

# 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



3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2 x 10 A
$V_{RRM}$	45 V
$I_{FSM}$	120 A
$V_F$ at $I_F = 10\text{ A}$ ( $T_A = 125\text{ °C}$ )	0.40 V
$T_J$ max.	150 °C
Package	SMPD (TO-263AC)
Circuit configuration	Common cathode

## 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.

## 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	V20D45C	UNIT
Device marking code		V20D45C	
Maximum repetitive peak reverse voltage	$V_{RRM}$	45	V
Maximum average forward rectified current (fig. 1)	$I_{F(AV)}$ (1)	20	A
		10	
Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load	$I_{FSM}$	120	A
Operating junction temperature range	$T_J$ (2)	-40 to +150	°C
Storage temperature range	$T_{STG}$	-55 to +150	

## 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** ( $T_A = 25\text{ }^{\circ}\text{C}$  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>	0.44	-	V
	I <sub>F</sub> = 10 A			0.49	0.57	
	I <sub>F</sub> = 5 A	T <sub>A</sub> = 125 °C		0.34	-	
	I <sub>F</sub> = 10 A			0.40	0.50	
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	mA
		T <sub>A</sub> = 125 °C		10	20	
Typical junction capacitance	4.0 V, 1 MHz		C <sub>J</sub>	1900	-	pF

**Notes**

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

(2) Pulse test: Pulse width  $\leq 5\text{ ms}$ 
**THERMAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

PARAMETER	SYMBOL	V20D45C	UNIT
Typical thermal resistance per device	$R_{\theta JC}^{(1)}$	1.8	$^{\circ}\text{C/W}$
	$R_{\theta JA}^{(2)(3)}$	48	

**Notes**

(1) Mounted on infinite heatsink

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

(3) Free air, without heatsink

**ORDERING INFORMATION** (Example)

PREFERRED P/N	UNIT WEIGHT (g)	PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
V20D45C-M3/I	0.55	I	2000/reel	13" diameter plastic tape and reel
V20D45CHM3/I <sup>(1)</sup>	0.55	I	2000/reel	13" diameter plastic tape and reel

**Note**

(1) AEC-Q101 qualified

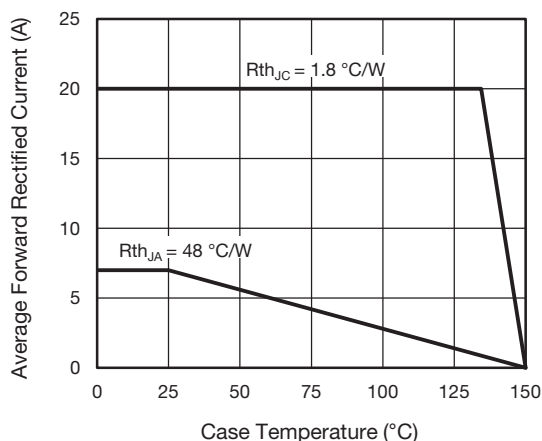
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

