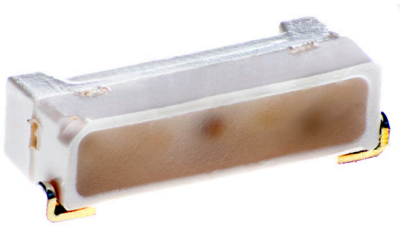
QLS6A-FKW: PLCC6 3 in 1 SMD LED (with zener protection)



PRODUCT DESCRIPTION

These SMD LEDs are packaged in an industry standard PLCC6 package. These high performance tricolor SMT LEDs are designed to work in a wide range of applications. A wide viewing angle and high brightness make these LEDs suitable for indoor signage applications.

FEATURES

- Size (mm): 4.7 x 1.5 x 1.3
- Dominant Wavelength
  Red (619 - 624nm)
  Green (520 - 540nm)
  Blue (460 - 480nm)
- Luminous Intensity (mcd)
  (900-2800)
- Moisture Sensitivity Level: 3
- Lead-Free
- RoHS Compliant

APPLICATIONS

- Full-Color Video Screen
- Decorative Lighting
- Amusement

Cree LED / 4400 Silicon Drive / Durham, NC 27703 USA / +1.919.313.5330 / www.cree-led.com

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ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Items	Symbol	Absolute Maximum Rating			Unit
		R	G	B	
Forward Current Note 1	I_F	30	20	20	mA
Peak Forward Current Note 2	I_{FP}	200	100	100	mA
Reverse Voltage	V_R	5	5	5	V
Power Dissipation	P_D	78	76	76	mW
Operation Temperature	T_{opr}	-40 ~ +85			°C
Storage Temperature	T_{stg}	-40 ~ +100			°C
Junction Temperature	T_J	110	110	110	°C
Junction/ambient 1 chip on	R_{THJA}	360	475	450	°C/W
Junction/solder point 1 chip on	R_{THJS}	200	330	300	°C/W
Junction/ambient 3 chip on	R_{THJA}	510	675	690	°C/W
Junction/solder point 3 chip on	R_{THJS}	280	470	420	°C/W

Note:

1. Single-color light
2. Pulse width ≤0.1 msec, duty ≤1/10.

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

Characteristics	Condition	Symbol	Values			Unit
			R	G	B	
Dominant Wavelength	I_F = 14mA(R) I_F = 12mA(G) I_F = 16mA(B)	λ_{DOM}	619~624	520~540	460~480	nm
Spectral bandwidth at 50% I_{REL} max	I_F = 14mA(R) I_F = 12mA(G) I_F = 16mA(B)	Δ λ				nm
Forward Voltage	I_F = 14mA(R) I_F = 12mA(G) I_F = 16mA(B)	$V_{F(avg)}$	2.1	3.0	3.1	V
		$V_{F(max)}$	2.6	3.8	3.8	V
Luminous Intensity	I_F = 14mA(R) I_F = 12mA(G) I_F = 16mA(B)	$I_{V(min)}$	900-2800			mcd
Reverse Current (max)	V_R = 5 V	I_R	10	10	10	μA

* Continuous reverse voltage can cause LED damage.

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INTENSITY BIN LIMIT

RGB(14 mA /12 mA/16mA)		
Bin Code	Min.(mcd)	Max.(mcd)
NS	900	2800

* Tolerance of measurement of luminous intensity is ±10%.

