



**BRIGHTTEK**  
**BRIGHTTEK (EUROPE) LIMITED**

*Brighten up The World With LED!*



ISO/TS 16949:2009



BS EN ISO 14001:2004



QC 080000 IECQ HSPM

## PRODUCT DATASHEET



- ▶ PCB/CHIP with IC
- ▶ 0808 (2020) IC 0.65t (6 pins)
- ▶ Red/Green/Blue

NOM68S72IC



Release Date: 23 January 2025 Version: A1.1



### 0808 (2020) IC-Integrated



**RoHS Compliant**

#### FEATURES:

- **Package:** CHIP Top View Package with Integrated IC 9822: Dual Wire Low Grey Transmission IC with 18mA capacity.
- **R/G/B Output Current (typ.):** 18mA
- **Logical Supply Voltage (typ.):** 5V
- **R/G/B Luminous Intensity (typ.):** 240/450/120mcd
- **Colour:** Red/Green/Blue
- **Lens Colour:** Water Diffused
- **IC Feature:** Control IC and RGB LED chip integrated 0808 (2020) package. SPI transmission protocol. Infinite cascading capability. Dual lines data transmission (SDI+CKI). Greyscale adjust-ment: 256 levels. Current gain: 5Bit (level 32). Built-in reset circuit, power on not light. Maximum serial input data frequency 15MHz. Forward voltage: 5V@18mA adjustable (RBG OUT).
- **Soldering Methods:** Reflow soldering
- **ESD Level:** 2kV
- **MSL Level:** acc. to JEDEC Level 4
- **Packing:** 8mm tape with max.4500pcs/reel,  $\phi$ 180mm (7")

#### APPLICATIONS:

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

## CHARACTERISTICS:

### Absolute Maximum Characteristics (T<sub>a</sub>=25°C)

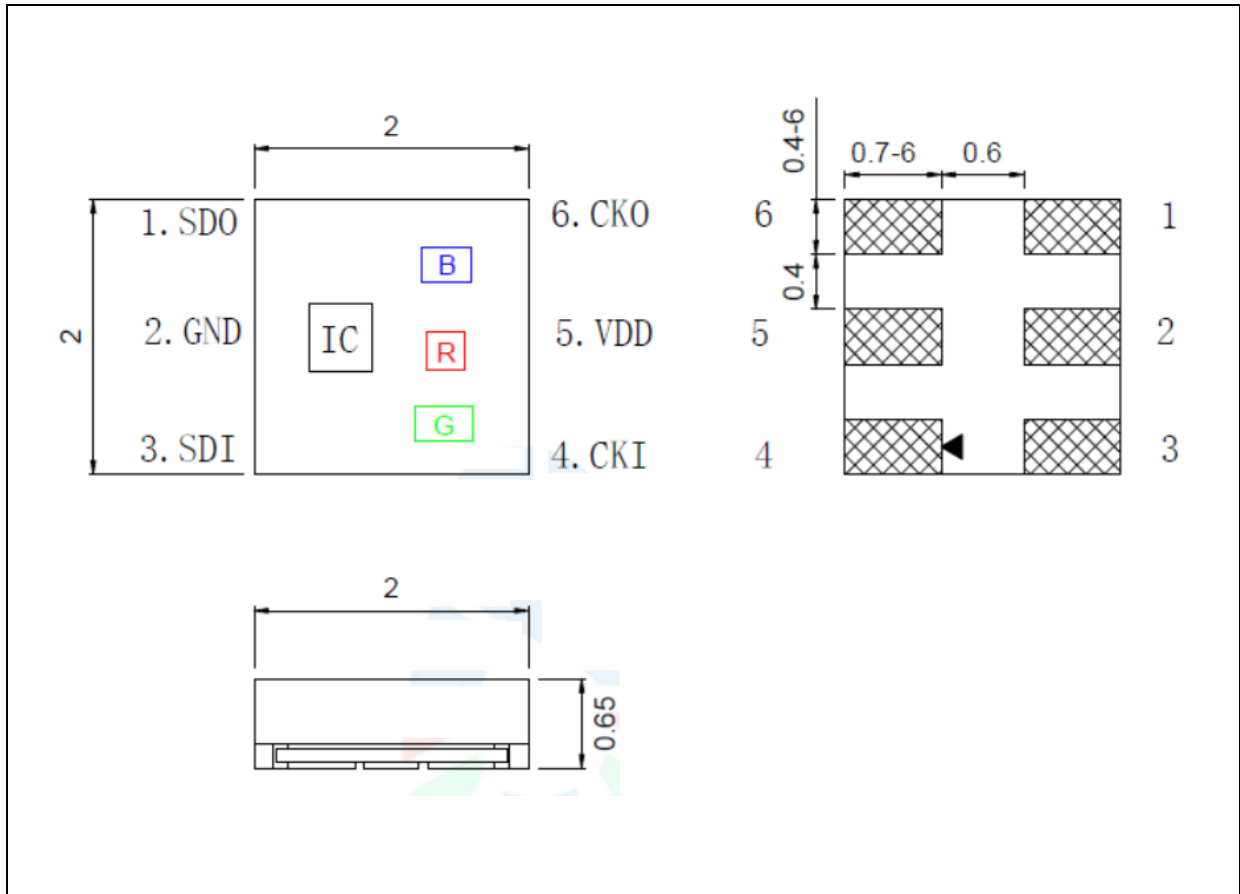
Parameter	Symbol	Ratings	Unit
Working Voltage	V <sub>DD</sub>	-0.3~V <sub>DD</sub> +0.3	V
Operation Temperature	T <sub>OPT</sub>	-40~+85	°C
Storage Temperature	T <sub>STG</sub>	-40~+85	°C
ESD Withstand Voltage (Human Mode)	V <sub>ESD</sub>	2	kV

