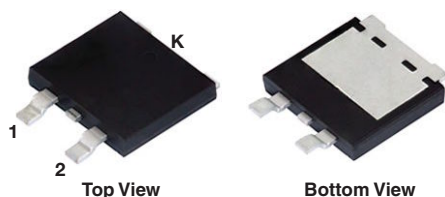


# Dual Low-Voltage TMBS® (Trench MOS Barrier Schottky) Rectifier

Ultra Low  $V_F = 0.34\text{ V}$  at  $I_F = 5.0\text{ A}$

## eSMP® Series SMPD (TO-263AC)



## DESIGN SUPPORT TOOLS AVAILABLE



## 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)

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 in commercial, industrial, and automotive application.

## PRIMARY CHARACTERISTICS

|                                                        |                 |
|--------------------------------------------------------|-----------------|
| $I_{F(AV)}$                                            | 2 x 20 A        |
| $V_{RRM}$                                              | 45 V            |
| $I_{FSM}$                                              | 240 A           |
| $V_F$ at $I_F = 20\text{ A}$ ( $T_A = 125\text{ °C}$ ) | 0.48 V          |
| $T_J$ max.                                             | 175 °C          |
| Package                                                | SMPD (TO-263AC) |
| Circuit configuration                                  | 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

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 meet JESD 201 class 2 whisker test

**Polarity:** as marked

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

| PARAMETER                                                                          | SYMBOL          | V40DM45C    | UNIT |
|------------------------------------------------------------------------------------|-----------------|-------------|------|
| Device marking code                                                                |                 | V40DM45C    |      |
| Maximum repetitive peak reverse voltage                                            | $V_{RRM}$       | 45          | V    |
| Maximum average forward rectified current<br>(fig. 1)                              | $I_{F(AV)}$ (1) | 40          | A    |
| per diode                                                                          |                 | 20          |      |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$       | 240         | A    |
| Operating junction temperature range                                               | $T_J$ (2)       | -40 to +175 | °C   |
| Storage temperature range                                                          | $T_{STG}$       | -55 to +175 |      |

## Notes

(1) Mounted on infinite heatsink

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



| 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> | 0.46 | -    | V    |
|                                                                            | I <sub>F</sub> = 10 A |                         |                               | 0.50 | -    |      |
|                                                                            | I <sub>F</sub> = 20 A |                         |                               | 0.56 | 0.60 |      |
|                                                                            | I <sub>F</sub> = 5 A  | T <sub>A</sub> = 125 °C |                               | 0.34 | -    |      |
|                                                                            | I <sub>F</sub> = 10 A |                         |                               | 0.39 | -    |      |
|                                                                            | I <sub>F</sub> = 20 A |                         |                               | 0.48 | 0.54 |      |
| Reverse current at rated V <sub>R</sub> per diode                          | V <sub>R</sub> = 45 V | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -    | 1.1  | mA   |
|                                                                            |                       | T <sub>A</sub> = 125 °C |                               | 7    | 25   |      |
| Typical junction capacitance                                               | 4.0 V, 1 MHz          |                         | C <sub>J</sub>                | 4400 | -    | 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                   | V40DM45C | UNIT                 |
| Typical thermal resistance per device                                                       | $R_{\theta JC}^{(1)}$    | 0.8      | $^{\circ}\text{C/W}$ |
|                                                                                             | $R_{\theta JA}^{(2)(3)}$ | 50       |                      |

**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-ambient

(3) Free air, without heatsink

| <b>ORDERING INFORMATION</b> (Example) |                 |              |               |                                    |
|---------------------------------------|-----------------|--------------|---------------|------------------------------------|
| PREFERRED P/N                         | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| V40DM45C-M3/I                         | 0.55            | I            | 2000/reel     | 13" diameter plastic tape and reel |
| V40DM45CHM3/I <sup>(1)</sup>          | 0.55            | I            | 2000/reel     | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

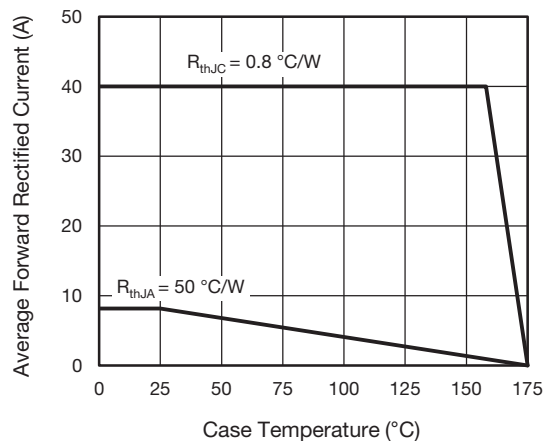
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

