

Data sheet

Part number : TPP1101WA-TR



Package	Flat lens package, PIN Photo diode (Photo detector) Peak sensitivity wavelength : 950nm Outer Dimension 3.0 x 2.0 x 1.5mm (L x W x H)
Product features	<ul style="list-style-type: none"> •Lead-free soldering compatible •RoHS2 : 2011/65/EU, (EU)2015/863 compliant

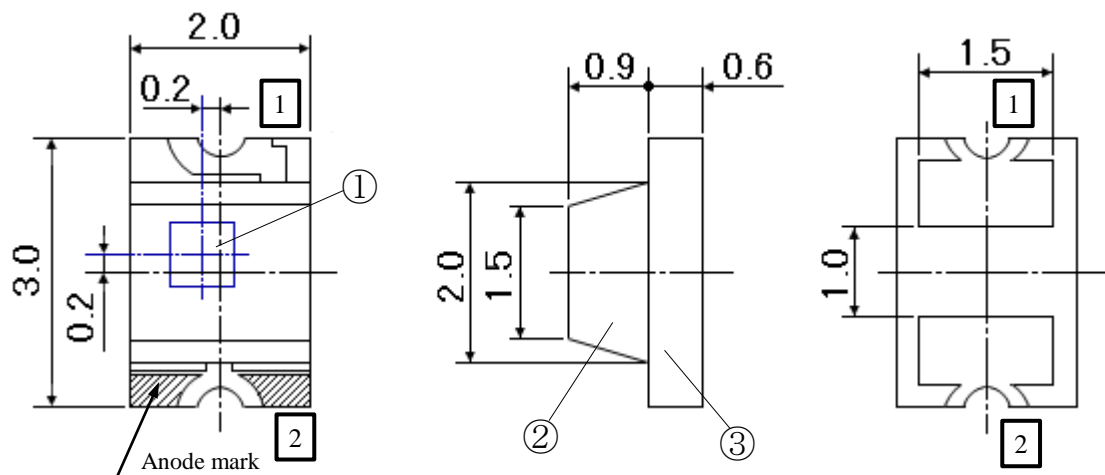
Recommended applications

- Optical power monitor for Laser, LED, etc.
- Optical space transmission
- Photoelectric switch
- Sensor for smoke, dust ,etc.

Outline dimensions

TPP1101WA-TR

Unit :mm
Weight :7.8mg
Tolerance :±0.2

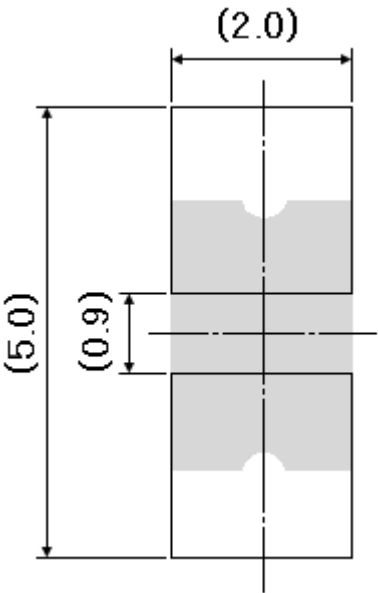


1 Cathode
2 Anode

Inside circuit

NO.	Part name	Material	Qty.
①	Photo diode	Si	1
②	Mold resin	Epoxy resin	1
③	Substrate	Glass fabrics	1

Recommended pad



Unit :mm

Specifications

TPP1101WA-TR

【 Absolute maximum ratings 】

Item	Symbol	Maximum ratings	Unit
Power dissipation	Pd	30	mW
Reverse voltage	V _R	15	V
Operating temperature	T _{opr}	-40 to +85	°C
Storage temperature	T _{stg}	-40 to +100	°C

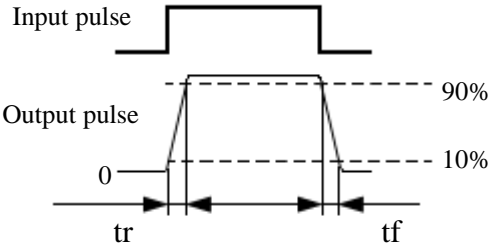
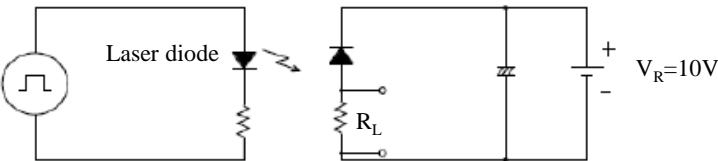
【 Electro-Optical characteristics 】

(Ta=25°C)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dark current	I _D	V _R = 10V	-	2	20	nA
Photo current	I _p	V _R = 5V, ※1 E _e = 5mW/cm ²	2.0	4.0	-	μA
Response time	Rise time	※2 V _R = 10V, R _L = 1kΩ	-	50	-	ns
	Fall time		-	50	-	ns
Peak wavelength	λ _p	V _R = 0V	-	950	-	nm
Capacitance	C _T	V _R = 5V, f=1MHz	-	3.0	-	pF
Photo area	A	-	-	0.3	-	mm ²
Angle of half sensitivity	Δθ _x	-	-	140	-	deg.
	Δθ _y	-	-	140	-	deg.