COLOR BIN LIMIT

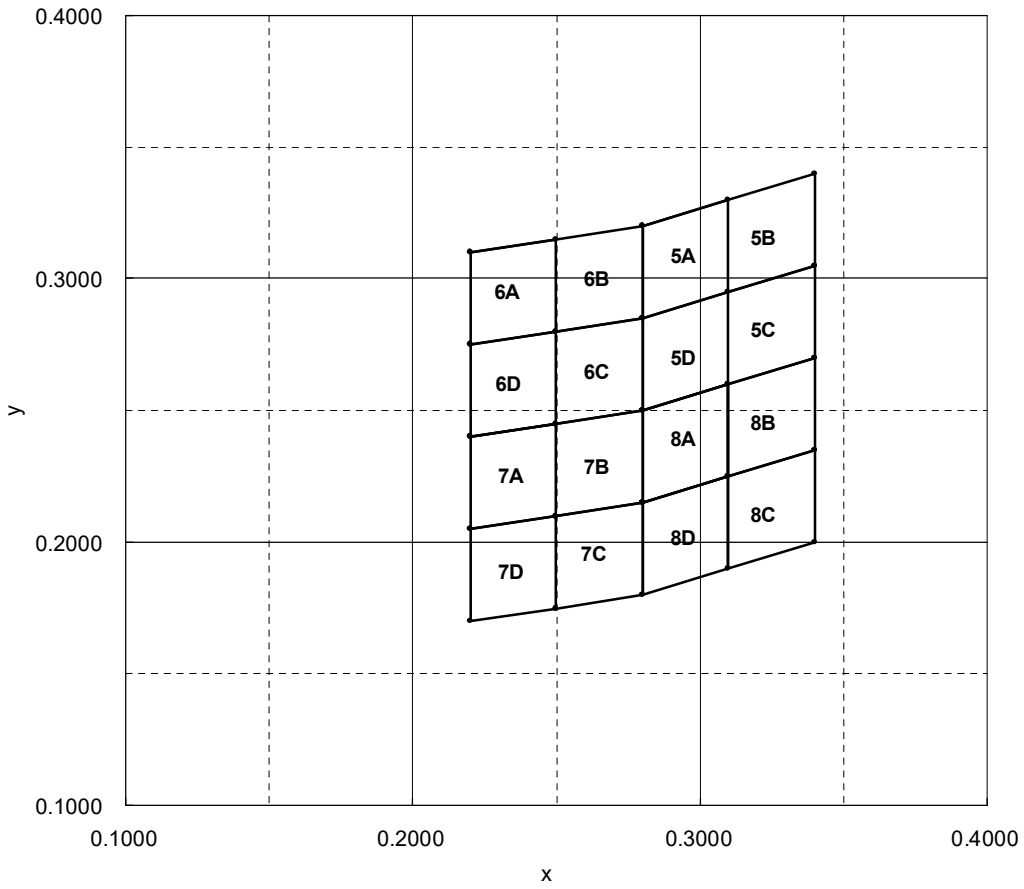
Bin Cold	x	y	Region	x	y	Region	x	y	Region	x	y
5A	0.2800	0.3200	5B	0.3100	0.3300	5C	0.3100	0.2950	5D	0.2800	0.2850
	0.3100	0.3300		0.3400	0.3400		0.3400	0.3050		0.3100	0.2950
	0.3100	0.2950		0.3400	0.3050		0.3400	0.2700		0.3100	0.2600
	0.2800	0.2850		0.3100	0.2950		0.3100	0.2600		0.2800	0.2500
6A	0.2200	0.3100	6B	0.2500	0.3150	6C	0.2500	0.2800	6D	0.2200	0.2750
	0.2500	0.3150		0.2800	0.3200		0.2800	0.2850		0.2500	0.2800
	0.2500	0.2800		0.2800	0.2850		0.2800	0.2500		0.2500	0.2450
	0.2200	0.2750		0.2500	0.2800		0.2500	0.2450		0.2200	0.2400
7A	0.2200	0.2400	7B	0.2500	0.2450	7C	0.2500	0.2100	7D	0.2200	0.2050
	0.2500	0.2450		0.2800	0.2500		0.2800	0.2150		0.2500	0.2100
	0.2500	0.2100		0.2800	0.2150		0.2800	0.1800		0.2500	0.1750
	0.2200	0.2050		0.2500	0.2100		0.2500	0.1750		0.2200	0.1700
8A	0.2800	0.2500	8B	0.3100	0.2600	8C	0.3100	0.2250	8D	0.2800	0.2150
	0.3100	0.2600		0.3400	0.2700		0.3400	0.2350		0.3100	0.2250
	0.3100	0.2250		0.3400	0.2350		0.3400	0.2000		0.3100	0.1900
	0.2800	0.2150		0.3100	0.2250		0.3100	0.1900		0.2800	0.1800

* Tolerance of measurement of the color coordinates is ±0.02.

