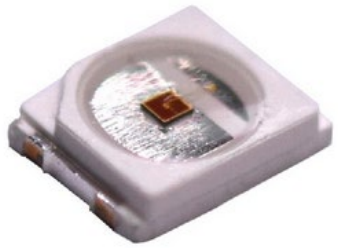
SMD Top View Package LED
SMTL3528RC, Red

SMTL3528RC

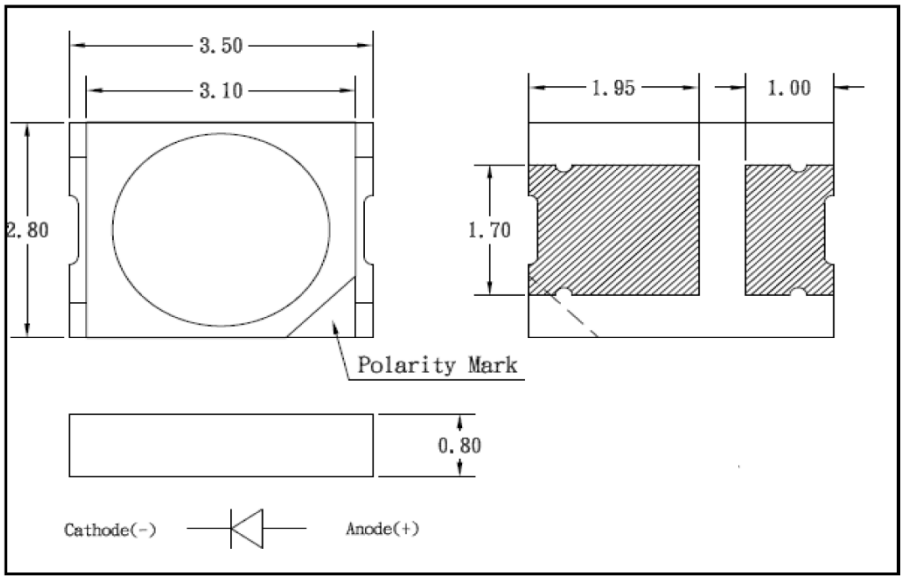
- **Industry Standard PLCC Footprint**
- **Low Profile Package**
- **High Luminous Intensity**
- **Wide Viewing Angle**
- **High Power Efficiency**

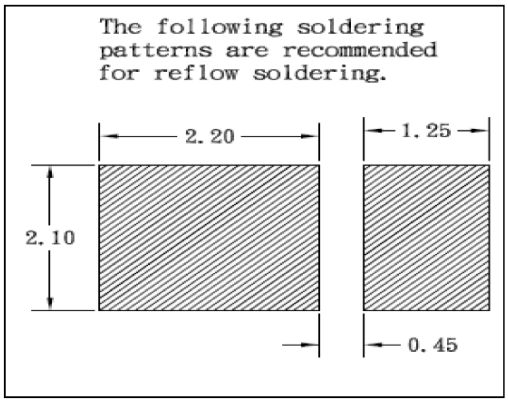


Bivar SMTL3528 LED is offered in an industry standard PLCC package with high luminous intensity and wide viewing angles. The miniature package is ideal for small scale applications such as illumination, general indication, and backlighting. Low power consumption and excellent long-life reliability are suitable for battery powered equipment. The robust package is ideal for harsh working environments and can be used in clusters for high luminous applications. Wide variety of color and intensity combinations are available to meet any illumination needs. Bivar SMTL3528 LED is packaged in standard tape and reels for pick and place assemblies.

Part Number	Emitted Color	Dominant Wavelength (nm)	Luminous Intensity Typ. mcd	Lens Color	Viewing Angle
SMTL3528RC	Red	624	2950	Water Clear	120°

Outline Dimensions





ATTENTION OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

RoHS Compliant

Moisture Sensitivity Level 4

Outline Drawings Notes:
1. All dimensions are in millimeter [inches]
2. Standard tolerance: ±0.010" (0.25mm) unless otherwise noted.

Absolute Maximum Ratings T_A = 25°C unless otherwise noted	
Power Dissipation	252 mW
Continuous Forward Current (DC)	90 mA
Pulse Current [1]	200 mA
Electrostatic Discharge Classification (HBM)	+/- 500V
Reverse Voltage	5 V
Shelf Life	1 year
Operating Temperature Range	-40°C ~ +85°C
Storage Temperature Range	-55°C ~ +100°C
Lead Soldering Temperature	245°C for 10 sec.

