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# SML13RGB2KH-TR

Super Red/Aqua Green/Super Blue

Surface Mount LED

3.2 × 2.7 × 1.1 mm Chip LED

120° Viewing Angle

DWG BY:  
BL / GP  
01-19-07

R&D:  
UF  
09-10-19

MFG:  
LD  
09-10-19

QA:  
SB  
09-10-19

REVISION LTR: C  
ECR#: 091019-GP01  
09-10-19

## ● Features:

1. Emitted Color : Super Red;  
Aqua Green and Super Blue
2. Lens Appearance : Water Clear
3. Multi-color type.
4. 3.2x2.7x1.1mm(1210) 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 doesn't contain restriction  
Substance, comply ROHS standard.

## ● Applications:

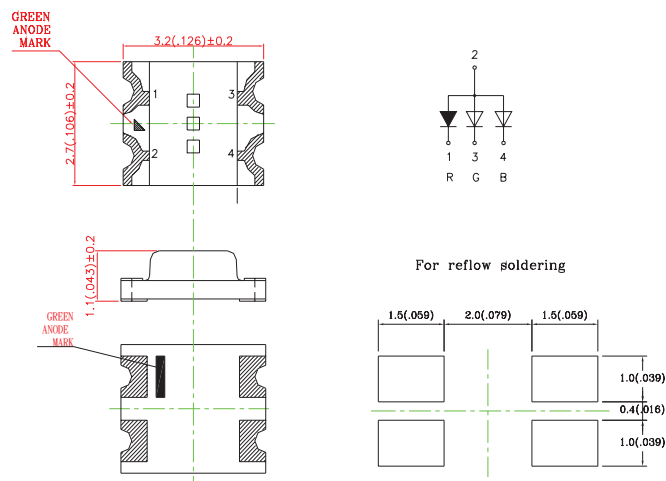
1. Backlighting : LCDs, Key pads advertising.
2. Status indicators : Consumer & industrial  
electronics.
3. General use.

## ● Absolute Maximum Ratings(Ta=25°C)

| Parameter                | Symbol          | Super Red   | Aqua Green | Super Blue | Unit |
|--------------------------|-----------------|-------------|------------|------------|------|
| Power Dissipation        | Pd              | 50          | 70         | 70         | mW   |
| Forward Current          | I <sub>F</sub>  | 20          | 20         | 20         | mA   |
| Peak Forward Current * 1 | I <sub>FP</sub> | 100         | 100        | 100        | mA   |
| Reverse Voltage          | V <sub>R</sub>  | 5           |            |            | V    |
| Operating Temperature    | Topr            | -40°C~+85°C |            |            | -    |
| Storage Temperature      | Tstg            | -40°C~+85°C |            |            | -    |
| Soldering Temperature    | Tsol            | See Page7   |            |            | -    |

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

## ● Package Dimensions:



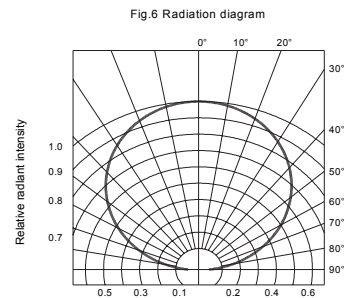
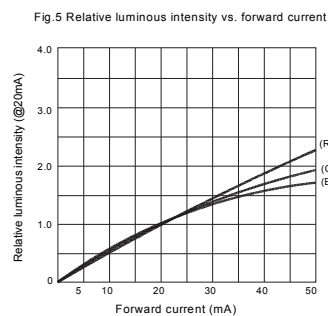
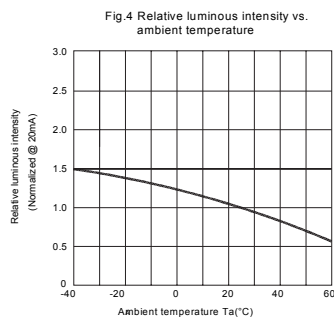
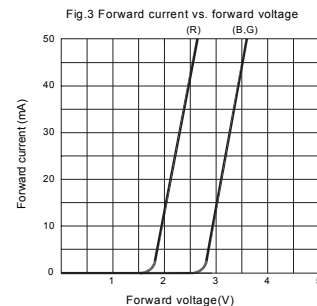
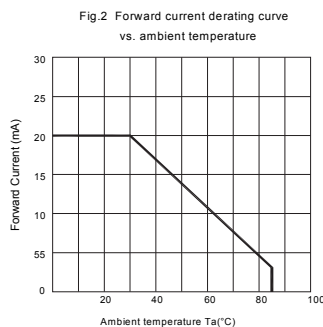
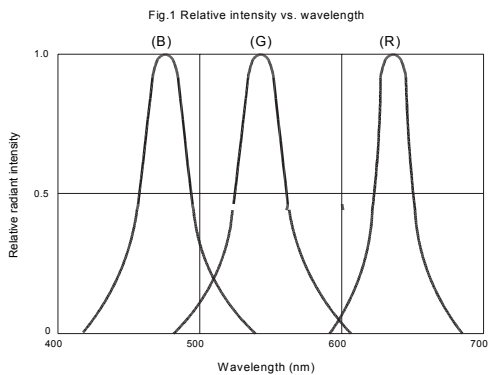
### NOTES:

