

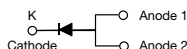
# SMD Photovoltaic Solar Cell Protection Trench MOS Barrier Schottky Rectifiers

Ultra Low  $V_F = 0.31\text{ V}$  at  $I_F = 5\text{ A}$

TMBS® eSMP® Series



TO-277A (SMPC)



## FEATURES

- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- 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 junction box as a bypass diode for protection, using DC forward current without reverse bias.

## 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

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

M3 suffix meets JESD 201 class 2 whisker test

| PRIMARY CHARACTERISTICS      |                |
|------------------------------|----------------|
| $I_{F(AV)}$                  | 15 A           |
| $V_{RRM}$                    | 45 V           |
| $I_{FSM}$                    | 210 A          |
| $V_F$ at $I_F = 15\text{ A}$ | 0.42 V         |
| $T_J$ max.                   | 150 °C         |
| Package                      | TO-277A (SMPC) |
| Diode variation              | Single die     |

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                       |             |             |      |
|--------------------------------------------------------------------------------------|-------------|-------------|------|
| PARAMETER                                                                            | SYMBOL      | V15P45S     | UNIT |
| Device marking code                                                                  |             | 1545S       |      |
| Maximum repetitive peak reverse voltage                                              | $V_{RRM}$   | 45          | V    |
| Maximum DC forward current                                                           | $I_F^{(1)}$ | 15          | A    |
|                                                                                      | $I_F^{(2)}$ | 4.8         |      |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load    | $I_{FSM}$   | 210         | A    |
| Junction temperature in DC forward current without reverse bias, $t \leq 1\text{ h}$ | $T_J^{(3)}$ | $\leq 200$  | °C   |
| Operating junction temperature range                                                 | $T_{OP}$    | -40 to +150 | °C   |
| Storage temperature range                                                            | $T_{STG}$   | -40 to +175 | °C   |

## Notes

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

| 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> = 5.0 A | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.40 | -    | V    |
|                                                                            | I <sub>F</sub> = 7.5 A |                         |                               | 0.45 | -    |      |
|                                                                            | I <sub>F</sub> = 15 A  |                         |                               | 0.49 | 0.58 |      |
|                                                                            | I <sub>F</sub> = 5.0 A | T <sub>A</sub> = 125 °C |                               | 0.31 | -    |      |
|                                                                            | I <sub>F</sub> = 7.5 A |                         |                               | 0.34 | -    |      |
|                                                                            | I <sub>F</sub> = 15 A  |                         |                               | 0.42 | 0.51 |      |
| Reverse current                                                            | V <sub>R</sub> = 45 V  | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -    | 1500 | μA   |
|                                                                            |                        | T <sub>A</sub> = 125 °C |                               | 15   | 50   | mA   |

**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                | V15P45S | UNIT                 |
| Typical thermal resistance                                                                  | $R_{\theta JA}^{(1)}$ | 75      | $^{\circ}\text{C/W}$ |
|                                                                                             | $R_{\theta JM}^{(2)}$ | 4       |                      |

**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 aluminum 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                      |
| V15P45S-M3/86A                        | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| V15P45S-M3/87A                        | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |

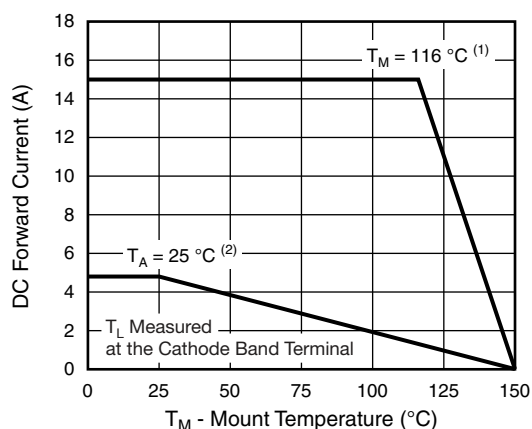
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Forward Current Derating Curve

