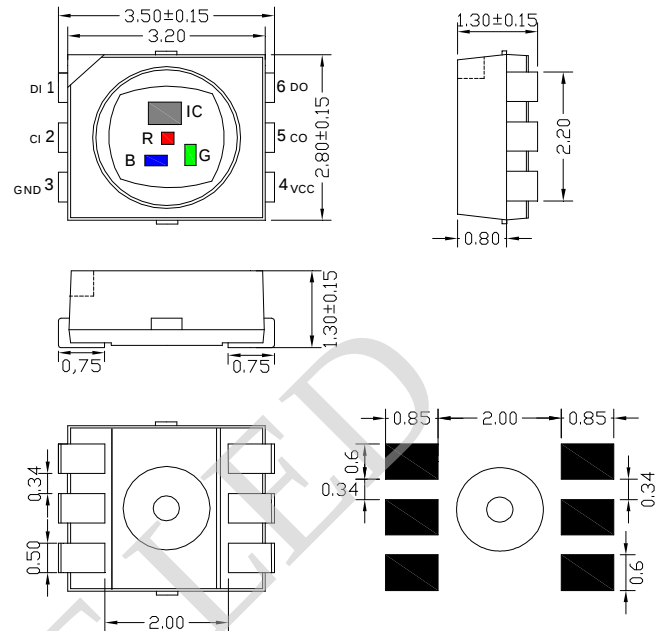


● Features:

1. Emitted Color: Red, Blue and Green.
2. Lens Appearance: Water Clear.
3. 3.5x2.8x1.3 mm standard package.
4. Applied Voltage : 5V
5. Suitable for all SMT assembly methods.
6. Compatible with infrared and vapor phase reflow solder process.
7. Compatible with automatic placement equipment.
8. This product doesn't contain restriction Substance, comply ROHS standard.
9. Synchronous of two-lane.
10. 8Bit(256 level)Color set.
11. 5Bit(32 level)brightness adjustment.
12. 18mA Content current output.
13. High contrast.
14. Choose positive output or negative output RGB tri-color LED output.
15. With self-detection signal
Built-in support for continuous oscillation
PWM output can be maintained static screen.
16. AEC-Q102 Qualified

● Package Dimensions:



NOTES:

1. All dimensions are in millimeters (inches).
2. Tolerance is $\pm 0.10\text{mm}$ (0.004") unless otherwise specified.
3. Specifications are subject to change without notice.

● Applications:

1. Interior Lighting.
2. Ambient Lighting.
3. Automotive.

● Absolute Maximum Ratings($T_a=25^\circ\text{C}$)

Parameter	Symbol	Range	Unit
Supply voltage	VCC	4.5~5.5	V
Input Voltage	V_i	-0.4~VDD+0.4	V
Operating Temperature	Topr	-40~+85	$^\circ\text{C}$
Storage Temperature	Tstg	-40~+85	$^\circ\text{C}$
Soldering Temperature	Tsol	See Page9	-

● Electrical characteristics(Ta=25°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	VCC	-	4.5	5.0	5.5	V
Input Voltage Level	VIH	Din High Level	3.0	-	-	V
	VIL	Din Low Level	-	-	0.3*VCC	V
Static current	IDD	VDD = 4.5V , Iout "OFF"	-	0.5	-	mA
R/G/B Constant Current	Iout	-	19	20	21	mA
Frequency of Clock signal	FCLK	-	-	0~5	15	MHz
Frequency of PWM	FPWM	-	-	20	-	KHz
The clock high level width	tCLKH	-	30	-	-	ns
The clock Low level width	tCLKL	-	30	-	-	ns
Data set up time	tSETUP	-	10	-	-	ns
Data hold time	tHOLD	-	5	-	-	ns

● Optical characteristics(Ta=25°C)

Parameter	Symbol	Condition	Min	Typ	Max.	Unit
Luminous Intensity	IV(R)	Iout=20mA	580	920	1305	mcd
	IV(G)	Iout=20mA	1070	1800	2400	mcd
	IV(B)	Iout=20mA	259	420	583	mcd
Dominant Wavelength	WLD(R)	Iout=20mA	620	625	630	nm
	WLD(G)	Iout=20mA	520	525	530	nm
	WLD(B)	Iout=20mA	460	465	470	nm
View Angle	2θ 1/2	Iout=20mA	-	120	-	deg

