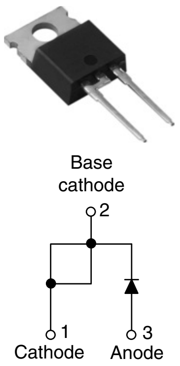
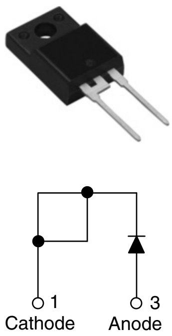
Hyperfast Rectifier, 8 A FRED Pt™

8ETH06PbF



TO-220AC

8ETH06FPPbF



TO-220 FULL-PAK

FEATURES

- Hyperfast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- Fully isolated package (V_{INS} = 2500 V_{RMS})
- UL E78996 approved
- Lead (Pb)-free
- Designed and qualified for industrial level

Pb Pb-free Available

RoHS* COMPLIANT

DESCRIPTION/APPLICATIONS

State of the art hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, hyperfast recovery time, and soft recovery.

The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in PFC boost stage in the AC-DC section of SMPS, inverters or as freewheeling diodes.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

PRODUCT SUMMARY	
t_{rr} (typical)	18 ns
$I_{F(AV)}$	8 A
V_R	600 V

ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Repetitive peak reverse voltage		V_{RRM}		600	V
Average rectified forward current		$I_{F(AV)}$	T_C = 144 °C	8	A
	FULL-PAK		T_C = 108 °C		
Non-repetitive peak surge current		I_{FSM}	T_J = 25 °C	90	
	FULL-PAK			100	
Repetitive peak forward current		I_{FM}		16	
Operating junction and storage temperatures		T_J, T_{Stg}		- 65 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	600	-	-	V
Forward voltage	V_F	I_F = 8 A	-	2.0	2.4	
		I_F = 8 A, T_J = 150 °C	-	1.3	1.8	
Reverse leakage current	I_R	V_R = V_R rated	-	0.3	50	µA
		T_J = 150 °C, V_R = V_R rated	-	55	500	
Junction capacitance	C_T	V_R = 600 V	-	17	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8.0	-	nH

* Pb containing terminations are not RoHS compliant, exemptions may apply

DYNAMIC RECOVERY CHARACTERISTICS (T_C = 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 = 100 A/µs, V_R = 30 V		-	18	22	ns
		I_F = 8 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	20	25	
		T_J = 25 °C	I_F = 8 A dI_F/dt = 200 A/µs V_R = 390 V	-	25	-	
		T_J = 125 °C		-	40	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	2.4	-	A
		T_J = 125 °C		-	4.8	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	25	-	nC
		T_J = 125 °C		-	120	-	
Reverse recovery time	t_{rr}	T_J = 125 °C	I_F = 8 A dI_F/dt = 600 A/µs V_R = 390 V	-	33	-	ns
Peak recovery current	I_{RRM}			-	12	-	A
Reverse recovery charge	Q_{rr}			-	220	-	nC

THERMAL - MECHANICAL SPECIFICATIONS							
PARAMETER		SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range		T_J, T_{Stg}		- 65	-	175	°C
Thermal resistance, junction to case	per leg	R_{thJC}		-	1.4	2	°C/W
	(FULL-PAK) per leg			-	3.4	4.3	
Thermal resistance, junction to ambient per leg		R_{thJA}	Typical socket mount	-	-	70	
Thermal resistance, case to heatsink		R_{thCS}	Mounting surface, flat, smooth and greased	-	0.5	-	
Weight				-	2.0	-	g
				-	0.07	-	oz.
Mounting torque				6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device			Case style TO-220AC	8ETH06			
			Case style TO-220 FULL-PAK	8ETH06FP			

