GP1A52HRJ00F

Gap : 3mm, Slit : 0.5mm
*OPIC Output
Case package Transmissive Photointerrupter

■ Description

GP1A52HRJ00F is a standard, OPIC 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.

■ Features

1. Transmissive with OPIC output
2. Highlights:
   - Vertical Slit for alternate motion detection
   - Output Low Level at intercepting optical path
3. Key Parameters:
   - Gap Width : 3mm
   - Slit Width (detector side) : 0.5mm
   - Package : 12.2×10×5mm
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, FAX, Optical storage unit

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

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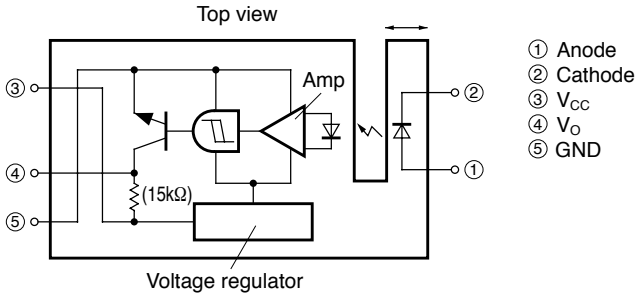
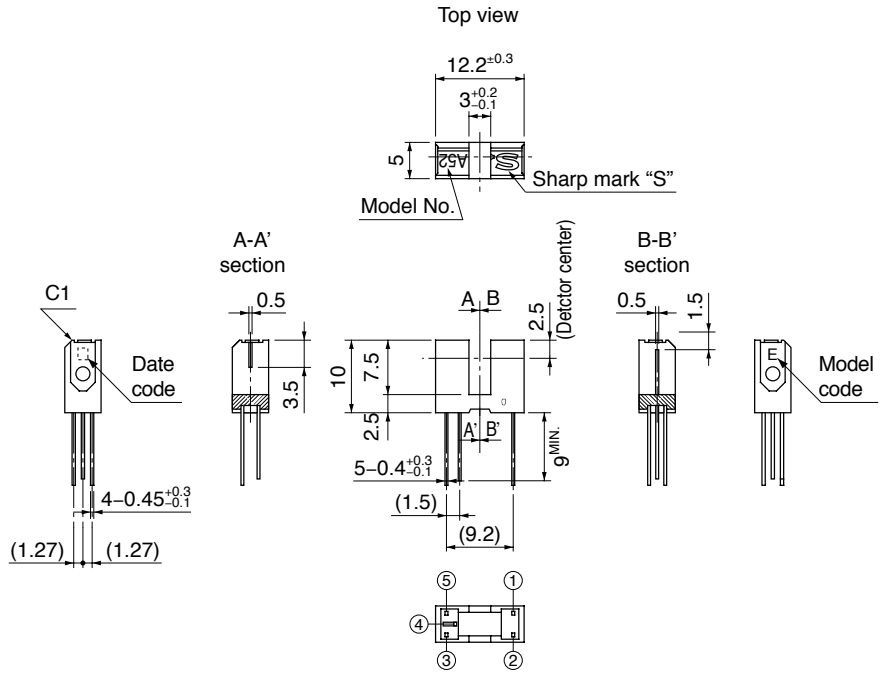
■ Internal Connection Diagram



■ Outline Dimensions

(Unit : mm)



• Unspecified tolerance shall be as follows ;

Dimensions(d)	Tolerance
d≤6	±0.1
6<d≤18	±0.2

• ( ) : Reference dimensions

Product mass : approx. 0.7g

Dip soldering material : Sn–3Ag–0.5Cu

Date code

Month of production	
Month	Mark
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	X
11	Y
12	Z

Model code	Year of production (Christian year)
E	Even year
e	Odd year

Country of origin

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

■ Absolute Maximum Ratings

(T_a=25°C)

Parameter		Symbol	Rating	Unit
Input	*1 Forward current	I_F	50	mA
	*1, 2 Peak forward current	I_{FM}	1	A
	Reverse voltage	V_R	6	V
	Power dissipation	P	75	mW
Output	Supply voltage	V_{CC}	–0.5 to +17	V
	Output current	I_O	50	mA
	Power dissipation	P_O	250	mW
Operating temperature		T_{opr}	–25 to +85	°C
Storage temperature		T_{stg}	–40 to +100	°C
*3 Soldering temperature		T_{sol}	260	°C

