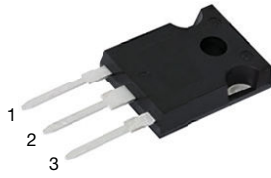
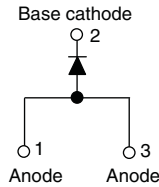
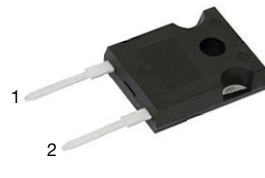
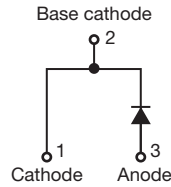


## Ultrafast Rectifier, 30 A FRED Pt<sup>®</sup>


**TO-247AC 3L**

**VS-APU3006-N3**

**TO-247AC 2L**

**VS-EPU3006-N3**

### FEATURES

- Low forward voltage drop
- Ultrafast recovery time
- 175 °C operating junction temperature
- Designed and qualified according to JEDEC<sup>®</sup>-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**  
Available

### DESCRIPTION

Ultralow  $V_F$ , soft-switching ultrafast 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.

### APPLICATIONS

AC/DC SMPS 70 W to 400 W

e.g. laptop and printer AC adaptors, desktop PC, TV and monitor, games units, and DVD AC/DC power supplies.

### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	30 A
$V_R$	600 V
$V_F$ at $I_F$	1.15 V
$t_{rr}$ typ.	30 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	$I_{F(AV)}$	$T_C = 127\text{ °C}$	30	A
Non-repetitive peak surge current	$I_{FSM}$	$T_C = 25\text{ °C}, t_p = 10\text{ ms}$	220	
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	$V_F$	$I_F = 30\text{ A}$	-	1.4	2	V
		$I_F = 30\text{ A}, T_J = 150\text{ °C}$	-	1.15	1.35	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	-	30	$\mu\text{A}$
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	-	250	
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 <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	-	30	45	ns
		T <sub>J</sub> = 25 °C	-	45	-	
		T <sub>J</sub> = 125 °C	-	100	-	
Peak recovery current	I <sub>RRM</sub>	T <sub>J</sub> = 25 °C	-	5.6	-	A
		T <sub>J</sub> = 125 °C	-	10	-	
Reverse recovery charge	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C	-	127	-	nC
		T <sub>J</sub> = 125 °C	-	580	-	

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>		-	0.7	1.1	°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	-	0.5	-	
Weight			-	2.0	-	g
			-	0.07	-	oz.
Mounting torque			1.2 (10)	-	2.4 (20)	kgf · cm (lbf · in)
Marking device		Case style TO-247AC 3L	APU3006			
		Case style TO-247AC 2L	EPU3006			

