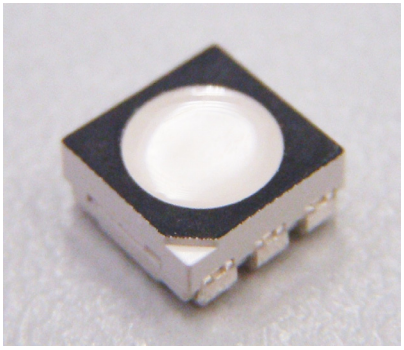
Cree® PLCC6 3 in 1 SMD LED CLV6A-FKB

Data Sheet

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 outdoor signage applications.

The encapsulation resin contains UV inhibitors to minimize the effects of long-term exposure to direct sunlight, resulting in stable light output over the life of the LED.



FEATURES

- Size (mm): 5.5 x 5.5
- Dominant Wavelength (nm):
  Red (619-624)
  Green (520-540)
  Blue (460-480)
- Luminous Intensity (mcd)
  Red (560 - 1120)
  Green (1120 - 2240)
  Blue (280 - 560)
- Water-Resistant (IPX5*)
- Moisture Sensitivity Level: 3
- Lead-Free
- RoHS Compliant

APPLICATIONS

- Outdoor Full-Color Video Screen
- Decorative lighting
- Amusement

* This part is tested under the condition of assembling it on a PCB with isolating the electrical path by silicone.

Absolute Maximum Ratings (T_A = 25°C)

Items	Symbol	Absolute Maximum Rating			Unit
		R	G	B	
Forward Current Note 1	I_F	50	35	35	mA
Peak Forward Current Note 2	I_{FP}	200	100	100	mA
Reverse Voltage	V_R	5	5	5	V
Power Dissipation	P_D	130	140	140	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/ambient 3 chips on	R_{THJA}	650	580	680	°C/W
Junction/solder point 1 chip on	R_{THJS}	230	230	200	°C/W
Junction/solder point 3 chips on	R_{THJS}	230	230	200	°C/W
Electrostatic Discharge Classification(MIL-STD-883E)	ESD	1000 V			

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	
Wavelength at peak emission	I_F = 20 mA	λ_{PEAK}	630	527	470	nm
Dominant Wavelength	I_F = 20 mA	λ_{DOM}	619~624	520~540	460~480	nm
Spectral bandwidth at 50% I_{REL} max	I_F = 20 mA	Δ λ	24	38	28	nm
Viewing Angle at 50% I_V	I_F = 20 mA	2θ½	120	120	120	deg
Forward Voltage	I_F = 20 mA	$V_{F(avg)}$	2.0	3.2	3.2	V
		$V_{F(max)}$	2.6	4.0	4.0	V
Luminous Intensity	I_F = 20 mA	$I_{V(min)}$	560	1120	280	mcd
		$I_{V(avg)}$	700	1600	400	mcd
Reverse Current (max)	V_R = 5 V	I_R	10	10	10	μA

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Intensity Bin Limit (I_F = 20 mA)

Red

Bin Code	Min. (mcd)	Max. (mcd)
K	560	710
M	710	900
N	900	1120

Green

Bin Code	Min. (mcd)	Max. (mcd)
P	1120	1400
Q	1400	1800
R	1800	2240

Blue

Bin Code	Min. (mcd)	Max. (mcd)
G	280	355
H	355	450
J	450	560

- Tolerance of measurement of luminous intensity is ±10%

Color Bin Limit (I_F = 20 mA)

