

SHARP

OPTO-ELECTRONIC DEVICES DIVISION
ELECTRONIC COMPONENTS GROUP
SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR

PHOTOTRIAC COUPLER

MODEL No.

S2S3

(Business dealing name : S2S3AD0F)

Specified for

Enclosed please find copies of the Specifications which consists of 11 pages including cover.
After confirmation of the contents, please be sure to send back ☐ 1 copies of the Specifications
with approving signature on each.

CUSTOMER'S APPROVAL

DATE

BY

PRESENTED

DATE Aug. 26, 2004

BY

H. Imanaka

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Engineering Dept., II
Opto-Electronic Devices Div.
ELECOM Group
SHARP CORPORATION

Product name : PHOTOTRIAC COUPLER

Model No. : S2S3

(Business dealing name : S2S3AD0F)

1. These specification sheets include materials protected under copyright of Sharp Corporation ("Sharp"). Please do not reproduce or cause anyone to reproduce them without Sharp's consent.
2. When using this product, please observe the absolute maximum ratings and the instructions for use outlined in these specification sheets, as well as the precautions mentioned below. Sharp assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets, and the precautions mentioned below.

(Precautions)

- (1) This product is designed for use in the following application areas ;

· OA equipment	· Audio visual equipment	· Home appliances
· Telecommunication equipment (Terminal)	· Measuring equipment	
· Tooling machines	· Computers	

If the use of the product in the above application areas is for equipment listed in paragraphs (2) or (3), please be sure to observe the precautions given in those respective paragraphs.

- (2) Appropriate measures, such as fail-safe design and redundant design considering the safety design of the overall system and equipment, should be taken to ensure reliability and safety when this product is used for equipment which demands high reliability and safety in function and precision, such as ;

· Transportation control and safety equipment (aircraft, train, automobile etc.)	}
· Traffic signals · Gas leakage sensor breakers · Rescue and security equipment	
· Other safety equipment etc.	

- (3) Please do not use this product for equipment which require extremely high reliability and safety in function and precision, such as ;

· Space equipment	· Telecommunication equipment (for trunk lines)	}
· Nuclear power control equipment	· Medical equipment etc.	

- (4) Please contact and consult with a Sharp sales representative if there are any questions regarding interpretation of the above three paragraphs.

3. Please contact and consult with a Sharp sales representative for any questions about this product.

1. Application

This specification applies to the outline and characteristics of phototriac coupler Model No. S2S3 (Apply line voltage 200V AC).

2. Outline

Refer to the attached sheet, page 4.

3. Ratings and characteristics

Refer to the attached sheet, page 5, 6.

4. Reliability

Refer to the attached sheet, page 7.

5. Outgoing inspection

Refer to the attached sheet, page 8.

6. Supplement

6.2 Package specification

Refer to the attached sheet, page 9,10.

6.3 Isolation voltage shall be measured in the following method.

- (1) Short between pins 1 to 2 on the primary side and between pins 3 to 4 on the secondary side.
- (2) The dielectric withstand 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.)

6.4 This Model is approved by UL, CSA.

Approved Model No. : S2S3

UL file No. : E64380

CSA file No. : CA95323

CSA approved mark "  " shall be indicated on minimum unit package.

6.5 This product is not designed against irradiation.

This product is assembled with electrical input and output.

This product incorporates non-coherent light emitting diode.

6.6 ODS materials

This product shall not contain the following materials.

Also, the following materials shall not be used in the production process for this product.

Materials for ODS : CFC_s, Halon, Carbon tetrachloride, 1,1,1-Trichloroethane (Methyl chloroform)

6.7 Brominated flame retardants

Specific brominated flame retardants such as the PBBO_s and PBB_s are not used in this device at all.

7. Notes

7.1 Before the 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 as 2 times or more 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 pulse drive is carried out, it shall be recommended to use that the pulse width of input signal is 1ms or more.

7.2 Usage

For triggering medium and high power triac. (This model shall be used in the ON state condition of triggering power triac.)

7.3 For 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 doesn't occur any defect before starting the ultrasonic cleaning.

