

# Cree® PLCC6 3 in 1 SMD LED CV94D-FCC



## PRODUCT DESCRIPTION

This SMD LED features an IPx8 water resistant rating in a PLCC6 package. These high performance tricolor SMT LEDs are designed to work in a wide range of applications.

The encapsulation resin contains UV inhibitors to minimize the effects of long-term exposure to direct sunlight, resulting in stable light output over the life of the LED. This PLCC6 package has an increased package height to ease in the manufacturing process.

## FEATURES

- Size (mm):9.4x4.2x4.0
- Dominant Wavelength:  
Red (619 - 624nm)  
Green (520 - 540nm)  
Blue (460 - 480nm)
- Luminous Intensity (mcd)  
Red (3550 - 9000 )  
Green (7100 - 18000)  
Blue (1400 - 3550 )
- Water-Resistant (IPx8)\*
- Moisture Sensitivity Level: 5a
- Lead-Free
- RoHS Compliant

## APPLICATIONS

- Transportation and road way signs
- Channel Letter
- Amusement

\*:This part is tested under the condition of assembling it on a PCB with isolating the electrical path by silicone. The leads area of the LED is not IPx8 rated and it's required to insulate for moisture by customer in outdoor application.

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Items	Symbol	Absolute Maximum Rating			Unit
		R	G	B	
Forward Current <sup>Note 1</sup>	$I_F$	50	35	35	mA
Peak Forward Current <sup>Note 2</sup>	$I_{FP}$	100	100	100	mA
Reverse Voltage	$V_R$	5	5	5	V
Power Dissipation	$P_D$	140	126	126	mW
Operation Temperature	$T_{opr}$	-40 ~ +85			$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 ~ +100			$^\circ\text{C}$
Junction Temperature	$T_J$	110	110	110	$^\circ\text{C}$
Junction/ambient	$R_{THJA}$	350	380	300	$^\circ\text{C}/\text{W}$
Junction/solder point	$R_{THJS}$	160	200	140	$^\circ\text{C}/\text{W}$
Electrostatic Discharge Classification(MIL-STD-883E)	ESD	1000 V			

**Note:** 1.Single-color light.  
2.Pulse width  $\leq 0.1$  msec, duty  $\leq 1/10$ .

### TYPICAL ELECTRICAL & OPTICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

Characteristics	Condition	Symbol	Values			Unit
			R	G	B	
Dominant Wavelength	$I_F = 20$ mA	$\lambda_{DOM}$	619~624	520~540	460~480	nm
Spectral bandwidth at 50% $I_{REL}$ max	$I_F = 20$ mA	$\Delta \lambda$	24	38	28	nm
Forward Voltage	$I_F = 20$ mA	$V_{F(avg)}$	2.1	2.8	2.9	V
		$V_{F(max)}$	2.8	3.6	3.6	V
Luminous Intensity	$I_F = 20$ mA	$I_{V(min)}$	3550	7100	1400	mcd
		$I_{V(avg)}$	6000	12000	2300	mcd
Reverse Current (max)	$V_R = 5$ V	$I_R$	10	10	10	$\mu\text{A}$

**Note:** Continuous reverse voltage can cause LED damage.

## INTENSITY BIN LIMIT ( $I_F = 20 \text{ mA}$ )

Red			Green			Blue		
Bin Code	Min.(mcd)	Max.(mcd)	Bin Code	Min.(mcd)	Max.(mcd)	Bin Code	Min.(mcd)	Max.(mcd)
Yb	3550	4500	B0	7100	9000	Wb	1400	1800
Z0	4500	5600	C0	9000	11200	Xa	1800	2240
A0	5600	7100	D0	11200	14000	Xb	2240	2800
B0	7100	9000	E0	14000	18000	Ya	2800	3550

Tolerance of measurement of luminous intensity is  $\pm 10\%$ .

## COLOR BIN LIMIT ( $I_F = 20 \text{ mA}$ )

Red			Green			Blue		
Bin Code	Min.(nm)	Max.(nm)	Bin Code	Min.(nm)	Max.(nm)	Bin Code	Min.(nm)	Max.(nm)
RB	619	624	G7	520	525	B3	460	465
			G23	522.5	527.5	B23	462.5	467.5
			G8	525	530	B4	465	470
			G45	527.5	532.5	B45	467.5	472.5
			G9	530	535	B5	470	475
			G67	532.5	537.5	B67	472.5	477.5
			Ga	535	540	B6	475	480

Tolerance of measurement of dominant wavelength is  $\pm 1 \text{ nm}$ .

