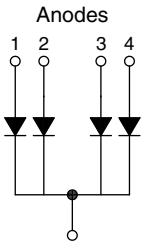
Not Insulated SOT-227 Power Module
Ultrafast Rectifier, 250 A

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

Pb-free

RoHS COMPLIANT

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 a 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 °C per module (1)	250 A
t_{rr}	40 ns
Type	Modules - Diode FRED Pt®
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 °C	65	A
Single pulse forward current per diode	I_{FSM} (2)	T_C = 25 °C	750	
Maximum power dissipation per module	P_D	T_C = 135 °C	421	W
Operating junction and storage temperatures	T_J, T_{Stg}		-55 to +175	°C

Notes

(1) All four anode terminals connected;
Maximum I_{RMS} current per leg 100 A to do not exceed the maximum temperature of terminals

(2) 10 ms sine or 6 ms rectangular pulse

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

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

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Junction to case, single leg conducting	R_{thJC}		-	-	0.38	°C/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			

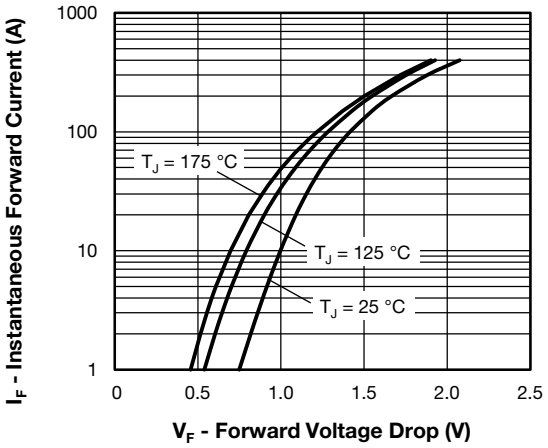


Fig. 1 - Typical Forward Voltage Drop Characteristics
(per Leg)

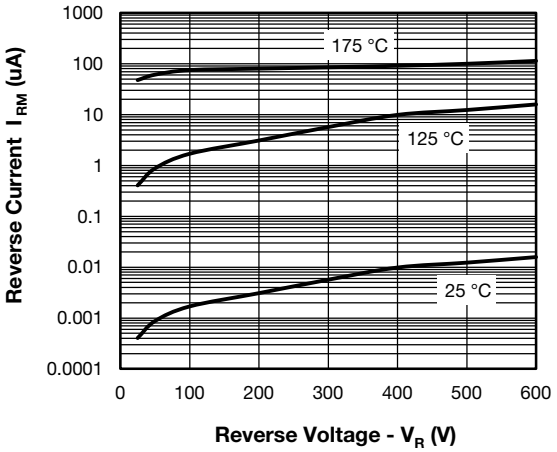


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage
(per Leg)

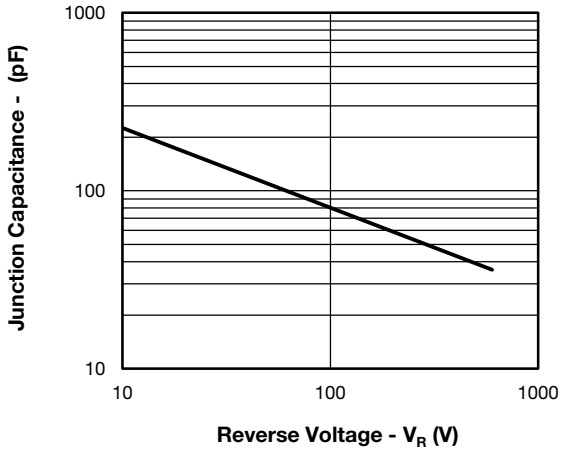


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage
(per Leg)

