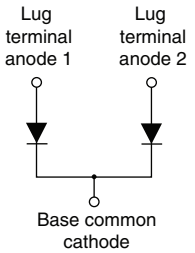
FRED Pt® Gen 5, Ultrafast Rectifier Diode, 600 V, 600 A



TO-244



FEATURES

- Ultrafast and optimized Q_{rr}
- Best in class forward voltage drop and switching losses trade off
- Optimized for high speed operation
- 175 °C maximum operation junction temperature
- 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

Featuring a unique combination of low conduction and switching losses the FRED Pt® Gen 5 is the right choice for soft switched and resonant converters, as well as medium frequency hard switching converters.
These devices are also ideally suited for HF welding, power converters, and other applications where switching losses are significant portion of the total losses.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$ at 77 °C (per module)	600 A
V_R	600 V
Q_{rr} (typical)	800 nC
t_{rr}	78 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 °C	505	A
		T_C = 85 °C	359	
		T_C = 106 °C	271	
Non-repetitive single pulse forward current per diode	I_{FSM}	T_C = 25 °C	2200	
Maximum power dissipation per diode	P_D	T_C = 25 °C	938	W
		T_C = 106 °C	431	
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 = 400 µA	600	-	-	V
Forward voltage	V_{FM}	I_F = 300 A	-	1.34	1.70	
		I_F = 600 A	-	1.52	2.25	
		I_F = 300 A, T_J = 150 °C	-	1.11	-	
		I_F = 600 A, T_J = 150 °C	-	1.35	-	
Reverse leakage current	I_{RM}	T_J = 150 °C, V_R = 600 V	-	0.4	1.0	mA
Series inductance	L_S	From top of terminal hole to mounting plane	-	5	-	nH
Maximum junction capacitance per leg	C_T	V_{DC} = 5 V, f = 1 MHz, 25 °C	-	-	1.8	nF

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DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time	t_{rr}	T_J = 25 °C	I_F = 50 A, dI_F/dt = 200 A/µs, V_R = 300 V	-	78	-	ns
		T_J = 125 °C		-	193	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	9.0	-	A
		T_J = 125 °C		-	25	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	880	-	nC
		T_J = 125 °C		-	4000	-	

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}	-	0.10	-	
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			

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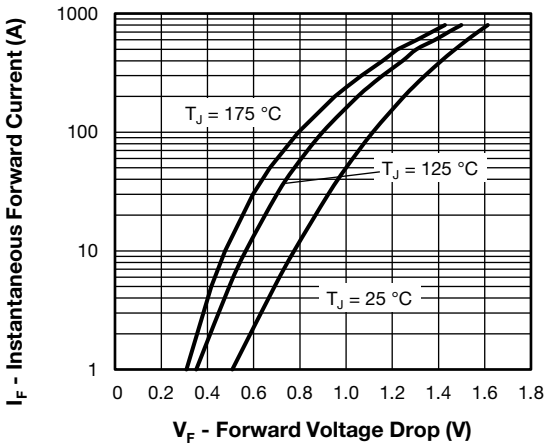

Fig. 1 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Diode)

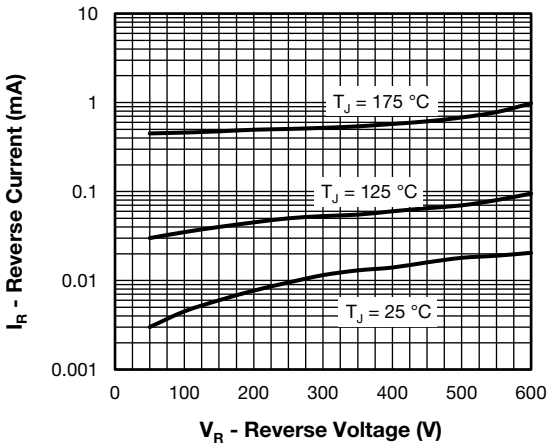

Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Diode)