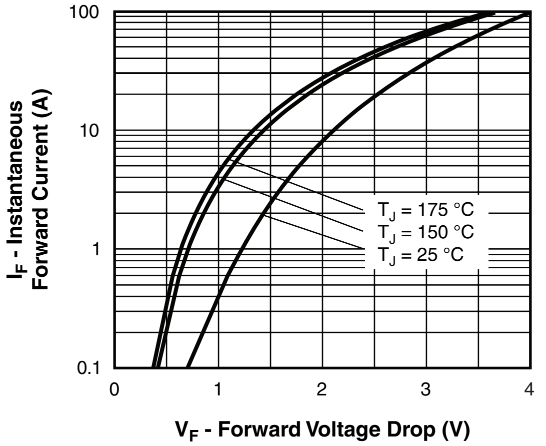


Fig. 1 - Typical Forward Voltage Drop Characteristics

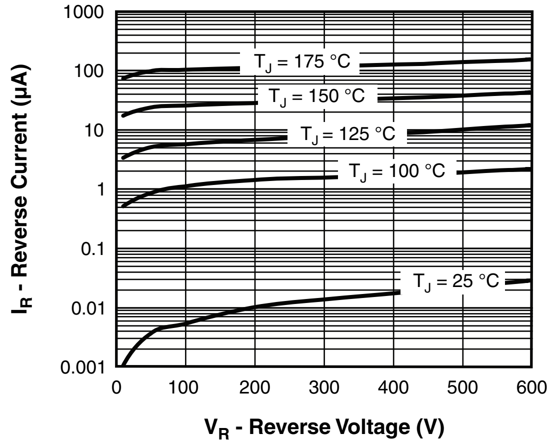


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

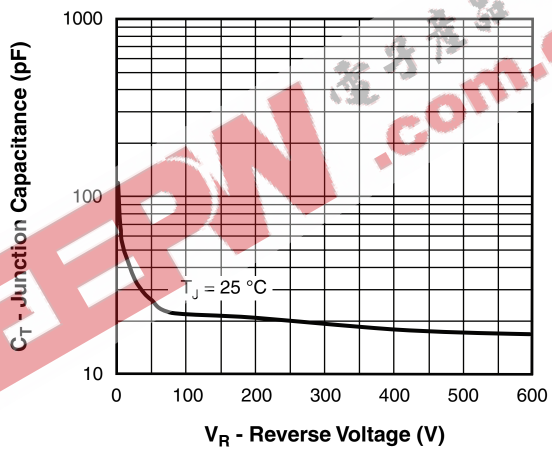


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

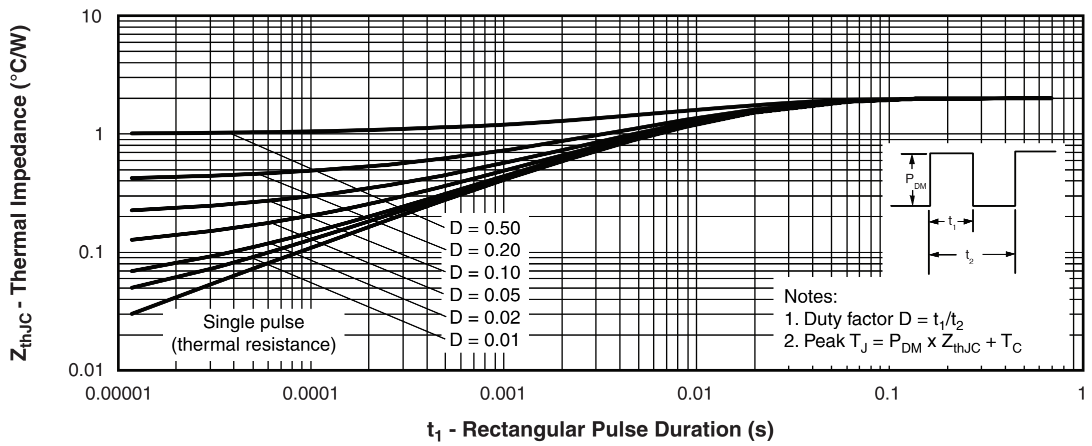


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

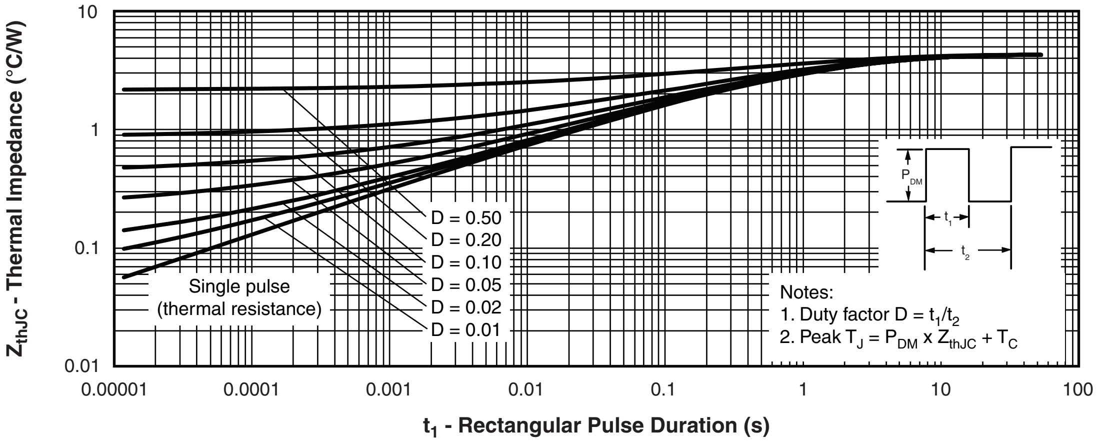


Fig. 5 - Maximum Thermal Impedance Z_{thJC} Characteristics (FULL-PAK)

