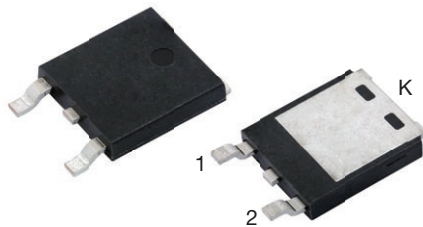


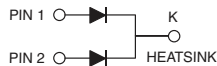
# High Current Density Surface-Mount TMBS® (Trench MOS Barrier Schottky) Rectifier

 Ultra Low  $V_F = 0.39$  V at  $I_F = 5$  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

|   |                     |
|---|---------------------|
| $I_{F(AV)}$                             | 20 A                |
| $V_{RRM}$                               | 45 V                |
| $I_{FSM}$                               | 150 A               |
| $V_F$ at $I_F = 10$ A ( $T_A = 125$ °C) | 0.46 V              |
| $T_J$ max.                              | 175 °C              |
| Package                                 | SlimDPAK (TO-252AE) |
| Circuit configuration                   | Common cathode      |

## 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 ( $T_A = 25$ °C unless otherwise noted)

| PARAMETER  | SYMBOL   | V20PWM45C   | UNIT |
|--|--|-------------|------|
| Device marking code  |  | V20PWM45C   |      |
| Maximum repetitive peak reverse voltage  | $V_{RRM}$  | 45          | V    |
| Maximum average forward rectified current (fig. 1)   | $I_{F(AV)}$ <sup>(1)</sup><br>per device / per diode | 20          | A    |
|  |  | 10          | A    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load per diode | $I_{FSM}$  | 150         | 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 | $I_F = 5.0\text{ A}$ | $T_A = 25\text{ }^\circ\text{C}$  | 0.49 | -    | V    |
|   | $I_F = 10\text{ A}$  |                                   | 0.54 | 0.62 |      |
|   | $I_F = 5.0\text{ A}$ | $T_A = 125\text{ }^\circ\text{C}$ | 0.39 | -    |      |
|   | $I_F = 10\text{ A}$  |                                   | 0.46 | 0.54 |      |
| Reverse current per diode               | $V_R = 45\text{ V}$  | $T_A = 25\text{ }^\circ\text{C}$  | -    | 0.2  | mA   |
|   |                      | $T_A = 125\text{ }^\circ\text{C}$ | 3    | 8    |      |
| Typical junction capacitance            | 4.0 V, 1 MHz         | $C_J$                             | 1590 | -    | 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                 | V20PWM45C | UNIT               |
|----------------------------|------------------------|-----------|--------------------|
| Typical thermal resistance | $R_{\theta JA}$ (1)(2) | 55        | $^\circ\text{C/W}$ |
|                            | $R_{\theta JM}$ (3)    | 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

**ORDERING INFORMATION** (Example)

| PREFERRED P/N      | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|--------------------|-----------------|------------------------|---------------|------------------------------------|
| V20PWM45C-M3/I     | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |
| V20PWM45CHM3/I (1) | 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)

