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

- PLCC4 SMD with IC
- 5050IC 1.57t Series
- Red/Green/Blue

Release Date: 15 April 2021 Version: A1.1

N0M50S18IC

5050 IC Intergrated

5050 IC-Integrated

RoHS Compliant

FEATURES:

- **Package:** PLCC4 EIA STD Package with Integrated IC 104
- **Forward Current:** 12mA
- **Forward Voltage (typ.):** +3.8~+5.5V
- **Luminous Intensity (typ.):** 1490mcd mixed white
- **Colour:** Red/Green/Blue
- **Wavelength:** 622/525/467nm
- **Viewing angle:** 120°
- **Materials:**
  - Resin: Silicone (Water Clear)
  - L/F Finish: Ag Plated
- **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 constand 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 5a
- **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 (Ta=25°C)

Parameter	Symbol	Ratings	Unit
DC Forward Current	I_F	12	mA
IC Power Supply Voltage	V_{DD}	+3.8~+5.5	V
IC Input Voltage	V_I	-0.4~V_{DD}+0.4	V
Operating Temperature	T_{OPR}	-40~+85	°C
Storage Temperature	T_{STG}	-40~+105	°C

Electrical & Optical Characteristics (Ta=25°C)

Parameter		Symbol	Values			Unit	Test Condition
			Min.	Typ.	Max.		
Luminous Intensity	R	I_V	---	340	---	mcd	I_F=12mA
	G		---	960	---		
	B		---	210	---		
	W		780	1490	---		
Forward Voltage		V_F	3.8	---	5.5	V	I_F=12mA
Dominant Wavelength	R	λ_D	615	---	630	nm	I_F=12mA
	G		520	---	530		
	B		460	---	475		
Colour Coordinate	X	---	---	0.2287	---	---	I_F=12mA
	Y		---	0.2129	---	---	
Viewing Angle		$2\theta_{1/2}$	---	120	---	deg	I_F=12mA

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

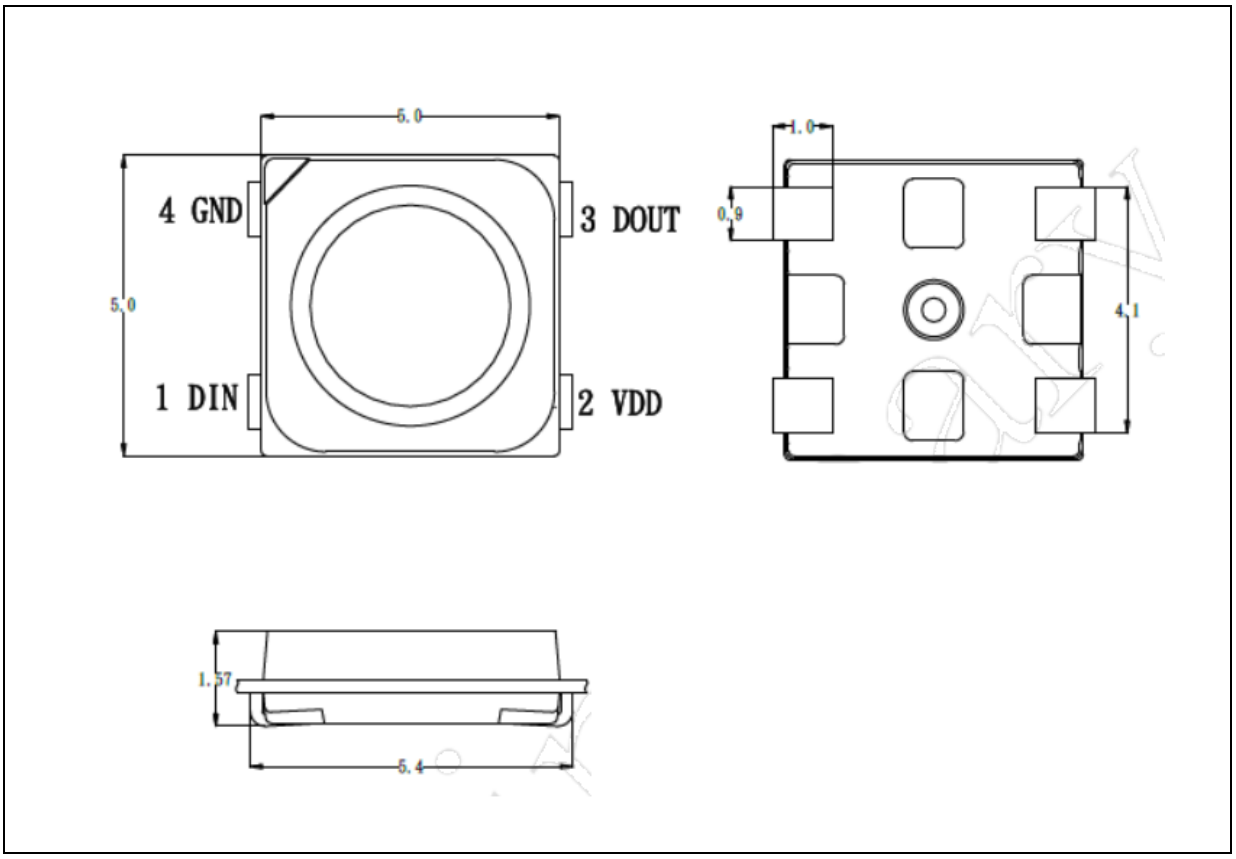
Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Static Current	I_{DD}	---	0.5	---	mA	V_{DD}=4.5V I_{OUT}=OFF
Input Voltage Level	V_{IH}	0.7 V_{DD}	---	---	V	D_{IN}, SET
	V_{IL}	---	---	0.3 V_{DD}	V	D_{IN}, SET
ESD Pressure	V_{ESD}	---	2000	---	V	HBM

