

Data sheet

Part number : TPS1101WA-TR



Package	Flat lens package, Photo transistor (Photo detector) Peak sensitivity wavelength : 880nm 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

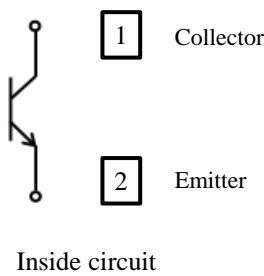
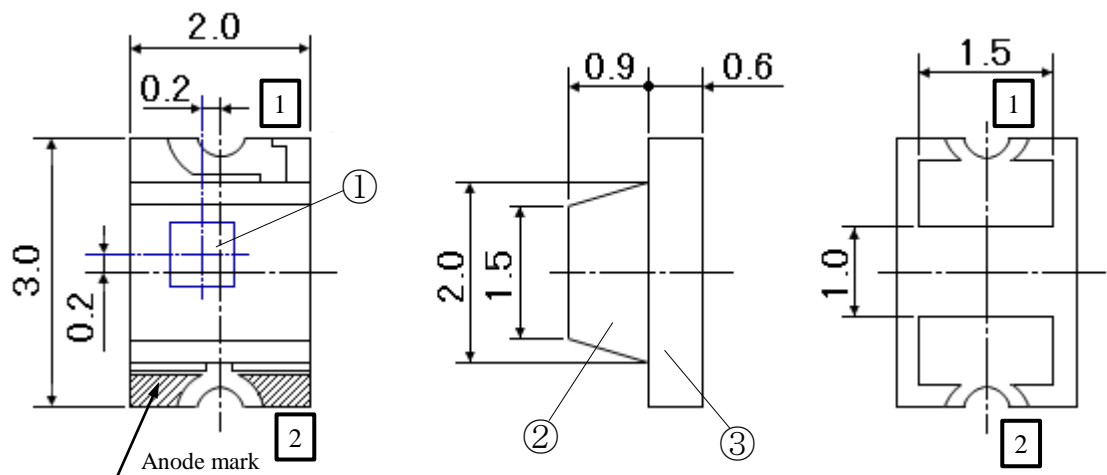
Recommended applications

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

Outline dimensions

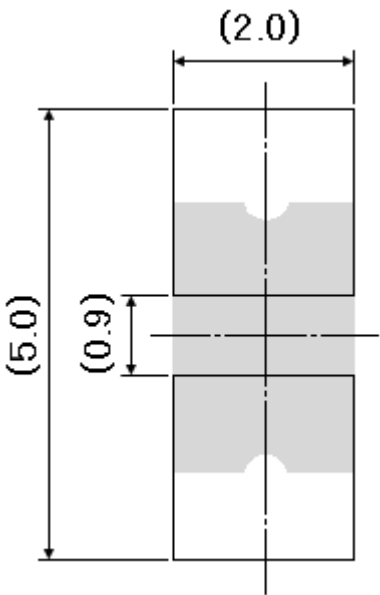
TPS1101WA-TR

Unit :mm
Weight :7.8mg
Tolerance :±0.2



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

TPS1101WA-TR

【 Absolute maximum ratings 】

Item	Symbol	Maximum ratings	Unit
Power dissipation	Pc	75	mW
Collector - emitter voltage	V _{CEO}	12	V
Emitter - collector voltage	V _{ECO}	5	V
Operating temperature	T _{opr}	-40 to +85	°C
Storage temperature	T _{stg}	-40 to +100	°C

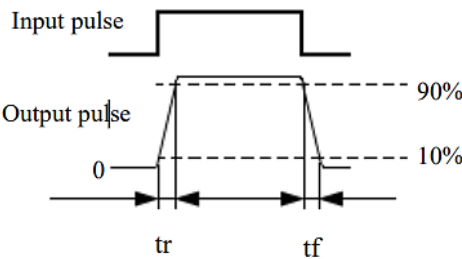
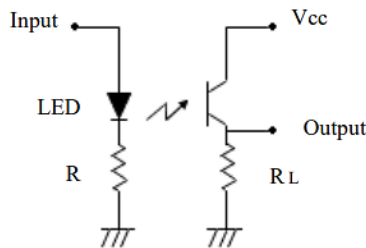
【 Electro-Optical characteristics 】

Ta=25°C

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit
Dark current		I _{CEO}	V _{CEO} = 10V	-	-	0	μA
Photo current		I _c	V _{CE} = 5V, ※1 Ee = 5mW/cm ²	2.1	-	7.2	mA
Response time	Rise time	tr	※2 V _{CE} = 10V, Ic=2mA, R _L = 100Ω	-	11	-	μsec
	Fall time	tf		-	13	-	μsec
Peak wavelength		λp	V _R = 0V	-	880	-	nm
Collector - emitter saturation voltage		V _{CE(sat)}	Ic = 0.5mA, Ee = 10mW/cm ²	-	0.1	-	V
Angle of half sensitivity		Δθx	-	-	140	-	deg.
		Δθy	-	-	140	-	deg.

