

# For better use of our Catalog

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## ⟨For specifications⟩

Specifications in this product catalog are subject to change without prior notice. Detailed specifications are omitted for some of the products due to limited space. Please inquire and ask for individual specification sheets when ordering.

## ⟨Information⟩


Our product catalog consists of two volumes.

This catalog, the first volume, carries product information on switches, trimmers, attenuators, circuit protectors,

Please see the second volume for other products such as sensors and motors.

The switches described in this catalog include DIP switches and Operating switches.

Concerning Operating switches such as order to be made products and standard products, there is a common annotation related to switches at last half catalog. Please refer it.

For other products, in each product catalog  logo or a description to point out order to be made products on each item at the catalog.

If there is no indication, it is a standard products.

## Note prior to placing order

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Please do not use our products under conditions or environments not described in this catalog. Even under the conditions or environments described in this catalog, if you want to use our products for applications requiring high reliability (These include, but are not limited to, nuclear power control equipment, railroad equipment, aviation equipment, vehicle equipment, combustion equipment, medical equipment, entertainment equipment, and disaster prevention equipment), be sure to contact our point of contact beforehand.

The details of warranty shall be as per the descriptions in this document and we shall not be liable for any damage on you resulting from the use of any equipment or device (including control systems) which is not in accordance with this document (hereinafter referred to as "use in violation"). In the case where you resell our products, we shall not be liable for any damage on a third party resulting from use in violation by the third party, and even if we make payment to the third party in connection with such use in violation regardless of the name by which such payment may be called, we may demand the whole amount thereof from you.

### 〈Warranty Period〉

The warranty period is one year from the date of delivery. The warranty is only applicable to the product itself, not applicable to consumable products such as batteries and etc.

### 〈Warranty Coverage〉

If any malfunctions should occur due to our fault, NIDEC COMPONENTS warrants any part of our product within one year from the date of delivery by repair or replacement at free of charge. However, warranty is not applicable if the causes of defect should result from the following conditions:

- Failure or damages caused by inappropriate use, inappropriate conditions, and inappropriate handling.
- Failure or damages caused by inappropriate modifications, adjustment, or repair.
- Failure or damage caused by technically and Scientifically unpredictable factors.
- Failure or damage caused by natural disaster, fire or unavoidable factors.

# P.R.C.P.

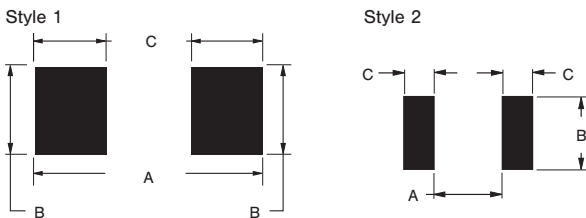
## POLYMER RESETTABLE CIRCUIT PROTECTORS

### ENVIRONMENTAL CHARACTERISTICS

| Item                                | Test conditions                                                                                   | Specifications                      |                    |                     |                     |                    |                    |                    |                    |       |
|-------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------|--------------------|---------------------|---------------------|--------------------|--------------------|--------------------|--------------------|-------|
|                                     |                                                                                                   | SMDF, MSMF, USMF, NSMF, PSMF series | SM series          | ASML/X series       | NSML/X series       | R, RG series       | RM series          | RX72 series        | RHT series         |       |
| Operating Temperature               |                                                                                                   | -40 ~ 85°C                          | -40 ~ 85°C         | -40 ~ 85°C          | -40 ~ 85°C          | -40 ~ 85°C         | -20 ~ 85°C         | -40 ~ 85°C         | -40 ~ 85°C         |       |
| typical resistance change (Typical) | Passive aging                                                                                     | 85°C, 1000 h                        | ± 5 %              | ± 5 %               | ± 10 %              | ± 10 %             | ± 5 %              | ± 20 %             | ± 5 %              | ± 5 % |
|                                     | Humidity aging                                                                                    | 85°C, 85 % RH, 1000 h               | ± 5 %              | -                   | -                   | -                  | ± 5 %              | ± 20 %             | ± 5 %              | ± 5 % |
|                                     |                                                                                                   | 85°C, 85 % RH, 168 h                | -                  | ± 5 %               | -                   | -                  | -                  | -                  | -                  | -     |
| Thermal shock                       | 85 ~ -40°C, 20 cycles<br>85 ~ -40°C, 10 cycles<br>85 ~ -55°C, 10 cycles<br>125 ~ -40°C, 10 cycles | 85°C, 85 % RH, 100 h                | -                  | -                   | ± 30 %              | -                  | -                  | -                  | -                  | -     |
|                                     |                                                                                                   | 85°C, 85 % RH, 24 h                 | -                  | -                   | -                   | -                  | -                  | -                  | -                  | -     |
|                                     |                                                                                                   | ± 10 % (SMDF only ± 20 %)           | - 20 %             | ± 30 %              | ± 30 %              | -                  | -                  | -                  | -                  | -     |
| Solvent resistance                  | MIL-STD-202 Method 215                                                                            | No change                           | -                  | No change           | No change           | No change          | No change          | No change          | No change          |       |
| Vibration                           | MIL-STD-883C Method 2007.1, Condition A                                                           | No change                           | No change          | No change           | No change           | No change          | No change          | No change          | No change          |       |
| MSL (Moisture Sensitivity Level)    |                                                                                                   | Level 1, J-STD-020                  | Level 1, J-STD-020 | Level 2a, J-STD-020 | Level 2a, J-STD-020 | Level 1, J-STD-020 | Level 1, J-STD-020 | Level 1, J-STD-020 | Level 1, J-STD-020 |       |

