

FR5050RGB4C-F1

5.5x5.0mm, Intelligent control LED
PLCC-4 Package integrated light source



Technical Data Sheet

Features:

- PLCC-4 package.
- Intelligent reverse connect protection, the power supply reverse connection does not damage the IC.
- The control circuit and the LED share the only power source.
- Control circuit and RGB chip are integrated in a package of 5050 components, form a complete control of pixel point.
- Built-in signal reshaping circuit, after wave reshaping to the next driver, ensure wave-form distortion not accumulate.
- Built-in electric reset circuit and power lost reset circuit.
- Each pixel of the three primary color can achieve 256 brightness display, completed 16777216 color full color display, and scan frequency not less than 400Hz/s.
- Cascading port transmission signal by single line.
- Any two point the distance more than 5m transmission signal without any increase circuit.
- When the refresh rate is 30fps, cascade number are not less than 1024 points.
- Send data at speeds of 800Kbps.

Applications:

- Full-color module, Full color soft lights a lamp strip.
- LED decorative lighting, Indoor/outdoor LED video irregular screen.

| Part No. | Emitting Color | | Lens Color |
|----------------|----------------|------------|-------------|
| FR5050RGB4C-F1 | R | Red | Water Clear |
| | G | Pure Green | |
| | B | Blue | |

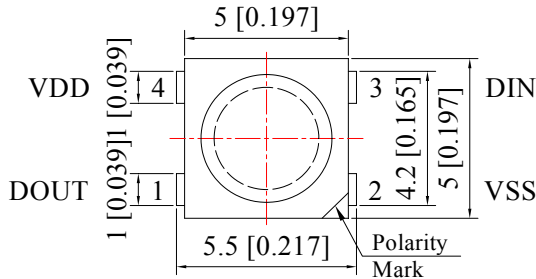
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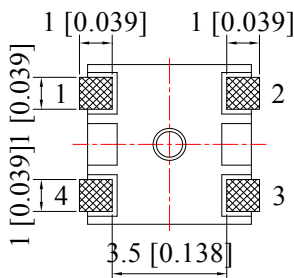
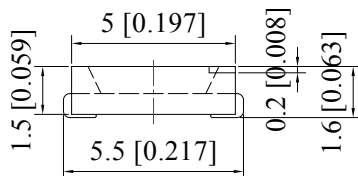
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Package Dimension:

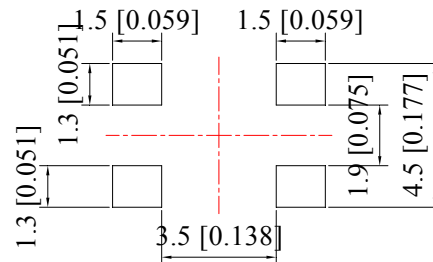


Pin Function

- 1 DOUT: Control Data Signal Output
- 2 VSS: Ground
- 3 DIN: Control Data Signal Input
- 4 VDD: Power Supply LED



Recommended Soldering Pad dimensions



Unit: mm
Tolerance: ±0.10mm

PIN function:

| NO. | Symbol | Function description |
|-----|--------|----------------------------|
| 1 | VDD | Power supply LED |
| 2 | DOUT | Control data signal output |
| 3 | VSS | Ground |
| 4 | DIN | Control data signal input |

Notes:

- 1. All dimensions are in millimeters (inches).
- 2. Tolerance is ± 0.25 mm (.010") unless otherwise noted.
- 3. Protruded resin under flange is 1.00mm (.039") max.

