AUTOMOTIVI GRADE

COMPLIANT

HALOGEN FREE



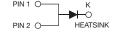
# Vishay General Semiconductor

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

Ultra Low  $V_F = 0.58 \text{ V}$  at  $I_F = 5 \text{ A}$ 



SlimDPAK (TO-252AE)



#### **ADDITIONAL RESOURCES**



| PRIMARY CHARACTERISTICS                        |                     |  |  |
|--|---------------------|--|--|
| $I_{F(AV)}$                                    | 20 A                |  |  |
| $V_{RRM}$                                      | 200 V               |  |  |
| I <sub>FSM</sub>                               | 200 A               |  |  |
| $V_F$ at $I_F = 20$ A $(T_J = 125  ^{\circ}C)$ | 0.74 V              |  |  |
| T <sub>J</sub> max.                            | 175 °C              |  |  |
| Package  | SlimDPAK (TO-252AE) |  |  |
| Circuit configuration                          | Single              |  |  |

#### **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 <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

#### **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\_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

| <b>MAXIMUM RATINGS</b> (T <sub>A</sub> = 25 °C unless otherwise noted)             |                               |             |      |  |
|--|-------------------------------|-------------|------|--|
| PARAMETER  | SYMBOL                        | V20PW22     | UNIT |  |
| Device marking code  |                               | V20PW22     |      |  |
| Maximum repetitive peak reverse voltage  | V <sub>RRM</sub>              | 200         | V    |  |
| Maximum average forward rectified current (Fig. 1)                                 | I <sub>F(AV)</sub> (1)        | 20          | A    |  |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | I <sub>FSM</sub> 200          |             | А    |  |
| Operating junction temperature range   | T <sub>J</sub> <sup>(2)</sup> | -40 to +175 | °C   |  |
| Storage temperature range  | T <sub>STG</sub>              | -55 to +175 | °C   |  |

#### Notes

- (1) With infinite heatsink
- $^{(2)}$  The heat generated must be less than the thermal conductivity from junction to ambient:  $dP_D/dT_J < 1/R_{\theta JA}$



| <b>ELECTRICAL CHARACTERISTICS</b> (T <sub>J</sub> = 25 °C unless otherwise noted) |                        |                         |                                 |        |      |      |
|---|------------------------|-------------------------|---------------------------------|--------|------|------|
| PARAMETER   | TEST CONDITIONS        |                         | SYMBOL                          | TYP.   | MAX. | UNIT |
| Maximum Instantaneous forward voltage   | $I_F = 5.0 \text{ A}$  | T <sub>J</sub> = 25 °C  | - V <sub>F</sub> <sup>(1)</sup> | 0.73   | -    | V    |
|   | I <sub>F</sub> = 10 A  |                         |                                 | 0.8    | -    |      |
|   | I <sub>F</sub> = 20 A  |                         |                                 | 0.88   | 0.96 |      |
|   | $I_F = 5.0 \text{ A}$  | T <sub>J</sub> = 125 °C |                                 | 0.58   | -    |      |
|   | I <sub>F</sub> = 10 A  |                         |                                 | 0.65   | -    |      |
|   | I <sub>F</sub> = 20 A  |                         |                                 | 0.74   | 0.82 |      |
| Reverse current   | V <sub>R</sub> = 160 V | T <sub>J</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup>   | 0.0006 | -    | mA   |
|   | V <sub>R</sub> = 100 V | T <sub>J</sub> = 125 °C |                                 | 1.5    | -    |      |
|   | V <sub>R</sub> = 200 V | T <sub>J</sub> = 25 °C  |                                 | -      | 0.3  |      |
|   |                        | T <sub>J</sub> = 125 °C |                                 | 3      | 12   |      |
| Typical junction capacitance  | 4.0 V, 1 MHz           |                         | CJ                              | 780    | -    | pF   |

#### Notes

 $^{(1)}\,$  Pulse test: 300  $\mu s$  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 V20PW22  |                         |    |      |  |
| Tunical thormal registance  | R <sub>0JA</sub> (1)(2) | 65 | °C/W |  |
| Typical thermal resistance  | R <sub>0JM</sub> (3)    | 2  | C/VV |  |

#### 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, 2 oz., FR4 PCB; 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                      |  |
| V20PW22-M3/I                   | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |  |
| V20PW22HM3_A/I (1)             | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |  |

#### Note

(1) AEC-Q101 qualified



## **RATINGS AND CHARACTERISTICS CURVES** (T<sub>A</sub> = 25 °C unless otherwise noted)

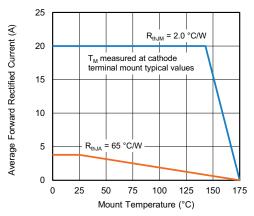


Fig. 1 - Maximum Forward Current Derating Curve

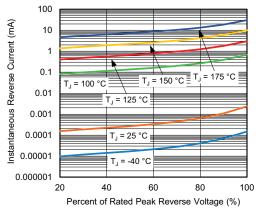


Fig. 4 - Typical Reverse Leakage Characteristics

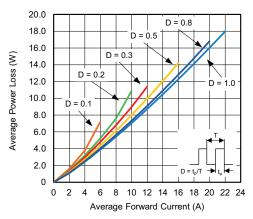


Fig. 2 - Forward Power Loss Characteristics

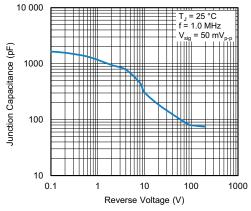


Fig. 5 - Typical Junction Capacitance

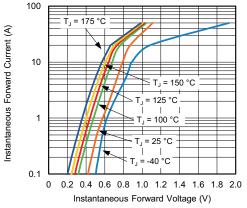


Fig. 3 - Typical Instantaneous Forward Characteristics

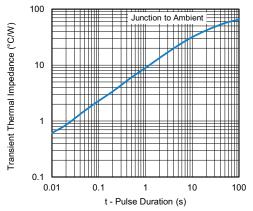


Fig. 6 - Typical Transient Thermal Impedance



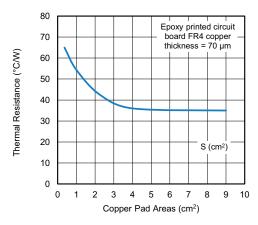
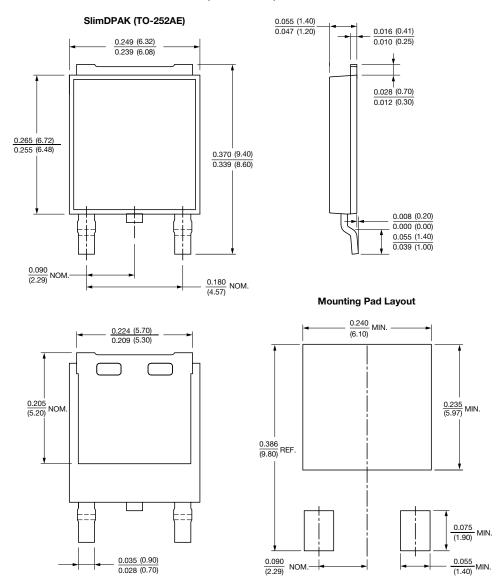


Fig. 7 - Typical Resistance Junction to Ambient vs. Copper Pad Areas



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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