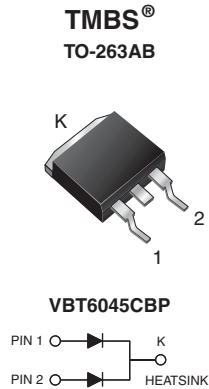


## Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

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


### 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
- $T_J$  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

### TYPICAL APPLICATIONS

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

| PRIMARY CHARACTERISTICS         |                |
|---------------------------------|----------------|
| $I_{F(AV)}$                     | 2 x 30 A       |
| $V_{RRM}$                       | 45 V           |
| $I_{FSM}$                       | 320 A          |
| $V_F$ at $I_F = 30\text{ A}$    | 0.47 V         |
| $T_{OP}$ max. (AC mode)         | 150 °C         |
| $T_J$ max. (DC forward current) | 200 °C         |
| Package                         | TO-263AB       |
| Diode variation                 | Common cathode |

### 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 ( $T_A = 25\text{ °C}$ unless otherwise noted)                               |                            |             |      |
|--|----------------------------|-------------|------|
| PARAMETER  | SYMBOL                     | VBT6045CBP  | 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  | 60   |
|  |                            | per diode   | 30   |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load per diode | $I_{FSM}$                  | 320         | 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  | $I_F = 10\text{ A}$ | $T_A = 25\text{ }^\circ\text{C}$  | $V_F^{(1)}$ | 0.44 | -    | V             |
|  | $I_F = 15\text{ A}$ |                                   |             | 0.47 | -    |               |
|  | $I_F = 30\text{ A}$ |                                   |             | 0.54 | 0.64 |               |
|  | $I_F = 10\text{ A}$ | $T_A = 125\text{ }^\circ\text{C}$ |             | 0.33 | -    |               |
|  | $I_F = 15\text{ A}$ | 0.37                              |             | -    |      |               |
|  | $I_F = 30\text{ A}$ | 0.47                              |             | 0.56 |      |               |
| Reverse current per diode  | $V_R = 45\text{ V}$ | $T_A = 25\text{ }^\circ\text{C}$  | $I_R^{(2)}$ | -    | 3000 | $\mu\text{A}$ |
|  |                     | $T_A = 125\text{ }^\circ\text{C}$ |             | 18   | 50   | 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                | VBT6045CBP | UNIT               |
| Typical thermal resistance  | per diode  | $R_{\theta\text{JC}}$ | 1.5        | $^\circ\text{C/W}$ |
|   | per device |                       | 0.8        |                    |

| <b>ORDERING INFORMATION</b> (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 |

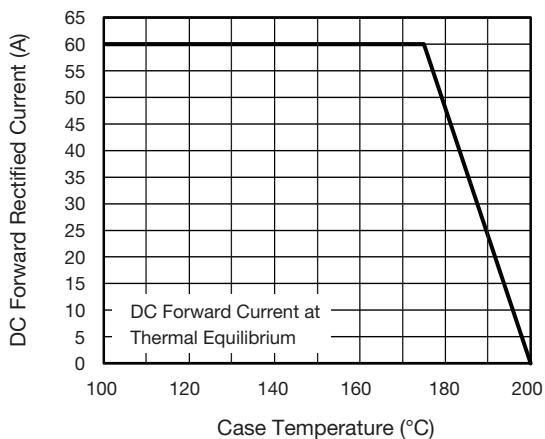
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

