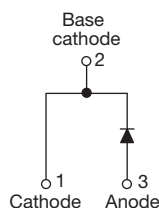


Hyperfast Rectifier, 15 A FRED Pt®



2L TO-220AC



FEATURES

- Hyperfast recovery time
- Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current
- 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

DESCRIPTION / APPLICATIONS

State of the art hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, hyperfast recovery time, and soft recovery.

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 PFC boost stage in the AC/DC section of SMPS, inverters or as freewheeling diodes.

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

$I_{F(AV)}$	15 A
V_R	600 V
V_F at I_F	1.3 V
t_{rr} typ.	22 ns
T_J max.	175 °C
Package	2L TO-220AC
Circuit configuration	Single

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		600	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 140\text{ °C}$	15	A
Non-repetitive peak surge current	I_{FSM}	$T_J = 25\text{ °C}$	120	
Peak repetitive forward current	I_{FM}		30	
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	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	V_F	$I_F = 15\text{ A}$	-	1.8	2.2	
		$I_F = 15\text{ A}, T_J = 150\text{ °C}$	-	1.3	1.6	
Reverse leakage current	I_R	$V_R = V_R$ rated	-	0.2	50	μA
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	30	500	
Junction capacitance	C_T	$V_R = 600\text{ V}$	-	20	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8.0	-	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}	$I_F = 1\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	22	30	ns
		$I_F = 15\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	28	35	
		$T_J = 25\text{ }^{\circ}\text{C}$	-	29	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	75	-	
Peak recovery current	I_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$	-	3.5	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	7	-	
Reverse recovery charge	Q_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	-	57	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	300	-	
Reverse recovery time	t_{rr}	$I_F = 15\text{ A}$ $di_F/dt = 800\text{ A}/\mu\text{s}$ $V_R = 390\text{ V}$	-	51	-	ns
Peak recovery current	I_{RRM}		-	20	-	A
Reverse recovery charge	Q_{rr}		-	580	-	nC

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	R_{thJC}		-	1.0	1.3	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction-to-ambient per leg	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 2L TO-220AC	15ETH06			

