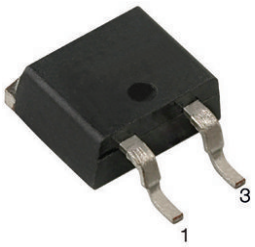
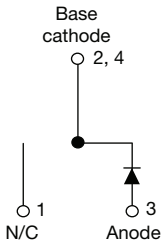
Ultrafast Rectifier, 20 A FRED Pt®



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

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	20 A
V_R	600 V
V_F at I_F	1.2 V
t_{rr} (typ.)	ns
T_J max.	175 °C
Package	D²PAK 2L (TO-263AB 2L)
Circuit configuration	Single

DESCRIPTION

State of the art, 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 switching applications

APPLICATIONS

AC/DC SMPS 70 W to 400 W
e.g. laptop and printer AC adapters, 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 = 129 °C	20	A
Non-repetitive peak surge current	I_{FSM}	T_C = 25 °C	180	
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 = 20 A	-	1.35	1.7	V
		I_F = 20 A, T_J = 150 °C	-	1.2	1.4	
Reverse leakage current	I_R	V_R = V_R rated	-	0.02	5	µA
		T_J = 150 °C, V_R = V_R rated	-	20	200	
Junction capacitance	C_T	V_R = 600 V	-	12	-	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		-	26	-	ns
		T_J = 25 °C	I_F = 20 A dI_F/dt = 200 A/μs V_R = 390 V	-	42	-	
		T_J = 125 °C		-	89	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	4.9	-	A
		T_J = 125 °C		-	8.4	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	110	-	C
		T_J = 125 °C		-	440	-	

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}		-	-	1.51	°C/W
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	70	
Thermal resistance, case to heat sink	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 2L (TO-263AB 2L)	ETU2006SH			