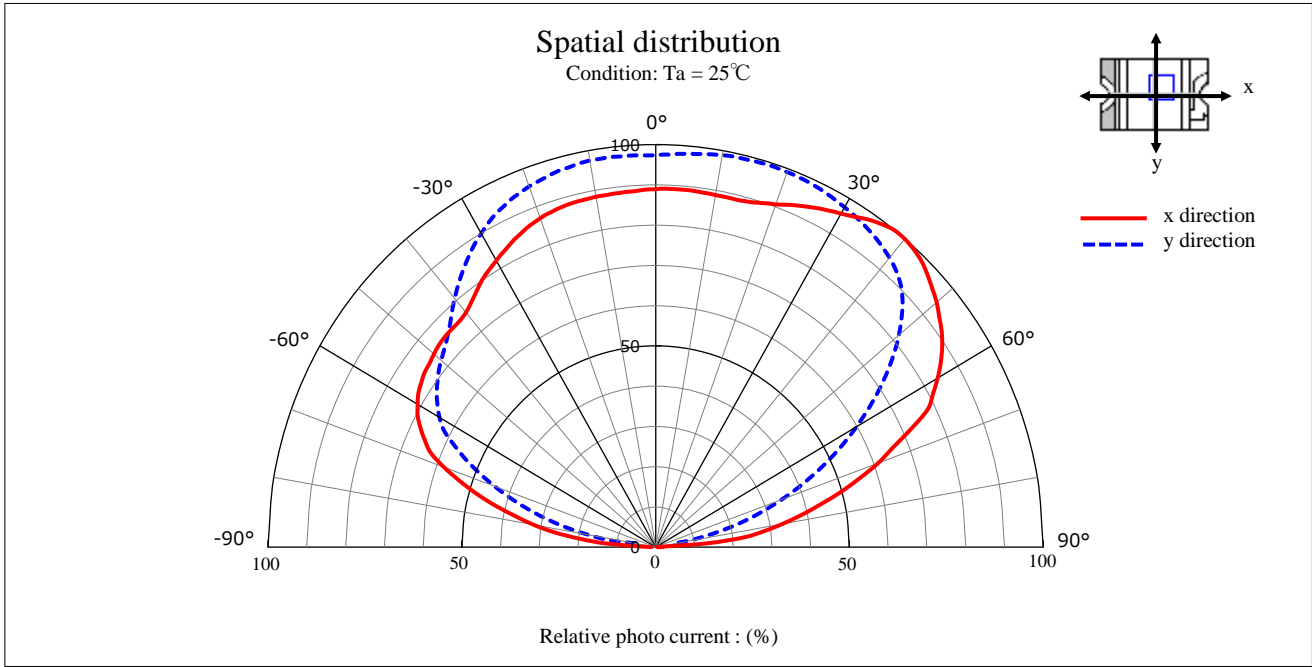
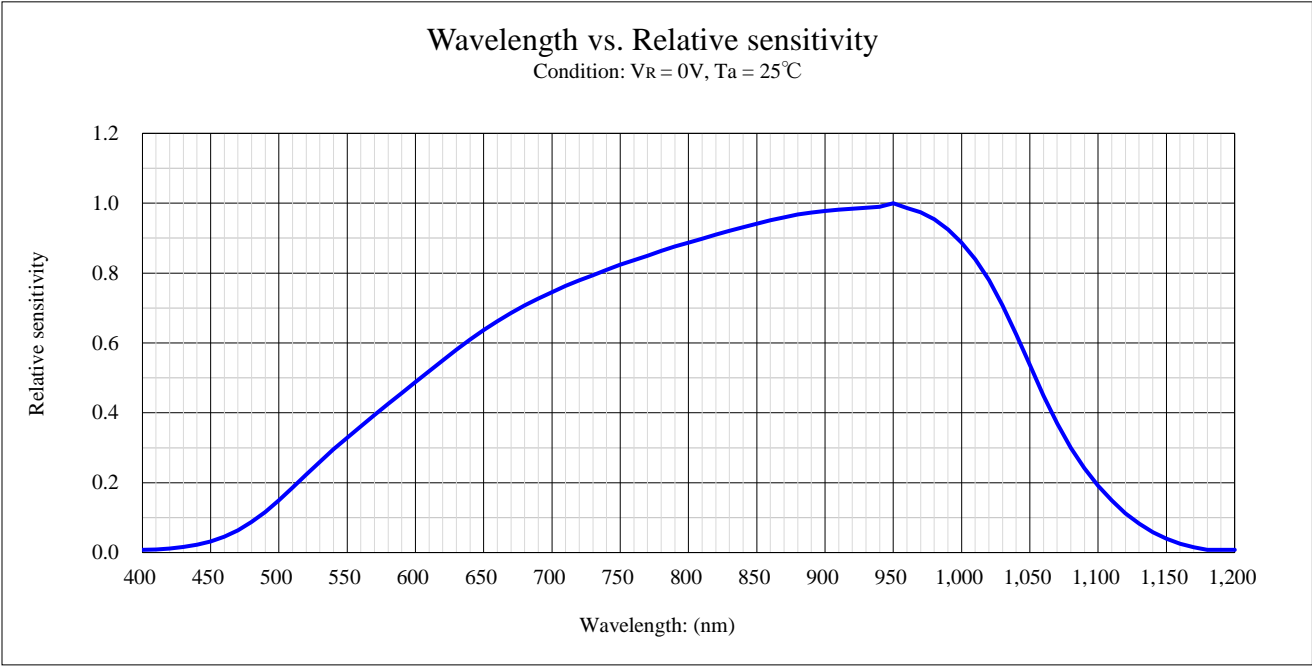
※1 Color temperature of light source : Use 2,856Kelvin tungsten filament lamp

