Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

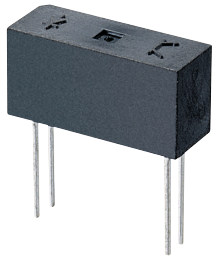
We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!


## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

# 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

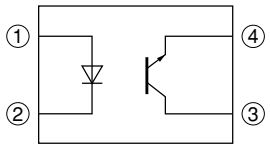
1. Power supplies





Sheet No.: D2-A04601EN
Date Nov. 28. 2003

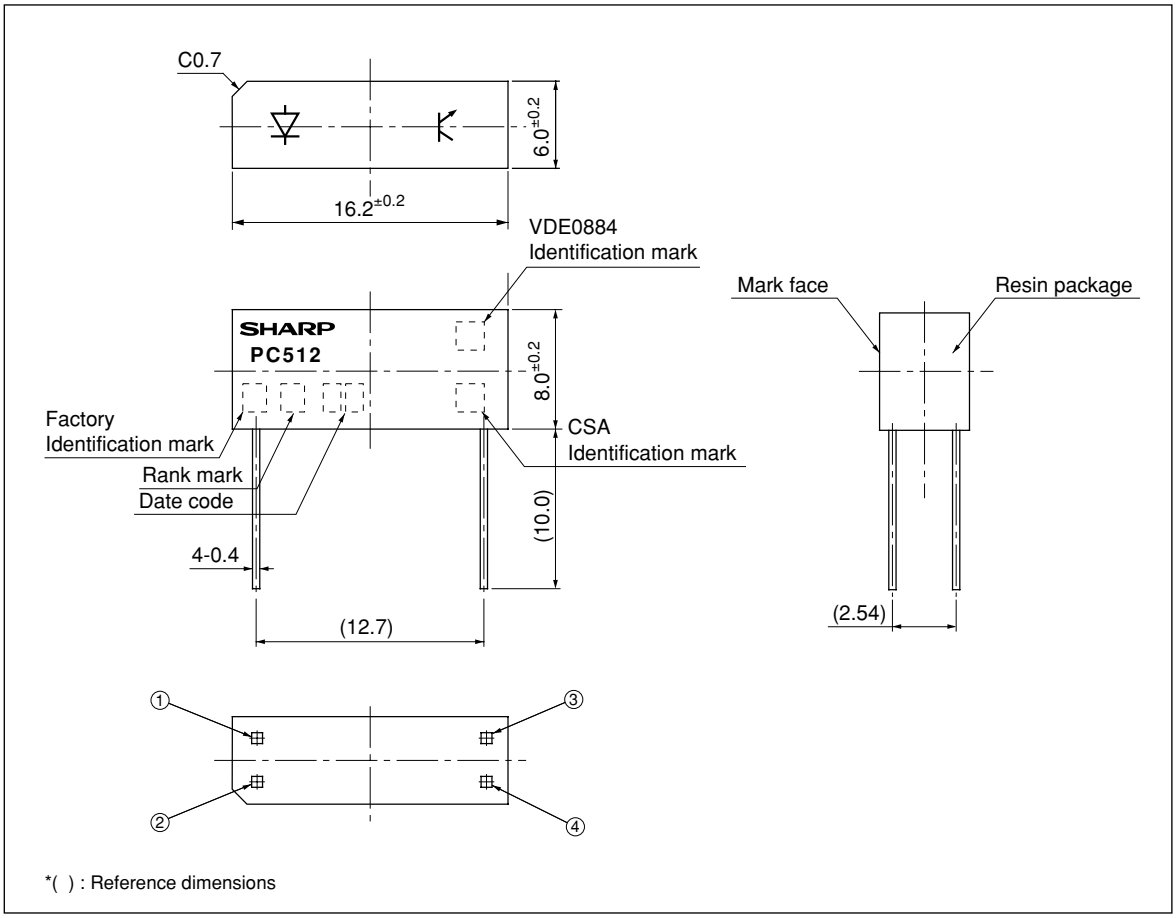
## ■ Internal Connection Diagram




① Anode
② Cathode
③ Collector
④ Emitter

## ■ 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

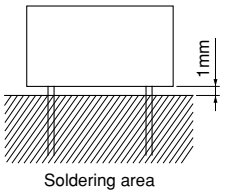