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

※2 Response time test circuit



Specifications

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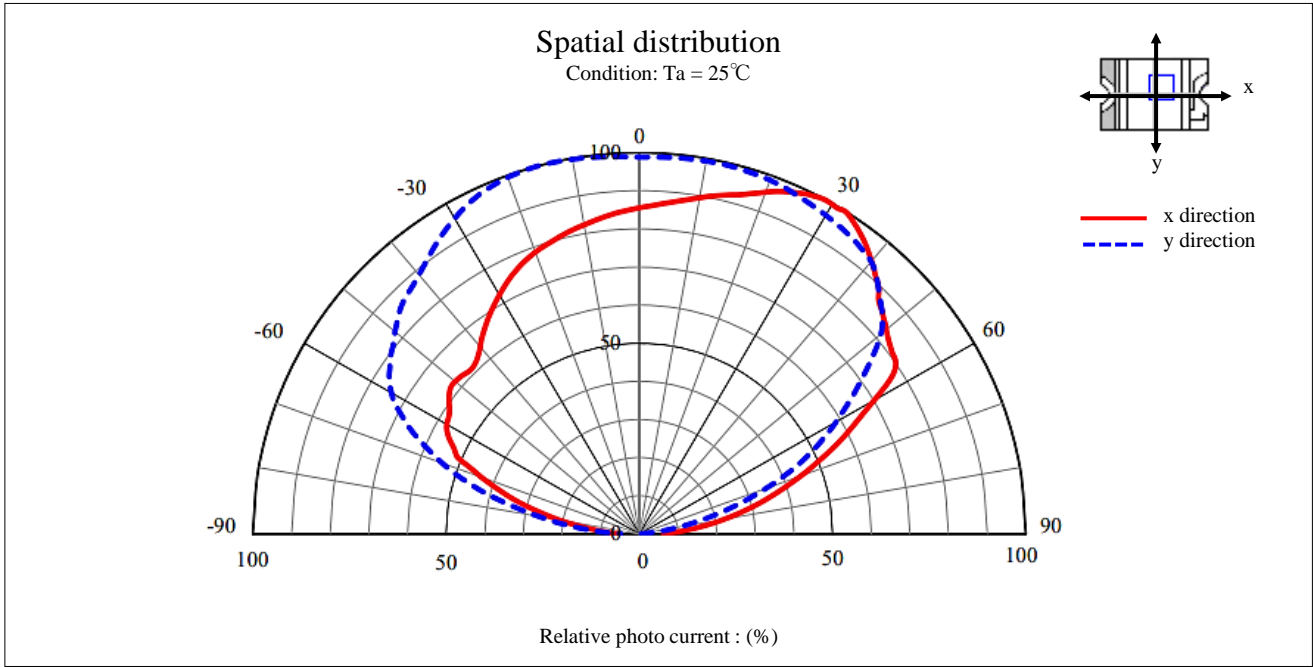
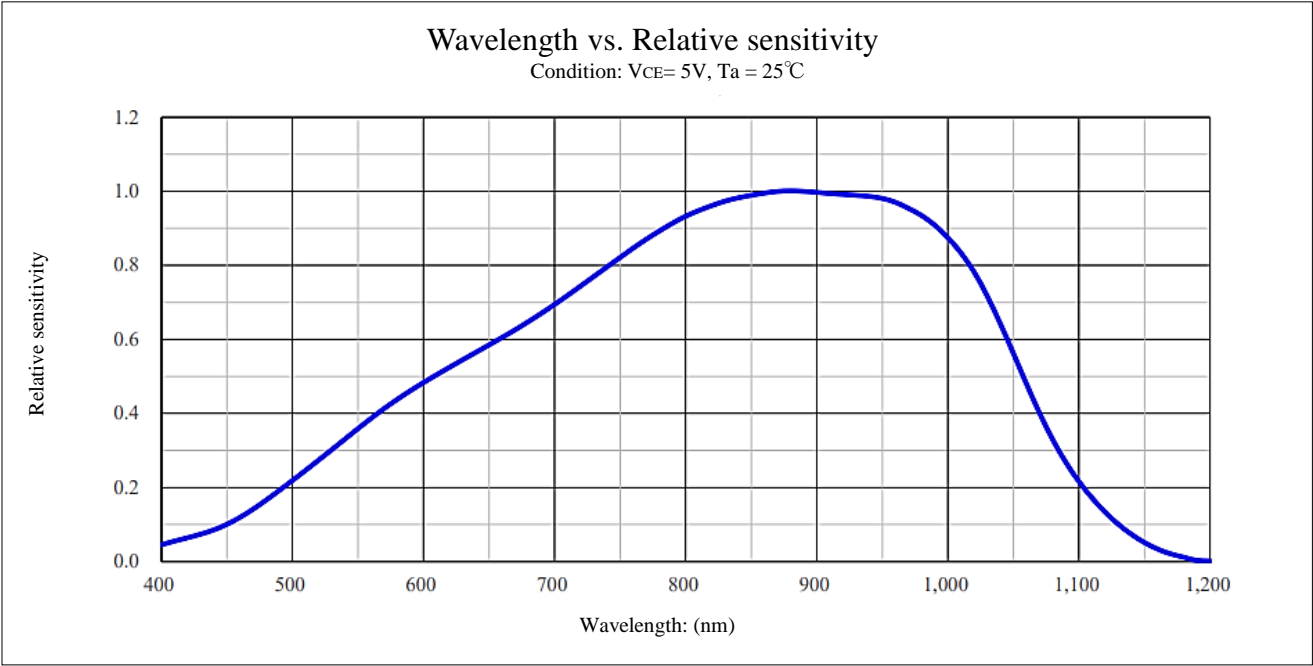
【 Sorting chart for Photo curre

Photo transistors shall be sorted out into the following two ranks of photo current.

