



**SMD LED**  
**Product Data Sheet**  
LTST-020VFL

Spec No. :DS22-2008-0182  
Effective Date: 06/10/2023  
Revision: B

**LITE-ON DCC**

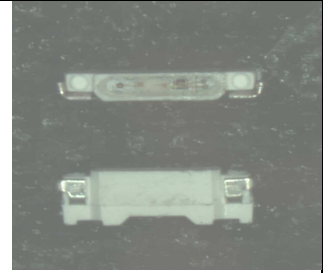
**RELEASE**

**BNS-OD-FC001/A4**

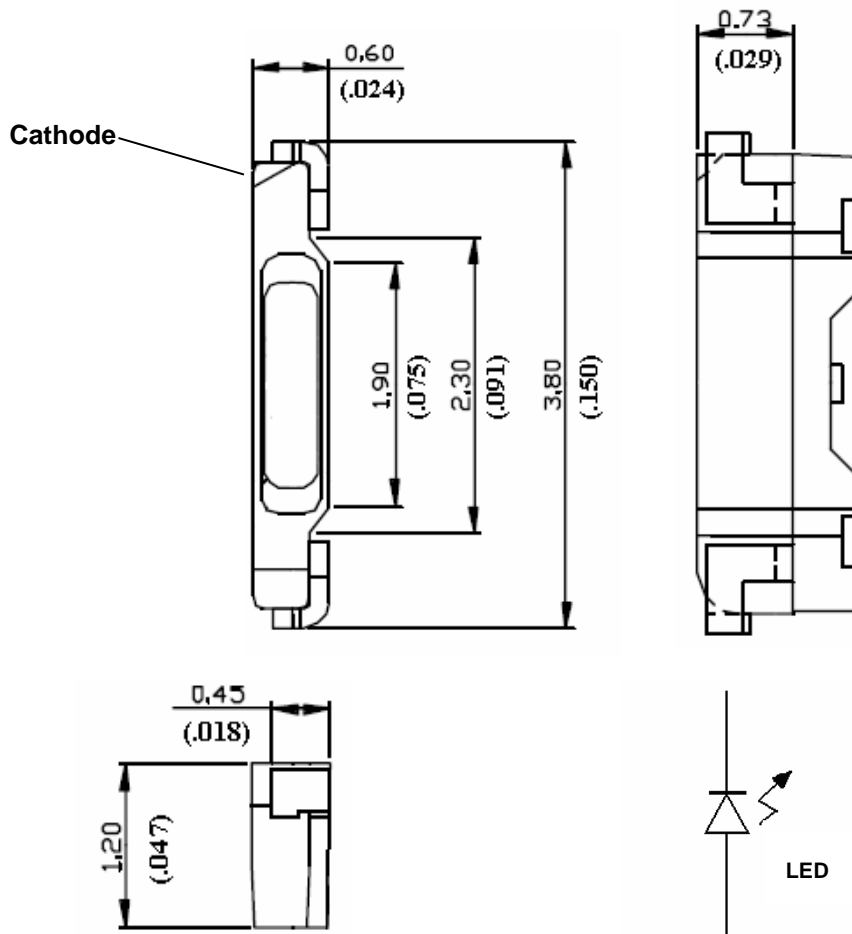
**Property of Lite-On Only**

**Features**

- \* Package in 8mm tape on 7" diameter reels.
- \* Compatible with automatic placement equipment.
- \* Compatible with infrared and vapor phase reflow solder process.
- \* EIA STD package.
- \* I.C. compatible.
- \* Meet green product and Pb-free(According to RoHS)



