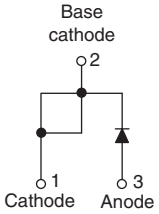
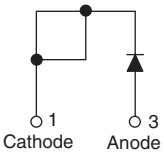
Ultralow V_F Hyperfast Rectifier for Discontinuous Mode PFC, 8 A FRED Pt™

8ETL06PbF **8ETL06FPPbF**





TO-220AC **TO-220 FULL-PAK**

FEATURES

- Benchmark ultralow forward voltage drop
- Hyperfast recovery time
- 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-free Available

RoHS* COMPLIANT

DESCRIPTION

State of the art, ultralow V_F, soft-switching hyperfast rectifiers optimized for Discontinuous (Critical) Mode (DCM) Power Factor Correction (PFC).
The minimized conduction loss, optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.
The device is also intended for use as a freewheeling diode in power supplies and other power switching applications.

APPLICATIONS

AC-DC SMPS 70 W to 400 W
e.g. laptop and printer AC adaptors, desktop PC, TV and monitor, games units and DVD AC-DC power supplies.

PRODUCT SUMMARY	
V_F (typical)	0.96 V
$I_{F(AV)}$	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 = 160 °C	8	A
Average rectified forward current, FULL-PAK	$I_{F(AV)}$	T_C = 142 °C	8	A
Non-repetitive peak surge current	I_{FSM}	T_J = 25 °C	175	A
Repetitive peak forward current	I_{FM}		16	A
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	-	0.96	1.05	V
		I_F = 8 A, T_J = 150 °C	-	0.81	0.86	V
Reverse leakage current	I_R	V_R = V_R rated	-	0.05	5	µA
		T_J = 150 °C, V_R = V_R rated	-	20	100	µA
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		-	60	100	ns
		I_F = 8 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	150	250	
		T_J = 25 °C	I_F = 8 A dI_F/dt = 200 A/µs V_R = 390 V	-	170	-	
		T_J = 125 °C		-	250	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	15	-	A
		T_J = 125 °C		-	20	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	1.3	-	µC
		T_J = 125 °C		-	2.6	-	

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
Thermal resistance, junction to case, (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	8ETL06			
		Case style TO-220 FULL-PAK	8ETL06FP			

