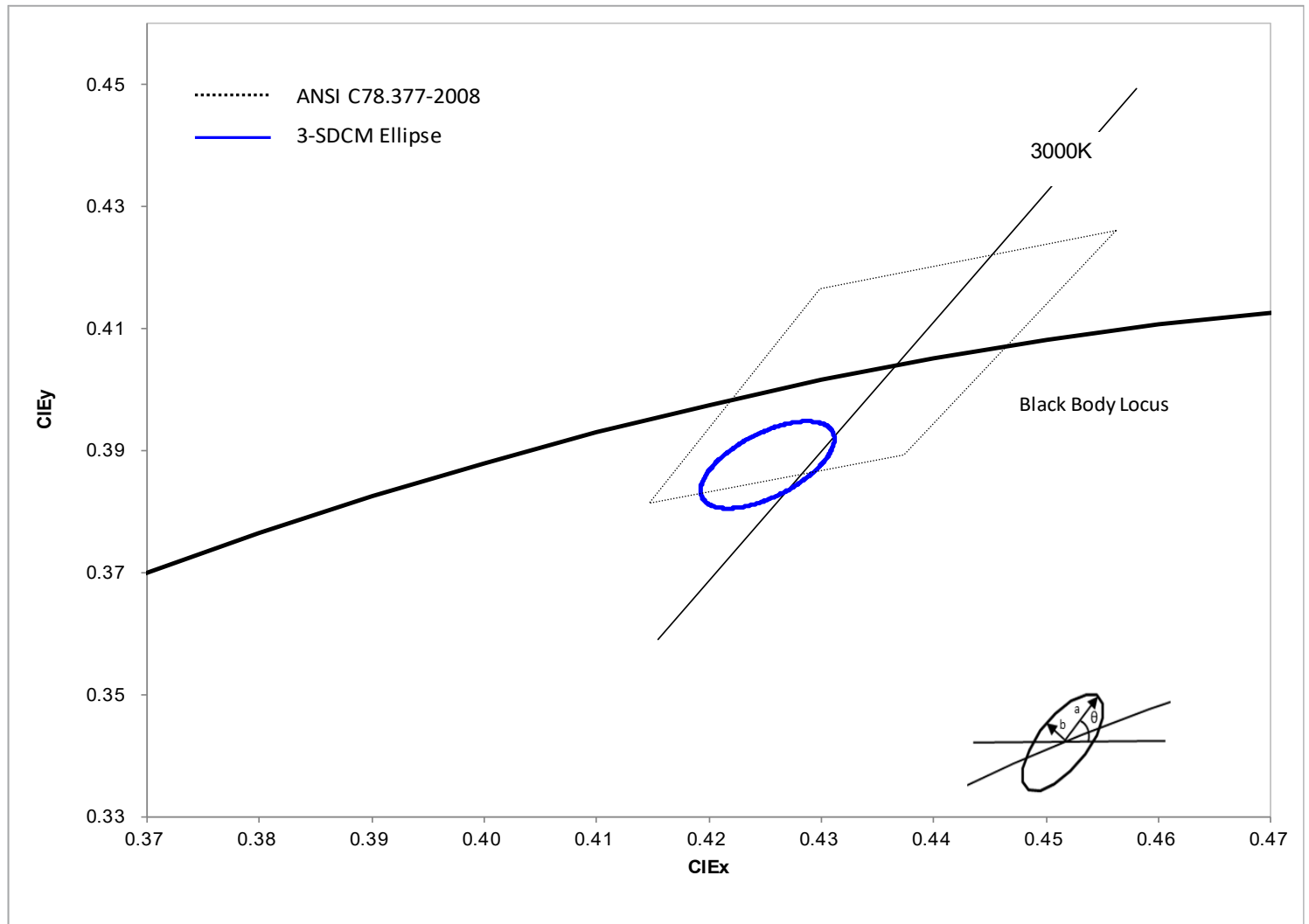
### Chromaticity Bin Range

Chromaticity binning delivers color consistency for every order. Standard products are delivered with a 3-step MacAdam ellipse. This ensures color performance matching in the application. For the most demanding application, Luminus is one of only a few companies that can provide a 2 SDCM. These tightly controlled, small distribution bins provide customers predictable, repeatable colors.

### Testing Temperature

Luminus COB products are measured at temperatures typical for the LED operating in the fixture. Each device is tested at 85°C junction temperature eliminating the need to scale datasheet specifications to real world situations.

### Chromaticity Bin Structure



### Perfect White Chromaticity Bins

The following tables describe the chromaticity bin center points, the orientation angle for the ellipse ( $\theta^\circ$ ), and the maximum radii for the ellipses. The ANSI Bin is provided for reference.

CCT	Center Point		Angle	3-step Bin	
	CIEx	CIEy	$\theta^\circ$	a	b
3000K	0.4252	0.3877	53.6	0.00834	0.00408

\*Note: Luminus maintains a  $\pm 0.005$  tolerance on chromaticity (CIEx and CIEy) measurements.

## Product Ordering and Shipping Part Number Nomenclature

All Perfect White LED products are packaged and labeled with part numbers as outlined in the table on page 5. When shipped, each package will contain only a single flux and chromaticity bin. The part number designation is as follows:

CXM — XX — 30 — 90 — 36 — QQPP — FG — W

Product Family	Light Emitting Surface Diameter <sup>1</sup>	Color Temperature <sup>2</sup>	Color Rendering Index (CRI) <sup>3</sup>	Voltage (typical)	Package Configurator	Flux Bin	Chromaticity Bin
CXM: Chip on Board	XX: LES Diameter (mm) Approximate	CT	XX	V	PC32 (Basic package)	Lumens	See page 3 for bins

Note 1: XX nomenclature corresponds to the following:

6 = 6.3 mm  
 9 = 9.6 mm  
 11 = 11.7 mm  
 14 = 14.3 mm  
 22 = 22.0 mm

Note 2: CT Nomenclature corresponds to the following

30 is 3000K

Note 3: XX Color Rendering nomenclature corresponds to the following

90 = min. 90 CRI

Note: Luminus part numbers may be accompanied by prefixes or suffixes. The most common is the "Rev01" suffix indicating a part is fully released and carries a full warranty. These additional characters may appear on shipping labels, packing slips and invoices. In all cases the basic part number described above will always be included.

**Perfect White Series Part Numbers**

The following tables describe products with typical flux and minimum flux measured at typical currents and specified at 85°C. The values at 25°C are calculated and shown for reference only. All product is measured and specified at 85°C junction temperature.

Output Flux (lm)			CRI (min)	LES Diameter (mm)	Typ. Cur- rent (mA)	Ordering Part Number
Typ. (85°C)	Min. (85°C)	Typ. (calculated) (25°C)				3 SDCM
450	420	485	90	6.3	300	CXM-6-30-90-18-PC32-F4-3
1,155	1,075	1,365	90	9.6	360	CXM-9-30-90-36-PC32-F4-3
1,445	1,330	1,680	90	11.7	450	CXM-11-30-90-36-PC32-F4-3
2,310	2,105	2,680	90	14.3	720	CXM-14-30-90-36-PC32-F4-3
3,685	3,430	3,975	90	22.0	1,050	CLM-22-30-90-36-PC32-F4-3

\*Note: Luminus maintains a +/- 6% tolerance on flux measurements.

Luminus maintains a +/- 2% tolerance on CRI measurements.