**Package Dimensions**



Part No.	Lens Color	Source Color
LTST-020VFL	Water Clear	AlInGaP Orange

**Notes:**

1. All dimensions are in millimeters (inches).
2. Tolerance is  $\pm 0.1$  mm (.004") unless otherwise noted.

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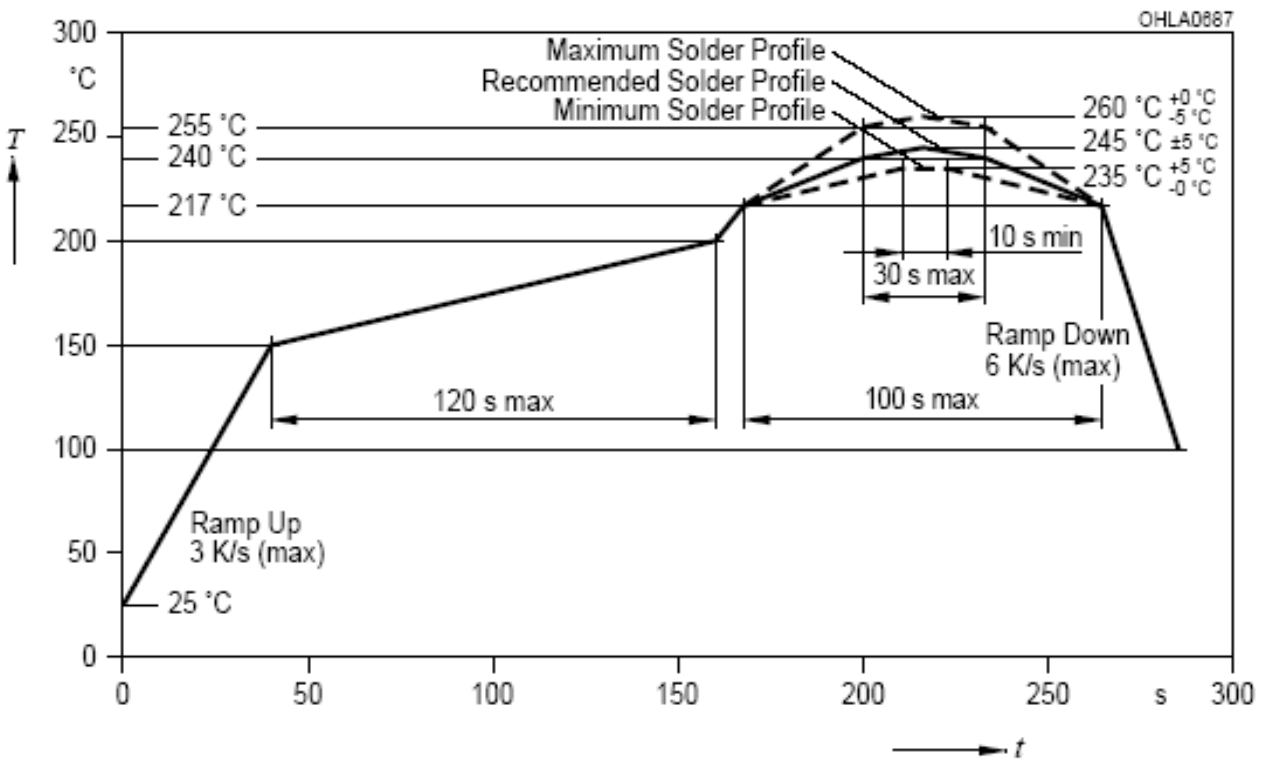
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**Absolute Maximum Ratings at Ta=25°C**

Parameter	LTST-020VFL	Unit
Power Dissipation	75	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	80	mA
DC Forward Current	30	mA
Derating Linear From 35°C	0.46	mA/°C
Reverse Voltage	5	V
Operating Temperature Range	-40°C to +85°C	
Storage Temperature Range	-40°C to +100°C	

Suggest IR Reflow Condition :

**R-Reflow Soldering Profile for lead free soldering (Acc. to J-STD-020B)**



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## Electrical Optical Characteristics At Ta=25°C

Parameter	Symbol	Part No. LTST-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	IV	020VFL	450.0	900	1120.0	mcd	IF = 20mA Note 1
Viewing Angle	$2\theta 1/2$	020VFL		110		deg	Note 2 (Fig.6)
Peak Emission Wavelength	$\lambda P$	020VFL		611		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	$\lambda d$	020VFL		605		nm	Note 3
Spectral Line Half-Width	$\Delta\lambda$	020VFL		15		nm	
Forward Voltage	VF	020VFL	1.7		2.5	V	IF = 20mA
Reverse Current	IR	020VFL			100	$\mu A$	VR = 5V
Capacitance	C	020VFL		40		PF	VF=0, f=1MHZ

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- 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 luminous intensity.
3. The dominant wavelength,  $\lambda_d$  is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
4. Forward Voltage Tolerance is +/- 0.1 volt.

