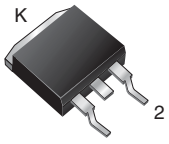
# Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

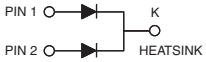
Ultra Low $V_F$ = 0.33 V at $I_F$ = 5.0 A

TMBS®

D²PAK (TO-263AB)




VBT2045CBP




## 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

RoHS COMPLIANT HALOGEN FREE

## DESIGN SUPPORT TOOLS

click logo to get started

3D Models Available

## 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 10 A |
| $V_{RRM}$ | 45 V |
| $I_{FSM}$ | 160 A |
| $V_F$ at $I_F$ = 10 A | 0.41 V |
| $T_{OP}$ max. (AC mode) | 150 °C |
| $T_J$ max. (DC forward current) | 200 °C |
| Package | D²PAK (TO-263AB) |
| Circuit configuration | Common cathode |

## MECHANICAL DATA

**Case:** D²PAK (TO-263AB)
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

| MAXIMUM RATINGS ($T_A$ = 25 °C unless otherwise noted) | | | | |
|---|---|---|---|---|
| **PARAMETER** | | **SYMBOL** | **VBT2045CBP** | **UNIT** |
| Maximum repetitive peak reverse voltage | | $V_{RRM}$ | 45 | V |
| Maximum average forward rectified current (fig. 1) | per device | $I_{F(AV)}$ (1) | 20 | A |
| | per diode | | 10 | |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load per diode | | $I_{FSM}$ | 160 | 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 ≤ 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 per diode | $I_F$ = 5 A | $T_A$ = 25 °C | $V_F$ (1) | 0.44 | - | V |
| | $I_F$ = 10 A | | | 0.49 | 0.58 | |
| | $I_F$ = 5 A | $T_A$ = 125 °C | | 0.33 | - | |
| | $I_F$ = 10 A | | | 0.41 | 0.52 | |
| Reverse current per diode | $V_R$ = 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 | VBT2045CBP | UNIT |
| Typical thermal resistance | per diode | $R_{\theta JC}$ | 3.0 | °C/W |
| | per device | | 2.0 | |

| ORDERING INFORMATION (Example) | | | | | |
|---|---|---|---|---|---|
| PACKAGE | PREFERRED P/N | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| TO-263AB | VBT2045CBP-M3/4W | 1.38 | 4W | 50/tube | Tube |
| TO-263AB | VBT2045CBP-M3/8W | 1.38 | 8W | 800/reel | Tape and reel |

