



CSP LED

CSP Product Data Sheet

LTPL-A138DWAHS-GL2

Created Date: 12 / 21 / 2022
Revision: 2.0



CSP LTPL-A138DWAHS-GL2

ECN list for datasheet

| Rev. | Effective Date | Description | Issue By |
|------|----------------|--|------------|
| 1.0 | 10/07/2022 | NEW SPEC | Samson Lin |
| 2.0 | 12/21/2022 | Add ESD/ VF@10uA@0.1mA spec. Modify IR spec/ Reliability test item | Samson Lin |

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1. Description

LITEON FLASH is a compact power LED light source specifically designed to provide greater amounts of light where needed, enabling higher resolution pictures to be taken in lower level ambient light environments at greater distances..

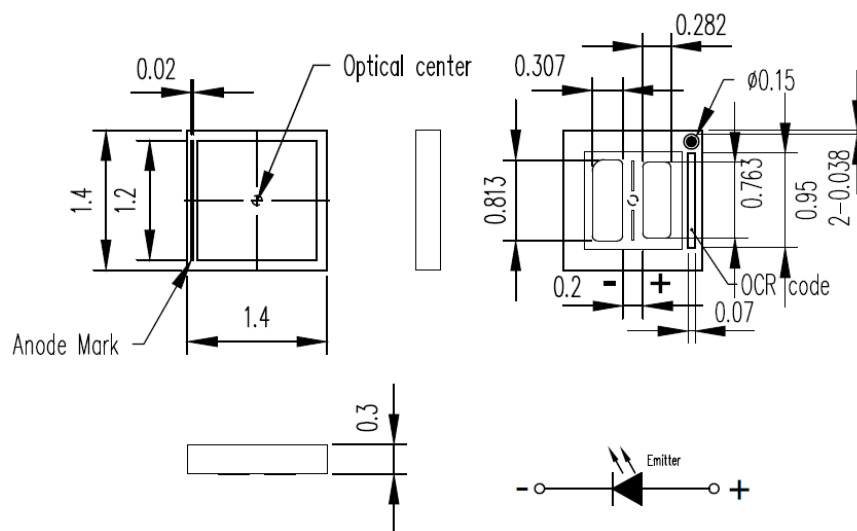
1.1 Features

- Smallest and highest flux density chip scale package
- Direct attach – Flip Chip type
- High efficacy and flux at high current density
- Better thermal conduction

1.2 Applications

- Camera phones
- Handhelds
- Digital still cameras

2. Package Dimensions



| Part No. | Lens Color | Emitted Color |
|--------------------|--------------|---------------|
| LTPL-A138DWAHS-GL2 | Orange/White | InGaN White |

Notes :

1. All dimensions are in millimeters and dimension tolerances are $\pm 0.05\text{mm}$.
2. Dimensions without tolerances are for reference only.

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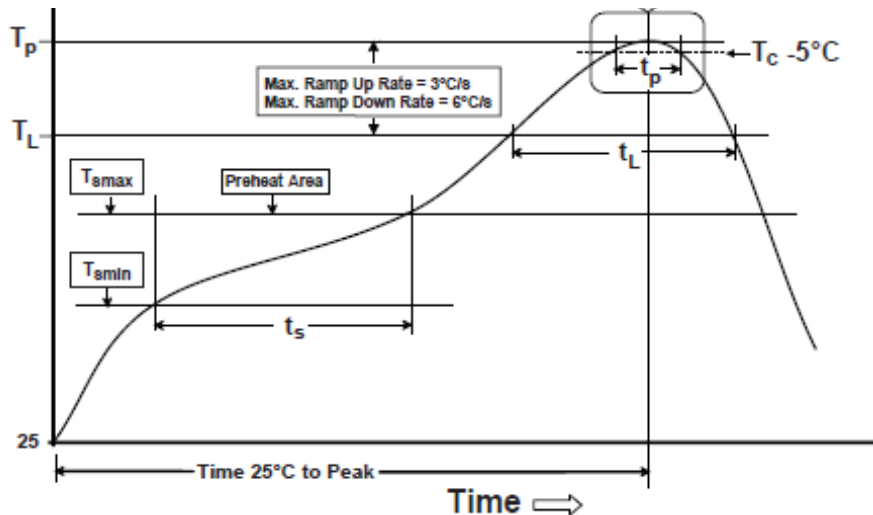
3. Rating and Characteristics

