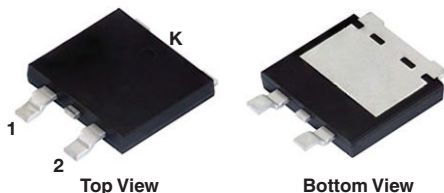
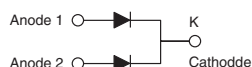


# Dual High Voltage TMBS® (Trench MOS Barrier Schottky) Rectifier

## eSMP® Series



SMPD (TO-263AC)



## FEATURES

- Very low profile - typical height of 1.7 mm
- 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
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

AUTOMOTIVE  
GRADE  
Available



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

|                                           |                 |
|-------------------------------------------|-----------------|
| $I_{F(AV)}$                               | 2 x 10.0 A      |
| $V_{RRM}$                                 | 170 V           |
| $I_{FSM}$                                 | 150 A           |
| $V_F$ at $I_F = 10.0$ A ( $T_A = 125$ °C) | 0.68 V          |
| $T_J$ max.                                | 175 °C          |
| Package                                   | SMPD (TO-263AC) |
| Circuit configurations                    | Common cathode  |

## MECHANICAL DATA

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

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

**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:** As marked

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

| PARAMETER                                                                          | SYMBOL      | V20D170C    | UNIT |
|------------------------------------------------------------------------------------|-------------|-------------|------|
| Device marking code                                                                |             | V20D170C    |      |
| Maximum repetitive peak reverse voltage                                            | $V_{RRM}$   | 170         | V    |
| Maximum average forward rectified current<br>(fig. 1)                              | $I_{F(AV)}$ | 20          | A    |
| per device                                                                         |             | 10          |      |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$   | 150         | A    |
| Operating junction temperature range                                               | $T_J$ (1)   | -40 to +175 | °C   |
| Storage temperature range                                                          | $T_{STG}$   | -55 to +175 | °C   |

### Note

(1) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$

| ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                        |                         |                               |       |      |      |
|----------------------------------------------------------------------------|------------------------|-------------------------|-------------------------------|-------|------|------|
| PARAMETER                                                                  | TEST CONDITIONS        |                         | SYMBOL                        | TYP.  | MAX. | UNIT |
| Instantaneous forward voltage per diode                                    | I <sub>F</sub> = 5 A   | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.75  | -    | V    |
|                                                                            | I <sub>F</sub> = 10 A  |                         |                               | 0.83  | 0.9  |      |
|                                                                            | I <sub>F</sub> = 5 A   | T <sub>A</sub> = 125 °C |                               | 0.6   | -    |      |
|                                                                            | I <sub>F</sub> = 10 A  |                         |                               | 0.68  | 0.76 |      |
| Reverse current at rated V <sub>R</sub> per diode                          | V <sub>R</sub> = 140 V | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 0.001 | -    | mA   |
|                                                                            |                        | T <sub>A</sub> = 125 °C |                               | 0.8   | -    | mA   |
|                                                                            | V <sub>R</sub> = 170 V | T <sub>A</sub> = 25 °C  |                               | -     | 0.15 | mA   |
|                                                                            |                        | T <sub>A</sub> = 125 °C |                               | 1.5   | 5    | mA   |
| Typical junction capacitance                                               | 4.0 V, 1 MHz           |                         | C <sub>J</sub>                | 520   | -    | 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 noted) |                          |          |                      |
|---------------------------------------------------------------------------------------------|--------------------------|----------|----------------------|
| PARAMETER                                                                                   | SYMBOL                   | V20D170C | UNIT                 |
| Typical thermal resistance per device                                                       | $R_{\theta JC}^{(1)}$    | 1.5      | $^{\circ}\text{C/W}$ |
|                                                                                             | $R_{\theta JA}^{(2)(3)}$ | 58       |                      |

**Notes**

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

| <b>ORDERING INFORMATION</b> (Example) |                 |              |               |                                    |
|---------------------------------------|-----------------|--------------|---------------|------------------------------------|
| PREFERRED P/N                         | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| V20D170C-M3/I                         | 0.55            | I            | 2000/reel     | 13" diameter plastic tape and reel |
| V20D170CHM3/I <sup>(1)</sup>          | 0.55            | I            | 2000/reel     | 13" diameter plastic tape and reel |

