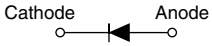
Ultrafast Soft Recovery Diode, 80 A FRED Pt™

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

Pb-free
RoHS COMPLIANT

BENEFITS

- Reduced RFI and EMI
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

PRODUCT SUMMARY	
t_{rr} (typical)	50 ns
$I_{F(AV)}$	80 A
V_R	400 V

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.

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 °C	80	A
Single pulse forward current	I_{FSM}	T_C = 25 °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 °C unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Breakdown voltage, blocking voltage	V_{BR}, V_r	I_R = 100 µA	400	-	-	V
Forward voltage	V_F	I_F = 80 A	-	1.1	1.3	
		I_F = 80 A, T_J = 175 °C	-	0.92	1.08	
		I_F = 80 A, T_J = 125 °C		0.98	1.15	
Reverse leakage current	I_R	V_R = V_R rated	-	-	50	µA
		T_J = 150 °C, V_R = V_R rated	-	-	2	mA
Junction capacitance	C_T	V_R = 200 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 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time	t_{rr}	I_F = 1 A, dI_F/dt = 200 A/µs, V_R = 30 V		-	50	60	ns
		T_J = 25 °C	I_F = 80 A V_R = 200 V dI_F/dt = 200 A/µs	-	87	-	
		T_J = 125 °C		-	151	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	9.3	-	A
		T_J = 125 °C		-	17.2	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	405	-	nC
		T_J = 125 °C		-	1300	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Thermal resistance, junction to case	R_{thJC}		-	-	0.70	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™	80EBU04			

