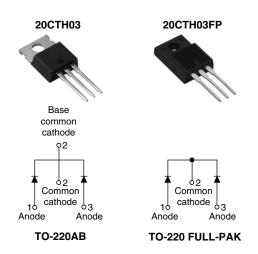


Vishay High Power Products

Hyperfast Rectifier, 2 x 10 A FRED PtTM



PRODUCT SUMMARY				
t _{rr} (maximum)	35 ns			
I _{F(AV)}	2 x 10 A			
V_{R}	300 V			

FEATURES

- · Hyperfast recovery time
- · Low forward voltage drop
- · Low leakage current
- 175 °C operating junction temperature
- Fully isolated package (V_{INS} = 2500 V_{RMS})
- TO-220 designed and qualified for AEC Q101 level
- TO-220FP designed and qualified for industrial level

DESCRIPTION/APPLICATIONS

300 V series are the state of the art hyperfast recovery rectifiers designed with optimized performance of forward voltage drop and hyperfast recovery time.

The planar structure and the platinum doped life time control, guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in the output rectification stage of SMPS, UPS, dc-to-dc converters as well as freewheeling diodes in low voltage inverters and chopper motor drives.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

ABSOLUTE MAXIMUM RATINGS						
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Peak repetitive reverse voltage		V_{RRM}		300	V	
	per diode		T _C = 160 °C	10		
Average rectified forward current	(FULL-PAK) per diode	I _{F(AV)}	T _C = 135 °C	10	A	
	per device			20		
Non-repetitive peak surge current		I _{FSM}	T _J = 25 °C	120		
Operating junction and storage temperatures		T _J , T _{Stg}		- 65 to 175	°C	

ELECTRICAL SPECIFICATIONS (T _J = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Breakdown voltage, blocking voltage	V _{BR} , V _R	$I_R = 100 \mu A$	300	-	-		
Forward voltage	V _F	I _F = 10 A	-	1.05	1.25	V	
		I _F = 10 A, T _J = 125 °C	-	0.85	0.95		
Reverse leakage current		$V_R = V_R$ rated	-	-	20		
neverse leakage current	I _R	$T_J = 125 ^{\circ}\text{C}, V_R = V_R \text{rated}$	-	6	200	μΑ	
Junction capacitance	C _T	V _R = 300 V - 30		30	-	pF	
Series inductance	L _S	Measured lead to lead 5 mm from package body - 8 -		nH			

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DYNAMIC RECOVERY CHARACTERISTICS (T _C = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CO	MIN.	TYP.	MAX.	UNITS	
Reverse recovery time t _{rr}		$I_F = 1 \text{ A}, dI_F/dt = 50 \text{ A/}\mu\text{s}, V_R = 30 \text{ V}$		-	-	35	
	t _{rr}	$I_F = 1 \text{ A}, dI_F/dt = 100 \text{ A/}\mu\text{s}, V_R = 30 \text{ V}$		-	-	30	
		T _J = 25 °C		-	31	-	ns
	T _J = 125 °C		-	42	-		
Peak recovery current I _{RRM}		T _J = 25 °C	$I_F = 10 \text{ A}$ $dI_F/dt = 200 \text{ A/}\mu\text{s}$ $V_R = 200 \text{ V}$	-	2.4	-	A
	IRRM	T _J = 125 °C		-	5.6	-	
Reverse recovery charge	Q _{rr} —	T _J = 25 °C		-	36	-	nC
		T _J = 125 °C		-	120	-	

THERMAL - MECHANICAL SPECIFICATIONS							
PARAMETER		SYMBOL	TEST CONDTIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and temperature range	d storage	T _J , T _{Stg}		- 65	-	175	°C
Thermal resistance,	per diode	Mounting surface, flat, smooth		-	-	1.5	°C/W
junction to case	(FULL-PAK) per diode	R_{thJC}	and greased	-	-	3.9	O/ VV
Marking device			Case style TO-220AB	20CTH03			
			Case style TO-220 FULL-PAK		20CTI	H03FP	



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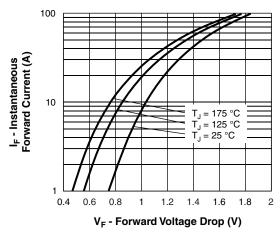


