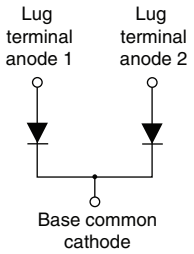
FRED Pt®
Ultrafast Soft Recovery Diode Module, 480 A

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

Pb-free
RoHS COMPLIANT

BENEFITS

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

DESCRIPTION

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	
$I_{F(AV)}$	480 A
V_R	200 V
Q_{rr} (typical)	249 nC
t_{rr}	87 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		200	V
Continuous forward current	$I_{F(AV)}$	T_C = 127 °C	240	A
Single pulse forward current	I_{FSM}	T_C = 25 °C	2300	
Storage temperature range	T_{Stg}		-40 to +150	°C
Operating junction temperature range	T_J		-40 to +175	°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	200	-	-	V
Forward voltage	V_{FM}	I_F = 200 A	-	0.94	1.0	
		I_F = 400 A	-	1.06	1.14	
		I_F = 200 A, T_J = 175 °C	-	0.73	0.80	
		I_F = 400 A, T_J = 175 °C	-	0.88	0.99	
Reverse leakage current	I_{RRM}	T_J = 175 °C, V_R = V_R rated	-	0.67	1.5	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 = 50 A, dI_F/dt = 200 A/μs, V_R = 200 V, T_J = 25 °C	-	87	130	ns
		I_F = 50 A, dI_F/dt = 200 A/μs, V_R = 100 V, T_J = 125 °C	-	95	155	
Peak recovery current	I_{RR}	I_F = 50 A, dI_F/dt = 200 A/μs, V_R = 200 V, T_J = 25 °C	-	6	11.5	A
		I_F = 50 A, dI_F/dt = 200 A/μs, V_R = 100 V, T_J = 125 °C	-	10.62	16.5	
Reverse recovery charge	Q_{rr}	I_F = 50 A, dI_F/dt = 200 A/μs, V_R = 200 V, T_J = 25 °C	-	249	420	nC
		I_F = 50 A, dI_F/dt = 200 A/μs, V_R = 100 V, T_J = 125 °C	-	493	980	

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THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		-	-	-40 to +175	°C
Thermal resistance, junction-to-case per leg	R_{thJC}	DC operation	-	-	0.19	°C/W
Thermal resistance, junction-to-case per module			-	-	0.095	
Thermal resistance, case-to-heatsink (flag greased surface)	R_{thCS}	Flag, greased, surface	-	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 module			

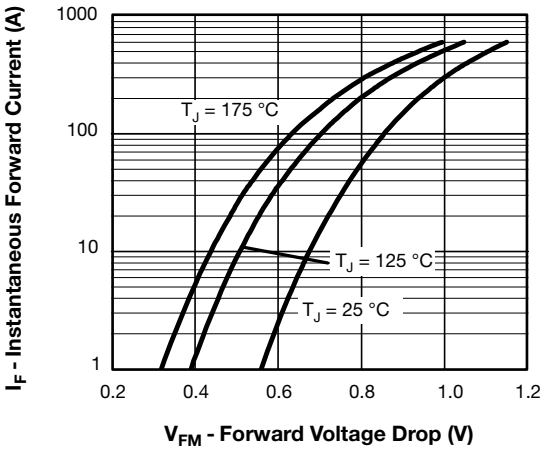

Fig. 1 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

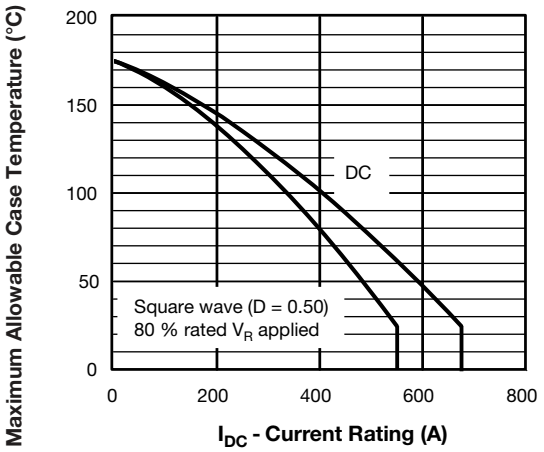

Fig. 3 - Maximum Current Rating Capability (Per Leg)