- 1.All dimensions are in millimeters .
- 2.Tolerance is ± 0.10mm unless otherwise specified.
- 3.Specifications are subject to change without notice.

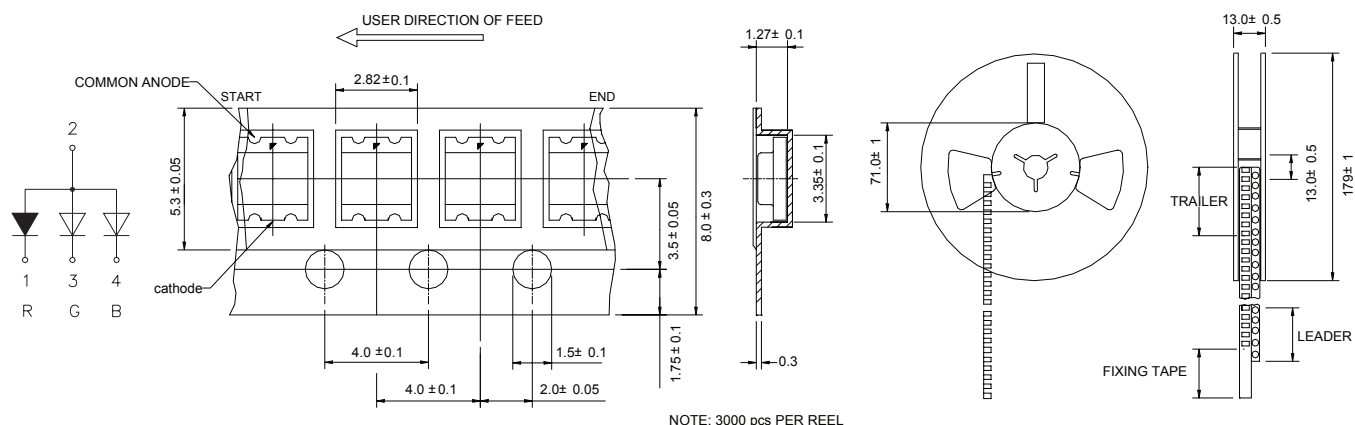
## ● Electrical and optical characteristics(Ta=25°C)

| Parameter                | Symbol            | Condition            | Color                                 | Min.              | Typ.              | Max.              | Unit |
|--------------------------|-------------------|----------------------|---------------------------------------|-------------------|-------------------|-------------------|------|
| Forward Voltage          | V <sub>F</sub>    | I <sub>F</sub> =20mA | Super Red<br>Aqua Green<br>Super Blue | -<br>-<br>-       | 2.0<br>2.9<br>3.2 | 2.6<br>3.6<br>3.6 | V    |
| Luminous Intensity       | I <sub>v</sub>    | I <sub>F</sub> =20mA | Super Red<br>Aqua Green<br>Super Blue | -<br>-<br>-       | 130<br>600<br>127 | -                 | mcd  |
| Reverse Current          | I <sub>R</sub>    | V <sub>R</sub> =5V   | Super Red<br>Aqua Green<br>Super Blue | -<br>-<br>-       | -<br>-<br>-       | 100<br>1<br>1     | μA   |
| Peak Wave Length         | λ <sub>p</sub>    | I <sub>F</sub> =20mA | Super Red<br>Aqua Green<br>Super Blue | -<br>-<br>-       | 633<br>518<br>464 | -                 | nm   |
| Dominant Wave Length     | λ <sub>d</sub>    | I <sub>F</sub> =20mA | Super Red<br>Aqua Green<br>Super Blue | 615<br>520<br>465 | 622<br>526<br>468 | 625<br>530<br>470 | nm   |
| Spectral Line Half-width | Δλ                | I <sub>F</sub> =20mA | Super Red<br>Aqua Green<br>Super Blue | -<br>-<br>-       | 20<br>34<br>25    | -                 | nm   |
| Viewing Angle            | 2θ <sub>1/2</sub> | I <sub>F</sub> =20mA | Super Red<br>Aqua Green<br>Super Blue | -<br>-<br>-       | 120               | -                 | deg  |
| Chromaticity Coordinates | X                 | I <sub>F</sub> =20mA | Super Red                             | -                 | 0.69              | -                 |      |
|                          | Y                 |                      |                                       | -                 | 0.30              | -                 |      |
| Chromaticity Coordinates | X                 | I <sub>F</sub> =20mA | Aqua Green                            | -                 | 0.16              | -                 |      |
|                          | Y                 |                      |                                       | -                 | 0.72              | -                 |      |
| Chromaticity Coordinates | X                 | I <sub>F</sub> =20mA | Super Blue                            | -                 | 0.13              | -                 |      |
|                          | Y                 |                      |                                       | -                 | 0.06              | -                 |      |

