


## 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 $T_C = 123\text{ °C}$	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.

ABSOLUTE MAXIMUM RATINGS			
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	A²s
	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 ( $T_J = 25\text{ °C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	$V_{BR}$	$I_R = 250\text{ }\mu\text{A}$	650	-	-	V
Forward voltage, per diode	$V_{FM}$	$I_F = 60\text{ A}$	-	1.7	2.35	
Reverse leakage current, per leg	$I_{RM}$	$V_R = 650\text{ V}$	-	1.0	100	$\mu\text{A}$
		$V_R = 650\text{ V}, T_J = 150\text{ °C}$	-	250	-	
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		60	A
				123	°C
Maximum peak, one-cycle non-repetitive forward current	I <sub>FSM</sub>	t = 10 ms	No voltage reapplied	360	A
		t = 8.3 ms		377	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied	303	
		t = 8.3 ms		317	
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reapplied	648	A <sup>2</sup> s
		t = 8.3 ms		589	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied	458	
		t = 8.3 ms		417	
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		6.4	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		16.49	V
Low level value of forward slope resistance	r <sub>f1</sub>			0.88	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		15.87	V
High level value of forward slope resistance	r <sub>f2</sub>			1.16	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	$t_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$ , $I_F = 50\text{ A}$ , $V_R = 200\text{ V}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$	63	ns
		$T_J = 125\text{ }^{\circ}\text{C}$ , $I_F = 50\text{ A}$ , $V_R = 200\text{ V}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$	134	
Typical reverse recovery current, per diode	$I_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$ , $I_F = 50\text{ A}$ , $V_R = 200\text{ V}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$	4.1	A
		$T_J = 125\text{ }^{\circ}\text{C}$ , $I_F = 50\text{ A}$ , $V_R = 200\text{ V}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$	11.4	
Typical reverse recovery charge, per diode	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$ , $I_F = 50\text{ A}$ , $V_R = 200\text{ V}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$	130	nC
		$T_J = 125\text{ }^{\circ}\text{C}$ , $I_F = 50\text{ A}$ , $V_R = 200\text{ V}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$	765	
Typical junction capacitance	$C_T$	$V_R = 650\text{ V}$	77	pF

The graph illustrates the reverse recovery characteristics of a diode. The vertical axis represents current  $I$  and the horizontal axis represents time  $t$ . The curve starts at a positive forward current  $I_{FM}$ , then transitions to a negative reverse current. The reverse recovery time  $t_{rr}$  is the time interval from the start of reverse current to the point where the current reaches its minimum value  $I_{RM(REC)}$ . The area under the reverse current curve is shaded and labeled  $Q_{rr}$ , representing the reverse recovery charge. The slope of the reverse current curve is labeled  $\frac{di_R}{dt}$ .

**THERMAL AND MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction and storage temperature range	$T_J, T_{Stg}$		-55	-	175	°C
Thermal resistance junction to case	$R_{thJC}$		-	-	0.91	°C/W
Thermal resistance 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	-	-	1.3 (11.5)	Nm (lbf.in)
Case style			SOT-227			

