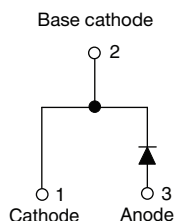


# Hyperfast Rectifier, 30 A FRED Pt®



TO-220AC 2L



## FEATURES

- Hyper fast and soft recovery
- Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current
- True 2 pin package
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## PRIMARY CHARACTERISTICS

$I_{F(AV)}$	30 A
$V_R$	650 V
$V_F$ at $I_F$	1.4 V
$t_{rr}$ typ.	33 ns
$T_J$ max.	175 °C
Package	TO-220AC 2L
Circuit configuration	Single

## DESCRIPTION / APPLICATIONS

Ultra low  $V_F$ , soft-switching hyper fast rectifiers optimized for discontinuous (critical) mode (DCM) power factor correction (PFC).

The minimized conduction loss, optimized stored charge and low recovery current minimized 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.

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Repetitive peak reverse voltage	$V_{RRM}$		650	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 120\text{ °C}$	30	A
Non-repetitive peak surge current	$I_{FSM}$	$T_J = 25\text{ °C}$	210	
Operating junction and storage temperatures	$T_J, T_{Stg}$		-55 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	$V_{BR}, V_R$	$I_R = 100\text{ }\mu\text{A}$	650	-	-	V
Forward voltage	$V_F$	$I_F = 30\text{ A}$	-	1.8	2.1	
		$I_F = 30\text{ A}, T_J = 150\text{ °C}$	-	1.4	1.6	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	0.02	30	$\mu\text{A}$
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	50	300	
Junction capacitance	$C_T$	$V_R = 650\text{ V}$	-	22	-	pF
Series inductance	$L_S$	Measured lead to lead 5 mm from package body	-	8	-	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	$t_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 1\text{ A}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$	-	37	-	ns
		$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 30\text{ A}$ $dI_F/dt = 1000\text{ A}/\mu\text{s}$ $V_R = 400\text{ V}$	-	33	-	
		$T_J = 125\text{ }^{\circ}\text{C}$		-	88	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$		-	18	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$		-	30	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$		-	450	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$		-	1350	-	

THERMAL - MECHANICAL SPECIFICATIONS (T <sub>J</sub> = 25 °C unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-55	-	175	°C
Thermal resistance, junction to case	R <sub>thJC</sub>		-	1.0	1.3	°C/W
Thermal resistance, junction to ambient	R <sub>thJA</sub>	Typical socket mount	-	-	70	
Thermal resistance, case to heatsink	R <sub>thCS</sub>	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 2L	ETH3007			