Notes: 1. 10% Duty Cycle, Pulse Width ≤ 0.1 msec. 2. Solder time less than 10 seconds at maximum temperature.
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

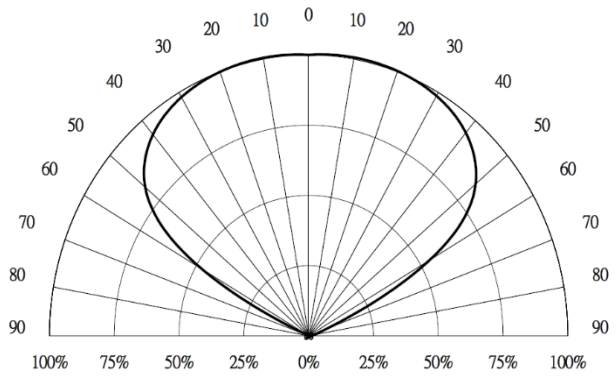
T_A = 25°C & I_F = 20 mA unless otherwise noted

Emitting Color	Forward Voltage (V)[1]			Recommended Forward Current (mA)			Reverse Current (μA) @ V_R=5V	Dominant Wavelength (nm)[2]			Luminous Intensity Iv (mcd)[3]			Viewing Angle 2 Θ ½ (deg)
	MIN	TYP	MAX	MIN	TYP	MAX	MAX	MIN	TYP	MAX	MIN	TYP	MAX	TYP
Red	1.6	2.2	2.8	/	60	/	10	618	624	630	2500	2950	3400	120

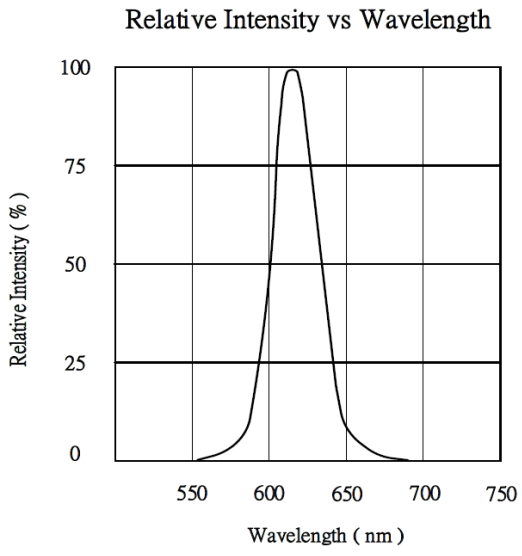
Notes: 1. Tolerance of forward voltage: ±0.05V.
2. Tolerance of dominant wavelength: -1.0nm of MIN & +1nm of MAX.
3. Tolerance of luminous intensity: ±10%

Directivity Radiation

T_A = 25°C unless otherwise noted



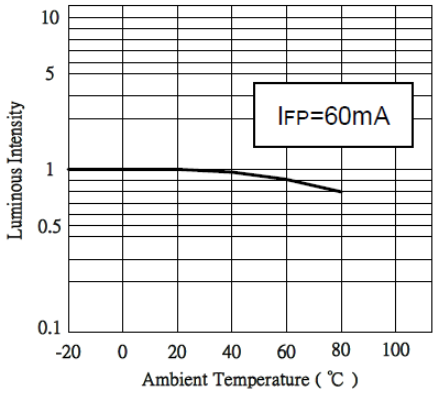
Radiation Diagram



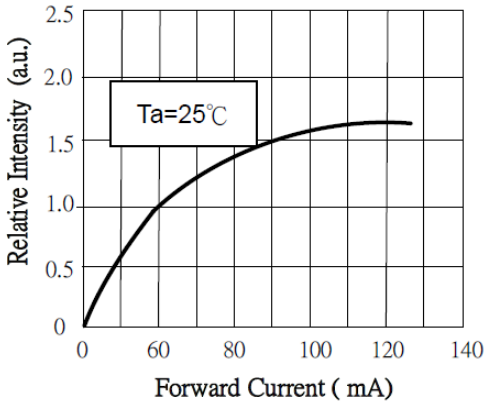
Typical Electrical / Optical Characteristics Curves