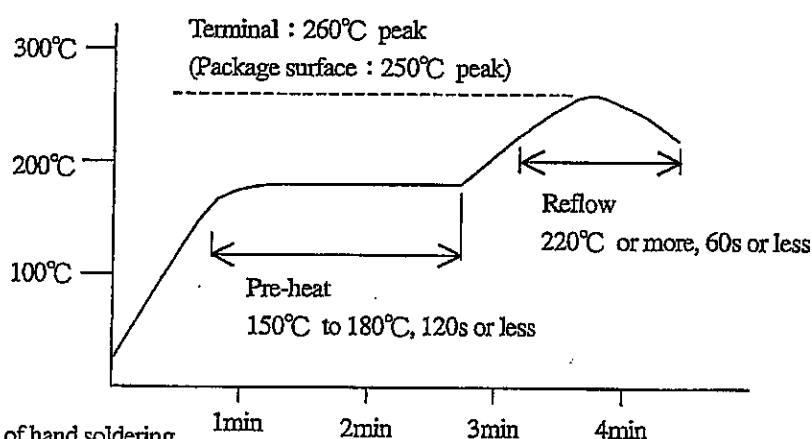
- (3) Applicable solvent : Ethyl alcohol, Methyl alcohol, Isopropyl alcohol

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.

7.4 Precautions for Soldering Phototriac couplers

- (1) In the case of flow soldering (Whole dipping is possible.)
It is recommended that flow solder be at 260°C or less and within 10 seconds (Pre-heating : 100 to 150°C, 30 to 80seconds).
(2 times or less)
- (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)



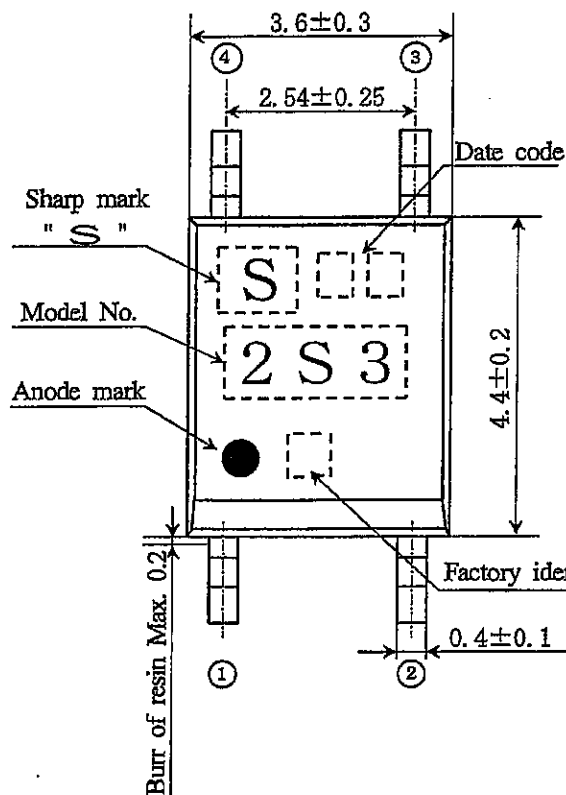
- (3) In the case of hand soldering
What is done on the following condition is recommended. (2 times or less)

