

# SML0603-G4-TR

Hi-Eff Green

Surface Mount LED

1.6 × 0.8 × 0.8mm Chip LED

120° viewing angle

DWG BY:  
BL / GP  
09-25-06

CHK BY:  
PL  
12-27-06

QA:  
\_\_-\_\_-06

MFG:  
\_\_-\_\_-\_\_

REVISION LTR: -  
12-27-06

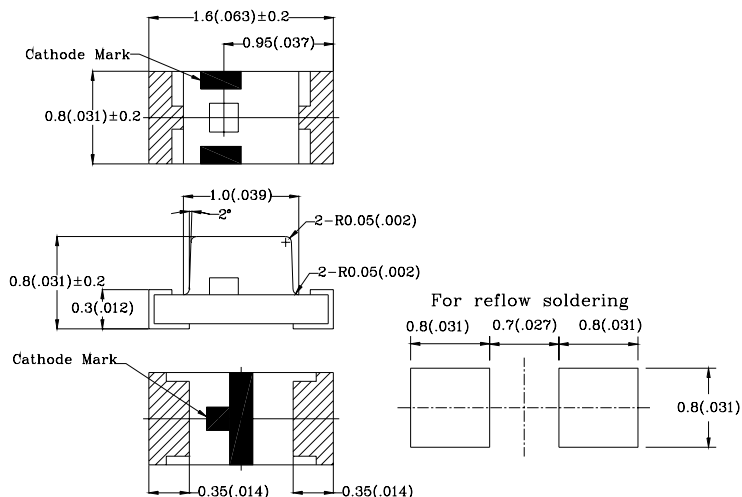
• **Features:**

1. Emitted Color : Hi-Eff Green
2. Lens Appearance : Water Clear.
3. Mono-color type.
4. 1.6x0.8x0.8mm(0603) standard package.
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 is RoHS compliant.

• **Applications:**

1. Automotive : Dashboards, stop lamps, turn signals.
2. Backlighting : LCDs, Key pads advertising.
3. Status indicators : Consumer & industrial electronics.
4. General use.

• **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.

• **Absolute Maximum Ratings(Ta=25°C)**

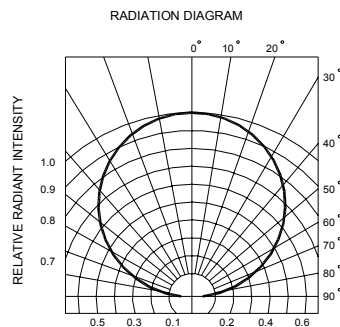
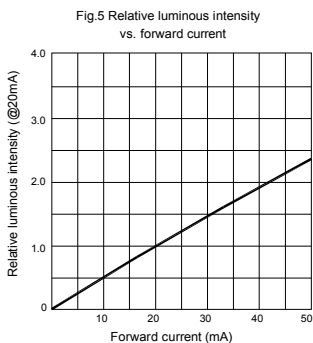
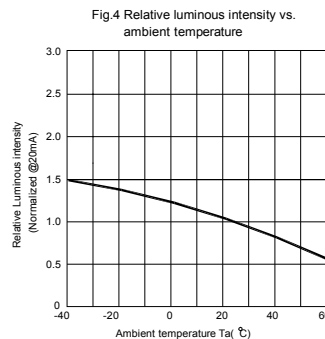
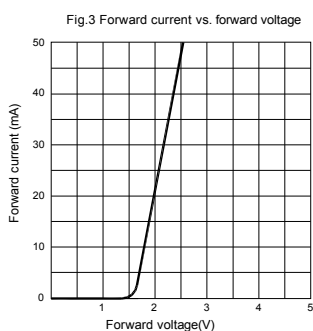
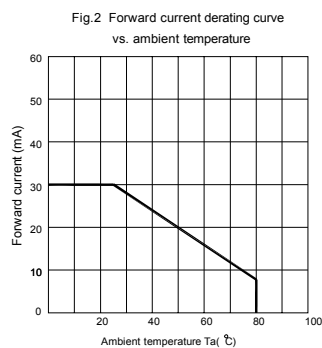
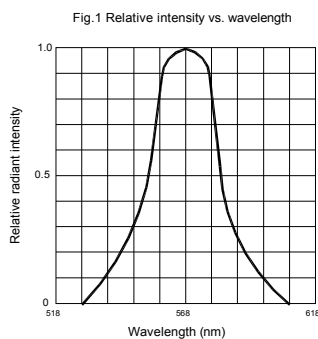
| Parameter                 | Symbol          | Rating     | Unit |
|---------------------------|-----------------|------------|------|
| Power Dissipation         | Pd              | 80         | mW   |
| Forward Current           | I <sub>F</sub>  | 30         | mA   |
| Peak Forward Current *1 * | I <sub>FP</sub> | 100        | mA   |
| Reverse Voltage           | V <sub>R</sub>  | 5          | V    |
| Operating Temperature     | Topr            | -55°C~85°C | -    |
| Storage Temperature       | Tstg            | -55°C~85°C | -    |
| Soldering Temperature     | Tsol            | See Page6  | -    |

