

## CV94D-FCC: PLCC6 3 in 1 SMD LED



### 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): 9.4 x 4.2 x 4.0
- Dominant Wavelength
  - Red (619 - 624nm)
  - Green (520 - 540nm)
  - Blue (460 - 480nm)
- Luminous Intensity (mcd)
  - Red (3550 - 11200)
  - Green (7100 - 18000)
  - Blue (1400 - 4500)
- 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	1000V			

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

\* Continuous reverse voltage can cause LED damage.

## INTENSITY BIN LIMIT

Red (20 mA)			Green (20 mA)			Blue (20 mA)		
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
C0	9000	11200				Yb	3550	4500

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

## COLOR BIN LIMIT

Red (20 mA)			Green (20 mA)			Blue (20 mA)		
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  $\pm 1$  nm.

## ORDER CODE TABLE

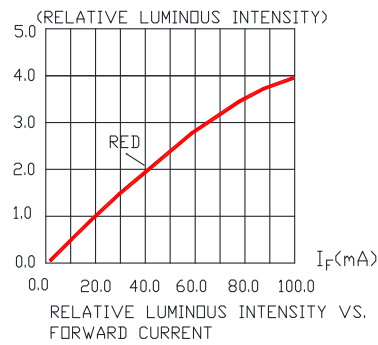
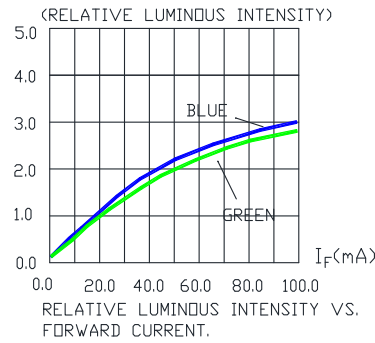
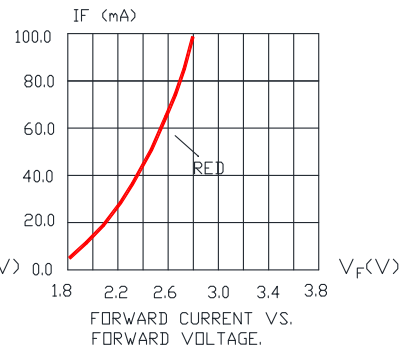
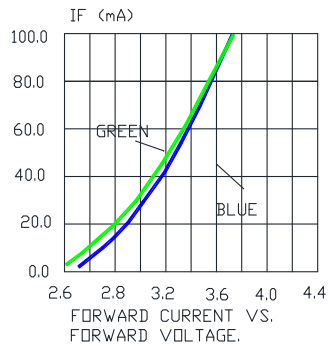
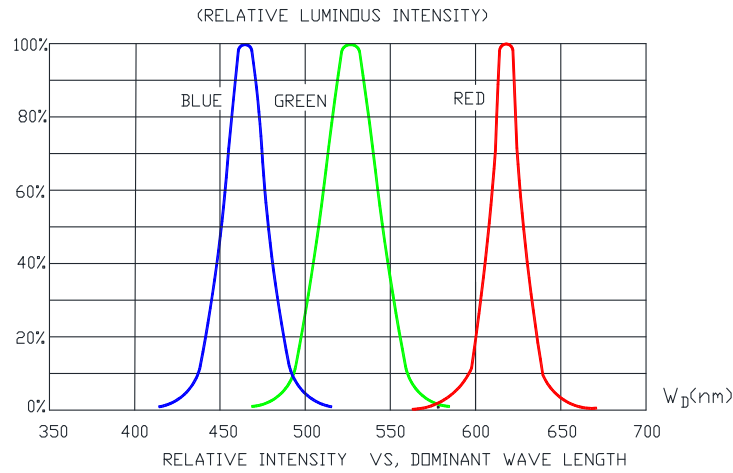
Kit Number	Color	Luminous Intensity (mcd)		Dominant Wavelength (nm)				Package
		Min.	Max.	Color Bin	Min.(nm)	Color Bin	Max. (nm)	
CV94D-FCC-CYbC0B0E0WbYbBB7a363	Red	3550	11200	RB	619	RB	624	Reel
	Green	7100	18000	G7	520	Ga	540	Reel
	Blue	1400	4500	B3	460	B6	480	Reel
CV94D-FCC-CYb2B02Wb2BB7D3D3	Red	Any 2 Intensity bin from Yb(3550) - C0(11200)		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) - Yb(4500)		Any 1 hue bin from B3(460)-B6(480)				Reel

### Notes:

- The above kit numbers represent order codes that include multiple intensity-bin and color-bin codes. Only one intensity-bin code and one color-bin code will be shipped on each bulk. Single intensity-bin code and single color-bin codes will not be orderable.
- Please refer to the [HB LED Lamp Reliability Test Standards](#) document for reliability test conditions.
- Please refer to the [HB LED Lamp Soldering & Handling](#) document for information about how to use this LED product safely.

