

PC512

Long Creepage Distance, Reinforced Insulation Type Photocoupler



■ Description

PC512 contains an IRED optically coupled to a phototransistor.

It is packaged in a 4 pin case type.

Input-output isolation voltage(rms) is 5.0kV.

Collector-emitter voltage is 35V

■ Features

1. 4 pin case type package
2. Long creepage distance type (MIN. 11.5mm)
3. Reinforced insulation type
(Isolation distance : MIN. 9.5mm)
4. High isolation voltage between input and output
($V_{iso(rms)}$: 5.0kV)

■ Agency approvals/Compliance

1. Recognized by UL1577 (Double protection isolation), file No. E64380 (as model No. **PC512**)
2. Approved by BSI, BS-415, file No. 7413, BS-7002, file No. 7413 (as model No. **PC512**)
3. Package resin : UL flammability grade (94V-0)
4. Approved by SEMKO, file No. 204587 (as model No. **PC512**)
5. Approved by DEMKO, file No. 108025 (as model No. **PC512**)
6. Approved by FIMKO, file No. 19390 (as model No. **PC512**)
7. Recognized by CSA, file No. CA095323 (as model No. **PC512**)
8. Approved by VDE VDE0884 (as an option), file No. 77296, 77297 (as model No. **PC512**)
9. Package case resin : UL flammability (94V-0)

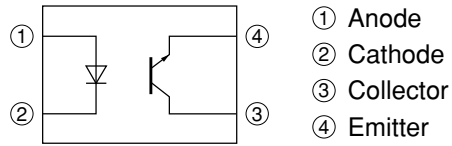
■ Applications

1. Power supplies

Notice The content of data sheet is subject to change without prior notice.

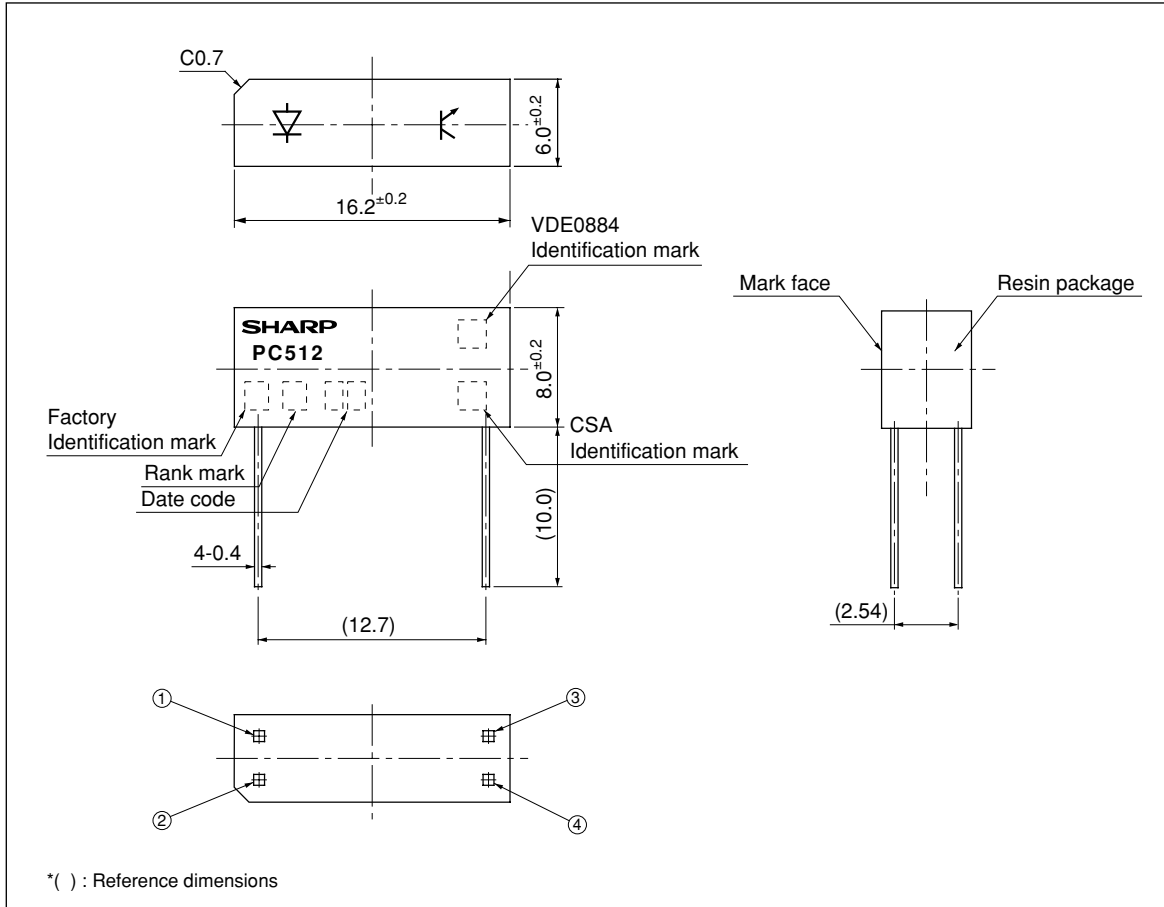
In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

