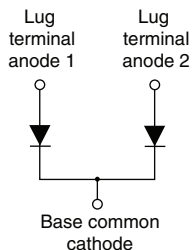


# **FRED Pt<sup>®</sup>, Ultrafast Soft Recovery Diode Module, 500 A**


**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](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	
$I_{F(AV)}$	500 A
$V_R$	600 V
$Q_{rr}$ (typical)	1770 nC
$t_{rr}$	270 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	$I_{F(DC)}$	$T_C = 25\text{ }^{\circ}\text{C}$	619	A
		$T_C = 85\text{ }^{\circ}\text{C}$	438	
		$T_C = 134\text{ }^{\circ}\text{C}$	250	
Single pulse forward current per diode	$I_{FSM}$	$T_C = 150\text{ }^{\circ}\text{C}$	4000	
Maximum power dissipation	$P_D$	$T_C = 25\text{ }^{\circ}\text{C}$	937	W
		$T_C = 134\text{ }^{\circ}\text{C}$	253	
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	$V_{BR}$	$I_R = 200\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	$V_{FM}$	$I_F = 250\text{ A}$	-	0.97	1.170	
		$I_F = 500\text{ A}$	-	1.08	-	
		$I_F = 250\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	-	0.82	-	
		$I_F = 500\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	-	0.97	-	
Reverse leakage current	$I_{RM}$	$T_J = 175\text{ }^{\circ}\text{C}, V_R = V_R\text{ rated}$	-	0.33	-	mA

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	270	-	ns
		$T_J = 150\text{ }^{\circ}\text{C}$	-	590	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	9	-	A
		$T_J = 150\text{ }^{\circ}\text{C}$	-	22	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	1770	-	nC
		$T_J = 150\text{ }^{\circ}\text{C}$	-	7820	-	

 $I_F = 50\text{ A}$ ,  
 $di_F/dt = 50\text{ A}/\mu\text{s}$ ,  
 $V_R = 400\text{ V}$ 
**THERMAL - MECHANICAL SPECIFICATIONS**

THERMAL MECHANICAL SPECIFICATIONS						
PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	per leg	$R_{thJC}$	-	-	0.16	°C/W
	per module		-	-	0.08	
Thermal resistance, case to heatsink		$R_{thCS}$	-	0.1	-	
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			

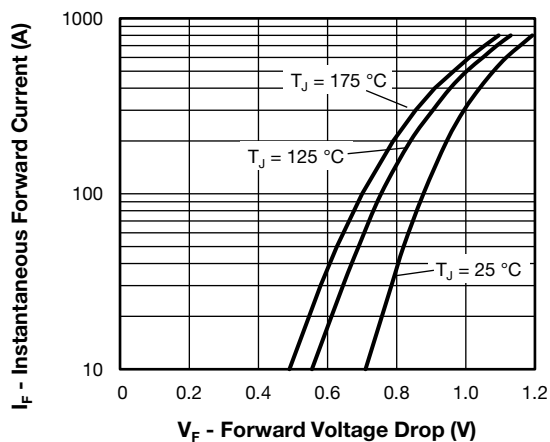


Fig. 1 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Diode)

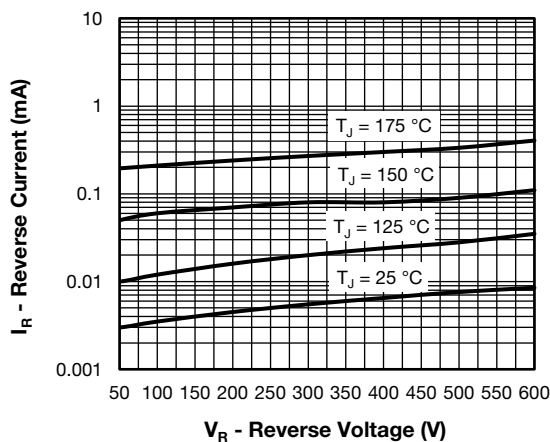


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Diode)

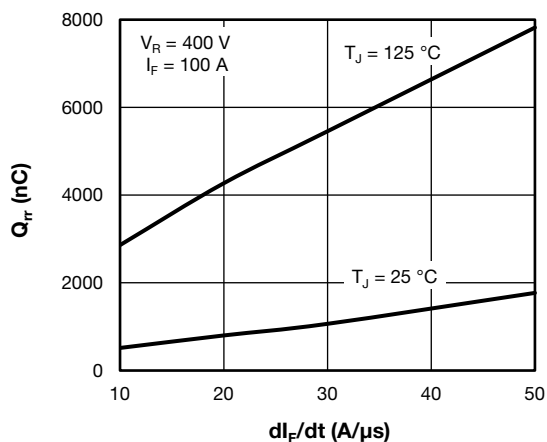


Fig. 3 - Typical Reverse Recovery Charge vs  $dI_F/dt$  (Per Diode)