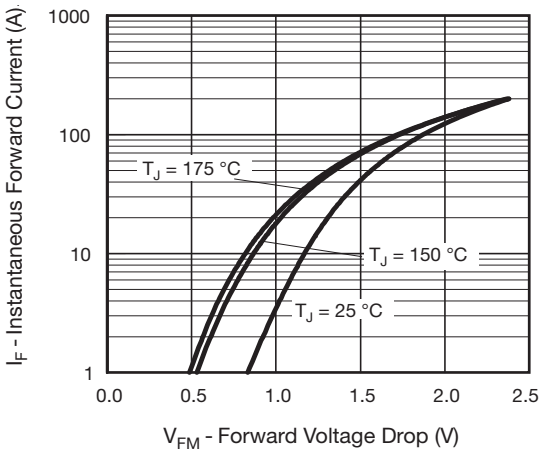


Fig. 1 - Typical Forward Voltage Drop Characteristics

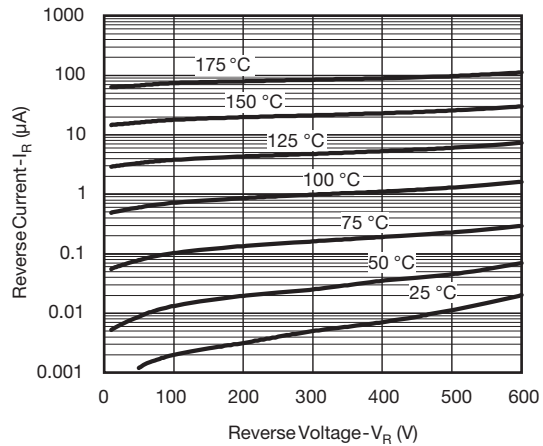


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

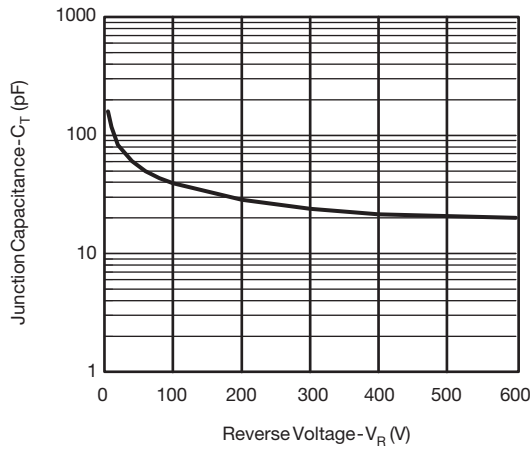


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

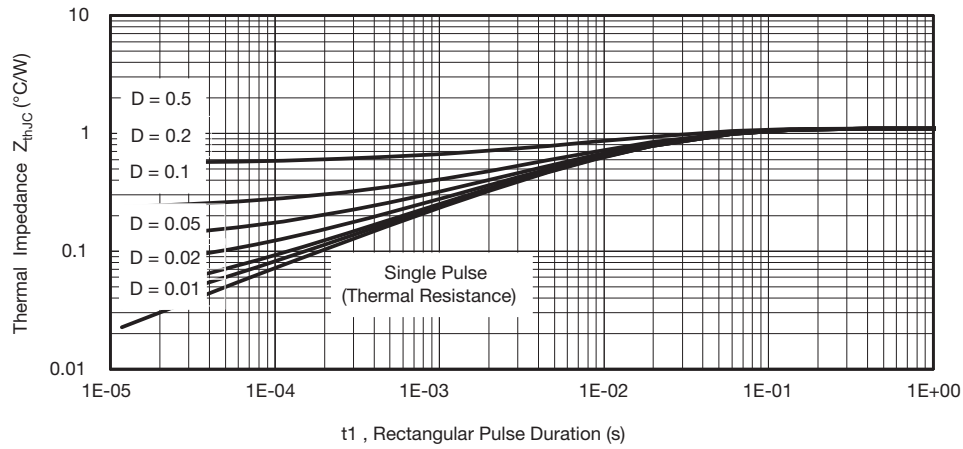


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics

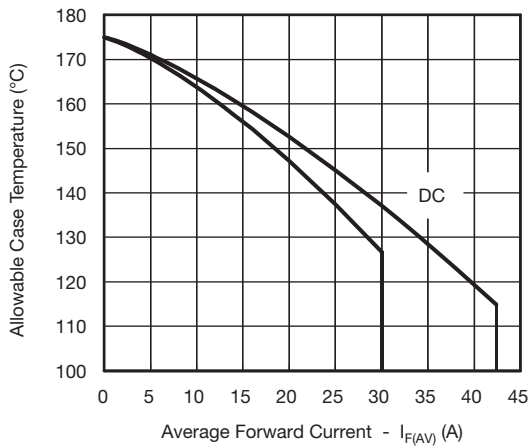


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

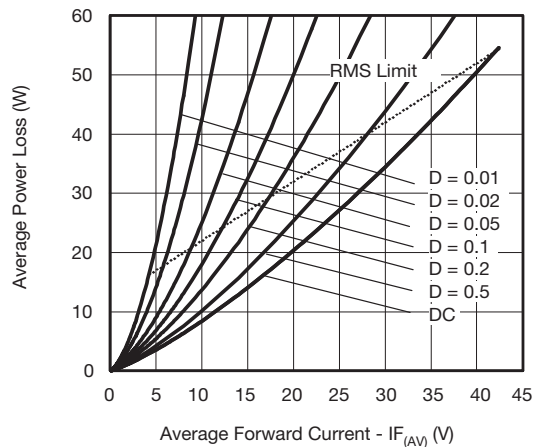


Fig. 6 - Forward Power Loss Characteristics

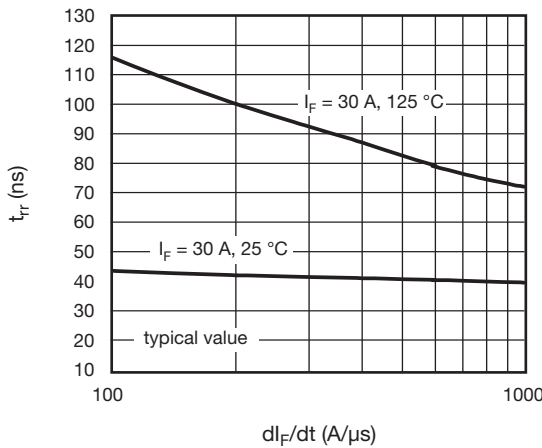


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

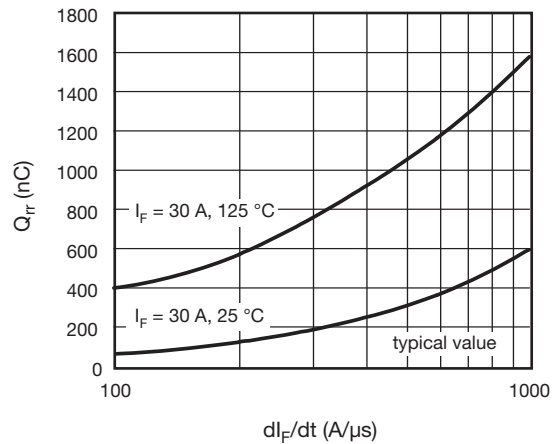
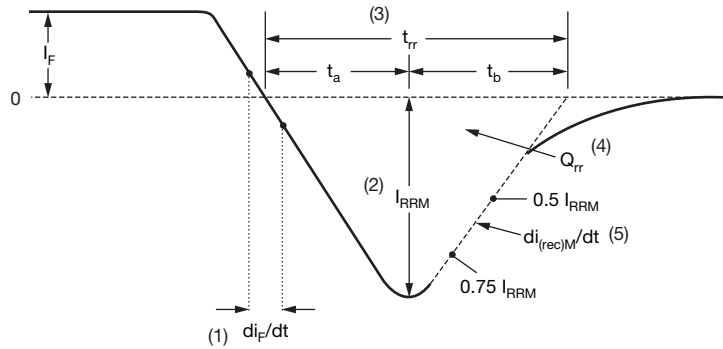


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$



- (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

VS-	E	P	U	30	06	-N3
①	②	③	④	⑤	⑥	⑦

- 1** - Vishay Semiconductors product
- 2** - Circuit configuration
  - E = single diode, 2 pins
  - A = single diode, 3 pins
- 3** - P = TO-247AC
- 4** - U = ultrafast recovery time
- 5** - Current code (30 = 30 A)
- 6** - Voltage code (06 = 600 V)
- 7** - Environmental digit:
  - N3 = halogen-free, RoHS-compliant and totally lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-APU3006-N3	25	500	Antistatic plastic tube
VS-EPU3006-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	TO-247AC 3L <a href="http://www.vishay.com/doc?96138">www.vishay.com/doc?96138</a>
	TO-247AC 2L <a href="http://www.vishay.com/doc?96144">www.vishay.com/doc?96144</a>
Part marking information	TO-247AC 3L <a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a>
	TO-247AC 2L <a href="http://www.vishay.com/doc?95442">www.vishay.com/doc?95442</a>







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