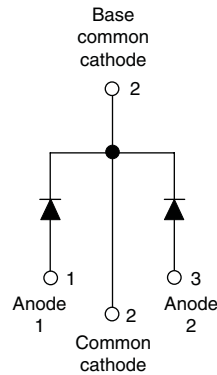


## Hyperfast Rectifier, 2 x 30 A FRED Pt™


**TO-247AC**


### FEATURES

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


**RoHS  
COMPLIANT**

### DESCRIPTIONS/APPLICATIONS

60CPH03PbF series are the state of the art ultrafast recovery rectifiers designed with optimized performance of forward voltage drop and ultrafast recovery time.

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 the output rectification stage of SMPS, UPS, dc-to-dc converters as well as freewheeling diodes in low voltage inverters and chopper motor drives.

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

$t_{rr}$	55 ns
$I_{F(AV)}$	2 x 30 A
$V_R$	300 V

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Repetitive peak reverse voltage	$V_{RRM}$		300	V
Average rectified forward current <span style="margin-left: 20px;">per leg</span> <span style="margin-left: 20px;">total device</span>	$I_{F(AV)}$	$T_C = 143\text{ °C}$	30 60	A
Non-repetitive peak surge current per leg	$I_{FSM}$	$T_J = 25\text{ °C}$	300	
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	$V_{BR}, V_R$	$I_R = 100\text{ }\mu\text{A}$	300	-	-	V
Forward voltage	$V_F$	$I_F = 30\text{ A}$ $I_F = 30\text{ A}, T_J = 125\text{ °C}$	-	1.08 0.92	1.25 1.00	
Reverse leakage current	$I_R$	$V_R = V_R\text{ rated}$ $T_J = 125\text{ °C}, V_R = V_R\text{ rated}$	-	0.05 20	60 300	$\mu\text{A}$
Junction capacitance	$C_T$	$V_R = 300\text{ V}$	-	70	-	pF
Series inductance	$L_S$	Measured lead to lead 5 mm from package body	-	3.5	-	nH

<b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 1.0\text{ A}$ , $di_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	-	55	ns
		$T_J = 25\text{ }^\circ\text{C}$	-	39	-	
		$T_J = 125\text{ }^\circ\text{C}$	-	57	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$	-	2.8	-	A
		$T_J = 125\text{ }^\circ\text{C}$	-	7.5	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	-	55	-	nC
		$T_J = 125\text{ }^\circ\text{C}$	-	214	-	

<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	$R_{thJC}$		-	0.5	0.9	$^\circ\text{C}/\text{W}$
Thermal resistance, junction to ambient per leg	$R_{thJA}$	Typical socket mount	-	-	40	
Thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, flat, smooth and greased	-	0.4	-	
Weight			-	6.0	-	g
			-	0.22	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-247AC	60CPH03			

