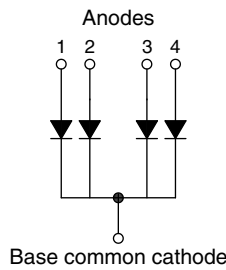


## Not Insulated SOT-227 Power Module Ultrafast Rectifier, 250 A



SOT-227



### FEATURES

- Not insulated package
- Ultrafast reverse recovery
- Ultrasoft reverse recovery current shape
- Optimized for power conversion: welding and industrial SMPS applications
- Plug-in compatible with other SOT-227 packages
- Easy to assemble
- Direct mounting to heatsink
- UL approved file E222165
- 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)



### DESCRIPTION

The VS-UFL250AB60 not insulated modules integrate four ultrafast recovery rectifiers in the compact, industry standard SOT-227 package. The planar structure of the diodes, and the platinum doping life time control, provide an ultra-soft 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	
$V_R$	600 V
$I_{F(AV)}$ at $T_C = 120\text{ }^\circ\text{C}$ per module <sup>(1)</sup>	250 A
$t_{rr}$	40 ns
Type	Modules - Diode FRED Pt <sup>®</sup>
Package	SOT-227 not insulated

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	$V_R$		600	V
Continuous forward current per diode	$I_F$	$T_C = 135\text{ }^\circ\text{C}$	65	A
Single pulse forward current per diode	$I_{FSM}$ <sup>(2)</sup>	$T_C = 25\text{ }^\circ\text{C}$	750	
Maximum power dissipation per module	$P_D$	$T_C = 135\text{ }^\circ\text{C}$	421	W
Operating junction and storage temperatures	$T_J, T_{Stg}$		-55 to +175	$^\circ\text{C}$

#### Notes

- <sup>(1)</sup> All four anode terminals connected;  
Maximum  $I_{RMS}$  current per leg 100 A to do not exceed the maximum temperature of terminals
- <sup>(2)</sup> 10 ms sine or 6 ms rectangular pulse



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, per leg	$V_{FM}$	$I_F = 50\ \text{A}$	-	1.25	1.44	
		$I_F = 50\ \text{A}, T_J = 125\text{ }^\circ\text{C}$	-	1.09	1.24	
		$I_F = 50\ \text{A}, T_J = 175\text{ }^\circ\text{C}$	-	1.01	-	
		$I_F = 100\ \text{A}$	-	1.42	-	
		$I_F = 100\ \text{A}, T_J = 125\text{ }^\circ\text{C}$	-	1.29	-	
		$I_F = 100\ \text{A}, T_J = 175\text{ }^\circ\text{C}$	-	1.22	-	
Reverse leakage current, per leg	$I_{RM}$	$V_R = V_R\ \text{rated}$	-	0.1	50	$\mu\text{A}$
		$V_R = V_R\ \text{rated}, T_J = 125\text{ }^\circ\text{C}$	-	100	-	mA
		$V_R = V_R\ \text{rated}, T_J = 175\text{ }^\circ\text{C}$	-	0.20	1	
Junction capacitance, per leg	$C_T$	$V_R = 600\ \text{V}$	-	36	-	pF

DYNAMIC RECOVERY CHARACTERISTICS PER DIODE ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Reverse recovery time, per leg	$t_{rr}$	$I_F = 1.0\ \text{A}, dI_F/dt = 400\ \text{A}/\mu\text{s}, V_R = 30\ \text{V}$	-	40	-	ns	
		$T_J = 25\text{ }^\circ\text{C}$	-	100	-		
		$T_J = 125\text{ }^\circ\text{C}$	-	190	-		
Peak recovery current, per leg	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$	$I_F = 50\ \text{A}$ $dI_F/dt = 200\ \text{A}/\mu\text{s}$ $V_R = 200\ \text{V}$	-	9	-	A
		$T_J = 125\text{ }^\circ\text{C}$		-	19	-	
Reverse recovery charge, per leg	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$		-	440	-	nC
		$T_J = 125\text{ }^\circ\text{C}$		-	1850	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction to case, single leg conducting	$R_{thJC}$		-	-	0.38	$^\circ\text{C}/\text{W}$
Junction to case, all leg conducting			-	-	0.095	
Case to heat sink, per module	$R_{thCS}$	Flat, greased surface	-	0.07	-	
Weight			-	30	-	g
Mounting torque, on terminal and heat sink			-	-	1.3	Nm
Case style			SOT-227 not insulated			