**CXM-6 Operating Characteristics<sup>1</sup>**
**Optical and Electrical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Forward Current <sup>2</sup>	$I_f$		300	450	mA
Forward Voltage <sup>3</sup>	$V_f$	15.5	17	18.5	V
Power			5.2	8.1	W
Operating Case Temperature	$T_c$			105	°C
Light Emitting Surface Diameter	LES		6.3		mm
Thermal Resistance (junction-to-case)	$\Theta_{jc}$		0.96		°C/W
Junction Temperature	$T_j$			140	°C
Viewing Angle			120		Degree

**CXM-9 Operating Characteristics<sup>1</sup>**
**Optical and Electrical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Forward Current <sup>2</sup>	$I_f$		360	540	mA
Forward Voltage <sup>3</sup>	$V_f$	31	33.8	37	V
Power			12.2	19	W
Operating Case Temperature	$T_c$			105	°C
Light Emitting Surface Diameter	LES		9.6		mm
Thermal Resistance (junction-to-case)	$\Theta_{jc}$		0.65		°C/W
Junction Temperature	$T_j$			140	°C
Viewing Angle			120		Degree

**CXM-11 Operating Characteristics<sup>1</sup>**
**Optical and Electrical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Forward Current <sup>2</sup>	$I_f$		450	675	mA
Forward Voltage <sup>3</sup>	$V_f$	31	33.8	37	V
Power			15.2	24	W
Operating Case Temperature	$T_c$			105	°C
Light Emitting Surface Diameter	LES		11.7		mm
Thermal Resistance (junction-to-case)	$\Theta_{jc}$		0.31		°C/W
Junction Temperature	$T_j$			140	°C
Viewing Angle			120		Degree

**CXM-14 Operating Characteristics<sup>1</sup>**
**Optical and Electrical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Forward Current <sup>2</sup>	$I_f$		720	1,080	mA
Forward Voltage <sup>3</sup>	$V_f$	31	34	37	V
Power			24.5	38	W
Operating Case Temperature	$T_c$			105	°C
Light Emitting Surface Diameter	LES		14.3		mm
Thermal Resisance (junction-to-case)	$\Theta_{jc}$		0.27		°C/W
Junction Temperature	$T_j$			140	°C
Viewing Angle			120		Degree

**CLM-22 Operating Characteristics<sup>1</sup>**
**Optical and Electrical Characteristics**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Forward Current <sup>2</sup>	$I_f$		1,050	1,575	mA
Forward Voltage <sup>3</sup>	$V_f$	31	34.5	38	V
Power			36.2	56.5	W
Operating Case Temperature	$T_c$			105	°C
Light Emitting Surface Diameter	LES		22.0		mm
Thermal Resisance (junction-to-case)	$\Theta_{jc}$		0.19		°C/W
Junction Temperature	$T_j$			140	°C
Viewing Angle			120		Degree

Note 1: Ratings are based on operation at a constant junction temperature  $T_j = 85^\circ\text{C}$ .

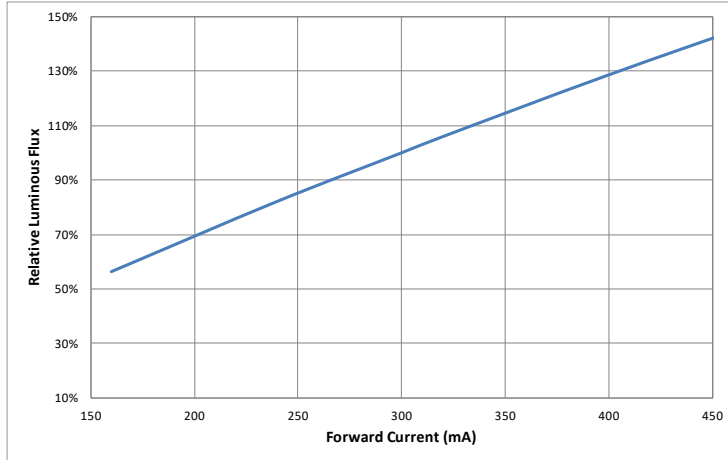
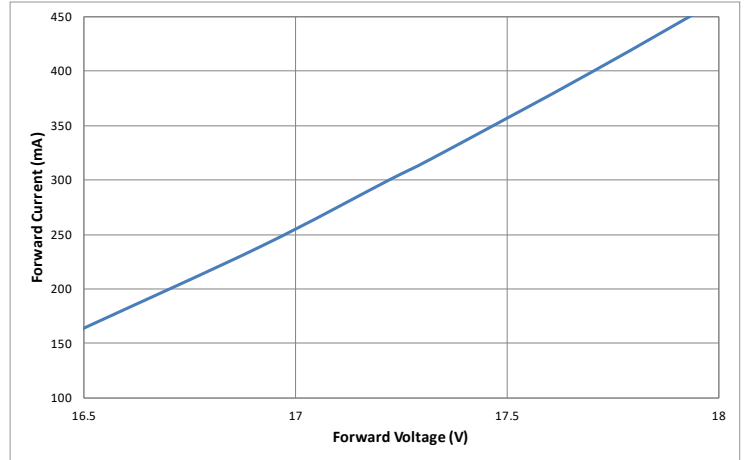
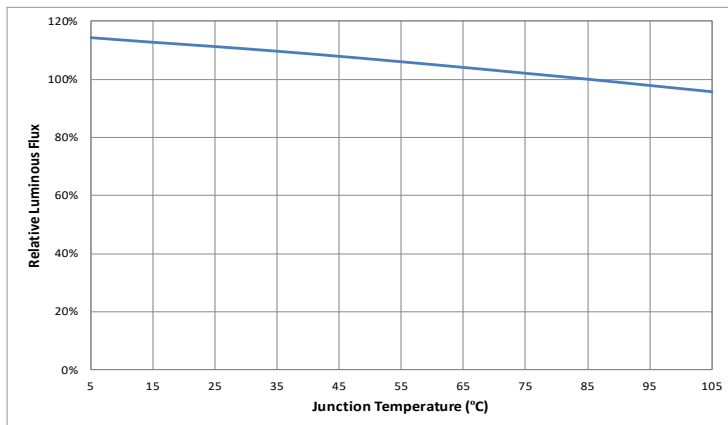
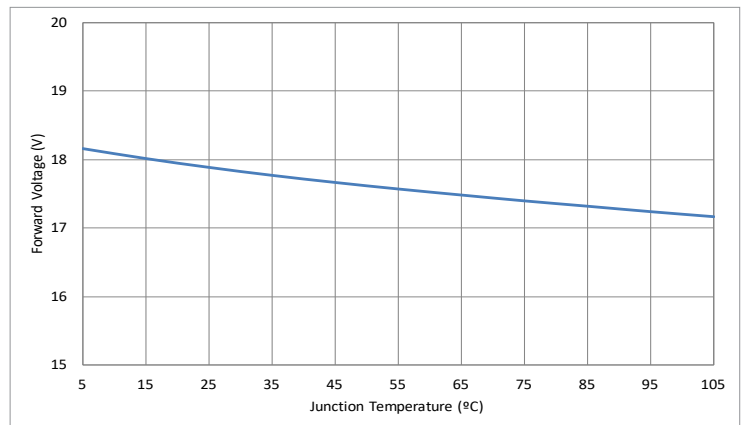
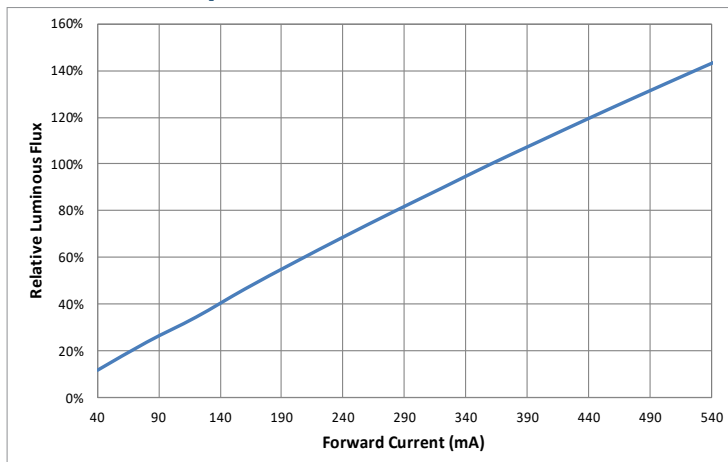
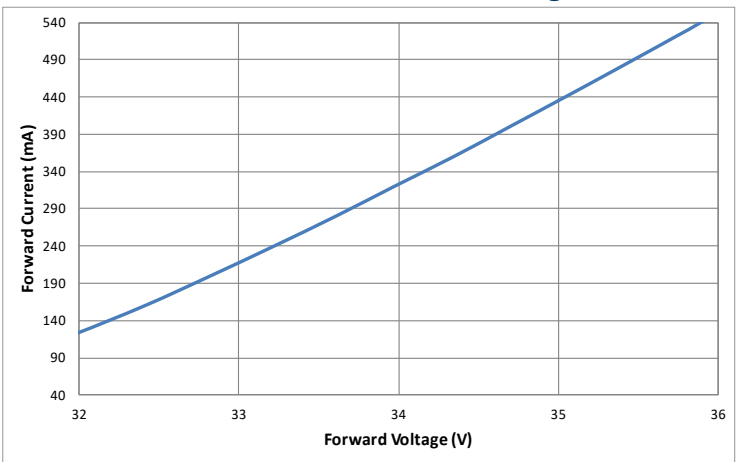
Note 2: To prevent damage refer to operating conditions and derating curves for appropriate maximum operating conditions

