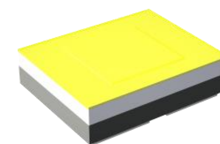

HGC-L2016A030W60E-CP1

Product Brief

Description

• The Compact LED is ideal light sources for automotive applications and mobile flash, general lighting.
Package Size :2.0x1.6x0.7mm.

• Compatible with standard SMT, good reflow welding quality, high yield and low cost.

• Strong resistance to cold and hot shock and high current shock.

• The package design coupled with careful selection of component materials allow these products to perform with high reliability.

Features and Benefits

•Long operating life
•Low voltage DC operated
•Cool beam, safe to the touch
•Flip Chip Technology,
•Pb-free Reflow Soldering Application
•No wire bonds for high reliability

Key Applications

•Automotive lighting

Approval	Check	Formulation

Customer Confirmation		
Customer name:		
Purchase department	Quality department	Technical department

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Performance Characteristics

Table 1. Product Selection Guide, IF= 1000mA , Ta= 25ºC, RH30%

TYPE	CODE			
CCT(K)	A50	A55	A60	A65
	5000-5500	5500-6000	6000-6500	6500-7000

TYPE	CODE			
VF(V)	V28	V30	V32	V34
	2.8-3.0	3.0-3.2	3.2-3.4	3.4-3.6

TYPE	CODE		
Φv(Lm)	L1	L2	L3
	350-400	400-450	450-500

Notes :

(1) Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.

(2) HGC maintains a tolerance of ±0.1V on Forward Voltage measurements.

(3) The lumen table is only for reference.

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Performance Characteristics

Table 3. Characteristics, I_F=1000mA, Ta= 25ºC, RH30%

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Forward Current	I_F	-	1000	1500	mA
Forward Voltage[1]	V_F	2.8	-	3.6	V
Luminous Intensity[1]	I_v	350	-	500	(lm)
CCT	-	5000	-	7000	K
CRI[1]	R_a	70	-	-	%
Viewing Angle [2]	$2\Theta_{1/2}$	-	120	-	Deg.
Thermal resistance (J to S) [3]	$R\theta_{J-S}$	-	-	4	K/W
ESD Sensitivity(HBM)	-	8000V			

Table 4. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Forward Current	I_F	1500	mA
Power Dissipation	P_D	5	W
Junction Temperature	Tj	150	ºC
Operating Temperature	T_{opr}	-30~ +125	ºC
Storage Temperature	T_{stg}	-40 ~ + 85	ºC

Notes :

(1) Tolerance : VF :±0.1V, IV :±5%, Ra :±2, x,y :±0.005.

(2) $2\Theta_{1/2}$ is the off-axis where the luminous intensity is 1/2 of the peak intensity.

(3) Thermal resistance : Rth_{JS} (Junction / solder).

• LED's properties might be different from suggested values like above and below tables if operation condition will be exceeded our parameter range. Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.

• All high power emitter LED products mounted on aluminum metal-core printed circuit board, can be lighted directly, but we do not recommend lighting the high power products for more than 5 seconds without a appropriate heat dissipation equipment.

• Thermal resistance can be increased substantially depending on the heat sink design/operating condition, and the maximum possible driving current will decrease accordingly.

• All measurements were made under the standardized environment of HGC.

