


## FRED Pt<sup>®</sup> Gen 5 Ultrafast Single Phase Bridge, 600 V, 30 A



SOT-227

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 <sup>®</sup>
Package	SOT-227
Circuit configuration	Single phase bridge

### 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?99912](http://www.vishay.com/doc?99912)



### 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.

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 <sup>2</sup> s
		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 <sup>2</sup> √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



<b>ELECTRICAL SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ 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	$\mu\text{A}$
		$T_J = 125\text{ }^\circ\text{C}, V_R = 600\text{ V}$	-	14	-	
		$T_J = 150\text{ }^\circ\text{C}, V_R = 600\text{ V}$	-	53	-	

<b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^\circ\text{C}$ 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	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$	$I_F = 30\text{ A},$ $di_F/dt = 1000\text{ A}/\mu\text{s},$ $V_R = 400\text{ V}$	-	12	-	A
		$T_J = 125\text{ }^\circ\text{C}$		-	25	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$		-	0.3	-	$\mu\text{C}$
		$T_J = 125\text{ }^\circ\text{C}$		-	0.9	-	
Junction capacitance	$C_T$	$V_R = 600\text{ V}, f = 1\text{ MHz}$	-	29	-	pF	

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

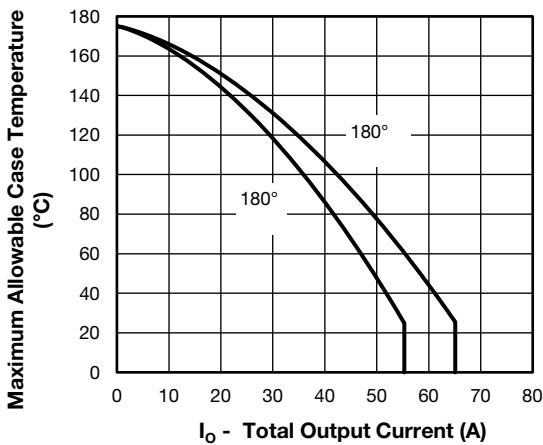


Fig. 1 - Current Rating Characteristics

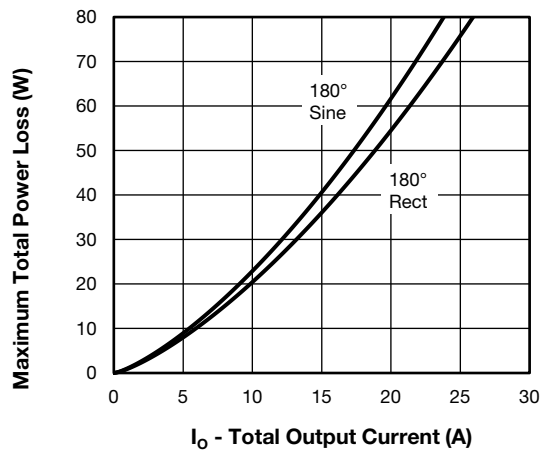


Fig. 2 - Total Power Loss Characteristics

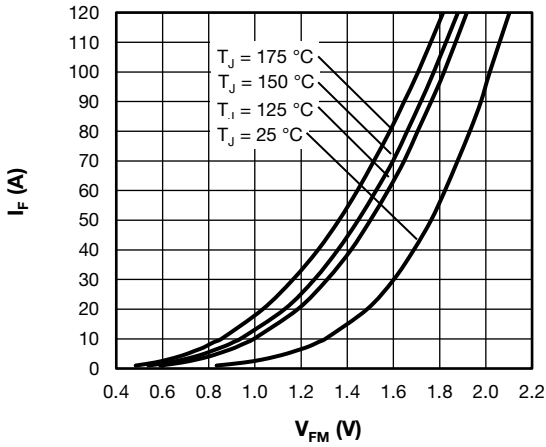


Fig. 3 - Typical Forward Voltage Drop Characteristics

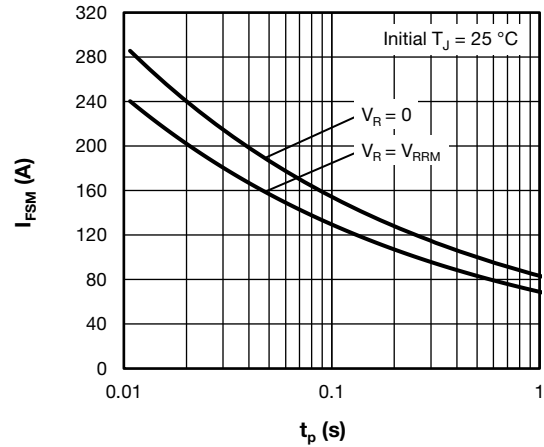


