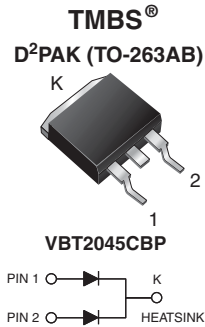


## Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

 Ultra Low  $V_F = 0.33\text{ V}$  at  $I_F = 5.0\text{ A}$ 


### 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  
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.

### MECHANICAL DATA

**Case:** D<sup>2</sup>PAK (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

| PRIMARY CHARACTERISTICS         |                               |
|---------------------------------|-------------------------------|
| $I_{F(AV)}$                     | 2 x 10 A                      |
| $V_{RRM}$                       | 45 V                          |
| $I_{FSM}$                       | 160 A                         |
| $V_F$ at $I_F = 10\text{ A}$    | 0.41 V                        |
| $T_{OP}$ max. (AC mode)         | 150 °C                        |
| $T_J$ max. (DC forward current) | 200 °C                        |
| Package                         | D <sup>2</sup> PAK (TO-263AB) |
| Circuit configuration           | Common cathode                |

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                               |                            |             |      |
|--|----------------------------|-------------|------|
| PARAMETER  | SYMBOL                     | VBT2045CBP  | 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  | 20   |
|  |                            | 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, $t \leq 1\text{ h}$         | $T_J$ <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



| ELECTRICAL CHARACTERISTICS (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> = 5 A  | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.44 | -    | V    |
|  | I <sub>F</sub> = 10 A |                         |                               | 0.49 | 0.58 |      |
|  | I <sub>F</sub> = 5 A  | T <sub>A</sub> = 125 °C |                               | 0.33 | -    |      |
|  | I <sub>F</sub> = 10 A |                         |                               | 0.41 | 0.52 |      |
| Reverse current per diode  | V <sub>R</sub> = 45 V | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -    | 2000 | μA   |
|  |                       | T <sub>A</sub> = 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 <sub>A</sub> = 25 °C unless otherwise noted) |            |                  |            |      |
|---|------------|------------------|------------|------|
| PARAMETER   |            | SYMBOL           | VBT2045CBP | UNIT |
| Typical thermal resistance  | per diode  | R <sub>θJC</sub> | 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<sub>A</sub> = 25 °C unless otherwise noted)**

