

# High Current Density Surface-Mount TMBS<sup>®</sup> (Trench MOS Barrier Schottky) Rectifier

 Ultra Low  $V_F = 0.35\text{ V}$  at  $I_F = 5\text{ A}$ 


SlimDPAK (TO-252AE)



## LINKS TO ADDITIONAL RESOURCES



3D Models

| PRIMARY CHARACTERISTICS                                |                     |
|--|---------------------|
| $I_{F(AV)}$  | 2 x 20 A            |
| $V_{RRM}$  | 45 V                |
| $I_{FSM}$  | 240 A               |
| $V_F$ at $I_F = 20\text{ A}$ ( $T_A = 125\text{ °C}$ ) | 0.52 V              |
| $T_J$ max.   | 175 °C              |
| Package  | SlimDPAK (TO-252AE) |
| Circuit configuration                                  | Common cathode      |

## FEATURES

- Very low profile - typical height of 1.3 mm
- Trench MOS Schottky technology
- 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
- AEC-Q101 qualified available  
- Automotive ordering code: base P/NHM3
- 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 low voltage high frequency DC/DC converters, freewheeling diodes, and polarity protection applications.

## MECHANICAL DATA

**Case:** SlimDPAK (TO-252AE)

Molding compound meets UL 94 V-0 flammability rating

Base P/N-M3 - halogen-free, RoHS-compliant

Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

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

M3 and HM3 suffix meets JESD 201 class 2 whisker test

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                               |                            |             |      |
|--|----------------------------|-------------|------|
| PARAMETER  | SYMBOL                     | V40PWM45C   | UNIT |
| Device marking code  |                            | V40PWM45C   |      |
| Maximum repetitive peak reverse voltage  | $V_{RRM}$                  | 45          | V    |
| Maximum average forward rectified current (fig. 1)   | $I_{F(AV)}$ <sup>(1)</sup> | per device  | 40   |
|  |                            | per diode   | 20   |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load per diode | $I_{FSM}$                  | 240         | A    |
| Operating junction temperature range   | $T_J$ <sup>(2)</sup>       | -40 to +175 | °C   |
| Storage temperature range  | $T_{STG}$                  | -55 to +175 | °C   |

## Notes

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

<sup>(2)</sup> The heat generated must be less than the thermal conductivity from junction to ambient:  $dP_D/dT_J < 1/R_{\theta JA}$



| ELECTRICAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                      |                                   |             |      |      |    |
|---|----------------------|-----------------------------------|-------------|------|------|----|
| PARAMETER   | TEST CONDITIONS      | SYMBOL                            | TYP.        | MAX. | UNIT |    |
| Instantaneous forward voltage per diode   | $I_F = 5.0\text{ A}$ | $T_A = 25\text{ }^\circ\text{C}$  | $V_F^{(1)}$ | 0.47 | -    | V  |
|   | $I_F = 10\text{ A}$  |                                   |             | 0.51 | -    |    |
|   | $I_F = 20\text{ A}$  |                                   |             | 0.59 | 0.67 |    |
|   | $I_F = 5.0\text{ A}$ | $T_A = 125\text{ }^\circ\text{C}$ |             | 0.35 | -    |    |
|   | $I_F = 10\text{ A}$  |                                   |             | 0.42 | -    |    |
|   | $I_F = 20\text{ A}$  |                                   |             | 0.52 | 0.60 |    |
| Reverse current per diode   | $V_R = 45\text{ V}$  | $T_A = 25\text{ }^\circ\text{C}$  | $I_R^{(2)}$ | -    | 0.4  | mA |
|   |                      | $T_A = 125\text{ }^\circ\text{C}$ |             | 5    | 16   |    |
| Typical junction capacitance  | 4.0 V, 1 MHz         | $C_J$                             | 2710        | -    | pF   |    |

**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                   | V40PWM45C | UNIT               |
| Typical thermal resistance   | $R_{\theta JA}^{(1)(2)}$ | 55        | $^\circ\text{C/W}$ |
|  | $R_{\theta JM}^{(3)}$    | 1.5       |                    |

**Notes**

- (1) The heat generated must be less than thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$   
(2) Free air, mounted on recommended copper pad area; thermal resistance  $R_{\theta JA}$  - junction to ambient  
(3) Mounted on infinite heat sink; thermal resistance  $R_{\theta JM}$  - junction-to-mount

| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| V40PWM45C-M3/I                 | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |
| V40PWM45CHM3/I <sup>(1)</sup>  | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |

**Note**

- (1) AEC-Q101 qualified

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

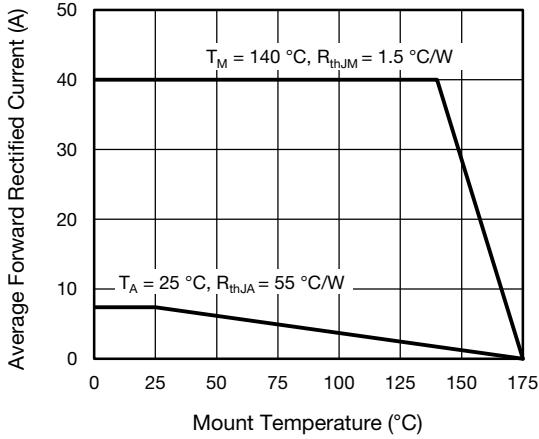


Fig. 1 - Maximum Forward Current Derating Curve

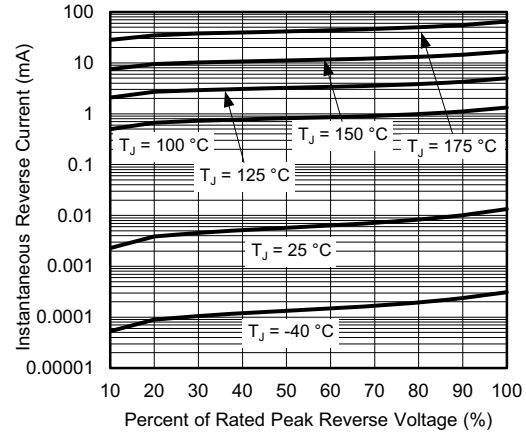


Fig. 4 - Typical Reverse Leakage Characteristics

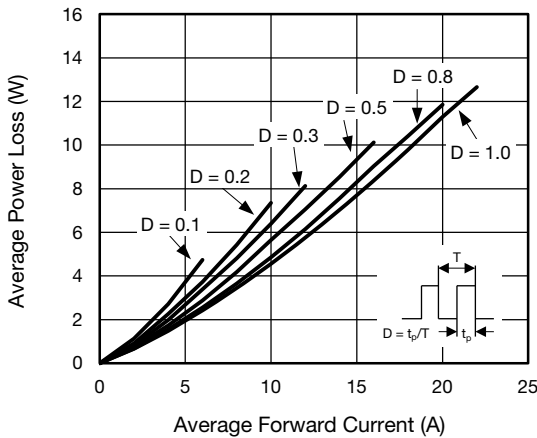


Fig. 2 - Forward Power Loss Characteristics

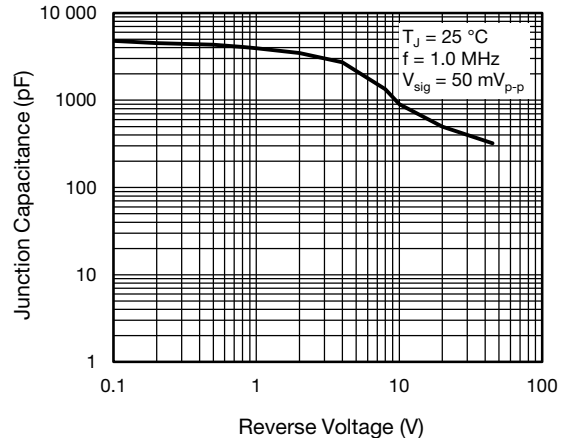


Fig. 5 - Typical Junction Capacitance

