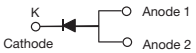
# AR3PD, AR3PG, AR3PJ

Vishay General Semiconductor

## 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

AUTOMOTIVE GRADE Available

RoHS COMPLIANT

HALOGEN FREE

- 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**

### 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 | $V_{RRM}$ | 200 | 400 | 600 | V |
| Maximum DC forward current (fig. 1) | $I_F$ (1) | 3.0 | | | A |
| | $I_F$ (2) | 1.8 | | | |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | $I_{FSM}$ | 50 | | | A |
| Non-repetitive avalanche energy at $T_J$ = 25 °C, $I_{AS}$ = 2.5 A max. | $E_{AS}$ | 20 | | | mJ |
| Non-repetitive avalanche energy at $T_J$ = 25 °C, $I_{AS}$ = 1.0 A typ. | | 30 | | | |
| Operating junction and storage temperature range | $T_J$, $T_{STG}$ | - 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


For technical questions within your region, please contact one of the following:
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| ELECTRICAL CHARACTERISTICS ($T_A$ = 25 °C unless otherwise noted) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITIONS** | | **SYMBOL** | **TYP.** | **MAX.** | **UNIT** |
| Instantaneous forward voltage | $I_F$ = 3.0 A | $T_A$ = 25 °C | $V_F$ (1) | 1.24 | 1.6 | V |
| | | $T_A$ = 125 °C | | 1.04 | 1.20 | |
| Reverse current | Rated $V_R$ | $T_A$ = 25 °C | $I_R$ (2) | 0.33 | 10 | µA |
| | | $T_A$ = 125 °C | | 44 | 250 | |
| Maximum reverse recovery time | $I_F$ = 0.5 A, $I_R$ = 1.0 A, $I_{rr}$ = 0.25 A | | $t_{rr}$ | 122 | 140 | ns |
| Typical junction capacitance per diode | Rated $V_R$ = 4.0 V, 1 MHz | | $C_J$ | 44 | - | pF |

**Notes**

(1) Pulse test: 300 µs pulse width, 1 % duty cycle

(2) Pulse test: Pulse width ≤ 40 ms

| THERMAL CHARACTERISTICS ($T_A$ = 25 °C unless otherwise noted) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **AR3PD** | **AR3PG** | **AR3PJ** | **UNIT** | |
| Typical thermal resistance | $R_{\theta JA}$ (1) | 85 | | | °C/W | |
| | $R_{\theta JM}$ (2) | 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 (1) | 0.10 | 86A | 1500 | 7" diameter plastic tape and reel |
| AR3PJHM3/86A (1) | 0.10 | 87A | 6500 | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified



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## RATINGS AND CHARACTERISTICS CURVES

($T_A$ = 25 °C unless otherwise noted)

