



**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



- ▶ PLCC6 SMD with IC
- ▶ 3535IC 1.47t Series
- ▶ Red/Green/Blue

NOM50S15IC



Sleep Mode



Release Date: 06 November 2019 Version: A1.1



### 3535 IC-Integrated

**RoHS**  
Compliant



#### FEATURES:

- **Package:** PLCC6 EIA STD Package with Integrated IC Sleep Mode Type 102
- **Forward Current:** 20mA
- **Forward Voltage (typ.):** +4.5~+5.5V
- **Luminous Intensity (typ.):** 2500mcd mixed white
- **Colour:** Red/Green/Blue
- **Wavelength:** 622/527/467nm
- **Viewing angle:** 120°
- **Materials:**
  - Resin: Silicone (White Diffused)
  - L/F Finish: Ag Plated
- **Operating Temperature:** -40~+85°C
- **Storage Temperature:** -40~+105°C
- **IC Feature:** Serial data transmission signal by DATA CLK two lines
- **Pixel:** One pixel contains R, G, and B colour that each can achieve 256 level brightness greyscales, which forms 16,777,216 combination colours.
- **Soldering methods:** IR Reflow soldering
- **Preconditioning:** acc. to JEDEC Level 5
- **Packing:** 12mm tape with Max.1300pcs/reel, ø180mm (7")

#### APPLICATIONS:

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



Support sleep/wake up mode. In sleep mode the LED's current was lower than 5µA

**CHARACTERISTICS:**

## Absolute Maximum Characteristics (Ta=25°C)

Parameter	Symbol	Ratings	Unit
The Max. LED Output Current	I <sub>OMAX</sub>	20/channel	mA
Rate of Data Signal	F <sub>CLK</sub>	15	MHz
IC Power Supply Voltage	V <sub>DD</sub>	<6.5	V
Power Dissipation	P <sub>D</sub>	<400	mW
Operating Temperature	T <sub>OPR</sub>	-40~+85	°C
Storage Temperature	T <sub>STG</sub>	-40~+105	°C
Soldering Temperature	T <sub>SD</sub>	260	°C

 Electrical & Optical Characteristics (Ta=25°C, V<sub>DD</sub>=5V)

