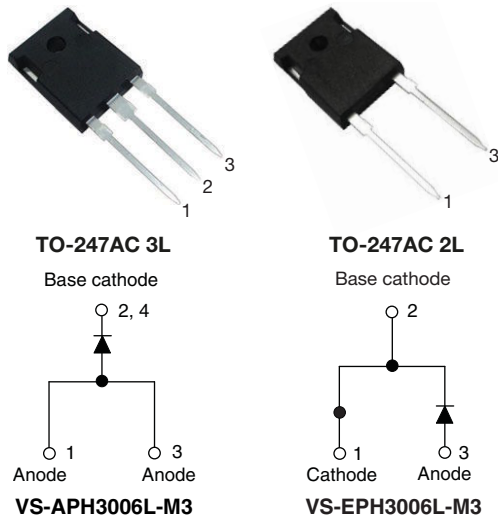


## Hyperfast Rectifier, 30 A FRED Pt®



### FEATURES

- Low forward voltage drop
- Hyperfast soft recovery time
- 175 °C operating junction temperature
- Designed and qualified according to commercial qualification
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

### 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.

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	TO-247AC 3L, TO-247AC 2L
Circuit configuration	Single

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Repetitive peak reverse voltage	$V_{RRM}$		600	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 112$ °C	30	A
Non-repetitive peak surge current	$I_{FSM}$	$T_C = 25$ °C	220	
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	600	-	-	V
		$I_F = 30$ A	-	2.0	2.65	
Forward voltage	$V_F$	$I_F = 30$ A, $T_J = 150$ °C	-	1.4	1.8	V
		$V_R = V_R$ rated	-	0.02	30	
Reverse leakage current	$I_R$	$T_J = 150$ °C, $V_R = V_R$ rated	-	-	300	$\mu$ A
			-	-	-	
Junction capacitance	$C_T$	$V_R = 600$ V	-	20	-	pF
Series inductance	$L_S$	Measured lead to lead 5 mm from package body	-	8.0	-	nH



<b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 1\text{ A}$ , $di_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	26	-	ns
		$T_J = 25\text{ }^\circ\text{C}$	-	26	-	
		$T_J = 125\text{ }^\circ\text{C}$	-	70	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$	-	3.5	-	A
		$T_J = 125\text{ }^\circ\text{C}$	-	7.6	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	-	50	-	nC
		$T_J = 125\text{ }^\circ\text{C}$	-	280	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
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	$R_{thJC}$		-	0.7	1.1	$^\circ\text{C}/\text{W}$
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			-	5.5	-	g
			-	0.2	-	oz.
Mounting torque			1.2 (10)	-	2.4 (20)	kgf · cm (lbf · in)
Marking device		Case style TO-247AC 3L	APH3006L			
		Case style TO-247AC 2L	EPH3006L			