3.1 Absolute Maximum Ratings at Ta=25°C

| Parameter | LTPL-A138DWAHS-GL2 | Unit |
|--|--------------------|------|
| Power Dissipation(Pulse Mode) | 5.7 | W |
| Pulsed Forward Current (400ms:ON → 3600ms: OFF → D=0.1) | 1500 | mA |
| DC Forward Current | 500 | mA |
| Junction Temperature | 150 | °C |
| Electrostatic Discharge Threshold (HBM) | 2000 | V |
| Operating Temperature Range | -40 °C to + 85 °C | |
| Storage Temperature Range | -40 °C to + 100 °C | |

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3.2 Suggest IR Reflow Condition For Pb Free Process:



| 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 – 150 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 | 8 minutes max |

Notes:

1. All temperatures refer to topside of the package, measured on the package body surface.
2. The soldering condition referring to J-STD-020D.
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.
7. When flux is used, it should be a halogen and Pb free flux. Ensure that the manufacturing process is not designed in a manner where the flux will come in contact with the LEDs.
8. Make sure that there are no issues with the type and amount of solder that is being used.

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3.3 Electrical / Optical Characteristics at Ta=25°C

| Parameter | Symbol | LTPL-A138DWAHS-GL2 | | | Unit | Test Condition |
|------------------------------------|-----------------|--------------------|------|------|---------------|--------------------------|
| | | MIN. | TYP. | MAX. | | |
| Luminous Flux | Φ_V | 215 | 240 | 275 | lm | $I_{FP} = 1200\text{mA}$ |
| Viewing Angle | $2\theta_{1/2}$ | | 117 | | Deg | Fig.2 |
| Color Temperature | CCT | 3703 | -- | 4258 | K | $I_{FP} = 1200\text{mA}$ |
| Color Rendering index | CRI | 90 | -- | -- | | $I_{FP} = 1200\text{mA}$ |
| Forward Voltage | VF | 2.9 | 3.3 | 3.6 | V | $I_{FP} = 1200\text{mA}$ |
| | | 2.0 | | | | $I_{FP} = 0.1\text{mA}$ |
| | | 1.8 | | | | $I_{FP} = 10\mu\text{A}$ |
| Forward Voltage (For reference) | VF | 2.6 | 2.7 | 2.8 | V | $I_{FP} = 125\text{mA}$ |
| Reverse Current | IR | | | 10 | μA | VR = 5V Note 4 |

NOTE:

1. Luminous flux measurement tolerance: $\pm 10\%$
2. Forward voltage measurement tolerance: $\pm 0.1\text{V}$
3. Electric and optical data is tested at 300ms pulse condition.
4. Reverse voltage(VR) condition is applied to IR test only. The device is not designed for reverse operation.
5. Electric and optical data are reference only.

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4. Color Bin Rank

| Color Ranks Table | | | | | | | | | | | |
|-------------------|-----------------------|--------|--------|--------|--------|-------|-----------------------|--------|--------|--------|--------|
| Ranks | Color bin limits | | | | | Ranks | Color bin limits | | | | |
| | $I_F = 1200\text{mA}$ | | | | | | $I_F = 1200\text{mA}$ | | | | |
| A1 | x | 0.3741 | 0.3830 | 0.3803 | 0.3720 | B3 | x | 0.3777 | 0.3857 | 0.3826 | 0.3751 |
| | y | 0.3878 | 0.3934 | 0.3832 | 0.3781 | | y | 0.3730 | 0.3780 | 0.3674 | 0.3628 |
| A2 | x | 0.3720 | 0.3803 | 0.3777 | 0.3698 | C1 | x | 0.3920 | 0.4013 | 0.3974 | 0.3889 |
| | y | 0.3781 | 0.3832 | 0.3730 | 0.3681 | | y | 0.3991 | 0.4052 | 0.3937 | 0.3886 |
| A3 | x | 0.3698 | 0.3777 | 0.3751 | 0.3676 | C2 | x | 0.3889 | 0.3974 | 0.3939 | 0.3857 |
| | y | 0.3681 | 0.3730 | 0.3628 | 0.3582 | | y | 0.3886 | 0.3937 | 0.3829 | 0.3780 |
| B1 | x | 0.3830 | 0.3920 | 0.3889 | 0.3803 | C3 | x | 0.3857 | 0.3939 | 0.3904 | 0.3826 |
| | y | 0.3934 | 0.3991 | 0.3886 | 0.3832 | | y | 0.3780 | 0.3829 | 0.3720 | 0.3674 |
| B2 | x | 0.3803 | 0.3889 | 0.3857 | 0.3777 | | | | | | |
| | y | 0.3832 | 0.3886 | 0.3780 | 0.3730 | | | | | | |

