GP1S092HCPIF

SMT, Gap : 2mm, Slit : 0.3mm Phototransistor Output, Compact Transmissive Photointerrupter

■ Description

GP1S092HCPIF is a compact-package, photo-transistor output, transmissive photointerrupter, with opposing emitter and detector in a molding that provides non-contact sensing. The compact package series is a result of unique technology combing transfer and injection molding.

This surface mount device has a shaped positioning pin to assure accurate PCB placement, of the emitter and detector. It is unique, because it is one of the few photointerrupters that comes in Tape and Reel packaging, for use with highly automated pick and place equipment.

■ Features

1. Transmissive with phototransistor output
2. Highlights:
   - Compact Size
   - Positioning Pin “D” shaped to prevent misalignment
   - Surface Mount Type (SMT)
   - Tape and Reel (T&R) 2 000 pcs per reel
3. Key Parameters:
   - Gap Width : 2mm
   - Slit Width (detector side): 0.3mm
   - Package : 4.5×2.6×2.9 mm
4. Lead free and RoHS directive compliant

■ Agency approvals/Compliance

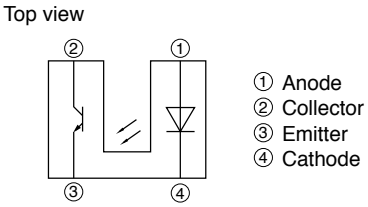
1. Compliant with RoHS directive

■ Applications

1. General purpose detection of object presence or motion.
2. Example: printer, lens control for camera

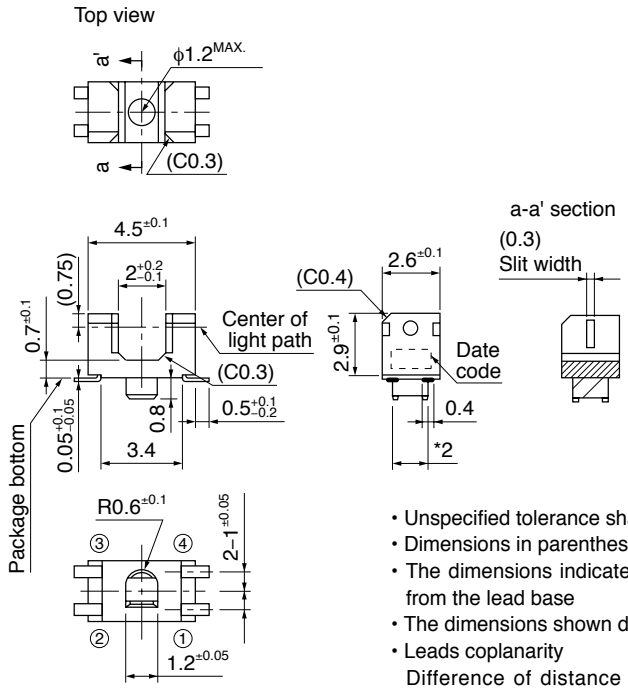
Sheet No.: D3-A00201EN
Date Oct. 3. 2005

■ Internal Connection Diagram



■ Outline Dimensions

(Unit : mm)



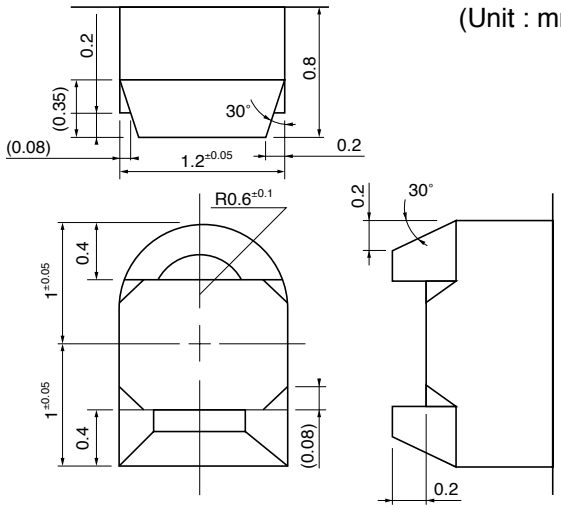
- Unspecified tolerance shall be ± 0.2mm
- Dimensions in parenthesis are shown for reference
- The dimensions indicated by ∗ refer to those measured from the lead base
- The dimensions shown do not include those of burrs
- Leads coplanarity
  Difference of distance between package bottom and bottom side of each shall be MAX. 0.1mm
- Coplanarity of the boss and gap of the device shall be 0.1mm
- ▭ portion : No solder plating
- The marking specifications are shown below

