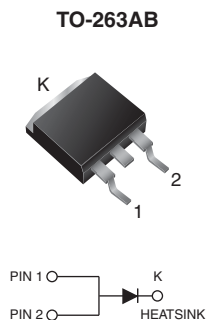


## Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

Ultra Low  $V_F = 0.28\text{ V}$  at  $I_F = 5\text{ A}$



### 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
- 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.

### MECHANICAL DATA

**Case:** TO-263AB

Molding compound meets UL 94 V-0 flammability rating  
Base P/N-E3 - RoHS-compliant and 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         |            |
|---------------------------------|------------|
| $I_{F(DC)}$                     | 40 A       |
| $V_{RRM}$                       | 45 V       |
| $I_{FSM}$                       | 240 A      |
| $V_F$ at $I_F = 40\text{ A}$    | 0.51 V     |
| $T_{OP}$ max. (AC mode)         | 150 °C     |
| $T_J$ max. (DC forward current) | 200 °C     |
| Package                         | TO-263AB   |
| Diode variation                 | Single die |

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                       |                   |             |      |
|--------------------------------------------------------------------------------------|-------------------|-------------|------|
| PARAMETER                                                                            | SYMBOL            | VBT4045BP   | UNIT |
| Maximum repetitive peak reverse voltage                                              | $V_{RRM}$         | 45          | V    |
| Maximum DC forward bypassing current (fig. 1)                                        | $I_{F(DC)}^{(1)}$ | 40          | A    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load   | $I_{FSM}$         | 240         | A    |
| Operating junction temperature range (AC mode)                                       | $T_{OP}$          | -40 to +150 | °C   |
| Junction temperature in DC forward current without reverse bias, $t \leq 1\text{ h}$ | $T_J^{(1)}$       | $\leq 200$  | °C   |

#### Notes

(1) With heatsink

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

| ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                       |                         |                               |      |      |      |
|----------------------------------------------------------------------------|-----------------------|-------------------------|-------------------------------|------|------|------|
| PARAMETER                                                                  | TEST CONDITIONS       |                         | SYMBOL                        | TYP. | MAX. | UNIT |
| Instantaneous forward voltage                                              | I <sub>F</sub> = 5 A  | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.41 | -    | V    |
|                                                                            | I <sub>F</sub> = 20 A |                         |                               | 0.50 | -    |      |
|                                                                            | I <sub>F</sub> = 40 A |                         |                               | 0.57 | 0.67 |      |
|                                                                            | I <sub>F</sub> = 5 A  | T <sub>A</sub> = 125 °C |                               | 0.28 | -    |      |
|                                                                            | I <sub>F</sub> = 20 A |                         |                               | 0.41 | -    |      |
|                                                                            | I <sub>F</sub> = 40 A |                         |                               | 0.51 | 0.63 |      |
| Reverse current                                                            | V <sub>R</sub> = 45 A | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -    | 3000 | μA   |
|                                                                            |                       | T <sub>A</sub> = 125 °C |                               | 29   | 85   | 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          | VB T4045BP | UNIT                 |
| Typical thermal resistance                                                                  | $R_{\theta JC}$ | 0.8        | $^{\circ}\text{C/W}$ |

| <b>ORDERING INFORMATION</b> (Example) |                  |                 |              |               |               |
|---------------------------------------|------------------|-----------------|--------------|---------------|---------------|
| PACKAGE                               | PREFERRED P/N    | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| TO-263AB                              | VB T4045BP-E3/4W | 1.37            | 4W           | 50/tube       | Tube          |
| TO-263AB                              | VB T4045BP-E3/8W | 1.37            | 8W           | 800/reel      | Tape and reel |

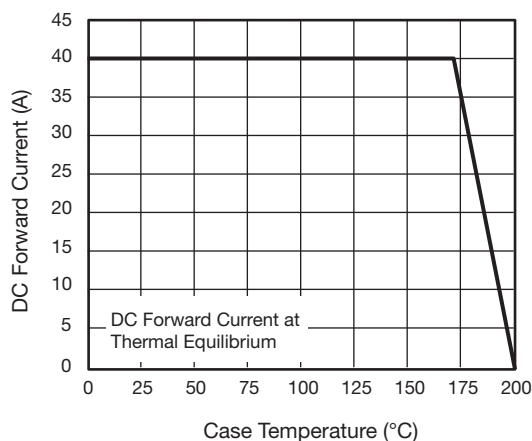
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Forward Current Derating Curve

