Single Phase Fast Recovery Bridge (Power Modules), 61 A

SOT-227

FEATURES

- Fast recovery time characteristic
- Electrically isolated base plate
- Simplified mechanical designs, rapid assembly
- Excellent power/volume ratio
- Designed and qualified for industrial and consumer level
- UL approved file E78996
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

DESCRIPTION

The semiconductor in the SOT-227 package is isolated from the copper base plate, allowing for common heatsinks and compact assemblies to be built.

PRIMARY CHARACTERISTICS	
V_{RRM}	600 V
I_O	61 A
t_{rr}	170 ns
Type	Modules - Bridge, Fast
Package	SOT-227
Circuit configuration	Single phase bridge

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
I_O		61	A
	T_C	57	°C
I_{FSM}	50 Hz	300	A
	60 Hz	310	
I^2t	50 Hz	442	A^2s
	60 Hz	402	
V_{RRM}		600	V
T_J		-55 to +150	°C

ELECTRICAL SPECIFICATIONS

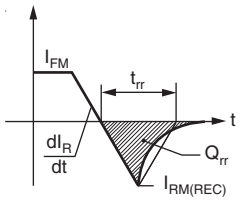
VOLTAGE RATINGS				
TYPE NUMBER	VOLTAGE CODE	V_{RRM}, MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V_{RSM}, MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM} MAXIMUM AT T_J MAXIMUM mA
SA61BA60	60	600	700	10

FORWARD CONDUCTION

PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS
Maximum DC output current at case temperature	I_O	Resistive or inductive load			61	A
					57	°C
Maximum peak, one-cycle non-repetitive forward current	I_{FSM}	t = 10 ms	No voltage reapplied	Initial T_J = T_J maximum	300	A
		t = 8.3 ms			310	
		t = 10 ms	100 % V_{RRM} reapplied		250	
		t = 8.3 ms			260	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		442	A^2s
		t = 8.3 ms			402	
		t = 10 ms	100 % V_{RRM} reapplied		313	
		t = 8.3 ms			284	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	I^2t for time $t_x = I_2\sqrt{t} \times \sqrt{t_x}$; $0.1 \le t_x \le 10$ ms, V_{RRM} = 0 V			4.4	$kA^2\sqrt{s}$
Value of threshold voltage	$V_{F(TO)}$	T_J maximum			0.914	V
Forward slope resistance	r_t				10.5	mΩ
Maximum forward voltage drop	V_{FM}	T_J = 25 °C, I_{FM} = 30 A_{pk}		t_p = 400 µs	1.33	V
		T_J = T_J maximum, I_{FM} = 30 A_{pk}			1.23	
RMS isolation voltage base plate	V_{ISOL}	f = 50 Hz, t = 1 s			3000	

RECOVERY CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Reverse recovery time, typical	t_{rr}	T_J = 25 °C, I_F = 20 A, V_R = 30 V, dI_F/dt = 100 A/µs	170	ns
		T_J = 125 °C, I_F = 20 A, V_R = 30 V, dI_F/dt = 100 A/µs	250	
Reverse recovery current, typical	I_{rr}	T_J = 25 °C, I_F = 20 A, V_R = 30 V, dI_F/dt = 100 A/µs	10.5	A
		T_J = 125 °C, I_F = 20 A, V_R = 30 V, dI_F/dt = 100 A/µs	16	
Reverse recovery charge, typical	Q_{rr}	T_J = 25 °C, I_F = 20 A, V_R = 30 V, dI_F/dt = 100 A/µs	900	nC
		T_J = 125 °C, I_F = 20 A, V_R = 30 V, dI_F/dt = 100 A/µs	1970	
Snap factor, typical	S	T_J = 25 °C	0.6	-
Junction capacitance, typical	C_T	V_R = 600 V	67	pF



THERMAL AND MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction and storage temperature range	T_J, T_{Stg}		- 55	-	150	°C
Thermal resistance junction to case, per diode	R_{thJC}		-	-	1.2	°C/W
Thermal resistance junction to case, per module			-	-	0.30	
Thermal resistance case to heatsink	R_{thCS}	Flat, greased surface	-	0.05	-	
Weight			-	30	-	g
Mounting torque		Torque to terminal	-	-	1.1 (9.7)	Nm (lbf.in)
		Torque to heatsink	-	-	1.8 (15.9)	Nm (lbf.in)
Case style			SOT-227			

