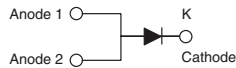
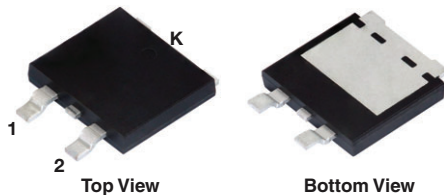


# TMBS<sup>®</sup> (Trench MOS Barrier Schottky) Rectifier for PV Solar Cell Bypass Protection

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

## eSMP<sup>®</sup> Series SMPD (TO-263AC)



### LINKS TO ADDITIONAL RESOURCES


[3D Models](#)

### PRIMARY CHARACTERISTICS

|  |                 |
|--|-----------------|
| $I_{F(AV)}$  | 20 A            |
| $V_{RRM}$  | 45 V            |
| $I_{FSM}$  | 160 A           |
| $V_F$ at $I_F = 20\text{ A}$ ( $T_A = 125\text{ °C}$ ) | 0.50 V          |
| $T_{OP}$ max. (AC model)                               | 150 °C          |
| $T_J$ max. (DC forward current)                        | 200 °C          |
| Package  | SMPD (TO-263AC) |
| Circuit configuration                                  | Single          |

### MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)

| PARAMETER  | SYMBOL                     | V20DL45BP   | UNIT |
|--|----------------------------|-------------|------|
| Maximum repetitive peak reverse voltage  | $V_{RRM}$                  | 45          | V    |
| Maximum DC forward current (fig. 1)  | $I_{F(DC)}$ <sup>(1)</sup> | 20          | A    |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load      | $I_{FSM}$                  | 160         | A    |
| Operating junction temperature range (AC model)  | $T_{OP}$                   | -40 to +150 | °C   |
| Junction temperature in DC forward current without reverse bias, $t = \leq 1\text{ h}$ | $T_J$ <sup>(2)</sup>       | $\leq 200$  | °C   |

#### Note

<sup>(1)</sup> With heatsink

<sup>(2)</sup> Meets the requirements of IEC 61215 ed.2 bypass diode thermal test

### FEATURES

- Trench MOS Schottky technology
- Very low profile - typical height of 1.7 mm
- Ideal for automated placement
- 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:** SMPD (TO-263AC)

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

**Polarity:** as marked

| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                     |                                   |             |      |      |    |
|--|---------------------|-----------------------------------|-------------|------|------|----|
| PARAMETER  | TEST CONDITIONS     | SYMBOL                            | TYP.        | MAX. | UNIT |    |
| Instantaneous forward voltage  | $I_F = 5\text{ A}$  | $T_A = 25\text{ }^\circ\text{C}$  | $V_F^{(1)}$ | 0.42 | -    | V  |
|  | $I_F = 10\text{ A}$ |                                   |             | 0.48 | -    |    |
|  | $I_F = 20\text{ A}$ |                                   |             | 0.55 | 0.64 |    |
|  | $I_F = 5\text{ A}$  | $T_A = 125\text{ }^\circ\text{C}$ |             | 0.31 | -    |    |
|  | $I_F = 10\text{ A}$ | 0.38                              |             | -    |      |    |
|  | $I_F = 20\text{ A}$ | 0.50                              |             | 0.58 |      |    |
| Reverse current  | $V_R = 45\text{ V}$ | $T_A = 25\text{ }^\circ\text{C}$  | $I_R^{(2)}$ | -    | 2.5  | mA |
|  |                     | $T_A = 125\text{ }^\circ\text{C}$ |             | 20   | 50   |    |

**Notes**

- (1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle  
 (2) Pulse test: Pulse width  $\leq 5\text{ ms}$

| <b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                          |           |                    |
|---|--------------------------|-----------|--------------------|
| PARAMETER   | SYMBOL                   | V20DL45BP | UNIT               |
| Typical thermal resistance  | $R_{\theta JC}$          | 1.6       | $^\circ\text{C/W}$ |
|   | $R_{\theta JA}^{(1)(2)}$ | 45        |                    |

**Notes**

- (1) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$   
 (2) Free air, without heatsink

| <b>ORDERING INFORMATION</b> (Example) |                |                 |              |               |                                    |
|---------------------------------------|----------------|-----------------|--------------|---------------|------------------------------------|
| PACKAGE                               | PREFERRED P/N  | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| SMPD (TO-263AC)                       | V20DL45BP-M3/I | 0.55            | I            | 2000/reel     | 13" diameter plastic tape and reel |