T_A = 25°C unless otherwise noted

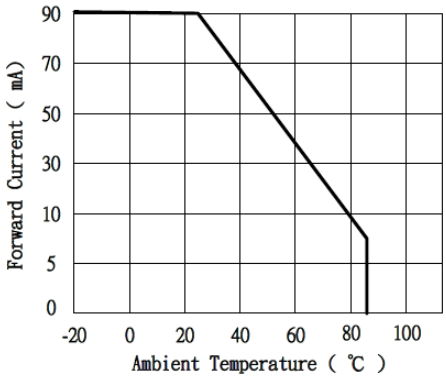
Luminous Intensity vs.
Ambient Temperature



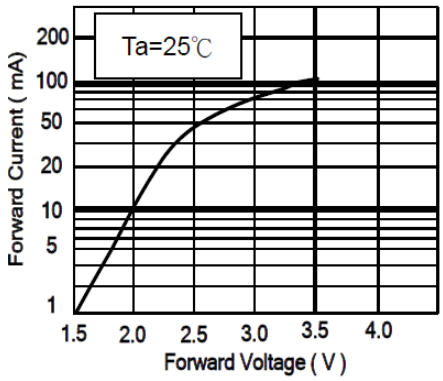
Relative Intensity
vs. Forward Current



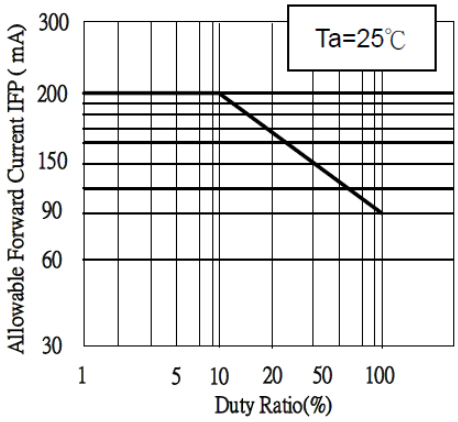
Forward Current vs.
Ambient Temperature



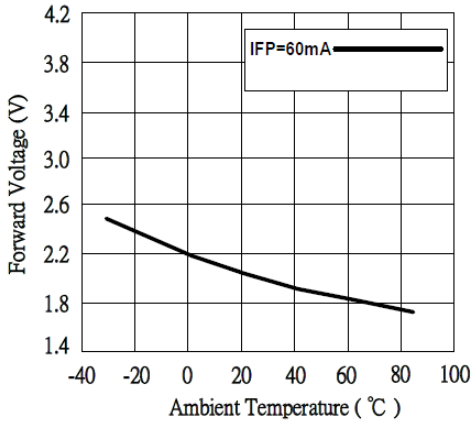
Forward Current vs.
Forward Voltage



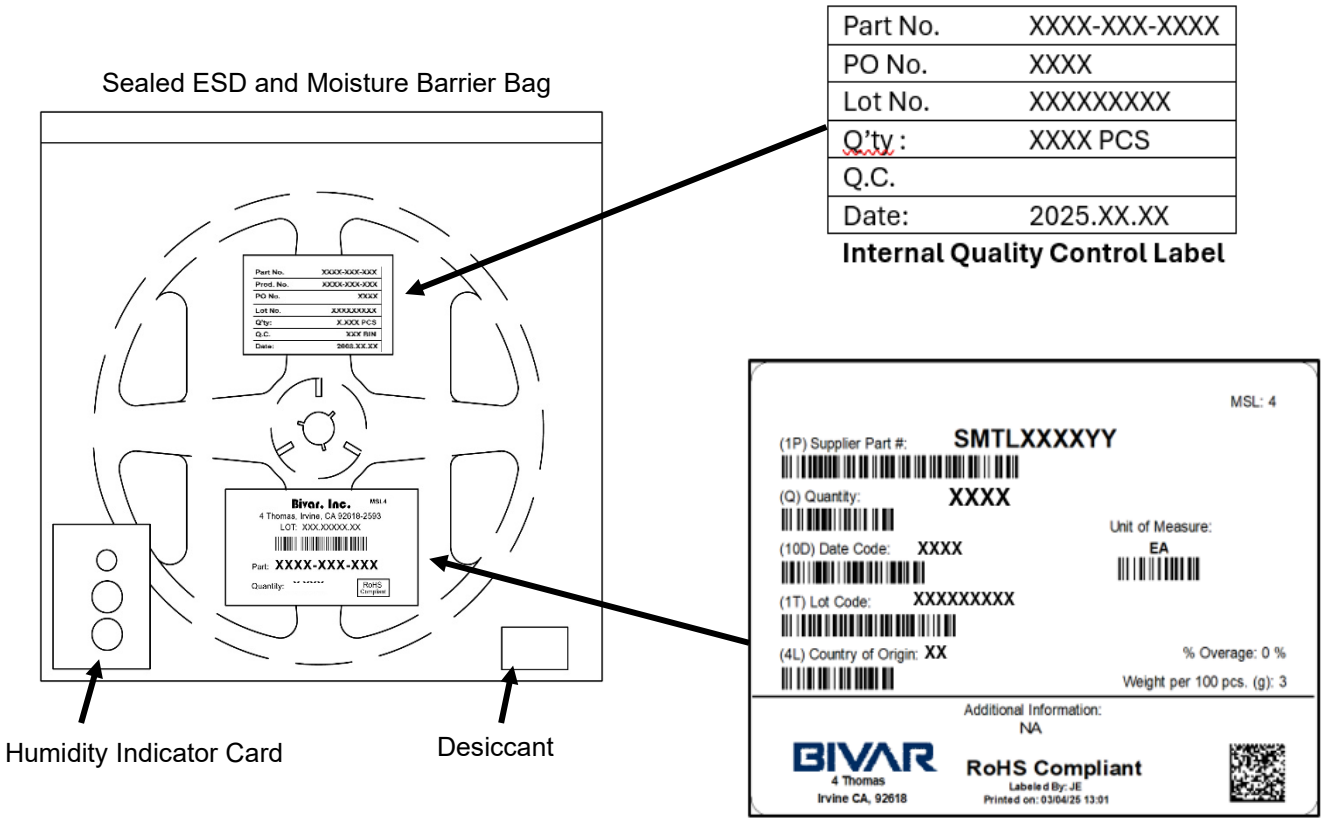
Duty Ratio vs.
Allowable Forward Current



