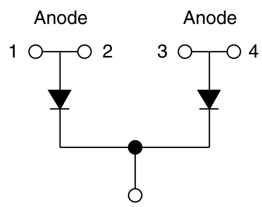
Not Insulated SOT-227 Power Module Ultrafast Rectifier, 200 A

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
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level

Pb-free
RoHS COMPLIANT

PRODUCT SUMMARY

V_R	400 V
$I_{F(AV)}$ at T_C = 146 °C per module (1)	200 A
t_{rr}	89 ns

Note

(1) All 4 anode terminals connected

DESCRIPTION

The UFB200CB40P 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-to-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		400	V
Continuous forward current per diode	I_F (1)	T_C = 140 °C	142	A
Single pulse forward current per diode	I_{FSM} (2)	T_C = 25 °C	1300	
Maximum power dissipation per module	P_D	T_C = 140 °C	368	W
Operating junction and storage temperatures	T_J, T_{Stg}		- 55 to 175	°C

Notes

(1) Both anode terminals connected;
Maximum I_{RMS} current per leg 200 A to do not exceed the maximum temperature of terminals, see fig. 6

(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	400	-	-	V
Forward voltage	V_{FM}	I_F = 100 A	-	1.11	1.34	
		I_F = 100 A, T_J = 125 °C	-	0.99	1.1	
		I_F = 200 A	-	1.3	1.6	
		I_F = 200 A, T_J = 125 °C	-	1.22	1.4	
Reverse leakage current	I_{RM}	V_R = V_R rated	-	-	50	µA
		T_J = 175 °C, V_R = V_R rated	-	-	4	mA
Junction capacitance	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	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 = 100 V	-	89	136	
		T_J = 125 °C		-	184	235	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	9	12	A
		T_J = 125 °C		-	20	25	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	400	815	nC
		T_J = 125 °C		-	1840	2940	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction to case, single leg conducting	R_{thJC}		-	-	0.19	°C/W
Junction to case, both leg conducting			-	-	0.095	
Case to heatsink, per module	R_{thCS}	Flat, greased surface	-	0.05	-	
Weight			-	30	-	g
Mounting torque			-	1.3	-	Nm

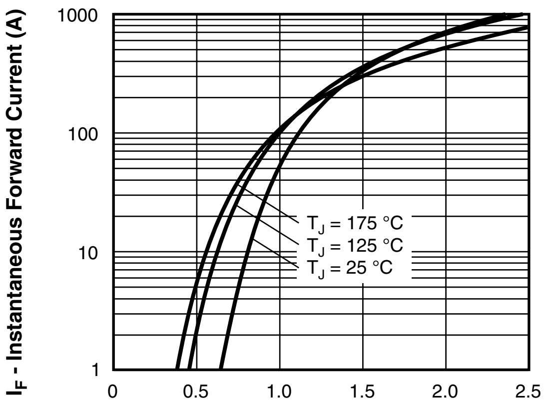


Fig. 1 - Typical Forward Voltage Drop Characteristics (Per Diode)

