



BRIGHT LED ELECTRONICS CORP.

Specification for Approval

- DEVICE NUMBER: BB-HBRG32L-3-TRB-0

SAMPLES
ATTACHED AREA

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| 2021/06/17 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | Initial Released |
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FOR CUSTOMER'S APPROVAL STAMP OR SIGNATURE

| APPROVED | PURCHASE | MANUFACTURE | QUALITY | ENGINEERING |
|----------|----------|-------------|---------|-------------|
| | | | | |

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| ISSUED | APPROVED | PREPARED |
|--------|----------|----------|
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● Features:

1. Emitted Color: Red, Green, Blue,
2. Lens Appearance: Water Clear.
3. 5.4x5.0x1.6mm standard package.
4. Applied Voltage : 5V
5. Power consumption : 0.3W
6. Suitable for all SMT assembly methods.
7. Compatible with infrared and vapor phase reflow solder process.
8. Compatible with automatic placement equipment.
9. This product doesn't contain restriction Substance, comply ROHS standard.
10. Synchronous of two-lane.
11. 8Bit(256 level)Color set.
12. 5Bit(32 level)brightness adjustment.
13. 18mA Content current output.
14. High contrast.
15. Choose positive output or negative output
RGB tri-color LED output.
16. With self-detection signal
Built-in support for continuous oscillation
PWM output can be maintained
static screen.

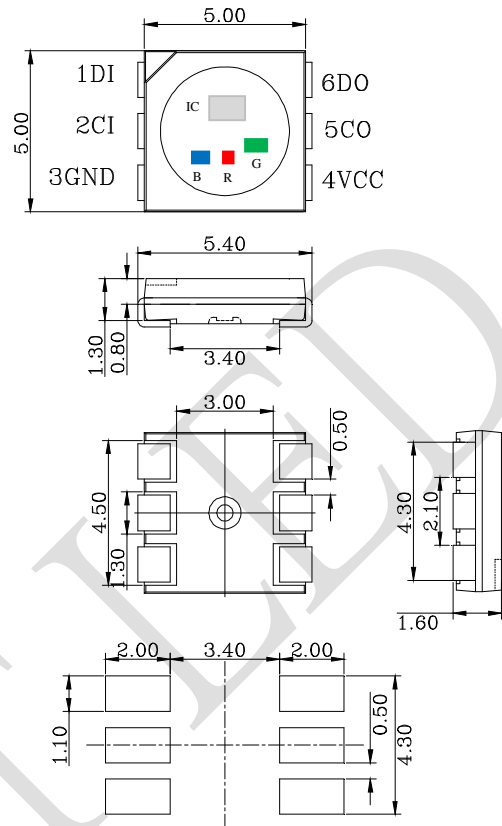
● Applications:

1. Large LED Display.
2. Soft Light Bar.
3. Full Color Display.

● Absolute Maximum Ratings(Ta=25°C)

| Parameter | Symbol | Range | Unit |
|-----------------------|--------|--------------|------|
| Supply voltage | VCC | 4.5~5.5 | V |
| Input Voltage | Vi | -0.4~VDD+0.4 | V |
| Operating Temperature | Topt | -40°C~85°C | - |
| Storage Temperature | Tstg | -40°C~105°C | - |
| Soldering Temperature | Tsol | See Page7 | - |

● 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.



