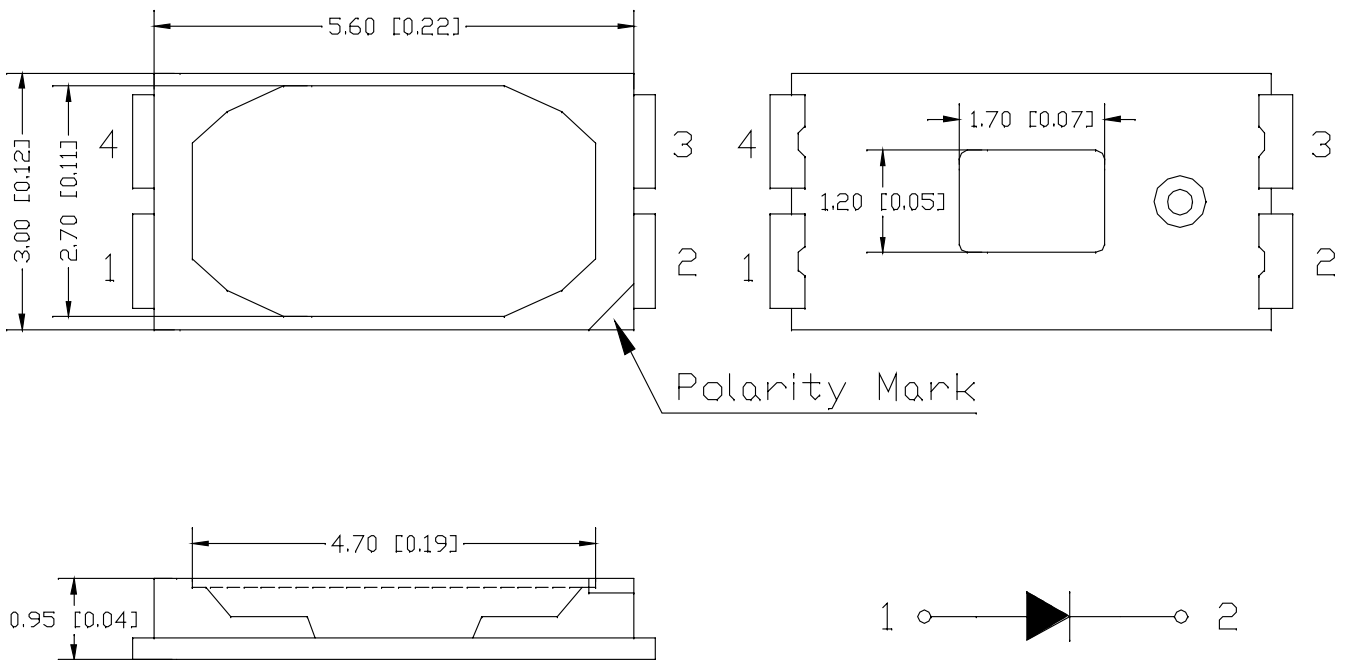



### Feature

- ◆ Viewing angle:120 deg
- ◆ The materials of the LED dice is InGaN
- ◆ 6.10mm×3.00mm×0.95mm
- ◆ RoHS compliant lead-free soldering compatible

**RF-\*\*MI56DS-FD-J**

### Package Outline





**ATTENTION**  
 OBSERVE PRECAUTIONS  
 FOR HANDLING  
 ELECTROSTATIC  
 SENSITIVE DEVICES

### NOTES:

1. All dimensions are in millimeters (inches);
2. Tolerances are ±0.2mm (0.008inch) unless otherwise noted.

### Absolute maximum ratings at Ta=25°C

| Parameter                   | Symbol | Value     | Unit |
|-----------------------------|--------|-----------|------|
| Forward current             | If     | 180       | mA   |
| Reverse voltage             | Vr     | 5         | V    |
| Operating temperature range | Top    | -20 ~+85  | °C   |
| Storage temperature range   | Tstg   | -35 ~+85  | °C   |
| Pulse Forward Current       | Ifp    | 180       | mA   |
| Electrostatic Discharge     | ESD    | 2000(HBM) | V    |

