

FRED Pt® Gen 5

Ultrafast Single Phase Bridge, 600 V, 30 A



SOT-227



RoHS
COMPLIANT

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 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?999912

DESCRIPTION / APPLICATIONS

Featuring a unique combination of low conduction and switching losses, the VS-U5FH30BA60 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.

PRIMARY CHARACTERISTICS	
V_R	600 V
V_F (typical) at 30 A, per diode	1.6 V
t_{rr} (typical) at 30 A, per diode	63 ns
I_O at $T_C = 131\text{ °C}$	30 A
Type	Modules - diode, FRED Pt®
Package	SOT-227
Circuit configuration	Single phase bridge

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	V_R		600	V
Continuous forward current per diode	I_F	$T_C = 105\text{ °C}$	30	A
Maximum power dissipation per diode	P_D	$T_C = 105\text{ °C}$	53	W
Maximum peak one cycle forward non- repetitive surge current	I_{FSM}	10 ms or 6 ms rectangular pulse, $T_J = 25\text{ °C}$, no voltage reapplied	290	A
		8.3 ms sine, $T_J = 25\text{ °C}$, no voltage reapplied	305	
Maximum I^2t capability for fusing	I^2t	No voltage reapplied, $t = 10\text{ ms}$	424	A^2s
		No voltage reapplied, $t = 8.3\text{ ms}$	387	
Maximum $I^2\sqrt{t}$ capability for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to } 10\text{ ms}$, no voltage reapplied	4244	$A^2\sqrt{s}$
RMS isolation voltage	V_{ISOL}	Any terminal to case, $t = 1\text{ min}$	2500	V
Operating junction and storage temperature range	T_J, T_{Stg}		-55 to +175	°C
SINGLE PHASE BRIDGE				
Maximum DC output current of bridge	I_O	180° rect. conduction angle, $T_C = 131\text{ °C}$	30	A

**ELECTRICAL SPECIFICATIONS** ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	V_{BR}	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	V_{FM}	$I_F = 30\text{ A}$	-	1.6	2.1	
		$I_F = 30\text{ A}, T_J = 150\text{ }^{\circ}\text{C}$	-	1.26	-	
Reverse leakage current	I_{RM}	$V_R = 600\text{ V}$	-	0.1	30	μA
		$T_J = 125\text{ }^{\circ}\text{C}, V_R = 600\text{ V}$	-	14	-	
		$T_J = 150\text{ }^{\circ}\text{C}, V_R = 600\text{ V}$	-	53	-	

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}	$T_J = 25\text{ }^{\circ}\text{C}$	-	57	-	ns
		$T_J = 125\text{ }^{\circ}\text{C}$	-	62	-	
Peak recovery current	I_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$	-	12	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	25	-	
Reverse recovery charge	Q_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	-	0.3	-	μC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	0.9	-	
Junction capacitance	C_T	$V_R = 600\text{ V}, f = 1\text{ MHz}$	-	29	-	pF

THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Single phase bridge - Thermal resistance junction to case, per diode	R_{thJC}		-	-	1.39	$^{\circ}\text{C/W}$
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			