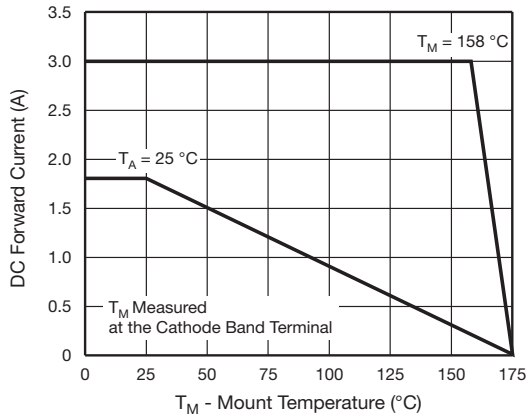


Fig. 1 - Maximum Forward Current Derating Curve

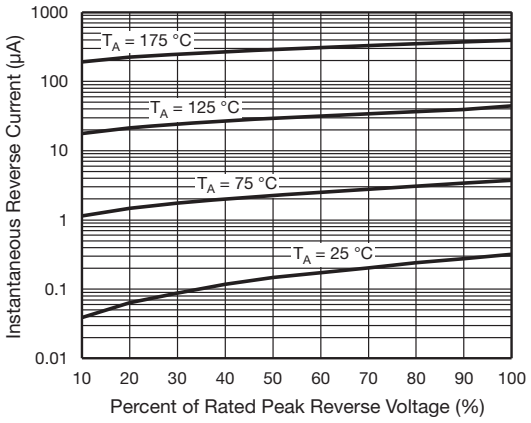


Fig. 4 - Typical Reverse Leakage Characteristics

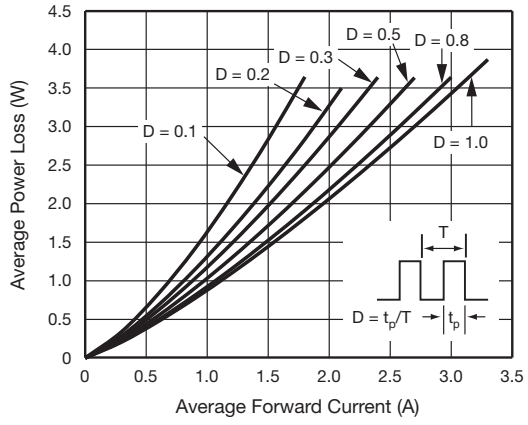


Fig. 2 - Average Power Loss Characteristics

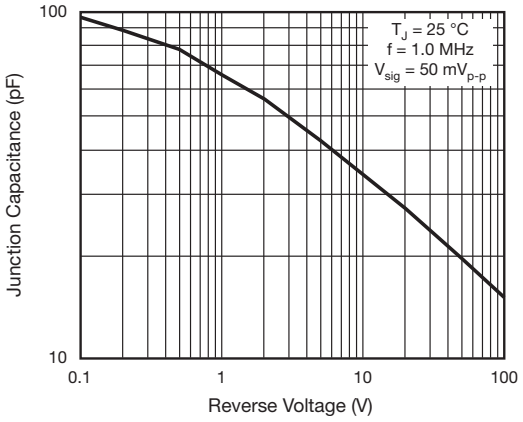


Fig. 5 - Typical Junction Capacitance

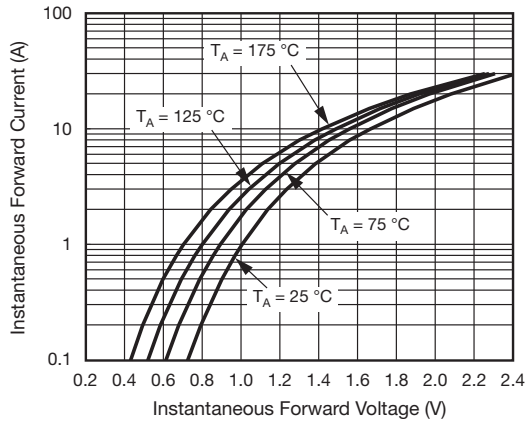


Fig. 3 - Typical Instantaneous Forward Characteristics

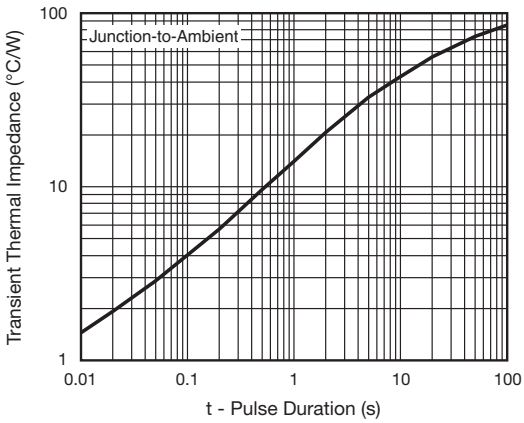


Fig. 6 - Typical Transient Thermal Impedance



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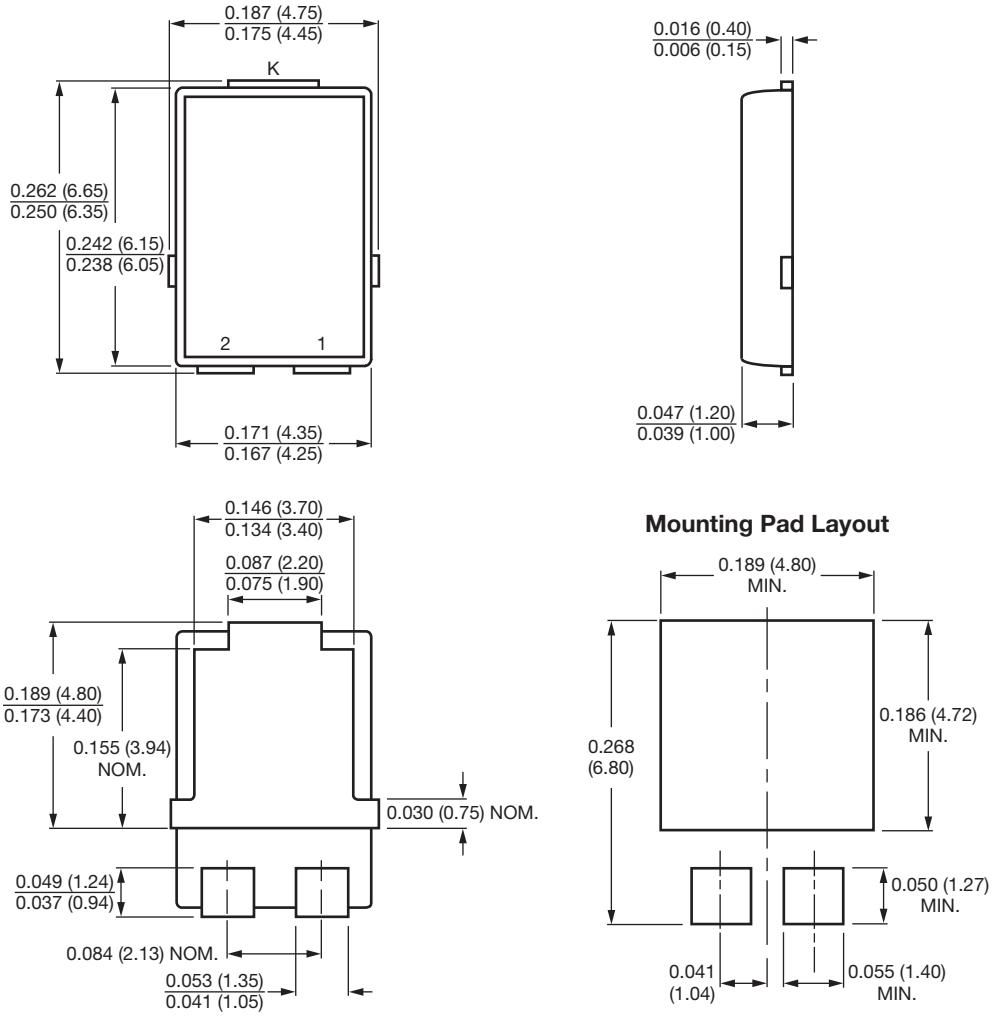
**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

**TO-277A (SMPC)**




**Mounting Pad Layout**




Conform to JEDEC TO-277A



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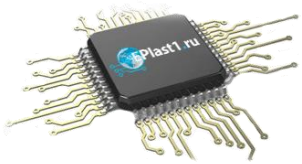


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