

# Data sheet

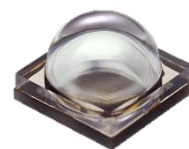
Part number : ZEUBE265-2CA-TR



2011/65/EU, (EU)2015/863  
10 Substances regulation compliant



Lead-free solder heat resistant product



Package	Wide distribution angle <b>Deep-UV LED (UVC) Peak wavelength 265nm</b> Outer dimension 3.6 x 3.6 x 2.36mm ( L x W x H )
Product features	<ul style="list-style-type: none"> <li>• Automotive quality standard: AEC-Q102 compliant</li> <li>• Total radiant flux : 50mW (TYP.) @ <math>I_F = 440\text{mA}</math></li> <li>• Operating temperature : -40 to +100 deg.</li> <li>• High reliability hermetic sealing package for reducing influence of humidity and the out gas</li> <li>• Lead-free soldering compliant</li> <li>• RoHS :2011/65/EU, (EU)2015/863 compliant</li> </ul>

## Recommended applications

Water/liquids : House water purifier, humidifier (water tank part)

Object surface : Storehouse, bio/medical equipment

Inspection light sources : Image inspection light, water quality sensor

Air : Air purifier, air conditioner etc.

### CAUTION

**Risk group "3" product** in IEC62471.(Photo biological Safety of Lamps and Lamp Systems Standard)

Since the  $V_F$  is higher than that of visible light LEDs, if proper heat dissipation design is not done, even within the rated current, heat generation exceeding rated  $T_j$  may occur.

It is recommended to select the board size and material according to the usage conditions and to use a heat sink.



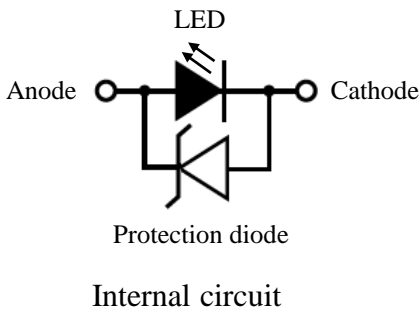
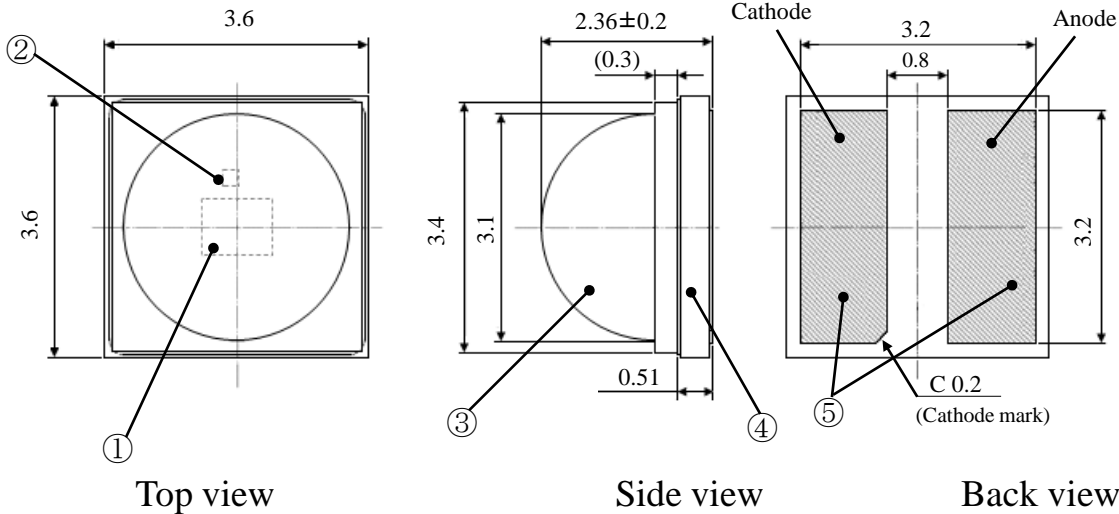
## WARNING

- UV LEDs **emit high intensity UV (ultraviolet) light.**
- **Do not look directly into the UV light source ; this can be harmful to your eyes and skin.**
- **Wear protective eyewear to avoid exposure to UV light, as well as protective masks and gloves, etc. in order not to expose your skin to the light.**
- **Attach warning labels to your products which contain UV LEDs.**
- **keep out of reach of children.**

Outline dimensions

ZEUBE265-2CA-TR

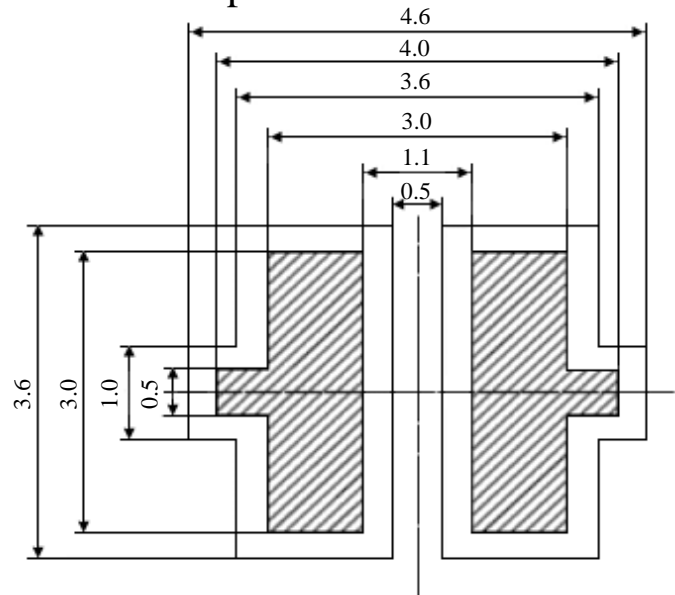
Unit : mm  
Weight : 40mg  
Tolerance : ±0.1



No.	Part name	Materials	Qty.
①	LED die	AlGaIn / AlN	1
②	Protection diode	Si	1
③	Sealing glass	Quartz	1
④	Substrate	AlN	1
⑤	Electrode	Au plating	Anode : 1 Cathode : 1

Recommended pad

Unit : mm



Recommended pad  
Recommended stencil pattern

Recommended thickness of stencil : 120 to 150μm

# Specifications

## 【 Product overview 】

Die material	AlGaIn/AlN
Emitting color	Ultra violet

## 【 Absolute maximum ratings 】

Item	Symbol	Maximum ratings	Units	
Power dissipation	$P_d$	4.1	W	
Forward current	$I_F$	100 to 500	mA	
Repetitive peak forward current (1ms, 1/10duty)	$I_{FRM}$	650	mA	
Forward current reduction rate from "Ts=78.4℃"	$\Delta I_F$	13.7	mA/℃	
Repetitive peak forward current reduction rate from "Ts=78.4℃"	$\Delta I_{FRM}$	17.8	mA/℃	
Operating temperature	$T_{opr}$	-40 to +100	℃	Note 1
Storage temperature	$T_{stg}$	-40 to +115	℃	Note 1
Electrostatic discharge threshold "HBM"	$V_{ESD}$	8	kV	Note 2
Junction temperature	$T_j$	115	℃	
Peak temperature of reflow soldering	$T_{sld}$	260	℃	Note 3

- Note 1      The ranges of operating and storage temperature are not applied to taping condition.
- Note 2      ESD testing method : ANSI/ESDA/JEDEC JS-001 Human Body Model (HBM)  1.5kΩ,100pF
- Note 3      Please refer to page.8 "Soldering Conditions".

## 【 Thermal characteristics 】

(Ta=25℃)

Item	Symbol	Typ.	Max.	Units
Thermal resistance (Junction - Solder point)	$R_{th(j-s)}$	6.0	7.5	℃/W

## Specifications

### 【 Electro-Optical characteristics 】

(Ta=25°C)

Item	Symbol	Conditions	Min.	Typ.	Max.	Units	
Total radiant flux	$\Phi_e$	$I_F = 440\text{mA}$	40	50	60	mW	Note 4
Peak wavelength	$\lambda_p$	$I_F = 440\text{mA}$	259	265	269	nm	Note 5
Spectral half width	$\Delta\lambda$	$I_F = 440\text{mA}$	-	11	-	nm	
Half intensity angle	$2\theta_{1/2}$	$I_F = 440\text{mA}$	-	120	-	deg.	
Forward voltage	$V_F$	$I_F = 440\text{mA}$	5.9	6.9	8.0	V	Note 6

Note 4 Total radiant flux is measured by integrating sphere, and the tolerance is  $\pm 7\%$ .