## RATINGS AND CHARACTERISTICS CURVES ($T_A$ = 25 °C unless otherwise noted)

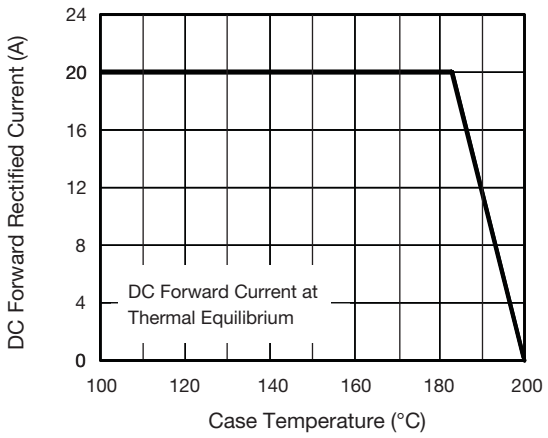



Fig. 1 - Maximum Forward Current Derating Curve

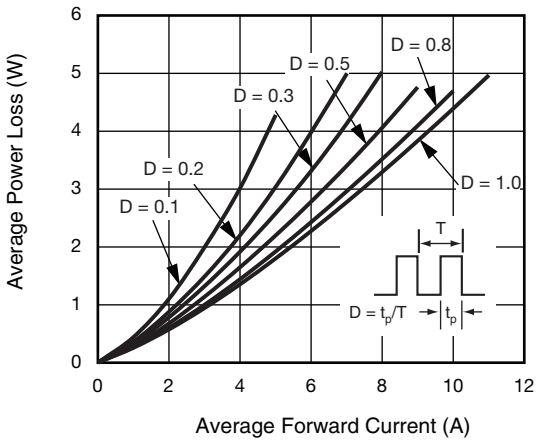



Fig. 2 - Forward Power Loss Characteristics Per Diode

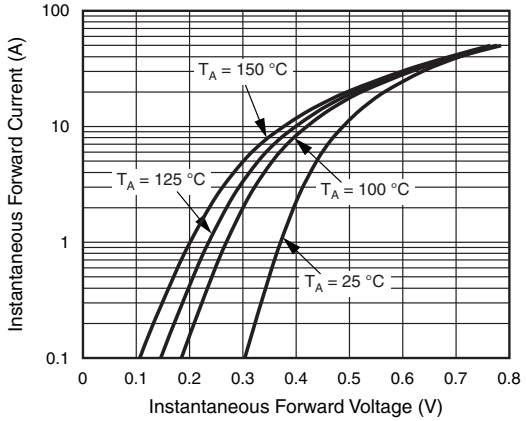



Fig. 3 - Typical Instantaneous Forward Characteristics Per Diode

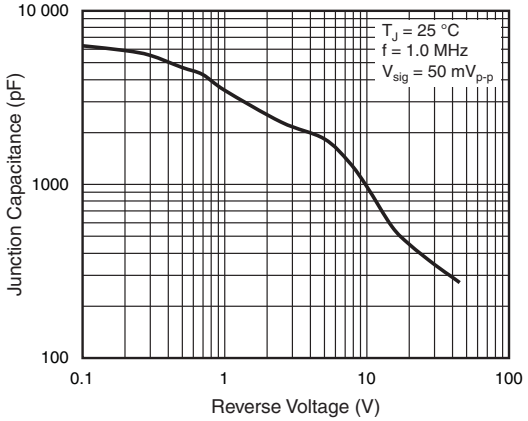



Fig. 5 - Typical Junction Capacitance Per Diode

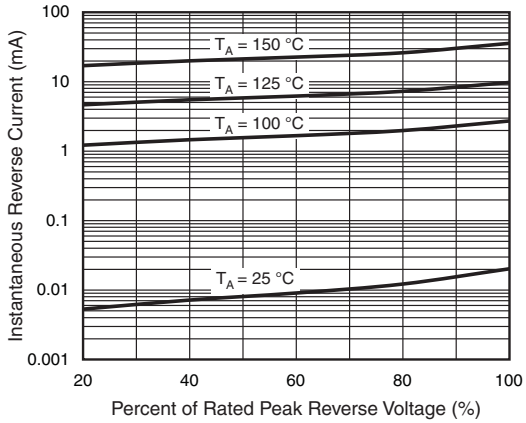



Fig. 4 - Typical Reverse Characteristics Per Diode

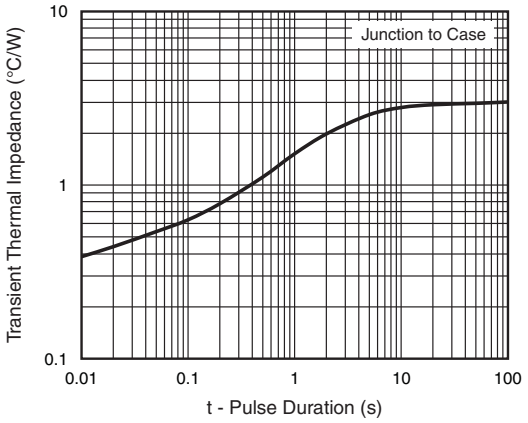
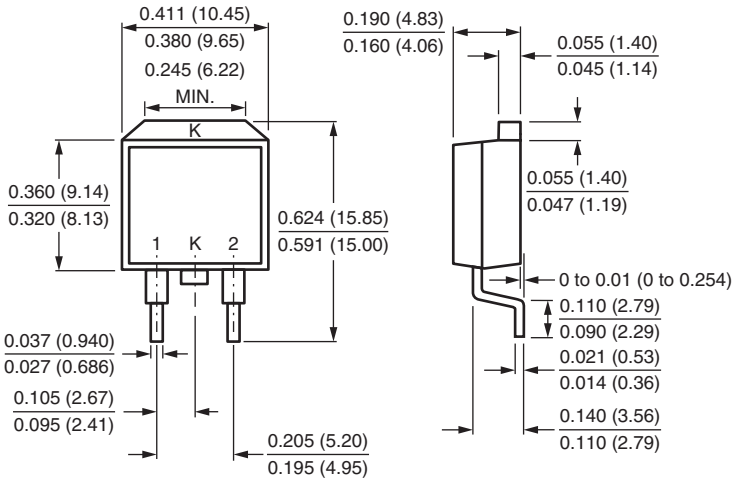


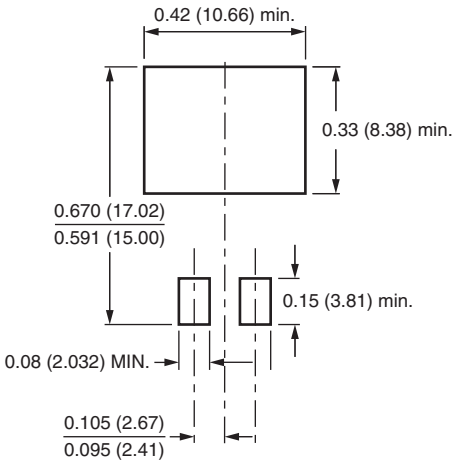

Fig. 6 - Typical Transient Thermal Impedance Per Diode

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

### D²PAK (TO-263AB)




### Mounting Pad Layout



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