Hyperfast Rectifier,  
 2 x 30 A FRED Pt™

## Vishay High Power Products

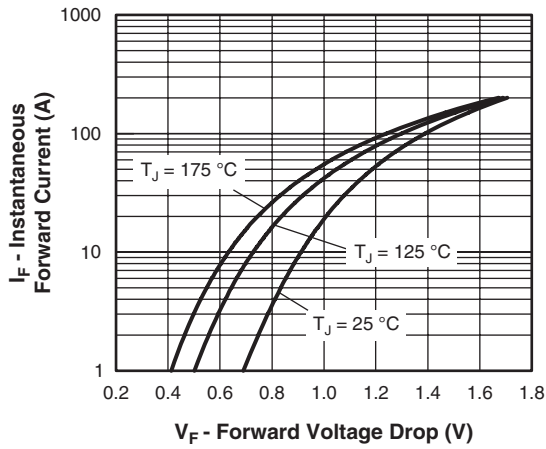


Fig. 1 - Typical Forward Voltage Drop Characteristics

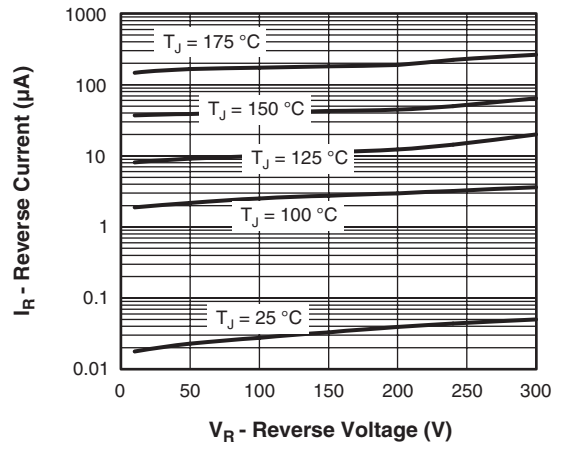


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

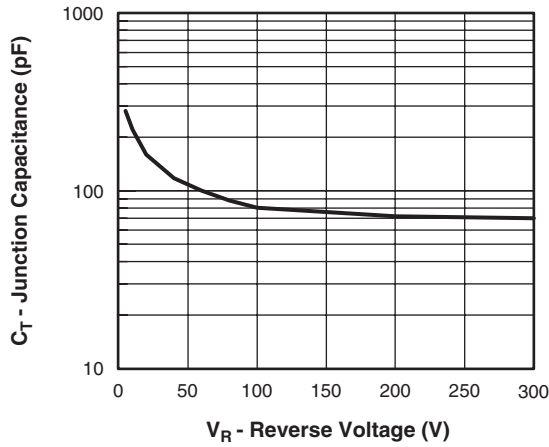
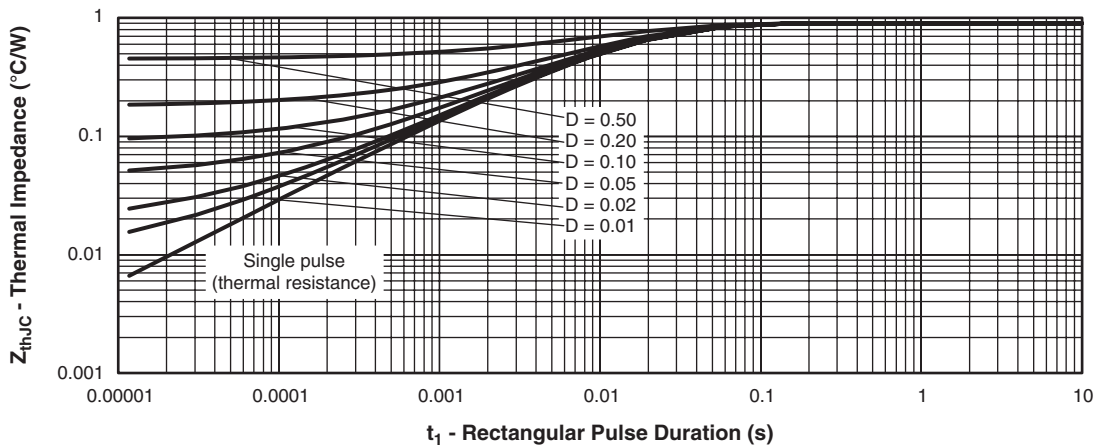


