LITEON®
OPTOELECTRONICS

Automotive

Product Data Sheet

LTPA-P35PUCBPPAA

Preliminary

Spec No.：

Created Date: 2017/11/17

Revision: (PRELIMINARY)-1.0

BNS-OD-FC001/A4

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Specific Lighting
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Rev	Description	By	Date
1.0	New data sheet	Aron Tsai	11/17/2017
Above data for PD and Customer tracking only			

Customer Name:

Customer Signature: **Print Name:**

LiteON Sales Signature: **Print Name:**

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1. Description

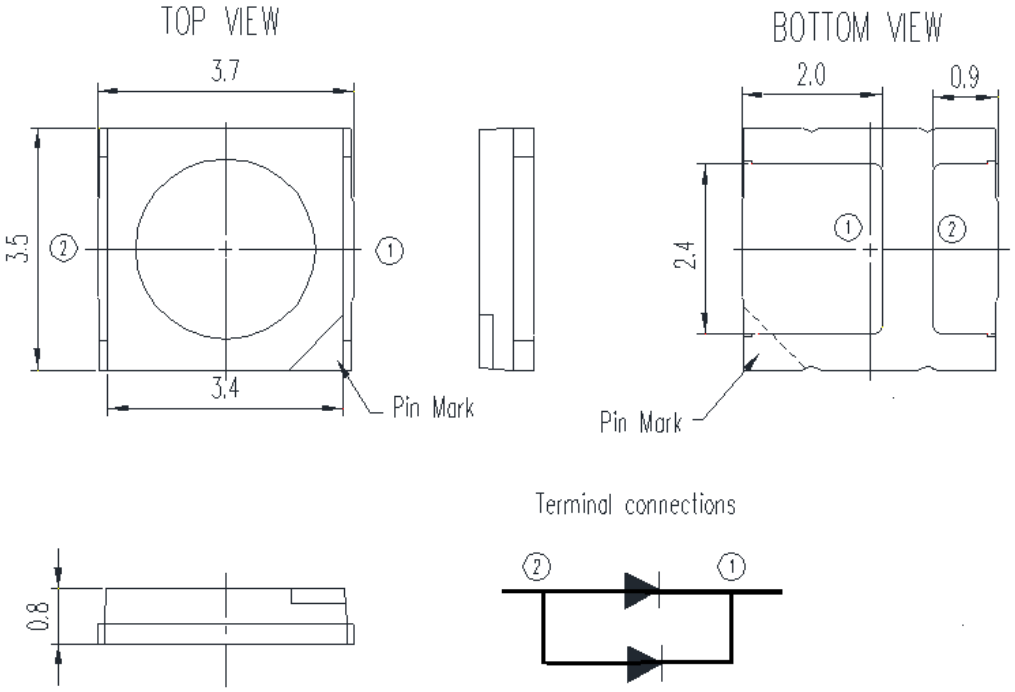
The LiteOn White LED is a revolutionary, energy efficient and ultra-compact new light source, combining the lifetime and reliability advantages of Light Emitting Diodes with the brightness of conventional lighting. It gives you total design freedom and unmatched brightness, creating a new opportunities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

1.1 Features

- Meet RoHS and HF
- Highest brightness SMD LED
- Qualification refer to AEC-Q102 Rev D
- Package in 12mm tape on 7" diameter reels.
- Improve corrosion robustness.
- I.C. compatible
- Compatible with automatic placement equipment
- Compatible with infrared reflow solder process

1.2 Applications

- Automotive: accessary applications



Part No.	Lens Color	Source Color
LTPA-P35PUCBPPAA	Amber / Water	InGaN White

Notes:

1. All dimensions are in millimeters and dimension tolerances are ±0.2mm
2. Dimensions without tolerances are for reference only.