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Characteristics Graph

Fig 1. Color Spectrum, Ta = 25ºC   Ra>70

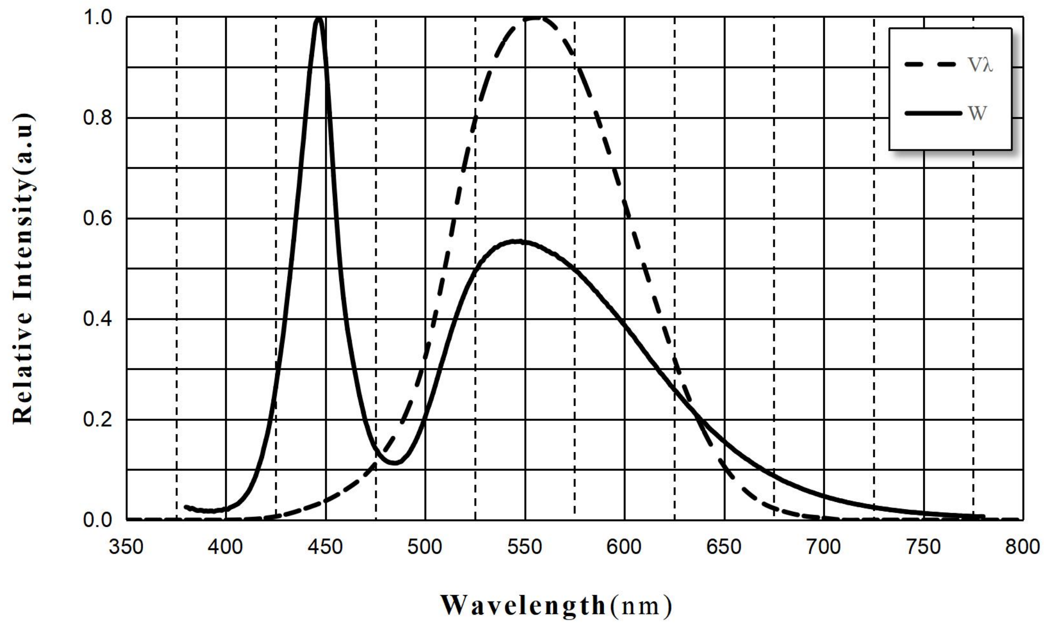
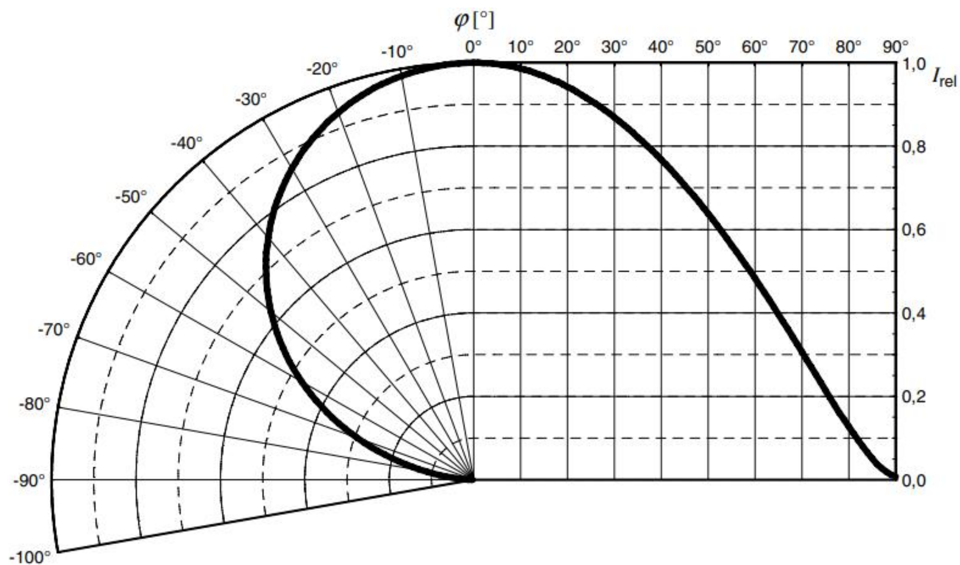


Fig 2. Radiation diagram, Ta = 25ºC



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Characteristics Graph

Fig 3. Forward Voltage vs. Forward Current, Ta = 25ºC

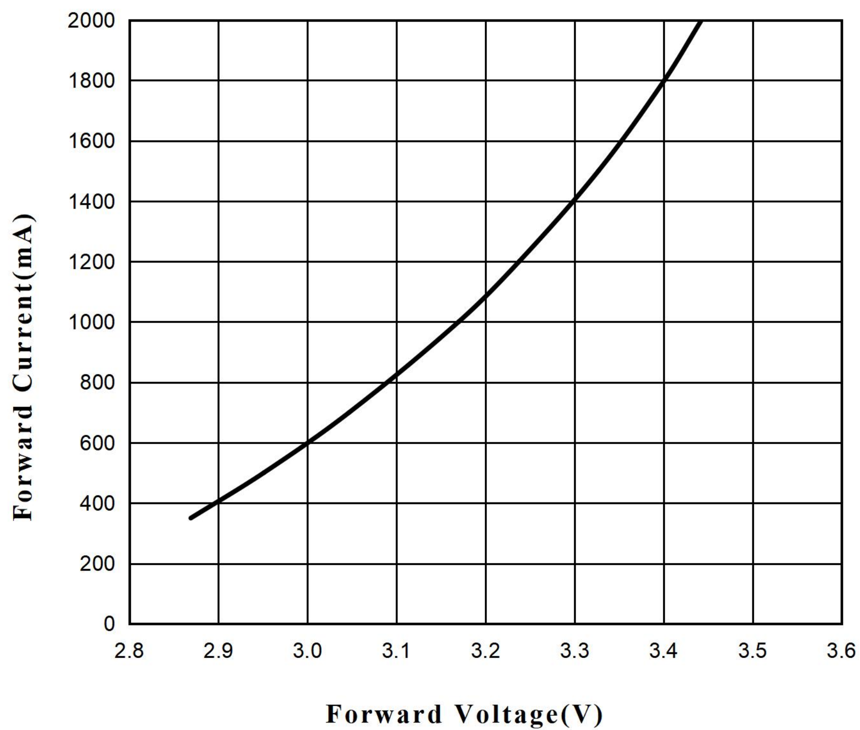
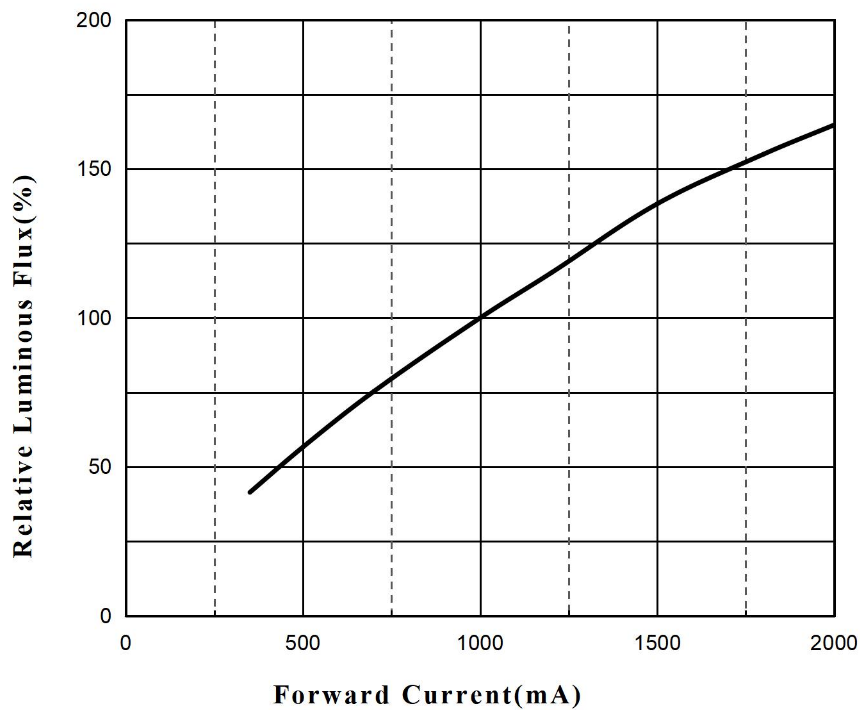