Note 3: Forward voltage is rated at typical forward current. For voltage at different forward currents, refer to the voltage versus current performance graphs.

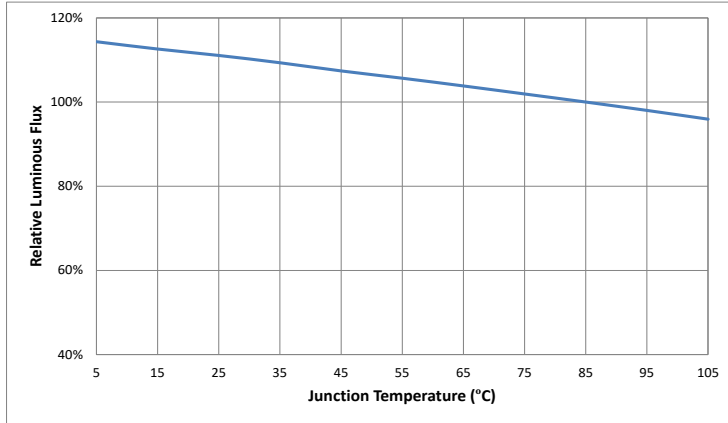
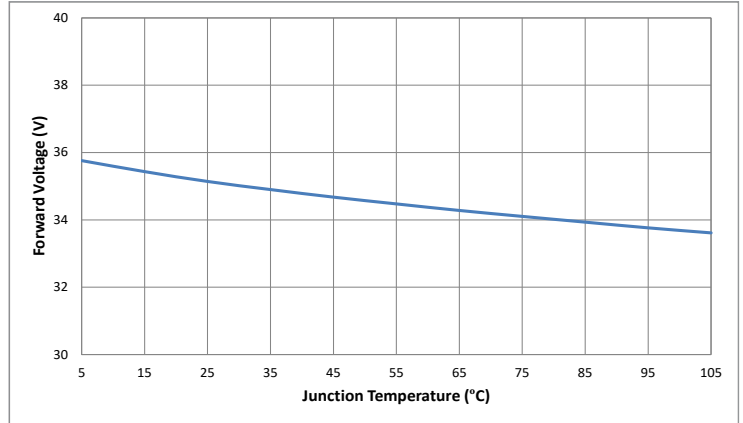
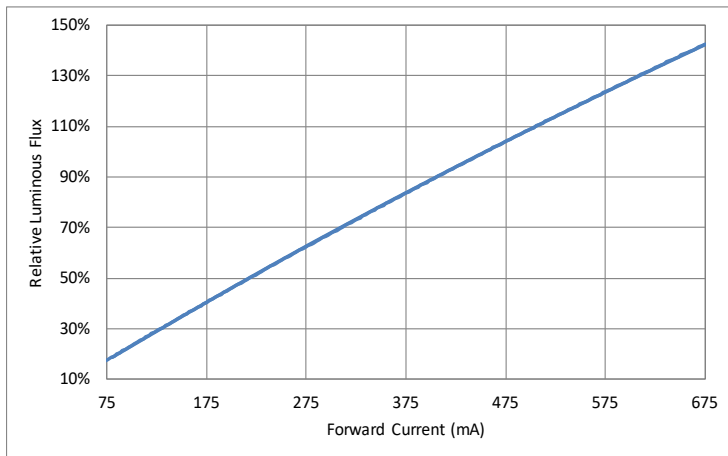
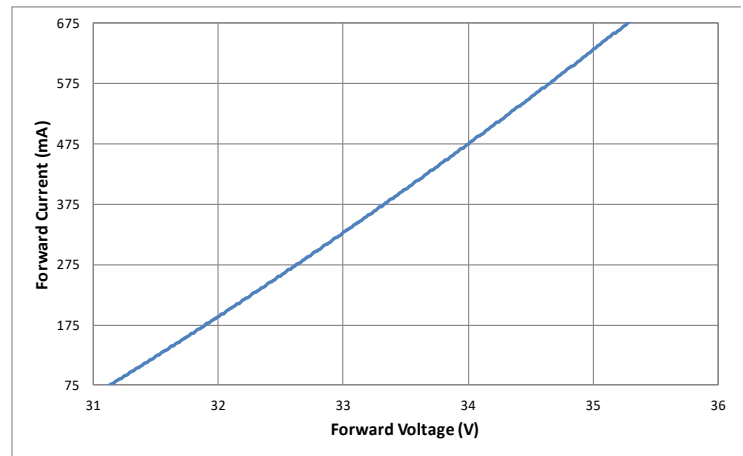
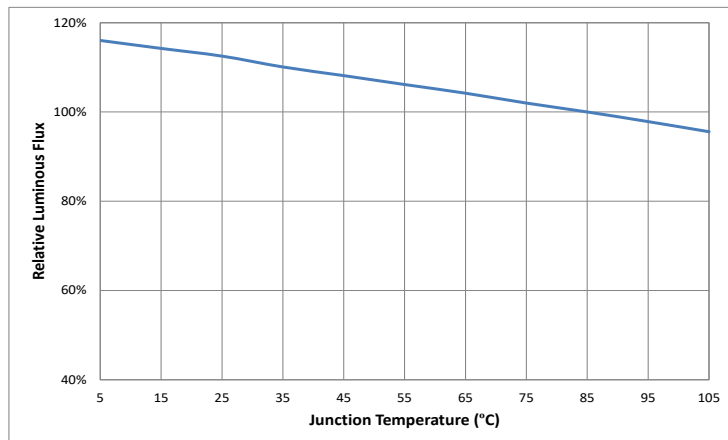
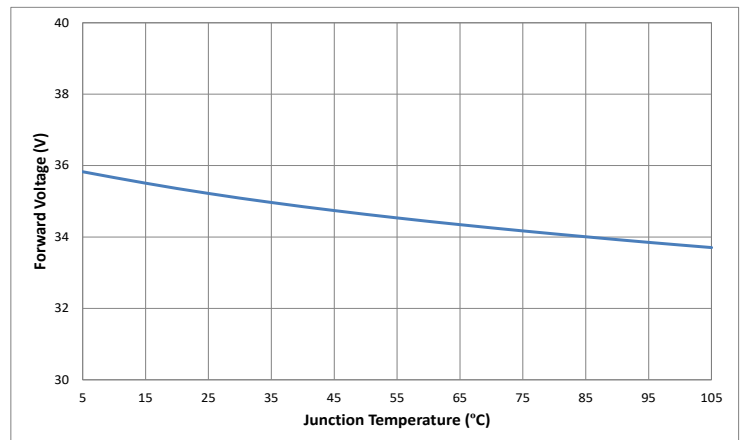
Note 4: COB LEDs are designed for operation to a minimum of 20% of the typical forward current value. Operation at currents lower than this value will not harm the device but may result in uneven light emission across the LES surface.

