UVC3535ZL

PRELIMINARY SPECIFICATIONS

Elphoton
INNOVATE HUMAN LIFE

CONTENTS

1. Description

The EL photon UVC3535 product series is a deep UV LED package with a Peak emission wavelength from 260nm to 280nm.

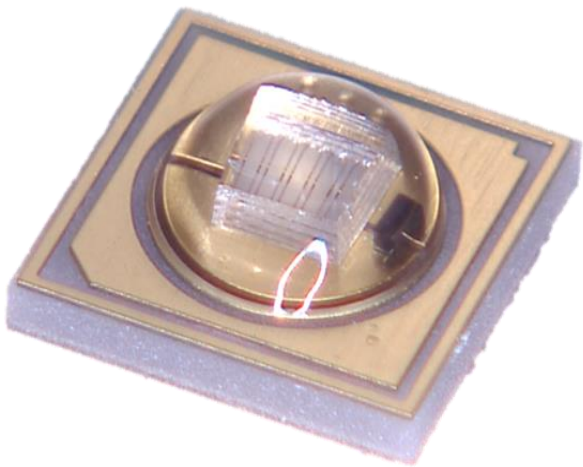
The UVC3535 product series is a specially designed for high radiant power in a AlN based LED that suitable for UV application.

◆Features

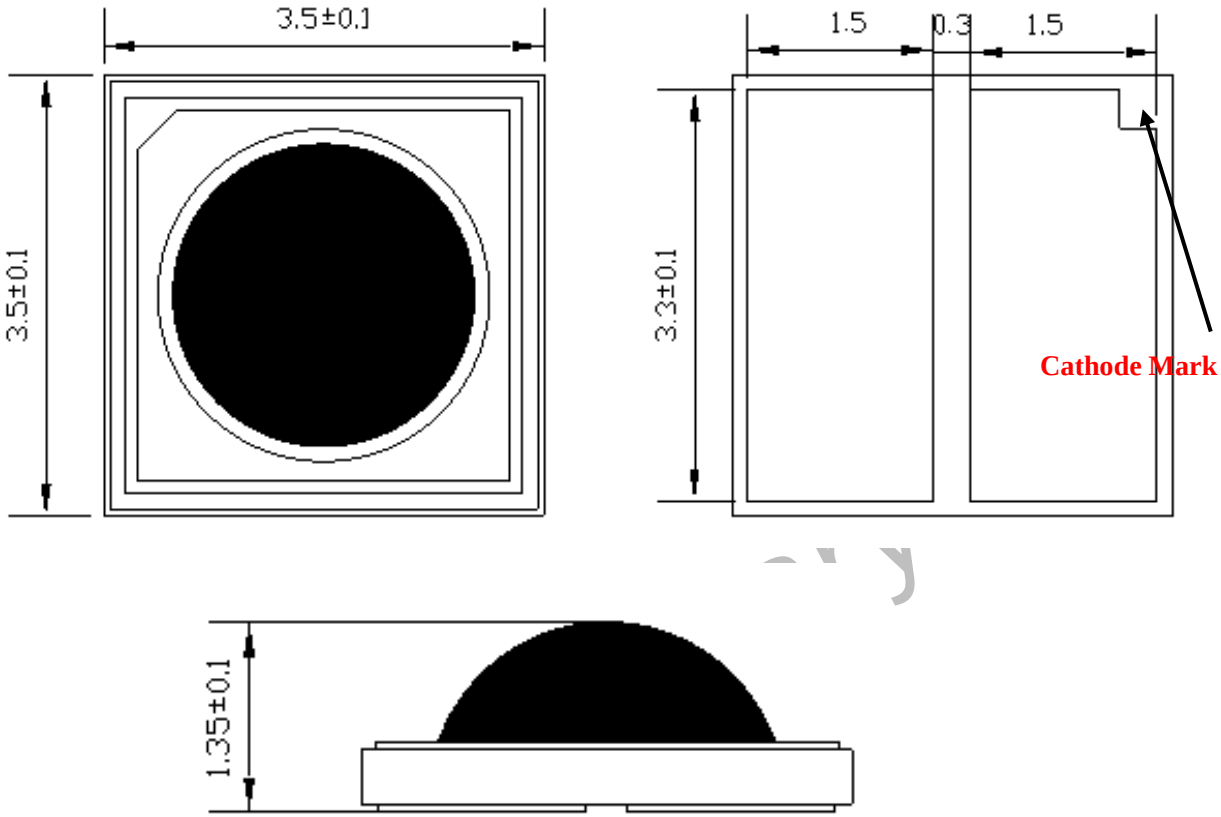
- Lighting Color(Peak Wavelength): 260~280nm
- Surface Mount Type LED Package: 3.5 × 3.5 ×1.35 (L × D × H) [Unit: mm]
- View angle (2Θ1/2=160deg)
- RoHS compliant
- ESD Protection up to 2KV
- Pb free

