



## Surface Mount Fast Avalanche Rectifiers

### eSMP® Series



DO-220AA (SMP)

#### PRIMARY CHARACTERISTICS

|             |                 |
|-------------|-----------------|
| $I_{F(AV)}$ | 1.0 A           |
| $V_{RRM}$   | 200 V to 1000 V |
| $I_{FSM}$   | 30 A, 25 A      |
| $t_{rr}$    | 140 ns, 120 ns  |
| $I_R$       | 1 $\mu$ A       |
| $E_{AS}$    | 20 mJ           |
| $T_J$ max.  | 175 °C          |

#### TYPICAL APPLICATIONS

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

#### FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Glass passivated chip junction
- Fast switching for high efficiency
- Low reverse current
- 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

AUTOMOTIVE  
GRADE  
Available



RoHS  
COMPLIANT  
HALOGEN  
FREE

#### MECHANICAL DATA

**Case:** DO-220AA (SMP)

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                            | AR1PD         | AR1PG | AR1PJ | AR1PK | AR1PM | UNIT |
|------------------------------------------------------------------------------------|-----------------------------------|---------------|-------|-------|-------|-------|------|
| Device marking code                                                                |                                   | ARD           | ARG   | ARJ   | ARK   | ARM   |      |
| Maximum repetitive peak reverse voltage                                            | V <sub>RRM</sub>                  | 200           | 400   | 600   | 800   | 1000  | V    |
| Average forward current                                                            | I <sub>F(AV)</sub>                | 1.0           |       |       |       |       | A    |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load  | I <sub>FSM</sub>                  | 30            |       |       | 25    |       | A    |
| Non-repetitive avalanche energy at I <sub>AS</sub> = 1.0 A, T <sub>A</sub> = 25 °C | E <sub>AS</sub>                   | 20            |       |       |       |       | mJ   |
| Operating junction and storage temperature range                                   | T <sub>J</sub> , T <sub>STG</sub> | - 55 to + 175 |       |       |       |       | °C   |

## AR1PD thru AR1PM

Vishay General Semiconductor



| ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                                                                          |                         |                               |       |       |       |       |       |      |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------|-------------------------------|-------|-------|-------|-------|-------|------|
| PARAMETER                                                                  | TEST CONDITIONS                                                          |                         | SYMBOL                        | AR1PD | AR1PG | AR1PJ | AR1PK | AR1PM | UNIT |
| Maximum instantaneous forward voltage                                      | I <sub>F</sub> = 1.0 A                                                   | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 1.25  |       |       | 1.6   |       | V    |
|                                                                            |                                                                          | T <sub>A</sub> = 125 °C |                               | 1.15  |       |       | 1.4   |       |      |
| Maximum reverse current                                                    | Rated V <sub>R</sub>                                                     | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 1.0   |       |       |       |       | μA   |
|                                                                            |                                                                          | T <sub>A</sub> = 125 °C |                               | 100   |       |       |       |       |      |
| 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>               | 140   |       |       | 120   |       | ns   |
| Typical junction capacitance                                               | 4.0 V, 1 MHz                                                             |                         | C <sub>J</sub>                | 12.5  |       |       | 8.5   |       | 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                          | AR1PD | AR1PG | AR1PJ | AR1PK | AR1PM | UNIT |
| Typical thermal resistance                                              | R <sub>θJA</sub> <sup>(1)</sup> | 132   |       |       |       |       | °C/W |
|                                                                         | R <sub>θJM</sub> <sup>(1)</sup> | 15    |       |       |       |       |      |

## Note

(1) Free air, mounted on recommended copper pad area. Thermal resistance  $R_{\theta JA}$  - junction to ambient,  $R_{\theta JM}$  - junction to mount at the terminal cathode band

| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| AR1PJ-M3/84A                   | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| AR1PJ-M3/85A                   | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |
| AR1PJHM3/84A <sup>(1)</sup>    | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| AR1PJHM3/85A <sup>(1)</sup>    | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |

## Note

(1) Automotive grade

## RATINGS AND CHARACTERISTICS CURVES

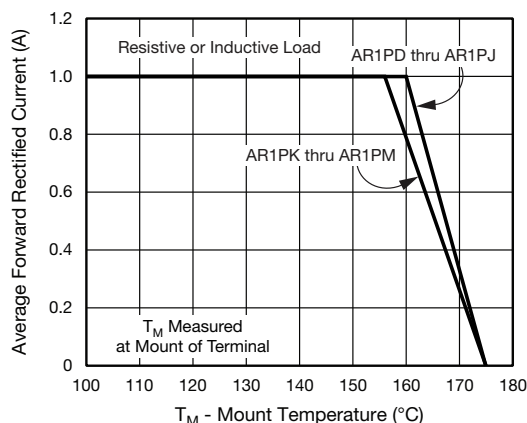
 $(T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

