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

- ► EMC SMD with IC
- ► 2020 IC 0.75t
- ► Red/Green/Blue

Release Date: 26 April 2021 Version: A1.0

N0M58S99IC

2020 IC Integrated

2020 IC-Integrated

RoHS Compliant

FEATURES:

- **Package:** EMC 6-Pins EIA STD Package with Integrated IC
- **Forward Current:** 15/15/9mA*
- **Forward Voltage (typ.):** +4.5~+7.0V
- **Luminous Intensity (typ.):** 1100mcd mixed white
- **Colour:** Red/Green/Blue
- **Materials:**
  - Resin: Silicone (Water Diffused)
  - L/F Finish: Ag Plated
- **IC Feature:** Single line double channel serial level connection port. Serial data frequency is 400~1600KHz adjustable, using zero-return code. Double backup data transmission function, single point of data corruption does not affect the other data transmission. Low EMI design.
  Built-in open / short circuit detection feedback function, overvoltage protection, and low brightness compensation.
- **Pixel:** R/G/B monochrome support 16bit data, and 65,536 full gamma-ray resolution. The maximum number of LED cascades can reach 2000pcs.
- **Soldering methods:** IR Reflow soldering
- **Preconditioning:** acc. to JEDEC Level 3
- **Packing:** 8mm tape with Max.4000pcs/reel, ø180mm (7'')

* in order of Red/Green/Blue

APPLICATIONS:

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

CHARACTERISTICS:

Absolute Maximum Characteristics (Ta=25°C)

Parameter	Symbol	Ratings	Unit
The Max. LED Output Current	I_{OMAX}	15	mA
IC Power Supply Voltage	V_{DD}	7	V
IC Input Voltage	V_{IN}	-0.4~V_{DD}	V
Logic Output Voltage	V_{OUT}	-0.4~+5.5	V
Operating Temperature	T_{OPR}	-40~+85	°C
Storage Temperature	T_{STG}	-40~+105	°C
Soldering Temperature	T_{SD}	260	°C
Electrostatic discharge (HBM)	ESD	4000	V

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

Parameter		Symbol	Values			Unit	Test Condition
			Min.	Typ.	Max.		
Forward Voltage		V_F	4.5	5.0	7.0	V	---
Luminous Intensity	R	I_V	---	330	---	mcd	I_F=15mA
	G		---	610	---		I_F=15mA
	B		---	98	---		I_F=9mA
	W		---	1100	---		I_F=39mA
Dominant Wavelength	R	λ_D	615	---	630	nm	I_F=15mA
	G		520	---	535		I_F=15mA
	B		460	---	475		I_F=9mA
Colour Coordinate	X	---	---	0.3100	---	---	I_F=39mA
	Y		---	0.3100	---	---	
Viewing Angle		$2\theta_{1/2}$	---	120	---	deg	I_F=39mA