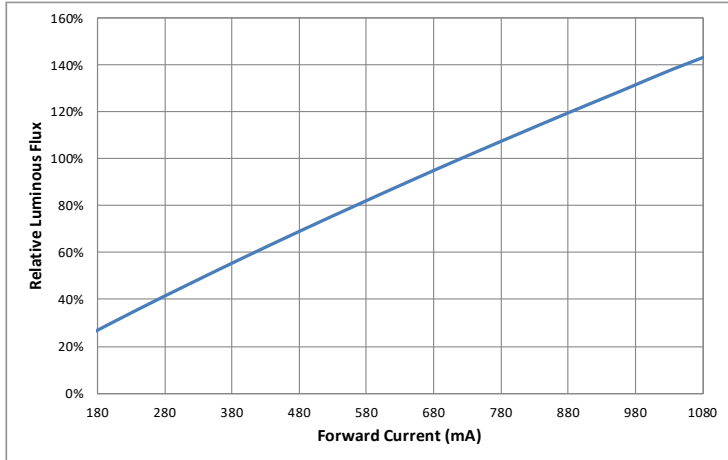
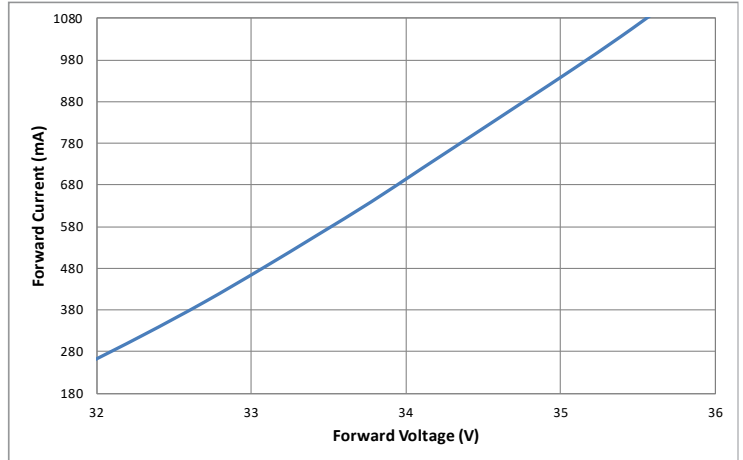
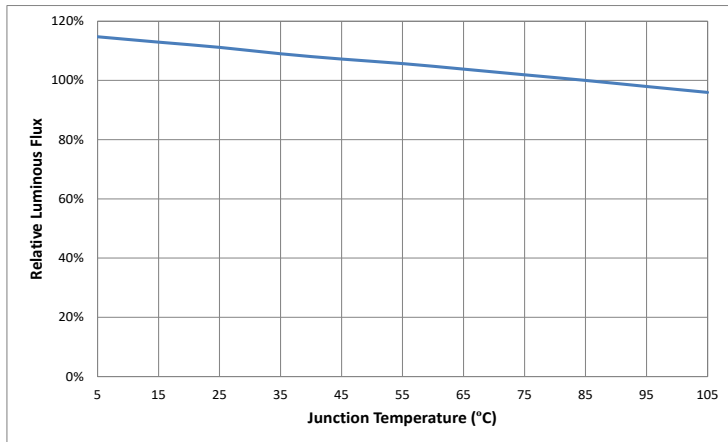
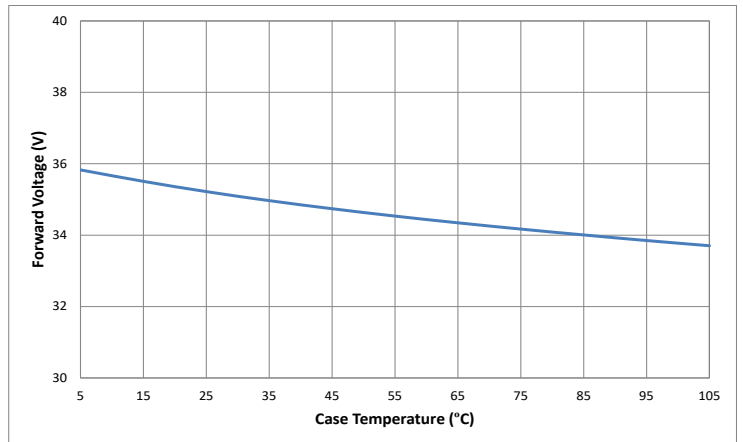
Note 5: Luminus may change any specifications without prior notice. Please refer to the company web site for the latest datasheet revision

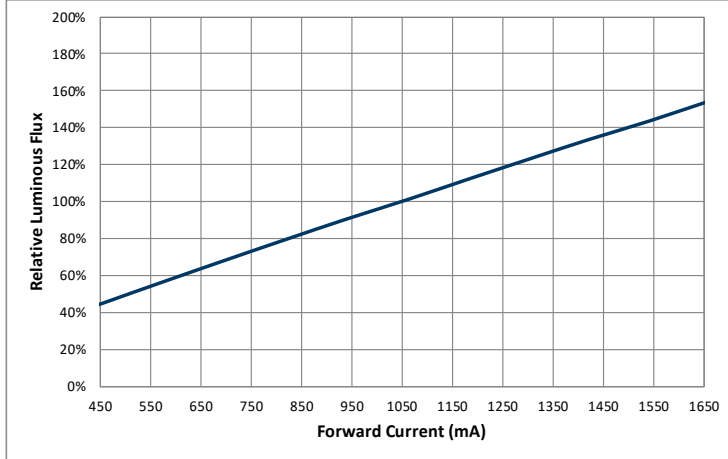
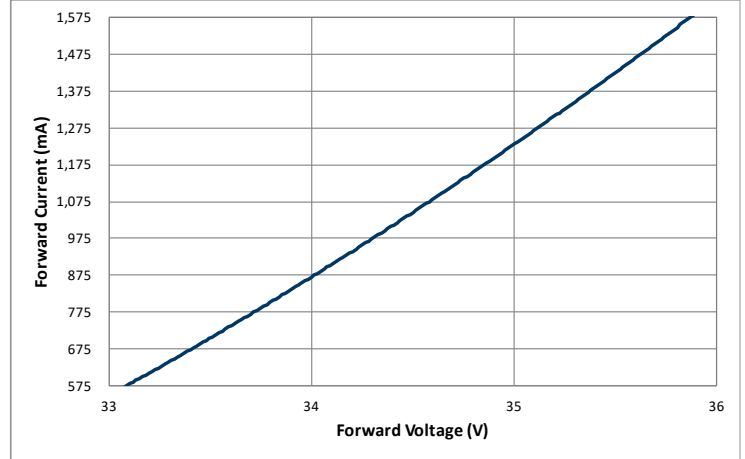
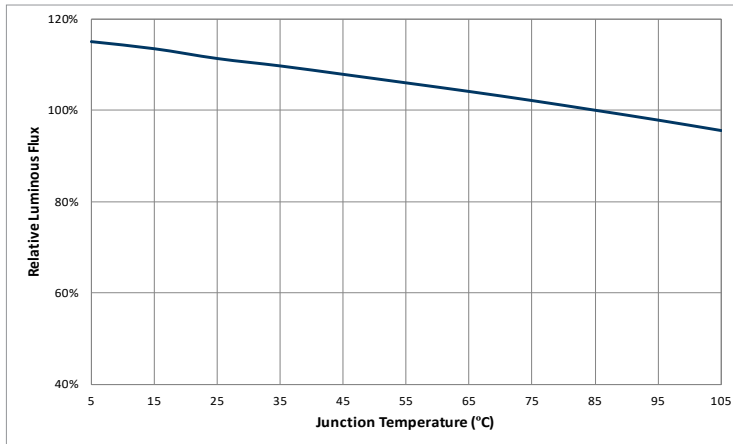
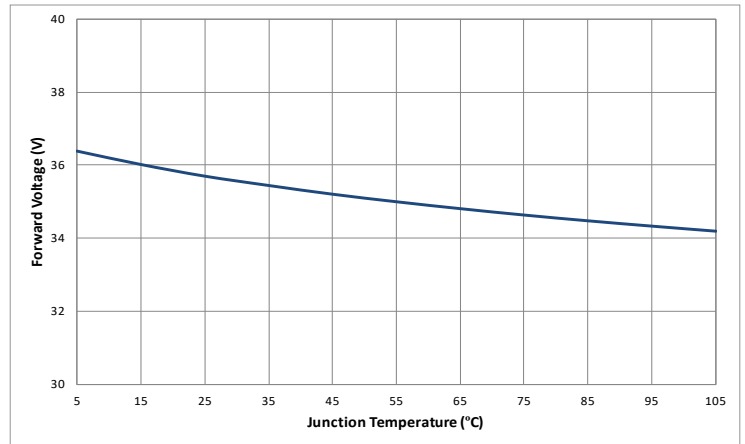
Note 6: Caution must be taken not to stare at the light emitted from these LEDs. Under special circumstances, the high intensity could damage the eye.