Note 5 Peak wavelength tolerance is  $\pm 1.8\text{nm}$ .

Note 6 Forward voltage tolerance is  $\pm 3\%$ .

Note 7 Not designed for reverse operation.

Please do not input reverse voltage and reverse current for prevent the electrical destruction.

Note 8 Measurement time : Lighting at moment 10msec.

### 【 Sorting chart for total radiant flux 】

LEDs shall be sorted out "Total radiant flux" into the following chart and each rank parts shall be packed separately when shipping.

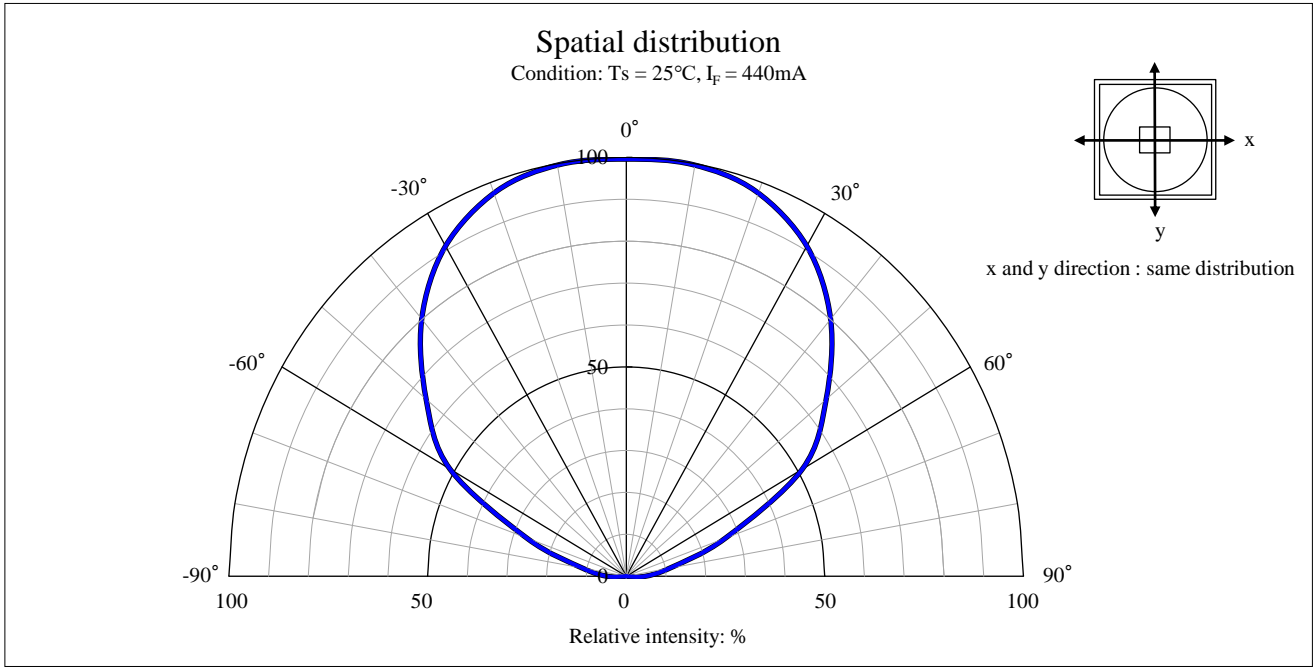
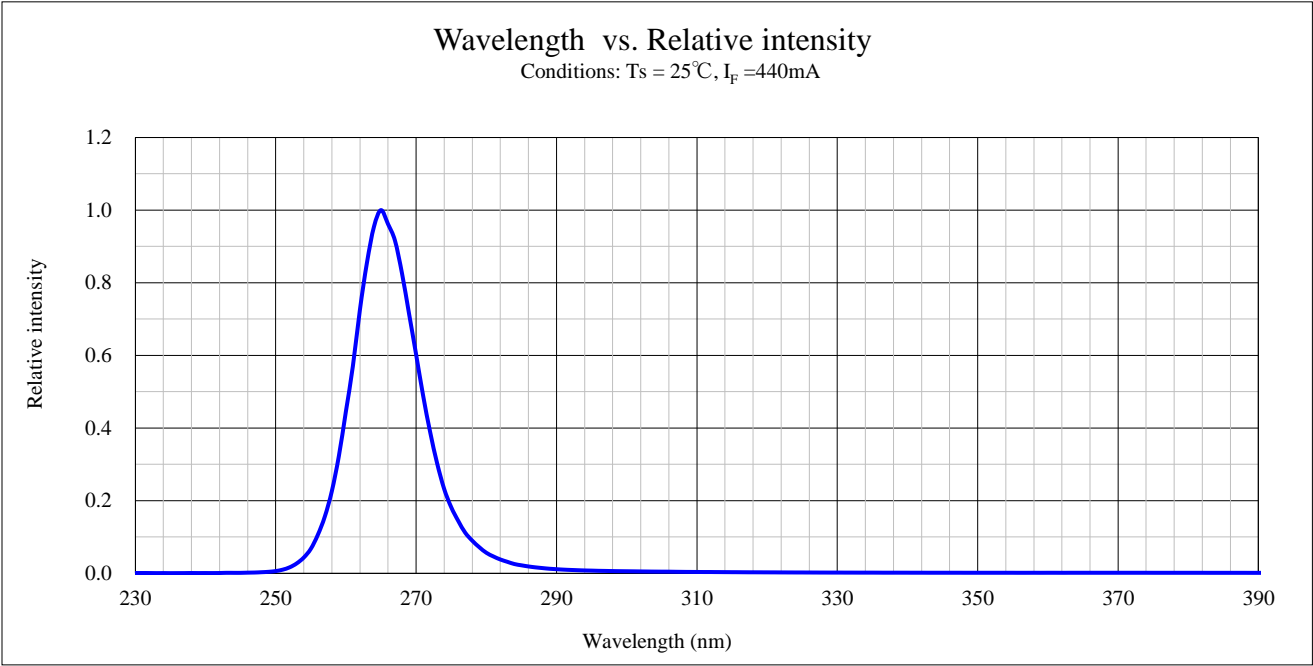
Rank	Total radiant flux (mW)		Conditions
	Min.	Max.	
CA	40	50	$I_F = 440\text{mA}$ $T_a = 25^\circ\text{C}$
CB	50	60	