Fig 4. Forward Current vs. Relative Luminous Intensity, Ta = 25ºC



Characteristics Graph

Fig 5. Forward Current vs. Chromaticity coordinate shift ; Ta = 25 ℃

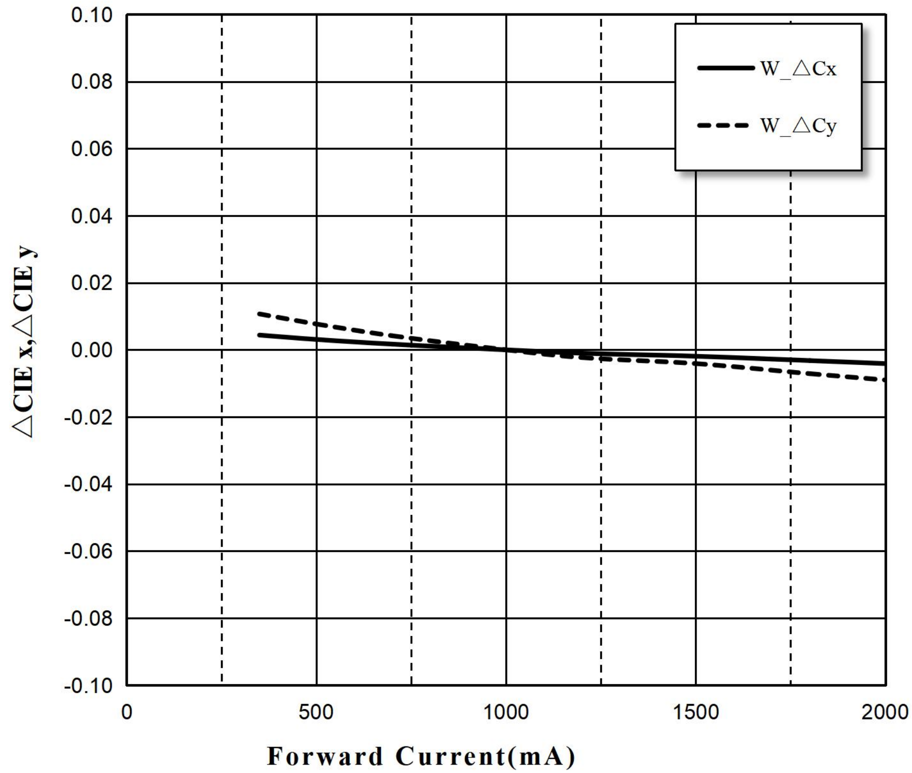
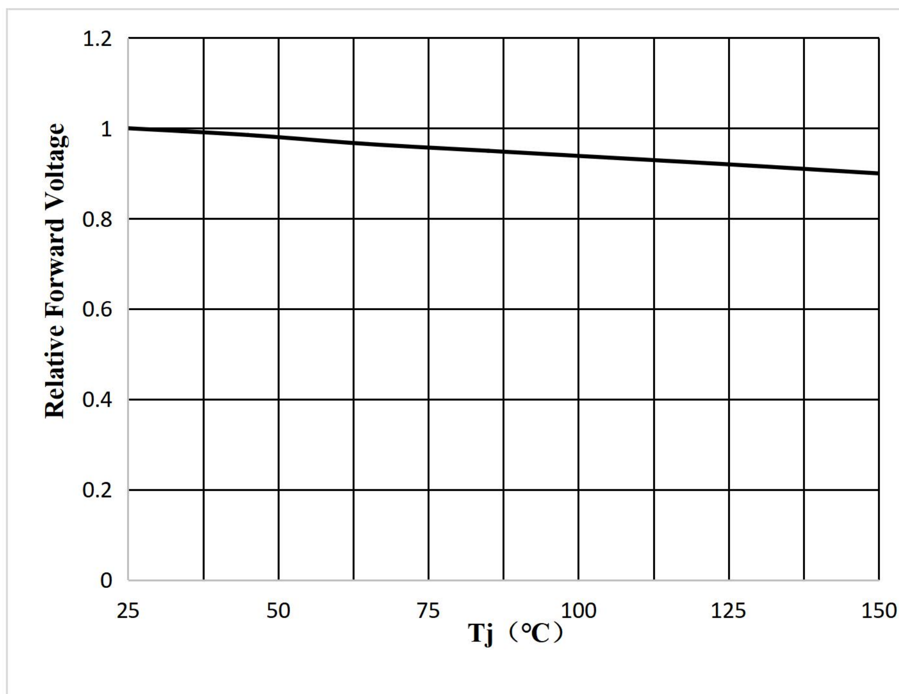


