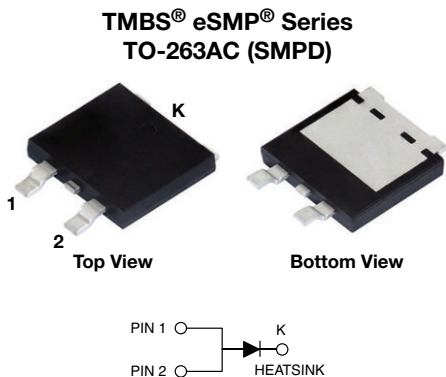


# Low-Voltage Trench MOS Barrier Schottky Rectifier

Ultra Low  $V_F = 0.31\text{ V}$  at  $I_F = 5\text{ A}$



## FEATURES

- Trench MOS Schottky technology
- Very low profile - typical height of 1.7 mm
- Ideal for automated placement
- 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)



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

## TYPICAL APPLICATIONS

For use in high frequency DC/DC converters, switching power supplies, freewheeling diodes, OR-ing diode, and reverse battery protection.

## PRIMARY CHARACTERISTICS

|                                                        |                 |
|--------------------------------------------------------|-----------------|
| $I_{F(AV)}$                                            | 20 A            |
| $V_{RRM}$                                              | 45 V            |
| $I_{FSM}$                                              | 160 A           |
| $V_F$ at $I_F = 20\text{ A}$ ( $T_A = 125\text{ °C}$ ) | 0.50 V          |
| $T_J$ max.                                             | 150 °C          |
| Package                                                | TO-263AC (SMPD) |
| Diode variations                                       | Single die      |

## MECHANICAL DATA

**Case:** TO-263AC (SMPD)

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

**Polarity:** as marked

## MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)

| PARAMETER                                                                         | SYMBOL            | V20DL45-M3, V20DL45HM3 | UNIT |
|-----------------------------------------------------------------------------------|-------------------|------------------------|------|
| Maximum repetitive peak reverse voltage                                           | $V_{RRM}$         | 45                     | V    |
| Maximum average forward rectified current (fig. 1)                                | $I_{F(AV)}^{(1)}$ | 20                     | A    |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | $I_{FSM}$         | 160                    | A    |
| Operating junction and storage temperature range                                  | $T_J, T_{STG}$    | -40 to +150            | °C   |

### Note

(1) With heatsink

| 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> = 5 A  | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.42 | -    | V    |
|                                                                            | I <sub>F</sub> = 10 A |                         |                               | 0.48 | -    |      |
|                                                                            | I <sub>F</sub> = 20 A |                         |                               | 0.55 | 0.64 |      |
|                                                                            | I <sub>F</sub> = 5 A  | T <sub>A</sub> = 125 °C |                               | 0.31 | -    |      |
|                                                                            | I <sub>F</sub> = 10 A |                         |                               | 0.38 | -    |      |
|                                                                            | I <sub>F</sub> = 20 A |                         |                               | 0.50 | 0.58 |      |
| Reverse current                                                            | V <sub>R</sub> = 45 V | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -    | 2.5  | mA   |
|                                                                            |                       | T <sub>A</sub> = 125 °C |                               | 20   | 50   |      |

**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                   | V20DL45-M3, V20DL45HM3 | UNIT                 |
| Typical thermal resistance                                                                  | $R_{\theta JC}$          | 1.6                    | $^{\circ}\text{C/W}$ |
|                                                                                             | $R_{\theta JA}^{(1)(2)}$ | 45                     |                      |

**Notes**

- (1) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$   
(2) Free air, without heatsink

| <b>ORDERING INFORMATION</b> (Example) |                 |                        |               |                                    |
|---------------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                         | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| V20DL45-M3/I                          | 0.54            | I                      | 2000/reel     | 13" diameter plastic tape and reel |
| V20DL45HM3/I <sup>(1)</sup>           | 0.54            | I                      | 2000/reel     | 13" diameter plastic tape and reel |
| V20DL45HM3_A/I <sup>(1)</sup>         | 0.54            | I                      | 2000/reel     | 13" diameter plastic tape and reel |

**Note**

- (1) AEC-Q101 qualified

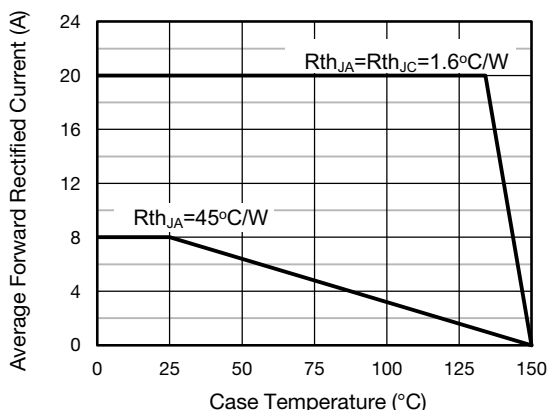
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Forward Current Derating Curve

