

# SOT-227 Silicon Carbide Single Phase Bridge, 50 A




SOT-227

## LINKS TO ADDITIONAL RESOURCES



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](http://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	$\text{A}^2\text{s}$
	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	$V_{BR}$	$I_R = 200\text{ }\mu\text{A}$	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	$\mu\text{A}$
		$T_J = 125\text{ }^{\circ}\text{C}, V_R = 650\text{ V}$	-	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 <sub>O</sub>	Resistive or inductive load			50	A	
					124	°C	
Maximum peak, one-cycle non-repetitive forward current	I <sub>FSM</sub>	t = 10 ms	No voltage reapplied	Initial T <sub>J</sub> = 25 °C	267	A	
		t = 8.3 ms			280		
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		225		A <sup>2</sup> s
		t = 8.3 ms			235		
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reapplied		358		
		t = 8.3 ms			327		
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		253		
		t = 8.3 ms			231		
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 x √t <sub>x</sub> ; 0.1 ≤ t <sub>x</sub> ≤ 10 ms, V <sub>RRM</sub> = 0 V			3.58	kA <sup>2</sup> √s	
Low level of threshold voltage, per leg	V <sub>F(T0)1</sub>	(16.7 % x π x I <sub>F(AV)</sub> ) < I < π x I <sub>F(AV)</sub> , T <sub>J</sub> = T <sub>J</sub> maximum			0.87	V	
Low level value of forward slope resistance	r <sub>f1</sub>				25.47	mΩ	
High level of threshold voltage, per leg	V <sub>F(T0)2</sub>	(I > π x I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum			0.98	V	
High level value of forward slope resistance	r <sub>f2</sub>				25.19	mΩ	
Maximum forward voltage, per diode	V <sub>FM</sub>	I <sub>F</sub> = 50 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	$^{\circ}\text{C/W}$
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			

