

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

 Ultra Low $V_F = 0.50$ V at $I_F = 5$ 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


RoHS
COMPLIANT
HALOGEN
FREE
DESIGN SUPPORT TOOLS AVAILABLE

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 | |
|---|---------------------|
| $I_{F(AV)}$ | 40 A |
| V_{RRM} | 120 V |
| I_{FSM} | 240 A |
| V_F at $I_F = 20$ A ($T_A = 125$ °C) | 0.70 V |
| T_J max. | 175 °C |
| Package | SlimDPAK (TO-252AE) |
| Circuit configuration | Common cathode |

| MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted) | | | |
|--|----------------------------|-------------|------|
| PARAMETER | SYMBOL | V40PWM12C | UNIT |
| Device marking code | | V40PWM12C | |
| Maximum repetitive peak reverse voltage | V_{RRM} | 120 | V |
| Maximum average forward rectified current (Fig. 1) | $I_{F(AV)}$ ⁽¹⁾ | per device | 40 |
| | | per diode | 20 |
| 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 ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | | |
|---|----------------------|-----------------------------------|-------------|------|------|------|
| PARAMETER | TEST CONDITIONS | | SYMBOL | TYP. | MAX. | UNIT |
| Instantaneous forward voltage per diode | $I_F = 5.0\text{ A}$ | $T_A = 25\text{ }^\circ\text{C}$ | $V_F^{(1)}$ | 0.58 | - | V |
| | $I_F = 10\text{ A}$ | | | 0.70 | - | |
| | $I_F = 20\text{ A}$ | | | 0.92 | 1.00 | |
| | $I_F = 5.0\text{ A}$ | $T_A = 125\text{ }^\circ\text{C}$ | | 0.50 | - | |
| | $I_F = 10\text{ A}$ | | | 0.59 | - | |
| | $I_F = 20\text{ A}$ | | | 0.70 | 0.78 | |
| Reverse current per diode | $V_R = 90\text{ V}$ | $T_A = 25\text{ }^\circ\text{C}$ | $I_R^{(2)}$ | 0.01 | - | mA |
| | | $T_A = 125\text{ }^\circ\text{C}$ | | 3.5 | - | |
| | $V_R = 120\text{ V}$ | $T_A = 25\text{ }^\circ\text{C}$ | | - | 0.5 | |
| | | $T_A = 125\text{ }^\circ\text{C}$ | | 7 | 20 | |
| Typical junction capacitance | 4.0 V, 1 MHz | | C_J | 1440 | - | pF |

Notes

- (1) Pulse test: 300 μs 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 | V40PWM12C | UNIT |
| Typical thermal resistance | $R_{\theta JA}^{(1)(2)}$ | 55 | $^\circ\text{C/W}$ |
| | $R_{\theta JM}^{(3)}$ | 1.5 | |

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 |
| V40PWM12C-M3/I | 0.20 | I | 4500 | 13" diameter plastic tape and reel |
| V40PWM12CHM3/I ⁽¹⁾ | 0.20 | I | 4500 | 13" diameter plastic tape and reel |

Note

- (1) AEC-Q101 qualified



RATINGS AND CHARACTERISTICS CURVES (T_A = 25 °C unless otherwise noted)

