

|           |     |   |
|-----------|-----|---|
| $V_{RWM}$ | 18  | V |
| $P_{PP}$  | 200 | W |
| $I_{PP}$  | 6.8 | A |

### ● Feature

High reliability  
Small mold type

### ● Application

Surge Protection

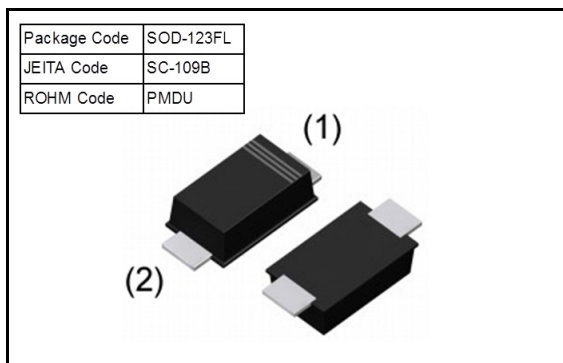
### ● Structure

Silicon Epitaxial Planar

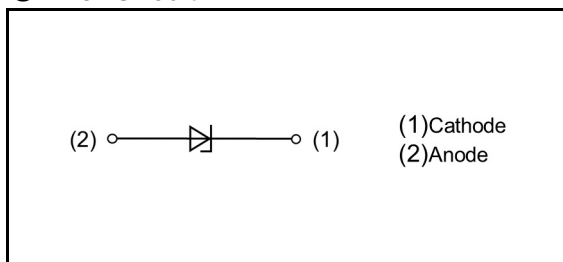
### ● Absolute Maximum Rating ( $T_a = 25^\circ\text{C}$ )

| Parameter            | Symbol           | Conditions               | Min.    | Max. | Unit |    |
|----------------------|------------------|--------------------------|---------|------|------|----|
| Peak Pulse Power     | P <sub>pp</sub>  | tp=10/1000us             | -       | 200  | W    |    |
| Peak Pulse Current   | I <sub>pp</sub>  | tp=10/1000us             | -       | 6.8  | A    |    |
| Power dissipation    | P <sub>D</sub>   | on Glass-epoxy substrate | -       | 1    | W    |    |
| Junction temperature | T <sub>j</sub>   | -                        | -       | 150  | °C   |    |
| Storage temperature  | T <sub>stg</sub> | -                        | -65     | 150  | °C   |    |
| ESD capability       | V <sub>ESD</sub> | IEC61000-4-2             | Air     | -    | 30   | kV |
|                      |                  |                          | Contact | -    | 30   | kV |

### ● Outline



### ● Inner Circuit



### ● Packaging Specification

| Packing          | Embossed Tape |
|------------------|---------------|
| Reel Size(mm)    | 180           |
| Taping Width(mm) | 8             |
| Quantity(pcs)    | 3000          |
| Taping Code      | TR            |
| Marking          | QW            |