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

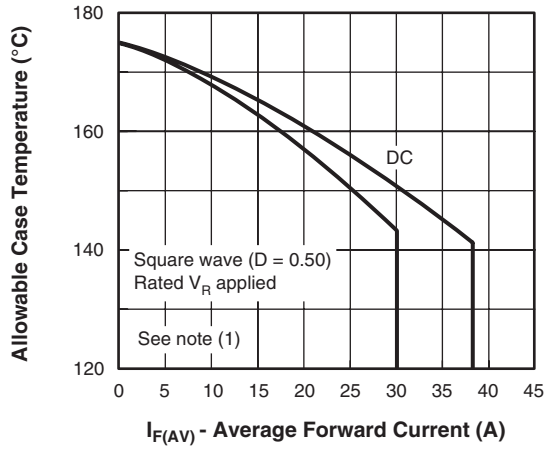


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

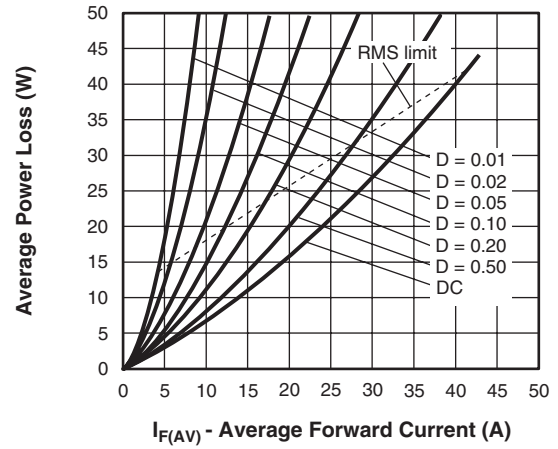


Fig. 6 - Forward Power Loss Characteristics

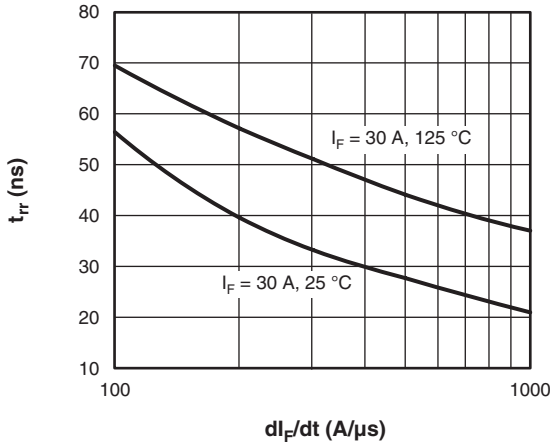


Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$

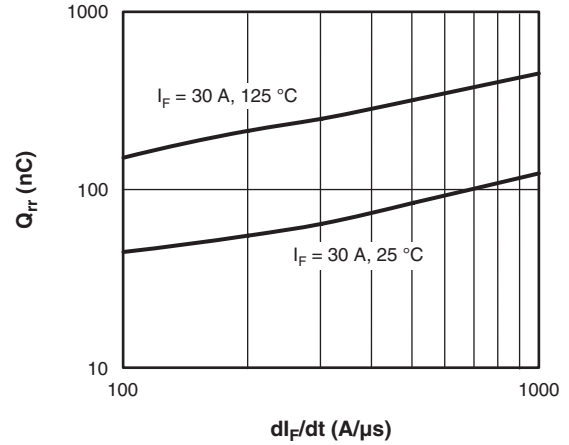


Fig. 8 - Typical Stored Charge vs.  $dI_F/dt$

**Note**

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

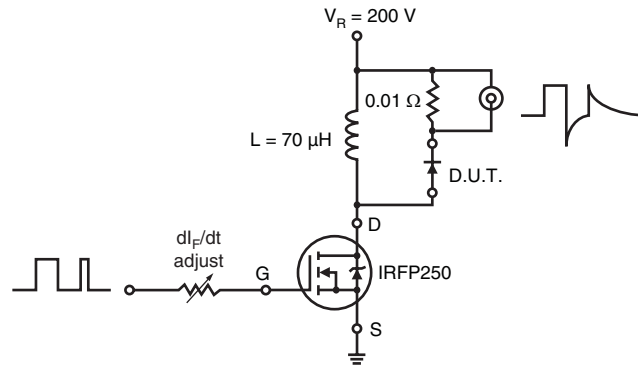
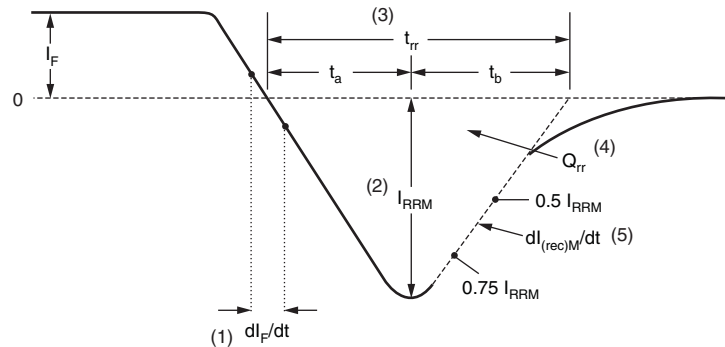


Fig. 9 - Reverse Recovery Parameter Test Circuit


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

Fig. 10 - Reverse Recovery Waveform and Definitions

# 60CPH03PbF

Vishay High Power Products

Hyperfast Rectifier,  
2 x 30 A FRED Pt™



## ORDERING INFORMATION TABLE

Device code	60	C	P	H	03	PbF
	①	②	③	④	⑤	⑥

- 1** - Current rating (60 = 60 A)
- 2** - Circuit configuration:  
C = Common cathode
- 3** - Package:  
P = TO-247AC (modified)
- 4** - H = Hyperfast recovery
- 5** - Voltage code (03 = 300 V)
- 6** -
  - None = Standard production
  - PbF = Lead (Pb)-free

Tube standard pack quantity: 25 pieces

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95223">http://www.vishay.com/doc?95223</a>
Part marking information	<a href="http://www.vishay.com/doc?95226">http://www.vishay.com/doc?95226</a>



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