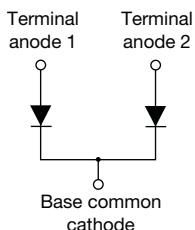



# **FRED Pt<sup>®</sup>, Ultrafast Soft Recovery Diode, 400 A**


**TO-244**


## **FEATURES**

- Ultrafast recovery
- UL approved file E222165 
- Designed for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## **BENEFITS**

- Reduced RFI and EMI
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

## **DESCRIPTION / APPLICATIONS**

FRED Pt<sup>®</sup> diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for HF welding, power converters and other applications where switching losses are significant portion of the total losses.

### **PRIMARY CHARACTERISTICS**

$I_{F(AV)}$	400 A
$V_R$	600 V
$Q_{rr}$ (typical)	1466 nC
$t_{rr}$	124 ns
Type	Modules - diode, FRED Pt <sup>®</sup>
Package	TO-244
Circuit configuration	Two diodes common cathode

### **ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	$V_R$		600	V
Continuous forward current per diode	$I_{F(DC)}$	$T_C = 25\text{ }^{\circ}\text{C}$	480	A
		$T_C = 85\text{ }^{\circ}\text{C}$	338	
		$T_C = 132\text{ }^{\circ}\text{C}$	200	
Single pulse forward current per diode	$I_{FSM}$	$T_C = 25\text{ }^{\circ}\text{C}$	2880	
Maximum power dissipation per diode	$P_D$	$T_C = 25\text{ }^{\circ}\text{C}$	789	W
		$T_C = 124\text{ }^{\circ}\text{C}$	270	
Operating junction and storage temperatures	$T_J, T_{Stg}$		-40 to +175	$^{\circ}\text{C}$

### **ELECTRICAL SPECIFICATIONS PER DIODE ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage	$V_{BR}$	$I_R = 100\text{ }\mu\text{A}$	600	-	-	
Forward voltage	$V_{FM}$	$I_F = 200\text{ A}$	-	1.13	1.36	V
		$I_F = 400\text{ A}$	-	1.27	1.72	
		$I_F = 200\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	-	0.92	-	
		$I_F = 400\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	-	1.07	-	
Reverse leakage current	$I_{RM}$	$T_J = 175\text{ }^{\circ}\text{C}, V_R = V_R\text{ rated}$	-	0.6	3.0	mA
Series inductance	$L_S$	From top of terminal hole to mounting plane	-	5	-	nH

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	124	-	ns
		$T_J = 125\text{ }^{\circ}\text{C}$	-	222	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	24	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	45	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	1466	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	5000	-	

**THERMAL - MECHANICAL SPECIFICATIONS**

THERMAL MECHANICAL REQUIREMENTS						
PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	per diode	R <sub>thJC</sub>	-	-	0.19	°C/W
	per module		-	-	0.095	
Thermal resistance, case to heatsink	per module		R <sub>thCS</sub>	-	0.10	
Weight			-	68	-	g
			-	2.4	-	oz.
Mounting torque			30 (3.4)	-	40 (4.6)	lbf · in (N · m)
Mounting torque center hole			12 (1.4)	-	18 (2.1)	
Terminal torque			30 (3.4)	-	40 (4.6)	
Vertical pull			-	-	80	lbf · in
2" lever pull			-	-	35	
Case style			TO-244			

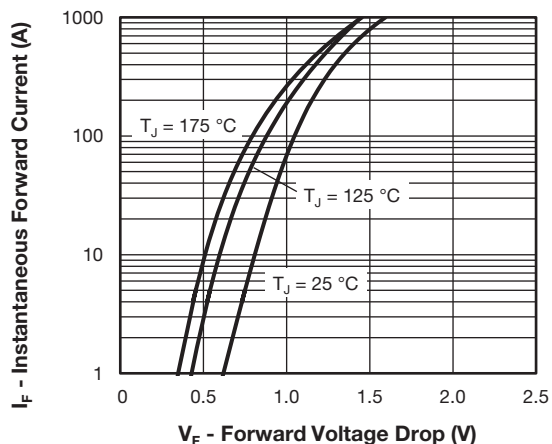


Fig. 1 - Typical Forward Voltage Drop Characteristics (Per Leg)

