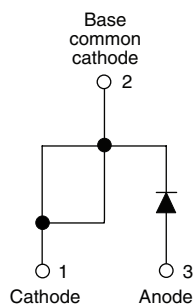# Hyperfast Rectifier,
30 A FRED Pt^{TM}

FEATURES

- Hyperfast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- Dual diode center tap
- Lead (Pb)-free ("PbF" suffix)
- Designed and qualified for industrial level

Pb-free Available

RoHS* COMPLIANT

TO-220AC

Base common cathode
○ 2

○ 1   ○ 3
Cathode   Anode

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)	28 ns
$I_{F(AV)}$	30 A
V_R	600 V

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		600	V
Average rectified forward current	$I_{F(AV)}$	T_C = 103 °C	30	A
Non-repetitive peak surge current	I_{FSM}	T_J = 25 °C	200	
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 = 30 A	-	2.0	2.6	
		I_F = 30 A, T_J = 150 °C	-	1.34	1.75	
Reverse leakage current	I_R	V_R = V_R rated	-	0.3	50	µA
		T_J = 150 °C, V_R = V_R rated	-	60	500	
Junction capacitance	C_T	V_R = 600 V	-	33	-	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

30ETH06PbF

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                              30 A FRED Pt^{TM}

DYNAMIC RECOVERY CHARACTERISTICS (T$_J$ = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t$_{rr}$	I$_F$ = 1.0 A, dI$_F$/dt = 50 A/μs, V$_R$ = 30 V		-	28	35	ns
		T$_J$ = 25 °C	I$_F$ = 30 A dI$_F$/dt = 200 A/μs V$_R$ = 200 V	-	31	-	
		T$_J$ = 125 °C		-	77	-	
Peak recovery current	I$_{RRM}$	T$_J$ = 25 °C		-	3.5	-	A
		T$_J$ = 125 °C		-	7.7	-	
Reverse recovery charge	Q$_{rr}$	T$_J$ = 25 °C		-	65	-	nC
		T$_J$ = 125 °C		-	345	-	

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$_{thJC}$		-	0.7	1.1	°C/W
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	-	0.2	-	
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	30ETH06			

Hyperfast Rectifier,
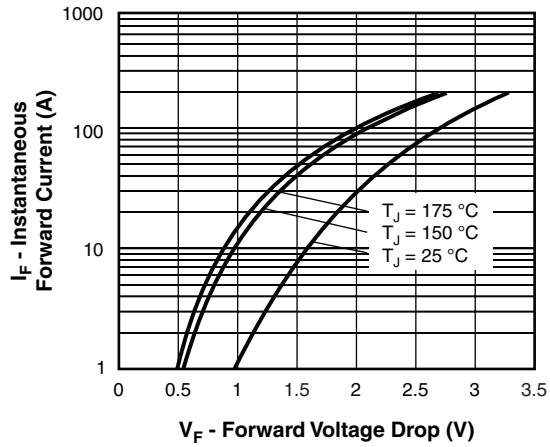30 A FRED Pt™

Vishay High Power Products

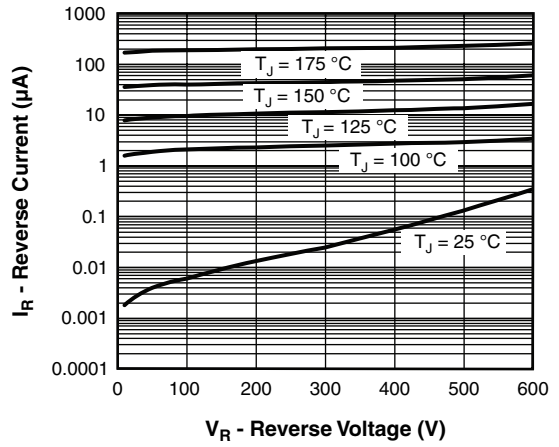Fig. 1 - Typical Forward Voltage Drop Characteristics

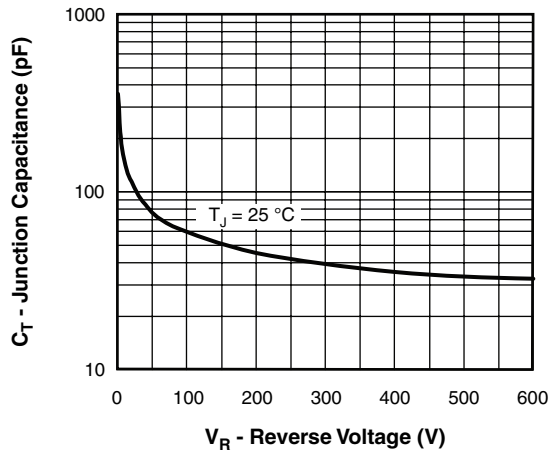Fig. 2 - Typical Values of Reverse Current vs.
Reverse Voltage

