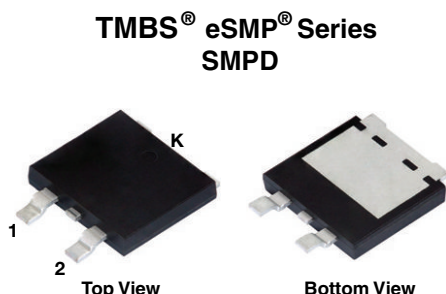
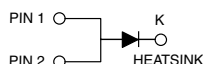


# Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

Ultra Low  $V_F = 0.26\text{ V}$  at  $I_F = 5\text{ A}$



**V40DL45BP**



## 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

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 1A whisker test

**Polarity:** As marked

## PRIMARY CHARACTERISTICS

|                                                        |            |
|--------------------------------------------------------|------------|
| $I_{F(DC)}$                                            | 40 A       |
| $V_{RRM}$                                              | 45 V       |
| $I_{FSM}$                                              | 240 A      |
| $V_F$ at $I_F = 40\text{ A}$ ( $T_A = 125\text{ °C}$ ) | 0.53 V     |
| $T_{OP}$ max. (AC model)                               | 150 °C     |
| $T_J$ max. (DC forward current)                        | 200 °C     |
| Package                                                | SMPD       |
| Diode variations                                       | Single die |

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

| PARAMETER                                                                            | SYMBOL                     | V40DL45BP   | UNIT |
|--------------------------------------------------------------------------------------|----------------------------|-------------|------|
| Maximum repetitive peak reverse voltage                                              | $V_{RRM}$                  | 45          | V    |
| Maximum DC forward current (fig. 1)                                                  | $I_{F(DC)}$ <sup>(1)</sup> | 40          | A    |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load    | $I_{FSM}$                  | 240         | 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

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

| PARAMETER                     | TEST CONDITIONS     | SYMBOL      | TYP. | MAX. | UNIT |
|-------------------------------|---------------------|-------------|------|------|------|
| Instantaneous forward voltage | $I_F = 5\text{ A}$  | $V_F^{(1)}$ | 0.38 | -    | V    |
|                               | $I_F = 20\text{ A}$ |             | 0.47 | -    |      |
|                               | $I_F = 40\text{ A}$ |             | 0.58 | 0.66 |      |
|                               | $I_F = 5\text{ A}$  |             | 0.26 | -    |      |
|                               | $I_F = 20\text{ A}$ |             | 0.38 | -    |      |
|                               | $I_F = 40\text{ A}$ |             | 0.53 | 0.61 |      |
| Reverse current               | $V_R = 45\text{ V}$ | $I_R^{(2)}$ | -    | 5    | mA   |
|                               |                     |             | 36   | 125  |      |

**Notes**

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

(2) Pulse test: Pulse width  $\leq 5\text{ ms}$ 
**THERMAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

| PARAMETER                  | SYMBOL                   | V40DL45BP | UNIT                 |
|----------------------------|--------------------------|-----------|----------------------|
| Typical thermal resistance | $R_{\theta JC}$          | 0.9       | $^{\circ}\text{C/W}$ |
|                            | $R_{\theta JA}^{(1)(2)}$ | 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

**ORDERING INFORMATION** (Example)

| PACKAGE | PREFERRED P/N  | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|---------|----------------|-----------------|--------------|---------------|------------------------------------|
| SMPD    | V40DL45BP-M3/I | 0.55            | I            | 2000/reel     | 13" diameter plastic tape and reel |

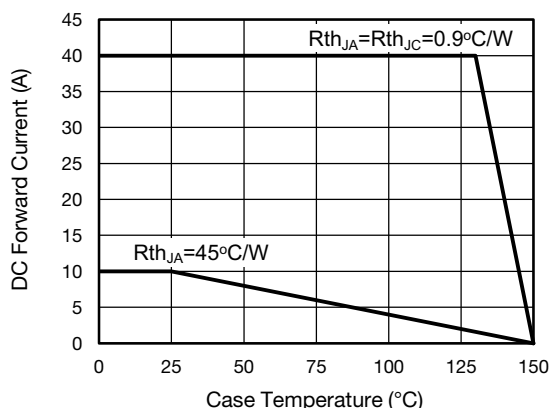
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Forward Current Derating Curve