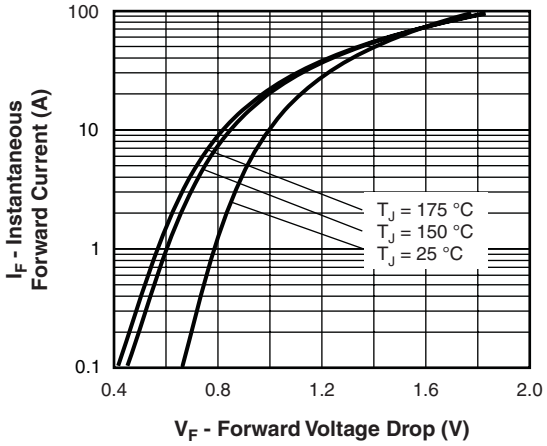


Fig. 1 - Typical Forward Voltage Drop Characteristics

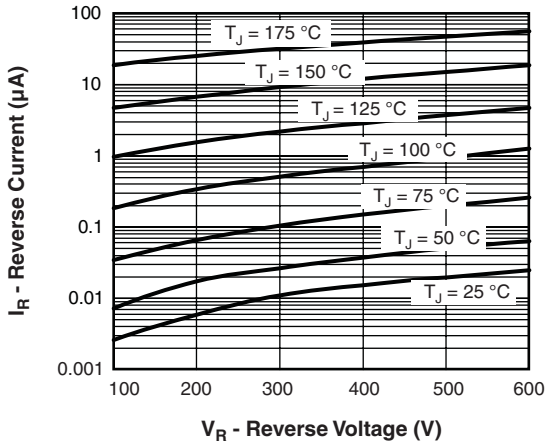


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

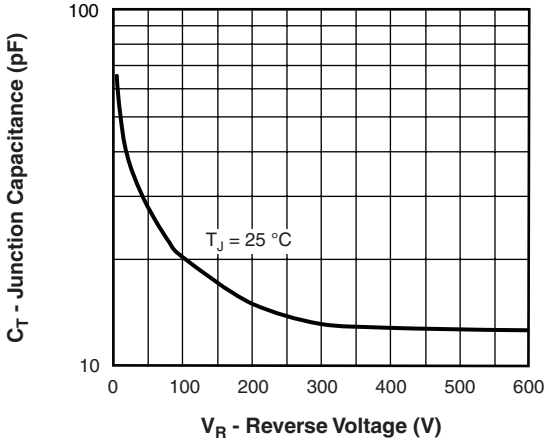


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

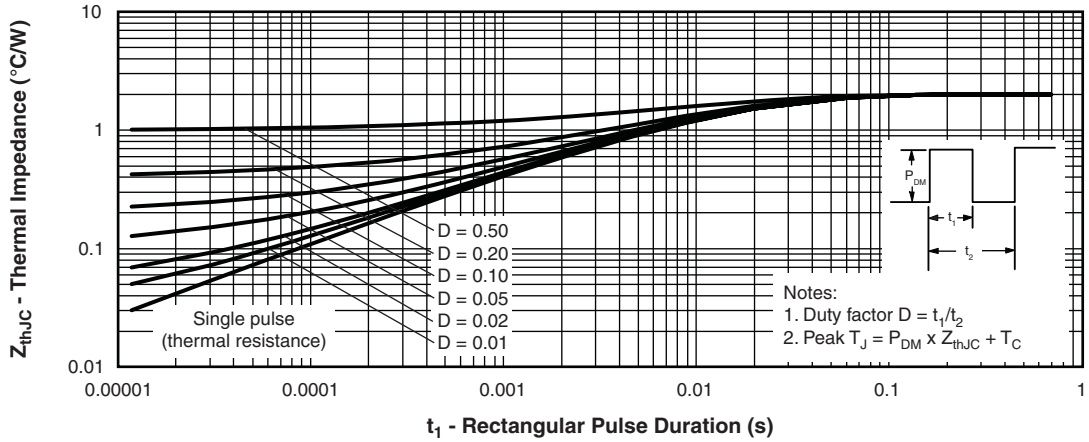


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

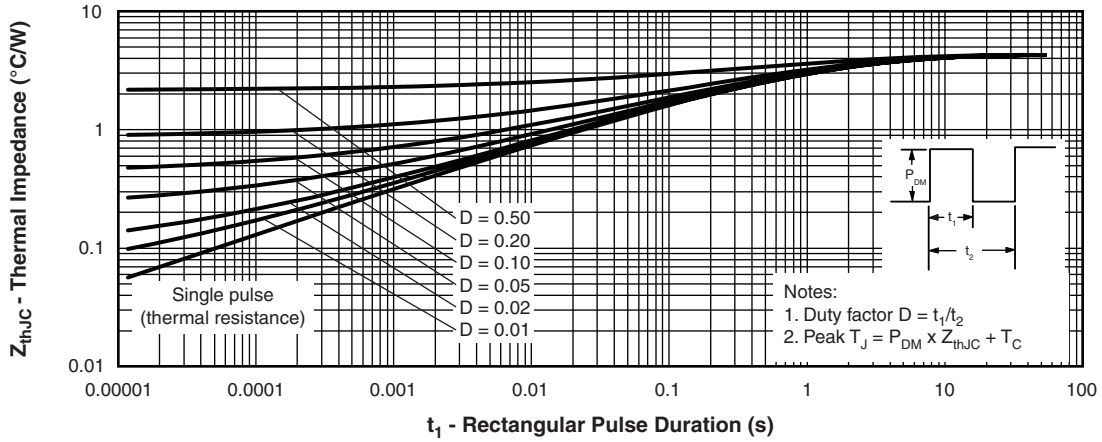


Fig. 5 - Maximum Thermal Impedance Z_{thJC} Characteristics (FULL-PAK)

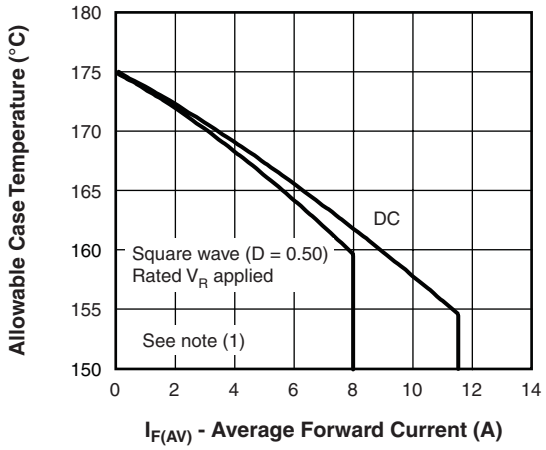


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current

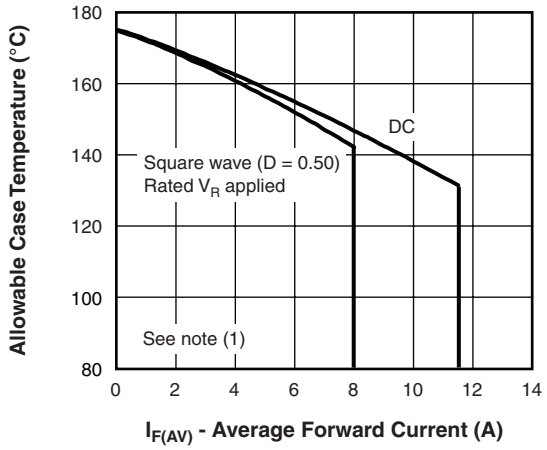


Fig. 7 - Maximum Allowable Case Temperature vs. Average Forward Current (FULL-PAK)