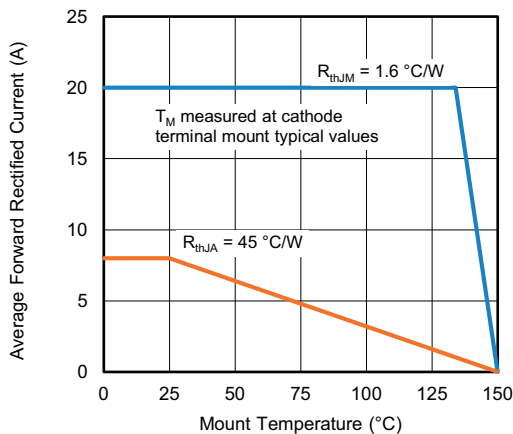
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)


Fig. 1 - Forward Current Derating Curve

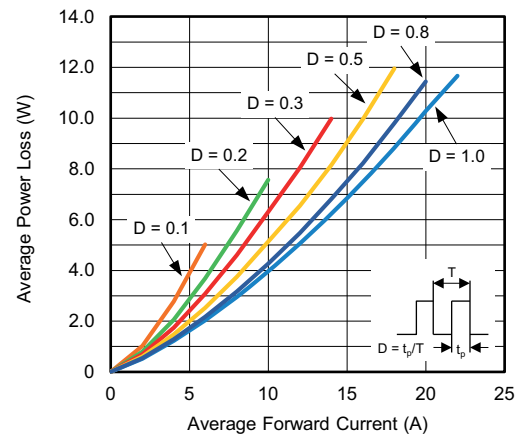


Fig. 2 - Forward Power Loss Characteristics

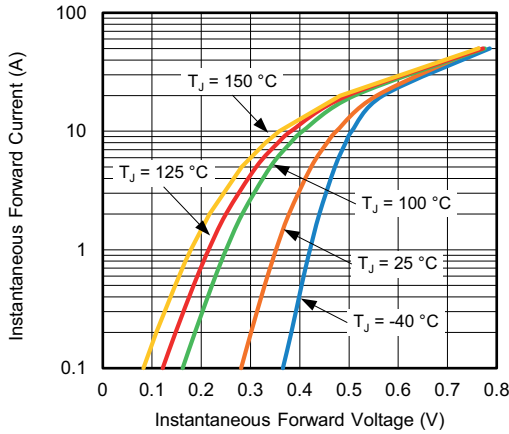


Fig. 3 - Typical Instantaneous Forward Characteristics

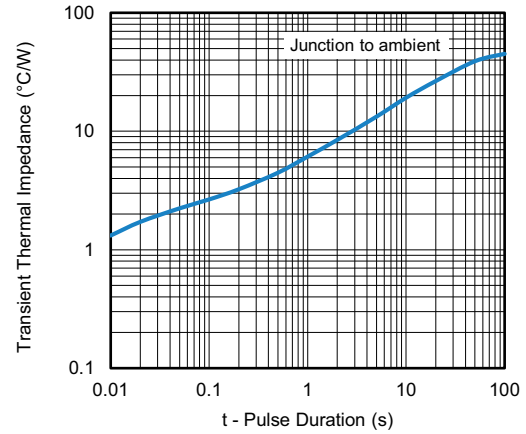


Fig. 6 - Typical Transient Thermal Impedance

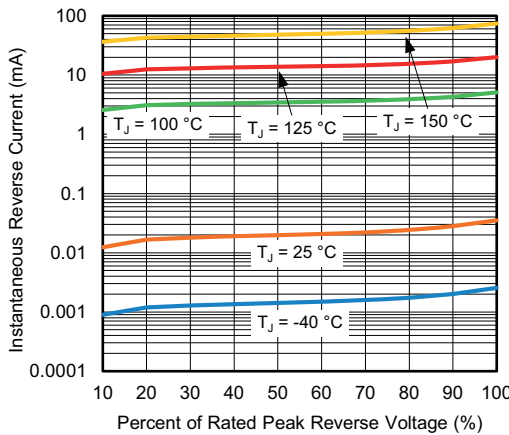