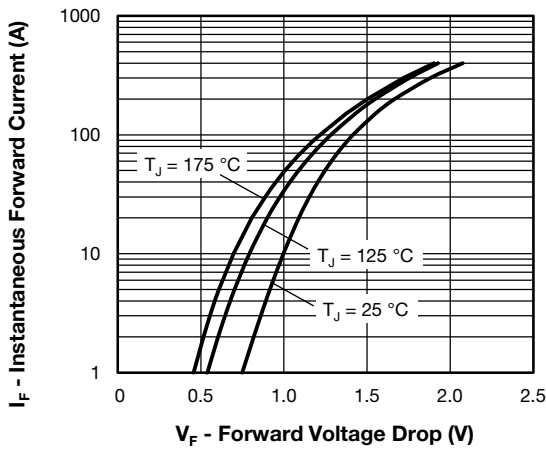


Fig. 1 - Typical Forward Voltage Drop Characteristics (per Leg)

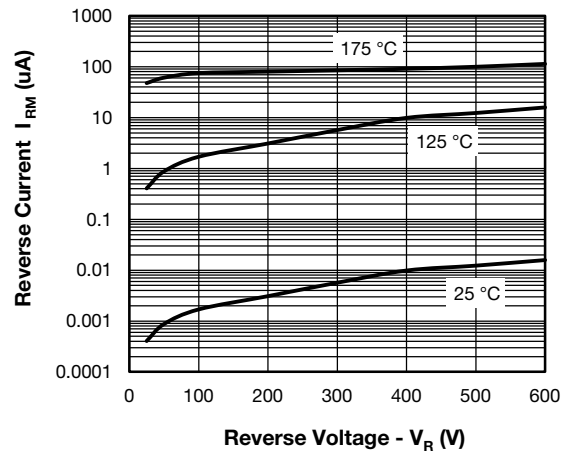


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (per Leg)

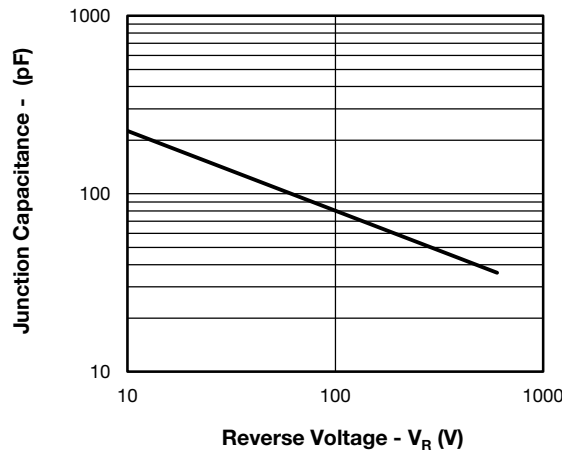


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (per Leg)

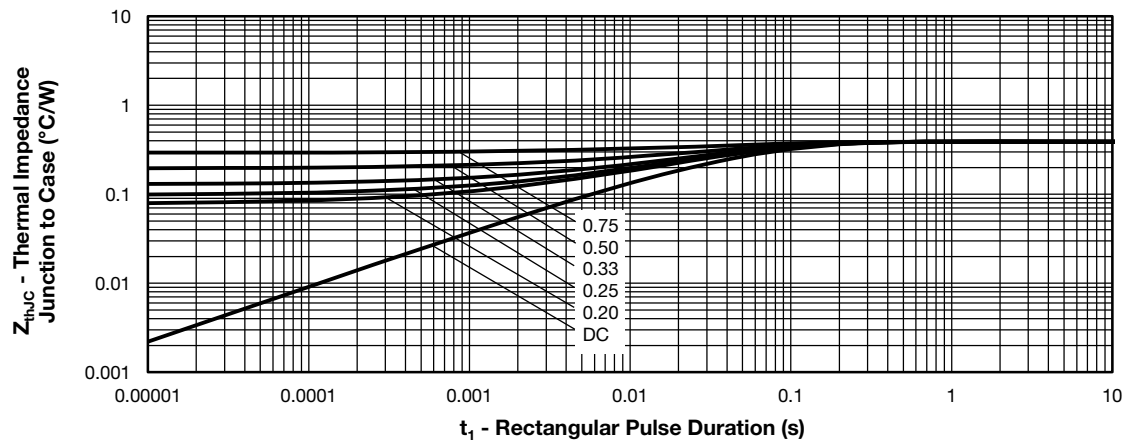


Fig. 4 - Maximum Thermal Impedance  $Z_{thJ-C}$  Characteristics (per Leg)