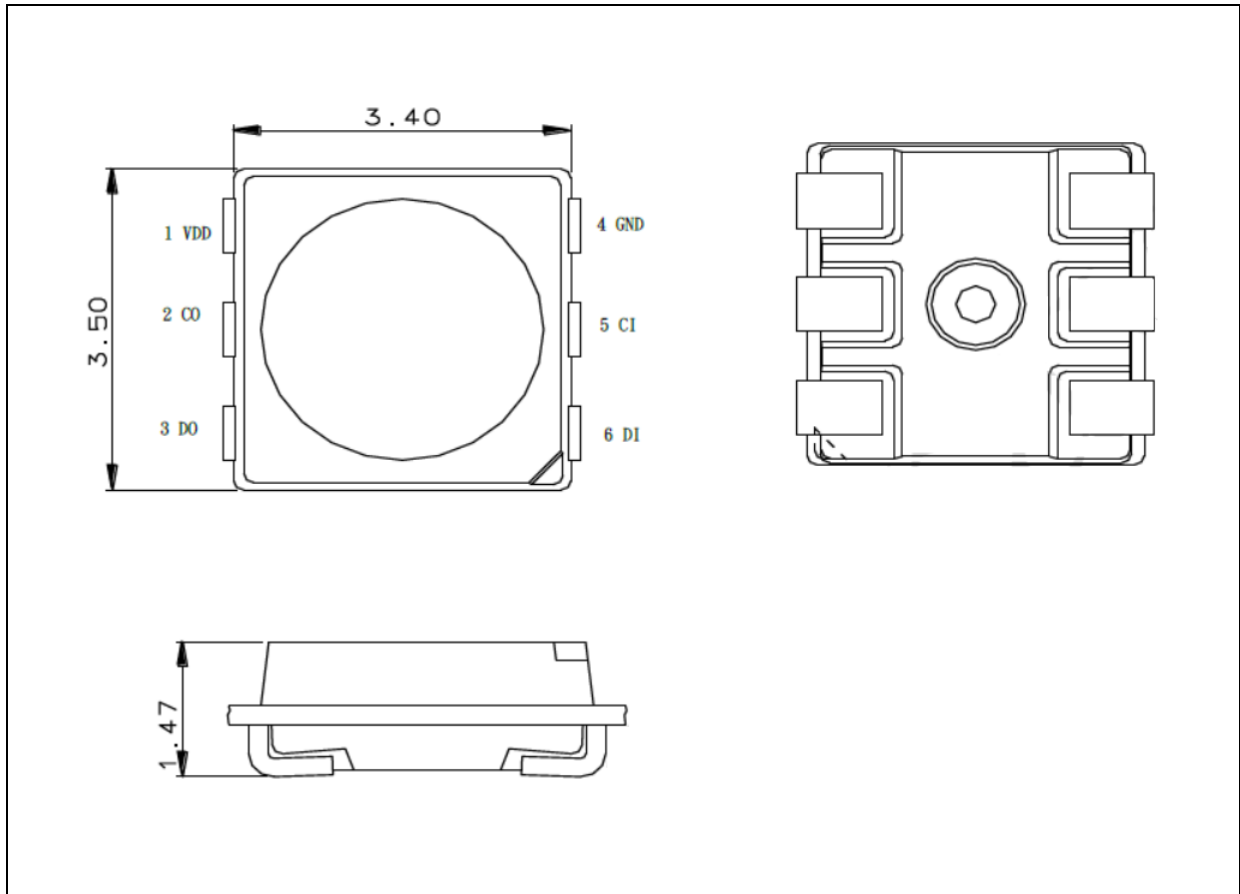
Parameter	Symbol	Values			Unit	Test Condition	
		Min.	Typ.	Max.			
Forward Voltage	V <sub>F</sub>	4.5	---	5.5	V	I <sub>F</sub> =20mA	
Luminous Intensity	R	I <sub>v</sub>	---	550	---	mcd	I <sub>F</sub> =20mA
	G		---	1700	---		
	B		---	300	---		
	W		---	2500	---		
Dominant Wavelength	R	λ <sub>D</sub>	615	---	630	nm	I <sub>F</sub> =20mA
	G		520	---	535		
	B		460	---	475		
Colour Coordinate	X	---	---	0.2500	---	---	I <sub>F</sub> =20mA
	Y		---	0.2500	---		
Viewing Angle	2θ <sub>1/2</sub>	---	120	---	deg	I <sub>F</sub> =20mA	

Electrical & Optical Characteristics (Ta=25°C, V<sub>DD</sub>=5V)

Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Supply Voltage	V <sub>DD</sub>	4.5	5.0	5.5	V	---
Input Voltage Level	V <sub>IH</sub>	2.7	---	V <sub>DD</sub> +0.4	V	---
	V <sub>IL</sub>	-0.4	---	1.0	V	---
Clock High Level Width	T <sub>CLKH</sub>	30	---	---	ns	---
Clock Low Level Width	T <sub>CLKL</sub>	30	---	---	ns	---
Data Set-Up Time	T <sub>SETUP</sub>	10	---	---	ns	---
Data Hold Time	T <sub>HOLD</sub>	5	---	---	ns	---
Working Current (IC)	I <sub>DD</sub>	---	---	2	mA	I <sub>out</sub> =OFF
Static Current	I <sub>sleep</sub>	---	---	5	μA	Sleep Mode
ESD Pressure (HBM)	V <sub>ESD</sub>	---	6000	---	V	---