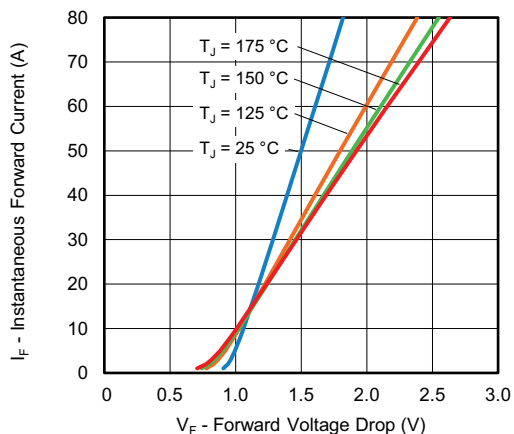


Fig. 1 - Typical Forward Voltage Drop Characteristics

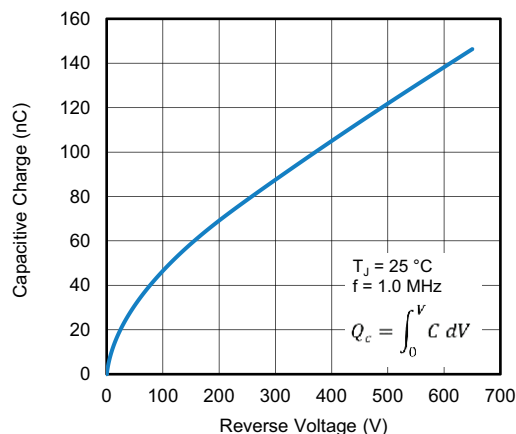


Fig. 4 - Typical Capacitive Charge vs. Reverse Voltage

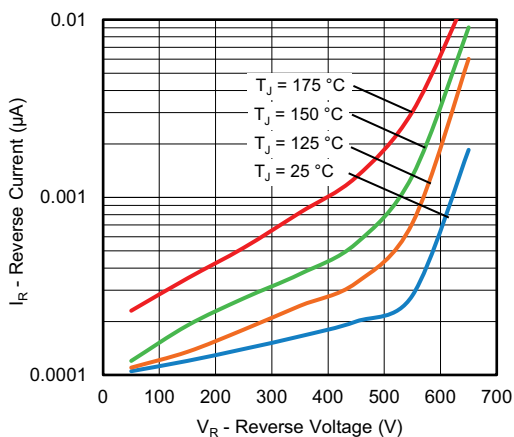


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

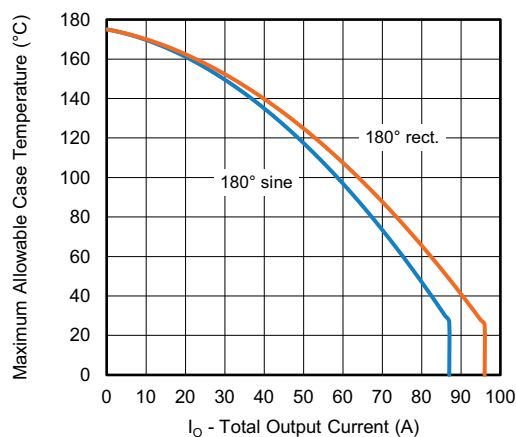


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

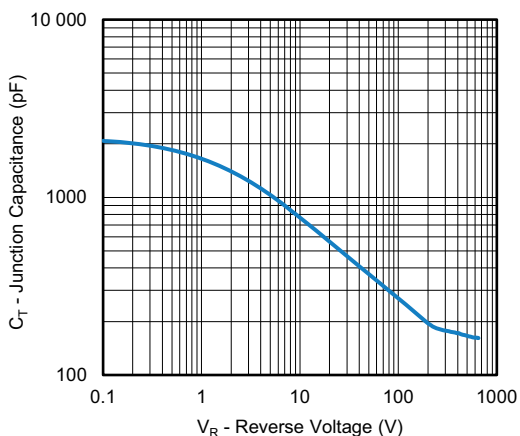


Fig. 3 - Junction Capacitance vs. Reverse Voltage

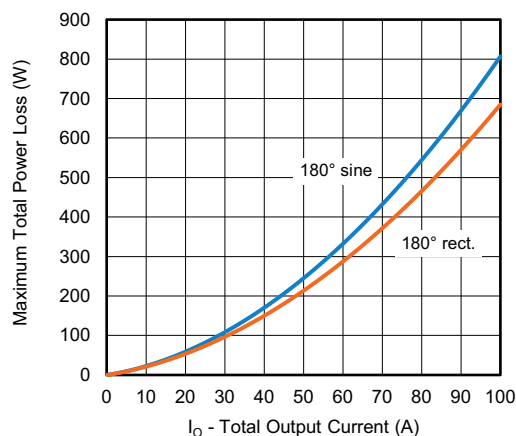


Fig. 6 - Forward Power Loss Characteristics

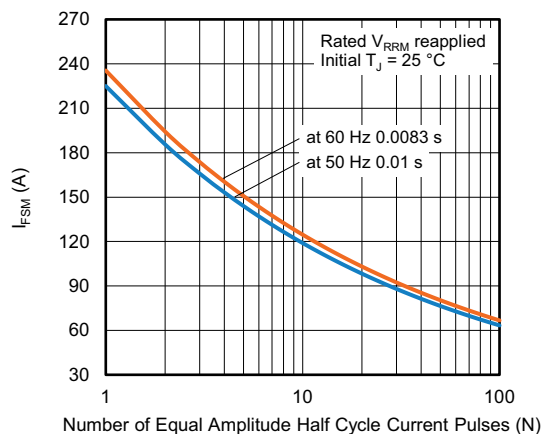


Fig. 7 - Non-Repetitive Peak Forward Surge Current vs. Number Pulses

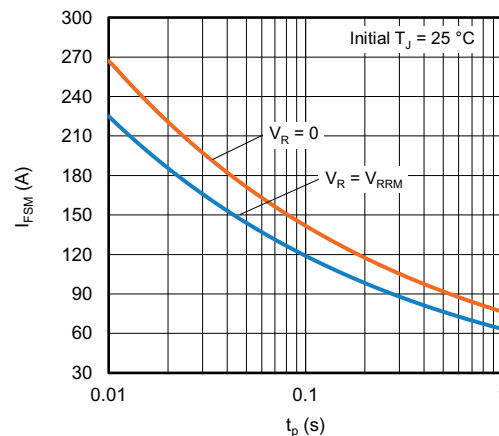


Fig. 8 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration

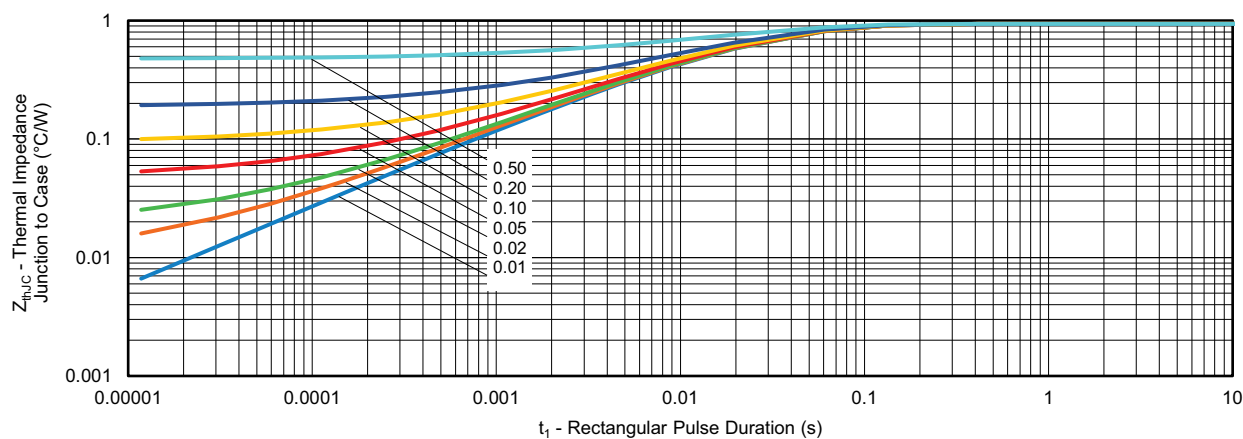


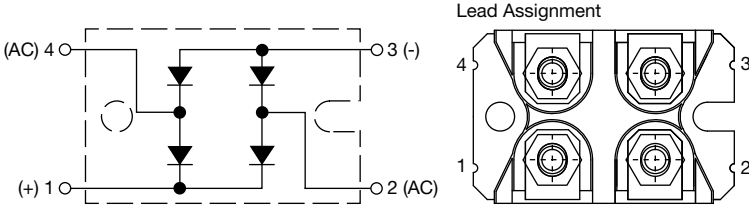
Fig. 9 - Maximum Thermal Impedance Characteristics

**ORDERING INFORMATION TABLE**

Device code	VS-	S	C	50	B	A	65
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	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	<a href="http://www.vishay.com/doc?95423">www.vishay.com/doc?95423</a>
Part marking information	<a href="http://www.vishay.com/doc?95425">www.vishay.com/doc?95425</a>



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.