

Cree® PLCC4 3 in 1 RGB SMD LED CLMUC-FKA



PRODUCT DESCRIPTION

The CLMUC-FKA full-color RGB LED offers a high-intensity light output and a wide viewing angle. The compact 1.5mm x 1.5mm package allows for a very high resolution screen and is designed to work in a wide array of environmental conditions. Cree PLCC full-color RGB LEDs are suited for indoor video screen, decorative lighting and amusement applications.

FEATURES

- Size (mm): 1.5x 1.5
- Dominant Wavelength:
Red (619 - 624nm)
Green (520 - 535nm)
Blue (460 - 475nm)
- Luminous Intensity (mcd)
Red (36 - 71)@ 5mA
Green (112 - 280)@ 5mA
Blue (18 - 45)@ 5mA
- Moisture Sensitivity Level: 5a
- Lead-Free
- RoHS Compliant
- Matte Surface

APPLICATIONS

- Full-Color Video Screen
- Decorative lighting
- Amusement

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

Items	Symbol	Absolute Maximum Rating			Unit
		R	G	B	
Forward Current ^{Note 1}	I_F	25	13	13	mA
Peak Forward Current ^{Note 2}	I_{FP}	70	50	50	mA
Reverse Voltage	V_R	5	5	5	V
Power Dissipation	P_D	60	49	49	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 1 chip on	R_{THJA}	460	560	540	$^\circ\text{C/W}$
Junction/solder point 1 chip on	R_{THJS}	220	310	300	$^\circ\text{C/W}$

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	$I_F = 5$ mA	λ_{DOM}	619~624	520~535	460~475	nm
Spectral bandwidth at 50% I_{REL} max	$I_F = 5$ mA	$\Delta \lambda$	24	38	28	nm
Forward Voltage	$I_F = 5$ mA	$V_{F(avg)}$	1.9	3.0	3.0	V
		$V_{F(max)}$	2.4	3.7	3.7	V
Luminous Intensity	$I_F = 5$ mA	$I_{V(min)}$	36	112	18	mcd
		$I_{V(avg)}$	55	170	28	mcd
Luminous Intensity(Reference)	$I_F = 20/10/10$ mA	$I_{V(avg)}$	215	260	45	mcd
Reverse Current (max)	$V_R = 5$ V	I_R	10	10	10	μA

Note: Continuous reverse voltage can cause LED damage.

INTENSITY BIN LIMIT ($I_F = 5 \text{ mA}$)

Red

Bin Code	Min.(mcd)	Max.(mcd)
L8	36	45
3g3f	41	51
L9	45	56
3e3d	51	64
L	56	71

Green

Bin Code	Min.(mcd)	Max.(mcd)
C	112	140
78	126	160
D	140	180
9a	160	202
E	180	224
bc	202	252
F	224	280

Blue

Bin Code	Min.(mcd)	Max.(mcd)
L5	18	22
3p3n	20	25
L6	22	28
3m3k	25	32
L7	28	36
3j3h	32	41
L8	36	45

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

COLOR BIN LIMIT ($I_F = 5 \text{ mA}$)

Red

Bin Code	Min.(nm)	Max.(nm)
RB	619	624

Green

Bin Code	Min.(nm)	Max.(nm)
G7	520	525
G23	522.5	527.5
G8	525	530
G45	527.5	532.5
G9	530	535

Blue

Bin Code	Min.(nm)	Max.(nm)
B3	460	465
B23	462.5	467.5
B4	465	470
B45	467.5	472.5
B5	470	475

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)	
CLMUC-FKA-CL8LCFL5L8BB79353	Red	36	71	RB	619	RB	624	Reel
	Green	112	280	G7	520	G9	535	Reel
	Blue	18	45	B3	460	B5	475	Reel
CLMUC-FKA-CL81C1L51BB7C3C3	Red	Any 1 Intensity bin from L8(36) - L(71)		RB	619	RB	624	Reel
	Green	Any 1 Intensity bin from C(112) - F(280)		Any 1 hue bin from G7(520) - G9(535)				Reel
	Blue	Any 1 Intensity bin from L5(18) - L8(45)		Any 1 hue bin from B3(460) - B5(475)				Reel
CLMUC-FKA-CL91D1L61BB7C3C3	Red	Any 1 Intensity bin from L9(45) - L(71)		RB	619	RB	624	Reel
	Green	Any 1 Intensity bin from D(140) - F(280)		Any 1 hue bin from G7(520) - G9(535)				Reel
	Blue	Any 1 Intensity bin from L6(22) - L8(45)		Any 1 hue bin from B3(460) - B5(475)				Reel