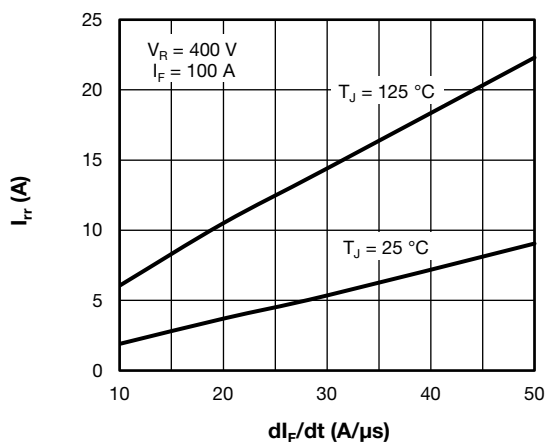


Fig. 5 - Typical Reverse Recovery Current vs.  $dI_F/dt$  (Per Diode)

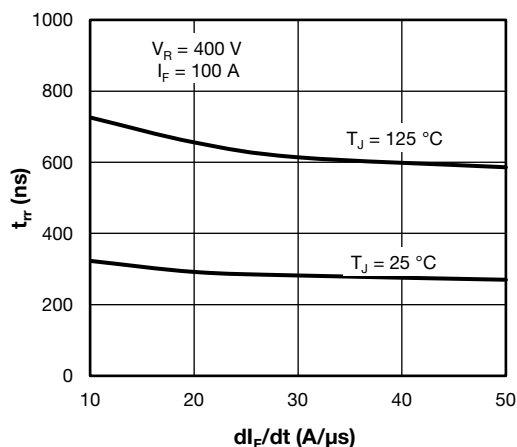


Fig. 4 - Typical Reverse Recovery Time vs  $dI_F/dt$  (Per Diode)

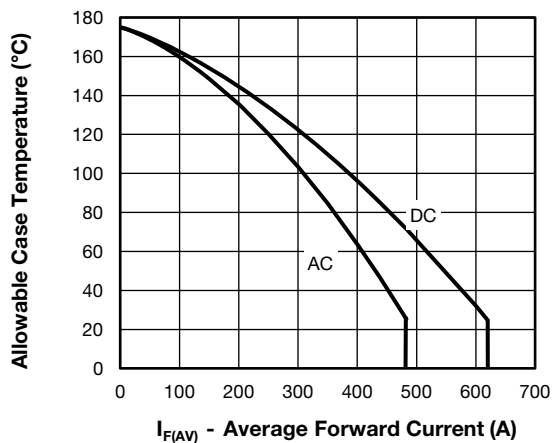


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

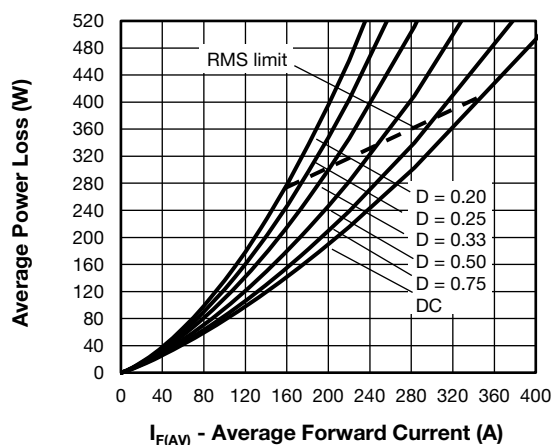


Fig. 7 - Average Power Loss vs. Average Forward Current (Forward Power Loss Characteristics)

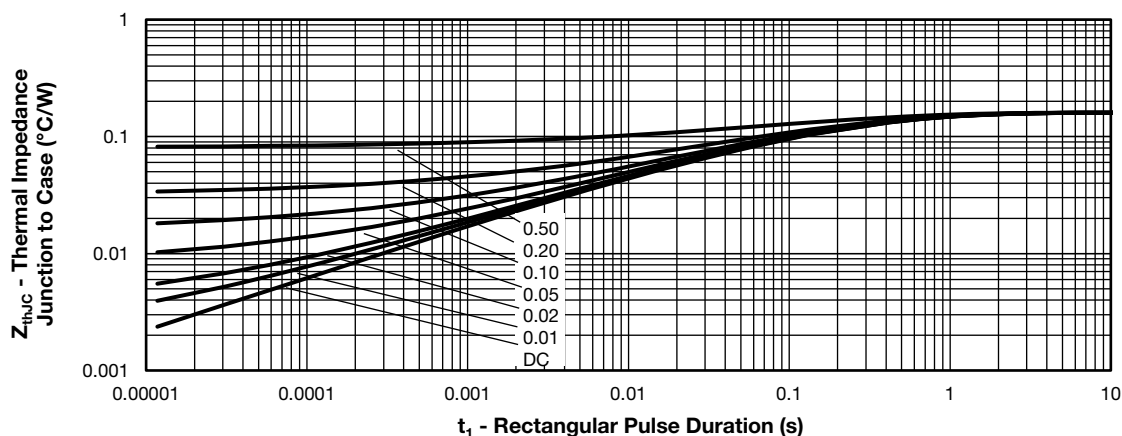


Fig. 8 -  $Z_{thJC}$  - Maximum Thermal Impedance Junction to Case vs.  $t_1$  Rectangular Pulse Duration