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## Bin Code List

Luminous Intensity		Unit : mcd @20mA	
Bin Code	Min.	Max.	
U1	450.0	560.0	
U2	560.0	710.0	
V1	710.0	900.0	
V2	900	1120	

Tolerance on each Intensity bin is +/-15%

Forward Voltage		Unit : V @20mA	
Bin Code	Min.	Max.	
0	1.7	1.8	
1	1.8	1.9	
2	1.9	2.0	
3	2.0	2.1	
4	2.1	2.2	
5	2.2	2.3	
6	2.3	2.4	
7	2.4	2.5	

Tolerance on each Forward Voltage bin is +/-0.10 volt

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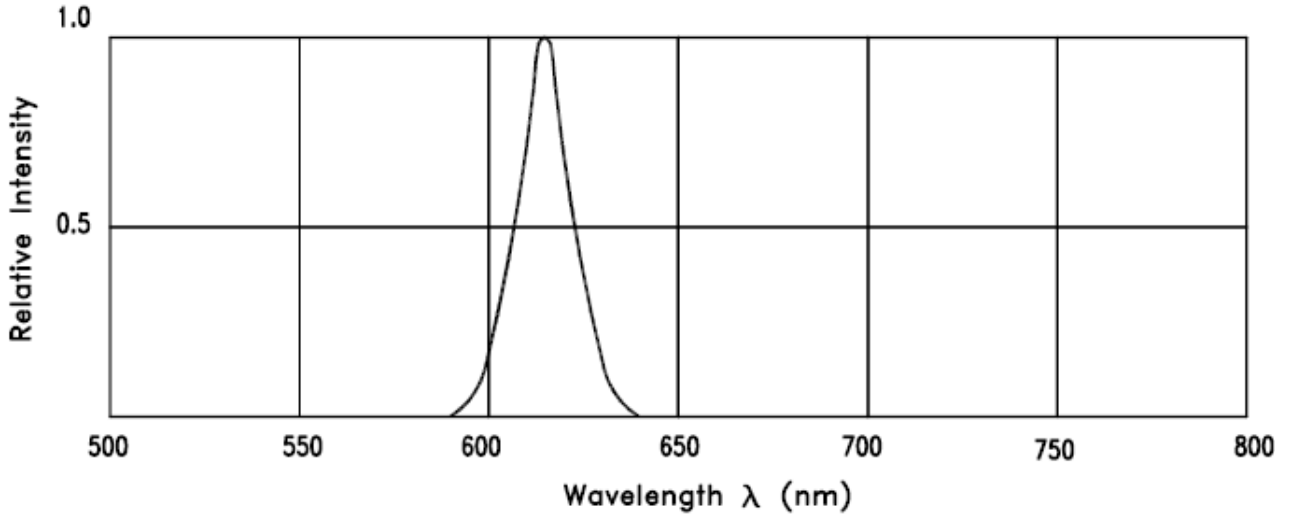
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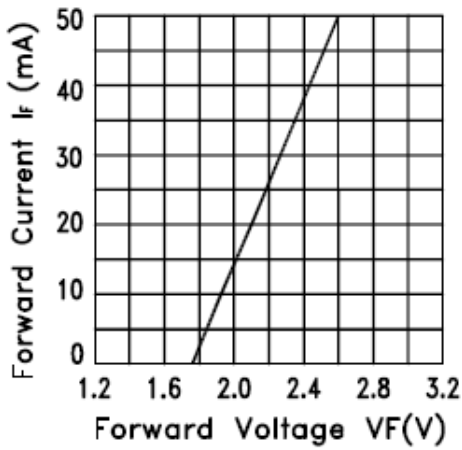
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**Typical Electrical / Optical Characteristics Curves**  
**(25°C Ambient Temperature Unless Otherwise Noted)**

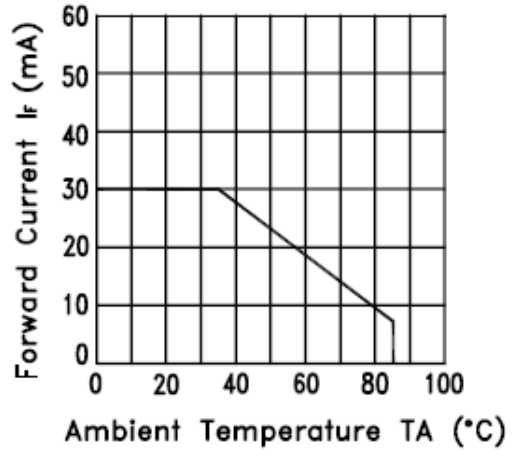
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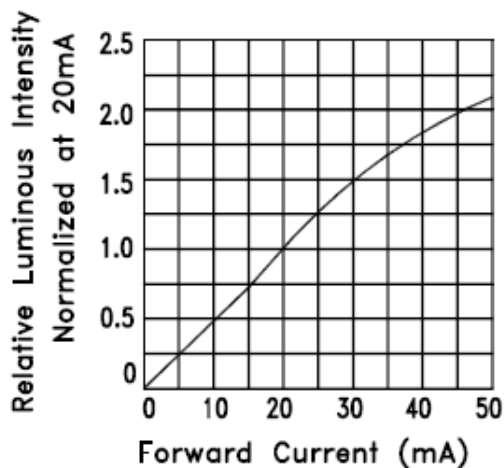
**Fig.1 RELATIVE INTENSITY VS. WAVELENGTH**



