

# Surface Mount Trench MOS Barrier Schottky Rectifier



## FEATURES

- Very low profile - typical height of 0.95 mm
- Ideal for automated placement
- Trench MOS Schottky technology
- Low power losses, high efficiency
- Low forward voltage drop
- 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)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## TYPICAL APPLICATIONS

For use in high frequency inverters, freewheeling, DC/DC converters, and polarity protection in commercial, industrial, and automotive applications.

## MECHANICAL DATA

**Case:** DO-221AC (SlimSMA)

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

**Polarity:** Color band denotes cathode end

| PRIMARY CHARACTERISTICS         |                    |
|---------------------------------|--------------------|
| $I_{F(AV)}$                     | 5.0 A              |
| $V_{RRM}$                       | 120 V              |
| $I_{FSM}$                       | 100 A              |
| $V_F$ at $I_F = 5.0$ A (125 °C) | 0.64 V             |
| $T_J$ max.                      | 175 °C             |
| Package                         | DO-221AC (SlimSMA) |
| Diode variation                 | Single die         |

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)                           |                   |             |      |
|-----------------------------------------------------------------------------------|-------------------|-------------|------|
| PARAMETER                                                                         | SYMBOL            | VSSAF5M12   | UNIT |
| Device marking code                                                               |                   | 5M12        |      |
| Maximum repetitive peak reverse voltage                                           | $V_{RRM}$         | 120         | V    |
| Maximum DC forward current                                                        | $I_{F(AV)}^{(1)}$ | 2.4         | A    |
|                                                                                   | $I_{F(AV)}^{(2)}$ | 5.0         |      |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | $I_{FSM}$         | 100         | A    |
| Operating junction and storage temperature range                                  | $T_J, T_{STG}$    | -40 to +175 | °C   |

## Notes

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

(2) Mounted on 30 mm x 30 mm pad area



| 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> = 2.5 A | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.64 | -    | V    |
|                                                                            | I <sub>F</sub> = 5.0 A |                         |                               | 0.81 | 0.89 |      |
|                                                                            | I <sub>F</sub> = 2.5 A | T <sub>A</sub> = 125 °C |                               | 0.55 | -    |      |
|                                                                            | I <sub>F</sub> = 5.0 A |                         |                               | 0.64 | 0.74 |      |
| Reverse current                                                            | V <sub>R</sub> = 90 V  | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 0.01 | -    | mA   |
|                                                                            |                        | T <sub>A</sub> = 125 °C |                               | 0.8  | -    |      |
|                                                                            | V <sub>R</sub> = 120 V | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -    | 0.35 | mA   |
|                                                                            |                        | T <sub>A</sub> = 125 °C |                               | 1.6  | 6    |      |
| Typical junction capacitance                                               | 4.0 V, 1 MHz           |                         | C <sub>J</sub>                | 420  | -    | pF   |

**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 specified) |                          |           |                      |
|------------------------------------------------------------------------------------------|--------------------------|-----------|----------------------|
| PARAMETER                                                                                | SYMBOL                   | VSSAF5M12 | UNIT                 |
| Typical thermal resistance                                                               | $R_{\theta JA}^{(1)(2)}$ | 115       | $^{\circ}\text{C/W}$ |
|                                                                                          | $R_{\theta JM}^{(3)}$    | 12        |                      |

**Notes**

- (1) Free air, mounted on recommended PCB, 2 oz. pad area; thermal resistance  $R_{\theta JA}$  - junction to ambient,  $R_{\theta JM}$  - junction to mount  
 (2) The heat generated must be less than thermal conductivity from junction-to-ambient:  $dP_D/DT_J < 1/R_{\theta JA}$   
 (3) Mounted on 30 mm x 30 mm pad area

| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| VSSAF5M12-M3/H                 | 0.032           | H                      | 3500          | 7" diameter plastic tape and reel  |
| VSSAF5M12-M3/I                 | 0.032           | I                      | 14 000        | 13" diameter plastic tape and reel |
| VSSAF5M12HM3/H <sup>(1)</sup>  | 0.032           | H                      | 3500          | 7" diameter plastic tape and reel  |
| VSSAF5M12HM3/I <sup>(1)</sup>  | 0.032           | I                      | 14 000        | 13" diameter plastic tape and reel |