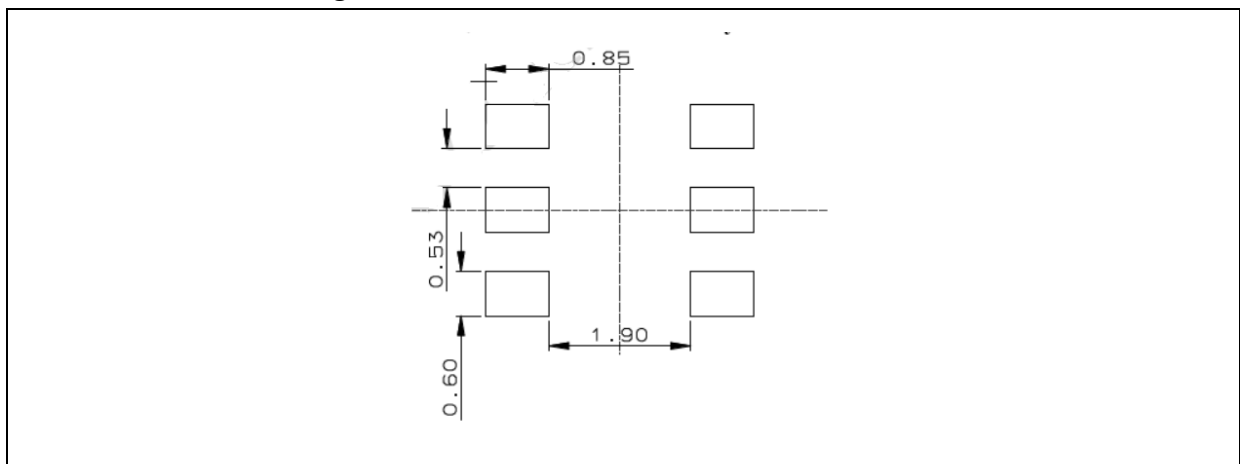
## OUTLINE DIMENSION:

Package Dimension:



1. All dimensions are in millimetre (mm).
2. Tolerance  $\pm 0.2\text{mm}$ , unless otherwise noted.

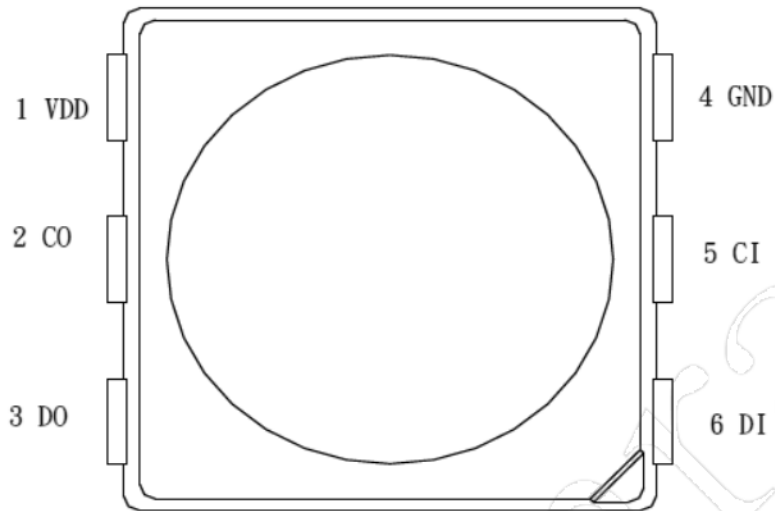
Recommended Soldering Pad Dimension:



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

**PIN CONFIGURATION:**


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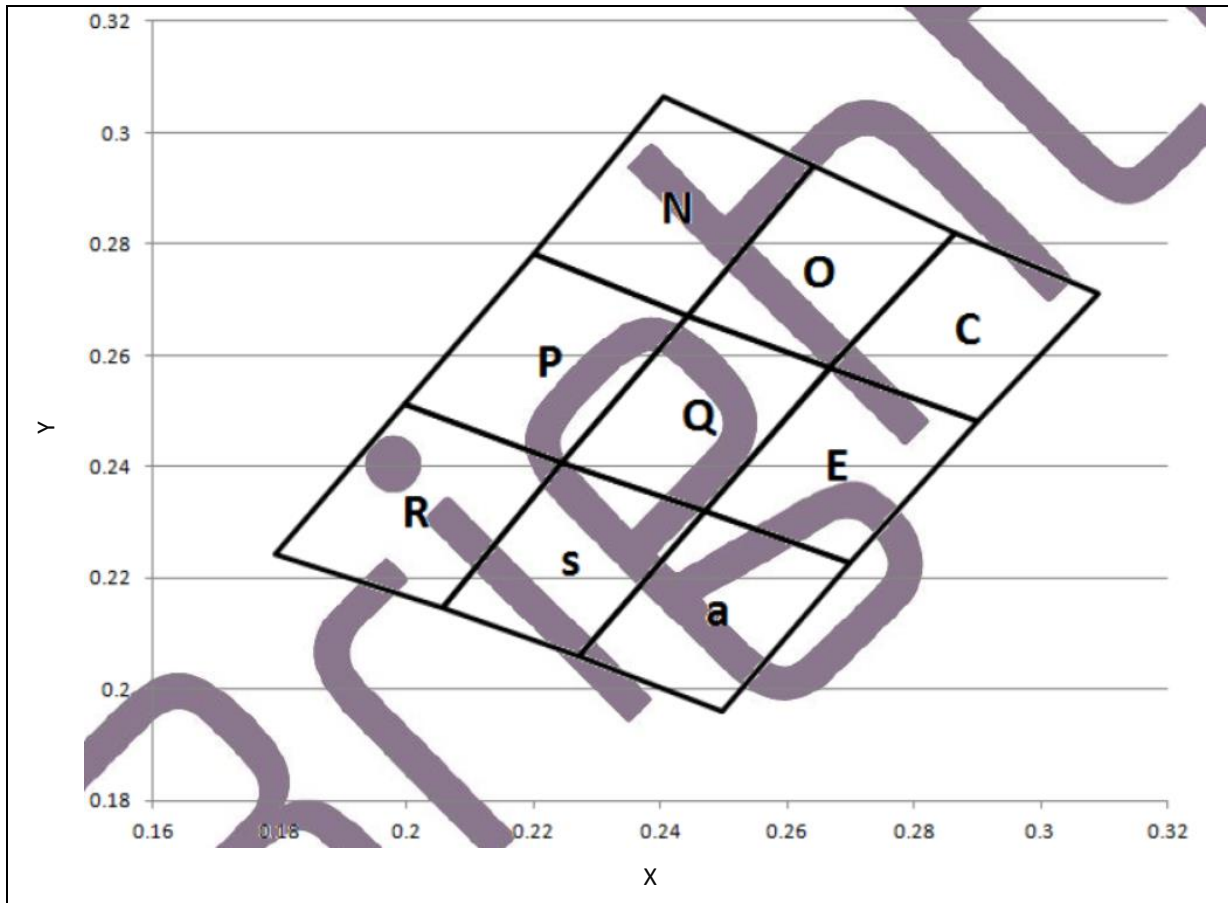
No.	Symbol	Function Description
1	VDD	Supply Voltage
2	CO	Clock Output
3	DO	Data Output
4	GND	Ground
5	CI	Clock Input
6	DI	Data Input

**BINNING GROUPS:**

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Luminous Intensity Classifications (White) ( $I_f = 20\text{mA}$ ):