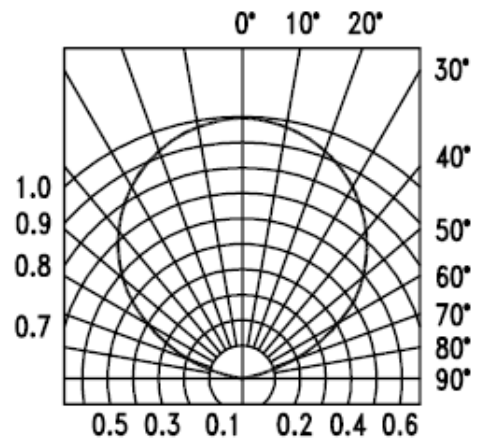
**Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE**



**Fig.3 FORWARD CURRENT DERATING CURVE**



**Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT**



**Fig.5 Spatial Distribution**



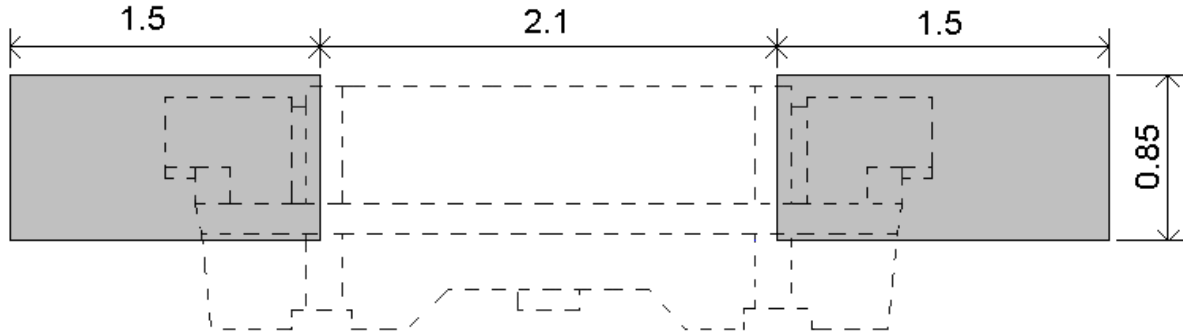
**Property of Lite-On Only**

**Cleaning**

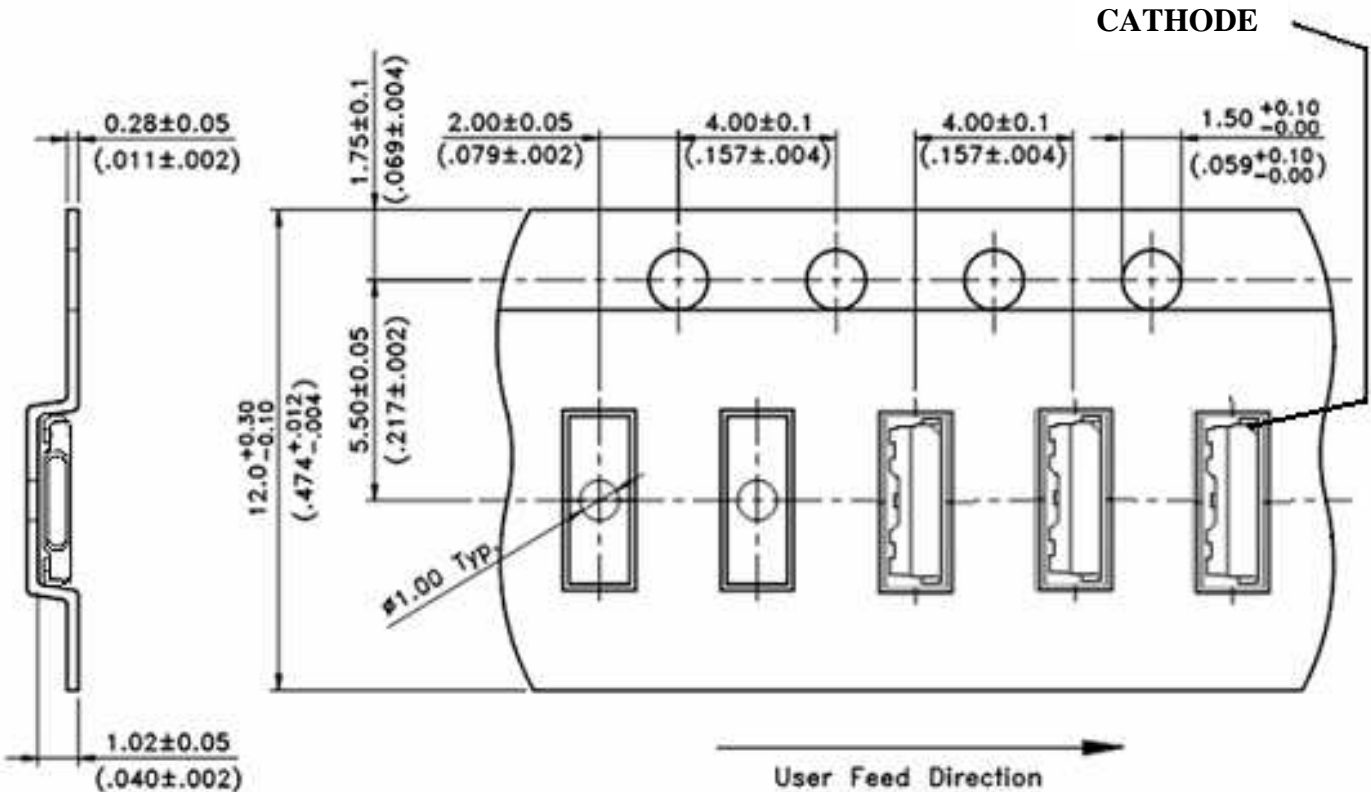
