

PC4SF21YWPSF

V_{DRM} : 800V, Reinforced insulation type
Zero cross type
DIP 6pin
Phototriac Coupler for triggering



■Description

PC4SF21YWPSF reinforced insulation type Phototriac Coupler include an infrared emitting diode (IRED) optically coupled to an output Phototriac. These devices feature full wave control and are ideal isolated drivers for medium to high current Triacs. DIP package provides 5.0kV isolation from input to output with superior commutative noise immunity.

■Features

1. High repetitive peak off-state voltage (V_{DRM} : 800V)
2. Zero crossing functionality (V_{OX} : MAX.20V)
3. 6 pin DIP package
4. Superior noise immunity (dV/dt : MIN. 500V/ μ s)
5. Double transfer mold construction (Ideal for Flow Soldering)
6. High isolation voltage between input and output (Viso(rms) : 5.0kV)

■Agency approvals/Compliance

1. Recognized by UL1577 (Double protection isolation), file No. E64380 (as model No. **4SF21**)
2. Approved by CSA, file No. CA95323 (as model No. **4SF21**)
3. Approved by BSI : file No.6690/7421 (BS EN60065/BS EN60950-1), (as model No. **4SF21**)
4. Approved by SEMKO, EN60065/EN60335-1/EN60950-1 (as model No. **4SF21**)
5. Approved by DEMKO, EN60065/EN60335-1/EN60950-1 (as model No. **4SF21**)
6. Approved by FIMKO, EN60065/EN60335-1/EN60950-1 (as model No. **4SF21**)
7. Approved by VDE (DIN EN 60747-5-5), file No. 40009162 (as model No. **4SF21**)
8. Package resin : UL flammability grade (94V-0)

■Applications

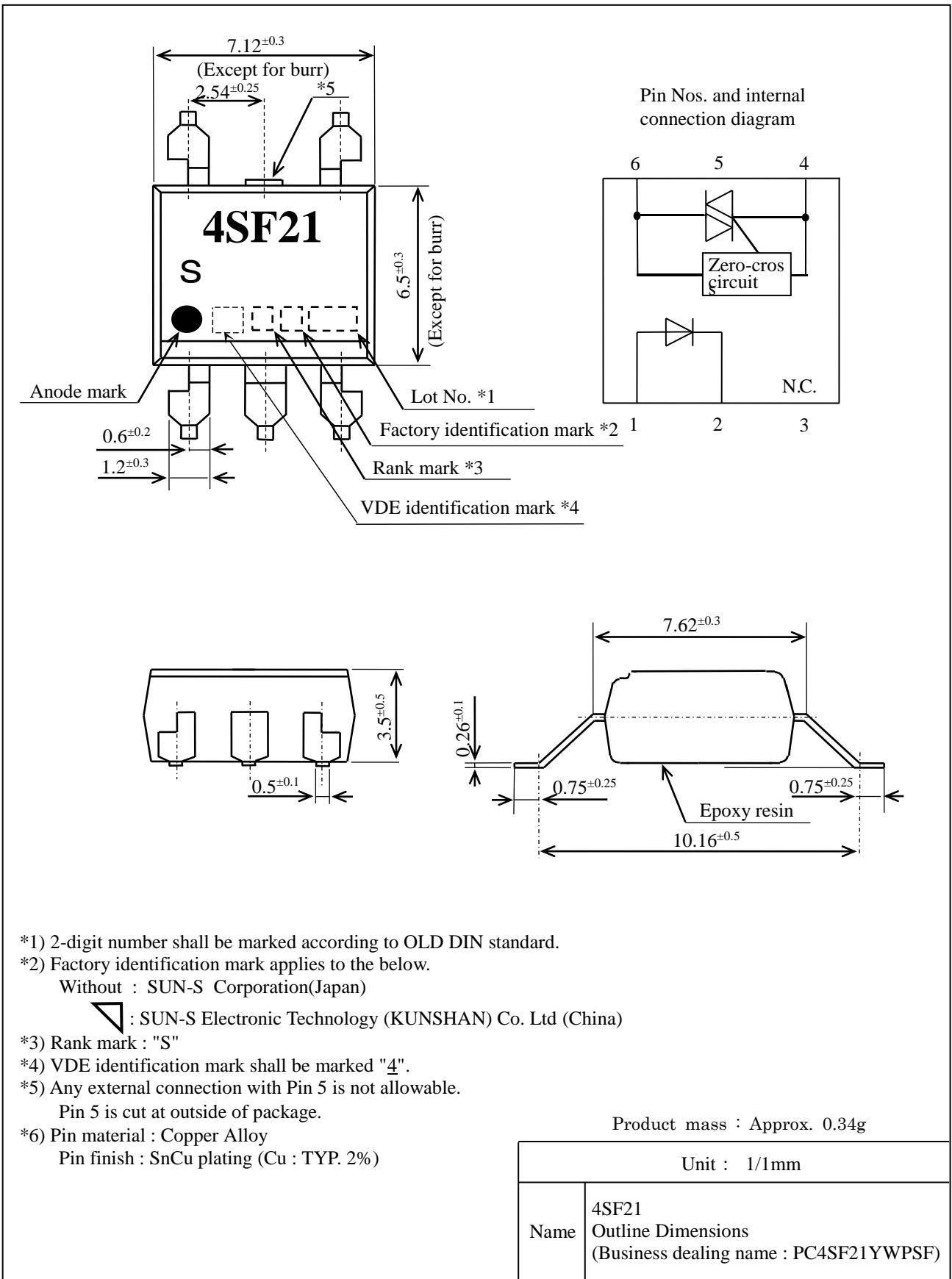
1. Triggering for Triacs used to switch on and off devices which require AC loads.
For example heaters, fans, motors, solenoids, and valves.
2. AC line control in power supply applications.

