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SHARP

OPTO-ELECTRONIC DEVICES DIVISION
ELECTRONIC COMPONENTS GROUP
SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR

PHOTOTRANSISTOR

MODEL No.

PT100MF0MP1

Specified for

Enclosed please find copies of the Specifications which consists of 16 pages including cover.

After confirmation of the contents, please be sure to send back ☐ copies of the Specifications with approving signature on each.

CUSTOMER'S APPROVAL

DATE

BY

PRESENTED

DATE

BY

O. Ichikawa,
Department General Manager of
Engineering Dept., III
Opto-Electronic Devices Div.
ELECOM Group
SHARP CORPORATION

Product name : PHOTOTRANSISTOR

Model No. : PT100MFOMP1

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

- (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

- (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 Silicon phototransistor Model No. PT100MFOMP1.

2. Outline

Refer to the attached drawing No. CY10100H02A.

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

6-1 Packaging specifications

Refer to the attached sheets-2-1 to 2-5.

6-2 This product is not designed against electromagnetic and ionized-particle irradiation.

6-3 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)

6-4 Product mass (Piece) : Approximately 10mg

7. Notes**Soldering****7-1 Solder reflow**

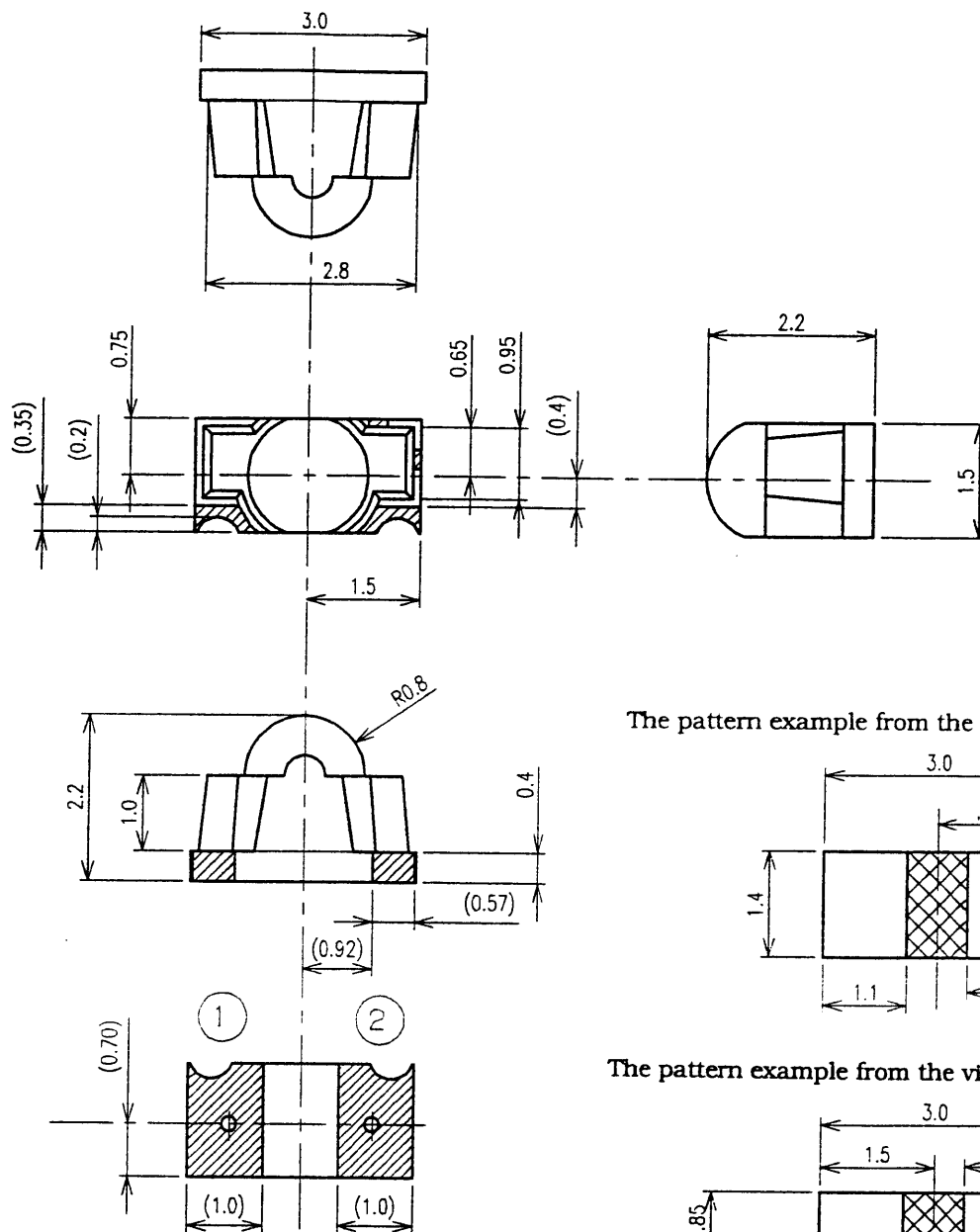
Please do only one soldering at the temperature and the time within the temperature profile in attached sheets-1-1, 2.

