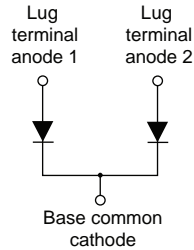


## FRED Pt<sup>®</sup>, Ultrafast Soft Recovery Diode Module, 400 A


**TO-244**

**FEATURES**

- Ultrafast recovery
- 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)	5100 nC
$t_{rr}$	215 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	$I_{F(DC)}$	$T_C = 25\text{ °C}$	572	A
		$T_C = 85\text{ °C}$	397	
		$T_C = 137\text{ °C}$	200	
Single pulse forward current per diode	$I_{FSM}$	$T_C = 25\text{ °C}$	3330	
Maximum power dissipation	$P_D$	$T_C = 25\text{ °C}$	789	W
		$T_C = 137\text{ °C}$	200	
Operating junction and storage temperatures	$T_J, T_{Stg}$		-40 to +175	°C

ELECTRICAL SPECIFICATIONS PER LEG ( $T_J = 25\text{ °C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage	$V_{BR}$	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	$V_{FM}$	$I_F = 200\text{ A}$	-	1.0	1.2	
		$I_F = 400\text{ A}$	-	1.12	1.37	
		$I_F = 200\text{ A}, T_J = 175\text{ °C}$	-	0.83	1.0	
		$I_F = 400\text{ A}, T_J = 175\text{ °C}$	-	0.98	1.21	
Reverse leakage current	$I_{RM}$	$T_J = 175\text{ °C}, V_R = V_R\text{ rated}$	-	0.3	3.0	mA
Series inductance	$L_S$	From top of terminal hole to mounting plane	-	5	-	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	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	$I_F = 50\text{ A,}$ $di_F/dt = 500\text{ A}/\mu\text{s,}$ $V_R = 200\text{ V}$	-	215	-	ns
		$T_J = 150\text{ }^\circ\text{C}$		-	432	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$		-	48	-	A
		$T_J = 150\text{ }^\circ\text{C}$		-	70	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$		-	5100	-	nC
		$T_J = 150\text{ }^\circ\text{C}$		-	15 100	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	
Thermal resistance, junction to case	per leg	-	-	0.19	$^\circ\text{C}/\text{W}$	
	per module	-	-	0.095		
Thermal resistance, case to heatsink	$R_{thCS}$	-	0.10	-		
Weight		-	68	-	g	
		-	2.4	-	oz.	
Mounting torque		30 (3.4)	-	40 (4.6)	$\text{lbf} \cdot \text{in}$ ( $\text{N} \cdot \text{m}$ )	
Mounting torque center hole		12 (1.4)	-	18 (2.1)		
Terminal torque		30 (3.4)	-	40 (4.6)		
Vertical pull		-	-	80	$\text{lbf} \cdot \text{in}$	
2" lever pull		-	-	35		
Case style		TO-244				

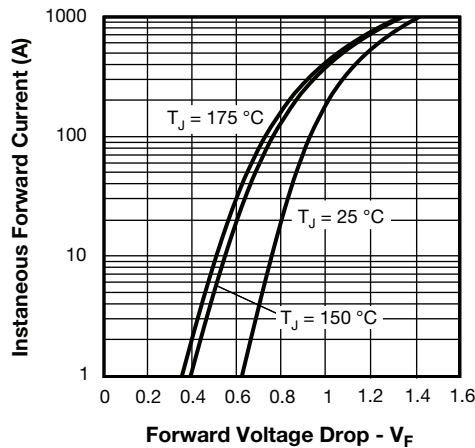


Fig. 1 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

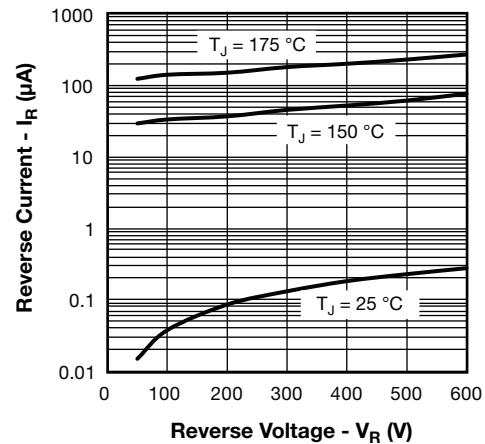


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

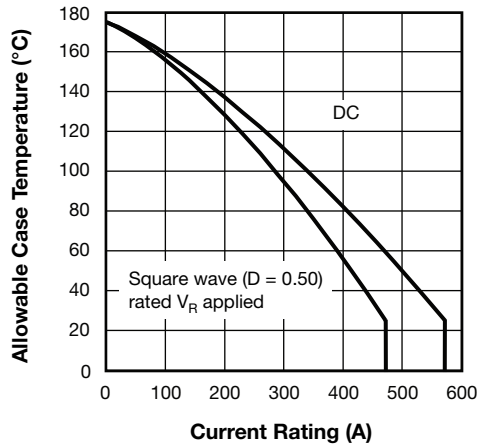


Fig. 3 - Maximum Current Rating Capability (Per Leg)

