

Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

Ultra Low $V_F = 0.33$ V at $I_F = 5$ A



DESIGN SUPPORT TOOLS

3D
Models Available

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FEATURES

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

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: D²PAK (TO-263AB)

Molding compound meets UL 94 V-0 flammability rating
Base P/N-E3 - RoHS-compliant, commercial grade

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

E3 suffix meets JESD 201 class 1A whisker test

Polarity: as marked

Mounting Torque: 10 in-lbs maximum

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	20 A
V_{RRM}	45 V
I_{FSM}	160 A
V_F at $I_F = 20$ A	0.51 V
T_{OP} max. (AC mode)	150 °C
T_J max. (DC forward current)	200 °C
Package	D²PAK (TO-263AB)
Circuit configurations	Single

MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted)				
PARAMETER	SYMBOL	VBT2045BP		UNIT
Maximum repetitive peak reverse voltage	V_{RRM}	45		V
Maximum DC forward bypassing current (fig. 1)	$I_{F(DC)}^{(1)}$	20		A
Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load	I_{FSM}	160		A
Operating junction temperature range (AC mode)	T_{OP}	-40 to +150		°C
Junction temperature in DC forward current without reverse bias, $t \leq 1$ h	$T_J^{(2)}$	≤ 200		°C

Notes

(1) With heatsink

(2) Meets the requirements of IEC 61215 ed.2 bypass diode thermal test

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	$V_F^{(1)}$	0.44	-	V	
	$I_F = 10$ A			0.49	-		
	$I_F = 20$ A			0.57	0.66		
	$I_F = 5$ A	$T_A = 125$ °C		0.33	-		
	$I_F = 10$ A			0.41	-		
	$I_F = 20$ A			0.51	0.63		
Reverse current	$V_R = 45$ V	$T_A = 25$ °C	$I_R^{(2)}$	-	2000	μ A	
		$T_A = 125$ °C		10	30	mA	

Notes

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

(2) Pulse test: Pulse width ≤ 40 ms

THERMAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	VBT2045BP	UNIT
Typical thermal resistance	$R_{\theta\text{JC}}$	1.5	$^\circ\text{C}/\text{W}$

ORDERING INFORMATION (Example)

PACKAGE	PREFERRED P/N	UNIT WEIGHT (g)	PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
TO-263AB	VBT2045BP-E3/4W	1.37	4W	50/tube	Tube
TO-263AB	VBT2045BP-E3/8W	1.37	8W	800/reel	Tape and reel

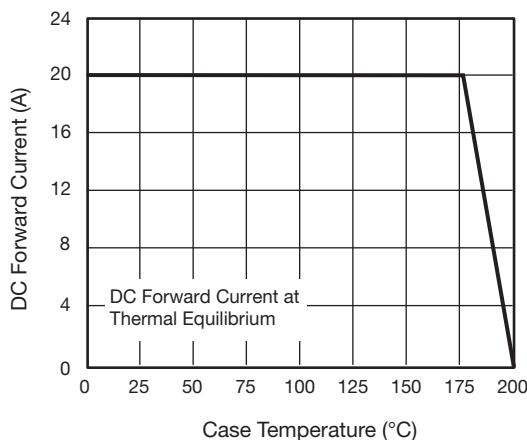
RATINGS AND CHARACTERISTICS CURVES ($T_A = 25^\circ\text{C}$ unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

