



## SMD RGB LED (Visible LED) - NO: S7.3- 8541401000SL1501 SPECIFICATION FOR APPROVALFOR APPROVAL

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### S1615RGB &RGB LED



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## Performance Characteristics

### Product Selection Guide

Table1. Product performance of QUEENDOM RGB at 20mA, Tj=25°C.

| PRODUCT   | RANK NO. | DOMINANT WAVELENGTH <sup>[1]</sup> (nm) |         | INTENSITY <sup>[2]</sup> (mcd) |         | FORWARD VOLTAGE |         |
|-----------|----------|-----------------------------------------|---------|--------------------------------|---------|-----------------|---------|
|           |          | [1] (nm)                                |         | [2] (mcd)                      |         | [3] (V/F)       |         |
|           |          | MINIMUM                                 | MAXIMUM | MINIMUM                        | MAXIMUM | MINIMUM         | MAXIMUM |
| S1615RGB4 | Red      | 619                                     | 625     | 40                             | 120     | 1.8             | 2.4     |
|           | Green    | 520                                     | 525     | 300                            | 500     | 2.8             | 3.2     |
|           | Blue     | 460                                     | 470     | 60                             | 190     | 2.8             | 3.2     |

Notes for Table 1:

- Queendom leds maintains a tolerance of  $\pm 1\text{nm}$  on dominant wavelength measurements.
- Queendom leds maintains a tolerance of  $\pm 10\%$  on luminous intensity measurements.

## Optical Characteristics

Table 2. Optical characteristics for QUEENDOM RGB at 20mA, Tj=25°C.

| PRODUCT   | COLOR | TYPICAL SPECTRAL HALF-WIDTH <sup>[1]</sup> (nm) | TYPICAL TEMPERATURE COEFFICIENT OF DOMINANT WAVELENGTH (nm/°C) | TYPICAL VIEWING ANGLE <sup>[2]</sup> | PART NUMBER      |
|-----------|-------|-------------------------------------------------|----------------------------------------------------------------|--------------------------------------|------------------|
| S1615RGB4 | Red   | 6                                               | 0.04                                                           | 120°                                 | 8541401000SL1501 |
|           | Green | 5                                               | 0.04                                                           | 120°                                 |                  |
|           | Blue  | 5                                               | 0.04                                                           | 120°                                 |                  |

Notes for Table 2:

- Spectral half-width is the spectral bandwidth at 50% of the peak intensity.
- Viewing angle is the off axis angle from the LED centerline where the luminous intensity is  $\frac{1}{2}$  of the peak value.

## Electrical and Thermal Characteristics

Table 3. Electrical and thermal characteristics for QUEENDOM RGB at 20mA, Tj=25°C.

| COLOR | PART NUMBER      | FORWARD VOLTAGE <sup>[1]</sup> (V <sub>f</sub> ) |         |         | TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE <sup>[2]</sup> (mV/°C) | TYPICAL THERMAL RESISTANCE—JUNCTION TO SOLDER PAD (°C/W) |
|-------|------------------|--------------------------------------------------|---------|---------|---------------------------------------------------------------------------|----------------------------------------------------------|
|       |                  | MINIMUM                                          | TYPICAL | MAXIMUM |                                                                           |                                                          |
| Red   | 8541401000SL1501 | 1.80                                             | 2.10    | 2.40    | -1.6                                                                      | 75                                                       |
| Green |                  | 2.80                                             | 3.00    | 3.20    | -2.4                                                                      | 120                                                      |
| Blue  |                  | 2.80                                             | 3.00    | 3.20    | -2.6                                                                      | 85                                                       |

## Absolute Maximum Ratings

Table 4. Absolute maximum ratings for QUEENDOM 3227 RGB.