Note Tolerance :  $\pm 7\%$

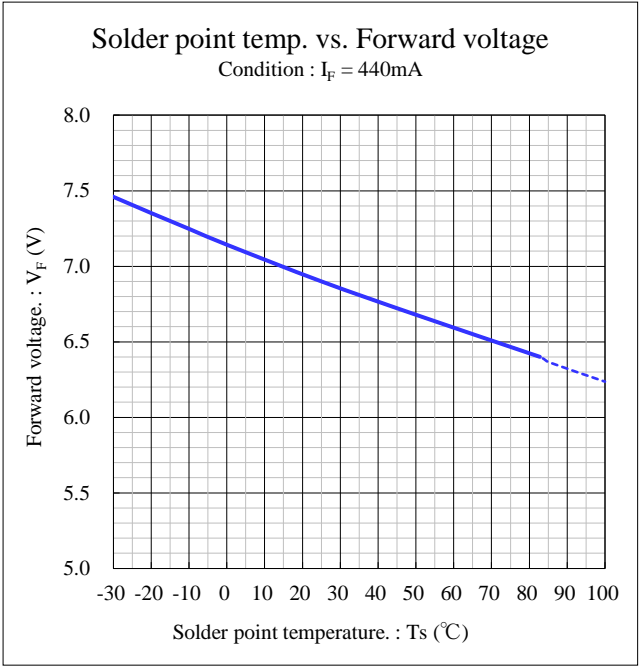
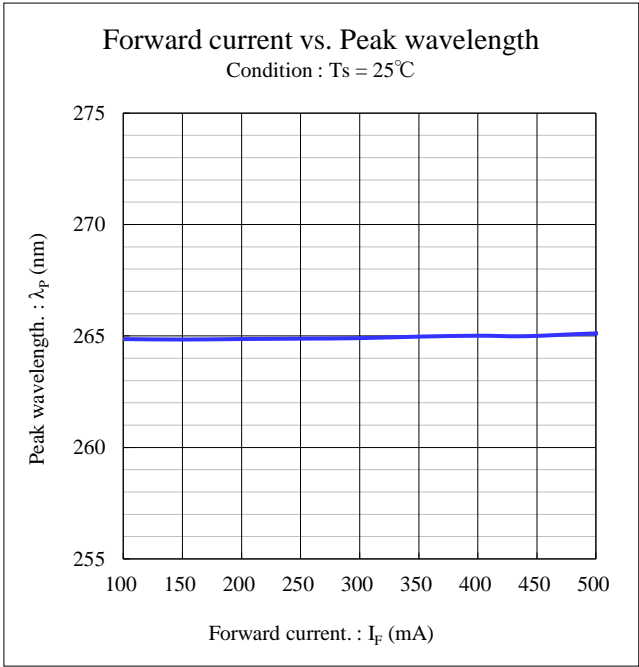
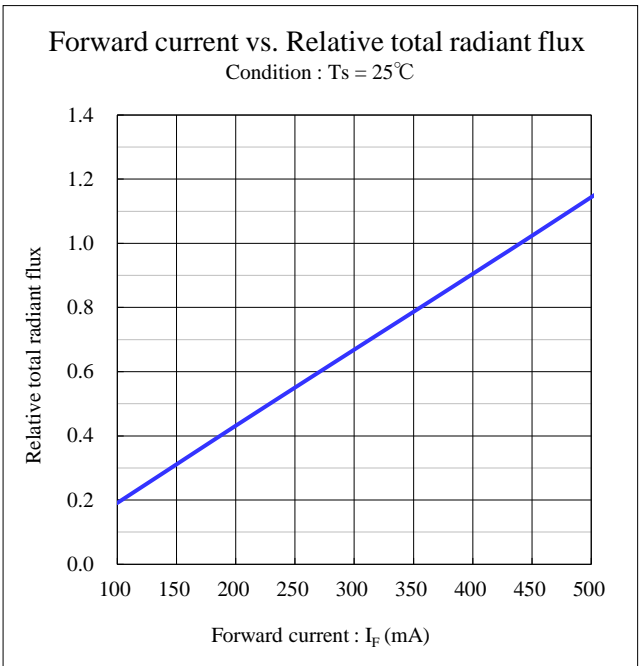
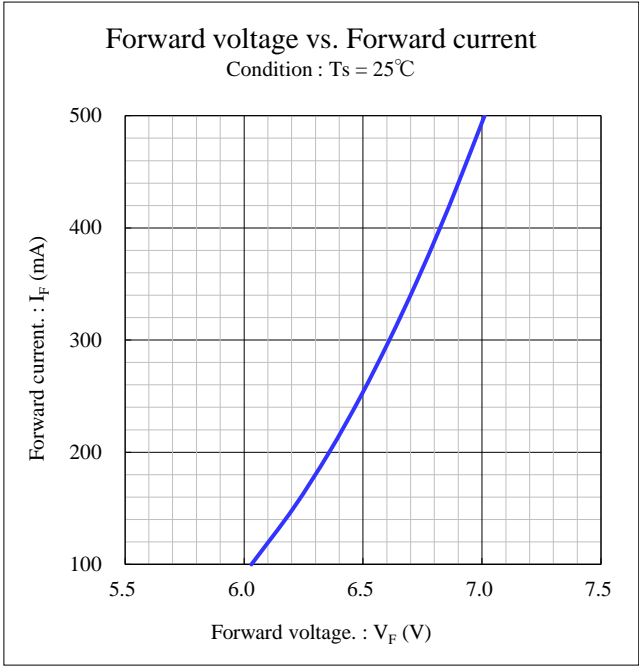
Measurement time : Lighting at moment 10msec.

Technical data

ZEUBE265-2CA-TR



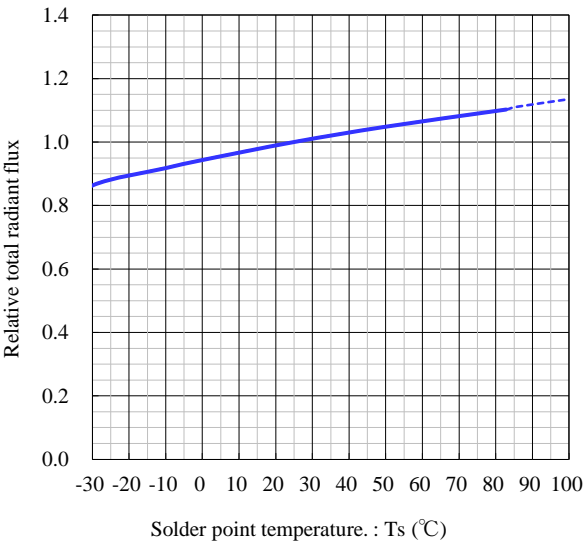
Technical data



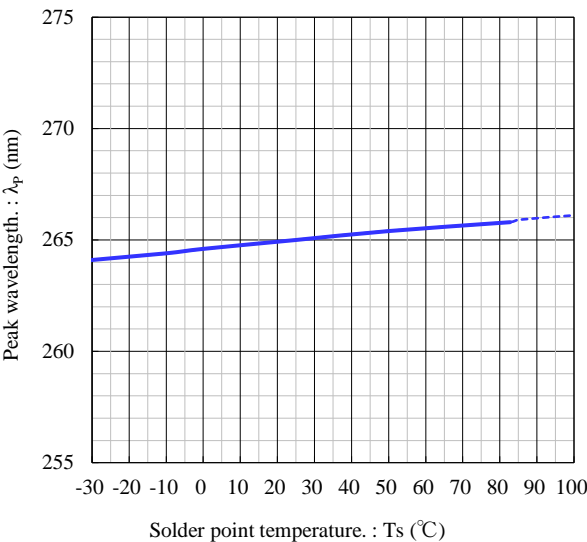
※ Do not use under 100mA to avoid the instability of the reliability/function.

Technical data

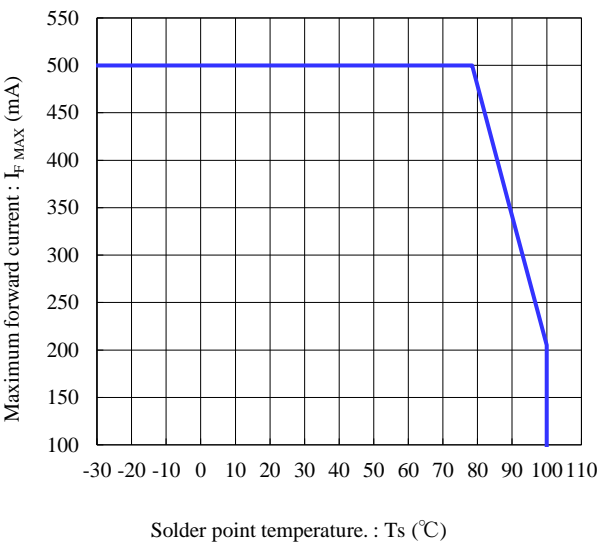
Solder point temp. vs. Relative total radiant flux  
Condition :  $I_F = 440\text{mA}$



Solder point temp. vs. Peak wavelength  
Condition :  $I_F = 440\text{mA}$



Max. forward current vs. Solder point temp.



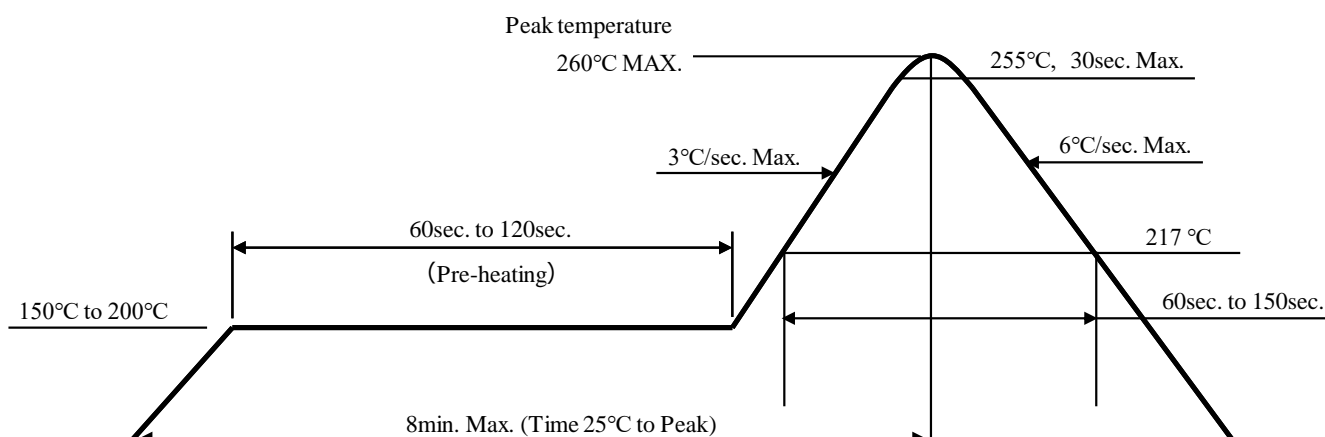
## Soldering condition

### 【Soldering precaution】

(acc.to IPC/JEDEC J-STD-020 F)

