GP1A91LRJ00F

Gap : 1.2mm, Slit : 0.23mm
***OPIC Output,**
Compact Transmissive
Photointerrupter

■ Description

GP1A91LRJ00F is a compact-package, OPIC 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 has 2 positioning bosses on the detector side, and pull-up resistor included in the device's output.

■ Features

1. Transmissive with OPIC output
2. Highlights:
   - Compact Size
3. Key Parameters:
   - Gap Width : 1.2mm
   - Slit Width (detector side): 0.23mm
   - Package : 3.7×2.6×3.1mm
4. Lead free and RoHS directive compliant

■ Agency approvals/Compliance

1. Compliant with RoHS directive

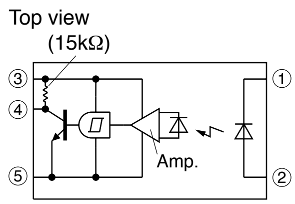
■ Applications

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

* "OPIC"(Optical IC) is a trademark of the SHARP Corporation. An OPIC consists of a light-detecting element and a signal-processing

Sheet No.: D3-A01501EN
Date Oct. 3. 2005

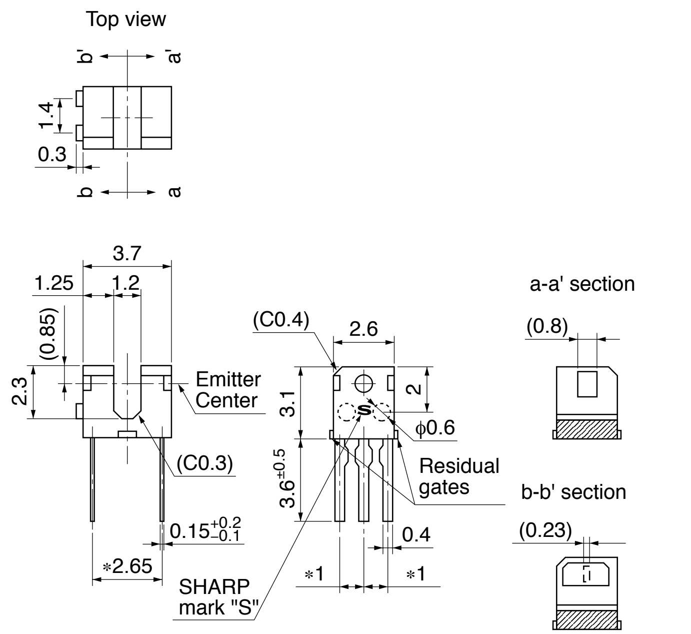
■ Internal Connection Diagram

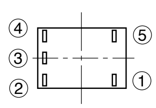


① Anode
② Cathode
③ V_{CC}
④ V_O
⑤ GND

■ Outline Dimensions

(Unit : mm)





- Unspecified tolerance : ±0.2mm.
- ( ) : Reference dimensions.
- The dimensions indicated by * refer to those measured from the lead base.
- The dimensions shown do not include burr.
  Burr's dimension : 0.15mm MAX.
  Rest of gate : 0.3mm MAX.

Product mass : approx. 0.052g

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

Country of origin

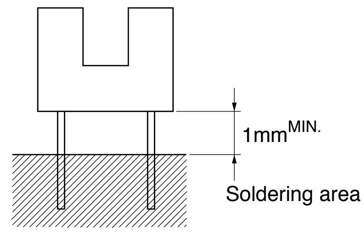
Japan

■ Absolute Maximum Ratings

(T_a=25˚C)

Parameter		Symbol	Rating	Unit
Input	*1 Forward current	I_F	50	mA
	Reverse voltage	V_R	6	V
	Power dissipation	P	75	mW
Output	Supply voltage	V_{CC}	7	V
	*1 Low level output current	I_O	2	mA
	*1 Power dissipation	P_O	80	mW
Operating temperature		T_{opr}	–25 to +85	˚C
Storage temperature		T_{stg}	–40 to +100	˚C
*2 Soldering temperature		T_{sol}	260	˚C

