Insulated Ultrafast Rectifier Module, 120 A

SOT-227

FEATURES

- Two fully independent diodes
- Ceramic fully insulated package (V_{ISOL} = 2500 V_{AC})
- Ultrafast reverse recovery
- Ultrasoft reverse recovery current shape
- Low forward voltage
- Optimized for power conversion: welding and industrial SMPS applications
- Industry standard outline
- Plug-in compatible with other SOT-227 packages
- Easy to assemble
- Direct mounting to heatsink
- UL approved file E78996
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level

Pb-free
RoHS
COMPLIANT

PRODUCT SUMMARY	
V_R	200 V
$I_{F(AV)}$ at T_C = 90 °C	120 A
t_{rr}	28 ns

DESCRIPTION

The UFB120FA20P insulated modules integrate two state of the art Vishay Semiconductors 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		200	V
Continuous forward current per diode	I_F	T_C = 90 °C	60	A
Single pulse forward current per diode	I_{FSM}	T_C = 25 °C	850	
Maximum power dissipation per module	P_D	T_C = 90 °C	110	W
RMS isolation voltage	V_{ISOL}	Any terminal to case, t = 1 min	2500	V
Operating junction and storage temperatures	T_J, T_{Stg}		- 55 to 150	°C

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	200	-	-	V
Forward voltage	V_{FM}	I_F = 60 A	-	0.96	1.13	
		I_F = 60 A, T_J = 150 °C	-	0.79	0.90	
Reverse leakage current	I_{RM}	$V_R = V_R$ rated	-	-	100	μA
		T_J = 150 °C, $V_R = V_R$ rated	-	-	1.0	mA
Junction capacitance	C_T	V_R = 200 V	-	105	-	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 = 200 A/μs, V_R = 30 V		-	-	28	ns
		T_J = 25 °C	I_F = 50 A dI_F/dt = 200 A/μs V_R = 100 V	-	32	-	
		T_J = 125 °C		-	64	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	4.0	-	A
		T_J = 125 °C		-	8.2	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	64	-	nC
		T_J = 125 °C		-	263	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Junction to case, single diode conducting	R_{thJC}		-	0.8	1.1	K/W
Junction to case, both diodes conducting			-	0.4	0.55	
Case to heatsink	R_{thCS}	Flat, greased surface	-	0.05	-	
Weight			-	30	-	g
Mounting torque			-	1.3	-	Nm

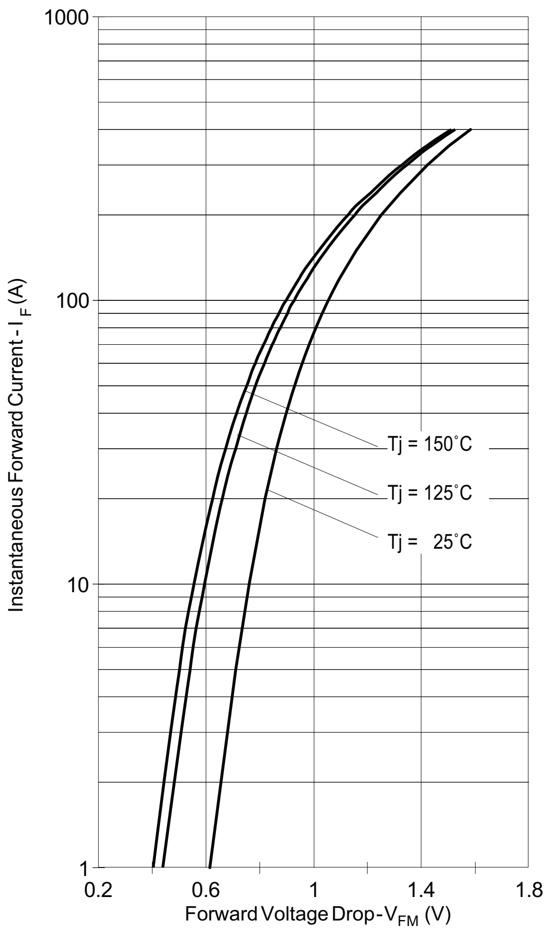


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Diode)