### Electrical & Optical Characteristics

Parameter	Symbol	Values			Unit	Test Condition	
		Min.	Typ.	Max.			
Chip Input Voltage	V <sub>DD</sub>	---	5.0	5.3	V	---	
R/G/B Output Drive Current	I <sub>DOUT</sub>	16	---	21	mA	V <sub>DS</sub> =1V	
PWM Frequency	F <sub>PWM</sub>	---	1.2	---	KHz	---	
Static Power Consumption	I <sub>DD</sub>	---	1	---	mA	---	
High Level Input Voltage	V <sub>IH</sub>	3.4	---	5.3	V	---	
Low Level Input Voltage	V <sub>IL</sub>	-0.3	---	1.6	V	---	
Dominant Wavelength	Red	λ <sub>d</sub>	620	---	625	nm	I <sub>F</sub> =18mA
	Green		525	---	530		
	Blue		465	---	470		
Luminous Intensity	Red	I <sub>v</sub>	160	---	320	mcd	I <sub>F</sub> =18mA
	Green		320	---	580		
	Blue		80	---	160		
Viewing Angle	2θ <sub>1/2</sub>	---	160	---	deg	I <sub>F</sub> =18mA	

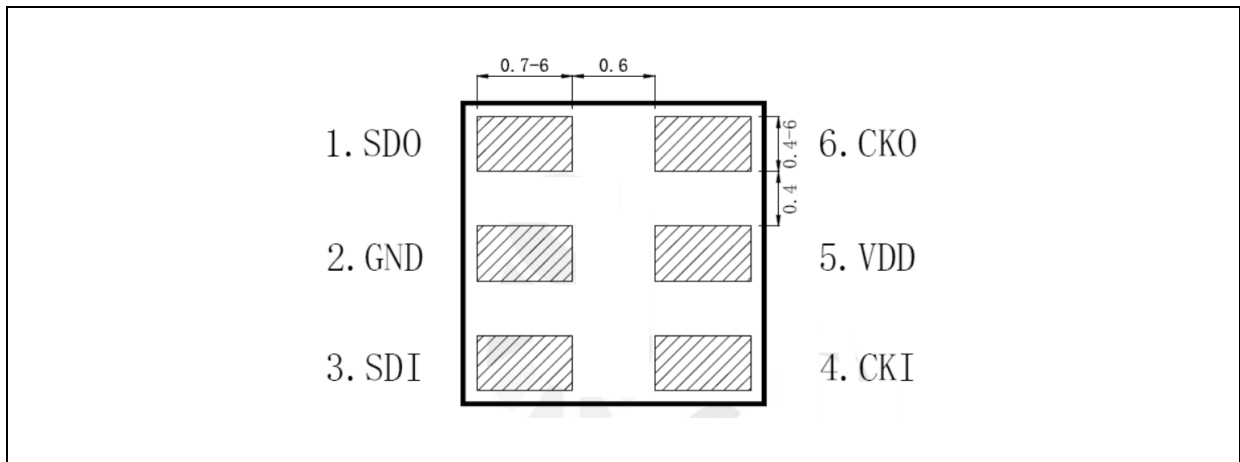
## OUTLINE DIMENSION:

Package Dimension:

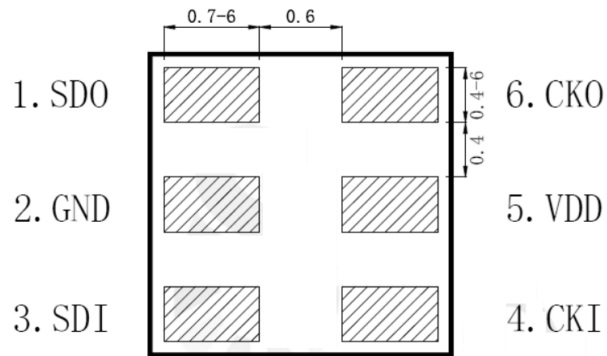


1. All dimensions are in millimetre (mm).
2. Tolerance  $\pm 0.1\text{mm}$ , unless otherwise noted.

Recommended Soldering Pad Dimension:



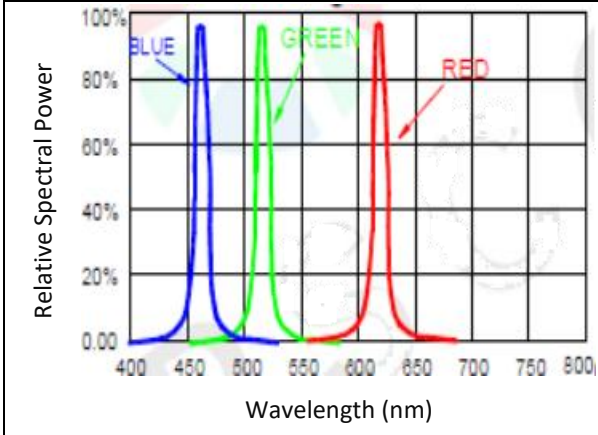
1. Dimensions are in millimetre (mm).
2. Tolerance  $\pm 0.1\text{mm}$  with angle tolerance  $\pm 0.5^\circ$ .

**PIN CONFIGURATION:**


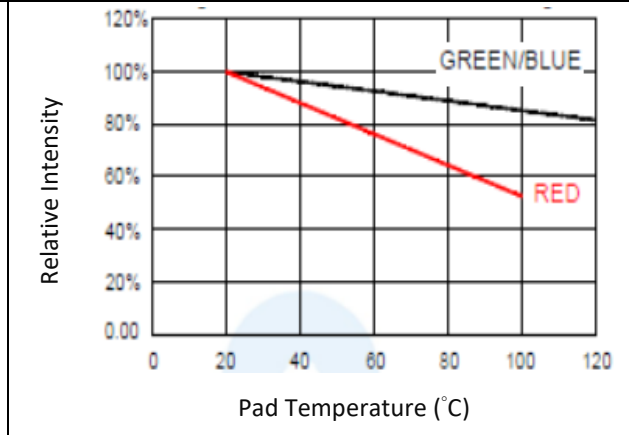
No.	Symbol	Function Description
1	SDO	Data output: Serial data output terminal
2	GND	Ground or power negative terminal: Negative pole of power supply
3	SDI	Data input: Serial data input terminal
4	CKI	Clock input: Serial connection of clock signal input terminal
5	VDD	Positive end of power supply: Positive pole of power supply
6	CKO	Clock output: Serial connection of clock signal output terminal