Fig 6. Junction Temperature vs. Relative Forward Voltage, I_F=1000mA



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Characteristics Graph

Fig 7. Junction Temperature vs. Relative Luminous Flux, I_F=1000mA

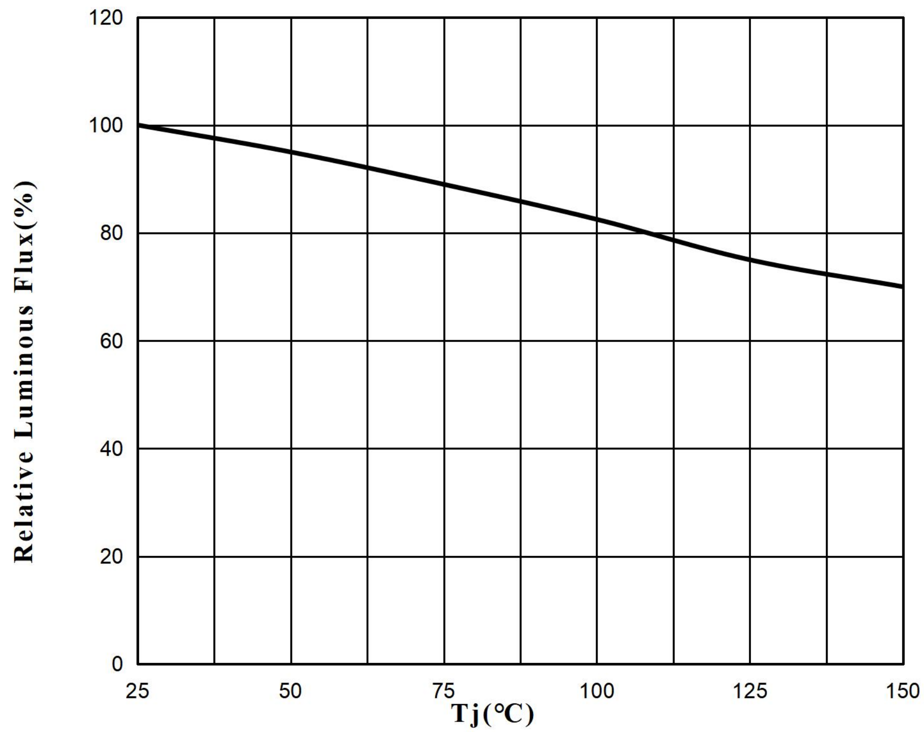
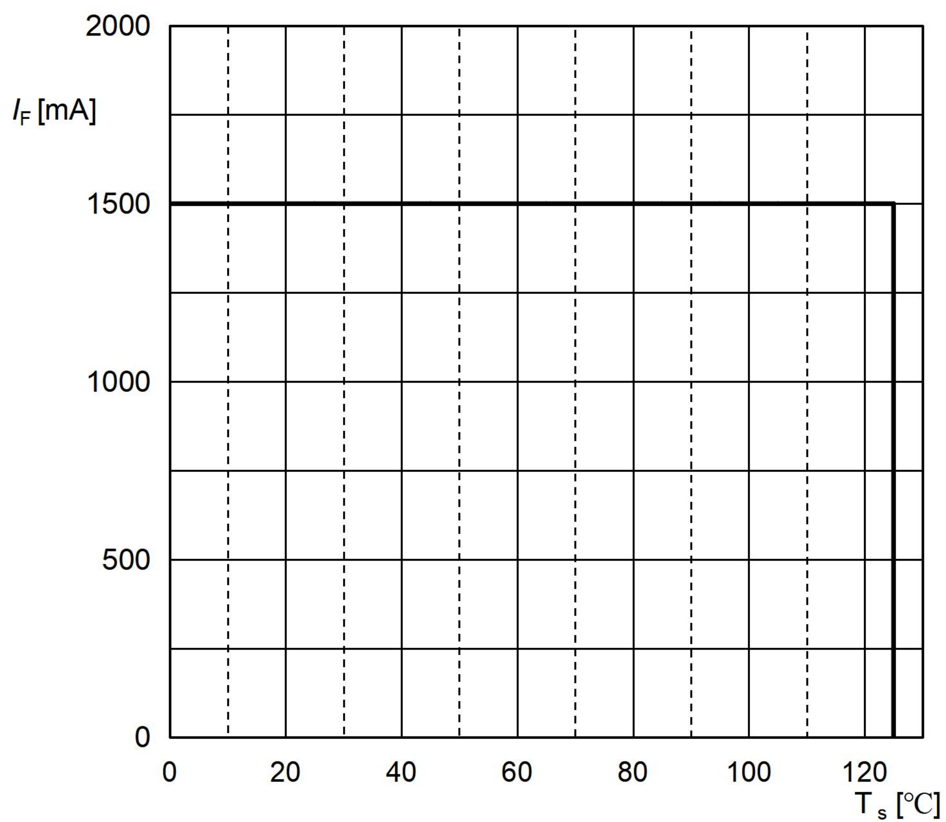


