

# High Efficiency Snubber Diode

## Features and Benefits

- High Peak Reverse Voltage,  $V_{RM}$ : 800 V
- Low Forward Voltage,  $V_F$ : 1.05 V (max.) at  $I_F = 1.0$  A
- Peak Forward Surge Current,  $I_{FSM}$ : 30 A
- Average Forward Current,  $I_{F(AV)}$ : 1.0 A
- Flammability rating UL94V-0 (Equivalent)
- Pins Pb (lead) free
- Built-in series resistor: 22  $\Omega$

## Package: Through Hole



*Not to scale*

## Description

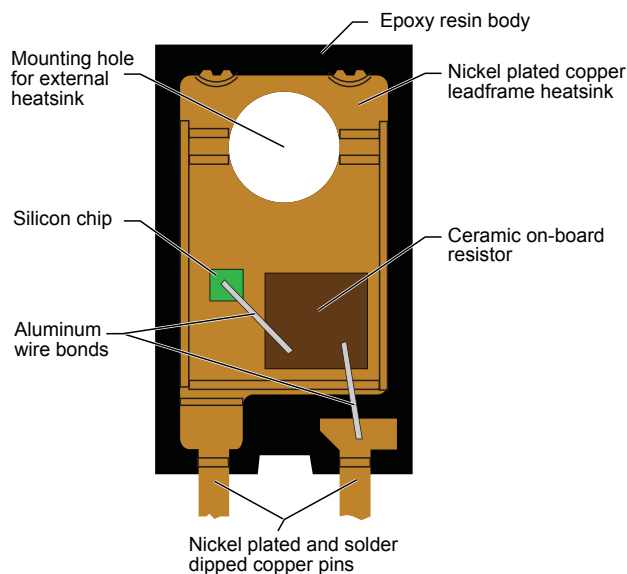
The SARS10 is an 800 V silicon diode designed especially for use in high-efficiency snubber circuits. This diode can sustain a high voltage with low loss, with low-noise rectification.

To suppress surge voltage with low noise, conduct the surge voltage and noise into a capacitor. A series resistor,  $R_S$ , of 22  $\Omega$  is built into the SARS10, eliminating a external component. Then allow the capacitor to discharge the energy into power supply line with the regenerative circuit operation, shown below in the typical application circuit schematic.

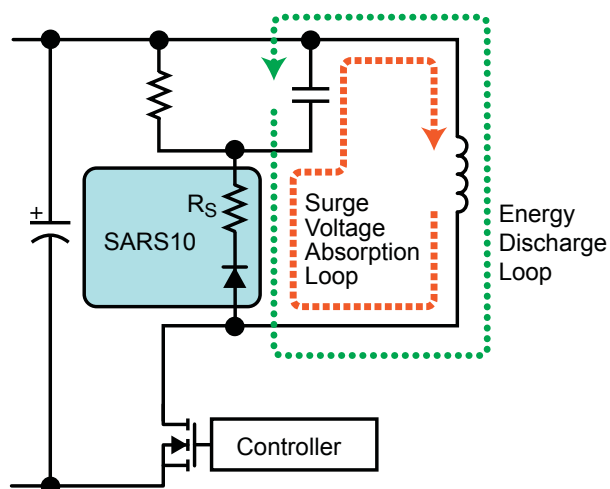
## Applications

- White goods appliances
- Audio-visual equipment
- Light fixtures
- Communication equipment
- Factory automation

## Product Structure



## Typical Application



**Selection Guide**

| Part Number | Packing                  |
|-------------|--------------------------|
| SARS10      | 500 pieces per box, bulk |

**Absolute Maximum Ratings**

| Characteristic             | Symbol      | Conditions                  | Rating     | Unit |
|----------------------------|-------------|-----------------------------|------------|------|
| Peak Reverse Surge Voltage | $V_{RSM}$   |                             | 800        | V    |
| Peak Reverse Voltage       | $V_{RM}$    |                             | 800        | V    |
| Average Forward Current    | $I_{F(AV)}$ | Refer to figure 1           | 0.3        | A    |
| Peak Forward Surge Current | $I_{FSM}$   | 1 ms, square wave, one shot | 1.5        | A    |
| Power Dissipation          | P           | Refer to figure 3           | 3.0        | W    |
| Junction Temperature       | $T_J$       |                             | -20 to 125 | °C   |
| Storage Temperature        | $T_{stg}$   |                             | -20 to 125 | °C   |