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

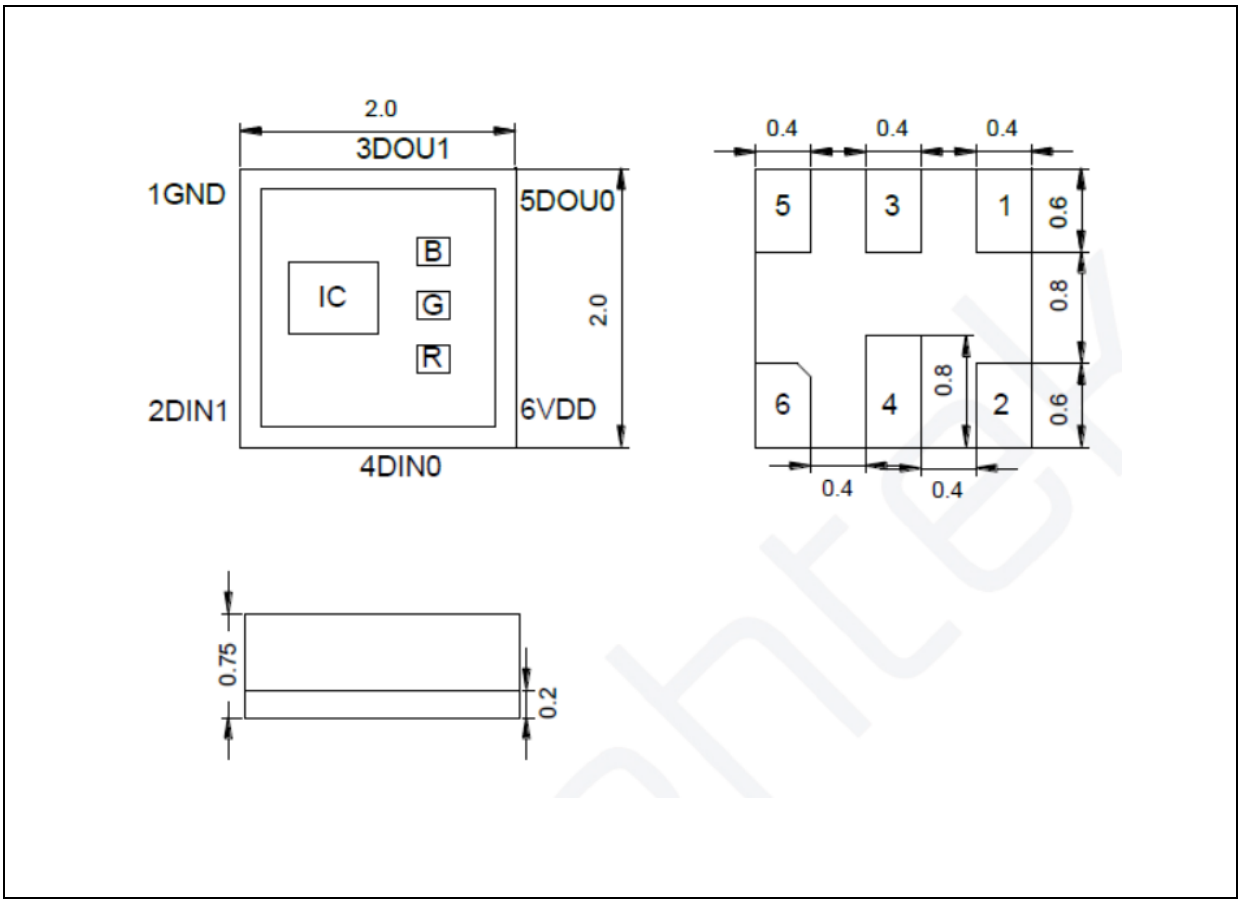
Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Supply Voltage	V_{DD}	3.3	5.0	7.0	V	---
Input Voltage Level	V_{IH}	2.7	---	---	V	D_{IN}, SET
	V_{IL}	---	---	0.3 V_{DD}	V	D_{IN}, SET
Output Voltage Level	V_{OH}	---	---	V_{DD} - 0.3	---	---
	V_{OL}	---	---	0.1	---	---
R/G/B Current Output	I_{OUT}	1.2	---	15	mA	V_{DD}=5V
Static Power Consumption	I_{DD}	---	---	0.5	mA	No Signal
Working Current	I_{CC}	---	---	0.7	mA	800KHz Data Input

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

Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Rate of Data Signal	F_{DIN}	400	---	1600	KHz	---
The Output Frequency	F_{OUT}	---	12	---	KHz	R/G/B
Transmission Delay Time	T_{pzl}	---	300	---	ns	$D_{IN0} \rightarrow D_{O0}$ $D_{IN1} \rightarrow D_{O1}$

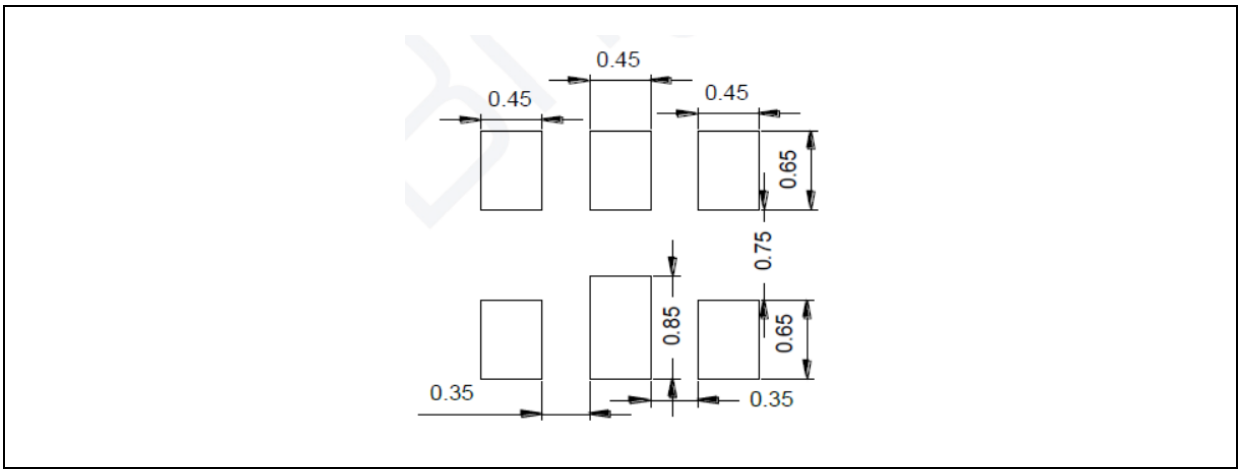
OUTLINE DIMENSION:

Package Dimension:



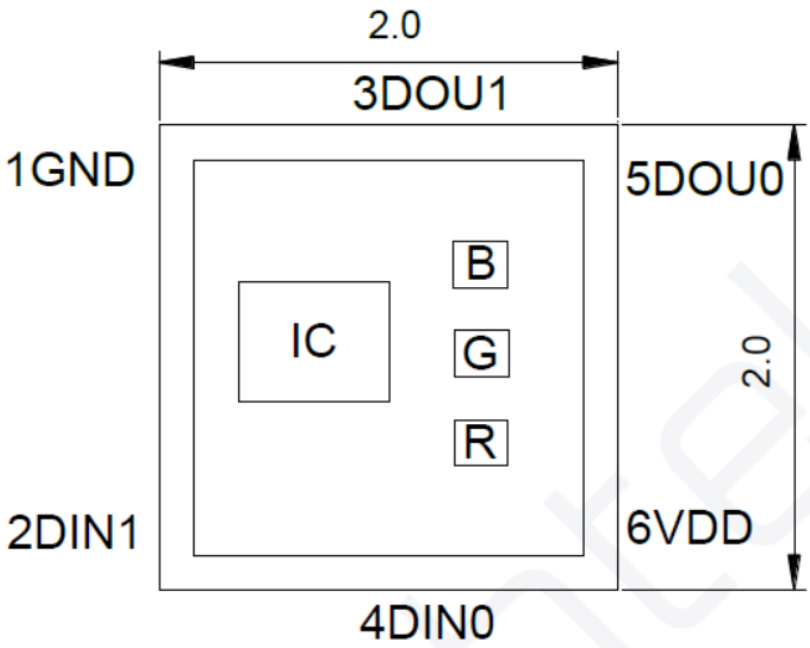
1. All dimensions are in millimetre (mm).
2. Tolerance ±0.2mm, unless otherwise noted.

Recommended Soldering Pad Dimension:



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

PIN CONFIGURATION:



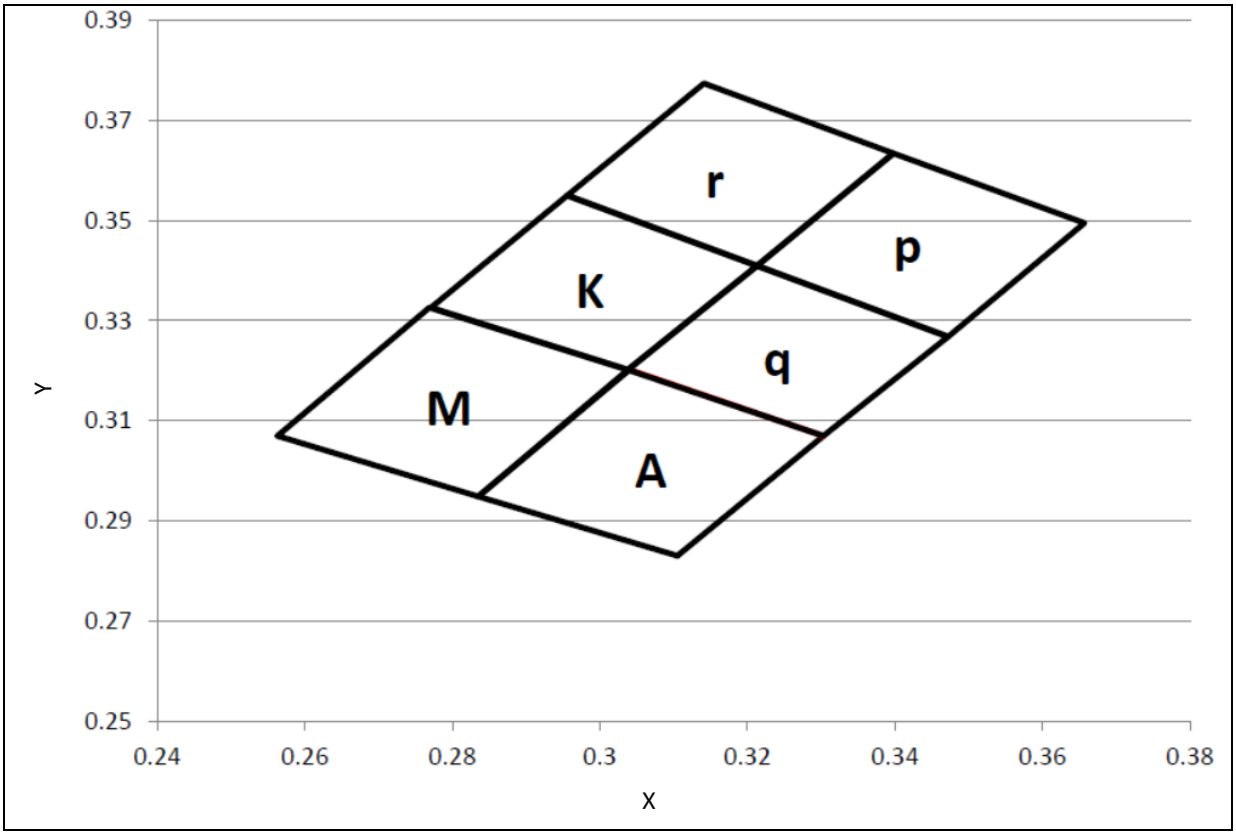
No.	Symbol	Function Description
1	GND	Ground
2	DIN1	Backup Data Input
3	DOU1	Backup Data Output
4	DIN0	Data Input
5	DOU0	Data Output
6	VDD	Supply Voltage LED

BINNING GROUPS:

Luminous Intensity Classifications (White) (I_F = 39mA, V_{DD}=5V):

Code	Min.	Max.	Unit
20	630	800	mcd
21	800	1000	
22	1000	1250	
23	1250	1600	

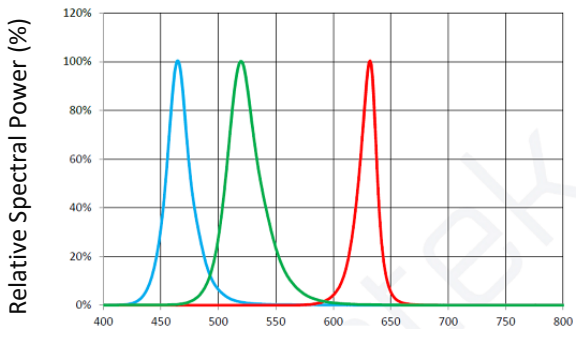
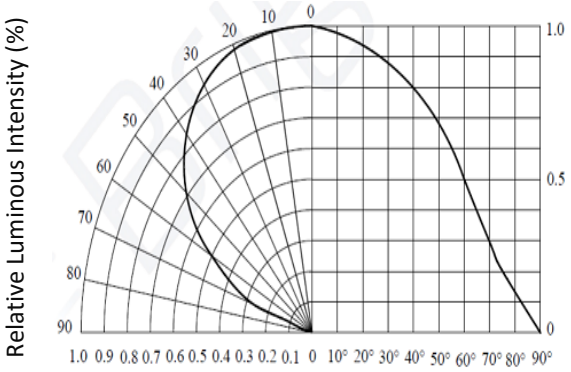
CIE CHROMATICITY DIAGRAM:



Chromaticity Coordinates Classifications (I_F = 39mA):

