

PREPARED BY: <i>A. Murayama</i>	DATE: <i>Oct. 15, 1998</i>	<h1>SHARP</h1>	SPEC. No. ED-98179
APPROVED BY: <i>K. Matsumura</i>	DATE: <i>Oct. 15, 1998</i>		<p style="text-align: center;">ELECTRONIC COMPONENTS GROUP SHARP CORPORATION</p> <h2>SPECIFICATION</h2>

REFERENCE

DEVICE SPECIFICATION FOR

PHOTOTRIAC COUPLER

MODEL No.

S11MS7B

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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 ;

<ul style="list-style-type: none"> • OA equipment • Telecommunication equipment (Terminal) • Tooling machines 	• Audio visual equipment	• Home appliances	<ul style="list-style-type: none"> • Measuring equipment • Computers
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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 ;

<ul style="list-style-type: none"> • Transportation control and safety equipment (aircraft, train, automobile etc.) • Other safety equipment 	• Traffic signals	• Gas leakage sensor breakers	<ul style="list-style-type: none"> • Rescue and security equipment
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 - (3) Please do not use this product for equipment which require extremely high reliability and safety in function and precision, such as ;

<ul style="list-style-type: none"> • Space equipment • Nuclear power control equipment 	• Telecommunication equipment (for trunk lines)	<ul style="list-style-type: none"> • Medical equipment
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 - (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.

CUSTOMER'S APPROVAL

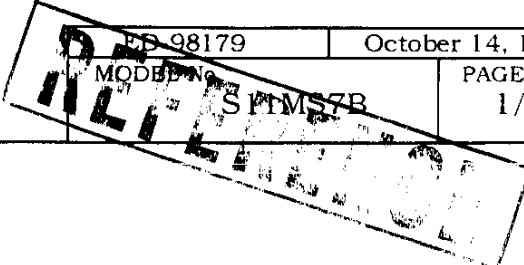
DATE _____

BY _____

DATE PRESENTED BY *T. Matsumura*

T. Matsumura,
Department General Manager of
Engineering Dept., II
Opto-Electronic Devices Div.
ELECOM Group
SHARP CORPORATION

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1. Application

This specification applies to the outline and characteristics of phototriac coupler Model No. S11MS7 (Apply line voltage 100V AC).

2. Outline

Refer to the attached drawing No. CY6645E02.

3. Ratings and characteristics

Refer to the attached sheet, page 5 to 7.

4. Reliability

Refer to the attached sheet, page 8.

5. Incoming inspection

Refer to the attached sheet, page 9.

6. Supplement

6.1 The business dealing name used for this product when ordered or delivered shall be S11MS7B.

6.2 Package specification

Refer to the attached sheet, page 10 to 12.

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 5 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.

Approved Model No. : S11MS7

UL file No. : E64380

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 (Methylchloroform)

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 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)

7.2 In order to avoid a error by external disturbing light, we recommend to remold this device by opaque resin. And, please confirm not to occur error operation under the actual application.

7.3 Input current (I_F) at off state shall be set 0.1 mA or less.

7.4 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

In case 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.

7.5 Usage

For triggering medium and high power triac.

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

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.

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7.6 Precautions for soldering

