

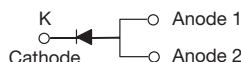
High Current Density Surface-Mount TMBS® (Trench MOS Barrier Schottky) Rectifier

Ultra Low $V_F = 0.37\text{ V}$ at $I_F = 6\text{ A}$

eSMP® Series



SMPC (TO-277A)



DESIGN SUPPORT TOOLS

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3D
Models
Available

| PRIMARY CHARACTERISTICS | |
|--|----------------|
| $I_{F(AV)}$ | 12.0 A |
| V_{RRM} | 45 V |
| I_{FSM} | 200 A |
| V_F at $I_F = 12.0\text{ A}$ ($T_A = 125\text{ °C}$) | 0.46 V |
| T_J max. | 175 °C |
| Package | SMPC (TO-277A) |
| Circuit configuration | Single |

FEATURES

- Very low profile - typical height of 1.1 mm
- Trench MOS Schottky technology
- 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

AUTOMOTIVE
GRADE
Available



RoHS
COMPLIANT
HALOGEN
FREE

TYPICAL APPLICATIONS

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

MECHANICAL DATA

Case: SMPC (TO-277A)

Molding compound meets UL 94 V-0 flammability rating
Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade

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

| MAXIMUM RATINGS ($T_A = 25\text{ °C}$ unless otherwise noted) | | | |
|---|-------------|-------------|------|
| PARAMETER | SYMBOL | V12PM45 | UNIT |
| Device marking code | | 12M45 | |
| Maximum repetitive peak reverse voltage | V_{RRM} | 45 | V |
| Maximum average forward rectified current (fig. 1) | $I_F^{(1)}$ | 12.0 | A |
| | $I_F^{(2)}$ | 5.0 | |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | I_{FSM} | 200 | A |
| Operating junction temperature range | $T_J^{(3)}$ | -40 to +175 | °C |
| Storage temperature range | T_{STG} | -55 to +175 | °C |

Notes

(1) Mounted on 30 mm x 30 mm pad areas aluminum PCB

(2) Free air, mounted on recommended copper pad area

(3) 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 °C unless otherwise noted) | | | | | | |
|--|-------------------------|-------------------------|-------------------------------|------|------|------|
| PARAMETER | TEST CONDITIONS | | SYMBOL | TYP. | MAX. | UNIT |
| Instantaneous forward voltage | I _F = 6.0 A | T _A = 25 °C | V _F ⁽¹⁾ | 0.49 | - | V |
| | I _F = 12.0 A | | | 0.52 | 0.60 | |
| | I _F = 6.0 A | T _A = 125 °C | | 0.37 | - | |
| | I _F = 12.0 A | | | 0.46 | 0.54 | |
| Reverse current | V _R = 45 V | T _A = 25 °C | I _R ⁽²⁾ | - | 0.5 | mA |
| | | T _A = 125 °C | | 4.0 | 15 | |
| Typical junction capacitance | 4.0 V, 1 MHz | | C _J | 2350 | - | 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 | V12PM45 | UNIT |
| Typical thermal resistance | $R_{\theta JA}^{(1)(2)}$ | 75 | $^{\circ}\text{C/W}$ |
| | $R_{\theta JM}^{(3)}$ | 4 | |

Notes

- (1) The heat generated must be less than the 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 30 mm x 30 mm aluminum PCB; thermal resistance $R_{\theta JM}$ - junction to mount

| ORDERING INFORMATION (Example) | | | | |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| V12PM45-M3/H | 0.10 | H | 1500 | 7" diameter plastic tape and reel |
| V12PM45-M3/I | 0.10 | I | 6500 | 13" diameter plastic tape and reel |
| V12PM45HM3/H ⁽¹⁾ | 0.10 | H | 1500 | 7" diameter plastic tape and reel |
| V12PM45HM3/I ⁽¹⁾ | 0.10 | I | 6500 | 13" diameter plastic tape and reel |

Note

- (1) AEC-Q101 qualified

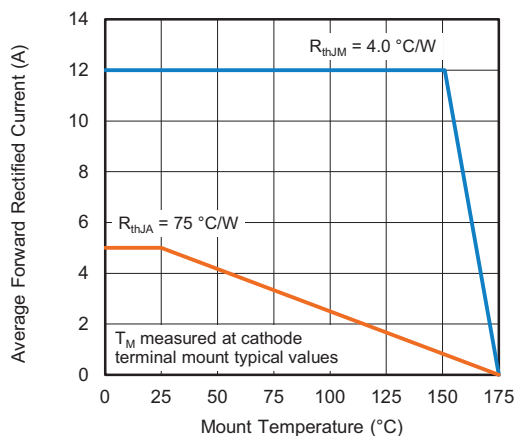
RATINGS AND CHARACTERISTICS CURVES ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)