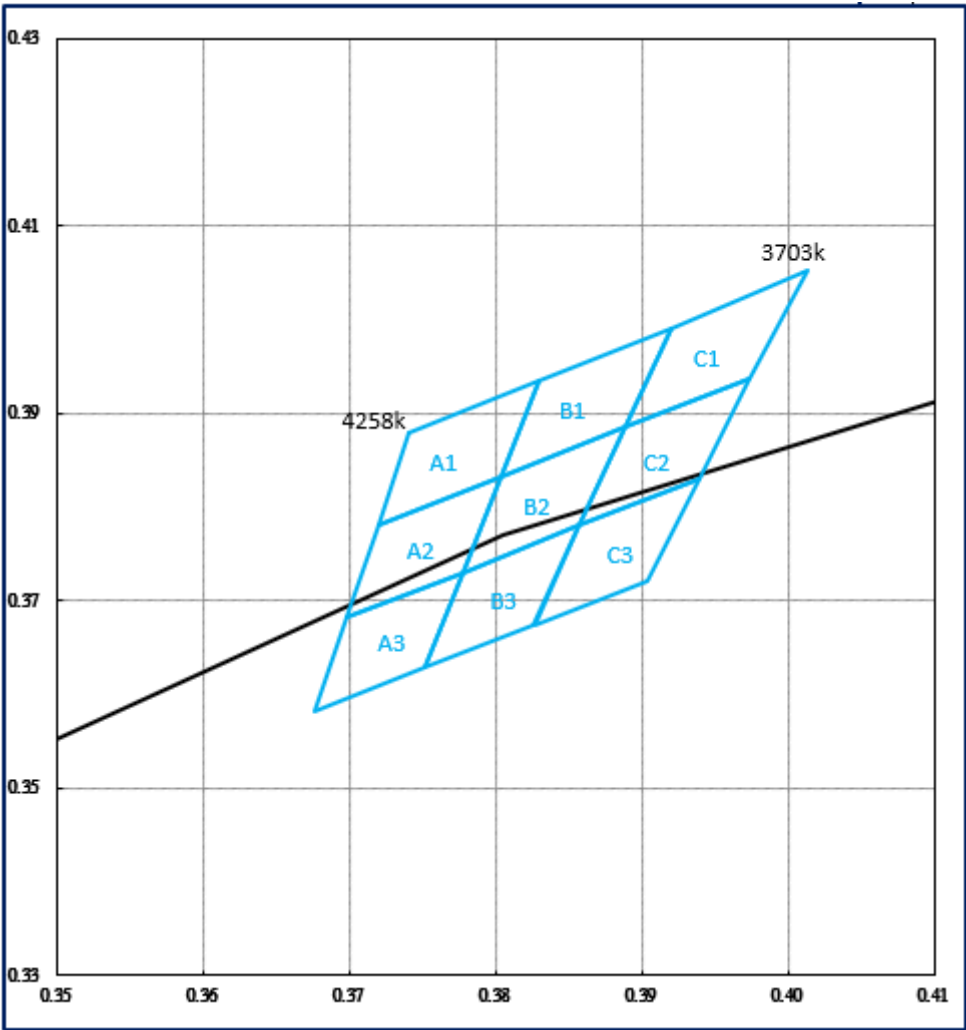
Notes:

1. The value is all dies operated performance.
2. The chromaticity coordinates (x, y) is derived from the CIE 1931 chromaticity diagram.
3. IS CAS140B is for the luminous flux (lm) and the CIE1931 chromaticity coordinates (x, y) testing. The chromaticity coordinates (x, y) guarantee should be added ± 0.01 tolerance.



