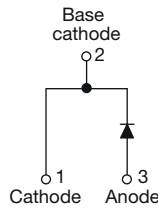
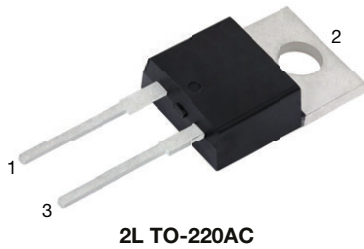


## Hyperfast Rectifier, 30 A FRED Pt®



### FEATURES

- Hyperfast soft recovery time
- 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](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	30 A
$V_R$	600 V
$V_F$ at $I_F$	1.4 V
$t_{rr}$ typ.	27 ns
$T_J$ max.	175 °C
Package	2L TO-220AC
Circuit configuration	Single

### DESCRIPTION / APPLICATIONS

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.

The 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	$V_{RRM}$		600	V
Average rectified forward current in DC	$I_{F(AV)}$	$T_C = 131\text{ °C}$	30	A
Non-repetitive peak surge current	$I_{FSM}$	$T_J = 25\text{ °C}$	180	
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	$V_F$	$I_F = 30\text{ A}$	-	2.0	2.65	
		$I_F = 30\text{ A}, T_J = 150\text{ °C}$	-	1.4	1.8	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	0.02	30	$\mu\text{A}$
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	50	300	
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	-	nH



DYNAMIC RECOVERY CHARACTERISTICS (T <sub>J</sub> = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 1 A, dI <sub>F</sub> /dt = 50 A/μs, V <sub>R</sub> = 30 V		-	26	35	ns
		T <sub>J</sub> = 25 °C	I <sub>F</sub> = 30 A, dI <sub>F</sub> /dt = 200 A/μs, V <sub>R</sub> = 200 V	-	26	-	
		T <sub>J</sub> = 125 °C		-	70	-	
Peak recovery current	I <sub>RRM</sub>	T <sub>J</sub> = 25 °C	I <sub>F</sub> = 30 A, dI <sub>F</sub> /dt = 200 A/μs, V <sub>R</sub> = 200 V	-	3.5	-	A
		T <sub>J</sub> = 125 °C		-	7.6	-	
Reverse recovery charge	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C	I <sub>F</sub> = 30 A, dI <sub>F</sub> /dt = 200 A/μs, V <sub>R</sub> = 200 V	-	50	-	nC
		T <sub>J</sub> = 125 °C		-	280	-	

THERMAL - MECHANICAL SPECIFICATIONS							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>			-65	-	175	°C
Thermal resistance, junction-to-case	R <sub>thJC</sub>			-	0.84	1.3	°C/W
Thermal resistance, junction-to-ambient	R <sub>thJA</sub>	Typical socket mount		-	-	70	
Typical thermal resistance, case-to-heatsink	R <sub>thCS</sub>	Mounting surface, flat, smooth and greased		-	0.5	-	
Weight				-	2	-	g
				-	0.07	-	oz.
Mounting torque				6 (5)	-	12 (10)	kgf · cm (lb · in)
Marking device		Case style 2L TO-220AC		ETH3006			