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CIE CHROMATICITY DIAGRAM



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ORDER CODE TABLE

Kit Number	Color	Luminous Intensity (mcd)		Dominant Wavelength (nm)	Package
		Min.	Max.		
QLS6A-FKW-CNSNSF043	RGB	900	2800	5A,5B,5C,5D,6A,6B,6C,6D, 7A,7B,7C,7D,8A,8B,8C,8D,	Reel

Notes:

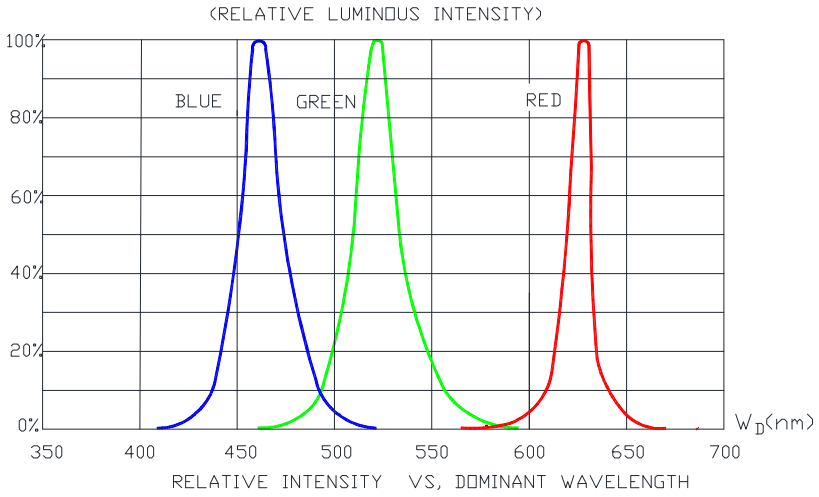
- The above kit numbers represent order codes that include multiple intensity-bin and color-bin codes. Only one intensity-bin code and one color-bin code will be shipped on each bulk. Single intensity-bin code and single color-bin codes will not be orderable.
- Please refer to the HB LED Lamp Reliability 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.

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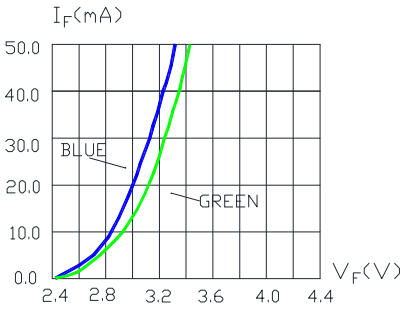
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GRAPHS

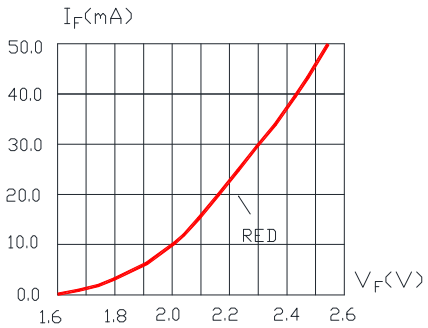
The data below are collected from statistical figures that do not necessarily correspond to the actual parameters of each single LED. Hence, these data will be changed without further notice.