※ Please refer to the data sheet of each individual series about the details.

### RECOMMENDED PAD LAYOUT

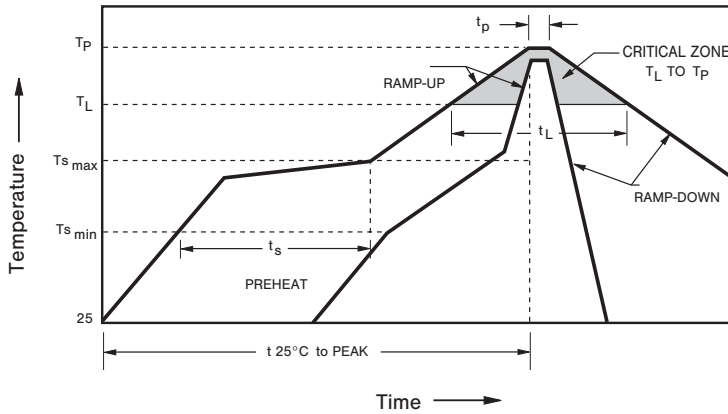


| Model                                       | A<br>mm / (inch)              | B<br>mm / (inch)              | C<br>mm / (inch)               | Style |
|---------------------------------------------|-------------------------------|-------------------------------|--------------------------------|-------|
| PRCP-SM030, 050, 075, 100, 100/33, 125, 260 | 9.7 ± 0.1<br>(0.38 ± 0.004)   | 3.1 ± 0.1<br>(0.12 ± 0.004)   | 2.3 ± 0.1<br>(0.09 ± 0.004)    | 1     |
| PRCP-SM150, 150/33, 185/33, 200, 250        | 10.7 ± 0.1<br>(0.42 ± 0.004)  | 4.6 ± 0.1<br>(0.18 ± 0.004)   | 2.3 ± 0.1<br>(0.09 ± 0.004)    | 1     |
| PRCP-SMDF series                            | 3.4 ± 0.1<br>(0.134 ± 0.004)  | 4.6 ± 0.1<br>(0.181 ± 0.004)  | 1.5 ± 0.05<br>(0.059 ± 0.002)  | 2     |
| PRCP-MSMF series                            | 2.7 ± 0.1<br>(0.106 ± 0.004)  | 3.2 ± 0.1<br>(0.126 ± 0.004)  | 1.5 ± 0.05<br>(0.059 ± 0.002)  | 2     |
| PRCP-MSMF110/24X 150/24X, 250/16X           | 3.1 ± 0.1<br>(0.122 ± 0.004)  | 2.95 ± 0.1<br>(0.114 ± 0.004) | 1.68 ± 0.05<br>(0.066 ± 0.002) | 2     |
| PRCP-USMF series                            | 2.0 ± 0.1<br>(0.079 ± 0.004)  | 2.5 ± 0.1<br>(0.098 ± 0.004)  | 1.0 ± 0.05<br>(0.039 ± 0.002)  | 2     |
| PRCP-NSMF series                            | 2.0 ± 0.1<br>(0.079 ± 0.004)  | 1.6 ± 0.1<br>(0.063 ± 0.004)  | 1.0 ± 0.05<br>(0.039 ± 0.002)  | 2     |
| PRCP-PSMF series                            | 1.20 ± 0.1<br>(0.047 ± 0.004) | 1.50 ± 0.1<br>(0.059 ± 0.004) | 1.00 ± 0.05<br>(0.039 ± 0.002) | 2     |
| PRCP-ASML/X series                          | 0.4<br>(0.016)                | 0.7<br>(0.028)                | 0.6<br>(0.024)                 | 2     |
| PRCP-NSML/X series                          | 2.0<br>(0.079)                | 1.6<br>(0.063)                | 1.0<br>(0.039)                 | 2     |

