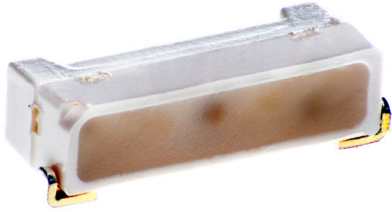# QLS6C-FKW: PLCC6 3 in 1 SMD LED

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)
  (3175-4500)

- Moisture Sensitivity Level: 3
- 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	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	80	80	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	R_{THJA}	360	400	300	°C/W
Junction/solder point	R_{THJS}	240	280	200	°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 = 20mA(R) I_F = 18mA(G) I_F = 20mA(B)	λ_{DOM}	619~624	520~540	460~480	nm
Spectral bandwidth at 50% I_{REL} max	I_F = 20mA(R) I_F = 18mA(G) I_F = 20mA(B)	$\Delta\lambda$	24	38	28	nm
Forward Voltage	I_F = 20mA(R) I_F = 18mA(G) I_F = 20mA(B)	$V_{F(avg)}$	2.2	2.7	2.9	V
		$V_{F(max)}$	2.6	3.4	3.4	V
Luminous Intensity	I_F = 20mA(R) I_F = 18mA(G) I_F = 20mA(B)	$I_{V(min)}$	3175-4500			mcd
Reverse Current (max)	V_R = 5 V	I_R	10	10	10	µA

* Continuous reverse voltage can cause LED damage.

INTENSITY BIN LIMIT

RGB(20 mA /18 mA/20mA)		
Bin Code	Min.(mcd)	Max.(mcd)
Y2	3175	3550
Y3	3550	4025
Y4	4025	4500

* 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	5D	0.2800	0.2850	6A	0.2200	0.3100	6B	0.2500	0.3150
	0.3100	0.3300		0.3100	0.2950		0.2500	0.3150		0.2800	0.3200
	0.3100	0.2950		0.3100	0.2600		0.2500	0.2800		0.2800	0.2850
	0.2800	0.2850		0.2800	0.2500		0.2200	0.2750		0.2500	0.2800
6C	0.2500	0.2800	6D	0.2200	0.2750	7A	0.2200	0.2400	7B	0.2500	0.2450
	0.2800	0.2850		0.2500	0.2800		0.2500	0.2450		0.2800	0.2500
	0.2800	0.2500		0.2500	0.2450		0.2500	0.2100		0.2800	0.2150
	0.2500	0.2450		0.2200	0.2400		0.2200	0.2050		0.2500	0.2100
8A	0.2800	0.2500									
	0.3100	0.2600									
	0.3100	0.2250									
	0.2800	0.2150									