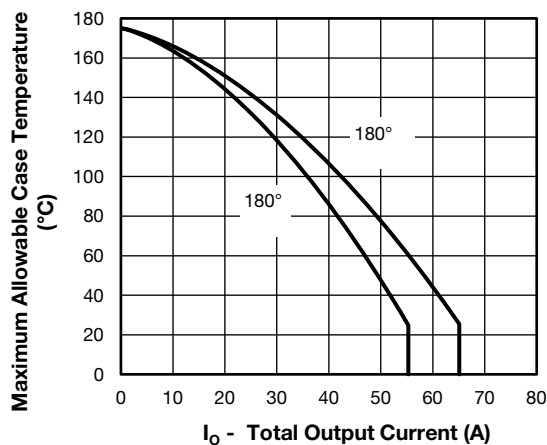


Fig. 1 - Current Rating Characteristics

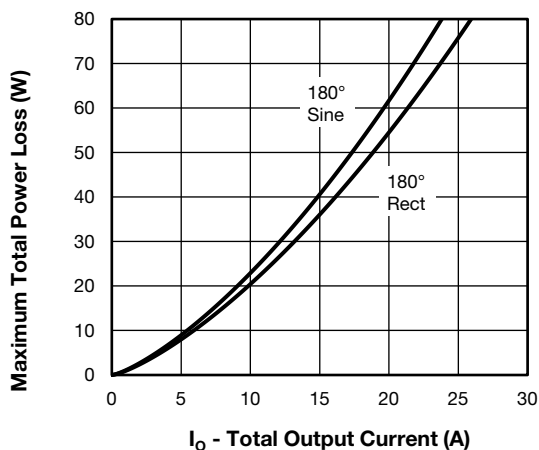


Fig. 2 - Total Power Loss Characteristics

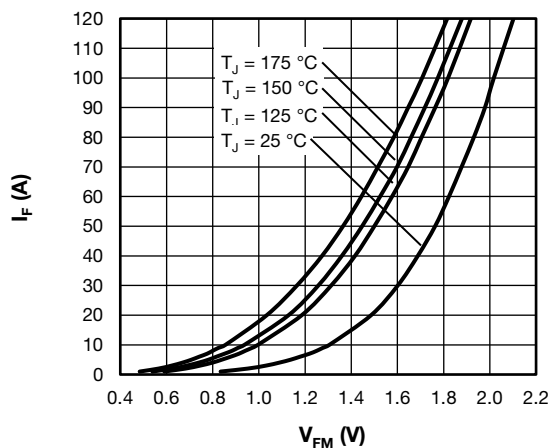


Fig. 3 - Typical Forward Voltage Drop Characteristics

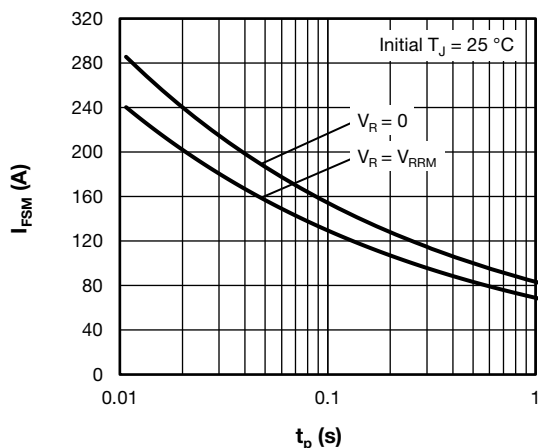


Fig. 6 - Non-Repetitive peak Forward Surge Current vs. Pulse Duration

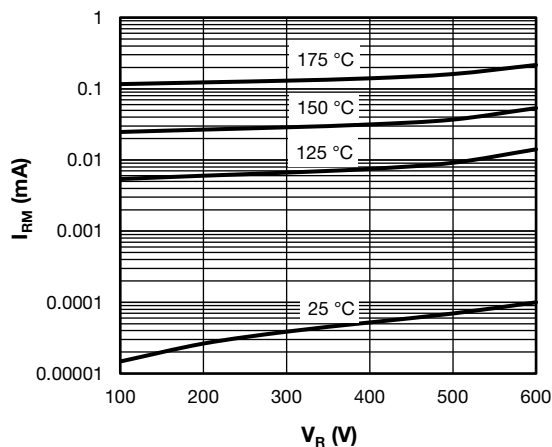


Fig. 4 - Typical Values of Reverse Current

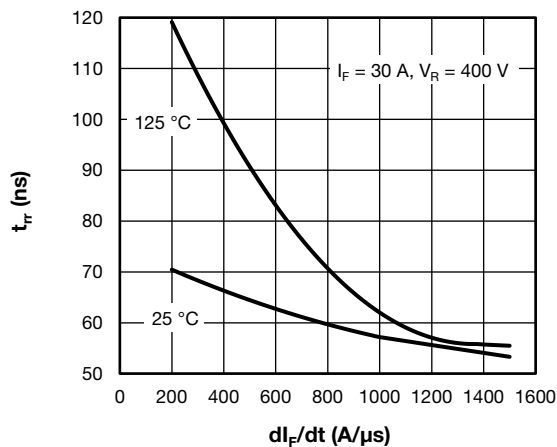
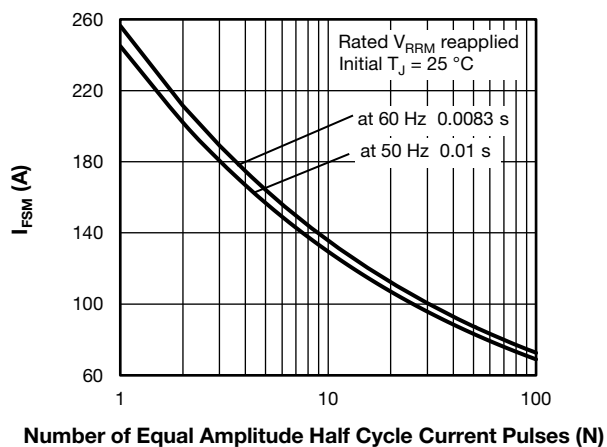
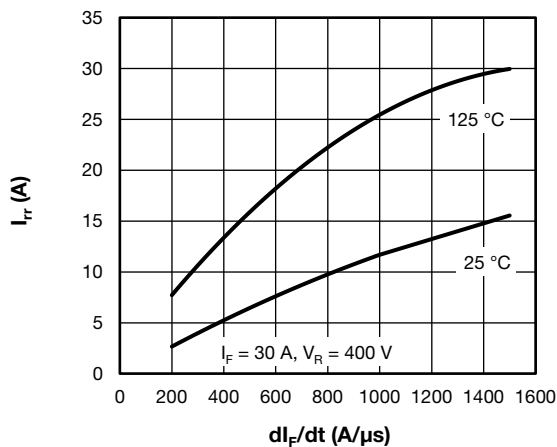