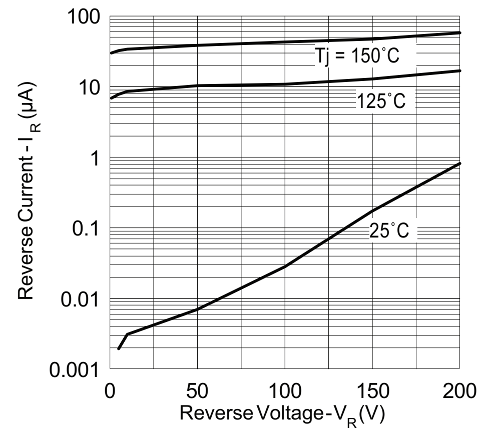


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

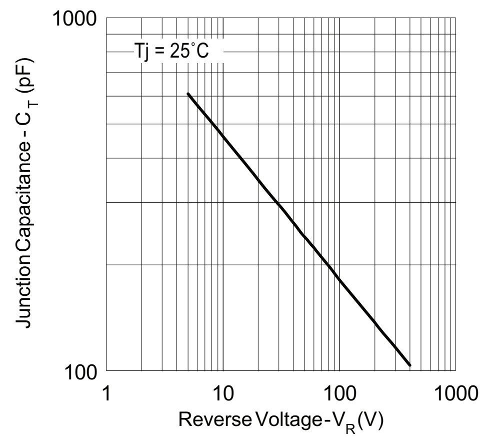


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

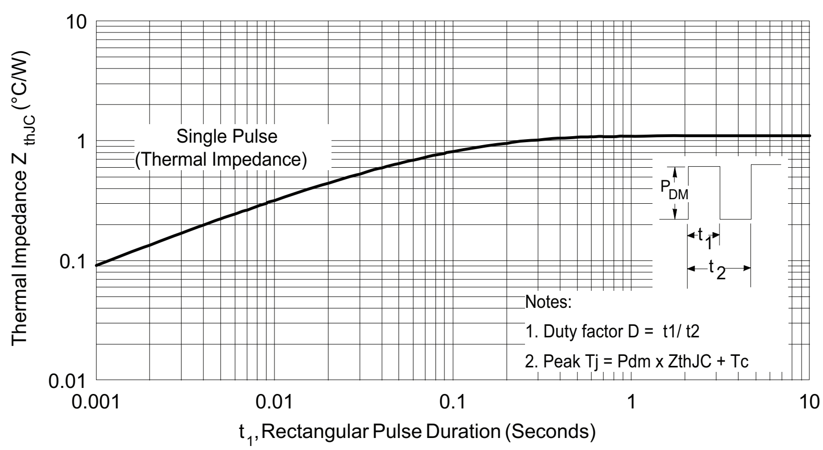


Fig. 4 - Maximum Thermal Impedance Z_{thJC} (Per Diode)

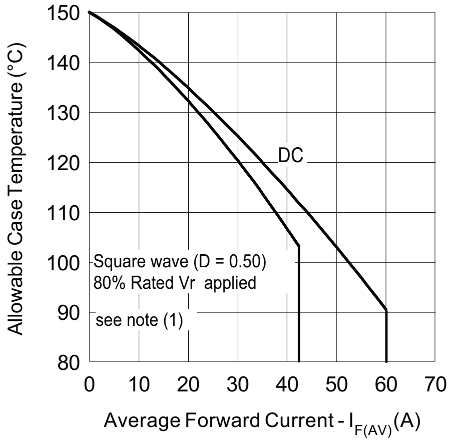


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Diode)

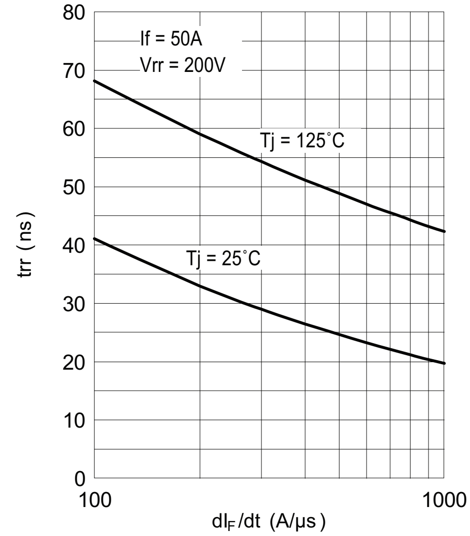


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

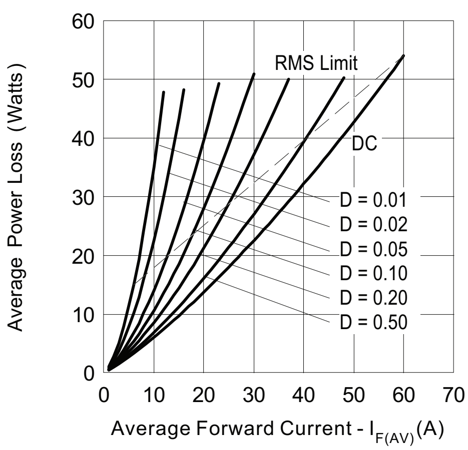


Fig. 6 - Forward Power Loss (Per Diode)