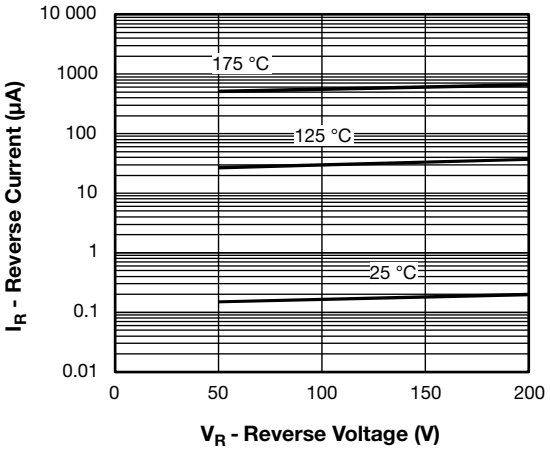

Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

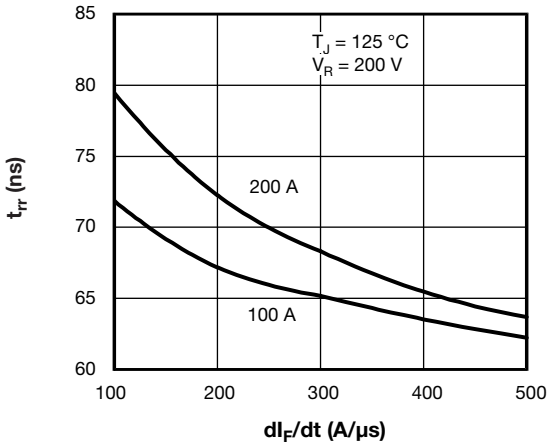

Fig. 4 - Typical Recovery Time vs. dI_F/dt (Per Leg)

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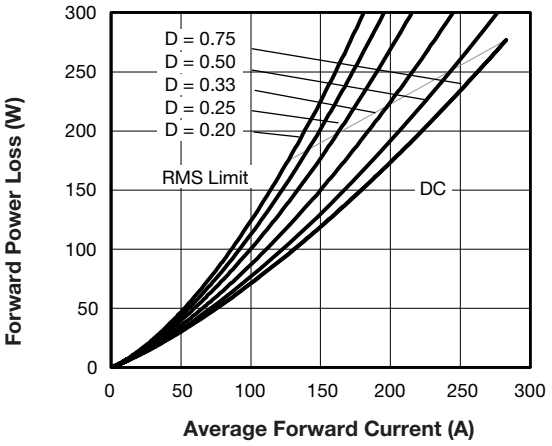

Fig. 5 - Forward Power Loss Characteristics (Per Leg)

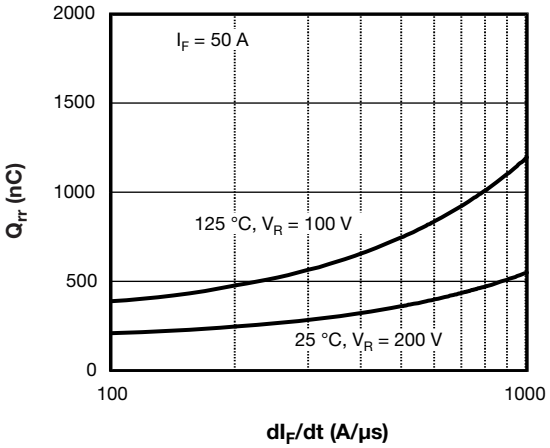

Fig. 7 - Typical Reverse Recovery Charge vs. dI_F/dt (Per Leg)

