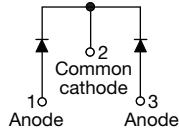


Hyperfast Rectifier, 2 x 10 A FRED Pt[®]


3L TO-220 FullPAK

VS-20CTH03FP-N3

RoHS
 COMPLIANT
 HALOGEN
FREE
FEATURES

- Hyperfast recovery time
- Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current
- Fully isolated package ($V_{INS} = 2500 V_{RMS}$)
- UL pending
- Designed and qualified according to JEDEC[®]-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

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/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.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2 x 10 A
V_R	300 V
V_F at I_F	0.85 V
t_{rr} typ.	See Recovery table
T_J max.	175 °C
Package	3L TO-220 FullPAK
Circuit configuration	Common cathode

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		300	V
Average rectified forward current	$I_{F(AV)}$	per diode	$T_C = 135\text{ °C}$	10
		per device		20
Non-repetitive peak surge current	I_{FSM}	$T_J = 25\text{ °C}$	120	A
Operating junction and storage temperatures	T_J, T_{Stg}		-65 to +175	°C

ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ °C}$ 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	-	-	V
Forward voltage	V_F	$I_F = 10\text{ A}$	-	1.05	1.25	V
		$I_F = 10\text{ A}, T_J = 125\text{ °C}$	-	0.85	0.95	
Reverse leakage current	I_R	$V_R = V_R$ rated	-	-	20	μA
		$T_J = 125\text{ °C}, V_R = V_R$ rated	-	6	200	
Junction capacitance	C_T	$V_R = 300\text{ V}$	-	30	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8	-	nH



DYNAMIC RECOVERY CHARACTERISTICS ($T_C = 25\text{ }^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	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	ns	
		$I_F = 1\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	-	30		
		$T_J = 25\text{ }^\circ\text{C}$	-	31	-		
		$T_J = 125\text{ }^\circ\text{C}$	-	42	-		
Peak recovery current	I_{RRM}	$I_F = 10\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	2.4	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	5.6	-	
Reverse recovery charge	Q_{rr}	$I_F = 10\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	36	-	nC
			$T_J = 125\text{ }^\circ\text{C}$	-	120	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J , T_{Stg}		-65	-	175	$^\circ\text{C}$
Thermal resistance, junction-to-case per diode	R_{thJC}	Mounting surface, flat, smooth, and greased	-	-	3.9	$^\circ\text{C}/\text{W}$
Marking device		Case style 3L TO-220 FullPAK	20CTH03FP			

