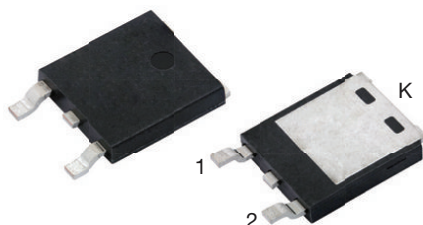


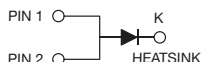
# High Current Density Surface-Mount TMBS® (Trench MOS Barrier Schottky) Rectifier

Ultra Low  $V_F = 0.47\text{ V}$  at  $I_F = 5\text{ A}$

eSMP® Series



SlimDPAK (TO-252AE)



## LINKS TO ADDITIONAL RESOURCES



## 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

## 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

## PRIMARY CHARACTERISTICS

|                                                        |                     |
|--------------------------------------------------------|---------------------|
| $I_{F(AV)}$                                            | 20 A                |
| $V_{RRM}$                                              | 100 V               |
| $I_{FSM}$                                              | 200 A               |
| $V_F$ at $I_F = 20\text{ A}$ ( $T_A = 125\text{ °C}$ ) | 0.70 V              |
| $T_J$ max.                                             | 175 °C              |
| Package                                                | SlimDPAK (TO-252AE) |
| Circuit configuration                                  | Single              |

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

| PARAMETER                                                                          | SYMBOL            | V20PWM10    | UNIT |
|------------------------------------------------------------------------------------|-------------------|-------------|------|
| Device marking code                                                                |                   | V20PWM10    |      |
| Maximum repetitive peak reverse voltage                                            | $V_{RRM}$         | 100         | V    |
| Maximum average forward rectified current (Fig. 1)                                 | $I_{F(AV)}^{(1)}$ | 20          | A    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$         | 200         | 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** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

| PARAMETER                     | TEST CONDITIONS        |                         | SYMBOL                        | TYP. | MAX. | UNIT |
|-------------------------------|------------------------|-------------------------|-------------------------------|------|------|------|
| Instantaneous forward voltage | I <sub>F</sub> = 5.0 A | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.55 | -    | V    |
|                               | I <sub>F</sub> = 10 A  |                         |                               | 0.65 | -    |      |
|                               | I <sub>F</sub> = 20 A  |                         |                               | 0.82 | 0.90 |      |
|                               | I <sub>F</sub> = 5.0 A | T <sub>A</sub> = 125 °C |                               | 0.47 | -    |      |
|                               | I <sub>F</sub> = 10 A  |                         |                               | 0.58 | -    |      |
|                               | I <sub>F</sub> = 20 A  |                         |                               | 0.70 | 0.78 |      |
| Reverse current               | V <sub>R</sub> = 70 V  | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 0.01 | -    | mA   |
|                               |                        | T <sub>A</sub> = 125 °C |                               | 3    | -    |      |
|                               | V <sub>R</sub> = 100 V | T <sub>A</sub> = 25 °C  |                               | -    | 0.2  |      |
|                               |                        | T <sub>A</sub> = 125 °C |                               | 5    | 15   |      |
| Typical junction capacitance  | 4.0 V, 1 MHz           |                         | C <sub>J</sub>                | 1575 | -    | 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                   | V20PWM10 | UNIT                 |
|----------------------------|--------------------------|----------|----------------------|
| Typical thermal resistance | $R_{\theta JA}^{(1)(2)}$ | 55       | $^{\circ}\text{C/W}$ |
|                            | $R_{\theta JM}^{(3)}$    | 2.0      |                      |

**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**ORDERING INFORMATION** (Example)

| PREFERRED P/N                | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|------------------------------|-----------------|------------------------|---------------|------------------------------------|
| V20PWM10-M3/I                | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |
| V20PWM10HM3/I <sup>(1)</sup> | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

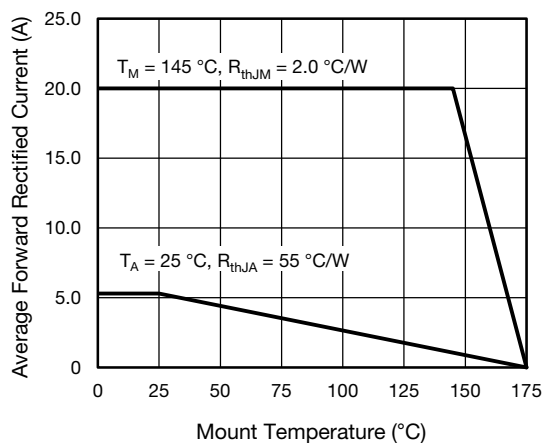
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

