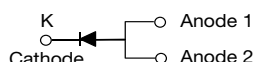


# Fast Switching Avalanche Surface-Mount Rectifiers

## eSMP® Series



## SMPC (TO-277A)



## ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS |                |
|-------------------------|----------------|
| $I_{F(AV)}$             | 4.0 A          |
| $V_{RRM}$               | 800 V, 1000 V  |
| $I_{FSM}$               | 65 A           |
| $t_{rr}$                | 120 ns         |
| $E_{AS}$                | 20 mJ          |
| $V_F$ at $I_F = 4.0$ A  | 1.27 V         |
| $T_J$ max.              | 175 °C         |
| Package                 | SMPC (TO-277A) |
| Circuit configuration   | Single         |

## FEATURES

- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Glass passivated pellet 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 available
  - Automotive ordering code: base P/NHM3
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

## TYPICAL APPLICATIONS

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

## MECHANICAL DATA

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

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

Base P/NHM3\_X - halogen-free, RoHS-compliant and AEC-Q101 qualified

("\_X" denotes revision code e.g. A, B,.....)

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

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

| MAXIMUM RATINGS (T <sub>A</sub> = 25 °C unless otherwise noted)                   |                              |                                   |             |       |      |
|-----------------------------------------------------------------------------------|------------------------------|-----------------------------------|-------------|-------|------|
| PARAMETER                                                                         |                              | SYMBOL                            | AR4PK       | AR4PM | UNIT |
| Device marking code                                                               |                              |                                   | AR4K        | AR4M  |      |
| Maximum repetitive peak reverse voltage                                           |                              | V <sub>RRM</sub>                  | 800         | 1000  | V    |
| Maximum DC forward current (fig. 1)                                               |                              | I <sub>F</sub> <sup>(1)</sup>     | 4.0         |       | 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>                  | 65          |       | A    |
| Non-repetitive avalanche energy at T <sub>J</sub> = 25 °C                         | I <sub>AS</sub> = 2.5 A max. | E <sub>AS</sub>                   | 20          |       | mJ   |
|                                                                                   | I <sub>AS</sub> = 1.0 A typ. |                                   | 30          |       |      |
| Operating junction and storage temperature range                                  |                              | T <sub>J</sub> , T <sub>STG</sub> | -55 to +175 |       | °C   |

## Notes

(1) Mounted on 30 mm x 30 mm pad areas, 1 oz. FR4 PCB

(2) Free air, mounted on recommended pad area

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

| PARAMETER                              | TEST CONDITIONS                                                           | SYMBOL      | TYP. | MAX. | UNIT          |
|----------------------------------------|---------------------------------------------------------------------------|-------------|------|------|---------------|
| Instantaneous forward voltage          | $I_F = 4.0\text{ A}$                                                      | $V_F^{(1)}$ | 1.66 | 1.9  | V             |
|                                        |                                                                           |             | 1.27 | 1.6  |               |
| Reverse current                        | Rated $V_R$                                                               | $I_R^{(2)}$ | 0.42 | 10   | $\mu\text{A}$ |
|                                        |                                                                           |             | 96.3 | 500  |               |
| Maximum reverse recovery time          | $I_F = 0.5\text{ A}$ , $I_R = 1.0\text{ A}$ ,<br>$I_{rr} = 0.25\text{ A}$ | $t_{rr}$    | 79   | 120  | ns            |
| Typical junction capacitance per diode | Rated $V_R = 4.0\text{ V}$ , 1 MHz                                        | $C_J$       | 55   | -    | 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** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

| PARAMETER                  | SYMBOL                          | AR4PK | AR4PM | 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 30 mm x 30 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                      |
|-----------------------------|-----------------|------------------------|---------------|------------------------------------|
| AR4PM-M3/86A                | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| AR4PM-M3/87A                | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |
| AR4PMHM3_A/H <sup>(1)</sup> | 0.10            | H                      | 1500          | 7" diameter plastic tape and reel  |
| AR4PMHM3_A/I <sup>(1)</sup> | 0.10            | I                      | 6500          | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

