BRIGHTEK

BRIGHTEK (EUROPE) LIMITED

Brighten Up The World With LED!

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

Release Date: 13 September 2024 Version: A1.2

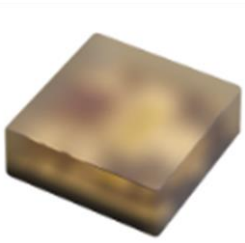
PRODUCT DATASHEET

ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

- ▶ CHIP SMD with IC
- ▶ 0808 (2020) IC 0.75t
- ▶ Red/Green/Blue

N0M67S14IC

Sleep Mode



0808 IC Integrated

0808 IC-Integrated

RoHS Compliant

AUTOMOTIVE AEC-Q100 AUTOMOTIVE AEC-Q102

FEATURES:

- **Package:** CHIP EIA STD Package 6 Pins with Integrated IC
- **Output Current:** 20mA/Channel
- **LED Voltage:** 4.5~5.5V
- **Luminous Intensity (typ.):** 280/850/150mcd*
- **Colour:** Red/Green/Blue
- **Dominant Wavelength (typ.):** 633/527/457nm
- **Viewing Angle:** 120°
- **Materials:**
  - Resin: Epoxy (Water Clear)
- **Operating Temperature:** -40~+85°C
- **Storage Temperature:** -40~+85°C
- **IC Feature:** Serial data transmission signal by DATA CLK two lines. Supports sleep/wake-up mode. In sleep mode, the LED's current was lower than 5μA.
- **Pixel:** One pixel contains R, G, and B colour that each can achieve 256 level brightness grayscales, which forms 16,777,216 combination colours.
- **Soldering methods:** IR reflow soldering
- **MSL Level:** acc. to JEDEC Level 3
- **Packing:** 8mm tape with max.4000pcs/reel, ø180mm (7'')

* in order of Red/Green/Blue

APPLICATIONS:

- Telecommunication
- Status 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_{OMAX}	20/Channel	mA
IC Power Supply Voltage	V_{DD}	< 6.5	V
LED Voltage	V_{LED}	4.5~5.5	V
Power Dissipation	PD	< 400	mW
Rate of Data Signal	F_{CLK}	15	MHz
Operating Temperature	T_{OPR}	-40~+85	°C
Storage Temperature	T_{STG}	-40~+85	°C
Electrostatic Discharge (HBM)	ESD	6000	V
Soldering Temperature	T_{SD}	260 for 10s max.	°C

Electrical & Optical Characteristics (Ta=25°C, V_{DD}=5V)

Parameter		Symbol	Values			Unit	Test Condition
			Min.	Typ.	Max.		
LED Voltage		V_{LED}	4.5	---	5.5	V	---
Luminous Intensity	R	I_V	220	280	350	mcd	V_{DD}=5V
	G		700	850	1050		
	B		120	150	200		
Dominant Wavelength	R	λ_d	630	---	636	nm	V_{DD}=5V
	G		524	---	529		
	B		455	---	460		
Viewing Angle		$2\theta_{1/2}$	---	120	---	deg	V_{DD}=5V