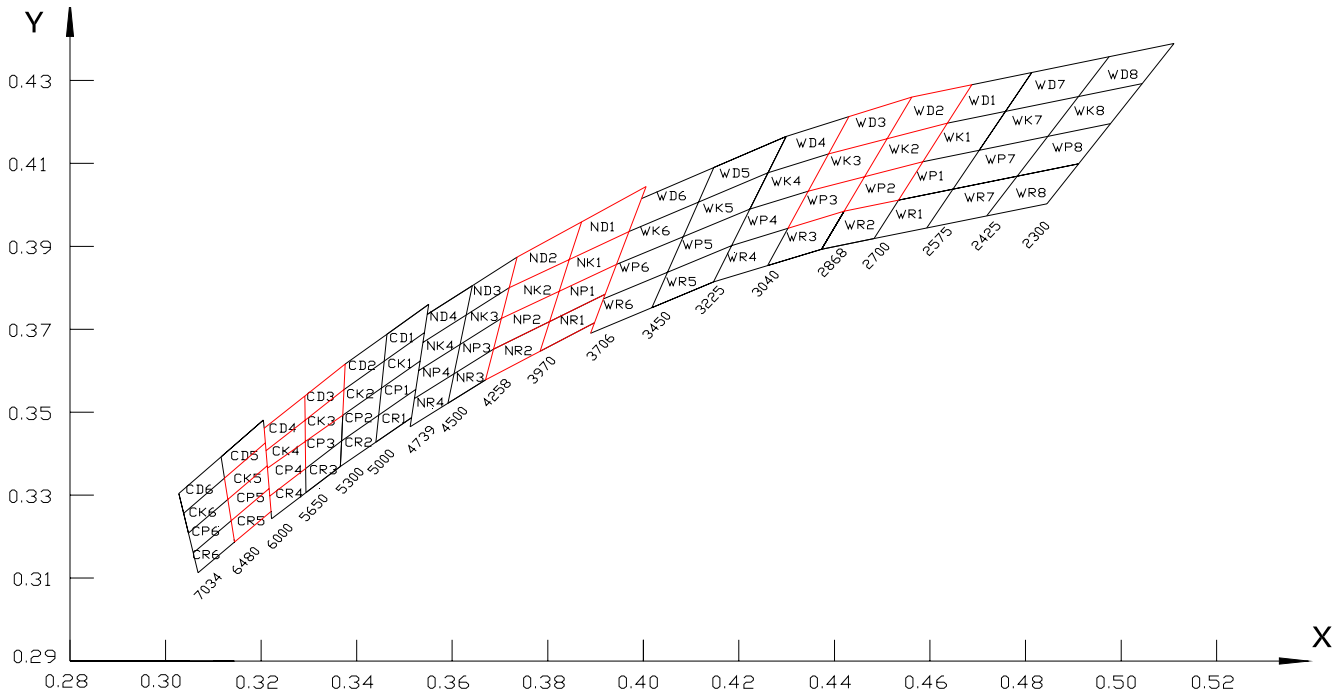
### Electro-optical characteristics at Ta=25°C

| Parameter   | Test Condition | Symbol  | Value    |      | Typ. | Unit |    |
|---|----------------|---------|----------|------|------|------|----|
|   |                |         | Min.     | Max. |      |      |    |
| Forward voltage                                   | If=150mA       | Vf      | Rank G2  | 2.9  | 3.0  | --   | V  |
|   |                |         | Rank H1  | 3.0  | 3.1  | --   | V  |
|   |                |         | Rank H2  | 3.1  | 3.2  | --   | V  |
|   |                |         | Rank I1  | 3.2  | 3.3  | --   | V  |
|   |                |         | Rank I2  | 3.3  | 3.4  | --   | V  |
|   |                |         | Rank J1  | 3.4  | 3.5  | --   | V  |
| RF-IMMI56DS-FD-J<br>Luminous flux<br>(2700-3050K) | If=150mA       | Φ       | Rank SAA | 45.3 | 50.0 |      | lm |
|   |                |         | Rank SBA | 50.0 | 55.3 | 50   | lm |
|   |                |         | Rank SCA | 55.3 | 61.2 |      | lm |
| RF-WNMI56DS-FD-J<br>Luminous flux<br>(3700-4250K) | If=150mA       | Φ       | Rank SAA | 45.3 | 50.0 |      | lm |
|   |                |         | Rank SBA | 50.0 | 55.3 | 54   | lm |
|   |                |         | Rank SCA | 55.3 | 61.2 |      | lm |
| RF-WMMI56DS-FD-J<br>Luminous flux<br>(5300-6450K) | If=150mA       | Φ       | Rank SAA | 45.3 | 50.0 |      | lm |
|   |                |         | Rank SBA | 50.0 | 55.3 | 55   | lm |
|   |                |         | Rank SCA | 55.3 | 61.2 |      | lm |
| Viewing angle at 50% Iv                           | If=150mA       | 2 θ 1/2 | --       | --   | 120  | Deg  |    |
| Color Rendering Index                             | If=150mA       | CRI     | 70       | --   | --   | --   |    |
| Reverse current                                   | Vr=5V          | Ir      | --       | 10   | --   | μA   |    |