Forward Voltage vs.
Ambient Temperature



Packaging and Labeling Plan
Note: 1 Reel / Bag



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 the environment which main 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.

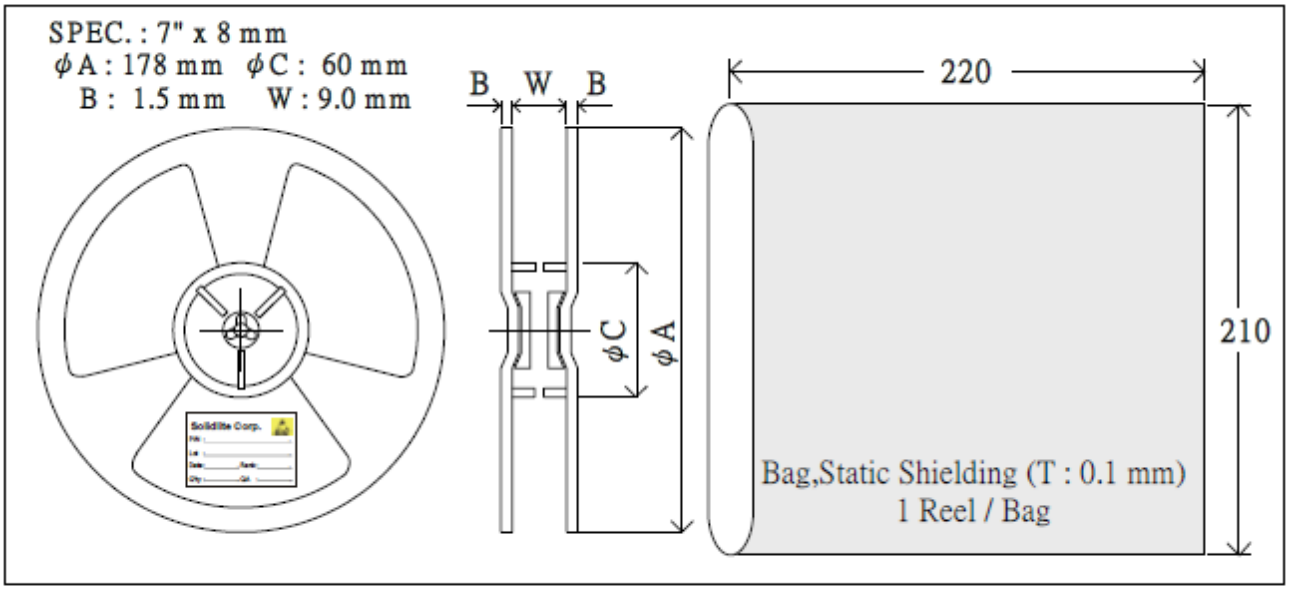
Moisture Proof Package:

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.