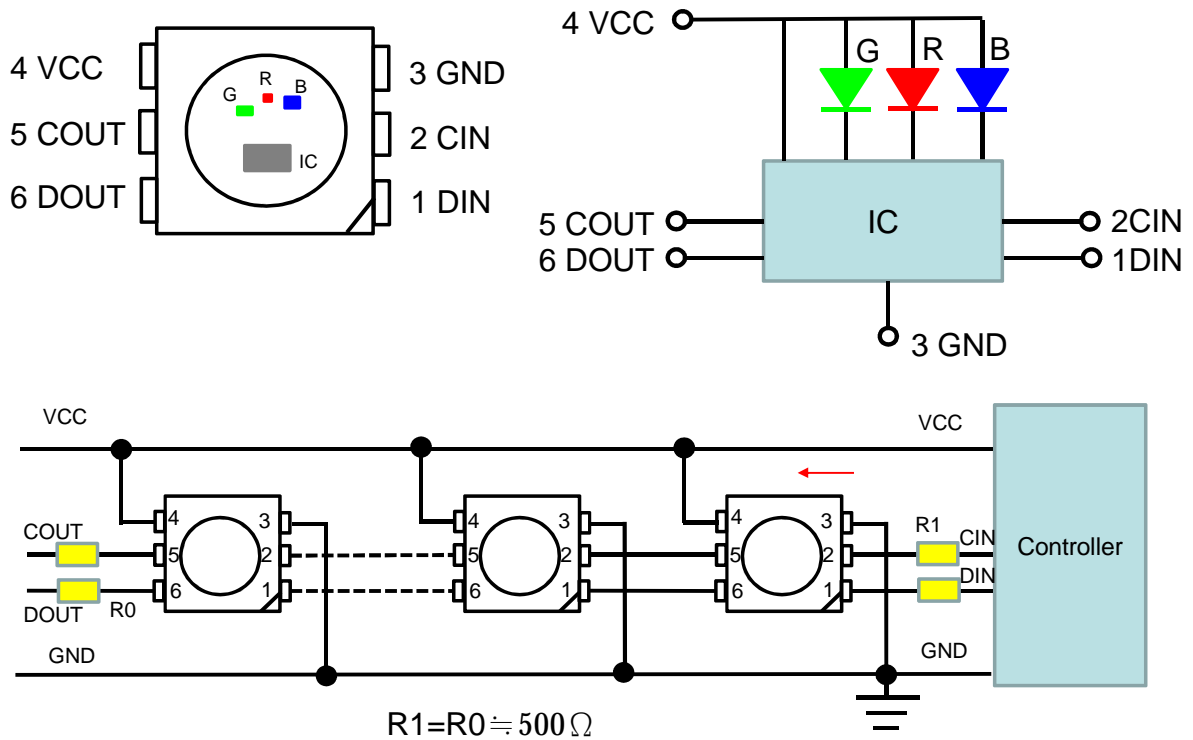
● Electrical characteristics(Ta=25°C)

| 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 |

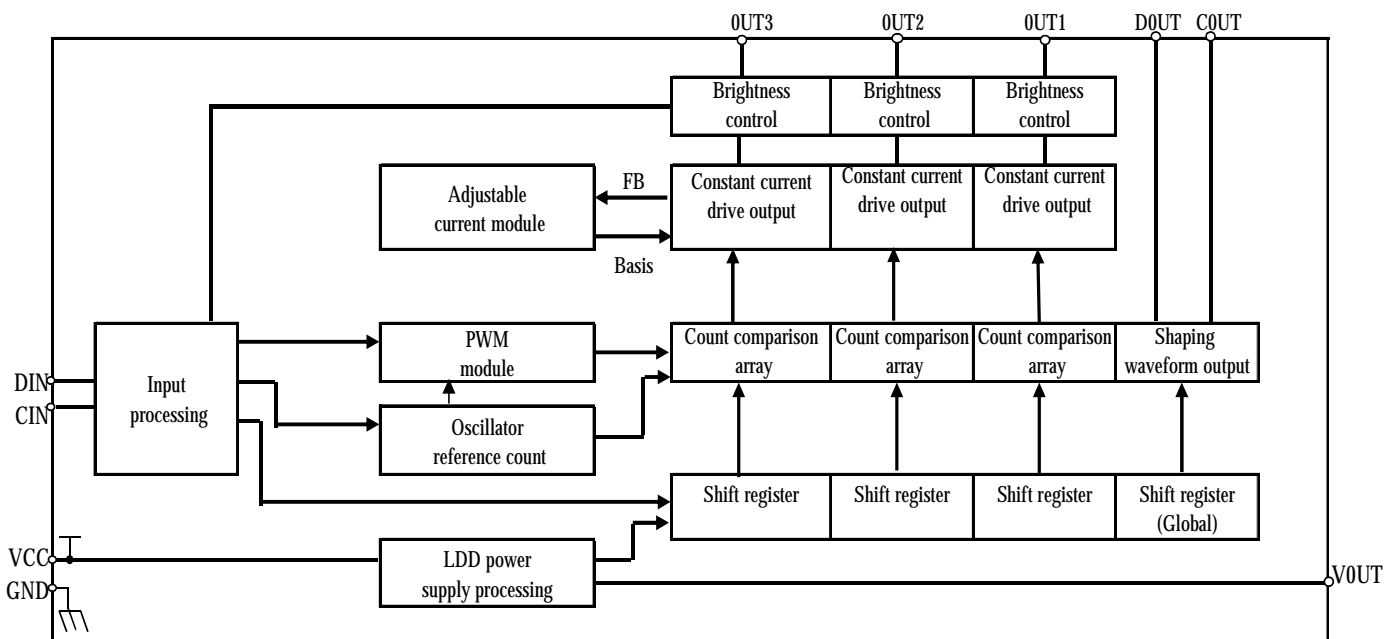
● Optical characteristics(Ta=25°C)