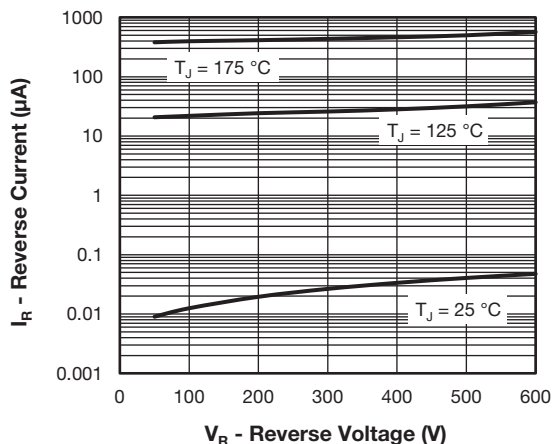


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

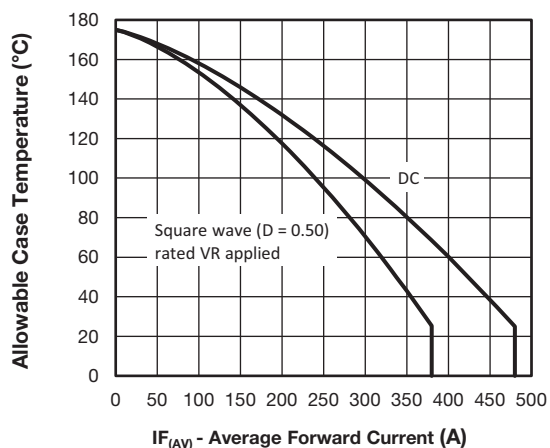


Fig. 3 - Maximum Current Rating Capability (Per Leg)

