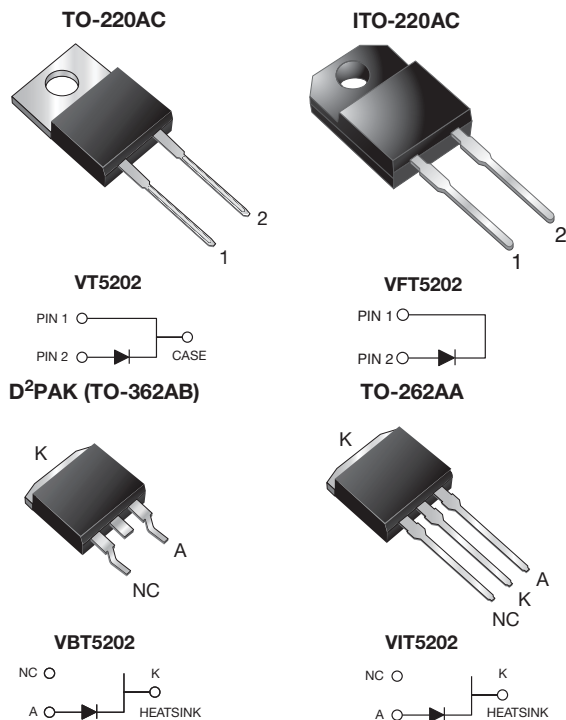


## TMBS® (Trench MOS Barrier Schottky) Rectifier

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



**RoHS**  
COMPLIANT  
HALOGEN  
FREE

### 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 D²PAK (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)

### 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, D²PAK (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, D²PAK (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 $V_R$ )                                              | $dV/dt$        | 10 000      |         |         |         | V/ $\mu$ s |
| Isolation voltage (ITO-220AC only) from terminal to heatsink, $t = 1 \text{ min}$  | $V_{AC}$       | 1500        |         |         |         | V          |
| Operating junction and storage temperature range                                   | $T_J, T_{STG}$ | -40 to +175 |         |         |         | °C         |



| ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                        |                         |                |      |      |      |
|----------------------------------------------------------------------------|------------------------|-------------------------|----------------|------|------|------|
| PARAMETER                                                                  | TEST CONDITIONS        |                         | SYMBOL         | TYP. | MAX. | UNIT |
| Instantaneous forward voltage per diode <sup>(1)</sup>                     | I <sub>F</sub> = 2.5 A | T <sub>A</sub> = 25 °C  | V <sub>F</sub> | 0.74 | -    | V    |
|                                                                            | I <sub>F</sub> = 5.0 A |                         |                | 0.80 | 0.88 |      |
|                                                                            | I <sub>F</sub> = 2.5 A | T <sub>A</sub> = 125 °C |                | 0.58 | -    |      |
|                                                                            | I <sub>F</sub> = 5.0 A |                         |                | 0.65 | 0.73 |      |
| Reverse current <sup>(2)</sup>                                             | V <sub>R</sub> = 160 V | T <sub>A</sub> = 25 °C  | I <sub>R</sub> | 0.2  | -    | μA   |
|                                                                            |                        | T <sub>A</sub> = 125 °C |                | 0.4  | -    | mA   |
|                                                                            | V <sub>R</sub> = 200 V | T <sub>A</sub> = 25 °C  |                | -    | 150  | μA   |
|                                                                            |                        | T <sub>A</sub> = 125 °C |                | 1.0  | 5    | mA   |

**Notes**

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

| THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                                    |        |         |         |         |      |
|-------------------------------------------------------------------------|------------------------------------|--------|---------|---------|---------|------|
| PARAMETER                                                               | SYMBOL                             | VT5202 | VFT5202 | VBT5202 | VIT5202 | UNIT |
| Typical thermal resistance                                              | R <sub>θJC</sub>                   | 3.4    | 6.8     | 3.4     |         | °C/W |
|                                                                         | R <sub>θJA</sub> <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 ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

