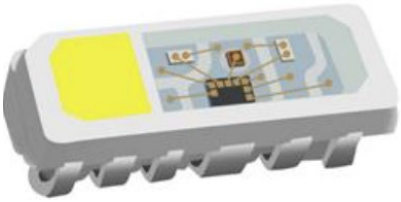
SMD Top View Package LED
SMTLA5018RGBW Red, Green, Blue, White

SMTLA5018RGBW

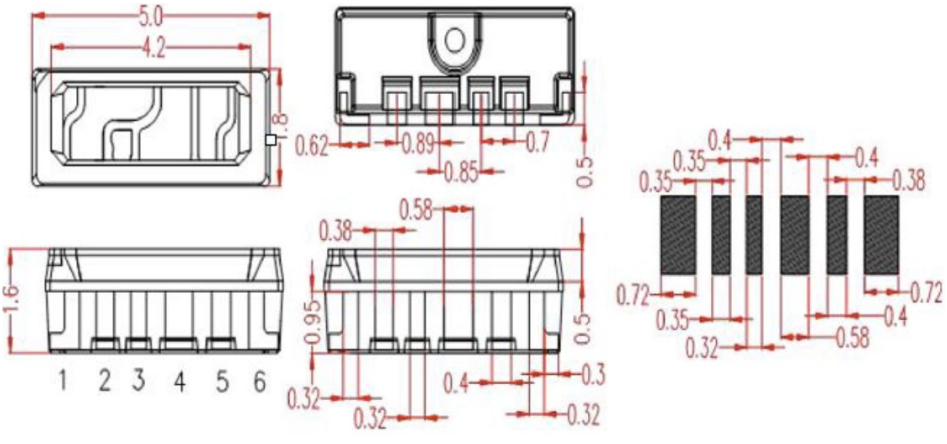
- Built-In IC Multi-Color Intelligent Control LED light source
- Built-in RGBW four-way channel
- Built-in data shaping circuit
- Built-in power-on reset and power-off reset circuit
- Built-in high precision and high stability oscillator
- Gray adjustment circuit
- Single-wire data transmission, unlimited cascading
- Low Profile Package
- High Luminous Intensity
- Wide Viewing Angle
- High Power Efficiency



Bivar's SMTLA5018RGBW is an intelligent controlled LED light source that integrates a control circuit and a light-emitting LED in an industry standard PLCC 5018 SMD LED, where each element is a pixel. The pixel contains an digital interface data latch signal shaping amplifier drive circuit, a power supply voltage regulator circuit, a built-in constant current circuit, a high-precision RC oscillator, and the output drive adopts patented PWM technology to effectively ensure the color consistency of the pixel light. The SMTLA5018RGBW has the advantages of a low voltage drive, environmental protection and energy saving, high brightness, large scattering angle, good consistency, ultra-low power, and ultra-long life. Integrating the control circuit on the LED in a smaller PLCC package makes the circuit simpler, smaller in size, and easier to apply.

Part Number	Emitted Color	Dominant Wavelength Typ. (nm)	Luminous Intensity Typ. mcd	Lens Color	Viewing Angle
SMTLA5018RGBW	Red	623	250	Water Clear	120°
	Green	523	700		
	Blue	468	250		
	White	(Color Temperature) 4550K	5 lumens		

Outline Dimensions



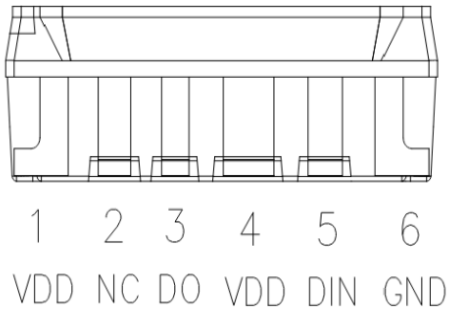
Outline Drawings Notes:
1. All dimensions are in millimeters.
2. Standard tolerance: ±0.25mm unless otherwise noted
3. Package size: 5.0 x 1.8 x 1.6mm

ATTENTION OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

RoHS Compliant

Moisture Sensitivity Level 5a

Recommended size of solder pad



Pin No	Symbol	Pin name	Function description
1	VDD	power	White light supply pin
2	NC	empty pin	NC
3	DO	data output	Control data signal output
4	VDD	power	Power supply pin
5	DIN	data input	Control data signal input
6	GND	ground	Signal and power connect ground

Absolute Maximum Ratings

T_A = 25°C unless otherwise noted

Logic Power Supply Voltage (V_{DD})	3.5 to 7.5 V
Logic Input Voltage (V_I)	-0.5 to +5.5 V
Electrostatic Withstand Voltage (V_{ESD})	4000 V
Shelf Life	1 year
Operating Temperature Range	-40 - +85°C
Storage Temperature Range	-40 - +120°C

Notes: 1. 10% Duty Cycle, Pulse Width ≤ 0.1 msec. 2. Solder time less than 4 seconds at temperature extreme.
Handling: (1) Reflow soldering must not be performed more than twice. Hand soldering must not be performed more than once. **(2)** Sensitive to static electricity or surge voltage. Proper handling required to avoid ESD damage and impair LED reliability.