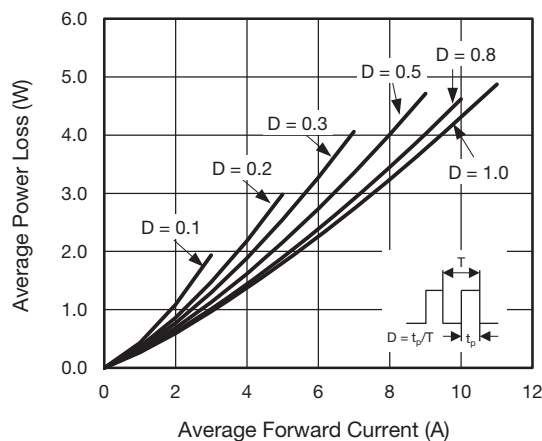


Fig. 2 - Average Power Loss Characteristics

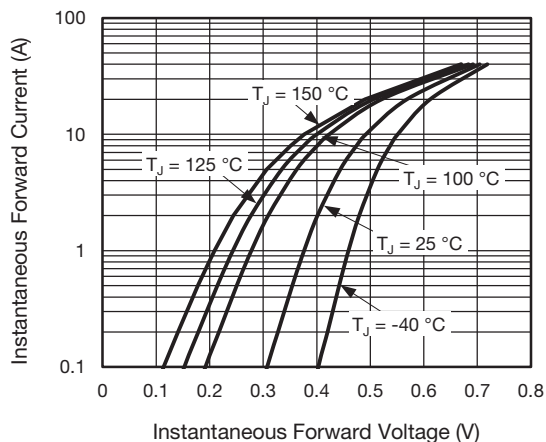


Fig. 3 - Typical Instantaneous Forward Characteristics

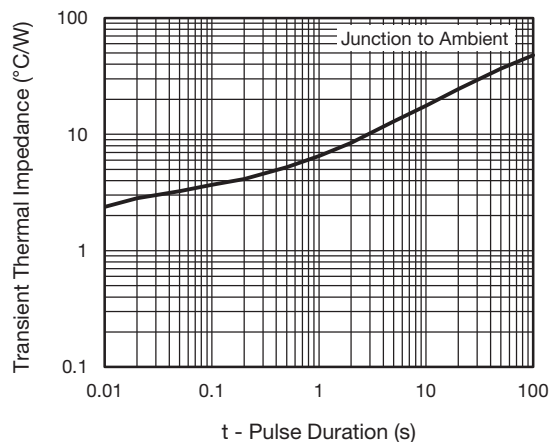


Fig. 6 - Typical Transient Thermal Impedance

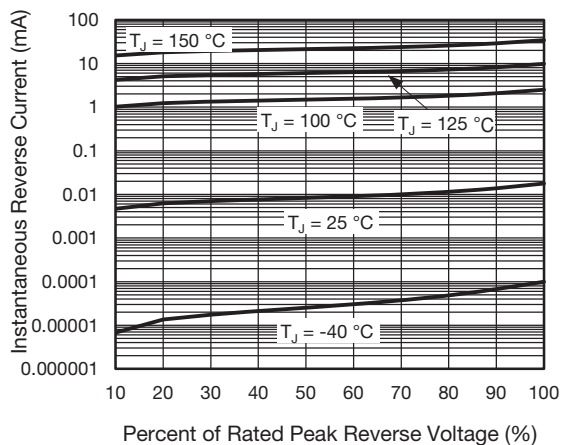


Fig. 4 - Typical Reverse Leakage Characteristics

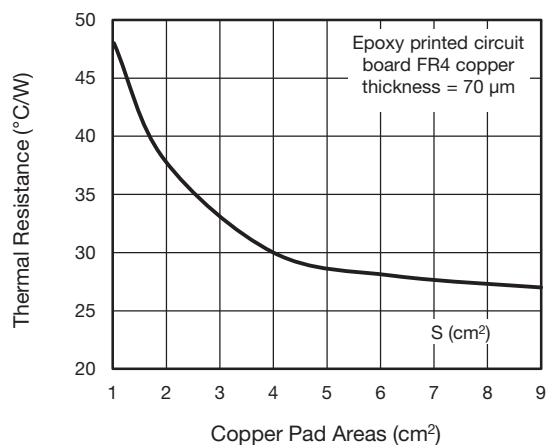