**Note**

- (1) AEC-Q101 qualified

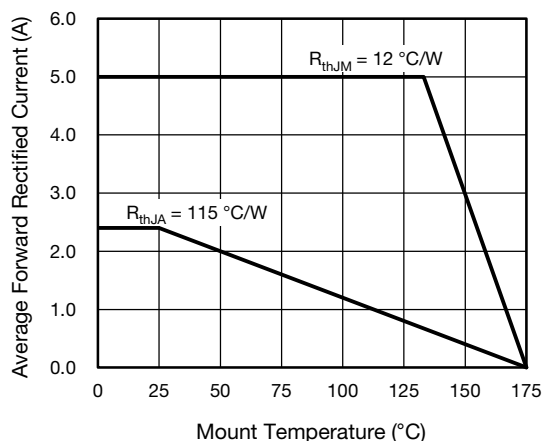
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

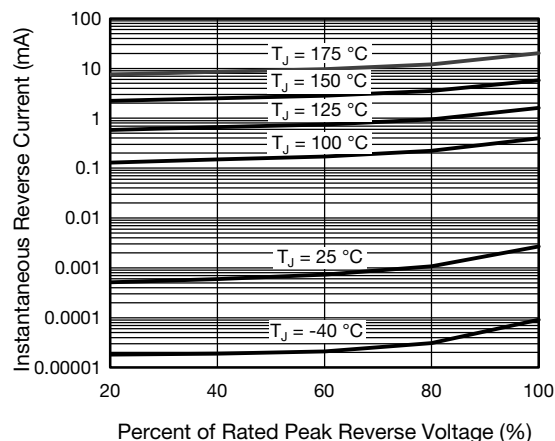


Fig. 4 - Typical Reverse Leakage Characteristics

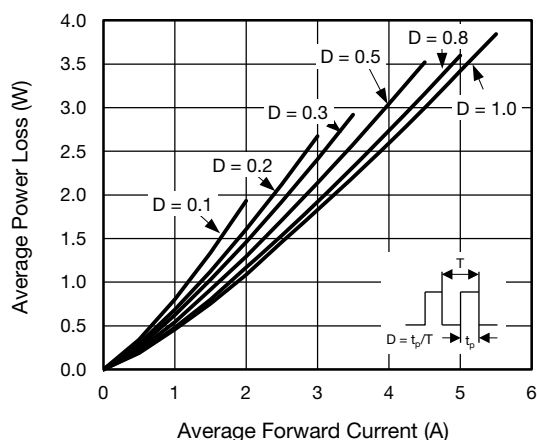


Fig. 2 - Forward Power Loss Characteristics

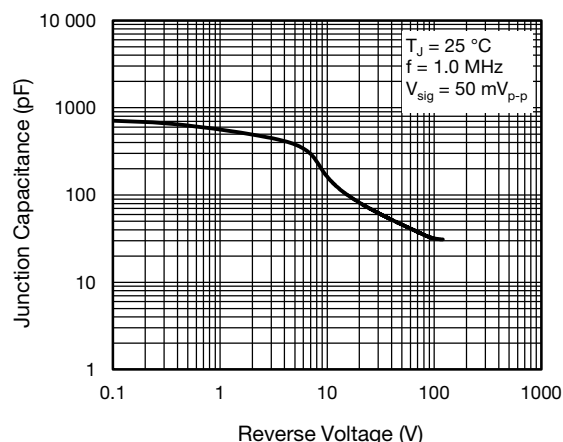


Fig. 5 - Typical Junction Capacitance

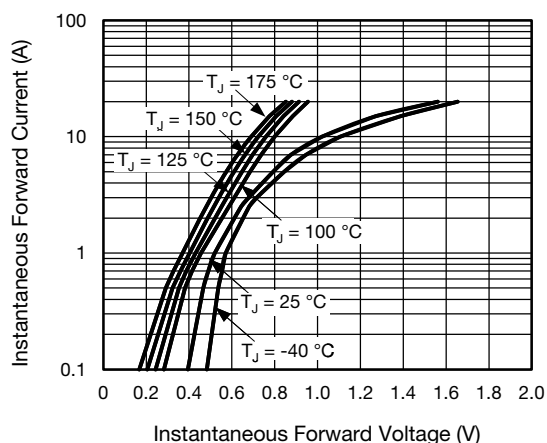


