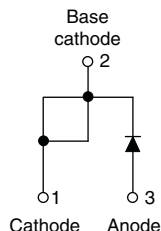


## Hyperfast Rectifier, 30 A FRED Pt®


**TO-220AC**


### FEATURES

- Reduced  $Q_{rr}$  and soft recovery
- 175 °C  $T_J$  maximum
- For PFC CRM/CCM operation
- Low forward voltage drop
- Low leakage current
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified for industrial level


**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

Package	TO-220AC
$I_{F(AV)}$	30 A
$V_R$	600 V
$V_F$ at $I_F$	2.60 V
$t_{rr}$ (typ.)	See Recovery table
$T_J$ max.	175 °C
Diode variation	Single die

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	$V_{RRM}$		600	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 103\text{ °C}$	30	A
Non-repetitive peak surge current	$I_{FSM}$	$T_J = 25\text{ °C}$	200	
Operating junction and storage temperatures	$T_J, T_{Stg}$		- 65 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	$V_{BR}, V_R$	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	$V_F$	$I_F = 30\text{ A}$	-	2.0	2.6	
		$I_F = 30\text{ A}, T_J = 150\text{ °C}$	-	1.34	1.75	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	0.3	50	$\mu\text{A}$
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	60	500	
Junction capacitance	$C_T$	$V_R = 600\text{ V}$	-	33	-	pF
Series inductance	$L_S$	Measured lead to lead 5 mm from package body	-	8.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS (T <sub>J</sub> = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 1.0 A, dI <sub>F</sub> /dt = 50 A/μs, V <sub>R</sub> = 30 V		-	28	35	ns
		T <sub>J</sub> = 25 °C	I <sub>F</sub> = 30 A dI <sub>F</sub> /dt = 200 A/μs V <sub>R</sub> = 200 V	-	31	-	
		T <sub>J</sub> = 125 °C		-	77	-	
Peak recovery current	I <sub>RRM</sub>	T <sub>J</sub> = 25 °C		-	3.5	-	A
		T <sub>J</sub> = 125 °C		-	7.7	-	
Reverse recovery charge	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C		-	65	-	nC
		T <sub>J</sub> = 125 °C		-	345	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$		- 65	-	175	$^{\circ}\text{C}$
Thermal resistance, junction to case per leg	$R_{thJC}$		-	0.7	1.1	$^{\circ}\text{C}/\text{W}$
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			