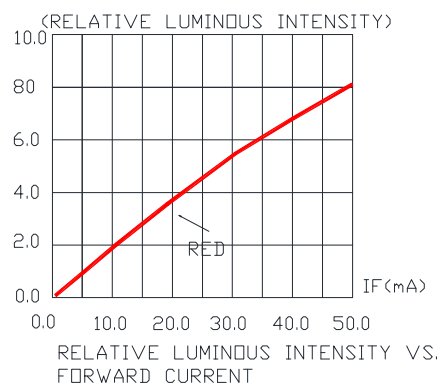
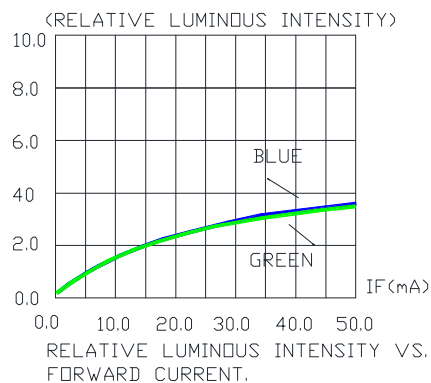
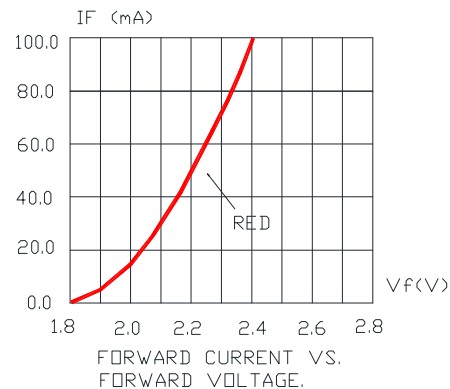
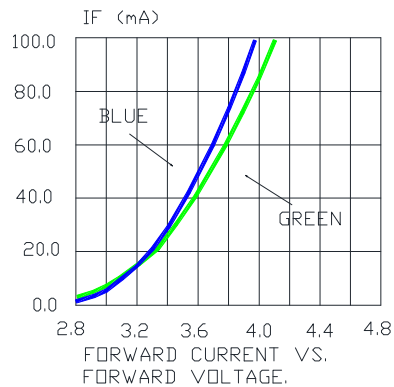
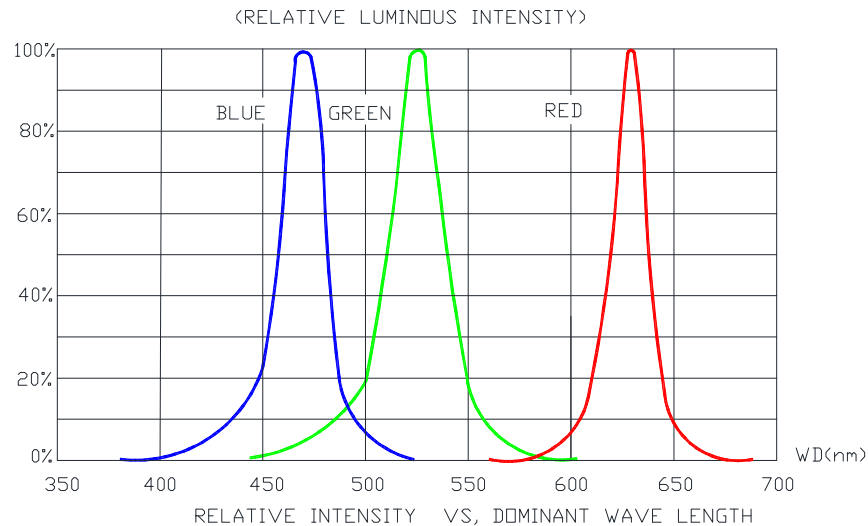
Notes:

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.
2. For example, any 1 intensity-bin from C - F means only 1 intensity-bin (C or 78 or D or 9a or E or bc or F) will be shipped by Cree.
3. For example, any 1 color-bin from G7 - G9 means only 1 color-bin (G7 or G23 or G8 or G45 or G9) will be shipped by Cree.
4. Please refer to the "Cree LED Lamp Reliability Test Standards" document ^{#1} for reliability test conditions.
5. 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

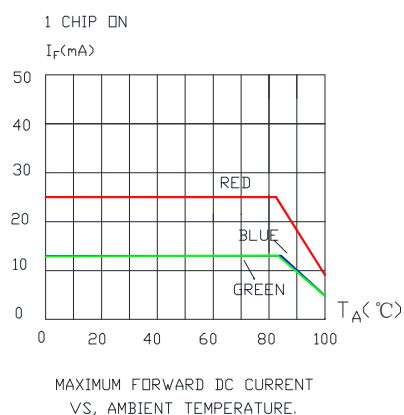
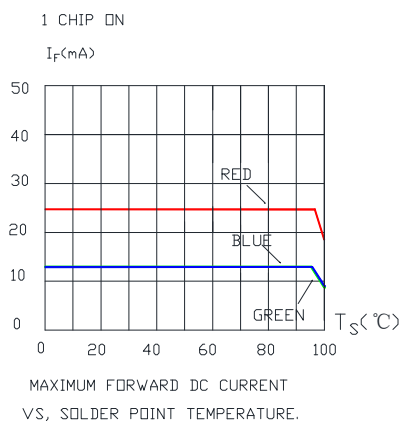
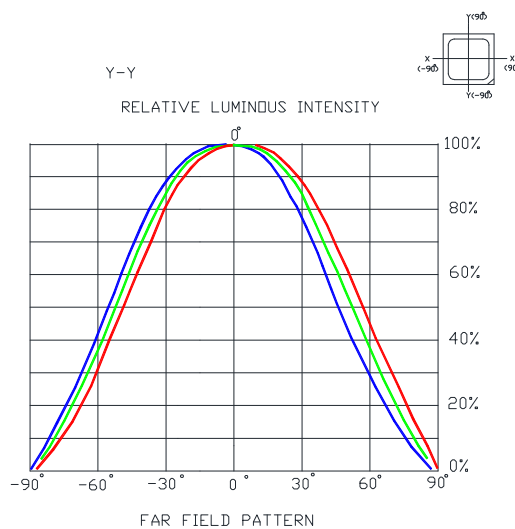
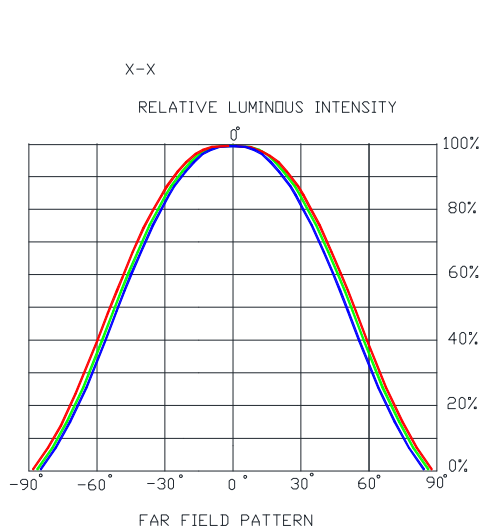
#2: Refer to <http://www.cree.com/led-components/media/documents/sh-HB.pdf>

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.