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Sheet No.: OP14022EN

■ Outline



*1) 2-digit number shall be marked according to OLD DIN standard.

*2) Factory identification mark applies to the below.

Without : SUN-S Corporation(Japan)

◁ : SUN-S Electronic Technology (KUNSHAN) Co. Ltd (China)

*3) Rank mark : "S"

*4) VDE identification mark shall be marked "4".

*5) Any external connection with Pin 5 is not allowable.

Pin 5 is cut at outside of package.

*6) Pin material : Copper Alloy

Pin finish : SnCu plating (Cu : TYP. 2%)

■ Absolute maximum ratings

Ta=25°C

| Parameter | | Symbol | Rating | Unit |
|-----------------------|-----------------------------------|-----------------------|---------------------|------|
| Input | Forward current *1 | I _F | 50 | mA |
| | Reverse voltage | V _R | 6 | V |
| Output | RMS on-state current *1 | I _{T(rms)} | 0.1 | A |
| | Peak one cycle surge current | I _{surge} | 1.2(50Hz sine wave) | A |
| | Repetitive peak off-state voltage | V _{DRM} | 800 | V |
| Isolation voltage *2 | | V _{iso(rms)} | 5 | kV |
| Operating temperature | | T _{opr} | -30 to +100 | °C |
| Storage temperature | | T _{stg} | -55 to +125 | °C |
| Soldering temperature | | T _{sol} | 270 (For 10s) | °C |

*1 The derating factors of absolute maximum rating due to ambient temperature are shown in Fig.1,2.

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

■ Electrical characteristics

Ta=25°C

| Parameter | | Symbol | MIN. | TYP. | MAX. | Unit | Conditions |
|--------------------------|--|------------------|--------------------|------------------|--------------------|------|--|
| Input | Forward voltage | V _F | - | 1.2 | 1.4 | V | I _F =20mA |
| | Reverse current | I _R | - | - | 10 ⁻⁵ | A | V _R =3V |
| Output | Repetitive peak off-state current | I _{DRM} | - | - | 3×10 ⁻⁶ | A | V _D =V _{DRM} |
| | On-state voltage | V _T | - | - | 2.5 | V | I _T =0.05A |
| | Holding current | I _H | 0.1 | - | 3.5 | mA | V _D =4V |
| | Critical rate of rise of off-state voltage | dv/dt | 500 | 1000 | - | V/μs | V _D =1/√2 · V _{DRM} |
| | Zero-cross voltage | V _{OX} | - | - | 20 | V | I _F =15mA, R load |
| Transfer characteristics | Minimum trigger current | I _{FT} | - | - | 7 | mA | V _D =4V, R _L =100Ω |
| | Isolation resistance | R _{ISO} | 5×10 ¹⁰ | 10 ¹¹ | - | Ω | DC500V 40 to 60%RH |
| | Turn on time | t _{ON} | - | - | 50 | μs | V _D =4V, R _L =100Ω, I _F =20mA |