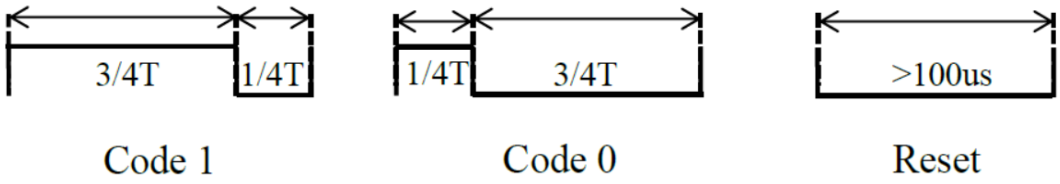
	1		2		3		4	
	X	Y	X	Y	X	Y	X	Y
A	0.3040	0.3202	0.3303	0.3070	0.3105	0.2830	0.2835	0.2949
M	0.2563	0.3070	0.2769	0.3326	0.3038	0.3202	0.2835	0.2949
K	0.2771	0.3326	0.2956	0.3550	0.3213	0.3410	0.3038	0.3202
r	0.2956	0.3550	0.3141	0.3774	0.3398	0.3634	0.3214	0.3410
p	0.3213	0.3410	0.3398	0.3634	0.3657	0.3495	0.3471	0.3268
q	0.3038	0.3202	0.3213	0.3410	0.3472	0.3268	0.3303	0.3070

ELECTRO-OPTICAL CHARACTERISTICS:

Relative Intensity v.s. Wavelength	Characteristics of Radiation
	

Function Description - Data Transfer Time (TH+TL=1.2μs±300ns):

1. Timing Wave Form:



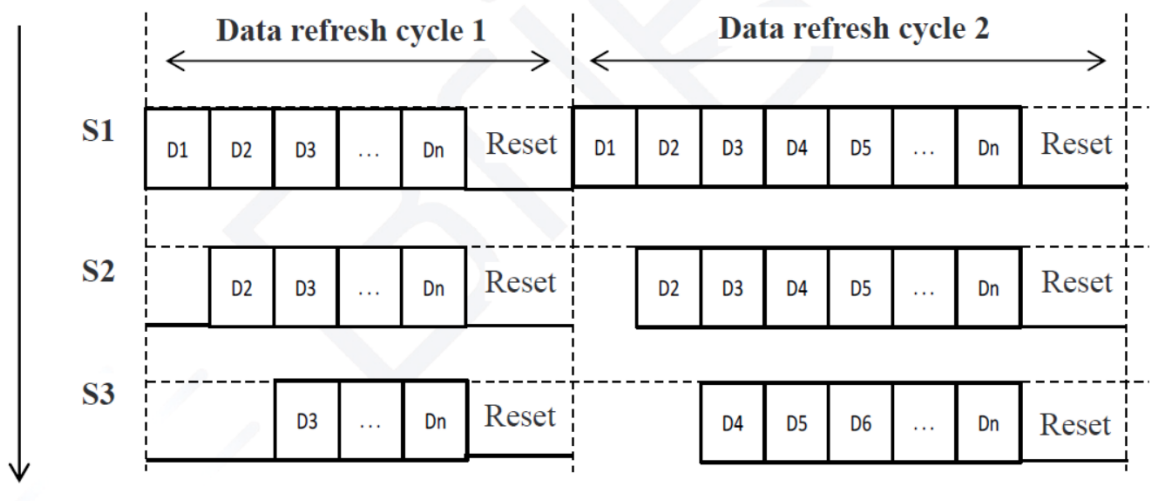
2. Code Signal Description:

Description	Typical	Unit
Unit code frequency	400~1600	KHZ
Code 1 time	3/4T Hige voltage time 1/4T Low voltage time	--
Code 0 time	1/4T Hige voltage time 3/4T Low voltage time	--
Reset time	100 ~ 1000	us

Note:

1. The 0 code or 1 code period is between 625us (frequency 1.6MHz) and 2.5us (frequency 400KHz), the chip can work normally, but the high-level time of 0 code and 1 code must conform to the corresponding numerical specifications in the above table.
2. Controlling an LED requires sending a 48-bit code. If the signal stops transmitting, the lamp bead will turn off automatically.

