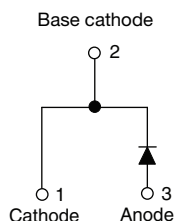


Hyperfast Rectifier, 30 A FRED Pt®



TO-220AC 2L



FEATURES

- Hyper fast and soft recovery
- Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current
- True 2 pin package
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

PRIMARY CHARACTERISTICS

$I_{F(AV)}$	30 A
V_R	650 V
V_F at I_F	1.4 V
t_{rr} typ.	33 ns
T_J max.	175 °C
Package	TO-220AC 2L
Circuit configuration	Single

DESCRIPTION / APPLICATIONS

Ultra low V_F , soft-switching hyper fast rectifiers optimized for discontinuous (critical) mode (DCM) power factor correction (PFC).

The minimized conduction loss, optimized stored charge and low recovery current minimized the switching losses and reduce over dissipation in the switching element and snubbers.

The device is also intended for use as a freewheeling diode in power supplies and other power switching applications.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Repetitive peak reverse voltage	V_{RRM}		650	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 120\text{ °C}$	30	A
Non-repetitive peak surge current	I_{FSM}	$T_J = 25\text{ °C}$	210	
Operating junction and storage temperatures	T_J, T_{Stg}		-55 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	$I_R = 100\text{ }\mu\text{A}$	650	-	-	V
Forward voltage	V_F	$I_F = 30\text{ A}$	-	1.8	2.1	
		$I_F = 30\text{ A}, T_J = 150\text{ °C}$	-	1.4	1.6	
Reverse leakage current	I_R	$V_R = V_R$ rated	-	0.02	30	μA
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	50	300	
Junction capacitance	C_T	$V_R = 650\text{ V}$	-	22	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8	-	nH

DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX. UNITS
Reverse recovery time	t_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 1\text{ A}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$	-	37	- ns
		$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 30\text{ A}$ $dI_F/dt = 1000\text{ A}/\mu\text{s}$ $V_R = 400\text{ V}$	-	33	-
		$T_J = 125\text{ }^{\circ}\text{C}$		-	88	-
Peak recovery current	I_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$		-	18	- A
		$T_J = 125\text{ }^{\circ}\text{C}$		-	30	-
Reverse recovery charge	Q_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$		-	450	- nC
		$T_J = 125\text{ }^{\circ}\text{C}$		-	1350	-

THERMAL - MECHANICAL SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		-55	-	175	$^{\circ}\text{C}$
Thermal resistance, junction to case	R_{thJC}		-	1.0	1.3	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	70	
Thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth, and greased	-	-	0.5	
Weight			-	2.0	-	g
			-	0.07	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-220AC 2L	ETH3007			