Fig.1 Forward current vs. ambient temperature

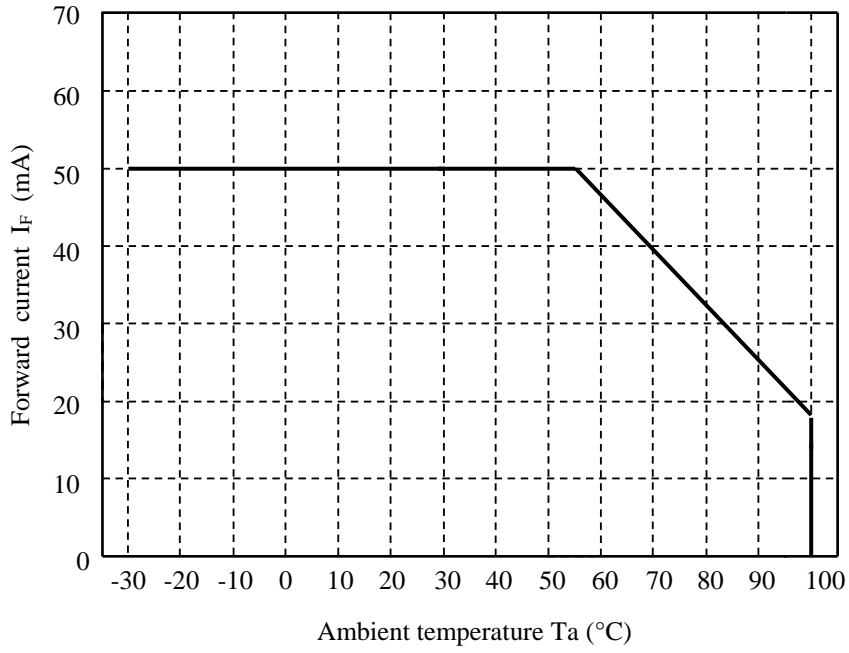
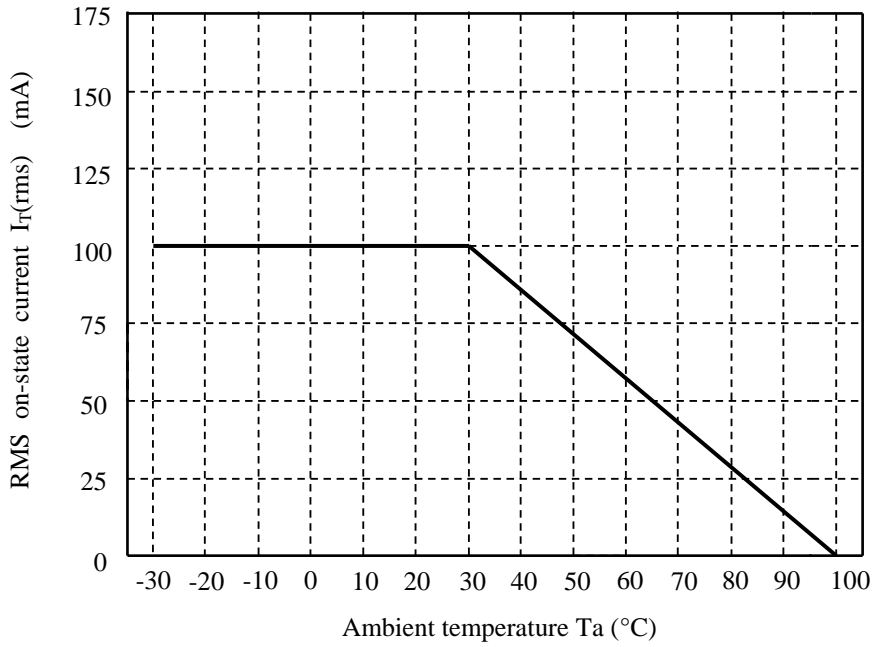



Fig.2 RMS on-state current I_{r(rms)} vs. ambient temperature



■Supplement

- The business dealing name shall be “PC4SF21YWPSF”, when this product is ordered or delivered.
And the following selection shall be made as to the critical rate of rise of off-state voltage (dv/dt).
 $dv/dt \geq 5kV/\mu s$ [Test conditions] $V_D = 1/\sqrt{2} \cdot V_{DRM}$, $T_a = 25^\circ C$
- Package specification
Refer to the attached sheet, page 8 to 11.
- Isolation voltage shall be measured in the following method.
 - (1) Short between pins 1 to 3 on the primary side and between pins 4 to 6 on the secondary side.
 - (2) The dielectric withstanding tester with zero-cross circuit shall be used.
 - (3) The wave form of applied voltage shall be a sine wave.
(It is recommended that the isolation voltage be measured in insulation oil.)
- This Model is approved by UL, CSA
Approved Model No. : 4SF21
UL file No. : E64380
CSA file No. : CA95323
CSA approved mark "  " shall be indicated on minimum unit package.
- This product is approved by BSI, SEMKO, DEMKO and FIMKO
Approved Model No. : 4SF21
BSI Certificate No. : file No.6690/7421(BS EN60065/BS EN60950-1)
- This product is not designed against irradiation.
This product incorporates non-coherent light emitting diode.
This product is assembled with electrical input and output.
- ODS materials
 - (1) This product shall not contain the following materials.
 - (2) The following materials shall not be used in the production process for this product.
Materials for ODS: CFCs, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methylchloroform)
- Specific brominated flame retardants such as the PBBOs and PBBs are not used in this device at all.

■Notes

- Circuit design

- (1) The LED used in the Phototriac coupler generally decreases the light emission power by operation.
In case of long operation time, please decide I_F value so that I_F is more than 2 times of the Maximum value of the Minimum triggering current at circuit design with considering the decreases of the light emission power of the LED. (50% / 5years)
- (2) Input current (I_F) at off state shall be set 0.1mA or less.
- (3) In case that L (Inductance) load such as motor etc. is used, please use this device after confirming whether this device operates normally in actual condition since there is a case that the zero-cross circuit works and the load does not turn on due to the phase difference of load current.
- (4) If the voltage exceeding the repetitive peak off-state voltage (V_{DRM}) in the absolute maximum ratings is applied to the phototriac, it may cause not only faulty operation but breakdown. Make sure that the surge voltage exceeding V_{DRM} shall not be applied by using the varistor, CR.

