

## Insulated Single Phase Hyperfast Bridge (Power Modules), 60 A



SOT-227

**FEATURES**

- Hyperfast and soft recovery characteristic
- Electrically isolated base plate
- Simplified mechanical designs, rapid assembly
- High operation junction temperature ( $T_J$  max. = 175 °C)
- 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](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

PRIMARY CHARACTERISTICS	
$V_{RRM}$	650 V
$I_O$ at $T_C = 123$ °C	60 A
$t_{rr}$	63 ns
Type	Modules - Bridge, Hyperfast
Package	SOT-227
Circuit configuration	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
$I_O$		60	A
	$T_C$	123	°C
$I_{FSM}$	50 Hz	360	A
	60 Hz	377	
$I^2t$	50 Hz	648	A <sup>2</sup> s
	60 Hz	589	
$V_{RRM}$		650	V
$T_J$		-55 to +175	°C

**ELECTRICAL SPECIFICATIONS**

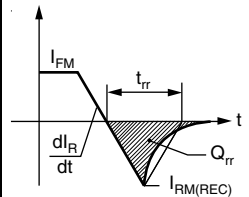
VOLTAGE RATINGS				
TYPE NUMBER	VOLTAGE CODE	$V_{RRM}$ , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	$I_{RRM}$ MAXIMUM AT $T_J$ MAXIMUM mA
UFH60BA65	65	650	700	2

ELECTRICAL SPECIFICATIONS ( $T_J = 25$ °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Cathode to anode breakdown voltage	$V_{BR}$	$I_R = 250$ $\mu$ A	650	-	-	V	
Forward voltage, per diode	$V_{FM}$	$I_F = 60$ A	-	1.7	2.35		
Reverse leakage current, per leg	$I_{RM}$	$V_R = 650$ V	-	1.0	100	$\mu$ A	
		$V_R = 650$ V, $T_J = 150$ °C	-	250	-		
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 <sub>o</sub>	Resistive or inductive load		60	A
				123	°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	A
		t = 8.3 ms			
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		
		t = 8.3 ms			
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reapplied	Initial T <sub>J</sub> = 25 °C	A <sup>2</sup> s
		t = 8.3 ms			
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		
		t = 8.3 ms			
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 × √t <sub>x</sub> ; 0.1 ≤ t <sub>x</sub> ≤ 10 ms, V <sub>RRM</sub> = 0 V		6.4	kA <sup>2</sup> √s
Low level of threshold voltage, per leg	V <sub>F(T0)1</sub>	(16.7 % × π × I <sub>F(AV)</sub> ) < I < π × I <sub>F(AV)</sub> , T <sub>J</sub> = T <sub>J</sub> maximum		0.88	V
Low level value of forward slope resistance	r <sub>f1</sub>			16.49	mΩ
High level of threshold voltage, per leg	V <sub>F(T0)2</sub>	(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum		1.16	V
High level value of forward slope resistance	r <sub>f2</sub>			15.87	mΩ
Maximum forward voltage, per diode	V <sub>FM</sub>	I <sub>F</sub> = 60 A		2.35	V

RECOVERY CHARACTERISTICS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Typical reverse recovery time, per diode	t <sub>rr</sub>	T <sub>J</sub> = 25 °C, I <sub>F</sub> = 50 A, V <sub>R</sub> = 200 V, dI <sub>F</sub> /dt = 200 A/μs	63	ns
		T <sub>J</sub> = 125 °C, I <sub>F</sub> = 50 A, V <sub>R</sub> = 200 V, dI <sub>F</sub> /dt = 200 A/μs	134	
Typical reverse recovery current, per diode	I <sub>rr</sub>	T <sub>J</sub> = 25 °C, I <sub>F</sub> = 50 A, V <sub>R</sub> = 200 V, dI <sub>F</sub> /dt = 200 A/μs	4.1	A
		T <sub>J</sub> = 125 °C, I <sub>F</sub> = 50 A, V <sub>R</sub> = 200 V, dI <sub>F</sub> /dt = 200 A/μs	11.4	
Typical reverse recovery charge, per diode	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C, I <sub>F</sub> = 50 A, V <sub>R</sub> = 200 V, dI <sub>F</sub> /dt = 200 A/μs	130	nC
		T <sub>J</sub> = 125 °C, I <sub>F</sub> = 50 A, V <sub>R</sub> = 200 V, dI <sub>F</sub> /dt = 200 A/μs	765	
Typical junction capacitance	C <sub>T</sub>	V <sub>R</sub> = 650 V	77	pF



THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-55	-	175	°C
Thermal resistance junction to case, per diode	R <sub>thJC</sub>		-	-	0.91	°C/W
Thermal resistance case to heatsink	R <sub>thCS</sub>	Flat, greased surface	-	0.1	-	
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			