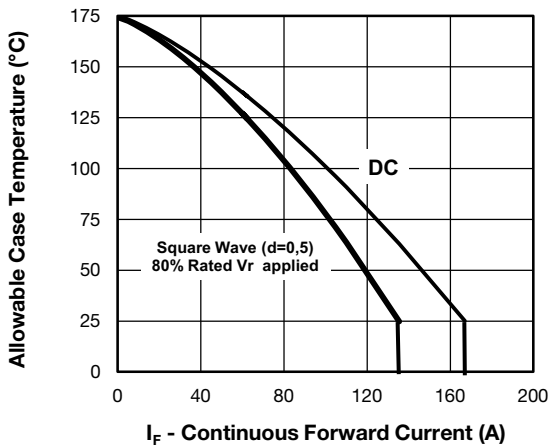


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (per Leg)

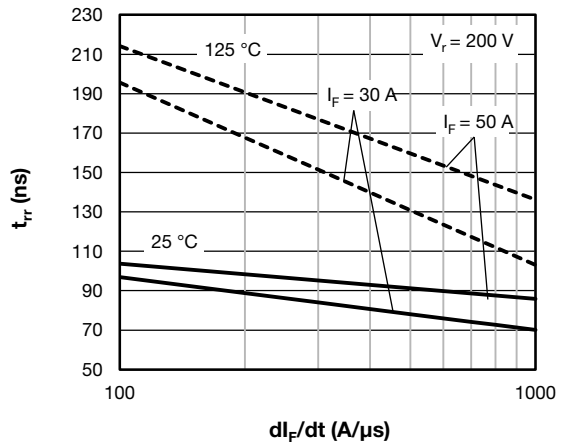


Fig. 7 - Typical Reverse Recovery Time vs.  $di/dt$  (per Leg)

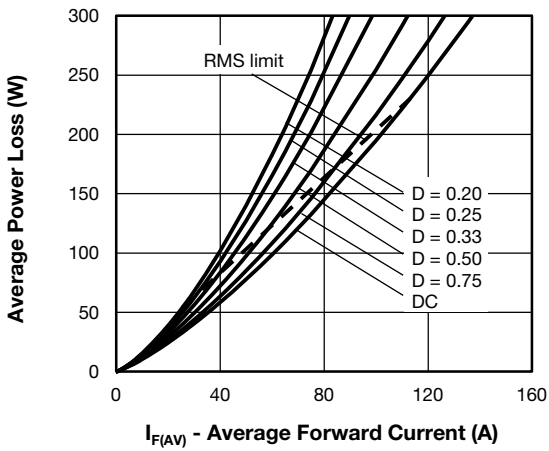


Fig. 6 - Forward Power Losses Characteristics (per Leg)

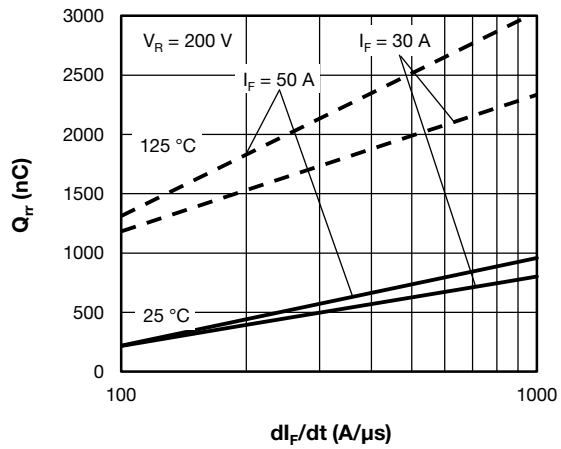


Fig. 8 - Typical Stored Charge vs.  $di/dt$  (per Leg)