*1 Refer to Fig.2, 3, 4
*2 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=5mA	–	1.15	1.25	V
	Reverse current		I_R	V_R=3V	–	–	10	μA
Output	Operating supply voltage		V_{CC}	–	1.4	–	7	V
	Low level output voltage		V_{OL}	V_{CC}=3V, I_{OL}=1mA, I_F=5mA	–	0.1	0.4	V
	High level output voltage		V_{OH}	V_{CC}=3V, I_F=0	2.9	–	–	V
	Low level supply current		I_{CCL}	V_{CC}=3V, I_F=5mA	–	0.7	1.2	mA
	High level supply current		I_{CCH}	V_{CC}=3V, I_F=0	–	0.3	0.5	mA
Transfer charac-teristics	*3 "High→Low" threshold input current		I_{FHL}	V_{CC}=3V	–	1.2	3.5	mA
	*4 Hysteresis		I_{FLH}/I_{FHL}	V_{CC}=3V	0.55	0.8	0.95	–
	Response time	"Low→High" Propagation delay time	t_{PLH}	V_{CE}=3V, I_F=5mA, R_L=3kΩ	–	10	30	μs
		"High→Low" Propagation delay time	t_{PHL}		–	3	15	
		Rise time	t_r		–	0.6	3	
		Fall time	t_f		–	0.2	1	

*3 I_{FHL} represents forward current when output goes from "High" to "Low".
*4 Hysteresis stands for I_{FLH}/I_{FHL}. I_{FLH} represents forward current when output goes from "High" to "Low".