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

Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Rate of Data Signal	F_{DIN}	---	800	---	KHz	---
Transfer Time	T_{PLH}	---	---	80	ns	D_{IN} -> D_{OUT}
	T_{PHL}	---	---	80	ns	
Conversion Time of I_{OUT} R/G/B	Tr	---	---	50	ns	I_{OUT} R/G/B=12mA RL=200Ω CL=15pF
	Tf	---	---	100	ns	

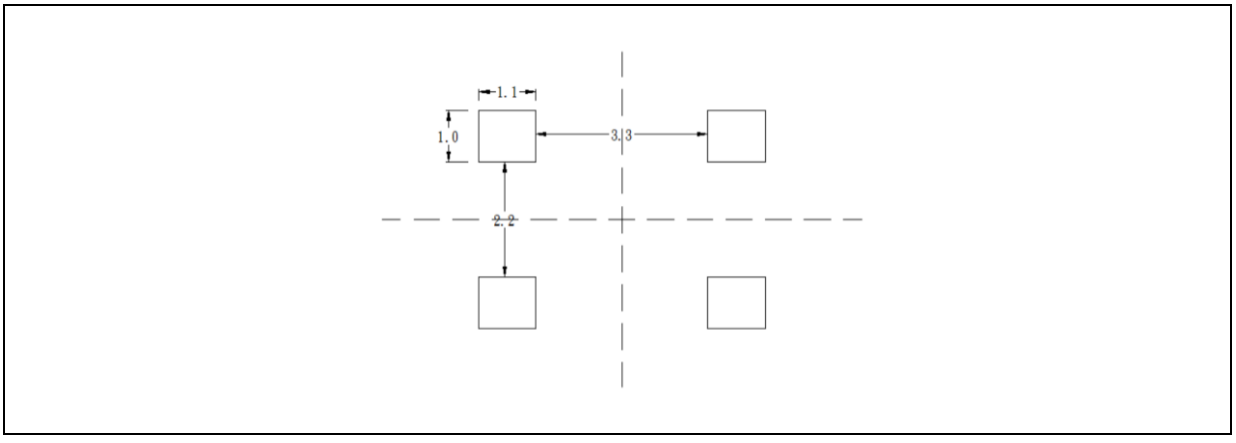
OUTLINE DIMENSION:

Package Dimension:



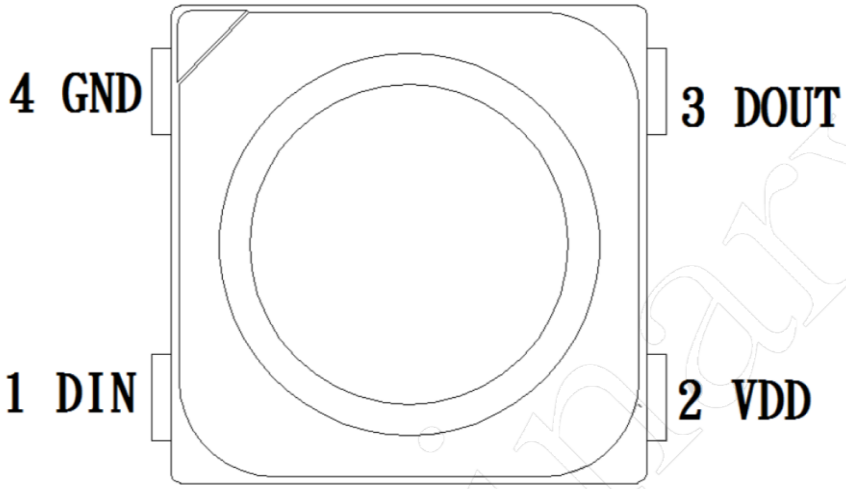
1. All dimensions are in millimetre (mm).
2. Tolerance ±0.2mm, unless otherwise noted.

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) (I_F = 12mA):

Code	Min.	Max.	Unit
14	780	1000	mcd
15	1000	1300	
16	1300	1700	
17	1700	2200	
18	2200	2800	

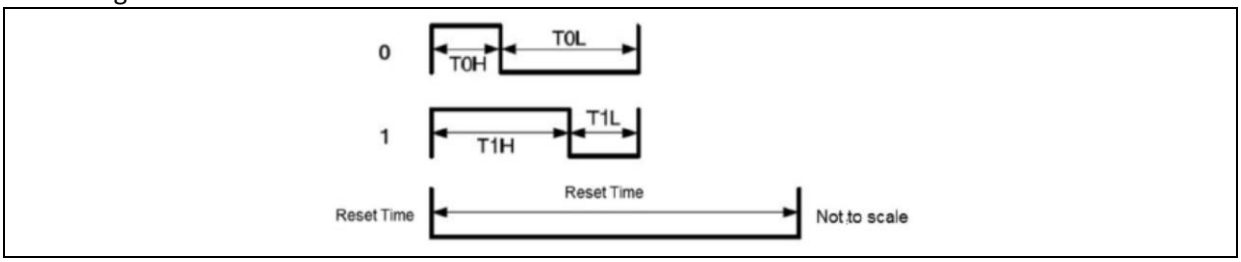
CIE CHROMATICITY DIAGRAM:

Chromaticity Coordinates Classifications (I_F = 12mA):

	1		2		3		4	
	X	Y	X	Y	X	Y	X	Y
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
T	0.1792	0.2243	0.1588	0.1973	0.1862	0.1886	0.2056	0.2148
U	0.2056	0.2148	0.1862	0.1886	0.2075	0.1802	0.2273	0.2000
f	0.2273	0.2061	0.2075	0.1802	0.2305	0.1700	0.2498	0.1959

DATA TRANSFER TIME (TH+TL=1.2μs±600ns):

1. Timing Wave Form



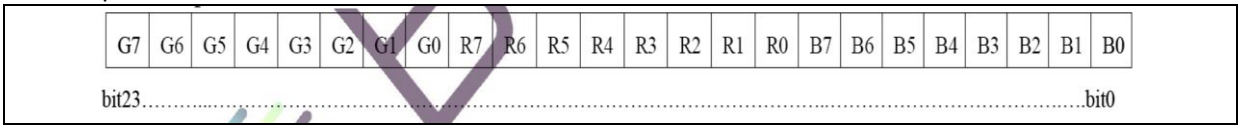
2. High Speed Mode

Item	Description	Typical	Allowance
T_{0H}	0 code, high voltage time	300ns	±150ns
T_{1H}	1 code, high voltage time	600ns	±150ns
T_{0L}	0 code, low voltage time	900ns	±150ns
T_{1L}	1 code, low voltage time	600ns	±150ns
RES	Reset Time	>200μs	---

