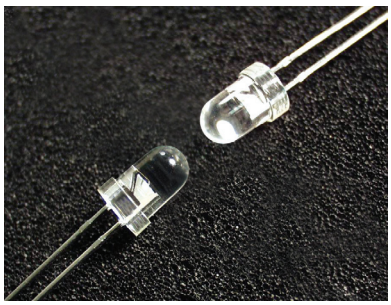
Cree® 5-mm Red and Amber Round LED C503B-RAS/RAN/AAS/AAN C503B-RBS/RBN/ABS/ABN C503B-RCS/RCN/ACS/ACN



PRODUCT DESCRIPTION

Round LEDs offer superior light output for excellent readability in sunlight and dependable performance. They provide extremely stable light output over long periods of time.

These lamps are made with an advanced optical-grade epoxy offering superior high-temperature and high-moisture-resistance performance in outdoor signal and sign applications.

FEATURES

- Size (mm): 5
- Color and Typical Dominant Wavelength:
  Red (624nm)
  Amber(591nm)
- Luminous Intensity (mcd)
  C503B-RAS/RAN:
  (8200 - 32900)
  C503B-RBS/RBN:
  (3000 - 12000)
  C503B-RCS/RCN:
  (3000 - 12000)
  C503B-AAS/AAN:
  (5860 - 23500)
  C503B-ABS/ABN:
  (3000 - 12000)
  C503B-ACS/ACN:
  (4180 - 12000)
- Viewing angle:
  C503B-RAS/RAN/AAS/AAN:
  15 degree
  C503B-RBS/RBN/ABS/ABN:
  23 degree
  C503B-RCS/RCN/ACS/ACN:
  30 degree
- Lead - Free
- RoHS Compliant

APPLICATIONS

- Electronic Signs & Signals (ESS)
- Motorway Signs
- Variable Message Sign (VMS)
- Advertising signs
- Petrol Signs
- Amusement

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sales@prom-elec.com / ООО ПРОМЭЛЕКТРОНИКА

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Items	Symbol	Absolute Maximum Rating	Unit
		Red/Amber	
Forward Current	I_F	50 Note1	mA
Peak Forward Current Note2	I_{FP}	200	mA
Reverse Voltage	V_R	5	V
Power Dissipation	P_D	130	mW
Operation Temperature	T_{opr}	-40 ~ +100	°C
Storage Temperature	T_{stg}	-40 ~ +100	°C
Lead Soldering Temperature	T_{sol}	Max. 260°C for 3 sec. max. (3 mm from the base of the epoxy bulb)	
Electrostatic Discharge Classification (MIL-STD-883E)	ESD	Class 2	

Note:
1. For long term performance the drive currents between 10mA and 30mA are recommended. Please contact CREE sales representative for more information on recommended drive conditions.
2. Pulse width ≤0.1 msec, duty ≤1/10.

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

Characteristics	Color		Symbol	Condition	Unit	Minimum	Typical	Maximum
Forward Voltage	Red/Amber		V_F	I_F = 20 mA	V		2.1	2.6
Reverse Current	Red/Amber		I_R	V_R = 5 V	μA			100
Dominant Wavelength	Red		λ_D	I_F = 20 mA	nm	618	624	630
	Amber		λ_D	I_F = 20 mA	nm	584	591	596
Luminous Intensity	Red	C503B-RAS/RAN (15 degree)	I_V	I_F = 20 mA	mcd	8200	15000	
		C503B-RBS/RBN (23 degree)	I_V	I_F = 20 mA	mcd	3000	5000	
		C503B-RCS/RCN (30 degree)	I_V	I_F = 20 mA	mcd	3000	5100	
	Amber	C503B-AAS/AAN (15 degree)	I_V	I_F = 20 mA	mcd	5860	13000	
		C503B-ABS/ABN (23 degree)	I_V	I_F = 20 mA	mcd	3000	5000	
		C503B-ACS/ACN (30 degree)	I_V	I_F = 20 mA	mcd	4180	6000	
50% Power Angle	C503B-RAS/RAN/AAS/AAN		2θ½	I_F = 20 mA	deg		15	
	C503B-RBS/RBN/ABS/ABN		2θ½	I_F = 20 mA	deg		23	
	C503B-RCS/RCN/ACS/ACN		2θ½	I_F = 20 mA	deg		30	

Note: Continuous reverse voltage can cause LED damage.