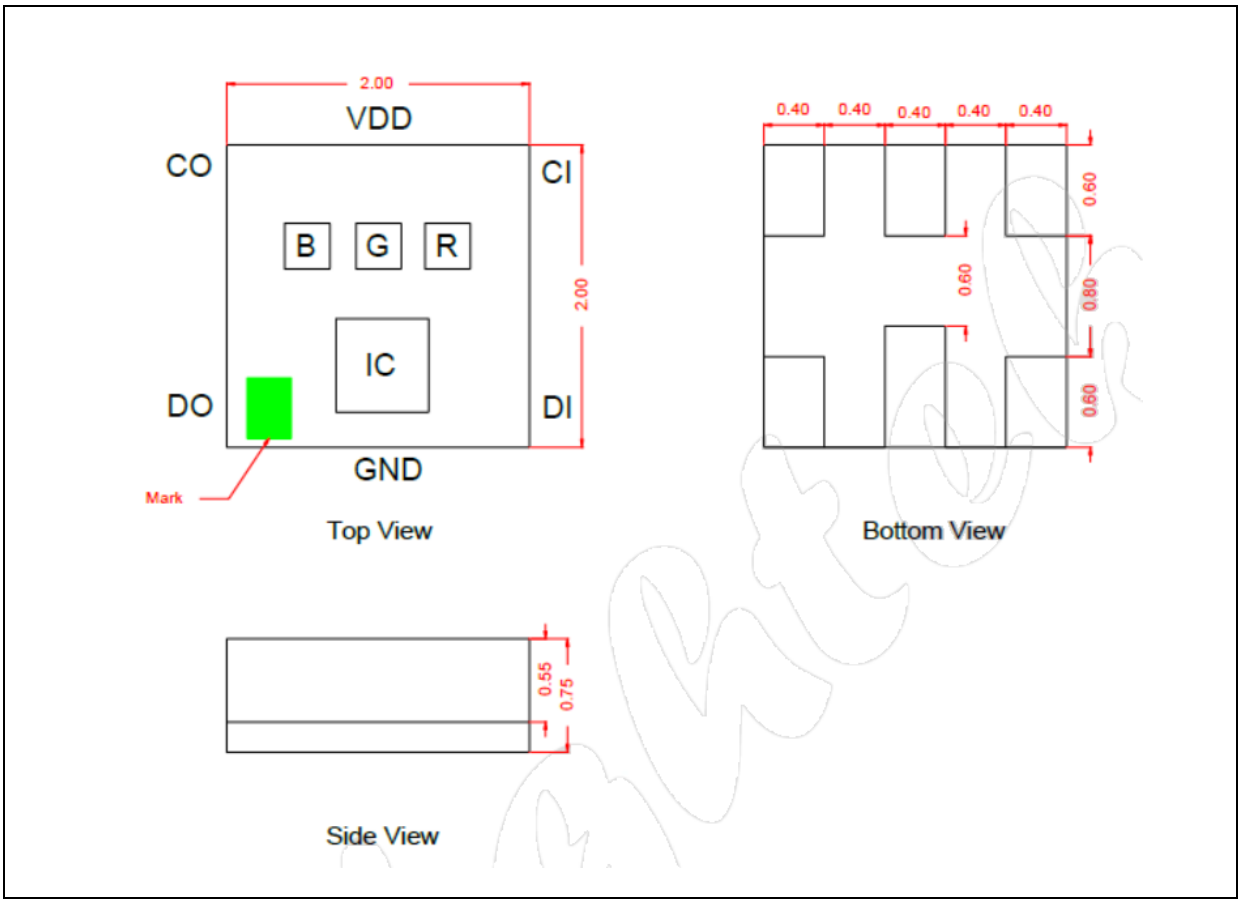
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $2\theta_{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λ_d is derived from CIE chromaticity diagram and represents the single wavelength which defines the color of the device. Peak emission wavelength tolerance is ±1nm.

Electrical Characteristics (Ta=25°C, V_{DD}=5V)

Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Supply Voltage	V_{DD}	4.5	5.0	5.5	V	---
Input High Voltage	V_{IH}	2.7	---	V_{DD}+0.4	V	---
Input Low Voltage	V_{IL}	-0.4	---	1.0	V	---
Clock High Level Width	T_{CLKH}	30	---	---	ns	---
Clock Low Level Width	T_{CLKL}	30	---	---	ns	---
Data Setup Time	T_{SETUP}	10	---	---	ns	---
Data Hold Time	T_{HOLD}	5	---	---	ns	---
Working Current (IC)	I_{DD}	---	---	2	mA	I_{out}=”OFF”
Static Current	I_{Sleep}	---	---	5	μA	Sleep Mode