Rank	Ic(mA)		Conditions
	Min.	Max.	
C	2.1	4.2	Vce=5V Ee=5mW/cm ² Ta=25℃
D	3.6	7.2	

Technical Data

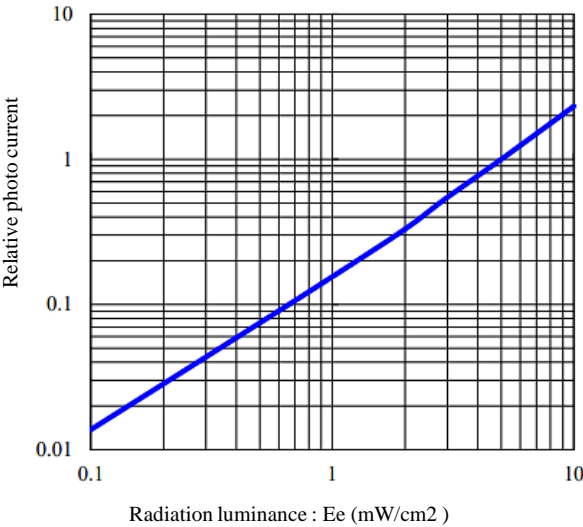
TPS1101WA-TR



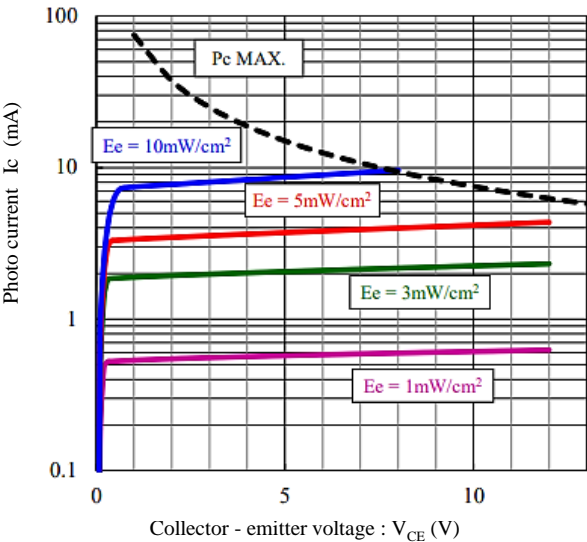
Technical Data

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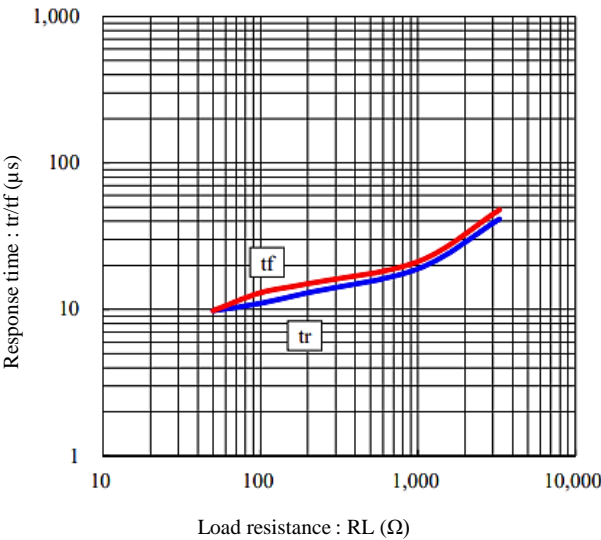
Radiation luminance vs. Relative photo current
Condition : $V_{CE} = 5V$, $T_a = 25^\circ C$



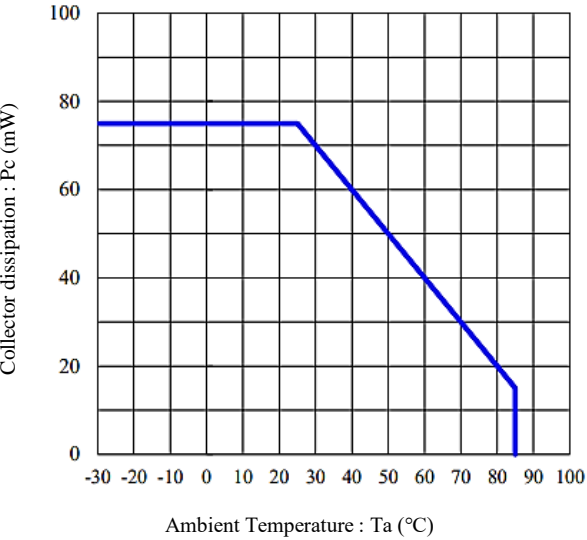
Collector - emitter voltage vs. Photo current
Condition: $T_a = 25^\circ C$