1. Heat stress during soldering will influence the reliability of LEDs, however that effect will vary with heating method. Also, if components with different shapes need to be mounted together, it is recommended to set the soldering pad temperature according to the component most vulnerable to heat stress (ex. chip type LED).
2. The LEDs constituent parts do not stabilize immediately after the soldering. Any mechanical stress may cause damage to the products. Please avoid stacking the PCBs, or any other storage method which may cause the PCBs to bend, also, prevent contact of LED with any materials.
3. The recommended temperature profile for reflow soldering is listed as the pad temperature of soldering point. This is due to the fact that temperature distribution varies on heating method, PCB material, other components in the assembly, and concentration of the parts mounted.  
Please do not repeat the heating process during reflow more than two times.

### 【 Reflow Soldering Condition.】



- Note 1 Temperature Profile for the reflow should be set to pad temperature of soldering point, which is the maximum temperature for soldering. Lowering the heating temperature and decreasing heating time is very effective in achieving higher reliability.
- Note 2 The reflow soldering process should be done max2 times. The interval between first and second process should be as short as possible to prevent absorption of moisture to LED resin. Please cool down the LED temperature at room temperature after soldering, then start the second process.



## Soldering condition

4. This product uses ceramic as the substrate, and there is a possibility of glass cracking or substrate breakage during reflow heating. This is due to stress generated between the product and the PCB, which is caused by the difference in coefficient of linear thermal expansion (CTE) between the product and the PCB or warpage/deflection due to the PCB design. Please test the product on the PCB to be used and use the product only after confirming that there are no problems.
5. When using a metal PCB, the solder may crack and problems may occur due to major stress on the soldered portion caused by thermal shock. Please carry out a thorough advance verification before use. For the metal PCB's insulation, it is recommended to use stress-reducing materials.

Material	CTE* (ppm/°C)
Aluminum nitride (AlN)	4.6
Glass epoxy (FR-4)	14
Copper (Cu)	17
Aluminum (Al)	21
Glass composite (CEM3)	25

\* CTE are typical values.

6. The products can not be used for hand soldering and dipping ( Through the Wave ) soldering.
7. When cleaning, using isopropyl alcohol is recommended. Some chemicals, including Freon substitute detergent could corrode the surface or the products, which cause discoloration, clouding, crack and so on. Please review the reference chart below for cleaning.  
If water is used to clean (including the final cleaning process), please use pure water (not tap water), and completely dry the LED before using. Cleaning with ultrasonic is not recommended.

Cleaning agents	Recommended / Not recommended
Ethyl alcohol	✓ <b>Recommended</b>
Isopropyl alcohol	✓ <b>Recommended</b>
Pure water	✓ <b>Recommended</b>
Trichloroethylene	x <b>Not recommended</b>
Chloroethene	x <b>Not recommended</b>
Acetone	x <b>Not recommended</b>
Thinner	x <b>Not recommended</b>

## Handling precaution

### 【For Electric Static Discharge ( ESD)】

This type of LED lamp is highly sensitive to surge voltage generated by the On/Off status change and discharges of static electricity through frictions with synthetic materials, which may cause severe damage to the die or undermine its reliability. Damaged products may experience conditions such as extremely high reverse voltage, or a decrease of forward rise voltage, deteriorating its optical characteristic. Stanley products are packed with anti-static components. However, the following precautions and measures are vital in ensuring product quality during shipment.

#### 1. Electrification/Static electricity protection

Stanley recommends the following precautions in order to avoid product (die) damage from static electricity , when an operator and other materials electrified by friction coming in contact with the product.

- ① Do not place electrified non-conductive materials near the LED product.  
Avoid LED products from coming into contact with metallic materials.( Should the metallic material be electrified , the sudden surge voltage will most likely damage the product.)
- ② Avoid a working process which may cause the LED product to rub against other materials.
- ③ Install ground wires for any equipment, where they can be installed, with measures to avoid static electricity surges.
- ④ Prepare a ESD protective area by placing a Conductive Mattress (1MΩ MAX.) and Ionizer to remove any static electricity.
- ⑤ Operators should wear a protective wrist-strap.
- ⑥ Operators should wear conductive work-clothes and shoes.
- ⑦ To handle the products directly, Stanley recommends the use of ceramic, and not metallic, tweezers.

#### 2. Working environment

- ① A dry environment is more likely to cause static electricity. Although a dry environment is ideal for storage state of LED products, Stanley recommends an environment with approximately 50% humidity after the soldering process.
- ② Recommended static electricity level in the working environment is 150V, which is the same value as Integrated Circuits (which are sensitive to static electricity).

## Handling precaution

### 【Other precautions】

1. The products are designed to achieve the highest performance reliability, however they can be influenced by usage conditions.
2. Absolute Maximum Ratings are set to prevent LED products from breaking due to extreme stress (temperature, current, voltage, etc.).  
Usage conditions must never go above the ratings, nor the factors reach the rating level simultaneously.
3. To achieve the highest performance reliability it is necessary to take into account factors such as forward voltage adjusted to the usage temperature condition, derating of the power consumption, and other variable factors.
4. Please insert Protective Resistors in series into the circuit in order to stabilize LED operations and to prevent the device from overheating. The power supply should be such that there is no overcurrent due to surges when it is switched on and off, and no voltage in either the forward or reverse direction when it is switched off.
5. Please avoid using the products with materials and products that contain sulfur and chlorine elements because the reliability may be decreased. Please keep in desiccator before and after mounting, to prevent the products from being affected by corrosive gas.  
Also please make sure there isn't any gas in the surrounding area or entering from outside when using the products.
6. Please check the actual life time performance in the actual product use at your company because the specification sheets describe the characteristics of only the LED itself.
7. After mounting the product, if there is a process that uses ultrasonic welding etc., it may adversely affect the reliability of the junctions (ex. Die bonding and Wire bonding) in the package. Please make sure there are no problems before using.
8. The products are designed to perform without failure in the recommended usage conditions. However, please take the necessary precautions to prevent fire, injury, and other damage from these unexpected failures.
9. The products are manufactured to be used for ordinary electronic equipment. Please contact our sales staff in advance when exceptional quality and reliability are required, when the failure or malfunction of the products might directly jeopardize life or health (such as for airplanes, aerospace, medical applications, nuclear reactor control systems and so on).
10. Please avoid overloading pressure to the product when using tweezers to pick up LEDs.  
Overload might cause deformation, disconnection, chip-outs and consequently lead to lighting failure.  
Tweezers made of resin(PEEK etc.) with a flat tip is recommended.
11. The edge of glass is sharp. Please do not handle the LEDs with hands directly to avoid injury.  
Also, please do not touch the glass surface, the contamination of glass can affect the optical characteristics.
12. Please adjust the load, the pick up point, the nozzle diameter and etc. before mounting because the over load can cause the breakage of the glass. (Load condition : Less than 5N)
13. Pay attention to handling and storage of LEDs even after mounting, because overload caused by stacking PCBs and shock due to dropping or hitting might also lead to deformation, disconnection, and chipping.
14. In the processes of water pressure during cleaning, air pressure, drying and other processes after mounting, overload to glass should be avoided.

