

GP1S59J0000F

Gap: 4.2mm, Slit: 0.5mm Phototransistor Output, Case package Transmissive Photointerrupter



■ Description

GP1S59J0000F is a standard, phototransistor output, transmissive photointerrupter with opposing emitter and detector in a case, providing non-contact sensing. For this family of devices, the emitter and detector are inserted in a case, resulting in a through-hole design.

This device is unique because it has a horizontal slit and a position pin to insure accurate placement on the PCB and prevent miss-orientation.

■ Features

- 1. Transmissive with phototransistor output
- 2. Highlights:
 - Horizontal Slit for alternate motion detection
 - · Positioning Pin to prevent misalignment
- 3. Key Parameters:
 - · Gap Width: 4.2mm
 - · Slit Width (detector side): 0.5mm
 - Package: 13.5×9.3×5.2mm
- 4. Lead free and RoHS directive compliant

■ Agency approvals/Compliance

1. Compliant with RoHS directive

■Applications

- General purpose detection of object presence or motion.
- 2. Example: Printer, FAX, Optical storage unit

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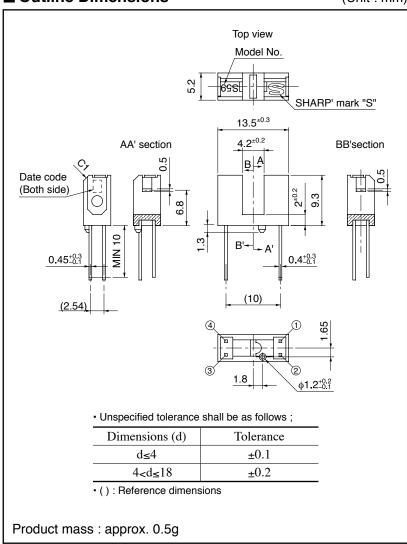


■ Internal Connection Diagram

Top view 3 1 Anode 3 Collector 2 Cathode 4 Emitter

■ Outline Dimensions





Dip soldering material : Sn-3Ag-0.5Cu



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

Country of origin

Japan, Indonesia or Philippines (Indicated on the packing case)



■ Absolute Maximum Ratings $(T_a=25^{\circ}C)$ Symbol Parameter Rating Unit Forward current 50 I_{F} mA*1, 2Peak forward current 1 $I_{FM} \\$ Α Input Reverse voltage V V_R 6 Power dissipation P 75 mWCollector-emitter voltage V_{CEO} 35 V 6 V Emitter-collector voltage V_{ECO} Output Collector current 20 $I_{\rm C}$ mA *1 Collector power dissipation 75 P_{C} mW °C Operating temperature $T_{\rm opr}$ -25 to +85Storage temperature T_{stg} _40 to +100 °C *3Soldering temperature $T_{sol} \\$ 260 °C

■ Electro-optical Characteristics

 $(T_a=25^{\circ}C)$

<u>'</u>						-a-25 C)		
Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	
	Forward voltage		V_{F}	I _F =20mA	_	1.25	1.4	V
Input	Input Peak forward voltage		V_{FM}	$I_{FM}=0.5A$		3	4	V
Reverse current		I_R	$V_R=3V$	_	_	10	μΑ	
Output	t Collector dark current		I_{CEO}	$V_{CE}=20V$	_	1	100	nA
Transfer	Collector current		I_C	$V_{CE}=5V$, $I_F=20mA$	0.5	_	10	mA
charac-		V _{CE(sat)}	I_F =40mA, I_C =0.5mA	_	-	0.4	V	
	Response time	Rise time	t _r	V_{CE} =2V, I_{C} =2mA, R_{L} =100 Ω	_	3	15	
		Fall time	t_{f}		_	4	20	μs

^{*1} Refer to Fig. 1, 2, 3 *2 Pulse width \leq 100 μ s, Duty ratio=0.01

^{*3} For 5s or less



Fig.1 Forward Current vs. Ambient Temperature

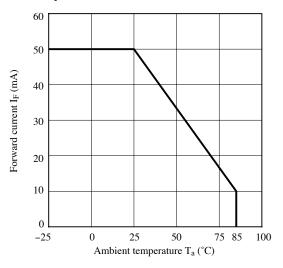


Fig.3 Peak Forward Current vs. Duty Ratio

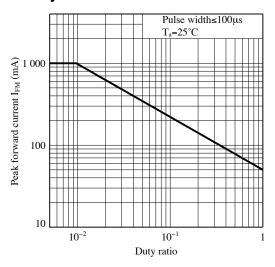


Fig.5 Collector Current vs. Forward Current

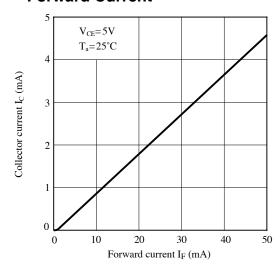


Fig.2 Collector Power Dissipation vs. Ambient Temperature

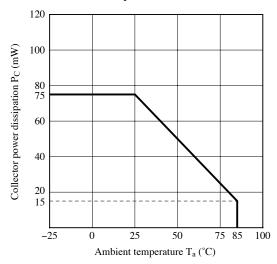


Fig.4 Forward Current vs. Forward Voltage

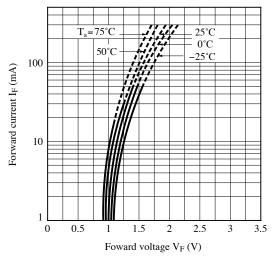


Fig.6 Collector Current vs.
Collector-emitter Voltage

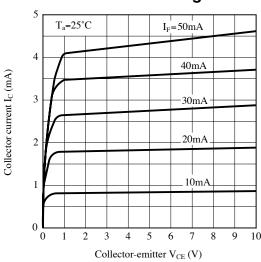




Fig.7 Collector Current vs.