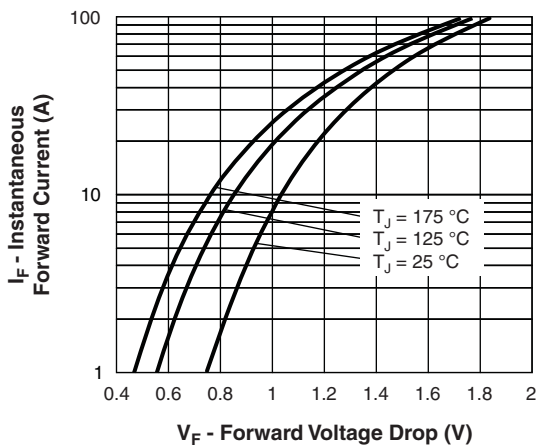


Fig. 1 - Typical Forward Voltage Drop Characteristics

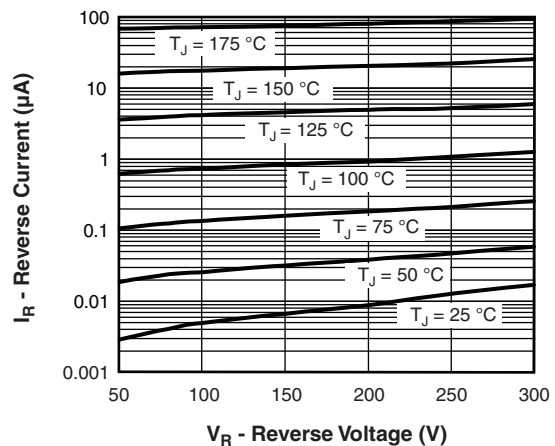


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

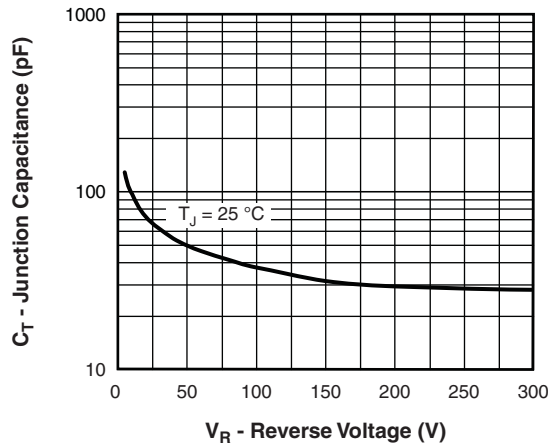


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

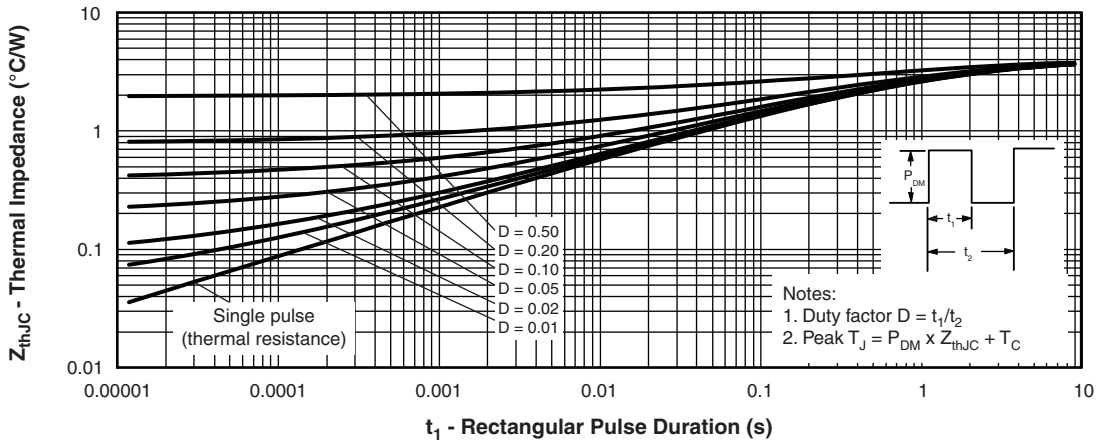


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

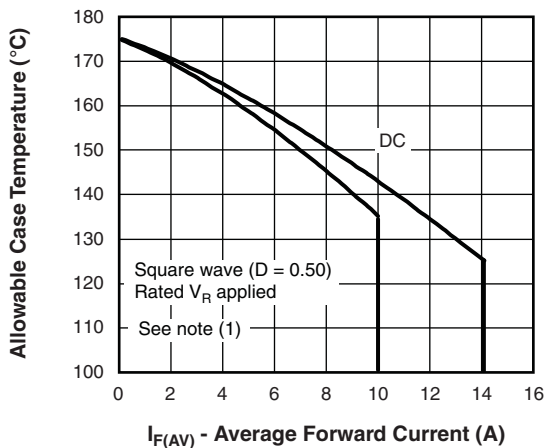


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

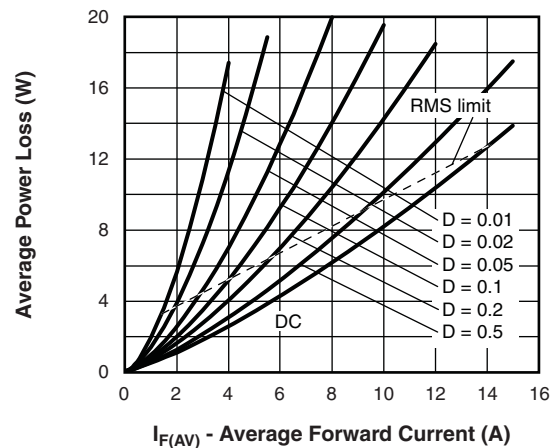


Fig. 6 - Forward Power Loss Characteristics

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. 5);
 $P_{d_{REV}}$ = inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = rated V_R