| 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 |

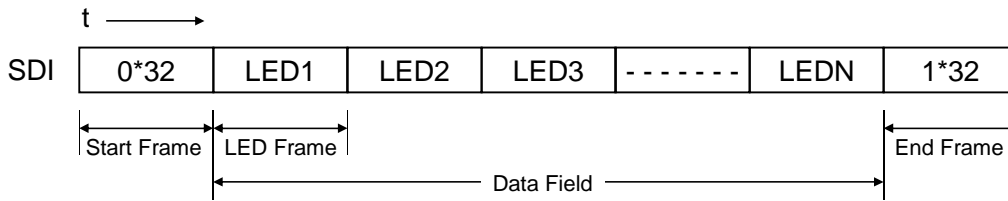
● Circuit diagram



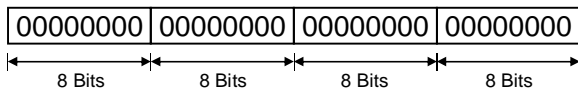
● IC's function diagram



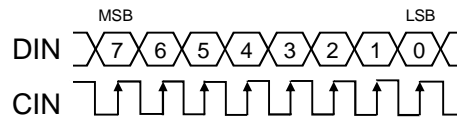
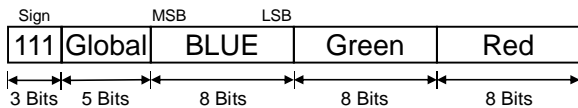
● Sequence Chart



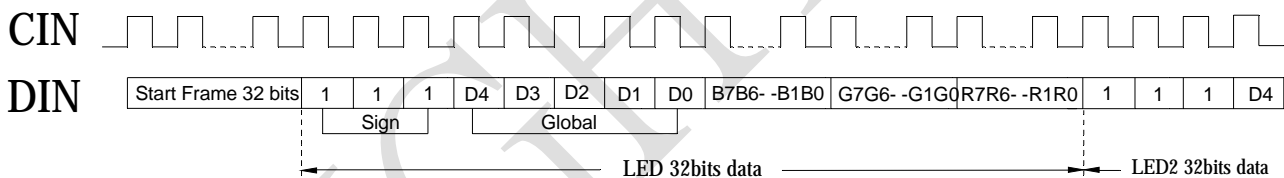
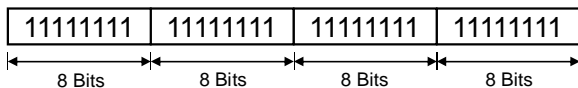
Start Frame 32 Bits



