

### Vishay General Semiconductor

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

Ultra Low  $V_F = 0.33 \text{ V}$  at  $I_F = 10 \text{ A}$ 

TMBS® TO-263AB



VBT6045CBP				
PIN 1 O	K			
PIN 2	—O HEATSINK			

PRIMARY CHARACTERISTICS				
I <sub>F(AV)</sub> 2 x 30 A				
$V_{RRM}$	45 V			
I <sub>FSM</sub>	320 A			
V <sub>F</sub> at I <sub>F</sub> = 30 A	0.47 V			
T <sub>OP</sub> max. (AC mode)	150 °C			
T <sub>J</sub> max. (DC forward current)	200 °C			
Package	TO-263AB			
Diode variation	Common cathode			

#### **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



COMPLIANT

- T<sub>J</sub> 200 °C max. in solar bypass mode application
- Material categorization: For definitions of compliance please see <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

#### **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-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

MAXIMUM RATINGS (T <sub>A</sub> = 25 °C unless otherwise noted)				
PARAMETER		SYMBOL	VBT6045CBP	UNIT
Maximum repetitive peak reverse voltage		$V_{RRM}$	45	V
Maximum average forward rectified current (fig. 1)	per device	I <sub>F(AV)</sub> (1)	60	А
	per diode		30	
Peak forward surge current 8.3 ms single half sine-w superimposed on rated load per diode	I <sub>FSM</sub>	320	А	
Operating junction and storage temperature range (AC mode)		T <sub>OP</sub> , T <sub>STG</sub>	-40 to +150	°C
Junction temperature in DC forward current without reverse bias, $t \le 1$ h		T <sub>J</sub> <sup>(2)</sup>	≤ 200	°C

#### **Notes**

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

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



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<b>ELECTRICAL CHARACTERISTICS</b> (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> = 10 A	T <sub>A</sub> = 25 °C	- V <sub>F</sub> <sup>(1)</sup>	0.44	-	. v
	I <sub>F</sub> = 15 A			0.47	-	
	I <sub>F</sub> = 30 A			0.54	0.64	
	I <sub>F</sub> = 10 A	T <sub>A</sub> = 125 °C		0.33	-	
	I <sub>F</sub> = 15 A			0.37	-	
	I <sub>F</sub> = 30 A			0.47	0.56	
Reverse current per diode	V <sub>R</sub> = 45 V	T <sub>A</sub> = 25 °C		-	3000	μΑ
	$V_R = 45 \text{ V}$ $T_A = 125$	T <sub>A</sub> = 125 °C		18	50	mA

#### Notes

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

(2) Pulse test: Pulse width ≤ 40 ms

THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted)					
PARAMETER		SYMBOL	VBT6045CBP	UNIT	
Typical thermal resistance	per diode	$R_{ hetaJC}$	1.5	- °C/W	
	per device		0.8		

ORDERING INFORMATION (Example)						
PACKAGE	PREFERRED P/N	UNIT WEIGHT (g)	PACKAGE CODE	BASE QUANTITY	DELIVERY MODE	
TO-263AB	VBT6045CBP-E3/4W	1.38	4W	50/tube	Tube	
TO-263AB	VBT6045CBP-E3/8W	1.38	8W	800/reel	Tape and reel	

## RATINGS AND CHARACTERISTICS CURVES (T<sub>A</sub> = 25 °C unless otherwise noted)

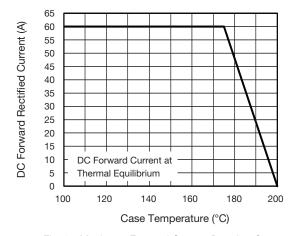


Fig. 1 - Maximum Forward Current Derating Curve

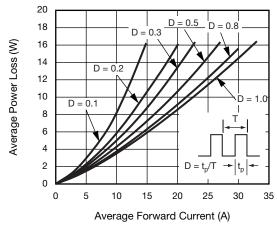


Fig. 2 - Forward Power Loss Characteristics Per Diode



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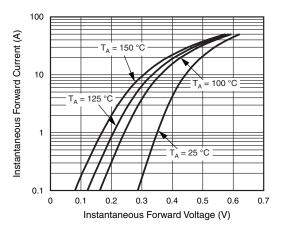


Fig. 3 - Typical Instantaneous Forward Characteristics Per Diode

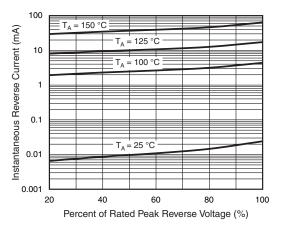


Fig. 4 - Typical Reverse Characteristics Per Diode

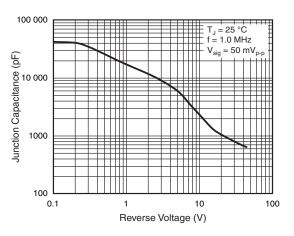


Fig. 5 - Typical Junction Capacitance Per Diode

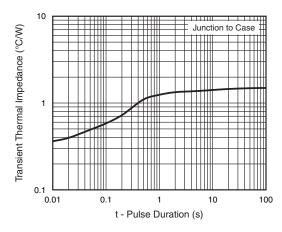
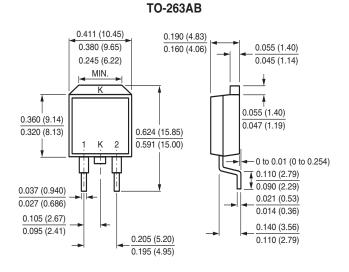
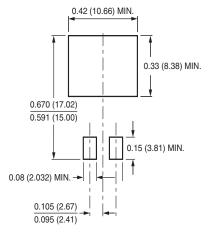


Fig. 6 - Typical Transient Thermal Impedance Per Diode

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



#### **Mounting Pad Layout**





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