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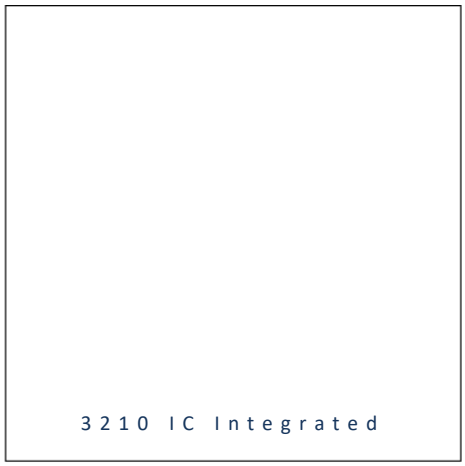
ISO/TS 16949:2009 BS EN ISO 14001:2004 QC 080000 IECQ HSPM

# PRODUCT DATASHEET


- PCB Side View SMD with IC
- 3210ICSV 0.8t Series
- Red/Green/Blue

Release Date: 11 December 2024 Version: A1.4

# N0M67S09ICSV




## 3210 IC-Integrated

RoHS Compliant

## FEATURES:

- **Package:** PCB Side View Package with Integrated IC
- **Forward Current:** 5mA
- **IC Power Supply Voltage:** +3.8~+5.5V
- **Luminous Intensity (typ.):** Mixed White 380mcd
- **Colour:** Red/Green/Blue with White Diffused Lens
- **Dominant Wavelength (typ.):** 622/527/467nm
- **Viewing angle:** 120°
- **Operating Temperature:** -40~+85°C
- **Storage Temperature:** -40~+105°C
- **IC Feature:** Serial data transmission signal by single wire. RGB and driver chip are integrated in a package, to form a complete control of pixel point with constant current. One pixel contains R, G, and B colour that each can achieve 256 level brightness grayscales, which forms 16,777,216 combination colours. The signal communication frequency is 800 KHz.
- **Soldering methods:** Reflow soldering
- **MSL Level:** acc. to JEDEC Level 3
- **Packing:** 8mm tape with max.4000pcs/reel, ø180mm (7'')

## APPLICATIONS:

- Telecommunication
- Indicator
- Home Appliance
- Decoration Lighting
- Full Colour LED Strip
- Gaming Device

## CHARACTERISTICS:

### Absolute Maximum Characteristics ($T_a$=25°C)

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Forward Current | $I_F$ | 5 | mA |
| IC Power Supply Voltage | $V_{DD}$ | +3.8~+5.5 | V |
| R/G/B Output Port Withstand Voltage | $V_{ds}$ | 9 | V |
| Operating Temperature | $T_{OPR}$ | -40~+85 | °C |
| Storage Temperature | $T_{STG}$ | -40~+105 | °C |
| Soldering Temperature | $T_{SD}$ | 260 for 10s max. | °C |
| Electrostatic Discharge acc. To ANSI/ESDA/JEDEC JS-001 | ESD | 2 | kV |

### Electrical & Optical Characteristics ($T_a$=25°C; $V_{DD}$=5V)

| Parameter | | Symbol | Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | | |
| Luminous Intensity | R | $I_V$ | 63 | 130 | 200 | mcd | $I_F$=5mA |
| | G | | 125 | 230 | 400 | | |
| | B | | 13 | 34 | 63 | | |
| Mixed White | W | $I_V$ | 250 | 380 | 800 | mcd | $I_F$=3*5mA |
| Dominant Wavelength | R | $\lambda_D$ | 615 | --- | 630 | nm | $I_F$=5mA |
| | G | | 520 | --- | 535 | | |
| | B | | 460 | --- | 475 | | |
| Colour Coordinate | X | --- | --- | 0.3041 | --- | --- | $I_F$=3*5mA |
| | Y | | --- | 0.2814 | --- | --- | |
| Viewing Angle | | $2\theta_{1/2}$ | --- | 120 | --- | deg | $I_F$=3*5mA |