**ORDER CODE TABLE\***

Kit Number	Color	Luminous Intensity (mcd)		Dominant Wavelength (nm)				Pack- age
		Min.	Max.	Color Bin	Min. (nm)	Color Bin	Max. (nm)	
CV94D-FCC-CYbB0B0E0WbYaBB7a363	Red	3550	9000	RB	619	RB	624	Reel
	Green	7100	18000	G7	520	Ga	540	Reel
	Blue	1400	3550	B3	460	B6	480	Reel
CV94D-FCC-CYb2B02Wb2BB7D3D3	Red	Any 2 Intensity bin from Yb(3550) - B0(9000)		RB	619	RB	624	Reel
	Green	Any 2 Intensity bin from B0(7100) - E0(18000)		Any 1 hue bin from G7(520) - Ga(540)				Reel
	Blue	Any 2 Intensity bin from Wb(1400) - Ya(3550)		Any 1 hue bin from B3(460) - B6(480)				Reel

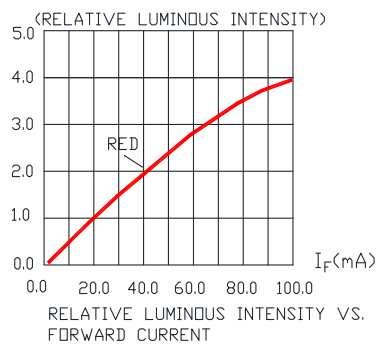
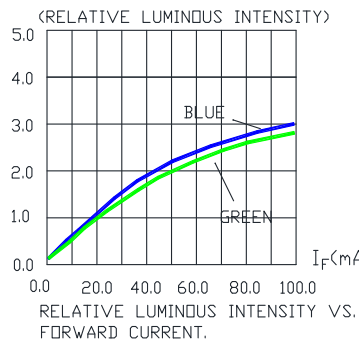
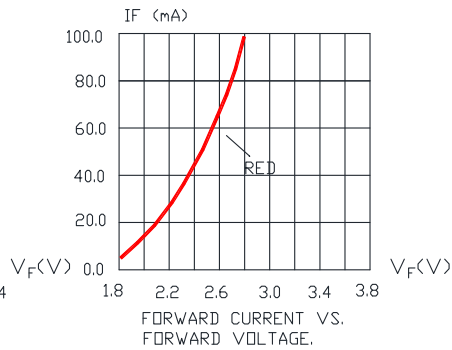
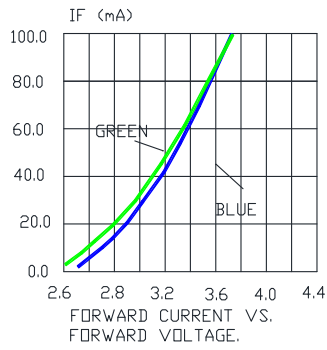
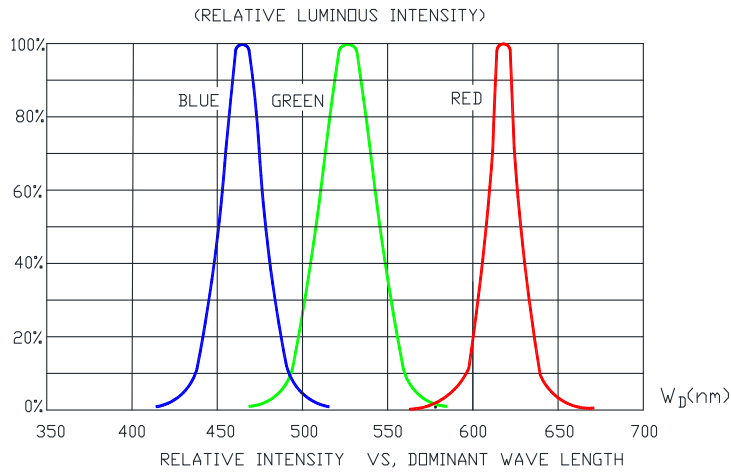
Notes:

1. The above kit numbers represent the order codes which include multiple intensity-bin and color-bin codes. Only one intensity-bin code and one color-bin code will be shipped on each reel. Single intensity-bin code and single color-bin code will be orderable in certain quantities. For example, any 2 intensity bin from B0 - E0 means only 2 intensity bin (B0&C0 or C0&D0 or D0&E0) will be shipped by Cree. For example, any 1 color bin from G7 - Ga means only 1 color bin (G7 or G23 or G8 or G45 or G9 or G67 or Ga) will be shipped by Cree.
2. Please refer to the "Cree LED Lamp Reliability Test Standards" document #1 for reliability test conditions.
3. Please refer to the "Cree LED Lamp Soldering & Handling" document #2 for information about how to use this LED product safely.