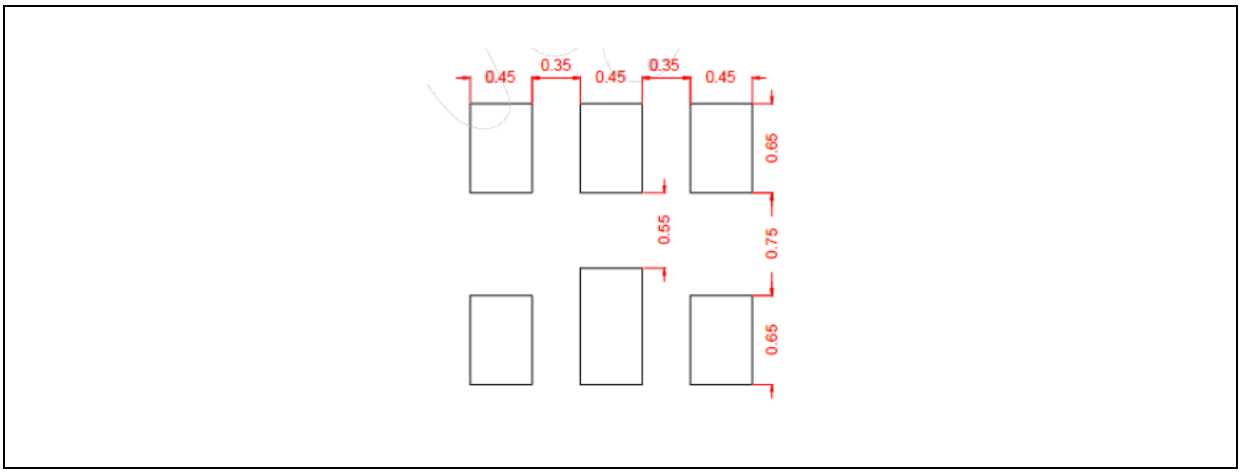
OUTLINE DIMENSION:

Package Dimension:



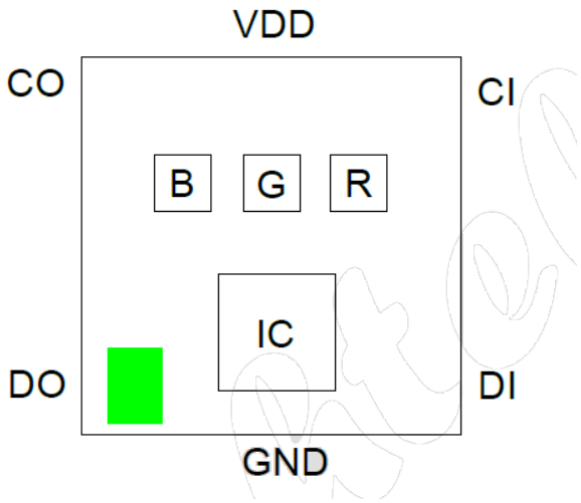
1. All dimensions are in millimetre (mm).
2. Tolerance ±0.1mm, unless otherwise noted.

Recommended Soldering Pad Dimension:



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

PIN CONFIGURATION:



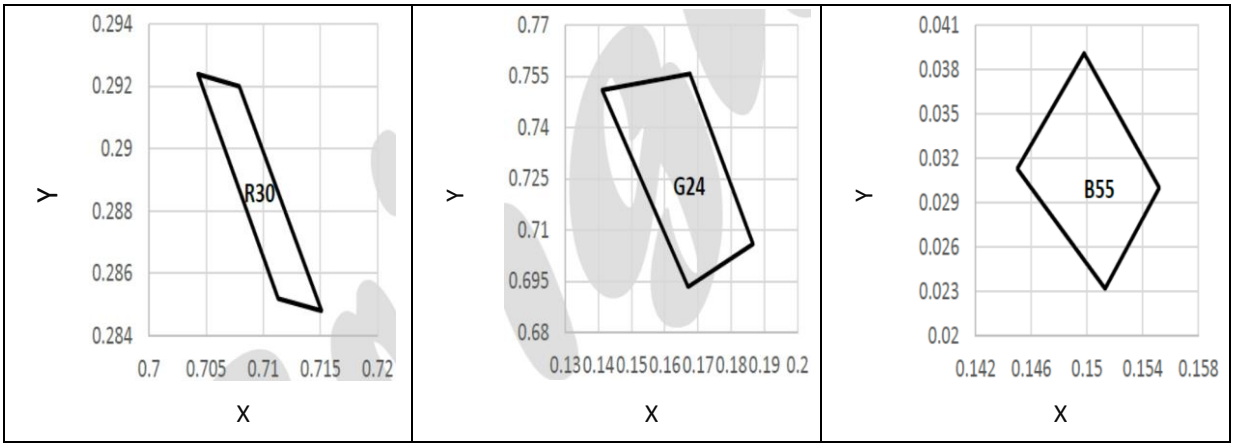
No.	Symbol	Function Description
1	CO	Clock Output
2	VDD	Supply Voltage
3	CI	Clock Input
4	DO	Data Output
5	GND	Ground
6	DI	Data Input