## ● Characteristic (Ta = 25°C)

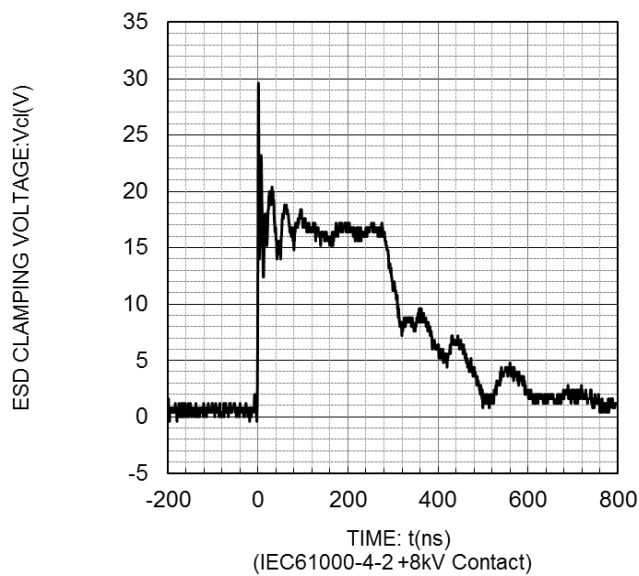
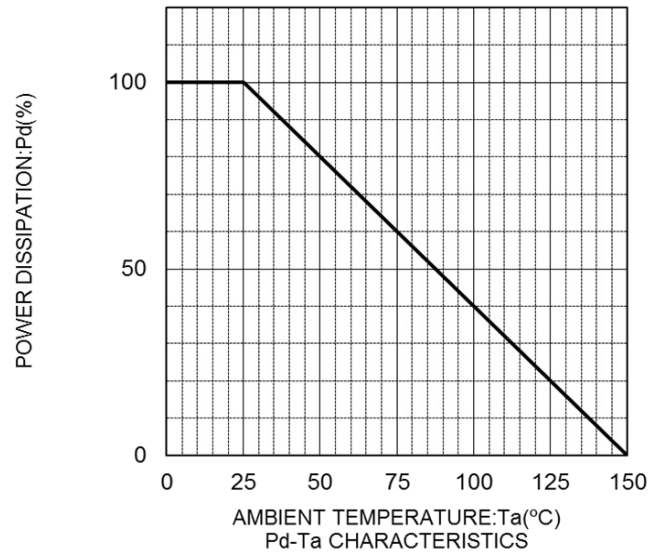
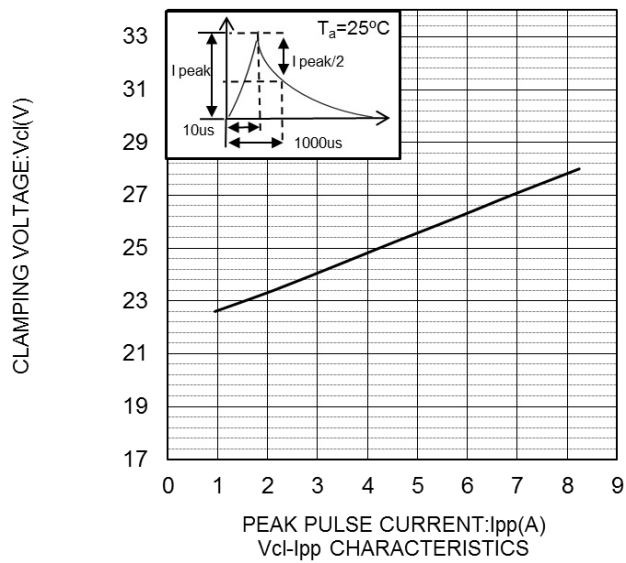
| Part Number | Symbol                                 |           |                                 |          |                                 |             |                                           |
|-------------|----------------------------------------|-----------|---------------------------------|----------|---------------------------------|-------------|-------------------------------------------|
|             | Breakdown voltage<br>$V_{BR}(V)^{(1)}$ |           | Reverse Current<br>$I_R(\mu A)$ |          | Clamping voltage<br>$V_{CL}(V)$ |             | Reverse Stand-off voltage<br>$V_{RWM}(V)$ |
|             | MIN                                    | $I_T(mA)$ | MAX                             | $V_R(V)$ | MAX                             | $I_{PP}(A)$ | MAX                                       |
| SMF5V0      | 6.40                                   | 40        | 5.0                             | 5.0      | 9.2                             | 21.7        | 5.0                                       |
| SMF6V0      | 6.67                                   | 40        | 26                              | 6.0      | 10.3                            | 19.4        | 6.0                                       |
| SMF6V5      | 7.72                                   | 40        | 20                              | 6.5      | 11.2                            | 17.9        | 6.5                                       |
| SMF7V0      | 7.78                                   | 40        | 3.0                             | 7.0      | 12.0                            | 16.7        | 7.0                                       |
| SMF7V5      | 8.33                                   | 40        | 0.1                             | 7.5      | 12.9                            | 15.5        | 7.5                                       |
| SMF8V0      | 8.89                                   | 40        | 0.1                             | 8.0      | 13.6                            | 14.7        | 8.0                                       |
| SMF9V0      | 10.0                                   | 40        | 0.1                             | 9.0      | 15.4                            | 13.0        | 9.0                                       |
| SMF10V      | 11.1                                   | 20        | 0.1                             | 10       | 17.0                            | 11.8        | 10                                        |
| SMF11V      | 12.2                                   | 20        | 0.1                             | 11       | 18.2                            | 11.0        | 11                                        |
