

High Efficiency Snubber Diode

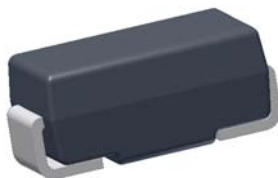
Features and Benefits

- 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

Description

The SARS05 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.

Package: Surface Mount

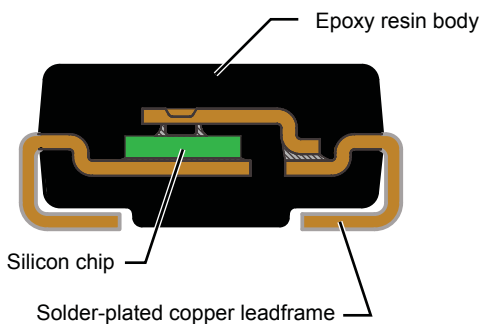


Not to scale

Applications

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

Product Structure



Selection Guide

Part Number	Packing*
SARS05VL	1800 pieces per reel, embossed taping; cathode left
SARS05VR	1800 pieces per reel, embossed taping; cathode right

*See the Packing Options page for details on the packing orientation.

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	1.0	A
Peak Forward Surge Current	I_{FSM}	10 ms, half sine wave, one shot	30	A
I^2t Limiting Value	I^2t	1 ms < t < 10 ms	4.5	A ² ·s
Junction Temperature	T_j		−40 to 150	°C
Storage Temperature	T_{stg}		−40 to 150	°C

Electrical Characteristics valid at $T_A = 25^{\circ}\text{C}$, unless otherwise specified

Characteristic	Symbol	Test Conditions	Value	Unit
Forward Voltage	V_F	$I_F = 1.0\text{ A}$	1.05 (max)	V
Reverse Current	I_R	$V_R = V_{RM}$	5 (max)	μA
Reverse Current (High Temperature)	$I_{R(H)}$	$V_R = V_{RM}, T_j = 100^{\circ}\text{C}$	50 (max)	μA
Reverse Recovery Time	t_{rr}	$I_F = I_{RP} = 100\text{ mA}$, 95% recovery point, $T_j = 25^{\circ}\text{C}$, see figure 2	2 to 19 (max)	μs
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	Between junction and pin	20 (max)	$^{\circ}\text{C/W}$

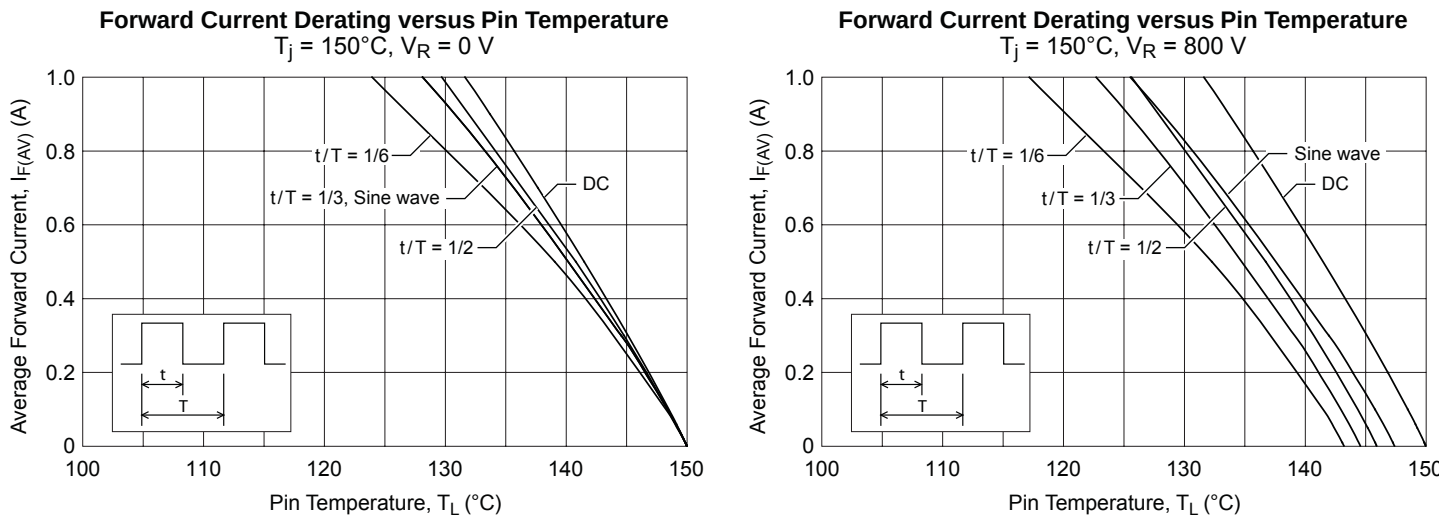


Figure 1. Derating Characteristics and Mounting Conditions

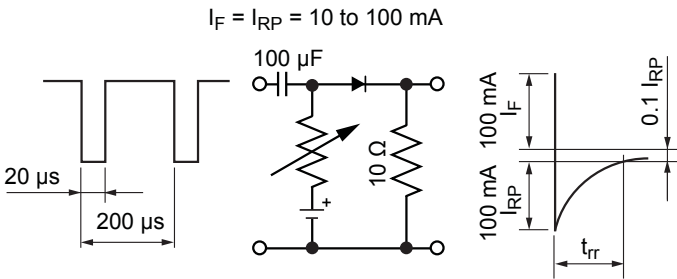
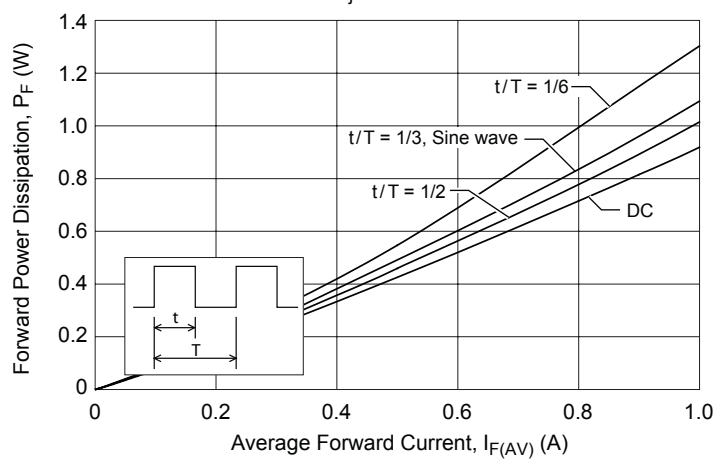


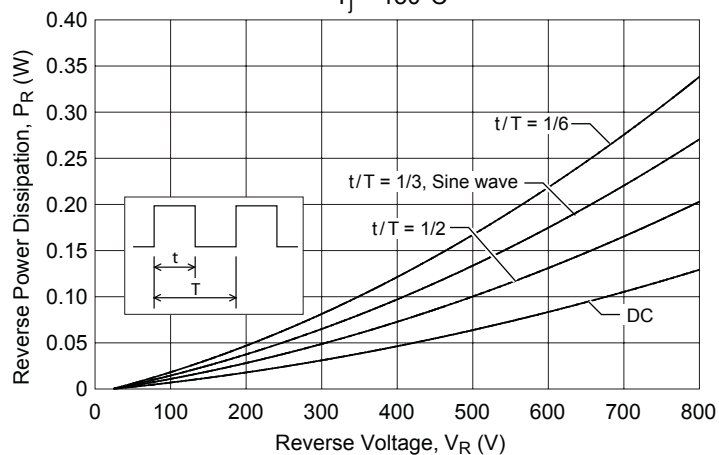
Figure 2. Definition of Peak Reverse Current, I_{RP}

