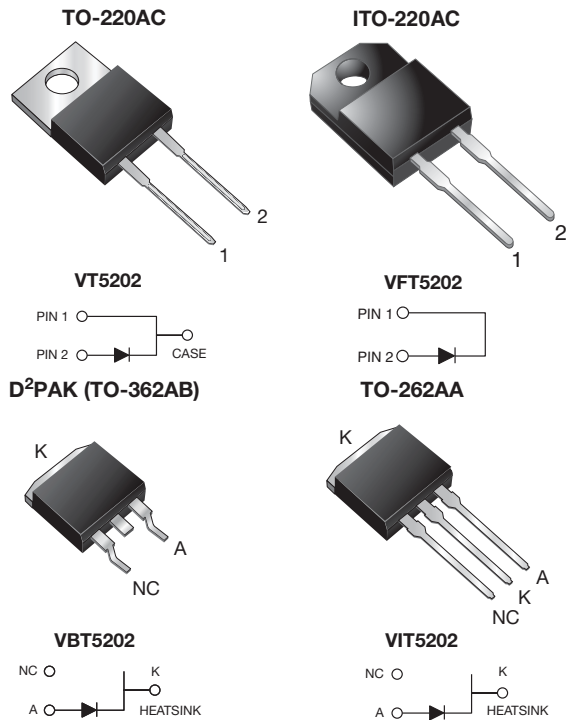


# TMBS<sup>®</sup> (Trench MOS Barrier Schottky) Rectifier

 Ultra Low  $V_F = 0.58 \text{ V}$  at  $I_F = 2.5 \text{ A}$ 


## FEATURES

- Trench MOS Schottky technology Gen 2
- Low forward voltage drop, low power losses
- High efficiency operation
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C (for D<sup>2</sup>PAK (TO-263AB) package)
- Solder bath temperature 275 °C max. 10 s, per JESD 22-B106 (for TO-220AC, ITO-220AC, and TO-262AA package)
- 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 high frequency DC/DC converters, switching power supplies, freewheeling diodes, OR-ing diode, and reverse battery protection.

## MECHANICAL DATA

**Case:** TO-220AC, ITO-220AC, D<sup>2</sup>PAK (TO-263AB), and TO-262AA

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 max.

## DESIGN SUPPORT TOOLS AVAILABLE



| PRIMARY CHARACTERISTICS                                   |  |
|---|--|
| $I_{F(AV)}$   | 5.0 A  |
| $V_{RRM}$   | 200 V  |
| $I_{FSM}$   | 100 A  |
| $V_F$ at $I_F = 5.0 \text{ A}$ ( $T_J = 125 \text{ °C}$ ) | 0.65 V   |
| $T_J$ max.  | 175 °C   |
| Package   | TO-220AC, ITO-220AC, D <sup>2</sup> PAK (TO-263AB), TO-262AA |
| Circuit configuration                                     | Single   |

| MAXIMUM RATINGS ( $T_A = 25 \text{ °C}$ unless otherwise noted)                    |                |             |         |         |         |            |
|--|----------------|-------------|---------|---------|---------|------------|
| PARAMETER  | SYMBOL         | VT5202      | VFT5202 | VBT5202 | VIT5202 | UNIT       |
| Maximum repetitive peak reverse voltage  | $V_{RRM}$      | 200         |         |         |         | V          |
| Maximum average forward rectified current (fig. 1)                                 | $I_{F(AV)}$    | 5.0         |         |         |         | A          |
| Maximum DC reverse voltage   | $V_{DC}$       | 160         |         |         |         | V          |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$      | 100         |         |         |         | A          |
| Voltage rate of change (rated $V_F$ )  | dV/dt          | 10 000      |         |         |         | V/ $\mu$ s |
| Isolation voltage (ITO-220AC only) from terminal to heatsink, t = 1 min            | $V_{AC}$       | 1500        |         |         |         | V          |
| Operating junction and storage temperature range                                   | $T_J, T_{STG}$ | -40 to +175 |         |         |         | °C         |