Reverse voltage vs. Capacitance
Condition : $V_{CE} = 10V$, $I_c = 2mA$, $T_a = 25^\circ C$

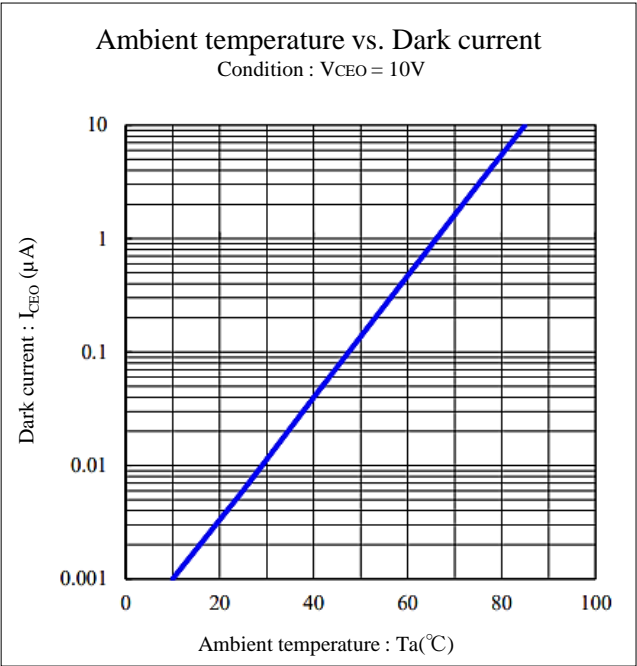
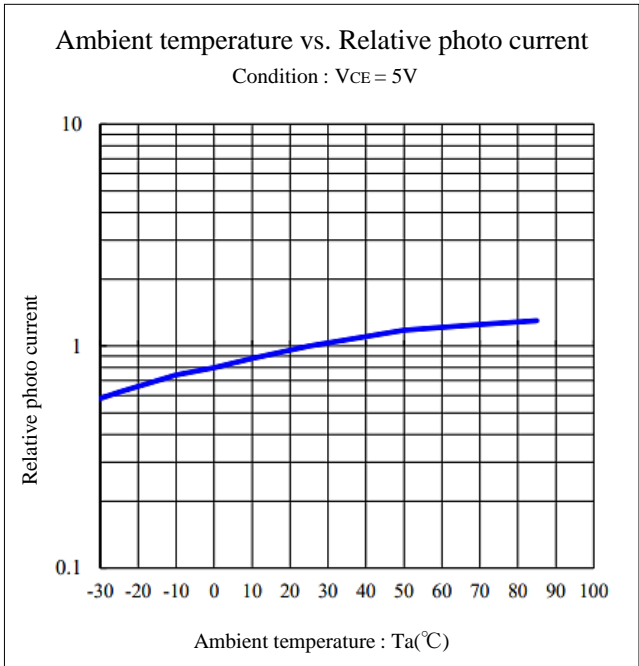


Ambient temperature vs. Collector dissipation



Technical Data

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Soldering condition

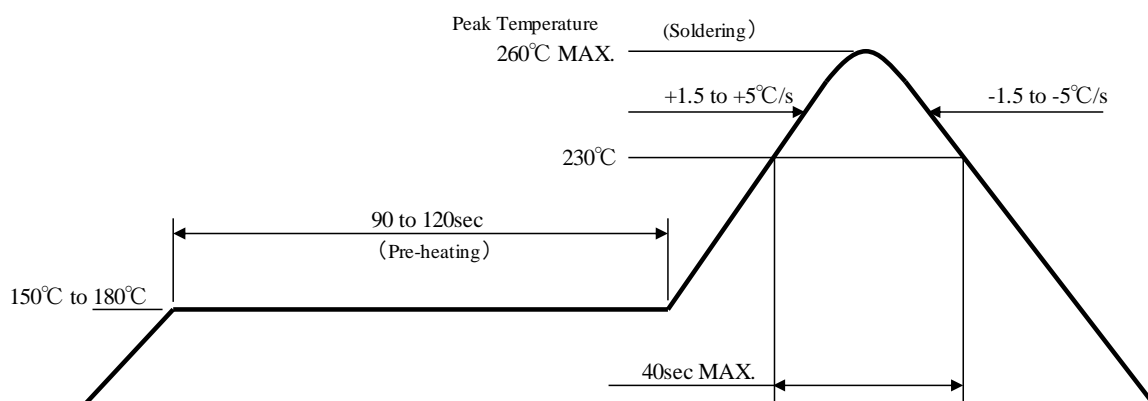
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【Soldering precaution】

(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

TPS1101WA-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

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【 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

TPS1101WA-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 to 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 ± 5 degrees Celsius if following conditions apply.