● Typical Electro-Optical Characteristics Curves

FIG.1 RELATIVE INTENSITY VS. WAVELENGTH

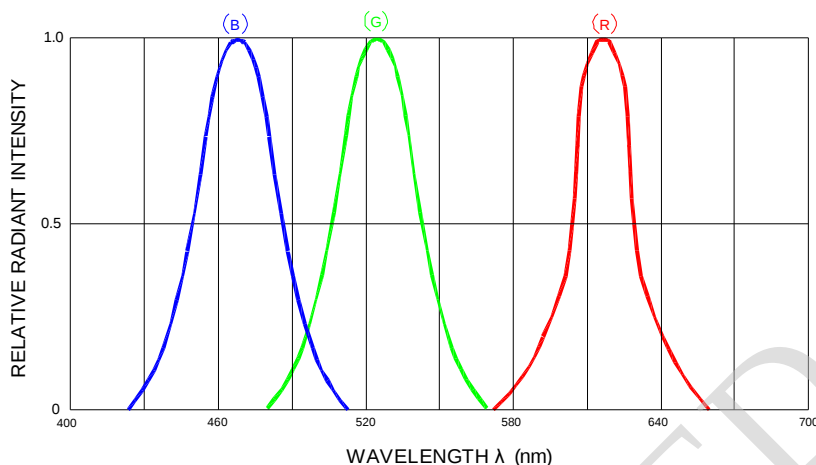


FIG.2 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

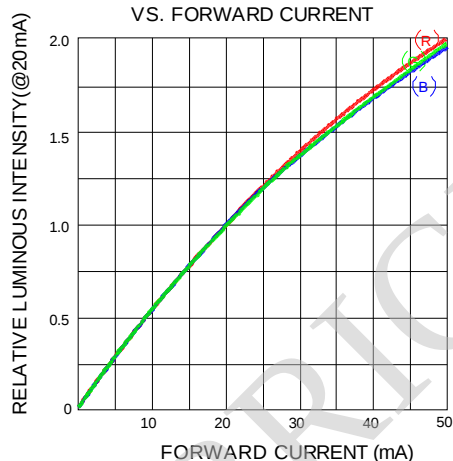


FIG.3 RELATIVE LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

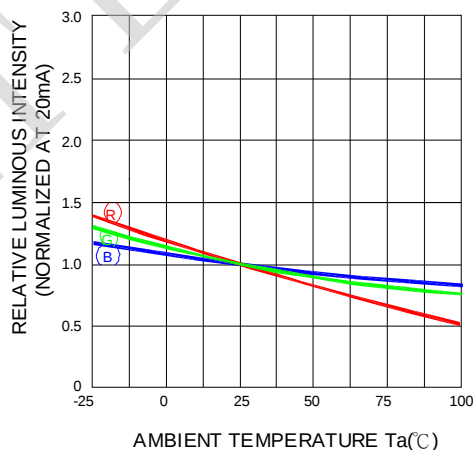
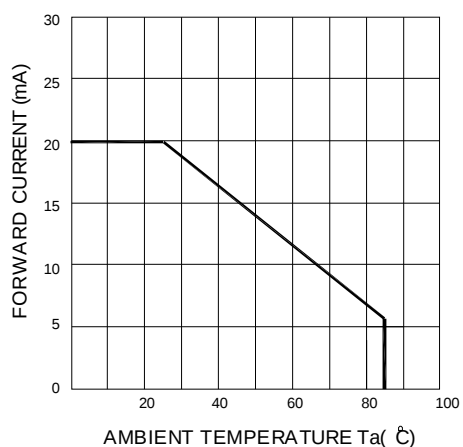
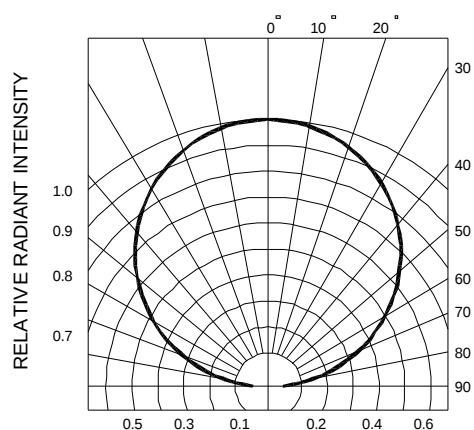


