

PC815XJ0000F Series

*4-channel package type is also available.
(model No. **PC845XJ0000F Series**)

DIP 4pin
Darlington Phototransistor Output,
Photocoupler



■ Description

PC815XJ0000F Series contains an IRED optically coupled to a phototransistor.

It is packaged in a 4 pin DIP.

Input-output isolation voltage(rms) is 5.0 kV.

CTR is MIN. 600% at input current of 1.0 mA.

■ Features

1. 4 pin DIP package
2. Double transfer mold package
(Ideal for Flow Soldering)
3. Darlington phototransistor output (CTR : MIN. 600%
at $I_F=1.0$ mA, $V_{CE}=2$ V)
4. High isolation voltage between input and output
($V_{iso(rms)}$: 5.0 kV)
5. Lead-free and RoHS directive compliant

■ Agency approvals/Compliance

1. Recognized by UL1577 (Double protection isolation),
file No. E64380 (as model No. **PC815**)
2. Approved by VDE, DIN EN60747-5-2^(*) (as an
option), file No. 40008087 (as model No. **PC815**)
3. Package resin : UL flammability grade (94V-0)

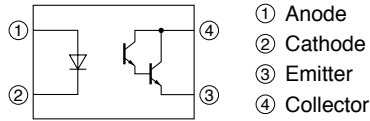
^(*) DIN EN60747-5-2 : successor standard of DIN VDE0884.

■ Applications

1. Home appliances
2. Programmable controller
3. Signal transmission between circuits of different
potentials and impedances

Notice The content of data sheet is subject to change without prior notice.
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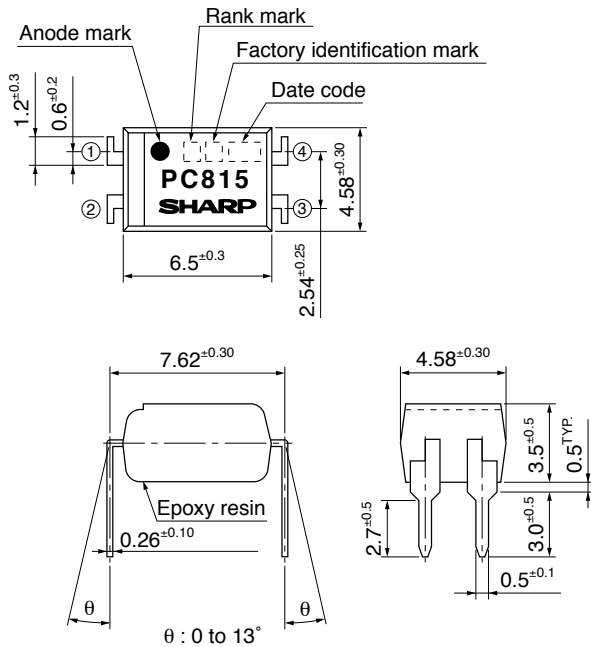
Internal Connection Diagram



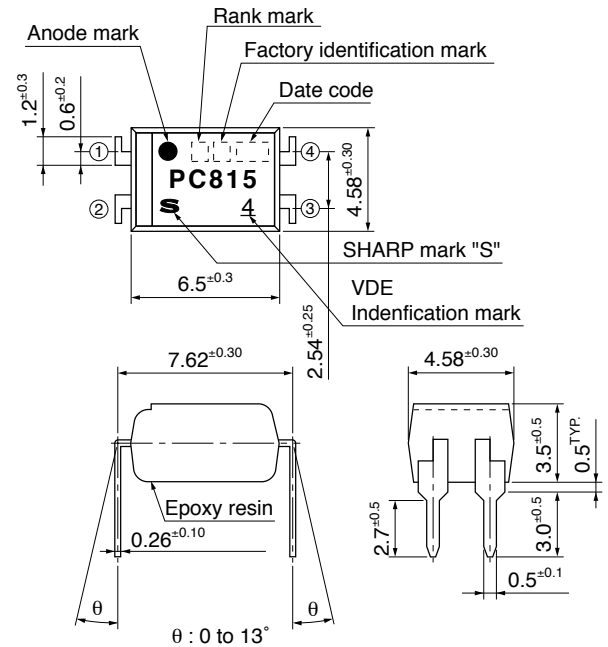
Outline Dimensions

(Unit : mm)