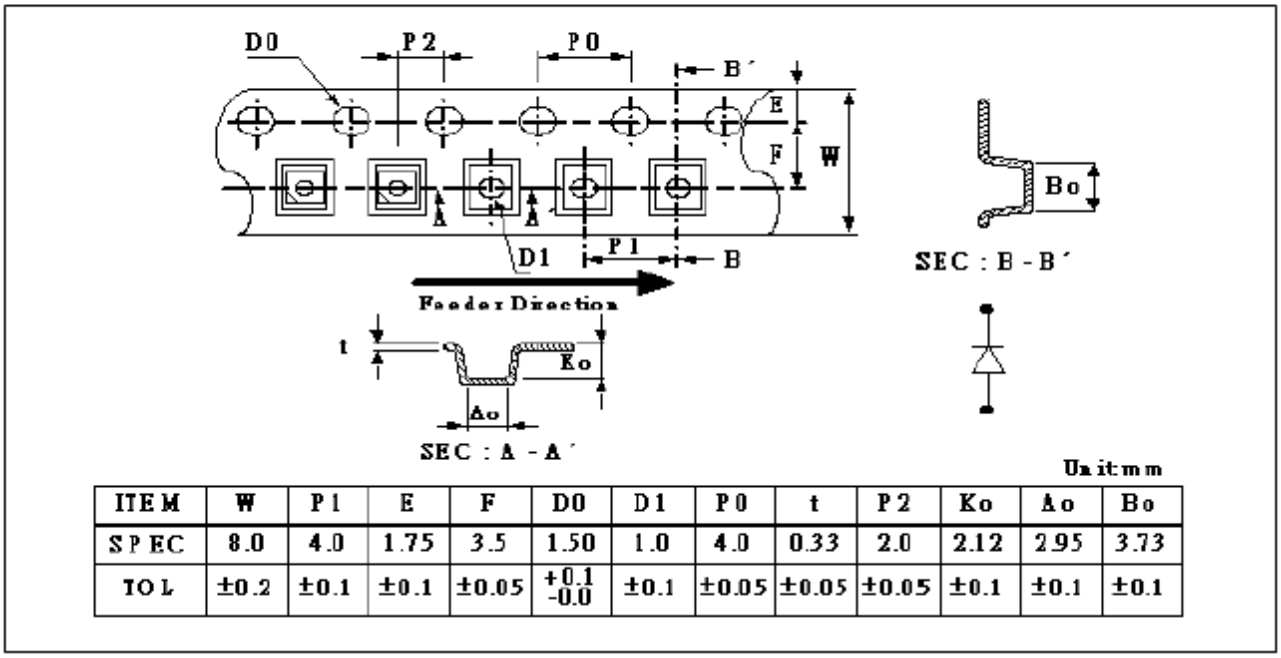
Tape and Reel Dimensions

Note: 2000 pcs/Reel

Package Reel & Static Shielding Bag Dimensions :



Package Carrier Tape Dimensions : 2,000 pcs/Reel

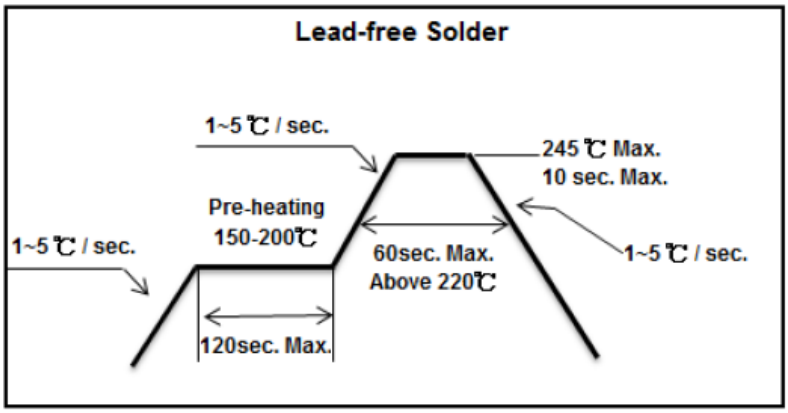


Unit:mm

ITEM	W	P1	E	F	D0	D1	P0	t	P2	Ko	Ao	Bo
SPEC	8.0	4.0	1.75	3.5	1.50	1.0	4.0	0.33	2.0	2.12	2.95	3.73
TOL	±0.2	±0.1	±0.1	±0.05	+0.1 -0.0	±0.1	±0.05	±0.05	±0.05	±0.1	±0.1	±0.1

Recommended Soldering Conditions – Time Profile (Reflow Soldering)

Lead Free Solder	
Pre-heat	150~200 ℃
Pre-heat time	120 sec. Max.
Peak-Temperature	245 ℃ Max.
Soldering time Condition	10 sec. Max.