Electrical / Optical Characteristics

T_A = 25°C & I_F = 12 mA unless otherwise noted

Emitting Color	Logic Power Supply Voltage (V)[1]			Recommend Forward Current (mA)			Dominant Wavelength (nm) White Chromaticity (K)			Luminous Intensity[3] Iv (mcd) or (lm)			Viewing Angle 2 Θ ½ (deg)
	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	TYP
Red	3.5	5.0	7.5	/	12	/	620	623	625	200	250	300	120°
Green				/	12	/	520	523	525	600	700	800	
Blue				/	12	/	465	468	470	200	250	300	
White				/	12	/	2600K	4550K	6500K	4 lm	5 lm	6 lm	

Notes: 1. Tolerance of forward voltage: ±0.05V.
2. Tolerance of dominant wavelength: -1.0nm of MIN & +1nm of MAX.
3. Tolerance of luminous intensity: ±10%

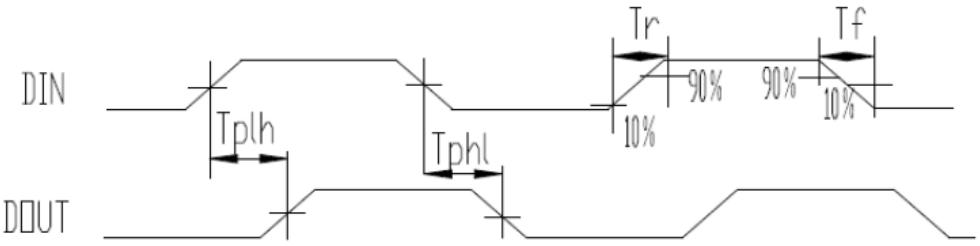
Integrated Circuit

Electrical Specifications

Parameter name	Symbol	Min	Typical	Max	Unit	Test conditions
Chip input voltage	V_{DD}	-	5.0	7.5	V	-
High level input voltage	V_{IH}	0.7x V_{DD}	0.9x V_{DD}	1.0x V_{DD}	V	V_{DD} = 5.0V
Low-level input voltage	V_{IL}	0 V_{DD}	0.1 V_{DD}	0.3x V_{DD}	V	
PWM frequency	F_{PWM}	-	4	-	KHZ	-
Static power	I_{DD}	-	5	-	uA	-

Dynamic Parameter

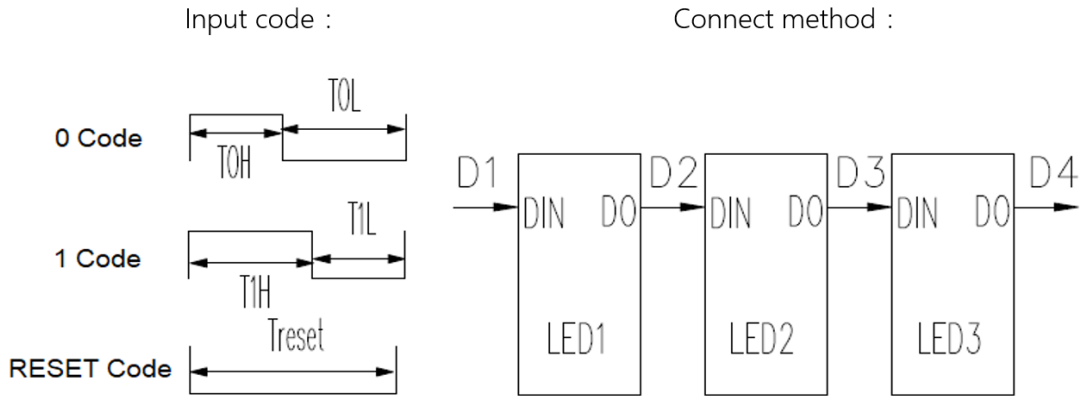
Parameter name	Symbol	Min	Typical	Max	Unit	Test conditions
Data transfer rate	F_{DIN}	--	800	1100	KHZ	--
Transmission delay time	T_{PLZ}	--	--	500	ns	D IN→DO