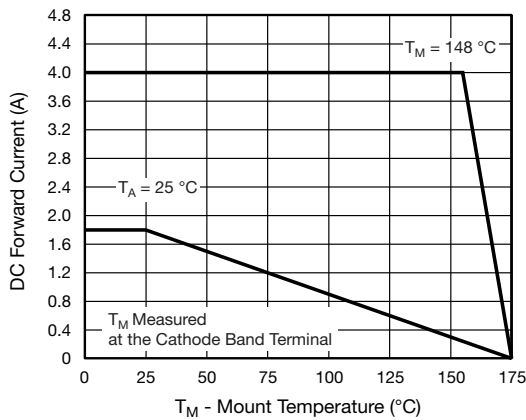
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum DC Forward Current Derating Curve

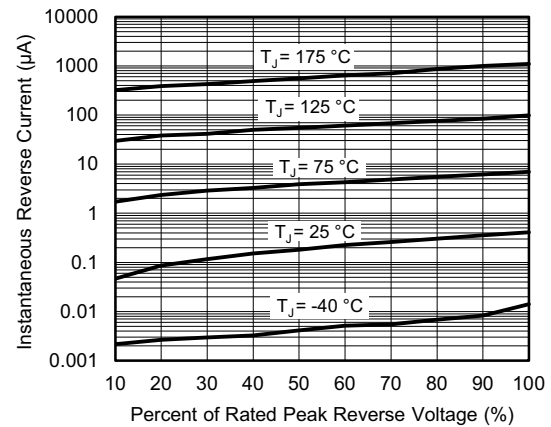


Fig. 4 - Typical Reverse Leakage Characteristics

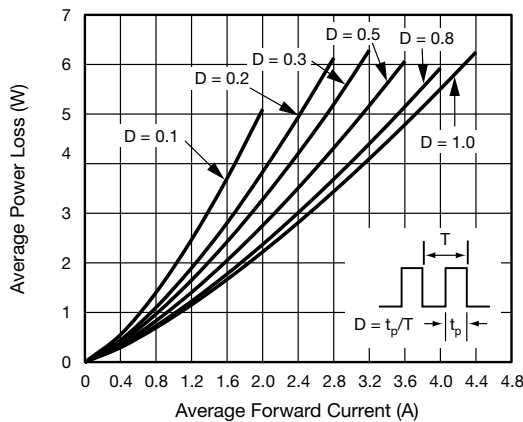


Fig. 2 - Average Power Loss Characteristics

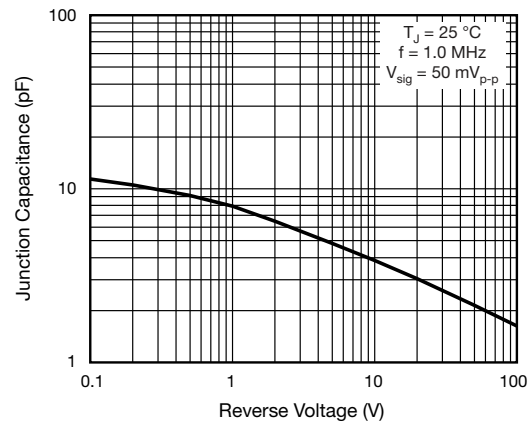


Fig. 5 - Typical Junction Capacitance