## ● Typical Electro-Optical Characteristics Curves



● **Tapping and packaging specifications(Units: mm)**  
**Quantity:3000PCS**



● **Bin Limits**

**Intensity Bin Limits (JE) (20mA)**

| BIN CODE | Min. (mcd) | Max. (mcd) |
|----------|------------|------------|
| P        | 63         | 94         |
| Q        | 94         | 140        |
| R        | 140        | 210        |
| S        | 210        | 317        |

Tolerance for each Bin limit is  $\pm 15\%$ .

**Intensity Bin Limits (G6) (20mA)**

| BIN CODE | Min. (mcd) | Max. (mcd) |
|----------|------------|------------|
| S        | 210        | 317        |
| T        | 317        | 475        |
| U        | 475        | 715        |
| V        | 715        | 1070       |

Tolerance for each Bin limit is  $\pm 15\%$ .

**Color Bin Limits (G6) (20mA)**

| BIN CODE | Min. (nm) | Max. (nm) |
|----------|-----------|-----------|
| 6        | 520       | 525       |
| 7        | 525       | 530       |

Tolerance for each Bin limit is  $\pm 1\text{nm}$ .

**V<sub>F</sub> Bin Limits (G6) (20mA)**

| BIN CODE | Min.(v) | Max.(v) |
|----------|---------|---------|
| G        | 2.8     | 3.0     |
| H        | 3.0     | 3.2     |
| J        | 3.2     | 3.4     |
| K        | 3.4     | 3.6     |

Tolerance for each Bin limit is  $\pm 0.05\text{V}$ .

## ● Bin Limits

### Intensity Bin Limits (BH) (20mA)

| BIN CODE | Min. (mcd) | Max. (mcd) |
|----------|------------|------------|
| P        | 63         | 94         |
| Q        | 94         | 140        |
| R        | 140        | 210        |
| S        | 210        | 317        |

Tolerance for each Bin limit is  $\pm 15\%$ .

### Color Bin Limits (BH) (20mA)

| BIN CODE | Min. (nm) | Max. (nm) |
|----------|-----------|-----------|
| 4        | 465       | 470       |

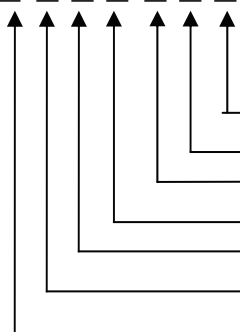
Tolerance for each Bin limit is  $\pm 1\text{nm}$ .

### V<sub>F</sub> Bin Limits (BH) (20mA)

| BIN CODE | Min.(v) | Max.(v) |
|----------|---------|---------|
| G        | 2.8     | 3.0     |
| H        | 3.0     | 3.2     |
| J        | 3.2     | 3.4     |
| K        | 3.4     | 3.6     |

Tolerance for each Bin limit is  $\pm 0.05\text{V}$ .