Do not use unspecified chemical liquid to clean LED they could harm the package.  
If cleaning is necessary, immerse the LED in ethyl alcohol or isopropyl alcohol at normal temperature for less one minute.

**Recommend Printed Circuit Board Attachment Pad**

Infrared / vapor phase  
Reflow Soldering

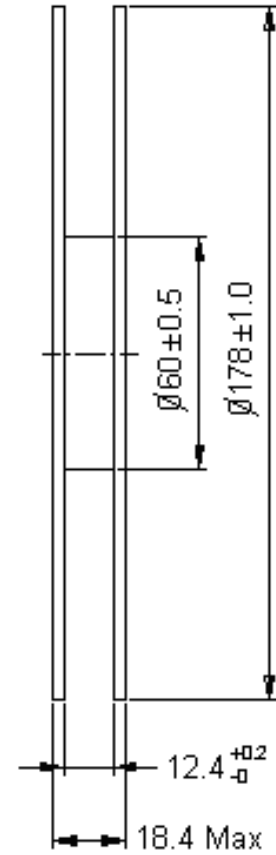
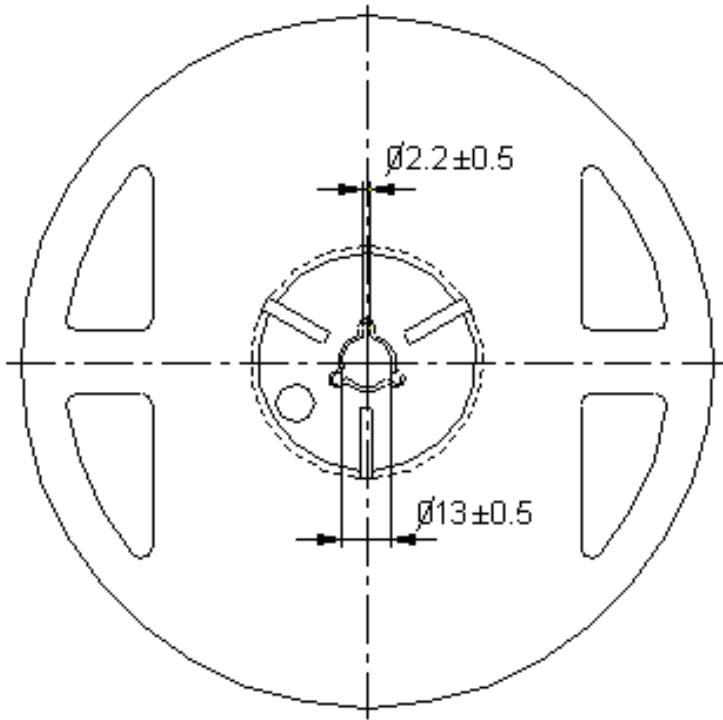