Electrical Characteristics valid at T<sub>A</sub> = 25°C, unless otherwise specified

| Characteristic                       | Symbol            | Test Conditions                                                                                         | Value        | Unit |
|--------------------------------------|-------------------|---------------------------------------------------------------------------------------------------------|--------------|------|
| Forward Voltage                      | V <sub>F</sub>    | I <sub>F</sub> = 0.5 A                                                                                  | 13 (max)     | V    |
| Reverse Current                      | I <sub>R</sub>    | V <sub>R</sub> = V <sub>RM</sub>                                                                        | 10 (max)     | μA   |
| Reverse Current (High Temperature)   | I <sub>R(H)</sub> | V <sub>R</sub> = V <sub>RM</sub> , T <sub>A</sub> = 125°C                                               | 100 (max)    | μA   |
| Reverse Recovery Time                | t <sub>rr</sub>   | I <sub>F</sub> = I <sub>RP</sub> = 100 mA, 90% recovery point, T <sub>J</sub> = 25°C, refer to figure 2 | 1 to 9 (max) | μs   |
| Thermal Resistance, Junction to Case | R <sub>θJC</sub>  | Between junction and body                                                                               | 15 (max)     | °C/W |

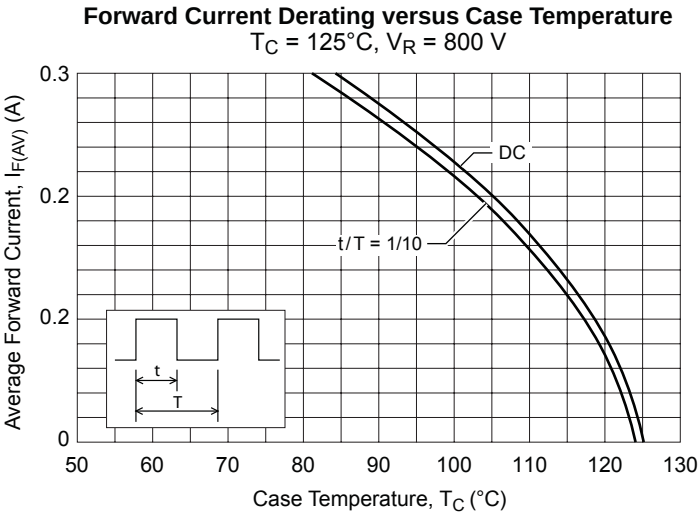


Figure 1. Derating Characteristics and Mounting Conditions

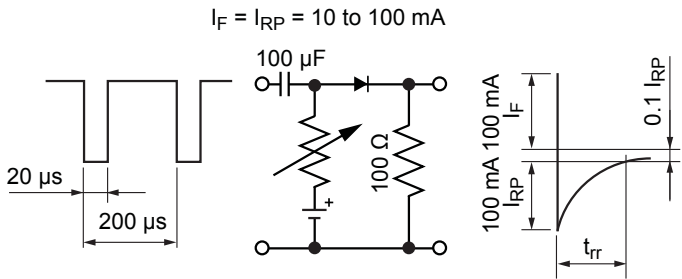


Figure 2. Definition of Peak Reverse Current, I<sub>RP</sub>

Characteristic Performance

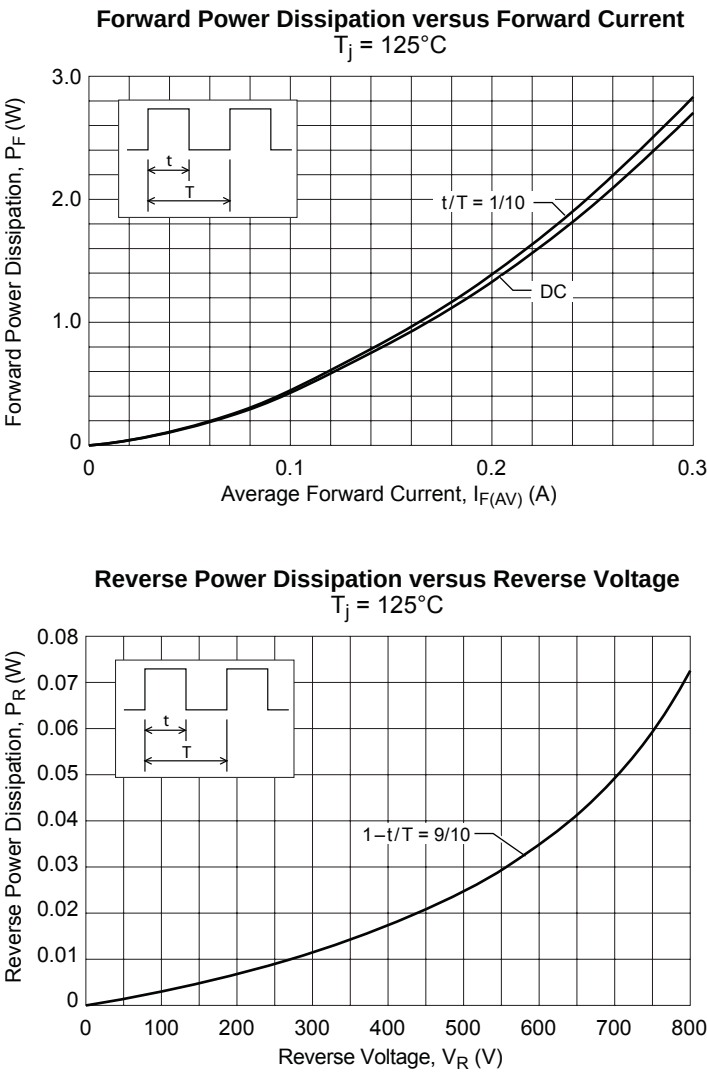
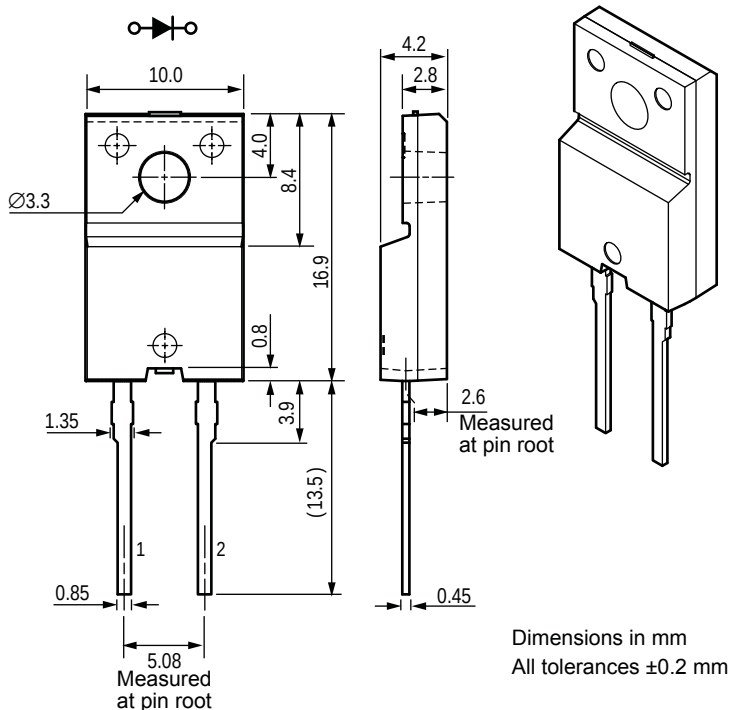
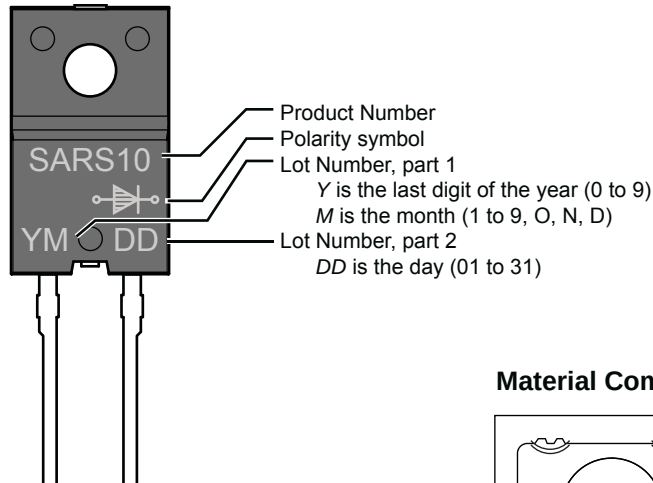