| SMF12V      | 13.3                                   | 20        | 0.1                             | 12       | 19.9                            | 10.1        | 12                                        |
| SMF13V      | 14.4                                   | 20        | 0.1                             | 13       | 21.5                            | 9.3         | 13                                        |
| SMF14V      | 15.6                                   | 20        | 0.1                             | 14       | 23.2                            | 8.6         | 14                                        |
| SMF15V      | 16.7                                   | 20        | 0.1                             | 15       | 24.4                            | 8.2         | 15                                        |
| SMF16V      | 17.2                                   | 20        | 0.1                             | 16       | 26.0                            | 7.7         | 16                                        |
| SMF17V      | 18.9                                   | 20        | 0.1                             | 17       | 27.6                            | 7.2         | 17                                        |
| SMF18V      | 20.0                                   | 20        | 0.1                             | 18       | 29.2                            | 6.8         | 18                                        |
| SMF20V      | 22.2                                   | 10        | 0.1                             | 20       | 32.4                            | 6.2         | 20                                        |
| SMF22V      | 24.4                                   | 10        | 0.1                             | 22       | 35.5                            | 5.6         | 22                                        |
| SMF24V      | 26.7                                   | 10        | 0.1                             | 24       | 38.9                            | 5.1         | 24                                        |
| SMF26V      | 28.9                                   | 10        | 0.1                             | 26       | 42.1                            | 4.8         | 26                                        |
| SMF28V      | 31.1                                   | 10        | 0.1                             | 28       | 45.4                            | 4.4         | 28                                        |
| SMF30V      | 33.3                                   | 10        | 0.1                             | 30       | 48.4                            | 4.1         | 30                                        |
| SMF33V      | 36.7                                   | 10        | 0.1                             | 33       | 53.3                            | 3.8         | 33                                        |

