

# Ultrafast Soft Recovery Diode, 80 A FRED Pt®



PowerTab®



## 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.

## PRODUCT SUMMARY

|                 |                    |
|-----------------|--------------------|
| Package         | PowerTab®          |
| $I_{F(AV)}$     | 80 A               |
| $V_R$           | 400 V              |
| $V_F$ at $I_F$  | 0.92 V             |
| $t_{rr}$ (typ.) | See recovery table |
| $T_J$ max.      | 175 °C             |
| Diode variation | Single die         |

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                   | SYMBOL         | TEST CONDITIONS       | MAX.        | UNITS |
|---------------------------------------------|----------------|-----------------------|-------------|-------|
| Cathode to anode voltage                    | $V_R$          |                       | 400         | V     |
| Continuous forward current                  | $I_{F(AV)}$    | $T_C = 101\text{ °C}$ | 80          | A     |
| Single pulse forward current                | $I_{FSM}$      | $T_C = 25\text{ °C}$  | 800         |       |
| Maximum repetitive forward current          | $I_{FRM}$      | Square wave, 20 kHz   | 160         |       |
| 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 | $V_{BR}, V_r$ | $I_R = 100\text{ }\mu\text{A}$               | 400  | -    | -    | V             |
| Forward voltage                     | $V_F$         | $I_F = 80\text{ A}$                          | -    | 1.1  | 1.3  |               |
|                                     |               | $I_F = 80\text{ A}, T_J = 175\text{ °C}$     | -    | 0.92 | 1.08 |               |
|                                     |               | $I_F = 80\text{ A}, T_J = 125\text{ °C}$     | -    | 0.98 | 1.15 |               |
| 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                | $C_T$         | $V_R = 200\text{ V}$                         | -    | 50   | -    | pF            |
| Series inductance                   | $L_S$         | Measured lead to lead 5 mm from package body | -    | 3.5  | -    | nH            |

| <b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified) |           |                                                                                 |      |      |      |       |
|----------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------|------|------|------|-------|
| PARAMETER                                                                                                | SYMBOL    | TEST CONDITIONS                                                                 | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time                                                                                    | $t_{rr}$  | $I_F = 1\text{ A}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ | -    | 50   | 60   | ns    |
|                                                                                                          |           | $T_J = 25\text{ }^{\circ}\text{C}$                                              | -    | 87   | -    |       |
|                                                                                                          |           | $T_J = 125\text{ }^{\circ}\text{C}$                                             | -    | 151  | -    |       |
| Peak recovery current                                                                                    | $I_{RRM}$ | $T_J = 25\text{ }^{\circ}\text{C}$                                              | -    | 9.3  | -    | A     |
|                                                                                                          |           | $T_J = 125\text{ }^{\circ}\text{C}$                                             | -    | 17.2 | -    |       |
| Reverse recovery charge                                                                                  | $Q_{rr}$  | $T_J = 25\text{ }^{\circ}\text{C}$                                              | -    | 405  | -    | nC    |
|                                                                                                          |           | $T_J = 125\text{ }^{\circ}\text{C}$                                             | -    | 1300 | -    |       |

| <b>THERMAL - MECHANICAL SPECIFICATIONS</b> |            |                                            |             |      |             |                             |
|--------------------------------------------|------------|--------------------------------------------|-------------|------|-------------|-----------------------------|
| PARAMETER                                  | SYMBOL     | TEST CONDITIONS                            | MIN.        | TYP. | MAX.        | UNITS                       |
| Thermal resistance, junction to case       | $R_{thJC}$ |                                            | -           | -    | 0.70        | $^{\circ}\text{C}/\text{W}$ |
| Thermal resistance, junction 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>(lbf · in)         |
| Marking device                             |            | Case style PowerTab®                       | 80EBU04     |      |             |                             |