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                      |                                   |        |      |      |               |
|--|----------------------|-----------------------------------|--------|------|------|---------------|
| PARAMETER  | TEST CONDITIONS      |                                   | SYMBOL | TYP. | MAX. | UNIT          |
| Instantaneous forward voltage per diode <sup>(1)</sup>                                       | $I_F = 2.5\text{ A}$ | $T_A = 25\text{ }^\circ\text{C}$  | $V_F$  | 0.74 | -    | V             |
|  | $I_F = 5.0\text{ A}$ |                                   |        | 0.80 | 0.88 |               |
|  | $I_F = 2.5\text{ A}$ | $T_A = 125\text{ }^\circ\text{C}$ |        | 0.58 | -    |               |
|  | $I_F = 5.0\text{ A}$ |                                   |        | 0.65 | 0.73 |               |
| Reverse current <sup>(2)</sup>   | $V_R = 160\text{ V}$ | $T_A = 25\text{ }^\circ\text{C}$  | $I_R$  | 0.2  | -    | $\mu\text{A}$ |
|  |                      | $T_A = 125\text{ }^\circ\text{C}$ |        | 0.4  | -    | mA            |
|  | $V_R = 200\text{ V}$ | $T_A = 25\text{ }^\circ\text{C}$  |        | -    | 150  | $\mu\text{A}$ |
|  |                      | $T_A = 125\text{ }^\circ\text{C}$ |        | 1.0  | 5    | mA            |

**Notes**

- (1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle  
(2) Pulse test: Pulse width  $\leq 5\text{ ms}$

| <b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |   |        |         |         |         |                    |
|---|---|--------|---------|---------|---------|--------------------|
| PARAMETER   | SYMBOL                                  | VT5202 | VFT5202 | VBT5202 | VIT5202 | UNIT               |
| Typical thermal resistance  | $R_{\theta\text{JC}}$                   | 3.4    | 6.8     | 3.4     |         | $^\circ\text{C/W}$ |
|   | $R_{\theta\text{JA}}$ <sup>(1)(2)</sup> | 52     | 60      | 52      |         |                    |

**Notes**

- (1) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta\text{JA}}$   
(2) Free air, without heatsink

| <b>ORDERING INFORMATION</b> (Example) |               |                 |              |               |               |
|---------------------------------------|---------------|-----------------|--------------|---------------|---------------|
| PACKAGE                               | PREFERRED P/N | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| TO-220AC                              | VT5202-M3/4W  | 1.89            | 4W           | 50/tube       | Tube          |
| ITO-220AC                             | VFT5202-M3/4W | 1.65            | 4W           | 50/tube       | Tube          |
| D <sup>2</sup> PAK (TO-263AB)         | VBT5202-M3/4W | 1.38            | 4W           | 50/tube       | Tube          |
| D <sup>2</sup> PAK (TO-263AB)         | VBT5202-M3/8W | 1.38            | 8W           | 800/reel      | Tape and reel |
| TO-262AA                              | VIT5202-M3/4W | 1.46            | 4W           | 50/tube       | Tube          |



