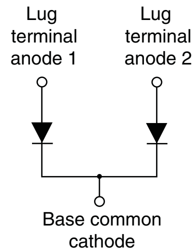
FRED Pt®
Ultrafast Soft Recovery Diode Module, 360 A

TO-244



FEATURES

- Very low Q_{rr} and t_{rr}
- UL approved file E222165
- Designed and qualified for industrial level
- 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

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 a significant portion of the total losses.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	360 A
V_R	400 V
Q_{rr} (typical)	243 nC
t_{rr}	74 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		400	V
Continuous forward current per diode	$I_{F(AV)}$	T_C = 25 °C	510	A
		T_C = 85 °C	305	
		T_C = 116 °C	180	
Single pulse forward current per diode	I_{FSM}	T_C = 25 °C	2880	
Maximum power dissipation	P_D	T_C = 25 °C	570	W
		T_C = 110 °C	180	
Operating junction and storage temperatures	T_J, T_{Stg}		-40 to +150	°C

ELECTRICAL SPECIFICATIONS PER LEG (T_J = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage	V_{BR}	I_R = 100 μA	400	-	-	V
Forward voltage	V_{FM}	I_F = 180 A	-	1.09	1.27	
		I_F = 360 A	-	1.23	1.50	
		I_F = 180 A, T_J = 150 °C	-	0.88	0.96	
		I_F = 360 A, T_J = 150 °C	-	1.04	1.18	
Reverse leakage current	I_{RM}	T_J = 150 °C, V_R = V_R rated	-	0.26	1.28	mA
Series inductance	L_S	From top of terminal hole to mounting plane	-	5	-	nH

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time	t_{rr}	I_F = 1.0 A, dI_F/dt = 200 A/μs, V_R = 30 V		-	40	69	ns
		T_J = 25 °C	I_F = 180 A, dI_F/dt = 200 A/μs, V_R = 200 V	-	74	-	
		T_J = 150 °C		-	171	-	
Peak recovery current	I_{RRM}	I_F = 1.0 A, dI_F/dt = 200 A/μs, V_R = 30 V		-	5.1	-	A
		I_F = 180 A, dI_F/dt = 200 A/μs, V_R = 200 V		-	6.6	-	
		I_F = 180 A, dI_F/dt = 200 A/μs, V_R = 200 V, T_J = 150 °C		-	15.2	-	
Reverse recovery charge	Q_{rr}	I_F = 1.0 A, dI_F/dt = 200 A/μs, V_R = 30 V		-	125	-	nC
		I_F = 180 A, dI_F/dt = 200 A/μs, V_R = 200 V		-	243	-	
		I_F = 180 A, dI_F/dt = 200 A/μs, V_R = 200 V, T_J = 150 °C		-	1295	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Thermal resistance, junction-to-case per leg	R_{thJC}		-	-	0.19	°C/W
Thermal resistance, junction-to-case per module			-	-	0.095	
Thermal resistance, case-to-heatsink (flag greased surface)	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			

