

# High Current Density Surface Mount Trench MOS Barrier Schottky Rectifier

Ultra Low  $V_F = 0.56\text{ V}$  at  $I_F = 5\text{ A}$



## 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                |
| $V_{RRM}$                                              | 150 V               |
| $I_{FSM}$                                              | 200 A               |
| $V_F$ at $I_F = 20\text{ A}$ ( $T_A = 125\text{ °C}$ ) | 0.74 V              |
| $T_J$ max.                                             | 150 °C              |
| Package                                                | SlimDPAK (TO-252AE) |
| Circuit configuration                                  | Single              |

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                     |                   |             |      |
|------------------------------------------------------------------------------------|-------------------|-------------|------|
| PARAMETER                                                                          | SYMBOL            | V20PW15     | UNIT |
| Device marking code                                                                |                   | V20PW15     |      |
| Maximum repetitive peak reverse voltage                                            | $V_{RRM}$         | 150         | 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 +150 | °C   |
| Storage temperature range                                                          | $T_{STG}$         | -55 to +150 | °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 |
|---------------------------------------|------------------------|-------------------------|-------------------------------|------|------|------|
| Maximum Instantaneous forward voltage | I <sub>F</sub> = 5.0 A | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.70 | -    | V    |
|                                       | I <sub>F</sub> = 10 A  |                         |                               | 0.90 | -    |      |
|                                       | I <sub>F</sub> = 20 A  |                         |                               | 1.32 | 1.47 |      |
|                                       | I <sub>F</sub> = 5.0 A | T <sub>A</sub> = 125 °C |                               | 0.56 | -    |      |
|                                       | I <sub>F</sub> = 10 A  |                         |                               | 0.65 | -    |      |
|                                       | I <sub>F</sub> = 20 A  |                         |                               | 0.74 | 0.82 |      |
| Reverse current                       | V <sub>R</sub> = 100 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> = 150 V | T <sub>A</sub> = 25 °C  |                               | -    | 0.25 |      |
|                                       |                        | T <sub>A</sub> = 125 °C |                               | 6    | 20   |      |
| Typical junction capacitance          | 4.0 V, 1 MHz           |                         | C <sub>J</sub>                | 950  | -    | 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                   | V20PW15 | UNIT                 |
|----------------------------|--------------------------|---------|----------------------|
| Typical thermal resistance | $R_{\theta JA}^{(1)(2)}$ | 55      | $^{\circ}\text{C/W}$ |
|                            | $R_{\theta JM}^{(3)}$    | 2.2     |                      |

**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                      |
|-----------------------------|-----------------|------------------------|---------------|------------------------------------|
| V20PW15-M3/I                | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |
| V20PW15HM3/I <sup>(1)</sup> | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |

**Note**

- (1) AEC-Q101 qualified

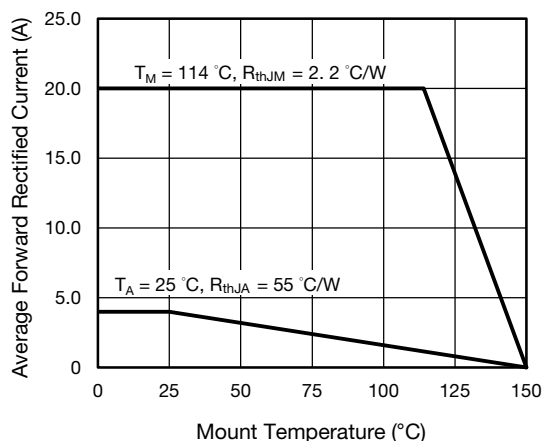
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