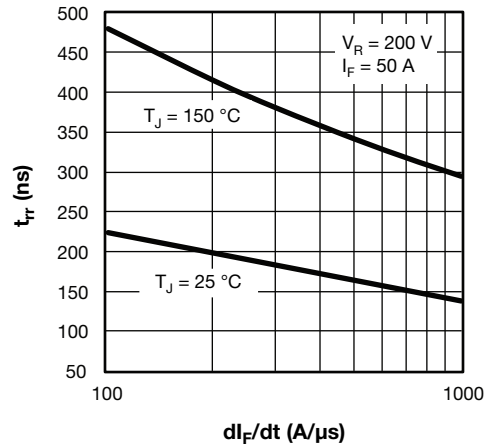


Fig. 5 - Typical Reverse Recovery Time vs.  $di_F/dt$

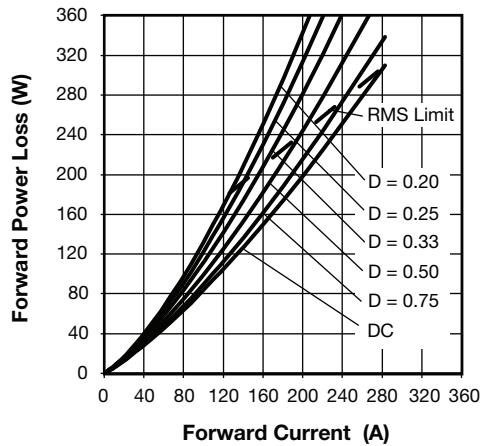


Fig. 4 - Forward Power Loss Characteristics

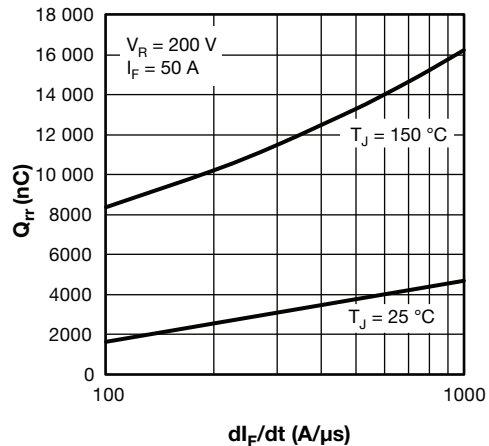


Fig. 6 - Typical Reverse Recovery Charge vs.  $di_F/dt$

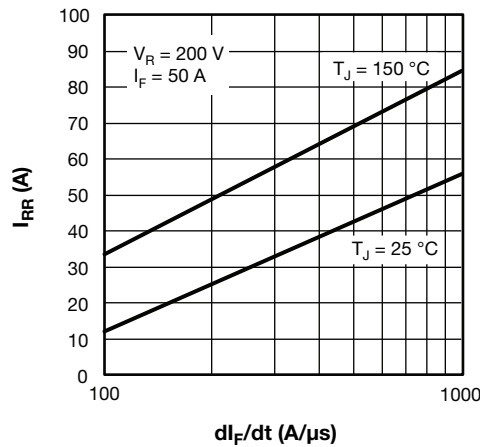


Fig. 7 - Typical Reverse Recovery Current vs.  $di_F/dt$

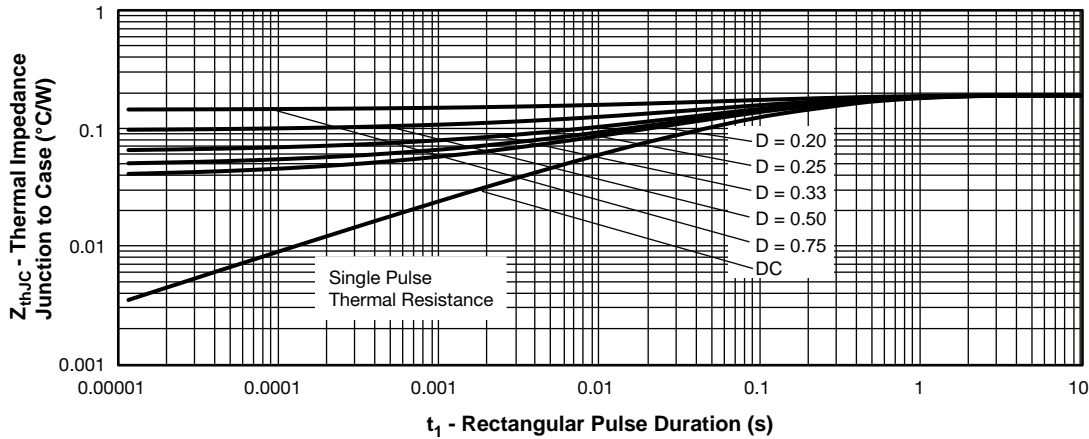


Fig. 8 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

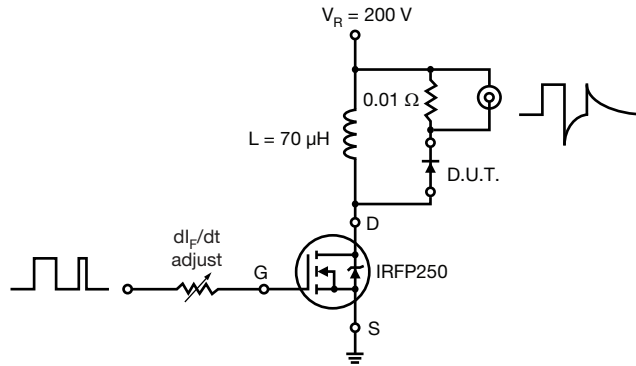


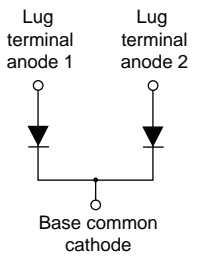
Fig. 9 - Reverse Recovery Parameter Test Circuit