Figure 3. Power Dissipation Characteristics

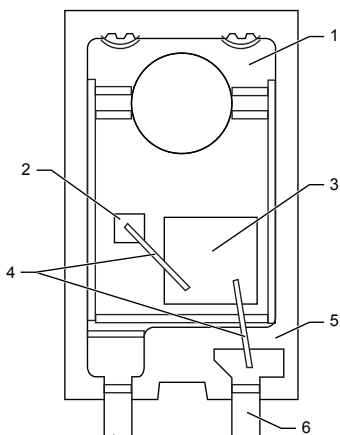
## Package Outline



## Package Marking



## Material Composition and Internal Structure



1. Leadframe: Cu with solder plating
2. Chip: Si
3. On-board Resistor: Ceramic
4. Interior Wire Bonds: Al
5. Body: Plastic epoxy resin
6. Leadframe: Cu, Ni plated and dipped in solder

Weight: Approximately 2.1 g



Pin treatment Pb-free. Device composition compliant with the RoHS directive.

Because reliability can be affected adversely by improper storage environments and handling methods, please observe the following cautions.

**Cautions for Storage**

- Ensure that storage conditions comply with the standard temperature (5°C to 35°C) and the standard relative humidity (around 40% to 75%); avoid storage locations that experience extreme changes in temperature or humidity.
- Avoid locations where dust or harmful gases are present and avoid direct sunlight.
- Reinspect for rust on leads and solderability of the products that have been stored for a long time.

**Cautions for Testing and Handling**

When tests are carried out during inspection testing and other standard test periods, protect the products from power surges from the testing device, shorts between the product pins, and wrong connections. Ensure all test parameters are within the ratings specified by Sanken for the products.

**Remarks About Using Silicone Grease with a Heatsink**

- When silicone grease is used in mounting the products on a heatsink, it shall be applied evenly and thinly. If more silicone grease than required is applied, it may produce excess stress.
- Volatile-type silicone greases may crack after long periods of time, resulting in reduced heat radiation effect. Silicone greases with low consistency (hard grease) may cause cracks in the mold resin when screwing the products to a heatsink.

Our recommended silicone greases for heat radiation purposes, which will not cause any adverse effect on the product life, are indicated below:

| Type   | Suppliers                            |
|--------|--------------------------------------|
| G746   | Shin-Etsu Chemical Co., Ltd.         |
| YG6260 | Momentive Performance Materials Inc. |
| SC102  | Dow Corning Toray Co., Ltd.          |

**Cautions for Mounting to a Heatsink**

- When the flatness around the screw hole is insufficient, such as when mounting the products to a heatsink that has an extruded (burred) screw hole, the products can be damaged, even with a lower than recommended screw torque. For mounting the products, the mounting surface flatness should be 0.05 mm or less.

- Please select suitable screws for the product shape. Do not use a flat-head machine screw because of the stress to the products. Self-tapping screws are not recommended. When using self-tapping screws, the screw may enter the hole diagonally, not vertically, depending on the conditions of hole before threading or the work situation. That may stress the products and may cause failures.
  - Recommended screw torque: 0.490 to 0.686 N•m (5 to 7 kgf•cm).
  - For tightening screws, if a tightening tool (such as a driver) hits the products, the package may crack, and internal stress fractures may occur, which shorten the lifetime of the electrical elements and can cause catastrophic failure. Tightening with an air driver makes a substantial impact. In addition, a screw torque higher than the set torque can be applied and the package may be damaged. Therefore, an electric driver is recommended.
- When the package is tightened at two or more places, first pre-tighten with a lower torque at all places, then tighten with the specified torque. When using a power driver, torque control is mandatory.

**Soldering**

- When soldering the products, please be sure to minimize the working time, within the following limits:  
260±5°C 10±1 s (Flow, 2 times)  
380±10°C 3.5±0.5 s (Soldering iron, 1 time)
- Soldering should be at a distance of at least 2.0 mm from the body of the products.

**Electrostatic Discharge**

- When handling the products, the operator must be grounded. Grounded wrist straps worn should have at least 1 MΩ of resistance from the operator to ground to prevent shock hazard, and it should be placed near the operator.
- Workbenches where the products are handled should be grounded and be provided with conductive table and floor mats.
- When using measuring equipment such as a curve tracer, the equipment should be grounded.
- When soldering the products, the head of soldering irons or the solder bath must be grounded in order to prevent leak voltages generated by them from being applied to the products.
- The products should always be stored and transported in Sanken shipping containers or conductive containers, or be wrapped in aluminum foil.

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In addition, it should be noted that since power devices or IC's including power devices have large self-heating value, the degree of derating of junction temperature affects the reliability significantly.

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