Red

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

Green

Bin Code	Min.(nm)	Max.(nm)
G7	520	525
G8	525	530
G9	530	535
Ga	535	540

Blue

Bin Code	Min.(nm)	Max.(nm)
B3	460	465
B4	465	470
B5	470	475
B6	475	480

- Tolerance of measurement of dominant wavelength is ±1 nm

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Order Code Table*

Kit Number	Color	Luminous Intensity (mcd)		Dominant Wavelength (nm)				Package
		Min.	Max.	Color Bin	Min. (nm)	Color Bin	Max. (nm)	
CLV6A-FKB-CKNPRGJBB7a363	Red	560	1120	RB	619	RB	624	Reel
	Green	1120	2240	G7	520	Ga	540	Reel
	Blue	280	560	B3	460	B6	480	Reel
CLV6A-FKB-CK1P1G1BB7R3R3	Red	Any 1 Intensity bin from K(560) - N(1120)		RB	619	RB	624	Reel
	Green	Any 1 Intensity bin from P(1120) - R(2240)		Any 1 hue bin from G7(520) - Ga(540)				Reel
	Blue	Any 1 Intensity bin from G(280) - J(560)		Any 1 hue bin from B3(460) - B6(480)				Reel
CLV6A-FKB-CM1Q1H1BB7R3R3	Red	Any 1 Intensity bin from M(710) - N(1120)		RB	619	RB	624	Reel
	Green	Any 1 Intensity bin from Q(1400) - R(2240)		Any 1 hue bin from G7(520) - Ga(540)				Reel
	Blue	Any 1 Intensity bin from H(355) - J(560)		Any 1 hue bin from B3(460) - B6(480)				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 K - N means only 1 intensity-bin (K or M or N) will be shipped by Cree.
3. For example, any 1 color-bin from G7 - Ga means only 1 color-bin (G7 or G8 or G9 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.

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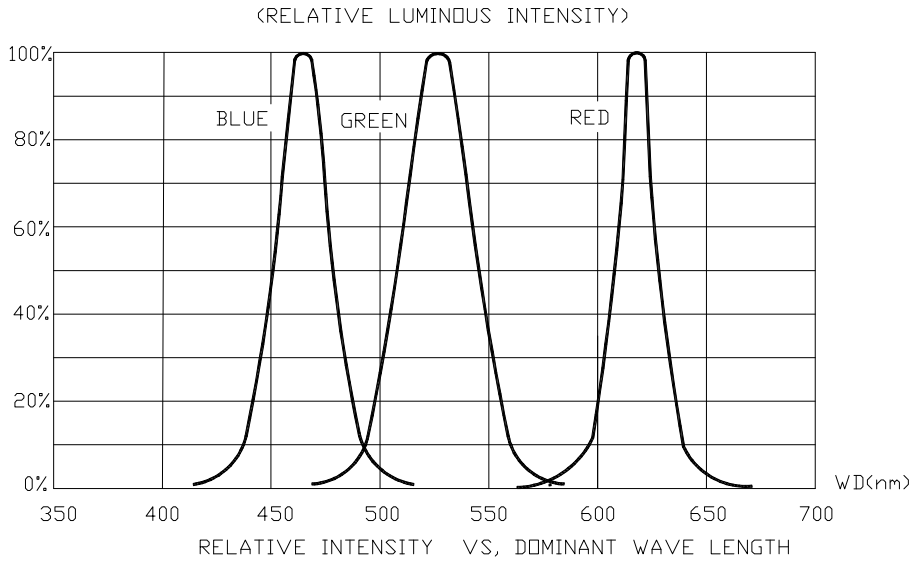
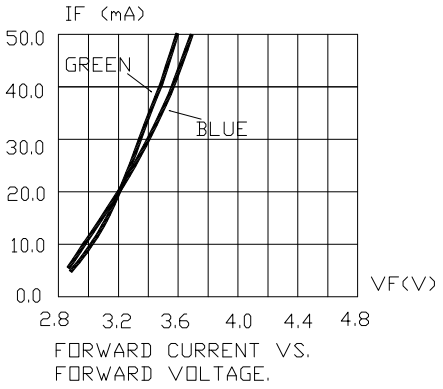
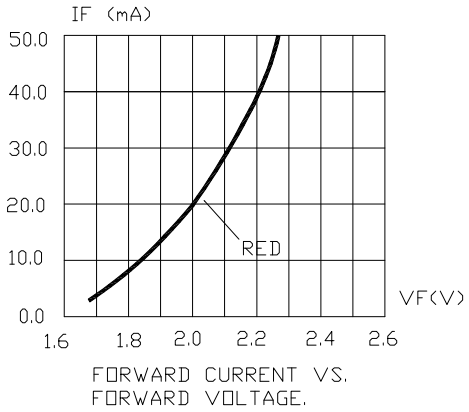
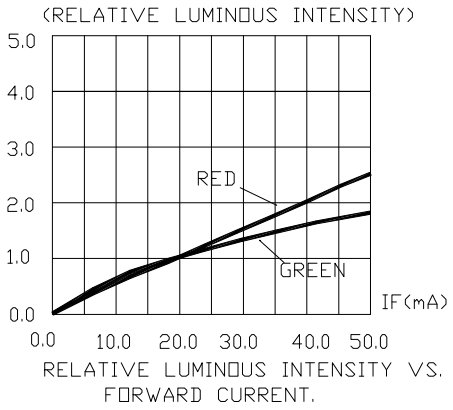
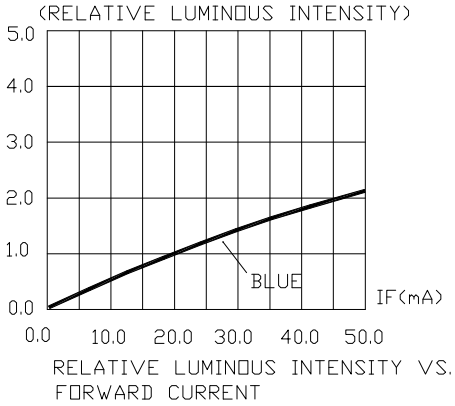
Graphs











