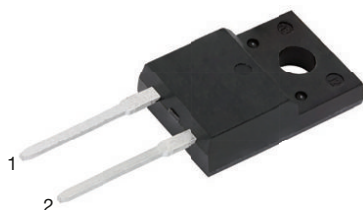
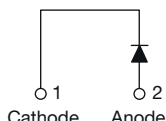


# Ultrafast Rectifier, 20 A FRED Pt®


**TO-220 FullPAK 2L**


## LINKS TO ADDITIONAL RESOURCES



### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	20 A
$V_R$	600 V
$V_F$ at $I_F$	1.26 V
$t_{rr}$ (typ.)	61 ns
$T_J$ max.	175 °C
Package	TO-220 FullPAK 2L
Circuit configuration	Single

### FEATURES

- Low forward voltage drop
- Ultrafast soft recovery time
- 175 °C operating junction temperature
- Low leakage current
- Fully isolated package ( $V_{INS} = 2500 V_{RMS}$ )
- 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**

### 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	$I_{F(AV)}$	$T_C = 102\text{ °C}$	20	A
Non-repetitive peak surge current	$I_{FSM}$	$T_J = 25\text{ °C}$	190	
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	$V_{BR}, V_R$	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	$V_F$	$I_F = 20\text{ A}$	-	1.4	1.63	
		$I_F = 20\text{ A}, T_J = 125\text{ °C}$	-	1.26	1.49	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	0.3	15	$\mu\text{A}$
		$T_J = 125\text{ °C}, V_R = V_R$ rated	-	50	500	
Junction capacitance	$C_T$	$V_R = 600\text{ V}$	-	18	-	pF
Series inductance	$L_S$	Measured lead to lead 5 mm from package body	-	8	-	nH

**DYNAMIC RECOVERY CHARACTERISTICS** ( $T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	61	-	ns
		$T_J = 125\text{ }^{\circ}\text{C}$	-	87	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	13	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	21	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	480	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	1080	-	

**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$		-55	-	175	$^{\circ}\text{C}$
Thermal resistance, junction to case	$R_{thJC}$		-	2.5	3	
Thermal resistance, junction to ambient	$R_{thJA}$	Typical socket mount	-	-	70	$^{\circ}\text{C/W}$
Typical thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, flat, smooth, and greased	-	0.5	-	
Weight			-	2	-	g
			-	0.07	-	oz.
Mounting torque			6 (5)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style: 2L TO-220 FullPAK	E4TU2006FP			

