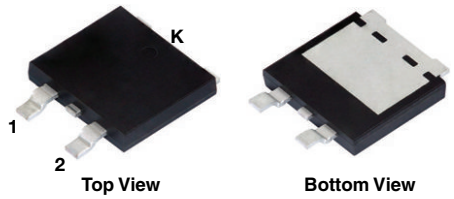
Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

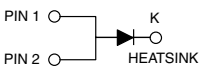
Ultra Low V_F = 0.26 V at I_F = 5 A

TMBS® eSMP® Series
SMPD



Top View Bottom View

V40DL45BP



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
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

TYPICAL APPLICATIONS

For use in solar cell junction box as a bypass diode for protection, using DC forward current without reverse bias.

MECHANICAL DATA

Case: SMPD
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 1A whisker test

Polarity: As marked

PRIMARY CHARACTERISTICS	
$I_{F(DC)}$	40 A
V_{RRM}	45 V
I_{FSM}	240 A
V_F at I_F = 40 A (T_A = 125 °C)	0.53 V
T_{OP} max. (AC model)	150 °C
T_J max. (DC forward current)	200 °C
Package	SMPD
Diode variations	Single die

MAXIMUM RATINGS (T_A = 25 °C unless otherwise noted)			
PARAMETER	**SYMBOL**	**V40DL45BP**	**UNIT**
Maximum repetitive peak reverse voltage	V_{RRM}	45	V
Maximum DC forward current (fig. 1)	$I_{F(DC)}$ (1)	40	A
Peak forward surge current 10 ms single half sine-wave superimposed on rated load	I_{FSM}	240	A
Operating junction temperature range (AC model)	T_{OP}	-40 to +150	°C
Junction temperature in DC forward current without reverse bias, t = ≤ 1 h	T_J (2)	≤ 200	°C

Note
(1) With heatsink
(2) Meets the requirements of IEC 61215 ed.2 bypass diode thermal test

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)						
PARAMETER	**TEST CONDITIONS**		**SYMBOL**	**TYP.**	**MAX.**	**UNIT**
Instantaneous forward voltage	I_F = 5 A	T_A = 25 °C	V_F (1)	0.38	-	V
	I_F = 20 A			0.47	-	
	I_F = 40 A			0.58	0.66	
	I_F = 5 A	T_A = 125 °C		0.26	-	
	I_F = 20 A			0.38	-	
	I_F = 40 A			0.53	0.61	
Reverse current	V_R = 45 V	T_A = 25 °C	I_R (2)	-	5	mA
		T_A = 125 °C		36	125	

Notes

(1) Pulse test: 300 µs pulse width, 1 % duty cycle

(2) Pulse test: Pulse width ≤ 5 ms

THERMAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)			
PARAMETER	**SYMBOL**	**V40DL45BP**	**UNIT**
Typical thermal resistance	$R_{\theta JC}$	0.9	°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

ORDERING INFORMATION (Example)					
PACKAGE	**PREFERRED P/N**	**UNIT WEIGHT (g)**	**PACKAGE CODE**	**BASE QUANTITY**	**DELIVERY MODE**
SMPD	V40DL45BP-M3/I	0.55	I	2000/reel	13" diameter plastic tape and reel

RATINGS AND CHARACTERISTICS CURVES (T_A = 25 °C unless otherwise noted)