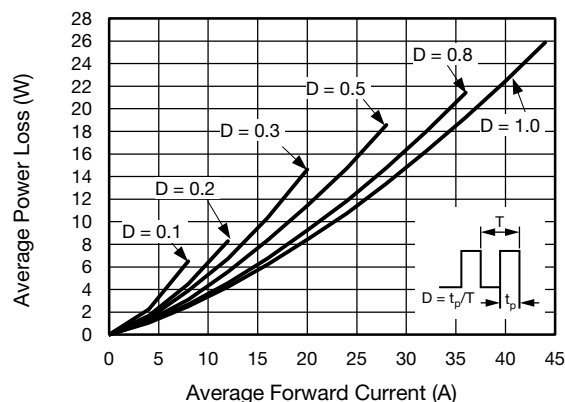


Fig. 2 - Forward Power Loss Characteristics

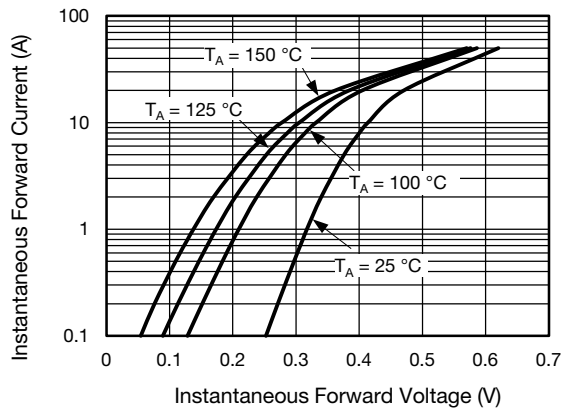


Fig. 3 - Typical Instantaneous Forward Characteristics

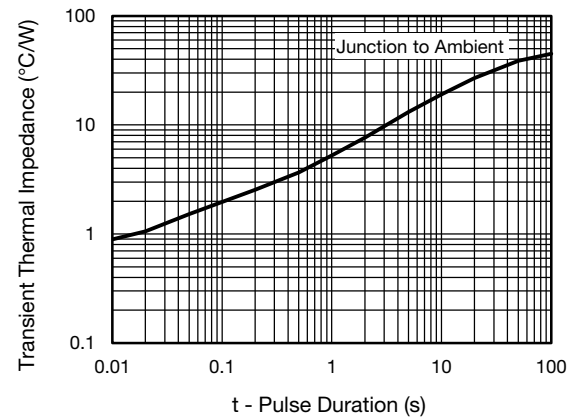


Fig. 6 - Typical Transient Thermal Impedance

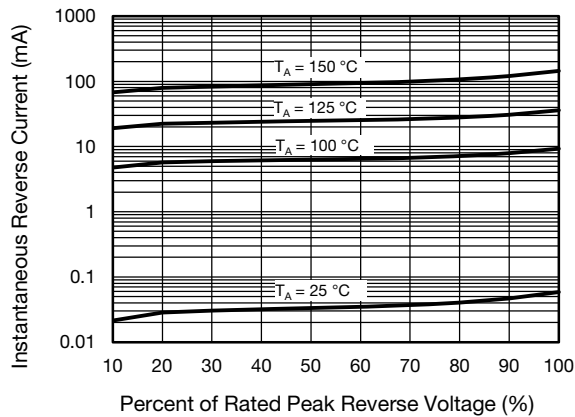


Fig. 4 - Typical Reverse Characteristics