7-2 Soldering by hand

To solder onto lead pins, please solder at 260°C for 3 seconds or less.
Please be careful not to give the mechanical stress to the package when soldering because it may cause the deformation or defect due to the plated connection.

7-3 Case of other soldering

Other soldering methods such as dip soldering and VPS shall not be used.
Please use (1) and (2).



The pattern example from the view point of PCB (Side view)

The pattern example from the view point of PCB (Top view)

 : Please be careful not to put a pattern on the shaded portion.

- 1) Unspecified tolerance shall be ± 0.2 .
- 2) Dimensions in parenthesis are shown for reference.
- 3)  area : Au plating
- 4) Resin burr shall not be included in outline dimensions.
- 5) Package : Visible light cut-off resin (black)

6) Pin arrangement

- ① Emitter
- ② Collector



Scale	Material	Finish	Name	PT100MFOMP1 Outline Dimensions
10/1	Package : Epoxy resin	Lead : Au plating		
Unit			Drawing No.	CY10100H02A
1=1/1mm				

3. Ratings and characteristics

3.1 Absolute maximum ratings

Ta=25°C

Parameter	Symbol	Rating	Unit
Collector-emitter voltage	V_{CEO}	35	V
Emitter-collector voltage	V_{ECO}	6	V
Collector current	I_c	20	mA
Collector power dissipation	P_c	75	mW
Operating temperature	T_{opr}	-30 to +85	°C
Storage temperature	T_{stg}	-40 to +95	°C
* Soldering temperature	T_{sol}	240	°C

*1 Within 10min (MAX.) according to the attached reflow profile.