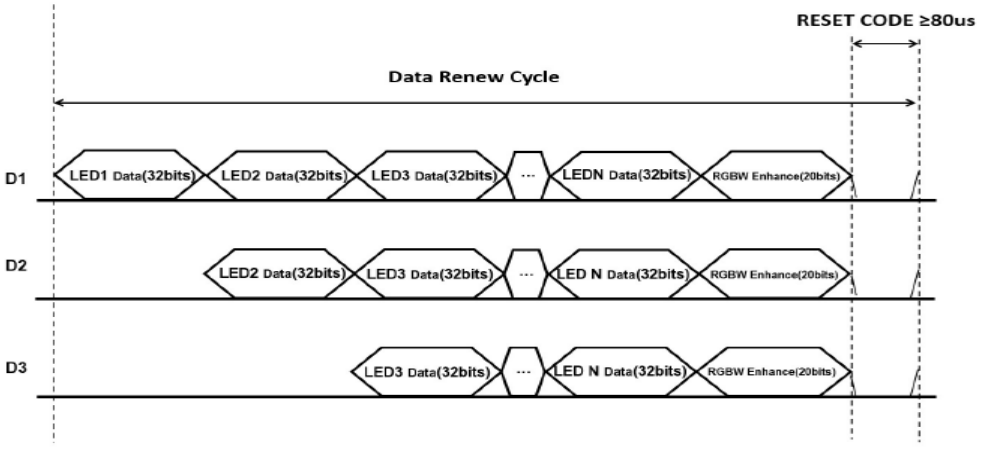
Data Transmission Time

T Symbol	Code	Min	Typical	Max	Unit
TOH	0 code, high level time	0.295	0.3	0.305	us
TOL	0 code, low level time	0.85	0.9	0.95	us
T1H	1 code, high level time	0.85	0.9	0.95	Us
T1L	1 code, low level time	0.25	0.3	0.305	Us
Trst	Reset code, low level time	80	--	--	us

Temporal Waveform Figure



Mode of Data Transmission

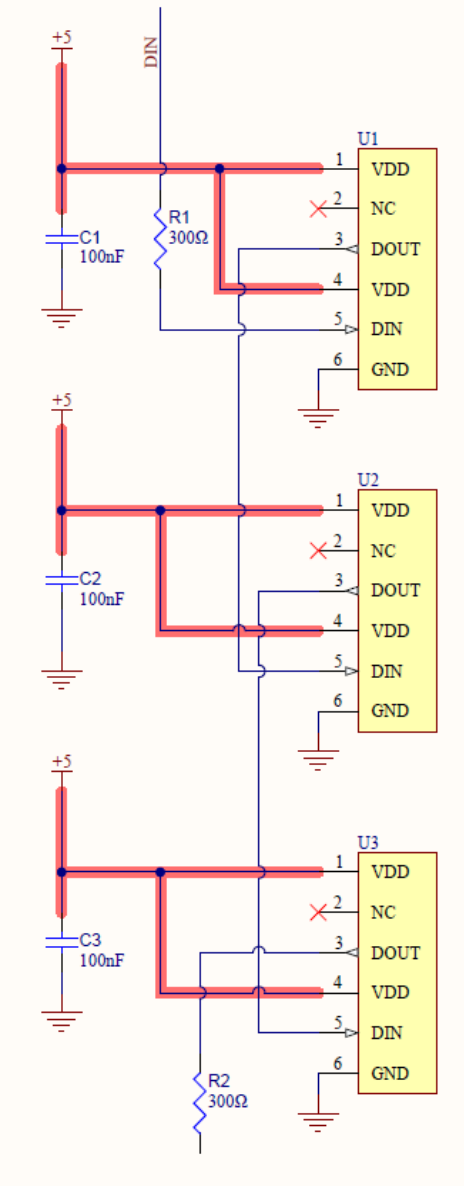


Note: D1 is the data sent by the MCU, and D2, D3 and D4 are the data that the cascade circuit automatically reshapes and forwards.

