

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

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

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.

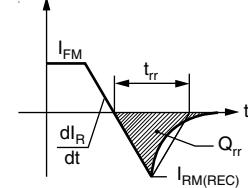
MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
I_O		61	A
	T_C	57	°C
I_{FSM}	50 Hz	300	A
	60 Hz	310	
I^2t	50 Hz	442	A^2s
	60 Hz	402	
V_{RRM}		600	V
T_J		-55 to +150	°C

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}	$t = 10 \text{ ms}$	No voltage reapplied	Initial $T_J = T_J$ maximum	300	A	
		$t = 8.3 \text{ ms}$			310		
		$t = 10 \text{ ms}$	100 % V_{RRM} reapplied		250		
		$t = 8.3 \text{ ms}$			260		
Maximum I^2t for fusing	I^2t	$t = 10 \text{ ms}$	No voltage reapplied		442	A^2s	
		$t = 8.3 \text{ ms}$			402		
		$t = 10 \text{ ms}$	100 % V_{RRM} reapplied		313		
		$t = 8.3 \text{ ms}$			284		
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	I^2t for time $t_x = I_2\sqrt{t} \times \sqrt{t_x}; 0.1 \leq t_x \leq 10 \text{ ms}, V_{RRM} = 0 \text{ V}$			4.4	$\text{kA}^2\sqrt{\text{s}}$	
Value of threshold voltage	$V_{F(TO)}$	T_J maximum			0.914	V	
Forward slope resistance	r_t				10.5	$\text{m}\Omega$	
Maximum forward voltage drop	V_{FM}	$T_J = 25 \text{ °C}, I_{FM} = 30 \text{ A}_{\text{pk}}$	$t_p = 400 \mu\text{s}$		1.33	V	
		$T_J = T_J$ maximum, $I_{FM} = 30 \text{ A}_{\text{pk}}$			1.23		
RMS isolation voltage base plate	V_{ISOL}	$f = 50 \text{ Hz}, t = 1 \text{ s}$			3000		

RECOVERY CHARACTERISTICS						
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS		
Reverse recovery time, typical	t_{rr}	$T_J = 25 \text{ °C}, I_F = 20 \text{ A}, V_R = 30 \text{ V}, \frac{dI_F}{dt} = 100 \text{ A}/\mu\text{s}$	170	ns		
		$T_J = 125 \text{ °C}, I_F = 20 \text{ A}, V_R = 30 \text{ V}, \frac{dI_F}{dt} = 100 \text{ A}/\mu\text{s}$	250			
Reverse recovery current, typical	I_{rr}	$T_J = 25 \text{ °C}, I_F = 20 \text{ A}, V_R = 30 \text{ V}, \frac{dI_F}{dt} = 100 \text{ A}/\mu\text{s}$	10.5	A		
		$T_J = 125 \text{ °C}, I_F = 20 \text{ A}, V_R = 30 \text{ V}, \frac{dI_F}{dt} = 100 \text{ A}/\mu\text{s}$	16			
Reverse recovery charge, typical	Q_{rr}	$T_J = 25 \text{ °C}, I_F = 20 \text{ A}, V_R = 30 \text{ V}, \frac{dI_F}{dt} = 100 \text{ A}/\mu\text{s}$	900	nC		
		$T_J = 125 \text{ °C}, I_F = 20 \text{ A}, V_R = 30 \text{ V}, \frac{dI_F}{dt} = 100 \text{ A}/\mu\text{s}$	1970			
Snap factor, typical	S	$T_J = 25 \text{ °C}$	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	R_{thJC}		-	-	0.30	°C/W
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	-	-	1.3 (11.5)	Nm (lbf.in)
Case style			SOT-227			

