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[Vishay Semiconductor/Diodes Division](#)  
[VS-UFB250FA60](#)

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## VS-UFB250FA60


Vishay Semiconductors

### Insulated Ultrafast Rectifier Module, 250 A



SOT-227

#### FEATURES

- Two fully independent diodes
- Fully insulated package
- Ultrafast, soft reverse recovery, with high operation junction temperature ( $T_J$  max. = 175 °C)
- Very 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

PRODUCT SUMMARY	
$V_R$	600 V
$I_{F(AV)}$ <sup>(1)</sup> per module at $T_C = 113$ °C	250 A
$t_{rr}$	166 ns
Type	Modules - Diode FRED Pt®
Package	SOT-227

#### DESCRIPTION / APPLICATIONS

The VS-UFB250FA60 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	$V_R$		600	V
Continuous forward current per diode	$I_F$ <sup>(1)</sup>	$T_C = 90$ °C	168	A
Single pulse forward current per diode	$I_{FSM}$	$T_C = 25$ °C	1300	
Maximum power dissipation per module	$P_D$	$T_C = 90$ °C	395	W
RMS isolation voltage	$V_{ISOL}$	Any terminal to case, $t = 1$ minute	2500	V
Operating junction and storage temperatures	$T_J, T_{Stg}$		-55 to +175	°C

#### Note

<sup>(1)</sup> Maximum continuous forward current must be limited to 100 A to do not exceed the maximum temperature of power terminals.



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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	$V_{BR}$	$I_R = 100\ \mu\text{A}$	600	-	-	V
Forward voltage	$V_{FM}$	$I_F = 100\ \text{A}$	-	1.02	1.19	
		$I_F = 100\ \text{A}, T_J = 175\text{ }^\circ\text{C}$	-	0.87	1.02	
Reverse leakage current	$I_{RM}$	$V_R = V_R$ rated	-	1.3	50	$\mu\text{A}$
		$T_J = 175\text{ }^\circ\text{C}, V_R = V_R$ rated	-	-	4	mA
Junction capacitance	$C_T$	$V_R = 600\ \text{V}$	-	72	-	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	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	-	166	-	ns	
		$T_J = 150\text{ }^\circ\text{C}$	-	291	-		
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$	$I_F = 50\ \text{A}$ $dI_F/dt = 500\ \text{A}/\mu\text{s}$ $V_R = 200\ \text{V}$	-	41	-	A
		$T_J = 150\text{ }^\circ\text{C}$		-	64	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$		-	3.5	-	$\mu\text{C}$
		$T_J = 150\text{ }^\circ\text{C}$		-	10.0	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction to case, single leg conducting	$R_{thJC}$		-	-	0.43	$^\circ\text{C}/\text{W}$
Junction to case, both leg conducting			-	-	0.215	
Case to heatsink	$R_{thCS}$	Flat, greased surface	-	0.05	-	
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			



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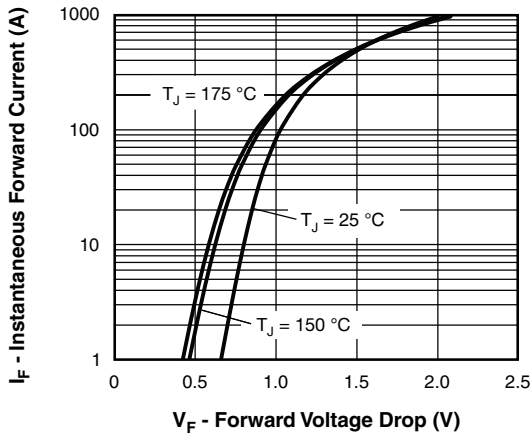