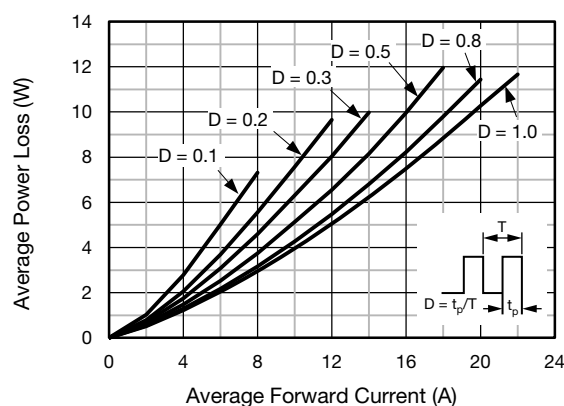


Fig. 2 - Forward Power Loss Characteristics

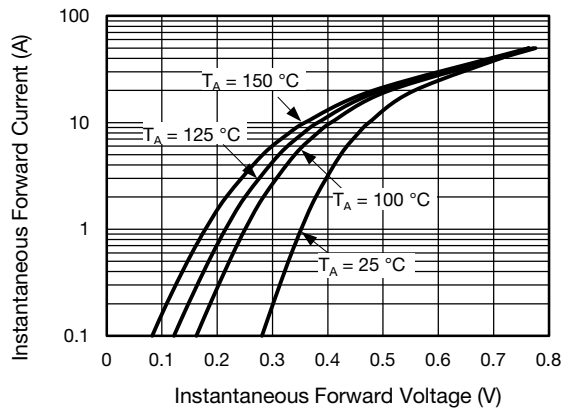


Fig. 3 - Typical Instantaneous Forward Characteristics

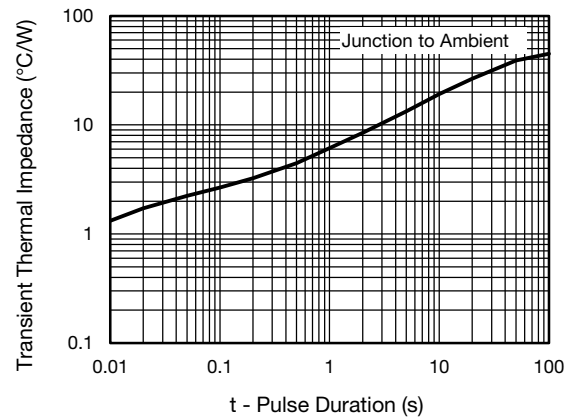


Fig. 6 - Typical Transient Thermal Impedance

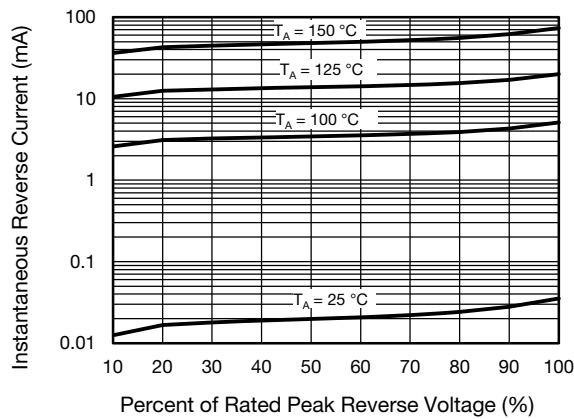


Fig. 4 - Typical Reverse Characteristics

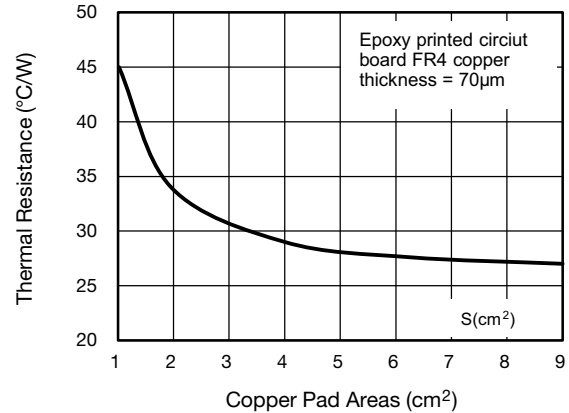