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2. Rating and Characteristics

2.1 Absolute Maximum Ratings at Ta=25℃

Parameter	Symbol	Rating	Unit
Power Dissipation	P_o	1.5	W
DC Forward Current	I_F	400	mA
Junction Temperature	T_j	125	°C
Thermal Resistance, Junction-Case	Rth, J-C	20	°C / W
Operating Temperature Range	T_{opr}	-40~+110	°C
Storage Temperature Range	T_{stg}	-40~+110	°C

Notes :

1. Forbid to operating at reverse voltage condition
2. ESD spec is reference to AEC-Q101-001 HBM.
3. The unit of Rth is °C/W electrical and driving current is 350mA.
4. Thermal resistance measurement tolerance is ± 10%,and with 8x 6 cm heat sink.
5. The package LEDs are not designed to be driven in reverse bias

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2.2 Electro-Optical Characteristics

■ Typical Performance for white (Ta= 25°C)

Parameter	Symbol	Values			Unit	Test Condition
		Min	Typ.	Max		
Viewing Angle	$2\theta_{1/2}$	--	120	--	deg	I_F = 350mA
Forward Voltage	V_F	2.8	--	3.6	V	
Luminous Flux	ΦV	50	--	105	lm	
Reverse Current	IR	--	--	10	uA	VR=5V Note 6
Chromaticity Coordinates	CCx	--	0.5843	--	--	
	CCy	--	0.4151	--	--	

Notes

1. All of the VF value are typical and the real bin range please refer ”VF Binning Parameter”.
2. All of the Flux value are typical and the real Bin range please refer ”Flux Binning Parameter”.
3. Tolerance of Flux is ±10%, Tolerance of VF is ±5%, tolerance of CCx/CCy is ±0.01.
4. LEDs are lighted up and measured with externally parallel connecting leads of LED.
5. Typical viewing angle is 120deg.
6. Reverse voltage (VR) condition is applied to IR test only. The device is not designed for reverse operation.

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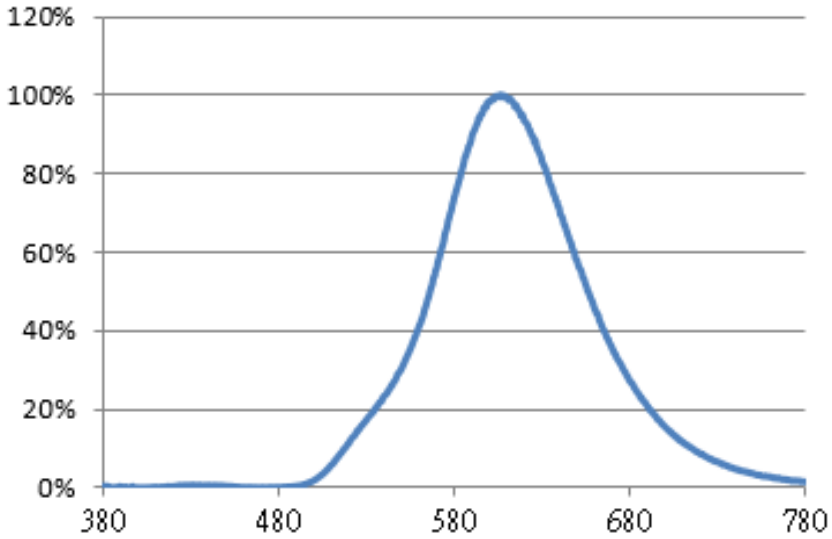
3. Typical Electrical/Optical Characteristics Curve

