

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-JESD47
- PowerTab® package
- Material categorization: For definitions of compliance please see 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 | 1.3 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 | μA |
| | | $T_J = 150\text{ °C}, V_R = V_R$ 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 |



| 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} | $I_F = 1\text{ A}$, $di_F/dt = 200\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$ | - | 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 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|--|------------|--|-------------|------|-------------|---------------------------|
| 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 (10) | - | 2.4 (20) | N · m (lb · in) |
| Marking device | | Case style PowerTab® | 80EBU04 | | | |

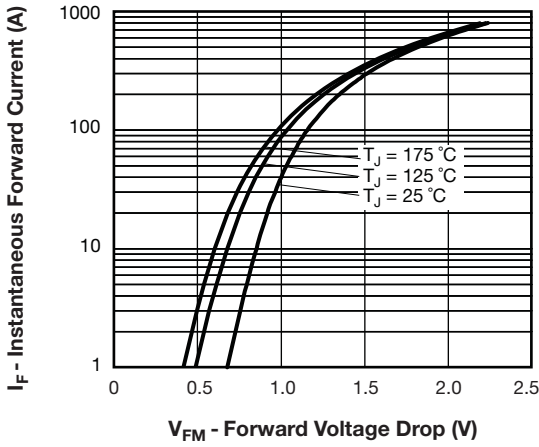


Fig. 1 - Maximum Forward Voltage Drop Characteristics

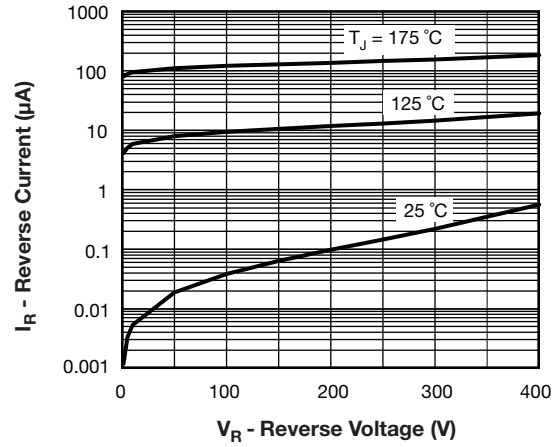


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

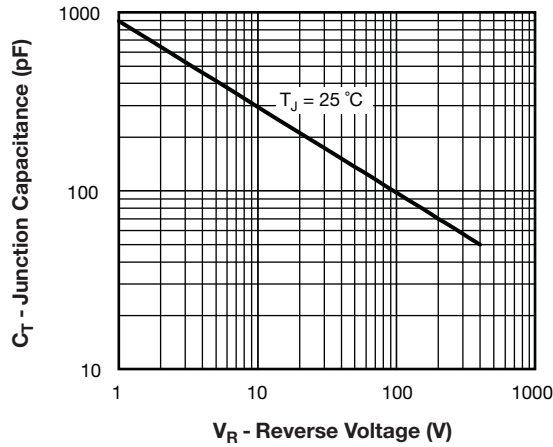


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

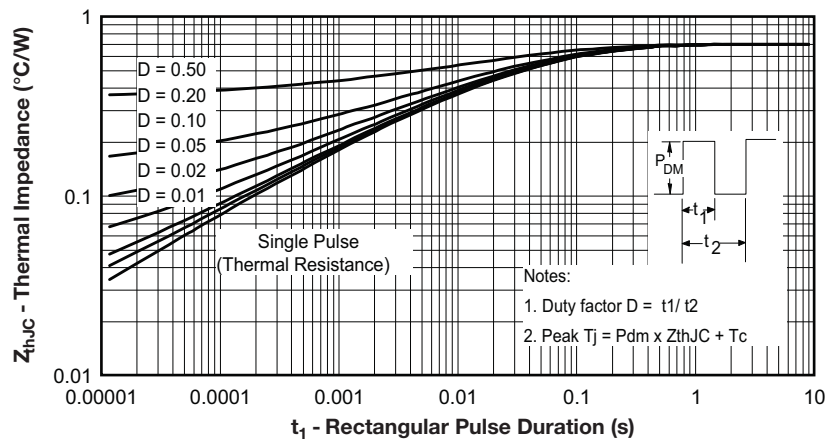


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