Product mass : approx. 0.05g

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

■ Details of positioning pin dimensions

(Unit : mm)



Date code (2 digit)

1st digit		2nd digit	
Year of production		Month of production	
A.D.	Mark	Month	Mark
2000	0	1	1
2001	1	2	2
2002	2	3	3
2003	3	4	4
2004	4	5	5
2005	5	6	6
2006	6	7	7
2007	7	8	8
2008	8	9	9
2009	9	10	X
2010	0	11	Y
:	:	12	Z

repeats in a 10 year cycle

Rank mark

There is no rank indicator.

Country of origin

Japan

■ Absolute Maximum Ratings

(T_a=25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	50	mA
	Reverse voltage	V_R	6	V
	Power dissipation	P	75	mW
Output	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
Total power dissipation		P_{tot}	100	mW
Operating temperature		T_{opr}	–25 to +85	°C
Storage temperature		T_{stg}	–40 to +100	°C
*1Soldering temperature		T_{sol}	260	°C

*1 For 5s or less

■ 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
	Reverse current		I_R	V_R=3V	–	–	10	μA
Output	Collector dark current		I_{CEO}	V_{CE}=20V	–	–	100	nA
Transfer characteristics	Collector current		I_C	V_{CE}=5V, I_F=5mA	100	–	400	μA
	Collector-emitter saturation voltage		$V_{CE(sat)}$	I_F=10mA, I_C=40μA	–	–	0.4	V
	Response time	Rise time	t_r	V_{CE}=5V, I_C=100μA, R_L=1kΩ	–	50	150	μs
		Fall time	t_f		–	50	150	μs