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INTENSITY BIN LIMIT (I_F = 20 mA)

Red

C503B-RAS/RAN (15 degree)

Bin Code	Min. (mcd)	Max. (mcd)
Z0	8200	12000
A0	12000	16800
B0	16800	23500
C0	23500	32900

C503B-RBS/RBN (23 degree)

Bin Code	Min. (mcd)	Max. (mcd)
W0	3000	4180
X0	4180	5860
Y0	5860	8200
Z0	8200	12000

C503B-RCS/RCN (30 degree)

Bin Code	Min. (mcd)	Max. (mcd)
W0	3000	4180
X0	4180	5860
Y0	5860	8200
Z0	8200	12000

Amber

C503B-AAS/AAN (15 degree)

Bin Code	Min. (mcd)	Max. (mcd)
Y0	5860	8200
Z0	8200	12000
A0	12000	16800
B0	16800	23500

C503B-ABS/ABN (23 degree)

Bin Code	Min. (mcd)	Max. (mcd)
W0	3000	4180
X0	4180	5860
Y0	5860	8200
Z0	8200	12000

C503B-ACS/ACN (30 degree)

Bin Code	Min. (mcd)	Max. (mcd)
X0	4180	5860
Y0	5860	8200
Z0	8200	12000

- Tolerance of measurement of luminous intensity is ±15%

COLOR BIN LIMIT (I_F = 20 mA)

Red

Bin Code	Min. (nm)	Max. (nm)
RA	618	630

Amber

Bin Code	Min. (nm)	Max. (nm)
A2	584	587
A3	587	590
A4	590	593
A5	593	596

- Tolerance of measurement of dominant wavelength is ±1 nm

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ORDER CODE TABLE*

Red (15 degree)

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Dominant Wavelength				Package	Standoff
			Min.	Max.	Color Bin	Min. (nm)	Color Bin	Max. (nm)		
Red	C503B-RAS-CZ0C0AA1	15	8200	32900	RA	618	RA	630	Bulk	Yes
Red	C503B-RAS-CA0C0AA1	15	12000	32900	RA	618	RA	630	Bulk	Yes
Red	C503B-RAS-CA0B0AA1	15	12000	23500	RA	618	RA	630	Bulk	Yes
Red	C503B-RAN-CZ0C0AA1	15	8200	32900	RA	618	RA	630	Bulk	No
Red	C503B-RAN-CA0C0AA1	15	12000	32900	RA	618	RA	630	Bulk	No
Red	C503B-RAN-CA0B0AA1	15	12000	23500	RA	618	RA	630	Bulk	No
Red	C503B-RAS-CZ0C0AA2	15	8200	32900	RA	618	RA	630	Ammo	Yes
Red	C503B-RAS-CA0C0AA2	15	12000	32900	RA	618	RA	630	Ammo	Yes
Red	C503B-RAS-CA0B0AA2	15	12000	23500	RA	618	RA	630	Ammo	Yes
Red	C503B-RAN-CZ0C0AA2	15	8200	32900	RA	618	RA	630	Ammo	No
Red	C503B-RAN-CA0C0AA2	15	12000	32900	RA	618	RA	630	Ammo	No
Red	C503B-RAN-CA0B0AA2	15	12000	23500	RA	618	RA	630	Ammo	No

Red (23 degree)

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Dominant Wavelength				Package	Standoff
			Min.	Max.	Color Bin	Min. (nm)	Color Bin	Max. (nm)		
Red	C503B-RBS-CW0Z0AA1	23	3000	12000	RA	618	RA	630	Bulk	Yes
Red	C503B-RBS-CX0Y0AA1	23	4180	8200	RA	618	RA	630	Bulk	Yes
Red	C503B-RBS-CY0Z0AA1	23	5860	12000	RA	618	RA	630	Bulk	Yes
Red	C503B-RBN-CW0Z0AA1	23	3000	12000	RA	618	RA	630	Bulk	No
Red	C503B-RBN-CX0Y0AA1	23	4180	8200	RA	618	RA	630	Bulk	No
Red	C503B-RBN-CY0Z0AA1	23	5860	12000	RA	618	RA	630	Bulk	No
Red	C503B-RBS-CW0Z0AA2	23	3000	12000	RA	618	RA	630	Ammo	Yes
Red	C503B-RBS-CX0Y0AA2	23	4180	8200	RA	618	RA	630	Ammo	Yes
Red	C503B-RBS-CY0Z0AA2	23	5860	12000	RA	618	RA	630	Ammo	Yes
Red	C503B-RBN-CW0Z0AA2	23	3000	12000	RA	618	RA	630	Ammo	No
Red	C503B-RBN-CX0Y0AA2	23	4180	8200	RA	618	RA	630	Ammo	No
Red	C503B-RBN-CY0Z0AA2	23	5860	12000	RA	618	RA	630	Ammo	No

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Red (30 degree)

