

SOT-227 Silicon Carbide Single Phase Bridge, 50 A



SOT-227

LINKS TO ADDITIONAL RESOURCES



Application Notes

PRIMARY CHARACTERISTICS	
I_O at $T_C = 124\text{ }^\circ\text{C}$	50 A
V_{RRM}	650 V
V_{FM} at 50 A, $T_C = 25\text{ }^\circ\text{C}$	1.5 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	50	A
	T_C	124	$^\circ\text{C}$
I_{FSM}	50 Hz	267	A
	60 Hz	280	
I^2t	50 Hz	358	A^2s
	60 Hz	327	
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-SC50BA65	650	650



ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	V_{BR}	$I_R = 200\ \mu\text{A}$	650	-	-	V
Forward voltage	V_{FM}	$I_F = 50\ \text{A}$	-	1.5	1.73	
		$I_F = 50\ \text{A}, T_J = 150\text{ }^\circ\text{C}$	-	1.88	-	
Reverse leakage current	I_{RM}	$V_R = 650\ \text{V}$	-	1.9	80	μA
		$T_J = 125\text{ }^\circ\text{C}, V_R = 650\ \text{V}$	-	6.0	-	
		$T_J = 150\text{ }^\circ\text{C}, V_R = 650\ \text{V}$	-	9.0	-	
Junction capacitance	C_T	$V_R = 650\ \text{V}, f = 1\ \text{MHz}$	-	161	-	pF
RMS isolation voltage base plate	V_{ISOL}	$f = 50\ \text{Hz}$, any terminal to case, $t = 1\ \text{min.}$	2500	-	-	V

FORWARD CONDUCTION						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum DC output current at case temperature	I_O	Resistive or inductive load		50	A	
				124	$^\circ\text{C}$	
Maximum peak, one-cycle non-repetitive forward current	I_{FSM}	$t = 10\ \text{ms}$	No voltage reapplied	Initial $T_J = 25\text{ }^\circ\text{C}$	267	A
		$t = 8.3\ \text{ms}$			280	
		$t = 10\ \text{ms}$	100 % V_{RRM} reapplied		225	
		$t = 8.3\ \text{ms}$			235	
Maximum I^2t for fusing	I^2t	$t = 10\ \text{ms}$	No voltage reapplied	Initial $T_J = 25\text{ }^\circ\text{C}$	358	A^2s
		$t = 8.3\ \text{ms}$			327	
		$t = 10\ \text{ms}$	100 % V_{RRM} reapplied		253	
		$t = 8.3\ \text{ms}$			231	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	I^2t for time $t_x = I_2\sqrt{t} \times \sqrt{t_x}; 0.1 \leq t_x \leq 10\ \text{ms}, V_{RRM} = 0\ \text{V}$		3.58	$\text{kA}^2\sqrt{\text{s}}$	
Low level of threshold voltage, per leg	$V_{F(TO)1}$	$(16.7\% \times \pi \times I_{F(AV)}) < I < \pi \times I_{F(AV)}, T_J = T_J\ \text{maximum}$		0.87	V	
Low level value of forward slope resistance	r_{f1}			25.47	$\text{m}\Omega$	
High level of threshold voltage, per leg	$V_{F(TO)2}$	$(I > \pi \times I_{F(AV)}), T_J = T_J\ \text{maximum}$		0.98	V	
High level value of forward slope resistance	r_{f2}			25.19	$\text{m}\Omega$	
Maximum forward voltage, per diode	V_{FM}	$I_F = 50\ \text{A}$		1.73	V	

DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Total capacitive charge	Q_C	$V_R = 400\ \text{V}$	-	110	-	nC

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance junction-to-case, per diode	R_{thJC}		-	-	0.94	$^\circ\text{C}/\text{W}$
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			