Fig.1 Forward Current vs. Ambient Temperature

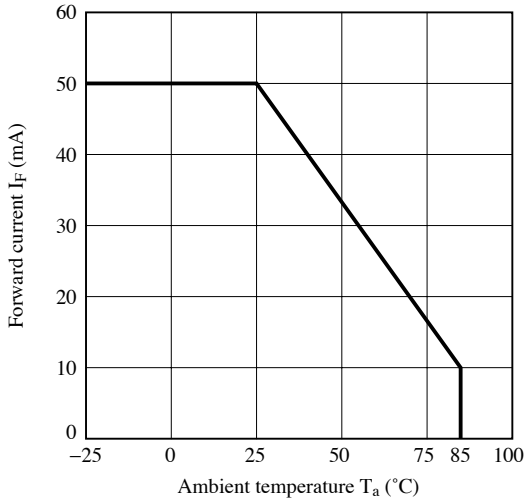


Fig.2 Power Dissipation vs. Ambient Temperature

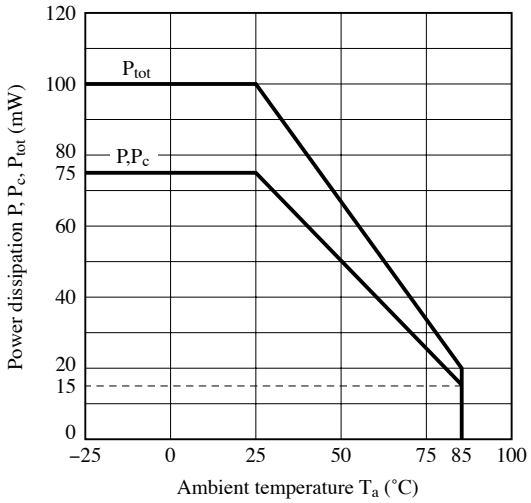


Fig.3 Forward Current vs. Forward Voltage

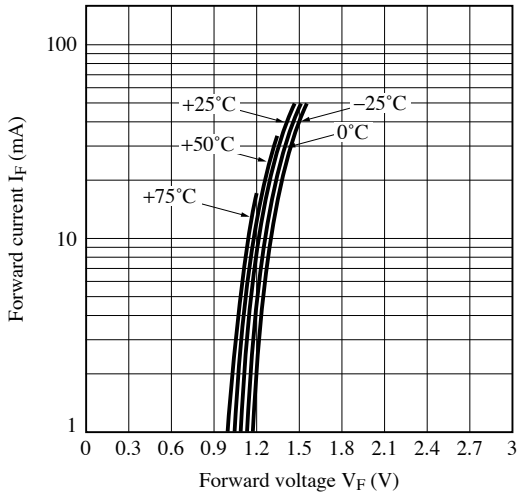


Fig.4 Collector Current vs. Forward Current

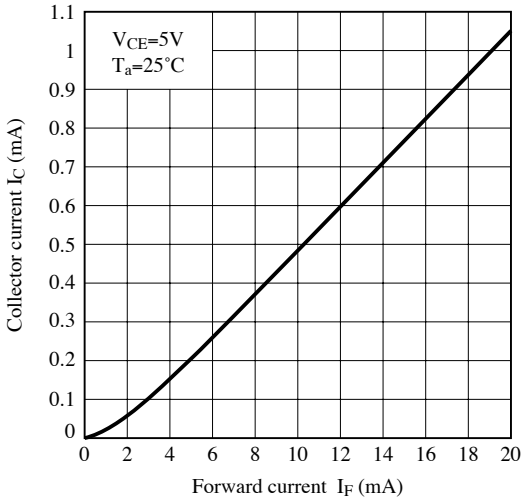


Fig.5 Collector Current vs. Collector-emitter Voltage

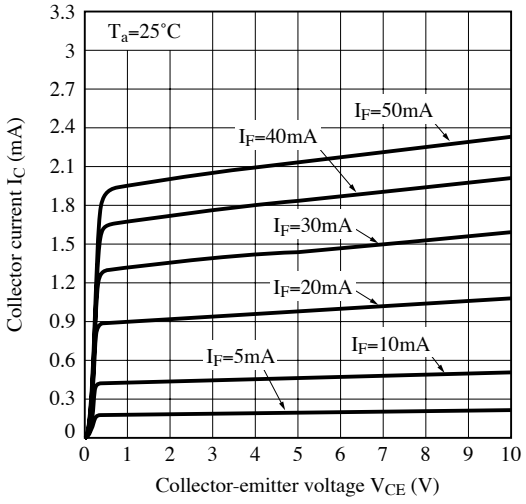


Fig.6 Relative Collector Current vs. Ambient Temperature