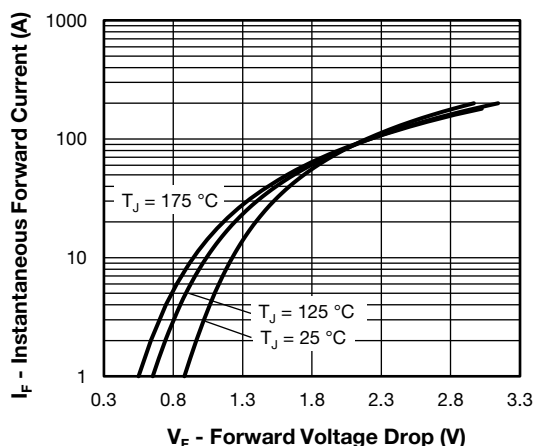


Fig. 1 - Typical Forward Voltage Drop Characteristics

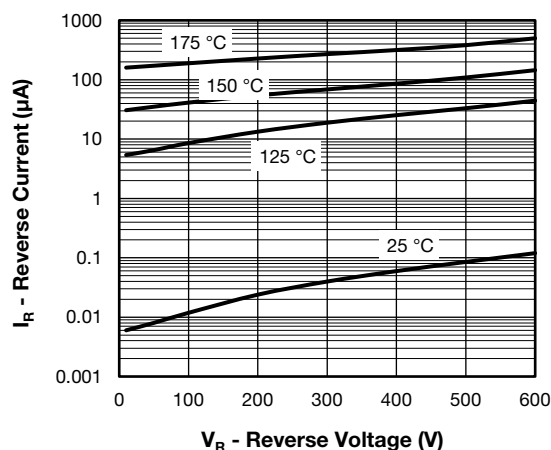


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

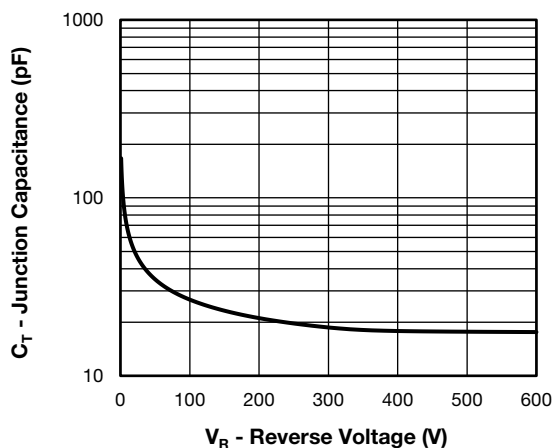


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

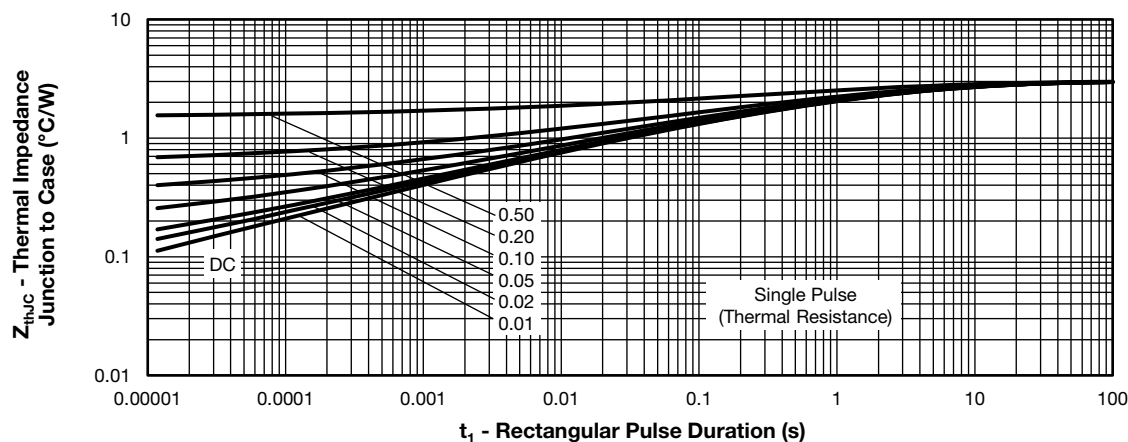
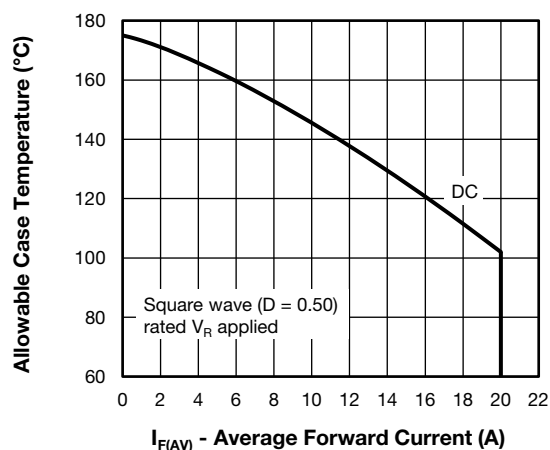