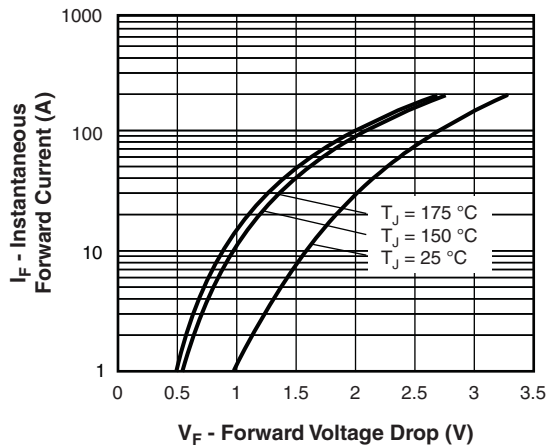


Fig. 1 - Typical Forward Voltage Drop Characteristics

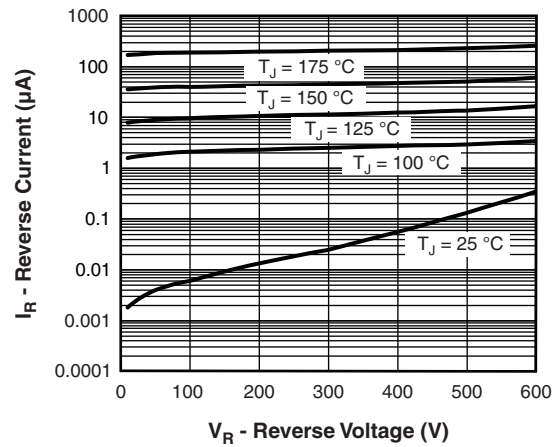


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

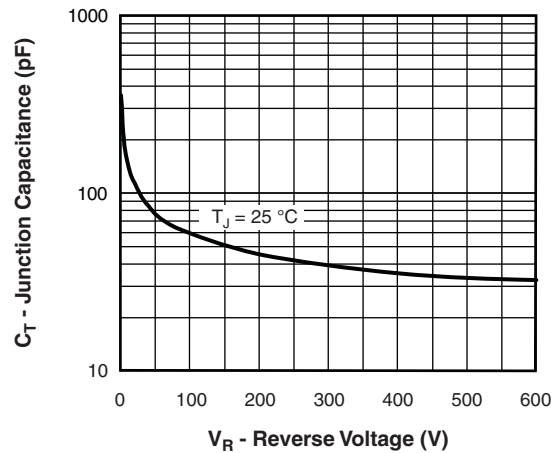
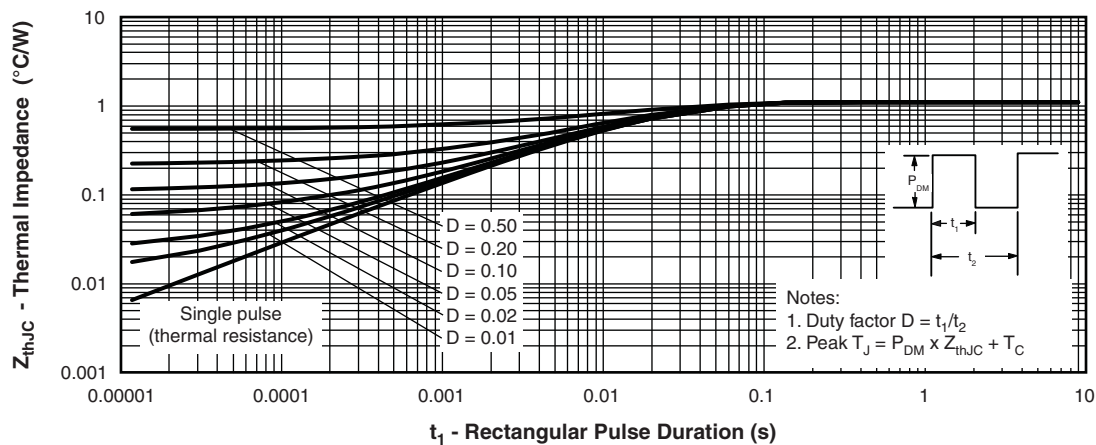