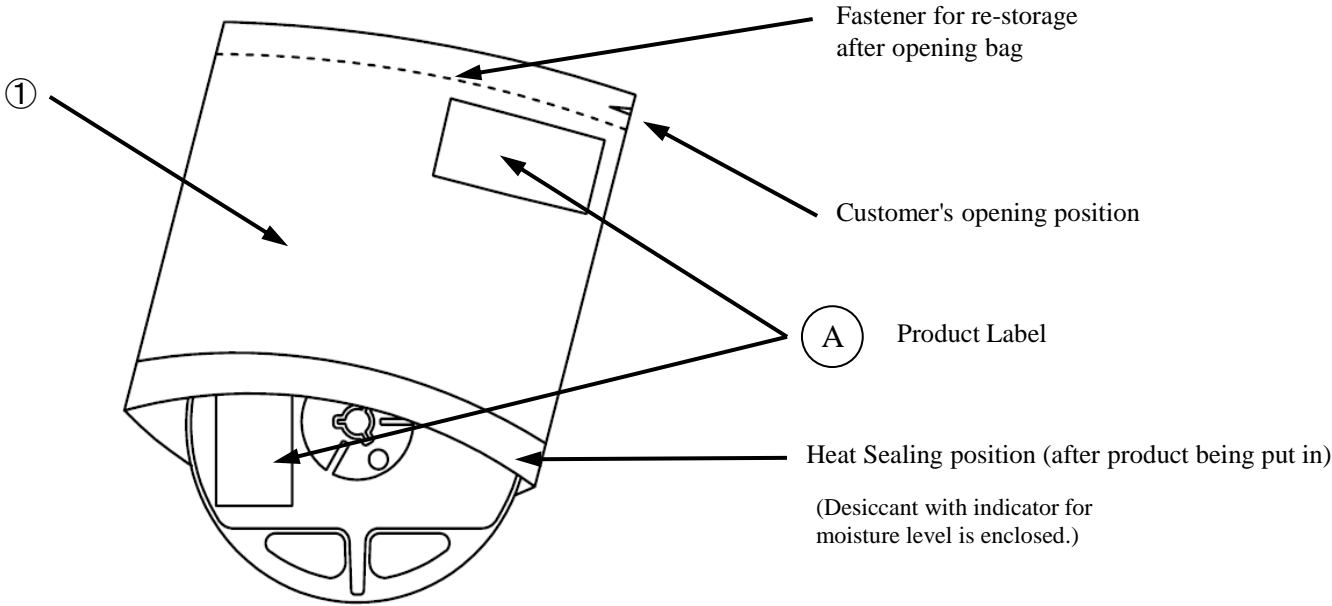
1. In the case of silica gel (blue) which indicates the moisture level within the package, changes or loses its blue color.
2. In the case of time is passed for 72h after the package is opened once.

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

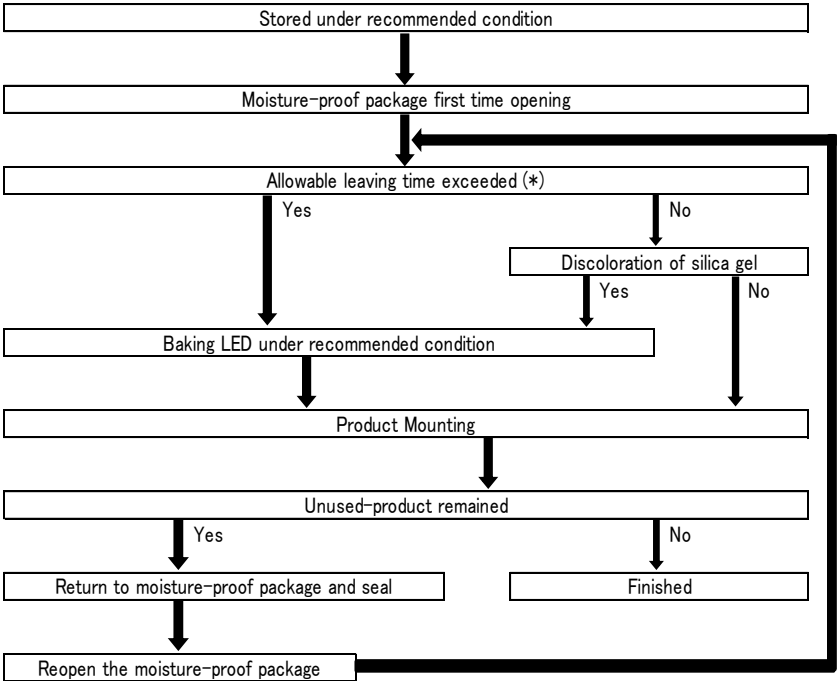
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【Moisture-proof packaging specification】



