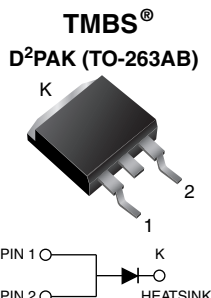


# Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

Ultra Low  $V_F = 0.33\text{ V}$  at  $I_F = 5\text{ A}$



## LINKS TO ADDITIONAL RESOURCES



## 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?999912](http://www.vishay.com/doc?999912)


**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:** D<sup>2</sup>PAK (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 CHARACTERISTICS         |                               |
|---------------------------------|-------------------------------|
| $I_{F(AV)}$                     | 20 A                          |
| $V_{RRM}$                       | 45 V                          |
| $I_{FSM}$                       | 160 A                         |
| $V_F$ at $I_F = 20\text{ A}$    | 0.51 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           | Single                        |

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ 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, $t \leq 1\text{ h}$ | $T_J^{(2)}$       | $\leq 200$  | °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> | 0.44 | -    | V    |
|                                                                            | I <sub>F</sub> = 10 A |                         |                               | 0.49 | -    |      |
|                                                                            | I <sub>F</sub> = 20 A |                         |                               | 0.57 | 0.66 |      |
|                                                                            | I <sub>F</sub> = 5 A  | T <sub>A</sub> = 125 °C |                               | 0.33 | -    |      |
|                                                                            | I <sub>F</sub> = 10 A |                         |                               | 0.41 | -    |      |
|                                                                            | I <sub>F</sub> = 20 A |                         |                               | 0.51 | 0.63 |      |
| Reverse current                                                            | 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  $\mu\text{s}$  pulse width, 1 % duty cycle

(2) Pulse test: Pulse width  $\leq 40\text{ ms}$



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

| PARAMETER                  | SYMBOL          | VBT2045BP | UNIT                 |
|----------------------------|-----------------|-----------|----------------------|
| Typical thermal resistance | $R_{\theta JC}$ | 1.5       | $^{\circ}\text{C/W}$ |

**ORDERING INFORMATION** (Example)

| PACKAGE                       | PREFERRED P/N   | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
|-------------------------------|-----------------|-----------------|--------------|---------------|---------------|
| D <sup>2</sup> PAK (TO-263AB) | VBT2045BP-E3/4W | 1.37            | 4W           | 50/tube       | Tube          |
| D <sup>2</sup> PAK (TO-263AB) | VBT2045BP-E3/8W | 1.37            | 8W           | 800/reel      | Tape and reel |