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Absolute Maximum Ratings at Ta=25°C

| Parameter | Symbol | Ratings | Unit |
|--------------------------------|--------|--------------|------|
| Power supply voltage | VDD | +3.5~+5.5 | V |
| Input voltage | VI | -0.5~VDD+0.5 | V |
| Operation junction temperature | Topt | -25~+80 | °C |
| Storage temperature range | Tstg | -40~+105 | °C |

Electrical Characteristics: (TA=-20~+70°C, VDD=4.5~5.5V, VSS=0V, unless otherwise specified)

| Parameter | Symbol | conditions | Min | Tpy | Max | Unit |
|---------------------|--------|------------|--------|------|---------|------|
| Input current | II | VI=VDD/VSS | — | — | ±1 | µA |
| Input voltage level | VIH | DIN, SET | 0.7VDD | — | — | V |
| | VIL | DIN, SET | — | — | 0.3 VDD | V |
| Hysteresis voltage | VH | DIN, SET | — | 0.35 | — | V |

Switching characteristics:

| Parameter | Symbol | Condition | Min | Tpy | Max | Unit |
|-------------------------|--------|----------------------------|-----|-----|-----|------|
| Transmission delay time | tPLZ | CL=15pF, DIN→DOUT, RL=10KΩ | — | — | 300 | ns |
| Fall time | tTHZ | CL=300pF, OUTR/OUTG/OUTB | — | — | 120 | µs |
| Input capacity | CI | — | — | — | 15 | pF |

RGB IC characteristic parameter:

| Emitting color | Model | Wavelength(nm) | Luminous intensity (mcd) Typ | Voltage(V) |
|----------------|-------|----------------|------------------------------|------------|
| Red | — | 620-625 | 500 | 1.8-2.4 |
| Green | — | 520-525 | 1000 | 2.8-3.4 |
| Blue | — | 465-470 | 250 | 2.8-3.4 |

Spec No.: FR5050

Issue No.: G-Rev-4

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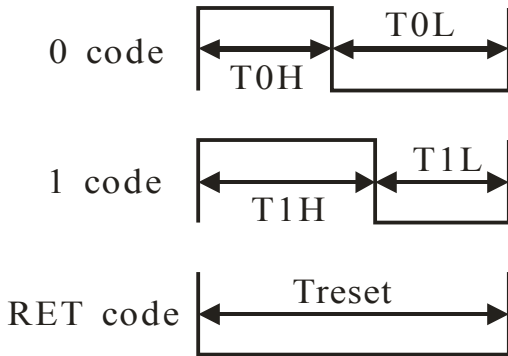


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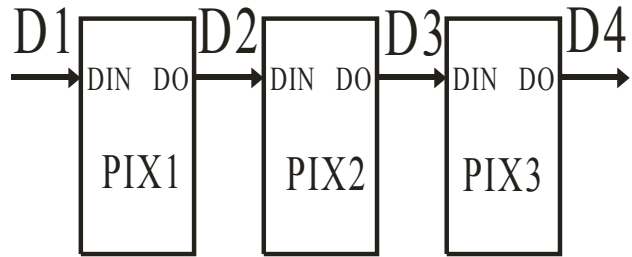
Data transfer time: ($T_H+T_L=1.25\mu s\pm 600ns$)

| | | | |
|-----|---------------------------|------------------|-------------|
| T0H | 0 code ,high voltage time | 0.4us | $\pm 150ns$ |
| T1H | 1 code ,high voltage time | 0.8us | $\pm 150ns$ |
| T0L | 0 code , low voltage time | 0.85us | $\pm 150ns$ |
| T1L | 1 code ,low voltage time | 0.45us | $\pm 150ns$ |
| RES | low voltage time | Above 50 μs | |

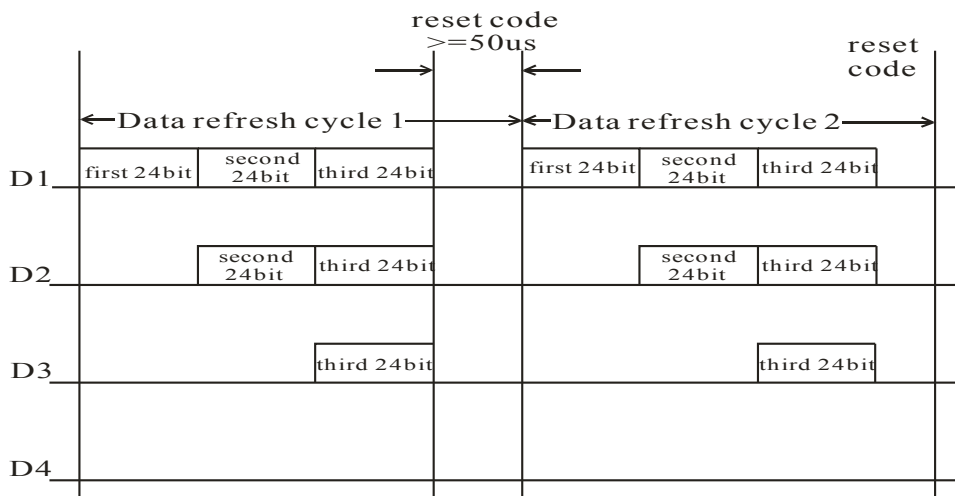
Sequence chart:



Cascade method:



Data transmission method:



Note: The data of D1 is send by MCU,and D2, D3, D4 through pixel internal reshaping amplification to transmit.

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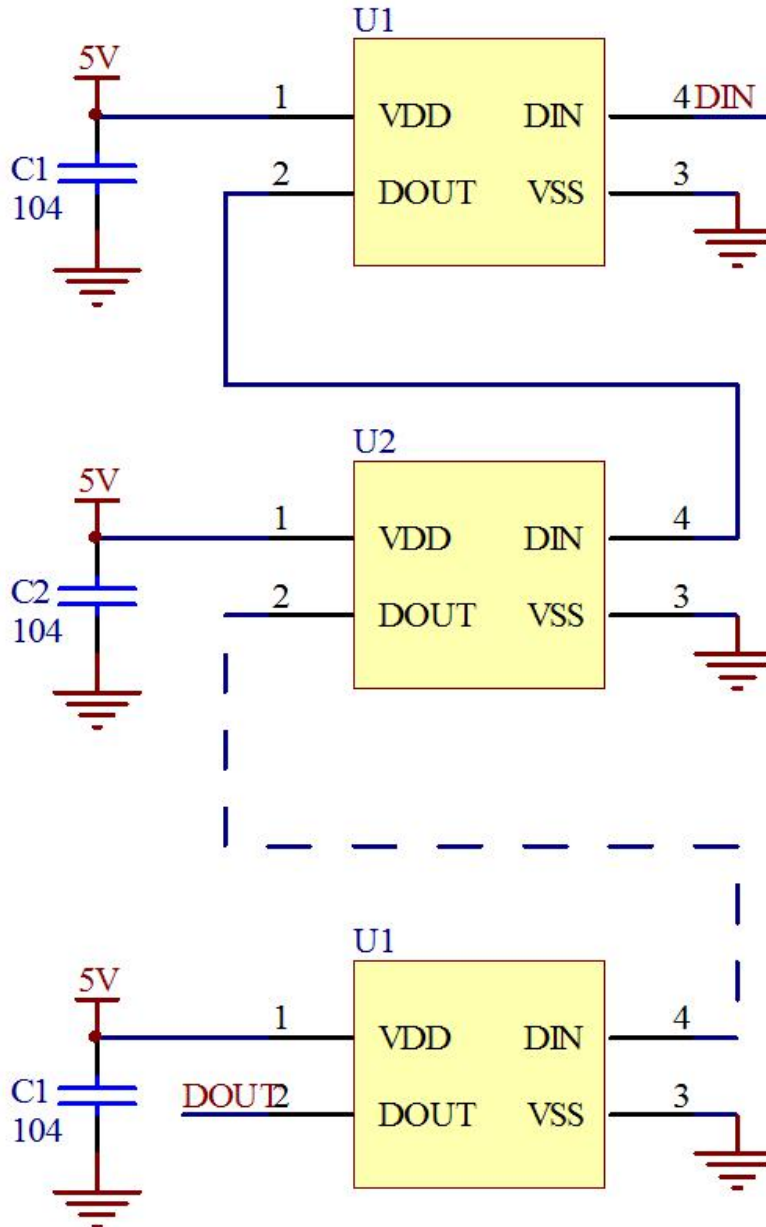
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Composition of 24bit data:

| | | | | | | | | | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

Note: Follow the order of GRB to sent data and the high bit sent at first.