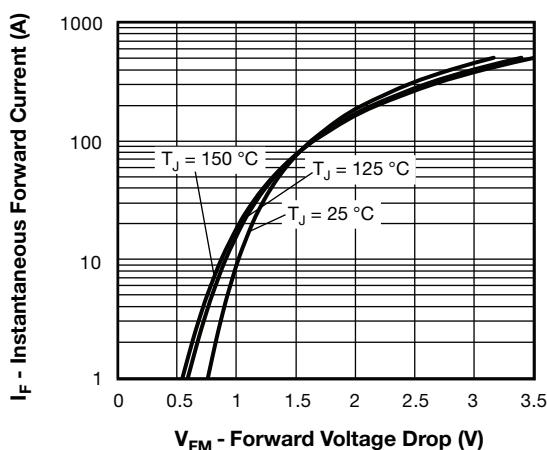


Fig. 1 - Typical Forward Voltage Drop Characteristics

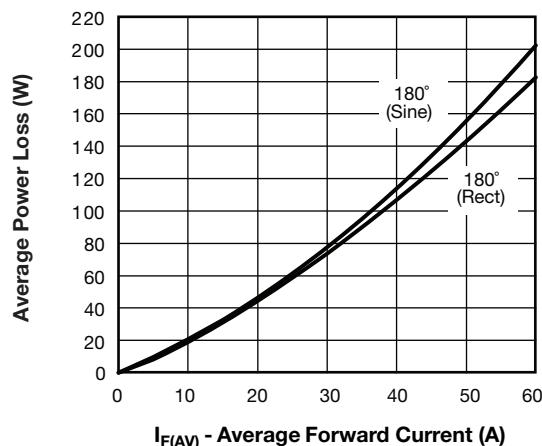


Fig. 4 - Current Rating Characteristics

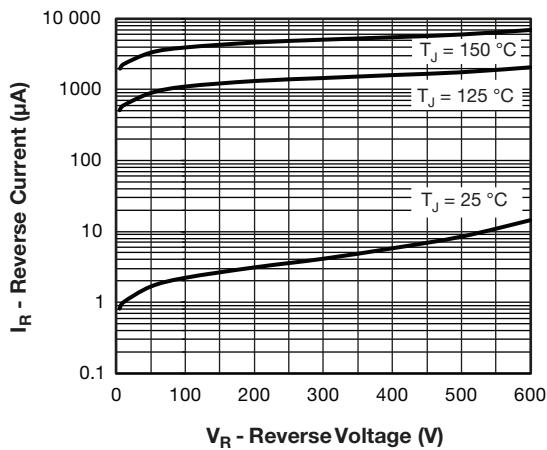


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

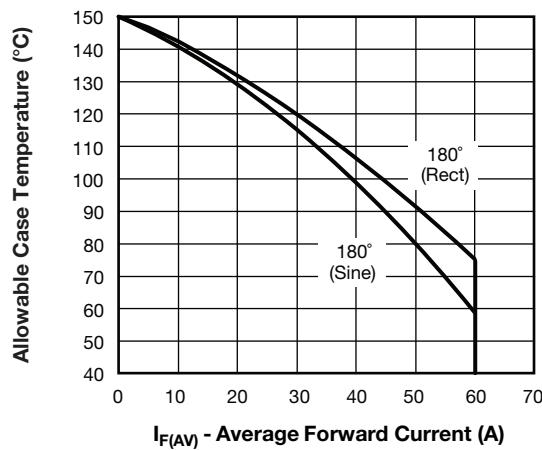


Fig. 5 - Forward Power Loss Characteristics

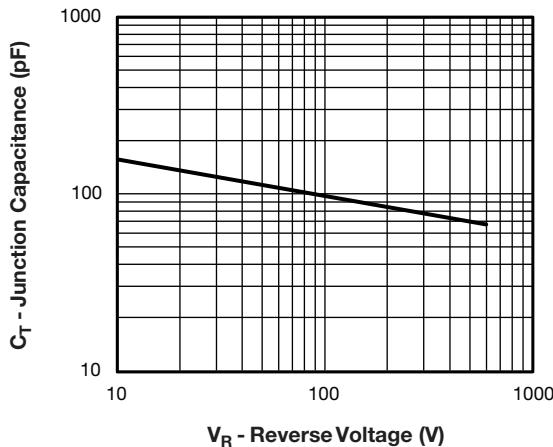


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

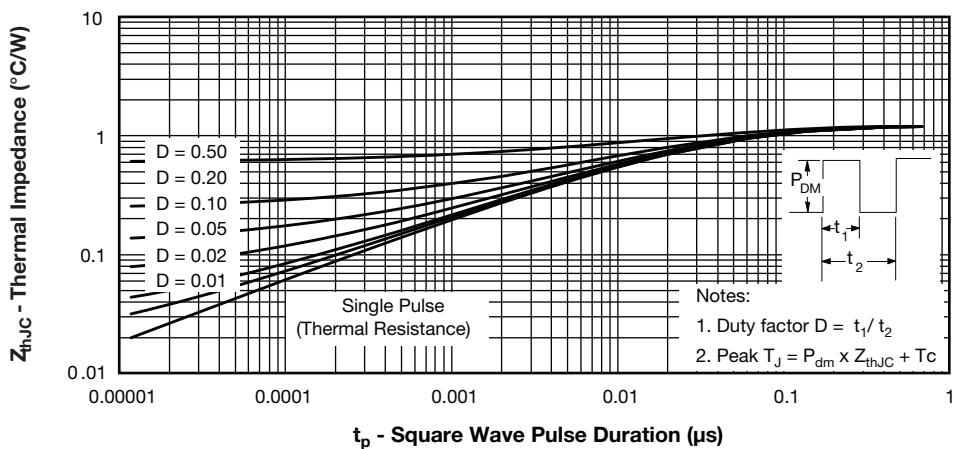


Fig. 6 - Typical Forward Voltage Drop Characteristics

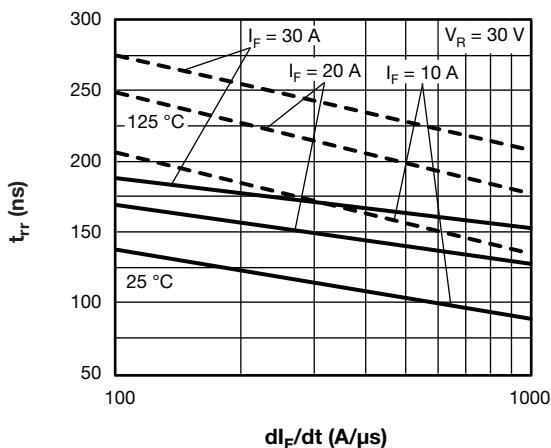


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

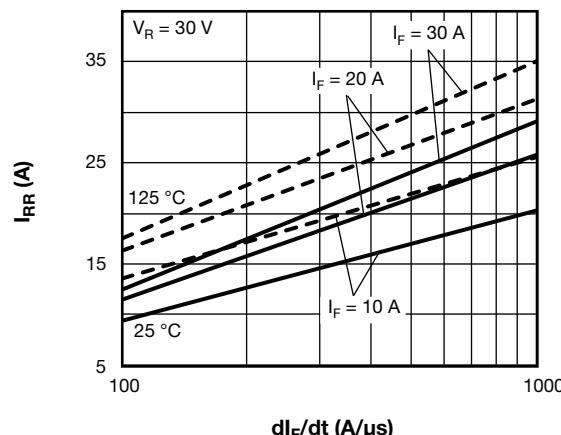