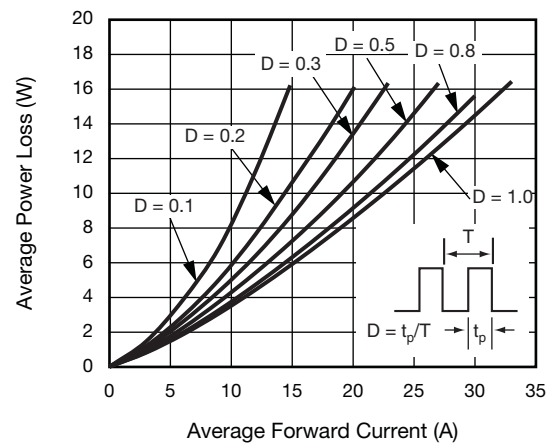


Fig. 2 - Forward Power Loss Characteristics Per Diode

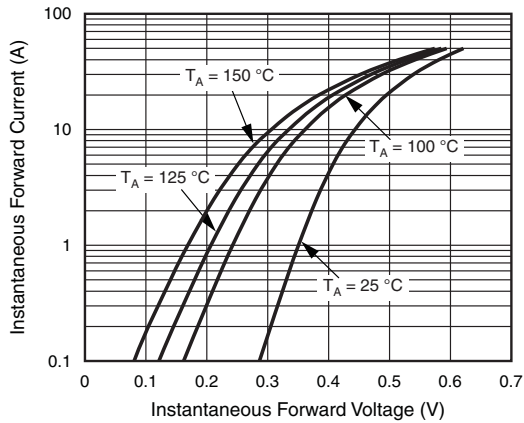


Fig. 3 - Typical Instantaneous Forward Characteristics Per Diode

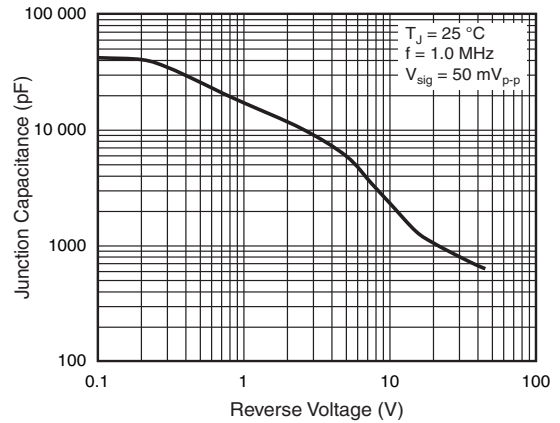


Fig. 5 - Typical Junction Capacitance Per Diode

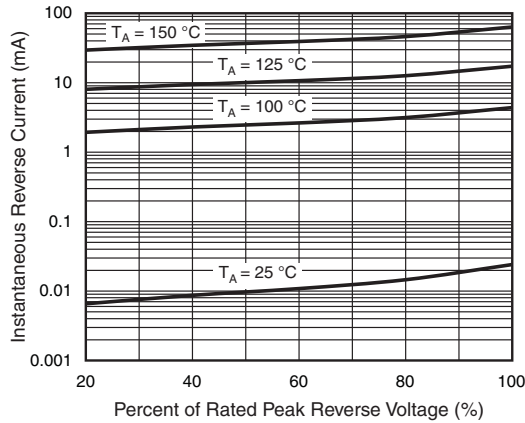


Fig. 4 - Typical Reverse Characteristics Per Diode

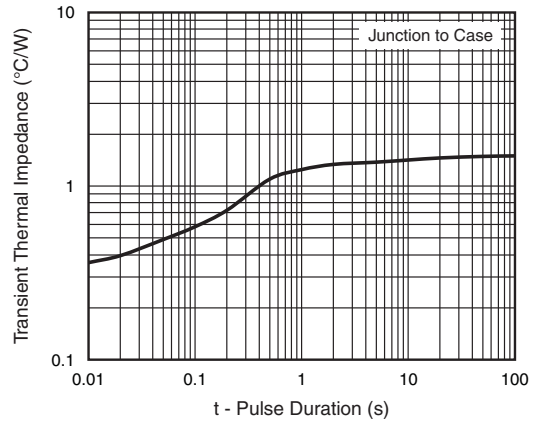
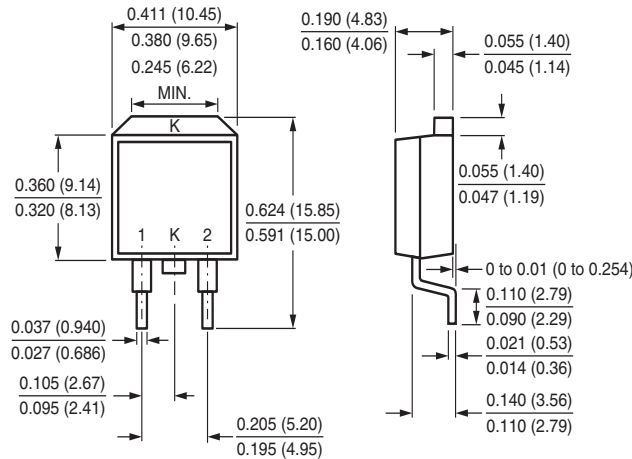


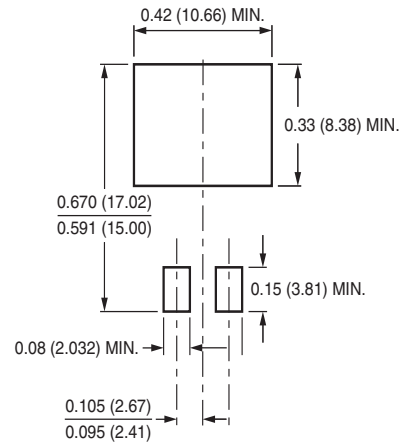
Fig. 6 - Typical Transient Thermal Impedance Per Diode

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

**TO-263AB**



**Mounting Pad Layout**





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