## Handling precaution

### 【Other precautions】

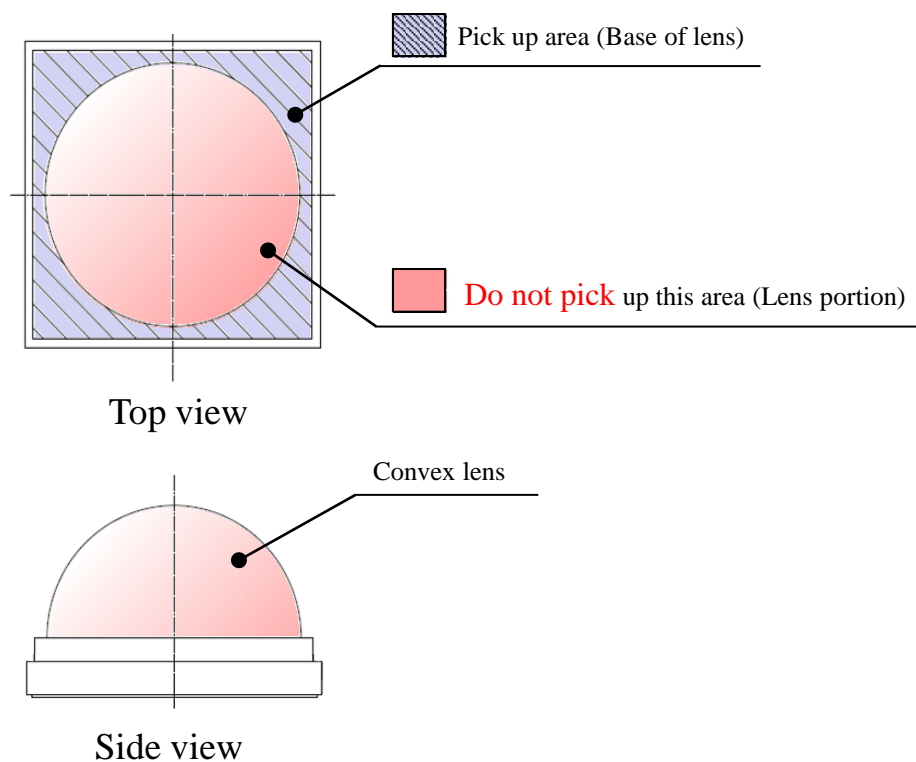
15. When LED mounted board fixed to the heat sink or housing, the package may break or the glass may come off if the LEDs and the mounted board are subjected to significant stress due to strain.  
The following are examples of strain (stress) generation.
  - LED mounted board is warped or twisted.
  - The flatness of the LED mounted board and the surface to be assembled is large.
  - Foreign objects are caught during assembly.
  - There is no margin between the LED mounted board hole diameter and the fixing screw, and stress is applied to the LED mounted board by the screw when tightening.
  - TIM (Thermal Interface Material) is crushed between the LED mounted board and the heat sink or housing.To prevent stress leading to breakage, the strain value in the solder pad during assembly should be less than  $900\mu\epsilon$ .  
( In case of Pb-Free Solder(SnAgCu), Al base-MCPCB )
16. When selecting the TIM, it should be confirmed that there will be no degradation of heat dissipation due to ageing, no degradation of optical properties due to scattering of organic compounds, and no contact failure.
17. In the same way, when dividing a surface-mounted board, please use a division method that does not place mechanical stress on the LED mounting area, and design the LED mounting position in such a way that it is not affected by the mechanical stress caused by the division.
18. This product belongs to risk group "3" in the Photobiological Safety of Lamps and Lamp Systems Standard (IEC 62471), which indicates potential risk of damage to eyes and skin due to ultraviolet radiations. Risk group 3 is classified as "high" concerning potential hazards to the human body; it is the highest risk group "that causes damage even from temporary or short exposure to ultraviolet radiations". Safety precautions are required.
19. This product emits strong ultraviolet rays when it is illuminated. Please do not look directly into the light source, for it could damage your eyes. Should it be necessary to observe the product while it is being lit, always use protective glasses that cut ultraviolet rays, as well as protective masks and gloves, etc. in order not to expose skin to the UV light. Please also take sufficient safety measures against UV light leakage, etc., in order to avoid any influence on the human body. Since the parts(materials) around the LED may also be discolored or deteriorated by ultraviolet light, please check before using.
20. This product generates heat when it is lit up. Since there is a risk of adverse effects on the human body and surrounding parts, please take sufficient safety measures against smoke, ignition and deterioration of parts.
21. Attach caution labels to your products which contain UV LEDs.
22. Storing and driving LEDs with water droplets due to dew condensation should be avoided. Exposed metal parts may corrode, leading to electrical failure (open / short).  
Waterproof coating is not recommended as it may contaminate the lens surface and impair product characteristics. If used, make sure that the coating process does not affect the LED and that the coating material is sufficiently durable against the emitted UV light.
23. If the product is used in an environment that does not meet the conditions of use and reliability test items described in this specification, damage or malfunction caused by those factors is not covered by the Stanley Warranty.
24. Keep out of reach of children.
25. The formal specification sheets should be exchanged and signed by both parties.

## Handling precaution

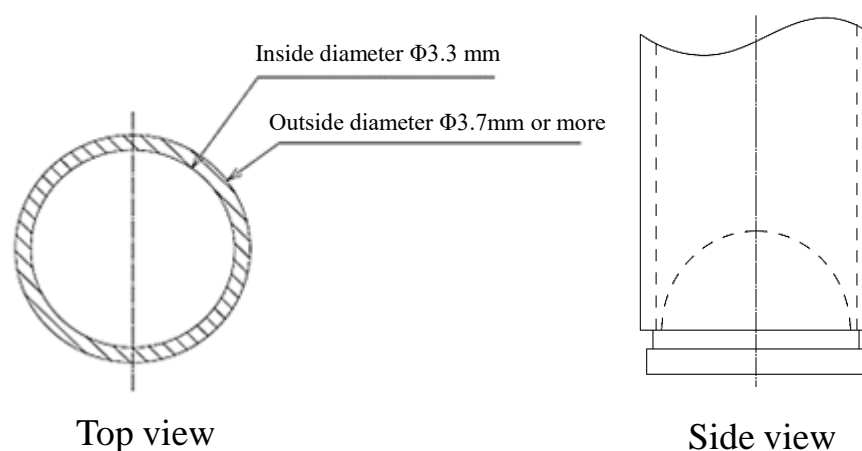
### 【Handling precautions for product mounting】

< Recommended conditions >

1. Pick up point : Base of lens of LED. (Shown below)  
Please pick up the lens base area only due to because the lens is made of quartz glass.  
Nozzle contact with the part except the lens base area may cause damage to the lens.



2. Load : **Less than 5N**
3. Nozzle should be used that a diameter inside is  $\phi 3.3$  mm and outside is  $\phi 3.7$  mm and more.  
Please adjust the load, the pick up point, the nozzle diameter and etc. before mounting because the over load can cause the breakage of the lens.



## Packaging specifications

This product is shipped in moisture-proof packaging (as shown below) to minimize moisture absorption during shipping. However, in regards to storing the products, the use of dry-box under the following conditions is recommended. Moisture-proof bag as the packaging is made of anti-static material but packaging box is not.

### 【Recommended storage condition / Products warranty period】

Temperature	+5 to 30°C
Humidity	Under 60%rh

In the case of the package unopened, **12 months under 【 Recommended storage condition 】**. Please avoid rapid transition from low temp. condition to high temp. condition and storage in corroding and dusty environment.

### 【Time elapsed after package opening】

This product is **equivalent to IPC/JEDEC J-STD-020F MSL 2a.** (672h = 4 weeks)

The package should not be opened until immediately prior to its use.

If any components should remain after their use, please seal the package and store them under the conditions described in the above 【 Recommended storage condition 】.

Baking process should be performed after putting out from package.

