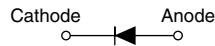


## Ultrafast Soft Recovery Diode, 150 A FRED Pt™


**PowerTab™**

**FEATURES**

- Ultrafast recovery
- 175 °C operating junction temperature
- Screw mounting only
- Lead (Pb)-free plating
- Designed and qualified for industrial level
- Compliant to RoHS directive 2002/95/EC


**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**

$t_{rr}$	60 ns
$I_{F(AV)}$	150 A
$V_R$	400 V

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	$V_R$		400	V
Continuous forward current	$I_{F(AV)}$	$T_C = 104\text{ °C}$	150	A
Single pulse forward current	$I_{FSM}$	$T_C = 25\text{ °C}$	1500	
Maximum repetitive forward current	$I_{FRM}$	Square wave, 20 kHz	300	
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	$V_{BR}, V_R$	$I_R = 200\text{ }\mu\text{A}$	400	-	-	V
Forward voltage	$V_F$	$I_F = 150\text{ A}$	-	1.07	1.3	
		$I_F = 150\text{ A}, T_J = 175\text{ °C}$	-	0.9	1.1	
Reverse leakage current	$I_R$	$V_R = V_R\text{ rated}$	-	-	50	$\mu\text{A}$
		$T_J = 150\text{ °C}, V_R = V_R\text{ rated}$	-	-	4	mA
Junction capacitance	$C_T$	$V_R = 400\text{ V}$	-	100	-	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	$t_{rr}$	$I_F = 1.0\text{ A}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	-	60	ns	
		$T_J = 25\text{ }^\circ\text{C}$	-	93	-		
		$T_J = 125\text{ }^\circ\text{C}$	-	172	-		
Peak recovery current	$I_{RRM}$	$I_F = 150\text{ A}$ $V_R = 200\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$	$T_J = 25\text{ }^\circ\text{C}$	-	11	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	20	-	
Reverse recovery charge	$Q_{rr}$	$I_F = 150\text{ A}$ $V_R = 200\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$	$T_J = 25\text{ }^\circ\text{C}$	-	490	-	nC
			$T_J = 125\text{ }^\circ\text{C}$	-	1740	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	$R_{thJC}$		-	-	0.35	K/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™	150EBU04			