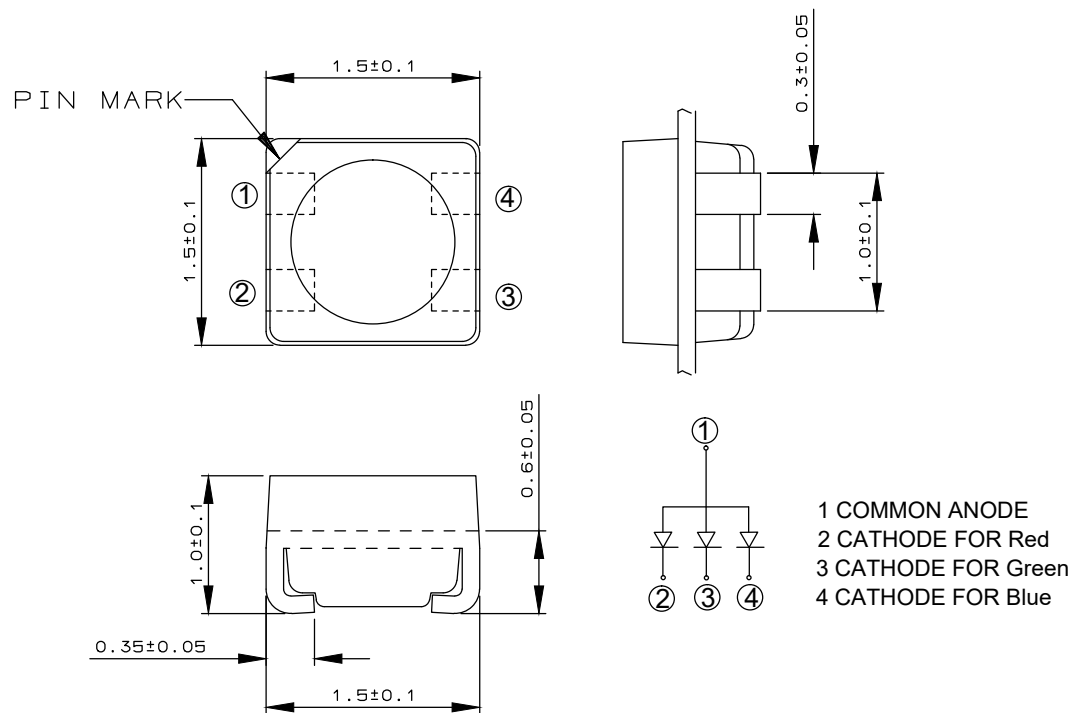
GRAPHS



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MECHANICAL DIMENSIONS

All dimensions are in mm.



NOTES

RoHS Compliance

The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise 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 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), as amended through April 21, 2006.