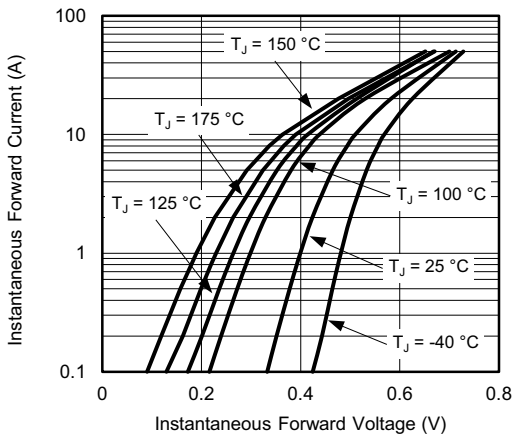


Fig. 3 - Typical Instantaneous Forward Characteristics

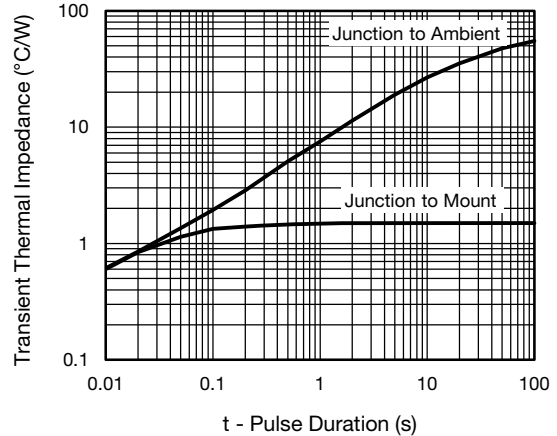


Fig. 6 - Typical Transient Thermal Impedance

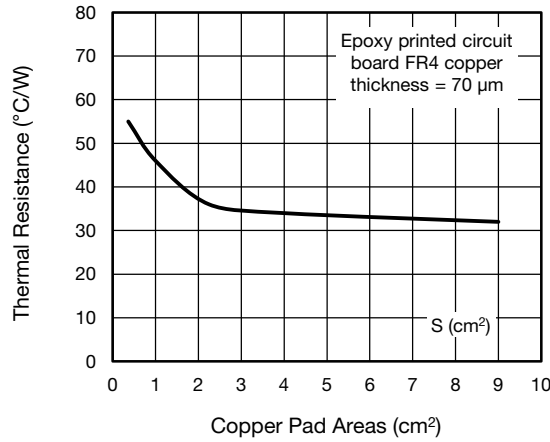
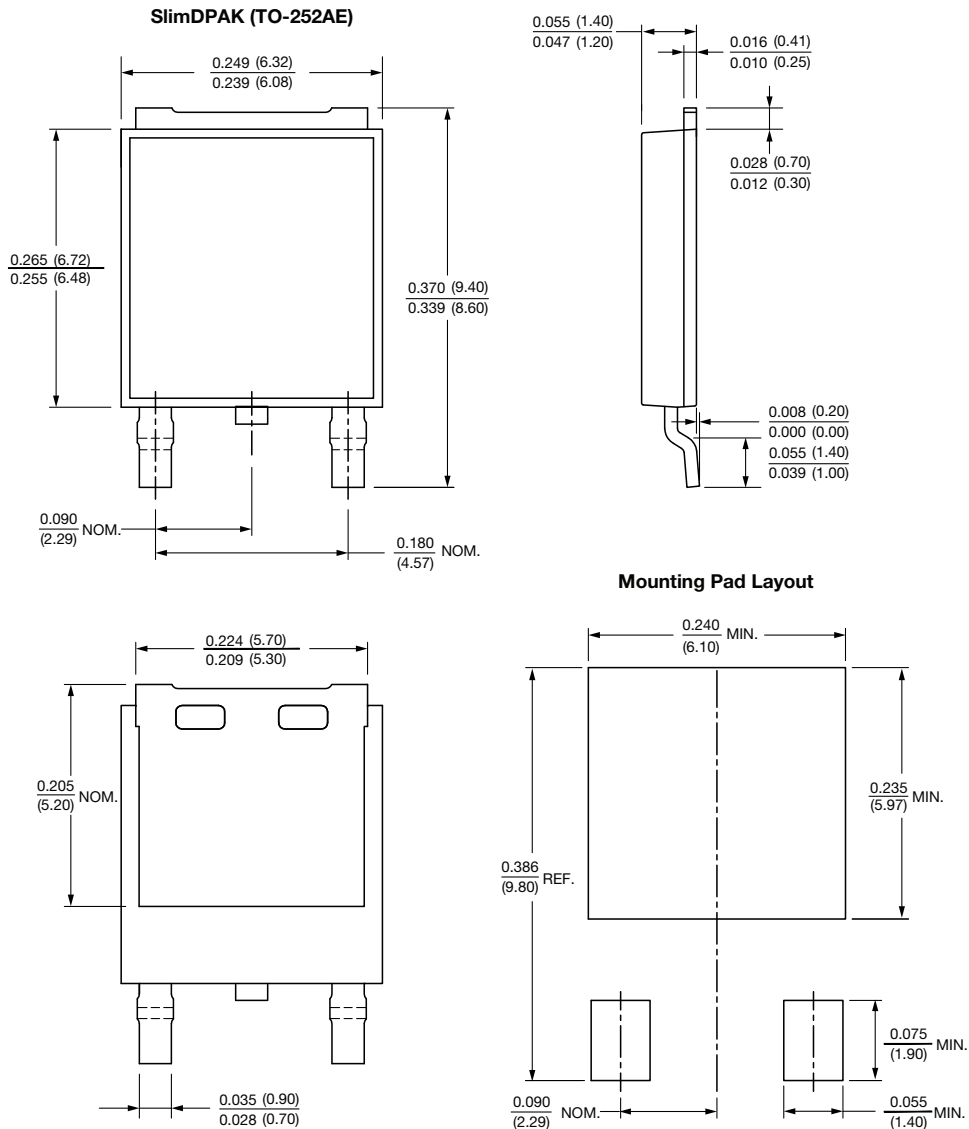


Fig. 7 - Typical Resistance Junction to Ambient vs. Copper Pad Areas

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





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