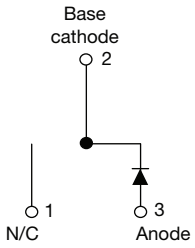
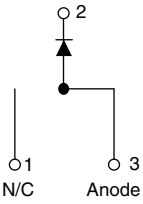
Ultrafast Rectifier, 30 A FRED Pt®

VS-ETU3006SHM3

VS-ETU3006-1HM3



D²PAK



TO-262

FEATURES

- Low forward voltage drop
- Ultrafast recovery time
- 175 °C operating junction temperature
- Low leakage current
- AEC-Q101 qualified, meets JESD 201 class 1A whisker test
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb

e3

RoHS COMPLIANT

HALOGEN FREE

DESCRIPTION/APPLICATIONS

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.

PRODUCT SUMMARY	
Package	TO-263AB (D²PAK), TO-262AA
$I_{F(AV)}$	30 A
V_R	600 V
V_F at I_F	2 V
t_{rr} (typ.)	30 ns
T_J max.	175 °C
Diode variation	Single die

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 = 113 °C	30	A
Non-repetitive peak surge current	I_{FSM}	T_C = 25 °C	200	
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 µA	600	-	-	V
Forward voltage	V_F	I_F = 30 A	-	1.4	2.0	
		I_F = 30 A, T_J = 150 °C	-	1.15	1.35	
Reverse leakage current	I_R	V_R = V_R rated	-	0.02	30	µA
		T_J = 150 °C, V_R = V_R rated	-	30	250	
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

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time	t_{rr}	I_F = 1 A, dI_F/dt = 50 A/µs, V_R = 30 V		-	30	45	ns
		T_J = 25 °C	I_F = 30 A dI_F/dt = 200 A/µs V_R = 200 V	-	45	-	
		T_J = 125 °C		-	100	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	5.6	-	A
		T_J = 125 °C		-	10	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	127	-	nC
		T_J = 125 °C		-	580	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Maximum junction and storage temperature range	T_J, T_{Stg}		- 65	-	175	°C
Thermal resistance, junction to case	R_{thJC}		-	0.95	1.4	°C/W
Thermal resistance, junction to ambient	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 (5)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style D²PAK modified	ETU3006SH			
		Case style TO-262	ETU3006-1H			