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

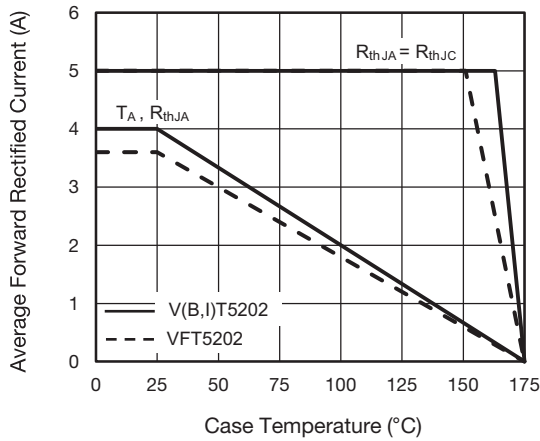


Fig. 1 - Maximum Forward Current Derating Curve

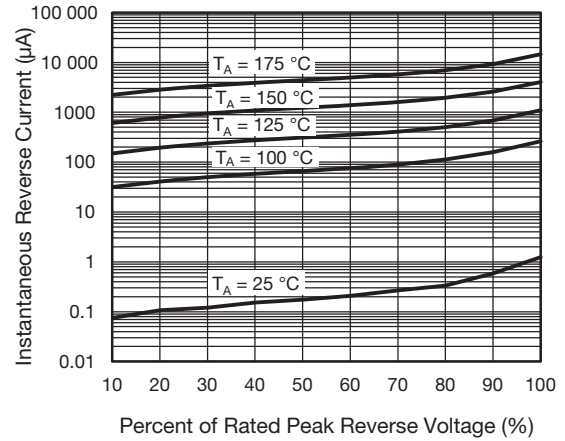


Fig. 4 - Typical Reverse Characteristics

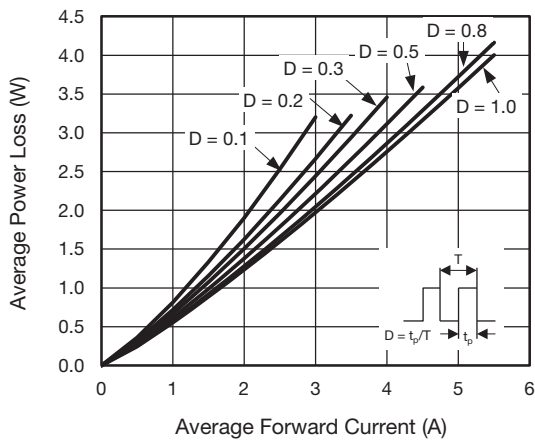


Fig. 2 - Forward Power Dissipation Characteristics

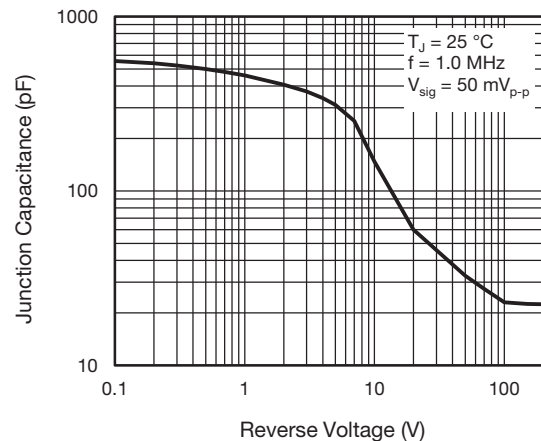


Fig. 5 - Typical Junction Capacitance

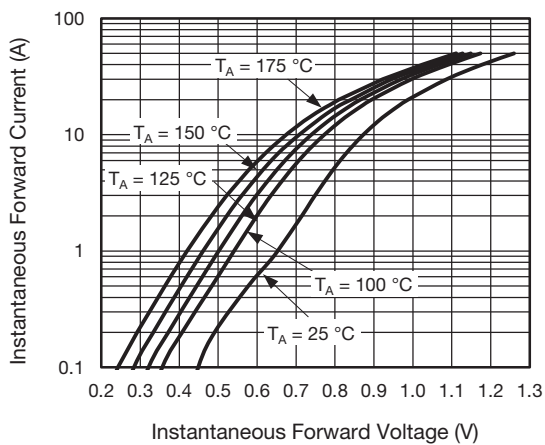


Fig. 3 - Typical Instantaneous Forward Characteristics

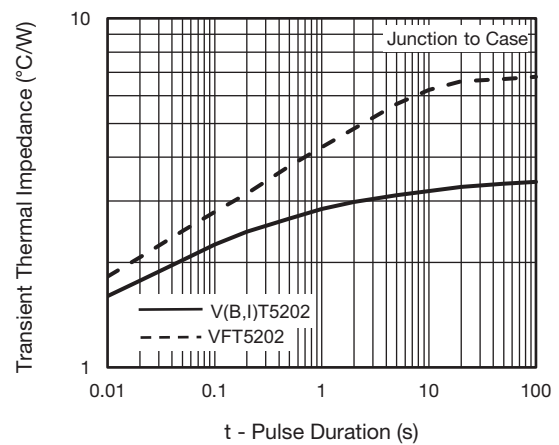
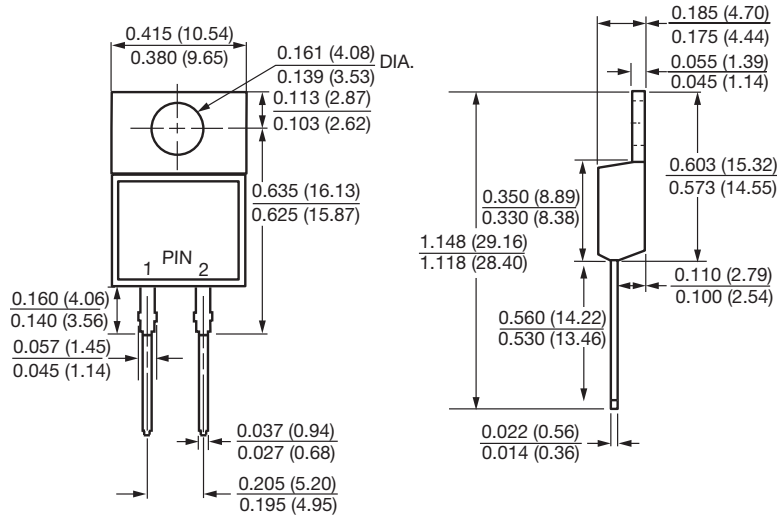