With or without

## ■ 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.

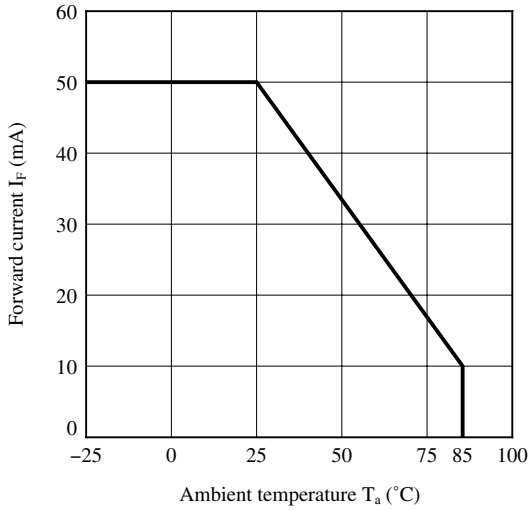



## ■ Electro-optical Characteristics

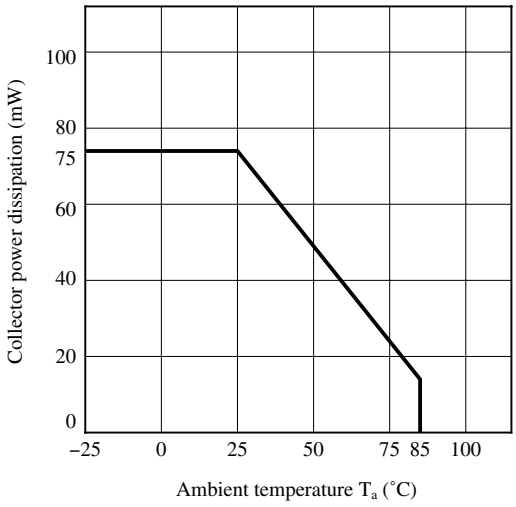
($T_a$=25˚C)

| | 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 | $1\times10^{12}$ | – | – | 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 | μs |
| | | Fall time | $t_f$ | | – | 4 | 30 | μs |

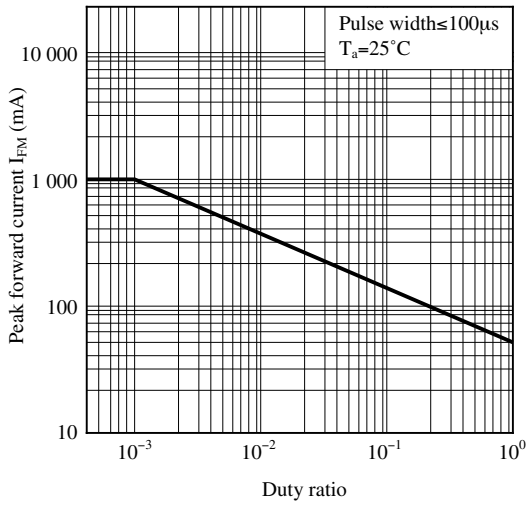
## Fig.1 Forward Current vs. Ambient Temperature



