

# 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](http://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 <sup>2</sup> s
	60 Hz	402	
$V_{RRM}$		600	V
$T_J$		-55 to +150	°C

## ELECTRICAL SPECIFICATIONS

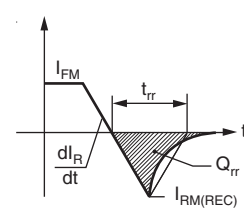
### VOLTAGE RATINGS

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 <sub>O</sub>	Resistive or inductive load		61	A
				57	°C
Maximum peak, one-cycle non-repetitive forward current	I <sub>FSM</sub>	t = 10 ms	No voltage reapplied	300	A
		t = 8.3 ms		310	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied	250	
		t = 8.3 ms		260	
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reapplied	442	A <sup>2</sup> s
		t = 8.3 ms		402	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied	313	
		t = 8.3 ms		284	
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t	I <sup>2</sup> t for time t <sub>x</sub> = I <sub>2</sub> √t x √t <sub>x</sub> ; 0.1 ≤ t <sub>x</sub> ≤ 10 ms, V <sub>RRM</sub> = 0 V		4.4	kA <sup>2</sup> √s
Value of threshold voltage	V <sub>F(TO)</sub>	T <sub>J</sub> maximum		0.914	V
Forward slope resistance	r <sub>t</sub>			10.5	mΩ
Maximum forward voltage drop	V <sub>FM</sub>	T <sub>J</sub> = 25 °C, I <sub>FM</sub> = 30 A <sub>pk</sub>	t <sub>p</sub> = 400 μs	1.33	V
		T <sub>J</sub> = T <sub>J</sub> maximum, I <sub>FM</sub> = 30 A <sub>pk</sub>		1.23	
RMS isolation voltage base plate	V <sub>ISOL</sub>	f = 50 Hz, t = 1 s		3000	

**RECOVERY CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Reverse recovery time, typical	$t_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$ , $I_F = 20\text{ A}$ , $V_R = 30\text{ V}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	170	ns	
		$T_J = 125\text{ }^{\circ}\text{C}$ , $I_F = 20\text{ A}$ , $V_R = 30\text{ V}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	250		
Reverse recovery current, typical	$I_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$ , $I_F = 20\text{ A}$ , $V_R = 30\text{ V}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	10.5	A	
		$T_J = 125\text{ }^{\circ}\text{C}$ , $I_F = 20\text{ A}$ , $V_R = 30\text{ V}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	16		
Reverse recovery charge, typical	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$ , $I_F = 20\text{ A}$ , $V_R = 30\text{ V}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	900	nC	
		$T_J = 125\text{ }^{\circ}\text{C}$ , $I_F = 20\text{ A}$ , $V_R = 30\text{ V}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	1970		
Snap factor, typical	S	$T_J = 25\text{ }^{\circ}\text{C}$	0.6	-	
Junction capacitance, typical	$C_T$	$V_R = 600\text{ V}$	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	

