

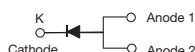


## High Current Density Standard Avalanche Surface Mount Rectifiers

### eSMP® Series



TO-277A (SMPC)



### FEATURES

- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Glass passivated chip junction
- Controlled avalanche characteristics
- Low leakage current
- High forward surge capability
- AEC-Q101 qualified
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- 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**

### PRIMARY CHARACTERISTICS

|                      |                 |
|----------------------|-----------------|
| $I_{F(AV)}$          | 4.0 A           |
| $V_{RRM}$            | 200 V to 1000 V |
| $I_{FSM}$            | 100 A           |
| $E_{AS}$             | 20 mJ           |
| $V_F$ at $I_F = 4$ A | 0.92 V          |
| $T_J$ max.           | 175 °C          |

### TYPICAL APPLICATIONS

For use in general purpose rectification of power supplies, inverters, converters and freewheeling diodes for consumer, automotive and telecommunication.

### 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                            | AS4PD         | AS4PG | AS4PJ | AS4PK | AS4PM | UNIT |
|-----------------------------------------------------------------------------------|---------------------------------|-----------------------------------|---------------|-------|-------|-------|-------|------|
| Device marking code                                                               |                                 |                                   | AS4D          | AS4G  | AS4J  | AS4K  | AS4M  |      |
| Maximum repetitive peak reverse voltage                                           |                                 | V <sub>RRM</sub>                  | 200           | 400   | 600   | 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>     | 2.4           |       |       |       |       |      |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load |                                 | I <sub>FSM</sub>                  | 100           |       |       |       |       | 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 typical |                                   | 30            |       |       |       |       |      |
| Operating junction and storage temperature range                                  |                                 | T <sub>J</sub> , T <sub>STG</sub> | - 55 to + 175 |       |       |       |       | °C   |

### Notes

(1) Mounted on 20 mm x 20 mm pad areas, 1 oz. FR4 PCB

(2) Free air, mounted on recommended copper pad area



| 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> = 2.0 A                                                   | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.962 | -    | V    |
|                                                                            | I <sub>F</sub> = 4.0 A                                                   |                         |                               | 1.044 | 1.10 |      |
|                                                                            | I <sub>F</sub> = 2.0 A                                                   | T <sub>A</sub> = 125 °C |                               | 0.822 | -    |      |
|                                                                            | I <sub>F</sub> = 4.0 A                                                   |                         |                               | 0.922 | 0.98 |      |
| Reverse current                                                            | rated V <sub>R</sub>                                                     | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 0.35  | 10   | μA   |
|                                                                            |                                                                          | T <sub>A</sub> = 125 °C |                               | 75    | 150  |      |
| Typical 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>               | 1.8   | -    | μs   |
| Typical junction capacitance per diode                                     | 4.0 V, 1 MHz                                                             |                         | C <sub>J</sub>                | 60    | -    | 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                          | AS4PD | AS4PG | AS4PJ | AS4PK | AS4PM | UNIT |
| Typical thermal resistance                                              | R <sub>θJA</sub> <sup>(1)</sup> | 80    |       |       |       |       | °C/W |
|                                                                         | R <sub>θJM</sub> <sup>(2)</sup> | 5     |       |       |       |       |      |

**Notes**(1) Free air, mounted on recommended PCB 1 oz. pad area; thermal resistance  $R_{\theta JA}$  - junction to ambient(2) Units mounted on PCB with 20 mm x 20 mm copper pad areas, 1 oz. FR4 PCB;  $R_{\theta JM}$  - junction to mount

| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| AS4PJ-M3/86A                   | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| AS4PJ-M3/87A                   | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |
| AS4PJHM3/86A <sup>(1)</sup>    | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| AS4PJHM3/87A <sup>(1)</sup>    | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

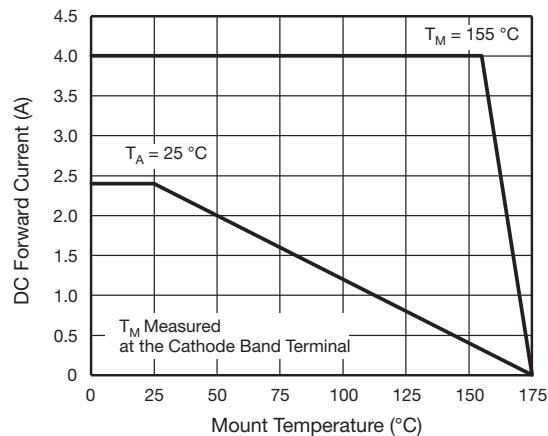
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

