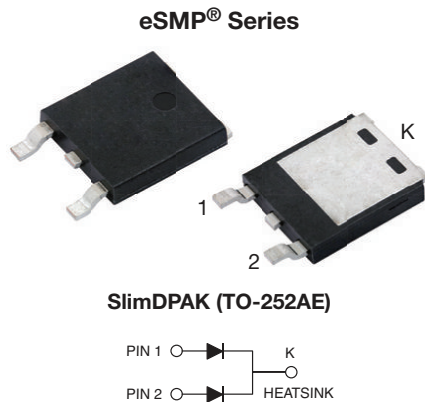


# High Current Density Surface-Mount TMBS<sup>®</sup> (Trench MOS Barrier Schottky) Rectifier

 Ultra Low  $V_F = 0.58\text{ V}$  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)

 AUTOMOTIVE  
GRADE  
Available

**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## LINKS TO ADDITIONAL RESOURCES



## TYPICAL APPLICATIONS

For use in low voltage high frequency DC/DC converters, freewheeling diodes, and polarity protection applications.

| PRIMARY CHARACTERISTICS                                |                     |
|--------------------------------------------------------|---------------------|
| $I_{F(AV)}$                                            | 2 x 20 A            |
| $V_{RRM}$                                              | 200 V               |
| $I_{FSM}$                                              | 240 A               |
| $V_F$ at $I_F = 20\text{ A}$ ( $T_J = 125\text{ °C}$ ) | 0.75 V              |
| $T_J$ max.                                             | 175 °C              |
| Package                                                | SlimDPAK (TO-252AE) |
| Circuit configuration                                  | Common cathode      |

## 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\_X - halogen-free, RoHS-compliant, and AEC-Q101 qualified

(“\_X” denotes revision code e.g. A, B,.....)

**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      | V40PW22C          | UNIT |
| Device marking code                                                                          |             | V40PW22C          |      |
| Maximum repetitive peak reverse voltage                                                      | $V_{RRM}$   | 200               | V    |
| Maximum average forward rectified current (fig. 1)                                           | per device  | $I_{F(AV)}^{(1)}$ | 40 A |
|                                                                                              | per diode   | $I_{F(AV)}^{(1)}$ | 20 A |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load per diode | $I_{FSM}$   | 240               | 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 |    |
| Maximum instantaneous forward voltage                                      | I <sub>F</sub> = 5.0 A | T <sub>J</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.74   | -    | V  |
|                                                                            | I <sub>F</sub> = 10 A  |                         |                               | 0.8    | -    |    |
|                                                                            | I <sub>F</sub> = 20 A  |                         |                               | 0.89   | 0.97 |    |
|                                                                            | I <sub>F</sub> = 5.0 A | T <sub>J</sub> = 125 °C |                               | 0.58   | -    |    |
|                                                                            | I <sub>F</sub> = 10 A  |                         |                               | 0.65   | -    |    |
|                                                                            | I <sub>F</sub> = 20 A  |                         |                               | 0.75   | 0.83 |    |
| Reverse current                                                            | V <sub>R</sub> = 160 V | T <sub>J</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 0.0007 | -    | mA |
|                                                                            |                        | T <sub>J</sub> = 125 °C |                               | 1.5    | -    |    |
|                                                                            | V <sub>R</sub> = 200 V | T <sub>J</sub> = 25 °C  |                               | -      | 0.25 |    |
|                                                                            |                        | T <sub>J</sub> = 125 °C |                               | 3      | 10   |    |
| Typical junction capacitance                                               | 4.0 V, 1 MHz           | C <sub>J</sub>          | 700                           | -      | pF   |    |

**Notes**

- (1) Pulse test: 300 μs pulse width, 1 % duty cycle  
(2) Pulse test: pulse width ≤ 5 ms

| THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                                    |          |      |
|-------------------------------------------------------------------------|------------------------------------|----------|------|
| PARAMETER                                                               | SYMBOL                             | V40PW22C | UNIT |
| Typical thermal resistance                                              | R <sub>θJA</sub> <sup>(1)(2)</sup> | 65       | °C/W |
|                                                                         | R <sub>θJM</sub> <sup>(3)</sup>    | 1.5      |      |

**Notes**

- (1) The heat generated must be less than thermal conductivity from junction-to-ambient: dP<sub>D</sub>/dT<sub>J</sub> < 1/R<sub>θJA</sub>  
(2) Free air, mounted on recommended copper pad area, 2 oz., FR4 PCB; thermal resistance R<sub>θJA</sub> - junction to ambient  
(3) Mounted on infinite heat sink; thermal resistance R<sub>θJM</sub> - junction-to-mount

| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| V40PW22C-M3/I                  | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |
| V40PW22CHM3_A/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)