Fig.1 Test Circuit for Response Time

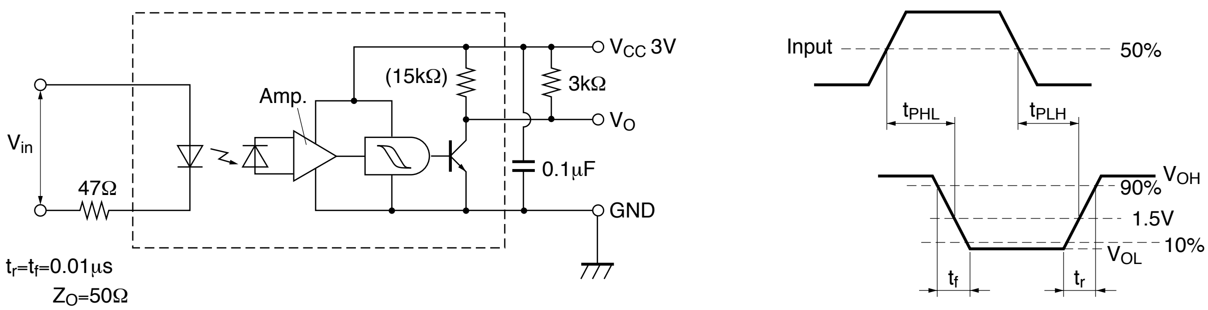


Fig.2 Forward Current vs. Ambient Temperature

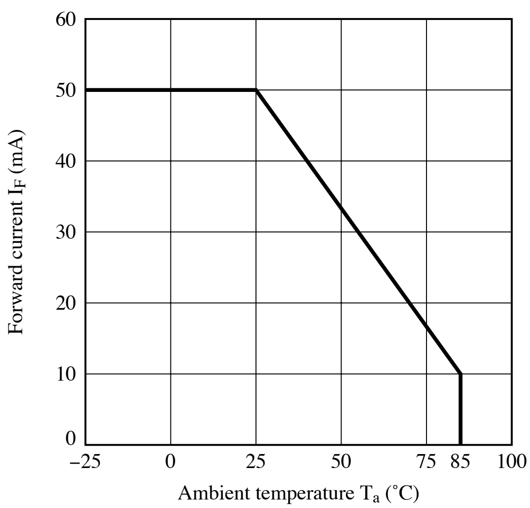


Fig.3 Output Current vs. Ambient Temperature

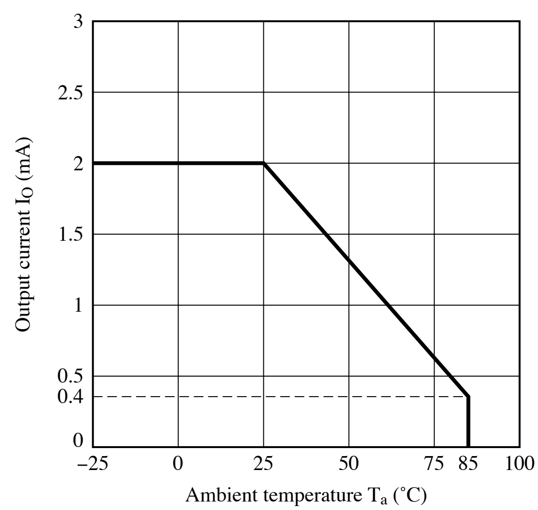


Fig.4 Output Power Dissipation vs. Ambient Temperature

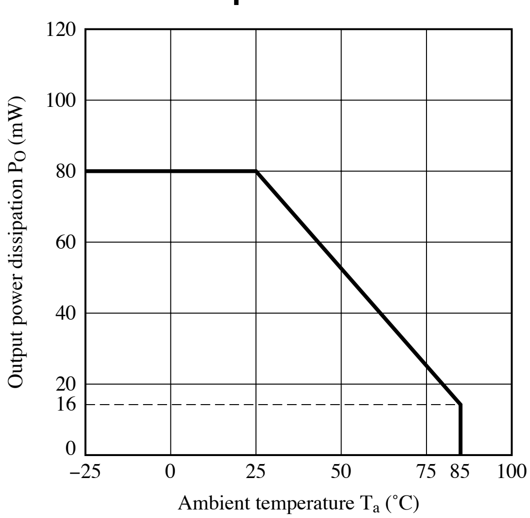


Fig.5 Forward Current vs. Forward Voltage

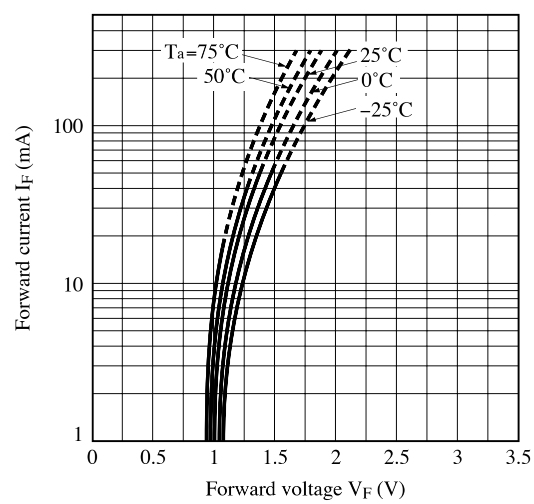


