

Cree® PLCC4 3 in 1 RGB SMD LED

CLMVB-FKA



PRODUCT DESCRIPTION

The CLMVB-FKA full-color RGB LED offers a high-intensity light output and a wide viewing angle. The compact 2mm x 2mm 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): 2.0x 2.0
- Dominant Wavelength:
Red (619 - 624nm)
Green (520 - 540nm)
Blue (460 - 480nm)
- Luminous Intensity (mcd)
Red (224 - 450)@ 20mA
Green (180 - 450)@ 10mA
Blue (56 - 140)@ 10mA
- Lead-Free
- RoHS Compliant

APPLICATIONS

- Full-Color Video Screen
- Decorative lighting
- Amusement

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

| Items | Symbol | Absolute Maximum Rating | | | Unit |
|--|-------------------|-------------------------|-----|-----|------|
| | | R | G | B | |
| Forward Current ^{Note 1} | I _F | 25 | 17 | 17 | mA |
| Peak Forward Current ^{Note 2} | I _{FP} | 100 | 70 | 70 | mA |
| Reverse Voltage | V _R | 5 | 5 | 5 | V |
| Power Dissipation | P _D | 65 | 65 | 65 | mW |
| Operation Temperature | T _{opr} | -40 ~ +100 | | | °C |
| Storage Temperature | T _{stg} | -40 ~ +100 | | | °C |
| Junction Temperature | T _J | 110 | 110 | 110 | °C |
| Junction/ambient 1 chip on | R _{THJA} | 450 | 400 | 450 | °C/W |
| Junction/solder point 1 chip on | R _{THJS} | 300 | 280 | 300 | °C/W |

Note: 1. Single-color light.

2. Pulse width \leq 0.1 msec, duty \leq 1/10.

TYPICAL ELECTRICAL & OPTICAL CHARACTERISTICS (T_A = 25°C)

| Characteristics | Condition | Symbol | Values | | | Unit |
|--|--|---------------------|---------|---------|---------|------|
| | | | R | G | B | |
| Dominant Wavelength | I _F = 20 mA(R) I _F = 10 mA(B.G) | λ _{DOM} | 619~624 | 520~540 | 460~480 | nm |
| Spectral bandwidth at 50% I _{REL} max | I _F = 20 mA(R) I _F = 10 mA(B.G) | Δ λ | 24 | 38 | 28 | nm |
| Forward Voltage | I _F = 20 mA(R) I _F = 10 mA(B.G) | V _{F(avg)} | 2.0 | 3.0 | 3.0 | V |
| | | V _{F(max)} | 2.6 | 3.8 | 3.8 | V |
| Luminous Intensity | I _F = 20 mA(R) I _F = 10 mA(B.G) | I _{V(min)} | 224 | 180 | 56 | mcd |
| | | I _{V(avg)} | 280 | 260 | 81 | mcd |
| Reverse Current (max) | V _R = 5 V | I _R | 10 | 10 | 10 | μA |

INTENSITY BIN LIMIT (RED $I_F = 20$ mA, GREEN & BLUE $I_F = 10$ mA)

Red

| Bin Code | Min.(mcd) | Max.(mcd) |
|----------|-----------|-----------|
| F | 224 | 280 |
| de | 252 | 318 |
| G | 280 | 355 |
| fg | 318 | 403 |
| H | 355 | 450 |

Green

| Bin Code | Min.(mcd) | Max.(mcd) |
|----------|-----------|-----------|
| E | 180 | 224 |
| bc | 202 | 252 |
| F | 224 | 280 |
| de | 252 | 318 |
| G | 280 | 355 |
| fg | 318 | 403 |
| H | 355 | 450 |

Blue

| Bin Code | Min.(mcd) | Max.(mcd) |
|----------|-----------|-----------|
| L | 56 | 71 |
| 3c3b | 64 | 81 |
| A | 71 | 90 |
| 3a4 | 81 | 101 |
| B | 90 | 112 |
| 56 | 101 | 126 |
| C | 112 | 140 |

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

COLOR BIN LIMIT (RED $I_F = 20$ mA, GREEN & BLUE $I_F = 10$ 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 |
| G67 | 532.5 | 537.5 |
| Ga | 535 | 540 |

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 |
| B67 | 472.5 | 477.5 |
| B6 | 475 | 480 |

 Tolerance of measurement of dominant wavelength is ± 1 nm.