Fig. 6 - Non-Repetitive peak Forward Surge Current vs. Pulse Duration

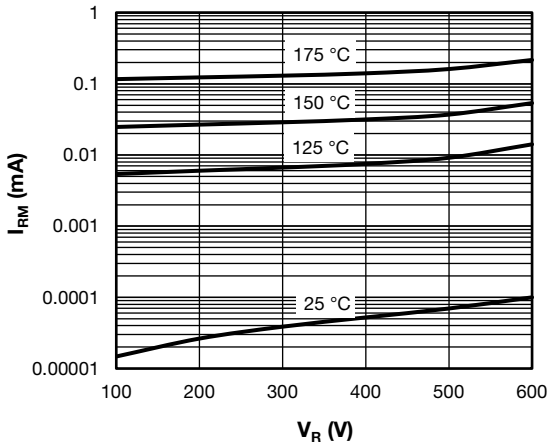


Fig. 4 - Typical Values of Reverse Current

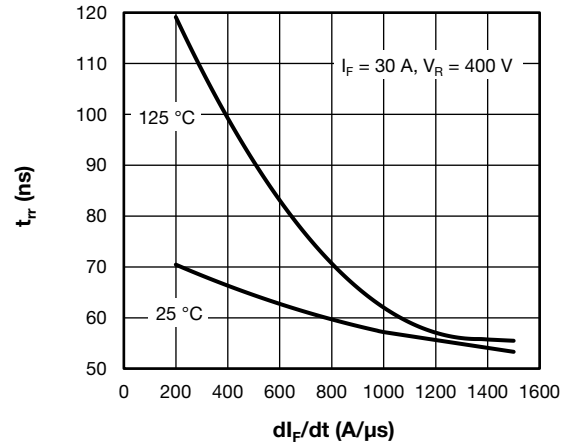


Fig. 7 - Diode Reverse Recovery Time vs.  $di/dt$

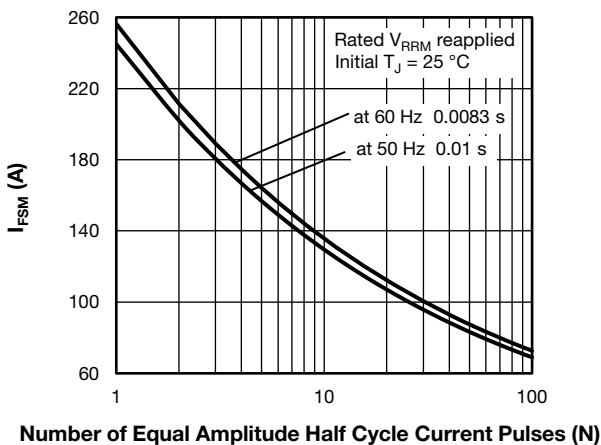


Fig. 5 - Non-Repetitive Peak Forward Surge Current vs. Number Pulses

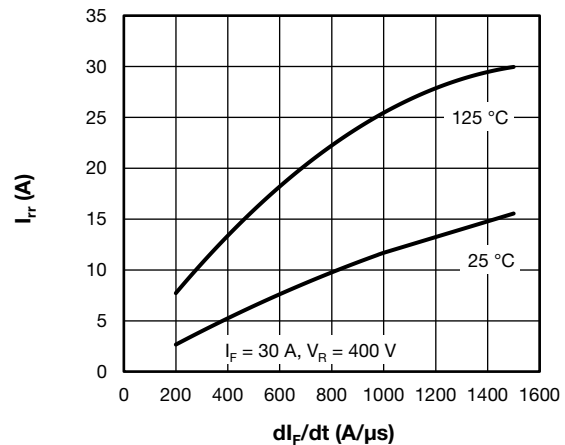


Fig. 8 - Diode Reverse Recovery Current vs.  $di/dt$

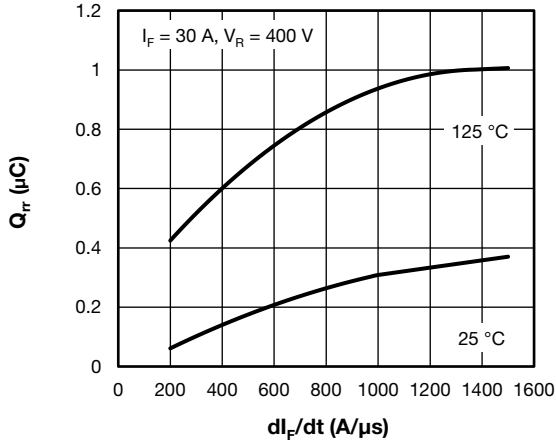


Fig. 9 - Diode Reverse Recovery Charge vs.  $dI_F/dt$

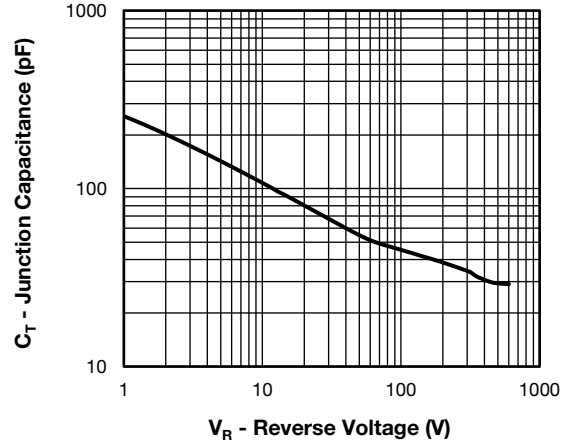


Fig. 10 - Junction Capacitance

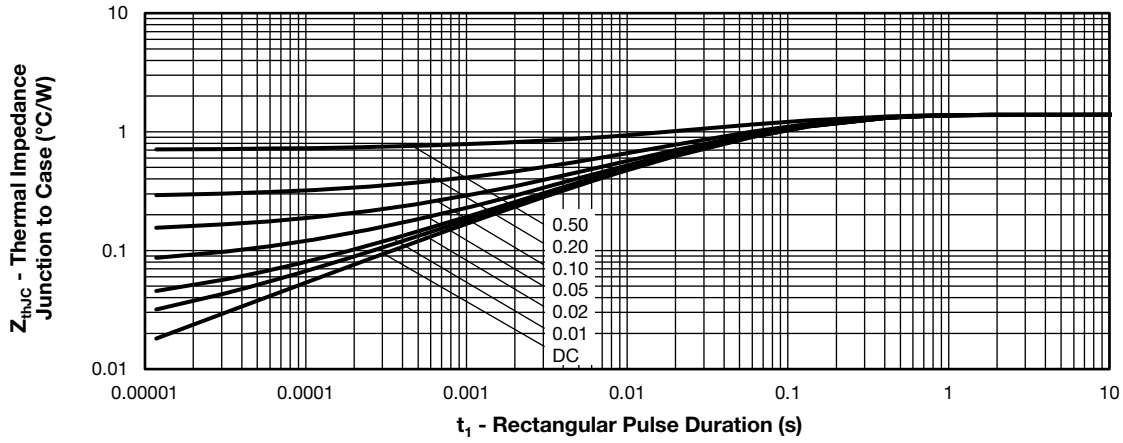


Fig. 11 - Maximum Thermal Impedance Junction to Case

## ORDERING INFORMATION TABLE

Device code	<b>VS-</b>	<b>U5F</b>	<b>H</b>	<b>30</b>	<b>B</b>	<b>A</b>	<b>60</b>
	①	②	③	④	⑤	⑥	⑦