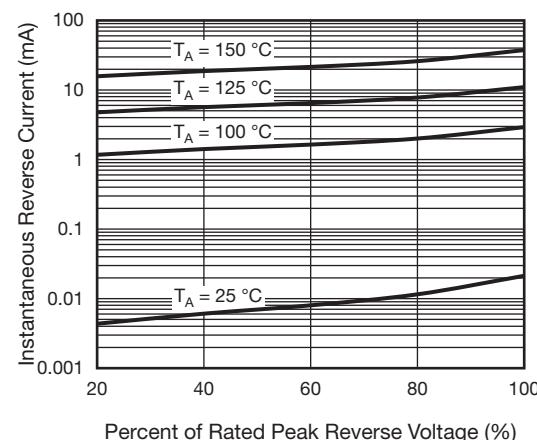


Fig. 3 - Typical Reverse Characteristics

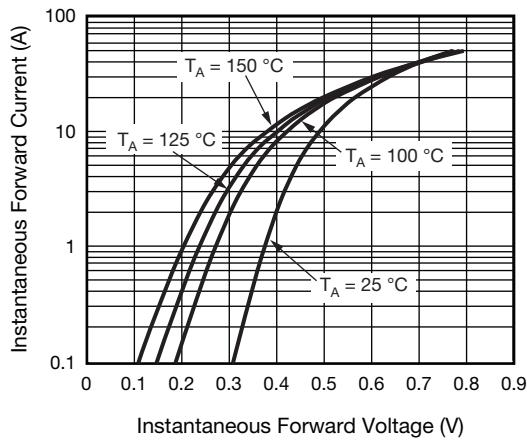


Fig. 2 - Typical Instantaneous Forward Characteristics

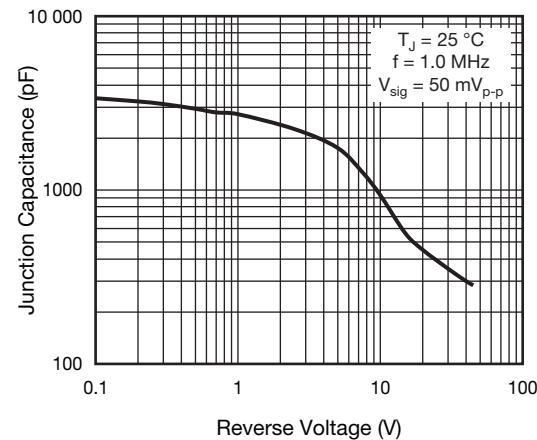


Fig. 4 - Typical Junction Capacitance

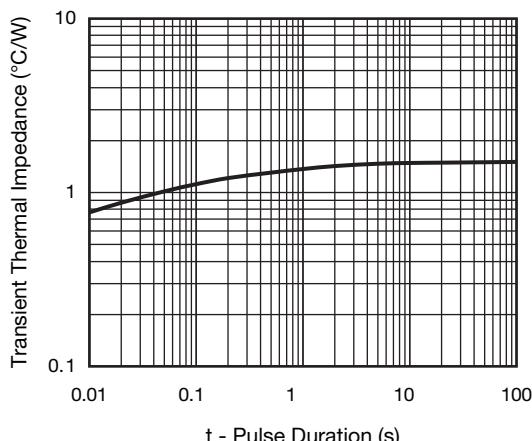
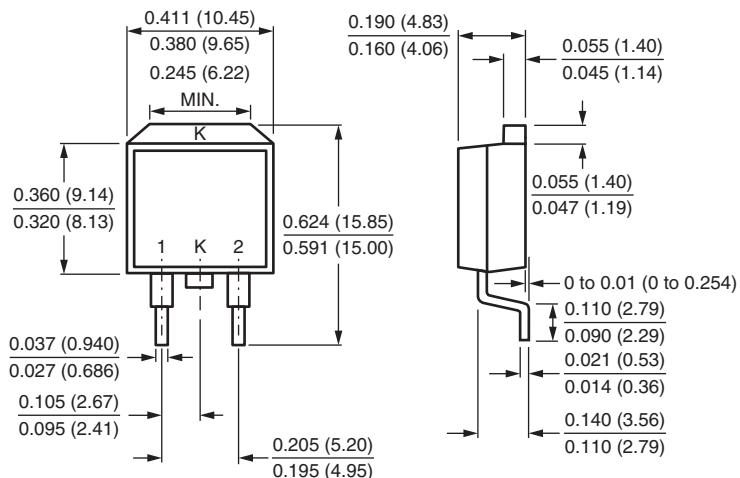


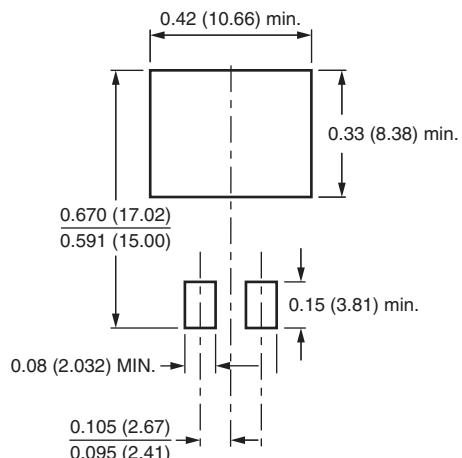
Fig. 5 - Typical Transient Thermal Impedance

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

D²PAK (TO-263AB)



Mounting Pad Layout



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