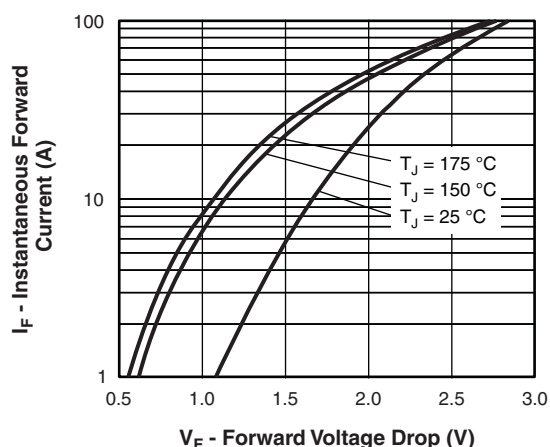


Fig. 1 - Typical Forward Voltage Drop Characteristics

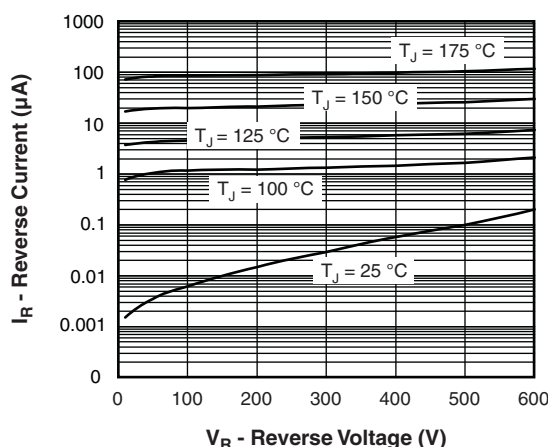


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

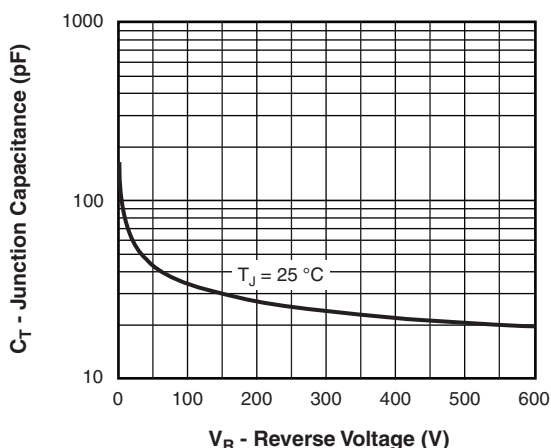


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

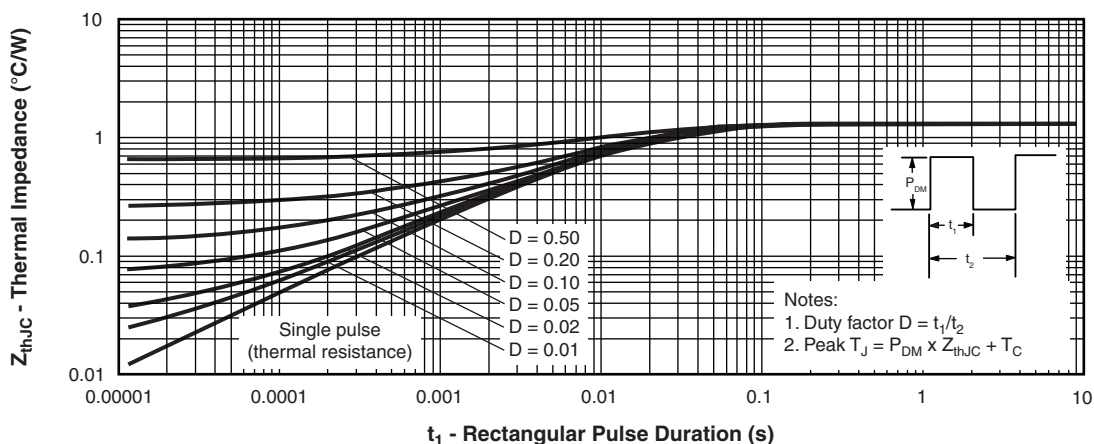


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

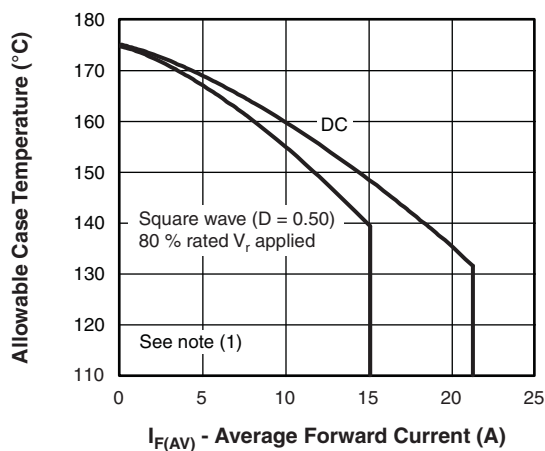


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

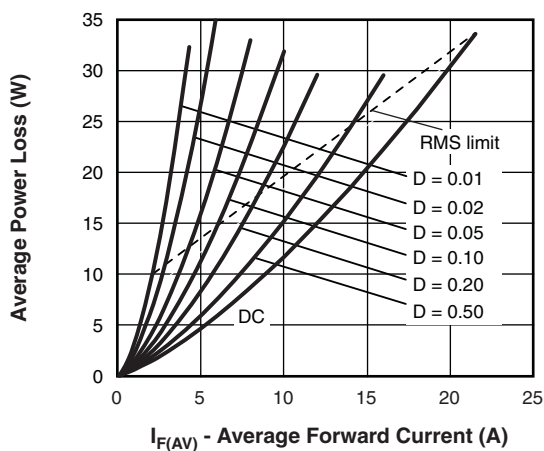


Fig. 6 - Forward Power Loss Characteristics

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

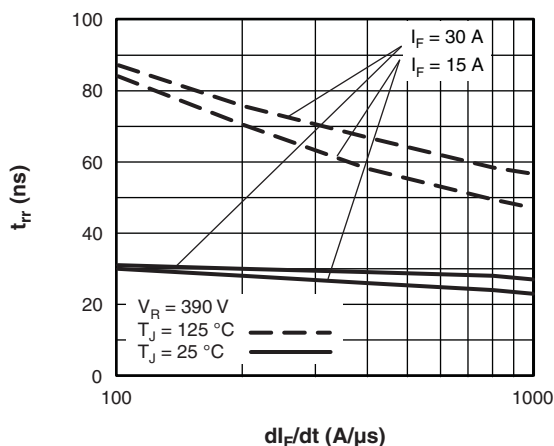


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

