

SOT-227 Silicon Carbide Single Phase Bridge, 90 A



SOT-227

LINKS TO ADDITIONAL RESOURCES



Application Notes

PRIMARY CHARACTERISTICS	
I_O at $T_C = 111\text{ }^\circ\text{C}$	90 A
V_{RRM}	650 V
V_{FM} at 90 A, $T_C = 25\text{ }^\circ\text{C}$	1.61 V
Package	SOT-227
Circuit configuration	Single phase bridge

FEATURES

- Virtually no recovery tail and no switching losses
- Majority carrier diode using Schottky technology on SiC wide band gap material
- Improved V_F and efficiency by thin wafer technology
- High speed switching, low switching losses
- Positive temperature coefficient, for easy paralleling
- 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


RoHS
COMPLIANT

DESCRIPTION / APPLICATIONS

Wide band gap SiC based 650 V Schottky diode, designed for high performance and ruggedness.

Optimum choice for high speed hard switching and efficient operation over a wide temperature range, it is also recommended for all applications suffering from Silicon ultrafast recovery behavior.

Typical applications include AC/DC PFC and DC/DC ultra high frequency output rectification in FBPS and LLC converters

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
I_O	180° rect. conduction angle	90	A
	T_C	111	$^\circ\text{C}$
I_{FSM}	50 Hz	340	A
	60 Hz	356	
I^2t	50 Hz	578	A^2s
	60 Hz	528	
V_{RRM}		650	V
T_J		-40 to +175	$^\circ\text{C}$

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS		
TYPE NUMBER	V_{RRM} , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V
VS-SC90BA65	650	650



ELECTRICAL SPECIFICATIONS PER DIODE (T _J = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	V _{BR}	I _R = 300 μA	650	-	-	V
Forward voltage	V _{FM}	I _F = 90 A	-	1.64	1.90	
		I _F = 90 A, T _J = 150 °C	-	2.04	-	
Reverse leakage current	I _{RM}	V _R = 650 V	-	2.4	120	μA
		T _J = 125 °C, V _R = 650 V	-	8.3	-	
		T _J = 150 °C, V _R = 650 V	-	12.0	-	
Junction capacitance	C _T	V _R = 650 V, f = 1 MHz	-	243	-	pF
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		90	A	
				111	°C	
Maximum peak, one-cycle non-repetitive forward current	I _{FSM}	t = 10 ms	No voltage reapplied	Initial T _J = 25 °C	340	A
		t = 8.3 ms			356	
		t = 10 ms	100 % V _{RRM} reapplied		286	
		t = 8.3 ms			299	
Maximum I ² t for fusing	I ² t	t = 10 ms	No voltage reapplied	Initial T _J = 25 °C	578	A ² s
		t = 8.3 ms			528	
		t = 10 ms	100 % V _{RRM} reapplied		409	
		t = 8.3 ms			373	
Maximum I ² √t for fusing	I ² √t	I ² t for time t _x = I ₂ √t × √t _x ; 0.1 ≤ t _x ≤ 10 ms, V _{RRM} = 0 V		5.78	kA ² √s	
Low level of threshold voltage, per leg	V _{F(T0)1}	(16.7 % × π × I _{F(AV)}) < I < π × I _{F(AV)} , T _J = T _J maximum		0.90	V	
Low level value of forward slope resistance	r _{F1}			16.38	mΩ	
High level of threshold voltage, per leg	V _{F(T0)2}	(I > π × I _{F(AV)}), T _J = T _J maximum		1.015	V	
High level value of forward slope resistance	r _{F2}			16.17	mΩ	
Maximum forward voltage, per diode	V _{FM}	I _F = 90 A		1.90	V	

DYNAMIC RECOVERY CHARACTERISTICS (T _J = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Total capacitive charge	Q _C	V _R = 400 V	-	164	-	nC

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance junction-to-case, per diode	R _{thJC}		-	-	0.6	°C/W
Case-to-heatsink	R _{thCS}	Flat, greased surface	-	0.1	-	
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