- 1** - Vishay Semiconductors product
- 2** - U5F = Gen 5 FRED Pt<sup>®</sup> family
- 3** - H = Ultrafast FRED Pt<sup>®</sup> 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)

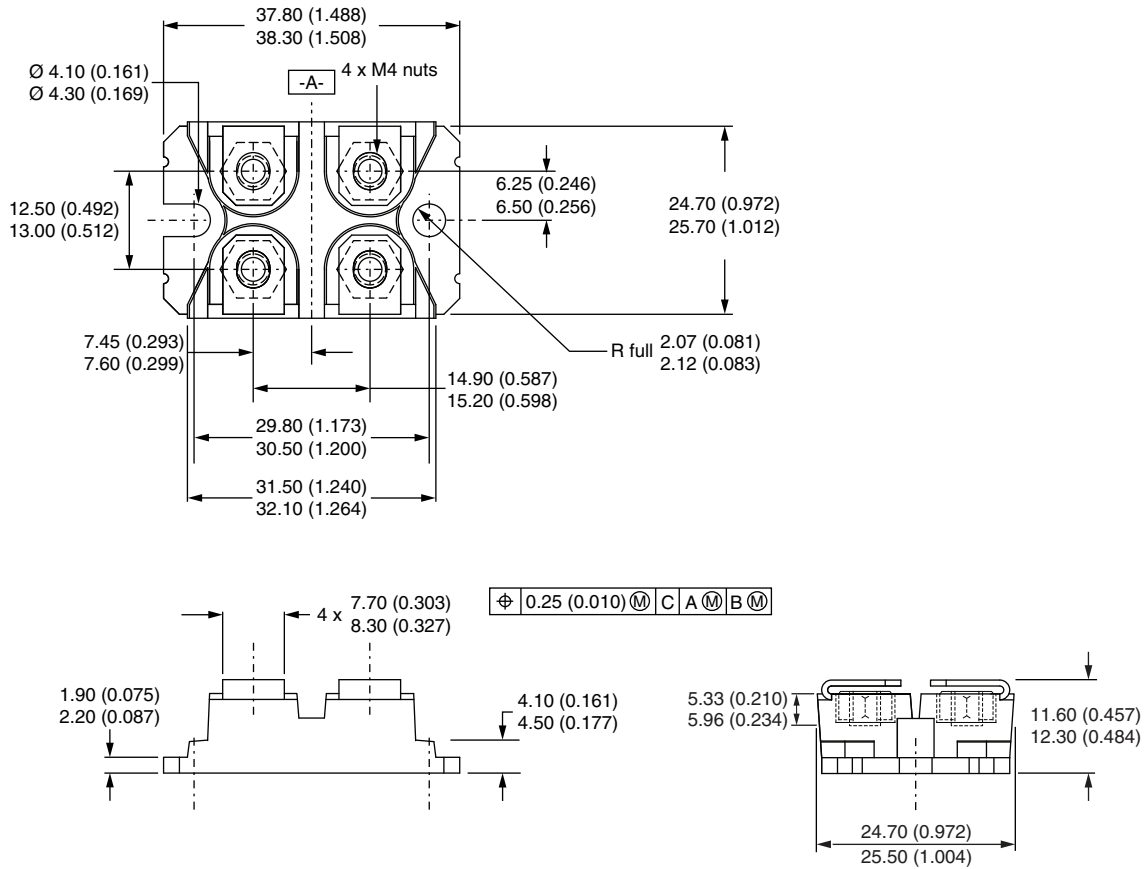
CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Single phase bridge	B	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>4 (AC)</p> <p>1 (+)</p> </div> <div style="text-align: center;"> <p>3 (-)</p> <p>1</p> </div> </div>

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95423">www.vishay.com/doc?95423</a>
Packaging information	<a href="http://www.vishay.com/doc?95425">www.vishay.com/doc?95425</a>



## SOT-227 Generation 2

**DIMENSIONS** in millimeters (inches)



**Note**

- Controlling dimension: millimeter



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