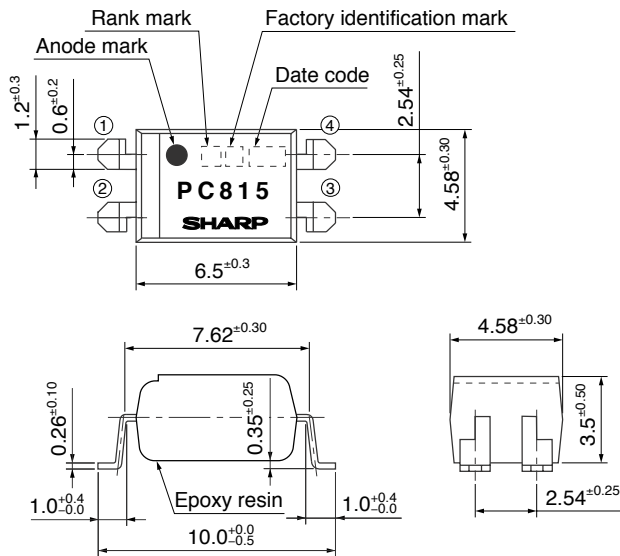
1. Through-Hole [ex. PC815XJ0000F]



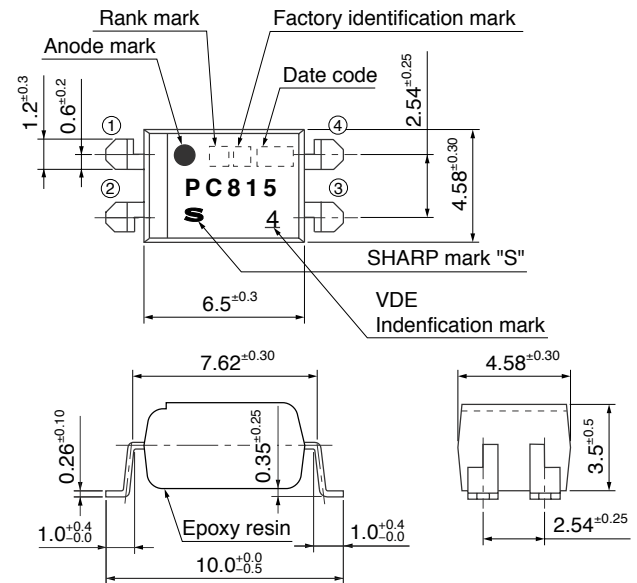
2. Through-Hole (VDE option) [ex. PC815XYJ0000F]



3. SMT Gullwing Lead-Form [ex. PC815XPJ0000F]



4. SMT Gullwing Lead-Form (VDE option) [ex. PC815XPYJ0000F]






Plating material : SnCu (Cu : TYP. 2%)

Date code (2 digit)

| 1st digit | | | | 2nd digit | |
|--------------------|------|------|------|---------------------|------|
| Year of production | | | | Month of production | |
| A.D. | Mark | A.D. | Mark | Month | Mark |
| 1990 | A | 2002 | P | January | 1 |
| 1991 | B | 2003 | R | February | 2 |
| 1992 | C | 2004 | S | March | 3 |
| 1993 | D | 2005 | T | April | 4 |
| 1994 | E | 2006 | U | May | 5 |
| 1995 | F | 2007 | V | June | 6 |
| 1996 | H | 2008 | W | July | 7 |
| 1997 | J | 2009 | X | August | 8 |
| 1998 | K | 2010 | A | September | 9 |
| 1999 | L | 2011 | B | October | O |
| 2000 | M | 2012 | C | November | N |
| 2001 | N | : | : | December | D |

repeats in a 20 year cycle

Factory identification mark

| Factory identification Mark | Country of origin |
|---|-------------------|
| no mark | Japan |
|  | |
|  | Indonesia |
|  | China |

* This factory marking is for identification purpose only.
Please contact the local SHARP sales representative to see the actual status of the production.

Rank mark

With or without.

■ Absolute Maximum Ratings (T_a=25°C)

| Parameter | | Symbol | Rating | Unit |
|--------------------------|-----------------------------|-----------------------|-------------|------|
| Input | Forward current | I _F | 50 | mA |
| | *1 Peak forward current | I _{FM} | 1 | A |
| | Reverse voltage | V _R | 6 | V |
| Power dissipation | | P | 70 | mW |
| Output | Collector-emitter voltage | V _{CEO} | 35 | V |
| | Emitter-collector voltage | V _{ECO} | 6 | V |
| | Collector current | I _C | 80 | mA |
| | Collector power dissipation | P _C | 150 | mW |
| Total power dissipation | | P _{tot} | 200 | mW |
| Operating temperature | | T _{opr} | -30 to +100 | °C |
| Storage temperature | | T _{stg} | -55 to +125 | °C |
| *2 Isolation voltage | | V _{iso(rms)} | 5 | kV |
| *3 Soldering temperature | | T _{sol} | 270 | °C |