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

CIE CHROMATICITY DIAGRAM
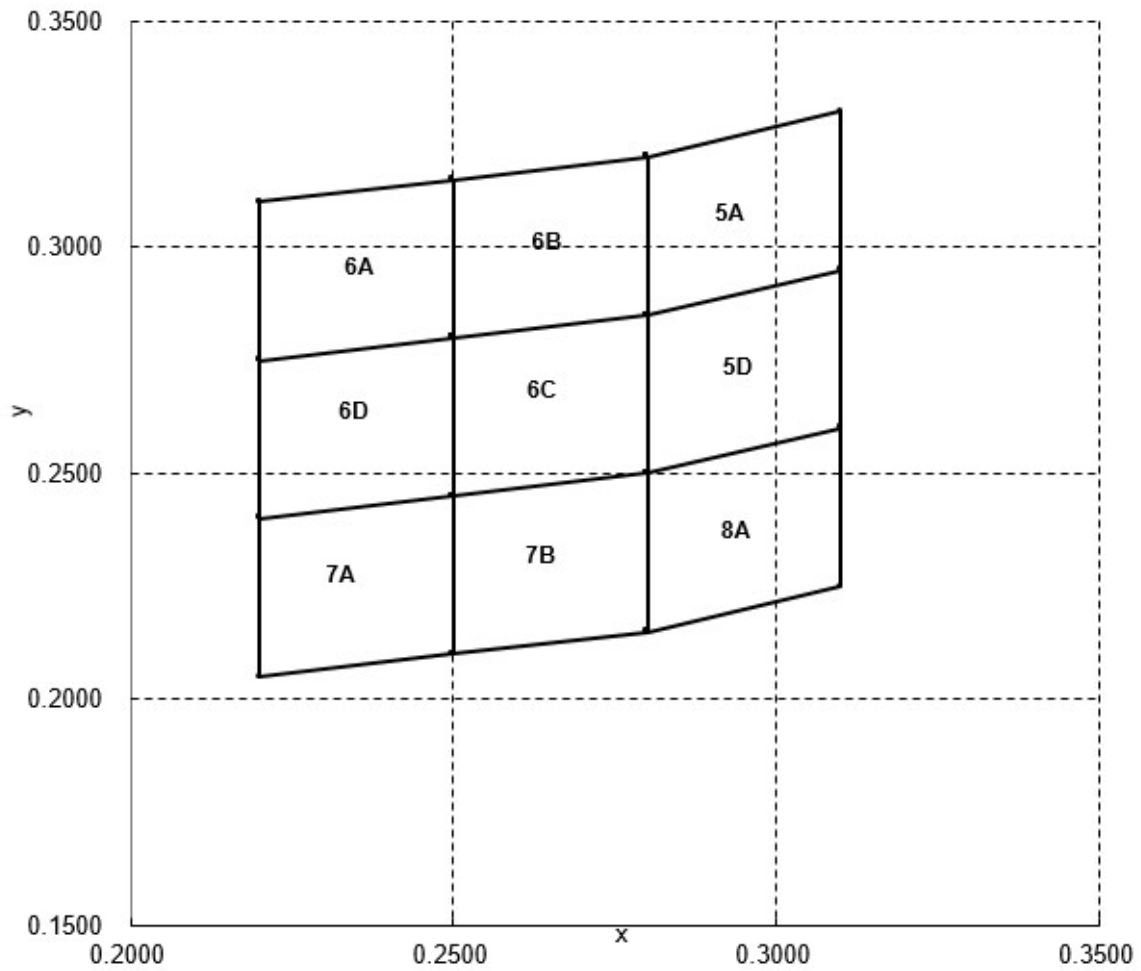
ORDER CODE TABLE

Kit Number	Color	Luminous Intensity (mcd)		Dominant Wavelength (nm)	Package
		Min.	Max.		
QLS6C-FKW-CY2Y4F093	RGB	3175	4500	5A,5D,6A,6B,6C,6D, 7A,7B,8A	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.
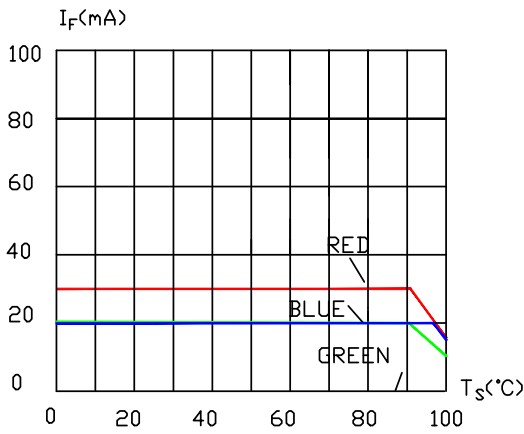
GRAPHS

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.

RELATIVE INTENSITY VS, DOMINANT WAVELENGTH

FORWARD CURRENT VS. FORWARD VOLTAGE.

FORWARD CURRENT VS. FORWARD VOLTAGE.

RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT.
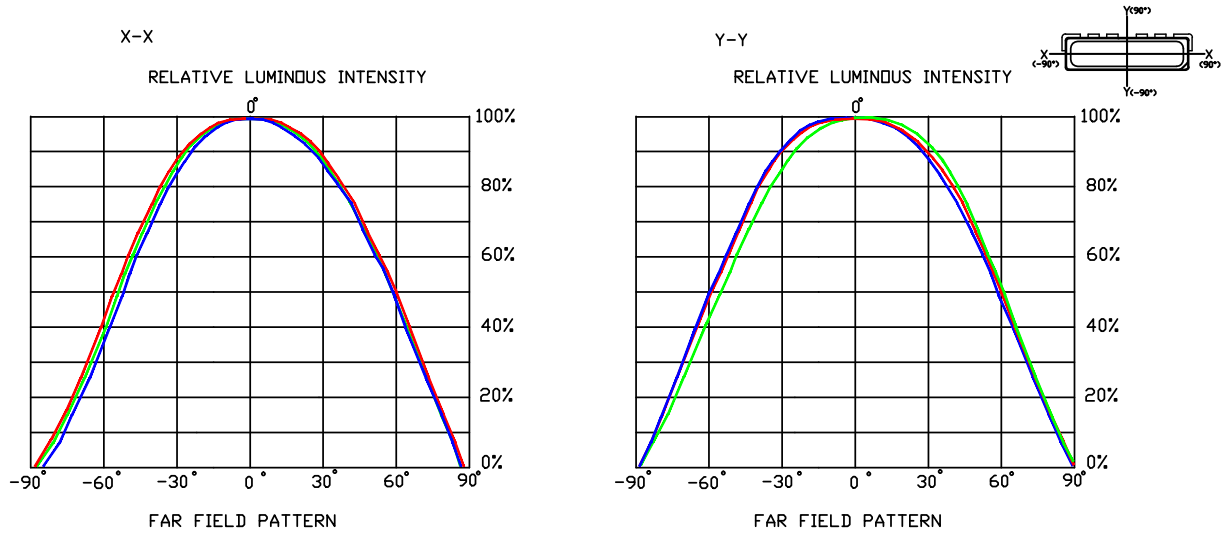

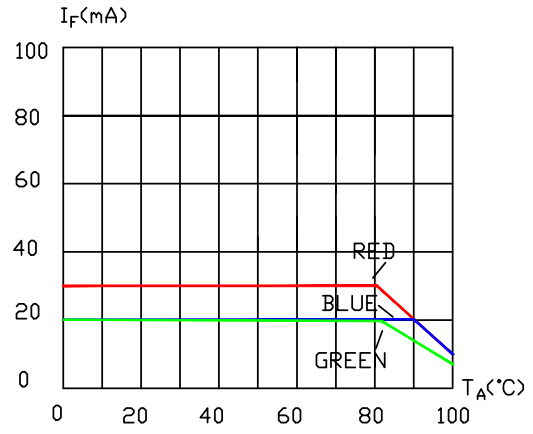RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

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.