■ Efficiency Comparison Table

3.1 Relative Spectrum of Emission



3.2 Beam Pattern

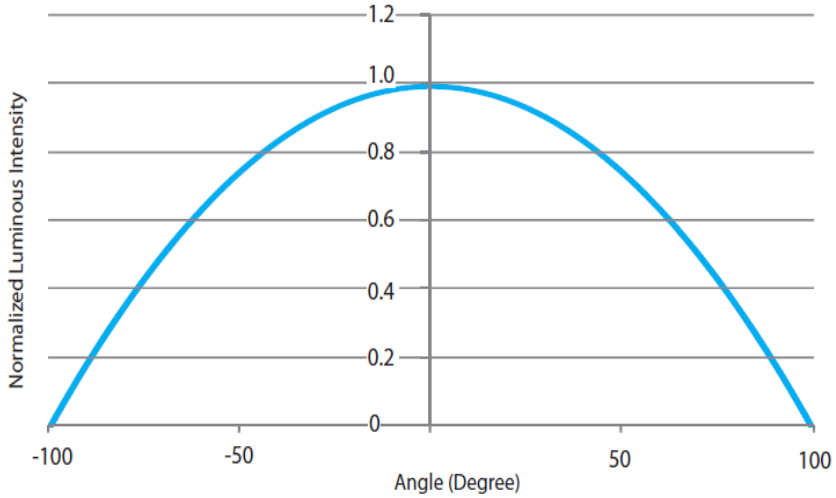


Fig 2. Emission angle

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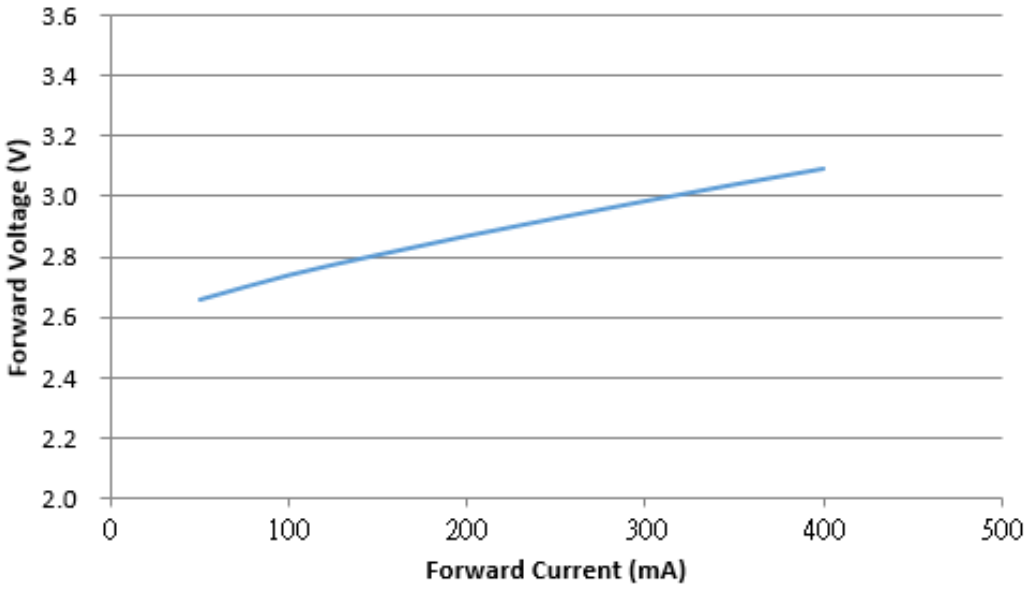
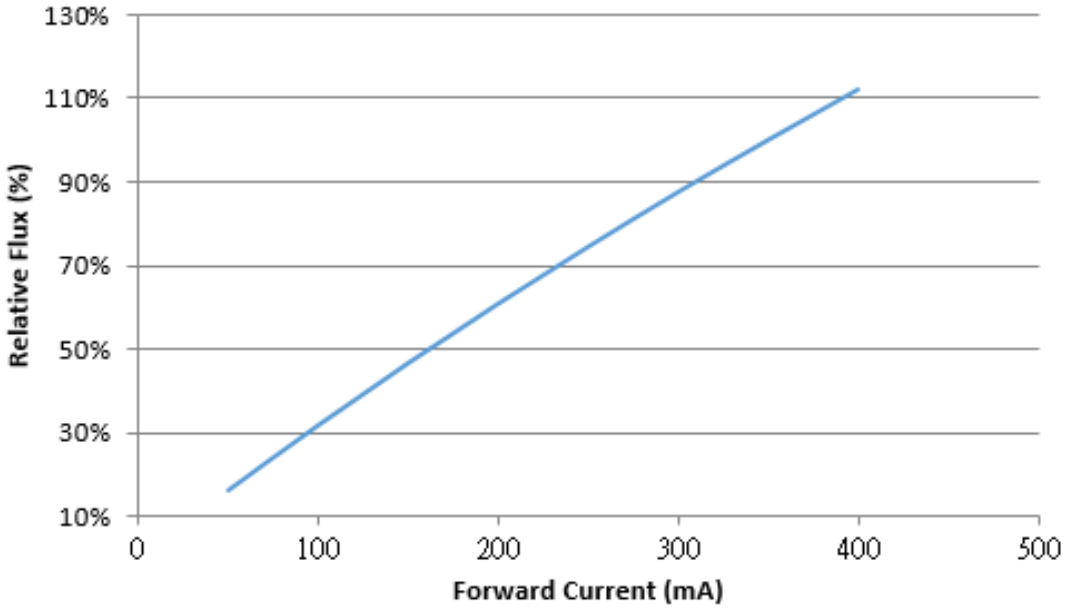
3.3 Forward Current vs. Forward Voltage at 25°C