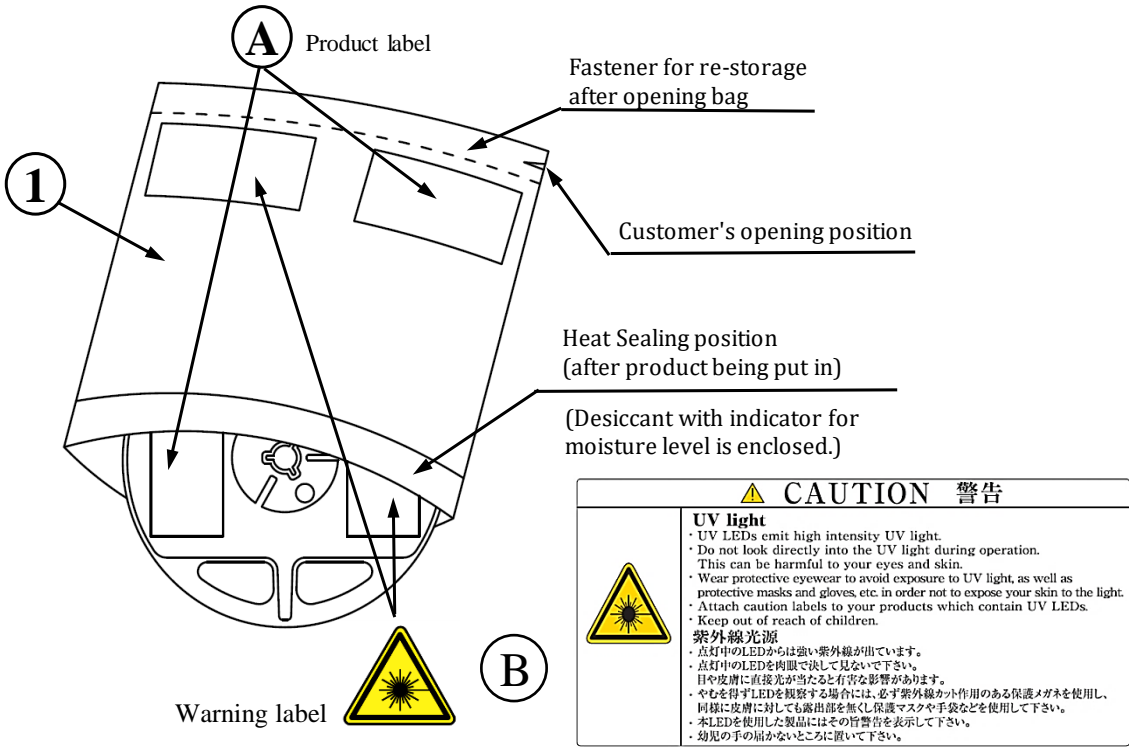
Please keep the time frame between package opening and soldering which is **【maximum 672h.】**

Baking conditions: **10h(min.), at +60°C ±5°C** just before use

Baking may be performed in the tape-reel form, however if it is performed with the reel stacked over one another, it may cause deformation of the reels and taping materials, which may cause problems during production. Please make sure that the product has cooled to normal temperature after performing the baking process. Provided that, baking process shall be 2 times Max.

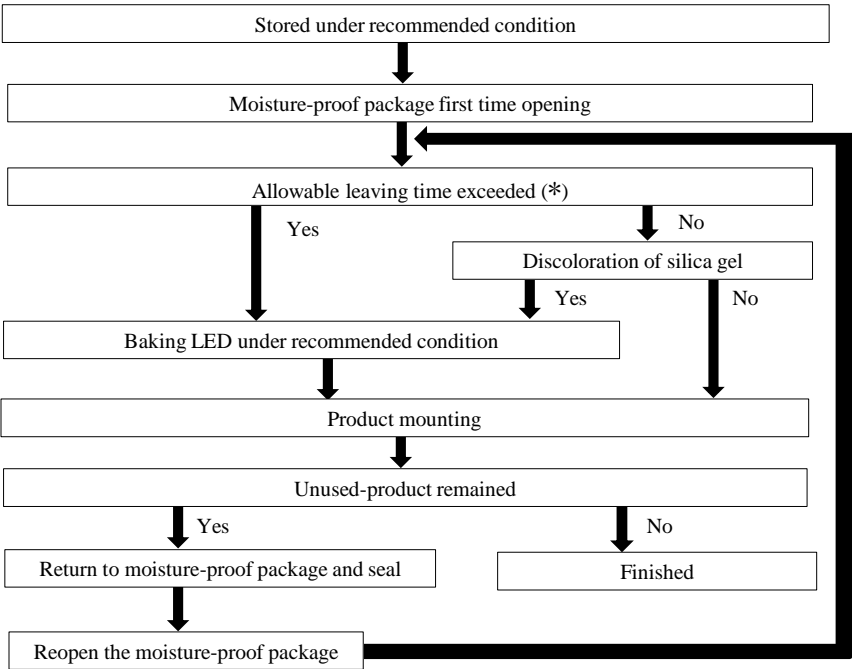
Packaging specifications

【Moisture-proof packaging specification】



No.	Part name	Material	Remarks
①	Moisture-proof bag with aluminum layer	PET+Al+PE	with ESD protection

【Flow chart-package opening to mounting】



Allowable leaving time means the maximum allowable leaving time after opening package, which depends on each LED type.

The allowable leaving time should be calculated form the first opening of package to the time when soldering process is finished.

When judging if the allowable leaving time has exceeded or not, please subtract the soldering time. The allowable leaving time after reopening should be calculated form the first opening of package, or from the time when baking process is finished.

Packaging specifications

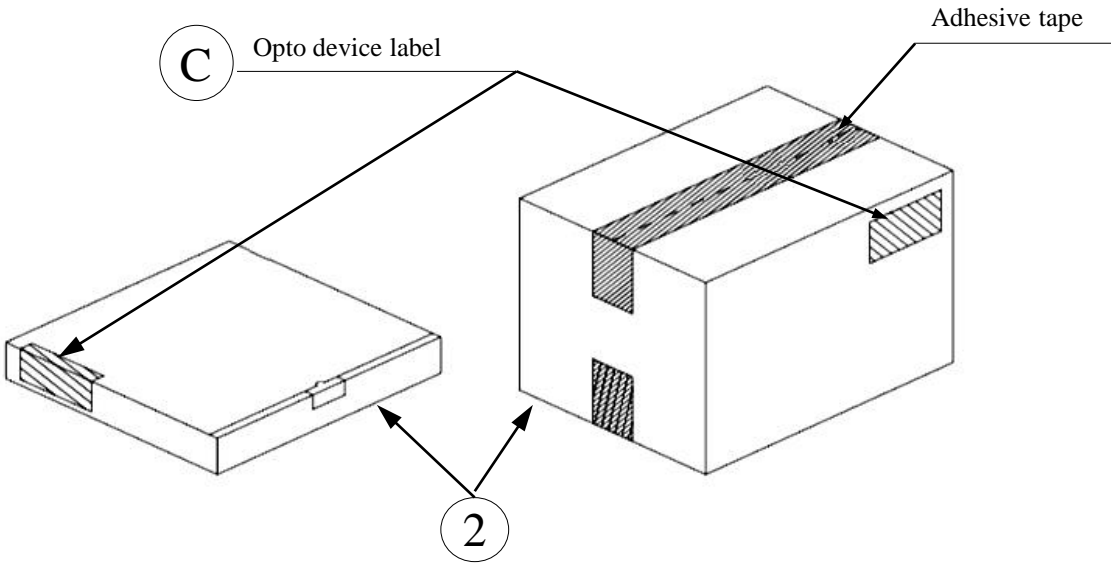
【Packing box】

(RoHS / ELV Compliant)

Box type	Outline dimension L × W × H (mm)	Capacity of the box
Type A	280 × 265 × 45 (mm)	2 reels
Type B	310 × 235 × 265 (mm)	10 reels
Type C	440 × 310 × 265 (mm)	20 reels
Type D	305 × 270 × 65 (mm)	2 reels
Type E	370 × 280 × 270 (mm)	20 reels
Type F	530 × 380 × 270 (mm)	40 reels

The above measures are all the reference values.

The box is selected out of the above table by shipping quantity.



Type A

Material / Box : Cardboard

Type B, C

Material / Box : Cardboard, Partition : Cardboard

Type D

Material / Box : Cardboard

Type E, F

Material / Box : Cardboard

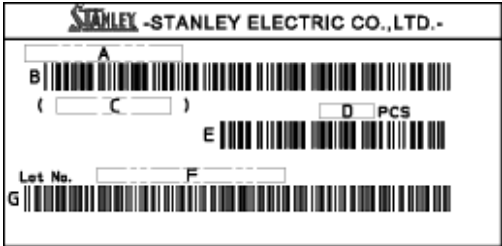
NO.	Part name	Material	Remarks
②	Packing box	Corrugated cardboard	without ESD protection



Packaging specifications

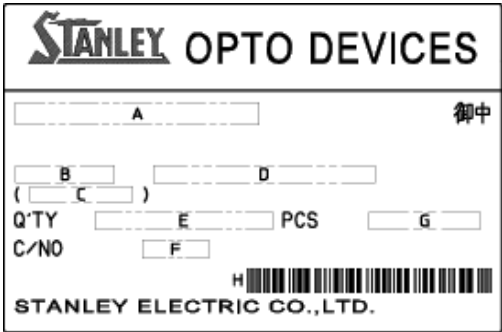
【Label specification】  
(acc.to ISO/IEC 16388)

A Product label



- A. Parts number
- B. Bar-code for parts number
- C. Parts code (In-house identification code for each parts number)
- D. Packed parts quantity
- E. Bar-code for packed parts quantity
- F. Lot number & rank  
(refer to Lot number notational system for details )
- G. Bar-code for lot number & rank