*1 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig. 1, 2, 3
*2 Pulse width ≤ 100μs, Duty ratio=0.01
*3 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	–	1.1	1.4	V
	Reverse current		I_R	V_R=3V	–	–	10	μA
Output	Operating supply voltage		V_{CC}	–	4.5	–	17	V
	Low level output voltage		V_{OL}	V_{CC}=5V, I_{OL}=16mA, I_F=0	–	0.15	0.4	V
	High level output voltage		V_{OH}	V_{CC}=5V, I_F=5mA	4.9	–	–	V
	Low level supply current		I_{CCL}	V_{CC}=5V, I_F=0	–	1.7	3.8	mA
	High level supply current		I_{CCH}	V_{CC}=5V, I_F=5mA	–	0.7	2.2	mA
Transfer characteristics	*4 "Low→High" threshold input current		I_{FLH}	V_{CC}=5V	–	1	5	mA
	*5 Hysteresis		I_{FHL}/I_{FLH}	V_{CC}=5V	0.55	0.75	0.95	–
	*6 Responce time	"Low→High" Propagation delay time	t_{PLH}	V_{CC}=5V, I_F=5mA, R_L=280Ω	–	3	9	μs
		"High→Low" Propagation delay time	t_{PHL}		–	5	15	
		Rise time	t_r		–	0.1	0.5	
		Fall time	t_f		–	0.05	0.5	

*4 I_{FLH} represents forward current when output goes from "Low" to "High".
*5 I_{FHL} represents forward current when output goes from "High" to "Low".
*6 Test circuit for response time is shown in Fig.12.