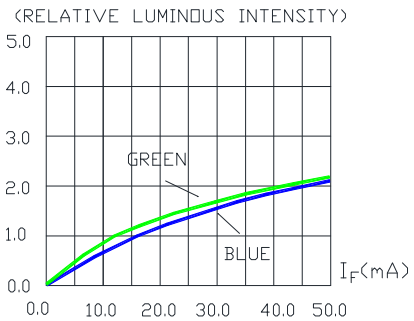
RELATIVE INTENSITY VS, DOMINANT WAVELENGTH



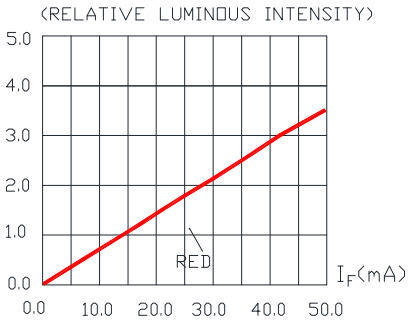
FORWARD CURRENT VS. FORWARD VOLTAGE.



FORWARD CURRENT VS. FORWARD VOLTAGE.



RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT.



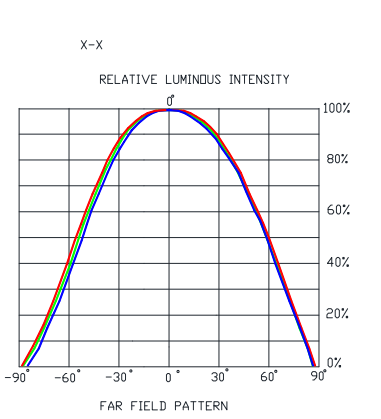
RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

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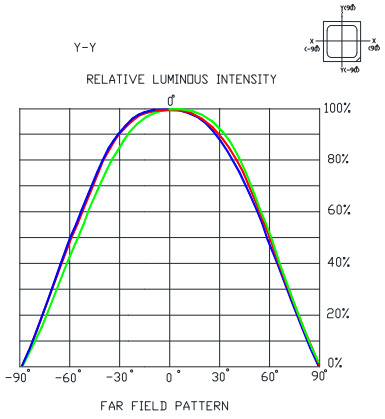
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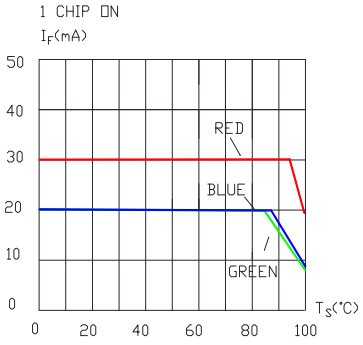
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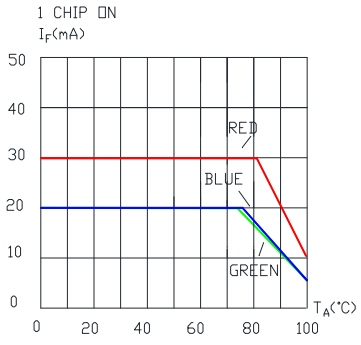
FAR FIELD PATTERN



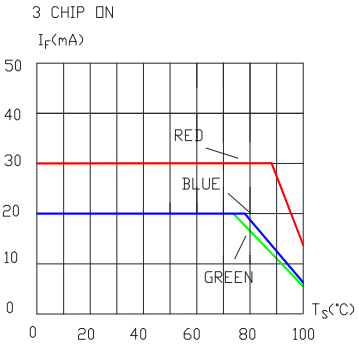
FAR FIELD PATTERN



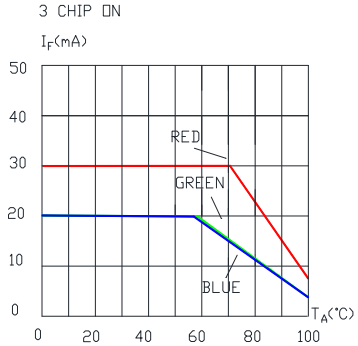
MAXIMUM FORWARD DC CURRENT
VS, SOLDER POINT TEMPERATURE.



MAXIMUM FORWARD DC CURRENT
VS, AMBIENT POINT TEMPERATURE.



MAXIMUM FORWARD DC CURRENT
VS, SOLDER POINT TEMPERATURE.



MAXIMUM FORWARD DC CURRENT
VS, AMBIENT POINT TEMPERATURE.