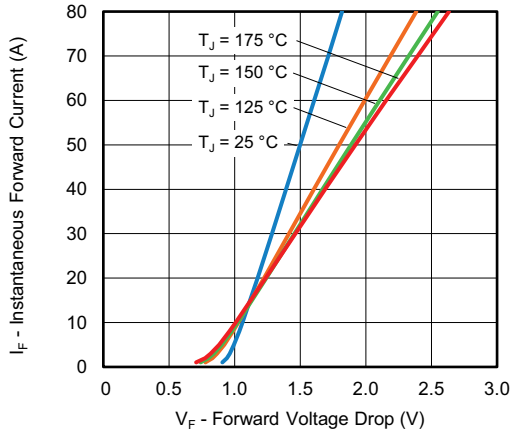


Fig. 1 - Typical Forward Voltage Drop Characteristics

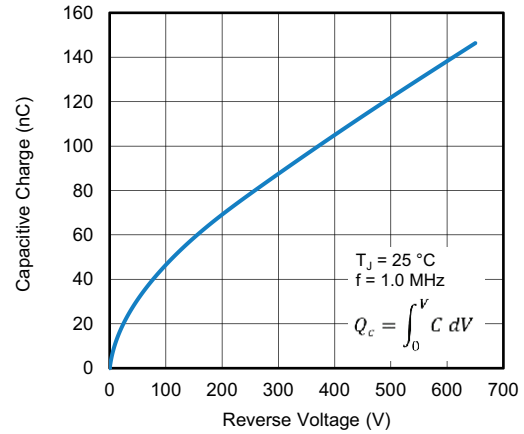


Fig. 4 - Typical Capacitive Charge vs. Reverse Voltage

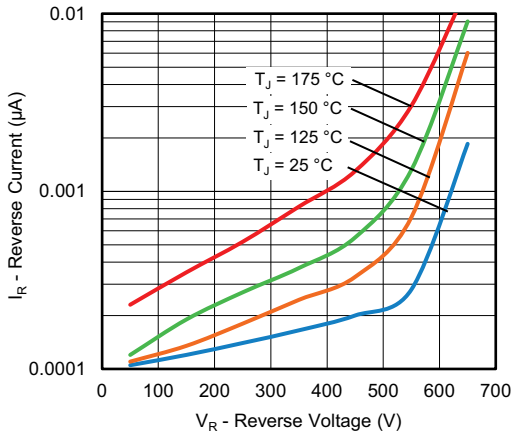


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

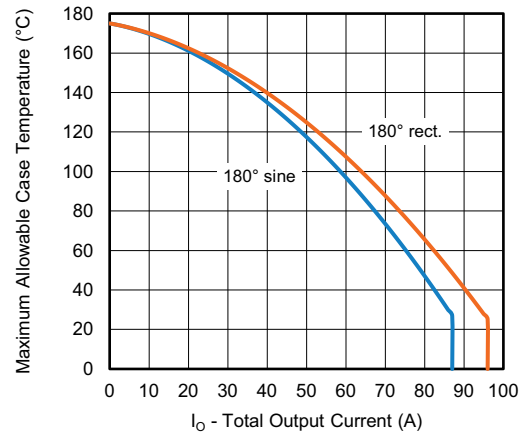


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

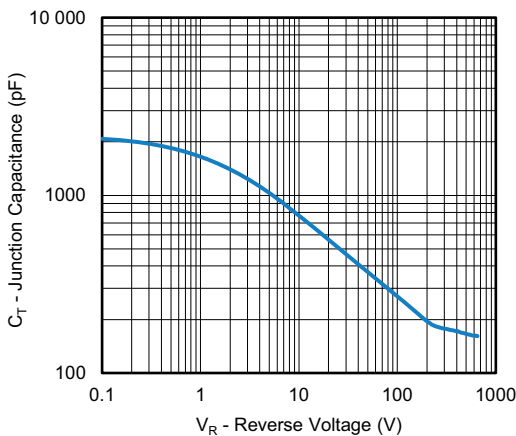


Fig. 3 - Junction Capacitance vs. Reverse Voltage

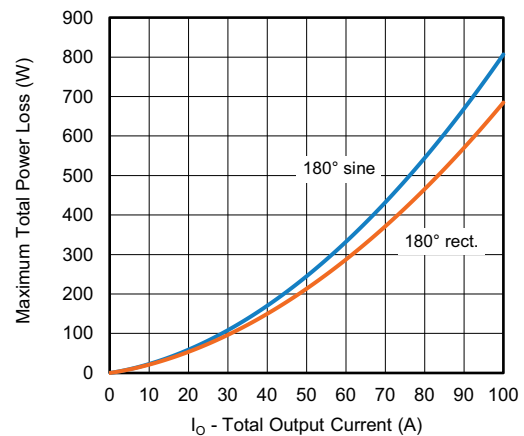


Fig. 6 - Forward Power Loss Characteristics