Fig. 9 - Typical Reverse Recovery Current vs. dI_F/dt

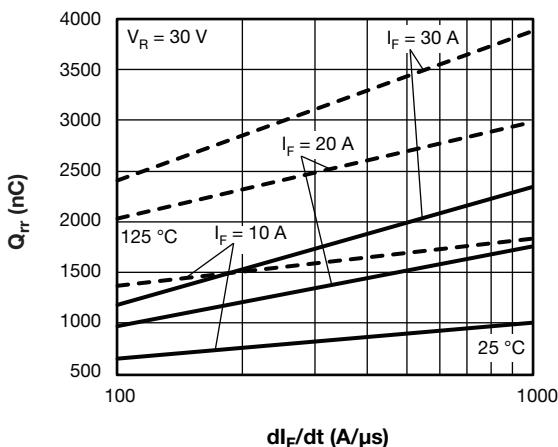


Fig. 8 - Typical Stored Charge vs. dI_F/dt

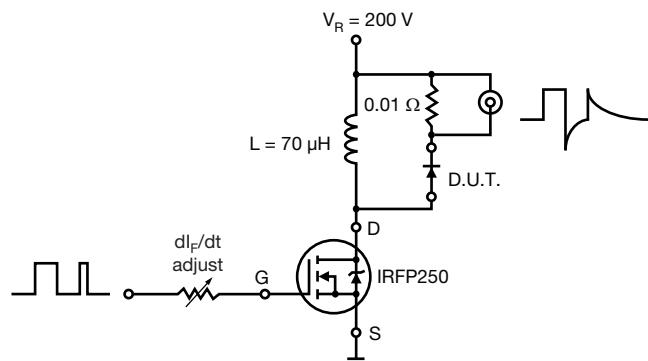
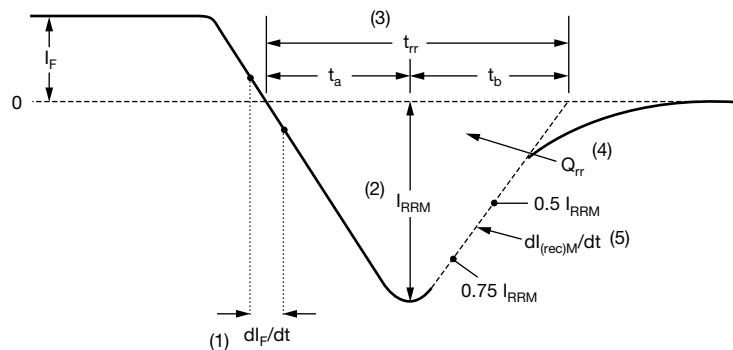


Fig. 10 - Reverse Recovery Parameter Test Circuit



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

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

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

(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.

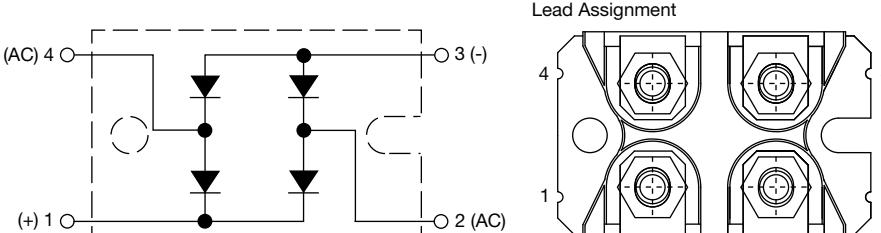
(5) $dl_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

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

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