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GP1S196HCZ0F
GP1S196HCPSF

Gap : 1.1mm, Slit : 0.3mm Phototransistor Output, Compact Transmissive Photointerrupter

■ Description

GP1S196HCZ0F 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 device is half the size of the rest of the parts in this family.

■ Features

1. Transmissive with phototransistor output
2. Highlights :
   - Compact Size
   - Low Profile
   - Narrow Gap
   - Through-hole : **GP1S196HCZ0F**
   - SMT : **GP1S196HCPSF**
3. Key Parameters :
   - Gap Width : 1.1mm
   - Slit Width (detector side): 0.3mm
   - Package : 3.1×2×2.7mm
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

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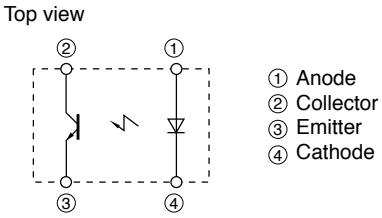
Date Jun. 30. 2005

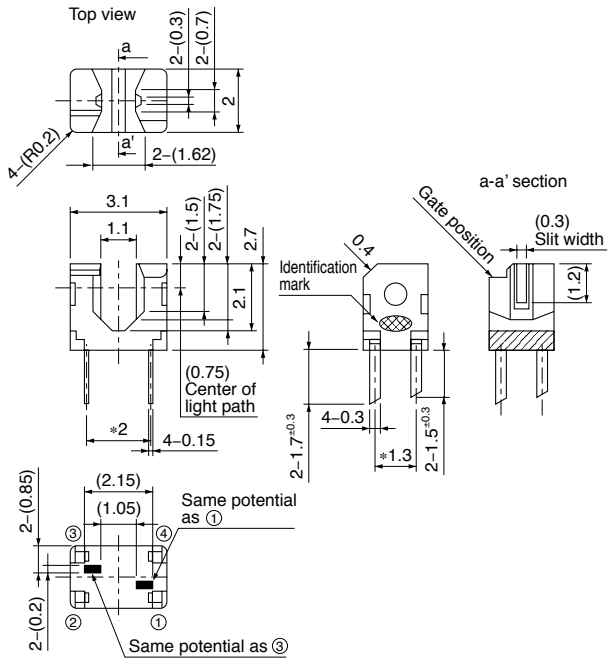
■ Internal Connection Diagram



■ Outline Dimensions

(Unit : mm)

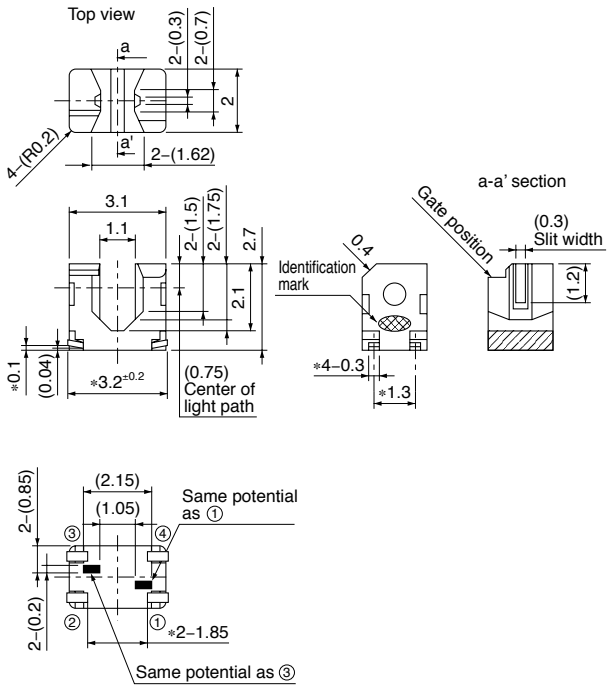
Through-Hole [GP1S196HCZ0F]



- Unspecified tolerance : ±0.1mm.
- 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.
  Burr's dimensions : 0.15mm MAX.
- The lead may be exposed at the painting out portion.
- There is agreer identification mark on he light emitting side.

Product mass : approx. 0.022g

SMT Gullwing Lead-Form [GP1S196HCPSF]



- Unspecified tolerance : ±0.1mm.
- Dimensions in parenthesis are shown for reference.
- The dimensions indicated by ∗ refer to those measured lead plating portion.
- The dimensions shown do not include those of burrs.
  Burr's dimensions : 0.15mm MAX.
- The lead may be exposed at the painting out portion.
- There is agreer identification mark on he light emitting side.