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RELIABILITY

Type	Test Item	REF.Standard	Test Condition	Note	Number of Damaged
Environmental sequence	Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30 mins, 5 mins, 30 mins, 5 mins	100 cycles	0/50
	Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/50
	High Temperature Storage	JEITA ED-4701 200 201	T_A=100°C	500 hrs	0/50
	Humidity Heat Storage	JEITA ED-4701 100 103	T_A=60°C RH=90%	500 hrs	0/50
	Low Temperature Storage	JEITA ED-4701 200 202	T_A=-40°C	500 hrs	0/50
Operation sequence	Life Test	-	T_A=25°C I_F: R=G=B=W=150mA	1000 hrs	0/30
	High Temperature Life Test	-	T_A=85°C I_F: R=G=B=W=80mA	1000 hrs	0/30
	High Humidity Heat Life Test	-	T_A=60°C, RH=90% I_F: R=G=B=W=80mA	500 hrs	0/30
	Low Temperature Life Test	-	T_A=-40°C I_F: R=G=B=W=150mA	500hrs	0/30

Judging Criteria

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V_F	I_F = 20 mA	–	Initial Data x 1.1
Reverse Current	I_R	V_R = 5 V	-	10μA
Luminous Flux/Intensity	Φ_V	I_F = 20 mA	Initial Data x 0.7	-

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CAUTIONS

1. Cleaning

- When necessary, cleaning should occur only with isopropyl alcohol (IPA) at room temperature (25ºC) for a duration of no more than one minute. Dry at room temperature for 15 minutes before use.
- The influence of ultrasonic cleaning on the SMD LED depends on factors such as ultrasonic power and the way the SMD LEDs are mounted. Ultrasonic cleaning should be pre-qualified to ensure this will not cause damage to the SMD LEDs.

2. Moisture-Proof Packing

- To prevent moisture absorption into SMD LEDs during the transportation and storage, the LEDs are packed in a moisture-barrier bag. Desiccants and a humidity indicator are packed together with the LEDs as secondary protection.
- A humidity-indicator card inside the packing indicates the humidity level.

3. Storage

- The shelf life of LEDs stored in the original sealed bag at <40ºC and <90%RH is 12 months. Baking is required if the shelf life has expired.
- Before openning the packaging, check for air leaks in the bag.
- After the bag is opened, the SMD LEDs must be stored at < 30ºC and < 60% RH. Under these conditions, SMD LEDs must be used (subject to reflow) within 168 hours. If the LEDs are not within 168 hours after removal from the bag, baking is required.
- To bake, place the SMD LEDs in an oven at 80ºC ±5ºC and relative humidity ≤10% RH for 24 hours.
- Take the material out of the packaging bag before baking. Do not open the oven door frequently during the baking process.

4. Soldering

a. Manual Soldering with a Soldering Iron

- Use of a soldering iron of less than 25 watts is recommended. The iron temperature must be kept below 315ºC and soldering time no more than 2 seconds.
- The epoxy resin of an SMD LED should not contact the tip of the soldering iron.
- No mechanical stress should be exerted on the resin portion of an SMD LED during soldering.
- Handling of an SMD LED should be done only when the package has been cooled down to below 40ºC or less. This is to prevent SMD LED failures due to thermal-mechanical stress during handling.