Soldering iron temperature : 400°C or less

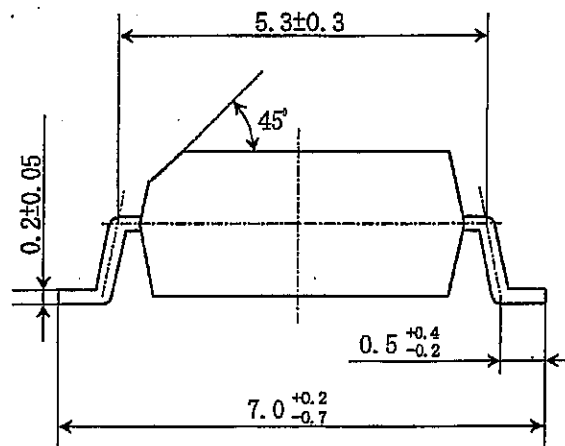
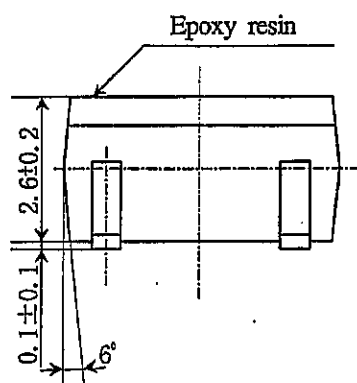
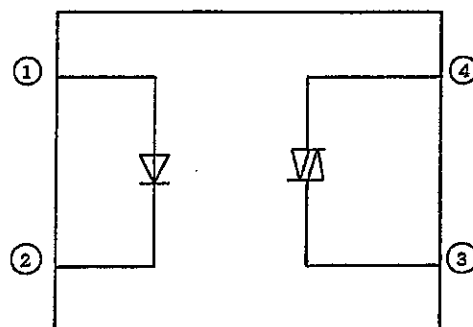
Time : 3s or less

- (4) Other precautions

Since, influence to the device is different according to reflow equipment and its condition, please use the device after confirming no damage in the actual using condition.



Pin Nos. and internal connection diagram



- *1) 2-digit number shall be marked according to DIN standard.
- *2) Factory identification mark shall be or shall not be marked.
- *3) Marking is laser marking

Product mass : Approx. 0.09g

UNIT : 1/1 mm

Name

S2S3 Outline Dimensions
(Business dealing name : S2S3AD0F)

3.1 Absolute maximum ratings

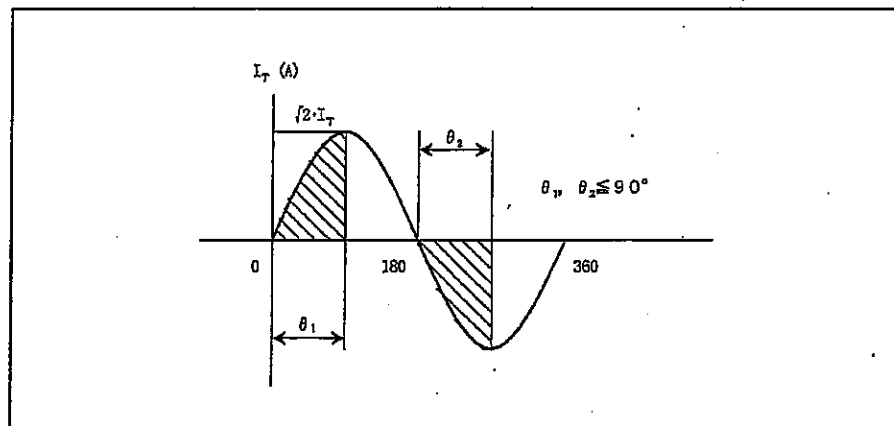
Ta=25°C

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	50	mA
	Reverse voltage	V_R	6	V
Output	RMS on-state current *1	$I_T(\text{rms})$	0.05	A
	Peak one cycle surge current	I_{surge}	0.6	A
	Repetitive peak off-state voltage	V_{DRM}	600	V
Isolation voltage *2		$V_{\text{iso}}(\text{rms})$	3.75	kV
Operating temperature		T_{opr}	-30 to +100	°C
Storage temperature		T_{stg}	-40 to +125	°C
Soldering temperature		T_{sol}	260 (For 10s)	°C

*1 The definition for conductive angle of on-state current shall be in accordance with the below drawings.

For the derating curve, see Fig.1, 2.