- Usage

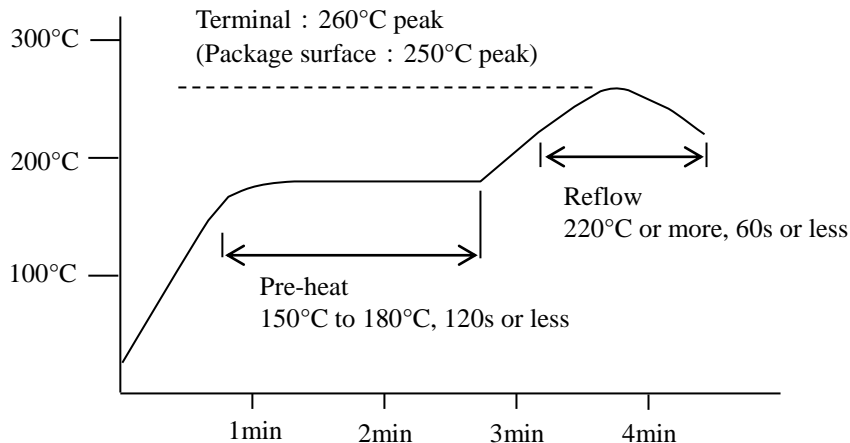
Only for triggering medium power triac and high power triac.
(This model shall be used under the conditions on which power triac turns on.)

- Cleaning

- (1) Solvent cleaning : Solvent temperature 45°C or less, Immersion for 3 min or less
- (2) Ultrasonic cleaning : The effect to device by ultrasonic cleaning differs by cleaning bath size, ultrasonic power output, cleaning time, PCB size or device mounting condition etc.
Please test it in actual using condition and confirm that any defect doesn't occur before starting the ultrasonic cleaning.
- (3) Applicable solvent : Ethyl alcohol, Methyl alcohol, Isopropyl alcohol
When the other solvent is used, there are cases that the packaging resin is eroded.
Please use the other solvent after thorough confirmation is performed in actual using condition.

- Precautions for Soldering Phototriac couplers

- (1) In the case of flow soldering (Whole dipping is possible.)
It is recommended that flow soldering be carried out at 270°C or less and within 10s
(Pre-heating : 100 to 150°C, 30 to 80s):Within 2 time
- (2) If solder reflow :
It is recommended to be done at the temperature and the time within the temperature profile as shown in the figure below. (2 times or less)



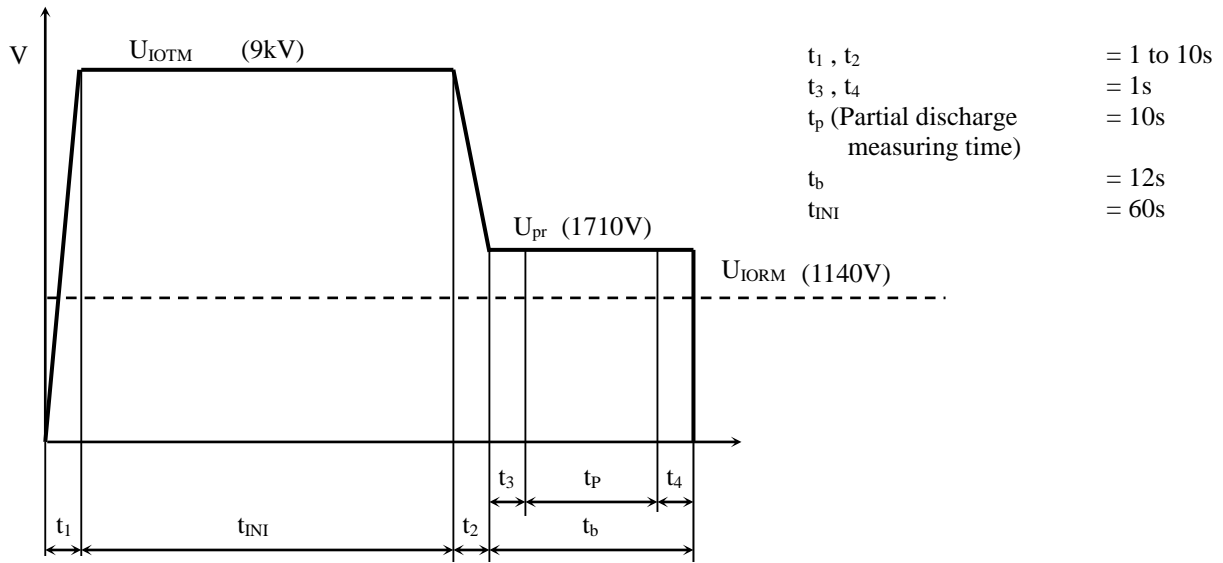
- (3) In the case of hand soldering

It is recommended that hand soldering be carried out at 400°C or less and within 3s :within 2 times

- (4) Other notes

Depending on equipment and soldering conditions (temperature, Using solder etc.), the effect to junction between PCB and lead pins of photocoupler is different.
Please confirm that there is no problem on the actual use conditions.

