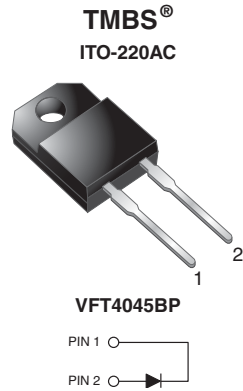


## Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

 Ultra Low  $V_F = 0.28\text{ V}$  at  $I_F = 5\text{ A}$ 


### FEATURES

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- Solder bath temperature 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:** ITO-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         |           |
|---------------------------------|-----------|
| $I_{F(DC)}$                     | 40 A      |
| $V_{RRM}$                       | 45 V      |
| $I_{FSM}$                       | 240 A     |
| $V_F$ at $I_F = 40\text{ A}$    | 0.51 V    |
| $T_{OP}$ max. (AC mode)         | 150 °C    |
| $T_J$ max. (DC forward current) | 200 °C    |
| Package                         | ITO-220AC |
| Circuit configuration           | Single    |

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                       |                            |             |      |
|--|----------------------------|-------------|------|
| PARAMETER  | SYMBOL                     | VFT4045BP   | UNIT |
| Maximum repetitive peak reverse voltage  | $V_{RRM}$                  | 45          | V    |
| Maximum DC forward bypassing current (fig. 1)  | $I_{F(DC)}$ <sup>(1)</sup> | 40          | A    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load   | $I_{FSM}$                  | 240         | A    |
| Operating junction temperature range (AC mode)                                       | $T_{OP}$                   | -40 to +150 | °C   |
| Isolation voltage from thermal to heatsink $t = 1\text{ min}$                        | $V_{AC}$                   | 1500        | V    |
| 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 ( $T_A = 25\text{ °C}$ unless otherwise noted) |                     |                      |      |      |               |
|---|---------------------|----------------------|------|------|---------------|
| PARAMETER   | TEST CONDITIONS     | SYMBOL               | TYP. | MAX. | UNIT          |
| Instantaneous forward voltage   | $I_F = 5\text{ A}$  | $V_F$ <sup>(1)</sup> | 0.41 | -    | V             |
|   | $I_F = 20\text{ A}$ |                      | 0.50 | -    |               |
|   | $I_F = 40\text{ A}$ |                      | 0.57 | 0.67 |               |
|   | $I_F = 5\text{ A}$  |                      | 0.28 | -    |               |
|   | $I_F = 20\text{ A}$ |                      | 0.41 | -    |               |
|   | $I_F = 40\text{ A}$ |                      | 0.51 | 0.63 |               |
| Reverse current   | $V_R = 45\text{ V}$ | $I_R$ <sup>(2)</sup> | -    | 3000 | $\mu\text{A}$ |
|   |                     |                      | 29   | 85   | mA            |

#### Notes

<sup>(1)</sup> Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle

<sup>(2)</sup> Pulse test: Pulse width  $\leq 40\text{ ms}$



| THERMAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                 |           |                    |
|--|-----------------|-----------|--------------------|
| PARAMETER  | SYMBOL          | VFT4045BP | UNIT               |
| Typical thermal resistance   | $R_{\theta JC}$ | 4.0       | $^\circ\text{C/W}$ |

| ORDERING INFORMATION (Example) |                 |                 |              |               |               |
|--------------------------------|-----------------|-----------------|--------------|---------------|---------------|
| PACKAGE                        | PREFERRED P/N   | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| ITO-220AC                      | VFT4045BP-M3/4W | 1.75            | 4W           | 50/tube       | Tube          |

