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 °C	90 A
V_{RRM}	650 V
V_{FM} at 90 A, T_C = 25 °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

Pb-free

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	°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	°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^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		578	A^2s
		t = 8.3 ms			528	
		t = 10 ms	100 % V_{RRM} reapplied		409	
		t = 8.3 ms			373	
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			5.78	$kA^2\sqrt{s}$
Low level of threshold voltage, per leg	$V_{F(T0)1}$	(16.7 % x π x $I_{F(AV)}$) < I < π x $I_{F(AV)}$, 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 x $I_{F(AV)}$), 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			

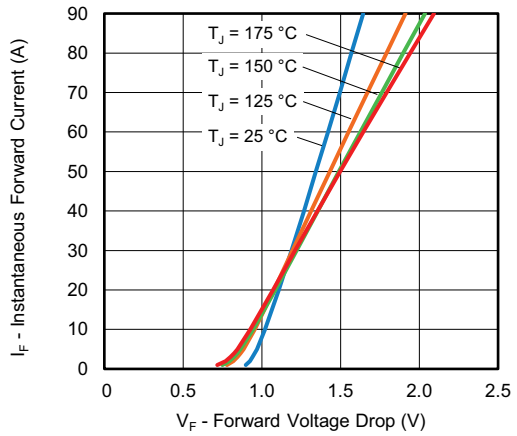


Fig. 1 - Typical Forward Voltage Drop Characteristics

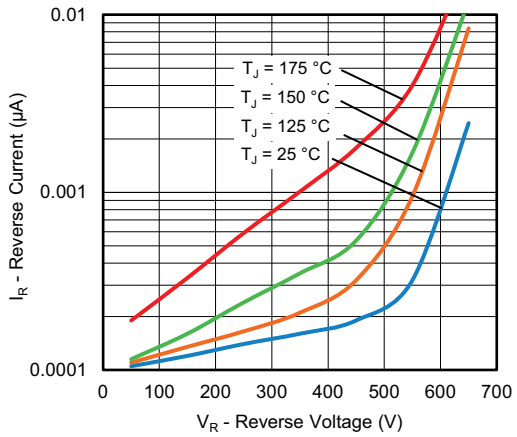