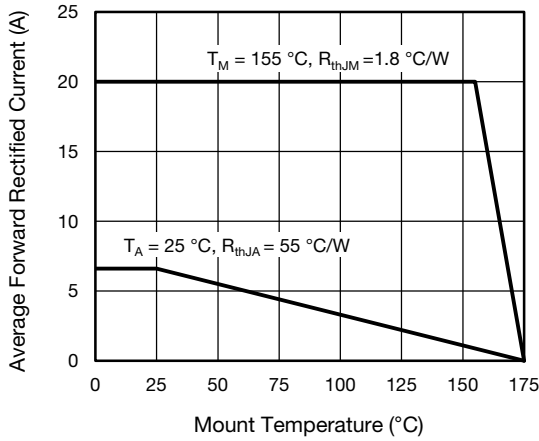


Fig. 1 - Maximum Forward Current Derating Curve

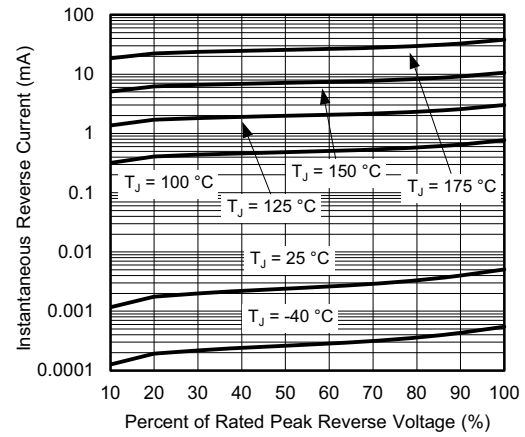


Fig. 4 - Typical Reverse Leakage Characteristics

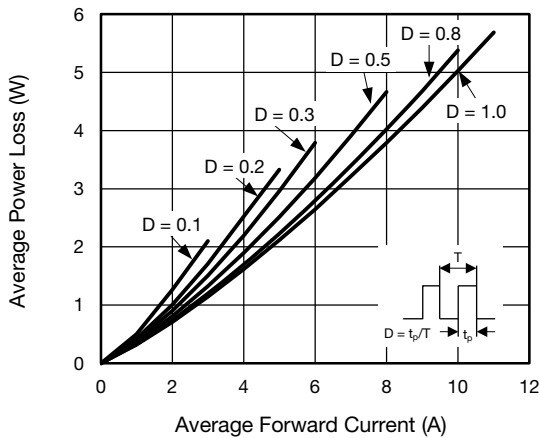


Fig. 2 - Forward Power Loss Characteristics

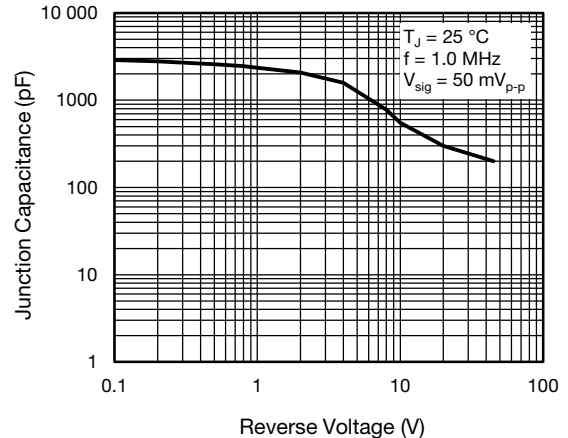


Fig. 5 - Typical Junction Capacitance

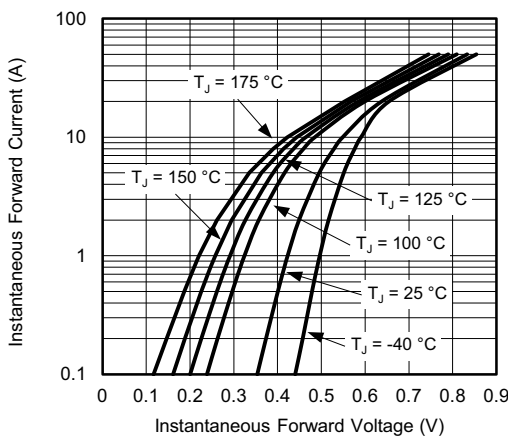