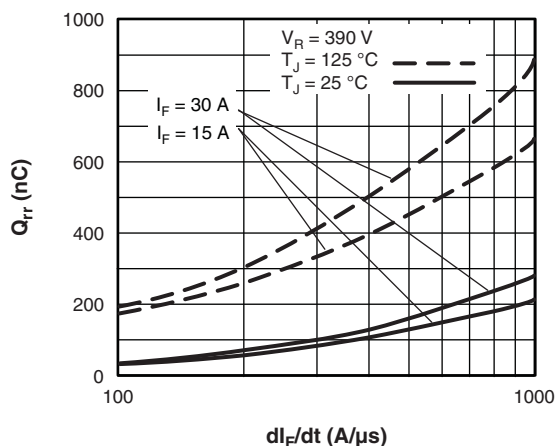


Fig. 8 - Typical Stored Charge vs. di_F/dt

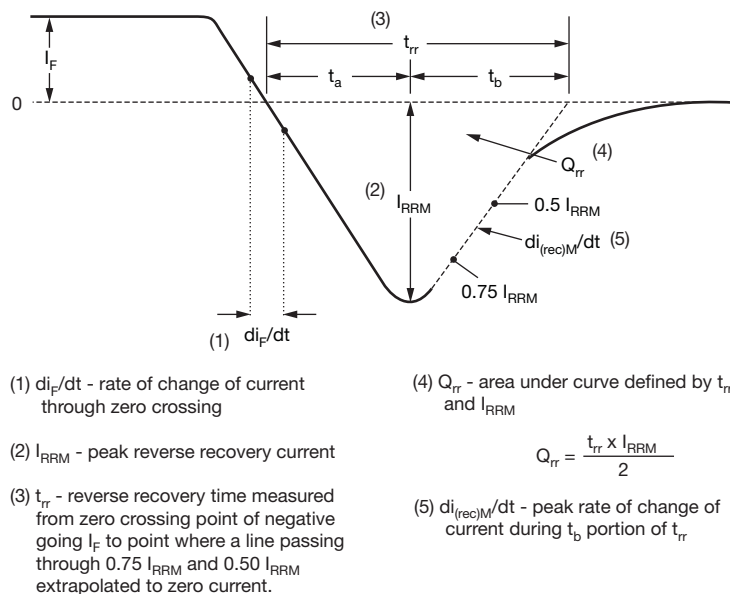


Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

Device code	VS-	15	E	T	H	06	-M3
	1	2	3	4	5	6	7

- | | | |
|---|---|--|
| 1 | - | Vishay Semiconductors product |
| 2 | - | Current rating (15 = 15 A) |
| 3 | - | E = single diode |
| 4 | - | T = TO-220, D ² PAK (TO-263AB) |
| 5 | - | H = hyperfast recovery |
| 6 | - | Voltage rating (06 = 600 V) |
| 7 | - | Environmental digit:
-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free |

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-15ETH06-M3	50	1000	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?96617



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