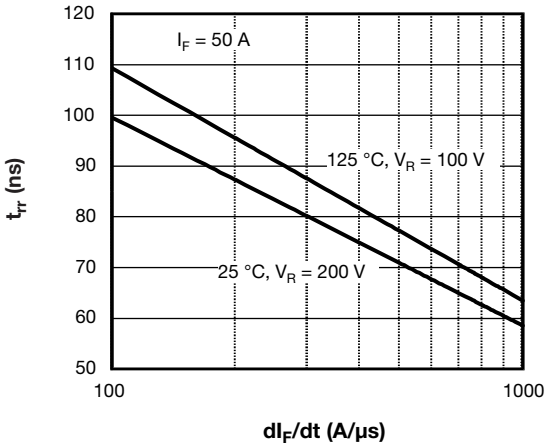

Fig. 6 - Typical Reverse Recovery Time vs. dI_F/dt (Per Leg)

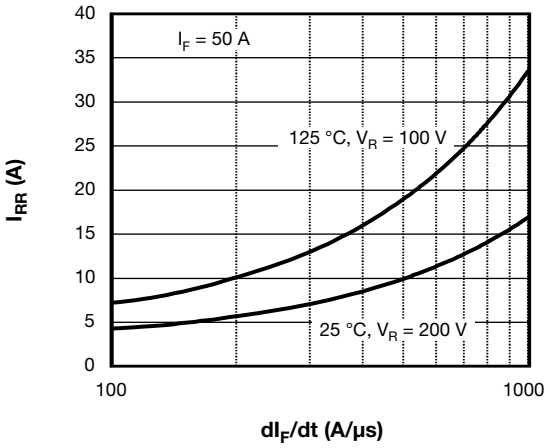

Fig. 8 - Typical Reverse Recovery Current vs. dI_F/dt (Per Leg)

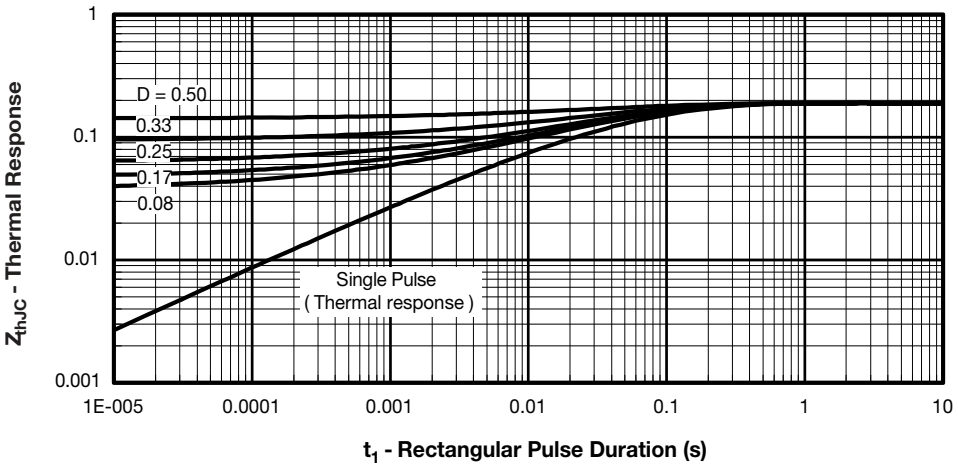

Fig. 9 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

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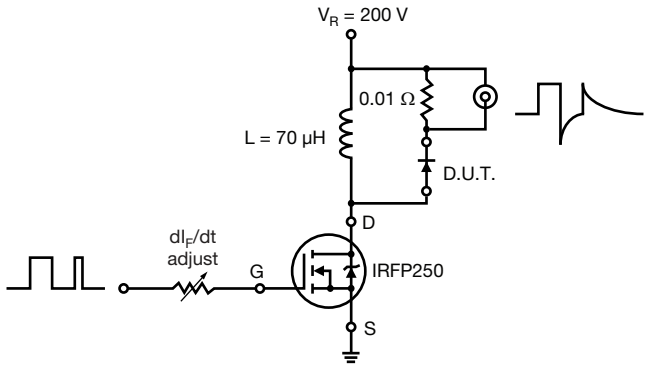
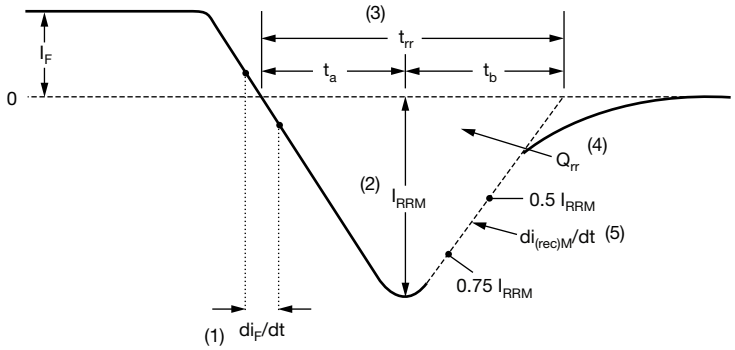