3.4 Forward Current vs. Relative Flux at 25°C



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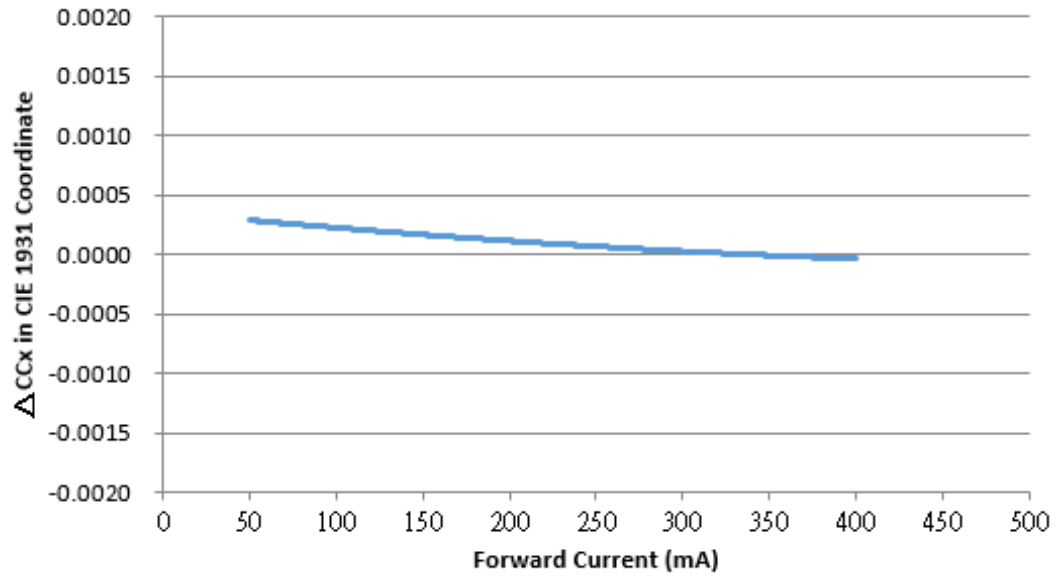
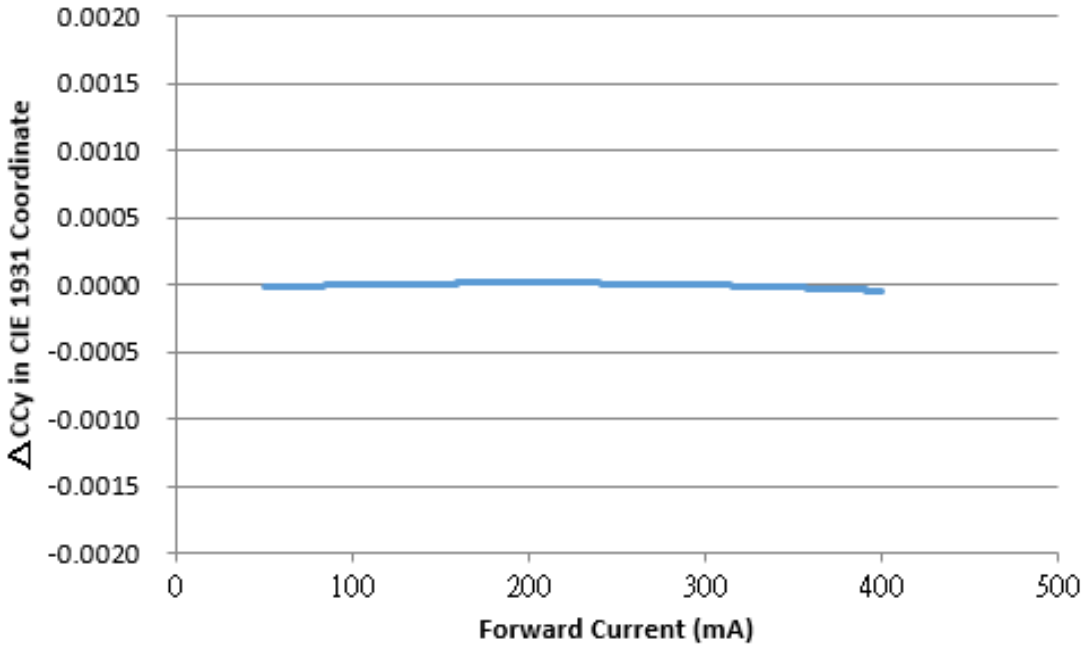
3.5 Relative CCx v.s. Forward Current at 25°C