BINNING GROUPS:

Luminous Intensity Classifications (V_{DD}=5V, I_F=20mA):

Code		Min.	Max.	Unit
Red	1	220	280	mcd
	2	280	350	
Green	1	700	850	mcd
	2	850	1050	
Blue	1	120	150	mcd
	2	150	200	

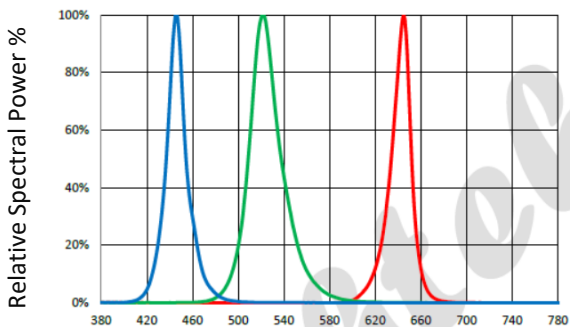
Chromaticity Coordinate Classifications (V_{DD}=5V, I_F=20mA):



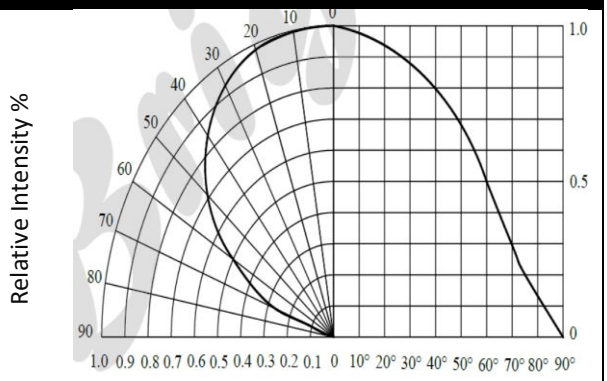
	1		2		3		4	
	X	Y	X	Y	X	Y	X	Y
R30	0.7043	0.2924	0.7079	0.2920	0.7151	0.2848	0.7113	0.2852
G24	0.1676	0.7558	0.1411	0.7510	0.1670	0.6934	0.1866	0.7059
B55	0.1450	0.0313	0.1513	0.0232	0.1552	0.0300	0.1498	0.0391

ELECTRO-OPTICAL CHARACTERISTICS (Full PWM):