Fig. 7 - Thermal Resistance Junction-to-Ambient vs. Copper Pad Areas

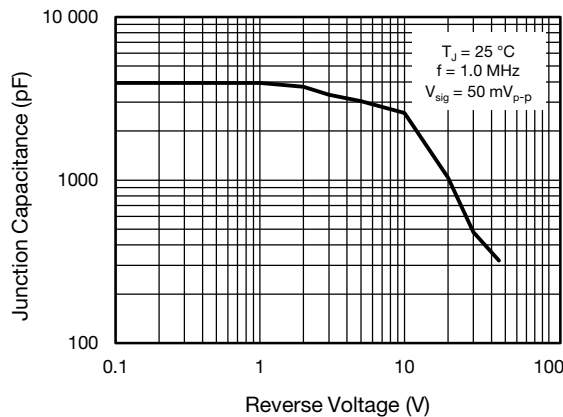
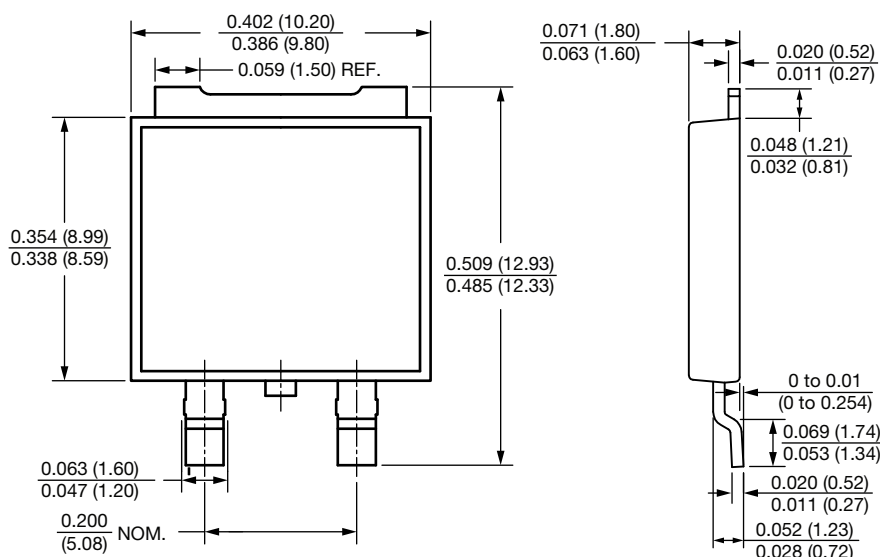


Fig. 5 - Typical Junction Capacitance

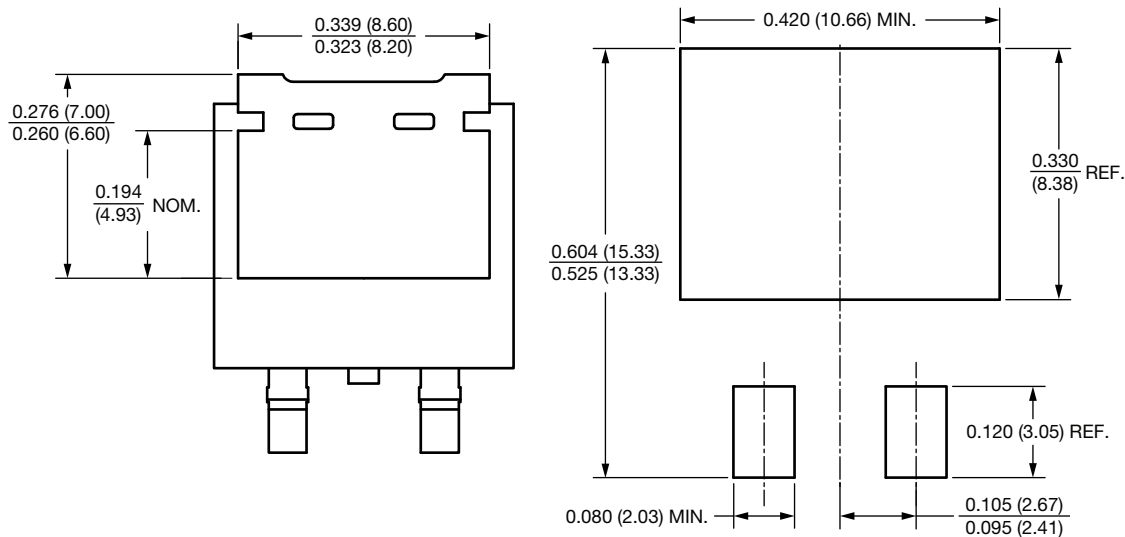


## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

### TO-263AC (SMPD)



### Mounting Pad Layout





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