Typical application circuit:



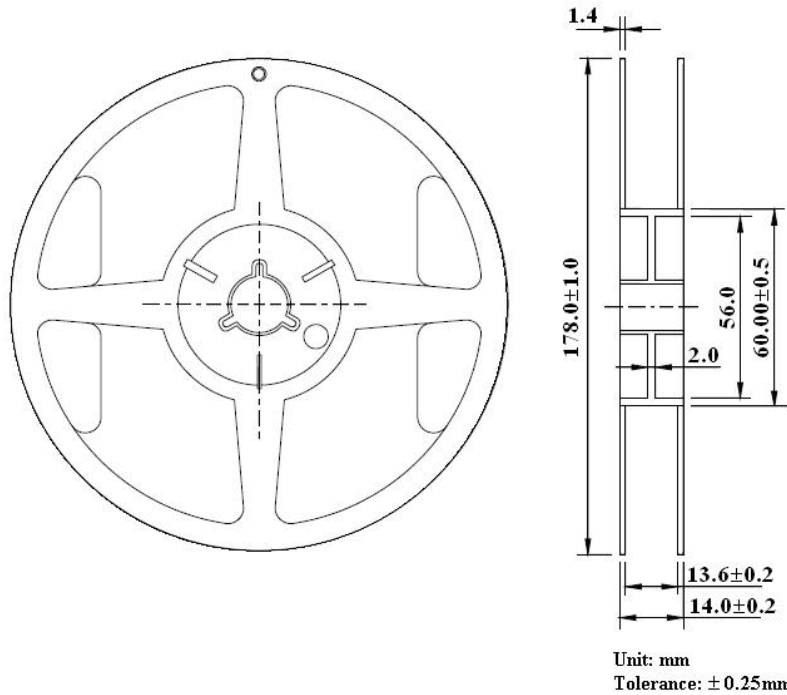
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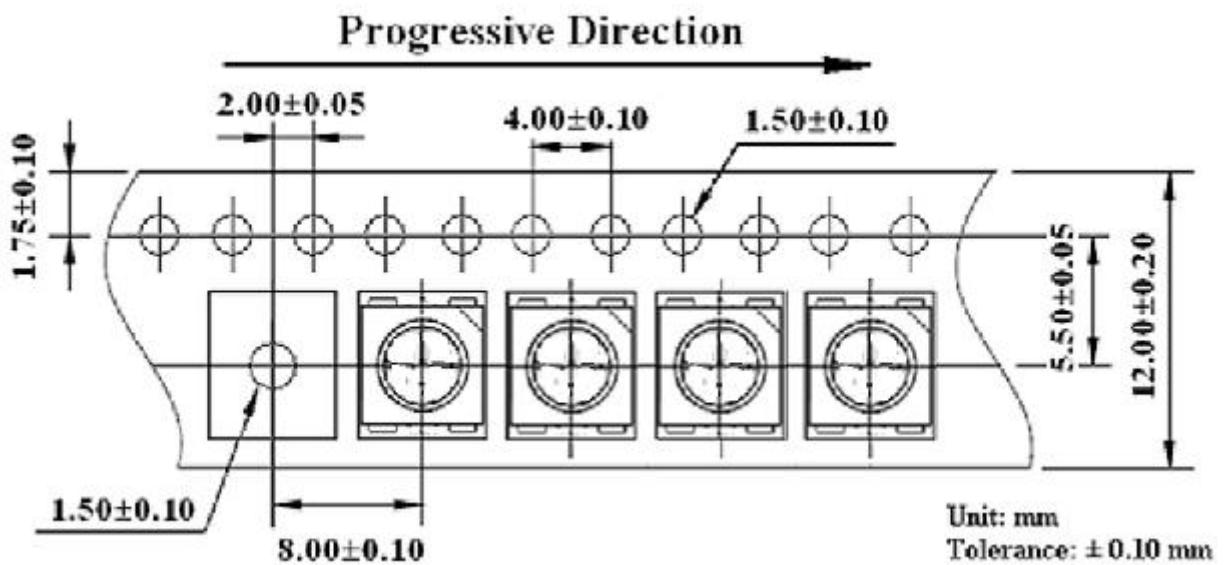
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Reel Dimensions:



Carrier Tape Dimensions:

Loaded quantity 1000 pcs per reel.



