

Insulated Ultrafast Rectifier Module, 130 A



SOT-227



RoHS
COMPLIANT

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

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.

PRIMARY CHARACTERISTICS

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

ABSOLUTE MAXIMUM RATINGS

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

ELECTRICAL SPECIFICATIONS PER DIODE ($T_J = 25$ °C unless otherwise specified)

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

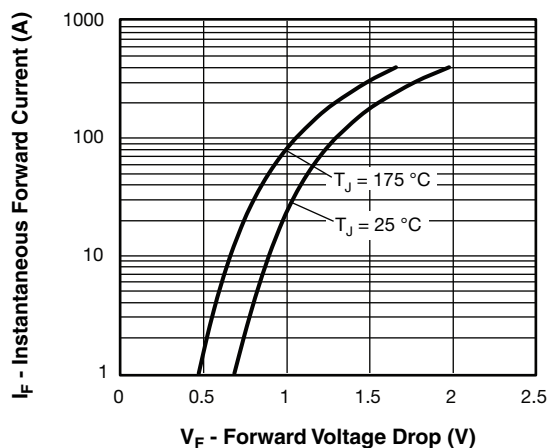


Fig. 1 - Typical Forward Voltage Drop Characteristics (Per Leg)

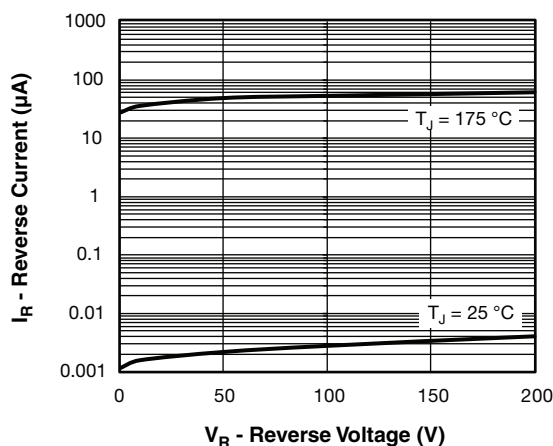


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

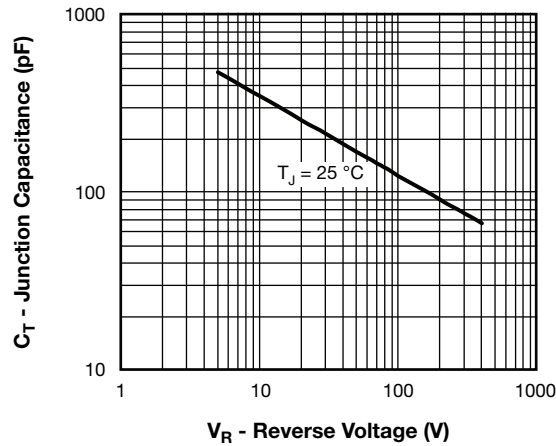


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

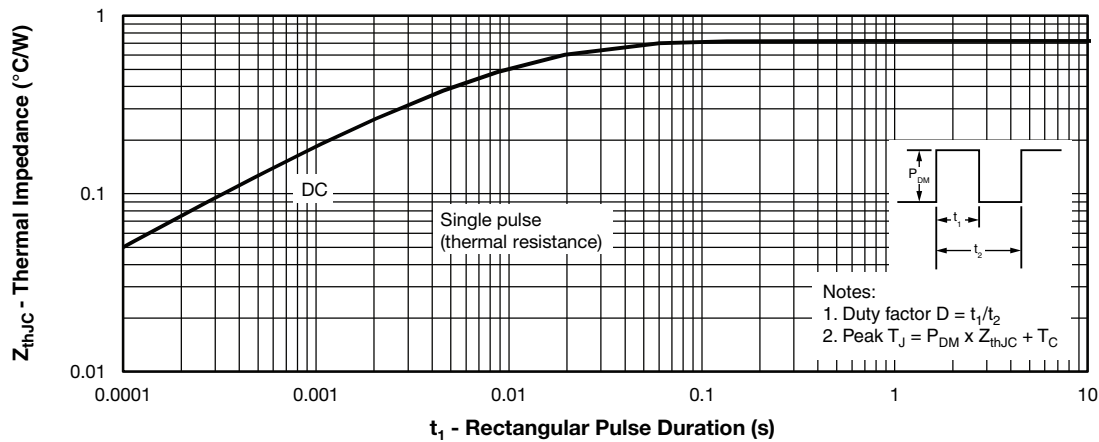


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

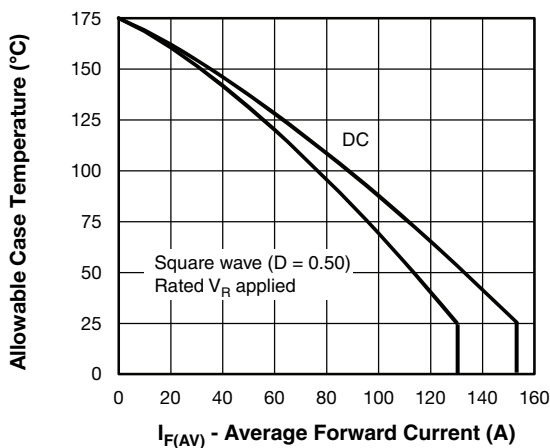


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

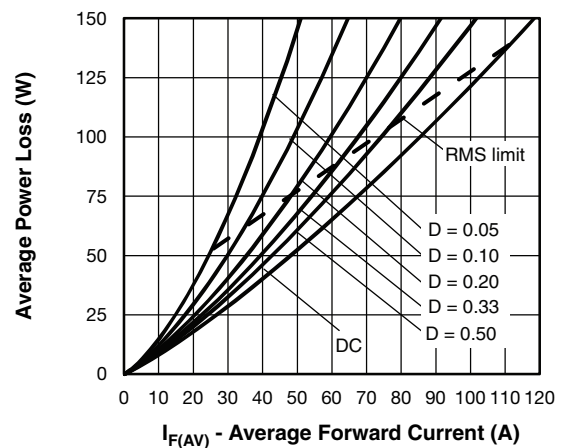


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

