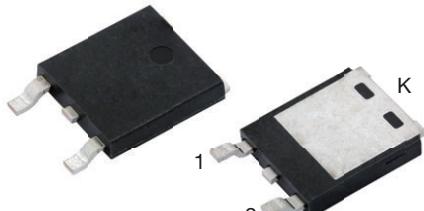


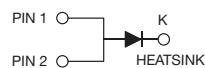
## High Current Density Surface-Mount TMBS® (Trench MOS Barrier Schottky) Rectifier

Ultra Low  $V_F$  = 0.35 V at  $I_F$  = 5 A

### eSMP® Series



**SlimDPAK (TO-252AE)**



### LINKS TO ADDITIONAL RESOURCES



3D Models

### 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

| PRIMARY CHARACTERISTICS                 |                     |
|---|---------------------|
| $I_{F(AV)}$                             | 20 A                |
| $V_{RRM}$                               | 45 V                |
| $I_{FSM}$                               | 200 A               |
| $V_F$ at $I_F$ = 20 A ( $T_A$ = 125 °C) | 0.51 V              |
| $T_J$ max.                              | 175 °C              |
| Package                                 | SlimDPAK (TO-252AE) |
| Circuit configuration                   | Single              |

| MAXIMUM RATINGS ( $T_A$ = 25 °C unless otherwise noted)                            |                            |             |      |
|--|----------------------------|-------------|------|
| PARAMETER  | SYMBOL                     | V20PWM45    | UNIT |
| Device marking code  |                            | V20PWM45    |      |
| Maximum repetitive peak reverse voltage  | $V_{RRM}$                  | 45          | V    |
| Maximum average forward rectified current (Fig. 1)                                 | $I_{F(AV)}$ <sup>(1)</sup> | 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   | $T_J$ <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:  $dP_D/dT_J < 1/R_{\theta JA}$

| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted) |                       |                           |                      |      |      |      |  |
|--|-----------------------|---------------------------|----------------------|------|------|------|--|
| PARAMETER  | TEST CONDITIONS       |                           | SYMBOL               | TYP. | MAX. | UNIT |  |
| Instantaneous forward voltage  | $I_F = 5.0 \text{ A}$ | $T_A = 25^\circ\text{C}$  | $V_F$ <sup>(1)</sup> | 0.47 | -    | V    |  |
|  | $I_F = 10 \text{ A}$  |                           |                      | 0.51 | -    |      |  |
|  | $I_F = 20 \text{ A}$  |                           |                      | 0.58 | 0.66 |      |  |
|  | $I_F = 5.0 \text{ A}$ | $T_A = 125^\circ\text{C}$ |                      | 0.35 | -    |      |  |
|  | $I_F = 10 \text{ A}$  |                           |                      | 0.42 | -    |      |  |
|  | $I_F = 20 \text{ A}$  |                           |                      | 0.51 | 0.59 |      |  |
| Reverse current  | $V_R = 45 \text{ V}$  | $T_A = 25^\circ\text{C}$  | $I_R$ <sup>(2)</sup> | -    | 0.7  | mA   |  |
|  |                       | $T_A = 125^\circ\text{C}$ |                      | 7    | 20   |      |  |
| Typical junction capacitance   | 4.0 V, 1 MHz          |                           | $C_J$                | 3100 | -    | 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> ( $T_A = 25^\circ\text{C}$ unless otherwise noted) |                                   |          |  |      |
|---|-----------------------------------|----------|--|------|
| PARAMETER   | SYMBOL                            | V20PWM45 |  | UNIT |
| Typical thermal resistance  | $R_{\theta JA}$ <sup>(1)(2)</sup> | 55       |  | °C/W |
|   | $R_{\theta JM}$ <sup>(3)</sup>    | 1.8      |  |      |