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Dominant Wavelength				Package	Standoff
			Min.	Max.	Color Bin	Min. (nm)	Color Bin	Max. (nm)		
Red	C503B-RCS-CW0Z0AA1	30	3000	12000	RA	618	RA	630	Bulk	Yes
Red	C503B-RCS-CW0X0AA1	30	3000	5860	RA	618	RA	630	Bulk	Yes
Red	C503B-RCS-CX0Y0AA1	30	4180	8200	RA	618	RA	630	Bulk	Yes
Red	C503B-RCN-CW0Z0AA1	30	3000	12000	RA	618	RA	630	Bulk	No
Red	C503B-RCN-CW0X0AA1	30	3000	5860	RA	618	RA	630	Bulk	No
Red	C503B-RCN-CX0Y0AA1	30	4180	8200	RA	618	RA	630	Bulk	No
Red	C503B-RCS-CW0Z0AA2	30	3000	12000	RA	618	RA	630	Ammo	Yes
Red	C503B-RCS-CW0X0AA2	30	3000	5860	RA	618	RA	630	Ammo	Yes
Red	C503B-RCS-CX0Y0AA2	30	4180	8200	RA	618	RA	630	Ammo	Yes
Red	C503B-RCN-CW0Z0AA2	30	3000	12000	RA	618	RA	630	Ammo	No
Red	C503B-RCN-CW0X0AA2	30	3000	5860	RA	618	RA	630	Ammo	No
Red	C503B-RCN-CX0Y0AA2	30	4180	8200	RA	618	RA	630	Ammo	No

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Amber (15 degree)

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Dominant Wavelength				Package	Standoff
			Min.	Max.	Color Bin	Min. (nm)	Color Bin	Max. (nm)		
Amber	C503B-AAS-CY0B0251	15	5860	23500	A2	584	A5	596	Bulk	Yes
Amber	C503B-AAS-CZ0B0341	15	8200	23500	A3	587	A4	593	Bulk	Yes
Amber	C503B-AAS-CA0B0341	15	12000	23500	A3	587	A4	593	Bulk	Yes
Amber	C503B-AAN-CY0B0251	15	5860	23500	A2	584	A5	596	Bulk	No
Amber	C503B-AAN-CZ0B0341	15	8200	23500	A3	587	A4	593	Bulk	No
Amber	C503B-AAN-CA0B0341	15	12000	23500	A3	587	A4	593	Bulk	No
Amber	C503B-AAS-CY0B0252	15	5860	23500	A2	584	A5	596	Ammo	Yes
Amber	C503B-AAS-CZ0B0342	15	8200	23500	A3	587	A4	593	Ammo	Yes
Amber	C503B-AAS-CA0B0342	15	12000	23500	A3	587	A4	593	Ammo	Yes
Amber	C503B-AAN-CY0B0252	15	5860	23500	A2	584	A5	596	Ammo	No
Amber	C503B-AAN-CZ0B0342	15	8200	23500	A3	587	A4	593	Ammo	No
Amber	C503B-AAN-CA0B0342	15	12000	23500	A3	587	A4	593	Ammo	No

Amber (23 degree)

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Dominant Wavelength				Package	Standoff
			Min.	Max.	Color Bin	Min. (nm)	Color Bin	Max. (nm)		
Amber	C503B-ABS-CW0Z0251	23	3000	12000	A2	584	A5	596	Bulk	Yes
Amber	C503B-ABS-CX0Y0341	23	4180	8200	A3	587	A4	593	Bulk	Yes
Amber	C503B-ABS-CY0Z0341	23	5860	12000	A3	587	A4	593	Bulk	Yes
Amber	C503B-ABN-CW0Z0251	23	3000	12000	A2	584	A5	596	Bulk	No
Amber	C503B-ABN-CX0Y0341	23	4180	8200	A3	587	A4	593	Bulk	No
Amber	C503B-ABN-CY0Z0341	23	5860	12000	A3	587	A4	593	Bulk	No
Amber	C503B-ABS-CW0Z0252	23	3000	12000	A2	584	A5	596	Ammo	Yes
Amber	C503B-ABS-CX0Y0342	23	4180	8200	A3	587	A4	593	Ammo	Yes
Amber	C503B-ABS-CY0Z0342	23	5860	12000	A3	587	A4	593	Ammo	Yes
Amber	C503B-ABN-CW0Z0252	23	3000	12000	A2	584	A5	596	Ammo	No
Amber	C503B-ABN-CX0Y0342	23	4180	8200	A3	587	A4	593	Ammo	No
Amber	C503B-ABN-CY0Z0342	23	5860	12000	A3	587	A4	593	Ammo	No

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Amber (30 degree)