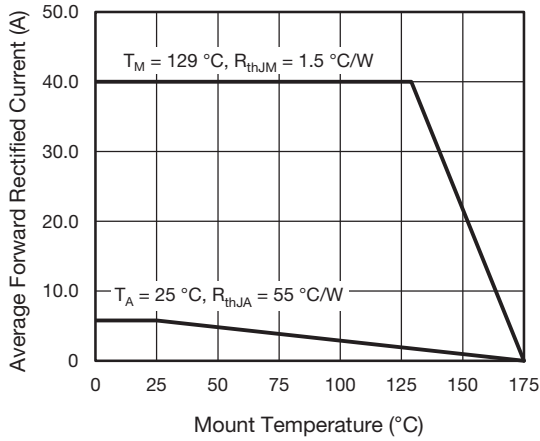


Fig. 1 - Maximum Forward Current Derating Curve

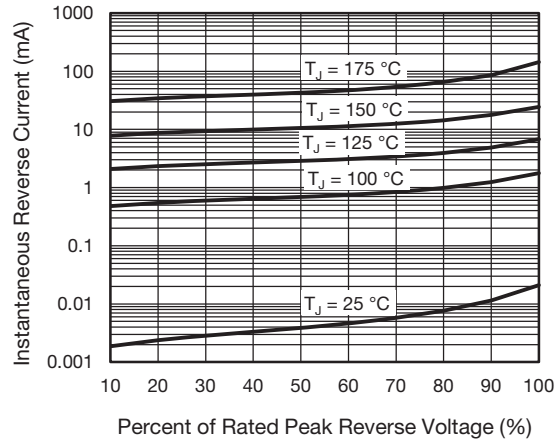


Fig. 4 - Typical Reverse Leakage Characteristics

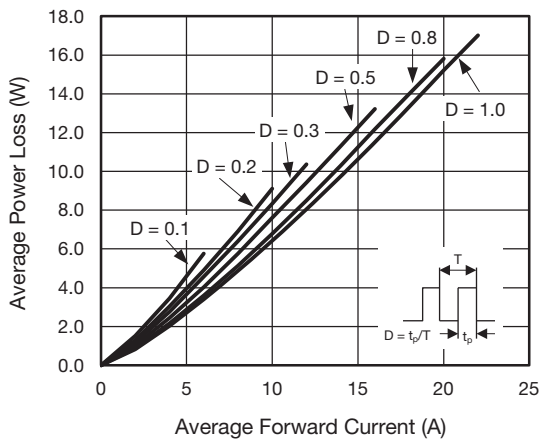


Fig. 2 - Forward Power Loss Characteristics

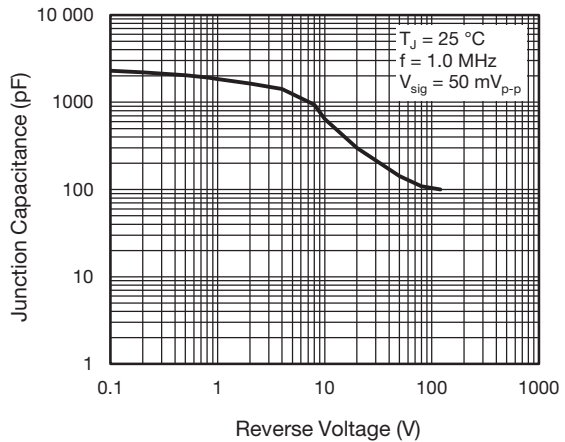


Fig. 5 - Typical Junction Capacitance

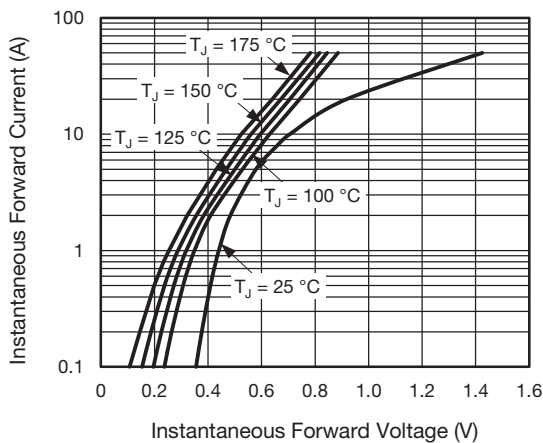


