

## Insulated Ultrafast Rectifier Module, 130 A




SOT-227

### PRIMARY CHARACTERISTICS

$V_R$	400 V
$I_{F(AV)}$ per module at $T_C = 114\text{ }^{\circ}\text{C}$	130 A
$t_{rr}$	40 ns
Type	Modules - diode FRED Pt®
Package	SOT-227

### FEATURES

- Two fully independent diodes
- Fully insulated package
- Ultrafast, soft reverse recovery, with high operation junction temperature ( $T_J$  max. = 175 °C)
- Low forward voltage drop
- Optimized for power conversion: welding and industrial SMPS applications
- Easy to use and parallel
- Industry standard outline
- UL approved file E78996 
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

### DESCRIPTION / APPLICATIONS

The VS-UFB130FA40 insulated modules integrate two state of the art ultrafast recovery rectifiers in the compact, industry standard SOT-227 package. The diodes structure, and its life time control, provide an ultrasoft recovery current shape, together with the best overall performance, ruggedness and reliability characteristics.

These devices are thus intended for high frequency applications in which the switching energy is designed not to be predominant portion of the total energy, such as in the output rectification stage of welding machines, SMPS, DC/DC converters. Their extremely optimized stored charge and low recovery current reduce both over dissipation in the switching elements (and snubbers) and EMI/RFI.

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	$V_R$		400	V
Continuous forward current per diode	$I_F$	$T_C = 123\text{ }^{\circ}\text{C}$	65	A
Single pulse forward current per diode	$I_{FSM}$	$T_C = 25\text{ }^{\circ}\text{C}$	800	
Maximum power dissipation per module	$P_D$	$T_C = 123\text{ }^{\circ}\text{C}$	144	W
RMS isolation voltage	$V_{ISOL}$	Any terminal to case, $t = 1\text{ min}$	2500	V
Operating junction and storage temperatures	$T_J, T_{Stg}$		-55 to +175	$^{\circ}\text{C}$

### ELECTRICAL SPECIFICATIONS PER DIODE ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	$V_{BR}$	$I_R = 100\text{ }\mu\text{A}$	400	-	-	V
Forward voltage	$V_{FM}$	$I_F = 60\text{ A}$	-	1.16	1.37	
		$I_F = 60\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	-	0.93	1.09	
Reverse leakage current	$I_{RM}$	$V_R = V_R$ rated	-	-	50	$\mu\text{A}$
		$T_J = 175\text{ }^{\circ}\text{C}, V_R = V_R$ rated	-	-	1	mA
Junction capacitance	$C_T$	$V_R = 400\text{ V}$	-	67	-	pF

**DYNAMIC RECOVERY CHARACTERISTICS** ( $T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 1.0\text{ A}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	40	-	ns
		$T_J = 25\text{ }^{\circ}\text{C}$	-	86	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	155	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	8.4	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	18.4	-	
		$T_J = 25\text{ }^{\circ}\text{C}$	-	350	-	nC
Reverse recovery charge	$Q_{rr}$	$T_J = 125\text{ }^{\circ}\text{C}$	-	1400	-	

**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction-to-case, single leg conducting	$R_{thJC}$		-	-	0.72	$^{\circ}\text{C}/\text{W}$
Junction-to-case, both leg conducting			-	-	0.36	
Case to heatsink	$R_{thCS}$	Flat, greased surface	-	0.10	-	
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			

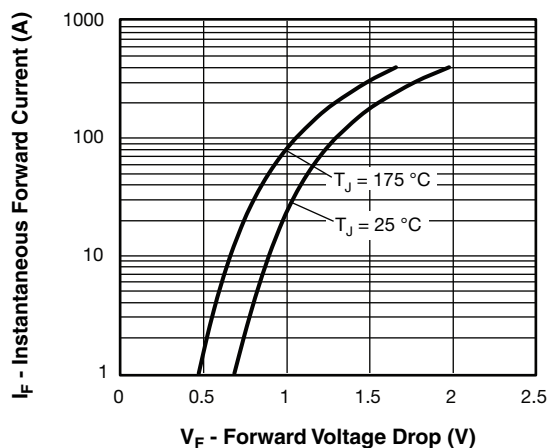


Fig. 1 - Typical Forward Voltage Drop Characteristics (Per Leg)