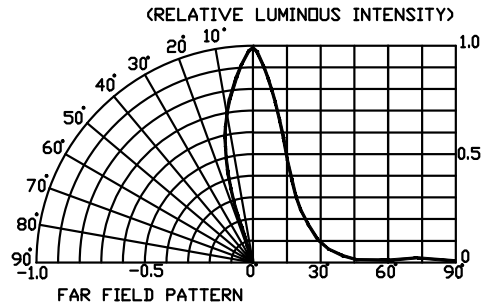
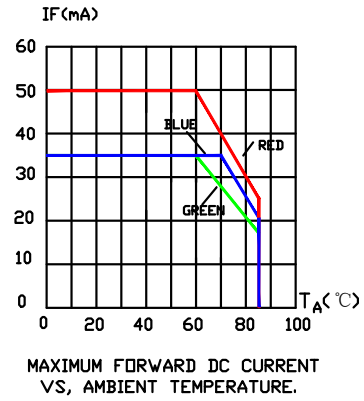
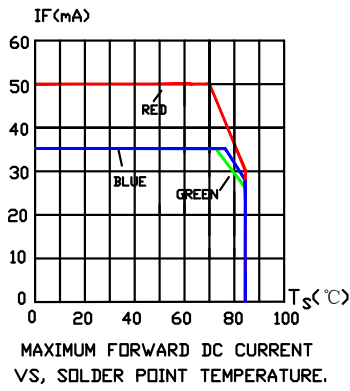
**GRAPHS**

The data below 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

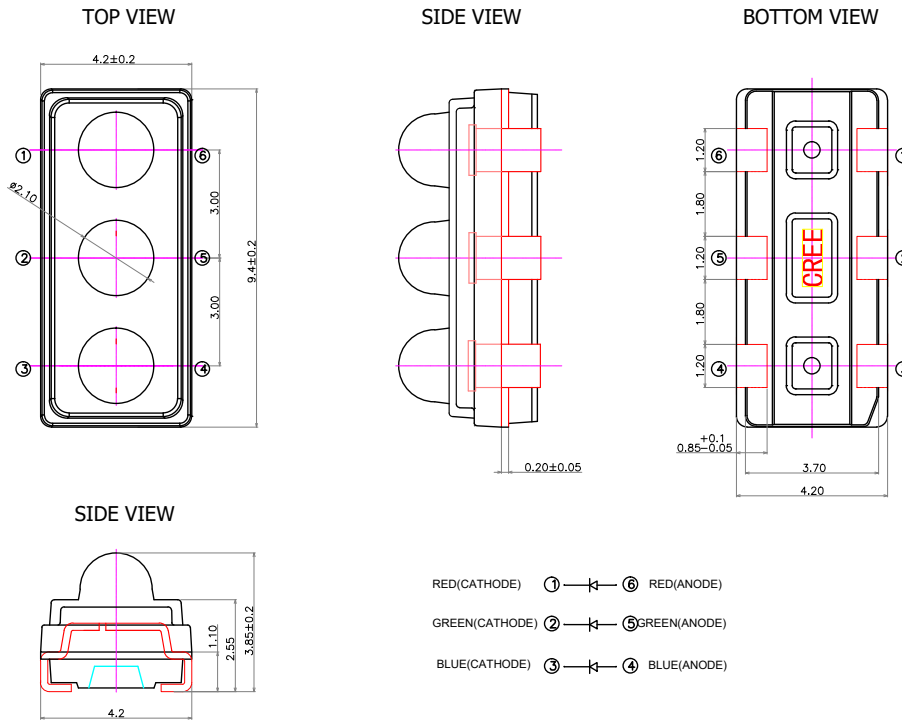
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## MECHANICAL DIMENSIONS

All dimensions are in mm.

Tolerance of measurement of the dimension is  $\pm 0.1$ .



## 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 January 2, 2013. RoHS Declarations for this product can be obtained from your Cree LED representative or from the [Product Ecology](#) section of the Cree LED website.

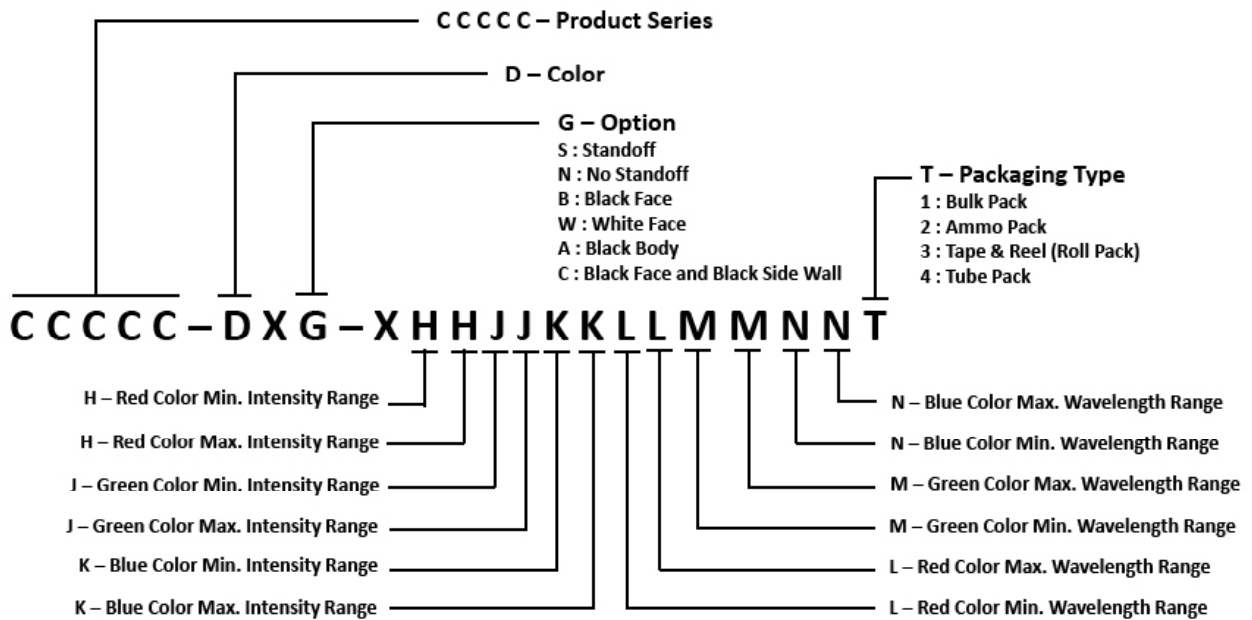
### Vision Advisory

**WARNING:** Do not look at an exposed lamp in operation. Eye injury can result.

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.

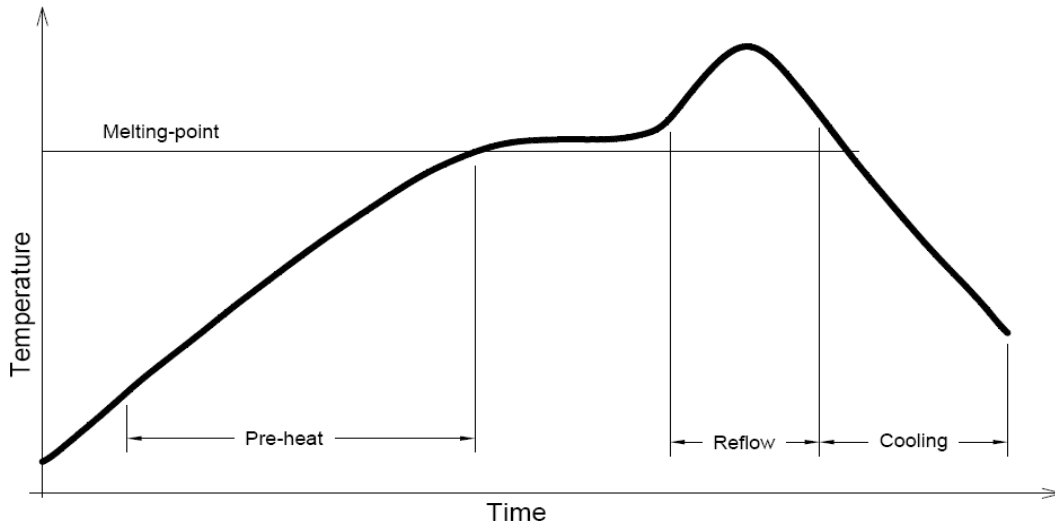
Cree LEDs are sold by order codes in combinations of bins called kits. Order codes are configured in the following manner:





## 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

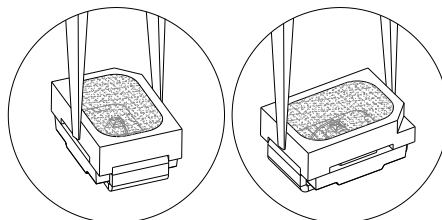


Use only with CV94D-FCC

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 = 250°C max
Time within 5°C of actual Peak Temperature = 10s max
Duration above 217°C is 60s max

## NOTES

- 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.