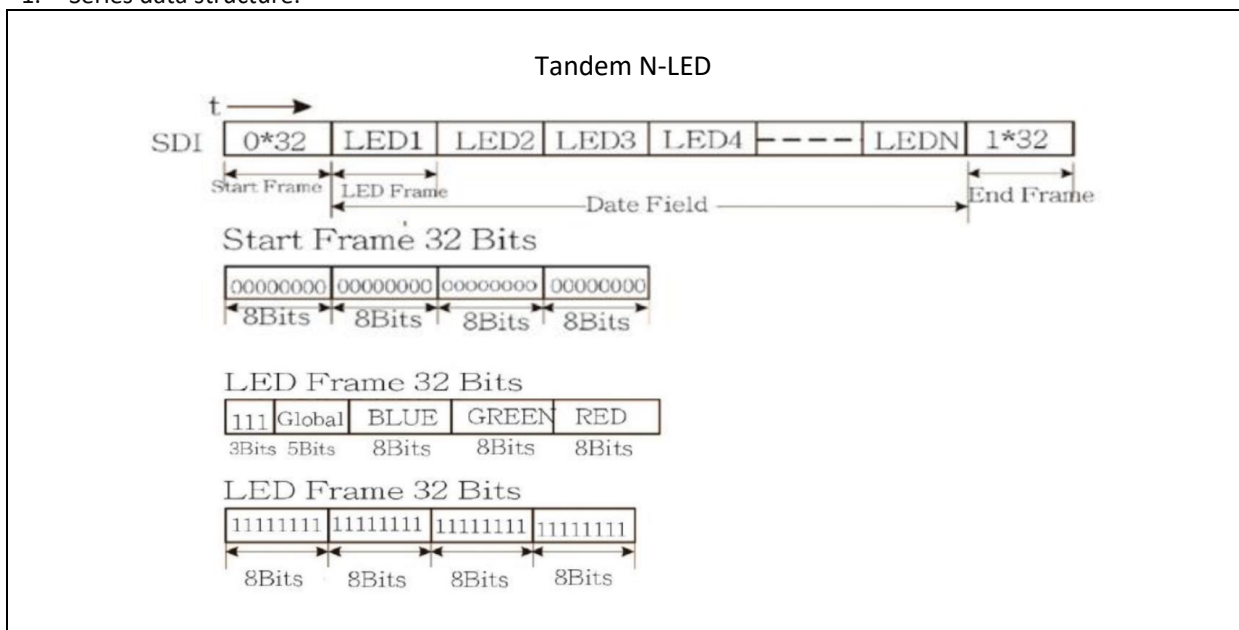
Code	Min.	Max.	Unit
16	1300	1700	mcd
17	1700	2200	
18	2200	2800	
19	2800	3600	
20	3600	4800	

**CIE CHROMATICITY DIAGRAM:**

 Chromaticity Coordinates Classifications ( $I_F = 20\text{mA}$ ):

	1		2		3		4	
	X	Y	X	Y	X	Y	X	Y
C	0.2865	0.2819	0.3091	0.2712	0.2899	0.2482	0.2667	0.2578
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
E	0.2667	0.2578	0.2899	0.2482	0.2700	0.2227	0.2470	0.2320
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
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

## Function Description:

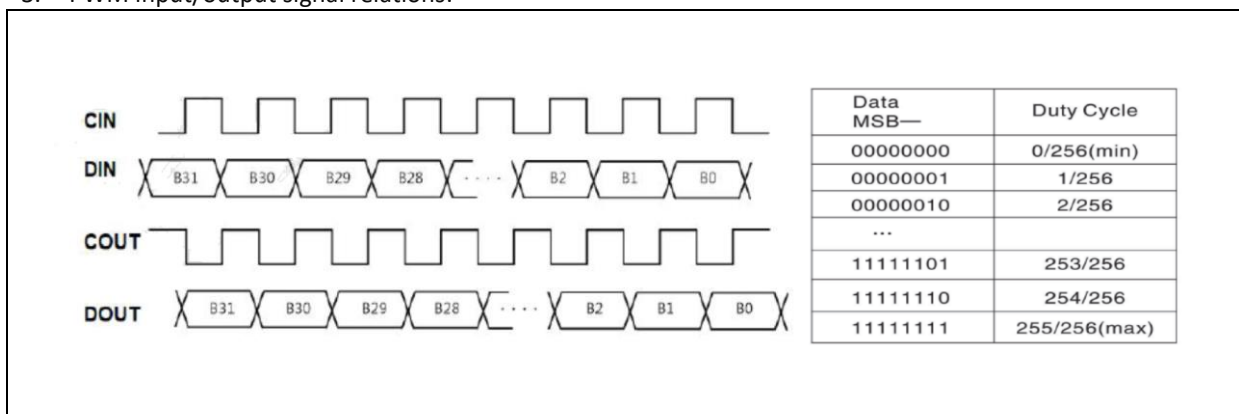
### 1. Series data structure:



### 2. 5-Bit (level 32) brightness adjustment (simultaneous control of OUTR/OUTG/OUTB three port current):

DATA MSB ← → LSB	Driving Current
00000	0/31
00001	1/31
00010	2/31
...	
11110	30/31
11111	31/31(max)

