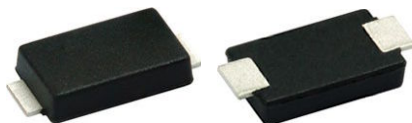


# Surface Mount Trench MOS Barrier Schottky Rectifier

## TMBS® eSMP® Series



Top View

Bottom View

### SlimSMA (DO-221AC)

Cathode  Anode

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

## 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)

## DESIGN SUPPORT TOOLS

[click logo to get started](#)
**3D**  
Models  
Available

## TYPICAL APPLICATIONS

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

## PRIMARY CHARACTERISTICS

|                        |                    |
|------------------------|--------------------|
| $I_{F(AV)}$            | 5.0 A              |
| $V_{RRM}$              | 60 V               |
| $I_{FSM}$              | 100 A              |
| $V_F$ at $I_F = 5.0$ A | 0.48 V             |
| $T_J$ max.             | 150 °C             |
| Package                | SlimSMA (DO-221AC) |
| Circuit configuration  | Single             |

## MECHANICAL DATA

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

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

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

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

| PARAMETER                                                                         | SYMBOL         | VSSAF56     | UNIT |
|-----------------------------------------------------------------------------------|----------------|-------------|------|
| Device marking code                                                               |                | V56         |      |
| Maximum repetitive peak reverse voltage                                           | $V_{RRM}$      | 60          | V    |
| Maximum DC forward current                                                        | $I_F^{(1)}$    | 5.0         | A    |
|                                                                                   | $I_F^{(2)}$    | 2.6         |      |
| 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 30 mm x 30 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                                                                  | $I_F = 2.5\text{ A}$ | $V_F^{(1)}$ | 0.47 | -    | V    |
|                                                                                                | $I_F = 5.0\text{ A}$ |             | 0.54 | 0.62 |      |
|                                                                                                | $I_F = 2.5\text{ A}$ |             | 0.38 | -    |      |
|                                                                                                | $I_F = 5.0\text{ A}$ |             | 0.48 | 0.56 |      |
| Reverse current                                                                                | $V_R = 60\text{ V}$  | $I_R^{(2)}$ | -    | 0.4  | mA   |
|                                                                                                |                      |             | 4.5  | 15   |      |
| Typical junction capacitance                                                                   | 4.0 V, 1 MHz         | $C_J$       | 540  | -    | pF   |

**Notes**

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

(2) Pulse test: pulse width  $\leq 5\text{ ms}$

| <b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise specified) |                       |         |                      |
|-------------------------------------------------------------------------------------------------|-----------------------|---------|----------------------|
| PARAMETER                                                                                       | SYMBOL                | VSSAF56 | 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, 2 oz. pad area; thermal resistance  $R_{\theta JA}$  - junction to ambient

(2) Mounted on 30 mm x 30 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                      |
| VSSAF56-M3/6A                         | 0.032           | 6A                     | 3500          | 7" diameter plastic tape and reel  |
| VSSAF56-M3/6B                         | 0.032           | 6B                     | 14 000        | 13" diameter plastic tape and reel |
| VSSAF56HM3_A/H <sup>(1)</sup>         | 0.032           | H                      | 3500          | 7" diameter plastic tape and reel  |
| VSSAF56HM3_A/I <sup>(1)</sup>         | 0.032           | I                      | 14 000        | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

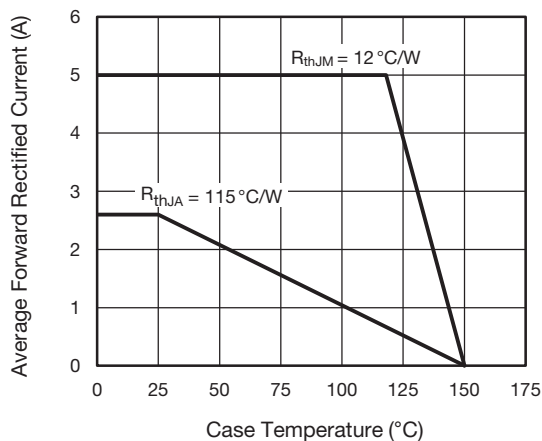
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)


