

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

Ultra Low  $V_F = 0.54 \text{ V}$  at  $I_F = 3 \text{ A}$

eSMP® Series



SlimDPAK (TO-252AE)



## 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)

AUTOMOTIVE  
GRADE  
Available



RoHS  
COMPLIANT  
HALOGEN  
FREE

## LINKS TO ADDITIONAL RESOURCES



3D Models

## PRIMARY CHARACTERISTICS

|                                                         |                     |
|---------------------------------------------------------|---------------------|
| $I_{F(AV)}$                                             | 6 A                 |
| $V_{RRM}$                                               | 120 V               |
| $I_{FSM}$                                               | 100 A               |
| $V_F$ at $I_F = 6 \text{ A}$ ( $T_J = 125 \text{ °C}$ ) | 0.63 V              |
| $T_J$ max.                                              | 175 °C              |
| Package                                                 | SlimDPAK (TO-252AE) |
| Circuit configuration                                   | Single              |

## 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            | V6PWM12     | UNIT |
|------------------------------------------------------------------------------------|-------------------|-------------|------|
| Device marking code                                                                |                   | V6PWM12     |      |
| Maximum repetitive peak reverse voltage                                            | $V_{RRM}$         | 120         | V    |
| Maximum average forward rectified current (Fig. 1)                                 | $I_{F(AV)}^{(1)}$ | 6           | A    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$         | 100         | A    |
| Operating junction temperature range                                               | $T_J^{(2)}$       | -40 to +175 | °C   |
| Storage temperature range                                                          | $T_{STG}$         | -55 to +175 | °C   |

### Notes

(1) With infinite heatsink

(2) 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 <sub>J</sub> = 25 °C unless otherwise noted) |                        |                         |                               |       |      |      |
|----------------------------------------------------------------------------|------------------------|-------------------------|-------------------------------|-------|------|------|
| PARAMETER                                                                  | TEST CONDITIONS        |                         | SYMBOL                        | TYP.  | MAX. | UNIT |
| Instantaneous forward voltage                                              | I <sub>F</sub> = 3 A   | T <sub>J</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.63  | -    | V    |
|                                                                            | I <sub>F</sub> = 6 A   |                         |                               | 0.78  | 0.83 |      |
|                                                                            | I <sub>F</sub> = 3 A   | T <sub>J</sub> = 125 °C |                               | 0.54  | -    |      |
|                                                                            | I <sub>F</sub> = 6 A   |                         |                               | 0.63  | 0.69 |      |
| Reverse current                                                            | V <sub>R</sub> = 90 V  | T <sub>J</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 0.001 | -    | mA   |
|                                                                            |                        | T <sub>J</sub> = 125 °C |                               | 1     | -    |      |
|                                                                            | V <sub>R</sub> = 120 V | T <sub>J</sub> = 25 °C  |                               | -     | 0.1  |      |
|                                                                            |                        | T <sub>J</sub> = 125 °C |                               | 2     | 5    |      |
| Typical junction capacitance                                               | 4.0 V, 1 MHz           |                         | C <sub>J</sub>                | 530   | -    | pF   |

**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                   | V6PWM12 | UNIT                 |
| Typical thermal resistance                                                                  | $R_{\theta JA}^{(1)(2)}$ | 65      | $^{\circ}\text{C/W}$ |
|                                                                                             | $R_{\theta JM}^{(3)}$    | 3.0     |                      |

**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

| <b>ORDERING INFORMATION</b> (Example) |                 |                        |               |                                    |
|---------------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                         | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| V6PWM12-M3/I                          | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |
| V6PWM12HM3/I <sup>(1)</sup>           | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

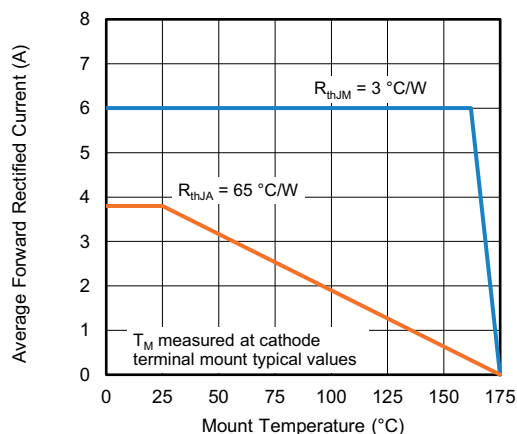
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