| PARAMETER                                            | RED                                                                 | GREEN AND BLUE |
|------------------------------------------------------|---------------------------------------------------------------------|----------------|
| DC Forward Current <sup>[1, 2]</sup>                 | 25mA                                                                | 25mA           |
| Peak Pulsed Forward Current <sup>[1, 3]</sup>        | 100mA                                                               | 100mA          |
| LED Junction Temperature <sup>[1]</sup> (DC & Pulse) | 115°C                                                               | 115°C          |
| ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)        | Class 2                                                             |                |
| LED Storage Temperature                              | -40°C to 80°C                                                       |                |
| Soldering Temperature                                | JEDEC 020c 250°C                                                    |                |
| Allowable Reflow Cycles                              | 3                                                                   |                |
| Reverse Voltage (V <sub>reverse</sub> )              | QUEENDOM3227 RGB LEDs are not designed to be driven in reverse bias |                |

Notes for Table 4:

- Proper current derating must be observed to maintain the junction temperature below the maximum allowable junction temperature.
- Single-color light.
- At 0.01ms pulse on time test with a pulse period of 0.1ms.

## Characteristic Curves

### Spectral Power Distribution Characteristics

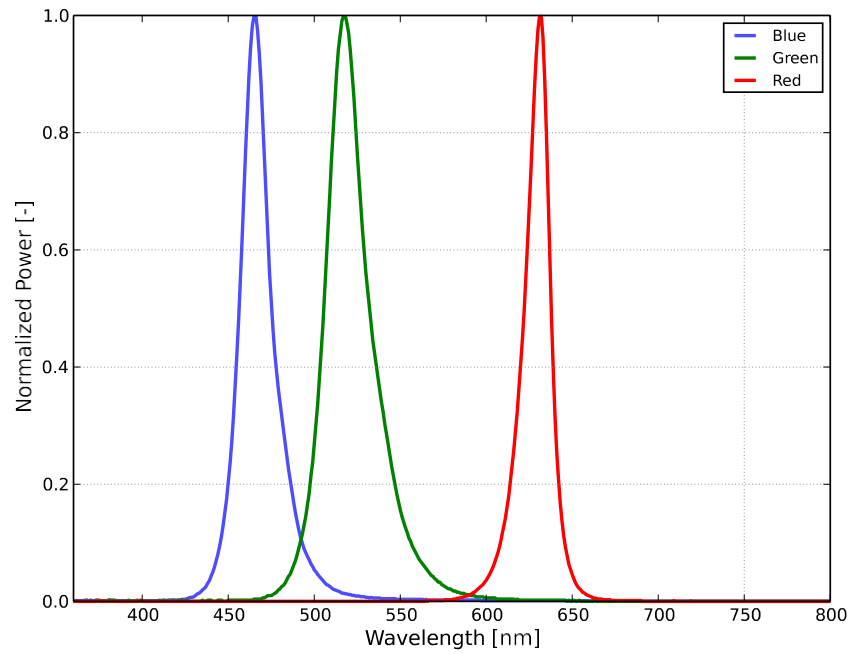


Figure 1. Typical normalized power vs. wavelength for Queendom 5050 RGB at 20mA,  $T_j=25^{\circ}\text{C}$ .