**ELECTRO-OPTICAL CHARACTERISTICS:**

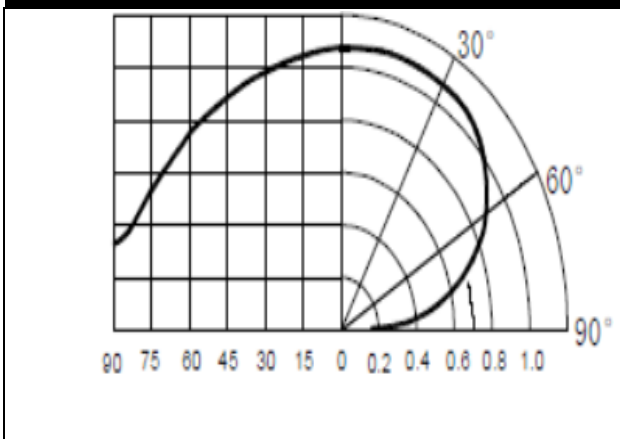
Relative Spectral Power v.s. Wavelength



Relative Intensity v.s. Temperature



Radiation Angle



## FUNCTION DESCRIPTION:

### 1. Serial Data Structure:

0*32	LED 1	LED 2	LED 4	....	LED N	1*32
Start frame	Data frame	Data frame	Data frame	.....	Data frame	End frame
Start frame	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
Data frame	3-bit Identify data bits 111	5-bit brightness adjustment	8-bit red light data	8-bit blue light data	8-bit green light data	
		MSB first	MSB first	MSB first	MSB first	
End frame	1111 1111	1111 1111	1111 1111	1111 1111	1111 1111	

Product output structure: RGB sequential lighting, optimizing product color mixing effect (adjusting IC default RGB sequential chip position)

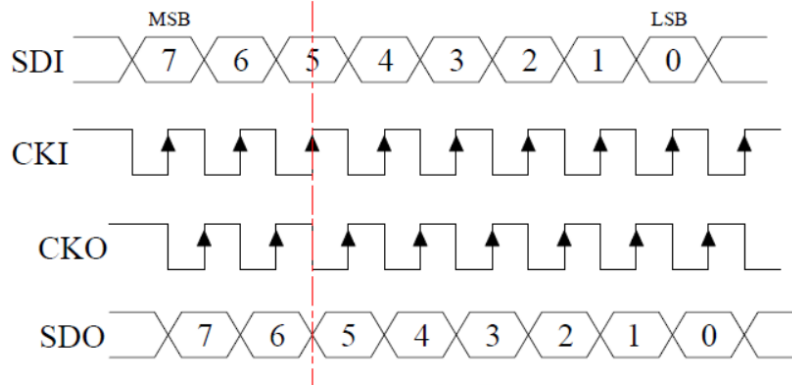
### 2. Refresh Rate:

Frame rate=1/(64+(32 \* points)) \* CKI cycle (unit: frames/second). For example, if there are 1024 points and the CKI frequency is 1MHz, the frame rate is 30 frames per second.

### 3. 256 Level Greyscale:

Numerical value	Duty cycle
MSB.....LSB	
0000 0000	0/256
0000 0001	1/256
0000 0010	2/256
-	-
-	-
-	-
1111 1101	253/256
1111 1110	254/256
1111 1111	255/256

#### 4. PWM Inut-Output Relationship:



SDI jumps on the falling edge of CKI and reads the current chip on the rising edge of CKI.

SDO jumps on the rising edge of CKI and reads the next chip on the falling edge of CKI.

That is to say: The input data SDI starts to jump at the falling edge of CKI, and only after the jump stabilizes can it be read at the rising edge of CKI; the output data SDO can only be output after the input data SDI is read in, and SDI is read in on the rising edge of CKI, so SDO is output on the rising edge of CKI.

CKI rising edge time: It is the moment when the SDI of the current level chip is read in and the SDO of the current level is output, which is the input data SDInext of the next level chip. If the CKI and CKO are synchronized and the signal is exactly the same, then it occurs at the rising edge of the CKI, and all chips input and output data simultaneously. This is an extremely unstable situation, and data transmission will be completely chaotic.