NOTE: (Tolerance: Iv ±10%, Vf ±0.05V, X, Y ±0.005)

IFP Conditions: Pulse Width ≦ 10msec. and Duty ≦ 1/10.

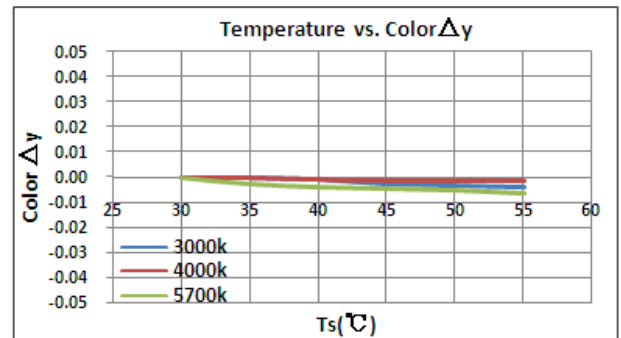
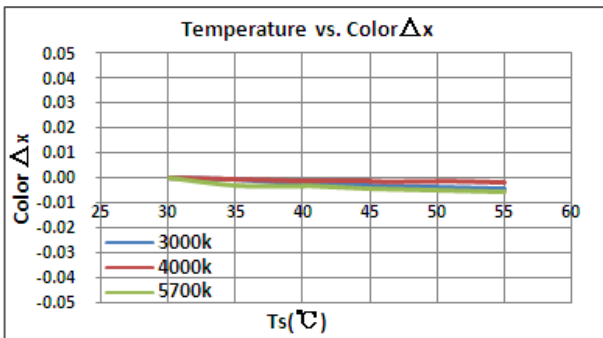
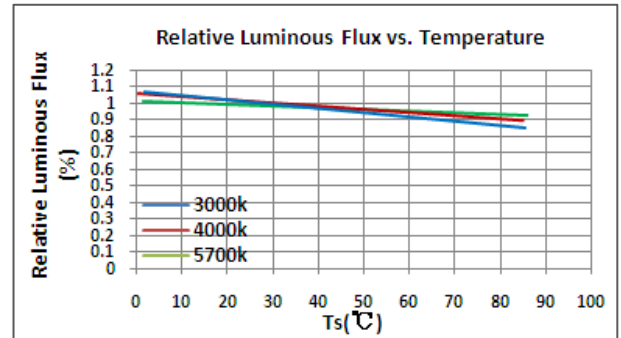
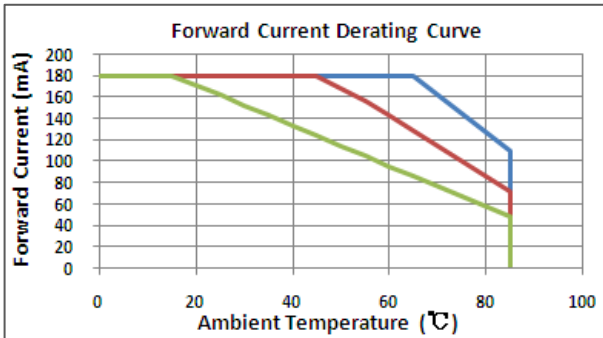