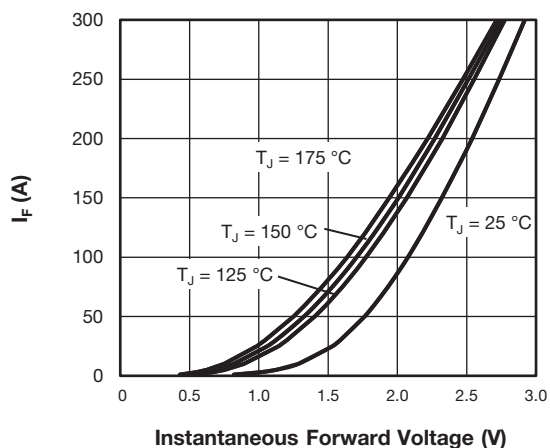


Fig. 1 - Typical Forward Voltage Characteristics

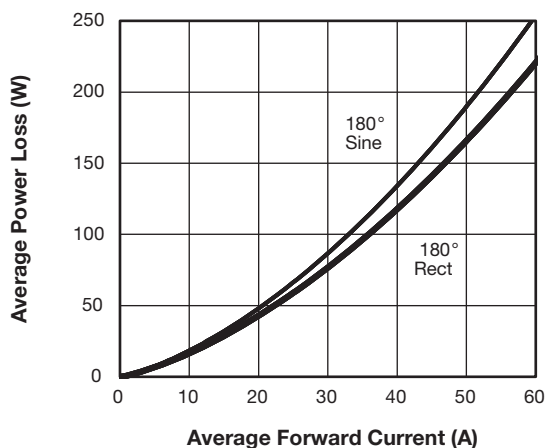


Fig. 4 - Forward Power Loss Characteristics

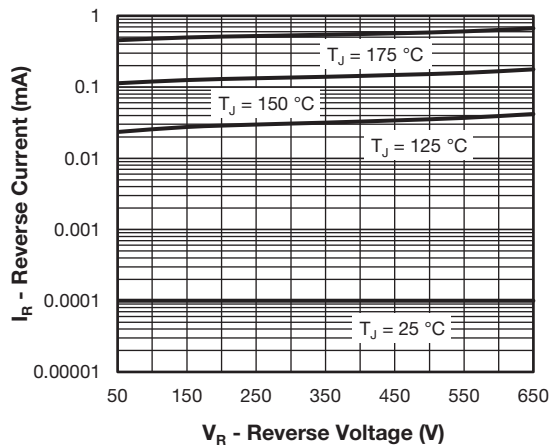


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Diode)

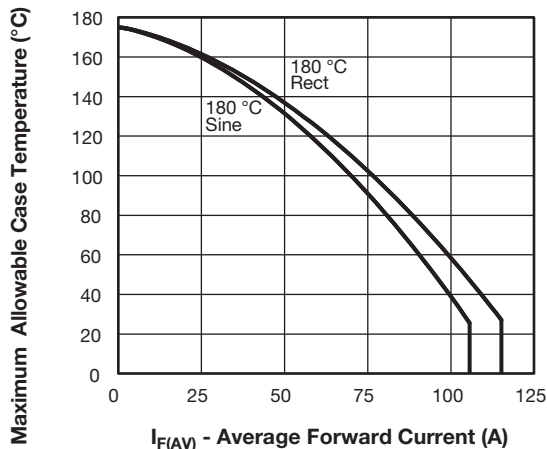


Fig. 5 - Current Rating Characteristics (A)

