

## Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

 Ultra Low  $V_F = 0.34\text{ V}$  at  $I_F = 2.5\text{ A}$ 


### FEATURES

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- Solder dip 275 °C max. 10 s, per JESD 22-B106
- $T_J$  200 °C max. in solar bypass mode application
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://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:** TO-220AB

 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

**Mounting Torque:** 10 in-lbs maximum

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2 x 5.0 A
$V_{RRM}$	45 V
$I_{FSM}$	100 A
$V_F$ at $I_F = 5.0\text{ A}$	0.41 V
$T_{OP}$ max. (AC mode)	150 °C
$T_J$ max. (DC forward current)	200 °C

MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)			
PARAMETER	SYMBOL	VT1045CBP	UNIT
Maximum repetitive peak reverse voltage	$V_{RRM}$	45	V
Maximum average forward rectified current (fig. 1)	$I_{F(AV)}$ <sup>(1)</sup>	per device	10
		per diode	5.0
Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load per diode	$I_{FSM}$	100	A
Operating junction and storage temperature range (AC mode)	$T_{OP}, T_{STG}$	- 40 to + 150	°C
Junction temperature in DC forward current without reverse bias, $t \leq 1\text{ h}$	$T_J$ <sup>(2)</sup>	$\leq 200$	°C

#### Notes

<sup>(1)</sup> With heatsink

<sup>(2)</sup> Meets the requirements of IEC 61215 ed. 2 bypass diode thermal test

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)						
PARAMETER	TEST CONDITIONS		SYMBOL	TYP.	MAX.	UNIT
Instantaneous forward voltage per diode	$I_F = 2.5\text{ A}$	$T_A = 25\text{ }^\circ\text{C}$	$V_F^{(1)}$	0.44	-	V
				$I_F = 5.0\text{ A}$	0.49	
	$I_F = 2.5\text{ A}$	$T_A = 125\text{ }^\circ\text{C}$		0.34	-	
				$I_F = 5.0\text{ A}$	0.41	
Reverse current per diode	$V_R = 45\text{ V}$	$T_A = 25\text{ }^\circ\text{C}$	$I_R^{(2)}$	-	500	$\mu\text{A}$
		$T_A = 125\text{ }^\circ\text{C}$		5	15	mA

**Notes**

- (1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle  
 (2) Pulse test: Pulse width  $\leq 40\text{ ms}$

<b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)				
PARAMETER		SYMBOL	VT1045CBP	UNIT
Typical thermal resistance	per diode	$R_{\theta JC}$	3.5	$^\circ\text{C/W}$
	per device		2.5	

<b>ORDERING INFORMATION</b> (Example)					
PACKAGE	PREFERRED P/N	UNIT WEIGHT (g)	PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
TO-220AB	VT1045CBP-M3/4W	1.87	4W	50/tube	Tube

