

# 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](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

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Package	PowerTab®
$I_{F(AV)}$	80 A
$V_R$	200 V
$V_F$ at $I_F$	1.13 V
$t_{rr}$ (typ.)	See recovery table
$T_J$ max.	175 °C
Diode variation	Single die

## ABSOLUTE MAXIMUM RATINGS

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	$V_R$		200	V
Continuous forward current	$I_{F(AV)}$	$T_C = 112^\circ\text{C}$	80	A
Single pulse forward current	$I_{FSM}$	$T_C = 25^\circ\text{C}$	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** ( $T_1 = 25^\circ\text{C}$ unless otherwise specified)

ELECTRICAL SPECIFICATIONS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	$V_{BR}$ , $V_r$	$I_R = 50 \mu\text{A}$	200	-	-	V
Forward voltage	$V_F$	$I_F = 80 \text{ A}$	-	0.98	1.13	
		$I_F = 80 \text{ A}, T_J = 175^\circ\text{C}$	-	0.79	0.92	
Reverse leakage current	$I_R$	$V_R = V_R \text{ rated}$	-	-	50	$\mu\text{A}$
		$T_J = 150^\circ\text{C}, V_R = V_R \text{ rated}$	-	-	2	$\text{mA}$
Junction capacitance	$C_T$	$V_R = 200 \text{ V}$	-	89	-	$\text{pF}$
Series inductance	$L_S$	Measured lead to lead 5 mm from package body	-	3.5	-	$\text{nH}$

DYNAMIC RECOVERY CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 1.0 \text{ A}$ , $dI_F/dt = 200 \text{ A}/\mu\text{s}$ , $V_R = 30 \text{ V}$		-	-	35	ns
		$T_J = 25^\circ\text{C}$	$I_F = 80 \text{ A}$ $V_R = 160 \text{ V}$ $dI_F/dt = 200 \text{ A}/\mu\text{s}$	-	32	-	
		$T_J = 125^\circ\text{C}$		-	52	-	
Peak recovery current	$I_{RRM}$	$T_J = 25^\circ\text{C}$		-	4.4	-	A
		$T_J = 125^\circ\text{C}$		-	8.8	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25^\circ\text{C}$		-	70	-	nC
		$T_J = 125^\circ\text{C}$		-	240	-	

THERMAL - MECHANICAL SPECIFICATIONS							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	$R_{thJC}$			-	-	0.70	°C/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 (lbf · in)
Marking device		Case style PowerTab®		80EBU02			