Fig. 10 - Reverse Recovery Parameter Test Circuit
(All recovery characteristics have been determined using test circuit shown)



(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. 11 - Reverse Recovery Waveform and Definitions

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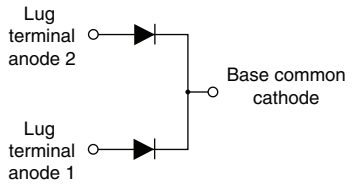
ORDERING INFORMATION TABLE

Device code

VS-VS	UD	400	C	W	20
1	2	3	4	5	6

1 - VS-VS = Vishay Semiconductors product
2 - Ultrafast diode
3 - Current rating (400 = 400 A)
4 - Circuit configuration:
C = not isolated
5 - Type of device:
W = TO-244 wire bondable not isolated
6 - Voltage rating (20 = 200 V)

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

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

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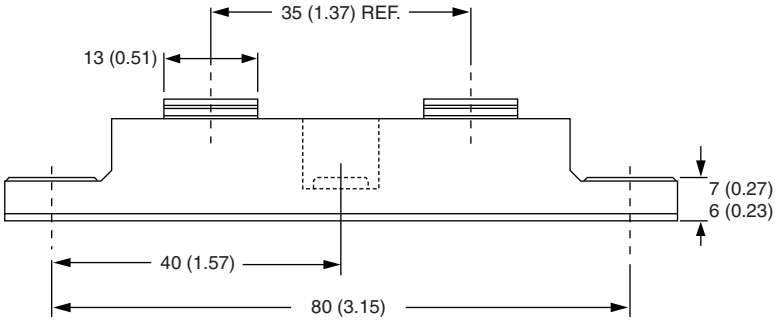
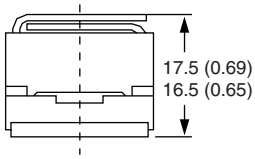
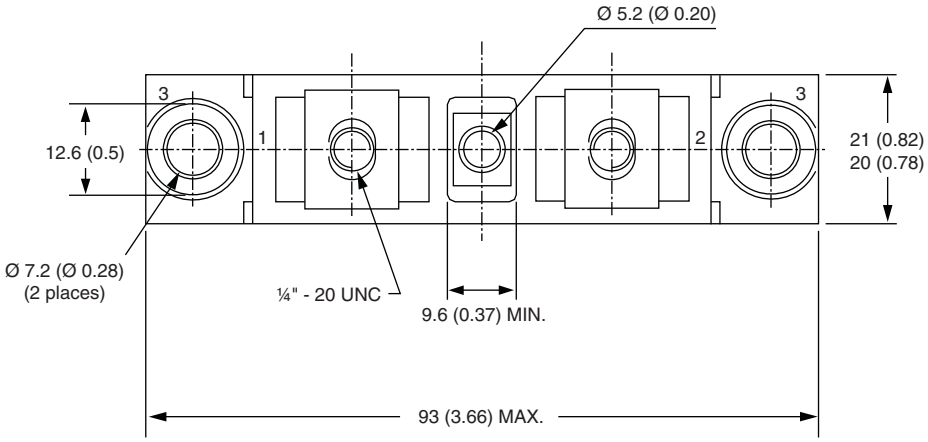
TO-244

DIMENSIONS in millimeters (inches)







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