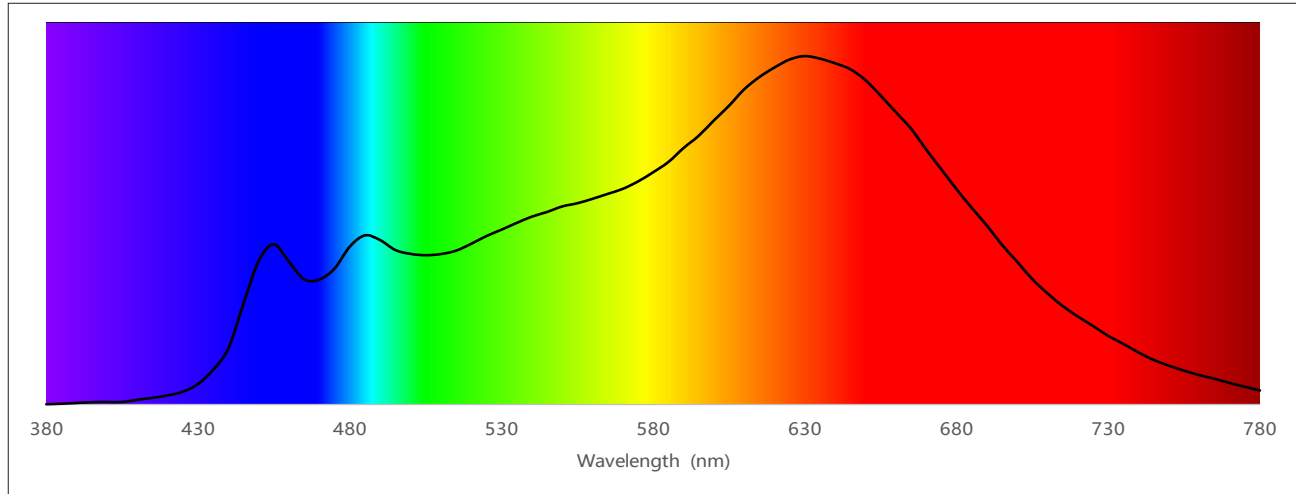
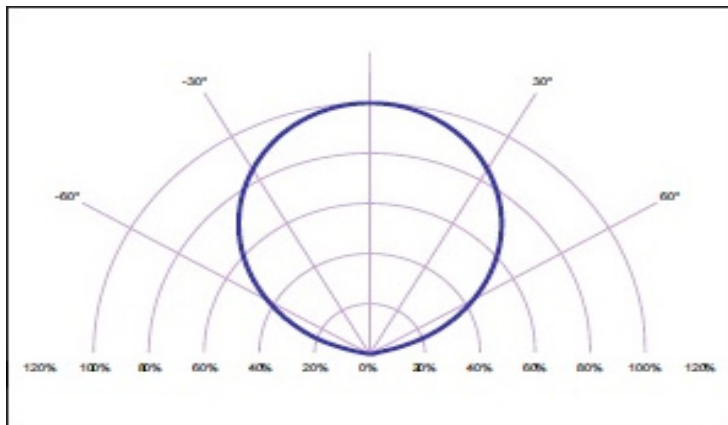
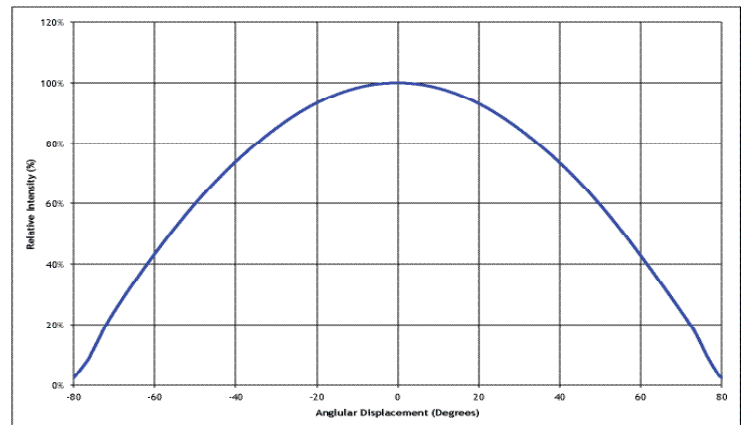
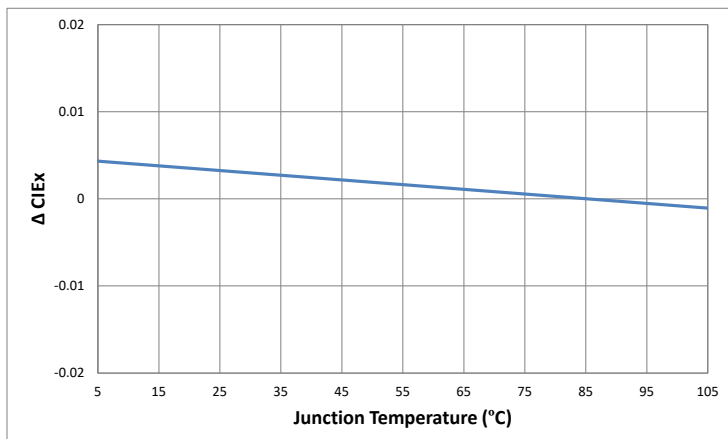
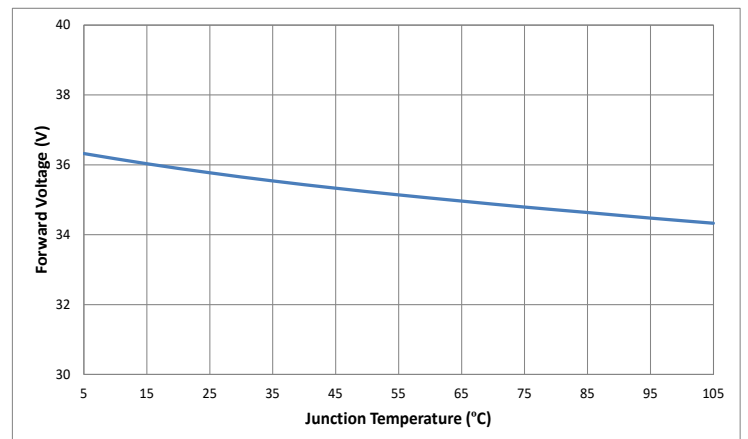
**CXM-6 Optical & Electrical Characteristics**
**Relative Output Flux vs. Forward Current @ 85°C**