*1 Pulse width ≤ 100ms, Duty ratio : 0.001

*2 40 to 60%RH, AC for 1minute, f=60Hz

*3 For 10s

■ Electro-optical Characteristics (T_a=25°C)

| Parameter | | Symbol | Condition | MIN. | TYP. | MAX. | Unit |
|--------------------------|--------------------------------------|----------------------|--|---|--------------------|-------|------|
| Input | Forward voltage | V _F | I _F =20mA | - | 1.2 | 1.4 | V |
| | Peak forward voltage | V _{FM} | I _{FM} =0.5V | - | - | 3.0 | V |
| | Reverse current | I _R | V _R =4V | - | - | 10 | μA |
| | Terminal capacitance | C _t | V=0, f=1kHz | - | 30 | 250 | pF |
| Output | Collector dark current | I _{CEO} | V _{CE} =10V, I _F =0 | - | - | 1 000 | nA |
| | Collector-emitter breakdown voltage | BV _{CEO} | I _C =0.1mA, I _F =0 | 35 | - | - | V |
| | Emitter-collector breakdown voltage | BV _{ECO} | I _E =10μA, I _F =0 | 6 | - | - | V |
| Transfer characteristics | Current transfer ratio | I _C | I _F =1mA, V _{CE} =2V | 6.0 | 16.0 | 75.0 | mA |
| | Collector-emitter saturation voltage | V _{CE(sat)} | I _F =20mA, I _C =5mA | - | 0.8 | 1.0 | V |
| | Isolation resistance | R _{ISO} | DC500V, 40 to 60%RH | 5×10 ¹⁰ | 1×10 ¹¹ | - | Ω |
| | Floating capacitance | C _f | V=0, f=1MHz | - | 0.6 | 1.0 | pF |
| | Cut-off frequency | f _C | V _{CE} =2V, I _C =2mA, R _L =100Ω, -3dB | 1 | 6 | - | kHz |
| | Response time | Rise time | t _r | V _{CE} =2V, I _C =10mA, R _L =100Ω | - | 60 | 300 |
| Fall time | | t _f | - | | 53 | 250 | μs |

■ Model Line-up

| Lead Form | Through-Hole | | SMT Gullwing Form | |
|-----------------|---------------------|---------------------|---------------------|---------------------|
| Package | Sleeve | | Taping | |
| | 100pcs/sleeve | | 2 000pcs/reel | |
| DIN EN60747-5-2 | — | Approved | — | Approved |
| Model No. | PC815XJ0000F | PC815XYJ000F | PC815XPJ000F | PC815XPYJ00F |

Please contact a local SHARP sales representative to inquire about production status.