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Dominant Wavelength				Package	Standoff
			Min.	Max.	Color Bin	Min. (nm)	Color Bin	Max. (nm)		
Amber	C503B-ACS-CX0Z0251	30	4180	12000	A2	584	A5	596	Bulk	Yes
Amber	C503B-ACS-CX0Z0341	30	4180	12000	A3	587	A4	593	Bulk	Yes
Amber	C503B-ACS-CX0Y0251	30	4180	8200	A2	584	A5	596	Bulk	Yes
Amber	C503B-ACS-CX0Y0341	30	4180	8200	A3	587	A4	593	Bulk	Yes
Amber	C503B-ACS-CY0Z0251	30	5860	12000	A2	584	A5	596	Bulk	Yes
Amber	C503B-ACS-CY0Z0341	30	5860	12000	A3	587	A4	593	Bulk	Yes
Amber	C503B-ACN-CX0Z0251	30	4180	12000	A2	584	A5	596	Bulk	No
Amber	C503B-ACN-CX0Z0341	30	4180	12000	A3	587	A4	593	Bulk	No
Amber	C503B-ACN-CX0Y0251	30	4180	8200	A2	584	A5	596	Bulk	No
Amber	C503B-ACN-CX0Y0341	30	4180	8200	A3	587	A4	593	Bulk	No
Amber	C503B-ACN-CY0Z0251	30	5860	12000	A2	584	A5	596	Bulk	No
Amber	C503B-ACN-CY0Z0341	30	5860	12000	A3	587	A4	593	Bulk	No
Amber	C503B-ACS-CX0Z0252	30	4180	12000	A2	584	A5	596	Ammo	Yes
Amber	C503B-ACS-CX0Z0342	30	4180	12000	A3	587	A4	593	Ammo	Yes
Amber	C503B-ACS-CX0Y0252	30	4180	8200	A2	584	A5	596	Ammo	Yes
Amber	C503B-ACS-CX0Y0342	30	4180	8200	A3	587	A4	593	Ammo	Yes
Amber	C503B-ACS-CY0Z0252	30	5860	12000	A2	584	A5	596	Ammo	Yes
Amber	C503B-ACS-CY0Z0342	30	5860	12000	A3	587	A4	593	Ammo	Yes
Amber	C503B-ACN-CX0Z0252	30	4180	12000	A2	584	A5	596	Ammo	No
Amber	C503B-ACN-CX0Z0342	30	4180	12000	A3	587	A4	593	Ammo	No
Amber	C503B-ACN-CX0Y0252	30	4180	8200	A2	584	A5	596	Ammo	No
Amber	C503B-ACN-CX0Y0342	30	4180	8200	A3	587	A4	593	Ammo	No
Amber	C503B-ACN-CY0Z0252	30	5860	12000	A2	584	A5	596	Ammo	No
Amber	C503B-ACN-CY0Z0342	30	5860	12000	A3	587	A4	593	Ammo	No

Notes:
1. 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.
2. Please refer to the "Cree LED Lamp Reliability Test Standards" document [#1] for reliability test conditions.
3. 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

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GRAPHS

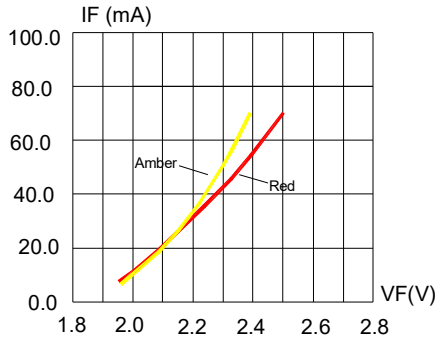

FIG.1 FORWARD CURRENT VS. FORWARD VOLTAGE.

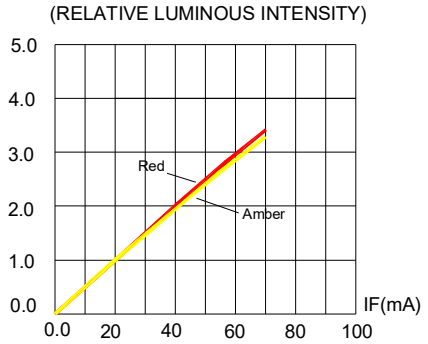

FIG.2 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

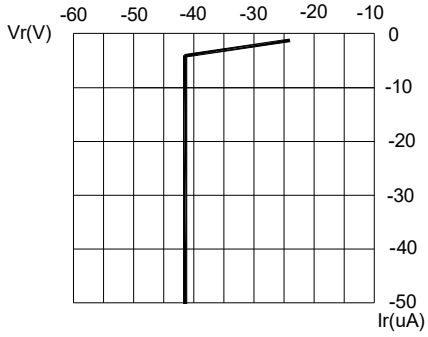

FIG.3 RED & AMBER REVERSE CURRENT VS. REVERSE VOLTAGE.

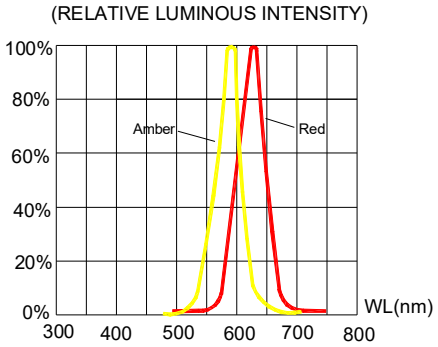

FIG.4 RELATIVE LUMINOUS INTENSITY VS. WAVELENGTH.