Fig. 6 - Typical Transient Thermal Impedance

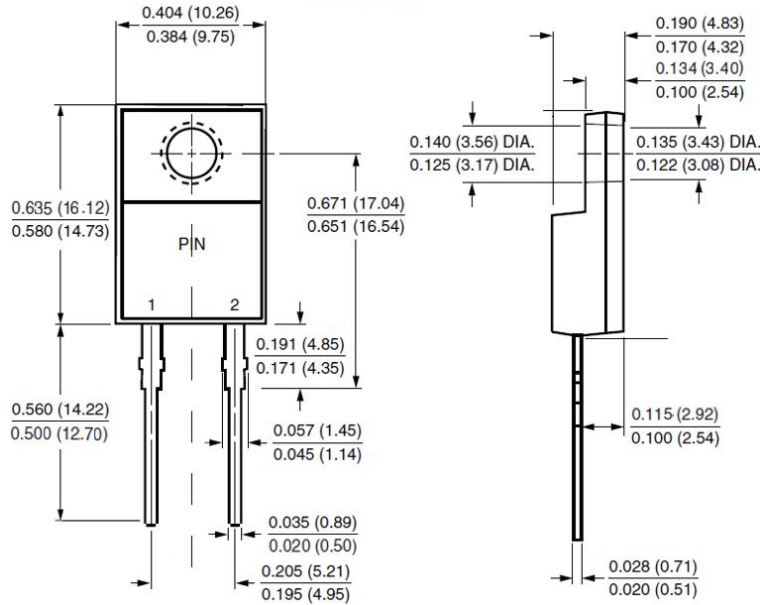


PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

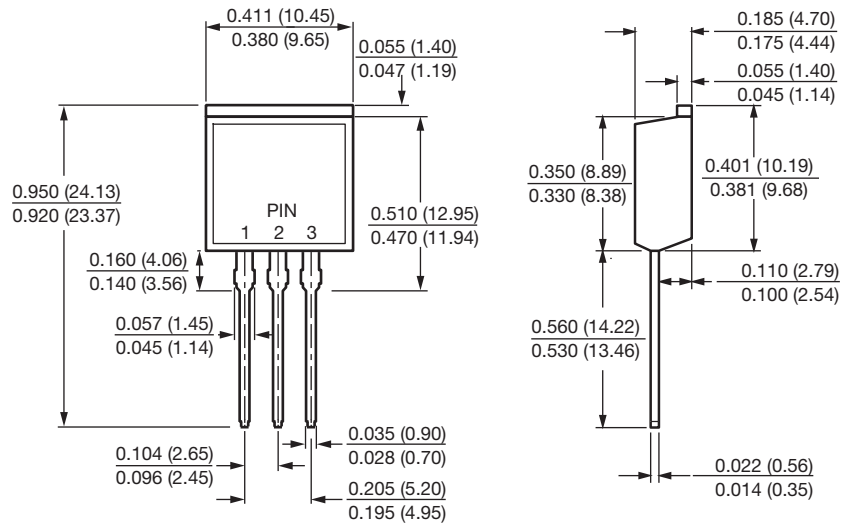
TO-220AC



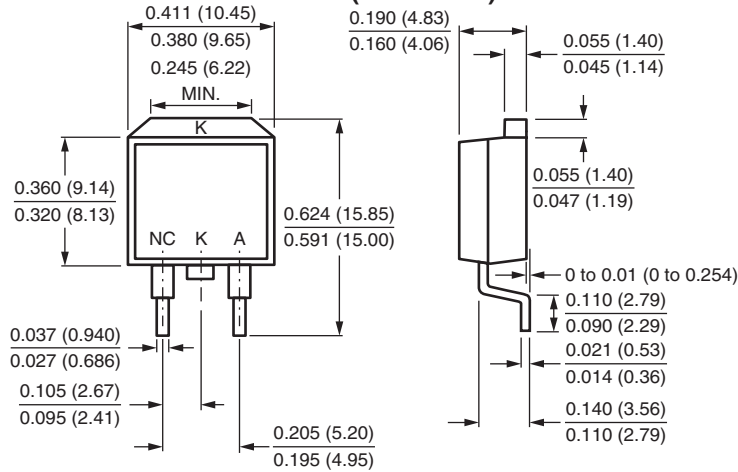
ITO-220AC



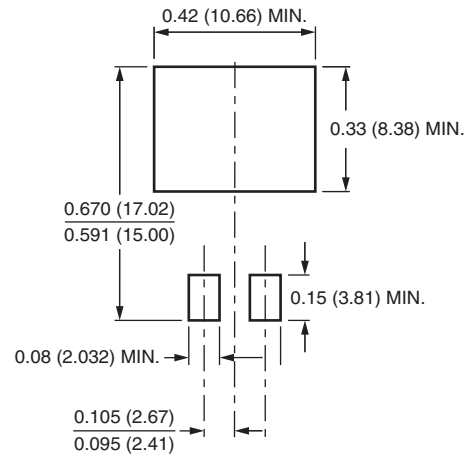
## TO-262AA



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



## Mounting Pad Layout





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