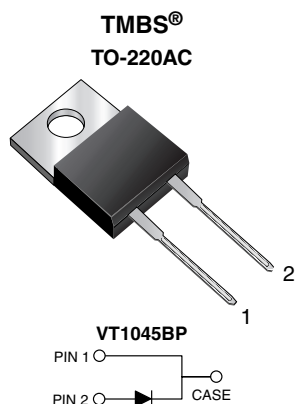


## Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

Ultra Low  $V_F = 0.41\text{ V}$  at  $I_F = 5\text{ A}$



### FEATURES

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- Solder dip 275 °C max. 10 s, per JESD 22-B106
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### 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-220AC

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         |            |
|---------------------------------|------------|
| $I_{F(DC)}$                     | 10 A       |
| $V_{RRM}$                       | 45 V       |
| $I_{FSM}$                       | 100 A      |
| $V_F$ at $I_F = 10\text{ A}$    | 0.52 V     |
| $T_{OP}$ max. (AC mode)         | 150 °C     |
| $T_J$ max. (DC forward current) | 200 °C     |
| Package                         | TO-220AC   |
| Diode variation                 | Single die |

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                       |                   |             |      |
|--------------------------------------------------------------------------------------|-------------------|-------------|------|
| PARAMETER                                                                            | SYMBOL            | VT1045BP    | UNIT |
| Maximum repetitive peak reverse voltage                                              | $V_{RRM}$         | 45          | V    |
| Maximum DC forward bypassing current (fig. 1)                                        | $I_{F(DC)}^{(1)}$ | 10          | A    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load   | $I_{FSM}$         | 100         | 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> | 0.50 | -    | V    |
|                                                                            | I <sub>F</sub> = 10 A |                         |                               | 0.57 | 0.68 |      |
|                                                                            | I <sub>F</sub> = 5 A  | T <sub>A</sub> = 125 °C |                               | 0.41 | -    |      |
|                                                                            | I <sub>F</sub> = 10 A |                         |                               | 0.52 | 0.64 |      |
| Reverse current                                                            | V <sub>R</sub> = 45 V | T <sub>A</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -    | 500  | μA   |
|                                                                            |                       | T <sub>A</sub> = 125 °C |                               | 5    | 15   | 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          | VT1045BP | UNIT                 |
| Typical thermal resistance                                                                  | $R_{\theta JC}$ | 3.0      | $^{\circ}\text{C/W}$ |

| <b>ORDERING INFORMATION</b> (Example) |                |                 |              |               |               |
|---------------------------------------|----------------|-----------------|--------------|---------------|---------------|
| PACKAGE                               | PREFERRED P/N  | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| TO-220AC                              | VT1045BP-M3/4W | 1.87            | 4W           | 50/tube       | Tube          |

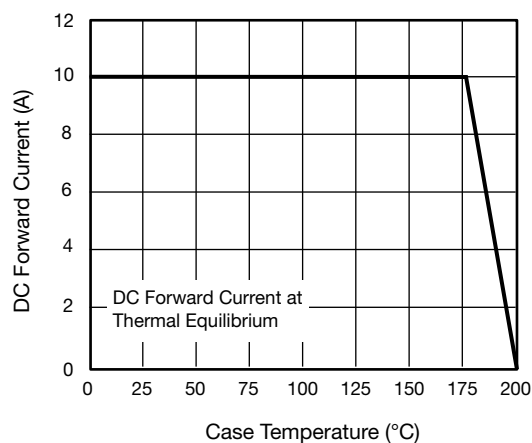
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