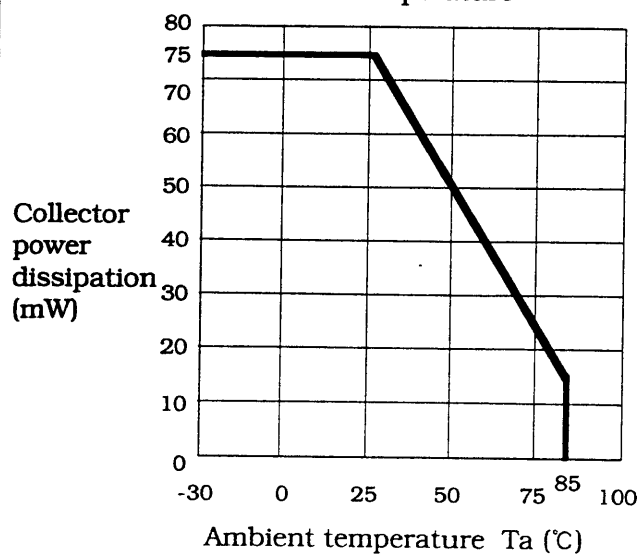
3.2 Electro-optical characteristics

Ta=25°C

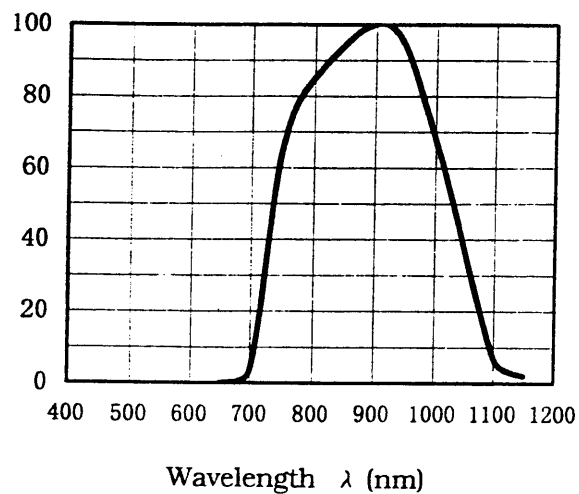
Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Conditions
Collector current	I_c	1.15	2	3.45	mA	* $E_e=1\text{mW/cm}^2$ $V_{CE}=5\text{V}$
Dark current	I_{CEO}	-	1.0	100	nA	$E_e=0$, $V_{CE}=20\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$	-	0.1	0.4	V	$E_e=10\text{mW/cm}^2$ $I_c=0.5\text{mA}$
Collector-emitter breakdown voltage	BV_{CEO}	35	-	-	V	$I_c=0.1\text{mA}$ $E_e=0$
Emitter-collector breakdown voltage	BV_{ECO}	6	-	-	V	$I_E=0.01\text{mA}$ $E_e=0$
Peak sensitivity wavelength	λ_p	-	910	-	nm	-
Response time (Rise)	t_r	-	5.0	-	μs	$V_{CE}=2\text{V}$, $I_c=2\text{mA}$ $R_L=100\Omega$
Response time (Fall)	t_f	-	6.0	-	μs	
Half intensity angle	$\Delta\theta$	-	± 15	-	°	-

* E_e : Irradiance by CIE standard light source A (tungsten lamp)

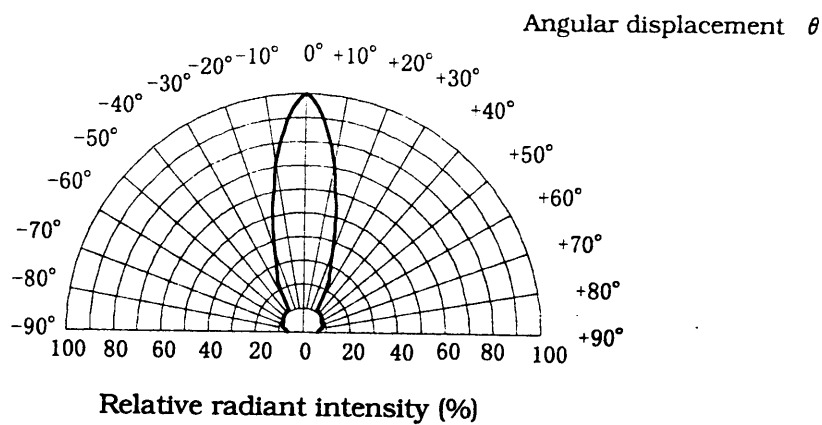
(3.3) Collector power dissipation vs. ambient temperature



(3.4) Spectral sensitivity (TYP)



(3.5) Radiation diagram (For reference)

 $T_a = 25^\circ\text{C}$ 

4. Reliability

The reliability of products shall satisfy items listed below.

Confidence level : 90%

LTPD : 10%/20%

Test Items	Test Conditions	Failure Judgement Criteria	Samples (n) Defective(C)
Temperature cycling	1 cycle -40℃ $\longleftrightarrow$ +95℃ (30min) (30min) 20 cycles test	$I_c < L \times 0.8$ $I_c > U \times 1.2$ $I_{CEO} > U \times 2.0$ $V_{CE(sat)} > U \times 1.2$ U: Upper specification limit L: Lower specification limit	n=22, C=0
High temp. and high humidity storage	+60℃, 90%RH, 500h		n=22, C=0
High temp. storage	+95℃, 500h		n=22, C=0
Low temp. storage	-40℃, 500h		n=22, C=0
Operation life	25℃, $P_c=75mW$, 500h		n=22, C=0
Mechanical shock	1000m/s ² , 6ms, Half sine wave 3 times/ $\pm X$, $\pm Y$, $\pm Z$ direction		n=11, C=0
Variable frequency vibration	200m/s ² 100 to 2000 to 100Hz /For approx. 4min 48 min/ X , Y , Z direction		n=11, C=0
Soldering heat	240 $\pm$ 5℃, 10 $\pm$ 0.5 s The temperature profile is according to the precautions for soldering photointerrupters (attach sheet-1).		n=11, C=0

5. Outgoing inspection

(1) Inspection lot

Inspection shall be carried out per each delivery lot.