**Package Dimensions of Tape**



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**Package Dimensions of Reel**



Note: 01. The tolerance unless mentioned is  $\pm 0.1 \text{ mm}$   
 02. The measured unit is "mm"

Notes:

1. Empty component pockets sealed with top cover tape.
2. 7 inch reel-4000 pieces per reel.
3. Minimum packing quantity is 200 pieces for remainders.
4. The maximum number of consecutive missing lamps is two.
5. In accordance with EIA-481-1-B specifications.

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## CAUTIONS

**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).

**2. Storage**

This product is qualified as Moisture sensitive Level 3 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 168hrs. 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 48hrs. To seal the remainder LEDs return to package, it's recommended to be with workable desiccants in original package.

**3. Cleaning**

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

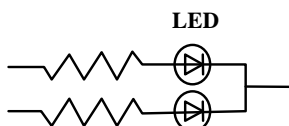
**4. Soldering**

Recommended soldering conditions:

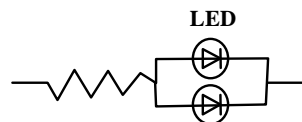
Reflow soldering		Soldering iron	
Pre-heat	120~150°C	Temperature	300°C Max.
Pre-heat time	120 sec. Max.	Soldering time	3 sec. Max.
Peak temperature	260°C Max.		(one time only)
Soldering time	30 sec. Max.		

**5. Drive Method**

An 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**

(A) Recommended circuit.

**Circuit model B**

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

**6. ESD (Electrostatic Discharge)**

Static Electricity or power surge will damage the LED.

Suggestions to prevent ESD damage:

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- 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 >2.0V@0.1mA for InGaN product and >1.4V@0.1mA for AlInGaP product.

**7. Reliability Test**

Classification	Test Item	Test Condition	Reference Standard
Endurance Test	Operation Life	Ta= Under Room Temperature As Per Data Sheet Maximum Rating *Test Time= 1000HRS (-24HRS,+72HRS)*@20mA.	MIL-STD-750D:1026 MIL-STD-883D:1005 JIS C 7021:B-1
	High Temperature High Humidity Storage	IR-Reflow In-Board, 2 Times Ta= 65±5°C,RH= 90~95% *Test Time= 240HRS±2HRS	MIL-STD-202F:103B JIS C 7021:B-11
	High Temperature Storage	Ta= 105±5°C *Test Time= 1000HRS (-24HRS,+72HRS)	MIL-STD-883D:1008 JIS C 7021:B-10
	Low Temperature Storage	Ta= -55±5°C *Test Time=1000HRS (-24HRS,+72H RS)	JIS C 7021:B-12
Environmental Test	Temperature Cycling	105°C ~ 25°C ~ -55°C ~ 25°C 30mins 5mins 30mins 5mins 10 Cycles	MIL-STD-202F:107D MIL-STD-750D:1051 MIL-STD-883D:1010 JIS C 7021:A-4
	Thermal Shock	IR-Reflow In-Board, 2 Times 85 ± 5°C ~ -30°C ± 5°C 10mins 10mins 100 Cycles	MIL-STD-202F:107D MIL-STD-750D:1051 MIL-STD-883D:1011
	IR-Reflow	Ramp-up rate(217°C to Peak) +3°C/ second max Temp. maintain at 175(±25)°C 180 seconds max Temp. maintain above 217°C 60-150 seconds Peak temperature range 260°C +0/-5°C Time within 5°C of actual Peak Temperature (tp) 20-40 seconds Ramp-down rate +6°C/second max	MIL-STD-750D:2031.2 J-STD-020B
	Solderability	T.sol= 235 ± 5°C Immersion time 2±0.5 sec Immersion rate 25±2.5 mm/sec Immersion rate 25±2.5 mm/sec Coverage ≥95% of the dipped surface	MIL-STD-202F:208D MIL-STD-750D:2026 MIL-STD-883D:2003 IEC 68 Part 2-20 JIS C 7021:A-2

**8. Others**

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

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**9. Quality Guarantee**

LiteOn guarantee DPPM level of function failure is smaller and equal to 50 DPPM.

(Based on 100k usage)

**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 &amp; 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 wear 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 Blue 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 recycle?

## 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?

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