FRED Pt® Gen 5
Hyperfast Rectifier Diode, 600 V, 120 A

SOT-227

PRIMARY CHARACTERISTICS	
V_R	600 V
V_F (typical) at 60 A, per diode	1.6 V
t_{rr} (typical) at 60 A, per diode	63 ns
$I_{F(DC)}$ per module at T_C = 100 °C	120 A
Type	Modules - diode, FRED Pt®
Package	SOT-227
Circuit configuration	Two separate diodes, parallel pin-out

FEATURES

- Hyperfast and optimized Q_{rr}
- Best in class forward voltage drop and switching losses trade off
- Optimized for high speed operation
- 175 °C maximum operating junction temperature
- Electrically isolated base plate
- Large creepage distance between terminal
- Simplified mechanical designs, rapid assembly
- Designed and qualified for industrial level
- UL approved file E78996
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

DESCRIPTION / APPLICATIONS

Featuring a unique combination of low conduction and switching losses, the VS-U5FX120FA60 is the right choice for high frequency converters, both soft switched / resonant. The semiconductor in the SOT-227 package is isolated from the copper base plate, allowing for common heatsinks and compact assemblies to be built.

These modules are specifically designed to improve efficiency of PFC and output rectification stages of EV / HEV battery charging stations, booster stage of solar inverters, and UPS applications, these devices are perfectly matched to operate with MOSFETs or high speed IGBTs.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	V_R		600	V
Continuous forward current per diode	I_F	T_C = 100 °C	60	A
Single pulse forward current per diode	I_{FSM}	T_J = 25 °C	450	
Maximum power dissipation per module	P_D	T_C = 100 °C	214	W
RMS isolation voltage	V_{ISOL}	Any terminal to case, t = 1 min	2500	V
Operating junction and storage temperature range	T_J, T_{Stg}		-55 to +175	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	V_{BR}	I_R = 100 µA	600	-	-	V
Forward voltage	V_{FM}	I_F = 60 A	-	1.6	2.2	
		I_F = 60 A, T_J = 150 °C	-	1.26	-	
Reverse leakage current	I_{RM}	V_R = 600 V	-	0.23	40	µA
		T_J = 125 °C, V_R = 600 V	-	27	-	
		T_J = 150 °C, V_R = 600 V	-	128	-	

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 = 60 A, di_F/dt = 1000 A/µs, V_R = 400 V	-	63	-	ns
		T_J = 125 °C		-	79	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	14	-	A
		T_J = 125 °C		-	32	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	0.4	-	µC
		T_J = 125 °C		-	1.6	-	
Junction capacitance	C_T	V_R = 600 V, f = 1 MHz		-	46.1	-	pF

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Thermal resistance junction to case, per diode	R_{thJC}		-	-	0.70	°C/W
Thermal resistance junction to case, per module			-	-	0.35	
Thermal resistance case to heatsink, per module	R_{thCS}	Flat, greased surface	-	0.05	-	
Weight			-	30	-	g
Mounting torque		Torque per diode	-	-	1.1 (9.7)	Nm (lbf.in)
		Torque to heatsink	-	-	1.8 (15.9)	Nm (lbf.in)
Case style			SOT-227			

