

CV94U-FGC: 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 (1120 - 2520)
 - Green (1800 - 4025)
 - Blue (403 - 900)
- Water-Resistant (IPx8)*
- Moisture Sensitivity Level: 5a
- Lead-Free
- RoHS Compliant

APPLICATIONS

- Electronic Signs & Signals (ESS)
- Full Color Video Screen
- Digital Billboards
- Motorway Signs
- Variable Message Sign (VMS)
- Advertising Signs
- Petrol Signs

*: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 ^{Note 1}	I_F	50	35	35	mA
Peak Forward Current ^{Note 2}	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}	280	380	300	$^\circ\text{C}/\text{W}$
Junction/solder point	R_{THJS}	100	200	140	$^\circ\text{C}/\text{W}$
Electrostatic Discharge Classification(MIL-STD-883E)	ESD	1000V			

Note:

1. Single-color light
2. Pulse width ≤ 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	$I_F = 15\text{mA(R)}$ $I_F = 10\text{mA(G)}$ $I_F = 10\text{mA(B)}$	λ_{DOM}	619~624	520~540	460~480	nm
Spectral bandwidth at 50% I_{REL} max	$I_F = 15\text{mA(R)}$ $I_F = 10\text{mA(G)}$ $I_F = 10\text{mA(B)}$	$\Delta \lambda$	24	38	28	nm
Forward Voltage	$I_F = 15\text{mA(R)}$ $I_F = 10\text{mA(G)}$ $I_F = 10\text{mA(B)}$	$V_{F(avg)}$	2.1	2.6	2.7	V
		$V_{F(max)}$	2.8	3.6	3.6	V
Luminous Intensity	$I_F = 15\text{mA(R)}$ $I_F = 10\text{mA(G)}$ $I_F = 10\text{mA(B)}$	$I_{V(min)}$	1120	1800	403	mcd
		$I_{V(avg)}$	1600	2800	560	mcd
Luminous Intensity(Reference)	$I_F = 20\text{mA(R/G/B)}$	$I_{V(avg)}$	2200	4800	1000	mcd
Reverse Current (max)	$V_R = 5\text{V}$	I_R	10	10	10	μA

* Continuous reverse voltage can cause LED damage.

INTENSITY BIN LIMIT

Red (15 mA)			Green (10 mA)			Blue (10 mA)		
Bin Code	Min.(mcd)	Max.(mcd)	Bin Code	Min.(mcd)	Max.(mcd)	Bin Code	Min.(mcd)	Max.(mcd)
P	1120	1400	R	1800	2240	hj	403	505
vw	1260	1600	z1a	2020	2520	J	450	560
Q	1400	1800	S	2240	2800	km	505	635
xy	1600	2020	1b1c	2520	3175	K	560	710
R	1800	2240	T	2800	3550	np	635	805
z1a	2020	2520	1d1e	3175	4025	M	710	900

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

COLOR BIN LIMIT

Red (15 mA)			Green (10 mA)			Blue (10 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 ± 1 nm.