\* 1 Condition for I<sub>FP</sub> is pulse of 1/10 duty and 0.1msec width.

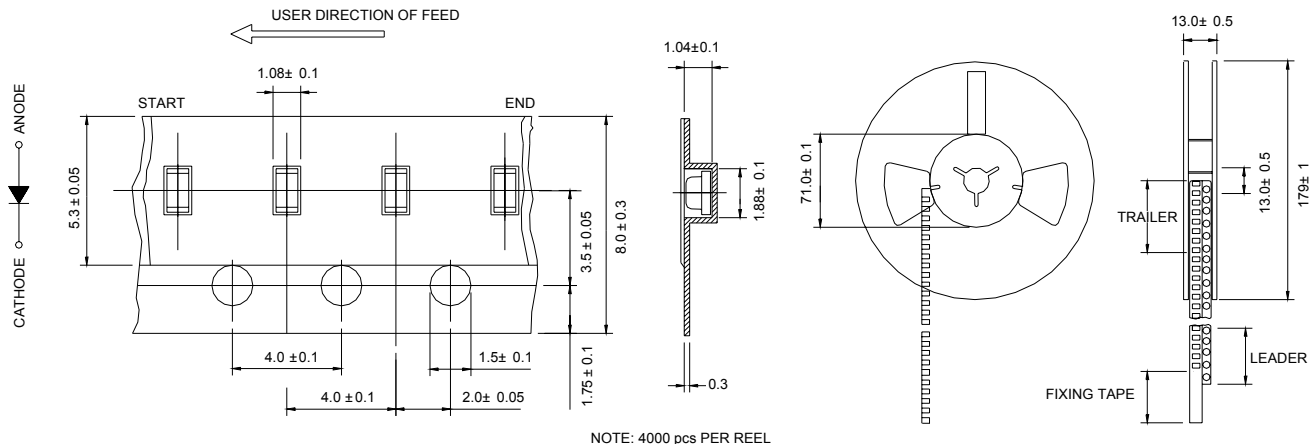
• **Electrical and optical characteristics (Ta=25°C)**

| Parameter                | Symbol          | Condition         | Min. | Typ. | Max. | Unit             |
|--------------------------|-----------------|-------------------|------|------|------|------------------|
| Forward Voltage          | $V_F$           | $I_F=20\text{mA}$ | -    | 2.2  | 2.6  | V                |
| Luminous Intensity       | $I_v$           | $I_F=20\text{mA}$ | 3.7  | 10   | -    | mcd              |
| Reverse Current          | $I_R$           | $V_R=5\text{V}$   | -    | -    | 100  | $\mu\text{A}$    |
| Peak Wave Length         | $\lambda_p$     | $I_F=20\text{mA}$ | 562  | 565  | 569  | nm               |
| Dominant Wave Length     | $\lambda_d$     | $I_F=20\text{mA}$ | 565  | 570  | 572  | nm               |
| Spectral Line Half-width | $\Delta\lambda$ | $I_F=20\text{mA}$ | -    | 29   | -    | nm               |
| Viewing Angle            | $2\theta_{1/2}$ | $I_F=20\text{mA}$ | -    | 120  | -    | deg              |
| Radiant Intensity        |                 | $I_F=20\text{mA}$ | -    | -    | -    | $\mu\text{W/sr}$ |
| Chromaticity Coordinates | X               | $I_F=20\text{mA}$ | -    | 0.45 | -    |                  |
|                          | Y               |                   | -    | 0.54 | -    |                  |

