BRIGHTEK

BRIGHTEK (EUROPE) LIMITED

Brighten Up The World With LED!

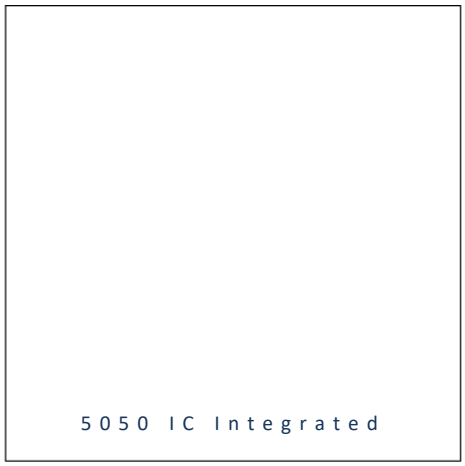
ISO/TS 16949:2009 BS EN ISO 14001:2004 QC 080000 IECQ HSPM

PRODUCT DATASHEET

- ▶ PLCC6 SMD with IC
- ▶ 5050IC 1.57t Series
- ▶ Red/Green/Blue

Release Date: 07 September 2024 Version: A1.0

N0M67S32IC



5050 IC-Integrated

RoHS Compliant

FEATURES:

- **Package:** PLCC6 EIA STD Package with Integrated IC
- **Forward Current:** 20mA
- **Forward Voltage (typ.):** +3.8~+5.5V
- **Luminous Intensity (typ.):** 3100mcd mixed white
- **Colour:** Red/Green/Blue
- **Dominant Wavelength:** 622/522/467nm
- **Viewing Angle:** 120°
- **Materials:**
  - Resin: Silicone (White Diffused)
- **Operating Temperature:** -40~+85°C
- **Storage Temperature:** -40~+105°C
- **IC Feature:**
  RGB and driver chip are integrated in one package, to form a complete control of pixel point with constant current. One Pixel contains R, G, and B colour each can achieve 256 level brightness greyscales, which form 16,777,216 combination colours. Internal clock frequency operates at 800kHz. Serial data transmission signal by single wire.
- **Soldering methods:** IR Reflow soldering
- **Preconditioning:** acc. to JEDEC Level 3
- **Packing:** 12mm tape with max.1000pcs/reel, ø180mm (7'')

APPLICATIONS:

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

CHARACTERISTICS:

Absolute Maximum Characteristics (T_a=25°C)

Parameter	Symbol	Ratings	Unit
DC Forward Current	I_F	20	mA
IC Power Supply Voltage	V_{DD}	+3.8~+5.5	V
IC Input Voltage	V_I	-0.4~V_{DD}+0.4	V
Electrostatic Discharge (HBM)	ESD	2000	V
Operating Temperature	T_{OPR}	-40~+85	°C
Storage Temperature	T_{STG}	-40~+105	°C
Soldering Temperature	T_{SD}	260 for 10s	°C

Electrical & Optical Characteristics (T_a=25°C)

Parameter		Symbol	Values			Unit	Test Condition
			Min.	Typ.	Max.		
Luminous Intensity	R	I_V	600	820	1200	mcd	V_{DD}=5V
	G		1100	1900	2200		
	B		270	450	540		
Mixed White	W	I_V	2000	3100	4000	mcd	V_{DD}=5V
Forward Voltage		V_F	3.8	---	5.5	V	---
Dominant Wavelength	R	λ_D	615	---	630	nm	V_{DD}=5V
	G		515	---	530		
	B		460	---	475		
Colour Coordinate	X	---	---	0.2516	---	---	V_{DD}=5V
	Y		---	0.2448	---	---	
Viewing Angle		$2\theta_{1/2}$	---	120	---	deg	V_{DD}=5V

1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. 2θ1/2 is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from CIE chromaticity diagram and represents the single wavelength which defines the color of the device. Peak Emission Wavelength Tolerance is ±1nm.

