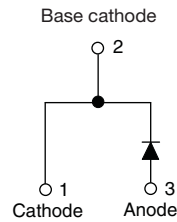


## Hyperfast Rectifier, 30 A FRED Pt<sup>®</sup>



2L TO-220AC



### FEATURES

- Hyper fast and soft recovery time
- Low forward voltage drop
- 175 °C maximum operating junction temperature
- Low leakage current
- True 2 pin package
- 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 $I_F$ at 125 °C	1.6 V
$t_{rr}$	27 ns
$T_J$ max.	175 °C
Package	2L TO-220AC
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	$I_{FSM}$	$T_C = 25\text{ °C}$	210	
Operating junction and storage temperature	$T_J, T_{Stg}$		-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	$V_{BR}, V_R$	$I_R = 250\text{ }\mu\text{A}$	650	-	-	V
Forward voltage	$V_F$	$I_F = 30\text{ A}$	-	2.1	2.5	
		$I_F = 30\text{ A}, T_J = 125\text{ °C}$	-	1.6	1.7	
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	$C_T$	$V_R = 200\text{ V}$	-	22	-	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>	T <sub>J</sub> = 25 °C	I <sub>F</sub> = 1 A dI <sub>F</sub> /dt = 100 A/μs V <sub>R</sub> = 30 V	-	35	-	ns
		T <sub>J</sub> = 25 °C		-	27	-	
		T <sub>J</sub> = 125 °C		-	88	-	
Peak recovery current	I <sub>RRM</sub>	T <sub>J</sub> = 25 °C	I <sub>F</sub> = 30 A dI <sub>F</sub> /dt = 1000 A/μs V <sub>R</sub> = 400 V	-	15	-	A
		T <sub>J</sub> = 125 °C		-	24	-	
Reverse recovery charge	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C		-	330	-	nC
		T <sub>J</sub> = 125 °C		-	1350	-	

THERMAL - MECHANICAL SPECIFICATIONS							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
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 heat sink	R <sub>thCS</sub>	Mounting surface, flat, smooth, and greased		-	-	0.5	
Weight				-	0.2	-	g
				-	0.07	-	oz.
Mounting torque				6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>			-55	-	175	°C
Marking device		Case style: 2L TO-220AC		ETX3007			

