



SMD LED

Product Data Sheet

LTPA-P3528SWL

Spec No.: DS22-2014-0367

Effective Date: 10/31/2014

Revision: -

LITE-ON DCC

RELEASE

BNS-OD-FC001/A4

Light LED LTPA-P3528SWL

1. Description

The LiteOn White LED is a revolutionary, energy efficient and ultra-compact new light source, combining the lifetime and reliability advantages of Light Emitting Diodes with the brightness of conventional lighting. It gives you total design freedom and unmatched brightness, creating a new opportunities for solid state lighting to displace conventional lighting technologies.

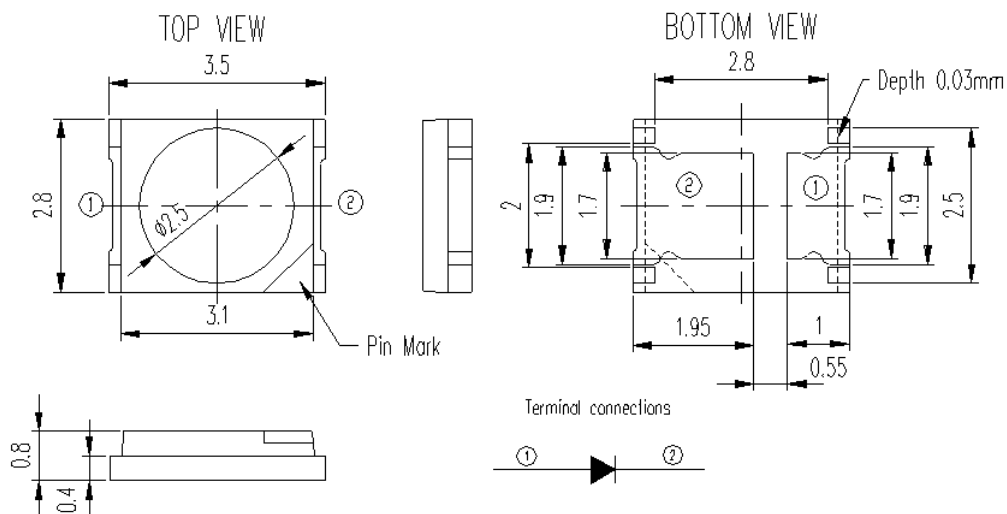
1.1 Features

- Meet ROHS and HF
- Instant Turn On. Very small emitter size
- Highest brightness SMD LED
- Package In 8mm Tape On 7" Diameter Reels
- EIA STD Package
- I.C. Compatible
- Compatible With Automatic Placement Equipment
- Compatible With Infrared Reflow Solder Process

1.2 Applications

- Automotive aftermarket eg: DRL, Reading light

2. Package Dimensions



Part No.	Lens Color	Emitted Color
LTPA-P3528SWL	Yellow	InGaN White

Notes :

1. All dimensions are in millimeters and dimension tolerances are $\pm 0.2\text{mm}$.
2. Dimensions without tolerances are for reference only.

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3. Rating and Characteristics

3.1 Absolute Maximum Ratings at Ta=25°C

Parameter	LTPA-P3528SWL	Unit
Power Dissipation	0.76	W
DC Forward Current	240	mA
Junction Temperature	110	°C
Operating Temperature Range	-40 °C to + 85 °C	
Storage Temperature Range	-40 °C to + 100 °C	