Fig. 1 - Maximum Forward Current Derating Curve

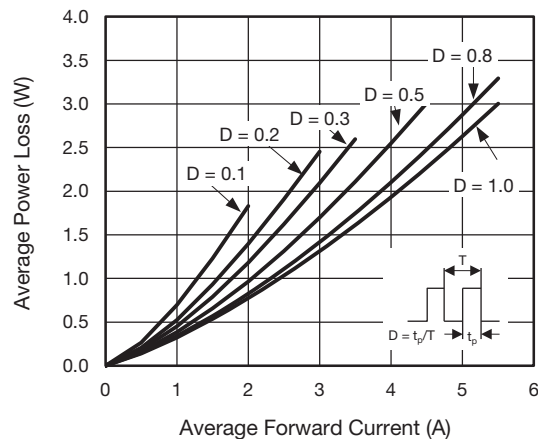


Fig. 2 - Average Power Loss Characteristics

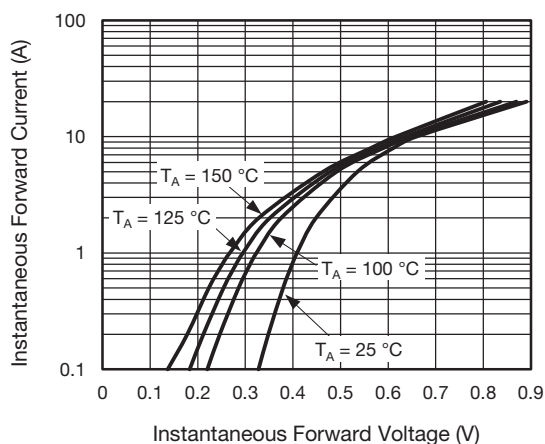


Fig. 3 - Typical Instantaneous Forward Characteristics

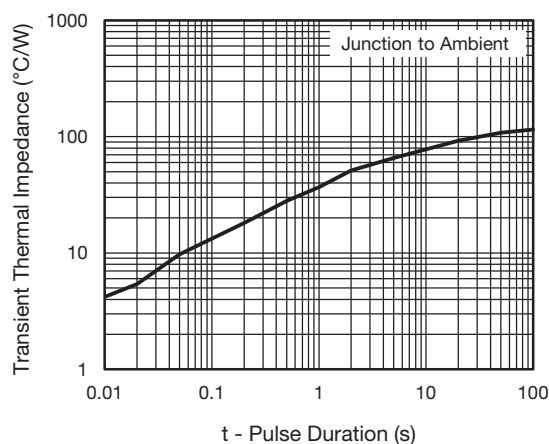


Fig. 6 - Typical Transient Thermal Impedance

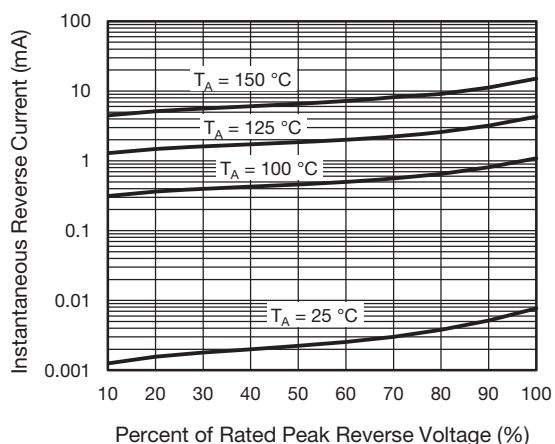


Fig. 4 - Typical Reverse Leakage Characteristics

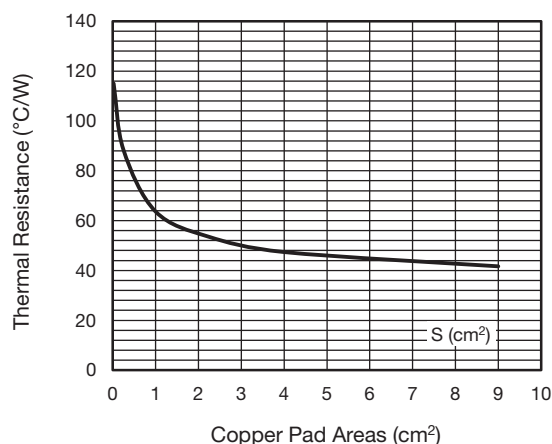


Fig. 7 - Thermal Resistance Junction to Ambient vs. Copper Pad Areas

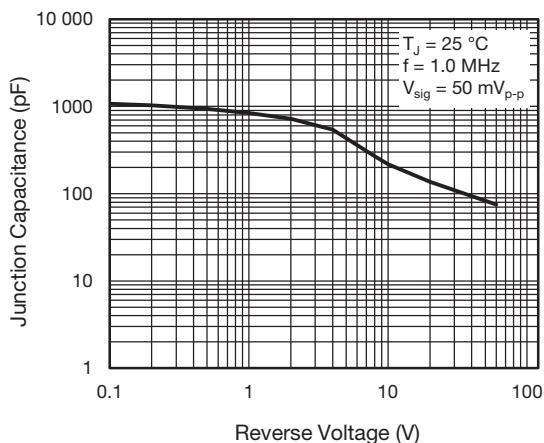
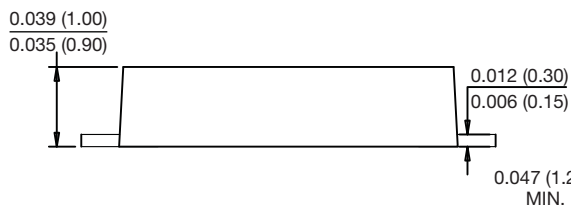
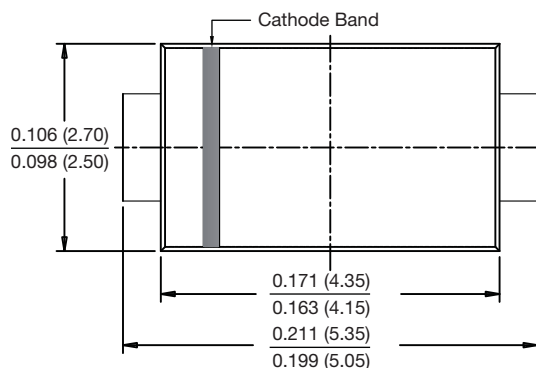


Fig. 5 - Typical Junction Capacitance

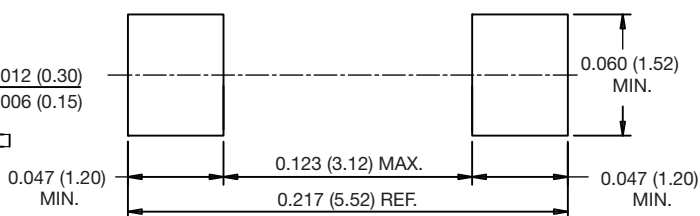


**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

**SlimSMA (DO-221AC)**



**Mounting Pad Layout**





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