Note(1)  $V_{BR}$  test time is 40ms.

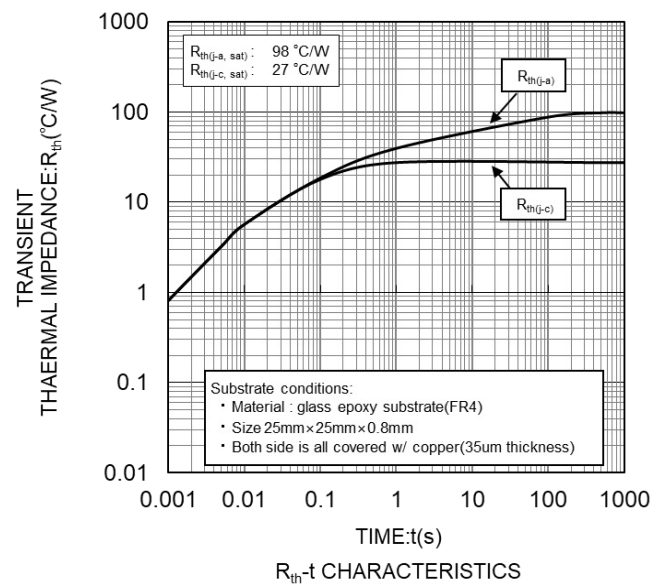
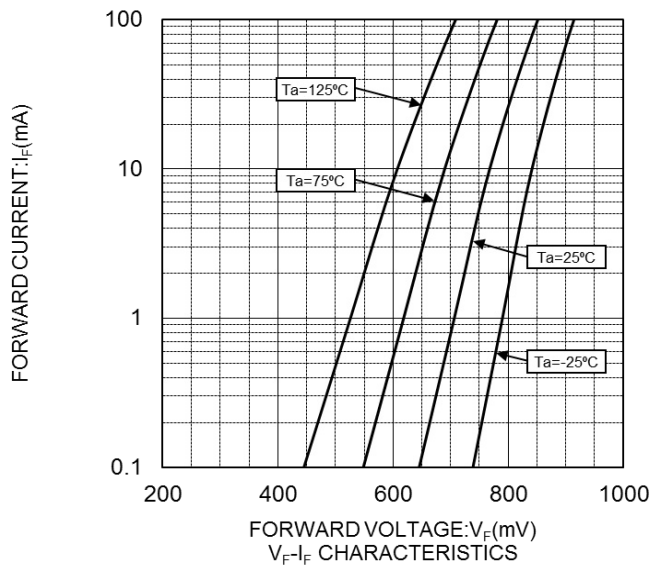
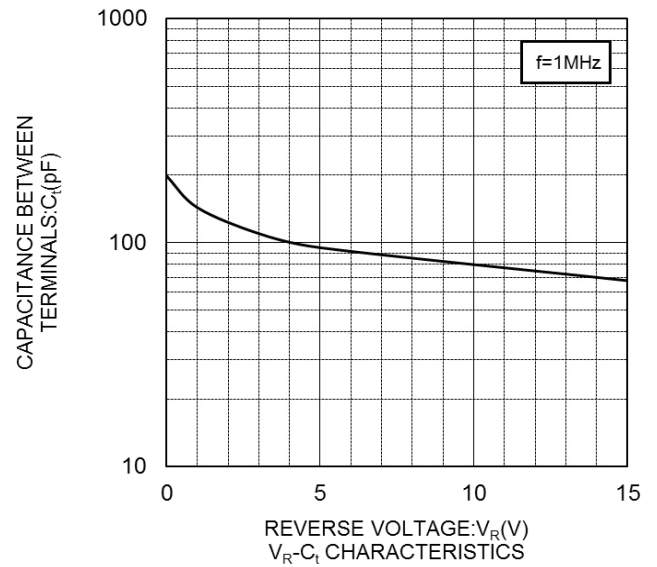
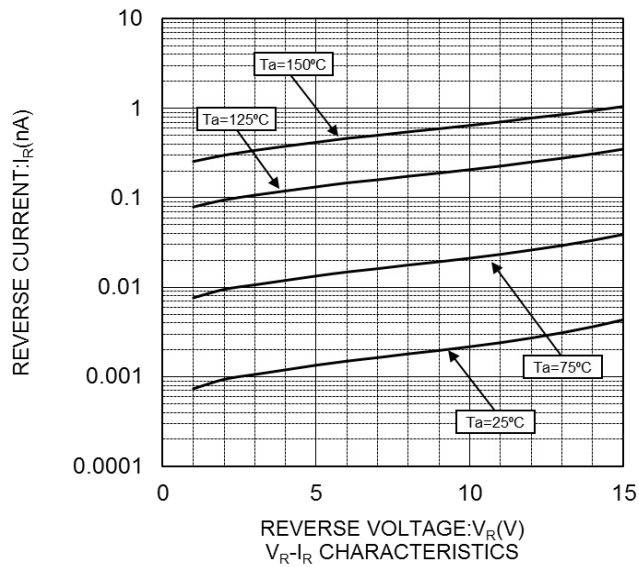
## ● Marking

| Part Number | Marking | Part Number | Marking |
|-------------|---------|-------------|---------|
| SMF5V0      | AW      | SMF15V      | NW      |
| SMF6V0      | BW      | SMF16V      | PW      |
| SMF6V5      | CW      | SMF17V      | YW      |
| SMF7V0      | DW      | SMF18V      | QW      |
| SMF7V5      | EW      | SMF20V      | RW      |
| SMF8V0      | FW      | SMF22V      | SW      |
| SMF9V0      | GW      | SMF24V      | TW      |
| SMF10V      | HW      | SMF26V      | UW      |
| SMF11V      | JW      | SMF28V      | VW      |
| SMF12V      | KW      | SMF30V      | VW      |
| SMF13V      | LW      | SMF33V      | XW      |
| SMF14V      | MW      |             |         |