◆Applications

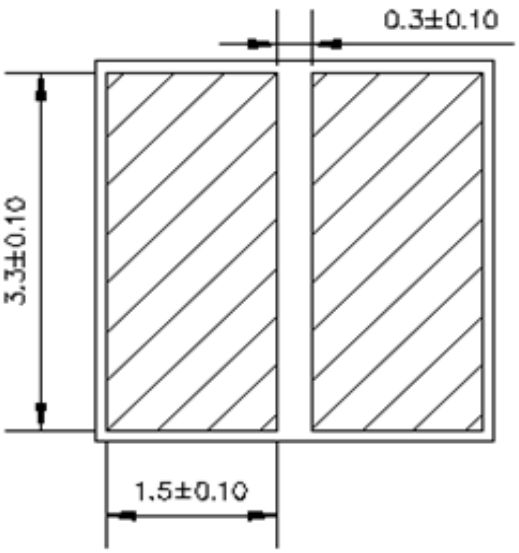
- Air/ Surface / water Disinfection and Sterilization
- Fluorescent Spectroscopy
- Sensor Light
- Medical Spectroscopy



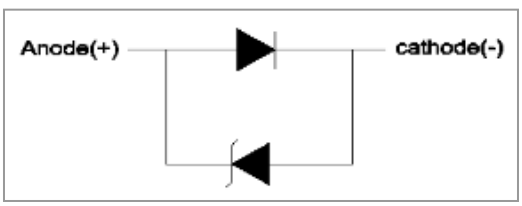
2. Outline Dimensions



Recommend Solder Pattern



Electrical scheme of SMD



* Note
1. All dimensions are in millimeters.
2. Undefined tolerance is ± 0.1mm
3. ESD protection

3. Absolute Maximum Rating at Ta = 25℃

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max	
Forward Current	I_F	-	-	500	mA
Power Dissipation	P_D	-	-	3.5	W
Operating Temperature	T_{OPR}	-40	-	+60	℃
Storage Temperature	T_{STG}	-40	-	+100	℃
Junction Temperature	T_j	-	-	80	℃

4. Electro-Optical Characteristics at Ta = 25℃

Parameter	Conditions	Symbol	Min.	Typ.	Max	Unit
Peak Wavelength	I_F=350mA	W_p	260	-	280	nm
Radiant Flux		ϕe	70	-	160	mW
Forward Voltage		VF	5.5	-	7.0	V
Spectrum Half Width		Δλ	-	10	-	nm
View Angle		2θ½	-	160	-	°
Thermal Resistance, Junction - Board		Rth $_{J-S}$	-	6.9	-	℃/W

Note

* These values measured by Optical spectrum analyzer and integrating sphere measuring system. And tolerances are followings as below.
* Rth j-s is the thermal resistance from chip junction to solder
* Reference for thermal resistance: Using 2.5x2.5x1.6cm aluminum MCPCB

1. Peak Wavelength Tolerance ± 3.5nm
2. Radiant Flux Measurement tolerance ±10%
3. Forward Voltage Tolerance ± 3%
4. View angle Tolerance ±10°
5. All characteristics are measured by EL photon

5. Bin Structure

[Ta = 25℃, 350mA]

Rank	Peak Wavelength(nm)		Radiant Flux(mW)		Forward Voltage(V)	
	Min	Max	Min	Max	Min	Max
W260-P100-V5.5	260	270	70	90	5.5	6.0
W260-P120-V5.5			90	110		
W260-P140-V5.5			110	130		
W260-P100-V6.0			70	90	6.0	6.5
W260-P120-V6.0			90	110		
W260-P140-V6.0			110	130		
W260-P100-V6.5			70	90	6.5	7.0
W260-P120-V6.5			90	110		
W260-P140-V6.5			110	130		

Note : Bin code (W260-P100-V6.0)

- Peak Wavelength = W260 (260-270nm)
- Radiant Flux = P100 (100-120mW)
- Forward Voltage = V6.0 (6.0-6.5V)

5. Bin Structure

[Ta = 25℃, 350mA]

Rank	Peak Wavelength(nm)		Radiant Flux(mW)		Forward Voltage(V)	
	Min	Max	Min	Max	Min	Max
W270-P100-V5.5	270	280	100	120	5.5	6.0
W270-P120-V5.5			120	140		
W270-P140-V5.5			140	160		
W270-P100-V6.0			100	120	6.0	6.5
W270-P120-V6.0			120	140		
W270-P140-V6.0			140	160		
W270-P100-V6.5			100	120	6.5	7.0
W270-P120-V6.5			120	140		
W270-P140-V6.5			140	160		