# P.R.C.P.

## POLYMER RESETTABLE CIRCUIT PROTECTORS

### SOLDER REFLOW RECOMMENDATIONS



**Notes:**

Wave soldering is permissible only if the device is on the top of the PCB, opposite the heat source.  
 Hand soldering is not recommended for these devices.  
 All temperatures refer to the topside of the device, measured on the device body surface.  
 If reflow temperatures exceed the recommended profile, devices may not meet the published specifications.  
 Compatible with Pb and Pb-free solder reflow profiles.  
 Excess solder may cause a short circuit.

| Profile Feature                                      | Pb-Free Assembly |
|------------------------------------------------------|------------------|
| Average Ramp-Up Rate ( $T_{s\ max}$ to $T_p$ )       | 3°C /second max. |
| PREHEAT                                              |                  |
| Temperature Min ( $T_{s\ min}$ )                     | 150°C            |
| Temperature Max ( $T_{s\ max}$ )                     | 200°C            |
| Time ( $T_{s\ min}$ to $T_{s\ max}$ ) ( $t_s$ )      | 60 ~ 180 seconds |
| TIME MAINTAINED ABOVE:                               |                  |
| Temperature ( $T_L$ )                                | 217°C            |
| Time ( $t_L$ )                                       | 60 ~ 150 seconds |
| Peak Temperature ( $T_p$ )                           | 260°C            |
| Time within 5°C of Actual Peak Temperature ( $t_p$ ) | 20 ~ 40 seconds  |
| Ramp-Down Rate                                       | 6°C/second max.  |
| Time 25°C to Peak Temperature                        | 8 minutes max.   |

# P.R.C.P.

## POLYMER RESETTABLE CIRCUIT PROTECTORS

### PACKAGING SPECIFICATIONS

#### Surface Mount Type

| Packaging option       | Tape and Reel |      |      |      |      |      |      |       |
|------------------------|---------------|------|------|------|------|------|------|-------|
| Symbol                 | - 2           |      |      |      |      |      |      |       |
| Quantity (pcs/reel)    | 1000          | 1500 | 2000 | 3000 | 3500 | 5000 | 6000 | 10000 |
| PRCP-SM030 ~ 125,260   |               |      | ○    |      |      |      |      |       |
| 150 ~ 250              |               | ○    |      |      |      |      |      |       |
| PRCP-MSMF010 ~ 030     |               | ○    |      |      |      |      |      |       |
| 050 ~ 200, 260         |               |      | ○    |      |      |      |      |       |
| 110/24X, 150/24X       |               | ○    |      |      |      |      |      |       |
| 250/16X                |               | ○    |      |      |      |      |      |       |
| PRCP-SMDF series       |               |      |      |      |      |      | ○    |       |
| PRCP-NSMF series       |               |      |      | ○    |      |      |      |       |
| PRCP-USMF series       |               |      |      | ○    |      |      |      |       |
| PRCP-PSMF series       |               |      |      | ○    |      |      |      |       |
| PRCP-ASML/X series     |               |      |      |      |      |      |      | ○     |
| PRCP-NSML150/6 ~ 260/6 |               |      |      |      |      | ○    |      |       |
| 300/6 ~ 600/6          |               |      |      |      | ○    |      |      |       |
| 150/12 ~ 260/12        |               |      |      |      |      | ○    |      |       |
| 300/12 ~ 450/12        |               |      |      |      | ○    |      |      |       |