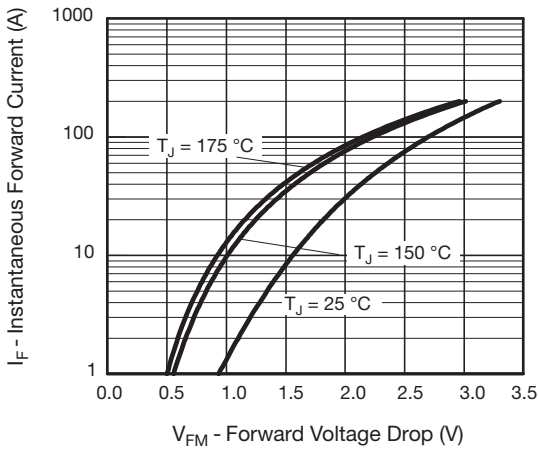


Fig. 1 - Typical Forward Voltage Drop Characteristics

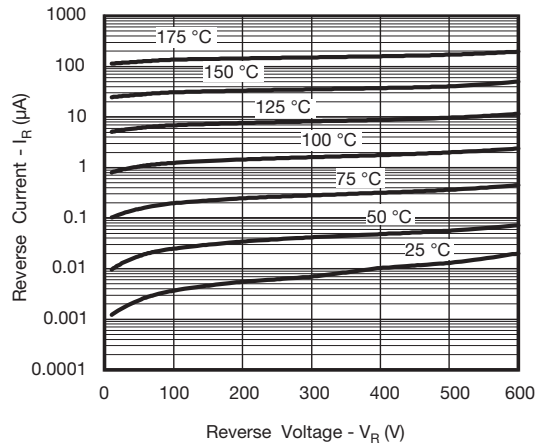


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

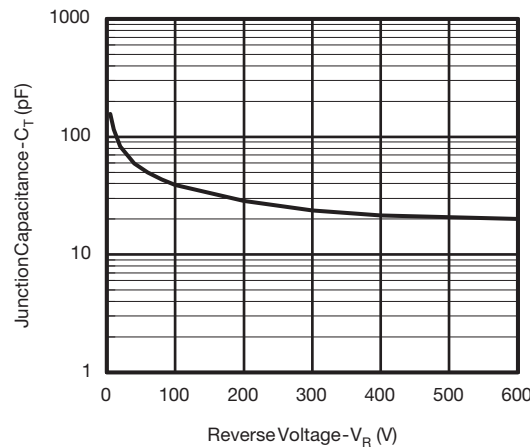


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

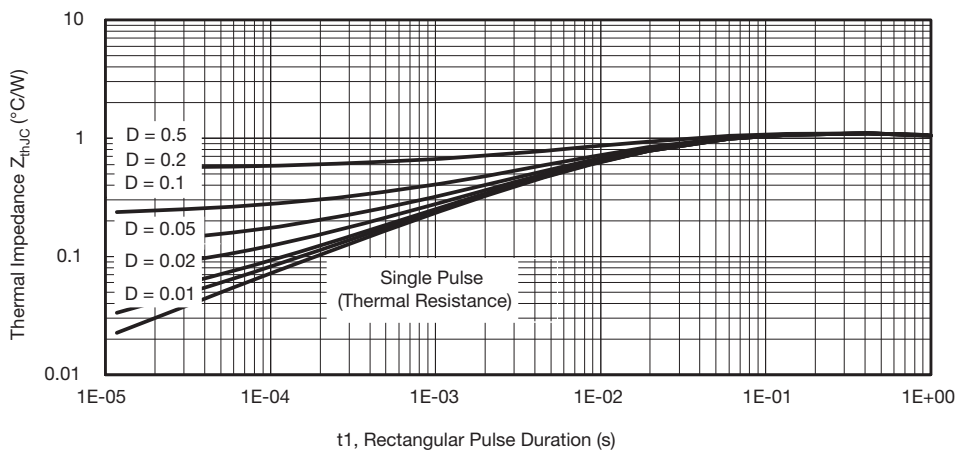


Fig. 4 - Max. Thermal Impedance  $Z_{thjC}$  Characteristics

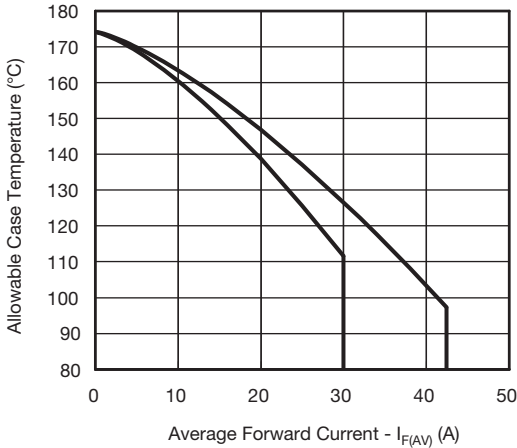


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

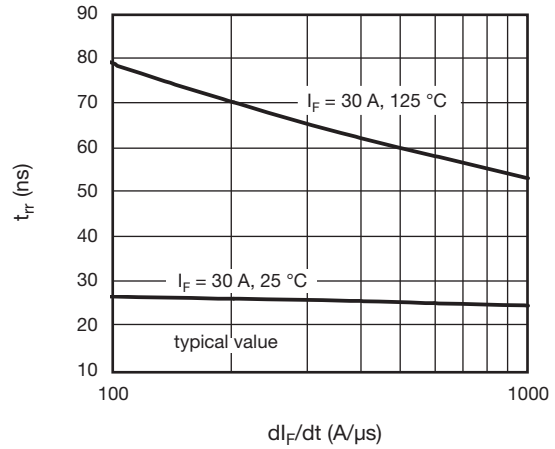


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

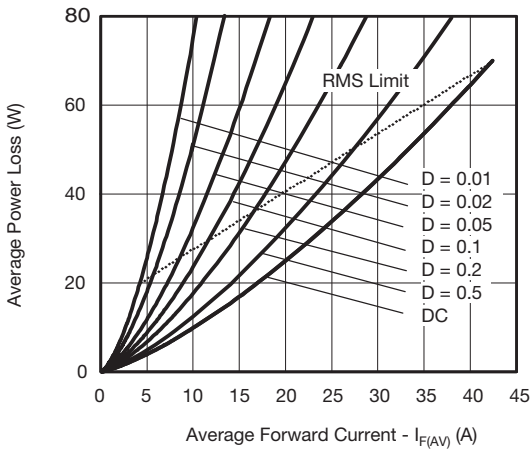


Fig. 6 - Forward Power Loss Characteristics

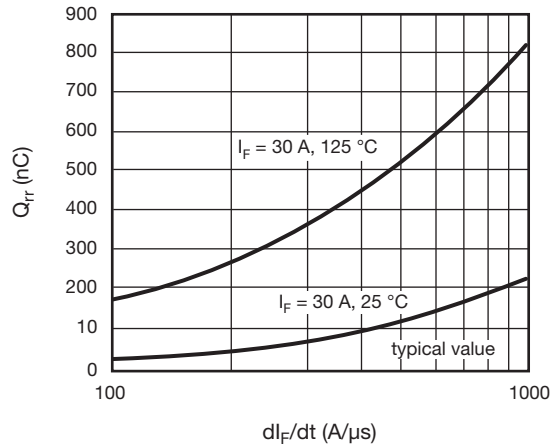
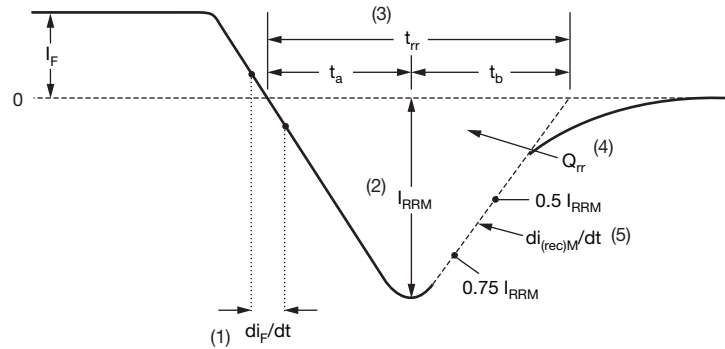


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$



- (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

Device code	<b>VS-</b>	<b>E</b>	<b>P</b>	<b>H</b>	<b>30</b>	<b>06</b>	<b>L</b>	<b>-M3</b>
	①	②	③	④	⑤	⑥	⑦	⑧
	<b>1</b>	-	Vishay Semiconductors product					