FIG.4 FORWARD CURRENT DERATING CURVE VS. AMBIENT TEMPERATURE



RADIATION DIAGRAM



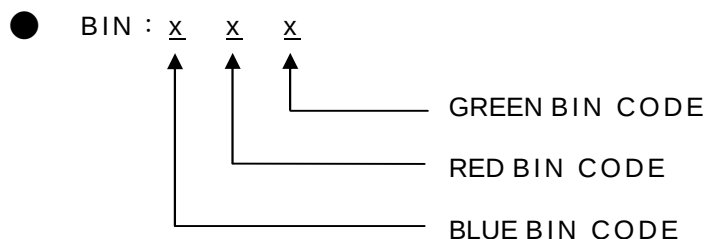


● Bin Limits (At 20mA)

COLOR	RED			
ITEM	IV (mcd)		WLD (nm)	
Spec	580-1305		620-630	
BIN	MIN	MAX	MIN	MAX
U6	580	870	620	625
U7			625	630
V6	870	1305	620	625
V7			625	630

COLOR	GREEN			
ITEM	IV (mcd)		WLD (nm)	
Spec	1070-2400		520-530	
BIN	MIN	MAX	MIN	MAX
W6	1070	1600	520	525
W7			525	530
X6	1600	2400	520	525
X7			525	530

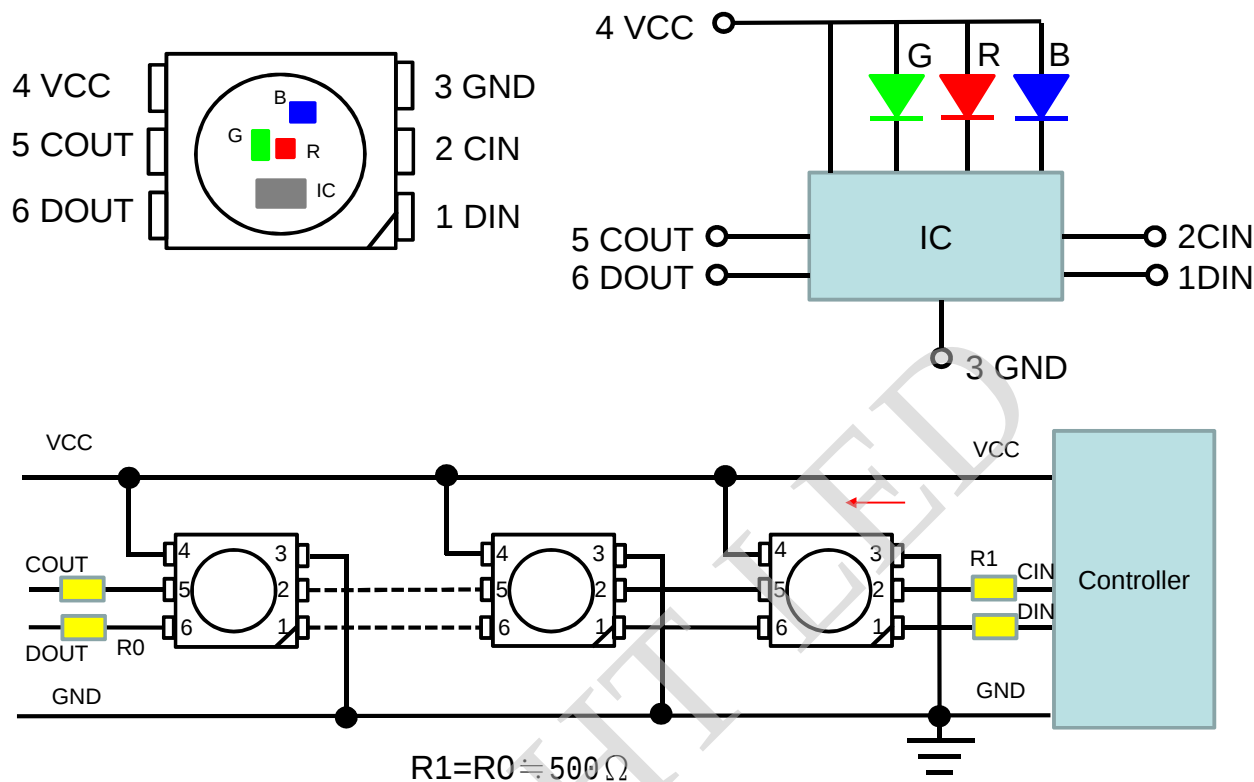
COLOR	BLUE			
ITEM	IV (mcd)		WLD (nm)	
Spec	259-583		460-470	
BIN	MIN	MAX	MIN	MAX
S3	259	387	460	465
S4			465	470
T3	387	583	460	465
T4			465	470