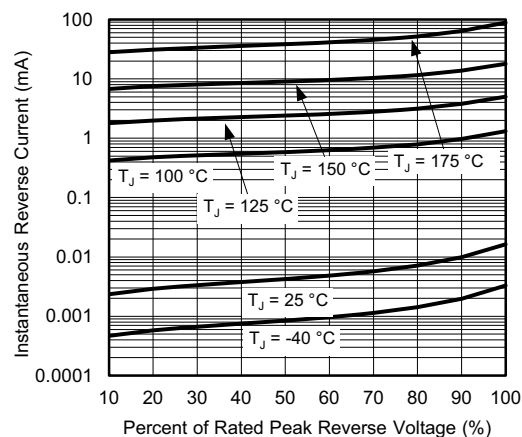


Fig. 4 - Typical Reverse Leakage Characteristics

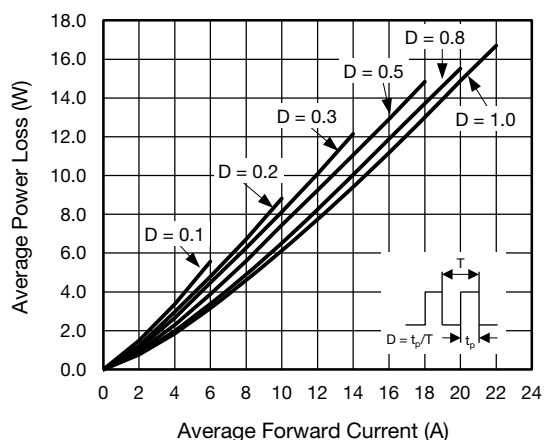


Fig. 2 - Forward Power Loss Characteristics

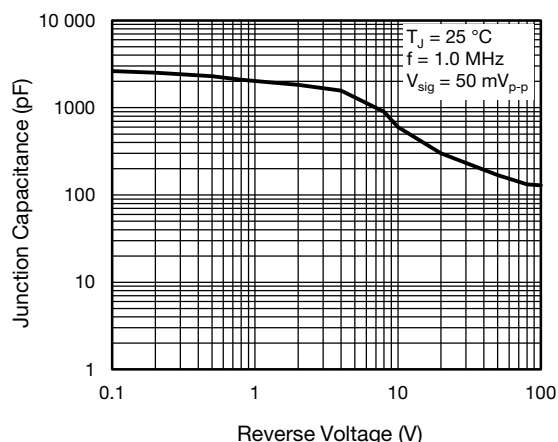


Fig. 5 - Typical Junction Capacitance

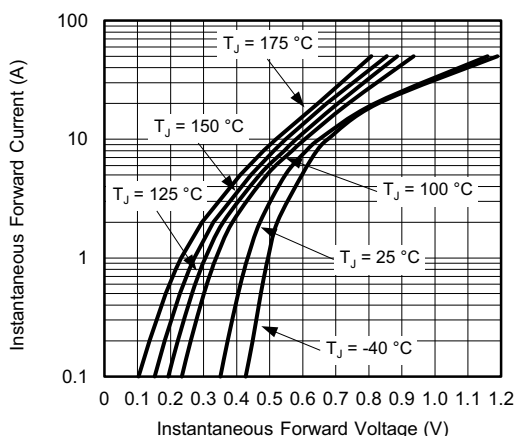


Fig. 3 - Typical Instantaneous Forward Characteristics

