# SMD Photovoltaic Solar Cell Protection TMBS® (Trench MOS Barrier Schottky) Rectifiers

Ultra Low $V_F$ = 0.31 V at $I_F$ = 5 A


## 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

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: 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
M3 suffix meets JESD 201 class 2 whisker test

## LINKS TO ADDITIONAL RESOURCES

3D Models

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

**MAXIMUM RATINGS** ($T_A$ = 25 °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 ≤ 1 h | $T_J$ (3) | ≤ 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


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| ELECTRICAL CHARACTERISTICS ($T_A$ = 25 °C unless otherwise noted) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITIONS** | | **SYMBOL** | **TYP.** | **MAX.** | **UNIT** |
| Instantaneous forward voltage | $I_F$ = 5.0 A | $T_A$ = 25 °C | $V_F$ (1) | 0.40 | - | V |
| | $I_F$ = 7.5 A | | | 0.45 | - | |
| | $I_F$ = 15 A | | | 0.49 | 0.58 | |
| | $I_F$ = 5.0 A | $T_A$ = 125 °C | | 0.31 | - | |
| | $I_F$ = 7.5 A | | | 0.34 | - | |
| | $I_F$ = 15 A | | | 0.42 | 0.51 | |
| Reverse current | $V_R$ = 45 V | $T_A$ = 25 °C | $I_R$ (2) | - | 1500 | µA |
| | | $T_A$ = 125 °C | | 15 | 50 | mA |

**Notes**

(1) Pulse test: 300 µs pulse width, 1 % duty cycle

(2) Pulse test: Pulse width ≤ 40 ms

| THERMAL CHARACTERISTICS ($T_A$ = 25 °C unless otherwise noted) | | | |
|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **V15P45S** | **UNIT** |
| Typical thermal resistance | $R_{\theta JA}$ (1) | 75 | °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

| ORDERING INFORMATION (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 |



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## RATINGS AND CHARACTERISTICS CURVES ($T_A$ = 25 °C unless otherwise noted)

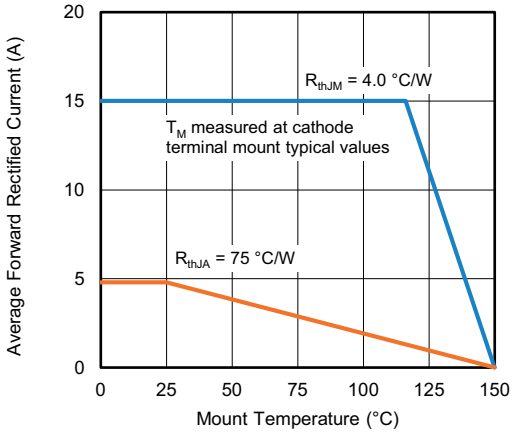


Fig. 1 - Forward Current Derating Curve

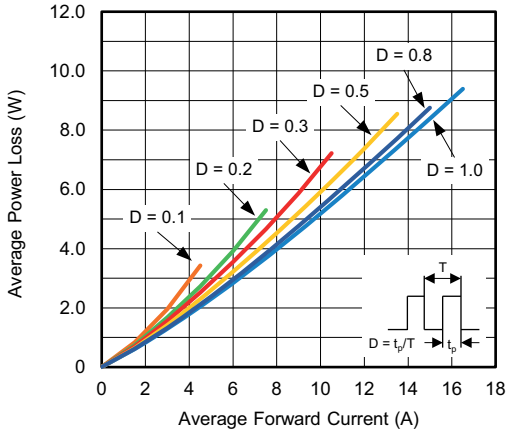


Fig. 2 - Forward Power Loss Characteristics Per Diode

**Notes**

(1) Mounted on 30 mm x 30 mm aluminum PCB; $T_M$ measured at the terminal of cathode band ($R_{\theta JM}$ = 4 °C/W)

(2) Free air, mounted on recommended copper pad area ($R_{\theta JA}$ = 75 °C/W)