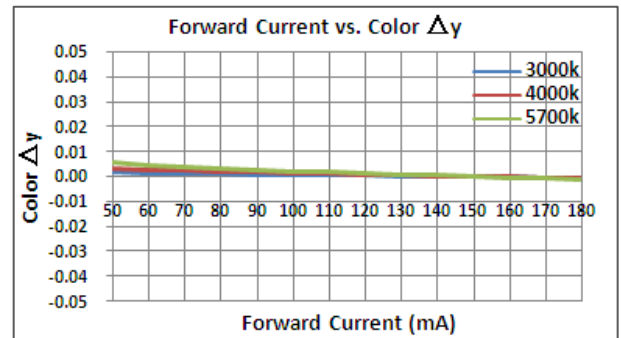
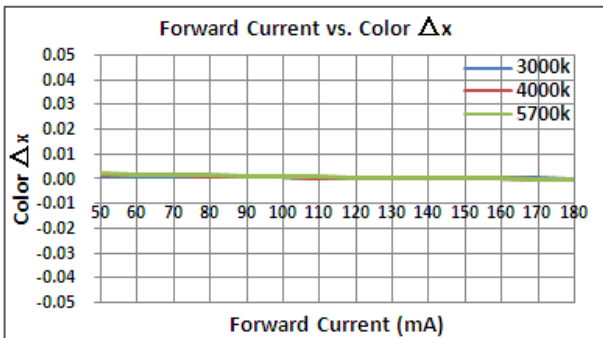
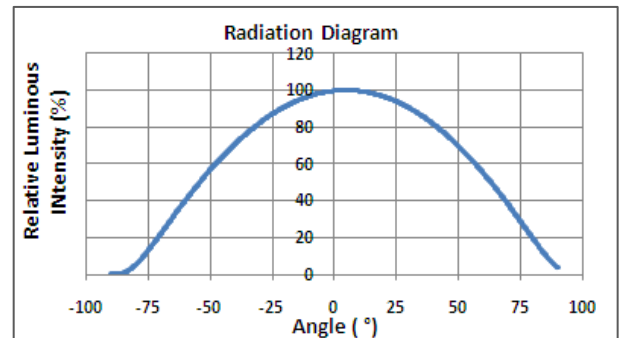
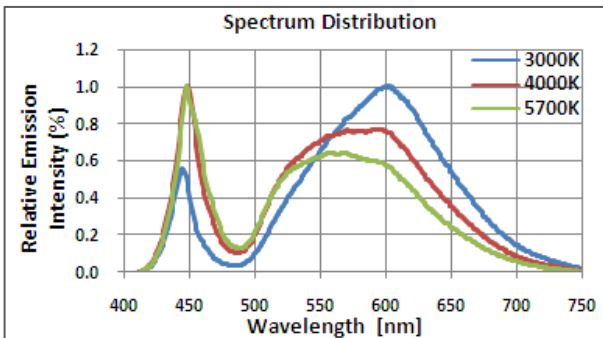
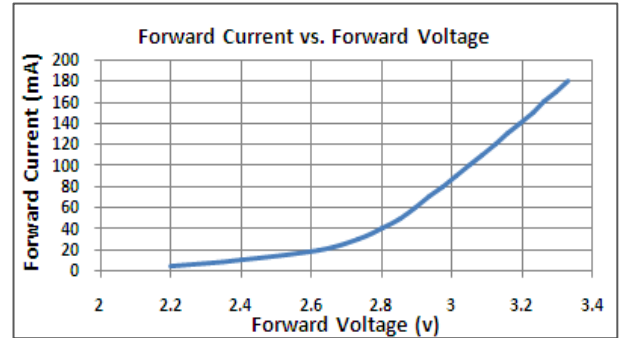
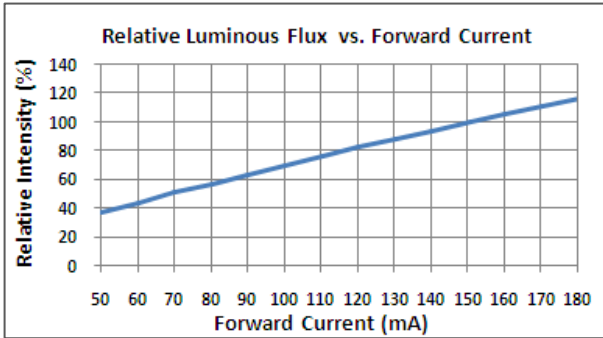
### Chromaticity Bin



