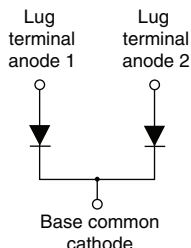


FRED Pt[®], Ultrafast Soft Recovery Diode Module, 400 A


TO-244


FEATURES

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


**RoHS
COMPLIANT**

BENEFITS

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

DESCRIPTION / APPLICATIONS

FRED Pt[®] 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 [®]
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	$I_{F(DC)}$	$T_C = 25\text{ }^{\circ}\text{C}$	572	A
		$T_C = 85\text{ }^{\circ}\text{C}$	397	
		$T_C = 137\text{ }^{\circ}\text{C}$	200	
Single pulse forward current per diode	I_{FSM}	$T_C = 25\text{ }^{\circ}\text{C}$	3330	
Maximum power dissipation	P_D	$T_C = 25\text{ }^{\circ}\text{C}$	789	W
		$T_C = 137\text{ }^{\circ}\text{C}$	200	
Operating junction and storage temperatures	T_J, T_{Stg}		-40 to +175	$^{\circ}\text{C}$

ELECTRICAL SPECIFICATIONS PER LEG ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage	V_{BR}	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	V_{FM}	$I_F = 200\text{ A}$	-	1.0	1.2	
		$I_F = 400\text{ A}$	-	1.12	1.37	
		$I_F = 200\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	-	0.83	1.0	
		$I_F = 400\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	-	0.98	1.21	
Reverse leakage current	I_{RM}	$T_J = 175\text{ }^{\circ}\text{C}, V_R = V_R\text{ rated}$	-	0.3	3.0	mA
Series inductance	L_S	From top of terminal hole to mounting plane	-	5	-	nH



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}	$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 50\text{ A,}$ $di_F/dt = 500\text{ A}/\mu\text{s,}$ $V_R = 200\text{ V}$	-	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	-

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	per leg	R _{thJC}	-	-	0.19	°C/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)	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			

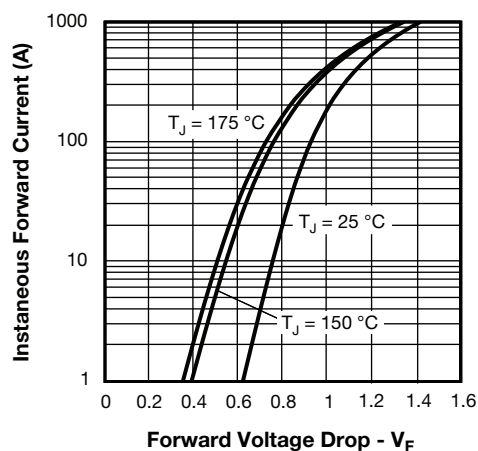


Fig. 1 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

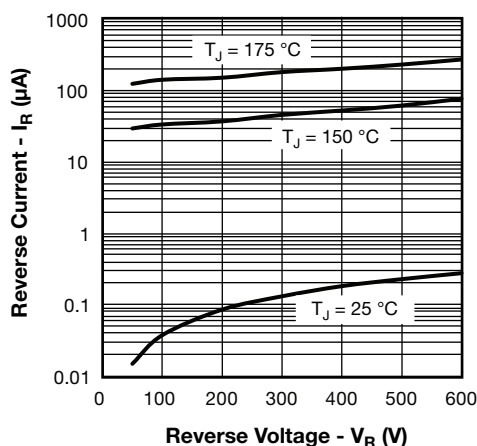


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

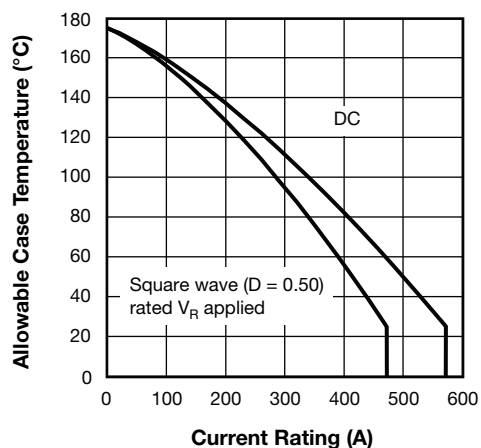


Fig. 3 - Maximum Current Rating Capability (Per Leg)