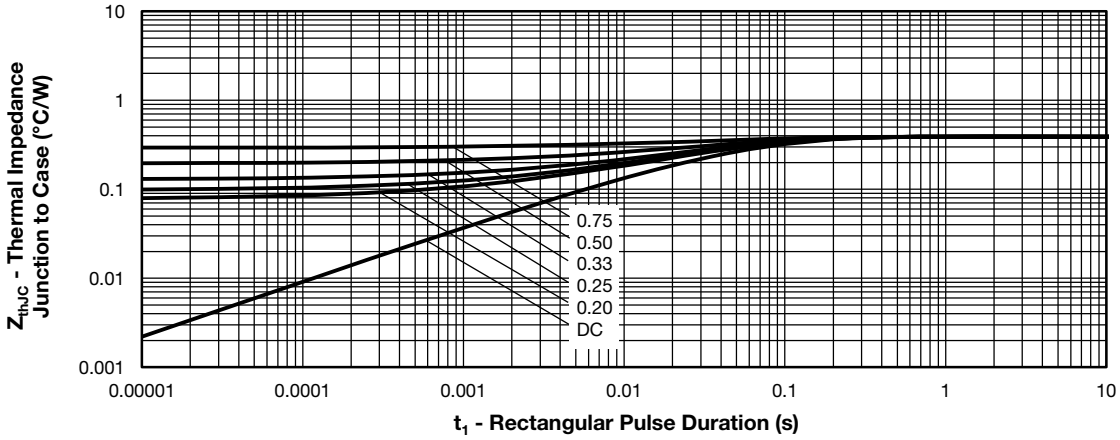


Fig. 4 - Maximum Thermal Impedance Z_{thJ-C} Characteristics
(per Leg)

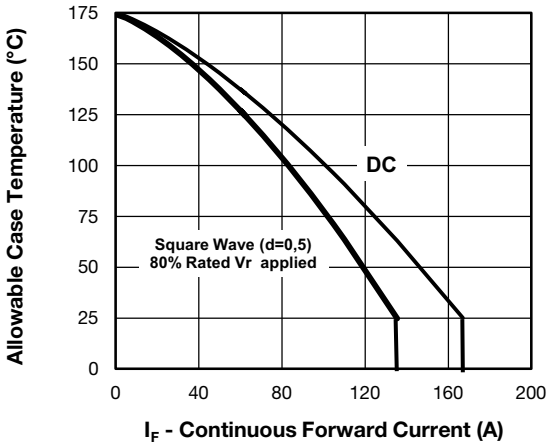


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (per Leg)

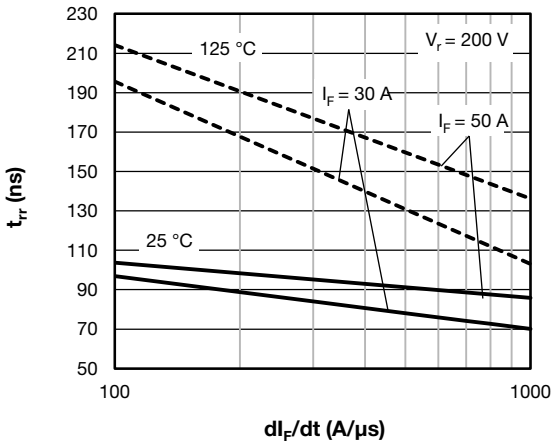


Fig. 7 - Typical Reverse Recovery Time vs. dI/dt (per Leg)

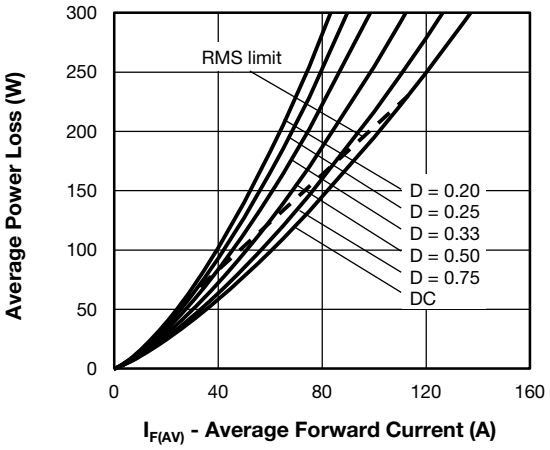


Fig. 6 - Forward Power Losses Characteristics (per Leg)

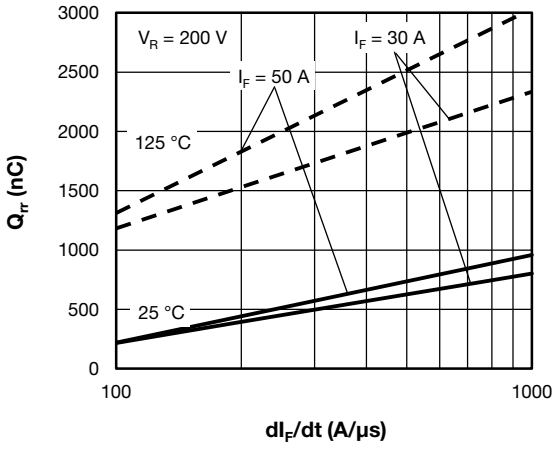


Fig. 8 - Typical Stored Charge vs. dI/dt (per Leg)