※2 Response time test circuit



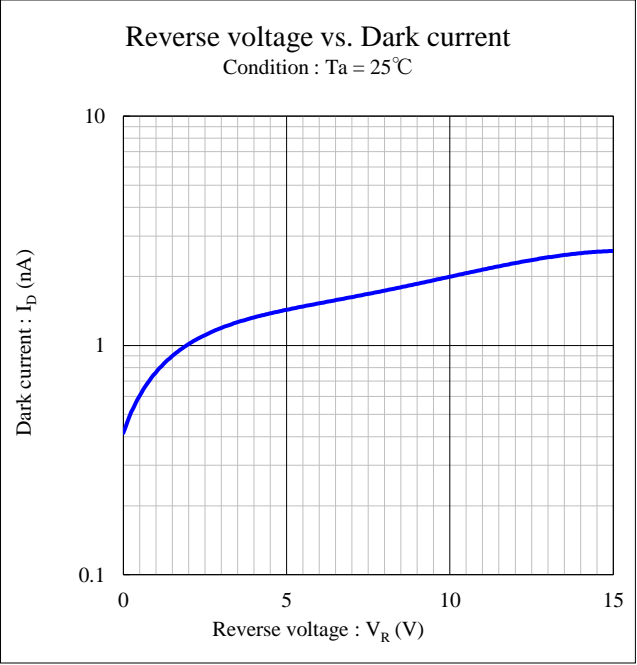
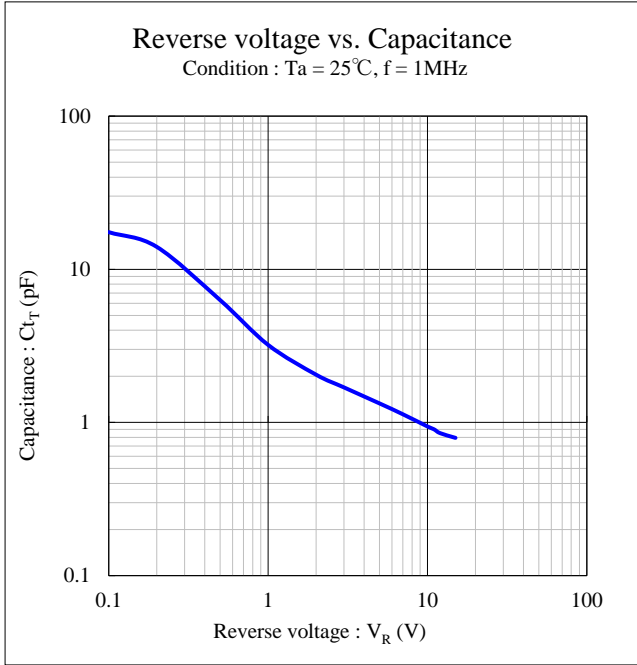
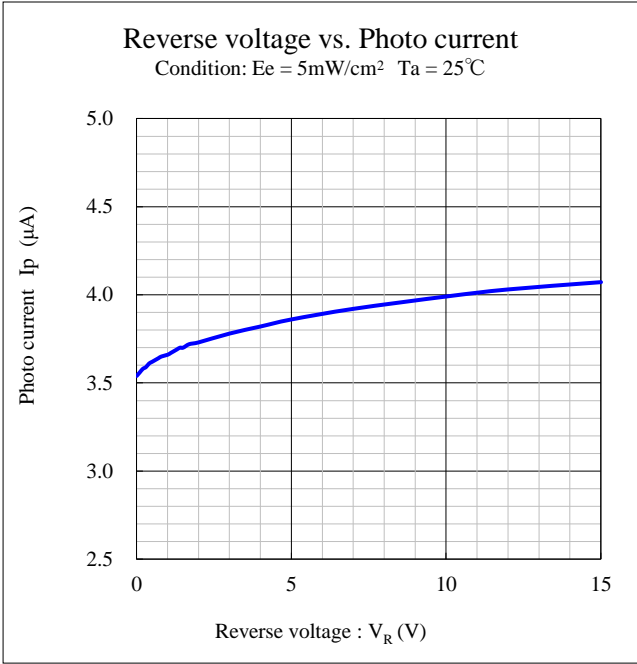
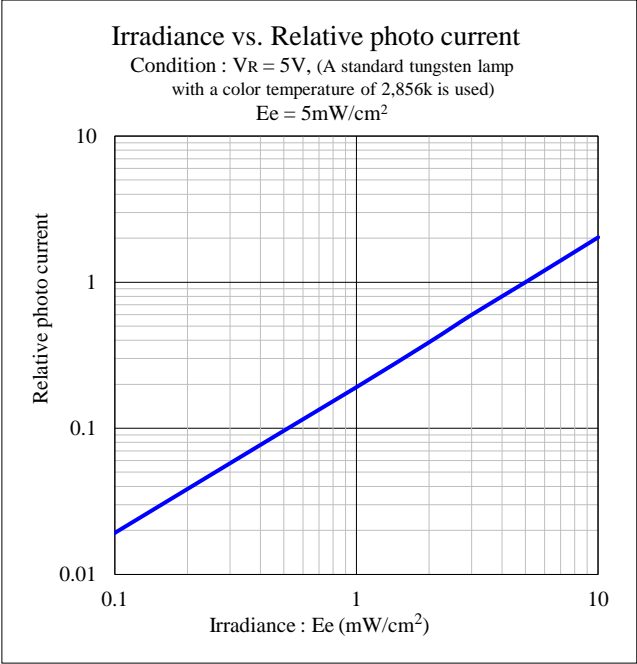
Technical Data