6. Characteristics Diagrams at Ta=25℃, IF=350mA

FIG 1. Forward Current vs. Forward Voltage

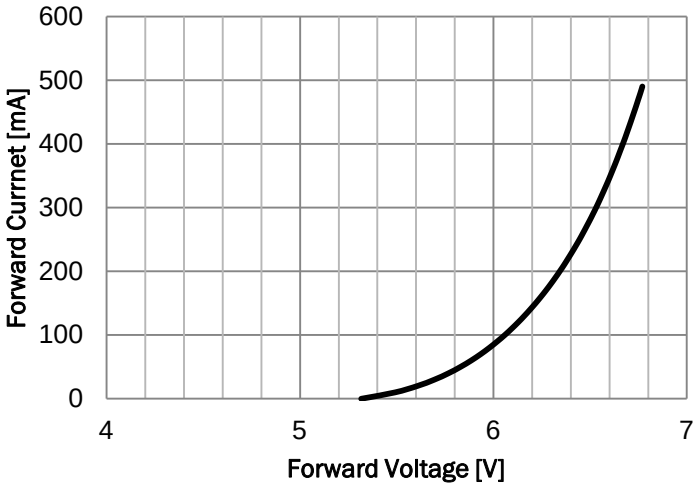


FIG 2. Relative Radiant Flux vs. Forward Current

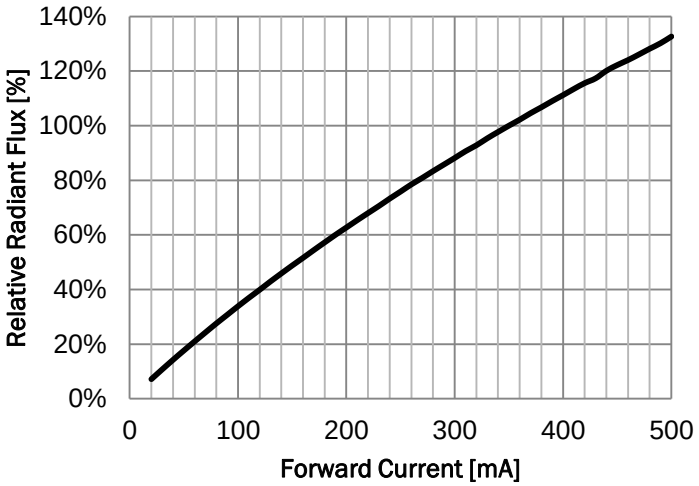


FIG 3. Peak Wavelength vs. Temperature

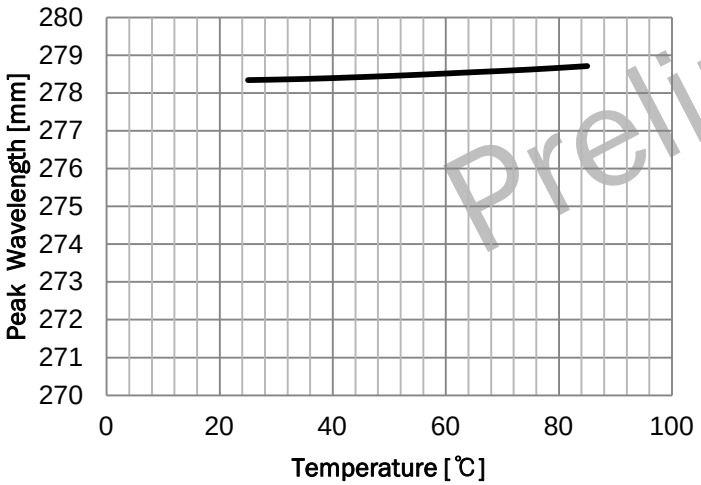


FIG 4. Typical Spectrum

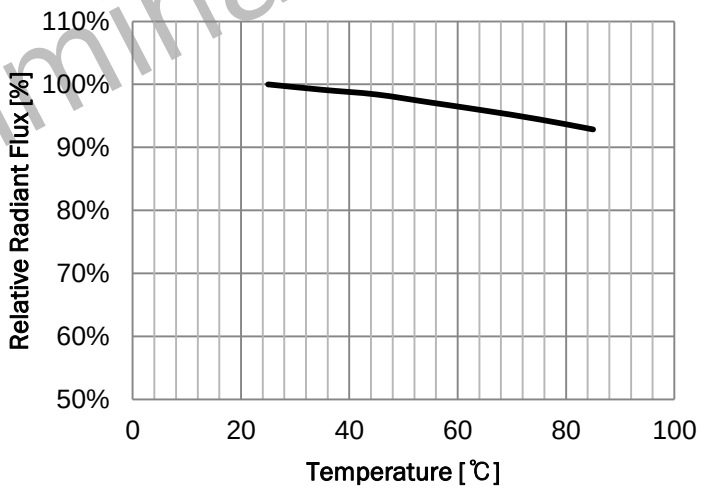


Fig 5. Forward Voltage vs Ambient Temperature

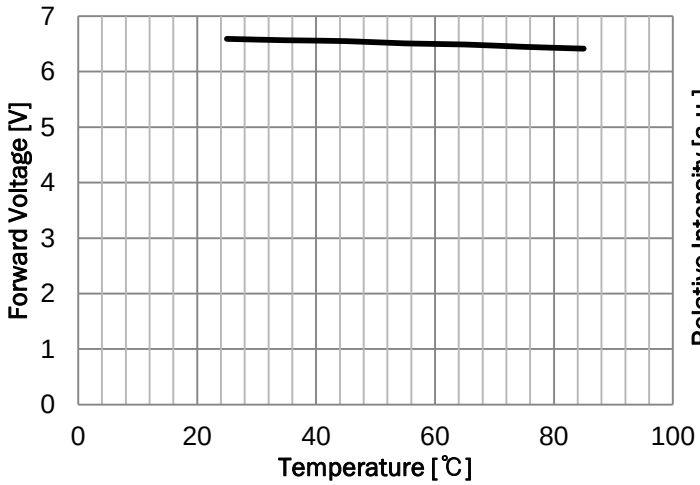
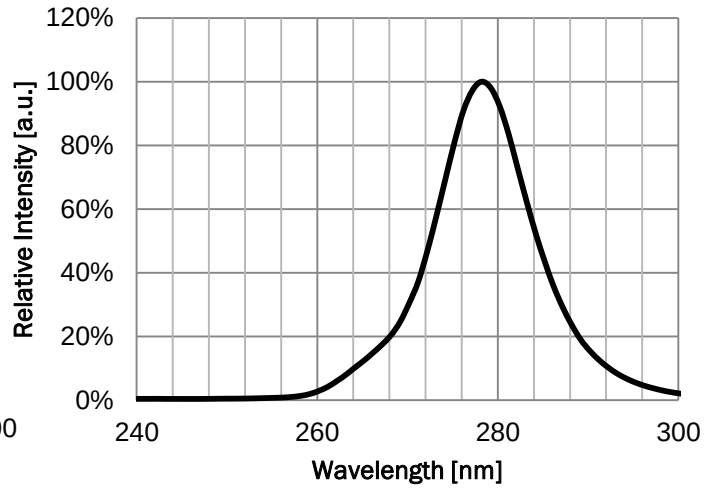
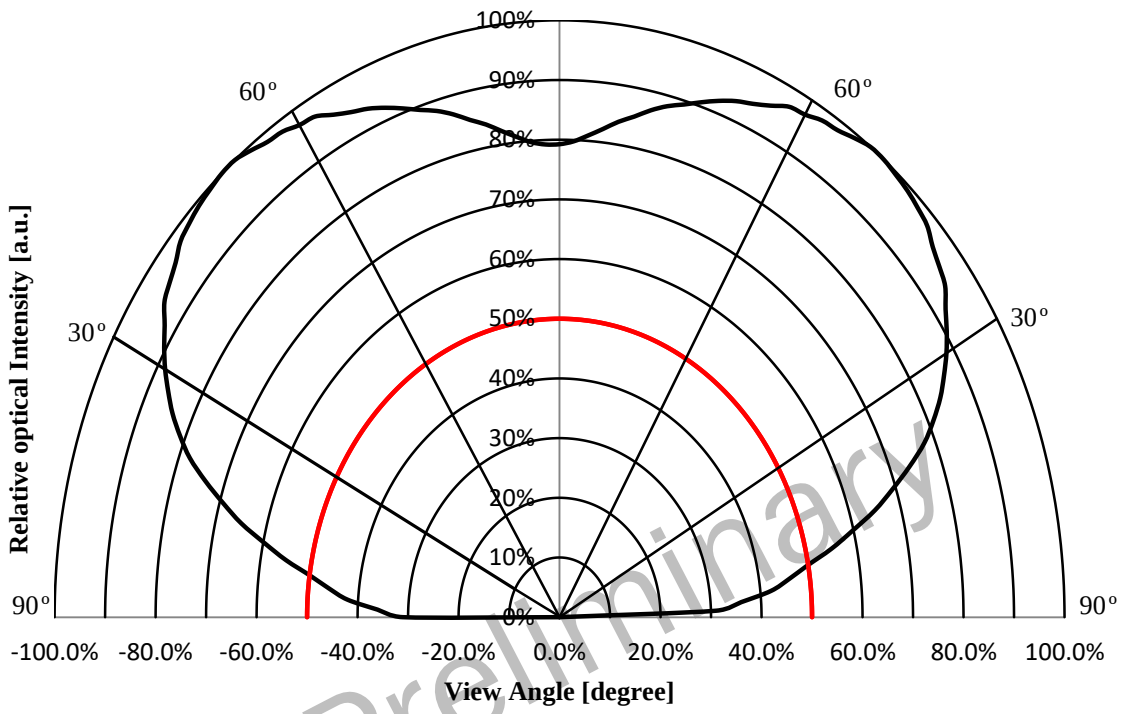


Fig 6. Relative Radiant Flux vs Ambient Temperature



6. Characteristics Diagrams at Ta=25℃, IF=350mA

FIG 7. Far-field Emission Pattern



7. Reliability Test Items and Conditions

1) Criteria for Judging the Damage

Parameter	Symbol	Condition	Criteria for Judgement	
			Min.	Max.
Forward Voltage	VF	IF=350mA	-	Initial value*1.1
Radiant Flux	ϕe		Initial value*0.5	-

2) Reliability Tests

Test Item	Test Conditions	Test Time	Sample Q'ty
Room Temperature Operating Life [RTOL]	Ta=25℃, If=350mA	1000hrs	6 pcs
High Temperature Operating Life [HTOL]	Ta=60℃, If=250mA	1000hrs	6 pcs
High Temperature Storage Life [HTSL]	Ta=100℃	1000hrs	6 pcs
Low Temperature Storage Life [LTSL]	Ta=-40℃	1000hrs	6 pcs
Thermal Cycle	Min = -40℃ / Max = 100℃ Dwell Time 15min / Transfer time: 5min 1 cycle = 30min	100 cycle	6 pcs
ESD	HBM, Voltage =2kV R=1.5kΩ, C=100pF	3 times Positive / negative	6 pcs

Note
- Using 2.5×2.5×1.6cm Aluminum MCPCB.
- 3ea of MCPCBs are mounted on 15×5×2.8cm metal thermal heat sink when reliability test.
- Measurements are performed after allowing the LEDs to return to room temperature.

8. Soldering Conditions

1) Recommended Soldering

- **El photon recommends to use SnBiAg(Tin/bisemuth/silver) of solder paste composition**.
- The recommended stencil thickness is 60~80㎛.
- The recommended stencil solder paste area is 60~80%.
- When soldering, recommend using a convection reflow machine and not a hot plate.
- If must use a heat gun, we suggest that you use it carefully and be sure to follow the guidelines in the following chapters.