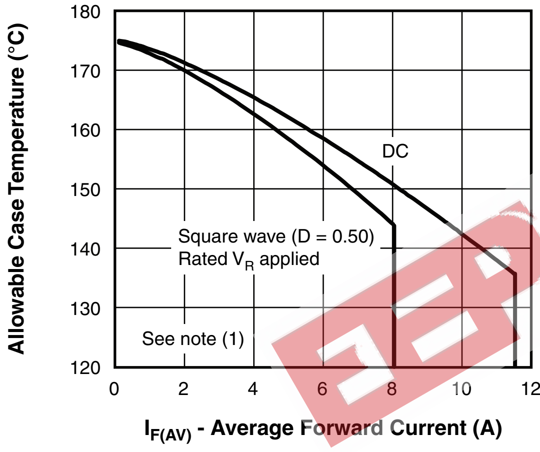


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current

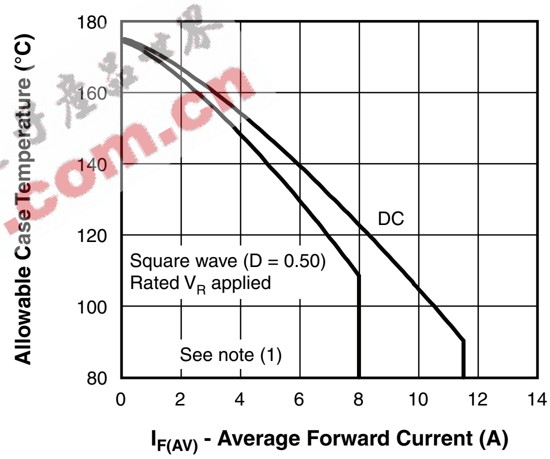


Fig. 7 - Maximum Allowable Case Temperature vs. Average Forward Current (FULL-PAK)

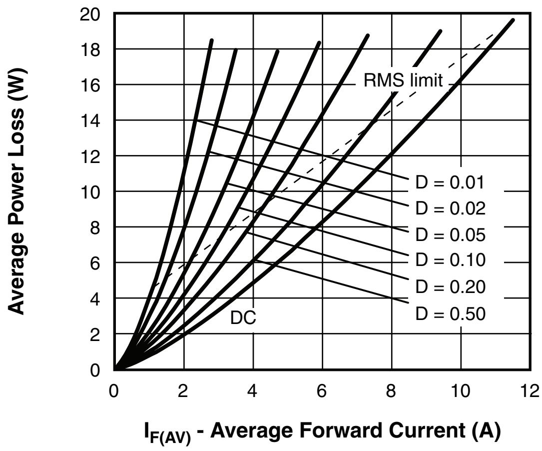


Fig. 8 - Forward Power Loss Characteristics

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. 8);
Pd_{REV} = Inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = Rated V_R