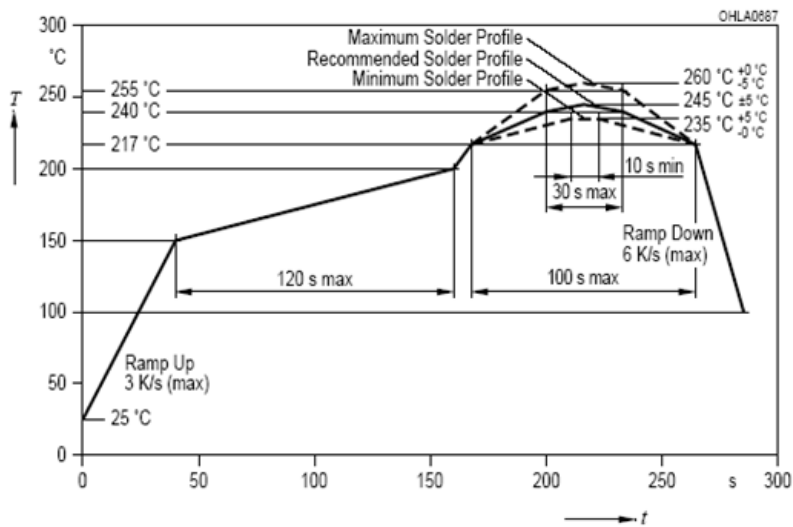
Notes :

1. Stresses in excess of the absolute maximum ratings can cause damage to the emitter. Maximum Rating limits apply to each parameter in isolation, all parameters having values within the Current Derating Curves. It should not be assumed that limiting values of more than one parameters can be applied to the product at the same time. Exposures to the absolute maximum ratings for extended periods can adversely affect device reliability and continuously will cause possible permanent damage and de-rating parameters.

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3.2 Suggest IR Reflow Condition For Pb Free Process:

(PCT reflow max temp. should be lower than 240°C)[Ⓢ]
Suggestion IR Reflow Profile For Pb Free Process :[Ⓢ]
IR-Reflow Soldering Profile for lead free soldering (Acc. to J-STD-020D)[Ⓢ]



Profile Feature	Lead Free Assembly
Average Ramp-Up Rate (T_{Smax} to T_P)	3°C / second max
Preheat Temperature Min (T_{Smin})	150°C
Preheat Temperature Max (T_{Smax})	200°C
Preheat Time (t_{Smin} to t_{Smax})	60 – 120 seconds
Time Maintained Above Temperature (T_L)	217°C
Time Maintained Above Time (t_L)	60 – 100 seconds
Peak / Classification Temperature (T_P)	260°C
Time Within 5°C of Actual Peak Temperature (t_p)	5 seconds
Ramp – Down Rate	6°C / second max
Time 25°C to Peak Temperature	3.5 minutes max

Notes:

- All temperatures refer to topside of the package, measured on the package body surface.
- The soldering condition referring to J-STD-020D.
- The soldering profile could be further referred to different soldering grease material characteristic. The grease vendor will provide this information.
- A rapid-rate process is not recommended for the LEDs cooling down from the peak temperature.
- Although the recommended reflow conditions are specified above, the reflow or hand soldering condition at the lowest possible temperature is desirable for the LEDs.
- LiteOn cannot make a guarantee on the LEDs which have been already assembled using the dip soldering method.

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3.3 Electrical / Optical Characteristics at Ta=25°C

Parameter	Symbol	LTPA-P3528SWL			Unit	Test Condition
		MIN.	TYP.	MAX.		
Luminous Flux	Φ_V	45	--	130	lm	$I_F = 150\text{mA}$
Viewing Angle	$2\theta_{1/2}$	--	120	--	Deg	Fig.2
Color Temperature	CCT	4500	--	7500	K	$I_F = 150\text{mA}$
Forward Voltage	V _F	2.7	--	4.5	V	$I_F = 150\text{m}$
Reverse Current	I _R	--	--	100	μA	VR = 5V Note 4

NOTE:

- Luminous flux measurement tolerance : $\pm 10\%$
- Forward voltage measurement tolerance : $\pm 0.1\text{V}$
- Electric and optical data is tested at 300ms pulse condition.
- Caution in ESD:
 Static Electricity and surge damages the LED. It is recommend to use a wrist band or anti-electrostatic glove when handling the LED. All devices, equipment and machinery must be properly grounded.
- Tester
 CAS140B is for the chromaticity coordinates(x,y) and Iv.
- The chromaticity coordinates(x,y) guarantee should be added ± 0.01 tolerance.
- Reverse voltage(VR) condition is applied to IR test only. The device is not designed for reverse operation.