Fig. 4 - Typical Reverse Characteristics

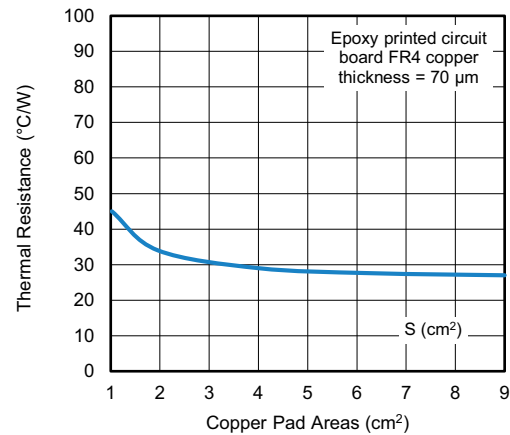


Fig. 7 - Thermal Resistance Junction-to-Ambient vs. Copper Pad Areas

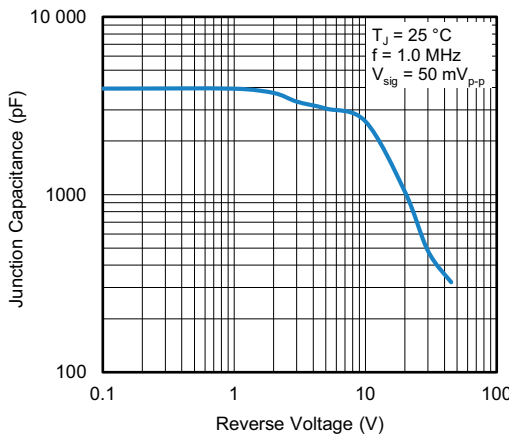
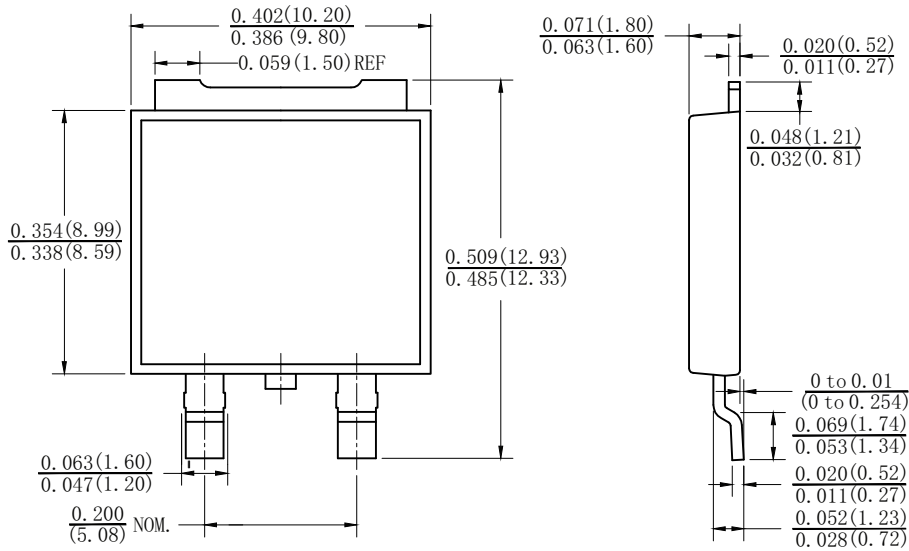


Fig. 5 - Typical Junction Capacitance

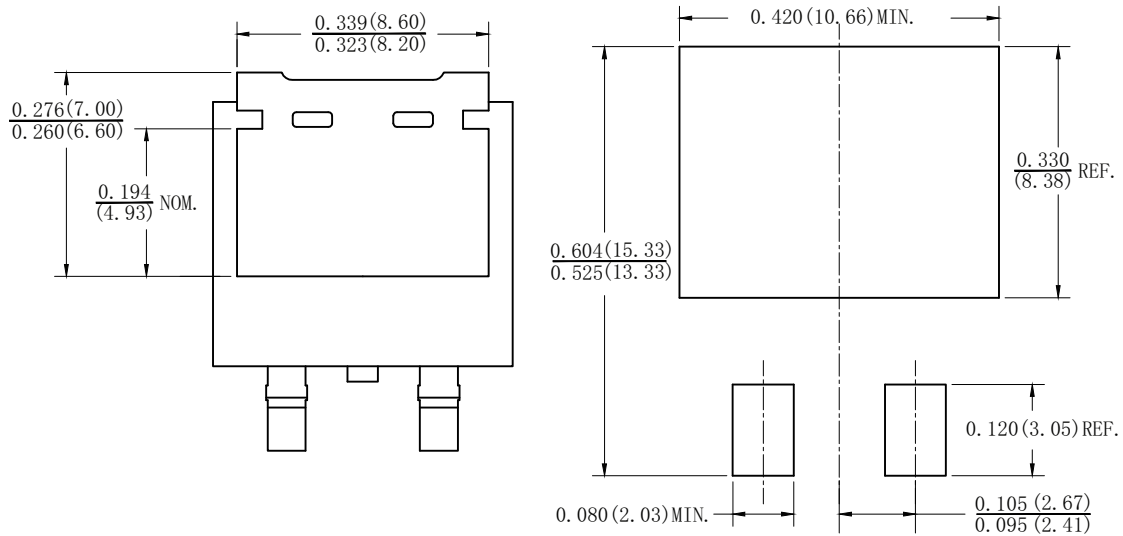


PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMPD (TO-263AC)



Mounting Pad Layout





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