Product mass : approx. 0.02g

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

Country of origin

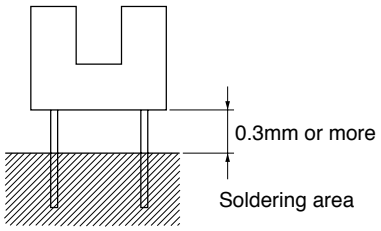
Japan

■ Absolute Maximum Ratings

(T_a=25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	30	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 3s or less



(GP1S196HCZ0F)

■ 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	

Fig.1 Forward Current vs. Ambient Temperature

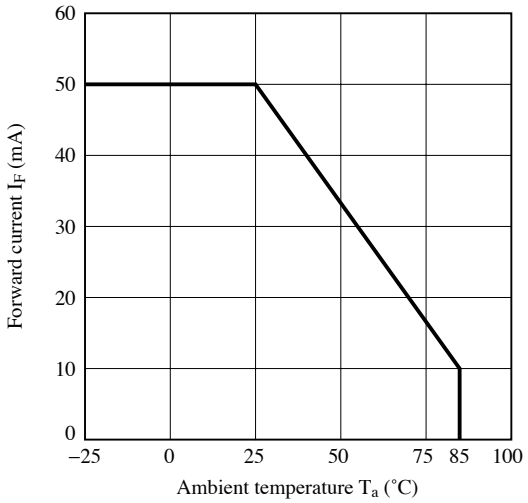


Fig.2 Power Dissipation vs. Ambient Temperature

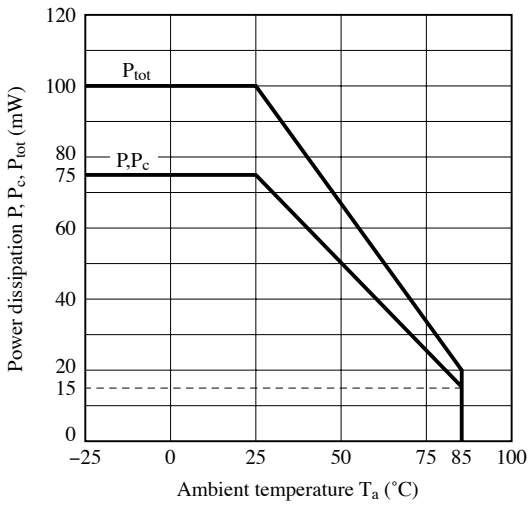


Fig.3 Forward Current vs. Forward Voltage

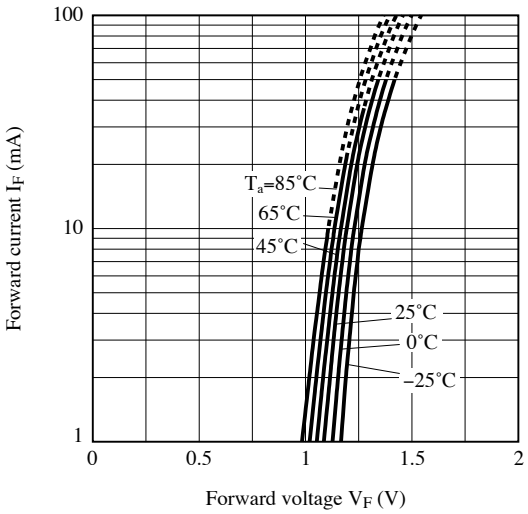