### Light Output Characteristics

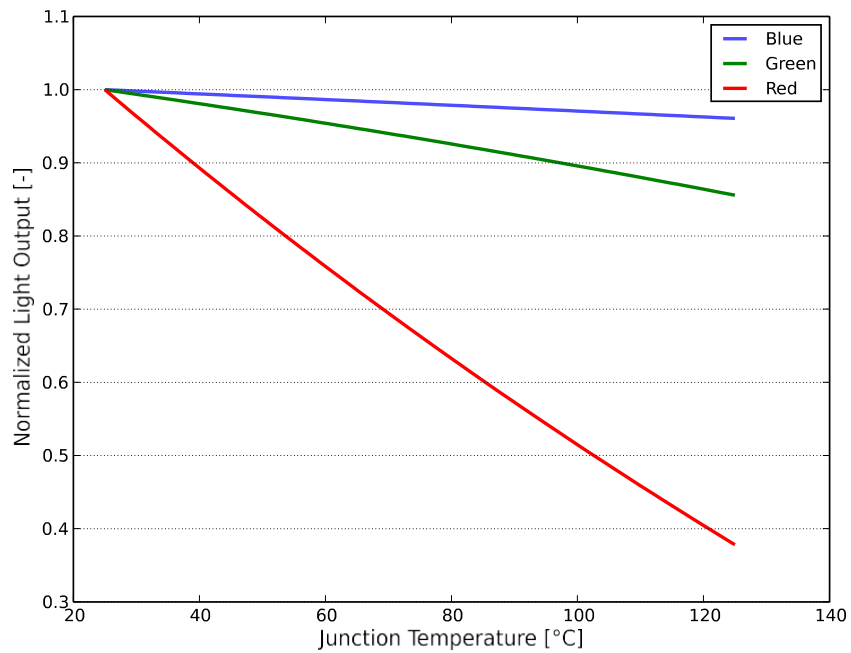
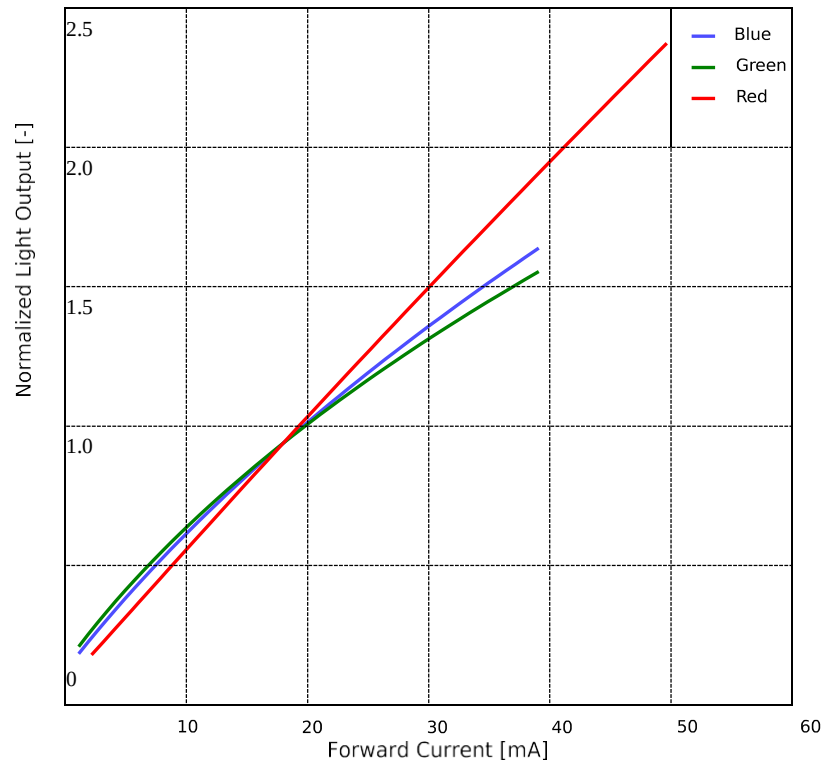


Figure 2. Typical normalized light output vs. junction temperature for Queendom 5050 RGB at 20mA.

## Light Output Characteristics

Figure 3. Typical normalized light output vs. forward current for Queendom 5050 RGB at  $T_j=25^{\circ}\text{C}$ .