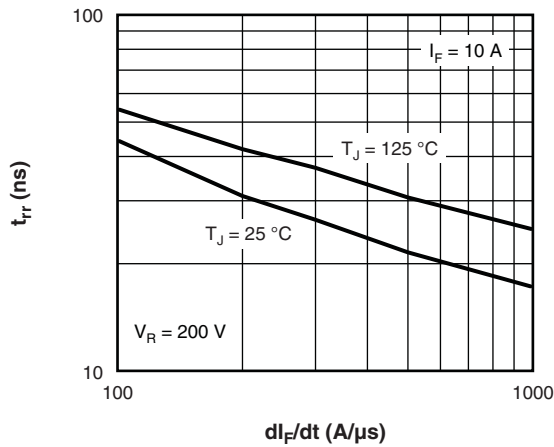


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

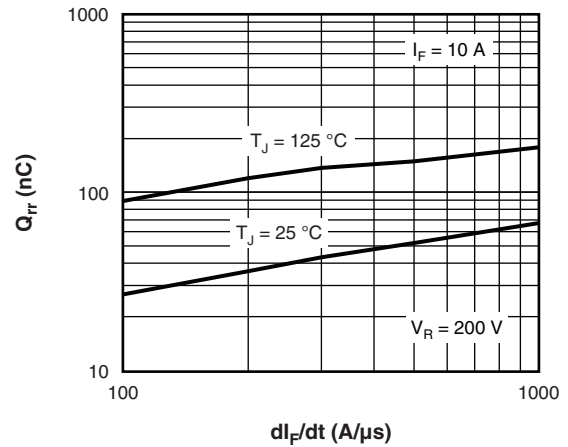
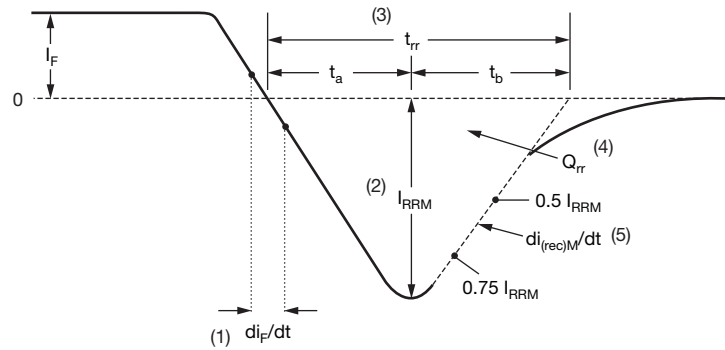


Fig. 8 - Typical Stored Charge vs. di_F/dt



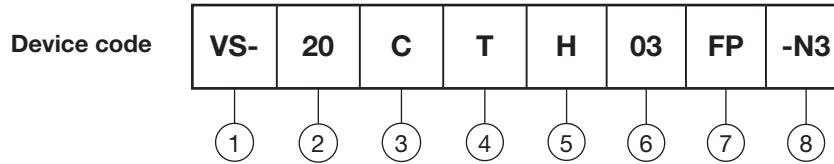
- (1) di_F/dt - rate of change of current through zero crossing
- (2) I_{RRM} - peak reverse recovery current
- (3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through $0.75 I_{RRM}$ and $0.50 I_{RRM}$ extrapolated to zero current.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