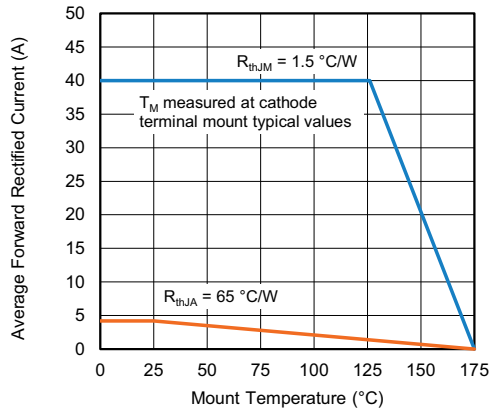


Fig. 1 - Maximum Forward Current Derating Curve

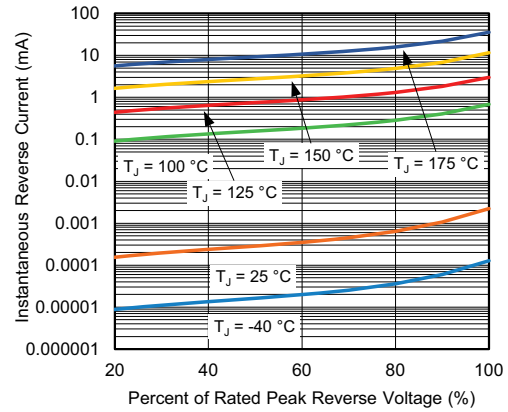


Fig. 4 - Typical Reverse Leakage Characteristics

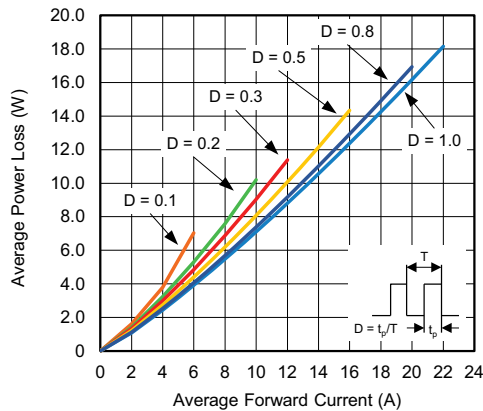


Fig. 2 - Forward Power Loss Characteristics

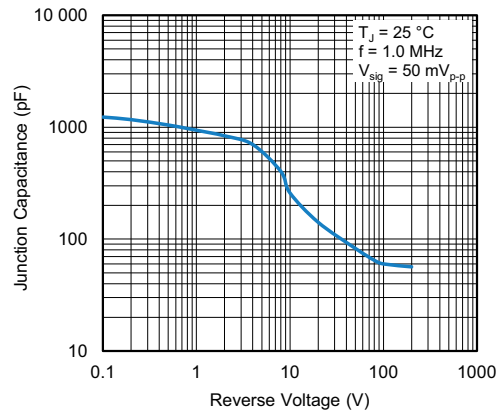


Fig. 5 - Typical Junction Capacitance

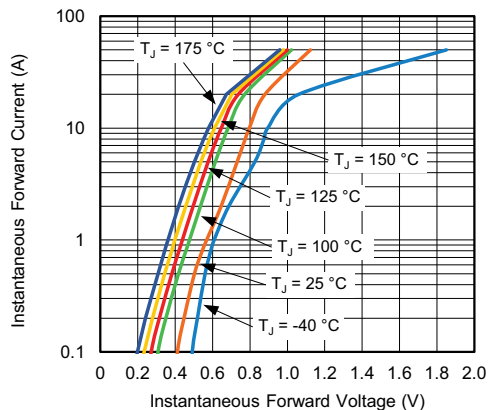