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

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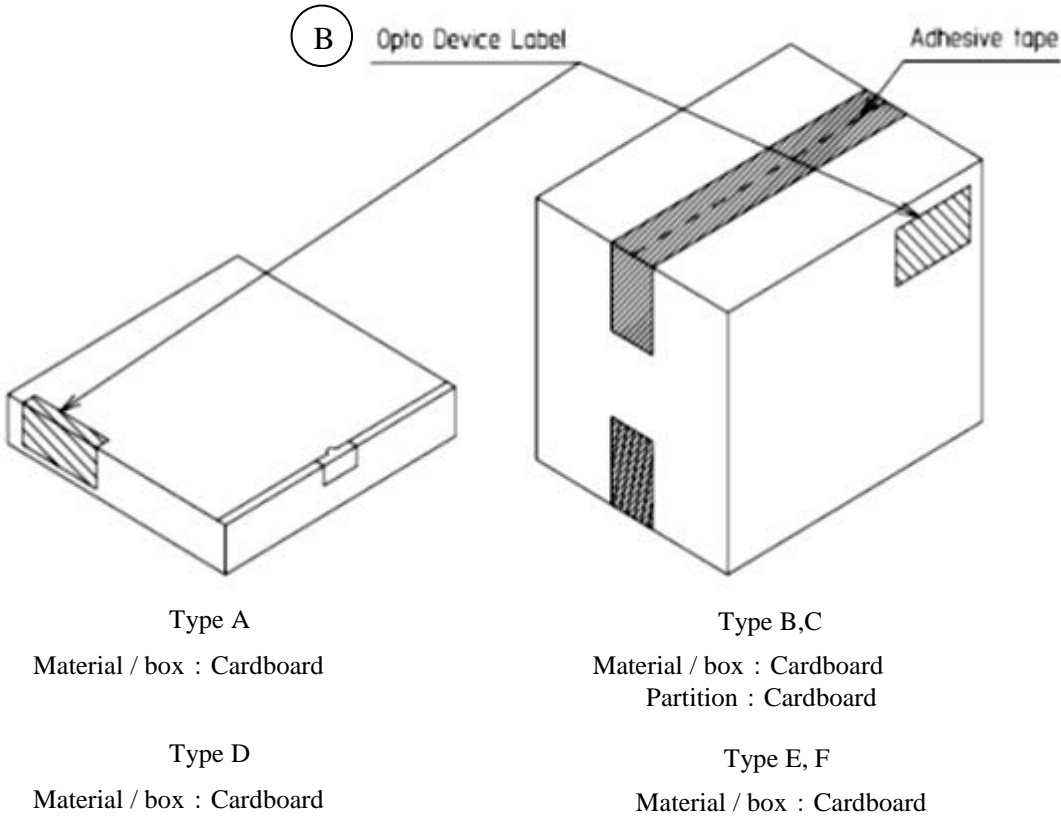
【 Packing box 】

(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

TPS1101WA-TR

【 Label specification】

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

A Product label

The diagram shows a product label with the following fields and labels:

- A**: Parts number (indicated by a bracket above the first barcode)
- B**: Bar-code for parts number (the first barcode)
- C**: Parts code (In-house identification code for each parts number) (indicated by a bracket above the second barcode)
- D**: Packed parts quantity (indicated by a bracket above the third barcode)
- E**: Bar-Code for packed parts quantity (the third barcode)
- F**: Lot number & rank (indicated by a bracket above the fourth barcode)
- G**: Bar-code for lot number & rank (the fourth barcode)

Other text on the label includes: STANLEY -STANLEY ELECTRIC CO.,LTD.-, Lot No., and PCS.

- 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

The diagram shows an opto device label with the following fields and labels:

- A**: Customer name (indicated by a bracket above the first field)
- B**: Parts type (indicated by a bracket above the second field)
- C**: Parts code (indicated by a bracket above the third field)
- D**: Parts number (indicated by a bracket above the fourth field)
- E**: Packed parts quantity (indicated by a bracket above the fifth field)
- F**: Carton number (indicated by a bracket above the sixth field)
- G**: Shipping date (indicated by a bracket above the seventh field)
- H**: Bar-code for in-house identification number (the barcode at the bottom)

Other text on the label includes: STANLEY OPTO DEVICES, 御中, Q'TY, C/NO, PCS, and 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