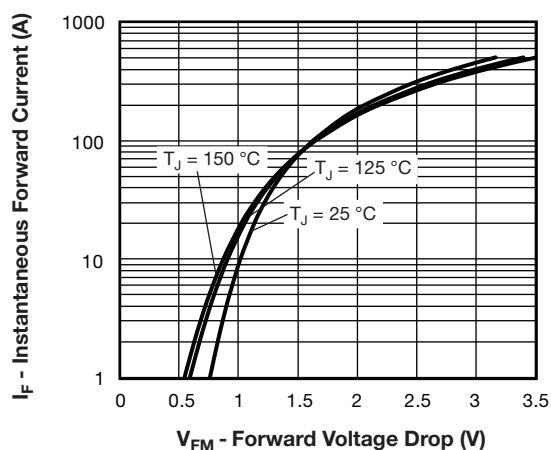


Fig. 1 - Typical Forward Voltage Drop Characteristics

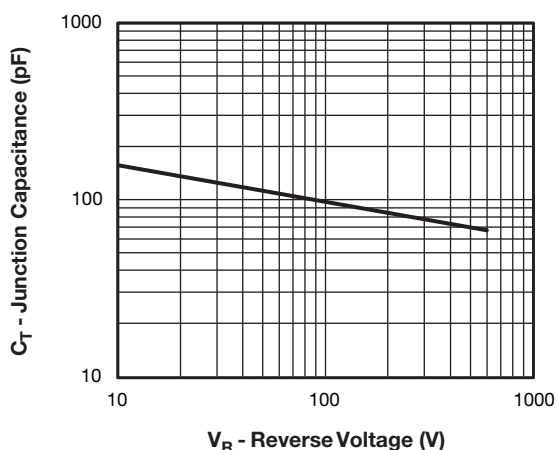


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

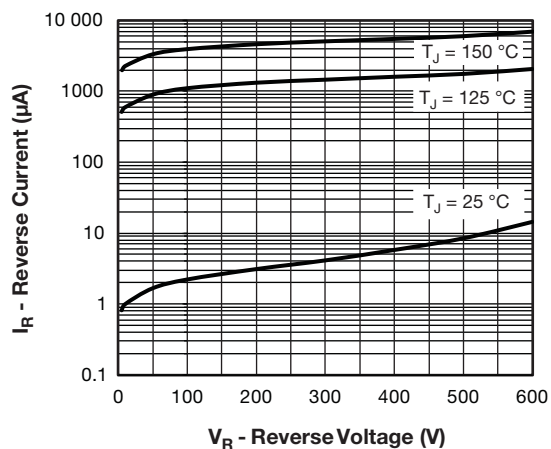


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

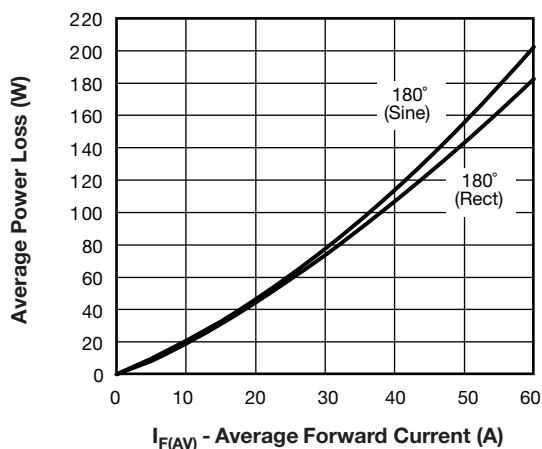


Fig. 4 - Current Rating Characteristics

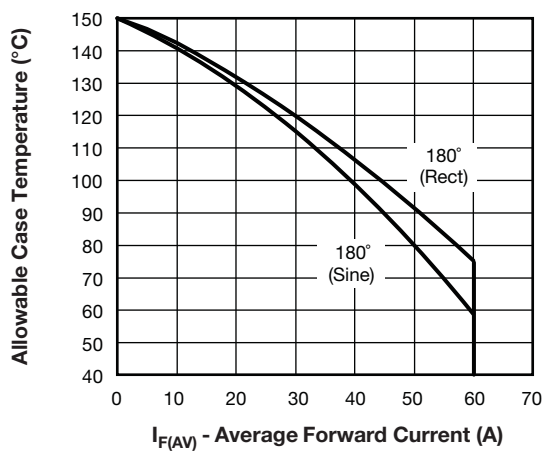


Fig. 5 - Forward Power Loss Characteristics

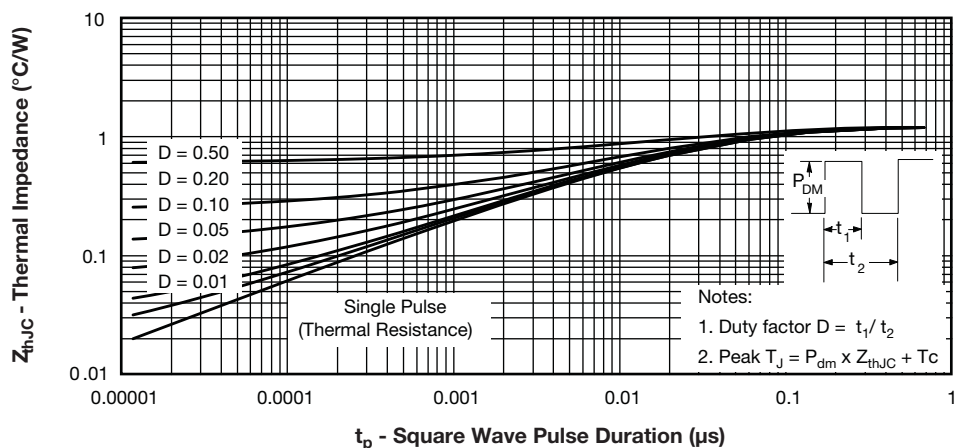
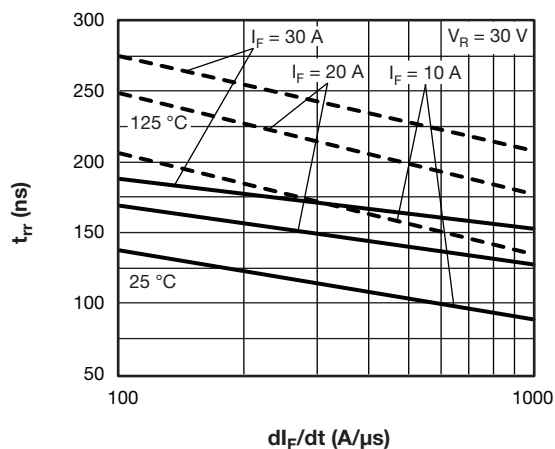
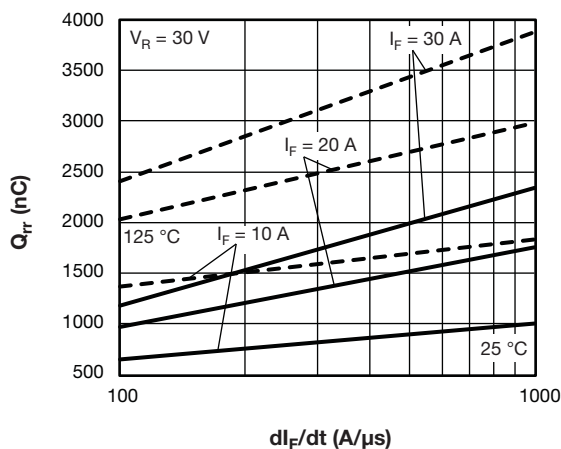
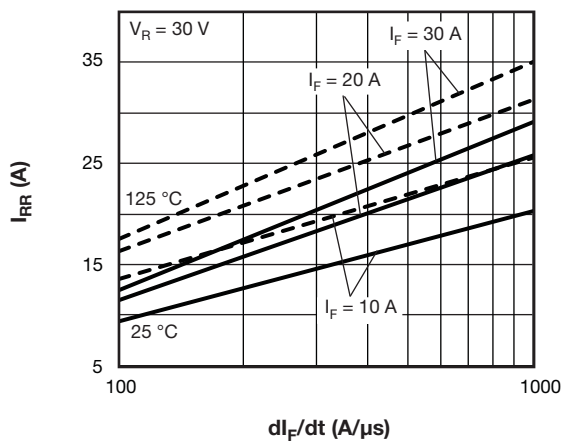