(2) Inspection method

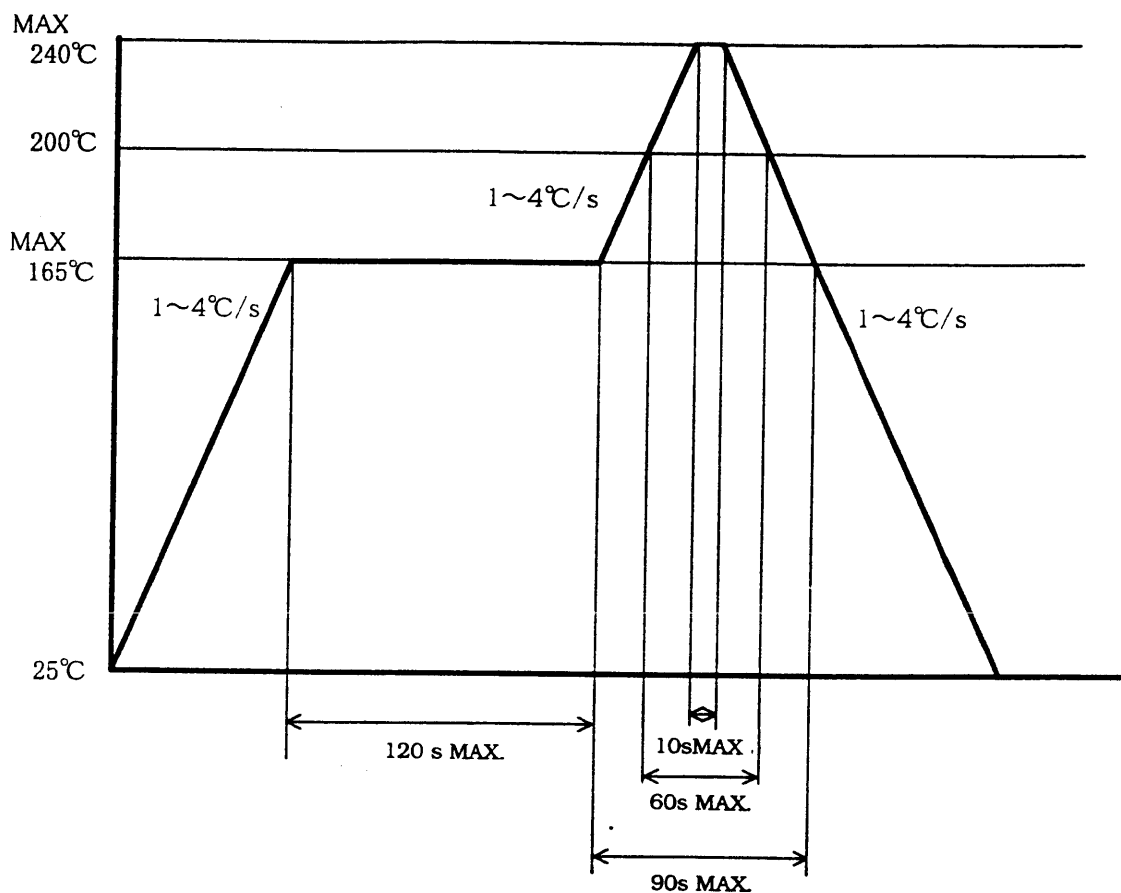
A single sampling plan, normal inspection level II based on ISO2859 shall be adopted.