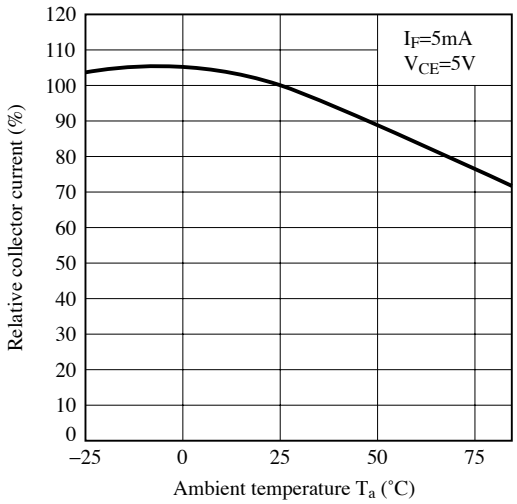


Fig.7 Collector-emitter Saturation Voltage vs. Ambient Temperature

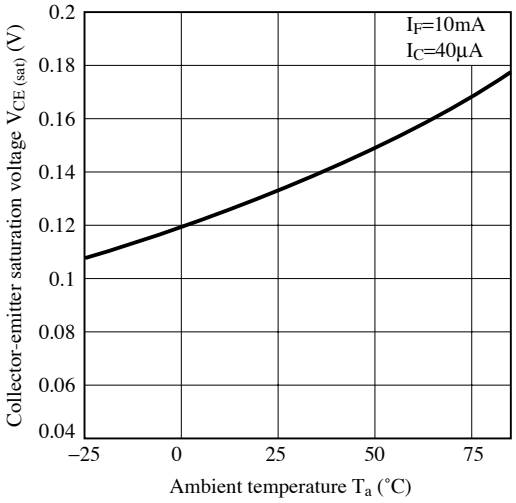


Fig.8 Collector Dark Current vs. Ambient Temperature

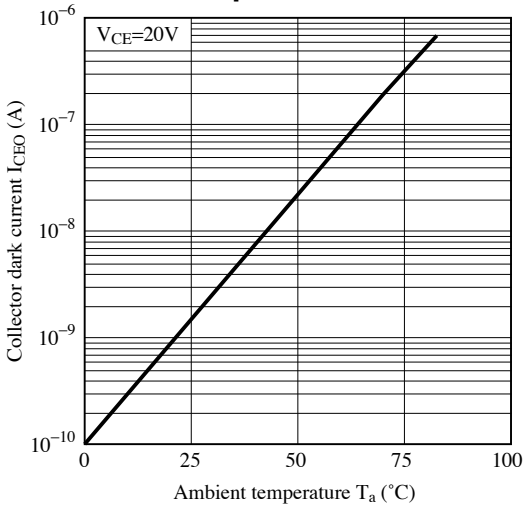


Fig.9 Response Time vs. Load Resistance

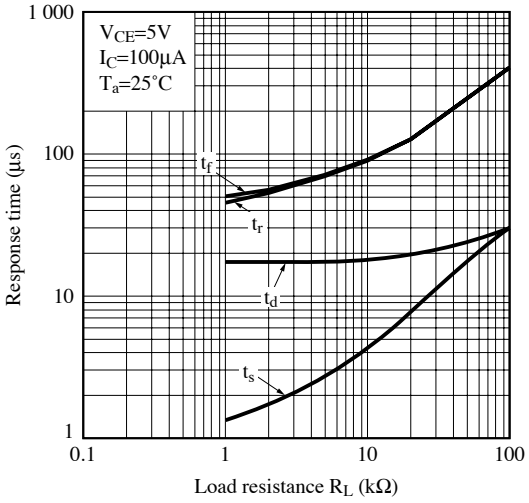


Fig.10 Test Circuit for Response Time

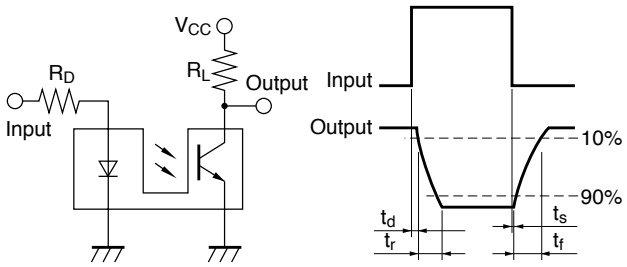


Fig.11 Detecting Position Characteristics (1)

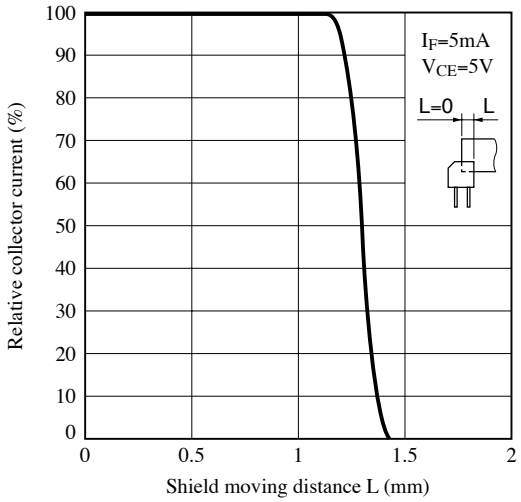
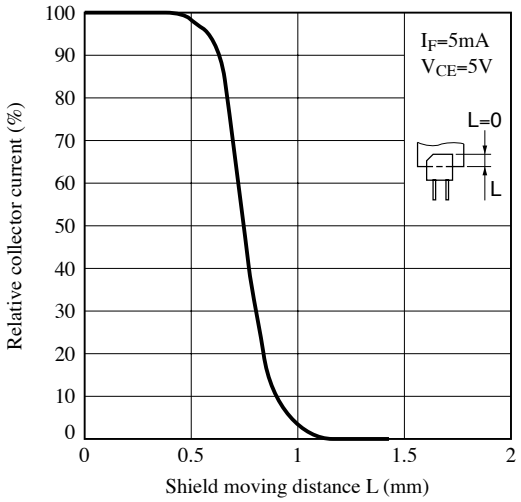