### Bin data:

| BIN CODE | CIE-X1 | CIE-Y1 | CIE-X2 | CIE-Y2 | CIE-X3 | CIE-Y3 | CIE-X4 | CIE-Y4 |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| WP2      | 0.4468 | 0.4077 | 0.4585 | 0.4106 | 0.4534 | 0.4011 | 0.4420 | 0.3985 |
| WK2      | 0.4515 | 0.4168 | 0.4636 | 0.4197 | 0.4585 | 0.4106 | 0.4468 | 0.4077 |
| WD2      | 0.4562 | 0.4260 | 0.4688 | 0.4290 | 0.4636 | 0.4197 | 0.4515 | 0.4168 |
| WP3      | 0.4345 | 0.4033 | 0.4468 | 0.4077 | 0.4420 | 0.3985 | 0.4303 | 0.3943 |
| WK3      | 0.4388 | 0.4123 | 0.4515 | 0.4168 | 0.4468 | 0.4077 | 0.4345 | 0.4033 |
| WD3      | 0.4431 | 0.4213 | 0.4562 | 0.4260 | 0.4515 | 0.4168 | 0.4388 | 0.4123 |
| ND1      | 0.3871 | 0.3959 | 0.4006 | 0.4044 | 0.3970 | 0.3936 | 0.3845 | 0.3868 |
| NK1      | 0.3845 | 0.3868 | 0.3970 | 0.3936 | 0.3943 | 0.3853 | 0.3824 | 0.3790 |
| NP1      | 0.3824 | 0.3790 | 0.3943 | 0.3853 | 0.3920 | 0.3784 | 0.3804 | 0.3718 |
| NR1      | 0.3804 | 0.3718 | 0.3920 | 0.3784 | 0.3898 | 0.3716 | 0.3784 | 0.3647 |
| ND2      | 0.3736 | 0.3874 | 0.3871 | 0.3959 | 0.3845 | 0.3868 | 0.3720 | 0.3800 |
| NK2      | 0.3720 | 0.3800 | 0.3845 | 0.3868 | 0.3824 | 0.3790 | 0.3703 | 0.3726 |
| NP2      | 0.3703 | 0.3726 | 0.3824 | 0.3790 | 0.3804 | 0.3718 | 0.3687 | 0.3652 |
| NR2      | 0.3687 | 0.3652 | 0.3804 | 0.3718 | 0.3784 | 0.3647 | 0.3670 | 0.3578 |
| CD3      | 0.3292 | 0.3481 | 0.3374 | 0.3554 | 0.3376 | 0.3616 | 0.3292 | 0.3539 |
| CK3      | 0.3292 | 0.3481 | 0.3374 | 0.3554 | 0.3371 | 0.3493 | 0.3293 | 0.3423 |
| CD4      | 0.3206 | 0.3461 | 0.3292 | 0.3539 | 0.3292 | 0.3481 | 0.3210 | 0.3407 |
| CK4      | 0.3210 | 0.3407 | 0.3292 | 0.3481 | 0.3293 | 0.3423 | 0.3214 | 0.3352 |
| CP4      | 0.3214 | 0.3352 | 0.3293 | 0.3423 | 0.3293 | 0.3364 | 0.3218 | 0.3298 |
| CK5      | 0.3123 | 0.3341 | 0.3209 | 0.3426 | 0.3213 | 0.3371 | 0.3131 | 0.3290 |
| CP5      | 0.3131 | 0.3290 | 0.3213 | 0.3371 | 0.3217 | 0.3316 | 0.3137 | 0.3238 |
| CR5      | 0.3137 | 0.3238 | 0.3217 | 0.3316 | 0.3221 | 0.3261 | 0.3145 | 0.3187 |

### Typical optical characteristics curves



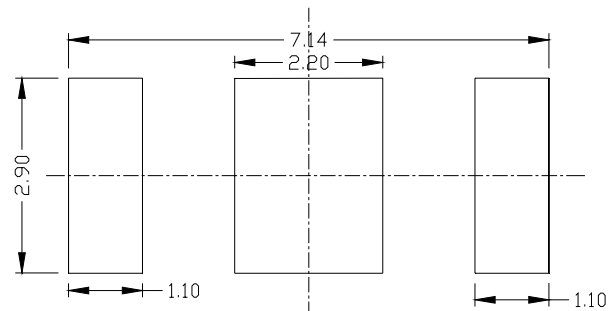
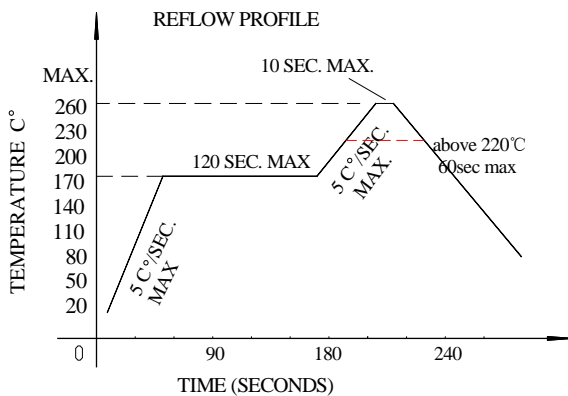
## Reflow profile