Fig 9. Solder Point Temperature vs.Forward Current



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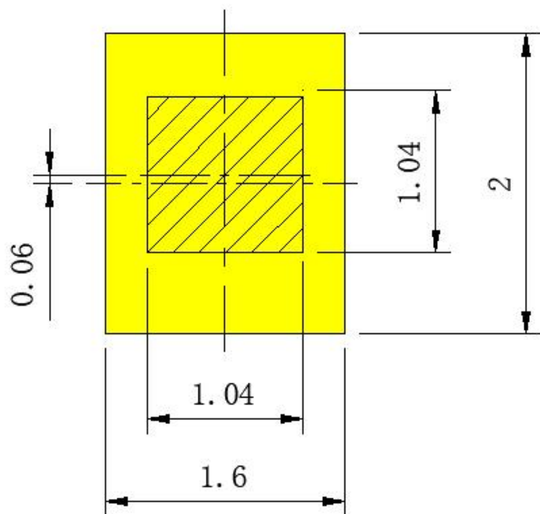
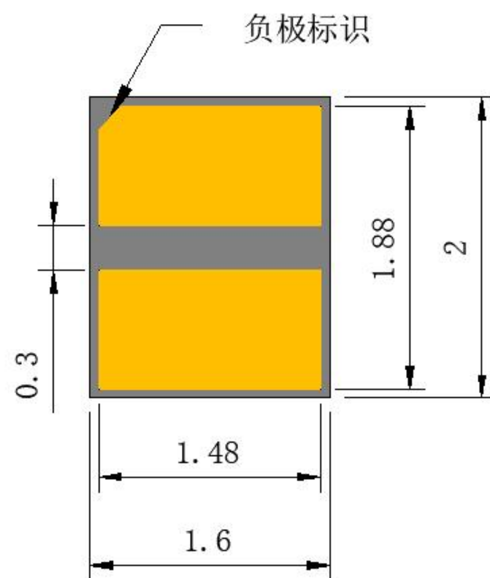
Mechanical Dimensions

Top View



Side View

Bottom View



***Notes :**

(1) All dimensions are in millimeters.

