

# 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 low voltage, high frequency inverters, freewheeling, DC/DC converters, and polarity protection applications.

## MECHANICAL DATA

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

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 JESD22-B102

M3 suffix meets JESD 201 class 1A whisker test, HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** color band denotes cathode end

| PRIMARY CHARACTERISTICS |            |
|-------------------------|------------|
| Package                 | DO-221AC   |
| $I_{F(AV)}$             | 5.0 A      |
| $V_{RRM}$               | 45 V       |
| $I_{FSM}$               | 100 A      |
| $V_F$ at $I_F = 5.0$ A  | 0.39 V     |
| $T_J$ max.              | 150 °C     |
| Diode variations        | Single die |

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)                           |                |             |      |
|-----------------------------------------------------------------------------------|----------------|-------------|------|
| PARAMETER                                                                         | SYMBOL         | VSSAF5L45   | UNIT |
| Device marking code                                                               |                | 5L45        |      |
| Maximum repetitive peak reverse voltage                                           | $V_{RRM}$      | 45          | V    |
| Maximum DC forward current                                                        | $I_F^{(1)}$    | 5.0         | A    |
|                                                                                   | $I_F^{(2)}$    | 3.0         |      |
| 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 +150 | °C   |

## Notes

(1) Mounted on 10 mm x 10 mm pad areas, 2 oz. FR4 PCB

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

| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted) |                      |             |      |      |               |
|------------------------------------------------------------------------------------------------|----------------------|-------------|------|------|---------------|
| PARAMETER                                                                                      | TEST CONDITIONS      | SYMBOL      | TYP. | MAX. | UNIT          |
| Instantaneous forward voltage                                                                  | $I_F = 2.5\text{ A}$ | $V_F^{(1)}$ | 0.42 | -    | V             |
|                                                                                                | $I_F = 5.0\text{ A}$ |             | 0.47 | 0.56 |               |
|                                                                                                | $I_F = 2.5\text{ A}$ |             | 0.31 | -    |               |
|                                                                                                | $I_F = 5.0\text{ A}$ |             | 0.39 | 0.47 |               |
| Reverse current                                                                                | $V_R = 45\text{ V}$  | $I_R^{(2)}$ | -    | 650  | $\mu\text{A}$ |
|                                                                                                |                      |             | 8    | 45   | mA            |
| Typical junction capacitance                                                                   | 4.0 V, 1 MHz         | $C_J$       | 740  | -    | pF            |

**Notes**

(1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle

(2) Pulse test: pulse width  $\leq 40\text{ ms}$

| <b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise specified) |                       |           |                      |
|-------------------------------------------------------------------------------------------------|-----------------------|-----------|----------------------|
| PARAMETER                                                                                       | SYMBOL                | VSSAF5L45 | UNIT                 |
| Typical thermal resistance                                                                      | $R_{\theta JA}^{(1)}$ | 115       | $^{\circ}\text{C/W}$ |
|                                                                                                 | $R_{\theta JM}^{(2)}$ | 12        |                      |

**Notes**

(1) Free air, mounted on recommended PCB, 1 oz. pad area; thermal resistance  $R_{\theta JA}$  - junction to ambient

(2) Mounted on 10 mm x 10 mm pad areas, 2 oz. FR4 PCB;  $R_{\theta JM}$  - junction to mount

| <b>ORDERING INFORMATION</b> (Example) |                 |                        |               |                                    |
|---------------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                         | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| VSSAF5L45-M3/6A                       | 0.032           | 6A                     | 3500          | 7" diameter plastic tape and reel  |
| VSSAF5L45-M3/6B                       | 0.032           | 6B                     | 14 000        | 13" diameter plastic tape and reel |
| VSSAF5L45HM3/6A <sup>(1)</sup>        | 0.032           | 6A                     | 3500          | 7" diameter plastic tape and reel  |
| VSSAF5L45HM3/6B <sup>(1)</sup>        | 0.032           | 6B                     | 14 000        | 13" diameter plastic tape and reel |
| VSSAF5L45HM3_A/H <sup>(1)</sup>       | 0.032           | H                      | 3500          | 7" diameter plastic tape and reel  |
| VSSAF5L45HM3_A/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)