Electrical & Optical Characteristics (T_a=25°C)

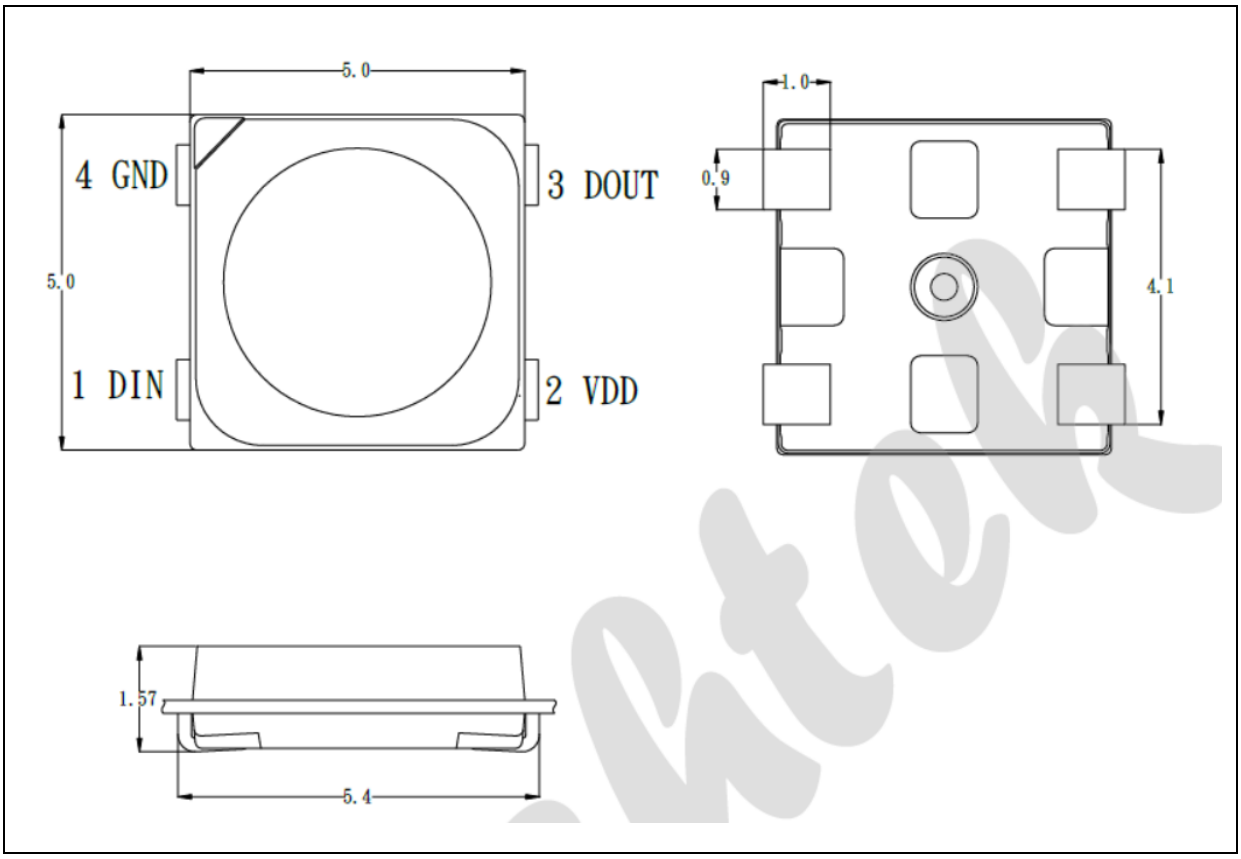
Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Standby Current	I_{STB}	---	1.2	1.5	mA	V_{DD}=4.5V I_{OUT}="OFF"
Input Voltage Level	V_{IH}	2.7	---	V_{DD}	V	D_{IN}, Input High Voltage
	V_{IL}	0	---	1.0	V	D_{IN}, Input Low Voltage