1. Tolerance of Measure: Luminous Intensity: ±10% mcd, Dominant Wavelength: ±1.0 nm, Color Coordinate: ±0.005

## Electrical & Optical Characteristics ($T_a$=25°C)

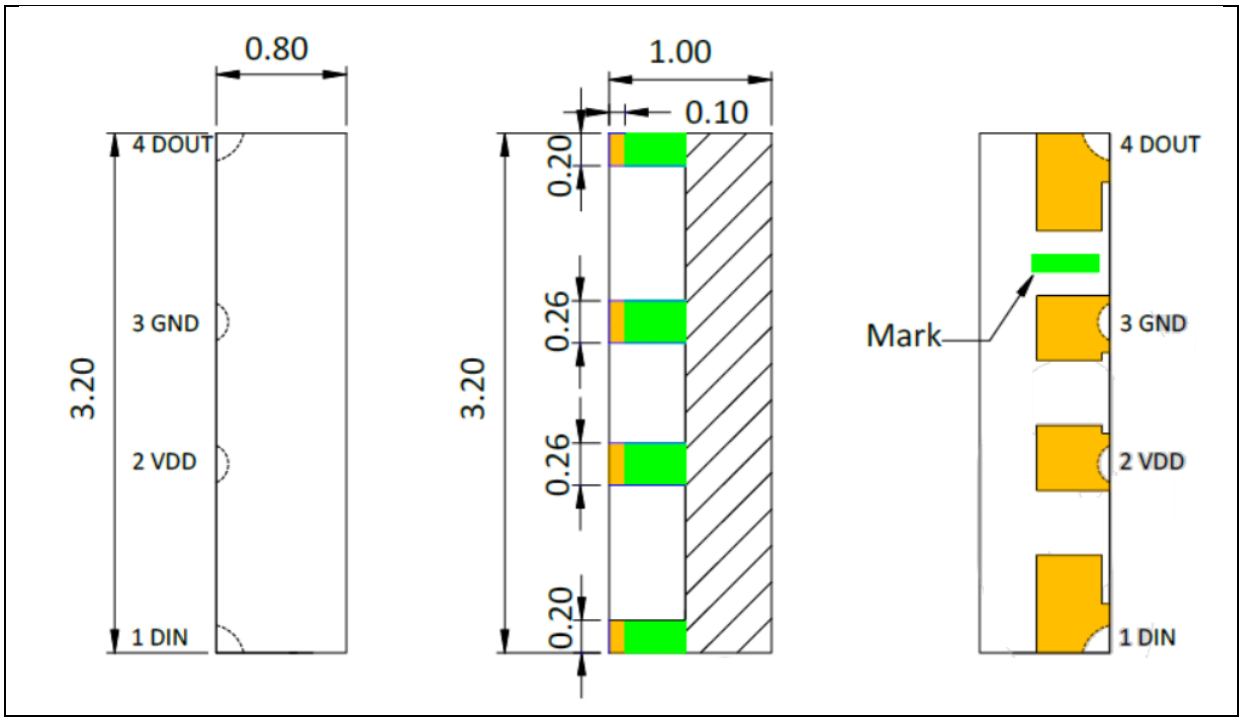
| Parameter | Symbol | Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Quiescent Current | $I_{DD}$ | --- | 0.45 | --- | mA | $V_{DD}$=4.5V<br>$I_{OUT}$="OFF" |
| Input Voltage Level | $V_{IH}$ | 3.1 | --- | --- | V | $D_{IN}$, Input High Level V |
| | $V_{IL}$ | --- | --- | 1.5 | V | $D_{IN}$, Input Low Level V |

## Switching Characteristics ($T_a$=25°C)

| Parameter | Symbol | Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Rate of Data Signal | $F_{DIN}$ | --- | 800 | --- | kHz | --- |
| Transfer Time | $T_{PLH}$ | --- | --- | 80 | ns | $D_{IN}$ -> $D_{OUT}$<br>$D_{OUT}$ Port to GND<br>CL=30pF |
| | $T_{PHL}$ | --- | --- | 80 | ns | |
| Conversion Time of $I_{OUT}$ R/G/B | $T_r$ | --- | 500 | --- | ns | $I_{OUT}$ R/G/B=5mA<br>RL=200Ω<br>CL=30pF |
| | $T_f$ | --- | 500 | --- | ns | |