- Soldering condition
  - Recommended soldering conditions

| Reflow Soldering |                              | Hand Soldering |                                  |
|------------------|------------------------------|----------------|----------------------------------|
| Pre-heat         | 160~180°C                    | Temperature    | 300°C Max.                       |
| Pre-heat time    | 120 seconds Max.             | Soldering time | 3 second Max.<br>(one time only) |
| Peak temperature | 260°C Max.                   |                |                                  |
| Soldering time   | 10 seconds Max.              |                |                                  |
| Condition        | Refer to Temperature-profile |                |                                  |

- After reflow soldering rapid cooling should be avoided
- Temperature-profile (Surface of circuit board)  
Use the following conditions shown in the figure.

### RECOMMEND PAD DESIGN (Units: mm)



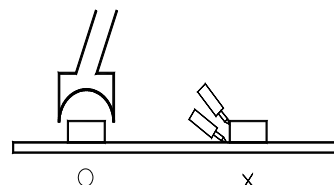
1. Reflow soldering should not be done more than two times
2. When soldering ,do not put stress on the LEDs during heating

### ■ Soldering iron

1. When hand soldering, keep the temperature of the iron under 300°C, and at that temperature keep the time under 3 sec.
2. The hand soldering should be done only a time
3. The basic spec is ≤5 sec. when the temperature of 260°C, do not contact the resin when hand soldering

### ■ Rework

1. Customer must finish rework within 5 sec under 260°C
2. The head of iron can not touch the resin
3. Twin-head type is preferred.



## ■ CAUTIONS

The encapsulated material of the LEDs is silicone . Therefore the LEDs have a soft surface on the top of package. The pressure to the top surface will be influence to the reliability of the LEDs. Precautions should be taken to avoid the strong pressure on the encapsulated part. So when using the picking up nozzle, the pressure on the silicone resin should be proper.

**Reliability**

(1)TEST ITEMS AND RESULTS

| Type                   | Test Item                                      | Ref. Standard | Test Conditions                               | Note      | Number of Damaged |
|------------------------|--|---------------|---|-----------|-------------------|
| Environmental Sequence | Resistance to Soldering Heat(Reflow Soldering) | JESD22-B106   | Tsld=260°C,10sec                              | 2 times   | 0/22              |
|                        | Temperature Cycle                              | JESD22-A104   | -40°C 30min<br>↑↓5min<br>100°C 30min          | 300 cycle | 0/22              |
|                        | Thermal Shock                                  | JESD22-A106   | -40°C 15min<br>↑↓<br>100°C 15min              | 300 cycle | 0/22              |
|                        | High Temperature Storage                       | JESD22-A103   | T <sub>a</sub> =100°C                         | 1000 hrs  | 0/22              |
|                        | Low Temperature Storage                        | JESD22-A119   | T <sub>a</sub> =-40°C                         | 1000 hrs  | 0/22              |
| Operation Sequence     | Life Test                                      | JESD22-A108   | T <sub>a</sub> =25°C<br>I <sub>F</sub> =150mA | 1000 hrs  | 0/22              |
|                        | High Humidity Heat Life Test                   | JESD22-A101   | 60°C RH=90%<br>I <sub>F</sub> =150mA          | 1000 hrs  | 0/22              |

(2)CRITERIA FOR JUDGING THE DAMAGE

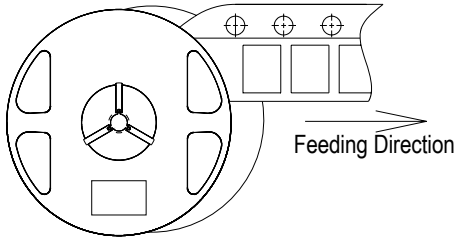
| Item               | Symbol | Test Conditions | Criteria for Judgement |             |
|--------------------|--------|-----------------|------------------------|-------------|
|                    |        |                 | Min.                   | Max.        |
| Forward Voltage    | VF     | IF=150mA        | -                      | U.S.L*)×1.1 |
| Reverse Current    | IR     | VR=5V           | -                      | U.S.L*)×2.0 |
| Luminous Intensity | IV     | IF=150mA        | L.S.L**)×0.7           | -           |