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.

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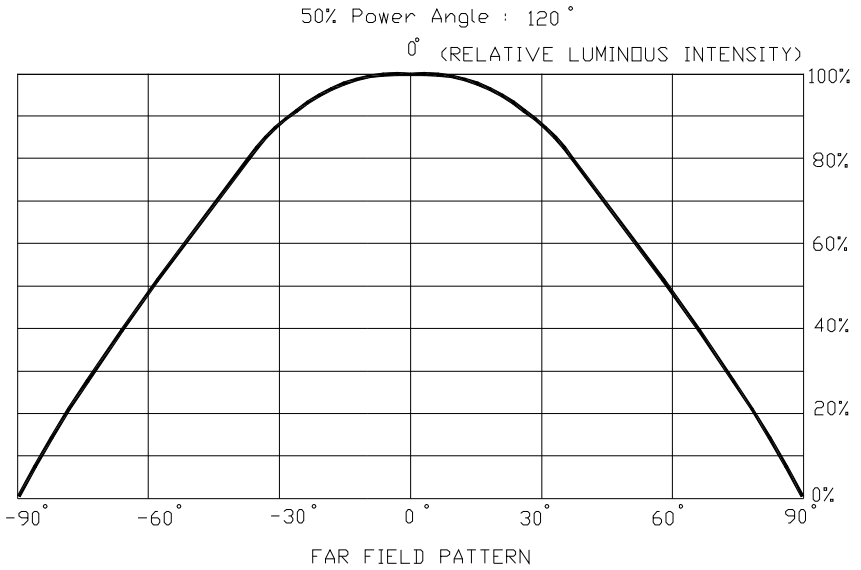
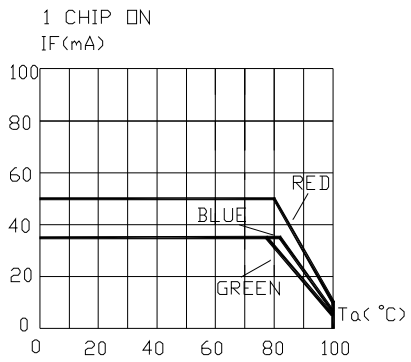
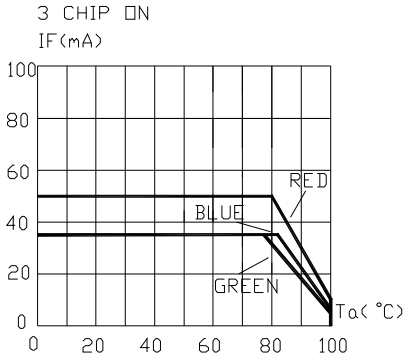


FAR FIELD PATTERN



MAXIMUM FORWARD DC CURRENT
VS, SOLDER POINT TEMPERATURE.