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



3.2 Electrical characteristics

Ta=25°C

Parameter		Symbol	MIN.	TYP.	MAX.	Unit	Conditions
Input	Forward voltage	V_F	-	1.2	1.4	V	$I_F=20\text{mA}$
	Reverse current	I_R	-	-	10	μA	$V_R=3\text{V}$
Output	Repetitive peak off-state current	I_{DRM}	-	-	1	μA	$V_D=V_{\text{DRM}}$
	On-state voltage	V_T	-	-	2.5	V	$I_T=0.05\text{A}$
	Holding current	I_H	0.1	-	3.5	mA	$V_D=6\text{V}$
	Critical rate of rise of off-state voltage	dv/dt	100	1000	-	V/ μs	$V_D=1/\sqrt{2} \cdot V_{\text{DRM}}$
Transfer characteristics	Minimum trigger current	I_{FT}	-	-	10	mA	$V_D=6\text{V}$ $R_L=100\Omega$
	Isolation resistance	R_{iso}	5×10^{10}	10^{11}	-	Ω	DC500V 40 to 60%RH
	Turn on time	t_{ON}	-	-	100	μs	$V_D=6\text{V}$, $R_L=100\Omega$, $I_F=20\text{mA}$

Fig.1 Forward current vs. ambient temperature

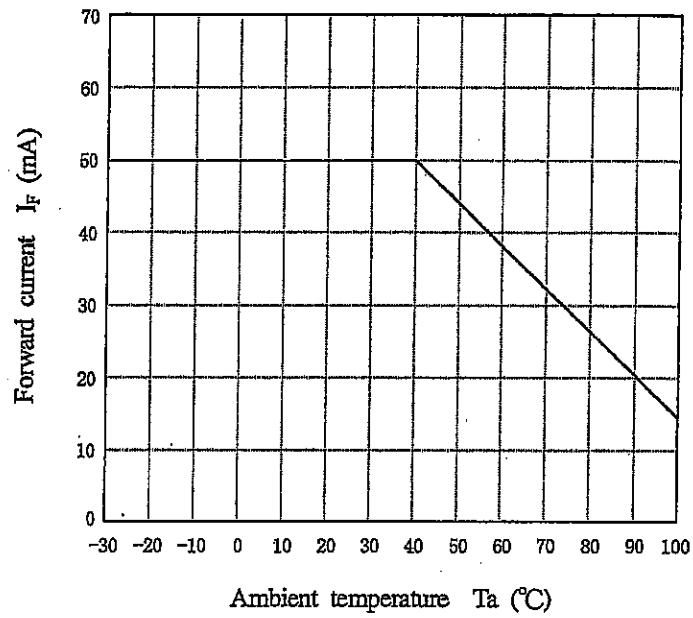
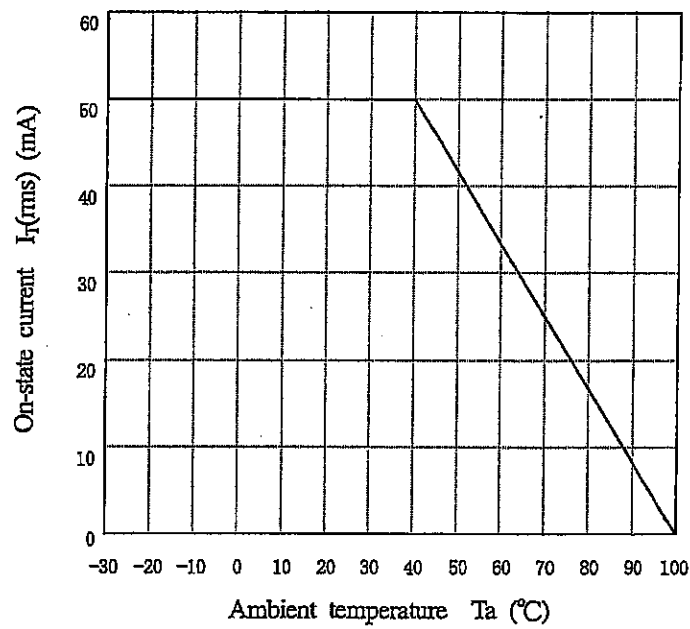


Fig.2 On-state current I_T (rms) vs. ambient temperature



4. Reliability

The reliability of products shall satisfy items listed below.