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}	---	15	---	ns	D_{IN} -> D_{OUT} D_{OUT} port to GND CL=30pF
	T_{PHL}	---	15	---	ns	
Conversion Time of I_{OUT} R/G/B	T_r	---	80	---	ns	I_{OUT} R/G/B=20mA RL=200Ω CL=30pF
	T_f	---	80	---	ns	

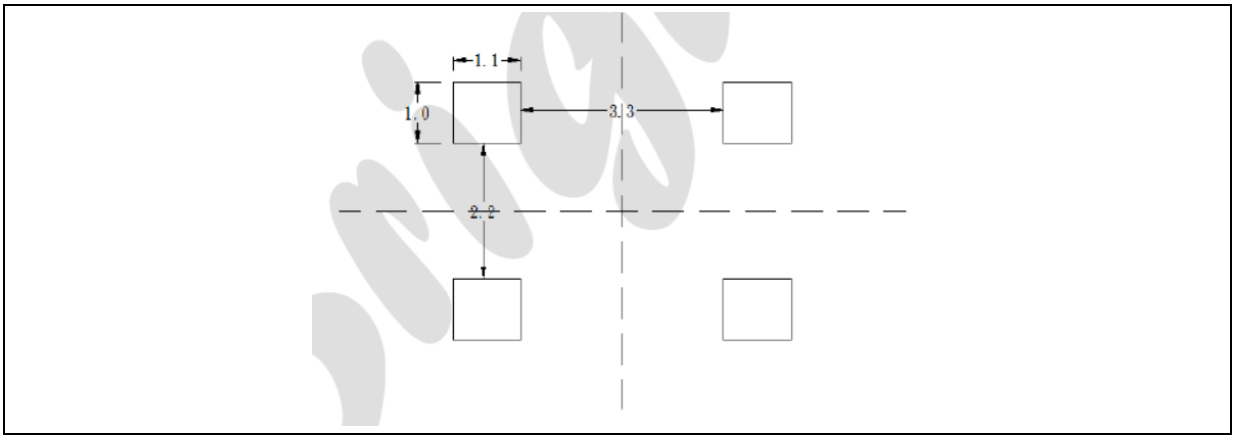
OUTLINE DIMENSION:

Package Dimension:



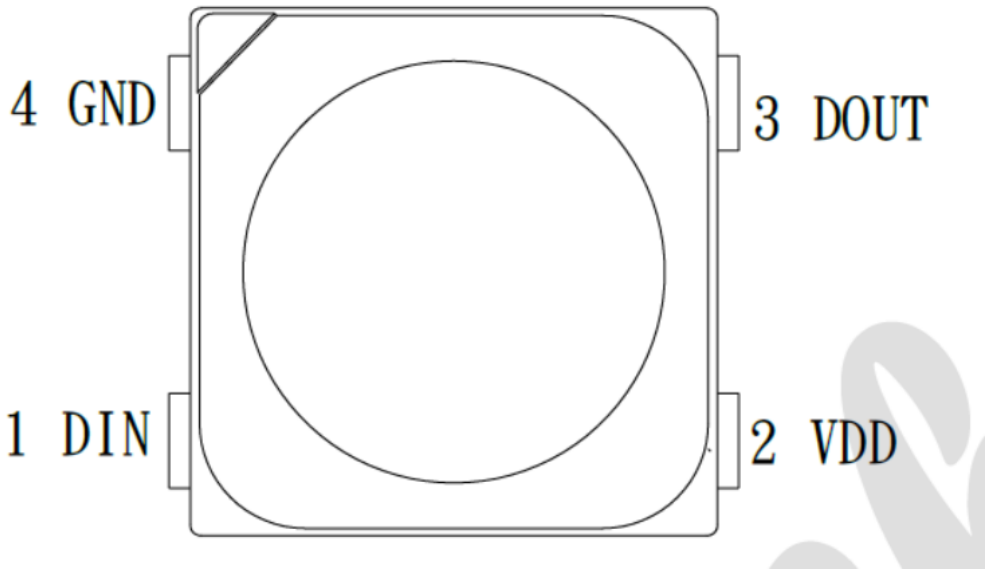
1. All dimensions are in millimetre (mm).
2. Tolerance ±0.2mm, unless otherwise noted.

