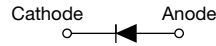
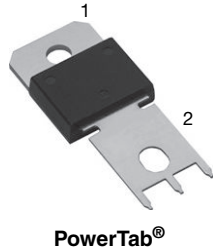


# Ultrafast Soft Recovery Diode, 150 A FRED Pt®



## FEATURES

- Ultrafast recovery time
- 175 °C max. operating junction temperature
- Screw mounting only
- Designed and qualified according to JEDEC®-JESD 47
- PowerTab® package
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## BENEFITS

- Reduced RFI and EMI
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

## DESCRIPTION / APPLICATIONS

These diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for HF welding, power converters and other applications where switching losses are not significant portion of the total losses.

| PRIMARY CHARACTERISTICS |                    |
|-------------------------|--------------------|
| $I_{F(AV)}$             | 150 A              |
| $V_R$                   | 200 V              |
| $V_F$ at $I_F$          | 0.79 V             |
| $t_{rr}$ (typ.)         | See recovery table |
| $T_J$ max.              | 175 °C             |
| Package                 | PowerTab®          |
| Circuit configuration   | Single             |

| ABSOLUTE MAXIMUM RATINGS                    |                |                       |             |       |
|---|----------------|-----------------------|-------------|-------|
| PARAMETER                                   | SYMBOL         | TEST CONDITIONS       | MAX.        | UNITS |
| Cathode to anode voltage                    | $V_R$          |                       | 200         | V     |
| Continuous forward current                  | $I_{F(AV)}$    | $T_C = 116\text{ °C}$ | 150         | A     |
| Single pulse forward current                | $I_{FSM}$      | $T_C = 25\text{ °C}$  | 1600        |       |
| Maximum repetitive forward current          | $I_{FRM}$      | Square wave, 20 kHz   | 380         |       |
| Operating junction and storage temperatures | $T_J, T_{Stg}$ |                       | -55 to +175 | °C    |

| ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ °C}$ unless otherwise specified) |               |  |      |      |      |               |
|--|---------------|--|------|------|------|---------------|
| PARAMETER  | SYMBOL        | TEST CONDITIONS                              | MIN. | TYP. | MAX. | UNITS         |
| Breakdown voltage, blocking voltage  | $V_{BR}, V_R$ | $I_R = 100\text{ }\mu\text{A}$               | 200  | -    | -    | V             |
| Forward voltage  | $V_F$         | $I_F = 150\text{ A}$                         | -    | 0.99 | 1.13 |               |
|  |               | $I_F = 150\text{ A}, T_J = 175\text{ °C}$    | -    | 0.79 | 0.90 |               |
| Reverse leakage current  | $I_R$         | $V_R = V_R$ rated                            | -    | -    | 50   | $\mu\text{A}$ |
|  |               | $T_J = 150\text{ °C}, V_R = V_R$ rated       | -    | -    | 2    | mA            |
| Junction capacitance   | $C_T$         | $V_R = 200\text{ V}$                         | -    | 180  | -    | pF            |
| Series inductance  | $L_S$         | Measured lead to lead 5 mm from package body | -    | 3.5  | -    | nH            |



| DYNAMIC RECOVERY CHARACTERISTICS ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified) |           |   |      |      |      |       |
|---|-----------|---|------|------|------|-------|
| PARAMETER   | SYMBOL    | TEST CONDITIONS   | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time   | $t_{rr}$  | $I_F = 1.0\text{ A}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ | -    | -    | 45   | ns    |
|   |           | $T_J = 25\text{ }^\circ\text{C}$  | -    | 34   | -    |       |
|   |           | $T_J = 125\text{ }^\circ\text{C}$   | -    | 58   | -    |       |
| Peak recovery current   | $I_{RRM}$ | $T_J = 25\text{ }^\circ\text{C}$  | -    | 4.5  | -    | A     |
|   |           | $T_J = 125\text{ }^\circ\text{C}$   | -    | 9.0  | -    |       |
| Reverse recovery charge   | $Q_{rr}$  | $T_J = 25\text{ }^\circ\text{C}$  | -    | 87   | -    | nC    |
|   |           | $T_J = 125\text{ }^\circ\text{C}$   | -    | 300  | -    |       |