X–X
RELATIVE LUMINOUS INTENSITY
FAR FIELD PATTERN

Y–Y
RELATIVE LUMINOUS INTENSITY
FAR FIELD PATTERN

$I_F(mA)$

RED
BLUE
GREEN

$T_S(°C)$
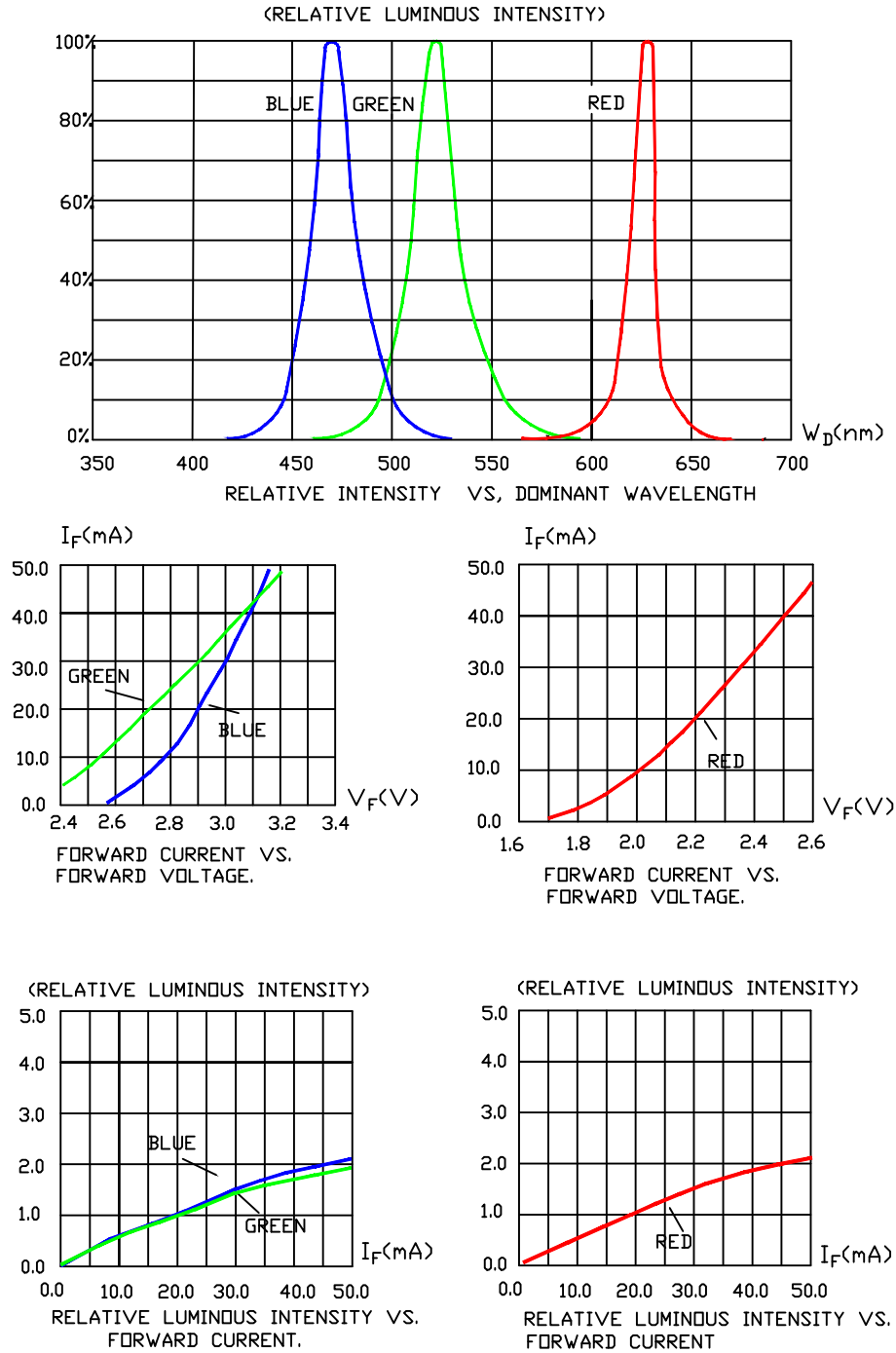
MAXIMUM FORWARD DC CURRENT
VS, SOLDER POINT TEMPERATURE.

$I_F(mA)$

RED
BLUE
GREEN

$T_A(°C)$

MAXIMUM FORWARD DC CURRENT
VS, AMBIENT POINT TEMPERATURE.

The graph shows the maximum allowable DC current for a LED die of each color.
(The above diagrams are valid for 1 chip on, 2 chips on or 3 chips on)

CAUTIONS

1. Cleaning

- When necessary, cleaning should occur only with isopropyl alcohol (IPA) at room temperature (25°C) 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 <40°C 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 < 30°C 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 80°C ±5°C 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.
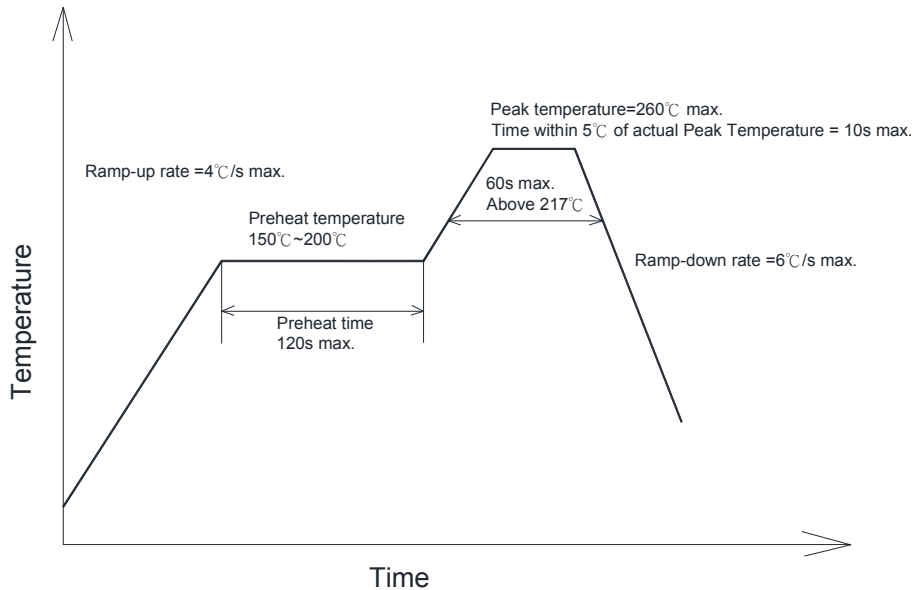
4. Soldering