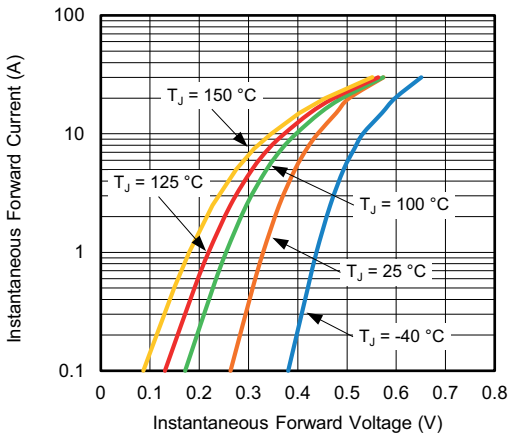


Fig. 3 - Typical Instantaneous Forward Characteristics Per Diode

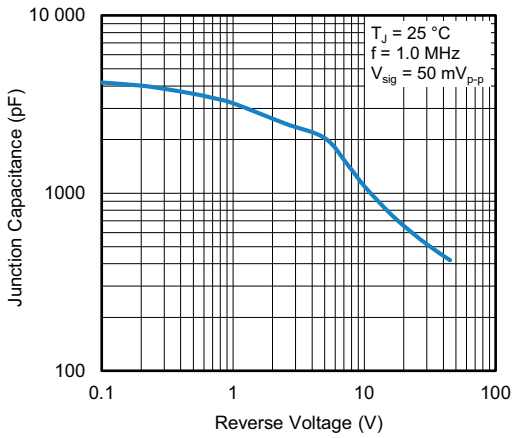


Fig. 5 - Typical Junction Capacitance

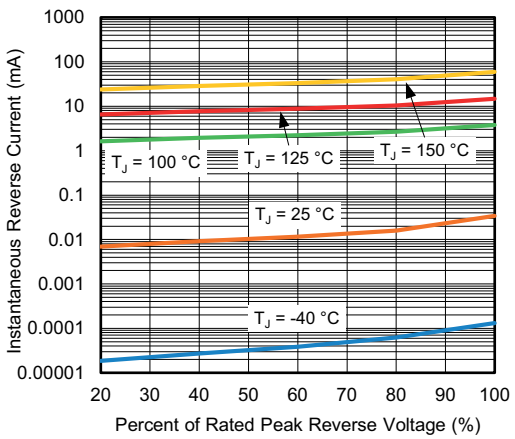


Fig. 4 - Typical Reverse Leakage Characteristics Per Diode

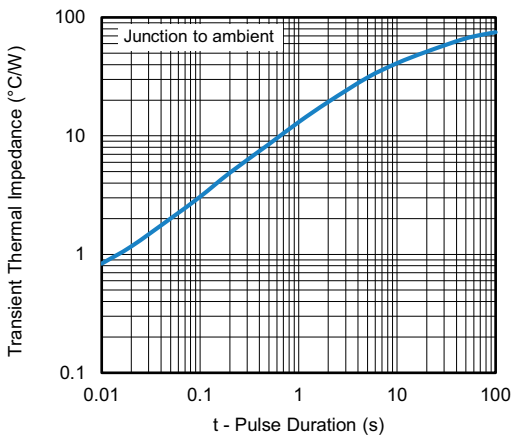


Fig. 6 - Typical Transient Thermal Impedance Per Diode


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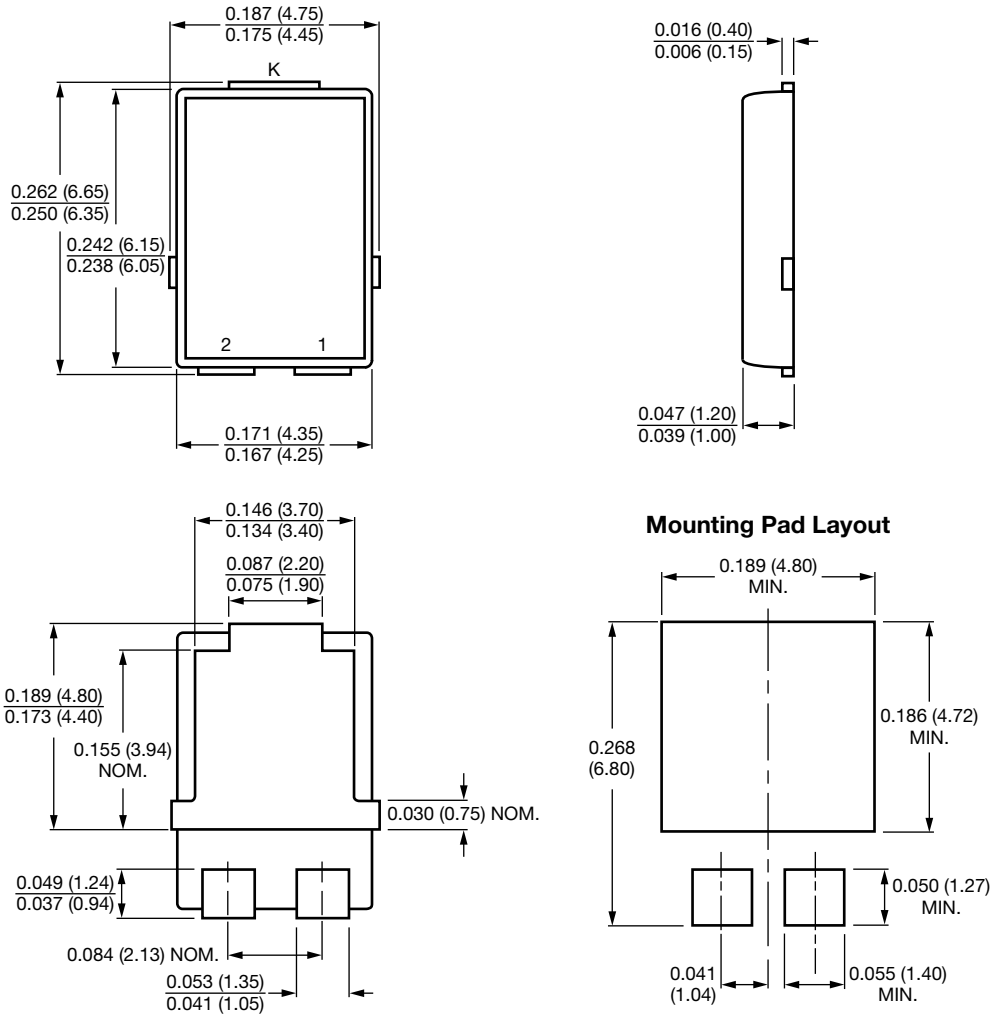
**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

**SMPC (TO-277A)**




**Mounting Pad Layout**




Conform to JEDEC® TO-277A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