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4. Bin Rank

4.1 Bin code list

■ VF Rank

Forward Voltage Color : <u>White</u> , Unit : V @150mA		
Bin Code	Min.	Max.
2	2.7	3.0
3	3.0	3.3
4	3.3	3.6
5	3.6	3.9
6	3.9	4.2
7	4.2	4.5

Tolerance on each Forward Voltage bin is $\pm 0.1V$

■ Luminous Flux Rank

Luminous Flux Color : <u>White</u> , Unit : lm @150mA		
Bin Code	Min.	Max.
C	45	55
D	55	70
E	70	85
F	85	105
G	105	130

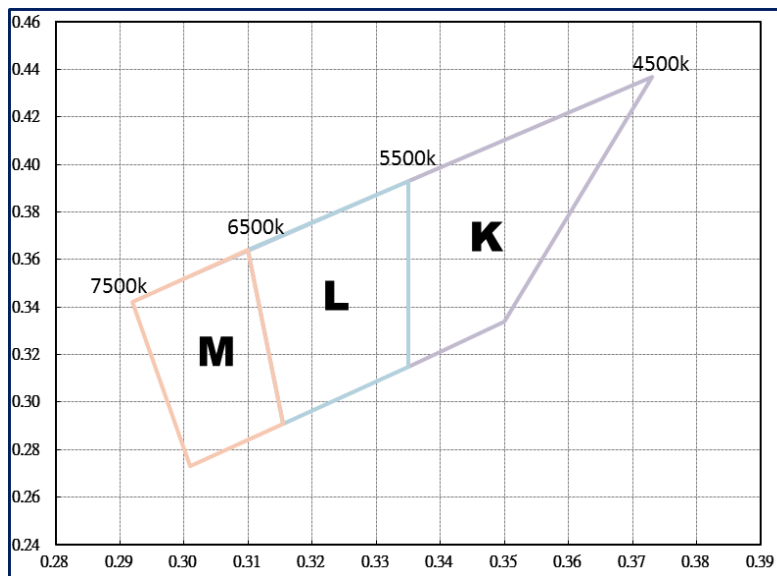
Tolerance on each Luminous Flux bin is $\pm 10\%$

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■ Hue Rank

Color bin limits at IF=150mA					
Bin Code	CIE 1931 Chromaticity coordinates				
K	x	0.3350	0.3350	0.3730	0.3500
	y	0.3150	0.3930	0.4370	0.3340
L	x	0.3155	0.3100	0.3350	0.3350
	y	0.2910	0.3640	0.3930	0.3150
M	x	0.3010	0.2920	0.3100	0.3155
	y	0.2730	0.3420	0.3640	0.2910

Tolerance on each Hue (x, y) bin is ± 0.01



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5. Typical Electrical / Optical Characteristics Curves.

(25°C Ambient Temperature Unless Otherwise Noted)