Parameter		Inspection items and test method				AQL(%)	
Major defect	1	Disconnection, short				0.065	
	2	Inverse polarity on terminal					
	3	Soldering defect (Obstacle to use)					
	4	Characteristics defect					
	Parameter		Symbol	Judgement criteria			Unit
				MIN.	MAX.		
	Collector current		I _c	1.15	3.45		mA
	Dark current		I _{CEO}	-	100		nA
	Collector-emitter breakdown voltage		BV _{CEO}	35	-		V
	Emitter-collector breakdown voltage		BV _{ECO}	6.0	-		V
Test conditions refer to parameter 3.2.							
Minor defect	1	Appearance defect				0.25	
	Parameter		Judgement criteria				
	Crack		Visible crack irrespective of its position shall be defect.				
	Split, Chip, Scratch, Stain, Blur		One which affects the characteristics of parameter 3.2 shall be defect.				

Precautions for Soldering PT100MFOMP1

1. In case, solder reflow

Please do only one soldering 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.

This device has pin structure connected and soldered on the epoxy resin package. Please be acknowledged that mechanical stress must not be put on the package when you solder the device by hand because there is possibility of deformation or defect of the device.

Even if within the temperature profile above, there is the possibility that the gold wire in package is broken in case that the deformation of PCB gives the affection to lead pins. Please use after confirmation the conditions fully by actual solder reflow machine.

3. Storage and management after open

3.1 Storage condition : Storage shall be in accordance with the below conditions.

Storage temp. : 5 to 30°C

Storage humidity : 70%RH or less

3.2 Treatment after open

- (1) After open, please mount at the conditions of humidity 60%RH or less and temperature 5 to 25°C within 2 days.
- (2) In case that long term storage is needed, devices should either be stored in dry box, or re-sealed to moist-proof bag with siccative and leave them in the environment where the temperature is 5 to 30°C, at the humidity condition of below 70%RH. Devices must be mounted within 2 weeks.

3.3 Baking before mounting

In case that it could not carry out the above treatment, it is able to mount by baking treatment. However baking treatment shall be limited only 1 time.

Recommended conditions : 125°C, 16 to 24 hours

- ※ Baking treatment can not carry out at the packaged condition. Please carry out baking at the condition of mounting on PCB or getting on the metal tray.

Package specifications (ϕ 180mm reel)

1. Application

This specification applies to the taping specifications and the relation items for the PT100MFOMP1.

2. Taping method

(2.1) Tape structure and Dimensions (Refer to the attached sheet-2-2)

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

(2.2) Reel structure and Dimensions (Refer to the attached sheet-2-3)

(2.3) Direction of product insertion (Refer to the attached sheet-2-3)

Product direction in carrier tape shall direct to the emitting diode at the hole side on the tape.

3. Adhesiveness of cover tape

The exhalation force between carrier tape and cover tape shall be 0.2N to 1N for the angle from 160° to 180° .

4. 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 2000 pcs.

5. Marking

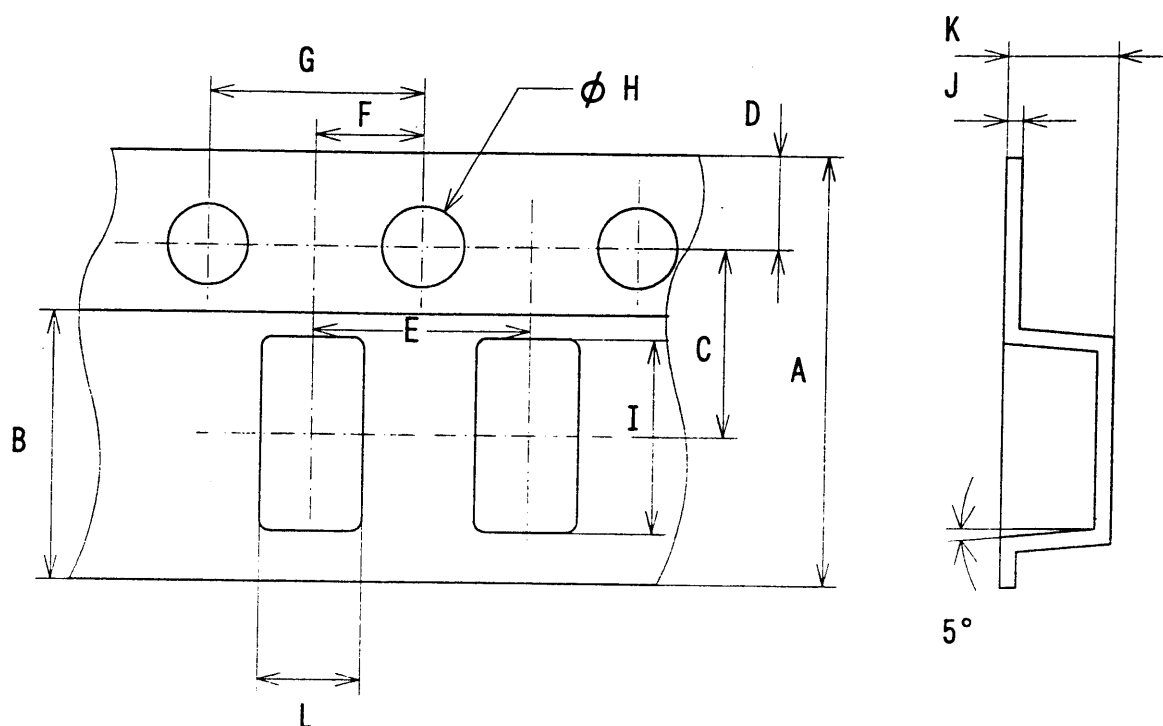
The outer packaging case shall be marked with following information.