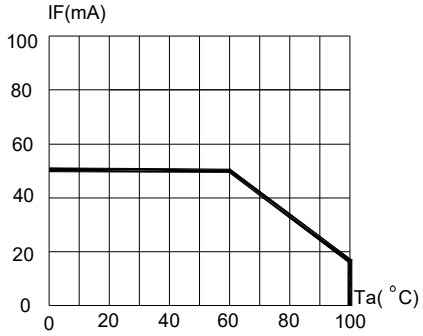

FIG.5 RED & AMBER MAXIMUM FORWARD DC CURRENT VS AMBIENT TEMPERATURE (Tjmax=110°C)

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.

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GRAPHS

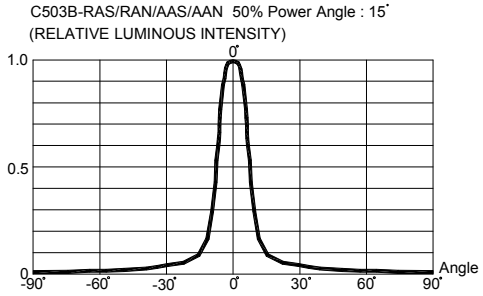

FIG.6 FAR FIELD PATTERN

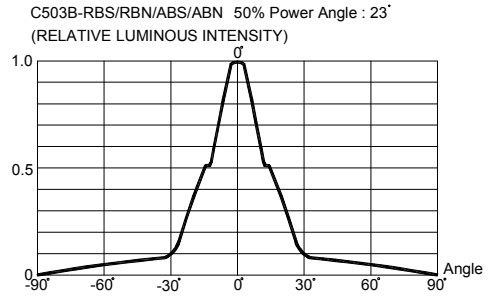

FIG.7 FAR FIELD PATTERN

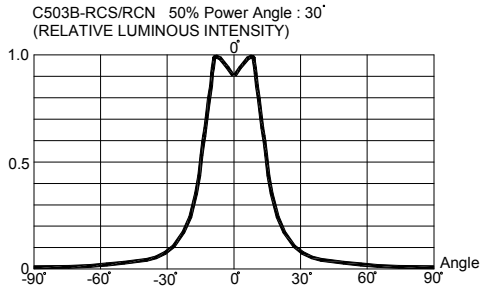

FIG.8 FAR FIELD PATTERN

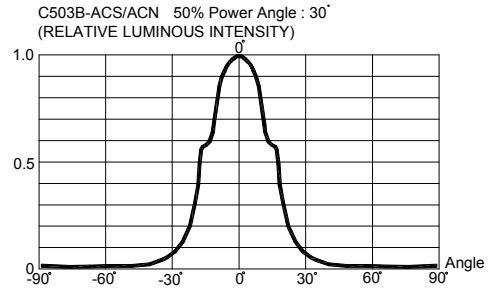

FIG.9 FAR FIELD PATTERN

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.

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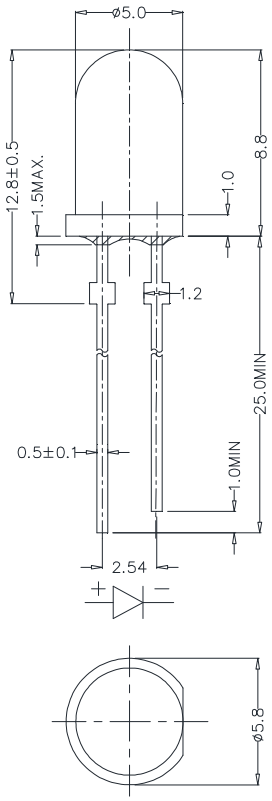
MECHANICAL DIMENSIONS

All dimensions are in mm. Tolerance is ±0.25 mm unless otherwise noted.

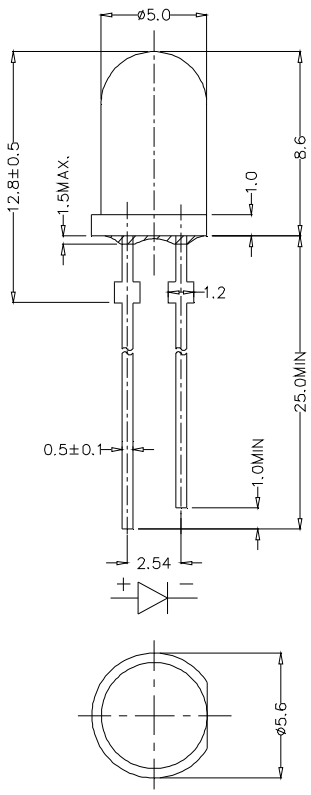
An epoxy meniscus may extend about 1.5 mm down the leads.