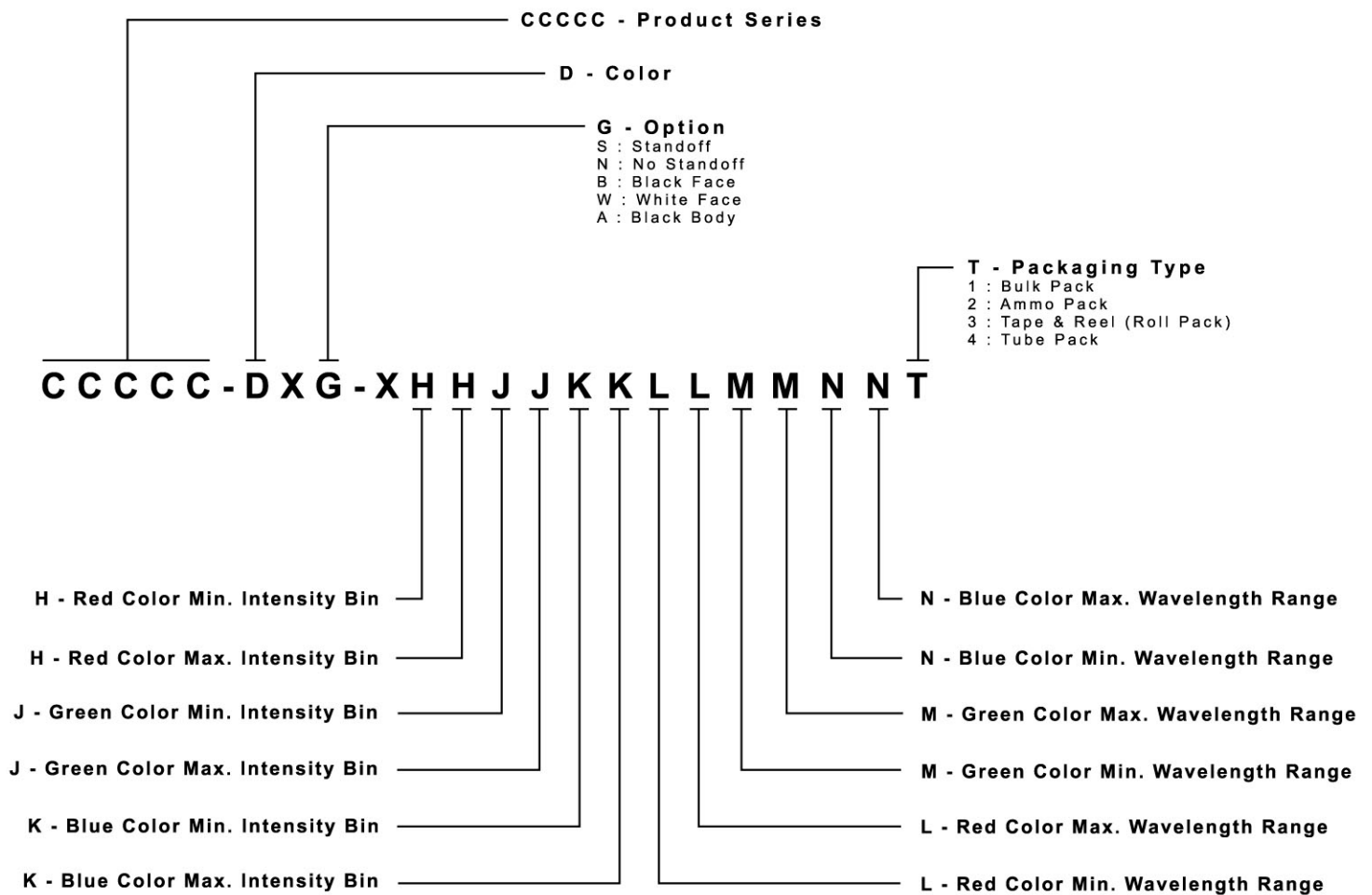
Vision Advisory Claim

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

KIT NUMBER SYSTEM

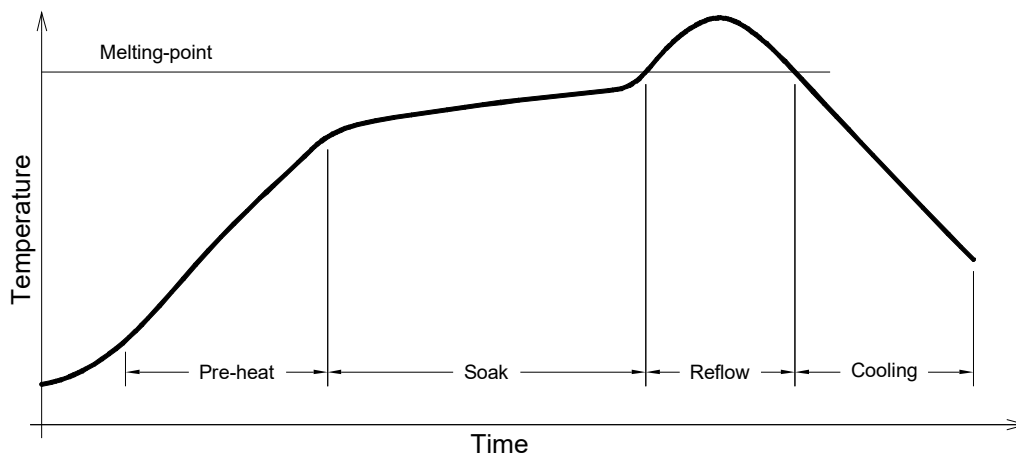
Cree LED lamps are tested and sorted into performance bins. A bin is specified by ranges of color, forward voltage, and brightness. Sorted LEDs are packaged for shipping in various convenient options. Please refer to the "Cree LED Lamp Packaging Standard" document for more information about shipping 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 CLMUC-FKA is rated as a MSL 5a product.
- After opening the sealed bag, the SMD LED must be stored under the condition $<30^{\circ}\text{C}$ and $<60\%\text{RH}$. Under these conditions, the SMD LEDs must be used (subject to reflow) within 24 hours after bag opening, and baking 24-hour/ 80°C is required when exceeding 24 hours.
- Note that baking must only be done once.
- The temperature profile is as below.



Use only with CLMUC-FKA

Solder
Average ramp-up rate = 4°C/s max
Preheat temperature = $150^{\circ}\text{C} \sim 200^{\circ}\text{C}$
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

- 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 CLMUC-FKA is rated as a MSL 5a product.
- 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 12800 pcs per reel.