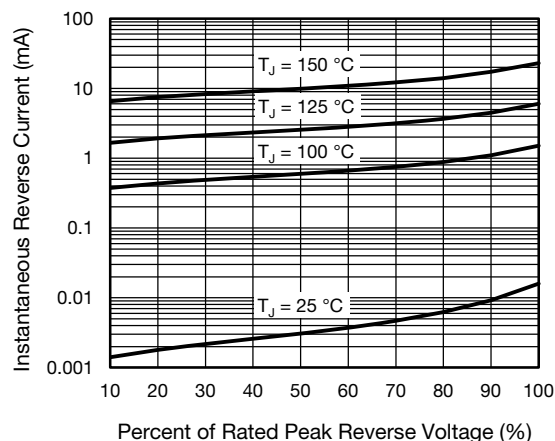


Fig. 4 - Typical Reverse Leakage Characteristics

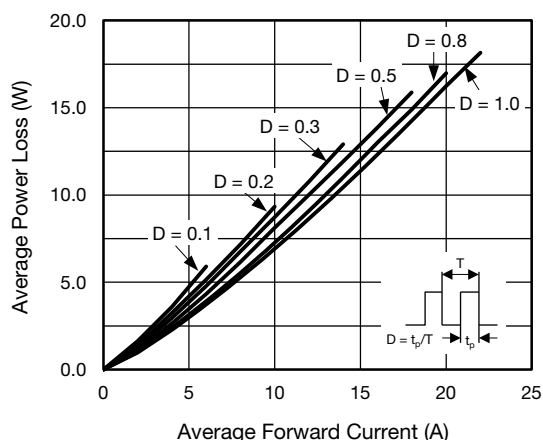


Fig. 2 - Forward Power Loss Characteristics

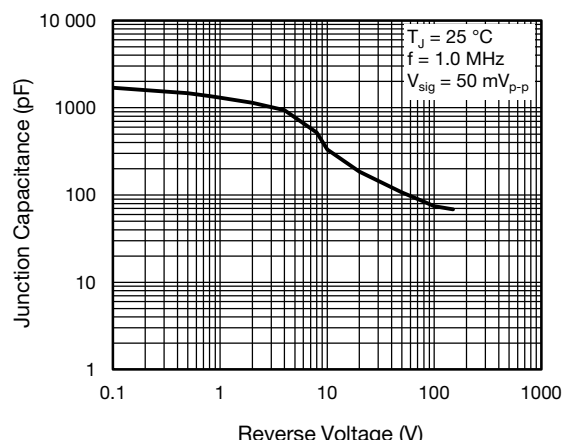


Fig. 5 - Typical Junction Capacitance

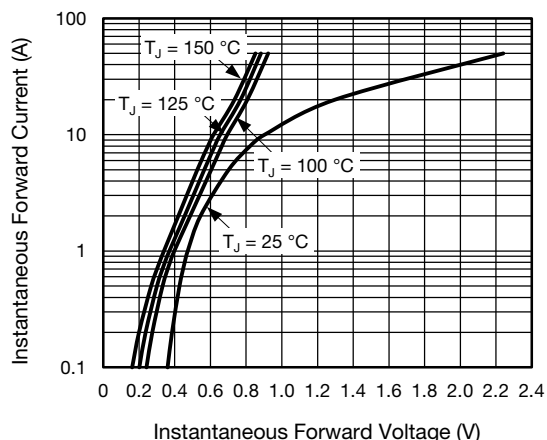


Fig. 3 - Typical Instantaneous Forward Characteristics