Fig.1 Forward Current vs. Ambient Temperature

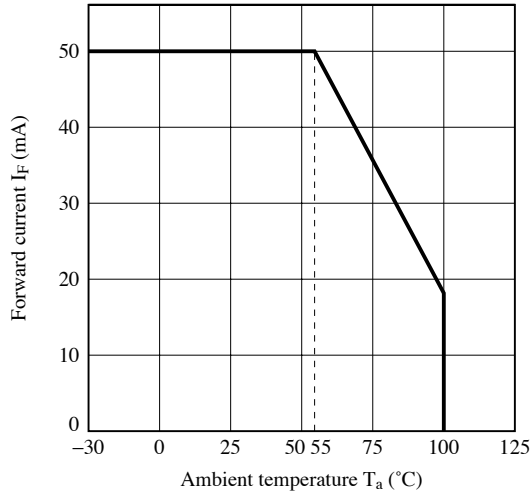


Fig.2 Diode Power Dissipation vs. Ambient Temperature

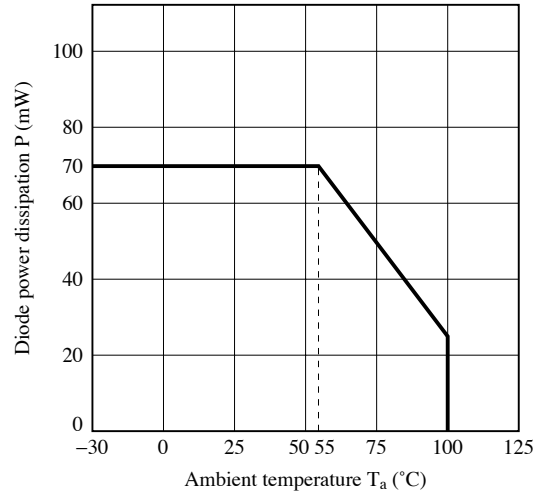


Fig.3 Collector Power Dissipation vs. Ambient Temperature

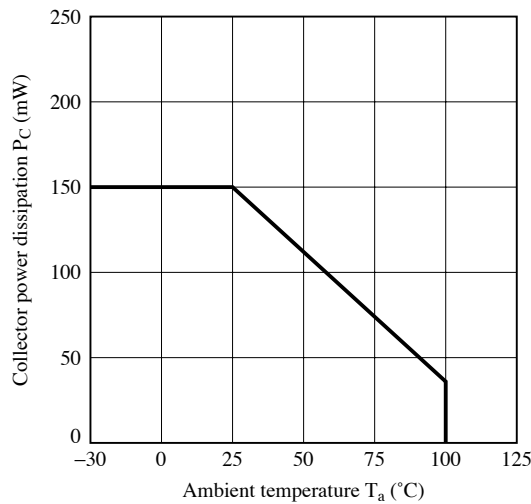


Fig.4 Total Power Dissipation vs. Ambient Temperature

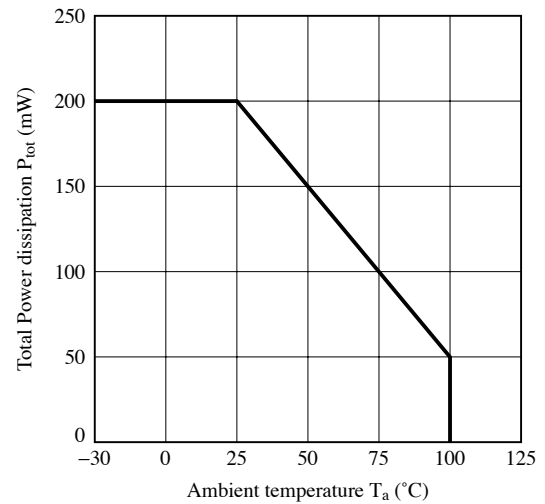


Fig.5 Peak Forward Current vs. Duty Ratio

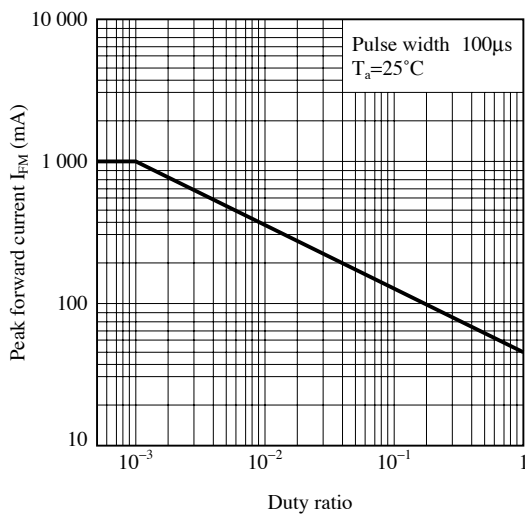


Fig.6 Current Transfer Ratio vs. Forward Current

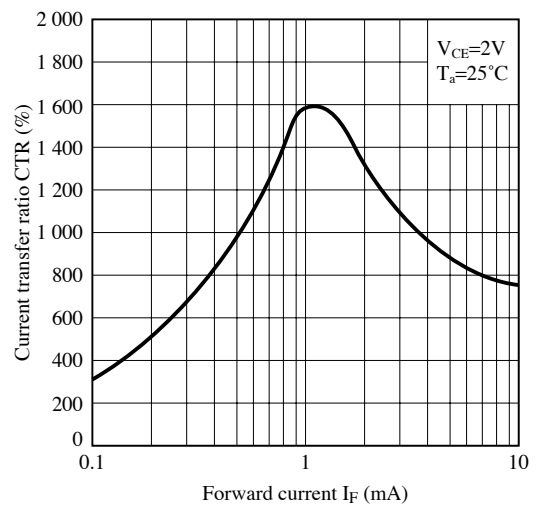


Fig.7 Forward Current vs. Forward Voltage

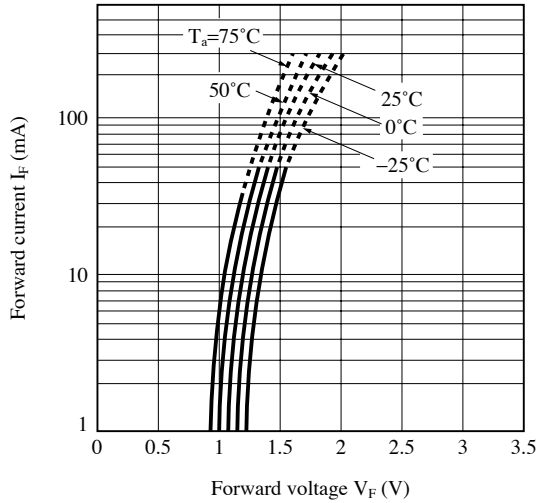


Fig.8 Collector Current vs. Collector-emitter Voltage

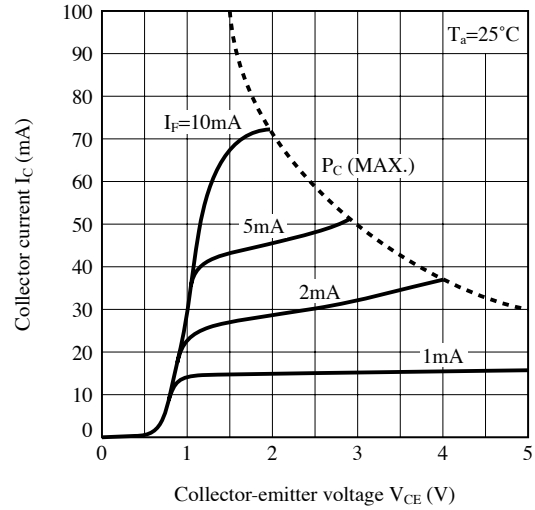