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Category Code Table



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5. Typical Electrical / Optical Characteristics Curves.

(25°C Ambient Temperature Unless Otherwise Noted)

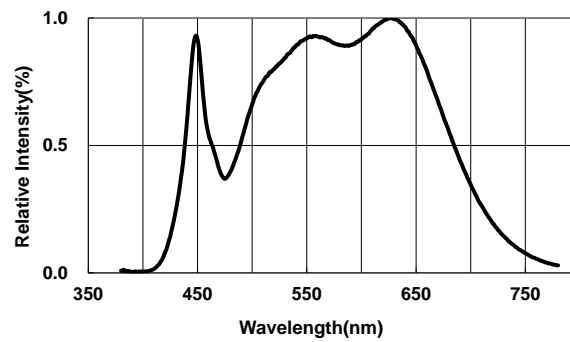


Fig 1. Relative Spectrum of Emission

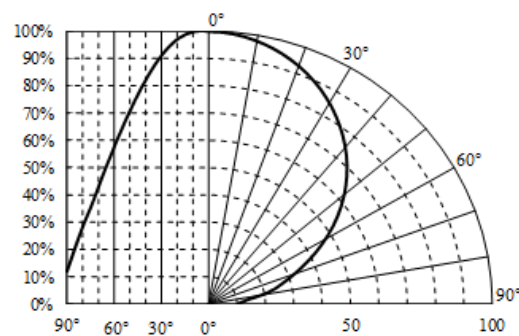


Fig 2. Radiation Characteristics

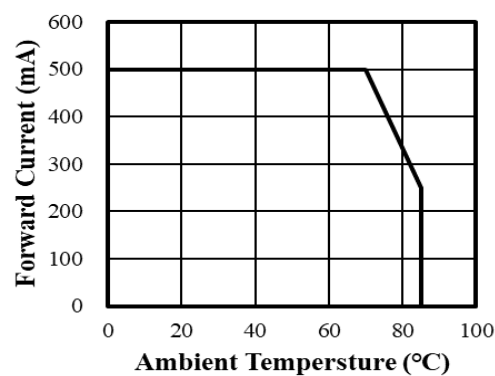


Fig 3. Forward Current Derating Curve

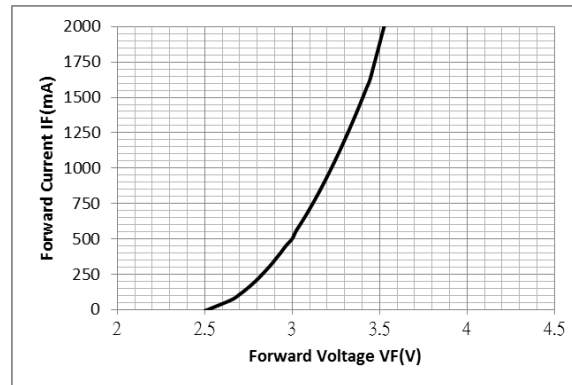
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Fig 4. Forward Current