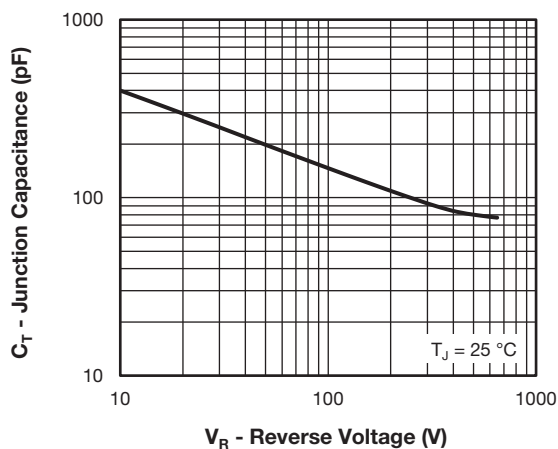
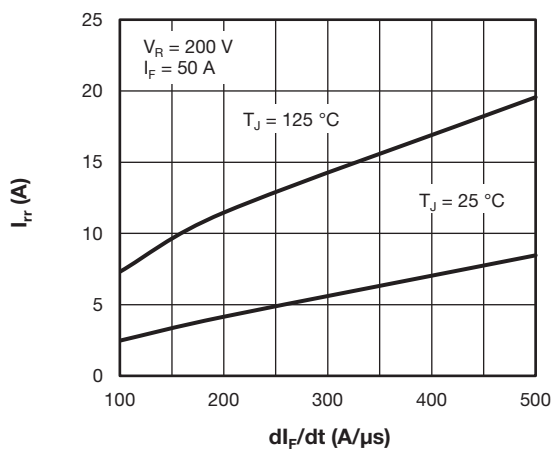
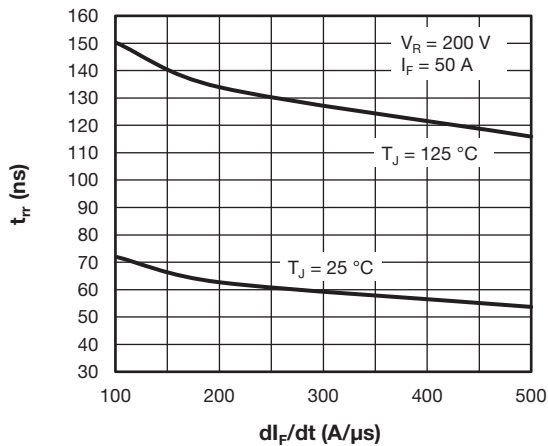
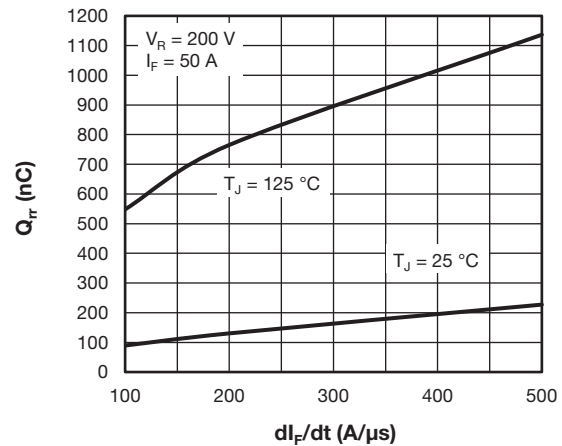
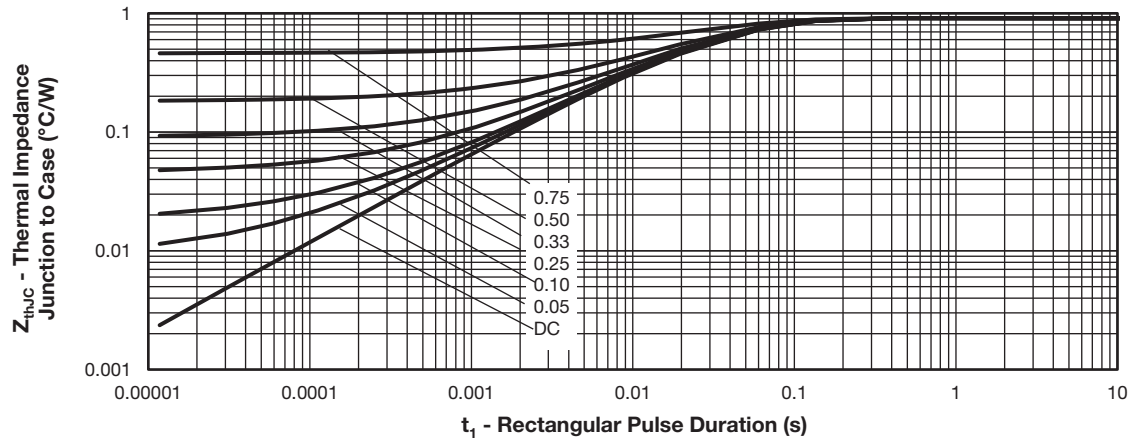


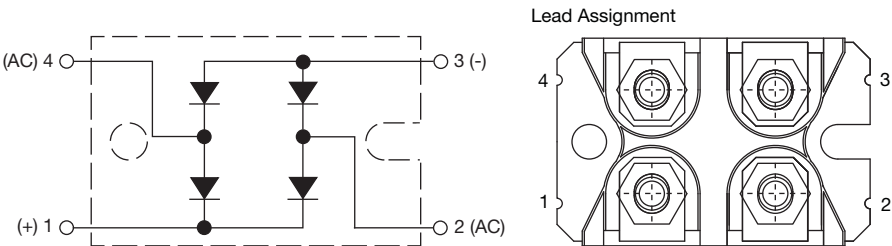
Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Diode)