## Forward Current Characteristics

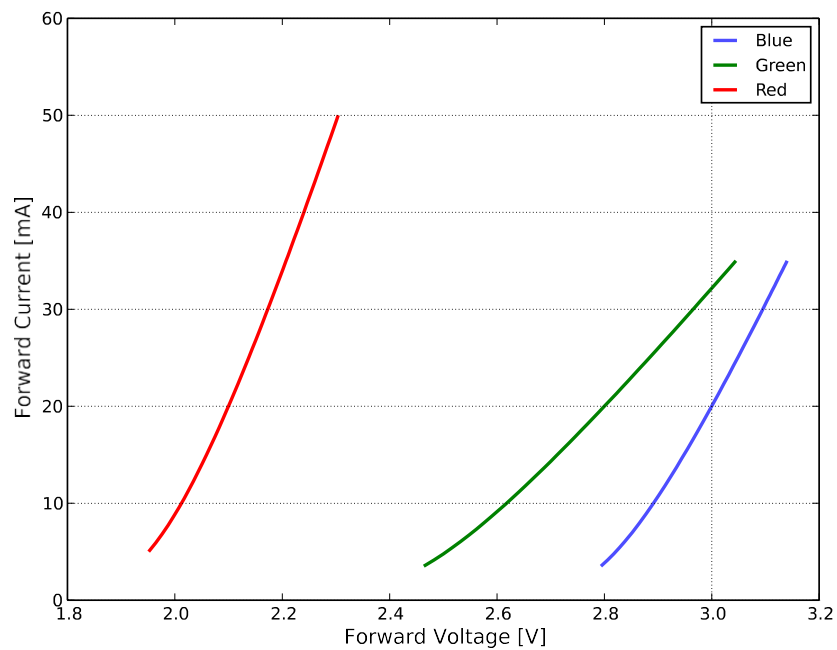


Figure 4. Typical forward current vs. forward voltage for Queendom 5050 RGB at  $T_j=25^{\circ}\text{C}$ .

## Radiation Pattern Characteristics

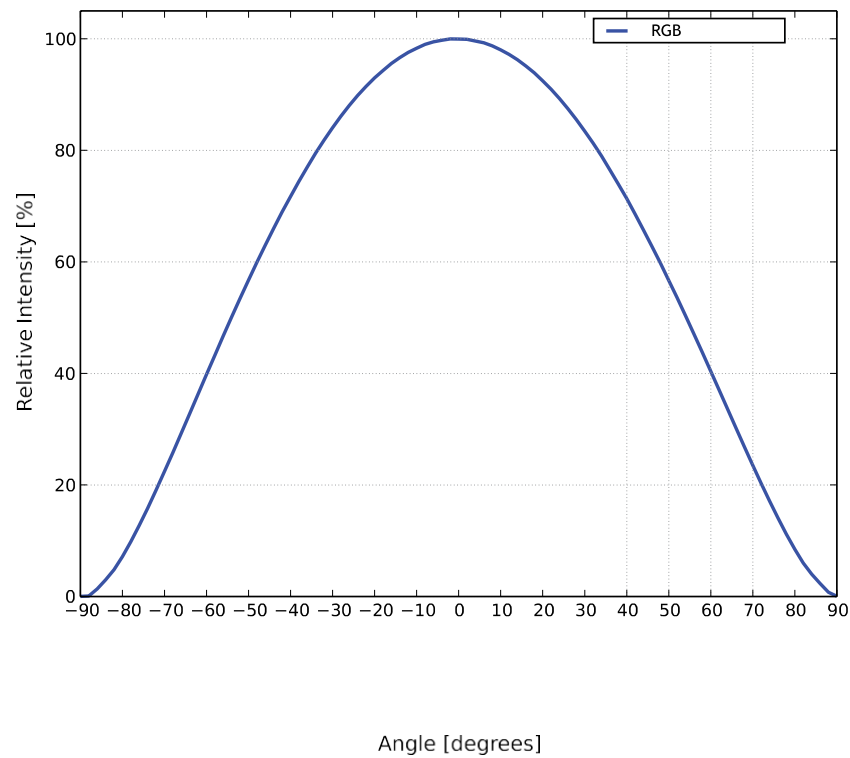


Figure 5. Typical radiation pattern for Queendom RGB at 20mA,  $T_j=25^\circ\text{C}$ .

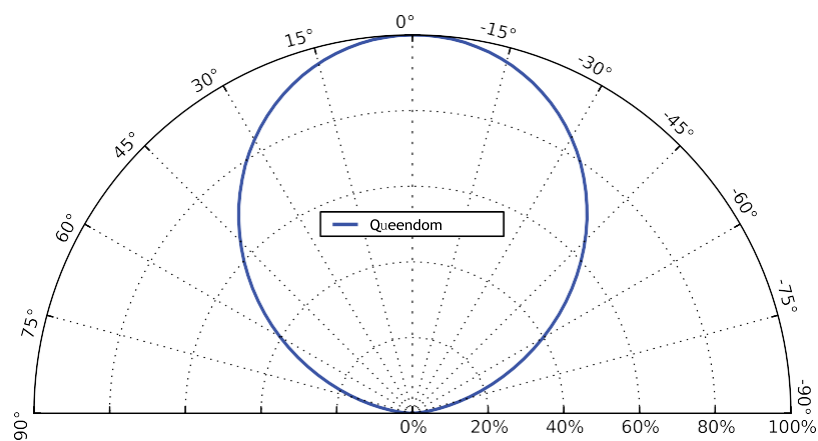


Figure 6. Typical polar radiation pattern for Queendom RGB at 20mA,  $T_j=25^\circ\text{C}$ .