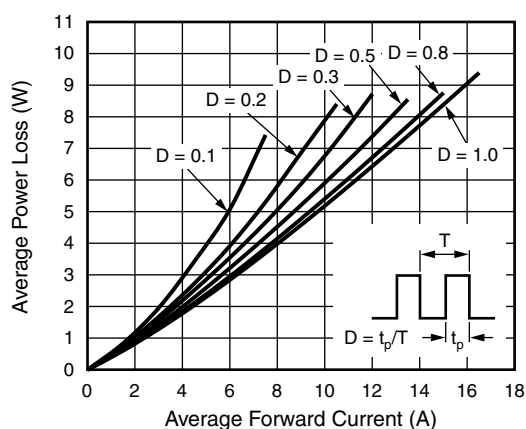


Fig. 2 - Forward Power Loss Characteristics Per Diode

**Notes**

- (1) Mounted on 30 mm x 30 mm aluminum PCB;  $T_M$  measured at the terminal of cathode band ( $R_{\theta JM} = 4\text{ }^{\circ}\text{C/W}$ )  
(2) Free air, mounted on recommended copper pad area ( $R_{\theta JA} = 75\text{ }^{\circ}\text{C/W}$ )

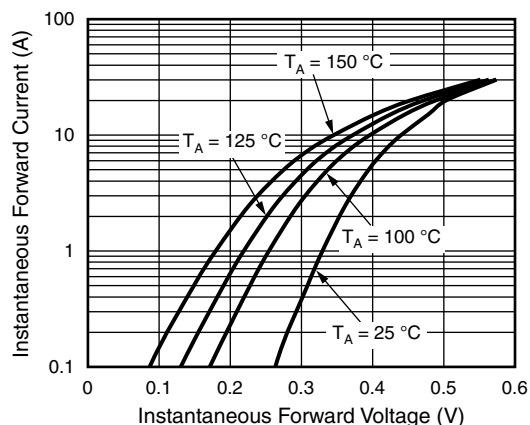


Fig. 3 - Typical Instantaneous Forward Characteristics Per Diode

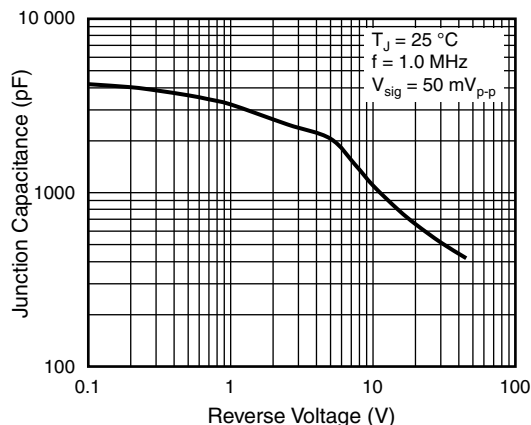


Fig. 5 - Typical Junction Capacitance

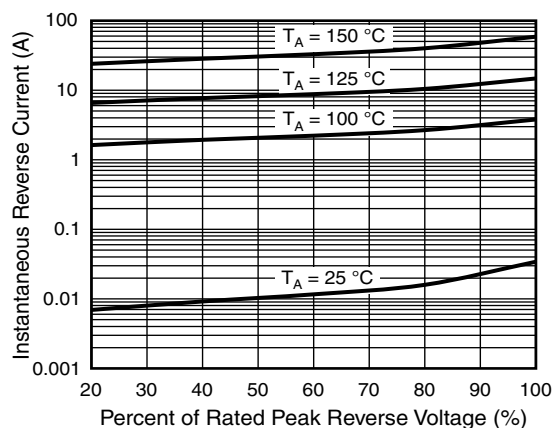


Fig. 4 - Typical Reverse Leakage Characteristics Per Diode

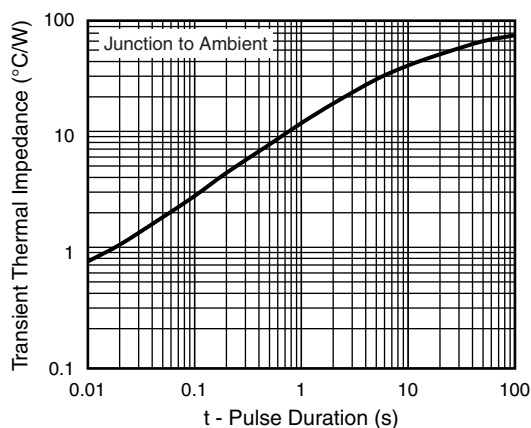


Fig. 6 - Typical Transient Thermal Impedance Per Diode



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



Conform to JEDEC TO-277A



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