Fig.6 Relative Input Threshold Current vs. Supply Voltage

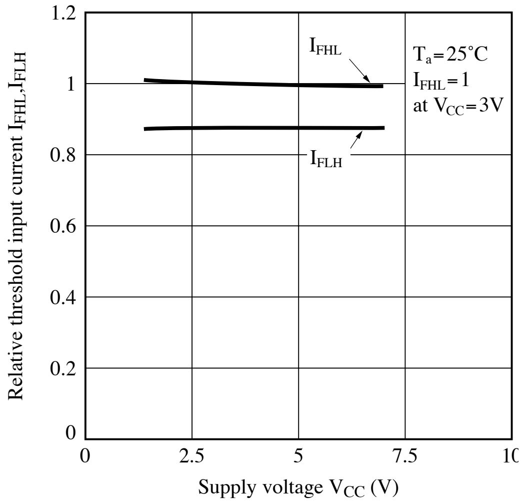


Fig.7 Relative Input Threshold Current vs. Ambient Temperature

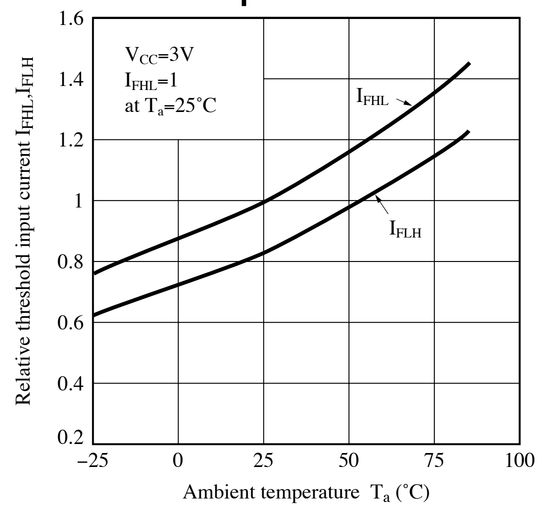


Fig.8 Low Level, High Level Supply Current vs. Supply Voltage (1)

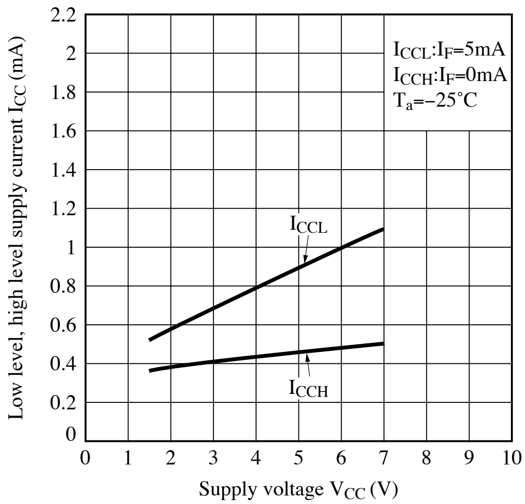


Fig.9 Low Level, High Level Supply Current vs. Supply Voltage (2)

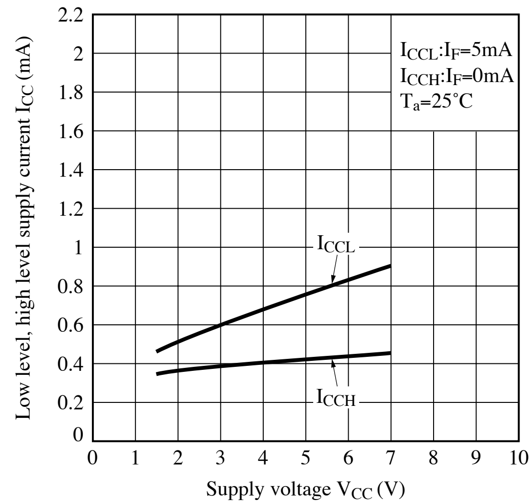


Fig.10 Low Level, High Level Supply Current vs. Supply Voltage (3)

