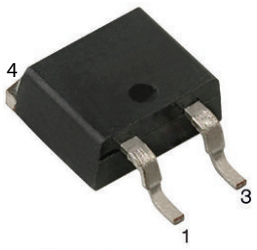
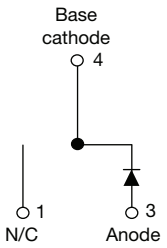
Ultrafast Rectifier, 30 A FRED Pt®



D²PAK 2L (TO-263AB 2L)



FEATURES

- Low forward voltage drop
- Ultrafast recovery time
- 175 °C operating junction temperature
- Low leakage current
- AEC-Q101 qualified, meets JESD 201 class 2 whisker test
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	30 A
V_R	600 V
V_F at I_F	0.9 V
t_{rr} (typ.)	110 ns
T_J max.	175 °C
Package	D²PAK 2L (TO-263AB 2L)
Circuit configuration	Single

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.

MECHANICAL DATA

Case: D²PAK 2L (TO-263AB 2L)
Molding compound meets UL 94 V-0 flammability rating

Terminals: matte tin plated leads, solderable per J-STD-002

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 = 125 °C	30	A
Non-repetitive peak surge current	I_{FSM}	T_C = 25 °C	280	
Operating junction and storage temperatures	T_J, T_{Stg}		-55 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	-	1.01	1.1	V
		I_F = 30 A, T_J = 150 °C	-	0.90	1.02	
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 = 100 A/µs, V_R = 30 V		-	110	-	
		T_J = 25 °C	I_F = 30 A dI_F/dt = 1000 A/µs V_R = 400 V	-	134	-	ns
		T_J = 125 °C		-	176	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	76	-	A
		T_J = 125 °C		-	94	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	6670	-	nC
		T_J = 125 °C		-	10 300	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		-55	-	175	°C
Thermal resistance, junction-to-case	R_{thJC}		-	0.95	1.2	°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.
Marking device		Case style D^2PAK 2L (TO-263AB 2L)	ETL3006SH			