Fig.9 Relative Current Transfer Ratio vs. Ambient Temperature

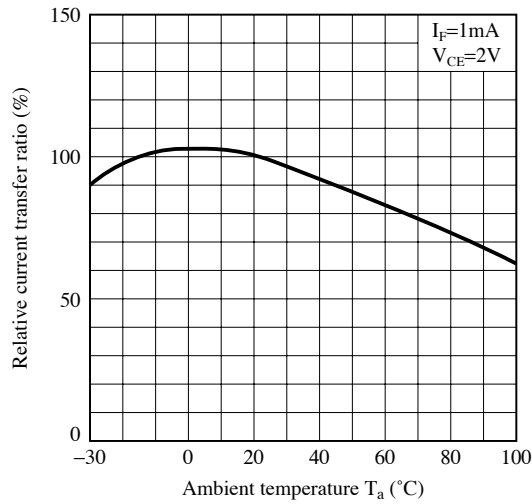


Fig.10 Collector - emitter Saturation Voltage vs. Ambient Temperature

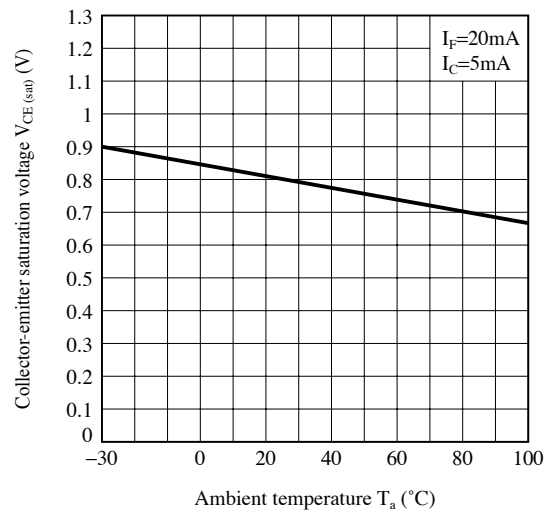


Fig.11 Collector Dark Current vs. Ambient Temperature

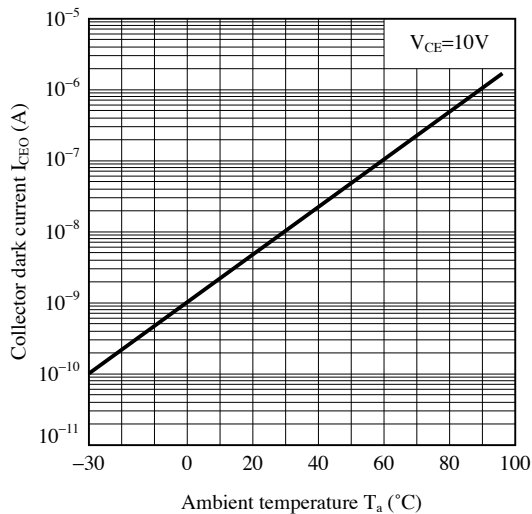


Fig.12 Collector-emitter Saturation Voltage vs. Forward Current

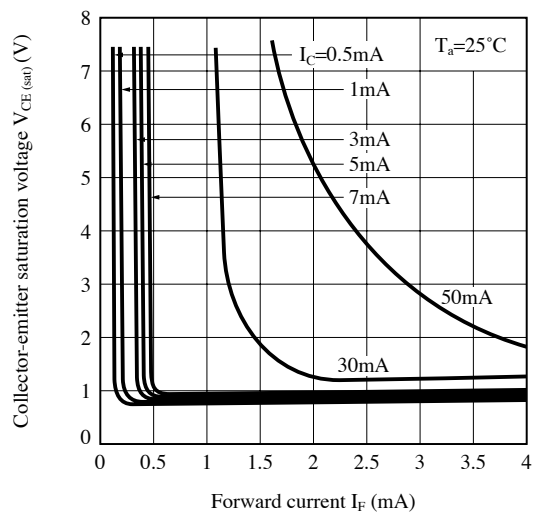


Fig.11 Response Time vs. Load Resistance

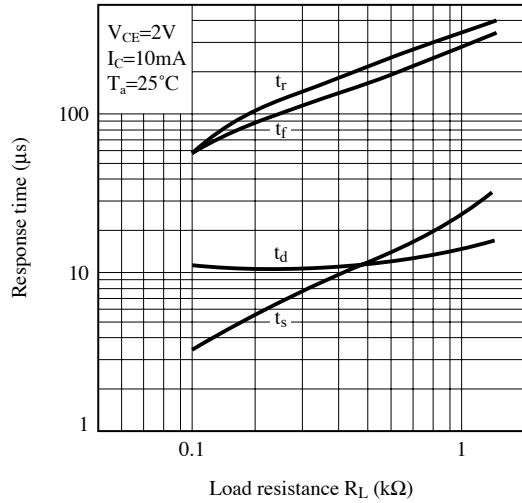
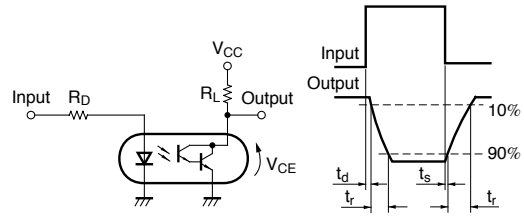


Fig.12 Test Circuit for Response Time



Please refer to the conditions in Fig.13

Fig.13 Frequency Response

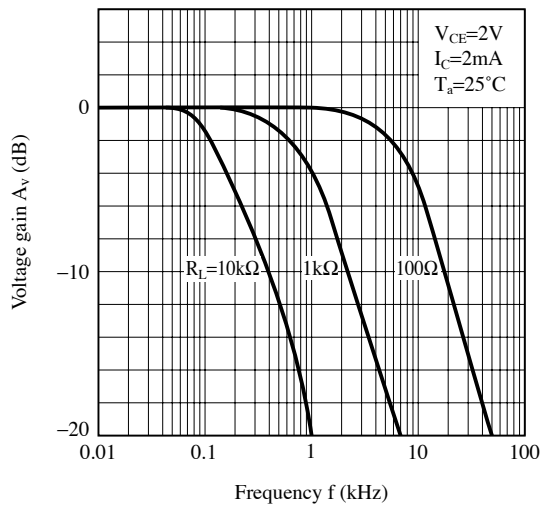