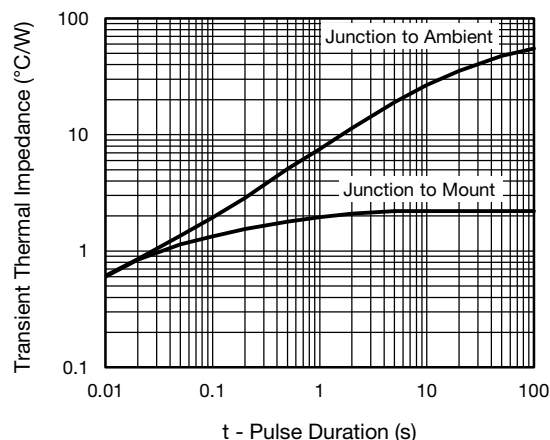


Fig. 6 - Typical Transient Thermal Impedance

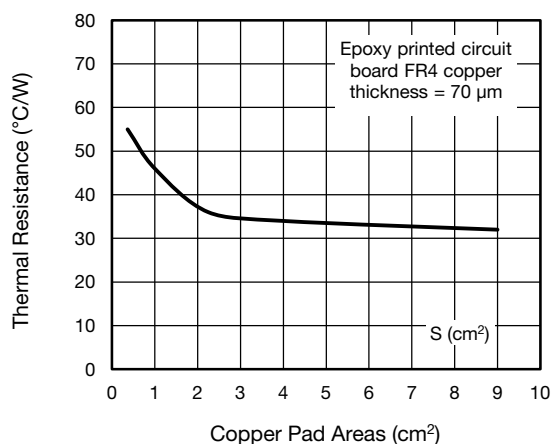
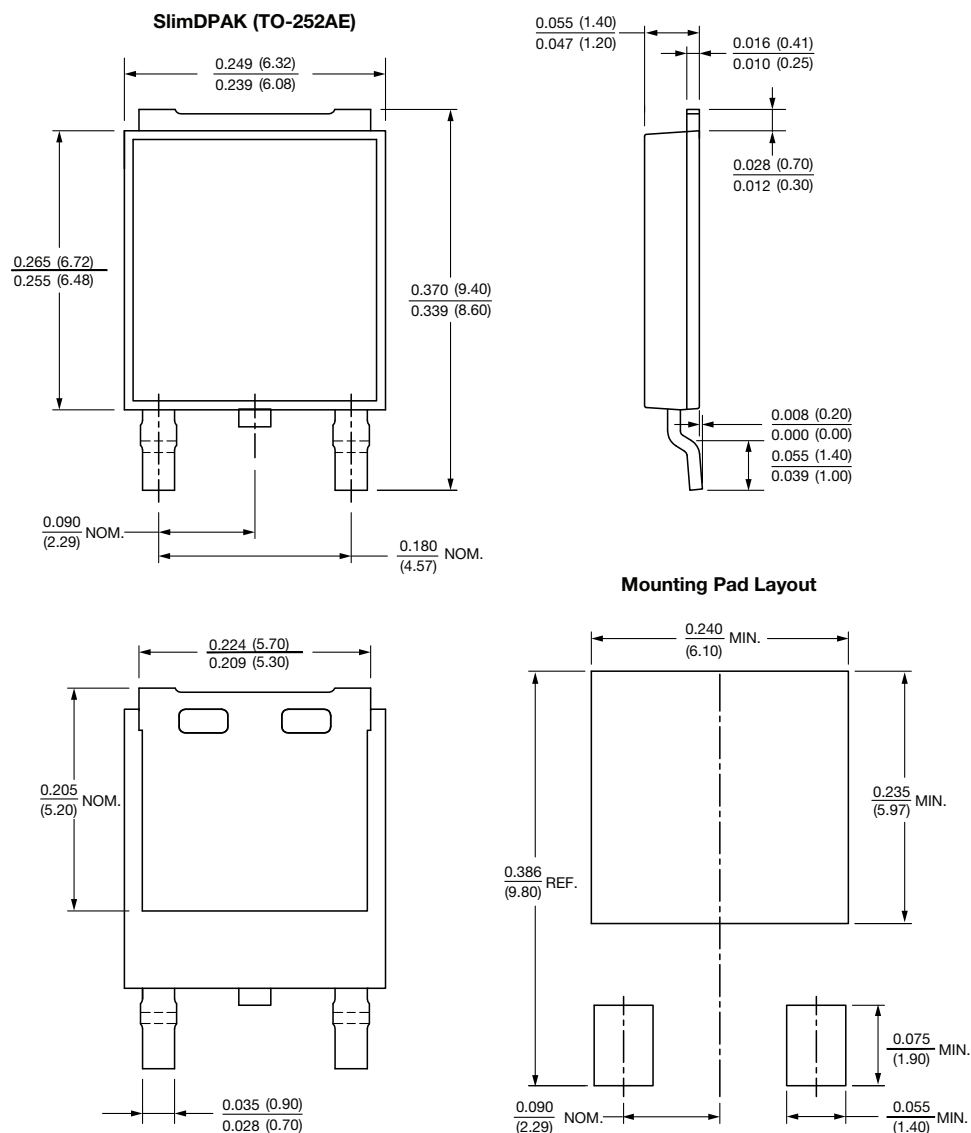


Fig. 7 - Typical Resistance Junction to Ambient vs. Copper Pad Areas

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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