3. Data Composition Structure:



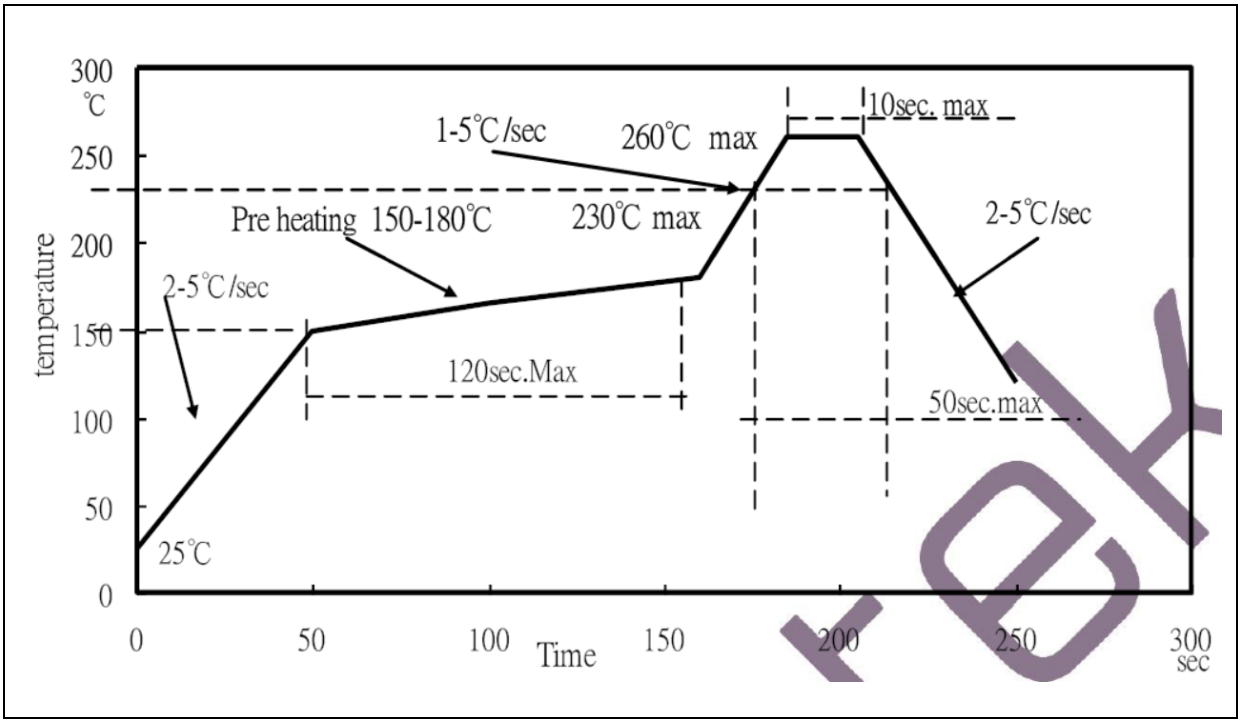
4. Composition of 48bit Data (Dn, n=1, 2, 3, …, n):

Note:

1. The number of 48bit signals sent needs to be the same as the number of LEDs controlled.
2. Each LED receives and intercepts the first 48bit signal it encounters, and transmits subsequent signals to the next LED. So the first 48bit signals.

RECOMMENDED SOLDERING PROFILE:

Lead-free Solder IR Reflow:



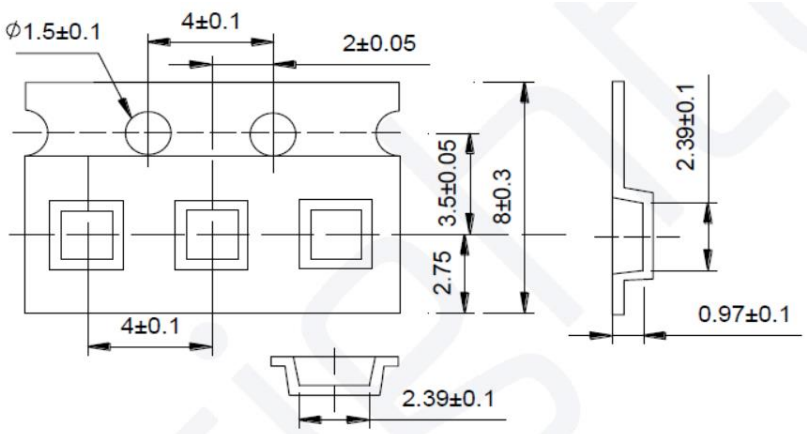
Note:

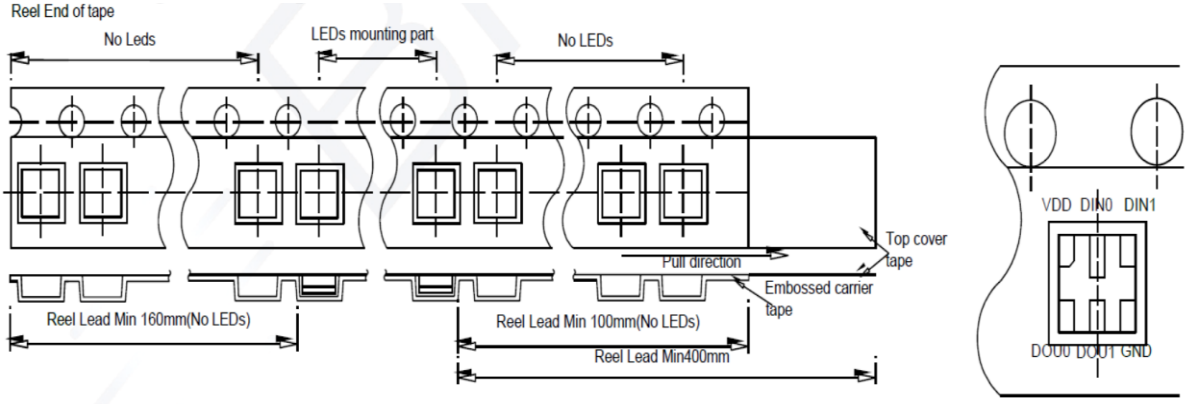
1. We recommend the reflow temperature 240°C (±5°C). The maximum soldering temperature should be limited to 260°C.
2. Maxima reflow soldering: 1 time.
3. Before, during, and after soldering, should not apply stress on the components and PCB board.

PACKING SPECIFICATION:

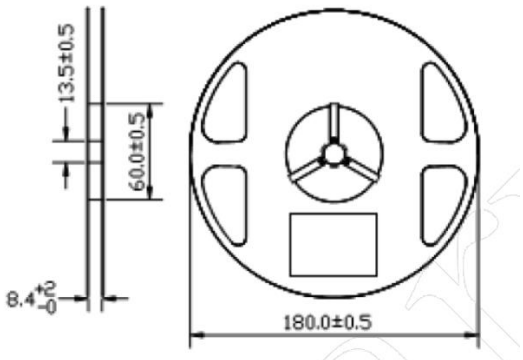
Reel Dimension:

Max.4000pcs/reel





The cathode is oriented towards the tape sprocket hole in accordance with ANSI/EIA RS-481 specifications.



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 48 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.

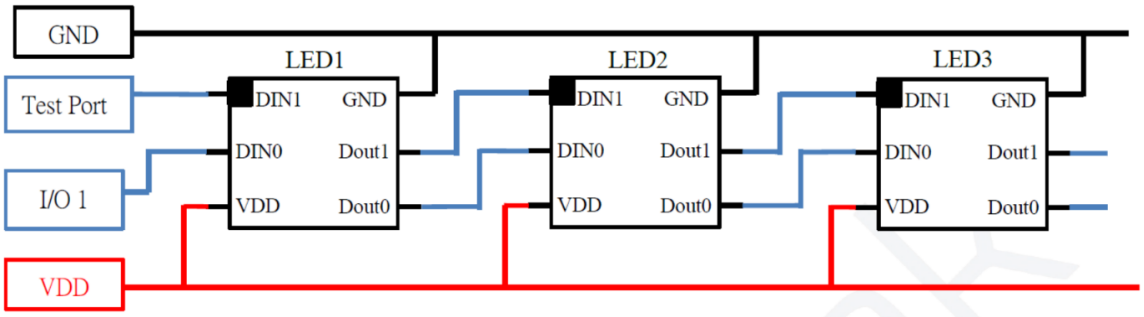
Baking:

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.

Typical Application Circuit:



If the number of LEDs in a light strip is large, the required current will be large. Please evaluate whether the conductivity of the circuit lead is sufficient to avoid voltage drop. If the number of connected LEDs is large (the number of LEDs is greater than 1000), it is suggested to connect a 1000uF electrolytic capacitor in parallel between VDD and GND of the power supply to improve the power stability.

After the LED patch, it is necessary to test whether the LED welding is normal through DIN0 and test port DIN1. When the normal finished product is used, the controller only needs to connect DIN0, and the test port is connected to GND.

After welding is completed, specific data instructions should be sent on the test port DIN1 and DIN0 respectively to test whether the LED is welded properly. There is no need to send this special instruction for normal use.

Test instruction: (24bit) 11011000_00000000_00000000 * 2000 + (16bit) 01001010+00011101 + 100us Low level

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	26/04/2021	Datasheet set-up.