#1: Refer to [http://www.cree.com/led-components/media/documents/LED\\_Lamp\\_Reliability\\_Test\\_Standard.pdf](http://www.cree.com/led-components/media/documents/LED_Lamp_Reliability_Test_Standard.pdf)

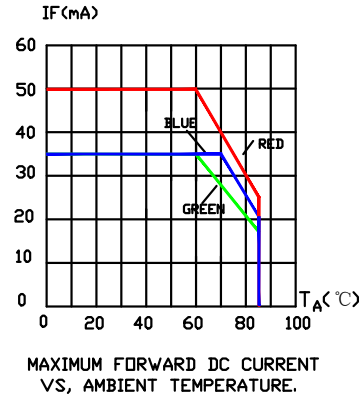
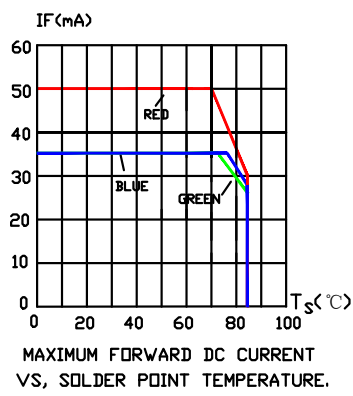
#2: Refer to <http://www.cree.com/led-components/media/documents/sh-HB.pdf>

## GRAPHS

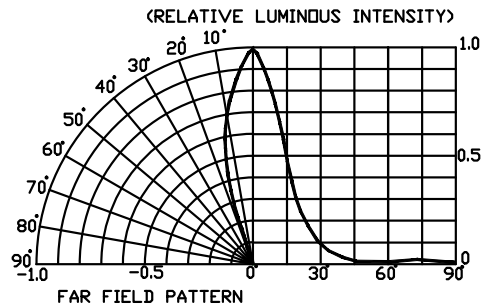


The above data are collected from statistical figures that do not necessarily correspond to the actual parameters of each single LED. Hence, these data will be changed without further notice.

## GRAPHS



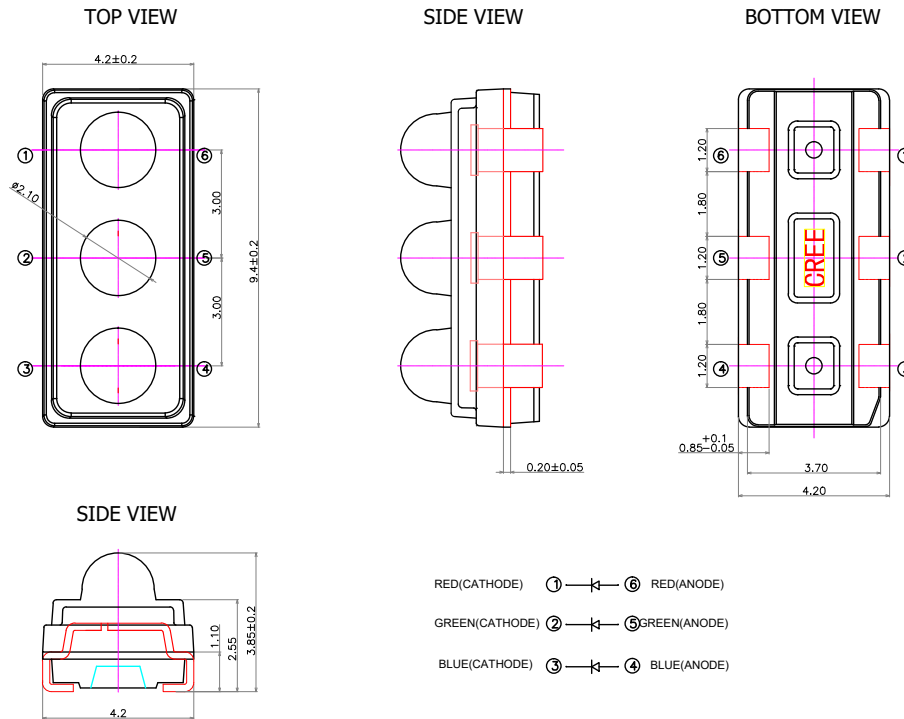
The graph shows the maximum allowable DC current for a LED die of each color.