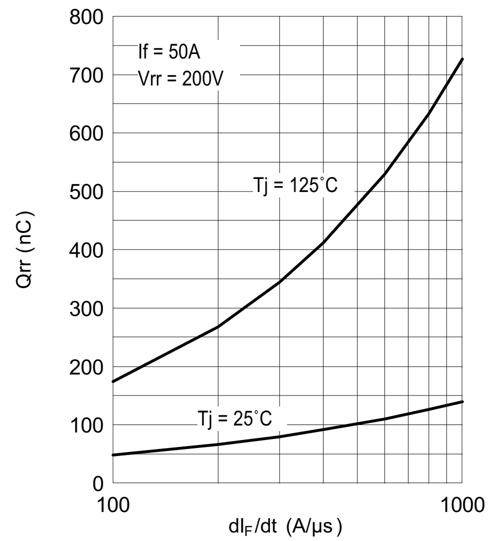


Fig. 8 - Typical Stored Charge vs. dI_F/dt

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

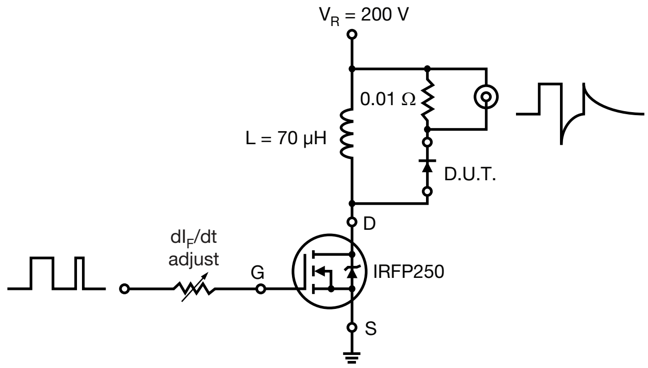
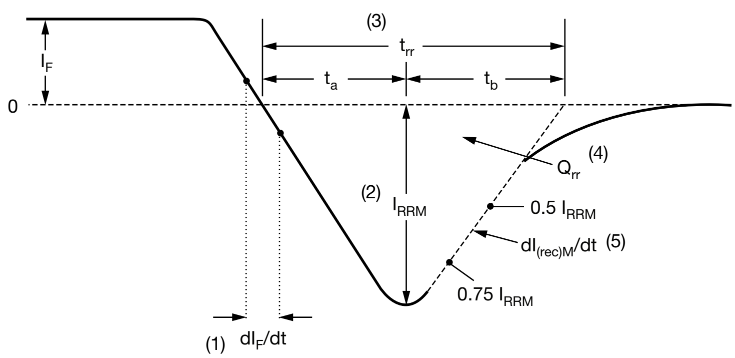


Fig. 9 - Reverse Recovery Parameter Test Circuit



(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}

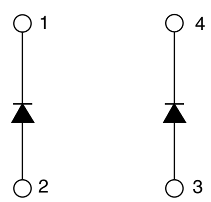
Fig. 10 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code	UF	B	120	F	A	20	P
	1	2	3	4	5	6	7

1 - Ultrafast rectifier
2 - Ultrafast Pt diffused
3 - Current rating (120 = 120 A)
4 - Circuit configuration (2 separate diodes, parallel pin-out)
5 - Package indicator (SOT-227 standard isolated base)
6 - Voltage rating (20 = 200 V)
7 - P = Lead (Pb)-free

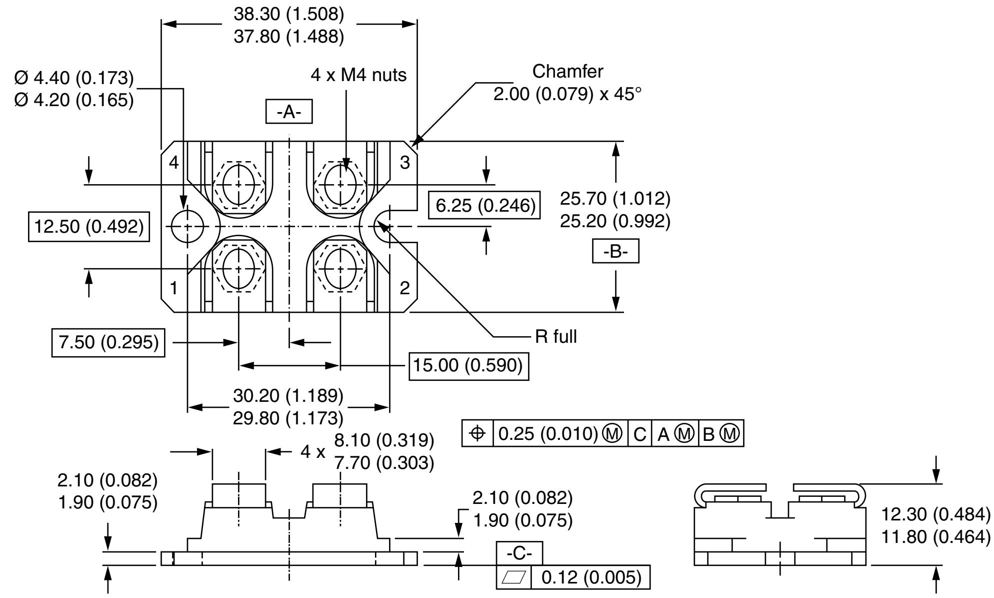
CIRCUIT CONFIGURATION



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

SOT-227

DIMENSIONS in millimeters (inches)



Notes

- Dimensioning and tolerancing per ANSI Y14.5M-1982
- Controlling dimension: millimeter

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