Fig.1 Forward Current vs. Ambient Temperature

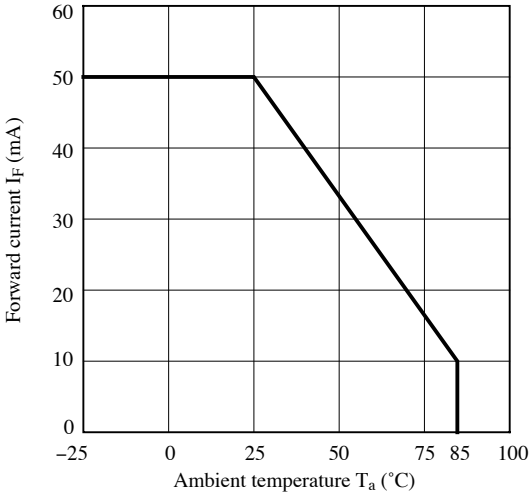


Fig.2 Output Power Dissipation vs. Ambient Temperature

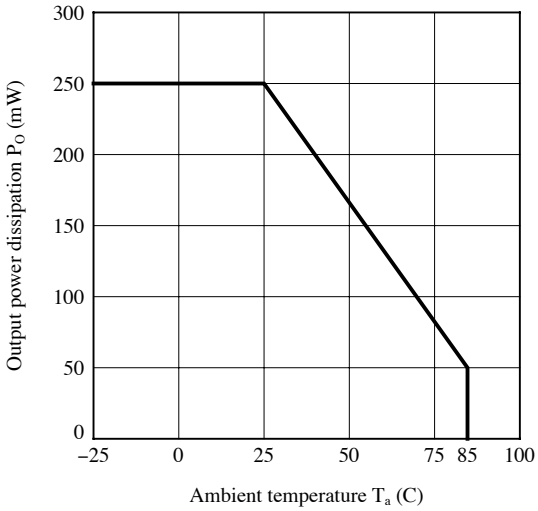


Fig.3 Low Level Output Current vs. Ambient Temperature

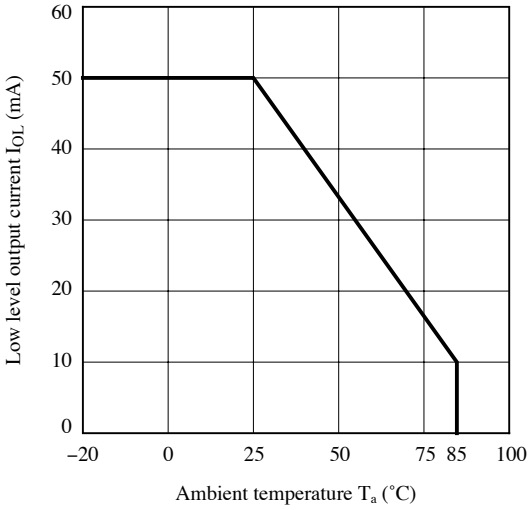


Fig.4 Forward Current vs. Forward Voltage

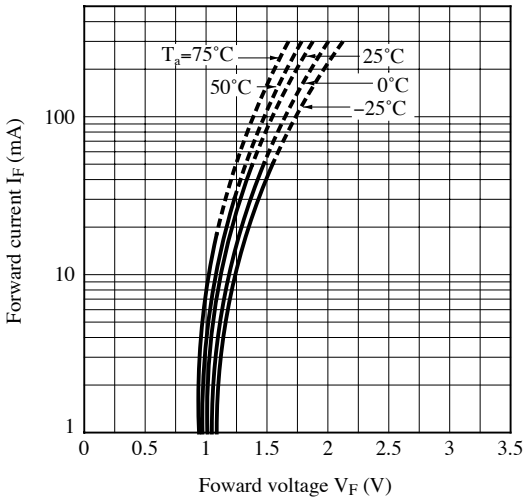


Fig.5 Relative Threshold Input Current vs. Supply Voltage

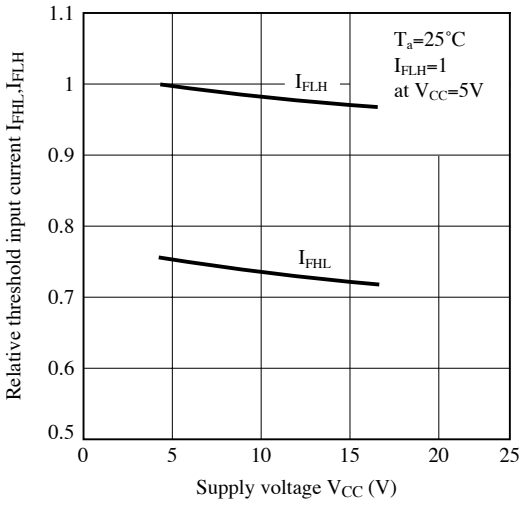


Fig.6 Relative Threshold Input Current vs. Ambient Temperature

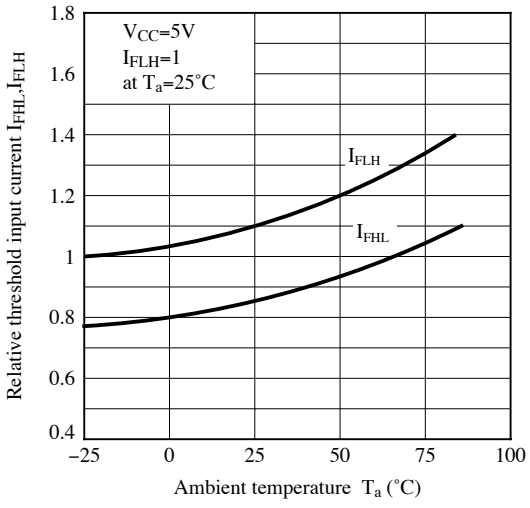


Fig.7 Low Level Output Voltage vs. Low Level Output Current

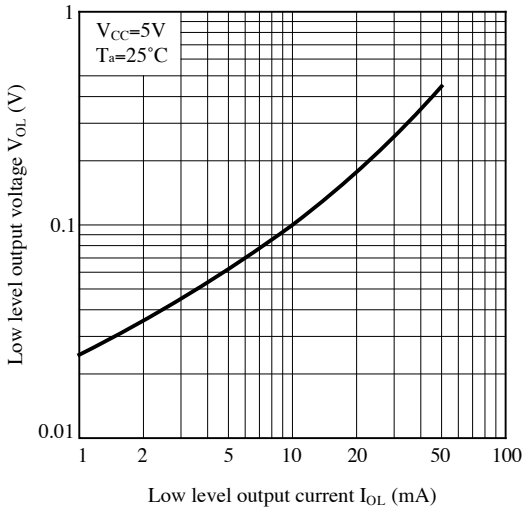


Fig.8 Low Level Output Voltage vs. Ambient Temperature

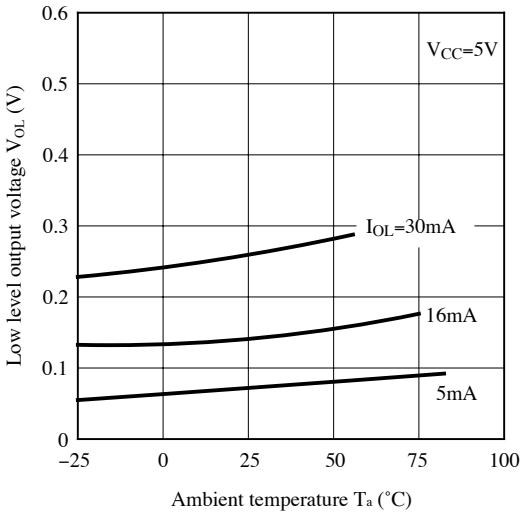