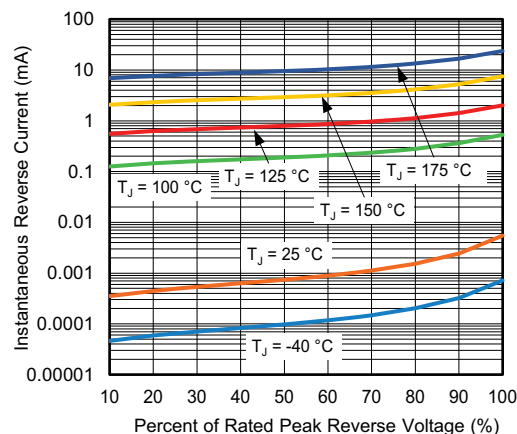


Fig. 4 - Typical Reverse Leakage Characteristics

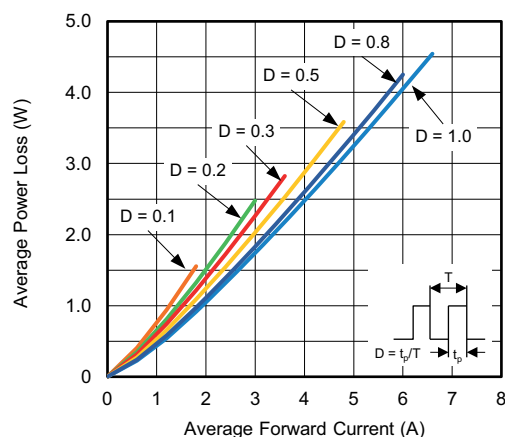


Fig. 2 - Forward Power Loss Characteristics

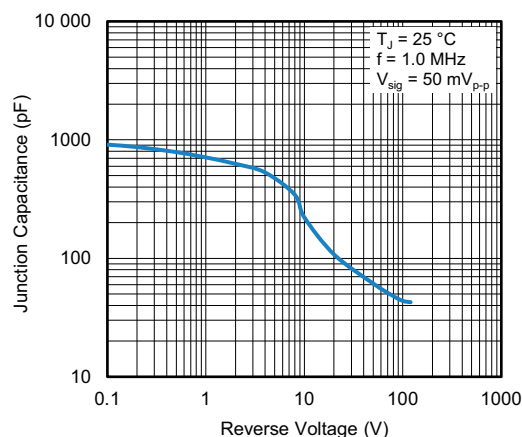


Fig. 5 - Typical Junction Capacitance

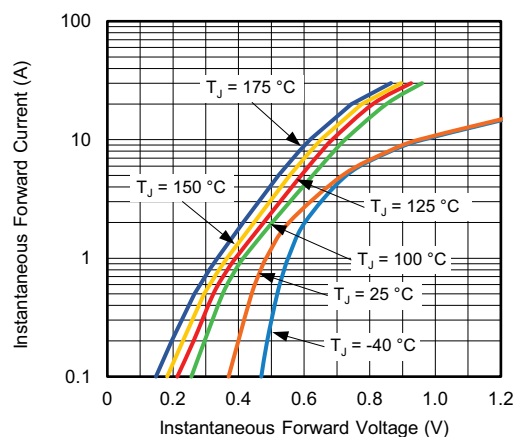


Fig. 3 - Typical Instantaneous Forward Characteristics