Fig. 7 - Diode Reverse Recovery Time vs. dI_F/dt


Fig. 5 - Non-Repetitive Peak Forward Surge Current vs. Number Pulses


Fig. 8 - Diode Reverse Recovery Current vs. dI_F/dt

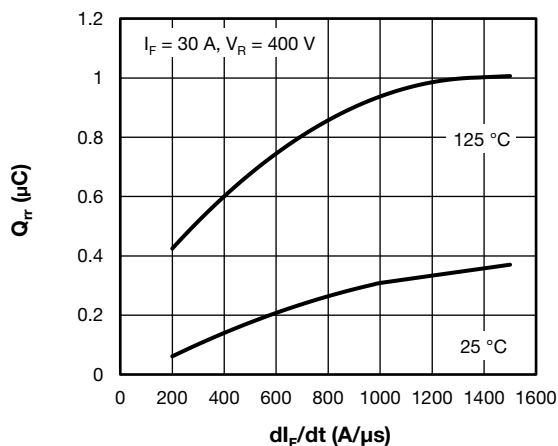


Fig. 9 - Diode Reverse Recovery Charge vs. dI_F/dt

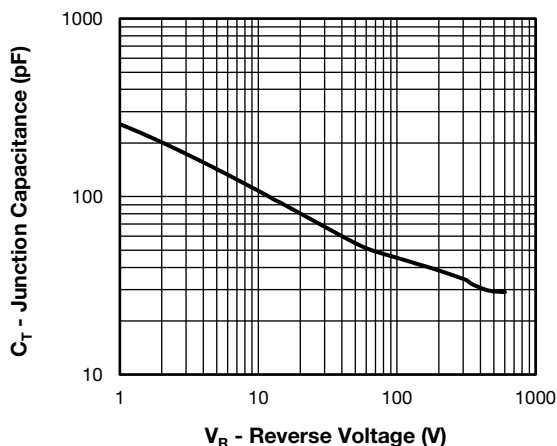


Fig. 10 - Junction Capacitance

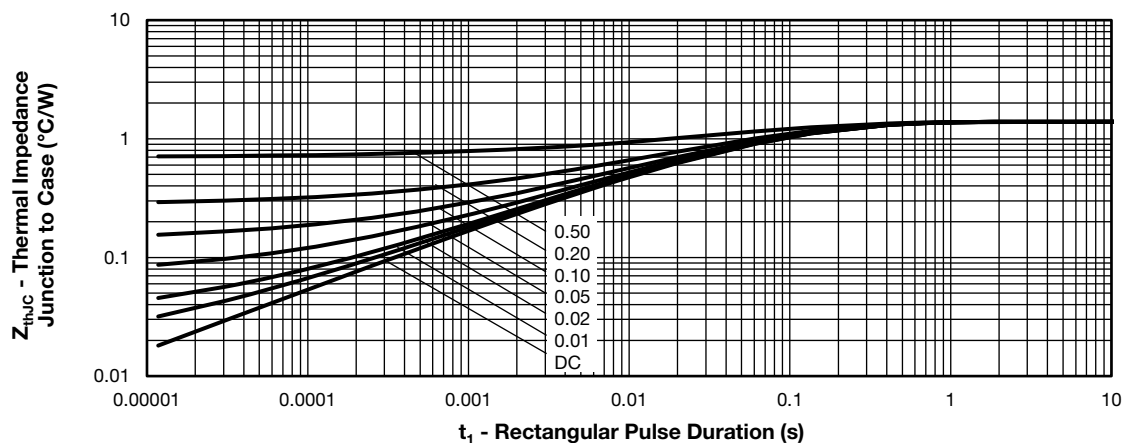
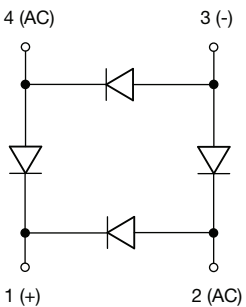
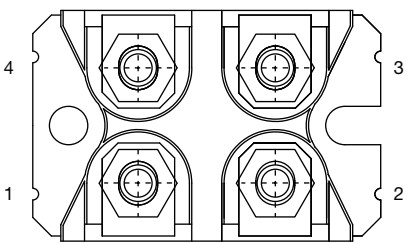