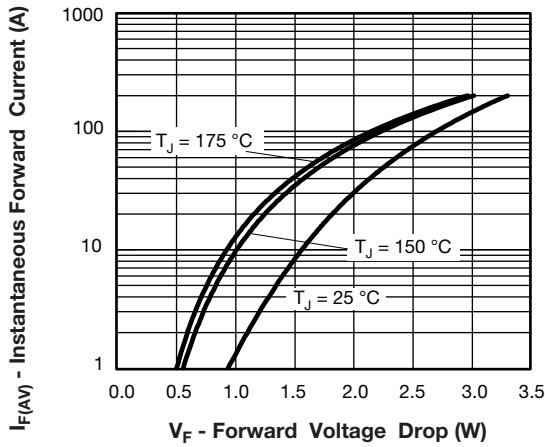


Fig. 1 - Typical Forward Voltage Drop Characteristics

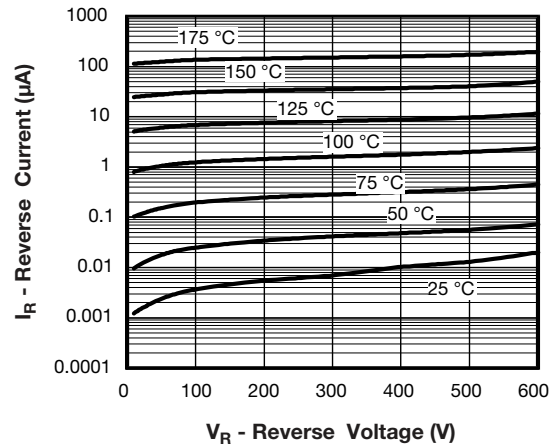


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

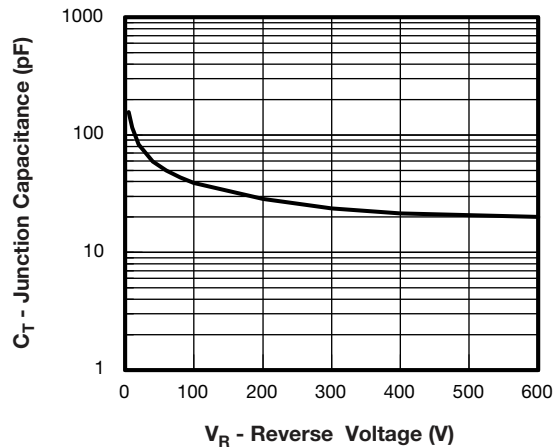


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

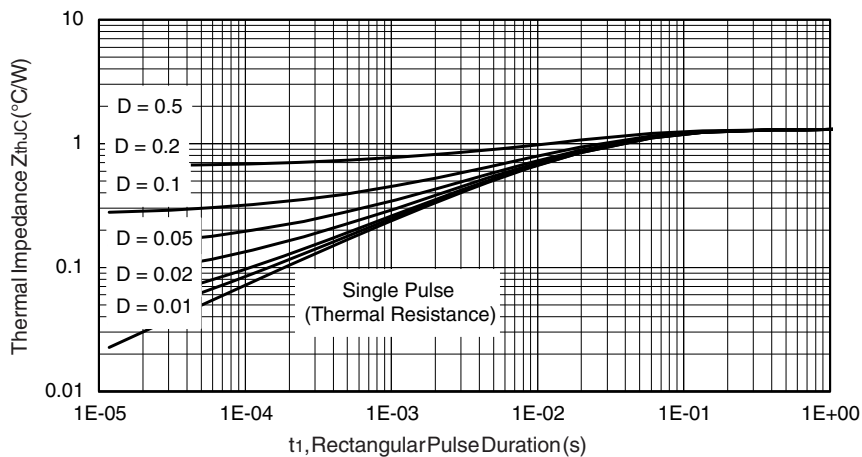


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

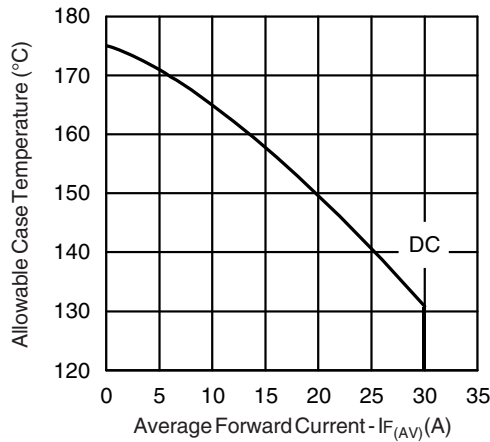


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

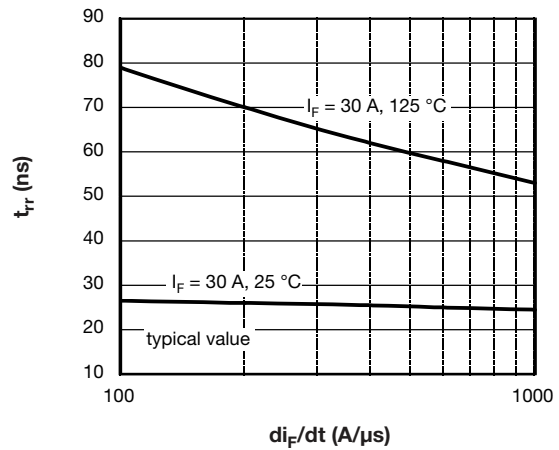


Fig. 7 - Typical Reverse Recovery vs.  $di_F/dt$

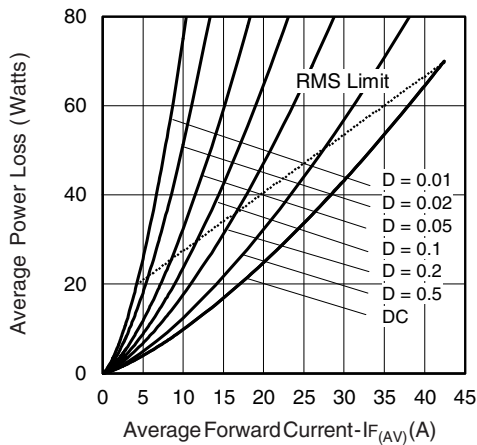


Fig. 6 - Forward Power Loss Characteristics

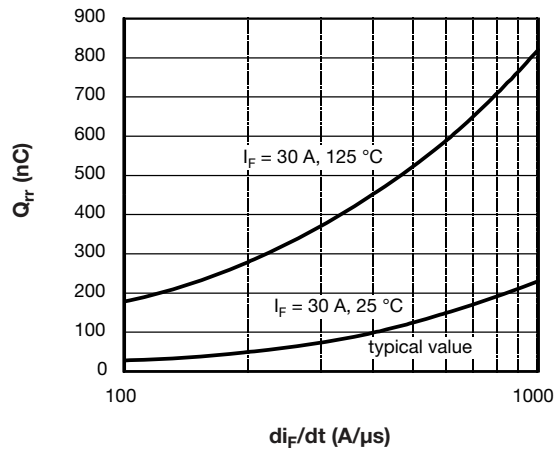
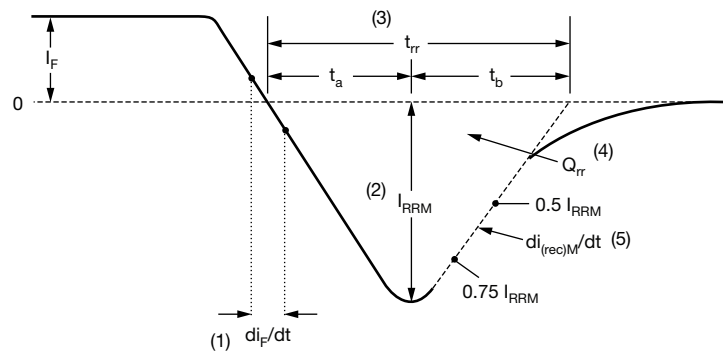


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$



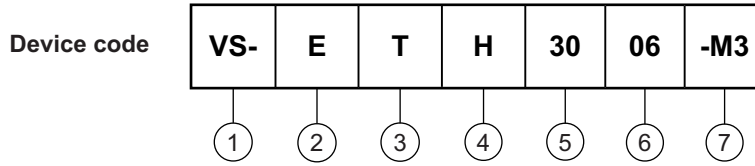
- (1)  $di_F/dt$  - rate of change of current through zero crossing
- (2)  $I_{RRM}$  - peak reverse recovery current
- (3)  $t_{rr}$  - reverse recovery time measured from zero crossing point of negative going  $I_F$  to point where a line passing through  $0.75 I_{RRM}$  and  $0.50 I_{RRM}$  extrapolated 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** - Circuit configuration:  
E = single
- 3** - T = 2L TO-220AC
- 4** - H = hyperfast recovery time
- 5** - Current code: 30 = 30 A
- 6** - Voltage code: 06 = 600 V