C Opto device label

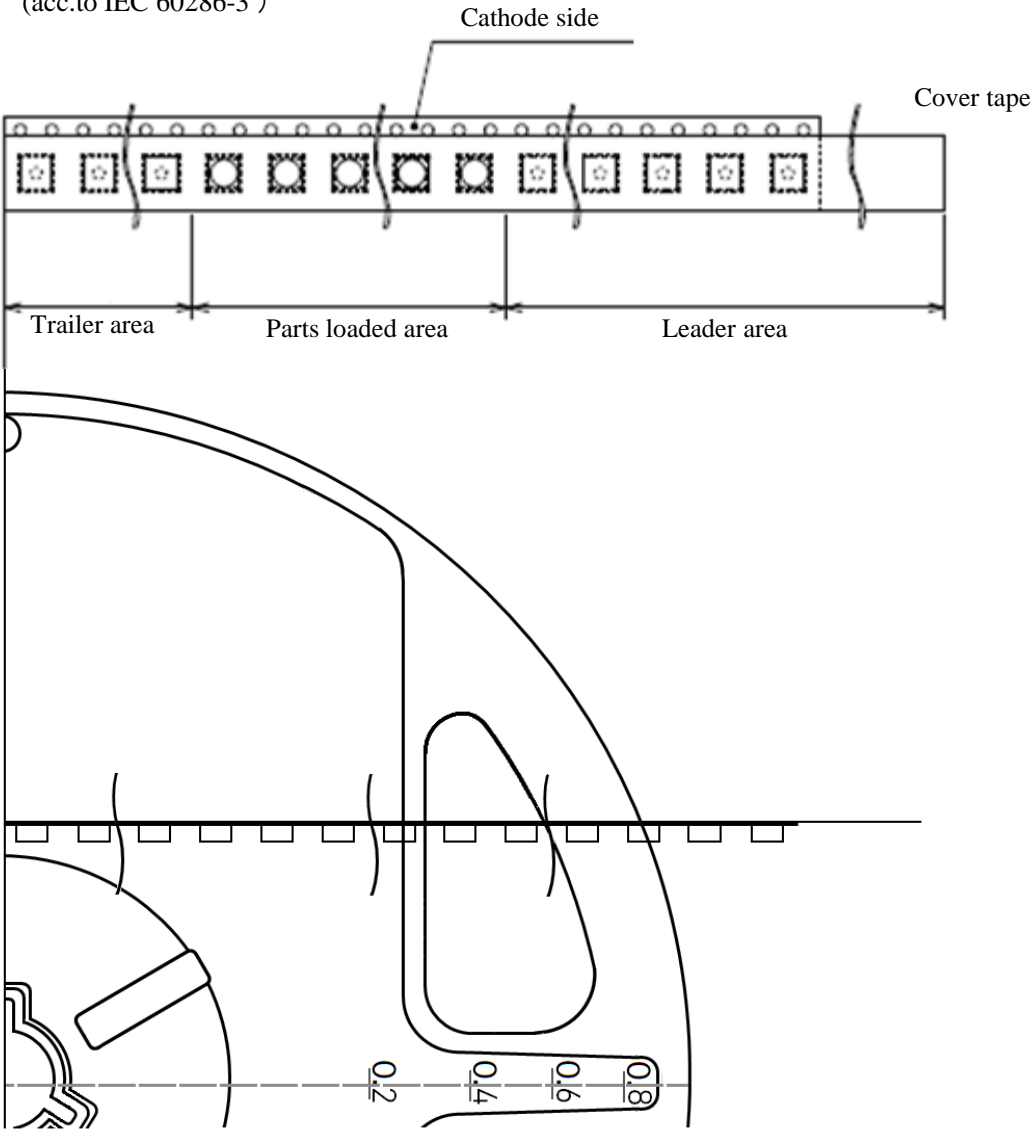


- A. Customer name
- B. Parts type
- C. Parts code
- D. Parts number
- E. Packed parts quantity
- F. Carton number
- G. Shipping date
- H. Bar-code for In-house identification number

<Remarks> Bar-code font : acc.to Code-39(ISO/IEC 16388)

Taping and reel specifications

【Appearance】  
(acc.to IEC 60286-3 )



Note  
"-TR" means Cathode Side of LEDs should be placed on the sprocket-hole side.

Items		Specifications	Remarks
Leader area	Cover-tape	Cover-tape shall be longer than 300mm without carrier-tape.	The end of cover-tape shall be held with adhesive tape.
	Carrier-tape	Empty pocket shall be more than 13 pieces. (longer than 100mm)	Please refer to the above figure for Taping & reel orientation .
Trailer area		Empty pocket shall be more than 20 pieces. (longer than 160mm)	The end of taping shall be inserted into a slit of the hub.

## Taping and reel specifications

ZEUBE265-2CA-TR

(acc.to IEC 60286-3 )

### 【Qty. per reel】

800parts/reel

Minimum Qty. per reel might be 100 parts when getting less than 800 parts.

In such case, parts of 100-unit-qty.(ex. 100, 200, 300, 400, 500, 600, 700, 800) shall be packed in a reel and the qty. shall be identified on the label.

### 【Mechanical strength】

Cover-tape adhesive strength shall be  $0.1 \sim 1.3\text{N}$  ( an angle between carrier-tape and cover-tape shall be  $170^\circ$ . ) Both tapes shall be so sealed that the contained parts will not come out from the tape when it is bent at a radius of 15mm.

### 【Others】

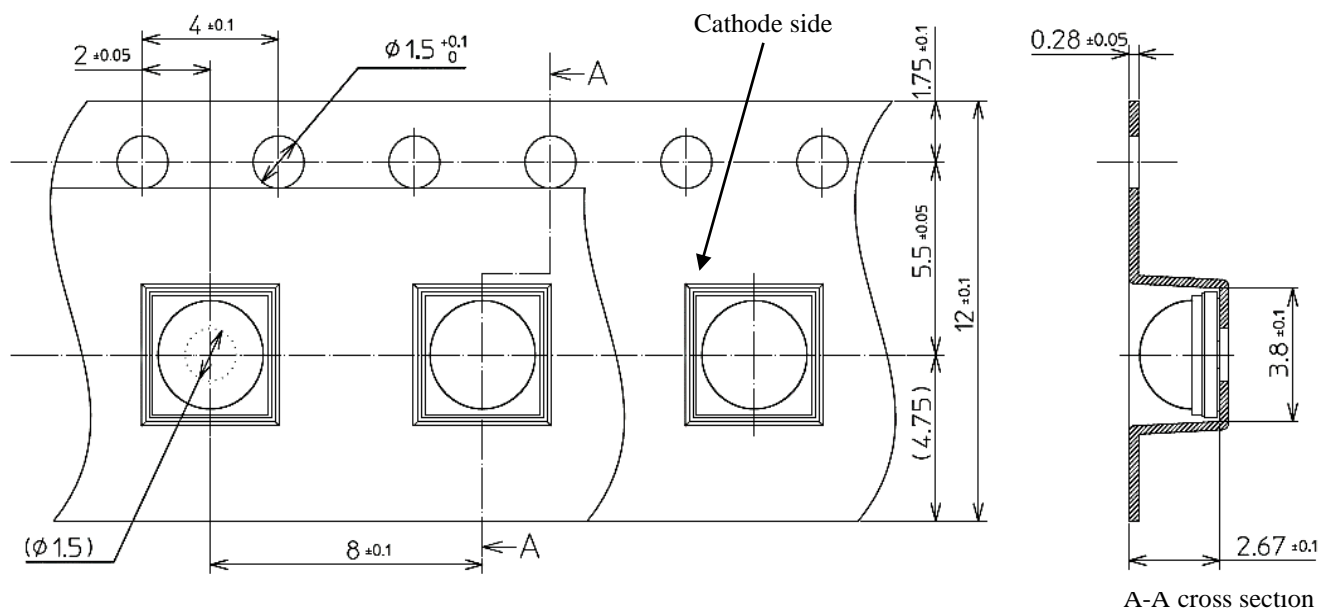
Reversed-orientation, Up-side down placing, side placing and out of spec. parts mixing shall not be held.  
Empty pocket per reel is assumed until 1 piece.