Fig. 11 - Maximum Thermal Impedance Junction to Case

ORDERING INFORMATION TABLE

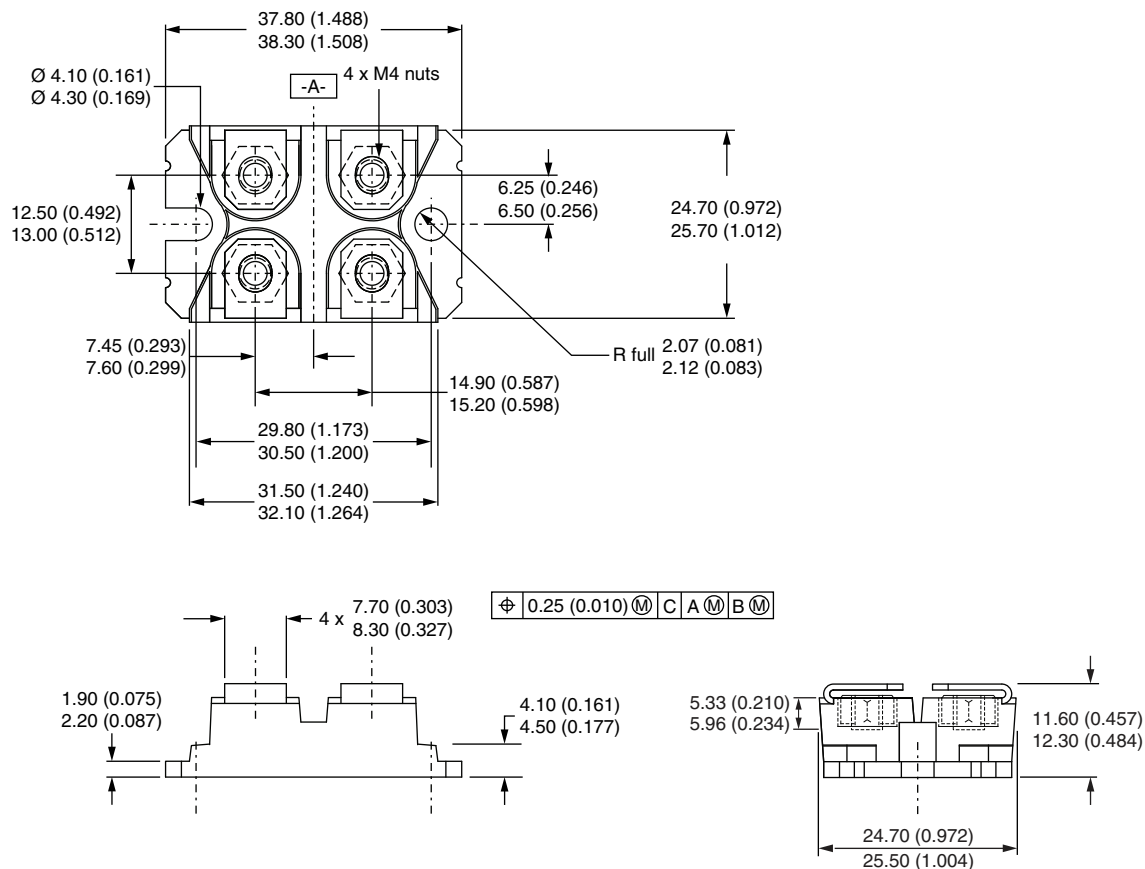
Device code	VS-	U5F	H	30	B	A	60
	1	2	3	4	5	6	7
1	- Vishay Semiconductors product						
2	- U5F = Gen 5 FRED Pt [®] family						
3	- H = Ultrafast FRED Pt [®] diode						
4	- Current rating per module (30 = 30 A)						
5	- B = circuit configuration (Single phase bridge)						
6	- Package indicator (SOT-227 standard insulated base)						
7	- Voltage rating (60 = 600 V)						

CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Single phase bridge	B	4 (AC)  3 (-) 1 (+) 2 (AC) Lead Assignment 

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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