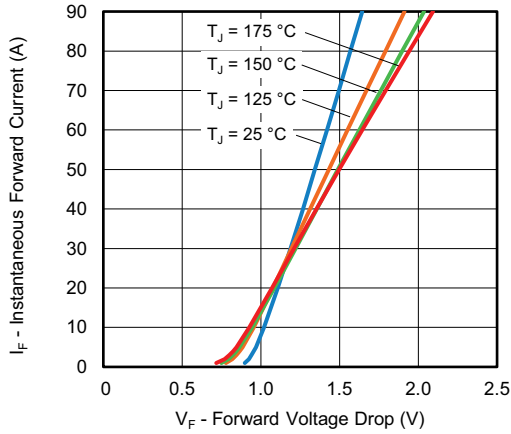


Fig. 1 - Typical Forward Voltage Drop Characteristics

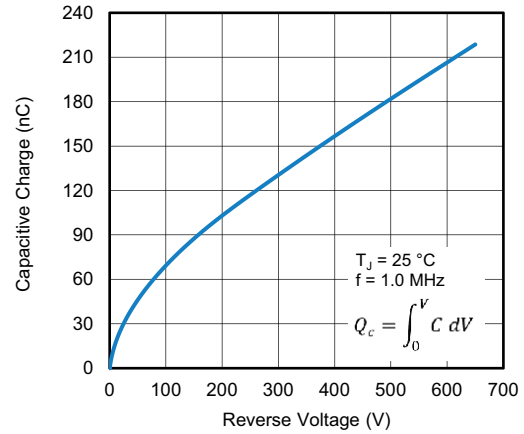


Fig. 4 - Typical Capacitive Charge vs. Reverse Voltage

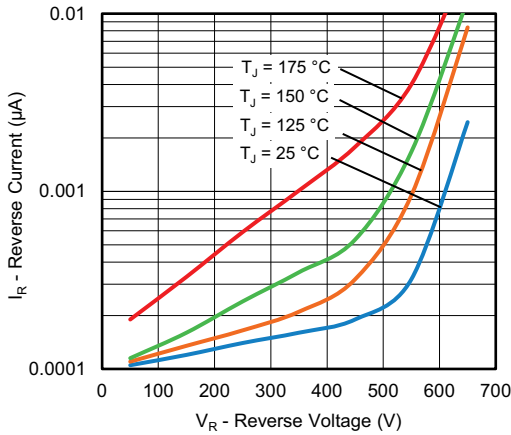


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

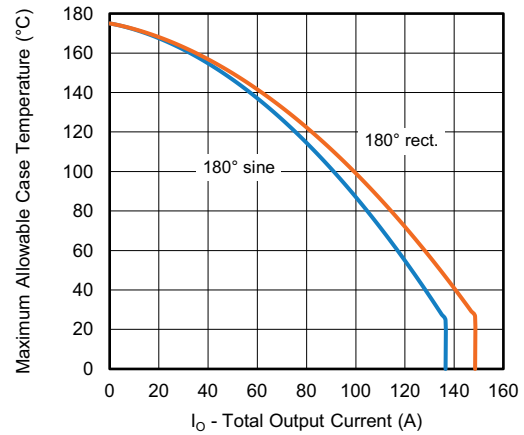


Fig. 5 - Current Rating Characteristics

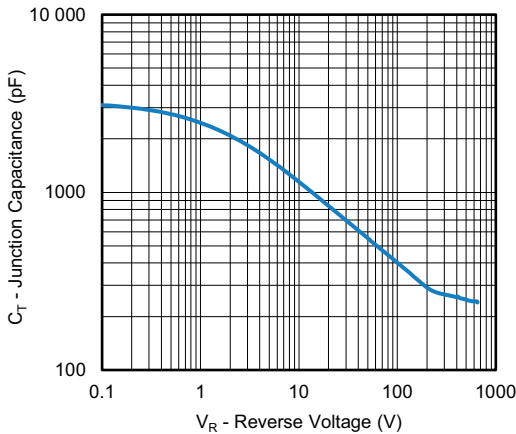


Fig. 3 - Junction Capacitance vs. Reverse Voltage

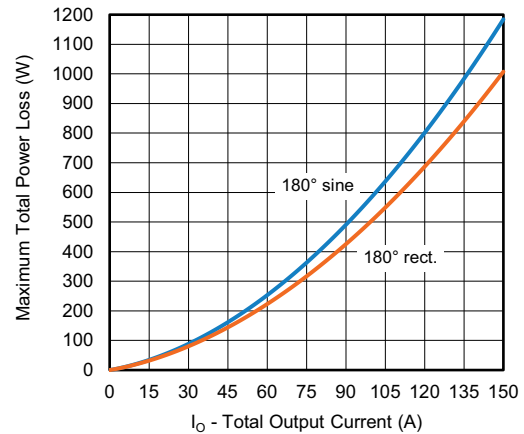


Fig. 6 - Total Power Loss Characteristics

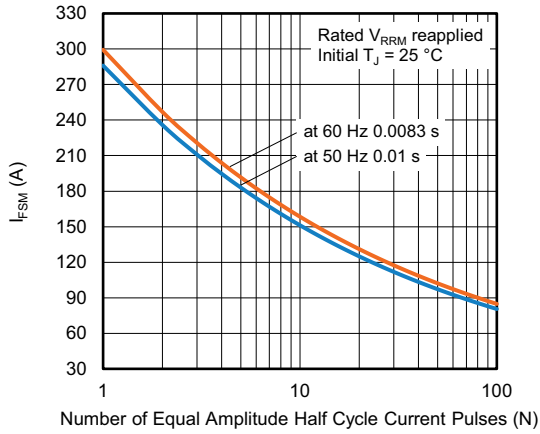


Fig. 7 - Non-Repetitive Peak Forward Surge Current vs. Number Pulses

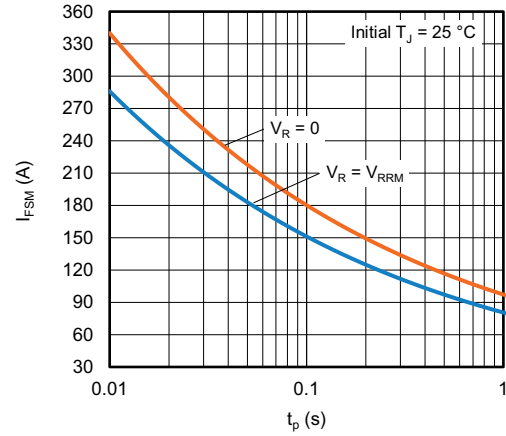