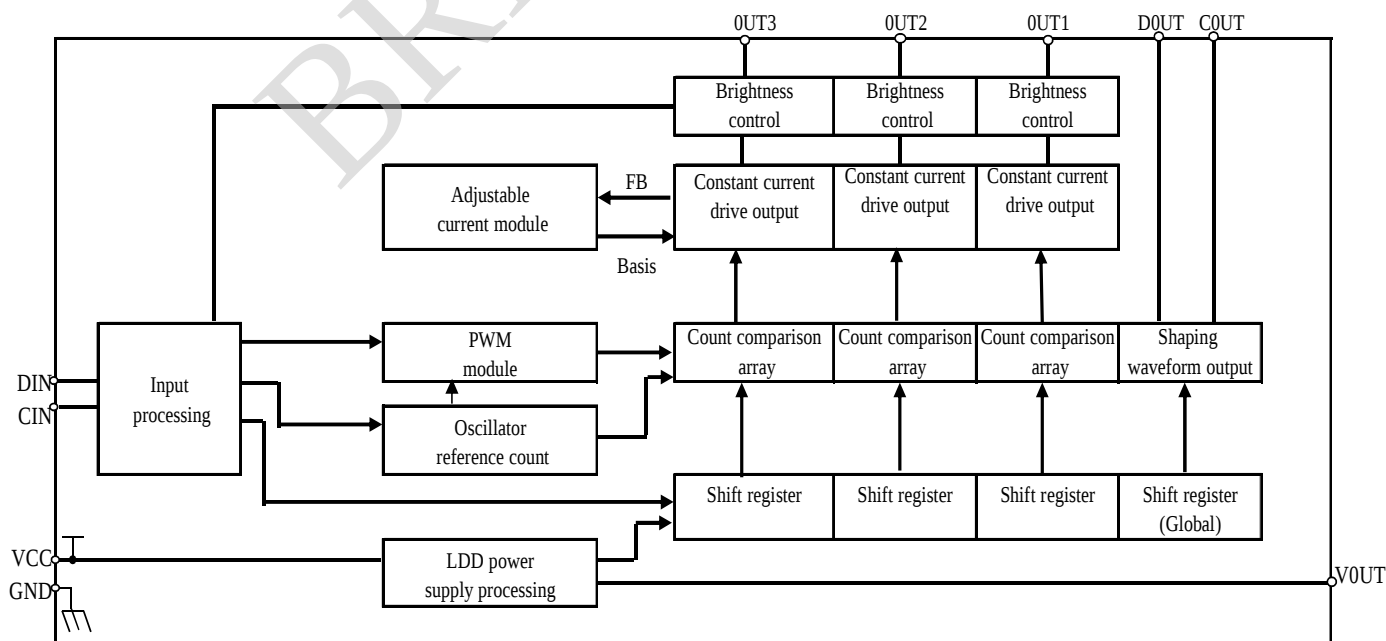
Notes:

1. Iv : Tolerance for each Bin limit is $\pm 15\%$
2. wd : Tolerance for each Bin limit is $\pm 1\text{nm}$
3. Bin categories are established for classification of products.
Products may not be available in all bin categories.