Fig.12 Detecting Position Characteristics (2)



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

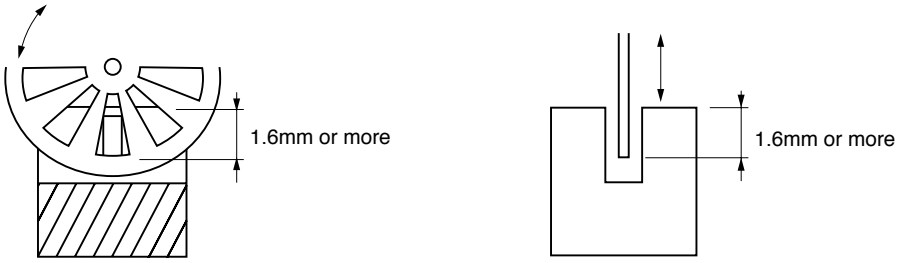
■ Design Considerations

● Design guide

1) Prevention of detection error
To prevent photointerrupter from faulty operation caused by external light, do not set the detecting face to the external light.

2) Position of opaque board
Opaque board shall be installed at place 1.6mm or more from the top of elements.

(Example)



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

● Degradation

In general, the emission of the IRED used in photointerrupter 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.

● Used parts

This product is assembled using the below parts.

• Photodetector (qty. : 1)

Category	Material	Maximum Sensitivity wavelength (nm)	Sensitivity wavelength (nm)	Response time (μs)
Phototransistor	Silicon (Si)	930	700 to 1 200	20

• Photo emitter (qty. : 1)

Category	Material	Maximum light emitting wavelength (nm)	I/O Frequency (MHz)
Infrared emitting diode (non-coherent)	Gallium arsenide (GaAs)	950	0.3

• Material

Case	Lead frame	Lead frame plating
Black polyphernylene sulfide resin (UL94 V-0)	42Alloy	SnCu plating

■ Manufacturing Guidelines

● Storage and management after open

Storage condition

Storage temp.: 5 to 30˚C, Storage humidity : 70%RH or less at regular packaging.

Treatment after opening the moisture-proof package

After opening, you should mount the products while keeping them on the condition of 5 to 25˚C and 70%RH or less in humidity within 4 days.

After opening the bag once even if the prolonged storage is necessary, you should mount the products within two weeks.

And when you store the rest of products you should put into a DRY BOX. Otherwise after the rest of products and silicagel are sealed up again, you should keep them under the condition of 5 to 30˚C and 70%RH or less in humidity.

Baking before mounting

When the above-mentioned storage method could not be executed, please process the baking treatment before mounting the products.

However the baking treatment is permitted within one time.

