

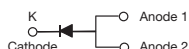
# High Current Density Surface Mount Trench MOS Barrier Schottky Rectifier

Ultra Low  $V_F = 0.51$  V at  $I_F = 6$  A

## TMBS® eSMP® Series



TO-277A (SMPC)



## PRIMARY CHARACTERISTICS

|                       |                |
|-----------------------|----------------|
| $I_{F(AV)}$           | 12 A           |
| $V_{RRM}$             | 120 V          |
| $I_{FSM}$             | 150 A          |
| $E_{AS}$              | 100 mJ         |
| $V_F$ at $I_F = 12$ A | 0.63 V         |
| $T_J$ max.            | 150 °C         |
| Package               | TO-277A (SMPC) |
| Diode variations      | Single die     |

## TYPICAL APPLICATIONS

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

## FEATURES

- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- 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

## MECHANICAL DATA

**Case:** TO-277A (SMPC)

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

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 suffix meets JESD 201 class 1A whisker test, HM3 suffix meets JESD 201 class 2 whisker test

## MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)

| PARAMETER                                                                             | SYMBOL         | V12P12      | UNIT |
|---------------------------------------------------------------------------------------|----------------|-------------|------|
| Device marking code                                                                   |                | V1212       |      |
| Maximum repetitive peak reverse voltage                                               | $V_{RRM}$      | 120         | V    |
| Maximum average forward rectified current (fig. 1)                                    | $I_{F(AV)}$    | 12          | A    |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load     | $I_{FSM}$      | 150         | A    |
| Non-repetitive avalanche energy at $I_{AS} = 2.0$ A, $L = 50$ mH, $T_J = 25$ °C       | $E_{AS}$       | 100         | mJ   |
| Peak repetitive reverse current at $t_p = 2$ $\mu$ s, 1 kHz, $T_J = 38$ °C $\pm$ 2 °C | $I_{RRM}$      | 0.5         | A    |
| Operating junction and storage temperature range                                      | $T_J, T_{STG}$ | -40 to +150 | °C   |



| ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                         |                         |                               |               |      |      |
|----------------------------------------------------------------------------|-------------------------|-------------------------|-------------------------------|---------------|------|------|
| PARAMETER                                                                  | TEST CONDITIONS         |                         | SYMBOL                        | TYP.          | MAX. | UNIT |
| Breakdown voltage                                                          | I <sub>R</sub> = 1.0 mA | T <sub>A</sub> = 25 °C  | V <sub>BR</sub>               | 120 (minimum) | -    | V    |
| Instantaneous forward voltage                                              | I <sub>F</sub> = 6 A    | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.57          | -    | V    |
|                                                                            | I <sub>F</sub> = 12 A   |                         |                               | 0.72          | 0.80 |      |
|                                                                            | I <sub>F</sub> = 6 A    | T <sub>A</sub> = 125 °C |                               | 0.51          | -    |      |
|                                                                            | I <sub>F</sub> = 12 A   |                         |                               | 0.63          | 0.70 |      |
|                                                                            |                         |                         |                               |               |      |      |
| Reverse current                                                            | V <sub>R</sub> = 90 V   | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 13            | -    | μA   |
|                                                                            |                         | T <sub>A</sub> = 125 °C |                               | 7             | -    | mA   |
|                                                                            | V <sub>R</sub> = 120 V  | T <sub>A</sub> = 25 °C  |                               | 50            | 500  | μA   |
|                                                                            |                         | T <sub>A</sub> = 125 °C |                               | 16            | 50   | mA   |
|                                                                            |                         |                         |                               |               |      |      |

**Notes**(1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle(2) Pulse test: Pulse width  $\leq 40\text{ ms}$ 

| THERMAL CHARACTERISTICS ( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted) |                       |        |                      |
|--------------------------------------------------------------------------------------|-----------------------|--------|----------------------|
| PARAMETER                                                                            | SYMBOL                | V12P12 | UNIT                 |
| Typical thermal resistance                                                           | $R_{\theta JA}^{(1)}$ | 60     | $^{\circ}\text{C/W}$ |
|                                                                                      | $R_{\theta JL}$       | 4      |                      |