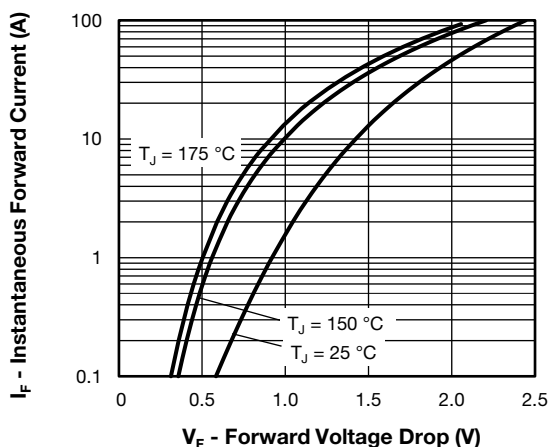


Fig. 1 - Typical Forward Voltage Drop Characteristics

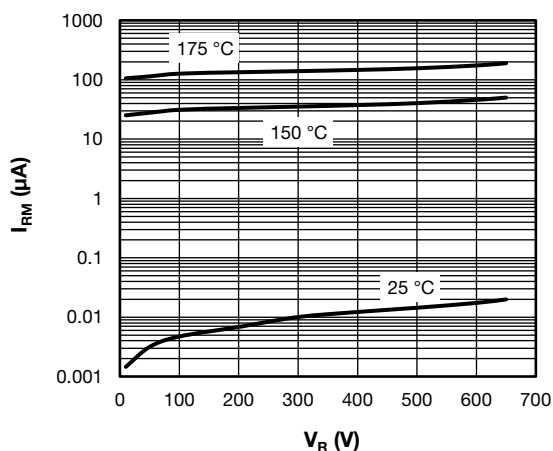


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

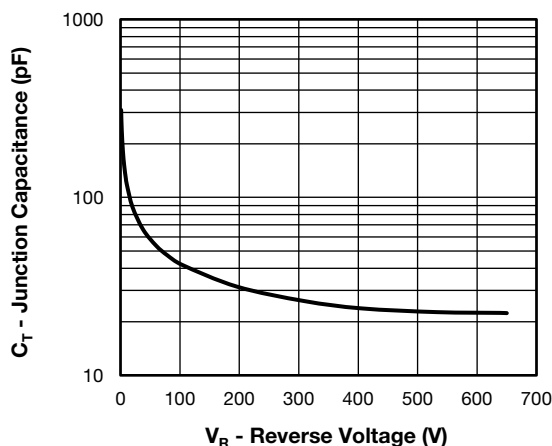


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

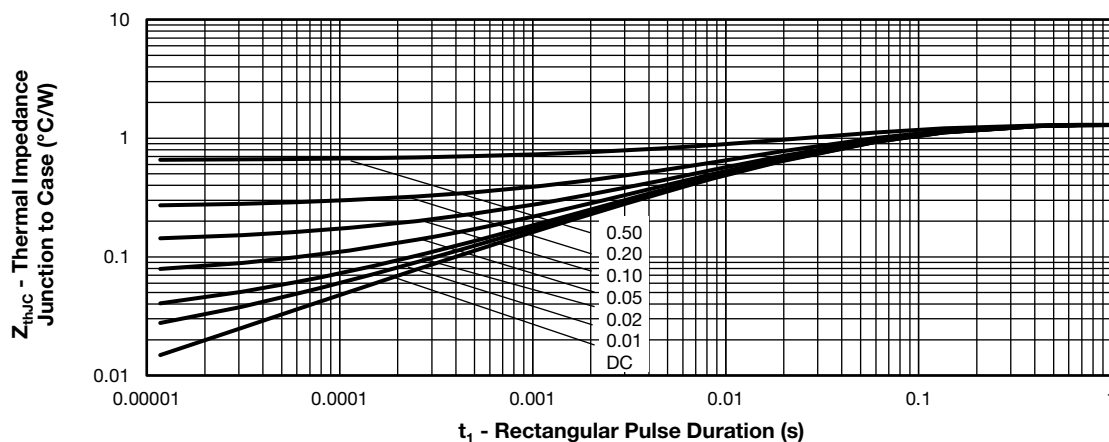
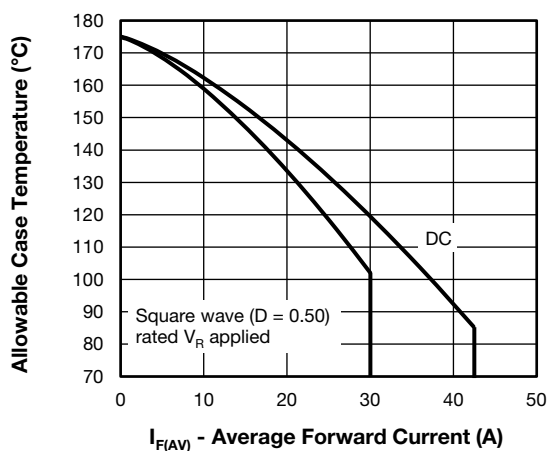

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics


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

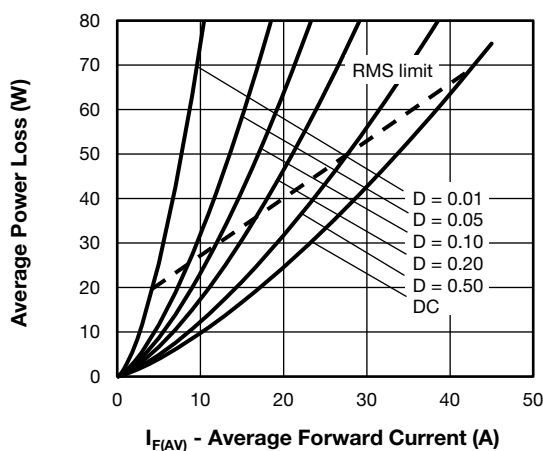


Fig. 6 - Forward Power Loss Characteristics

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
 P_d = forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 P_{dREV} = inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = rated V_R