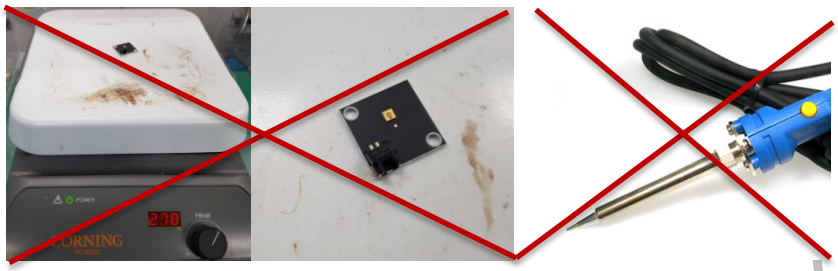


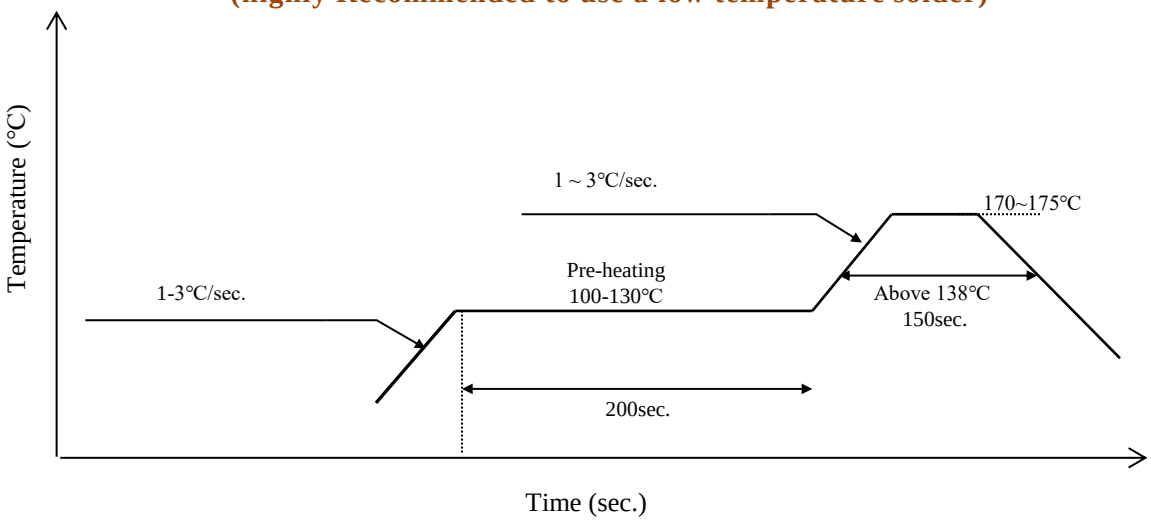
Figure1. When mounting the LED package on the PCB, it is not recommended to use a hot plate or soldering iron, and it is recommended to use a reflow machine.

2) Recommended Reflow Soldering profile

- Available Max temperature : 175℃ – 10 sec.
- A rapid-rate process is not recommended for the LEDs cooling down from the peak temperature.
- **Do not repeat Reflow soldering (UVC PKG must be a reflow process only once)**

Low Temperature Lead-Free Solder

(highly Recommended to use a low temperature solder)



Note

- Reflow soldering should not be done more than once.
- The peak temperature of the product can change depend on the material of the low temperature lead-free solder
- Reflow time may change depending on the environment.

8. Non Reflow Machine Soldering Conditions Guide Line

CAUTION

- **Alternative Soldering Methods**

- This section provides instructions for melting solder using a hot plate or heat gun, without the use of a reflow machine, in order to minimize potent ial damage to the product.

- **Risk of Lens Deformation**

- Sudden temperature changes above 145℃ can cause the lens to deform.

- **Lens Deformation Indicator**

- The most common sign of lens deformation is the presence of air bubble s inside the lens.

- **Impact on Product Performance**

- Air bubbles inside the lens are a cosmetic issue and do not affect the pro duct's performance or reliability.

- **Optimal Soldering Recommendation**

- For the best results, we recommend using the convection reflow machine method 1 (refer to page 11).

1) Solder Melting Method Using a Hot Plate

- Solder Type :
  - Use solder with a low melting point, such as SnBi0.4Ag.
- Temperature Control :
  - Maintain the hot plate surface temperature between 140℃ and 145℃.
  - Be aware of potential discrepancies between set and actual temperatures.
  - Temperatures above 150℃ increase the risk of product damage.

2) Solder Melting Method Using a Heat Gun

- Temperature Control :
  - Keep the heat gun temperature below 250℃.
  - Account for potential differences between set and actual temperatures.
- Distance and Duration :
  - Maintain a distance of 3 to 5 cm between the heat gun and the product.
  - Limit solder melting time to 25 seconds.