### 3. PWM input/output signal relations:

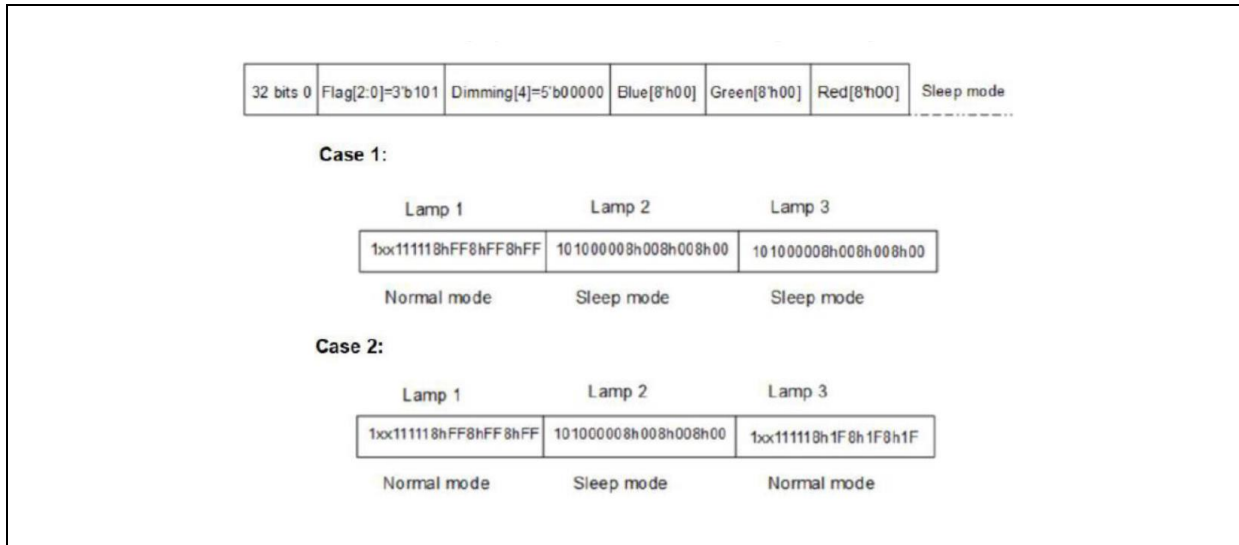




#### 4. Sleep and power saving mode:

LED supports the sleep/wake-up modes for power saving purpose. After the IC receives 24-bits 0's BGR data (that is B[7:0]=8h00, G[7:0]=8h00, R[7:0]=8h00), in the meantime, both of the data in 3-bits FLAG and 5-bits DIMMING is 8h'A0' (that is FLAG[2:0]=3b101 and DIMMING[4:0]=5b00000), the IC will enter sleep mode, its current is about 1μA.