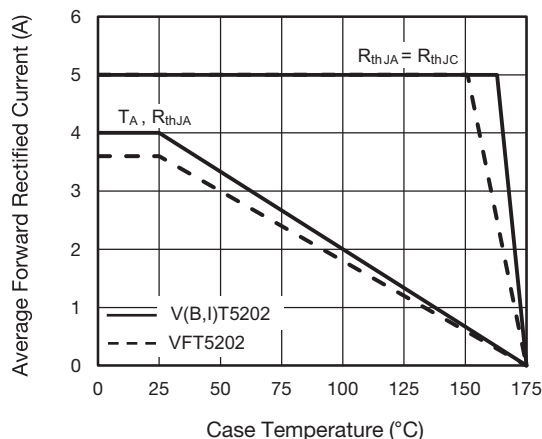


Fig. 1 - Maximum Forward Current Derating Curve

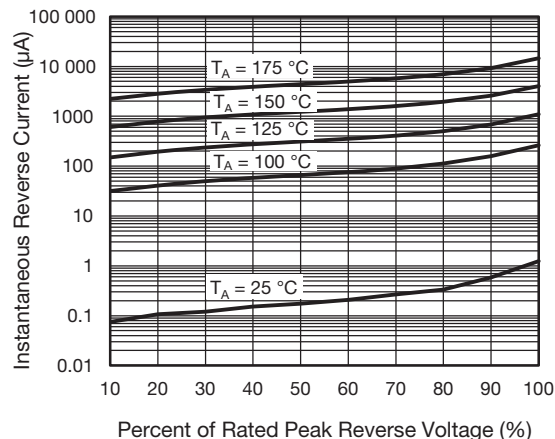


Fig. 4 - Typical Reverse Characteristics

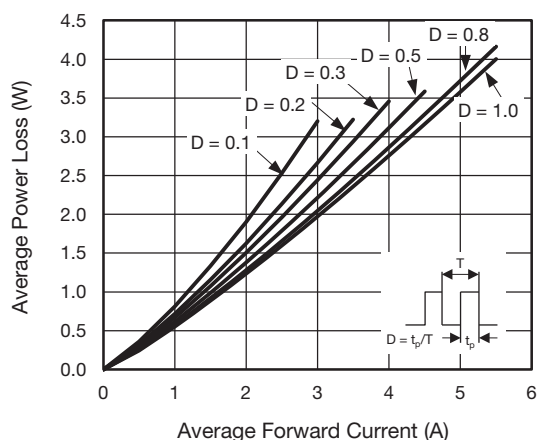


Fig. 2 - Forward Power Dissipation Characteristics