## Product Bin and Labeling Definitions

### Decoding Product Bin Labeling

In the manufacturing of semiconductor products, there are variations in performance around the average values given in the technical datasheet. For this reason, Queendom leds bins LED components for luminous flux, intensity, radiometric power, color point, peak wavelength, dominant wavelength and forward voltage.

### Dominant Wavelength Bins

RANK Table 1. Dominant wavelength bins & Product performance of Queendom Commercial LEDs at specified test conditions.

| PRODUCT   | COLOR | BIN | DOMINANT WAVELENGTH [1] (nm) |         | PART NUMBER      |
|-----------|-------|-----|------------------------------|---------|------------------|
|           |       |     | MINIMUM                      | MAXIMUM |                  |
| S1615RGB4 | Red   | R1A | 619                          | 624     | 8541401000SL1501 |
|           |       | R2B | 624                          | 627     |                  |
|           |       | R1C | 627                          | 630     |                  |
|           | Green | G2C | 520                          | 525     |                  |
|           |       | G2D | 525                          | 530     |                  |
|           |       | G3E | 530                          | 535     |                  |
|           | Blue  | B4D | 459                          | 465     |                  |
|           |       | B5E | 465                          | 470     |                  |
|           |       | B6F | 470                          | 475     |                  |
|           |       | B6G | 475                          | 478     |                  |

Notes for Table 1:

1. Queendom maintains a tolerance of ±1nm on dominant wavelength measurements

### Intensity Bins

RANK Table 2. Intensity bin definitions ,Electrical and thermal characteristics for Queendom at specified test current, Tj=25°C.

| BIN | QUEENDOM FLUX [1] (mcd) |         |
|-----|-------------------------|---------|
|     | MINIMUM                 | MAXIMUM |
| LD  | 40                      | 60      |
| LE  | 60                      | 80      |
| LF  | 90                      | 120     |
| LG  | 120                     | 190     |
| LH  | 190                     | 300     |
| LI  | 300                     | 500     |
| LD  | 40                      | 60      |

Notes for Table 2:

1. Queendom maintains a tolerance of ±10% on intensity measurements.

### Forward Voltage Bins

RANK Table 3.( Forward voltage bin definitions ) Electrical and thermal characteristics for Queendom at specified test current, Tj=25°C

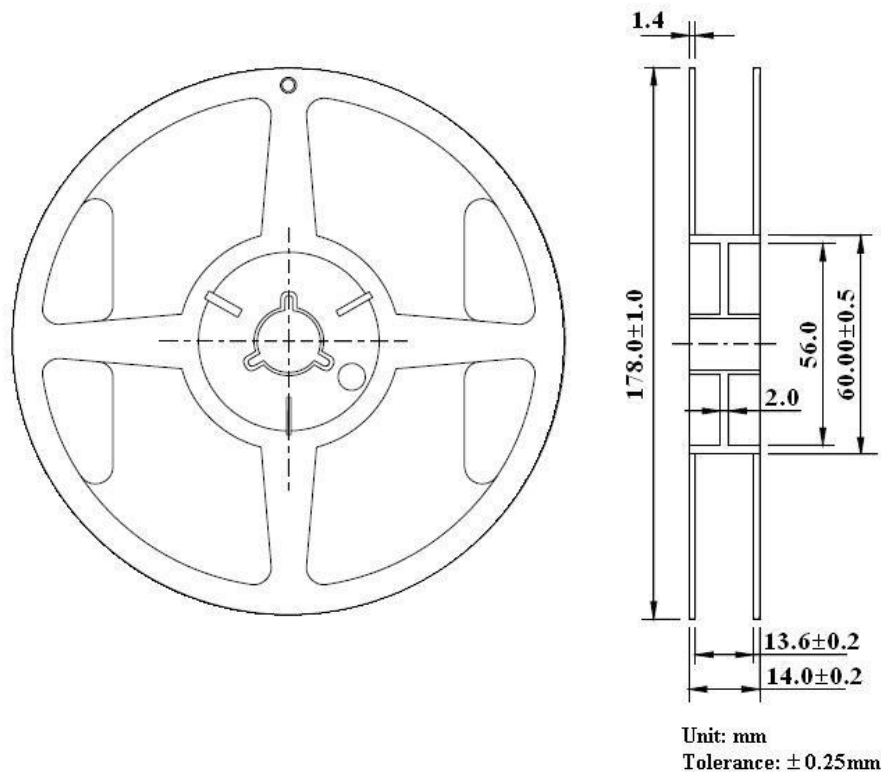
| NUMBER | FORWARD VOLTAGE [1] (Vf) |         |         |
|--------|--------------------------|---------|---------|
|        | MINIMUM                  | TYPICAL | MAXIMUM |
| V3     | 1.8                      | 2       | 2.2     |
| V4     | 2.2                      | 2.4     | 2.6     |
| V5     | 2.6                      | 2.8     | 3       |
| V6     | 3                        | 3.2     | 3.4     |
| V3     | 1.8                      | 2       | 2.2     |
| V4     | 2.2                      | 2.4     | 2.6     |
| V5     | 2.6                      | 2.8     | 3       |
| V6     | 3                        | 3.2     | 3.4     |
|        |                          |         |         |