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## MECHANICAL DIMENSIONS

All dimensions are in mm. Tolerance is  $\pm 0.25$  mm unless otherwise noted.



## NOTES

### RoHS Compliance

The levels of RoHS-restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application in accordance with EU Directive 2011/65/EC (RoHS2), as implemented by EU member states on January 2, 2013 and amended on March 31, 2015 by EU Directive 2015/863/EU.

RoHS Declarations for this product can be obtained from your Cree representative or from the Product Ecology section of the Cree website.

### Vision Advisory Claim

Users should be cautioned not to stare at the light of this LED product. The bright light can damage the eye.

## KIT NUMBER SYSTEM

Cree LED lamps are tested and sorted into performance bins. A bin is specified by ranges of color, forward voltage, and brightness. Sorted LEDs are packaged for shipping in various convenient options. Please refer to the "Cree LED Lamp Packaging Standard" document for more information about shipping and packaging options.

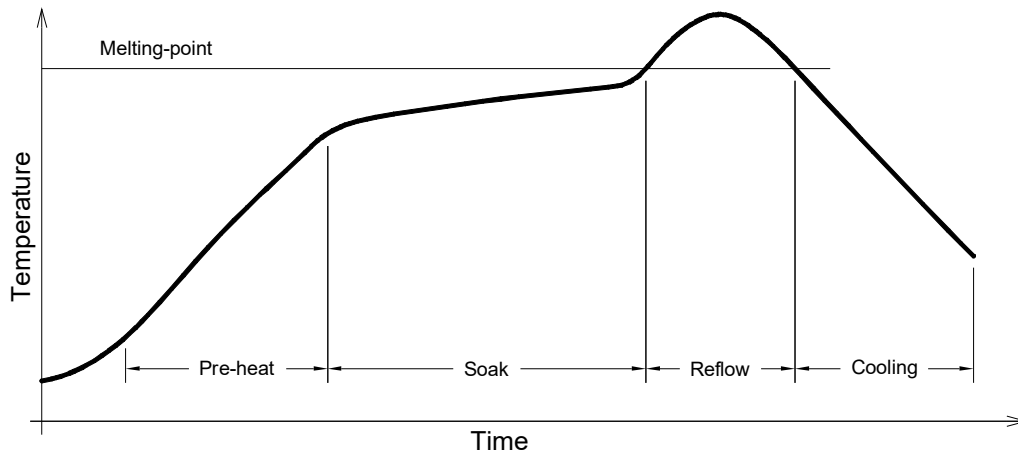
Cree LEDs are sold by order codes in combinations of bins called kits. Order codes are configured in the following manner:





## REFLOW SOLDERING

- The CV94D-FCC is rated as a MSL 5a product.
- The recommended floor life out of bag is 24hrs.
- The temperature profile is as below.



Use only with CV94D-FCC

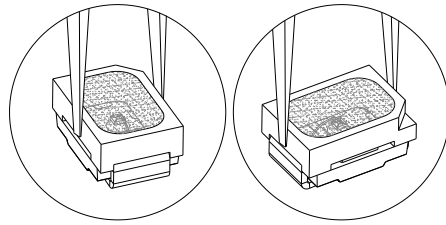
Solder
Average ramp-up rate = 4°C/s max
Preheat temperature = 150°C ~200°C
Preheat time = 120s max
Ramp-down rate = 6°C/s max
Peak temperature = 235°C max
Time within 5°C of actual Peak Temperature = 10s max
Duration above 217°C is 45s max

Refer to "<http://www.cree.com/led-components/media/documents/sh-HB.pdf>" for soldering & handling details.

## NOTES

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- The packaging sizes of these SMD products are very small and the resin is still soft after solidification. Users are required to handle with care. Never touch the resin surface of SMD products.
- To avoid damaging the product's surface and interior device, it is recommended to choose a special nozzle to pick up the SMD products during the process of SMT production. If handling is necessary, take special care when picking up these products. The following method is necessary:



## PACKAGING

- The boxes are not water resistant and they must be kept away from water and moisture.
- The LEDs are packed in cardboard boxes after packaging in normal or anti-electrostatic bags.
- Cardboard boxes will be used to protect the LEDs from mechanical shocks during transportation.
- The reel pack is applied in SMD LED.
- Max 1200 pcs per reel.