LED Frame 32 Bits



End Frame 32 Bits



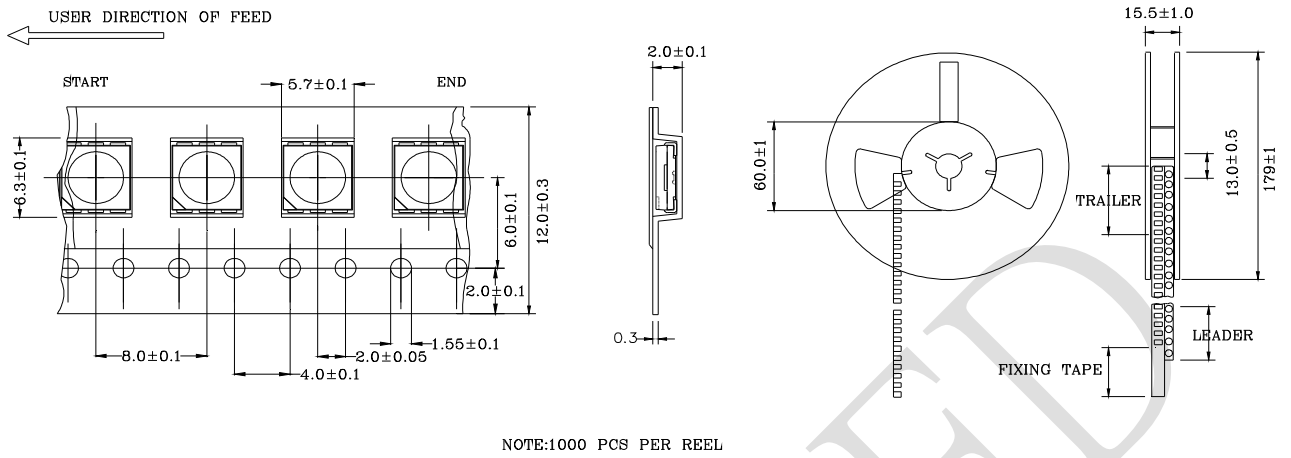
● Global 5-Bit Brightness adjustment

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

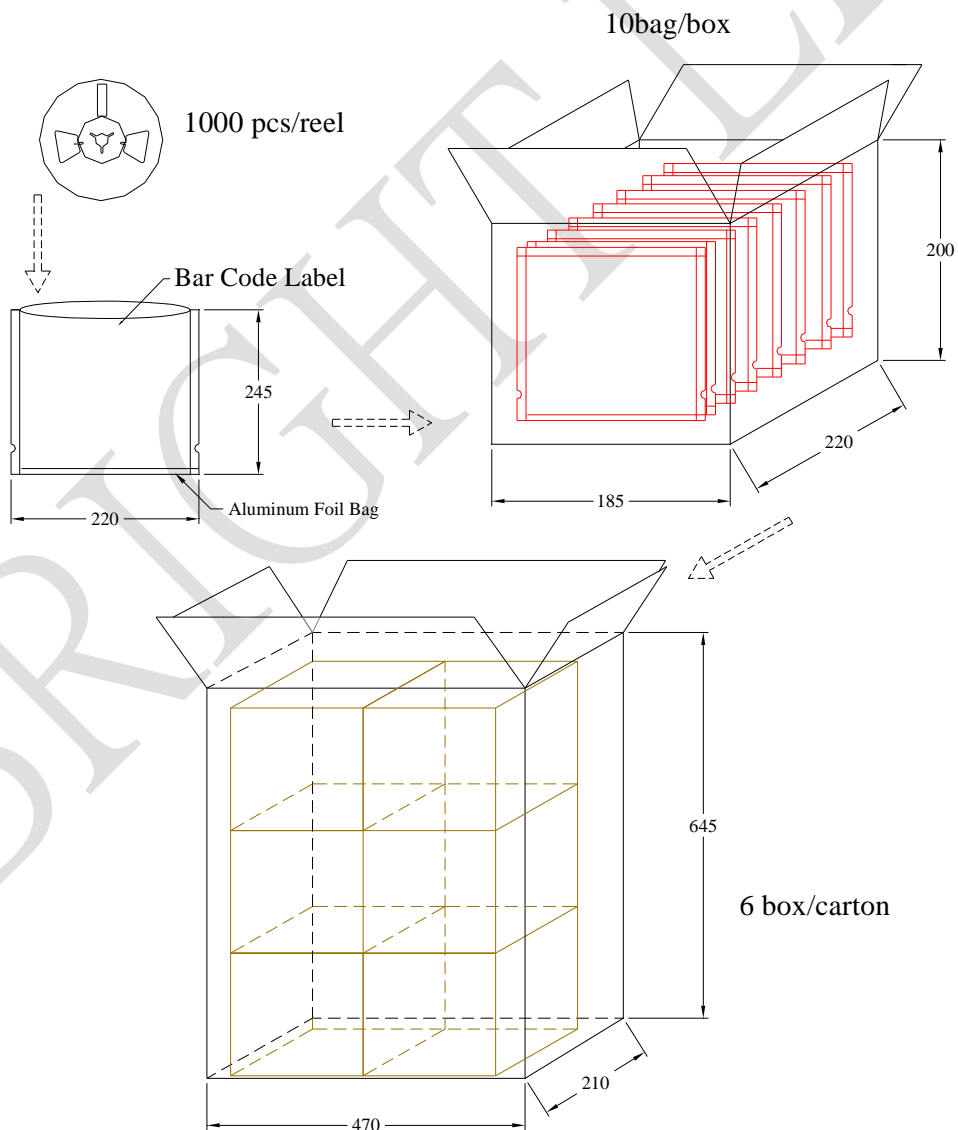
● B/G/R 8-Bit Gray scale adjustment

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

● Tapping and packaging specifications(Units: mm)



● 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 Iout =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 |