ORDER CODE TABLE

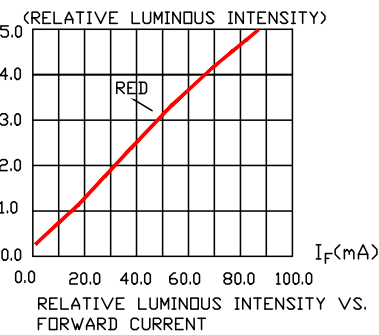
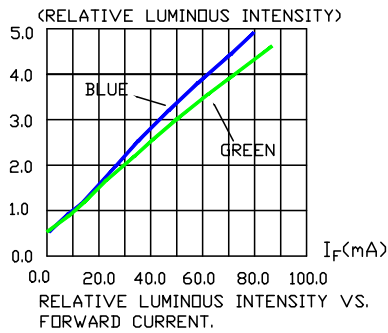
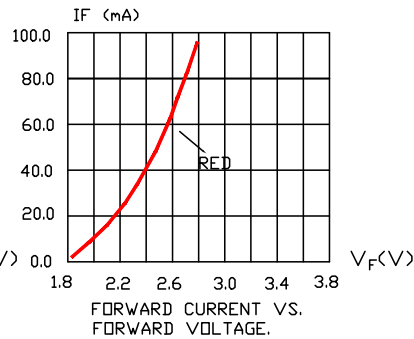
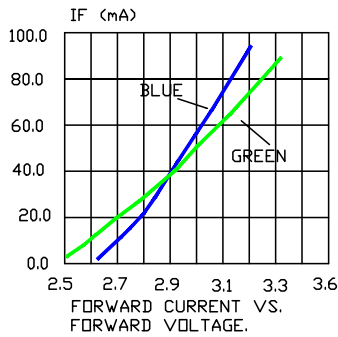
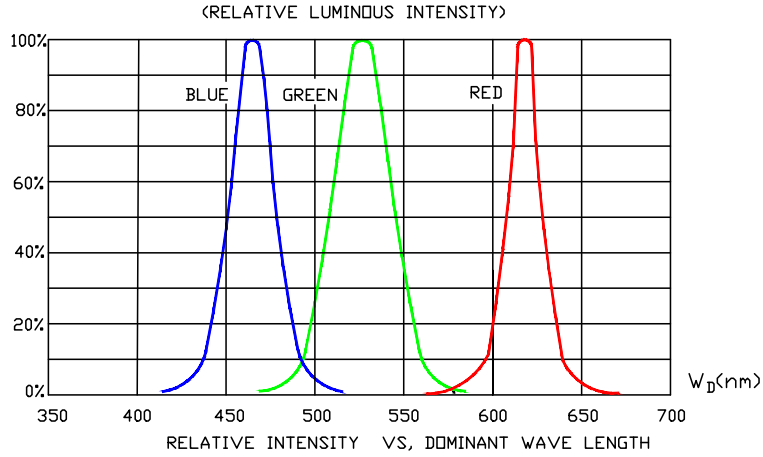
Kit Number	Color	Luminous Intensity (mcd)		Dominant Wavelength (nm)				Package
		Min.	Max.	Color Bin	Min.(nm)	Color Bin	Max. (nm)	
CV94U-FGC-CPz1aR1d1ehjMBB7a363	Red	1120	2520	RB	619	RB	624	Reel
	Green	1800	4025	G7	520	Ga	540	Reel
	Blue	403	900	B3	460	B6	480	Reel
CV94U-FGC-CP1R1hj1BB7D3D3	Red	Any 1 Intensity bin from P(1120) - z1a(2520)		RB	619	RB	624	Reel
	Green	Any 1 Intensity bin from R(1800) - 1d1e(4025)		Any 1 hue bin from G7(520)-Ga(540)			Reel	
	Blue	Any 1 Intensity bin from hj(403) - M(900)		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.



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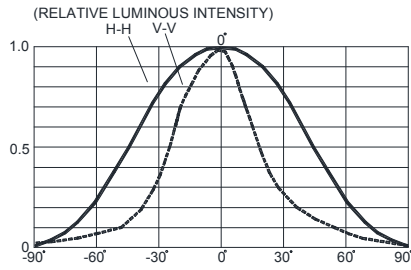
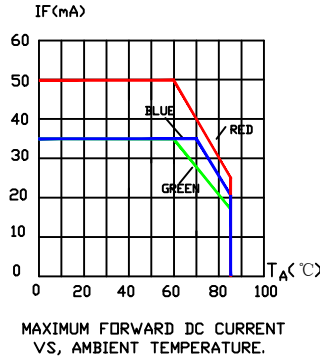
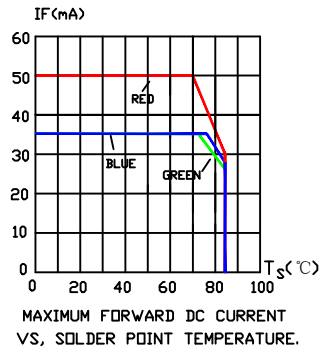


FIG.6a RED & BLUE&GREEN FAR FIELD PATTERN

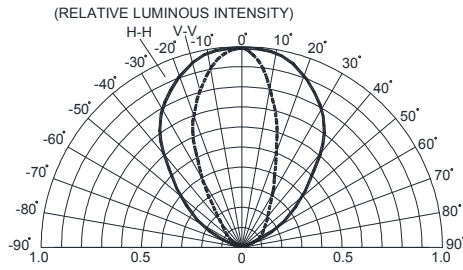


FIG.6b RED & BLUE&GREEN FAR FIELD PATTERN

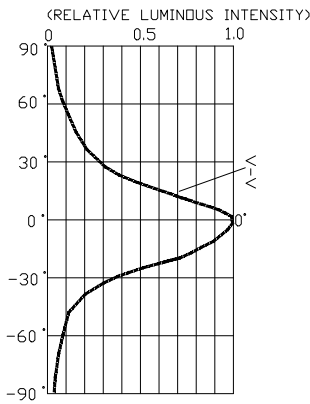


FIG.7 RED & BLUE&GREEN FAR FIELD PATTERN

PCB top view

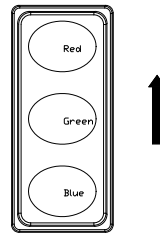
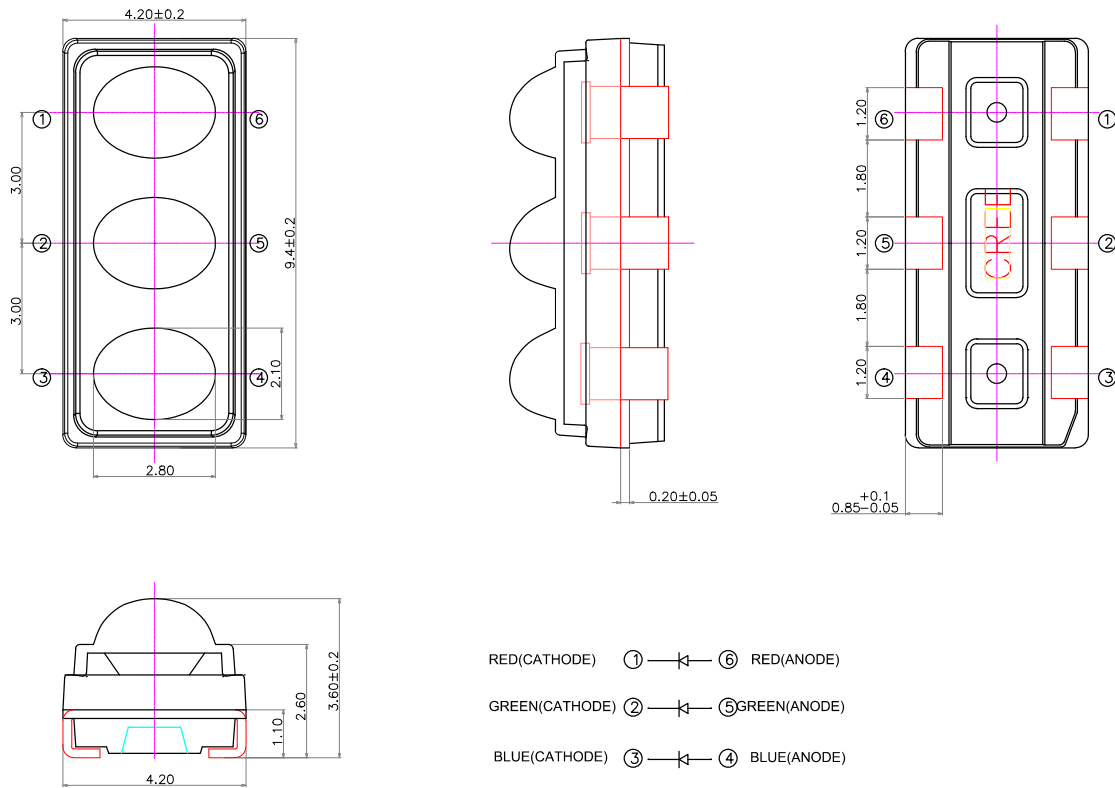


FIG.8 Recommended PCB structure for CV94U application

MECHANICAL DIMENSIONS

All dimensions are in mm.

Tolerance of measurement of the dimension is ± 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.