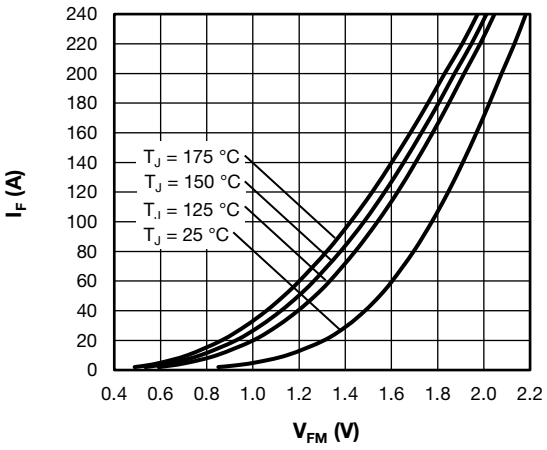


Fig. 1 - Typical Forward Voltage Drop Characteristics

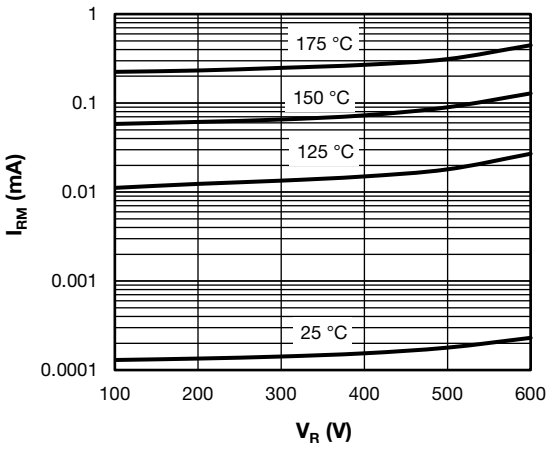


Fig. 2 - Typical Values of Reverse Current

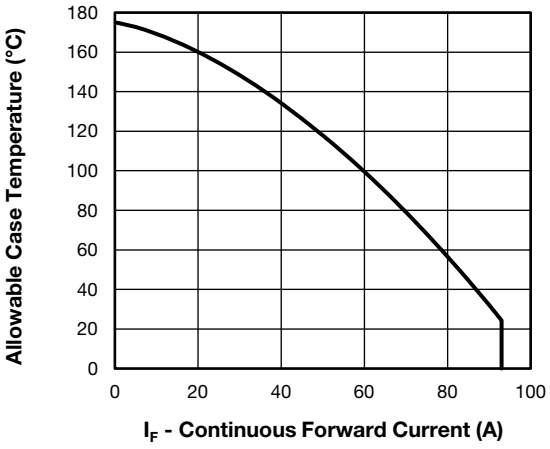


Fig. 3 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Diode)