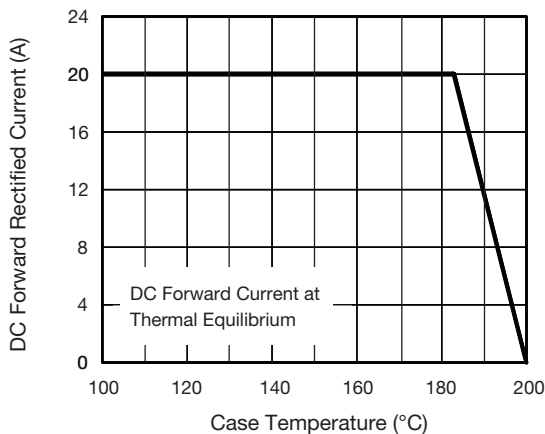


Fig. 1 - Maximum Forward Current Derating Curve

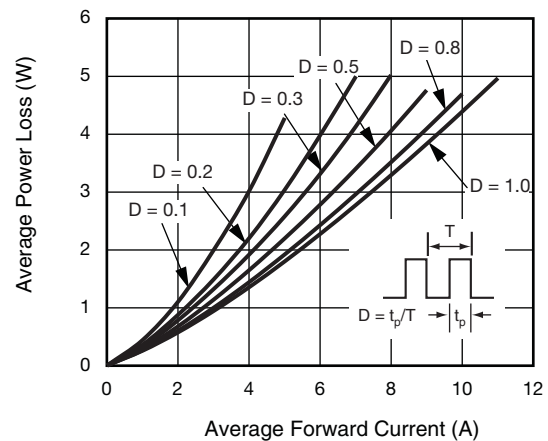


Fig. 2 - Forward Power Loss Characteristics Per Diode

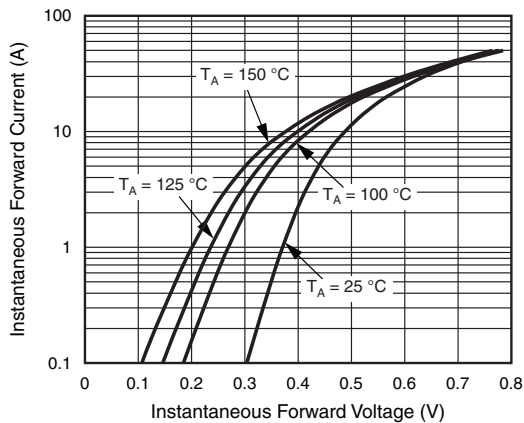


Fig. 3 - Typical Instantaneous Forward Characteristics Per Diode

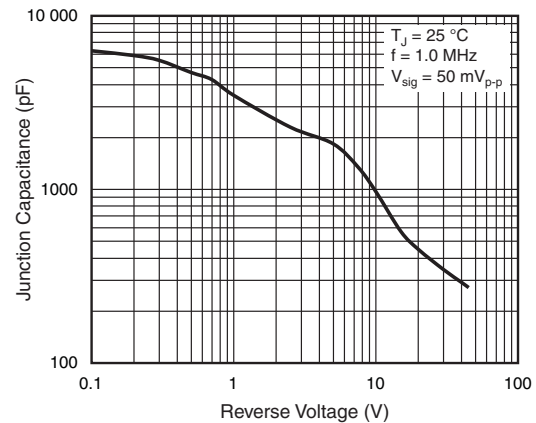


Fig. 5 - Typical Junction Capacitance Per Diode

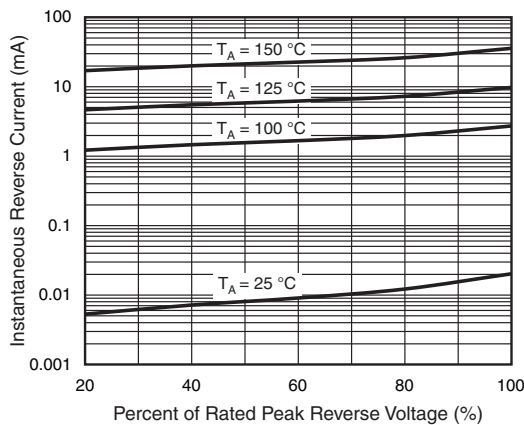


Fig. 4 - Typical Reverse Characteristics Per Diode

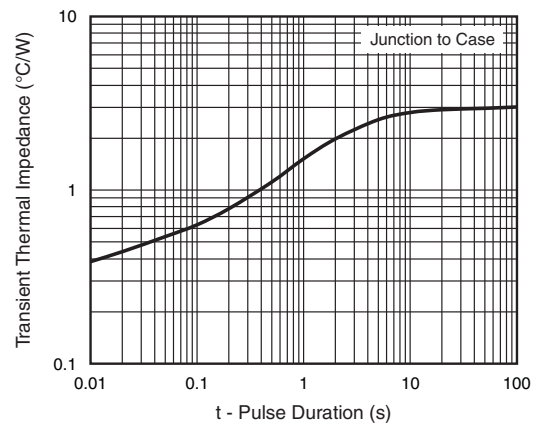
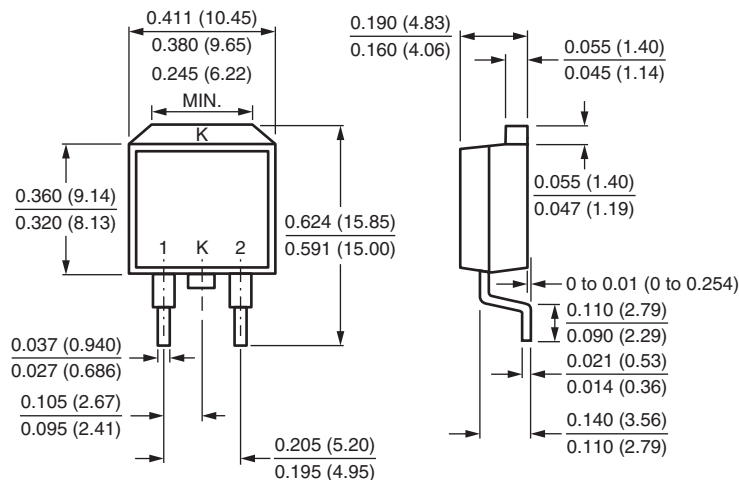


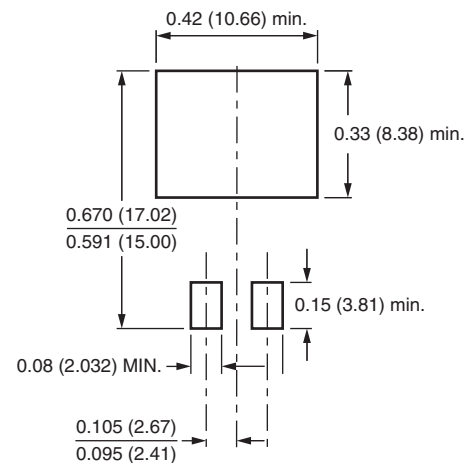
Fig. 6 - Typical Transient Thermal Impedance Per Diode

## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

### D<sup>2</sup>PAK (TO-263AB)



### Mounting Pad Layout





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