Fig. 6 - Typical Forward Voltage Drop Characteristics


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.  $dI_F/dt$

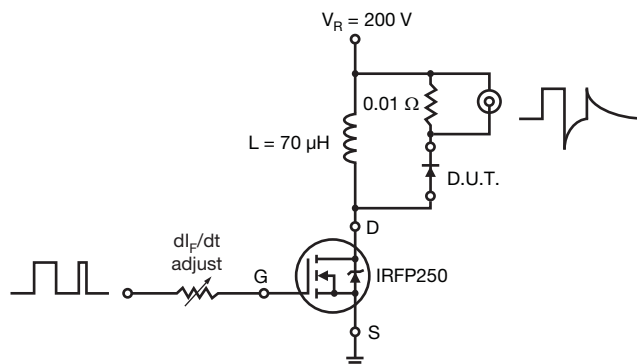
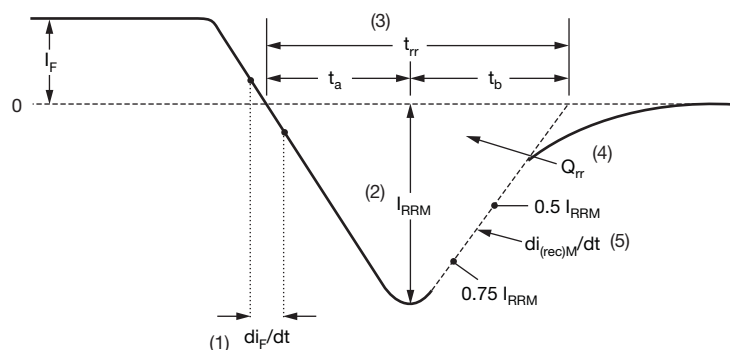


Fig. 10 - Reverse Recovery Parameter Test Circuit



(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  $I_{RRM}$

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

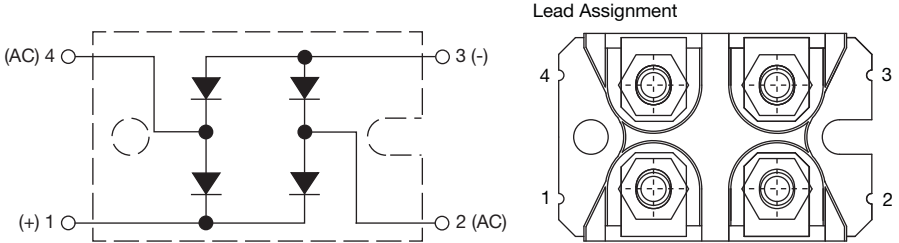
(5)  $di_{(rec)M}/dt$  - peak rate of change of current during  $t_b$  portion of  $t_{rr}$

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	<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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