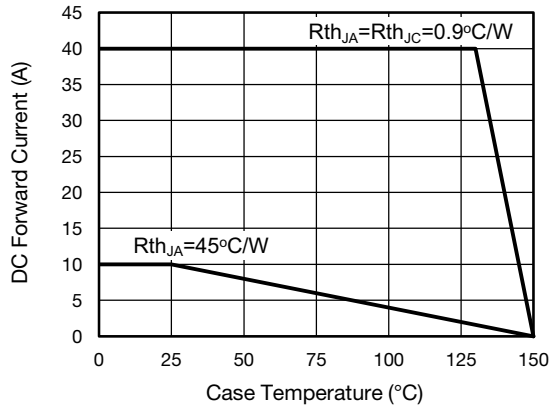

Fig. 1 - Forward Current Derating Curve

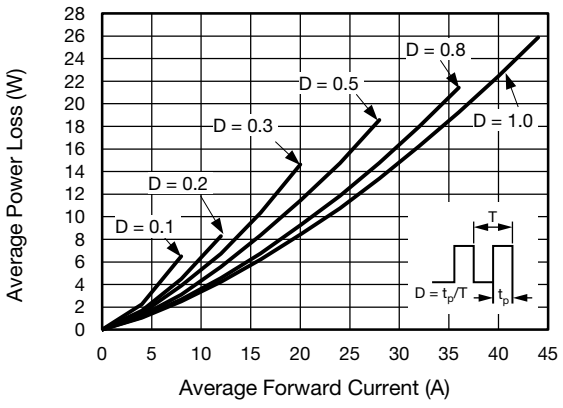

Fig. 2 - Forward Power Loss Characteristics

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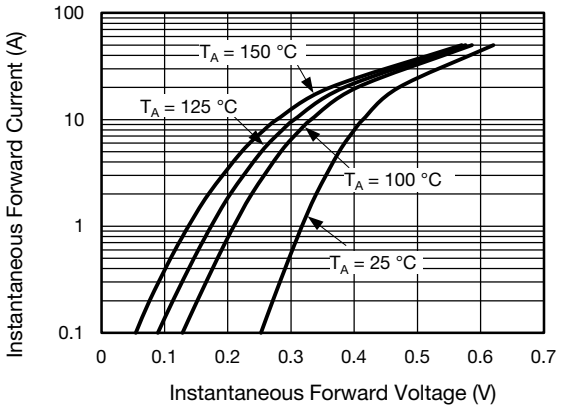

