

Insulated Ultrafast Rectifier Module, 280 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)
- Low forward voltage drop
- Optimized for power conversion: welding and industrial SMPS applications
- Easy to use and parallel
- Industry standard outline
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified for industrial level



RoHS
COMPLIANT

DESCRIPTION

The VS-UFB280FA40 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.

PRODUCT SUMMARY

V_R	400 V
$I_{F(AV)}$ per module at $T_C = 90\text{ °C}$	280 A
t_{rr}	40 ns
Type	Modules - Diode FRED Pt®

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	V_R		400	V
Continuous forward current per diode	$I_F^{(1)}$	$T_C = 90\text{ °C}$	170	A
Single pulse forward current per diode	I_{FSM}	$T_C = 25\text{ °C}$	1300	
Maximum power dissipation per module	P_D	$T_C = 90\text{ °C}$	395	W
RMS isolation voltage	V_{ISOL}	Any terminal to case, $t = 1\text{ minute}$	2500	V
Operating junction and storage temperatures	T_J, T_{Stg}		- 55 to 175	°C

Note

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

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}	$I_F = 100\text{ A}$	-	1.06	1.24	
		$I_F = 100\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	0.85	-	0.95	
Reverse leakage current	I_{RM}	$V_R = V_R\text{ rated}$	-	1.3	50	μA
		$T_J = 175\text{ }^{\circ}\text{C}, V_R = V_R\text{ rated}$	0.36	-	4	mA
Junction capacitance	C_T	$V_R = 400\text{ V}$	-	100	-	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
		$T_J = 25\text{ }^{\circ}\text{C}$	-	93	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	172	-	
Peak recovery current	I_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$	-	10.5	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	20.2	-	
Reverse recovery charge	Q_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	-	490	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	1740	-	

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			-	1.3	-	Nm
Case style			SOT-227			

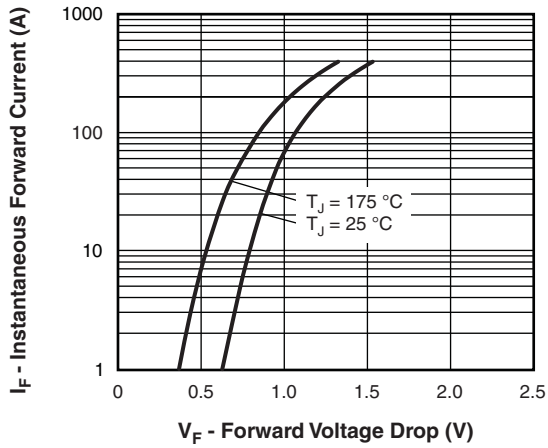


Fig. 1 - Typical Forward Voltage Drop Characteristics (Per Leg)

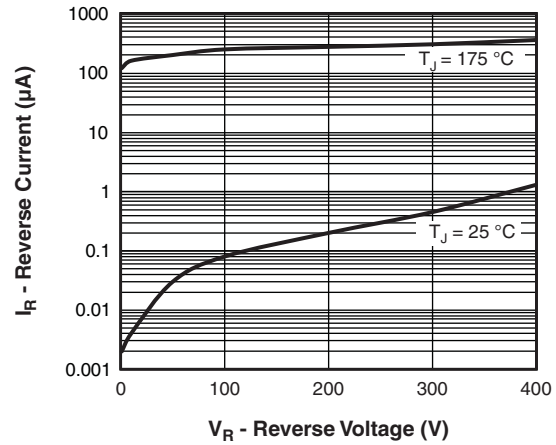


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

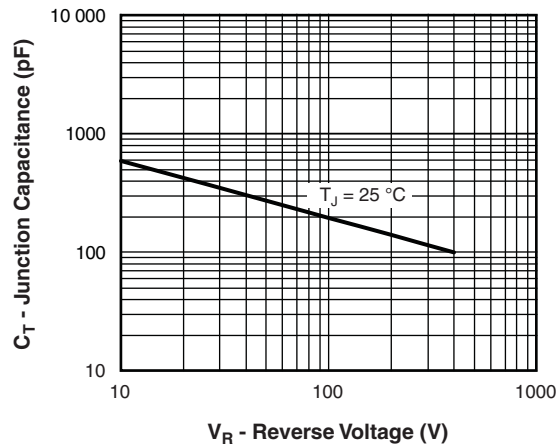
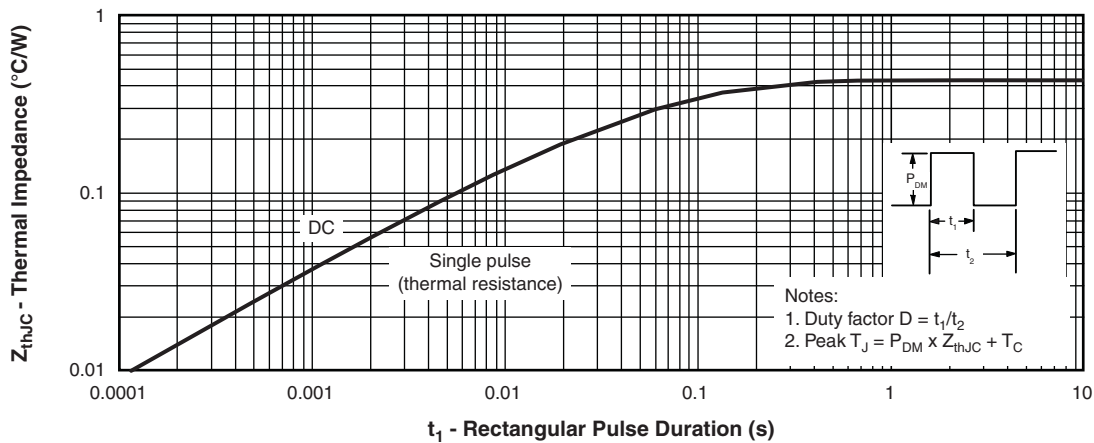