TPP1101WA-TR



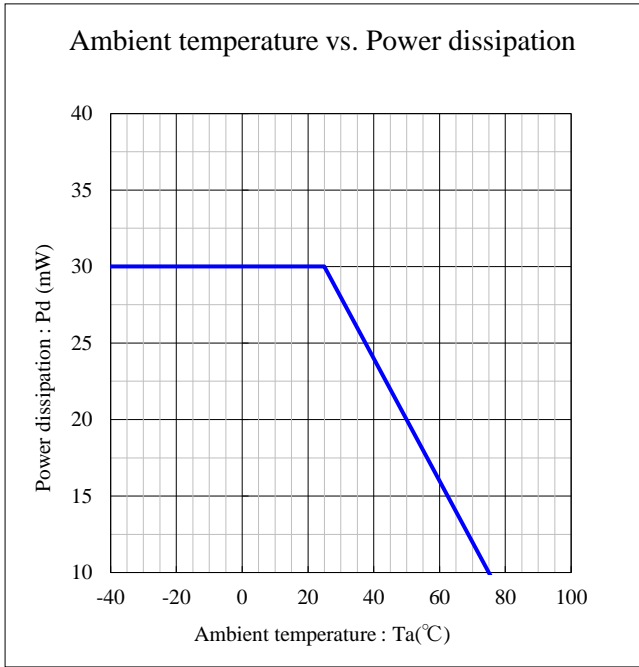
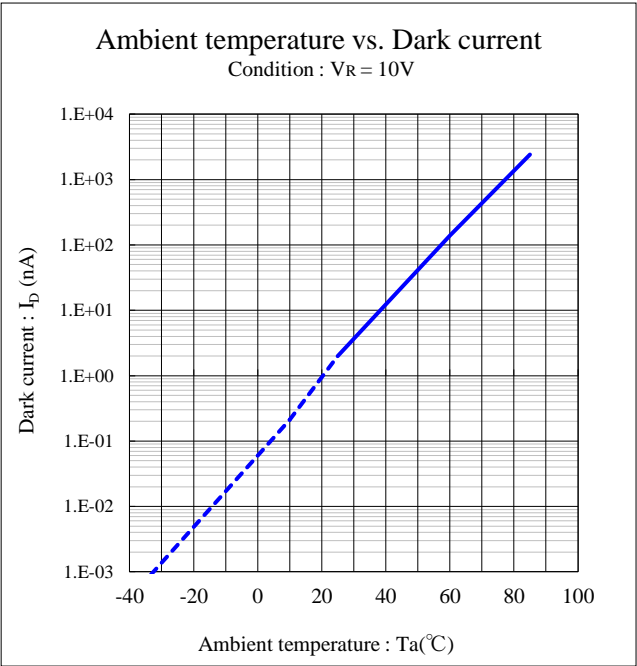
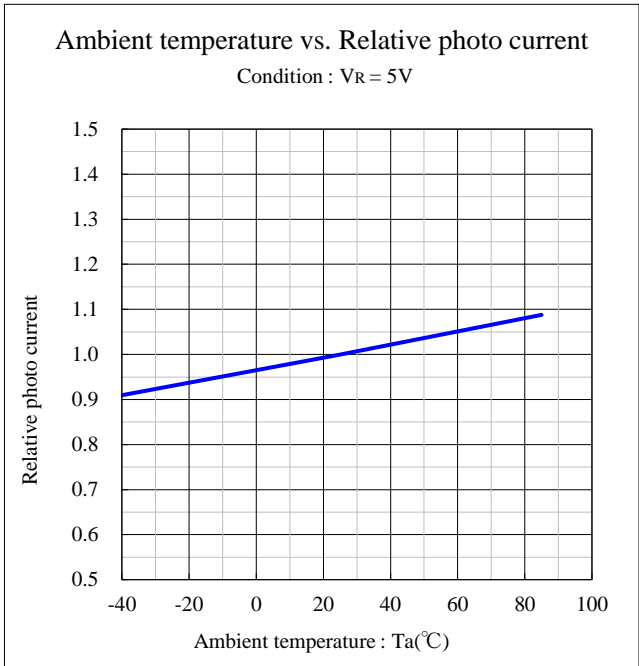
Technical Data

TPP1101WA-TR



Technical Data

TPP1101WA-TR



Soldering condition

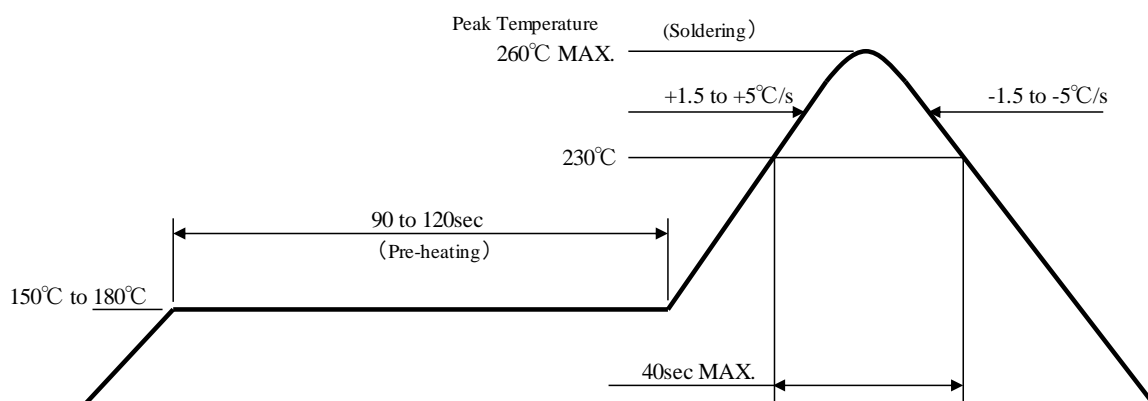
TPP1101WA-TR

【Soldering precaution】

(acc.to:EIAJ-4701/300)

1. Heat stress during soldering will influence the reliability of Photo transistors, however that effect will vary on heating method. Also, if components of varying shape are soldered together, it is recommended to set the soldering pad temperature according to the component most vulnerable to heat (e.g., surface mount Photo transistor).
2. Photo transistor parts including the resin are not stable immediately after soldering (when they are not at room temperature), any mechanical stress may cause damage to the product. Please avoid such stress after soldering, especially stacking of the boards which may cause the boards to warp and any other types of friction with hard materials.
3. Recommended temperature profile for the Reflow soldering is listed as the temperature of the resin surface. Temperature distribution varies on heating method, PCB material, other components in the assembly, and mounting density.
Please do not repeat the heating process in Reflow process more than twice.