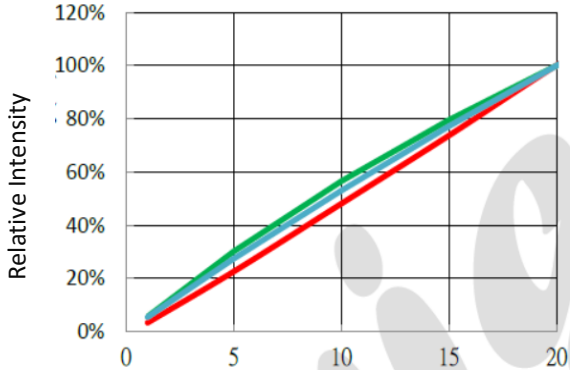
Relative Spectral Power v.s. Wavelength



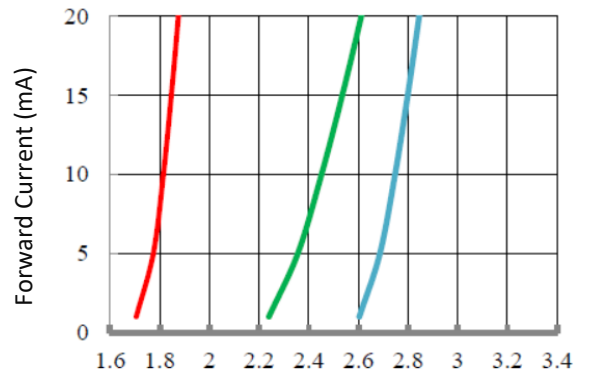
Directive Radiation



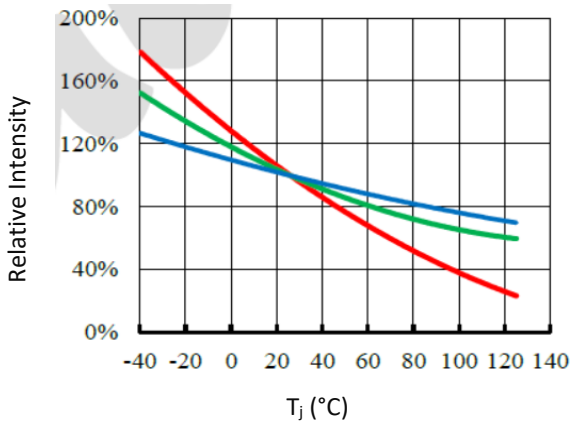
Relative Intensity v.s. Forward Current



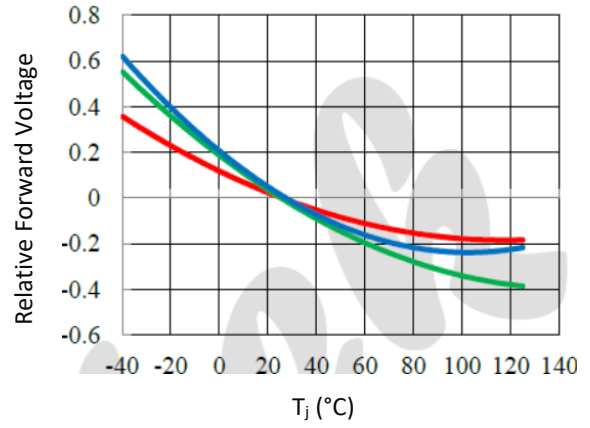
Forward Current v.s. Forward Voltage

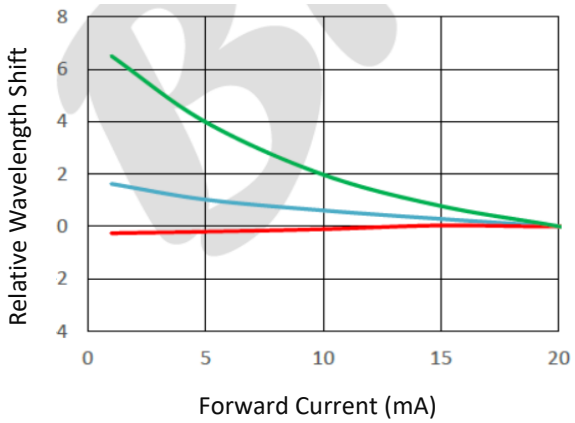
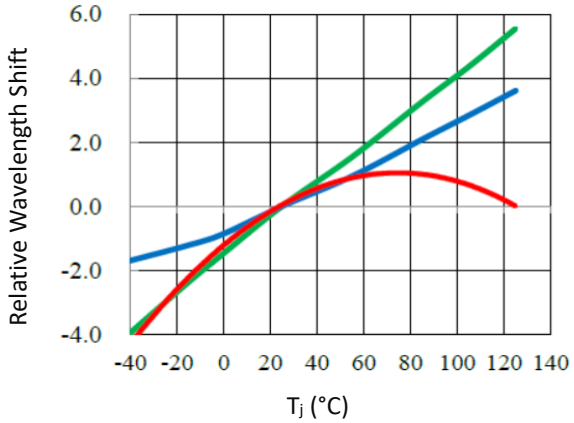