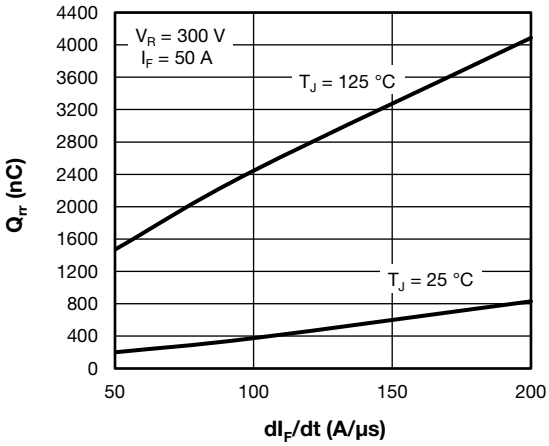

Fig. 3 - Typical Reverse Recovery Charge vs dI_F/dt (Per Diode)

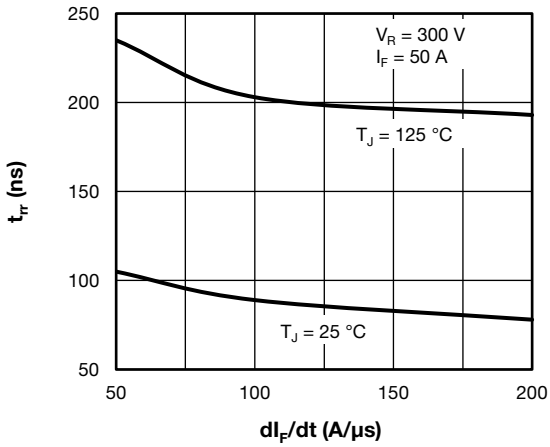

Fig. 4 - Typical Reverse Recovery Time vs dI_F/dt (Per Diode)

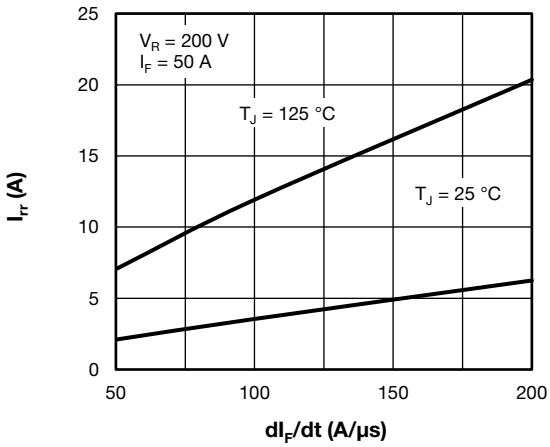

Fig. 5 - Typical Reverse Recovery Current vs dI_F/dt (Per Diode)

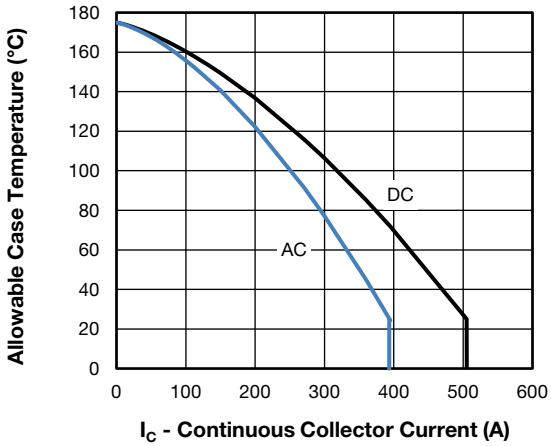

Fig. 6 - Maximum Continuous Forward Current vs. Case Temperature

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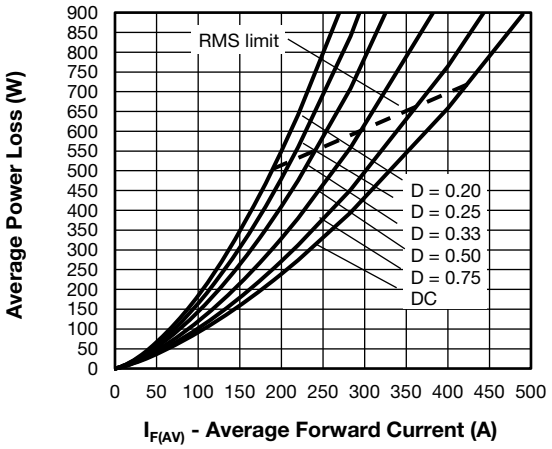