Fig.9 Supply Current vs. Ambient Temperature

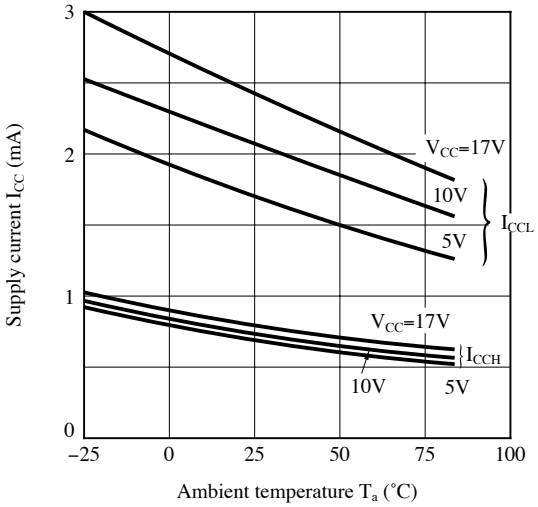


Fig.10 Propagation Delay Time vs. Forward Current

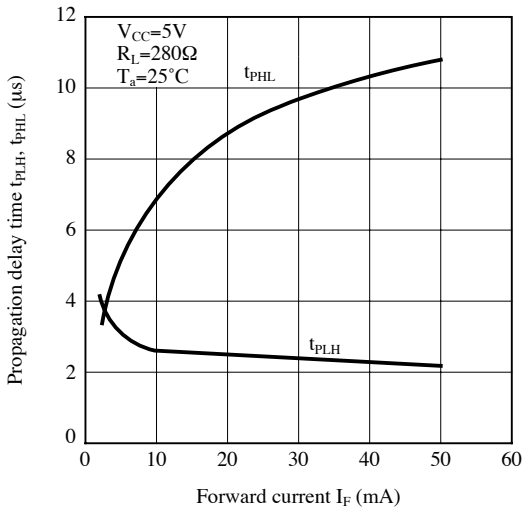


Fig.11 Rise Time,Fall Time vs. Load Resistance

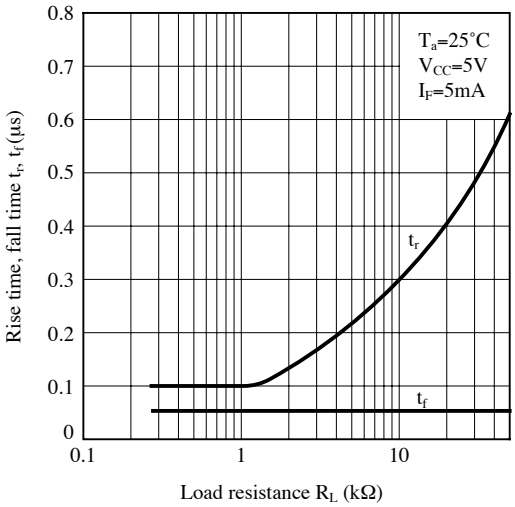
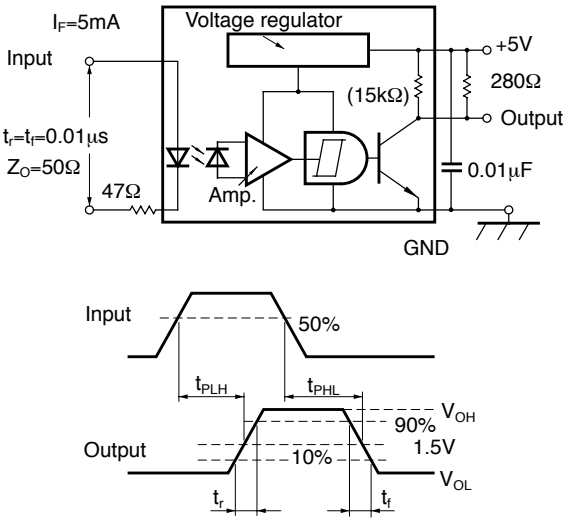


Fig.12 Test Circuit for Response Time



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.	TYP.	MAX.	Unit
Output current	I_O	–	–	16	mA
Forward current	I_F	10	–	20	mA
Operating terperature	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

1) Prevention of detection error

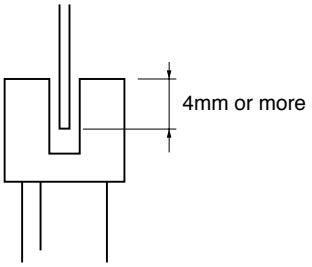
To prevent photointerrupter from faulty operation caused by external light, do not set the detecting face to the external light.