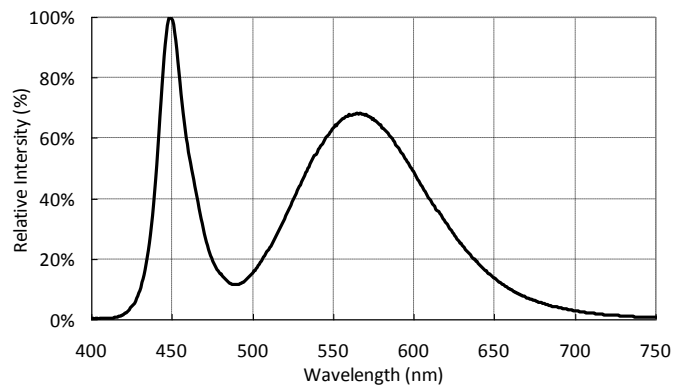


Fig 1. Relative Spectrum of Emission

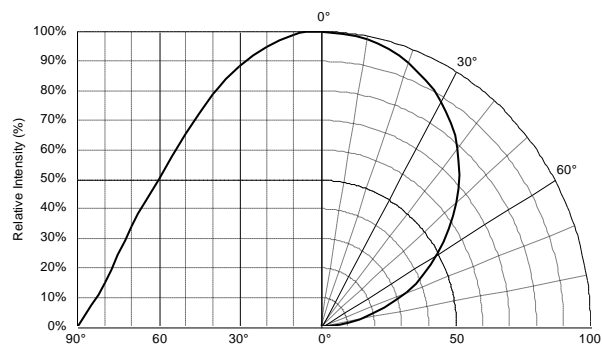


Fig 2. Radiation Characteristics

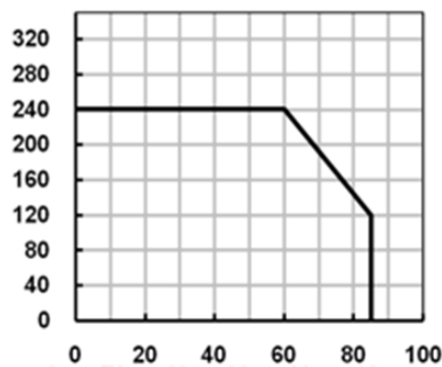


Fig 3. Forward Current Derating Curve

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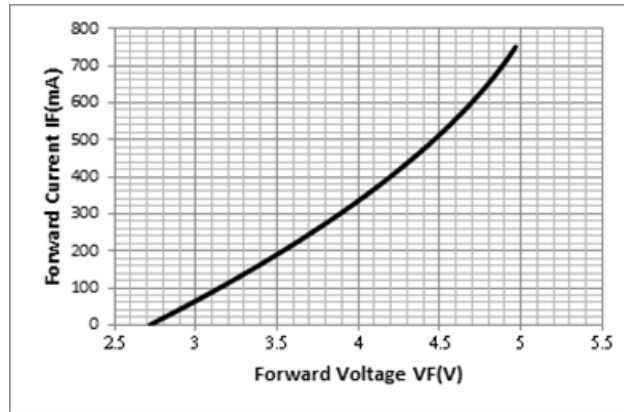


Fig 4. Forward Current

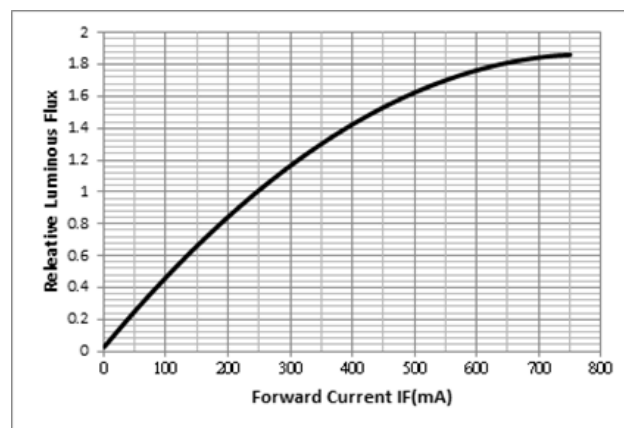


Fig 5. Relative Luminous Flux

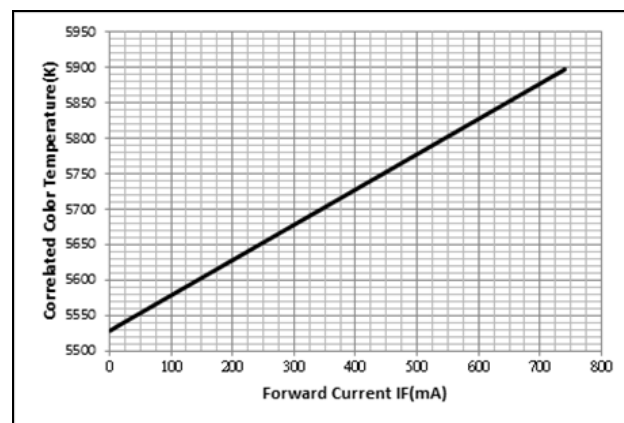


Fig 6. Correlated Color Temperature (CCT) Shift

Notes: All correlation data is mounted on thermal heat sink with 2cmX 2cm Metal Core PCB