Notes for Table 3:

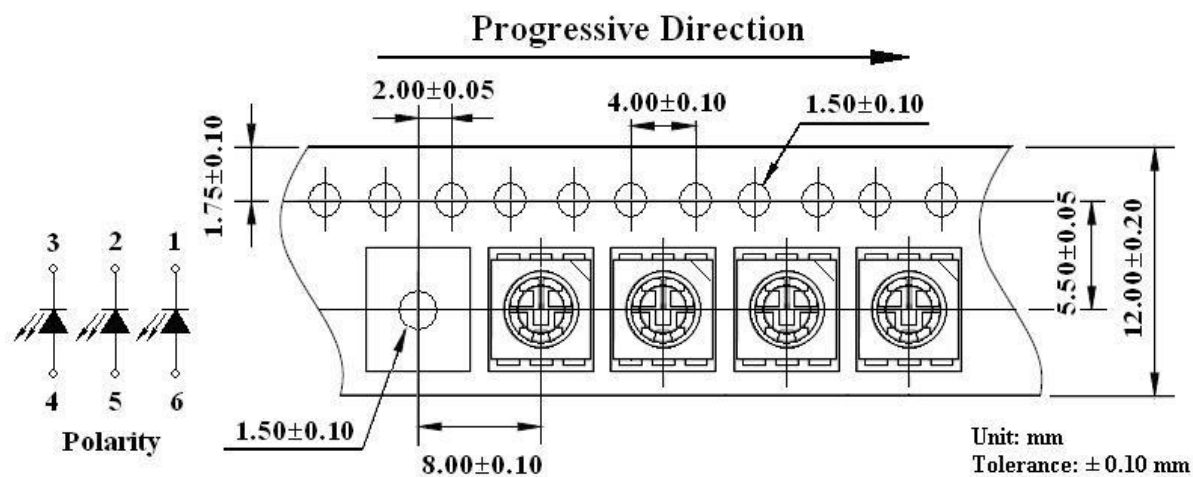
Queendom maintains a tolerance of ±0.1V on forward voltage measurements.