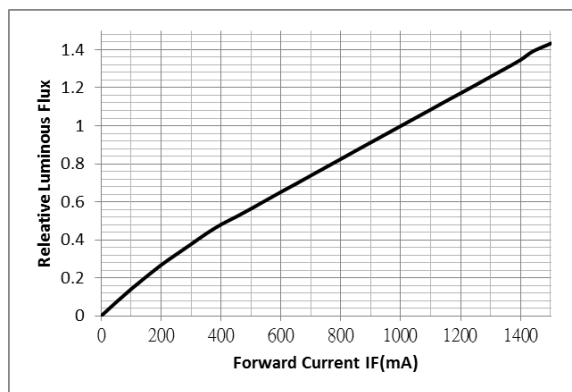


Fig 5. Relative Luminous Flux

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

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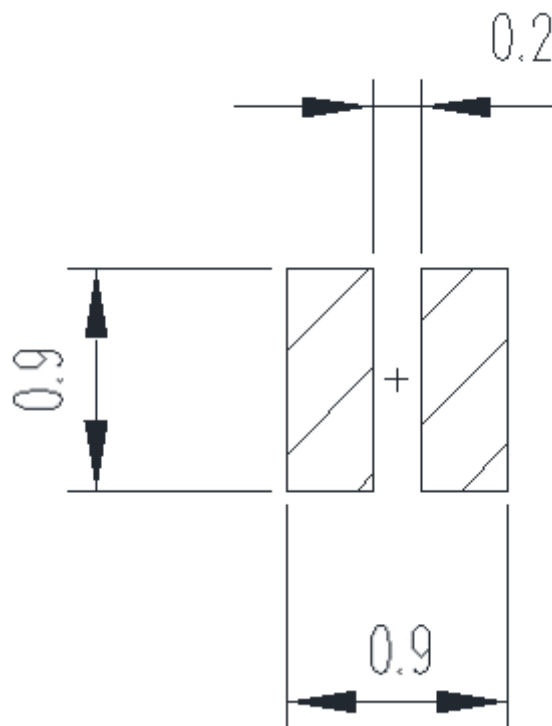
6. User Guide

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

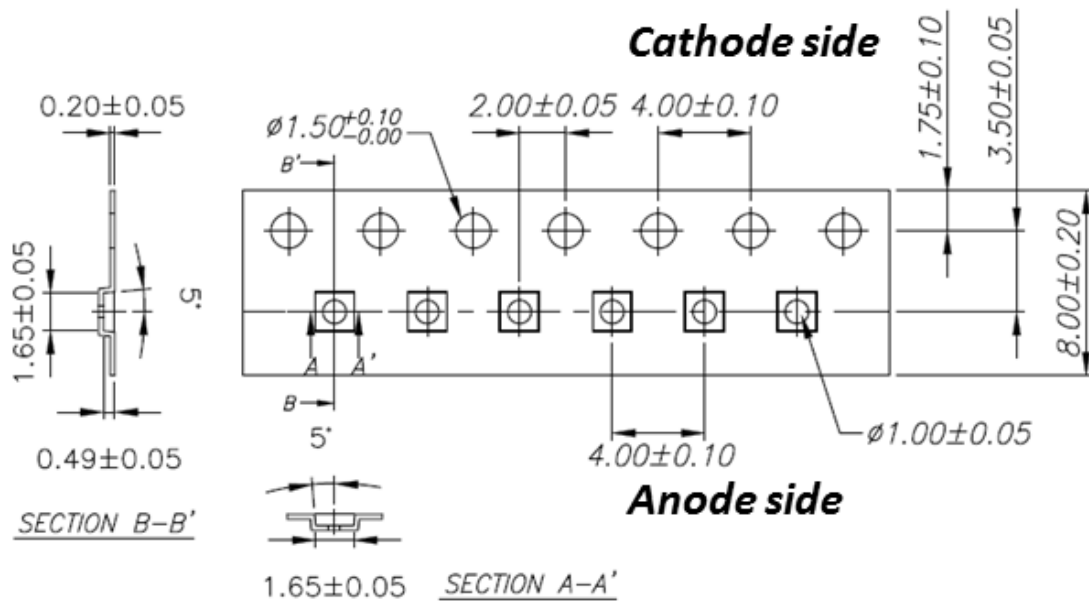


Notes:

1. Suggest stencil thickness is maximum 0.10mm.

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6.3 Package Dimensions Of Tape And Reel

