

## Fast Switching Avalanche Surface Mount Rectifiers

### eSMP® Series



TO-277A (SMPC)



### PRIMARY CHARACTERISTICS

|                        |                     |
|------------------------|---------------------|
| $I_{F(AV)}$            | 3.0 A               |
| $V_{RRM}$              | 200 V, 400 V, 600 V |
| $I_{FSM}$              | 50 A                |
| $t_{rr}$               | 140 ns              |
| $E_{AS}$               | 20 mJ               |
| $V_F$ at $I_F = 3.0$ A | 1.04 V              |
| $T_J$ max.             | 175 °C              |

### TYPICAL APPLICATIONS

For use in lighting, fast switching rectification of power supplies, inverters, converters, and freewheeling diodes for consumer, automotive, and telecommunication.

### FEATURES

- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Glass passivated chip junction
- Fast reverse recovery time
- Controlled avalanche characteristics
- Low leakage current
- High forward surge capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21 definition



**RoHS**  
COMPLIANT  
HALOGEN  
FREE

### MECHANICAL DATA

**Case:** TO-277A (SMPC)

Molding compound meets UL 94 V-0 flammability rating  
Base P/N-M3 - halogen-free, RoHS compliant, and commercial grade

Base P/NHM3 - halogen-free, RoHS compliant, and automotive grade

**Terminals:** Matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

M3 suffix meets JESD 201 class 1A whisker test, HM3 suffix meets JESD 201 class 2 whisker test

### MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)

| PARAMETER                                                                                                                 | SYMBOL                            | AR3PD         | AR3PG | AR3PJ | UNIT |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------|---------------|-------|-------|------|
| Device marking code                                                                                                       |                                   | AR3D          | AR3G  | AR3J  |      |
| Maximum repetitive peak reverse voltage                                                                                   | V <sub>RRM</sub>                  | 200           | 400   | 600   | V    |
| Maximum DC forward current (fig. 1)                                                                                       | I <sub>F</sub> <sup>(1)</sup>     | 3.0           |       |       | A    |
|                                                                                                                           | I <sub>F</sub> <sup>(2)</sup>     | 1.8           |       |       |      |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load                                         | I <sub>FSM</sub>                  | 50            |       |       | A    |
| Non-repetitive avalanche energy at T <sub>J</sub> = 25 °C<br>I <sub>AS</sub> = 2.5 A max.<br>I <sub>AS</sub> = 1.0 A typ. | E <sub>AS</sub>                   | 20            |       |       | mJ   |
|                                                                                                                           |                                   | 30            |       |       |      |
| Operating junction and storage temperature range                                                                          | T <sub>J</sub> , T <sub>STG</sub> | - 55 to + 175 |       |       | °C   |

### Notes

(1) Mounted on 14 mm x 14 mm pad areas, 1 oz. FR4 PCB

(2) Free air, mounted on recommended pad area

## AR3PD, AR3PG, AR3PJ

Vishay General Semiconductor



| ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                                                                          |                         |                               |      |      |      |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------|-------------------------------|------|------|------|
| PARAMETER                                                                  | TEST CONDITIONS                                                          |                         | SYMBOL                        | TYP. | MAX. | UNIT |
| Instantaneous forward voltage                                              | I <sub>F</sub> = 3.0 A                                                   | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 1.24 | 1.6  | V    |
|                                                                            |                                                                          | T <sub>A</sub> = 125 °C |                               | 1.04 | 1.20 |      |
| Reverse current                                                            | Rated V <sub>R</sub>                                                     | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 0.33 | 10   | μA   |
|                                                                            |                                                                          | T <sub>A</sub> = 125 °C |                               | 44   | 250  |      |
| Maximum reverse recovery time                                              | I <sub>F</sub> = 0.5 A, I <sub>R</sub> = 1.0 A, I <sub>rr</sub> = 0.25 A |                         | t <sub>rr</sub>               | 122  | 140  | ns   |
| Typical junction capacitance per diode                                     | Rated V <sub>R</sub> = 4.0 V, 1 MHz                                      |                         | C <sub>J</sub>                | 44   | -    | pF   |