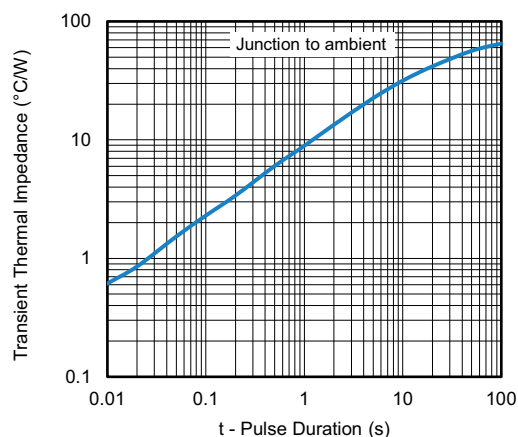


Fig. 6 - Typical Transient Thermal Impedance

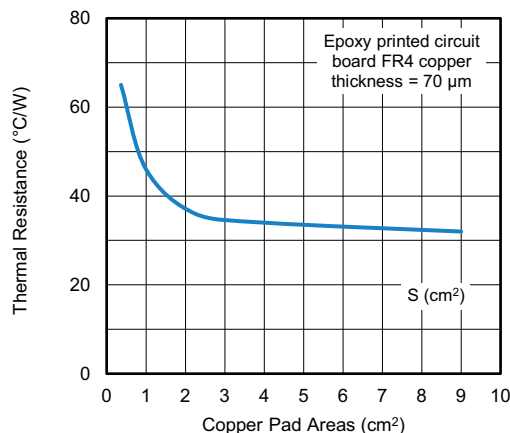
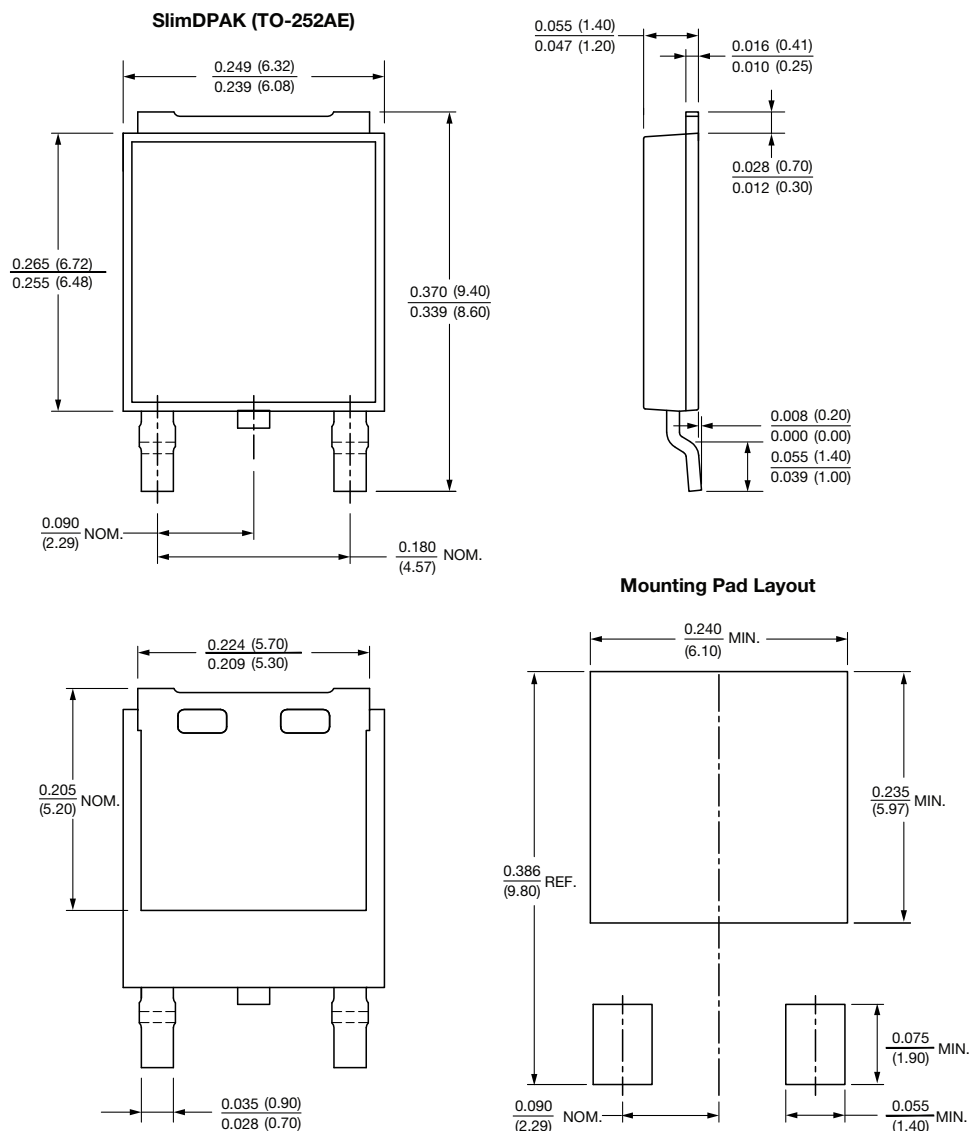


Fig. 7 - Typical Resistance Junction to Ambient vs. Copper Pad Areas

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




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