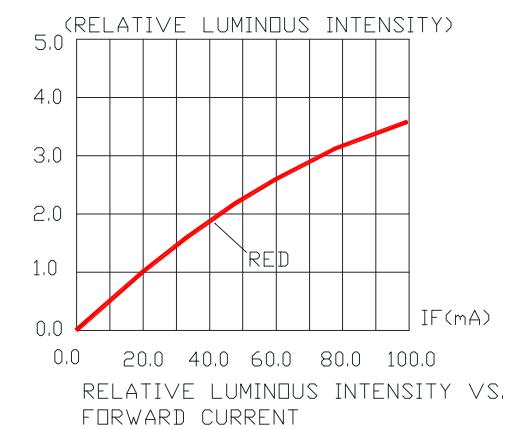
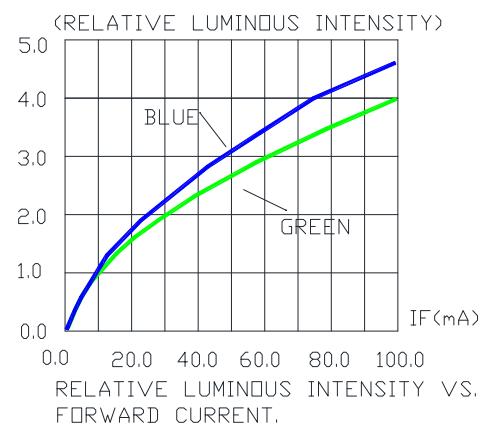
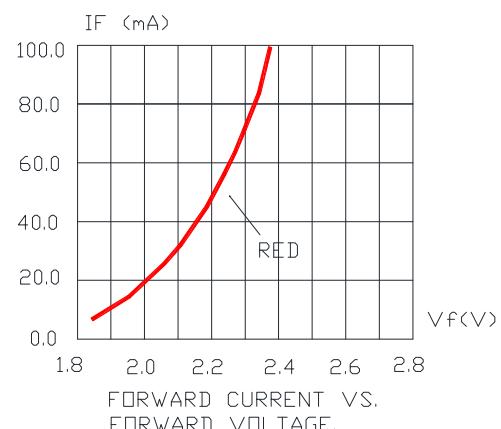
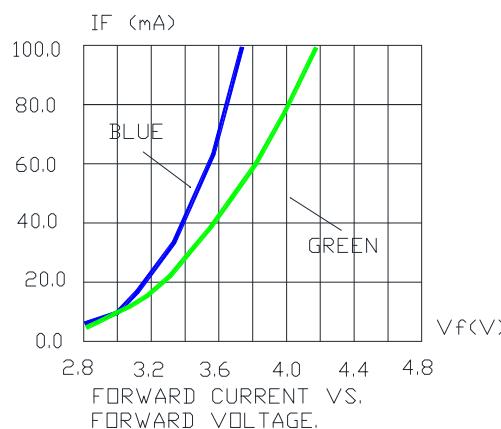
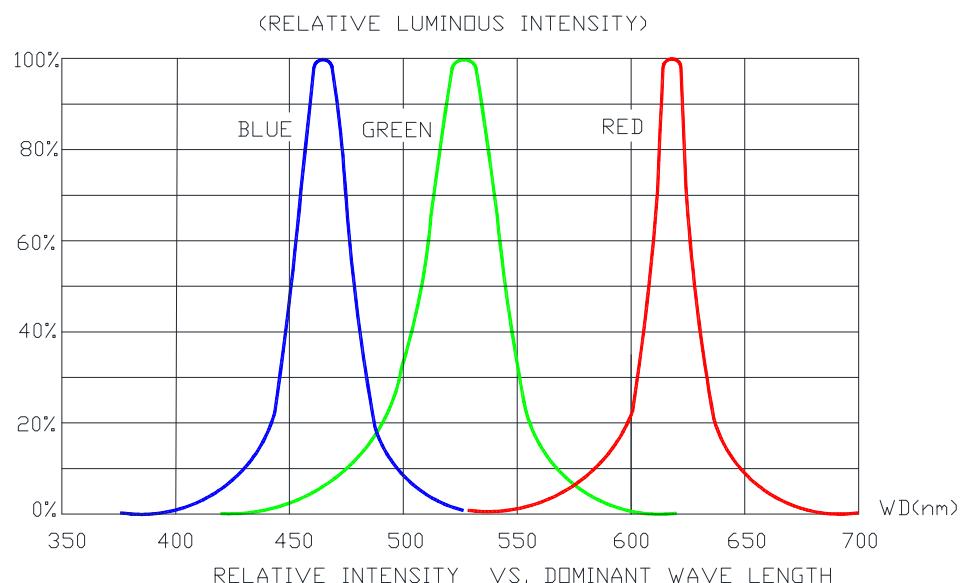
ORDER CODE TABLE*