Fig. 3 - Typical Instantaneous Forward Characteristics

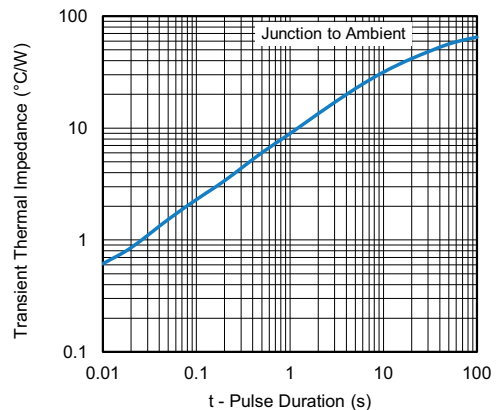


Fig. 6 - Typical Transient Thermal Impedance

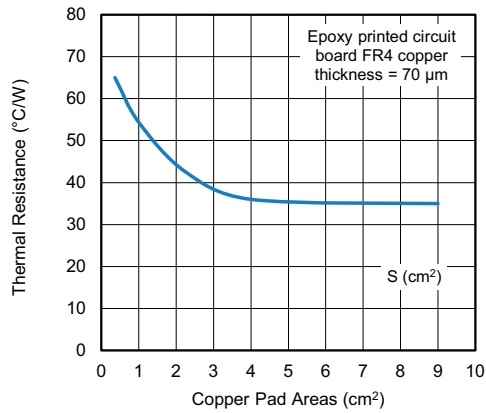
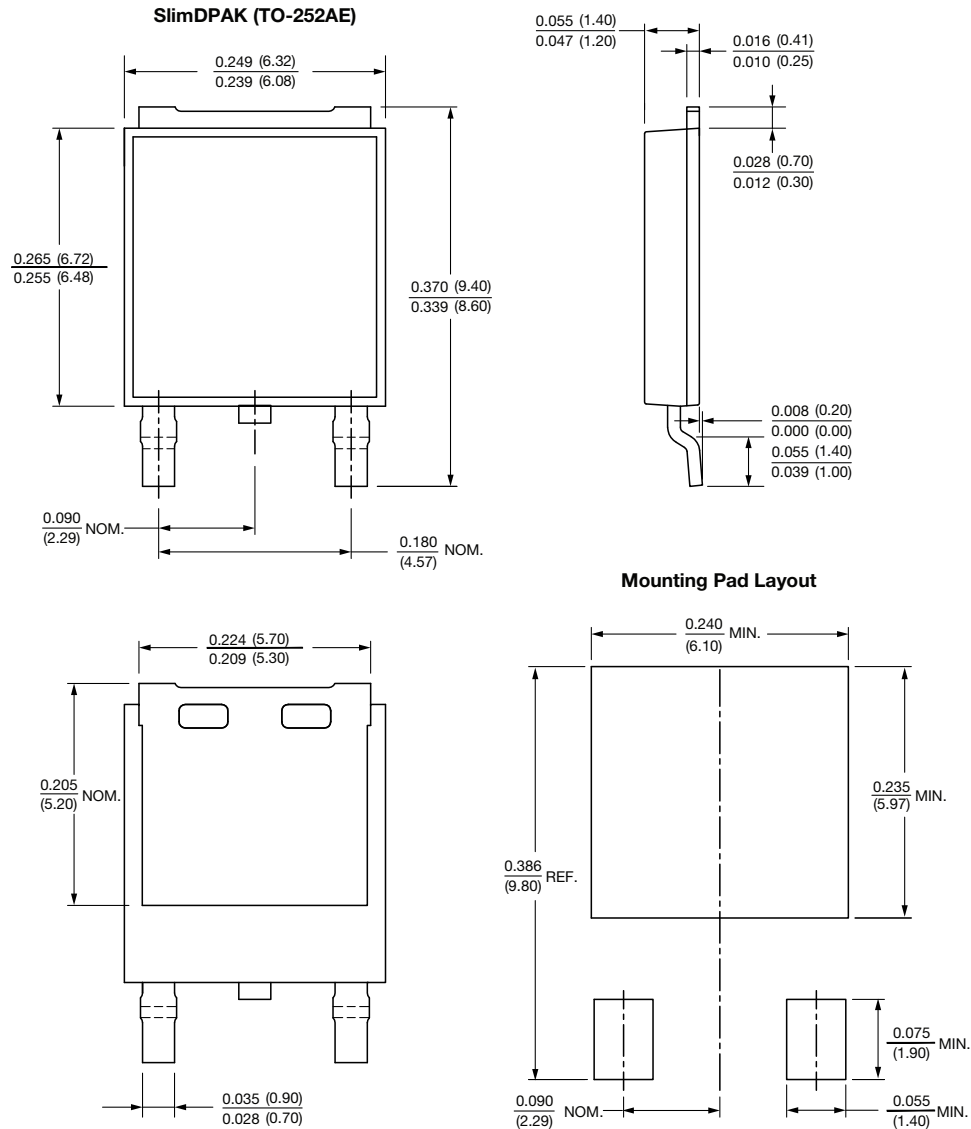


Fig. 7 - Typical Resistance Junction to Ambient vs. Copper Pad Areas



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





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