Method of Diagram 1: Breakdown test (Apply to type test and sampling test)



Method of Diagram 2 : Non breakdown test (Apply to all device test)

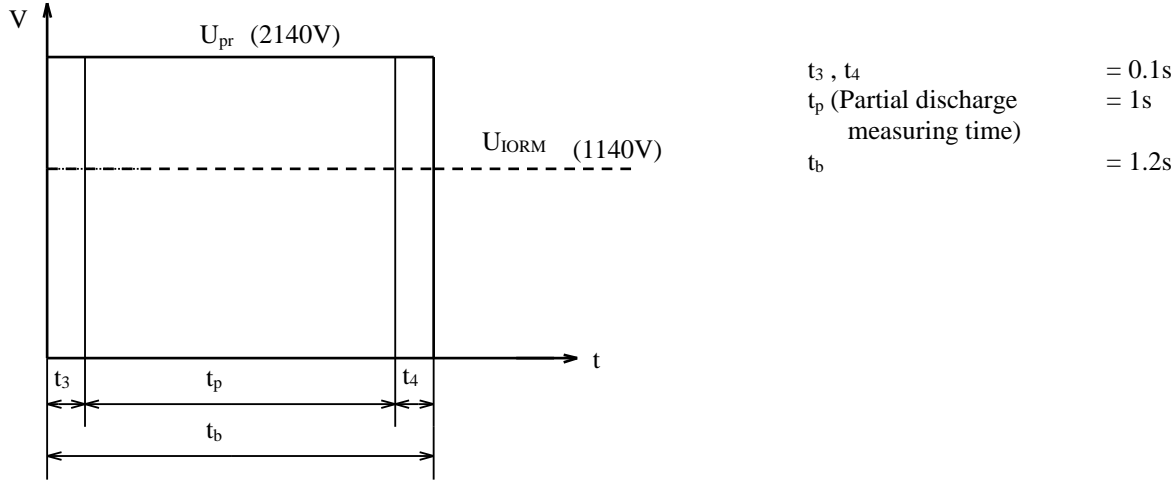


Fig. 1 Safety maximum power dissipation vs. ambient temperature (When failed)

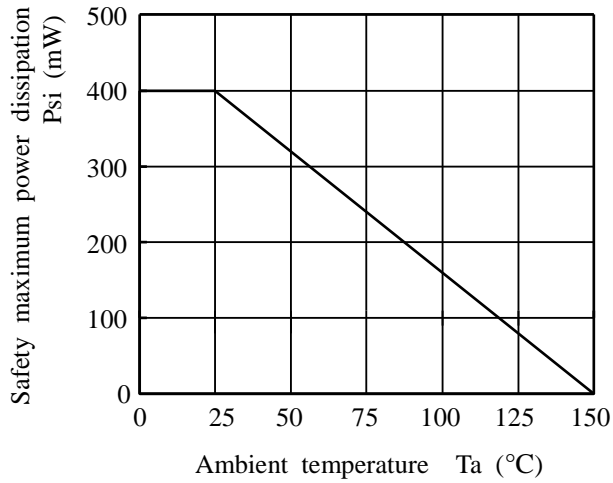
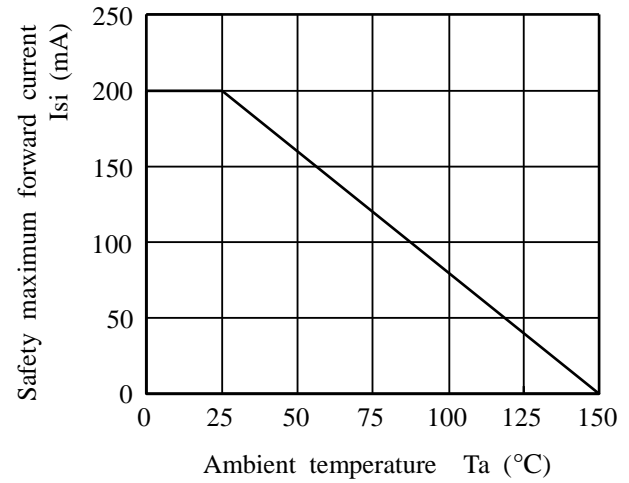


Fig. 2 Safety maximum forward current vs. ambient temperature (When failed)

