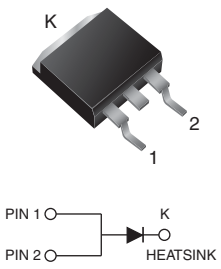
# Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

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

**TMBS®**

**TO-263AB**







## 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 to RoHS Directive 2011/65/EU

Pb e3 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, 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 CHARACTERISTCS | |
|---|---|
| $I_{F(DC)}$ | 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 |

| 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 ≤ 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 | µA |
| | | $T_A$ = 125 °C | | 10 | 30 | mA |

**Notes**

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

(2) Pulse test: Pulse width ≤ 40 ms

| THERMAL CHARACTERISTICS ($T_A$ = 25 °C unless otherwise noted) | | | |
|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **VBT2045BP** | **UNIT** |
| Typical thermal resistance | $R_{\theta JC}$ | 1.5 | °C/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 °C unless otherwise noted)

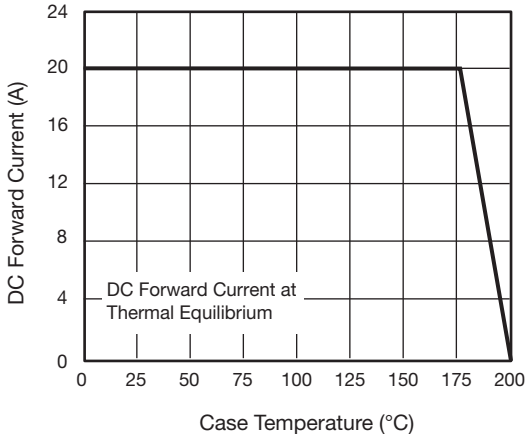



Fig. 1 - Maximum Forward Current Derating Curve

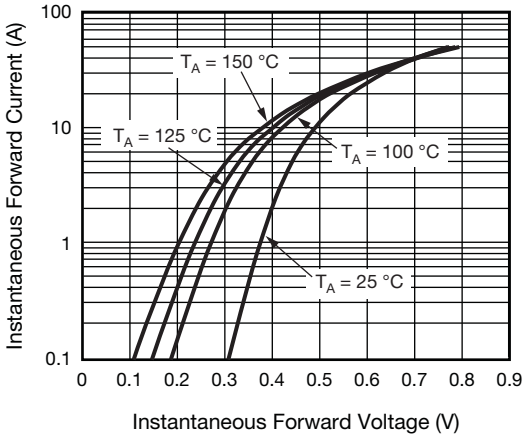



Fig. 2 - Typical Instantaneous Forward Characteristics

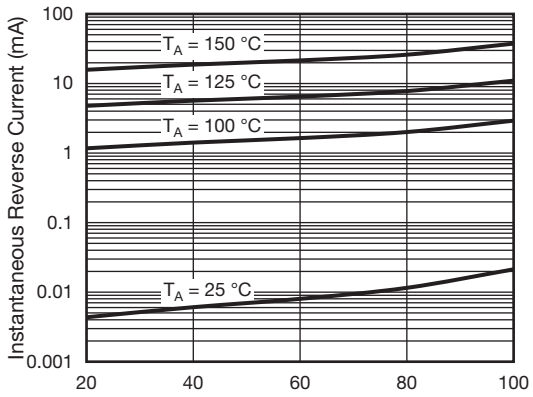



Fig. 3 - Typical Reverse Characteristics

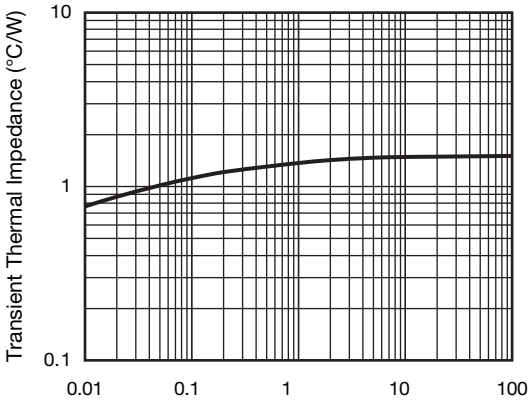



Fig. 5 - Typical Transient Thermal Impedance

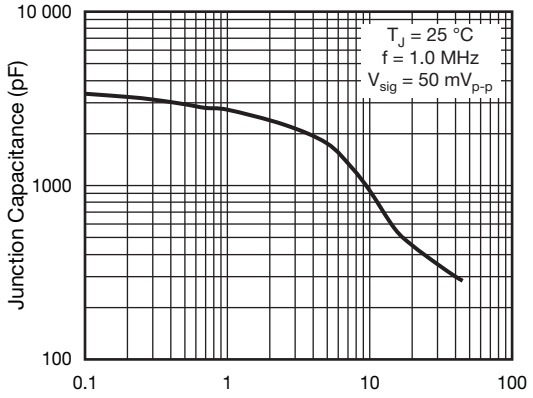
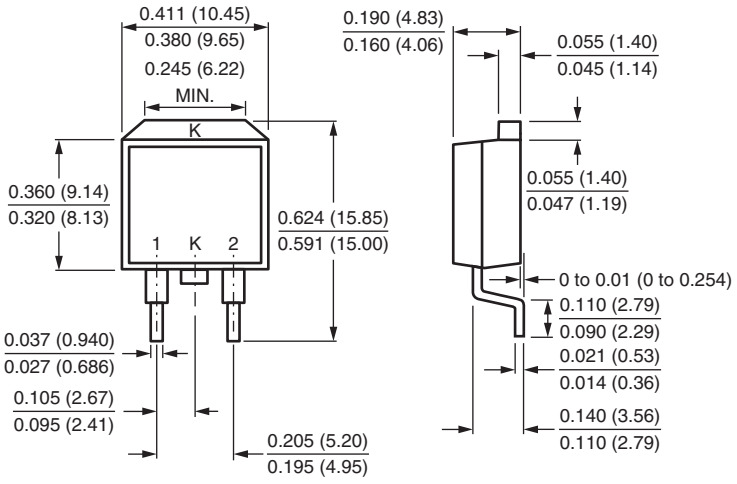


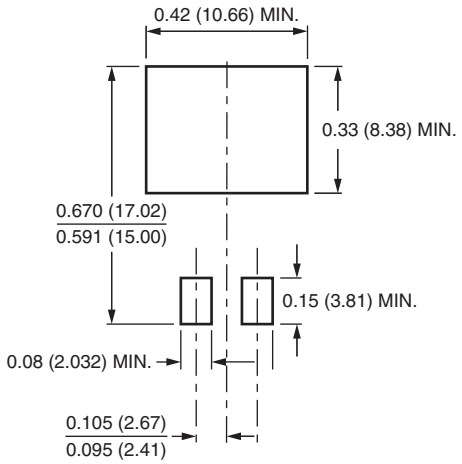

Fig. 4 - Typical Junction Capacitance

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

### TO-263AB




### Mounting Pad Layout



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