**Note**

(1) Units mounted on recommended PCB 1 oz. pad layout

| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| V12P12-M3/86A                  | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| V12P12-M3/87A                  | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |
| V12P12HM3/86A <sup>(1)</sup>   | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| V12P12HM3/87A <sup>(1)</sup>   | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |
| V12P12HM3_A/H <sup>(1)</sup>   | 0.10            | H                      | 1500          | 7" diameter plastic tape and reel  |
| V12P12HM3_A/I <sup>(1)</sup>   | 0.10            | I                      | 6500          | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

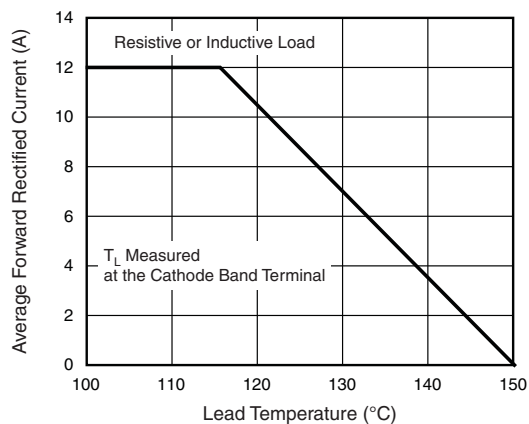
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