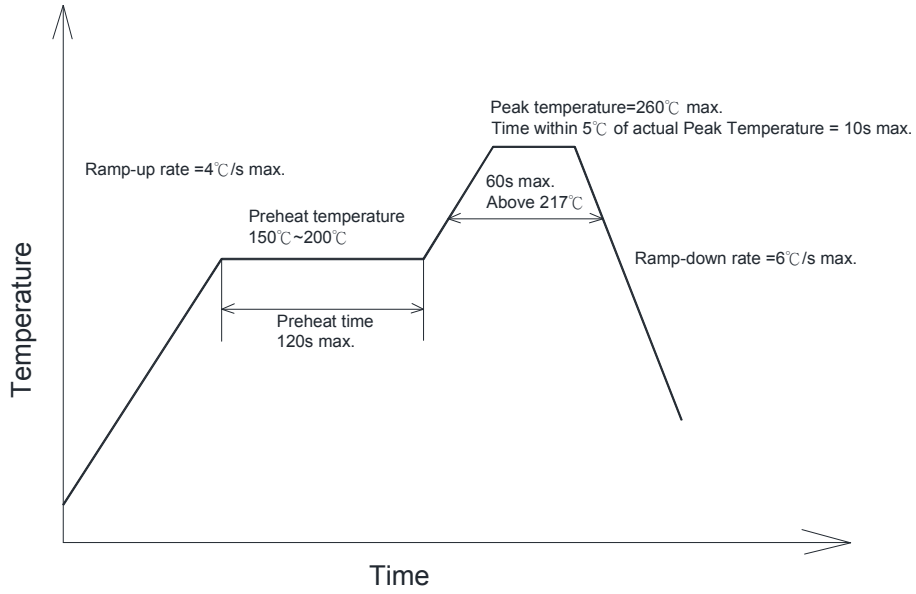
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CAUTIONS

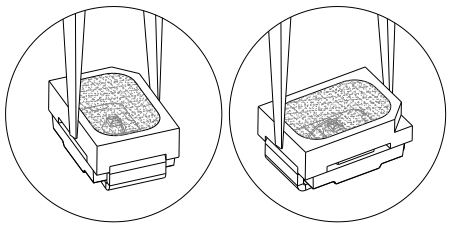
b. Reflow Soldering

Temperature (top surface of the SMD LED) profile:



NOTES

- SMD LEDs should not be modified after soldering. If modification cannot be avoided, the modifications must be pre-qualified to avoid damaging the SMD LEDs.
- In case of 2 times reflow process, 2nd reflow process must be performed as soon as possible after the 1st reflow.
- No stress should be exerted on the package during soldering.
- The PCB should not be wrapped after soldering; allow the PCB board and SMD LED to cool naturally.
- 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:



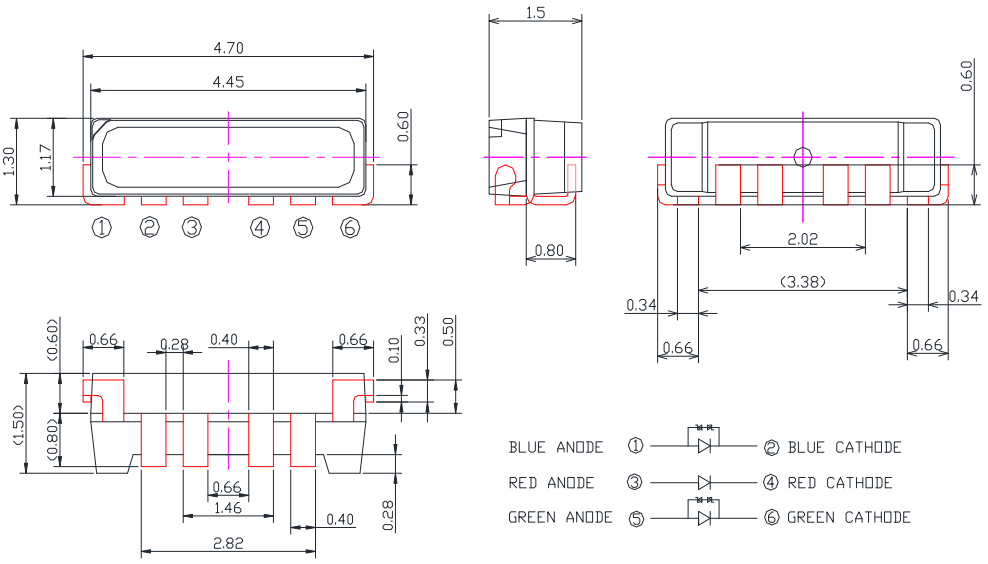
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MECHANICAL DIMENSIONS

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.