**Note**

- (1) AEC-Q101 qualified

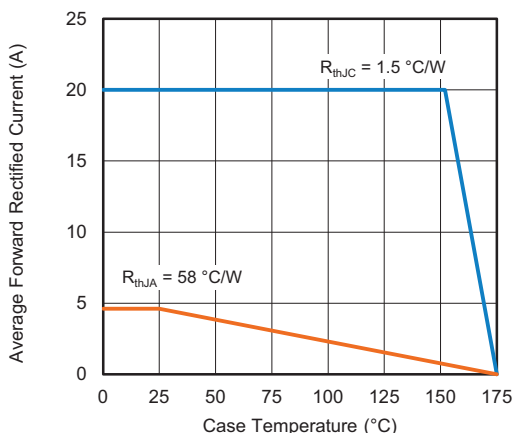
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Forward Current Derating Curve

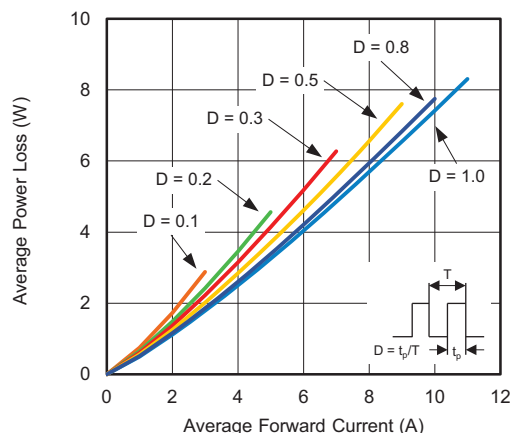


Fig. 2 - Forward Power Loss Characteristics

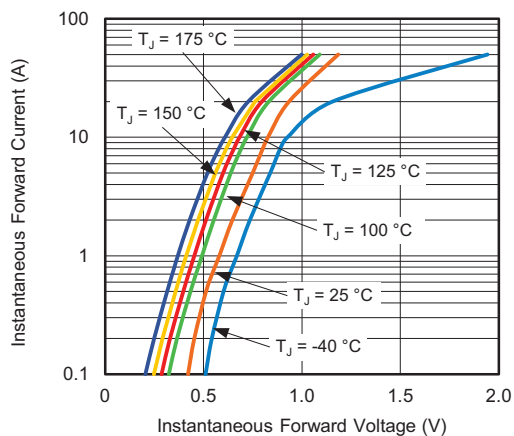


Fig. 3 - Typical Instantaneous Forward Characteristics

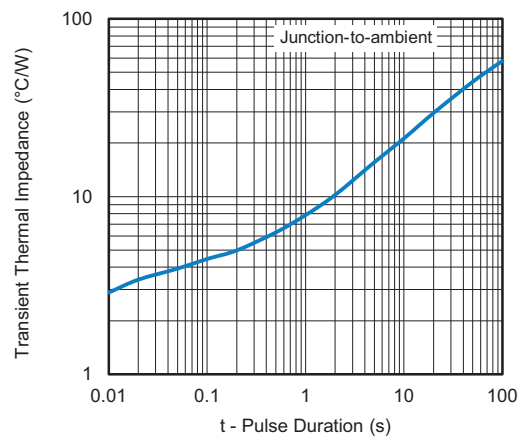


Fig. 6 - Typical Transient Thermal Impedance

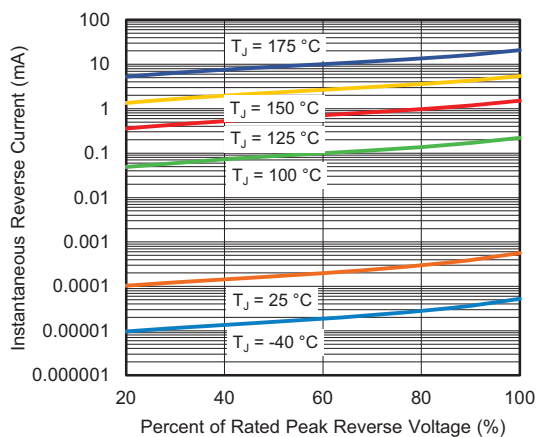