3) Additional Tips

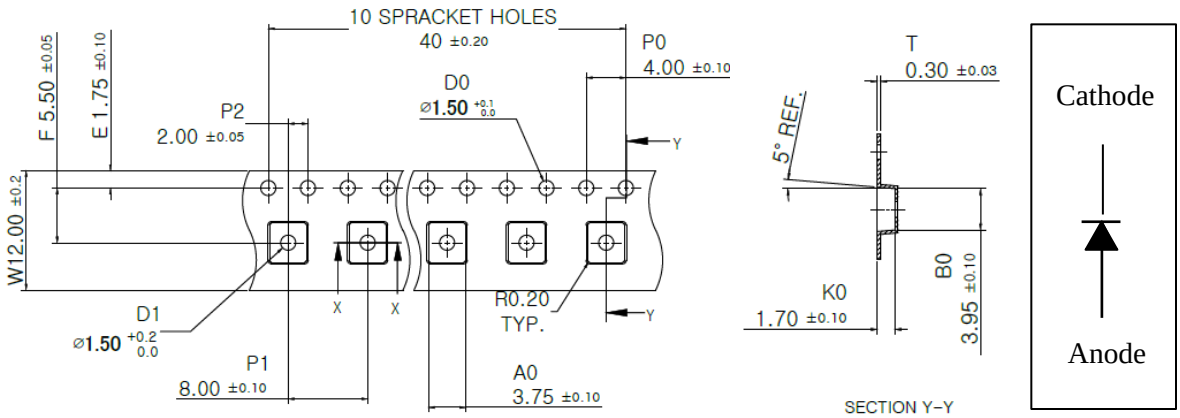
- Recommended Tools and Materials :
  - Use high-quality low-melting-point solder and reliable heat guns or hot plates.
- Troubleshooting Tips :
  - If solder doesn't melt properly, check the temperature settings and solder type.
  - For overheating, reduce the heat gun's temperature and increase the distance from the product.
- Testing and Quality Control :
  - Perform visual inspections and integrity tests on solder joints post-soldering.

By following these guidelines, you can significantly reduce the likelihood of defects, such as bubbles forming inside the lens.

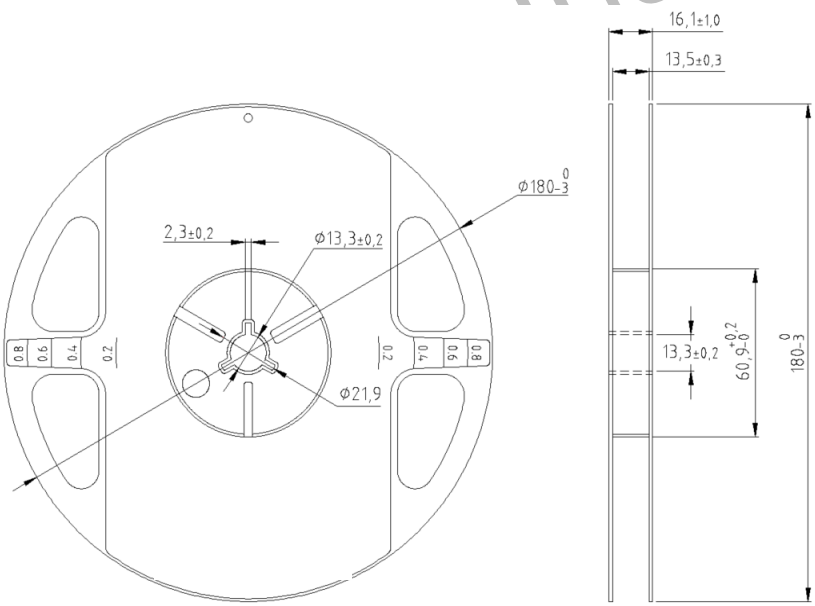
9. Packing

1) Tape & Reel Dimensions (unit : mm)

- Tape



- Reel



Note
- Maximum quantity : 1,000pcs/7inch reel (Minimum quantity: 100pcs)
- Adhesion strength of cover tape is 0.1 ~ 0.7N when the cover tape is turned off from the carrier tape.
- The maximum number of consecutive missing lamps is two

10. Label Structure

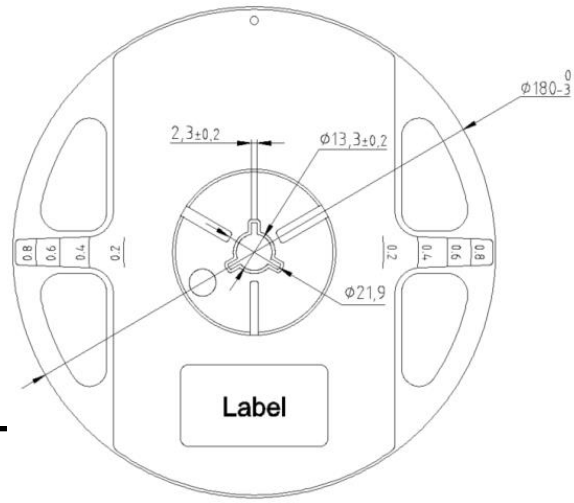
	MIN	MAX
WP	270	280
PO	100	120
VF	6.0	6.5

Note
- [1] Model name
- [2] BIN name : Consult to Page 6
- [3] Product Code : ① Bin No ② Reel type ③ Year ④ Month ⑤ Product Serial Number

