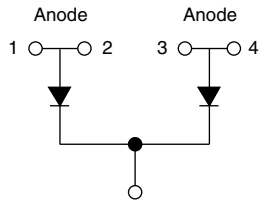
Not Insulated SOT-227 Power Module Ultrafast Rectifier, 310 A

SOT-227



Base common cathode

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
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS COMPLIANT

DESCRIPTION / APPLICATIONS

The VS-UFB310CB40 not insulated modules integrate two state of the art 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 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
$I_{F(AV)}$ at T_C = 119 °C per module (1)	310 A
t_{rr}	39 ns
at T_C	135 °C
Type	Modules - diode, FRED Pt®
Package	SOT-227

Note

(1) All 4 anode terminals connected

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 = 135 °C	155	A
Single pulse forward current per diode	I_{FSM} (1)	T_C = 25 °C	1300	
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

Note

(1) 10 ms sine or 6 ms rectangular pulse

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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	400	-	-	V
Forward voltage, per leg	V_{FM}	I_F = 100 A	-	1.11	1.34	
		I_F = 100 A, T_J = 125 °C	-	0.99	1.1	
		I_F = 100 A, T_J = 175 °C	-	0.97	-	
		I_F = 200 A	-	1.3	1.6	
		I_F = 200 A, T_J = 125 °C	-	1.22	1.4	
		I_F = 200 A, T_J = 175 °C	-	1.25	-	
Reverse leakage current, per leg	I_{RM}	V_R = V_R rated	-	1.3	50	μA
		V_R = V_R rated, T_J = 125 °C	-	100	-	
		V_R = V_R rated, T_J = 175 °C	-	1	4	mA
Junction capacitance, per leg	C_T	V_R = 400 V	-	100	-	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		-	39	-	ns
		T_J = 25 °C	I_F = 50 A dI_F/dt = 200 A/μs V_R = 200 V	-	89	-	
		T_J = 125 °C		-	184	-	
Peak recovery current, per leg	I_{RRM}	T_J = 25 °C		-	9	-	A
		T_J = 125 °C		-	20	-	
Reverse recovery charge, per leg	Q_{rr}	T_J = 25 °C		-	400	-	nC
		T_J = 125 °C		-	1840	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Junction and storage temperature range	T_J, T_{Stg}		-55	-	175	°C
Junction to case, single leg conducting	R_{thJC}		-	-	0.19	°C/W
Junction to case, both leg conducting			-	-	0.095	
Case to heatsink	R_{thCS}	Flat, greased surface	-	0.07	-	
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 not insulated			

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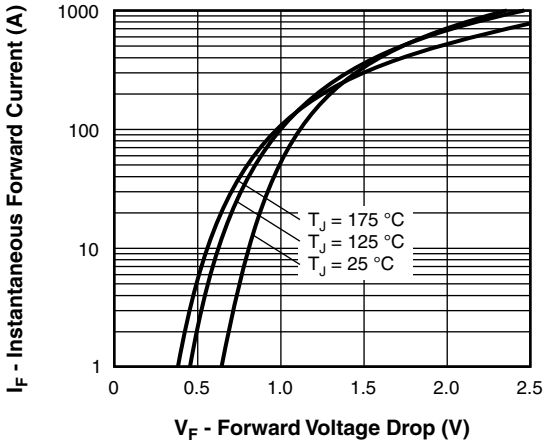

Fig. 1 - Typical Forward Voltage Drop Characteristics, Per Leg

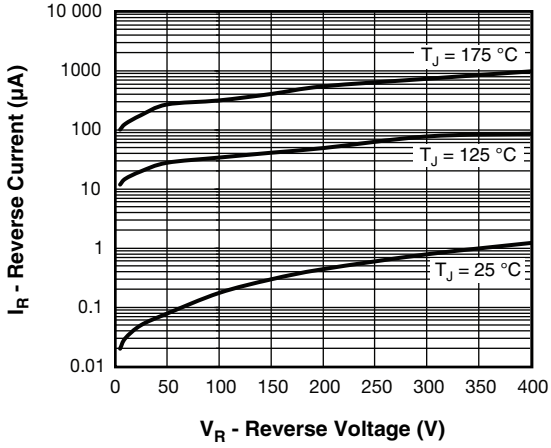

Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage, Per Leg

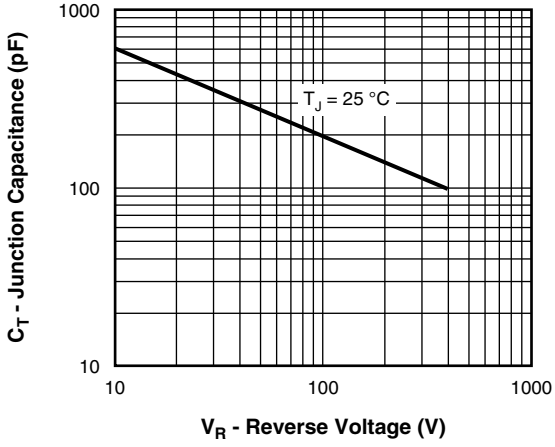

Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, Per Leg

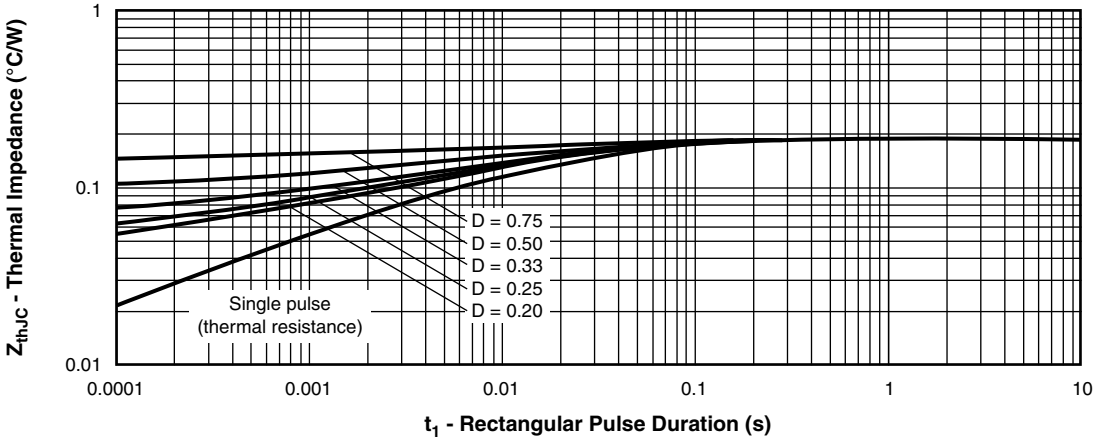

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics, Per Leg

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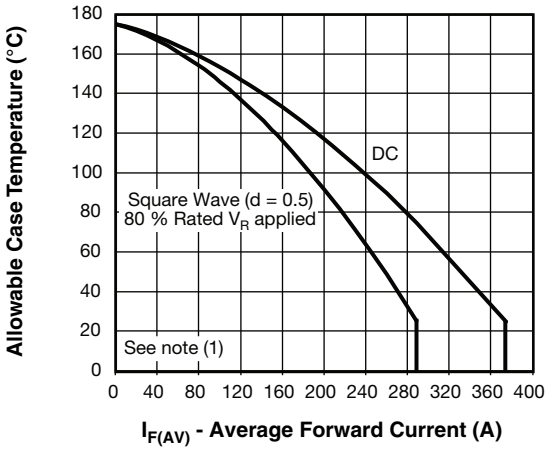

Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current, Per Leg

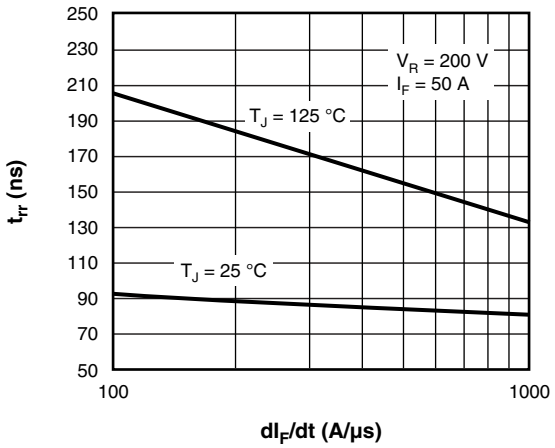

Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt, Per Leg

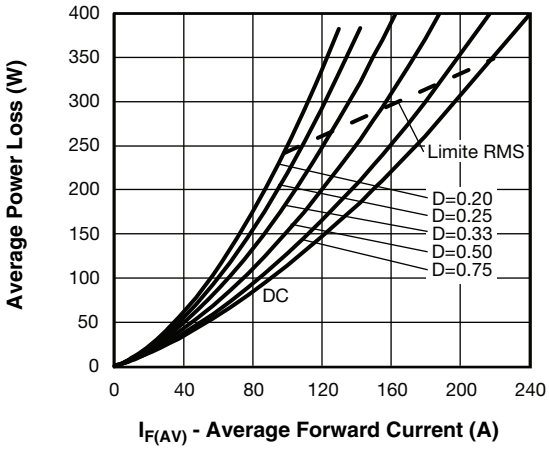

Fig. 6 - Forward Power Loss Characteristics, Per Leg

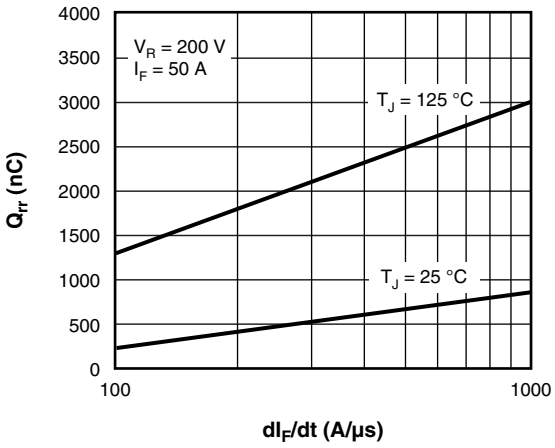

Fig. 8 - Typical Reverse Recovery Charge vs. dI_F/dt, Per Leg

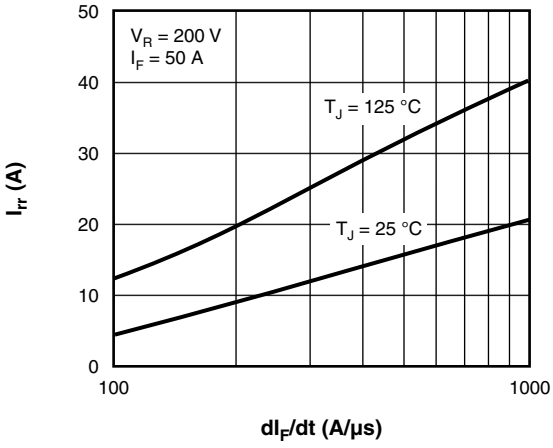

Fig. 9 - Typical Reverse Recovery Current vs. dI_F/dt, Per Leg

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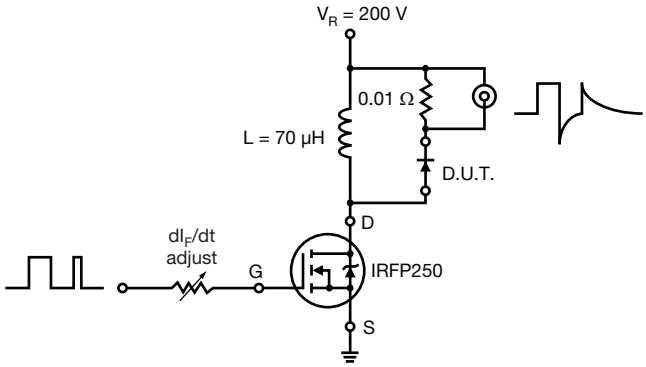
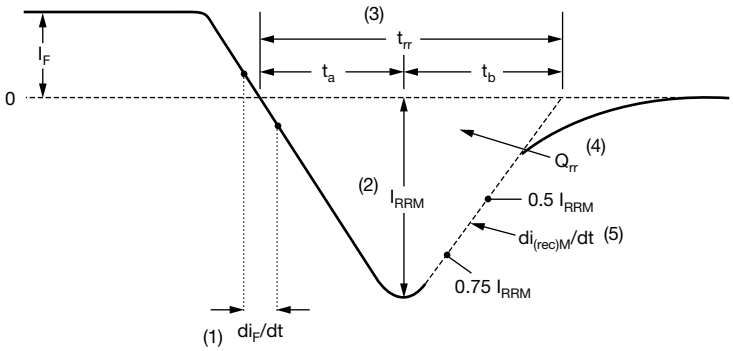