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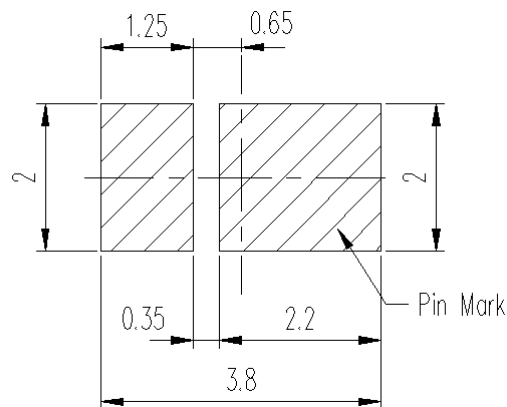
6. User Guide

6.1 Cleaning

Do not use unspecified chemical liquid to clean LED they could harm the package.

If clean is necessary, immerse the LED in ethyl alcohol or in isopropyl alcohol at normal temperature for less one minute.

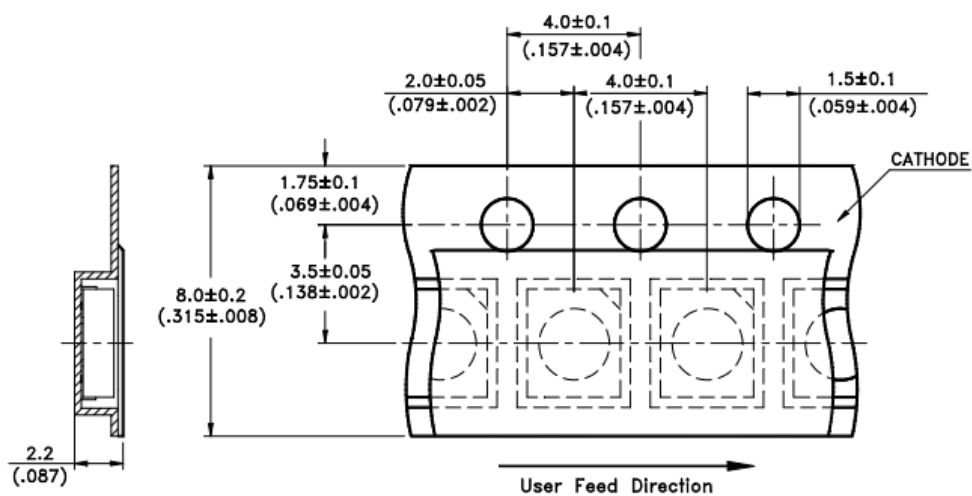
6.2 Recommend Printed Circuit Board Attachment Pad



Note:

1. Suggest stencil thickness is maximum 0.10mm.

6.3 Package Dimensions Of Tape And Reel

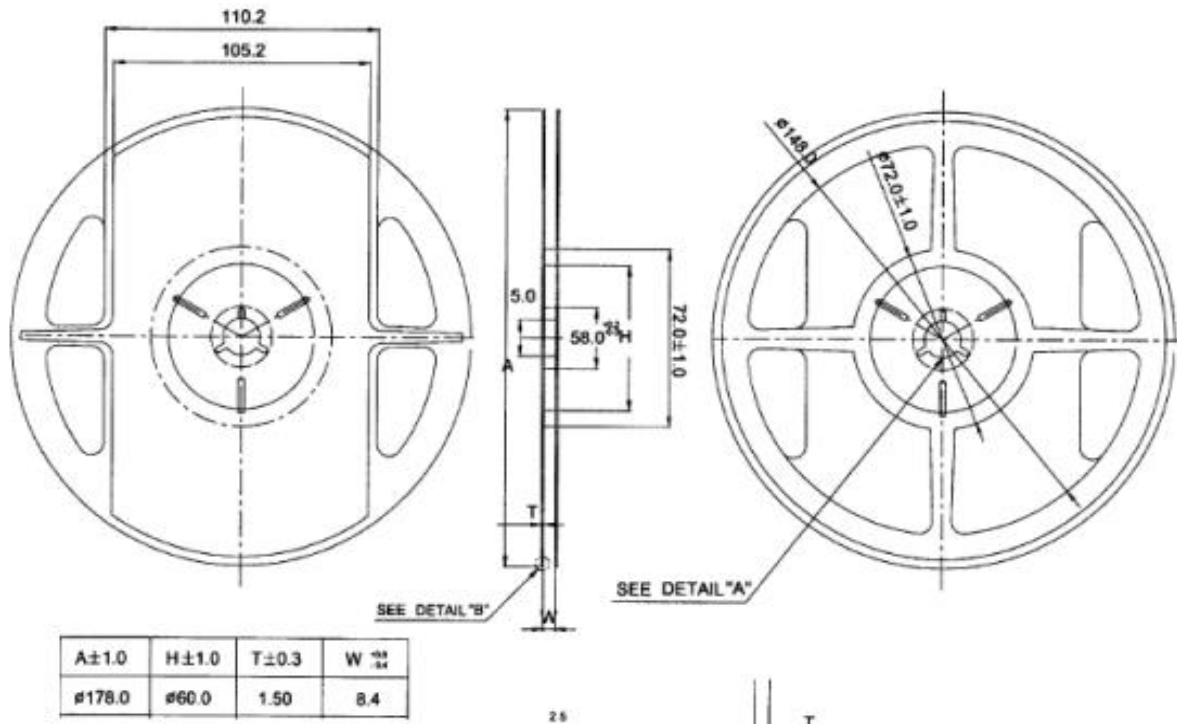


Note:

1. All dimensions are in millimeters (inches).

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6.4 Package Dimensions of Reel



Notes:

1. Empty component pockets sealed with top cover tape.
2. 7 inch reel-2000 pieces per reel.
3. Minimum packing quantity is 500 pieces for remainders.
4. The maximum number of consecutive missing lamps is two.
5. In accordance with EIA-481 specifications.

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7. Cautions

7.1 Application

The LEDs described here are intended to be used for ordinary electronic equipment (such as office equipment, communication equipment and household applications). Consult Liteon's Sales in advance for information on applications in which exceptional reliability is required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health (such as in aviation, transportation, traffic control equipment, medical and life support systems and safety devices).

7.2 Storage

This product is qualified as Moisture sensitive Level 4 per JEDEC J-STD-020 Precaution when handling this moisture sensitive product is important to ensure the reliability of the product.

The package is sealed:

The LEDs should be stored at 30°C or less and 90%RH or less. And the LEDs are limited to use within one year, while the LEDs is packed in moisture-proof package with the desiccants inside.

The package is opened:

The LEDs should be stored at 30°C or less and 60%RH or less. Moreover, the LEDs are limited to solder process within 72hrs. If the Humidity Indicator shows the pink color in 10% even higher or exceed the storage limiting time since opened, that we recommended to baking LEDs at 60°C at least 72hrs. To seal the remainder LEDs return to package, it's recommended to be with workable desiccants in original package.

7.3 Cleaning

Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LED if necessary.

7.4 Soldering

Recommended soldering conditions:

Reflow soldering		Soldering iron	
Pre-heat	150~200°C	Temperature	300°C Max.
Pre-heat time	120 sec. Max.	Soldering time	3 sec. Max. (one time only)
Peak temperature	260°C Max.		
Soldering time	10 sec. Max.(Max. two times)		

Notes:

Because different board designs use different number and types of devices, solder pastes, reflow ovens, and circuit boards, no single temperature profile works for all possible combinations. However, you can successfully mount your packages to the PCB by following the proper guidelines and PCB-specific characterization.