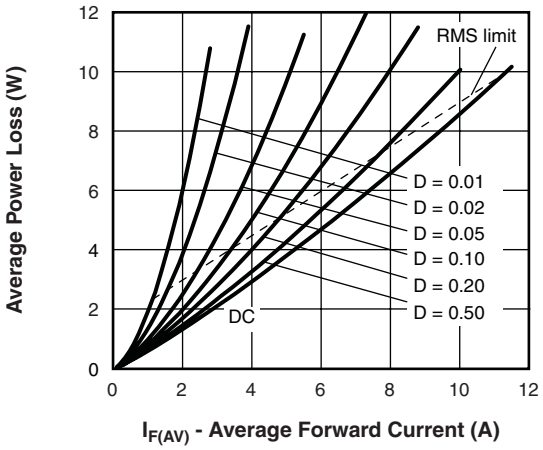


Fig. 8 - Forward Power Loss Characteristics

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

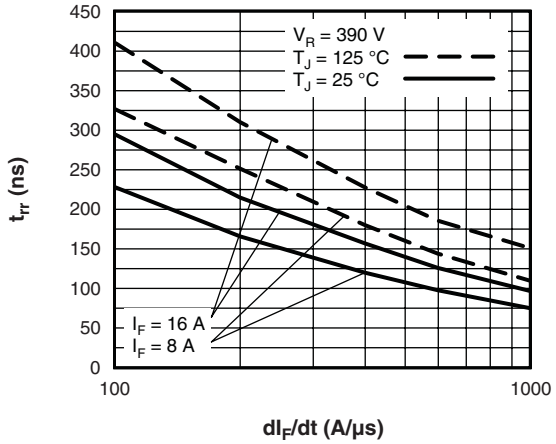


Fig. 9 - Typical Reverse Recovery Time vs. dI_F/dt

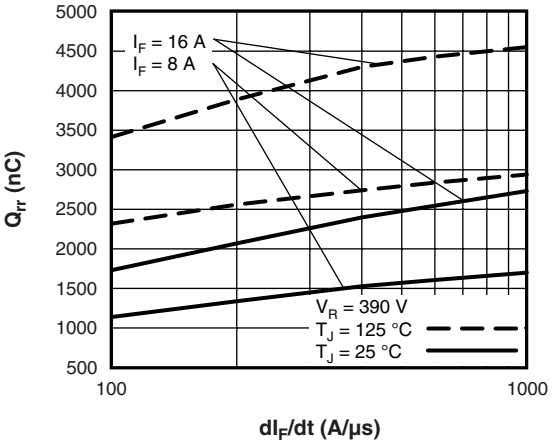


Fig. 10 - Typical Stored Charge vs. dI_F/dt

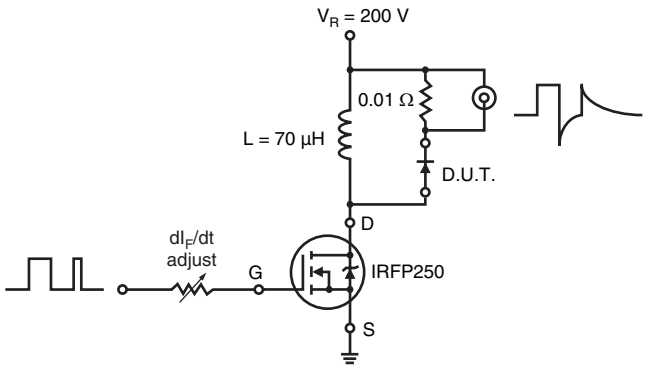
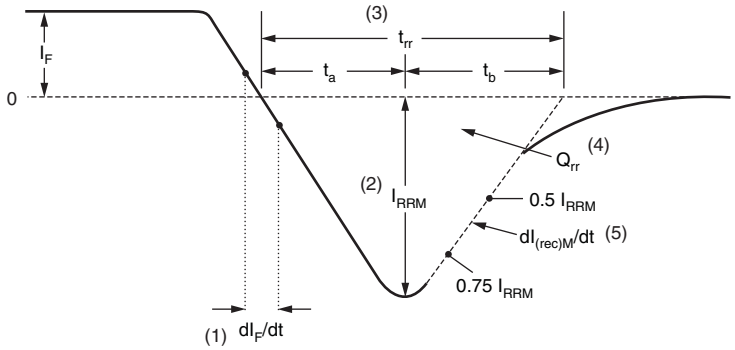


Fig. 11 - Reverse Recovery Parameter Test Circuit



(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	L	06	FP	PbF
①	②	③	④	⑤	⑥	⑦

- 1 - Current rating (8 = 8 A)
- 2 - E = Single diode
- 3 - T = TO-220, D^2PAK
- 4 - L = Ultralow V_F 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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