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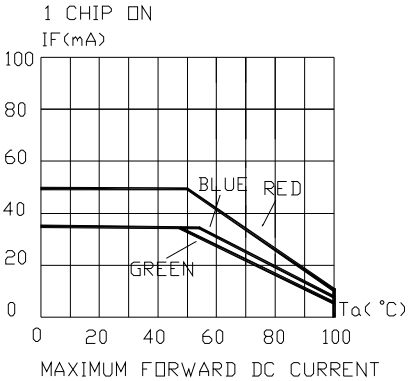
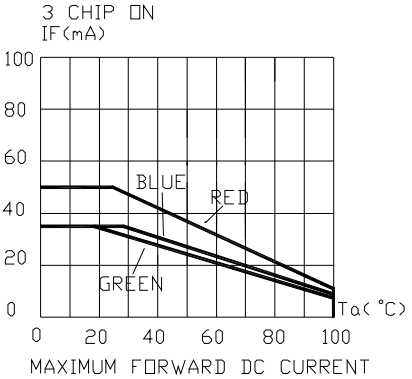


MAXIMUM FORWARD DC CURRENT
VS, AMBIENT TEMPERATURE.



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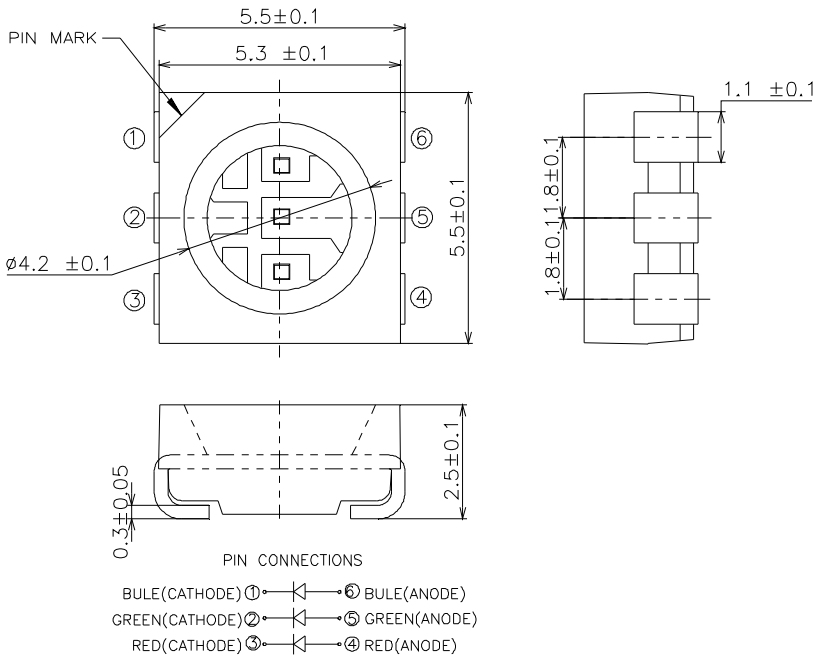
Mechanical Dimensions

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.