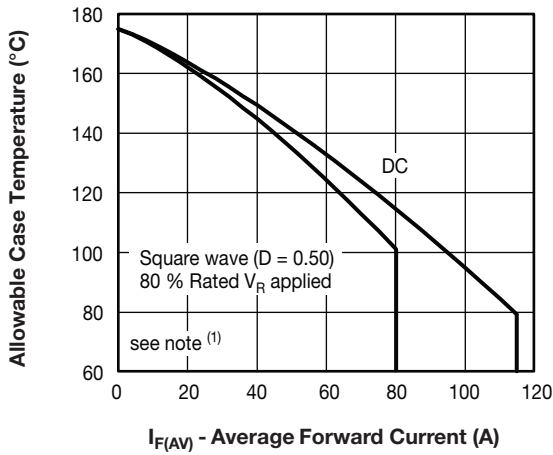


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

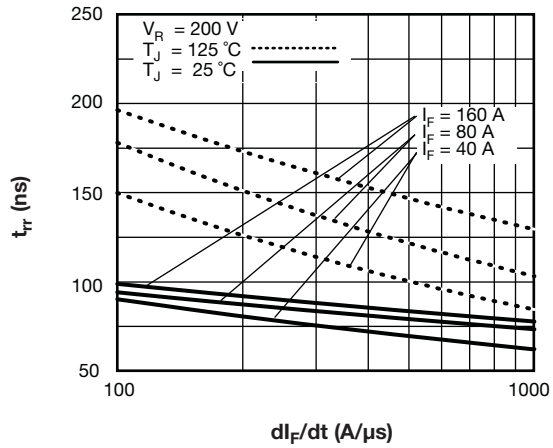


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

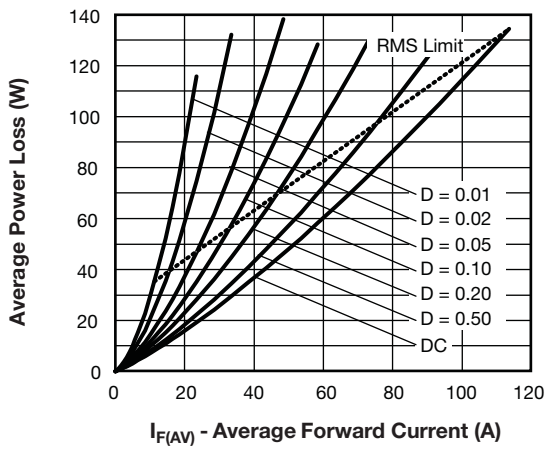


Fig. 6 - Forward Power Loss Characteristics

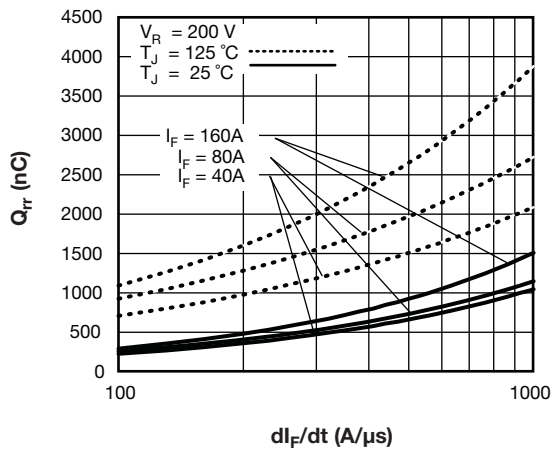


Fig. 8 - Typical Stored Charge vs. di_F/dt

Note

- (1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
 Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 Pd_{REV} = Inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at $V_{R1} = 80\%$ rated V_R

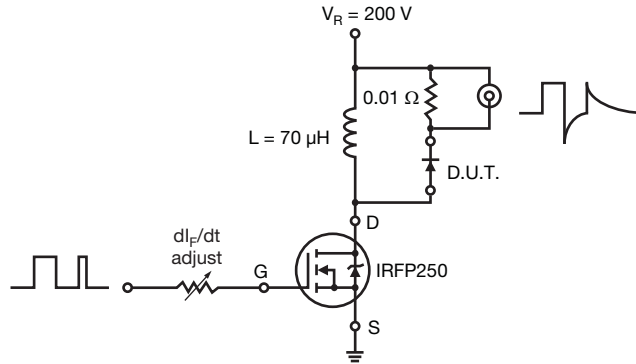
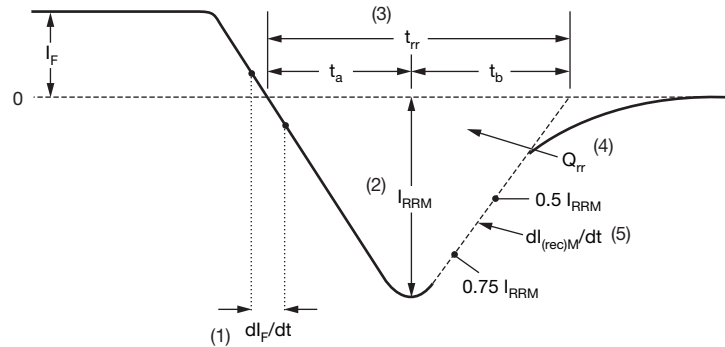


Fig. 9 - Reverse Recovery Parameter Test Circuit



- (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}

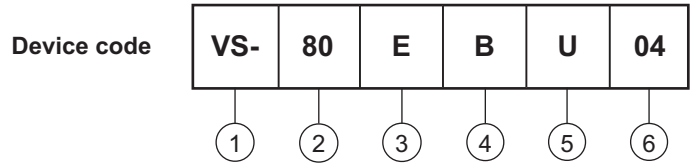
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

- (5) $dl_{(rec)M}/dt$ - 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 (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 | www.vishay.com/doc?95240 |
| Part marking information | www.vishay.com/doc?95370 |
| Application note | www.vishay.com/doc?95179 |



PowerTab®

DIMENSIONS in millimeters (inches)





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