【Recommended reflow soldering condition】



Notes 1 Temperature profile for the reflow should be set to the surface temperature of resin which is on the top of Photo transistor. This should be the maximum temperature for soldering.
Lowering the heating temperature and decreasing heating time is very effective in achieving higher reliability.

Notes 2 The reflow soldering process should be done up to twice(2 times Max). When second process is performed, interval between first and second process should be as short as possible to prevent absorption of moisture to resin of Photo transistor. The second soldering process should not be done until Photo transistors have returned to room temperature (by nature-cooling) after first soldering process.

Soldering condition

TPP1101WA-TR

4. If soldering manually, Stanley recommends using a soldering iron equipped with temperature control. During the actual soldering process, make sure that the soldering iron never touches the Photo transistor itself, and avoid the Photo transistor's electrode heating temperature reaching above the heating temperature of the solder pad. All repairs must be performed only once in the same spot, and please avoid reusing components.
5. In soldering process, immediately after iron tip is cleaned, please make sure that the soldering iron reaches the appropriate temperature before using. Also, please avoid applying any types of pressure to the soldered components before the solder has been cooled and hardened, as it may deteriorate solder performance and solder quality.

【Recommended manual soldering condition】

Temperature of iron tip	350°C MAX.
Soldering duration, time	3sec. Max., 1 time

6. When using adhesive material for tentative fixatives, thermosetting resin or Ultraviolet radiation (UV) setting resin with heat shall be recommended.
《The curing condition, Temperature:150°CMax./Time:120sec.Max.》
7. Isopropyl alcohol is recommended for cleaning. Some chemicals, including Freon substitute detergent could corrode or affect the optical characteristics of the lens or the casing surface. Please review the reference chart below for cleaning. Cleaning with ultrasonic shall not be recommended.

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

Dipping time is 3 minutes Max. at normal temperature.

8. Dip soldering : Not recommended for this product.

Handling precautions

TPP1101WA-TR

【 Other precautions 】

1. Stanley photo transistor has semiconductor characteristics and are designed to ensure high reliability. However, the performance may vary depending on usage conditions.
2. Absolute Maximum Ratings are set to prevent photo transistor from failing due to excess stress(temperature, current, voltage, etc.). Usage conditions must not exceed the ratings for a moment, nor do reach one item of absolute maximum ratings simultaneously.
3. In order to ensure high reliability from photo transistor, variable factors that arise in actual usage conditions should be taken into account for designing. (Derating of TYP., MAX Forward Voltage, etc.)
4. Please insert Straight Protective Resistors into the circuit in order to stabilize photo transistor operation and to prevent the device from igniting due to excess current.
5. Please check the actual performance in the assembly because the Specification Sheets are described for photo transistor only.
6. The products are designed to operate without failure in recommended usage conditions. However, please take the necessary precautions to prevent fire, injury, and other damages should any malfunction or failure arise
7. The products are manufactured to be used for ordinary electronic equipment. Please contact our sales staff beforehand when exceptional quality and reliability are required, and the failure or malfunction of the products might directly jeopardize life or health (such as for airplanes, aerospace, transport equipment, medical applications, nuclear reactor control systems and so on).
8. The formal specification sheets shall be valid only by exchange of documents signed by both parties.

Packaging specifications

TPP1101WA-TR

This product is baked (moisture removal) before packaging, and is shipped in moisture-proof packaging (as shown below) to minimize moisture absorption during transportation and storage. However, with regard to storing the products, Stanley recommends 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	+5~30°C
Humidity	Under 70%

In the case of the package unopened , 6 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.】

The package should not be opened until immediately prior to its use, and please keep the time frame between package opening and soldering which is **【maximum 72h】**.

If the device needs to be soldered twice, both soldering must be completed within the 168h.

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

This product must be required to perform baking process (moisture removal) for **at least 23h,not exceed for 48h**, at 60+ \pm 5 degrees Celsius if following conditions apply.

1. In the case of silica gel (blue) which indicates the moisture level within the package, changes or loses its blue color.
2. In the case of time is passed for 72h after the package is opened once.

