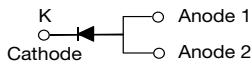


## SMD Photovoltaic Solar Cell Protection Rectifier

### eSMP® Series



### SMPC (TO-277A)



### FEATURES

- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Glass passivated pellet chip junction
- Low forward voltage drop
- High forward surge capability
- Low thermal resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- 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 solar cell panel blocking diode for protection, using DC forward current without reverse bias.

### 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

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

E3 suffix meets JESD 201 class 1A whisker test

### LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS |                |
|-------------------------|----------------|
| $I_{F(AV)}$             | 5.0 A          |
| $V_{RRM}$               | 1000 V         |
| $I_{FSM}$               | 100 A          |
| $I_R$                   | 10 $\mu$ A     |
| $V_F$ at $I_F = 5.0$ A  | 0.90 V         |
| $T_J$ max.              | 150 °C         |
| Package                 | SMPC (TO-277A) |
| Circuit configuration   | Single         |

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)                                      |                   |                |                    |
|----------------------------------------------------------------------------------------------|-------------------|----------------|--------------------|
| PARAMETER                                                                                    | SYMBOL            | S5PMS          | UNIT               |
| Device marking code                                                                          |                   | 5PMS           |                    |
| Max. repetitive peak reverse voltage                                                         | $V_{RRM}$         | 1000           | V                  |
| Max. DC forward current (fig. 1)                                                             | $I_F$             | $T_M = 130$ °C | 5.0 <sup>(1)</sup> |
|                                                                                              |                   | $T_A = 25$ °C  | 1.8 <sup>(2)</sup> |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load            | $I_{FSM}$         | 100            | A                  |
| Operating junction and storage temperature range                                             | $T_{OP}, T_{STG}$ | -55 to +150    | °C                 |
| Junction temperature in DC forward current without reverse bias, $t \leq 1$ h <sup>(3)</sup> | $T_J$             | $\leq 200$     | °C                 |

### Notes

- (1) Mounted on 30 mm x 30 mm Al PCB
- (2) Free air, mounted on recommended copper pad area
- (3) Meets the requirements of IEC 61215 Ed. 2 bypass diode thermal test



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                                                                           |                                   |             |      |               |               |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------|-------------|------|---------------|---------------|
| PARAMETER                                                                                    | TEST CONDITIONS                                                           | SYMBOL                            | TYP.        | MAX. | UNIT          |               |
| Instantaneous forward voltage                                                                | $I_F = 2.5\text{ A}$                                                      | $T_A = 25\text{ }^\circ\text{C}$  | $V_F^{(1)}$ | 0.94 | -             | V             |
|                                                                                              | $I_F = 5.0\text{ A}$                                                      |                                   |             | 0.99 | 1.15          |               |
|                                                                                              | $I_F = 2.5\text{ A}$                                                      | $T_A = 125\text{ }^\circ\text{C}$ |             | 0.82 | -             |               |
|                                                                                              | $I_F = 5.0\text{ A}$                                                      |                                   |             | 0.90 | 1.00          |               |
| Reverse current                                                                              | Rated $V_R$                                                               | $T_A = 25\text{ }^\circ\text{C}$  | $I_R^{(2)}$ | -    | 10            | $\mu\text{A}$ |
|                                                                                              |                                                                           | $T_A = 125\text{ }^\circ\text{C}$ |             | 55   | 100           |               |
| Max. reverse recovery time                                                                   | $I_F = 0.5\text{ A}$ , $I_R = 1.0\text{ A}$ ,<br>$t_{rr} = 0.25\text{ A}$ | $t_{rr}$                          | 2.5         | -    | $\mu\text{s}$ |               |
| Typical junction capacitance                                                                 | 4.0 V, 1 MHz                                                              | $C_J$                             | 30          | -    | pF            |               |

**Notes**

- (1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle  
(2) Pulse test: Pulse width  $\leq 40\text{ ms}$

| <b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                       |       |                    |
|-------------------------------------------------------------------------------------------|-----------------------|-------|--------------------|
| PARAMETER                                                                                 | SYMBOL                | S5PMS | UNIT               |
| Typical thermal resistance                                                                | $R_{\theta JA}^{(1)}$ | 90    | $^\circ\text{C/W}$ |
|                                                                                           | $R_{\theta JM}^{(2)}$ | 3     |                    |