Confidence level : 90%

LTPD : 10 or 20

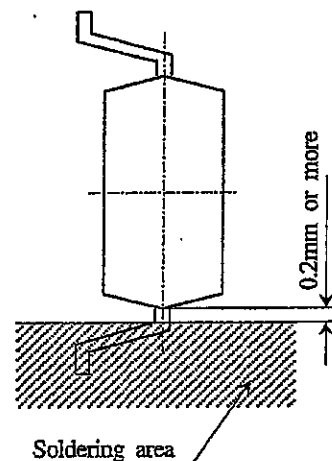
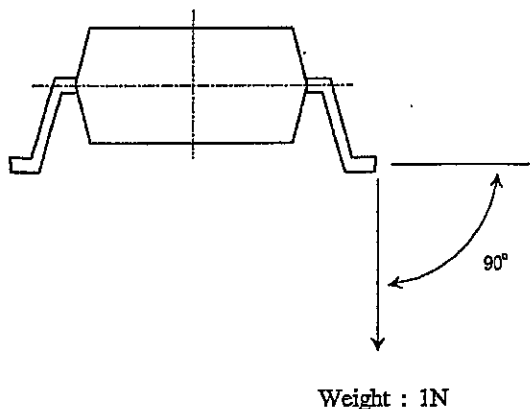
Test Items	Test Conditions *1	Failure Judgement Criteria	Samples (n)
			Defective(C)
Solderability *2	245±3°C, 5s	—	n=11, C=0
Soldering heat *3	(Flow soldering) 260°C, 10s	$V_F > U \times 1.2$ $V_T > U \times 1.2$ $I_{FT} > U \times 1.3$ $I_R > U \times 2.0$ $I_{DRM} > U \times 2.0$ U : Upper specification limit L : Lower specification limit	n=11, C=0
	(Soldering by hand) 400°C, 3 s		n=11, C=0
Terminal strength (Bending) *4	Weight : 1.0N 1 time/each terminal		n=11, C=0
Mechanical shock	15km/s ² , 0.5ms 3 times/±X, ±Y, ±Z direction		n=11, C=0
Variable frequency vibration	100 to 2000 to 100Hz/4min 200m/s ² 4 times/ X, Y, Z direction		n=11, C=0
Temperature cycling	1 cycle -40°C to +125°C (30min) (30min) 20 cycles test Without Load		n=22, C=0
High temp. and high humidity storage	+60°C, 90%RH, 500h		n=22, C=0
High temp. storage	+125°C, 1000h		n=22, C=0
Low temp. storage	-40°C, 1000h		n=22, C=0
Operation life	I _F =50mA, I _T =50mA(θ=180°) Ta=25°C, 1000h		n=22, C=0

*1 Test method, conforms to EIAJ ED 4701.

*2 Solder shall adhere at the area of 95% or more of immersed portion of lead, and pin hole or other holes shall not be concentrated on one portion.

*3 The lead pin depth dipped into solder shall be 0.2mm away from the root of lead pins.

*4 Terminal bending direction is shown below.



5. Outgoing inspection

5.1 Inspection items

(1) Electrical characteristics

V_F , I_R , I_{DRM} , V_T , I_{FT} , R_{ISO} , V_{ISO}

(2) Appearance

5.2 Sampling method and Inspection level

A single sampling plan, normal inspection level II based on ISO 2859 is applied.

The AQL according to the inspection items are shown below.

Defect	Inspection item	AQL (%)
Major defect	Electrical characteristics Unreadable marking	0.065
Minor defect	Appearance defect except the above mentioned.	0.25

6.2 Package specifications

6.2.1 Taping conditions

- (1) Tape structure and Dimensions (Refer to the attached sheet, Page 9)
The carrier tape has the heat pressed structure of PS material carries tape and three layers cover tape (PET material base).
- (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)
Product direction in carrier tape shall direct to the anode mark at the hole side on the tape.
- (4) Joint of tape
The cover tape and carrier tape in one reel shall be jointless.
- (5) The way to repair taped failure devices
The way to repair taped failure devices cut a bottom of carrier tape with a cutter, and after replacing to good devices, the cut portion shall be sealed with adhesive tape.

6.2.2 Adhesiveness of cover tape

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

6.2.3 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 shall contain 3000pcs.