So, the waveforms of CKI and CKO should be staggered; At the same time, it is necessary to stagger the latency issues between systems and design a unified CKO that reduces CKI by half a Clock.

Product output structure: GRB sequential lighting, optimizing product color mixing effect (adjusting IC default RGB sequential chip position).

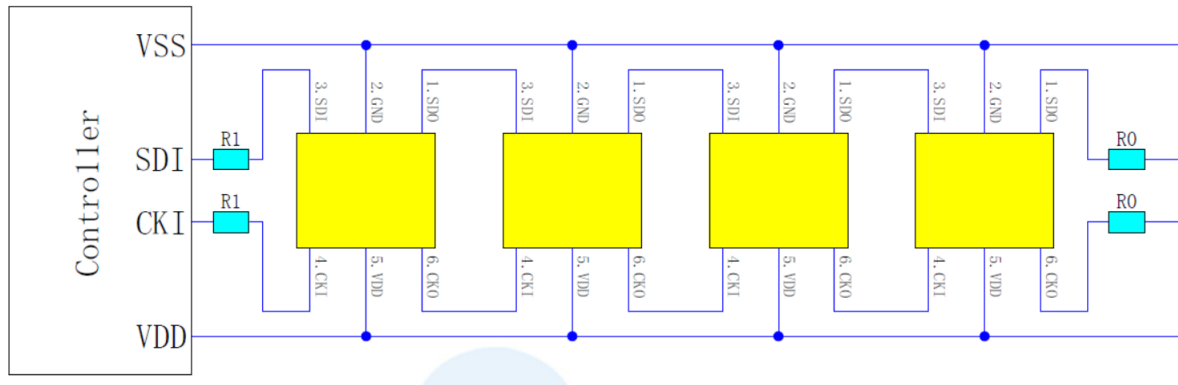
5. 5-Bit (level 32) brightness adjustment (simultaneously controlling the current of the three ports OUTR, OUTB, and OUTG):

Current regulation level	numerical value	Current adjustment	Corresponding current value	Notes
1	00000	0/31	0	Suggested use of current: 1-10 current regulation level
2	00001	1/31	0.581	
3	00010	2/31	1.162	
4	00011	3/31	1.743	
5	00100	4/31	2.324	
6	00101	5/31	2.905	
7	00110	6/31	3.486	
8	00111	7/31	4.067	
9	01000	8/31	4.648	
*10	01001	9/31	5.229	
11	01010	10/31	5.81	Based on the heat dissipation of the product, it is recommended to use a maximum current of 0-5mA for adjustment. The current adjustment level of 11-32 is not recommended
12	01011	11/31	6.391	
13	01100	12/31	6.972	
14	01101	13/31	7.553	
15	01110	14/31	8.134	
16	01111	15/31	8.715	
17	10000	16/31	9.296	
18	10001	17/31	9.877	
19	10010	18/31	10.458	
20	10011	19/31	11.039	
21	10100	20/31	11.62	
22	10101	21/31	12.201	
23	10110	22/31	12.782	
24	10111	23/31	13.363	
25	11000	24/31	13.944	
26	11001	25/31	14.525	
27	11010	26/31	15.106	
28	11011	27/31	15.687	
29	11100	28/31	16.268	
30	11101	29/31	16.849	
31	11110	30/31	17.43	
32	11111	31/31	18	

Suggested use of current: 1-10 current regulation levels. Based on the heat dissipation of the product, it is recommended to use a maximum current of 0-5mA for adjustment. The current adjustment level of 11-32 is not recommended.