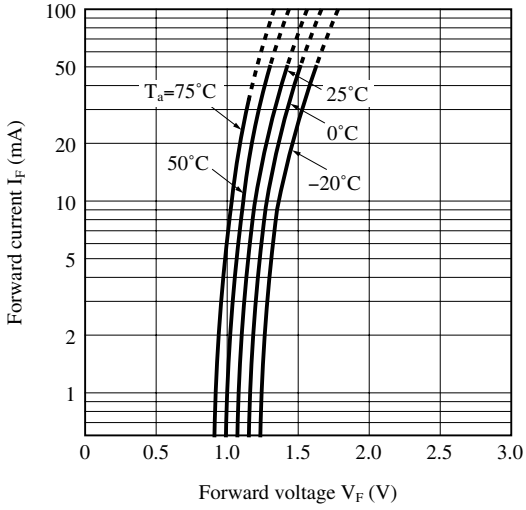

## Fig.2 Collector Power Dissipation vs. Ambient Temperature



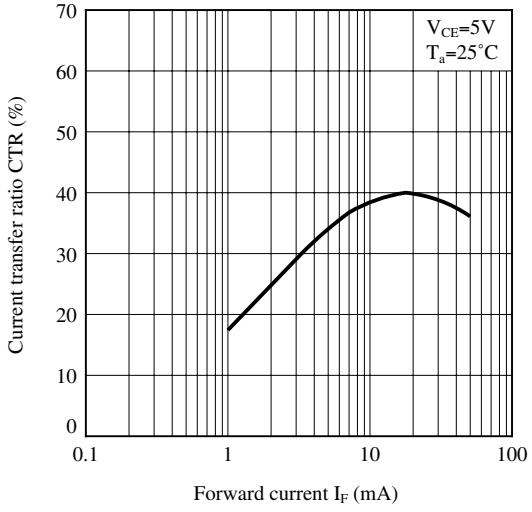

## Fig.3 Peak Forward Current vs. Duty Ratio



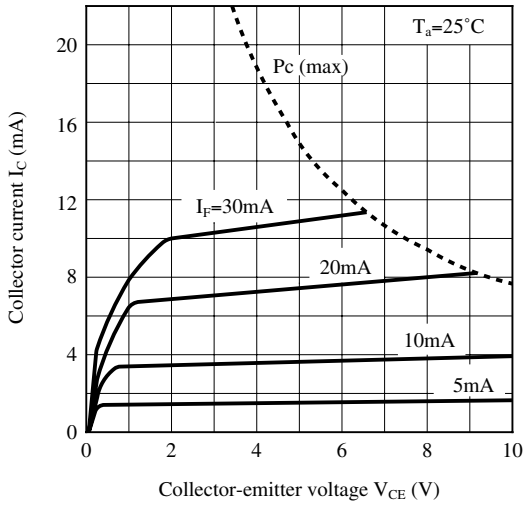

## Fig.4 Forward Current vs. Forward Voltage



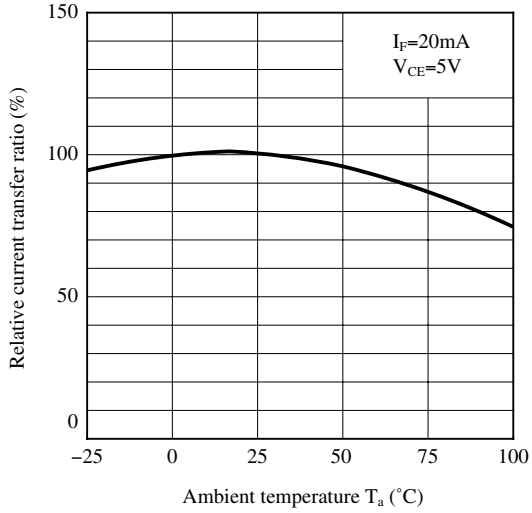

## Fig.5 Current Transfer Ratio vs. Forward Current



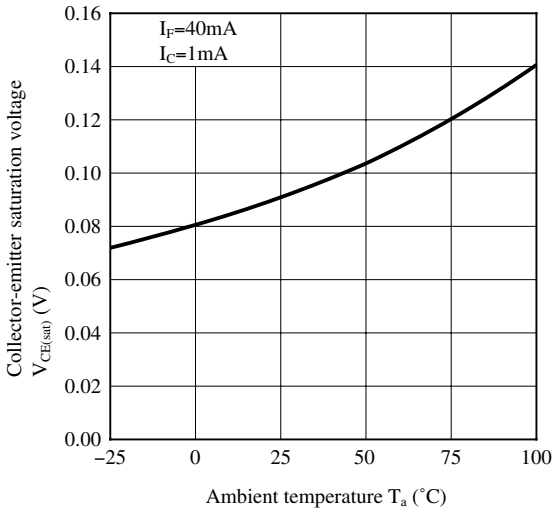

## Fig.6 Collector Current vs. Collector-emitter Voltage



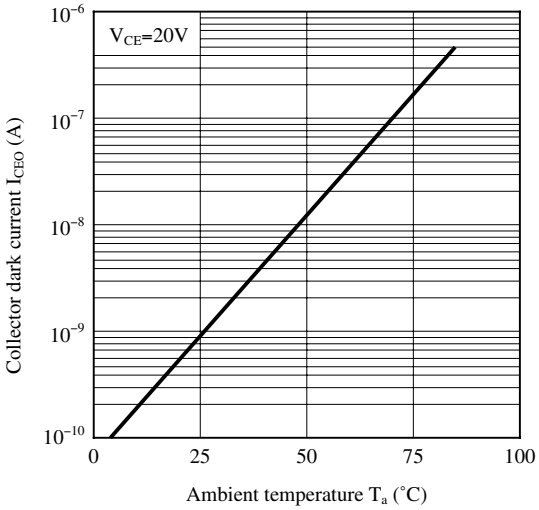
## Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature