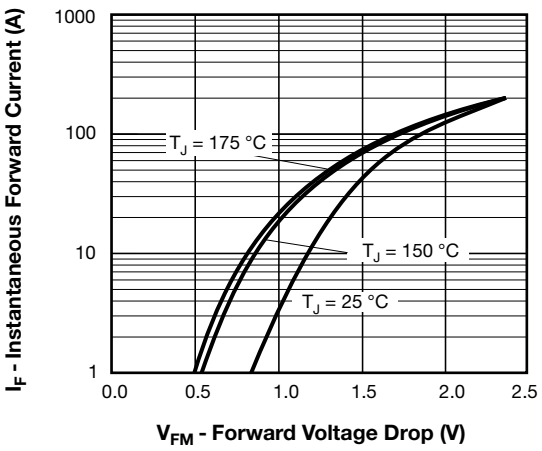


Fig. 1 - Typical Forward Voltage Drop Characteristics

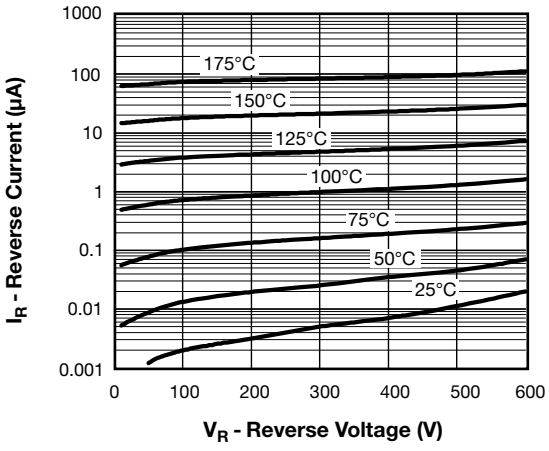


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

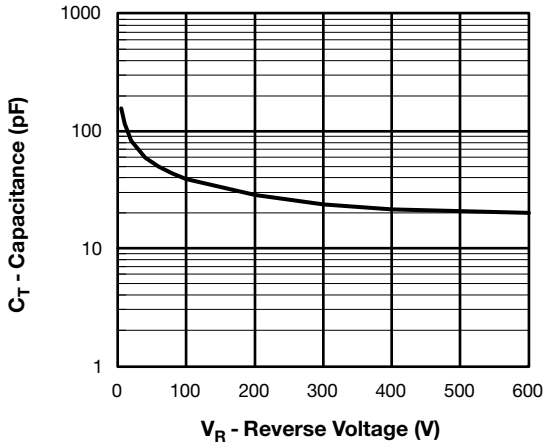


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

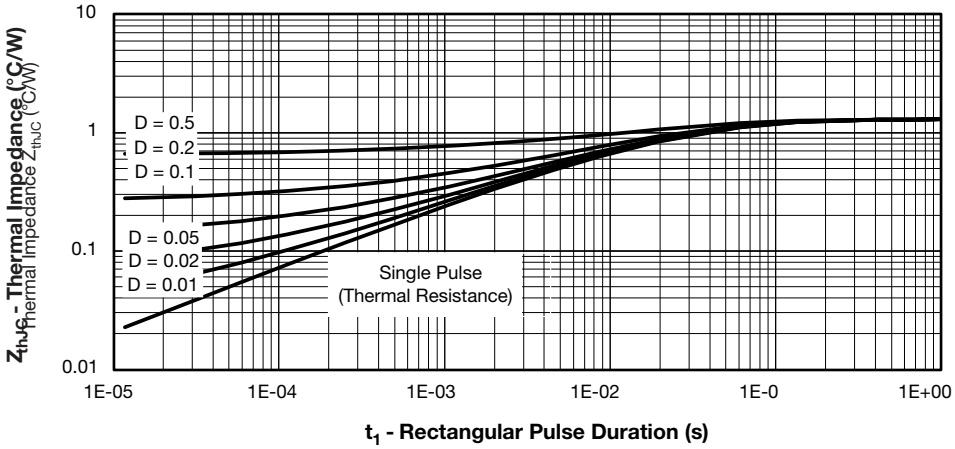


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

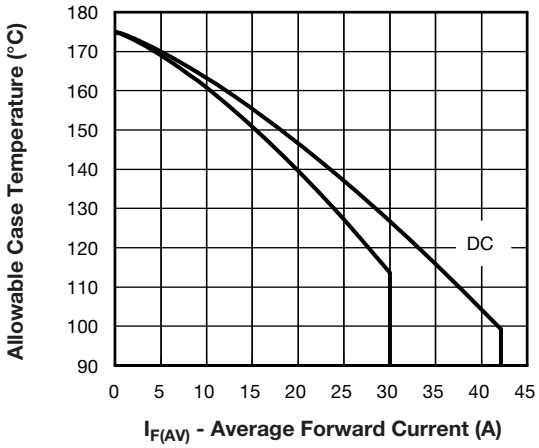


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

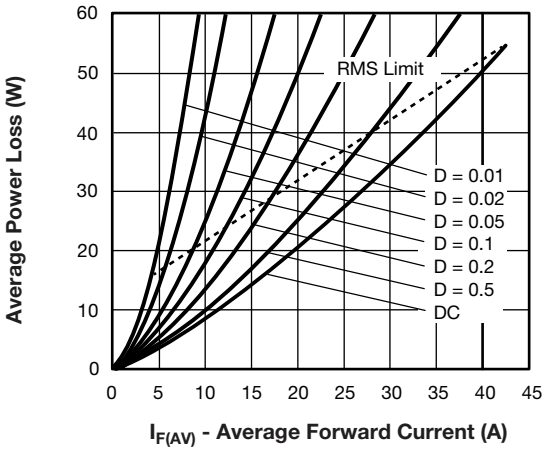


Fig. 6 - Forward Power Loss Characteristics

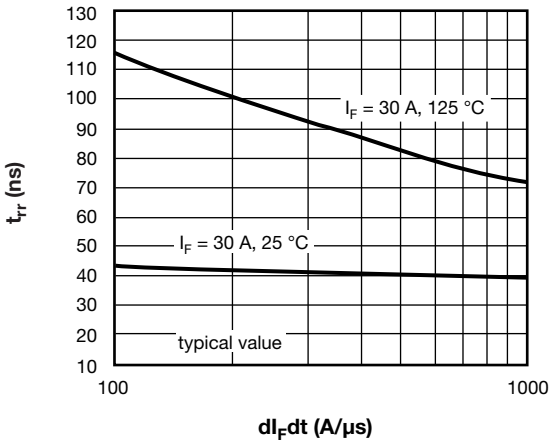


Fig. 7 - Typical Reverse Recovery vs. dI_F/dt

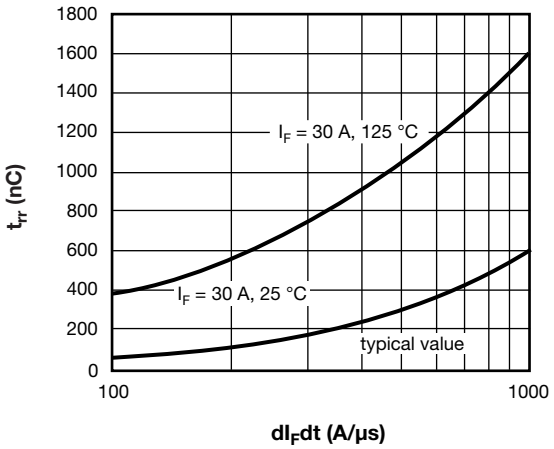


Fig. 8 - Typical Stored Charge vs. dI_F/dt

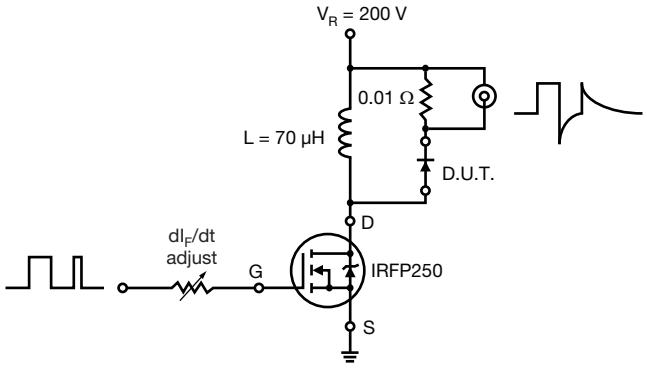
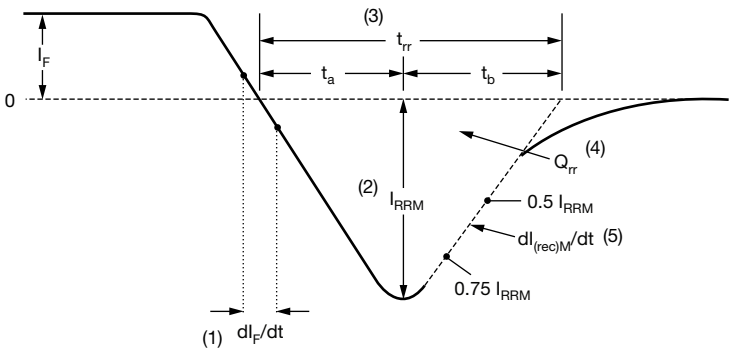


Fig. 9 - Reverse Recovery Parameter Test Circuit



(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}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) $dI_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 10 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code

