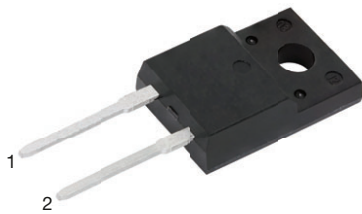


## Ultrafast Rectifier, 30 A FRED Pt<sup>®</sup>



TO-220 FullPAK 2L



### FEATURES

- Low forward voltage drop
- Ultrafast soft recovery time
- 175 °C operating junction temperature
- Low leakage current
- Fully isolated package ( $V_{INS} = 2500 V_{RMS}$ )
- True 2 pin package
- Designed and qualified according to JEDEC<sup>®</sup>-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**

### LINKS TO ADDITIONAL RESOURCES



3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	30 A
$V_R$	600 V
$V_F$ at $I_F$	1.15 V
$t_{rr}$ (typ.)	30 ns
$T_J$ max.	175 °C
Package	TO-220 FullPAK 2L
Circuit configuration	Single

### DESCRIPTION

Ultralow  $V_F$ , soft-switching ultrafast 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.

### APPLICATIONS

AC/DC SMPS 70 W to 400 W

e.g. laptop and printer AC adaptors, desktop PC, TV and monitor, games units and DVD AC/DC power supplies.

### MECHANICAL DATA

**Case:** TO-220 FullPAK 2L

Molding compound meets UL 94 V-0 flammability rating

**Terminals:** matte tin plated leads, solderable per J-STD-002

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	$V_{RRM}$		600	V
Average rectified forward current in DC	$I_{F(AV)}$	$T_C = 72\text{ °C}$	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	$V_{BR}, V_R$	$I_R = 100\ \mu A$	600	-	-	V
Forward voltage	$V_F$	$I_F = 30\text{ A}$ $I_F = 30\text{ A}, T_J = 150\text{ °C}$	-	1.4 1.15	2.0 1.35	
Reverse leakage current	$I_R$	$V_R = V_R$ rated $T_J = 150\text{ °C}, V_R = V_R$ rated	-	0.02 30	30 250	$\mu A$
Junction capacitance	$C_T$	$V_R = 600\text{ V}$	-	20	-	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	$t_{rr}$	$I_F = 1\text{ A}$ , $di_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	30	45	ns
		$T_J = 25\text{ }^\circ\text{C}$	-	45	-	
		$T_J = 125\text{ }^\circ\text{C}$	-	100	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$	-	5.6	-	A
		$T_J = 125\text{ }^\circ\text{C}$	-	10	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	-	127	-	nC
		$T_J = 125\text{ }^\circ\text{C}$	-	580	-	

<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	$R_{thJC}$		-	3.2	3.8	$^\circ\text{C}/\text{W}$
Thermal resistance, junction-to-ambient	$R_{thJA}$	Typical socket mount	-	-	70	
Typical thermal resistance, case-to-heatsink	$R_{thCS}$	Mounting surface, flat, smooth and greased	-	0.5	-	
Weight			-	2	-	g
Mounting torque			6 (5)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-220 FullPAK 2L	ETU3006FP			