**Notes**

- (1) Free air, mounted on recommended copper pad area. Thermal resistance  $R_{\theta JA}$  - junction to ambient  
(2) Mounted on 30 mm x 30 mm Al PCB. Thermal resistance  $R_{\theta JM}$  - junction to mount

| <b>ORDERING INFORMATION</b> (Example) |                 |                        |               |                                    |
|---------------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                         | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| S5PMS-M3/86A                          | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| S5PMS-M3/87A                          | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |

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

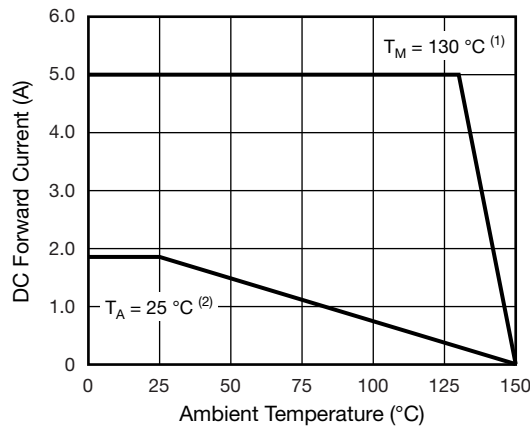


Fig. 1 - Forward Current Derating Curve

**Notes**

- (1) Mounted on 30 mm x 30 mm Al PCB  $T_M$  measured at the terminal ( $R_{\theta JM} = 3.0\text{ }^\circ\text{C/W}$ )
- (2) Free air, mounted on recommended copper pad area ( $R_{\theta JA} = 90\text{ }^\circ\text{C/W}$ )