Recommended Soldering Pad Dimension:



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

PIN CONFIGURATION:



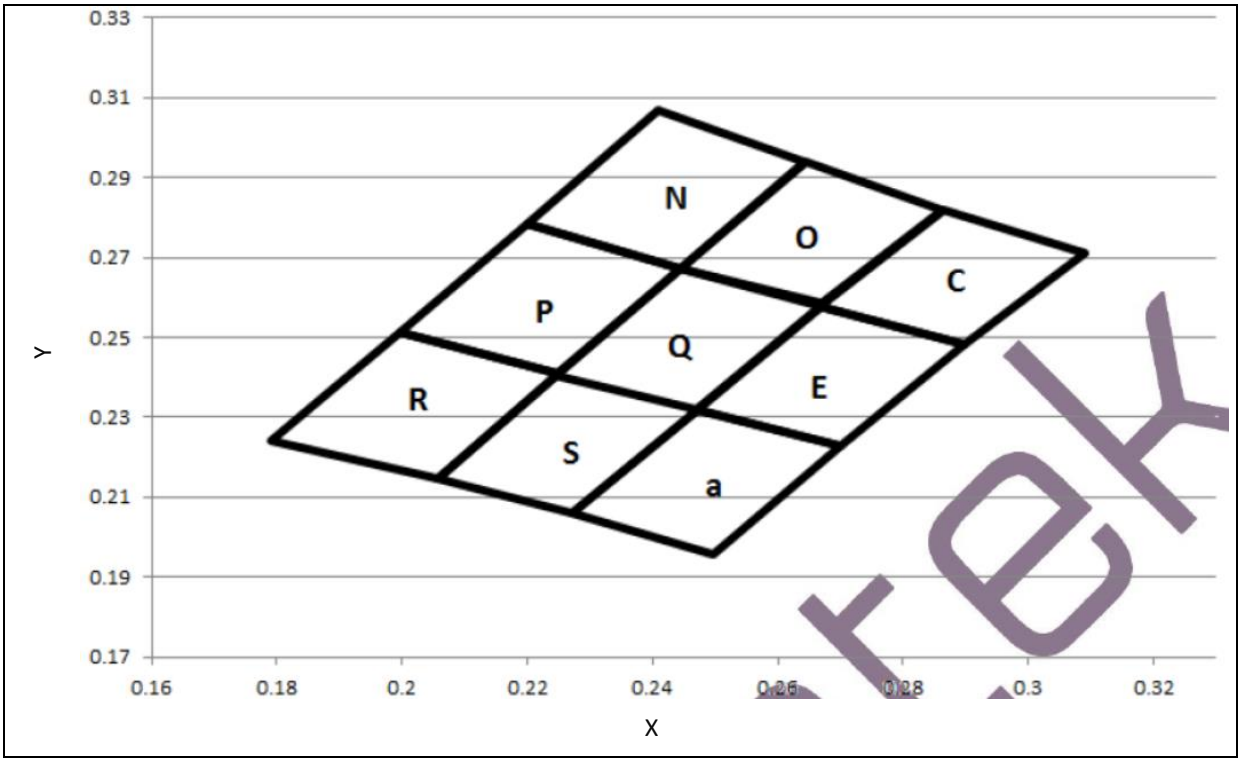
No.	Symbol	Function Description
1	DIN	Control data signal input
2	VDD	Power supply LED
3	DOUT	Control data signal output
4	GND	Ground

BINNING GROUPS:

Luminous Intensity Classifications (White) (V_{DD}=5V; I_F=20mA*3):