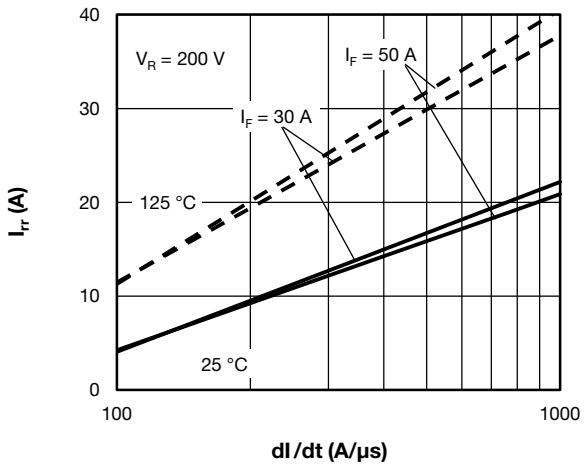


Fig. 9 - Typical Reverse Recovery Current vs. dI/dt (per Leg)

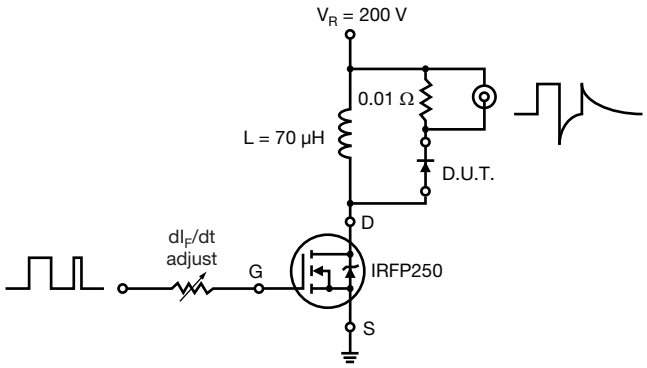
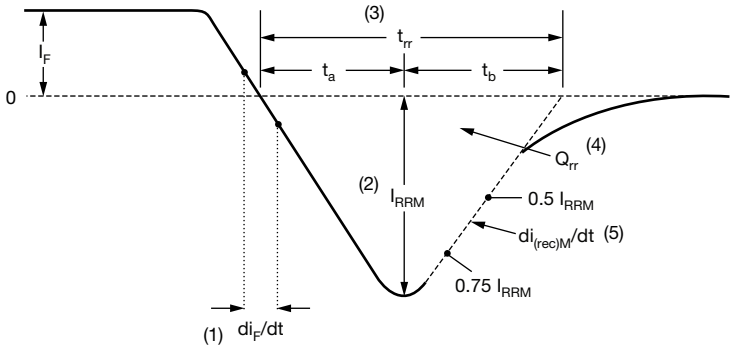


Fig. 10 - Reverse Recovery Parameter Test Circuit



(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}

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

(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 11 - Reverse Recovery Waveforms and Definitions