Fig.4 Collector Current vs. Forward Current

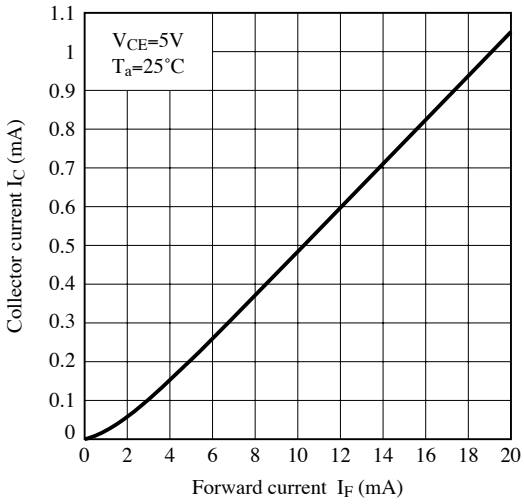


Fig.5 Collector Current vs. Collector-emitter Voltage

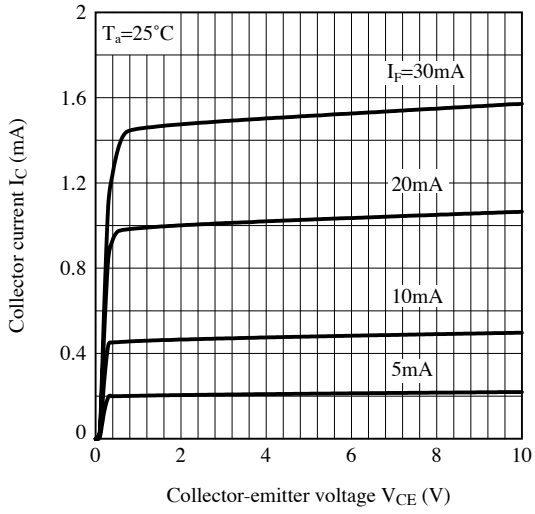


Fig.6 Relative Collector Current vs. Ambient Temperature

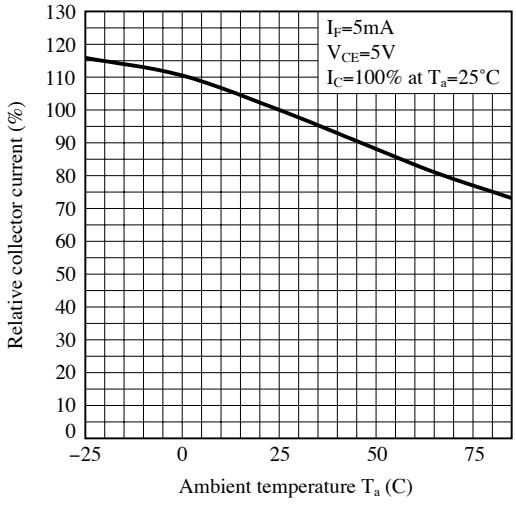


Fig.7 Collector-emitter Saturation Votage vs. Ambient Temperature

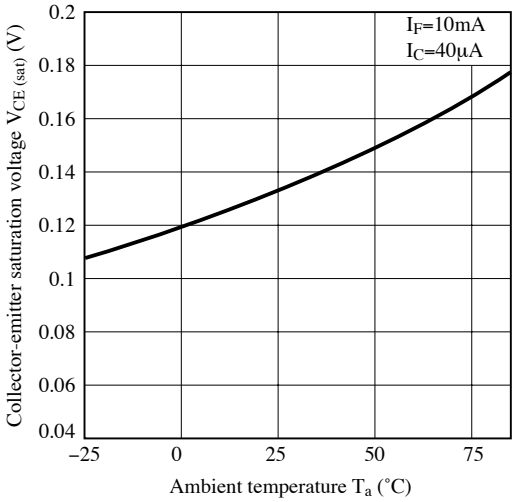


Fig.8 Collector Dark Current vs. Ambient Temperature

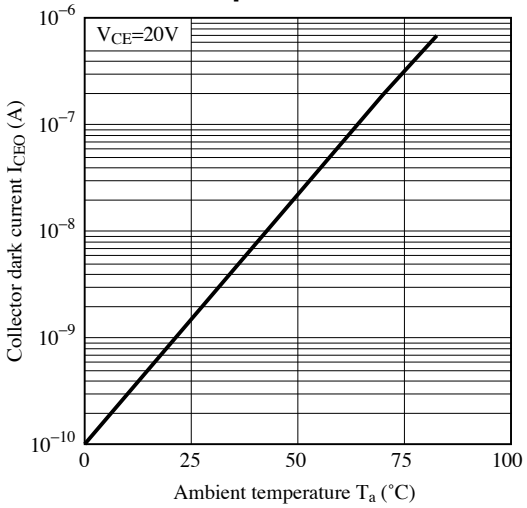


Fig.9 Response Time vs. Load Resistance

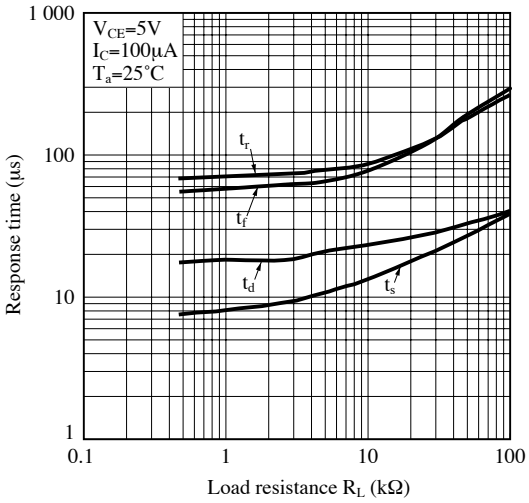


Fig.10 Test Circuit for Response Time

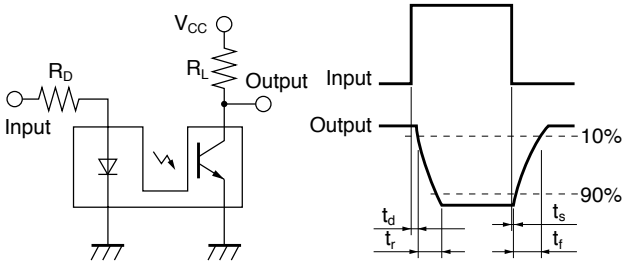