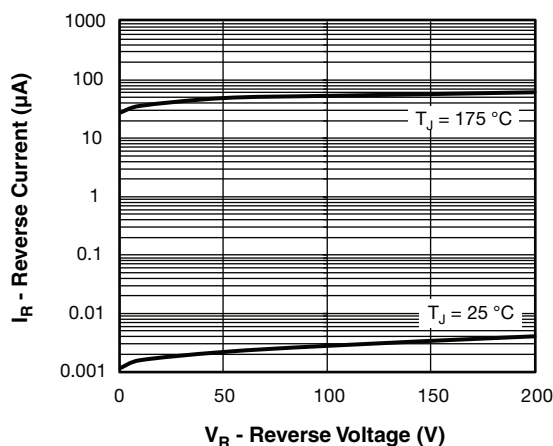


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

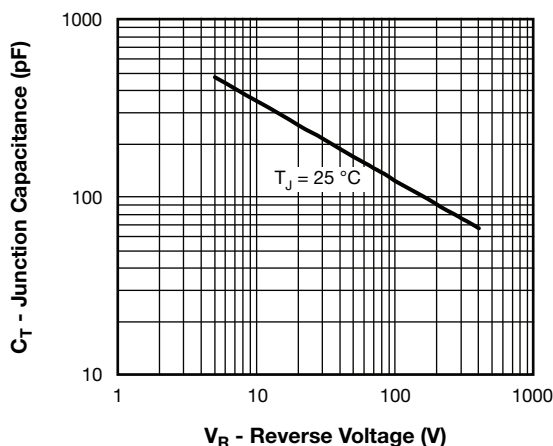


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

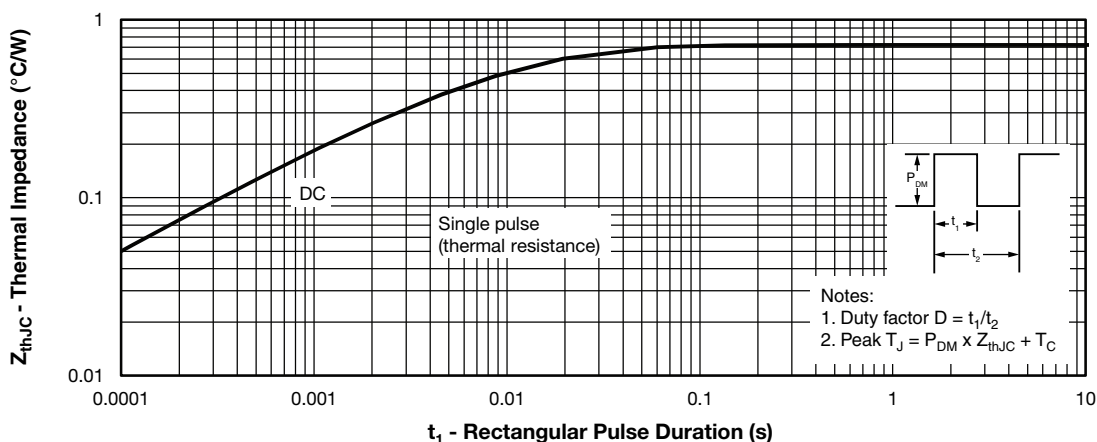
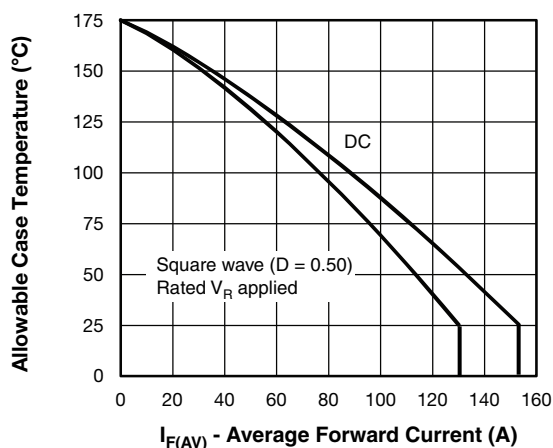

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

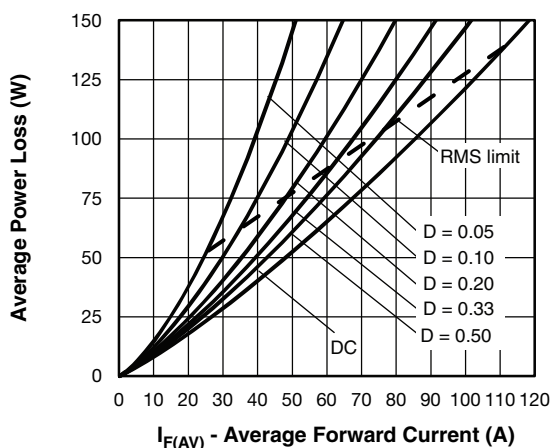


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{dREV}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$