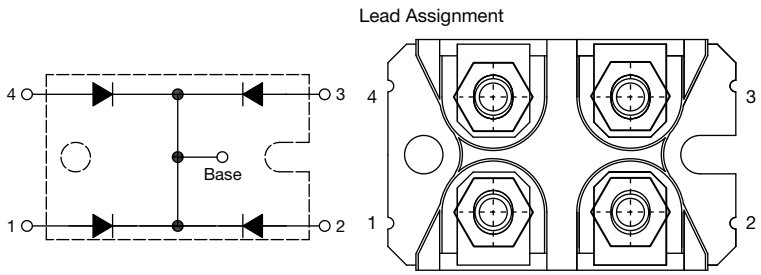
ORDERING INFORMATION TABLE

Device code

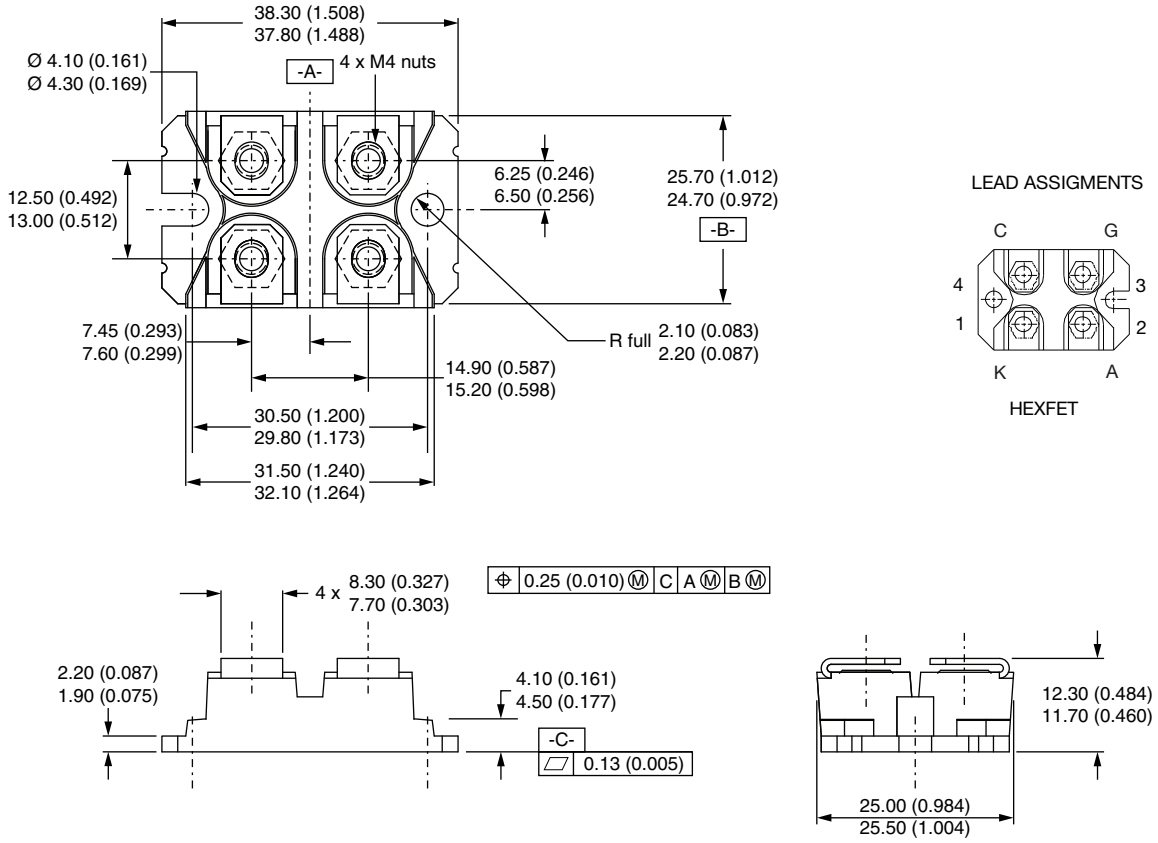
VS-	UF	L	250	A	B	60
1	2	3	4	5	6	7

- 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)

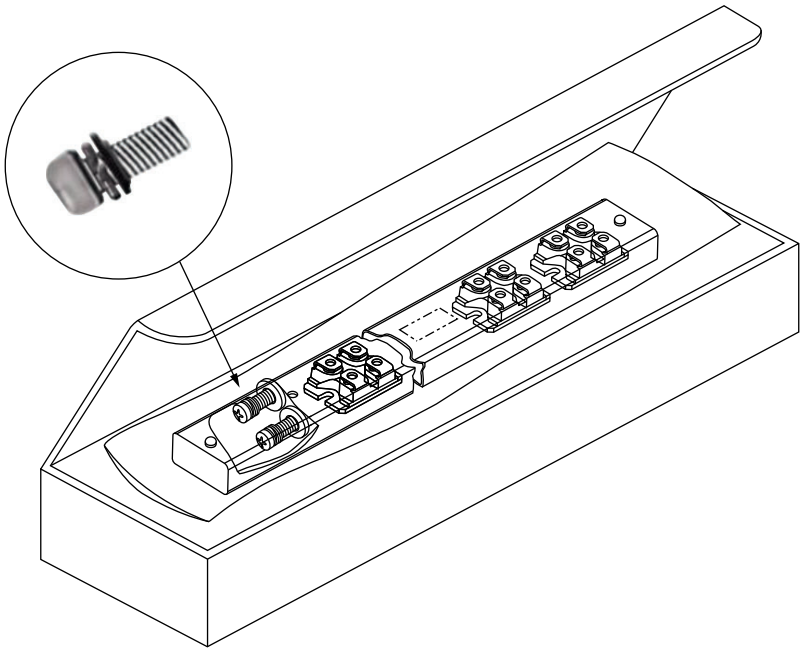
Quantity per tube is 10 pcs, M4 screw and washer included

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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