FRED Pt® Gen 5
Ultrafast Single Phase Bridge (Power Modules), 600 V, 30 A



SOT-227

PRIMARY CHARACTERISTICS	
V_{RRM}	600 V
I_O at T_C = 131 °C	30 A
V_F (typical) at 30 A, per diode	1.6 V
t_{rr} (typical) at 30 A, per diode	63 ns
Type	Modules - Bridge, Hyperfast
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

Pb-free

RoHS COMPLIANT

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.

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
I_O		30	A
	T_C	131	°C
I_{FSM}	50 Hz	290	A
	60 Hz	305	
I^2t	50 Hz	424	A^2s
	60 Hz	387	
V_{RRM}		650	V
T_J		-55 to +175	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS			
TYPE NUMBER	VOLTAGE CODE	V_{RRM}, MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V_{RSM}, MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V
VS-U5FH30BA60	60	600	600

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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 = 30 A	-	1.6	2.1	
		I_F = 30 A, T_J = 150 °C	-	1.26	-	
Reverse leakage current	I_{RM}	V_R = 600 V	-	0.1	30	µA
		T_J = 125 °C, V_R = 600 V	-	14	-	
		T_J = 150 °C, V_R = 600 V	-	53	-	
RMS isolation voltage base plate	V_{ISOL}	f = 50 Hz, any terminal to case, t = 1 min	2500	-	-	V

FORWARD CONDUCTION

PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS
Maximum DC output current at case temperature	I_O	Resistive or inductive load			30	A
					131	°C
Maximum peak, one-cycle non-repetitive forward current	I_{FSM}	t = 10 ms	No voltage reapplied	Initial T_J = 25 °C	291	A
		t = 8.3 ms			305	
		t = 10 ms	100 % V_{RRM} reapplied		245	
		t = 8.3 ms			256	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		424	A^2s
		t = 8.3 ms			387	
		t = 10 ms	100 % V_{RRM} reapplied		300	
		t = 8.3 ms			274	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	I^2t for time $t_x = I_2\sqrt{t} \times \sqrt{t_x}$; 0.1 ≤ t_x ≤ 10 ms, V_{RRM} = 0 V			4244	$kA^2\sqrt{s}$
Low level of threshold voltage, per leg	$V_{F(T0)1}$	(16.7 % x π x $I_{F(AV)}$) < I < π x $I_{F(AV)}$, T_J = T_J maximum			0.96	V
Low level value of forward slope resistance	r_{f1}				25.02	mΩ
High level of threshold voltage, per leg	$V_{F(T0)2}$	(I > π x $I_{F(AV)}$), T_J = T_J maximum			1.31	V
High level value of forward slope resistance	r_{f2}				23.71	mΩ
Maximum forward voltage, per diode	V_{FM}	I_F = 30 A			2.1	V

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 = 30 A, di_F/dt = 1000 A/µs, V_R = 400 V	-	57	-	ns
		T_J = 125 °C		-	62	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	12	-	A
		T_J = 125 °C		-	25	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	0.3	-	µC
		T_J = 125 °C		-	0.9	-	
Junction capacitance	C_T	V_R = 600 V, f = 1 MHz		-	29	-	pF

THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance junction to case, per diode	R_{thJC}		-	-	1.39	°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				

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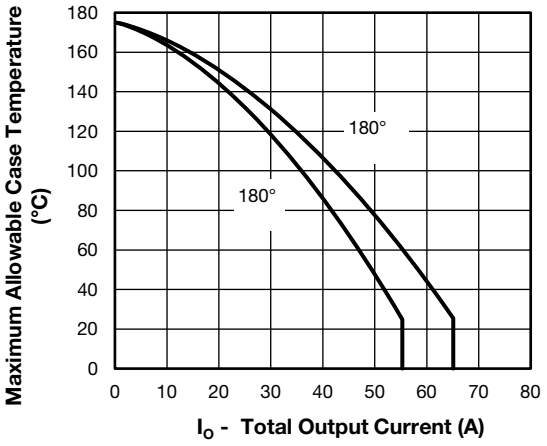