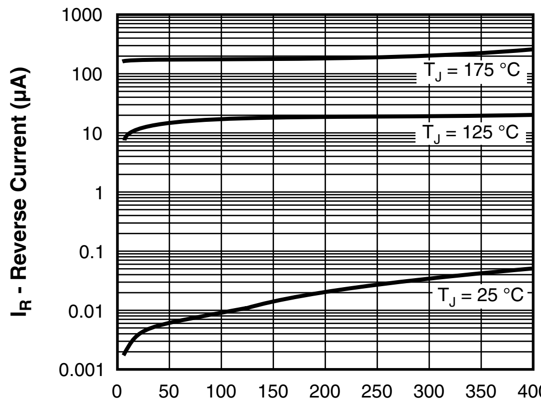


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

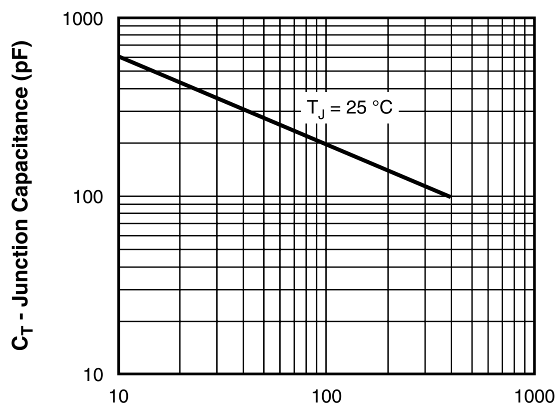


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

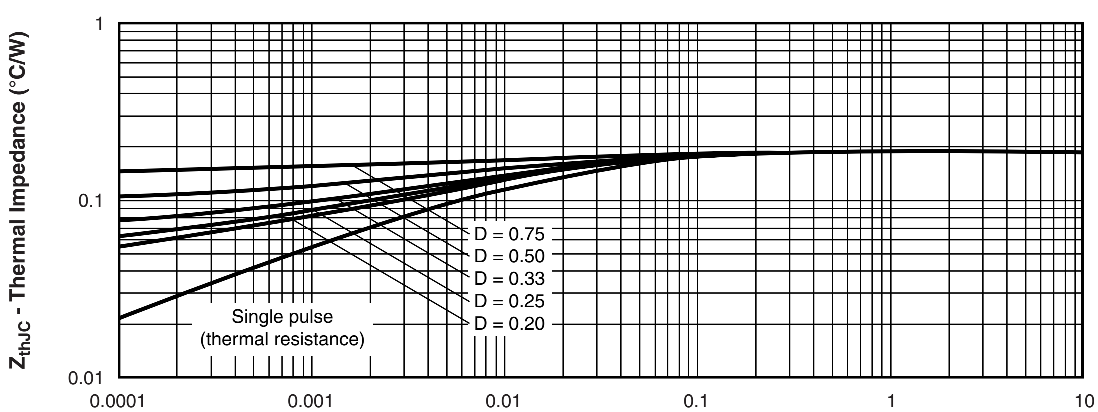


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Diode)