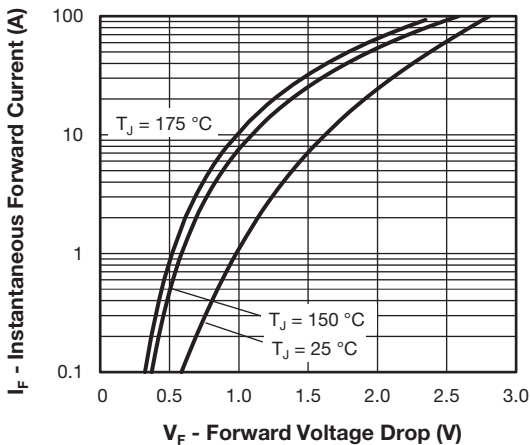


Fig. 1 - Typical Forward Voltage Drop Characteristics

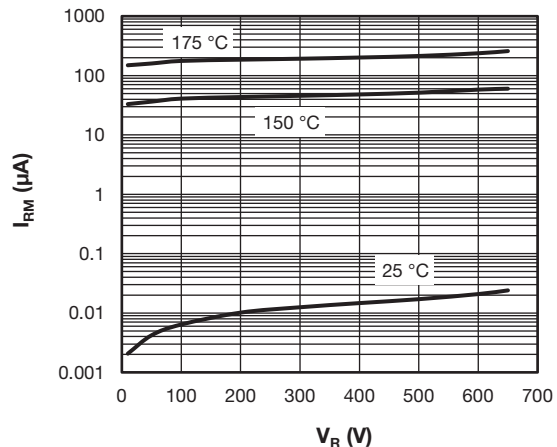


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

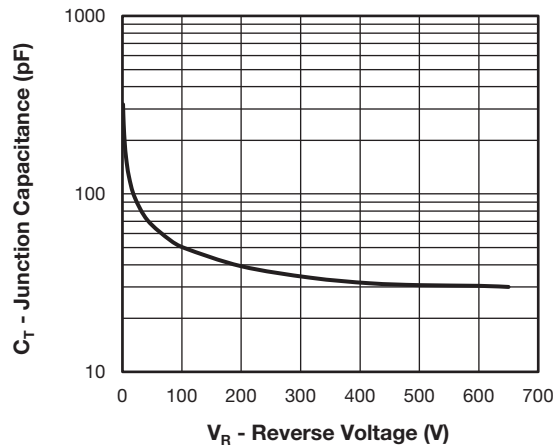


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

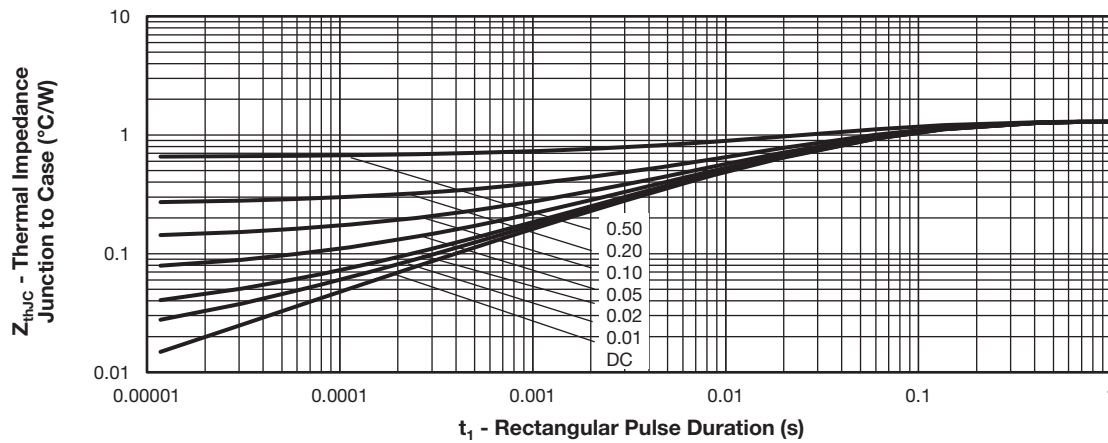


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

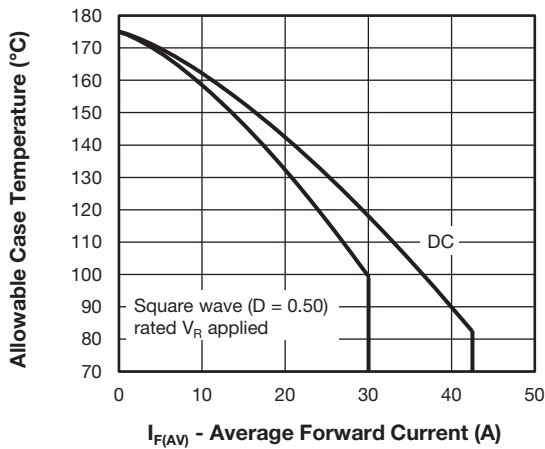


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

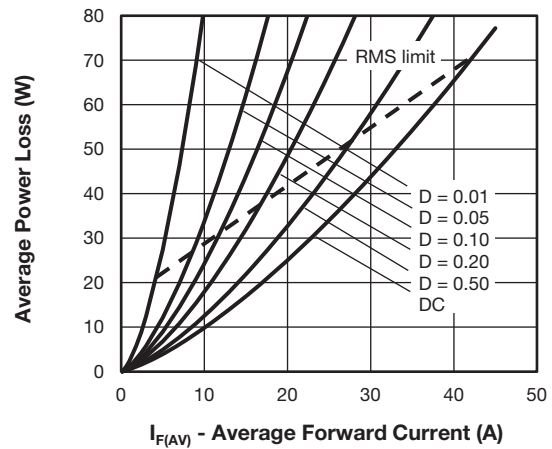


Fig. 6 - Forward Power Loss Characteristics

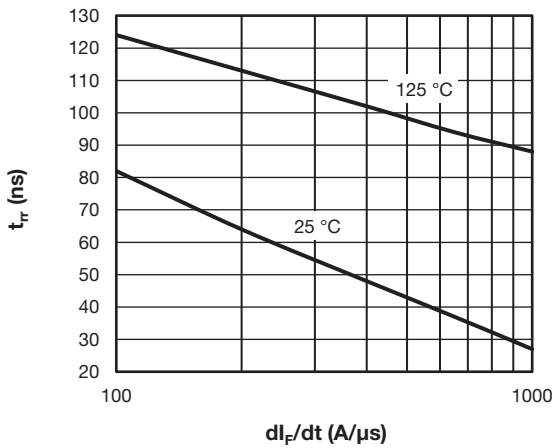


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

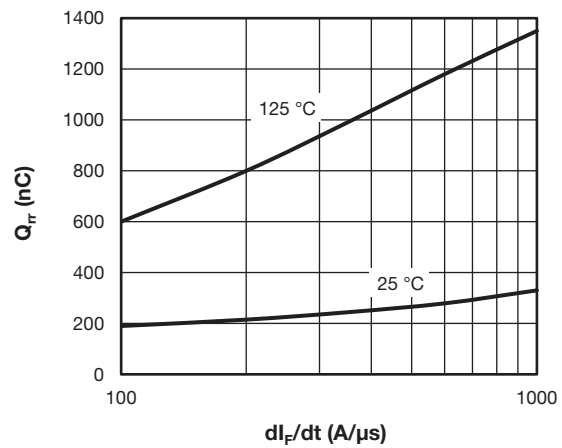
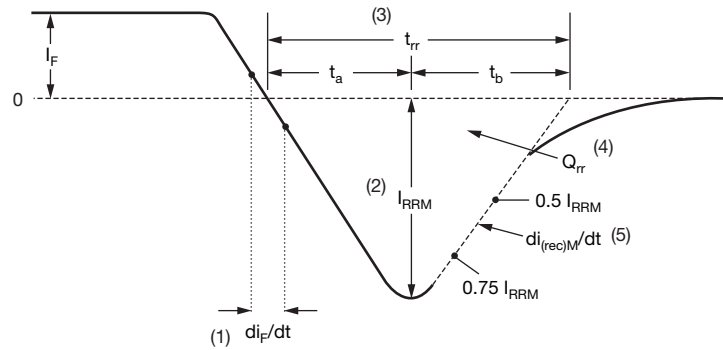


Fig. 8 - Typical Reverse Recovery Time vs.  $di_F/dt$



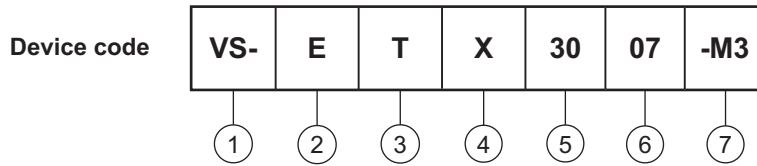
- (1)  $di_F/dt$  - rate of change of current through zero crossing
- (2)  $I_{RRM}$  - peak reverse recovery current
- (3)  $t_{rr}$  - reverse recovery time measured from zero crossing point of negative going  $I_F$  to point where a line passing through  $0.75 I_{RRM}$  and  $0.50 I_{RRM}$  extrapolated to zero current.
- (4)  $Q_{rr}$  - area under curve defined by  $t_{rr}$  and  $I_{RRM}$
- (5)  $di_{(rec)M}/dt$  - peak rate of change of current during  $t_b$  portion of  $t_{rr}$

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

Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE



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

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-ETX3007-M3	50	1000	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>
SPIICE model	<a href="http://www.vishay.com/doc?96532">www.vishay.com/doc?96532</a>



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