Fig. 3 - Typical Instantaneous Forward Characteristics

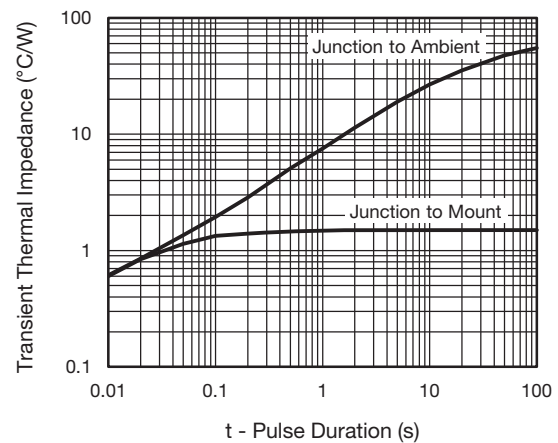


Fig. 6 - Typical Transient Thermal Impedance

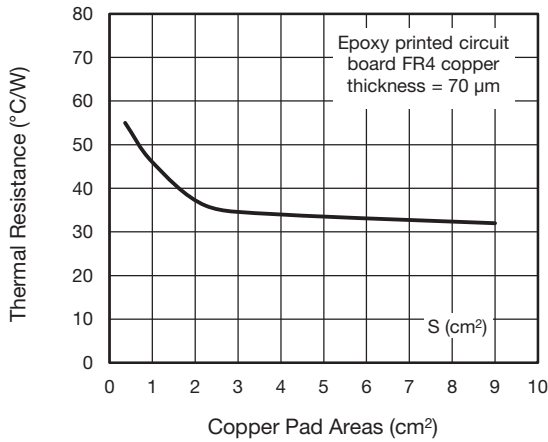
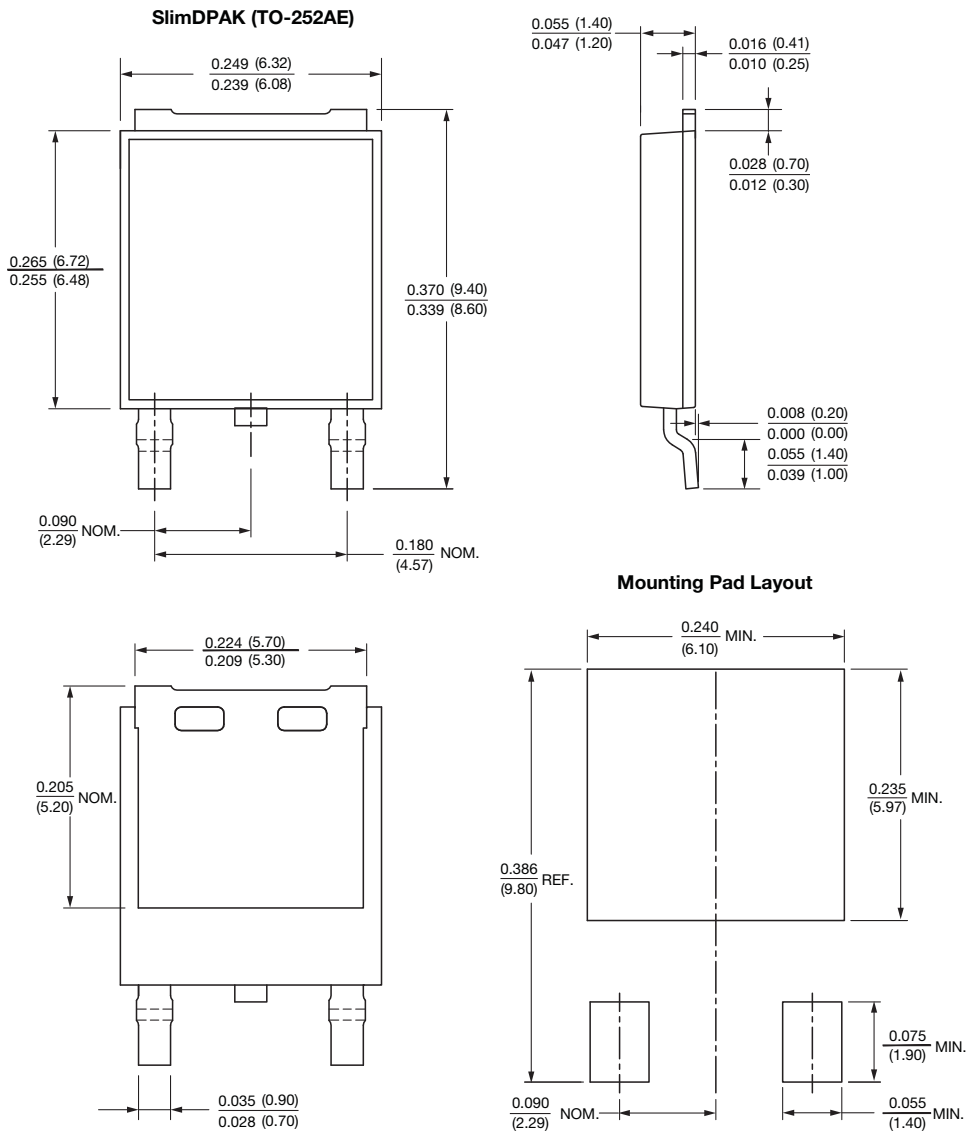


Fig. 7 - Typical Resistance Junction to Ambient vs. Copper Pad Areas

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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