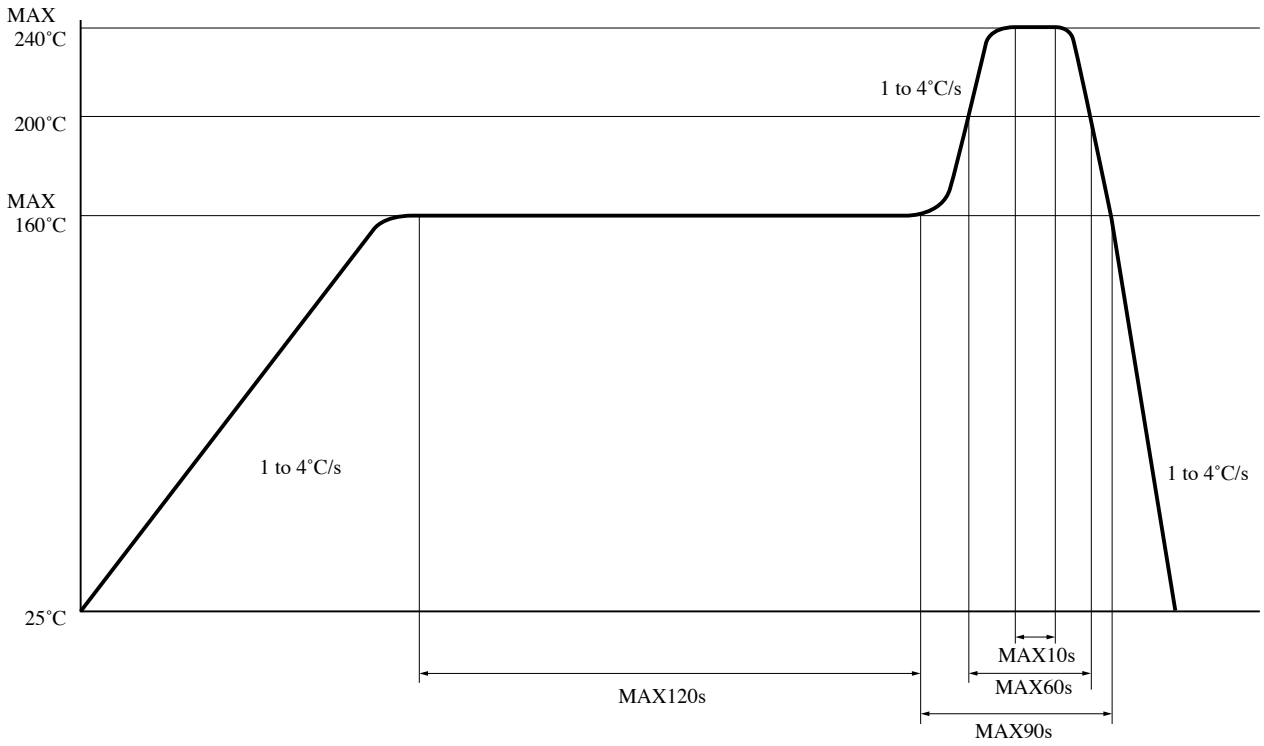
Recommended condition : 125˚C, 16 to 24 hours

∗Do not process the baking treatment with the product wrapped. When the baking treatment processing, you should move the products to a metallic tray or fix temporarily the products to substrate.

● 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 solder within one time.



Hand soldering

Hand soldering should be completed within 3 s when the point of solder iron is below 350˚C.
Please solder within one time.
Please don't touch the terminals directly by soldering iron.
Soldered product shall treat at normal temperature.

Other notice

Please take care not to let any external force exert on lead pins.
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 cooling and soldering conditions.

Lead terminals

Lead terminals of this product are tin copper alloy plated. Before usage, please evaluate solderability with actual conditions and confirm. And the uniformity in color for the lead terminals are not specified.

● Cleaning instructions

Solvent cleaning :

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

Ultrasonic cleaning :

Do not execute ultrasonic cleaning.

Recommended solvent materials :

Ethyl alcohol, Methyl alcohol and Isopropyl alcohol.

● 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 PBBOs and PBBs 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