| Kit Number | Color | Luminous Intensity (mcd) | | Dominant Wavelength (nm) | | | | Package |
|--------------------------|-------|--|------|--------------------------------------|-----------|-----------|-----------|---------|
| | | Min. | Max. | Color Bin | Min. (nm) | Color Bin | Max. (nm) | |
| CLMVB-FKA-CFHEHLCBB7a363 | Red | 224 | 450 | RB | 619 | RB | 624 | Reel |
| | Green | 180 | 450 | G7 | 520 | Ga | 540 | Reel |
| | Blue | 56 | 140 | B3 | 460 | B6 | 480 | Reel |
| CLMVB-FKA-CF1E1L1BB7D3D3 | Red | Any 1 Intensity bin from F(224) - G(355) | | RB | 619 | RB | 624 | Reel |
| | Green | Any 1 Intensity bin from E(180) - G(355) | | Any 1 hue bin from G7(520) - Ga(540) | | | | Reel |
| | Blue | Any 1 Intensity bin from L(56) - B(112) | | Any 1 hue bin from B3(460) - B6(480) | | | | Reel |
| CLMVB-FKA-CG1F1A1BB8C3C3 | Red | Any 1 Intensity bin from G(355) - H(450) | | RB | 619 | RB | 624 | Reel |
| | Green | Any 1 Intensity bin from F(224) - H(450) | | Any 1 hue bin from G8(525) - Ga(540) | | | | Reel |
| | Blue | Any 1 Intensity bin from A(71) - C(140) | | Any 1 hue bin from B3(460) - B5(475) | | | | Reel |

Notes:

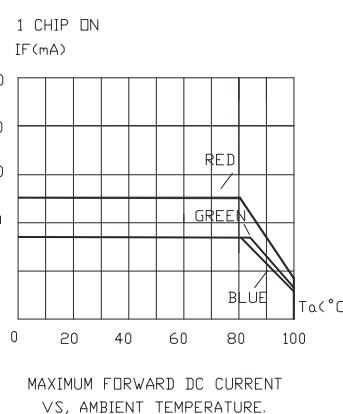
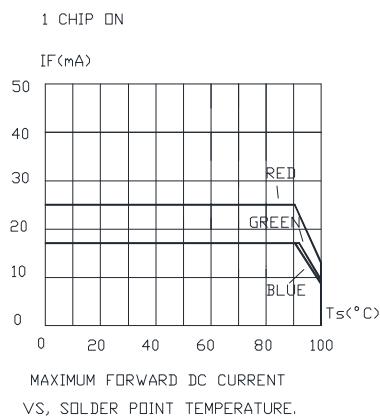
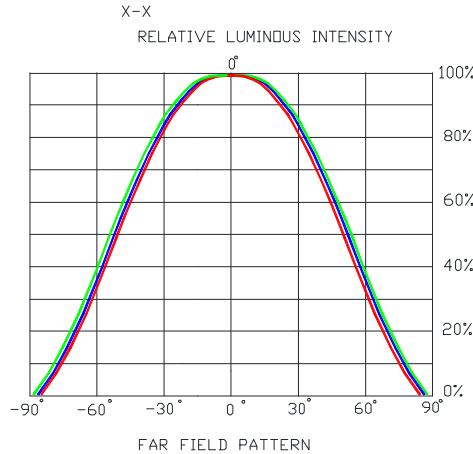
1. The above kit numbers represent the order codes which include multiple intensity-bin and color-bin codes. Only one intensity-bin code and one color-bin code will be shipped on each reel. Single intensity-bin code and single color-bin code will be orderable in certain quantities.
2. For example, any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

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.

