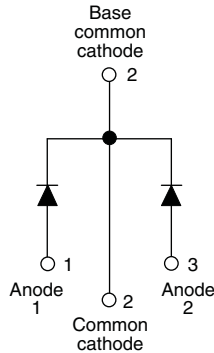


## Ultrafast Rectifier, 2 x 15 A FRED Pt®


**TO-247AC**


### FEATURES

- Ultrafast recovery time
- Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current
- Designed and qualified according to JEDEC-JESD47
- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### DESCRIPTION/APPLICATIONS

300 V series are the state of the art ultrafast recovery rectifiers designed with optimized performance of forward voltage drop and ultrafast 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.

PRODUCT SUMMARY	
Package	TO-247AC
$I_{F(AV)}$	2 x 15 A
$V_R$	300 V
$V_F$ at $I_F$	1.25 V
$t_{rr}$ typ.	See Recovery table
$T_J$ max.	175 °C
Diode variation	Common cathode

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Repetitive peak reverse voltage	$V_{RRM}$		300	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 142\text{ °C}$	15	A
per leg			30	
Non-repetitive peak surge current per leg	$I_{FSM}$	$T_J = 25\text{ °C}$	140	
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	$V_{BR}, V_R$	$I_R = 100\text{ }\mu\text{A}$	300	-	-	V
Forward voltage	$V_F$	$I_F = 15\text{ A}$	-	1.05	1.25	
		$I_F = 15\text{ A}, T_J = 125\text{ °C}$	-	0.85	1.00	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	0.05	40	$\mu\text{A}$
		$T_J = 125\text{ °C}, V_R = V_R$ rated	-	12	400	
Junction capacitance	$C_T$	$V_R = 300\text{ V}$	-	45	-	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> = 1.0 A, dI <sub>F</sub> /dt = 50 A/μs, V <sub>R</sub> = 30 V	-	-	40	ns	
		T <sub>J</sub> = 25 °C	-	32	-		
		T <sub>J</sub> = 125 °C	-	45	-		
Peak recovery current	I <sub>RRM</sub>	I <sub>F</sub> = 15 A dI <sub>F</sub> /dt = - 200 A/μs V <sub>R</sub> = 200 V	T <sub>J</sub> = 25 °C	-	2.4	-	A
			T <sub>J</sub> = 125 °C	-	6.1	-	
Reverse recovery charge	Q <sub>rr</sub>	I <sub>F</sub> = 15 A dI <sub>F</sub> /dt = - 200 A/μs V <sub>R</sub> = 200 V	T <sub>J</sub> = 25 °C	-	38	-	nC
			T <sub>J</sub> = 125 °C	-	137	-	

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 per leg	R <sub>thJC</sub>		-	0.9	2.0	°C/W
Thermal resistance, junction to ambient per leg	R <sub>thJA</sub>	Typical socket mount	-	-	40	
Thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, flat, smooth and greased	-	0.4	-	
Weight			-	6.0	-	g
			-	0.21	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-247AC	30CPH03			