11. Packing Structure

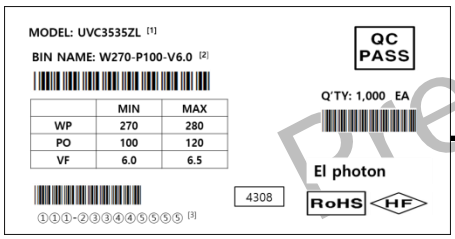
1) Packing Process

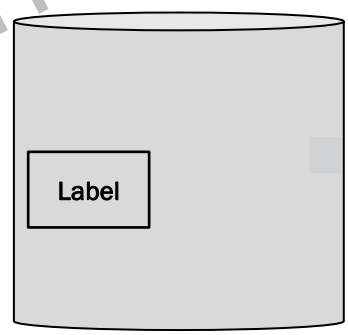
• Reel



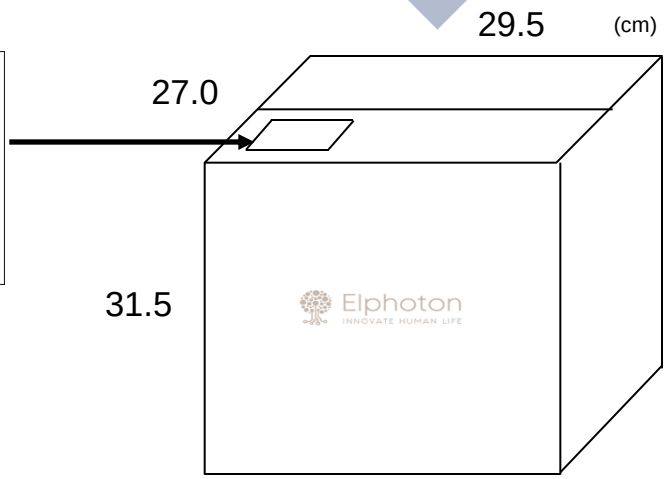
Desiccants

• Aluminum Foil Packing Bag





• Outer Box



12. Precaution

1. Cleaning.

- This Device is not allowed to be used in any type of fluid such as water, oil, organic Solvent, etc.
- If cleaning is required, IPA is recommended as cleaning solution.
- Pretests should be conducted with the actual cleaning process to validate that the process will not damage the UV LEDs

2. Mounting Precautions

- The time taken for a device to return to the room temperature after reflow soldering depends on the mounting board and environmental conditions.
- Pressure on the UV LEDs will influence to the reliability and easily scratched. Avoid friction against hard materials and strong pressure.
- It is recommend, do not put stress on the UV LEDs during heating .
- When installing an assembled board into equipment, ensure that the devices on the board do not contact with other components.
- Recommend once soldering. If re-soldering can not avoid, The UV LEDs characteristics should be carefully checked before and after such repair.

3. Packing

- This product is equivalent to IPC/JEDEC J-STD-020D MSL 5a
- LED packages may absorb moisture; therefore, we recommend the LEDs in moisture-proof bags.
- These UV LED devices are packed in an aluminum envelope with a silica gel and a moisture indicator to avoid moisture absorption. The optical characteristics of the device may be affected by exposure to moisture in the air before soldering and the device should therefore be stored under the following conditions.

Conditions		Temperature	Humidity	Time
Storage	Before opening Aluminum bag	<=30°C	<=60%RH	1 year
	After opening Aluminum bag	<=30°C	<=60%RH	24hours
Baking		65±5°C		>=24hr

- To avoid failure, solder the LEDs onto PCBs within 24 hours after opening the moisture-proof bags.
- If not used within 24 hours, El photon recommends drying for within 24hr at 65±5°C..

12. Precaution

4. Handling Precautions

- Workplace setup should follow the recommendations given in JEDEC standard document JESD625B "Requirements for Handling Electrostatic-Discharge-Sensitive (ESDS) Devices" or IEC 61340-5-1,2 and 3. In addition, properly train operators to handle UV LED according to the guidelines listed below:
- Always wear conductive wrist straps when handling UV LEDs—both on or off boards. Continuously monitor the conductive straps to ensure that they start and remain grounded.
- Use an ion blower to neutralize the static discharge that may build up on the surface of the UV LED during storage and handling.
- Always keep new UV LED in the protective ESD storage bag. Depending on the final application, it may be necessary to include additional ESD protection, such as a TVS protection diode on the substrate on which the UV LED is reflowed. El Photon UV LEDs have a TVS chip inside each package.
- Use tweezers to pick up UV LEDs. To avoid scratching UV LEDs, El Photon recommends using Teflon-coated tweezers.
- El Photon recommends holding the LED from the sidewalls (see Figure 2.)
- Do not apply pressure to the dome lens on packaged LED.

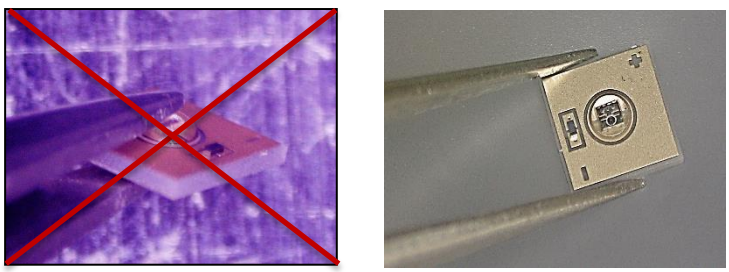


Figure 2. incorrect handling (left) and correct handling(right) of UV Package

12. Precaution

5. Assembly precautions

- UV LED consists of the chip and Flat substrate. The chip is protected by a specific material in the form of lens.
- Touching the lens, it may damage the chip.
- Pick up Point : Out area of lens of LED as Shown in Fig.3(a)
- It is recommended to use collet as shown in Fig.3(b). The Collet can carry out “Pick and Place Process” properly by avoiding damages of Lens.