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 315°C 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 40°C or less. This is to prevent SMD LED failures due to thermal-mechanical stress during handling.

CAUTIONS

b. Reflow Soldering

Temperature (top surface of the SMD LED) profile:

Peak temperature=260℃ max.
Time within 5℃ of actual Peak Temperature = 10s max.

Ramp-up rate =4℃/s max.

60s max.
Above 217℃

Preheat temperature
150℃~200℃

Ramp-down rate =6℃/s max.

Preheat time
120s max.

Temperature

Time

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:
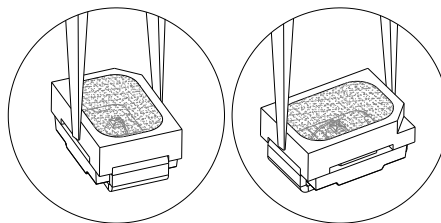
MECHANICAL DIMENSIONS

All dimensions are in mm.

Tolerance of measurement of the dimension is ±0.1.

BLUE ANODE ① ▷ ② BLUE CATHODE
RED ANODE ③ ▷ ④ RED CATHODE
GREEN ANODE ⑤ ▷ ⑥ GREEN CATHODE
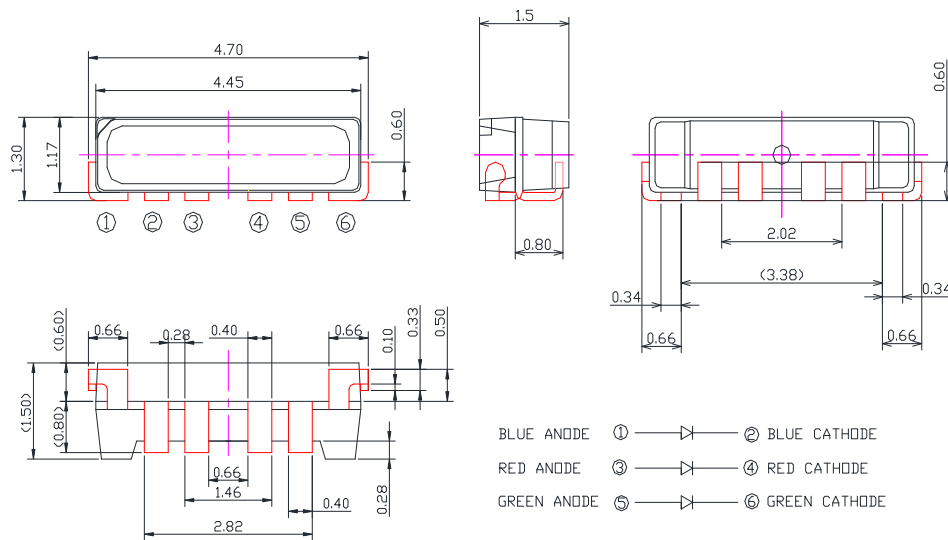
NOTES