* Model No. * Number of pieces delivered * Production date

6. Safety protection during shipping

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

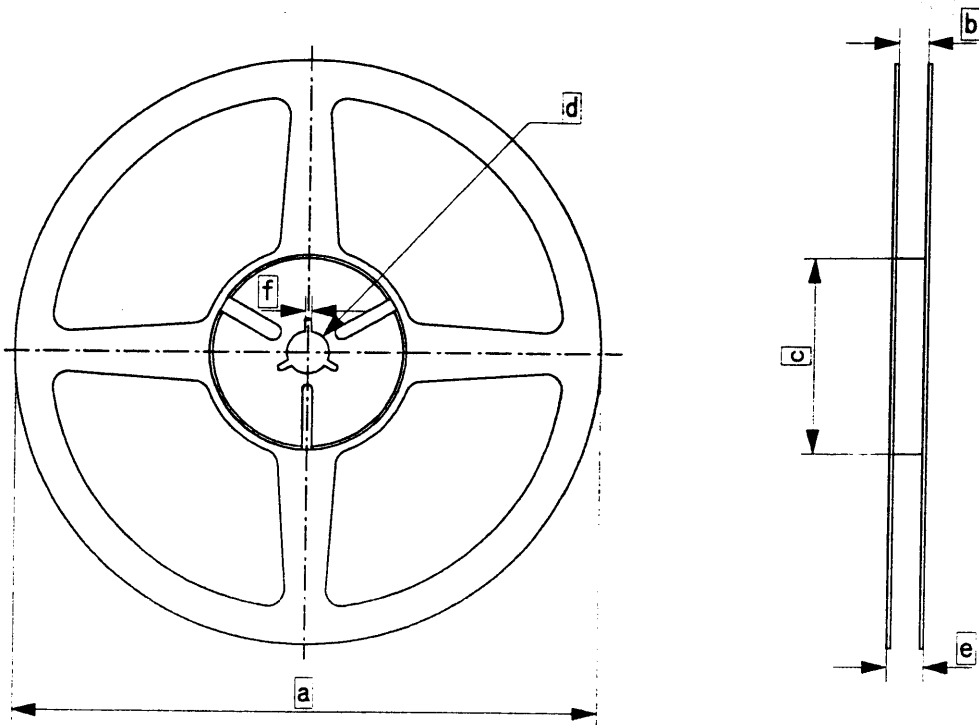
Tape structure and Dimensions



Symbol	A	B	C	D	E	F	G
Unit							
mm	± 0.3 8.0	± 0.1 5.5	± 0.05 3.5	± 0.1 1.75	± 0.1 4.0	± 0.05 2.0	± 0.1 4.0