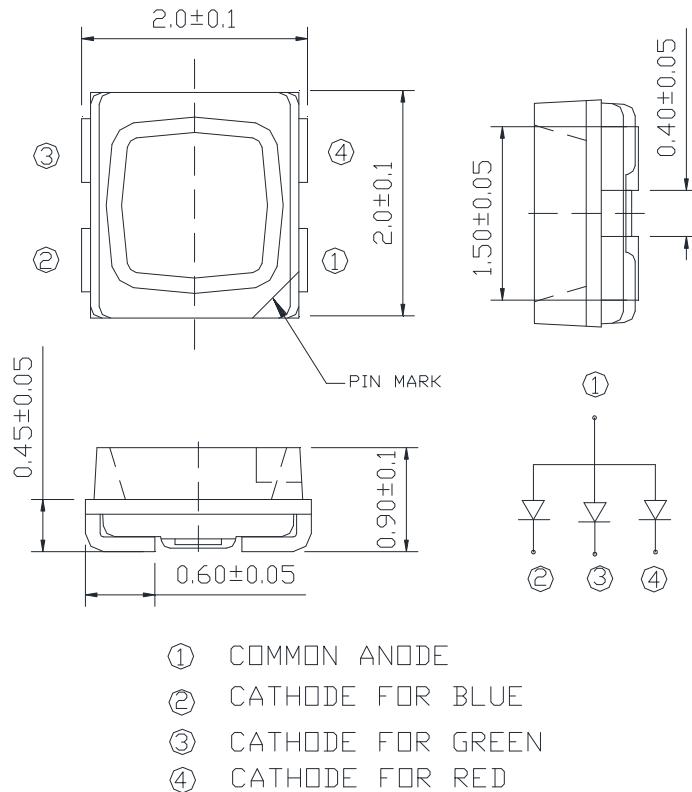
GRAPHS



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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.