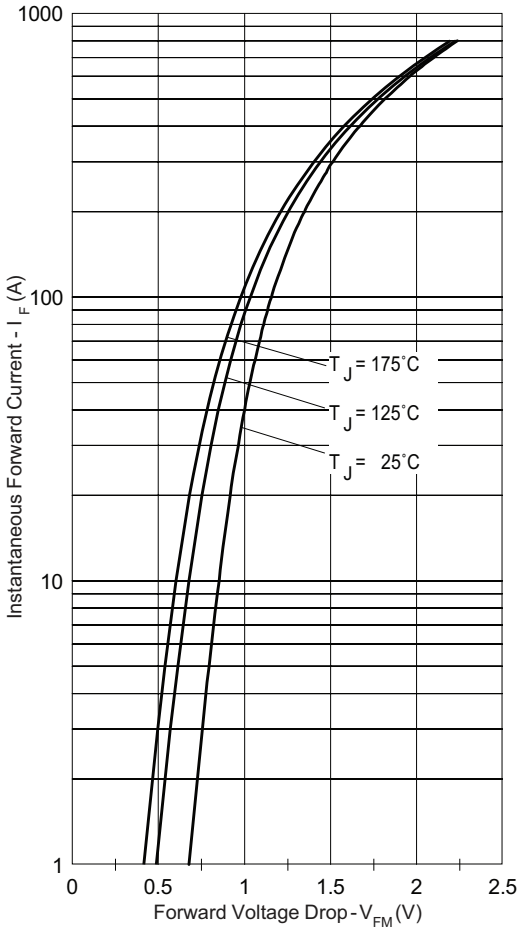


Fig. 1 - Maximum Forward Voltage Drop Characteristics

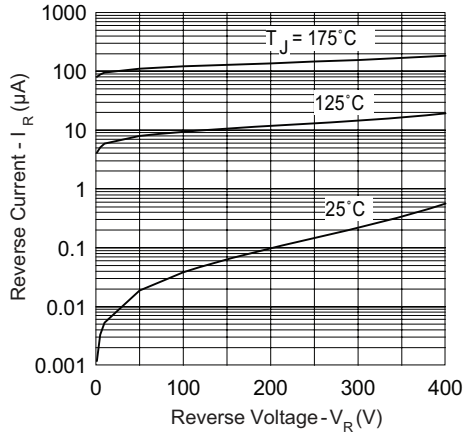


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

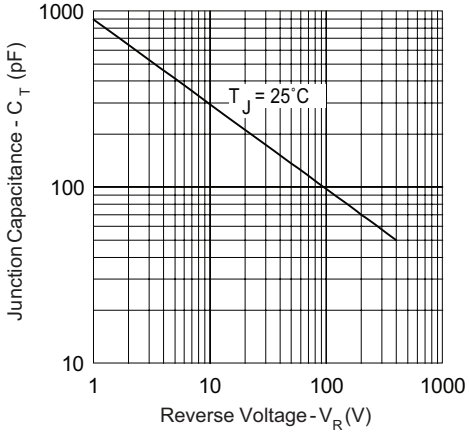


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

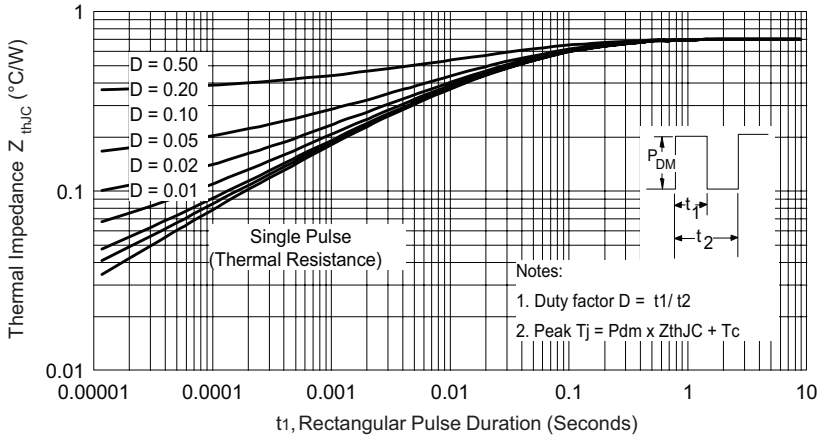


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

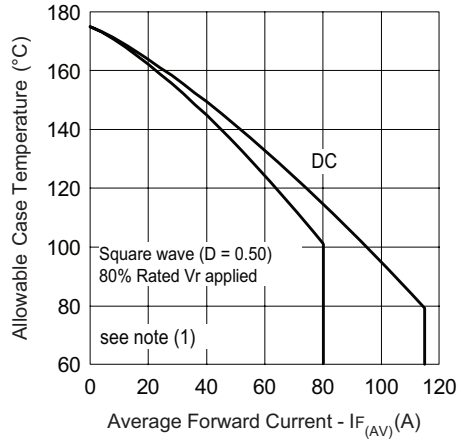


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

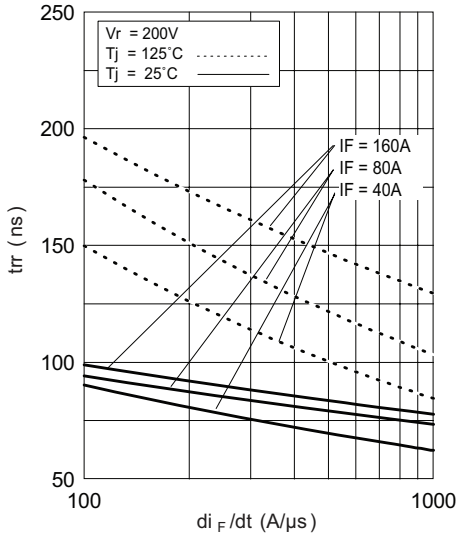


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

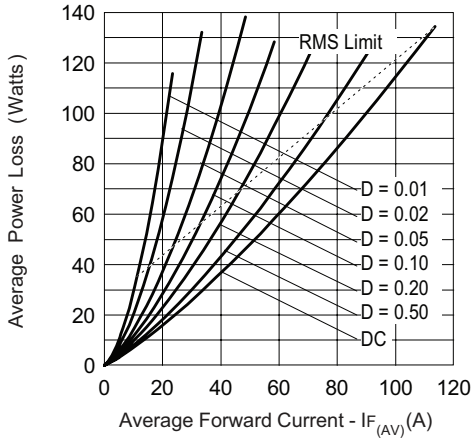


Fig. 6 - Forward Power Loss Characteristics

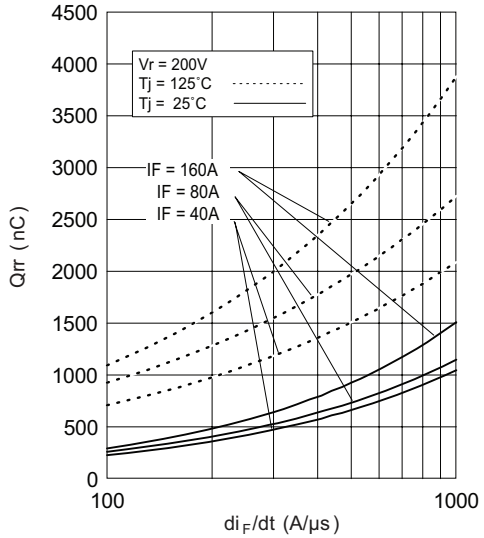


Fig. 8 - Typical Stored Charge vs. dI_F/dt

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

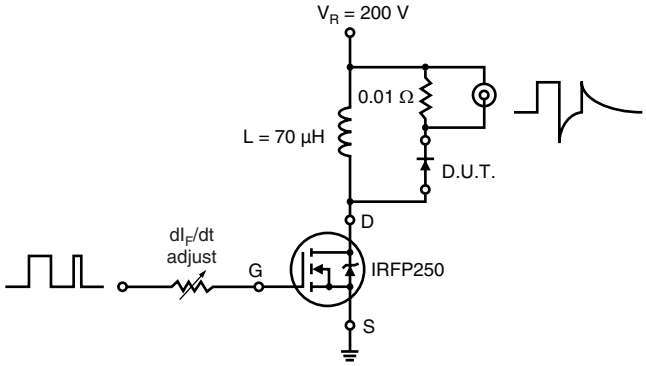
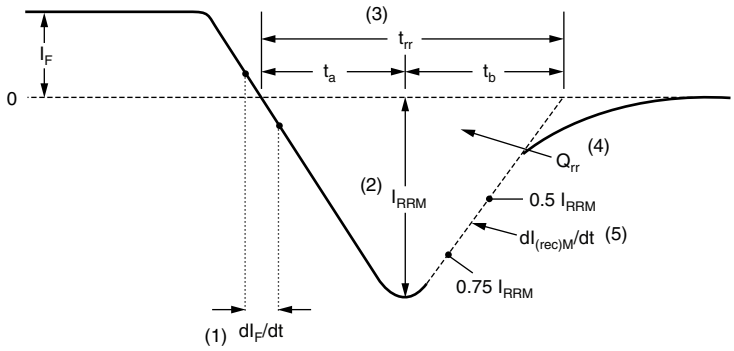


Fig. 9 - Reverse Recovery Parameter Test Circuit



(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}

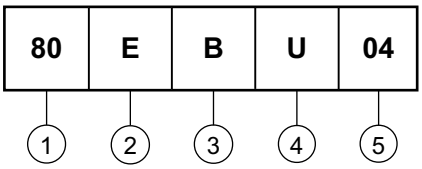
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) $dI_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 10 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code



1 - Current rating (80 = 80 A)
2 - Single diode
3 - PowerTab™ (ultrafast/hyperfast only)
4 - Ultrafast recovery
5 - 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

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