6.2.4 Outer packing appearance (Refer to attached sheet, Page 9)

6.2.5 Marking

- The outer packaging case shall be marked with following information.
* Model No. * Number of pieces delivered * Production date

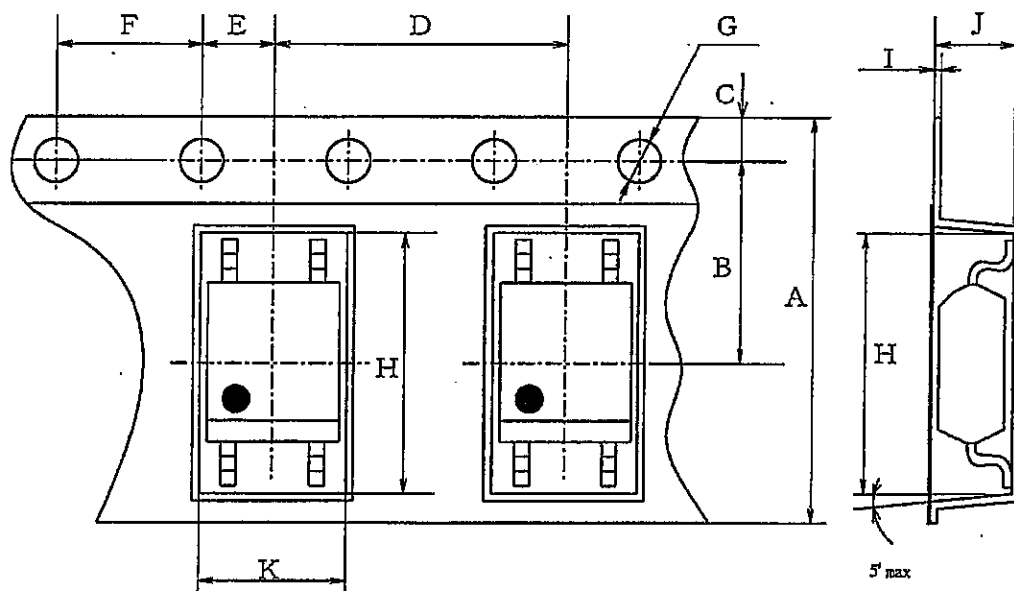
6.2.6 Storage condition

- Taped products shall be stored at the temperature 5 to 30°C and the humidities lower than 70%RH.

6.2.7 Safety protection during shipping

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

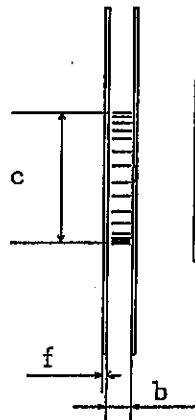
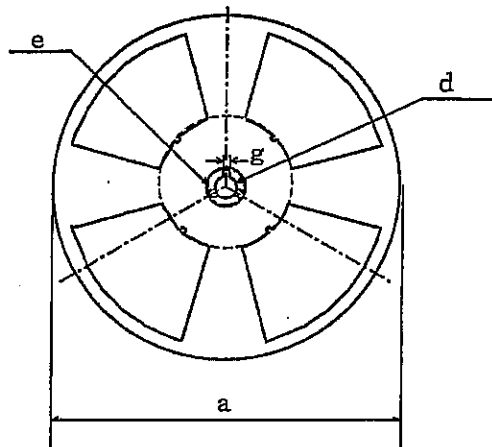
Carrier tape structure and Dimensions



Dimensions list (Unit : mm)

A	B	C	D	E	F	G	H	I	J	K
±0.3	±0.05	±0.1	±0.1	±0.05	±0.1	+0.1 -0.0	±0.1	±0.05	±0.1	±0.1
12.0	5.5	1.75	8.0	2.0	4.0	φ 1.5	7.4	0.3	3.1	4.0