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

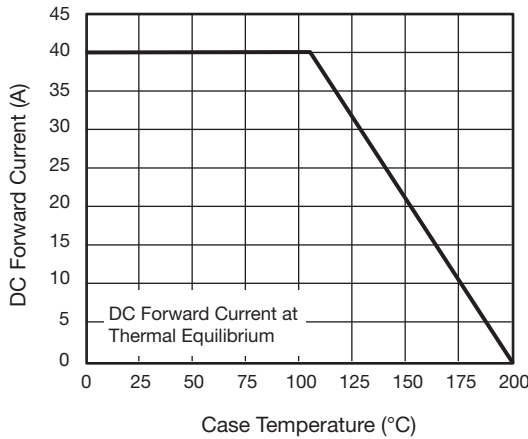


Fig. 1 - Maximum Forward Current Derating Curve

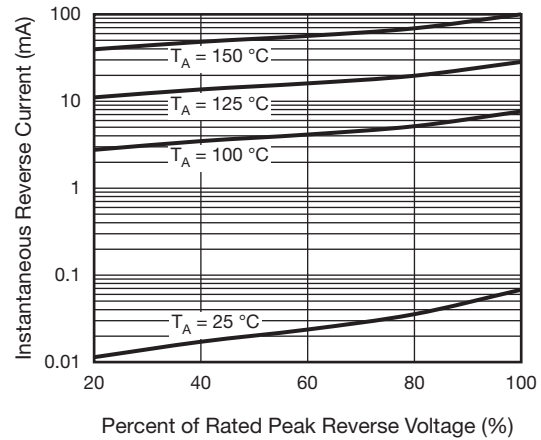


Fig. 3 - Typical Reverse Characteristics

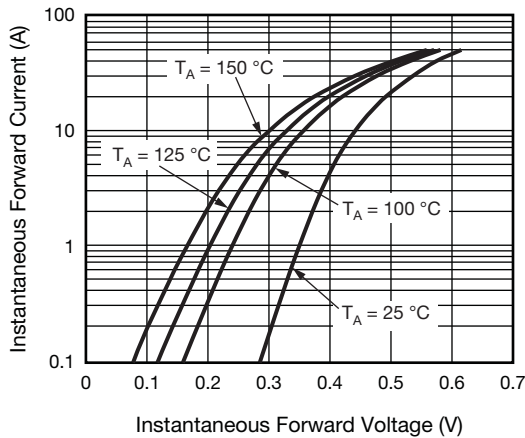


Fig. 2 - Typical Instantaneous Forward Characteristics

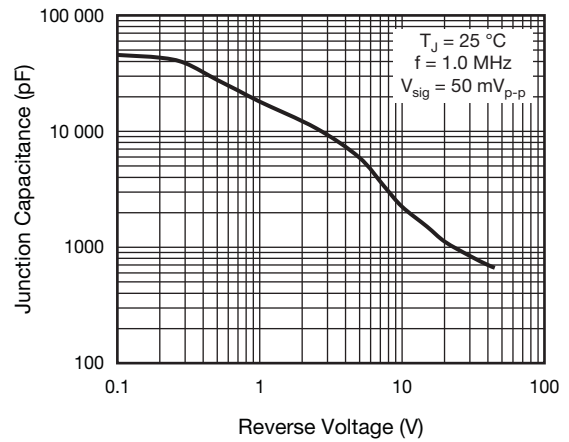


Fig. 4 - Typical Junction Capacitance

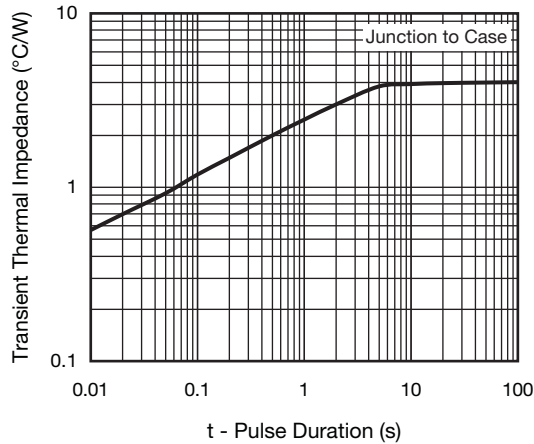
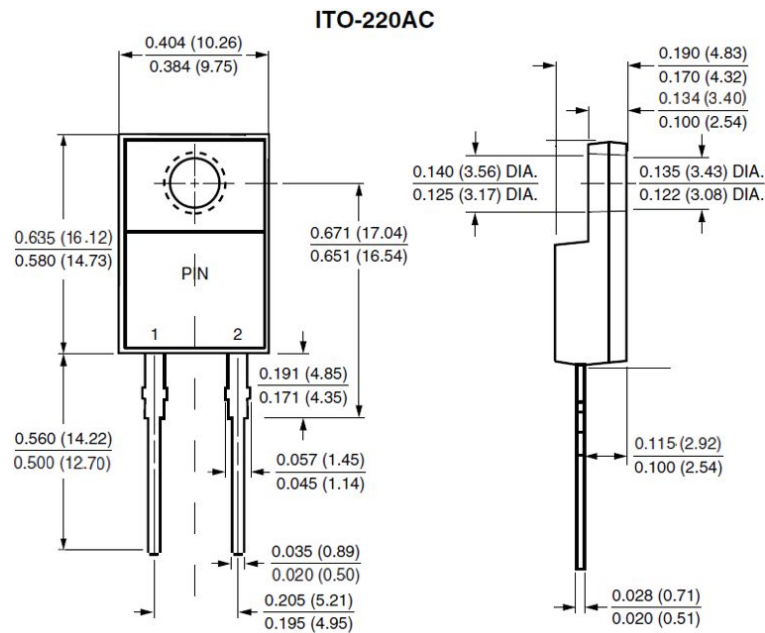


Fig. 5 - Typical Transient Thermal Impedance

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





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