U.S.L.: Upper Standard Level

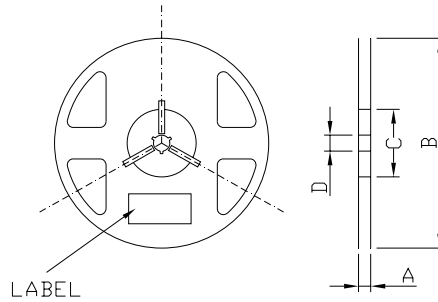
L.S.L.: Lower Standard Level

## Packaging Specifications

### ● Feeding Direction

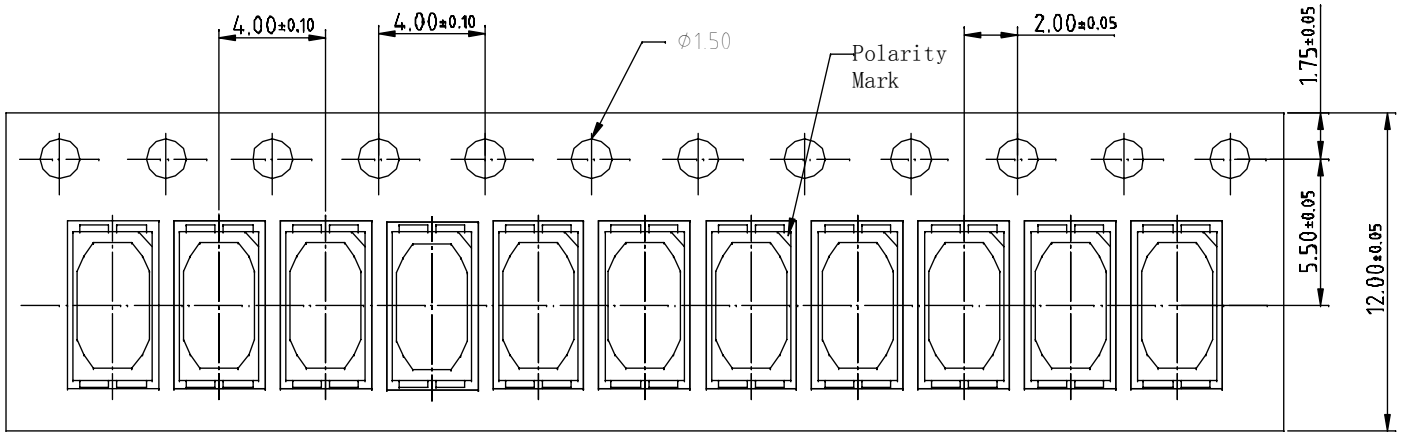


### ● Dimensions of Reel (Unit: mm)

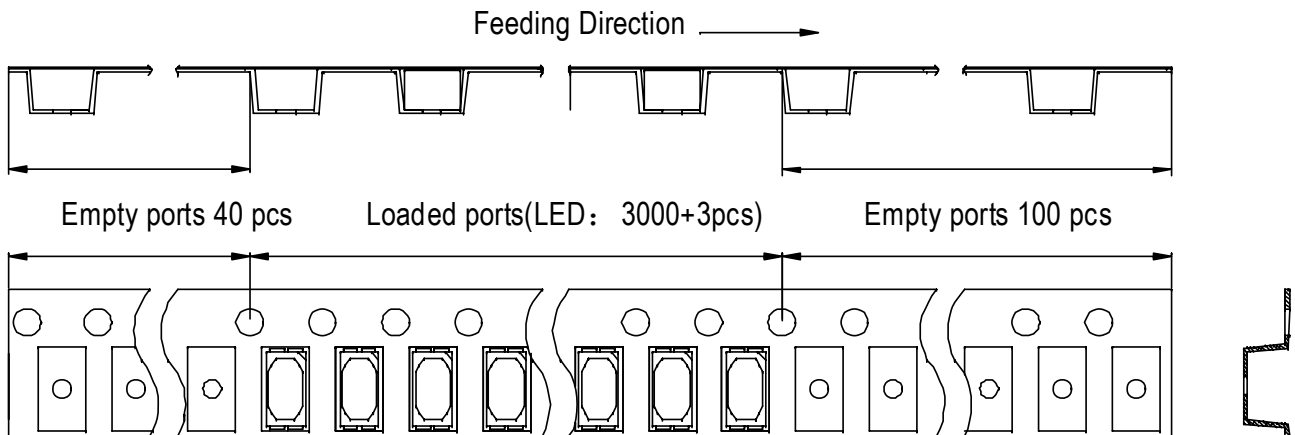


|   |              |
|---|--------------|
| A | 12 ± 0.1mm   |
| B | 179 ± 1mm    |
| C | 58 ± 1mm     |
| D | 13.5 ± 0.5mm |