G7	G6	...	G1	G0	R7	R6	...	R1	R0	B7	B6	...	B1	B0	W7	W6	...	W1	W0

Note: The high bit is sent first, and the data is sent in the order of GRBW (G7→G6……W0)

Typical Application Circuit:



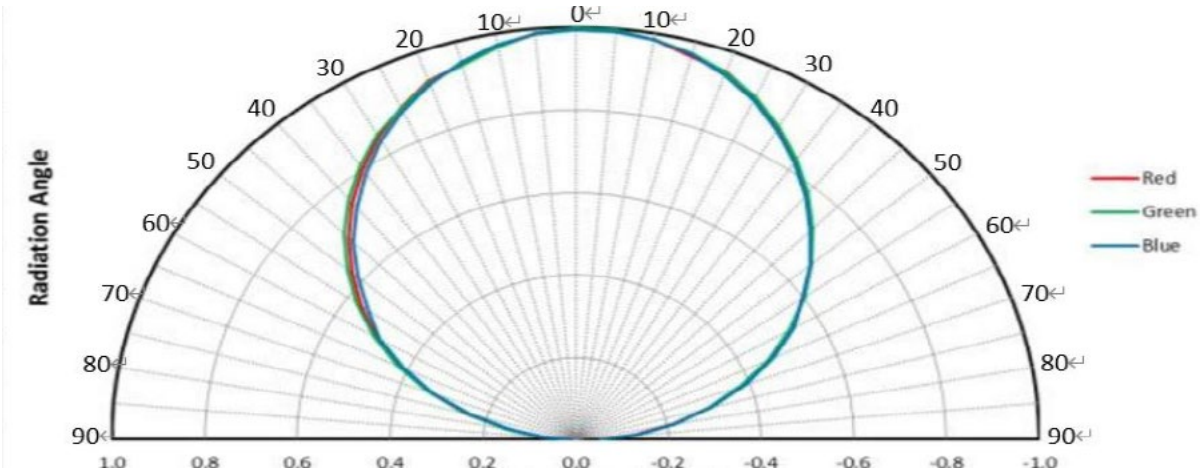
CAUTIONS:

To ensure that IC lamp beads are used in SMT patch reflow welding and in the use of the process yield and stability of the product, the following procedures are specified after many tests.

1. Sample evaluation: Because this product is a built-in IC product, the overall process is different from conventional RGB products, so the customer side needs to carry out all-round verification during the sample evaluation to ensure the matching performance of the product.
2. Incoming material inspection: ensure the vacuum packing is intact and there is no vacuum leakage. If there is vacuum leakage, please confirm whether the reflow welding is abnormal. If it is abnormal, please return to the factory for high-temperature dehumidification.
3. Use: Please confirm the first piece before the formal SMT. According to the principle of one package and one package, the lamp bead should not be exposed to air for more than 4 hours. The lamp bead should be reflow welded within 2 hours after the SMT is finished.
4. Maintenance: material should be completed within 4 hours and domestic demand after reflow soldering test and repair the lamp bead, such as more than 4 hours need to repair the lamp plate temperature above 65°C dehumidification 12 hours to repair work, and repair the lamp bead also must carry on the low temperature above 65°C dehumidification 12 hours, use prohibited in the process of maintenance with temperature over 240°C heating machine repair, prohibit the whole plate placed in the heating stage repair, follow the principle of bad which return which measuring.
5. Warm prompt: the whole process special considerations for light bead before use vacuum packing, dehumidification, SMT placement time and workshop of temperature and humidity control, product maintenance lamp plate if bare at room temperature environment for a long time need to dehumidification, light board and light bead light beads as LED electronic products, need to pay attention to moisture in spring and summer, autumn and winter anti-static, product quality is enterprise's life, to the quality strives for the survival, to the quality strives for the development is our consistent aim. Also, to ensure the quality of the client, please strictly refer to the above recommendations.

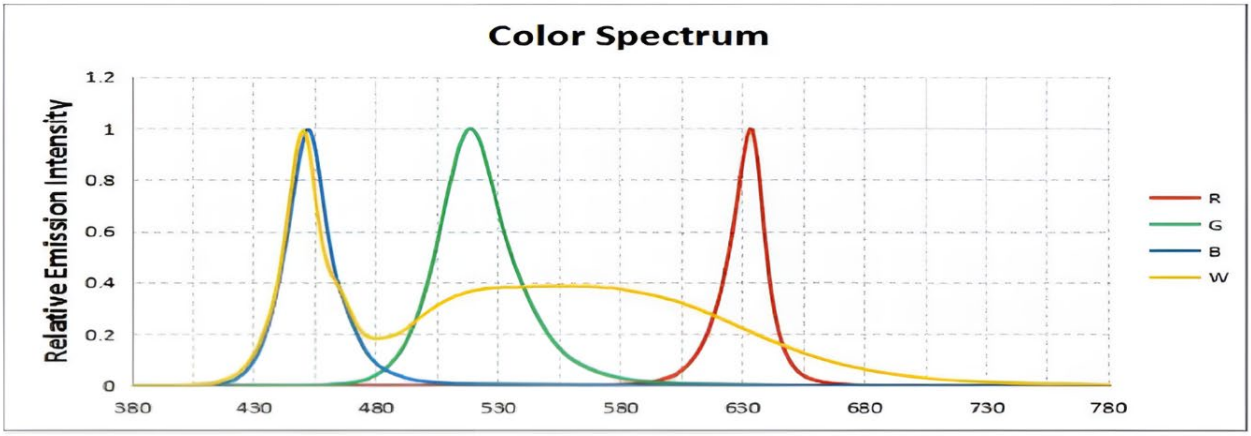
Directivity Radiation:

T_A = 25°C unless otherwise noted, I_F=12mA

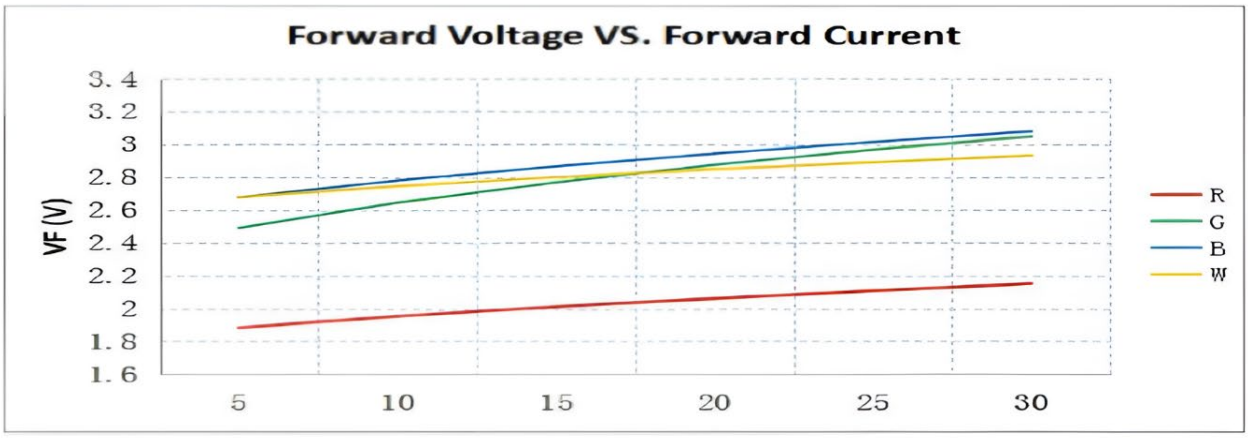


Typical Electrical / Optical Characteristics Curves

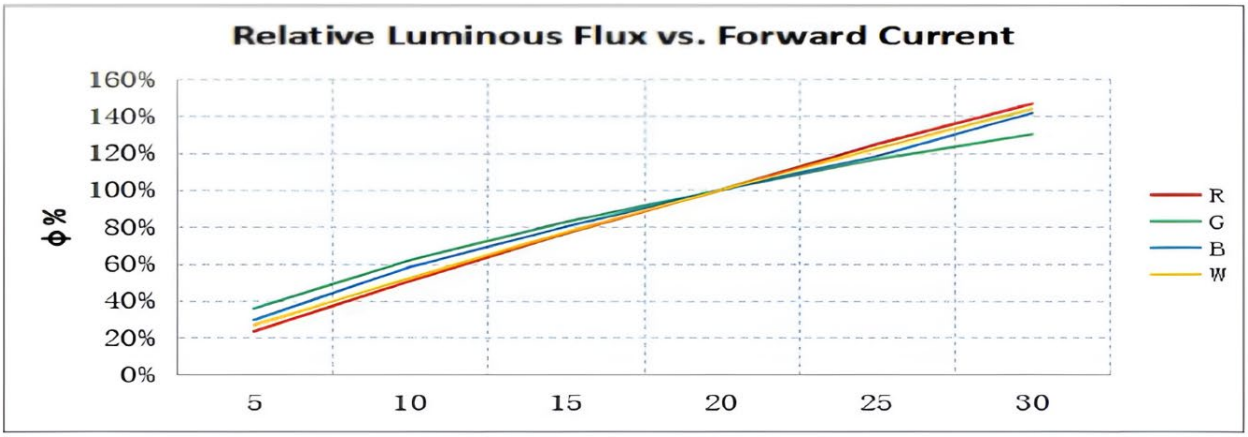
T_A = 25°C unless otherwise noted



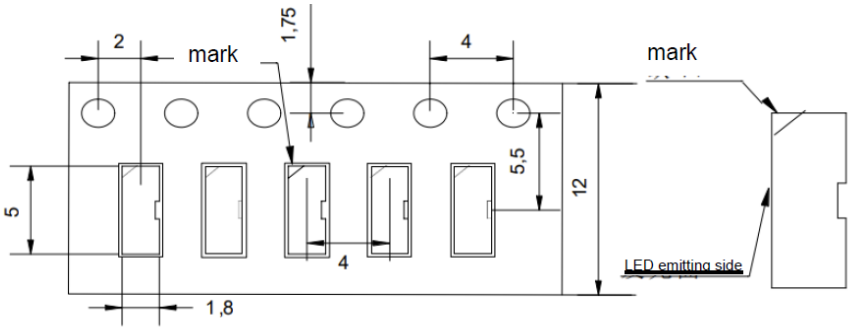
■ Relationship between voltage and current, Ta=25℃