## Packaging Information

### Reel Dimensions:

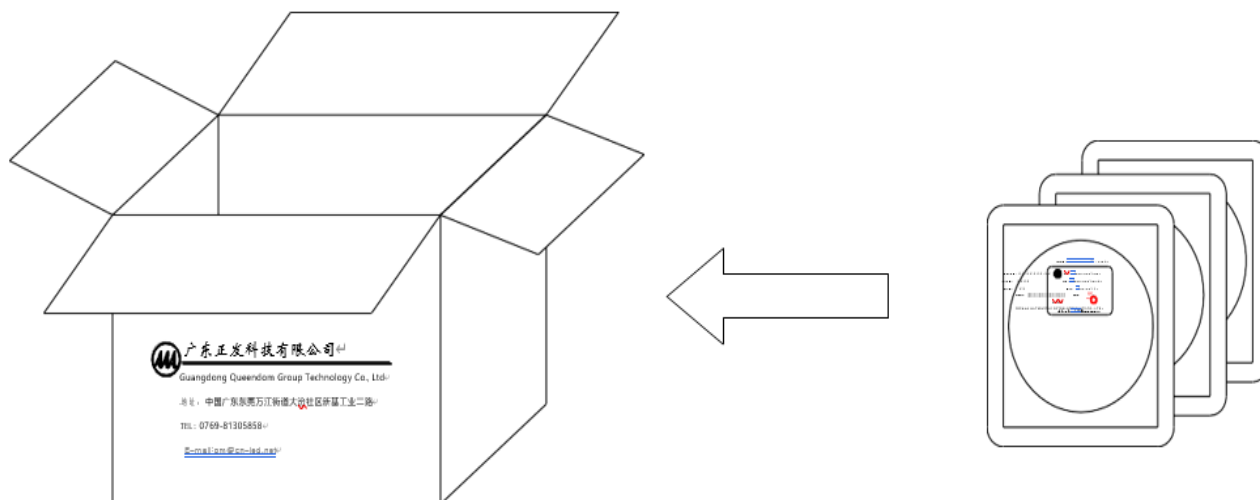


### Carrier Tape Dimensions:



Loaded quantity 3000 pcs per reel.

## Packaging cartons



## Information

### - With Stopper

|                        |               |
|------------------------|---------------|
| CPN:<br>P/N:XXXXXXXXXX | VF:XX-XX      |
|                        | IV:XX-XX      |
| QTY:XXX                | WLD:XX-XX     |
|                        | BIN:XX-XX     |
| LOT NO:XXXXXXXXXX      | DATE:XX-XX-XX |
|                        |               |

### Without Stopper

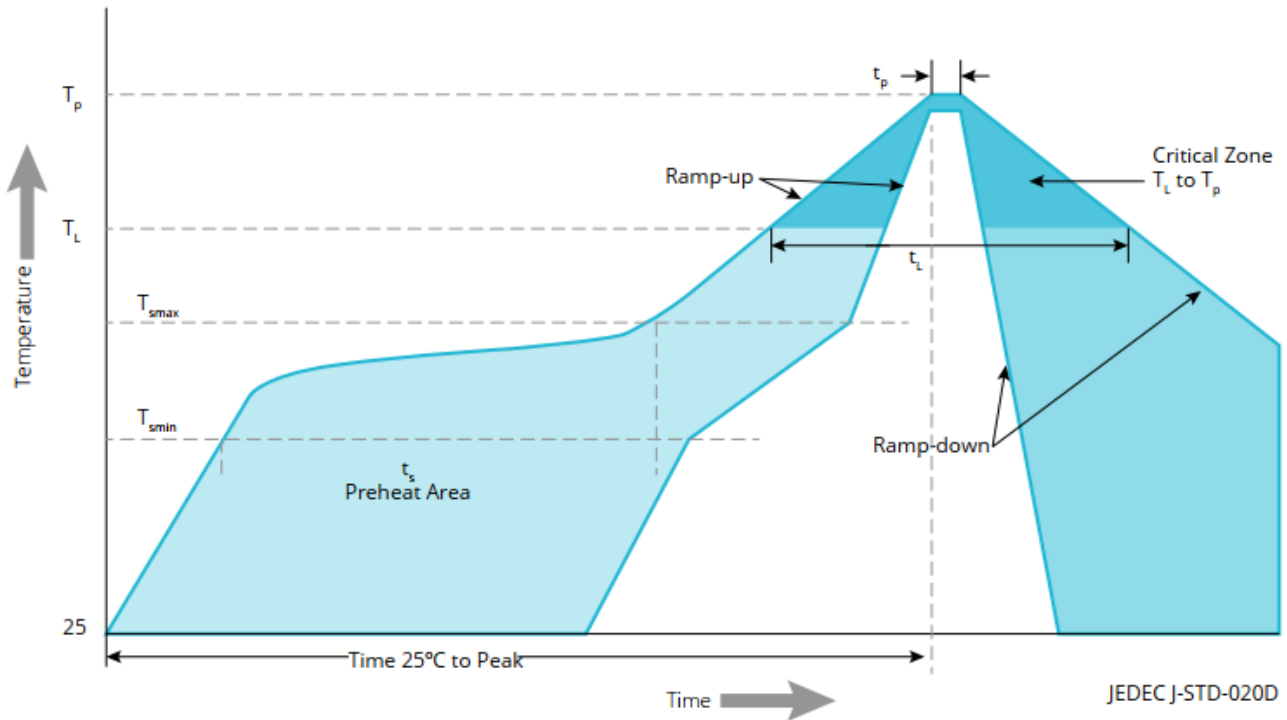
CPN:Customer's Product Number  
P/N:Product Number  
QTY:Packing Quantity  
LOT NO:Lot Number  
VF:Forward Voltage Rank  
IV:Luminous Intensity Rank  
WLD:Dom. Wavelength Rank  
BIN:BIN Code  
DATE:Date Of Dispatch