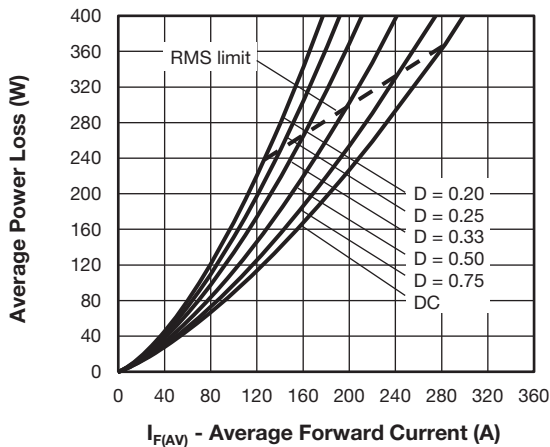


Fig. 4 - Forward Power Loss Characteristics

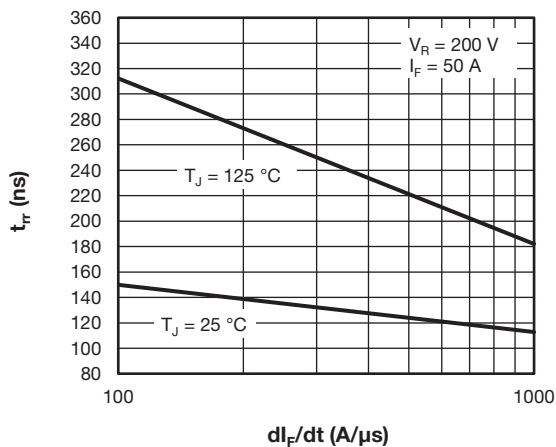


Fig. 5 - Typical Reverse Recovery Time vs.  $dI_F/dt$

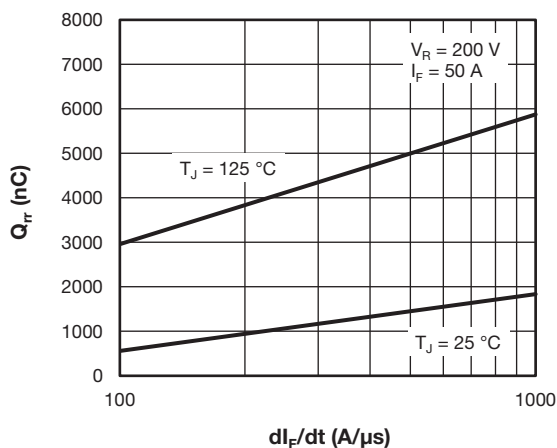


Fig. 6 - Typical Reverse Recovery Charge vs.  $dI_F/dt$

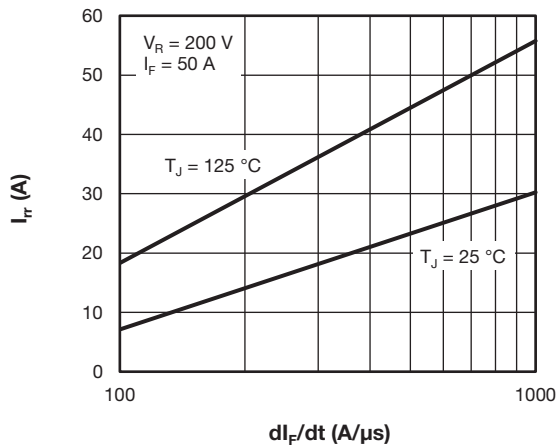


Fig. 7 - Typical Reverse Recovery Current vs.  $dI_F/dt$

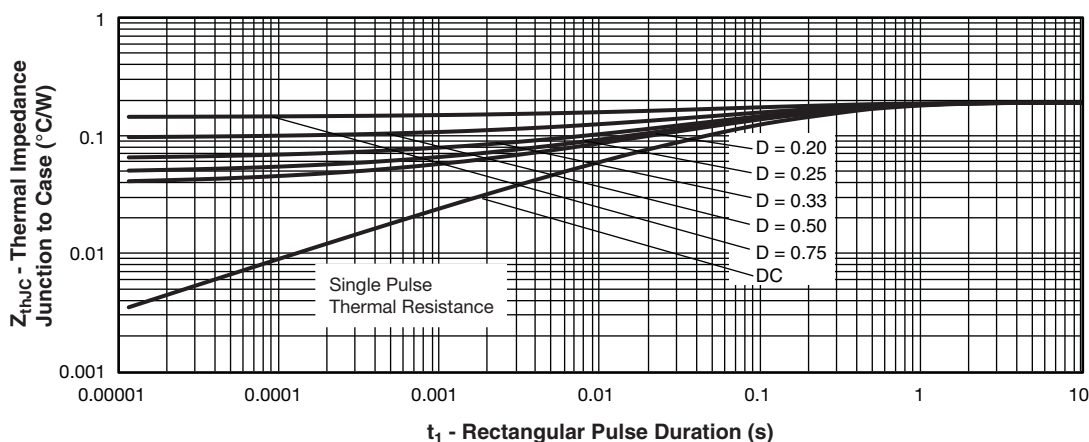


Fig. 8 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

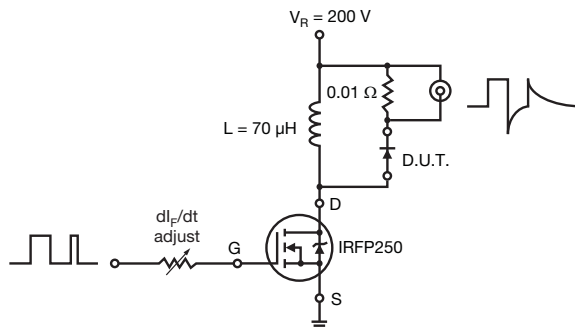
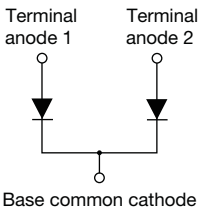