● Characteristic Curves



# ● Characteristic Curves



● Appended figure

Procedure to obtain ESD Clamping Voltage  
IEC61000-4-2 Spec

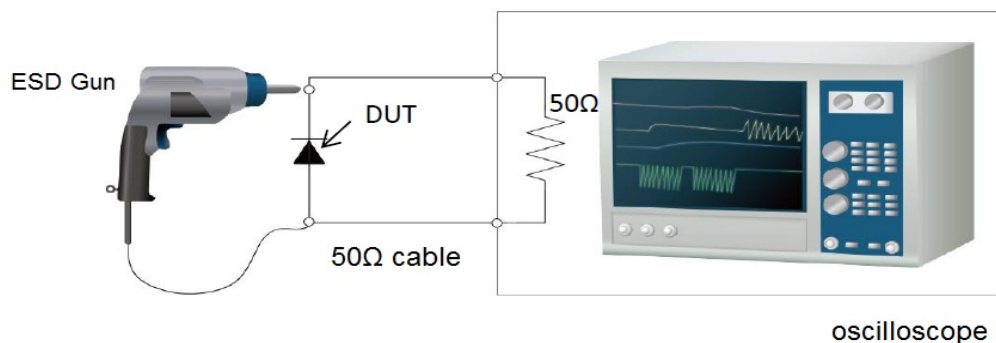
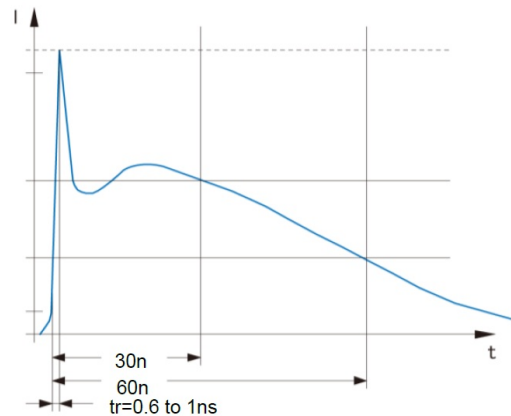
| Level | Test Voltage (kV) | First Peak Current (A) | Current at 30ns (A) | Current at 60ns (A) |
|-------|-------------------|------------------------|---------------------|---------------------|
| 1     | 2                 | 7.5                    | 4                   | 2                   |
| 2     | 4                 | 15                     | 8                   | 4                   |
| 3     | 6                 | 22.5                   | 12                  | 6                   |
| 4     | 8                 | 30                     | 16                  | 8                   |



$C_S$ :150pF  $R_d$ :330 $\Omega$

simplified diagram in ESD machine

IEC61000-4-2 Waveform



oscilloscope

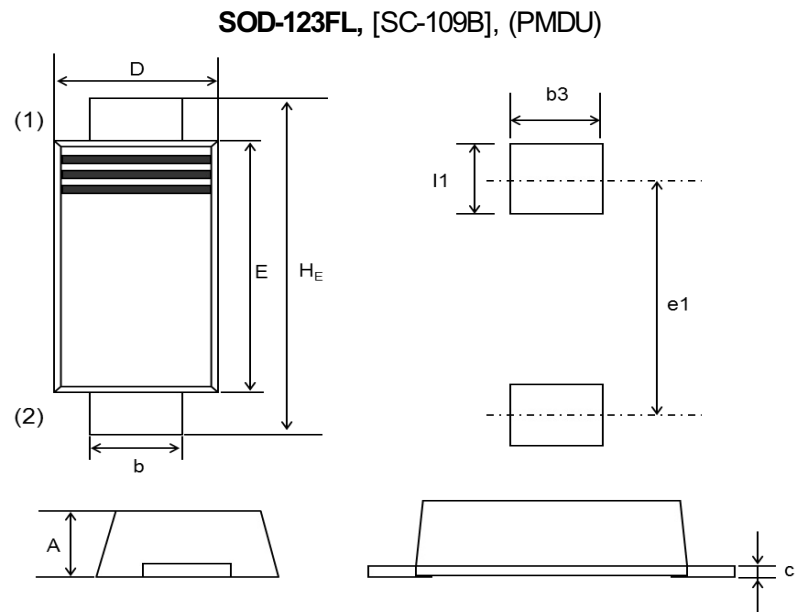
1 Set up ESD Tester at IEC61000-4-2 condition.  
(IEC61000-4-2 : C=150pF, R=330 $\Omega$ )

2 Mount a sample on the high frequency test board  
with the SMA connector.

3 Connect the SMA connector to the oscilloscope  
by 50 $\Omega$ cable.  
Then, add the 10X-attenuator between test board  
and the cable to protect the oscilloscope.