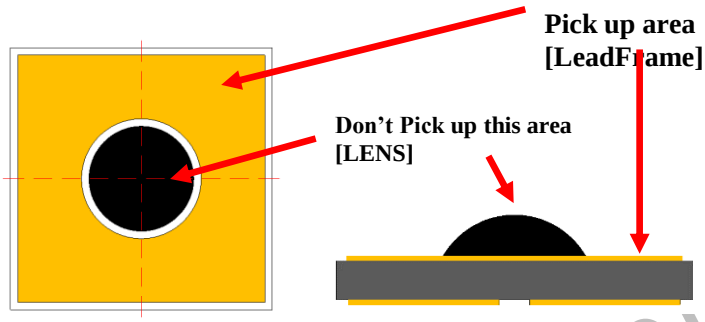
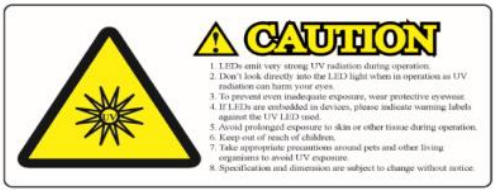


Figure 3(a). Pick up point of LED

Figure 3(b). Recommend collet design

6. General Precaution and UVC Safety

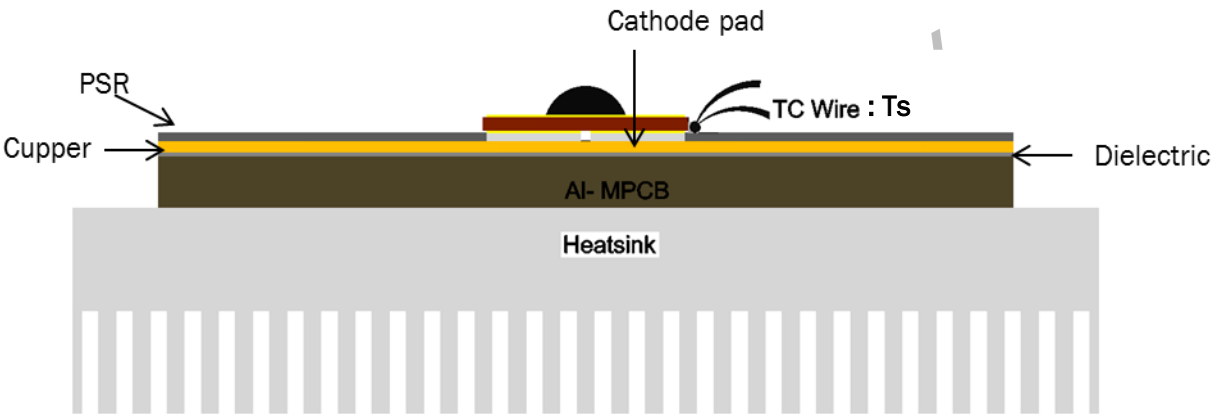
- UVC LEDs emit deep ultraviolet radiation with extremely high intensity near their surface. High irradiance allows rapid disinfection, but users must observe safety precautions during assembly, testing, and field use.
- By purchasing the UVC chips and packaged LEDs or arrays from El Photon, the customer agrees to indemnify the manufacturer of any bodily harm due to failure to follow the common-sense precautions or warnings and guidelines contained within this Specification.
- It is the buyer’s responsibility to design products that ensure the safety of end users.
- All assembly workers, operators, and bystanders must wear eye and skin protection when the UVC LEDs are energized. Therefore, bare-eye observation (including through microscopes) and bare-hand handling of a UVC LED in operation is PROHIBITED.
- Because most materials readily absorb UVC light, any oil or other absorbent liquid or solid substance must NOT be allowed to touch the sapphire side of the UVC chip or the dome lens on a packaged LED.



12. Precaution

7. Ts Measurement Guideline

- The recommended location of the sensor pad is right next to the cathode of the UV PKG on the PCB, as shown in below.
- To ensure accurate reading, the thermocouple (TC) tip must make direct contact to the copper of the PCB onto which the UV PKG cathode pad is soldered (i.e. any solder mask or other masking layer must first be removed before mounting the thermocouple onto the PCB).
- The tip of the TC wire should be placed as close as possible to the UV PKG on the exposed cathode copper layer. The thermal resistance (Rθj-s) between the sensor pad and the UV PKG junction was experimentally determined on a 1mm thick Al-MCPCB and Heatsink with the following PCB properties: 1 or 2 oz. copper and 100um thick dielectric layer with 3 W/(m·K).



8. Others

- If the forward or reverse voltage which exceeds the absolute maximum rating is applied to the UV LEDs, that will cause the damage to the UV LEDs. It is possible that the damaged UV LEDs .Be careful not to look the UV LEDs that the output power is strongly increased in the face. It is possible that eyesight has been getting weaker.

This specifications of the product may be revised without notice.

13. Revision Sheet

Revision	Date	Page	Description	Remark
Rev.0.0	23.11.15	-	Preliminary edition	
Rev.0.1	24.02.28	-	Modified Specification	
Rev.0.2	24.08.27	5	E,O-characteristics and Thermal resistance	
		9	Reliability Test	
		12	Soldering Conditions Guide Line	