Internal Connection Diagram



Outline Dimensions

(Unit : mm)




Product mass : approx. 1.46g

Date code (2 digit)

1st digit				2nd digit	
Year of production				Month of production	
A.D.	Mark	A.D.	Mark	Month	Mark
1990	A	2002	P	January	1
1991	B	2003	R	February	2
1992	C	2004	S	March	3
1993	D	2005	T	April	4
1994	E	2006	U	May	5
1995	F	2007	V	June	6
1996	H	2008	W	July	7
1997	J	2009	X	August	8
1998	K	2010	A	September	9
1999	L	2011	B	October	O
2000	M	2012	C	November	N
2001	N		∴	December	D

repeats in a 20 year cycle

Factory identification mark

Factory identification Mark	Country of origin
no mark	Japan
	

* This factory marking is for identification purpose only.
Please contact the local SHARP sales representative to see the actual status of the production.

Rank mark

With or without

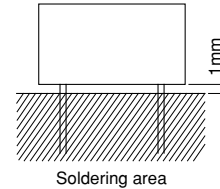
■ Absolute Maximum Ratings (T_a=25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I _F	50	mA
	*1 Peak forward current	I _{FM}	1	A
	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
	Operating temperature	T _{opr}	-25 to +85	°C
	Storage temperature	T _{stg}	-40 to +100	°C
	*2 Isolation voltage	V _{iso (rms)}	5	kV
	*3 Soldering temperature	T _{sol}	260	°C

*1 Pulse width ≤ 100μs, Duty ratio : 0.001

*2 40 to 60%RH, AC for 1minute, f=60Hz

*3 For MAX. 10s at the position of 1mm from the edge of resin package.



■ Electro-optical Characteristics

(T_a=25°C)

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V _F	I _F =20mA	-	1.2	1.4	V
	Peak forward voltage	V _{FM}	I _{FM} =0.5A	-	3	4	V
	Reverse current	I _R	V _R =3V	-	-	10	μA
	Terminal capacitance	C _t	V=0, f=1kHz	-	50	250	pF
Output	Collector dark current	I _{CEO}	V _{CE} =20V, I _F =0	-	-	100	nA
	Collector-emitter breakdown voltage	BV _{CEO}	I _C =0.1mA, I _F =0	35	-	-	V
	Emitter-collector breakdown voltage	BV _{ECO}	I _E =10μA, I _F =0	6	-	-	V
Transfer characteristics	Collector current	I _C	I _F =20mA, V _{CE} =5V	2	-	20	mA
	Collector-emitter saturation voltage	V _{CE (sat)}	I _F =40mA, I _C =1mA	-	-	0.4	V
	Isolation resistance	R _{ISO}	DC500V, 40 to 60%RH	1×10 ¹²	-	-	Ω
	Cut-off frequency	f _C	V _{CE} =2V, I _C =2mA, R _L =100Ω -3dB	12	80	-	kHz
	Response time	Rise time	t _r	V _{CE} =2V, I _C =2mA, R _L =100Ω	-	3	20
Fall time		t _f	-		4	30	μs