Fig. 7 - Thermal Resistance Junction-to-Ambient vs. Copper Pad Areas

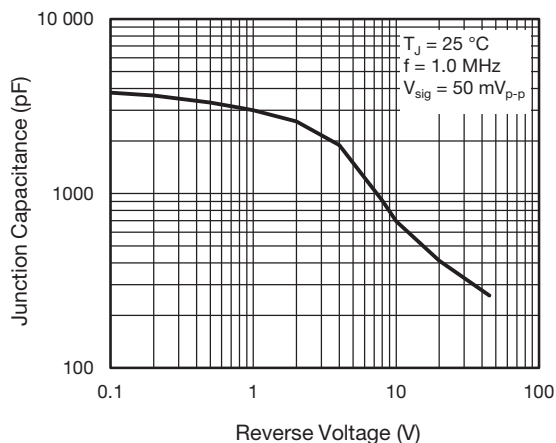
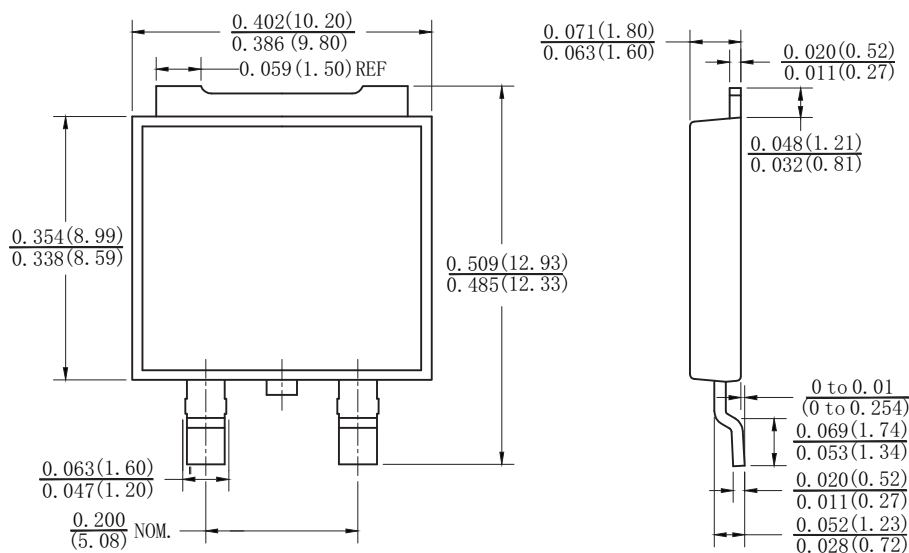
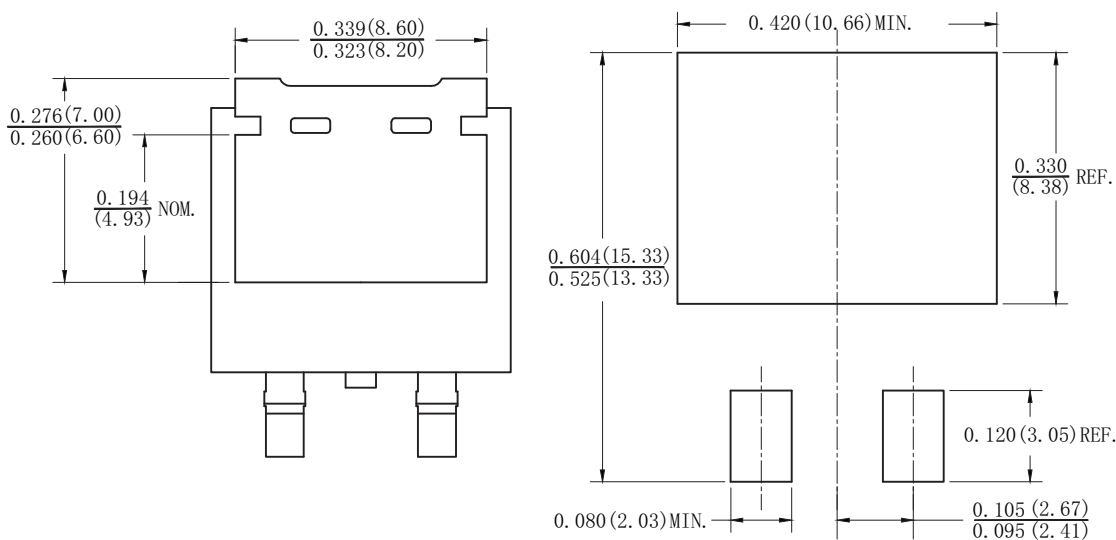


Fig. 5 - Typical Junction Capacitance

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

**SMPD (TO-263AC)**

**Mounting Pad Layout**




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