

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}	45 ns
$I_{F(AV)}$	150 A
V_R	200 V

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	$V_R = V_R\text{ rated}$	-	-	50	μA
		$T_J = 150\text{ °C}, V_R = V_R\text{ rated}$	-	-	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}	$I_F = 150\text{ A}$ $V_R = 160\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$	$T_J = 25\text{ }^\circ\text{C}$	-	4.5	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	9.0	-	
Reverse recovery charge	Q_{rr}	$I_F = 150\text{ A}$ $V_R = 160\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$	$T_J = 25\text{ }^\circ\text{C}$	-	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 (10)	-	2.4 (20)	N · m (lb · in)
Marking device		Case style PowerTab™	150EBU02			

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

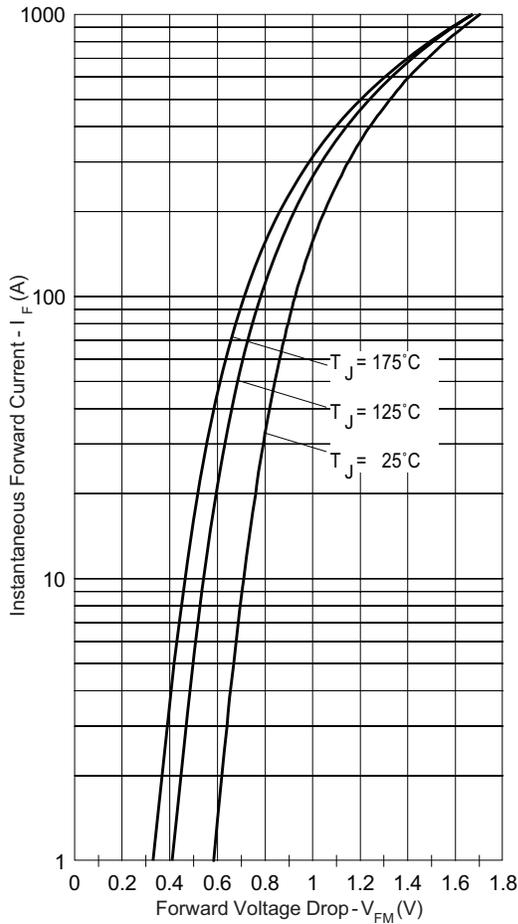


Fig. 1 - Maximum Forward Voltage Drop Characteristics

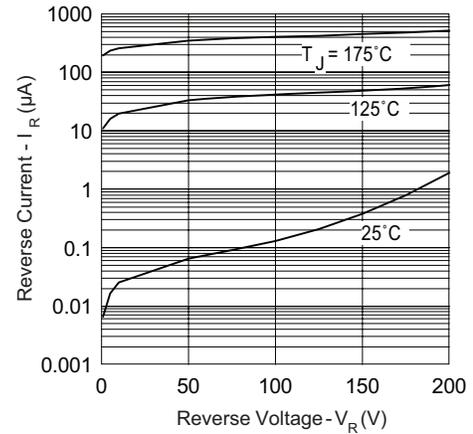


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

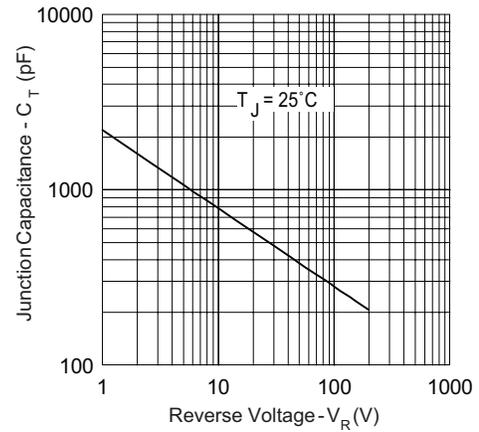


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

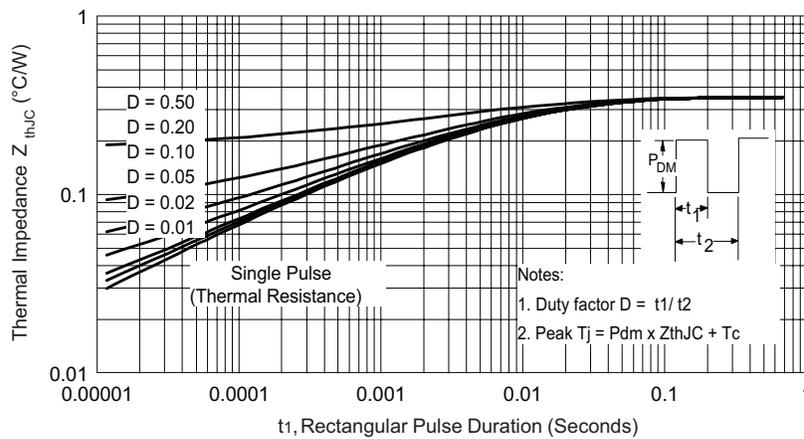


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

Vishay High Power Products Ultrafast Soft Recovery Diode,
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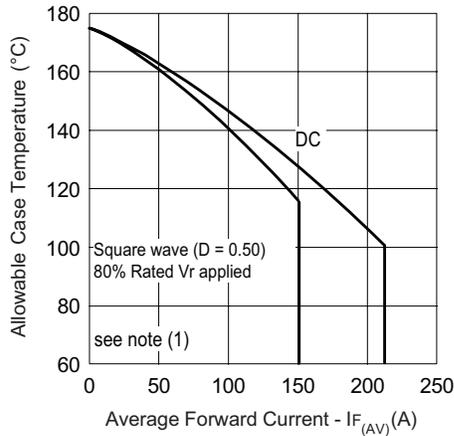


