

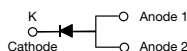
# High Current Density Surface Mount Trench MOS Barrier Schottky Rectifier

Ultra Low  $V_F = 0.29\text{ V}$  at  $I_F = 5\text{ A}$

**TMBS® eSMP® Series**



**TO-277A (SMPC)**



## 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
- 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 DC/DC converters, freewheeling, and polarity protection applications.

## 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

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

M3 suffix meets JESD 201 class 2 whisker test

| PRIMARY CHARACTERISTICS                                |                |
|--------------------------------------------------------|----------------|
| $I_{F(AV)}$                                            | 20 A           |
| $V_{RRM}$                                              | 50 V           |
| $I_{FSM}$                                              | 240 A          |
| $V_F$ at $I_F = 20\text{ A}$ ( $T_A = 125\text{ °C}$ ) | 0.46 V         |
| $T_J$ max.                                             | 150 °C         |
| Package                                                | TO-277A (SMPC) |
| Diode variation                                        | Single die     |

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                     |                |             |      |
|------------------------------------------------------------------------------------|----------------|-------------|------|
| PARAMETER                                                                          | SYMBOL         | V20PL50     | UNIT |
| Device marking code                                                                |                | 20L5        |      |
| Maximum repetitive peak reverse voltage                                            | $V_{RRM}$      | 50          | V    |
| Maximum average forward rectified current (fig. 1)                                 | $I_F^{(1)}$    | 20          | A    |
|                                                                                    | $I_F^{(2)}$    | 5.5         |      |
| Maximum DC reverse voltage                                                         | $V_{DC}$       | 40          | V    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$      | 240         | 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 aluminum 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                                                                  | $I_F = 5.0\text{ A}$                | $V_F^{(1)}$ | 0.40 | -    | V    |
|                                                                                                | $I_F = 10\text{ A}$                 |             | 0.45 | -    |      |
|                                                                                                | $I_F = 20\text{ A}$                 |             | 0.51 | 0.59 |      |
|                                                                                                | $I_F = 5.0\text{ A}$                |             | 0.29 | -    |      |
|                                                                                                | $I_F = 10\text{ A}$                 |             | 0.36 | -    |      |
|                                                                                                | $I_F = 20\text{ A}$                 |             | 0.46 | 0.54 |      |
| Reverse current                                                                                | $V_R = 40\text{ V}$                 | $I_R^{(2)}$ | 0.02 | -    | mA   |
|                                                                                                | $T_A = 25\text{ }^{\circ}\text{C}$  |             | 15   | -    |      |
|                                                                                                | $T_A = 125\text{ }^{\circ}\text{C}$ |             | -    | 3    | mA   |
|                                                                                                | $V_R = 50\text{ V}$                 |             | 20   | 60   |      |

**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 noted) |                          |         |                      |
|---------------------------------------------------------------------------------------------|--------------------------|---------|----------------------|
| PARAMETER                                                                                   | SYMBOL                   | V20PL50 | UNIT                 |
| Typical thermal resistance                                                                  | $R_{\theta JA}^{(1)(2)}$ | 68      | $^{\circ}\text{C/W}$ |
|                                                                                             | $R_{\theta JM}^{(3)}$    | 4       |                      |

**Notes**

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

| <b>ORDERING INFORMATION</b> (Example) |                 |                        |               |                                    |
|---------------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                         | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| V20PL50-M3/86A                        | 0.10            | 86A                    | 1500          | 7" diameter plastic tape and reel  |
| V20PL50-M3/87A                        | 0.10            | 87A                    | 6500          | 13" diameter plastic tape and reel |

**RATINGS AND CHARACTERISTICS CURVES**

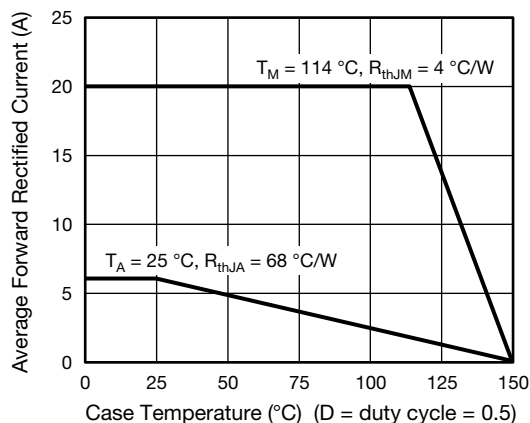
( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