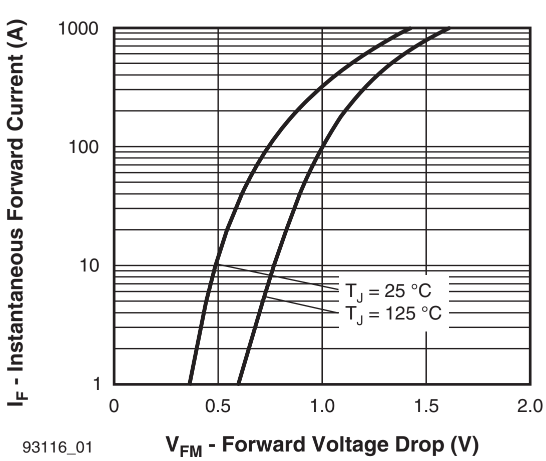


Fig. 1 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

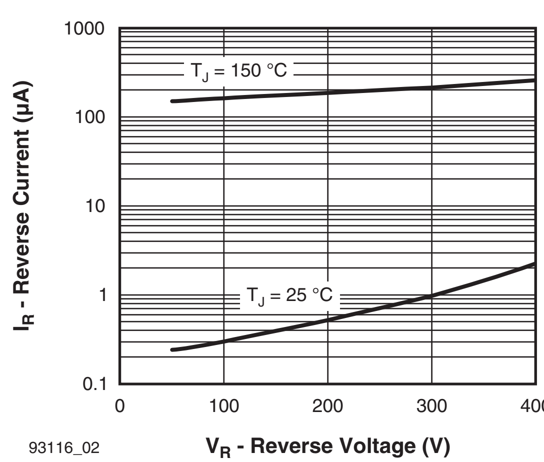


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

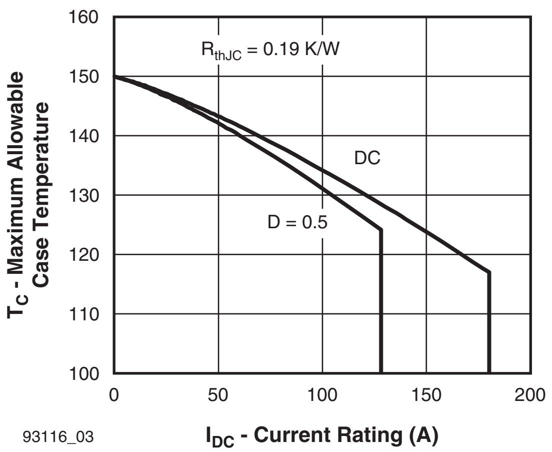


Fig. 3 - Maximum Current Rating Capability (Per Leg)

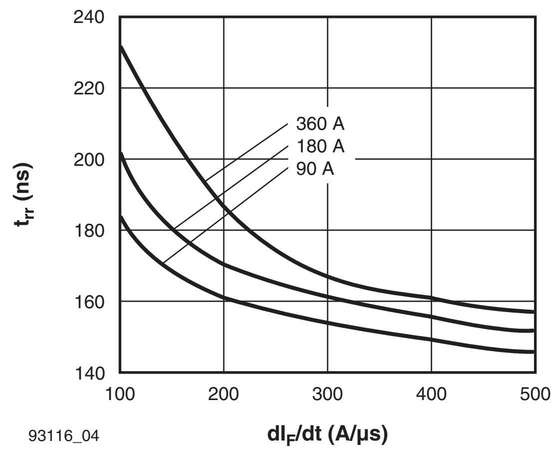


Fig. 4 - Typical Reverse Recovery Time vs. dI_F/dt T_J = 125 °C (Per Leg)

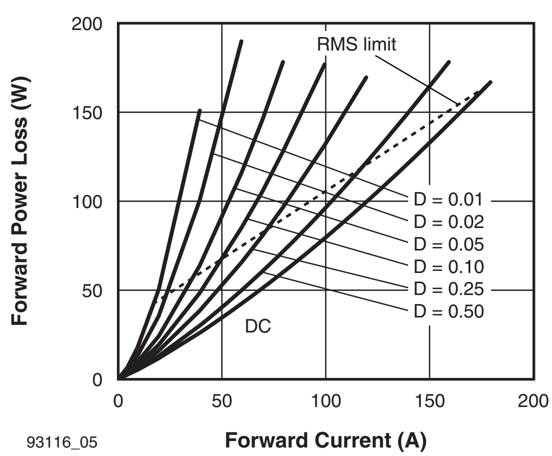


Fig. 5 - Forward Power Loss Characteristics

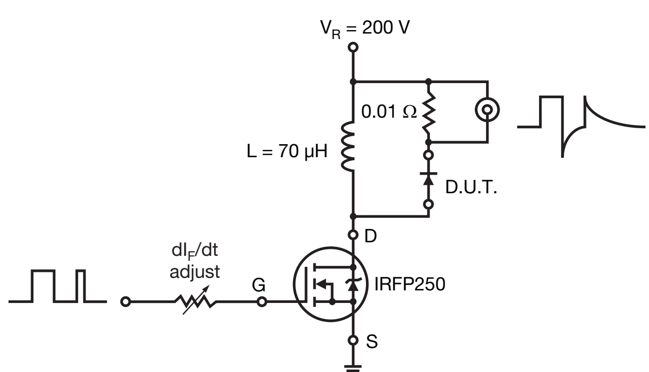
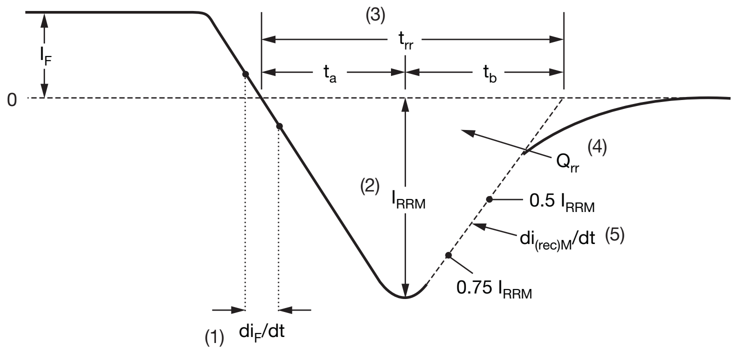


Fig. 6 - Reverse Recovery Parameter Test Circuit



(1) di_F/dt - rate of change of current through zero crossing

(2) I_{RRM} - peak reverse recovery current

(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current.