Fig.1 Forward Current vs. Ambient Temperature

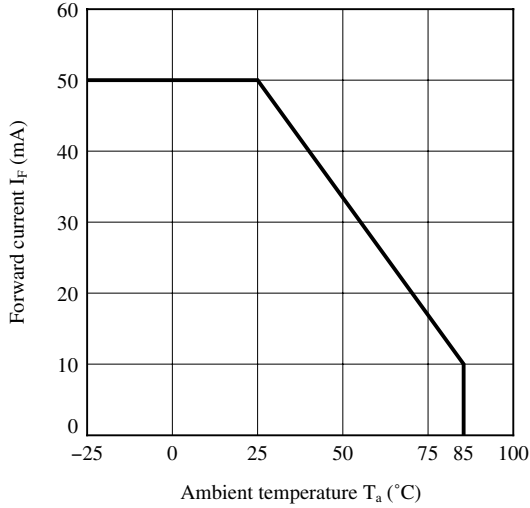


Fig.2 Collector Power Dissipation vs. Ambient Temperature

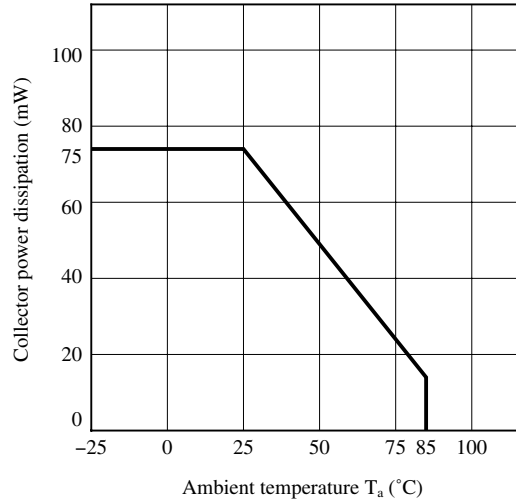


Fig.3 Peak Forward Current vs. Duty Ratio

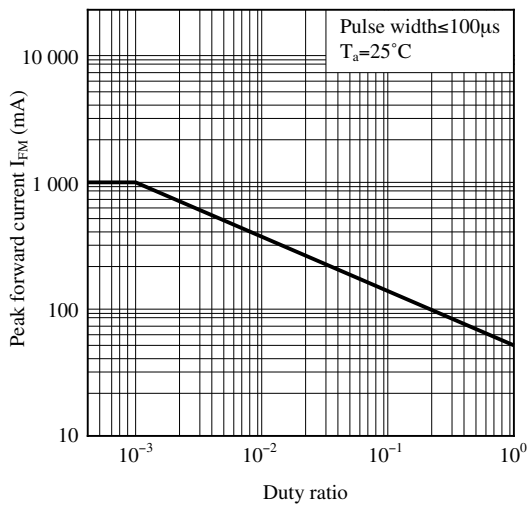


Fig.4 Forward Current vs. Forward Voltage

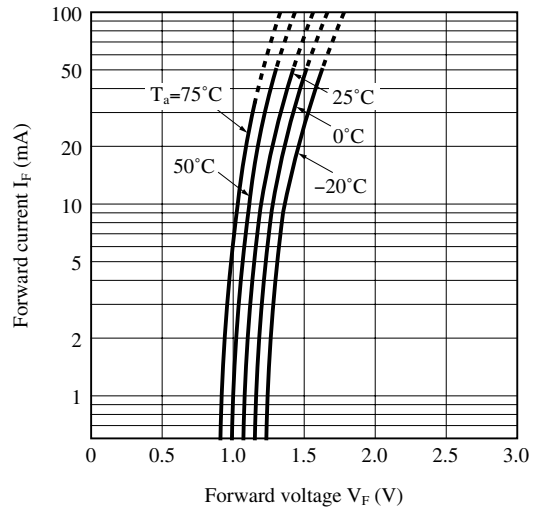


Fig.5 Current Transfer Ratio vs. Forward Current

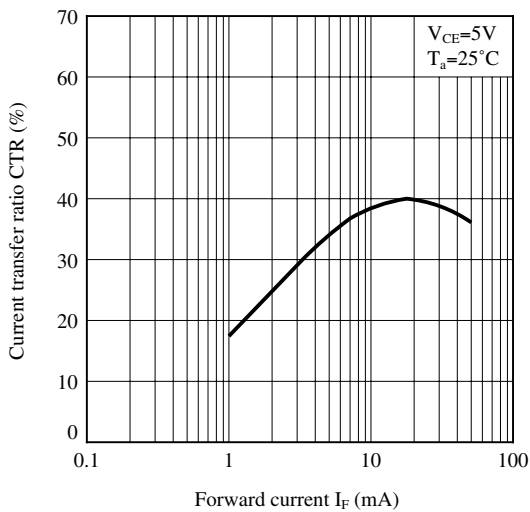


Fig.6 Collector Current vs. Collector-emitter Voltage

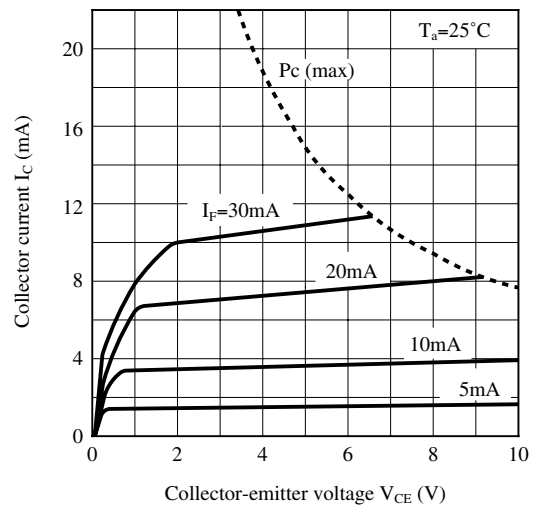


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

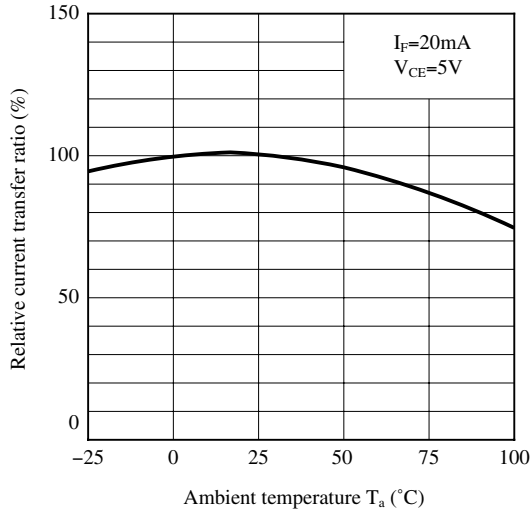


Fig.8 Collector - emitter Saturation Voltage vs. Ambient Temperature

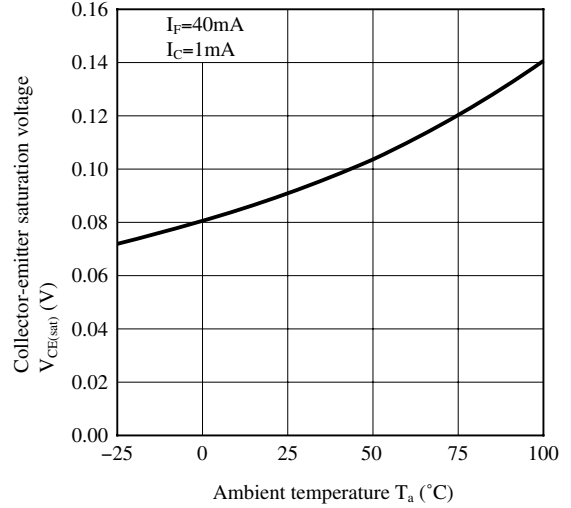


Fig.9 Collector Dark Current vs. Ambient Temperature

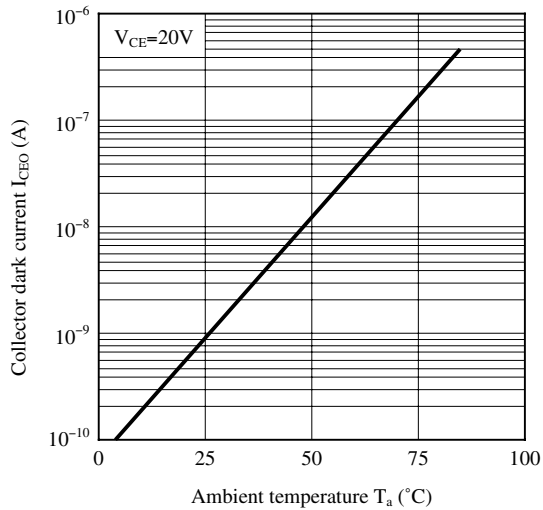


