

# 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

[click logo to get started](#)

**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](http://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 <sub>A</sub> = 25 °C unless otherwise noted) |                         |                         |                               |      |      |      |
|----------------------------------------------------------------------------|-------------------------|-------------------------|-------------------------------|------|------|------|
| PARAMETER                                                                  | TEST CONDITIONS         |                         | SYMBOL                        | TYP. | MAX. | UNIT |
| Instantaneous forward voltage                                              | I <sub>F</sub> = 6.0 A  | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.49 | -    | V    |
|                                                                            | I <sub>F</sub> = 12.0 A |                         |                               | 0.52 | 0.60 |      |
|                                                                            | I <sub>F</sub> = 6.0 A  | T <sub>A</sub> = 125 °C |                               | 0.37 | -    |      |
|                                                                            | I <sub>F</sub> = 12.0 A |                         |                               | 0.46 | 0.54 |      |
| Reverse current                                                            | V <sub>R</sub> = 45 V   | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -    | 0.5  | mA   |
|                                                                            |                         | T <sub>A</sub> = 125 °C |                               | 4.0  | 15   |      |
| Typical junction capacitance                                               | 4.0 V, 1 MHz            |                         | C <sub>J</sub>                | 2350 | -    | pF   |

**Notes**

- (1) Pulse test: 300  $\mu\text{s}$  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 <sup>(1)</sup>    | 0.10            | H                      | 1500          | 7" diameter plastic tape and reel  |
| V12PM45HM3/I <sup>(1)</sup>    | 0.10            | I                      | 6500          | 13" diameter plastic tape and reel |

**Note**

- (1) AEC-Q101 qualified

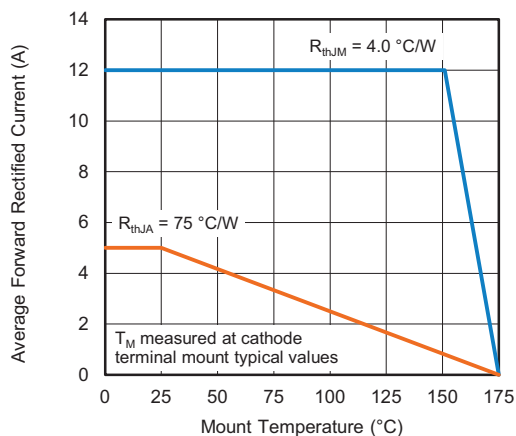
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Forward Current Derating Curve

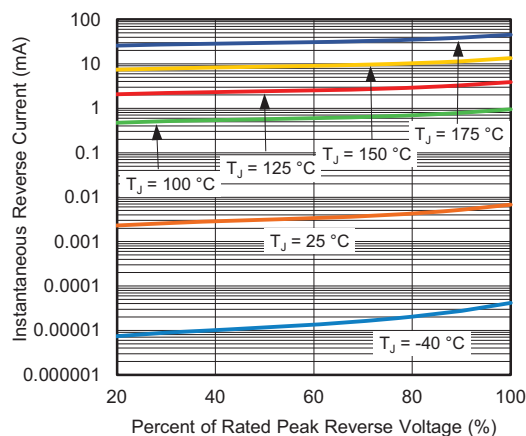


Fig. 4 - Typical Reverse Leakage Characteristics Per Diode

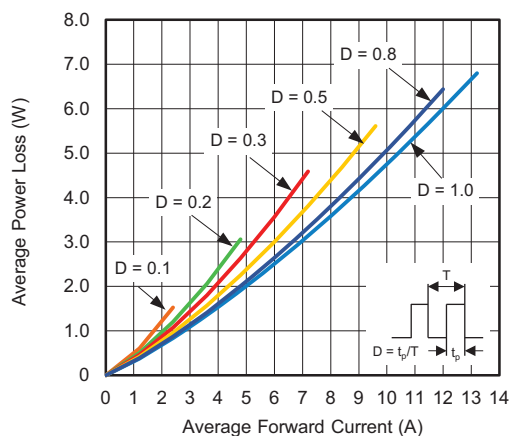


Fig. 2 - Forward Power Loss Characteristics

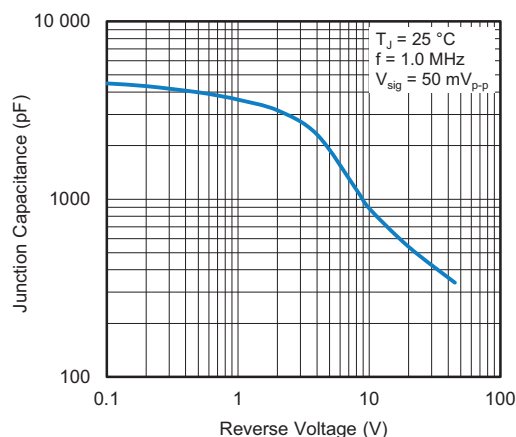


Fig. 5 - Typical Junction Capacitance

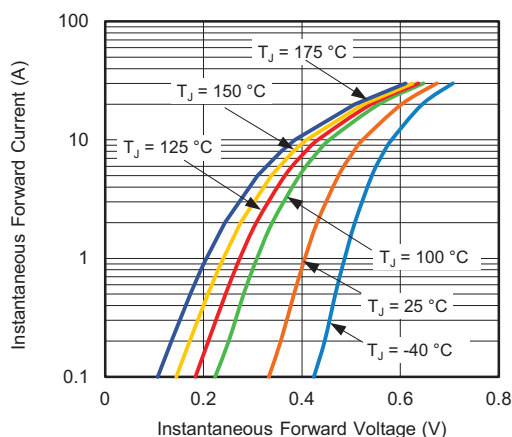


Fig. 3 - Typical Instantaneous Forward Characteristics

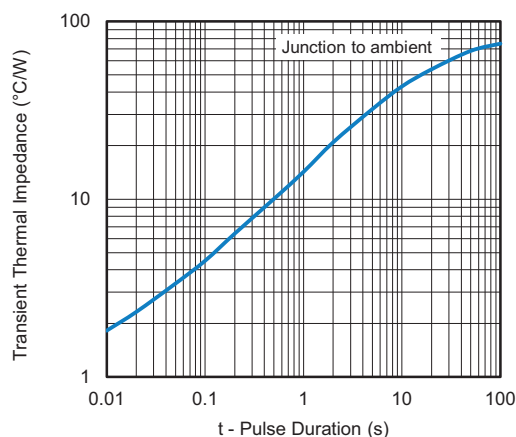


Fig. 6 - Typical Transient Thermal Impedance



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



Conform to JEDEC® TO-277A



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