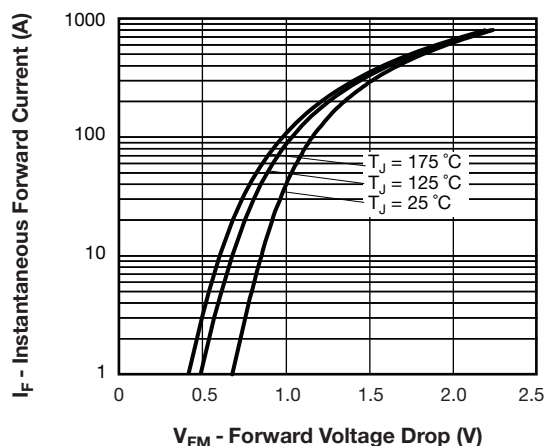


Fig. 1 - Maximum Forward Voltage Drop Characteristics

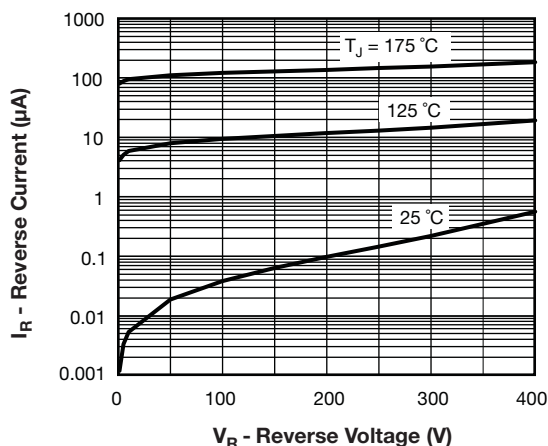


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

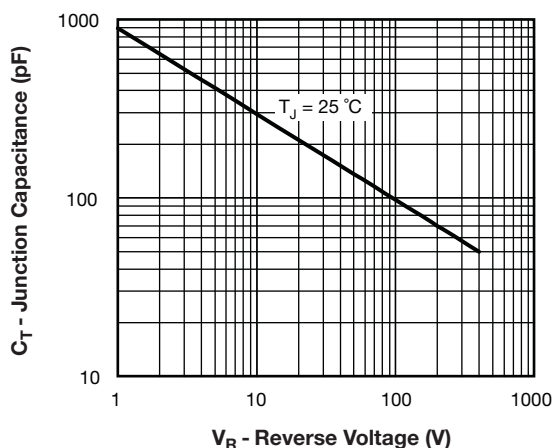


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

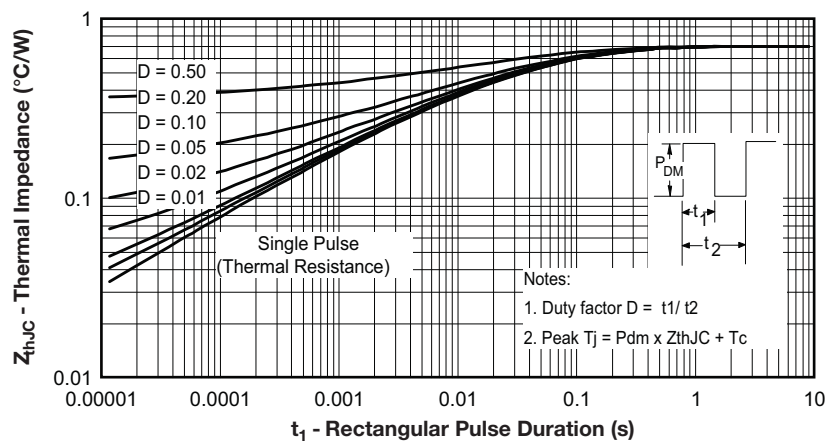
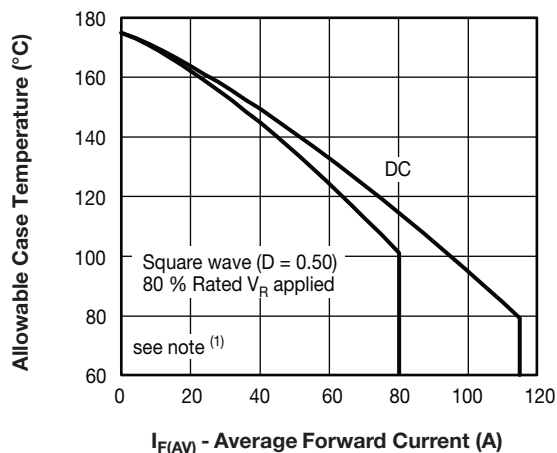