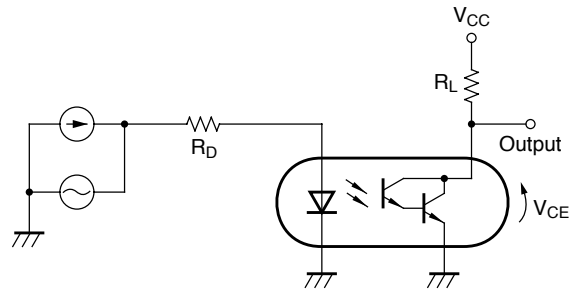


Fig.14 Test Circuit for Frequency Response



Please refer to the conditions in Fig.15

Remarks : Please be aware that all data in the graph are just for reference and not for guarantee.

■ Design Considerations**● Design guide**

While operating at $I_F < 1.0\text{mA}$, CTR variation may increase.
Please make design considering this fact.

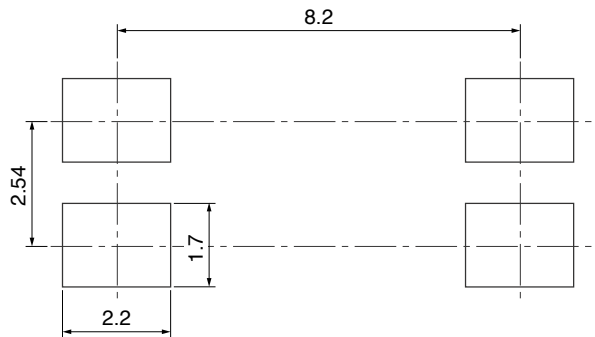
This product is not designed against irradiation and incorporates non-coherent IRED.

● Degradation

In general, the emission of the IRED used in photocouplers will degrade over time.
In the case of long term operation, please take the general IRED degradation (50% degradation over 5 years) into the design consideration.