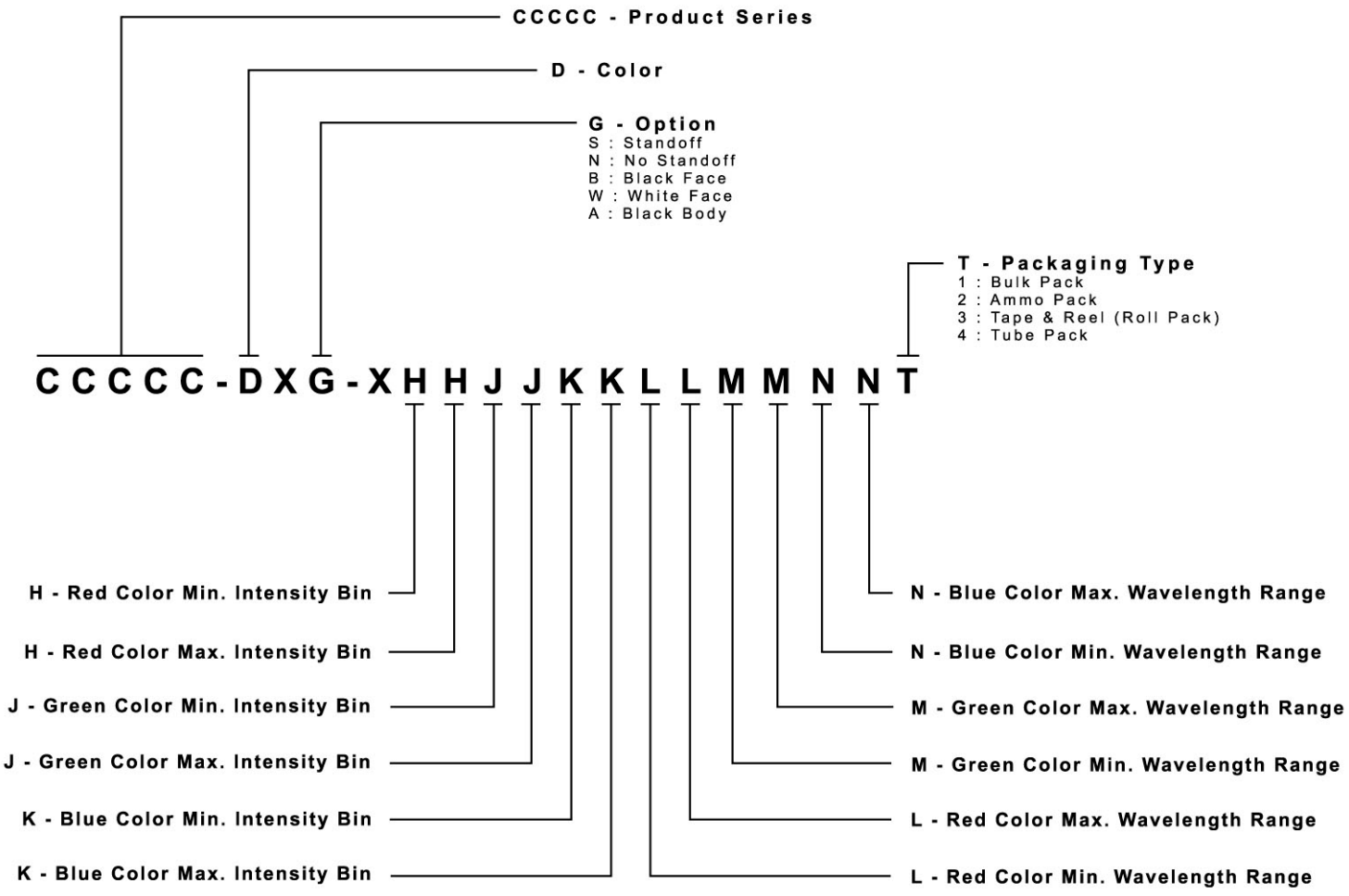
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KIT NUMBER SYSTEM

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:

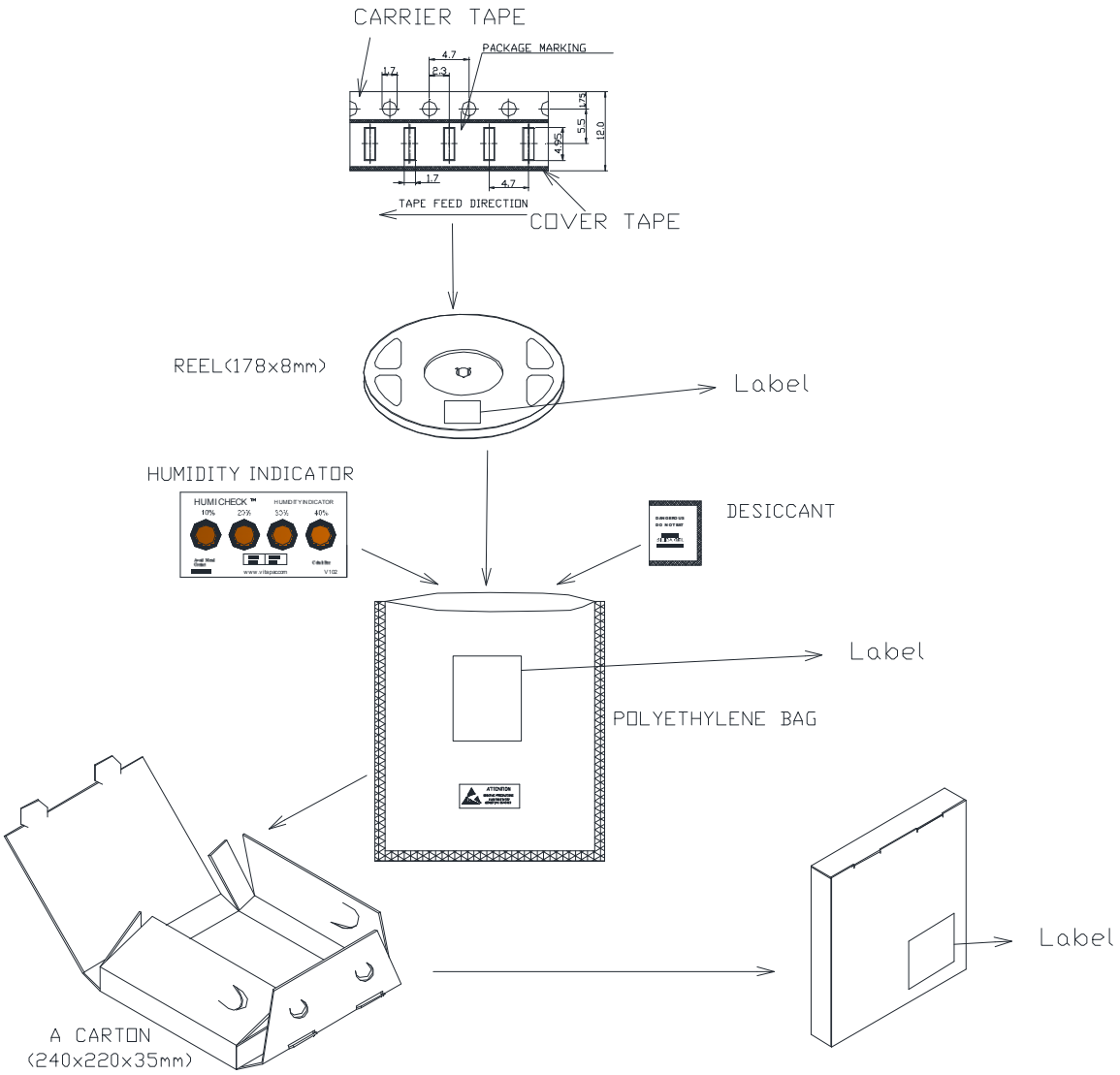


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PACKAGING

- 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 3000 pcs per reel.



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