6. Typical Application Circuit:

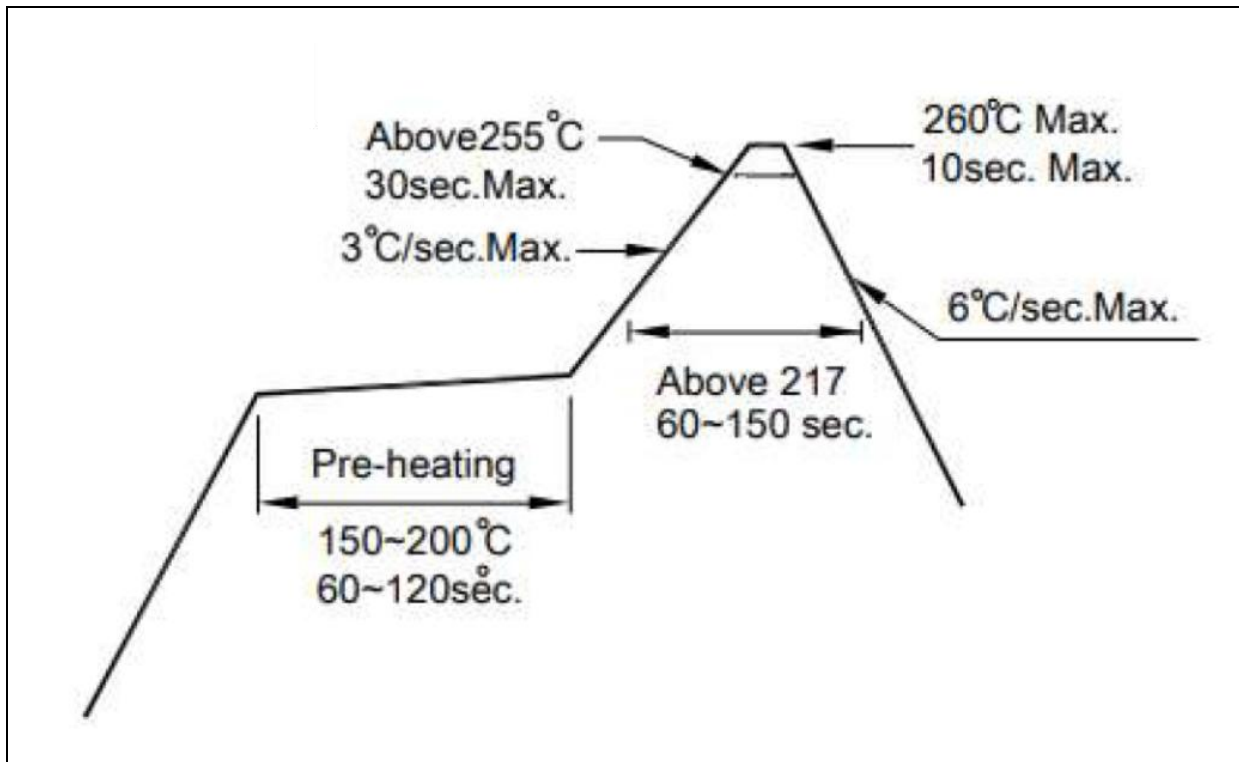


In practical application circuits, to prevent instantaneous high voltage damage to the internal power supply and signal input/output pins of the IC caused by live plugging and unplugging during testing, protective resistors should be connected in series at the signal input and output terminals. In addition, in order to ensure more stable operation between IC chips, the decoupling capacitance between each LED is essential.

1. It is generally not recommended to omit the decoupling capacitance at both ends of the product.
2. The signal input and output terminals of the product must be connected in series with protective resistors R1/R2. Due to different wire materials and transmission distances, the protective resistors connected in series at both ends may vary slightly; The size of R1/R2 depends on the number of cascaded light beads. The more cascaded the number, the smaller the R1/R2, and the longer the transmission distance between the light beads. It is generally recommended to take a value between 20-2K  $\Omega$ , and it is usually recommended to take a value of around 500  $\Omega$ ; Based on actual usage.