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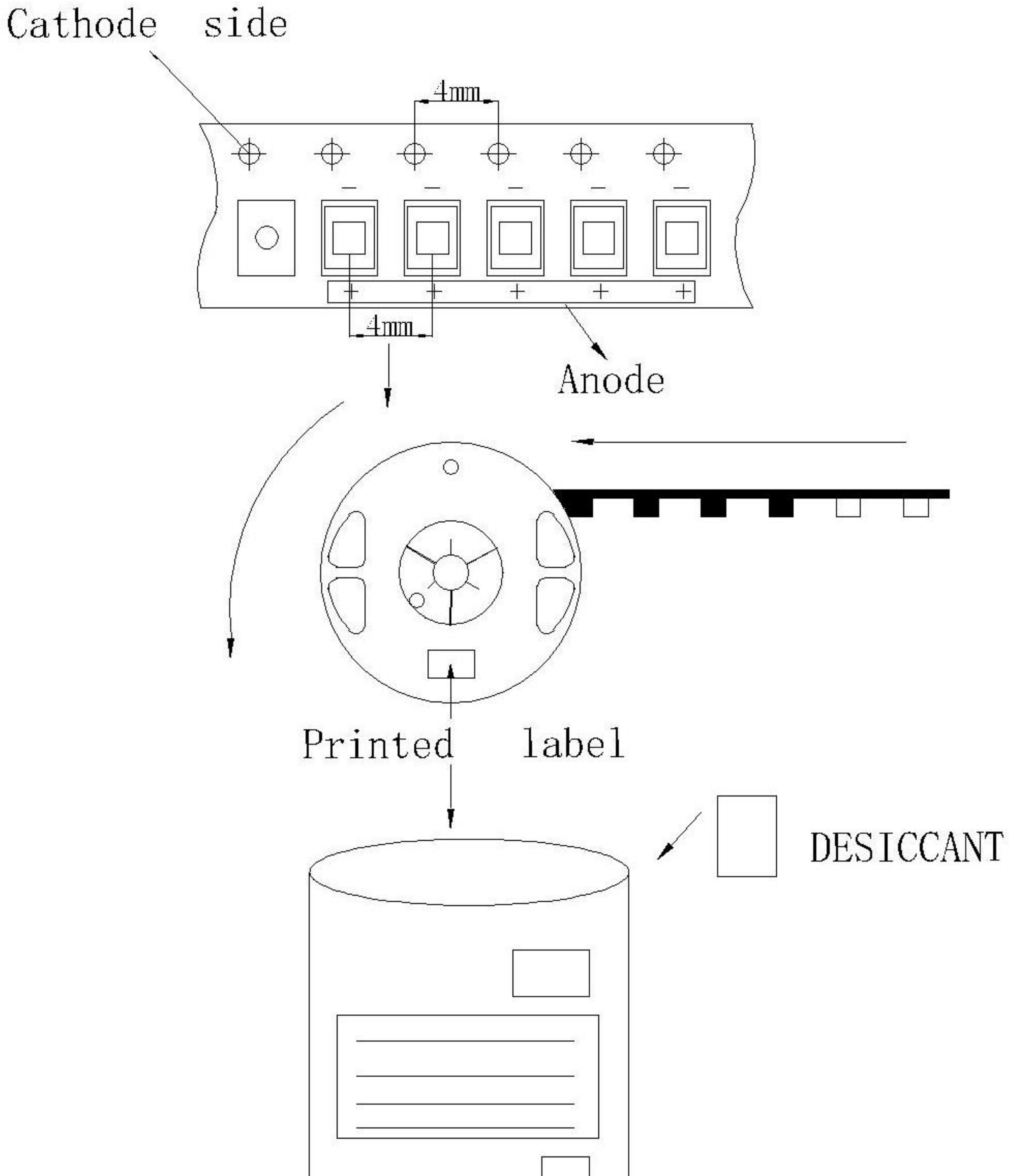
(2) Undefined tolerance is ±0.1mm.

Emitter Tape & Reel Packaging



Notes :

(1) Loaded Quantity 4000pcs per reel.

(2) Empty component pockets are sealed with top cover tape.

(3) The cathode is oriented towards the tape sprocket hole in accordance with ANSI/EIA RS-481 specifications.

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Reliability Test Items& Conditions

Table 6.

Item	Test Conditions	Test Hours /Cycle	Sample Size
Solderability (Reflow Soldering)	Tsol=260℃,5sec，Lead-free Solder (Pre-treatment 30℃,70%,168h)	3 times	22 pcs
Temperature Cycle	-30℃（30min）~125℃（30min） IF:1000mA	200 cycles	22 pcs
Thermal Shock	-30℃（15min）~125℃（15min）	200 cycles	22 pcs
High Temperature Storage	85℃	1000 hrs	22 pcs
Low Temperature Storage	-40℃	1000 hrs	22 pcs
Wet High Temperature Storage	Ta=85℃ ，RH=85%	1000 hrs	22 pcs
High Temperature Operating Life	Tj=150℃， IF =1500mA	1000 hrs	22 pcs
Intermittent operation life	Ta=80℃, IF=1000mA ,2min On/4 min Off	10000 cycles	22 pcs
Vibration	10m/s^2,100~20000~100Hz,4cycles,4min each X,Y,Z	3 times	22 pcs

Failure Criteria

Table 7.