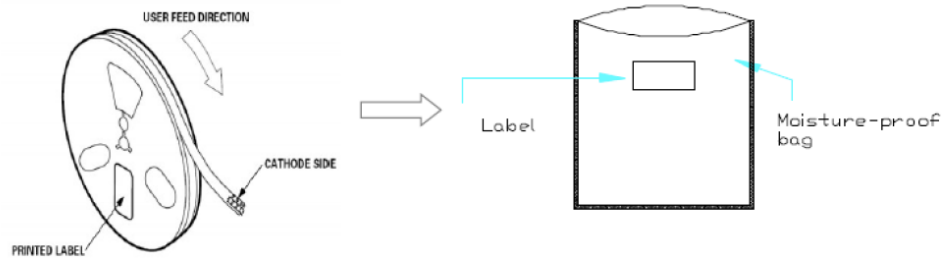


■ Relationship between brightness and current, Ta=25 ℃



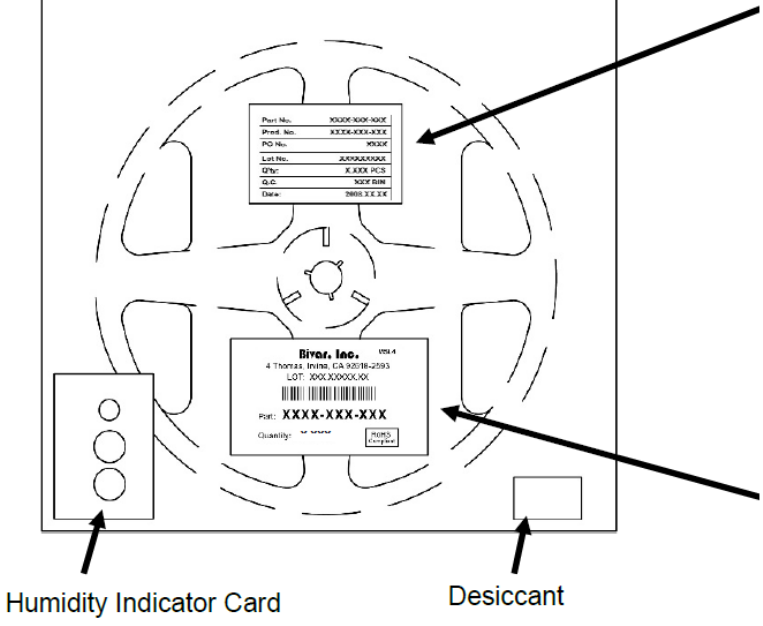
Tape and Reel Dimensions
Note: Reel Size: 178 x 12mm, 1500 pcs/Reel





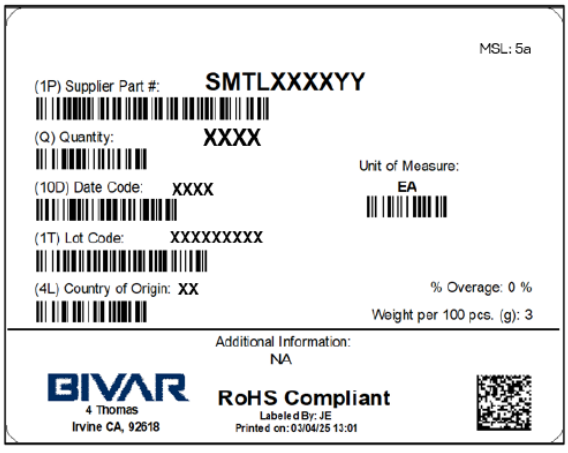
Packaging and Labeling Plan
Note: 1 Reel / Bag