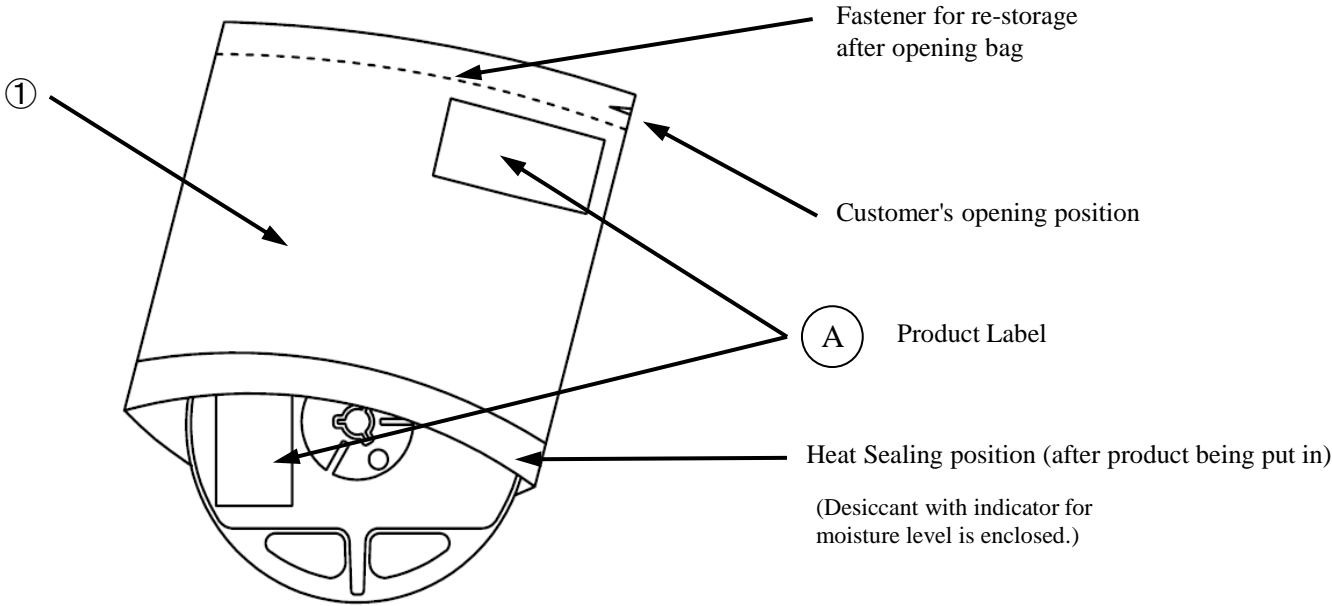
Baking process should be performed after Photo transistor having been taken out of the package.

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 and later obstruct mounting. Please handle only once it has returned to room temperature. Provided that, baking process shall be 2 times MAX.

Packaging specifications

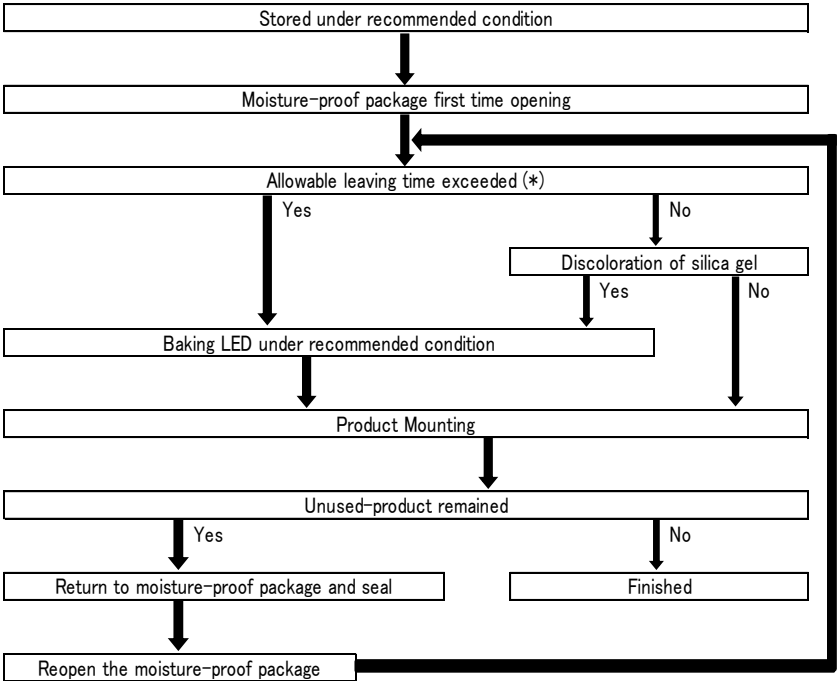
TPP1101WA-TR

【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 Photo transistor type. The allowable leaving time should be calculated from 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 from the first opening of package, or from the time when baking process is finished.