Burr around bottom of epoxy may be 0.5 mm max.

C503B-RAS/AAS:



C503B-RBS/ABS:



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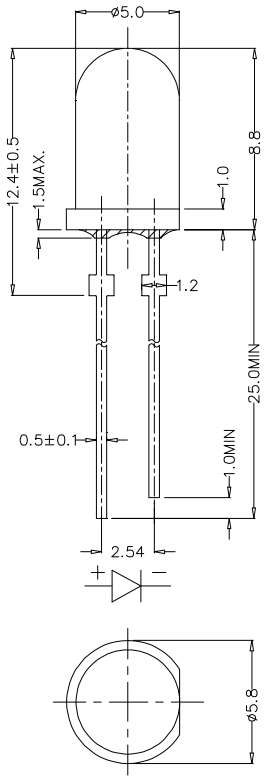

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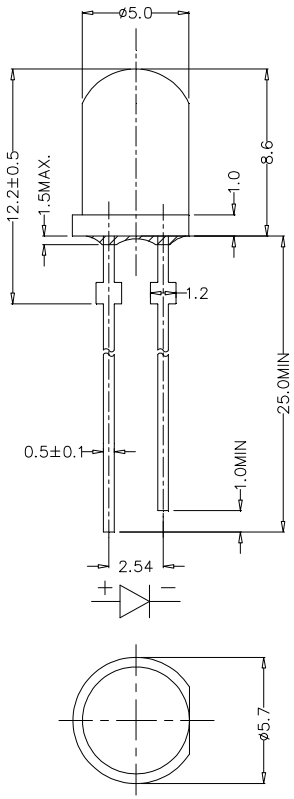

NOTES

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 by EU member states on January 2, 2013 and amended on March 31, 2015 by EU Directive 2015/863/EU.

RoHS Declarations for this product can be obtained from your Cree representative or from the Product Ecology section of the Cree website.

Vision Advisory Claim

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

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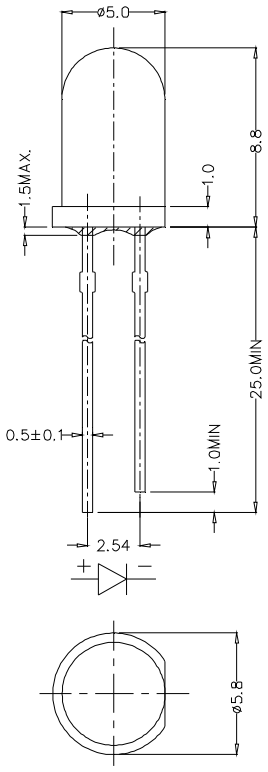
MECHANICAL DIMENSIONS

All dimensions are in mm. Tolerance is ±0.25 mm unless otherwise noted.

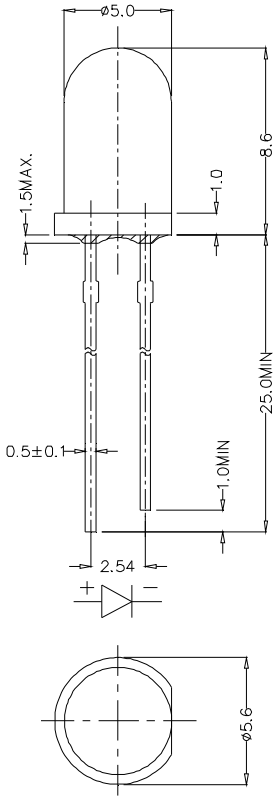
An epoxy meniscus may extend about 1.5 mm down the leads.

Burr around bottom of epoxy may be 0.5 mm max.

C503B-RAN/AAN/RCN:



C503B-RBN/ABN:



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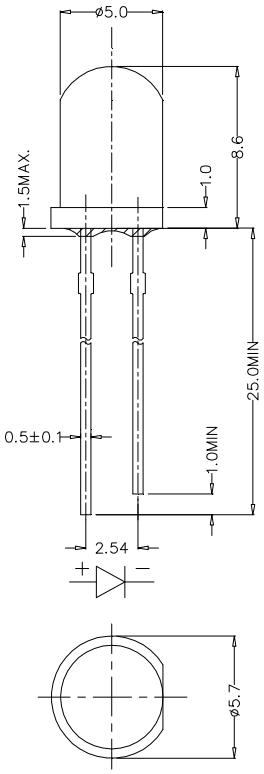