Relative Intensity v.s. Temperature



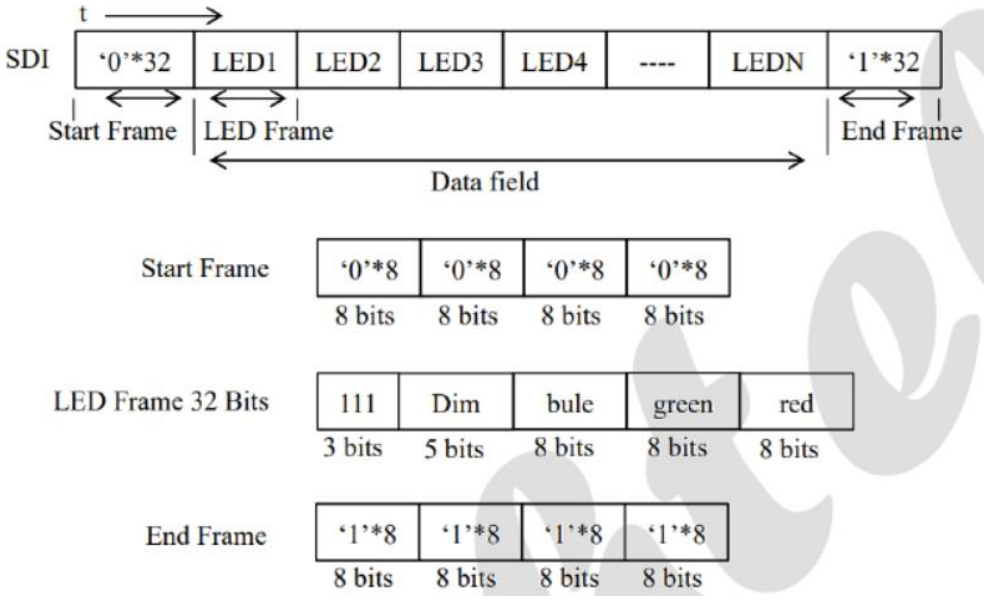
Relative Forward Voltage v.s. Temperature



Wavelength Shift v.s. Forward Current	Wavelength Shift v.s. Temperature
	

Function Description:

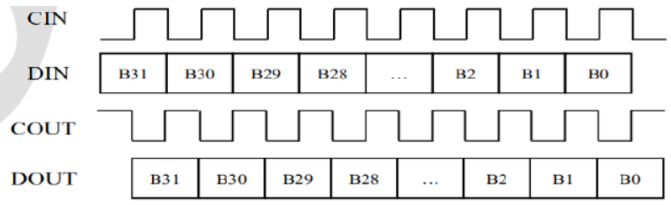
1. Series Data Structure – Tandem N-LED:



2. Dim 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 signals relations:

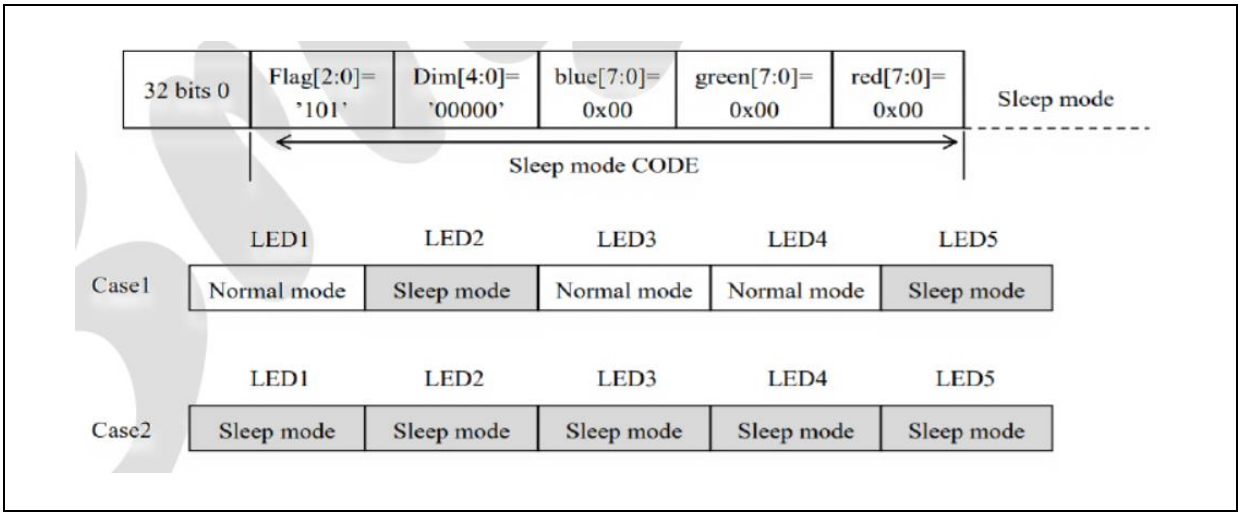


Data MSB--	Duty Cycle
00000000	0/255(min)
00000001	1/255
00000010	2/255
.....	
11111101	253/255
11111110	254/255
11111111	255/255(max)

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.