## Packing Quantity

1. 3000 PCS/1 Bag,
- 2.10 Inner Cartons/1 Outside Carton

## CAUTIONS

### Reflow Soldering Guidelines



Visualization of the acceptable reflow temperature profile as specified

Reflow profile characteristics for Queendom smd.

| PROFILE FEATURE                                      | LEAD-FREE ASSEMBLY           |
|------------------------------------------------------|------------------------------|
| Preheat Minimum Temperature ( $T_{smin}$ )           | 150°C                        |
| Preheat Maximum Temperature ( $T_{smax}$ )           | 200°C                        |
| Preheat Time ( $t_{smin}$ to $t_{smax}$ )            | 60 to 120 seconds            |
| Ramp-Up Rate ( $T_L$ to $T_p$ )                      | 4°C / second maximum         |
| Liquidous Temperature ( $T_L$ )                      | 217°C                        |
| Time Maintained Above Temperature $T_L$ ( $t_L$ )    | 60 to 150                    |
| seconds Peak / Classification Temperature ( $T_p$ )  | 250°C                        |
| Time Within 5°C of Actual Peak Temperature ( $t_p$ ) | 20 to 40 seconds             |
| Ramp-Down Rate ( $T_p$ to $T_L$ )                    | 6°C / second maximum maximum |
| Time 25°C to Peak Temperature                        | 8 minutes maximum            |

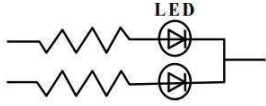
JEDEC Moisture Sensitivity

| LEVEL | FLOOR LIFE |                                           | SOAK REQUIREMENTS STANDARD |                                      |
|-------|------------|-------------------------------------------|----------------------------|--------------------------------------|
|       | TIME       | CONDITIONS                                | TIME                       | CONDITIONS                           |
| 5a    | 24 hours   | $\leq 30^\circ\text{C} / 60\% \text{ RH}$ | 48 Hours +2 / -0           | $30^\circ\text{C} / 60\% \text{ RH}$ |

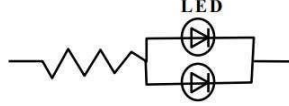
### Drive Method

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.

**Circuit model A**



**Circuit model B**



Recommended circuit

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

Repairing

Repair should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.

## ESD (Electrostatic Discharge)

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

Use 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 LEDs plastic lens as a result of friction between LEDs during storage and handing.

## Others

The information included in this document reflects representative usage scenarios and is intended for technical reference only.

The part number, type, and specifications mentioned in this document are subject to future change and improvement without notice. Before production usage customer should refer to the latest datasheet for the updated specifications.

When using the products referenced in this document, please make sure the product is being operated within the environmental and electrical limits specified in the datasheet. If customer usage exceeds the specified limits, Queendom will not be responsible for any subsequent issues.

The LEDs described here are intended to be used for ordinary electronic equipment (such as office equipment, communication equipment and household applications). Consult Queendom's Sales in advance for information on applications in which exceptional reliability is required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health, such as in aviation, transportation, traffic control equipment, medical and life support systems and safety devices.