Items	Symbols	Test Conditions	Limits
Forward Voltage	V_F	I=1000mA	>U.S.L*1.1
Luminous Flux	Φ	I=1000mA	<L.S.L*0.7
Solderability	-	-	Less than 90% solder coverage

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Soldering Conditions

Reflow Soldering Conditions (Pb Free)

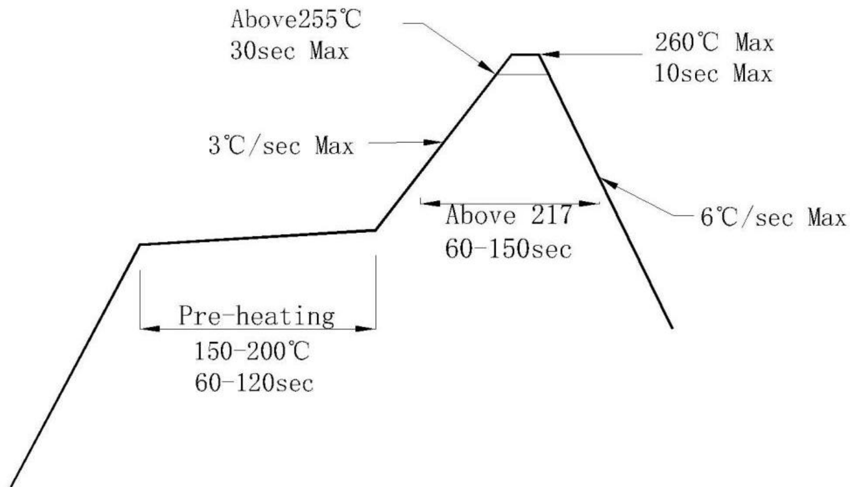

Table 5.

Profile Feature	Pb-Free Assembly
Average ramp-up rate (Tsmax to Tp)	3℃/second max.
- Temperature Min (Tsmin) - Temperature Max (Tsmax) - Time (Tsmin to Tsmax) (ts)	150℃ 200℃ 60-80 seconds
Time maintained above: - Temperature (TL) - Time (tL)	 217℃ 60-150seconds
Peak Temperature (Tp) Time within 5∘C of actual Peak Temperature (tp)2	260℃ 30 seconds max
Ramp-down Rate Time 25∘C to Peak Temperature	6℃/second max. 8 minutes max.

Notes :

(1) Reflow soldering should not be done more than two times.

(2) When soldering, do not put stress on the LED during heating.

(3) When hand soldering, the temperature of hot plate must less than260℃ for 3 seconds.

(4) The hand solder should be done only one times.

(5) Repairs should not be done after the LED have been soldered. When repair is unavoidable, suitable tools must be used.

(6) Die slug is to be soldered.

(7) When soldering, do not put stress on the LEDs during heating.

(8) After soldering, do not warp the circuit board.

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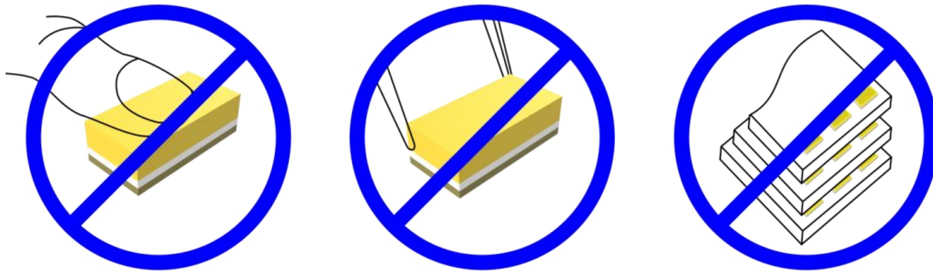
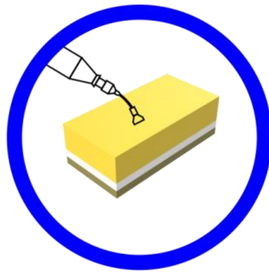
Handling of Silicone Resin for LED

(1) During processing, mechanical stress on the surface should be minimized as much as possible.
(2) Sharp objects of all types should not be used to pierce the sealing compound.



(2) In general, LED can only be sucked by vacuum suction pen, because the side of LED will also be injured.



(3) When populating boards in SMT production, there are basically no restrictions regarding the formof the pick and place nozzle, except that mechanical pressure on the surface of the resin must be prevented.
This is assured by choosing a pick and place nozzle which is larger than the LED reflector area.

(4) Silicone differs from materials conventionally used for the manufacturing of LED.
These conditions must be considered during the handling of such devices. Compared to standard encapsulants, silicone is generally softer, and the surface is more likely to attract dust.

As mentioned previously, the increased sensitivity to dust requires special care during processing.
In cases where a minimal level of dirt and dust particles cannot be guaranteed, a suitable cleaning solution must be applied to the surface after the soldering of components.

(5) HGC suggests using isopropyl alcohol for cleaning. In case other solvents are used, it must be assured that these solvents do not dissolve the package or resin.
Ultrasonic cleaning is not recommended. Ultrasonic cleaning may cause damage to the LED.

(6) Please do not mold this product into another resin (epoxy, urethane, etc) and do not handle this.
Product with acid or sulfur material in sealed space.

(7) Avoid leaving fingerprints on silicone resin parts.sealed space.

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Precaution for Use

(1) Storage

(2) To avoid the moisture penetration, we recommend store in a dry box with a desiccant.
The recommended storage temperature range is 5℃ to 30℃ and a maximum humidity of RH50%.