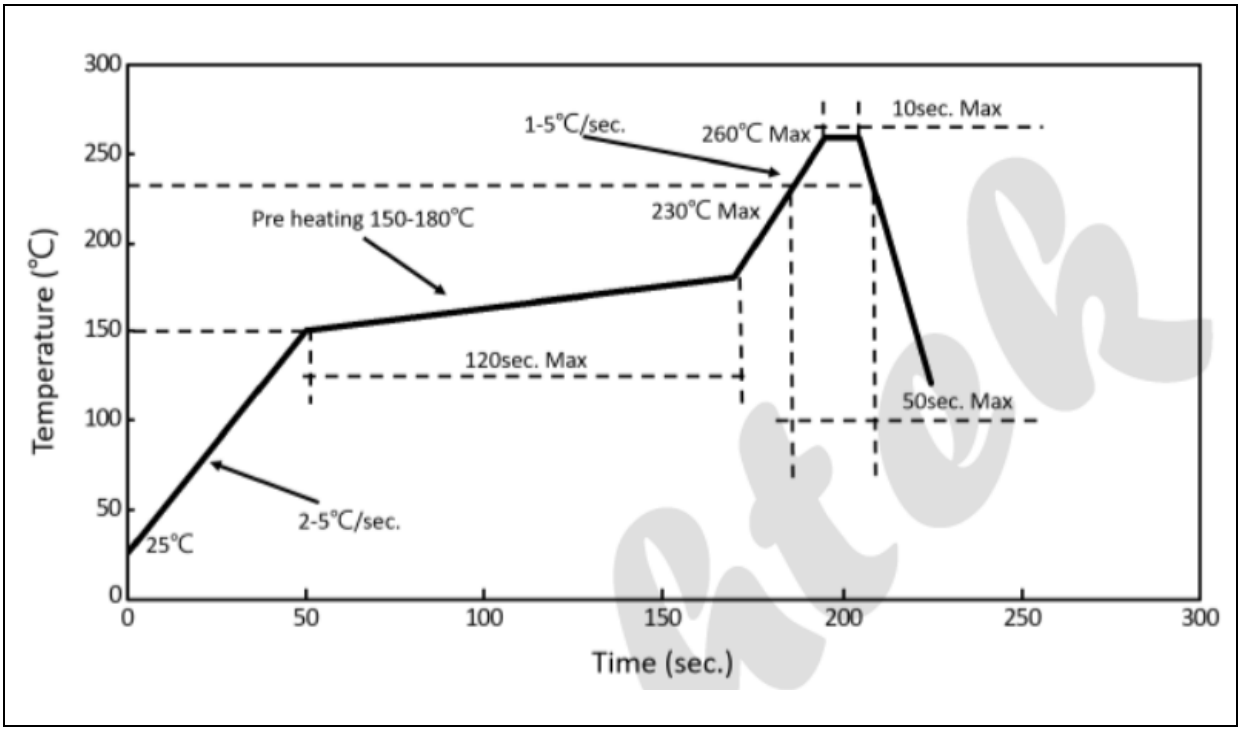
The IC will wake up from sleep mode once receiving the new data with the data of FLAG[2:0], DIMMING[4:0] is not 8h"A0"; after wake-up, all sleeping circuits in IC return to normal working mode within1ms. Since it takes 1ms for a sleeping IC returning to normal function mode, it is recommended for a host to wait for 1ms to send display data and command after issuing a wake-up command.



In case 1, 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.