**Notes**

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

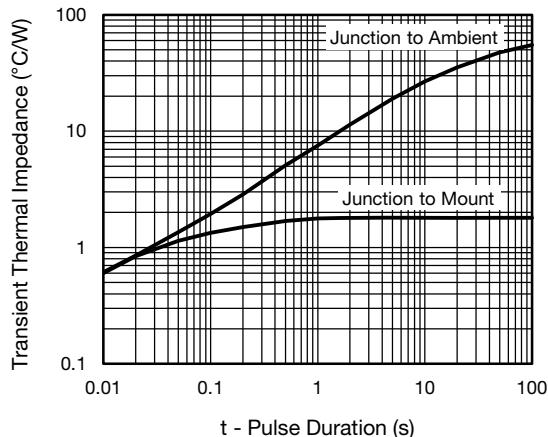
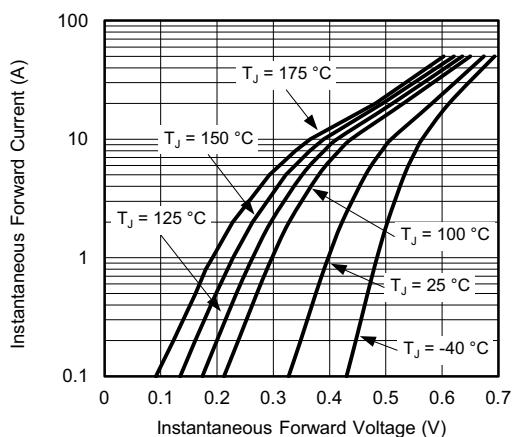
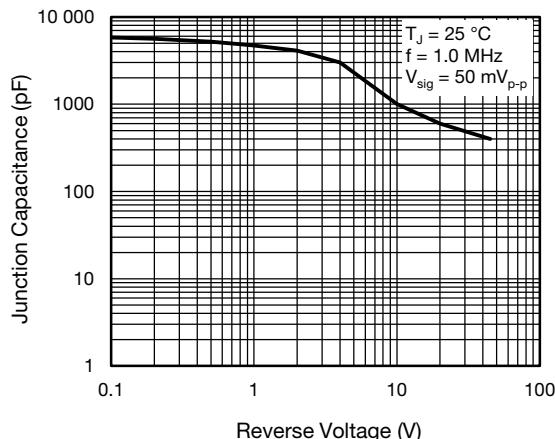
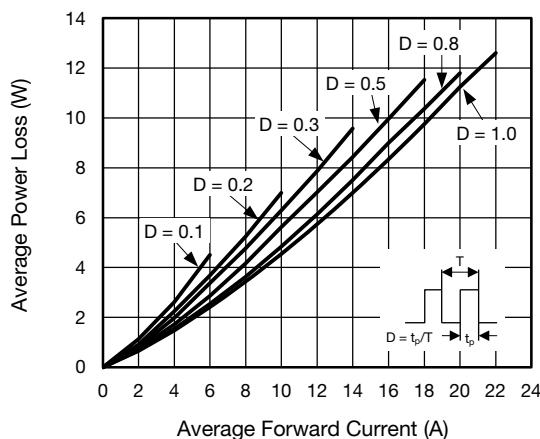
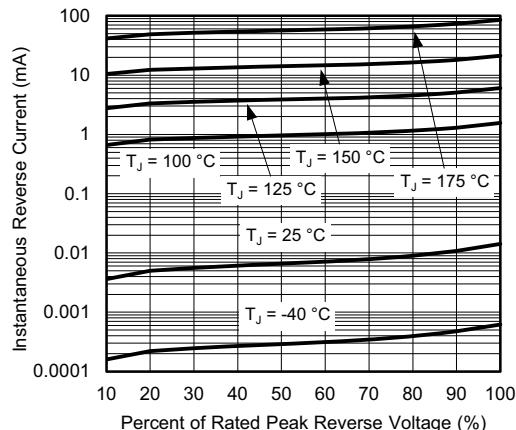
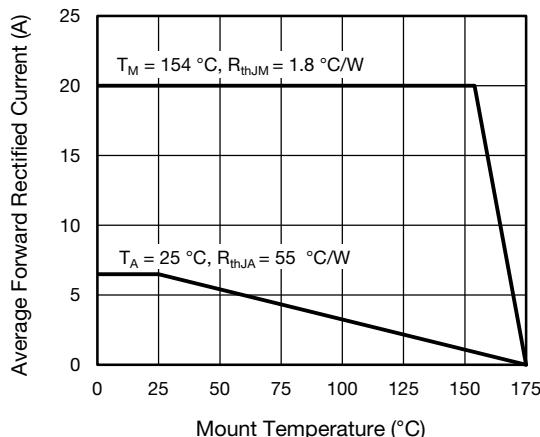
(2) Free air, mounted on recommended copper pad area; thermal resistance  $R_{\theta JA}$  - junction to ambient