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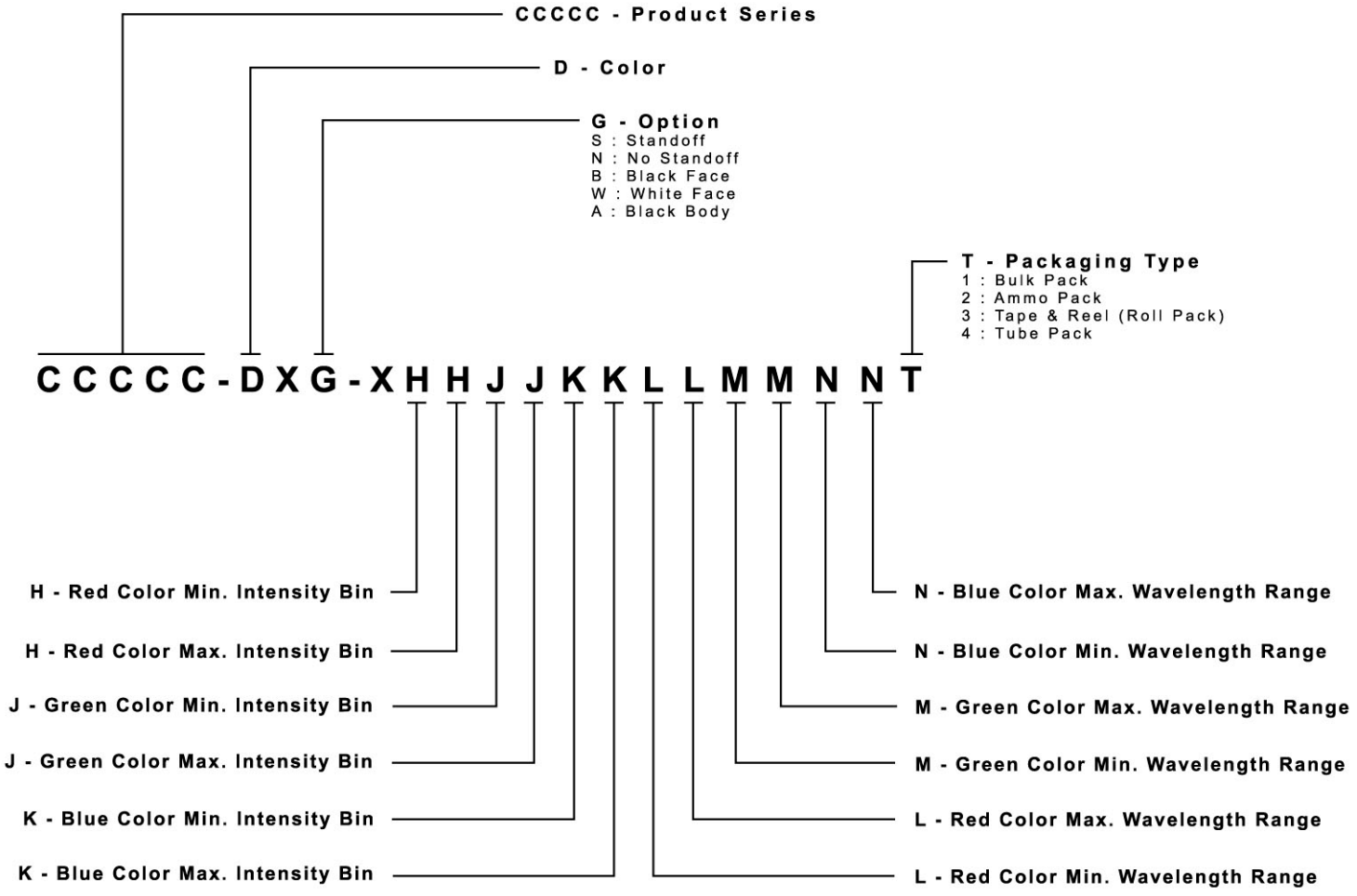
Kit Number System

Cree LED lamps are tested and sorted into performance bins. A bin is specified by ranges of color, forward voltage, and brightness. 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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Reliability

Tests and Results

Test	Applicable Standards	Test Condition	Note	Number of Damaged
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	0/45
Thermal Shock	MIL-STD-202G	-40°C~100°C 30 mins, 30 mins	100 cycles	0/45
Moisture Resistance	JEITA ED-4701 200 203	25°C~65°C~ 90%RH 24hrs/1cycle	10 cycles	0/45
High Temperature Storage	JEITA ED-4701 200 201	T_A=100°C	500 hrs	0/45
Temperature Humidity Storage	JEITA ED-4701 100 103	T_A=60°C RH=90%	500 hrs	0/45
Low Temperature Storage	JEITA ED-4701 200 202	T_A=-40°C	500 hrs	0/45
Water Proof Test*	IEC 60529:2001	IP X5 Water flow rate 12.5 l/min	15min	0/45
High Temperature Life Test	-	T_A=85°C I_F=15 mA	1000 hrs	0/45
Life Test	-	T_A=25°C IF: R=30mA G=35mA B=20mA	1000 hrs	0/45
High Humidity Heat Life Test	-	60°C RH=90% I_F=15 mA	500 hrs	0/45
Low Temperature Life Test	-	Ta=-40°C IF: R=30mA G=35mA B=20mA	500 hrs	0/45
Resistance to Soldering Heat(Reflow Soldering)	JEITA ED-4701 300 301	T_{sol}=260°C,10sec (Pre treatment 30°C,70%,168hrs)	2 times	0/45
Vibration-variable Frequency	MIL-STE-883 Method 2007	20G min, 20 to 2000Hz, 4cycles, 4mins, Each x,y,z	/	0/45
Electrostatic Discharge Test	AEC(Q101-001)	Human body model 1000 V (Forward and reverse current conduct electricity each 1time)	/	0/45