**RATINGS AND CHARACTERISTICS CURVES**

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

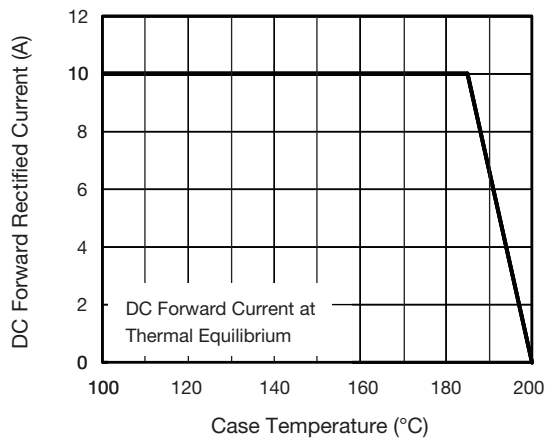


Fig. 1 - Maximum Forward Current Derating Curve

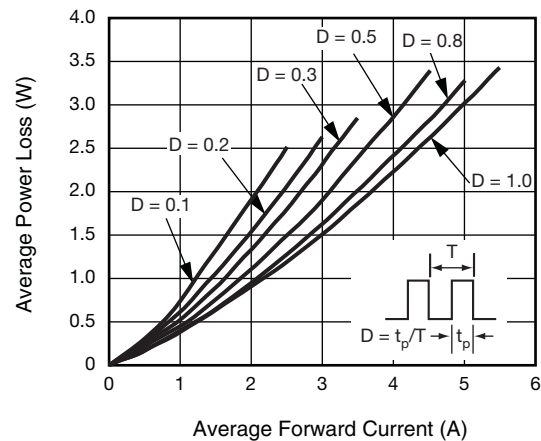


Fig. 2 - Forward Power Loss Characteristics Per Diode

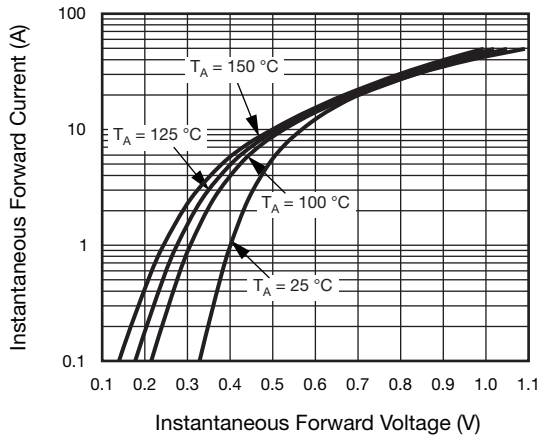


Fig. 3 - Typical Instantaneous Forward Characteristics Per Diode

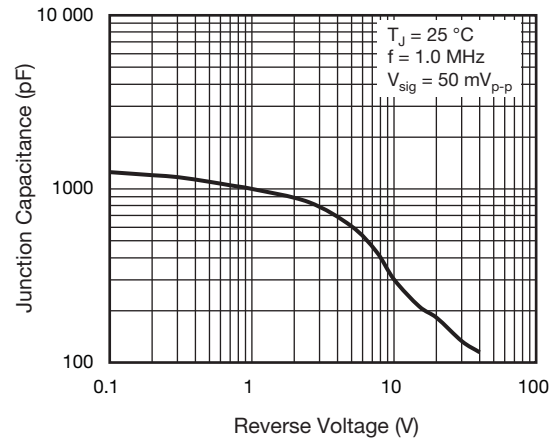


Fig. 5 - Typical Junction Capacitance Per Diode

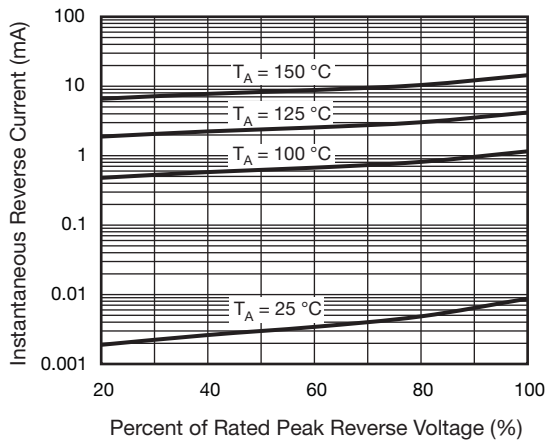


Fig. 4 - Typical Reverse Characteristics Per Diode

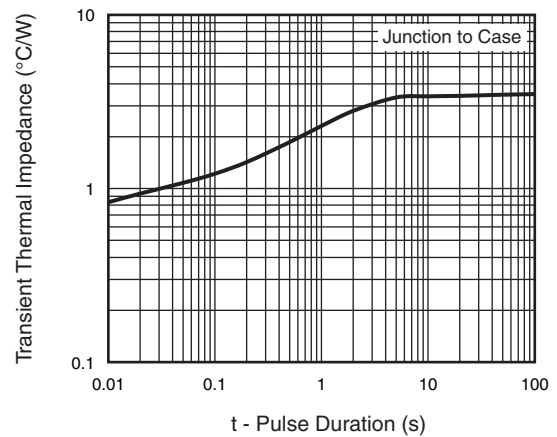
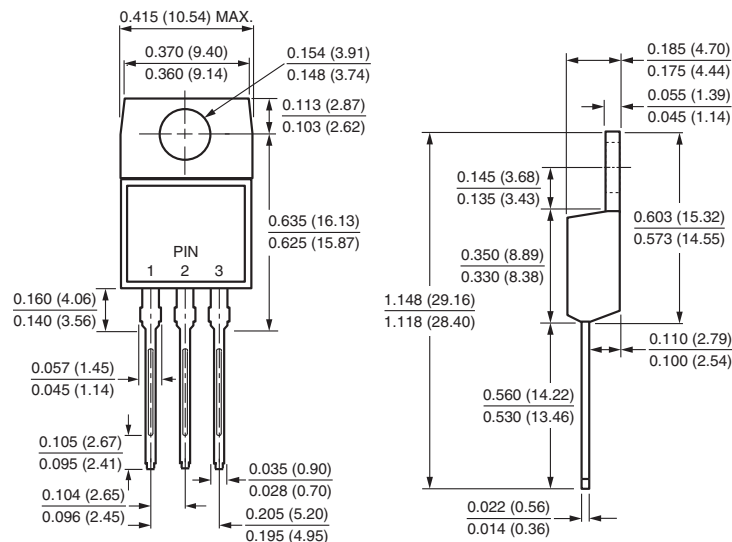


Fig. 6 - Typical Transient Thermal Impedance Per Diode

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

**TO-220AB**





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