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

Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (20 = 20 A)
- 3** - C = common cathode
- 4** - T = TO-220, D²PAK (TO-263AB)
- 5** - H = hyperfast recovery
- 6** - Voltage rating (03 = 300 V)
- 7** - FP = 3L TO-220 FullPAK
- 8** - Environmental digit:
-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

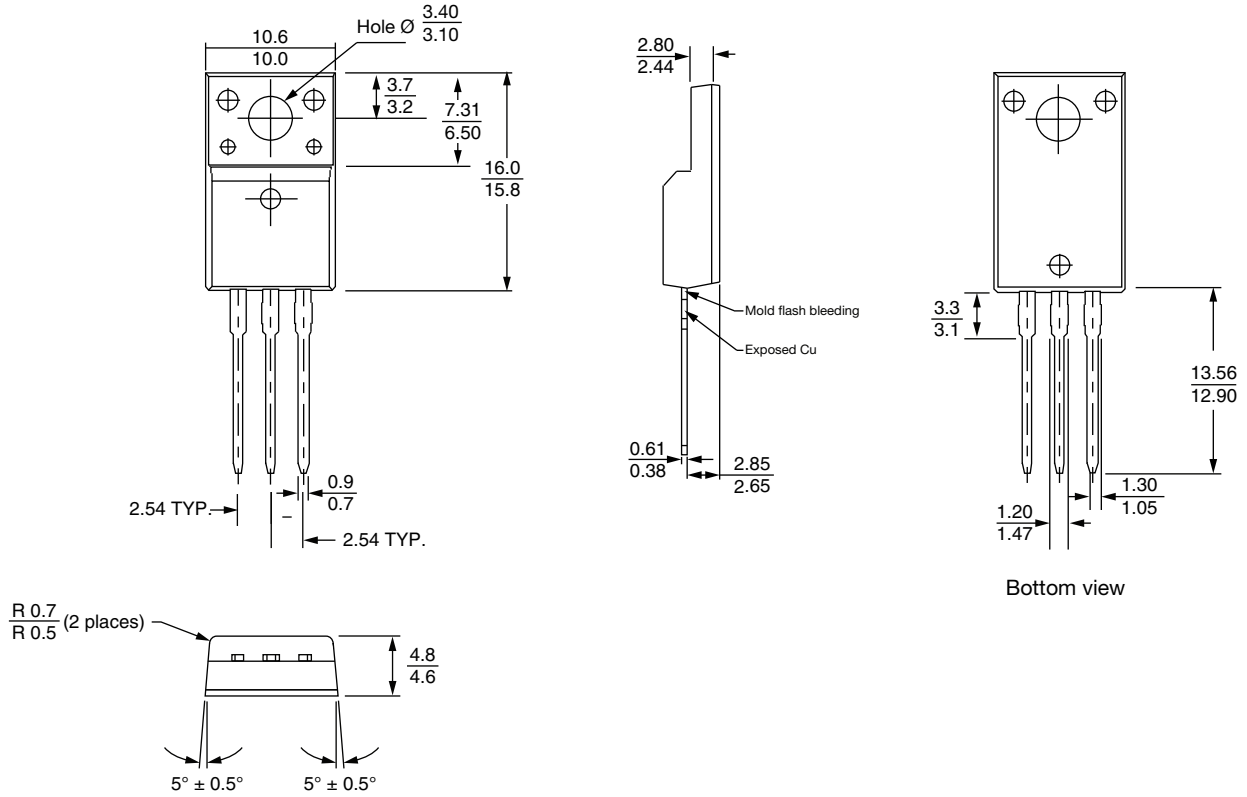
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-20CTH03FP-N3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96155
Part marking information	www.vishay.com/doc?95456
SPIICE model	www.vishay.com/doc?96584



3L TO-220 FullPAK

DIMENSIONS in millimeters



Notes

- (1) All dimensions are in mm
- (2) Package body size exclude mold flash and burrs. Moldflash should be less than 6 mils



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