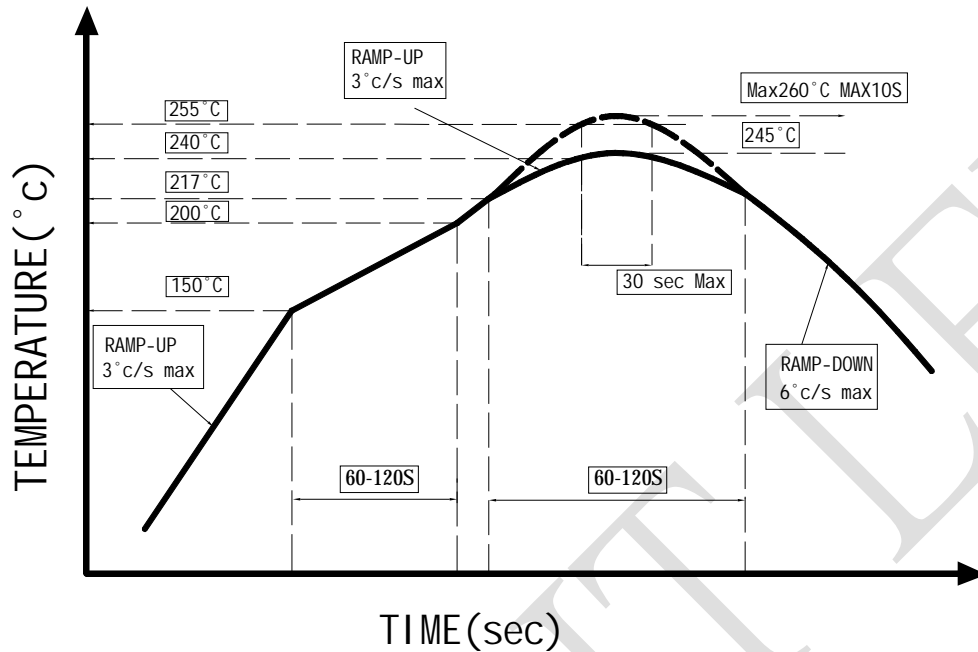
● Judgment criteria of failure for the reliability

| Measuring items | Symbol | Measuring conditions | Judgment criteria for failure |
|--------------------|-----------|----------------------|-------------------------------|
| Luminous intensity | Iv (mcd) | VCC=5V Iout =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.

● Handling Precautions

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

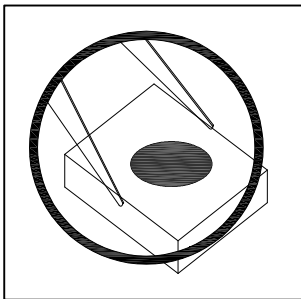
350°C Within 3 sec, one time only.

● Handling Precautions

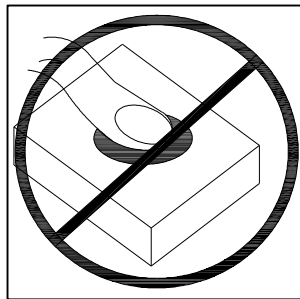
Compare to epoxy encapsulant that is hard and brittle, silicone is softer and flexible. Although its characteristic significantly reduces thermal stress, it is more susceptible to damage by external mechanical force.

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.

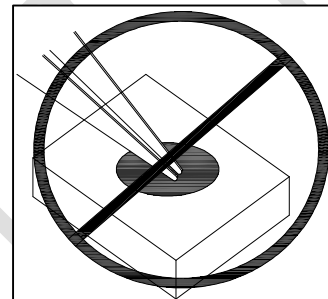
1. Handle the component along the side surfaces by using forceps or appropriate tools. (pic.1)
2. Do not directly touch or handle the silicone lens surface. It may damage the internal circuitry. (pic.2, pic.3)
3. Do not stack together assembled PCBs, containing exposed LEDs. Impact may scratch the silicone 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)



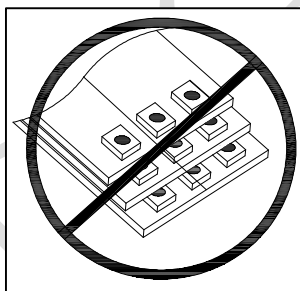
Pic.1



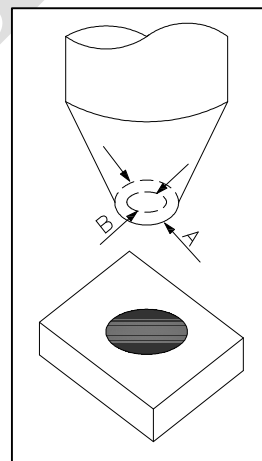
Pic.2



Pic.3



Pic.4



Pic.5



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● 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°C±5°C.

● Package and Label of Products:

- (1) Package: Products are packed in one bag of 1000 pcs (one taping reel) and a label is attached to each bag.
- (2) Label:

