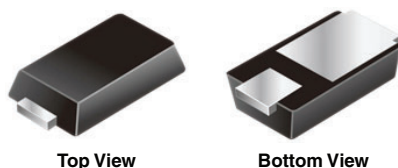


# Ultrafast Rectifier, 1 A FRED Pt®

## eSMP® Series



Top View

Bottom View

## MicroSMP (DO-219AD)

Anode  Cathode

## FEATURES

- Very low profile - typical height of 0.65 mm
- Ideal for automated placement
- Low forward voltage drop, low power losses
- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- For PFC, CRM snubber operation
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## LINKS TO ADDITIONAL RESOURCES



3D Models

| PRIMARY CHARACTERISTICS |                     |
|-------------------------|---------------------|
| $I_{F(AV)}$             | 1 A                 |
| $V_R$                   | 100 V, 200 V        |
| $V_F$ at $I_F$          | 0.72 V              |
| $t_{rr}$ (typ.)         | 33 ns               |
| $I_{FSM}$               | 30 A                |
| $T_J$ max.              | 175 °C              |
| Package                 | MicroSMP (DO-219AD) |
| Circuit configuration   | Single              |

## TYPICAL APPLICATIONS

For use in high frequency, freewheeling, DC/DC converters, PFC, and in snubber industrial and automotive applications.

## MECHANICAL DATA

**Case:** MicroSMP (DO-219AD)

Molding compound meets UL 94 V-0 flammability rating

**Terminals:** matte tin plated leads, solderable per J-STD-002, meets JESD 201 class 2 whisker test

**Polarity:** color band denotes cathode end

| ABSOLUTE MAXIMUM RATINGS                    |                |                                         |             |       |    |
|---------------------------------------------|----------------|-----------------------------------------|-------------|-------|----|
| PARAMETER                                   | SYMBOL         | TEST CONDITIONS                         | VALUES      | UNITS |    |
| Peak repetitive reverse voltage             | $V_{RRM}$      | VS-1EQH01-M3                            | 100         |       | V  |
|                                             |                | VS-1EQH02-M3                            | 200         |       |    |
| Average rectified forward current           | $I_{F(AV)}$    | $T_M = 159\text{ °C}$                   | 1           |       | A  |
| Non-repetitive peak surge current           | $I_{FSM}$      | $T_J = 25\text{ °C}$ , 10 ms sine pulse | 30          |       |    |
| Operating junction and storage temperatures | $T_J, T_{Stg}$ |                                         | -55 to +175 |       | °C |

| ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ °C}$ unless otherwise specified) |               |                                         |      |      |      |       |               |
|------------------------------------------------------------------------------|---------------|-----------------------------------------|------|------|------|-------|---------------|
| PARAMETER                                                                    | SYMBOL        | TEST CONDITIONS                         | MIN. | TYP. | MAX. | UNITS |               |
| Breakdown voltage, blocking voltage                                          | $V_{BR}, V_R$ | $I_R = 100\text{ }\mu\text{A}$          | 100  | -    | -    |       | V             |
|                                                                              |               |                                         | 200  |      |      |       |               |
| Forward voltage                                                              | $V_F$         | $I_F = 1\text{ A}$                      | -    | 0.88 | 0.97 |       |               |
|                                                                              |               | $I_F = 1\text{ A}, T_J = 150\text{ °C}$ | -    | 0.72 | 0.75 |       |               |
| Reverse leakage current                                                      | $I_R$         | $V_R = V_R$ rated                       | -    | -    | 1    |       | $\mu\text{A}$ |
|                                                                              |               | $T_J = 150\text{ °C}, V_R = V_R$ rated  | -    | -    | 25   |       |               |
| Junction capacitance                                                         | $C_T$         | $V_R = 200\text{ V}$                    | -    | 6    | -    |       | pF            |



| DYNAMIC RECOVERY CHARACTERISTICS ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified) |           |                                                                                  |      |      |      |       |
|---------------------------------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------|------|------|------|-------|
| PARAMETER                                                                                         | SYMBOL    | TEST CONDITIONS                                                                  | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time                                                                             | $t_{rr}$  | $I_F = 1.0\text{ A}$ , $dI_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ | -    | 33   | -    | ns    |
|                                                                                                   |           | $I_F = 0.5\text{ A}$ , $I_R = 1\text{ A}$ , $I_{rr} = 0.25\text{ A}$             | -    | -    | 23   |       |
|                                                                                                   |           | $T_J = 25\text{ }^{\circ}\text{C}$                                               | -    | 13   | -    |       |
|                                                                                                   |           | $T_J = 125\text{ }^{\circ}\text{C}$                                              | -    | 18   | -    |       |
| Peak recovery current                                                                             | $I_{RRM}$ | $T_J = 25\text{ }^{\circ}\text{C}$                                               | -    | 1.8  | -    | A     |
|                                                                                                   |           | $T_J = 125\text{ }^{\circ}\text{C}$                                              | -    | 2.7  | -    |       |
| Reverse recovery charge                                                                           | $Q_{rr}$  | $T_J = 25\text{ }^{\circ}\text{C}$                                               | -    | 11   | -    | nC    |
|                                                                                                   |           | $T_J = 125\text{ }^{\circ}\text{C}$                                              | -    | 23   | -    |       |

| THERMAL - MECHANICAL SPECIFICATIONS            |                                   |                                                     |       |      |      |       |
|------------------------------------------------|-----------------------------------|-----------------------------------------------------|-------|------|------|-------|
| PARAMETER                                      | SYMBOL                            | TEST CONDITIONS                                     | MIN.  | TYP. | MAX. | UNITS |
| Maximum junction and storage temperature range | T <sub>J</sub> , T <sub>Stg</sub> |                                                     | -55   | -    | 175  | °C    |
| Thermal resistance, junction to mount          | R <sub>thJM</sub> <sup>(1)</sup>  |                                                     | -     | 16   | 20   | °C/W  |
| Thermal resistance, junction to ambient        | R <sub>thJA</sub>                 | Device mounted on FR4 PCB, 2 oz. standard footprint | -     | 160  | -    |       |
| Approximate weight                             |                                   |                                                     | 0.006 |      |      | g     |
| Marking device                                 | VS-1EQH01-M3                      | Case style MicroSMP (DO-219AD)                      | 1H1   |      |      |       |
|                                                | VS-1EQH02-M3                      |                                                     | 1H2   |      |      |       |

**Note**

(1) Thermal resistance junction to mount follows JEDEC® 51-14 transient dual interface test method (TDIM)

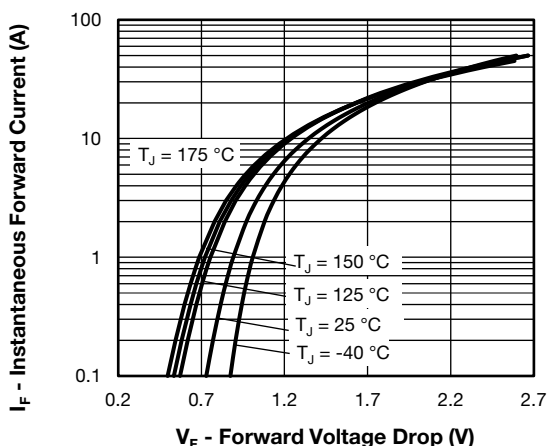


Fig. 1 - Typical Forward Voltage Drop Characteristics

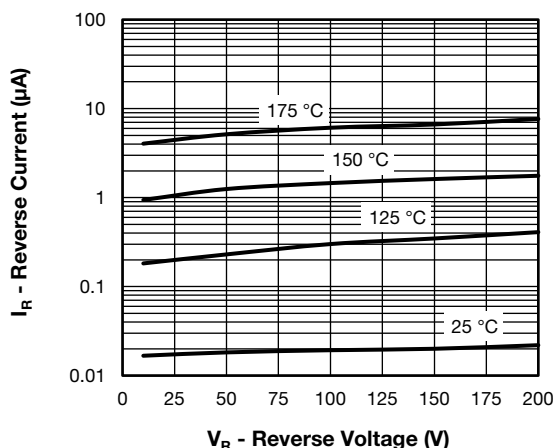


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

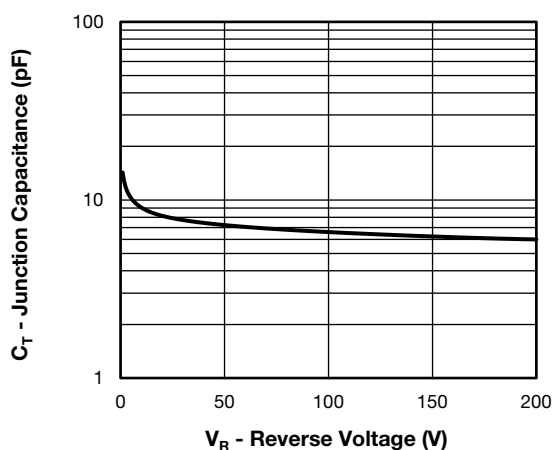


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

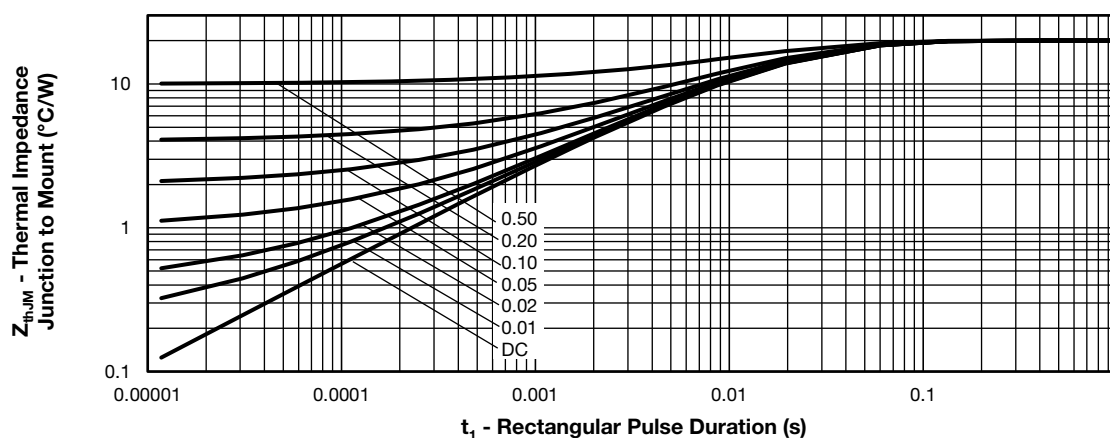


Fig. 4 - Maximum Transient Thermal Impedance, Junction to Mount

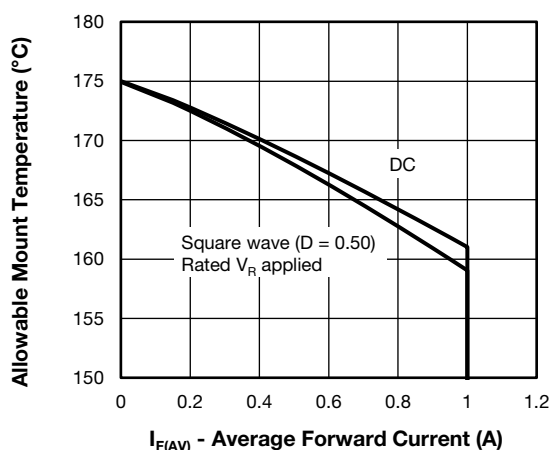


Fig. 5 - Maximum Allowable Mount Temperature vs. Average Forward Current