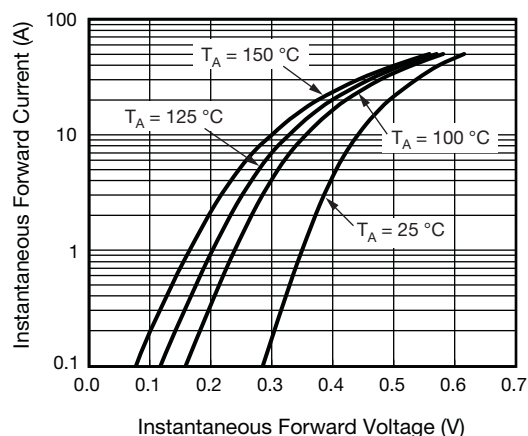


Fig. 2 - Typical Instantaneous Forward Characteristics

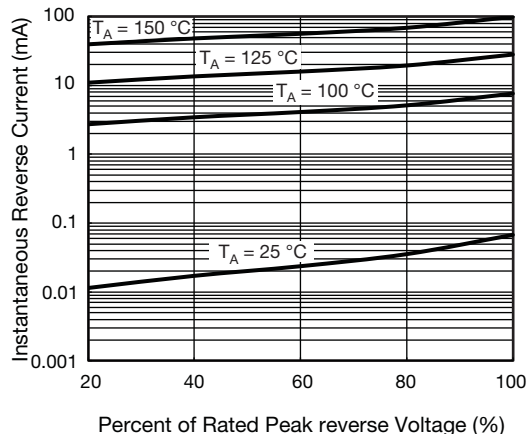


Fig. 3 - Typical Reverse Characteristics

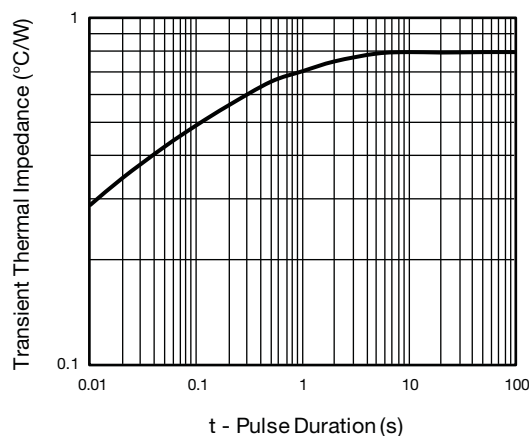


Fig. 5 - Typical Transient Thermal Impedance

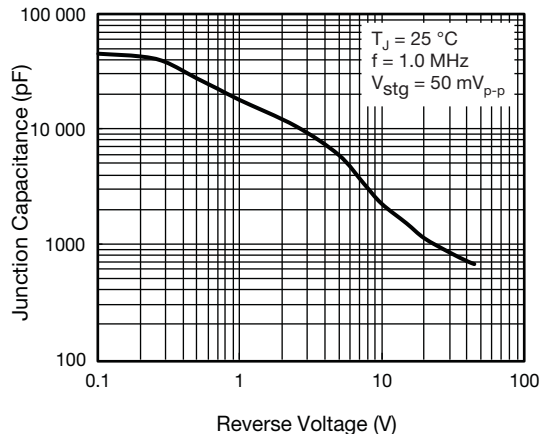
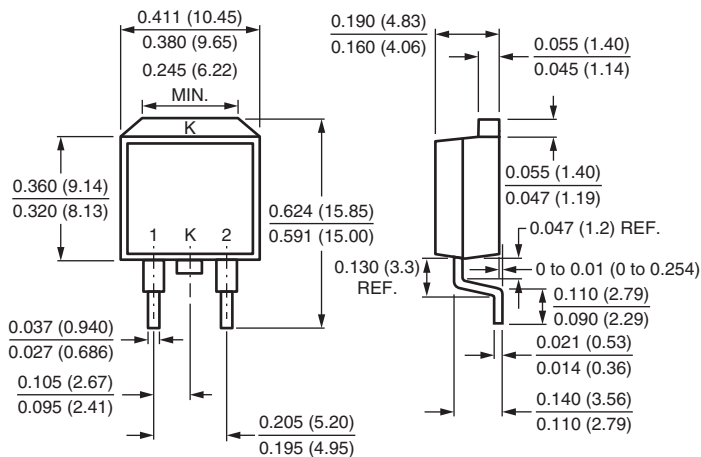


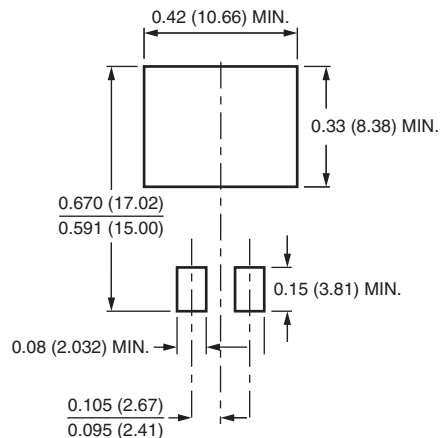
Fig. 4 - Typical Junction Capacitance

## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

### TO-263AB



### Mounting Pad Layout





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