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.
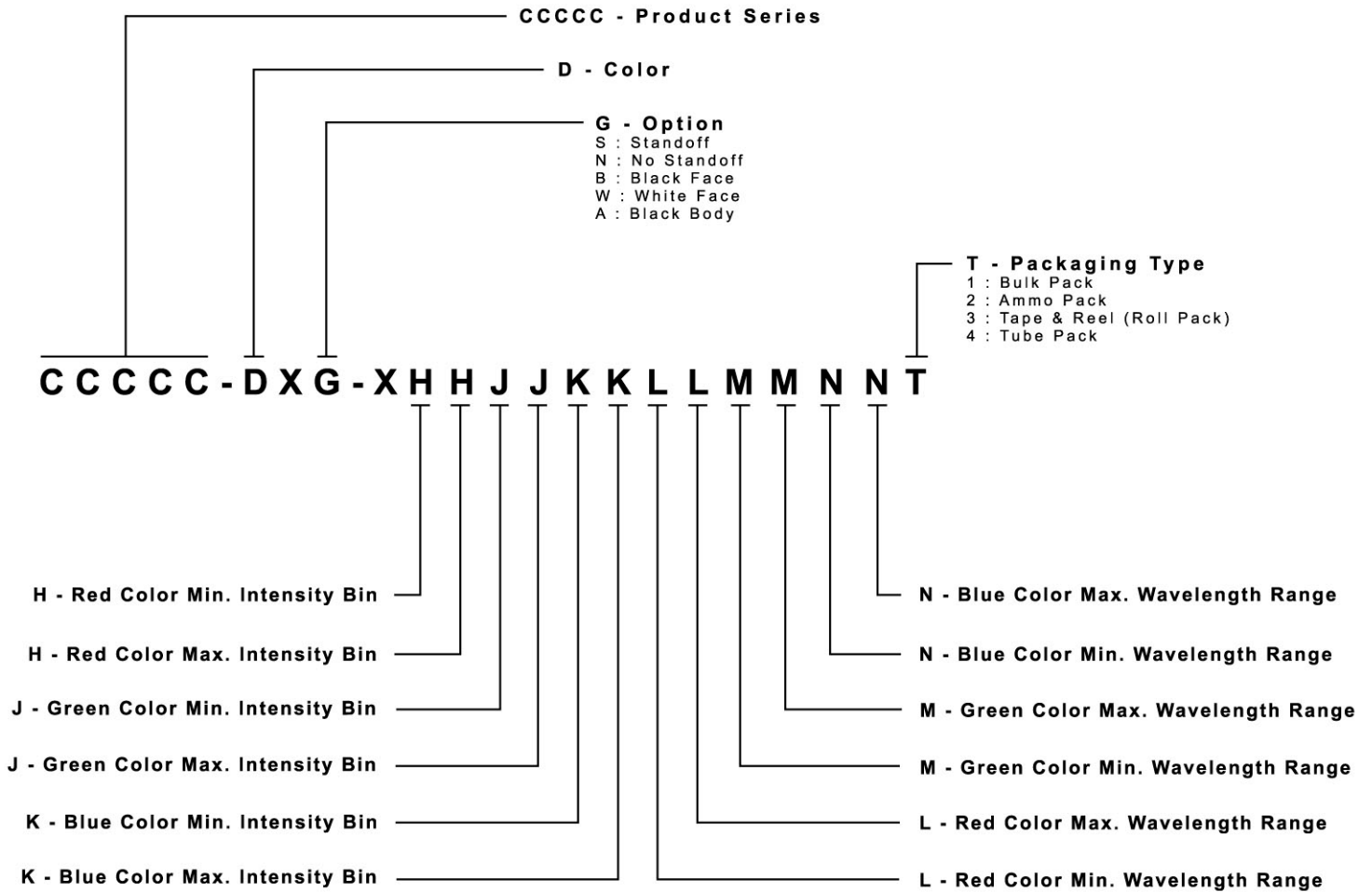
Vision Advisory

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:

CCCCC - Product Series

D - Color

G - Option
S : Standoff
N : No Standoff
B : Black Face
W : White Face
A : Black Body

T - Packaging Type
1 : Bulk Pack
2 : Ammo Pack
3 : Tape & Reel (Roll Pack)
4 : Tube Pack

C C C C C - D X G - X H H J J K K L L M M N N T

H - Red Color Min. Intensity Bin

H - Red Color Max. Intensity Bin

J - Green Color Min. Intensity Bin

J - Green Color Max. Intensity Bin

K - Blue Color Min. Intensity Bin

K - Blue Color Max. Intensity Bin

N - Blue Color Max. Wavelength Range

N - Blue Color Min. Wavelength Range

M - Green Color Max. Wavelength Range

M - Green Color Min. Wavelength Range

L - Red Color Max. Wavelength Range

L - Red Color Min. Wavelength Range

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.