# Taping and reel specifications

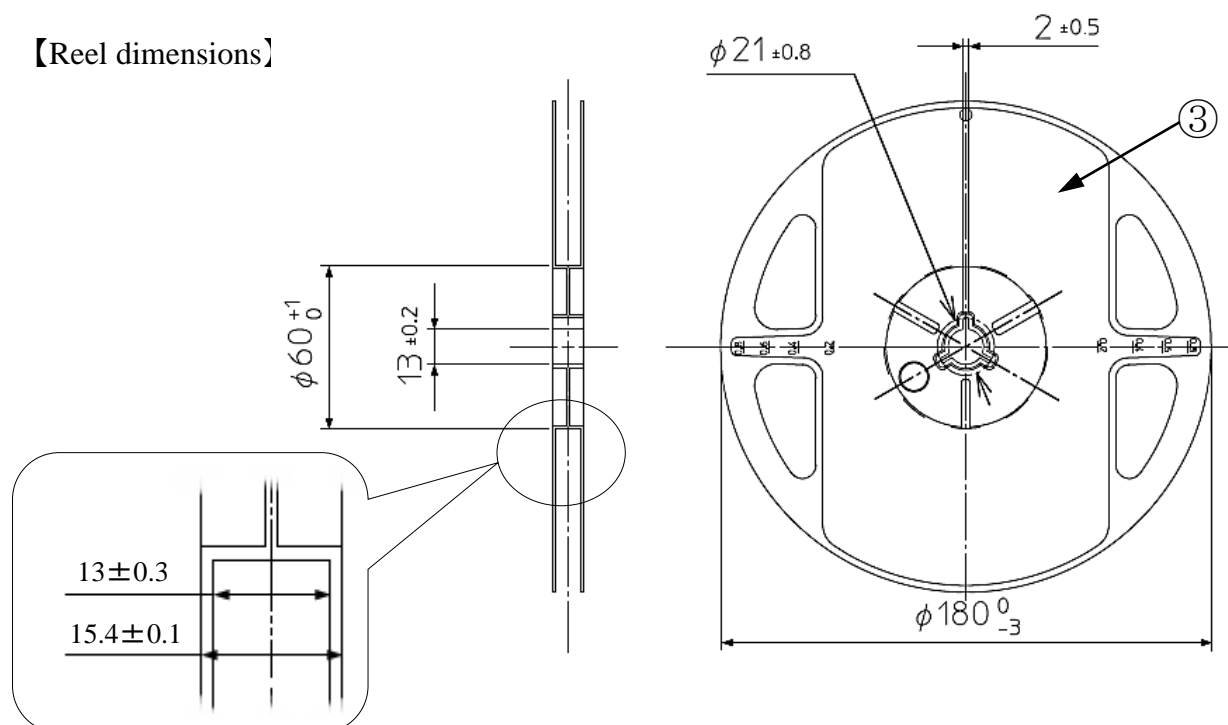
ZEUBE265-2CA-TR

## 【Taping dimensions】

(acc.to IEC 60286-3 )



## 【Reel dimensions】



NO.	Part name	Remarks
①	Carrier tape	with ESD protection
②	Cover tape	with ESD protection
③	Carrier reel	with ESD protection

## Lot number notational system

①	②	③	④	⑤	⑥	⑦	⑧	⑨							

① - 1digit : Production location (mark identify alphabet)

② - 1digit : Production year (The last digit of production year 2025→5, 2026→6, 2027→7, 2028→8 ...)

③ - 2digits : Production month (Jan. to Sep. , should be 01,02,03 ...)

④ - 2digits : Production date

⑤ - 3digits : Serial number

⑥ - 2digits : Tape and reel following number

⑦ - 2digits : Total radiant flux rank.

(If total radiant flux rank is 1 digit, "-" shall be dashed on the place for the second digit.

If there is no identified rank, "- -" is used to indicate.)

⑧ - 2digits : Peak wavelength rank

(If peak wavelength rank is 1 digit, "-" shall be dashed on the place for the second digit.

If there is no identified rank, "- -" is used to indicate.)

⑨ - 1digit : Forward voltage rank (If rank is not defined, "-" is described.)

## Correspondence to RoHS / ELV instruction

This product is in compliance with RoHS / ELV.

Prohibition substance and it's criteria value of RoHS / ELV are as follows.

- RoHS instruction ... Refer to following 1 to 10.
- ELV instruction ... Refer to following 1 to 4.

2011/65/EU, (EU)2015/863

No.	Substance group name	Maximum permissible concentration value
1	Lead and its compounds	1,000ppm (0.1%)
2	Cadmium and its compounds	100ppm (0.01%)
3	Mercury and its compounds	1,000ppm (0.1%)
4	Hexavalent chromium compounds	1,000ppm (0.1%)
5	PBB : Polybrominated Biphenyls	1,000ppm (0.1%)
6	PBDE : Polybrominated Biphenyl Ethers	1,000ppm (0.1%)
7	DEHP : Bis (2-ethylhexyl) phthalate	1,000ppm (0.1%)
8	BBP : Butyl benzyl phthalate	1,000ppm (0.1%)
9	DBP : Dibutyl phthalate	1,000ppm (0.1%)
10	DIBP : Diisobutyl phthalate	1,000ppm (0.1%)

# Reliability testing result

## 1. Reliability testing result

Test item	Standard	Test condition	Duration	Failure
Room temperature operating life	JEITA ED-4912B	Ta=25°C I <sub>F</sub> =440mA	1,000h	0 / 10
High temperature operating life	JEDEC JESD22-A108	Ta=85°C I <sub>F</sub> =360mA	1,000h	0 / 78
Low temperature operating life	JEDEC JESD22-A108	Ta=-40°C I <sub>F</sub> =440mA	1,000h	0 / 10
Wet high temperature operating life 1	JEDEC JESD22-A101	Ta=85°C 85% I <sub>F</sub> =360mA 30min On/Off	1,000h	0 / 78
Wet high temperature operating life 2	JEDEC JESD22-A101	Ta=85°C 85% Min I <sub>F</sub> =100mA	1,000h	0 / 78
Power temperature cycling	JEDEC JESD22-A105	Ta=-40°C to 85°C I <sub>F</sub> =360mA 5min On/Off (each 15min)	1,000 cycles	0 / 78
Temperature cycling	JEDEC JESD22-A104	Ta=-40°C to 115°C (each 15min)	1,000 cycles	0 / 78
Vibration variable frequency	JEDEC JESD22-B103	200m/s <sup>2</sup> or 1.5mm, 20Hz to 2,000Hz to 20Hz (X,Y,Z direction, 4min sweep of each direction,)	4 cycles	0 / 30
Mechanical shock	JEDEC JESD22-B110	15,000m/s <sup>2</sup> 0.5ms 6 directions	5 times of each direction	0 / 30
Dew cycling test	AEC-Q102-001	→ Ta=-10°C, 95-100%, 1h → TF/3h → 80°C, 95-100%, 1h → Min I <sub>F</sub> =100mA	10 cycles	0 / 78
Resistance to reflow soldering heat	JEDEC JESD22-A113	Moisture soak : 30°C 60% 4Weeks Preheating : 150 to 180°C 90 to 120sec Soldering : 260°C Peak	2 times	0 / 30
ElectroStatic Discharge (ESD)	ANSI/ESDA/JEDEC JS-001	HBM : C=100pF R2=1.5kΩ ±8,000V	3 times of each polarity	0 / 30
Gas resistance test (H <sub>2</sub> S) Hydrogen Sulphide	IEC 60068-2-43	H <sub>2</sub> S : 40°C 90% 15ppm	336h	0 / 78
Gas resistance test (FMG) Flowing Mixed Gas	IEC 60068-2-60	Mixed Gas : 25°C 75% H <sub>2</sub> S 0.01ppm, SO <sub>2</sub> 0.2ppm, NO <sub>2</sub> 0.2ppm, Cl <sub>2</sub> 0.01ppm	500h	0 / 78

## 2. Failure criteria

Item	Symbol	Condition	Failure Criteria
Total radiant flux	Φ <sub>e</sub>	I <sub>F</sub> =440mA	Measured value < Initial value × 0.5
Forward voltage	V <sub>F</sub>	I <sub>F</sub> =440mA	Measured value ≥ Initial value × 1.1
Cosmetic appearance	-	-	Notable, discoloration, deformation and cracking

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## WARNING

- UV LEDs **emit high intensity UV (ultraviolet) light.**
- **Do not look directly into the UV light source ; this can be harmful to your eyes and skin.**
- **Wear protective eyewear to avoid exposure to UV light, as well as protective masks and gloves, etc. in order not to expose your skin to the light.**
- **Attach warning labels to your products which contain UV LEDs.**
- **keep out of reach of children.**