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


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

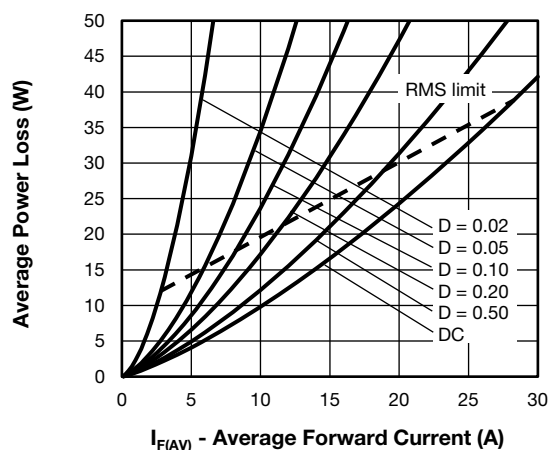


Fig. 6 - Forward Power Loss Characteristics

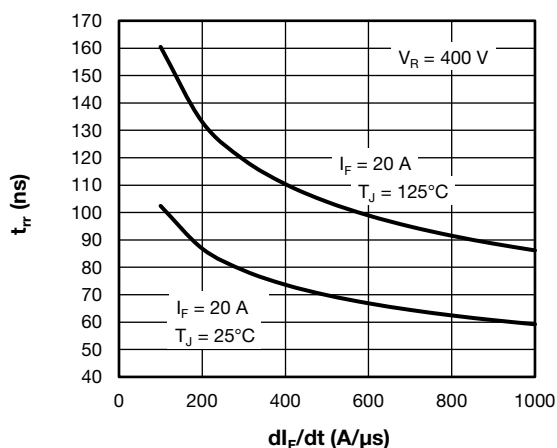
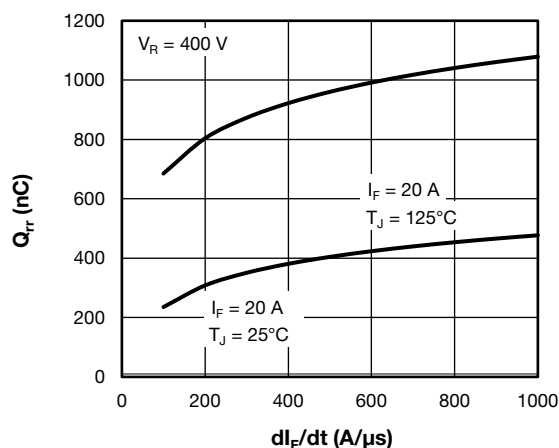
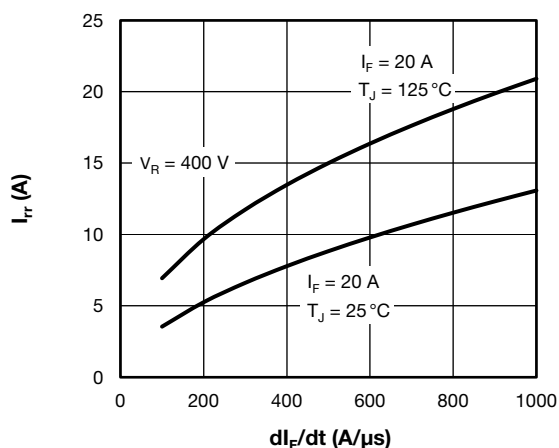
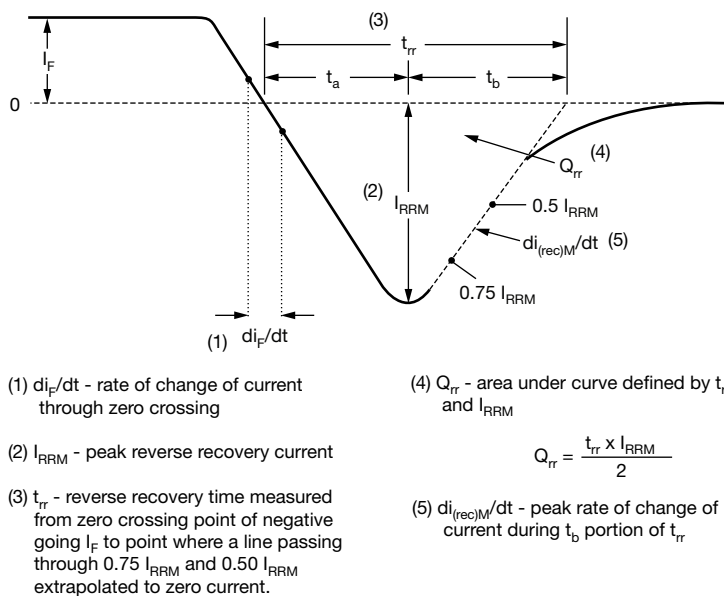

Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$ 

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

Fig. 9 - Typical Reverse Recovery Current vs.  $di_F/dt$ 


Fig. 10 - Reverse Recovery Waveform and Definitions



## ORDERING INFORMATION TABLE

Device code	VS-	E	4	T	U	20	06	FP	-N3
	1	2	3	4	5	6	7	8	9
	1	- Vishay Semiconductors product							
	2	- Circuit configuration:							
		E = single diode							
	3	- 4 = Gen 4 FRED Pt							
	4	- T = TO-220							
	5	- U = ultrafast recovery time							
	6	- Current code: 20 = 20 A							
	7	- Voltage code: 06 = 600 V							
	8	- FP = FullPAK							
	9	- Environmental digit:							
		-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free							

### ORDERING INFORMATION (Example)

PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-E4TU2006FP-N3	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>
SPICE model	<a href="http://www.vishay.com/doc?96822">www.vishay.com/doc?96822</a>



## 2L TO-220 FullPAK

**DIMENSIONS** in millimeters





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