3.6 Relative CCy v.s. Forward Current at 25°C



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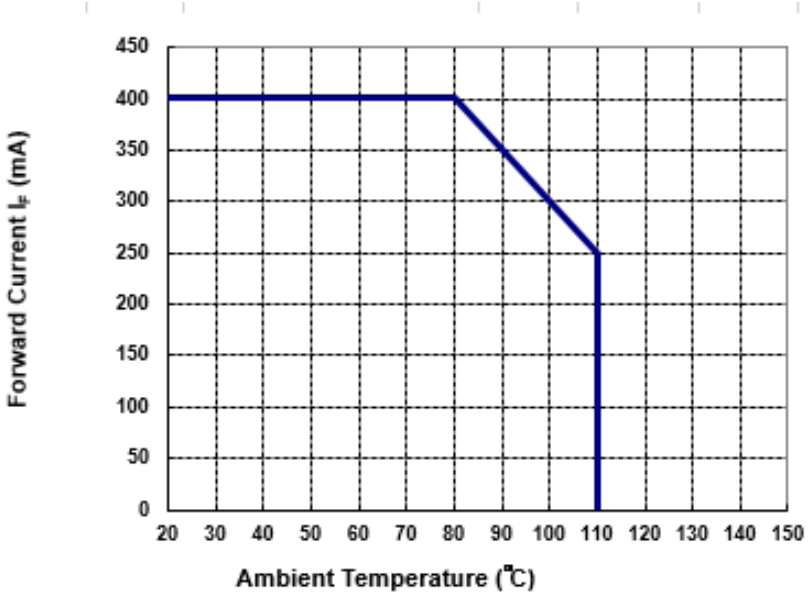
3.7 Forward Current Derating Curve vs. Ambient Temperature



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4. VF Bin Definition

4.1 Forward Voltage Binning Parameter at Ta = 25°C

Parameter	Bin	Symbol	Min	Max	Unit	Condition
Forward Voltage	C	VF	2.8	3.0	V	I_F = 350mA
	D		3.0	3.2		
	E		3.2	3.4		
	F		3.4	3.6		

Tolerance on each Forward Voltage bin is ±5%

5. Flux Bin Definition

5.1 Luminous Flux Binning Parameter at Ta = 25°C

Parameter	Bin	Symbol	Min	Max	Unit	condition
Luminous Flux	R7	ΦV	50	65	lm	I_F = 350mA
	R8		65	80		
	R9		80	90		
	S0		90	105		

Tolerance on each Luminous Flux bin is ±10%

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6. Hue Bin Definition

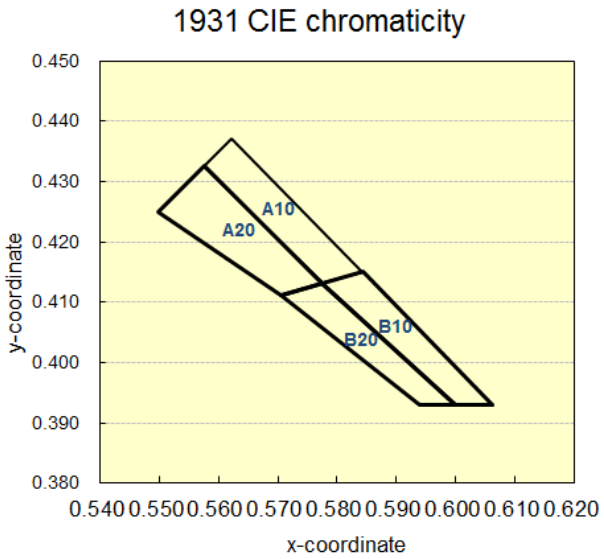
6.1 Chromaticity Coordinate Groups at Ta=25°C