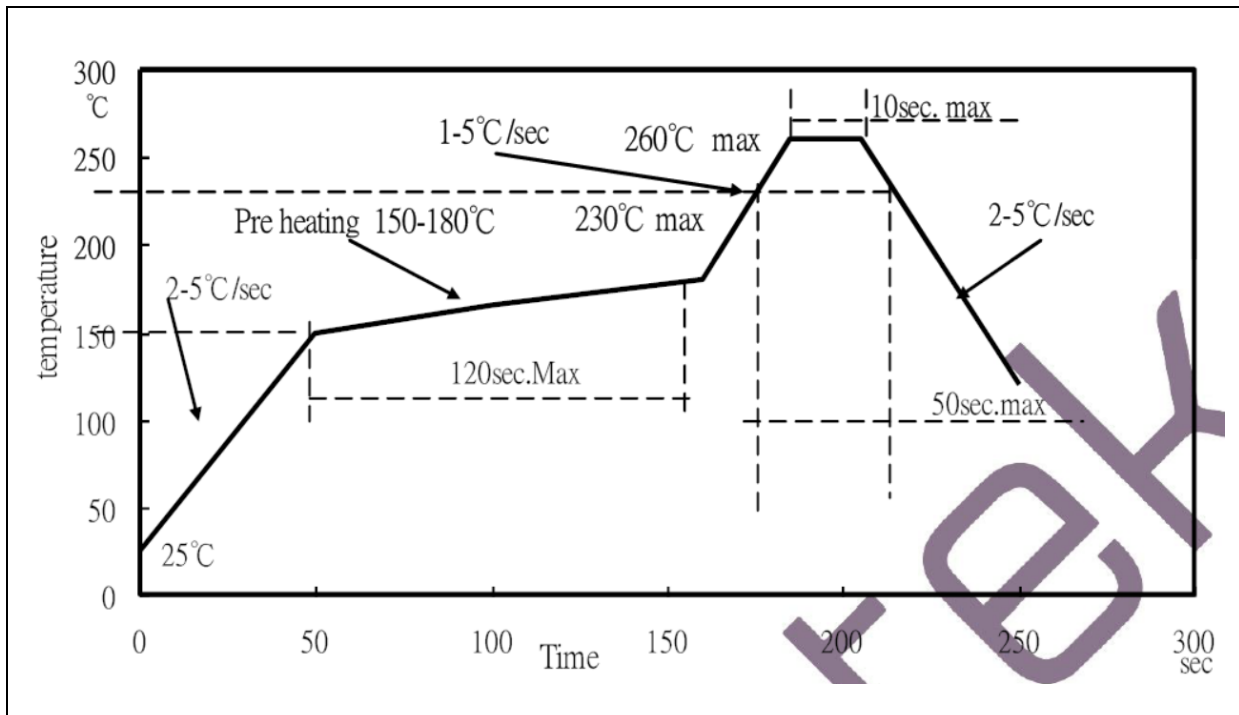
The IC will wake-up from sleep mode once receiving the new data with the data of FLAG[2:0], DIMMING[4:0] is not 8h'A0'; after wake-up, all sleeping circuits in IC return to normal working mode within 1ms. Since it takes 1ms for a sleeping IC returning to normal function mode, it is recommended for a host to wait for 1ms to send display data and command after issuing a wake-up command.



In case 2, while lamp 2 is under sleep mode, in the following data transfer process, the state of lamp 2 will be not changed as long as the 32-bits data for lamp 2 is received with data of FLAG[2:0] and DIMMING[4:0] being 8h'A0'. It means lamp 2 will keep in sleep mode as well. In the situation, lamp 2 can pass through the remaining data to lamp 3 (32-bits) to change the display data of lamp 3. In other words, the sleeping chip is able to pass the data to the next chips.

## RECOMMENDED SOLDERING PROFILE:

Lead-free Solder IR Reflow:

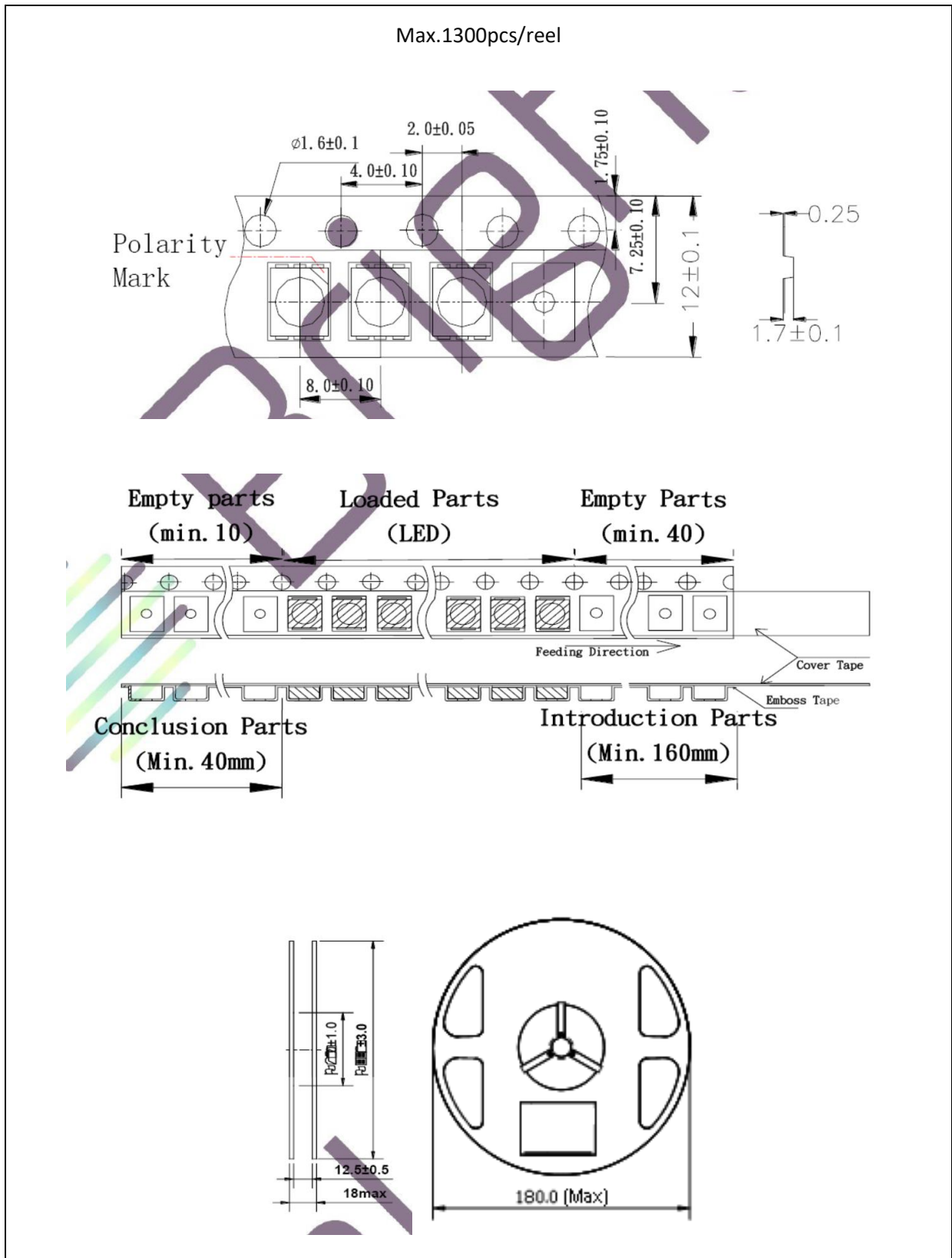


Note:

1. We recommend the reflow temperature 240°C ( $\pm 5^\circ\text{C}$ ). The maximum soldering temperature should be limited to 260°C.
2. Maximum reflow soldering: 1 time.
3. Before, during, and after soldering, should not apply stress on the components and PCB board.

**PACKING SPECIFICATION:**

Reel Dimension:



## 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 desiccating agent stored at R.H.<20% 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.

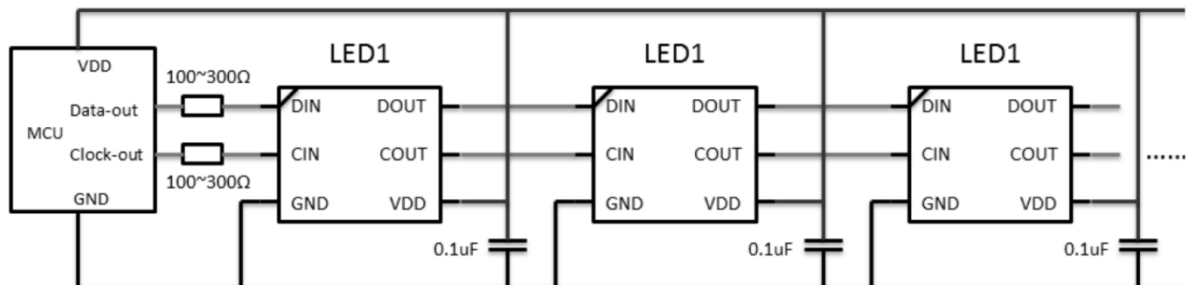
### Baking:

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±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 cascade, 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.

### 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	05/11/2019	Datasheet set-up.
A1.1	06/11/2019	Correct forward current (P.1).

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