Fig. 3 - Typical Instantaneous Forward Characteristics

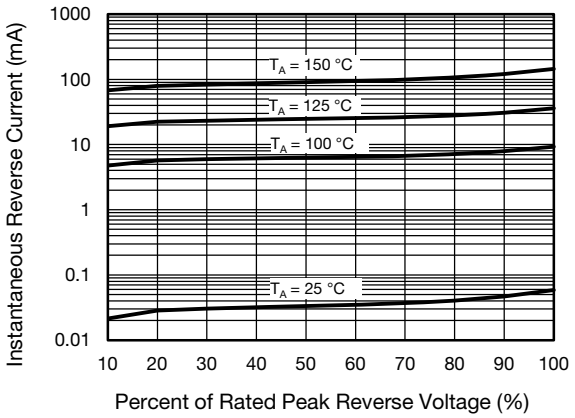

Fig. 4 - Typical Reverse Characteristics

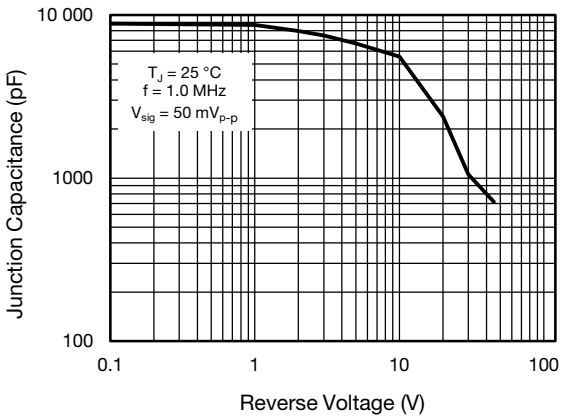

Fig. 5 - Typical Junction Capacitance

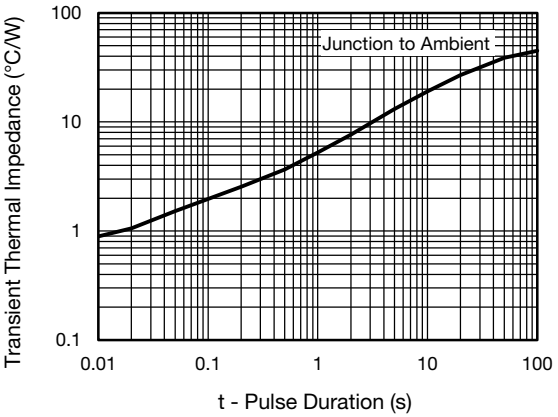

Fig. 6 - Typical Transient Thermal Impedance

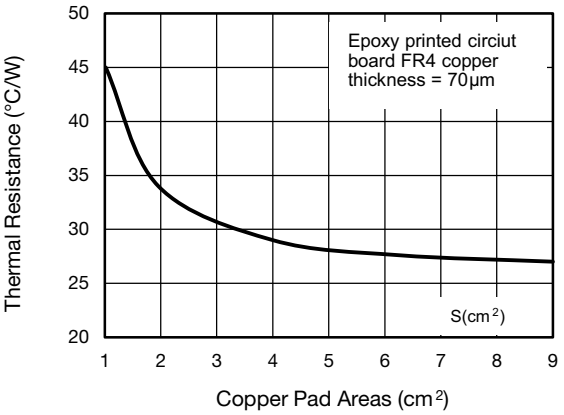

Fig. 7 - Thermal Resistance Junction-to-Ambient vs. Copper Pad Areas

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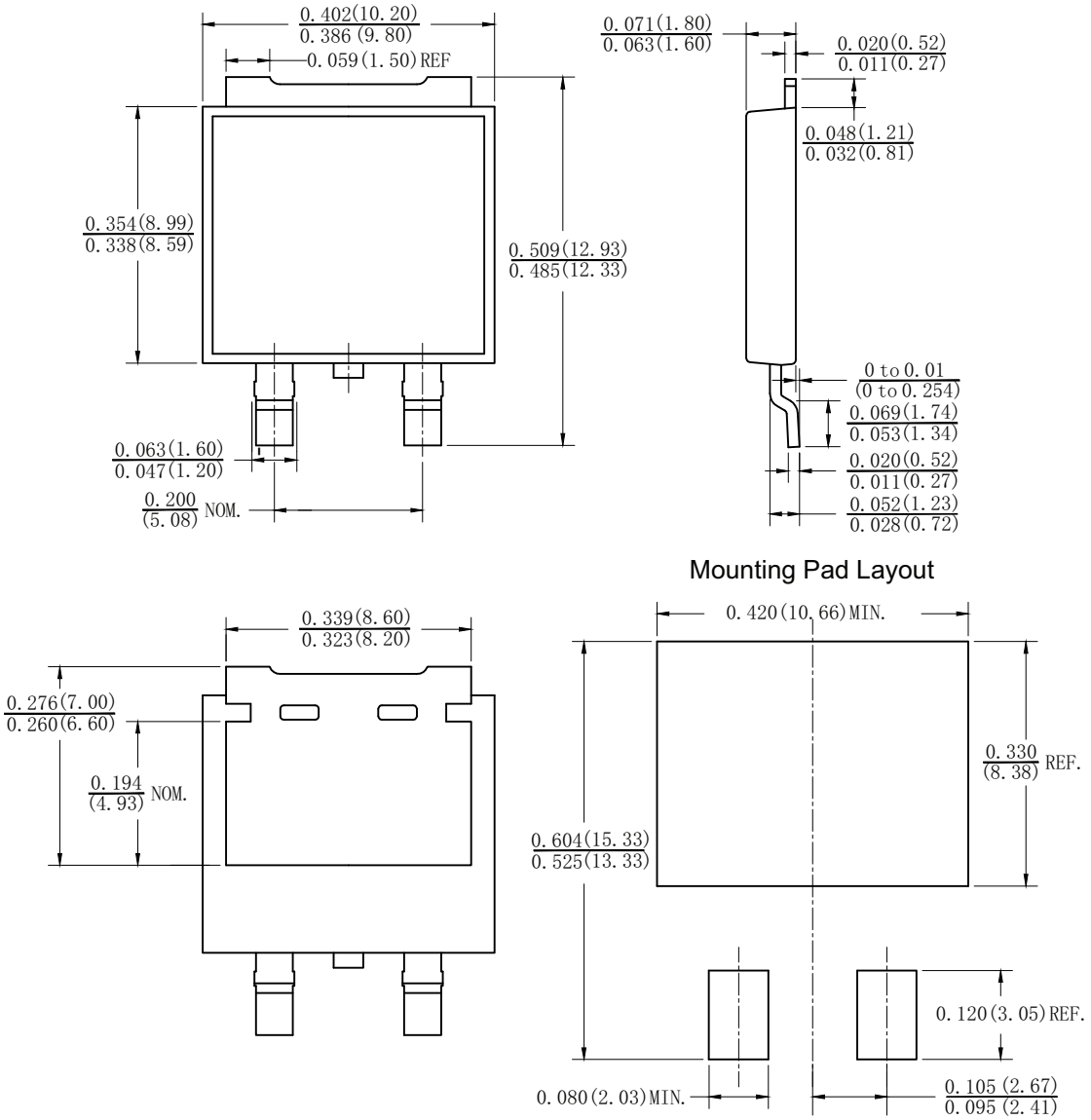
PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMPD



Mounting Pad Layout

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