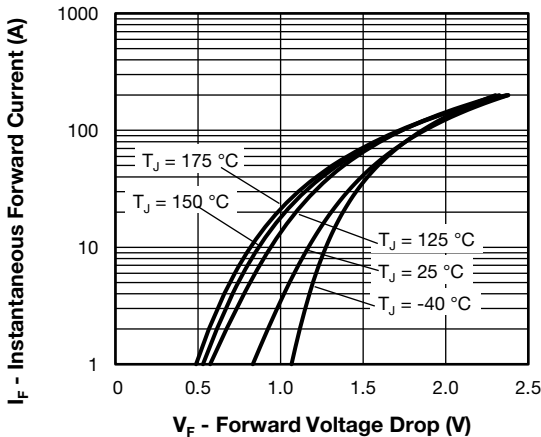


Fig. 1 - Typical Forward Voltage Drop Characteristics

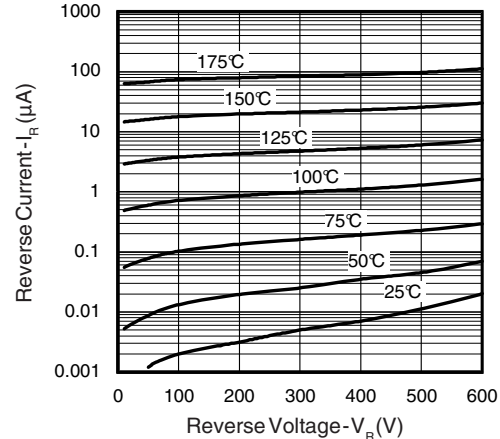


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

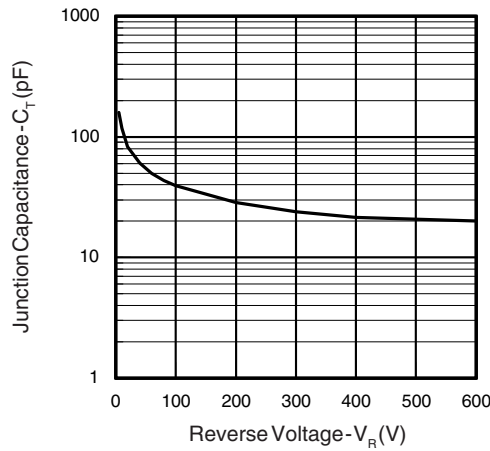


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

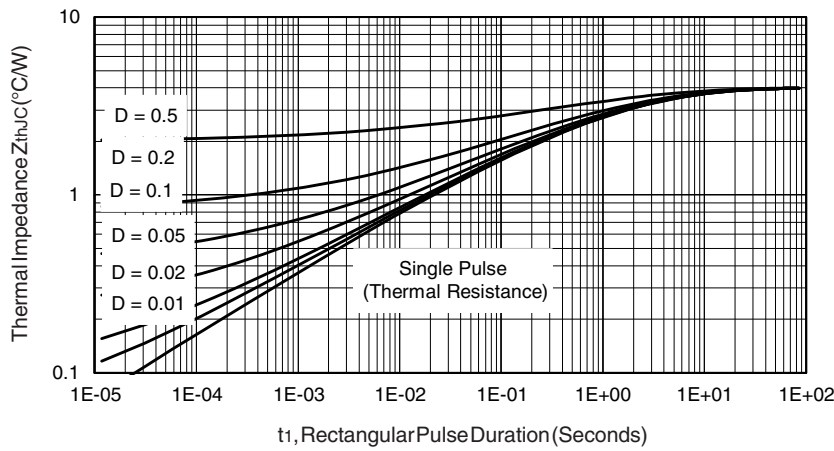


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

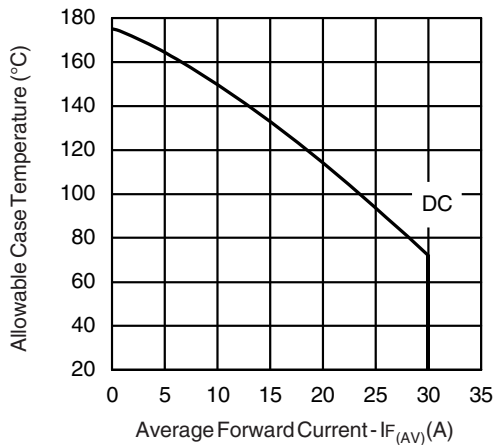


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

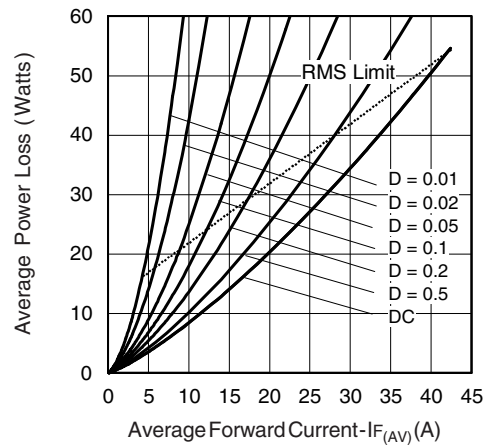


Fig. 6 - Forward Power Loss Characteristics

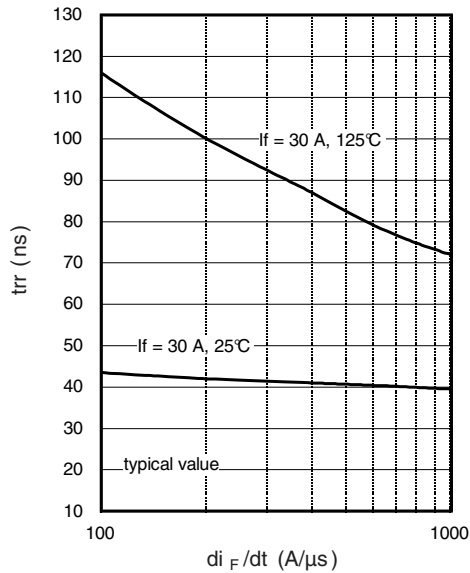


Fig. 7 - Typical Reverse Recovery vs.  $di_F/dt$

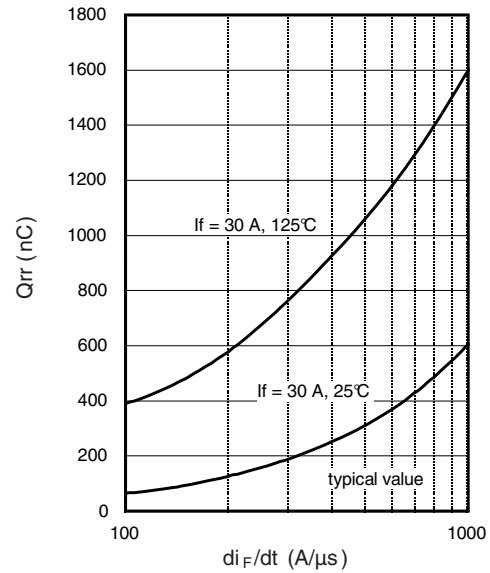
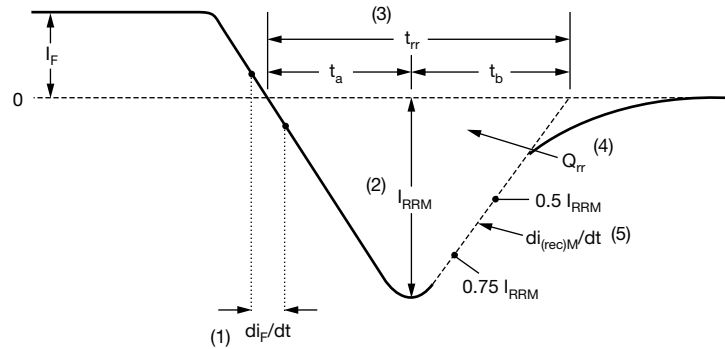


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$



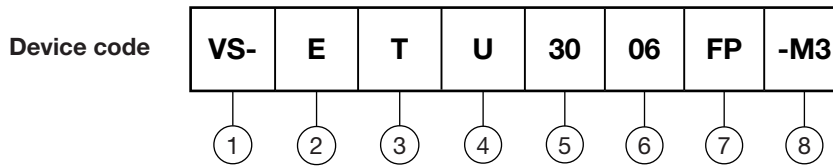
- (1)  $di_F/dt$  - rate of change of current through zero crossing
- (2)  $I_{RRM}$  - peak reverse recovery current
- (3)  $t_{rr}$  - reverse recovery time measured from zero crossing point of negative going  $I_F$  to point where a line passing through  $0.75 I_{RRM}$  and  $0.50 I_{RRM}$  extrapolated 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** - Circuit configuration:  
E = single
- 3** - T = TO-220
- 4** - U = hyperfast recovery time
- 5** - Current code: 30 = 30 A
- 6** - Voltage code: 06 = 600 V
- 7** - FP = TO-220 FullPAK 2L
- 8** - 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-ETU3006FP-M3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?96157">www.vishay.com/doc?96157</a>
Part marking information	<a href="http://www.vishay.com/doc?95392">www.vishay.com/doc?95392</a>
SPIICE model	<a href="http://www.vishay.com/doc?96437">www.vishay.com/doc?96437</a>



## 2L TO-220 FullPAK

**DIMENSIONS** in millimeters



Bottom view





## Disclaimer

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