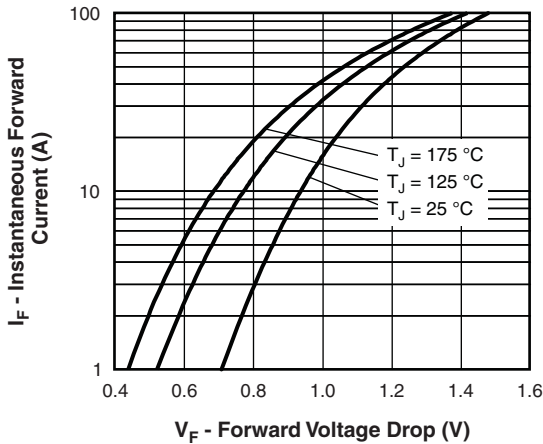


Fig. 1 - Typical Forward Voltage Drop Characteristics

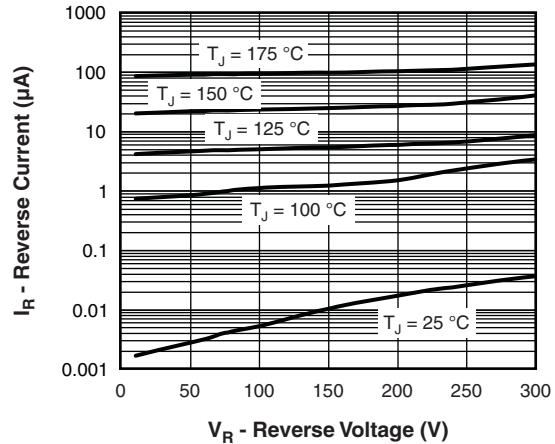


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

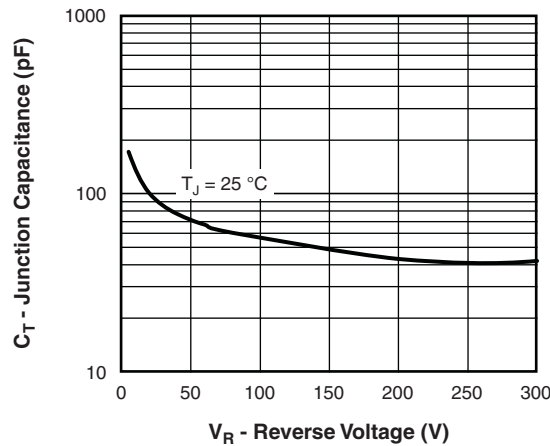


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

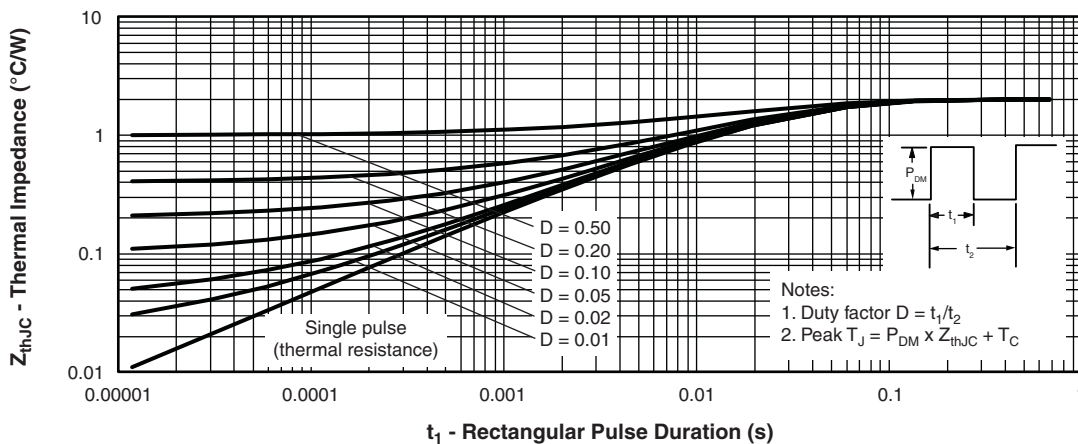


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

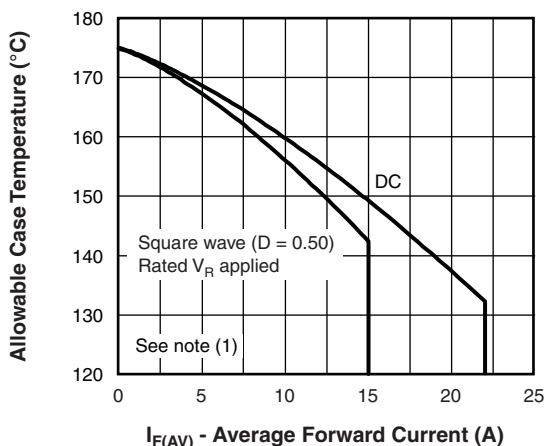


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

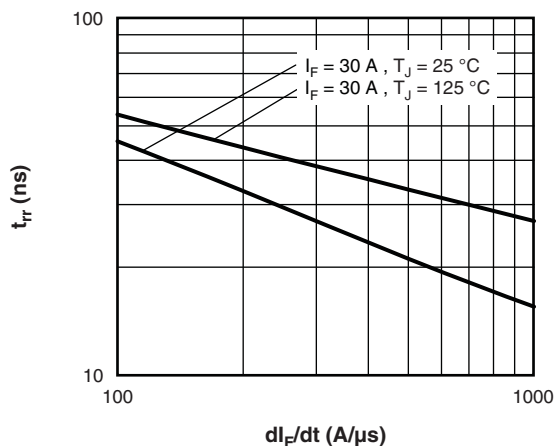


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

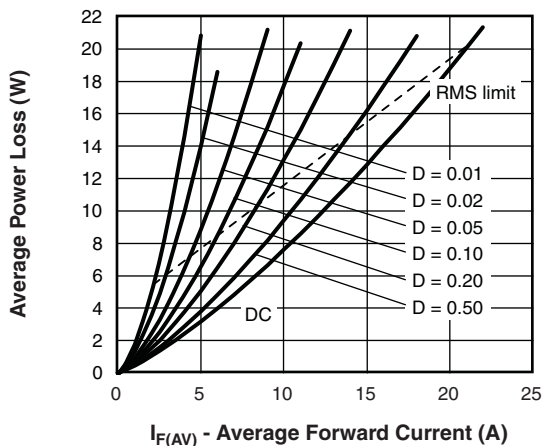


Fig. 6 - Forward Power Loss Characteristics

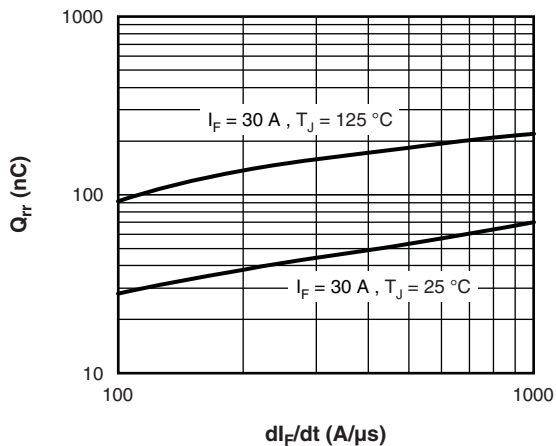


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$