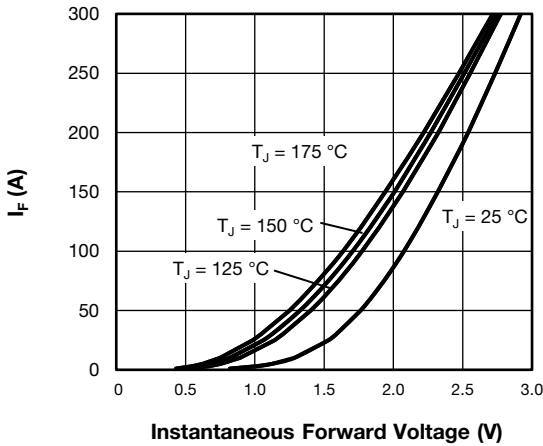


Fig. 1 - Typical Forward Voltage Characteristics

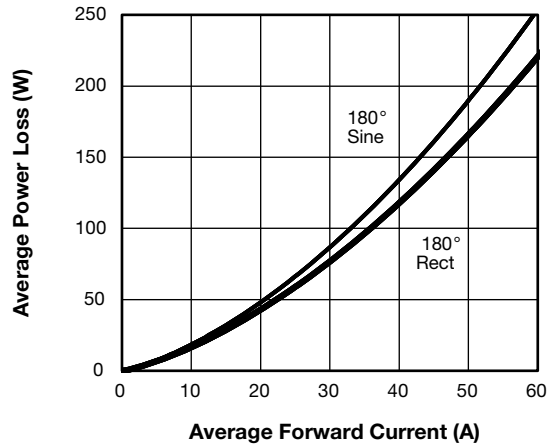


Fig. 4 - Forward Power Loss Characteristics

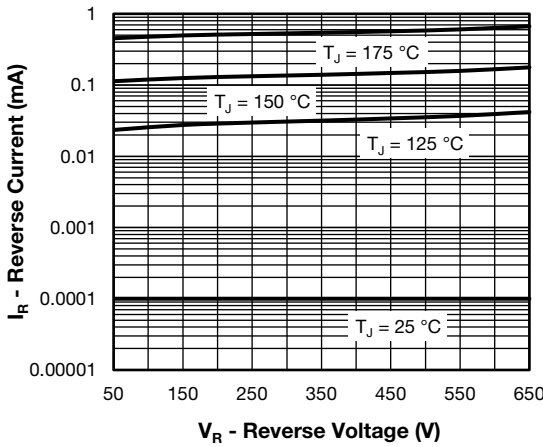


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Diode)

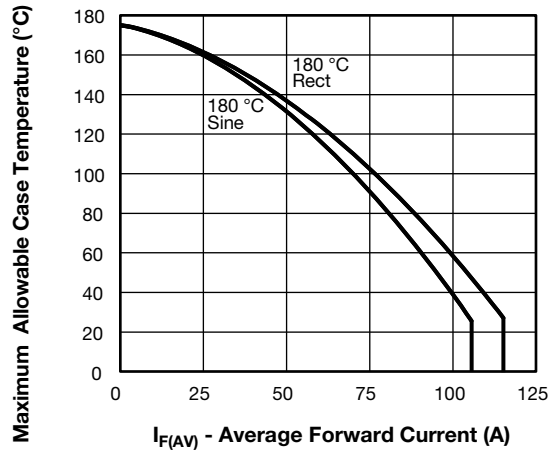


Fig. 5 - Current Rating Characteristics (A)

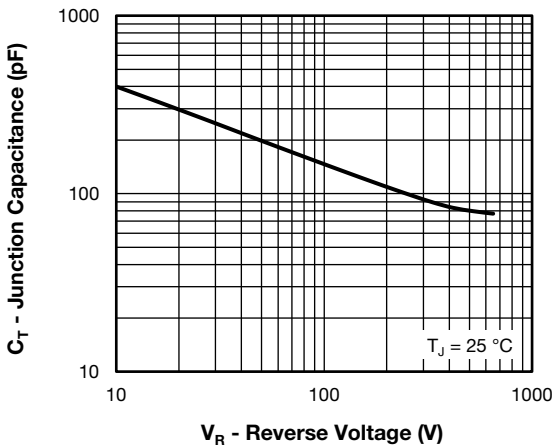


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Diode)