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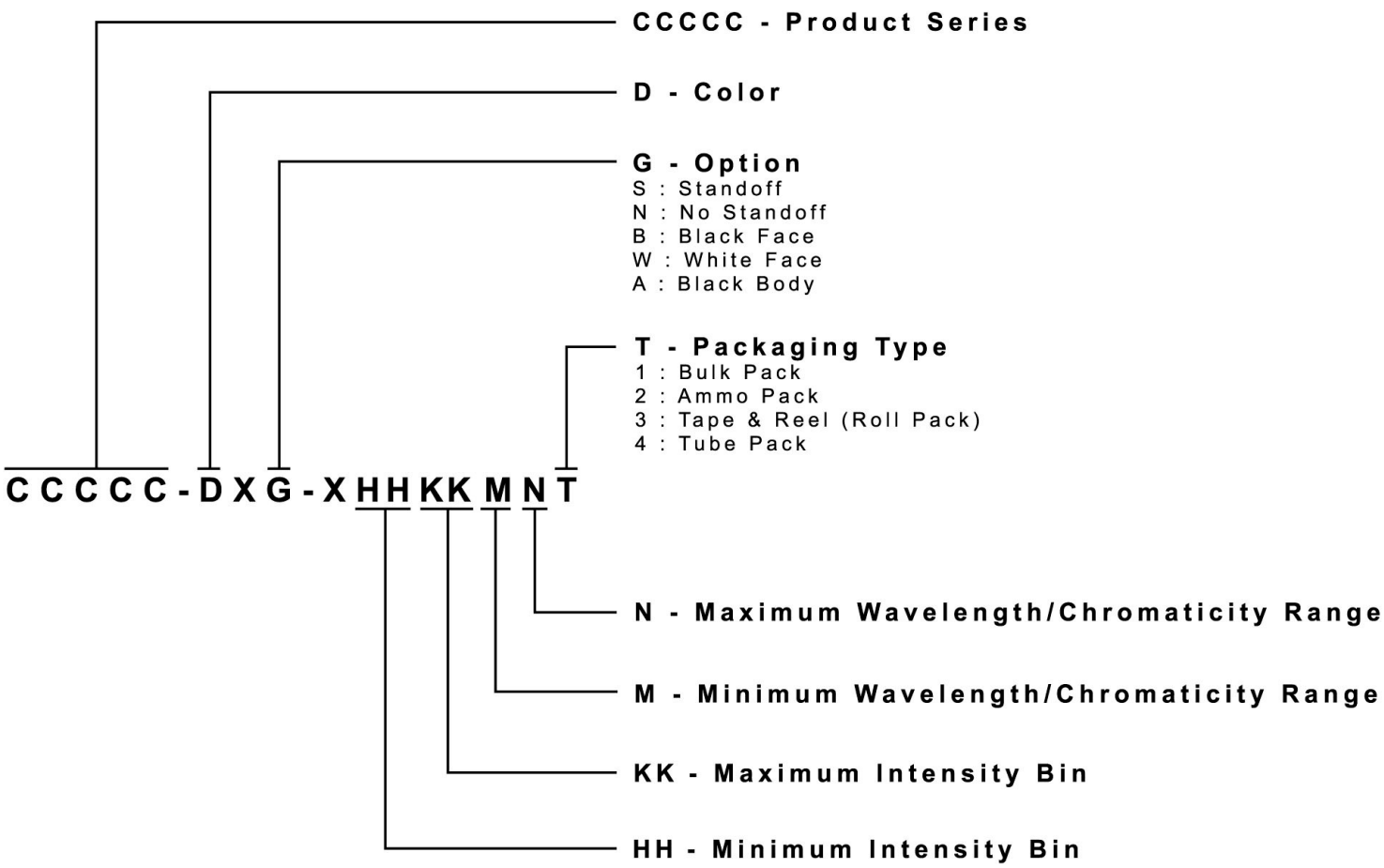
KIT NUMBER SYSTEM

All dimensions in mm.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:



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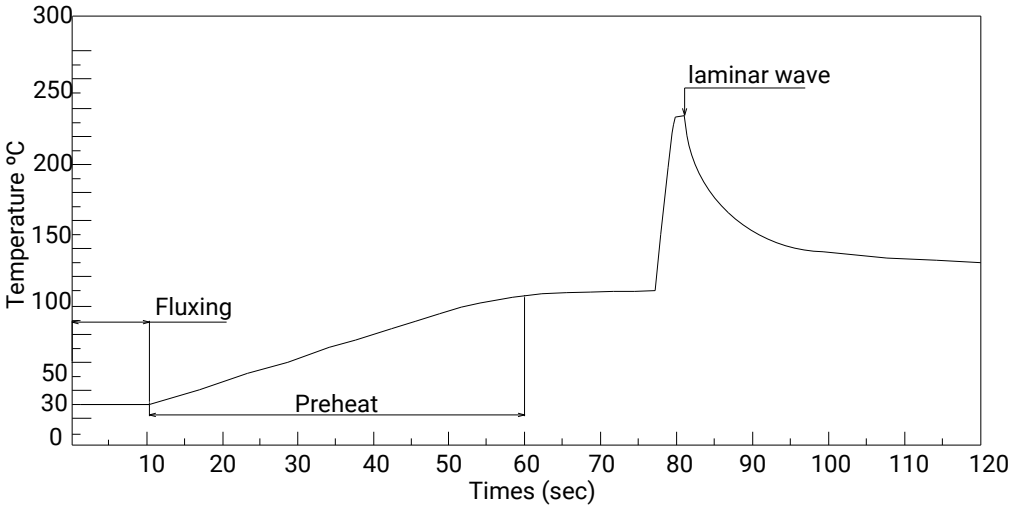
REFLOW SOLDERING