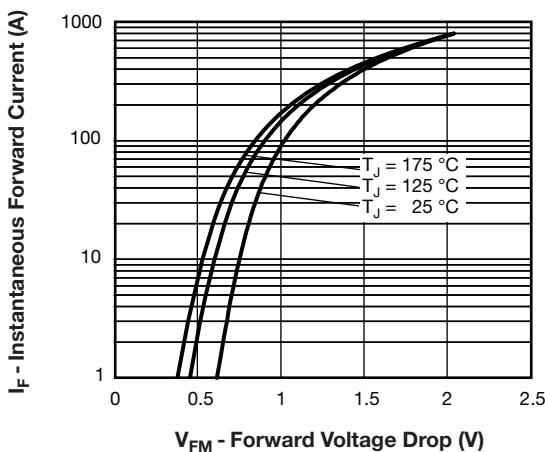


Fig. 1 - Maximum Forward Voltage Drop Characteristics

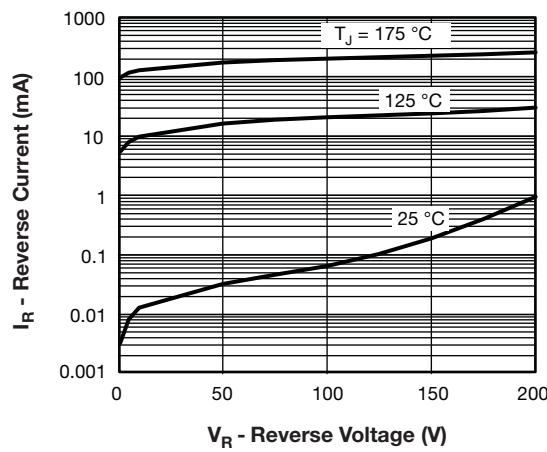


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

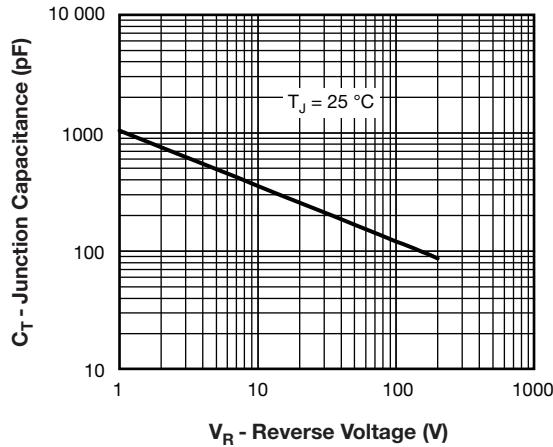


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

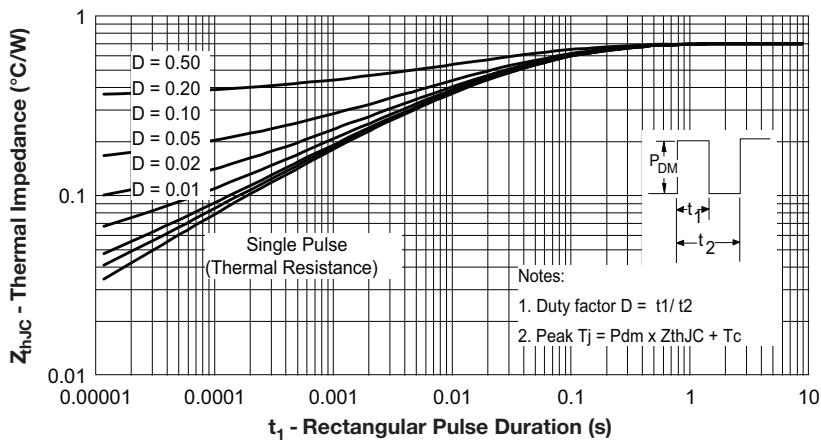


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

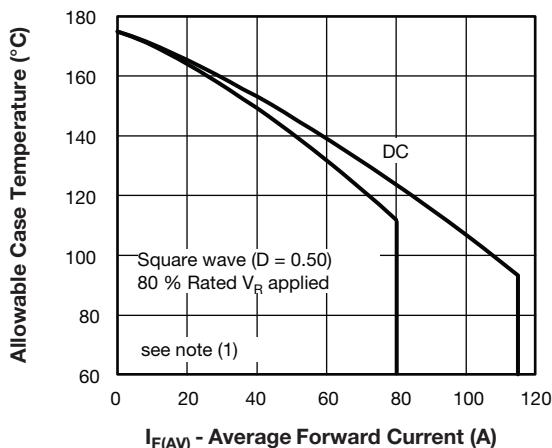


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

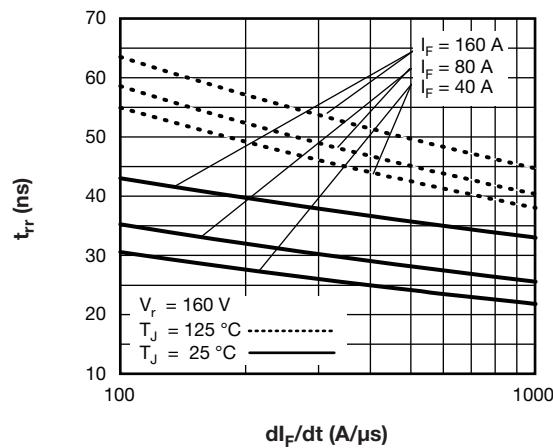


Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$

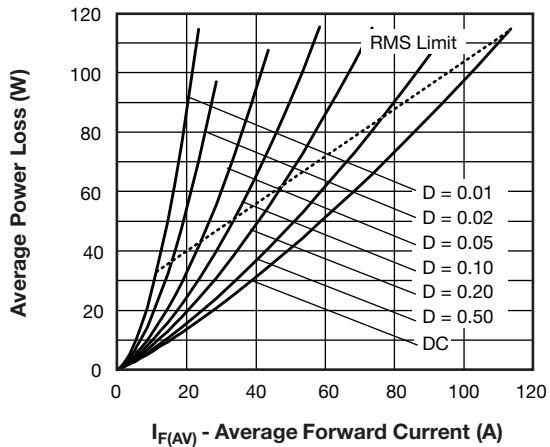