Fig. 7 - Average Power Loss vs. Average Forward Current (Forward Power Loss Characteristics)

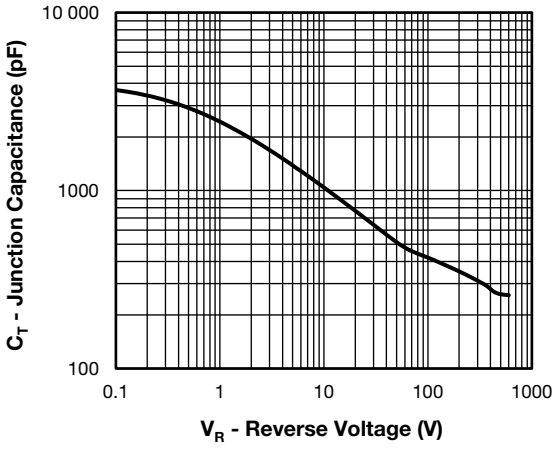

Fig. 8 - Typical Junction Capacitance vs. Reverse Voltage

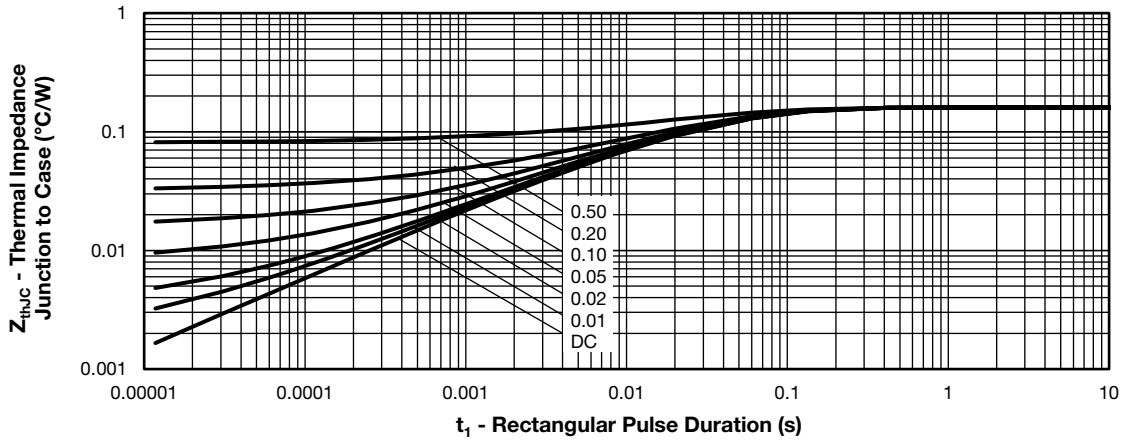

Fig. 9 - Z_{thJC} Maximum Thermal Impedance Junction to Case vs. t_1 Rectangular Pulse Duration

ORDERING INFORMATION TABLE

Device code

VS-VS	5HD	600	C	W	60
1	2	3	4	5	6

- 1 - Vishay Semiconductors product
- 2 - 5HD = high speed FRED Pt® Gen 5
- 3 - Current rating (600 = 600 A)
- 4 - Circuit configuration:
  C = two diodes common cathode
- 5 - W = TO-244 wire bondable not isolated
- 6 - Voltage rating (60 = 600 V)