● Circuit diagram

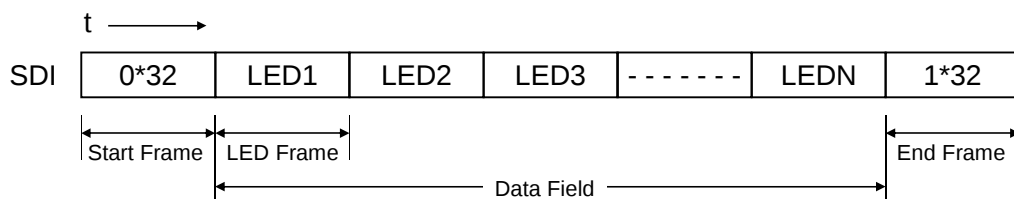


● IC's function diagram

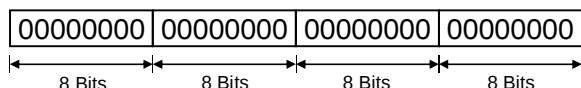




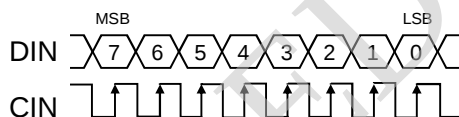
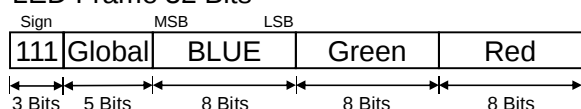
● Sequence Chart



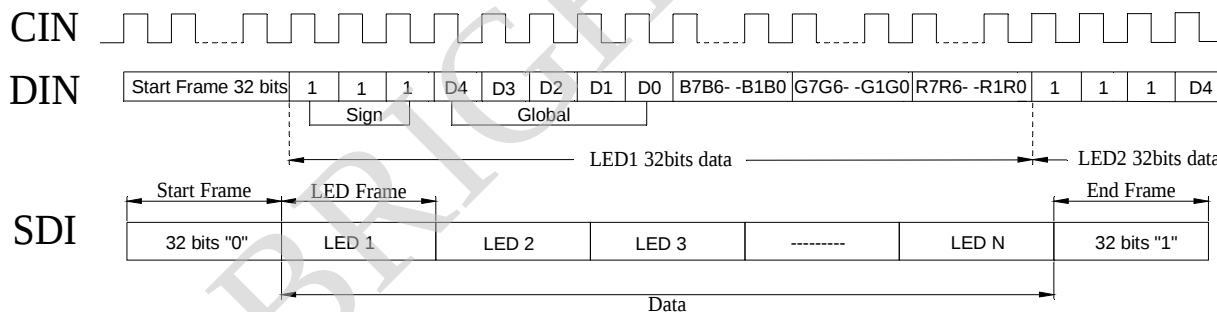
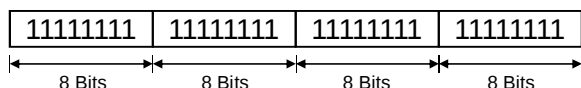
Start Frame 32 Bits



LED Frame 32 Bits



End Frame 32 Bits



● Global 5-Bit Brightness adjustment

DATA MSB←→LSB	Driving Current
00000	0/31(min)
00001	1/31
00010	2/31
...	...
11110	30/31
11111	31/31(max)

● B/G/R 8-Bit Gray scale adjustment

DATA MSB←→LSB	Duty Cycle
00000000	0/255(min)
00000001	1/255
00000010	2/255
...	...
11111110	254/255
11111111	255/255(max)



AEC-Q102 Qualified

● Package Method: (unit : mm)