## ● BIN : X-X X X-X X X



### ● Reliability Test

| Classification     | Test Item                              | Reference Standard                                                             | Test Conditions                                                               | Result |
|--------------------|----------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------|
| Endurance Test     | Operation Life                         | MIL-STD-750D:1026<br>MIL-STD-883D:1005<br>JIS-C-7021 :B-1                      | Ta: Under room temperature<br>Test time:1,000hrs<br>IF=Product Recommended IF | 0/32   |
|                    | High Temperature High Humidity Storage | MIL-STD-202F:103B<br>JIS-C-7021 :B-11                                          | Ta:85±5°C<br>RH:90%-95%<br>Test time:240hrs                                   | 0/32   |
|                    | High Temperature Storage               | MIL-STD-883:1008<br>JIS-C-7021 :B-10                                           | Ta:100±5°C<br>Test time:1,000hrs                                              | 0/32   |
|                    | Low Temperature Storage                | JIS-C-7021 :B-11                                                               | Ta: -45±5°C<br>Test time=1,000hrs                                             | 0/32   |
| Environmental Test | Temperature Cycling                    | MIL-STD-202F:107D<br>MIL-STD-750D:1051<br>MIL-STD-883D:1010<br>JIS-C-7021 :A-2 | Ta:-35±5°C~25±5°C~85±5°C~25±5°C<br>30min 5min 30min 5min                      | 0/32   |
|                    | Thermal Shock                          | MIL-STD-202F:107D(1980)<br>MIL-STD-750D:1051(95)<br>MIL-STD-883D:1011(1991)    | Ta:-45±5°C~+85±5°C<br>20min 20 min<br>Time: 40min/cycle 10cycle               | 0/32   |
|                    | Wetting balance                        | MIL-STD-883:2003<br>MIL-STD-202F:208D<br>MIL-STD-883D:2003                     | Ta:230±5°C<br>Time:5±0.5s                                                     | 0/32   |
|                    | Solder Resistance                      | MIL-STD-202F:210A<br>MIL-STD-883D:1011<br>JIS-C-7021 :A-1                      | Ta:260±10°C<br>Time:10±1s                                                     | 0/32   |

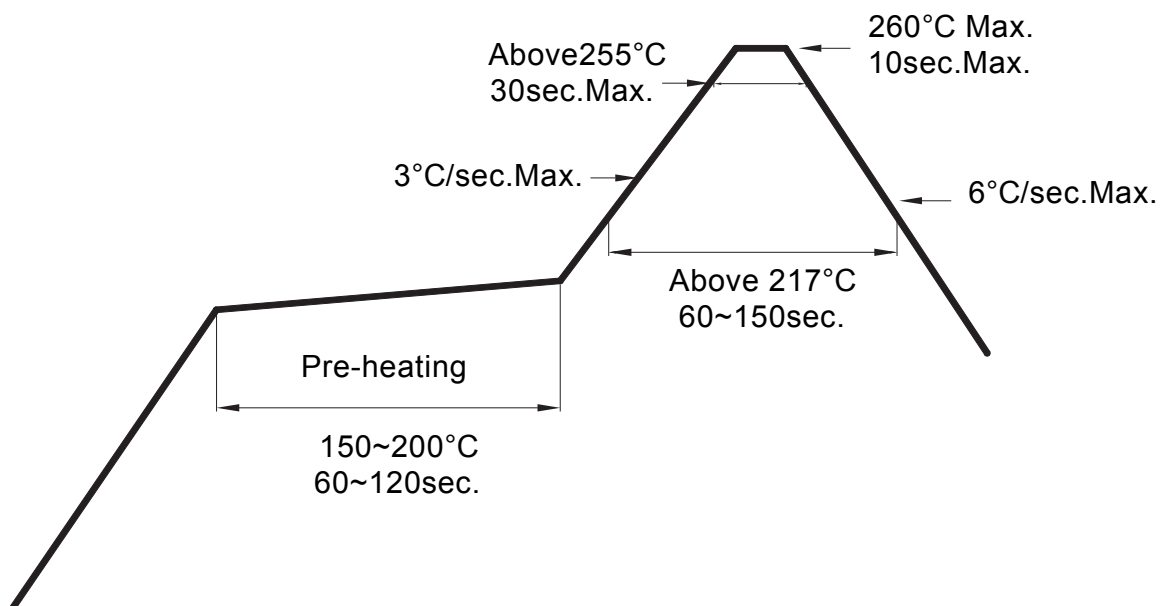
### ● Judgment criteria of failure for the reliability

| Measuring items    | Symbol             | Measuring conditions | Judgement criteria for failure |
|--------------------|--------------------|----------------------|--------------------------------|
| Forward voltage    | $V_F$ ( V )        | $I_F=20\text{mA}$    | Initial Level*1.1              |
| Reverse current    | $I_R(\mu\text{A})$ | $V_R=5\text{V}$      | Over U*2                       |
| Luminous intensity | $I_v$ ( mcd )      | $I_F=20\text{mA}$    | Initial Level*0.7              |

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

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

## ● IR-Reflow Soldering



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

**$350^{\circ}\text{C}$  Within 3 sec.,One time only.**

### ● 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 168 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:  
48 hours at 60°C±3°C

### ● Package and Label of Products:

- (1) Package: Products are packed in one bag of 3000 pcs (one taping reel) and a label is attached on each bag.