Fig. 3 - Typical Instantaneous Forward Characteristics

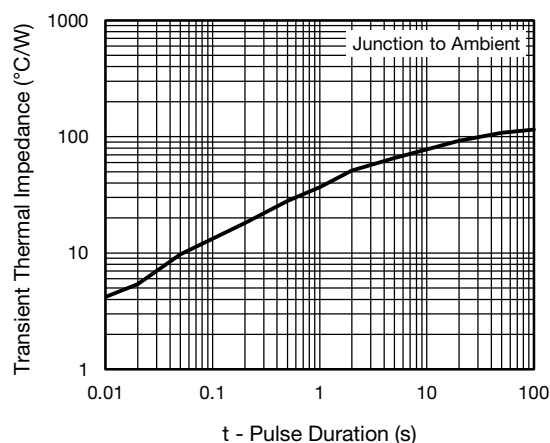


Fig. 6 - Typical Transient Thermal Impedance

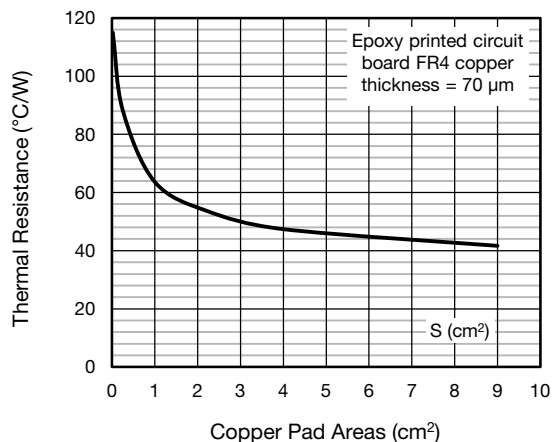
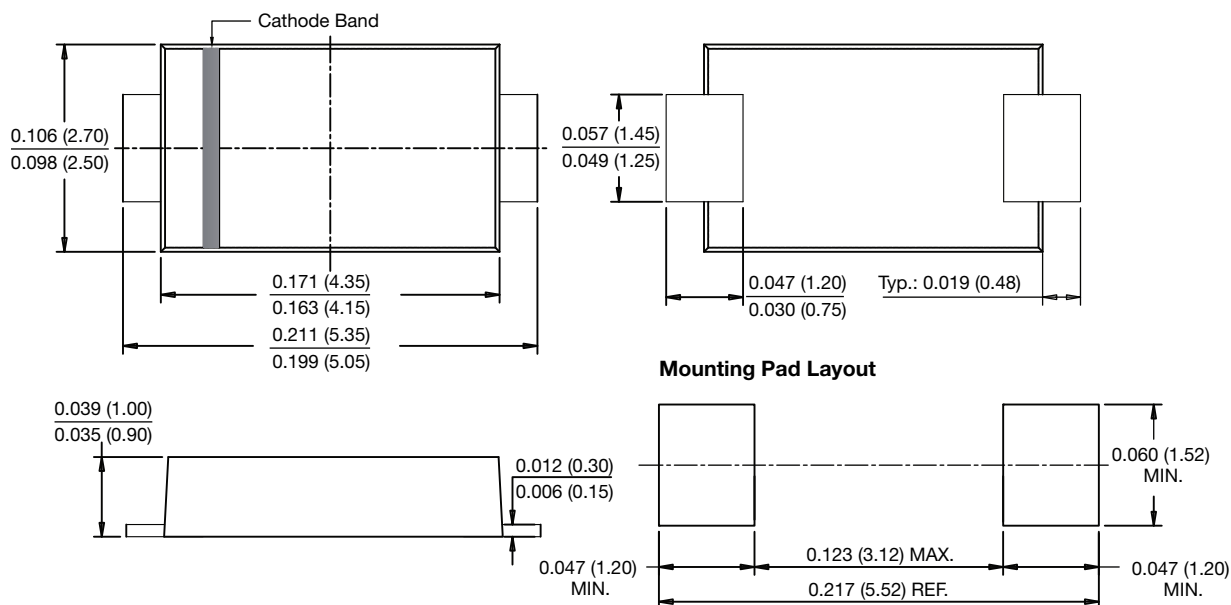


Fig. 7 - Thermal Resistance Junction to Ambient vs. Copper Pad Area

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

#### DO-221AC (SlimSMA)





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