Fig. 4 - Typical Reverse Characteristics

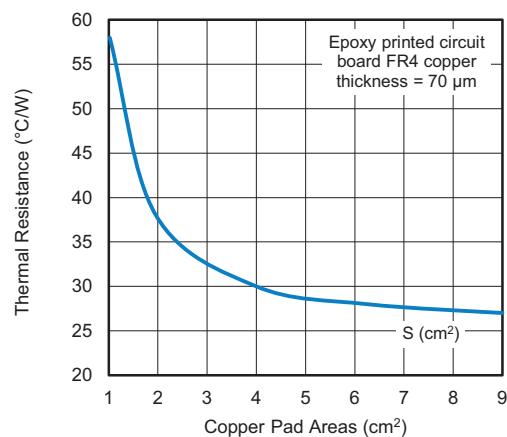


Fig. 7 - Thermal Resistance Junction-to-Ambient vs. Copper Pad Areas

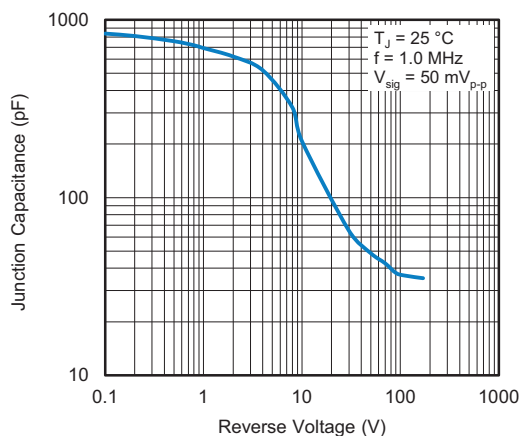
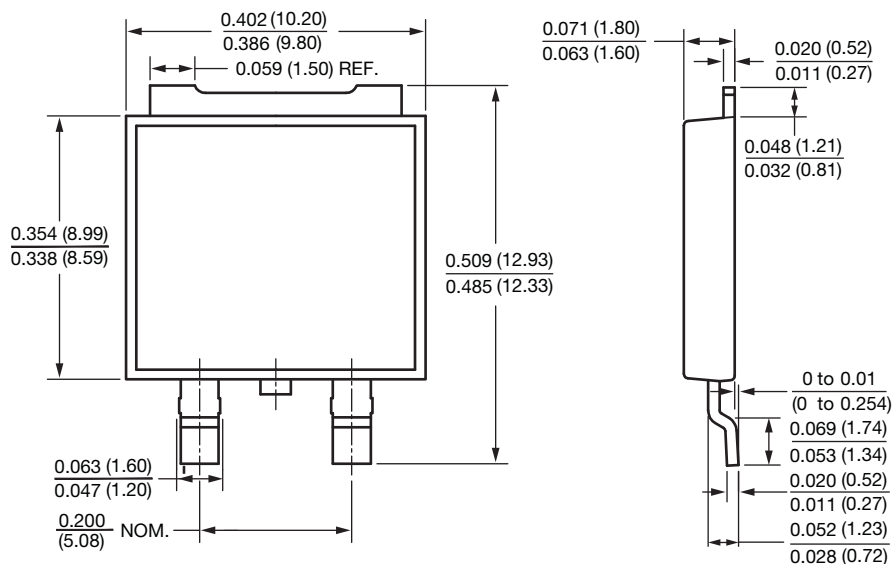
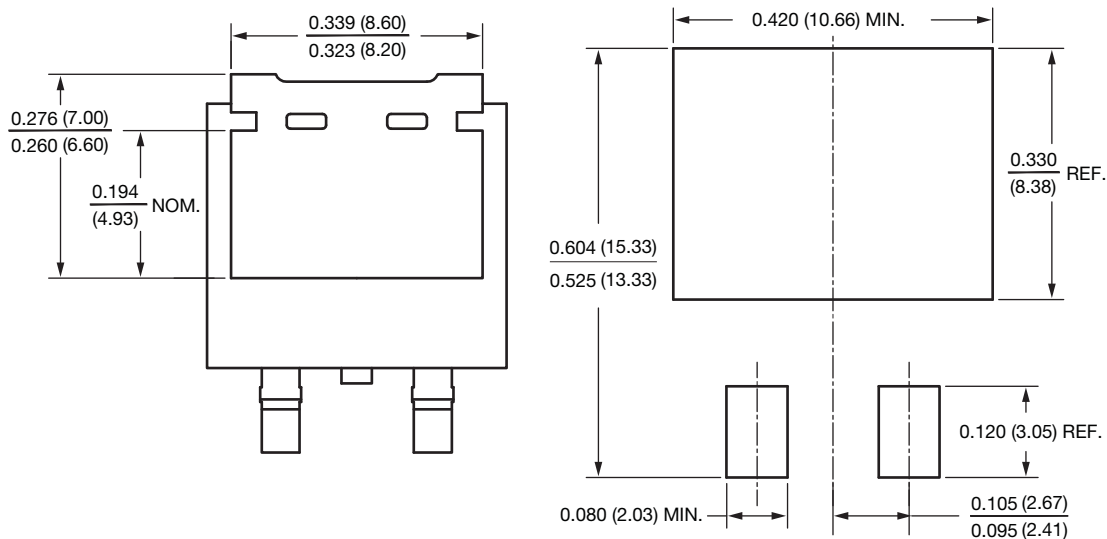


Fig. 5 - Typical Junction Capacitance

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

**SMPD (TO-263AC)**

**Mounting Pad Layout**




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