	<b>2</b>	-	• A = single diode • E = single diode					
	<b>3</b>	-	P = TO-247					
	<b>4</b>	-	H = hyperfast recovery time					
	<b>5</b>	-	Current code (30 = 30 A)					
	<b>6</b>	-	Voltage code (06 = 600 V)					
	<b>7</b>	-	L = long lead					
	<b>8</b>	-	Environmental digit: -M3 = halogen-free, RoHS-compliant and termination lead (Pb)-free					

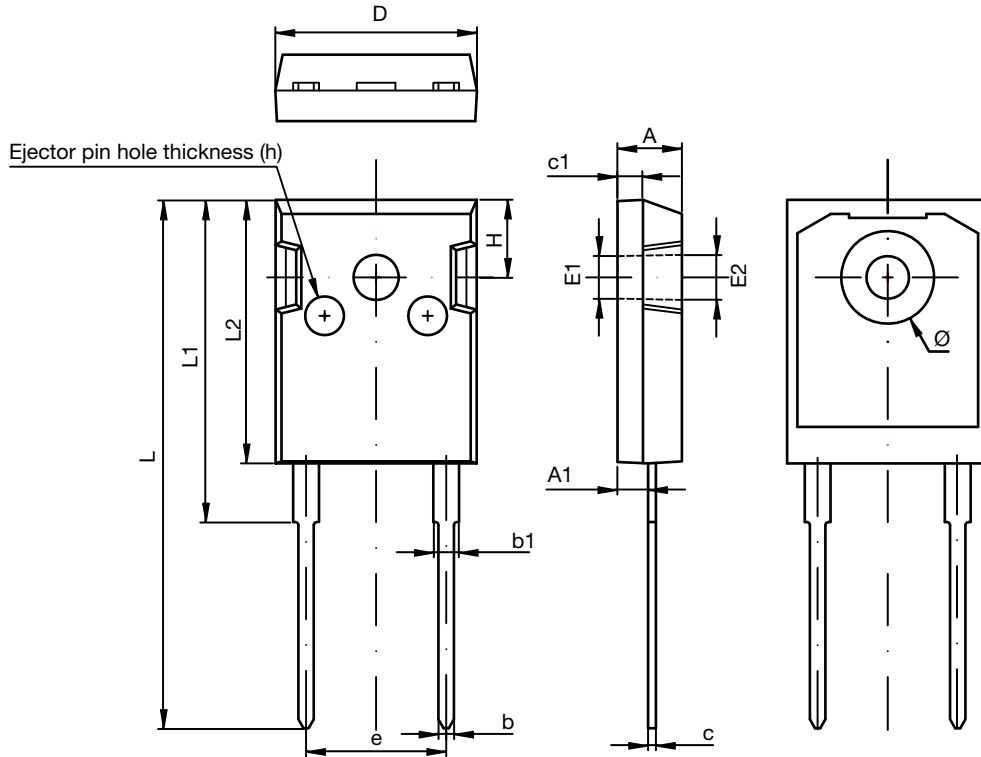
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-APH3006L-M3	30	300	Antistatic plastic tube
VS-EPH3006L-M3	30	300	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-247AC 3L	<a href="http://www.vishay.com/doc?95599">www.vishay.com/doc?95599</a>
	TO-247AC 2L	<a href="http://www.vishay.com/doc?95598">www.vishay.com/doc?95598</a>
Part marking information	TO-247AC 3L	<a href="http://www.vishay.com/doc?95593">www.vishay.com/doc?95593</a>
	TO-247AC 2L	<a href="http://www.vishay.com/doc?95592">www.vishay.com/doc?95592</a>
SPIICE model		<a href="http://www.vishay.com/doc?96580">www.vishay.com/doc?96580</a>