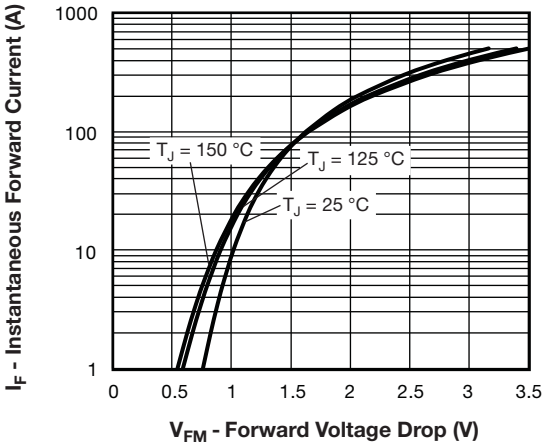


Fig. 1 - Typical Forward Voltage Drop Characteristics

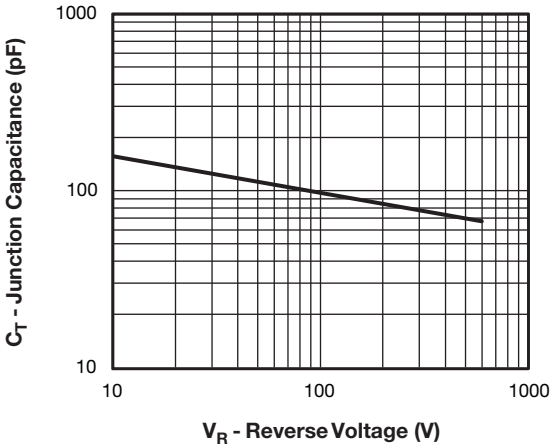


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

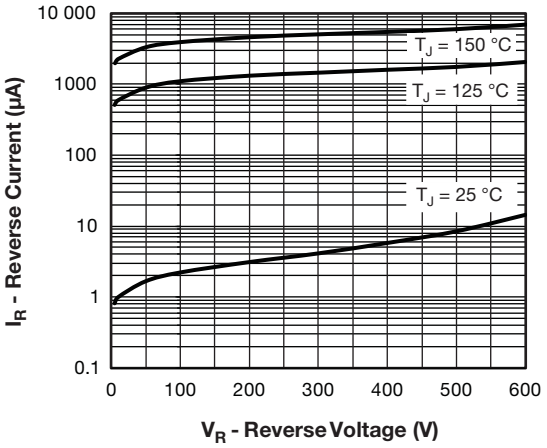


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

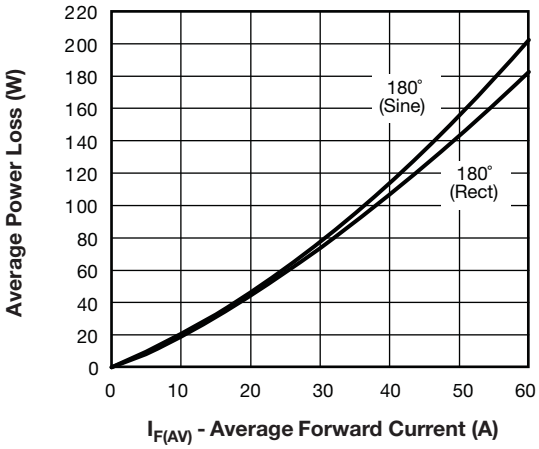


Fig. 4 - Current Rating Characteristics

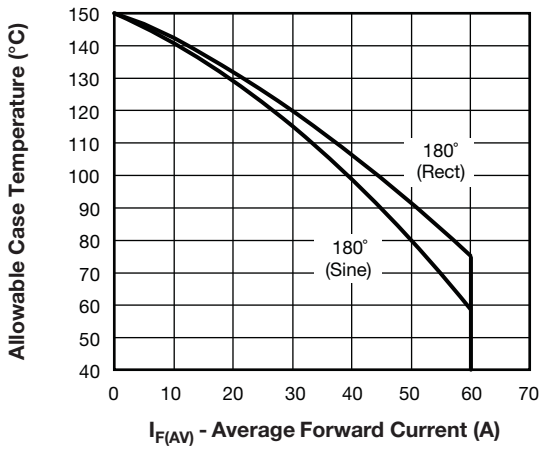


Fig. 5 - Forward Power Loss Characteristics

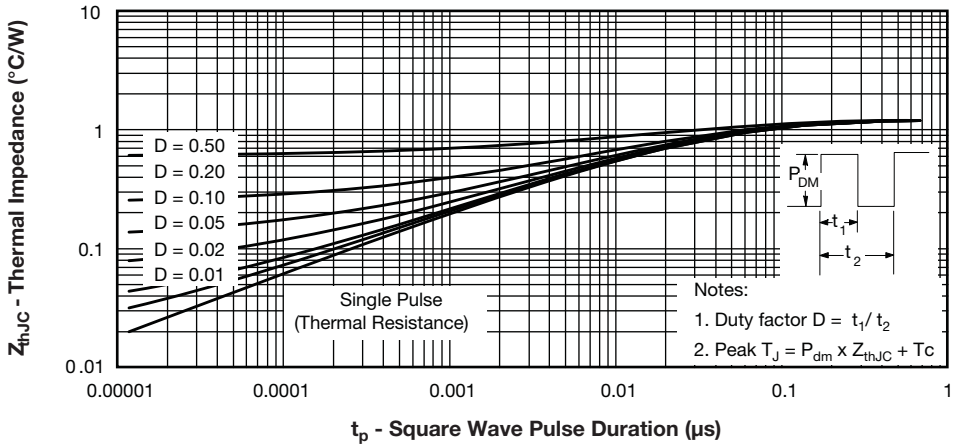


Fig. 6 - Typical Forward Voltage Drop Characteristics