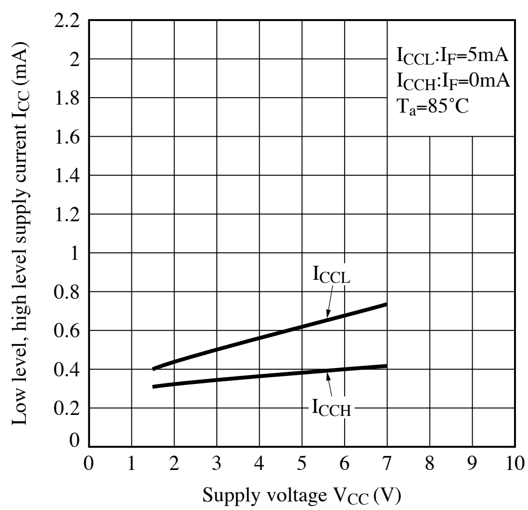


Fig.11 Low Level Output Voltage vs. Low Level Output Current

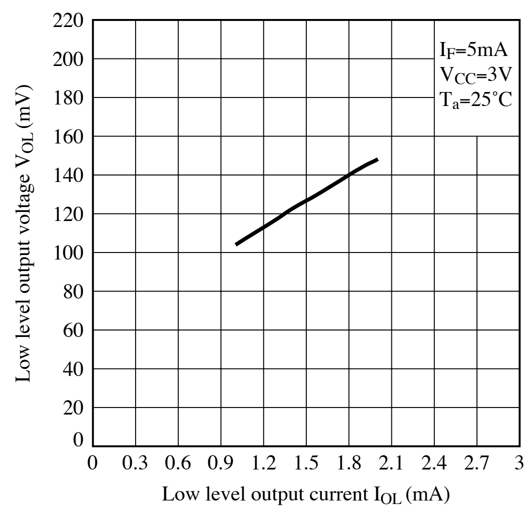


Fig.12 Low Level Output Voltage vs. Ambient Temperature

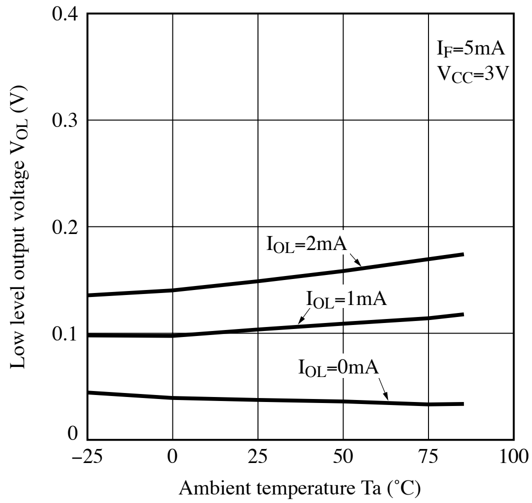


Fig.13 Rise Time, Fall Time vs. Load Resistance

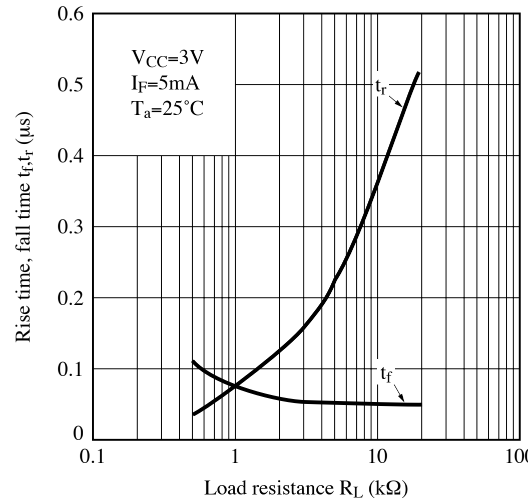


Fig.14 Propagation Delay Time vs. Forward Current

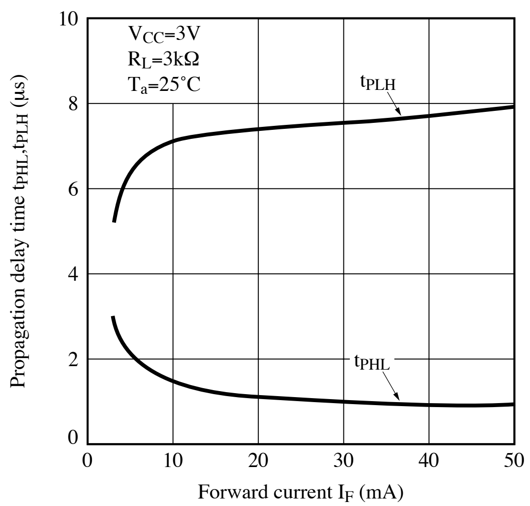


Fig.15 Low, High Level Output vs. Shield Distance (1) (Typical Value)