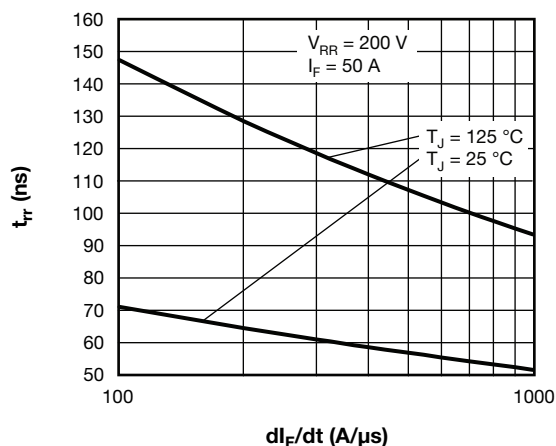
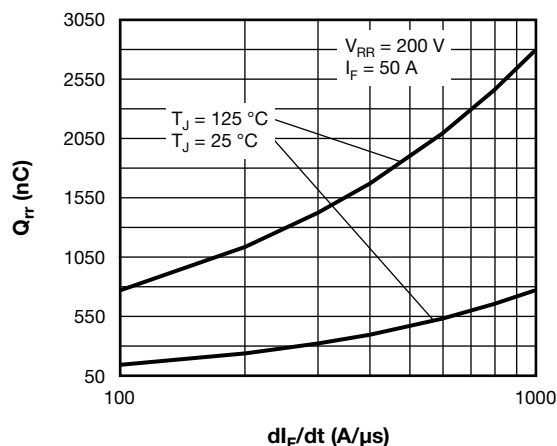
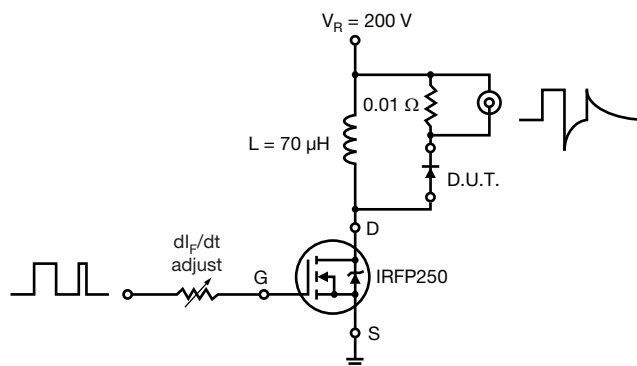

Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$ 

Fig. 8 - Typical Stored Charge vs.  $di_F/dt$ 


Fig. 9 - Reverse Recovery Parameter Test Circuit

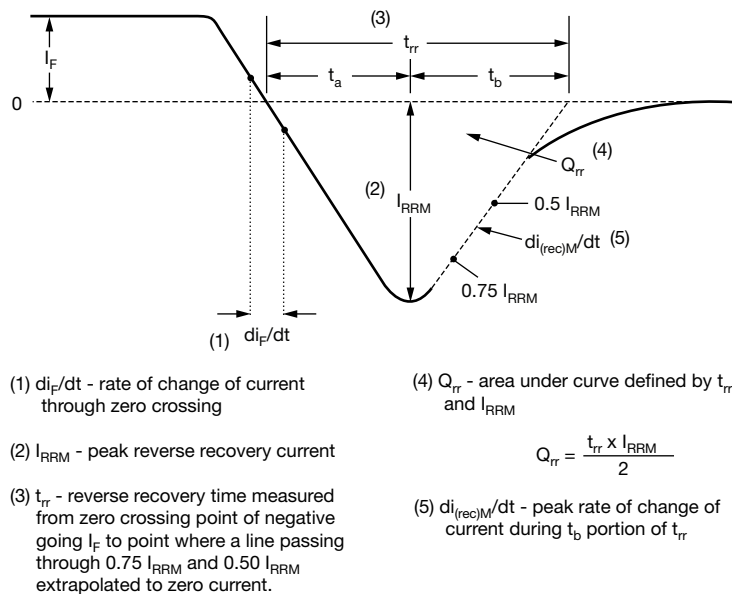


Fig. 10 - Reverse Recovery Waveform and Definitions

## ORDERING INFORMATION TABLE

Device code	<b>VS-</b>	<b>UF</b>	<b>B</b>	<b>130</b>	<b>F</b>	<b>A</b>	<b>40</b>
	1	2	3	4	5	6	7