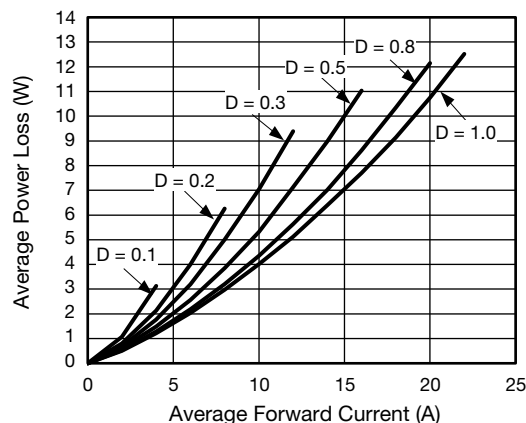


Fig. 2 - Forward Power Loss Characteristics

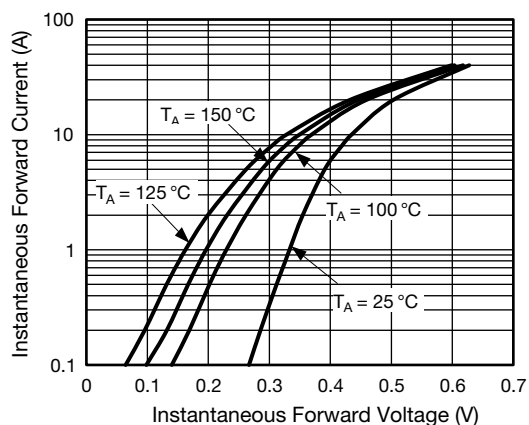


Fig. 3 - Typical Instantaneous Forward Characteristics

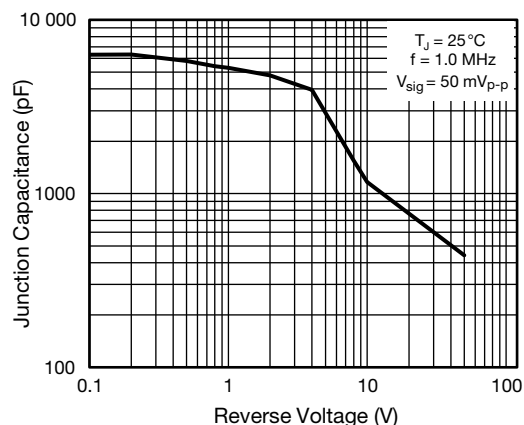


Fig. 5 - Typical Junction Capacitance

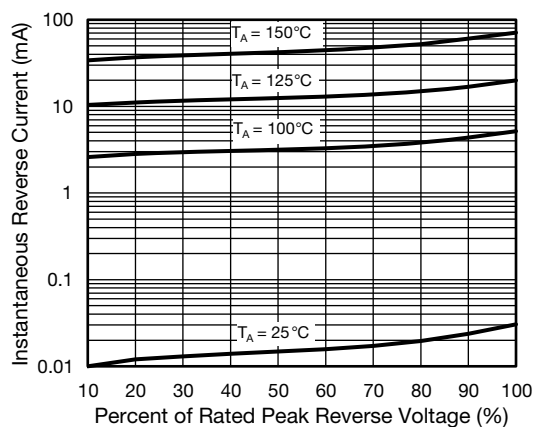


Fig. 4 - Typical Reverse Leakage Characteristics

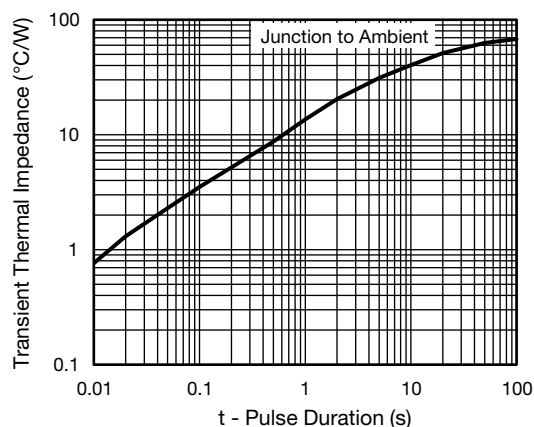


Fig. 6 - Typical Transient Thermal Impedance



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





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