• **Typical Electro-Optical Characteristics Curves**



• Tapping and packaging specifications (Units: mm)



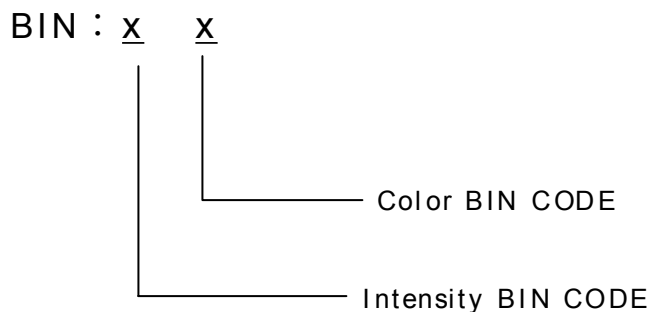
• Bin Limits

Intensity Bin Limits (At 20mA)

| BIN CODE | Min. (mcd) | Max. (mcd) |
|----------|------------|------------|
| G        | 3.2        | 6.3        |
| H        | 4.8        | 9.4        |
| J        | 7.0        | 14.0       |
| K        | 11.0       | 21.0       |

Color Bin Limits (At 20mA)

| BIN CODE | Min. (mcd) | Max. (mcd) |
|----------|------------|------------|
| 4        | 565        | 569        |
| 5        | 567        | 571        |
| 6        | 569        | 573        |
| 7        | 571        | 575        |
| 8        | 573        | 577        |



• **Reliability Test**

| Classification     | Test Item                              | Reference Standard                                                          | Test Conditions                                                                                       | Result |
|--------------------|----------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------|
| Endurance Test     | Operation Life                         | MIL-STD-750:1026<br>MIL-STD-883:1005<br>JIS-C-7021 :B-1                     | Ta=Under Room Temperature As Per Data Sheet Maximum Rating<br>Test Time=1000HRS(-24HRS,+72HRS) @ 20mA | 0/20   |
|                    | High Temperature High Humidity Storage | MIL-STD-202:103B<br>JIS-C-7021 :B-11                                        | Ta=+65°C±5°C<br>RH=90%-95%<br>Test time=240hrs±2HRS                                                   | 0/20   |
|                    | High Temperature Storage               | MIL-STD-883:1008<br>JIS-C-7021 :B-10                                        | High Ta=+105°C±5°C<br>Test time=1,000hrs(-24HRS,+72HRS)                                               | 0/20   |
|                    | Low Temperature Storage                | JIS-C-7021 :B-12                                                            | Low Ta=-55°C±5°C<br>Test time=1,000hrs(-24HRS,+72HRS)                                                 | 0/20   |
| Environmental Test | Temperature Cycling                    | MIL-STD-202:107D<br>MIL-STD-750:1051<br>MIL-STD-883:1010<br>JIS-C-7021 :A-4 | +105°C ~ +25°C ~ -55°C ~ +25°C<br>30min 5min 30min 5min<br>Test Time=10cycle                          | 0/20   |
|                    | Thermal Shock                          | MIL-STD-202:107D<br>MIL-STD-750:1051<br>MIL-STD-883:1011                    | IR-Reflow In-Board, 2 Times 85±5°C (10min)~-40±5°C(10min)<br>Test Time=10cycle                        | 0/20   |
|                    | Solder Resistance                      | MIL-STD-202:201A<br>MIL-STD-750:2031<br>JIS-C-7021 :A-1                     | T.sol=260±5<br>Dwell Time=10±1secs                                                                    | 0/20   |
|                    | IR-Reflow                              | -                                                                           | Ramp-up rate(183°C to Peak)+3°C 1sec max                                                              | 0/20   |
|                    | Solderability                          | -                                                                           | Temp maintain at 125±25°C 120sec max                                                                  | 0/20   |
|                    |                                        |                                                                             | Temp maintain above 183°C 60 ~ 150sec                                                                 | 0/20   |
|                    |                                        |                                                                             | Peak temperature range 235°C~ 240°C                                                                   | 0/20   |
|                    |                                        |                                                                             | Time within 5°C of actual Pwck Temperature 10-30sec                                                   | 0/20   |
|                    | Solderability                          | -                                                                           | Ramp-down rate+6°C 1sec max                                                                           | 0/20   |
|                    |                                        |                                                                             | T.sol=235±5°C                                                                                         | 0/20   |
|                    |                                        |                                                                             | Immersion time 2±0.5sec                                                                               | 0/20   |
|                    |                                        |                                                                             | Immersion rate 25±2.5mm/sec                                                                           | 0/20   |
|                    |                                        |                                                                             | Coverage ≥ 95% of the dipped surface                                                                  | 0/20   |