Fig. 10 - Reverse Recovery Parameter Test Circuit



(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}

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

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

Fig. 11 - Reverse Recovery Waveform and Definitions

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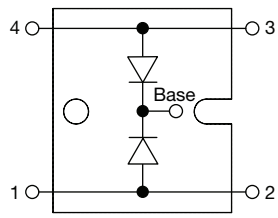
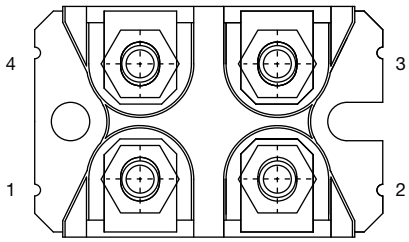
ORDERING INFORMATION TABLE

Device code	VS-	UF	B	310	C	B	40
	1	2	3	4	5	6	7

1 - Vishay Semiconductors product
2 - Ultrafast rectifier
3 - Ultrafast Pt diffused
4 - Current rating (310 = 310 A)
5 - Circuit configuration (two diodes common cathode)
6 - Package indicator (SOT-227 standard not insulated)
7 - Voltage rating (40 = 400 V)

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

CIRCUIT CONFIGURATION		
CIRCUIT	**CIRCUIT CONFIGURATION CODE**	**CIRCUIT DRAWING**
Two diodes common cathode	C	 Lead Assignment 

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

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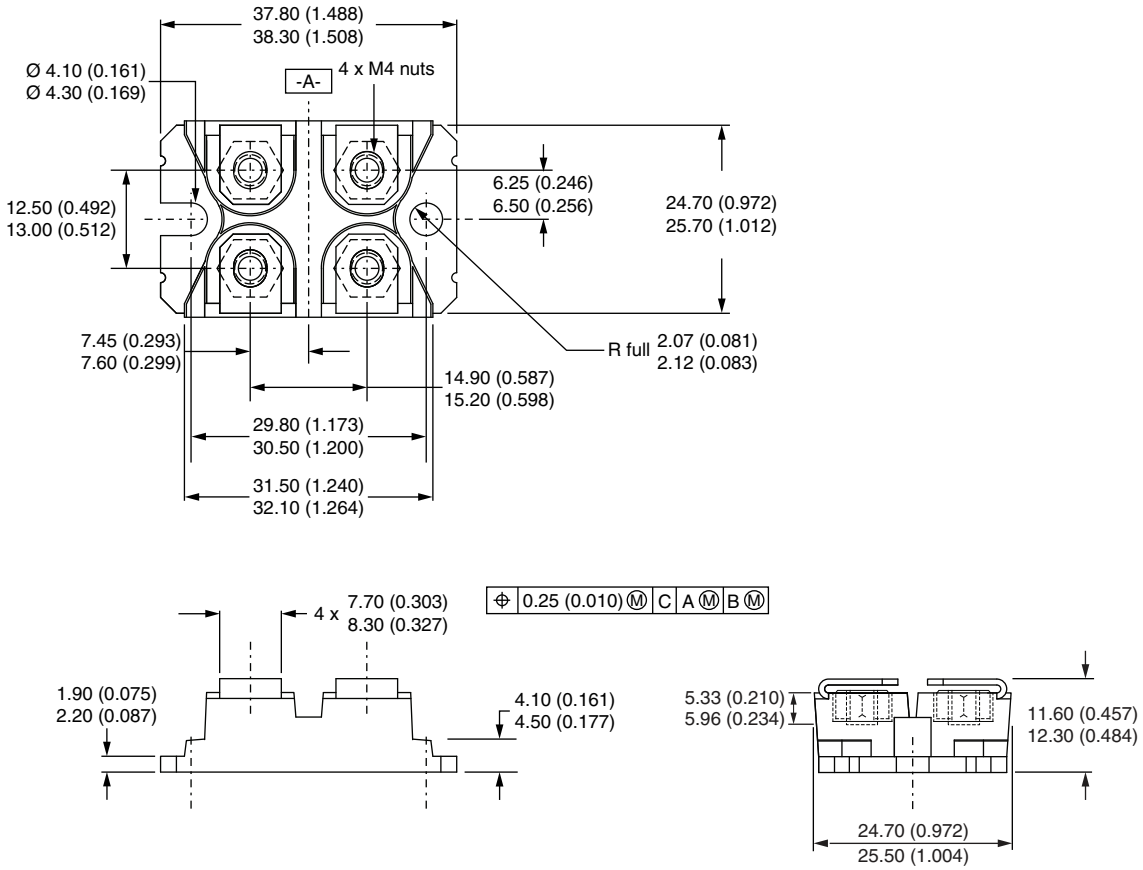
SOT-227 Generation 2

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter

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