Fig. 1 - Forward Current Derating Curve

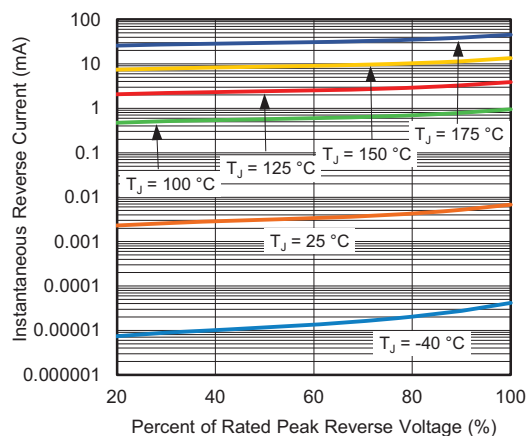


Fig. 4 - Typical Reverse Leakage Characteristics Per Diode

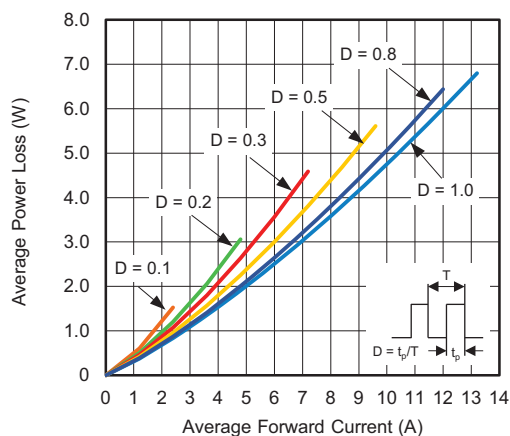


Fig. 2 - Forward Power Loss Characteristics

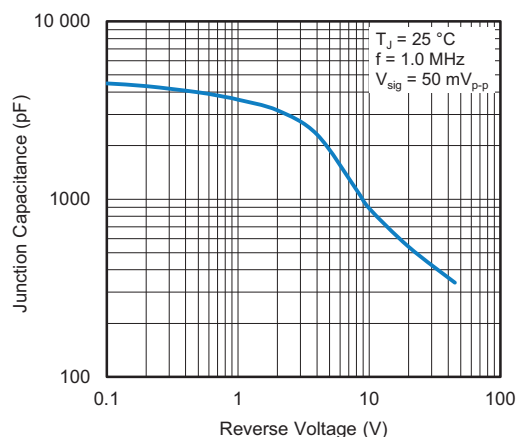


Fig. 5 - Typical Junction Capacitance

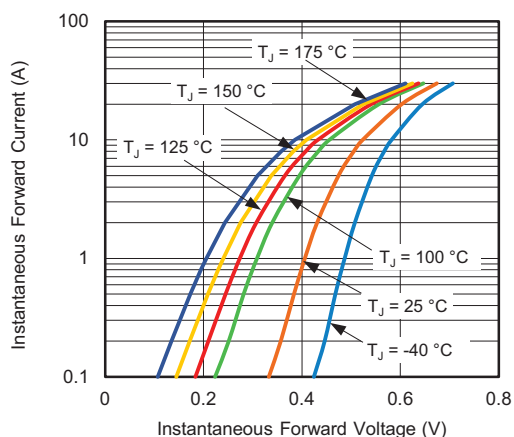


Fig. 3 - Typical Instantaneous Forward Characteristics

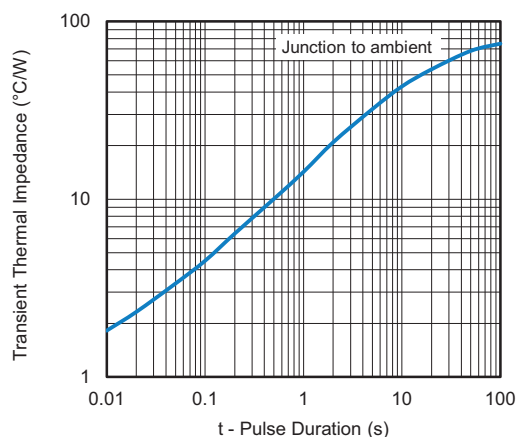


Fig. 6 - Typical Transient Thermal Impedance



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)



Conform to JEDEC® TO-277A



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