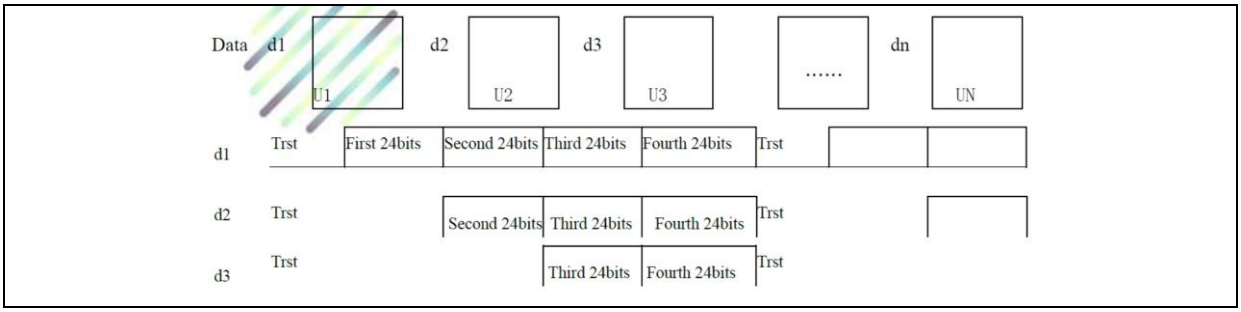
Note:

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

3. Composition of 24 Bits Data

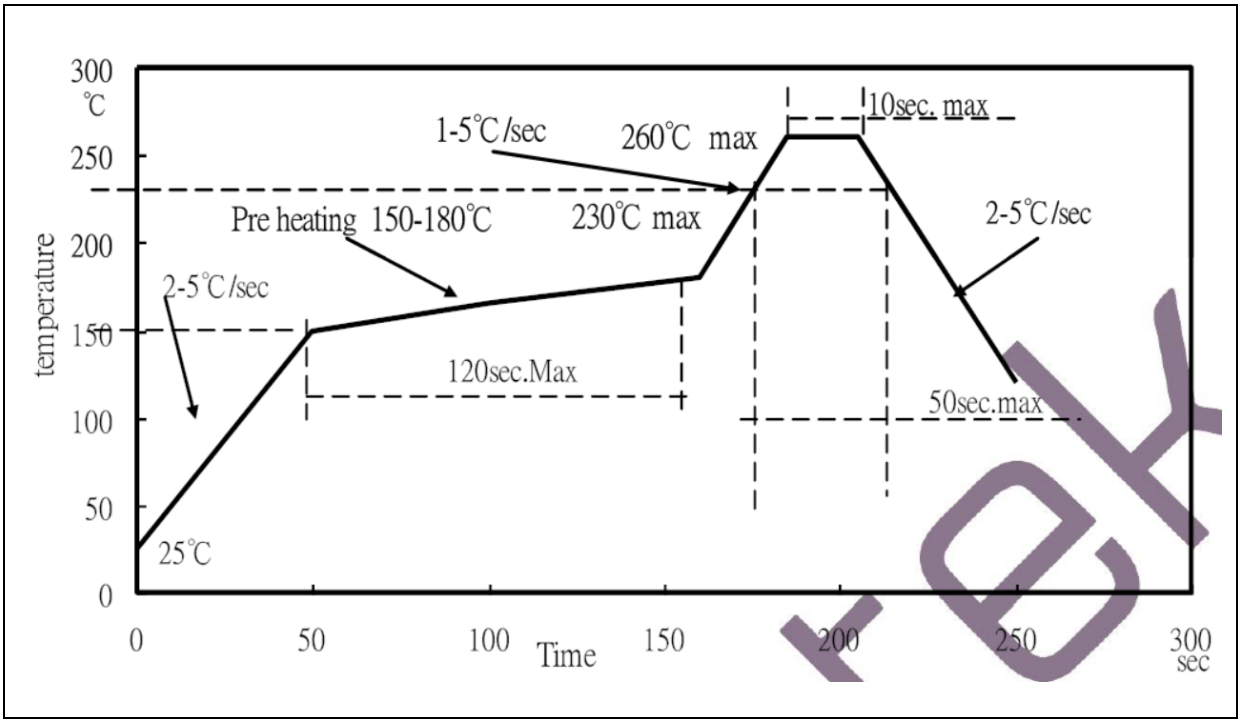


4. Data Transmission Method



RECOMMENDED SOLDERING PROFILE:

Lead-free Solder IR Reflow:



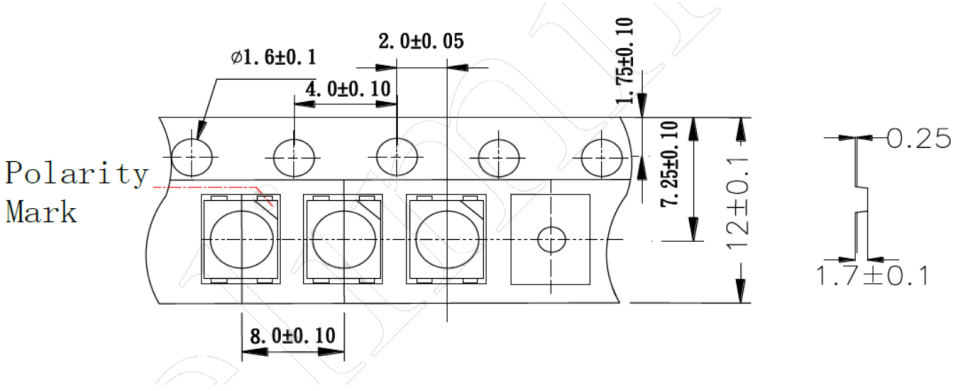
Note:

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

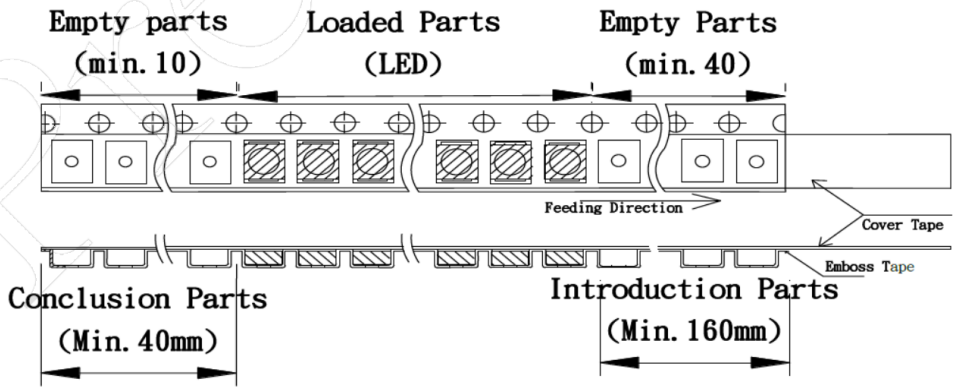
PACKING SPECIFICATION:

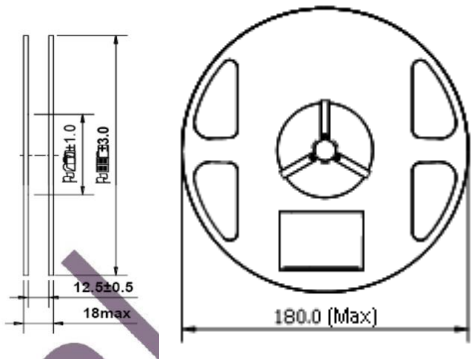
Reel Dimension:

Max.1000pcs/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 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.

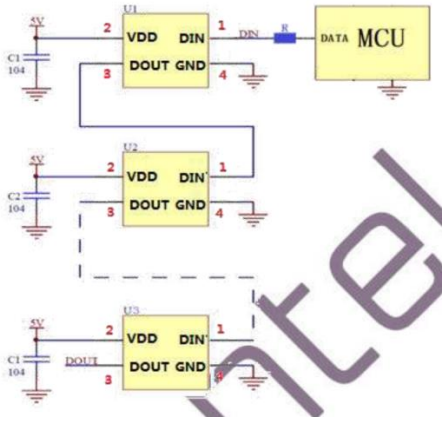
Baking:

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:



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	06/11/2019	Datasheet set-up.
A1.1	15/04/2021	Front page correction.