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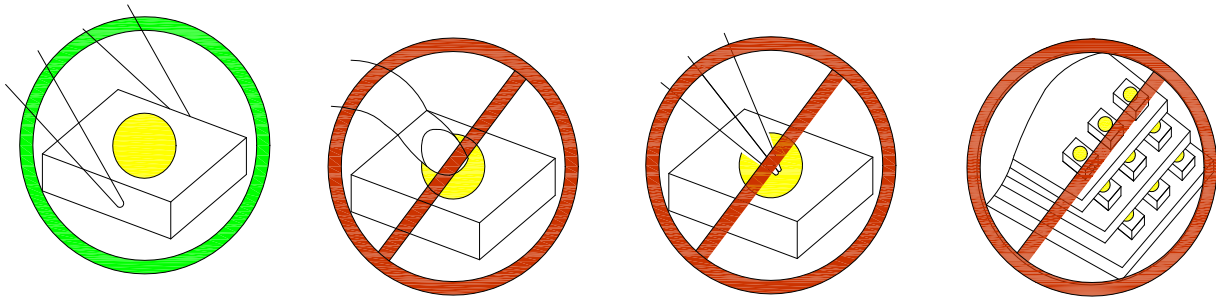
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CAUTIONS

1. Handling Precautions:

- 1.1. Handle the component along the side surfaces by using forceps or appropriate tools.
- 1.2. Do not directly touch or handle the silicone lens surface. It may damage the internal circuitry.
- 1.3. Do not stack together assembled PCBs containing exposed LEDs. Impact may scratch the silicone lens or damage the internal circuitry.



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.

2. Storage

- 2.1. Do not open moisture proof bag before the products are ready to use.
- 2.2. Before opening the package, the LEDs should be kept at 30°C or less and 60%RH or less.
- 2.3. The LEDs should be used within a year.
- 2.4. After opening the package, the LEDs should be kept at 30°C or less and 60%RH or less.
- 2.5. The LEDs should be used within 24 hours after opening the package.
- 2.6. If the moisture adsorbent material has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions. Baking treatment: 65±5°C for 24 hours.

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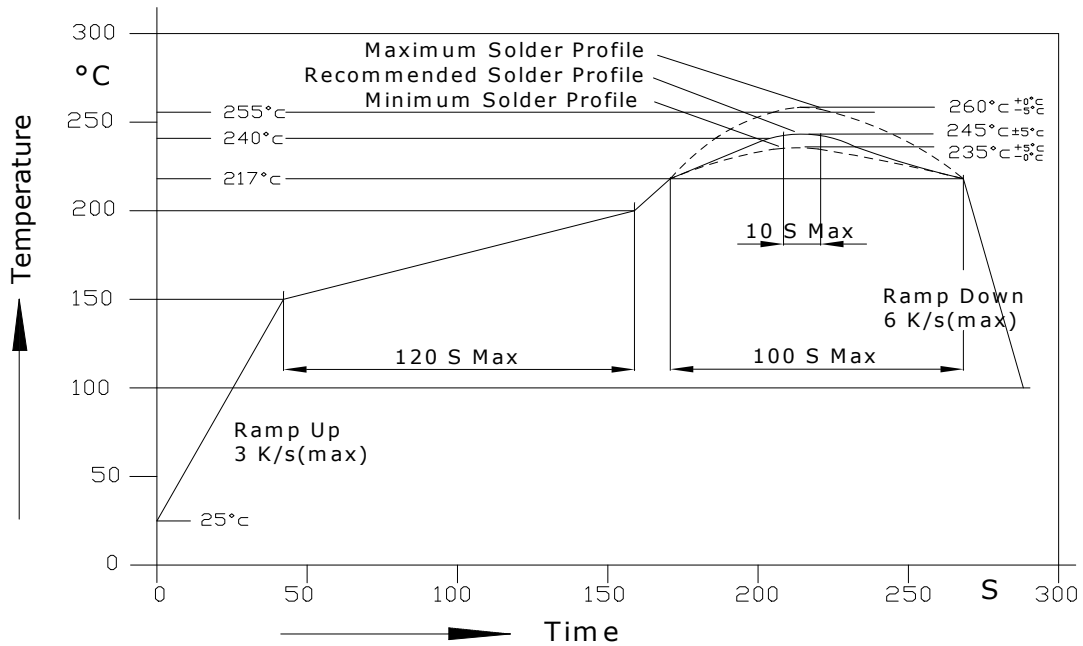
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3. Soldering Condition