## Notes

(1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle(2) Pulse test: Pulse width  $\leq 40\text{ ms}$ 

| THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                                 |       |       |       |      |
|-------------------------------------------------------------------------|---------------------------------|-------|-------|-------|------|
| PARAMETER                                                               | SYMBOL                          | AR3PD | AR3PG | AR3PJ | UNIT |
| Typical thermal resistance                                              | R <sub>θJA</sub> <sup>(1)</sup> | 85    |       |       | °C/W |
|                                                                         | R <sub>θJM</sub> <sup>(2)</sup> | 5     |       |       |      |

## Notes

(1) Free air, mounted on recommended PCB 1 oz. pad are; thermal resistance  $R_{\theta JA}$  - junction to ambient(2) Units mounted on PCB with 14 mm x 14 mm copper pad areas;  $R_{\theta JM}$  - junction to mount

| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| AR3PJ-M3/86A                   | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| AR3PJ-M3/87A                   | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |
| AR3PJHM3/86A <sup>(1)</sup>    | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| AR3PJHM3/86A <sup>(1)</sup>    | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |

## Note

(1) AEC-Q101 qualified



## RATINGS AND CHARACTERISTICS CURVES

( $T_A = 25^\circ\text{C}$  unless otherwise noted)

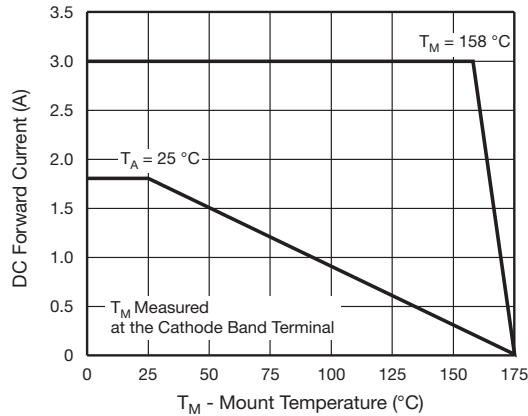


Fig. 1 - Maximum Forward Current Derating Curve

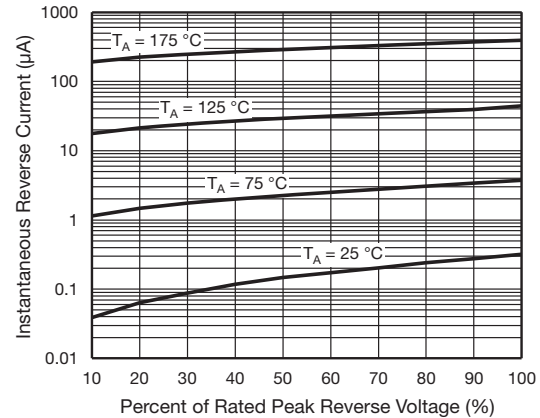


Fig. 4 - Typical Reverse Leakage Characteristics

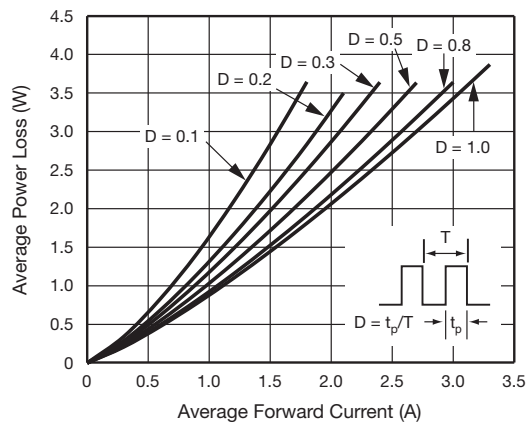


Fig. 2 - Average Power Loss Characteristics

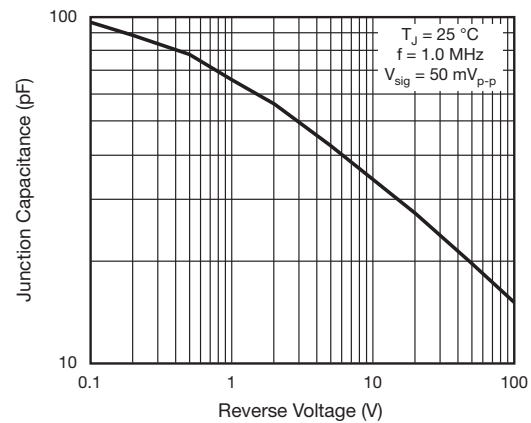


Fig. 5 - Typical Junction Capacitance

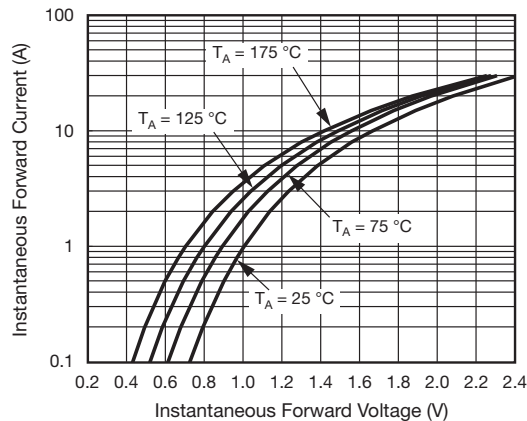


Fig. 3 - Typical Instantaneous Forward Characteristics

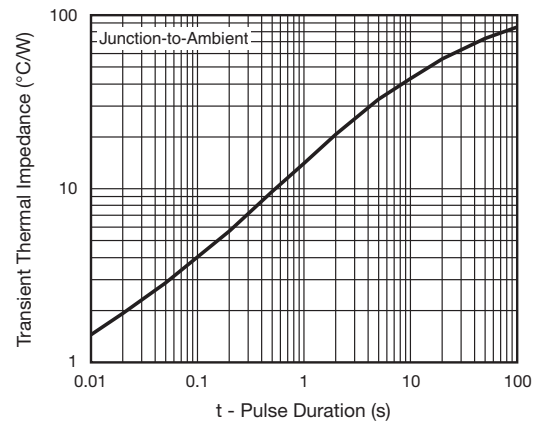
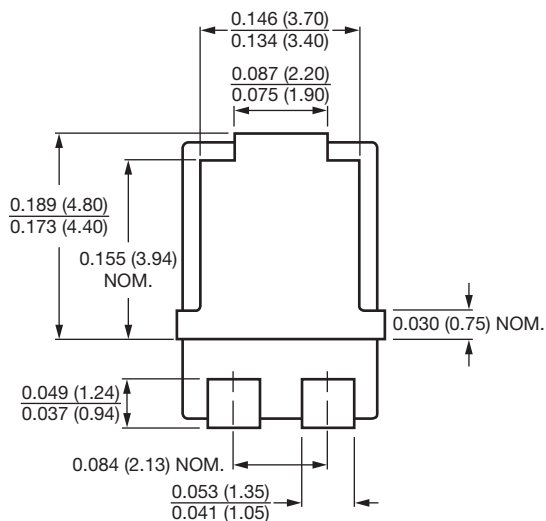
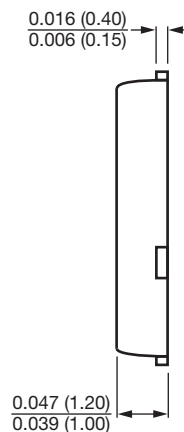
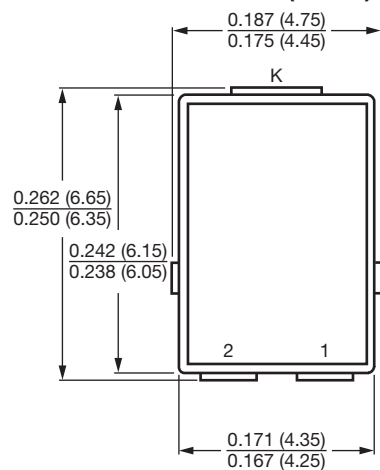


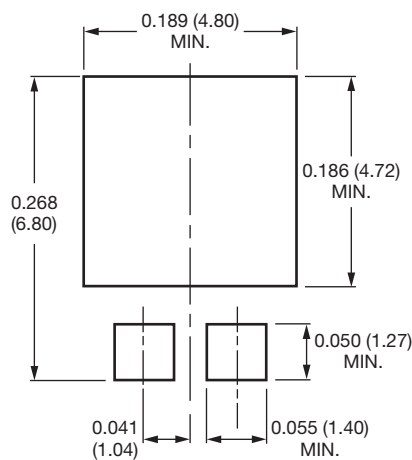
Fig. 6 - Typical Transient Thermal Impedance

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

## TO-277A (SMPC)



## Mounting Pad Layout



Conform to JEDEC TO-277A



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