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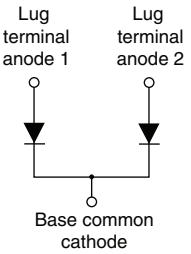
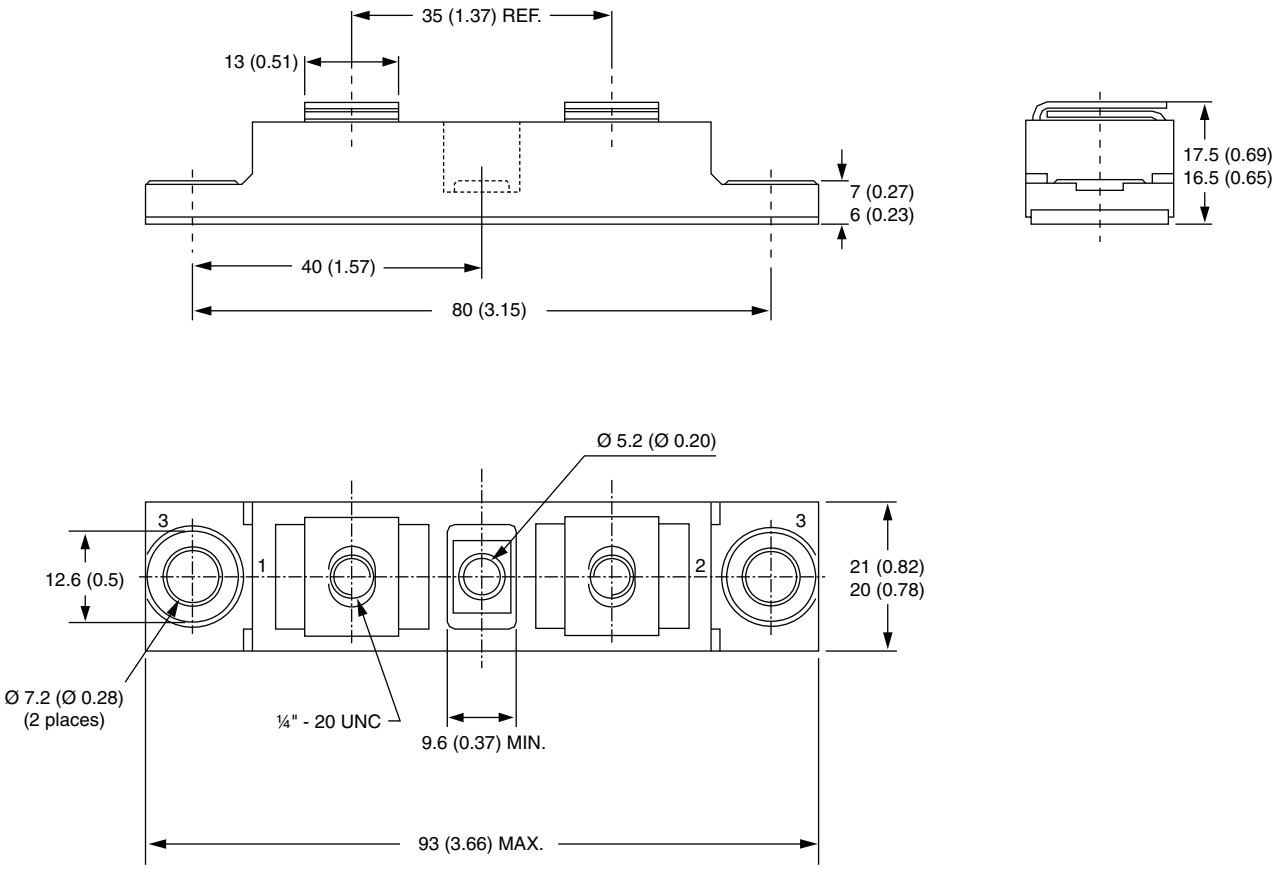
CIRCUIT CONFIGURATION		
CIRCUIT	**CIRCUIT CONFIGURATION CODE**	**CIRCUIT DRAWING**
Two diodes common cathode	C	

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

DIMENSIONS in millimeters (inches)



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