Ultrafast Soft Recovery Diode, Vishay High Power Products  
150 A FRED Pt™

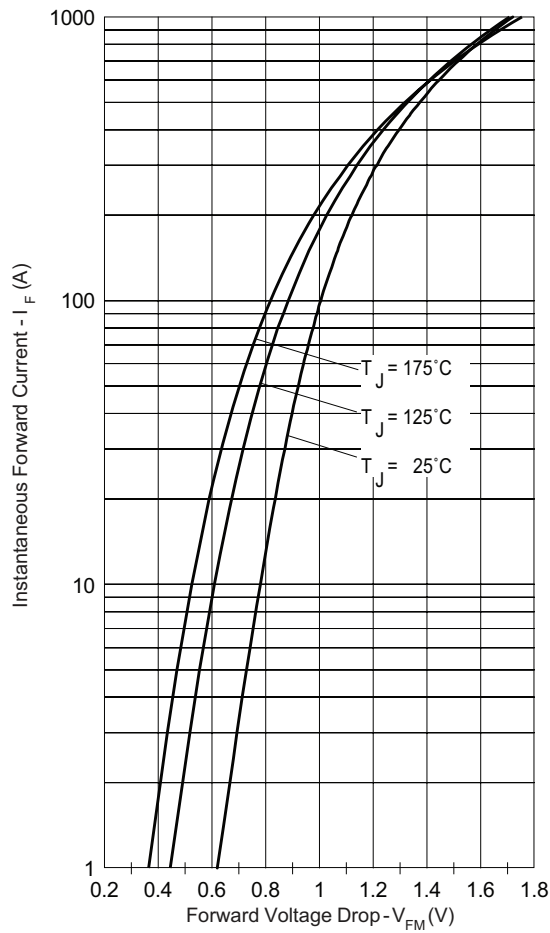


Fig. 1 - Maximum Forward Voltage Drop Characteristics

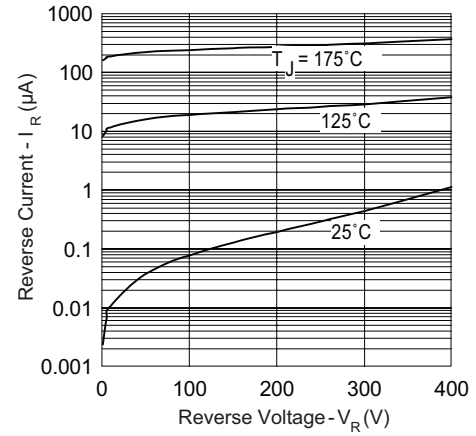


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

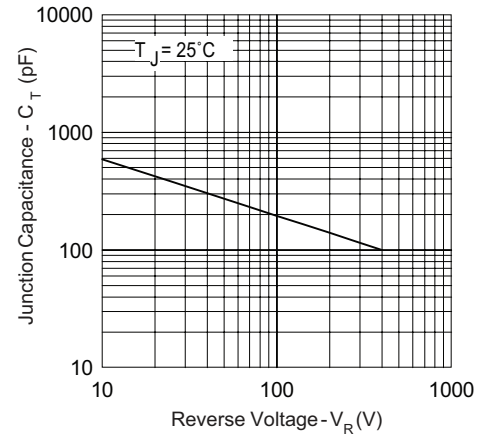


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

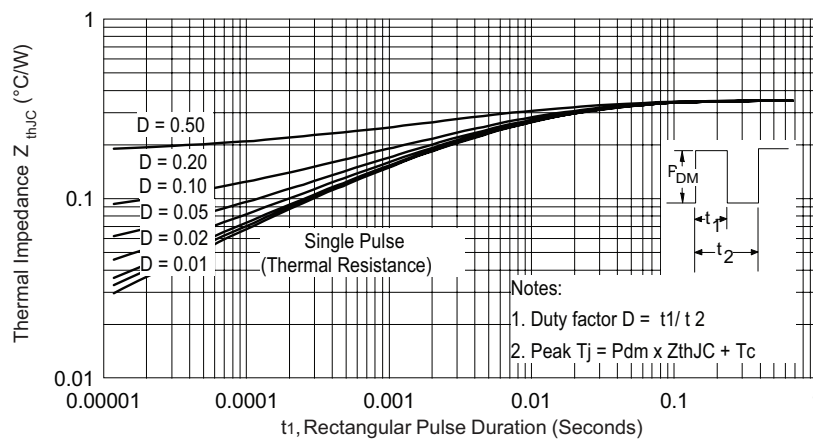


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

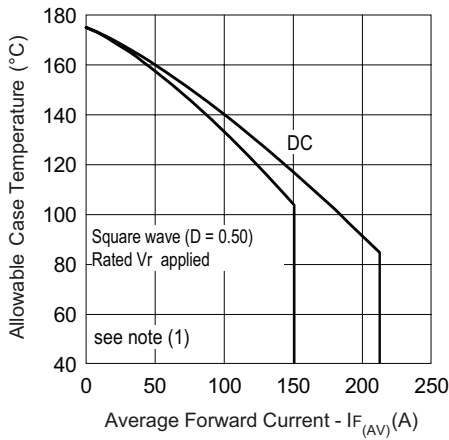


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

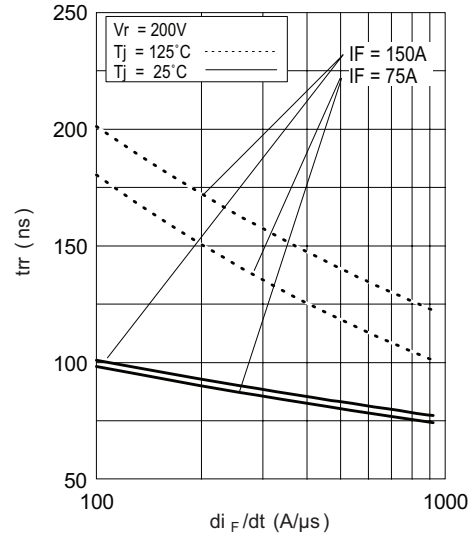


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

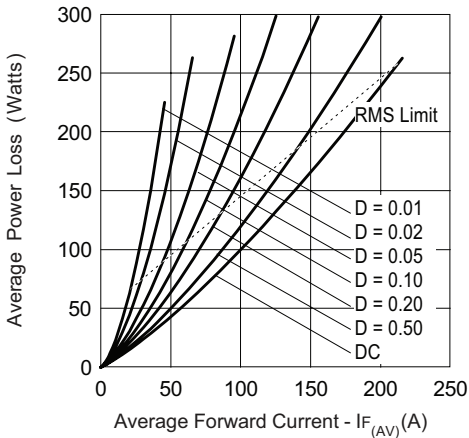


Fig. 6 - Forward Power Loss Characteristics

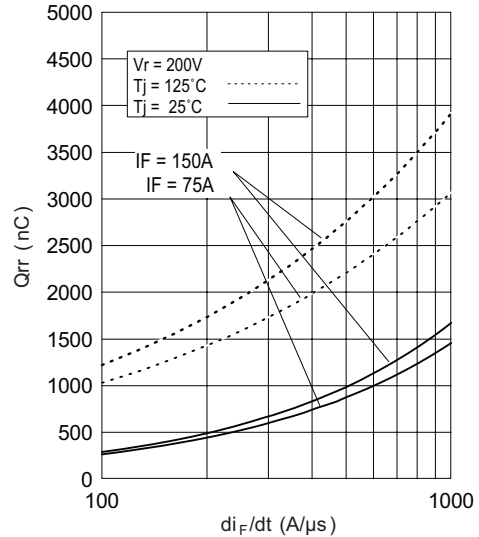


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$

**Note**

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

## Ultrafast Soft Recovery Diode, Vishay High Power Products 150 A FRED Pt™

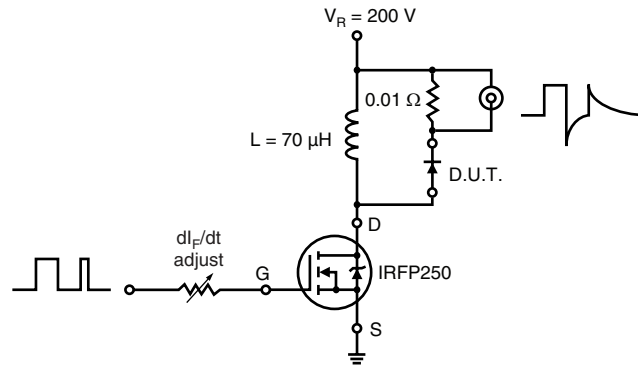
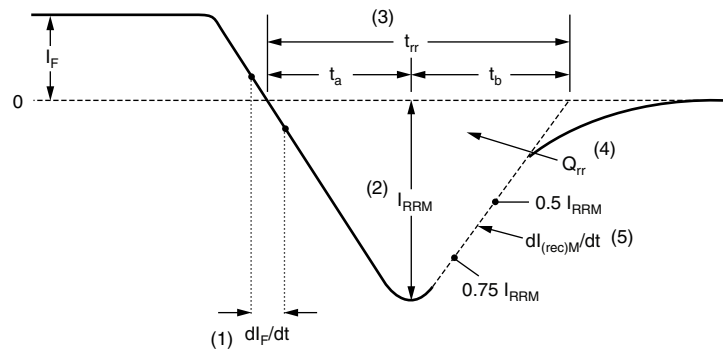


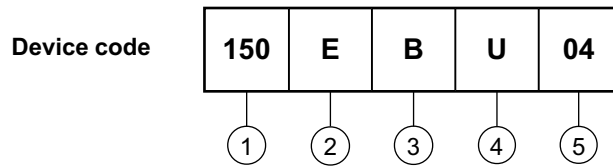
Fig. 9 - Reverse Recovery Parameter Test Circuit



- |   |   |
|---|---|
| <p>(1) <math>di_F/dt</math> - rate of change of current through zero crossing</p> <p>(2) <math>I_{RRM}</math> - peak reverse recovery current</p> <p>(3) <math>t_{rr}</math> - reverse recovery time measured from zero crossing point of negative going <math>I_F</math> to point where a line passing through <math>0.75 I_{RRM}</math> and <math>0.50 I_{RRM}</math> extrapolated to zero current.</p> | <p>(4) <math>Q_{rr}</math> - area under curve defined by <math>t_{rr}</math> and <math>I_{RRM}</math></p> $Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$ <p>(5) <math>di_{(rec)M}/dt</math> - peak rate of change of current during <math>t_b</math> portion of <math>t_{rr}</math></p> |
|---|---|

Fig. 10 - Reverse Recovery Waveform and Definitions

## ORDERING INFORMATION TABLE



- 1** - Current rating (150 = 150 A)
- 2** - Single diode
- 3** - PowerTab™ (ultrafast/hyperfast only)
- 4** - Ultrafast recovery
- 5** - 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>



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