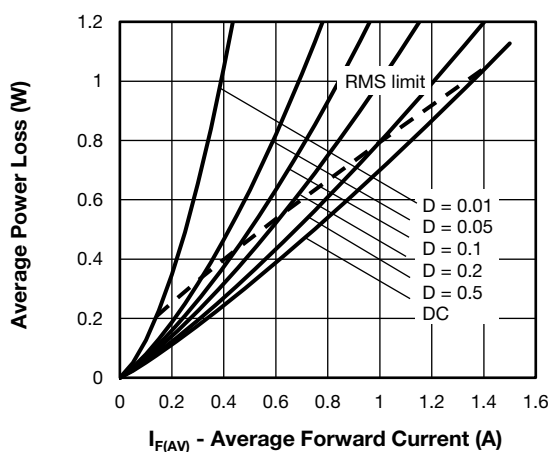


Fig. 6 - Forward Power Loss Characteristics

#### Note

Formula used:  $T_M = T_J - (P_d + P_{dREV}) \times R_{thJM}$ ;

$P_d$  = forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 5);

$P_{dREV}$  = inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1}$  = rated  $V_R$

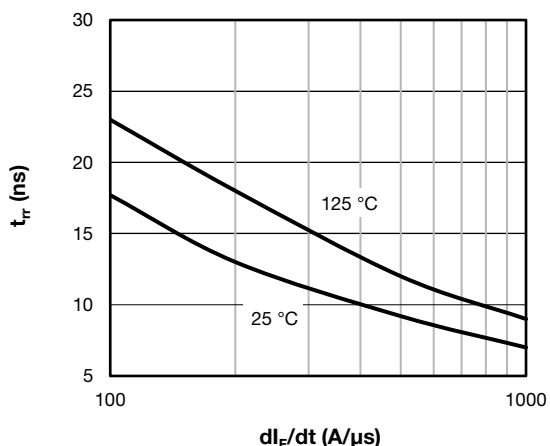
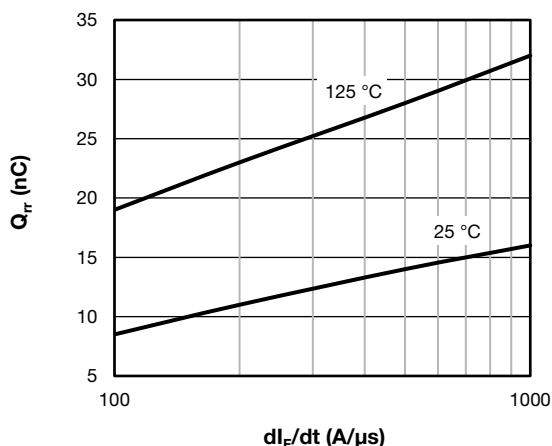
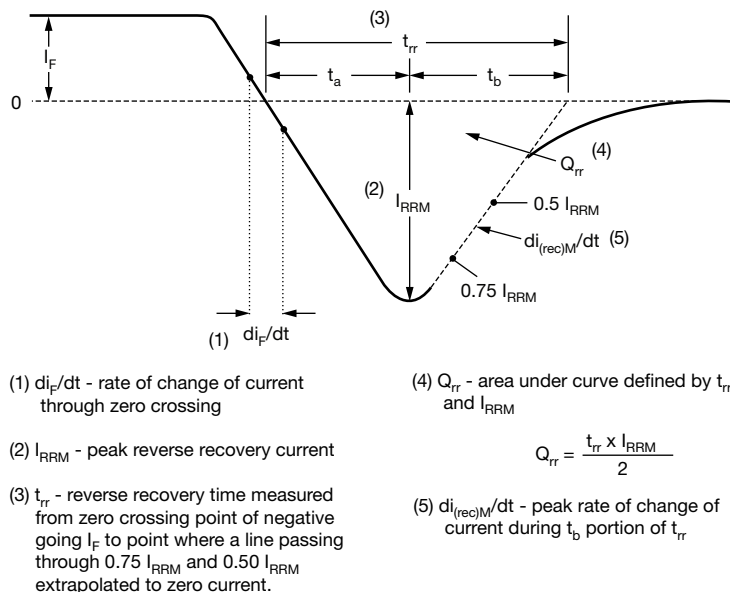

Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$ 

Fig. 8 - Typical Stored Charge vs.  $di_F/dt$ 


Fig. 9 - Reverse Recovery Waveform and Definitions

**ORDERING INFORMATION TABLE**

|             |            |          |                                                                    |          |          |           |          |           |
|-------------|------------|----------|--------------------------------------------------------------------|----------|----------|-----------|----------|-----------|
| Device code | <b>VS-</b> | <b>1</b> | <b>E</b>                                                           | <b>Q</b> | <b>H</b> | <b>02</b> | <b>H</b> | <b>M3</b> |
|             | 1          | 2        | 3                                                                  | 4        | 5        | 6         | 7        | 8         |
|             | <b>1</b>   | -        | Vishay Semiconductors product                                      |          |          |           |          |           |
|             | <b>2</b>   | -        | Current rating (1 = 1 A)                                           |          |          |           |          |           |
|             | <b>3</b>   | -        | Circuit configuration:<br>E = single diode                         |          |          |           |          |           |
|             | <b>4</b>   | -        | Q = MicroSMP package                                               |          |          |           |          |           |
|             | <b>5</b>   | -        | Process type,<br>H = ultrafast recovery                            |          |          |           |          |           |
|             | <b>6</b>   | -        | Voltage code (02 = 200 V)                                          |          |          |           |          |           |
|             | <b>7</b>   | -        | H = AEC-Q101 qualified                                             |          |          |           |          |           |
|             | <b>8</b>   | -        | M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free |          |          |           |          |           |

**ORDERING INFORMATION** (Example)

| PREFERRED P/N  | PREFERRED PACKAGE CODE | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION             |
|----------------|------------------------|------------------------|-----------------------------------|
| VS-1EQH01-M3/H | H                      | 4500                   | 7" diameter plastic tape and reel |
| VS-1EQH02-M3/H | H                      | 4500                   | 7" diameter plastic tape and reel |

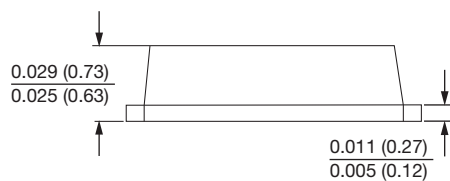
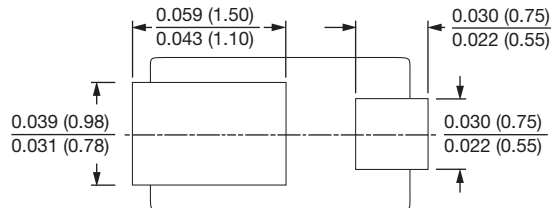
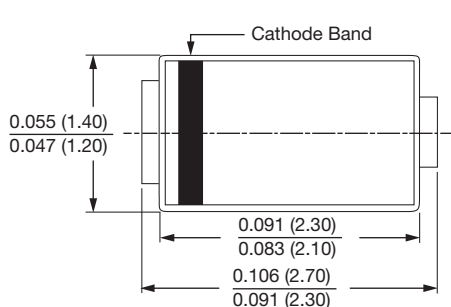
**LINKS TO RELATED DOCUMENTS**

|                          |                                                                        |
|--------------------------|------------------------------------------------------------------------|
| Dimensions               | <a href="http://www.vishay.com/doc?96591">www.vishay.com/doc?96591</a> |
| Part marking information | <a href="http://www.vishay.com/doc?96590">www.vishay.com/doc?96590</a> |
| Packaging information    | <a href="http://www.vishay.com/doc?88869">www.vishay.com/doc?88869</a> |
| SPIICE model             | <a href="http://www.vishay.com/doc?96594">www.vishay.com/doc?96594</a> |

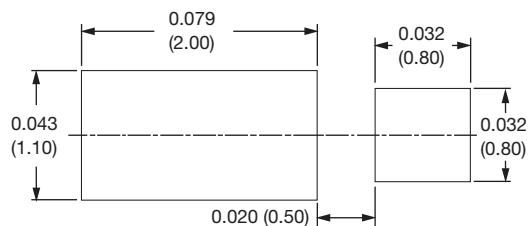


## MicroSMP (DO-219AD), FRED Pt®

**DIMENSIONS** in inches (millimeters)



Mounting Pad Layout





## Disclaimer

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