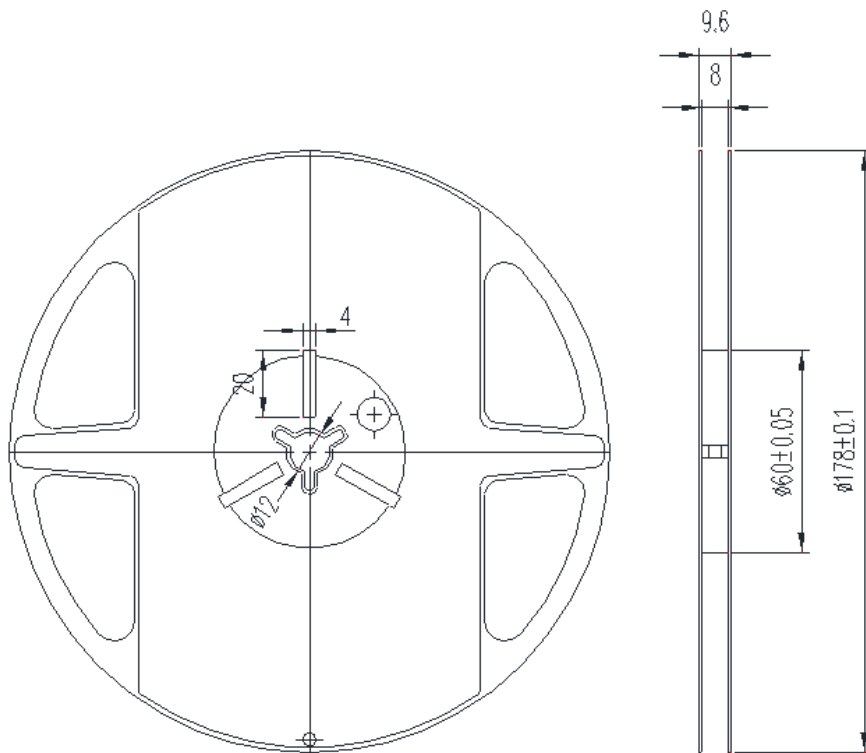


Note:

1. Drawings not to scale.
2. All dimensions are in millimeters.
3. All dimensions without tolerances are for reference only.

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6.4 Package Dimensions of Reel



Notes:

1. Drawings not to scale.
2. All dimensions are in millimeters.
3. All dimensions without tolerances are for reference only.
4. Minimum package quantity is 500 pieces for remainders.
5. 7 inch reel-6000 pieces.
6. Empty component pockets sealed with top cover tape.
7. The maximum number of consecutive missing lamps is two
8. 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 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.

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. |
| Peak temperature | 260°C Max. | | (one time only) |
| 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.

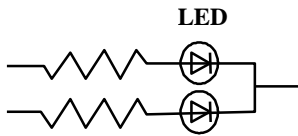
LITE-ON Runs both component-level verification using in-house **KYRAMX98** reflow chambers and board-level assembly. The results of this testing are verified through post-reflow reliability testing. Profiles used at LITE-ON are based on JEDEC standards to ensure that all packages can be successfully 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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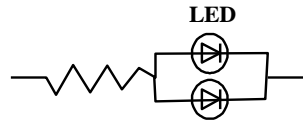
7.5 Drive Method

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.

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 |
|---|--|-----------------|
| IR_Resistance to Soldering Heat | Baking:125°C 24 Hrs , Soaking:60°C, 60%RH 52 Hrs | 3 times |
| High Temperature Storage Test | Ta= 100± 5°C | 1000 hr |
| Low Temperature Storage Test | Ta= -40± 5°C | 1000 hr |
| Temperature Cycling Test | 100°C~25°C~ -40°C~25°C (15m~5m~15m~5mins) | 1000 cycle |
| High Temperature Operation Life Test | Ta= 85°C, IF = 500mA | 1000 hr |
| Operating Life Of High Humidity Heat Test | Ta= 85°C,RH=85% | 1000 hr |
| Operating Life Of High Humidity Heat Test | Ta= 85°C,RH=85% ,IF = 350mA | 1000 hr |
| Pulse test | IF=1000mA 400ms on /3600 ms off @25°C | 30000times |
| Resistance to solder heat | Tsol=260°C, 10sec,6min | 3 times |

Notes:

- All reliability items are mounted on thermal heat sink with 2cmX 2cm Metal Core PCB
The thermal resistance $R_{th}=9.5^{\circ}\text{C/W}$ (from Tj to 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?