● Recommended foot print (reference)

SMT Gullwing Lead-form



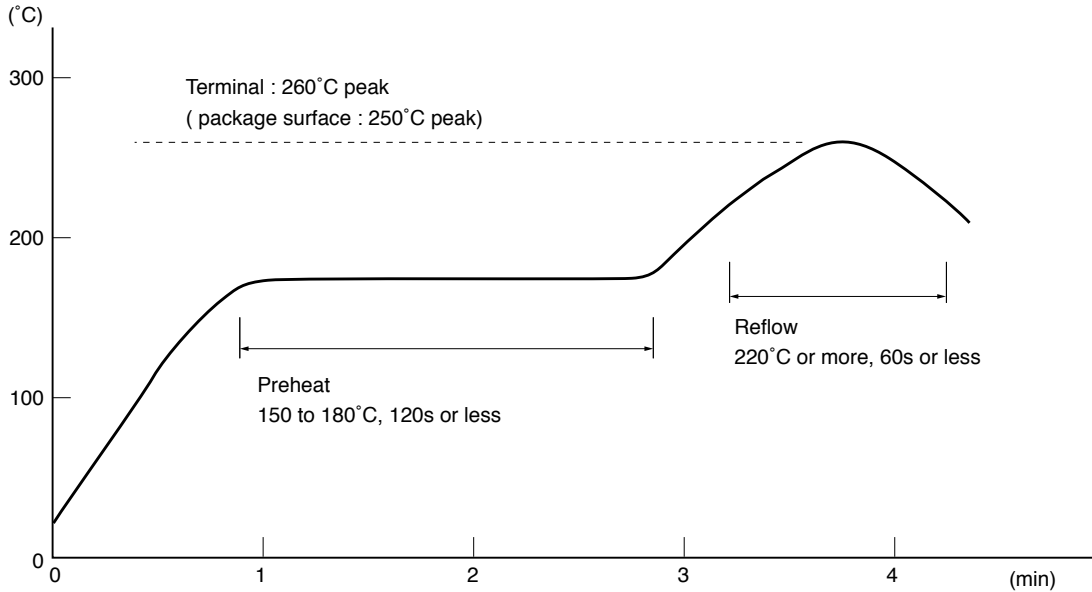
(Unit : mm)

■ **Manufacturing Guidelines**

● **Soldering Method**

Reflow Soldering:

Reflow soldering should follow the temperature profile shown below.
 Soldering should not exceed the curve of temperature profile and time.
 Please don't solder more than twice.



Flow Soldering :

Due to SHARP's double transfer mold construction submersion in flow solder bath is allowed under the below listed guidelines.

Flow soldering should be completed below 270 °C and within 10s.
 Preheating is within the bounds of 100 to 150 °C and 30 to 80s.
 Please don't solder more than twice.

Hand soldering

Hand soldering should be completed within 3s when the point of solder iron is below 400 °C.
 Please don't solder more than twice.

Other notice

Please test the soldering method in actual condition and make sure the soldering works fine, since the impact on the junction between the device and PCB varies depending on the tooling and soldering conditions.

● Cleaning instructions**Solvent cleaning :**

Solvent temperature should be 45°C or below. Immersion time should be 3 minutes or less.

Ultrasonic cleaning :

The impact on the device varies depending on the size of the cleaning bath, ultrasonic output, cleaning time, size of PCB and mounting method of the device.

Therefore, please make sure the device withstands the ultrasonic cleaning in actual conditions in advance of mass production.

Recommended solvent materials :

Ethyl alcohol, Methyl alcohol and Isopropyl alcohol.

In case the other type of solvent materials are intended to be used, please make sure they work fine in actual using conditions since some materials may erode the packaging resin.

● Presence of ODC

This product shall not contain the following materials.

And they are not used in the production process for this product.

Regulation substances : CFCs, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methylchloroform)

Specific brominated flame retardants such as the PBB and PBDE are not used in this product at all.

This product shall not contain the following materials banned in the RoHS Directive (2002/95/EC).

•Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE).

■ Package specification**● Sleeve package**

Package materials

Sleeve : HIPS (with anti-static material)

Stopper : Styrene-Elastomer

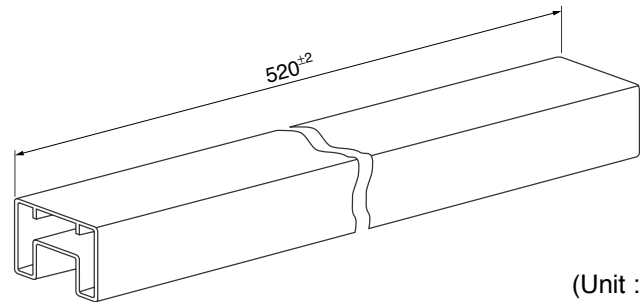
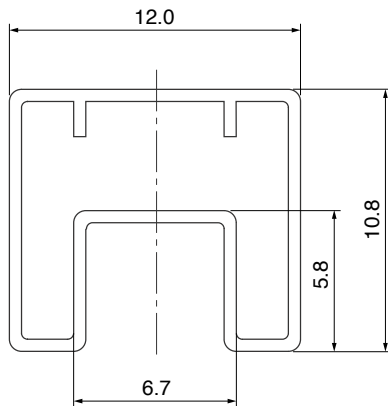
Package method

MAX. 100 pcs. of products shall be packaged in a sleeve. Both ends shall be closed by tabbed and tabless stoppers.