The LED soldering specification is shown below(suitable for both leaded solder & lead-free solder):

Manual Soldering		Solder Dipping	
Soldering iron	35 W max	Preheat	110 ºC max
Temperature	300 ºC max	Preheat time	60 seconds max
		Solder-bath temperature	260 ºC Max
Soldering time	3 seconds max	Dipping time	5 seconds max
Position	Not less than 3 mm from the base of the package.	Position	Not less than 3 mm from the base of the package.

• Manual soldering onto the PCB is not recommended because soldering time is uncontrollable.
• The recommended wave soldering is as below:



- Do not apply any stress to the LED package, particularly when heated.
- Only bottom preheat is suggested & should not preheat on top in order to reduce thermal stress experienced by the LEDs.
- The LEDs must not be re used once they have been extracted from PCB.
- After soldering the LEDs, the package should be protected from mechanical shock or vibration until the LEDs have reached 40 ºC or below.
- Precautions must be taken as mechanical stress on the LEDs may be caused by PCB warpage or from the clinching and cutting of the LED leads.
- When it is necessary to clam the LEDs during soldering, it is important to ensure no mechanical stress is exerted on the LEDs.
- Cut the LED lead at normal room temperature. Lead cutting at high temperature may cause failure of the LEDs.

Refer to "http://www.cree.com/led-components/media/documents/sh-HB.pdf" for soldering & handling details.

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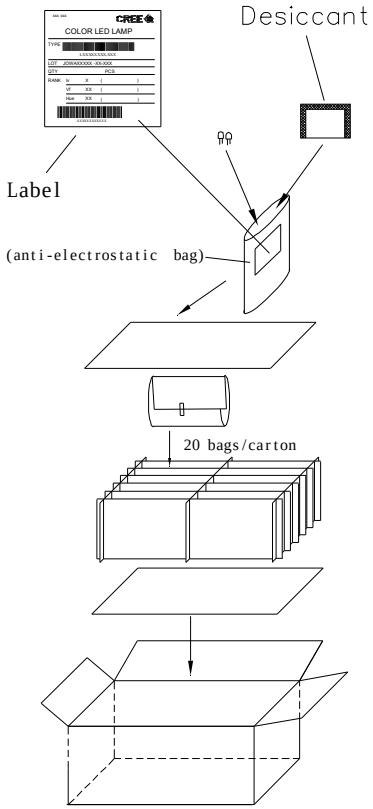
PACKAGING

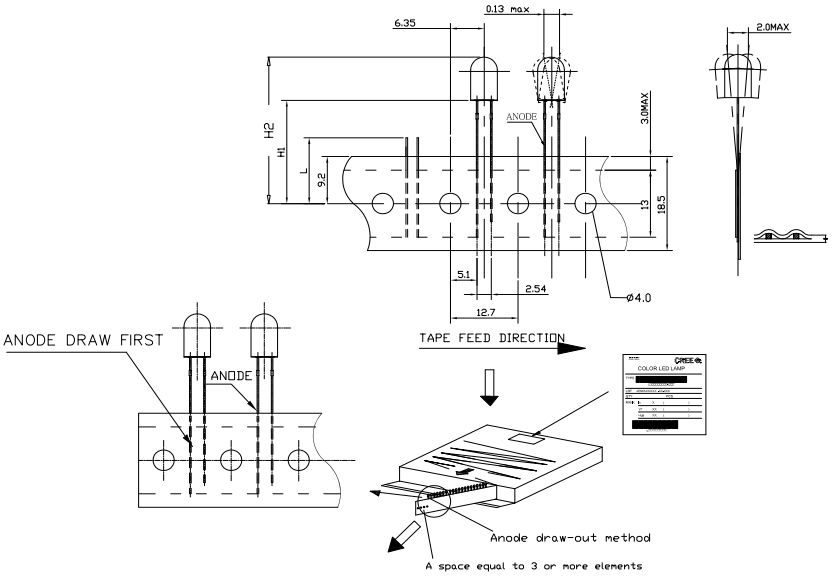
Features:

- 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 shock during transportation.
- The boxes are not water resistant, and they must be kept away from water and moisture.
- The Bulk Pack types of packaging.
- Max 500 pcs per bulk and Max 2500 pcs per ammo.

Bulk Pack Packaging Type:



Ammo Pack Packaging Type:



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