**Forward Current vs. Forward Voltage @ 85°C**

**Relative Output Flux vs. Junction Temperature**

**Change in Voltage vs. Junction Temperature**

**CXM-9 Optical & Electrical Characteristics**
**Relative Output Flux vs. Forward Current @ 85°C**

**Forward Current vs. Forward Voltage @ 85°C**




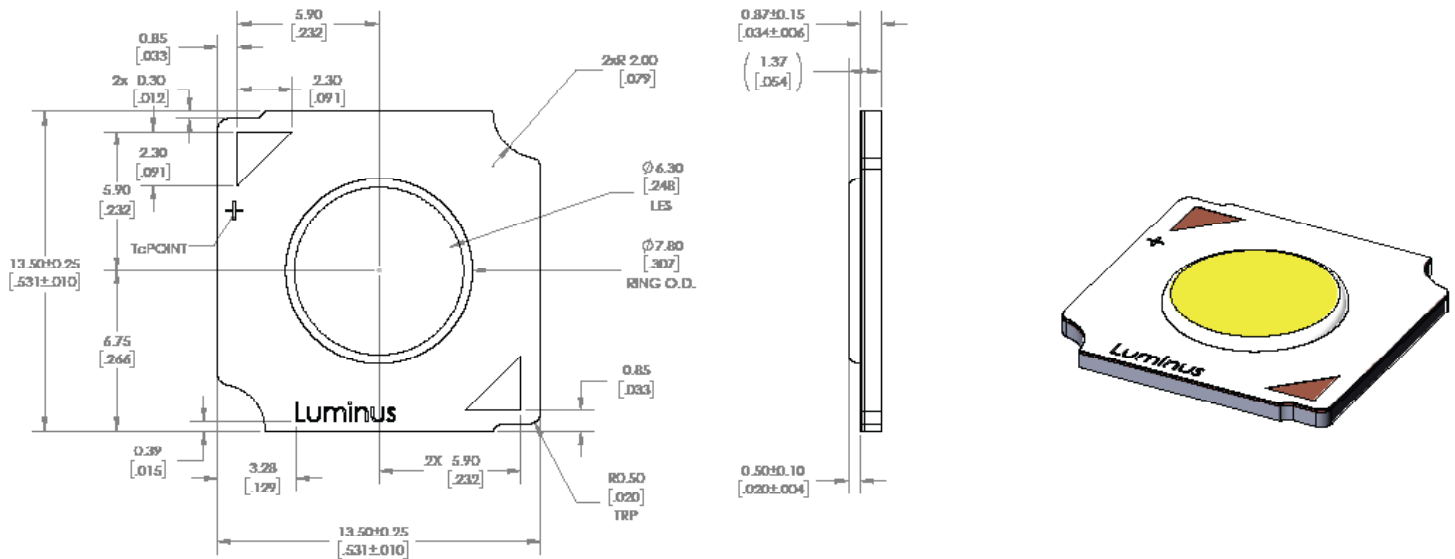
**CXM-9 Optical & Electrical Characteristics**
**Relative Output Flux vs. Junction Temperature**

**Change in Voltage vs. Junction Temperature**

**CXM-11 Optical & Electrical Characteristics**
**Relative Output Flux vs. Forward Current @ 85°C**

**Forward Current vs. Forward Voltage @ 85°C**

**Relative Output Flux vs. Junction Temperature**

**Change in Voltage vs. Junction Temperature**


**CXM-14 Optical & Electrical Characteristics**
**Relative Output Flux vs. Forward Current @ 85°C**

**Forward Current vs. Forward Voltage @ 85°C**

**Relative Output Flux vs. Junction Temperature**

**Change in Voltage vs. Junction Temperature**


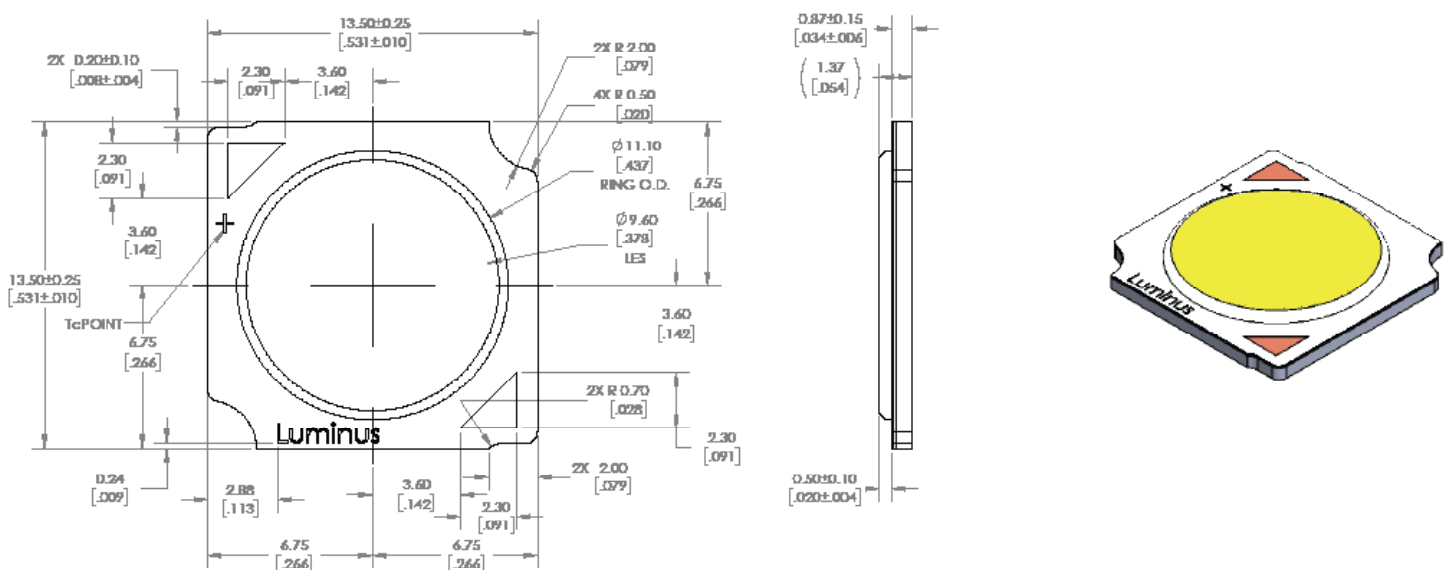
**CLM-22 Optical & Electrical Characteristics**
**Relative Output Flux vs. Forward Current @ 85°C**

**Forward Current vs. Forward Voltage @ 85°C**

**Relative Output Flux vs. Junction Temperature**

**Change in Voltage vs. Junction Temperature**


**Optical & Electrical Characteristics**
**Typical Spectrum**

**Typical Polar Radiation Pattern**

**Typical Angular Radiation Pattern**

**Change CIE<sub>x</sub> vs. Junction Temperature (3000K, 90CRI)**

**Change CIE<sub>y</sub> vs. Junction Temperature (3000K, 90CRI)**


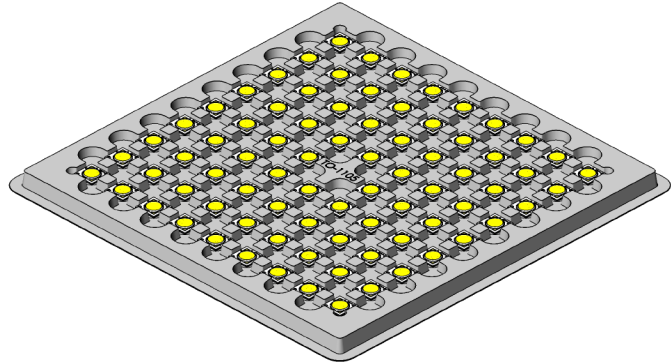
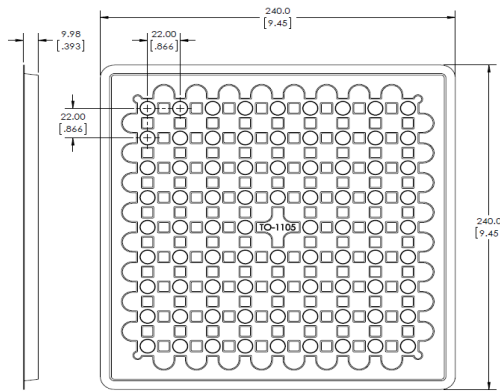
## Mechanical Dimensions (CXM-6)