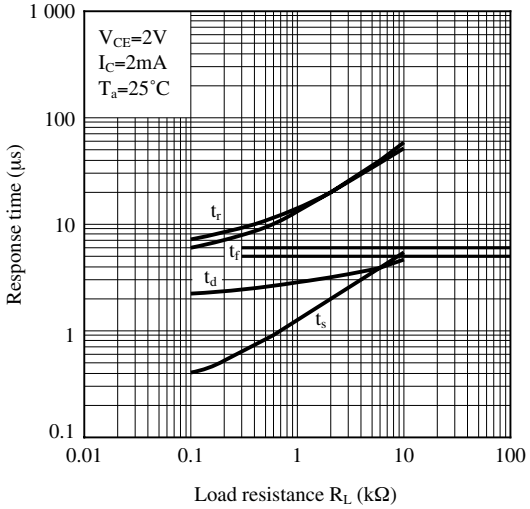

## Fig.8 Collector - emitter Saturation Voltage vs. Ambient Temperature



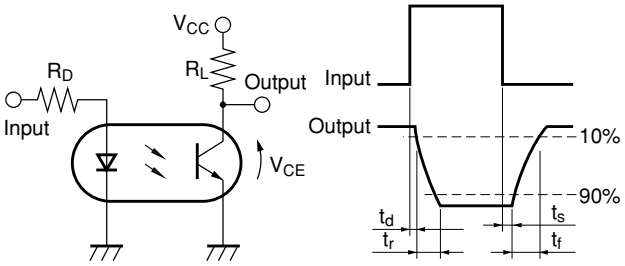

## Fig.9 Collector Dark Current vs. Ambient Temperature




## Fig.10 Response Time vs. Load Resistance

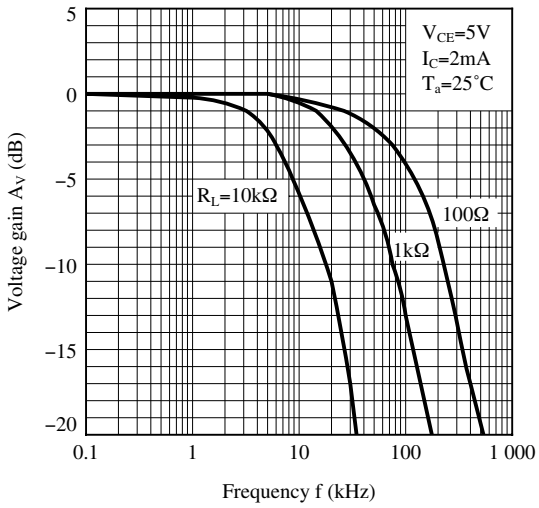



## Fig.11 Test Circuit for Response Time

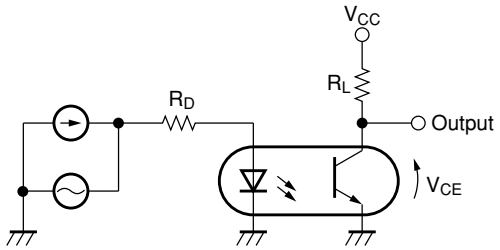



Please refer to the conditions in Fig.10