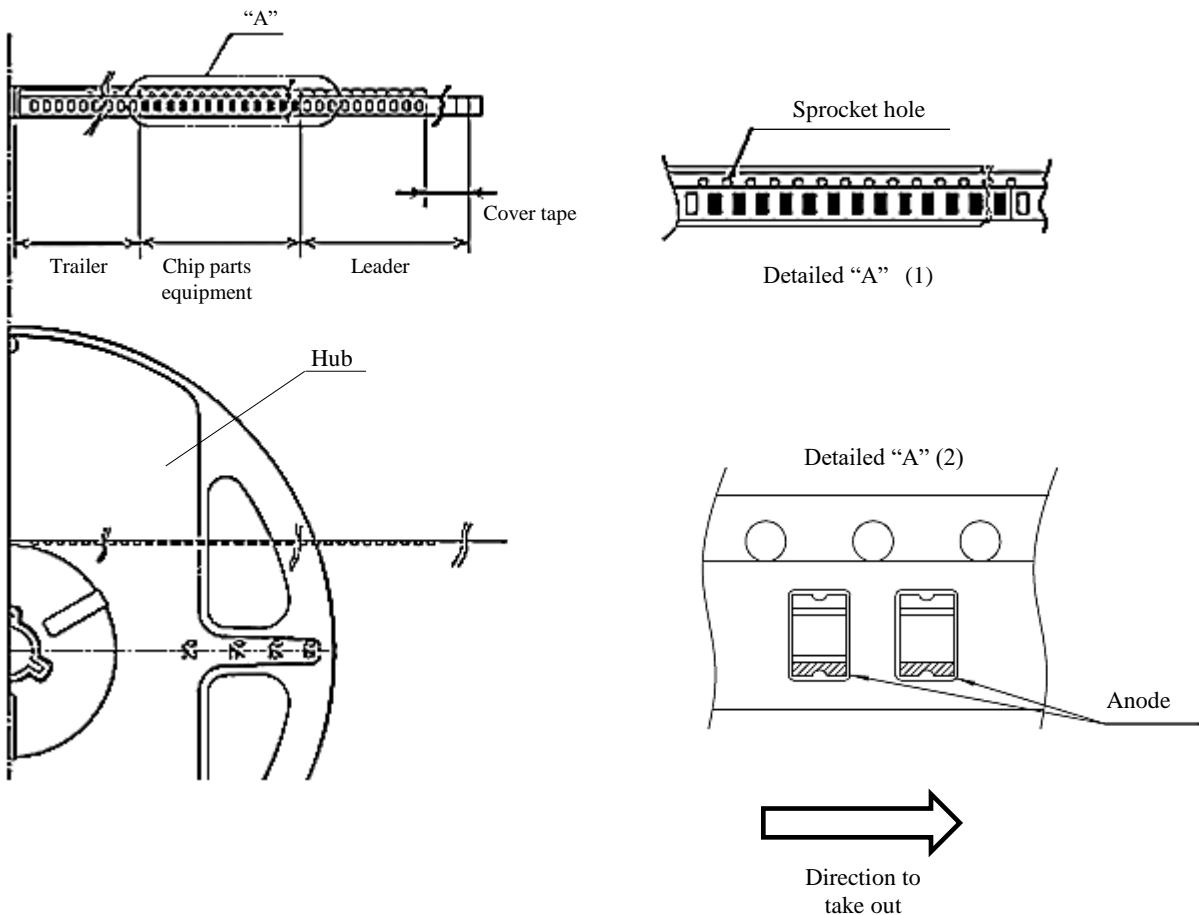
<Remarks> Bar-code font : acc.to Code-39 (JIS-X0503)

Taping and reel specifications

TPS1101WA-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

TPS1101WA-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.