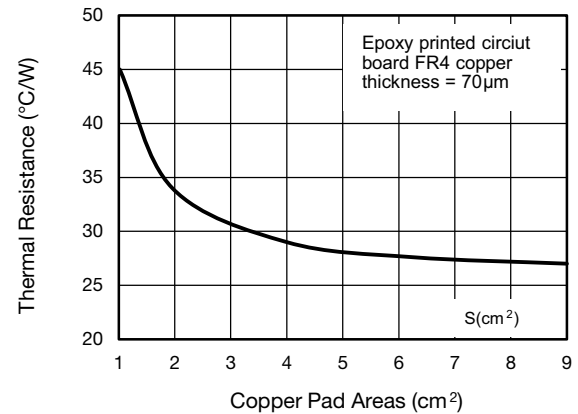


Fig. 7 - Thermal Resistance Junction-to-Ambient vs. Copper Pad Areas

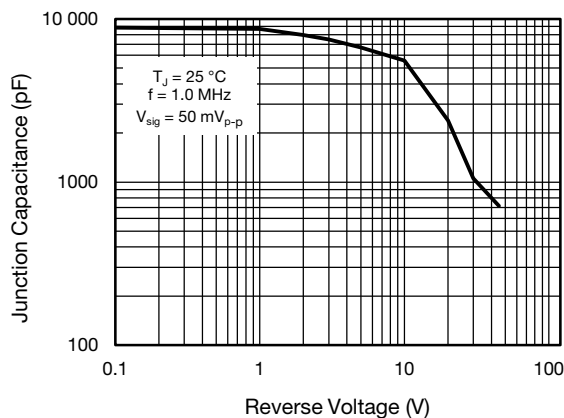
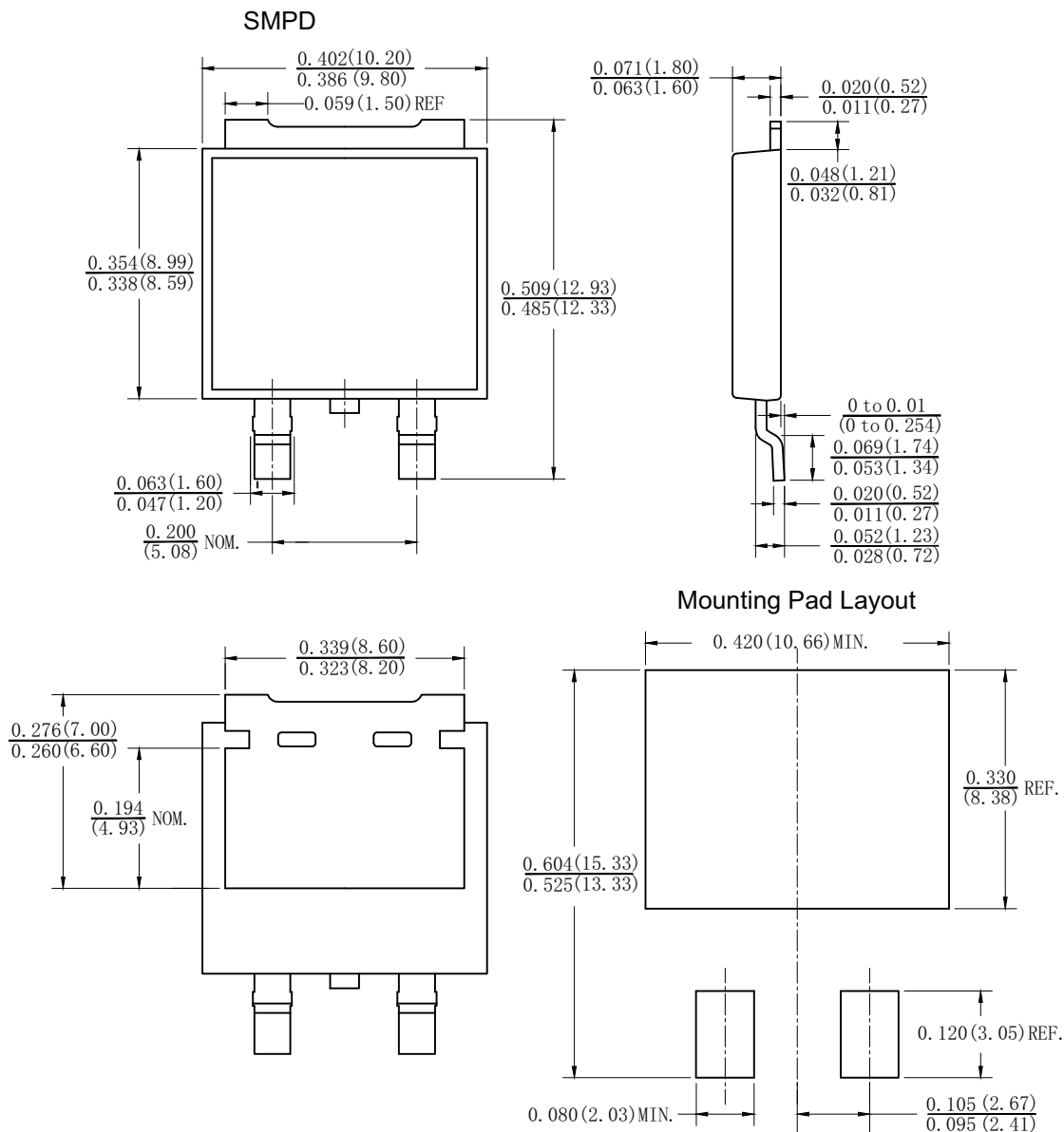


Fig. 5 - Typical Junction Capacitance

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




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