VS-	E	T	U	30	06	S	TRL	H	M3
1	2	3	4	5	6	7	8	9	10

1 - Vishay Semiconductors product

2 - Circuit configuration
E = Single diode

3 - T = TO-220

4 - U = Ultrafast recovery time

5 - Current code (30 = 30 A)

6 - Voltage code (06 = 600 V)

7 - • S = D^2PAK

- • -1 = TO-262

8 - • None = Tube

- • TRL = Tape and reel (left oriented, for D^2PAK package)

- • TRR = Tape and reel (right oriented, for D^2PAK package)

9 - H = AEC-Q101 qualified

10 - Environmental digit:
-M3 = Halogen-free, RoHS compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)

PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-ETU3006SHM3	50	1000	Antistatic plastic tube
VS-ETU3006-1HM3	50	1000	Antistatic plastic tube
VS-ETU3006STRRHM3	800	800	13" diameter reel
VS-ETU3006STRLHM3	800	800	13" diameter reel

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-263AB (D^2PAK)	www.vishay.com/doc?95046
	TO-262AA	www.vishay.com/doc?95419
Part marking information	TO-263AB (D^2PAK)	www.vishay.com/doc?95444
	TO-262AA	www.vishay.com/doc?95443
Packaging information	TO-263AB (D^2PAK)	www.vishay.com/doc?95032

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