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 damages of the device.

Soldering Reflow

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.

CAUTIONS:

Heat Management & Design Considerations

*** Heat generation must be controlled during LED use. The temperature of the chips is affected by the thermal resistance of the PCB and LED density configuration.
*** Attention should be made to circuit board design for effective heat dispersion and therefore, not allowing the LED joint temperature exceed the absolute maximum rated value.
*** In addition, the current should be determined shall be determined based on the Ambient Temperature surrounding the LED, and appropriate heat dissipation shall be implemented.

Static Electricity

*** It is recommended that a wrist band or an anti-electrostatic glove be used when handling the LEDs since Static electricity or surge voltage may potentially damage the LEDs.
*** It is recommended that measures be taken against surge voltage to the equipment that mounts the LEDs, where all related devices, equipment and machinery must be properly grounded.
*** It is recommended to check whether the assembled LEDs are damaged by static electricity during final product inspection in which LEDs were assembled. Recommend conducting a functional test with rated V_F and low 1mA current to find static-damaged LEDs.
*** Damaged LEDs may behave such as the leak current is significantly increased, the forward voltage becomes is reduced, or the LEDs do not light with the low test current. CRITERIA: (V_F > 2.0V at I_F=0.5mA)

Cleaning

*** It is recommended to use isopropyl alcohol for cleaning the LEDs. Shall be confirmed beforehand if other solvents can be utilized to verify if the package or the resin can be negatively impacted. Freon solvents should not be used to clean the LEDs due to worldwide regulations.
*** Do not clean the LEDs by ultrasonic means. If absolutely necessary, a pre-test should be performed to confirm whether any damage to the LEDs may occur before proceeding to clean. Ultrasonic cleaning impact on the LEDs may be impacted by factors such as ultrasonic power and the assembled conditions.

Others

*** Ensure reverse voltage does not exceed the absolute maximum rating when driving LEDs with a matrix system.
*** Recommend avoiding looking directly into the LEDs without proper eye protection for more than a few seconds, since the emitted high intensity light output may potentially injure the human eyes.
*** Flashing lights are known to potentially cause discomfort to certain people and shall take precautions when LEDs are flashing. Should also be cautious when using equipment which use LEDs as light or indication sources.
*** Intended applications of the LEDs in this datasheet are for common electronic equipment (such as office and communications equipment, measurement instruments, industrial usage and 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 impact on the life or health of the LEDs such as for aerospace, automotive, traffic control equipment, life support systems, safety devices or other similar applications.
*** User shall not reverse engineer under any circumstances the LEDs by disassembling or performing specialized analysis thereof, without Bivar's knowledge or consent. When defective LEDs are found, the user should inform Bivar for proper analysis, troubleshooting and resolution for course of action.
*** Formal design and specifications reviewed and agreed with Bivar prior to high volume ramp up is confirmed.
*** Product changes for the purpose of improving and/or for material changes can be implemented without notice.

Reliability Test Item and Conditions

Results of Reliability Test

No	Item	Test Condition	Test Hours/Cycles	Sample No	Ac / Re
1	DC Operating Life	I_F : 60mA	1,000 HRS	50 PCS	0 / 1
2	High Temperature Storage	Temp : 100℃	1,000 HRS	50 PCS	0 / 1
3	Low Temperature Storage	Temp : -55℃	1,000 HRS	50 PCS	0 / 1
4	Thermal Shock Test	-40 ˚C ⟷ 80℃ 5min 8secs 5min	100 CYCLES	50 PCS	0 / 1
5	Temperature Cycle	-40℃~25℃~100℃~25℃ 30min 5min 30min 5min	300 CYCLES	50 PCS	0 / 1
6	Temp. & Humidity	T_A=85℃,RH=85%	1,000 HRS	50 PCS	0 / 1

• The Reliability Criteria of SMD LED

Item	Symbol	Test Coundition	Limit	
			Min.	Max.
Forward Voltage	V_F	I_F : 60mA	-	U.S.L*1.1
Reverse Current	I_R	V_R : 5V	-	U.S.L*2
Luminous Intensity	I_V	I_F : 60mA	L.S.L.*0.5	-

*U.S.L. : Upper Standard Level *L.S.L. : Lower Standard Level