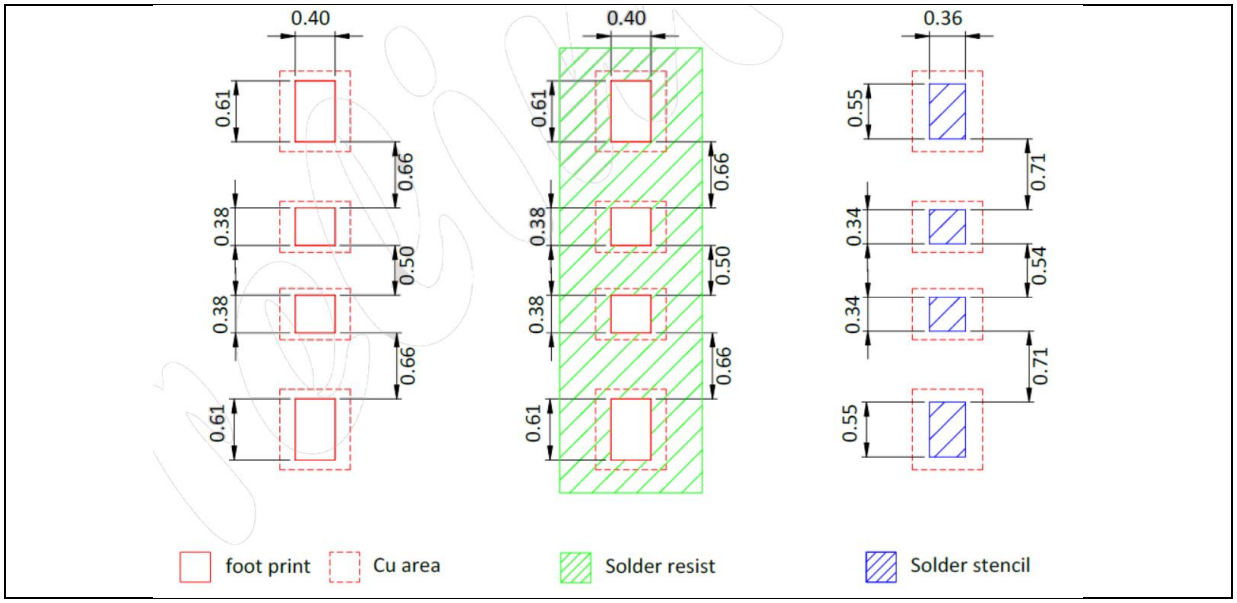
## OUTLINE DIMENSION:

Package Dimension:



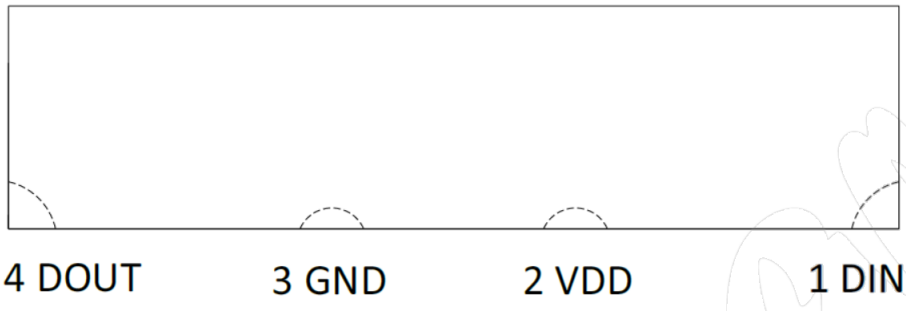

1. All dimensions are in millimetre (mm).
2. Tolerance ±0.2mm, unless otherwise noted.

Recommended Soldering Pad Dimension:




1. Dimensions are in millimetre (mm).
2. Tolerance ±0.1mm with angle tolerance ±0.5°.

## PIN CONFIGURATION:



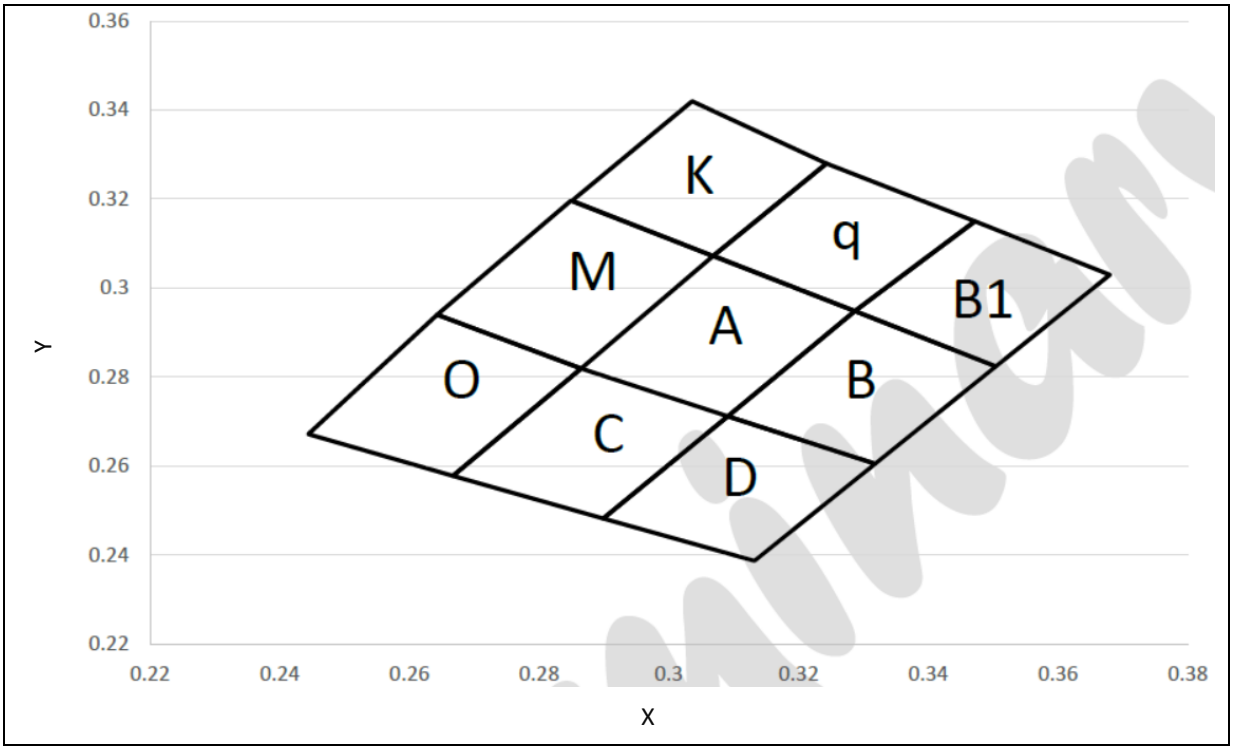

| No. | Symbol | Function Description |
|---|---|---|
| 1 | DIN | Control Data Signal Input |
| 2 | VDD | Power Supply LED |
| 3 | GND | Ground |
| 4 | DOUT | Control Data Signal Output |

## BINNING GROUPS:

Luminous Intensity Classifications (White) ($I_F$=3*5mA, $V_{DD}$=5V):

| Code | Min. | Max. | Unit |
|---|---|---|---|
| 15 | 200 | 250 | mcd |
| 16 | 250 | 320 | |
| 17 | 320 | 400 | |
| 18 | 400 | 500 | |
| 19 | 500 | 630 | |

## CIE CHROMATICITY DIAGRAM:

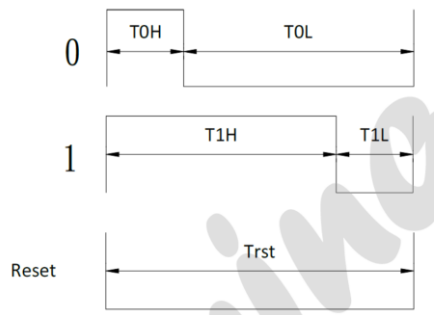



Chromaticity Coordinates Classifications ($I_F$=3*5mA; $V_{DD}$=5V):

| | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|
| | X | Y | X | Y | X | Y | X | Y |
| K | 0.2851 | 0.3196 | 0.3036 | 0.3420 | 0.3243 | 0.3280 | 0.3068 | 0.3072 |
| q | 0.3068 | 0.3072 | 0.3243 | 0.3280 | 0.3472 | 0.3150 | 0.3287 | 0.2948 |
| B1 | 0.3472 | 0.3150 | 0.3680 | 0.3030 | 0.3504 | 0.2824 | 0.3287 | 0.2948 |
| M | 0.2643 | 0.2940 | 0.2849 | 0.3196 | 0.3068 | 0.3072 | 0.2865 | 0.2819 |
| A | 0.3070 | 0.3072 | 0.3287 | 0.2948 | 0.3091 | 0.2712 | 0.2865 | 0.2819 |
| B | 0.3504 | 0.2824 | 0.3287 | 0.2948 | 0.3091 | 0.2712 | 0.3318 | 0.2605 |
| O | 0.2444 | 0.2672 | 0.2643 | 0.2940 | 0.2865 | 0.2819 | 0.2667 | 0.2578 |
| C | 0.2865 | 0.2819 | 0.3091 | 0.2712 | 0.2899 | 0.2482 | 0.2667 | 0.2578 |
| D | 0.3091 | 0.2712 | 0.3318 | 0.2605 | 0.3132 | 0.2387 | 0.2899 | 0.2482 |

## DATA TRANSFER TIME:

1. Timing Wave Form




2. Data Transfer Time:

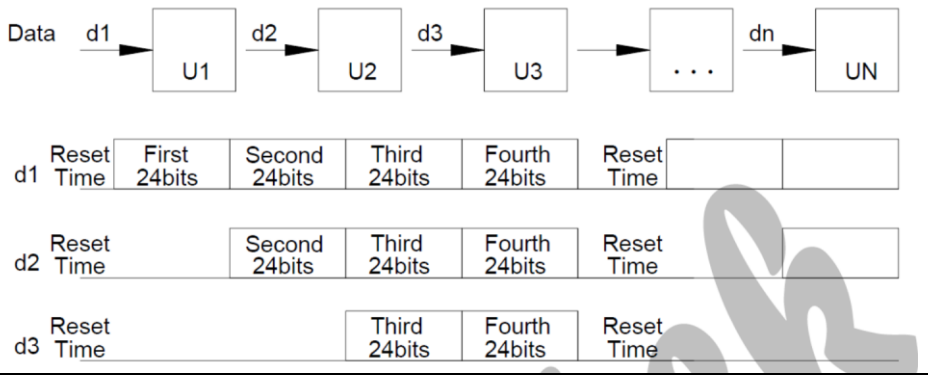
| Item | Description | Typical | Allowance |
|---|---|---|---|
| $T_{0H}$ | 0 code, high voltage time | 0.3μs | ±0.05μs |
| $T_{0L}$ | 0 code, low voltage time | 0.9μs | ±0.05μs |
| $T_{1H}$ | 1 code, high voltage time | 0.9μs | ±0.05μs |
| $T_{1L}$ | 1 code, low voltage time | 0.3μs | ±0.05μs |
| $T_{rst}$ | Reset Time, low voltage time | >200μs | --- |

3. Composition of 24 Bits 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

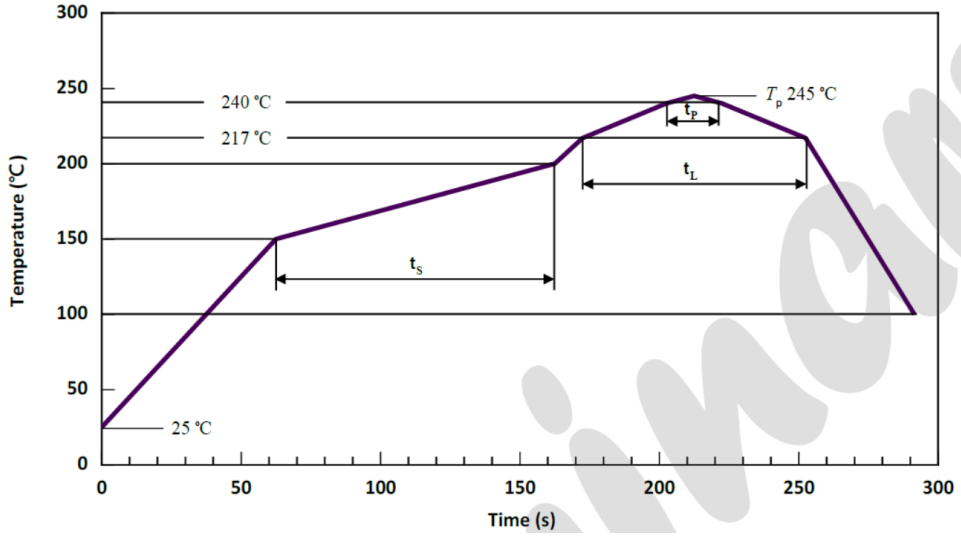
The single wire data transfer protocol supports 24-bits data for each LED's RGB display data refresh. ICLED receives 24-bits data and passes the remaining data to the next ICLED. The 24-bits data consist of green, red and blue data, each with 8-bits width, and are transferred with MSB first.

