


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



SOT-227


**RoHS**  
COMPLIANT

### 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)

### 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

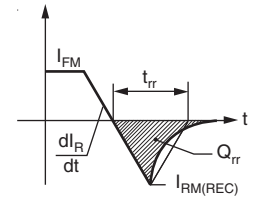
### ELECTRICAL SPECIFICATIONS

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 × √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 <sub>rr</sub>	T <sub>J</sub> = 25 °C, I <sub>F</sub> = 20 A, V <sub>R</sub> = 30 V, di <sub>F</sub> /dt = 100 A/μs	170	ns
		T <sub>J</sub> = 125 °C, I <sub>F</sub> = 20 A, V <sub>R</sub> = 30 V, di <sub>F</sub> /dt = 100 A/μs	250	
Reverse recovery current, typical	I <sub>rr</sub>	T <sub>J</sub> = 25 °C, I <sub>F</sub> = 20 A, V <sub>R</sub> = 30 V, di <sub>F</sub> /dt = 100 A/μs	10.5	A
		T <sub>J</sub> = 125 °C, I <sub>F</sub> = 20 A, V <sub>R</sub> = 30 V, di <sub>F</sub> /dt = 100 A/μs	16	
Reverse recovery charge, typical	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C, I <sub>F</sub> = 20 A, V <sub>R</sub> = 30 V, di <sub>F</sub> /dt = 100 A/μs	900	nC
		T <sub>J</sub> = 125 °C, I <sub>F</sub> = 20 A, V <sub>R</sub> = 30 V, di <sub>F</sub> /dt = 100 A/μs	1970	
Snap factor, typical	S	T <sub>J</sub> = 25 °C	0.6	-
Junction capacitance, typical	C <sub>T</sub>	V <sub>R</sub> = 600 V	67	pF



THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		- 55	-	150	°C
Thermal resistance junction to case, per diode	R <sub>thJC</sub>		-	-	1.2	°C/W
Thermal resistance junction to case, per module			-	-	0.30	
Thermal resistance case to heatsink	R <sub>thCS</sub>	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