Fig. 6 - Forward Power Loss Characteristics

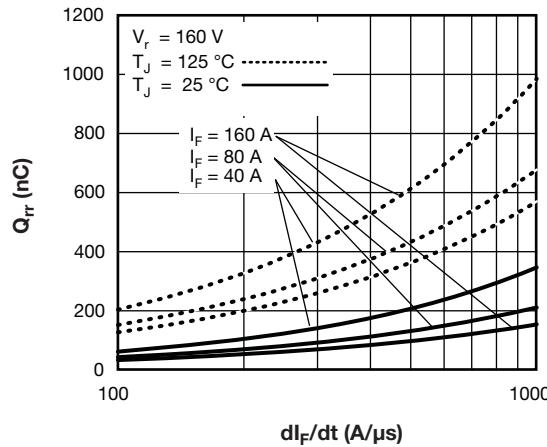


Fig. 8 - Typical Stored Charge vs.  $dI_F/dt$

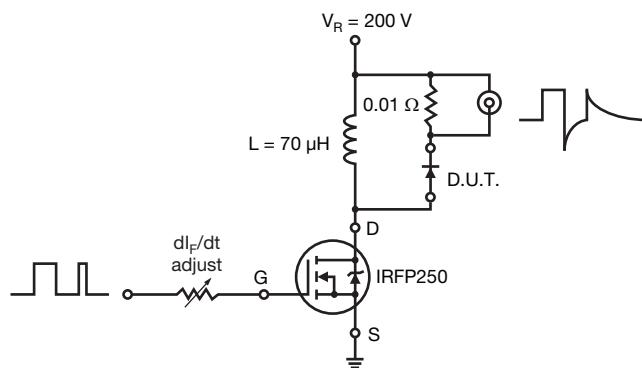
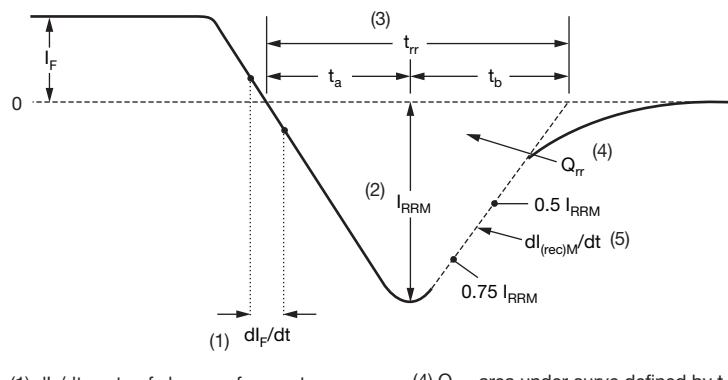


Fig. 9 - Reverse Recovery Parameter Test Circuit

#### Note

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



(1)  $dl_F/dt$  - rate of change of current through zero crossing

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

(2)  $I_{RRM}$  - peak reverse recovery current

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

(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.