4. Data Transmission Method



## RECOMMENDED SOLDERING PROFILE:

Lead-free Solder IR Reflow:




| Profile Feature | Symbol | Pb-Free (SnAgCu) Assembly | | | Unit |
|---|---|---|---|---|---|
| | | Minimum | Recommendation | Maximum | |
| Ramp-up Rate to Preheat<br>25 °C to 150 °C | | | 2 | 3 | K/s |
| Time $t_S$<br>$T_{Smin}$ to $T_{Smax}$ | $t_S$ | 60 | 100 | 120 | s |
| Ramp-up Rate to Peak<br>$T_{Smax}$ to $T_P$ | | | 2 | 3 | K/s |
| Liquids Temperature | $T_L$ | | 217 | | °C |
| Time Above Liquids Temperature | $t_L$ | | 80 | 100 | s |
| Peak Temperature | $T_P$ | | 245 | 260 | °C |
| Time Within 5 °C of the Specified Peak Temperature $T_P$ - 5 K | $T_P$ | | | 10 | s |
| Ramp-Down Rate<br>$T_P$ to 100 °C | | | 3 | 4 | K/s |
| Time<br>25 °C to $T_P$ | | | | 480 | s |

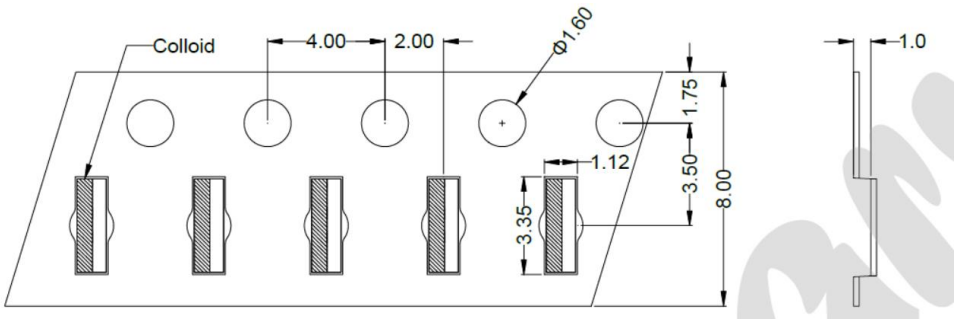
Note:

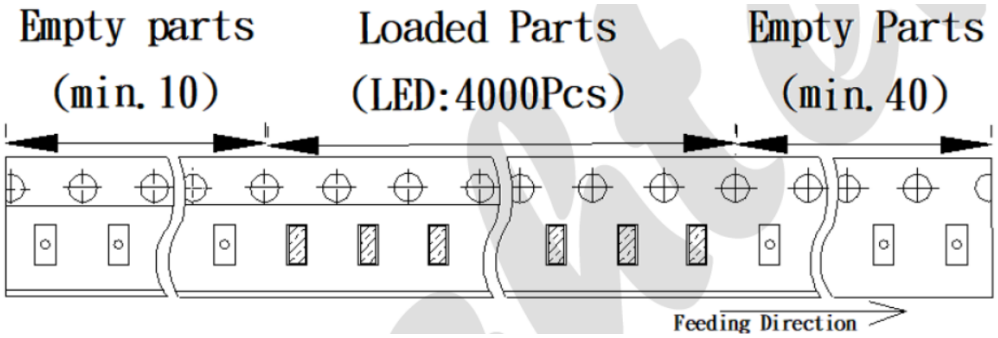
1. We recommend the reflow temperature 240°C (±5°C). The maximum soldering temperature should be limited to 260°C.
2. Maximum reflow soldering: 2 times.
3. Before, during, and after soldering, should not apply stress on the components and PCB board.