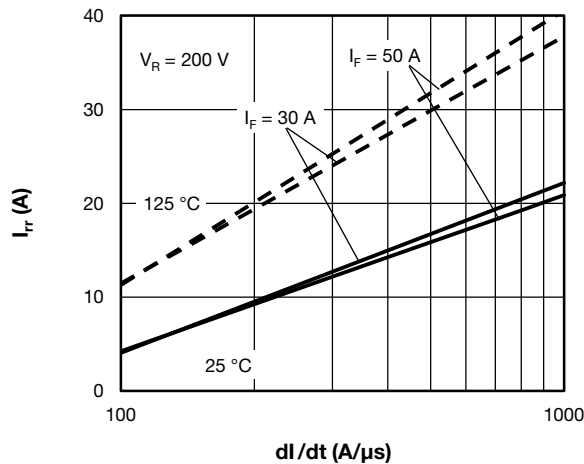


Fig. 9 - Typical Reverse Recovery Current vs.  $di/dt$  (per Leg)

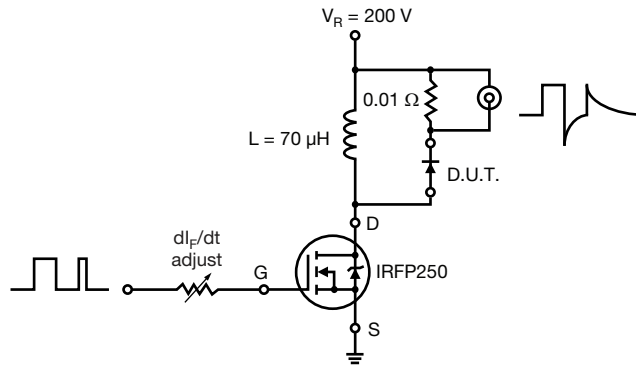
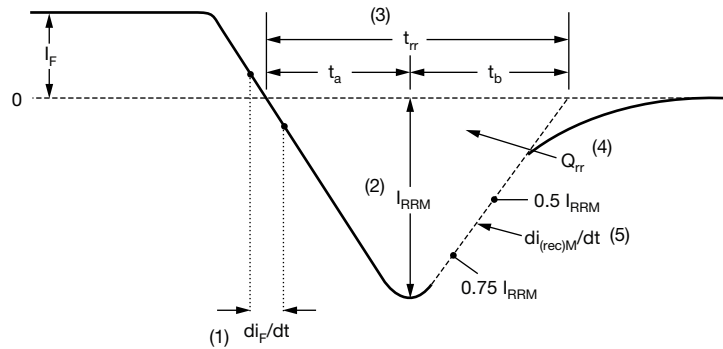


Fig. 10 - Reverse Recovery Parameter Test Circuit



- (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 Waveforms and Definitions