• **Judgment criteria of failure for the reliability**

| Measuring items    | Symbol                 | Measuring conditions | Judgement criteria for failure |
|--------------------|------------------------|----------------------|--------------------------------|
| Forward voltage    | V <sub>F</sub> ( V )   | I <sub>F</sub> =20mA | Over Ux1.2                     |
| Reverse current    | I <sub>R</sub> (uA)    | V <sub>R</sub> =5V   | Over Ux2                       |
| Luminous intensity | I <sub>v</sub> ( mcd ) | I <sub>F</sub> =20mA | Below SX0.5                    |

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

2.Measurment shall be taken between 2 hours and after the test pieces have been returned to normal ambient conditions after completion of each test.

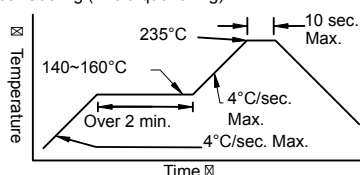
## 1. Soldering

### Manual of Soldering

The temperature of the iron tip should not be higher than 300°C (572°F) and soldering within 3 seconds per solder-land is to be observed.

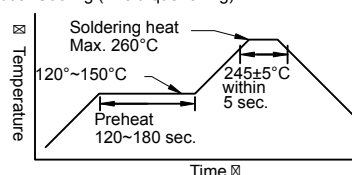
#### Reflow Soldering

Preheating: 140°C~160°C  $\pm 5^{\circ}\text{C}$ , within 2 minutes.  
 Operation heating: 260°C (Max.) within 10 seconds. (Max.)  
 Gradual Cooling (Avoid quenching).



#### DIP Soldering (Wave Soldering)

Preheating: 120°C~150°C, within 120~180 sec.  
 Operation heating: 245°C  $\pm 5^{\circ}\text{C}$  within 5 sec.  
 260°C (Max.)  
 Gradual Cooling (Avoid quenching).



## 2. Handling

Care must be taken not to cause damage to the epoxy resin portion of LEDs while it is exposed to high temperatures, or abrade the epoxy resin portion of LEDs with hard or sharp items as from sand blasting and the use of sharp metallic objects.

## 3. 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.

## 4. 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, store it in the following environment:

- (1) Temperature: 5°C~30°C (41°F~86°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 30% RH
- (3) Devices require baking before mounting if: (2)a or (2)b is not met.
- (4) If baking is required, devices must be baked under below conditions:
 

12 hours at 60°C  $\pm 3^{\circ}\text{C}$