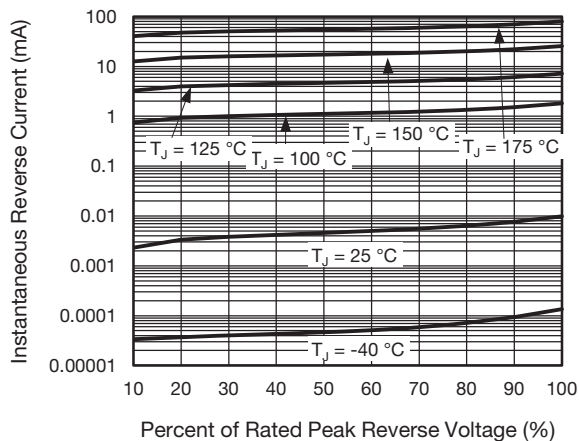


Fig. 4 - Typical Reverse Leakage Characteristics

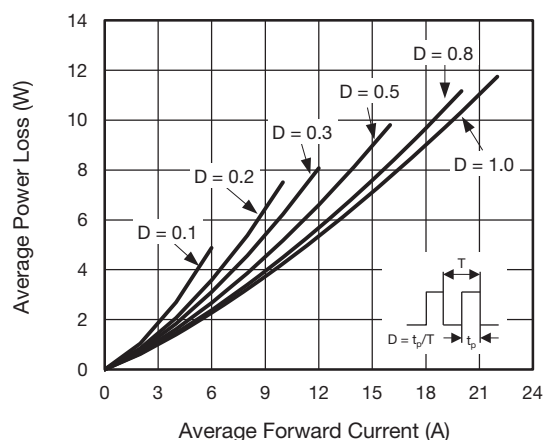


Fig. 2 - Average Power Loss Characteristics

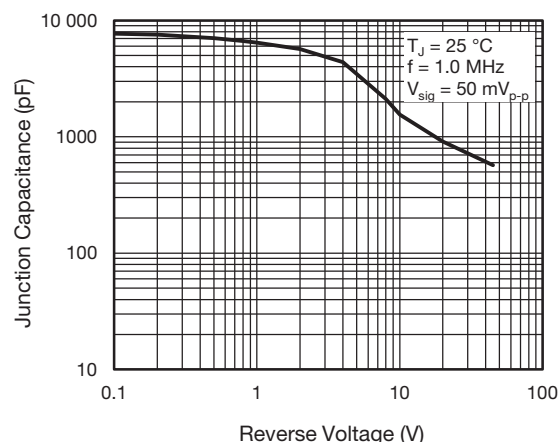


Fig. 5 - Typical Junction Capacitance

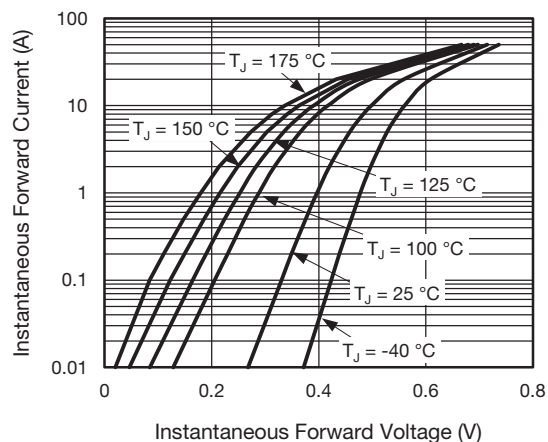


Fig. 3 - Typical Instantaneous Forward Characteristics

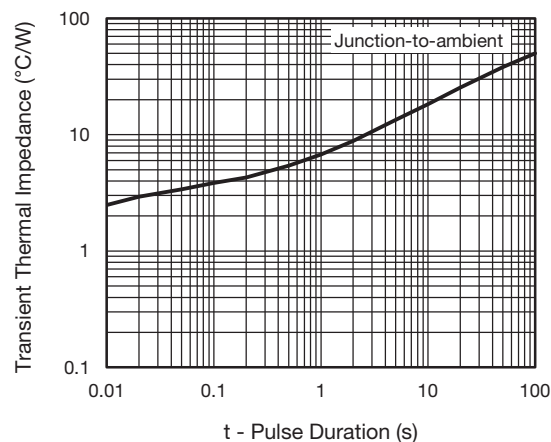