ECOMMENDED SOLDERING PROFILE:

Lead-free Solder IR Reflow:



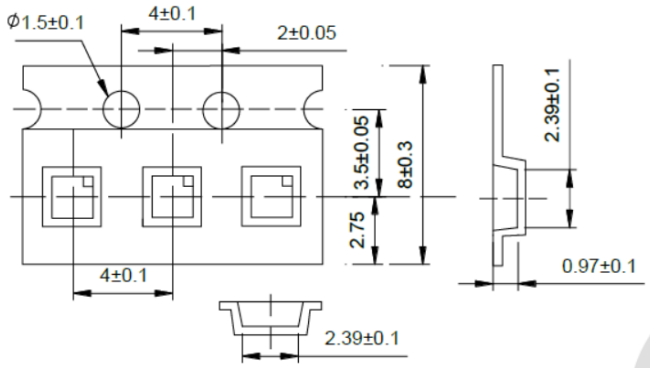
Note:

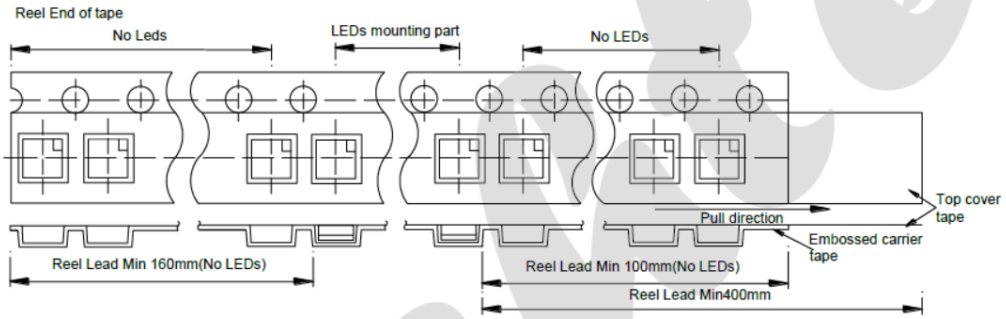
1. We recommend the reflow temperature 240°C (±5°C). The maximum soldering temperature should be limited to 260°C.
2. Maxima reflow soldering: 3 times.
3. Before, during, and after soldering, should not apply stress on the components and PCB board.

PACKING SPECIFICATION:

Reel Dimension:

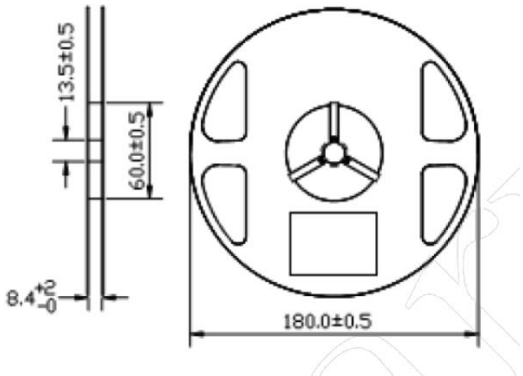
Max.4000pcs/reel





Notes:

1. Empty component pockets are sealed with top cover tape.
2. The max loss number of SMD is 2pcs.
3. The cathode is oriented towards the tape sprocket hole in accordance with ANSI/EIA RS-481 specifications.
4. The remainder packing in multiples of 500pcs.



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 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.

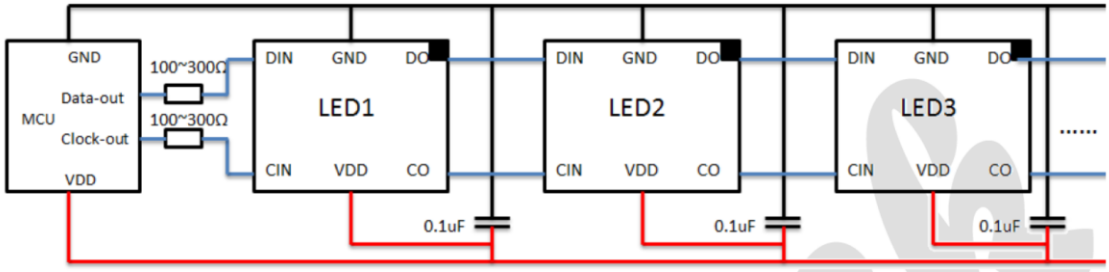
Baking:

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 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.

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	28/11/2022	Datasheet set-up.
A1.1	11/08/2024	Update automotive qualification.
A1.2	13/09/2024	Add product photos.