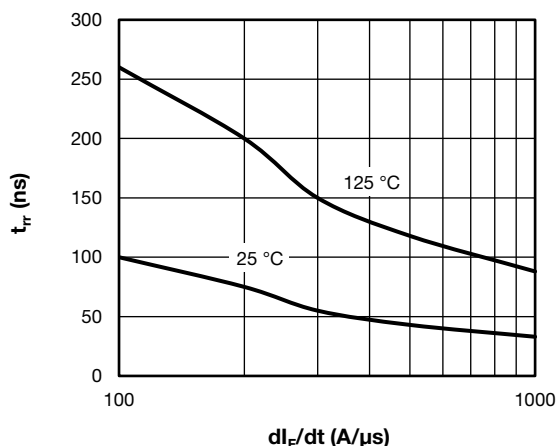
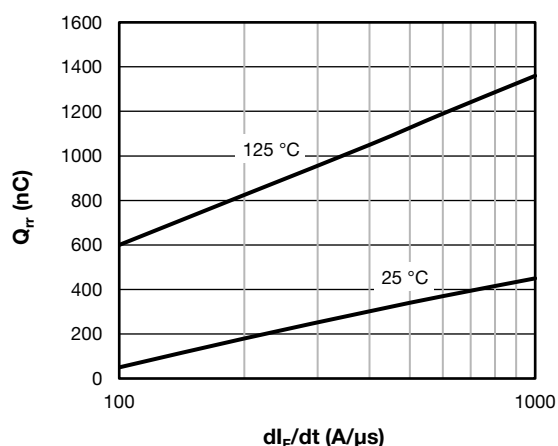
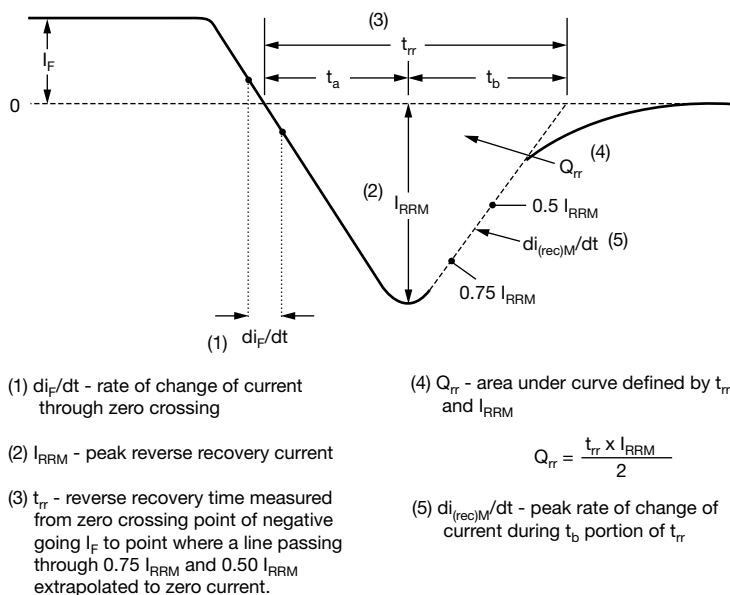

Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

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


Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

Device code	VS-	E	T	H	30	07	-M3
	1	2	3	4	5	6	7
1	-	Vishay Semiconductors product					
2	-	E = single diode					
3	-	Package:					
		T = TO-220AC					
4	-	H = hyper fast recovery					
5	-	Current rating (30 = 30 A)					
6	-	Voltage rating (07 = 650 V)					
7	-	Environmental digit:					
		-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free					

ORDERING INFORMATION (Example)

PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-ETH3007-M3	50	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?96156
Part marking information	www.vishay.com/doc?95391
SPICE model	www.vishay.com/doc?96531



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