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

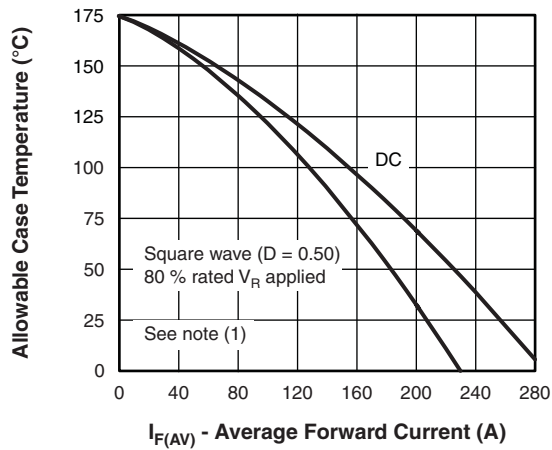


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

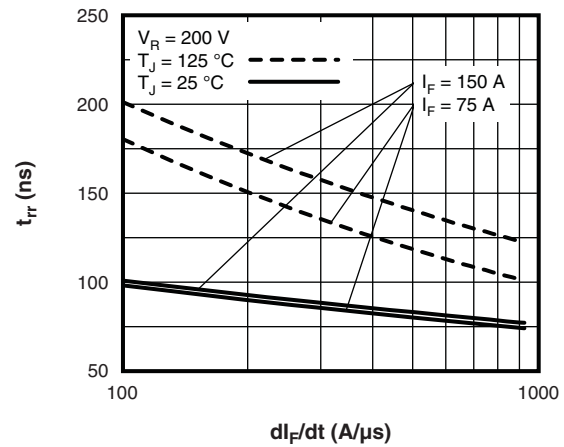


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

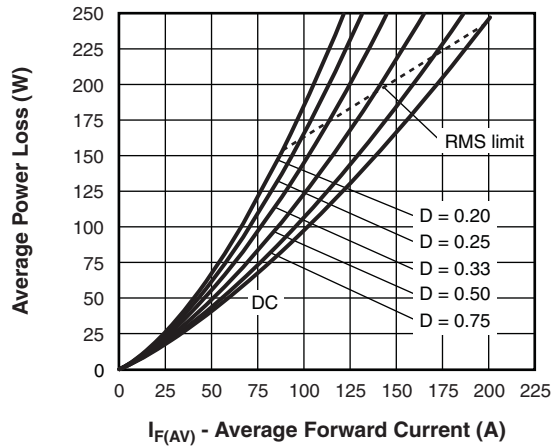


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

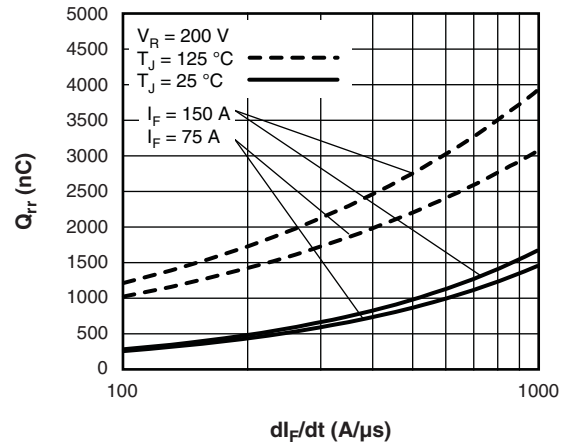


Fig. 8 - Typical Stored Charge vs. dI_F/dt

Note

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

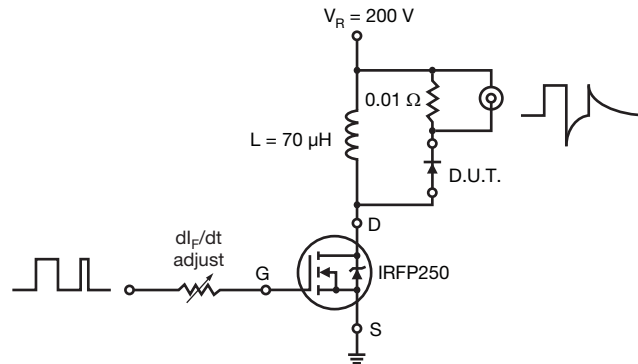


Fig. 9 - Reverse Recovery Parameter Test Circuit

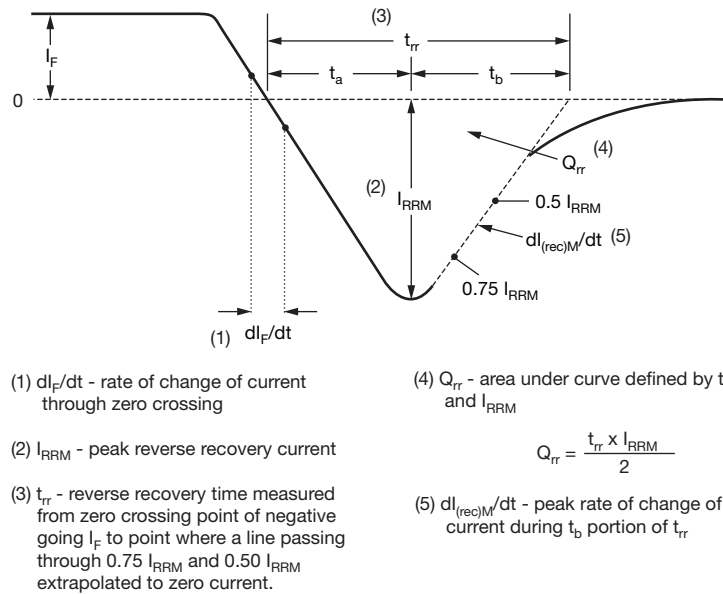


Fig. 10 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code

VS-	UF	B	280	F	A	40
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1 2 3 4 5 6 7

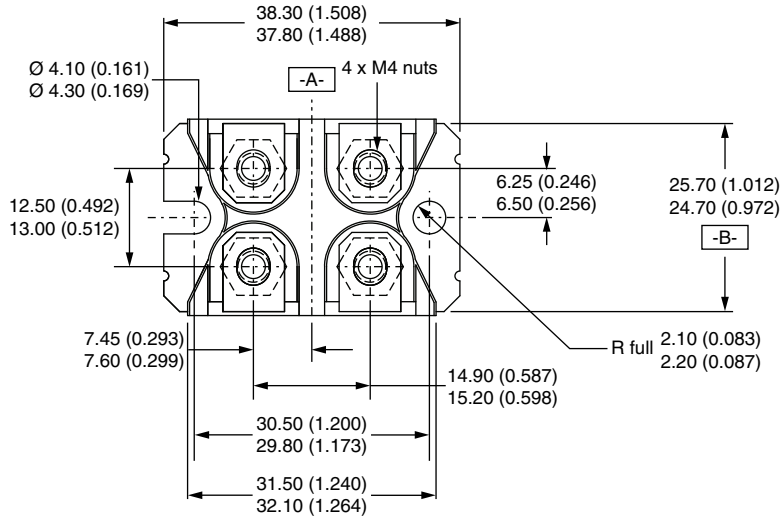
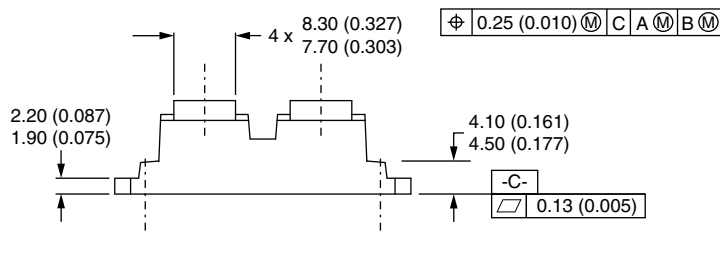
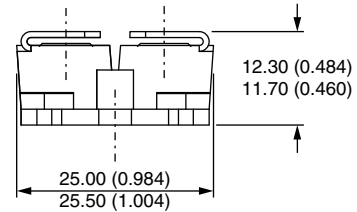
- 1 - Vishay Semiconductors product
- 2 - Ultrafast rectifier
- 3 - Ultrafast Pt diffused
- 4 - Current rating (280 = 280 A)
- 5 - Circuit configuration (2 separate diodes, parallel pin-out)
- 6 - Package indicator (SOT-227 standard isolated base)
- 7 - Voltage rating (40 = 400 V)

Circuit Configuration		
Circuit	Circuit Configuration Code	Circuit Drawing
2 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 anode connected to pin 4 and its cathode to pin 3. The bottom diode has its anode connected to pin 1 and its cathode to pin 2. On the right is a physical component drawing of a dual in-line package (DIP) with four pins. The pins are labeled 1, 2, 3, and 4 from left to right. The component has a circular feature on the left side and a notch on the right side. The text 'Lead Assignment' is written above the component drawing.</p>

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

SOT-227 Generation II

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter



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