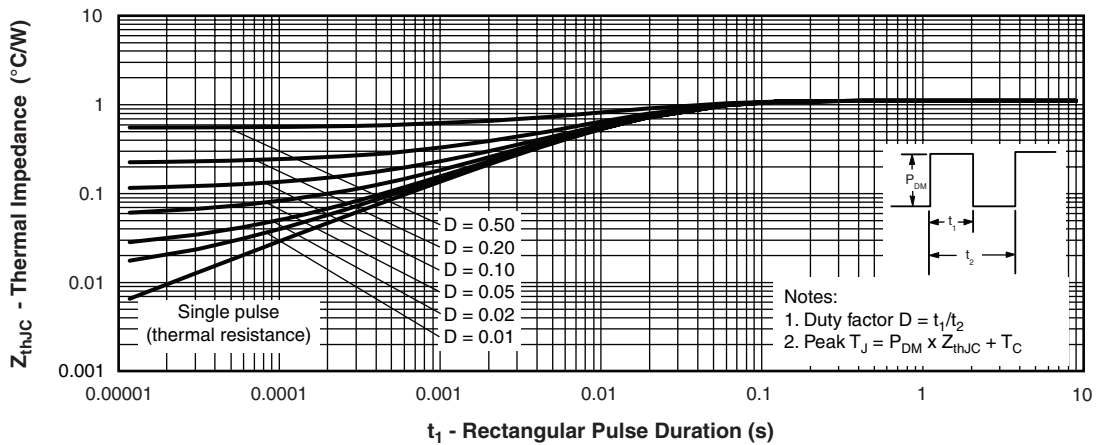Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

Notes:
1. Duty factor $D = t_1/t_2$
2. Peak $T_J = P_{DM}$ x $Z_{thJC} + T_C$

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

30ETH06PbF

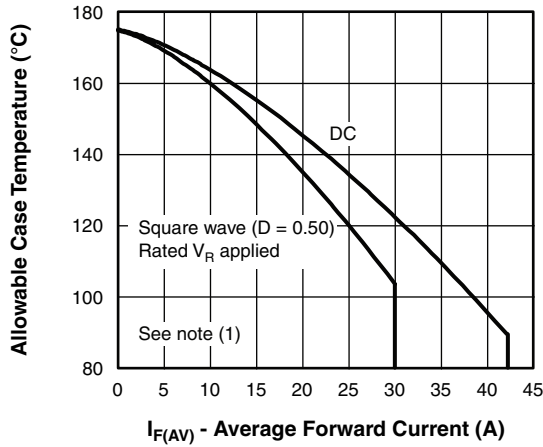## Vishay High Power Products

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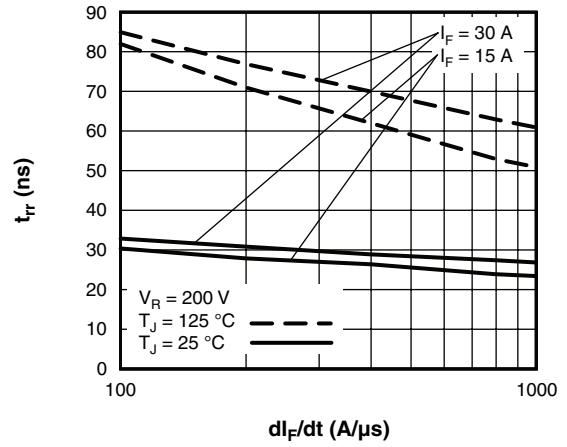Average Forward Current

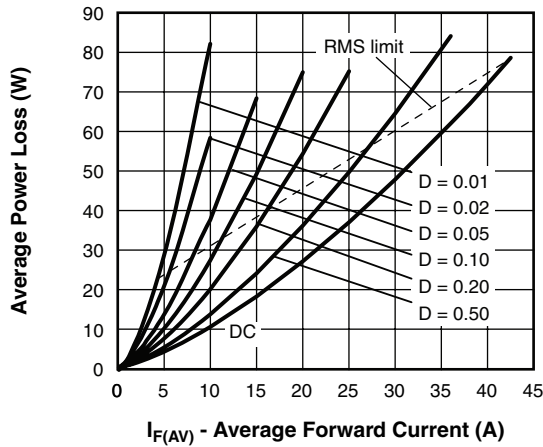Fig. 7 - Typical Reverse Recovery Time vs. dl$_F$/dt