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 - Typical Reverse Recovery Current vs.  $dI_F/dt$  (Per Diode)

**ORDERING INFORMATION TABLE**

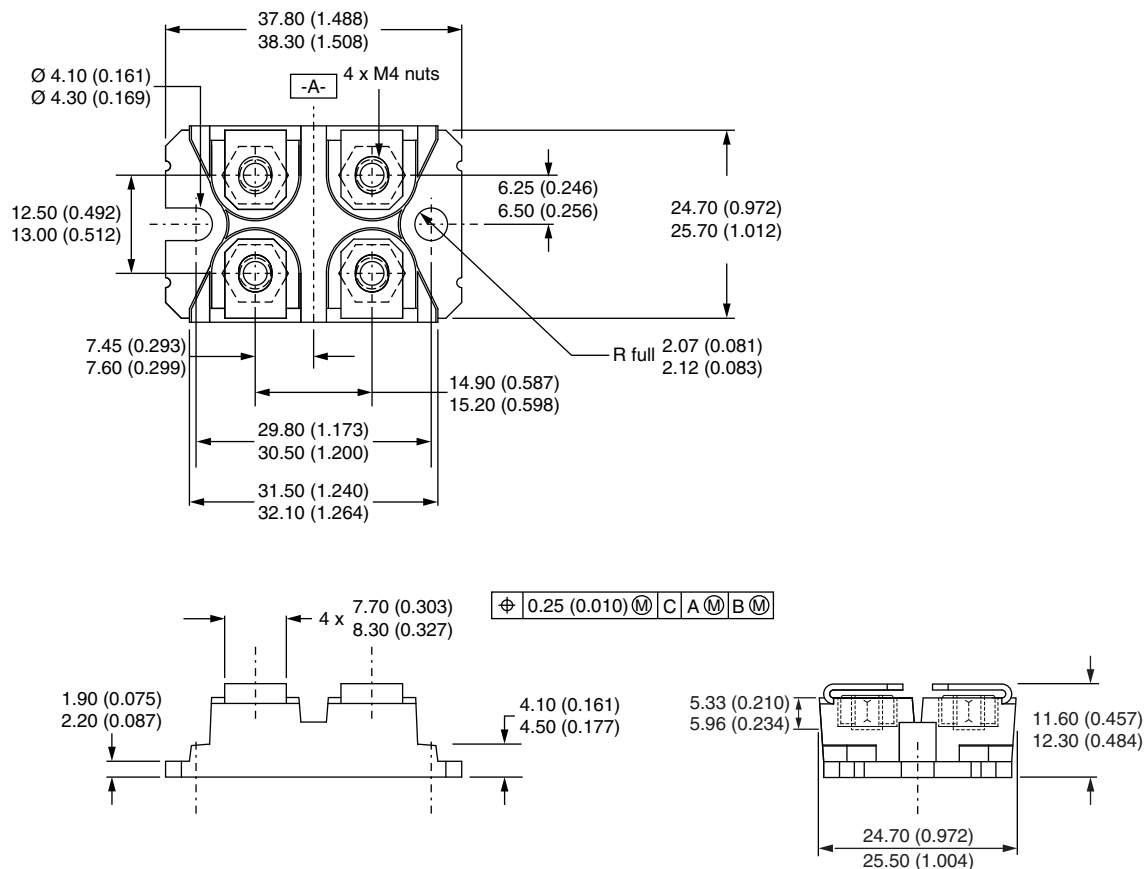
Device code	VS-	UF	H	60	B	A	65
	1	2	3	4	5	6	7
1	Vishay Semiconductors product						
2	Ultra fast rectifier						
3	Hyper fast FRED Pt <sup>®</sup> diffused						
4	Current rating (60 = 60 A)						
5	Circuit configuration: B = Single phase bridge						
6	Package indicator: A = SOT-227, standard insulated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

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

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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