Fig. 1 - Typical Forward Voltage Drop Characteristics

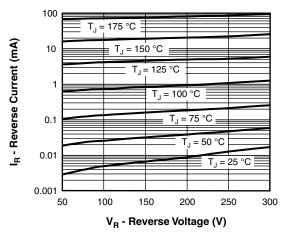


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

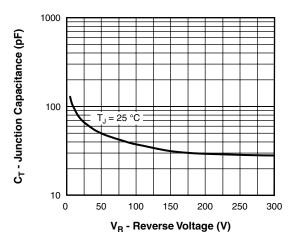


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

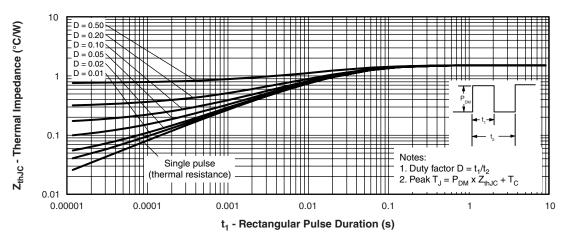


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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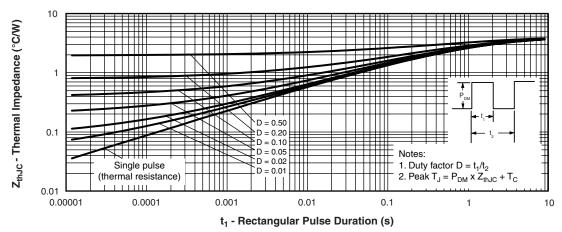


Fig. 5 - Maximum Thermal Impedance Z_{thJC} Characteristics (FULL-PAK)

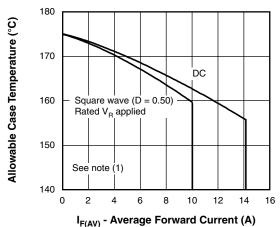


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current

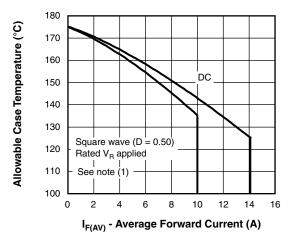


Fig. 7 - Maximum Allowable Case Temperature vs. Average Forward Current (FULL-PAK)

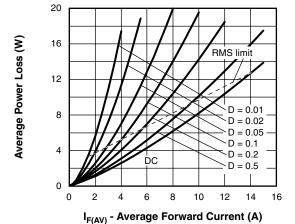


Fig. 8 - Forward Power Loss Characteristics

Note

Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{th,JC}$; $Pd = Forward power loss = I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 8); $Pd_{REV} = Inverse power loss = V_{R1} \times I_R$ (1 - D); I_R at $V_{R1} = Rated V_R$



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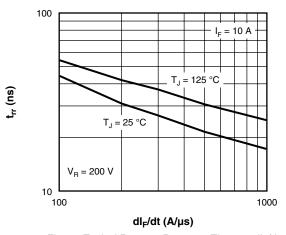


Fig. 9 - Typical Reverse Recovery Time vs. dI_F/dt

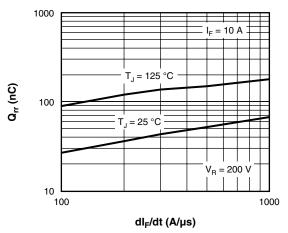


Fig. 10 - Typical Stored Charge vs. dl_F/dt

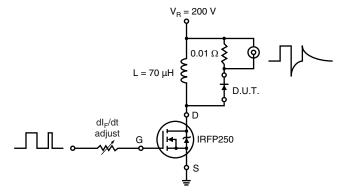
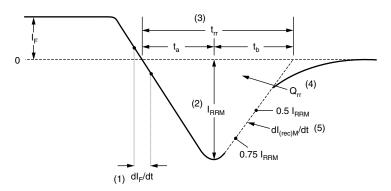


Fig. 11 - Reverse Recovery Parameter Test Circuit



- (1) dl_F/dt rate of change of current through zero crossing
- (2) I_{RRM} peak reverse recovery current
- (3) $\rm t_{rr}$ reverse recovery time measured from zero crossing point of negative going $\rm I_F$ to point where a line passing through 0.75 $\rm I_{RRM}$ and 0.50 $\rm I_{RRM}$ extrapolated to zero current.
- (4) Q_{rr} area under curve defined by t_{rr} and I_{RRM}

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

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

Fig. 12 - Reverse Recovery Waveform and Definitions

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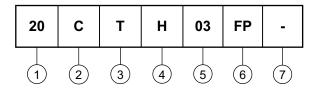
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ORDERING INFORMATION TABLE

Device code



- 1 Current rating (20 = 20 A)
- C = Common cathode
- 3 T = TO-220, D^2PAK
- 4 H = Hyperfast recovery
- 5 Voltage rating (03 = 300 V)
- 6 • None = TO-220AB
 - FP = TO-220 FULL-PAK
- 7 • None = Standard production
 - PbF = Lead (Pb)-free

Tube standard pack quantity: 50 pieces

LINKS TO RELATED DOCUMENTS				
Dimensions http://www.vishay.com/doc?95040				
Part marking information	http://www.vishay.com/doc?95042			



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