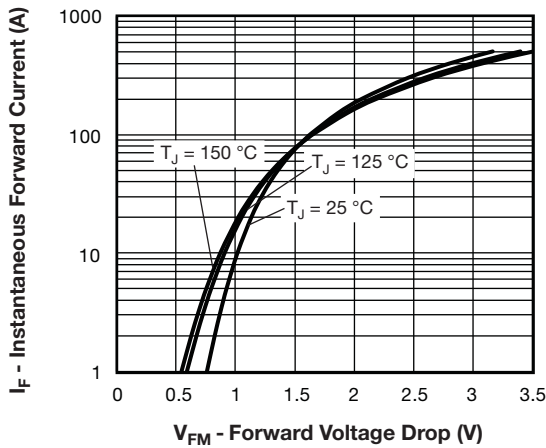


Fig. 1 - Typical Forward Voltage Drop Characteristics

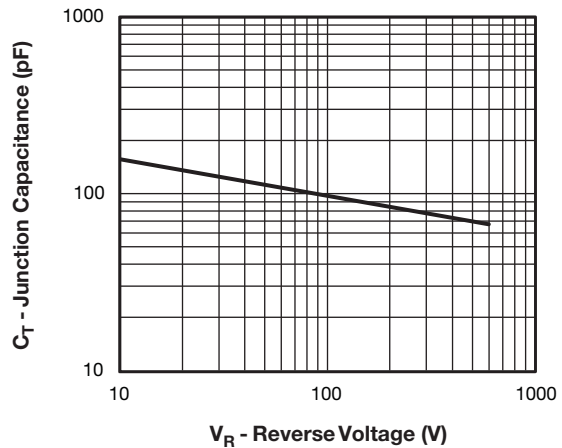


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

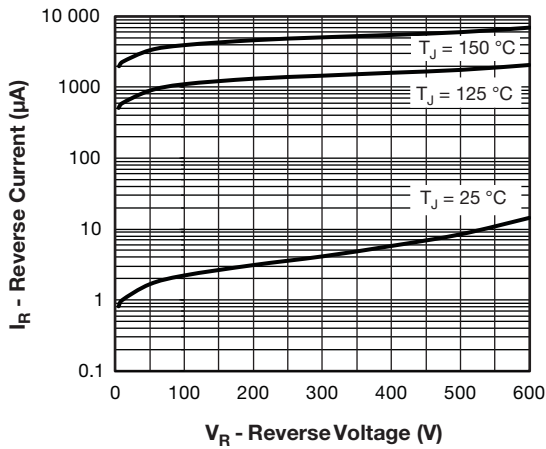


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

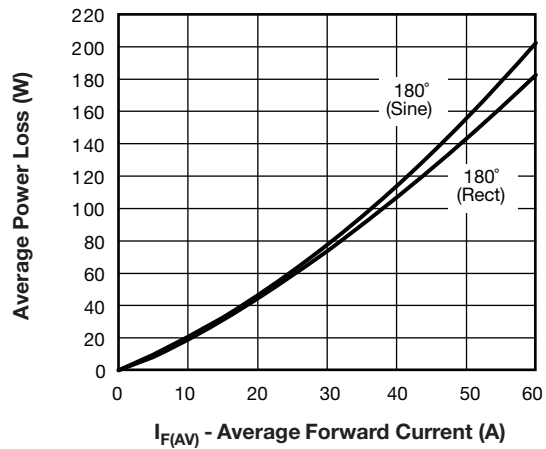


Fig. 4 - Current Rating Characteristics

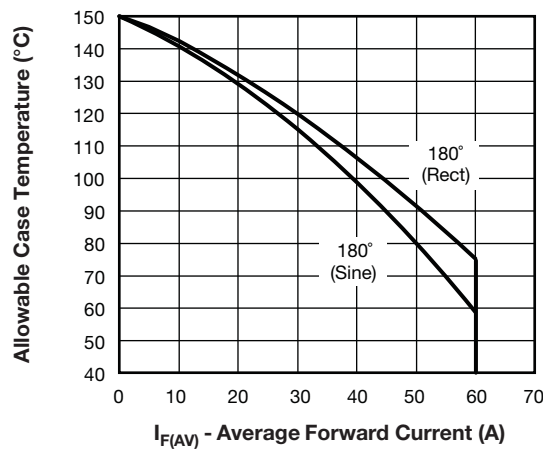


Fig. 5 - Forward Power Loss Characteristics

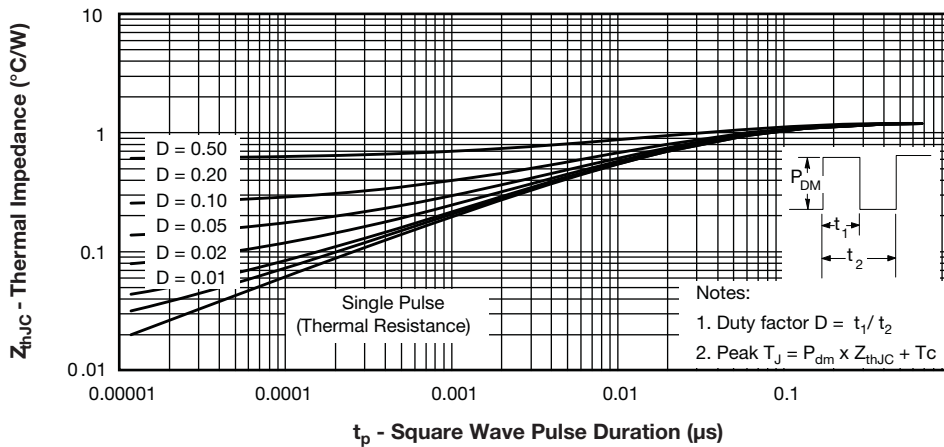


Fig. 6 - Typical Forward Voltage Drop Characteristics

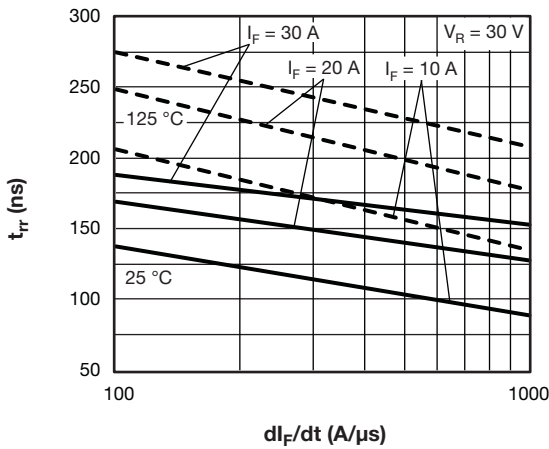


Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$

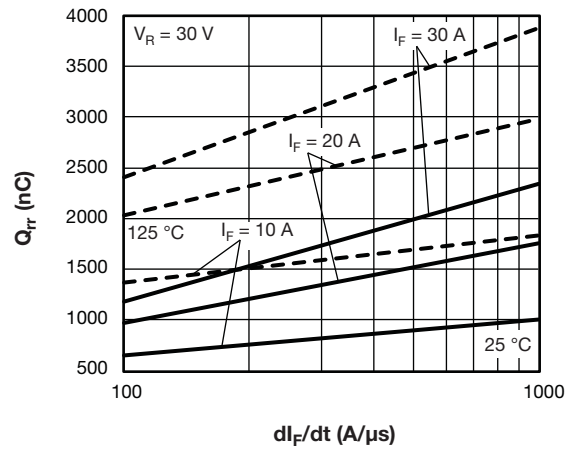


Fig. 8 - Typical Stored Charge vs.  $dI_F/dt$

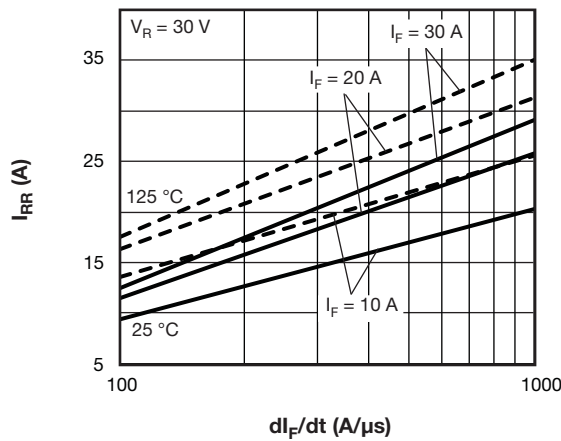


Fig. 9 - Typical Reverse Recovery Current vs.  $dI_F/dt$

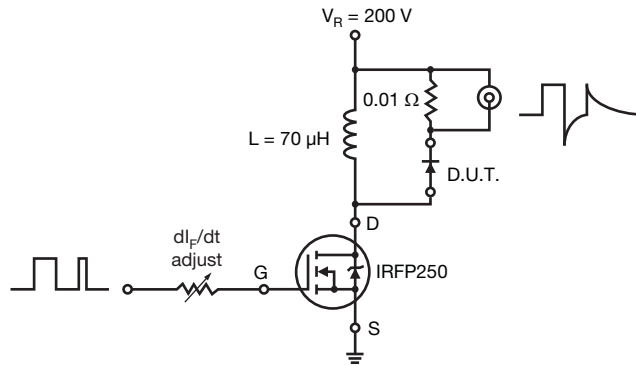
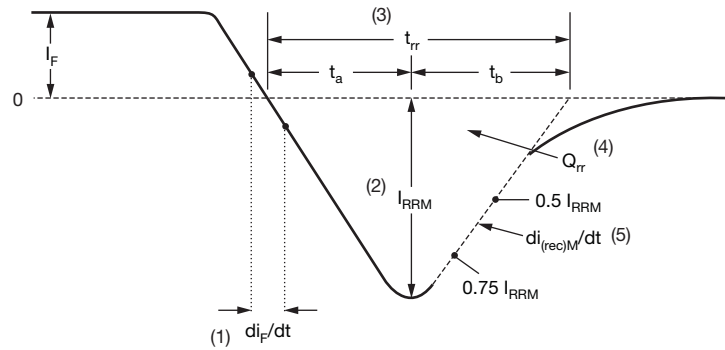


Fig. 10 - Reverse Recovery Parameter Test Circuit



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

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

Fig. 11 - Reverse Recovery Waveform and Definitions

**ORDERING INFORMATION TABLE**

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