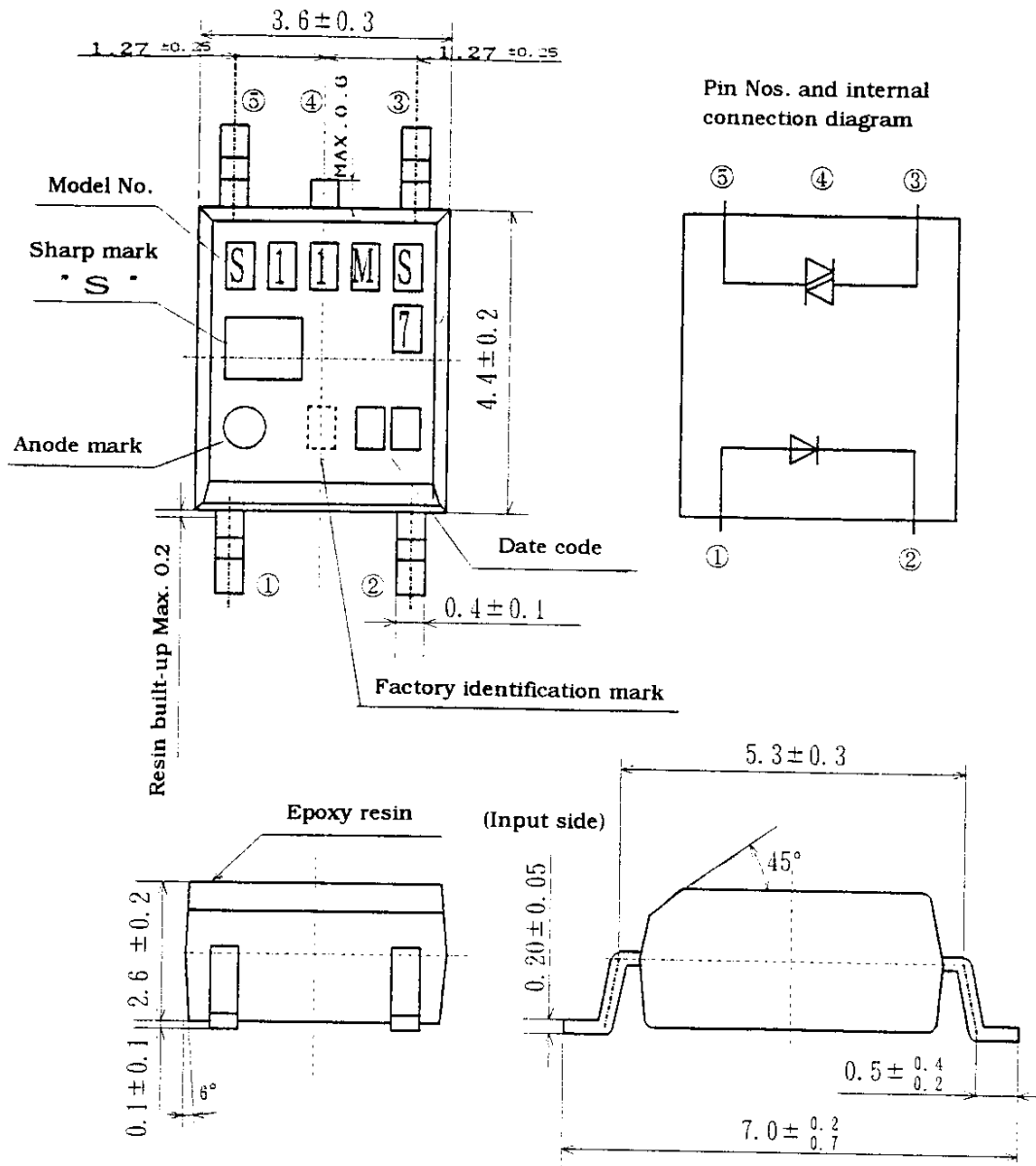
Soldering shall be mounted by the following conditions.

(Recommended soldering conditions)

Mounting method		Solder flow	Reflow *2	VPS reflow	Hand soldering	Remarks
Recommended conditions	Temperature (°C) *1	-	230 MAX.	-	260 MAX.	
	Time (s)	-	5 to 10	-	5 or less	
Applicability		No	Yes	No	Yes	
Detail		-	Attach sheet-1	-	-	

*1 Product surface

*2 Refer to the attached sheet-1.



- *1) 2-digit number shall be marked according to DIN standard.
- *2) Factory identification mark shall be or shall not be marked.
- *3) Pin 4 is not allowed external connection.
- *4) The outline of lead pin shall be plated with solder.