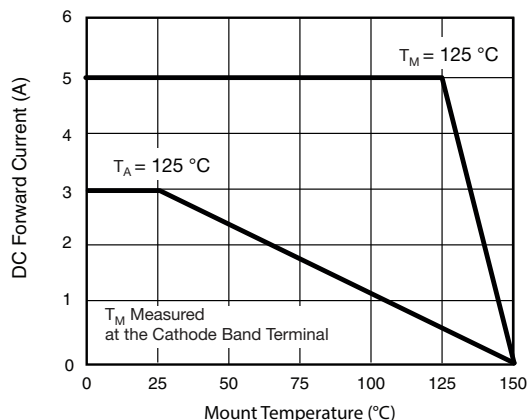


Fig. 1 - Maximum Forward Current Derating Curve

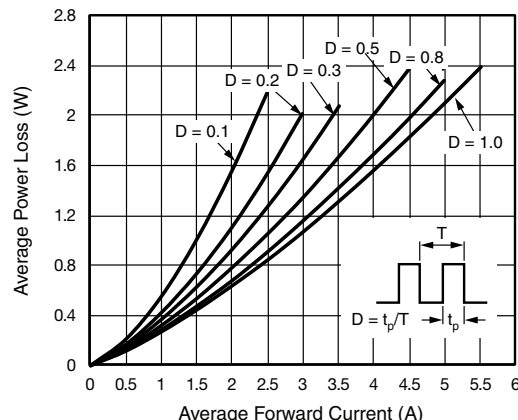


Fig. 2 - Average Power Loss Characteristics

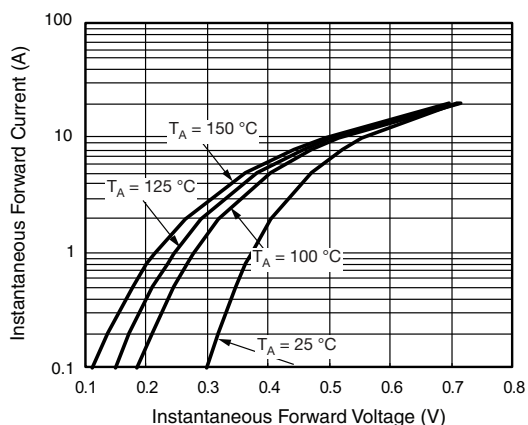


Fig. 3 - Typical Instantaneous Forward Characteristics

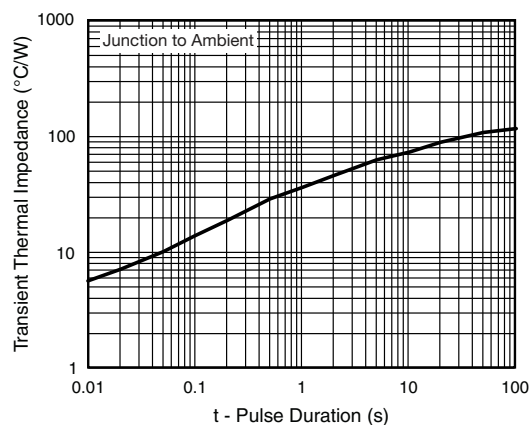


Fig. 6 - Typical Transient Thermal Impedance

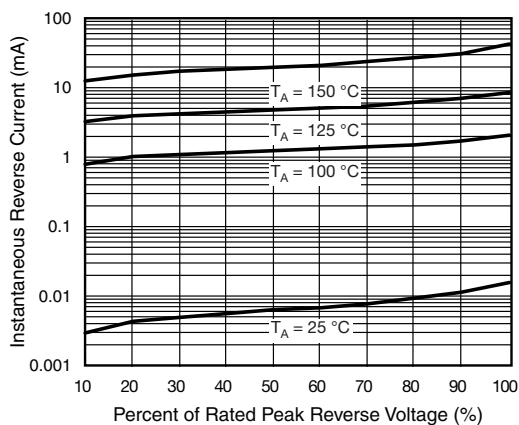


Fig. 4 - Typical Reverse Leakage Characteristics

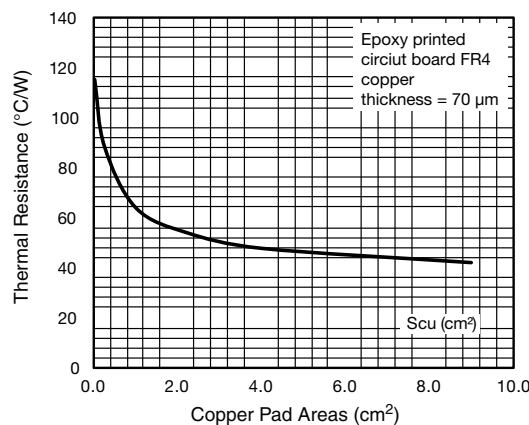