| THERMAL - MECHANICAL SPECIFICATIONS  |            |   |             |      |             |                    |
|--------------------------------------|------------|---|-------------|------|-------------|--------------------|
| PARAMETER                            | SYMBOL     | TEST CONDITIONS                             | MIN.        | TYP. | MAX.        | UNITS              |
| Thermal resistance, junction to case | $R_{thJC}$ |   | -           | -    | 0.35        | K/W                |
| Thermal resistance, case to heatsink | $R_{thCS}$ | Mounting surface, flat, smooth, and greased | -           | 0.2  | -           |                    |
| Weight                               |            |   | -           | -    | 5.02        | g                  |
|                                      |            |   | -           | 0.18 | -           | oz.                |
| Mounting torque                      |            |   | 1.2<br>(10) | -    | 2.4<br>(20) | N · m<br>(lb · in) |
| Marking device                       |            | Case style PowerTab®                        |             |      |             | 150EBU02           |

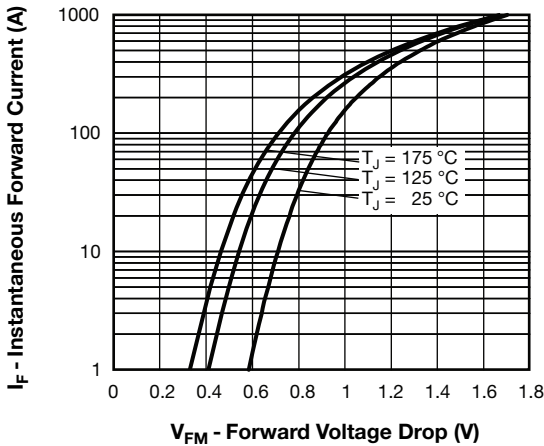