Fig. 1 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

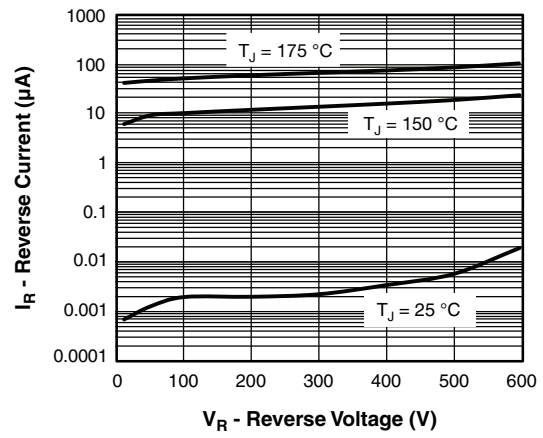


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

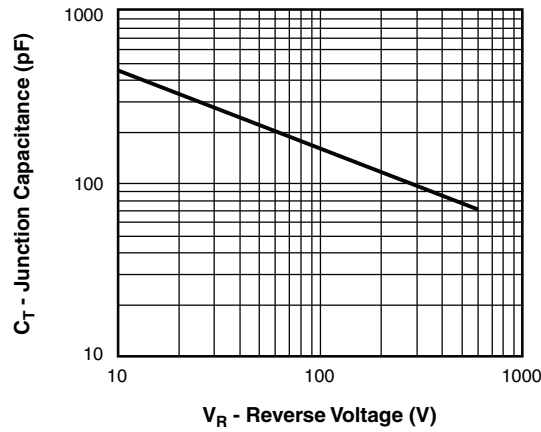


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

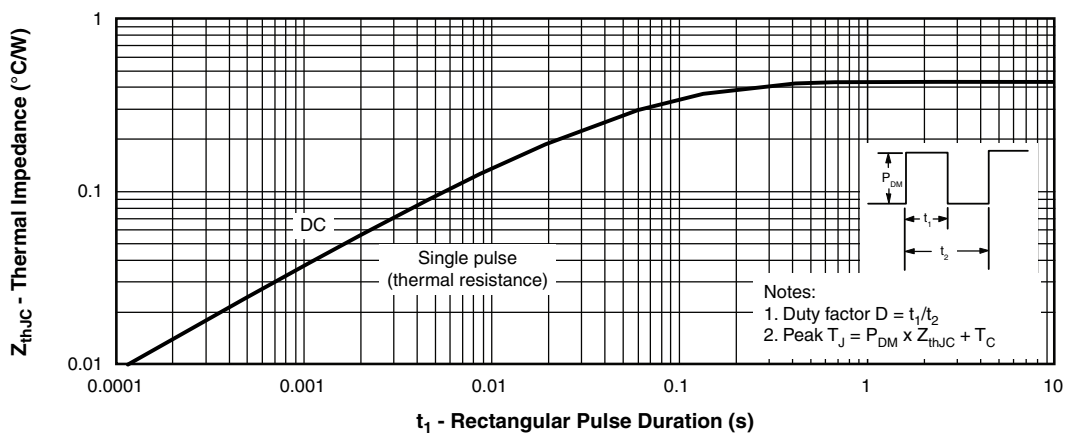


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)



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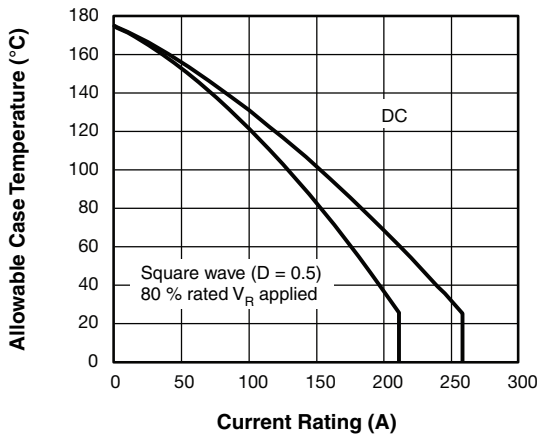


Fig. 5 - Maximum Current Rating (Per Leg)