**Note**

- (1) Formula used:  $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$ ;
- $Pd$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);
- $Pd_{REV}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1}$  = Rated  $V_R$

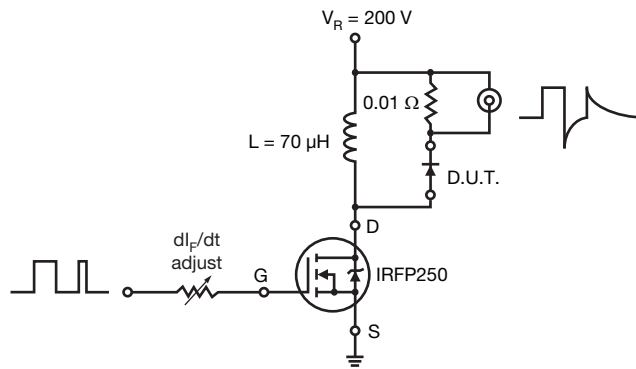
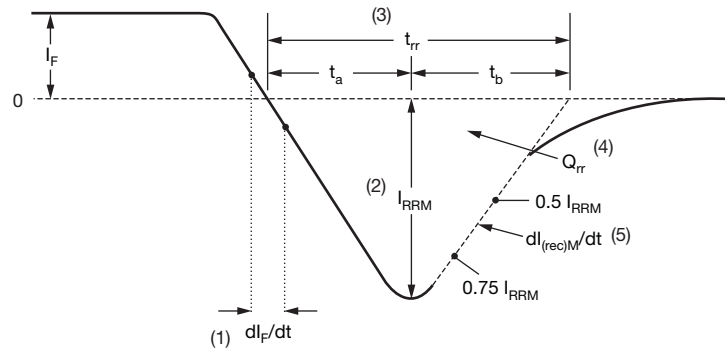


Fig. 9 - Reverse Recovery Parameter Test Circuit



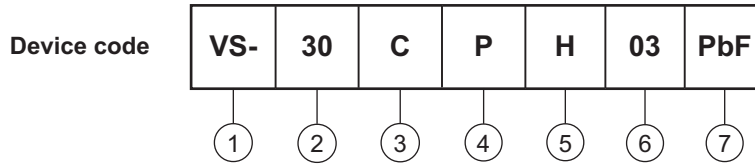
- (1)  $di_F/dt$  - rate of change of current through zero crossing
- (2)  $I_{RRM}$  - peak reverse recovery current
- (3)  $t_{rr}$  - reverse recovery time measured from zero crossing point of negative going  $I_F$  to point where a line passing through  $0.75 I_{RRM}$  and  $0.50 I_{RRM}$  extrapolated 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. 10 - Reverse Recovery Waveform and Definitions