## TO-247AD 2L

**DIMENSIONS** in millimeters

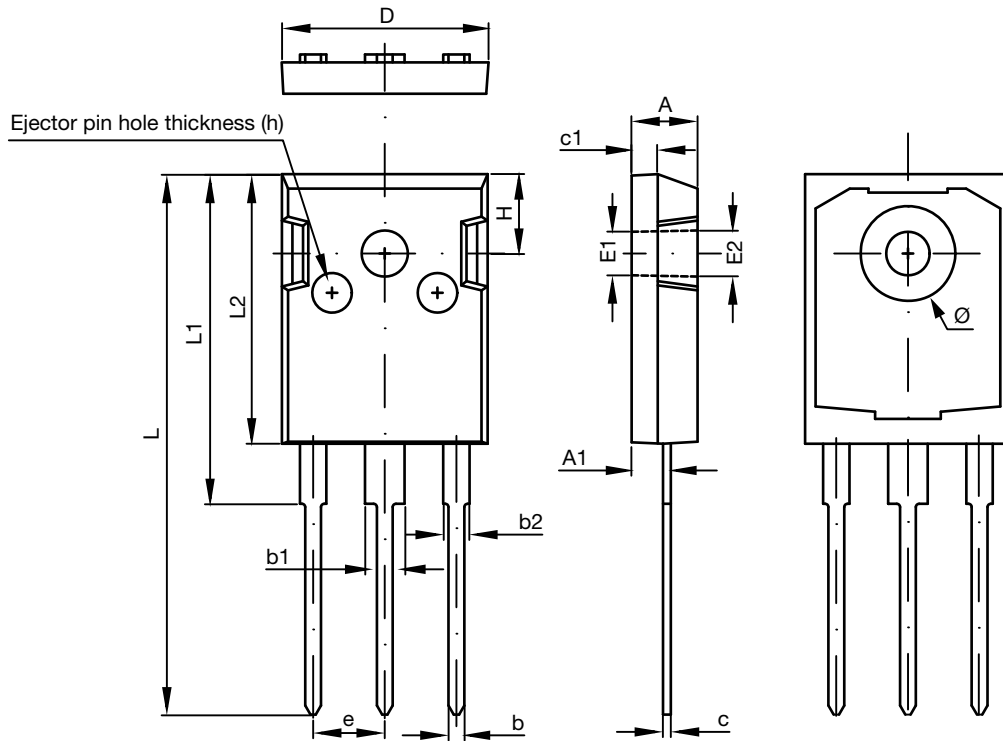


SYMBOL	DIMENSIONS IN MILLIMETERS		DIMENSIONS IN INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 Ref.		0.138 Ref.	
E2	3.600 Ref.		0.142 Ref.	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
$\emptyset$	7.100	7.300	0.280	0.287
e	10.900 Typ.		0.429 Typ.	
H	5.980 Typ.		0.235 Typ.	
h	0.000	0.300	0.000	0.012



TO-247AD 3L

**DIMENSIONS** in millimeters



SYMBOL	DIMENSIONS IN MILLIMETERS		DIMENSIONS IN INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
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h	0.000	0.300	0.000	0.012



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