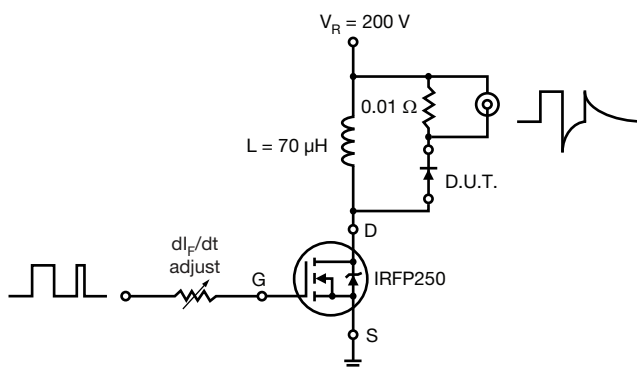


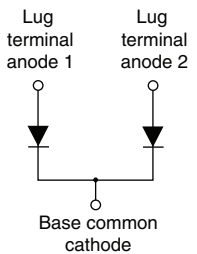
Fig. 9 - Reverse Recovery Parameter Test Circuit

## ORDERING INFORMATION TABLE

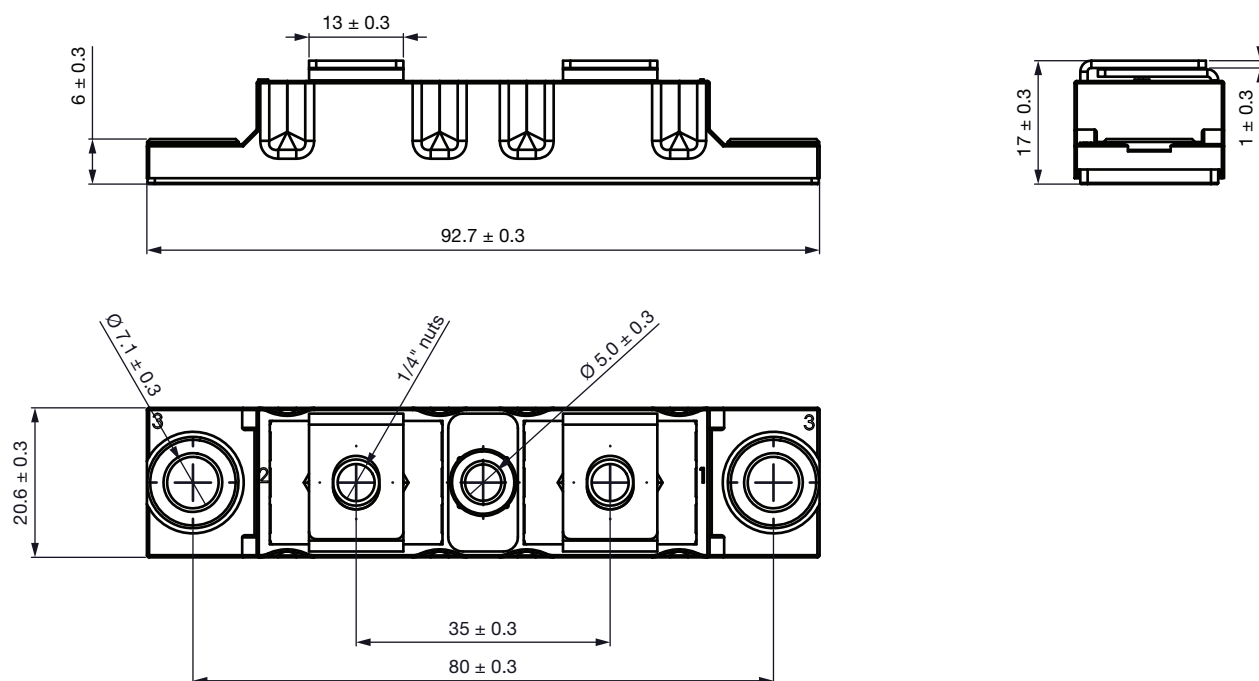
Device code	VS-VS	UD	510	C	W	60
	①	②	③	④	⑤	⑥

- ① - Vishay Semiconductors product
- ② - UD = FRED Pt®
- ③ - Current rating (510 = 500 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	

**DIMENSIONS** in millimeters (inches)





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