Fig. 1 - Maximum Forward Voltage Drop Characteristics

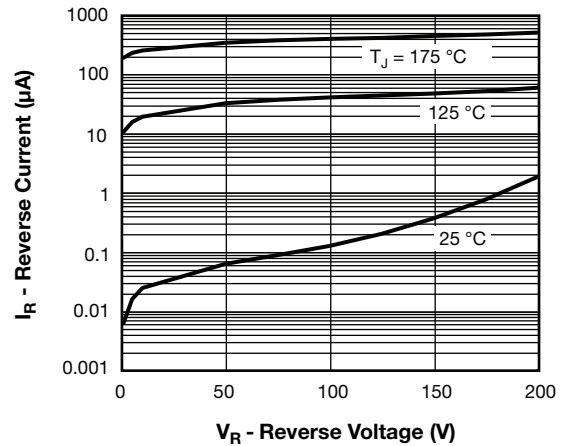


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

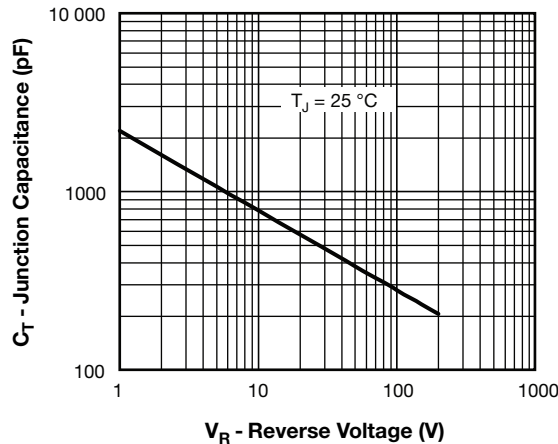


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

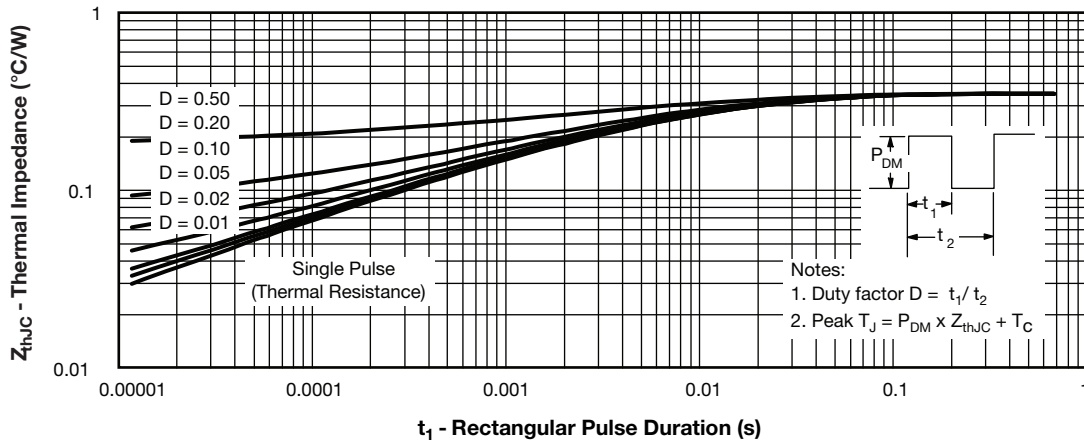


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

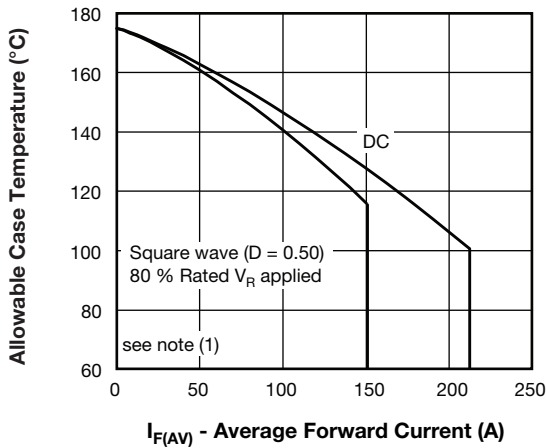


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

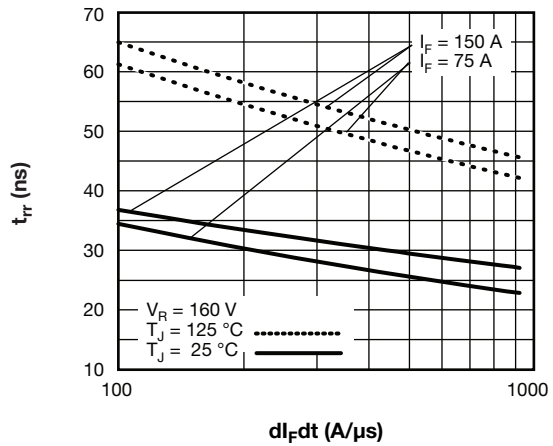


Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$

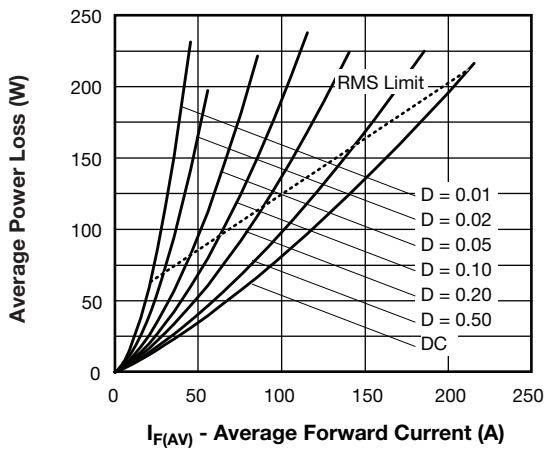


Fig. 6 - Forward Power Loss Characteristics

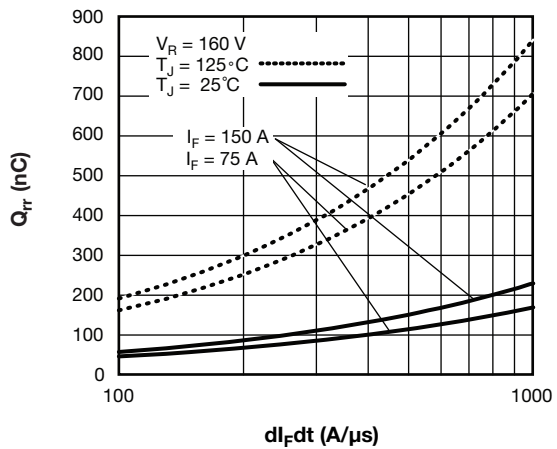


Fig. 8 - Typical Stored Charge vs.  $dI_F/dt$

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;
- $P_d$  = forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);
- $P_{dREV}$  = inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$

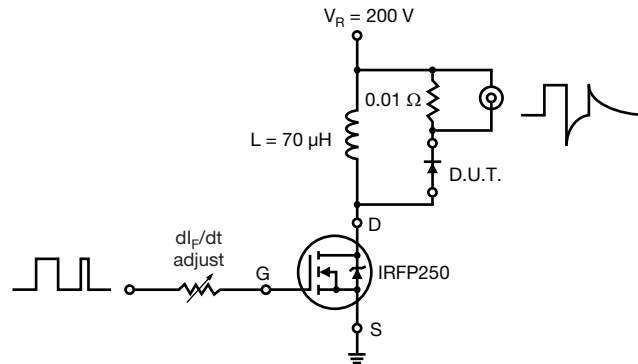
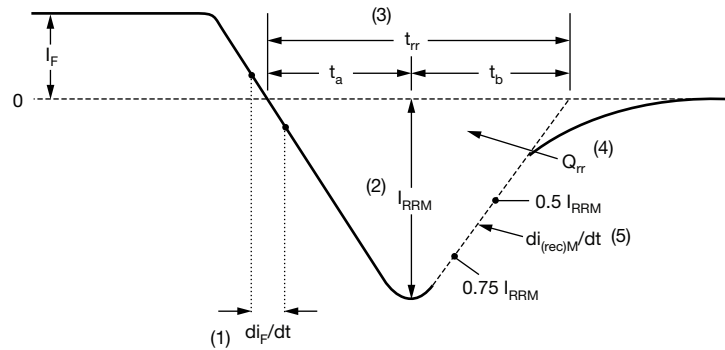


Fig. 9 - Reverse Recovery Parameter Test Circuit



- (1)  $di_F/dt$  - rate of change of current through zero crossing
- (2)  $I_{RRM}$  - peak reverse recovery current