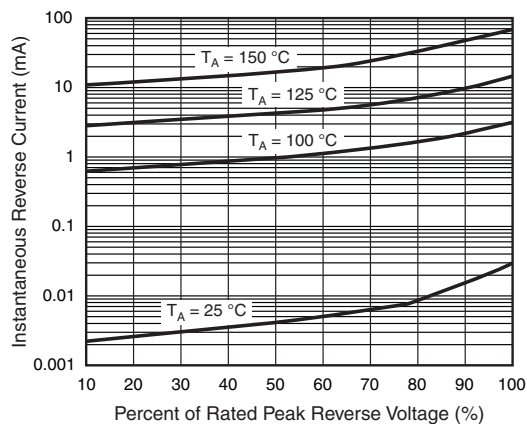


Fig. 4 - Typical Reverse Characteristics

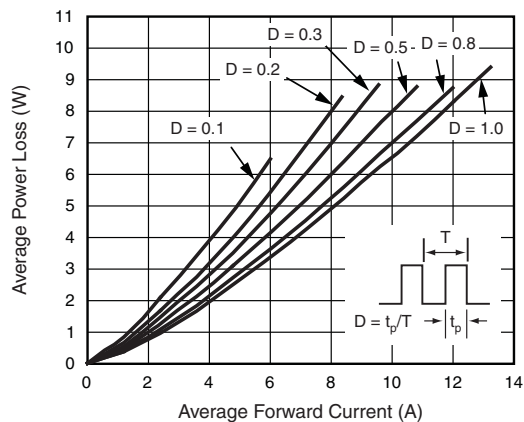


Fig. 2 - Forward Power Loss Characteristics

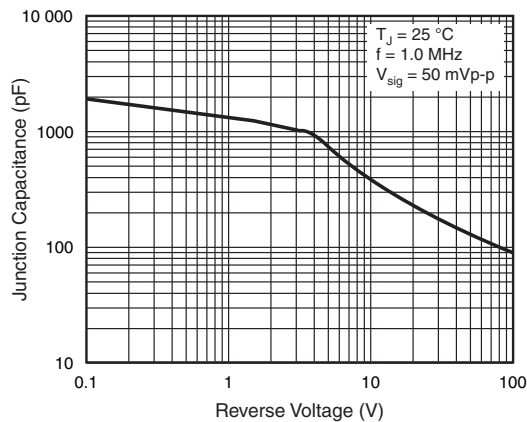


Fig. 5 - Typical Junction Capacitance

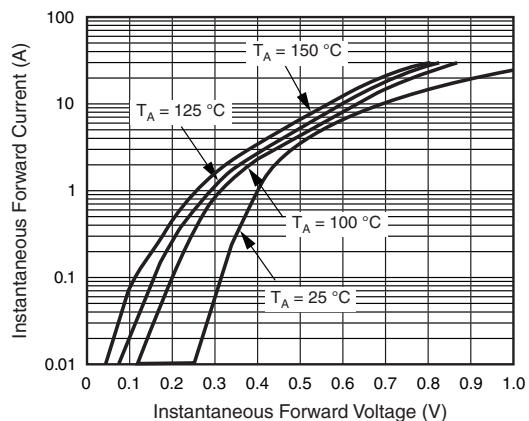


Fig. 3 - Typical Instantaneous Forward Characteristics

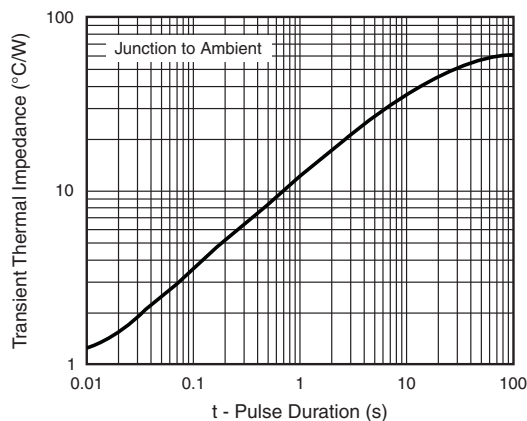
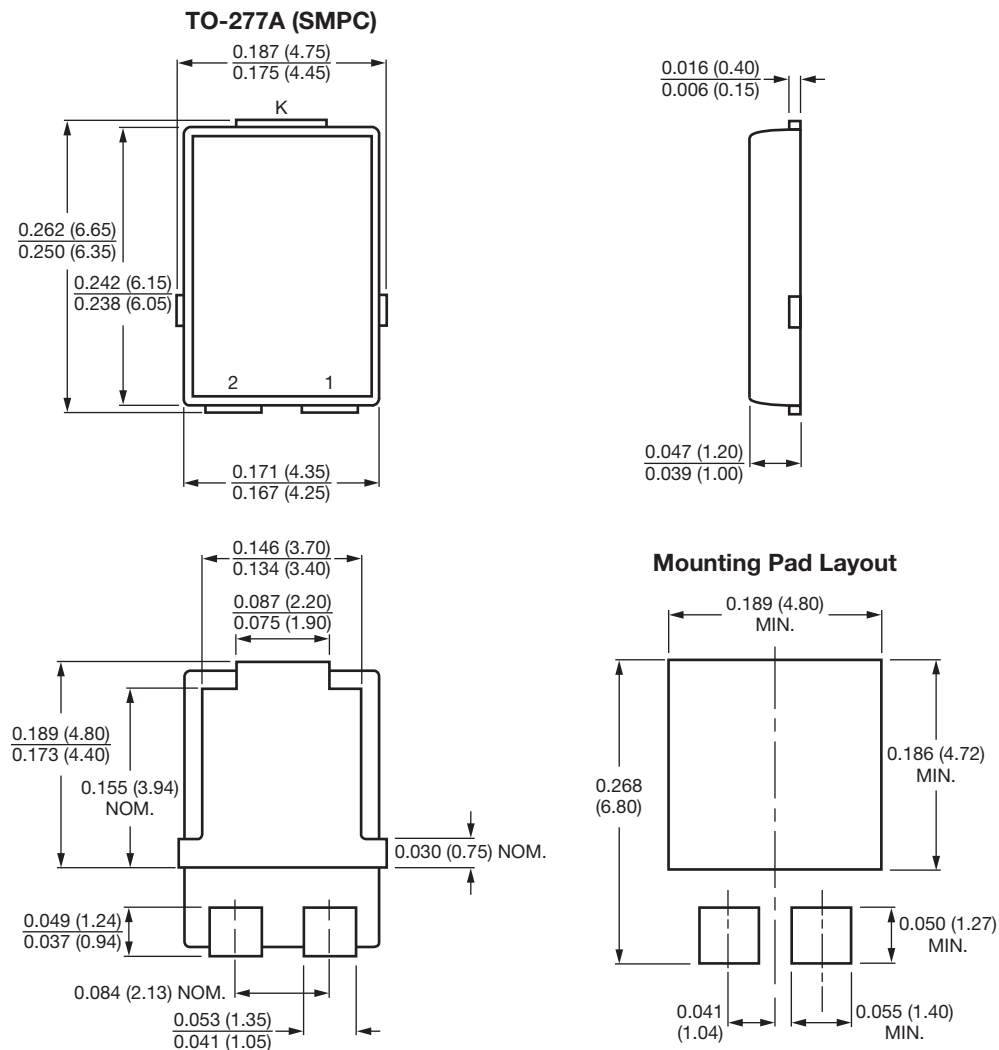


Fig. 6 - Typical Transient Thermal Impedance



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



Conform to JEDEC® TO-277A



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