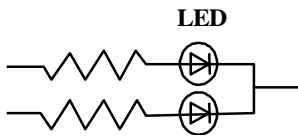
LITE-ON Runs both component-level verification using in-house **KYRAMX98** reflow chambers and board-level assembly. The results of this testing are verified through post-reflow reliability testing. Profiles used at LITE-ON are based on JEDEC standards to ensure that all packages can be successfully and reliably surface mounted. Figure on page2 shows a sample temperature profile compliant to JEDEC standards. You can use this example as a generic target to set up your reflow process. You should adhere to the JEDEC profile limits as well as specifications and recommendations from the solder paste manufacturer to avoid damaging the device and create a reliable solder joint.

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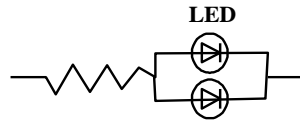
7.5 Drive Method

A LED is a current-operated device. In order to ensure intensity uniformity on multiple LEDs connected in parallel in an application, it is recommended that a current limiting resistor be incorporated in the drive circuit, in series with each LED as shown in Circuit A below.

Circuit model A



Circuit model B



(A) Recommended circuit.

(B) The brightness of each LED might appear different due to the differences in the I-V characteristics of those LEDs.

7.6 ESD (Electrostatic Discharge)

Static Electricity or power surge will damage the LED.

Suggestions to prevent ESD damage:

- Use of a conductive wrist band or anti-electrostatic glove when handling these LEDs.
- All devices, equipment, and machinery must be properly grounded.
- Work tables, storage racks, etc. should be properly grounded.
- Use ion blower to neutralize the static charge which might have built up on surface of the LED's plastic lens as a result of friction between LEDs during storage and handling.

Plastic lens as a result of friction between LEDs during storage and handling.

ESD-damaged LEDs will exhibit abnormal characteristics such as high reverse leakage current, low forward Voltage, or "no light-up" at low currents.

To verify for ESD damage, check for "light up" and V_f of the suspect LEDs at low currents.

The V_f of "good" LEDs should be $>2.0V@0.1mA$ for InGaN product. forward voltage, or "no lightup" at low currents.

To verify for ESD damage, check for "lightup" and V_f of the suspect LEDs at low currents.

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8. Reliability Test

Stress Test	Stress Condition	Stress Duration
Thermal Shock	- 40°C (20min)/100°C (20min) transition time 20 secs	100 cycles
Room Temperature Operation Life	25°C, IF=240mA	1000hr
Low Temperature Operation Life	- 30°C, IF=240mA	1000hr
High Temperature Operation Life	60°C, IF=240mA	1000hr
Resistance to solder heat	T _{sol} =260°C, 10sec,6min	3 times

Notes:

All reliability items are mounted on thermal heat sink with 2cmX 2cm Metal Core PCB

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9. Others

The appearance and specifications of the product may be modified for improvement without prior notice.

10. Suggested Checking List

Training and Certification

1. Everyone working in a static-safe area is ESD-certified?
2. Training records kept and re-certification dates monitored?

Static-Safe Workstation & Work Areas

1. Static-safe workstation or work-areas have ESD signs?
2. All surfaces and objects at all static-safe workstation and within 1 ft measure less than 100V?
3. All ionizer activated, positioned towards the units?
4. Each work surface mats grounding is good?

Personnel Grounding

1. Every person (including visitors) handling ESD sensitive (ESDS) items wears wrist strap, heel strap or conductive shoes with conductive flooring?
2. If conductive footwear used, conductive flooring also present where operator stand or walk?
3. Garments, hairs or anything closer than 1 ft to ESD items measure less than 100V*?
4. Every wrist strap or heel strap/conductive shoes checked daily and result recorded for all DLs?
5. All wrist strap or heel strap checkers calibration up to date?

Note: *50V for InGaN LED.

Device Handling

1. Every ESDS items identified by EIA-471 labels on item or packaging?
2. All ESDS items completely inside properly closed static-shielding containers when not at static-safe workstation?
3. No static charge generators (e.g. plastics) inside shielding containers with ESDS items?
4. All flexible conductive and dissipative package materials inspected before reuse or recycles?

Others

1. Audit result reported to entity ESD control coordinator?
2. Corrective action from previous audits completed?
3. Are audit records complete and on file?