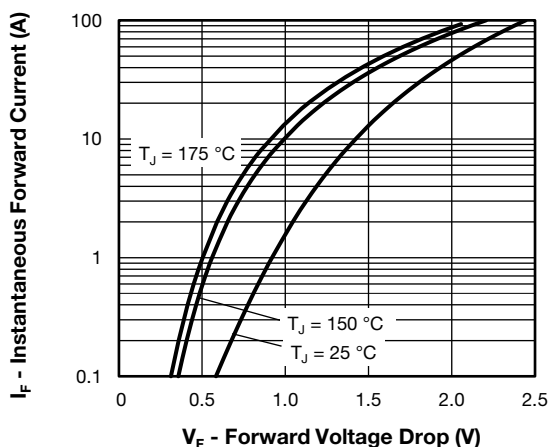


Fig. 1 - Typical Forward Voltage Drop Characteristics

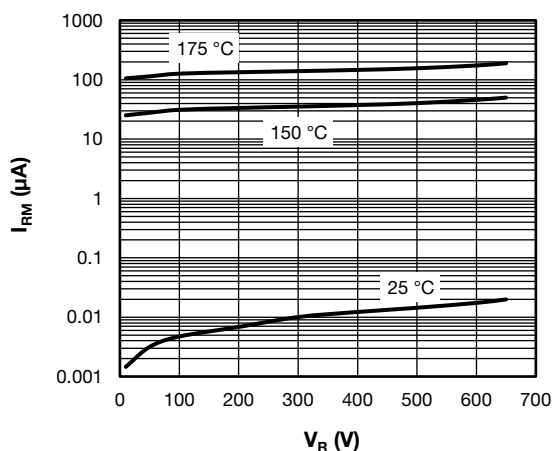


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

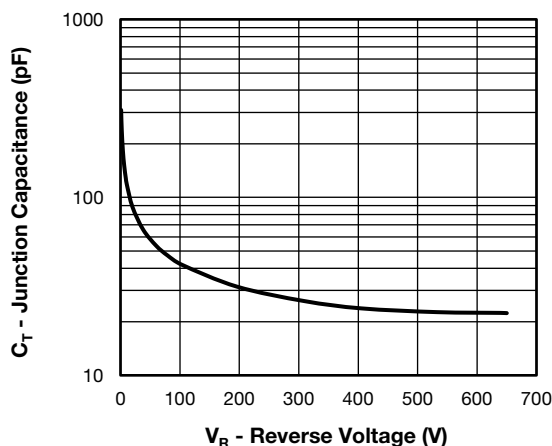


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

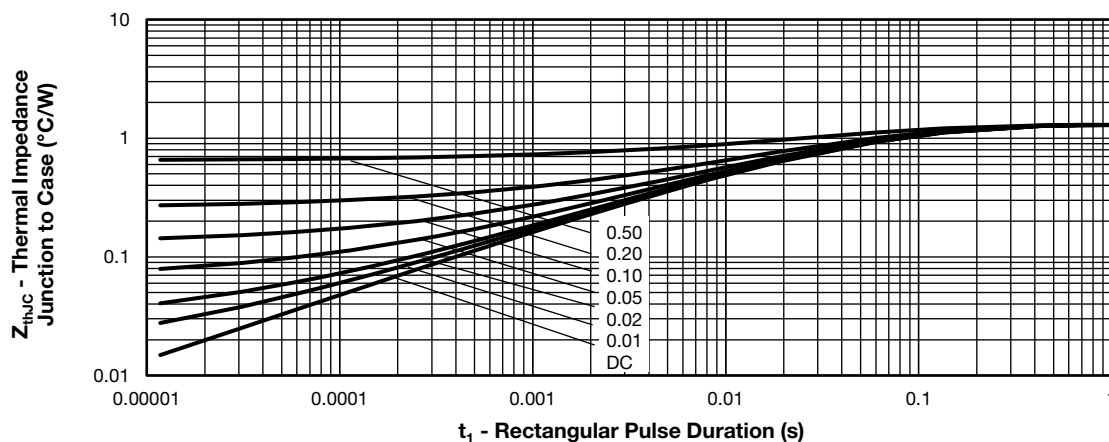
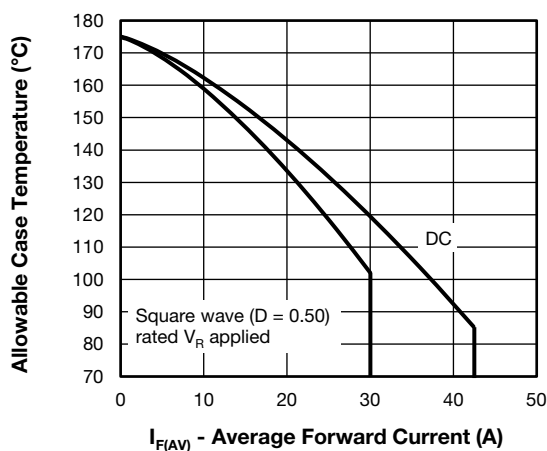