Packaging specifications

TPP1101WA-TR

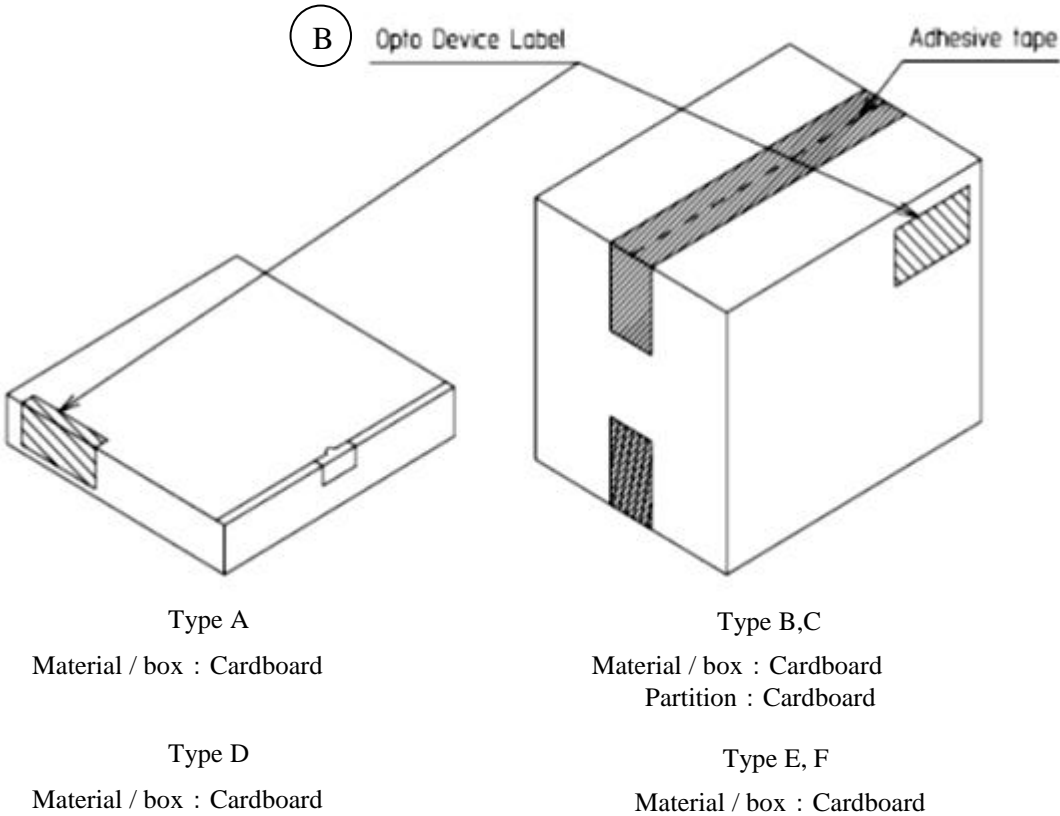
【 Packing box 】

(RoHS2 / ELV Compliant)

Box type	Outline dimension L × W × H (mm)	Capacity of the box
Type A	280 × 265 × 45	3 reels
Type B	310 × 235 × 265	15 reels
Type C	440 × 310 × 265	30 reels
Type D	305 × 270 × 65	3 reels
Type E	370 × 280 × 270	30 reels
Type F	530 × 380 × 270	60 reels

The above measure is all the reference value.

Box for shipment is selected out of the above table, according to the shipping quantity.



Packaging specifications

TPP1101WA-TR

【 Label specification】

(acc.to JIS-X0503(Code-39)

A Product label

STANLEY -STANLEY ELECTRIC CO.,LTD.-

A [] B [] C [] D [] PCS E [] F [] G []

Lot No. []

- 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

B Opto device label

STANLEY OPTO DEVICES

A [] 御中 B [] C [] D [] E [] PCS F [] G [] H []

Q'TY [] C/NO []

STANLEY ELECTRIC CO.,LTD.

- 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

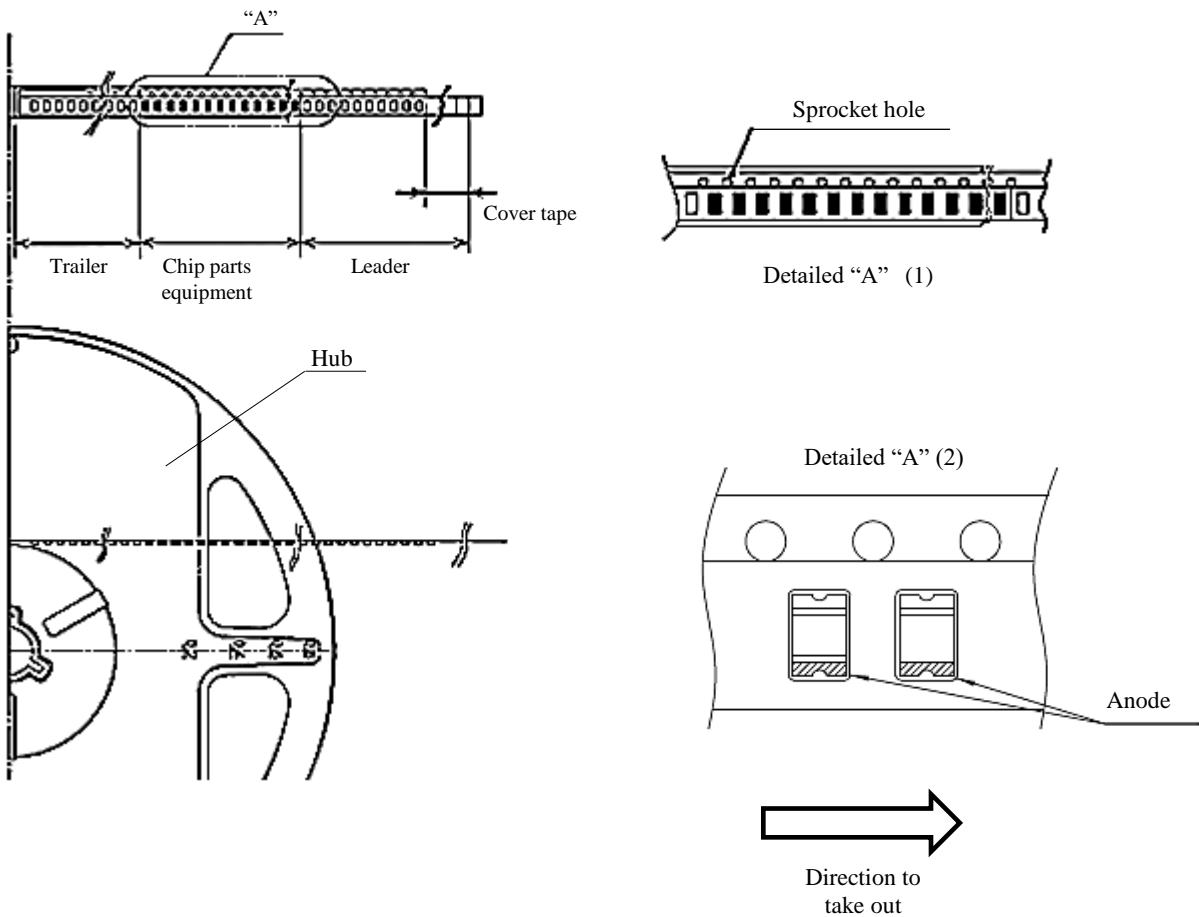
<Remarks> Bar-code font : acc.to Code-39 (JIS-X0503)

Taping and reel specifications

TPP1101WA-TR

(acc.to JIS-C0806-03)

【Appearance】



Note "-TR" means Emitter side of Photo transistors should be placed on the sprocket-hole side.