6.1.1 Cool White hue point (CW series)

Color bin limits at IF=350mA					
Bin Code	CIE 1931 Chromaticity coordinates				
A10	x	0.545	0.561	0.610	0.597
	y	0.425	0.441	0.390	0.390
A20	x	0.5775	0.5843	0.5622	0.5576
	y	0.4132	0.4151	0.4372	0.4326
B10	x	0.5705	0.5775	0.5576	0.5499
	y	0.4111	0.4132	0.4326	0.4249
B20	x	0.5775	0.5843	0.6062	0.6000
	y	0.4132	0.4151	0.3930	0.3930

Tolerance of each hue bin is ±0.01

6.1.2 Cool white hue range



Notes

1. The (CCx, CCy) center follow ANSI Quadrangle
2. Tolerance of CCx/CCy is ±0.01

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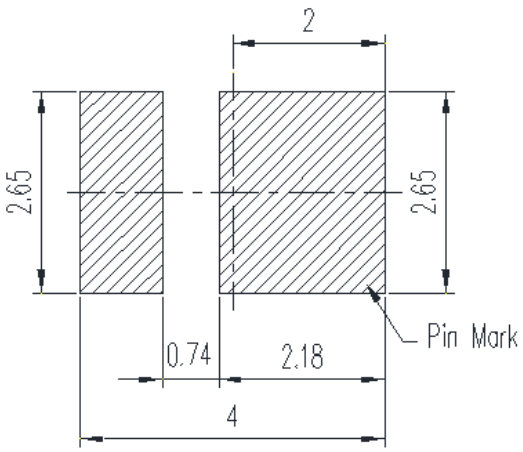
7. Recommend Soldering Pad Layout



Notes:

1. Suggest stencil thickness is maximum 0.10mm

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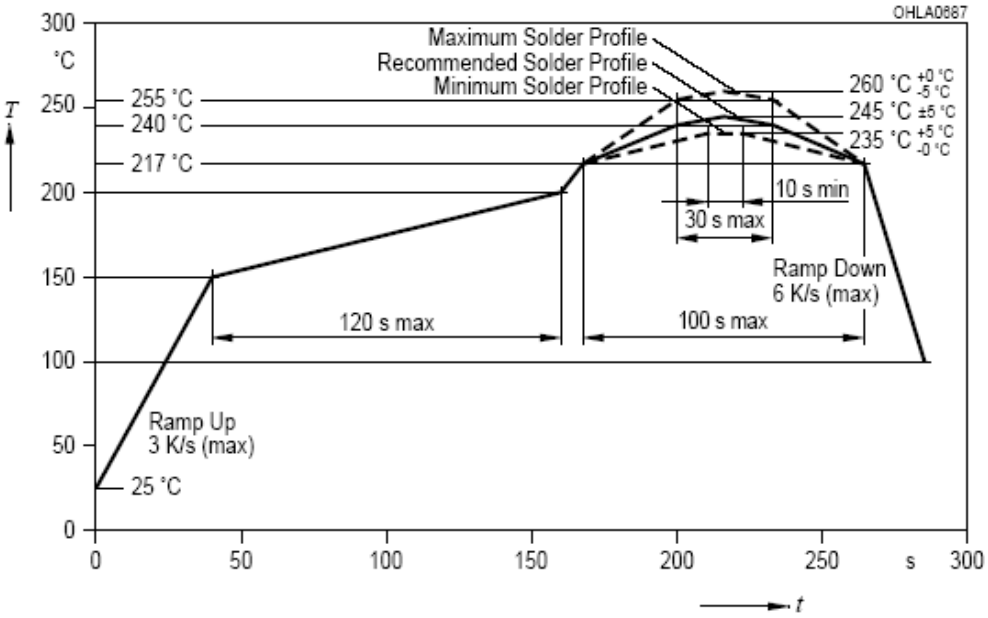
8. Reflow Soldering Characteristics