Product mass : Approx.0.09g

UNIT : 1/1 mm	
Name	S11MS7 Outline Dimensions (Business dealing name : S11MS7B)
Drawing No.	CY6645E02

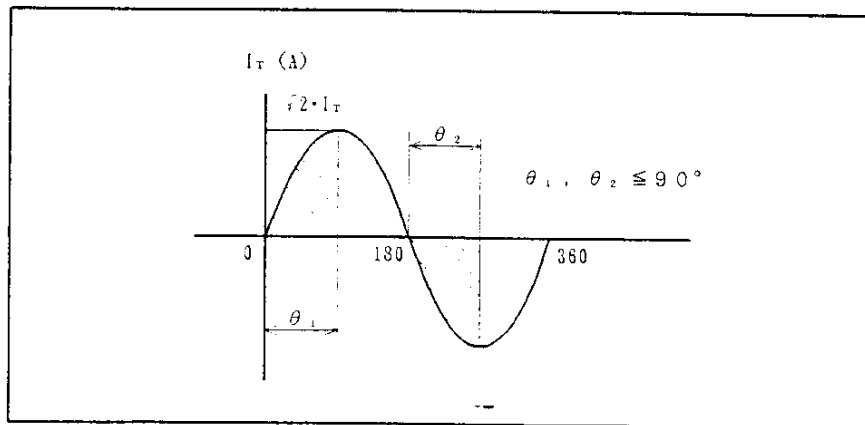
3.1 Absolute maximum ratings

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	0.05	Arms
	Peak one cycle surge current	I_{surge}	0.6	A
	Repetitive peak off-state voltage	V_{DRM}	400	V
Isolation voltage *2		V_{iso}	2.5	kVrms
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.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	-	1.3	2.5	V	$I_T=0.05\text{A}$
	Holding current	I_H	-	0.5	3.5	mA	$V_D=6\text{V}$
	Critical rate of rise of off-state voltage	dv/dt	500	-	-	V/ μs	$V_D=1/\sqrt{2} \cdot V_{\text{DRM}}$
Transfer characteristics	Minimum trigger current	I_{FT}	-	-	5	mA	$V_D=6\text{V}$, $R_L=100\ \Omega$
	Isolation resistance	Riso	5×10^{10}	10^{11}	-	Ω	DC500V 40 to 60%RH
	Turn on time	t_{ON}	-	10	15	μs	$V_D=6\text{V}$, $R_L=100\ \Omega$, $I_F=20\text{mA}$