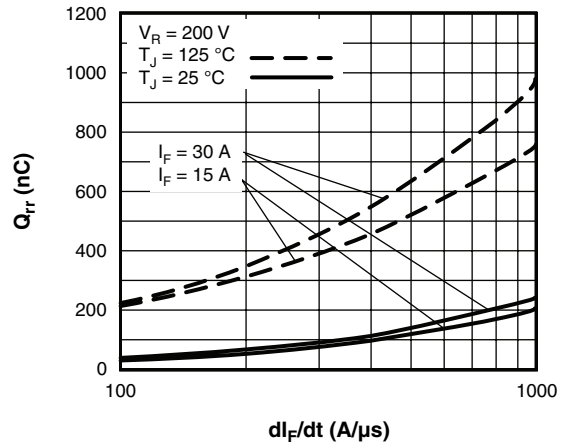Fig. 6 - Forward Power Loss Characteristics

Fig. 8 - Typical Stored Charge vs. dl$_F$/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} = Rated V_R
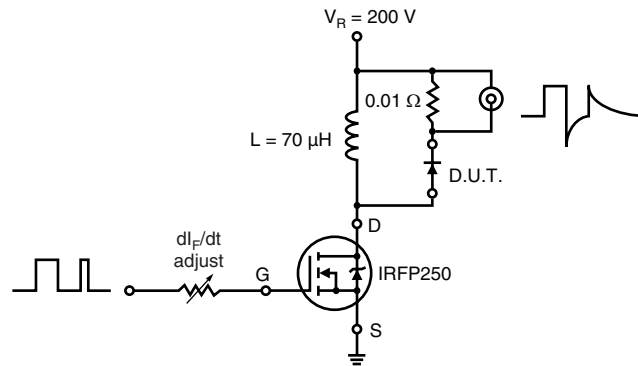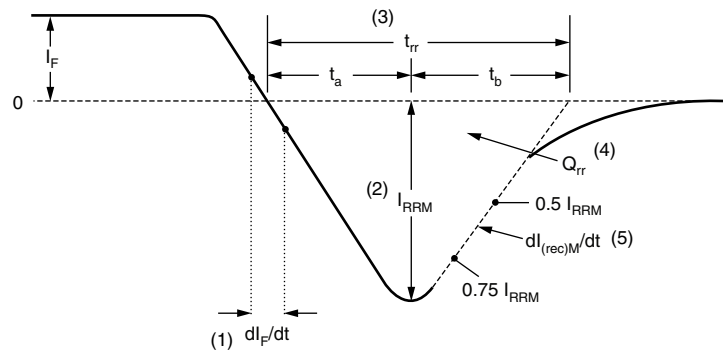
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Fig. 9 - Reverse Recovery Parameter Test Circuit

(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$_{RRM}$

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

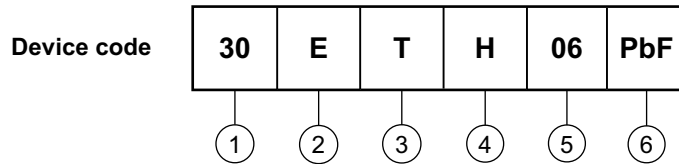(5) dI$_{(rec)M}$/dt - peak rate of change of current during t$_b$ portion of t$_{rr}$

Fig. 10 - Reverse Recovery Waveform and Definitions

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ORDERING INFORMATION TABLE

Device code	30	E	T	H	06	PbF
	(1)	(2)	(3)	(4)	(5)	(6)

1	-	Current rating (30 = 30 A)
2	-	E = Single diode
3	-	Package:
		T = TO-220
4	-	H = Hyperfast recovery
5	-	Voltage rating (06 = 600 V)
6	-	• None = Standard production
		• PbF = Lead (Pb)-free

Tube standard pack quantity: 50 pieces

LINKS TO RELATED DOCUMENTS	
Dimensions	http://www.vishay.com/doc?95221
Part marking information	http://www.vishay.com/doc?95224