(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                      |
| V20PWM45-M3/I                         | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |
| V20PWM45HM3/I <sup>(1)</sup>          | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

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


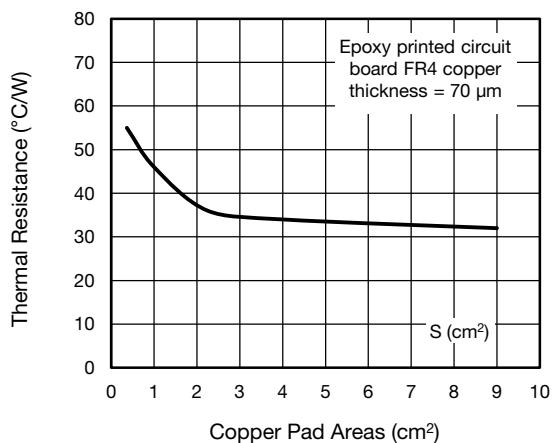
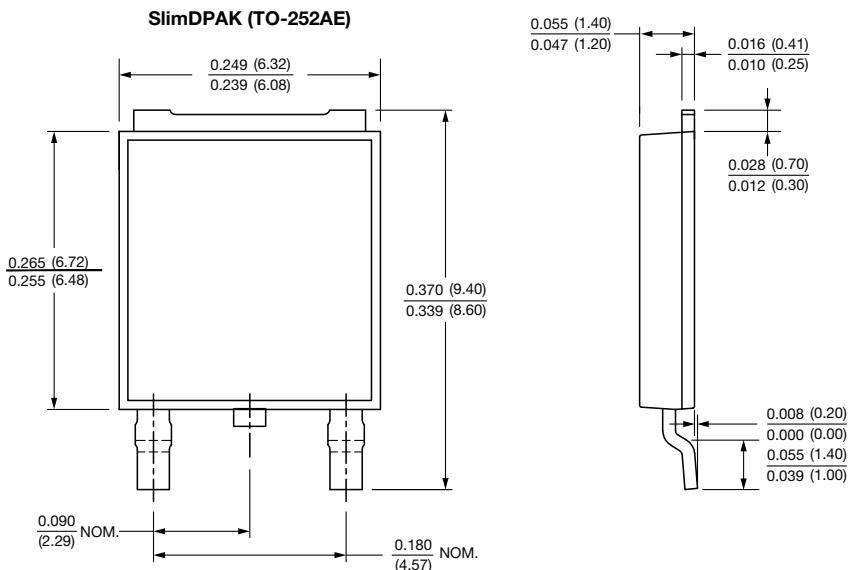
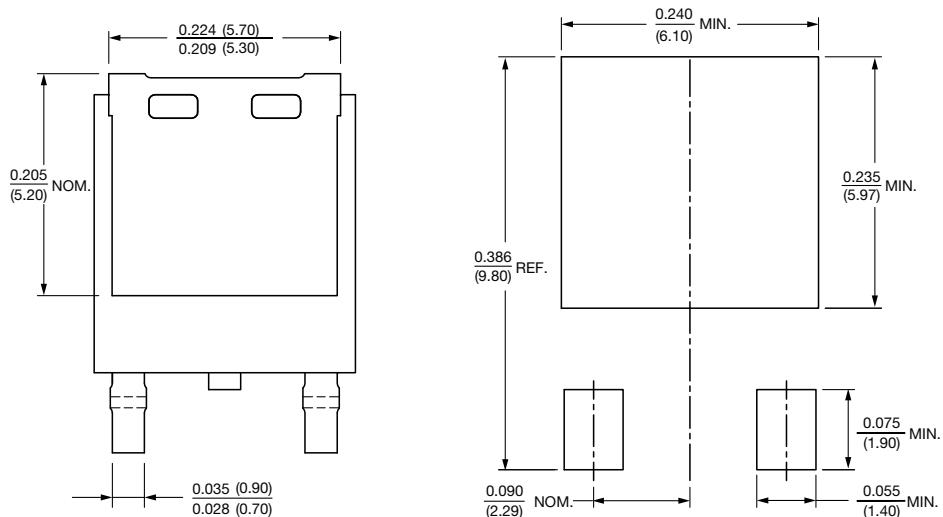


Fig. 7 - Typical Resistance Junction to Ambient vs.  
Copper Pad Areas

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)



Mounting Pad Layout



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