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

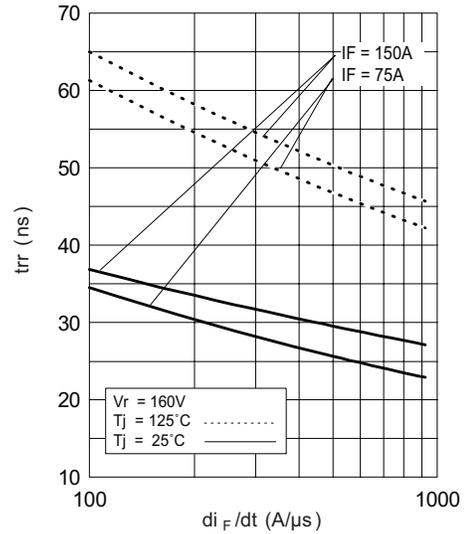


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

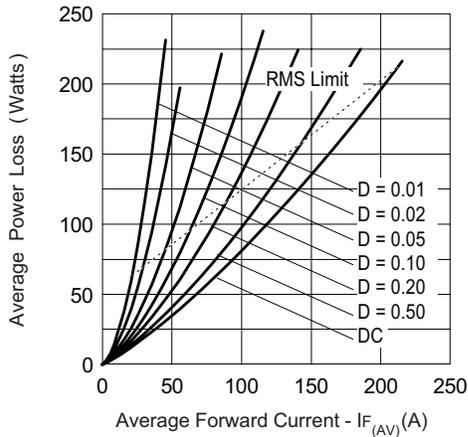


Fig. 6 - Forward Power Loss Characteristics

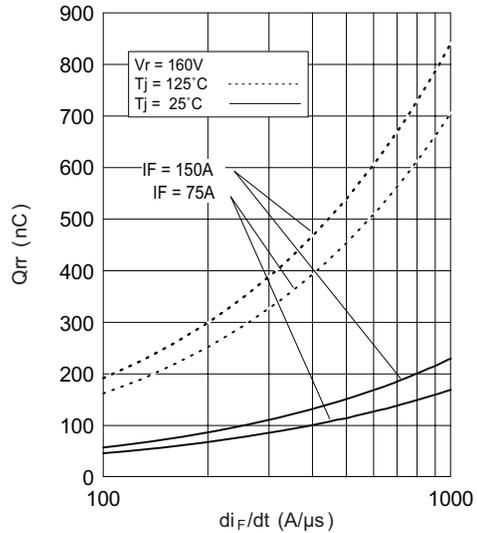


Fig. 8 - Typical Stored Charge vs. di_F/dt

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

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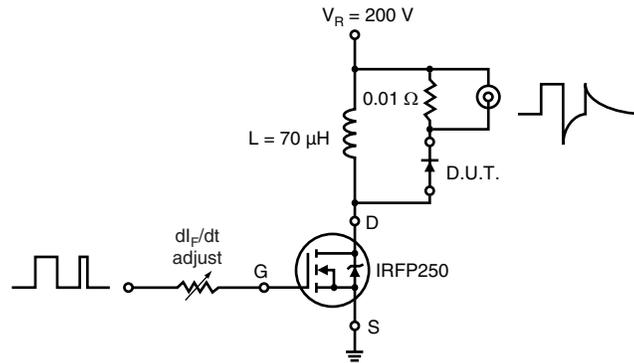
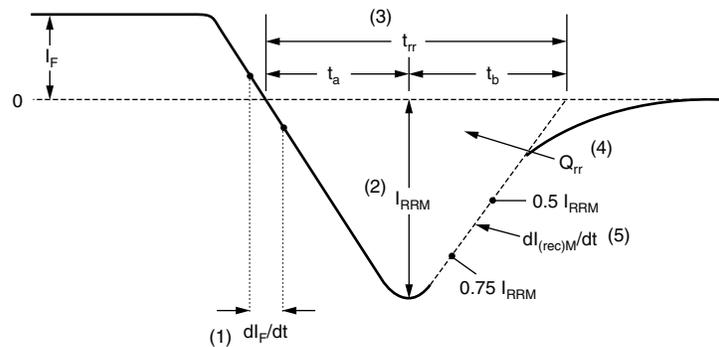


Fig. 9 - Reverse Recovery Parameter Test Circuit



- | | |
|---|---|
| <p>(1) di_F/dt - rate of change of current through zero crossing</p> <p>(2) I_{RRM} - peak reverse recovery current</p> <p>(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.</p> | <p>(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}</p> $Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$ <p>(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}</p> |
|---|---|

Fig. 10 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code	150	E	B	U	02
	①	②	③	④	⑤
	1	-	Current rating (150 = 150 A)		
	2	-	Single diode		
	3	-	PowerTab™ (ultrafast/hyperfast only)		
	4	-	Ultrafast recovery		
	5	-	Voltage rating (02 = 200 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



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