Sealed ESD and Moisture Barrier Bag



Part No.	XXXX-XXX-XXXX
PO No.	XXXX
Lot No.	XXXXXXXXX
Q'ty :	XXXX PCS
Q.C.	
Date:	2025.XX.XX

Internal Quality Control Label



Storage:

Before Opening the Package: The LEDs should be kept at 30°C or less and 90% RH or less. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with absorbent material (silica gel) is recommended.
After Opening the Package: The LEDs should be kept at 30°C or less and 70% RH or less. The LEDs should be soldered within 72 hours (3 days) after opening the package. If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with packages of moisture absorbent material (silica gel). It is also recommended to return the LEDs to the original moisture proof bag and to reseal the moisture proof bag again.
If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following condition: BAKE TREATMENT – more than 24 hours at 65 +/-°C.
LED electrode sections are comprised of silver-plated copper alloy. The silver surface may be affected by environments which contain corrosive gases and so on. Please avoid conditions which may cause the LED to corrode, tarnish or discolor. This corrosion or discoloration may cause difficulty during soldering operations. It is recommended that the user uses the LEDs as soon as possible. Avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.

Moisture Proof Package:

When moisture is absorbed into the SMT package, it may vaporize and expand during soldering. There is a possibility that this can cause exfoliation of the contacts and damage to the optical characteristics of the LEDs. For this reason, the moisture proof package is used to keep the moisture to a minimum in the package.
The moisture proof package is made of an aluminum moisture proof bag with a zipper. A package of a moisture absorbent material (silica gel) is inserted into the aluminum moisture proof bag. The silica gel changes its color from blue to pink as it absorbs moisture.

Heat Generation

*** Thermal design of the end product is of paramount importance. Please consider the heat generation of the LED when making the system design. The coefficient of temperature increases per input electric power is affected by the thermal resistance of the circuit board and density of LED placement on the board, as well as other components. It is necessary to avoid intense heat generation and operate within the maximum ratings given in this specification.
*** The operating current should be decided after considering the ambient maximum temperature of LEDs.

Static Electricity

*** Static electricity or surge voltage damages the LEDs. It is recommended that a wrist band or an anti-electrostatic glove be used when handling the LEDs.
*** All devices, equipment and machinery must be properly grounded. It is recommended that measures be taken against surge voltage to the equipment that mounts the LEDs.
*** When inspecting the final products in which LEDs were assembled, it is recommended to check whether the assembled LEDs are damaged by static electricity or not. It is to find static-damaged LEDs by a light-on or a V_F test at lower current (below 1mA is recommended.)
*** Damaged LEDs will show some unusual characteristics such as the leak current increases remarkably, the forward voltage becomes lower, or the LEDs do not light at low current. CRITERIA: (V_F > 2.0V at I_F=0.5mA)

Cleaning

*** It is recommended that isopropyl alcohol be used as a solvent for cleaning the LEDs. When using other solvents, it should be confirmed beforehand whether the solvents will dissolve the package and the resin or not. Freon solvents should not be used to clean the LEDs because of worldwide regulations.
*** Do not clean the LEDs by ultrasonic means. When absolutely necessary, the influence of ultrasonic cleaning of the LEDs depends on factors such as ultrasonic power and the assembled conditions. Before cleaning, a pre-test should be done to confirm whether any damage to the LEDs may occur.

Others

*** Care must be taken to ensure that the reverse voltage will not exceed the absolute maximum rating when using the LEDs with matrix drive.
*** The LED light output is strong enough to injure the human eyes. Pre-caution must be taken to prevent looking directly at the LEDs with unaided eyes for more than a few seconds.
*** Flashing lights have been known to cause discomfort to people. You can prevent this by taking precautions during use. Also, people should be cautious when using equipment that has LEDs incorporated into it.
***The LEDs described in this datasheet are intended to be used for ordinary electronic equipment (such as office equipment, communications equipment, measurement instruments and household appliances.) Consult Bivar in advance

for information on the applications in which exceptional quality and reliability are required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health (such as for aerospace, submersibles, nuclear reactor systems, automobiles, traffic control equipment, life support systems and safety devices.)
*** User shall not reverse engineer by disassembling or analysis of the LEDs without having prior written consent from Bivar. When defective LEDs are found, the user should inform Bivar directly before disassembling or analysis.
*** The formal specifications must be exchanged and signed by both parties before large volume purchases begin.
*** The appearance and specifications of the product may be modified for improvement without notice.

The LED is encapsulated with silicone; therefore, the top surface of the LED is soft. The pressure to the top surface will influence the reliability of the LEDs. Please do not touch silicone encapsulation while taking the LED.