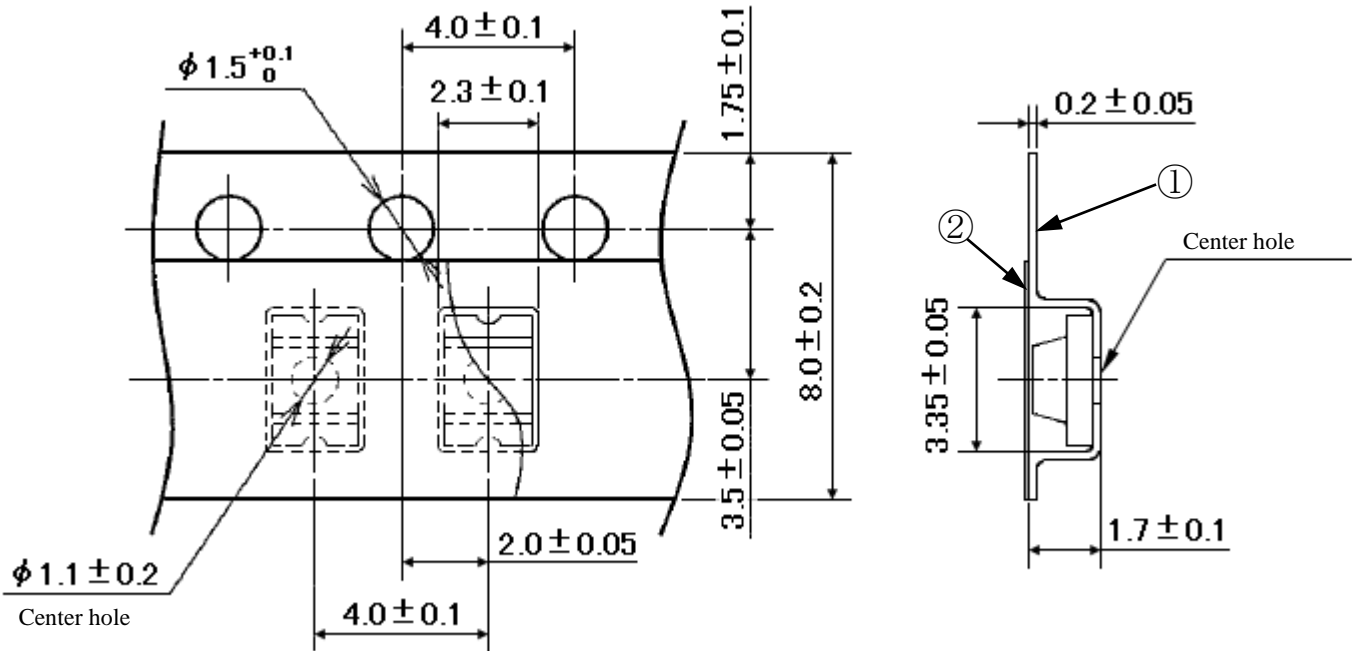
Taping and reel specifications

TPS1101WA-TR

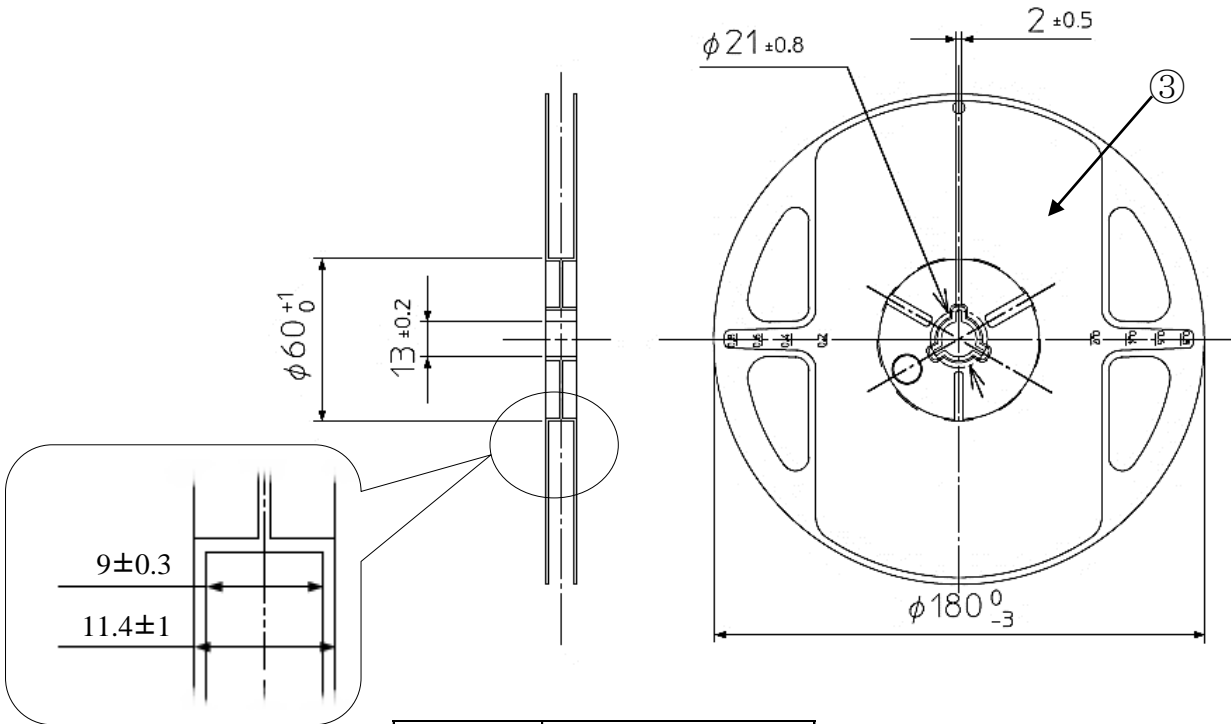
(acc.to JIS-C0806-03)

Unit :mm

【Taping dimensions】



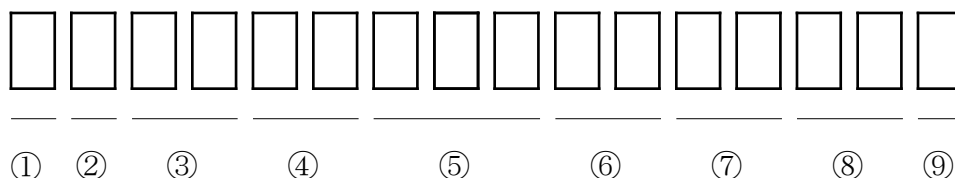
【Reel dimensions】



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

Lot number notational system

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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

TPS1101WA-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

TPS1101WA-TR

1. Reliability testing result

Test item	Test conditions
Endurance operational test	Ta=25°C, 1,000h, Pc=75mW
Humidity - resistance operational test	Ta=60°C, RH=90%, 1,000h, V _{CE} =5V
High temperature operational test	Ta=85°C, 1,000h, V _{CE} =5V
Low temperature operational test	Ta=-40°C, 1,000h, V _{CE} =5V
Heat shock test	Storage temperature min. value to max. value (30 min. of each)
High temperature shelf test	Ta=storage temperature max. value, 1,000h
Low temperature shelf test	Ta=storage temperature min. value, 1,000h
Resistance to reflow soldering	Moisture soak : 30°C 70% 72h Preheating : 150 to 180°C 120sec. max Soldering : 230°C 40sec. max., Peak 260°C max.

2.Failure criteria

Item	Symbol	Test condition	Failure Criteria
Dark current	I _{CEO}	V _{CE} = 5V	I _{CEO} < 0.1μA
Photo current	I _c	V _{CE} = 5V, Ee=5mW/cm ²	Initial value x 0.7 < I _c < initial value x 1.3
Cosmetic appearance	—	—	Notable, discoloration, deformation and cracking

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- 1) The technical information shown in the data sheets are limited to the typical characteristics and circuit examples of the referenced products. It does not constitute the warranting of industrial property nor the granting of any license.
- 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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