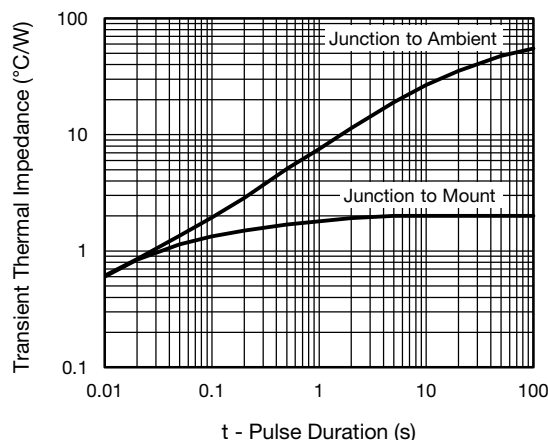


Fig. 6 - Typical Transient Thermal Impedance

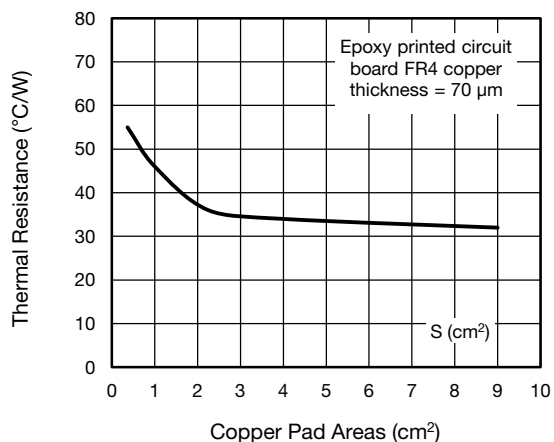
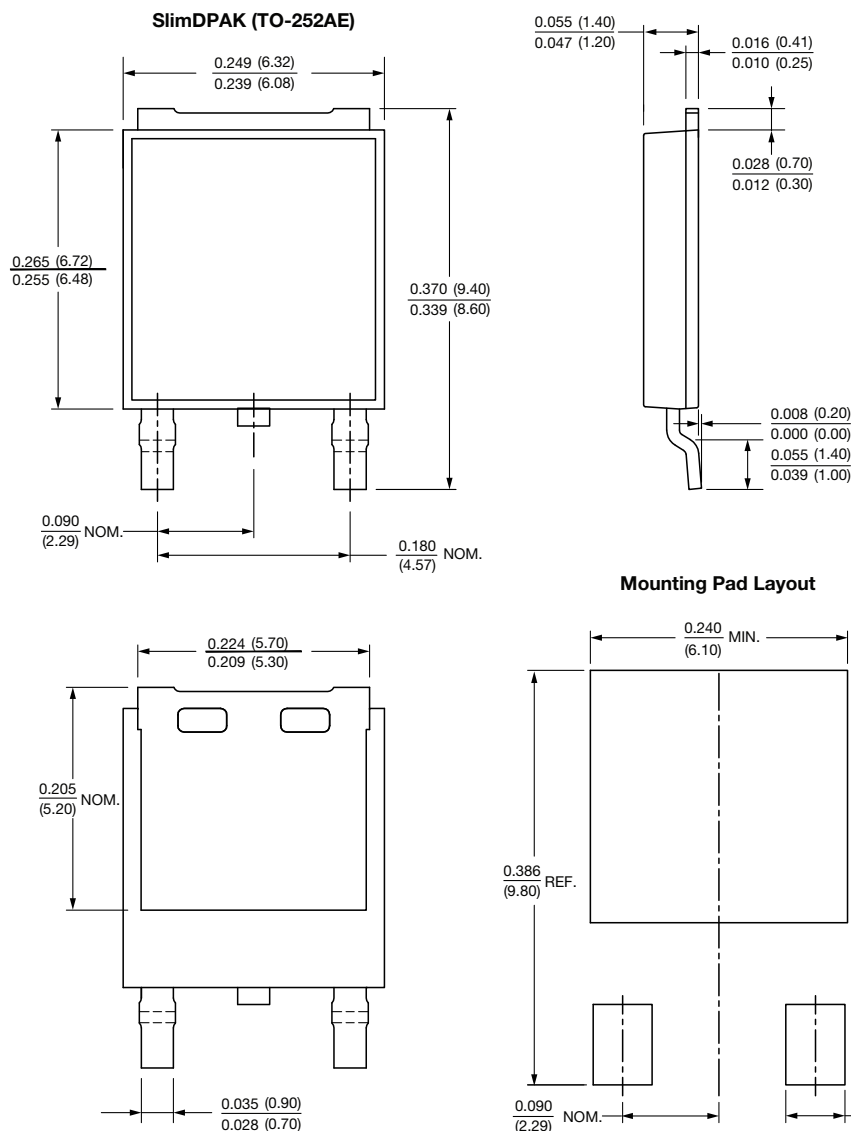


Fig. 7 - Typical Resistance Junction to Ambient vs. Copper Pad Areas

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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