AUTOMOTIVE GRADE

COMPLIANT

HALOGEN FREE



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## Vishay General Semiconductor

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

Ultra Low  $V_F = 0.3 \text{ V}$  at  $I_F = 1.5 \text{ A}$ 





### **LINKS TO ADDITIONAL RESOURCES**



| PRIMARY CHARACTERISTICS             |                     |  |  |  |
|-------------------------------------|---------------------|--|--|--|
| I <sub>F(AV)</sub>                  | 2 x 3 A             |  |  |  |
| $V_{RRM}$                           | 45 V                |  |  |  |
| I <sub>FSM</sub>                    | 70 A                |  |  |  |
| $V_F$ at $I_F = 3 A (T_J = 125 °C)$ | 0.37 V              |  |  |  |
| T <sub>J</sub> max.                 | 150 °C              |  |  |  |
| Package                             | SlimDPAK (TO-252AE) |  |  |  |
| Circuit configuration               | Common cathode      |  |  |  |

#### **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 - 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

| <b>MAXIMUM RATINGS</b> (T <sub>A</sub> = 25 °C unless otherwise noted)                       |                  |                                   |             |      |
|--|------------------|-----------------------------------|-------------|------|
| PARAMETER  |                  | SYMBOL                            | V6PWL45C    | UNIT |
| Device marking code  |                  |                                   | V6PWL45C    |      |
| Maximum repetitive peak reverse voltage  |                  | $V_{RRM}$                         | 45          | V    |
| Maximum average forward rectified current (Fig. 1)   | per device       | . (1)                             | 6           | А    |
|  | per diode        | I <sub>F(AV)</sub> <sup>(1)</sup> | 3           | Α    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load per diode | I <sub>FSM</sub> | 70                                | А           |      |
| Operating junction temperature range   |                  | T <sub>J</sub> <sup>(2)</sup>     | -40 to +150 | °C   |
| Storage temperature range  | T <sub>STG</sub> | -55 to +150                       | °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:  $dP_D/dT_J < 1/R_{\theta JA}$ 



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| <b>ELECTRICAL CHARACTERISTICS</b> (T <sub>J</sub> = 25 °C unless otherwise noted) |                        |                         |                               |      |      |      |
|---|------------------------|-------------------------|-------------------------------|------|------|------|
| PARAMETER   | TEST CONDITIONS        |                         | SYMBOL                        | TYP. | MAX. | UNIT |
| Instantaneous forward voltage per diode   | I <sub>F</sub> = 1.5 A | T <sub>J</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.42 | -    | V    |
|   | I <sub>F</sub> = 3 A   |                         |                               | 0.46 | 0.51 |      |
|   | I <sub>F</sub> = 1.5 A | T <sub>J</sub> = 125 °C |                               | 0.3  | -    |      |
|   | I <sub>F</sub> = 3 A   |                         |                               | 0.37 | 0.42 |      |
| Reverse current per diode   | V <sub>R</sub> = 45 V  | T <sub>J</sub> = 25 °C  | -                             | 0.2  | mA   |      |
|   | $V_R = 45 V$ $T_J$     | T <sub>J</sub> = 125 °C | IR (=)                        | 5    | 15   | IIIA |
| Typical junction capacitance per diode  | 4.0 V, 1 MHz           |                         | CJ                            | 580  | -    | pF   |

#### **Notes**

 $^{(1)}$  Pulse test: 300  $\mu s$  pulse width, 1 % duty cycle

 $^{(2)}\,$  Pulse test: pulse width  $\leq 5\,$  ms

| THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                                       |     |       |  |  |
|---|---------------------------------------|-----|-------|--|--|
| PARAMETER   | SYMBOL V6PWL45C                       |     | UNIT  |  |  |
| Typical thermal resistance per device                                   | R <sub>0JA</sub> <sup>(1)(2)</sup> 65 |     | °C/W  |  |  |
| Typical thermal resistance per device                                   | R <sub>eJM</sub> (3)                  | 2.5 | 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; 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                      |  |
| V6PWL45C-M3/I                  | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |  |
| V6PWL45CHM3/I (1)              | 0.20            | I                      | 4500          | 13" diameter plastic tape and reel |  |

### Note

(1) AEC-Q101 qualified



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

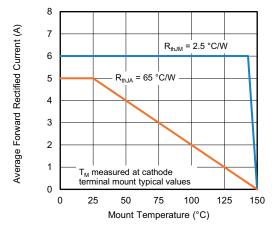


Fig. 1 - Maximum Forward Current Derating Curve

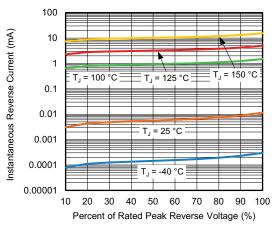


Fig. 4 - Typical Reverse Leakage Characteristics Per Diode

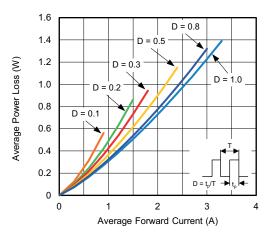


Fig. 2 - Forward Power Loss Characteristics Per Diode

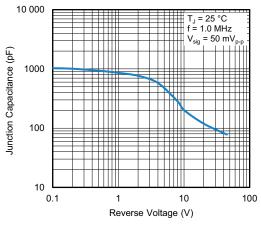


Fig. 5 - Typical Junction Capacitance Per Diode

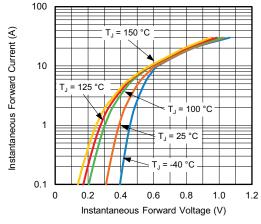


Fig. 3 - Typical Instantaneous Forward Characteristics Per Diode

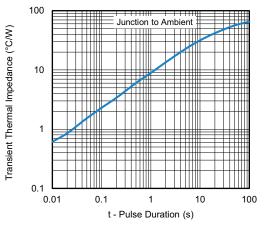


Fig. 6 - Typical Transient Thermal Impedance

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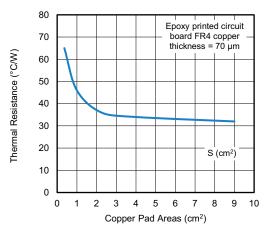
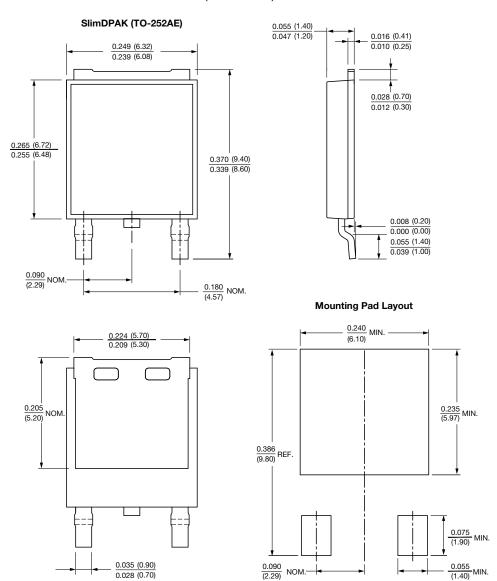


Fig. 7 - Typical Resistance Junction to Ambient vs. Copper Pad Areas



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





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