(5)  $dl_{recM}/dt$  - peak rate of change of current during  $t_b$  portion of  $t_{rr}$

Fig. 10 - Reverse Recovery Waveform and Definitions

## ORDERING INFORMATION TABLE

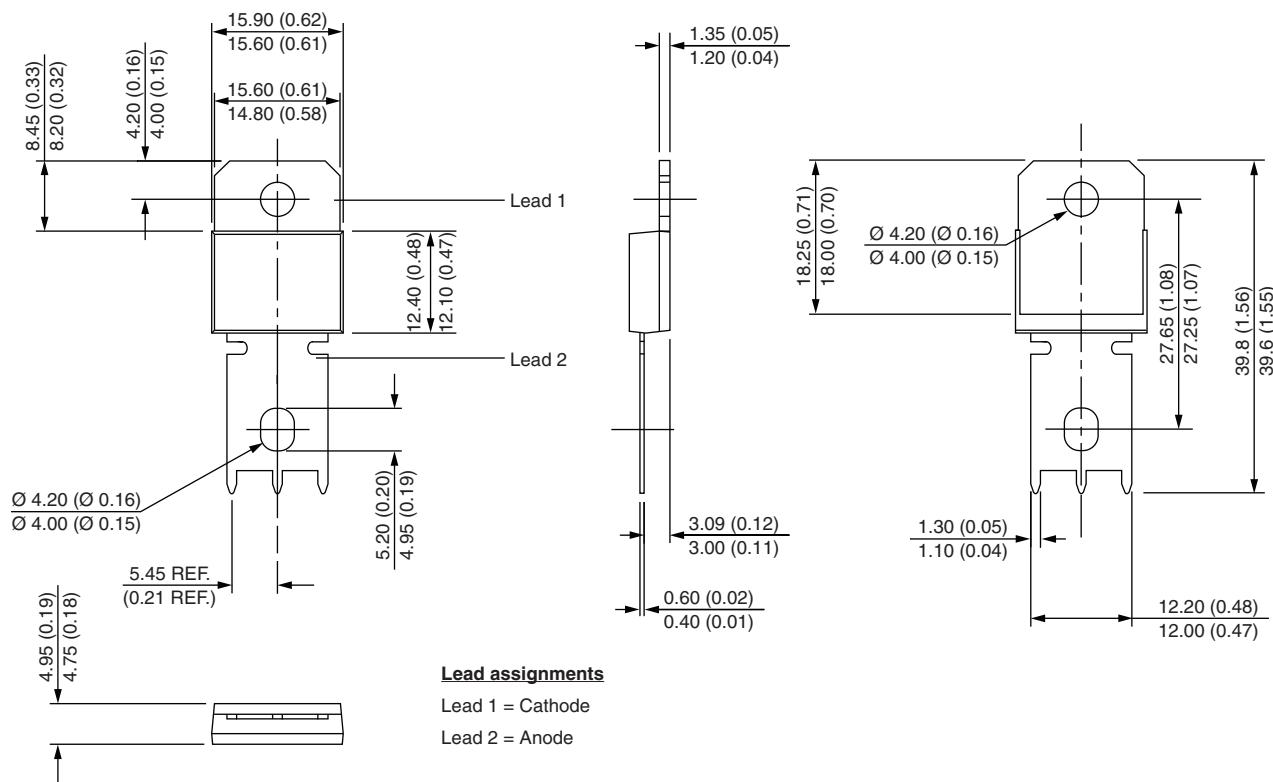
Device code	VS-	80	E	B	U	02
	(1)	(2)	(3)	(4)	(5)	(6)

- 1** - Vishay Semiconductors product
- 2** - Current rating (80 = 80 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>

## &lt;div[](PowerTabLogo.png)

## &lt;div[](https://www.adafruit.com/datasheets/2014-01-15-Adafruit\_16x2\_LCD\_White\_Hat\_for\_Raspberry\_Pi.pdf)



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