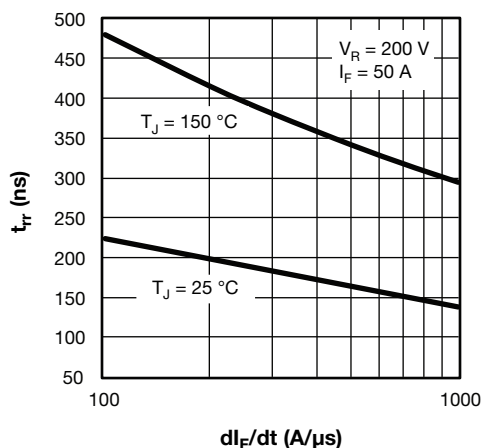
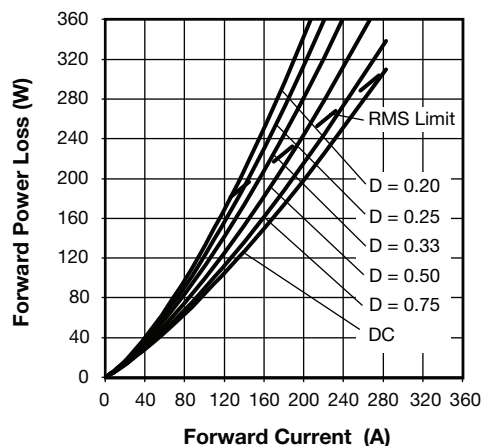
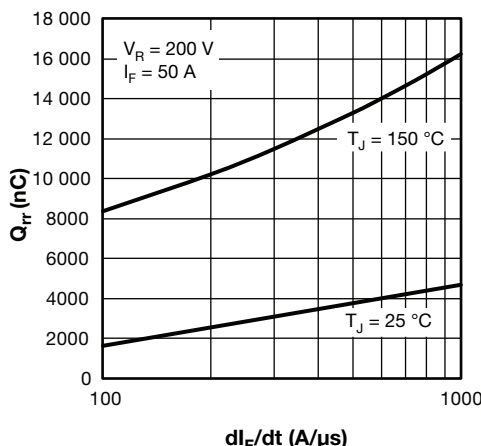
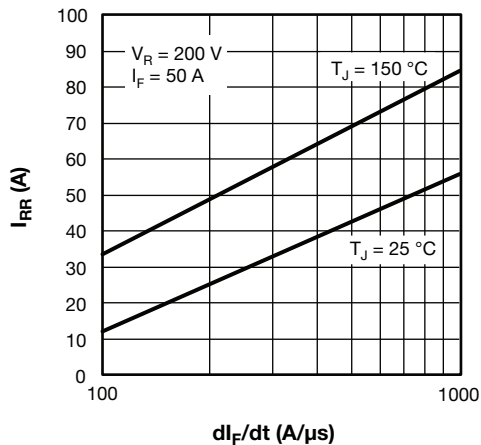

Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt


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

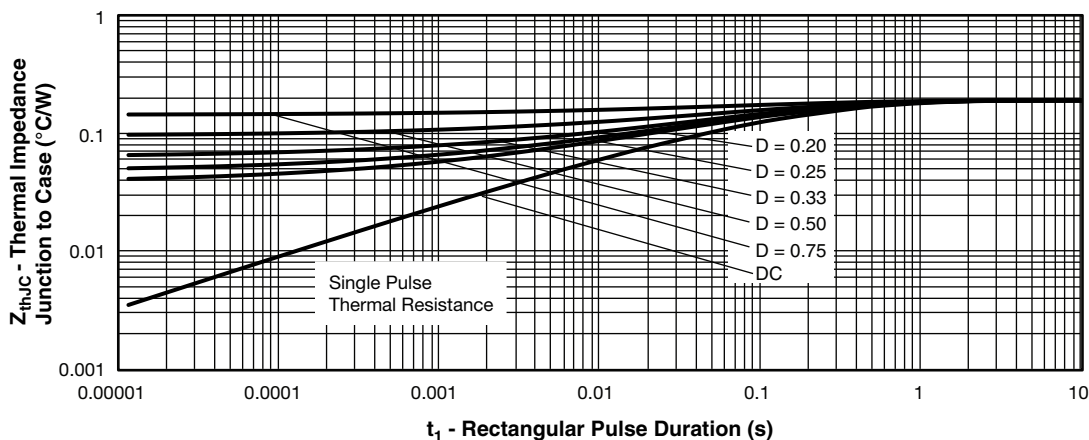


Fig. 8 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

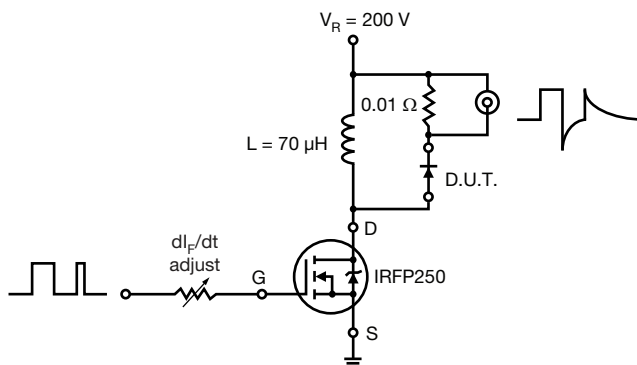


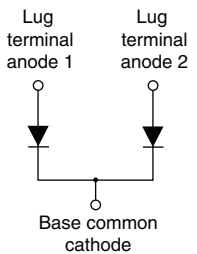
Fig. 9 - Reverse Recovery Parameter Test Circuit