Fig.10 Response Time vs. Load Resistance

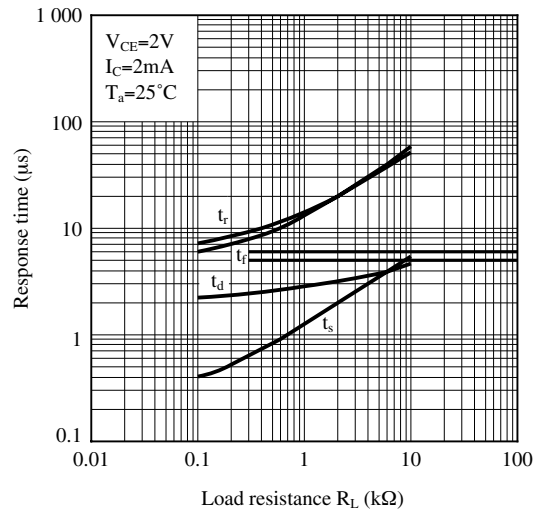
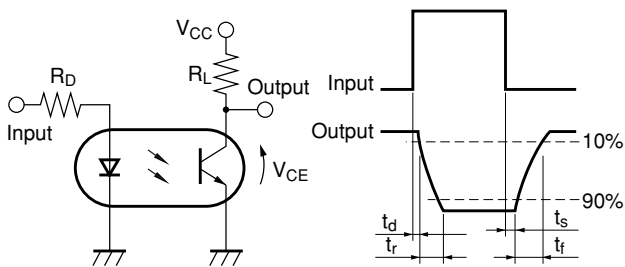


Fig.11 Test Circuit for Response Time



Please refer to the conditions in Fig.10

Fig.12 Frequency Response

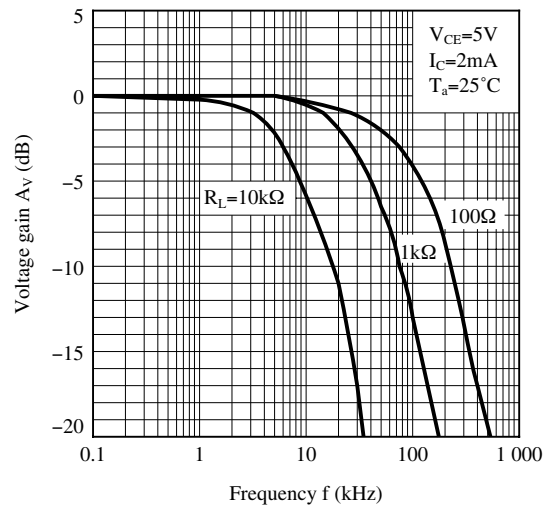
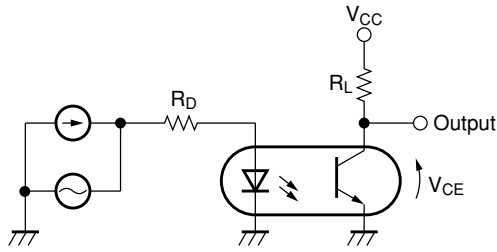
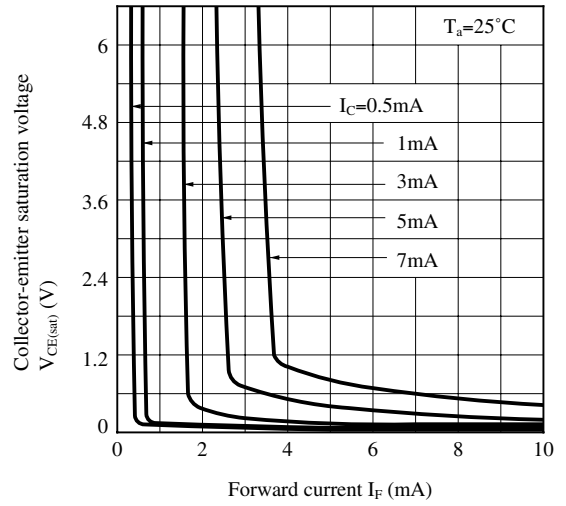


Fig.13 Test Circuit for Frequency Response



Please refer to the conditions in Fig.12

Fig.14 Collector-emitter Saturation Voltage vs. Forward Current



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

■ Design Considerations**● Design guide**

While operating at $I_F < 5.0\text{mA}$, CTR variation may increase.
Please make design considering this fact.

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 5years)
into the design consideration.

☆ For additional design assistance, please review our corresponding Optoelectronic Application Notes.

■ Manufacturing Guidelines**● Soldering Method****Hand soldering**

Hand soldering should be completed within 3s when the point of solder iron is below 400°C.
Please don't solder more than twice.

Please don't bend lead pins from the root of package when soldering.
And 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 notices

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 tooling and soldering conditions.

● Cleaning instructions**Solvent cleaning:**

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

Ultrasonic cleaning:

The impact on the device varies depending on the size of the cleaning bath, ultrasonic output, cleaning time, size of PCB and mounting method of the device.
Therefore, please make sure the device withstands the ultrasonic cleaning in actual conditions in advance of mass production.