Items		Specifications	Remarks
Leader area	Cover-tape	Cover-tape shall be longer than 400mm without carrier-tape	The end of cover-tape shall be held with adhesive tape.
	Carrier-tape	Empty pocket shall be more than 20 pieces.	Please refer to the above figure for Taping & reel orientation .
Trailer area		Empty pocket shall be more than 30 pieces.	The end of taping shall be inserted into a slit of the hub.

Taping and reel specifications

TPP1101WA-TR

(acc.to JIS-C0806-03)

【Qty. per Reel】

2,500parts/reel

【Mechanical strength】

Cover-tape adhesive strength shall be 0.1 ~ 1.0N (An angle between carrier-tape and cover-tape shall be 170 deg.).
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 mix shall not be held.

TPP1101WA-TR

Unit :mm

Technical drawing of a mechanical part, showing front and side views with dimensions and tolerances.

Front View Dimensions:

- Top hole diameter: $\phi 1.5^{+0.1}_0$
- Top hole center-to-center distance: 4.0 ± 0.1
- Top hole radius: 2.3 ± 0.1
- Top hole thickness: 1.75 ± 0.1
- Bottom hole diameter: $\phi 1.1 \pm 0.2$
- Bottom hole center-to-center distance: 4.0 ± 0.1
- Bottom hole radius: 2.0 ± 0.05
- Bottom hole thickness: 3.5 ± 0.05
- Total height: 8.0 ± 0.2

Side View Dimensions:

- Top flange thickness: 0.2 ± 0.05
- Bottom flange thickness: 1.7 ± 0.1
- Center hole diameter: 3.35 ± 0.05

Labels:

- ①: Top flange
- ②: Bottom flange
- Center hole: Central hole in the side view

Technical drawing of a circular mechanical part, showing a top view and a side view.

Top View Dimensions:

- Outer Diameter: $\phi 180^{0}_{-3}$
- Inner Hole Diameter: $\phi 21 \pm 0.8$
- Slot Width: 2 ± 0.5
- Feature 3: Indicated by a circled number 3 and an arrow pointing to a slot.

Side View Dimensions:

- Outer Diameter: $\phi 60^{+1}_{0}$
- Inner Hole Diameter: 13 ± 0.2

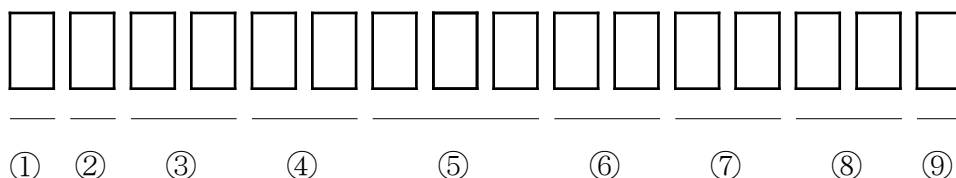
Detail View (Inset):

- Inner Hole Diameter: 9 ± 0.3
- Depth: 11.4 ± 1

NO.	Part name
①	Carrier tape
②	Cover tape
③	Carrier reel

Lot number notational system

TPP1101WA-TR



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

② - 1digit : Production year (The last digit of production year 2024→4, 2025→5, 2026→6, 2027→7 ...)

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 power rank.

(If total power 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 : Wavelength rank

(If 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 : VF Rank (If rank is not defined, "-" is described.)

Compliance with RoHS2/ELV

TPP1101WA-TR

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 condition

TPP1101WA-TR

1. Reliability testing result

Test item	Test condition	Duration	Failure
Operating life	Ta=25°C Maximum rated voltage (Dark condition)	1,000h	0 / 15
High temperature operating life	Ta=85°C V _R =5V (Dark condition)	1,000h	0 / 15
Low temperature operating life	Ta=-40°C V _R =5V (Dark condition)	1,000h	0 / 15
Wet high temperature operating life	Ta=60°C Rh=90% V _R =5V (Dark condition)	1,000h	0 / 15
High temperature storage life	Ta = Tstg max. Maximum storage temperature	1,000h	0 / 15
Low temperature storage life	Ta = Tstg min. Minimum storage temperature	1,000h	0 / 15
Wet high temperature storage life	Ta=60°C Rh=90%	1,000h	0 / 15
Thermal shock	Ta= Tstg max. to Tstg min. (each 15min)	200 cycles	0 / 15
Resistance to reflow soldering	Moisture soak : 30°C 70% 72h Preheating : 150 to 180°C 120sec. MAX. Soldering : 230 to 260°C 40sec. MAX.	2 times	0 / 15

2.Failure criteria

Item	Symbol	Test condition	Failure Criteria
Relative photo current	I _p	V _R = 5V , E _e = 5mW/cm ²	Testing MAX. value \geq Initial value \times 1.3 Testing MIN. value $<$ Initial value \times 0.7
Dark current	I _D	V _R = 10V	Testing MAX. value \geq 20nA \times 2.5
Cosmetic appearance	—	—	Notable, discoloration, deformation and cracking

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- 2) For the purpose of product improvement, the specifications, characteristics and technical data described in the data sheets are subject to change without prior notice. Therefore it is recommended that the most updated specifications be used in your design.
- 3) When using the products described in the data sheets, please adhere to the maximum ratings for operating voltage, heat dissipation characteristics, and other precautions for use. We are not responsible for any damage which may occur if these specifications are exceeded.
- 4) The products that have been described to this catalog are manufactured so that they will be used for the electrical instrument of the benchmark (OA equipment, telecommunications equipment, AV machine, home appliance and measuring instrument).
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