



**THE DATASHEET OF  
AR1PJ-M3/84A**



## Surface Mount Fast Avalanche Rectifiers

### eSMP® Series


**SMP (DO-220AA)**

Cathode Anode

### DESIGN SUPPORT TOOLS

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### FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Glass passivated pellet 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
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE  
Available

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

### TYPICAL APPLICATIONS

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

| PRIMARY CHARACTERISTICS |                                    |
|-------------------------|------------------------------------|
| $I_{F(AV)}$             | 1.0 A                              |
| $V_{RRM}$               | 200 V, 400 V, 600 V, 800 V, 1000 V |
| $I_{FSM}$               | 30 A, 25 A                         |
| $t_{rr}$                | 140 ns, 120 ns                     |
| $V_F$                   | 1.15 V, 1.4 V                      |
| $I_R$                   | 1 $\mu$ A                          |
| $E_{AS}$                | 20 mJ                              |
| $T_J$ max.              | 175 °C                             |
| Package                 | SMP (DO-220AA)                     |
| Circuit configuration   | Single                             |

### MECHANICAL DATA

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

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 2 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   | $V_{RRM}$      | 200         | 400   | 600   | 800   | 1000  | V    |
| Average forward current   | $I_{F(AV)}$    | 1.0         |       |       |       |       | A    |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | $I_{FSM}$      | 30          |       |       | 25    |       | A    |
| Non-repetitive avalanche energy at $I_{AS} = 1.0$ A, $T_A = 25$ °C                | $E_{AS}$       | 20          |       |       |       |       | mJ   |
| Operating junction and storage temperature range                                  | $T_J, T_{STG}$ | -55 to +175 |       |       |       |       | °C   |



| 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  | 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  | 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 μs pulse width, 1 % duty cycle
- (2) Pulse test: Pulse width ≤ 40 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> (1) | 132   |       |       |       |       | °C/W |
|   | R <sub>θJM</sub> (1) | 15    |       |       |       |       |      |

**Note**

- (1) Free air, mounted on recommended copper pad area. Thermal resistance R<sub>θJA</sub> - junction to ambient, R<sub>θJM</sub> - 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 (1)               | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| AR1PJHM3/85A (1)               | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |

**Note**

- (1) Automotive grade

**RATINGS AND CHARACTERISTICS CURVES (T<sub>A</sub> = 25 °C unless otherwise noted)**

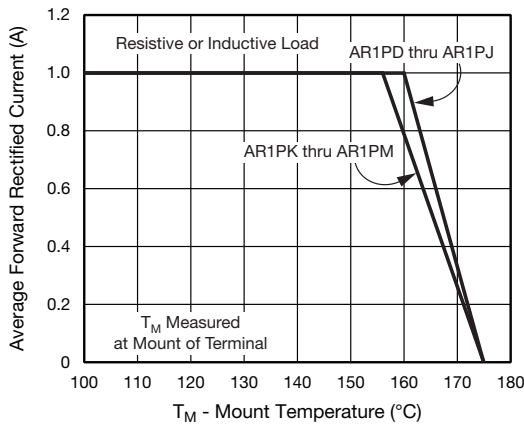


Fig. 1 - Maximum Forward Current Derating Curve

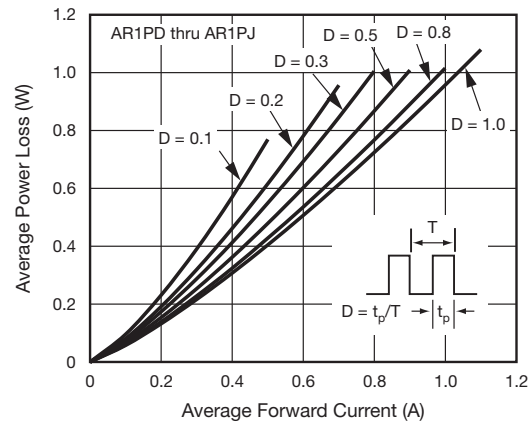


Fig. 2 - Forward Power Loss Characteristics

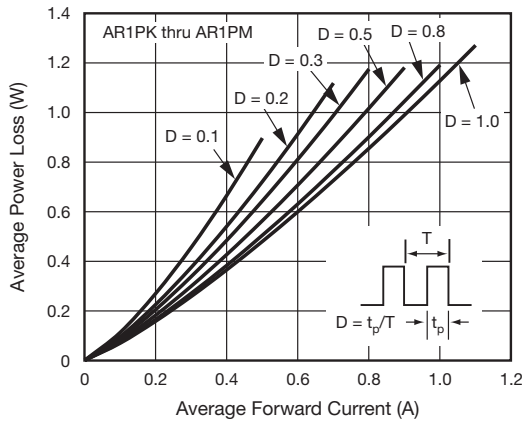


Fig. 3 - Forward Power Loss Characteristics

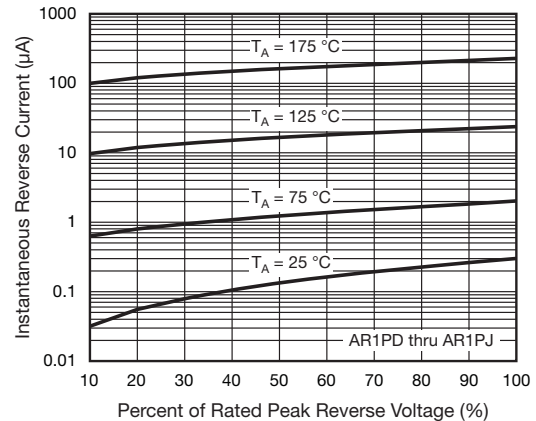


Fig. 6 - Typical Reverse Characteristics

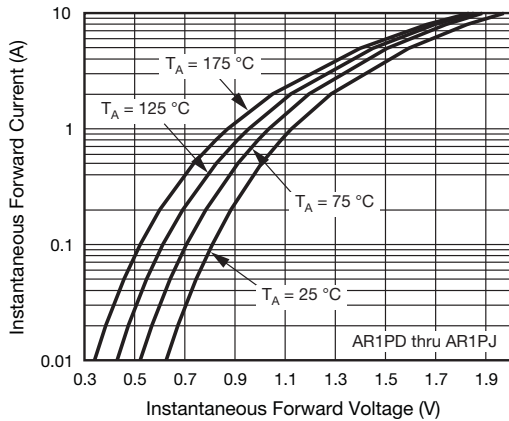


Fig. 4 - Typical Instantaneous Forward Characteristics