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

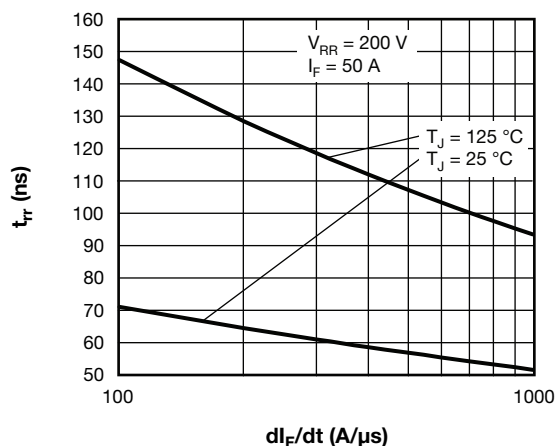
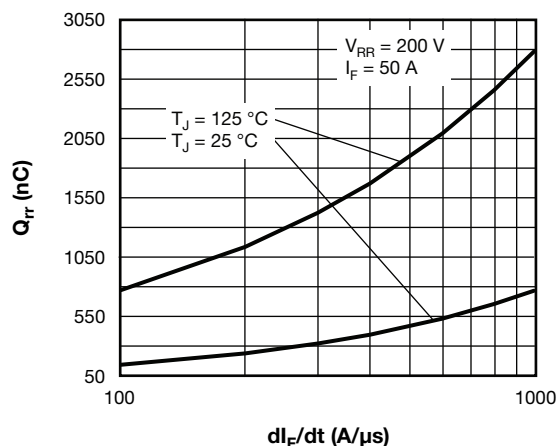
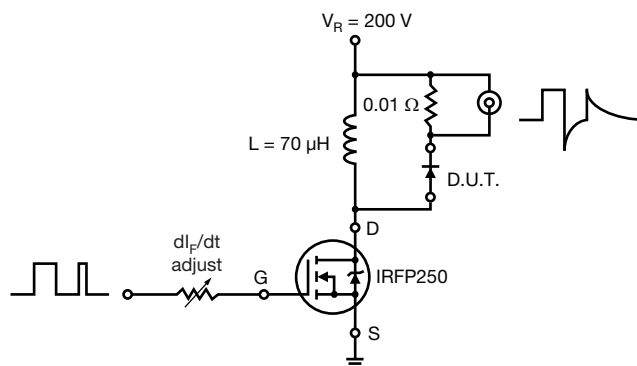

Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

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


Fig. 9 - Reverse Recovery Parameter Test Circuit

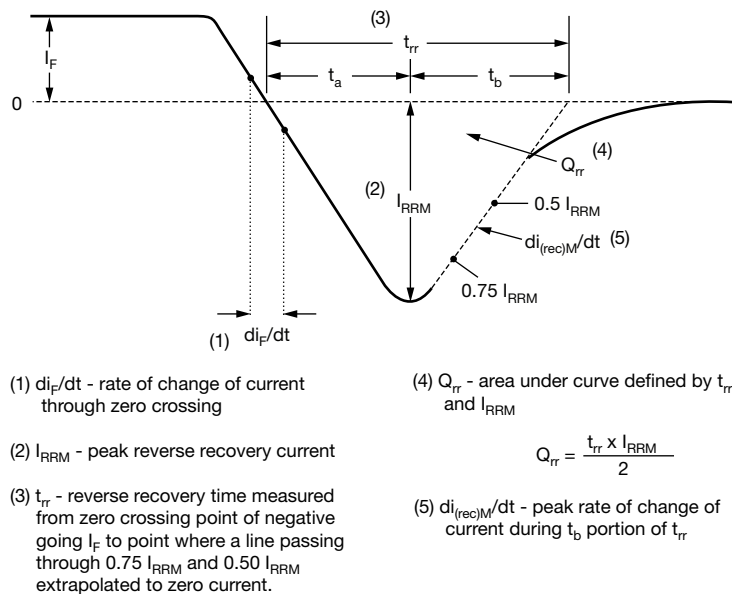


Fig. 10 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code	VS-	UF	B	130	F	A	40
	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	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 package drawing of a 4-pin component. The package has four pins labeled 1, 2, 3, and 4. Pin 1 is at the bottom left, pin 2 at the bottom right, pin 3 at the top right, and pin 4 at the top left. The package drawing includes a 'Lead Assignment' label and shows the internal structure of the package.

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95423
Packaging information	www.vishay.com/doc?95425

SOT-227 Generation 2

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter



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