Fig.1 Forward current vs. ambient temperature

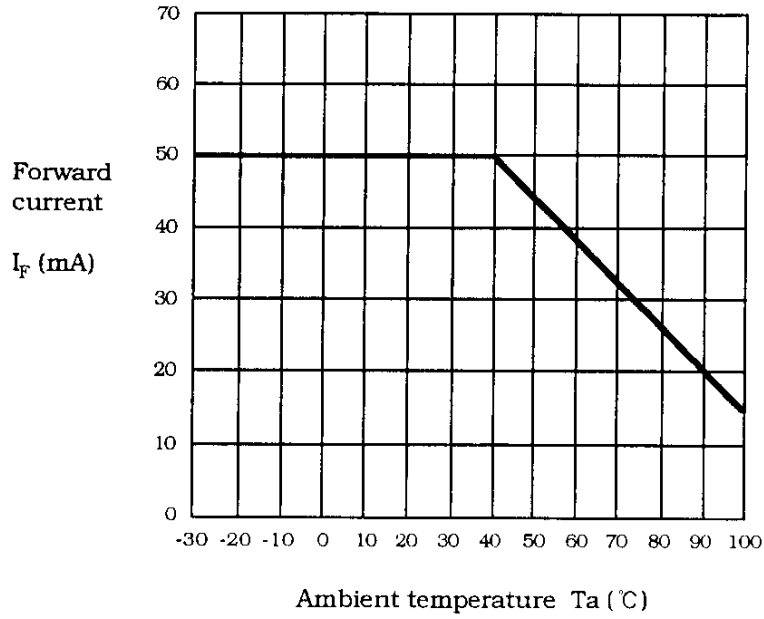
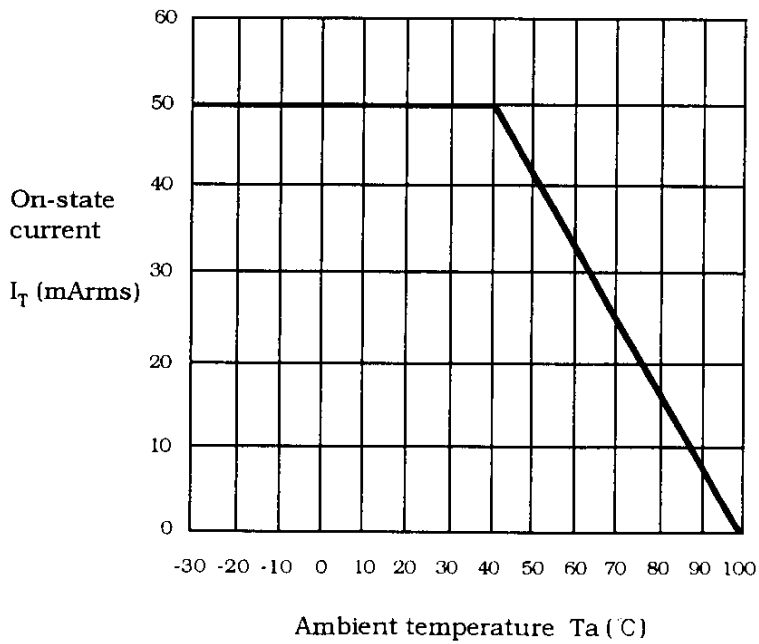


Fig.2 On-state current vs. ambient temperature



4. Reliability

The reliability of products shall satisfy items listed below.

Confidence level : 90%
 LTPD : 10%/20%

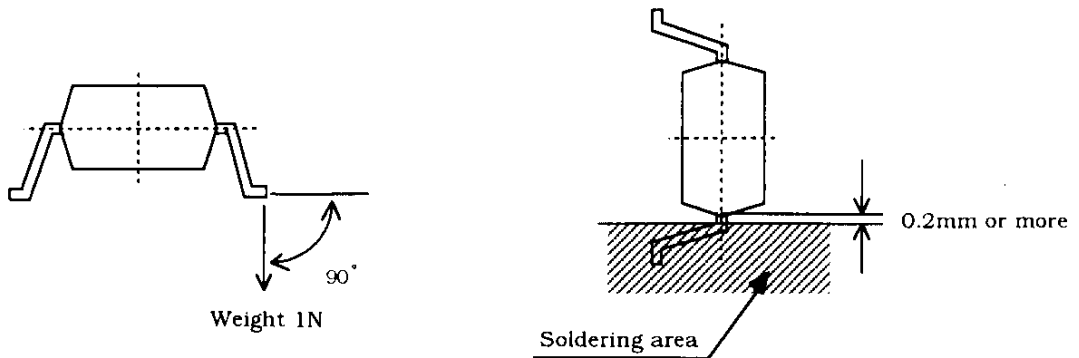
Test Items	Test Conditions *1	Failure Judgement Criteria	Samples (n) Defective(C)
Solderability *2	230°C, 5 s	—	n=11, C=0
Soldering heat *3	260°C, 10 s	$V_F > U \times 1.2$ $V_T > U \times 1.2$ $I_{FT} > U \times 1.3$ $I_R > U \times 2.0$ $I_{DRM} > U \times 2.0$ U : Upper specification limit	n=11, C=0
Terminal strength (Bending) *4	Weight : 1N 1 time/each terminal		n=11, C=0
Mechanical shock	15000m/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	$I_F=50\text{mA}$, $I_T=50\text{mA}$ ($\theta = 180^\circ$) $T_a=25^\circ\text{C}$, 1000h		n=22, C=0

*1 For details, conforms to JIS C 7021.