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


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

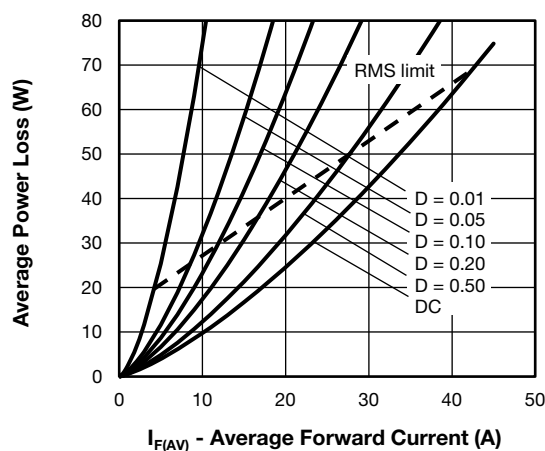


Fig. 6 - Forward Power Loss Characteristics

#### 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  $V_R$

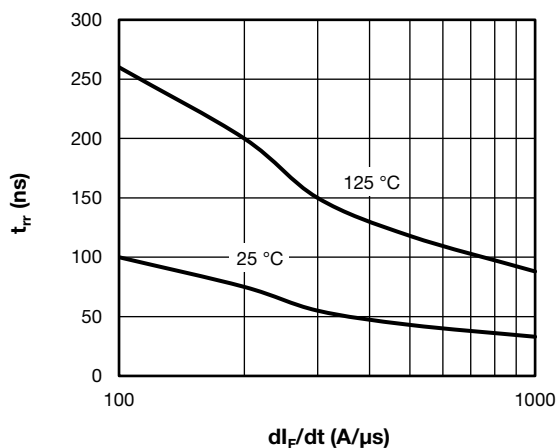
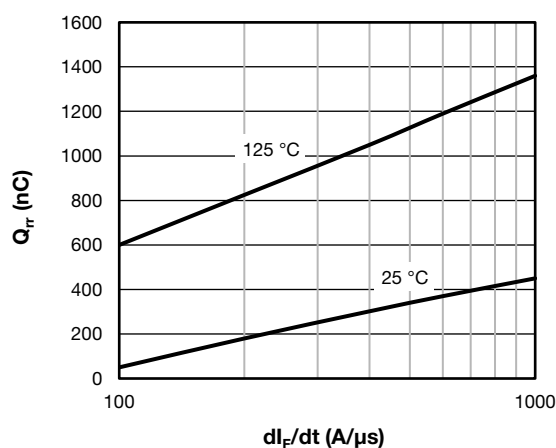
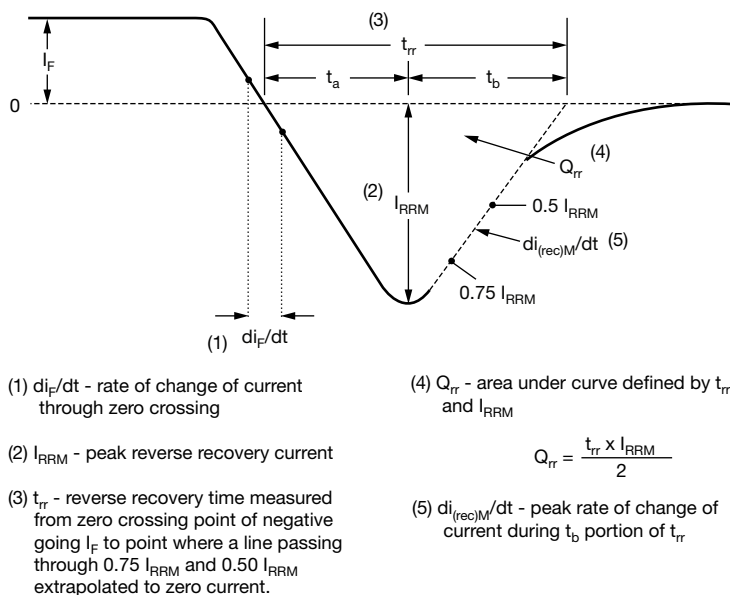

Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$ 

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


Fig. 9 - Reverse Recovery Waveform and Definitions



## ORDERING INFORMATION TABLE

Device code	VS-	E	T	H	30	07	-M3
	①	②	③	④	⑤	⑥	⑦
①	-	Vishay Semiconductors product					
②	-	E = single diode					
③	-	Package:					
		T = TO-220AC					
④	-	H = hyper fast recovery					
⑤	-	Current rating (30 = 30 A)					
⑥	-	Voltage rating (07 = 650 V)					
⑦	-	Environmental digit:					
		-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free					

### ORDERING INFORMATION (Example)

PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-ETH3007-M3	50	Antistatic plastic tube

### LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?96156">www.vishay.com/doc?96156</a>
Part marking information	<a href="http://www.vishay.com/doc?95391">www.vishay.com/doc?95391</a>
SPICE model	<a href="http://www.vishay.com/doc?96531">www.vishay.com/doc?96531</a>



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