Fig. 1 - Current Rating Characteristics

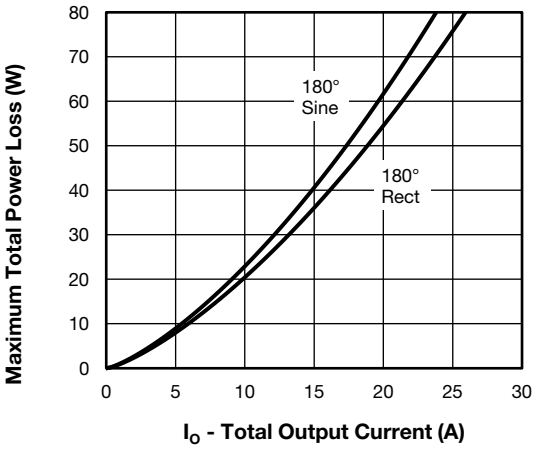


Fig. 2 - Total Power Loss Characteristics

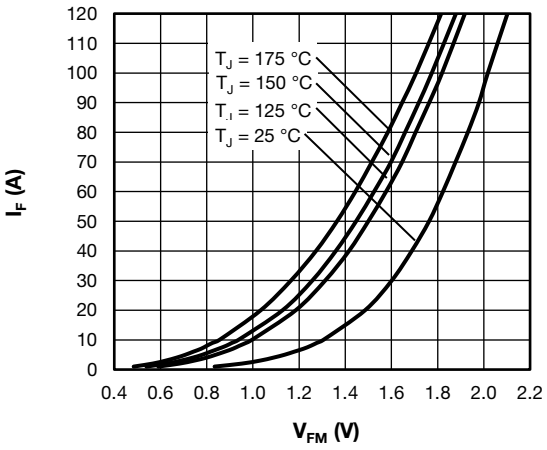


Fig. 3 - Typical Forward Voltage Drop Characteristics

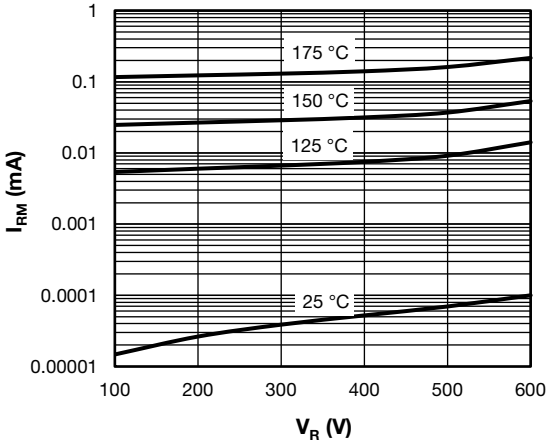


Fig. 4 - Typical Values of Reverse Current

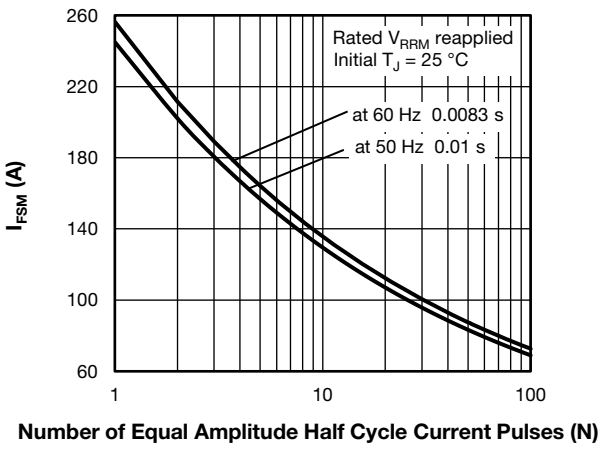


Fig. 5 - Non-Repetitive Peak Forward Surge Current vs. Number Pulses

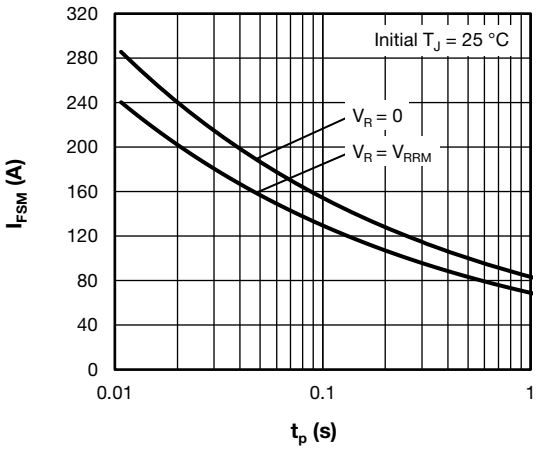


Fig. 6 - Non-Repetitive peak Forward Surge Current vs. Pulse Duration

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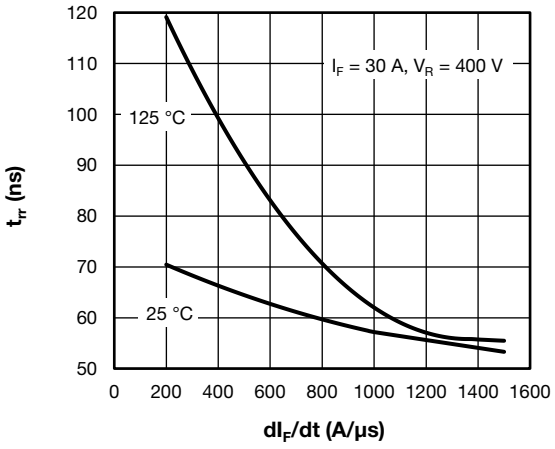