## Mechanical Dimensions (CXM-9)



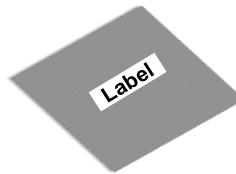
### Shipping Container (CXM-6/CXM-9)



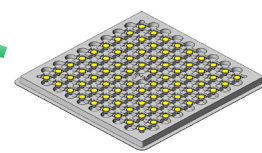
400 pcs per box  
Each bag is boxed for  
easier storage/ stacking



Trays are sealed in  
an anti-static bag



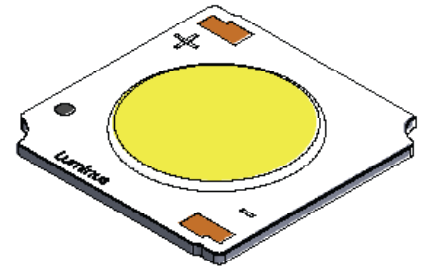
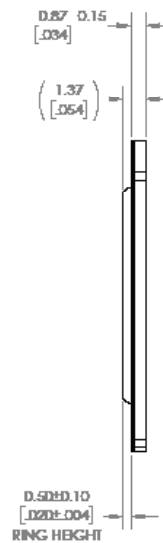
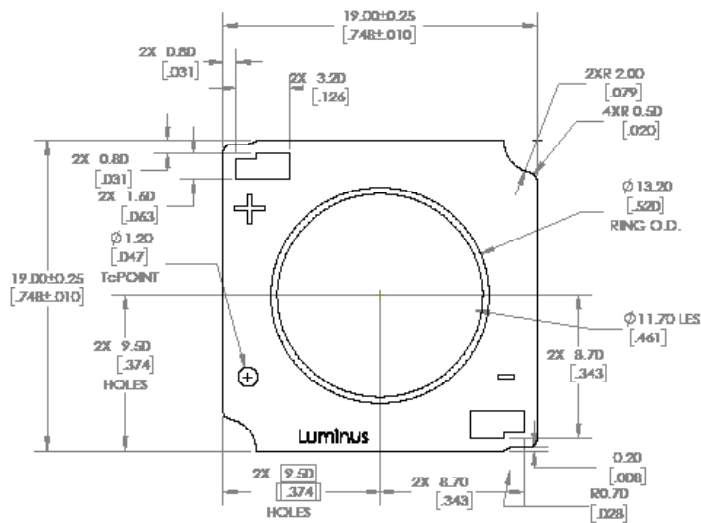
80 pcs per tray  
5 trays are stacked together  
with separate cover



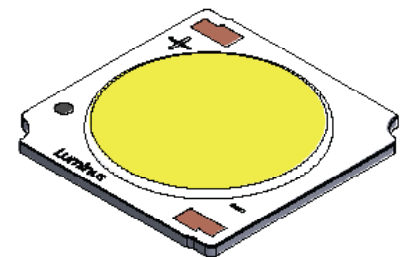
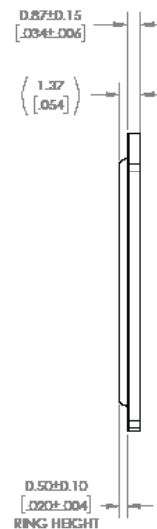
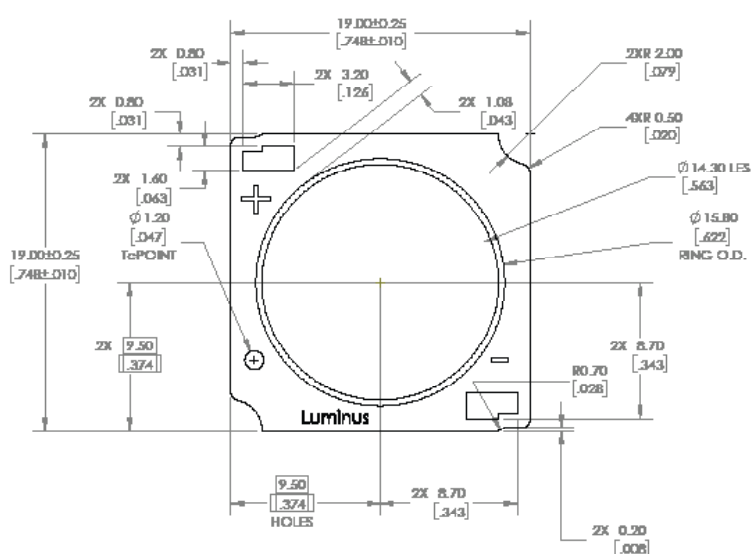
Luminus Label Model:

LUMINUS		Luminus Devices Inc		RoHS Compliant
XXXXXX-XX-XX (Manufacturer Part Number & Bin Kits)		Rev XX		
<div>Bar code</div>		<div>Bar code</div>		
XXX-XX-XX-XX-XX-XXXX-XX-X (Customer Part Number)				
XXXXXXXXXXXXXX (Box ID)		Qty: XX		
<div>Bar code</div>		<div>Bar code</div>		

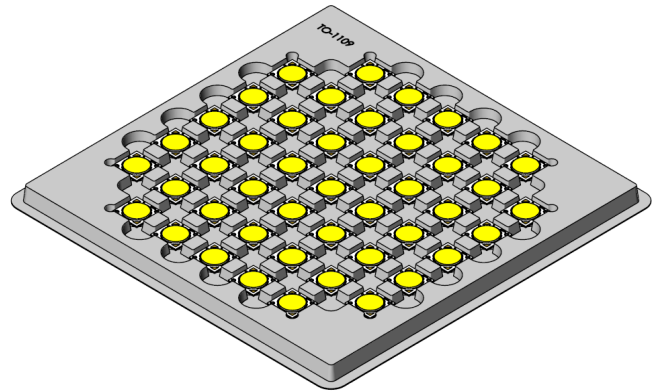
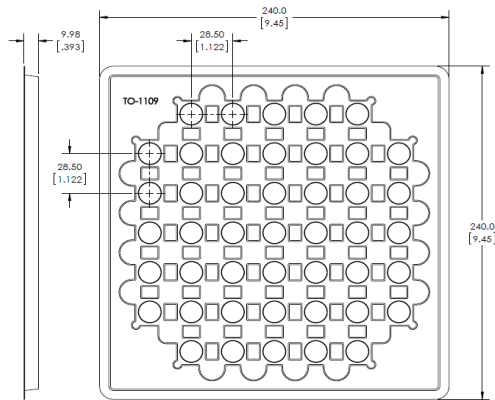
## Mechanical Dimensions (CXM-11)



## Mechanical Dimensions (CXM-14)



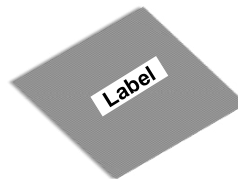
### Shipping Container (CXM-11/CXM-14)



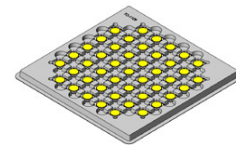
**225 pcs per box**  
Each bag is boxed for  
easier storage/ stacking