Fig. 1 - Maximum Forward Current Derating Curve

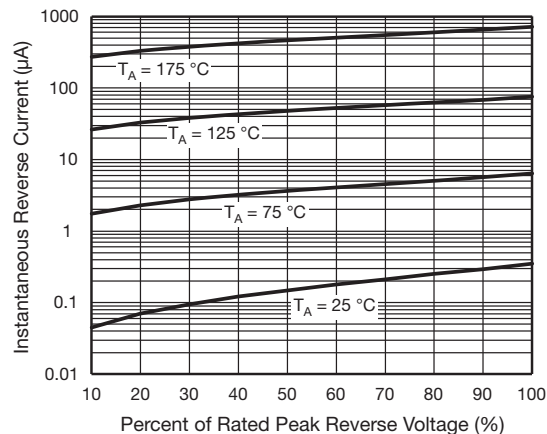


Fig. 4 - Typical Reverse Leakage Characteristics

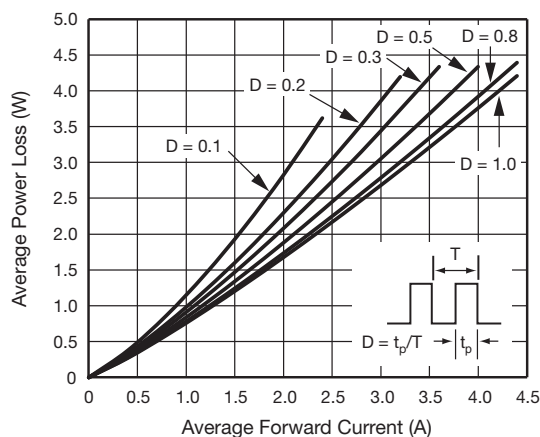


Fig. 2 - Forward Power Loss Characteristics

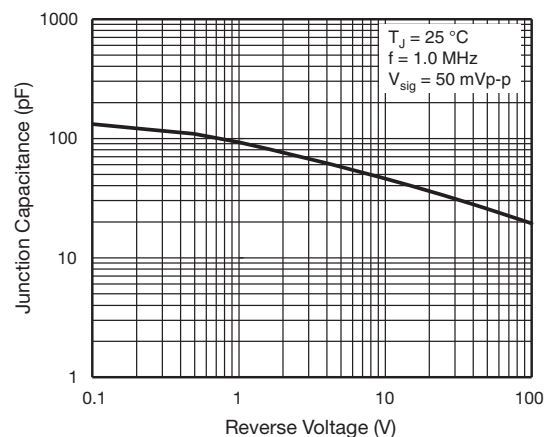


Fig. 5 - Typical Junction Capacitance

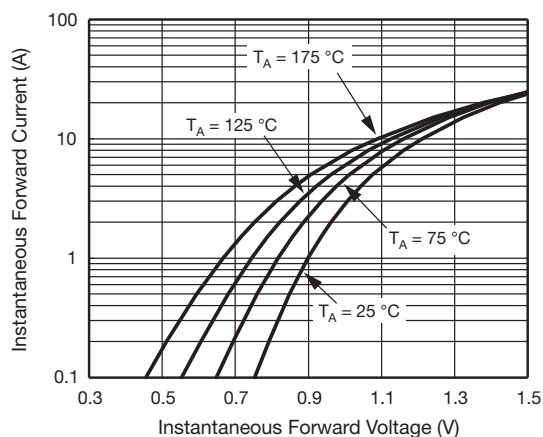


Fig. 3 - Typical Instantaneous Forward Characteristics

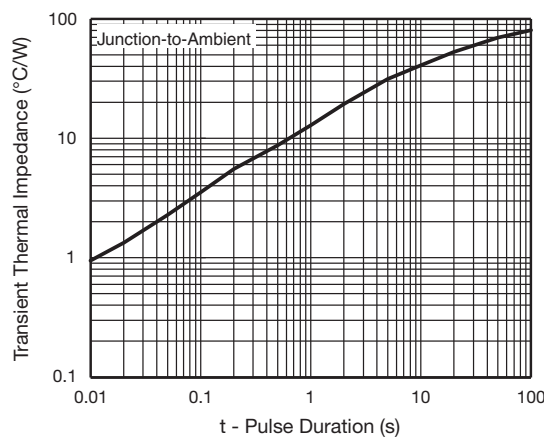


Fig. 6 - Typical Transient Thermal Impedance



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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