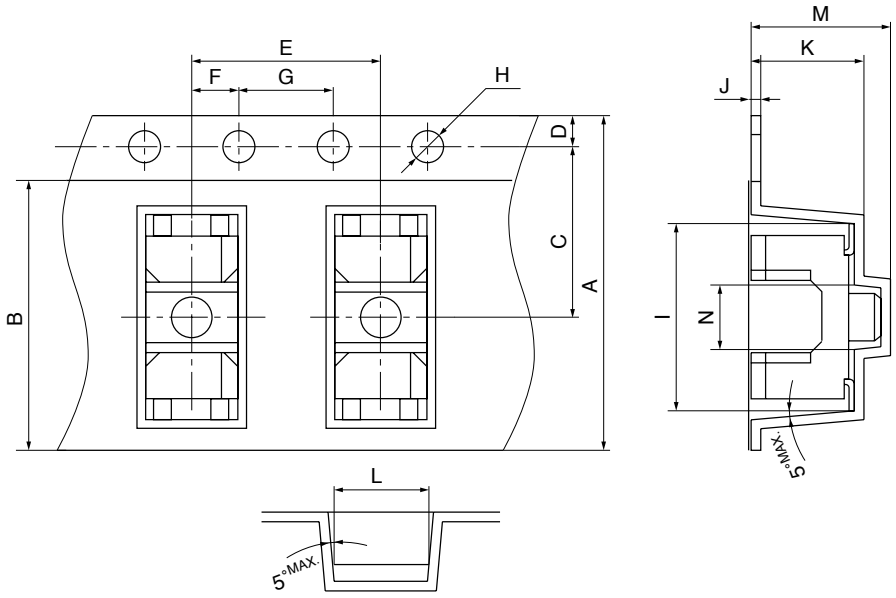
Package materials

Carrier tape : PS (with anti-static material)
Cover tape : PET (three layer system)
Reel : PS

Package method

2 000 pcs of products shall be packaged in a reel. One reed with silicagel is endased in aluminum laminated bag. After sealing up the bag, it encased in one case (5 bags/case).

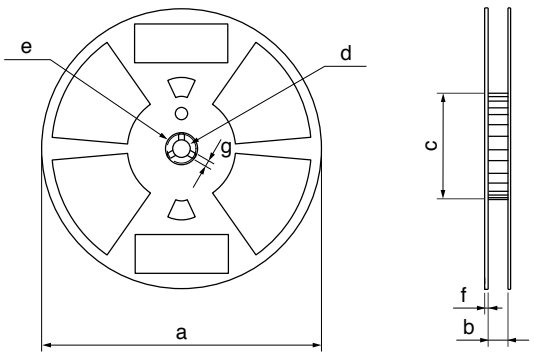
Carrier tape structure and Dimensions



Dimensions List (Unit : mm)

A	B	C	D	E	F	G
$12^{\pm0.3}$	$9.5^{+0.3}_{-0.2}$	$5.5^{\pm0.05}$	$1.75^{\pm0.1}$	$8^{\pm0.1}$	$2^{\pm0.05}$	$4^{\pm0.1}$
H	I	J	K	L	M	N
$\phi1.5^{+0.1}_{-0}$	$6.1^{\pm0.1}$	$0.4^{\pm0.05}$	$3.2^{\pm0.1}$	$2.8^{\pm0.1}$	$4.3^{\pm0.1}$	$1.45^{\pm0.1}$

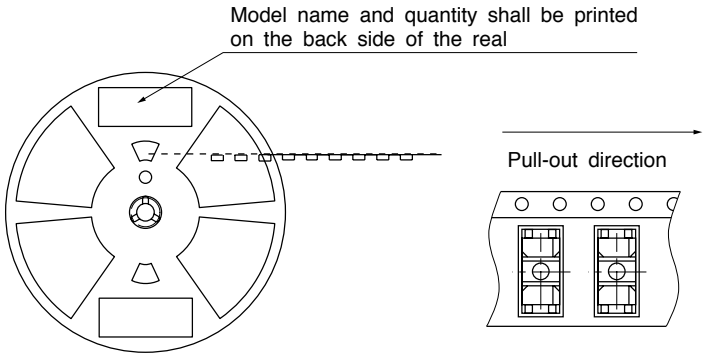
Reel structure and Dimensions



Dimensions List (Unit : mm)

a	b	c	d
$330^{\pm1}$	$13^{\pm1}$	$80^{\pm1}$	$13^{\pm0.5}$
e	f	g	
$21^{\pm1}$	$2^{\pm0.5}$	$2^{\pm0.5}$	

Direction of product insertion



[Packing : 2 000pcs/reel]

Storage method

Storage conditions should follow the condition shown below.

Storage temperature : 5 to 30˚C

Storage hunidity : 70%RH or less

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--- Office automation equipment
--- Telecommunication equipment [terminal]
--- Test and measurement equipment
--- Industrial control
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