## ORDERING INFORMATION TABLE

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

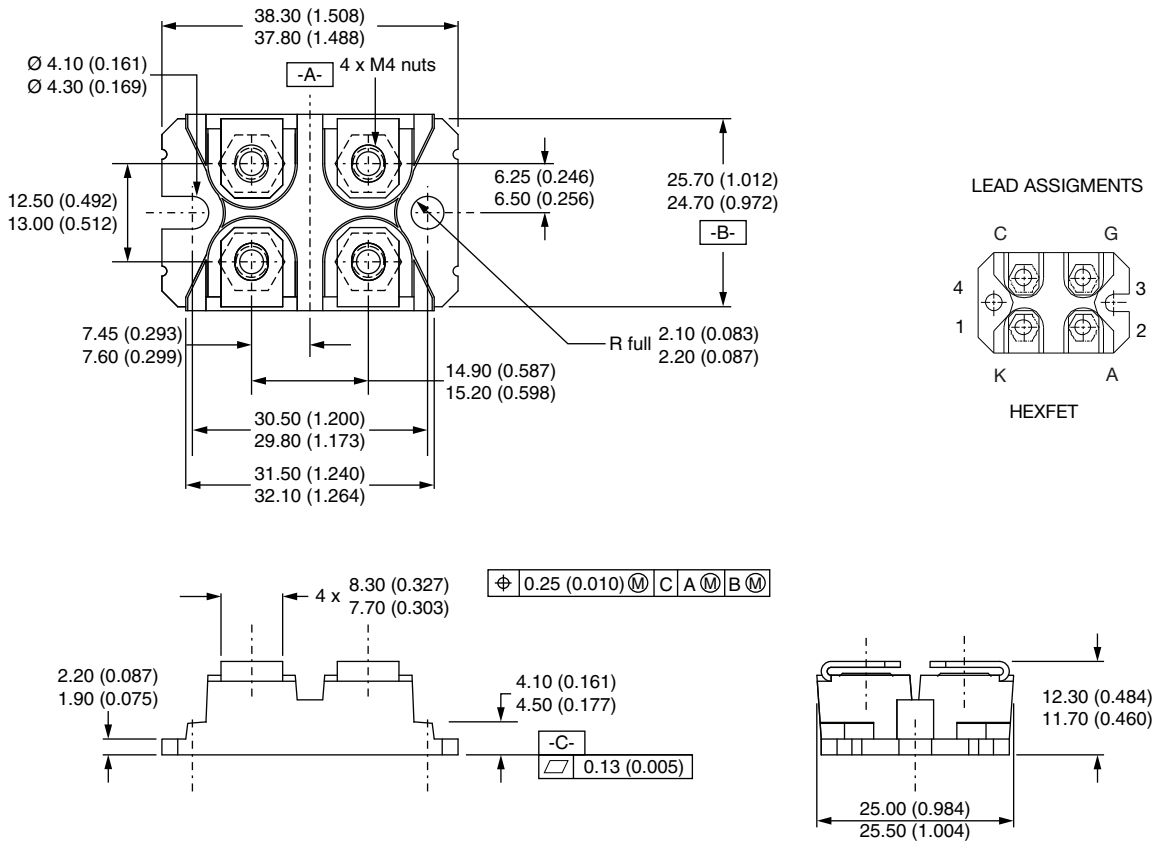
- 1** - Vishay Semiconductors product
- 2** - Ultrafast rectifier
- 3** - Ultrafast Pt diffused, low  $V_F$
- 4** - Current rating (250 = 250 A)
- 5** - Circuit configuration (separated anodes, common cathode diode)
- 6** - Package indicator (SOT-227 standard not insulated)
- 7** - Voltage rating (60 = 600 V)

Quantity per tube is 10 pcs, M4 screw and washer included

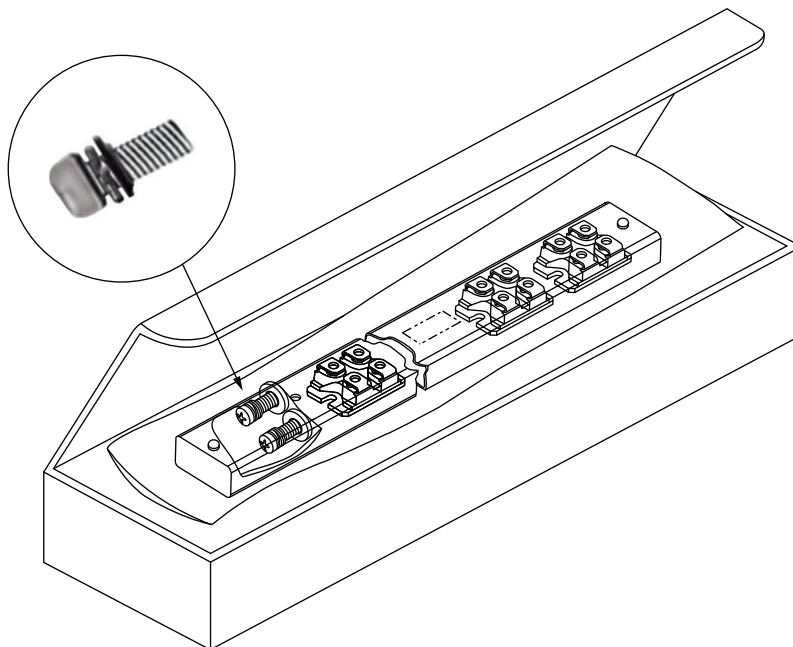
CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Separated anode diodes, not insulated, common cathodes	A	



**DIMENSIONS** in millimeters (inches)



**PACKAGING INFORMATION**





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