*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. Incoming 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	0.1
Minor defect	Appearance defect except the above mentioned.	0.4

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6.2 Package specifications

6.2.1 Taping conditions

(1) Tape structure and Dimensions (Refer to the attached sheet, Page 11)

The tape shall have a structure in which a cover tape is sealed heat-pressed on the carrier tape of protect against static electricity.

(2) Reel structure and Dimensions (Refer to the attached sheet, Page 12)

The taping reel shall be of plastic with its dimensions as shown in the attached drawing.

(3) Direction of product insertion (Refer to the attached sheet, Page 12)

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 750pcs.

6.2.4 Marking

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

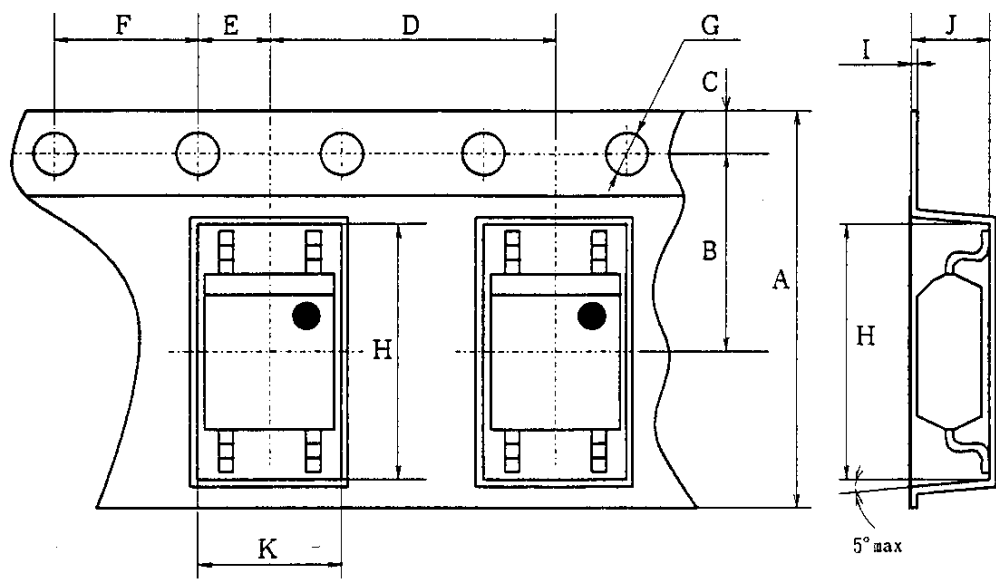
6.2.5 Storage condition

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