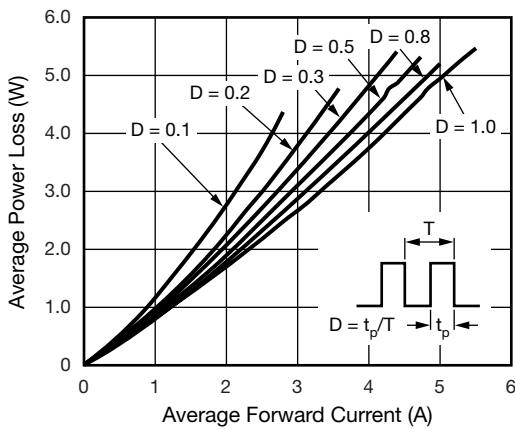


Fig. 2 - Forward Power Loss Characteristics

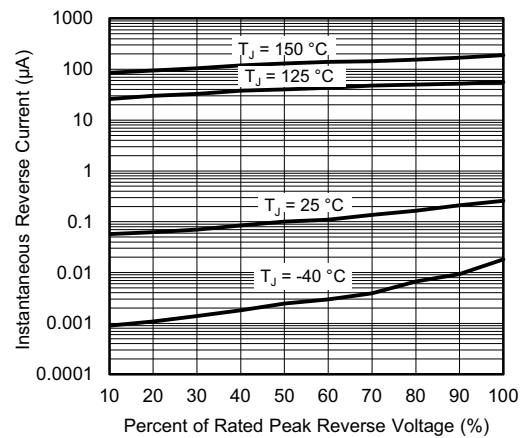


Fig. 4 - Typical Reverse Leakage Characteristics

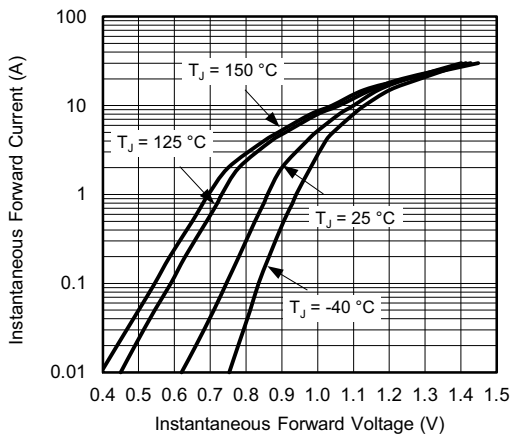


Fig. 3 - Typical Instantaneous Forward Characteristics

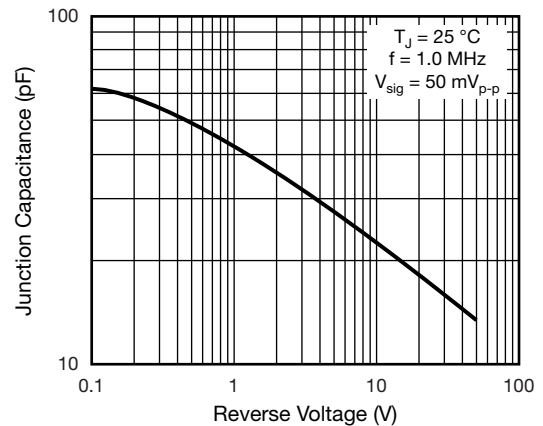
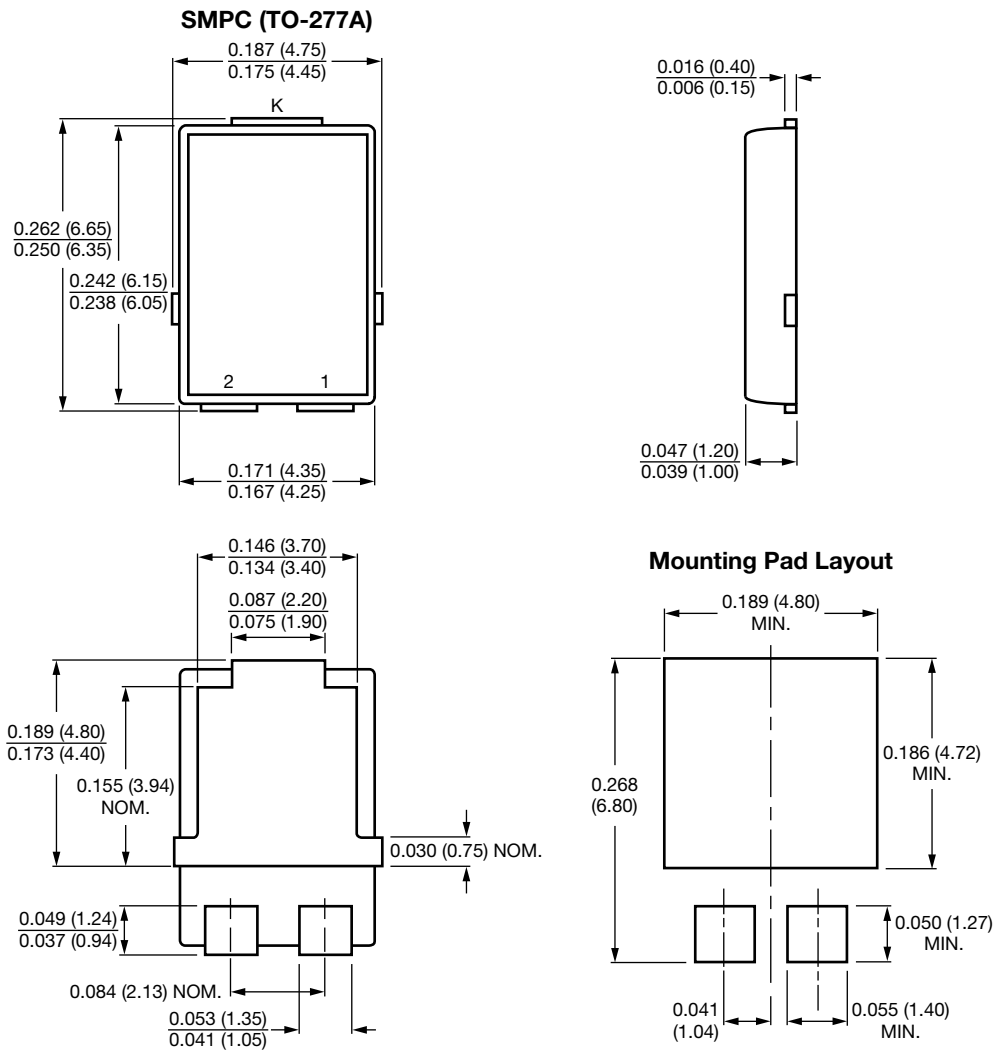


Fig. 5 - Typical Junction Capacitance

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





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