Fig. 3 - Typical Instantaneous Forward Characteristics

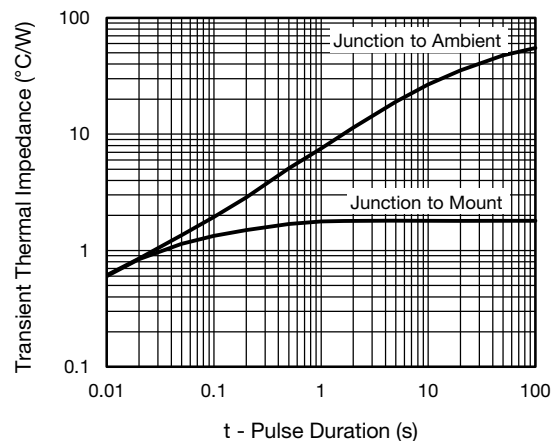


Fig. 6 - Typical Transient Thermal Impedance

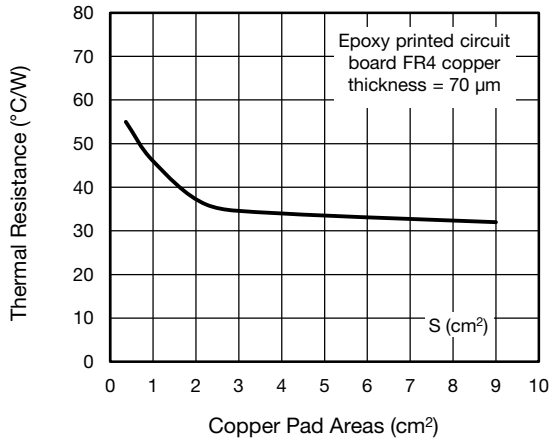
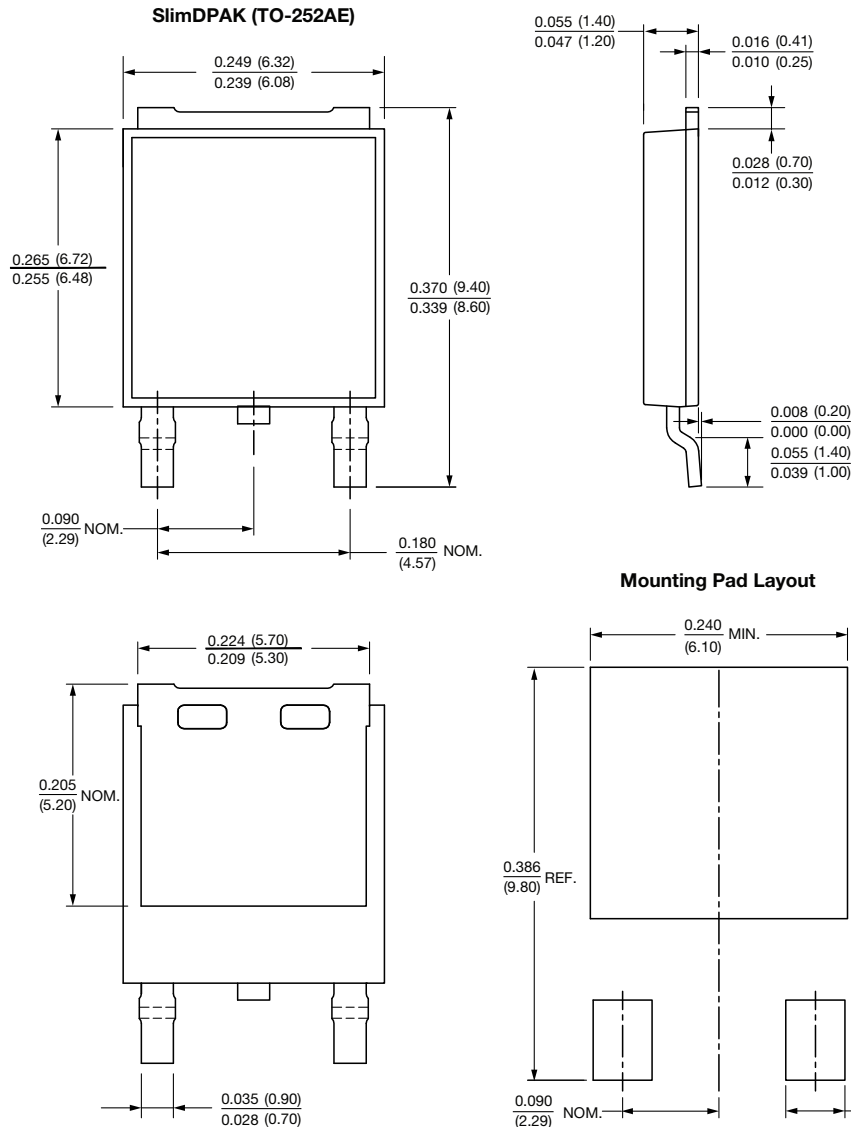


Fig. 7 - Typical Resistance Junction to Ambient vs. Copper Pad Areas

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





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