- 7** - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

<b>ORDERING INFORMATION</b> (Example)			
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-ETH3006-M3	50	1000	Antistatic plastic tube

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?96156">www.vishay.com/doc?96156</a>
Part marking information	<a href="http://www.vishay.com/doc?95391">www.vishay.com/doc?95391</a>



# 2L TO-220AC

**DIMENSIONS** in millimeters and inches



Conforms to JEDEC® outline TO-220AC

SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183		D2	11.68	13.30	0.460	0.524	6, 7
A1	1.14	1.40	0.045	0.055		E	10.11	10.51	0.398	0.414	3, 6
A2	2.50	2.92	0.098	0.115		E1	6.86	8.89	0.270	0.350	6
b	0.69	1.01	0.027	0.040		e	2.41	2.67	0.095	0.105	
b1	0.38	0.97	0.015	0.038	4	e1	4.88	5.28	0.192	0.208	
b2	1.20	1.73	0.047	0.068		H1	6.09	6.48	0.240	0.255	6
b3	1.14	1.73	0.045	0.068	4	L	13.52	14.02	0.532	0.552	
c	0.36	0.61	0.014	0.024		L1	3.32	3.82	0.131	0.150	2
c1	0.36	0.56	0.014	0.022	4	∅ P	3.54	3.91	0.139	0.154	
D	14.85	15.35	0.585	0.604	3	Q	2.60	3.00	0.102	0.118	
D1	8.38	9.02	0.330	0.355							

**Notes**

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1, and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
- (4) Dimension b1, b3, and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2, and E1
- (7) Outline conforms to JEDEC® TO-220, except D2



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