#### Radial Leaded Type

| Packaging option         | Bulk packaging | Tape and Reel |      |      |      |
|--------------------------|----------------|---------------|------|------|------|
| Symbol                   | - 0            | - 2           |      |      |      |
| Quantity (pcs/reel)      | 500            | 1000          | 1500 | 2000 | 3000 |
| PRCP-R005 ~ 160          | ○              |               |      |      | ○    |
| PRCP-R185 ~ 400          | ○              |               | ○    |      |      |
| PRCP-R500 ~ 1100         | ○              |               |      |      |      |
| PRCP-RG series           | ○              |               |      |      | ○    |
| PRCP-RX020/72 ~ 090/72   | ○              |               |      |      | ○    |
| PRCP-RX110/72 ~ 160/72   | ○              |               | ○    |      |      |
| PRCP-RX185/72 ~ 375/72   | ○              | ○             |      |      |      |
| PRCP-RHT070 ~ 200        | ○              |               |      |      | ○    |
| PRCP-RHT450 ~ 650        | ○              |               | ○    |      |      |
| PRCP-RHT750 ~ 1300       | ○              | ○             |      |      |      |
| PRCP-RM005/240 ~ 040/240 | ○              |               |      | ○    |      |
| PRCP-RM055/240           | ○              | ○             |      |      |      |

### DEFINITIONS OF SYMBOLS AND TERMS IN DATASHEET

#### V max : Maximum voltage

The maximum voltage a P.R.C.P. device can withstand without damage in its tripped state. The device may be damaged if you apply the voltage bigger than V max.

#### I max : Maximum current

The maximum fault current a P.R.C.P. device can withstand without damage at the rated voltage. The device may be damaged if you apply the current bigger than I max.

#### I hold : Hold current

The maximum current a P.R.C.P. device will not trip under specified conditions at 23°C.

#### I trip : Trip current

The minimum current that will switch a P.R.C.P. from the low resistance to the high resistance state under specified conditions at 23°C.

#### R min : Minimum resistance (Initial)

The minimum device resistance under specified conditions at 23°C.

#### R max : Maximum resistance (Initial)

The maximum device resistance under specified condition at 23°C.

#### R 1max : maximum resistance after past trip of past reflow

The maximum device resistance one hour after at 23°C.

A P.R.C.P. device has been tripped or been reflow-soldered.

#### Time to trip

The time for a P.R.C.P. device to trip. It will be in inverse proportion to the value of the current through the device.

#### Tripped power dissipation

Power dissipated from the device while in the tripped state at 23°C.

Power is calculated by the applied voltage and the current through the device.

### ■ PRECAUTIONS BEFORE USING

- P.R.C.P. devices are intended for the use of protection against the overcurrent fault, and should not be used where repeated or continuous fault conditions for the trip are expected.
- P.R.C.P. devices may be damaged by the abnormal heat generation caused by the application of the voltage greater than the maximum voltage.
- P.R.C.P. devices trip at the temperature of about 125°C. The devices may trip at the lower current than the expected I trip if the heat generating components are in the neighborhood or may not trip even at the I trip value if the surrounding high-temperature condition is super excellent.
- Hand-held soldering  
It is not recommended for the SMD type of P.R.C.P. using hand-held soldering at mounting, except for the PRCP-SM series.
- Parallel connection  
It is not able to recommend for parallel connection of P.R.C.P. because there is the possibility that does not act trip operation simultaneously, from the reason that the each currents differ by the difference of the resistance value of each device.

### ■ SELECTION GUIDE FOR THE OPTIMUM P.R.C.P. DEVICE

To select the optimum P.R.C.P. device, you have to consider the relations between the device parameters and operating conditions

Step for selection

Step 1: Select a suitable P.R.C.P. model which has the maximum voltage greater than the maximum circuit voltage.

Step 2: Select a suitable P.R.C.P. model which has the Ihold current greater than "Normal operating current" at "Operating Temperature" by using the "Thermal Derating chart - Ihold".

Step 3: Check the time to tripped state using the "Typical Time to trip at 23°C" for selected model.

| Operation condition          | Device parameter               |
|------------------------------|--------------------------------|
| Maximum circuit voltage (V)  | Vmax: Maximum voltage(V)       |
| Normal operating current (A) | Ihold: Hold current (A)        |
| Fault current (A)            | Itrip: Trip current (A)        |
| Operating Temperature (°C)   | Thermal derating chart (Ihold) |

# NON-STANDARD VERSIONS

## POLYMER RESETTABLE CIRCUIT PROTECTORS

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Special specification items are possible. From a cost and delivery standpoint, however, it is better to use standard catalog items, so sufficient consideration should be given at the design stage. The following are some examples of special specification items.

- DC motor protection