- (3)  $t_{rr}$  - reverse recovery time measured from zero crossing point of negative going  $I_F$  to point where a line passing through  $0.75 I_{RRM}$  and  $0.50 I_{RRM}$  extrapolated to zero current.

- (4)  $Q_{rr}$  - area under curve defined by  $t_{rr}$  and  $I_{RRM}$

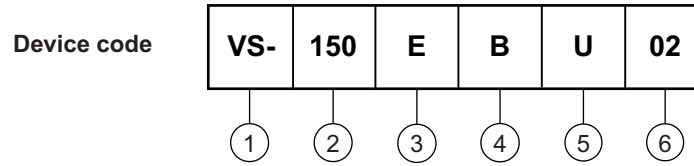
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

- (5)  $di_{(rec)M}/dt$  - peak rate of change of current during  $t_b$  portion of  $t_{rr}$

Fig. 10 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (150 = 150 A)
- 3** - Single diode
- 4** - PowerTab® (ultrafast/hyperfast only)
- 5** - Ultrafast recovery
- 6** - Voltage rating (02 = 200 V)

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?95240">www.vishay.com/doc?95240</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95370">www.vishay.com/doc?95370</a> |
| Application note           | <a href="http://www.vishay.com/doc?95179">www.vishay.com/doc?95179</a> |
| SPIICE model               | <a href="http://www.vishay.com/doc?96503">www.vishay.com/doc?96503</a> |



## PowerTab®

**DIMENSIONS** in millimeters (inches)





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