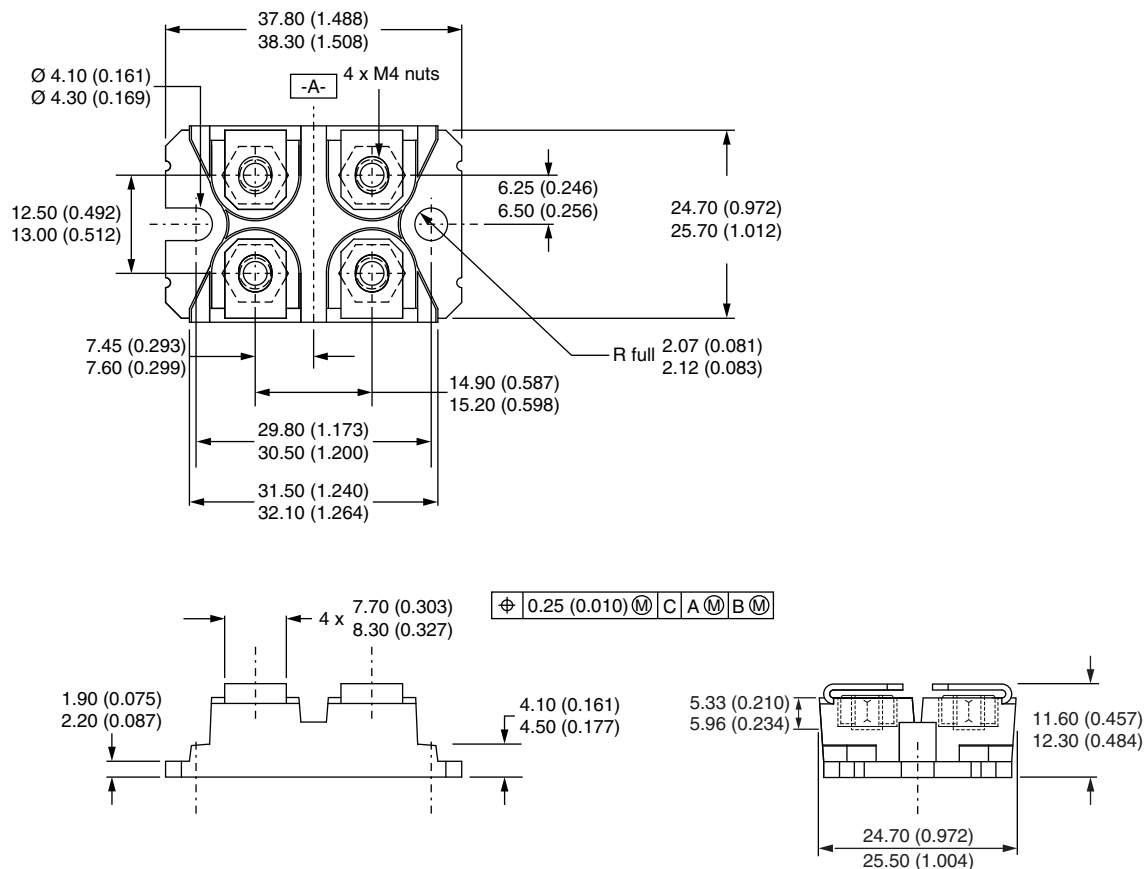
- 1 - Vishay Semiconductors product
- 2 - Ultrafast rectifier
- 3 - Ultrafast Pt diffused
- 4 - Current rating (130 = 130 A)
- 5 - Circuit configuration (two separate diodes, parallel pin-out)
- 6 - Package indicator (SOT-227 standard insulated base)
- 7 - Voltage rating (40 = 400 V)

Circuit Configuration		
Circuit	Circuit Configuration Code	Circuit Drawing
Two separate diodes, parallel pin-out	F	<p>The circuit drawing for configuration F consists of two parts. On the left is a schematic diagram showing two diodes connected in parallel. The top diode has its cathode (indicated by a triangle) connected to pin 4 and its anode (indicated by a line) connected to pin 3. The bottom diode has its cathode connected to pin 1 and its anode connected to pin 2. On the right is a physical component drawing of a square package with four pins. The pins are labeled with numbers: 4 at the top-left, 3 at the top-right, 1 at the bottom-left, and 2 at the bottom-right. The package has a central square area with four circular features, each containing a crosshair, representing the diodes.</p>

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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