● Reliability Test

Classification	Test Item	Reference Standard	Test Conditions	Result
Endurance Test	Operation Life	MIL-STD-750:1026 MIL-STD-883:1005 JIS-C-7021 :B-1	VCC=5V I _{out} =20mA Ta=Under room temperature Test time=1,000hrs	0/20
	High Temperature High Humidity Storage	MIL-STD-202:103B JIS-C-7021 :B-11	Ta=+65°C±5°C RH=90%-95% Test time=240hrs	0/20
	High Temperature Storage	MIL-STD-883:1008 JIS-C-7021 :B-10	High Ta=+85°C±5°C Test time=1,000hrs	0/20
	Low Temperature Storage	JIS-C-7021 :B-12	Low Ta=-35°C±5°C Test time=1,000hrs	0/20
Environmental Test	Temperature Cycling	MIL-STD-202:107D MIL-STD-750:1051 MIL-STD-883:1010 JIS-C-7021 :A-4	-35°C ~ +25°C ~ +85°C ~ +25°C 60min 20min 60min 20min Test Time=5cycle	0/20
	Thermal Shock	MIL-STD-202:107D MIL-STD-750:1051 MIL-STD-883:1011	-35°C±5°C ~ +85°C±5°C 20min 20min Test Time=10cycle	0/20
	Solder Resistance	MIL-STD-202:201A MIL-STD-750:2031 JIS-C-7021 :A-1	Preheating : 140°C-160°C, within 2 minutes. Operation heating : 260°C (Max.), within 10seconds. (Max.)	0/20

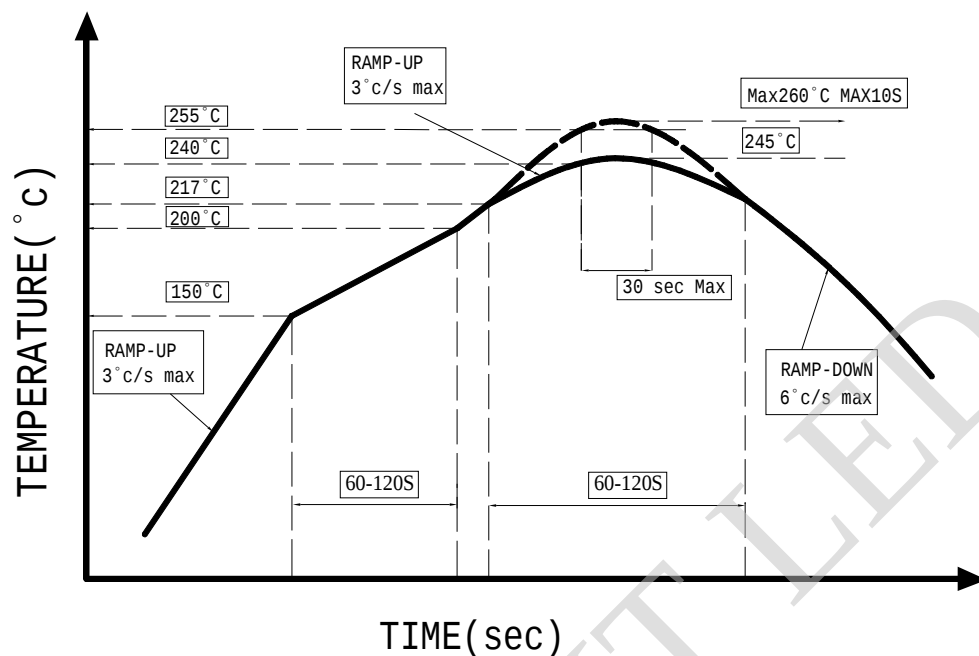
● Judgment criteria of failure for the reliability

Measuring items	Symbol	Measuring conditions	Judgment criteria for failure
Luminous intensity	I _v (mcd)	VCC=5V I _{out} =20mA	Below S ¹ X0.7

Note: 1. U means the upper limit of specified characteristics. S means initial value.

2. After each test, remove test pieces, wait for 2 hours and test pieces have returned to ambient temperature, then take next measurement.

● IR-Reflow



- 1、Avoid any external stress applied to the resin while the LEDs are at high temperature, especially during soldering.
- 2、Avoid rapid cooling or any excess vibration during temperature ramp-down process
- 3、Although the soldering condition is recommended above,
soldering at the lowest possible temperature is feasible for the LEDs

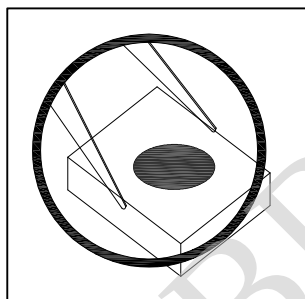
- IRON Soldering
350°C Within 3 sec, one time only.