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


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

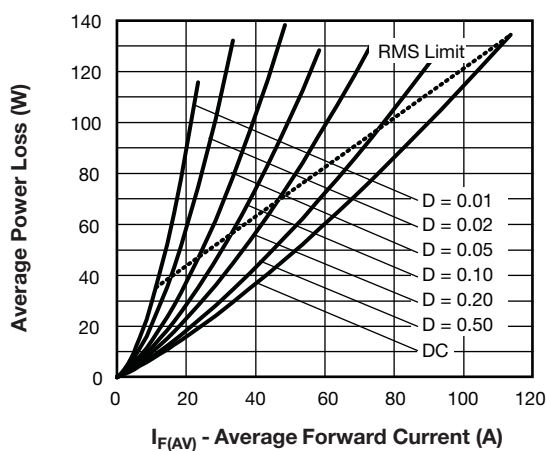
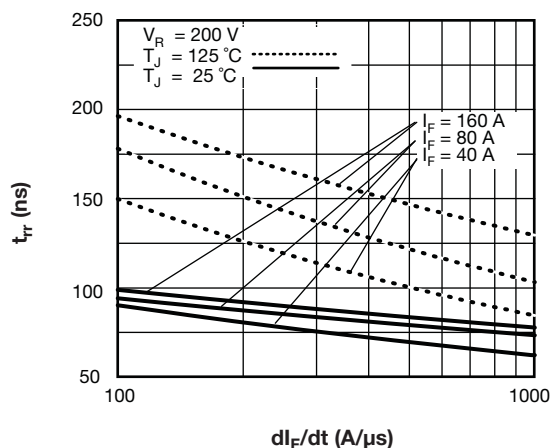
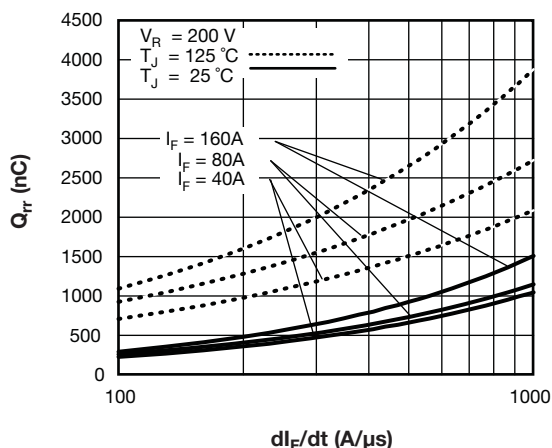