Fig. 7 - Diode Reverse Recovery Time vs. $dI_F dt$

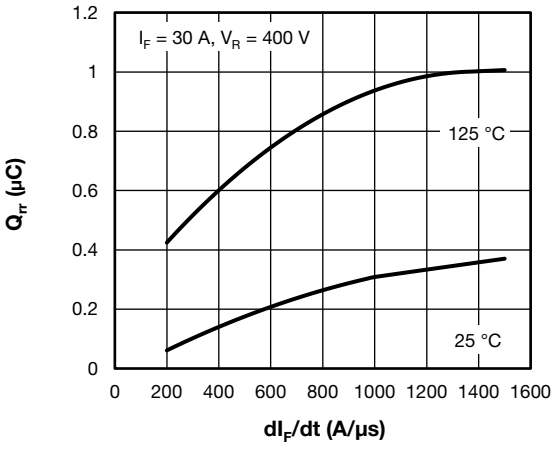


Fig. 9 - Diode Reverse Recovery Charge vs. $dI_F dt$

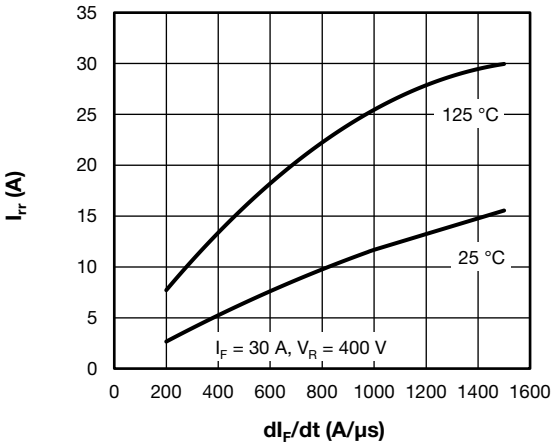


Fig. 8 - Diode Reverse Recovery Current vs. $dI_F dt$

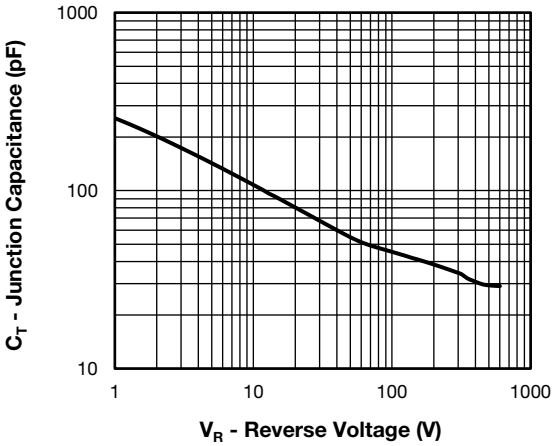


Fig. 10 - Junction Capacitance

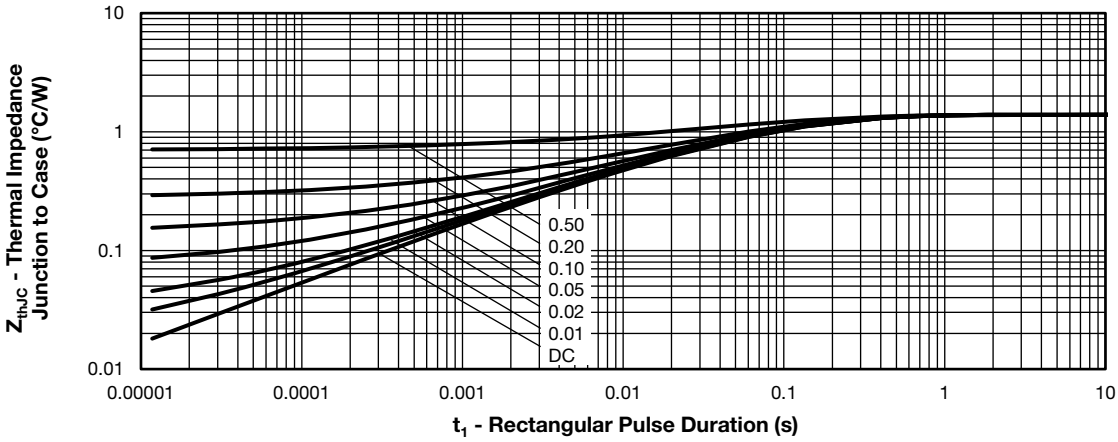


Fig. 11 - Maximum Thermal Impedance Junction to Case

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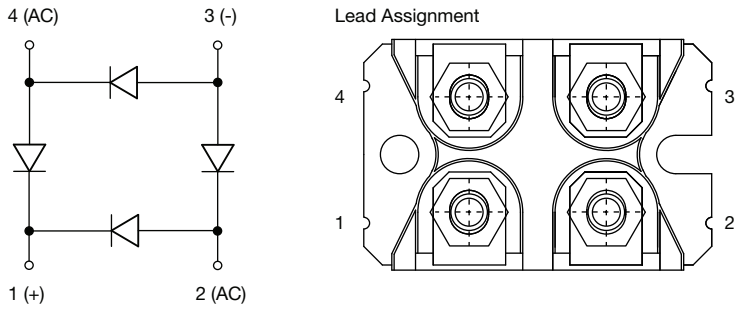