Ambient Temperature

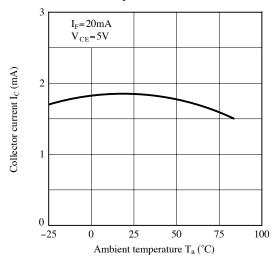


Fig.9 Response Time vs. Load Resistance

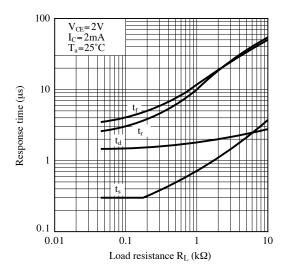


Fig.11 Frequency Response

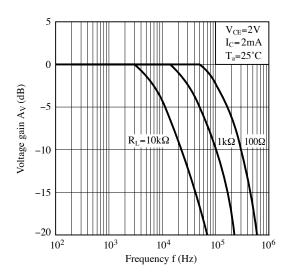


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

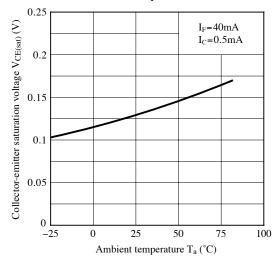


Fig.10 Test Circuit for Response Time

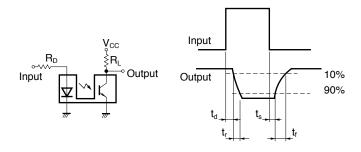


Fig.12 Collector Dark Current vs.
Ambient Temperature

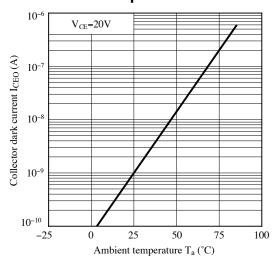
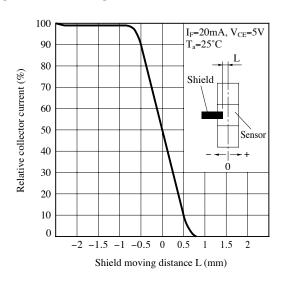
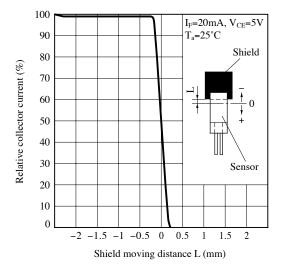




Fig.13 Detecting Position Characteristics (1)

Fig.14 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

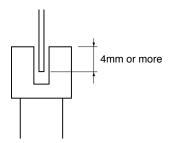
1) Prevention of detection error

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 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 photocouplers 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.

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)	800	400 to 1 200	3

• 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 plating
Black Polysulfone resin (UL94 V-0)	Solder dip. (Sn-3Ag-0.5Cu)



■ Manufacturing Guidelines

Soldering Method

Flow Soldering:

Soldering should be completed below 260°C and within 5 s.

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.

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 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.

Flux

Some flux, which is used in soldering, may crack the package due to synergistic effect of alcohol in flux and the rise in temperature by heat in soldering. Therefore, in using flux, please make sure that it does not have any influence on appearance and reliability of the photointerrupter.



Cleaning instructions

Solvent cleaning:

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

Ultrasonic cleaning:

The affect to device by ultrasonic cleaning is different 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.

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

Case package

Package materials

Anti-static plastic bag: Polyethtylene

Moltopren: Urethane

Partition: Corrugated fiberboard
Packing case: Corrugated fiberboard

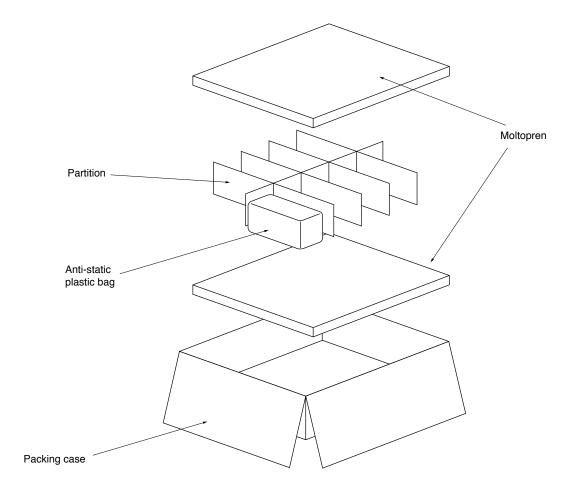
Package method

100 pcs of products shall be packaged in a plastic bag, Ends shall be fixed be by stoppers. The bottom of the packing case is covered with moltopren, and the partition is set in the packing case. Each partition should have 1 plastic bag.

The 10 plastic bags containing a product are put in the packing case.

Moltopren should be located after all product are settled (1 packing contains 1 000 pcs).

Packing composition





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