3.1. Pb-free solder temperature profile



- 3.2. Reflow soldering should not be done more than two times.
- 3.3. When soldering, do not put stress on the LEDs during heating.
- 3.4. After soldering, do not warp the circuit board.
- 3.5. Recommended soldering conditions:

| Reflow soldering | | Soldering iron | |
|------------------|------------------------------|----------------|-----------------|
| Pre-heat | 150~200°C | Temperature | 300°C Max. |
| Pre-heat time | 120 sec. Max. | Soldering time | 3 sec. Max. |
| Peak temperature | 250°C Max. | | (one time only) |
| Soldering time | 10 sec. Max.(Max. two times) | | |

3.6. Because different board designs use different number and types of devices, solder pastes, reflow ovens, and circuit boards, no single temperature profile works for all possible combinations.

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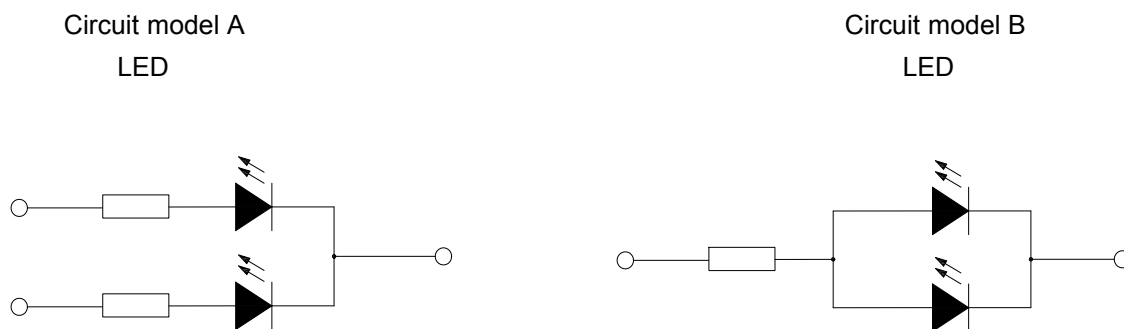
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However, you can successfully mount your packages to the PCB by following the proper guidelines and PCB-specific characterization.

4. Drive Method

4.1. An LED is a current-operated device. In order to ensure intensity uniformity on multiple LEDs connected in parallel in an application, it is recommended that a current limiting resistor be incorporated in the drive circuit, in series with each LED as shown in Circuit A below.



a. Recommended circuit.

b. The brightness of each LED might appear different due to the differences in the I-V characteristics of those LEDs.

5. ESD (Electrostatic Discharge):

Static Electricity or power surge will damage the LED. Suggestions to prevent ESD damage:

- Use of a conductive wrist band or anti-electrostatic glove when handling these LEDs.
- All devices, equipment, and machinery must be properly grounded.
- Work tables, storage racks, etc. should be properly grounded.
- Use ion blower to neutralize the static charge which might have built up on surface of the LED's plastic lens as a result of friction between LEDs during storage and handling.

ESD-damaged LEDs will exhibit abnormal characteristics such as high reverse leakage current, low forward voltage, or “no lightup” at low currents. To verify for ESD damage, check for “lightup” and V_f of the suspect LEDs at low currents. The V_f of “good” LEDs should be $>2.0V@0.1mA$ for InGaN product and $>1.4V@0.1mA$ for AlInGaP product.

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