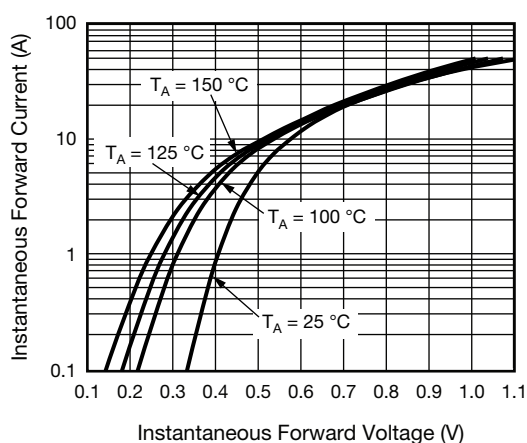
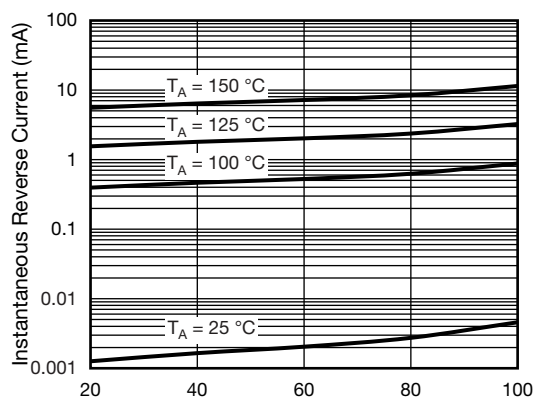
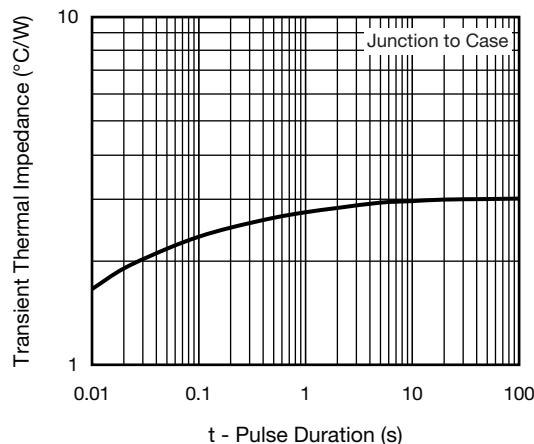


Fig. 2 - Typical Instantaneous Forward Characteristics



Percent of Rated Peak Reverse Voltage (%)  
Fig. 3 - Typical Reverse Characteristics



t - Pulse Duration (s)  
Fig. 5 - Typical Transient Thermal Impedance

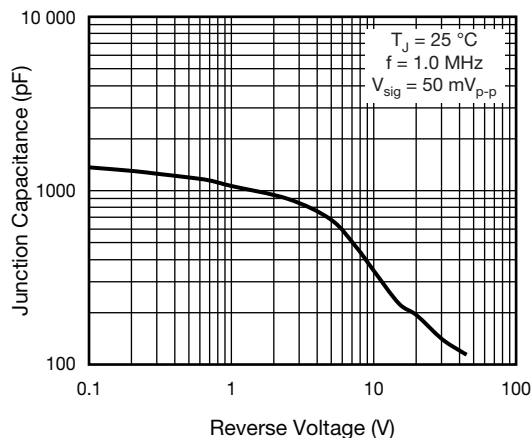
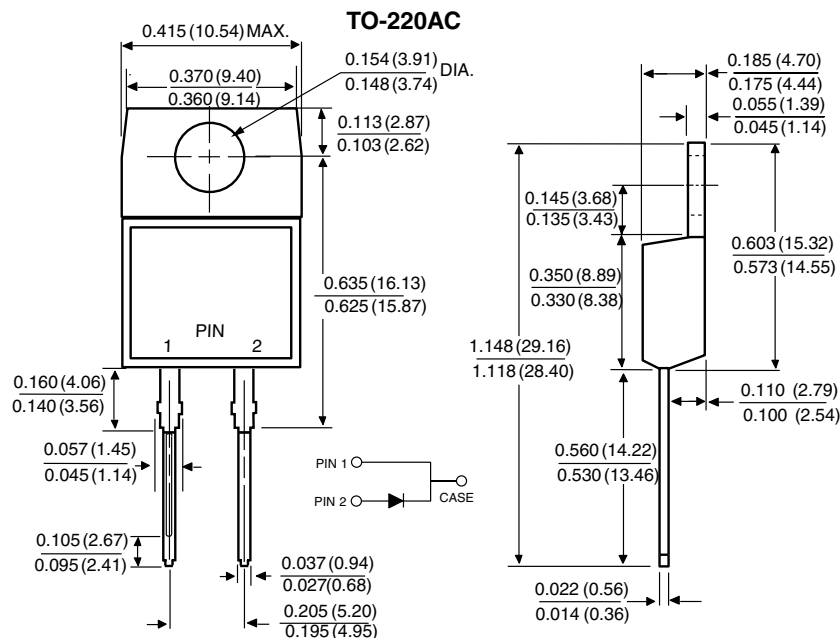


Fig. 4 - Typical Junction Capacitance

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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