Fig. 1 - Maximum Forward Current Derating Curve

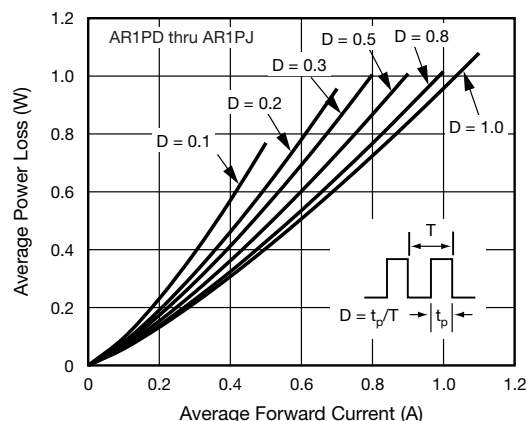


Fig. 2 - Forward Power Loss Characteristics

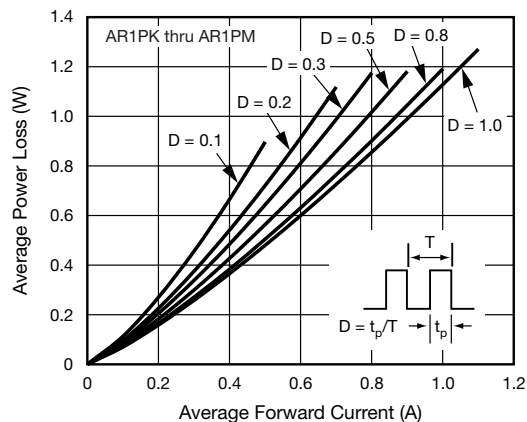


Fig. 3 - Forward Power Loss Characteristics

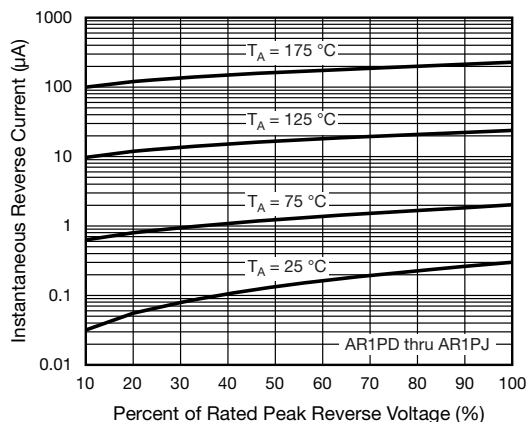


Fig. 6 - Typical Reverse Characteristics

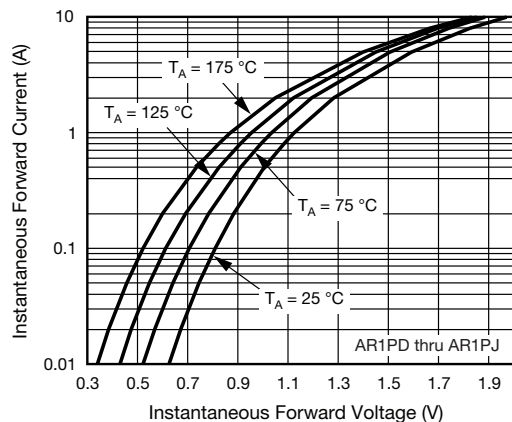


Fig. 4 - Typical Instantaneous Forward Characteristics

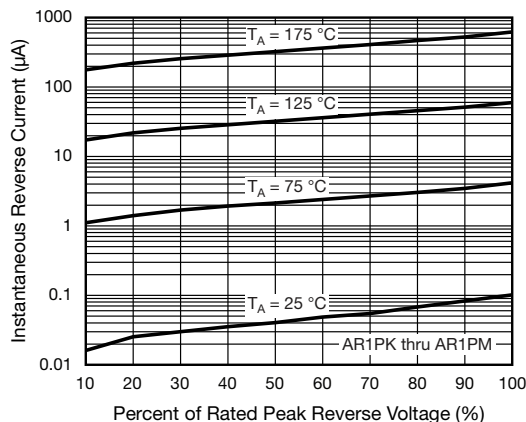


Fig. 7 - Typical Reverse Characteristics