6.2.6 Safety protection during shipping

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

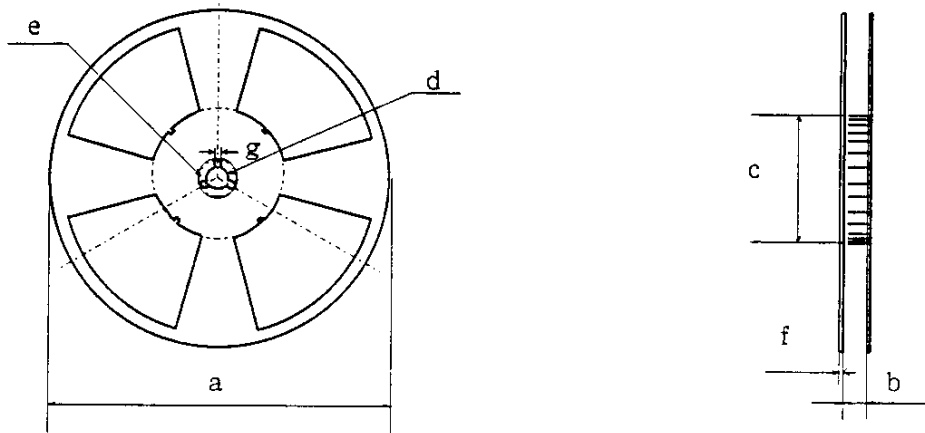
Carrier tape structure and Dimensions



Symbol	A	B	C	D	E
Unit					
mm	±0.3 12.0	±0.05 5.5	±0.1 1.75	±0.1 8.0	±0.05 2.0

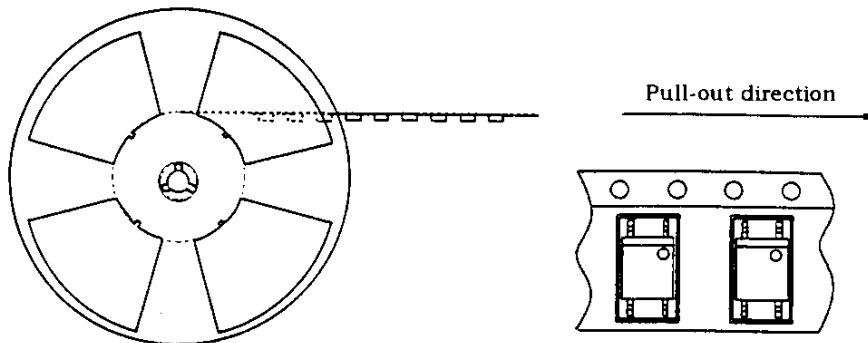
Symbol	F	G	H	I	J	K
Unit						
mm	±0.1 4.0	+0.1 -0.0 φ 1.5	±0.1 7.4	±0.05 0.3	±0.1 3.1	±0.1 4.0

Reel structure and Dimensions



Symbol Unit	Check word						
	a	b	c	d	e	f	g
mm	180	13.5±1.5	80±1	13±0.5	21±1	2.0±0.5	2.0±0.5

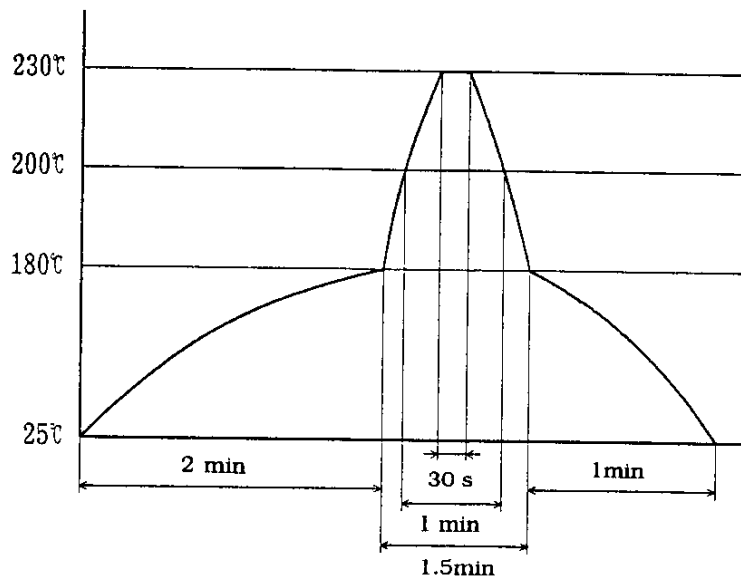
Direction of product insertion



Precautions for Soldering

1. If solder reflow :

It is recommended that only one soldering be done at the temperature and the time within the temperature profile as shown in the figure below.



2. Other precautions

An infrared lamp used to heat up for soldering may cause a localized temperature rise in the resin. So keep the package temperature within that specified in Item 1. Also avoid immersing the resin part in the solder.