Fig. 7 - Thermal Resistance Junction to Ambient vs. Copper Pad Areas

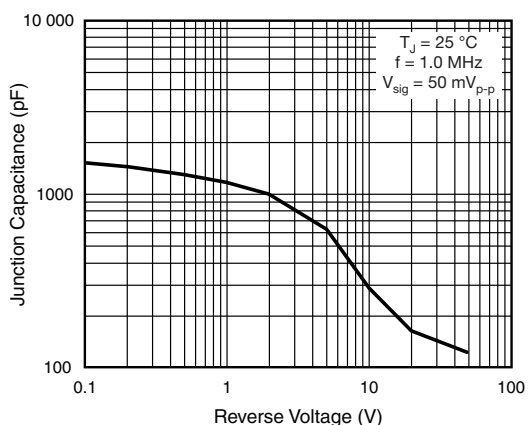
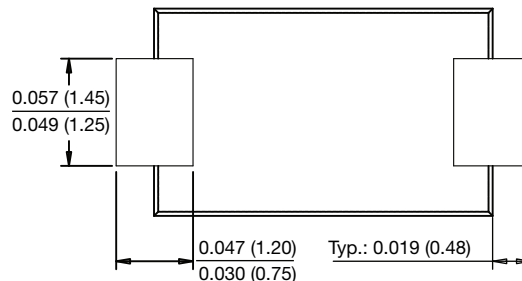
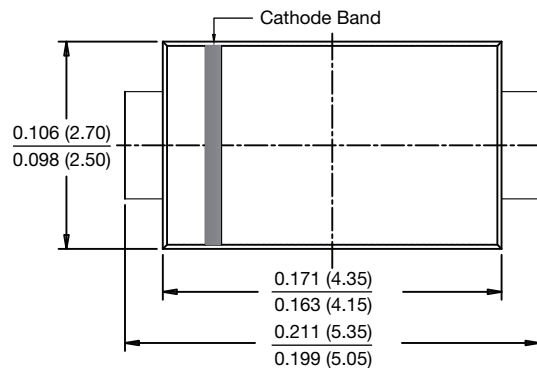


Fig. 5 - Typical Junction Capacitance

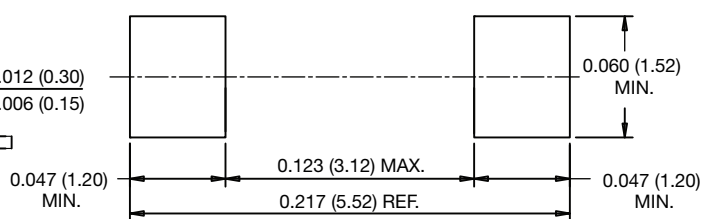
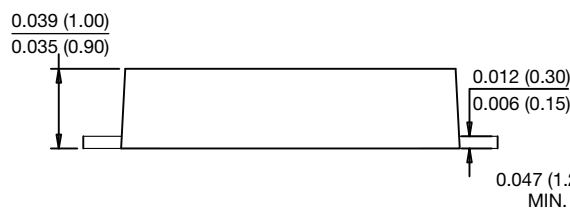


**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

**DO-221AC (SlimSMA)**



**Mounting Pad Layout**





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**Наши контакты:**

**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331