The product shall be arranged in the sleeve with its anode mark on the tabless stopper side.

MAX. 20 sleeves in one case.

Sleeve outline dimensions



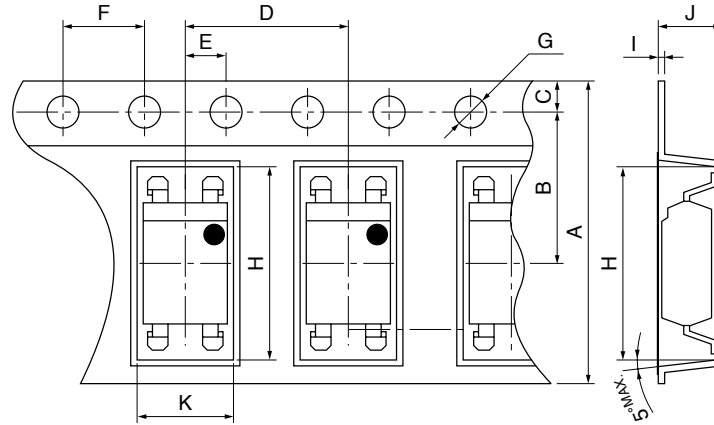
(Unit : mm)

● Tape and Reel package

Package materials

- Carrier tape : PS
- Cover tape : PET (three layer system)
- Reel : PS

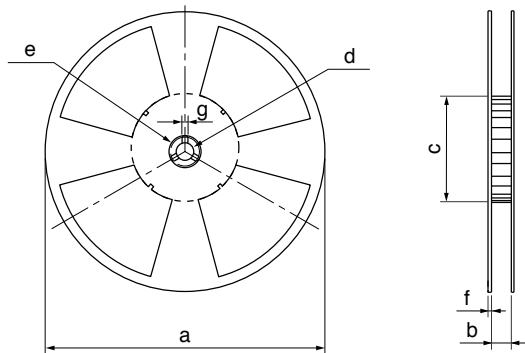
Carrier tape structure and Dimensions



Dimensions List (Unit : mm)

| A | B | C | D | E | F | G |
|----------|-----------|-----------|---------|---------|---------|-----------------|
| 16.0±0.3 | 7.5±0.1 | 1.75±0.10 | 8.0±0.1 | 2.0±0.1 | 4.0±0.1 | φ1.5±0.1 0.0 |
| H | I | J | K | | | |
| 10.4±0.1 | 0.40±0.05 | 4.2±0.1 | 5.1±0.1 | | | |

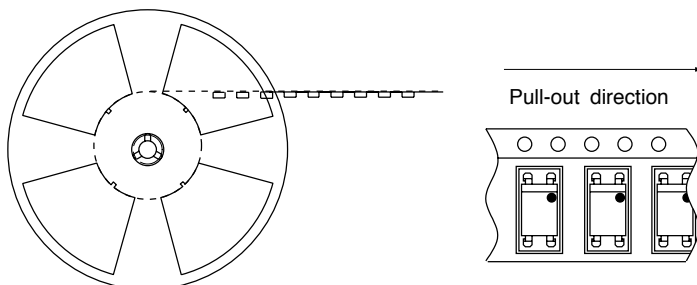
Reel structure and Dimensions



Dimensions List (Unit : mm)

| a | b | c | d |
|-----------|----------|------------|-----------|
| φ330 | 17.5±1.5 | φ100.0±1.0 | φ13.0±0.5 |
| e | f | g | |
| φ23.0±1.0 | 2.0±0.5 | 2.0±0.5 | |

Direction of product insertion



[Packing : 2 000pcs/reel]

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- Personal computers
- Office automation equipment
- Telecommunication equipment [terminal]
- Test and measurement equipment
- Industrial control
- Audio visual equipment
- Consumer electronics

(ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection

with equipment that requires higher reliability such as:

- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
- Traffic signals
- Gas leakage sensor breakers
- Alarm equipment
- Various safety devices, etc.

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- Telecommunication equipment [trunk lines]
- Nuclear power control equipment
- Medical and other life support equipment (e.g., scuba).

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