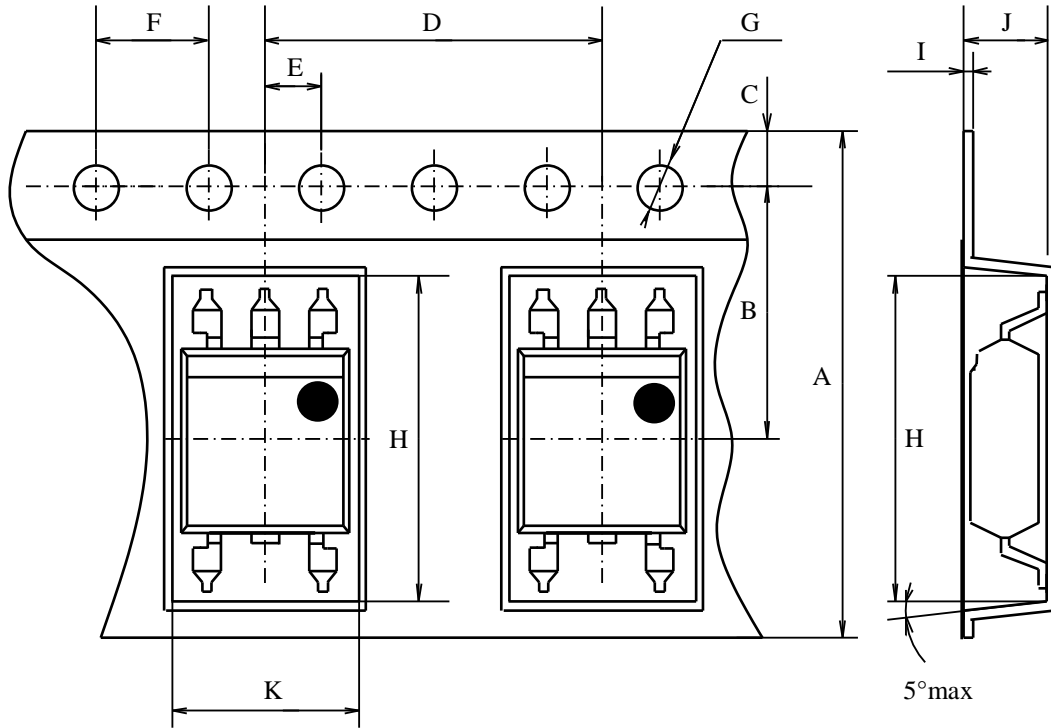


■ Package specifications

● Taping conditions

(1) Tape structure and Dimensions

The carrier tape has the heat pressed structure of PS material carries tape and three layers cover tape (PET material base).



Dimensions list (Unit : mm)

| A | B | C | D | E | F | G | H | I | J | K |
|------|------|-------|------|------|------|--------------|------|-------|------|------|
| ±0.3 | ±0.1 | ±0.10 | ±0.1 | ±0.1 | ±0.1 | +0.1 -0.0 | ±0.1 | ±0.05 | ±0.1 | ±0.1 |
| 24.0 | 11.5 | 1.75 | 12.0 | 2.0 | 4.0 | φ 1.5 | 12.2 | 0.40 | 4.2 | 7.8 |

(2) Reel structure and Dimensions (Refer to the attached sheet, Page 10)

The taping reel shall be of plastic (PS material).

(3) Direction of product insertion (Refer to the attached sheet, Page 10)

(4) Joint of tape

The cover tape and carrier tape in one reel shall be joint less.

(5) To repair failure-taped devices, cutting a bottom of carrier tape with a cutter.

After replacing the cut portion shall be sealed with adhesive tape.

● Adhesiveness of cover tape

The exfoliation force between carrier tape and cover tape shall be 0.2N to 0.7N for the angle 160° to 180°.

● Rolling method and quantity

Wind the tape back on the reel so that the cover tape will be outside the tape.



Attach more than 20cm of blank tape to the trailer and the leader of the tape and fix the both ends with adhesive tape.

One reel basically shall contain 1000pcs.

● Outer packing appearance (Refer to attached sheet, Page 11)

• Marking

(1) Label of model No., Lot No. and quantity

| | | | |
|------------------------------|-------------------------|---|---|
| S H A R P | | NO CFCs used In this packaging MADE IN JAPAN | |
| Electronic Components | | | |
| TYPE | 4SF21 (PC4SF21YWPSF) |  |  |
| QUANTITY | 1000 | | |
| LOT(DATE) | ***** - ** | | |
| | S5 | | |

- Label dimensions 60mm × 42mm
- Indications
 - 4SF21 Model No.
 - TYPE : (PC4SF21YWPSF) Business dealing name
 - QUANTITY : 1000 For cartons (1000)
 - LOT (DATE) : *****_** Packing lot No.
 - ** Mark date code

(2) Bar code label

| |
|-----------------------------|
| MODEL NUMBER : PC4SF21YWPSF |
| PC4SF21YWPSF |
| QUANTITY : 1000 |
| 1000 |
| PRODUCTION DATE CODE : S5 |
| S5 |