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

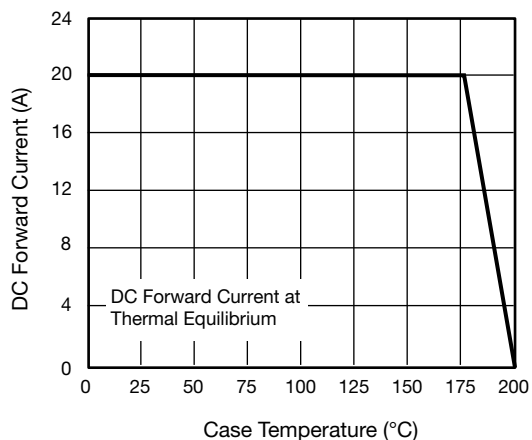


Fig. 1 - Maximum Forward Current Derating Curve

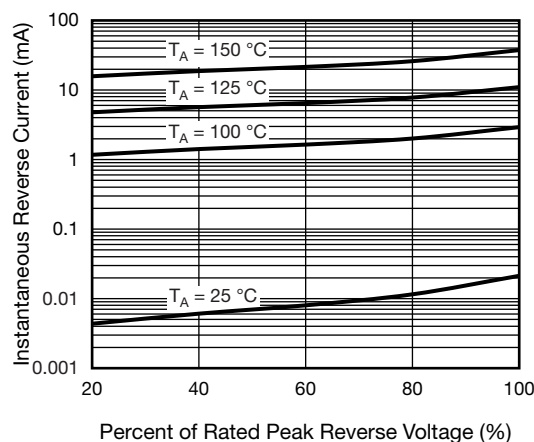


Fig. 3 - Typical Reverse Characteristics

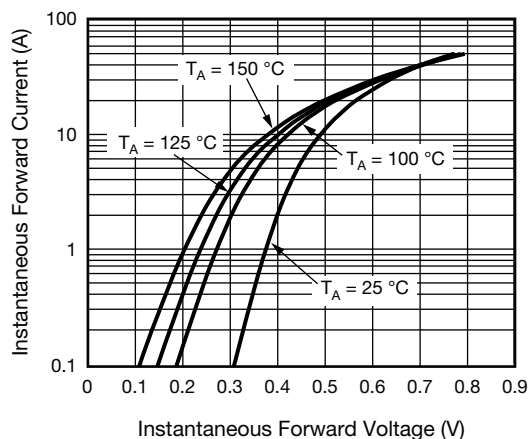


Fig. 2 - Typical Instantaneous Forward Characteristics

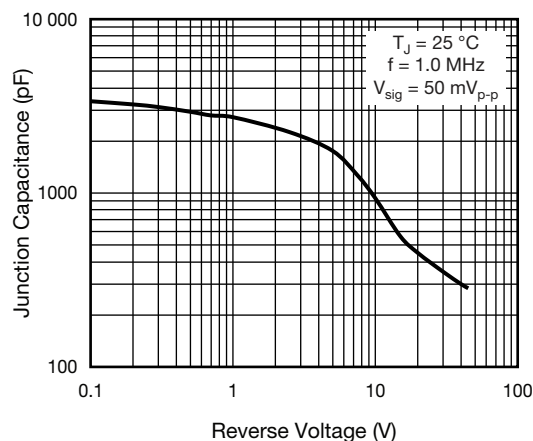


Fig. 4 - Typical Junction Capacitance

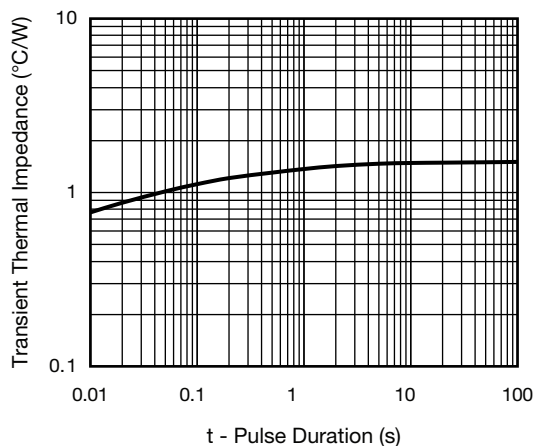
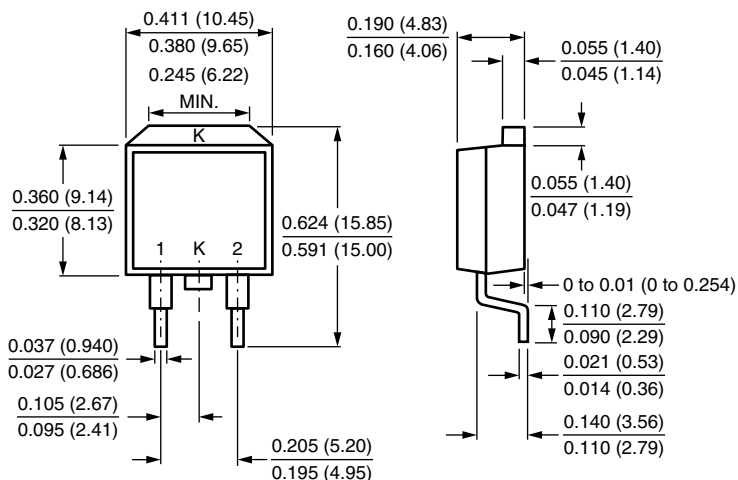
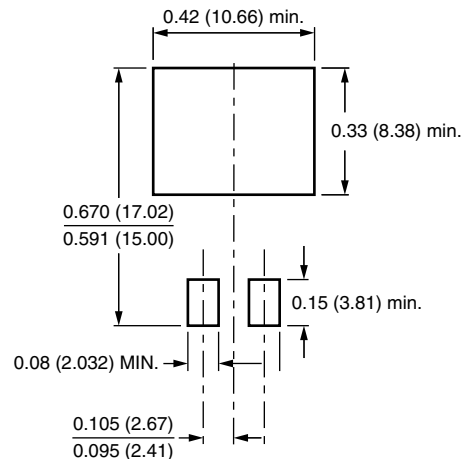


Fig. 5 - Typical Transient Thermal Impedance

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

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

**Mounting Pad Layout**




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