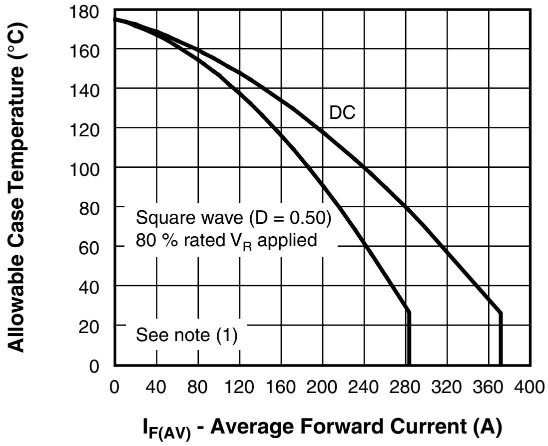


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

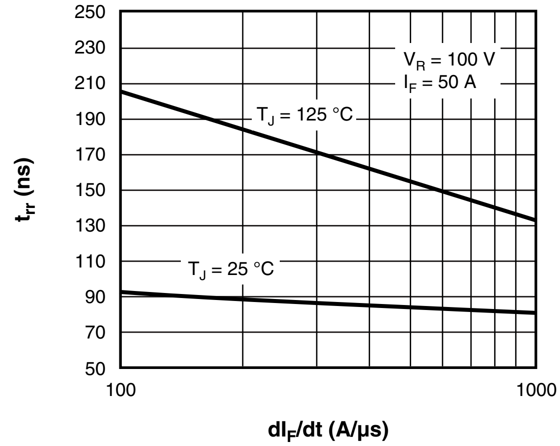


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

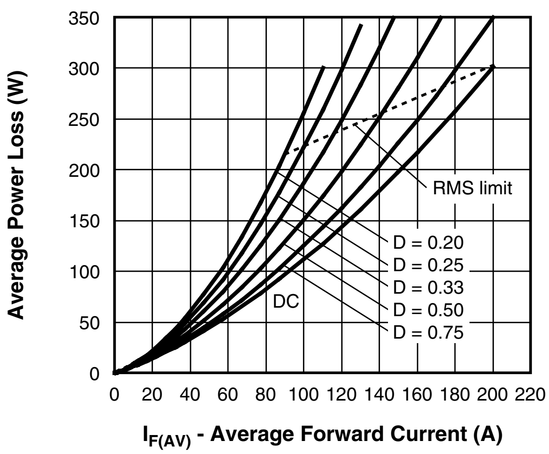


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

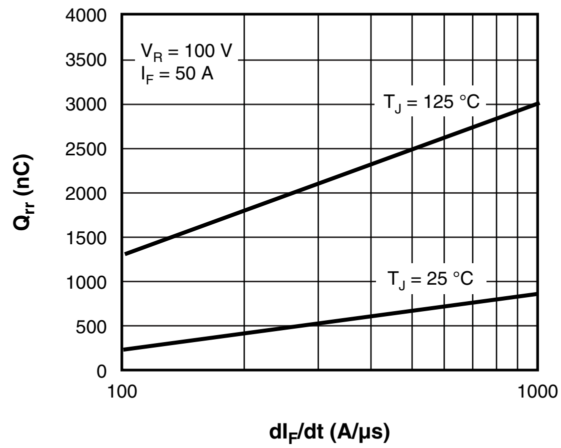


Fig. 8 - Typical Reverse Recovery Charge vs. dI_F/dt

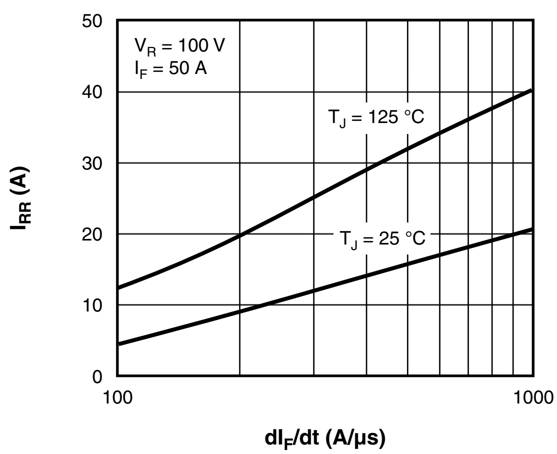


Fig. 9 - Typical Reverse Recovery Current vs. dI_F/dt

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

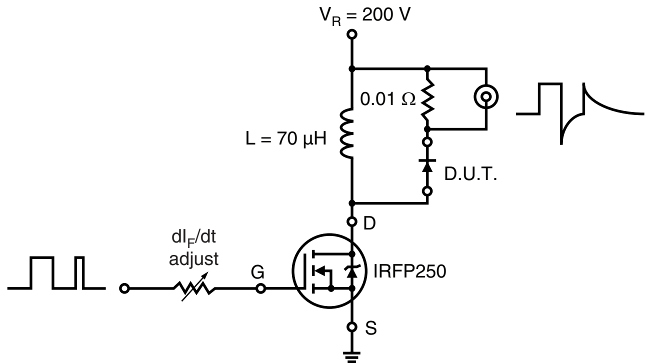
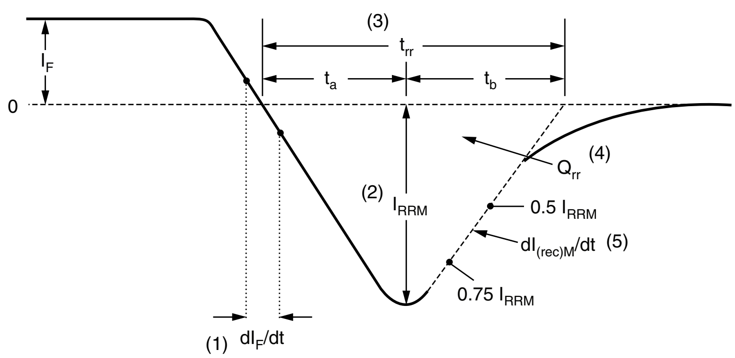


Fig. 10 - Reverse Recovery Parameter Test Circuit



(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

ORDERING INFORMATION TABLE

Device code	UF	B	200	C	B	40	P
	1	2	3	4	5	6	7

1 - Ultrafast rectifier
2 - Ultrafast Pt diffused
3 - Current rating (200 = 200 A)
4 - Circuit configuration (2 common cathode diodes)
5 - Package indicator (SOT-227 standard not insulated)
6 - Voltage rating (40 = 400 V)
7 - • P = Lead (Pb)-free

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

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95036
Packaging information	www.vishay.com/doc?95037

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