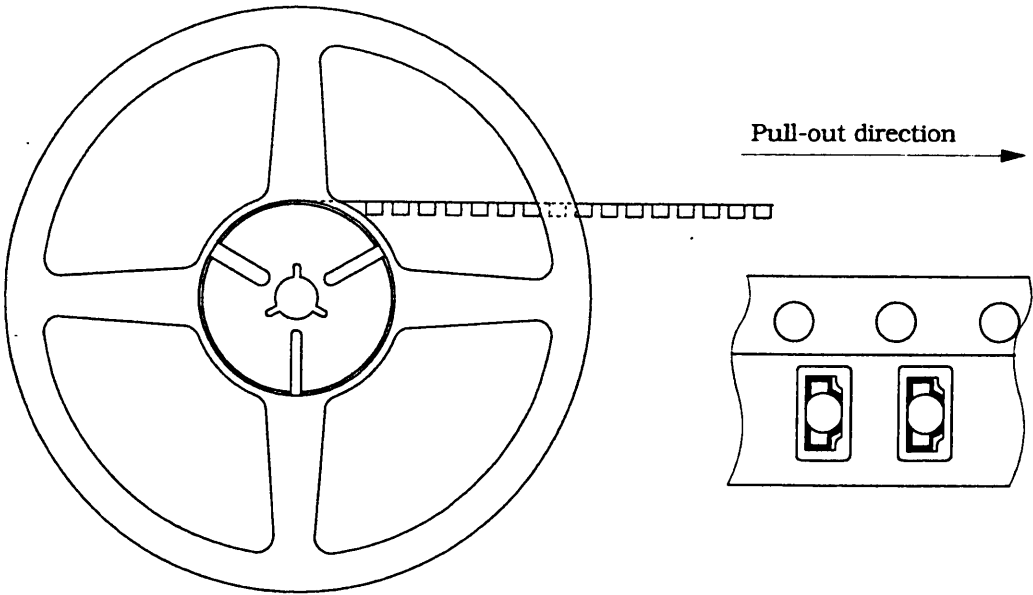
Symbol	H	I	J	K	L
Unit					
mm	$\begin{smallmatrix} +0.1 \\ -0 \end{smallmatrix}$ $\phi 1.5$	± 0.1 3.3	± 0.05 0.3	± 0.1 2.45	± 0.1 1.8

Reel structure and Dimensions



Symbol Unit	Check word					
	a	b	c	d	e	f
mm	180	9 ^{+0.3} ₋₀	60 ⁺¹ ₋₀	13±0.2	11.4±1	2±0.5

Direction of product insertion



Moisture-proof package specification (φ 180mm reel)

1. Application

This specification applies to the products which Sharp delivers to customer.

2. Packaging specifications

2.1 Packaging material

Name	Material	Q'ty	Aim
Aluminum laminated sack	Aluminum polyethylene	Refer to 2.2	Moisture-proof
Label	Paper(-made)	-	Indication of Model No. and Q'ty
Humidity indicator card	Paper(-made)	1 sheet/reel	Indication of Humidity

2.2 Packaging method

- (1) Seal the aluminum laminated bag included the ruled tape-reel and humidity indicator card quantity.
- (2) Fill up the blank of label and paste on the bag.
- (3) Put the moisture-proof laminated bag in the ruled case

Package shape	Product	Q'ty	Moisture-proof sack Q'ty
Tape-reel (φ 180mm)	1ch. type	1500pcs./reel	1reel/bag

Minimum order Q'ty : 1 reel/bag

3. Storage and management after open

3.1 Storage condition : Storage shall be in accordance with the below conditions.

Storage temp. : 5 to 30°C

Storage humidity : 70%RH or less

3.2 Treatment after open

(1) After open, please mount at the conditions of humidity 60%RH or less and temperature 5 to 25°C within 2 days.

(2) In case of long time storage after open, please mount at the conditions of humidity 70%RH or less and temperature 5 to 30°C within 2 weeks by using dry box or resealing with desiccant in moisture-proof sack by sealer.

3.3 Baking before mounting

In case that it could not carry out the above treatment, it is able to mount by baking treatment. However baking treatment shall be limited only 1 time.

Recommended conditions : 125°C, 16 to 24 hours

※ Baking treatment can not carry out at the packaged condition. Please carry out baking at the condition of mounting on PCB or getting on the metal tray.