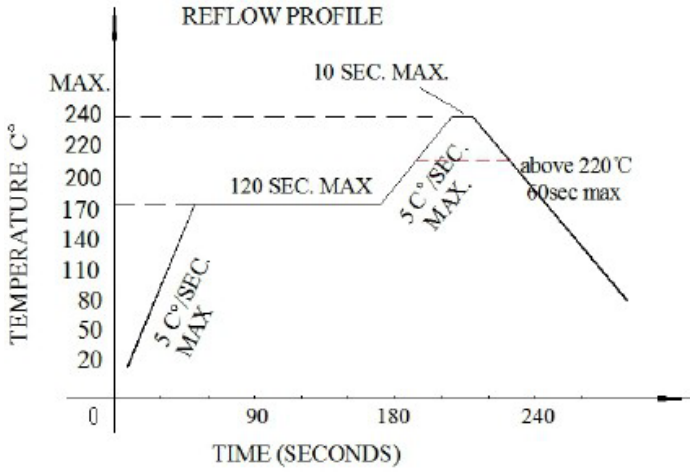
Surface Mounting Condition

In automatic mounting of the SMD LEDs on printed circuit boards, any bending, expanding and pulling forces or shock against the SMD LEDs shall be kept minimum to prevent them from electrical failures and mechanical damage of the device.

Reflow Soldering

Soldering of the SMD LEDs shall conform to the soldering conditions in the individual specifications. SMD LEDs are designed for Reflow Soldering. In the reflow soldering, too high temperature and too large temperature gradient such as rapid heating / cooling may cause electrical and optical failure and damage of the devices. Bivar cannot guarantee the LED after they have been assembled using the solder dipping method.

Reflow Soldering Time Profile



1. Reflow soldering should not be done more than 2 times.
2. When soldering, do not put stress on the LEDs during heating.

Soldering Iron

1. Keep the temperature under 300°C within 3 seconds when soldering.
2. The hand soldering should be done only one time.
3. Any rework should be done within 5 seconds under 240°C
4. The head of the iron cannot touch the LEDs.
5. Do not touch silicone encapsulation while taking the LED.
6. Twin-Head Type is preferred.

Reliability Test Item and Conditions

Results of Reliability Test

TEST ITEMS AND RESULTS

Item	Test Item	Ref. Standard	Test Conditions	Note	Conclusion
1	Reflow Soldering	JESD22-B106	Tsld=240°C,10sec	3times	0/22
2	Temperature Cycle	JESD22-A104	-20°C30min ↑↓ 15min 120°C30min	200cycle	0/22
3	Thermal Shock	JESD22-A106	-40°C15min ↑↓ 15sec 125°C15min	200cycle	0/22
4	High Temperature Storage	JESD22-A103	T_a=100°C	1000hrs	0/22
5	Low Temperature Storage	JESD22-A119	T_a=-40°C	1000hrs	0/22
6	Power temperature Cycling	JESD22-A105	On5min-40°C>15min ↑↓ <15min ↑↓ Off5min100°C>15min	200cycle	0/22
7	Life Test	JESD22-A108	T_a=25°C I_F=12mA	1000hrs	0/22
8	High Humidity Heat Life Test	JESD22-A101	60°CRH=90% I_F=12mA	1000hrs	0/22

Definition of Moisture Resistance

Moisture resistance verification						
Moisture resistance level	Life span after un packing		Verification condition			
	Time	Condition	Standard conditions		Accelerated conditions	
			Time	Condition	Time	Condition
LEVEL1	Unlimited	≦30℃/85%RH	168+5/-0H	85℃/85%RH	/	/
LEVEL2	1year	≦30℃/60%RH	168+5/-0H	85℃/60%RH	/	/
LEVEL2 a	4weeks	≦30℃/60%RH	696+5/-0H	30℃/60%RH	120+5/-0H	60℃/60%RH
LEVEL3	168hours	≦30℃/60%RH	192+5/-0H	30℃/60%RH	40+5/-0H	60℃/60%RH
LEVEL4	72hours	≦30℃/60%RH	96+5/-0H	30℃/60%RH	20+5/-0H	60℃/60%RH
LEVEL5	48hours	≦30℃/60%RH	72+5/-0H	30℃/60%RH	15+5/-0H	60℃/60%RH
LEVEL5 a	24hours	≦30℃/60%RH	48+5/-0H	30℃/60%RH	10+5/-0H	60℃/60%RH
LEVEL6	Take out And use	≦30℃/60%RH	Take out and use	30℃/60%RH	/	/