● Handling Precautions

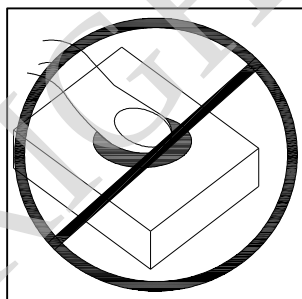
Compare to epoxy encapsulant that is hard and brittle, silicone is softer and flexible. Although its characteristic significantly reduces thermal stress, it is more susceptible to damage by external mechanical force.

As a result, special handling precautions need to be observed during assembly using silicone encapsulated LED products. Failure to comply might lead to damage and premature failure of the LED.

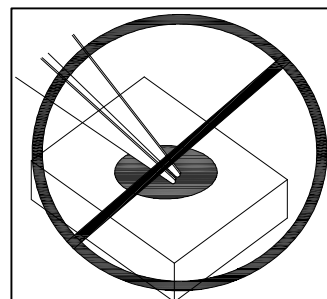
1. Handle the component along the side surfaces by using forceps or appropriate tools. (pic.1)
2. Do not directly touch or handle the silicone lens surface. It may damage the internal circuitry. (pic.2, pic.3)
3. Do not stack together assembled PCBs, containing exposed LEDs. Impact may scratch the silicone lens or damage the internal circuitry. (pic.4)
4. The outer diameter of the SMD pickup nozzle should not exceed the size of the LED to prevent air leaks. The inner diameter of the nozzle should be as large as possible. (pic.5)
5. A pliable material is suggested for the nozzle tip to avoid scratching or damaging the LED surface during pickup. (pic.5)
6. The dimensions of the component must be accurately programmed in the pick-and-place machine to insure precise pickup and avoid damage during production. (pic.5)



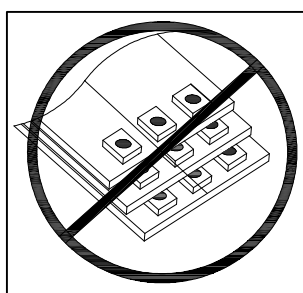
Pic.1



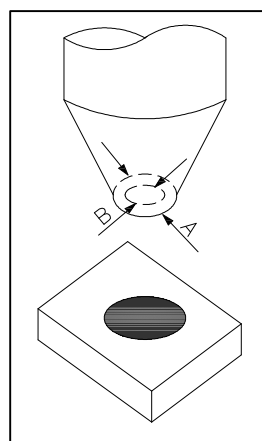
Pic.2



Pic.3



Pic.4



Pic.5



● Notes for designing:

Care must be taken to provide the current limiting resistor in the circuit so as to drive the LEDs within the rated figures. Also, caution should be taken not to overload LEDs with instantaneous voltage at the turning ON and OFF of the circuit.

When using the pulse drive care must be taken to keep the average current within the rated figures. Also, the circuit should be designed so as to be subjected to reverse voltage when turning off the LEDs.

● Storage:

In order to avoid the absorption of moisture, it is recommended to solder LEDs as soon as possible after unpacking the sealed envelope.

If the envelope is still packed, to store it in the environment as following:

- (1) Temperature : 5°C - 30°C (41°F) Humidity : RH 60% Max.
- (2) After this bag is opened, devices that will be applied to infrared reflow, vapor-phase reflow, or equivalent soldering process must be:
 - a. Completed within 24 hours.
 - b. Stored at less than 20% RH.
- (3) Devices require baking before mounting, if:
2a or 2b is not met.
- (4) If baking is required, devices must be baked under below conditions:
48 hours at $60^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

● Package and Label of Products:

- (1) Package: Products are packed in one bag of 2000 pcs (one taping reel) and a label is attached to each bag.
- (2) Label:

	佰鴻工業股份有限公司	←	BRIGHT LED LOGO
BRT BRIGHT LED ELECTRONICS CORP.			
Part No.:BL-Hxxxxx-TRB		←	Part No.
			Quantity
Quantity:xxxx PCS	BIN:x	←	BIN.
			
			
Sealing date:		←	
			
		↑	<u>x</u> <u>xx</u> <u>xx</u> <u>xx</u> Year Month Day
			Manufacture Location