## ORDERING INFORMATION TABLE



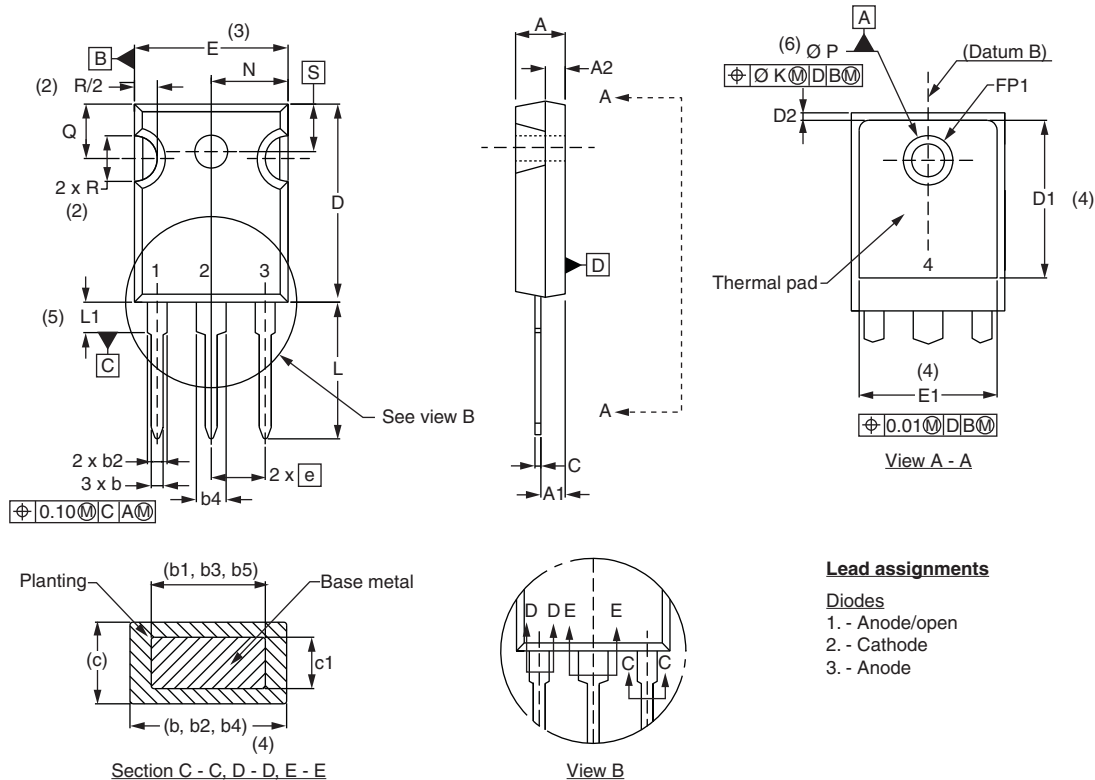
- 1** - Vishay Semiconductors product
- 2** - Current rating (30 = 30 A)
- 3** - Circuit configuration: C = Common cathode
- 4** - Package:  
P = TO-247
- 5** - H = Hyperfast recovery
- 6** - Voltage rating (03 = 300 V)
- 7** - Environmental digit:  
PbF = Lead (Pb)-free and RoHS compliant  
-N3 = Halogen-free, RoHS compliant and totally lead (Pb)-free

<b>ORDERING INFORMATION</b> (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-30CPH03PbF	25	500	Antistatic plastic tube
VS-30CPH03-N3	25	500	Antistatic plastic tube

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?95223">www.vishay.com/doc?95223</a>
Part marking information	TO-247ACPbF <a href="http://www.vishay.com/doc?95226">www.vishay.com/doc?95226</a>
	TO-247AC-N3 <a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a>



**DIMENSIONS** in millimeters and inches



**Lead assignments**

- Diodes**  
 1. - Anode/open  
 2. - Cathode  
 3. - Anode

SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209		D2	0.51	1.30	0.020	0.051	
A1	2.21	2.59	0.087	0.102		E	15.29	15.87	0.602	0.625	3
A2	1.50	2.49	0.059	0.098		E1	13.72	-	0.540	-	
b	0.99	1.40	0.039	0.055		e	5.46 BSC		0.215 BSC		
b1	0.99	1.35	0.039	0.053		FK	2.54		0.010		
b2	1.65	2.39	0.065	0.094		L	14.20	16.10	0.559	0.634	
b3	1.65	2.37	0.065	0.094		L1	3.71	4.29	0.146	0.169	
b4	2.59	3.43	0.102	0.135		N	7.62 BSC		0.3		
b5	2.59	3.38	0.102	0.133		ΦP	3.56	3.66	0.14	0.144	
c	0.38	0.86	0.015	0.034		ΦP1	-	6.98	-	0.275	
c1	0.38	0.76	0.015	0.030		Q	5.31	5.69	0.209	0.224	
D	19.71	20.70	0.776	0.815	3	R	4.52	5.49	1.78	0.216	
D1	13.08	-	0.515	-	4	S	5.51 BSC		0.217 BSC		

**Notes**

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) Dimension D 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) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC outline TO-247 with exception of dimension c



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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**





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