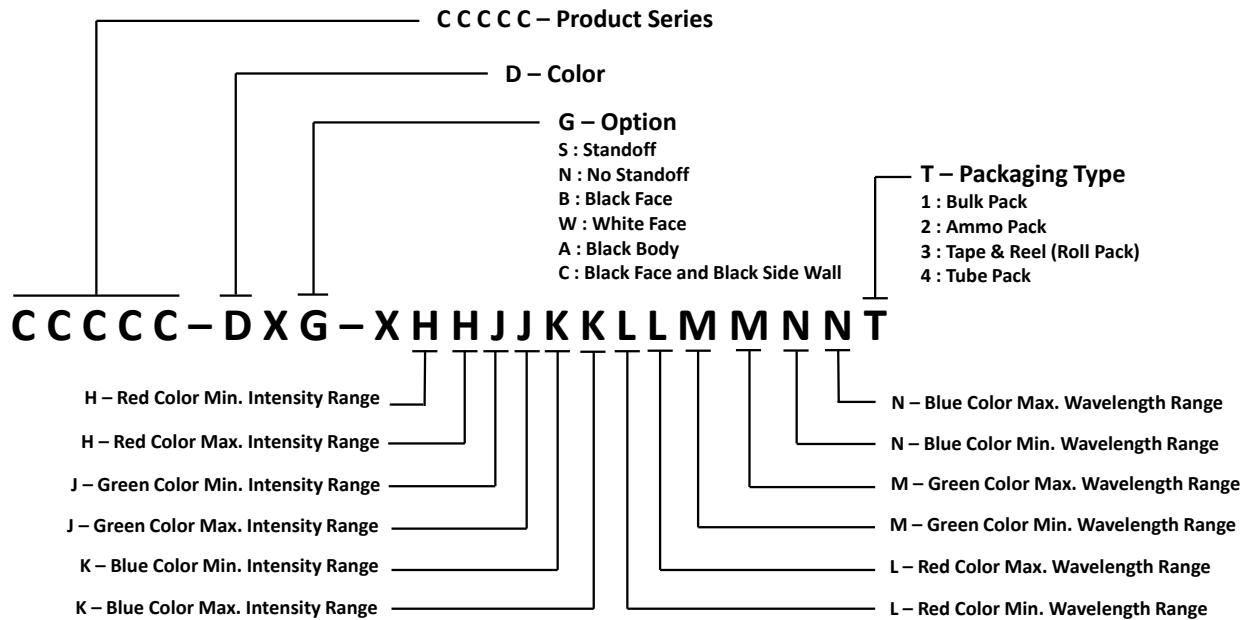
Vision Advisory

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

KIT NUMBER SYSTEM

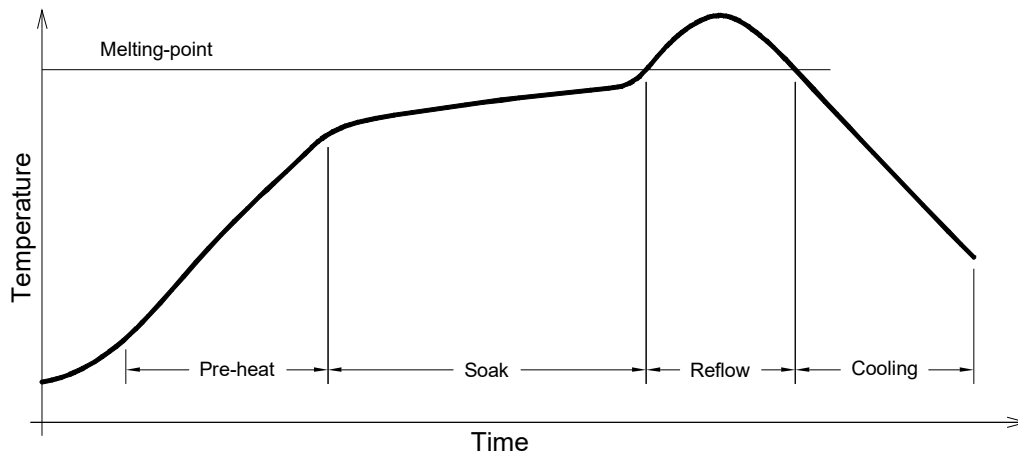
Cree LED lamps are tested and sorted into performance bins. A bin is specified by ranges of color, forward voltage, and brightness.

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



REFLOW SOLDERING

- The CV94U-FGC is rated as a MSL 5a product.
- The recommended floor life out of bag is 24hrs.
- The temperature profile is as below

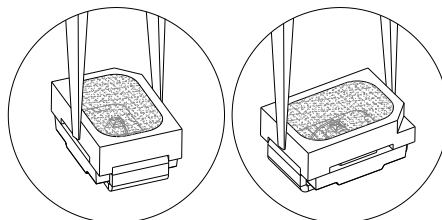


Use only with CV94U-FGC

Solder
Average ramp-up rate = 4 °C/second max.
Soak temperature = 150°C-200°C
Soak time = 120 seconds max.
Duration above 217 °C = 60 seconds max.
Peak temperature = 250°C max
Time within 5 °C of peak temperature = 10 seconds max.
Ramp-down rate = 6 °C/second 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.