Recommended solvent materials:

Ethyl alcohol, Methyl alcohol and Isopropyl alcohol

In case the other type of solvent materials are intended to be used, please make sure they work fine in actual using conditions since some materials may erode the packaging resin.

● Presence of ODC

This product shall not contain the following materials.

And they are not used in the production process for this device.

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.

■ Package specification

Package materials

Plastic bag : Polyethylene

Moltopren : Urethane

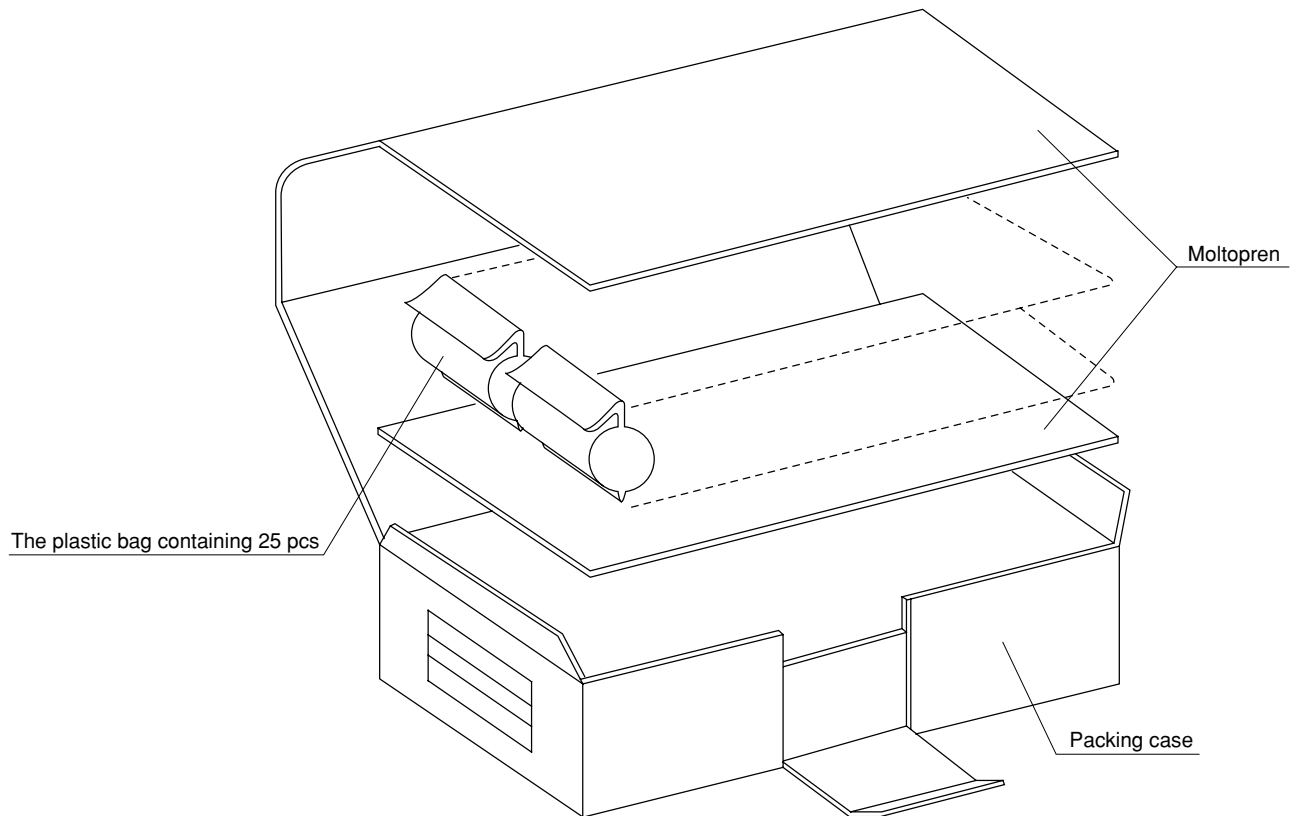
Packing case : Corrugated fiberboard

Package method

25 pcs of products shall be packaged in a plastic bag. Ends shall be fixed by stoppers.

The bottom of the packing case is covered with moltopren, and the plastic bag containing a product is put in order eight bags.

Packing composition



[Packing : 200pcs/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.

· This publication is the proprietary product of SHARP and is copyrighted, with all rights reserved. Under the copyright laws, no part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, in whole or in part, without the express written permission of SHARP. Express written permission is also required before any use of this publication may be made by a third party.

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