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 7 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code	VS-VS	UD	360	C	W	40
	1	2	3	4	5	6

1 - Vishay Semiconductors product

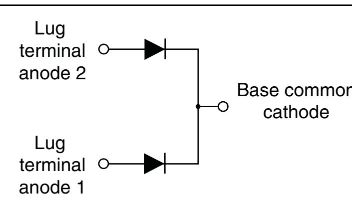
2 - Type of device: UD = FRED Pt®

3 - Current rating (360 = 360 A)

4 - Circuit configuration:
C = two diodes common cathode

5 - Type of device:
W = TO-244 wire bondable not insulated

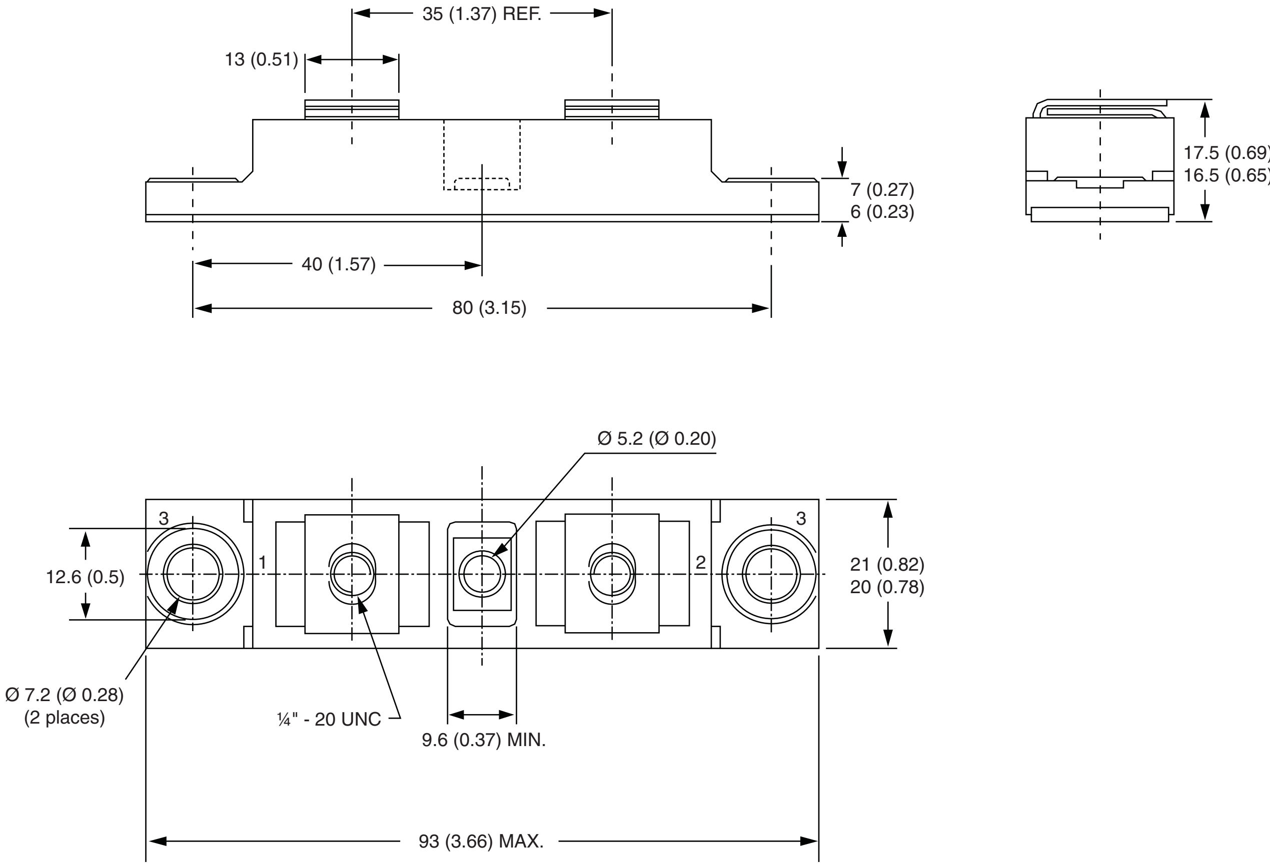
6 - Voltage rating (40 = 400 V)

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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