4 Discharge ESD in contact discharge mode at any voltage.  
(normally 8kV Max.)

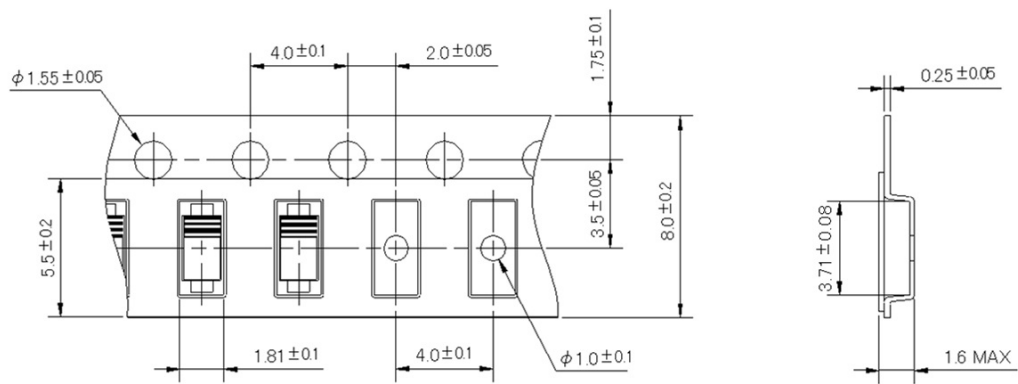
● Dimension



| DIM            | Millimeters |         |      | Inches |         |       |
|----------------|-------------|---------|------|--------|---------|-------|
|                | Min.        | Average | Max. | Min.   | Average | Max.  |
| A              | 0.70        | 0.80    | 0.90 | 0.028  | 0.031   | 0.035 |
| b              | 0.80        | 0.90    | 1.00 | 0.031  | 0.035   | 0.039 |
| c              | 0.05        | 0.10    | 0.20 | 0.002  | 0.004   | 0.008 |
| D              | 1.50        | 1.60    | 1.70 | 0.059  | 0.063   | 0.067 |
| E              | 2.50        | 2.60    | 2.70 | 0.098  | 0.102   | 0.106 |
| H <sub>E</sub> | 3.38        | 3.50    | 3.62 | 0.133  | 0.138   | 0.143 |
| l1             | -           | 0.85    | -    | -      | 0.033   | -     |
| b3             | -           | 1.20    | -    | -      | 0.047   | -     |
| e1             | -           | 3.05    | -    | -      | 0.120   | -     |

(1) The marking bar indicates the cathode.  
(2) The direction indicates the anode.

● Taping (Unit:mm)



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1. If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment <sup>(Note 1)</sup>, aircraft/spacecraft, nuclear power controllers, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any ROHM's Products for Specific Applications.

(Note1) Medical Equipment Classification of the Specific Applications

| JAPAN     | USA       | EU         | CHINA     |
|-----------|-----------|------------|-----------|
| CLASS III | CLASS III | CLASS II b | CLASS III |
| CLASS IV  |           | CLASS III  |           |

2. ROHM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures:
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  - [f] Sealing or coating our Products with resin or other coating materials
  - [g] Use of our Products without cleaning residue of flux (Exclude cases where no-clean type fluxes is used. However, recommend sufficiently about the residue.); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
  - [h] Use of the Products in places subject to dew condensation
4. The Products are not subject to radiation-proof design.
5. Please verify and confirm characteristics of the final or mounted products in using the Products.
6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse, is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
7. De-rate Power Dissipation depending on ambient temperature. When used in sealed area, confirm that it is the use in the range that does not exceed the maximum junction temperature.
8. Confirm that operation temperature is within the specified range described in the product specification.
9. ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

## Precaution for Mounting / Circuit board design

1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
2. In principle, the reflow soldering method must be used on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

## Precautions Regarding Application Examples and External Circuits

1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.
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## Precaution for Electrostatic

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of ionizer, friction prevention and temperature / humidity control).

## Precaution for Storage / Transportation

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
  - [a] the Products are exposed to sea winds or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and NO<sub>2</sub>
  - [b] the temperature or humidity exceeds those recommended by ROHM
  - [c] the Products are exposed to direct sunshine or condensation
  - [d] the Products are exposed to high Electrostatic
2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.
3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

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