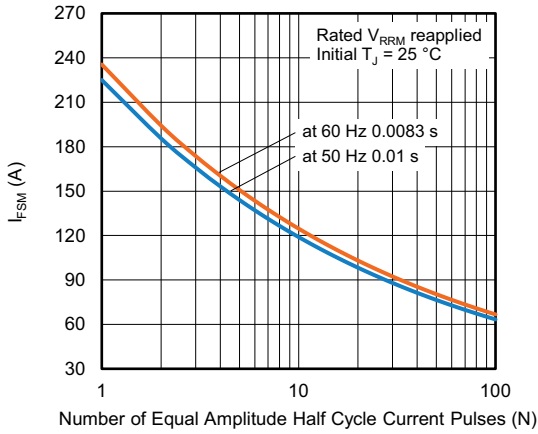


Fig. 7 - Non-Repetitive Peak Forward Surge Current vs. Number Pulses

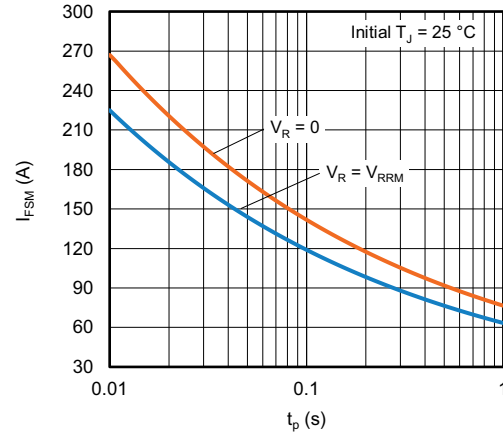


Fig. 8 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration

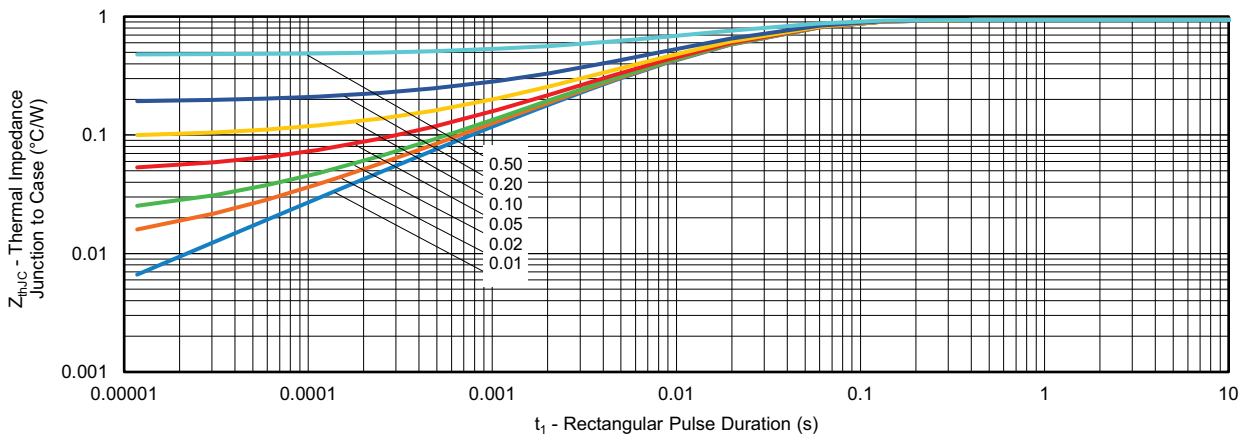


Fig. 9 - Maximum Thermal Impedance Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	S	C	50	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 (50 = 50 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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