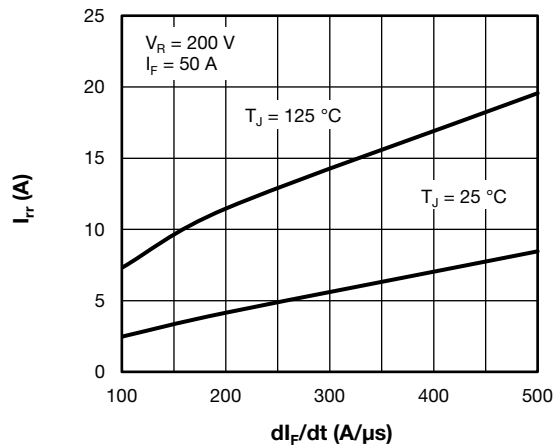


Fig. 6 - Typical Reverse Recovery Current vs.  $dI_F/dt$

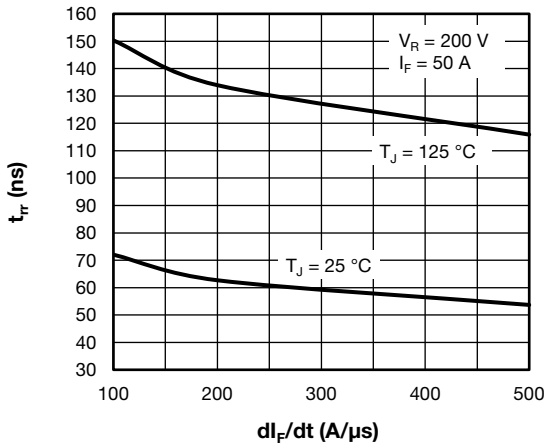


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

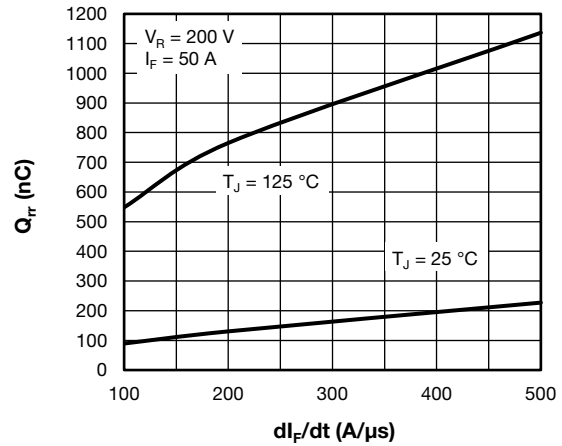


Fig. 8 - Reverse Recovery Charge vs.  $di_F/dt$

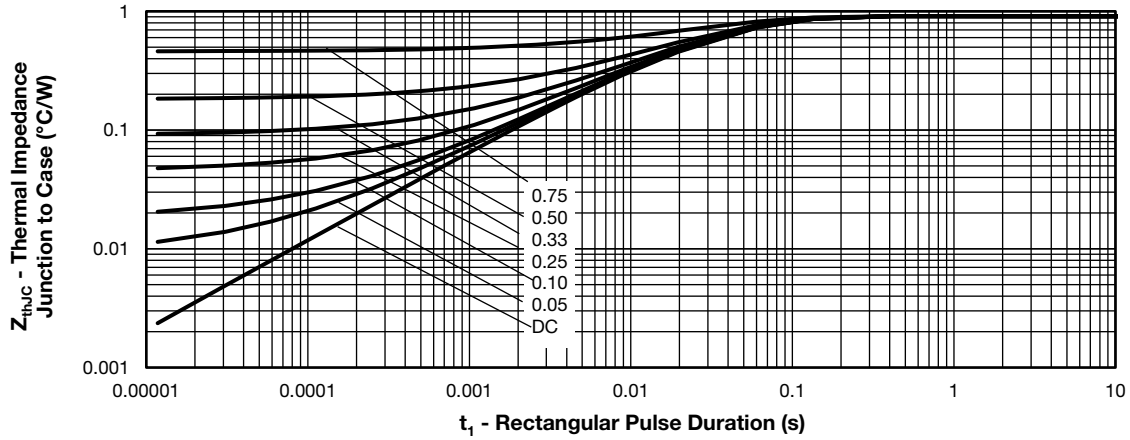


Fig. 9 - Maximum Thermal Impedance Junction-to-Case Characteristics (Per Diode)

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>UF</b>	<b>H</b>	<b>60</b>	<b>B</b>	<b>A</b>	<b>65</b>
	①	②	③	④	⑤	⑥	⑦

- 1** - Vishay Semiconductors product
- 2** - Ultra fast rectifier
- 3** - Hyper fast FRED Pt<sup>®</sup> diffused
- 4** - Current rating (60 = 60 A)
- 5** - Circuit configuration:  
B = Single phase bridge
- 6** - Package indicator:  
A = SOT-227, standard insulated base
- 7** - Voltage rating (65 = 650 V)

CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Single phase bridge	B	<div style="display: inline-block; vertical-align: top; margin-left: 20px;"> <p>Lead Assignment</p> </div>

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95423">www.vishay.com/doc?95423</a>
Packaging information	<a href="http://www.vishay.com/doc?95425">www.vishay.com/doc?95425</a>



## SOT-227 Generation 2

**DIMENSIONS** in millimeters (inches)



**Note**

- Controlling dimension: millimeter



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