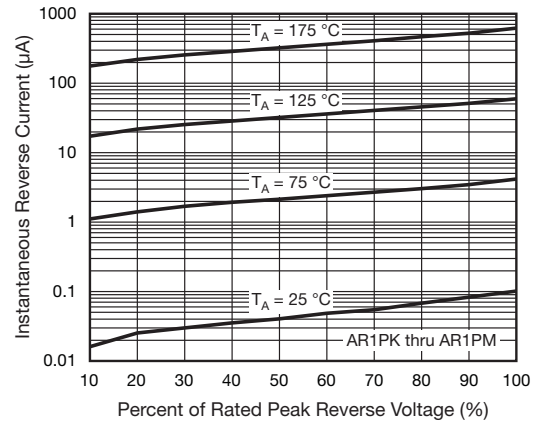


Fig. 7 - Typical Reverse Characteristics

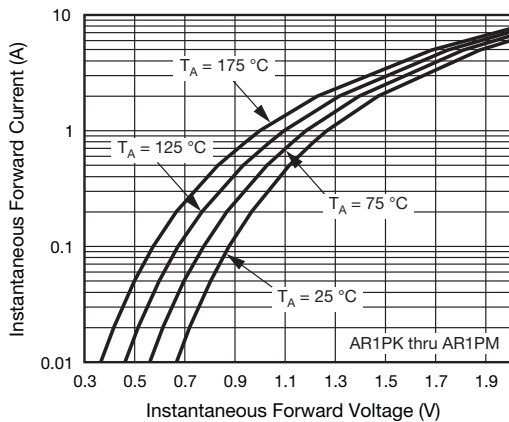


Fig. 5 - Typical Instantaneous Forward Characteristics

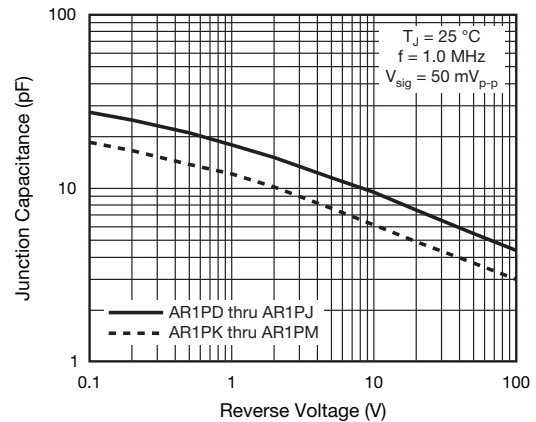


Fig. 8 - Typical Junction Capacitance

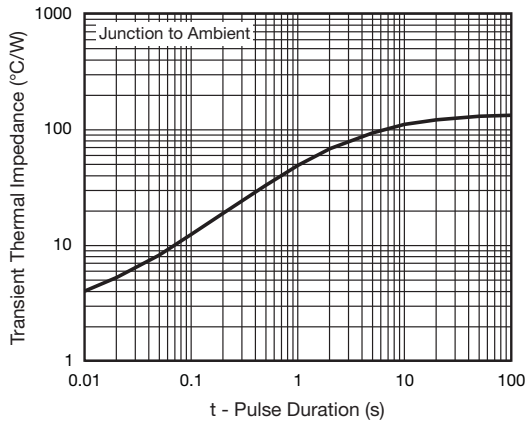
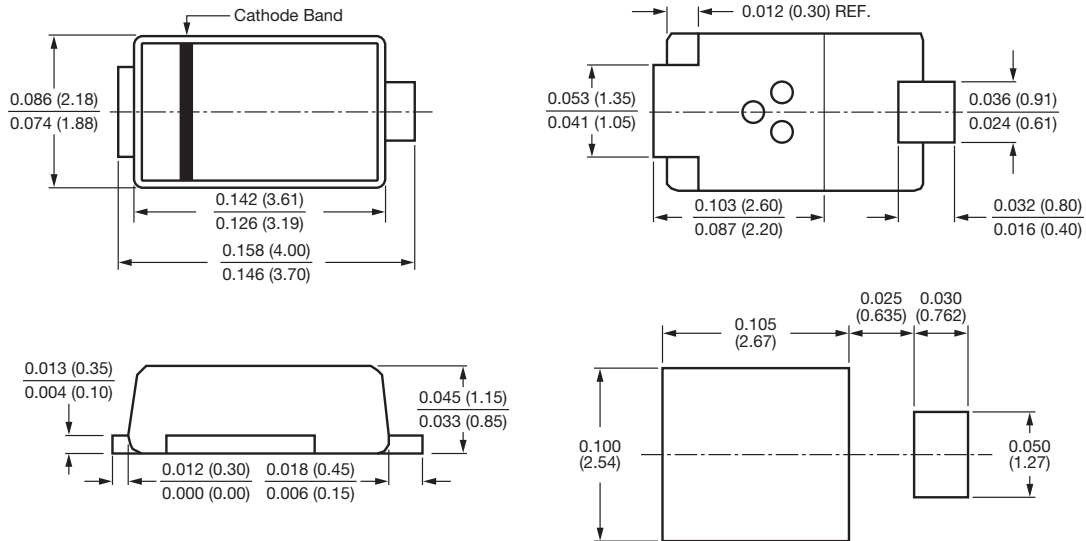


Fig. 9 - Typical Transient Thermal Impedance

## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

### SMP (DO-220AA)





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