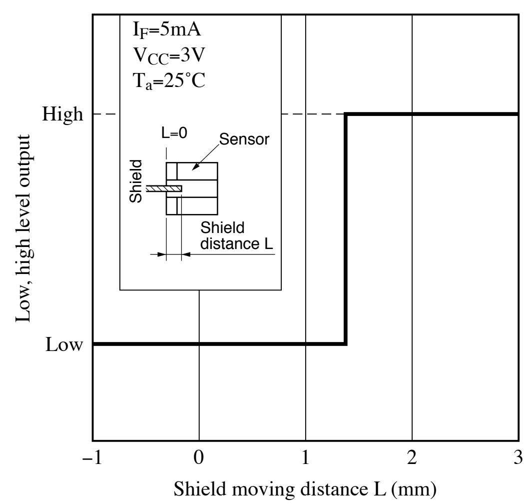
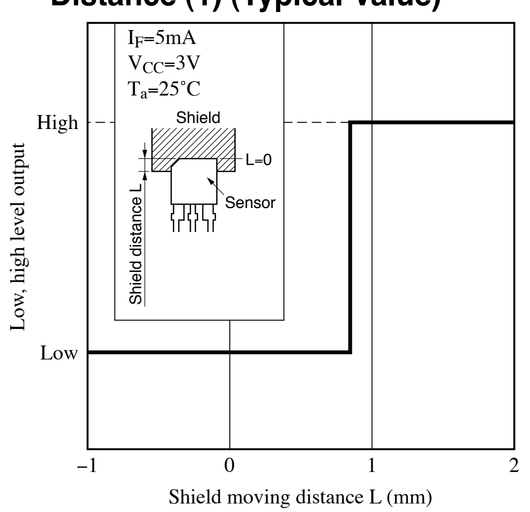


Fig.16 Low, High Level Output vs. Shield Distance (1) (Typical Value)



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

■Design Considerations

● Recommended operating conditions

Parameter	Symbol	MIN.	MAX.	Unit
Output current	I_O	–	1	mA
Forward current	I_F	7	10	mA
Operating Supply voltage	V_{CC}	1.6	7	V
Operating temperature	T_{opr}	0	70	˚C

● Notes about static electricity

Transisiter of detector side in bipolar configuration may be damaged by static electricity due to its minute design.

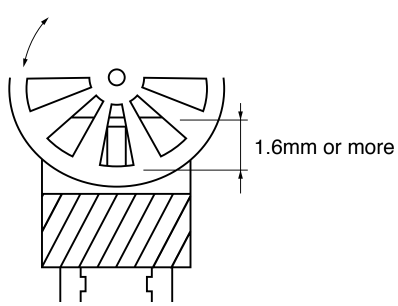
When handing these devices, general countermeasure against static electricity should be taken to avoid breakdown of devices or degradation of characteristics.

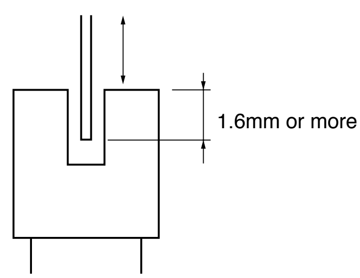
● Design guide

In order to stabilize power supply line, we should certainly recommend to connect a by-pass capacitor of 0.01μF or more between V_{CC} and GND near the divice.

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.

Please decide the input current which become 2 times of MAX. I_{FHL}.

● Parts

This product is assembled using the below parts.

• Photodetector (qty. : 1) [Using a silicon photodiode as light detecting portion, and a bipolar IC as signal processing circuit]

Category	Material	Maximum Sensitivity wavelength (nm)	Sensitivity wavelength (nm)	Response time (μs)
Photo diode	Silicon (Si)	900	700 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	Lead frame plating
Black polyphernylene sulfide resin (UL94 V-0)	42Alloy	SnCu plating

• Others

Laser generator is not used.

■ Manufacturing Guidelines

● Soldering Method

Flow Soldering:

Soldering should be completed below 260˚C and within 5 s.
Please solder within one time.
Soldering area is 1mm 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.

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.

● 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

Package materials

Sleeve : Polystyrene

Stopper : Styrene-Elastomer

Package method

MAX. 100 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.

■ Important Notices

· The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.

· Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.

· Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:

(i) The devices in this publication are designed for use in general electronic equipment designs such as:

--- Personal computers
--- 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:

--- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
--- Traffic signals
--- Gas leakage sensor breakers
--- Alarm equipment
--- Various safety devices, etc.

(iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:

--- Space applications
--- Telecommunication equipment [trunk lines]
--- Nuclear power control equipment
--- Medical and other life support equipment (e.g., scuba).

· If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Law of Japan, it is necessary to obtain approval to export such SHARP devices.

· Contact and consult with a SHARP representative if there are any questions about the contents of this publication.