Fig. 9 - Reverse Recovery Parameter Test Circuit

## ORDERING INFORMATION TABLE

Device code	VS-VS	UD	405	C	W	60
	1	2	3	4	5	6
1	-	Vishay Semiconductors product				
2	-	UD = FRED Pt®				
3	-	Current rating (405 = 400 A)				
4	-	Circuit configuration: C = two diodes common cathode				
5	-	W = TO-244 wire bondable not isolated				
6	-	Voltage rating (60 = 600 V)				



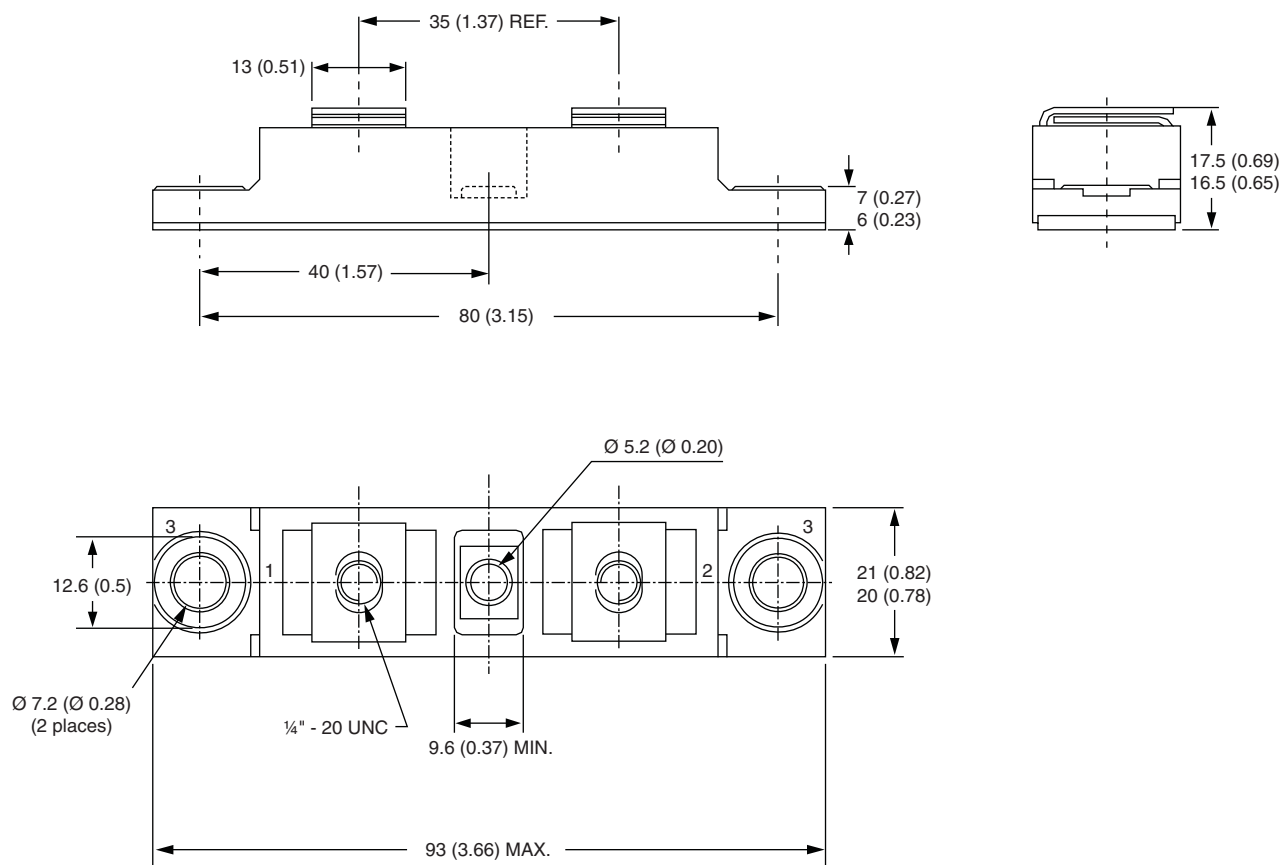
CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two diodes common cathode	C	

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95021">www.vishay.com/doc?95021</a>



## TO-244

**DIMENSIONS** in millimeters (inches)





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