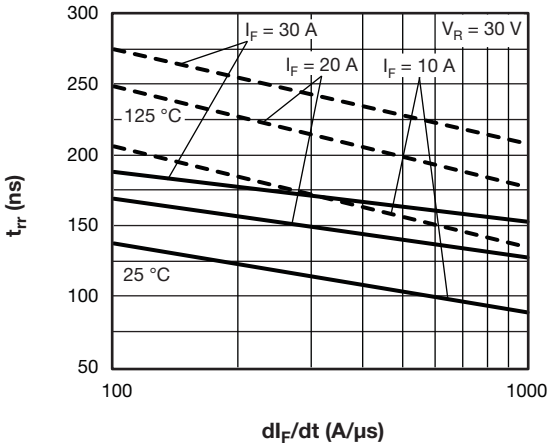


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

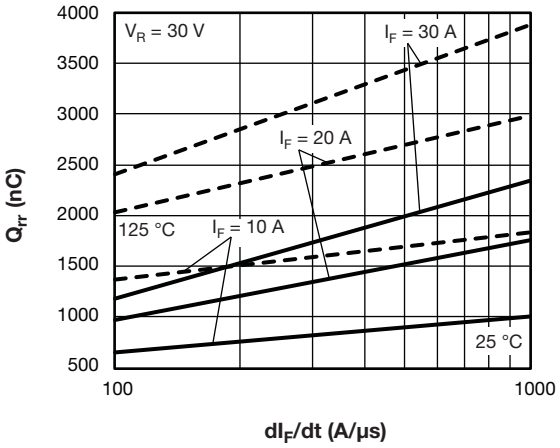


Fig. 8 - Typical Stored Charge vs. dI_F/dt

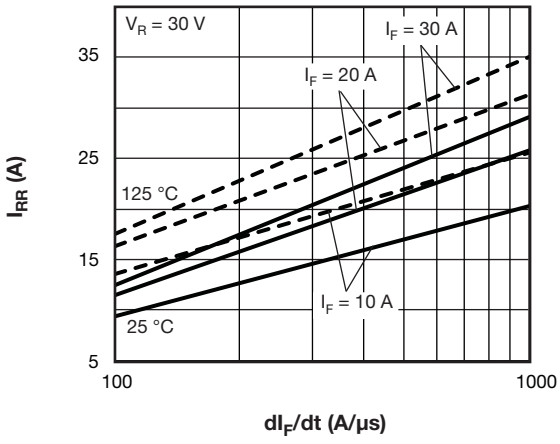


Fig. 9 - Typical Reverse Recovery Current vs. dI_F/dt

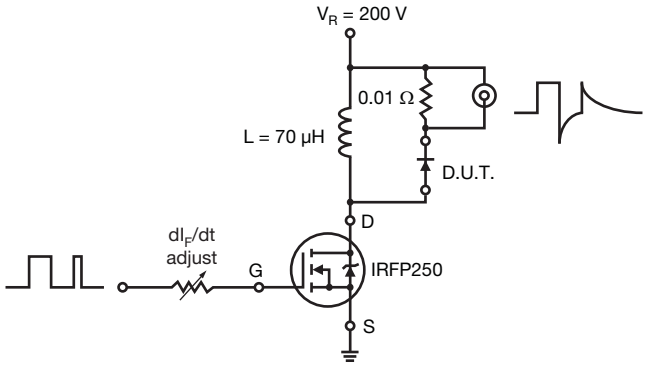
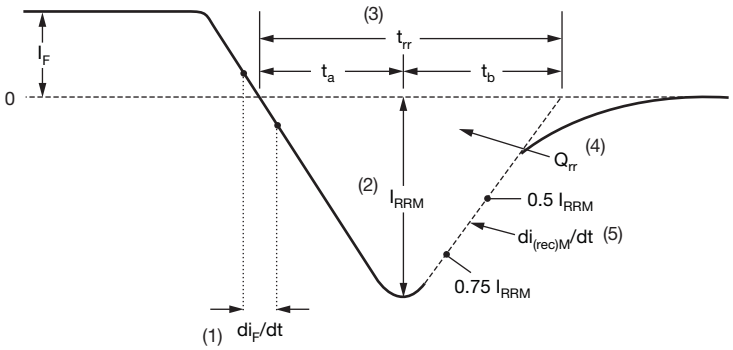


Fig. 10 - Reverse Recovery Parameter Test Circuit



(1) di_F/dt - rate of change of current through zero crossing

(2) I_{RRM} - peak reverse recovery current

(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current.