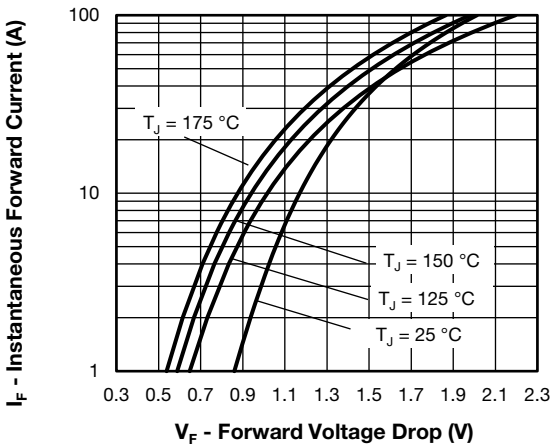


Fig. 1 - Typical Forward Voltage Drop Characteristics

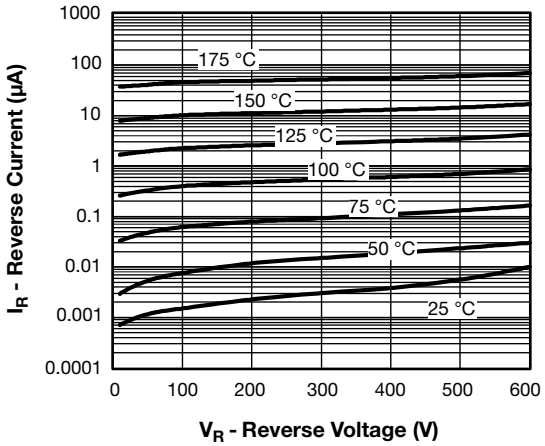


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

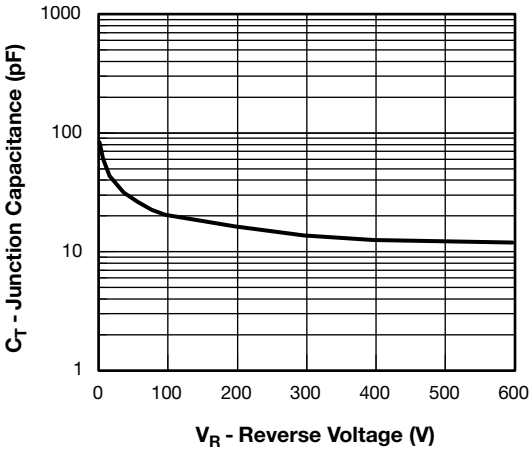


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

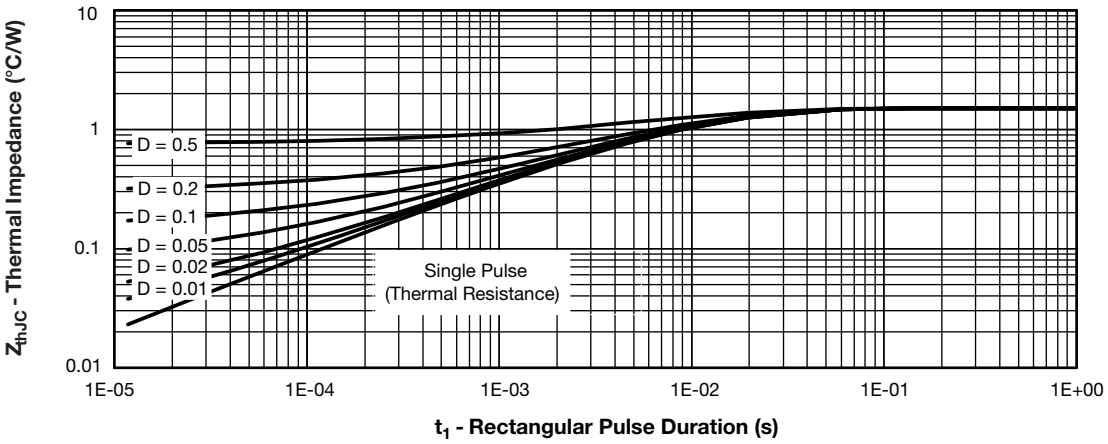


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

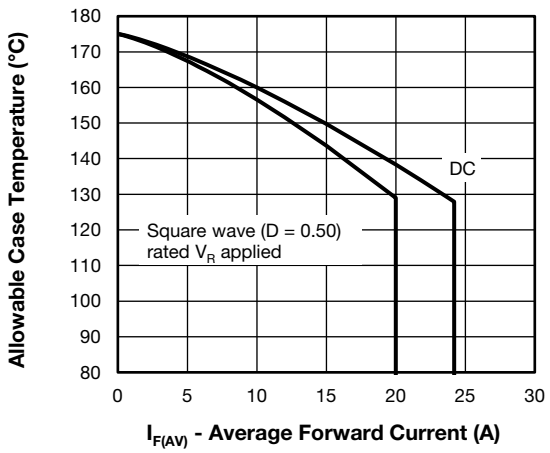


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

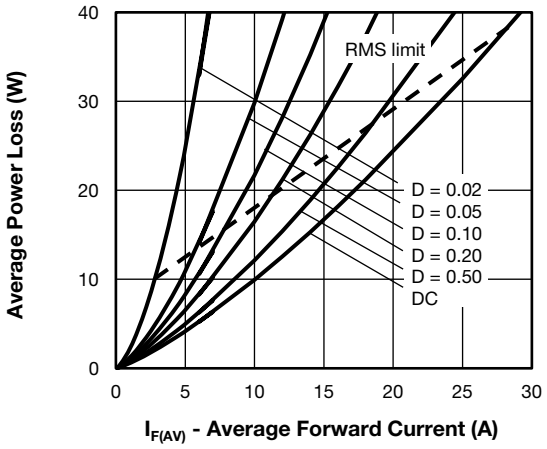


Fig. 6 - Forward Power Loss Characteristics

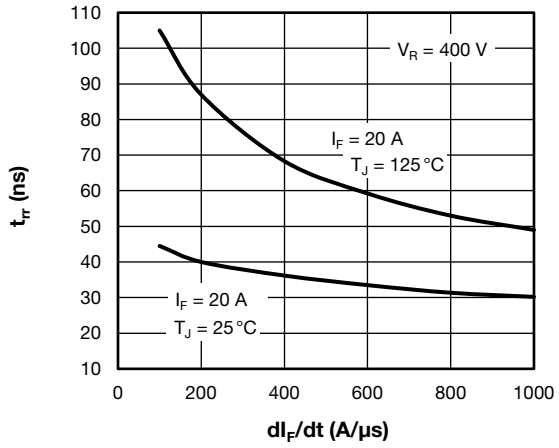


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

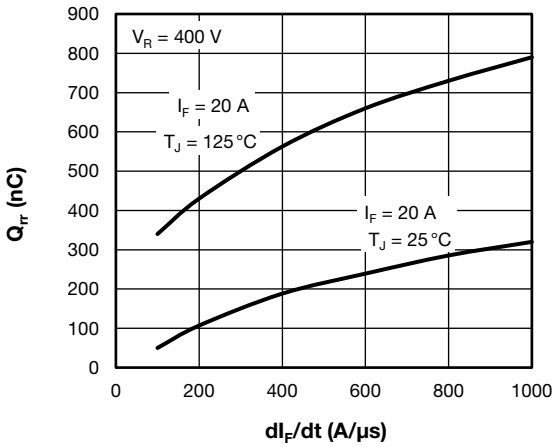
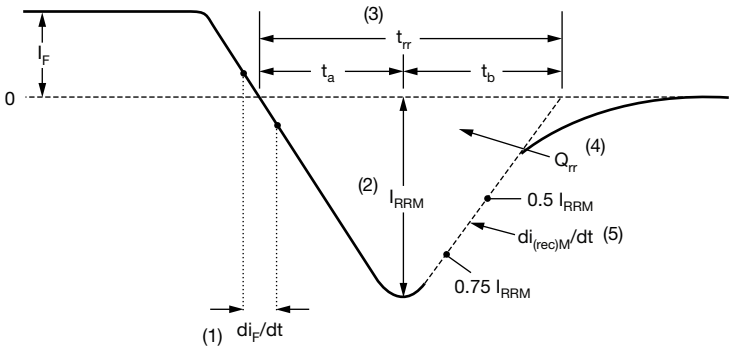


Fig. 8 - Typical Stored Charge vs. dI_F/dt



(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}

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

(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	U	20	06	S2	L	H	M3
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

- 1 - Vishay Semiconductors product
- 2 - Circuit configuration
  E = single diode
- 3 - T = D^2PAK (TO-263) package
- 4 - U = ultrafast recovery time
- 5 - Current code (20 = 20 A)
- 6 - Voltage code (06 = 600 V)
- 7 - • S2 = true 2 pin D^2PAK
- 8 - • None = tube (50 pieces)
- - • 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 termination lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER TUBE**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-ETU2006S2LHM3	800	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

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