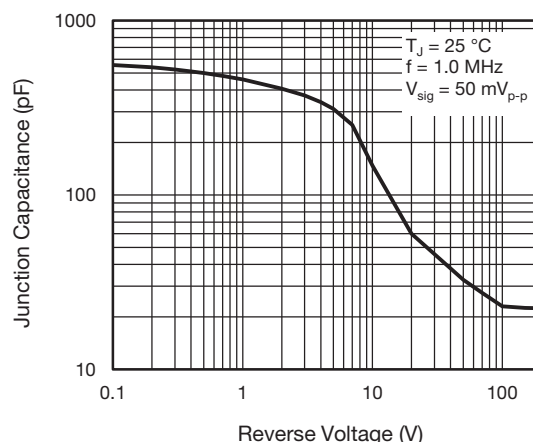


Fig. 5 - Typical Junction Capacitance

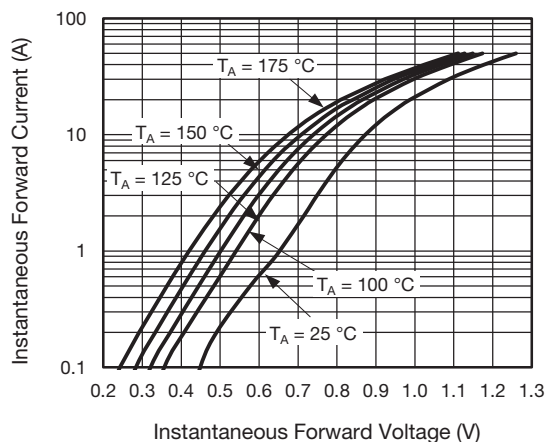


Fig. 3 - Typical Instantaneous Forward Characteristics

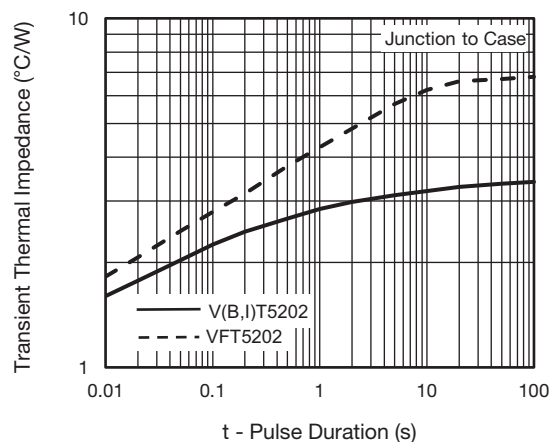
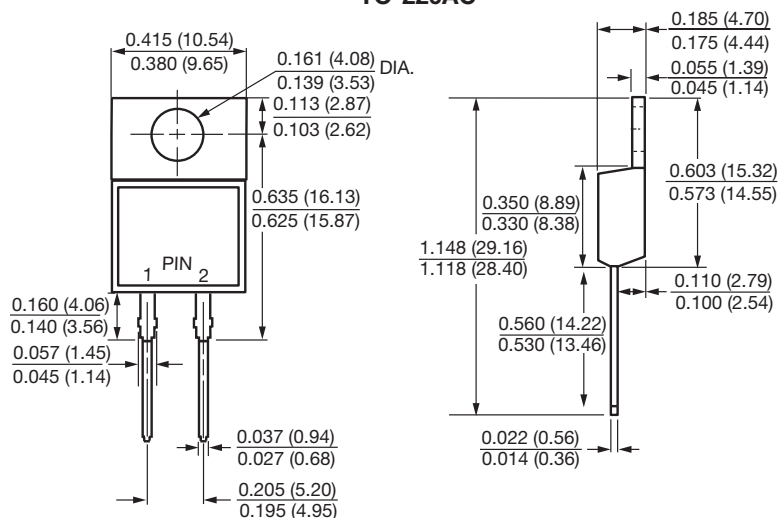