Water proof test*: The test is conducted on component level. It is strongly recommended the customers test the products for their application

Failure 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	-	100 μA
Luminous Flux/Intensity	Φ_V	I_F = 20 mA	Initial Data x 0.7	-
Resistance to Soldering Heat	-	I_F = 20 mA	No dead lamps and visual damage	
Vibration-variable Frequency	-	I_F = 20 mA	No dead lamps and visual damage	

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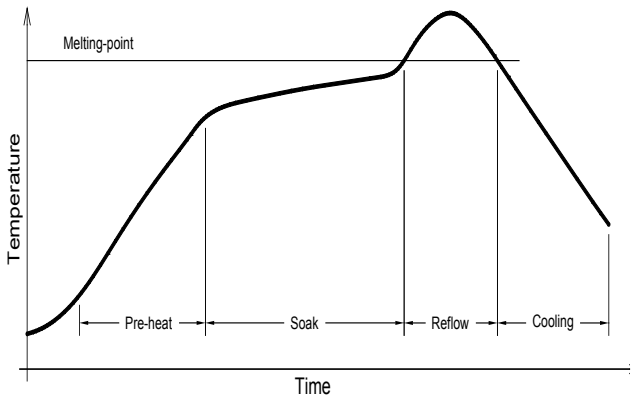
Soldering & Handling

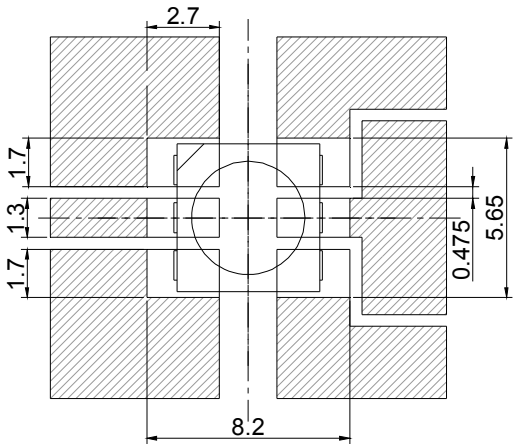
1. Cleaning
- Don't use unspecified chemical liquids to clean the SMD LED; the chemical could harm the SMD LED. When washing is necessary, please immerse the SMD LED in alcohol at normal room temperature for less than 1 minute and dry at normal room temperature for 15 minutes before use.
- The influence of ultrasonic cleaning on the SMD LED depending on factors such as ultrasonic power and the way SMD LED are mounted. Ultrasonic cleaning shall be pre-qualified to ensure this will not cause damage to the SMD LED.

2. Moisture Proof Packing
- In order to prevent moisture absorption into SMD LED during the transportation and storage, SMD LED is packed in a moisture barrier bag. Desiccants and a humidity indicator are packed together with SMD LED as the secondary protection. The indication of humidity indicator card provides the information of humidity within SMD packing.

3. Storage
- Shelf life in original sealed bag at storage condition of <40ºC and <90%RH is 12 months. Baking is required whenever shelf life is expired.
- Before openning the packaging , Please check whether bag leak air or not.
- After bag opening, the SMD LED must be stored under the condition < 30ºC and < 60%RH. Under this condition, SMD LED must be used (subject to reflow) within 168 hours after bag opening, and re-baking is required when exceeding 168 hours.
- For baking, place SMD LED in oven at temperature 80ºC±5ºC and relative humidity <=10%RH, for 24 hours.
- Take out the material from packaging bag for re-bake. Do not open the door of oven frequently during the baking process.

4. Soldering
- Manual soldering by soldering iron
- The use of a soldering iron of less than 25W is recommended and the temperature of the iron must be kept at below 315ºC, with soldering time within 2 seconds.
- The epoxy resin of SMD LED should not be in contact with tip of soldering iron.
- No mechanical stress should be exerted on the resin portion of SMD LED during soldering.
- Handling of SMD LED should be done when the package has been cooled down to below 40ºC or less. This is to prevent the SMD LED failures due to thermal-mechanical stress during handling.
- Reflow Soldering
- The temperature (Top surface of SMD LED) profile is as below:





Solder = Lead-free	
Average ramp-up rate = 4ºC/s max	Peak temperature = 250ºC max.
Preheat temperature = 150ºC ~200ºC	Time within 5ºC of actual Peak Temperature = 10s max.
Preheat time = 100s max.	Duration above 217ºC is 80s max.
Ramp-down rate = 6ºC/s max.	