Fig.11 Relative Collector Current vs. Shield Distance (1)

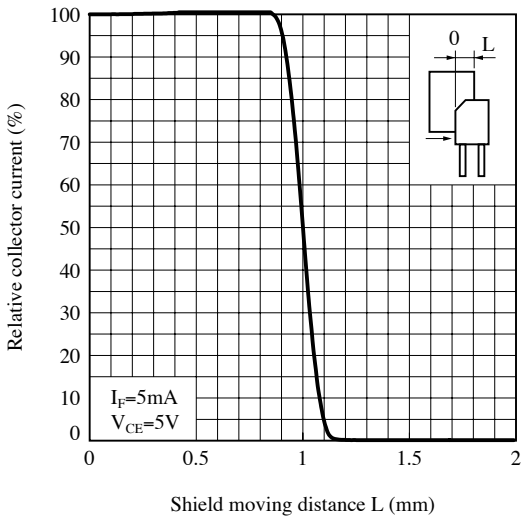
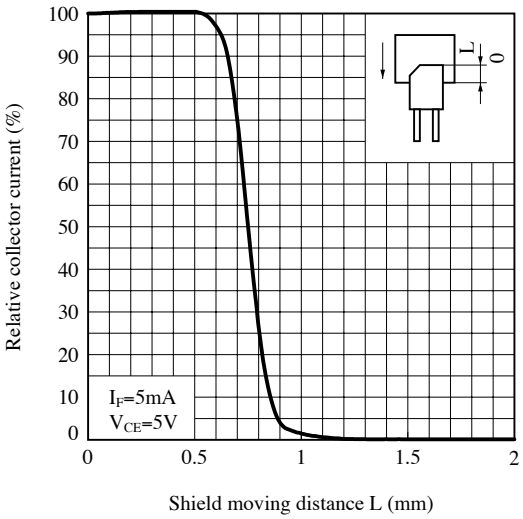


Fig.12 Relative Collector Current vs. Shield Distance (1)



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

■ Design Considerations

● Design guide

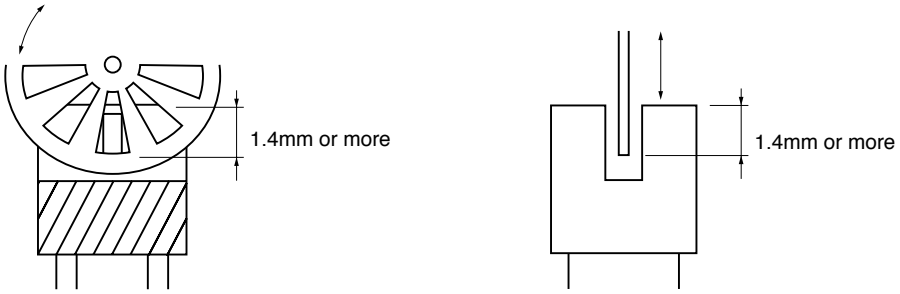
1) Prevention of detection error

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 1.4mm or more from the top of elements.

(Example)



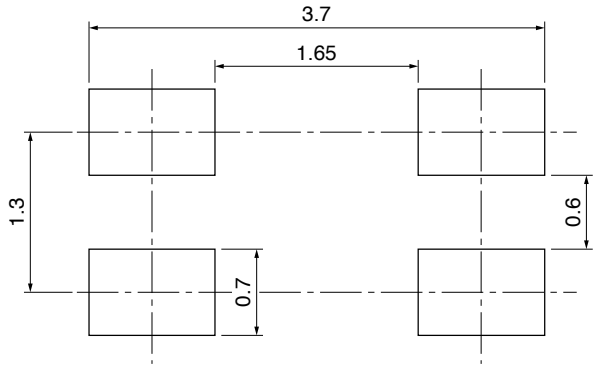
This product is not designed against irradiation and incorporates non-coherent IRED.

● 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.