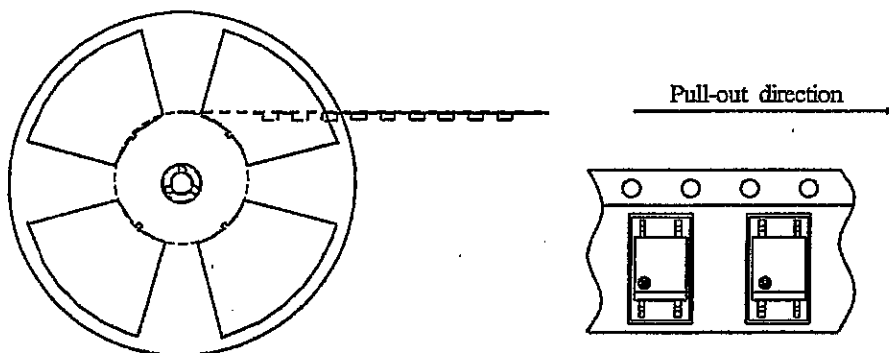
Reel structure and Dimensions



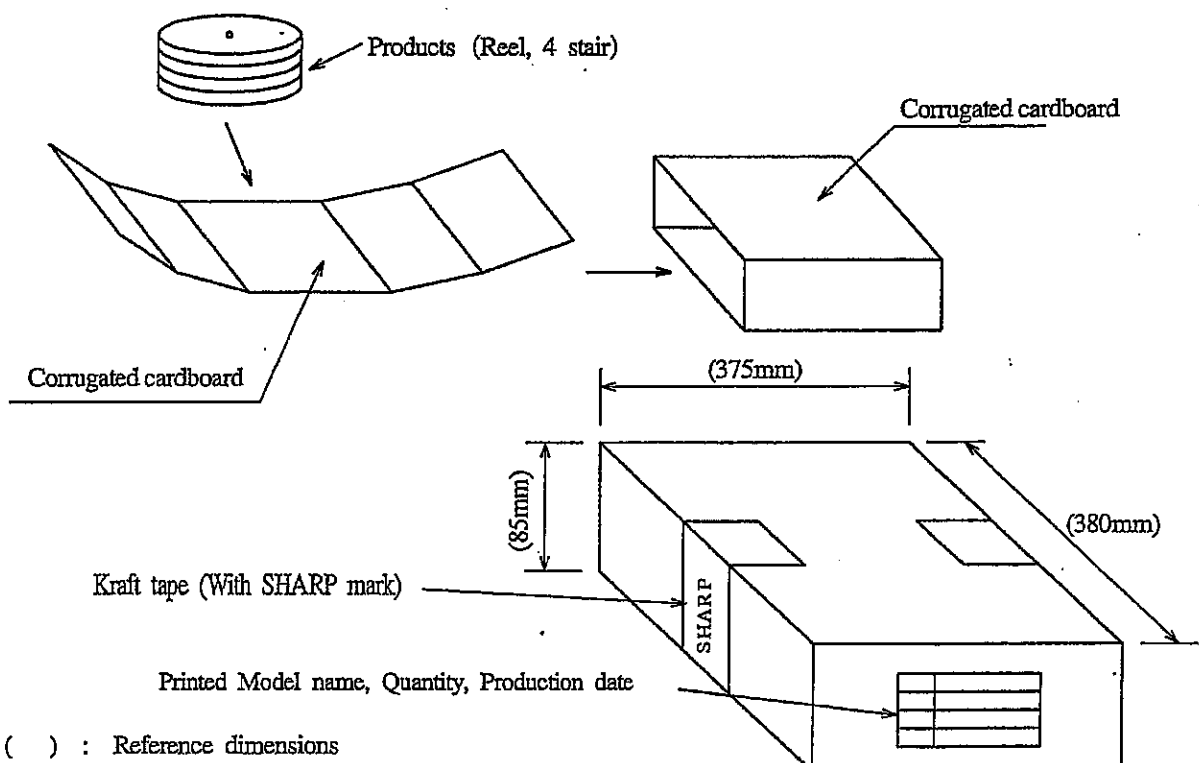
Dimensions list (Unit : mm)

a	b	c	d
370	13.5 ± 1.5	80 ± 1.0	13 ± 0.5
e	f	g	
21 ± 1.0	2.0 ± 0.5	2.0 ± 0.5	

Direction of product insertion



Outer packing appearance



() : Reference dimensions