ORDERING INFORMATION TABLE

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

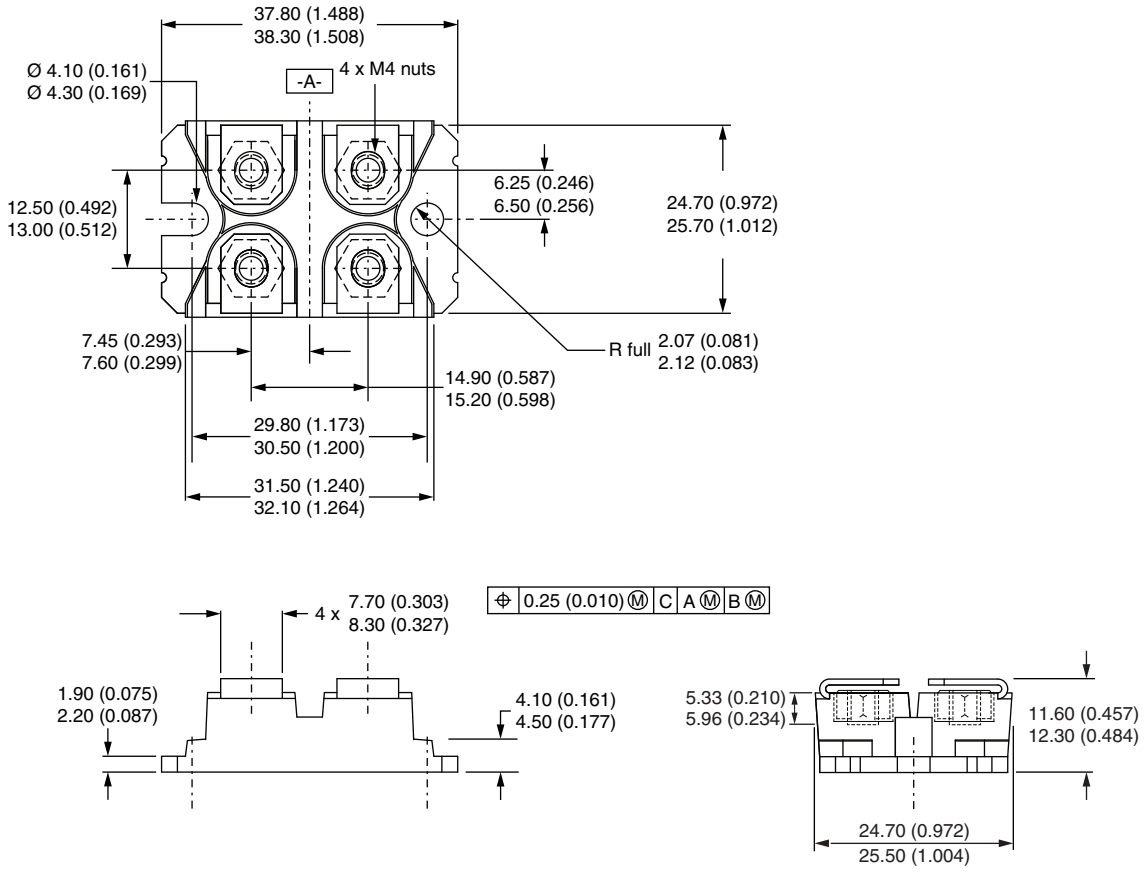
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Single phase bridge	B	

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

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SOT-227 Generation 2

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter

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