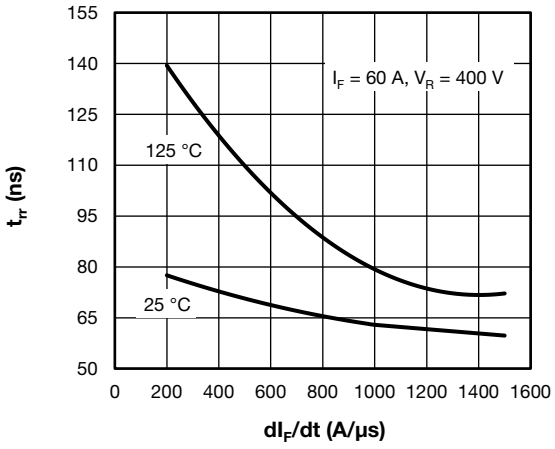


Fig. 6 - Diode Reverse Recovery Time vs. dI_Fdt

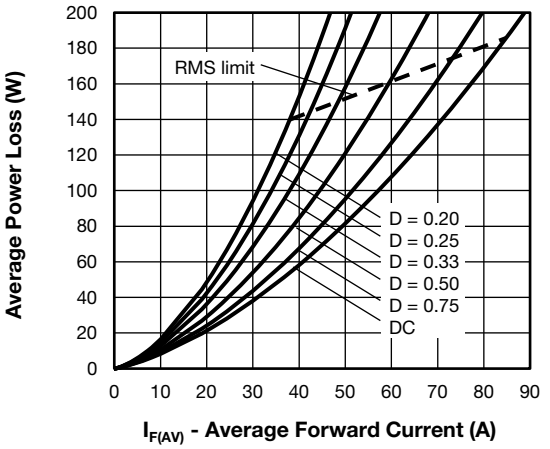


Fig. 4 - Average Power Loss vs. Average Forward Current

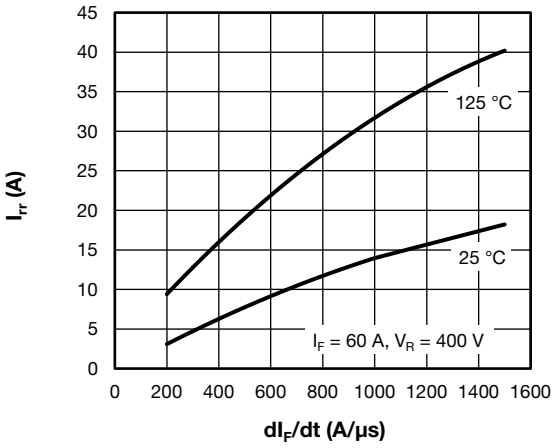


Fig. 7 - Diode Reverse Recovery Current vs. dI_Fdt

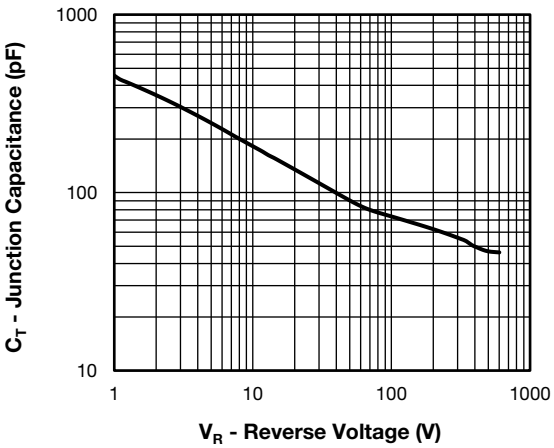


Fig. 5 - Typical Junction Capacitance vs. Reverse Voltage

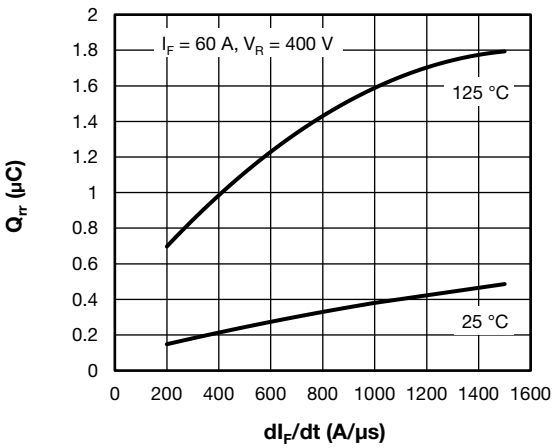


Fig. 8 - Diode Reverse Recovery Charge vs. dI_Fdt

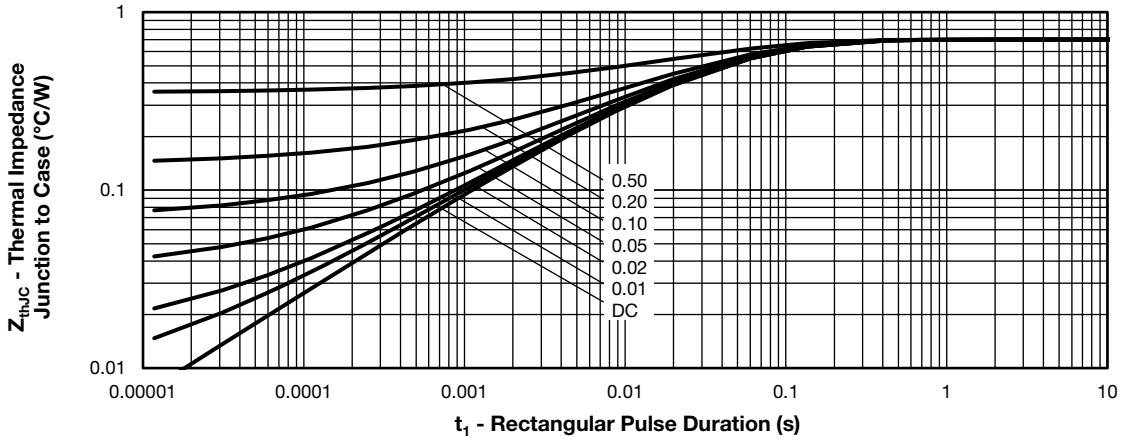


Fig. 9 - Maximum Thermal Impedance Junction to Case

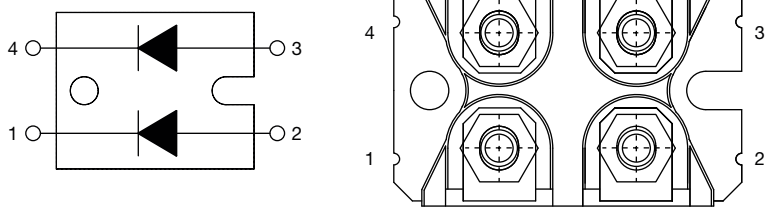
ORDERING INFORMATION TABLE

Device code

VS-	U5F	X	120	F	A	60
1	2	3	4	5	6	7