## Fig.12 Frequency Response

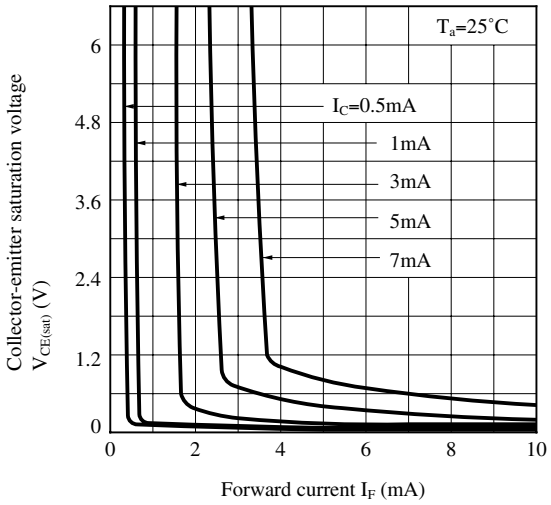


## Fig.13 Test Circuit for Frequency Response




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 $I_F$<5.0mA, 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

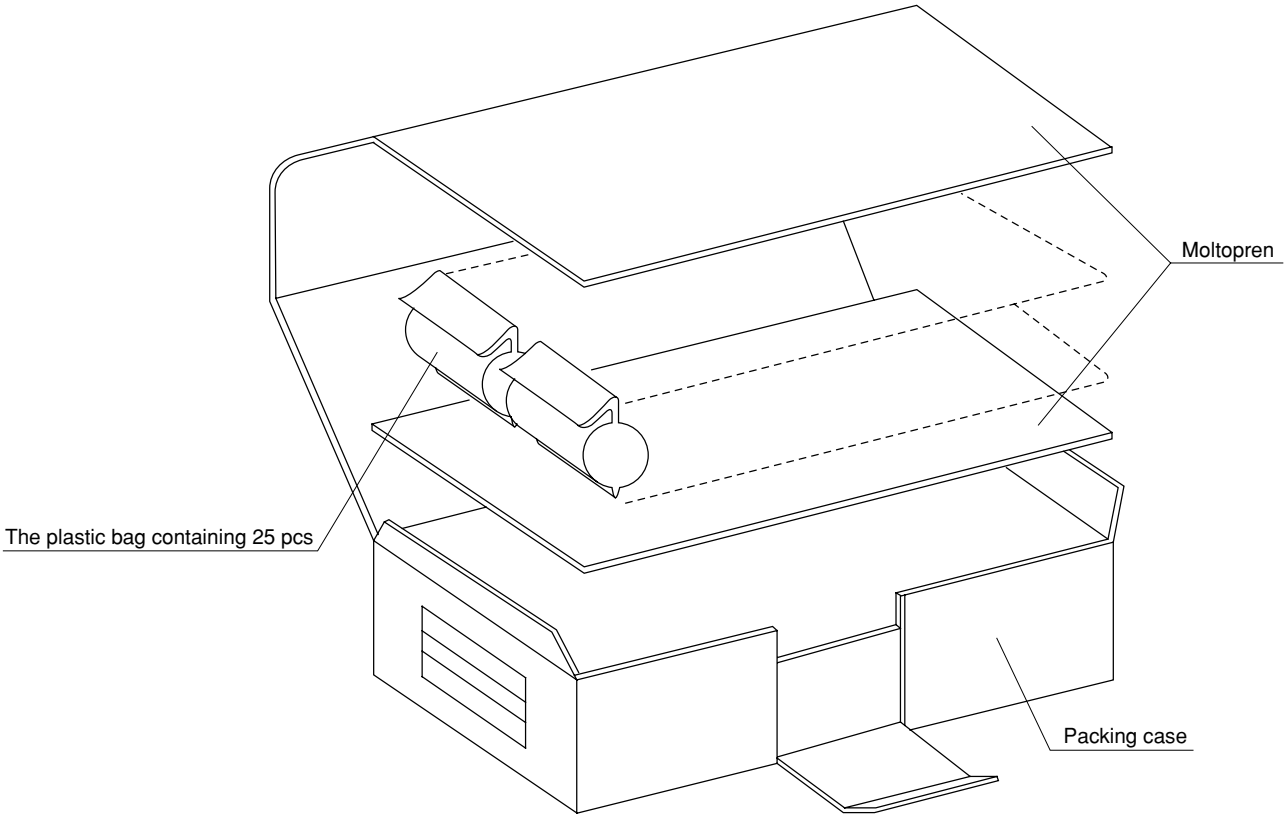
### Package materials

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 moltpren, 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.



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