Notes

1. The LEDs can be soldered using the reflow soldering or hand soldering method. The recommended hand soldering condition is 350°C max. and 2secs max. for one time only, and the recommended reflow soldering condition is 260°C max. and 5secs max. for three times max.
2. All temperatures refer to topside of the package, measured on the package body surface.
3. The soldering profile could be further referred to different soldering grease material characteristic. The grease vendor will provide this information.
4. A rapid-rate process is not recommended for the LEDs cooling down from the peak temperature.
5. Although the recommended reflow conditions are specified above, the reflow or hand soldering condition at the lowest possible temperature is desirable for the LEDs.
6. LiteOn cannot make a guarantee on the LEDs which have been already assembled using the dip soldering Method

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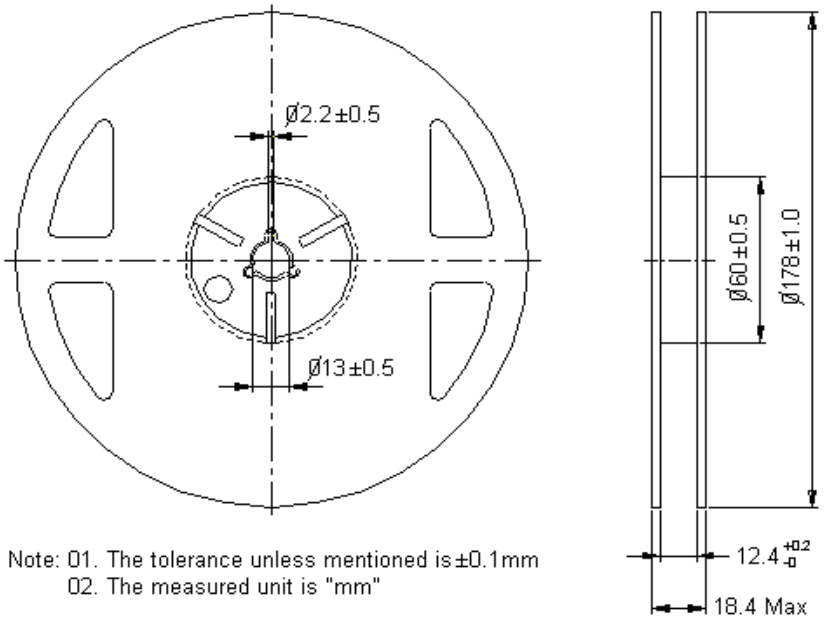
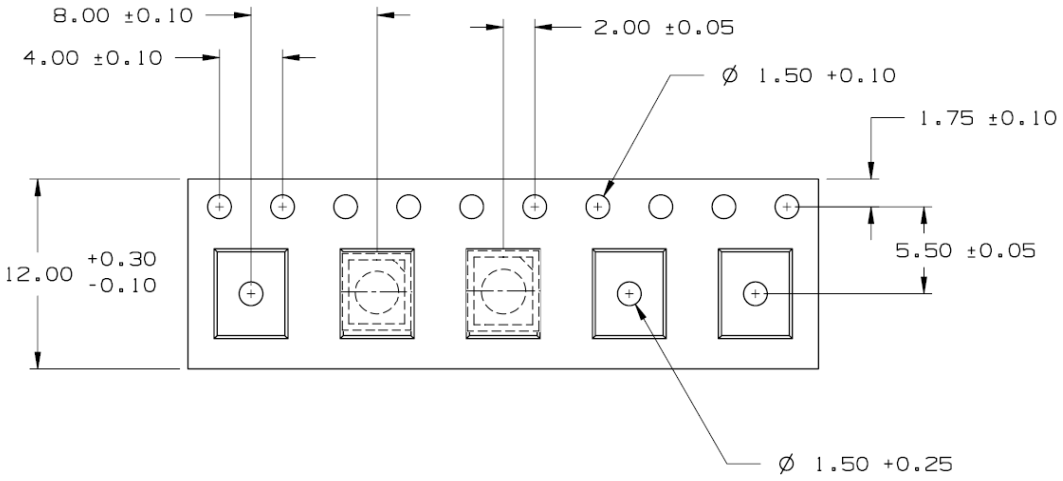
9. Package Dimensions of Tape and Reel

Reel Packaging



Note: 01. The tolerance unless mentioned is ±0.1mm
02. The measured unit is "mm"



Note:

1. All dimensions are in millimeters.
2. Empty component pockets sealed with top cover tape.
3. 7 inch reel max 1k pieces.
4. The maximum number of consecutive missing is two.
5. In accordance with ANSI/EIA 481 specifications.