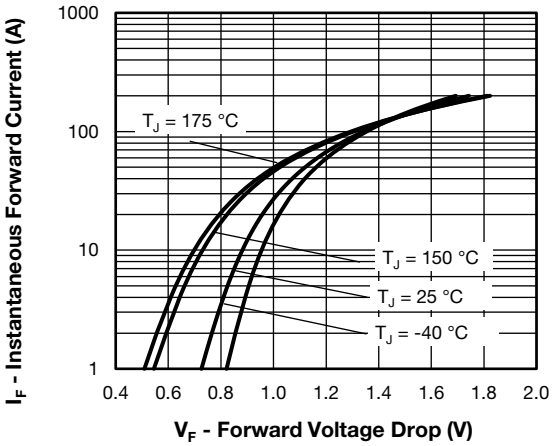


Fig. 1 - Typical Forward Voltage Drop Characteristics

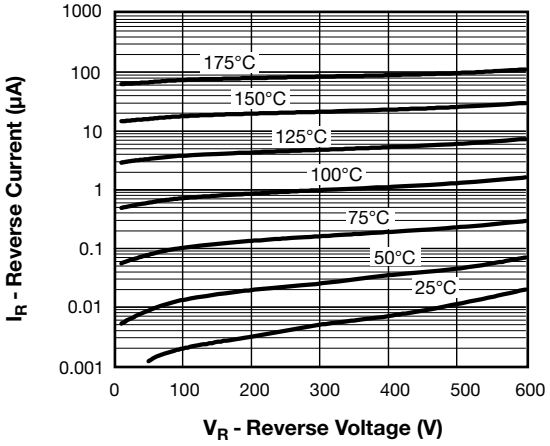


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

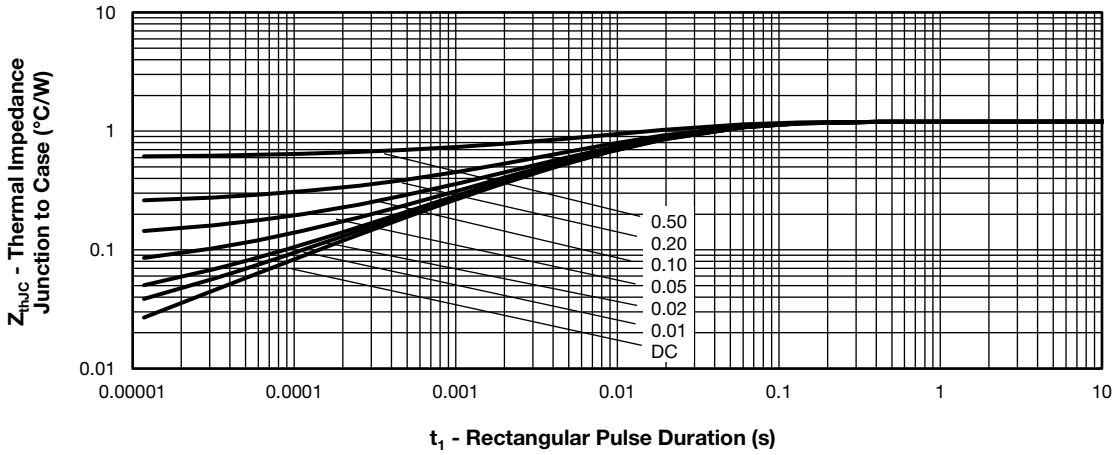


Fig. 3 - Maximum Thermal Impedance Z_{thJC} Characteristics

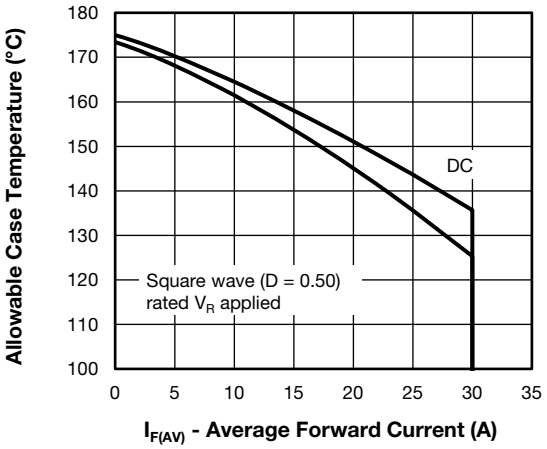


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

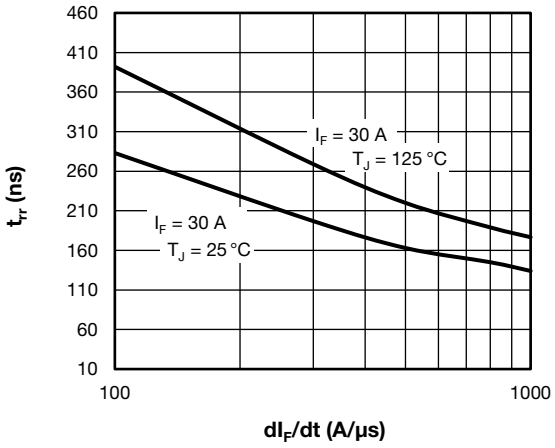


Fig. 6 - Typical Reverse Recovery Time vs. dI_F/dt

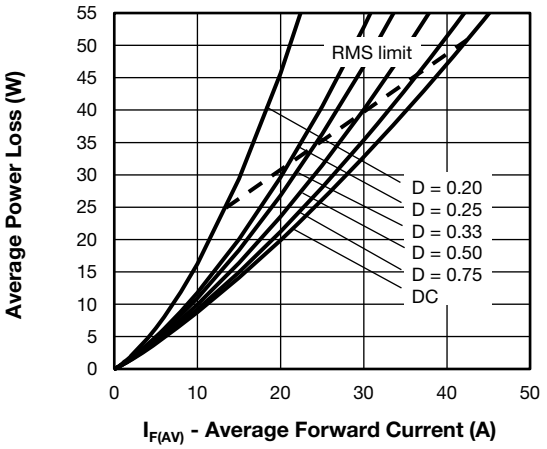


Fig. 5 - Forward Power Loss Characteristics

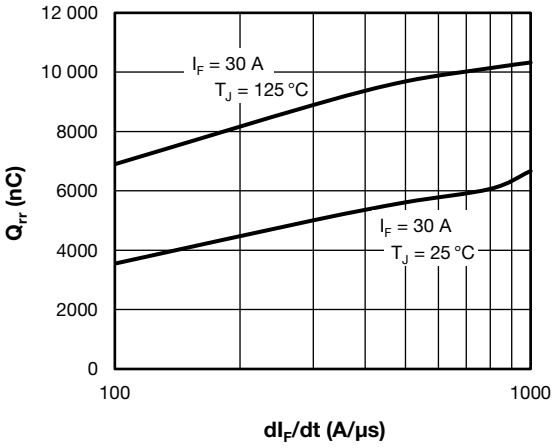


Fig. 7 - Typical Stored Charge vs. dI_F/dt

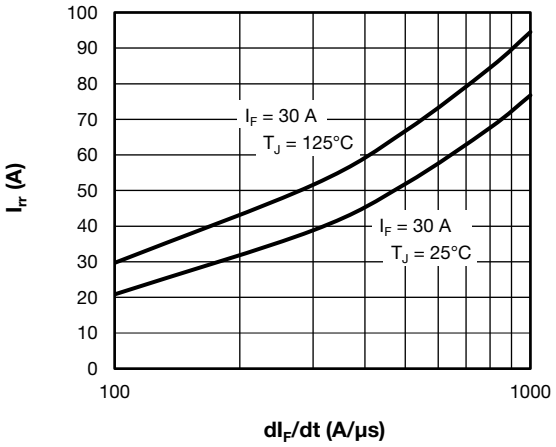
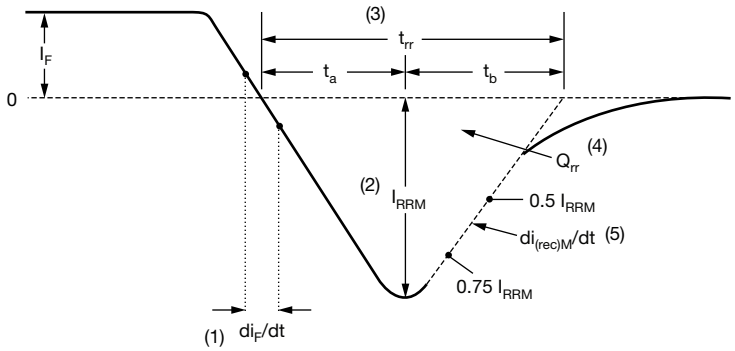


Fig. 8 - Typical Reverse Recovery Current vs. dI_F/dt



(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}

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

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

Fig. 9 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code

VS-	E	T	L	30	06	S2	L	H	M3
1	2	3	4	5	6	7	8	9	10

1 - Vishay Semiconductors product

2 - Circuit configuration
E = single

3 - T = D^2PAK (TO-262) package

4 - L = ultrafast recovery time

5 - Current code (30 = 30 A)

6 - Voltage code (06 = 600 V)

7 - S2 = true 2 pin D^2PAK

8 - • None = tube

- • L = tape and reel (left oriented, for D^2PAK package)
If needed different orientation/packaging, please contact factory