2) In order to stabilize power supply line, connect a by-pass capacitor of more than 0.01μF between V_{CC} and GND near the device.

3) 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) [Using a silicon photodiode as light detecting portion, and a bipolar IC as signal processing circuit]

Category	Maximum Sensitivity wavelength (nm)	Sensitivity wavelength (nm)	Response time (μs)
Photodiode	900	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 NORYL resin	Solder dip. (Sn–3Ag–0.5Cu)

• Others

Laser generator is not used.

■ 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 effect to device by ultrasonic cleaning differs 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

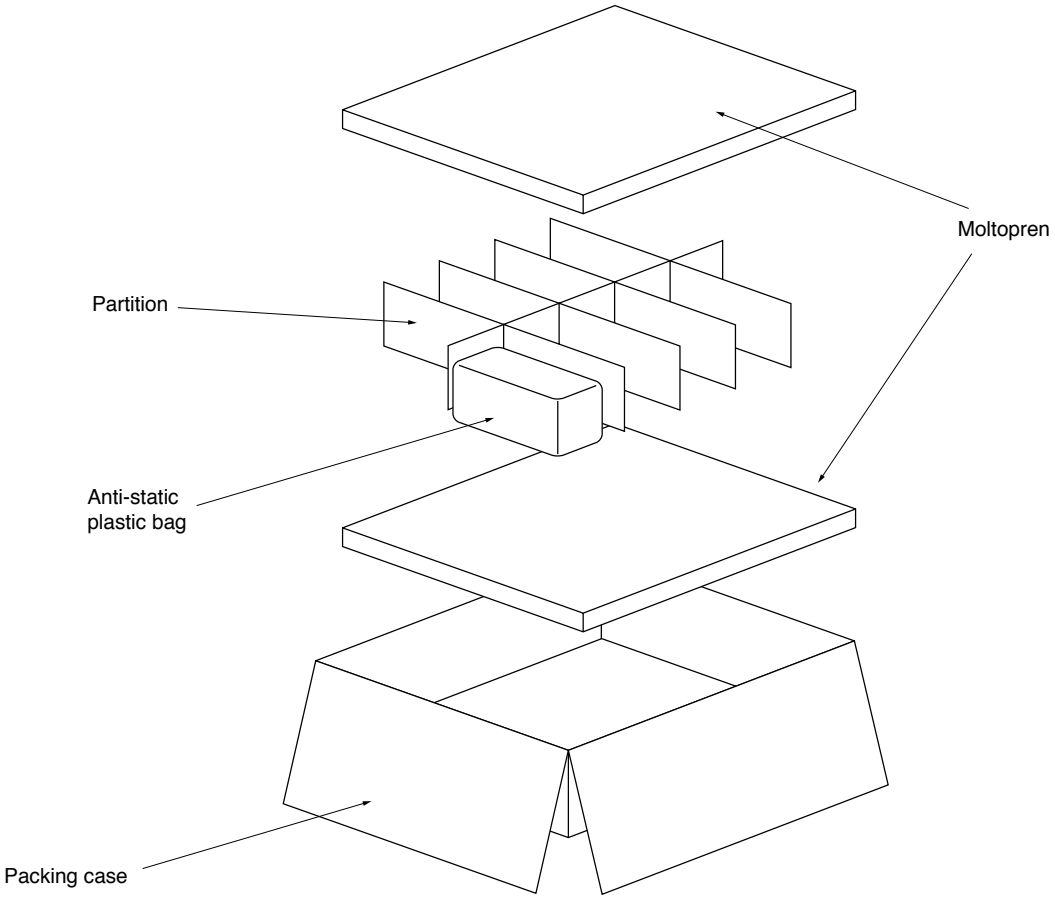
Package materials

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 by stoppers. The bottom ot 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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--- 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:

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--- Traffic signals
--- Gas leakage sensor breakers
--- Alarm equipment
--- Various safety devices, etc.

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--- Telecommunication equipment [trunk lines]
--- Nuclear power control equipment
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