**ORDERING INFORMATION TABLE**

Device code	<b>VS-VS</b>	<b>UD</b>	<b>410</b>	<b>C</b>	<b>W</b>	<b>60</b>
	①	②	③	④	⑤	⑥

- 1** - Vishay Semiconductors product
- 2** - UD = FRED Pt<sup>®</sup>
- 3** - Current rating (410 = 400 A)
- 4** - Circuit configuration:  
C = two diodes common cathode
- 5** - W = TO-244 wire bondable not isolated
- 6** - Voltage rating (60 = 600 V)

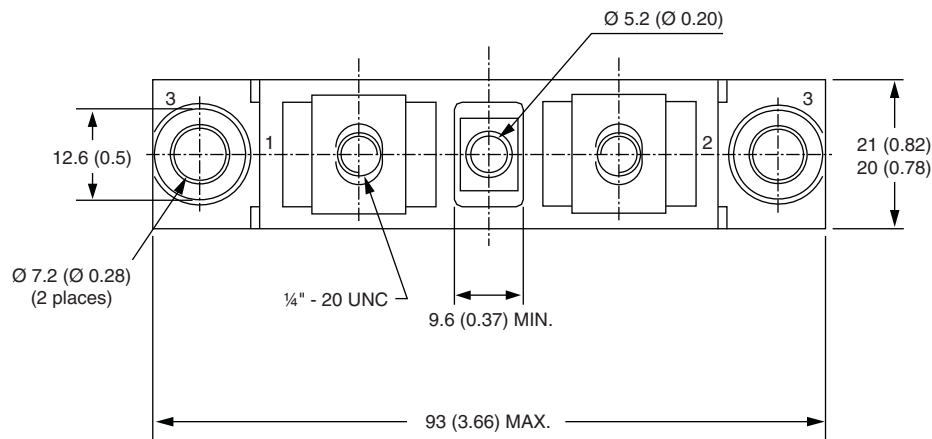
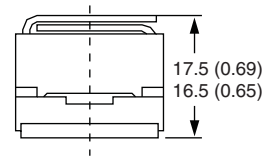
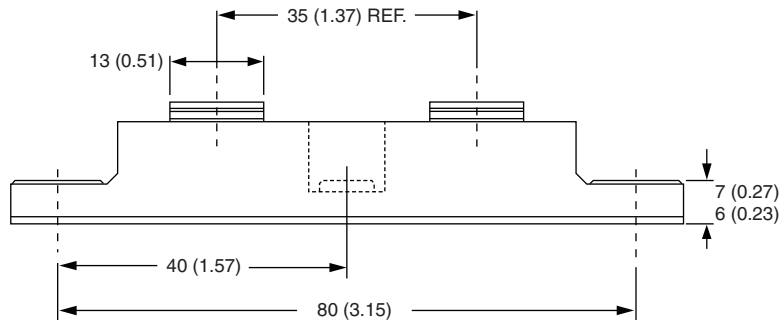


CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two diodes common cathode	C	

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)





## Disclaimer

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