## RECOMMENDED SOLDERING PROFILE:

Lead-free Solder IR Reflow:

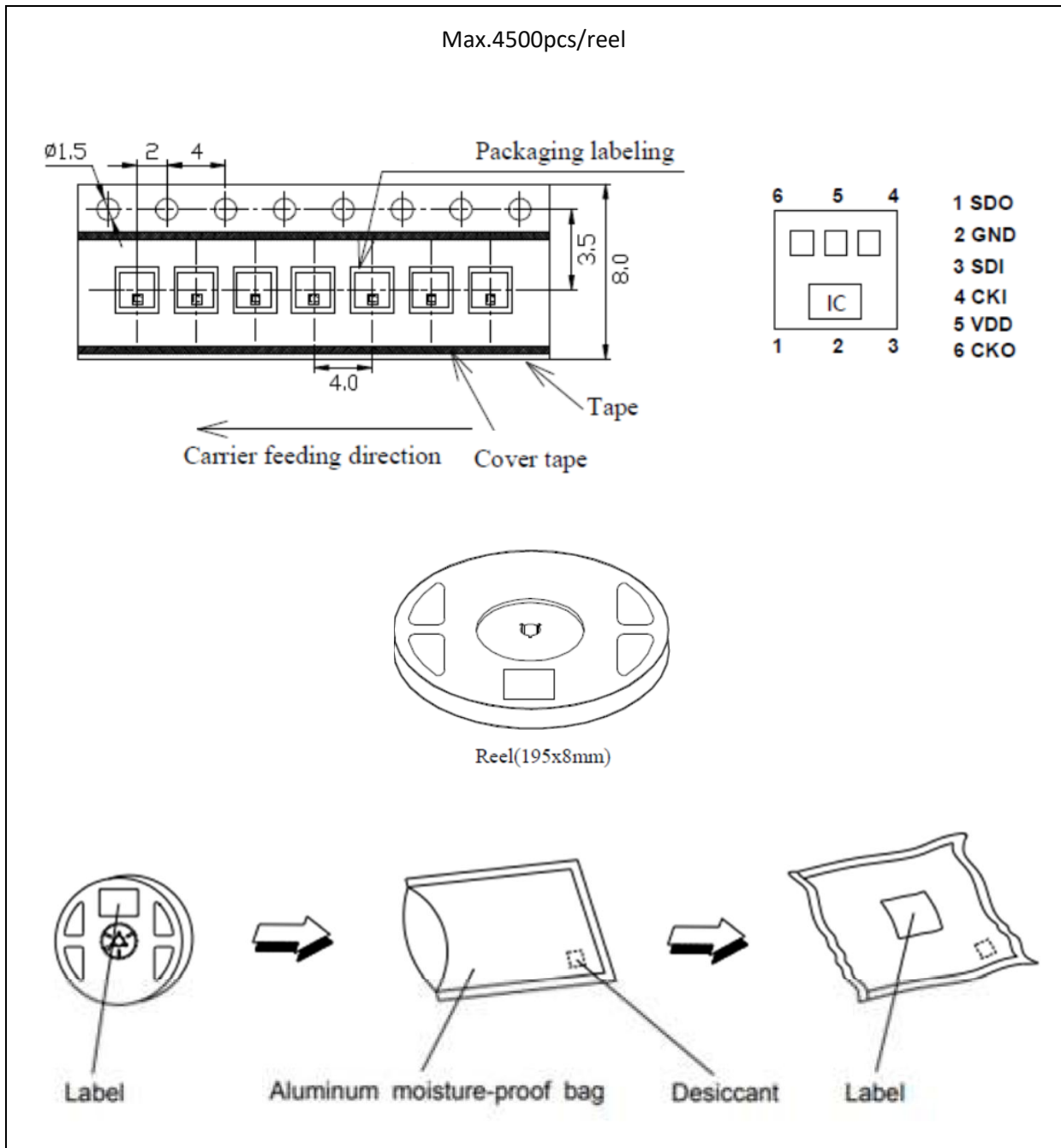


Note:

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

## PACKING SPECIFICATION:

Reel Dimension:



## PRECAUTIONS OF USE:

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### 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 72 hours. Otherwise, they should be kept in a damp-proof box with desiccating agent stored at R.H.<10% and apply baking before use.

### 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±5°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.

### 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-electrostatic glove is recommended when handling the LED all time. All devices, equipment, machinery, work tables, and storage racks must be properly grounded.

**REVISION RECORD:**

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Version	Date	Summary of Revision
A1.0	20/03/2024	Datasheet set-up.
A1.1	23/01/2025	New datasheet format.