● Recommended Foot Print (Only for **GP1S196HCPSF**)



● 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 (Only for **GP1S196HCPSF**)

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.

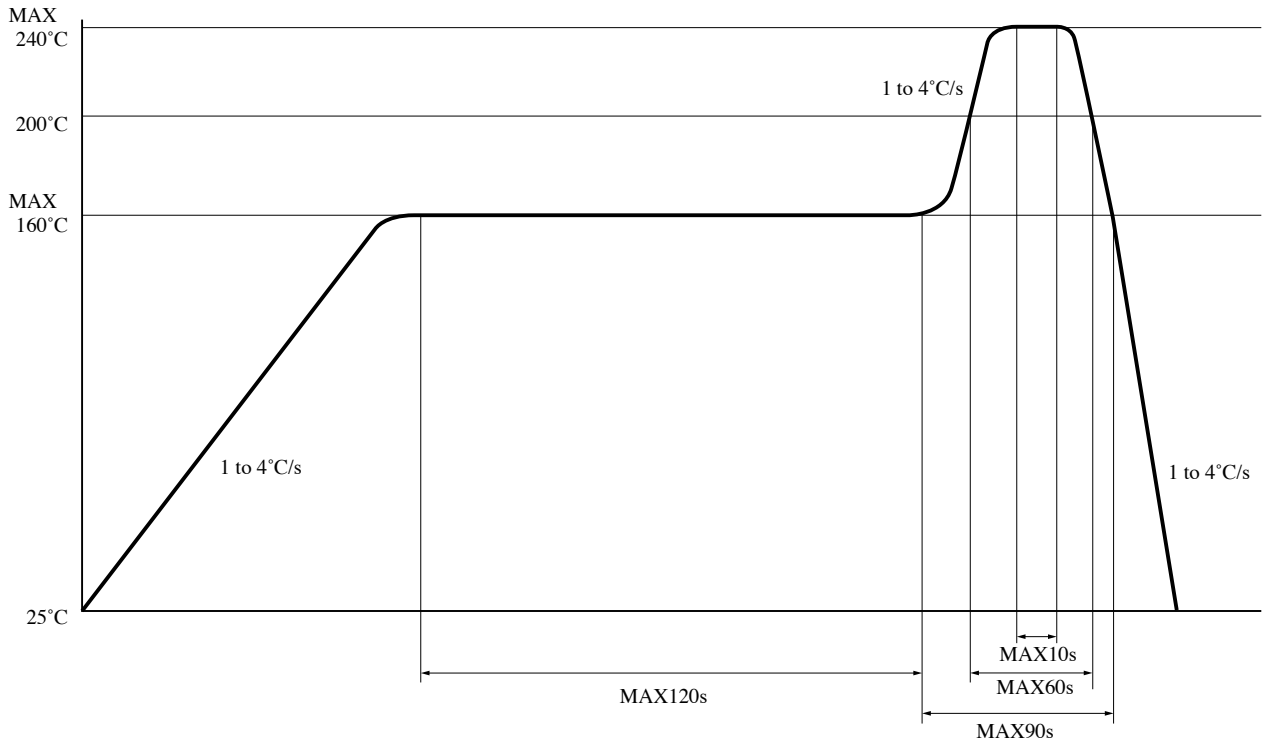
● Soldering Method

Reflow Soldering (Only for **GP1S196HCPSF**) :

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.



Flow Soldering:

Soldering should be completed below 260˚C and within 3 s.
Please solder within one time.
Soldering area is 0.3mm or more away from the bottom of housing.
Please take care not to let any external force exert on lead pins.
Please don't do soldering with preheating, and please don't do soldering by reflow.

Other notice

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.

● 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

● Sleeve package

1. Through-hole (**GP1S196HCZ0F**)

Package materials

Sleeve : Polycarbonate
Stopper : Styrene-Elastomer

Package method

MAX. 200 pcs. of products shall be packaged in a sleeve. Both ends shall be closed by tabbed and tabless stoppers.
MAX. 50 sleeves in one case.

2. SMT Gullwing (**GP1S196HCPSF**)

Package materials

Sleeve : Polycarbonate
Stopper : Styrene-Elastomer
Aluminium laminated Bag : Nylon, Polyphernylene, Aluminium

Package method

MAX. 200 pcs. of products shall be packaged in a sleeve. Both ends shall be closed by tabbed and tabless stoppers.
MAX. 50 sleeves with silicagel are enclosed in aluminium laminated bag. After sealing up the bag, it encased in one case.

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--- 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:

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--- Traffic signals
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--- Alarm equipment
--- Various safety devices, etc.

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