- Label dimensions 65mm × 45mm
- Bar coding method Code 39
- Indications
 - Model No. : PC4SF21YWPSF Business dealing name
 - QUANTITY : 1000 For cartons (1000)
 - Production date code : S5 Mark date code

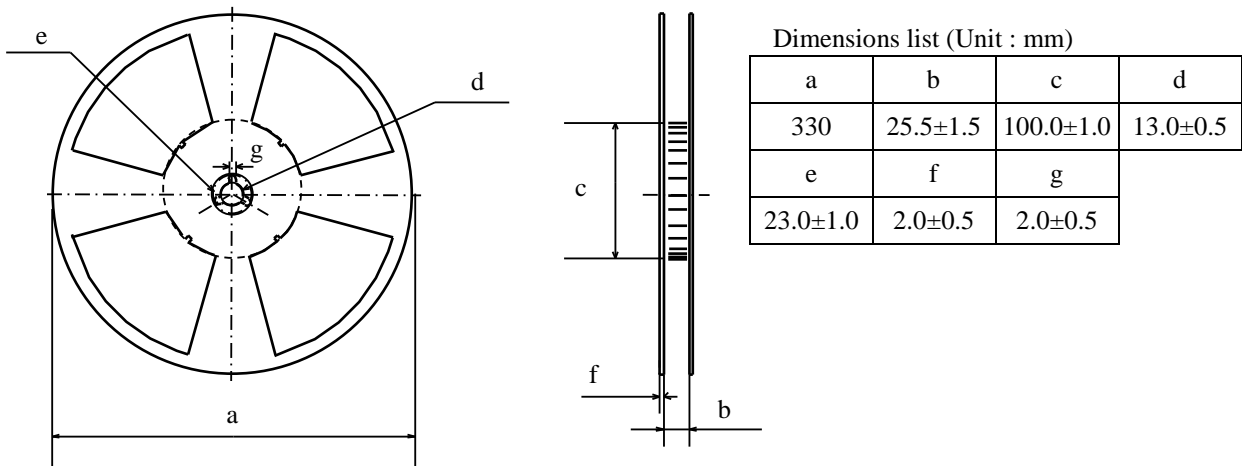
• Storage condition

Taped products shall be stored at the temperature 5 to 30°C and the humidity less than 70%RH.
Away from direct sunlight.

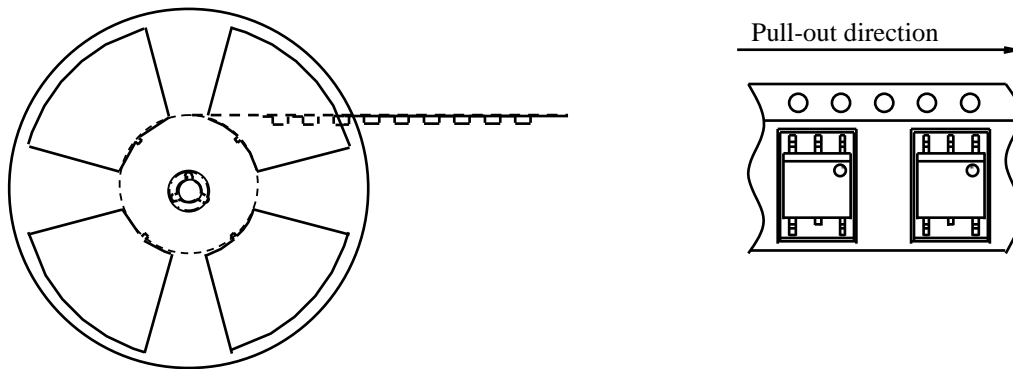
• Safety protection during shipping

There shall be no deformation of component or degradation of electrical characteristics due to shipping.