Trays are sealed in  
an anti-static bag



**45 pcs per tray**  
5 trays are stacked together  
with separate cover

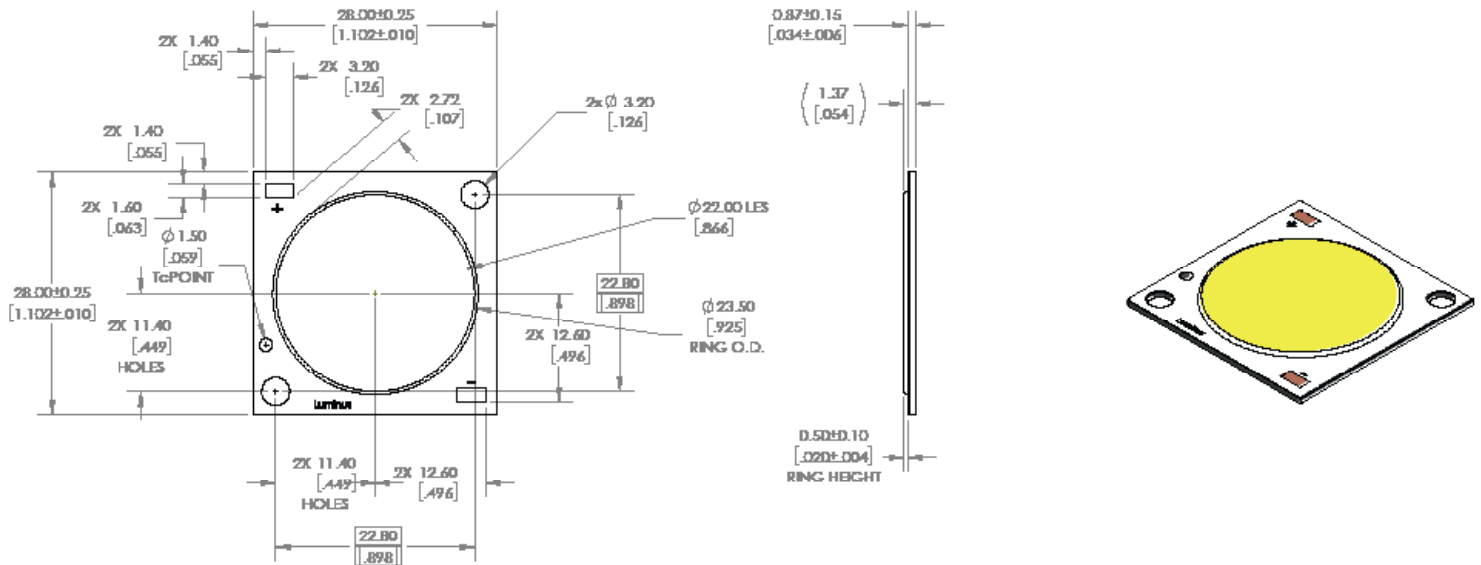


**Luminus Label Model:**

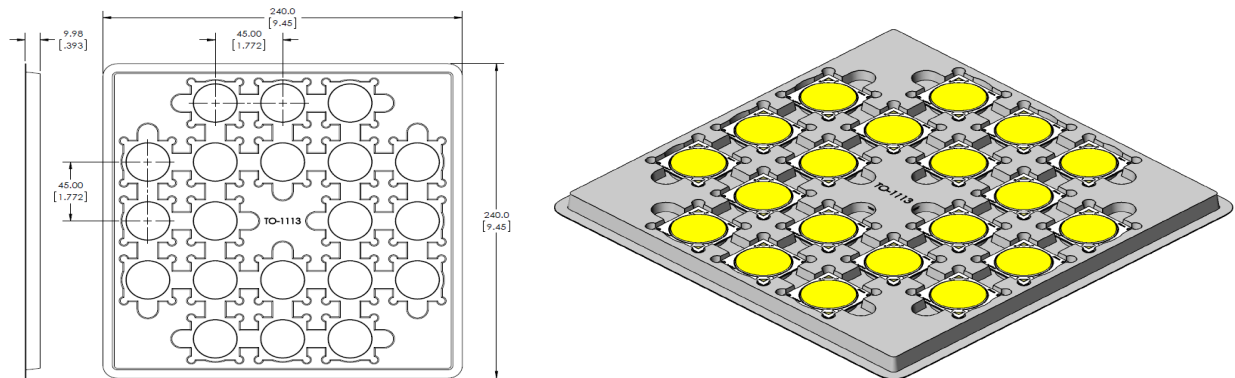
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XXXXXX-XX-XX (Manufacturer Part Number & Bin Kits)	Rev XX	RoHS Compliant	
Bar code	Bar code		
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XXXXXXXXXXXXXXXX (Box ID)	Qty: XX		
Bar code	Bar code		



## CLM-22 Mechanical Dimensions



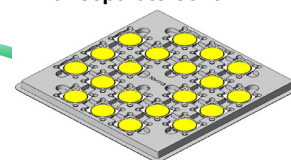
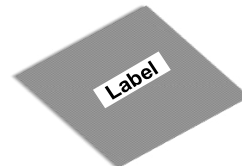
## CLM-22 Shipping Container




**100 pcs per box**  
**Each bag is boxed for**  
**easier storage/ stacking**

**Trays are sealed in an anti-static bag**

**20 pcs per tray**  
**5 trays are stacked together**  
**with separate cover**



**Luminus Label Model:**


**LUMINUS**

**Luminus Devices Inc**

XXXXXXXX-XX-XX (Manufacturer Part Number & Bin Kits)
Rev XX

XXX-XX-XX-XX-XX-XXXX-XX-X (Customer Part Number)

XXXXXXXXXXXXXXXXXX (Box ID)
Qty: XX

RoHS Compliant

**RoHS Compliant**

## Handling Notes for Luminus COBs

Luminus products are designed for robust performance in general lighting application. However, care must be taken when handling and assembling the LEDs into their fixtures. To avoid damaging Luminus COBs please follow these guidelines.

The following is an overview of the application notes detailing some of the practices to follow when working with these devices. More detailed information is available on the Luminus web site at [www.luminus.com](http://www.luminus.com).

### General Handling

Devices are made to be lifted or carried with tweezers on two adjacent corners opposite the contact pads. At no time should the devices be handled by or should anything come in contact with the light emitting surface (LES) area. This area includes the yellow colored circular area and the ring surrounding it. There are electrical connections under the LES which if damaged will cause the device to fail.

In addition, the ring frame itself should not be used for moving, lifting or carrying the device. Also do not attach any optics or mechanical holders to the ring as it is not capable to handle the mechanical stress.

### Static Electricity

Luminus COBs are electronic devices which can be damaged by electrostatic discharge (ESD). Please use appropriate measures to assure the devices do not experience ESD during their handling and or storage. ESD protection guidelines should be used at all times when working with Luminus COBs.

**Storage:** Luminus products are delivered in ESD shielded bags and should be stored in these bags until used.

**Assembly:** Individuals handling Luminus COBs during assembly should be trained in ESD protection practices. Assemblers should maintain constant conductive contact with a path to ground by means of a wrist strap, ankle straps, mat or other ESD protection system.

**Transporting:** When transporting the devices from one assembly area to another, ESD shielded carts and carriers should be used.

### Electrical Contact

Luminus COBs are designed with contact pads on their top surface. These pads are clearly marked with + and – polarity. Wires can be soldered to the contact pads for electrical connections or other solderless connector products are available.

If wires are being soldered to the COB product, we recommend attaching these wires prior to mounting the devices to a heat sink. Please contact Luminus for specific recommendations on how to solder wires if not familiar with the standard practice. Luminus can also offer design recommendations for jigs to allow easily soldering multiple products in rapid succession.

### Chemical Compatibility

The resin material used to form the LES can getter hydrocarbons from the surrounding environment. As a results, certain chemical compounds are not recommended for use with the Luminus products. Use of these compounds can cause damage to the light output of the device and may permanently damage the device. Please refer to [www.luminus.com](http://www.luminus.com) for a list of the compounds not recommended for use with the Luminus COB products.

### Thermal Interface Material (TIM)

Proper thermal management is critical for successful operation of any LED system. Excess operating temperature can reduce the light output of the device. And excessive heating can cause permanent damage to the device. Proper TIM material is a crucial component for effective heat transfer away from the LED during normal operation. Please refer to [www.luminus.com](http://www.luminus.com) for specific recommendations for TIM solutions.