ORDERING INFORMATION TABLE

Device code	VS-VS	UD	410	C	W	60
	①	②	③	④	⑤	⑥

- ① - Vishay Semiconductors product
- ② - UD = FRED Pt®
- 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)



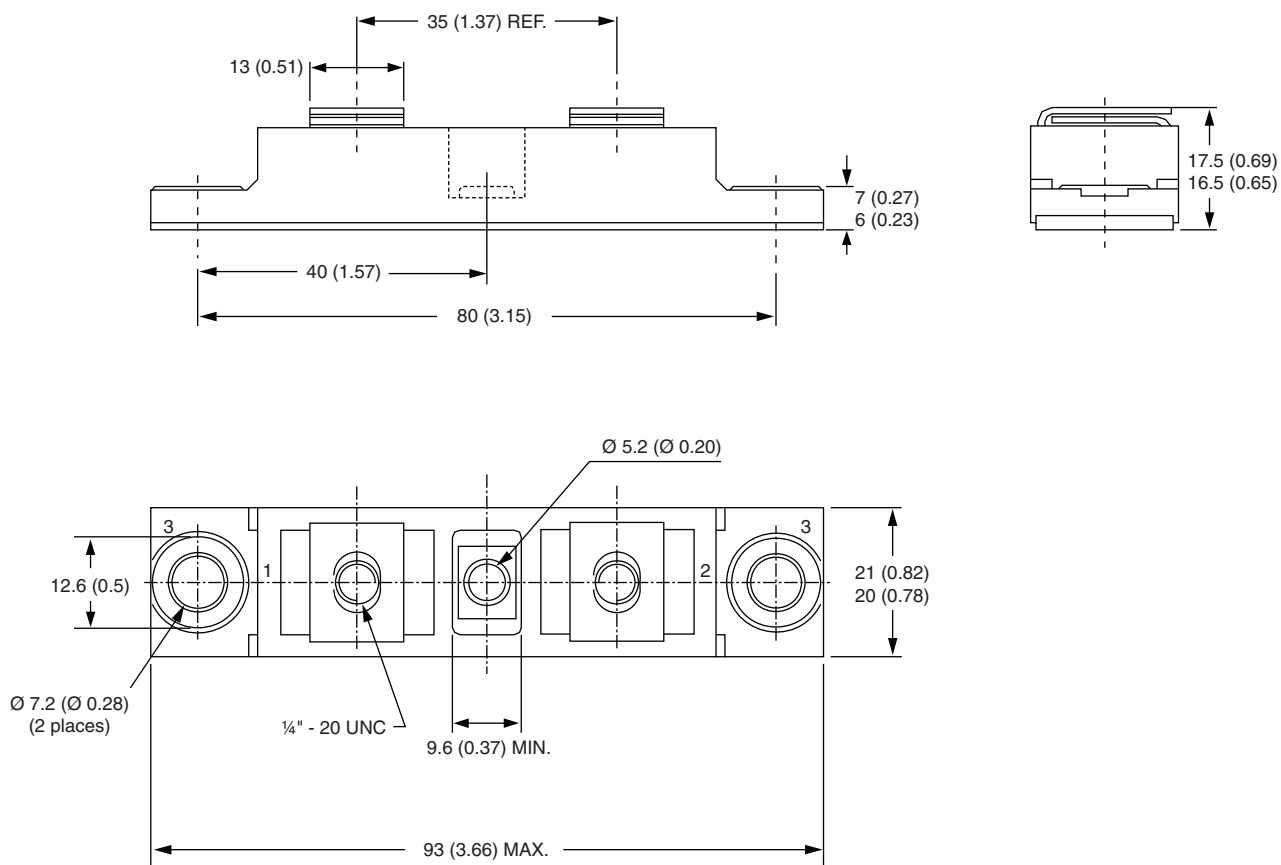
CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two diodes common cathode	C	

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95021



TO-244

DIMENSIONS in millimeters (inches)





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