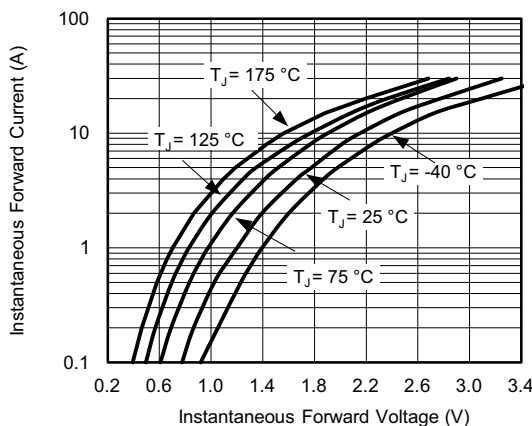


Fig. 3 - Typical Instantaneous Forward Characteristics

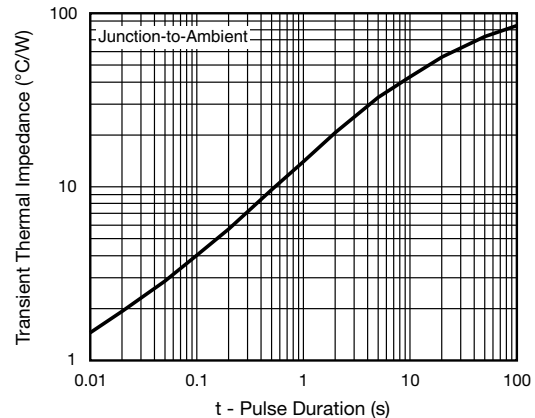
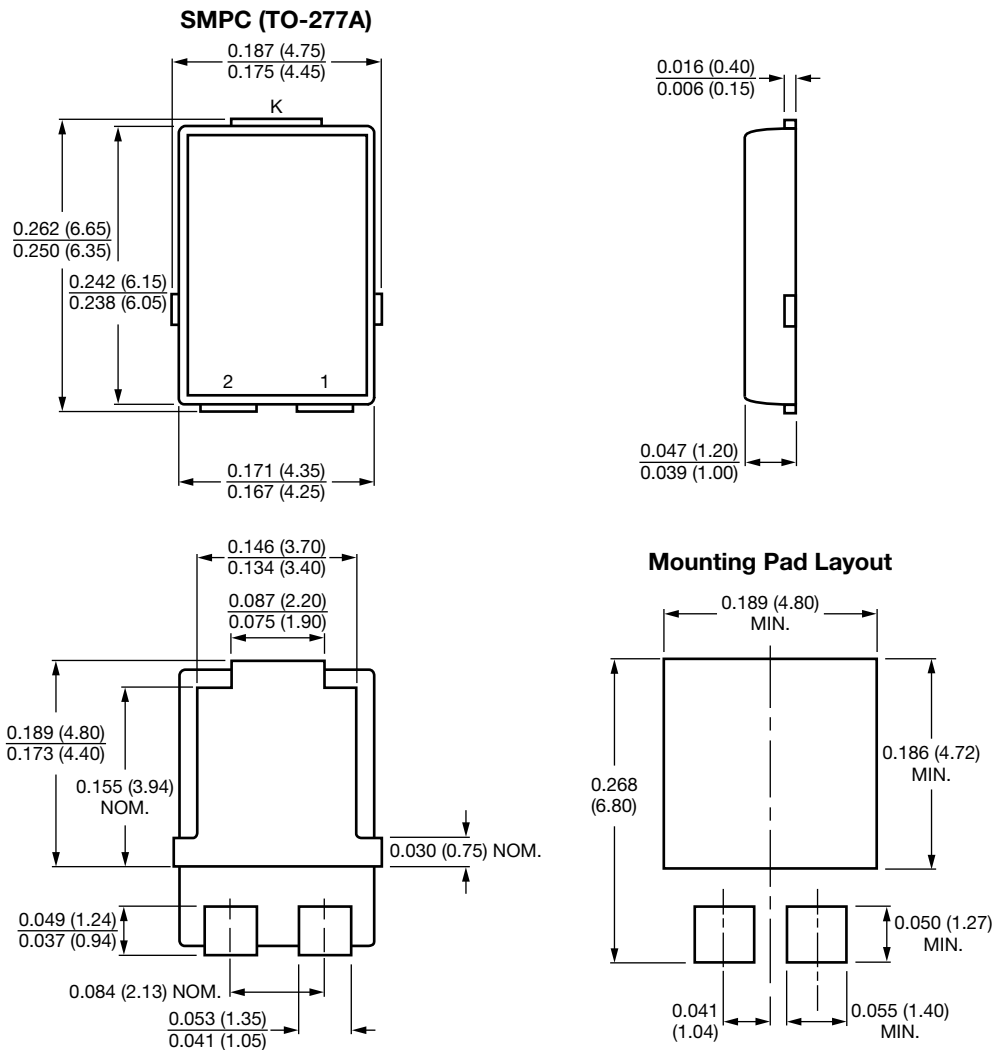


Fig. 6 - Typical Transient Thermal Impedance



**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)



Conform to JEDEC® TO-277A



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