Fig. 6 - Typical Transient Thermal Impedance

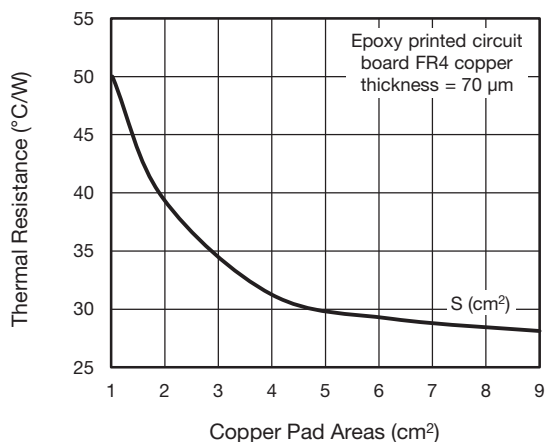
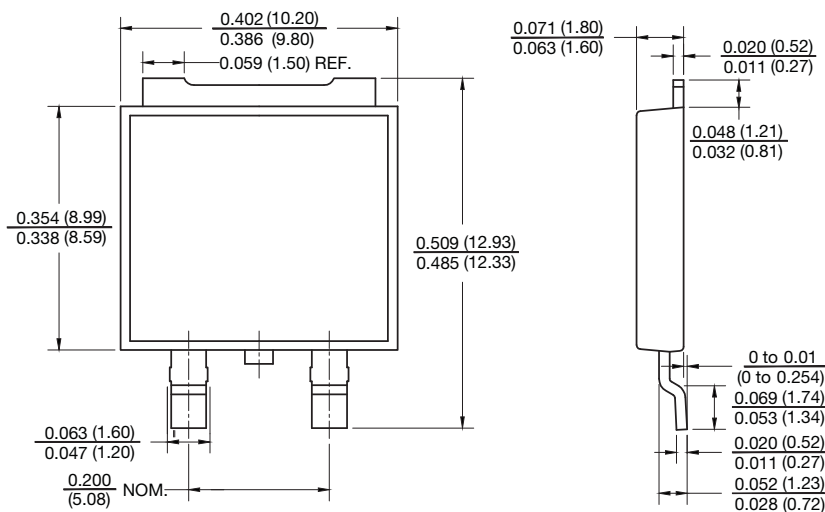


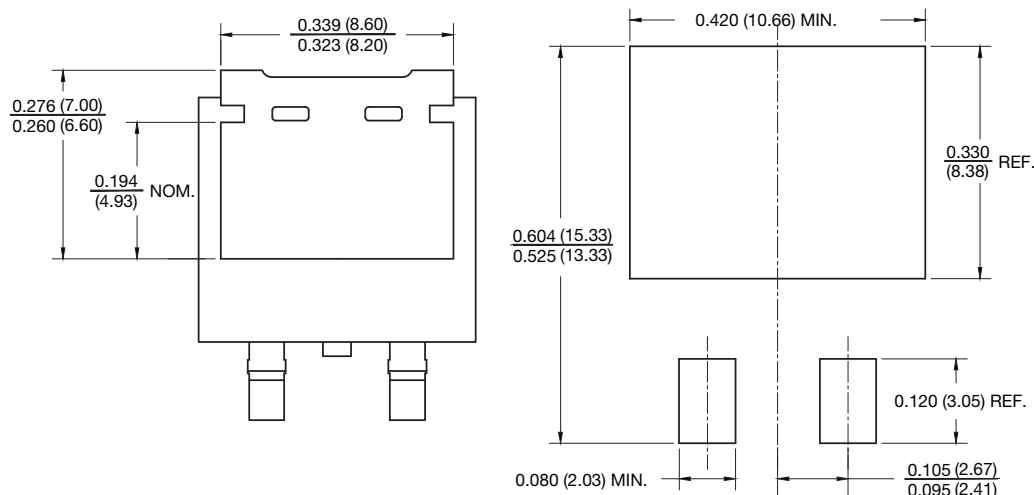
Fig. 7 - Thermal Resistance Junction-to-Ambient vs. Copper Pad Areas

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

#### SMPD (TO-263AC)



#### Mounting Pad Layout





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