### ● Dimensions of Tape (Unit: mm)



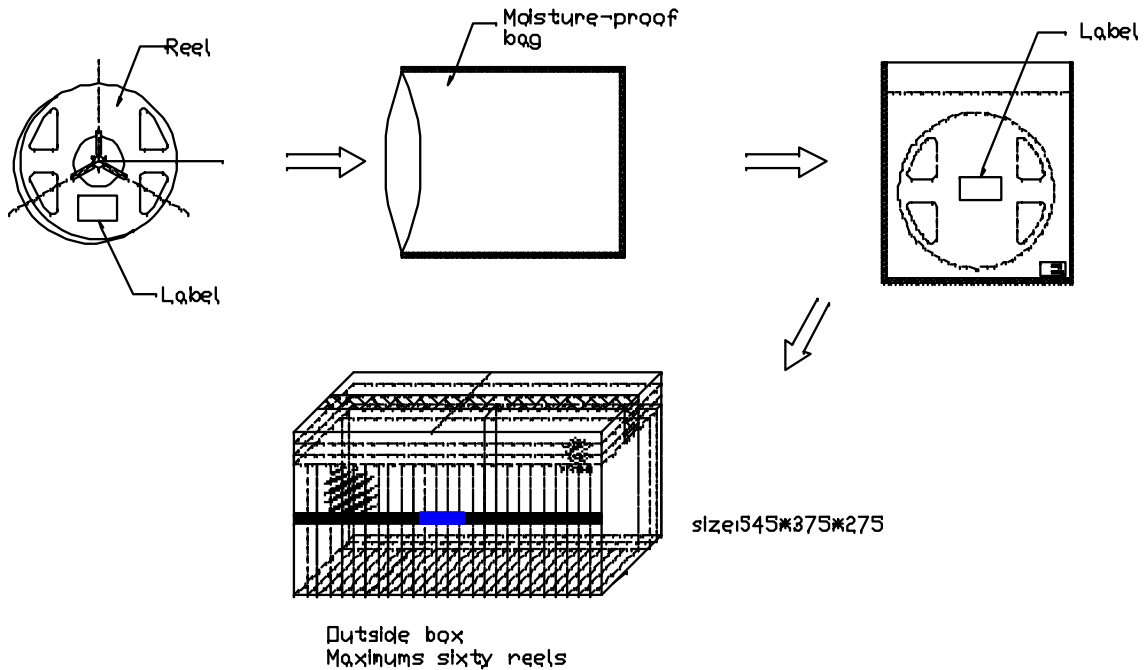
### ● Arrangement of tape:






### NOTES

1. Empty component pockets are sealed with top cover tape;
2. The maximum number of missing lamps is two;
3. The cathode is oriented towards the tape sprocket hole in accordance with ANSI/EIA RS-481 specifications.
4. 3,000 pcs/ Reel.

## Packaging specifications



■ Label

|  |          |
|--|----------|
| PART NO:   |          |
|  |          |
| LOT NO:  |          |
|  |          |
| BIN CODE:  |          |
|  |          |
| IV:  | VF: X/Y: |
| QTY:   | PCS      |
| DATE:  |          |

## CAUTIONS

### Package specifications

Reeled products (numbers of products are 3,000pcs) packed in a seal off moisture-proof bag along with a desiccant one by one, Sixty moisture-proof bag of maximums are put the outside box (size: about 545mm x about 375mm x about 275mm) Together with buffer material, and it is packed. (Pare No., Lot No., quantity should appear on the label on the moisture-proof bag, part No. And quantity should appear on the label on the cardboard box.) The number of the loading steps of outside box (cardboard box) has three steps.

### Storage conditions

#### Before opening the package:

The LEDs should be kept at 30°C or less and 90%RH or less. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with absorbent material (silica gel) is recommended.

#### After opening the package:

The LEDs should be kept at 30°C or less and 70%RH or less. If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with packages of moisture absorbent material (silica gel). It is also recommended to return the LEDs to the original moisture proof bag and to reseal the moisture proof bag again.