Characteristic Performance

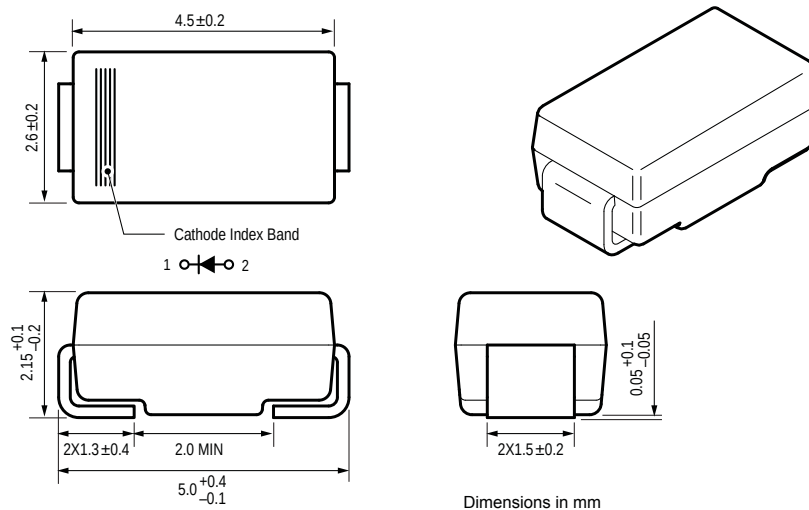
Forward Power Dissipation versus Average Forward Current
 $T_j = 150^\circ\text{C}$



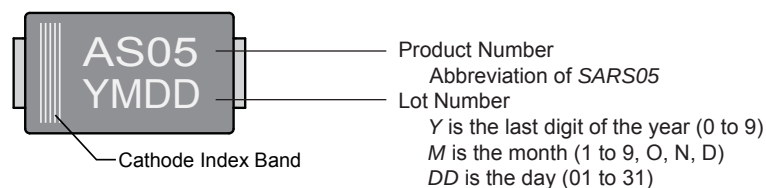
Reverse Power Dissipation versus Reverse Voltage
 $T_j = 150^\circ\text{C}$