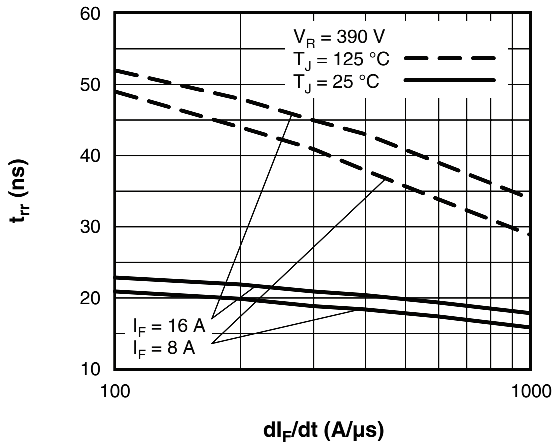


Fig. 9 - Typical Reverse Recovery Time vs. dI_F/dt

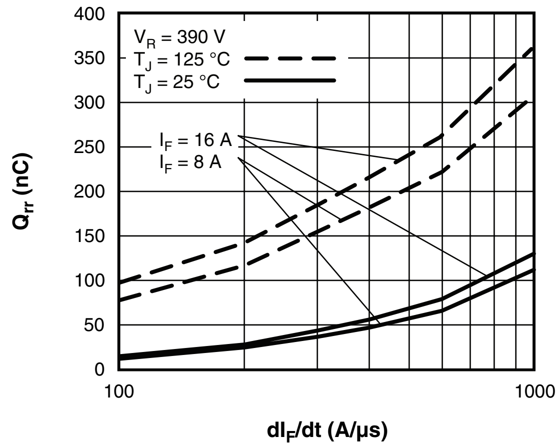


Fig. 10 - Typical Stored Charge vs. dI_F/dt

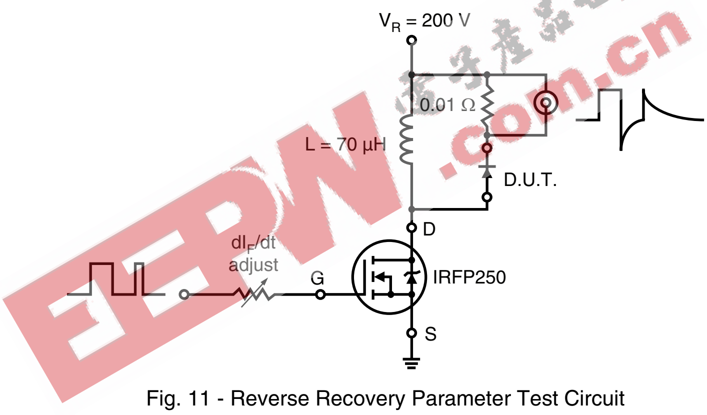
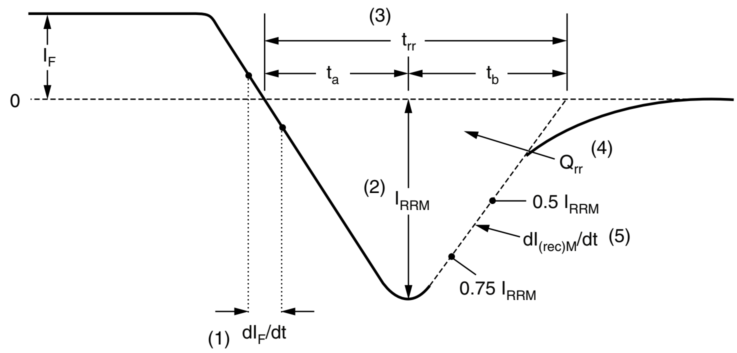


Fig. 11 - Reverse Recovery Parameter Test Circuit



(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. 12 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code	8	E	T	H	06	FP	PbF
	1	2	3	4	5	6	7

1 - Current rating (8 = 8A)
2 - E = Single diode
3 - T = TO-220, D^2PAK
4 - H = Hyperfast recovery
5 - Voltage rating (06 = 600 V)
6 - • None = TO-220AC
  • FP = TO-220 FULL-PAK
7 - • None = Standard production
  • PbF = Lead (Pb)-free

Tube standard pack quantity: 50 pieces

LINKS TO RELATED DOCUMENTS	
Dimensions	http://www.vishay.com/doc?95039
Part marking information	http://www.vishay.com/doc?95045

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All product specifications and data are subject to change without notice.

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