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

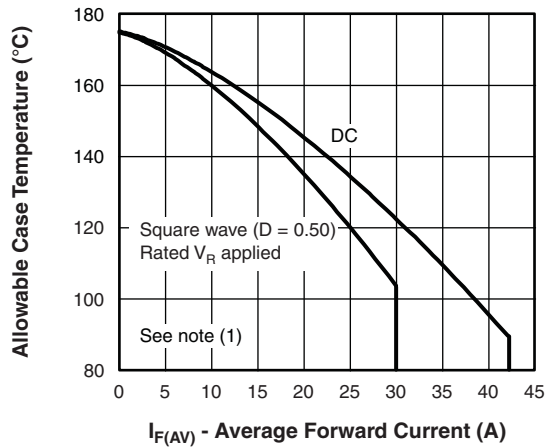


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

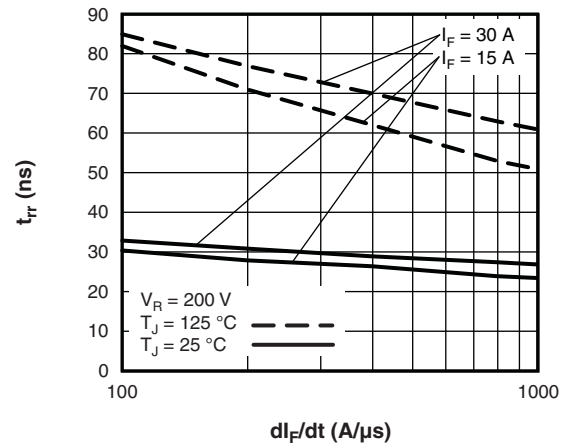


Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$

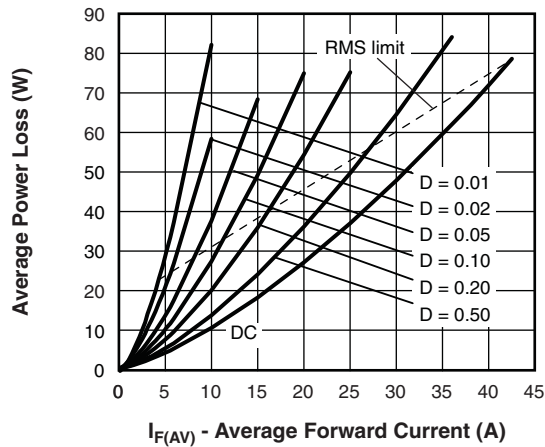


Fig. 6 - Forward Power Loss Characteristics

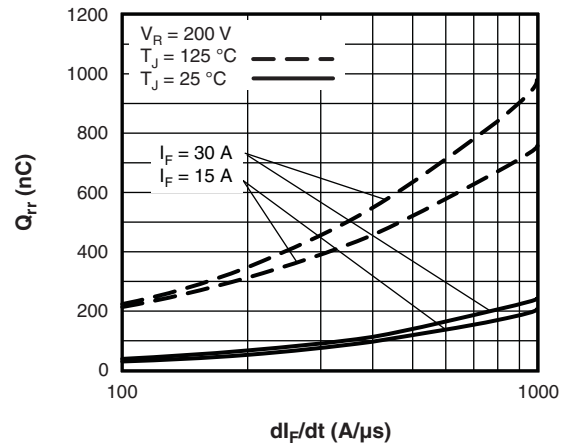


Fig. 8 - Typical Stored Charge vs.  $dI_F/dt$

## Note

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{dREV}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1}$  = Rated  $V_R$

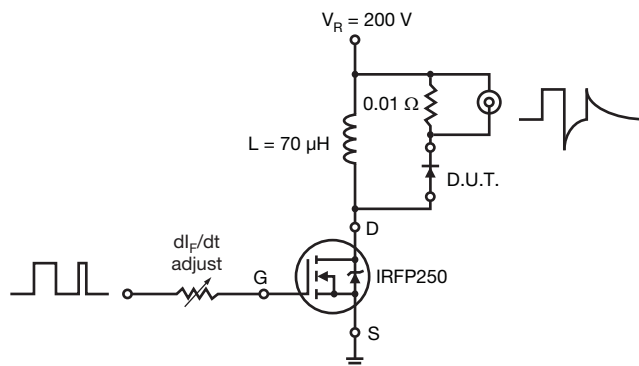


Fig. 9 - Reverse Recovery Parameter Test Circuit

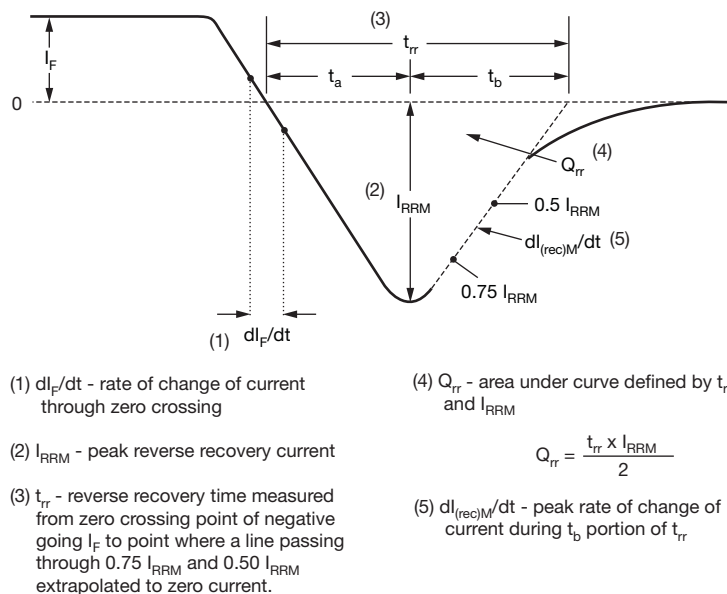


Fig. 10 - Reverse Recovery Waveform and Definitions



## ORDERING INFORMATION TABLE

**Device code**

<b>VS-</b>	<b>30</b>	<b>E</b>	<b>T</b>	<b>H</b>	<b>06</b>	<b>PbF</b>
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1 2 3 4 5 6 7

- 1 - Vishay Semiconductors product
- 2 - Current rating (30 = 30 A)
- 3 - E = Single diode
- 4 - Package:  
T = TO-220
- 5 - H = Hyperfast recovery
- 6 - Voltage rating (06 = 600 V)
- 7 - PbF = Lead (Pb)-free

Tube standard pack quantity: 50 pieces

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95221">www.vishay.com/doc?95221</a>
Part marking information	<a href="http://www.vishay.com/doc?95224">www.vishay.com/doc?95224</a>
SPICE model	<a href="http://www.vishay.com/doc?95422">www.vishay.com/doc?95422</a>



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