9 - H = AEC-Q101 qualified

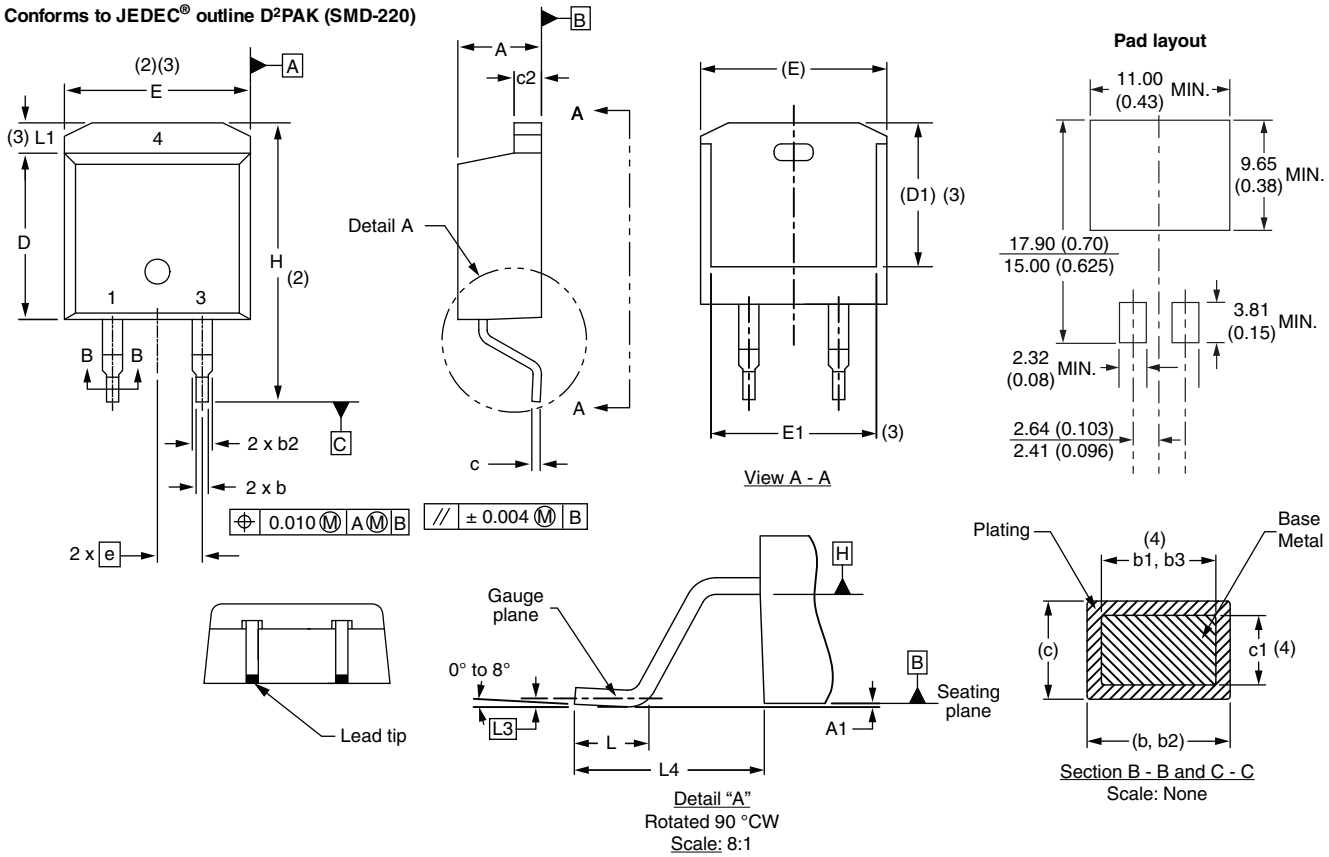
10 - Environmental digit:
M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)		
PREFERRED P/N	**BASE QUANTITY**	**PACKAGING DESCRIPTION**
VS-ETL3006S2LHM3	800	13" diameter reel

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96683
Part marking information	www.vishay.com/doc?96693
Packaging information	www.vishay.com/doc?95032

D²PAK 2L (TO-263AB 2L)

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	0.00	0.254	0.000	0.010	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
H	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	-	1.65	-	0.066	3
L3	0.25 BSC		0.010 BSC		
L4	4.78	5.28	0.188	0.208	

Notes

(1) Dimensioning and tolerancing per ASME Y14.5 M-1994

(2) 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 outmost extremes of the plastic body

(3) Thermal pad contour optional within dimension E, L1, D1 and E1

(4) Dimension b1 and c1 apply to base metal only

(5) Datum A and B to be determined at datum plane H

(6) Controlling dimension: inch

(7) Outline conforms to JEDEC® outline TO-263AB

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