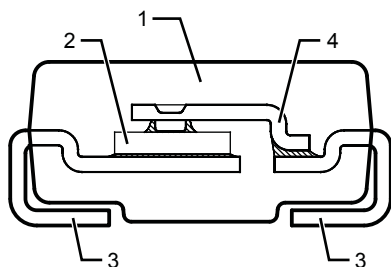
Package Outline



Package Marking



Material Composition and Internal Structure



1. Body: Plastic, epoxy resin
2. Chip: Si
3. Leadframe: Cu with solder plating
4. Interior Leadframe: Cu

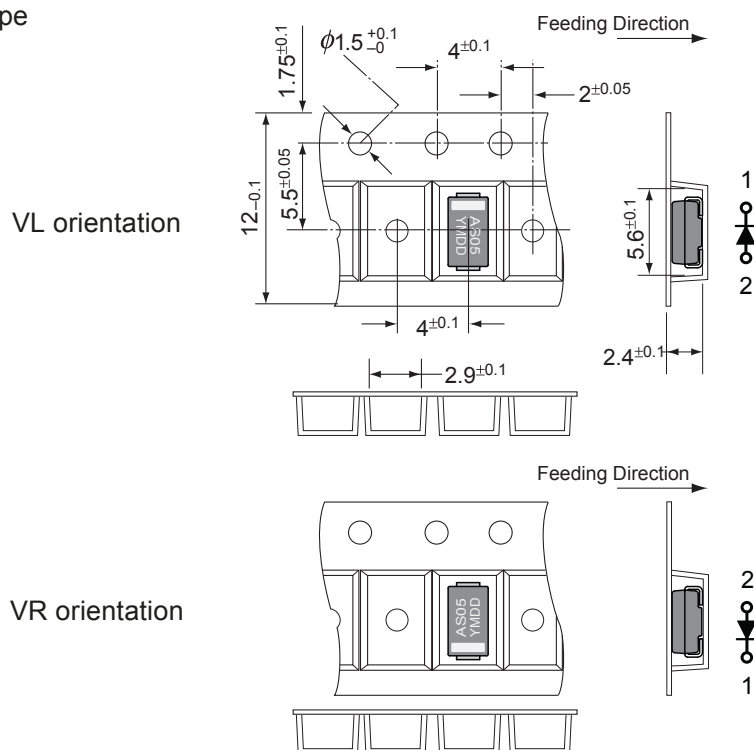
Weight: Approximately 0.072 g



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

Packing Options

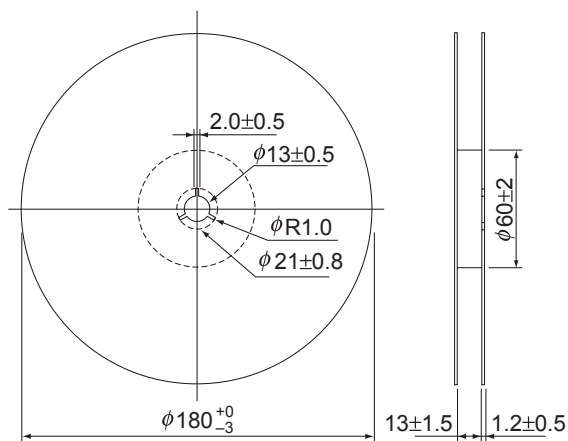
Embossed Tape



Dimensions in mm

Tape and reel dimensions the same for both orientations

Reel



1800 pieces per reel

- (1) Device is placed in the embossed pocket with the mounting electrode down.
- (2) 150 to 200 mm leader tape is attached to the tip of the tape.
- (3) 10 or more blank pockets are provided at both the beginning and the end of the tape.

Reliability Tests

Test Name	Test Conditions	Acceptance Criterion	Rating	Unit
Thermal Fatigue Test	$\Delta T_j = 100^\circ\text{C}$	1	5000	cycle
High Temperature Reverse Bias Test	$T_A = 150^\circ\text{C}$, $V_R = V_{RM}$ (AC, half-sine wave), with external heatsink	1	1000	hour
Humidity Reverse Bias Test	$T_A = 85^\circ\text{C}$, RH = 85%, $V_R = V_{RM} \times 0.8$ (DC)	1	500	hour
High Temperature Storage Test	$T_A = 150^\circ\text{C}$	1	1000	hour
Moisture Resistance Test	$T_A = 85^\circ\text{C}$, RH = 85%	1	1000	hour
Thermal Shock Test	Ice water (5 minutes), then room temperature water (20 seconds), then boiling water (5 minutes)	1	100	cycle
Temperature Cycle Test	-40°C (30 minutes), then 150°C (30 minutes)	1	100	cycle
Pressure Cooker Test	2.03×10^5 Pa, 100% RH, unsaturated equipment	1	96	hour
Resistance to Soldering Heat Test	$260 \pm 5^\circ\text{C}$, full solder dip	1	10	second
	$380 \pm 5^\circ\text{C}$, using soldering iron	1	3.5	second
Solderability Test	$245 \pm 5^\circ\text{C}$, 5 ± 0.5 seconds, using rosin flux	2	95	%
Drop Test	Free-fall drop from 1 m height onto maple plate	3	10	cycle

NOTE: Acceptance criteria as follows:

1 – Product meets all the values specified in the Electrical Characteristics table, after being exposed to normal temperature more than 2 hours and less than 24 hours.

2 – Product meets rating of the reliability test.

3 – No structural failures during reliability test, and product meets V_F and I_R specifications in the Electrical Characteristics table after completion of the reliability test.

Design Notes

Use resistors in series, and adjust so the diode saturates at junction temperature, $T_j \leq 150^\circ\text{C}$.

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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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