Code	Min.	Max.	Unit
25	2000	2500	mcd
26	2500	3200	
27	3200	4000	

CIE CHROMATICITY DIAGRAM:

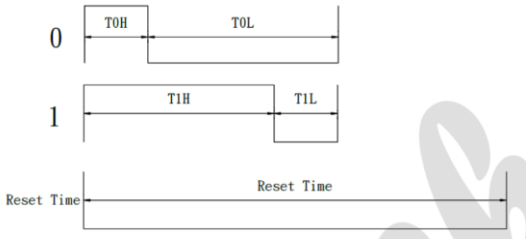


Chromaticity Coordinates Classifications (I_F=20mA):

	1		2		3		4	
	X	Y	X	Y	X	Y	X	Y
N	0.2200	0.2783	0.2406	0.3064	0.2643	0.2940	0.2444	0.2672
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
P	0.2200	0.2783	0.1996	0.2513	0.2244	0.2407	0.2444	0.2672
Q	0.2444	0.2672	0.2244	0.2407	0.2471	0.2320	0.2669	0.2579
E	0.2667	0.2578	0.2899	0.2482	0.2700	0.2227	0.2470	0.2320
R	0.1996	0.2513	0.1792	0.2243	0.2056	0.2148	0.2244	0.2407
S	0.2244	0.2407	0.2056	0.2148	0.2273	0.2061	0.2471	0.2320
a	0.2471	0.2320	0.2273	0.2061	0.2498	0.1959	0.2700	0.2227

DATA TRANSFER TIME:

1. Timing Wave Form:



2. Data Transfer Time:

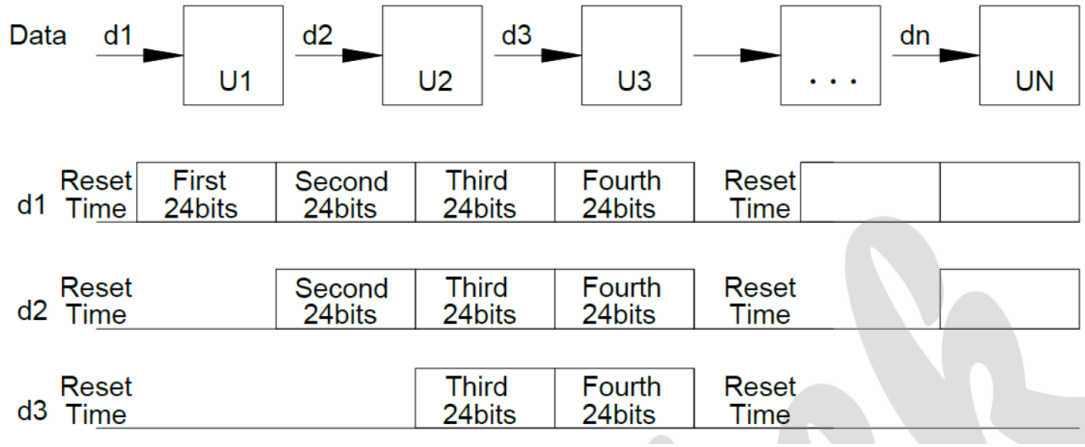
Item	Description	Typical	Allowance
T_{0H}	0 code, high voltage time	0.3μs	±0.05μs
T_{0L}	0 code, low voltage time	0.9μs	±0.05μs
T_{1H}	1 code, high voltage time	0.9μs	±0.05μs
T_{1L}	1 code, low voltage time	0.3μs	±0.05μs
RES	Reset Time	>250μs	---