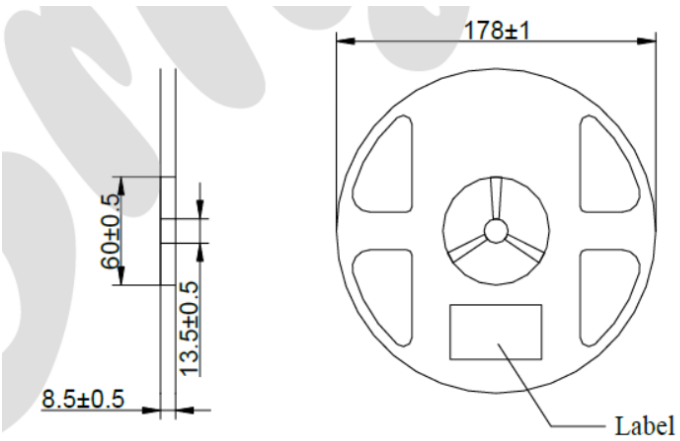
## PACKING SPECIFICATION:

Reel Dimension:

Max.4000pcs/reel



## PRECAUTIONS OF USE:

### Storage:

It is recommended to store the products in the following conditions:

- Humidity: 60% R.H. Max.
- Temperature: 5°C~30°C (41°F ~86°F).

Shelf life in sealed bag: 12 months at 5°C~30°C and <60% R.H.

Once the package is opened, the products should be used within 1 week. Otherwise, they should be kept in a damp-proof box with descanting agent <10% R.H. and apply baking.

### Over-Current Proof:

Must apply resistors for protection otherwise slight voltage shift will cause big current change and burn-out will happen.

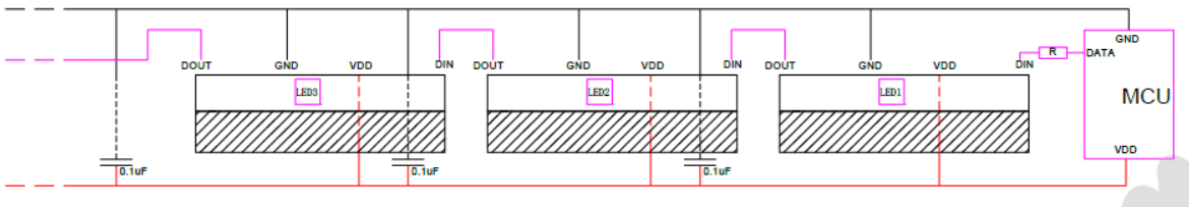
### Baking:

It is recommended to bake the LED before soldering if the pack has been unsealed for longer than 24hrs. The suggested baking conditions are as followings:

- 60±3°C x 6hrs and <5%RH, taped / reel package.

It's normal to see slight color fading of carrier (light yellow) after baking in process.

### Typical Application Circuit:




When the first LED is connected to the MCU, a resistance R is needed in series between its signal input line and the MCU. The size of R depends on the number of cascade beads. The more cascades, the smaller resistance R is used. It is generally recommended that the value be between 100-1K. Usually the recommended value is around 300 R. In order to make the LEDs work more stably, a parallel capacitor is needed between VDD and GND of each LED.

In order to avoid harmful effects in use, please try to add resistance and capacitance when using. If capacitors and resistors are not added, the number of LEDs on the lamp should be minimized, but this way still does not exclude the risk of problems.

### ESD (Electrostatic Discharge):

Static Electricity or power surge will damage the LED. Use of a conductive wrist band or anti-electrosatic glove is recommended when handing the LED all time. All devices, equipment, machinery, work tables, and storage racks must be properly grounded.

## REVISION RECORD:

| Version | Date | Summary of Revision |
|---|---|---|
| A1.0 | 24/04/2022 | Datasheet set-up. |
| A1.1 | 30/08/2024 | Add bin table. |
| A1.2 | 19/09/2024 | Add polarity on drawing. |
| A1.3 | 23/09/2024 | Revise pin table. |
| A1.4 | 11/12/2024 | Revised package dimensions. |