Fig. 6 - Forward Power Loss Characteristics


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

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  $V_R$

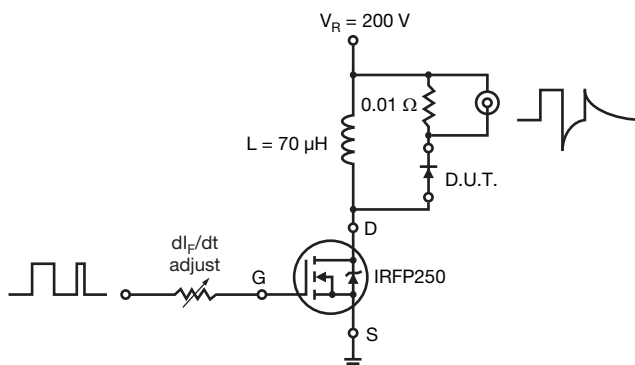


Fig. 9 - Reverse Recovery Parameter Test Circuit

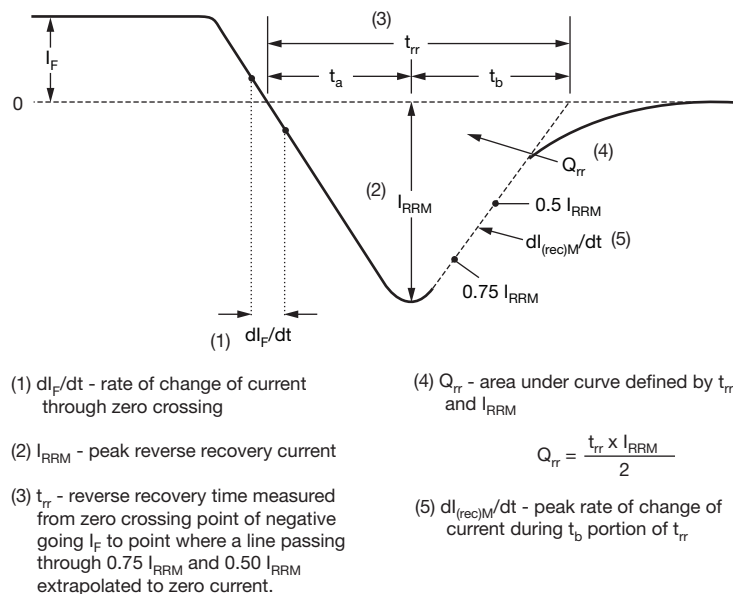


Fig. 10 - Reverse Recovery Waveform and Definitions

## ORDERING INFORMATION TABLE

| Device code | VS- | 80 | E | B | U | 04 |
|-------------|-----|----|---|---|---|----|
|             | 1   | 2  | 3 | 4 | 5 | 6  |

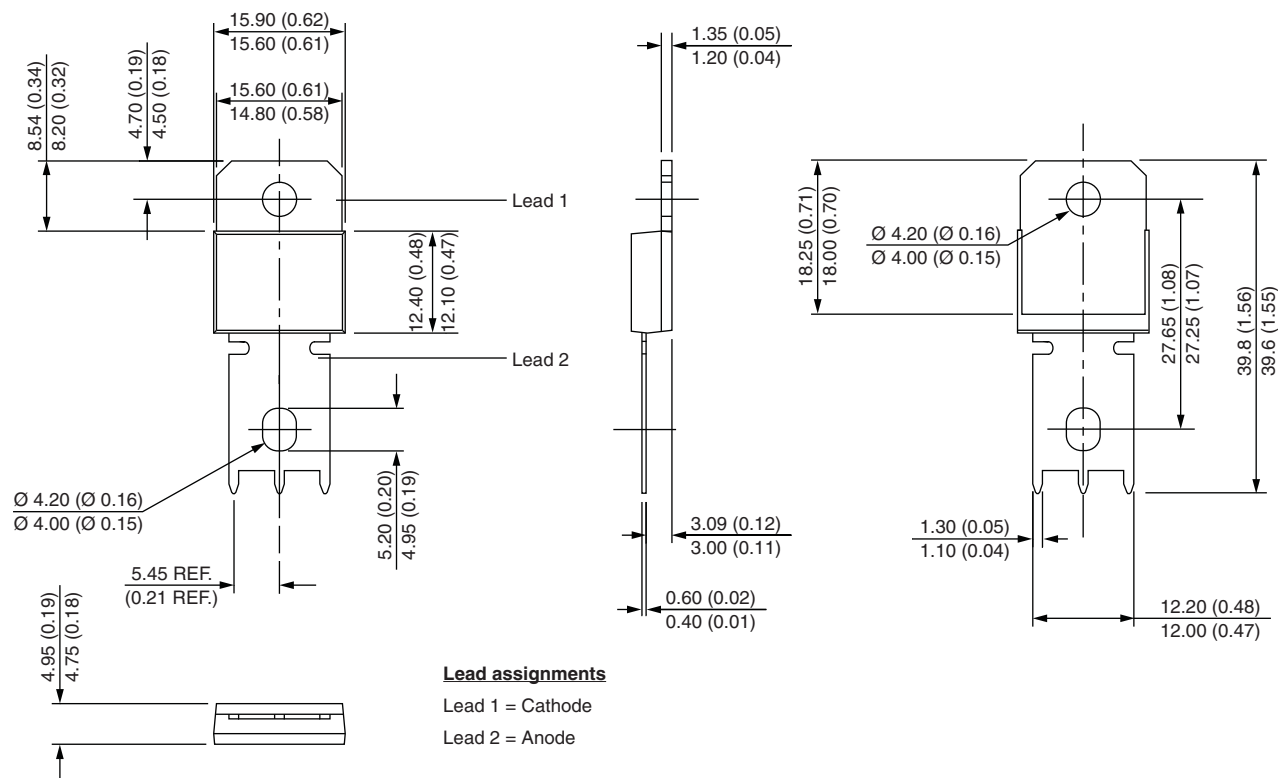
- 1** - Vishay Semiconductors product
- 2** - Current rating (80 = 80 A)
- 3** - E = Single diode
- 4** - B = PowerTab® (ultrafast/hyperfast only)
- 5** - U = Ultrafast recovery
- 6** - Voltage rating (04 = 400 V)

| 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> |



## PowerTab®

### DIMENSIONS in millimeters (inches)





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