3. Composition of 24 Bits Data

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

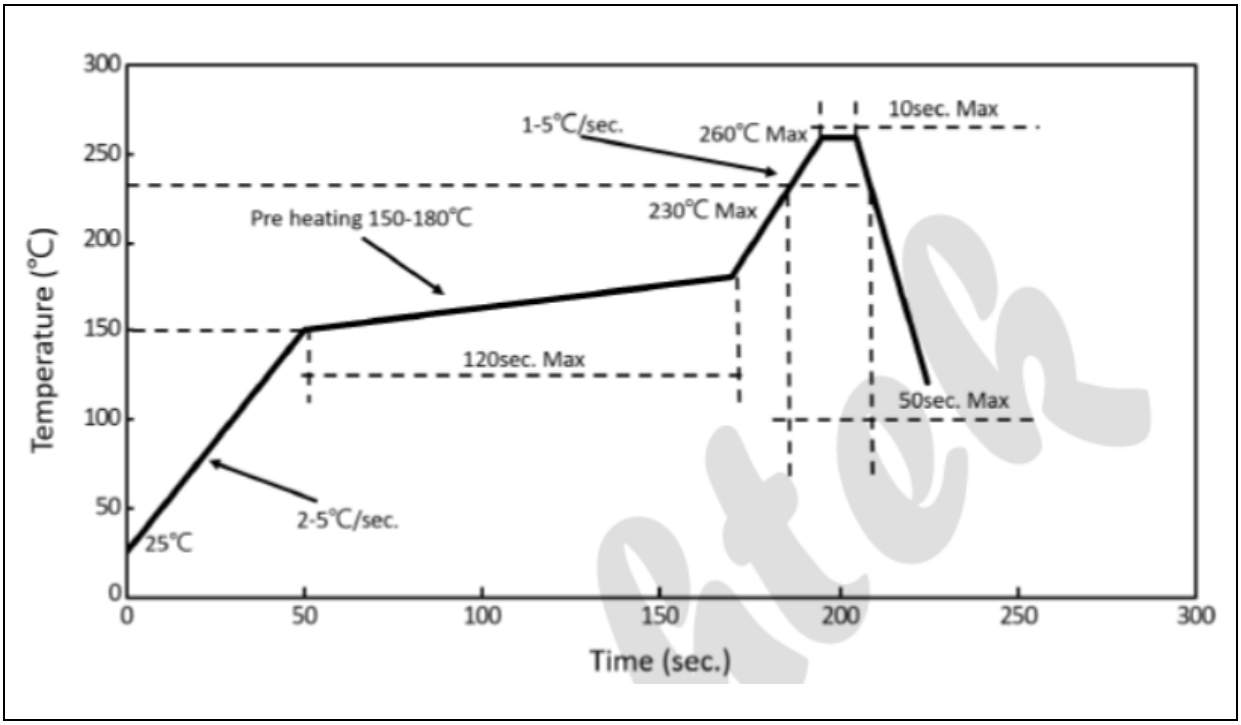
The single wire data transfer protocol supports 24-bit data for each LED's RGB display data refresh. ICLED receives 24-bit data and passes the remaining data to the next ICLED. The 24-bit data consist of green, red and blue data, each with 8-bit width, and are transferred with MSB first.

4. Data Transmission Method:



RECOMMENDED SOLDERING PROFILE:

Lead-free Solder IR Reflow:



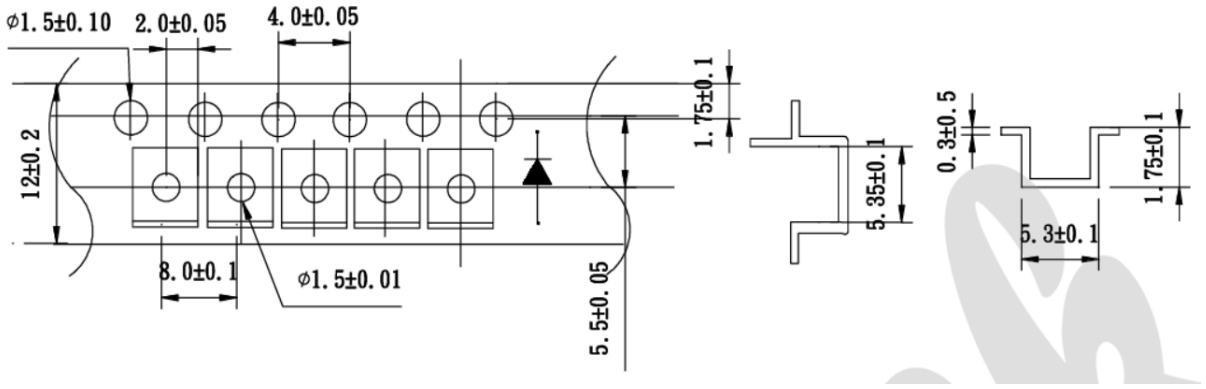
Note:

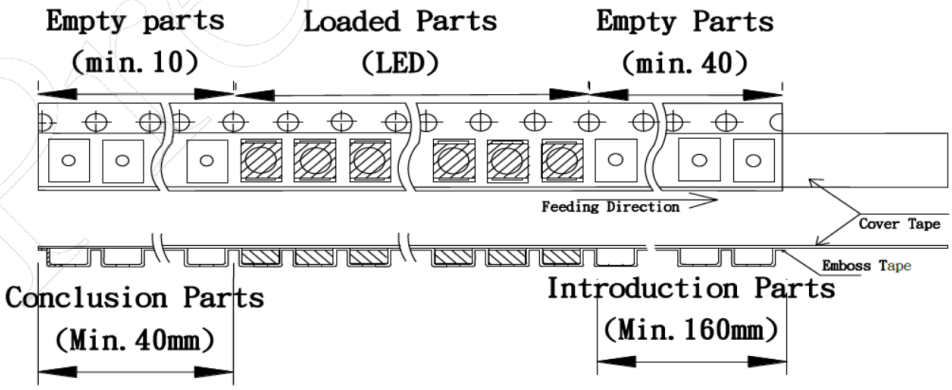
1. We recommend the reflow temperature 245°C (±5°C). The maximum soldering temperature should be limited to 260°C.
2. Maxima reflow soldering: 3 times.
3. Before, during, and after soldering, should not apply stress on the components and PCB board.

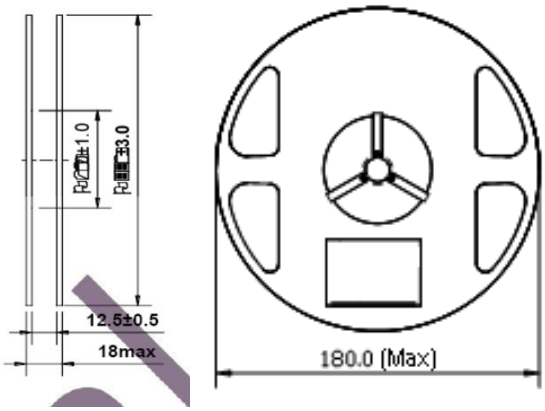
PACKING SPECIFICATION:

Reel Dimension:

Max.1000pcs/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 24 hours. 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.

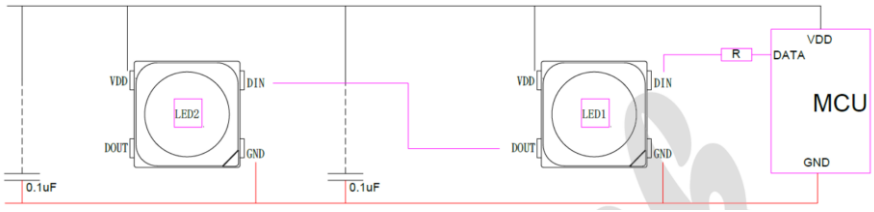
Baking:

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.

Testing 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.

Cleaning:

Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LED carrier / package. Avoid putting any stress force directly on to the LED lens.

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	07/09/2024	Datasheet set-up.