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

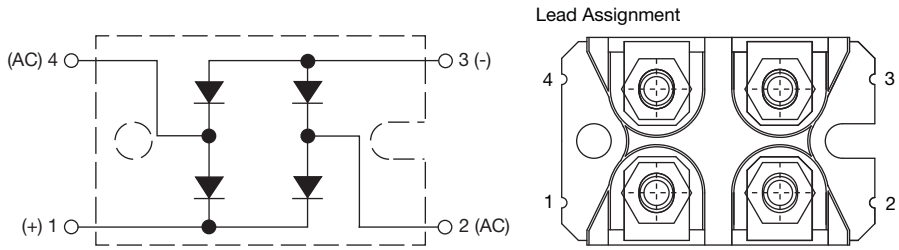
Fig. 11 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code

VS-	S	A	61	B	A	60
1	2	3	4	5	6	7

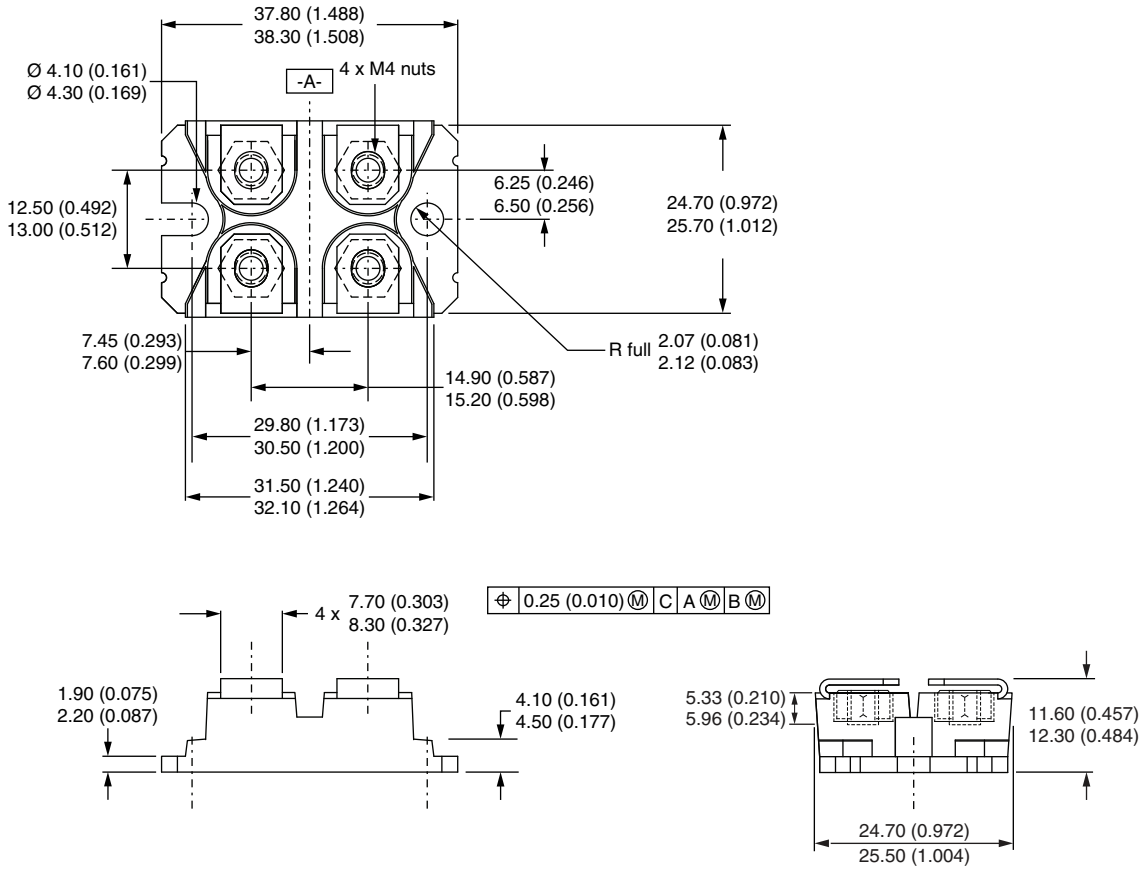
- 1 - Vishay Semiconductors product
- 2 - S = fast recovery diode
- 3 - A = present silicon generation
- 4 - Current rating (61 = 61 A)
- 5 - Circuit configuration:
  B = single phase bridge
- 6 - Package indicator:
  A = SOT-227, standard insulated base
- 7 - Voltage rating (60 = 600 V)

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

SOT-227 Generation 2

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter

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