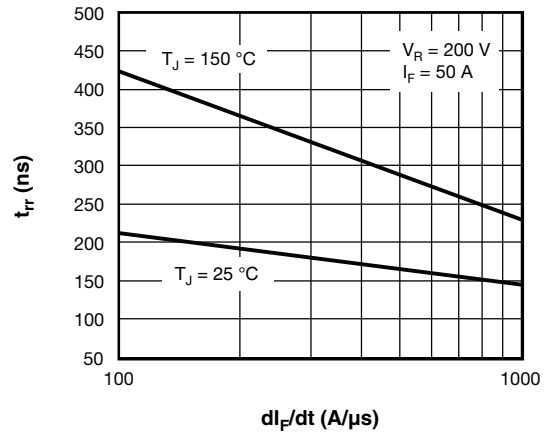


Fig. 7 - Typical Reverse Recovery Time vs. diF/dt

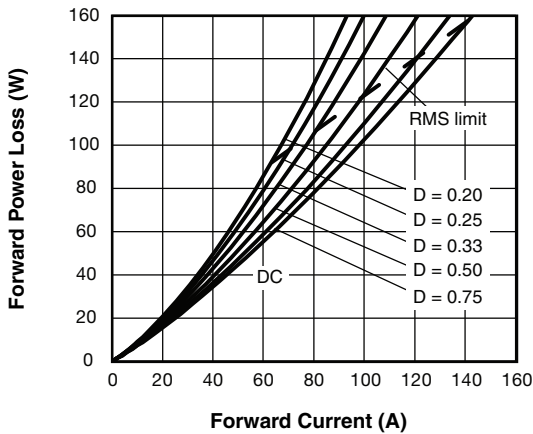


Fig. 6 - Forward Power Loss Characteristics

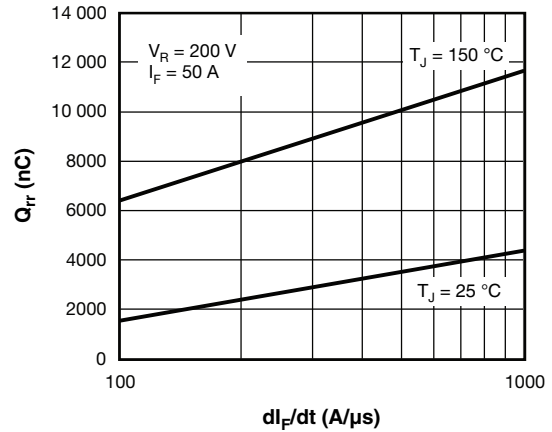


Fig. 8 - Typical Recovery Charge vs. diF/dt

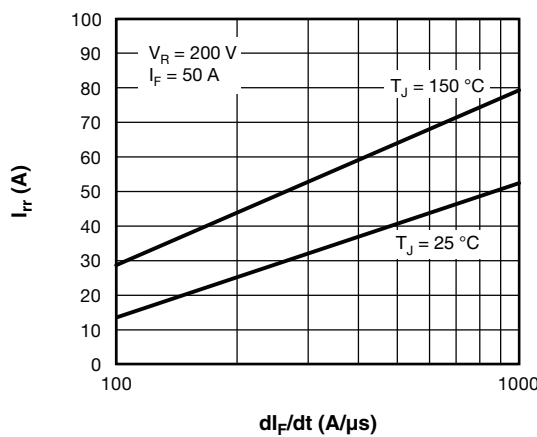


Fig. 9 - Typical Recovery Current vs. diF/dt

**Note**

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



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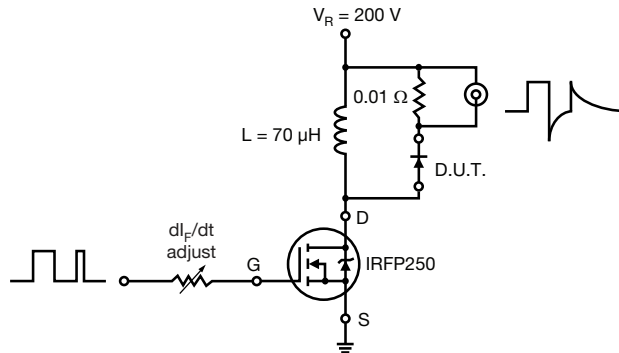
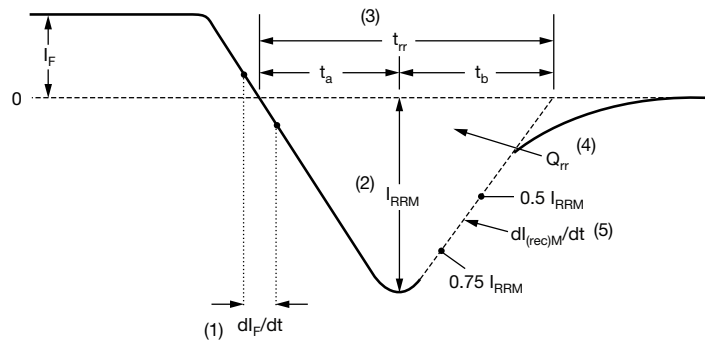


Fig. 10 - Reverse Recovery Parameter Test Circuit



- (1)  $di_F/dt$  - rate of change of current through zero crossing
- (2)  $I_{RRM}$  - peak reverse recovery current
- (3)  $t_{rr}$  - reverse recovery time measured from zero crossing point of negative going  $I_F$  to point where a line passing through  $0.75 I_{RRM}$  and  $0.50 I_{RRM}$  extrapolated to zero current.
- (4)  $Q_{rr}$  - area under curve defined by  $t_{rr}$  and  $I_{RRM}$
- (5)  $di_{(rec)M}/dt$  - peak rate of change of current during  $t_b$  portion of  $t_{rr}$

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

Fig. 11 - Reverse Recovery Waveform and Definitions



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**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>UF</b>	<b>B</b>	<b>250</b>	<b>F</b>	<b>A</b>	<b>60</b>
	①	②	③	④	⑤	⑥	⑦

- 1** - Vishay Semiconductors product
- 2** - Ultrafast rectifier
- 3** - Ultrafast Pt diffused
- 4** - Current rating (250 = 250 A)
- 5** - Circuit configuration (2 separate diodes, parallel pin-out)
- 6** - Package indicator (SOT-227 standard insulated base)
- 7** - Voltage rating (60 = 600 V)

CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
2 separate diodes, parallel pin-out	F	 

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>



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