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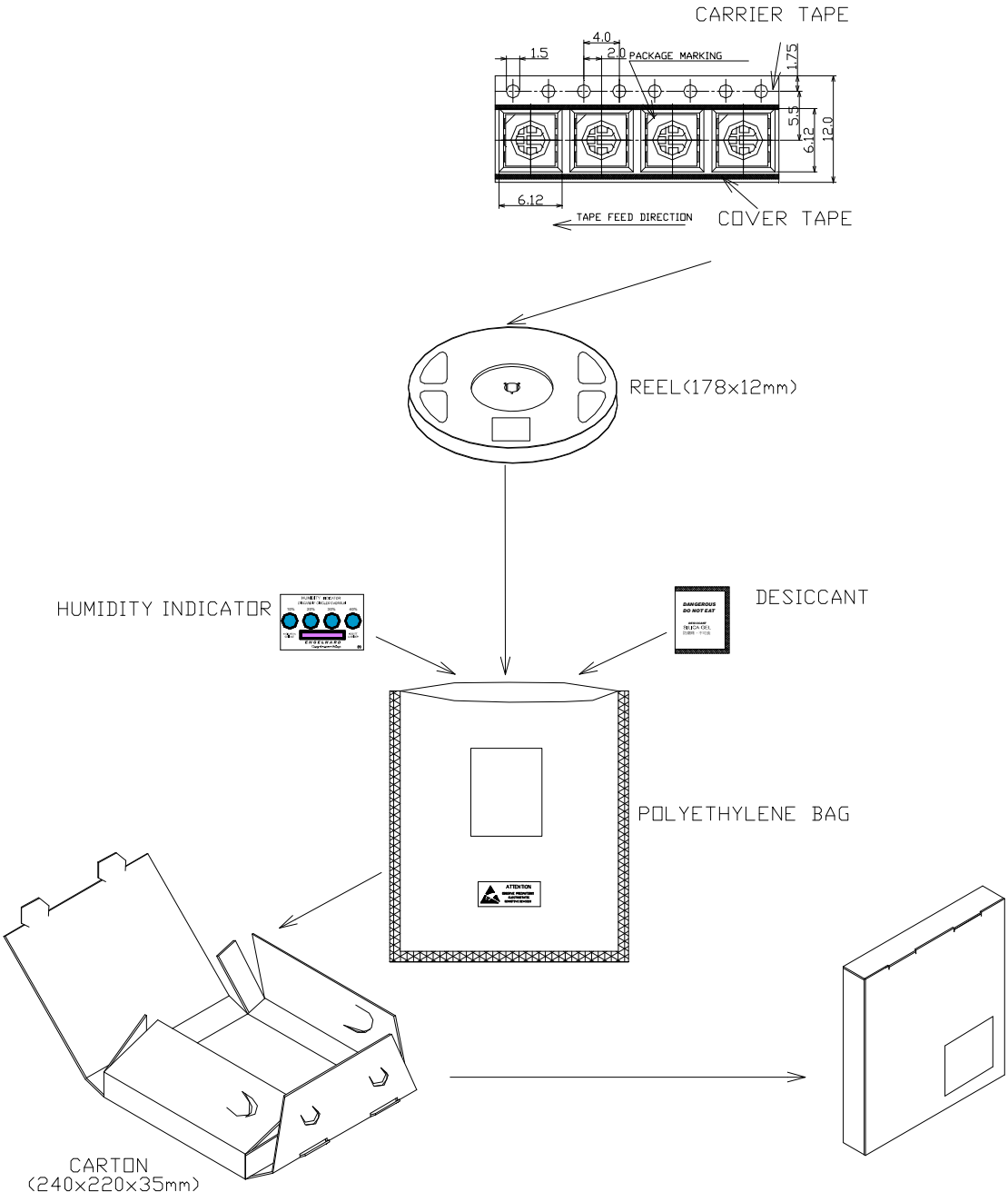
Package

- 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 900 pcs per reel.



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