Fig. 6 - Typical Transient Thermal Impedance

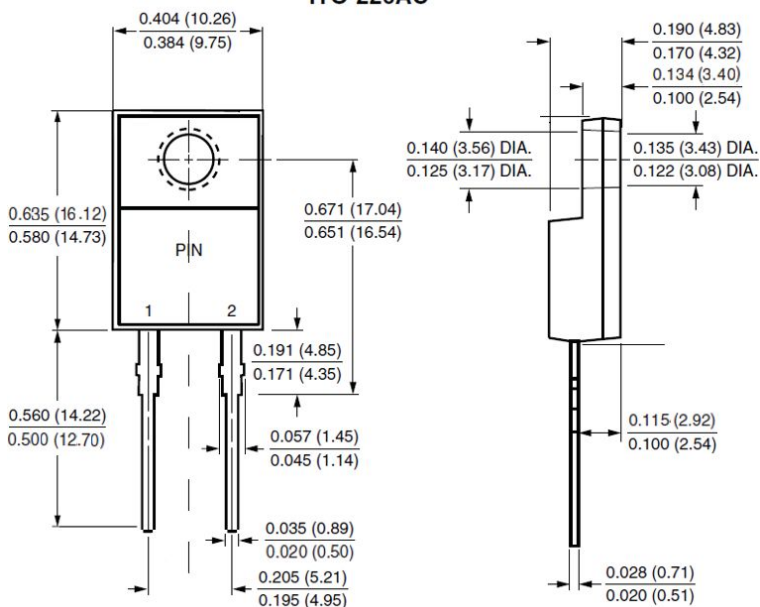


PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

TO-220AC

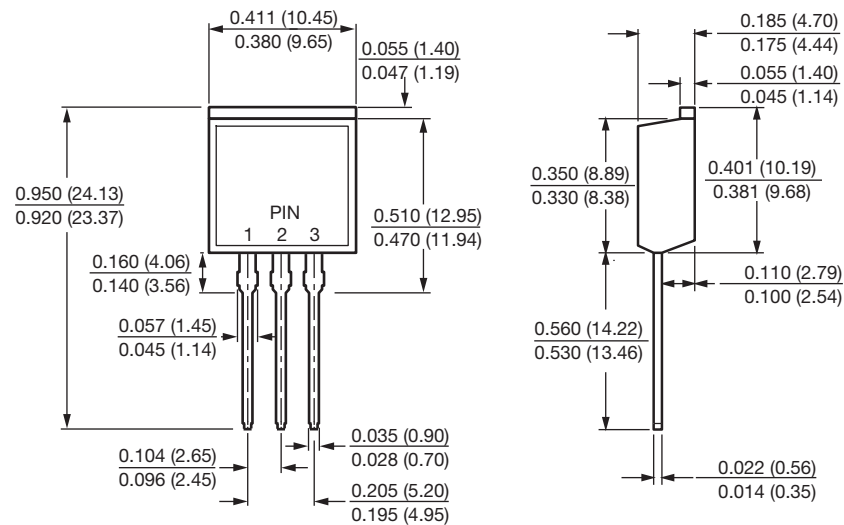


ITO-220AC

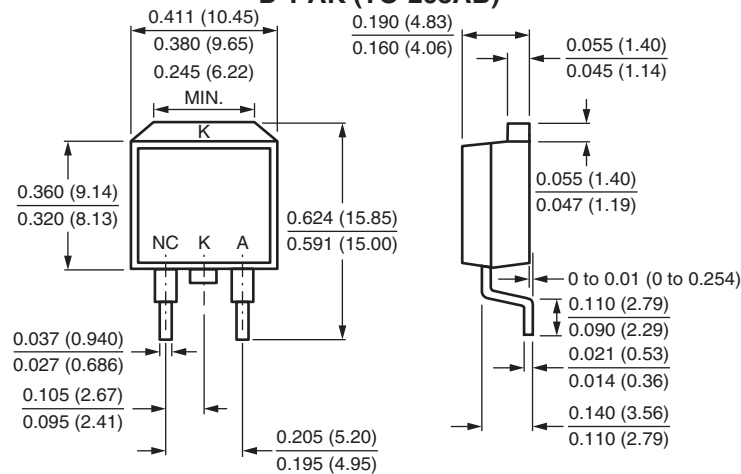




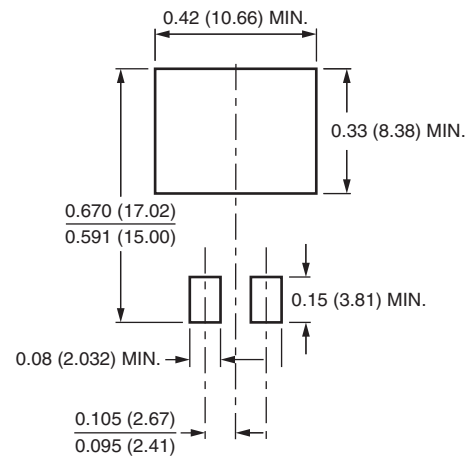
## TO-262AA



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



## Mounting Pad Layout





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