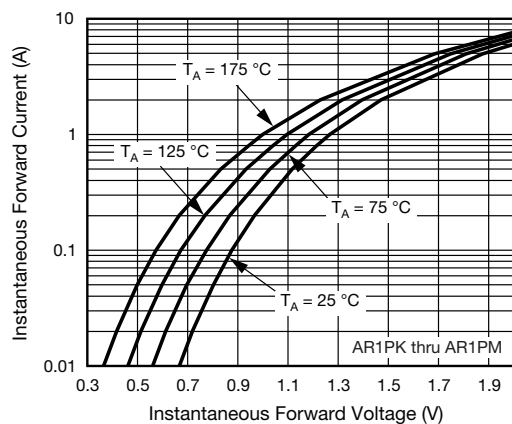


Fig. 5 - Typical Instantaneous Forward Characteristics

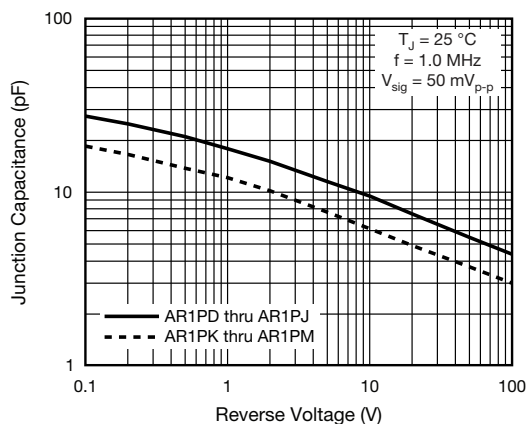


Fig. 8 - Typical Junction Capacitance

## AR1PD thru AR1PM

Vishay General Semiconductor

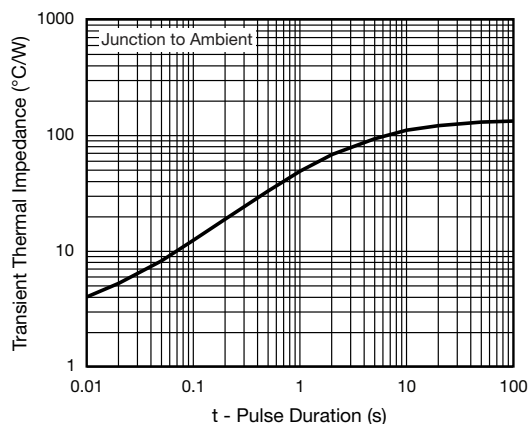
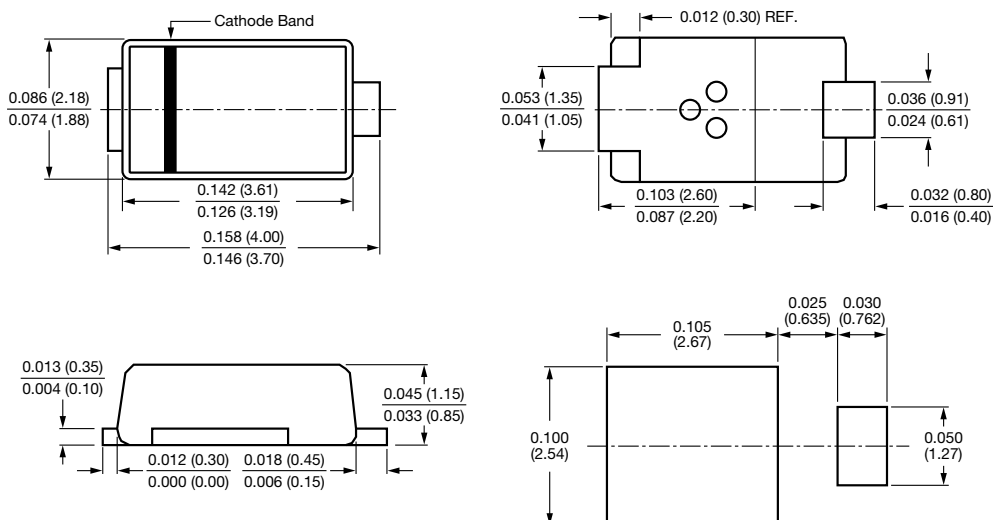


Fig. 9 - Typical Transient Thermal Impedance

**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)  
**DO-220AA (SMP)**




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