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10. Reliability Test

No	Test item	Test Condition	Duration	Number of Damaged
1	Pre-conditional	MSL 2a 125℃, 24hrs baking Moisture Soak 60℃/60% 168hrs Interval: 15mins~4hours to do IR-Reflow	Before and after	Qualification parts before Test # 2, 3, 4, 5, 6, 7
5b	High Temperature Forward Bias (HTFB)	IF=400mA, Ta=80℃.	1000 hrs	0/26
5b+	High Temperature Forward Bias (HTFB)	Ta=110℃., IF=250mA	1000 hrs	0/26
6a	Wet High Temperature Operating Life (WHTOL)	Ta = 85 ± 2°C, 85 ± 5% RH IF:400mA. Operated with power cycle 30 min on / 30 min off for power > 200mW, others are DC drove.	500 hrs	0/26
7	Temperature Cycling (TC)	-40°C(+0, -10) to 125°C (+15,-0) 15 min 15 min 15 min	1000 hrs	0/26
8	Power and Temperature Cycling (PTC)	-40°C (+0, -10) to 125°C (+15,-0) 10 min 30 min 10 min IF:100mA. Operated with power cycle 5 min. on / 5 min. off 1000 temperature cycles	500 cycle	0/26
18a	Resistance to Solder Heat (RSH-reflow)	SMD: The moisture sensitivity level of products ≧2a, and refers Data Sheet & IPC/JEDEC J-STD-020. For example: Level 2 ➔TEST (1) Bake 125℃ / 24 hours (2) Acceleration moisture soak condition (if urgent): 85°C / 60% / 168 hours (Interval: 15mins ~ 4 hours to do IR-Reflow)➔TEST (3) IR Reflow 3 times (260℃: 10 secs, Interval: 5 mins ~ 60 mins for each reflow)➔TEST	Before and after	0/10
19	Solderability (SD)	Tsld=235°C, 5 secs	Before and after	0/10

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20	Pulsed Operating Life (PLT)	Ta=55℃ Operated with pulse with 100μs on 500mA and duty cycle 3%; 3233μs off and duty cycle 97%; 1000 hrs	1000 hrs	0/26
21	Dew (DEW)	65℃(4 hrs) + 65℃→30℃(3 hrs) + 30℃→65℃ (3hrs)	1008 cycles	0/26

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11. Cautions

11.1 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).

11.2 Storage

- This product is qualified as Moisture sensitive Level 3 per JEDEC J-STD-020 Precaution when handing this moisture sensitive product is important to ensure the reliability of the product.
- The package is sealed:
  The LEDs should be stored at 30℃ 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 storage ambient for the LEDs should not exceed 30°C temperature or 60% relative humidity. It is recommended that LEDs out of their original packaging are IR-reflowed within one week.
  For extended storage out of their original packaging, it is recommended that the LEDs be stored in a sealed container with appropriate desiccant, or in a desiccators with nitrogen ambient.
  LEDs stored out of their original packaging for more than one year should be baked at about 60 deg C for at least 20 hours before solder assembly.

11.3 Cleaning

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

11.4 Soldering

Recommended soldering conditions:

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

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 page3 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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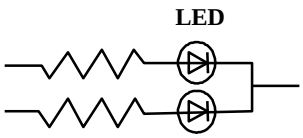
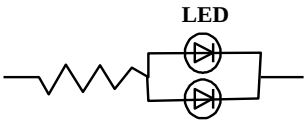
11.5 Drive Method

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.

11.6 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.

ESD-damaged LEDs will exhibit abnormal characteristics such as high reverse leakage current, low forward voltage, or " no lightup " at low currents.
To verify for ESD damage, check for " lightup " and Vf of the suspect LEDs at low currents.
The Vf of " good " LEDs should be >1.4V@0.1mA for AlInGaP product.

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12. Others

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

13. 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?