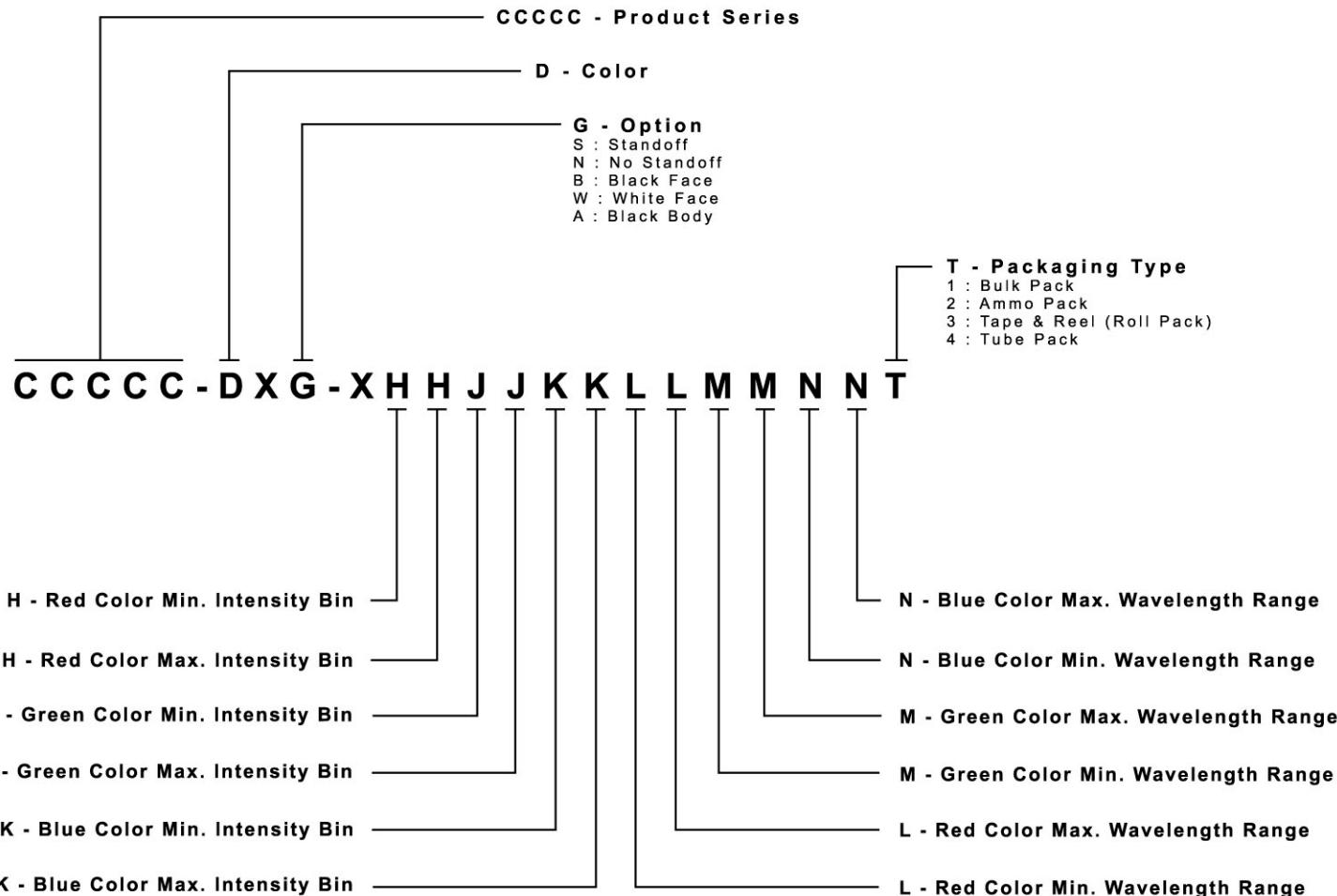
Vision Advisory Claim

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

KIT NUMBER SYSTEM

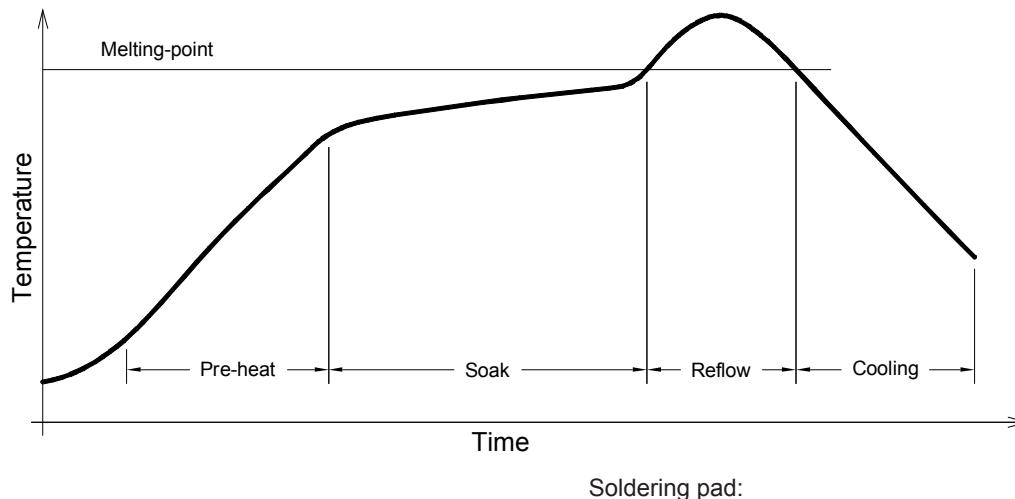
Cree LED lamps are tested and sorted into performance bins. A bin is specified by ranges of color, forward voltage, and brightness. Sorted LEDs are packaged for shipping in various convenient options. Please refer to the "Cree LED Lamp Packaging Standard" document for more information about shipping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

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



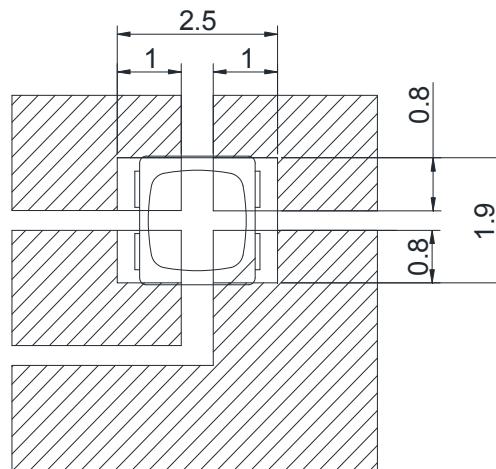
REFLOW SOLDERING

- The CLMVB-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 $<60\%$ 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 CLMVB-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 |



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 12800 pcs per reel.