Fig. 8 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration

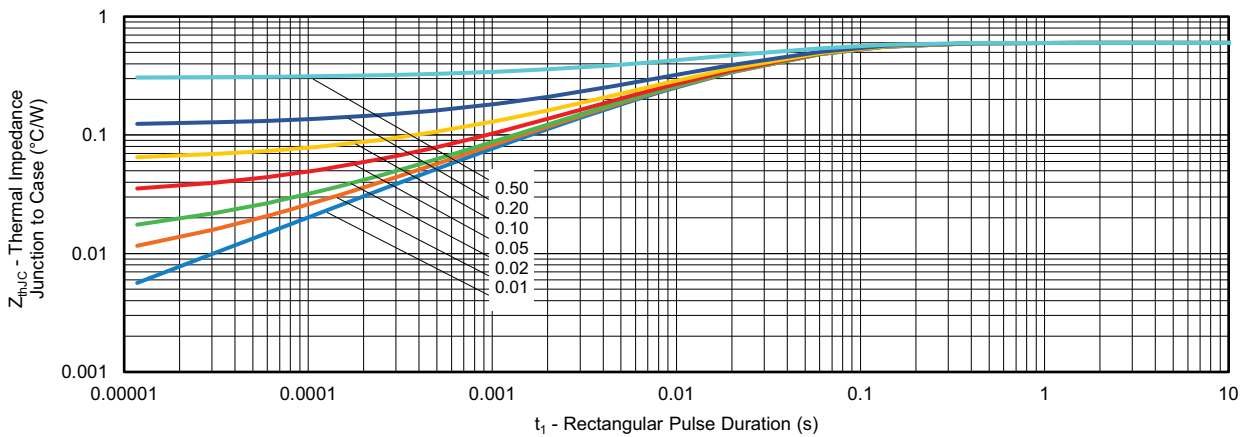


Fig. 9 - Maximum Thermal Impedance Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	S	C	90	B	A	65
	①	②	③	④	⑤	⑥	⑦

- 1** - Vishay Semiconductors product
- 2** - Silicon Carbide diode
- 3** - Present silicon generation
- 4** - Current rating (90 = 90 A)
- 5** - Circuit configuration (single phase bridge)
- 6** - Package indicator (SOT-227 standard insulated base)
- 7** - Voltage rating (65 = 650 V)

Quantity per tube is 10, M4 screw and washer included

CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Single phase bridge	B	

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



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