(3) Use Precaution after Opening the Packaging
Use proper SMT techniques when the LED is to be soldered dipped as separation of the lens may affect the light output efficiency.
Pay attention to the following:
a. Recommend conditions after opening the package
- Sealing
- Temperature : 5 ~ 30℃ Humidity : Less than RH60%
b. If the package has been opened more than 4 week (MSL_2a) or the color of the desiccant changes, components should be dried for 10-24hr at 65±5℃

(4) Do not apply mechanical force or excess vibration during the cooling process to normal temperature after soldering.

(5) Do not rapidly cool device after soldering.

(6) Components should not be mounted on warped (non coplanar) portion of PCB.

(7) Radioactive exposure is not considered for the products listed here in.

(8) Gallium arsenide is used in some of the products listed in this publication.
These products are dangerous if they are burned or shredded in the process of disposal.
It is also dangerous to drink the liquid or inhale the gas generated by such products when chemically disposed of.

(9) This device should not be used in any type of fluid such as water, oil, organic solvent and etc.
When washing is required, IPA (Isopropyl Alcohol) should be used.

(10) When the LED are in operation the maximum current should be decided after measuring the package temperature.

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Precaution for Use

(11) The appearance and specifications of the product may be modified for improvement without notice.

(12) Long time exposure of sunlight or occasional UV exposure will cause lens discoloration.

(13) VOCs (Volatile organic compounds) emitted from materials used in the construction of fixtures can penetrate silicone encapsulants of LED and discolor when exposed to heat and photonic energy.

The result can be a significant loss of light output from the fixture. Knowledge of the properties of the materials selected to be used in the construction of fixtures can help prevent these issues.

(14) Attaching LED, do not use adhesives that outgas organic vapor.

(15) The driving circuit must be designed to allow forward voltage only when it is ON or OFF.
If the reverse voltage is applied to LED, migration can be generated resulting in LED damage.

(16) Similar to most Solid state devices;
LED are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS).
Below is a list of suggestions that HGC purposes to minimize these effects.

a. ESD (Electro Static Discharge)
Electrostatic discharge (ESD) is the defined as the release of static electricity when two objects come into contact.
While most ESD events are considered harmless, it can be an expensive problem in many industrial environments during production and storage.
The damage from ESD to an LED may cause the product to demonstrate unusual characteristics such as:

- Increase in reverse leakage current lowered turn-on voltage
- Abnormal emissions from the LED at low current

The following recommendations are suggested to help minimize the potential for an ESD event.
One or more recommended work area suggestions:

- Ionizing fan setup
- ESD table/shelf mat made of conductive materials
- ESD safe storage containers

One or more personnel suggestion options:

- Antistatic wrist-strap
- Antistatic material shoes
- Antistatic clothes

Environmental controls:

- Humidity control (ESD gets worse in a dry environment)

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Precaution for Use

b. EOS (Electrical Over Stress)

Electrical Over-Stress (EOS) is defined as damage that may occur when an electronic device is subjected to a current or voltage that is beyond the maximum specification limits of the device.
The effects from an EOS event can be noticed through product performance like:

- Changes to the performance of the LED package
(If the damage is around the bond pad area and since the package is completely encapsulated the package may turn on but flicker show severe performance degradation.)
- Changes to the light output of the luminaire from component failure
- Components on the board not operating at determined drive power

Failure of performance from entire fixture due to changes in circuit voltage and current across total circuit causing trickle down failures.
It is impossible to predict the failure mode of every LED exposed to electrical overstress as the failure modes have been investigated to vary, but there are some common signs that will indicate an EOS event has occurred:

- Damaged may be noticed to the bond wires (appearing similar to a blown fuse)
- Damage to the bond pads located on the emission surface of the LED package (shadowing can be noticed around the bond pads while viewing through a microscope)
- Anomalies noticed in the encapsulation and phosphor around the bond wires.
- This damage usually appears due to the thermal stress produced during the EOS event.

c. To help minimize the damage from an EOS event HGC recommends utilizing:

- A surge protection circuit
- An appropriately rated over voltage protection device
- A current limiting device

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Company Information

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Company Information

HGC Technology Co., Ltd. was founded by an international team in 2017 and is headquartered in Wuhan,China. HGC owns the independent technology R&D center, focusing on LED packaging and testing, innovation of premium light source chips and optical devices, etc. At the same time, HGC is also an innovative high-tech enterprise with a number of core patented technologies. Since its establishment, HGC has undertaken many key government researching projects in China.

Our R&D center member consists of highly educated scientific research talents and professional, experienced LED chip engineers. The photoelectric performance of self-developed flip , vertical , high voltage, mini / micro LED chips and the concerned packaging devices, semiconductor optical devices have reached the world top level. They are widely used in automotive light source, special light source and display / backlight market. At present, HGC has successfully cooperated with well-known automotive manufacturer and also been listed as a qualified supplier of gaint display panel manufacturer.

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