1 - Vishay Semiconductors product
2 - U5F = Gen 5 FRED Pt® family
3 - X = Hyperfast FRED Pt® diode
4 - Current rating per module (120 = 120 A)
5 - F = circuit configuration (two separate diodes, parallel pin-out)
6 - Package indicator (SOT-227 standard insulated base)
7 - Voltage rating (60 = 600 V)

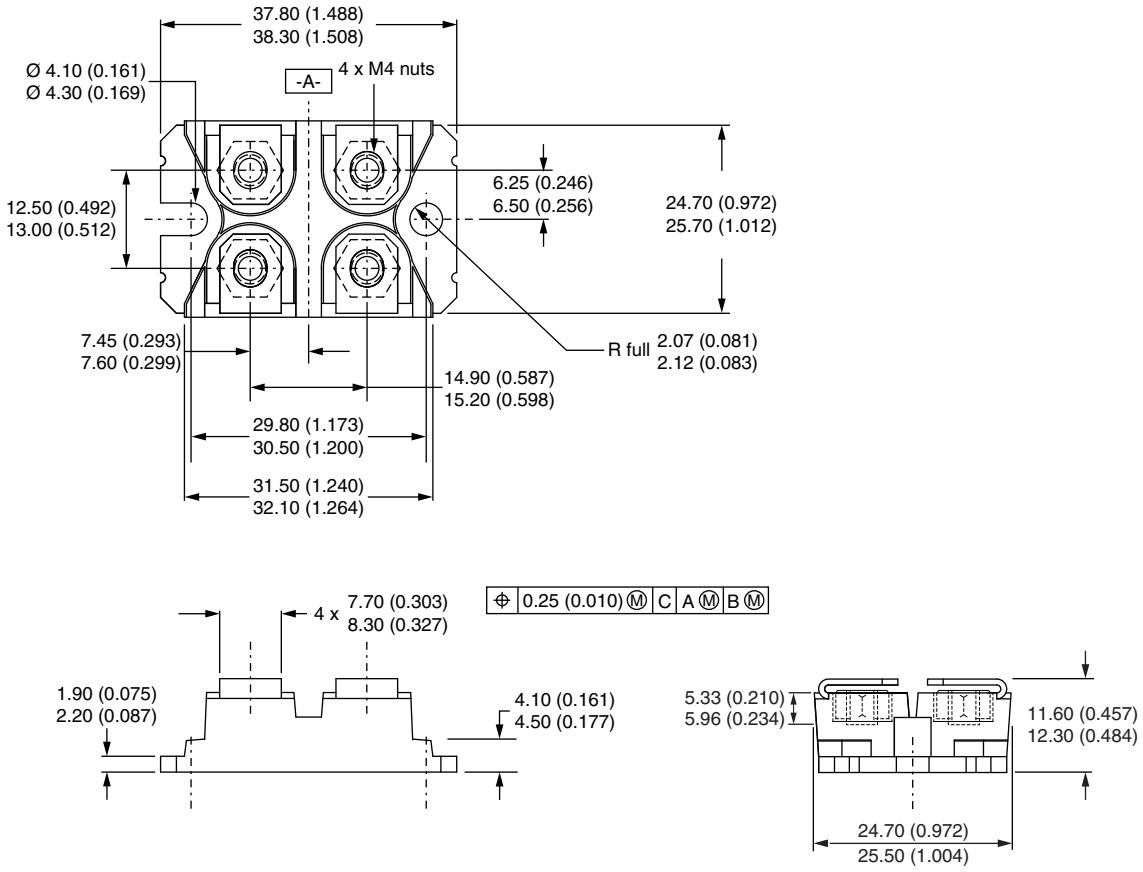
CIRCUIT CONFIGURATION

CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two separate diodes, parallel pin-out	F	

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95423
Packaging information	www.vishay.com/doc?95425

SOT-227 Generation 2

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter

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