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

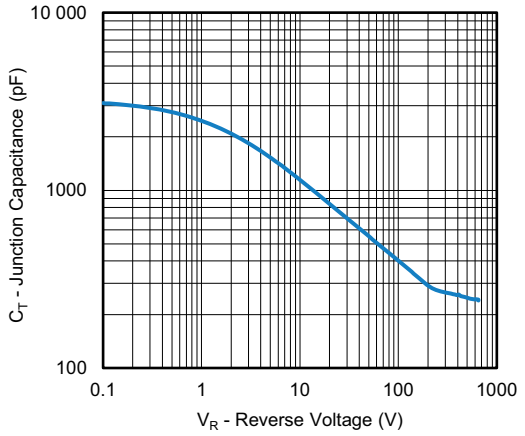


Fig. 3 - Junction Capacitance vs. Reverse Voltage

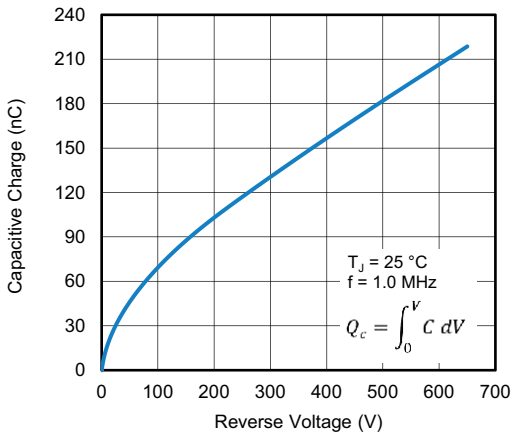


Fig. 4 - Typical Capacitive Charge vs. Reverse Voltage

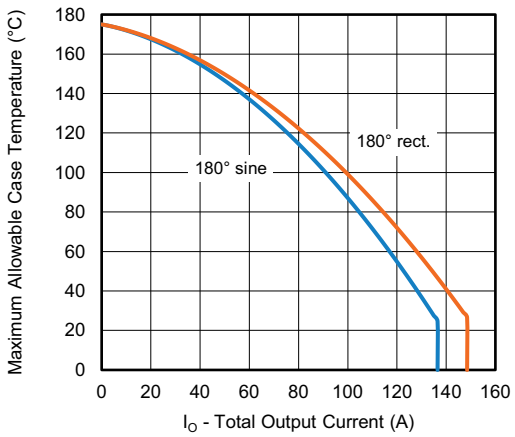


Fig. 5 - Current Rating Characteristics

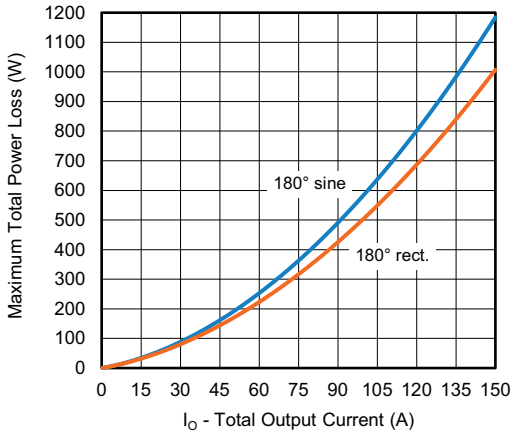


Fig. 6 - Total Power Loss Characteristics

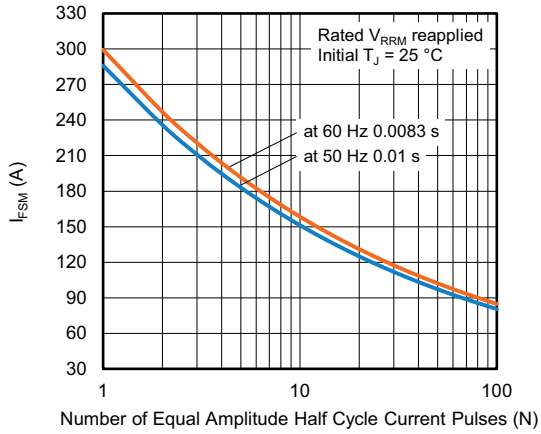


Fig. 7 - Non-Repetitive Peak Forward Surge Current vs. Number Pulses

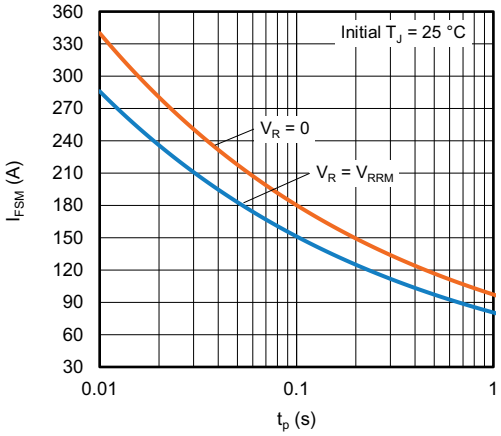


Fig. 8 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration

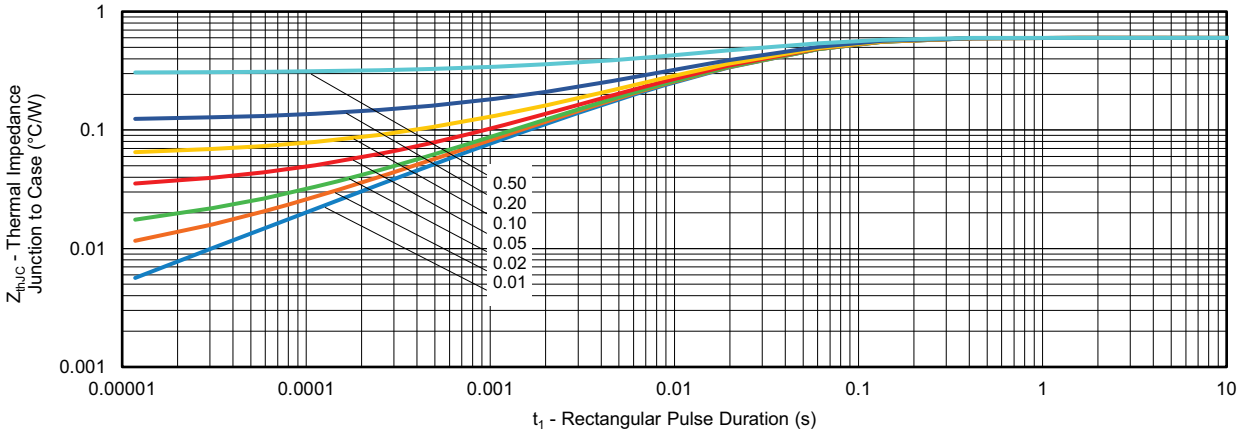


Fig. 9 - Maximum Thermal Impedance Characteristics

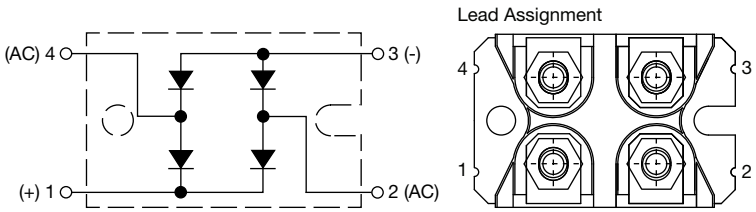
ORDERING INFORMATION TABLE

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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