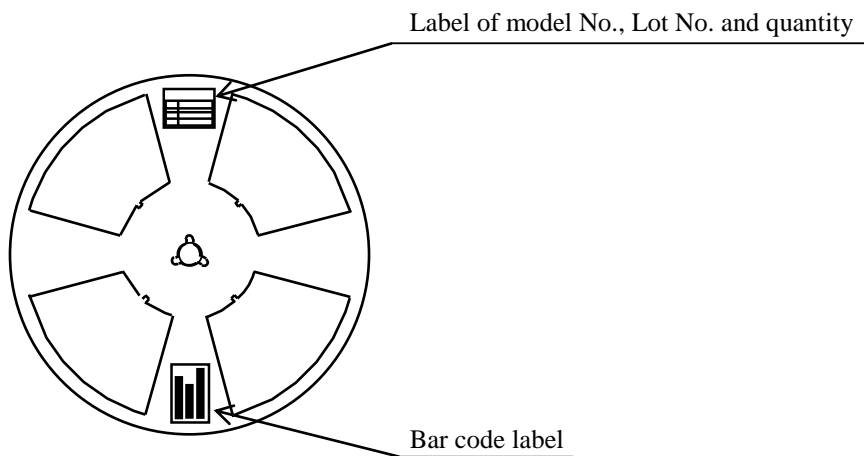
Reel structure and Dimensions



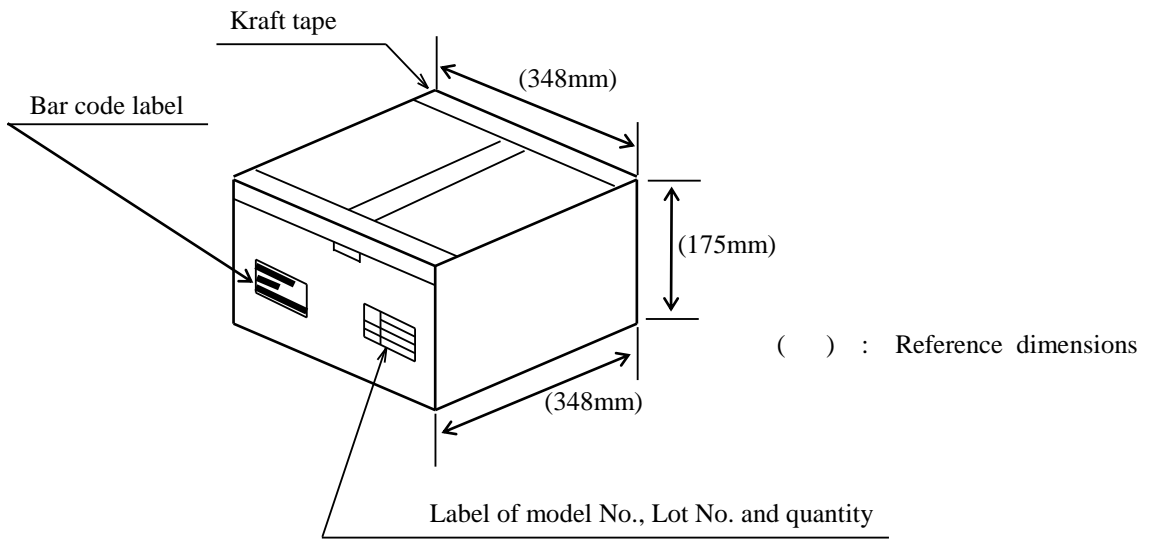
Direction of product insertion



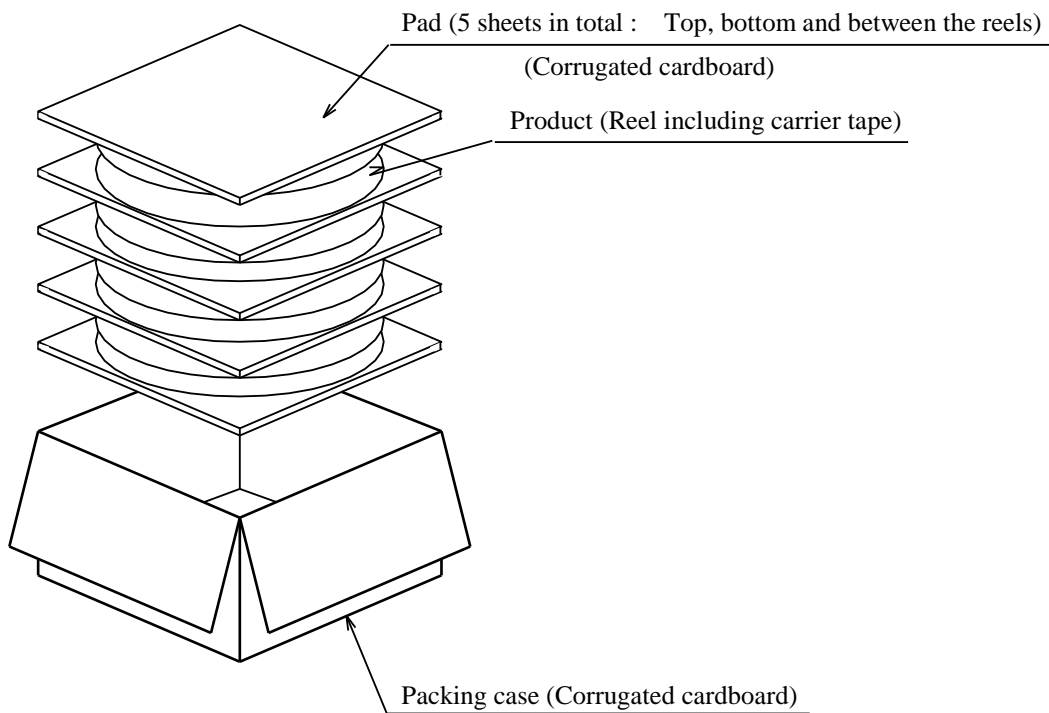
Taping reel indication



Packaging indication



Outer packing appearance



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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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- Space applications
- Telecommunication equipment [trunk lines]
- Nuclear power control equipment
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